

**REPORT NUMBER KAR22001-03**

**NEW CAR ASSESSMENT PROGRAM  
FRONTAL BARRIER IMPACT TEST**

**TOYOTA MOTOR MANUFACTURING  
2003 TOYOTA MATRIX  
4-DOOR WAGON**

**NHTSA NUMBER: M35105**

**PREPARED BY:  
KARCO ENGINEERING, LLC  
9270 HOLLY ROAD  
ADELANTO, CALIFORNIA 92301**



**APRIL 22, 2002**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
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OFFICE OF CRASHWORTHINESS STANDARDS  
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## Technical Report Documentation Page

| <b>1. Report No.</b><br>KAR21001-16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>2. Government Accession No.</b> | <b>3. Recipients Catalog No.</b>                                                                                                                                                                                     |                  |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
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| <b>4. Title and Subtitle</b><br>Final Report of New Car Assessment Program Testing of a<br>2003 Toyota Matrix 4 Door Wagon<br>NHTSA No. M35105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    | <b>5. Report Date</b><br>April 22, 2002                                                                                                                                                                              |                  |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
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| <b>9. Performing Organization Name and Address</b><br>KARCO Engineering, LLC<br>9270 Holly Road<br>Adelanto, CA 92301                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                    | <b>11. Contract or Grant No.</b><br>DTNH22-01-D-02005                                                                                                                                                                |                  |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
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| <b>12. Sponsoring Agency Name and Address</b><br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Safety Performance Standards<br>Office of Crashworthiness Standards<br>Mail Code: NPS-10<br>400 Seventh Street, SW, Room 5313<br>Washington, D.C. 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                    | <b>14. Sponsoring Agency Code</b><br>DOT/NHTSA/NRM/OCS                                                                                                                                                               |                  |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
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| <b>16. Abstract</b><br><p>A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2003 Toyota Matrix 4 Door Wagon at KARCO Engineering, LLC on 04/09/02. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 55.94 km/h. The ambient temperature at the barrier face at the time of impact is 27.8 degrees Celcius. The vehicle's maximum post test static crush is 534 mm at the vehile centerline. The test vehicle is equipped with a 3-point continuous belt system and second generation supplemental airbags in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Measurement Description</th> <th style="width: 15%;">Units</th> <th style="width: 15%;">Threshold</th> <th style="width: 15%;">Driver ATD</th> <th style="width: 20%;">Passenger ATD</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>391.9</td> <td>342.7</td> </tr> <tr> <td>Max. Thorax Accel. (3 msec Clip)</td> <td>G's</td> <td>60</td> <td>41.6</td> <td>44.3</td> </tr> <tr> <td>Left Femur force</td> <td>Newtons</td> <td>10009</td> <td>-1483.9</td> <td>-2912.5</td> </tr> <tr> <td>Right Femur Force</td> <td>Newtons</td> <td>10009</td> <td>-1984.7</td> <td>-169.6</td> </tr> </tbody> </table> |                                    |                                                                                                                                                                                                                      |                  | Measurement Description | Units | Threshold | Driver ATD | Passenger ATD | Head Injury Criteria (HIC) | N/A | 1000 | 391.9 | 342.7 | Max. Thorax Accel. (3 msec Clip) | G's | 60 | 41.6 | 44.3 | Left Femur force | Newtons | 10009 | -1483.9 | -2912.5 | Right Femur Force | Newtons | 10009 | -1984.7 | -169.6 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Units                              | Threshold                                                                                                                                                                                                            | Driver ATD       | Passenger ATD           |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
| Head Injury Criteria (HIC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                | 1000                                                                                                                                                                                                                 | 391.9            | 342.7                   |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
| Max. Thorax Accel. (3 msec Clip)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | G's                                | 60                                                                                                                                                                                                                   | 41.6             | 44.3                    |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
| Left Femur force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Newtons                            | 10009                                                                                                                                                                                                                | -1483.9          | -2912.5                 |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
| Right Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Newtons                            | 10009                                                                                                                                                                                                                | -1984.7          | -169.6                  |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
| <b>17. Key Words</b><br>56.3 km/h NCAP Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>2003 Toyota Matrix 4 Door Wagon<br>NHTSA No. M35105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    | <b>18. Distribution Statement</b><br>Copies of this report available from:<br>NHTSA Technical Reference Division<br>National Highway Traffic Safety Admin.<br>400 Seventh St., SW, Room 5108<br>Washington, DC 20590 |                  |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |
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| <b>20. Security Classification(this page)</b><br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                    | <b>21. No. of Pages</b><br>349                                                                                                                                                                                       | <b>22. Price</b> |                         |       |           |            |               |                            |     |      |       |       |                                  |     |    |      |      |                  |         |       |         |         |                   |         |       |         |        |

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## **SECTION 1**

### **PURPOSE AND SUMMARY OF TEST M35105**

#### **1.1 PURPOSE**

This 35 mph (56.3 km/h) frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-02005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph (48.3 km/h) requirements.

The 35 mph (56.3 km/h) frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Test procedure.

#### **1.2 SUMMARY**

A load cell barrier consisting of 24 load cells was impacted by a 2003 Toyota Matrix 4 Door Wagon at a velocity of 55.94 km/h. The test was performed at Karco Engineering, LLC on April 9, 2002. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50<sup>th</sup> percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with nine accelerometer array head, chest and pelvis triaxial accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also placed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 34) and the right-front passenger (position 2) ATD (Serial No. 35) were calibrated for this test.

One Hundred and Fifteen (115) channels of data were recorded using an on-board data acquisition system. Appendix B contains the vehicle and dummy response data traces. Appendix C contains Load Cell Barrier information. Appendix D contains the Instrumentation Data Channel assignments. Appendix E contains the Dummy Calibration data and Appendix F contains the owner's manual instructions for the occupant and restraint systems. Appendix G contains the Nine Accelerometer Head Array Data.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the impact event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 534mm at the vehicle centerline. Both the driver and the passenger side doors remained closed during the impact event and were operable without the aid of tools after the impact.

The driver's visible contact points were as follows: The driver ATD head contacted the airbag, its chest contacted the airbag, and both knees contacted the steering column and dash. No contact incurred for abdomen

The passenger's visible contact points were as follows: The passenger ATD head contacted the airbag. The chest contacted the airbag. Both knees contacted the glove box and dash. No contact incurred for abdomen.

Occupant injury data is contained in table below.

| OCCUPANT DATA SUMMARY |       |          |                 |                |                 |                 |
|-----------------------|-------|----------|-----------------|----------------|-----------------|-----------------|
| ATD Position          | HIC   | Clip (g) | Chest Disp (mm) | Left Femur (N) | Right Femur (N) | Belt Spool (mm) |
| Driver                | 391.9 | 41.6     | -24.9           | -1483.9        | -1984.7         | 162.3           |
| Passenger             | 342.7 | 44.3     | -25.7           | -2912.5        | -169.6          | 206.6           |

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 04/09/02

**CONVERSION FACTORS USED IN THIS REPORT\***

| Quantity           | Typical Application | Std Units           | Metric Unit | Multiply By         |
|--------------------|---------------------|---------------------|-------------|---------------------|
| Mass               | Vehicle Weight      | lb                  | kg          | 0.4536              |
| Linear Velocity    | Impact Velocity     | mile/h              | km/h        | 1.609               |
| Length or Distance | Measurements        | in                  | mm          | 25.4                |
| Volume             | Fuel Systems        | gal                 | liter       | 3.785               |
| Volume             | Small Fluids        | oz                  | mL          | 29.573              |
| Pressure           | Tire Pressures      | lbf/in <sup>2</sup> | kPa         | 7.0                 |
| Volume             | Liquid              | gal                 | liter       | 3.785               |
| Temperature        | General Use         | °F                  | °C          | $= (tf - 32) / 1.8$ |
| Force              | Dynamic Forces      | lbf                 | N           | 4.448               |
| Moment             | Torque              | lbf/ft              | Nm          | 1.355               |

\* Based on the Recommended Practice in SAE J916, May 85

**DATA SHEET NO. 1**  
**CRASH TEST SUMMARY**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02

**PRIMARY IMPACT DATA**

| Measured Parameter   | Units   | Value |
|----------------------|---------|-------|
| Velocity at Impact   | km/h    | 55.91 |
| Test Weight          | kg      | 2174  |
| Impact Angle         | degrees | 0     |
| Average Rebound      | mm      | 781   |
| Maximum Static Crush | mm      | 575   |

**DOOR OPENING AND SEAT TRACK INFORMATION**

| Description           | Driver                                                 | Passenger                                              |
|-----------------------|--------------------------------------------------------|--------------------------------------------------------|
| Front Door Opening    | Remained closed & latched, opened w/o the aid of tools | Remained closed & latched, opened w/o the aid of tools |
| Rear Door Opening     | Remained closed & latched, opened w/o the aid of tools | Remained closed & latched, opened w/o the aid of tools |
| Seat Track Shift (mm) | None                                                   | None                                                   |
| Seat Back Failure     | None                                                   | None                                                   |

**TEST DUMMY INFORMATION**

| Description             | Driver                       | Passenger                    |
|-------------------------|------------------------------|------------------------------|
| Dummy Type / Serial No. | 50% Male Hybrid III / No. 34 | 50% Male Hybrid III / No. 35 |
| Head Contact            | Airbag/Headrest              | Airbag/Headrest              |
| Chest Contact           | Airbag                       | Airbag                       |
| Abdomen Contact         | None                         | Airbag                       |
| Left Knee Contact       | Steering Column/Knee Bolster | Glove Box                    |
| Right Knee Contact      | Knee Bolster                 | Glove Box                    |

**16mm MOVIE COVERAGE**

|            |    |
|------------|----|
| High Speed | 16 |
| Real Time  | 1  |
| Total      | 17 |

**DATA CHANNELS**

|                                  |     |
|----------------------------------|-----|
| Driver ATD Sensors               | 49  |
| Passenger ATD Sensors            | 49  |
| Belt Assessment Sensors          | 8   |
| Vehicle Structure Accelerometers | 9   |
| Rigid Barrier Load Cells         | 24  |
| Total                            | 139 |

**DATA SHEET NO. 2**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**TEST VEHICLE INFORMATION**

|                         |                   |
|-------------------------|-------------------|
| Make                    | Honda             |
| Model                   | Pilot             |
| Body Style              | 4 Door SUV        |
| NHTSA No.               | HO5303            |
| VIN                     | 2T1KR32E63C019137 |
| Color                   | Aqua Blue         |
| Delivery Date           | 6/12/02           |
| Odometer Reading (mi.)  | 19                |
| Dealer                  | Valley Hi Toyota  |
| Transmission            | 5-Speed Manual    |
| Final Drive             | Rear              |
| Type/No. Cylinders      | In-Line 4         |
| Engine Displacement (L) | 3.5               |
| Engine Placement        | Transverse        |
| Front Seat Side Airbag  | Yes               |

**TEST VEHICLE OPTIONS**

|                     |     |
|---------------------|-----|
| Driver Front Airbag | Yes |
| Pass. Front Airbag  | Yes |
| Power Windows       | Yes |
| Pre-Tensioners      | Yes |
| Power Door Locks    | Yes |
| Tilt Wheel          | Yes |
| Air Conditioning    | Yes |
| Power Brakes        | Yes |
| Disc Brakes, Front  | Yes |
| Disc Brakes, Rear   | Yes |
| Anti-lock Brakes    | Yes |
| Head Airbag         | No  |
| Load Limiter        | Yes |
| Cruise Control      | Yes |
| Bucket Seats        | Yes |

**DATA FROM CERTIFICATION LABEL**

|                     |                 |                 |      |
|---------------------|-----------------|-----------------|------|
| Manufactured By     | Honda of Canada | GVWR (kg)       | 2699 |
| Date of Manufacture | May-02          | GAWR Front (kg) | 1300 |
|                     |                 | GAWR Rear (kg)  | 1431 |

**DATA FROM TIRE PLACARD**

| Measured Parameter       | Front      | Rear       |
|--------------------------|------------|------------|
| Max. Tire Pressure (kPa) | 225        | 225        |
| Cold Pressure (kPa)      | 225        | 225        |
| Recommend Tire Size      | P235/70R16 | P235/70R16 |
| Tire Size on Vehicle     | P235/70R16 | P235/70R16 |
| Tire Manufacturer        | Goodyear   | Goodyear   |

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

| Measured Parameter       | Front  | Rear  | Third | Total |
|--------------------------|--------|-------|-------|-------|
| Type of Seats            | Bucket | Bench | None  |       |
| Number of Occupants      | 2      | 3     | 3     | 8     |
| Capacity Wt. (VCW) (kg)  |        |       |       | 600   |
| Cargo Weight (RCLW) (kg) |        |       |       | 55    |

**DATA SHEET NO. 2...(CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered (UVW) |           |       | As Tested (ATW) |           |       |
|--------|-------|--------------------|-----------|-------|-----------------|-----------|-------|
|        |       | Front Axle         | Rear Axle | Total | Front Axle      | Rear Axle | Total |
| Left   | kg    | 352                | 262       |       | 391             | 320       |       |
| Right  | kg    | 353                | 250       |       | 397             | 302       |       |
| Ratio  | %     | 57.9               | 42.1      |       | 55.9            | 44.1      |       |
| Totals | kg    | 705                | 513       | 1217  | 788             | 622       | 1411  |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                      | Units | Value |
|-----------------------------------------|-------|-------|
| Total Delivered Weight (UVW)            | kg    | 1217  |
| Weight of 2 P572 ATD's                  | kg    | 152   |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 50    |
| Calculated Vehicle Target Weight (TVTW) | kg    | 1419  |

**TEST VEHICLE ATTITUDE AND CG**

|              | Units | LF  | RF  | LR  | RR  | CG (aft of front axle) |
|--------------|-------|-----|-----|-----|-----|------------------------|
| As Delivered | mm    | 704 | 706 | 705 | 712 | 1100                   |
| As Tested    | mm    | 690 | 688 | 690 | 686 | 1152                   |

Vehicle Wheel base (mm): 2613

Weight of Ballast secured in cargo area (kg): 0

Vehicle Components Removed: \_\_\_\_\_

\* Ballast weight does not include cameras, instrumentation, and brake abort system.

**FUEL SYSTEM DATA**

Fuel System Capacity From Owner's Manual (L): 50.0

Usable Capacity Figure Furnished by COTR (L): 50.0

Actual Test Volume with entire fuel System Filled (L): 46.5

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.764

Kinematic Viscosity: as per ASTM Standard D484-71 ; Color: Red

Is Vehicle Fuel Pump Electric or Mechanical?: Electric

If electric, does pump operate with ignition switch "ON" & engine "OFF"? Yes

Fuel System Particulars: Driver side filler door, tank mounted at rear.

**DATA SHEET NO. 3  
POST IMPACT DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 04/09/02

| Measured Parameter              | Units | Requirement    | Value |
|---------------------------------|-------|----------------|-------|
| Trap No. 1 Velocity (Primary)   | km/h  | 55.51 to 57.12 | 55.94 |
| Trap No. 1 Entry Distance       | mm    | < 1524         | 1524  |
| Trap No. 1 Exit Distance        | mm    | < 1524         | 305   |
| Trap No. 2 Velocity (Redundant) | km/h  | 55.51 to 57.12 | 55.99 |
| Trap No. 2 Entry Distance       | mm    | < 1524         | 1524  |
| Trap No. 2 Exit Distance        | mm    | < 1524         | 305   |

**VEHICLE STATIC CRUSH**

| Measured Parameter | Units | Pre-Test | Post-Test | Difference |
|--------------------|-------|----------|-----------|------------|
| Left Side          | mm    | 4186     | 3806      | -380       |
| Center             | mm    | 4345     | 3811      | -534       |
| Right Side         | mm    | 4186     | 3805      | -381       |

**VEHICLE REBOUND FROM BARRIER**

| Measured Parameter | Units | Value |
|--------------------|-------|-------|
| Left Side          | mm    | 1437  |
| Center             | mm    | 1403  |
| Right Side         | mm    | 1400  |
| Average            | mm    | 1413  |

**DATA SHEET NO. 4**  
**TEST VEHICLE INFORMATION**

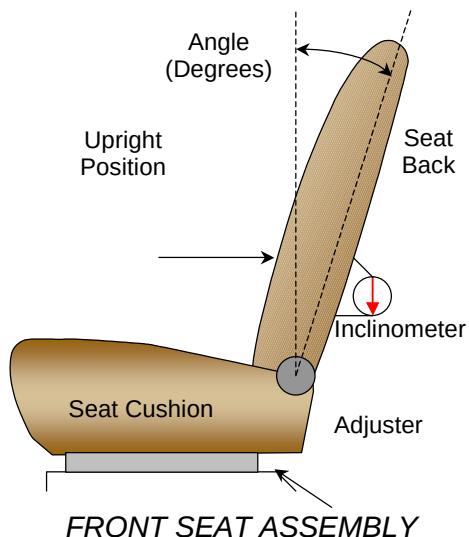
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02

**NOMINAL DESIGN RIDING POSITION**

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows: A special application tool with pointed probes is inserted through the fabric to make contact with the rigid portion of the lower seat frame assembly, approximately 13 inches above the pivot point of the seat back. An inclinometer is placed against the flat surface of the tool and the seat back angle is measured directly from the dial face.

Driver seat back angle: 14° with a seated dummy  
Passenger seat back angle: 14° with a seated dummy



**SEAT FORE/AFT POSITIONS**

Both driver and passenger seats have 17 positions or detents. The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for both driver and passenger.

Driver seat fore/aft total travel: 17 seating positions or detents  
Driver seat fore/aft position: 9th detent from forward most  
Passenger seat fore/aft total travel: 17 seating positions or detents  
Passenger seat fore/aft position: 9th detent from forward most

**SEAT BELT UPPER ANCHORAGE**

The test vehicle is equipped with adjustable anchorages for both driver and passenger seat positions. There are 5 positions or detents. Both the driver and the passenger anchorages are placed in the 1st position from the uppermost.



## DATA SHEET NO. 4...(CONTINUED)

### TEST VEHICLE INFORMATION

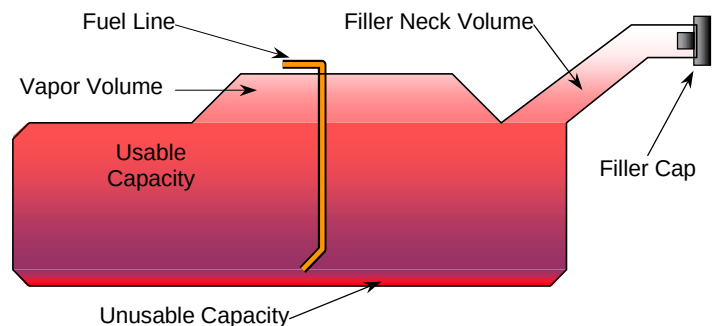
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02

### FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is: 50.0 liters  
The "Usable Capacity" of any optional equipment fuel tank is: N/A liters  
"Usable Capacity" used for certification tests FMVSS 301 requirements: 46.0 to 46.9 liters  
Actual amount of Stoddard solvent added to vehicle for certification test: 46.5 liters

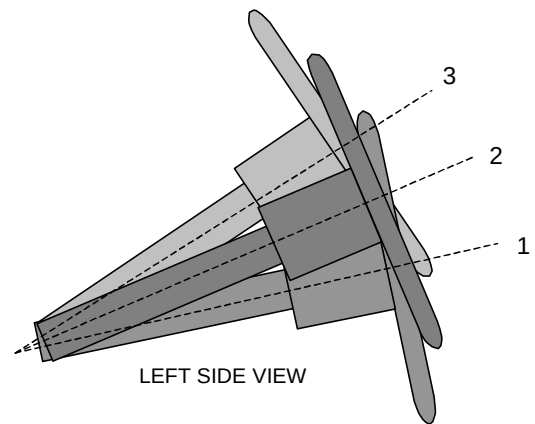
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat. Fuel lines run inside the right frame rail to the engine compartment.



VEHICLE FUEL TANK ASSEMBLY

### STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured. The steering column has three (3) positions or detents and is set in the second (2) detent as indicated by the diagram at right and the angle below.



STEERING COLUMN ASSEMBLY

Lowermost; position 1: 64°  
Geometric center; position 2: 61°  
Uppermost position 3: 60°

**DATA SHEET NO. 5**  
**DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02

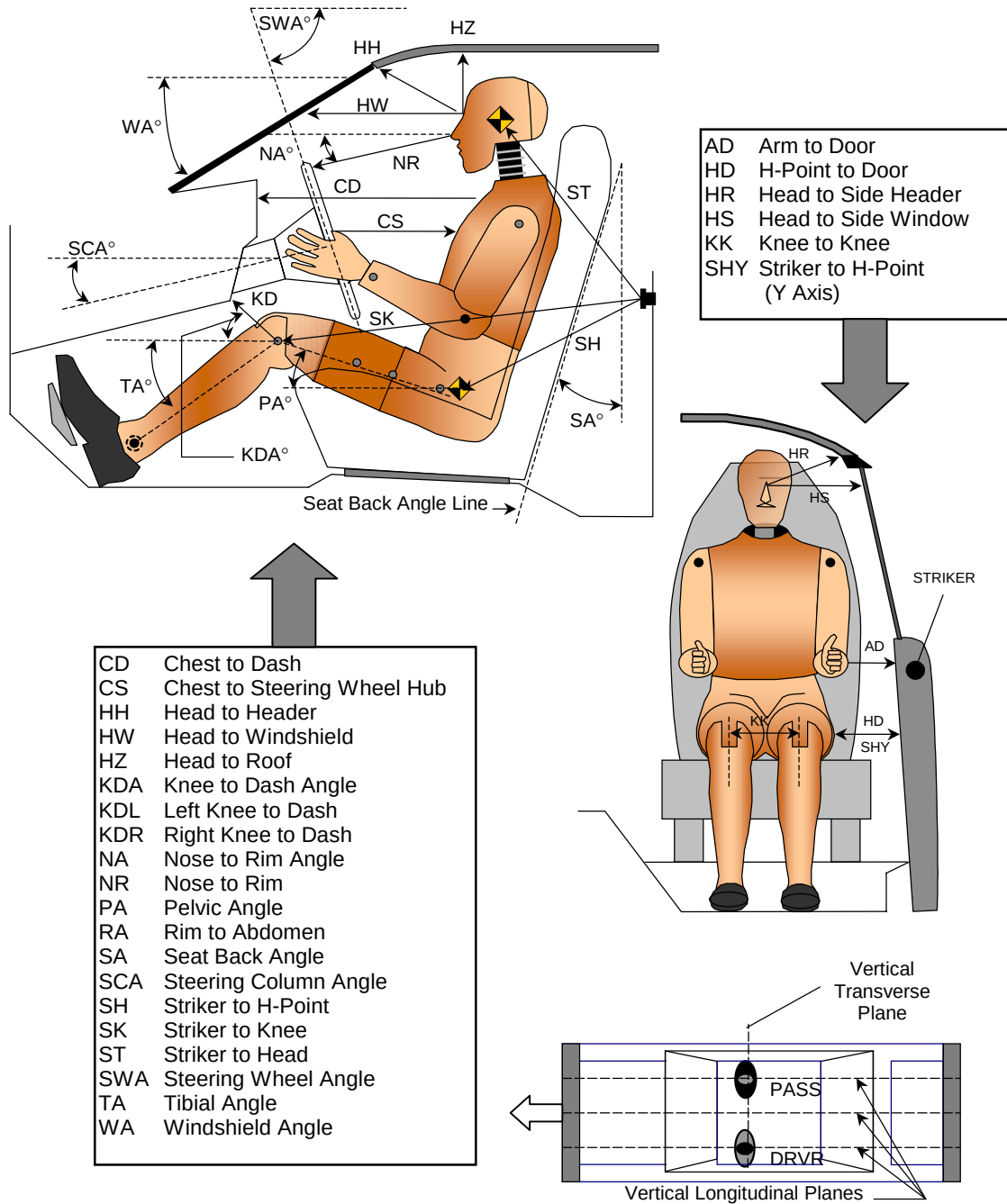
**TEST DUMMY POSITION MEASUREMENTS**

| Code | Measurement Description | Driver      |           | Passenger   |           |
|------|-------------------------|-------------|-----------|-------------|-----------|
|      |                         | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| WA   | Windshield Angle        |             | 30        |             |           |
| SWA  | Steering Wheel Angle    |             | 61        |             |           |
| SCA  | Steering Column Angle   |             | 29        |             |           |
| SA   | Seat Back Angle         |             | 14        |             | 14        |
| HZ   | Head to Roof (Z)        | 228         | 90        | 223         | 90        |
| HH   | Head to Header          | 304         |           | 315         |           |
| HW   | Head to Windshield      | 577         |           | 543         |           |
| HR   | Head to Side Header (Y) | 230         |           | 266         |           |
| NR   | Nose to Rim             | 398         | 20        |             |           |
| CD   | Chest to Dash           | 565         |           | 522         |           |
| CS   | Chest to Steering Hub   | 322         |           |             |           |
| RA   | Rim to Abdomen          | 175         |           |             |           |
| KDL  | Left Knee to Dash       | 135         | 25        | 128         |           |
| KDR  | Right Knee to Dash      | 115         |           | 147         | 33        |
| PA   | Pelvic Angle            |             | 24        |             | 21        |
| TA   | Tibia Angle             |             | 53        |             | 58        |
| KK   | Knee to Knee (Y)        | 260         |           | 275         |           |
| ST   | Striker to Head         | 618         | 9         | 606         | 21        |
| SK   | Striker to Knee         | 495         | 77        | 474         | 88        |
| SH   | Striker to H-Point      | 205         |           | 222         |           |
| SHY  | Striker to H-Point (Y)  | 222         |           | 231         |           |
| HS   | Head to Side Window     | 268         |           | 312         |           |
| HD   | H-Point to Door (Y)     | 145         |           | 136         |           |
| AD   | Arm to Door (Y)         | 95          |           | 23          |           |

# **DATA SHEET NO. 5...(CONTINUED)** **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

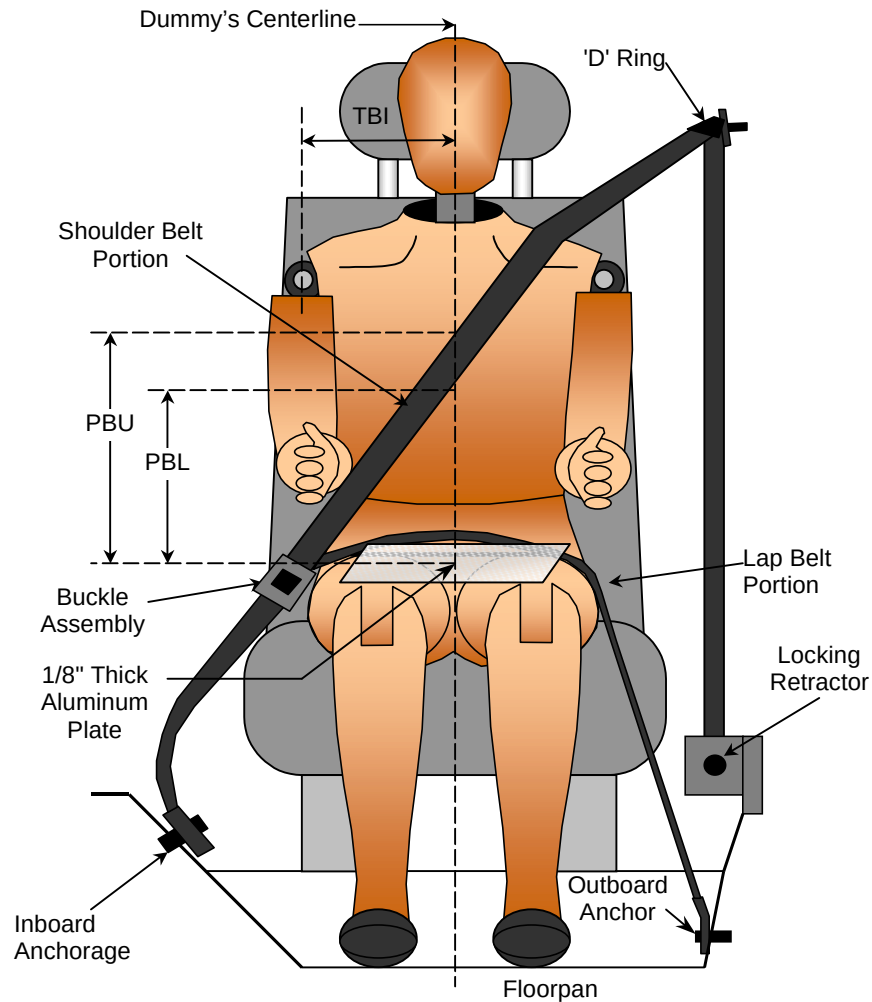


## **DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS**

**DATA SHEET NO. 6**  
**SEATBELT POSITIONING DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02



**SEAT BELT POSITIONING MEASUREMENTS**

| Measurement Description                           | Units    | Driver    | Passenger |
|---------------------------------------------------|----------|-----------|-----------|
| TBI - Dummy C/L to Lap/Shoulder Belt Intersect    | mm       | 260       | 248       |
| PBU - Top surface of reference to belt upper edge | mm       | 315       | 317       |
| PBL - Top surface of reference to belt lower edge | mm       | 250       | 231       |
| Lap Belt tension                                  | Newton's | 10        | 10        |
| Shoulder Belt tension                             | N/A      | Retractor | Retractor |

# DATA SHEET NO. 7 - VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 4/9/02

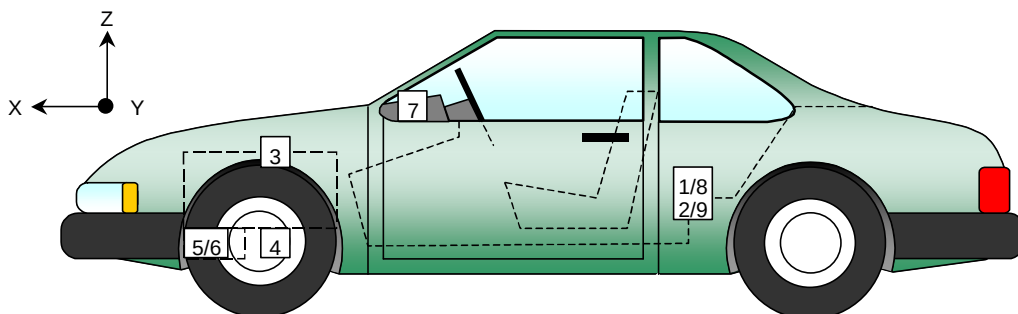
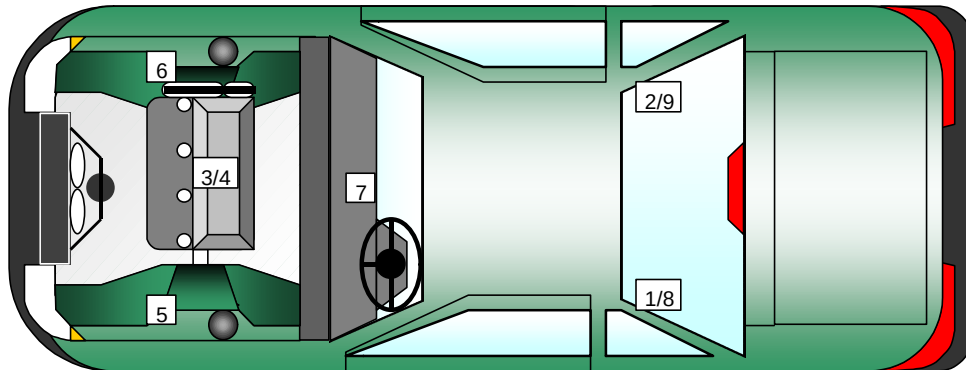
## VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

| No. | Accelerometer Location       | Measurements (mm) |       |      | Peak Values |       |       |        |        |
|-----|------------------------------|-------------------|-------|------|-------------|-------|-------|--------|--------|
|     |                              | X                 | Y     | Z    | Units       | Max   | Time  | Min    | Time   |
| 1   | Left Rear X-Member           | 1650              | -555  | 195  | G's         | 1.3   | 134.7 | -42.1  | 57.4   |
| 2   | Right Rear X-Member          | 1730              | 510   | 195  | G's         | 1.9   | 148.6 | -41.3  | 59.9   |
| 3   | Engine Top                   | 3500              | 85    | 810  | G's         | 111.7 | 48.5  | -148.3 | 33.3 * |
| 4   | Engine Bottom                | 3550              | 250   | 250  | G's         | 0.0   | 0.0   | 0.0    | 0.0 ** |
| 5   | Left Brake Caliper           | 3600              | -730  | 280  | G's         | 11.8  | 69.7  | -79.0  | 49.5 * |
| 6   | Right Brake Caliper          | 3600              | 730   | 280  | G's         | 17.4  | 68.3  | -100.2 | 36.0 * |
| 7   | Instrument Panel             | 2700              | -90   | 1040 | G's         | 14.2  | 86.1  | -83.4  | 55.6   |
| 8   | Left Rear X-Member (Z-Axis)  | 1650              | -.605 | 195  | G's         | 10.3  | 39.7  | -10.0  | 36.7   |
| 9   | Right Rear X-Member (Z-Axis) | 1730              | 345   | 195  | G's         | 22.5  | 19.5  | -20.6  | 14.4   |

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

\*\* Channel failed, no data

\* Channels failed at 85.3 msec.



# DATA SHEET NO. 8 - HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 4/9/02

## HEAD PRIMARY PEAK ACCELERATIONS

| Location          | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|-------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                   |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Head CG           | X    | G's   | 11.6   | 215.7 | -52.1 | 78.1 | 6.8       | 260.4 | -47.8 | 79.3  |
| Head CG           | Y    | G's   | 6.9    | 68.7  | -3.5  | 40.1 | 2.0       | 49.6  | -10.2 | 90.8  |
| Head CG           | Z    | G's   | 17.6   | 47.2  | -10.2 | 90.6 | 16.9      | 61.7  | -19.0 | 107.8 |
| Head CG Resultant | N/A  | G's   | 52.3   | 78.1  |       |      | 49.0      | 81.4  |       |       |

## CHEST PRIMARY PEAK ACCELERATIONS

| Location           | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|--------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                    |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Chest CG           | X    | G's   | 3.2    | 138.9 | -41.4 | 78.1 | 2.1       | 145.2 | -44.5 | 75.6  |
| Chest CG           | Y    | G's   | 3.8    | 99.5  | -4.4  | 34.0 | 2.2       | 50.2  | -11.3 | 75.0  |
| Chest CG           | Z    | G's   | 9.2    | 44.0  | -12.2 | 83.4 | 7.5       | 44.0  | -9.2  | 109.7 |
| Chest CG Resultant | N/A  | G's   | 42.8   | 78.2  |       |      | 45.8      | 75.5  |       |       |

## FEMUR PEAK FORCES

| Location    | Axis | Units   | Driver |      |         |      | Passenger |      |         |       |
|-------------|------|---------|--------|------|---------|------|-----------|------|---------|-------|
|             |      |         | Max    | Time | Min     | Time | Max       | Time | Min     | Time  |
| Left Femur  | Z    | Newtons | 634.7  | 40.5 | -1483.9 | 52.7 | 575.6     | 41.7 | -2912.5 | 66.6  |
| Right Femur | Z    | Newtons | 309.1  | 23.0 | -1984.7 | 52.3 | 2077.0    | 77.2 | -169.6  | 137.0 |

## SEAT BELT SENSOR PEAK VALUES

| Location              | Axis | Units   | Driver |      |       |      | Passenger |      |       |      |
|-----------------------|------|---------|--------|------|-------|------|-----------|------|-------|------|
|                       |      |         | Max    | Time | Min   | Time | Max       | Time | Min   | Time |
| Shoulder Belt Pullout | N/A  | MM      | 162.3  | 92.8 | -24.2 | 50.1 | 206.6     | 95.1 | -56.7 | 34.4 |
| Shoulder Belt Stretch | N/A  | MM/CM   | 0.00   | 0.0  | 0.00  | 0.0  | 0.00      | 0.0  | 0.00  | 0.0* |
| Lap Belt Force        | N/A  | Newtons | 9781.2 | 65.2 | -1.1  | 0.0  | 9608.5    | 68.2 | 2.6   | 0.0  |
| Shoulder Belt Force   | N/A  | Newtons | 5009.5 | 51.2 | -32.9 | 6.9  | 4265.7    | 48.7 | -39.2 | 6.7  |

\* Not used with pre-tensioner

## PRIMARY HEAD INJURY CRITERIA (HIC)

| Location        | Driver |                |                |       | Passenger |                |                |       |
|-----------------|--------|----------------|----------------|-------|-----------|----------------|----------------|-------|
|                 | HIC    | T <sup>1</sup> | T <sup>2</sup> | Avg G | HIC       | T <sup>1</sup> | T <sup>2</sup> | Avg G |
| Head CG Primary | 391.9  | 59.8           | 95.7           | 41.2  | 342.7     | 58.7           | 94.6           | 39.0  |

## PRIMARY CHEST CLIP (3MSEC)

| Location         | Driver |                |                | Passenger |                |                |
|------------------|--------|----------------|----------------|-----------|----------------|----------------|
|                  | CLIP   | T <sup>1</sup> | T <sup>2</sup> | CLIP      | T <sup>1</sup> | T <sup>2</sup> |
| Chest CG Primary | 41.6   | 77.3           | 80.3           | 44.3      | 73.7           | 76.7           |

# DATA SHEET NO. 8...(continued)

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 4/9/02

## PELVIC PEAK ACCELERATIONS

| Location         | Axis | Units | Driver |       |       |      | Passenger |      |       |      |
|------------------|------|-------|--------|-------|-------|------|-----------|------|-------|------|
|                  |      |       | Max    | Time  | Min   | Time | Max       | Time | Min   | Time |
| Pelvis           | X    | G's   | 10.0   | 95.2  | -45.6 | 52.5 | 7.5       | 99.8 | -46.0 | 65.8 |
| Pelvis           | Y    | G's   | 7.8    | 82.4  | -4.6  | 44.2 | 3.6       | 40.1 | -7.6  | 84.5 |
| Pelvis           | Z    | G's   | 2.4    | 298.2 | -30.2 | 76.6 | 3.2       | 25.5 | -25.9 | 86.1 |
| Pelvis Resultant | N/A  | G's   | 53.0   | 71.2  |       |      | 51.0      | 65.8 |       |      |

## UPPER NECK PEAK FORCES AND MOMENTS

| Location              | Axis | Units   | Driver |       |        |       | Passenger |       |        |       |
|-----------------------|------|---------|--------|-------|--------|-------|-----------|-------|--------|-------|
|                       |      |         | Max    | Time  | Min    | Time  | Max       | Time  | Min    | Time  |
| Neck Force            | X    | Newtons | 269.1  | 79.1  | -455.4 | 42.8  | 175.7     | 247.1 | -392.7 | 41.5  |
| Neck Force            | Y    | Newtons | 189.3  | 70.4  | -105.2 | 36.3  | 180.1     | 93.9  | -127.2 | 77.9  |
| Neck Force            | Z    | Newtons | 1395.2 | 68.9  | -329.4 | 247.2 | 808.2     | 67.9  | -677.1 | 108.0 |
| Neck Force Resultant  | N/A  | Newtons | 1410.0 | 68.9  |        |       | 817.4     | 50.9  |        |       |
| Neck Moment           | X    | N•m     | 3.7    | 206.9 | -16.2  | 73.0  | 18.5      | 106.1 | -11.5  | 133.8 |
| Neck Moment           | Y    | N•m     | 50.1   | 58.8  | -27.9  | 245.5 | 23.0      | 149.1 | -40.0  | 84.6  |
| Neck Moment           | Z    | N•m     | 3.6    | 129.1 | -7.7   | 74.6  | 22.5      | 107.1 | -6.7   | 165.9 |
| Neck Moment Resultant | N/A  | N•m     | 50.1   | 58.8  |        |       | 40.2      | 84.6  |        |       |

## FOOT PEAK ACCELERATIONS

| Location        | Axis | Units | Driver |       |        |      | Passenger |      |       |      |
|-----------------|------|-------|--------|-------|--------|------|-----------|------|-------|------|
|                 |      |       | Max    | Time  | Min    | Time | Max       | Time | Min   | Time |
| Left Foot Aft   | X    | G's   | 5.4    | 101.1 | -40.5  | 60.3 | 6.6       | 83.3 | -34.2 | 39.7 |
| Left Foot Aft   | Z    | G's   | 3.5    | 299.6 | -37.6  | 38.6 | 5.1       | 70.7 | -49.8 | 42.8 |
| Left Foot Fore  | Z    | G's   | 5.0    | 46.9  | -39.1  | 38.8 | 5.0       | 19.4 | -53.5 | 38.7 |
| Right Foot Aft  | X    | G's   | 6.2    | 96.2  | -95.2  | 46.3 | 3.9       | 73.1 | -55.5 | 60.4 |
| Right Foot Aft  | Z    | G's   | 3.1    | 116.2 | -119.6 | 45.8 | 3.6       | 14.6 | -30.1 | 36.7 |
| Right Foot Fore | Z    | G's   | 13.2   | 40.0  | -193.9 | 45.5 | 6.1       | 14.2 | -50.1 | 38.9 |

## UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

| Location           | Axis | Units   | Driver |       |         |      | Passenger |       |         |      |
|--------------------|------|---------|--------|-------|---------|------|-----------|-------|---------|------|
|                    |      |         | Max    | Time  | Min     | Time | Max       | Time  | Min     | Time |
| Left Upper Moment  | X    | N•m     | 20.9   | 115.0 | -30.6   | 76.1 | 46.9      | 75.0  | -9.6    | 36.9 |
| Left Upper Moment  | Y    | N•m     | 30.6   | 108.9 | -75.2   | 62.4 | 23.8      | 116.6 | -95.5   | 77.5 |
| Right Upper Moment | X    | N•m     | 33.9   | 43.7  | -40.6   | 81.2 | 7.9       | 21.5  | -20.9   | 58.9 |
| Right Upper Moment | Y    | N•m     | 21.0   | 106.0 | -168.5  | 47.1 | 11.3      | 202.6 | -157.0  | 77.4 |
| Left Lower Moment  | X    | N•m     | 28.0   | 65.5  | -8.2    | 37.0 | 15.7      | 75.9  | -2.2    | 27.2 |
| Left Lower Moment  | Y    | N•m     | 32.7   | 84.7  | -19.1   | 37.5 | 15.5      | 143.4 | -27.9   | 39.5 |
| Left Lower Force   | Z    | Newtons | 92.2   | 160.0 | -1235.3 | 84.9 | 141.5     | 216.8 | -2641.2 | 45.2 |
| Right Lower Moment | X    | N•m     | 14.1   | 41.0  | -75.3   | 45.5 | 4.3       | 20.8  | -10.3   | 77.1 |
| Right Lower Moment | Y    | N•m     | 42.5   | 99.9  | -53.5   | 47.3 | 14.3      | 125.7 | -47.6   | 59.7 |
| Right Lower Force  | Z    | Newtons | 171.9  | 241.1 | -3317.4 | 46.5 | 145.1     | 216.7 | -3288.6 | 77.1 |

**DATA SHEET NO. 8...(continued)**Test Vehicle: 2003 Toyota Matrix 4 Door WagonNHTSA No.: M35105Test Program: 2002 NHTSA 35mph NCAPTest Date: 4/9/02**CHEST PEAK DISPLACEMENTS**

| Location | Axis | Units | Driver |      |       |      | Passenger |      |       |      |
|----------|------|-------|--------|------|-------|------|-----------|------|-------|------|
|          |      |       | Max    | Time | Min   | Time | Max       | Time | Min   | Time |
| Chest CG | X    | MM    | 0.1    | 1.3  | -24.9 | 73.4 | 0.3       | 3.7  | -25.7 | 73.3 |

**HEAD REDUNDANT PEAK ACCELERATIONS**

| Location          | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|-------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                   |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Head CG           | X    | G's   | 12.5   | 214.8 | -52.5 | 75.7 | 6.9       | 260.4 | -47.8 | 78.8  |
| Head CG           | Y    | G's   | 6.7    | 67.9  | -3.3  | 39.2 | 2.4       | 263.9 | -10.5 | 89.4  |
| Head CG           | Z    | G's   | 17.6   | 47.6  | -11.8 | 91.9 | 17.1      | 61.7  | -17.4 | 107.7 |
| Head CG Resultant | N/A  | G's   | 53.0   | 75.7  |       |      | 48.9      | 81.1  |       |       |

**CHEST REDUNDANT PEAK ACCELERATIONS**

| Location           | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|--------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                    |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Chest CG           | X    | G's   | 3.0    | 138.9 | -42.6 | 72.1 | 2.4       | 144.7 | -44.4 | 75.5  |
| Chest CG           | Y    | G's   | 3.8    | 95.4  | -4.1  | 33.2 | 3.3       | 50.1  | -9.8  | 74.9  |
| Chest CG           | Z    | G's   | 8.9    | 43.9  | -12.5 | 83.4 | 7.9       | 43.9  | -8.7  | 110.5 |
| Chest CG Resultant | N/A  | G's   | 43.7   | 78.2  |       |      | 45.4      | 75.5  |       |       |

**REDUNDANT HEAD INJURY CRITERIA (HIC)**

| Location          | Driver |                |                |       | Passenger |                |                |       |
|-------------------|--------|----------------|----------------|-------|-----------|----------------|----------------|-------|
|                   | HIC    | T <sup>1</sup> | T <sup>2</sup> | Avg G | HIC       | T <sup>1</sup> | T <sup>2</sup> | Avg G |
| Head CG Redundant | 388.4  | 60.1           | 96.0           | 41.0  | 340.7     | 58.7           | 94.6           | 39.0  |

**REDUNDANT CHEST CLIP (3MSEC)**

| Location           | Driver |                |                | Passenger |                |                |
|--------------------|--------|----------------|----------------|-----------|----------------|----------------|
|                    | CLIP   | T <sup>1</sup> | T <sup>2</sup> | CLIP      | T <sup>1</sup> | T <sup>2</sup> |
| Chest CG Redundant | 42.6   | 77.3           | 80.3           | 44.0      | 72.4           | 75.4           |



**DATA SHEET NO. 9**  
**SEATBELT ASSESSMENT TEST DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**SEAT BELT PLACEMENT MEASUREMENTS**

| Measurement Description                           | Units    | Driver    | Passenger |
|---------------------------------------------------|----------|-----------|-----------|
| TBI - Dummy C/L to Lap/Shoulder Belt Intersect    | mm       | 260       | 248       |
| PBU - Top surface of reference to belt upper edge | mm       | 315       | 317       |
| PBL - Top surface of reference to belt lower edge | mm       | 250       | 231       |
| Lap Belt tension                                  | Newton's | 10        | 10        |
| Shoulder Belt tension                             | N/A      | Retractor | Retractor |

**BELT LENGTH DATA**

| Measurement Description                          | Units | Driver | Passenger |
|--------------------------------------------------|-------|--------|-----------|
| Retractor reel to 'D' ring                       | mm    | 752    | 752       |
| Shoulder belt length as measured on ATD          | mm    | 855    | 885       |
| Lap belt length as measured on ATD               | mm    | 940    | 928       |
| Remainder of belt on reel                        | mm    | 675    | 693       |
| Total belt length for continuous webbing systems | mm    | 3222   | 3258      |

**SHOULDER BELT SPOOL-OFF DATA**

| Measurement Description      | Units | Driver | Passenger |
|------------------------------|-------|--------|-----------|
| As determined mechanically   | mm    | 80.0   | 75.0      |
| As determined electronically | mm    | 162.3  | 206.6     |
| As determined by photography | mm    |        |           |

**BELT STRETCH DATA**

| Measurement Description                                     | Units | Driver | Passenger |
|-------------------------------------------------------------|-------|--------|-----------|
| Electronically between shoulder belt load cell and "D" ring | mm/cm | *      | *         |
| Mechanically                                                | mm/cm | None   | None      |

\*Not used with shoulder belt pre-tensioner systems.

**DATA SHEET NO. 10**  
**SUMMARY OF FMVSS 212 DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

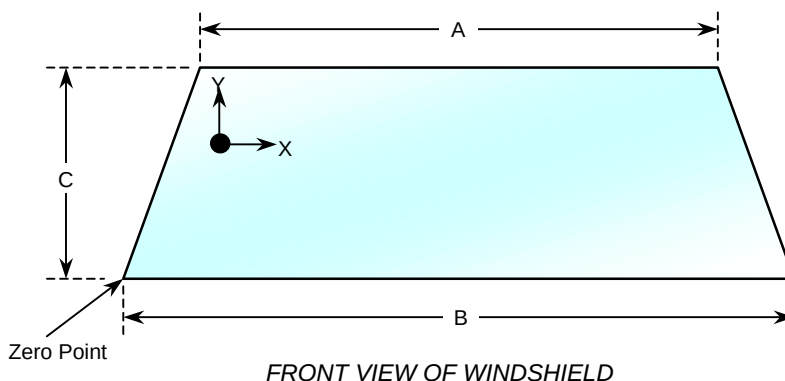
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the posttest retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles that are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.1 °C

**WINDSHIELD PERIPHERY MEASUREMENTS**

| Measurement | Pre-Test(mm) | Post-Test (mm) | % of Retention |
|-------------|--------------|----------------|----------------|
| Left Side   | 2090         | 2090           | 100            |
| Right Side  | 2090         | 2090           | 100            |
| Total       | 4180         | 4180           | 100            |



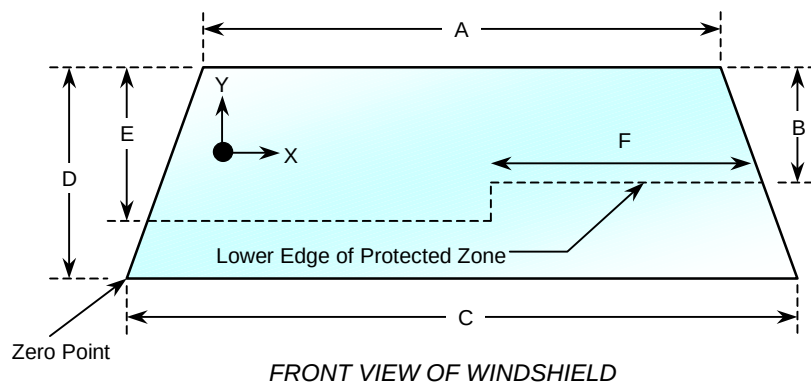
**WINDSHIELD DIMENSIONS**

| Item | Units | Segment Length | Molding Width |
|------|-------|----------------|---------------|
| A    | mm    | 1120           | 5             |
| B    | mm    | 1430           | 5             |
| C    | mm    | 815            | 5             |

**DATA SHEET NO. 11**  
**WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02



**WINDSHIELD AND  
PROTECTED ZONE**

| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 1120  |
| B    | mm    | 396   |
| C    | mm    | 1430  |
| D    | mm    | 815   |
| E    | mm    | 520   |
| F    | mm    | 677   |

**A OF PROTECTED ZONE FAILURES**

- A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one that is normally in contact with the windshield.

| X   | Y   |
|-----|-----|
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |

- B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

| X   | Y   |
|-----|-----|
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |

**DATA SHEET NO. 12**  
**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 04/09/02

Test Time: 12:01 P.M.

Temperature at Time of Impact 27.8 Deg C

**STODDARD SOLVENT SPILLAGE MEASUREMENTS**

A. From impact until vehicle motion ceases: 0.0 oz.  
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0.0 oz.  
(Maximum Allowable = 5 ounces)

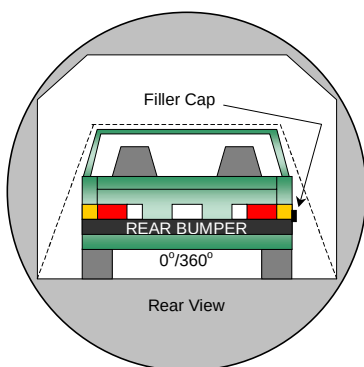
C. For the following 25 minutes: 0.0 oz.  
(Maximum Allowable = 1 oz./minute)

D. Spillage Location Details: No leakage occurred

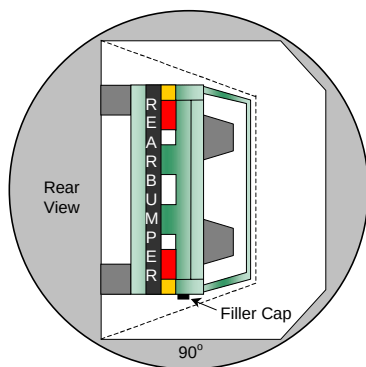
**DATA SHEET NO. 13**  
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

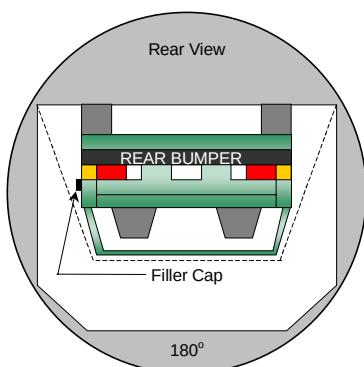
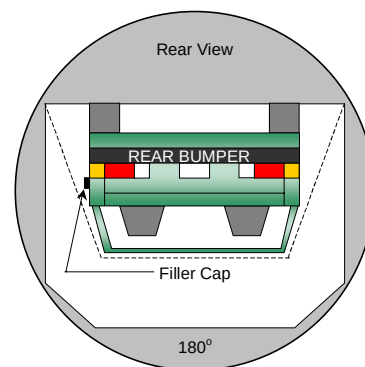
NHTSA No.: M35105  
 Test Date: 04/09/02



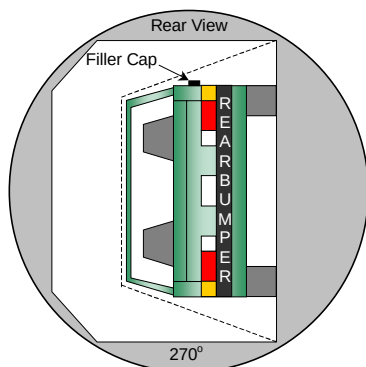
**0° to 90°**



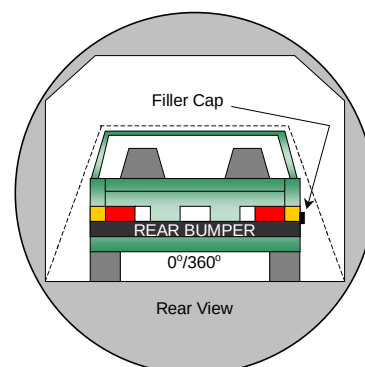
**90° to 180°**



**180° to 270°**



**270° to 360°**



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

| Test Phase   | Rotation Time (sec.) | Hold Time (sec.) | Spillage (oz.) |
|--------------|----------------------|------------------|----------------|
| 0° to 90°    | 82                   | 300              | 0              |
| 90° to 180°  | 83                   | 300              | 0              |
| 180° to 270° | 75                   | 300              | 0              |
| 270° to 360° | 82                   | 300              | 0              |

**DATA SHEET NO. 14**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

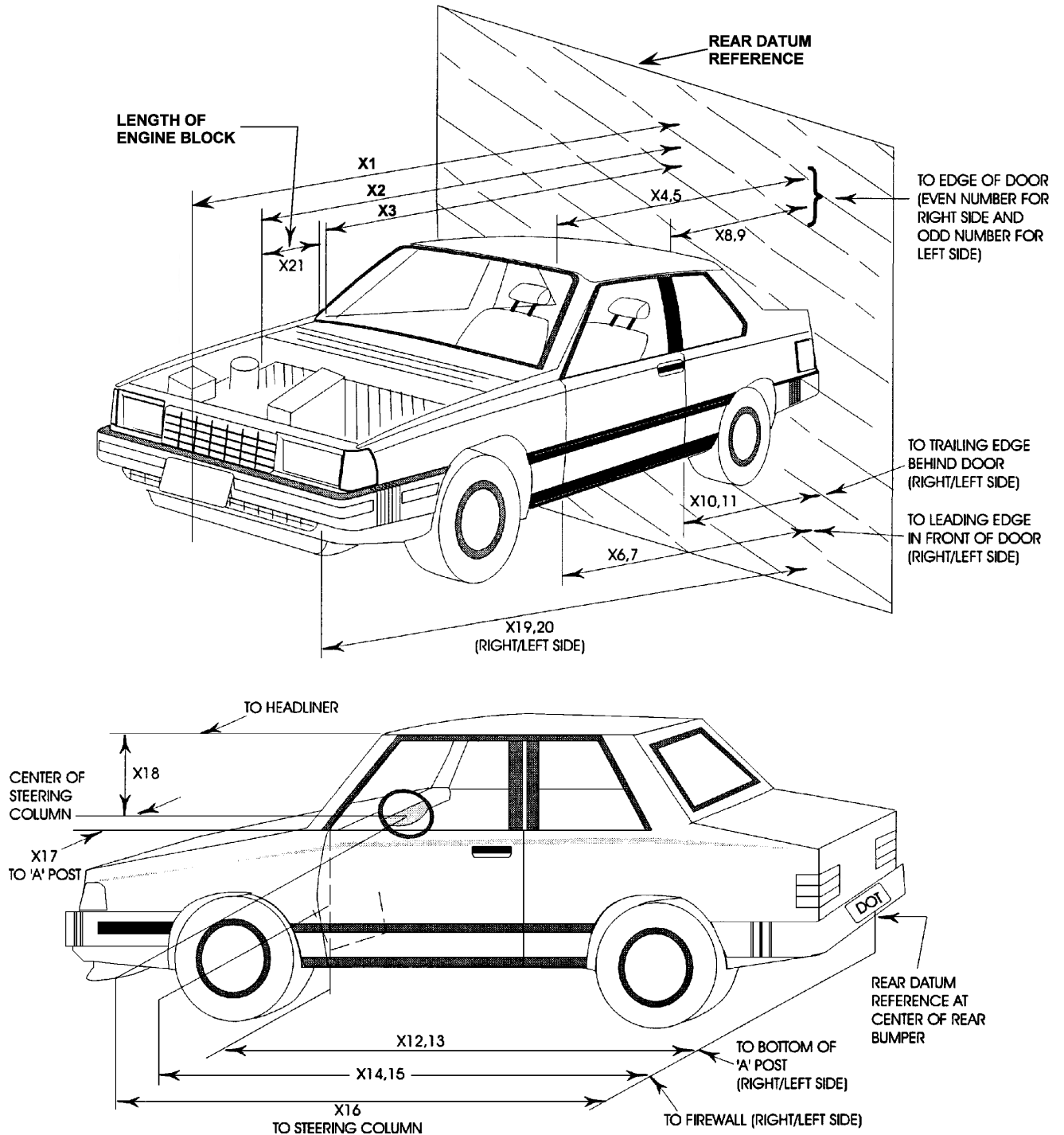
NHTSA No.: M35105  
Test Date: 04/09/02

| No. | Measurement Description                      | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------------------------|-------|----------|-----------|------------|
| 1   | Total length of vehicle at centerline        | mm    | 4345     | 3811      | -534       |
| 2   | RSOV to front of engine                      | mm    | 3678     | 3619      | -59        |
| 3   | RSOV to firewall centerline                  | mm    | 3393     | 3370      | -23        |
| 4   | RSOV to leading edge of right door           | mm    | 2994     | 3003      | 9          |
| 5   | RSOV to leading edge of left door            | mm    | 2988     | 3004      | 16         |
| 6   | RSOV to lower leading edge of right door     | mm    | 2922     | 2920      | -2         |
| 7   | RSOV to lower leading edge of left door      | mm    | 2913     | 2914      | 1          |
| 8   | RSOV to upper trailing edge of right door    | mm    | 1944     | 1952      | 8          |
| 9   | RSOV to upper trailing edge of left door     | mm    | 1943     | 1960      | 17         |
| 10  | RSOV to lower trailing edge of right door    | mm    | 1931     | 1928      | -3         |
| 11  | RSOV to lower trailing edge of left door     | mm    | 1926     | 1929      | 3          |
| 12  | RSOV to bottom of right 'A' pillar           | mm    | 2968     | 2975      | 7          |
| 13  | RSOV to bottom of left 'A' pillar            | mm    | 2963     | 2971      | 8          |
| 14  | RSOV to firewall on right side               | mm    | 3340     | 3300      | -40        |
| 15  | RSOV to firewall of left side                | mm    | 3334     | 3330      | -4         |
| 16  | RSOV to steering column                      | mm    | 2611     | 2551      | -60        |
| 17  | Center of steering column to left 'A' pillar | mm    | 388      | 367       | -21        |
| 18  | Center of steering column to headlining      | mm    | 436      | 458       | 22         |
| 19  | RSOV to right side of front bumper           | mm    | 4186     | 3805      | -381       |
| 20  | RSOV to left side of front bumper            | mm    | 4186     | 3806      | -380       |
| 21  | Length of engine block                       | mm    | 440      | 440       | 0          |
| RD  | RSOV to right side of dash panel             | mm    | 2738     | 2706      | -32        |
| CD  | RSOV to center of dash panel                 | mm    | 2721     | 2728      | 7          |
| LD  | RSOV to left side of dash panel              | mm    | 2739     | 2733      | -6         |

**DATA SHEET NO. 14...(CONTINUED)**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02



**DATA SHEET NO. 15**  
**CAMERA LOCATIONS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02

| No. | Camera View           | Location (mm) |        |       | Angle (Deg.) | Film Plane to Head | Lens (mm) | Speed (fps) |
|-----|-----------------------|---------------|--------|-------|--------------|--------------------|-----------|-------------|
|     |                       | X             | Y      | Z     |              |                    |           |             |
| 1   | Right Side, Real Time | 3454          | 10973  | 1245  | 0            | 1651               | Zoom      | 24          |
| 2   | Left Side, No. 1      | 2000          | -8250  | 1270  | 0            | 7952               | 13        | 530         |
| 3   | Left Side, No. 2      | 1060          | -6370  | 1470  | -2           | 6177               | 25        | 1020        |
| 4   | Left Side, No. 3      | 6500          | -10580 | 4640  | -16          | 11661              | 65        | 1000        |
| 5   | Left Side, No. 4      | 1460          | -8250  | 3340  | -17          | 8257               | 19        | 1000        |
| 6   | Left Side, No. 5      | 1460          | -8250  | 2970  | -16          | 8170               | 19        | 910         |
| 7   | Right Side, No. 1     | 2400          | 8150   | 1230  | -3           | 7853               | 19        | 1010        |
| 8   | Right Side, No. 2     | 1000          | 7180   | 1210  | 0            | 6980               | 35        | 1020        |
| 9   | Right Side, No. 3     | 7860          | 8900   | 2800  | -9           | 10425              | 80        | 990         |
| 10  | Right Side, No. 4     | 2750          | 9600   | 1500  | -2           | 9321               | 50        | 960         |
| 11  | Overhead Overall      | 250           | 0      | 4460  | -86          | N/A                | 13        | 1090        |
| 12  | Front View, Driver    | 2970          | -380   | 1330  | -43          | N/A                | 12        | 910         |
| 13  | Front View, Passenger | 2970          | 380    | 1330  | -55          | N/A                | 13        | 1080        |
| 14  | Pit Camera, Engine    | 650           | 0      | -1360 | -90          | N/A                | 10        | N/A         |
| 15  | Pit Camera, Fuel Tank | 3760          | 0      | -1680 | -55          | N/A                | 10        | 1210        |
| 16  | Driver Belt           | 2950          | -350   | 1220  | -7           | N/A                | 13        | 820         |
| 17  | Passenger Belt        | 2950          | 350    | 1220  | -7           | N/A                | 13        | 610         |

X - Barrier Face    Y - Monorail Centerline    Z - Ground



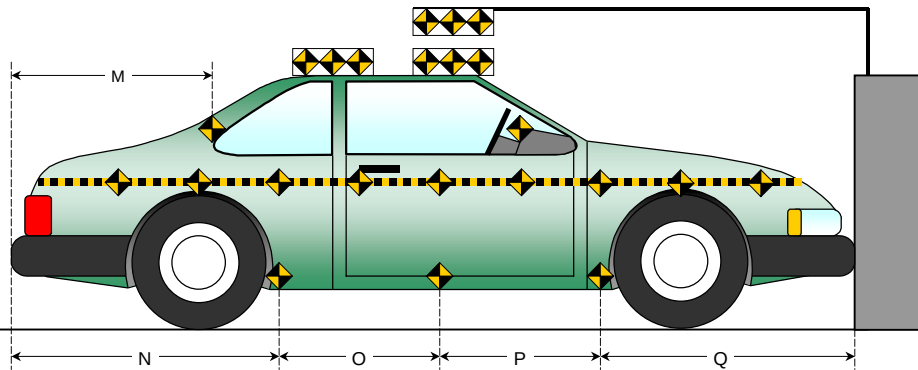
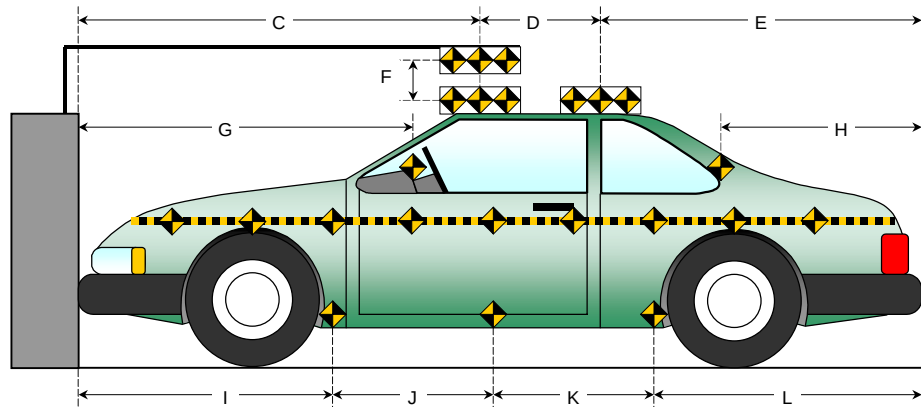
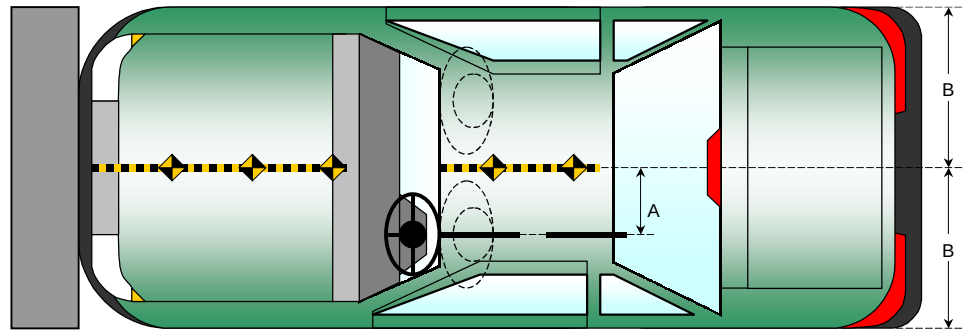
# **DATA SHEET NO. 16** **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

in mm

| Item | Value |
|------|-------|
| A    | 361   |
| B    | 877   |
| C    | 2100  |
| D    | 605   |
| E    | 1646  |
| F    | 155   |
| G    | 1625  |
| H    | 1100  |
| I    | 1360  |
| J    | 858   |
| K    | 858   |
| L    | 1266  |
| M    | 1104  |
| N    | 1270  |
| O    | 855   |
| P    | 855   |
| Q    | 1350  |



**DATA SHEET NO. 17**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

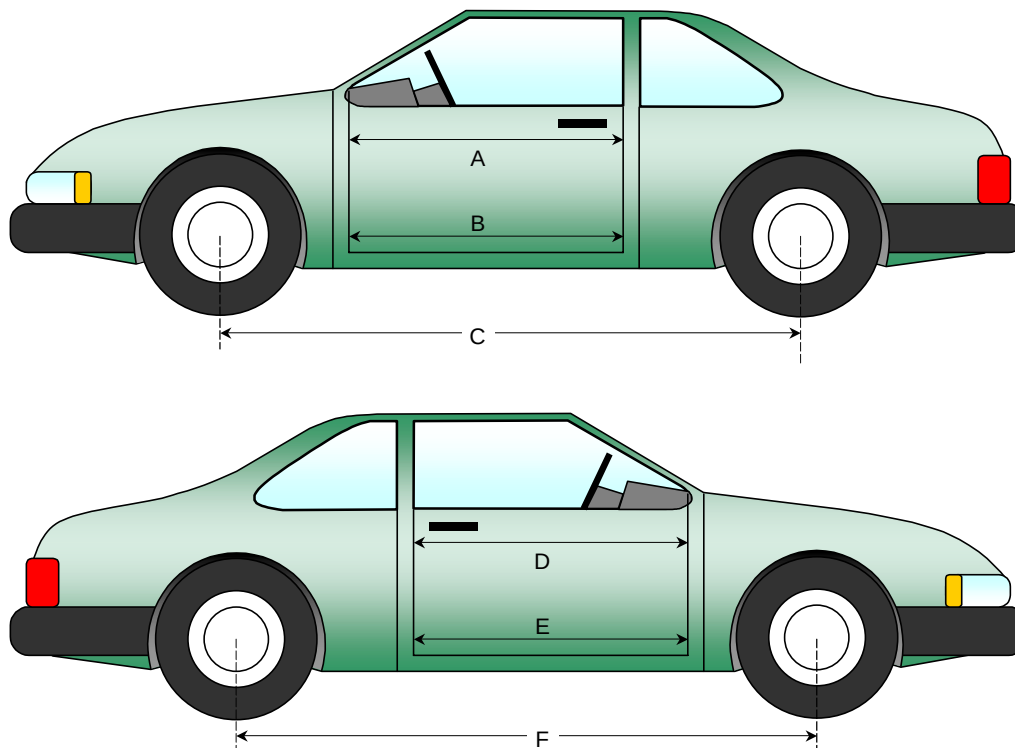
NHTSA No.: M35105  
 Test Date: 04/09/02

**DOOR OPENING WIDTH**

| Item | Description      | Units | Pre-Test | Post-Test | Difference |
|------|------------------|-------|----------|-----------|------------|
| A    | Left Side Upper  | mm    | 958      | 956       | -2         |
| B    | Left Side Lower  | mm    | 861      | 851       | -10        |
| D    | Right Side Upper | mm    | 957      | 958       | 1          |
| E    | Right Side Lower | mm    | 852      | 864       | 12         |

**WHEELBASE MEASUREMENTS**

| Item | Description           | Units | Pre-Test | Post-Test | Difference |
|------|-----------------------|-------|----------|-----------|------------|
| C    | Left Side Wheel base  | mm    | 2613     | 2566      | -47        |
| F    | Right Side Wheel base | mm    | 2613     | 2541      | -72        |



**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

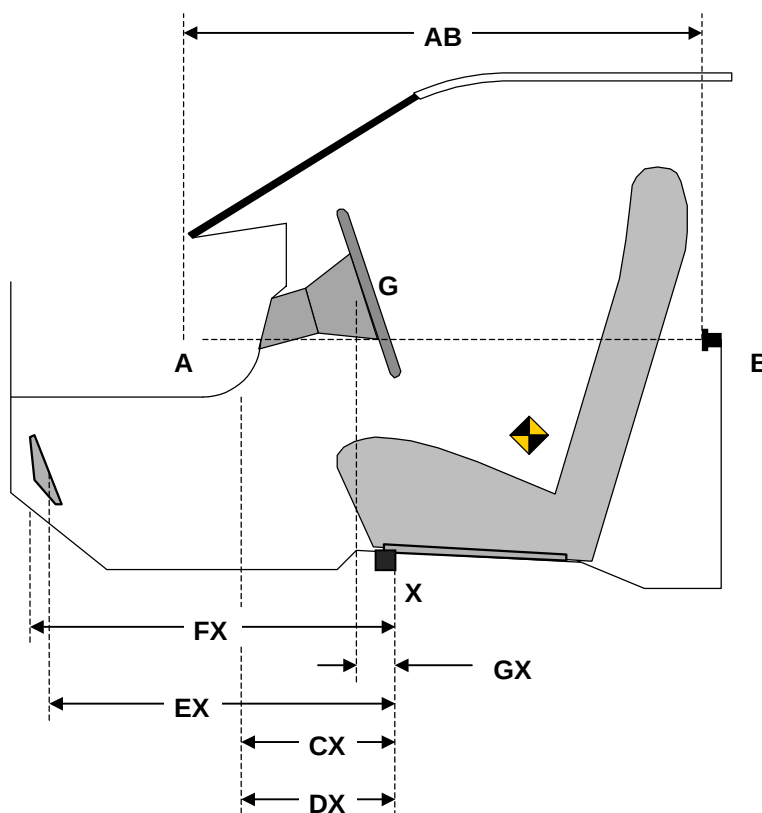
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**DRIVER COMPARTMENT INTRUSION**

| Item | Description                       | Units | Pre-Test | Post-Test | Difference |
|------|-----------------------------------|-------|----------|-----------|------------|
| AB   | Door Opening (Inside window jam)  | mm    | 958      | 956       | -2         |
| CX   | Left Knee Bolster to X            | mm    | 296      | 313       | 17         |
| DX   | Right Knee Bolster to X           | mm    | 325      | 301       | -24        |
| EX   | Brake Pedal to X                  | mm    | 571      | 512       | -59        |
| FX   | Foot Rest to X                    | mm    | 550      | 515       | -35        |
| GX   | Center of Steering Wheel Hub to X | mm    | 120      | 100       | -20        |

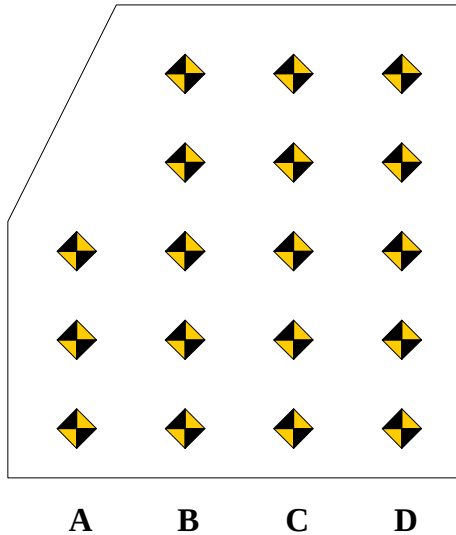
X = Left Front Seat Outboard Anchor Bolt Head



**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02



- 1 Measurement reference point for X and Z-axis is the forward outboard seat mounting bolt.
  - 2 Columns A through D are evenly spaced.
  - 3 Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4 and 5 are located on the most level portion of the floor pan.
  - 4
  - 5
- Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.

**DRIVER FLOOR PAN X-AXIS**

|   | Pre-Test |     |     |     | Post-Test |     |     |     | Difference |     |     |     |
|---|----------|-----|-----|-----|-----------|-----|-----|-----|------------|-----|-----|-----|
|   | A        | B   | C   | D   | A         | B   | C   | D   | A          | B   | C   | D   |
| 1 |          | 645 | 648 | 651 |           | 636 | 629 | 628 |            | -9  | -19 | -23 |
| 2 |          | 568 | 568 | 542 |           | 567 | 565 | 566 |            | -1  | -3  | 24  |
| 3 | 475      | 473 | 471 | 471 | 102       | 467 | 463 | 463 | -373       | -6  | -8  | -8  |
| 4 | 378      | 376 | 373 | 368 | 367       | 365 | 361 | 362 | -11        | -11 | -12 | -6  |
| 5 | 277      | 278 | 278 | 278 | 263       | 265 | 266 | 272 | -14        | -13 | -12 | -6  |

**DRIVER FLOOR PAN Z-AXIS**

|   | Pre-Test |      |      |      | Post-Test |      |      |      | Difference |    |    |    |
|---|----------|------|------|------|-----------|------|------|------|------------|----|----|----|
|   | A        | B    | C    | D    | A         | B    | C    | D    | A          | B  | C  | D  |
| 1 |          | -35  | -35  | -47  |           | -8   | -7   | -16  |            | 27 | 28 | 31 |
| 2 |          | -98  | -88  | -100 |           | -69  | -76  | -85  |            | 29 | 12 | 15 |
| 3 | -115     | -116 | -108 | -115 | -98       | -98  | -102 | -101 | 17         | 18 | 6  | 14 |
| 4 | -122     | -111 | -111 | -111 | -103      | -103 | -104 | -108 | 19         | 8  | 7  | 3  |
| 5 | -129     | -113 | -110 | -112 | -116      | -105 | -105 | -107 | 13         | 8  | 5  | 5  |

**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

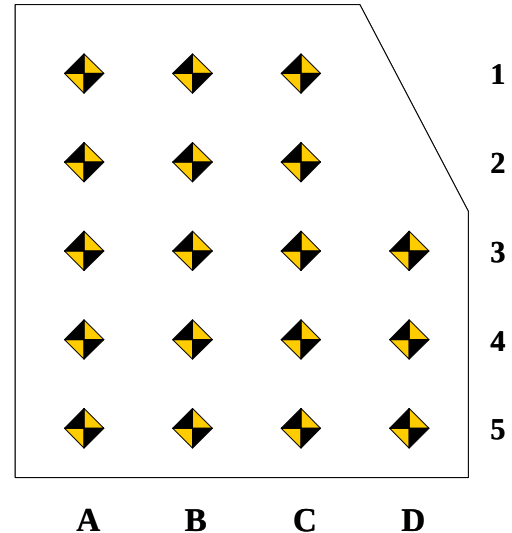
NHTSA No.: M35105  
 Test Date: 04/09/02

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



**PASSENGER FLOOR PAN X-AXIS**

|   | Pre-Test |     |     |     | Post-Test |     |     |     | Difference |     |     |    |
|---|----------|-----|-----|-----|-----------|-----|-----|-----|------------|-----|-----|----|
|   | A        | B   | C   | D   | A         | B   | C   | D   | A          | B   | C   | D  |
| 1 | 652      | 658 | 652 |     | 626       | 620 | 622 |     | -26        | -38 | -30 |    |
| 2 | 573      | 575 | 572 |     | 553       | 549 | 534 |     | -20        | -26 | -38 |    |
| 3 | 471      | 475 | 472 | 472 | 468       | 468 | 468 | 468 | -3         | -7  | -4  | -4 |
| 4 | 371      | 375 | 372 | 373 | 368       | 369 | 369 | 371 | -3         | -6  | -3  | -2 |
| 5 | 273      | 275 | 271 | 271 | 270       | 269 | 268 | 269 | -3         | -6  | -3  | -2 |

**PASSENGER FLOOR PAN Z-AXIS**

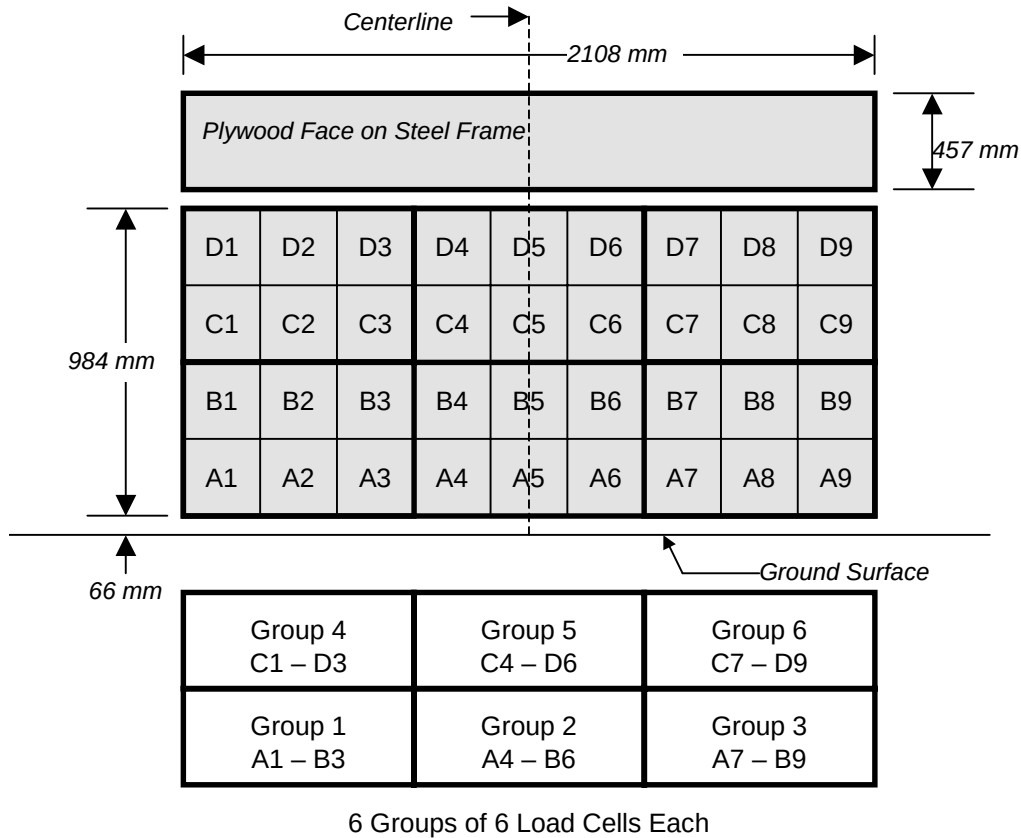
|   | Pre-Test |      |      |      | Post-Test |      |      |      | Difference |    |    |    |
|---|----------|------|------|------|-----------|------|------|------|------------|----|----|----|
|   | A        | B    | C    | D    | A         | B    | C    | D    | A          | B  | C  | D  |
| 1 | -35      | -21  | -12  |      | 5         | 8    | 13   |      | 40         | 29 | 25 |    |
| 2 | -77      | -77  | -75  |      | -52       | -48  | -55  |      | 25         | 29 | 20 |    |
| 3 | -106     | -109 | -115 | -110 | -102      | -103 | -96  | -85  | 4          | 6  | 19 | 25 |
| 4 | -111     | -107 | -106 | -105 | -108      | -108 | -105 | -108 | 3          | -1 | 1  | -3 |
| 5 | -108     | -108 | -108 | -108 | -109      | -105 | -105 | -108 | -1         | 3  | 3  | 0  |

**DATA SHEET NO. 18**  
**FIXED BARRIER LOAD CELL LOCATIONS**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**36 Load Cell Rigid Barrier (NHTSA Standard)**  
**Load Cell Locations on Fixed Barrier**



The Data is presented in Appendix C with the following requirements:

- 1.) Data from 36 individual load cells
- 2.) Sum data from 6 groupings shown above (6 cells/group)
- 3.) Total or sum of all 36 individual load cells
- 4.) Sum of all 36 individual load cells vs. vehicle dynamic crush

**DATA SHEET NO. 19**  
**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
 Test Date: 04/09/02

**VEHICLE INFORMATION**

VIN: 2T1KR32E63C019137  
 Vehicle Size Category: 4 Door SUV

Wheel base (mm): 2703  
 Test Weight (kg): 2174

**ACCELEROMETER DATA**

Accelerometer Location: Left rear floor pan  
 Cal. Procedure/Interval: 6 months / drop test  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 55.91  
 Velocity Change (km/h): 66.9

Linearity: Good

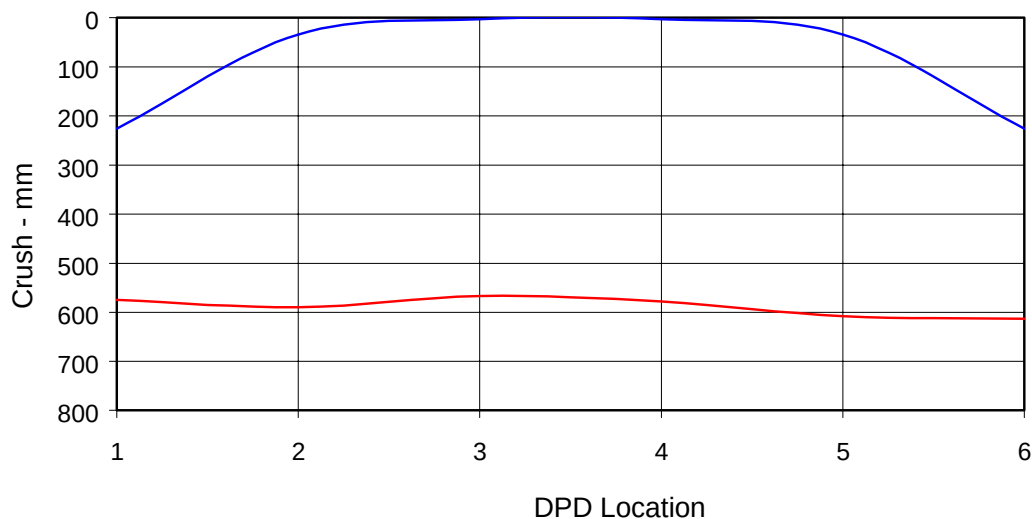
Time of Separation (msec): 68.6

**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW6  
 Damage Region Length (mm): 1593

Midpoint of Damage: Vehicle Centerline  
 Impact Mode: Full Frontal

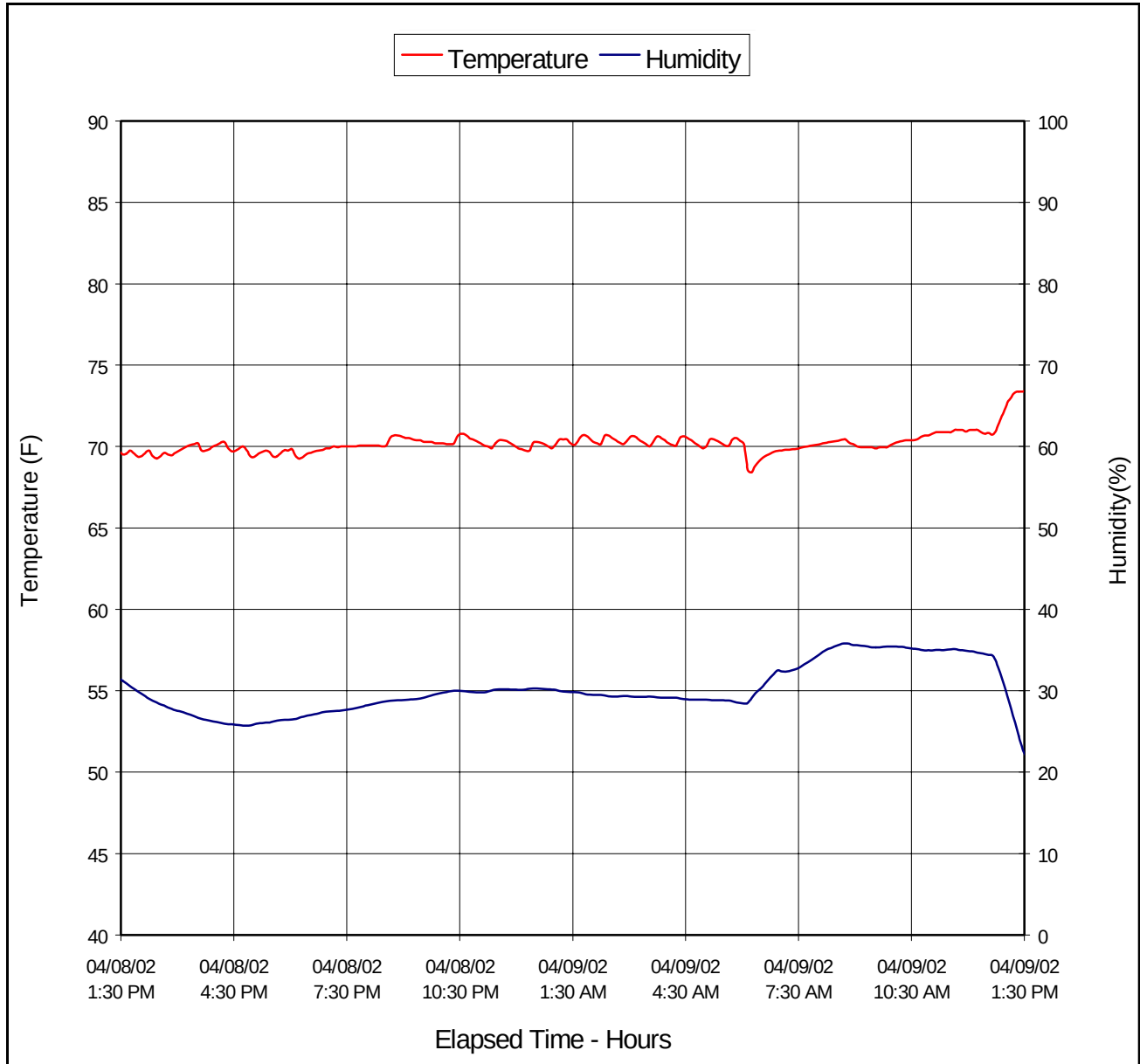
| No. | Measurement Description    | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------|-------|----------|-----------|------------|
| C1  | Crush zone 1 at left side  | mm    | 226      | 575       | -349       |
| C2  | Crush zone 2 on left side  | mm    | 34       | 590       | -556       |
| C3  | Crush zone 3 on left side  | mm    | 3        | 567       | -564       |
| C4  | Crush zone 4 on right side | mm    | 3        | 578       | -575       |
| C5  | Crush zone 5 on right side | mm    | 34       | 608       | -574       |
| C6  | Crush zone 6 at right side | mm    | 226      | 613       | -387       |



**DATA SHEET NO. 20**  
**DUMMY/VEHICLE TEMPERATURE STABILIZATION**

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon  
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105  
Test Date: 04/09/02





**APPENDIX A**

**PHOTOGRAPHS**

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Figure A-1: Right Front, as Received



Figure A-2: Left Rear, as Received



MFD.BY:TOYOTA MOTOR MANUFACTURING  
CANADA INC. 03/02

GVWR 3845LB GAWR FR 2015LB RR 1850LB  
THIS VEHICLE CONFORMS TO ALL APPLICABLE  
FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND  
THEFT PREVENTION STANDARDS IN EFFECT ON  
THE DATE OF MANUFACTURE SHOWN ABOVE.

2T1KR32E63C019137 PASS.CAR



C/TR:209/FA14  
A/TM: - 02A/C59

MODEL:ZZE132L - DHMDKA  
MADE IN CANADA

793

AA01959515

Figure A-3: Vehicle Certification Label

VEHICLE CAPACITY WEIGHT: 8601bs (390kg)  
 DESIGNATED SEATING CAPACITY: TOTAL 5 (FRONT 2, REAR 3)  
 RECOMMENDED COLD TIRE INFLATION PRESSURE: psi (kPa)  
 UP TO VEHICLE CAPACITY WEIGHT FRONT 32 (220), REAR 32 (220)  
 RECOMMENDED TIRE SIZE: P205/55R16 89H, P215/50ZR17  
 COMPACT SPARE TIRE  
 RECOMMENDED COLD TIRE INFLATION PRESSURE: 60psi (420kPa)  
 RECOMMENDED TIRE SIZE: T135/70R16 100M (FOR P205/55R16 89H)  
 T135/80R16 101M (FOR P215/50ZR17)  
 SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

---

CHARGE MAXIMALE DU VEHICULE: 860LIVRES (390kg)  
 NOMBRE DESIGNE DE PLACES ASSISES: TOTAL 5  
 (AVANT 2, ARRIERE 3)  
 PRESSION RECOMMANDEE DE GONFLAGE A FROID DES PNEUS  
 AU POIDS MAXIMAL DU VEHICULE CHARGE: LB/PO<sup>2</sup> (kPa)  
 AVANT 32 (220), ARRIERE 32 (220)  
 DIMENSION RECOMMANDEE DES PNEUS: P205/55R16 89H, P215/50ZR17  
 PNEU DE RECHANGE COMPACT  
 DIMENSION RECOMMANDEE DU PNEU: T135/70R16 100M (POUR P205/55R16 89H)  
 T135/80R16 101M (POUR P215/50ZR17)  
 PRESSION RECOMMANDEE DE GONFLAGE A FROID: 60LB/PO<sup>2</sup> (420kPa)  
 POUR DE PLUS AMPLES DETAILS, VOIR LE MANUEL DU PROPRIETAIRE

**01090** **B1**

Figure A-4: Vehicle Tire Label



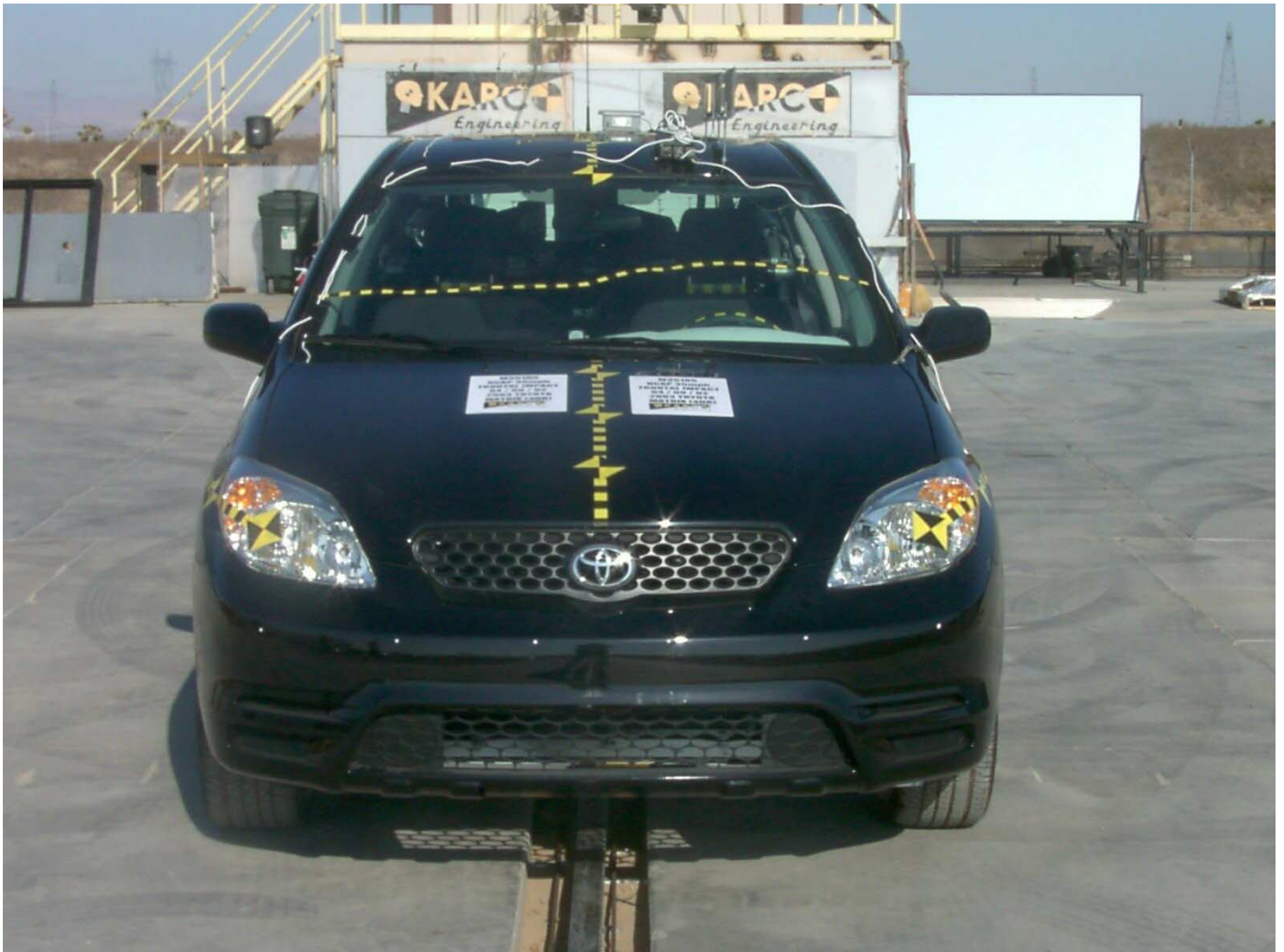


Figure A-5: Front View, Pre-Test



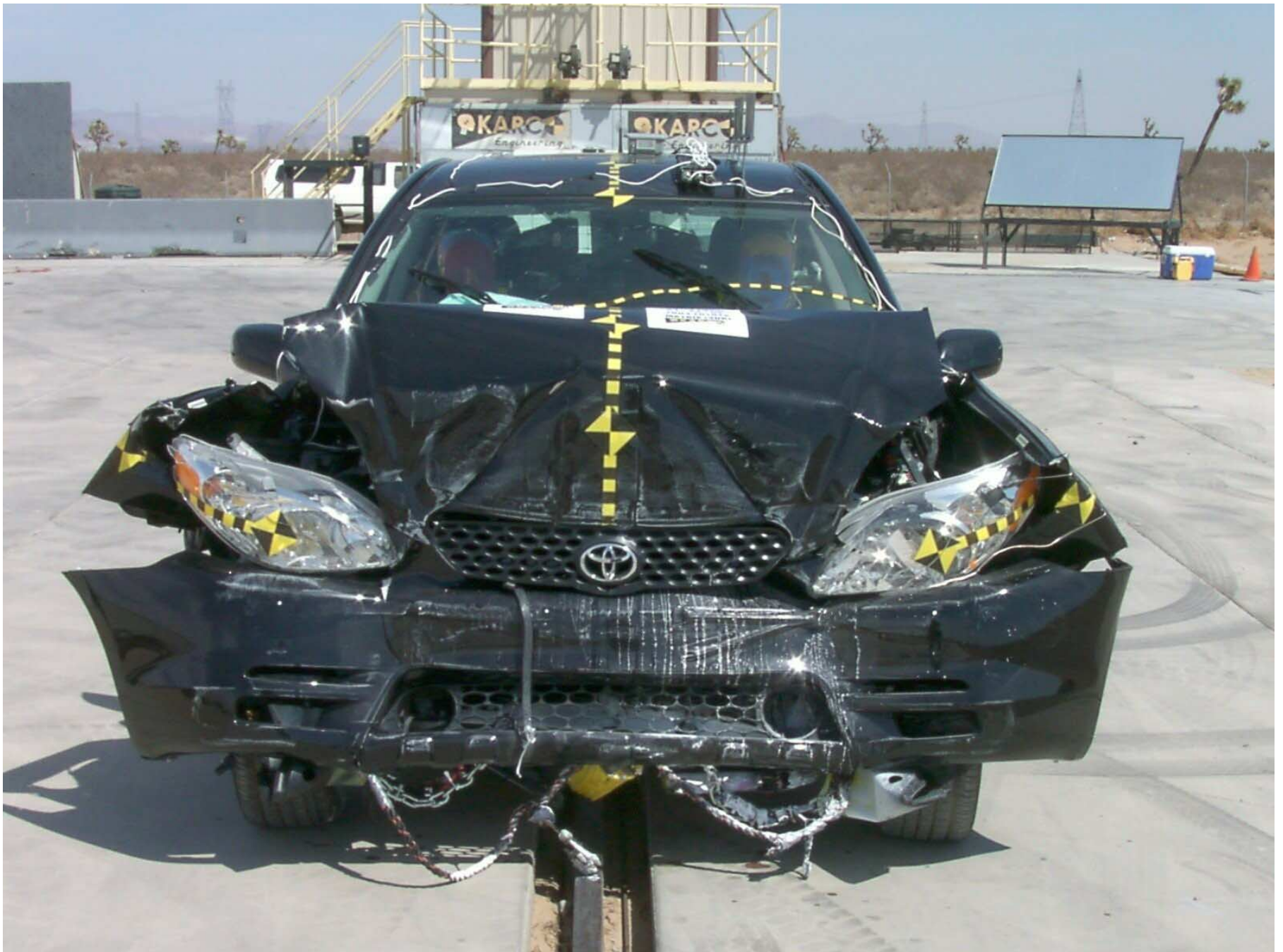


Figure A-6: Front View, Post-Test



Figure A-7: Left Side View, Pre-Test



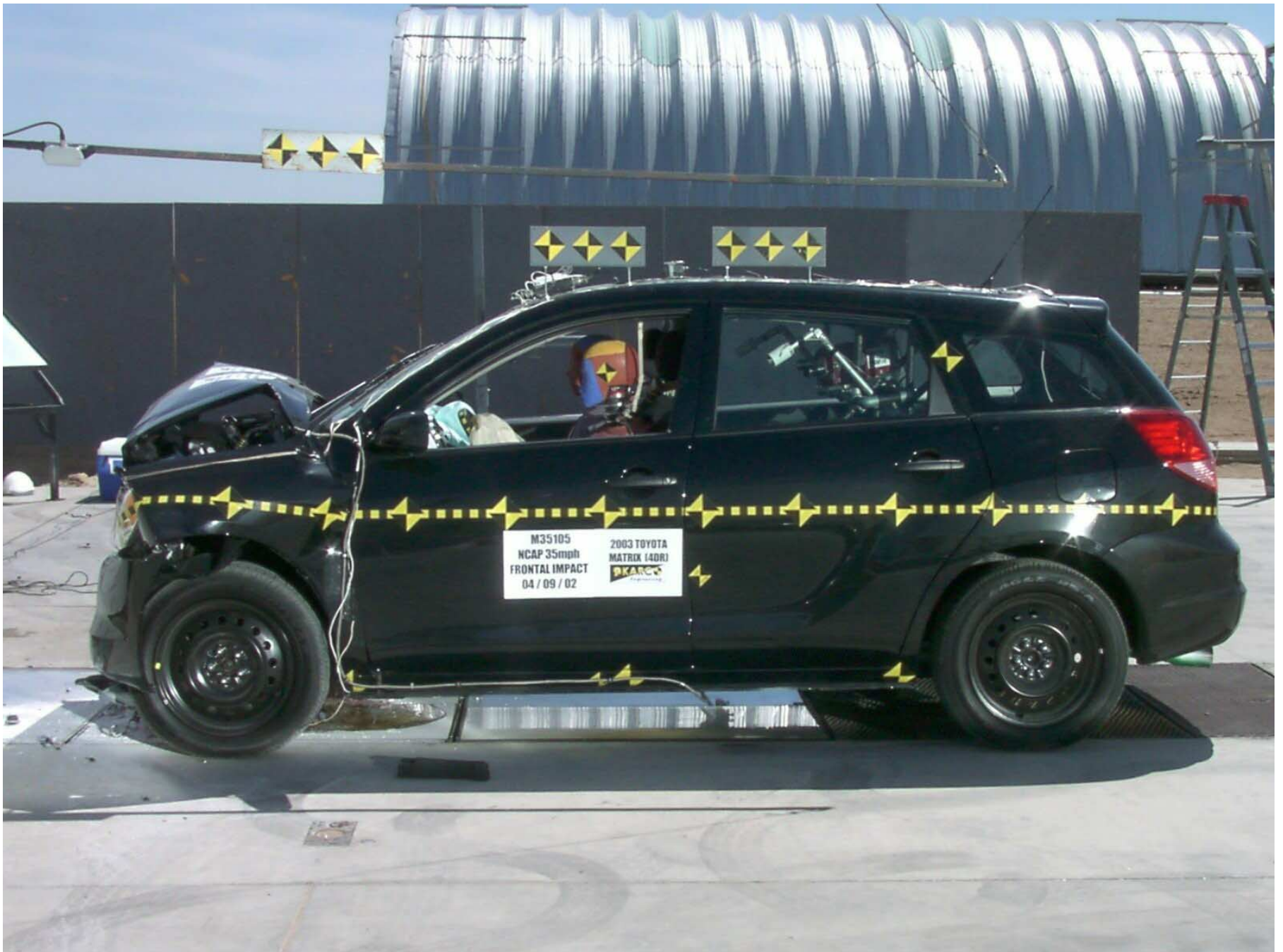


Figure A-8: Left Side View, Post-Test



Figure A-9: Right Side View, Pre-Test





Figure A-10: Right Side View, Post-Test



Figure A-11: Right Front View, Pre-Test





Figure A-12: Right Front View, Post-Test



Figure A-13: Left Rear View, Pre-Test





Figure A-14: Left Rear View, Post-Test



Figure A-15: Windshield, Pre-Test





Figure A-16: Windshield, Post-Test





Figure A-17: Engine Compartment, Pre-Test





Figure A-18: Engine Compartment, Post-Test





Figure A-19: Fuel Cap, Pre-test





Figure A-20: Fuel Cap, Post-Test





Figure A-21: Front Underside, Pre-Test



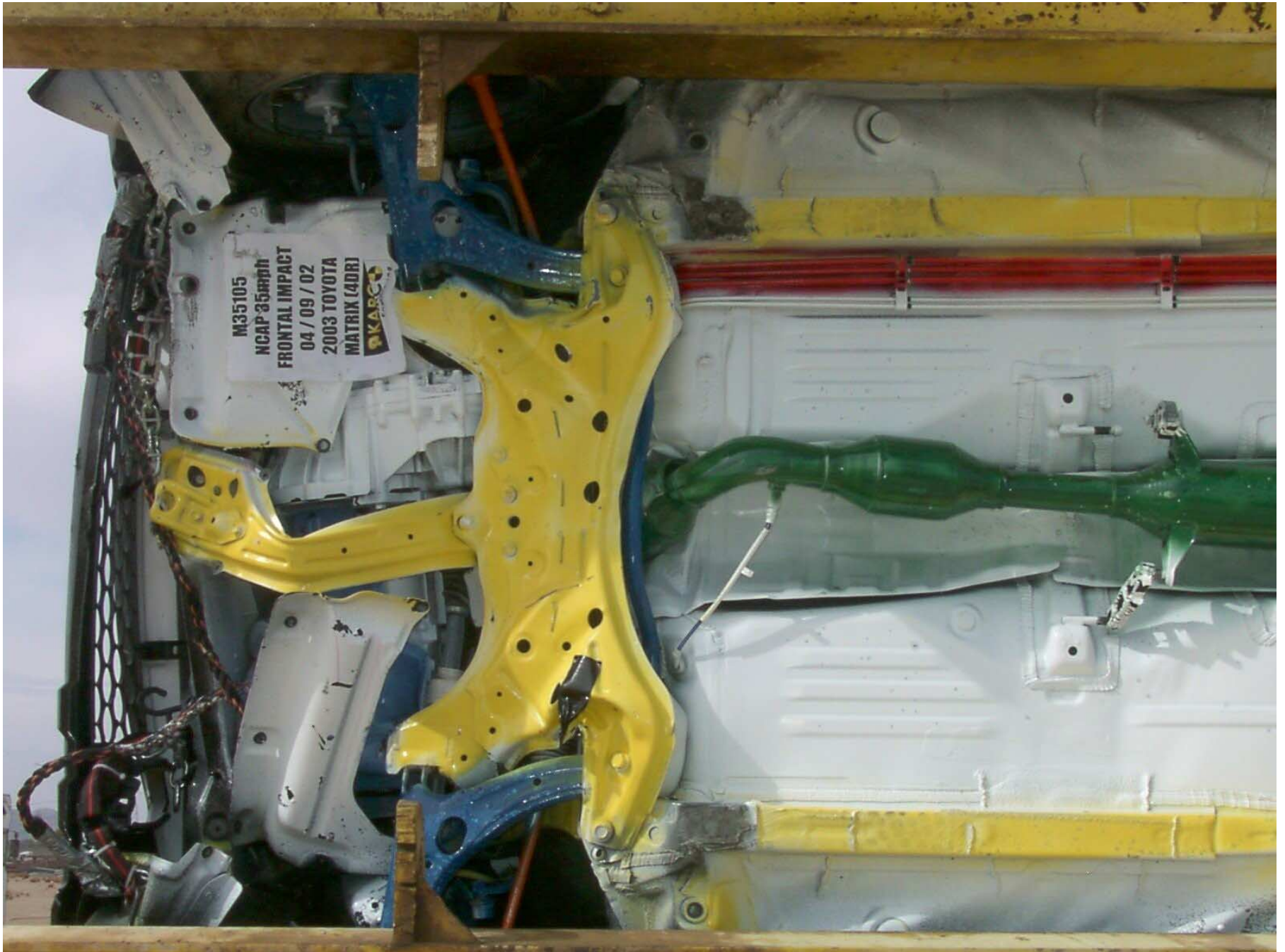


Figure A-22: Front Underside, Post-Test



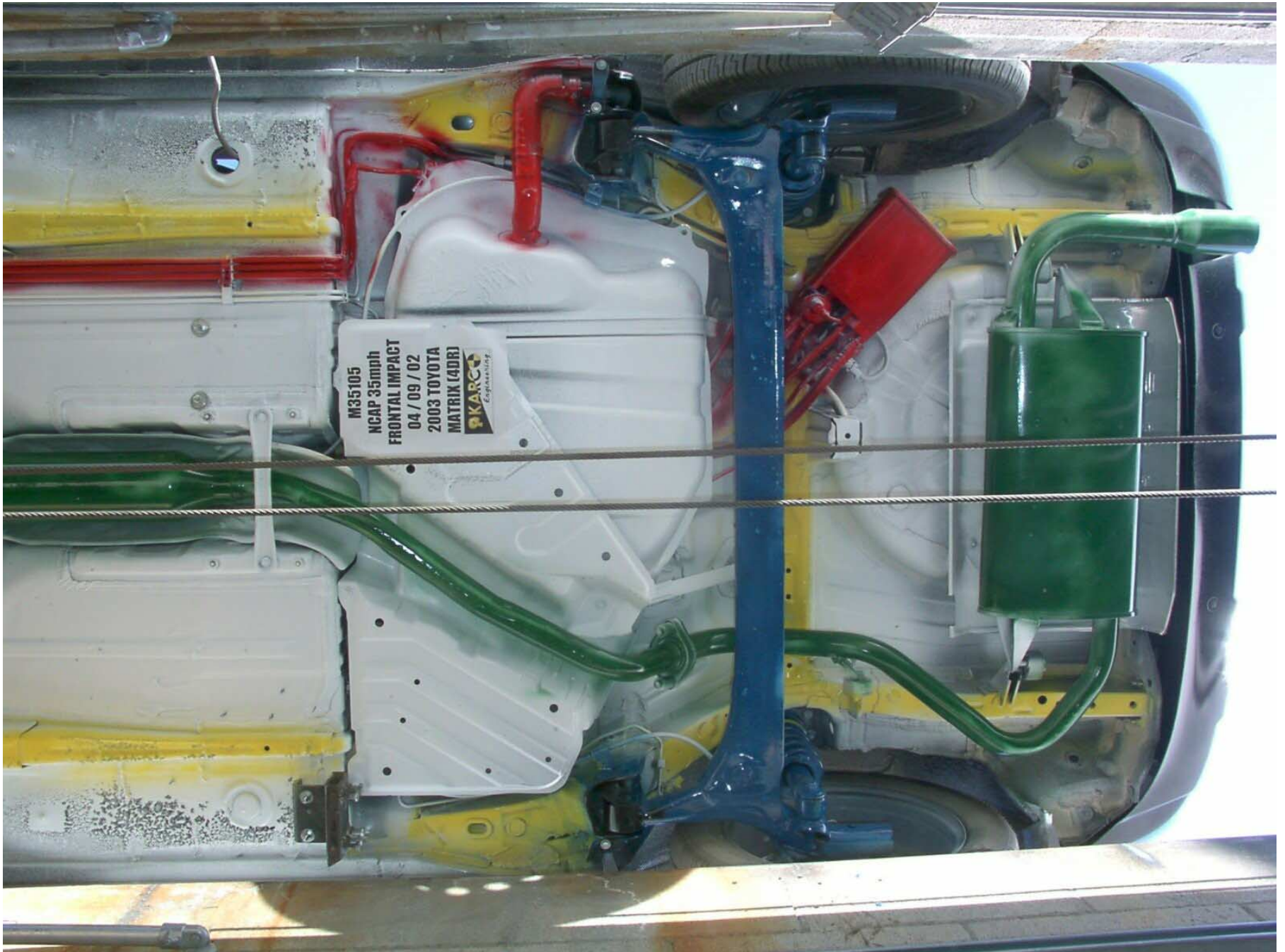


Figure A-23: Rear Underside, Pre-Test



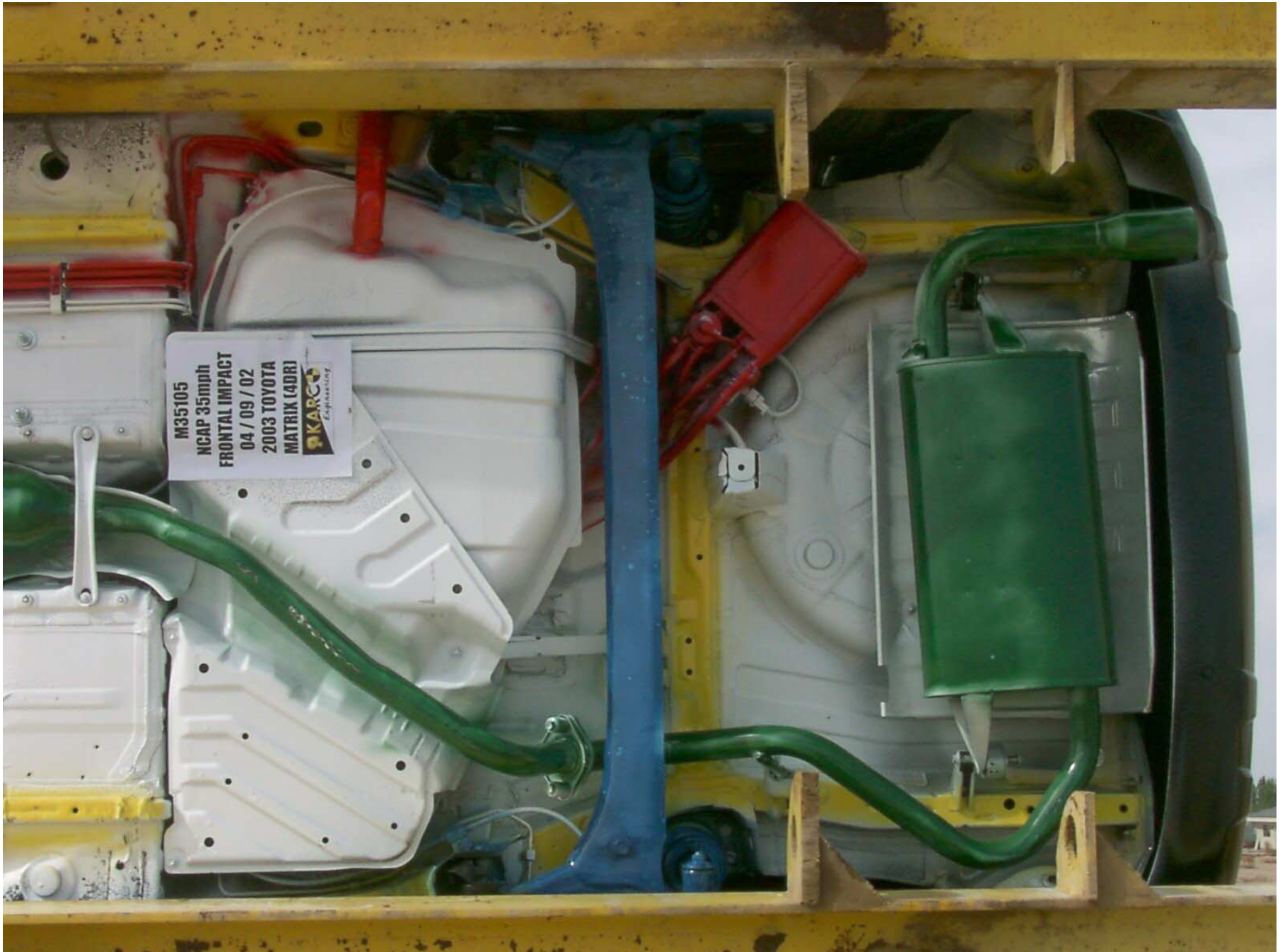


Figure A-24: Rear Underside, Post-Test





Figure A-25: Driver Dummy Front View, Pre-Test





Figure A-26: Driver Dummy Front View, Post-Test





Figure A-27: Driver Dummy Through Window, Pre-Test





Figure A-28: Driver Dummy Through Window, Post-Test



Figure A-29: Driver Dummy Door Open, Pre-Test





Figure A-30: Driver Dummy Door Open, Post-Test



Figure A-31: Driver Dummy 90° To Vehicle, Pre-Test





Figure A-32: Driver Dummy 90° To Vehicle, Post-Test



Figure A-33: Driver Dummy Feet, Pre-Test





Figure A-34: Driver Dummy Feet and Knee Contact, Post-Test





Figure A-35: Driver Side Knee Bolster, Pre-Test



Figure A-36: Driver Side Knee Bolster, Post-Test





Figure A-37: Driver Side Floor Pan, Pre-Test





Figure A-38: Driver Side Floor Pan, Post-Test





Figure A-39: Driver Dummy Head, Post-Test



Figure A-40: Driver Dummy Contact, Post-Test



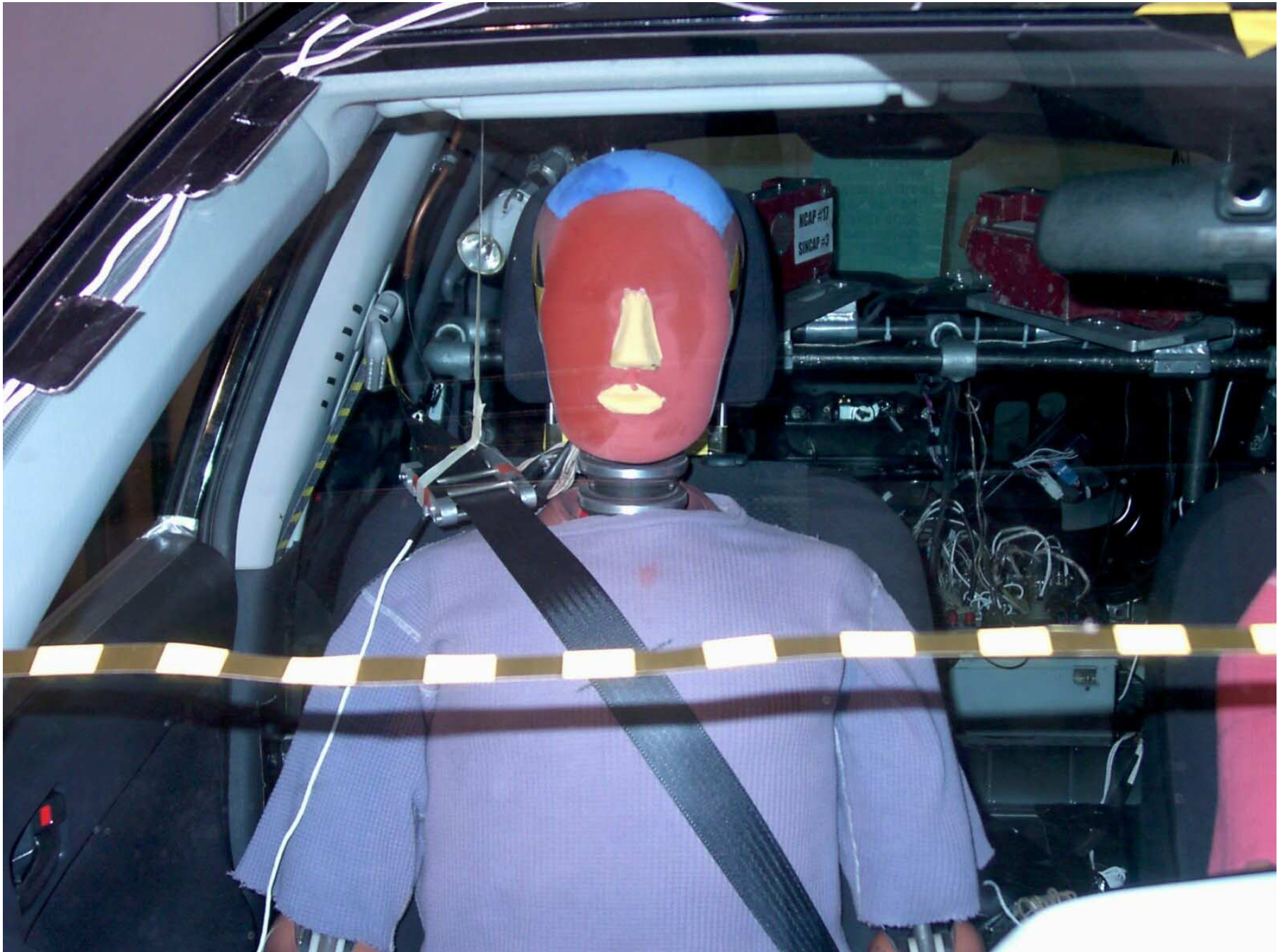


Figure A-41: Passenger Dummy Front View, Pre-Test





Figure A-42: Passenger Dummy Front View, Post-Test





Figure A-43: Passenger Dummy Through Window, Pre-Test





Figure A-44: Passenger Dummy Through Window, Post-Test



Figure A-45: Passenger Dummy Door Open, Pre-Test





Figure A-46: Passenger Dummy Door Open, Post-Test



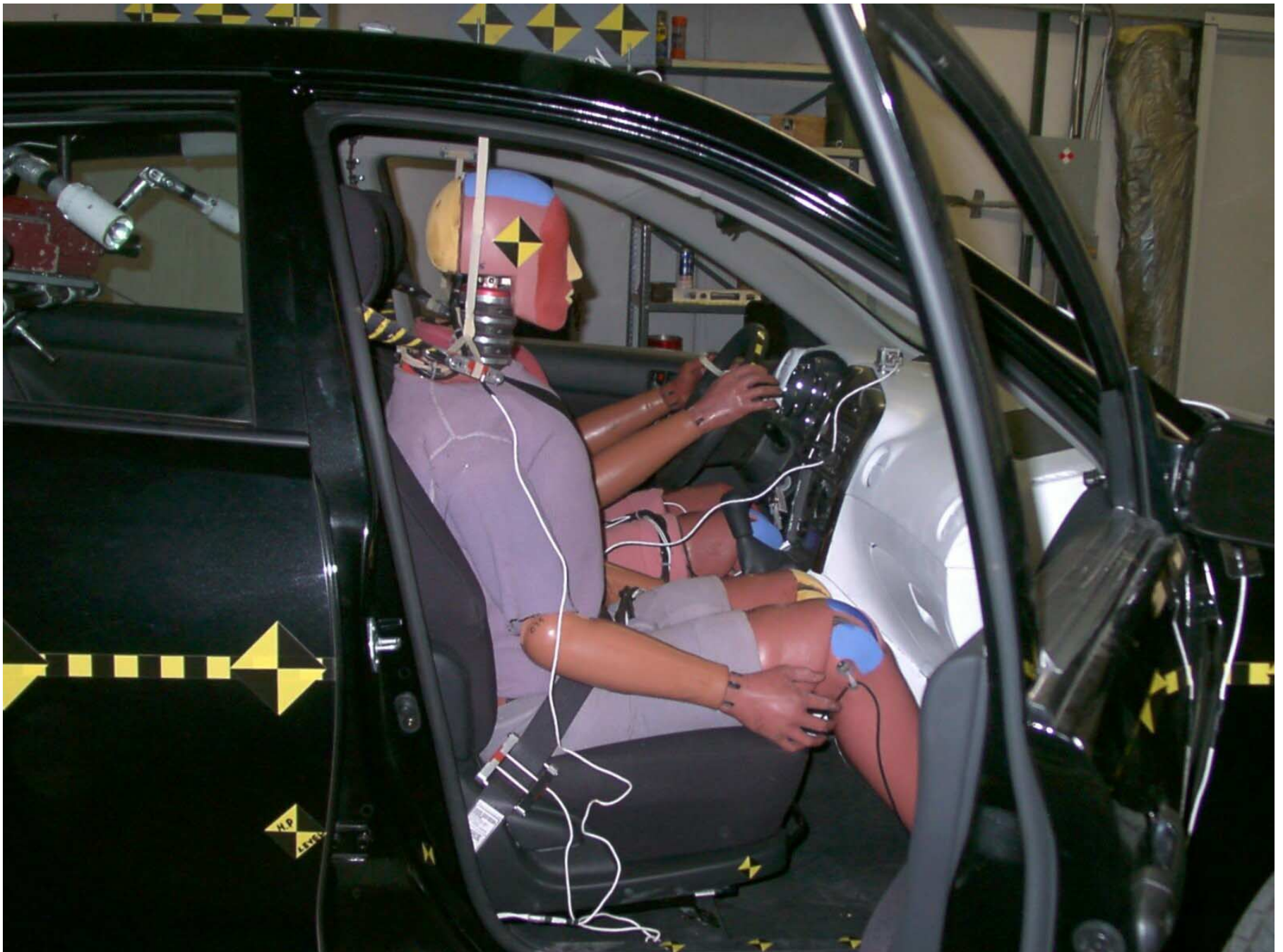


Figure A-47: Passenger Dummy 90° To Vehicle, Pre-Test



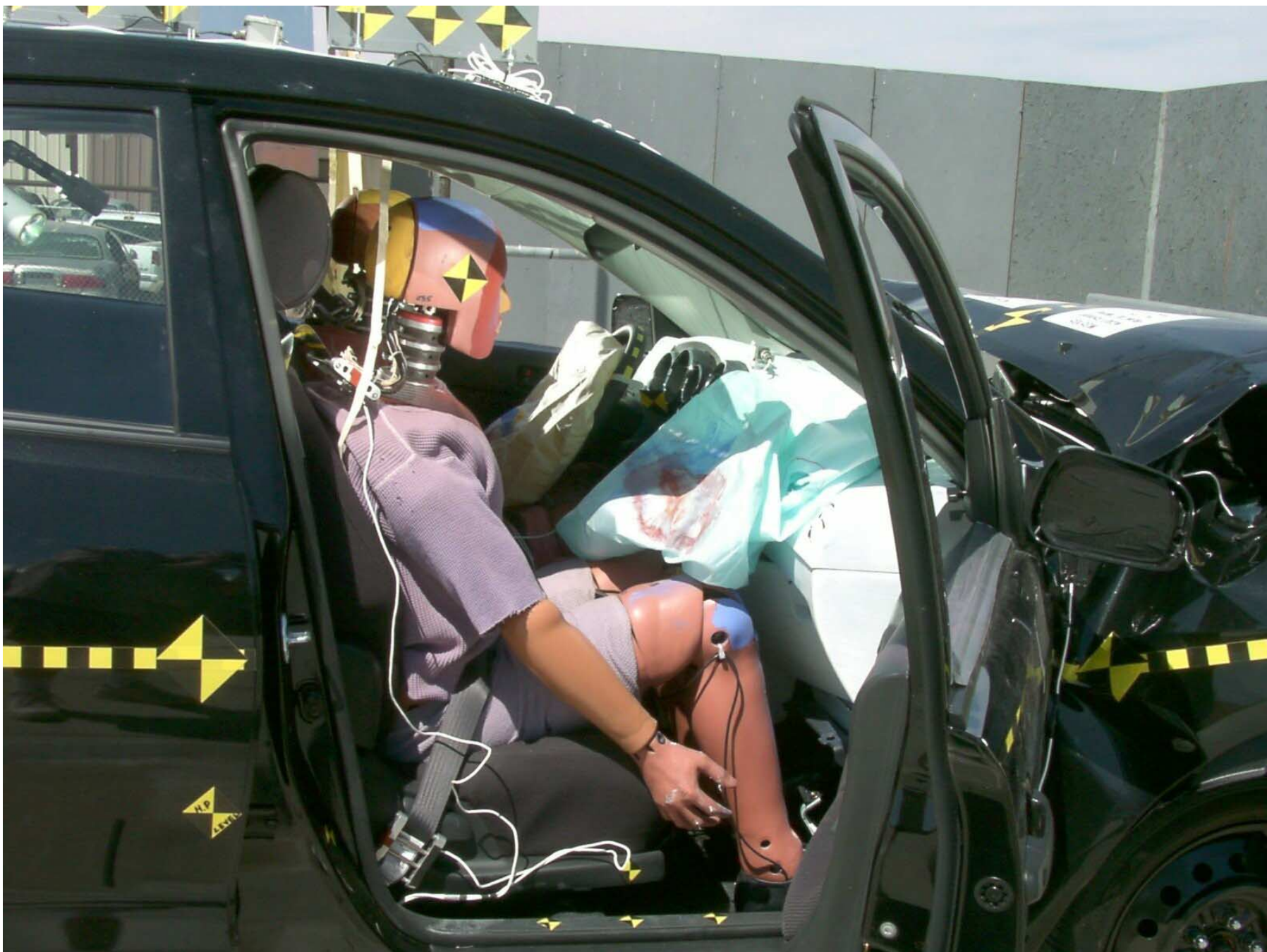


Figure A-48: Passenger Dummy 90° To Vehicle, Post-Test



Figure A-49: Passenger Dummy Feet, Pre-Test





Figure A-50: Passenger Dummy Feet and Knee Contact, Post-Test





Figure A-51: Passenger Side Floor Pan, Pre-Test





Figure A-52: Passenger Side Floor Pan, Post-Test





Figure A-53: Passenger Side Knee Bolster, Pre-Test



Figure A-54: Passenger Side Knee Bolster, Post-Test



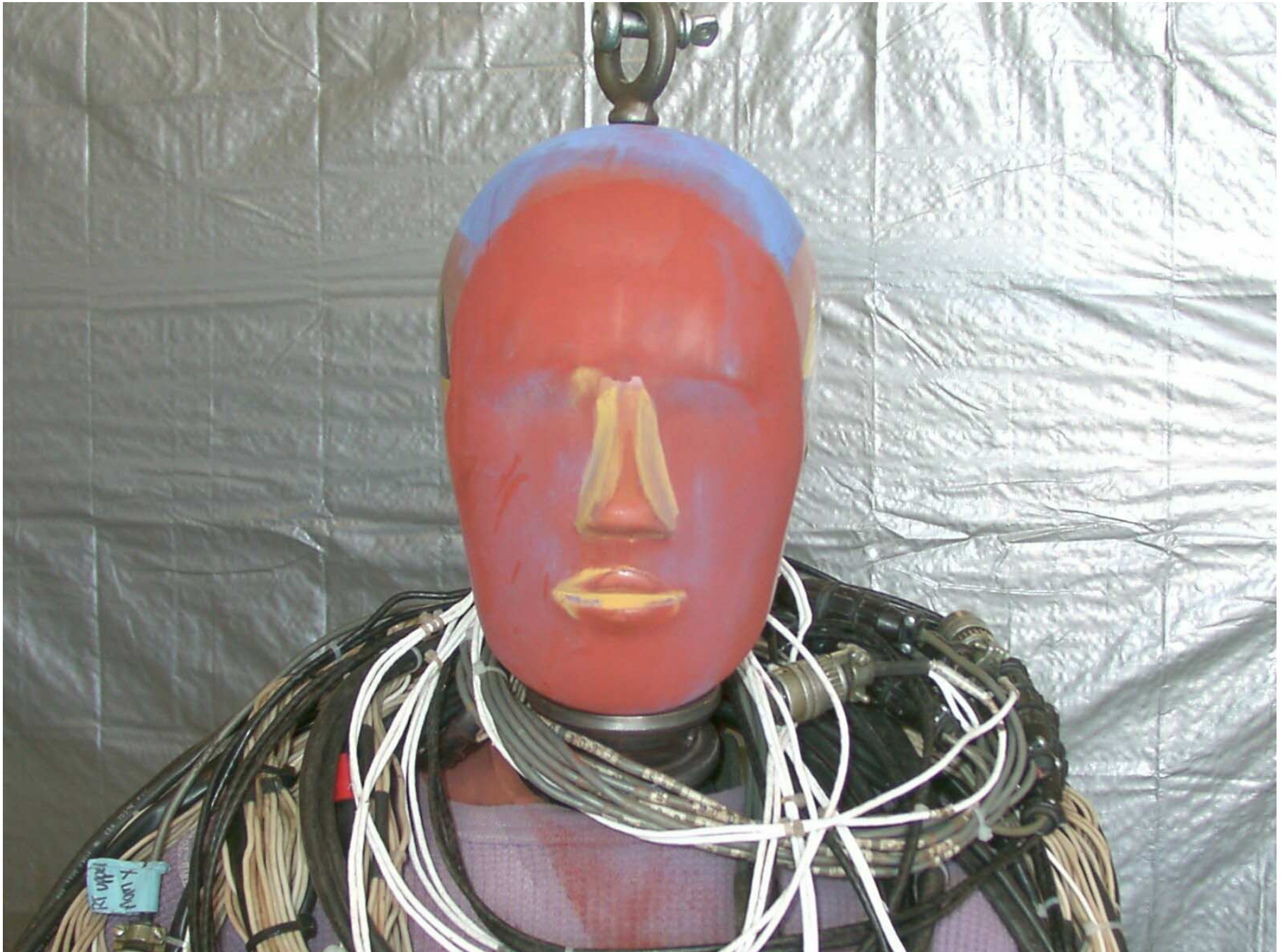


Figure A-55: Passenger Head, Post-Test



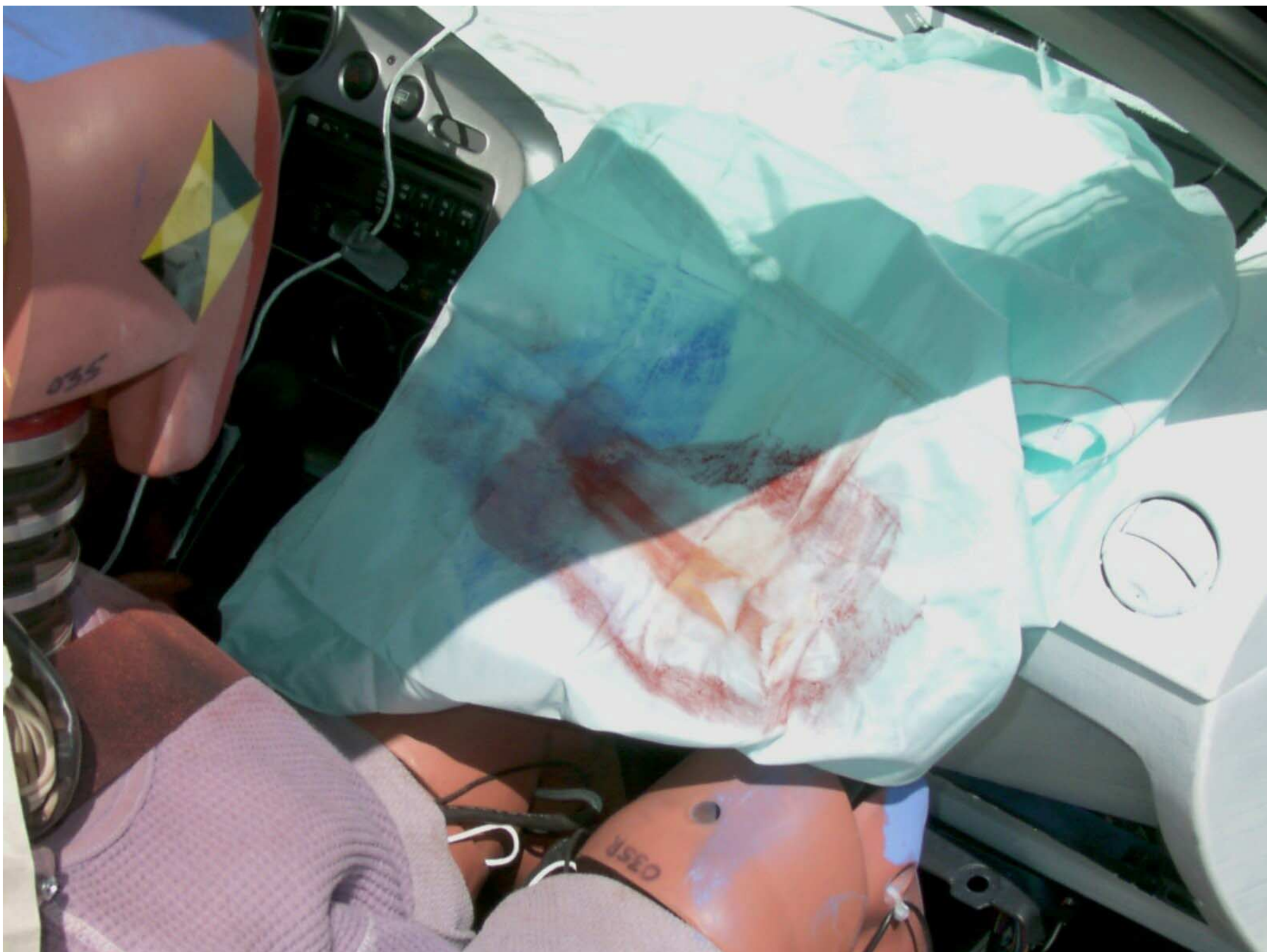


Figure A-56: Passenger Dummy Contact, Post-Test



Figure A-57: <sup>3</sup>/<sub>4</sub> Left Rear View of Doors Closed After Impact





Figure A-58:  $\frac{3}{4}$ Right Rear View of Doors Closed After Impact





Figure A-59: Vehicle on Rollover Device





Figure A-60: Vehicle During Impact

## **APPENDIX B**

### **DATA PLOTS**



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| B-43 Driver Left Upper Tibia Moment Y      | B-43 |
| B-44 Driver Right Upper Tibia Moment X     | B-44 |
| B-45 Driver Right Upper Tibia Moment Y     | B-45 |
| B-46 Driver Left Lower Tibia Moment X      | B-46 |
| B-47 Driver Left Lower Tibia Moment Y      | B-47 |
| B-48 Driver Left Lower Tibia Force Z       | B-48 |
| B-49 Driver Right Lower Tibia Moment X     | B-49 |
| B-50 Driver Right Lower Tibia Moment Y     | B-50 |
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| B-53 Driver Left Foot Aft Z                | B-53 |
| B-54 Driver Left Foot Fore Z               | B-54 |
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| B-82      | Passenger Chest Primary X                | B-82  |
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| B-84      | Passenger Chest Primary X Displacement   | B-84  |
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| B-90      | Passenger Chest Redundant X Displacement | B-90  |
| B-91      | Passenger Chest Redundant Y              | B-91  |
| B-92      | Passenger Chest Redundant Z              | B-92  |
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| B-94      | Passenger Chest Displacement X           | B-94  |
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| B-98      | Passenger Pelvis Y                       | B-98  |
| B-99      | Passenger Pelvis Z                       | B-99  |
| B-100     | Passenger Pelvis Resultant               | B-100 |
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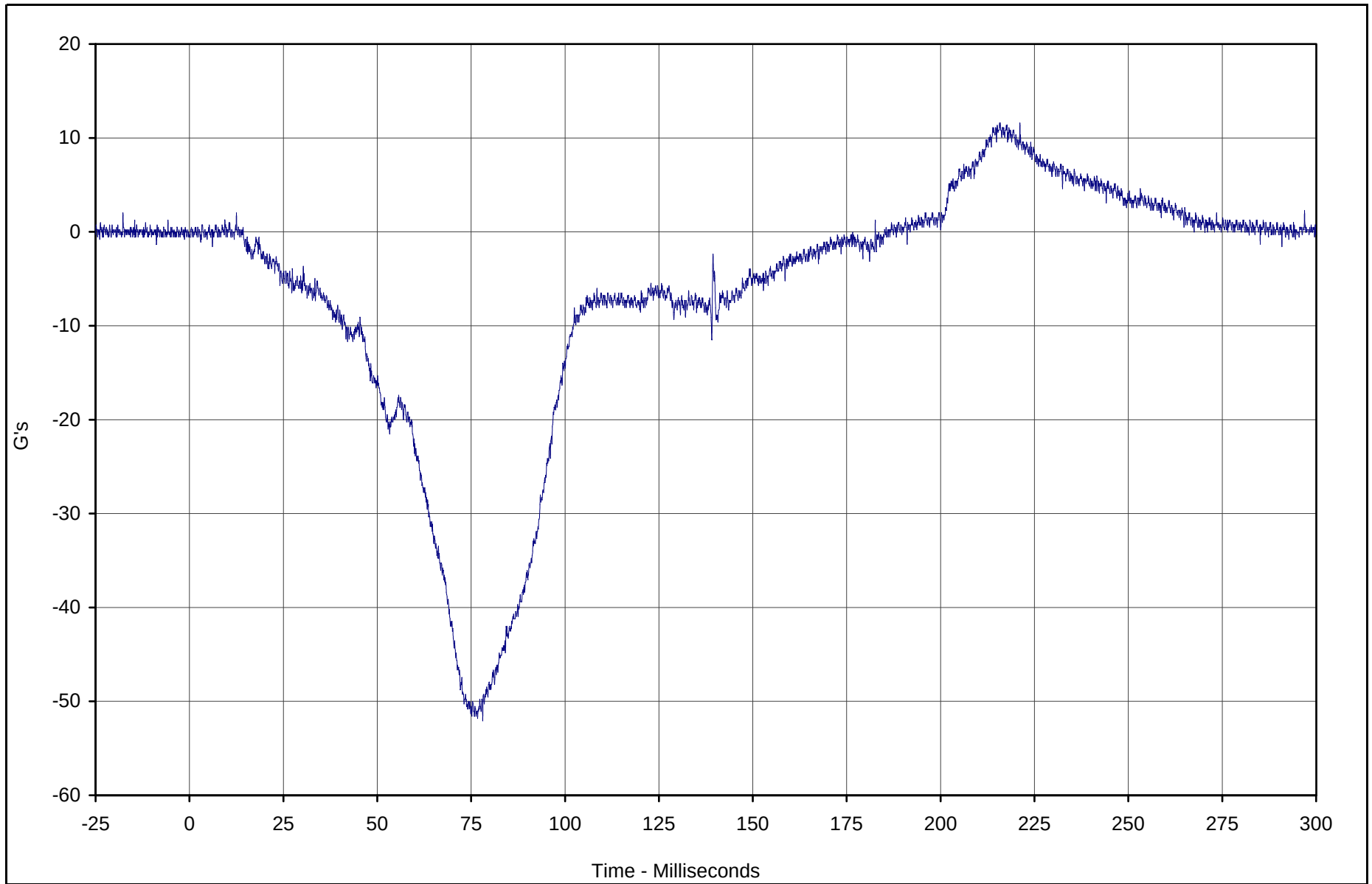


# LIST OF DATA PLOTS...(Continued)

| Data Plot | Page                                 |
|-----------|--------------------------------------|
| B-102     | Passenger Right Femur Force          |
| B-103     | Passenger Left Upper Tibia Moment X  |
| B-104     | Passenger Left Upper Tibia Moment Y  |
| B-105     | Passenger Right Upper Tibia Moment X |
| B-106     | Passenger Right Upper Tibia Moment Y |
| B-107     | Passenger Left Lower Tibia Moment X  |
| B-108     | Passenger Left Lower Tibia Moment Y  |
| B-109     | Passenger Left Lower Tibia Force Z   |
| B-110     | Passenger Right Lower Tibia Moment X |
| B-111     | Passenger Right Lower Tibia Moment Y |
| B-112     | Passenger Right Lower Tibia Force Z  |
| B-113     | Passenger Left Foot Aft X            |
| B-114     | Passenger Left Foot Aft Z            |
| B-115     | Passenger Left Foot Fore Z           |
| B-116     | Passenger Right Foot Aft X           |
| B-117     | Passenger Right Foot Aft Z           |
| B-118     | Passenger Right Foot Fore Z          |
| B-119     | Passenger Lap Belt Force             |
| B-120     | Passenger Shoulder Belt Force        |
| B-121     | Passenger Shoulder Belt Pullout      |
| B-122     | Passenger Shoulder Belt Elongation   |
| B-123     | Vehicle Left Rear X                  |
| B-124     | Vehicle Left Rear X Velocity         |
| B-125     | Vehicle Left Rear X Displacement     |
| B-126     | Vehicle Right Rear X                 |
| B-127     | Vehicle Right Rear X Velocity        |
| B-128     | Vehicle Right Rear X Displacement    |
| B-129     | Vehicle Engine Top                   |
| B-130     | Vehicle Engine Top Velocity          |
| B-131     | Vehicle Engine Top Displacement      |
| B-132     | Vehicle Engine Bottom                |
| B-133     | Vehicle Engine Bottom Velocity       |
| B-134     | Vehicle Engine Bottom Displacement   |
| B-135     | Vehicle Left Brake Caliper           |
| B-136     | Vehicle Left Brake Caliper Velocity  |

# LIST OF DATA PLOTS...(Continued)

| <u>Data Plot</u> |                                          | <u>Page</u> |
|------------------|------------------------------------------|-------------|
| B-137            | Vehicle Left Brake Caliper Displacement  | B-137       |
| B-138            | Vehicle Right Brake Caliper              | B-138       |
| B-139            | Vehicle Right Brake Caliper Velocity     | B-139       |
| B-140            | Vehicle Right Brake Caliper Displacement | B-140       |
| B-141            | Vehicle Instrument Panel                 | B-141       |
| B-142            | Vehicle Instrument Panel Velocity        | B-142       |
| B-143            | Vehicle Instrument Panel Displacement    | B-143       |
| B-144            | Vehicle Left Rear Z                      | B-144       |
| B-145            | Vehicle Left Rear Z Velocity             | B-145       |
| B-146            | Vehicle Left Rear Z Displacement         | B-146       |
| B-147            | Vehicle Right Rear Z                     | B-147       |
| B-148            | Vehicle Right Rear Z Velocity            | B-148       |
| B-149            | Vehicle Right Rear Z Displacement        | B-149       |



| Curve Description     | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|------|-------|-------|------|-----------|
| Driver Head Primary X | 001   | FIL  | G's   | 11.6 | 215.7 | -52.1 | 78.1 | 1000      |



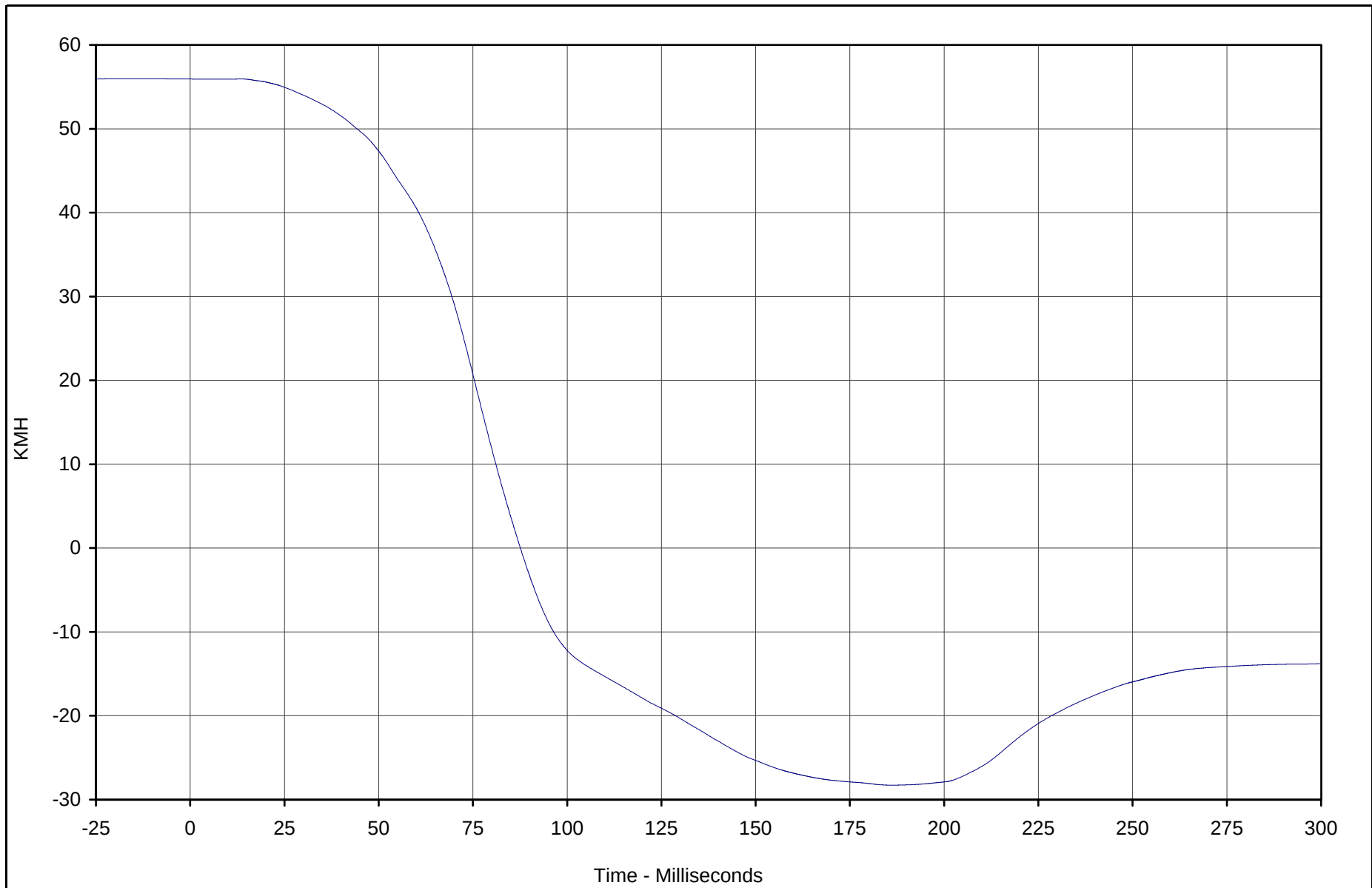
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description              | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Head Primary X Velocity | 001   | IN1  | KMH   | 55.9 | 13.5 | -28.3 | 186.2 | 180       |

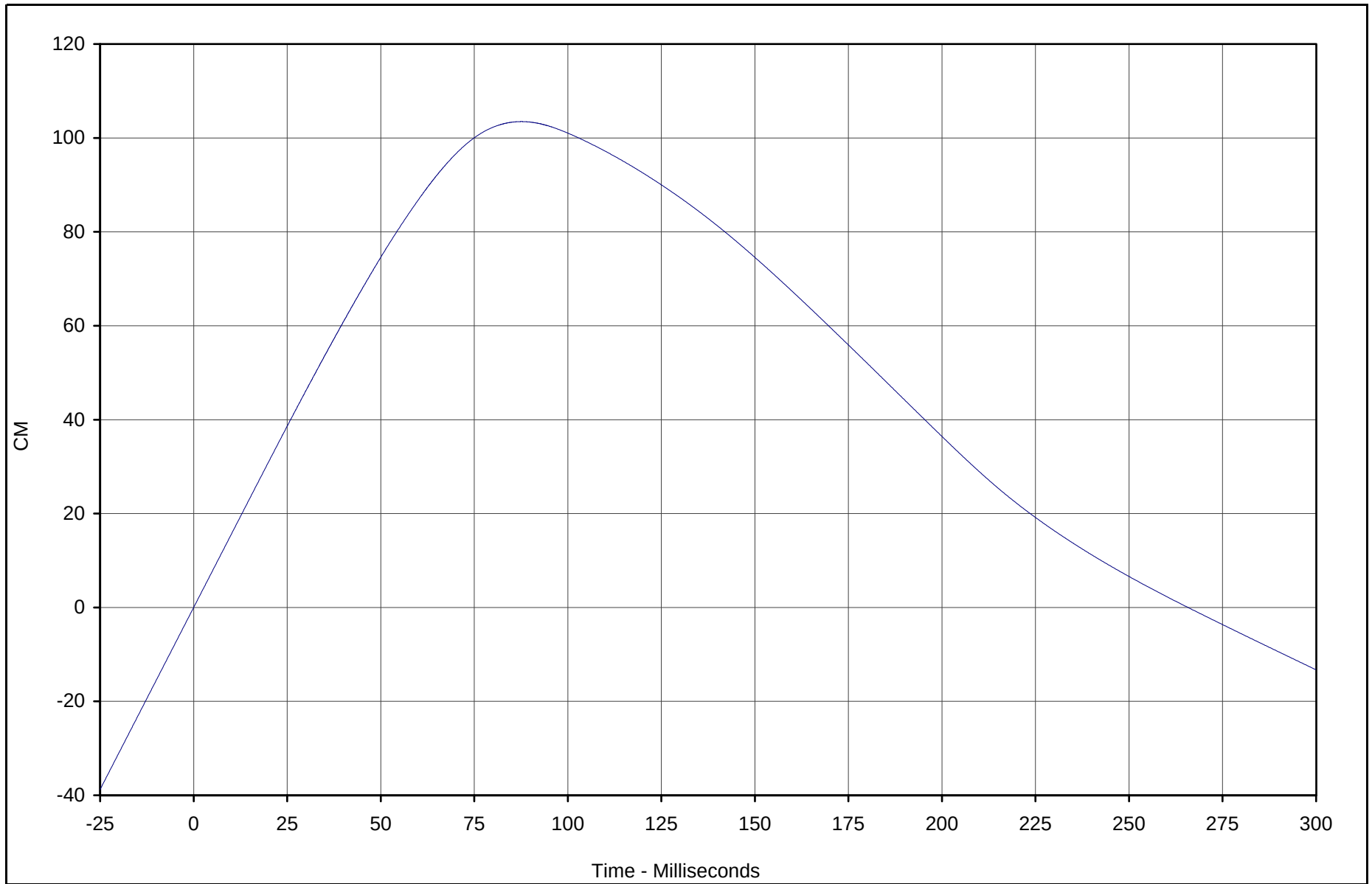


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description            | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Driver Head Primary X Displ. | 001   | IN2  | CM    | 103.5 | 87.6 | -13.2 | 299.9 | 180       |

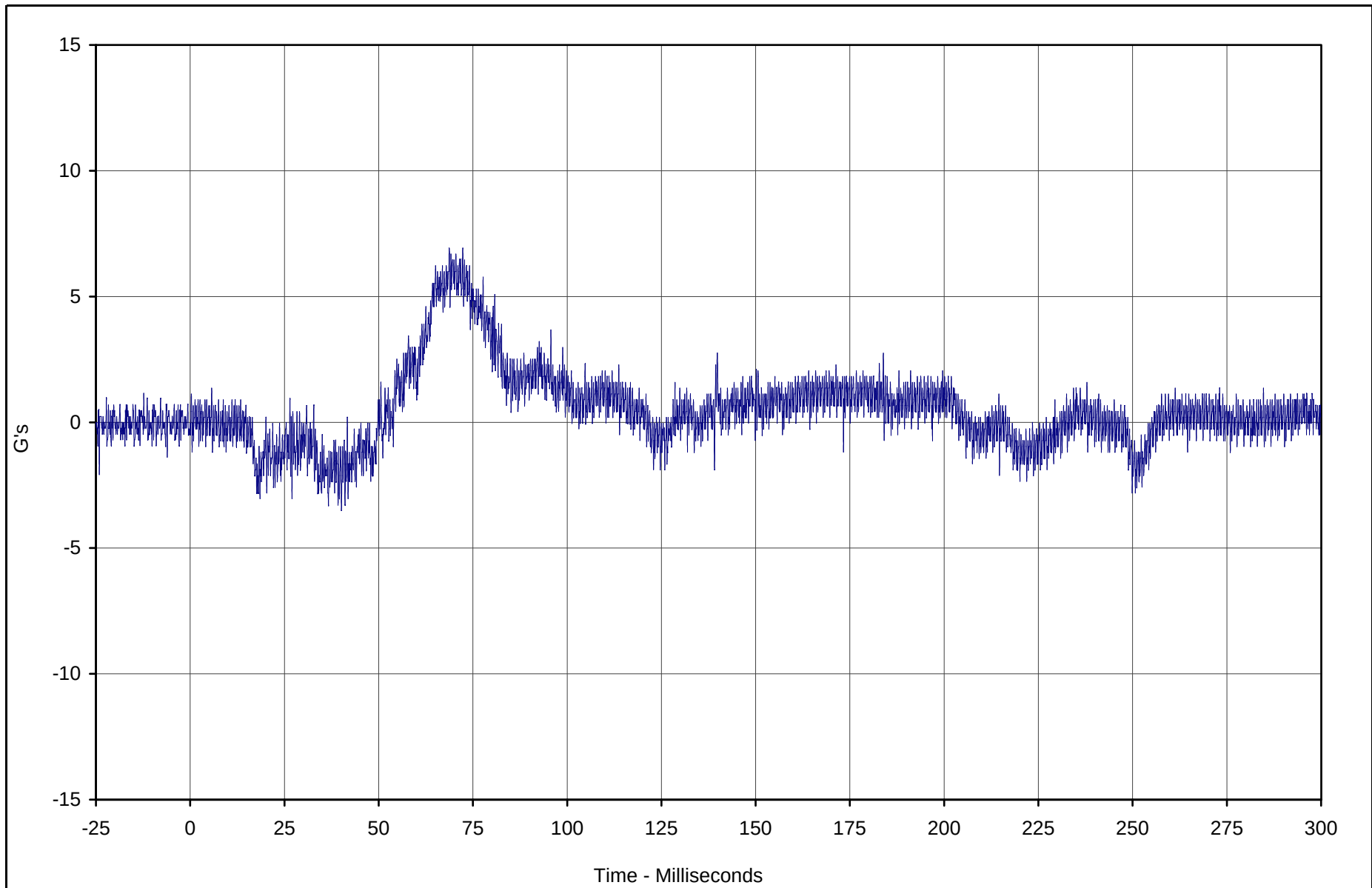


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description     | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-----------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Head Primary Y | 002   | FIL  | G's   | 6.9 | 68.7 | -3.5 | 40.1 | 1000      |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

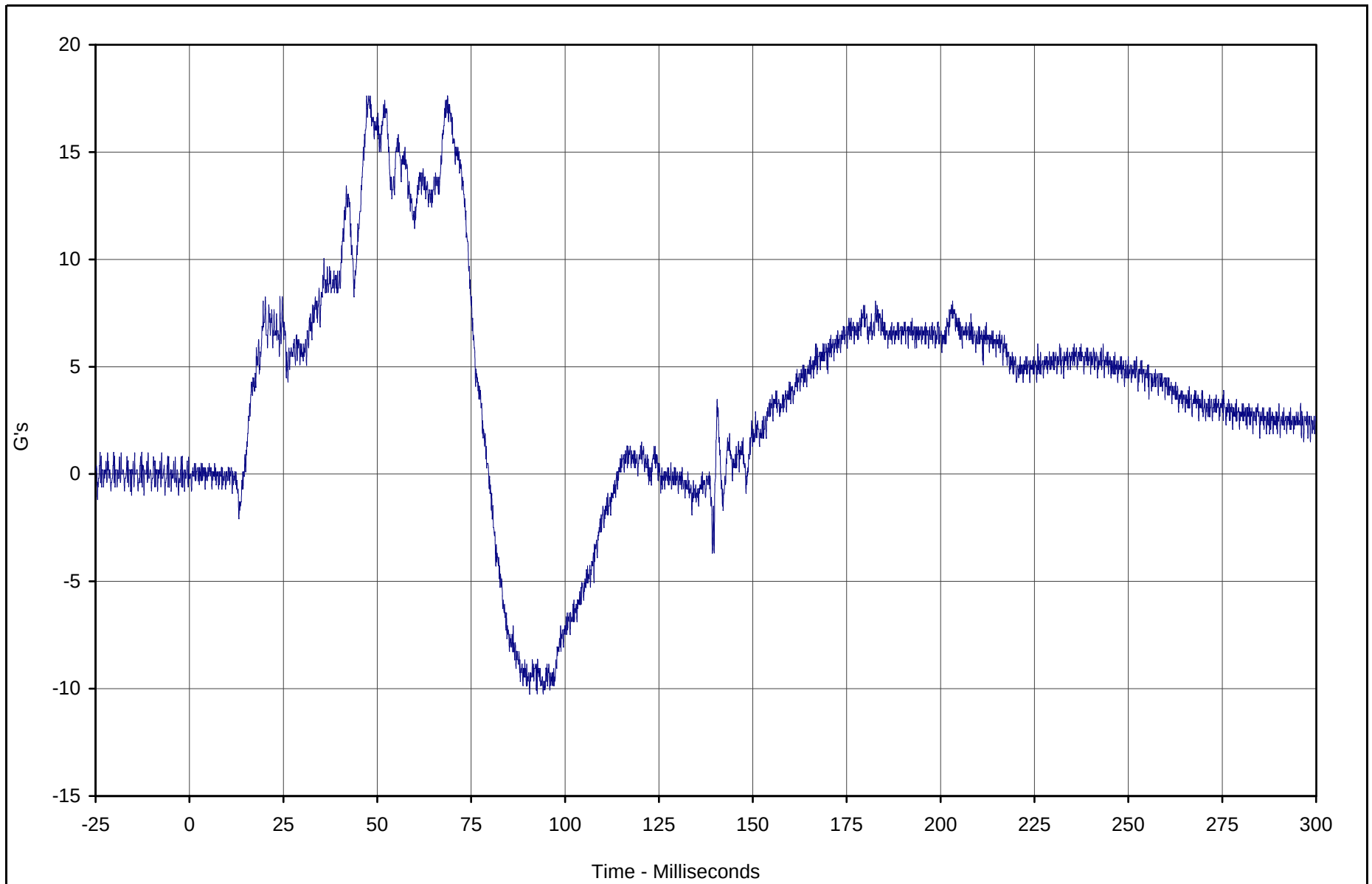
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



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| Curve Description     | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Head Primary Z | 003   | FIL  | G's   | 17.6 | 47.2 | -10.2 | 90.6 | 1000      |



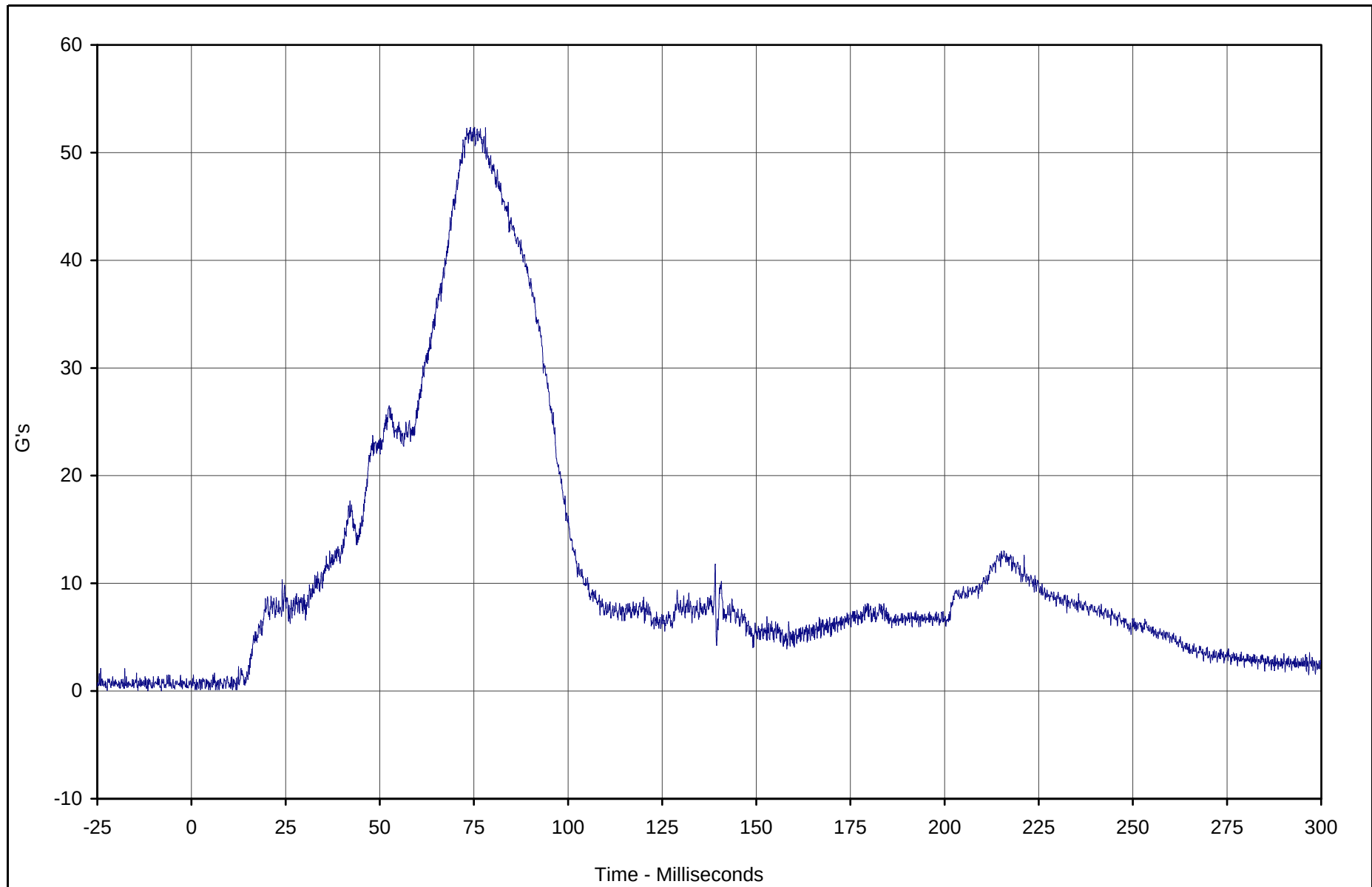
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description             | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Head Resultant Primary | 001   | RES  | G's   | 52.3 | 78.1 | 0.1 | 2.4  | 1000      |

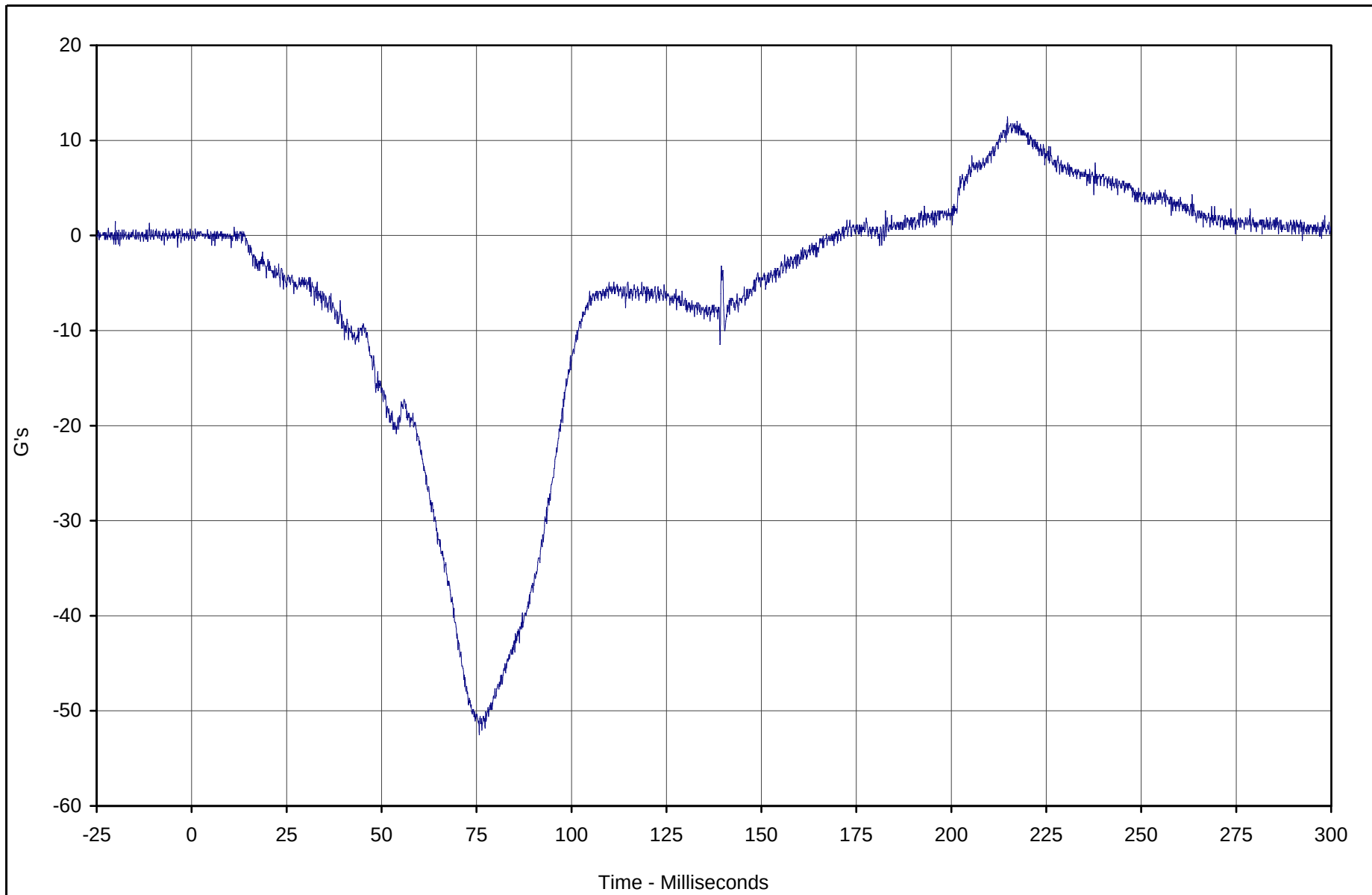


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Driver Head Redundant X | 004   | FIL  | G's   | 12.5 | 214.8 | -52.5 | 75.7 | 1000      |



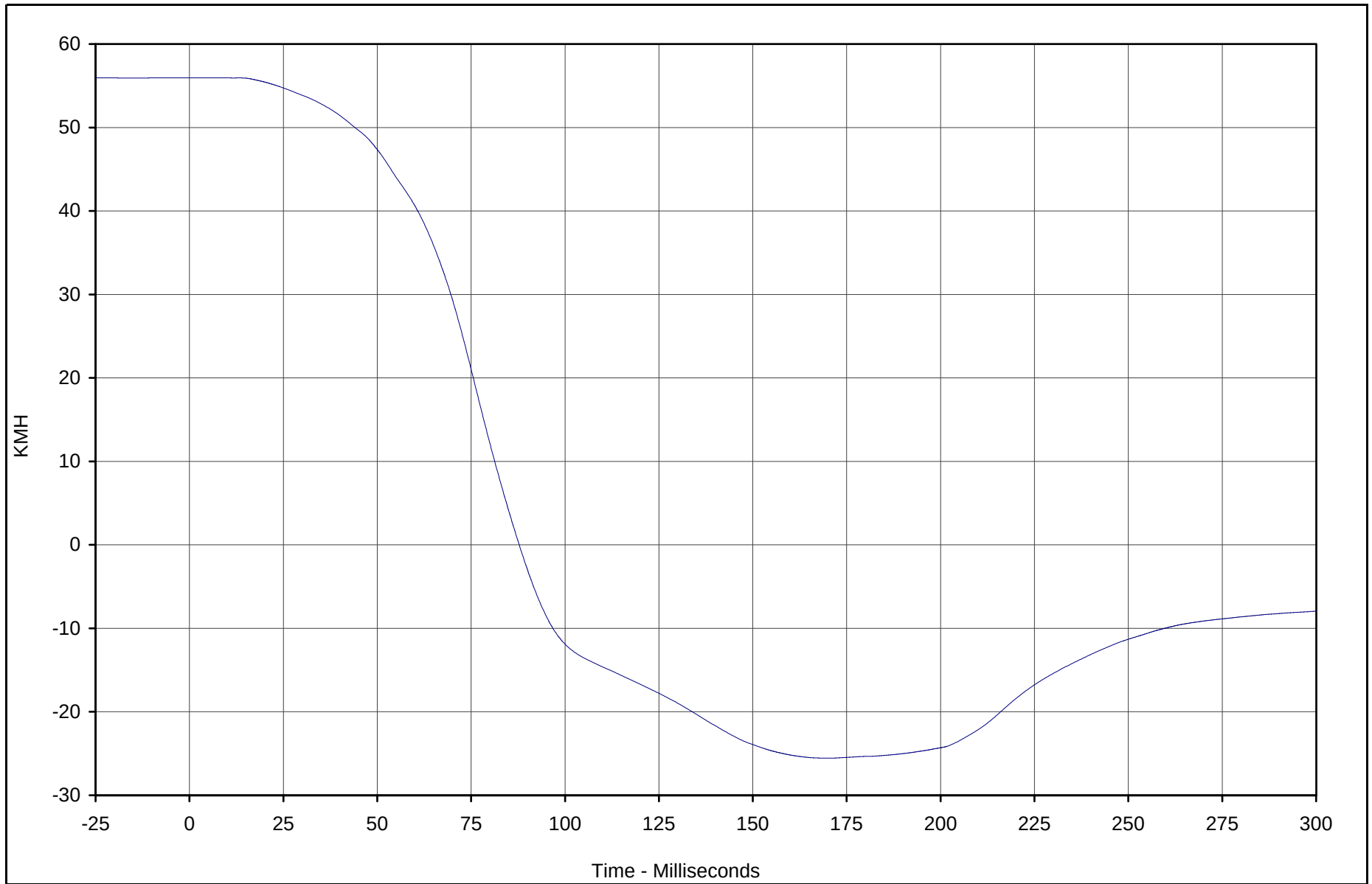
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Head Redundant X Velocity | 004   | IN1  | KMH   | 56.0 | 4.2  | -25.6 | 169.8 | 180       |

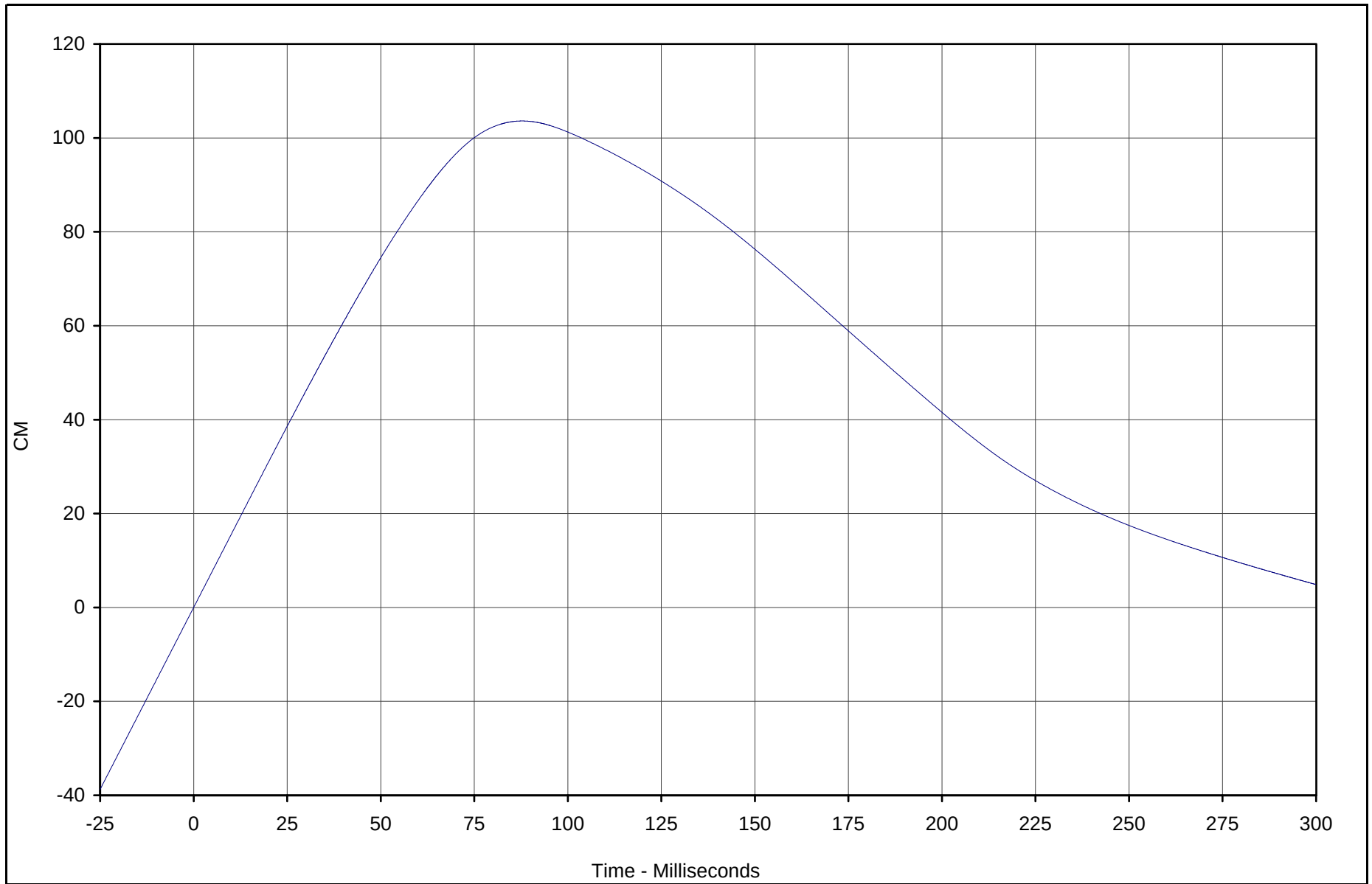


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description              | CURNO | Type | Units | Max   | Time | Min | Time | SAE Class |
|--------------------------------|-------|------|-------|-------|------|-----|------|-----------|
| Driver Head Redundant X Displ. | 004   | IN2  | CM    | 103.6 | 87.8 | 0.0 | 0.0  | 180       |

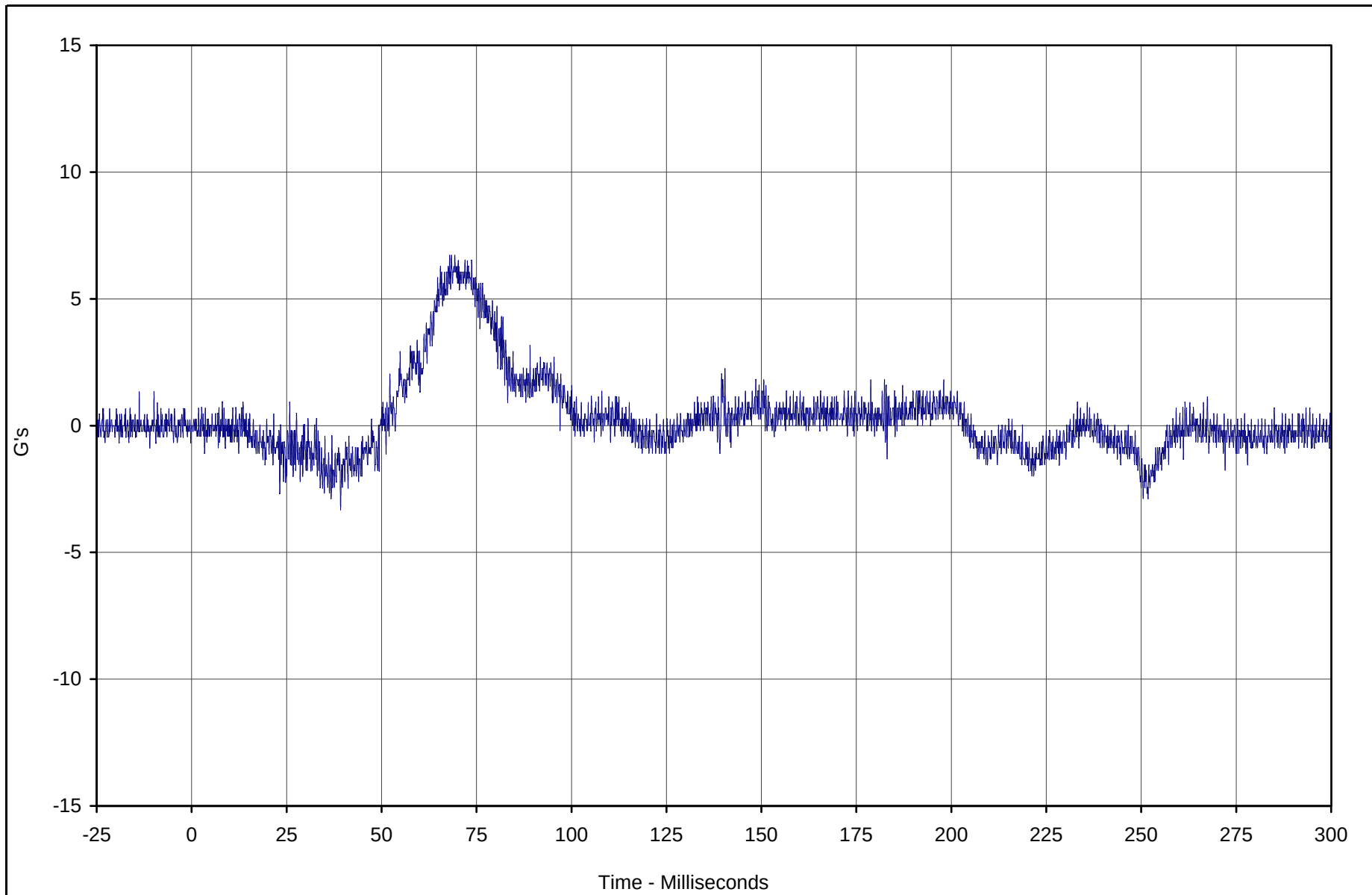


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-------------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Head Redundant Y | 005   | FIL  | G's   | 6.7 | 67.9 | -3.3 | 39.2 | 1000      |



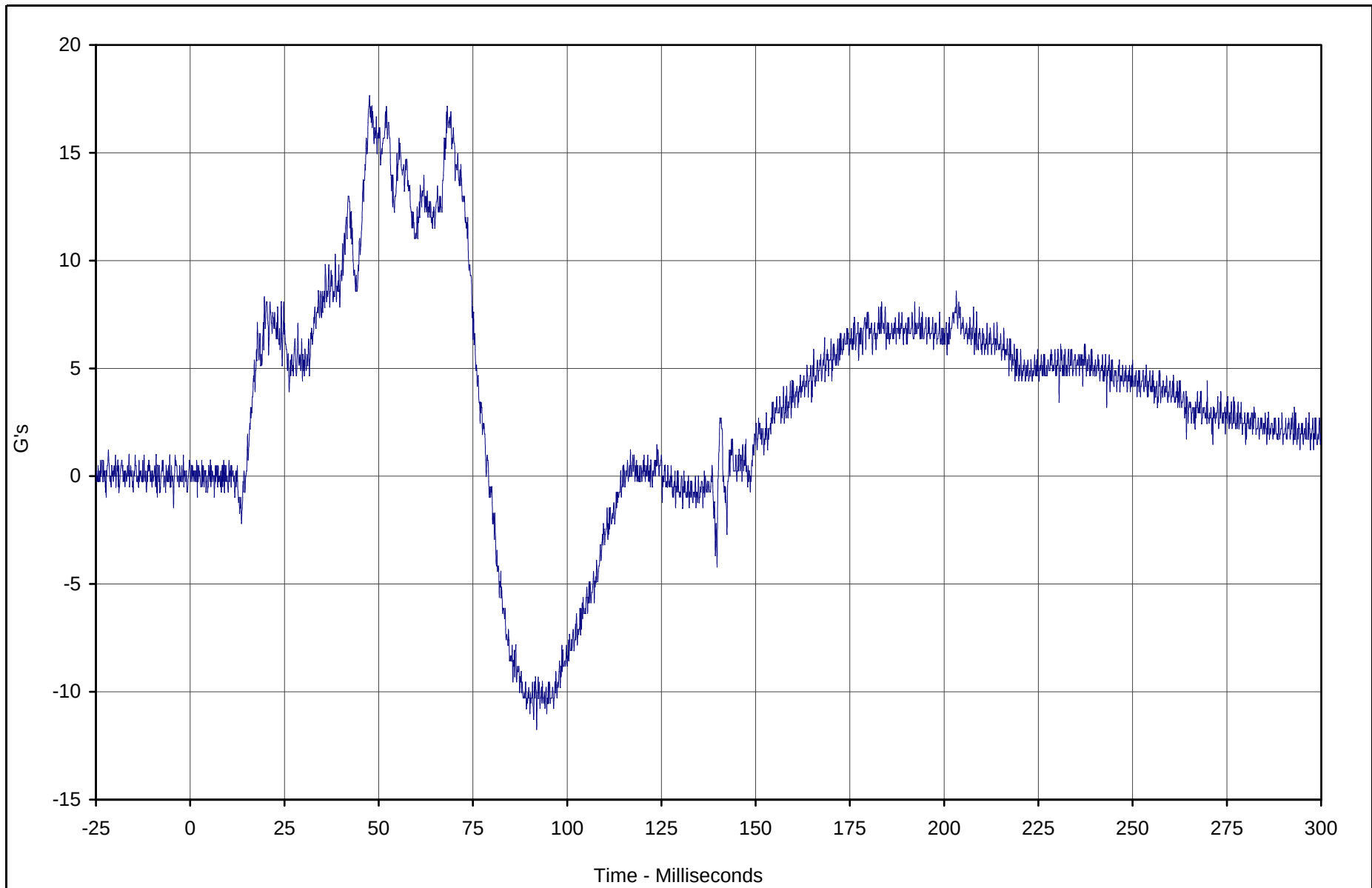
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description       | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Head Redundant Z | 006   | FIL  | G's   | 17.6 | 47.6 | -11.8 | 91.9 | 1000      |

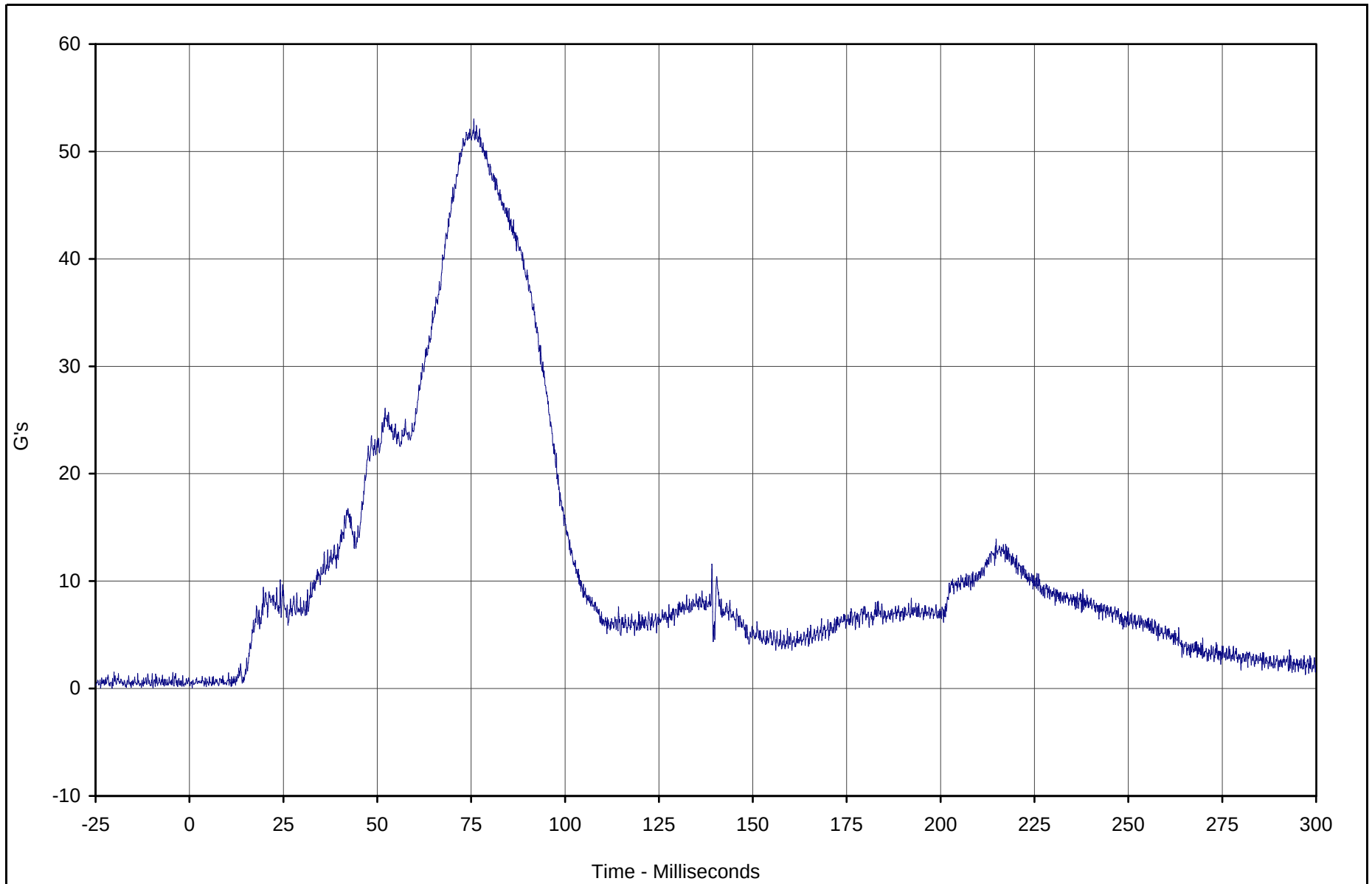


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Head Resultant Redundant | 004   | RES  | G's   | 53.0 | 75.7 | 0.0 | 0.7  | 1000      |

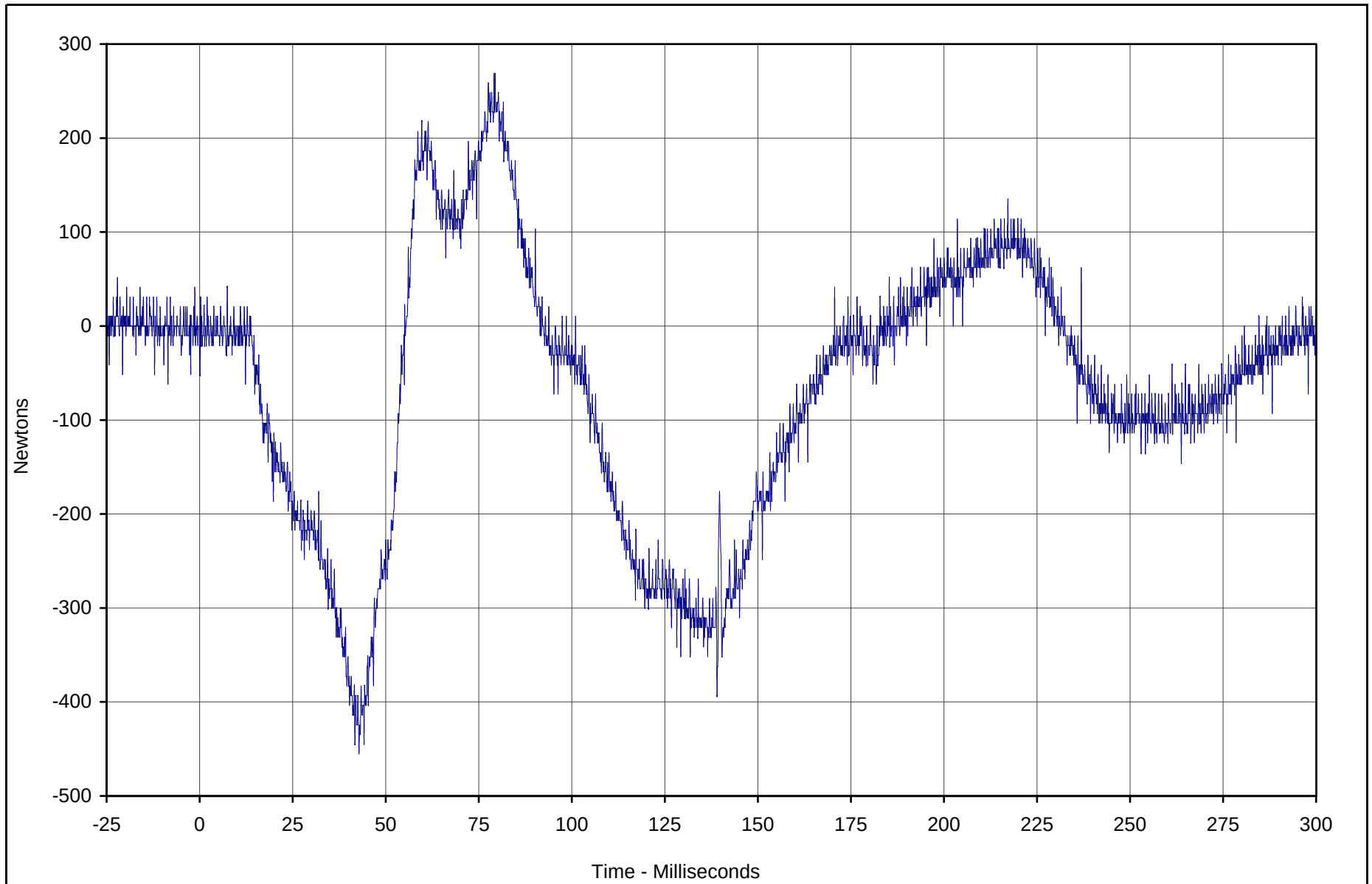


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description   | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|---------------------|-------|------|---------|-------|------|--------|------|-----------|
| Driver Neck Force X | 007   | FIL  | Newtons | 269.1 | 79.1 | -455.4 | 42.8 | 1000      |



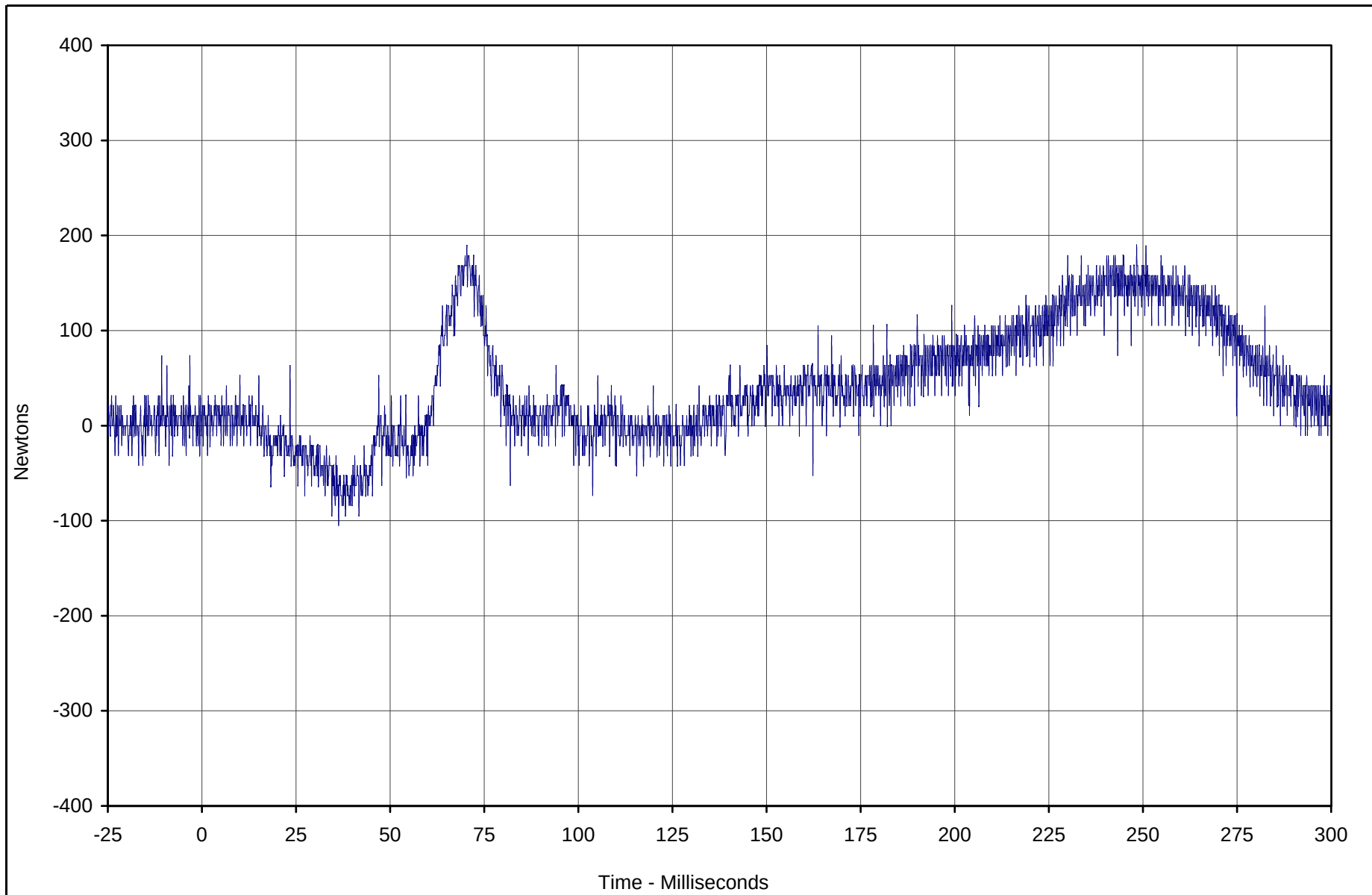
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description   | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|---------------------|-------|------|---------|-------|------|--------|------|-----------|
| Driver Neck Force Y | 008   | FIL  | Newtons | 189.3 | 70.4 | -105.2 | 36.3 | 1000      |

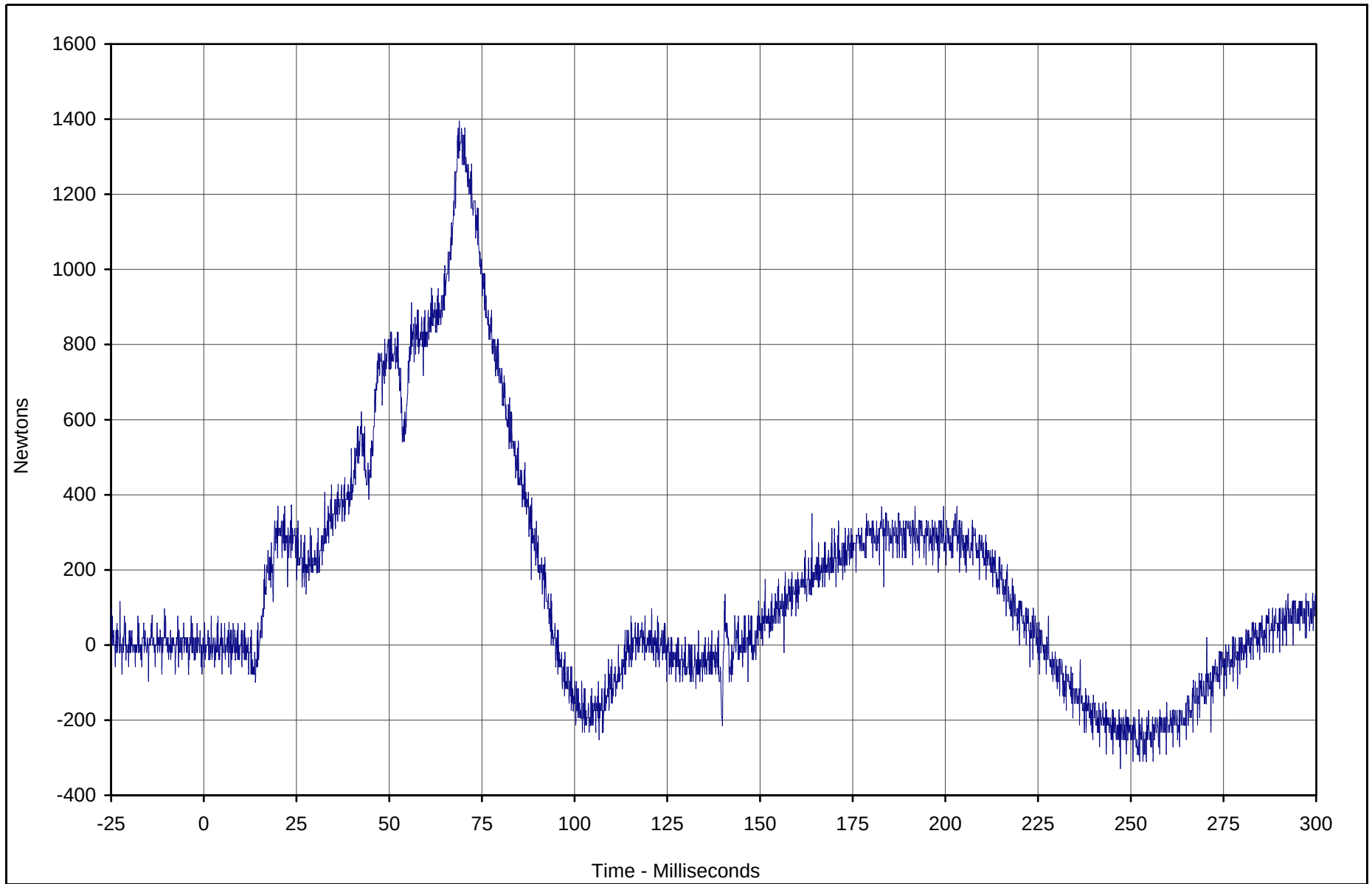


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description   | CURNO | Type | Units   | Max    | Time | Min    | Time  | SAE Class |
|---------------------|-------|------|---------|--------|------|--------|-------|-----------|
| Driver Neck Force Z | 009   | FIL  | Newtons | 1395.2 | 68.9 | -329.4 | 247.2 | 1000      |

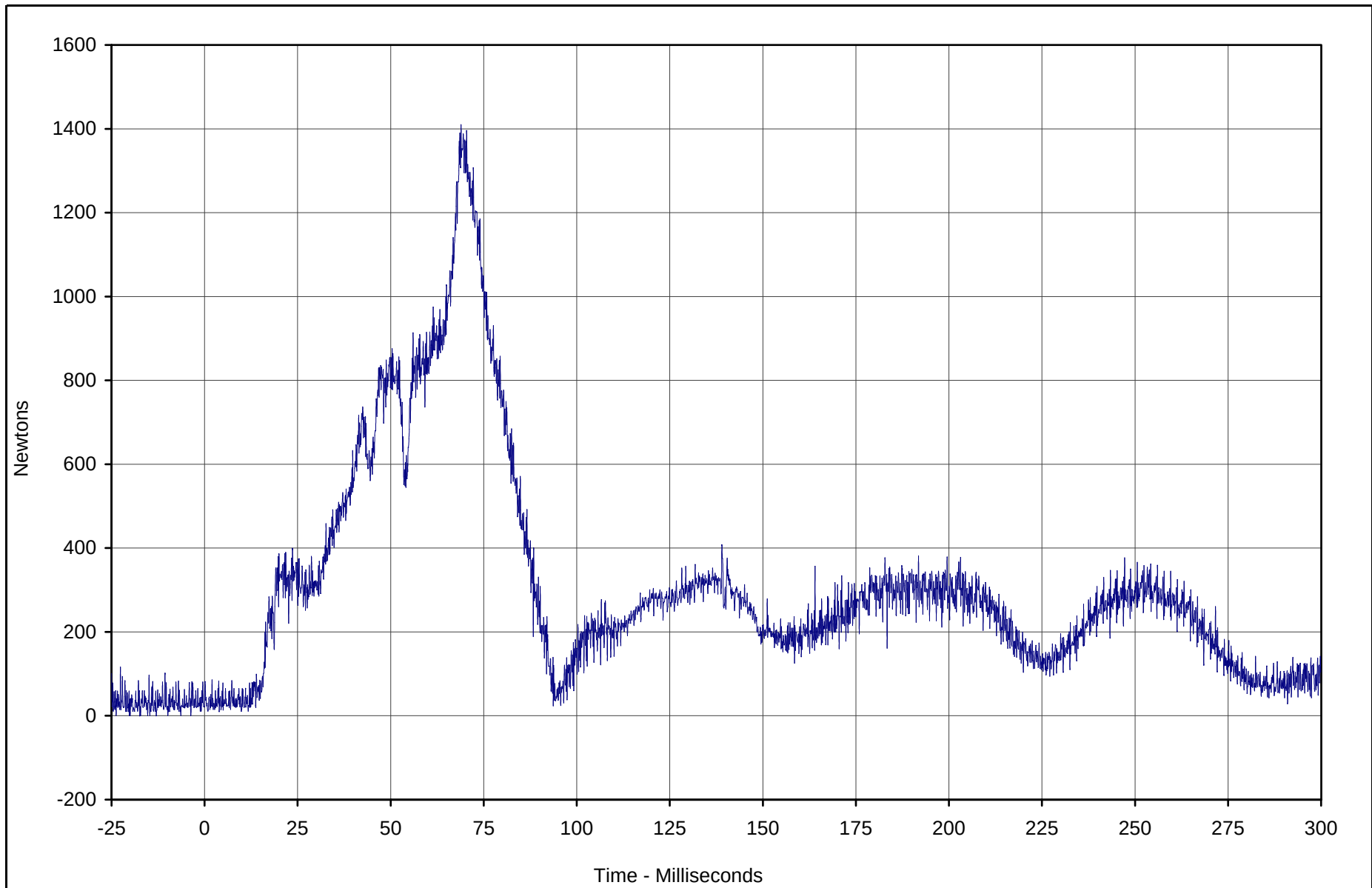


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description           | CURNO | Type | Units   | Max    | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|---------|--------|------|------|------|-----------|
| Driver Neck Force Resultant | 007   | RES  | Newtons | 1410.0 | 68.9 | 10.4 | 0.9  | 1000      |



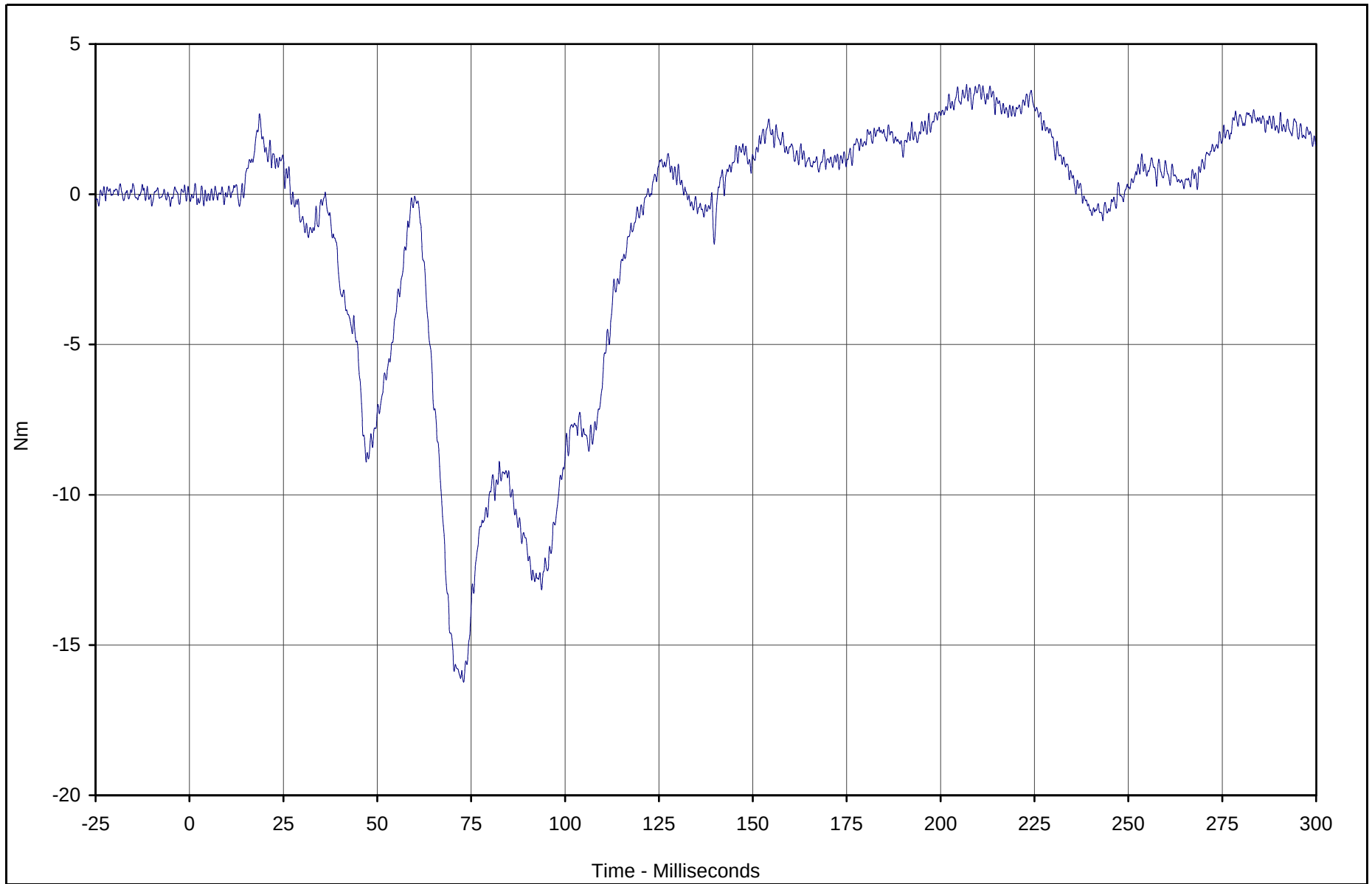
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description    | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Neck Moment X | 010   | FIL  | Nm    | 3.7 | 206.9 | -16.2 | 73.0 | 600       |

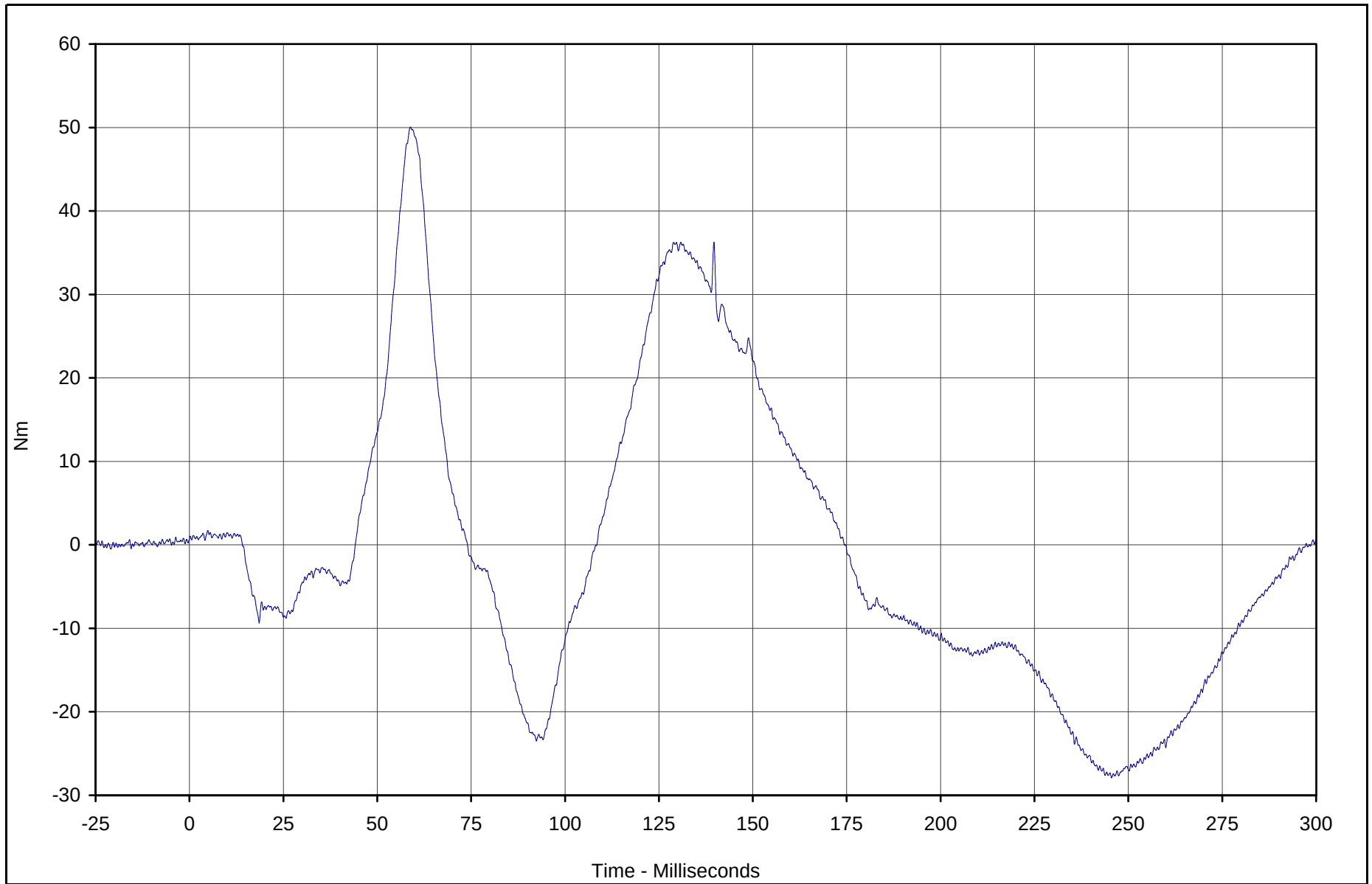


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description    | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Neck Moment Y | 011   | FIL  | Nm    | 50.1 | 58.8 | -27.9 | 245.5 | 600       |

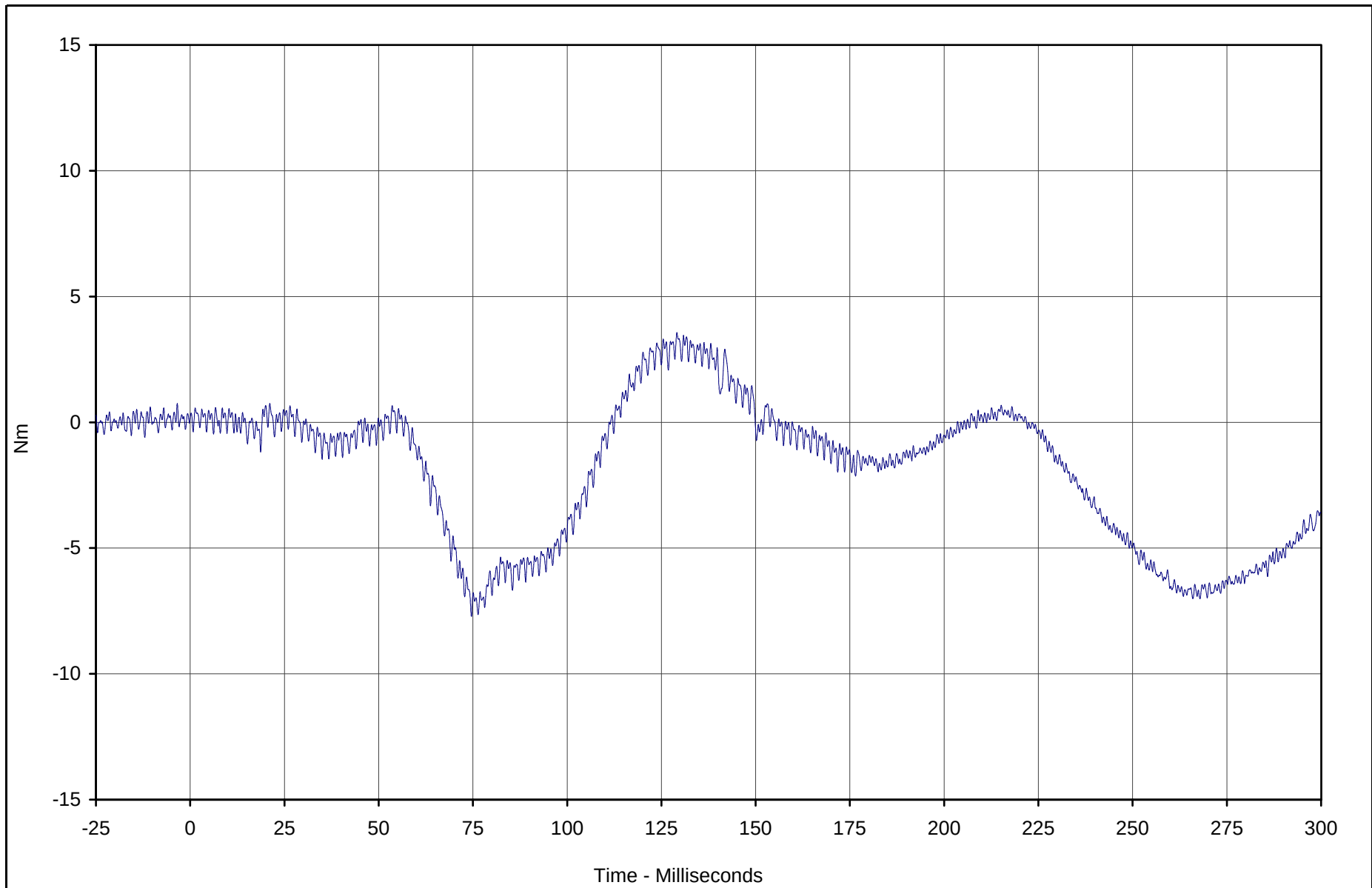


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description    | CURNO | Type | Units | Max | Time  | Min  | Time | SAE Class |
|----------------------|-------|------|-------|-----|-------|------|------|-----------|
| Driver Neck Moment Z | 012   | FIL  | Nm    | 3.6 | 129.1 | -7.7 | 74.6 | 600       |



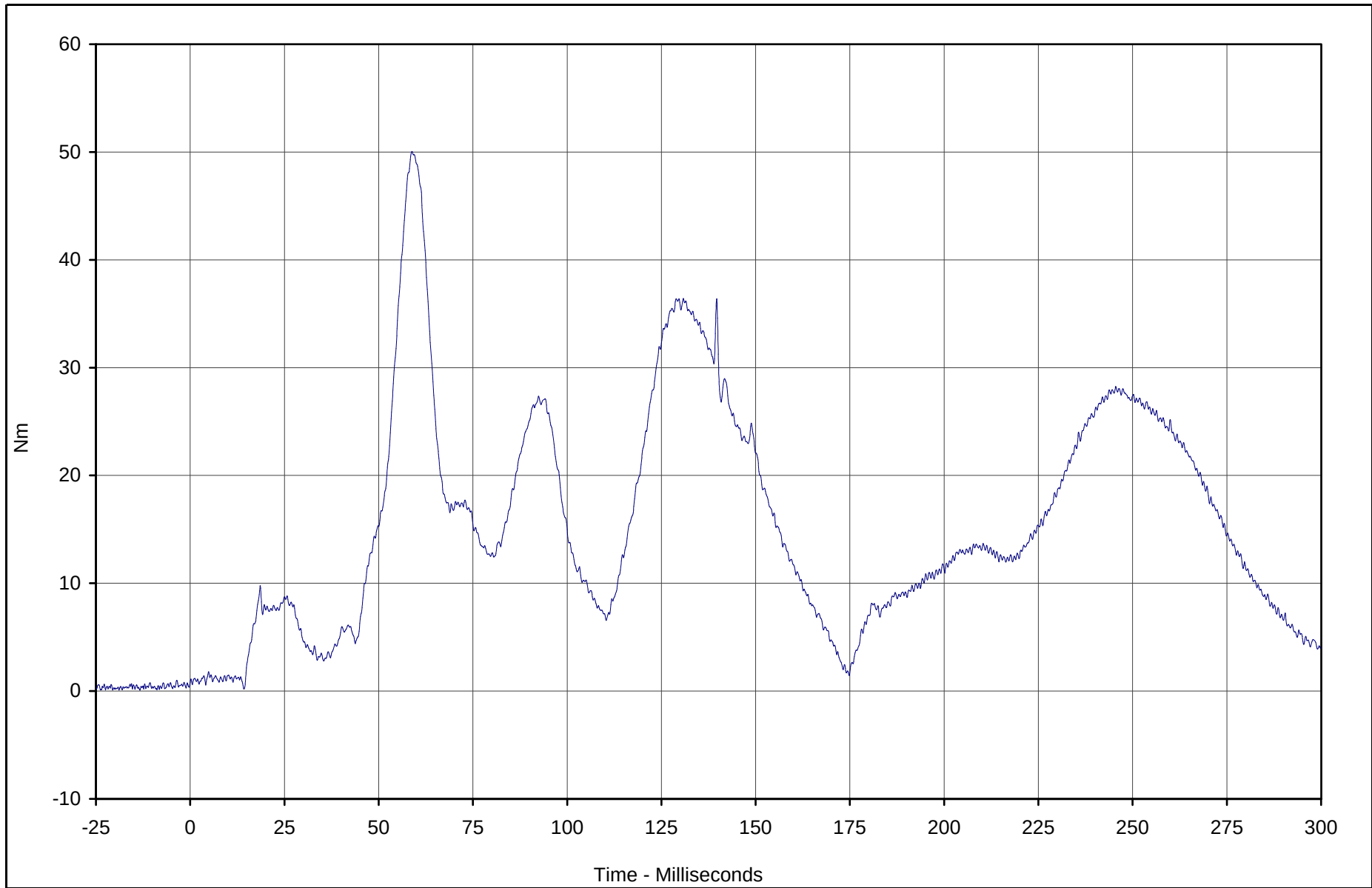
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description            | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Neck Moment Resultant | 010   | RES  | Nm    | 50.1 | 58.8 | 0.2 | 14.3 | 600       |



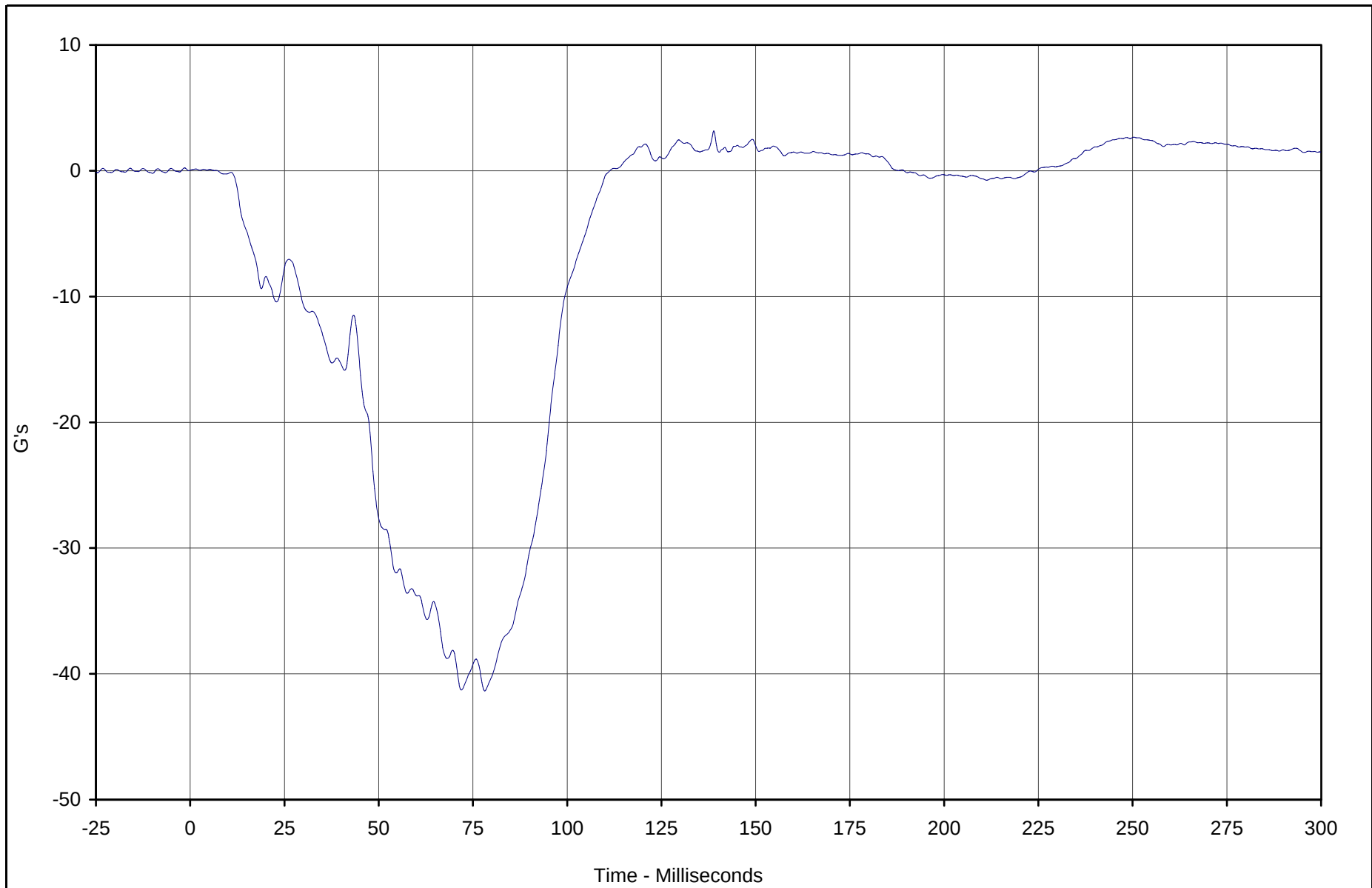
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description      | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Chest Primary X | 013   | FIL  | G's   | 3.2 | 138.9 | -41.4 | 78.1 | 180       |



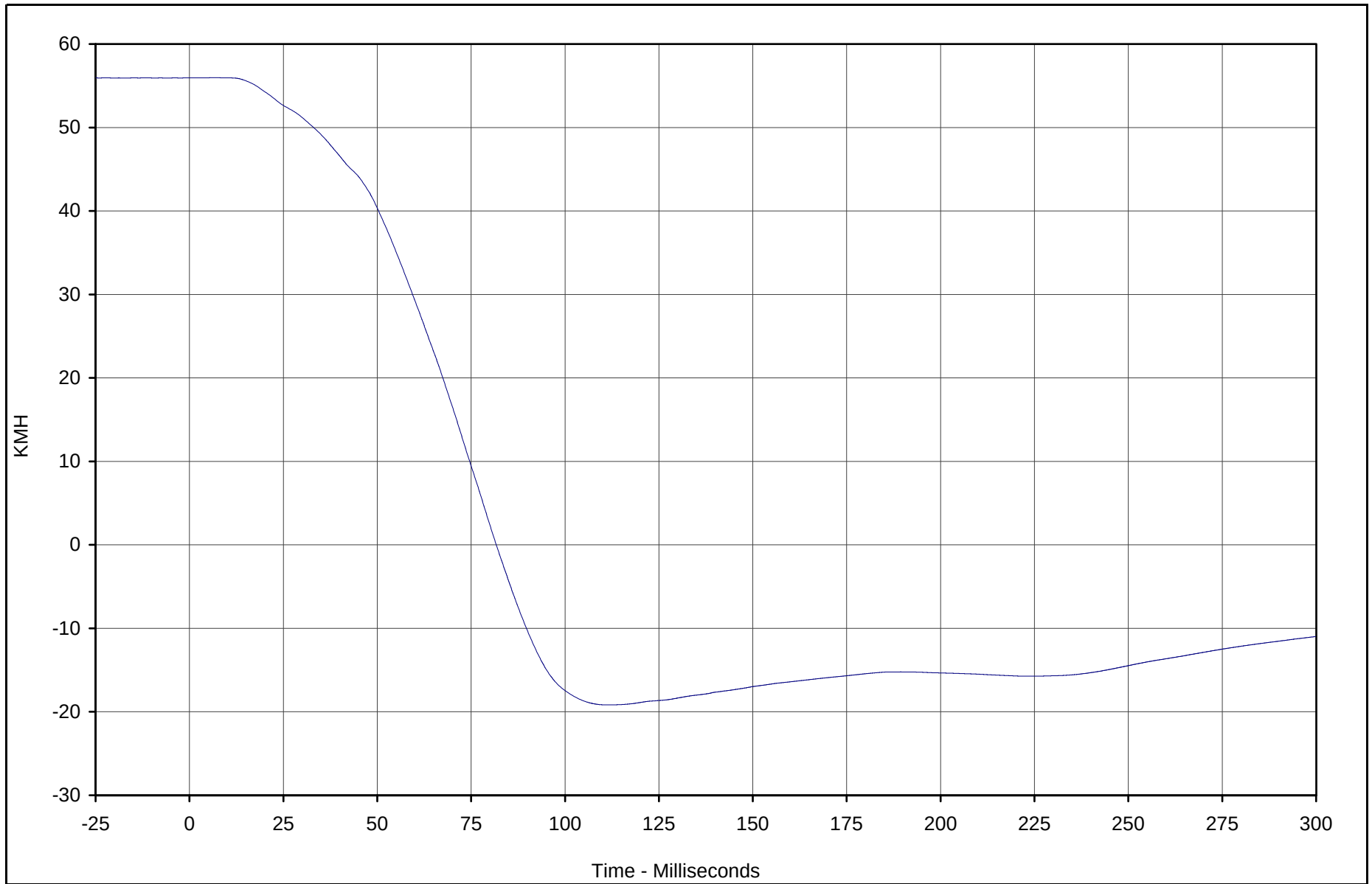
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description               | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|---------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Primary X Velocity | 013   | IN1  | KMH   | 56.0 | 7.3  | -19.2 | 111.3 | 180       |



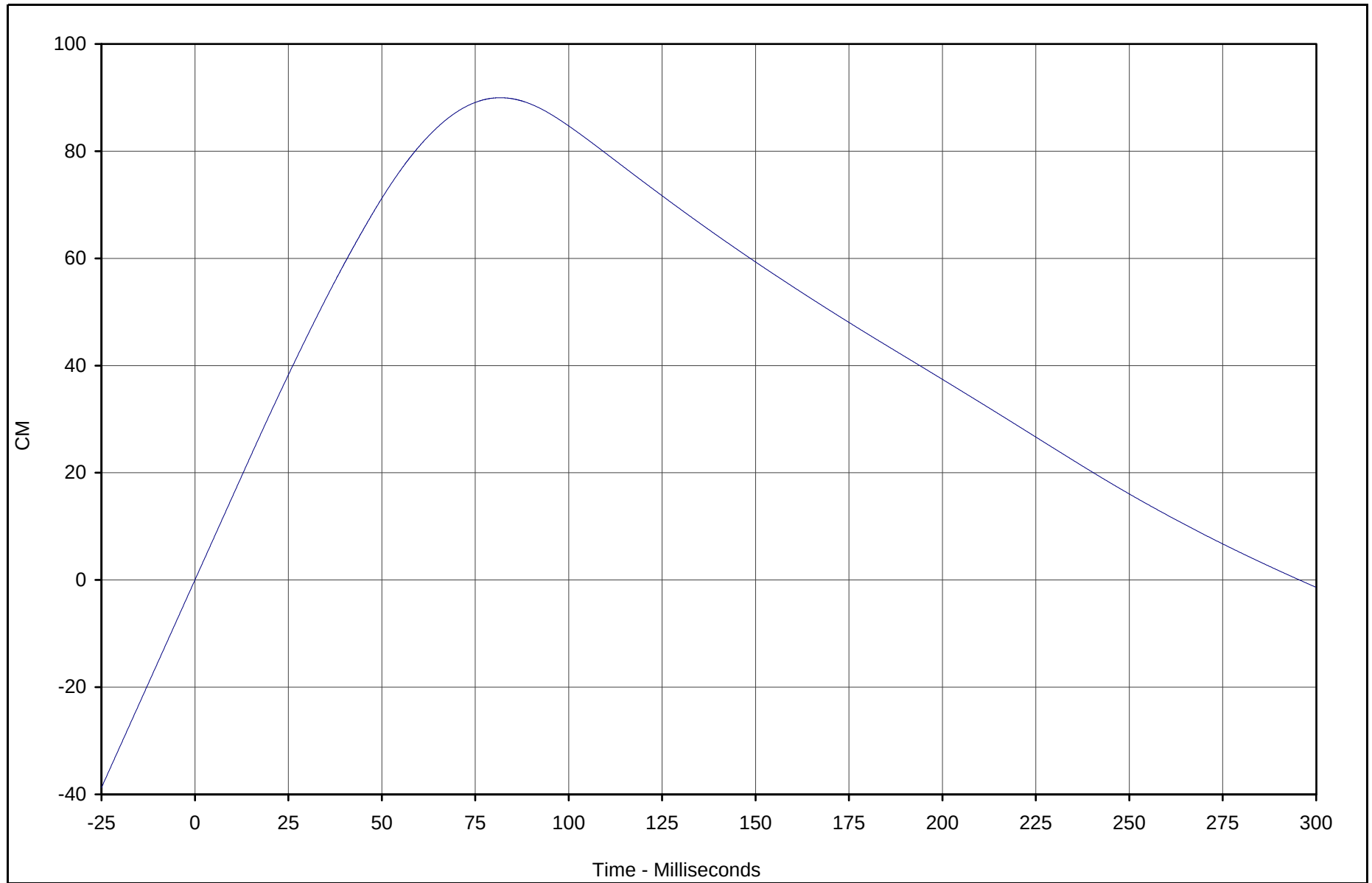
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description             | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|-------------------------------|-------|------|-------|------|------|------|-------|-----------|
| Driver Chest Primary X Displ. | 013   | IN2  | CM    | 90.0 | 81.7 | -1.3 | 299.9 | 180       |

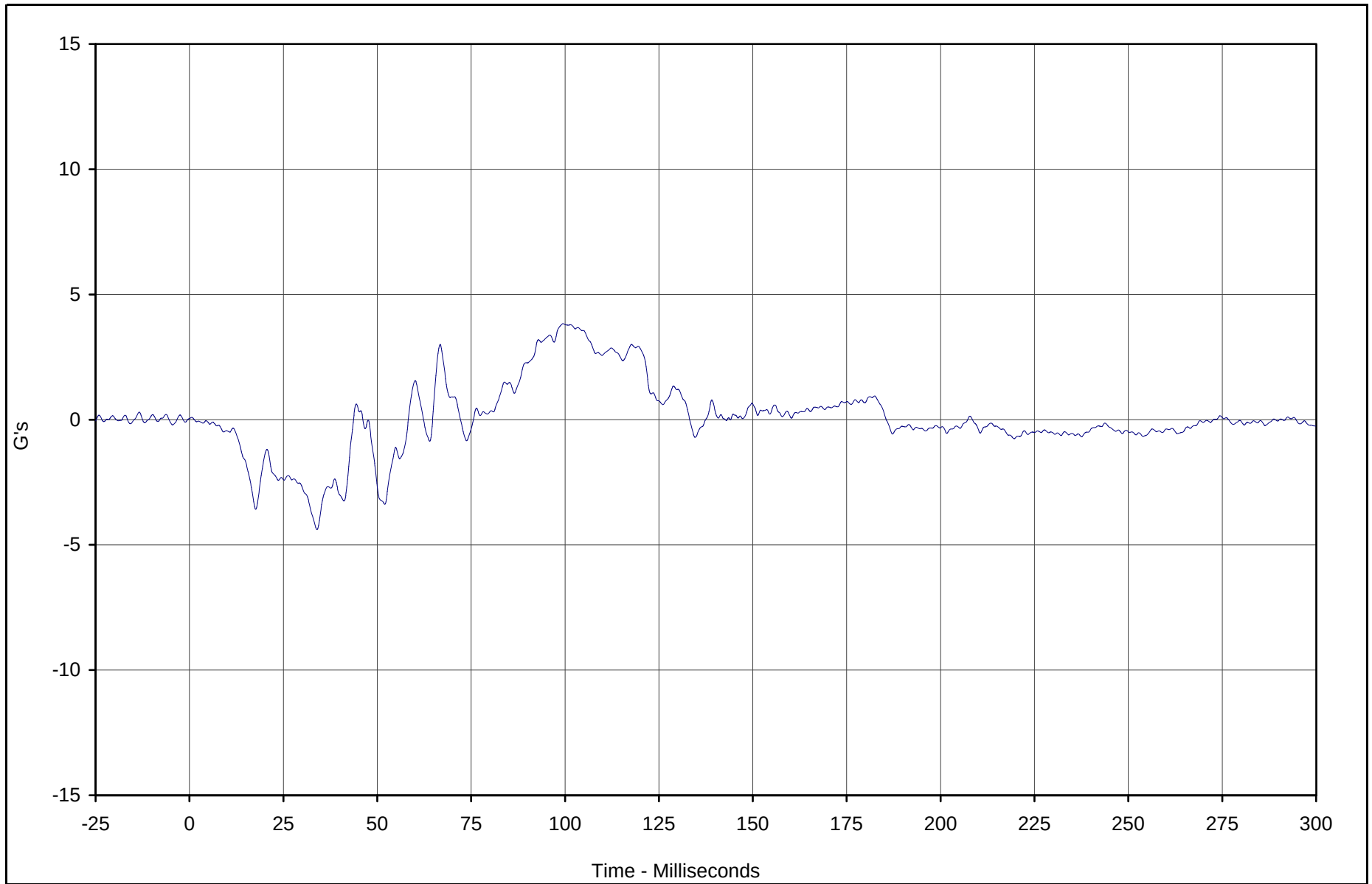


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description      | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|------------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Chest Primary Y | 014   | FIL  | G's   | 3.8 | 99.5 | -4.4 | 34.0 | 180       |

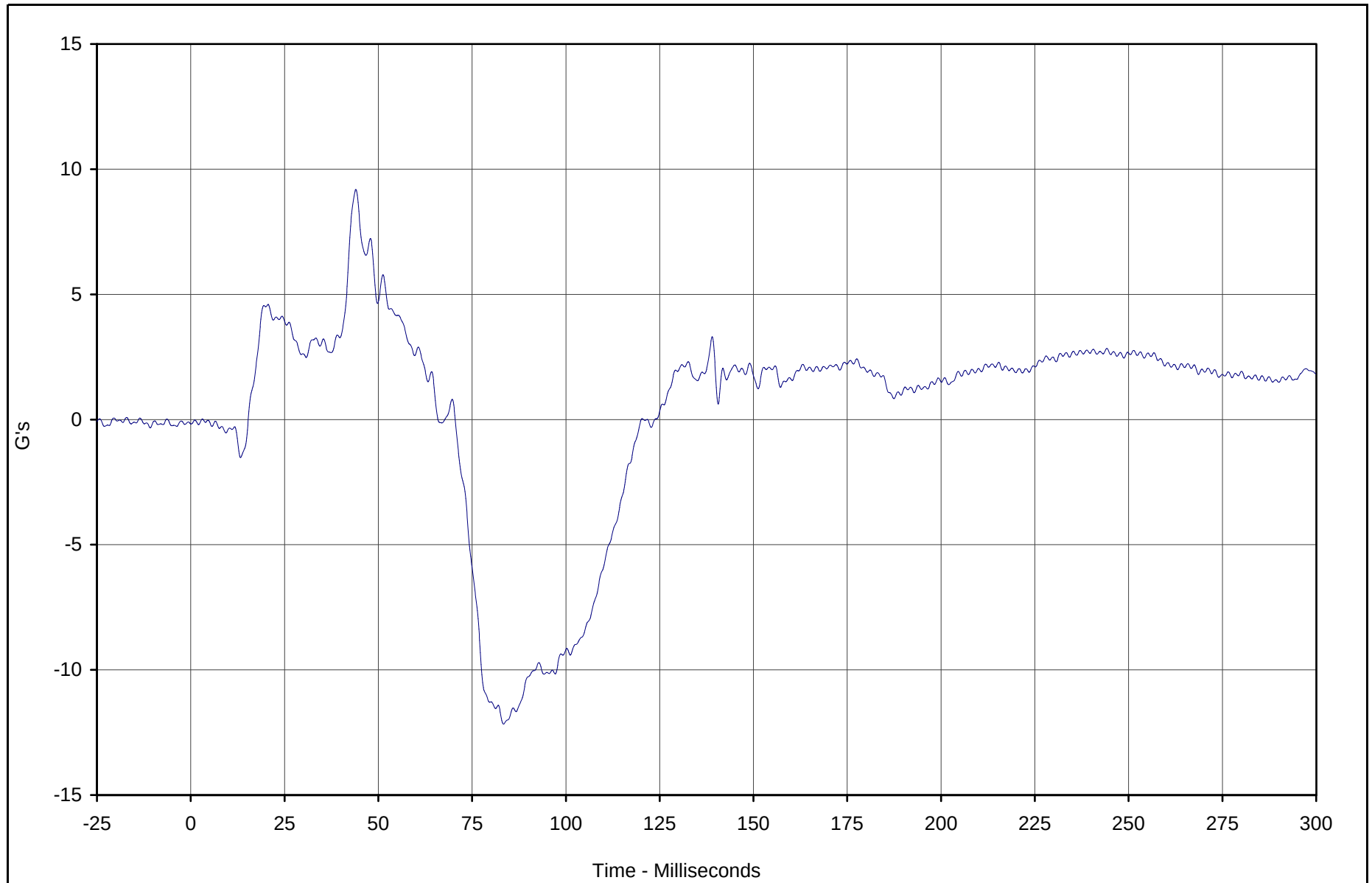


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description      | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Primary Z | 015   | FIL  | G's   | 9.2 | 44.0 | -12.2 | 83.4 | 180       |



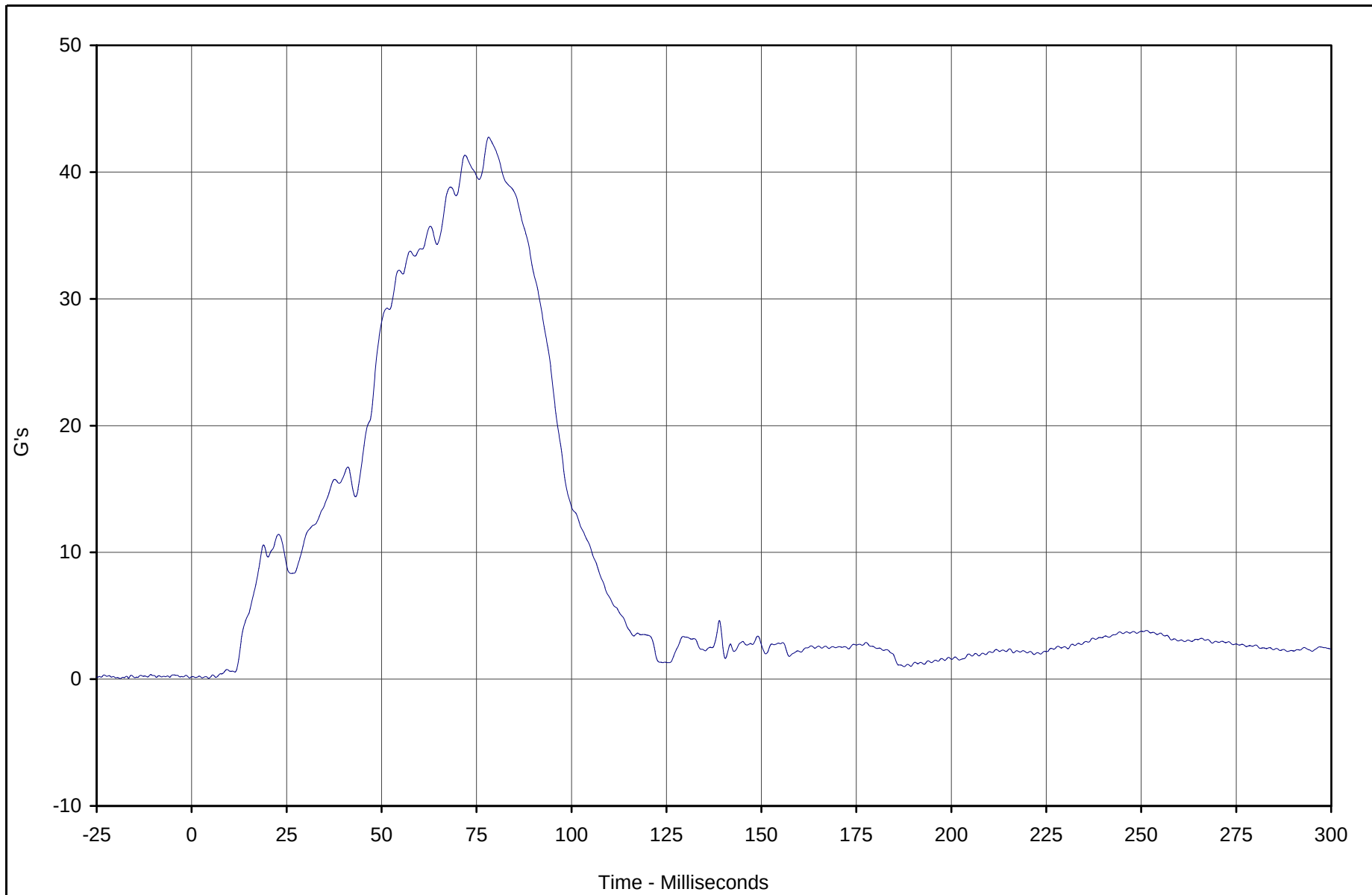
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description              | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|--------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Chest Resultant Primary | 013   | RES  | G's   | 42.8 | 78.2 | 0.1 | 4.5  | 180       |



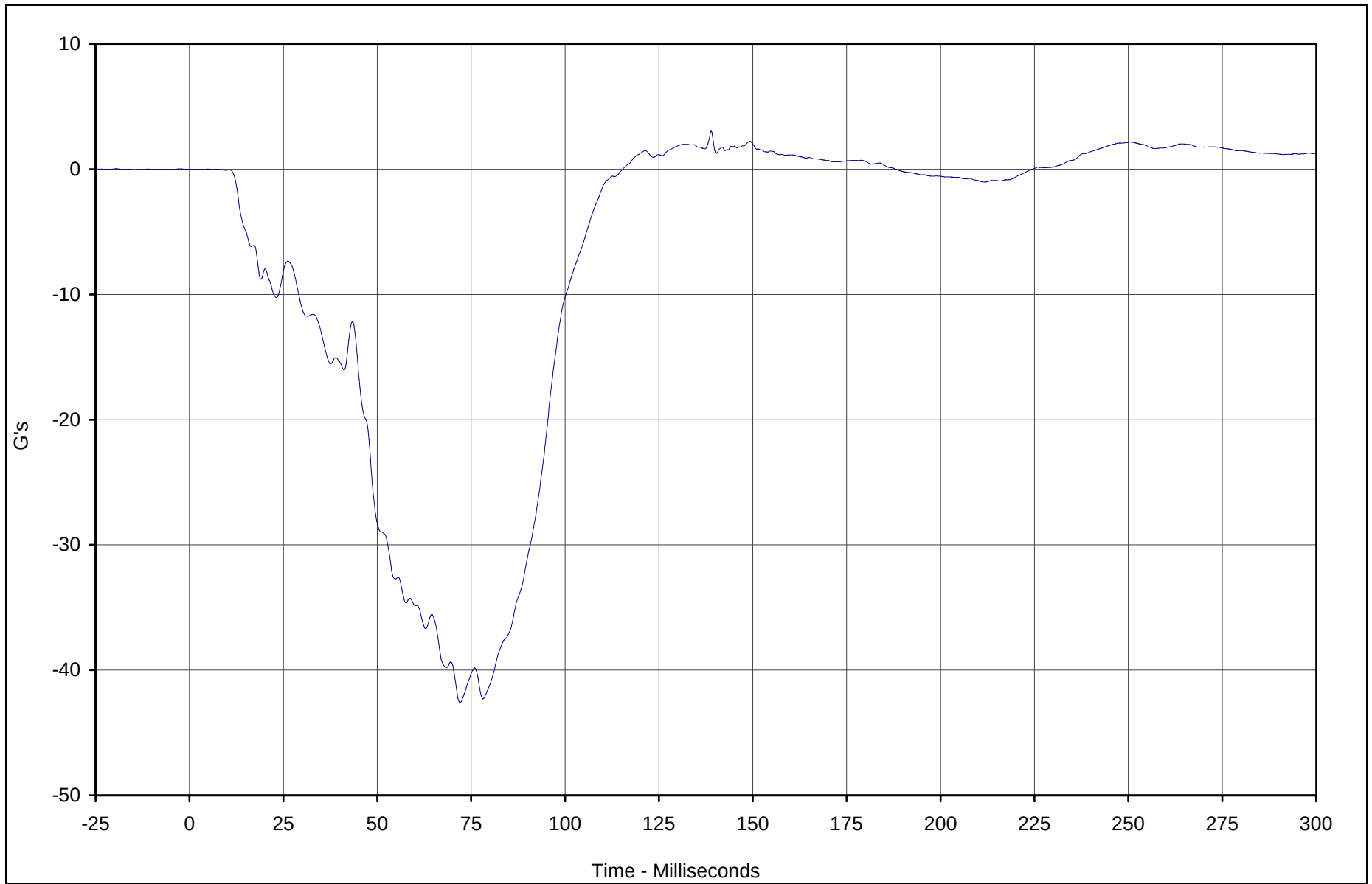
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description        | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Chest Redundant X | 016   | FIL  | G's   | 3.0 | 138.9 | -42.6 | 72.1 | 180       |



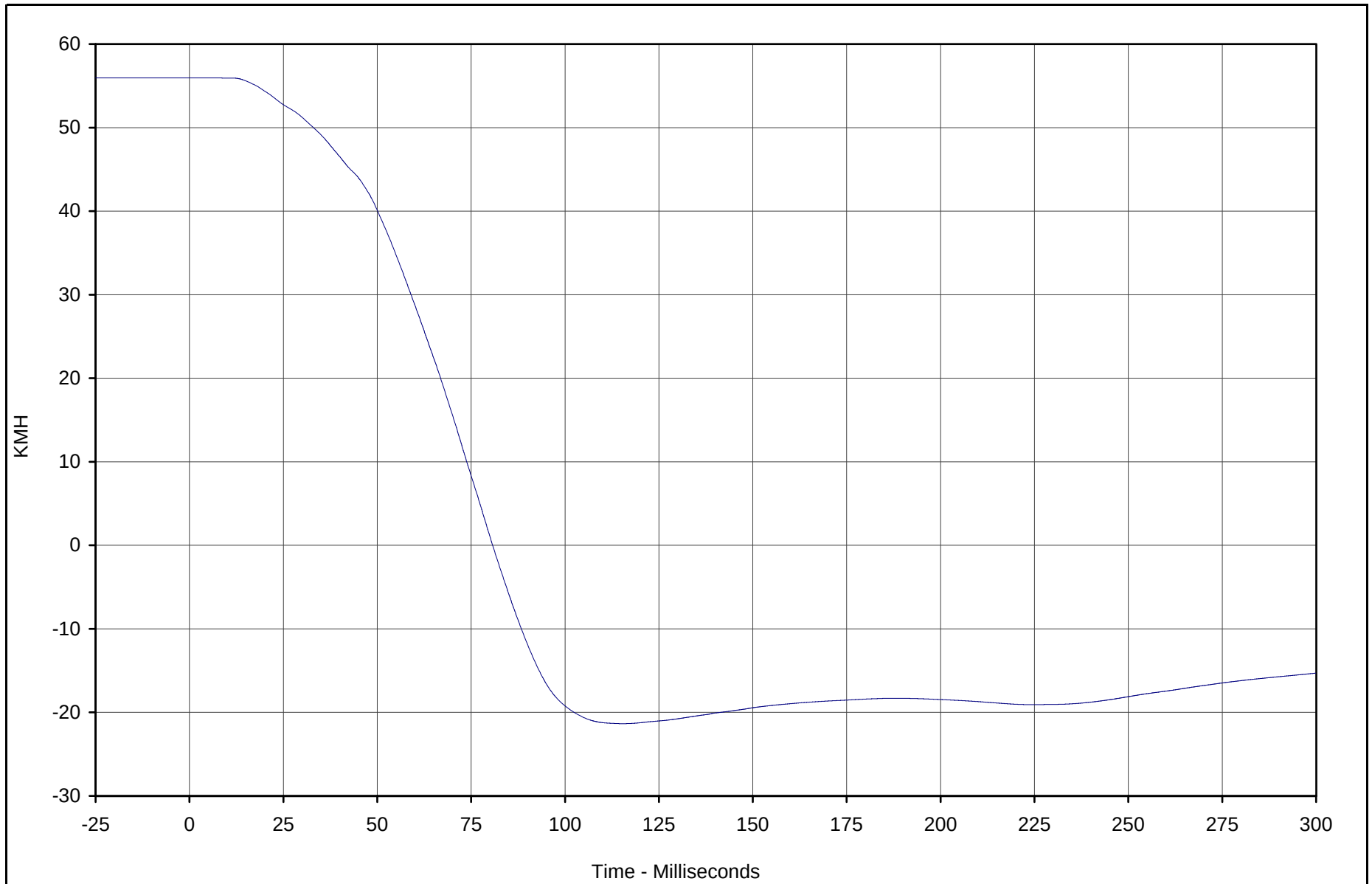
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Redundant X Velocity | 016   | IN1  | KMH   | 55.9 | 0.0  | -21.3 | 115.3 | 180       |



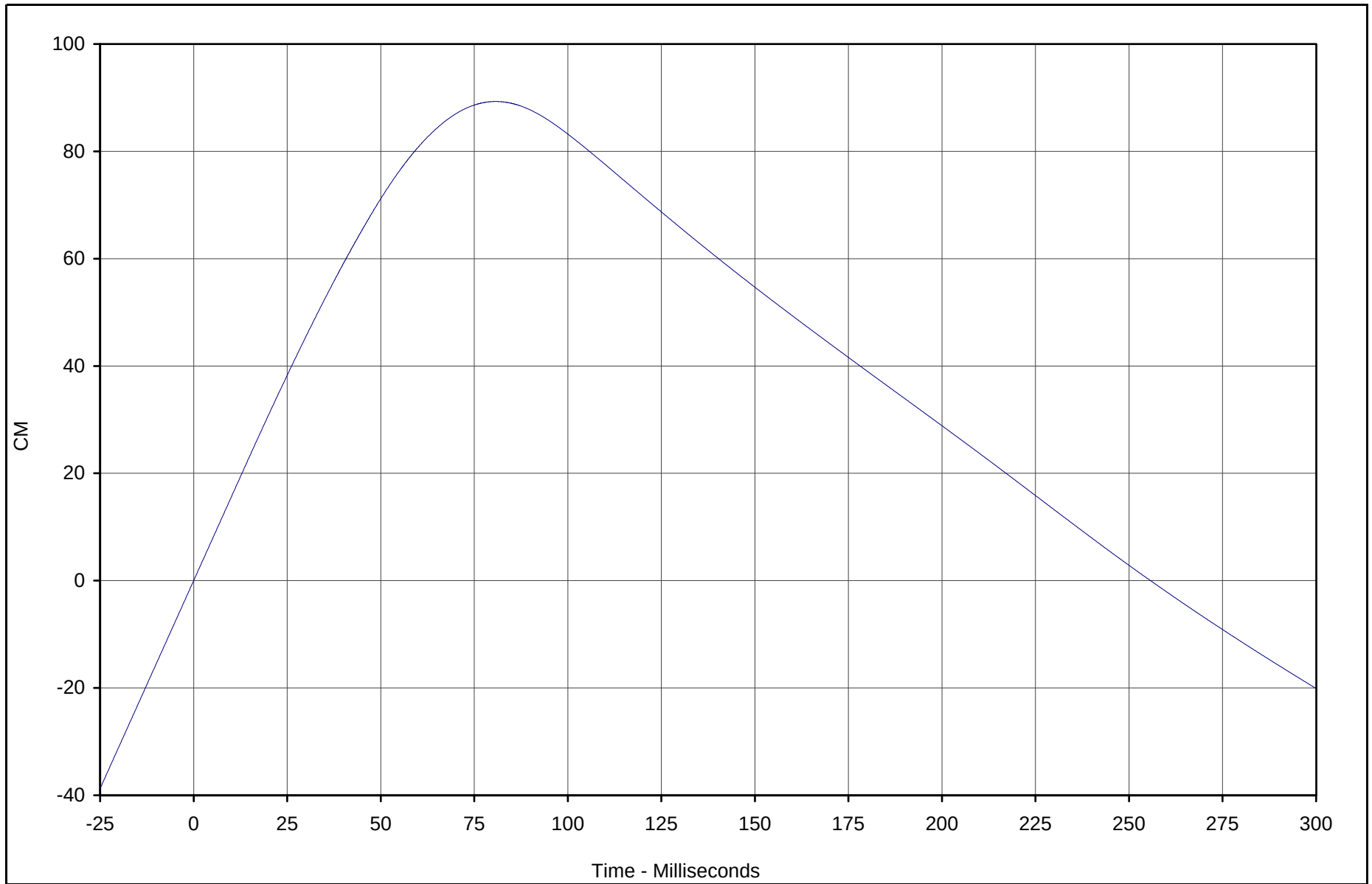
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description               | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|---------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Redundant X Displ. | 016   | IN2  | CM    | 89.3 | 80.7 | -20.1 | 299.9 | 180       |

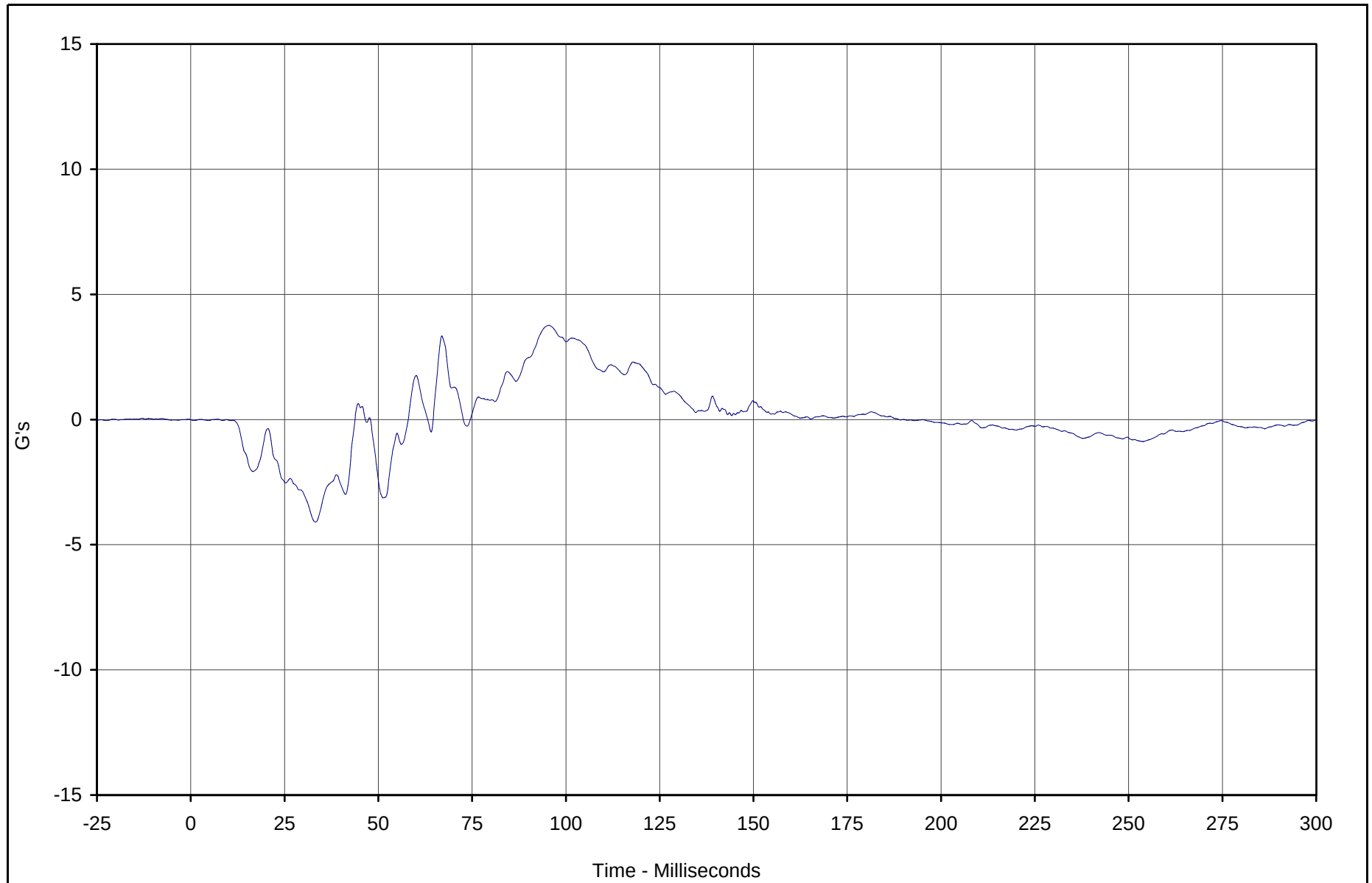


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Chest Redundant Y | 017   | FIL  | G's   | 3.8 | 95.4 | -4.1 | 33.2 | 180       |

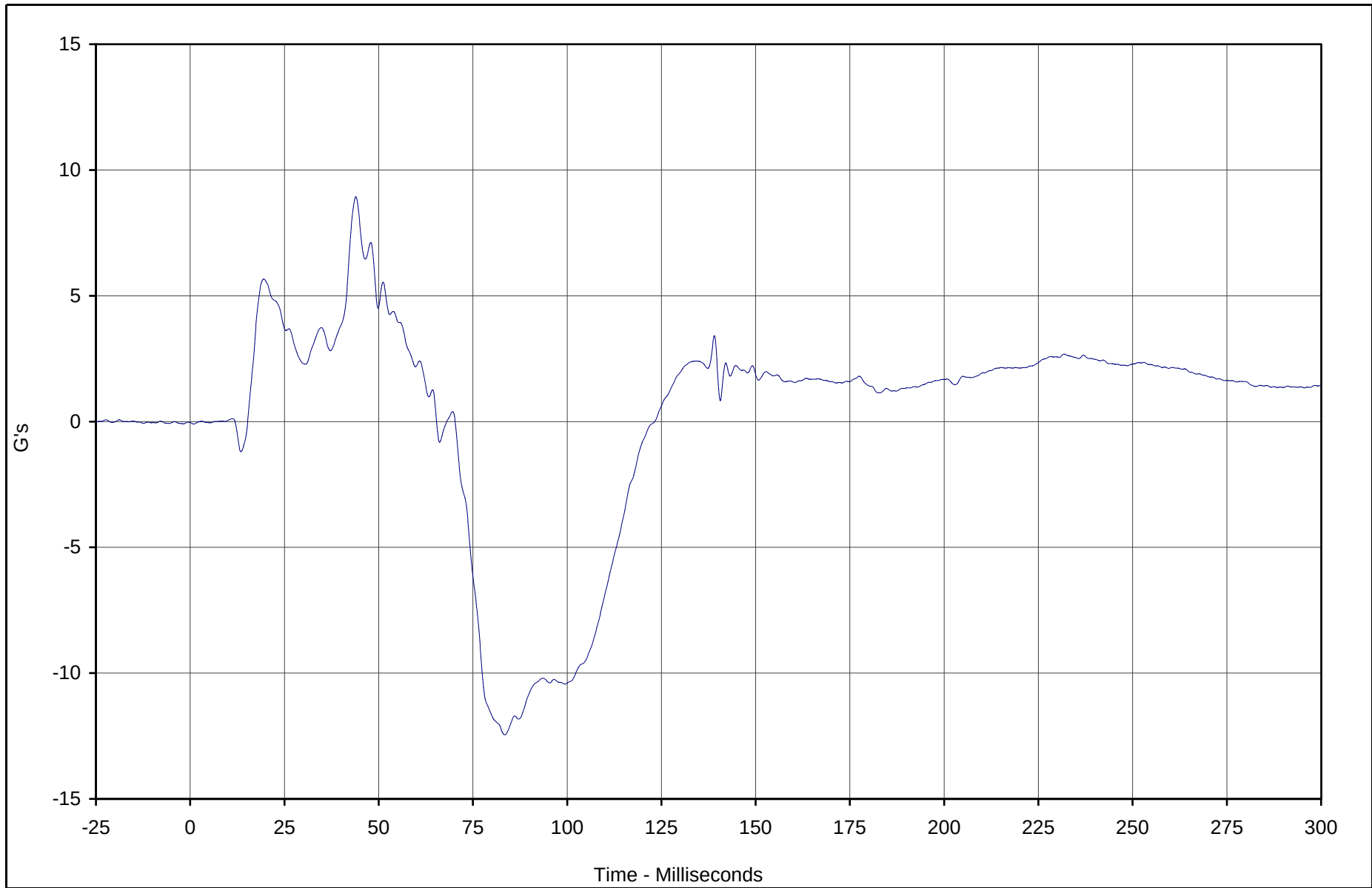


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Redundant Z | 018   | FIL  | G's   | 8.9 | 43.9 | -12.5 | 83.4 | 180       |



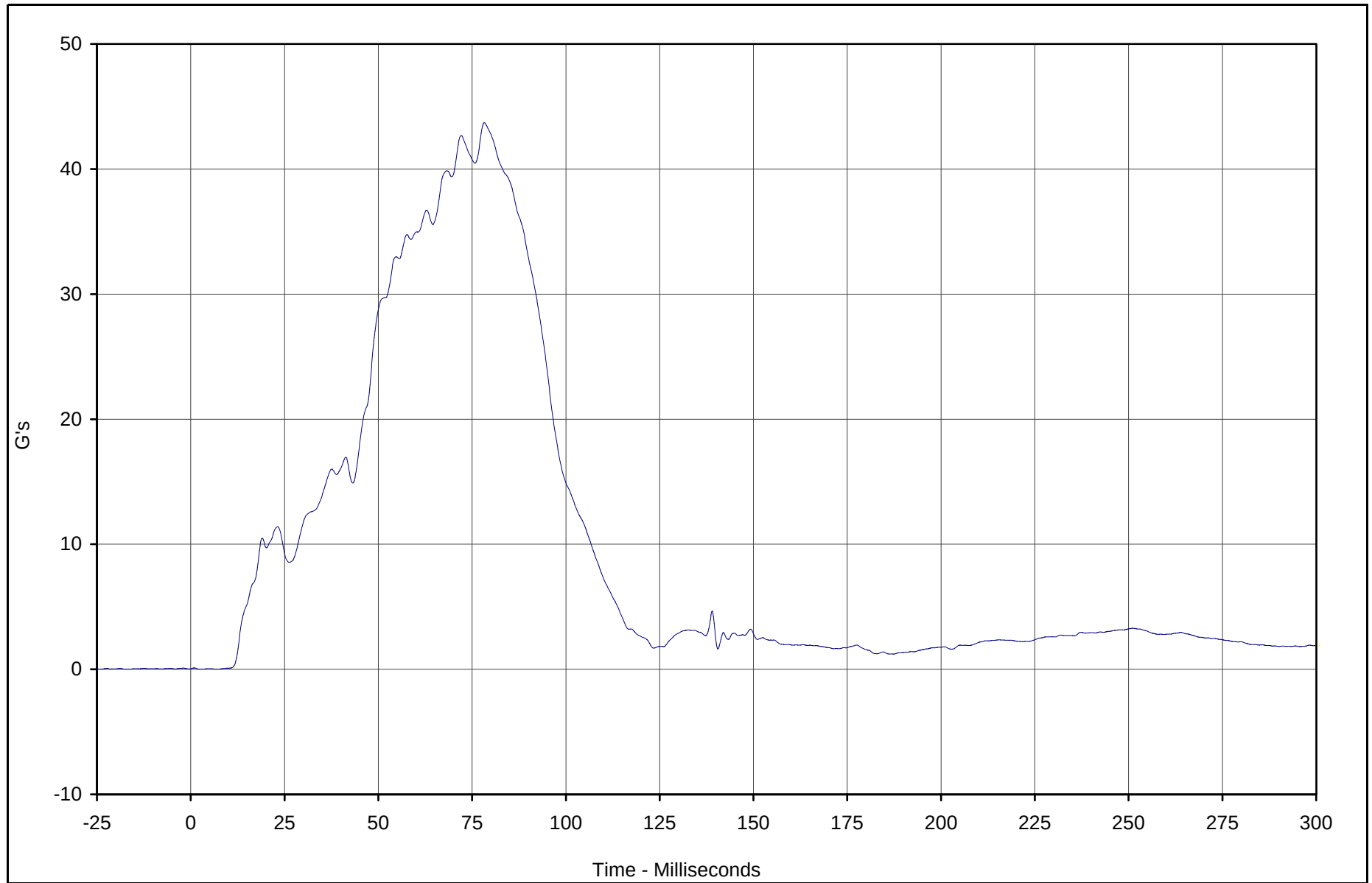
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description                | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Chest Resultant Redundant | 016   | RES  | G's   | 43.7 | 78.2 | 0.0 | 7.5  | 180       |

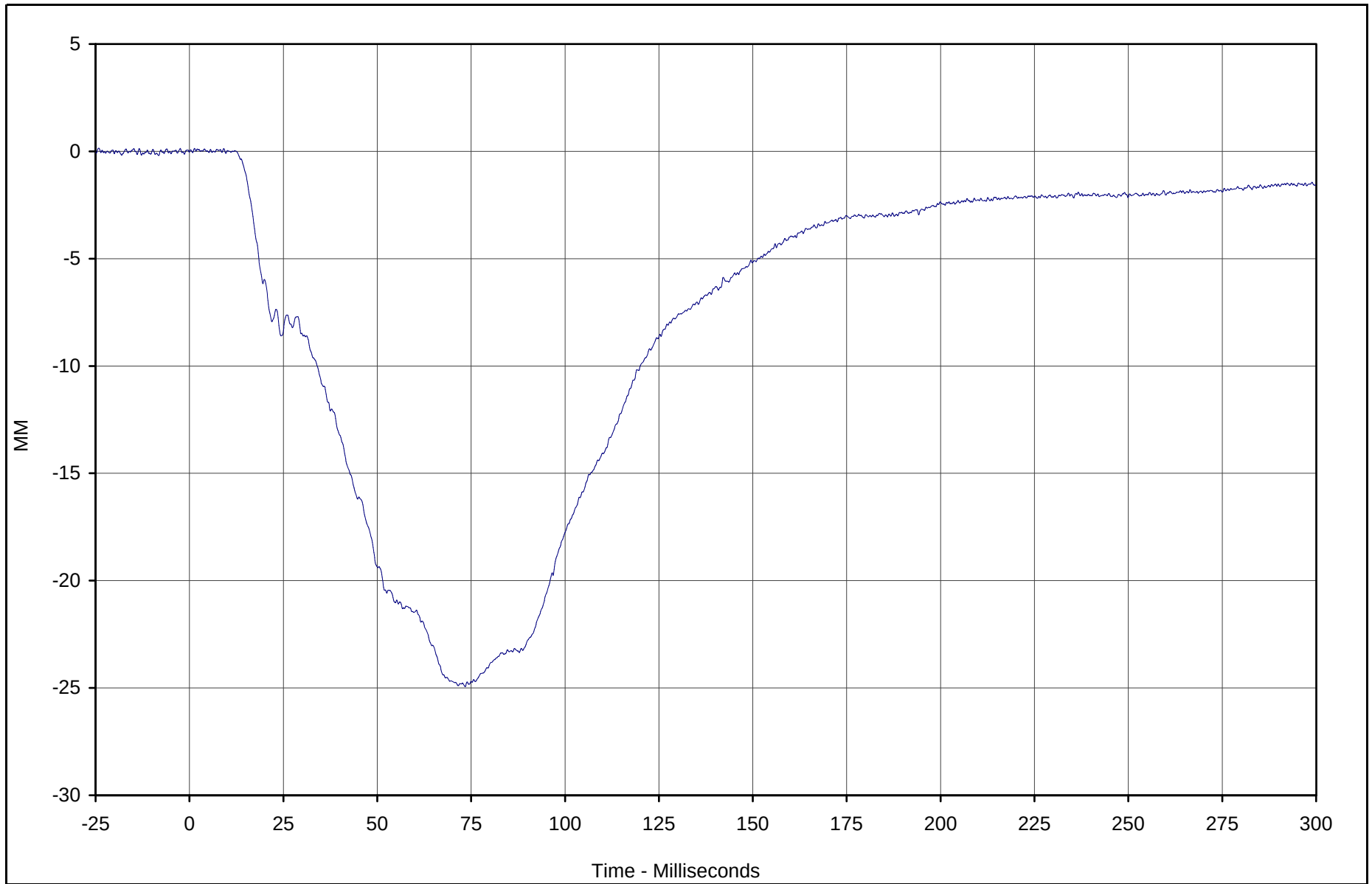


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description           | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Displacement X | 019   | FIL  | MM    | 0.1 | 1.3  | -24.9 | 73.4 | 600       |

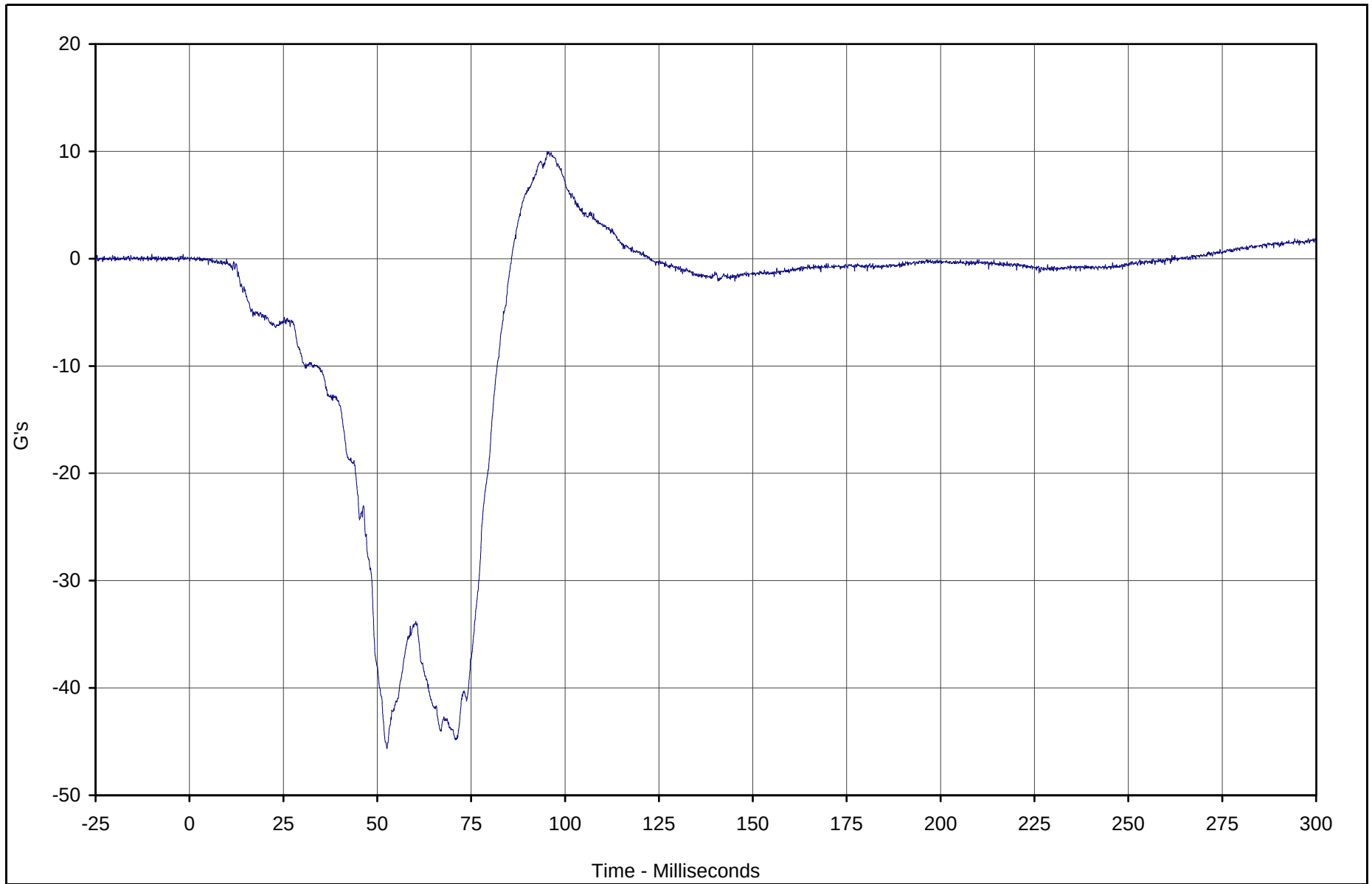


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Pelvis X   | 020   | FIL  | G's   | 10.0 | 95.2 | -45.6 | 52.5 | 1000      |

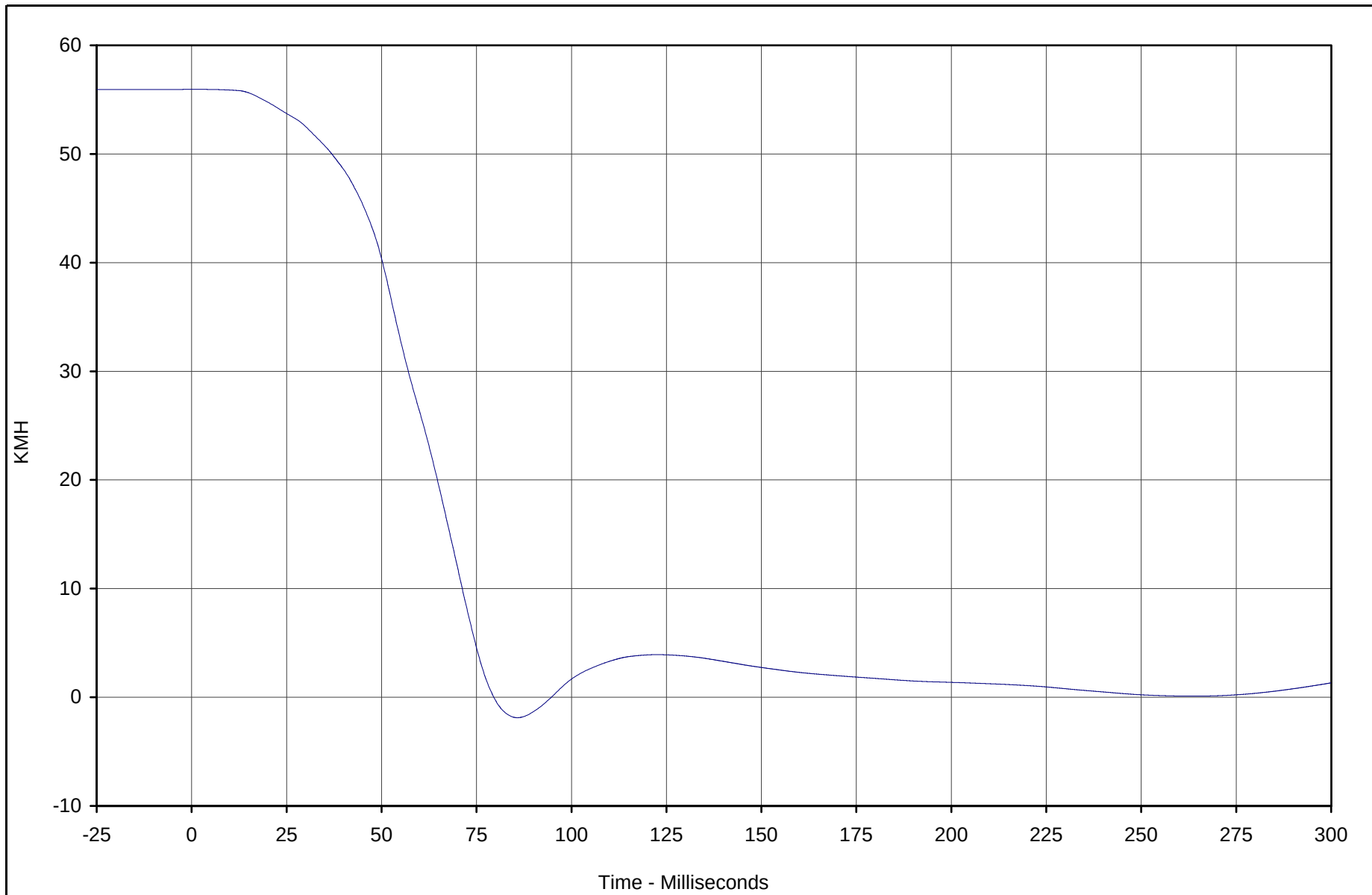


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Pelvis X Velocity | 020   | IN1  | KMH   | 55.9 | 1.0  | -1.9 | 85.7 | 180       |



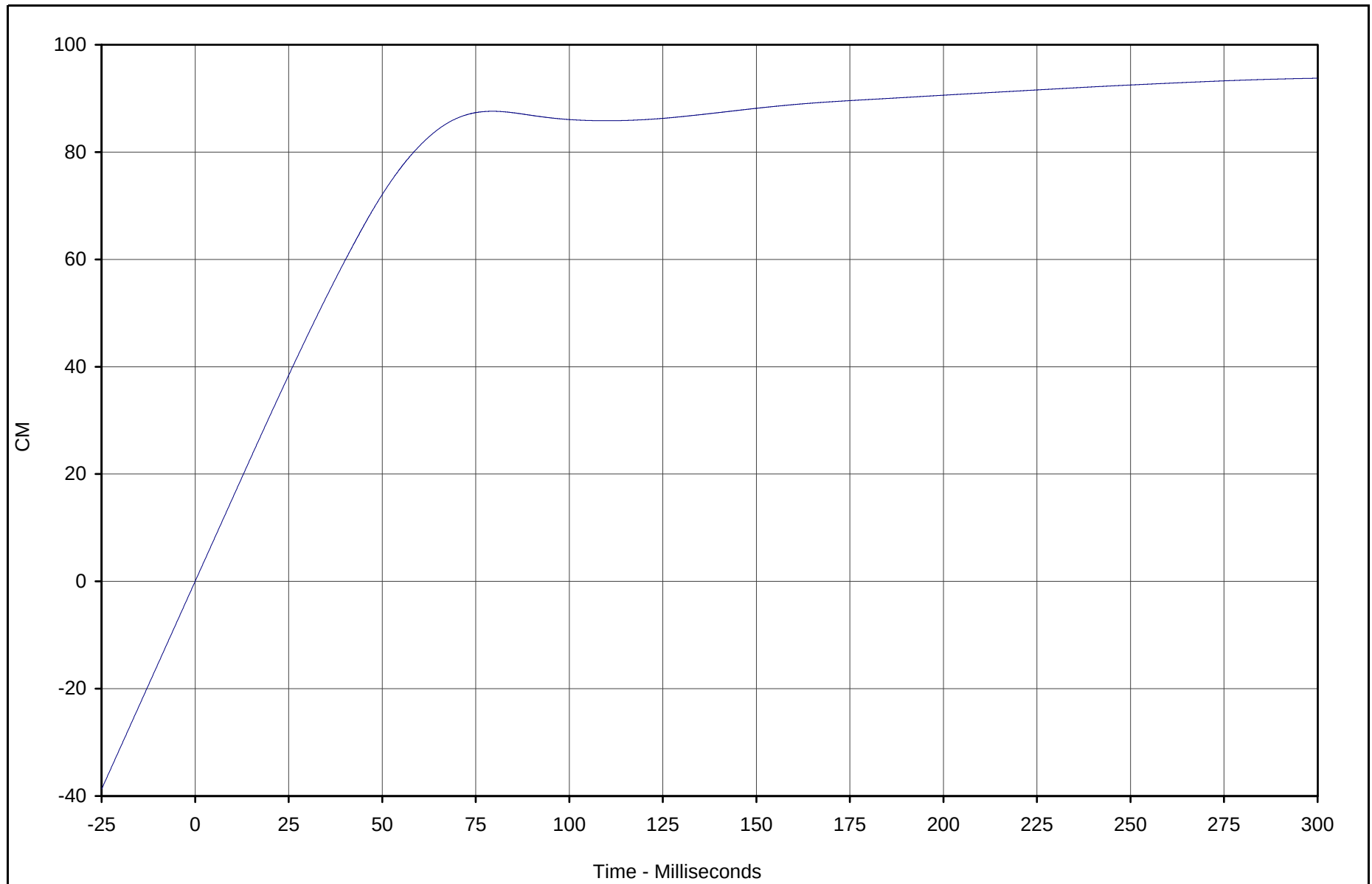
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description      | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Driver Pelvis X Displ. | 020   | IN2  | CM    | 93.8 | 299.9 | 0.0 | 0.0  | 180       |

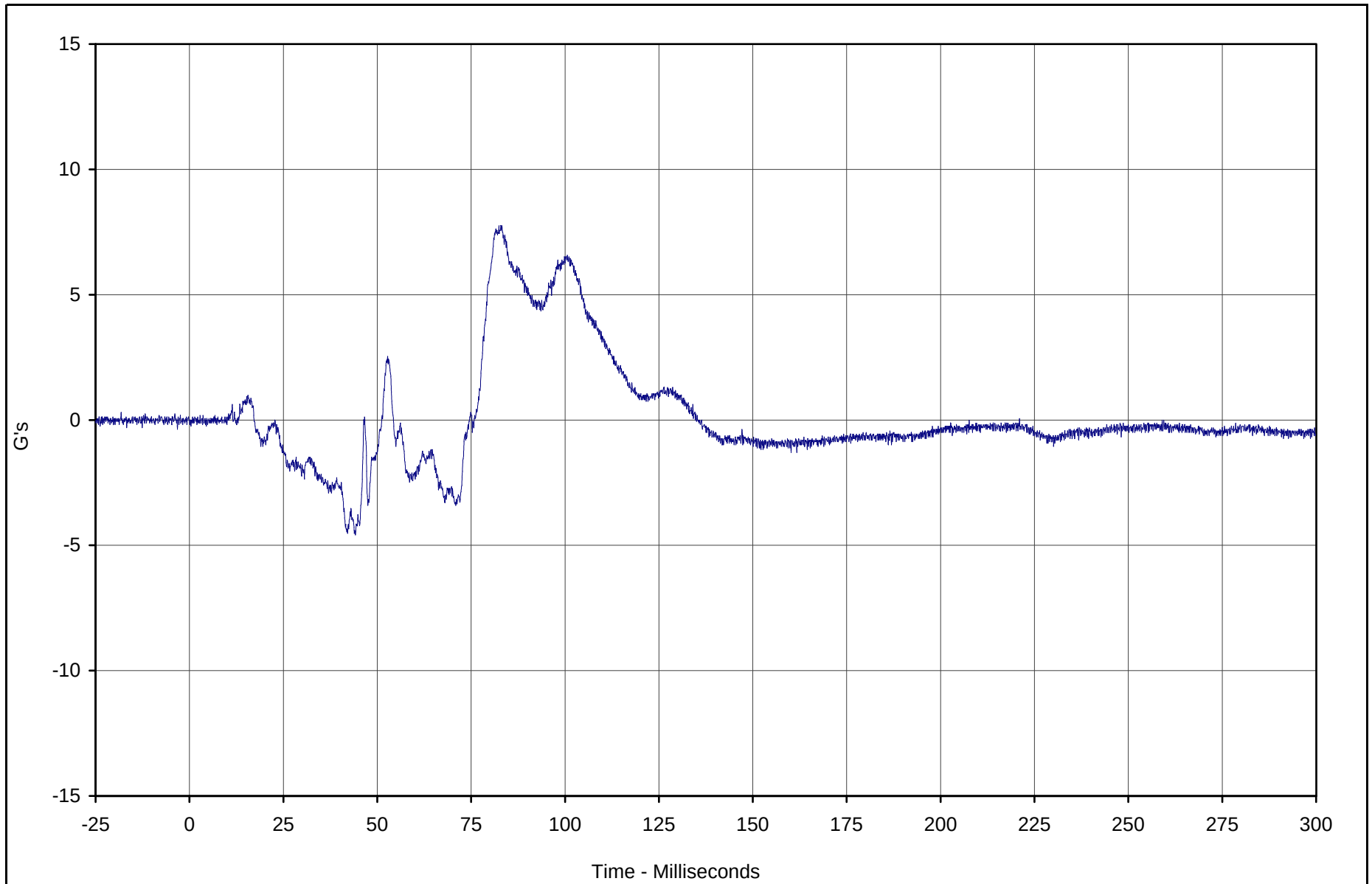


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Pelvis Y   | 021   | FIL  | G's   | 7.8 | 82.4 | -4.6 | 44.2 | 1000      |

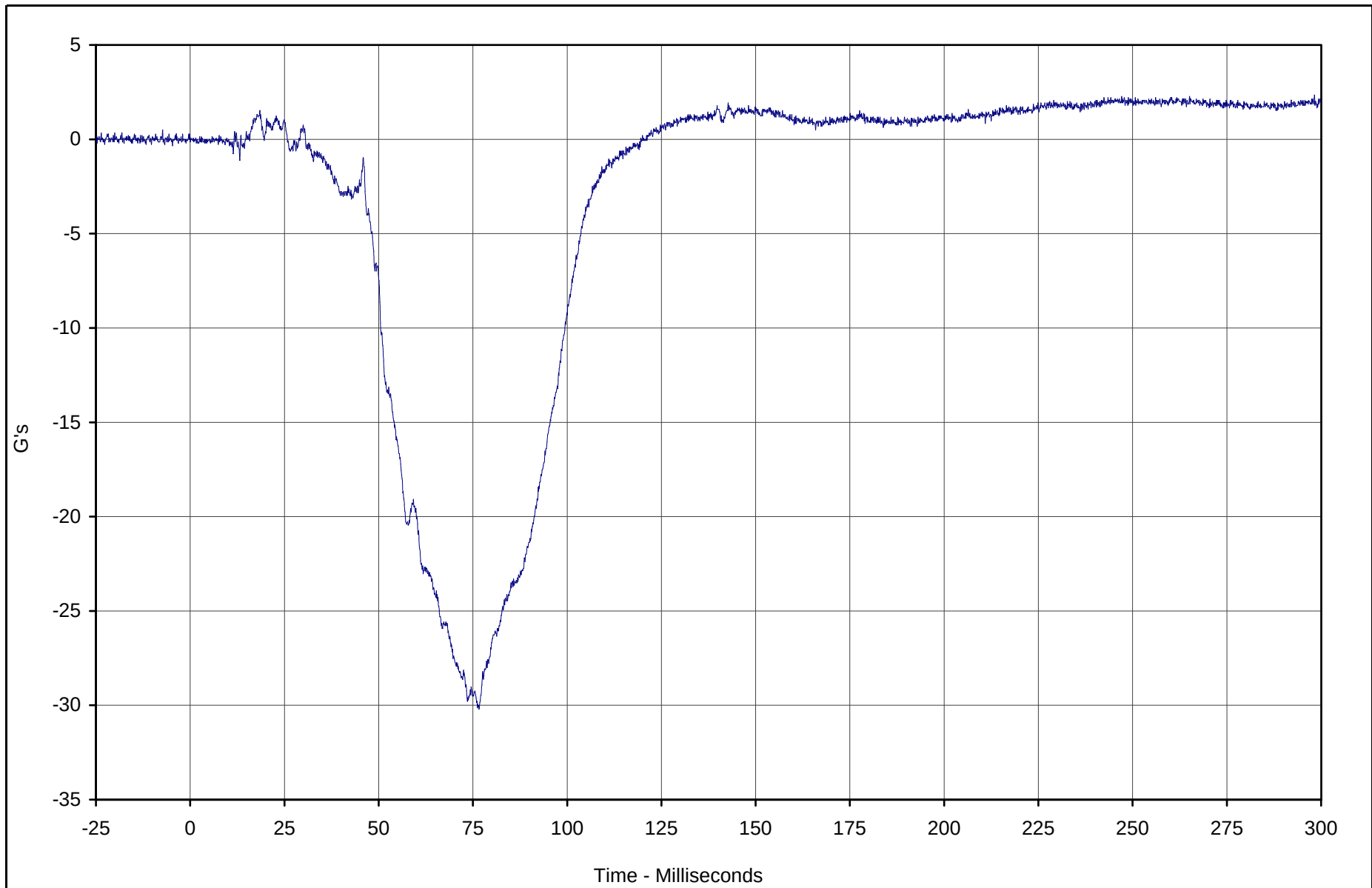


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Pelvis Z   | 022   | FIL  | G's   | 2.4 | 298.2 | -30.2 | 76.6 | 1000      |

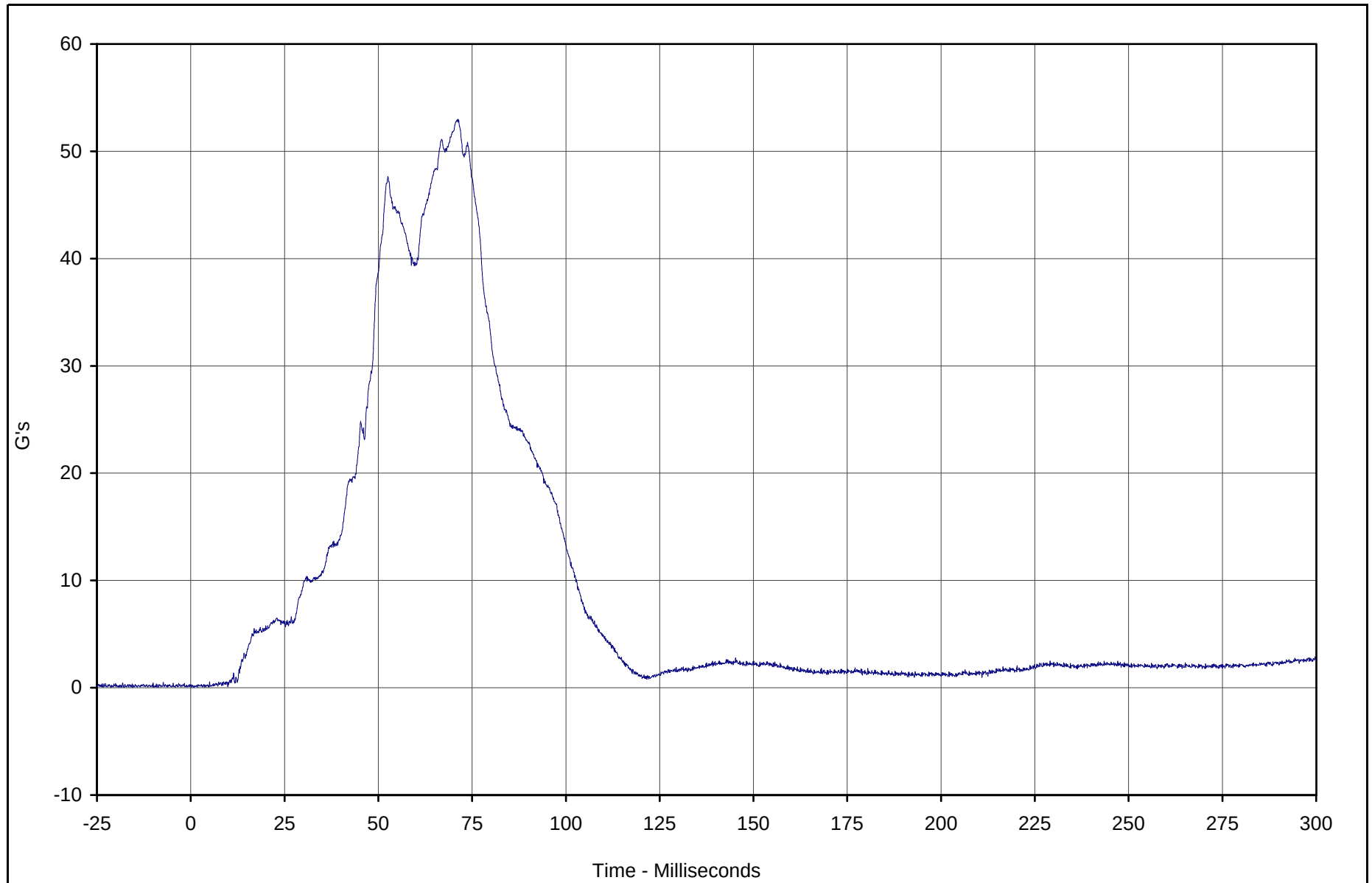


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Pelvis Resultant | 023   | RES  | G's   | 53.0 | 71.2 | 0.0 | 0.9  | 1000      |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

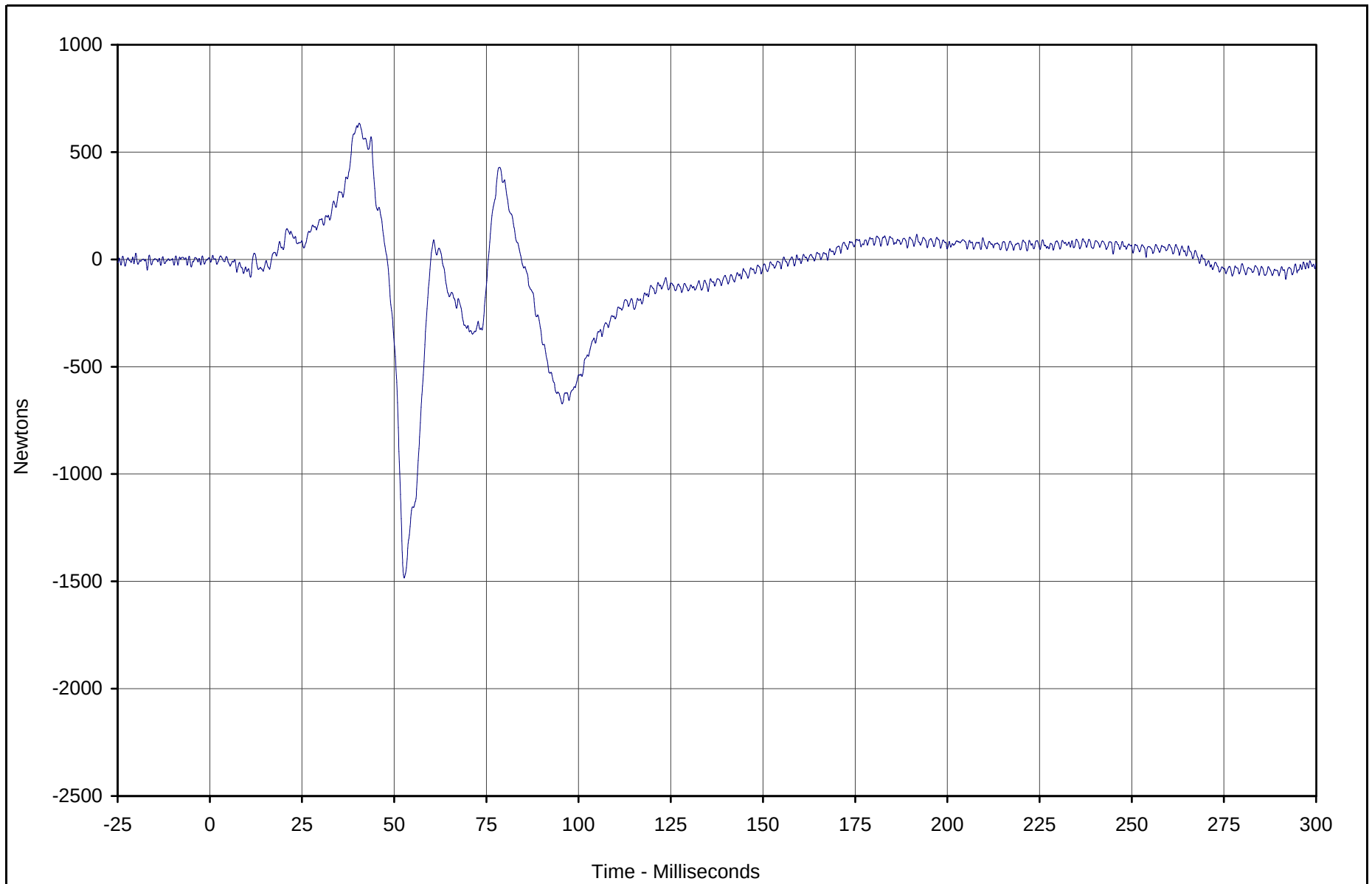
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



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| Curve Description       | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|-------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Driver Left Femur Force | 023   | FIL  | Newtons | 634.7 | 40.5 | -1483.9 | 52.7 | 600       |



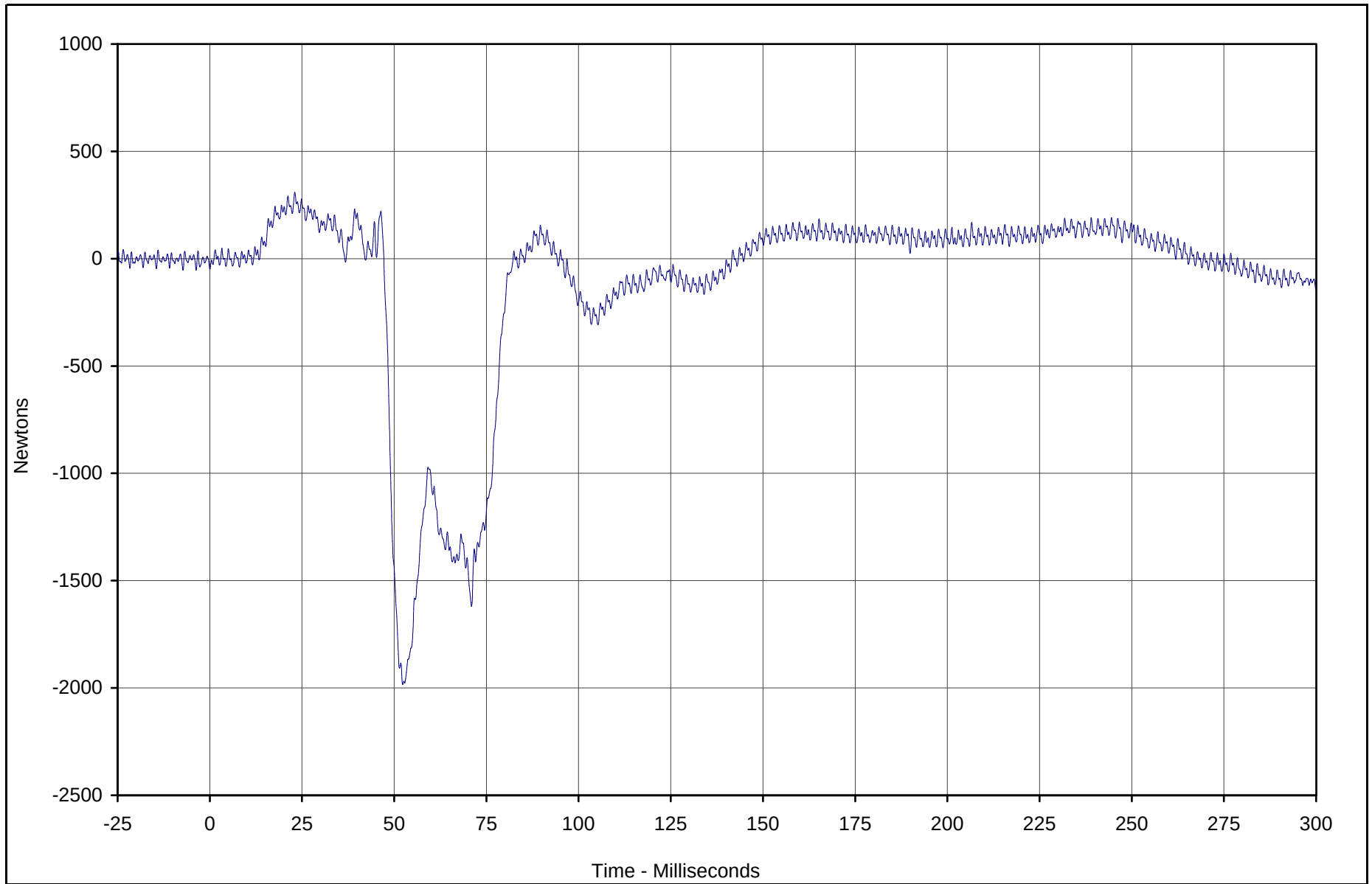
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description        | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|--------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Driver Right Femur Force | 024   | FIL  | Newtons | 309.1 | 23.0 | -1984.7 | 52.3 | 600       |

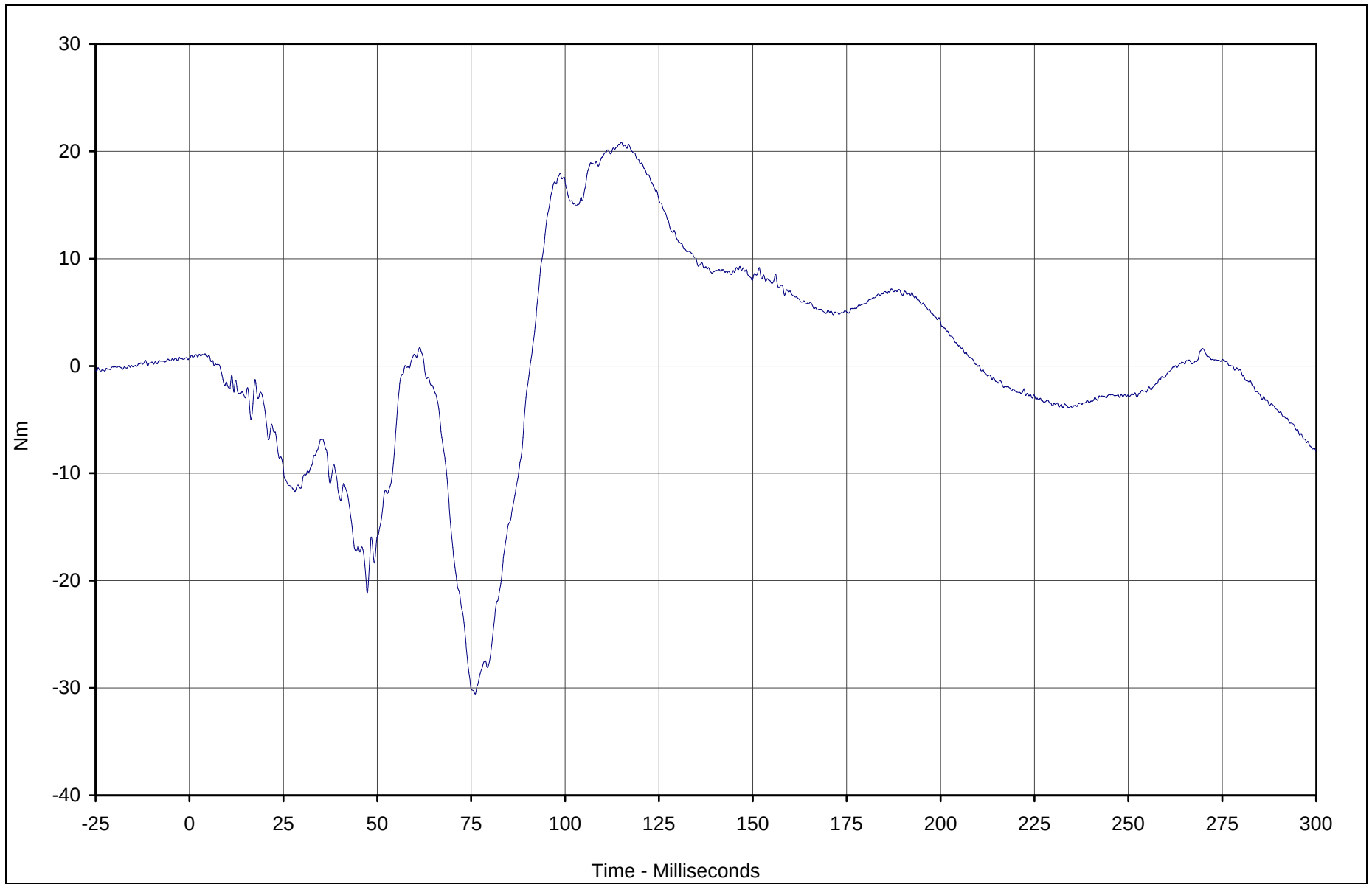


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|----------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Driver Left Upper Tibia Moment X | 025   | FIL  | Nm    | 20.9 | 115.0 | -30.6 | 76.1 | 600       |

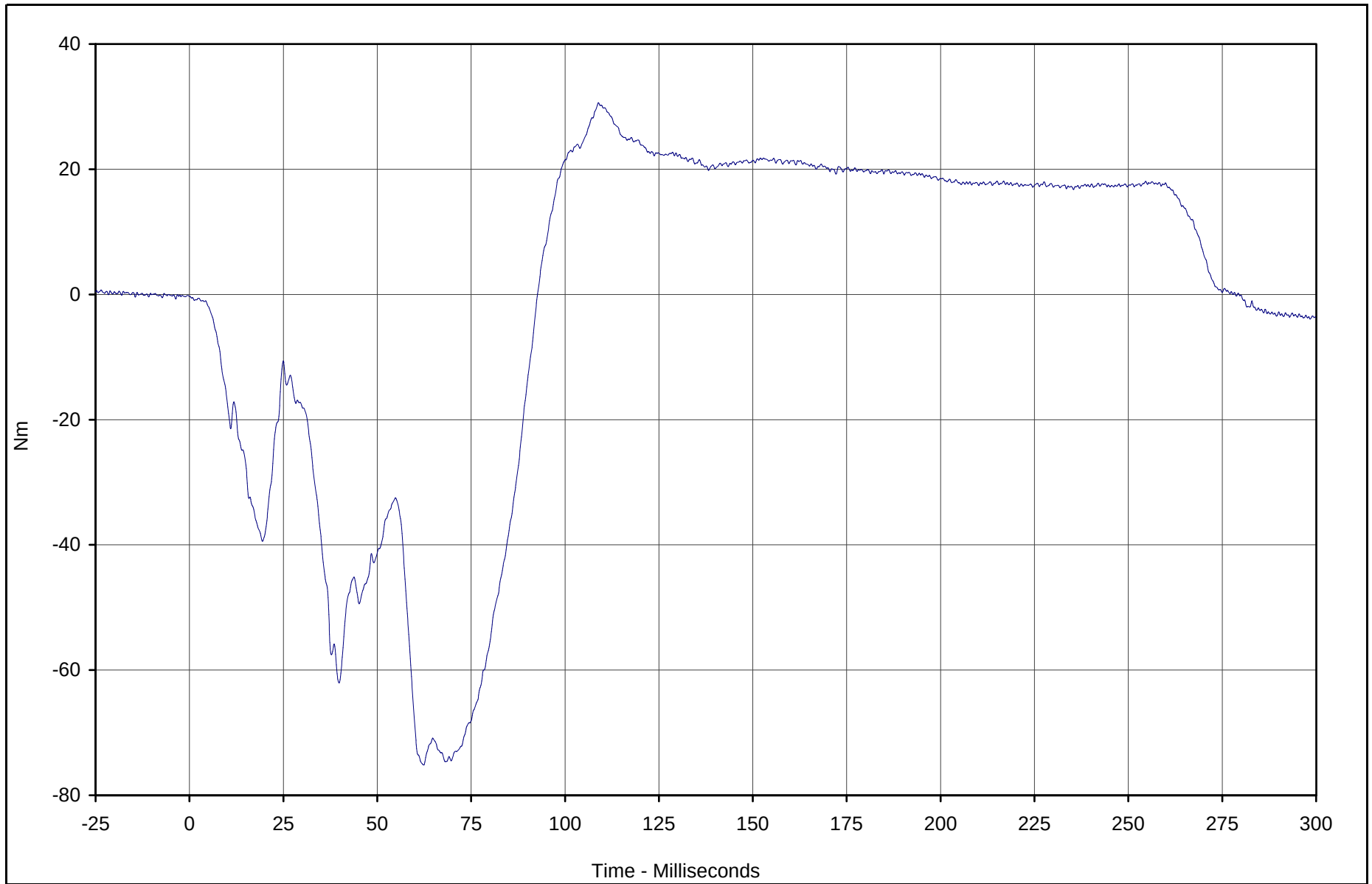


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|----------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Driver Left Upper Tibia Moment Y | 026   | FIL  | Nm    | 30.6 | 108.9 | -75.2 | 62.4 | 600       |



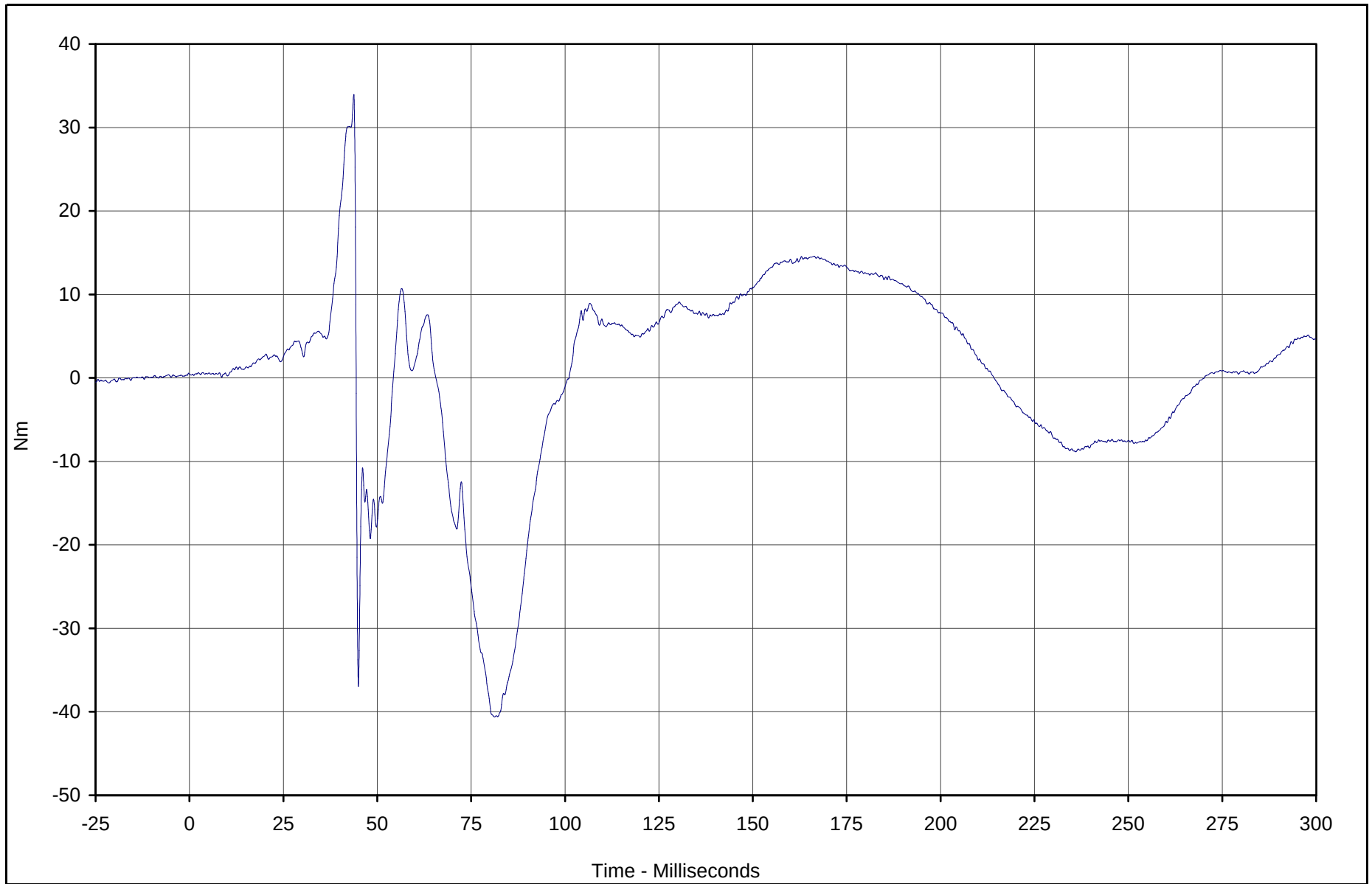
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Right Upper Tibia Moment X | 027   | FIL  | Nm    | 33.9 | 43.7 | -40.6 | 81.2 | 600       |

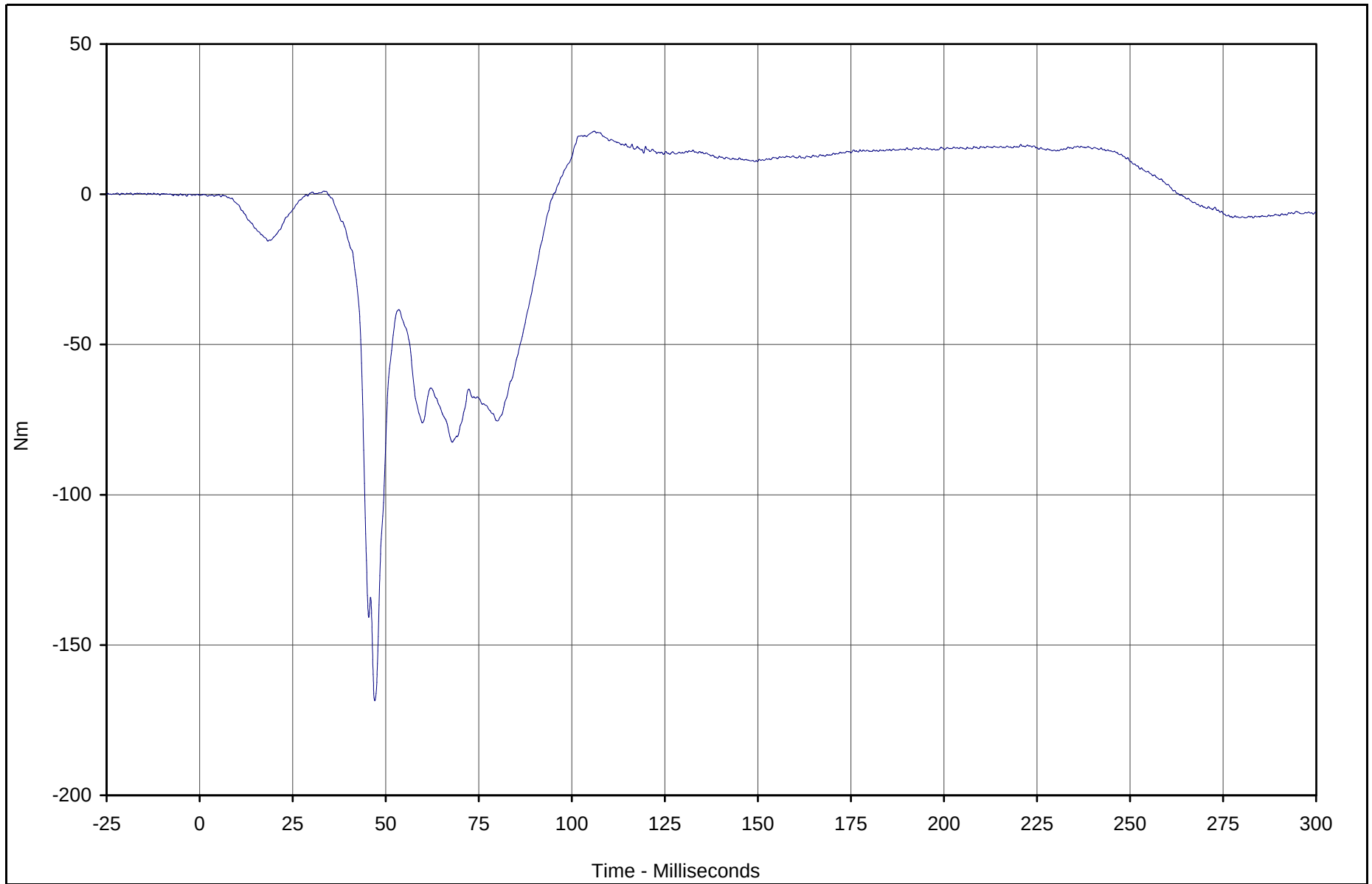


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                 | CURNO | Type | Units | Max  | Time  | Min    | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|-------|--------|------|-----------|
| Driver Right Upper Tibia Moment Y | 028   | FIL  | Nm    | 21.0 | 106.0 | -168.5 | 47.1 | 600       |

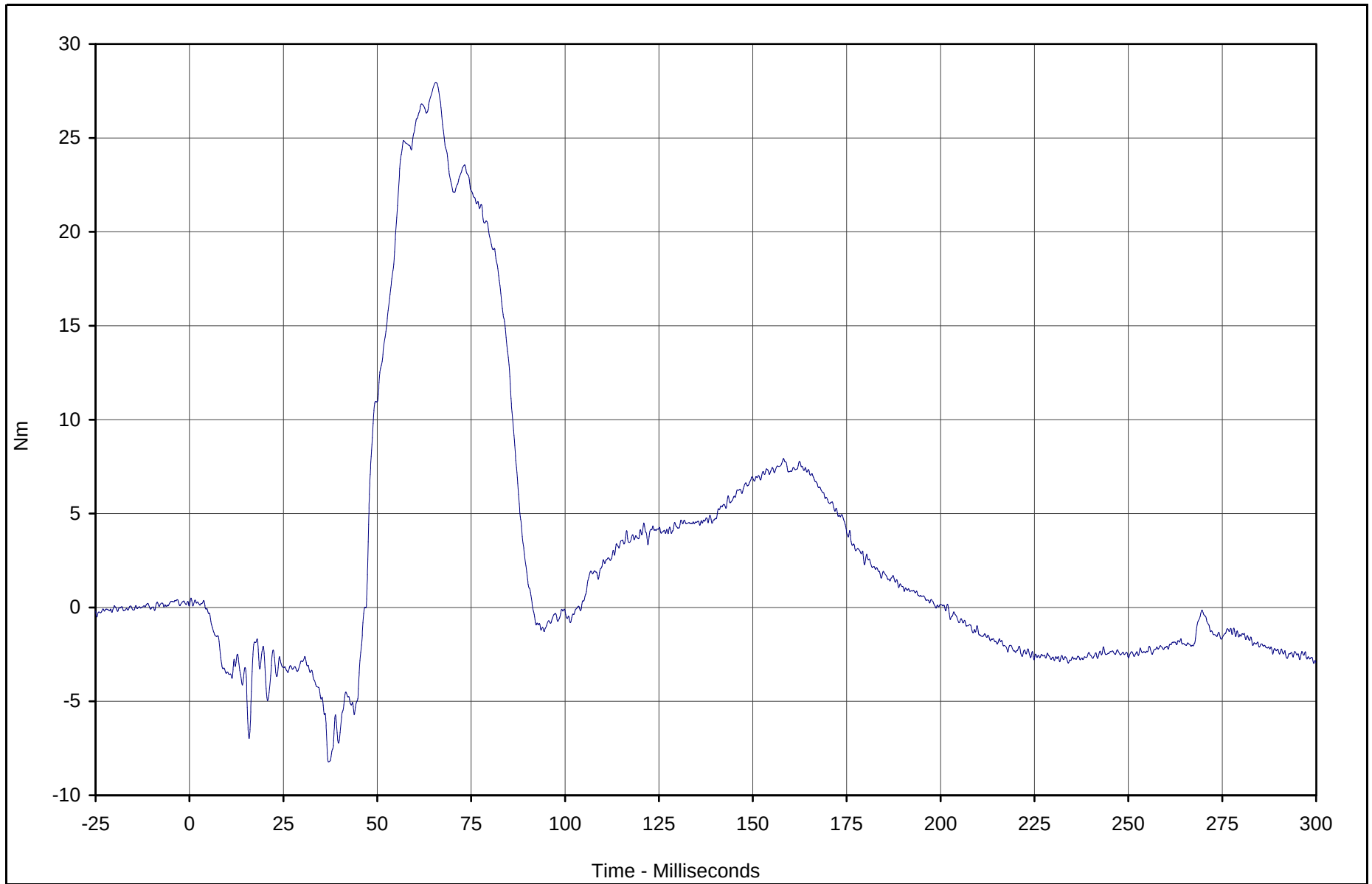


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Left Lower Tibia Moment X | 029   | FIL  | Nm    | 28.0 | 65.5 | -8.2 | 37.0 | 600       |

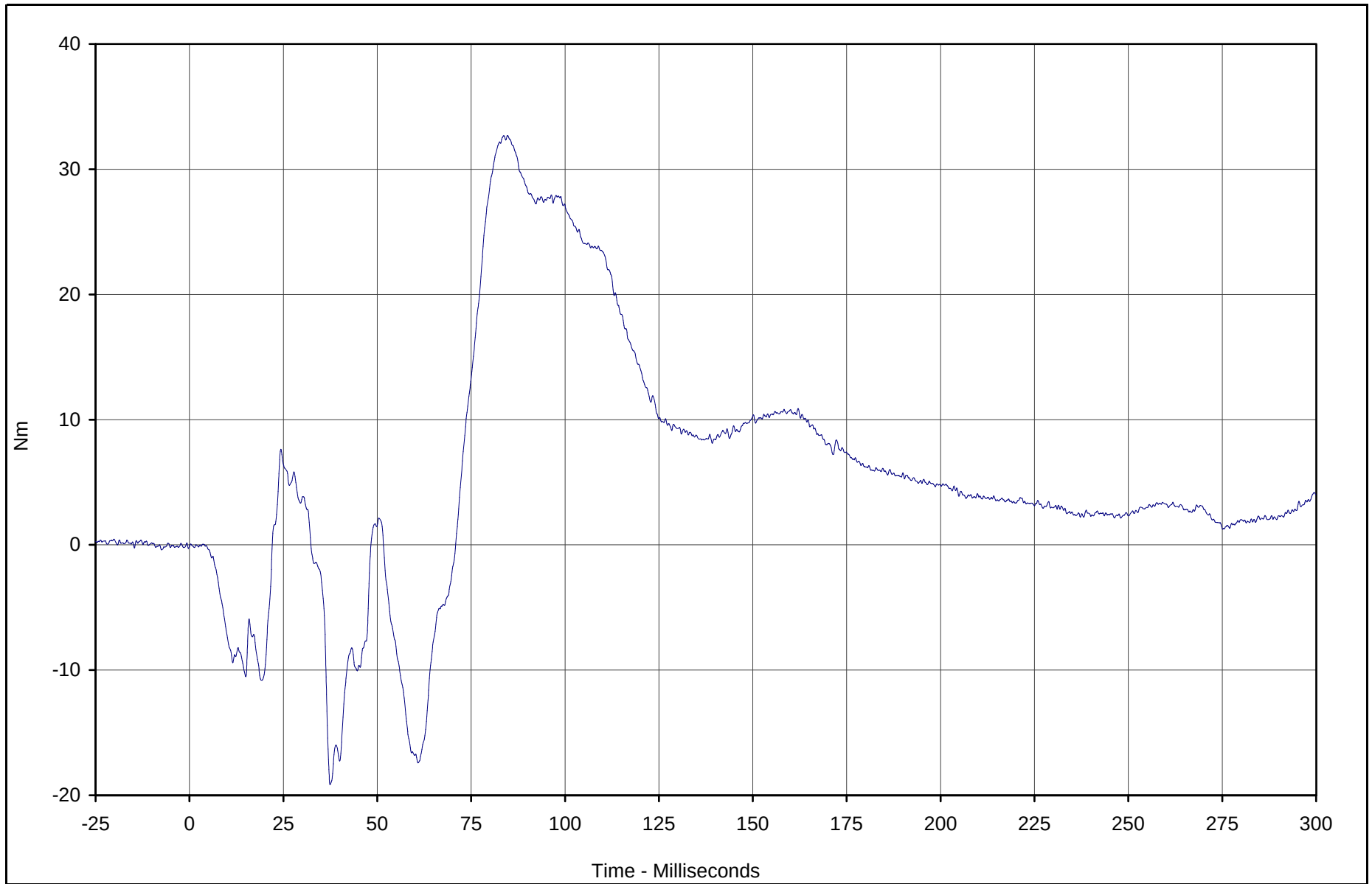


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Left Lower Tibia Moment Y | 030   | FIL  | Nm    | 32.7 | 84.7 | -19.1 | 37.5 | 600       |



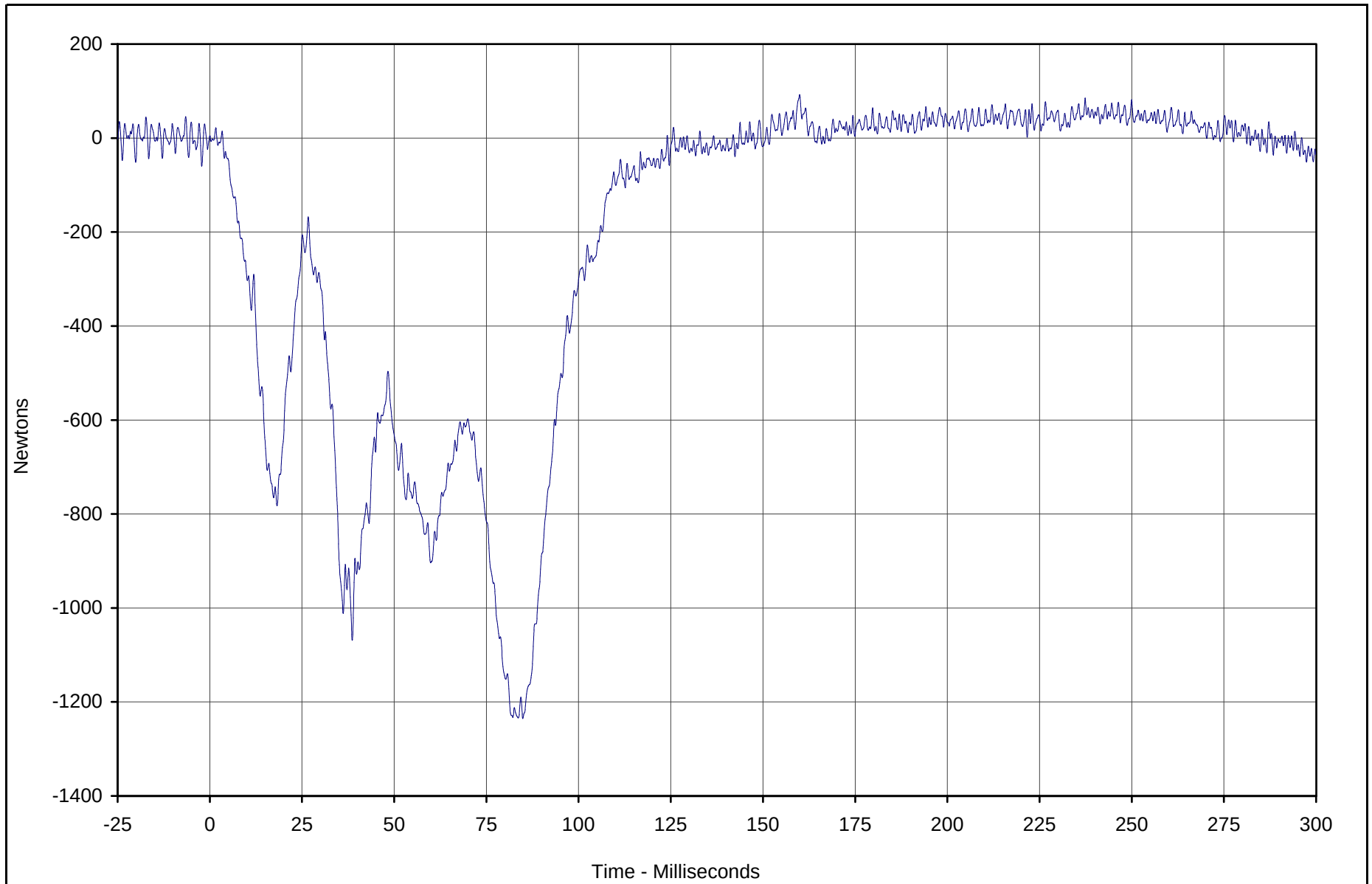
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description               | CURNO | Type | Units   | Max  | Time  | Min     | Time | SAE Class |
|---------------------------------|-------|------|---------|------|-------|---------|------|-----------|
| Driver Left Lower Tibia Force Z | 031   | FIL  | Newtons | 92.2 | 160.0 | -1235.3 | 84.9 | 600       |

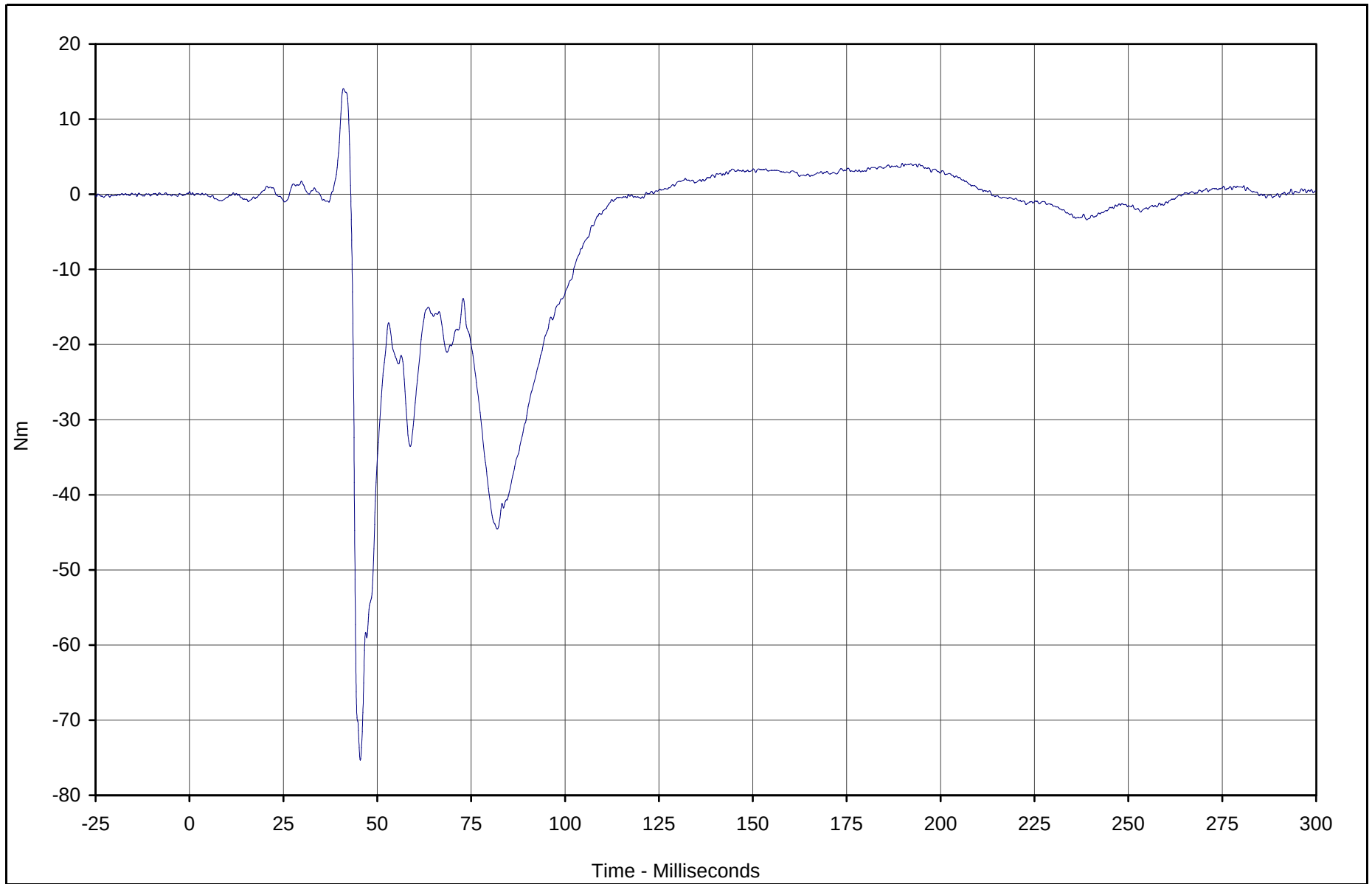


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Right Lower Tibia Moment X | 032   | FIL  | Nm    | 14.1 | 41.0 | -75.3 | 45.5 | 600       |



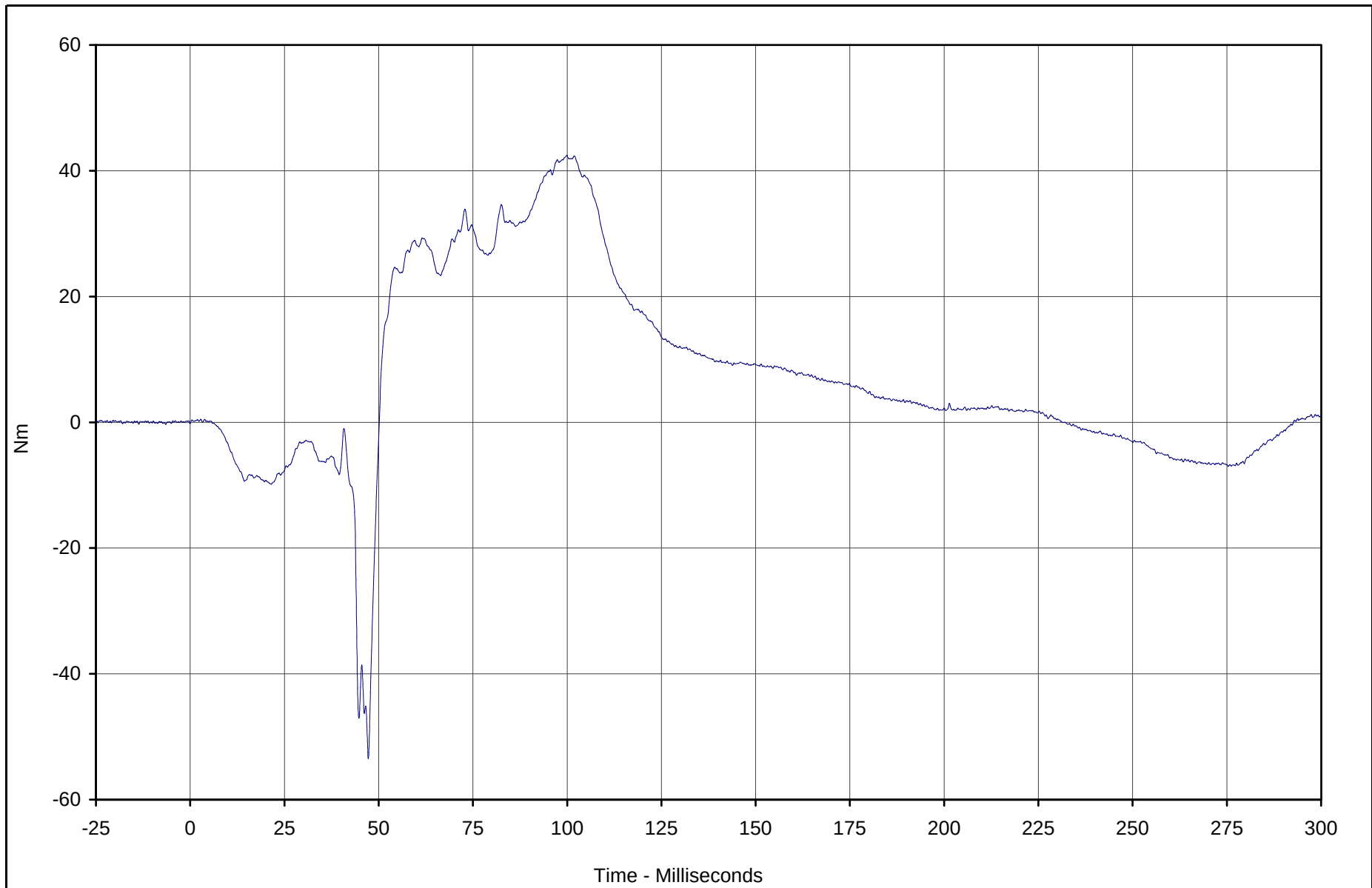
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Right Lower Tibia Moment Y | 033   | FIL  | Nm    | 42.5 | 99.9 | -53.5 | 47.3 | 600       |



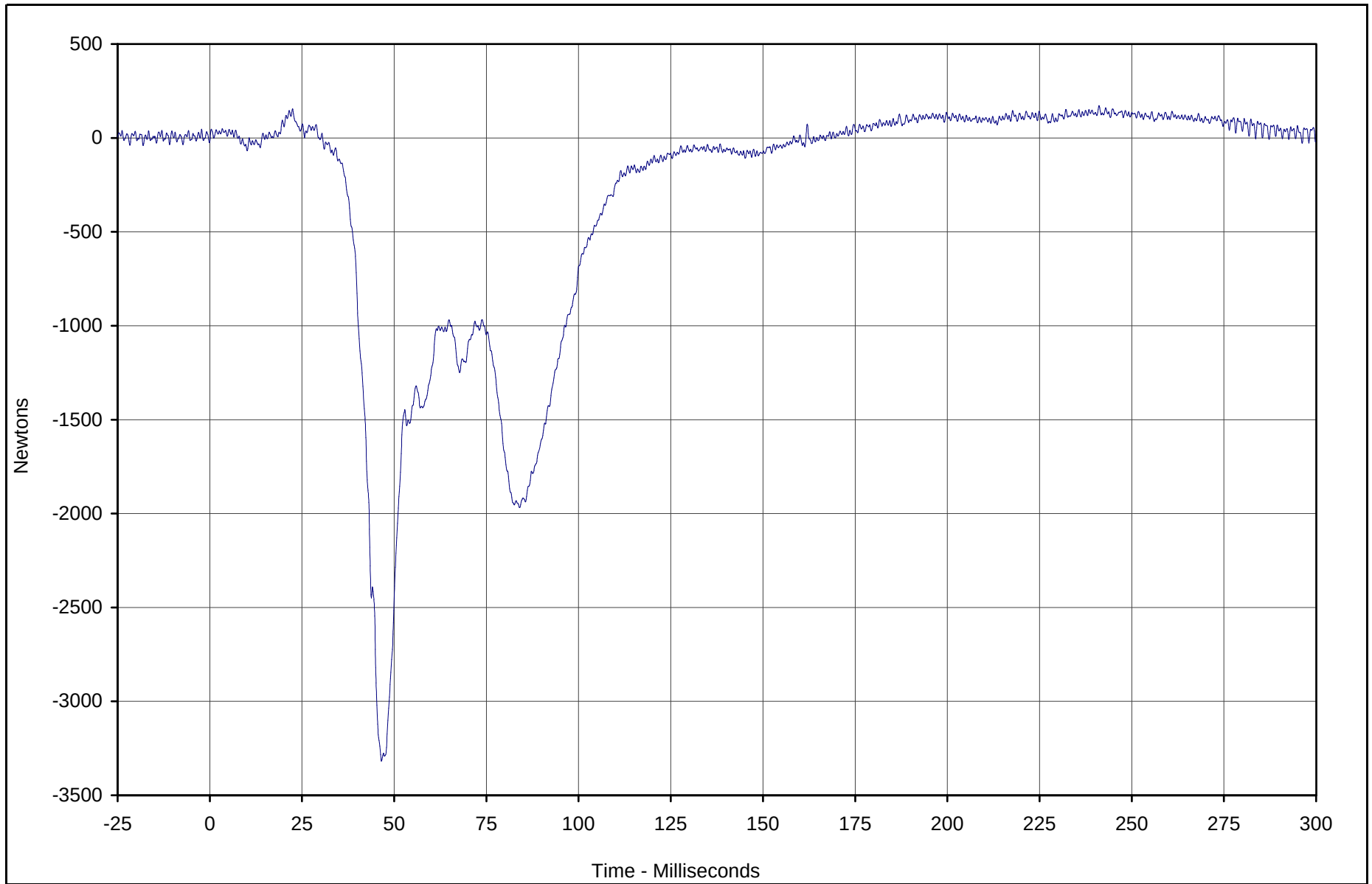
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                | CURNO | Type | Units   | Max   | Time  | Min     | Time | SAE Class |
|----------------------------------|-------|------|---------|-------|-------|---------|------|-----------|
| Driver Right Lower Tibia Force Z | 034   | FIL  | Newtons | 171.9 | 241.1 | -3317.4 | 46.5 | 600       |



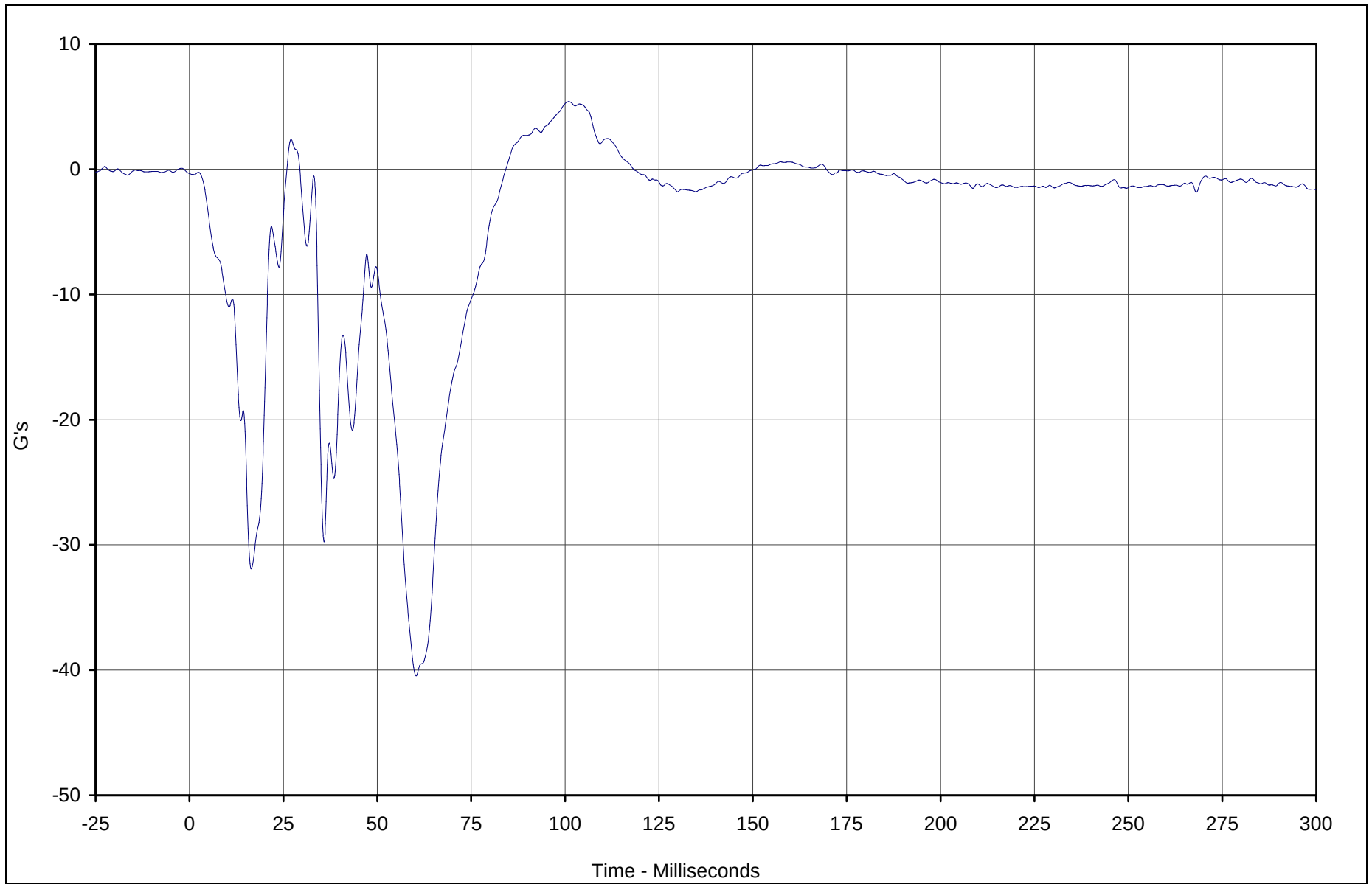
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description      | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Left Foot Aft X | 035   | FIL  | G's   | 5.4 | 101.1 | -40.5 | 60.3 | 180       |

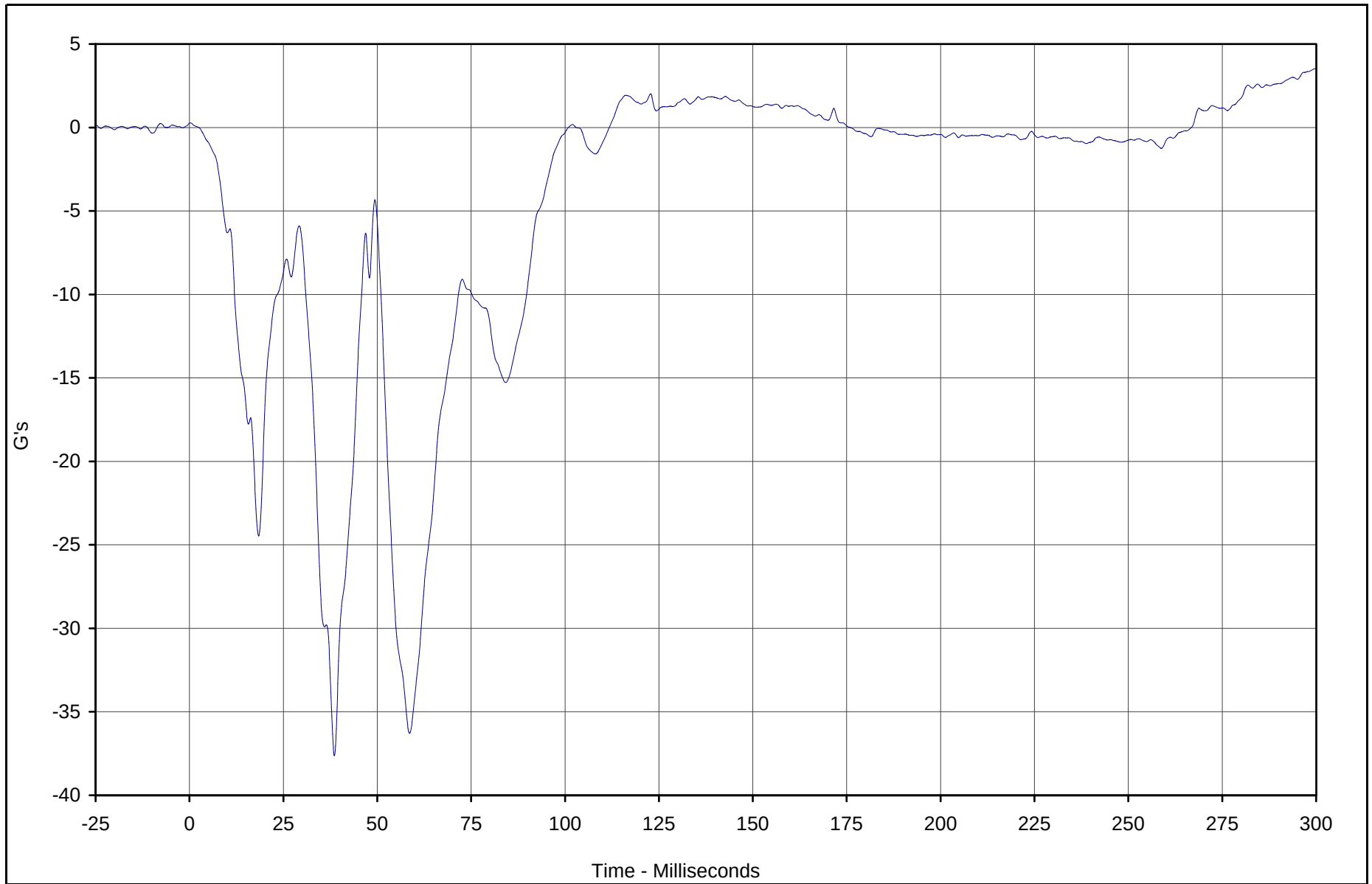


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description      | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Left Foot Aft Z | 036   | FIL  | G's   | 3.5 | 299.6 | -37.6 | 38.6 | 180       |



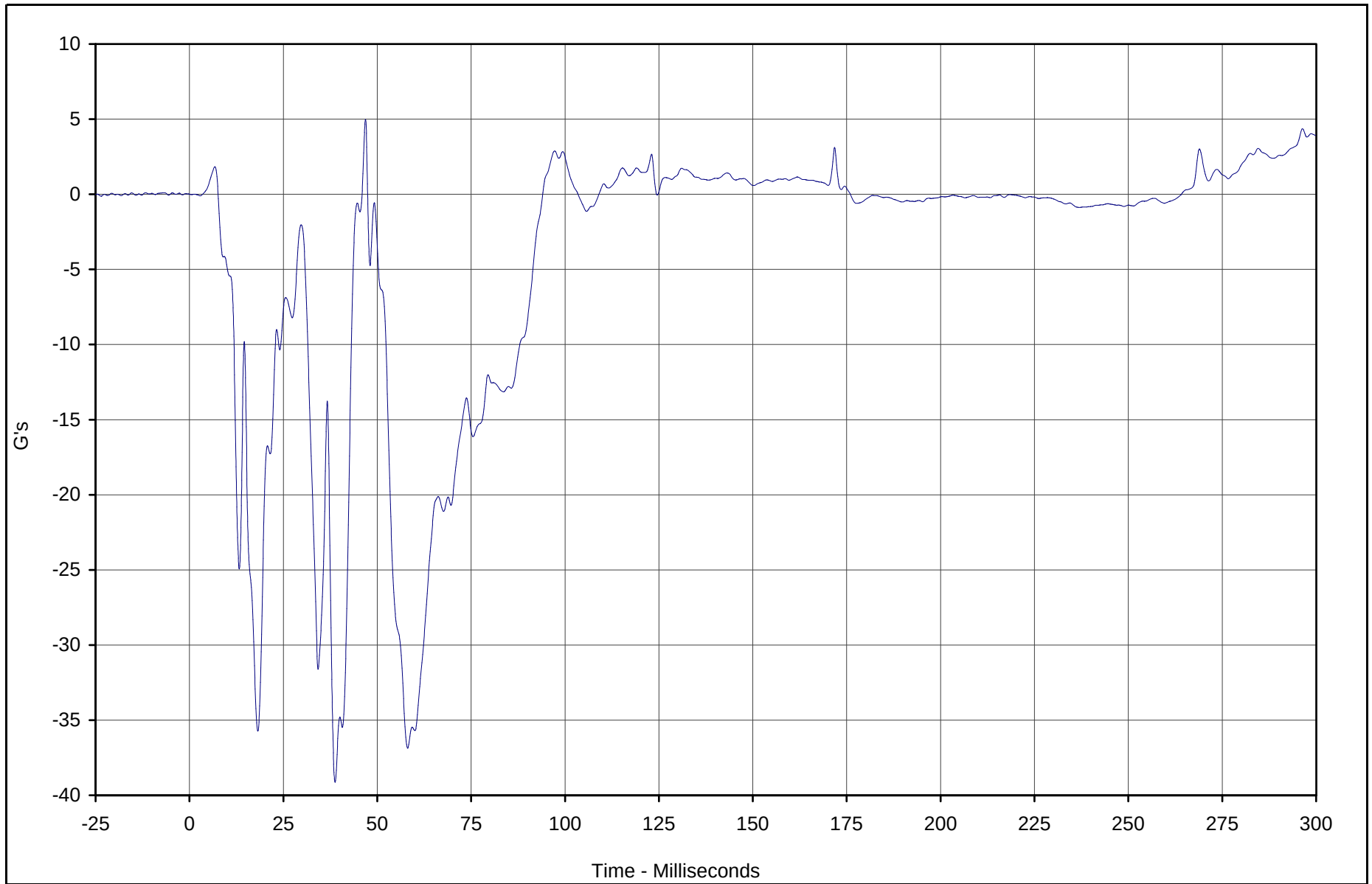
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description       | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Left Foot Fore Z | 037   | FIL  | G's   | 5.0 | 46.9 | -39.1 | 38.8 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

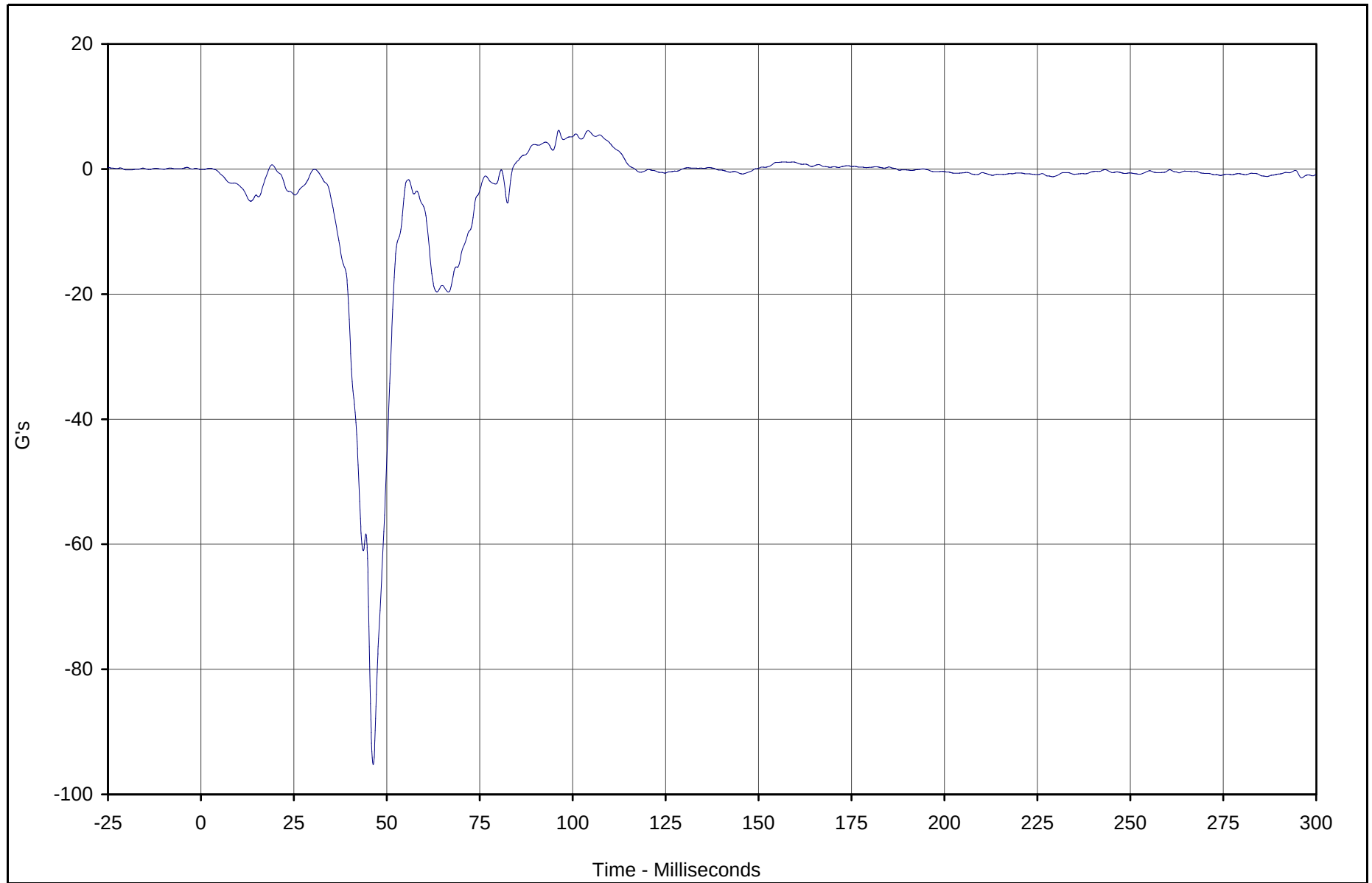
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description       | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Right Foot Aft X | 038   | FIL  | G's   | 6.2 | 96.2 | -95.2 | 46.3 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

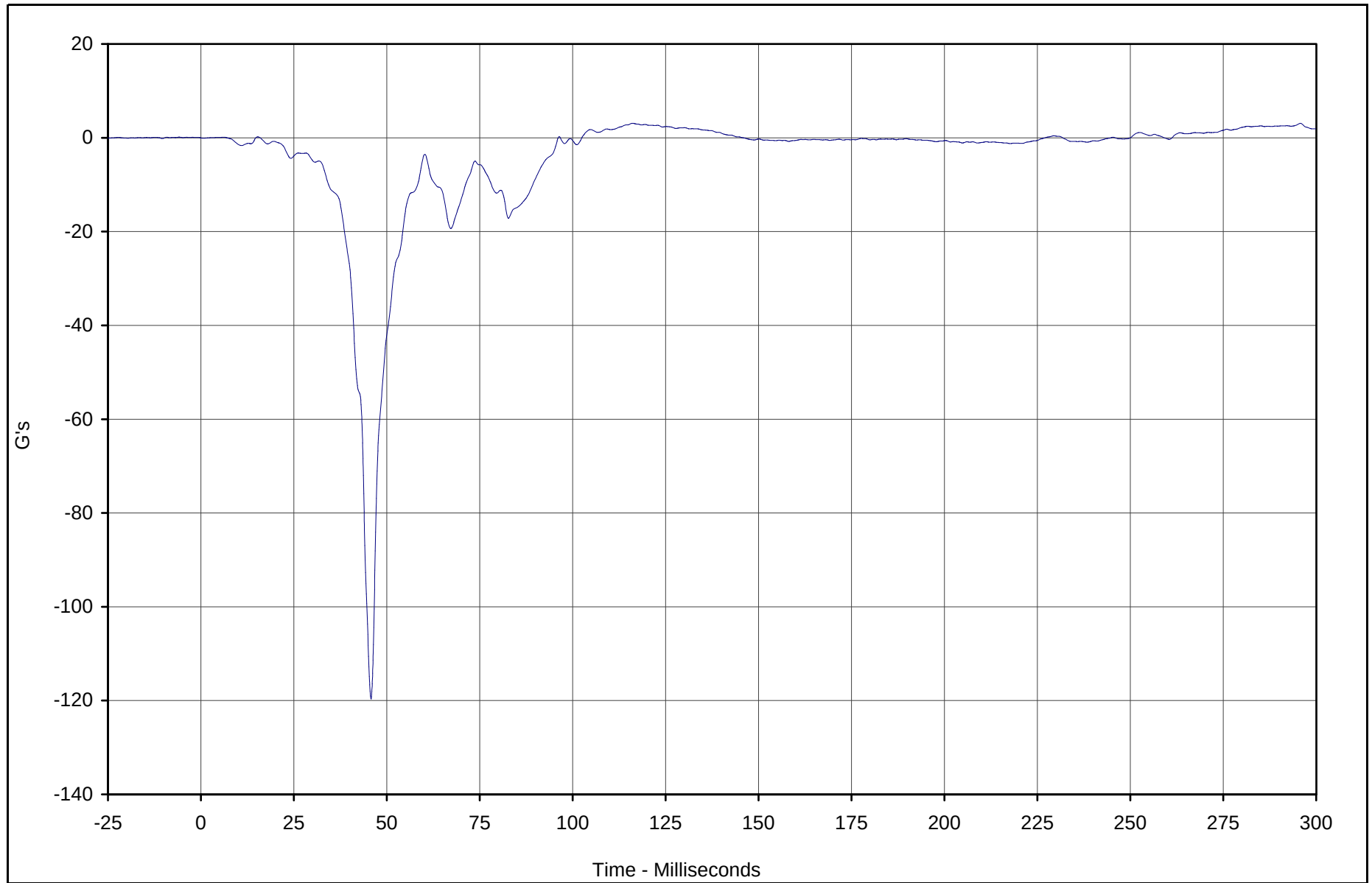
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description       | CURNO | Type | Units | Max | Time  | Min    | Time | SAE Class |
|-------------------------|-------|------|-------|-----|-------|--------|------|-----------|
| Driver Right Foot Aft Z | 039   | FIL  | G's   | 3.1 | 116.2 | -119.6 | 45.8 | 180       |



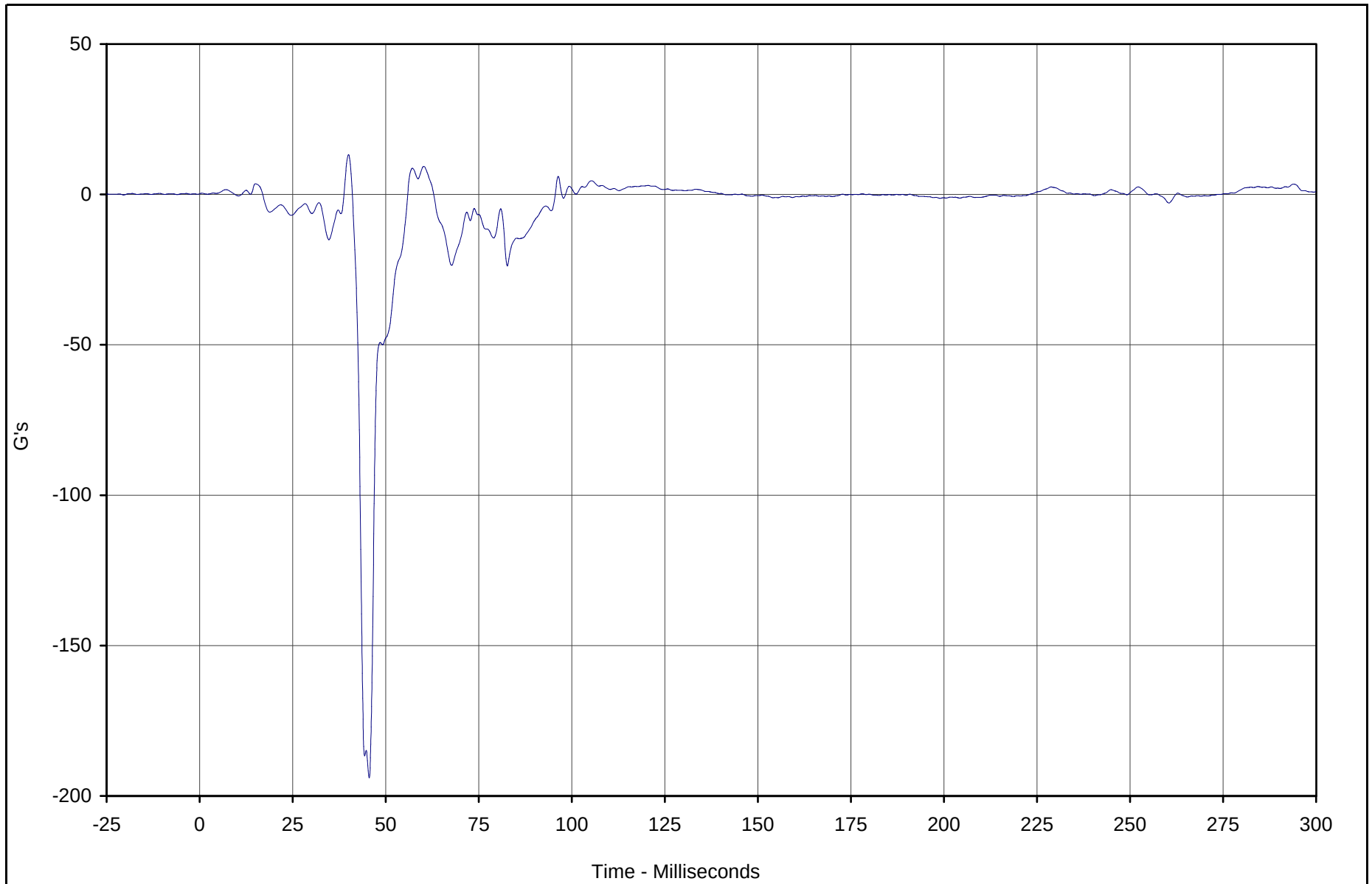
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description        | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|--------|------|-----------|
| Driver Right Foot Fore Z | 040   | FIL  | G's   | 13.2 | 40.0 | -193.9 | 45.5 | 180       |



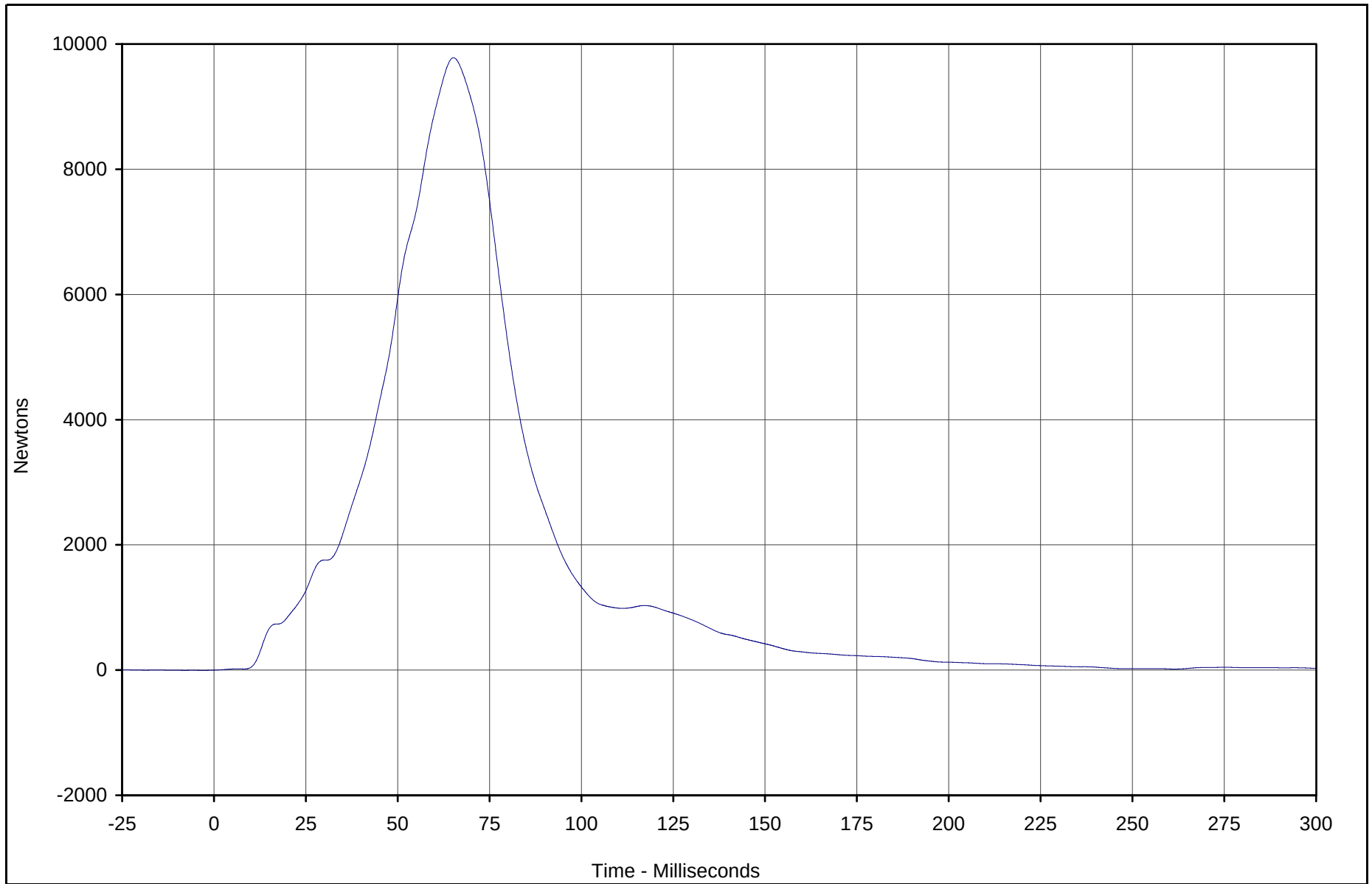
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description     | CURNO | Type | Units   | Max    | Time | Min  | Time | SAE Class |
|-----------------------|-------|------|---------|--------|------|------|------|-----------|
| Driver Lap Belt Force | 041   | FIL  | Newtons | 9781.2 | 65.2 | -1.1 | 0.0  | 60        |

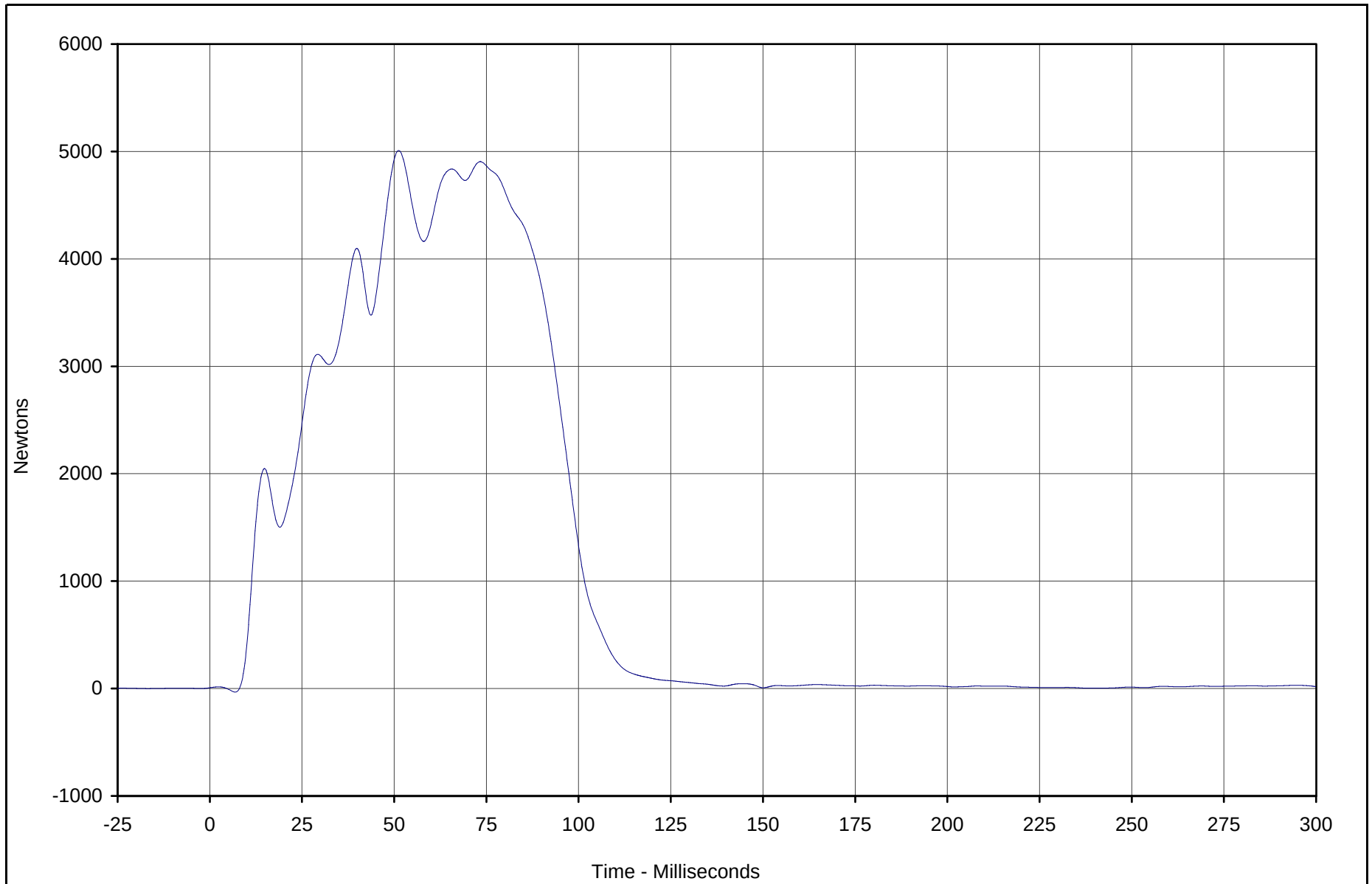


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description          | CURNO | Type | Units   | Max    | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|---------|--------|------|-------|------|-----------|
| Driver Shoulder Belt Force | 042   | FIL  | Newtons | 5009.5 | 51.2 | -32.9 | 6.9  | 60        |



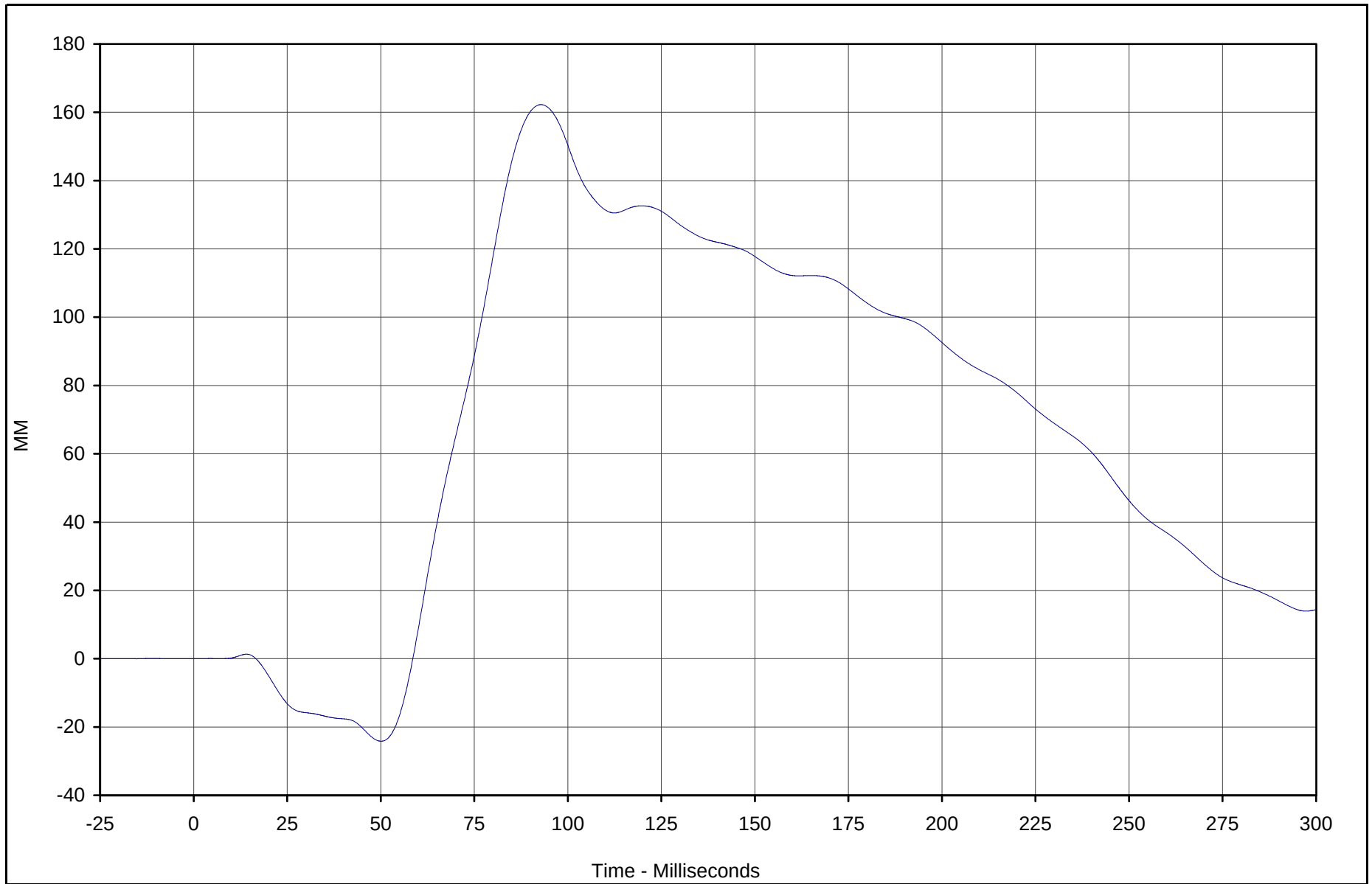
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description            | CURNO | Type | Units | Max   | Time | Min   | Time | SAE Class |
|------------------------------|-------|------|-------|-------|------|-------|------|-----------|
| Driver Shoulder Belt Pullout | 043   | FIL  | MM    | 162.3 | 92.8 | -24.2 | 50.1 | 60        |

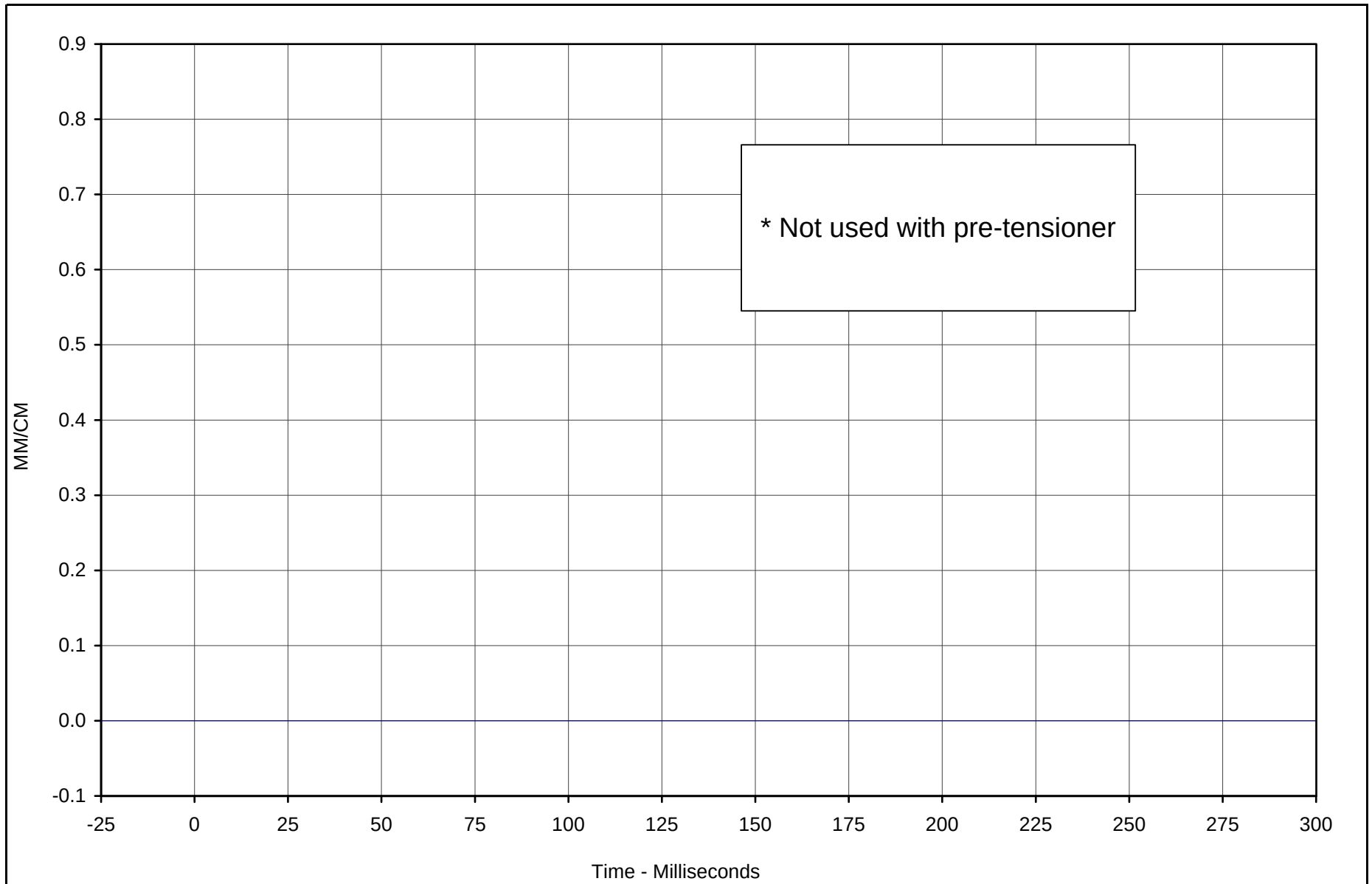


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Not used with pre-tensioner

| Curve Description               | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Shoulder Belt Elongation | 044   | FIL  | MM/CM | 0.00 | 0.0  | 0.00 | 0.0  | 60        |

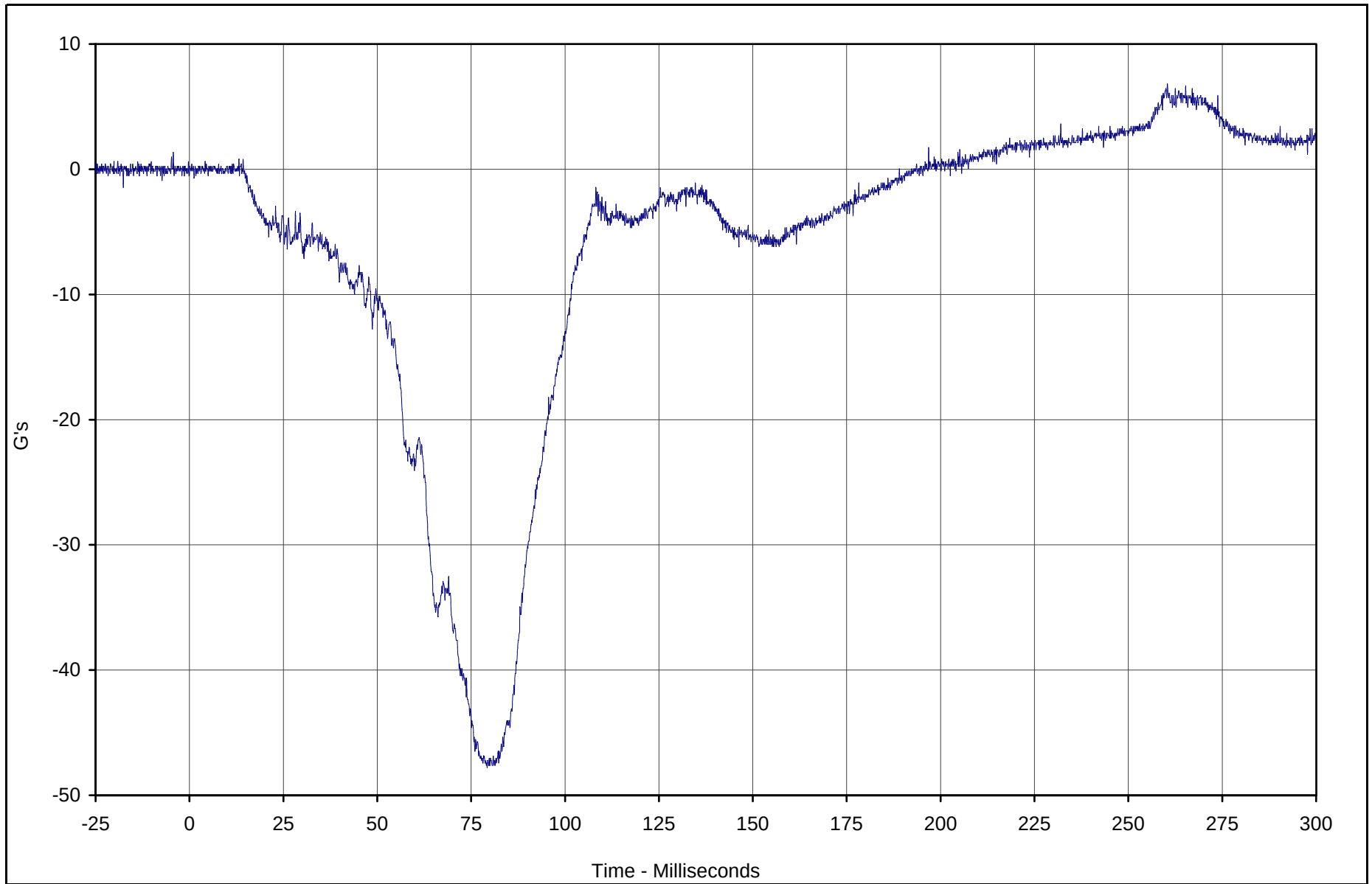


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Primary X | 045   | FIL  | G's   | 6.8 | 260.4 | -47.8 | 79.3 | 1000      |



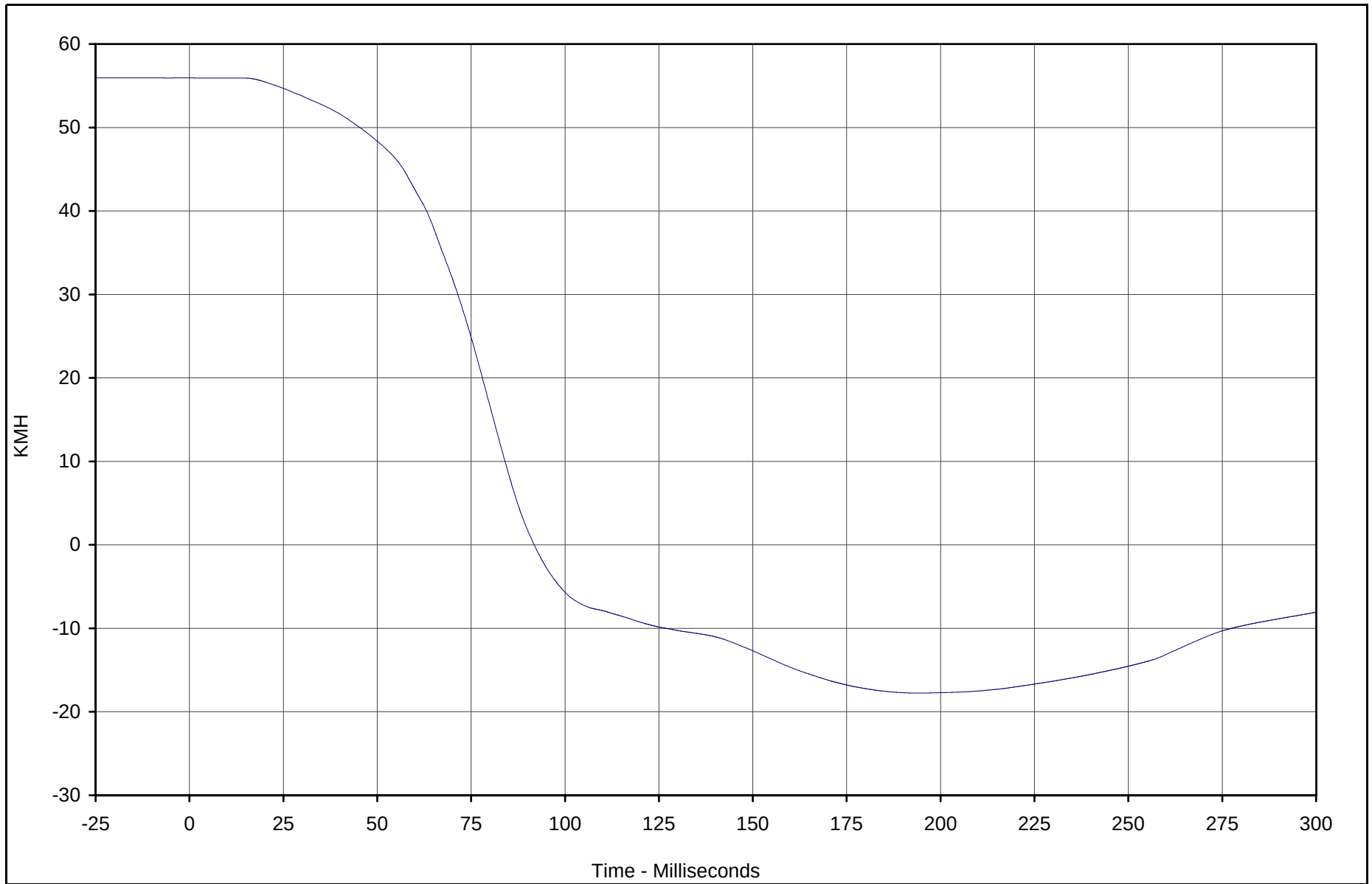
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Primary X Velocity | 045   | IN1  | KMH   | 55.9 | 0.0  | -17.8 | 195.2 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

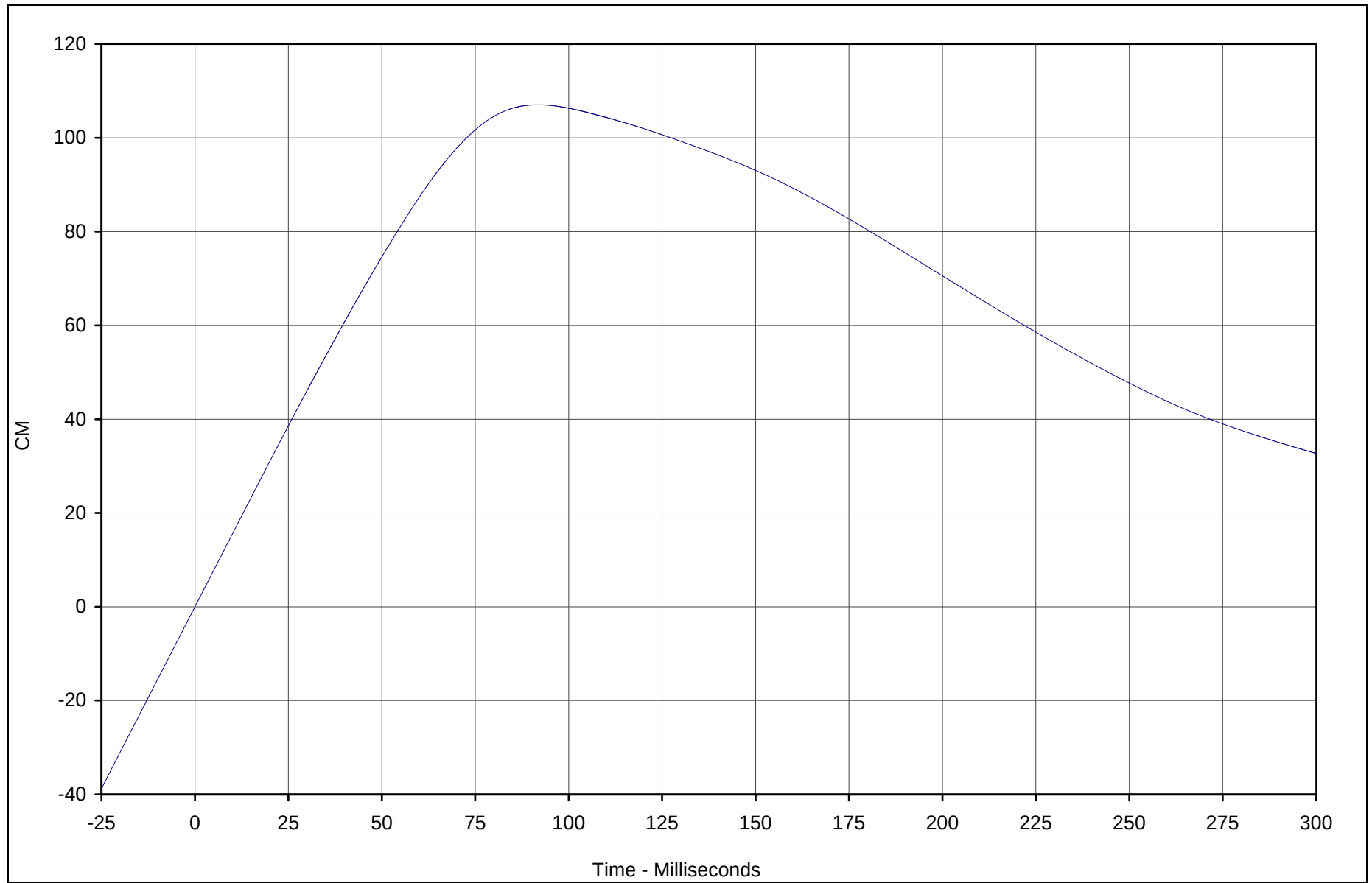
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03





| Curve Description               | CURNO | Type | Units | Max   | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|-------|------|-----|------|-----------|
| Passenger Head Primary X Displ. | 045   | IN2  | CM    | 107.0 | 91.8 | 0.0 | 0.0  | 180       |



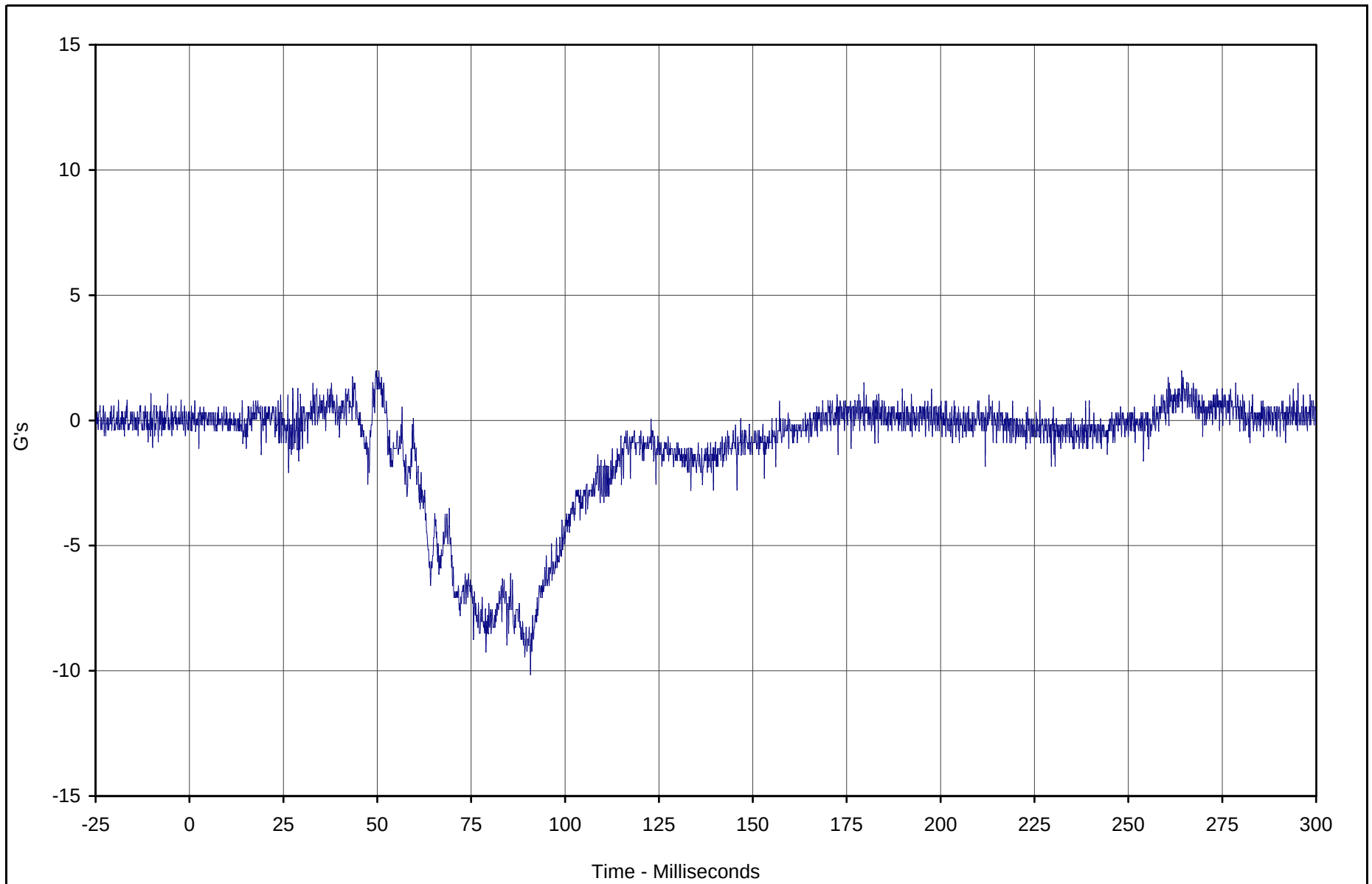
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description        | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Head Primary Y | 046   | FIL  | G's   | 2.0 | 49.6 | -10.2 | 90.8 | 1000      |



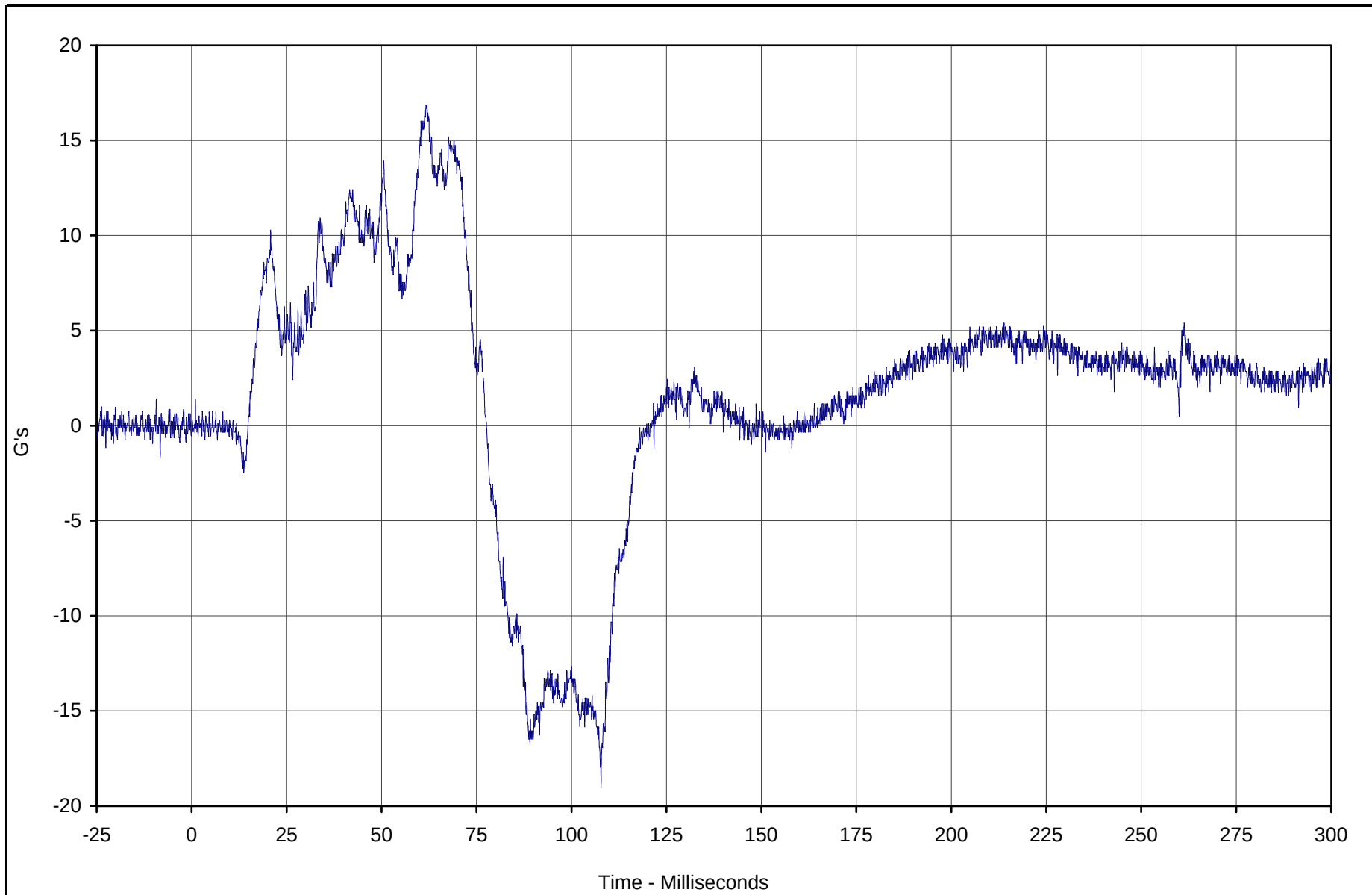
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description        | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Primary Z | 047   | FIL  | G's   | 16.9 | 61.7 | -19.0 | 107.8 | 1000      |

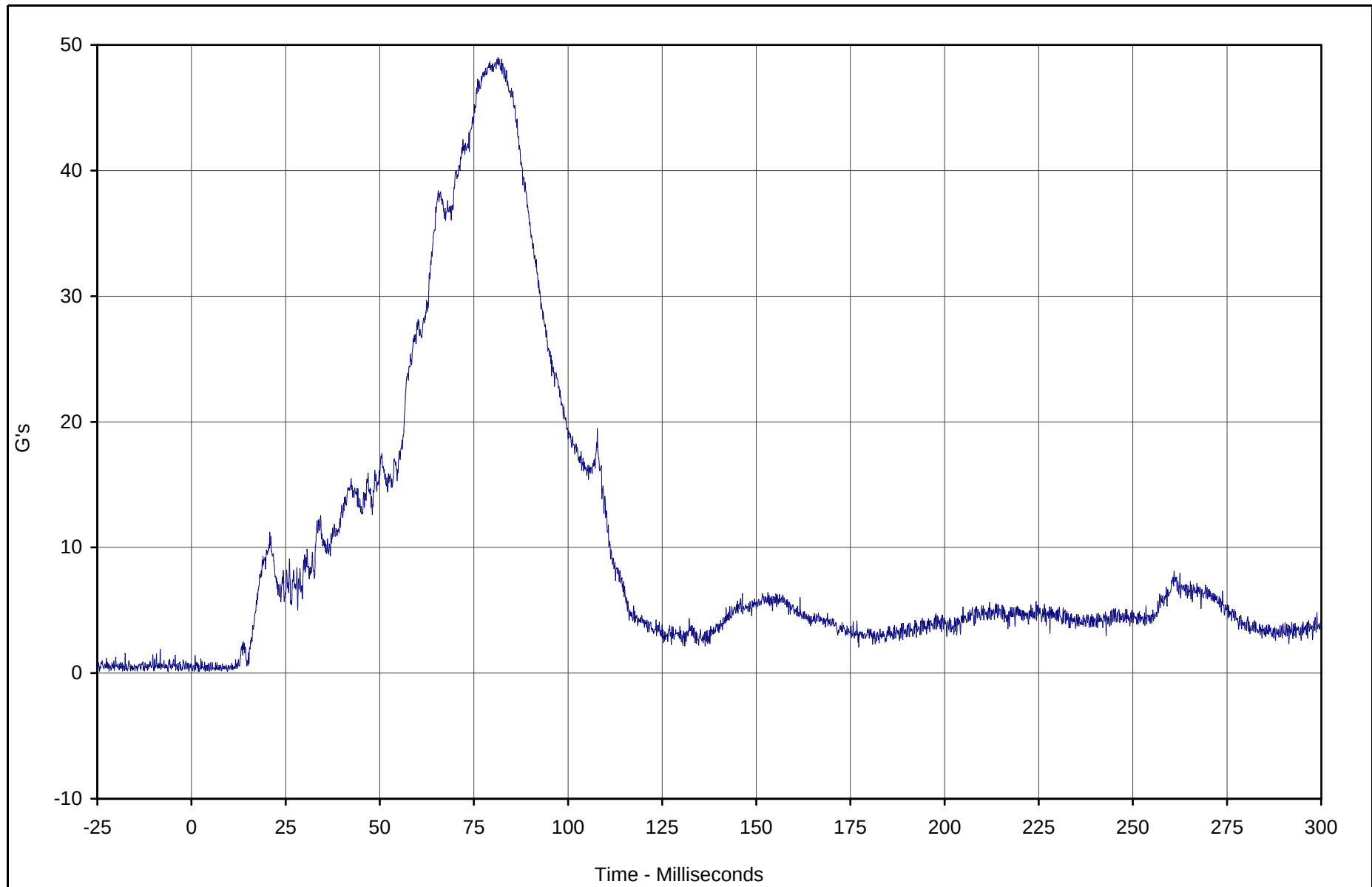


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Head Resultant Primary | 045   | RES  | G's   | 49.0 | 81.4 | 0.1 | 1.8  | 1000      |



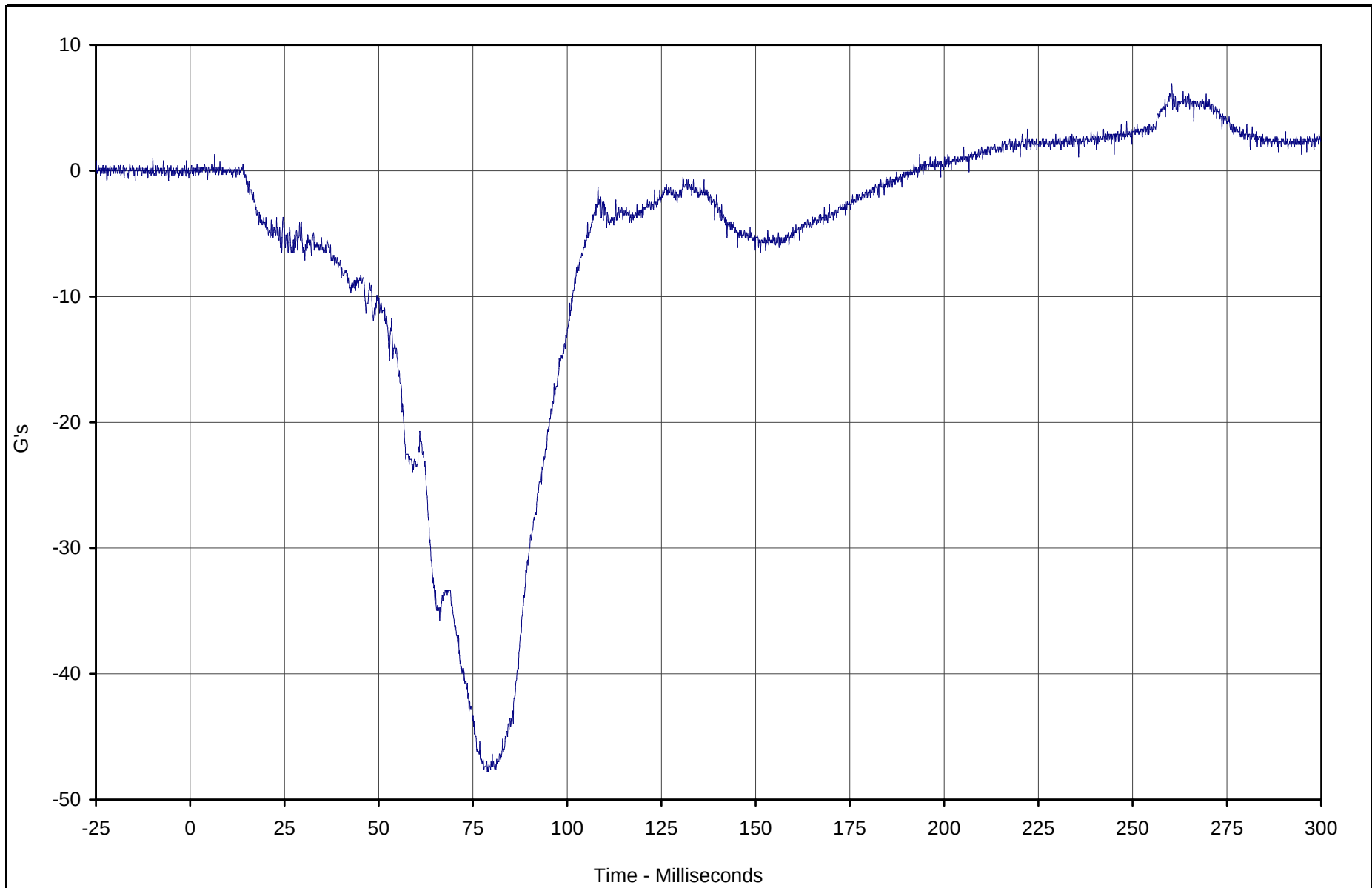
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description          | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Redundant X | 048   | FIL  | G's   | 6.9 | 260.4 | -47.8 | 78.8 | 1000      |



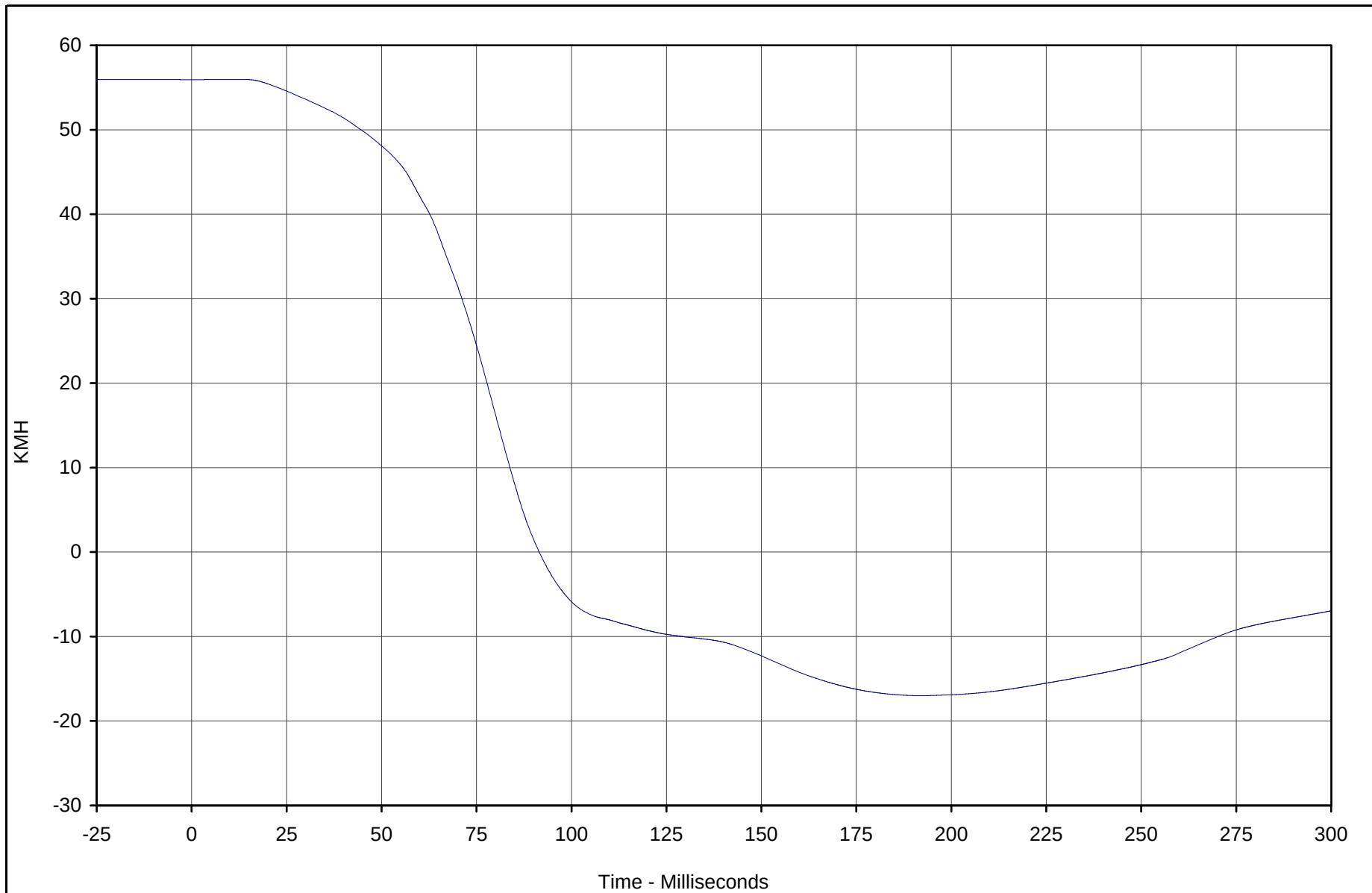
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                   | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Redundant X Velocity | 048   | IN1  | KMH   | 56.0 | 14.0 | -17.0 | 191.9 | 180       |



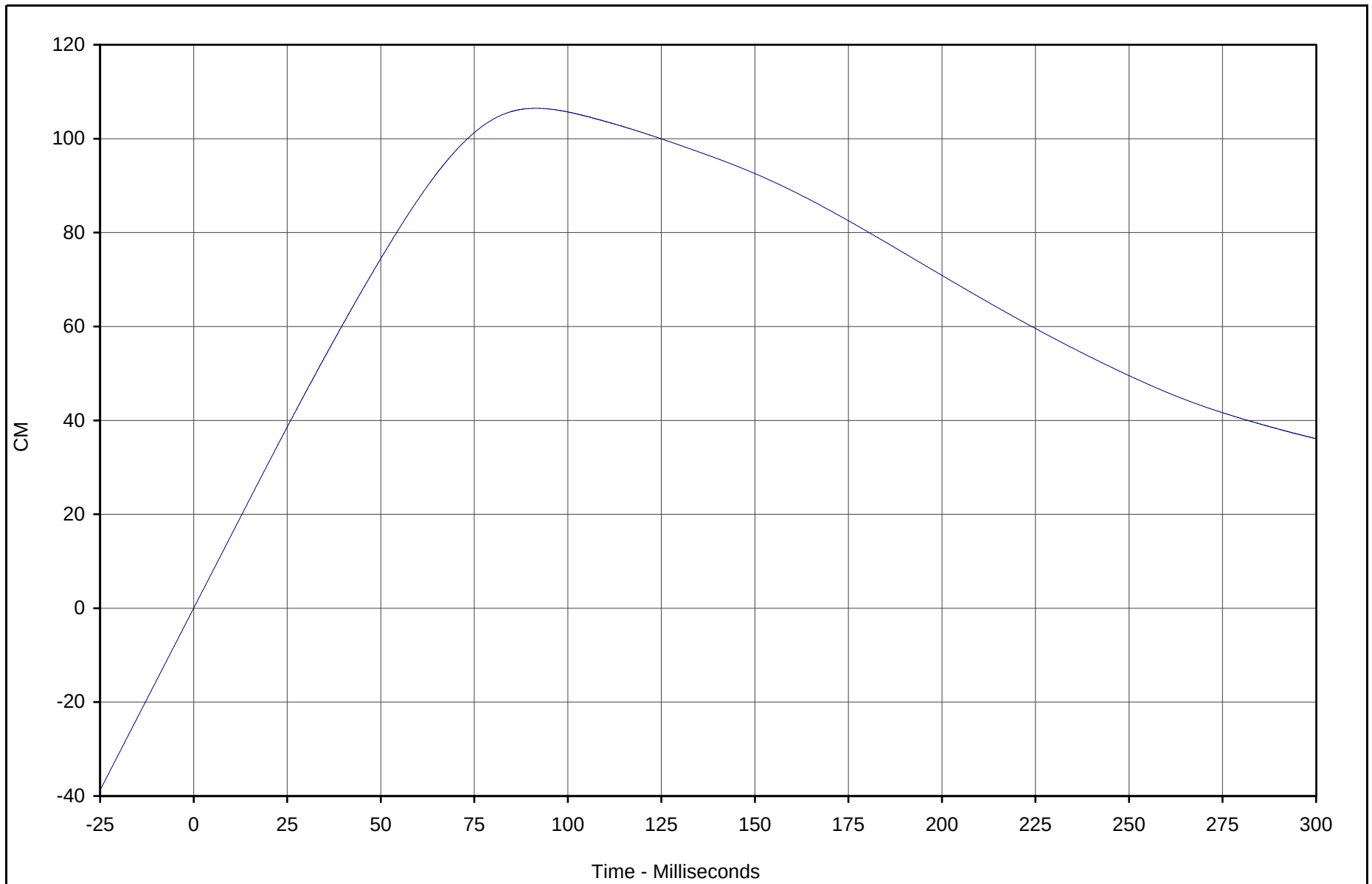
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description                 | CURNO | Type | Units | Max   | Time | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|-------|------|-----|------|-----------|
| Passenger Head Redundant X Displ. | 048   | IN2  | CM    | 106.5 | 91.5 | 0.0 | 0.0  | 180       |

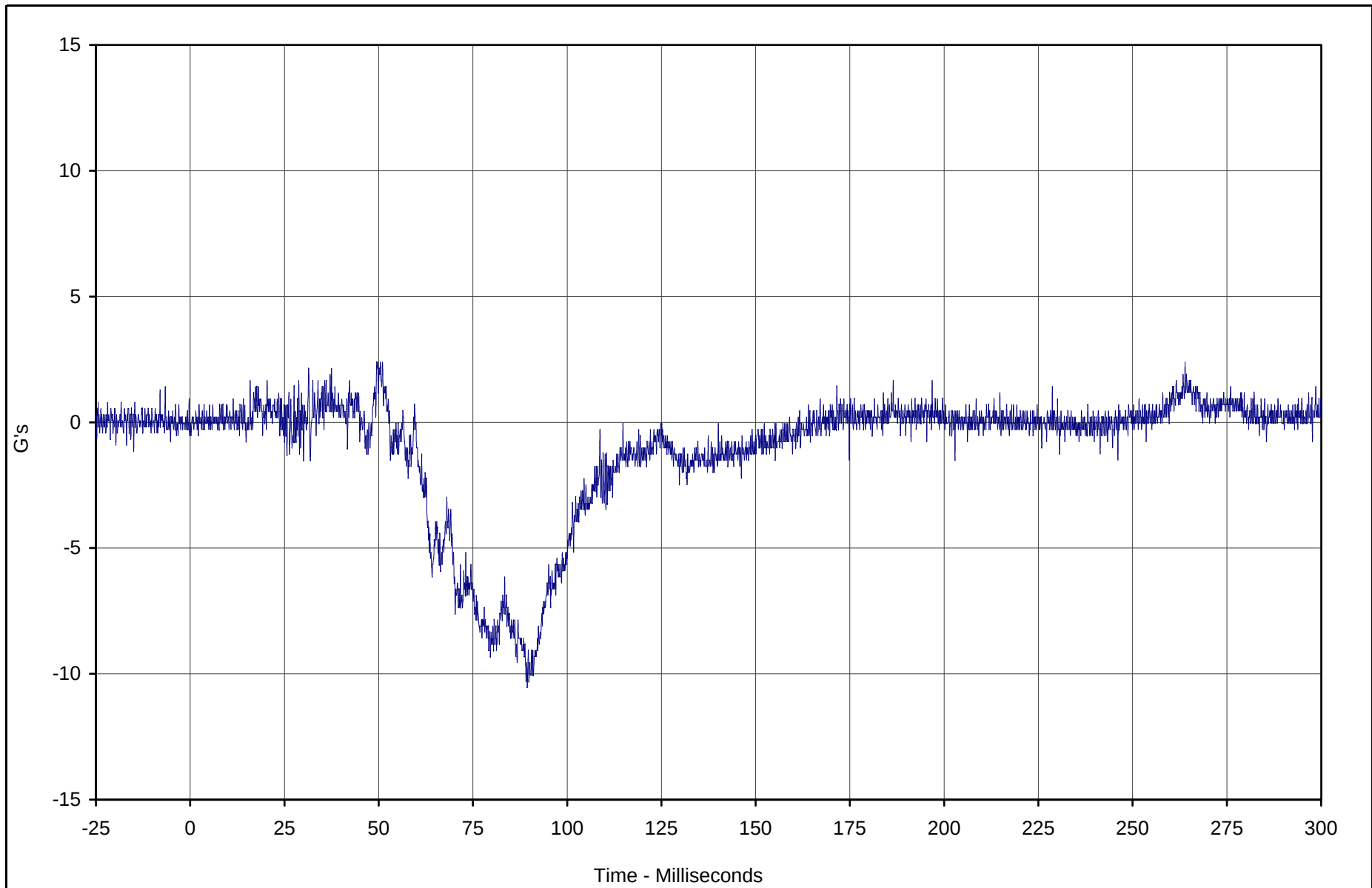


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description          | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Redundant Y | 049   | FIL  | G's   | 2.4 | 263.9 | -10.5 | 89.4 | 1000      |



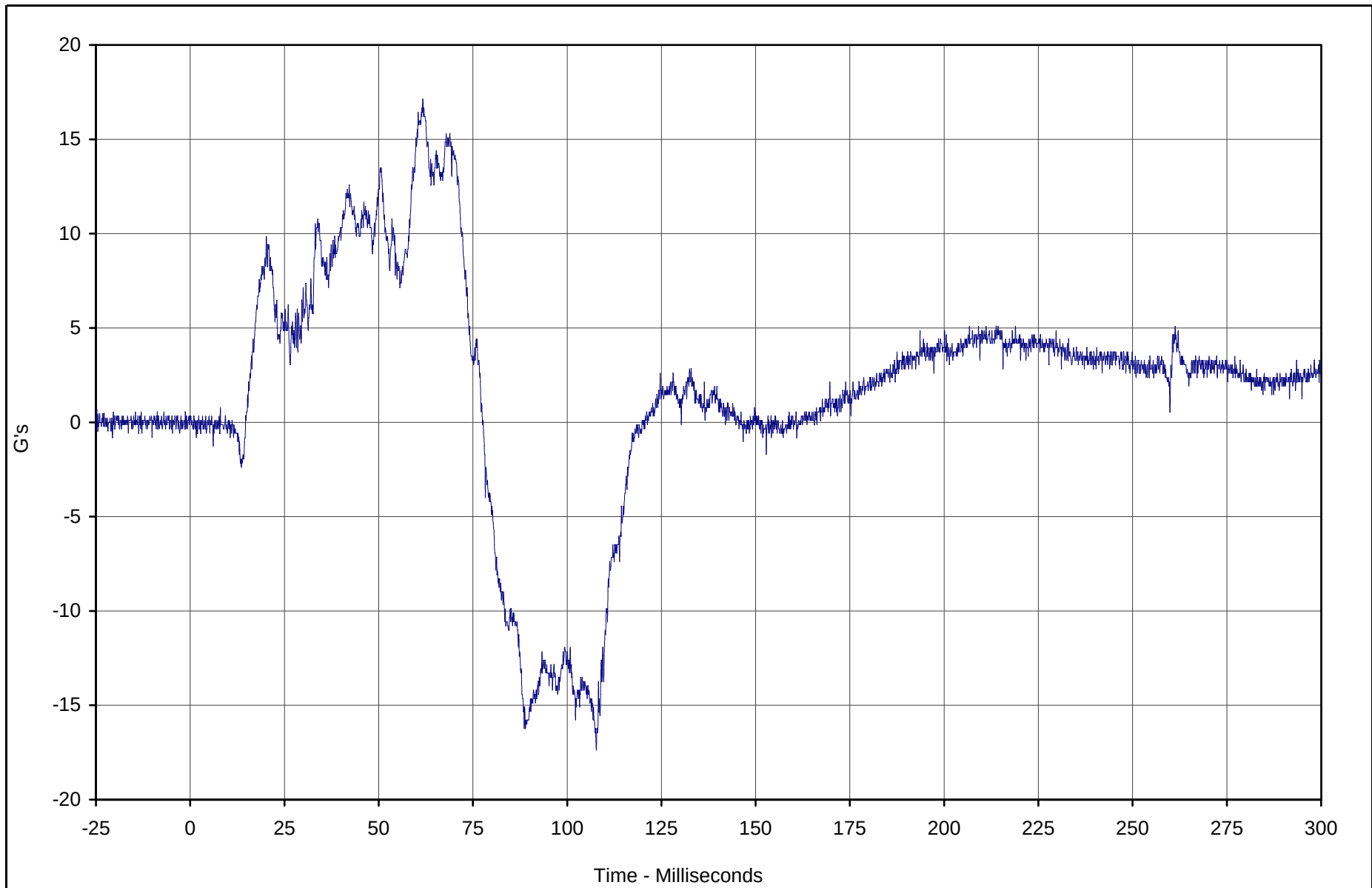
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description          | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Redundant Z | 050   | FIL  | G's   | 17.1 | 61.7 | -17.4 | 107.7 | 1000      |

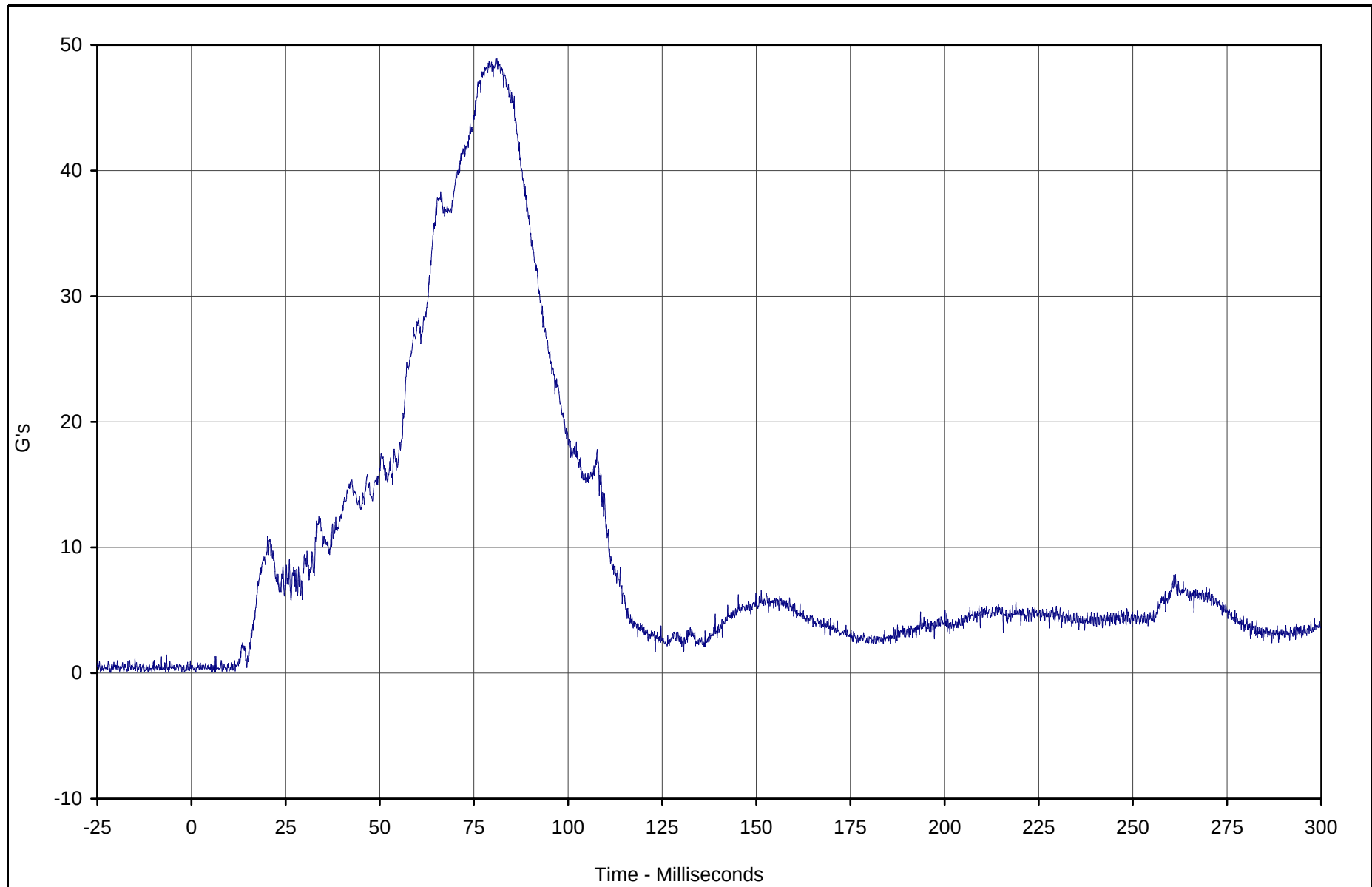


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Head Resultant Redundant | 048   | RES  | G's   | 48.9 | 81.1 | 0.1 | 1.1  | 1000      |

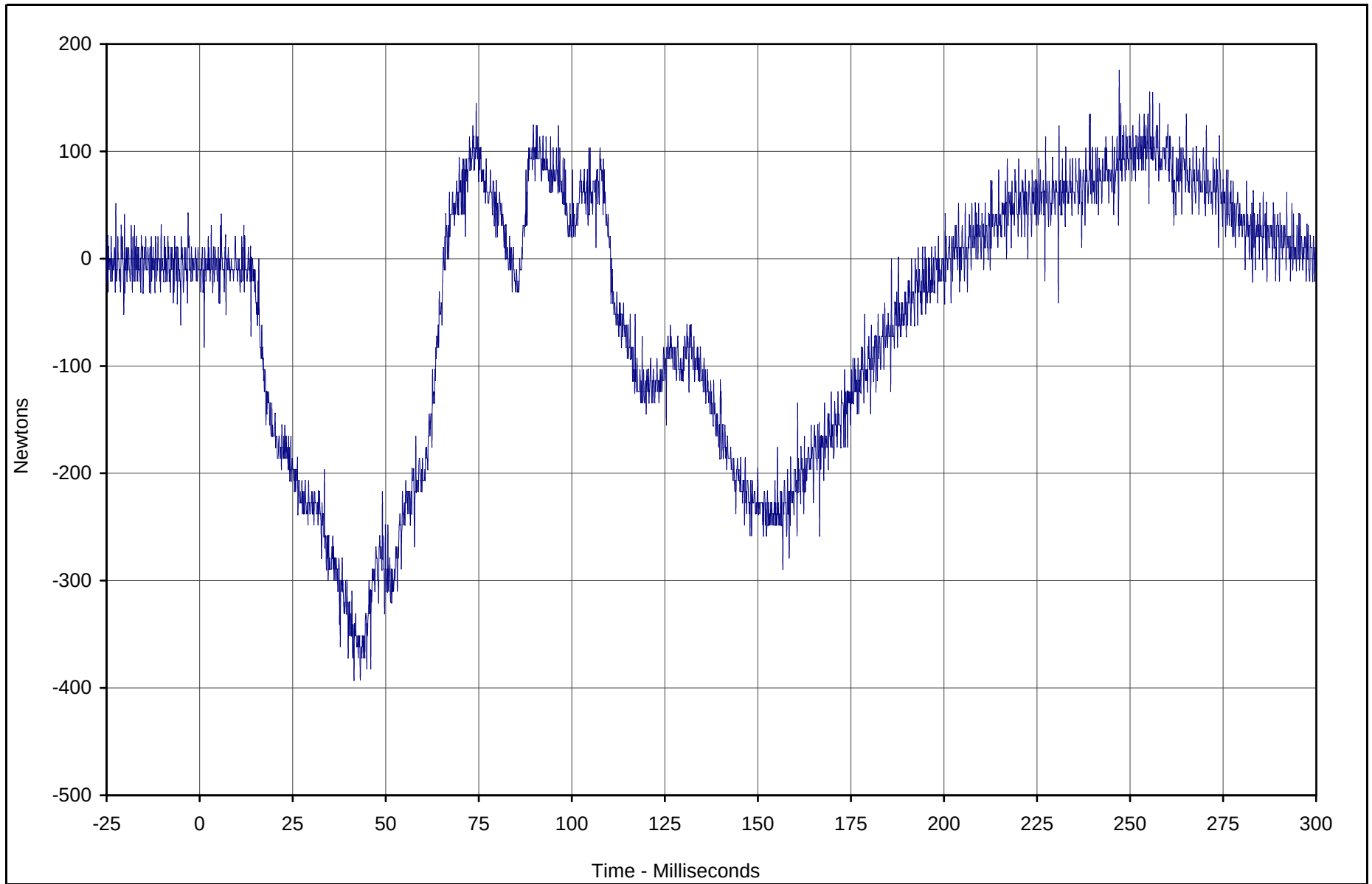


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description      | CURNO | Type | Units   | Max   | Time  | Min    | Time | SAE Class |
|------------------------|-------|------|---------|-------|-------|--------|------|-----------|
| Passenger Neck Force X | 051   | FIL  | Newtons | 175.7 | 247.1 | -392.7 | 41.5 | 1000      |



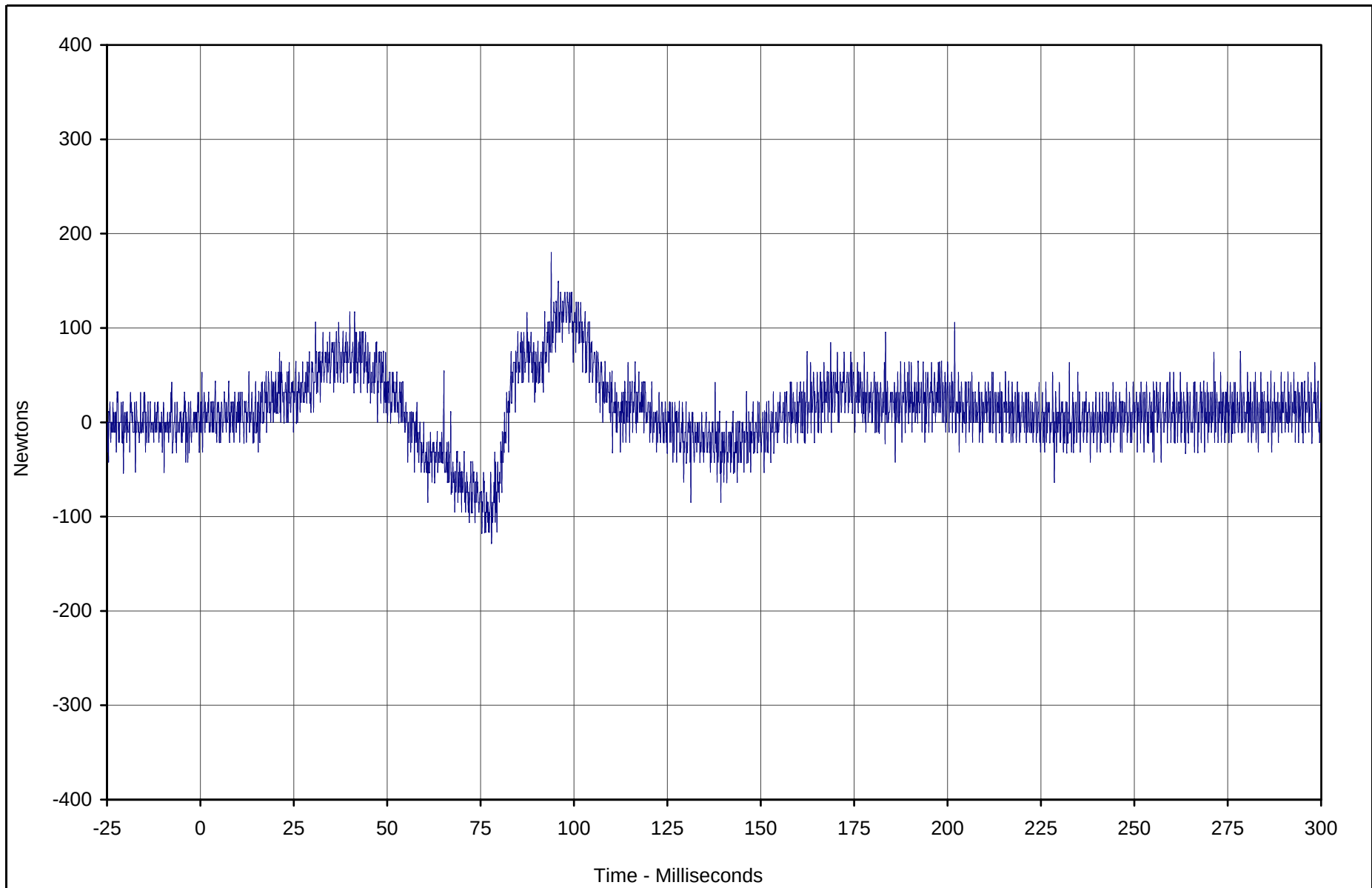
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description      | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|------------------------|-------|------|---------|-------|------|--------|------|-----------|
| Passenger Neck Force Y | 052   | FIL  | Newtons | 180.1 | 93.9 | -127.2 | 77.9 | 1000      |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

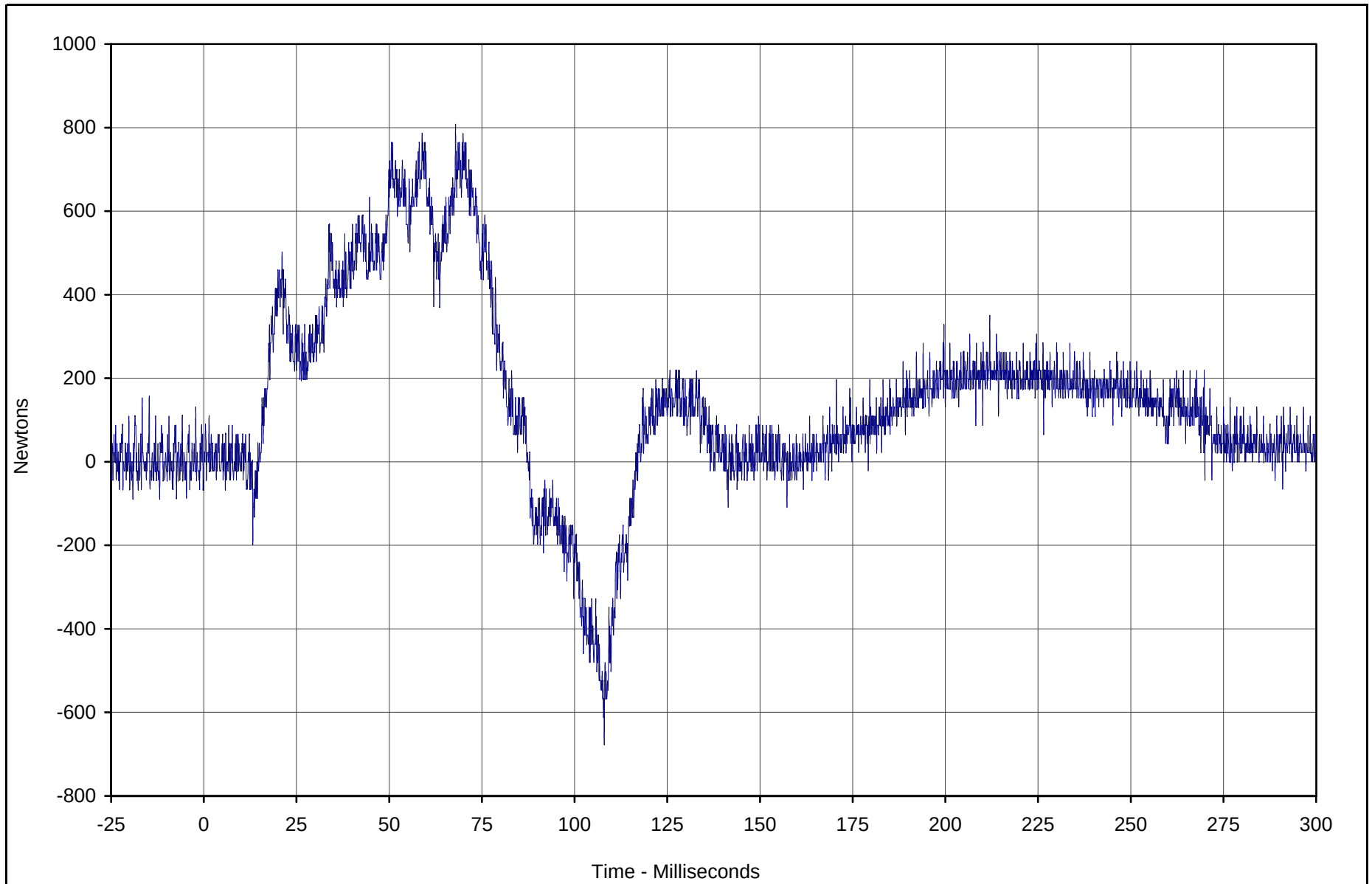
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03





| Curve Description      | CURNO | Type | Units   | Max   | Time | Min    | Time  | SAE Class |
|------------------------|-------|------|---------|-------|------|--------|-------|-----------|
| Passenger Neck Force Z | 053   | FIL  | Newtons | 808.2 | 67.9 | -677.1 | 108.0 | 1000      |

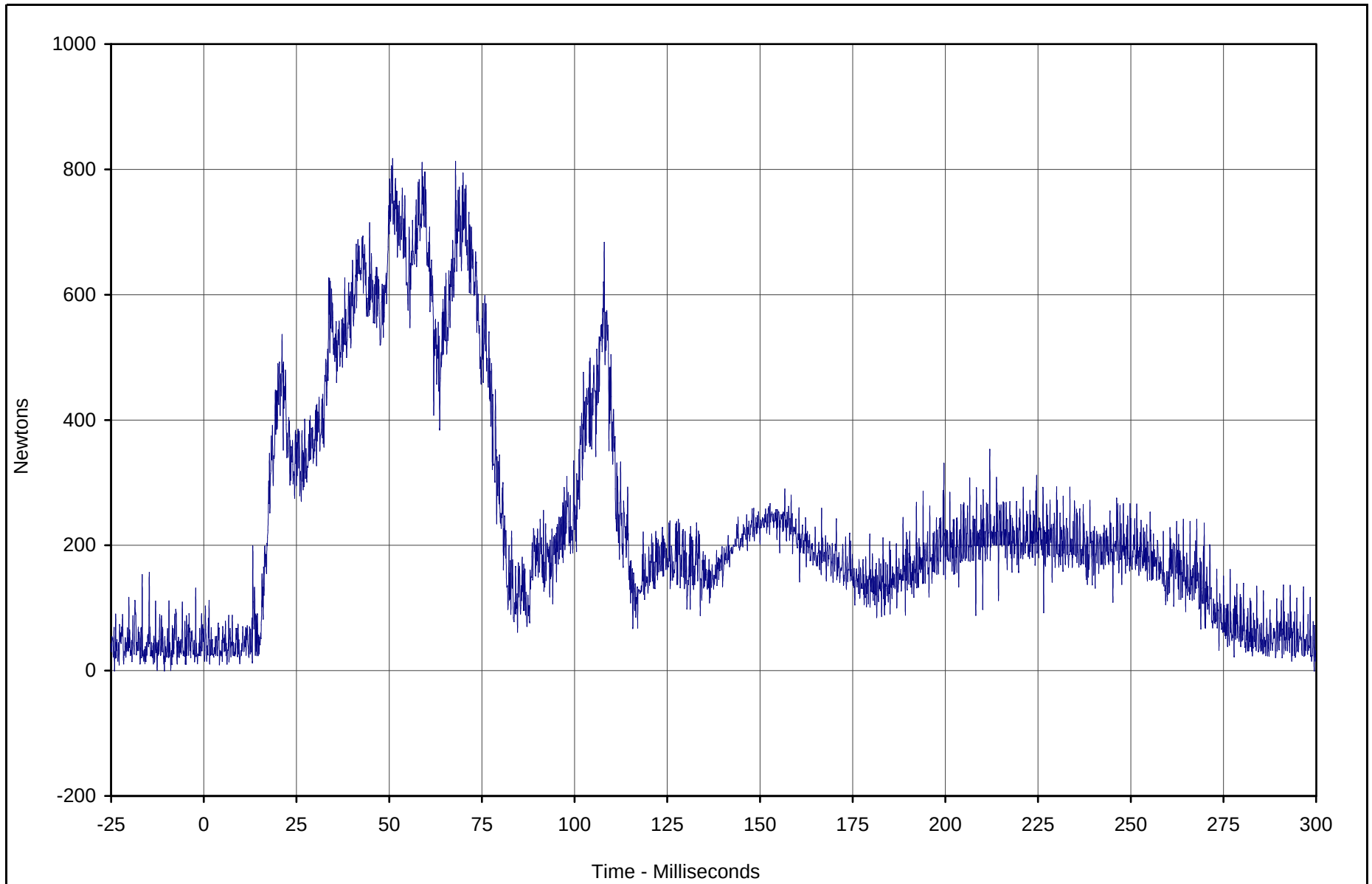


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description              | CURNO | Type | Units   | Max   | Time | Min | Time  | SAE Class |
|--------------------------------|-------|------|---------|-------|------|-----|-------|-----------|
| Passenger Neck Force Resultant | 051   | RES  | Newtons | 817.4 | 50.9 | 0.0 | 299.5 | 1000      |

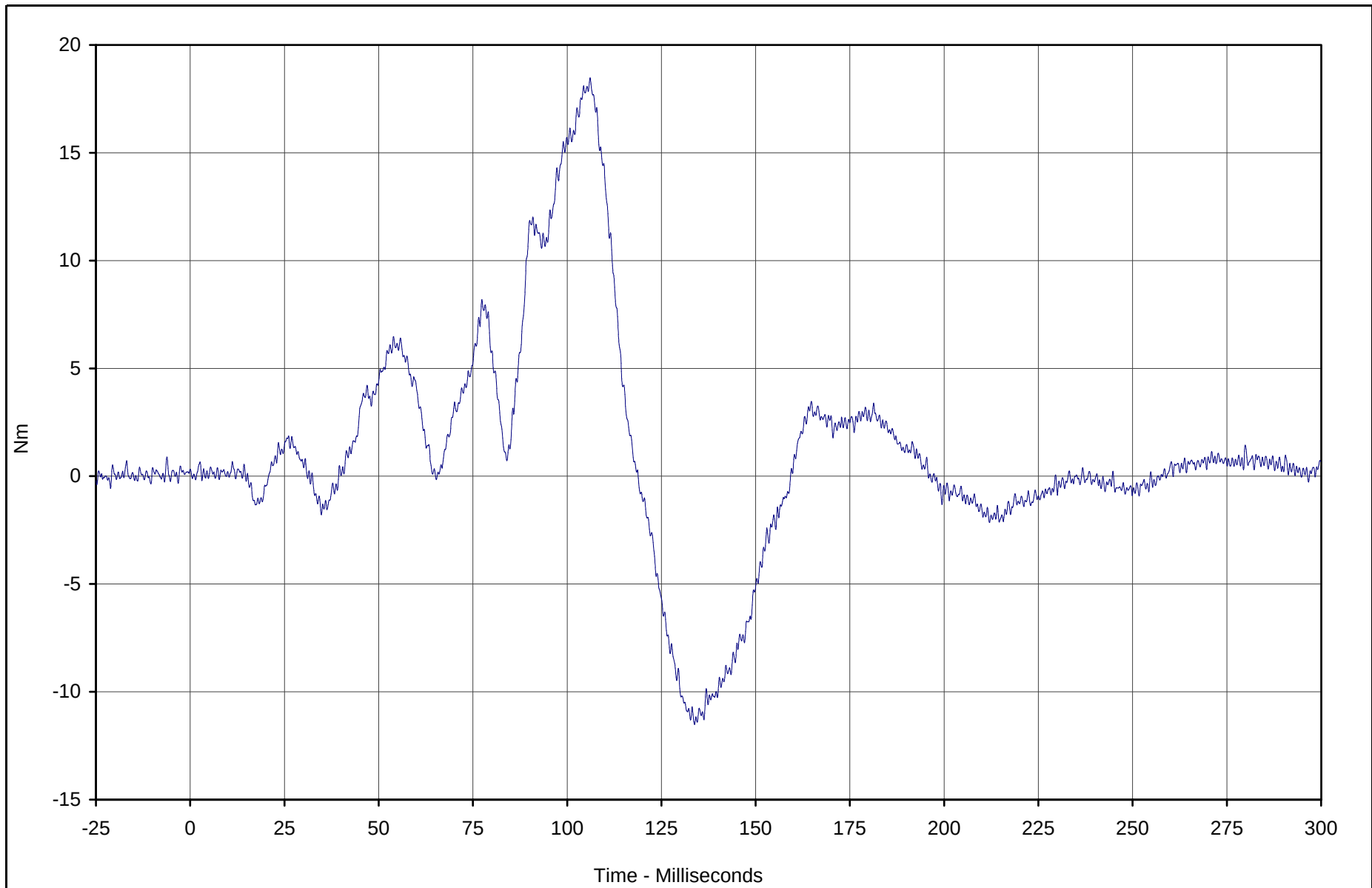


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max  | Time  | Min   | Time  | SAE Class |
|-------------------------|-------|------|-------|------|-------|-------|-------|-----------|
| Passenger Neck Moment X | 054   | FIL  | Nm    | 18.5 | 106.1 | -11.5 | 133.8 | 600       |

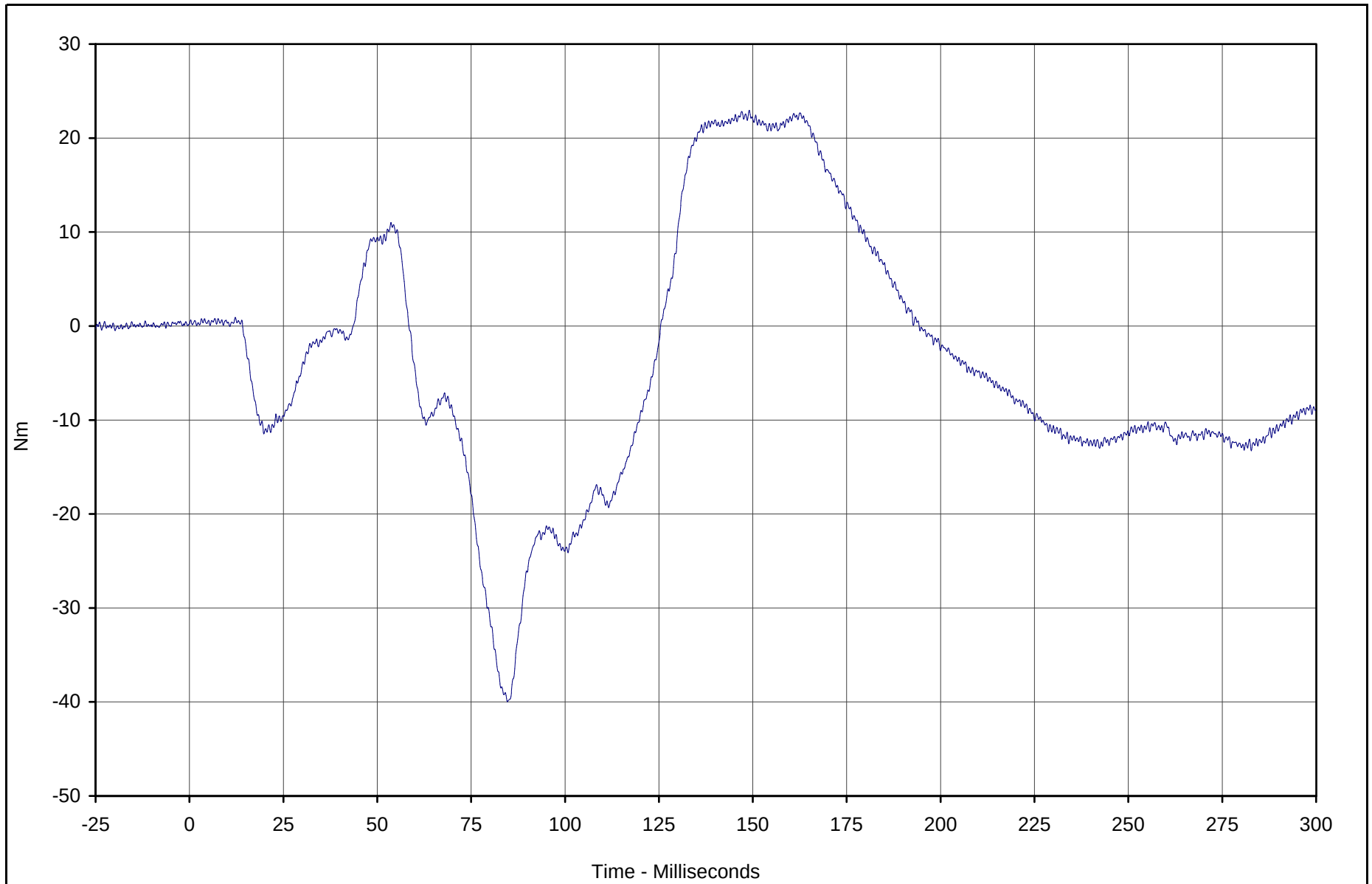


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Neck Moment Y | 055   | FIL  | Nm    | 23.0 | 149.1 | -40.0 | 84.6 | 600       |

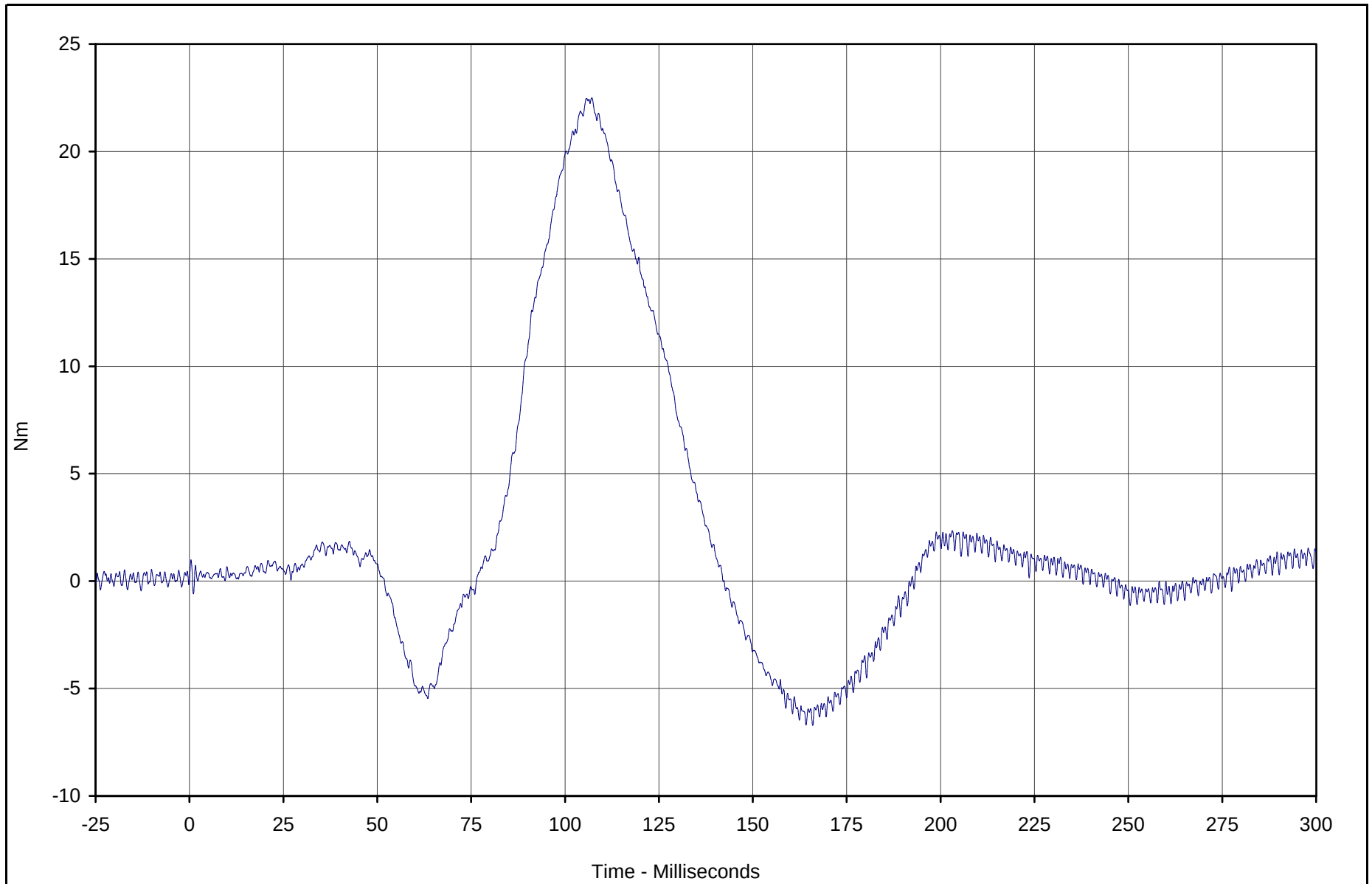


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description       | CURNO | Type | Units | Max  | Time  | Min  | Time  | SAE Class |
|-------------------------|-------|------|-------|------|-------|------|-------|-----------|
| Passenger Neck Moment Z | 056   | FIL  | Nm    | 22.5 | 107.1 | -6.7 | 165.9 | 600       |



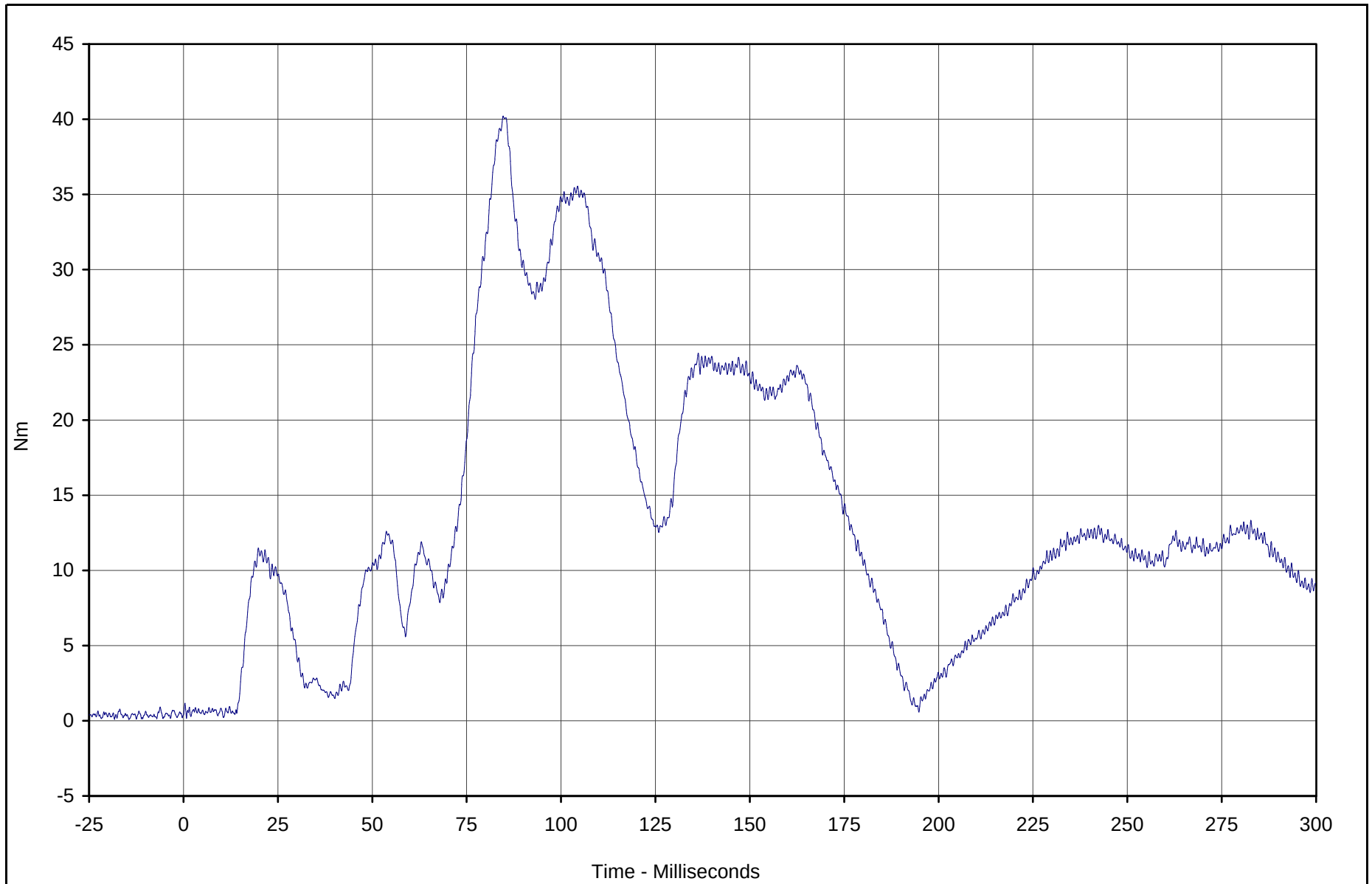
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Neck Moment Resultant | 054   | RES  | Nm    | 40.2 | 84.6 | 0.2 | 0.8  | 600       |



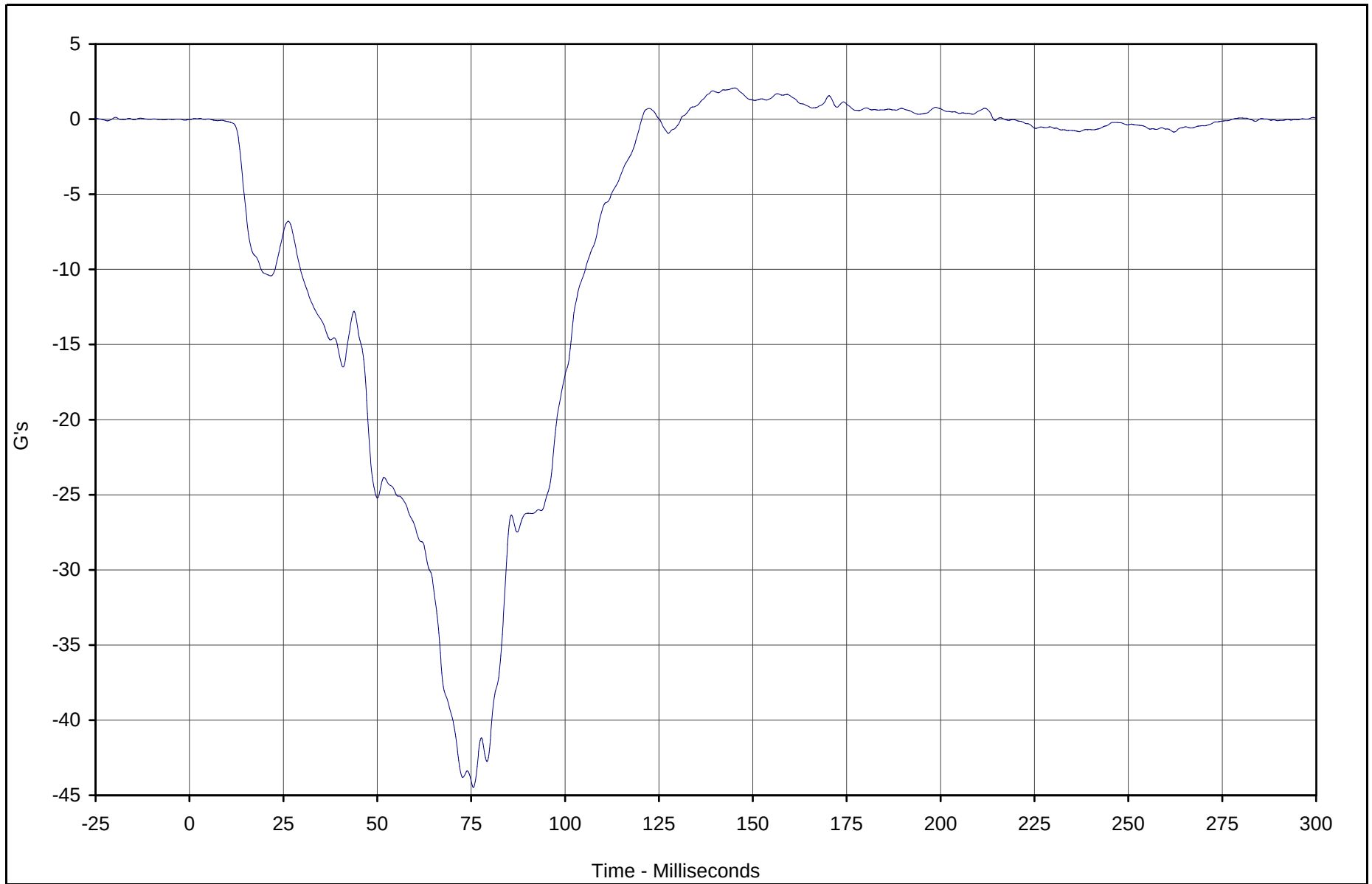
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description         | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Chest Primary X | 057   | FIL  | G's   | 2.1 | 145.2 | -44.5 | 75.6 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

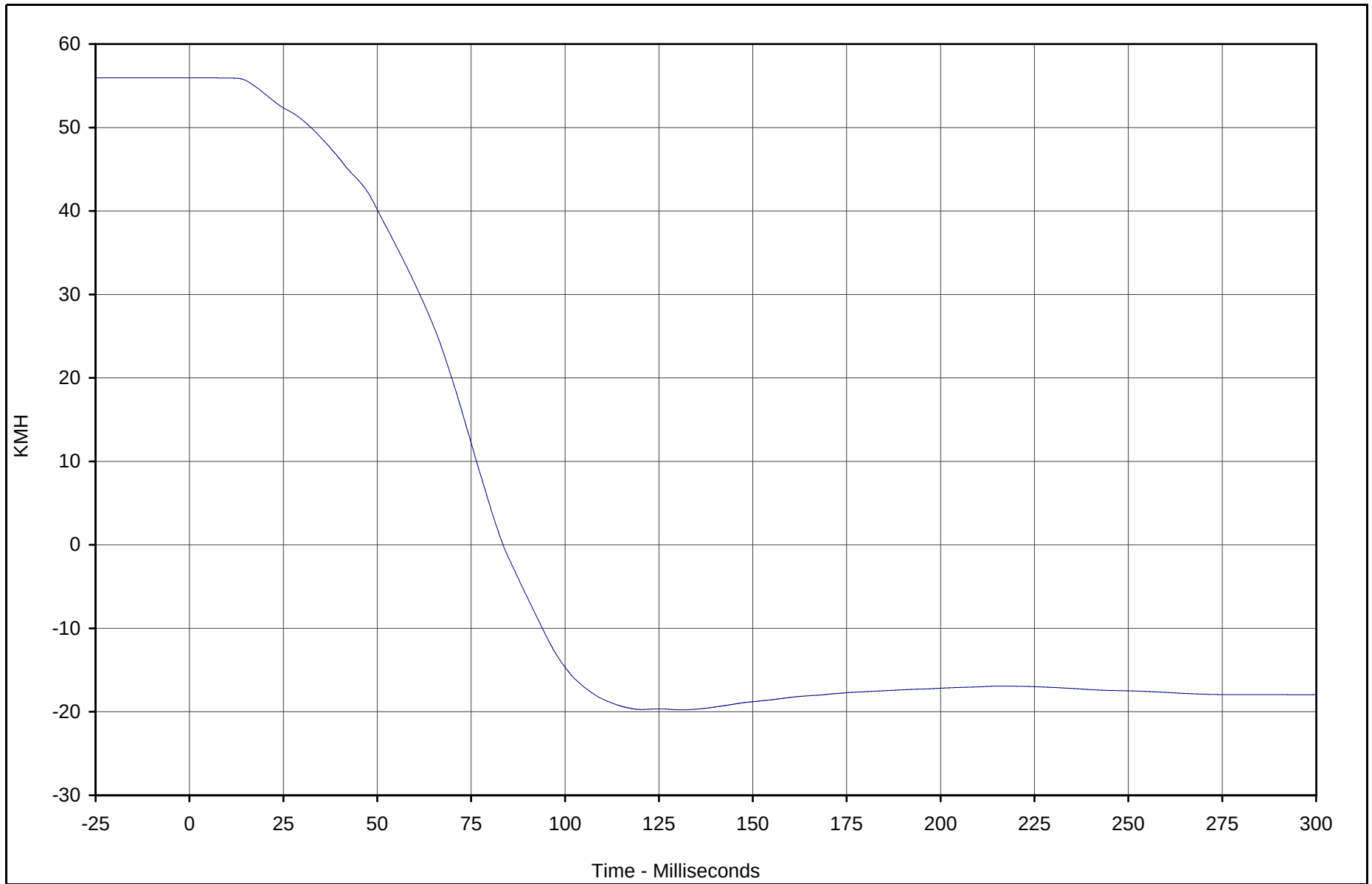
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

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| Curve Description                  | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Primary X Velocity | 057   | IN1  | KMH   | 55.9 | 5.5  | -19.8 | 130.8 | 180       |



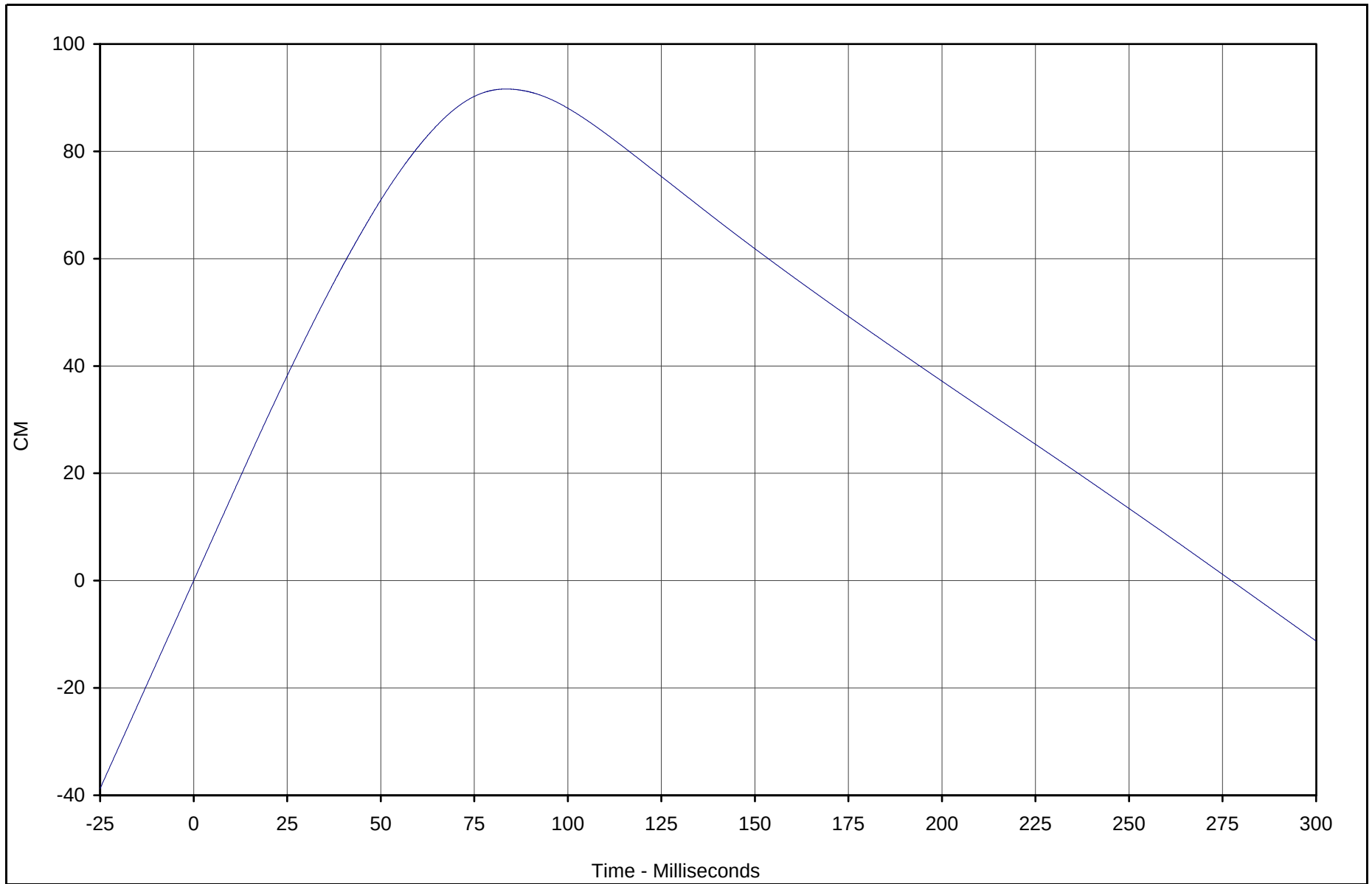
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Primary X Displ. | 057   | IN2  | CM    | 91.6 | 83.5 | -11.2 | 299.9 | 180       |



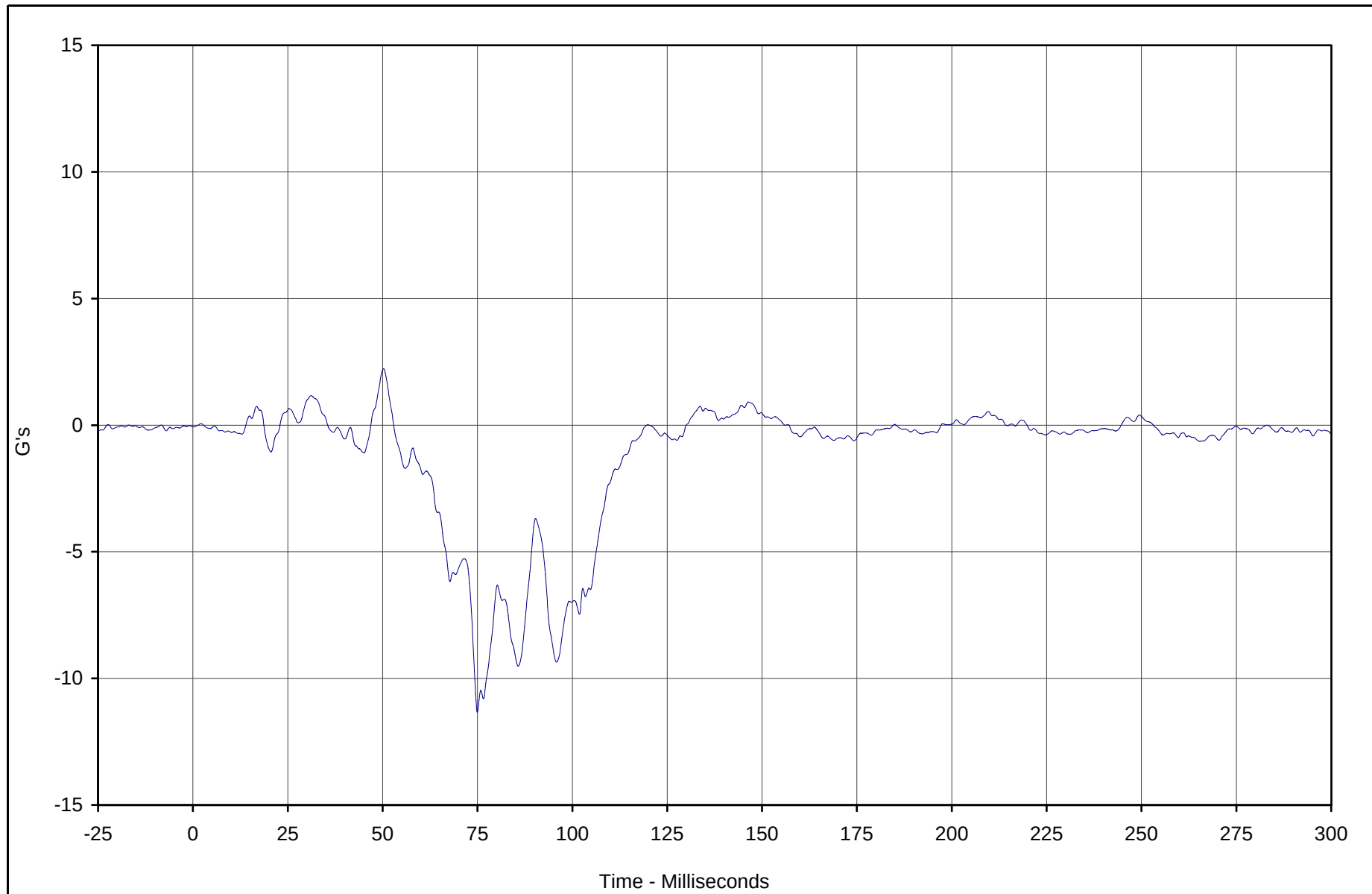
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description         | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Chest Primary Y | 058   | FIL  | G's   | 2.2 | 50.2 | -11.3 | 75.0 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

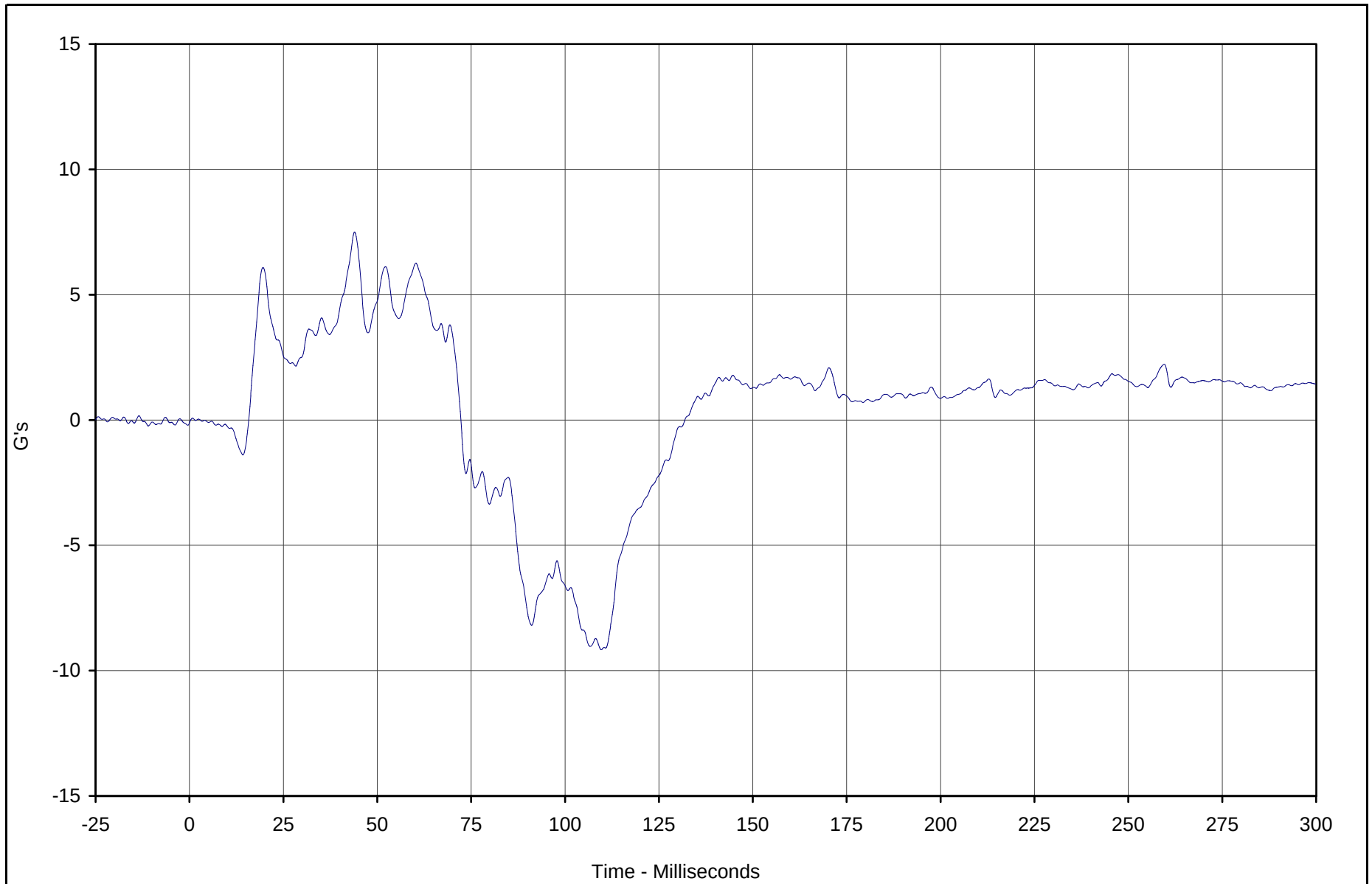
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03





| Curve Description         | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|---------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Passenger Chest Primary Z | 059   | FIL  | G's   | 7.5 | 44.0 | -9.2 | 109.7 | 180       |



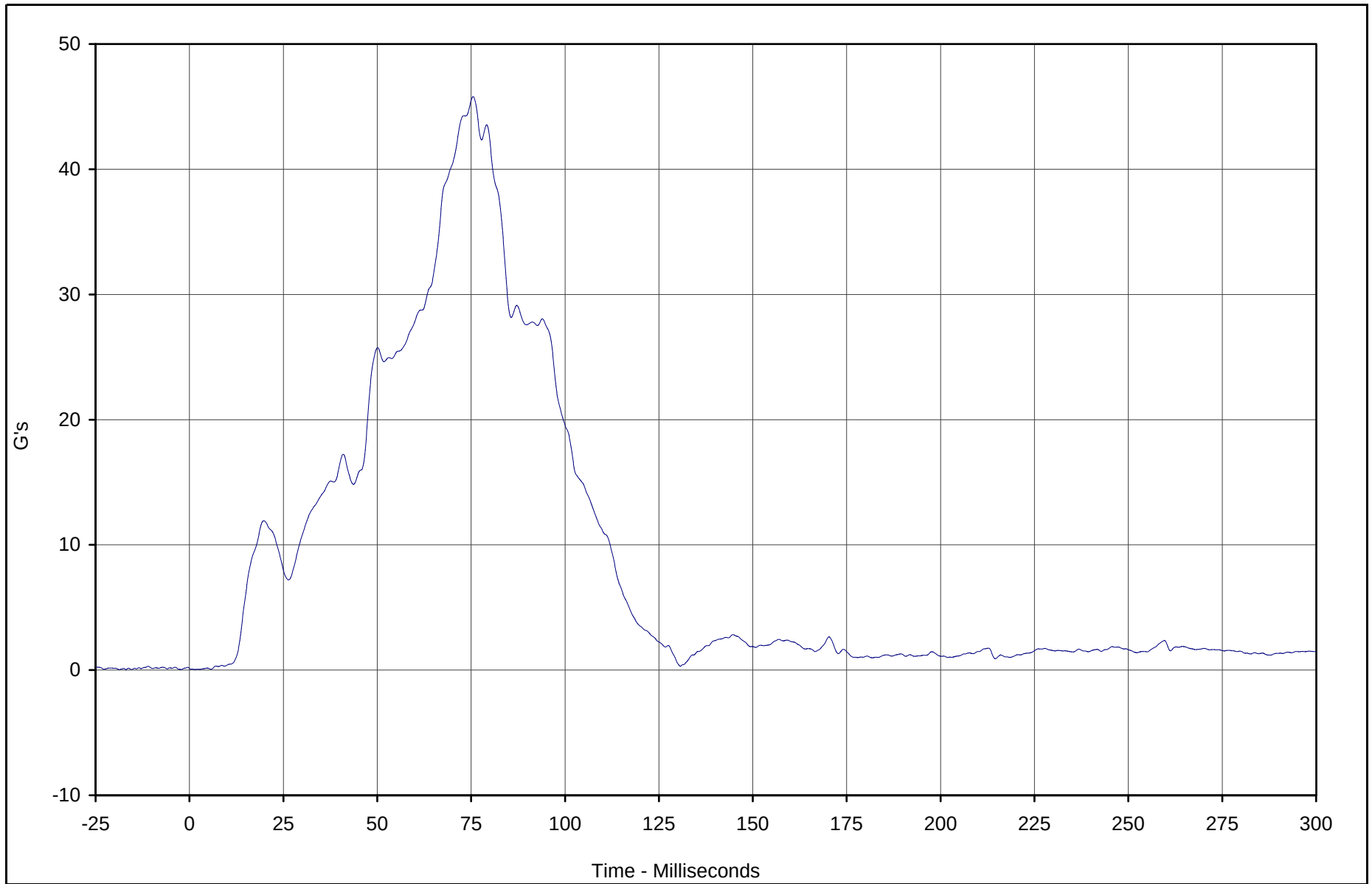
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                 | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Chest Resultant Primary | 057   | RES  | G's   | 45.8 | 75.5 | 0.0 | 1.4  | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

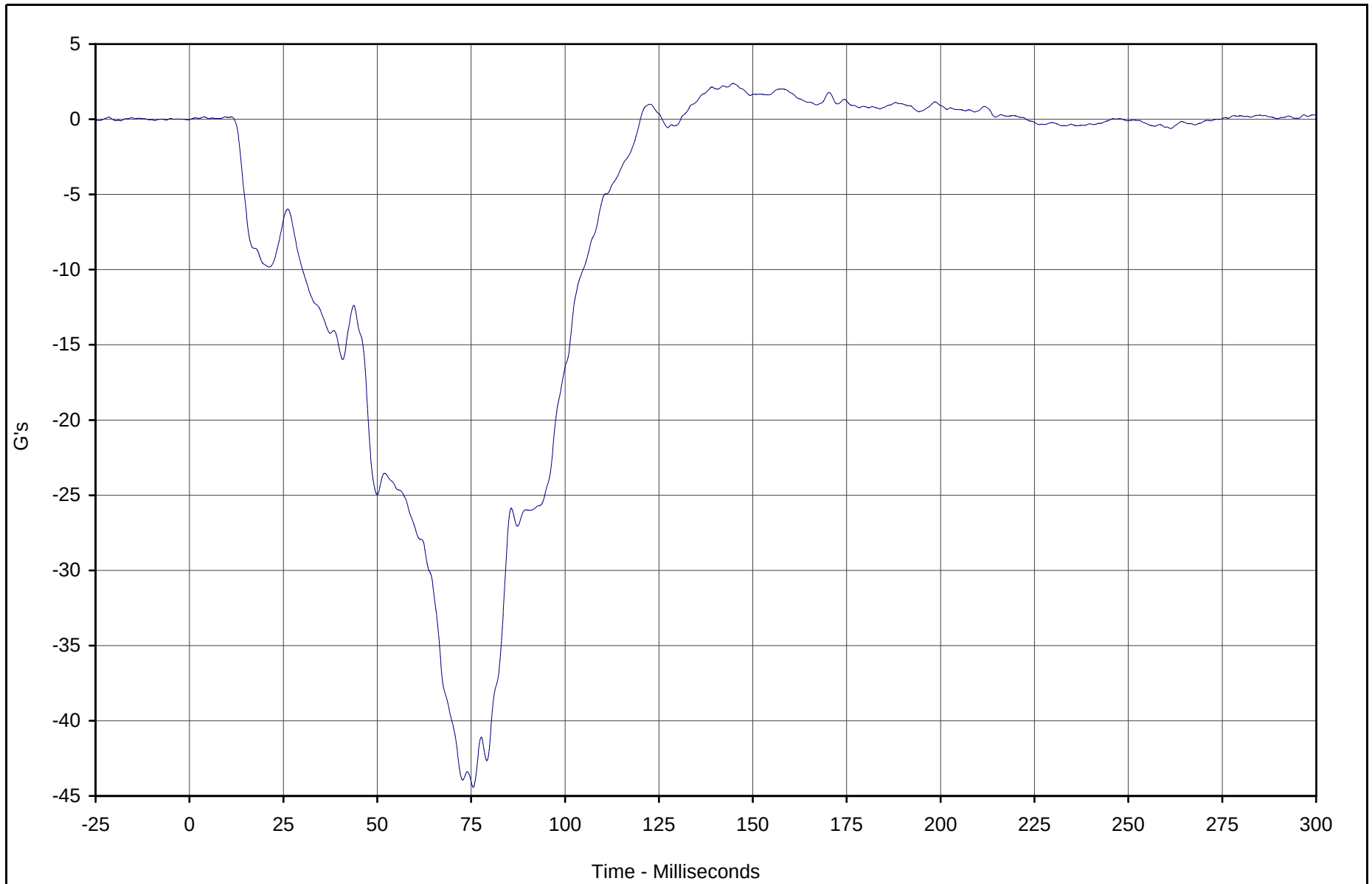
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

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| Curve Description           | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Chest Redundant X | 060   | FIL  | G's   | 2.4 | 144.7 | -44.4 | 75.5 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

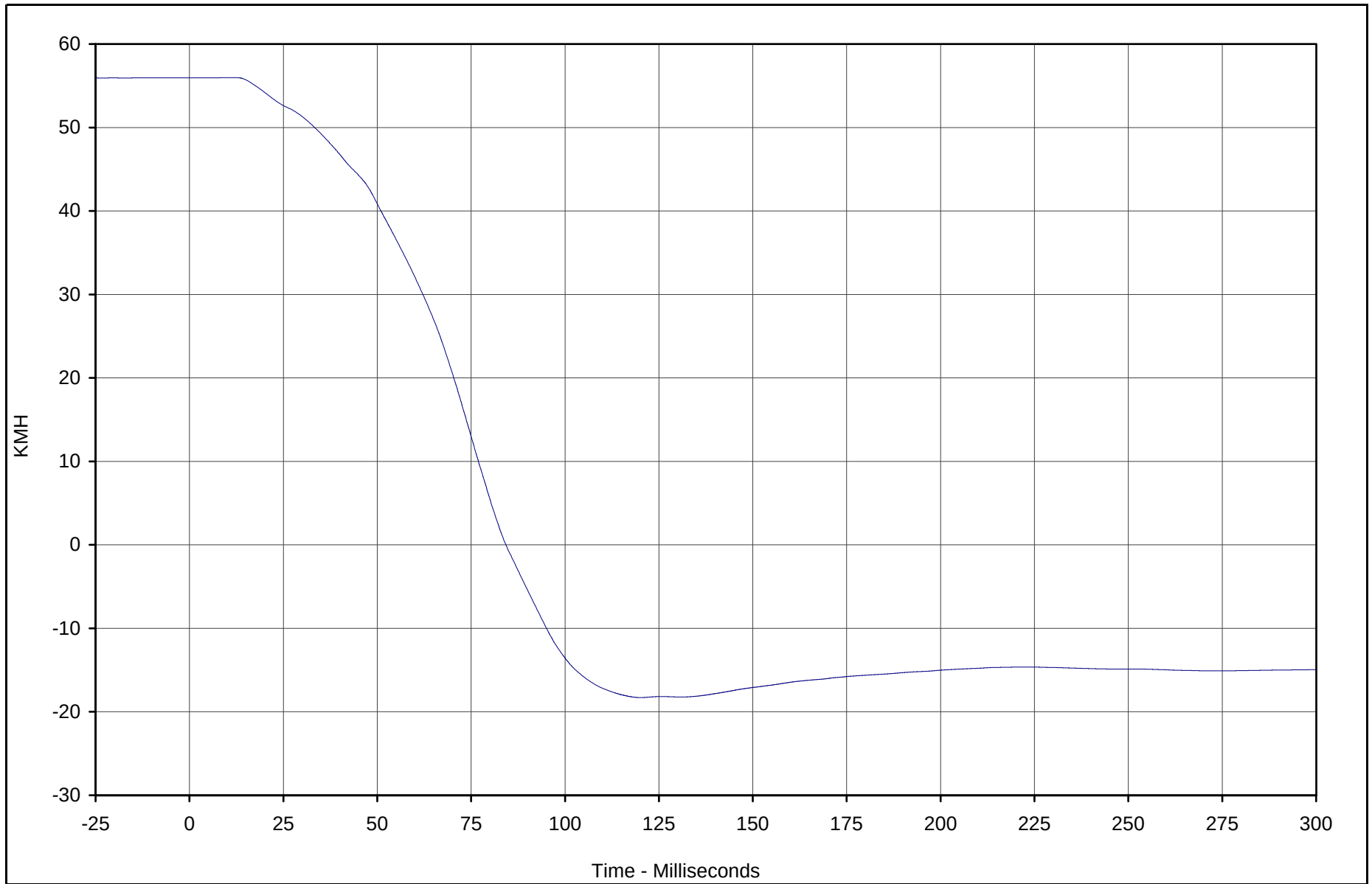
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                    | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Redundant X Velocity | 060   | IN1  | KMH   | 56.0 | 11.9 | -18.3 | 120.1 | 180       |



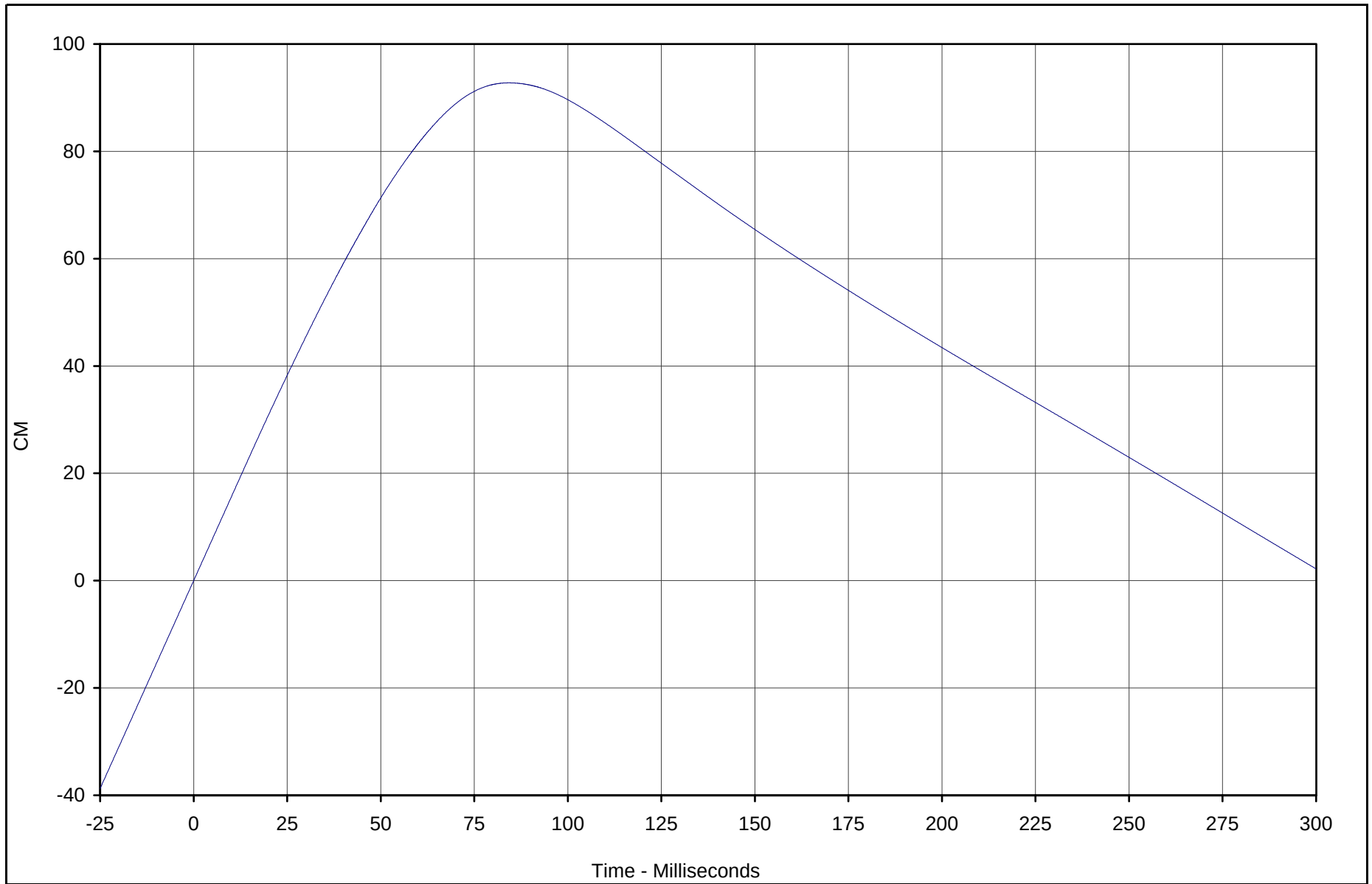
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Chest Redundant X Displ. | 060   | IN2  | CM    | 92.8 | 84.3 | 0.0 | 0.0  | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

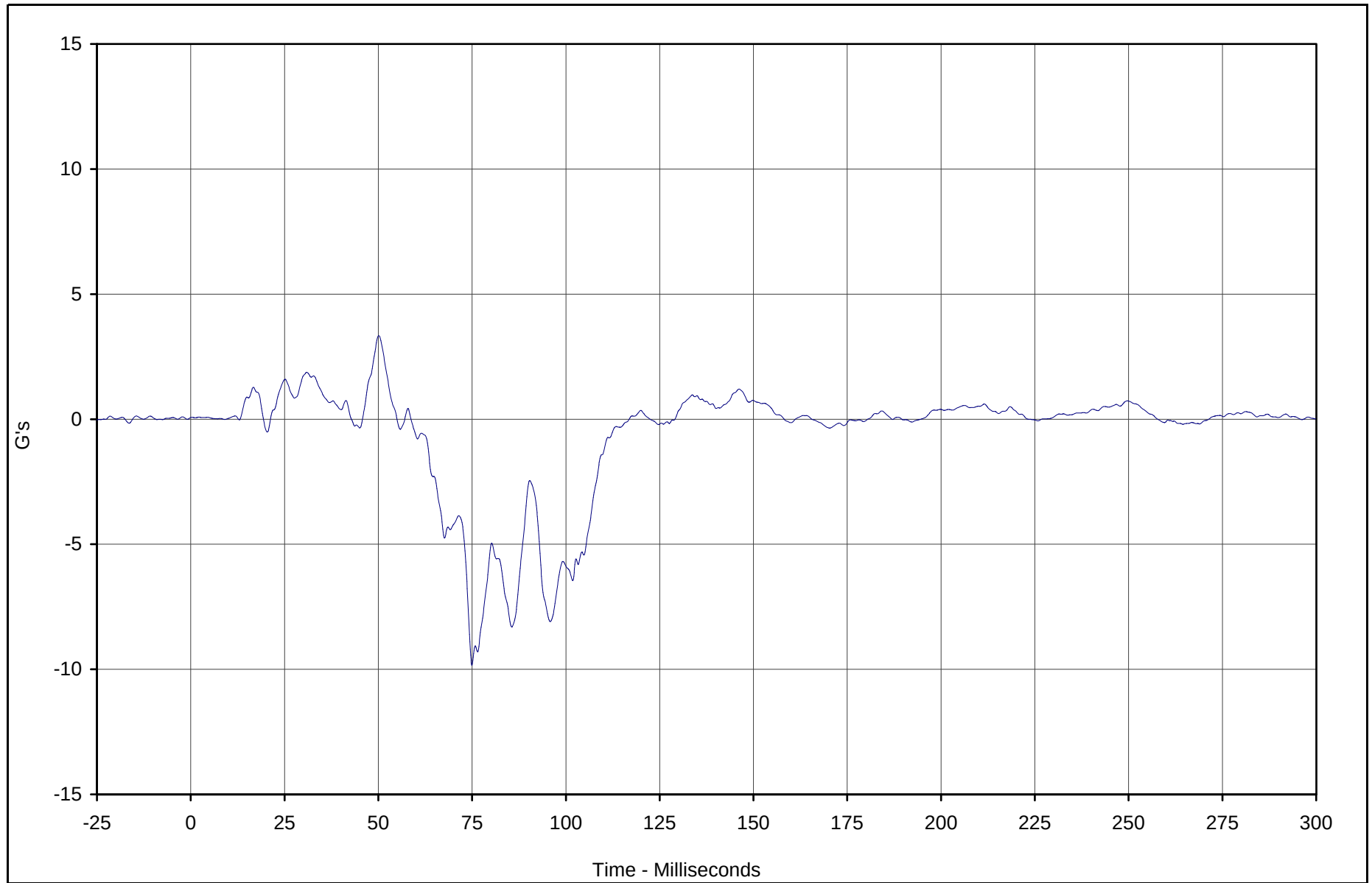
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



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| Curve Description           | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|------|------|------|-----------|
| Passenger Chest Redundant Y | 061   | FIL  | G's   | 3.3 | 50.1 | -9.8 | 74.9 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

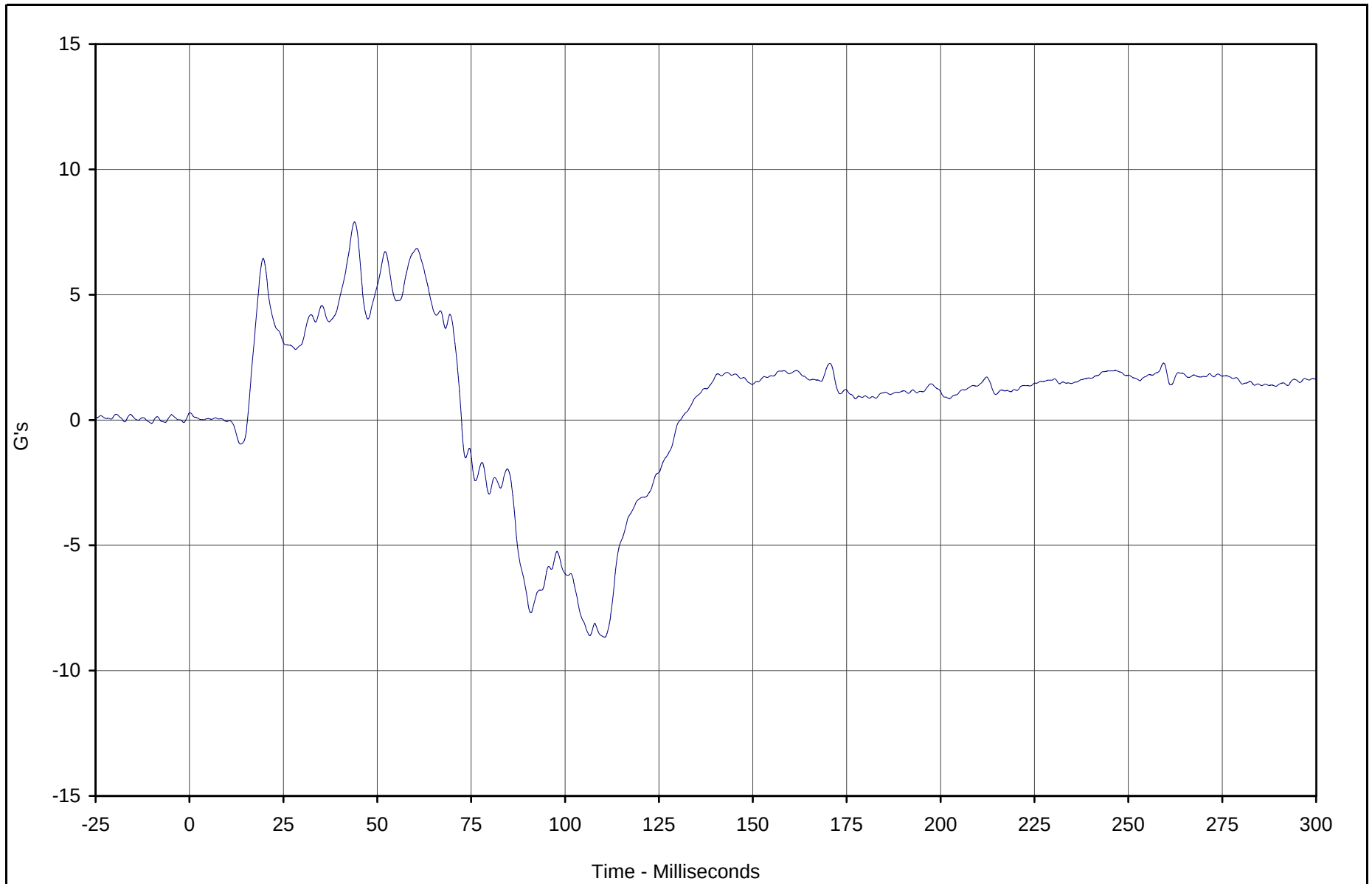
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

B-92



| Curve Description           | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|-----------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Passenger Chest Redundant Z | 062   | FIL  | G's   | 7.9 | 43.9 | -8.7 | 110.5 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

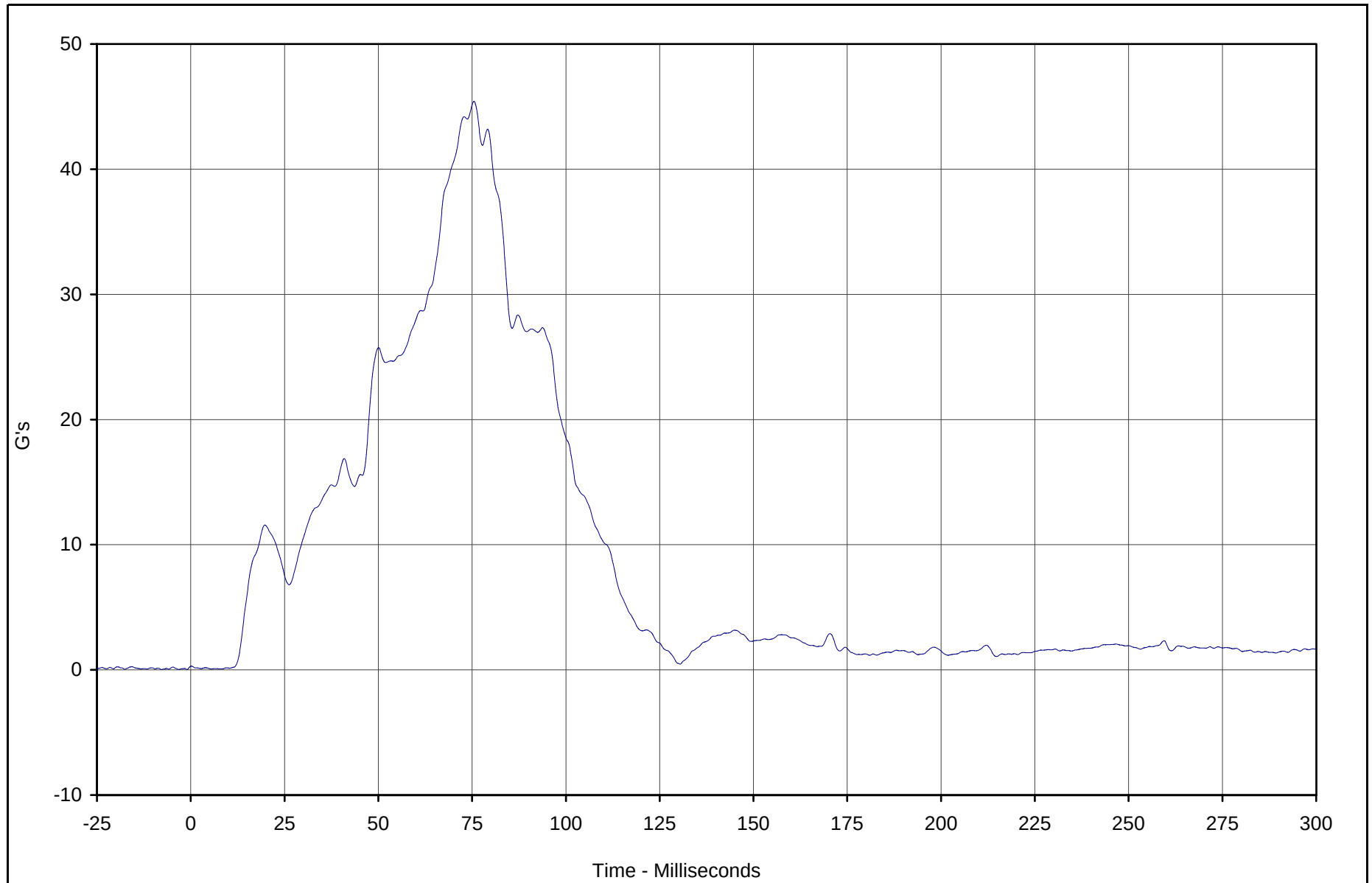
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                   | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Chest Resultant Redundant | 060   | RES  | G's   | 45.4 | 75.5 | 0.1 | 5.5  | 180       |



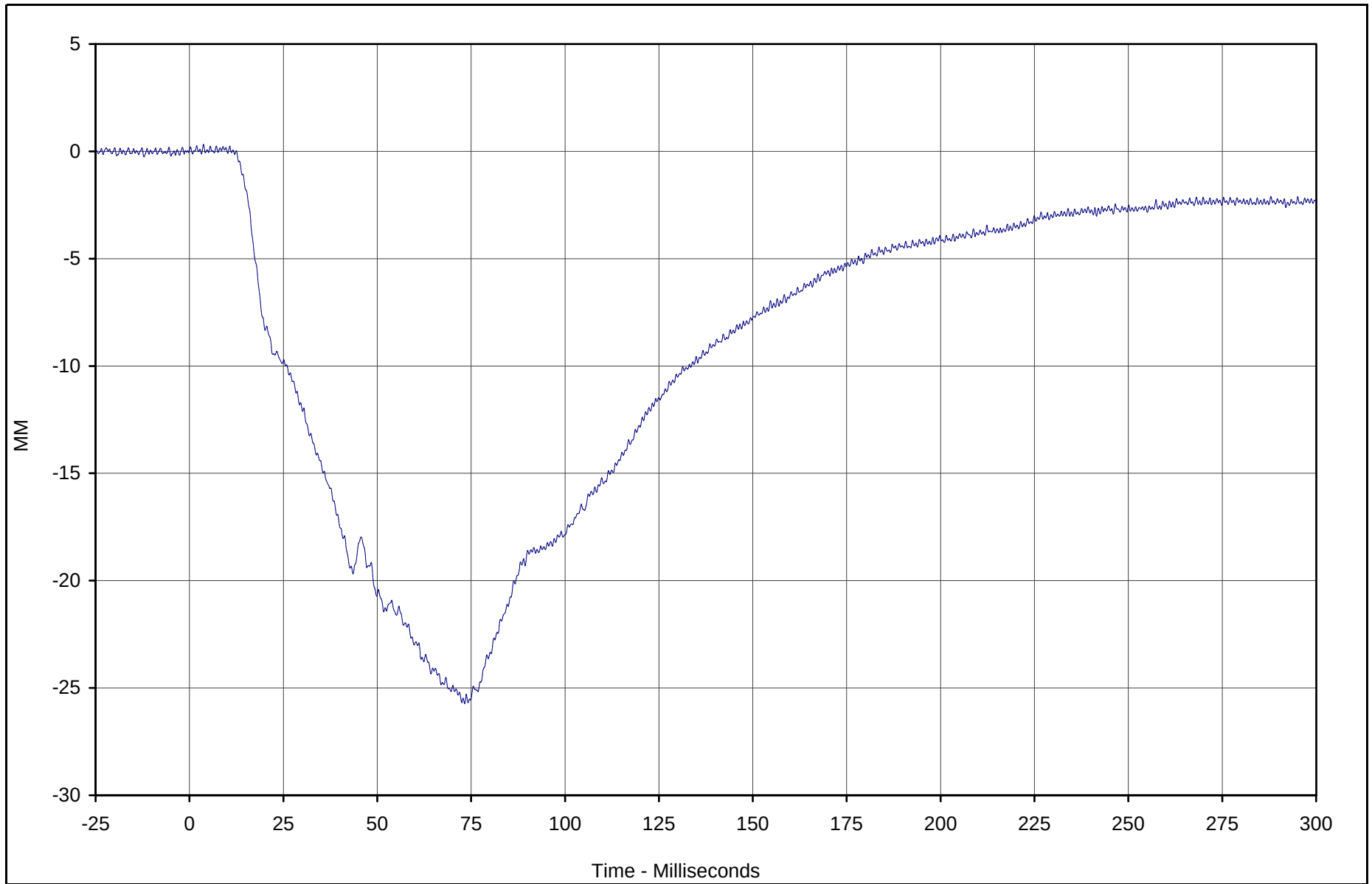
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description              | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Chest Displacement X | 063   | FIL  | MM    | 0.3 | 3.7  | -25.7 | 73.3 | 600       |



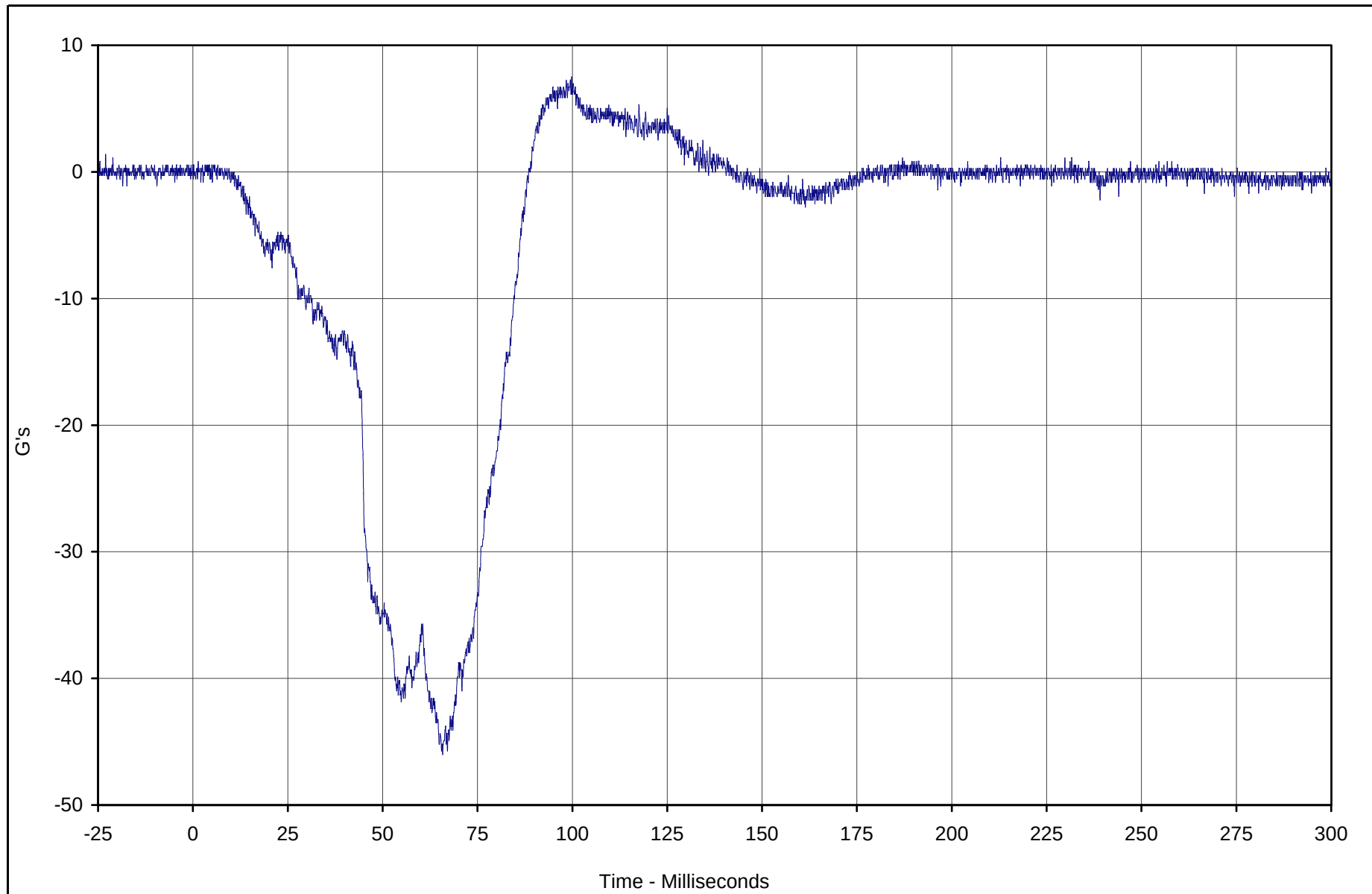
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description  | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Pelvis X | 064   | FIL  | G's   | 7.5 | 99.8 | -46.0 | 65.8 | 1000      |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

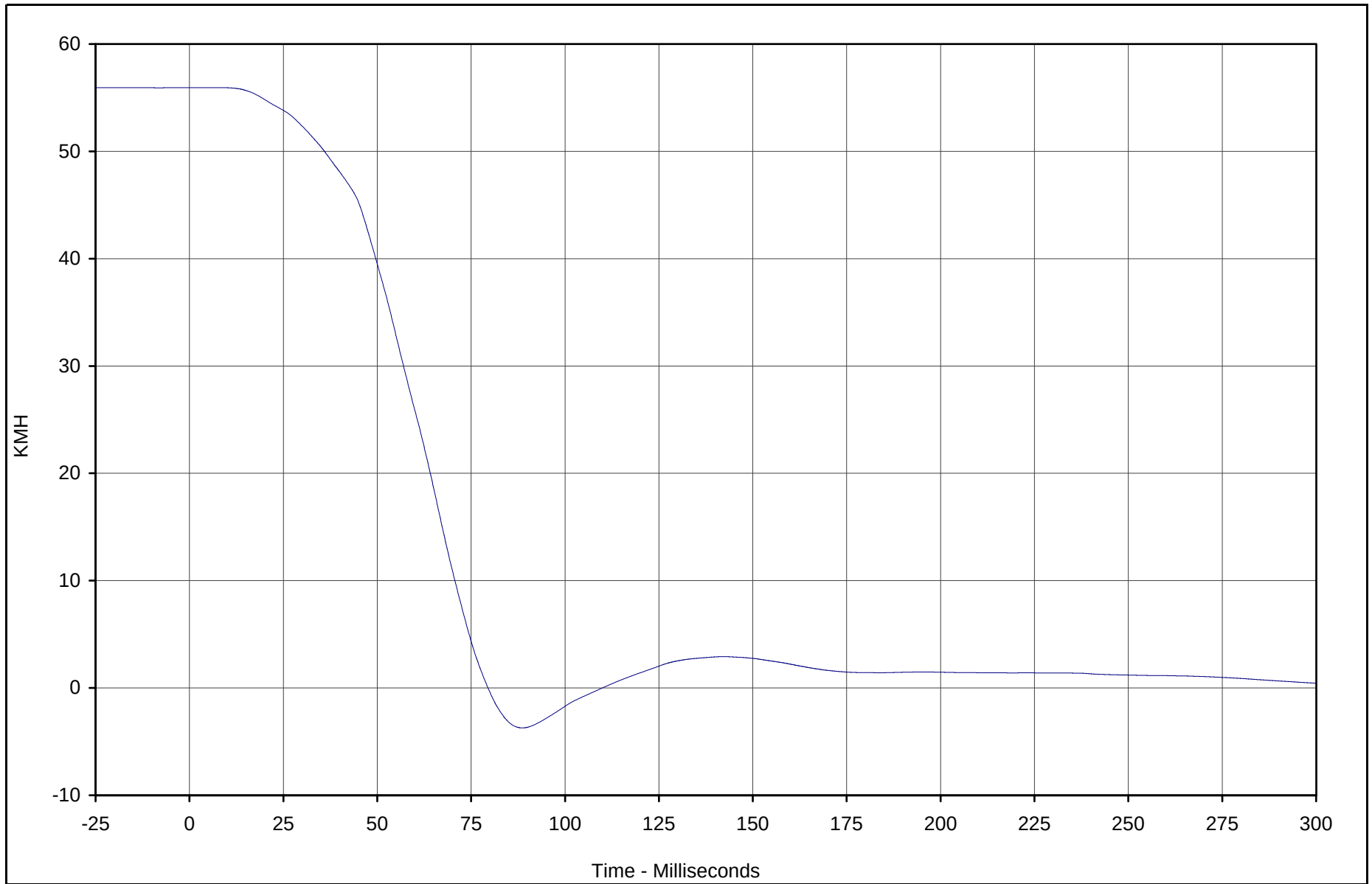
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03





| Curve Description           | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Pelvis X Velocity | 064   | IN1  | KMH   | 55.9 | 7.4  | -3.7 | 88.6 | 180       |

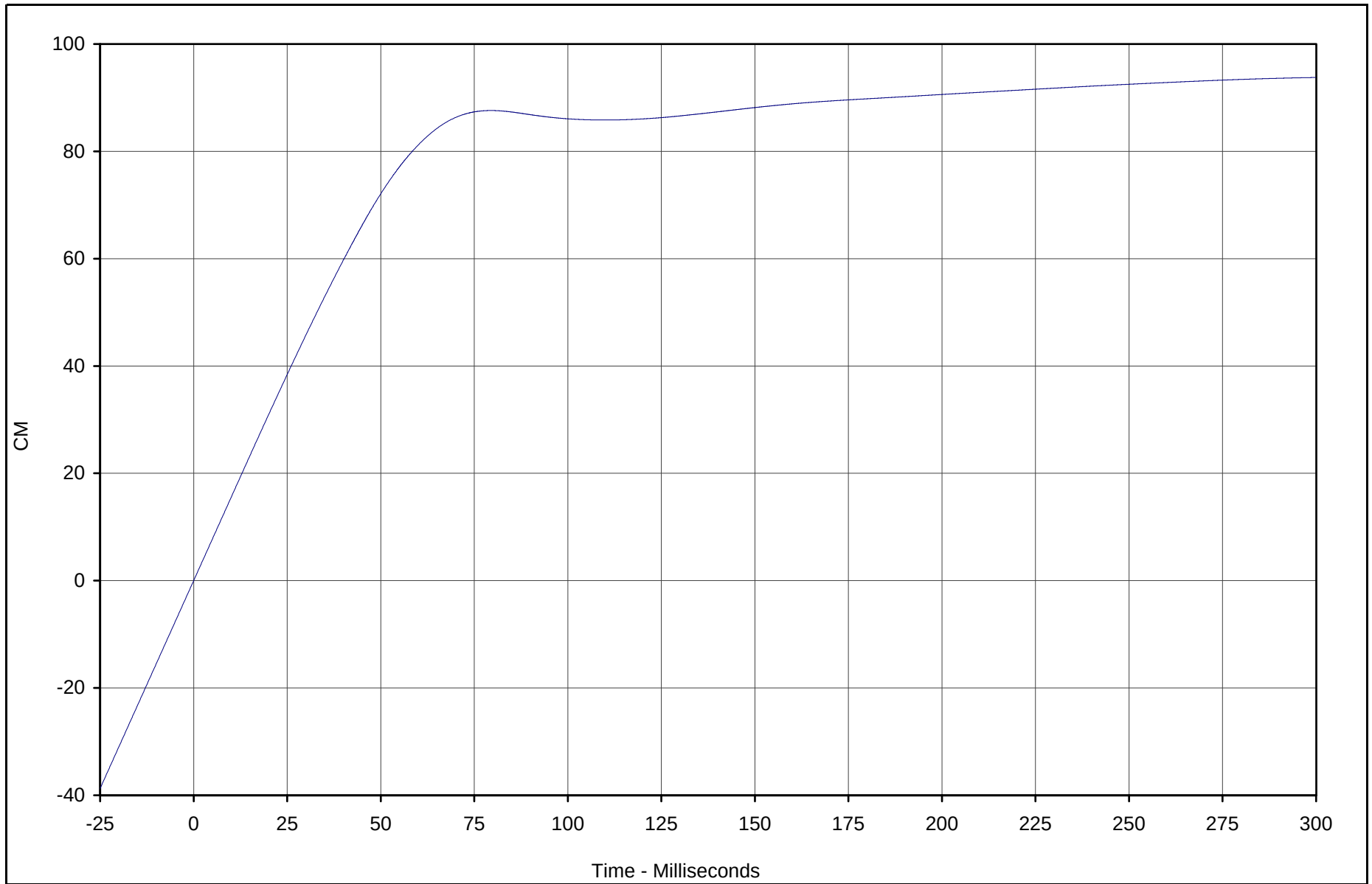


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description         | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|---------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Passenger Pelvis X Displ. | 064   | IN2  | CM    | 93.8 | 299.9 | 0.0 | 0.0  | 180       |

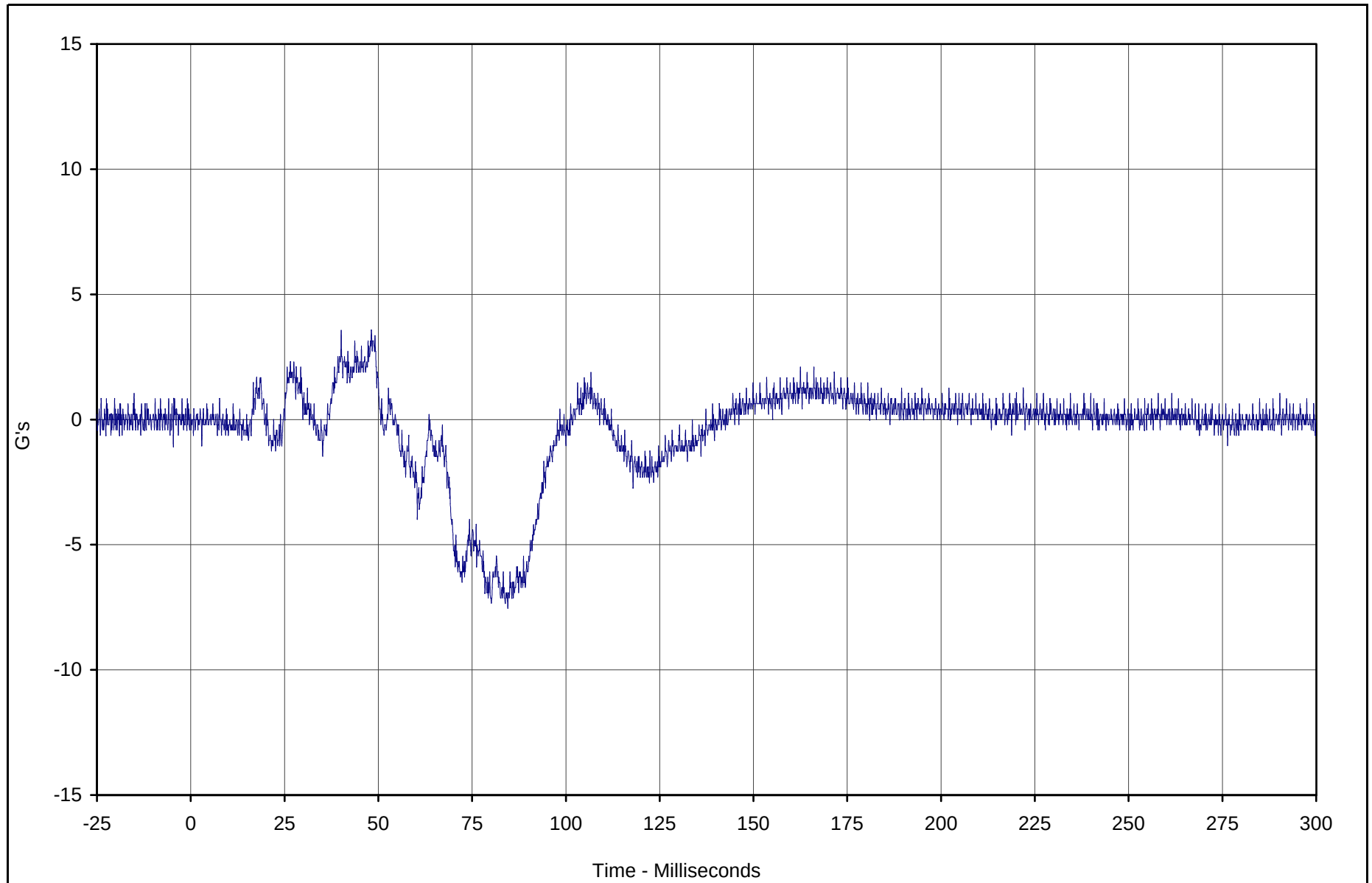


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description  | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|--------------------|-------|------|-------|-----|------|------|------|-----------|
| Passenger Pelvis Y | 065   | FIL  | G's   | 3.6 | 40.1 | -7.6 | 84.5 | 1000      |

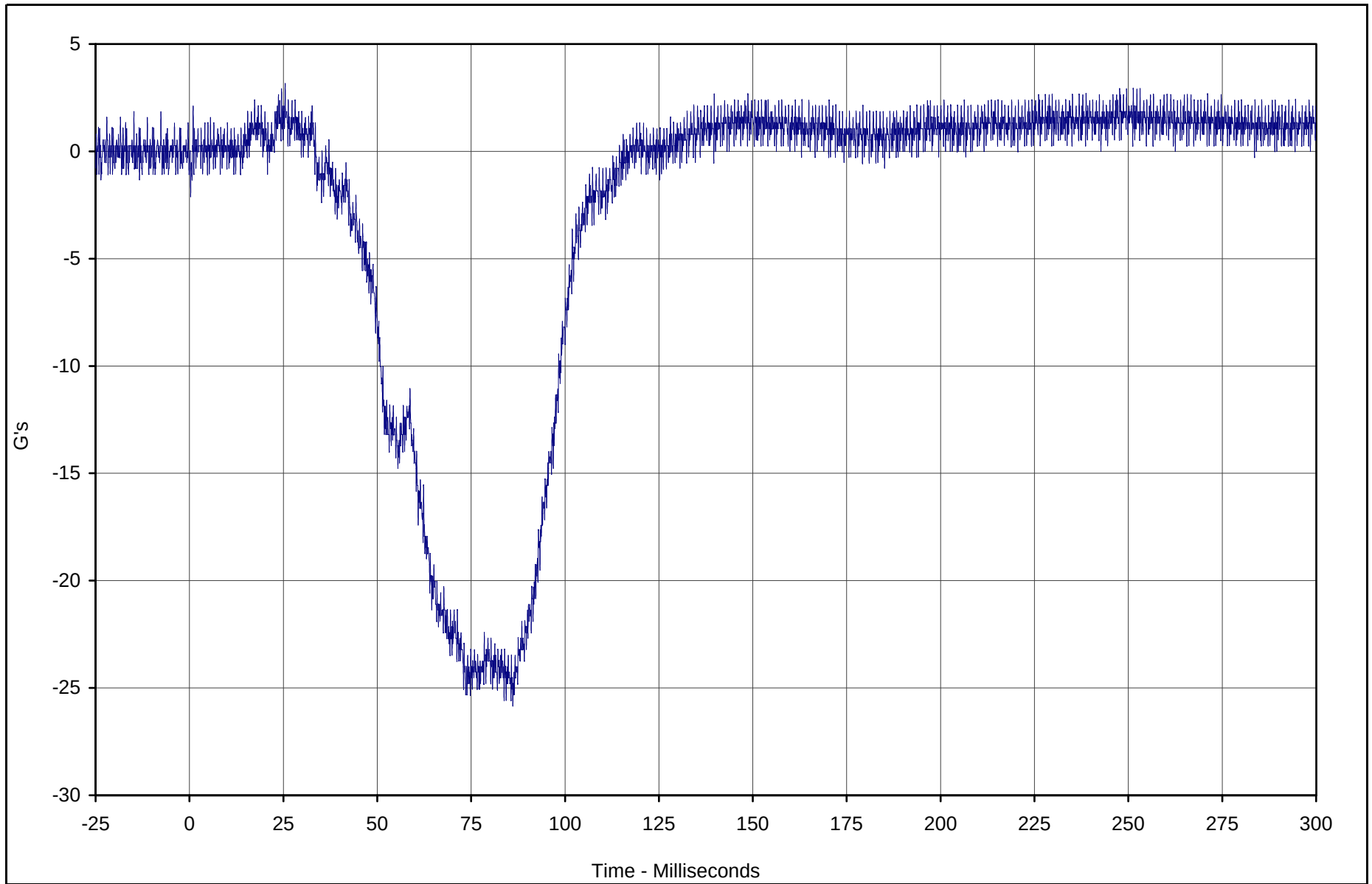


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description  | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Pelvis Z | 066   | FIL  | G's   | 3.2 | 25.5 | -25.9 | 86.1 | 1000      |

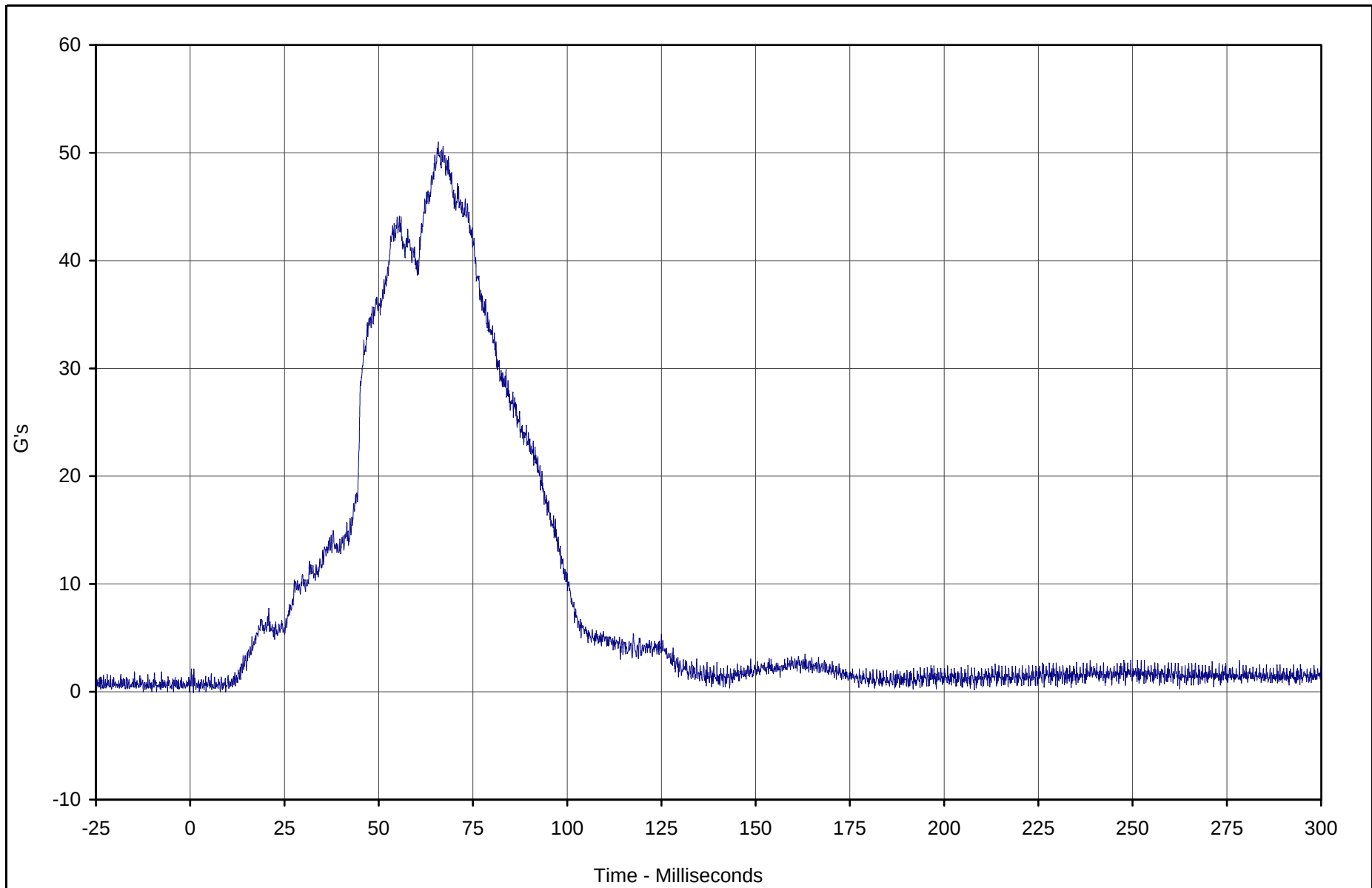


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description          | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Pelvis Resultant | 066   | RES  | G's   | 51.0 | 65.8 | 0.0 | 0.9  | 1000      |



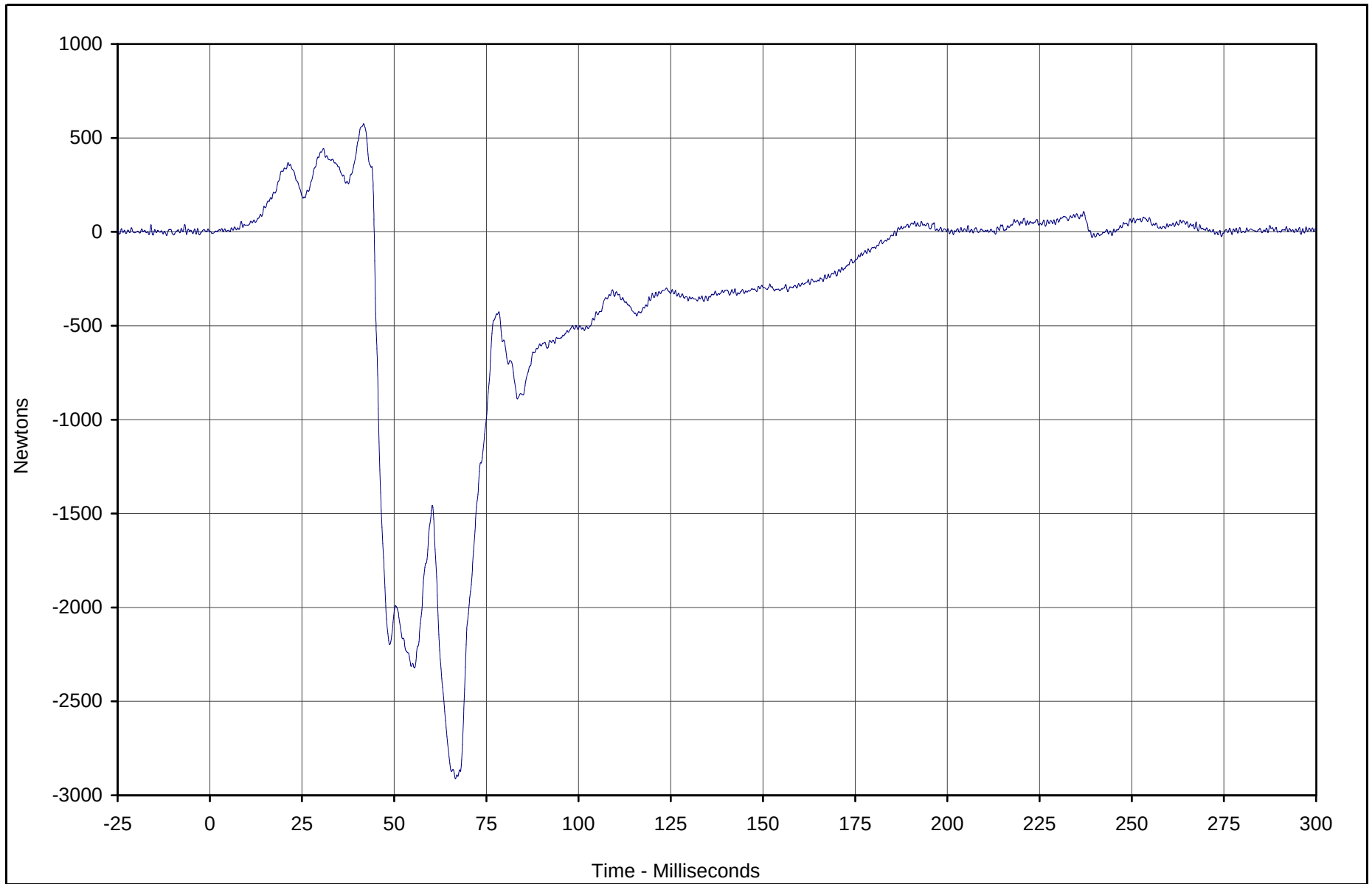
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description          | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|----------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Passenger Left Femur Force | 067   | FIL  | Newtons | 575.6 | 41.7 | -2912.5 | 66.6 | 600       |

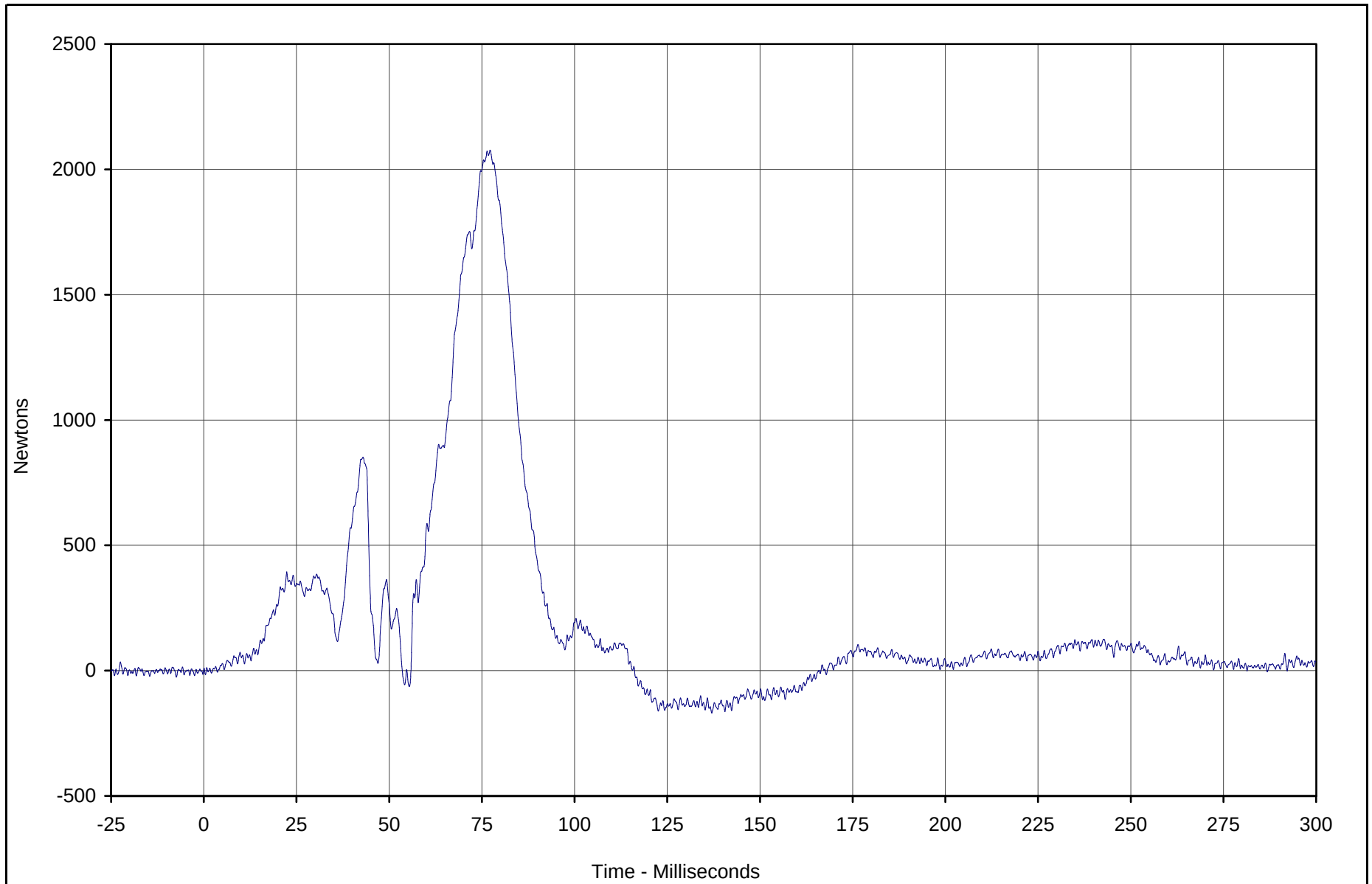


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description           | CURNO | Type | Units   | Max    | Time | Min    | Time  | SAE Class |
|-----------------------------|-------|------|---------|--------|------|--------|-------|-----------|
| Passenger Right Femur Force | 068   | FIL  | Newtons | 2077.0 | 77.2 | -169.6 | 137.0 | 600       |

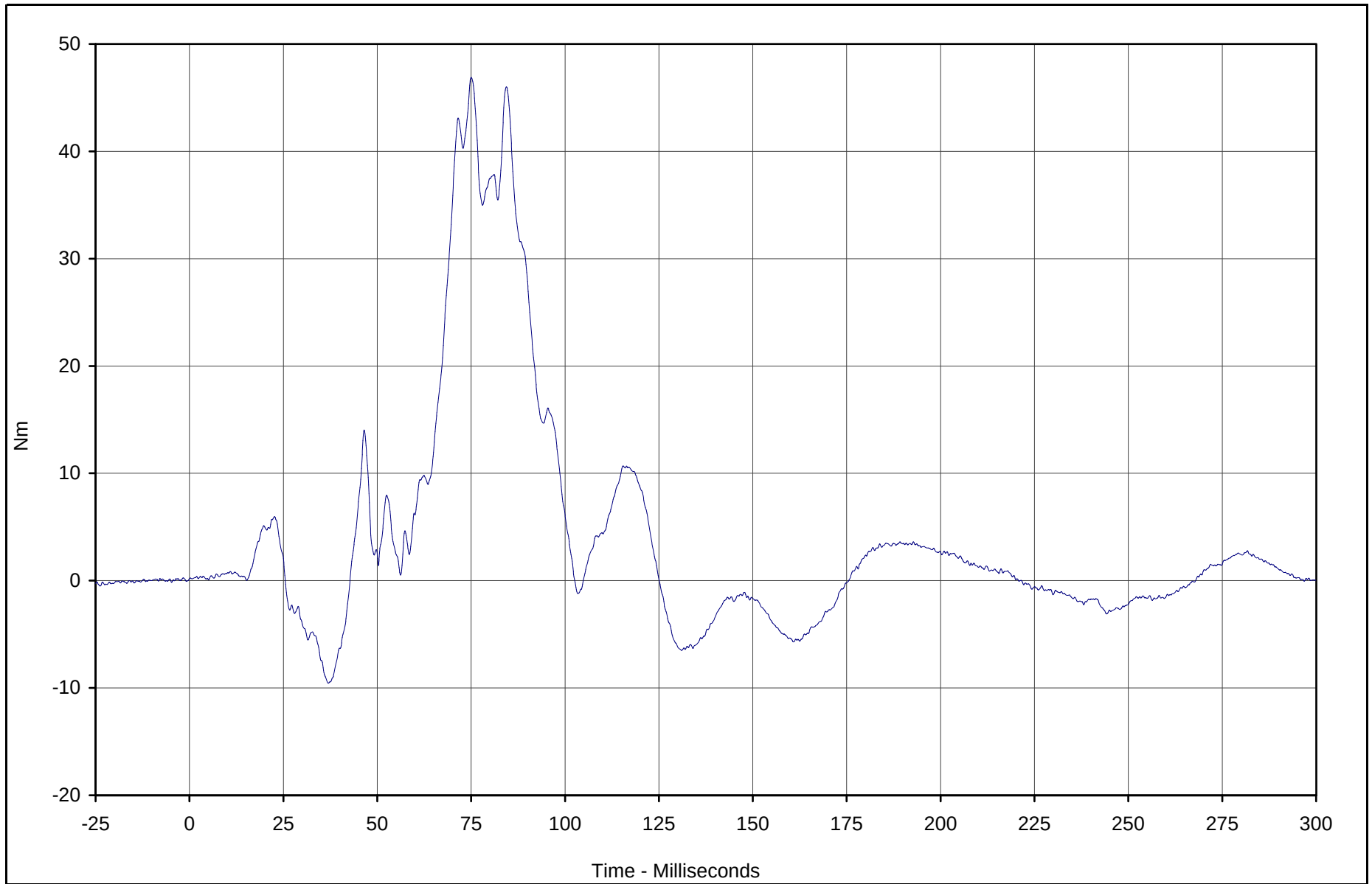


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Left Upper Tibia Moment X | 069   | FIL  | Nm    | 46.9 | 75.0 | -9.6 | 36.9 | 600       |

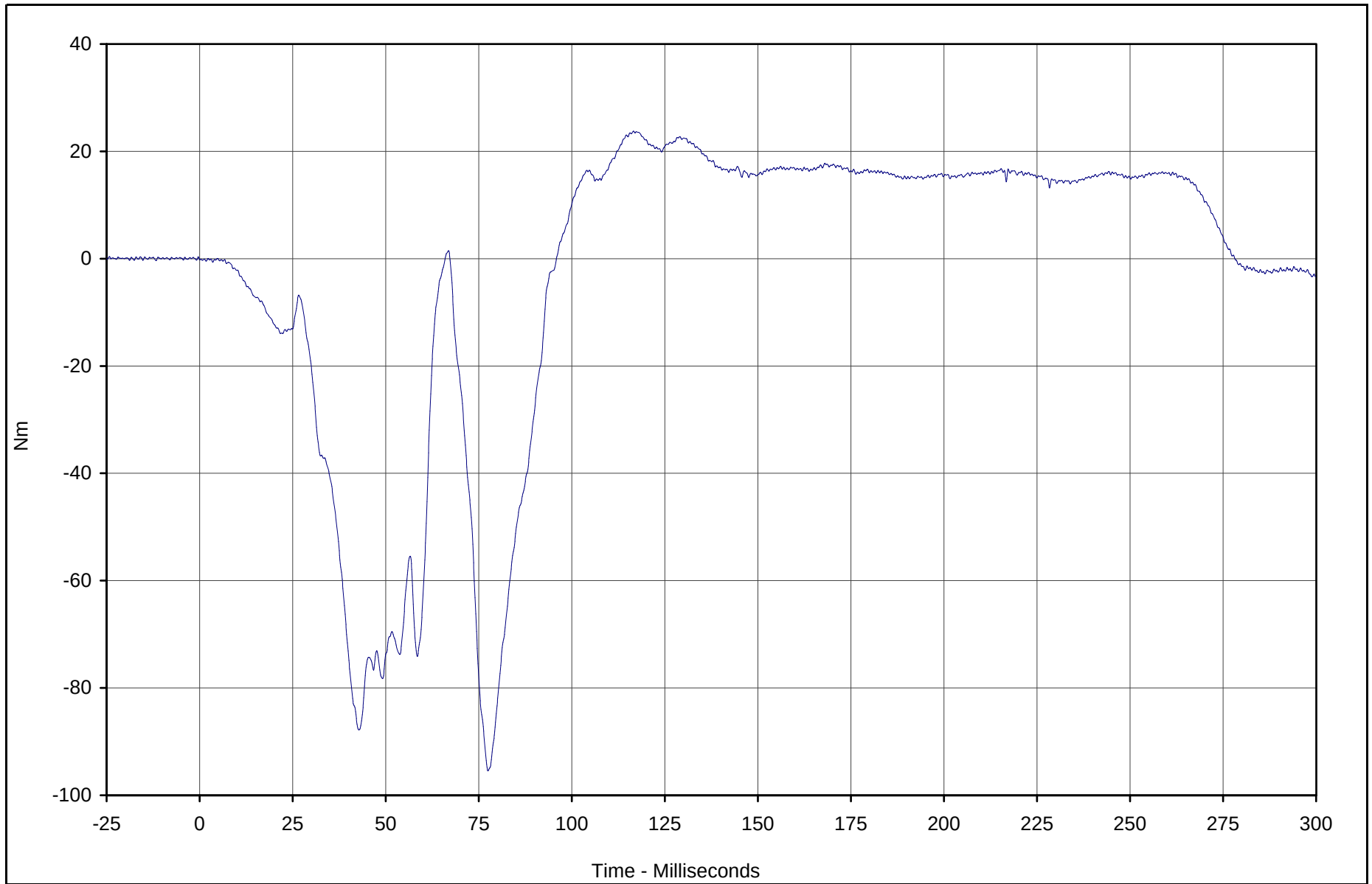


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                   | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Left Upper Tibia Moment Y | 070   | FIL  | Nm    | 23.8 | 116.6 | -95.5 | 77.5 | 600       |

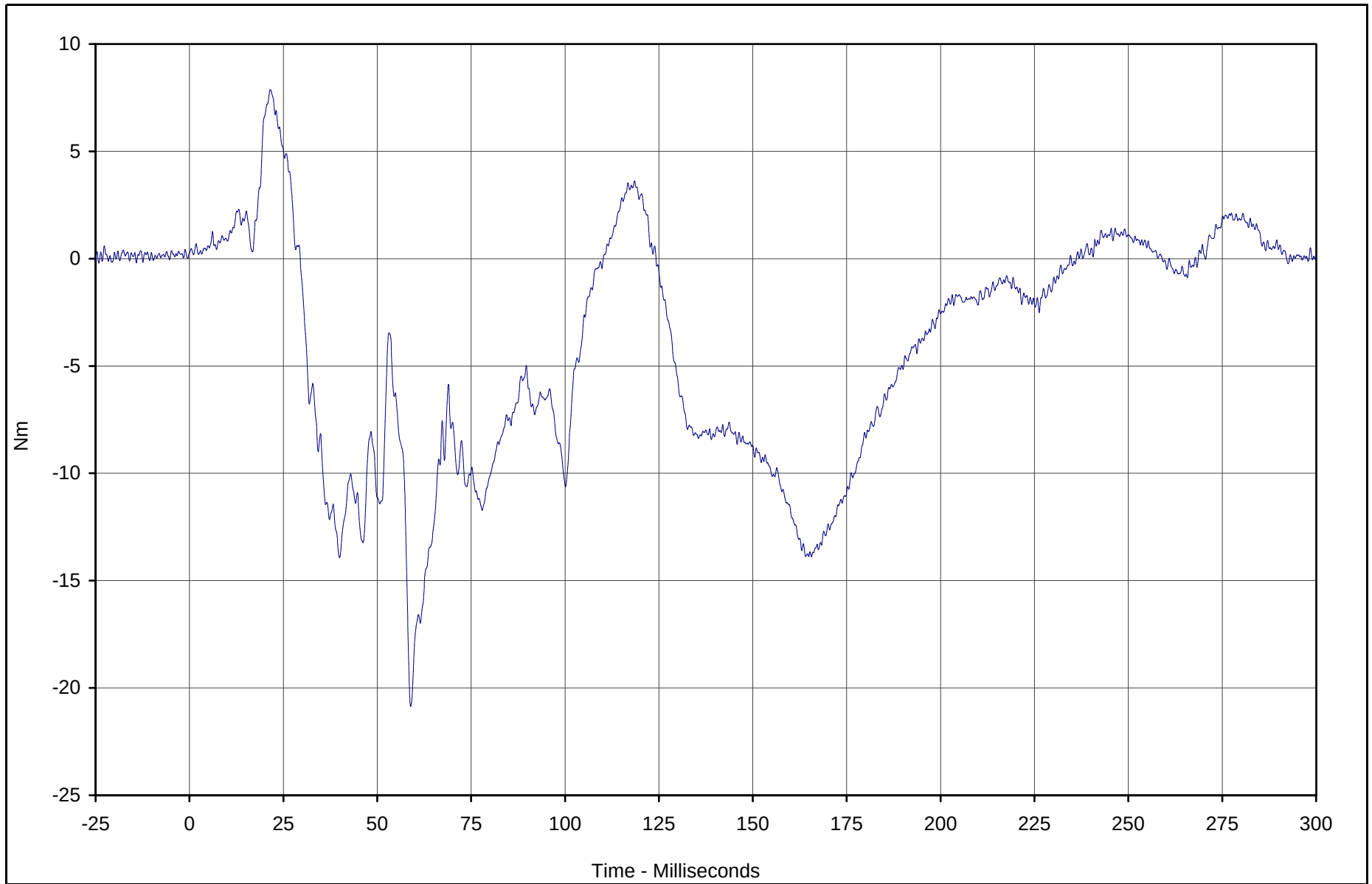


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                    | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Upper Tibia Moment X | 071   | FIL  | Nm    | 7.9 | 21.5 | -20.9 | 58.9 | 600       |



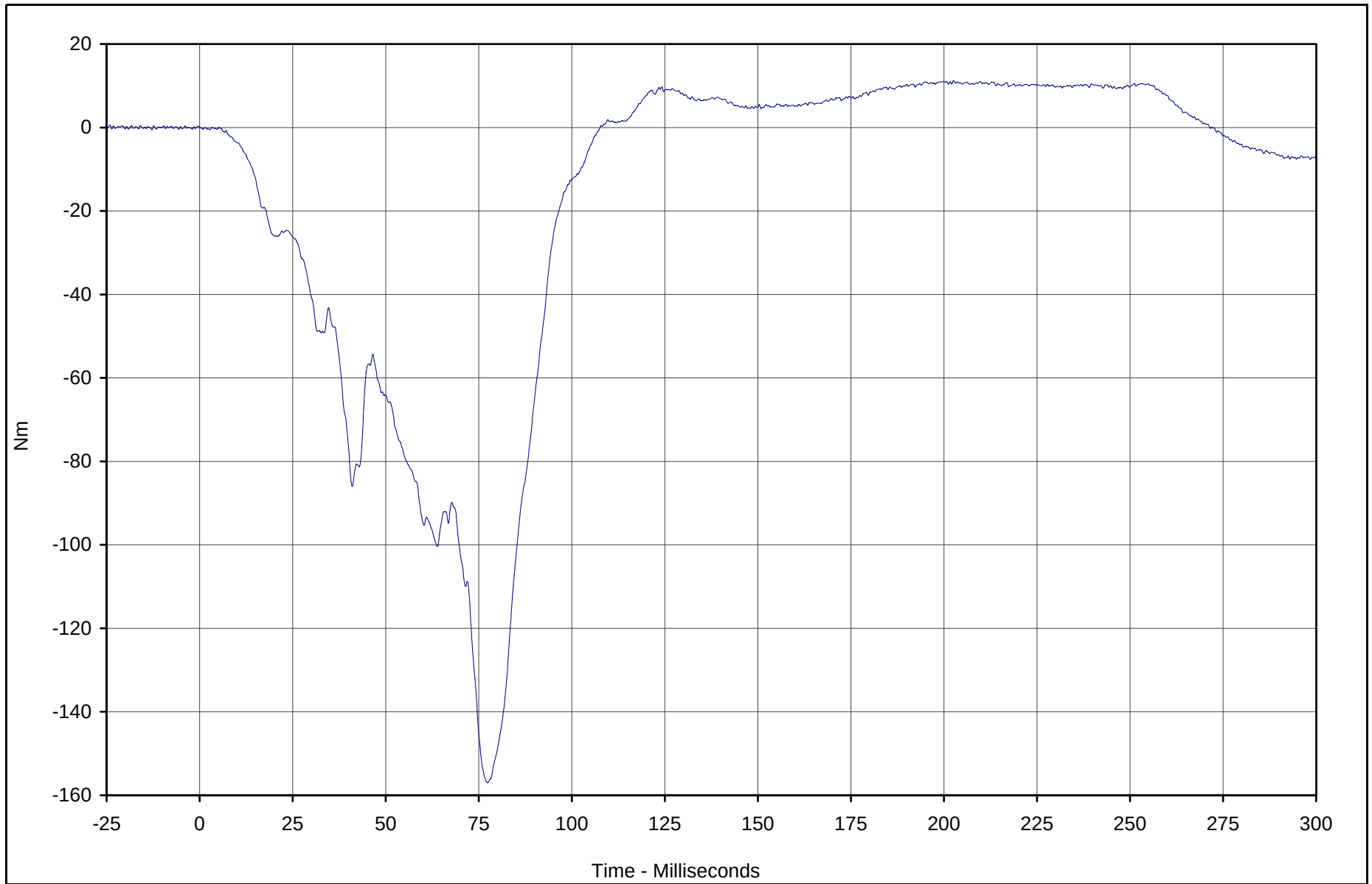
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description                    | CURNO | Type | Units | Max  | Time  | Min    | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|-------|--------|------|-----------|
| Passenger Right Upper Tibia Moment Y | 072   | FIL  | Nm    | 11.3 | 202.6 | -157.0 | 77.4 | 600       |

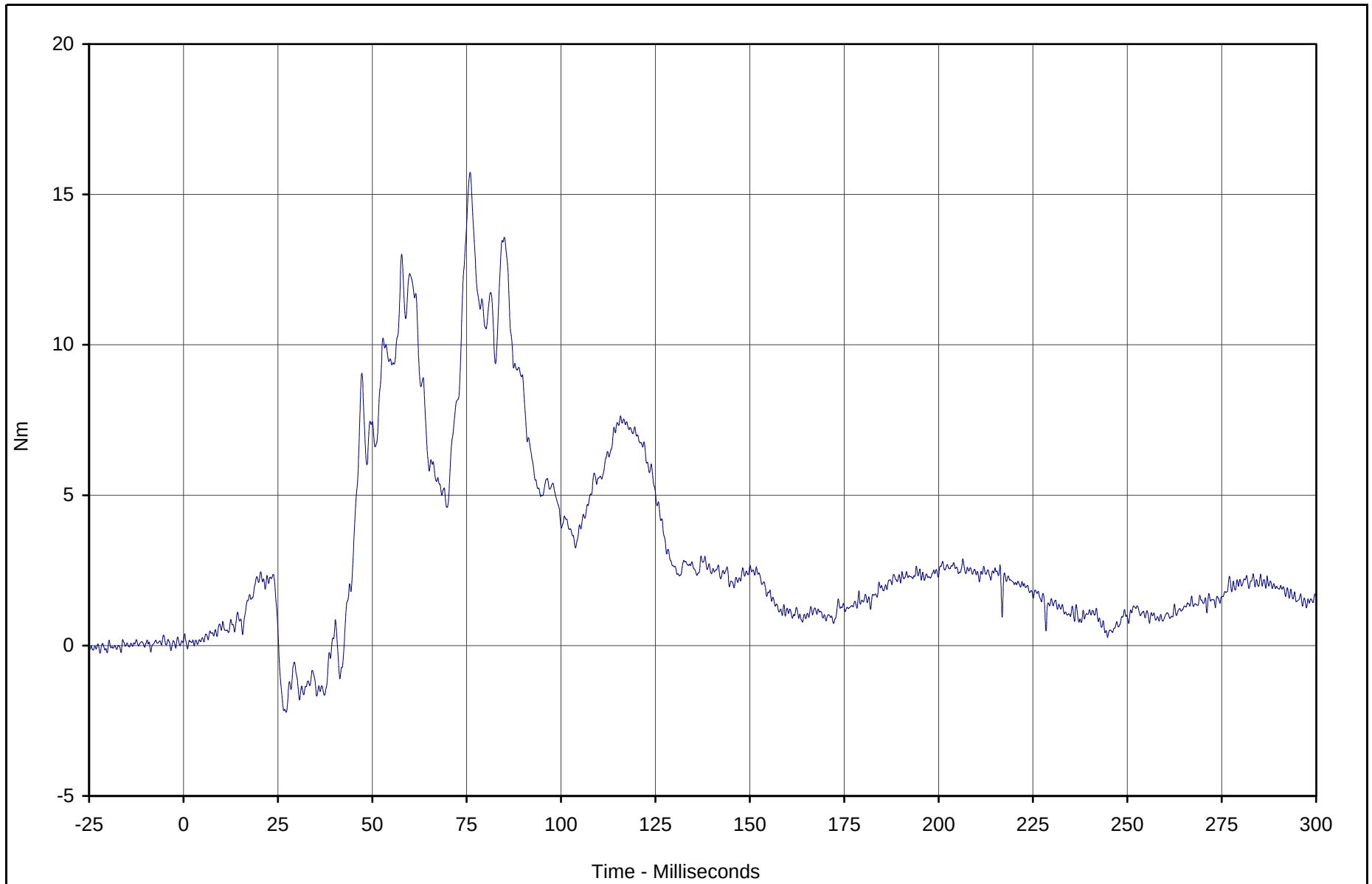


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Left Lower Tibia Moment X | 073   | FIL  | Nm    | 15.7 | 75.9 | -2.2 | 27.2 | 600       |

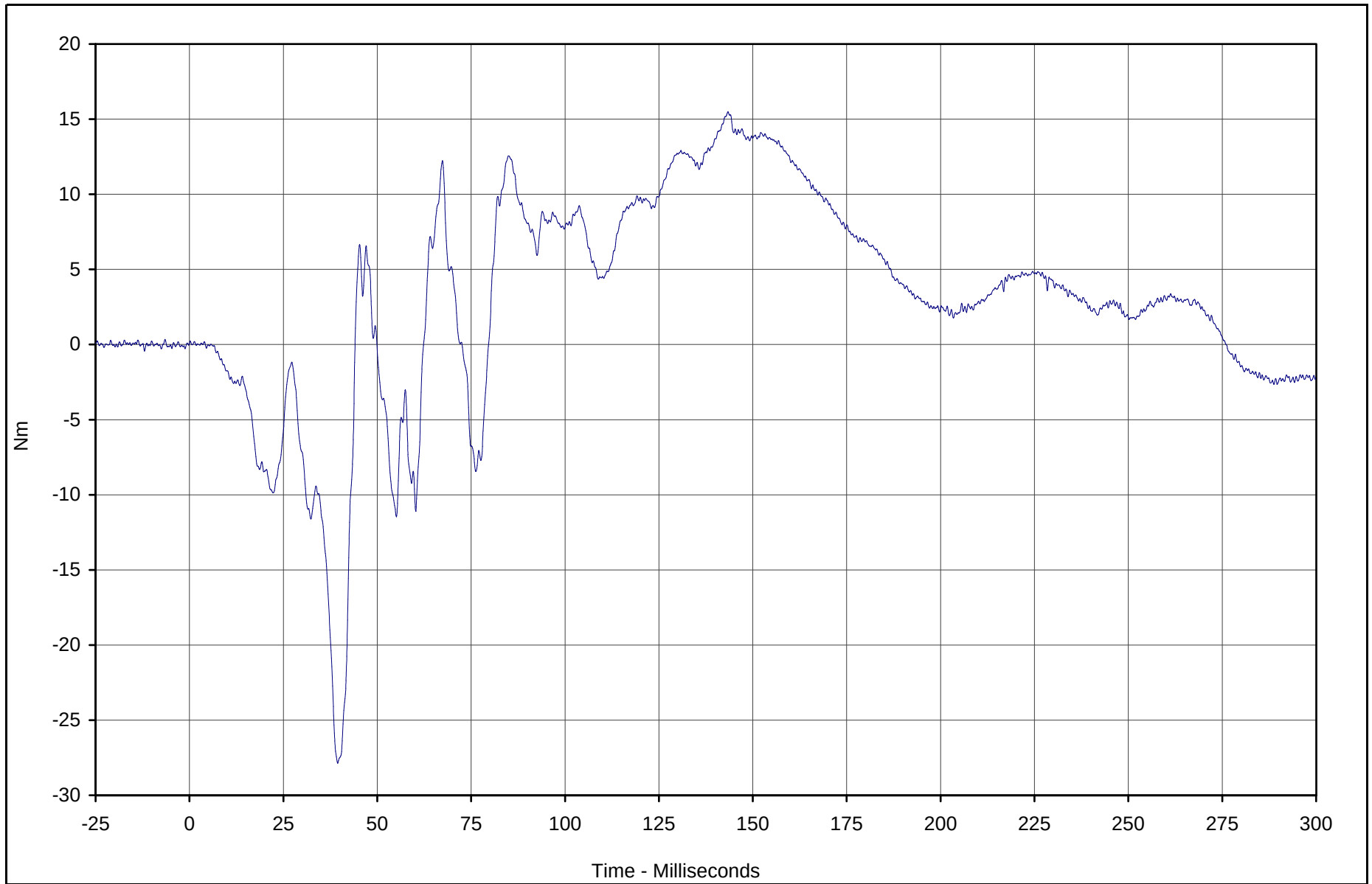


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                   | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Left Lower Tibia Moment Y | 074   | FIL  | Nm    | 15.5 | 143.4 | -27.9 | 39.5 | 600       |

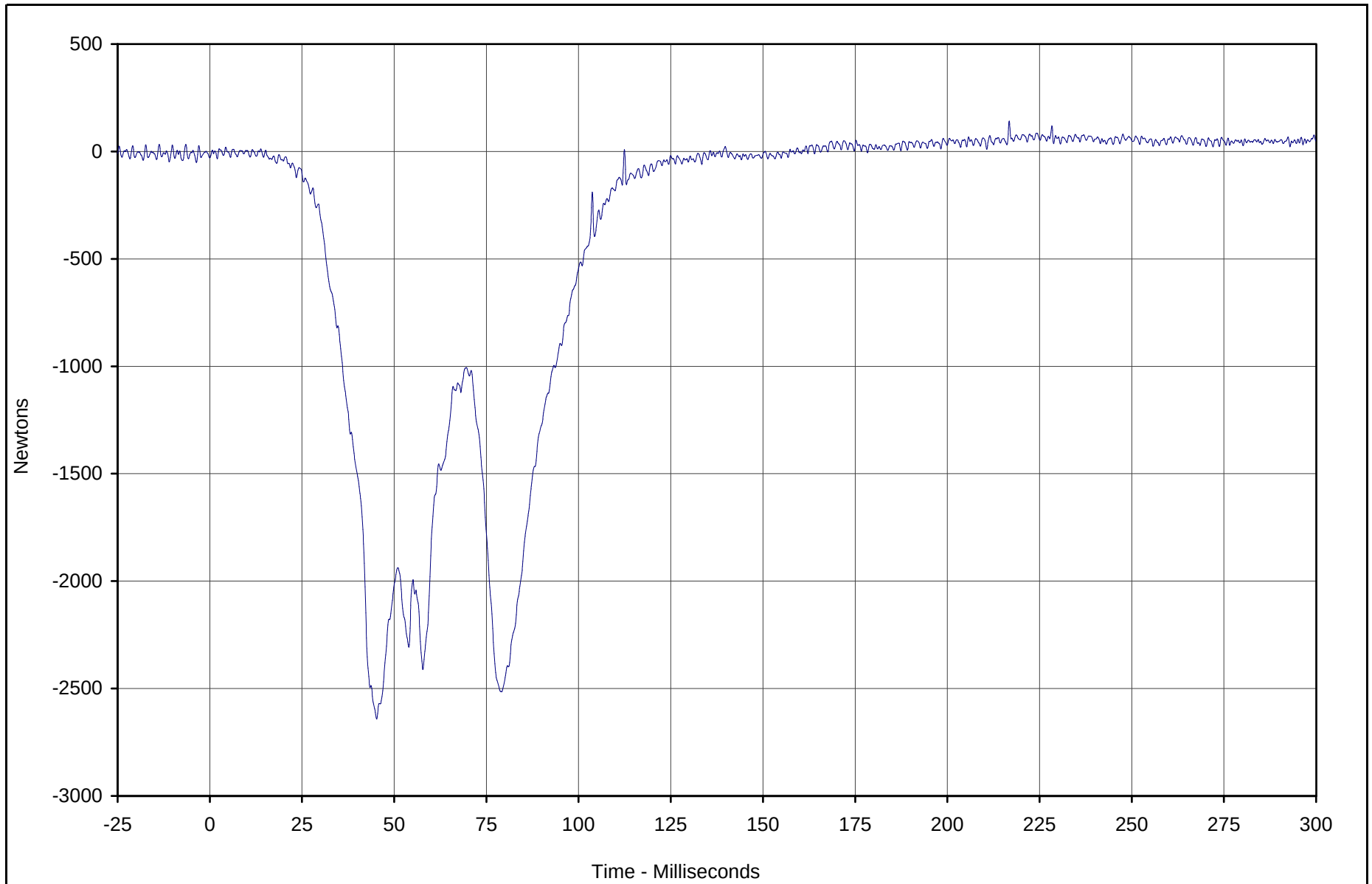


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                  | CURNO | Type | Units   | Max   | Time  | Min     | Time | SAE Class |
|------------------------------------|-------|------|---------|-------|-------|---------|------|-----------|
| Passenger Left Lower Tibia Force Z | 075   | FIL  | Newtons | 141.5 | 216.8 | -2641.2 | 45.2 | 600       |

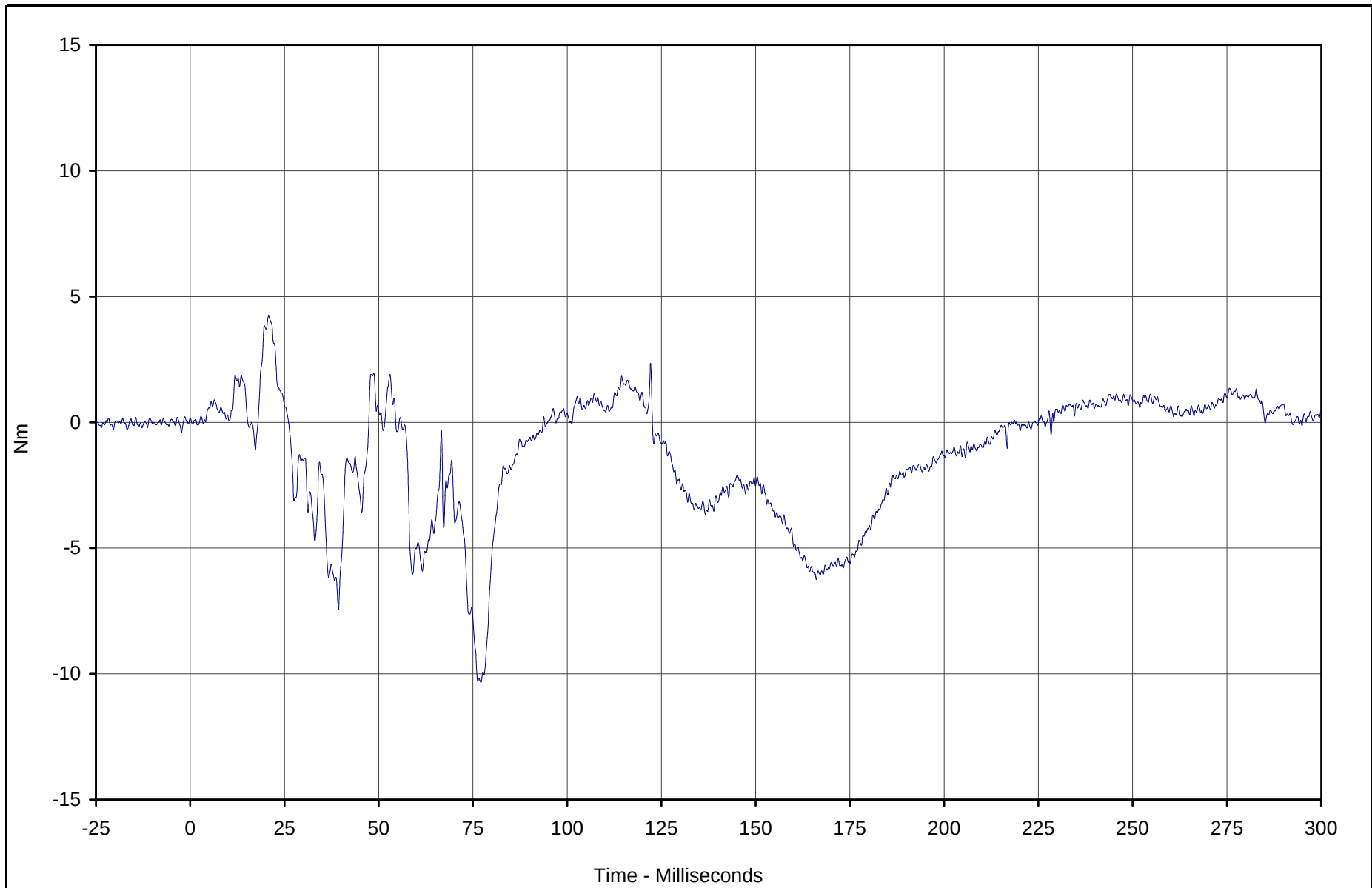


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                    | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Lower Tibia Moment X | 076   | FIL  | Nm    | 4.3 | 20.8 | -10.3 | 77.1 | 600       |



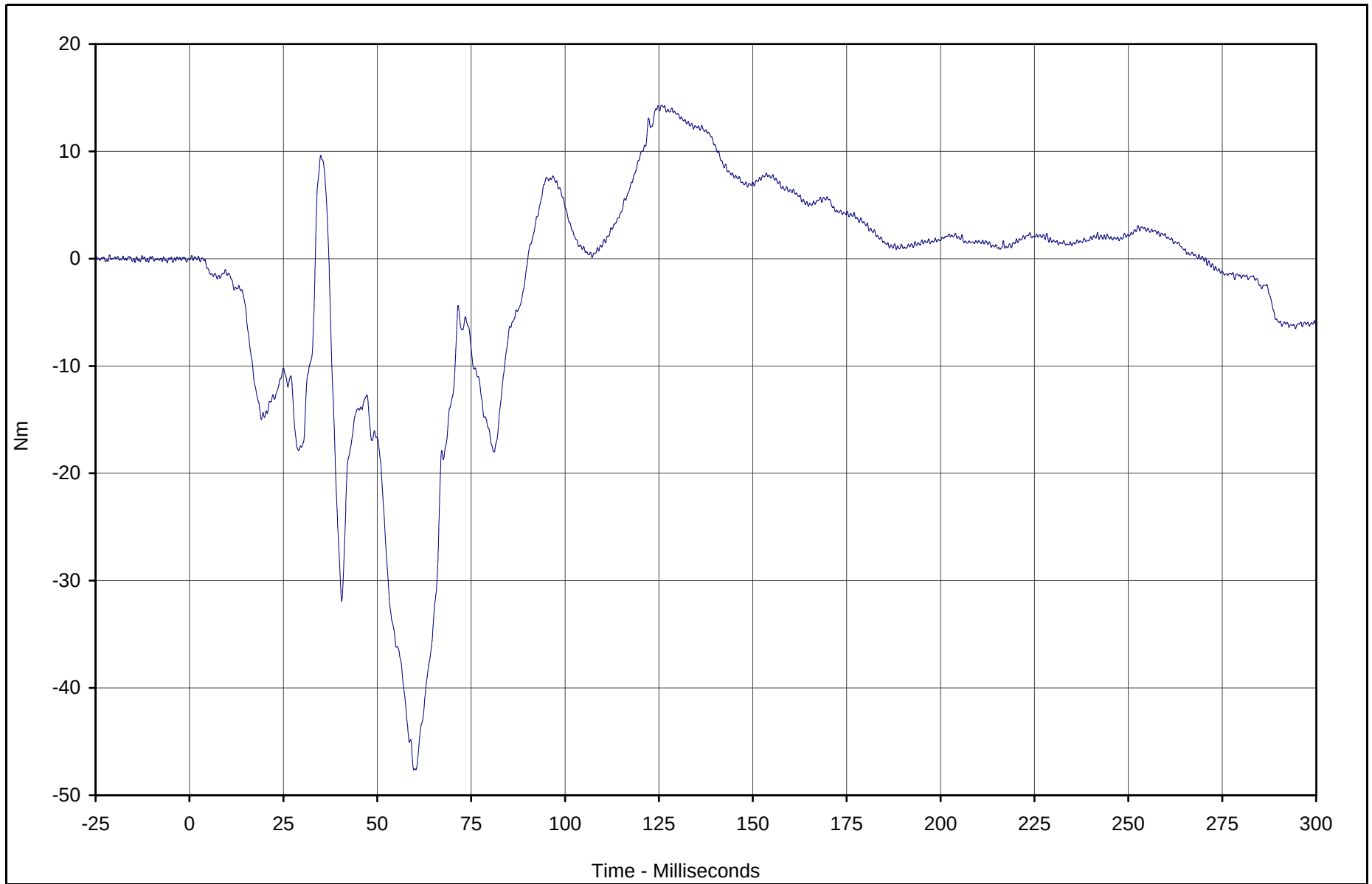
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description                    | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Right Lower Tibia Moment Y | 077   | FIL  | Nm    | 14.3 | 125.7 | -47.6 | 59.7 | 600       |

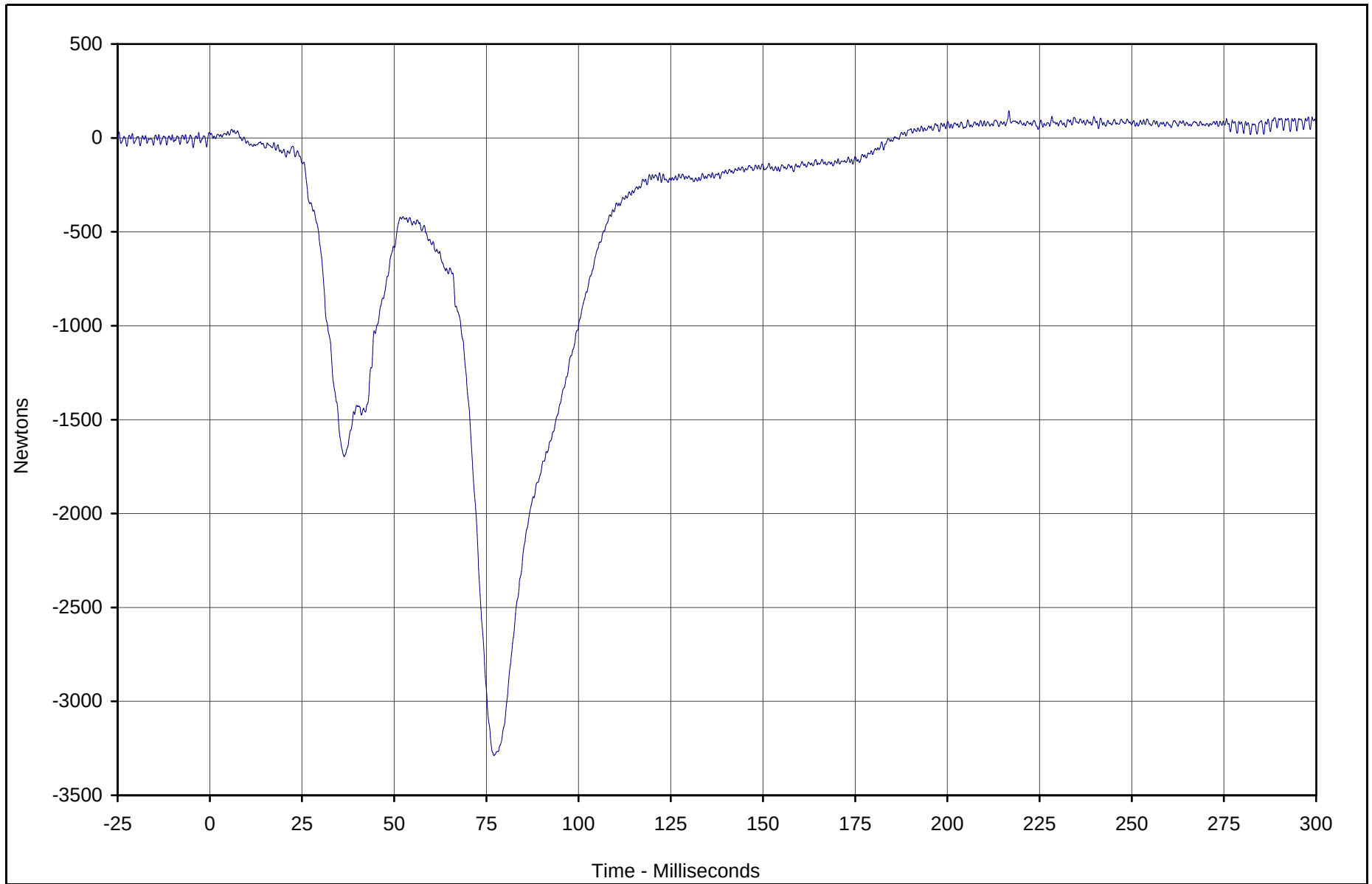


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description                   | CURNO | Type | Units   | Max   | Time  | Min     | Time | SAE Class |
|-------------------------------------|-------|------|---------|-------|-------|---------|------|-----------|
| Passenger Right lower Tibia Force Z | 078   | FIL  | Newtons | 145.1 | 216.7 | -3288.6 | 77.1 | 600       |

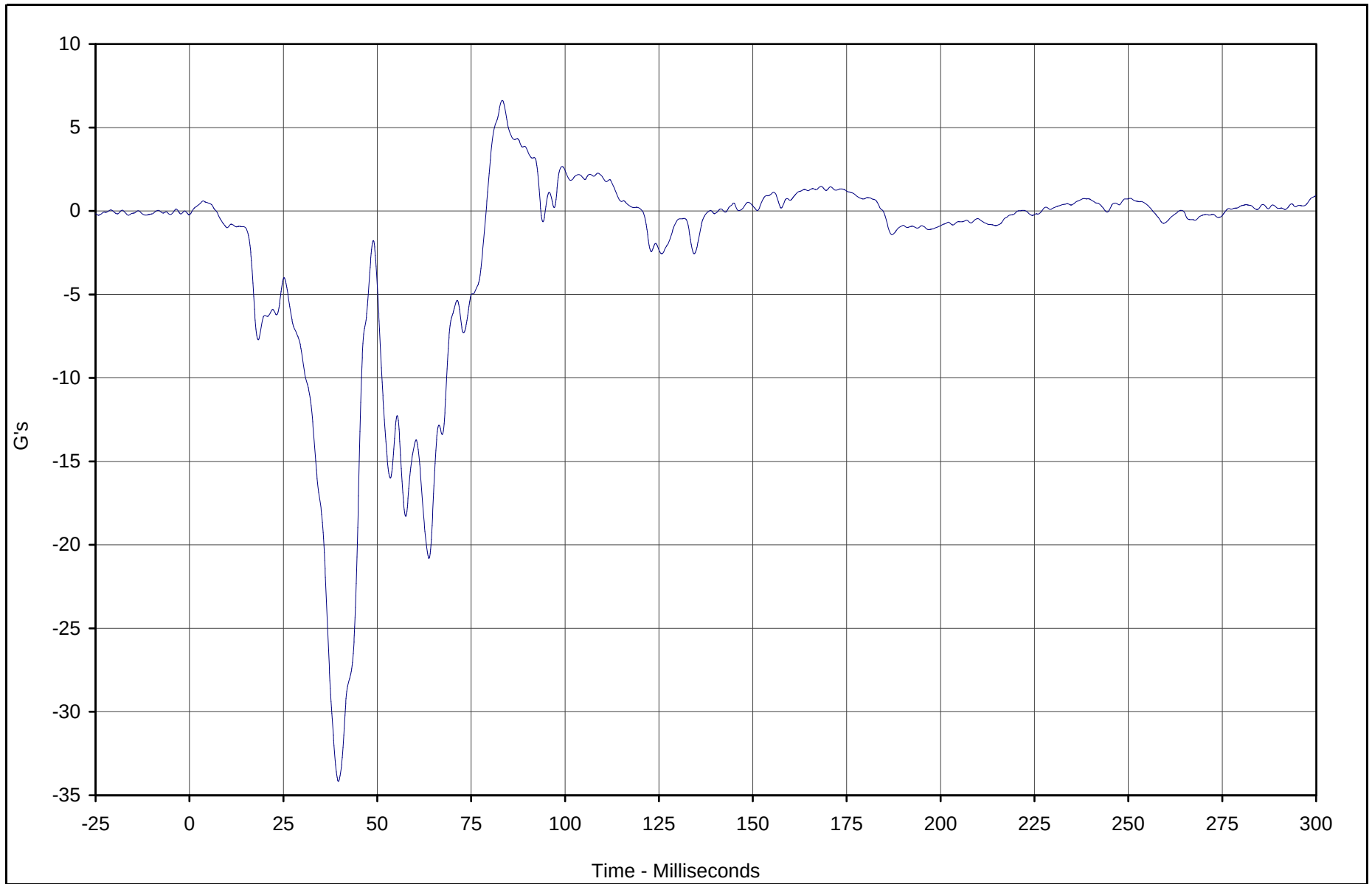


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description         | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Left Foot Aft X | 079   | FIL  | G's   | 6.6 | 83.3 | -34.2 | 39.7 | 180       |

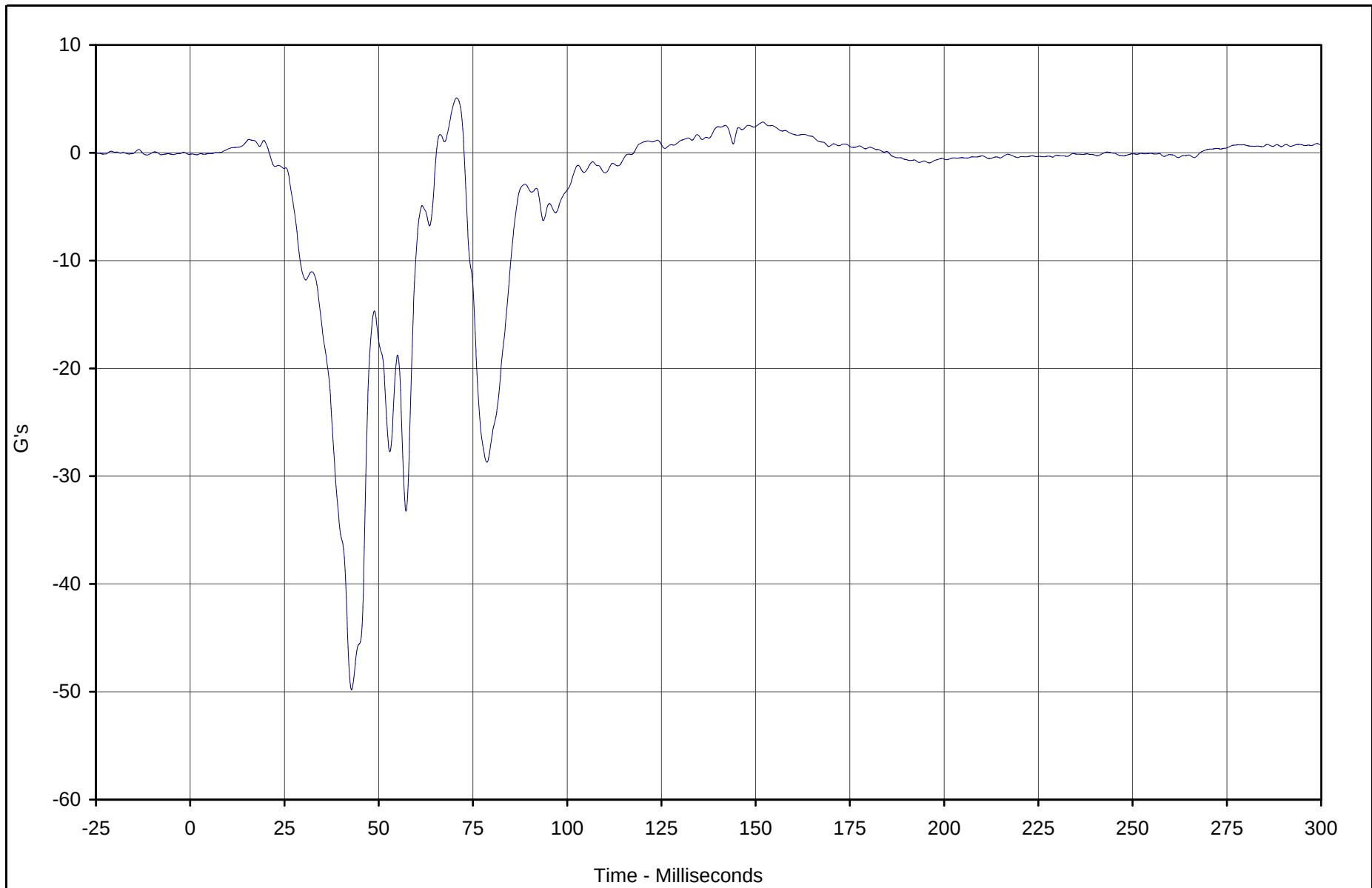


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description         | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Left Foot Aft Z | 080   | FIL  | G's   | 5.1 | 70.7 | -49.8 | 42.8 | 180       |

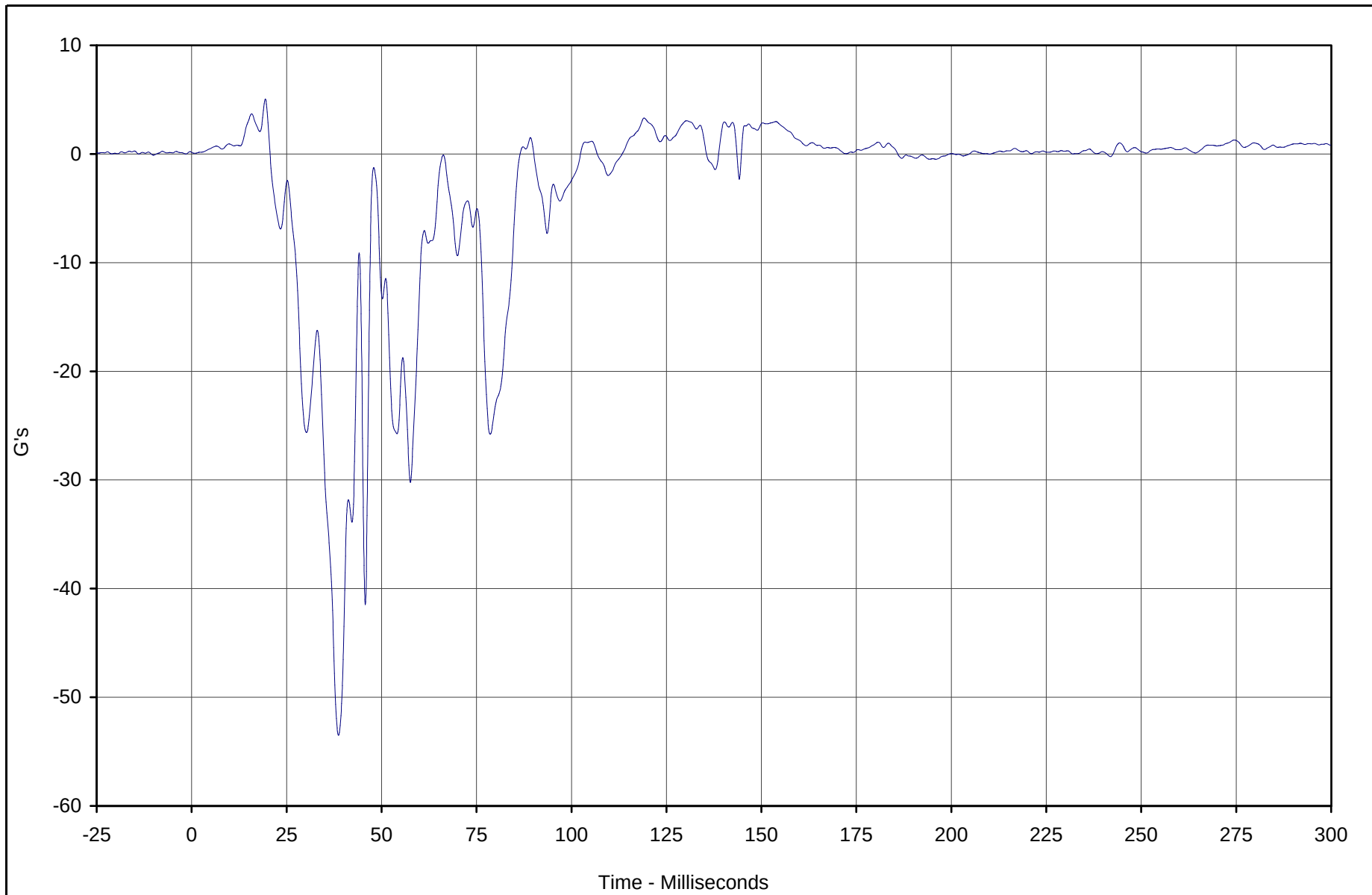


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description          | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Left Foot Fore Z | 081   | FIL  | G's   | 5.0 | 19.4 | -53.5 | 38.7 | 180       |



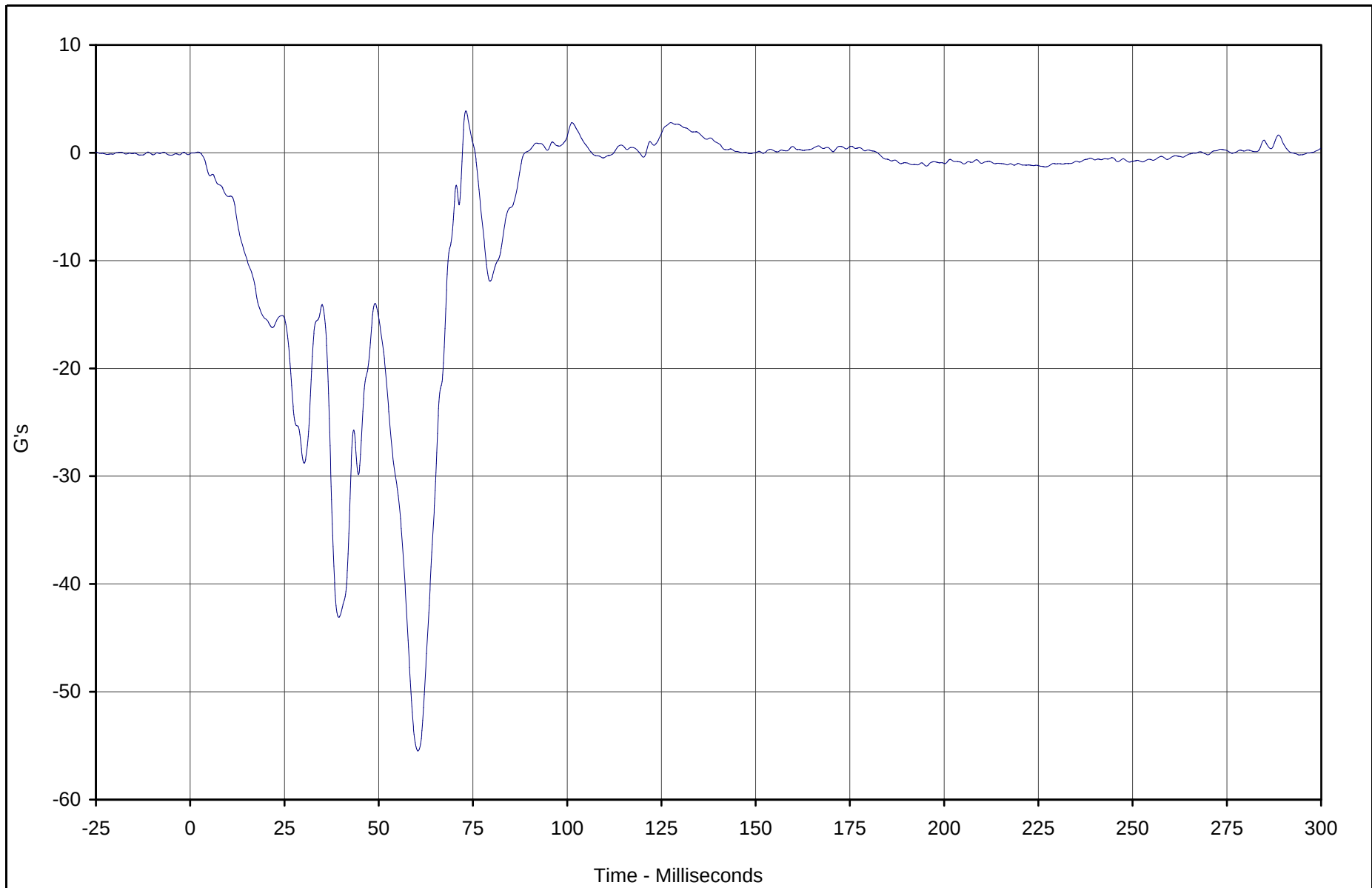
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description          | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Foot Aft X | 082   | FIL  | G's   | 3.9 | 73.1 | -55.5 | 60.4 | 180       |

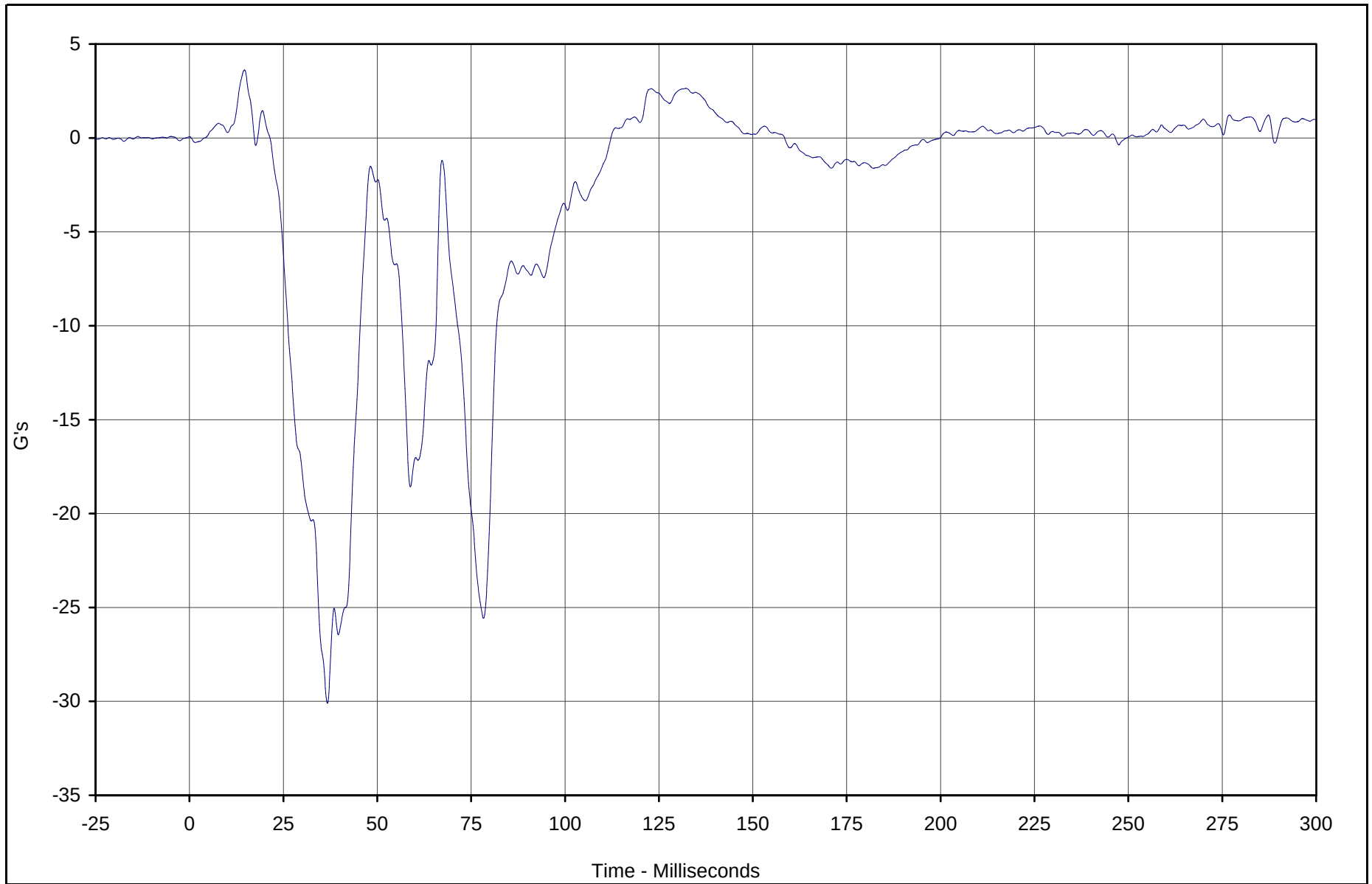


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description          | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Foot Aft Z | 083   | FIL  | G's   | 3.6 | 14.6 | -30.1 | 36.7 | 180       |

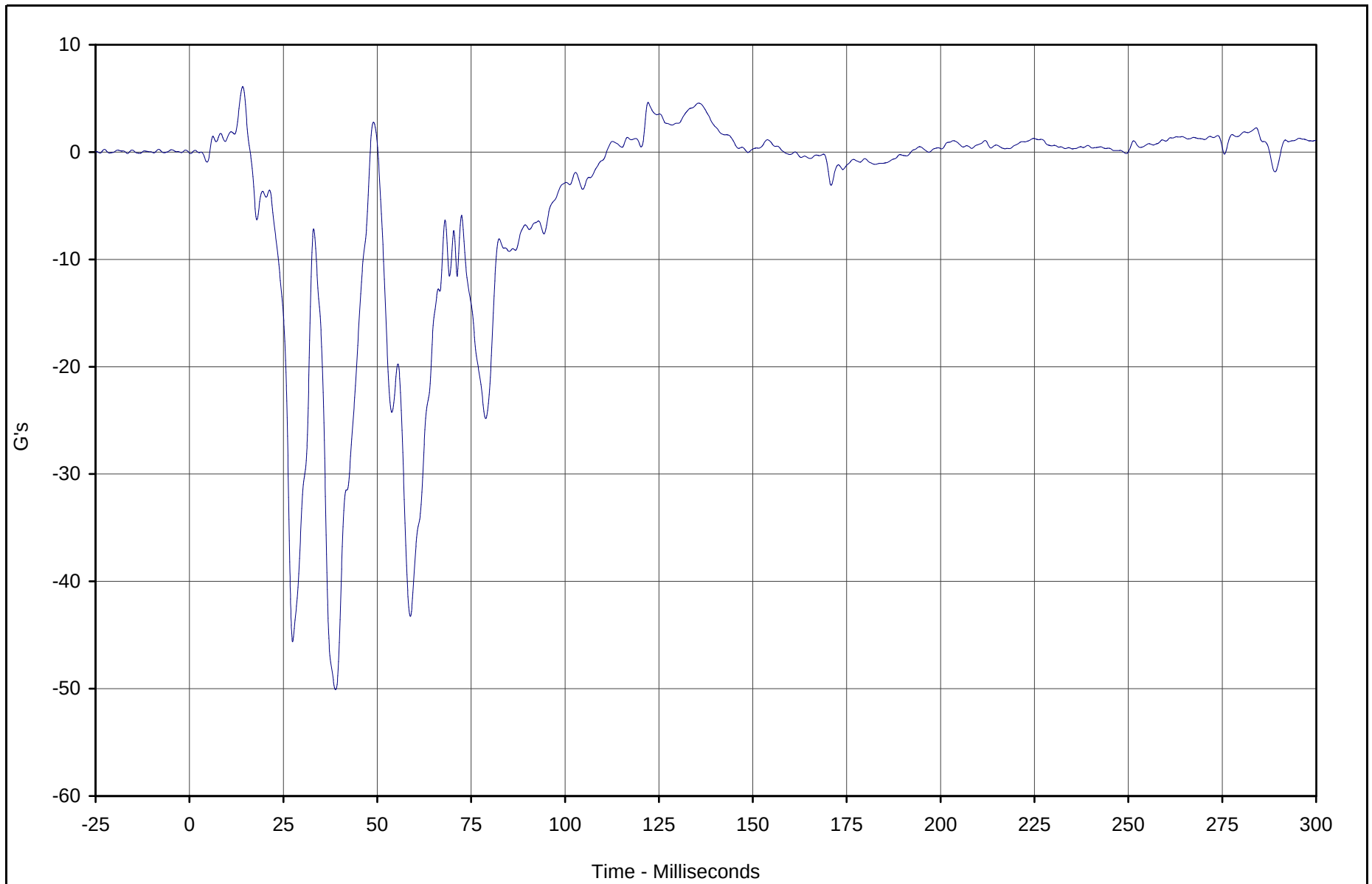


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description           | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Foot Fore Z | 084   | FIL  | G's   | 6.1 | 14.2 | -50.1 | 38.9 | 180       |

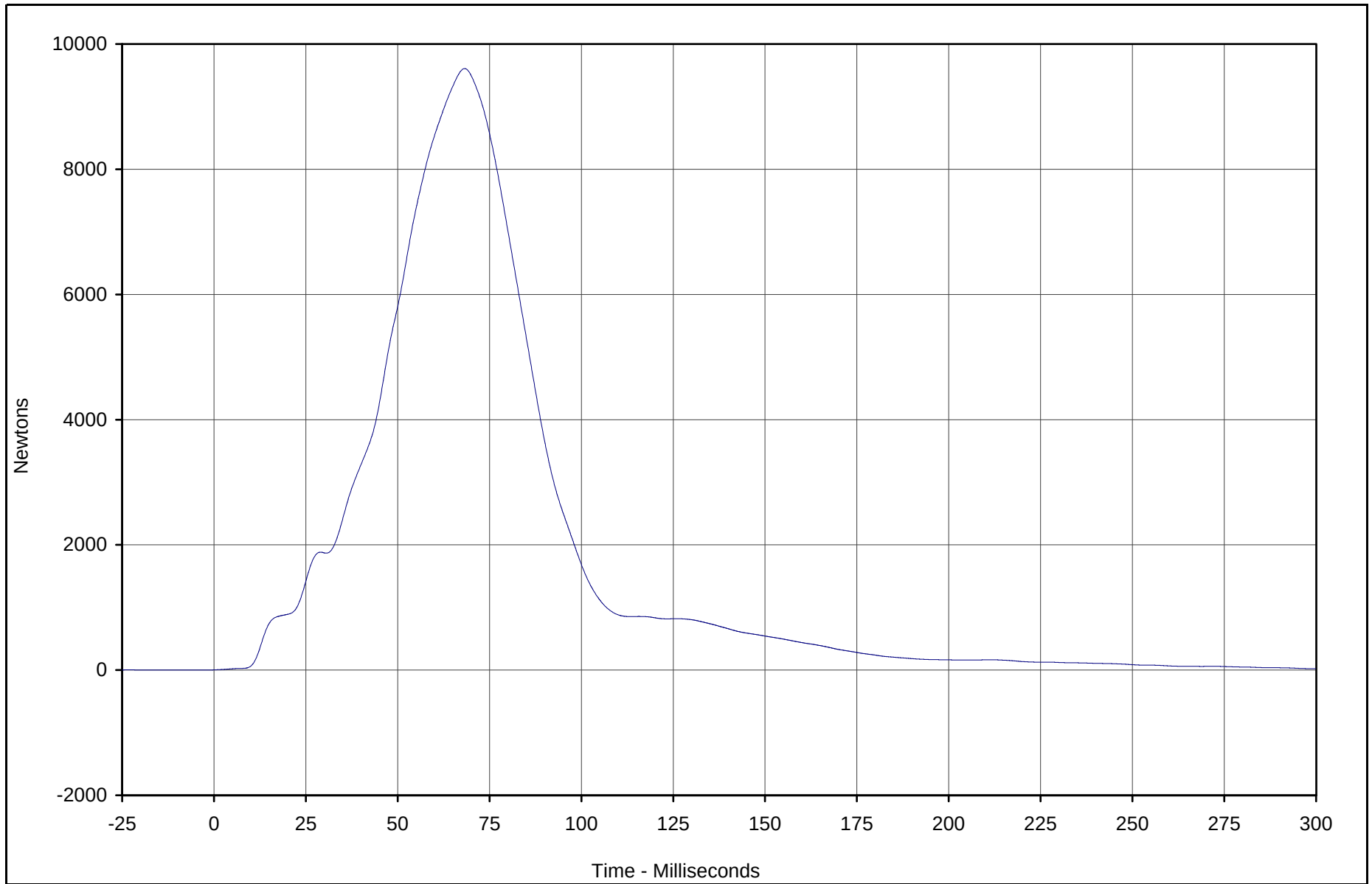


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|--------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Passenger Lap Belt Force | 085   | FIL  | Newtons | 9608.5 | 68.2 | 2.6 | 0.0  | 60        |



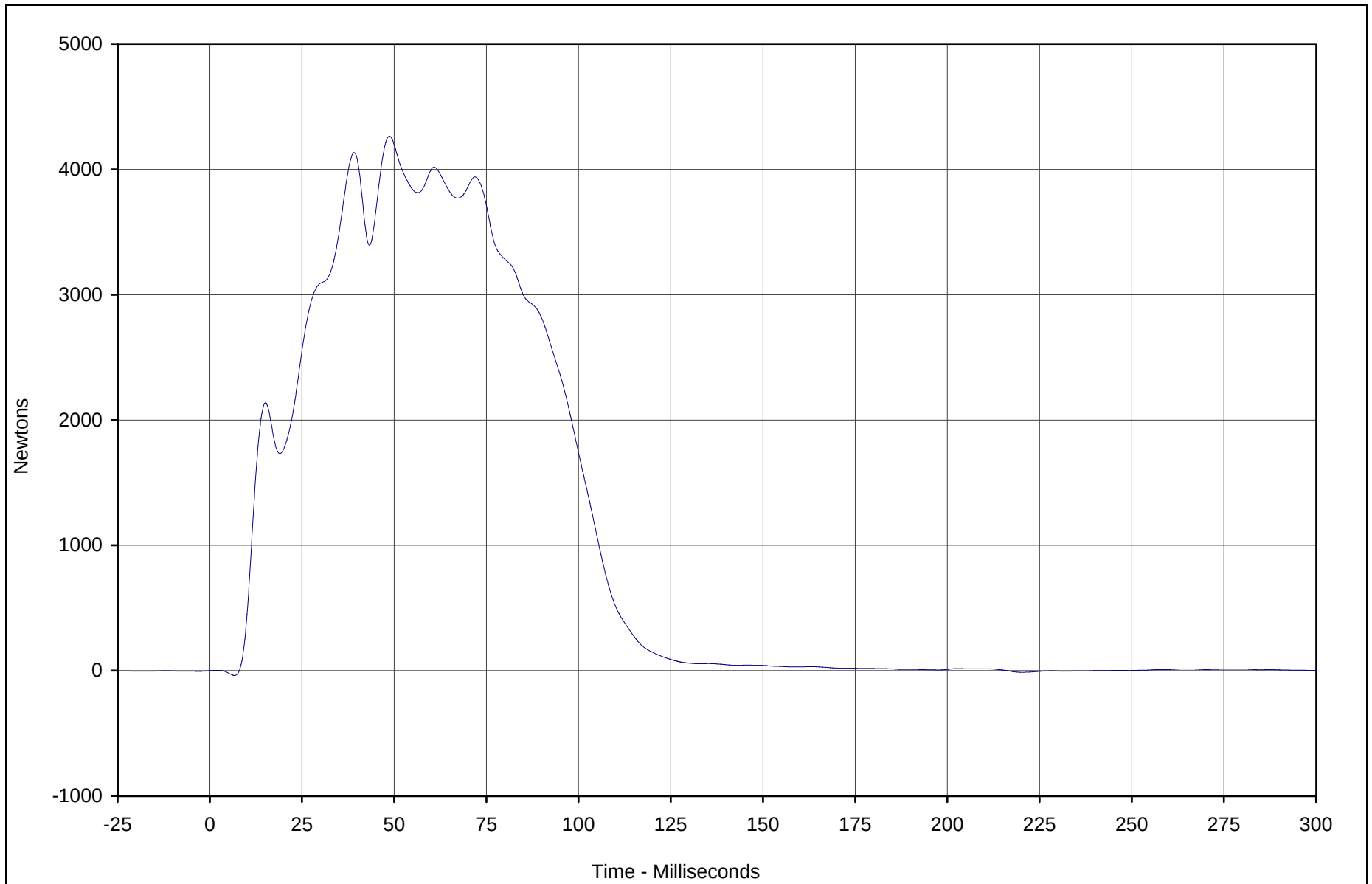
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description             | CURNO | Type | Units   | Max    | Time | Min   | Time | SAE Class |
|-------------------------------|-------|------|---------|--------|------|-------|------|-----------|
| Passenger Shoulder Belt Force | 086   | FIL  | Newtons | 4265.7 | 48.7 | -39.2 | 6.7  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

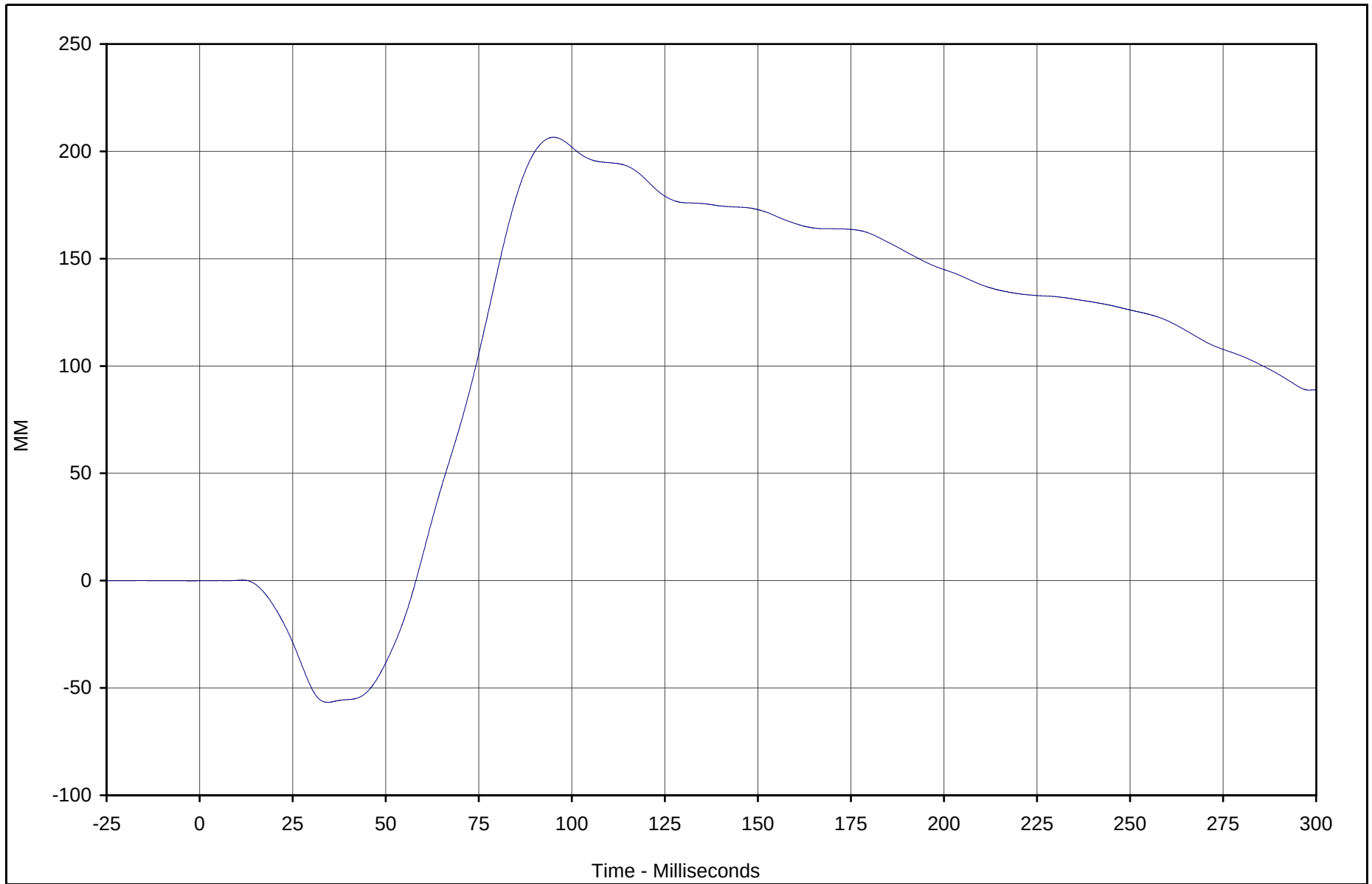
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



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| Curve Description               | CURNO | Type | Units | Max   | Time | Min   | Time | SAE Class |
|---------------------------------|-------|------|-------|-------|------|-------|------|-----------|
| Passenger Shoulder Belt Pullout | 087   | FIL  | MM    | 206.6 | 95.1 | -56.7 | 34.4 | 60        |



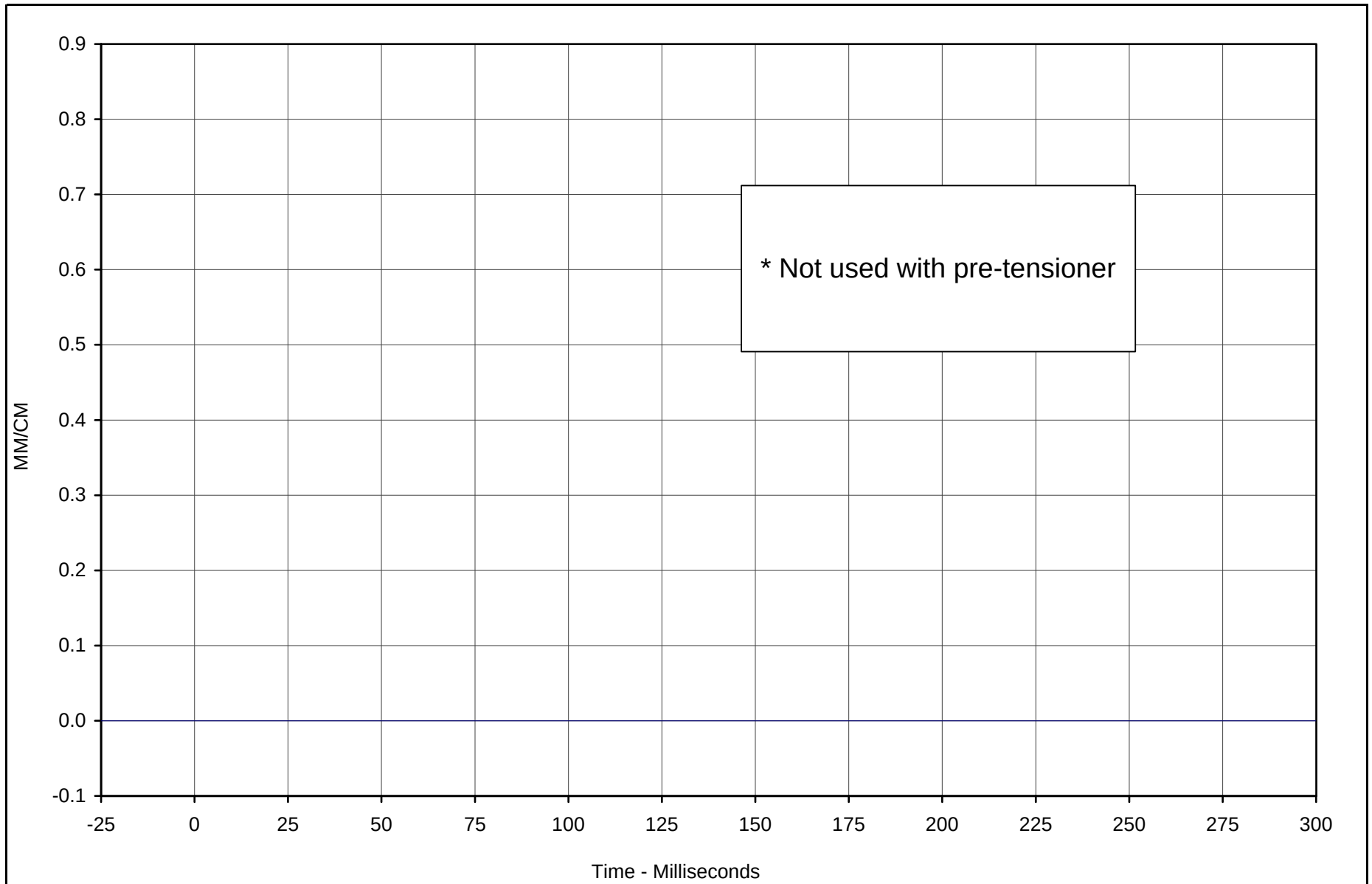
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



\* Not used with pre-tensioner

| Curve Description                  | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Shoulder Belt Elongation | 088   | FIL  | MM/CM | 0.00 | 0.0  | 0.00 | 0.0  | 60        |



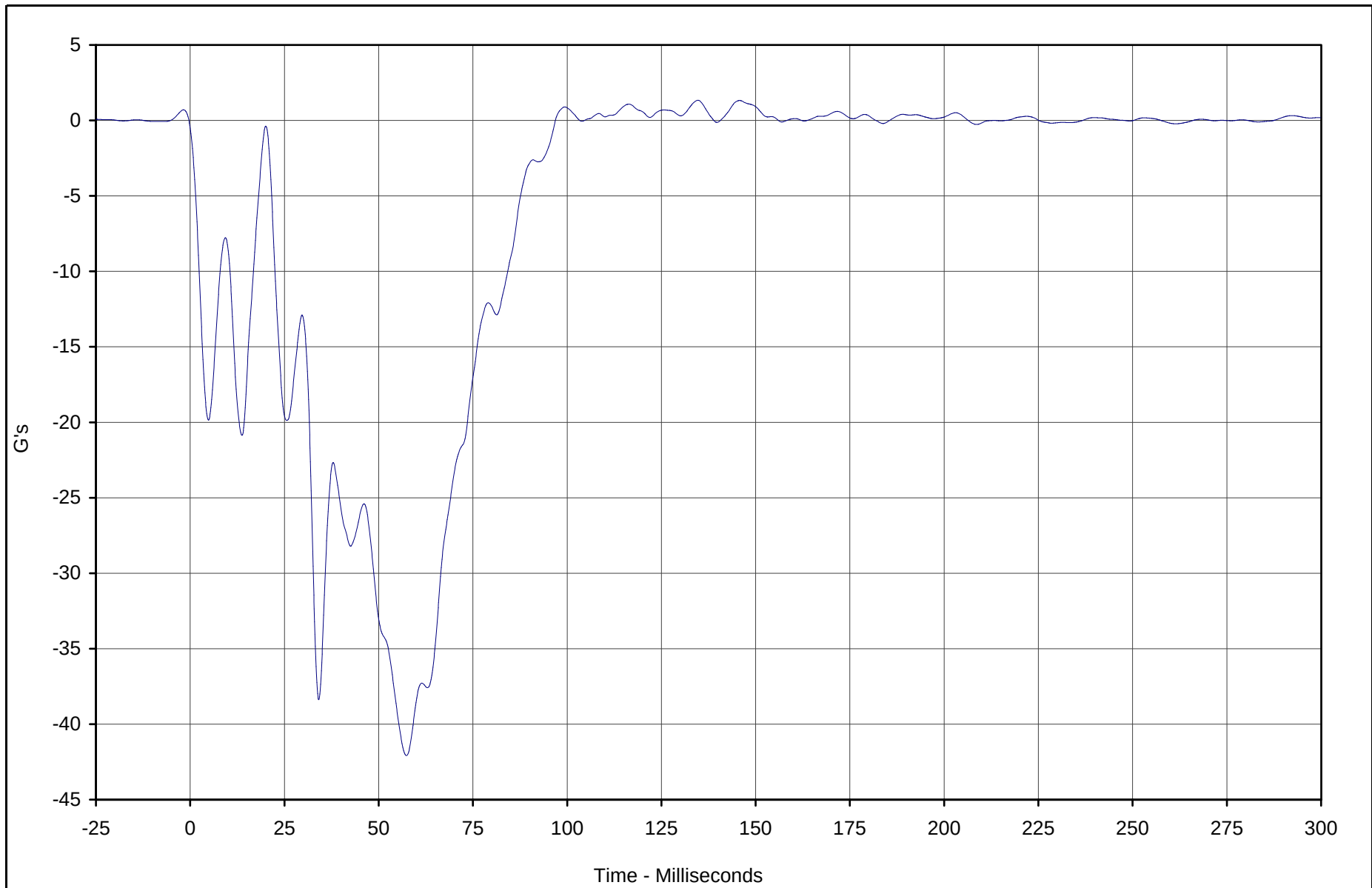
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description   | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|---------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Vehicle Left Rear X | 089   | FIL  | G's   | 1.3 | 134.7 | -42.1 | 57.4 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

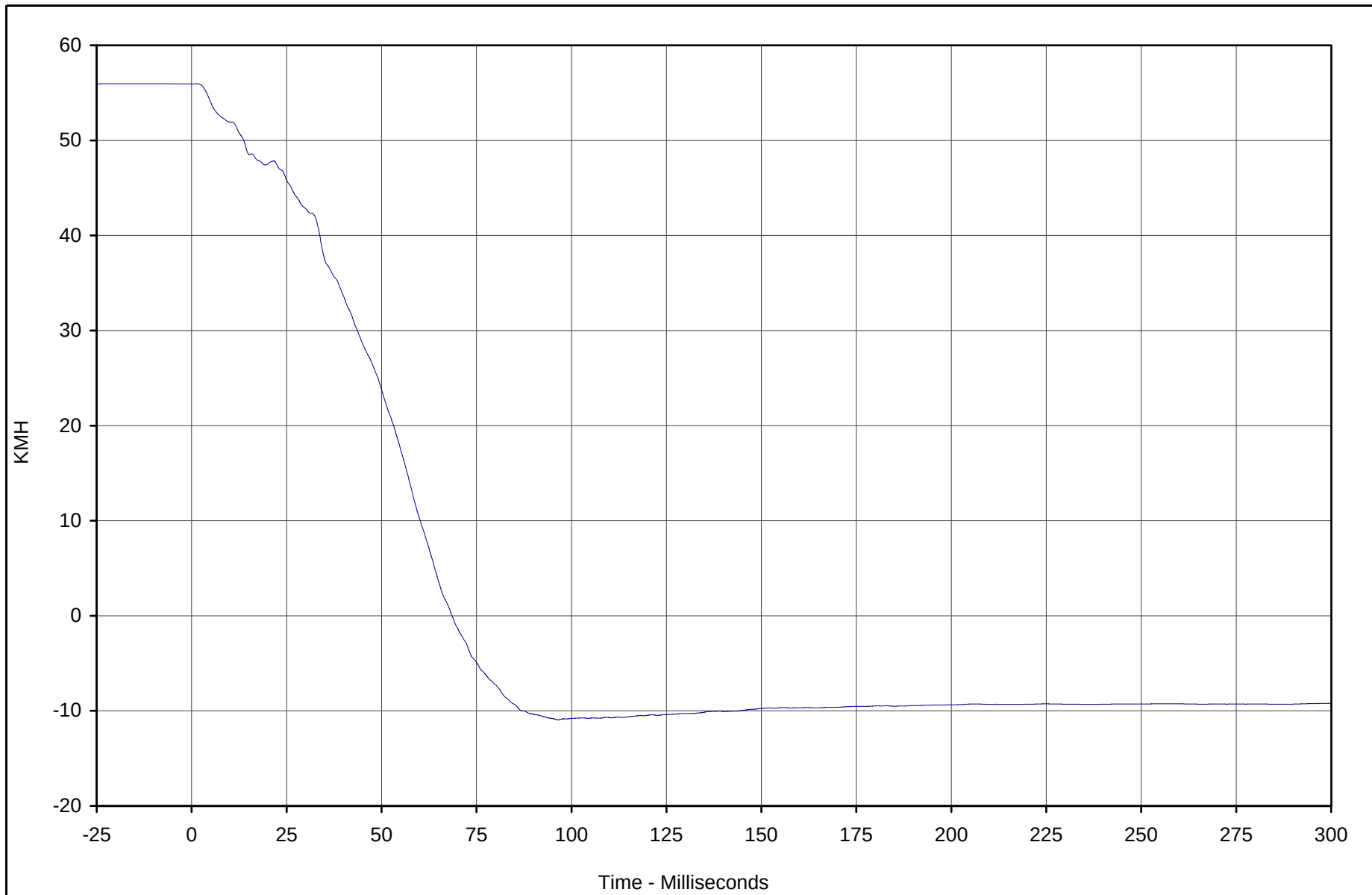
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

B-124



| Curve Description            | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Left Rear X Velocity | 089   | IN1  | KMH   | 56.0 | 1.4  | -11.0 | 96.5 | 180       |



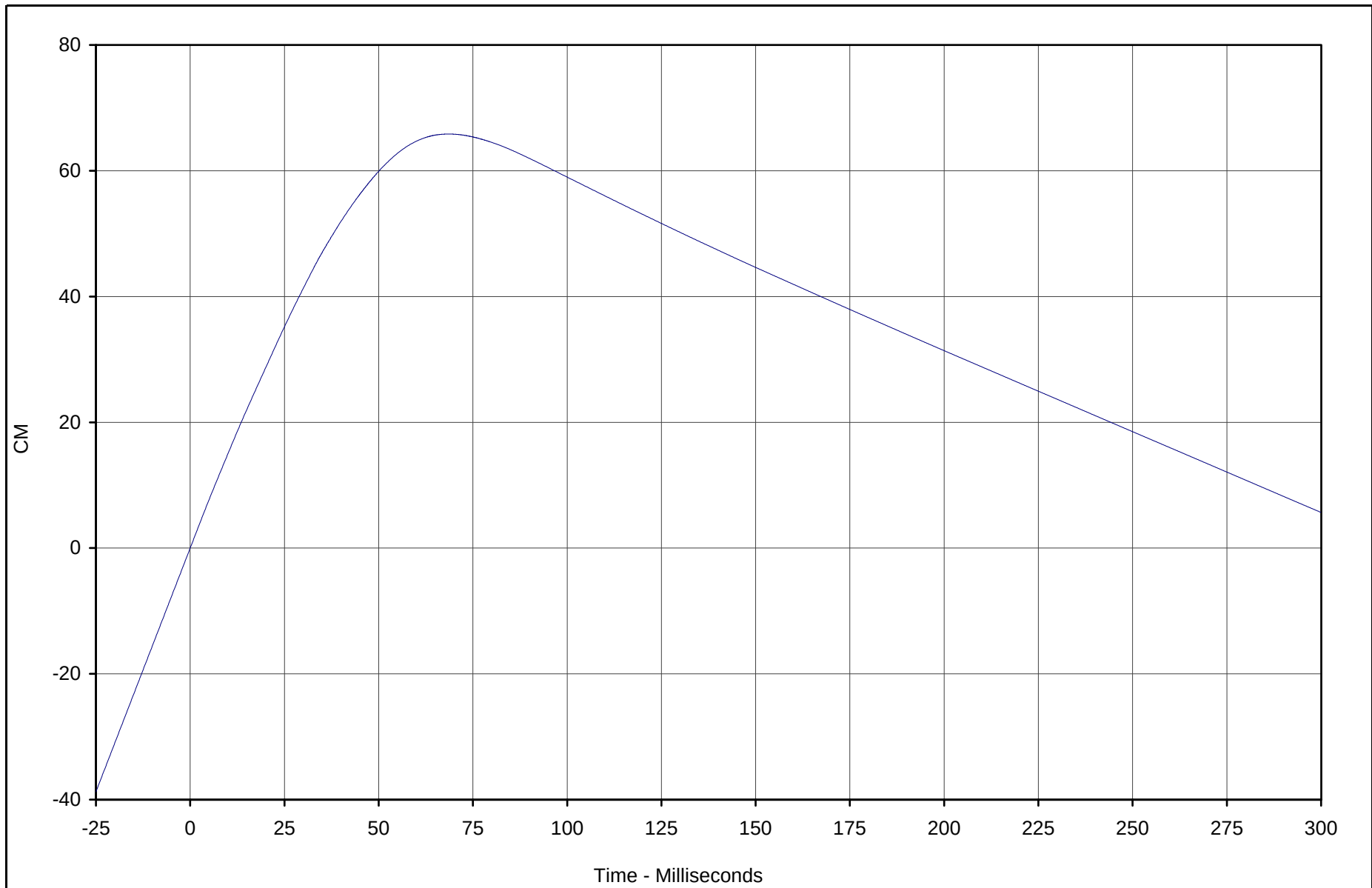
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description          | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Left Rear X Displ. | 089   | IN2  | CM    | 65.8 | 68.6 | 0.0 | 0.0  | 180       |



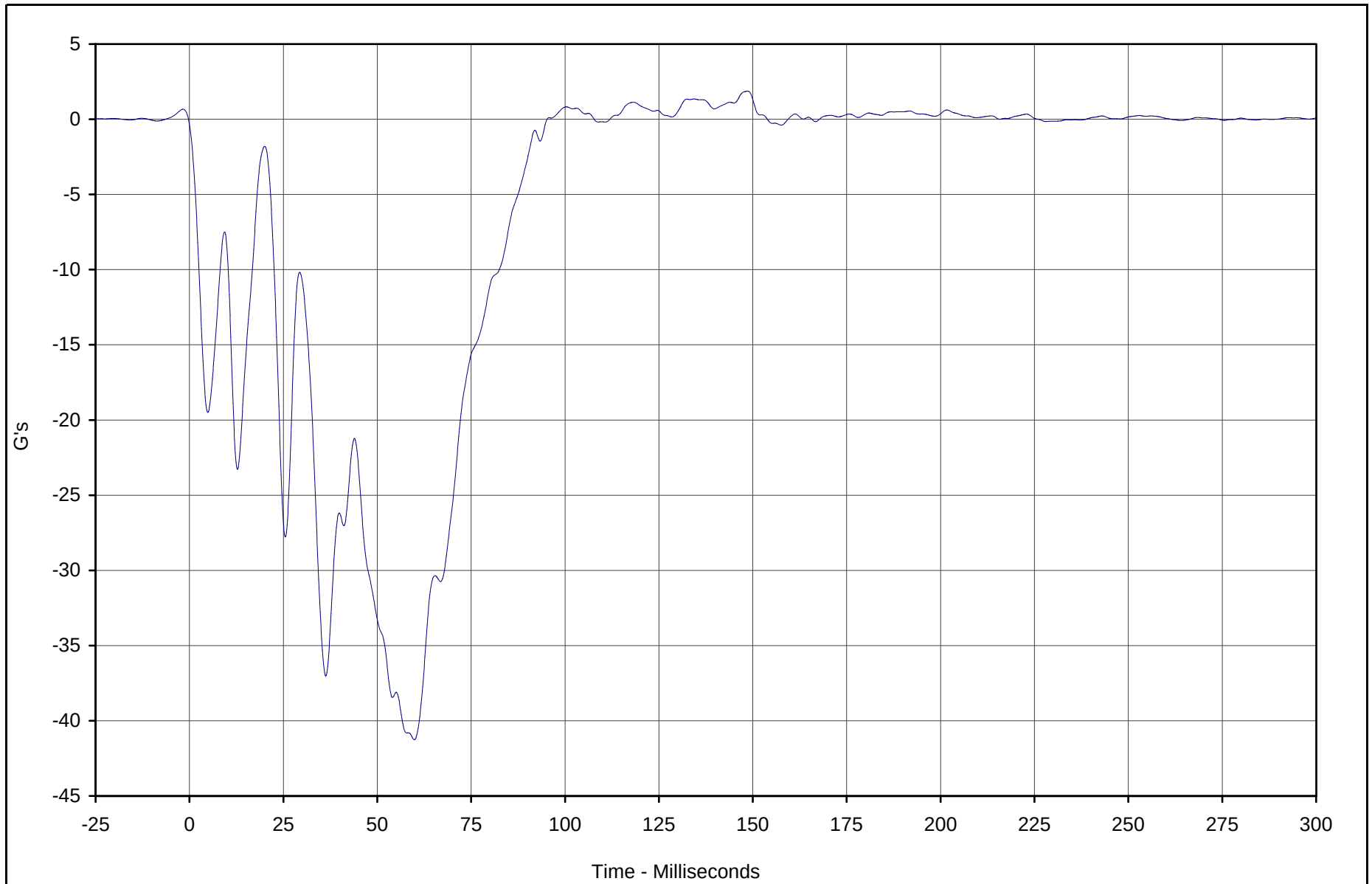
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description    | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Vehicle Right Rear X | 090   | FIL  | G's   | 1.9 | 148.6 | -41.3 | 59.9 | 60        |



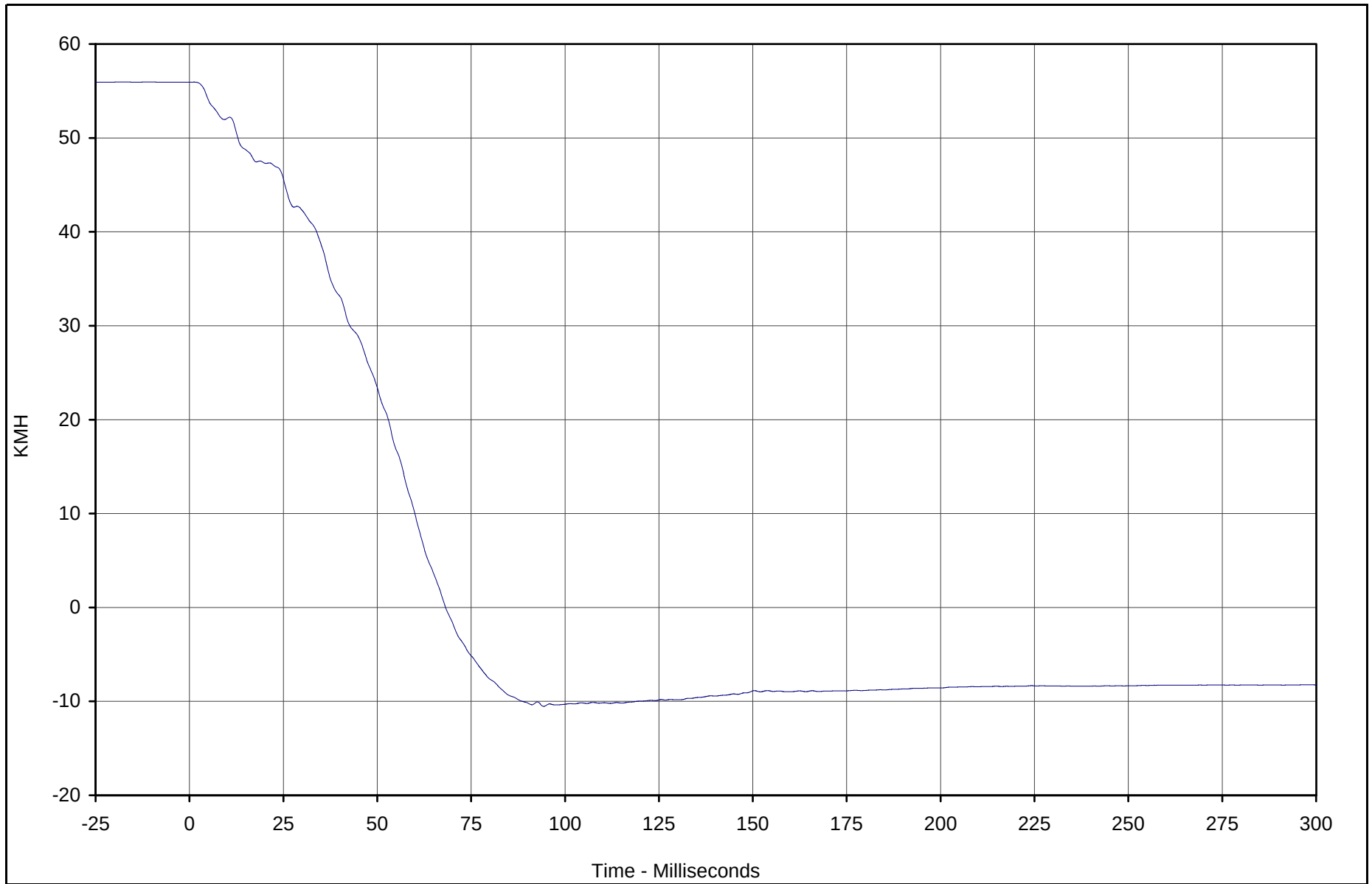
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description             | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Right Rear X Velocity | 090   | IN1  | KMH   | 55.9 | 1.3  | -10.5 | 94.3 | 180       |



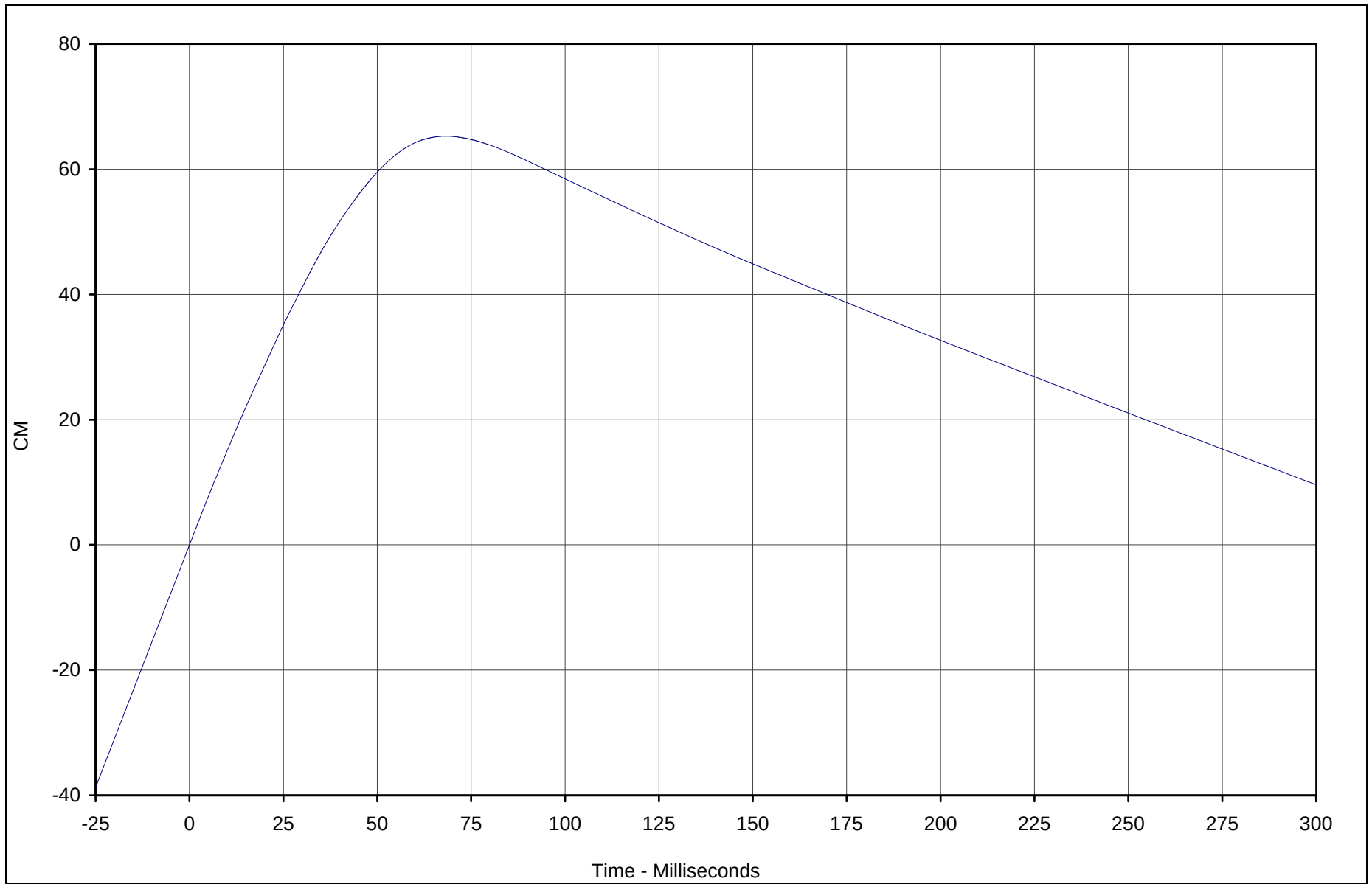
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description           | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Right Rear X Displ. | 090   | IN2  | CM    | 65.3 | 68.2 | 0.0 | 0.0  | 180       |

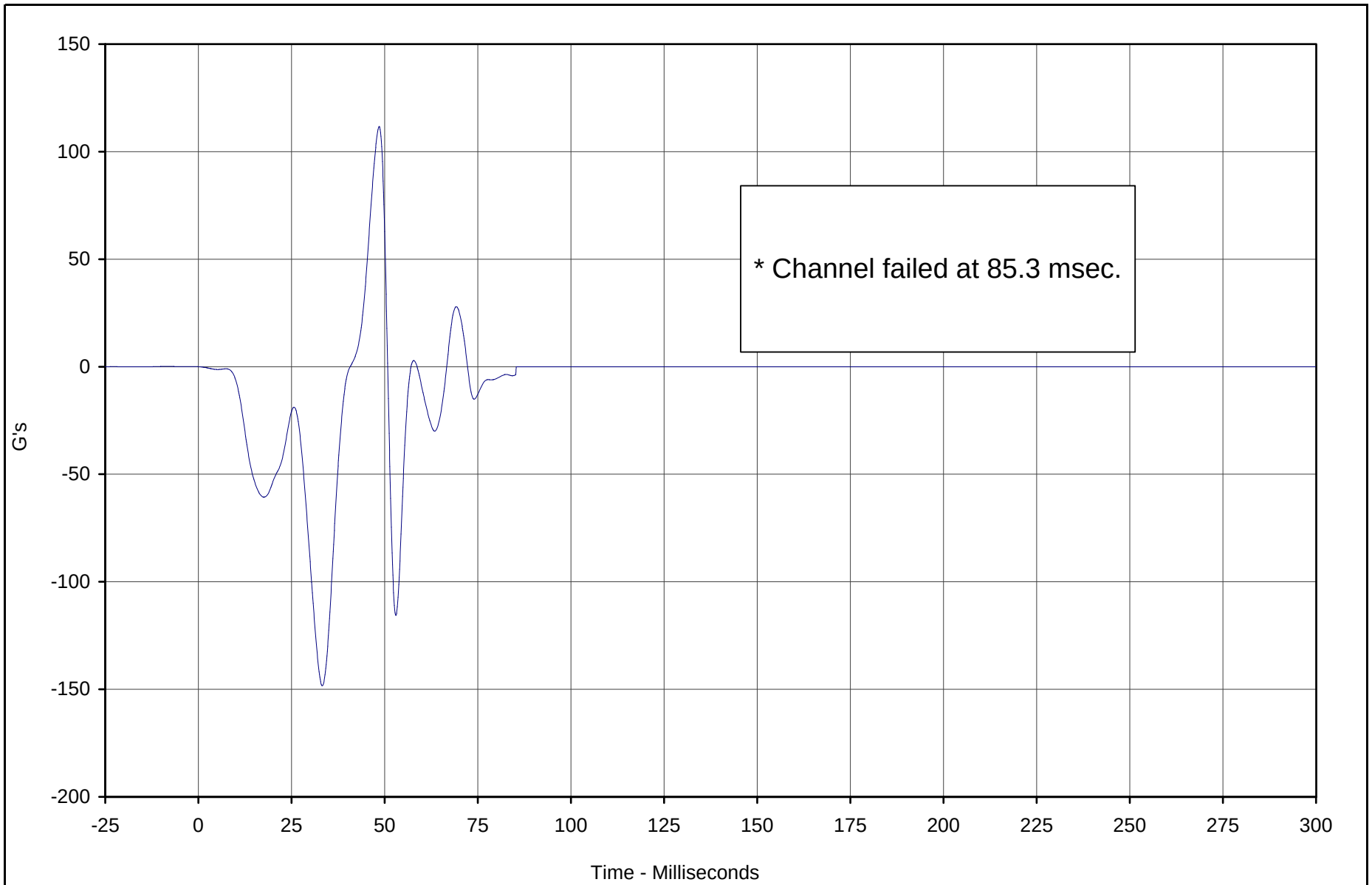


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description  | CURNO | Type | Units | Max   | Time | Min    | Time | SAE Class |
|--------------------|-------|------|-------|-------|------|--------|------|-----------|
| Vehicle Engine Top | 091   | FIL  | G's   | 111.7 | 48.5 | -148.3 | 33.3 | 60        |

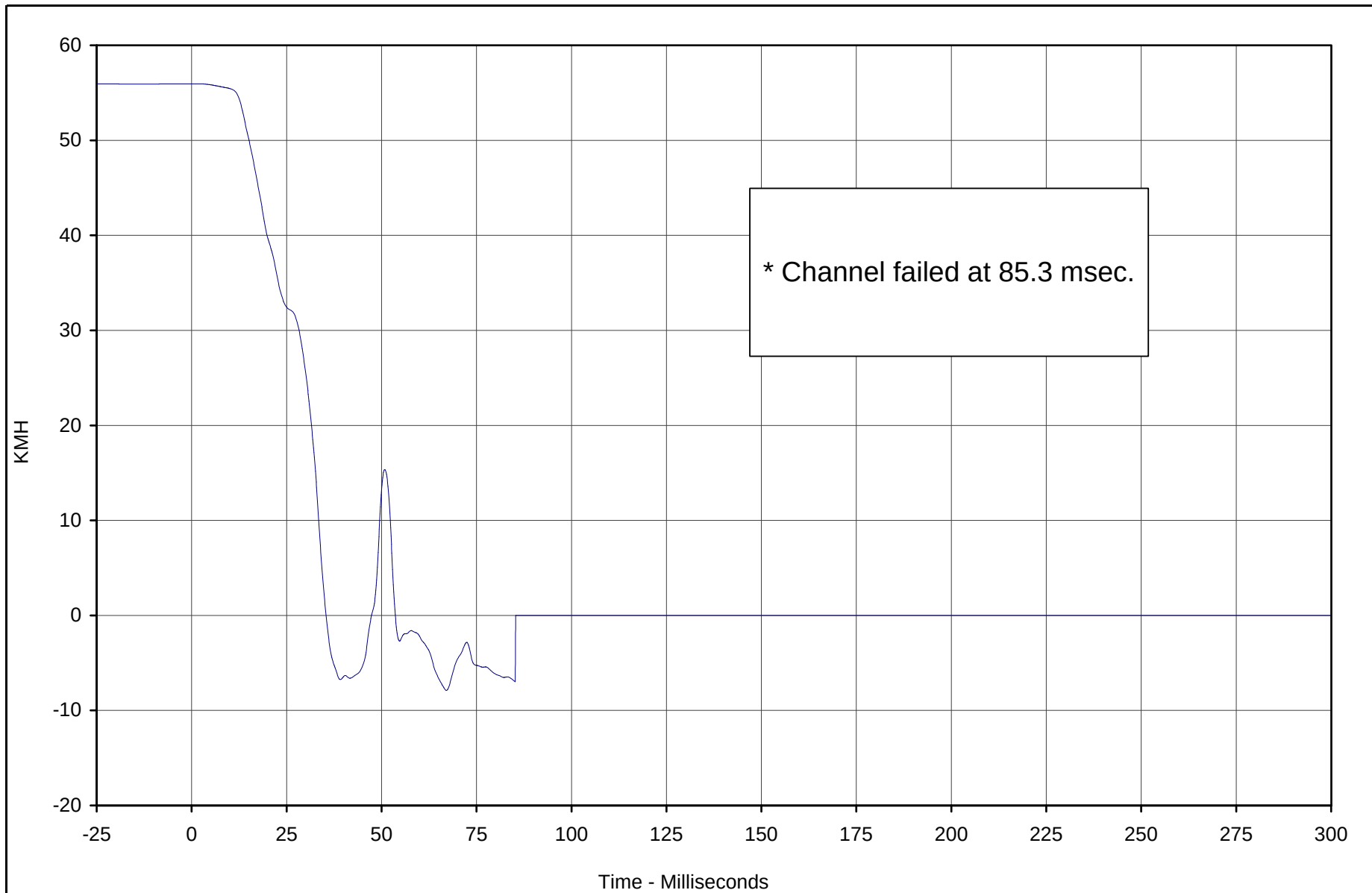


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description           | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Engine Top Velocity | 091   | IN1  | KMH   | 55.9 | 0.3  | -7.9 | 67.1 | 180       |

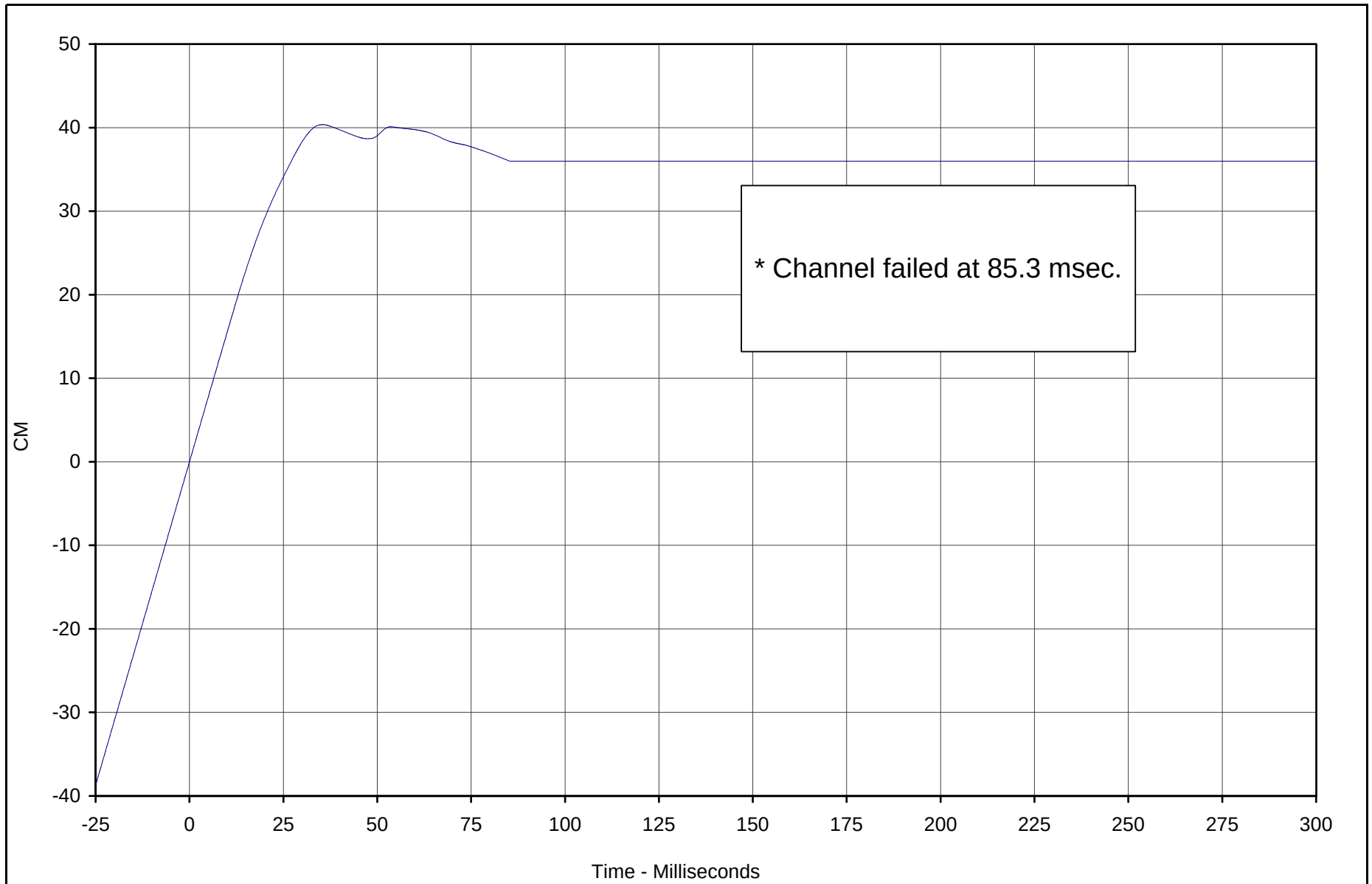


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Engine Top Displacement | 091   | IN2  | CM    | 40.4 | 35.4 | 0.0 | 0.0  | 180       |



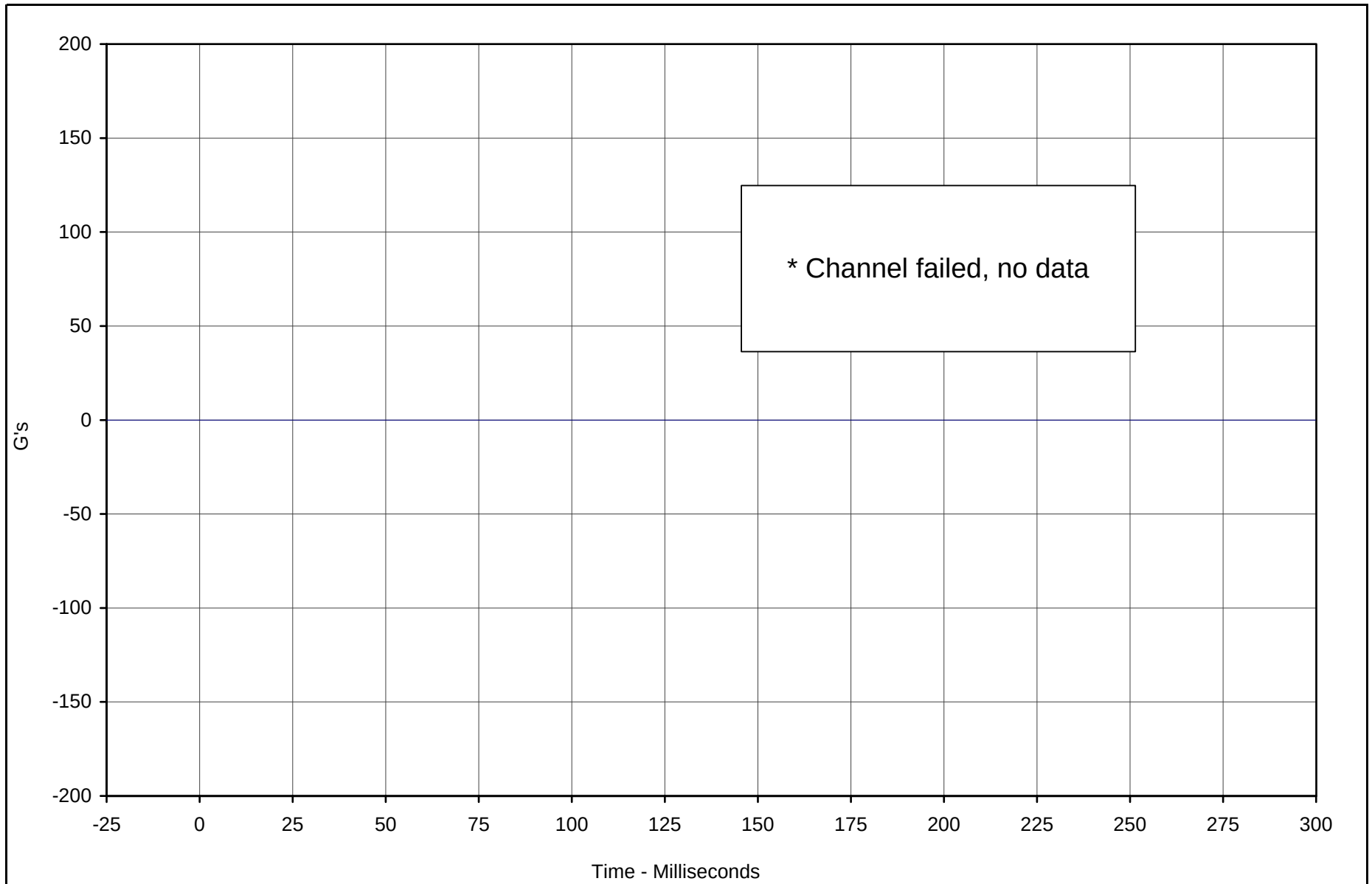
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





\* Channel failed, no data

| Curve Description     | CURNO | Type | Units | Max | Time | Min | Time | SAE Class |
|-----------------------|-------|------|-------|-----|------|-----|------|-----------|
| Vehicle Engine Bottom | 092   | FIL  | G's   | 0.0 | 0.0  | 0.0 | 0.0  | 60        |

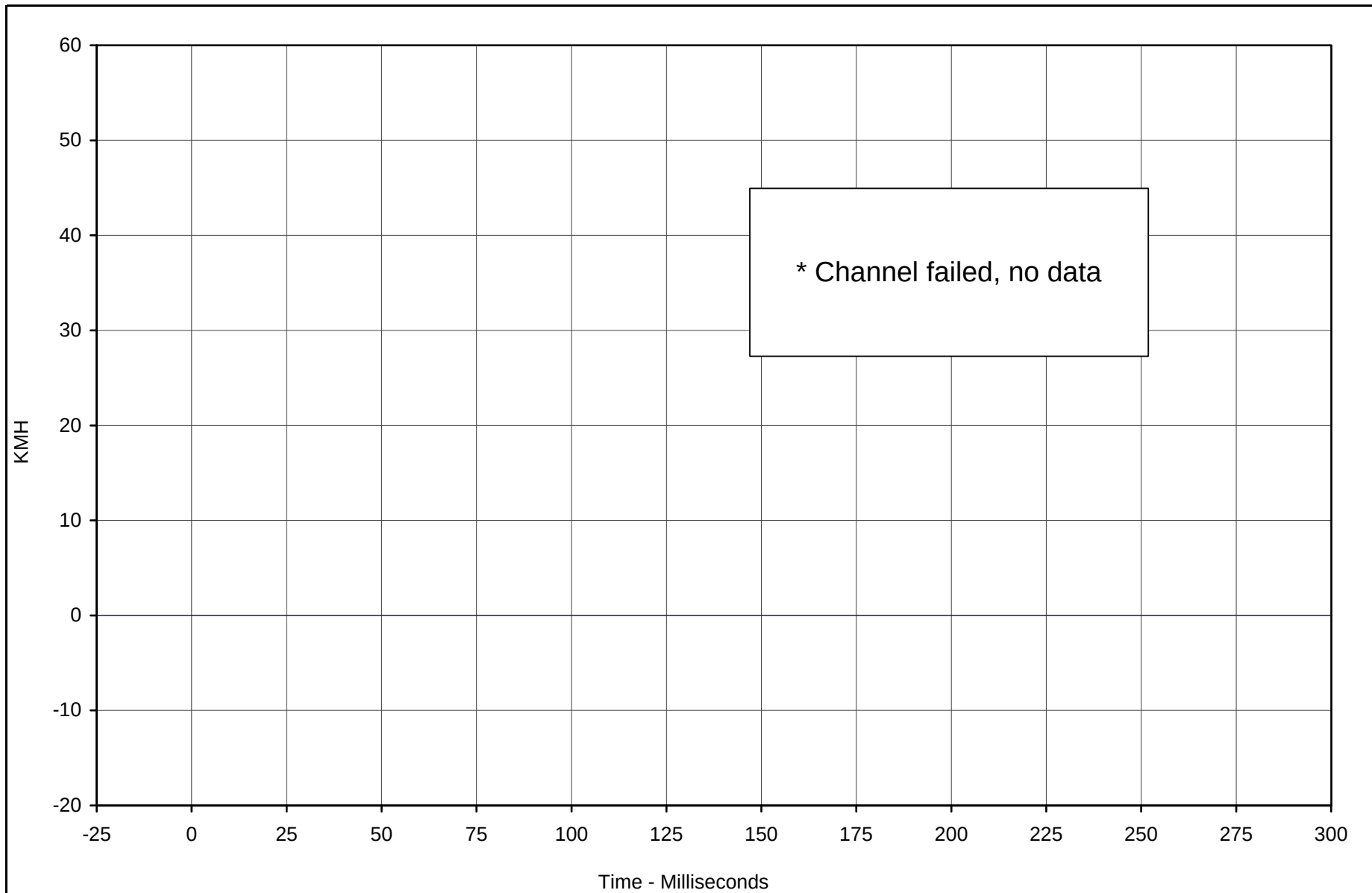


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed, no data

| Curve Description              | CURNO | Type | Units | Max | Time | Min | Time | SAE Class |
|--------------------------------|-------|------|-------|-----|------|-----|------|-----------|
| Vehicle Engine Bottom Velocity | 092   | IN1  | KMH   | 0.0 | 0.0  | 0.0 | 0.0  | 180       |

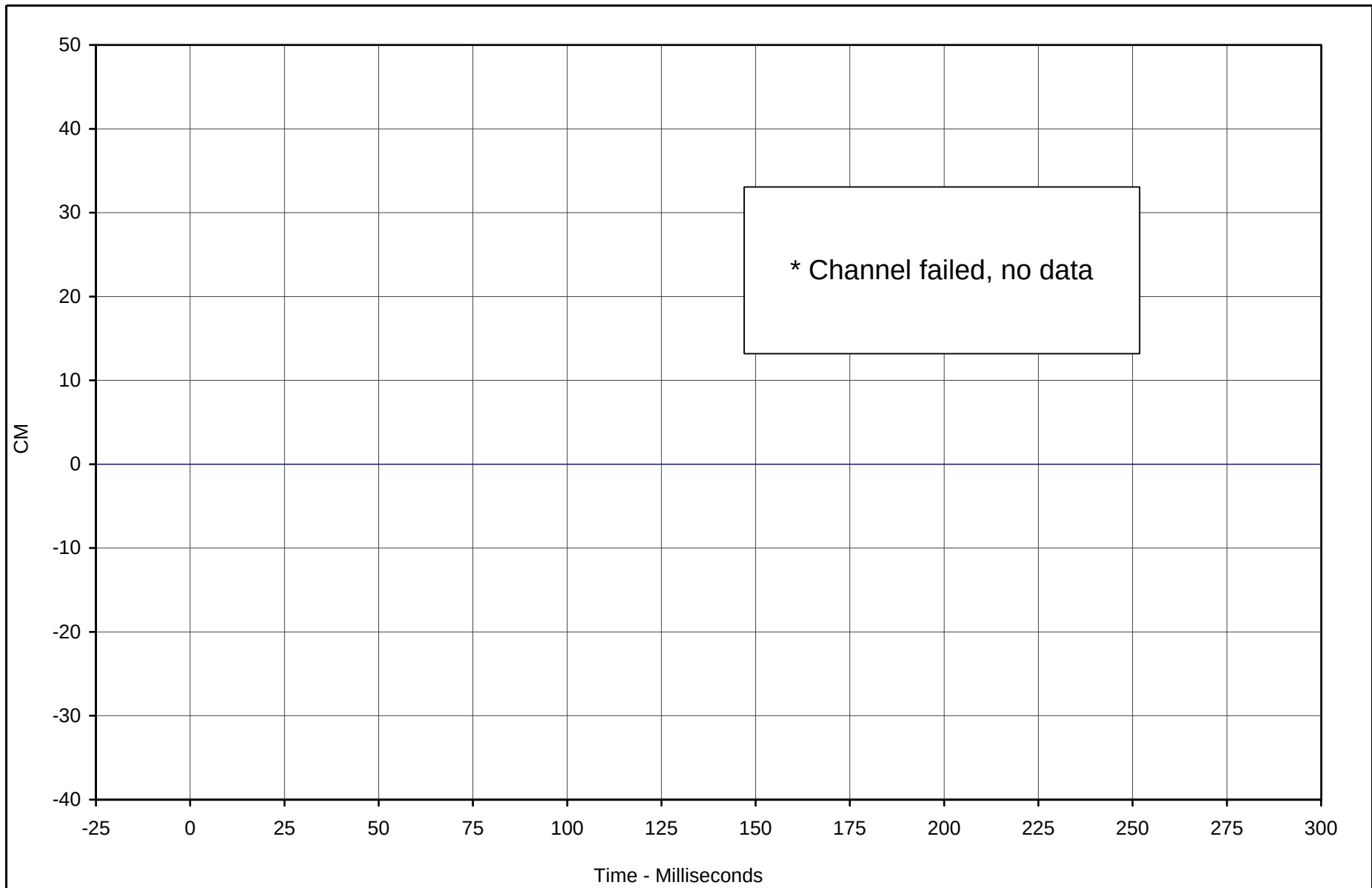


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed, no data

| Curve Description                  | CURNO | Type | Units | Max | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|-----|------|-----|------|-----------|
| Vehicle Engine Bottom Displacement | 092   | IN2  | CM    | 0.0 | 0.0  | 0.0 | 0.0  | 180       |

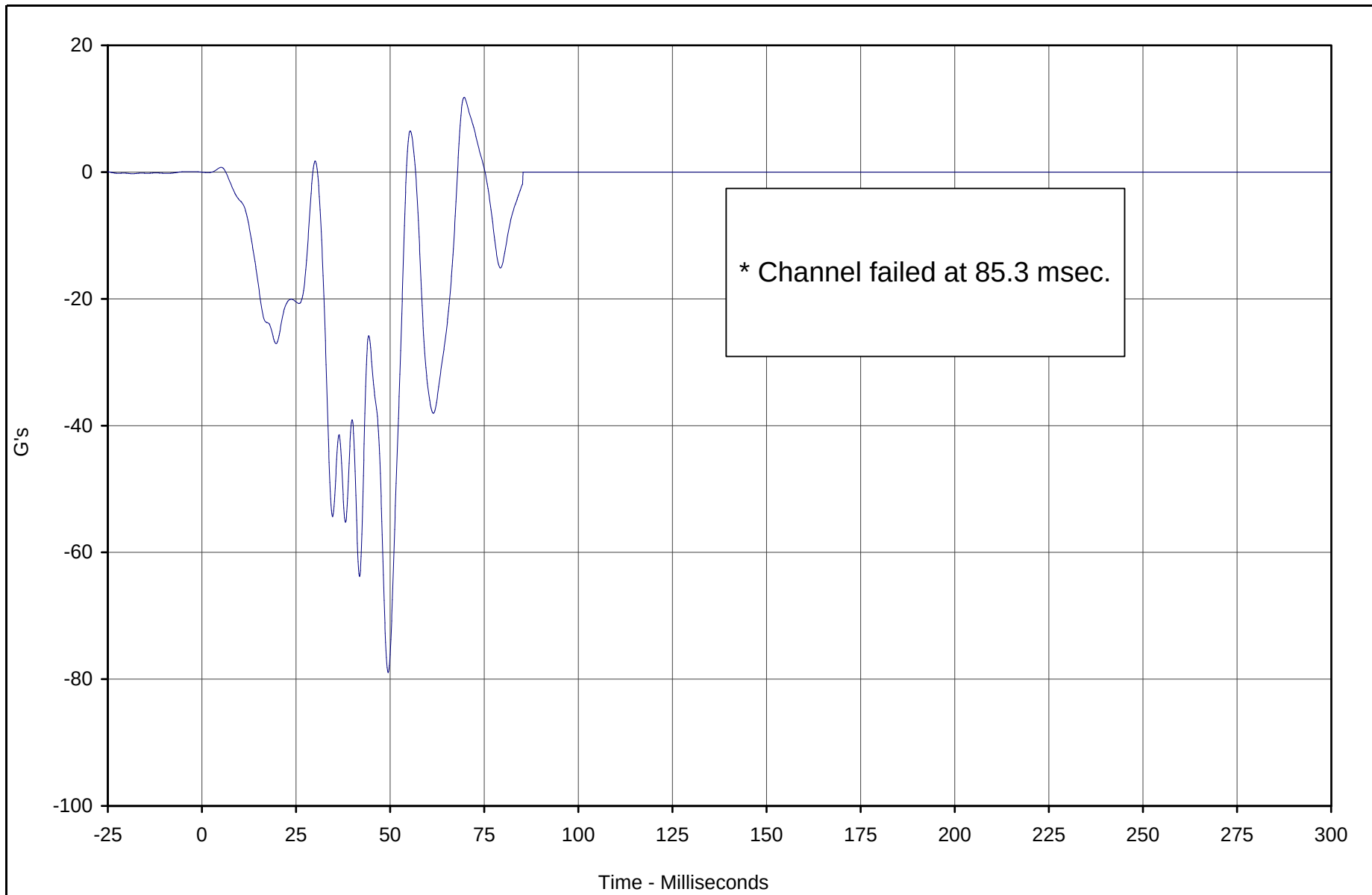


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description          | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Left Brake Caliper | 093   | FIL  | G's   | 11.8 | 69.7 | -79.0 | 49.5 | 60        |

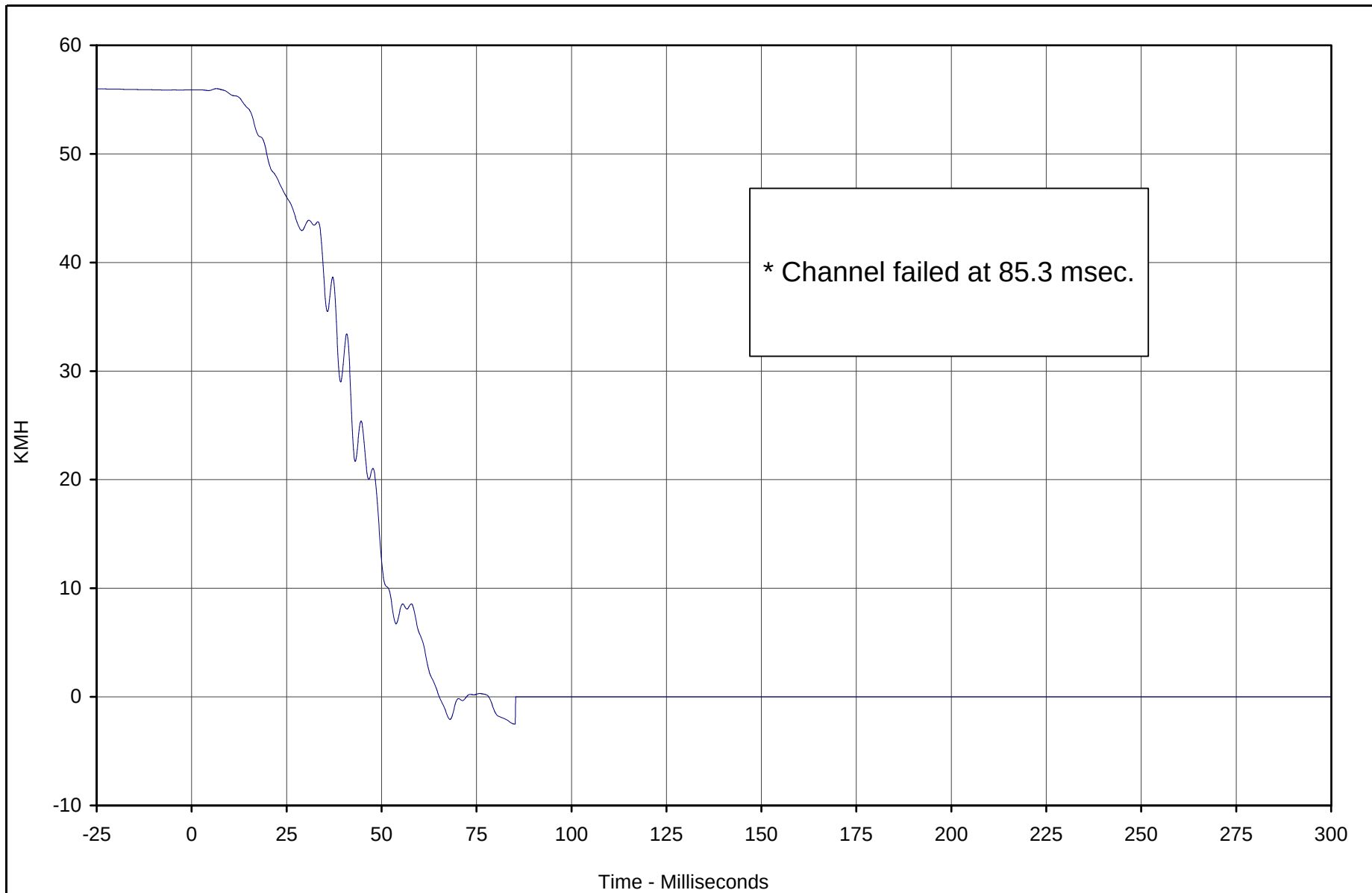


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description                   | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Left Brake Caliper Velocity | 093   | IN1  | KMH   | 56.0 | 6.5  | -2.5 | 85.2 | 180       |

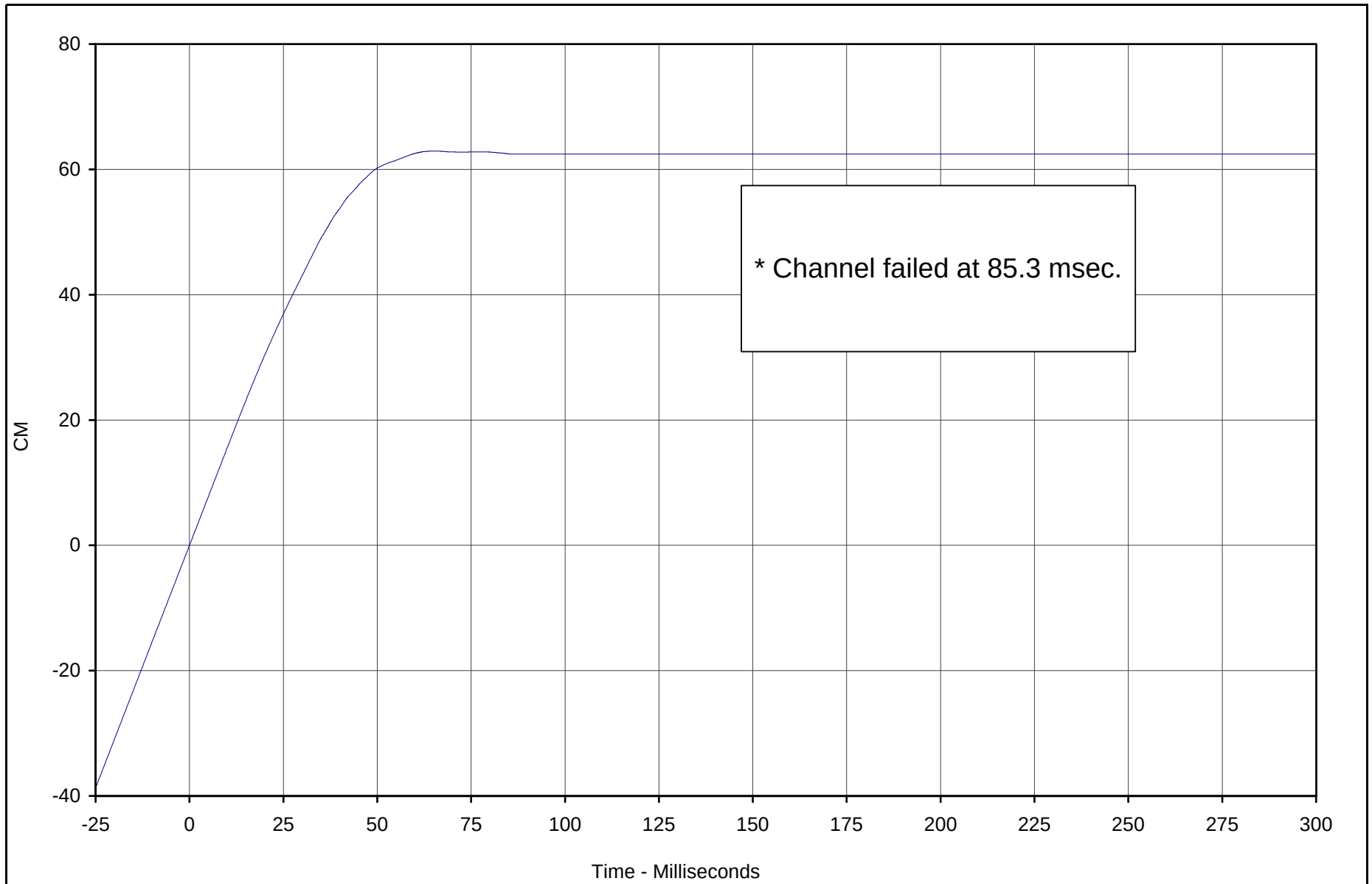


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description                 | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Left Brake Caliper Displ. | 093   | IN2  | CM    | 62.9 | 65.2 | 0.0 | 0.0  | 180       |



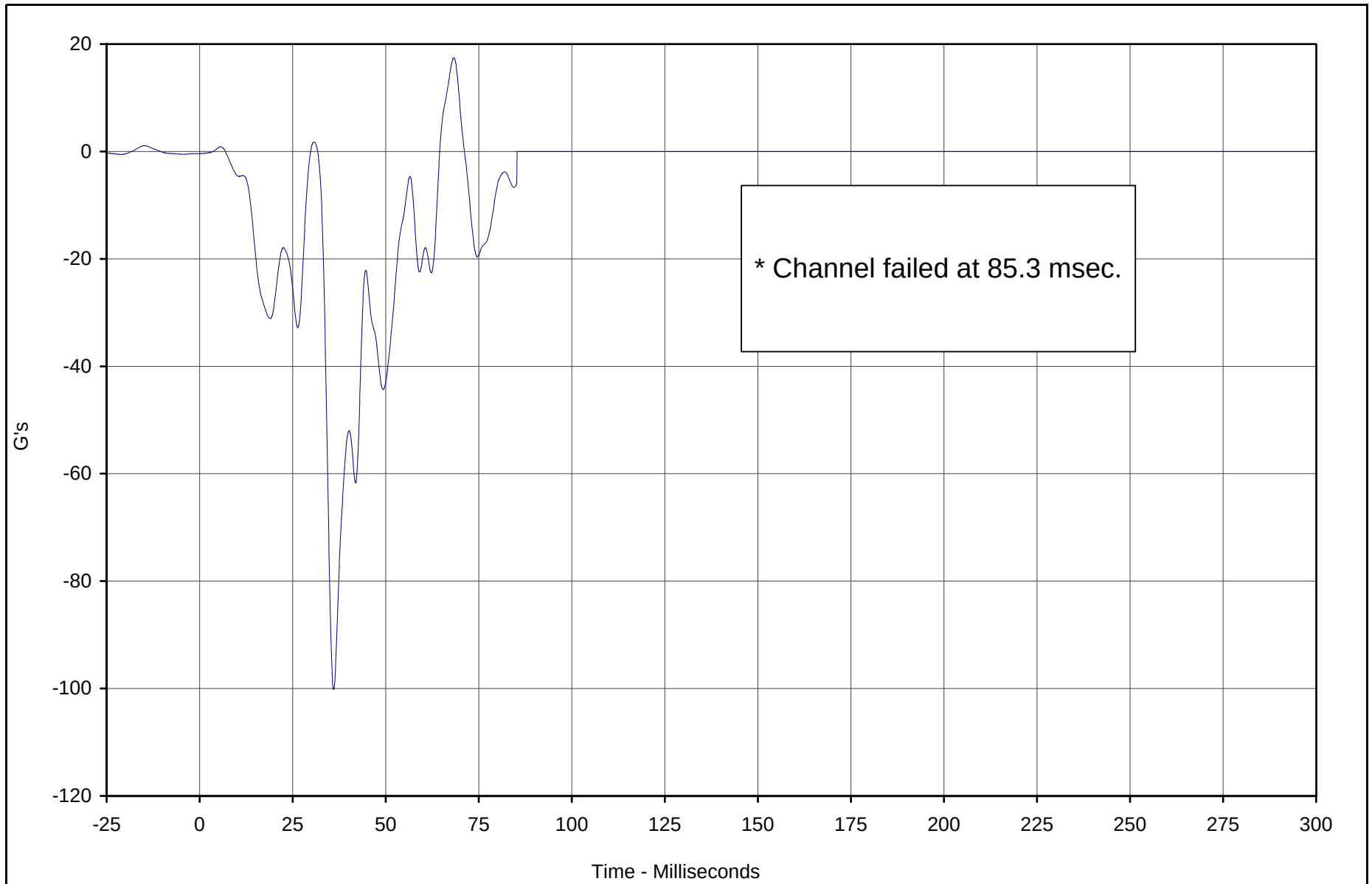
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





\* Channel failed at 85.3 msec.

| Curve Description           | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|--------|------|-----------|
| Vehicle Right Brake Caliper | 094   | FIL  | G's   | 17.4 | 68.3 | -100.2 | 36.0 | 60        |

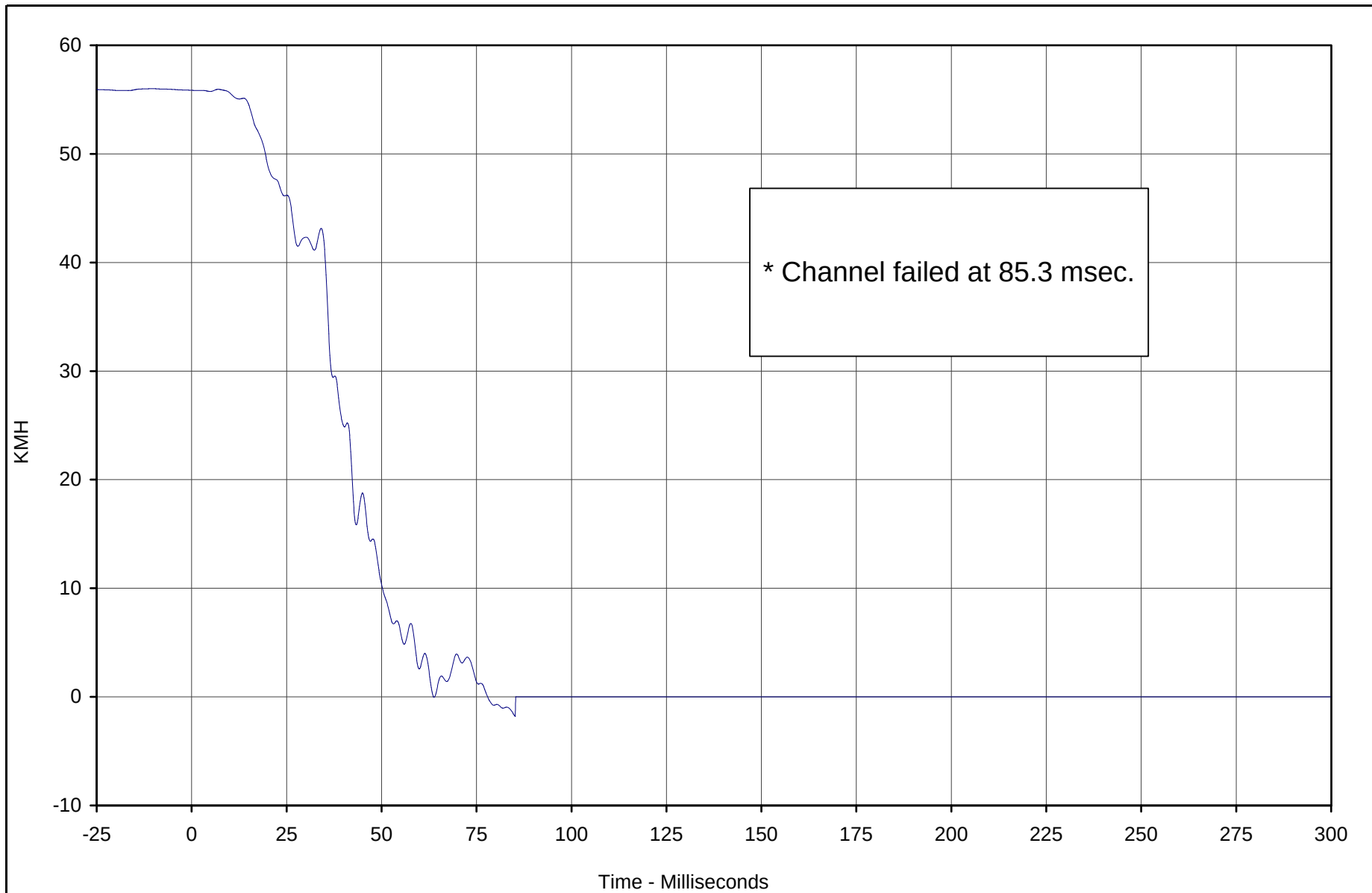


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description                    | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Right Brake Caliper Velocity | 094   | IN1  | KMH   | 55.9 | 7.0  | -1.8 | 85.2 | 180       |

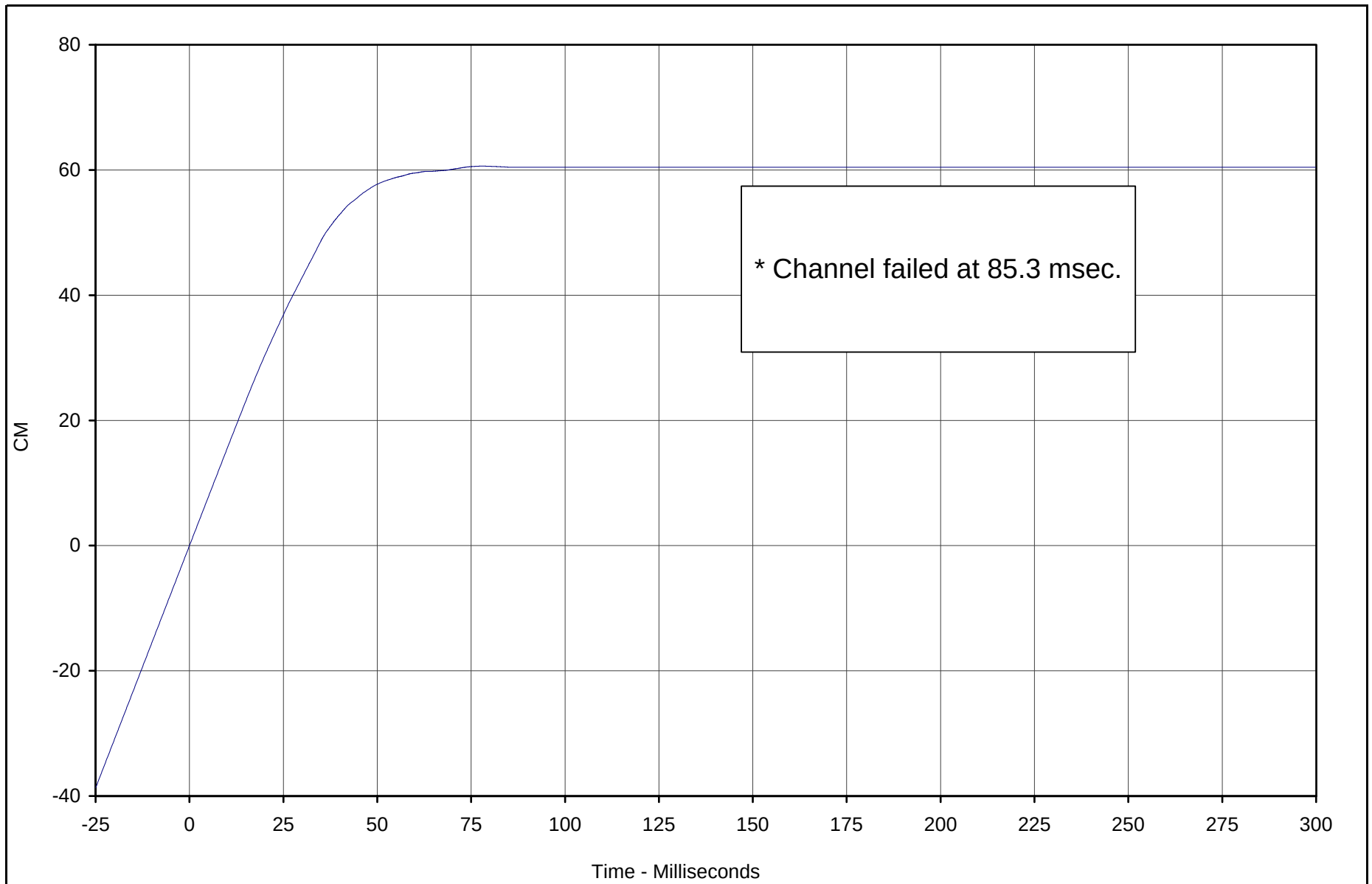


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



\* Channel failed at 85.3 msec.

| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Right Brake Caliper Displ. | 094   | IN2  | CM    | 60.6 | 77.9 | 0.0 | 0.0  | 180       |

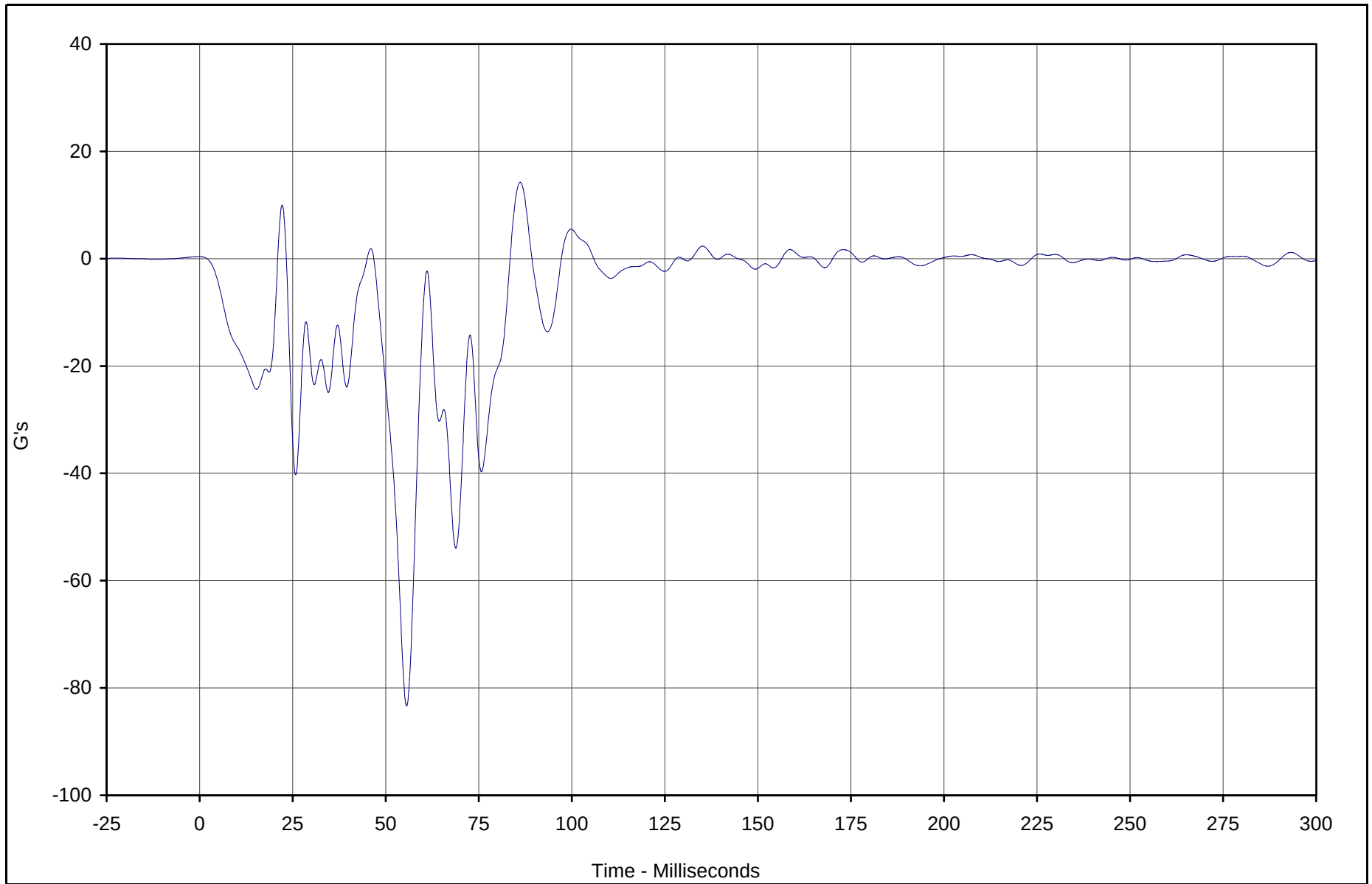


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Instrument Panel | 095   | FIL  | G's   | 14.2 | 86.1 | -83.4 | 55.6 | 60        |



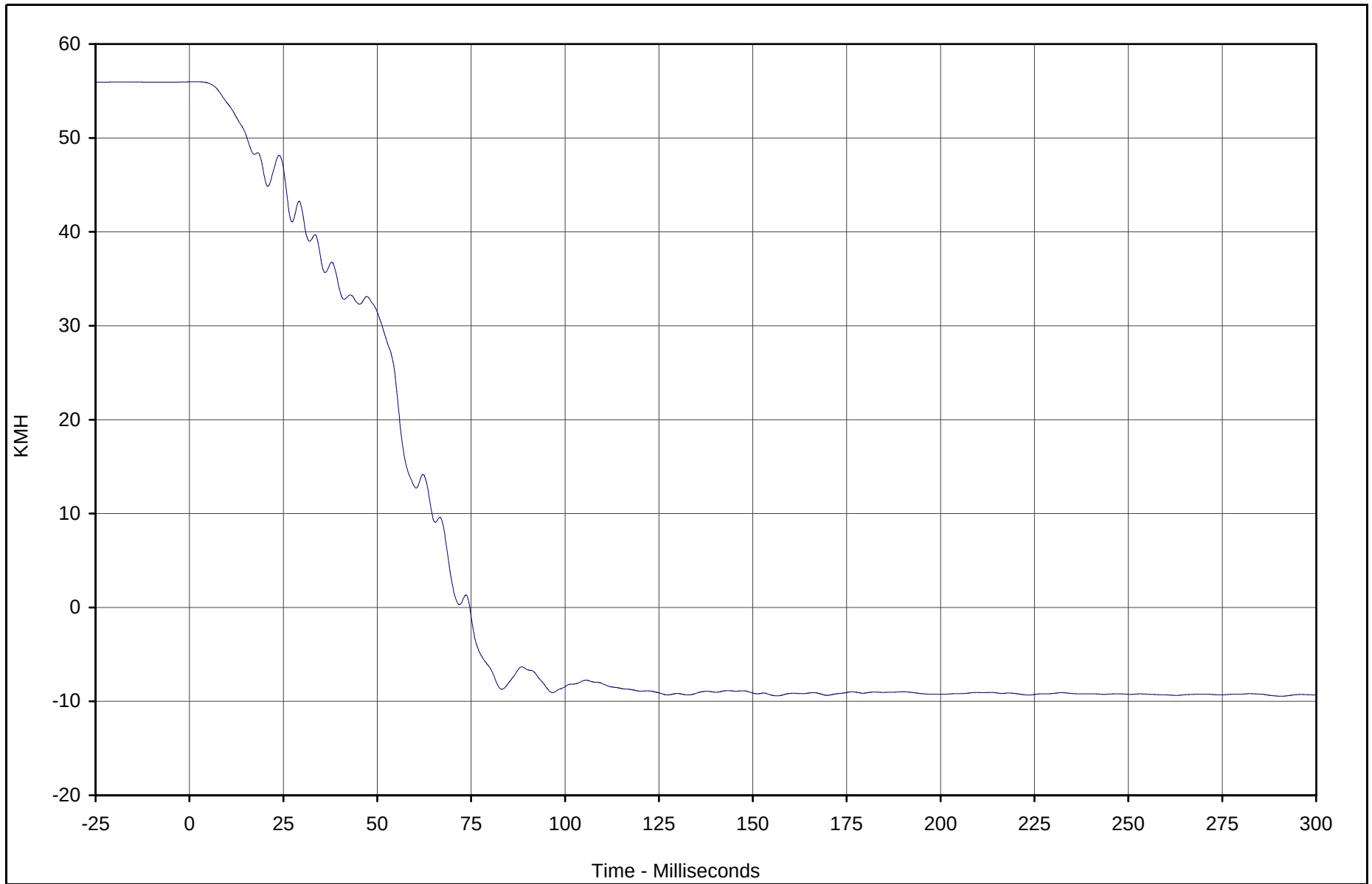
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

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| Curve Description                 | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|-----------------------------------|-------|------|-------|------|------|------|-------|-----------|
| Vehicle Instrument Panel Velocity | 095   | IN1  | KMH   | 56.0 | 1.1  | -9.5 | 290.7 | 180       |



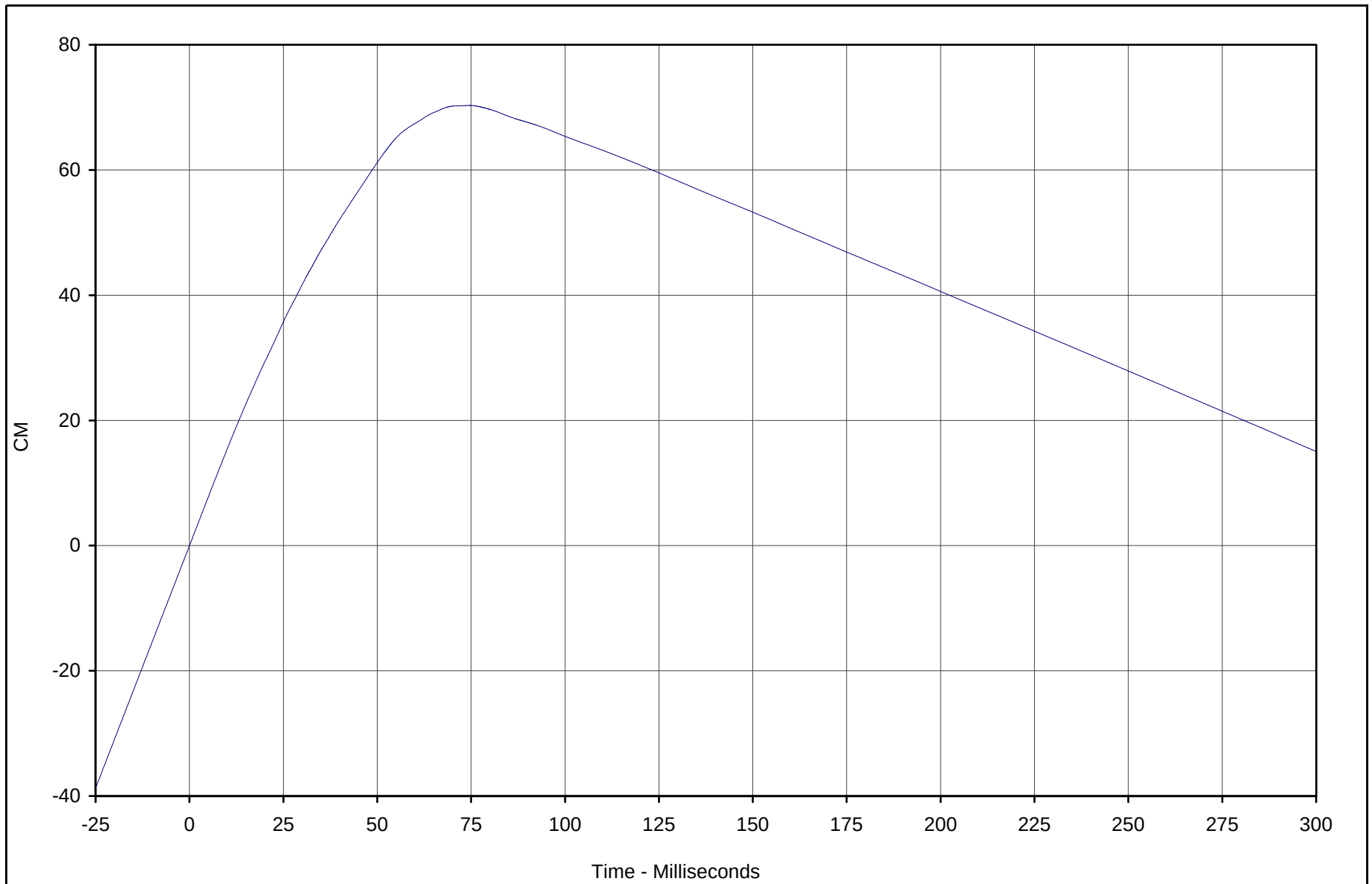
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description                     | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Instrument Panel Displacement | 095   | IN2  | CM    | 70.3 | 74.6 | 0.0 | 0.0  | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

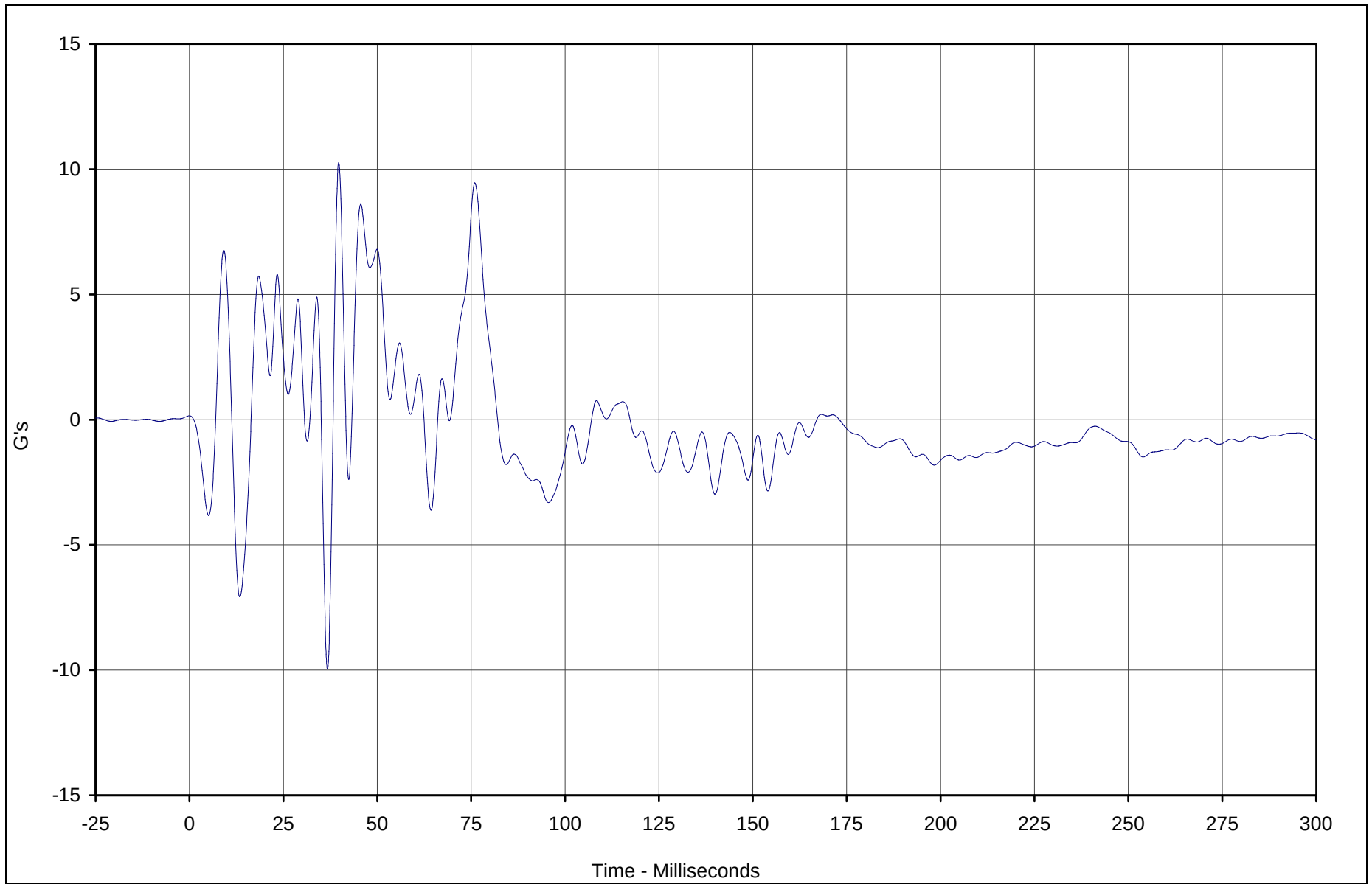
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



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| Curve Description   | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|---------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Left Rear Z | 096   | FIL  | G's   | 10.3 | 39.7 | -10.0 | 36.7 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

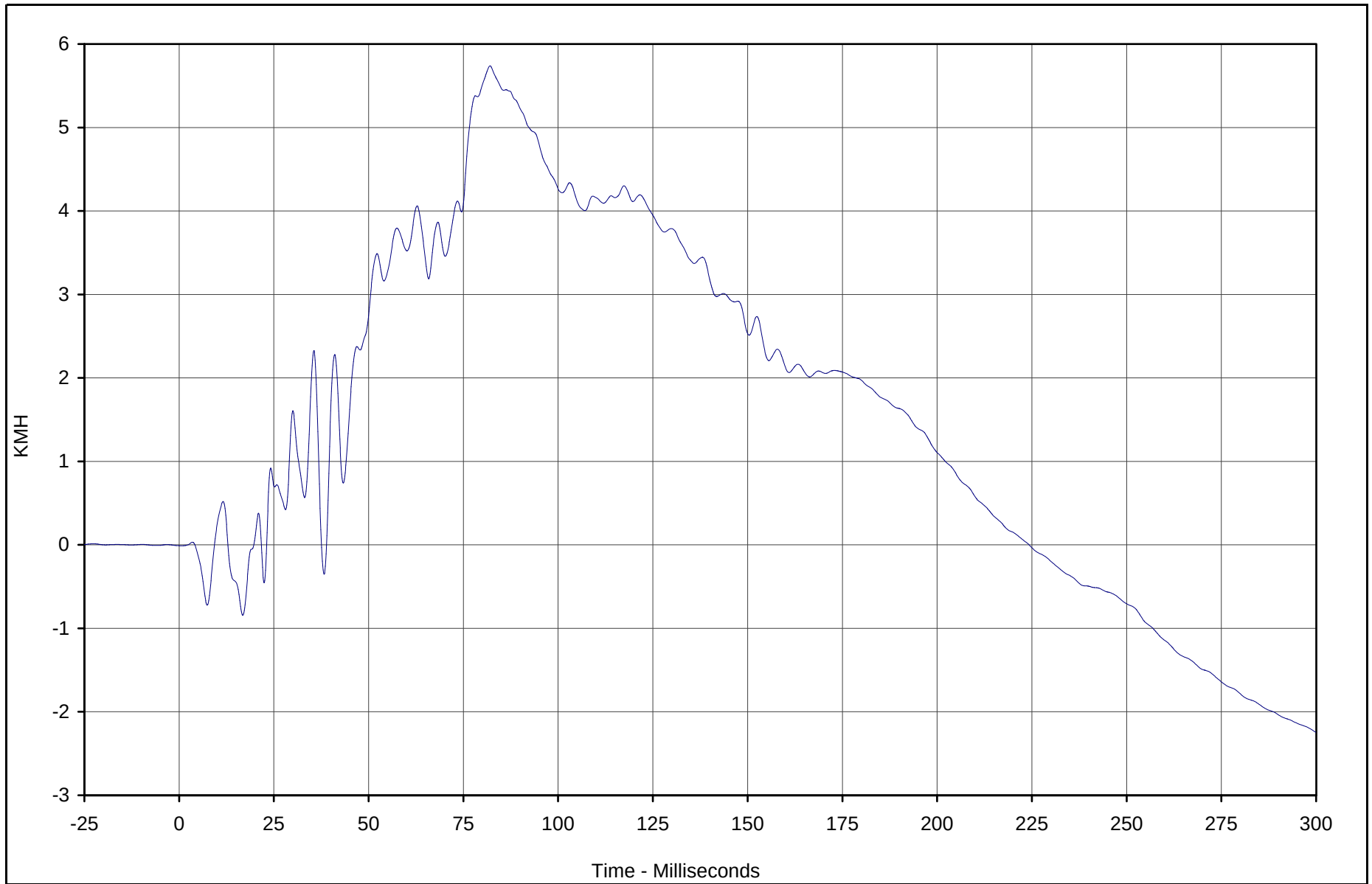
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

B-145



| Curve Description            | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|------------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Vehicle Left Rear Z Velocity | 096   | IN1  | KMH   | 5.7 | 82.0 | -2.2 | 299.9 | 180       |



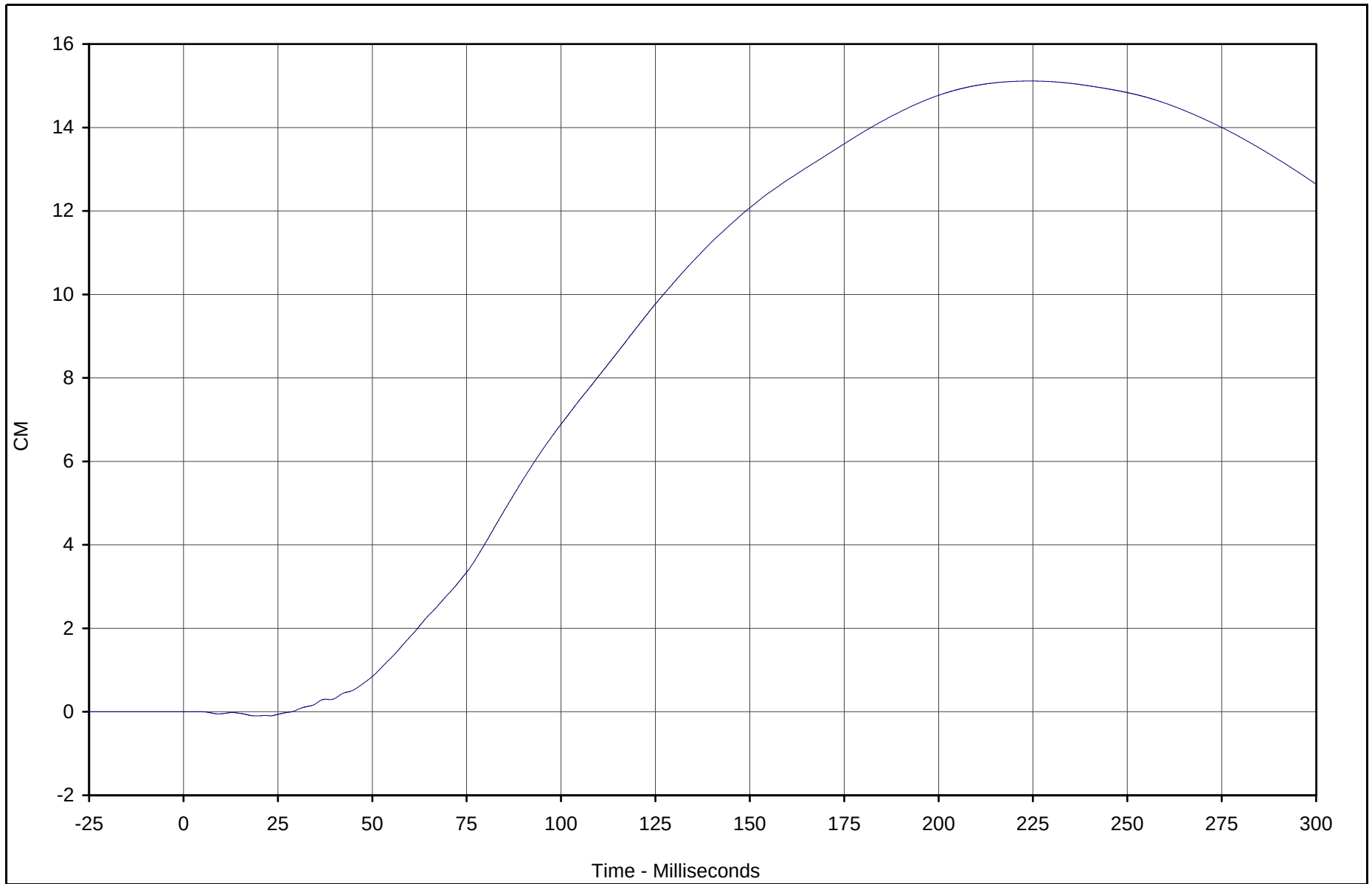
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description          | CURNO | Type | Units | Max  | Time  | Min  | Time | SAE Class |
|----------------------------|-------|------|-------|------|-------|------|------|-----------|
| Vehicle Left Rear Z Displ. | 096   | IN2  | CM    | 15.1 | 224.3 | -0.1 | 19.7 | 180       |

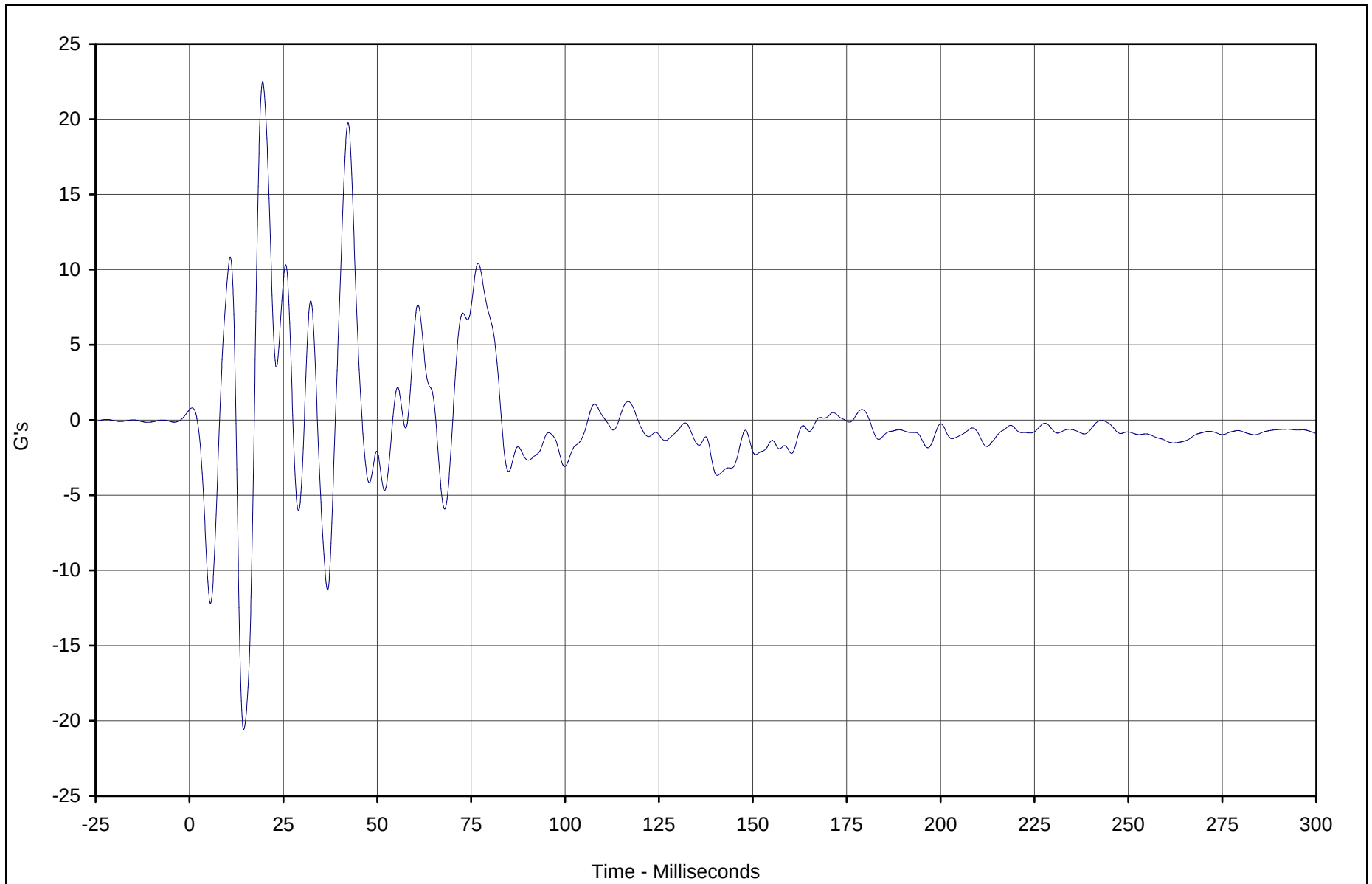


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description    | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Right Rear Z | 097   | FIL  | G's   | 22.5 | 19.5 | -20.6 | 14.4 | 60        |

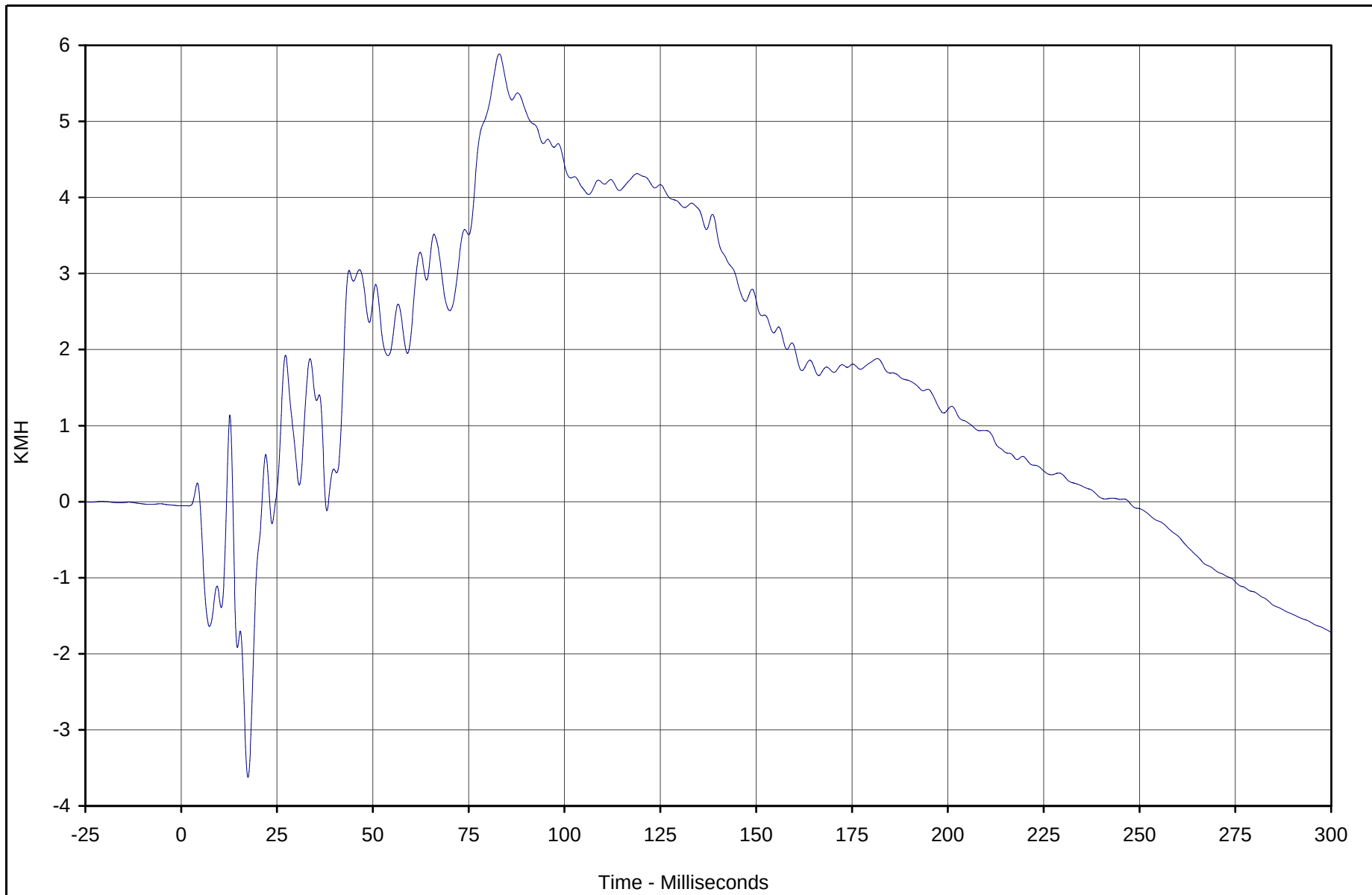


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description             | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-------------------------------|-------|------|-------|-----|------|------|------|-----------|
| Vehicle Right Rear Z Velocity | 097   | IN1  | KMH   | 5.9 | 83.0 | -3.6 | 17.4 | 180       |

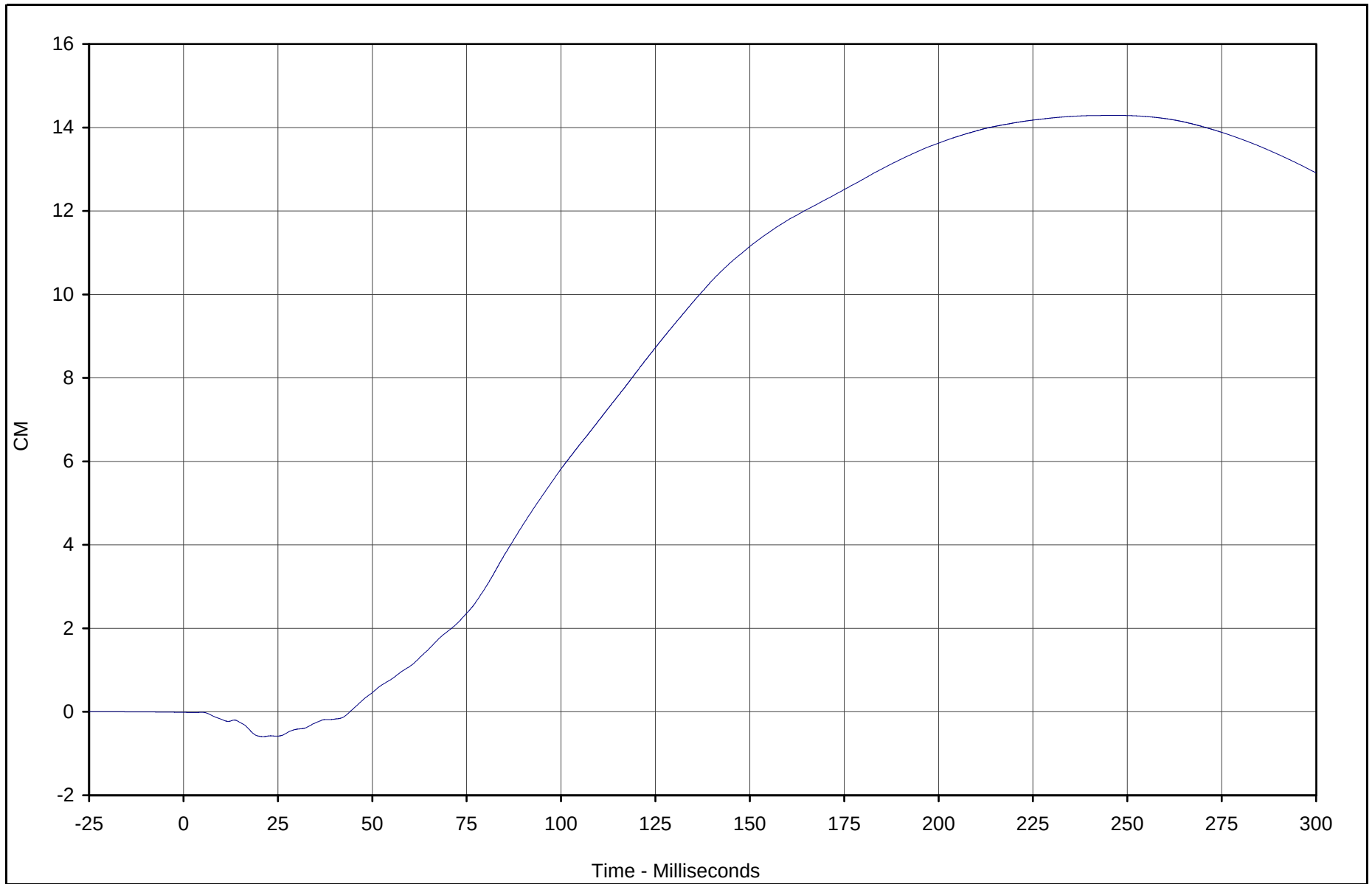


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description           | CURNO | Type | Units | Max  | Time  | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|------|-------|------|------|-----------|
| Vehicle Right Rear Z Displ. | 097   | IN2  | CM    | 14.3 | 247.2 | -0.6 | 21.1 | 180       |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

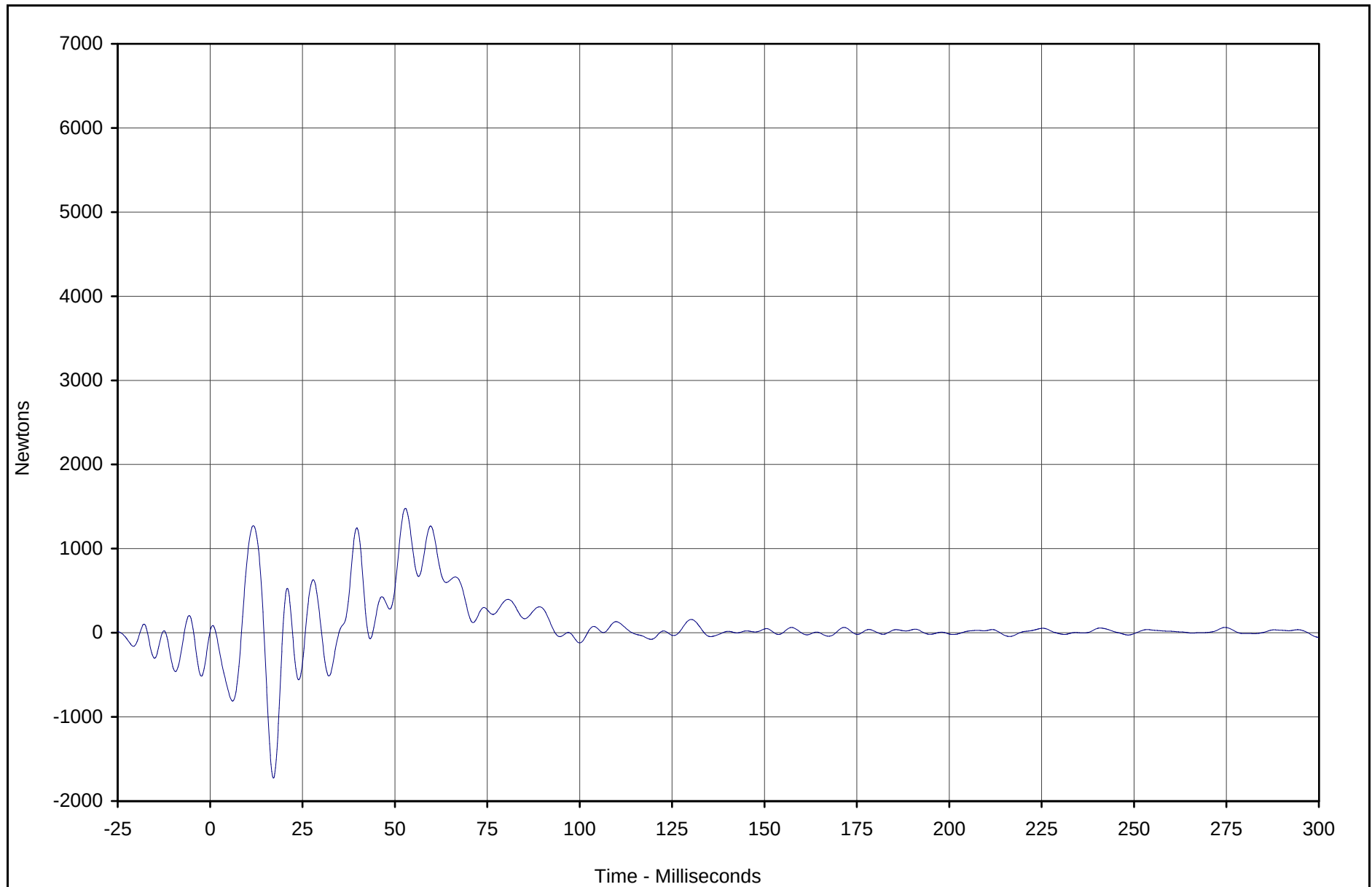
NHTSA No.: M35105



## **APPENDIX C**

### **LOAD CELL BARRIER DATA PLOTS**

C-1



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A2  | 099   | FIL  | Newtons | 1479.0 | 52.8 | -1726.7 | 17.1 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

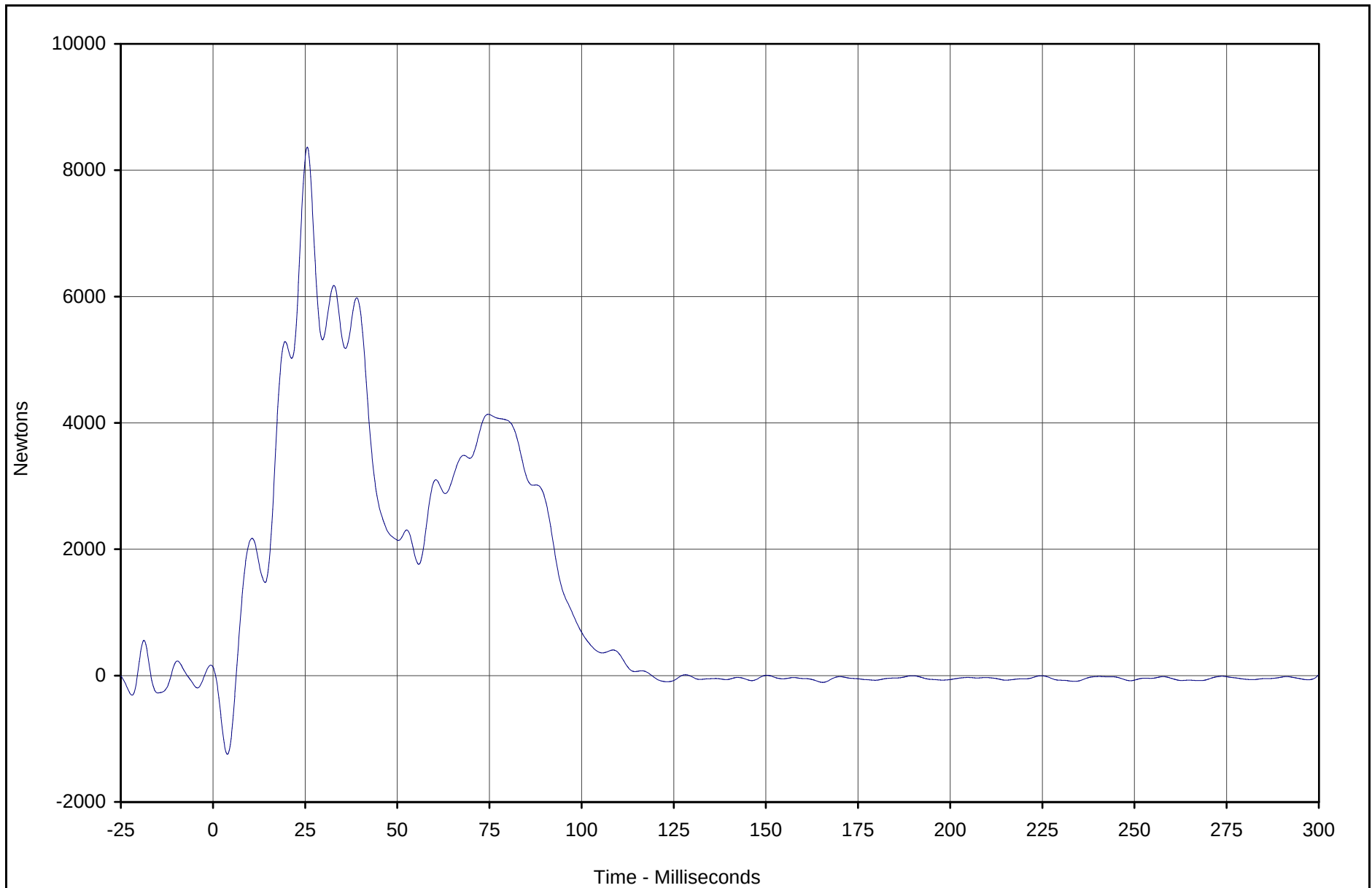
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-2



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A3  | 100   | FIL  | Newtons | 8363.6 | 25.6 | -1245.7 | 3.9  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

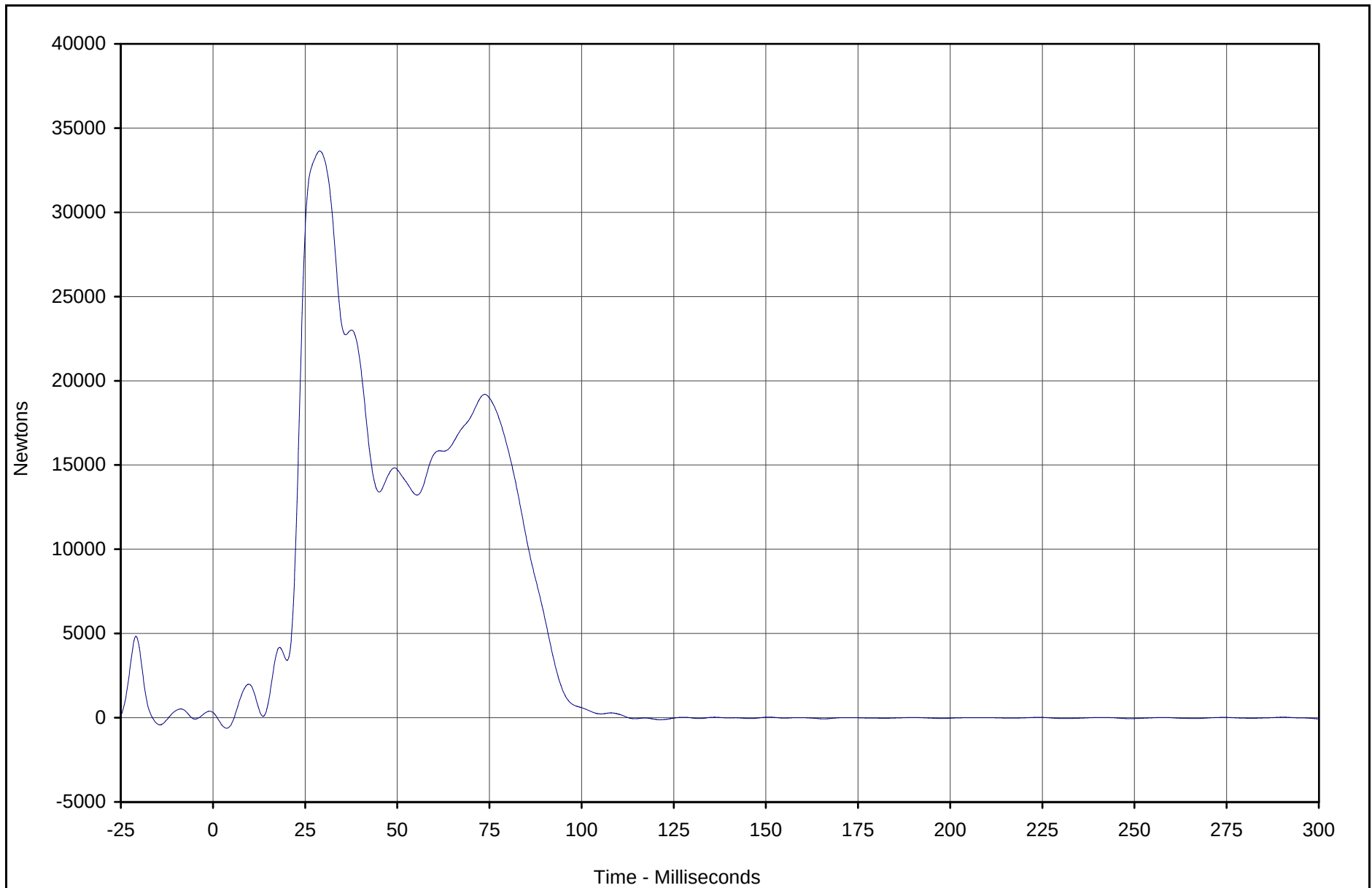
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-3



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force A4  | 101   | FIL  | Newtons | 33642.6 | 29.0 | -624.1 | 3.7  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

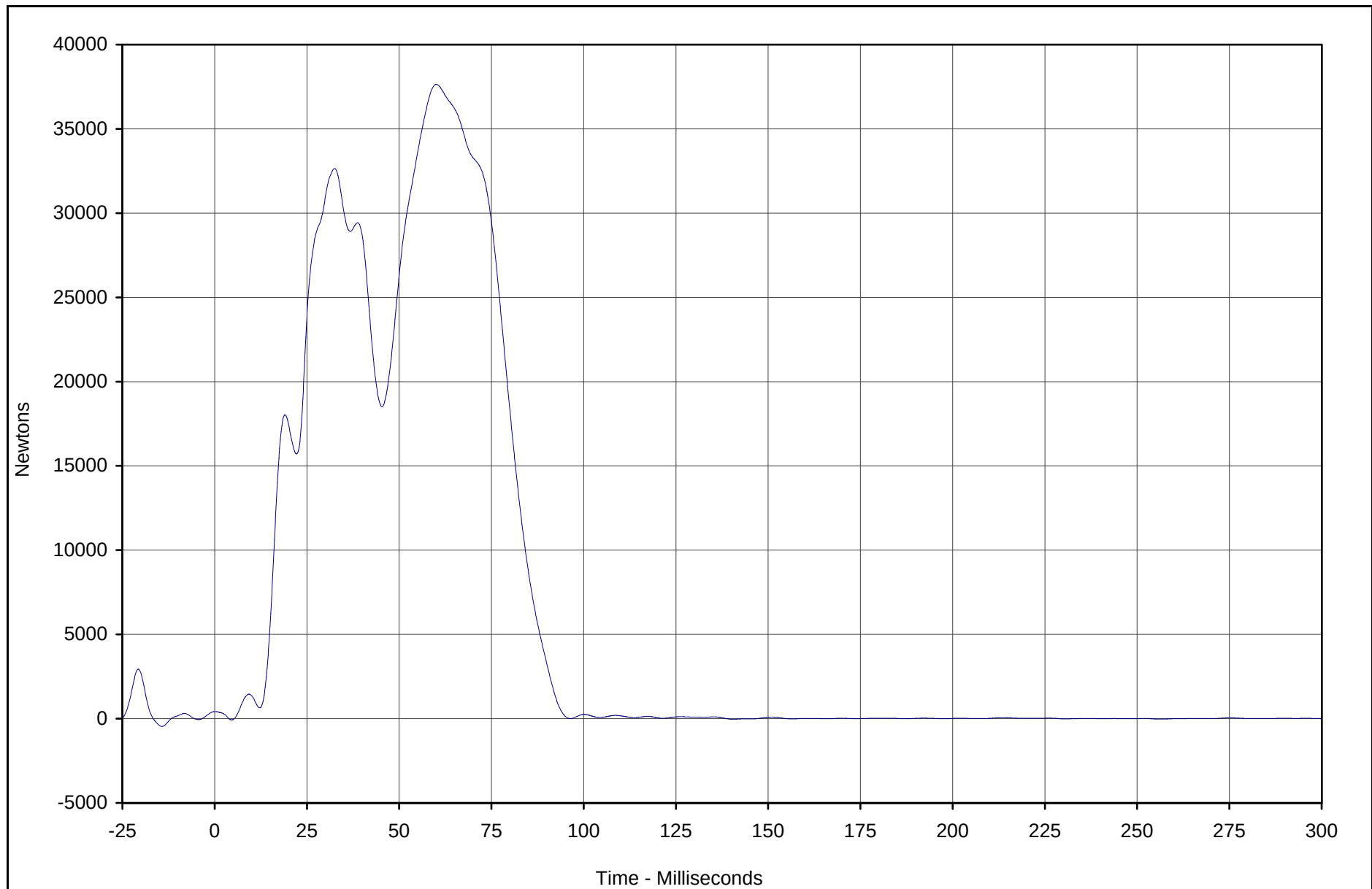
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-4



| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|------|-----------|
| Barrier Force A5  | 102   | FIL  | Newtons | 37639.1 | 60.1 | -74.7 | 4.6  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

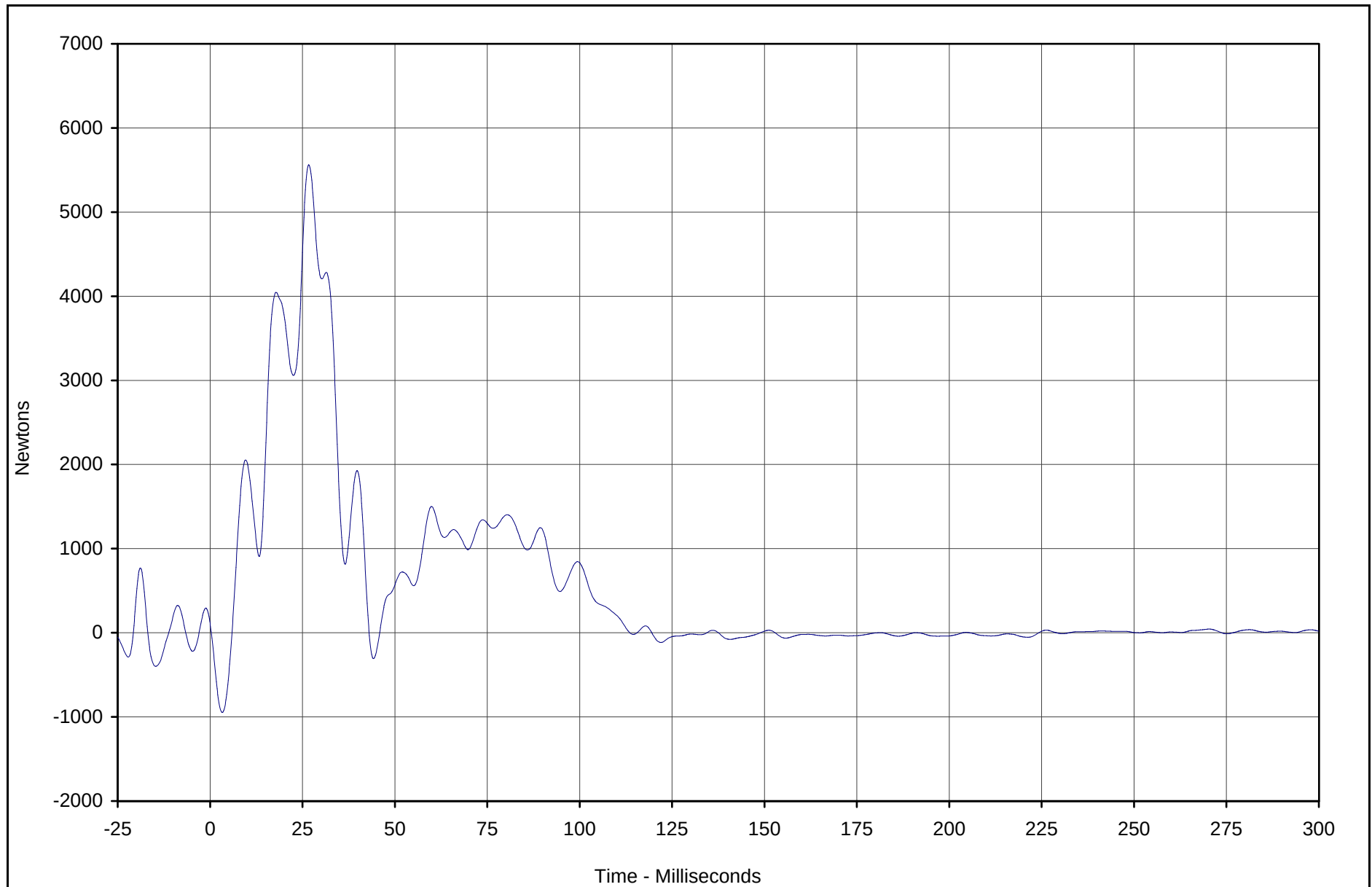
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-5



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force A6  | 103   | FIL  | Newtons | 5563.3 | 26.7 | -947.6 | 3.3  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

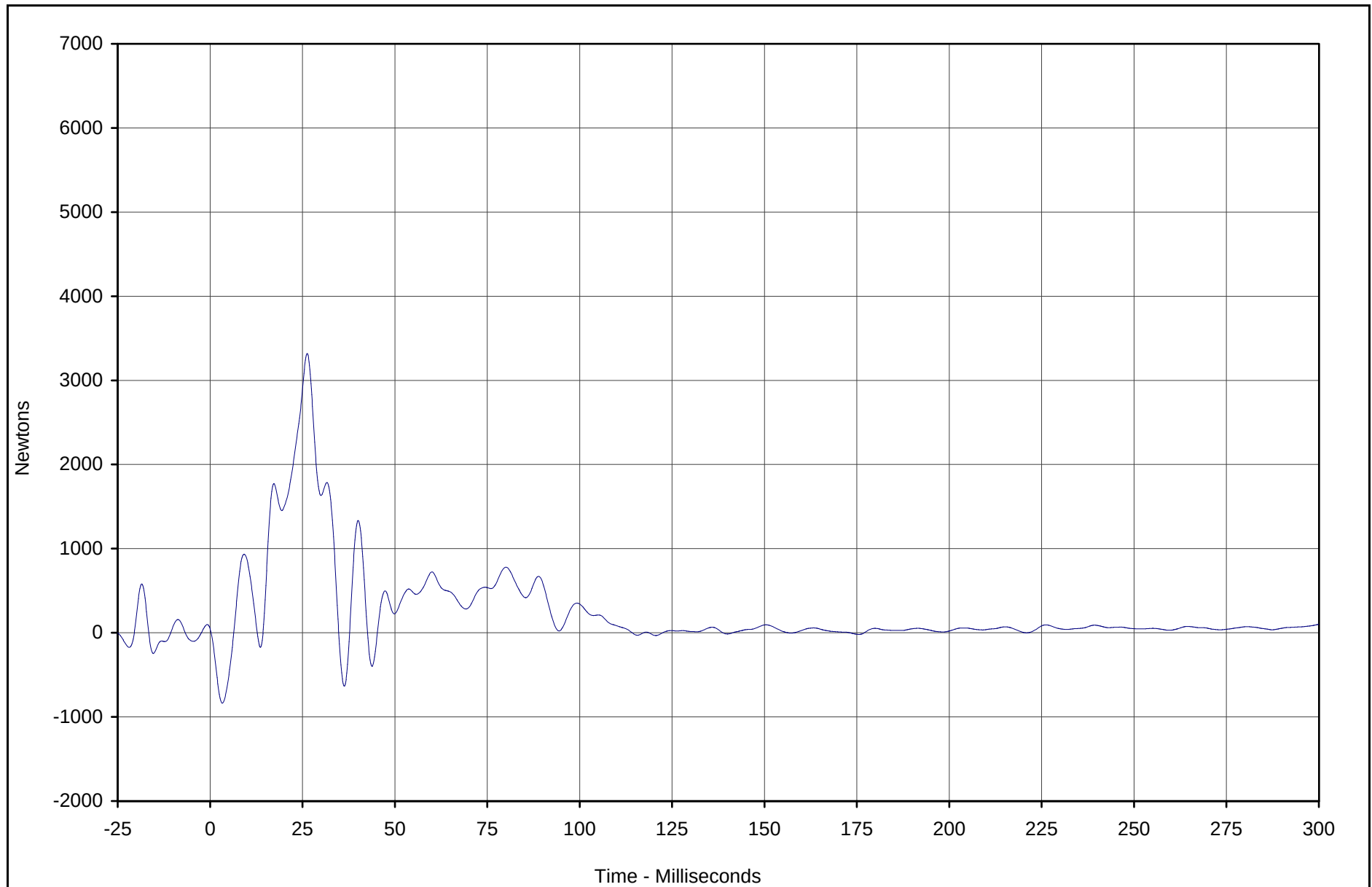
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



C-6



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force A7  | 104   | FIL  | Newtons | 3318.9 | 26.3 | -837.0 | 3.3  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

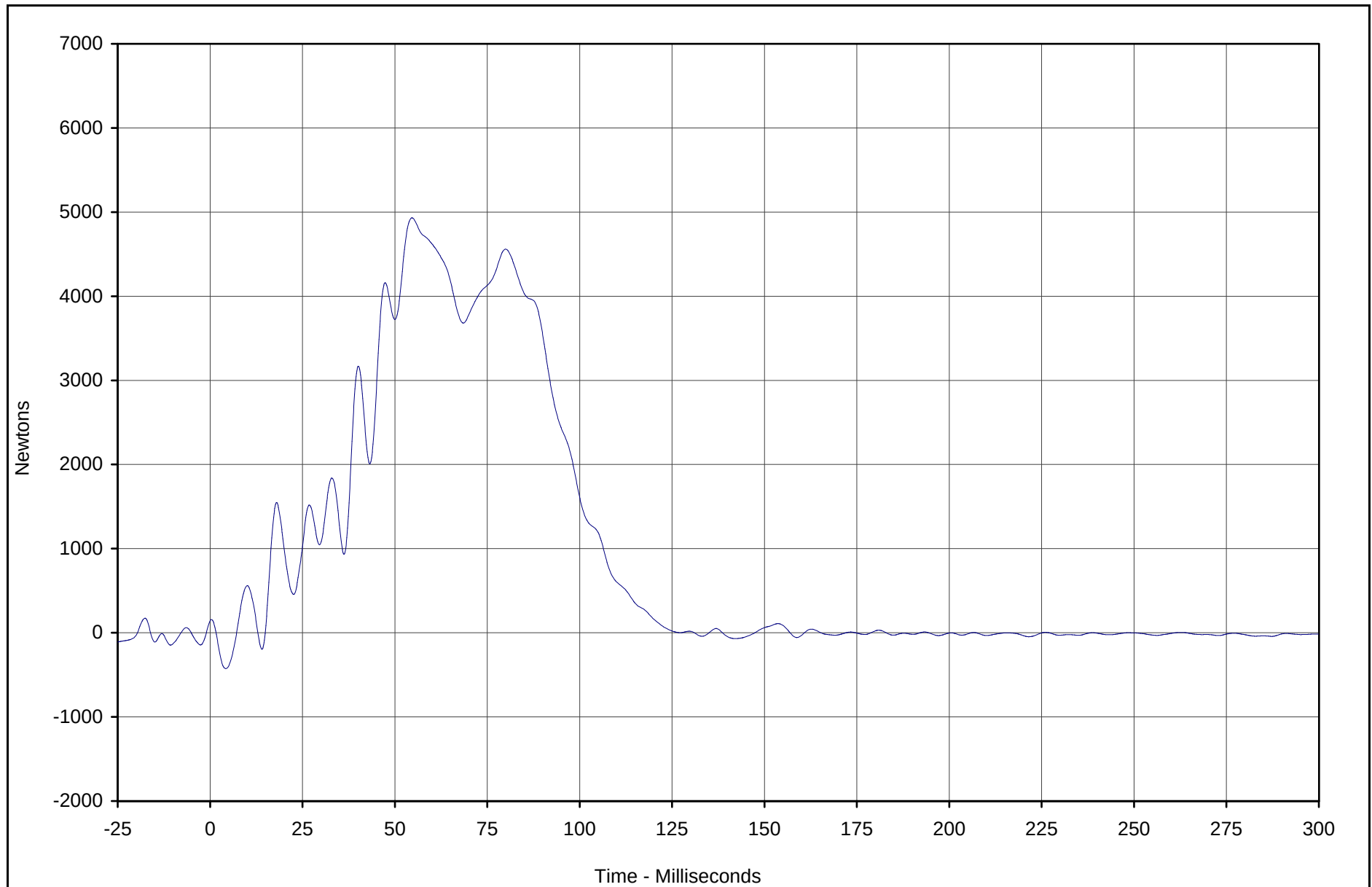
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-7



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force A8  | 105   | FIL  | Newtons | 4931.5 | 54.6 | -426.1 | 4.2  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

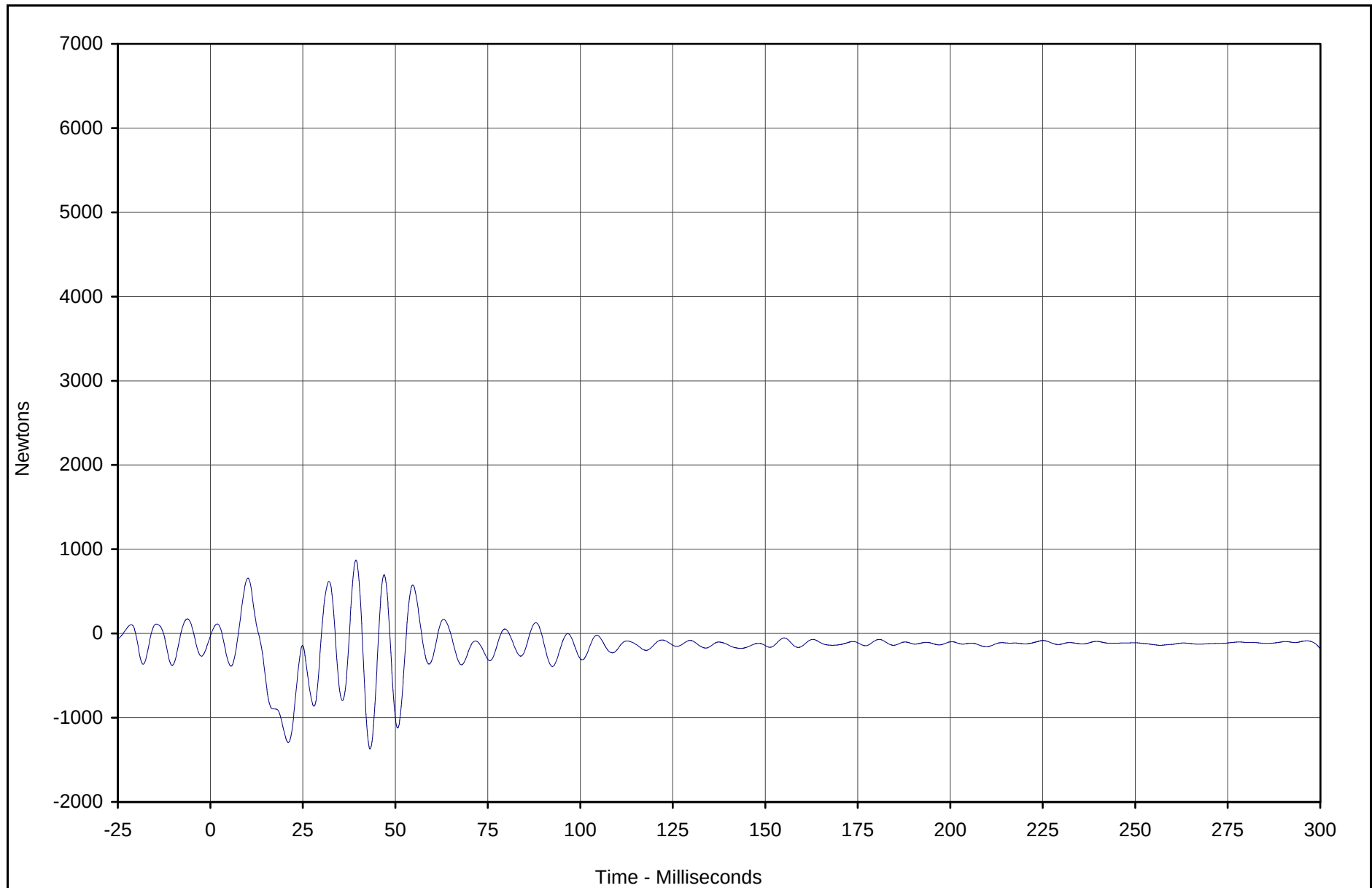
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-8



| Curve Description | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|-------|------|---------|------|-----------|
| Barrier Force A9  | 106   | FIL  | Newtons | 869.2 | 39.4 | -1370.7 | 43.2 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

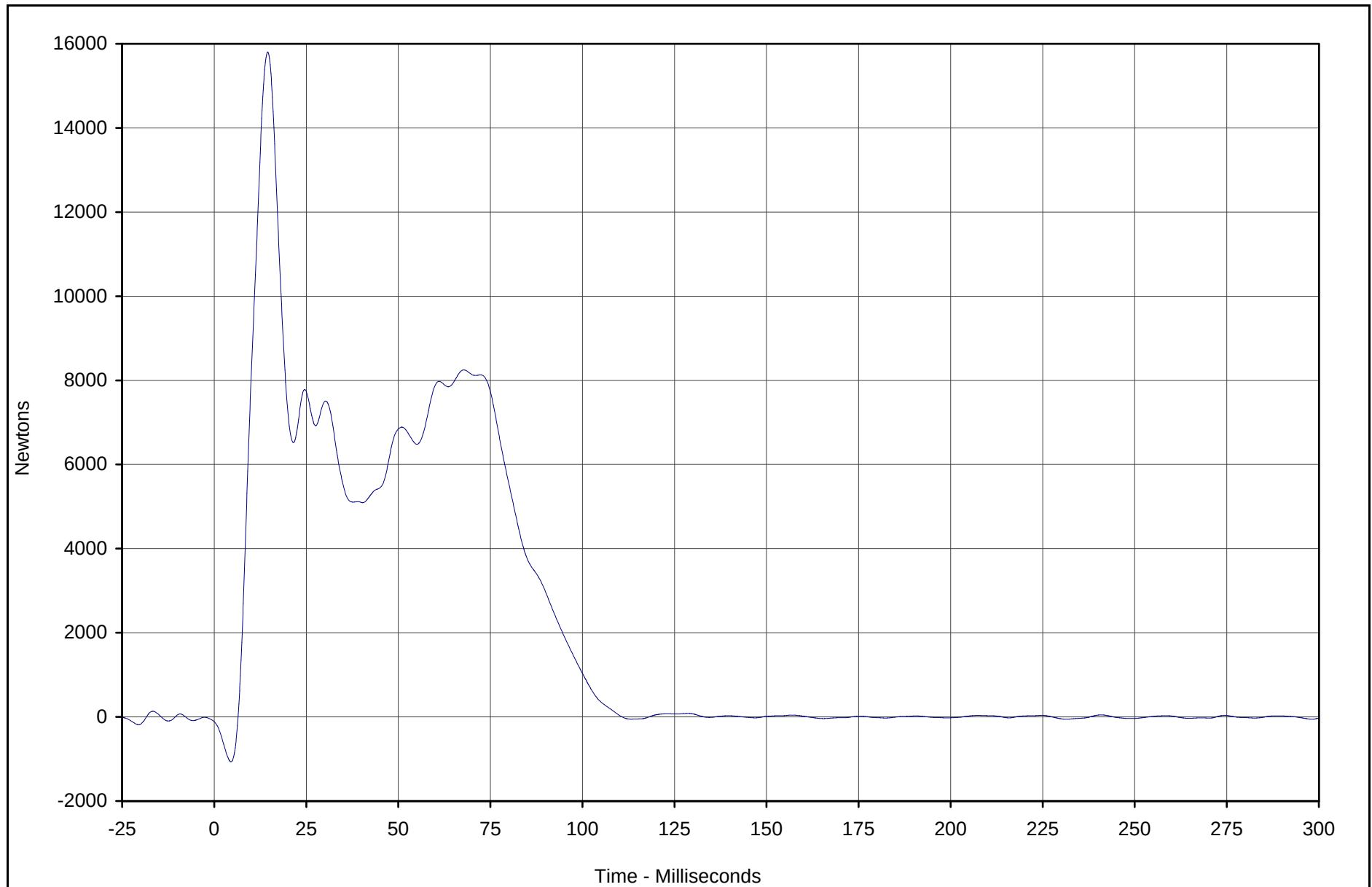
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-9



| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force B2  | 108   | FIL  | Newtons | 15805.8 | 14.5 | -1066.8 | 4.6  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

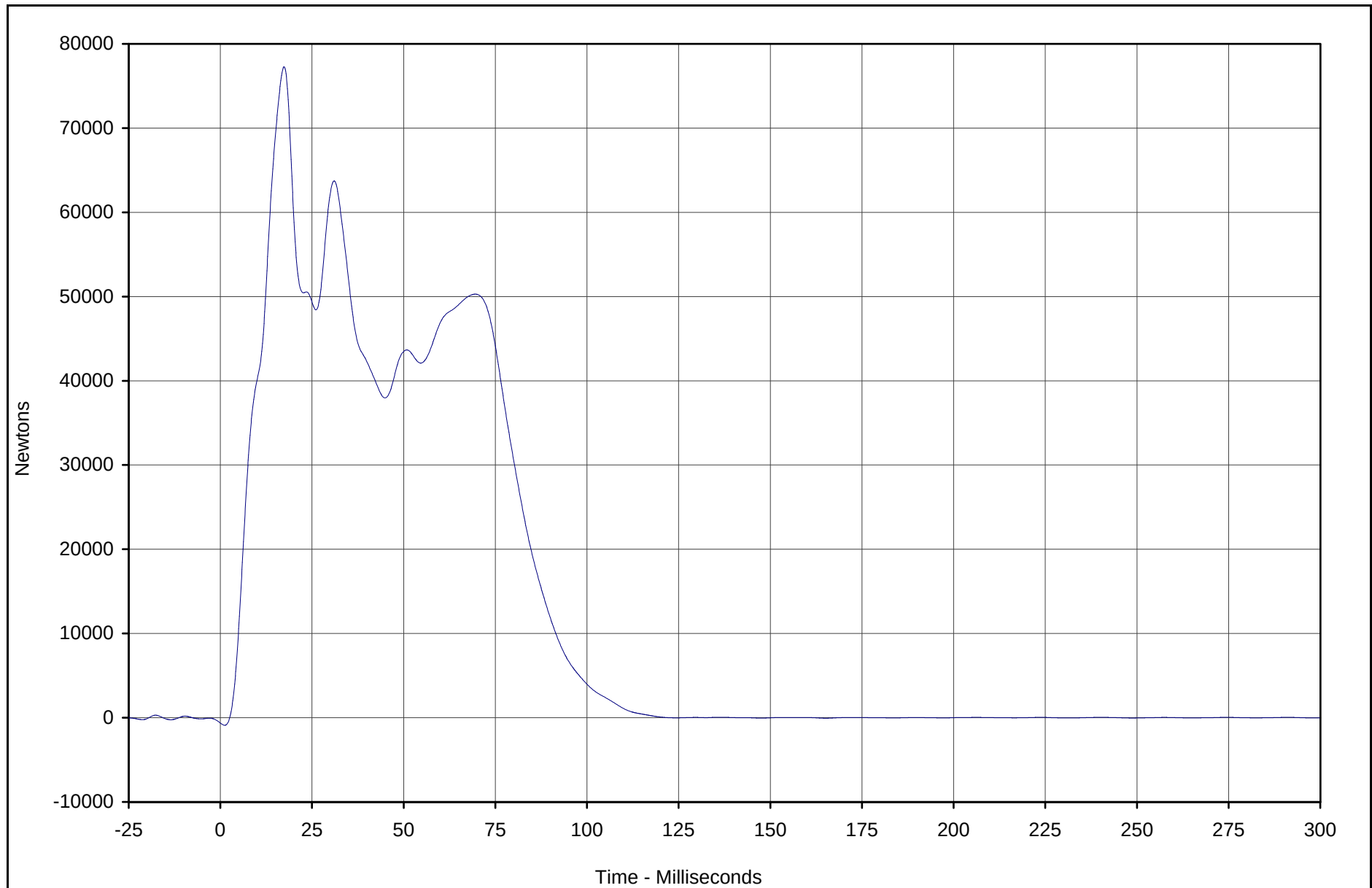
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-10



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force B3  | 109   | FIL  | Newtons | 77278.8 | 17.4 | -899.8 | 1.2  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

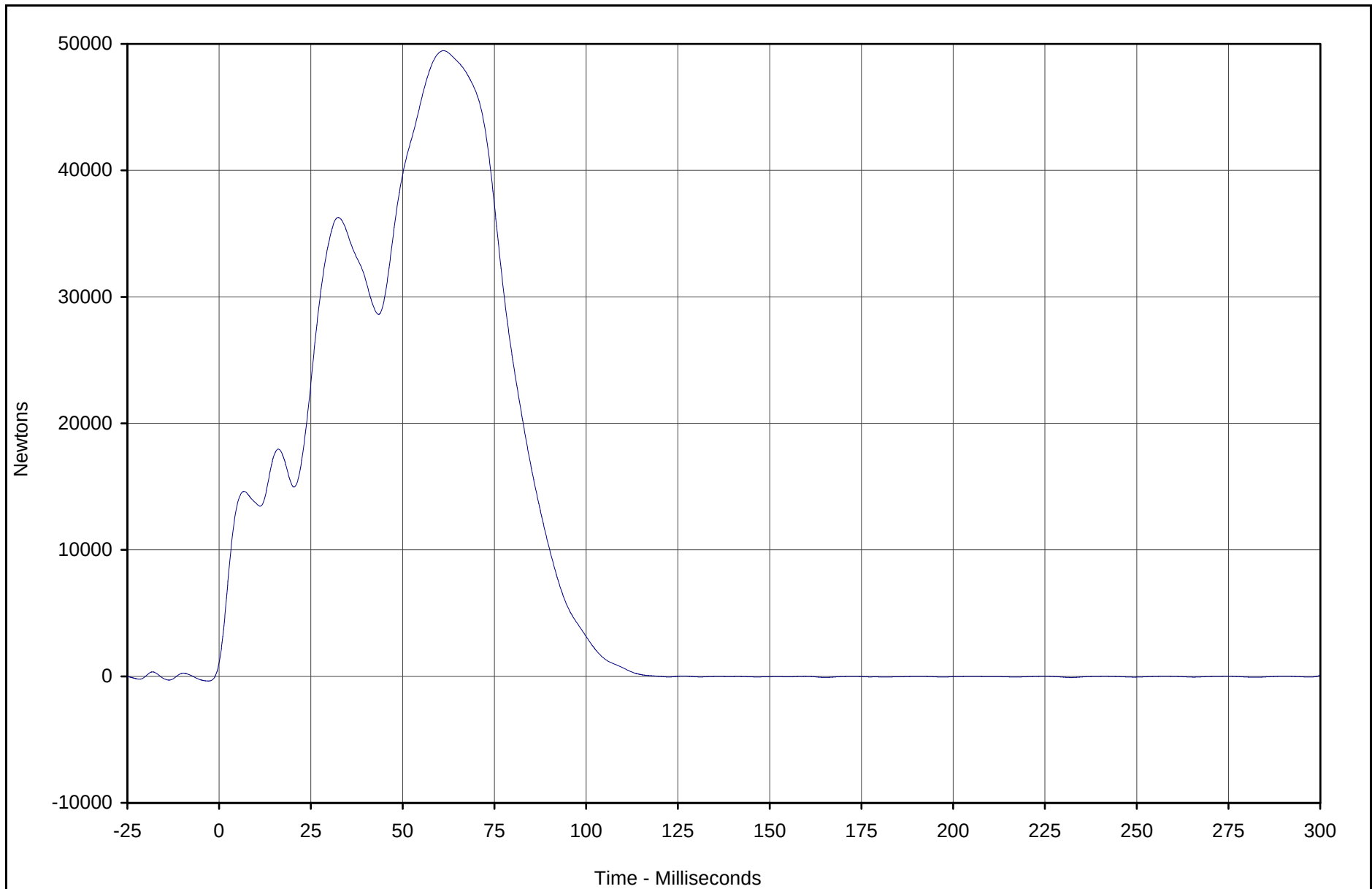
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-11



| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|-------|-----------|
| Barrier Force B4  | 110   | FIL  | Newtons | 49461.6 | 61.2 | -91.4 | 232.1 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

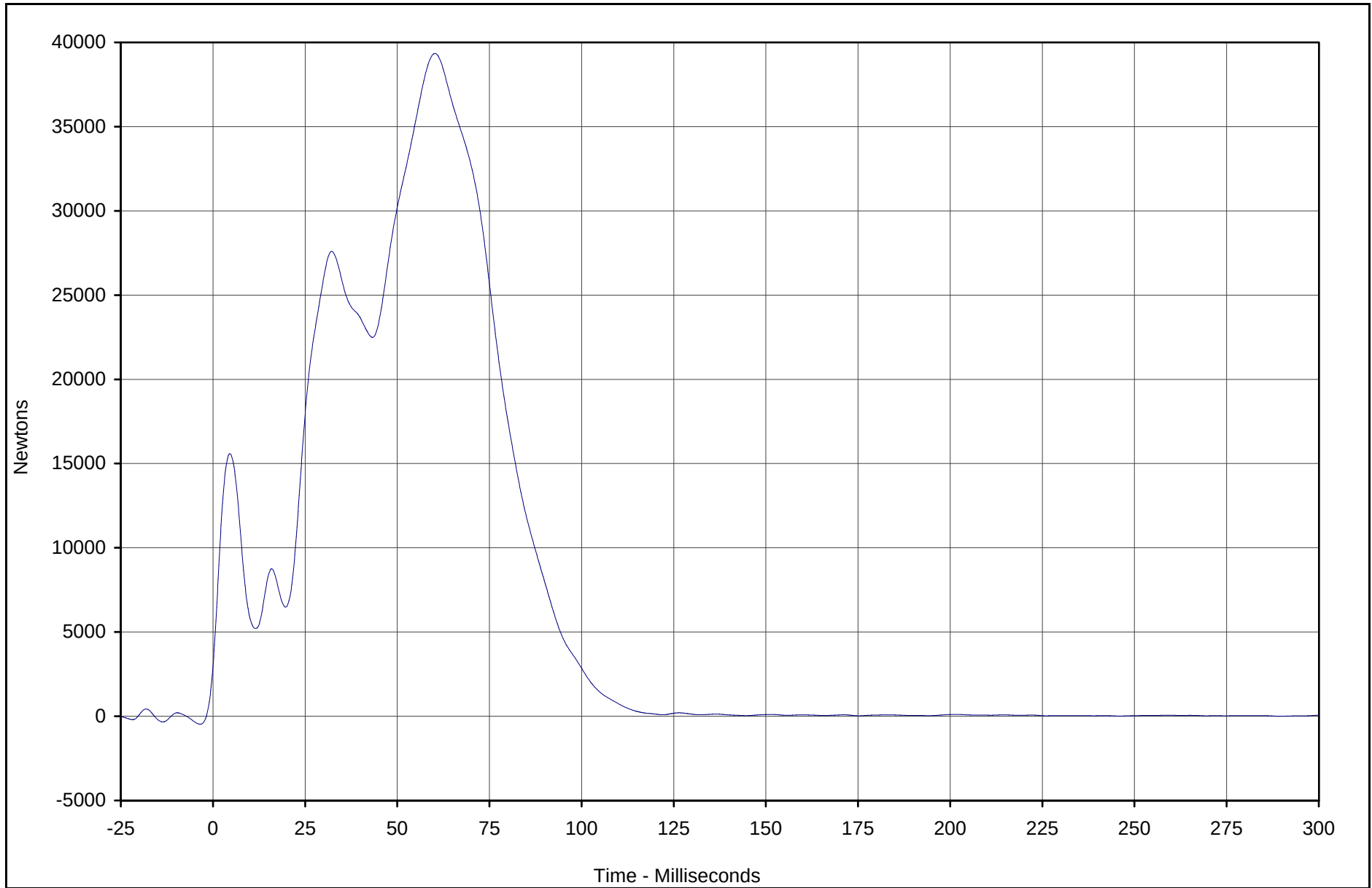
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



C-12



| Curve Description | CURNO | Type | Units   | Max     | Time | Min | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-----|-------|-----------|
| Barrier Force B5  | 111   | FIL  | Newtons | 39343.5 | 60.2 | 1.8 | 289.3 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

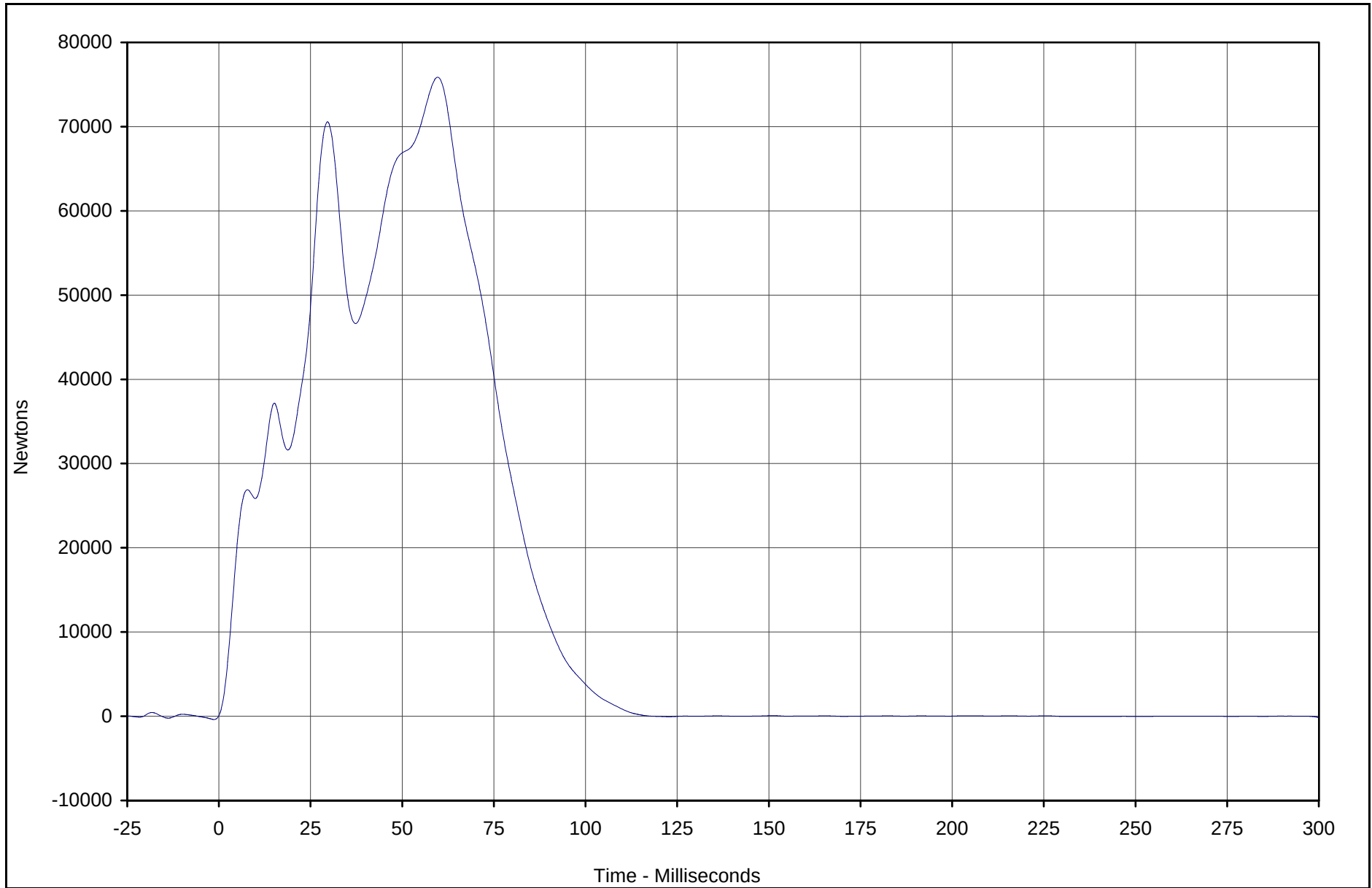
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-13



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force B6  | 112   | FIL  | Newtons | 75867.7 | 59.7 | -144.3 | 299.9 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

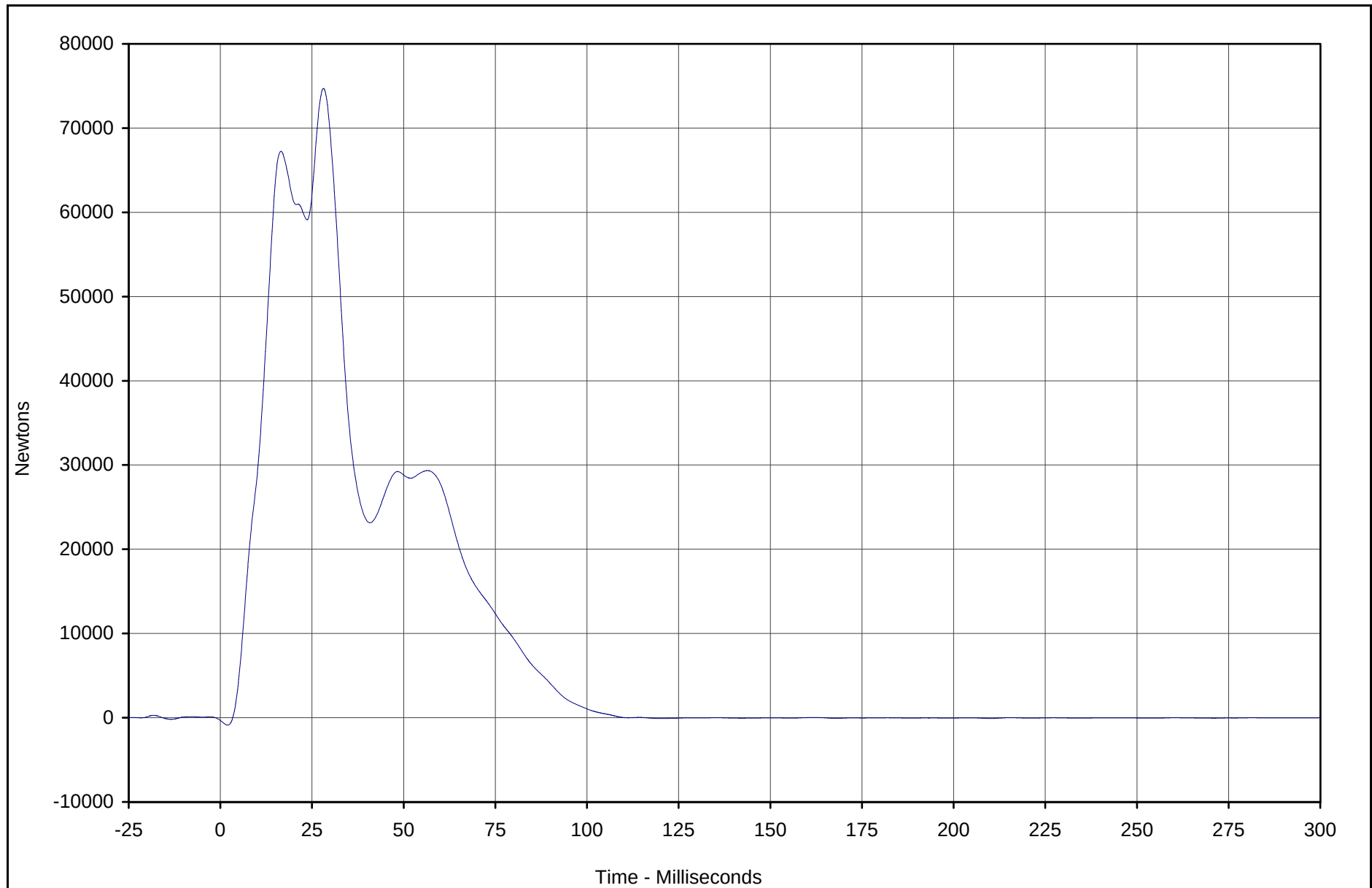
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-14



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force B7  | 113   | FIL  | Newtons | 74705.3 | 28.1 | -881.5 | 2.0  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

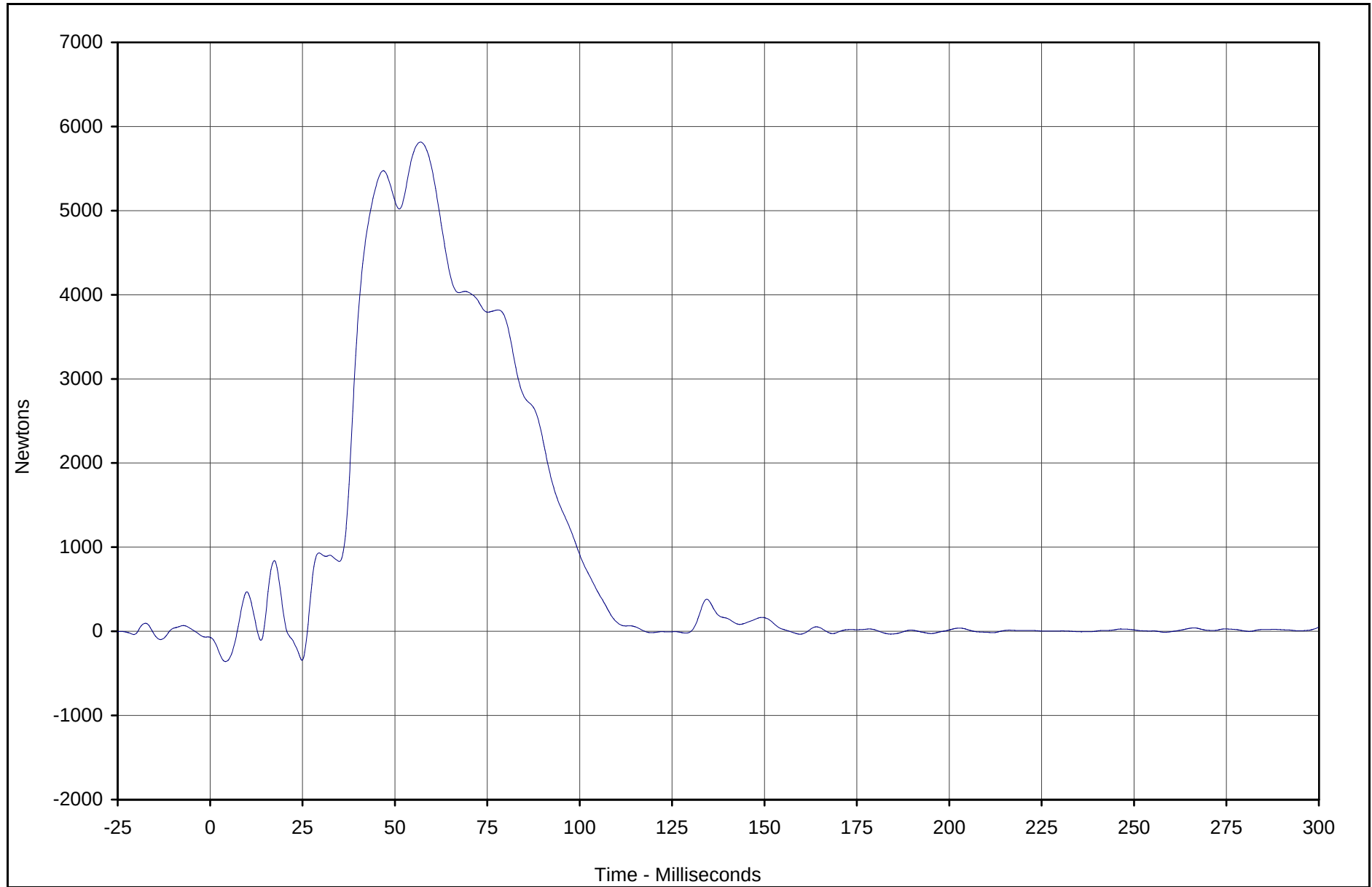
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-15



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force B8  | 114   | FIL  | Newtons | 5814.6 | 56.9 | -359.0 | 4.2  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

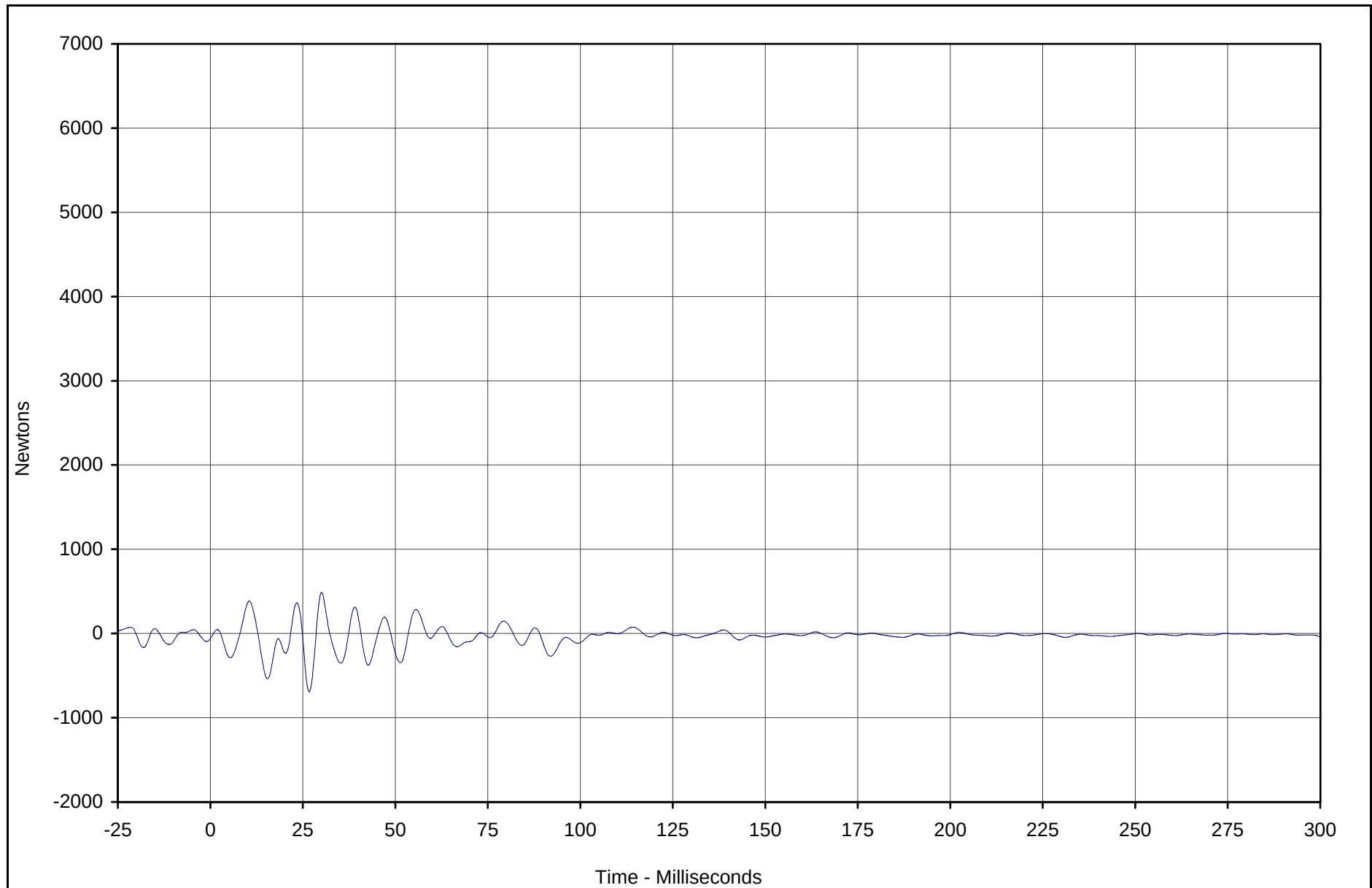
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-16



| Curve Description | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|-------|------|--------|------|-----------|
| Barrier Force B9  | 115   | FIL  | Newtons | 485.9 | 30.1 | -692.4 | 26.7 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

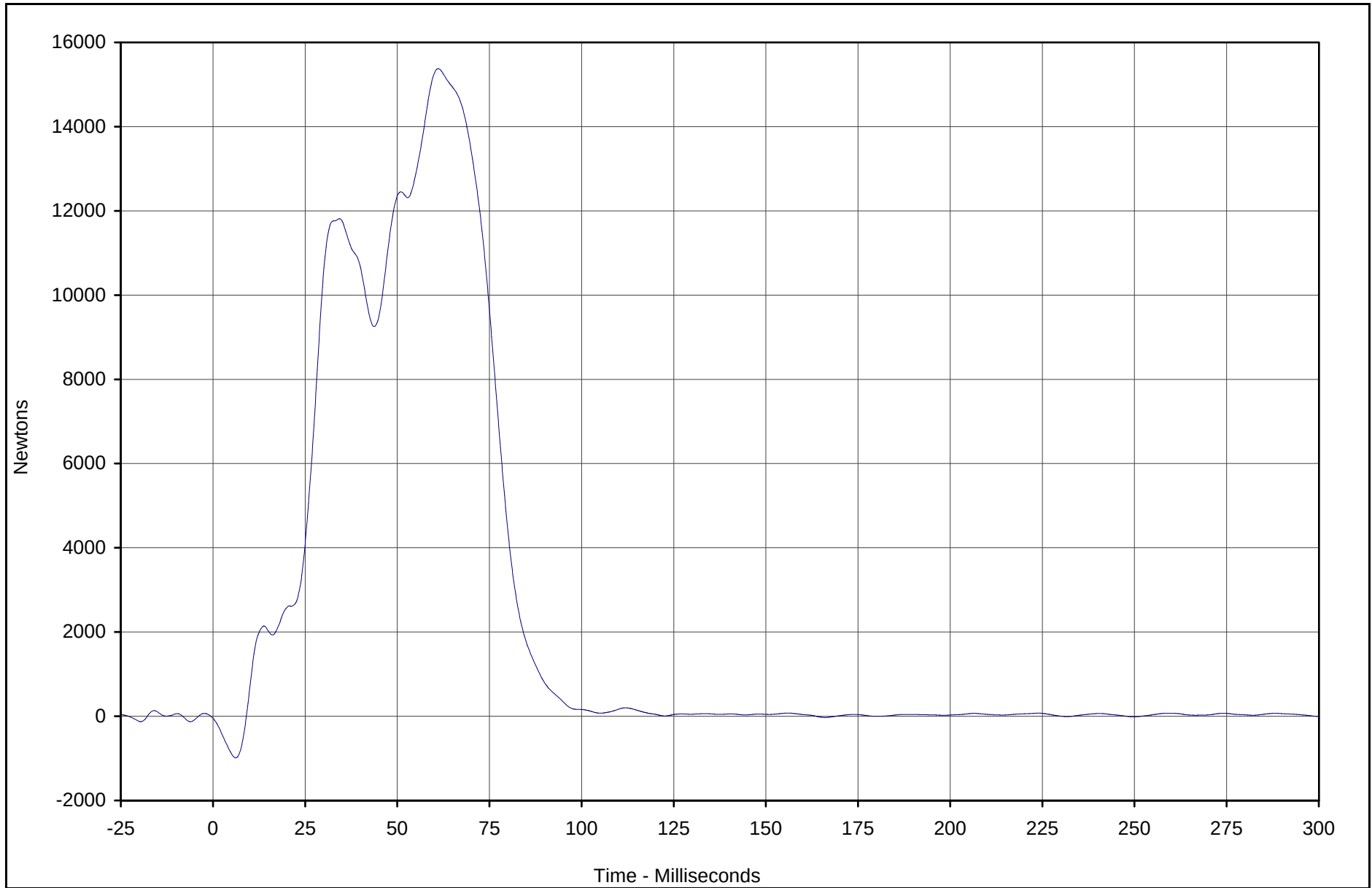
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-17



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force C2  | 117   | FIL  | Newtons | 15377.1 | 61.1 | -988.2 | 6.1  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

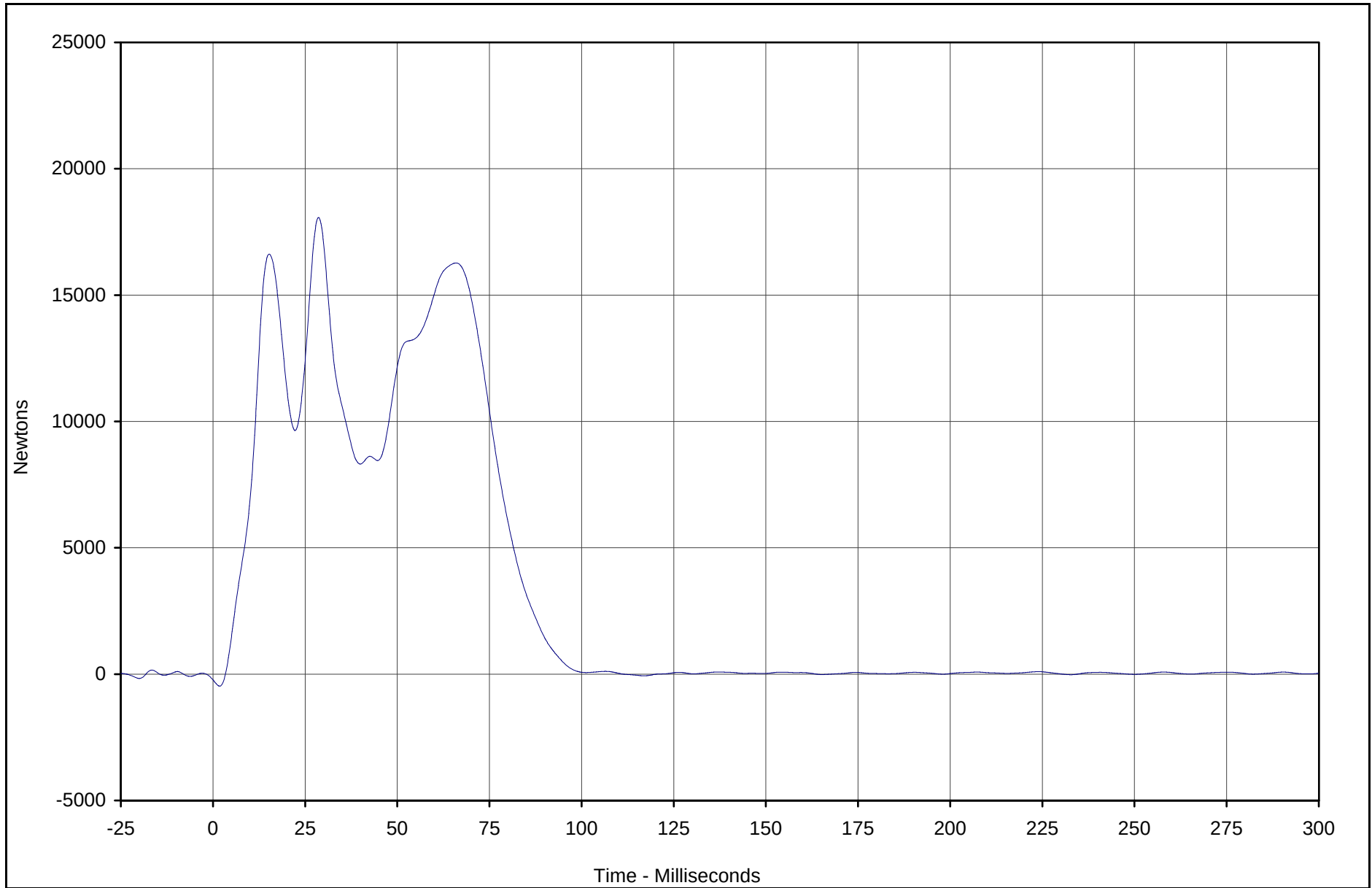
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



C-18



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force C3  | 118   | FIL  | Newtons | 18071.2 | 28.6 | -474.7 | 1.8  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

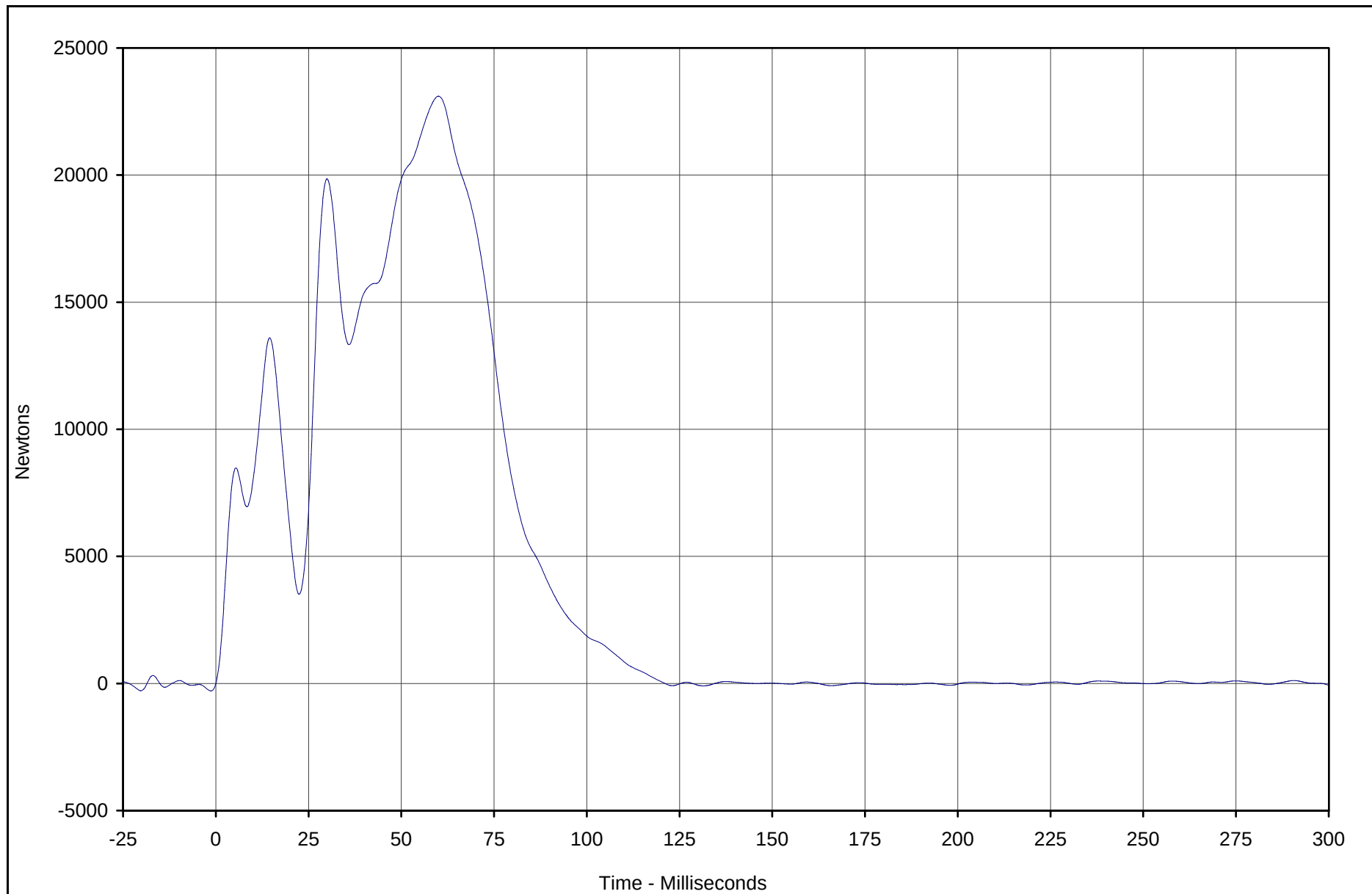
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-19



| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|-------|-----------|
| Barrier Force C4  | 119   | FIL  | Newtons | 23102.2 | 60.0 | -94.3 | 131.4 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

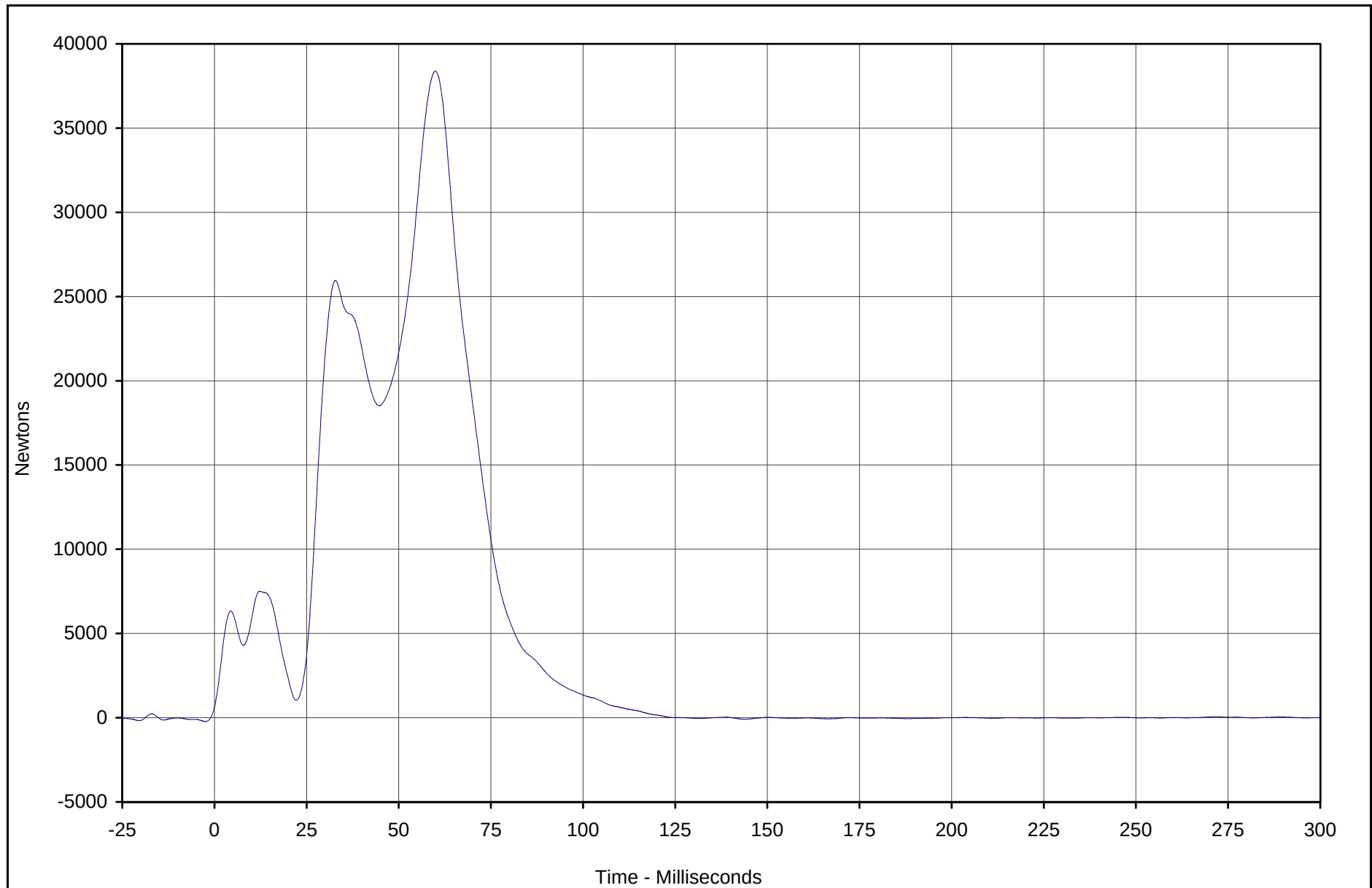
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-20



| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|-------|-----------|
| Barrier Force C5  | 120   | FIL  | Newtons | 38373.1 | 59.9 | -90.4 | 143.8 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

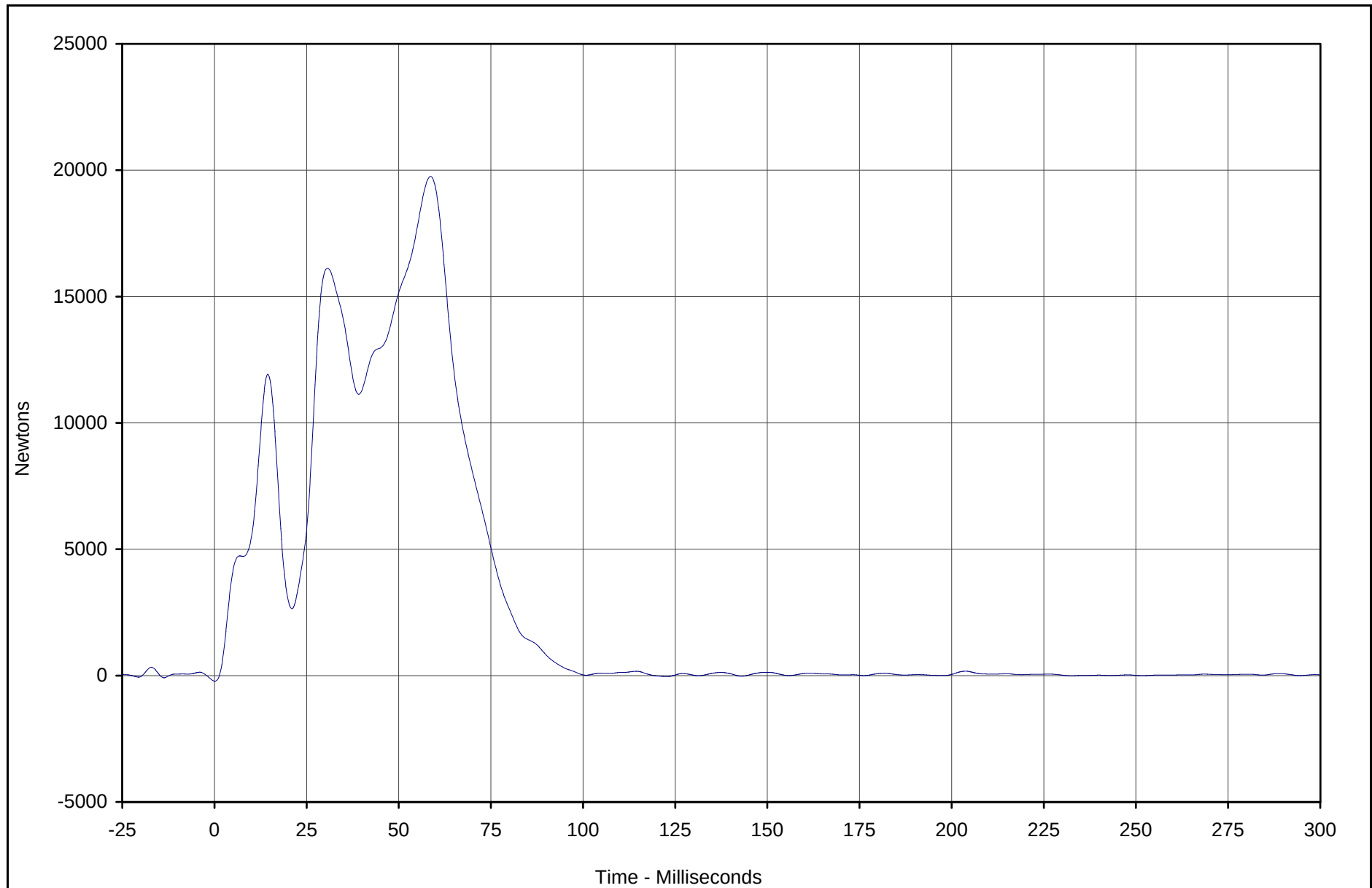
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-21



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force C6  | 121   | FIL  | Newtons | 19755.3 | 58.6 | -222.2 | 0.1  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

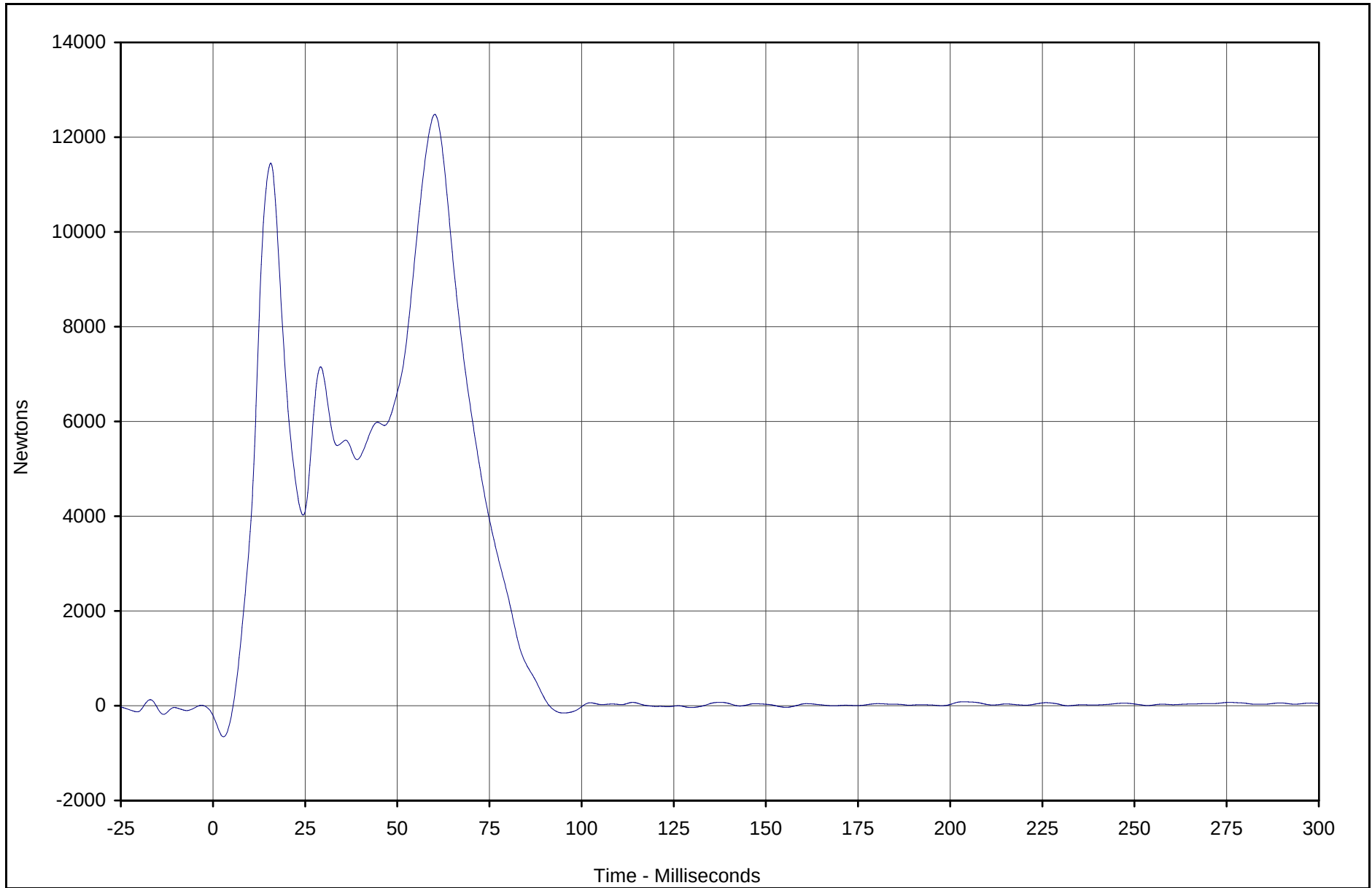
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-22



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force C7  | 122   | FIL  | Newtons | 12482.1 | 60.2 | -656.6 | 2.9  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

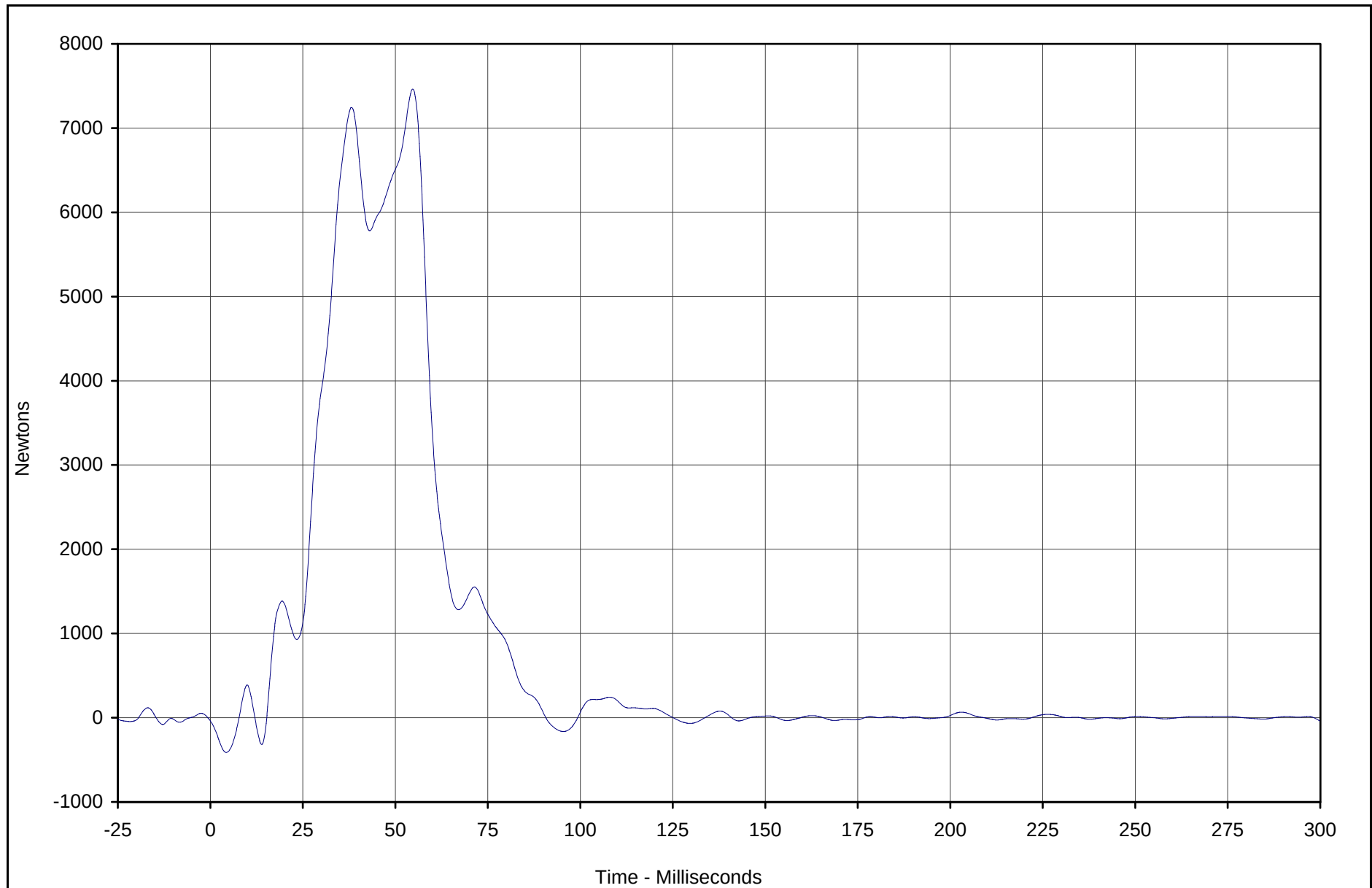
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-23



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force C8  | 123   | FIL  | Newtons | 7463.7 | 54.7 | -413.1 | 4.3  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

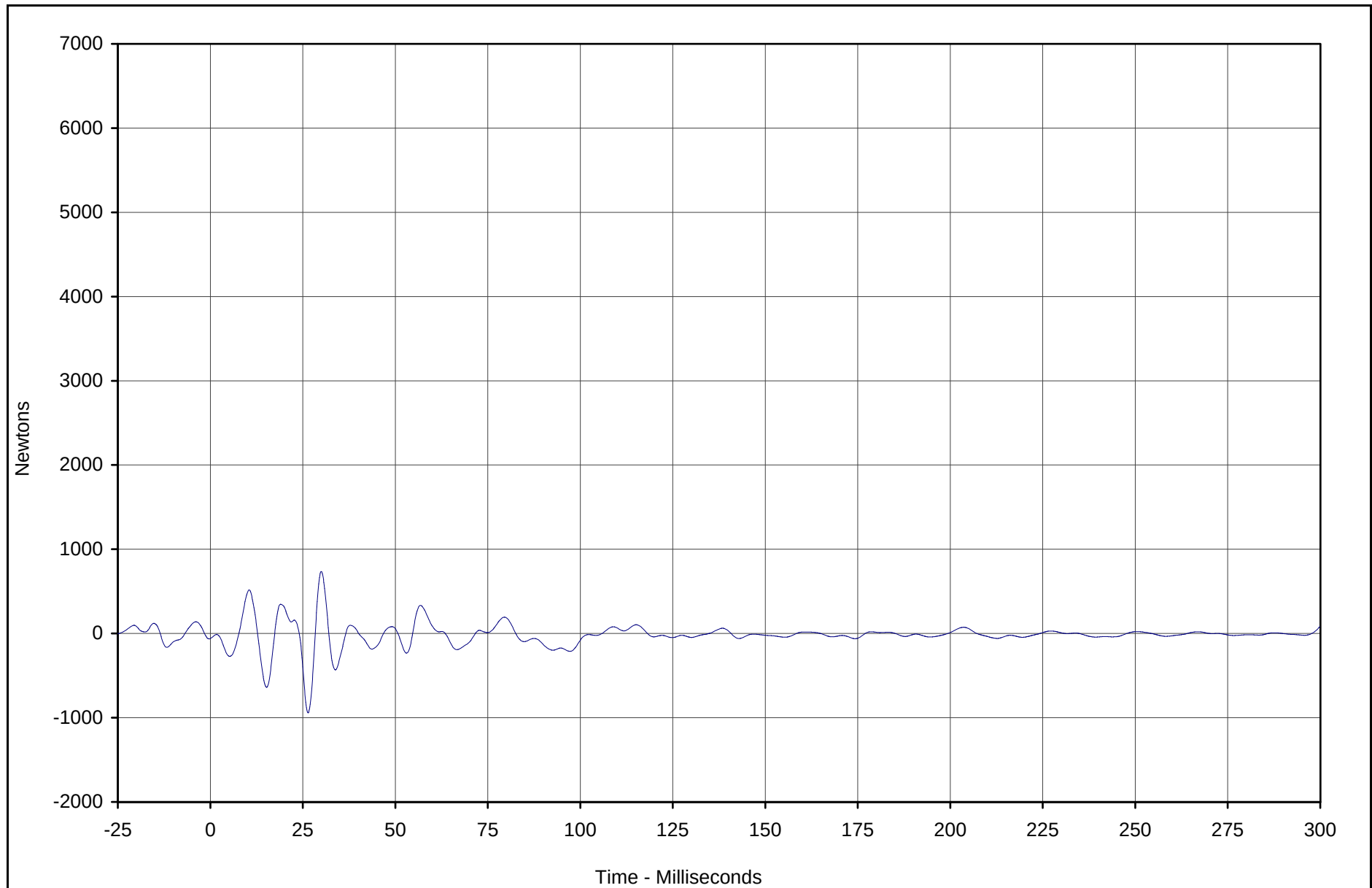
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



C-24



| Curve Description | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|-------|------|--------|------|-----------|
| Barrier Force C9  | 124   | FIL  | Newtons | 735.9 | 30.0 | -941.2 | 26.4 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

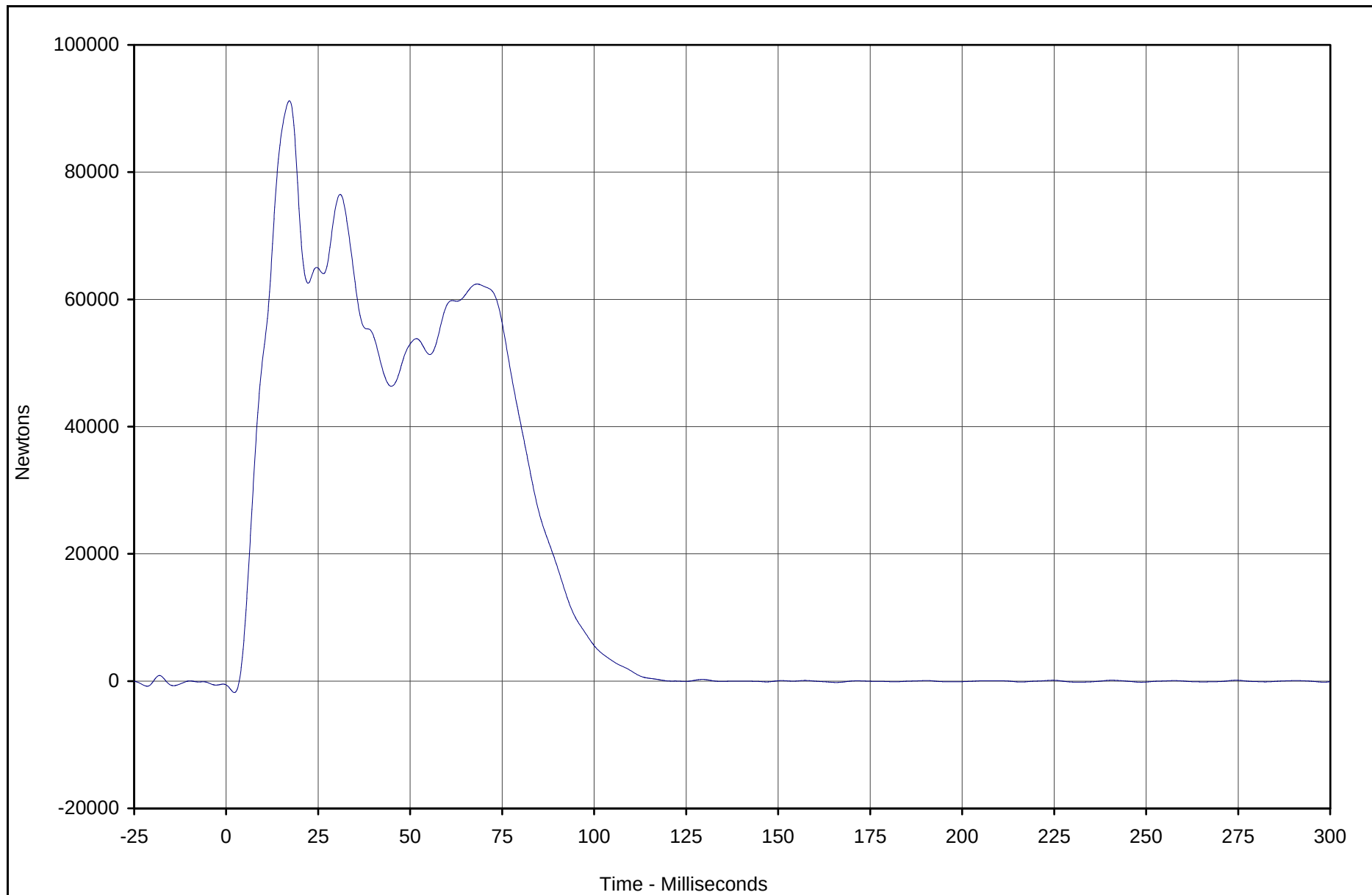
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-25



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|---------------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force Sum Group 1 | 001   | SUM  | Newtons | 91223.1 | 17.2 | -1799.1 | 2.2  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

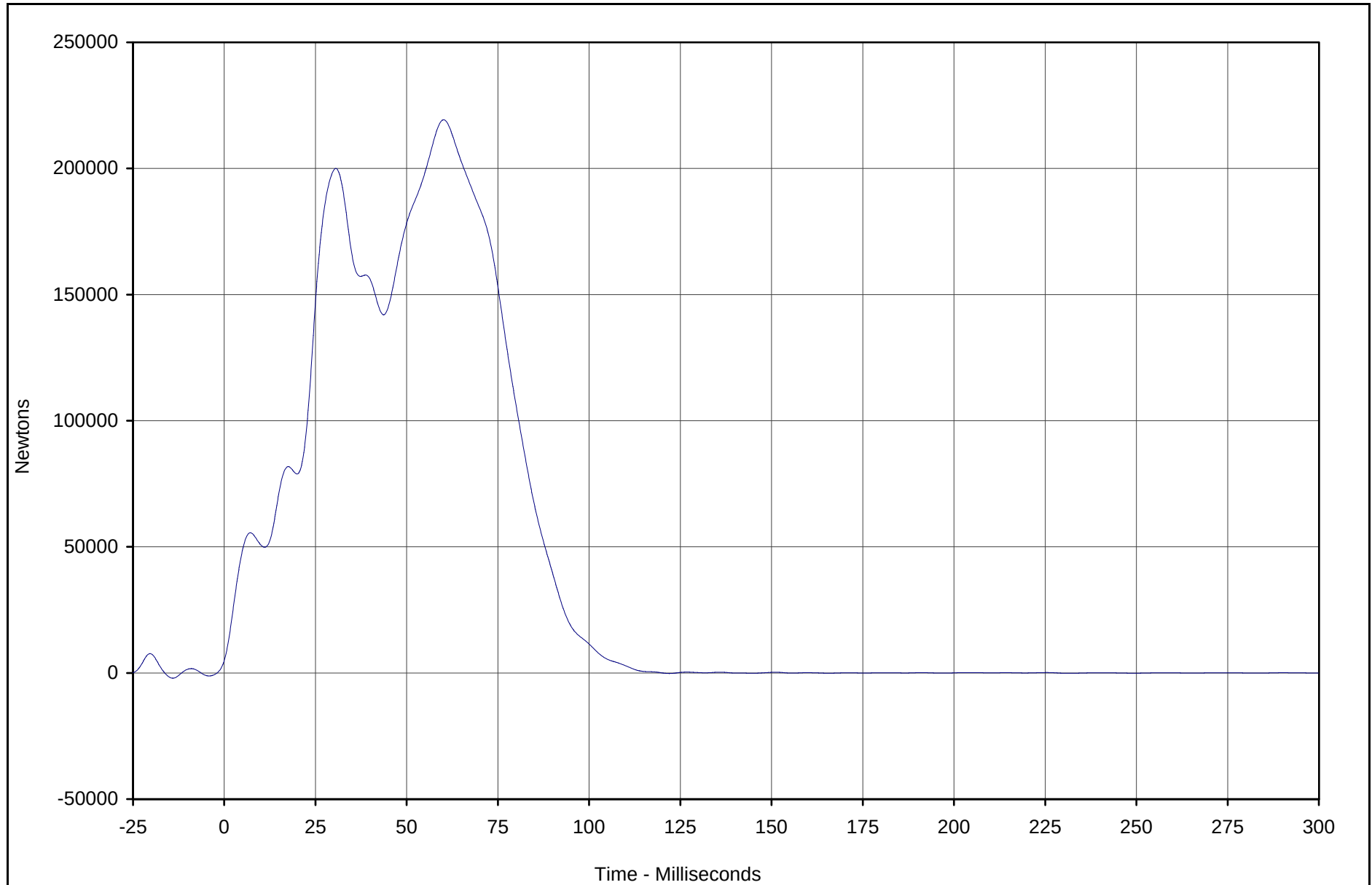
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-26



| Curve Description         | CURNO | Type | Units   | Max      | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|----------|------|--------|-------|-----------|
| Barrier Force Sum Group 2 | 002   | SUM  | Newtons | 219294.7 | 60.1 | -218.5 | 122.0 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

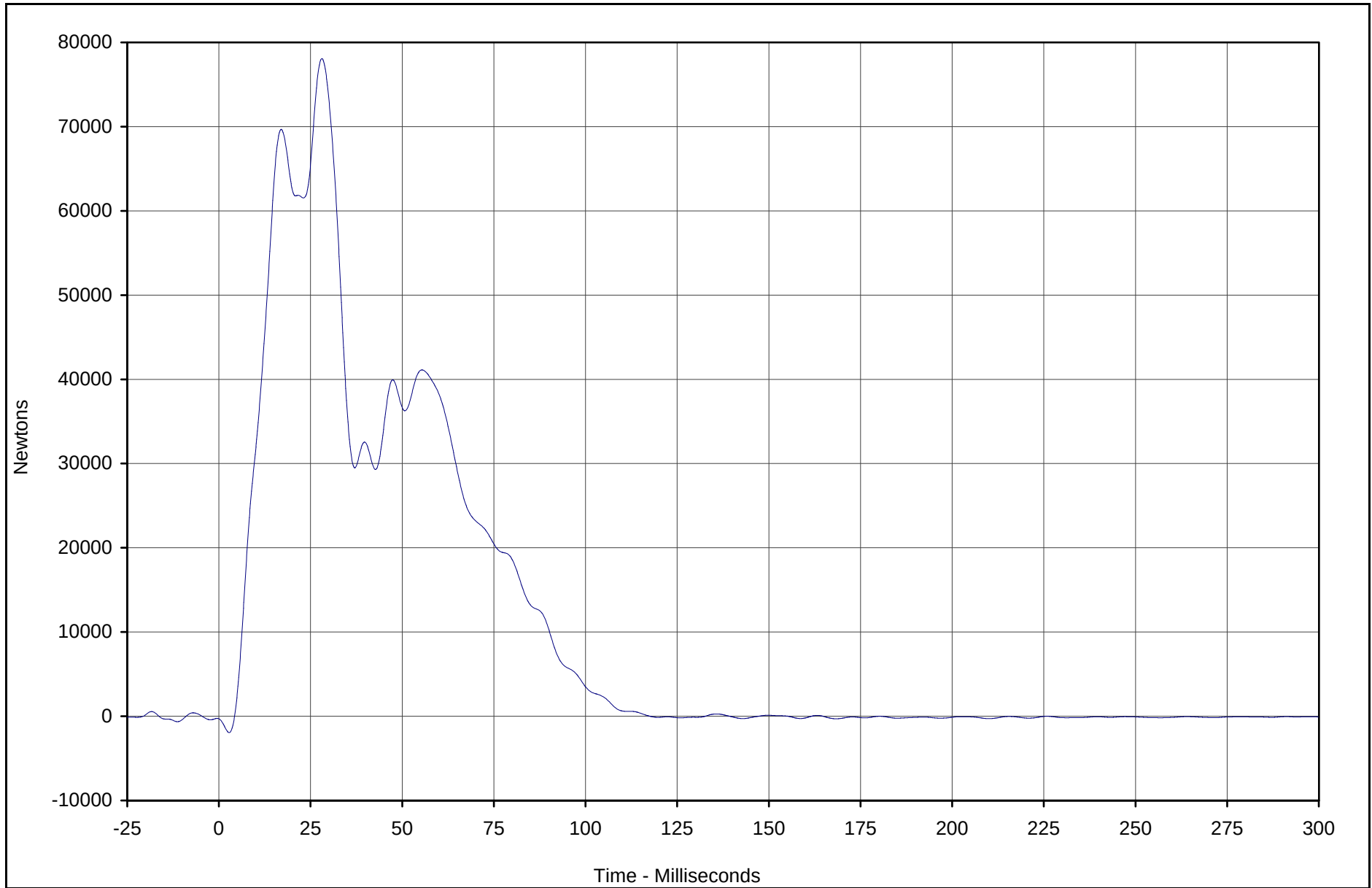
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-27



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|---------------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force Sum Group 3 | 003   | SUM  | Newtons | 78071.6 | 28.1 | -1938.1 | 2.8  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

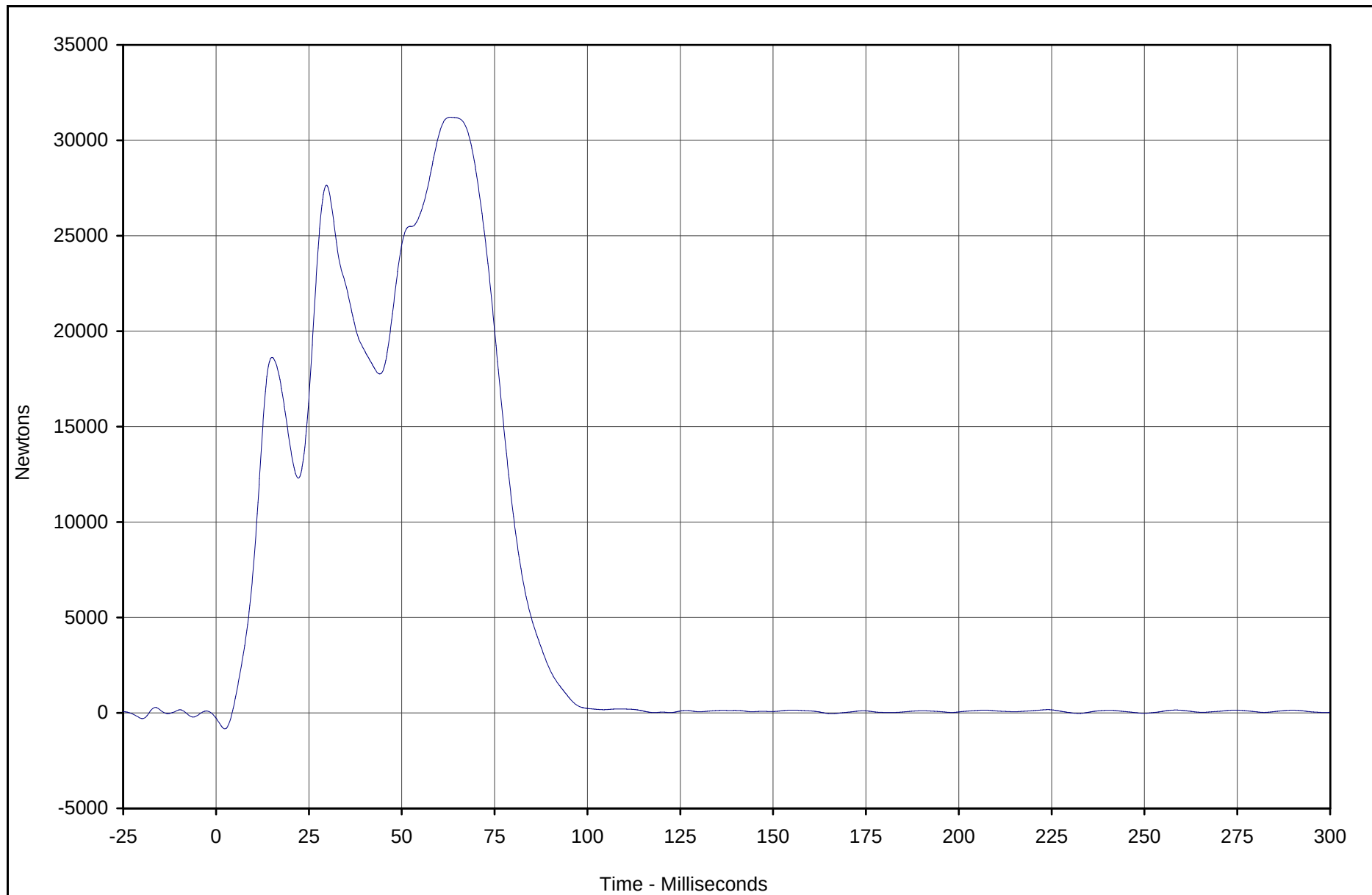
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-28



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|---------------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force Sum Group 4 | 004   | SUM  | Newtons | 31209.2 | 63.1 | -836.6 | 2.4  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

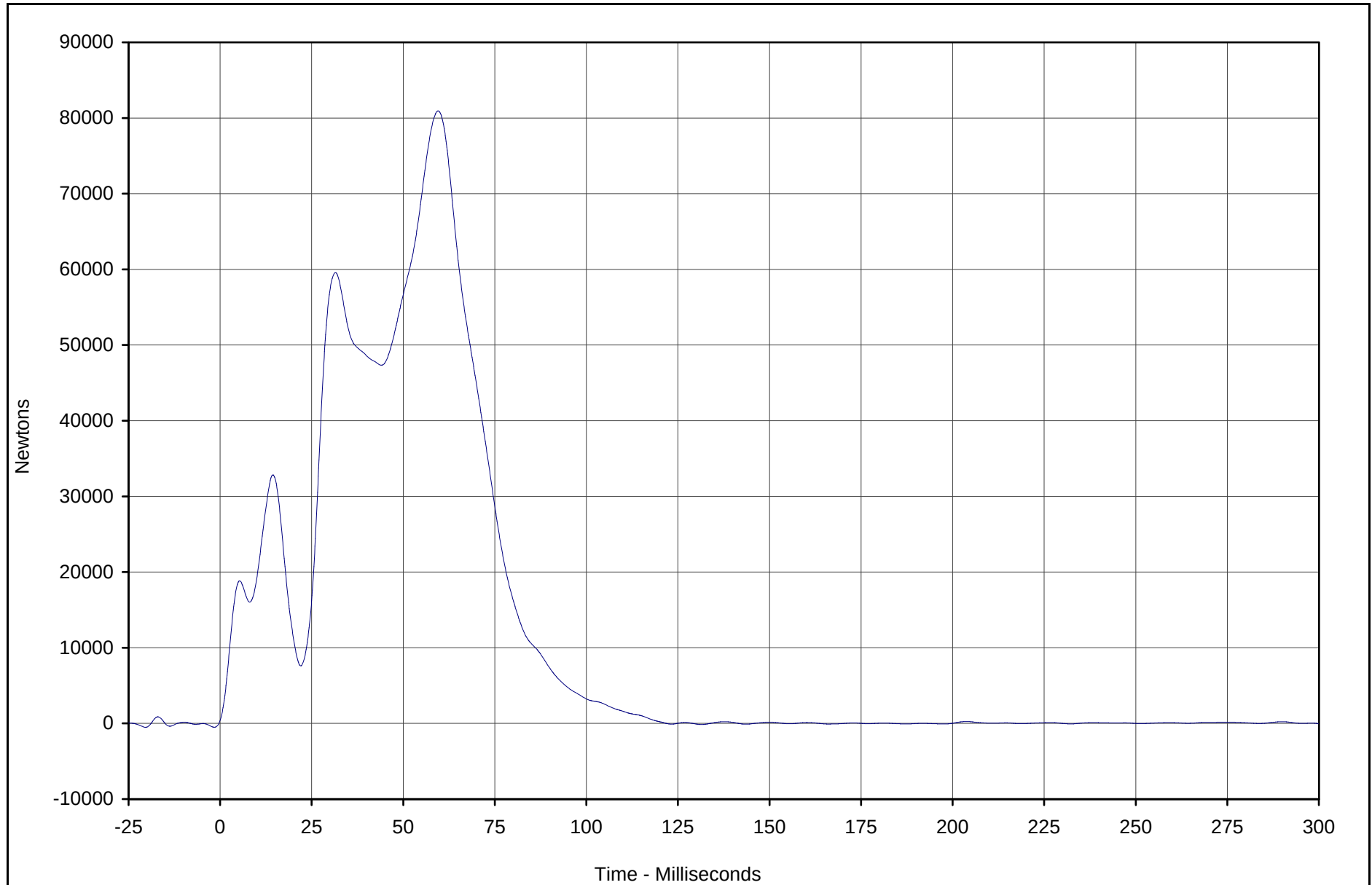
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-29



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force Sum Group 5 | 005   | SUM  | Newtons | 80938.3 | 59.5 | -140.8 | 131.4 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

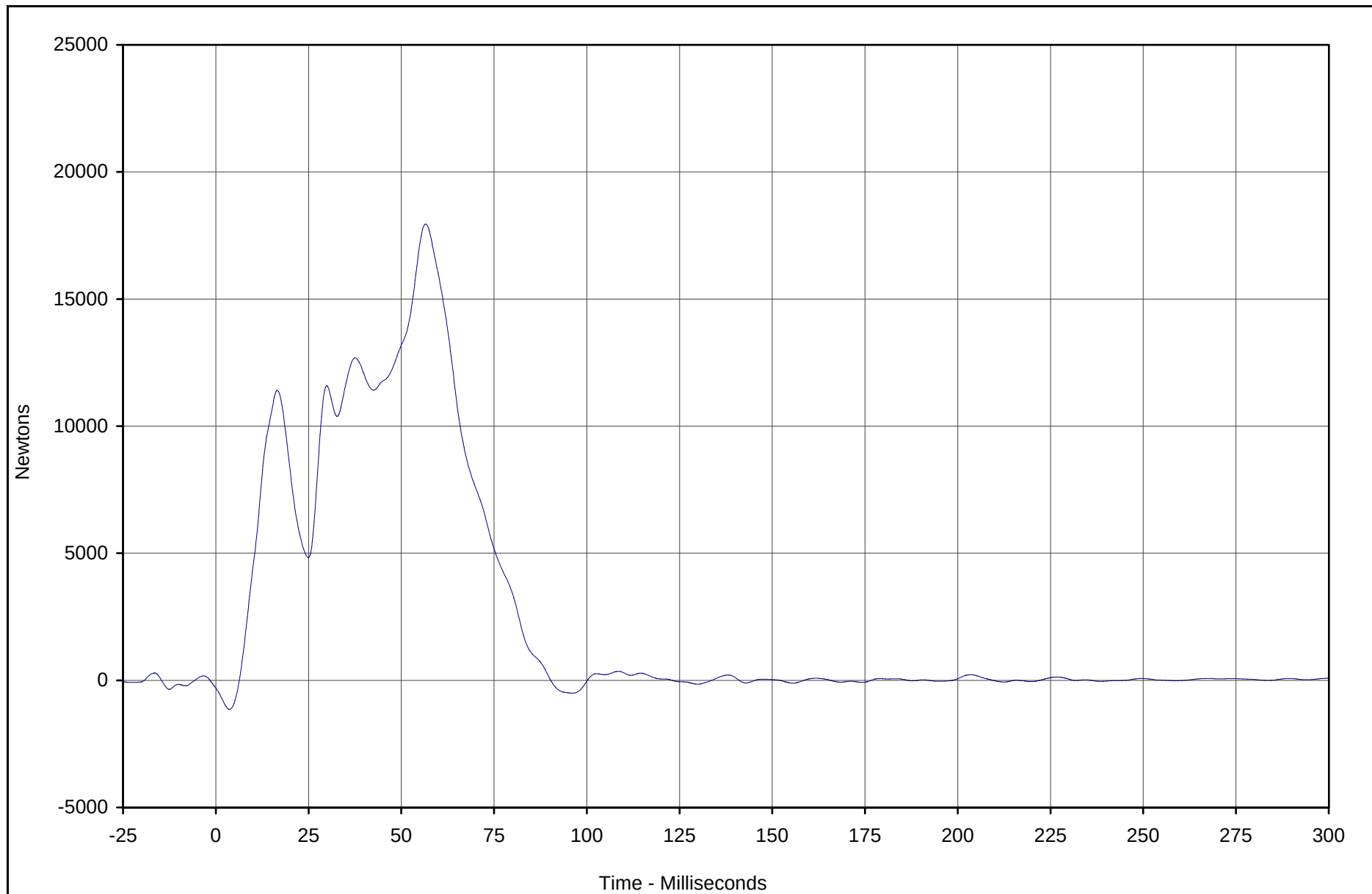
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



C-30



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|---------------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force Sum Group 6 | 006   | SUM  | Newtons | 17955.2 | 56.6 | -1143.8 | 3.7  | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

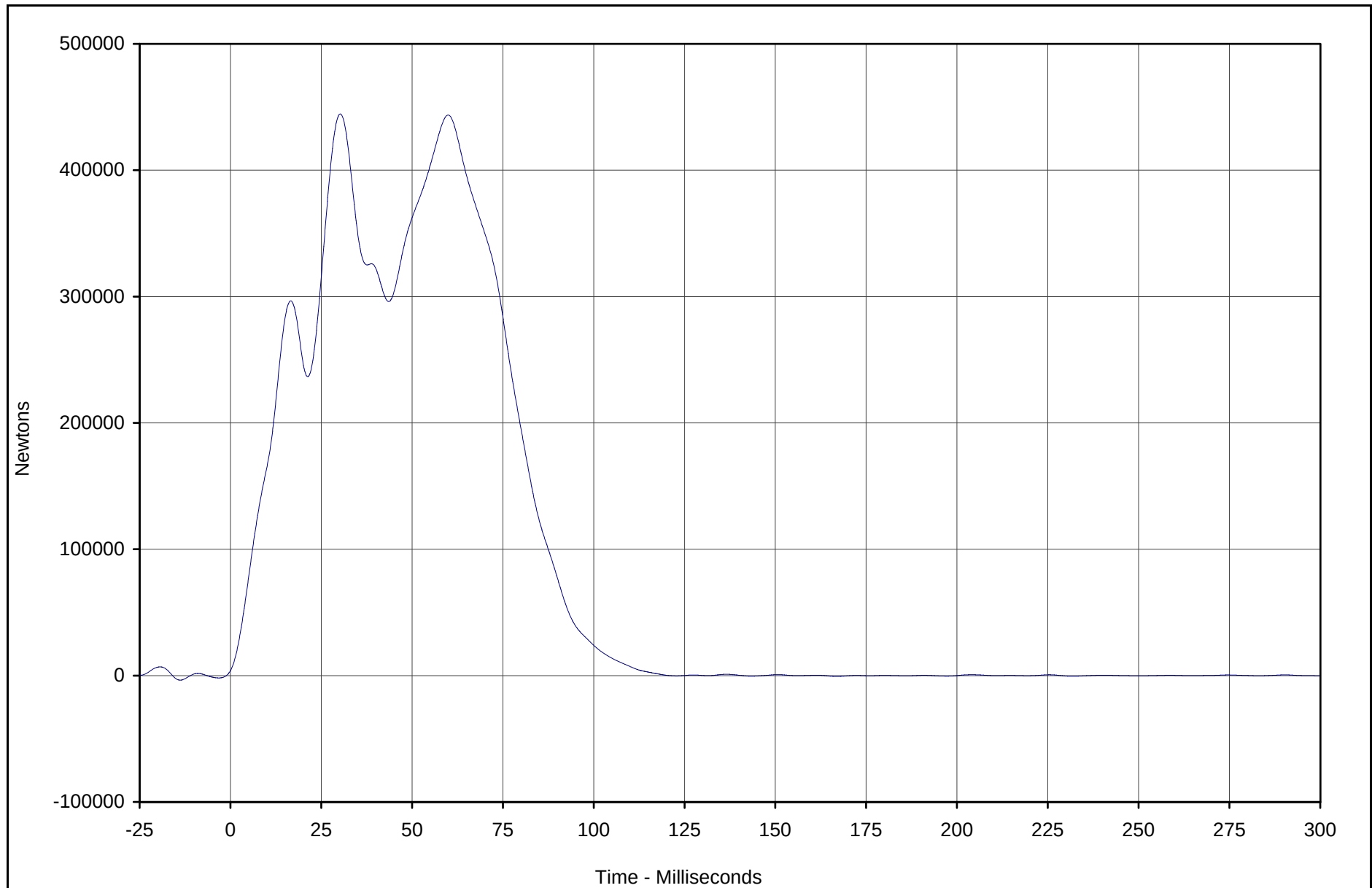
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-31



| Curve Description       | CURNO | Type | Units   | Max      | Time | Min    | Time  | SAE Class |
|-------------------------|-------|------|---------|----------|------|--------|-------|-----------|
| Barrier Force Total Sum | 007   | SUM  | Newtons | 444577.1 | 30.2 | -661.3 | 166.8 | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

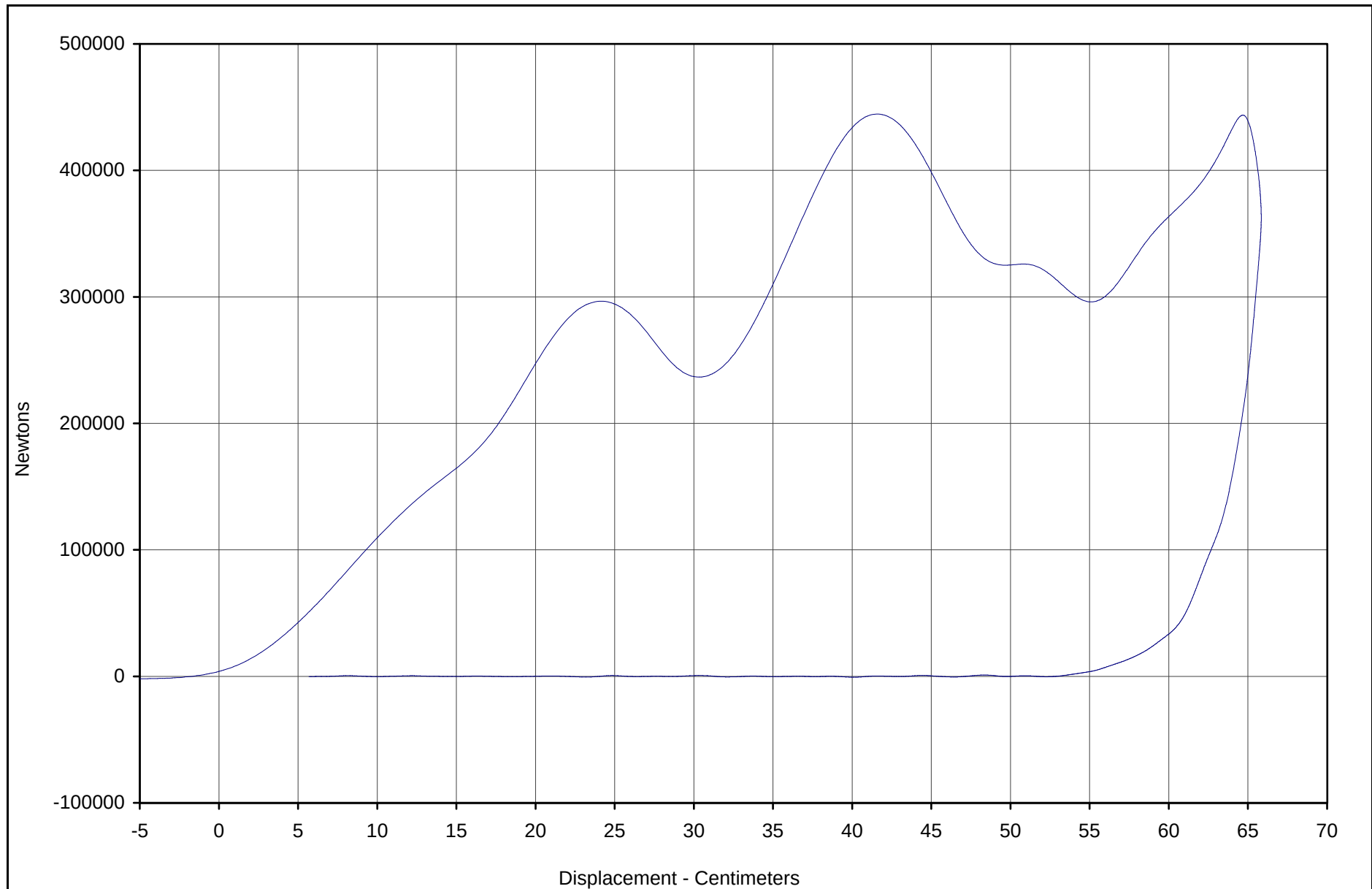
Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

C-32



| Curve Description                  | CURNO | Type | Units   | Max      | CM   | Energy (Joules) | SAE Class |
|------------------------------------|-------|------|---------|----------|------|-----------------|-----------|
| Barrier Force Total Sum vs. Displ. | 001   | XVY  | Newtons | 444577.1 | 41.5 | 167133.8        | 60        |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03

# BARRIER LOAD CELL SUMMARY DATA

Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

NHTSA No.: M35105

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 4/9/02

| Location                  | Max      | Time | Min     | Time  |
|---------------------------|----------|------|---------|-------|
| Barrier Force A2          | 1479.0   | 52.8 | -1726.7 | 17.1  |
| Barrier Force A3          | 8363.6   | 25.6 | -1245.7 | 3.9   |
| Barrier Force A4          | 33642.6  | 29.0 | -624.1  | 3.7   |
| Barrier Force A5          | 37639.1  | 60.1 | -74.7   | 4.6   |
| Barrier Force A6          | 5563.3   | 26.7 | -947.6  | 3.3   |
| Barrier Force A7          | 3318.9   | 26.3 | -837.0  | 3.3   |
| Barrier Force A8          | 4931.5   | 54.6 | -426.1  | 4.2   |
| Barrier Force A9          | 869.2    | 39.4 | -1370.7 | 43.2  |
| Barrier Force B2          | 15805.8  | 14.5 | -1066.8 | 4.6   |
| Barrier Force B3          | 77278.8  | 17.4 | -899.8  | 1.2   |
| Barrier Force B4          | 49461.6  | 61.2 | -91.4   | 232.1 |
| Barrier Force B5          | 39343.5  | 60.2 | 1.8     | 289.3 |
| Barrier Force B6          | 75867.7  | 59.7 | -144.3  | 299.9 |
| Barrier Force B7          | 74705.3  | 28.1 | -881.5  | 2.0   |
| Barrier Force B8          | 5814.6   | 56.9 | -359.0  | 4.2   |
| Barrier Force B9          | 485.9    | 30.1 | -692.4  | 26.7  |
| Barrier Force C2          | 15377.1  | 61.1 | -988.2  | 6.1   |
| Barrier Force C3          | 18071.2  | 28.6 | -474.7  | 1.8   |
| Barrier Force C4          | 23102.2  | 60.0 | -94.3   | 131.4 |
| Barrier Force C5          | 38373.1  | 59.9 | -90.4   | 143.8 |
| Barrier Force C6          | 19755.3  | 58.6 | -222.2  | 0.1   |
| Barrier Force C7          | 12482.1  | 60.2 | -656.6  | 2.9   |
| Barrier Force C8          | 7463.7   | 54.7 | -413.1  | 4.3   |
| Barrier Force C9          | 735.9    | 30.0 | -941.2  | 26.4  |
| Barrier Force Sum Group 1 | 91223.1  | 17.2 | -1799.1 | 2.2   |
| Barrier Force Sum Group 2 | 219294.7 | 60.1 | -218.5  | 122.0 |
| Barrier Force Sum Group 3 | 78071.6  | 28.1 | -1938.1 | 2.8   |
| Barrier Force Sum Group 4 | 31209.2  | 63.1 | -836.6  | 2.4   |
| Barrier Force Sum Group 5 | 80938.3  | 59.5 | -140.8  | 131.4 |
| Barrier Force Sum Group 6 | 17955.2  | 56.6 | -1143.8 | 3.7   |
| Barrier Force Total Sum   | 444577.1 | 30.2 | -661.3  | 166.8 |

Locations A1,B1,C1, and D1 through D9 (12 locations) were not recorded.

## **APPENDIX D**

### **INSTRUMENTATION DATA CHANNEL ASSIGNMENTS**

**2002 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Driver A.T.D. Serial Number 34**  
**4/9/02**  
**2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 1   | HEAD, PRIMARY      | X    | KEAC039    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 2   | HEAD, PRIMARY      | Y    | KEAC038    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 3   | HEAD, PRIMARY      | Z    | KEAC027    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 4   | HEAD, REDUNDANT    | X    | KEAC031    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 5   | HEAD, REDUNDANT    | Y    | KEAC032    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 6   | HEAD, REDUNDANT    | Z    | KEAC026    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 7   | NECK FORCE         | X    | GPUN02FX   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 8   | NECK FORCE         | Y    | GPUN02FY   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 9   | NECK FORCE         | Z    | GPUN02FZ   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 10  | NECK MOMENT        | X    | GPUN02MX   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 11  | NECK MOMENT        | Y    | GPUN02MY   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 12  | NECK MOMENT        | Z    | GPUN02MZ   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 13  | CHEST , PRIMARY    | X    | GPAC031    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 14  | CHEST , PRIMARY    | Y    | GPAC024    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 15  | CHEST , PRIMARY    | Z    | GPAC029    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 16  | CHEST , REDUNDANT  | X    | KEAC023    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 17  | CHEST , REDUNDANT  | Y    | KEAC022    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 18  | CHEST , REDUNDANT  | Z    | KEAC024    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 19  | CHEST DISPLACEMENT | X    | GPCP001    | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 20  | PELVIS, PRIMARY    | X    | KEAC019    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 21  | PELVIS, PRIMARY    | Y    | KEAC020    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 22  | PELVIS, PRIMARY    | Z    | KEAC021    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 23  | LEFT FEMUR FORCE   | Z    | KEFF001    | Load cell, Femur         | R.A. Denton  | 2121      | N     |
| 24  | RIGHT FEMUR FORCE  | Z    | KEFF002    | Load cell, Femur         | R.A. Denton  | 2121      | N     |

**2002 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Driver A.T.D. Serial Number 34  
4/9/02  
2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION               | AXIS | IDENT. NO. | DESCRIPTION               | MFR          | MODEL       | UNITS |
|-----|------------------------|------|------------|---------------------------|--------------|-------------|-------|
| 25  | UP. TIBIA LEFT MOM.    | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 26  | UP. TIBIA LEFT MOM.    | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 27  | UP. TIBIA RIGHT MOM.   | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 28  | UP. TIBIA RIGHT MOM.   | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 29  | LWR. TIBIA LEFT MOM.   | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 30  | LWR. TIBIA LEFT MOM.   | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 31  | LWR. TIBIA LEFT FORCE  | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 32  | LWR. TIBIA RIGHT MOM.  | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 33  | LWR. TIBIA RIGHT MOM.  | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 34  | LWR. TIBIA RIGHT FORCE | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 35  | FOOT LEFT, AFT         | X    | KEIC003X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 36  | FOOT LEFT, AFT         | Z    | KEIC003Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 37  | FOOT LEFT, FORE        | Z    | KEIC003Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 38  | FOOT RIGHT, AFT        | X    | KEIC004X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 39  | FOOT RIGHT, AFT        | Z    | KEIC004Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 40  | FOOT RIGHT, FORE       | Z    | KEIC004Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 41  | LAP BELT FORCE         | X    | KELC003    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 42  | SHOULDER BELT FORCE    | X    | KELC004    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 43  | SHOULDER BELT SPOOL    | X    | KEPP001    | Pullout pot               | Celesco      | PTX101-0030 | CM    |
| 44  | SHOULDER BELT ELONG.   | X    | KEEP001    | Linear pot., belt stretch | E.T.I.       | LCP8-10 10K | MM/CM |



**2002 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Passenger A.T.D. Serial Number 35**  
**4/9/02**  
**2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 45  | HEAD, PRIMARY      | X    | GPAC027    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 46  | HEAD, PRIMARY      | Y    | GPAC002    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 47  | HEAD, PRIMARY      | Z    | GPAC003    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 48  | HEAD, REDUNDANT    | X    | GPAC032    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 49  | HEAD, REDUNDANT    | Y    | GPAC021    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 50  | HEAD, REDUNDANT    | Z    | GPAC026    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 51  | NECK FORCE         | X    | GPUN01FX   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 52  | NECK FORCE         | Y    | GPUN01FY   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 53  | NECK FORCE         | Z    | GPUN01FZ   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 54  | NECK MOMENT        | X    | GPUN01MX   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 55  | NECK MOMENT        | Y    | GPUN01MY   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 56  | NECK MOMENT        | Z    | GPUN01MZ   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 57  | CHEST , PRIMARY    | X    | GPAC005    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 58  | CHEST , PRIMARY    | Y    | GPAC011    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 59  | CHEST , PRIMARY    | Z    | GPAC010    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 60  | CHEST , REDUNDANT  | X    | GPAC034    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 61  | CHEST , REDUNDANT  | Y    | GPAC023    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 62  | CHEST , REDUNDANT  | Z    | GPAC020    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 63  | CHEST DISPLACEMENT | X    | GPCP002    | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 64  | PELVIS, PRIMARY    | X    | GPAC025    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 65  | PELVIS, PRIMARY    | Y    | GPAC022    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 66  | PELVIS, PRIMARY    | Z    | GPAC019    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 67  | LEFT FEMUR FORCE   | Z    | KEFF003    | Load cell, Femur         | R.A. Denton  | 2121      | N     |
| 68  | RIGHT FEMUR FORCE  | Z    | KEFF004    | Load cell, Femur         | R.A. Denton  | 2121      | N     |

**2002 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Passenger A.T.D. Serial Number 35**  
**4/9/02**  
**2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION               | AXIS | IDENT. NO. | DESCRIPTION               | MFR          | MODEL       | UNITS |
|-----|------------------------|------|------------|---------------------------|--------------|-------------|-------|
| 69  | UP. TIBIA LEFT MOM.    | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 70  | UP. TIBIA LEFT MOM.    | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 71  | UP. TIBIA RIGHT MOM.   | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 72  | UP. TIBIA RIGHT MOM.   | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 73  | LWR. TIBIA LEFT MOM.   | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 74  | LWR. TIBIA LEFT MOM.   | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 75  | LWR. TIBIA LEFT FORCE  | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 76  | LWR. TIBIA RIGHT MOM.  | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 77  | LWR. TIBIA RIGHT MOM.  | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 78  | LWR. TIBIA RIGHT FORCE | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 79  | FOOT LEFT, AFT         | X    | KEIC002X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 80  | FOOT LEFT, AFT         | Z    | KEIC002Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 81  | FOOT LEFT, FORE        | Z    | KEIC002Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 82  | FOOT RIGHT, AFT        | X    | KEIC001X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 83  | FOOT RIGHT, AFT        | Z    | KEIC001Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 84  | FOOT RIGHT, FORE       | Z    | KEIC001Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 85  | LAP BELT FORCE         | X    | KELC001    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 86  | SHOULDER BELT FORCE    | X    | KELC002    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 87  | SHOULDER BELT SPOOL    | X    | KEPP001    | Pullout pot               | Celesco      | PTX101-0030 | MM    |
| 88  | SHOULDER BELT ELONG.   | X    | KEEP001    | Linear pot., belt stretch | E.T.I.       | LCP8-10 10K | MM/CM |

**2002 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Vehicle Accelerometers  
4/9/02  
2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION            | AXIS | IDENT. NO. | DESCRIPTION           | MFR         | MODEL    | UNITS |
|-----|---------------------|------|------------|-----------------------|-------------|----------|-------|
| 89  | Left Rear           | X    | KEVA002    | Accel., Pre-Amp       | I.C.S/Karco | 3031-500 | G     |
| 90  | Right Rear          | X    | KEVA010    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |
| 91  | Engine Top          | X    | KEVA012    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 92  | Engine Bottom       | X    | KEVA008    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 93  | Left Brake Caliper  | X    | KEVA007    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 94  | Right Brake Caliper | X    | KEVA001    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 95  | Instrument Panel    | X    | KEVA011    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |
| 96  | Left Rear           | Z    | KEVA005    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 97  | Right Rear          | Z    | KEVA006    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |

**2002 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Rigid Load Cell Barrier**  
**4/9/02**  
**2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION         | AXIS | IDENT. NO. | DESCRIPTION    | MFR   | MODEL   | UNITS |
|-----|------------------|------|------------|----------------|-------|---------|-------|
| 98  | BARRIER FORCE A1 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 99  | BARRIER FORCE A2 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 100 | BARRIER FORCE A3 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 101 | BARRIER FORCE A4 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 102 | BARRIER FORCE A5 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 103 | BARRIER FORCE A6 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 104 | BARRIER FORCE A7 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 105 | BARRIER FORCE A8 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 106 | BARRIER FORCE A9 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 107 | BARRIER FORCE B1 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 108 | BARRIER FORCE B2 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 109 | BARRIER FORCE B3 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 110 | BARRIER FORCE B4 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 111 | BARRIER FORCE B5 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 112 | BARRIER FORCE B6 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 113 | BARRIER FORCE B7 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 114 | BARRIER FORCE B8 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 115 | BARRIER FORCE B9 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |

**2002 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Rigid Load Cell Barrier  
4/9/02  
2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION         | AXIS | IDENT. NO. | DESCRIPTION    | MFR   | MODEL   | UNITS |
|-----|------------------|------|------------|----------------|-------|---------|-------|
| 116 | BARRIER FORCE C1 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 117 | BARRIER FORCE C2 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 118 | BARRIER FORCE C3 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 119 | BARRIER FORCE C4 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 120 | BARRIER FORCE C5 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 121 | BARRIER FORCE C6 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 122 | BARRIER FORCE C7 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 123 | BARRIER FORCE C8 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 124 | BARRIER FORCE C9 | X    | BARRIER    | Load Cell, LCB | Lebow | 1220-FS | N     |
| 125 | BARRIER FORCE D1 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 126 | BARRIER FORCE D2 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 127 | BARRIER FORCE D3 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 128 | BARRIER FORCE D4 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 129 | BARRIER FORCE D5 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 130 | BARRIER FORCE D6 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 131 | BARRIER FORCE D7 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 132 | BARRIER FORCE D8 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |
| 133 | BARRIER FORCE D9 | X    | BARRIER    | Not Used       | N/A   | N/A     | N/A   |

**2002 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Nine Accelerometer Head Array Channels**  
**4/9/02**  
**2003 Toyota Matrix 4 Door Wagon**

| CH. | LOCATION          | AXIS | IDENT. NO. | DESCRIPTION        | MFR     | MODEL     | UNITS |
|-----|-------------------|------|------------|--------------------|---------|-----------|-------|
| 134 | Driver Head CG    | X    | KEAC039    | Accel.,1/2 bridge  | Endevco | 7264-2000 | G     |
| 135 | Driver Head CG    | Y    | KEAC038    | Accel.,1/2 bridge  | Endevco | 7264-2000 | G     |
| 136 | Driver Head CG    | Z    | KEAC027    | Accel.,1/2 bridge  | Endevco | 7264-2000 | G     |
| 137 | Driver Y-arm      | Z    | GPAC016    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 138 | Driver Y-arm      | X    | GPAC015    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 139 | Driver X-arm      | Z    | GPAC004    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 140 | Driver X-arm      | Y    | GPAC018    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 141 | Driver Z-arm      | X    | GPAC006    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 142 | Driver Z-arm      | Y    | GPAC007    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 143 | Passenger Head CG | X    | GPAC027    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 144 | Passenger Head CG | Y    | GPAC002    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 145 | Passenger Head CG | Z    | GPAC003    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 146 | Passenger Y-arm   | Z    | GPAC012    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 147 | Passenger Y-arm   | X    | GPAC001    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 148 | Passenger X-arm   | Z    | GPAC036    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 149 | Passenger X-arm   | Y    | GPAC014    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 150 | Passenger Z-arm   | X    | GPAC030    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |
| 151 | Passenger Z-arm   | Y    | GPAC037    | Accel., 1/2 bridge | Endevco | 7264-2000 | G     |

\* Duplicate of Head CG Primary Channels

## **APPENDIX E**

### **DUMMY CALIBRATION DATA**





# Hybrid III Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Impact Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: LK01A

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.5  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.12   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5431   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

ATD Serial No.: 034

Location: Right Knee

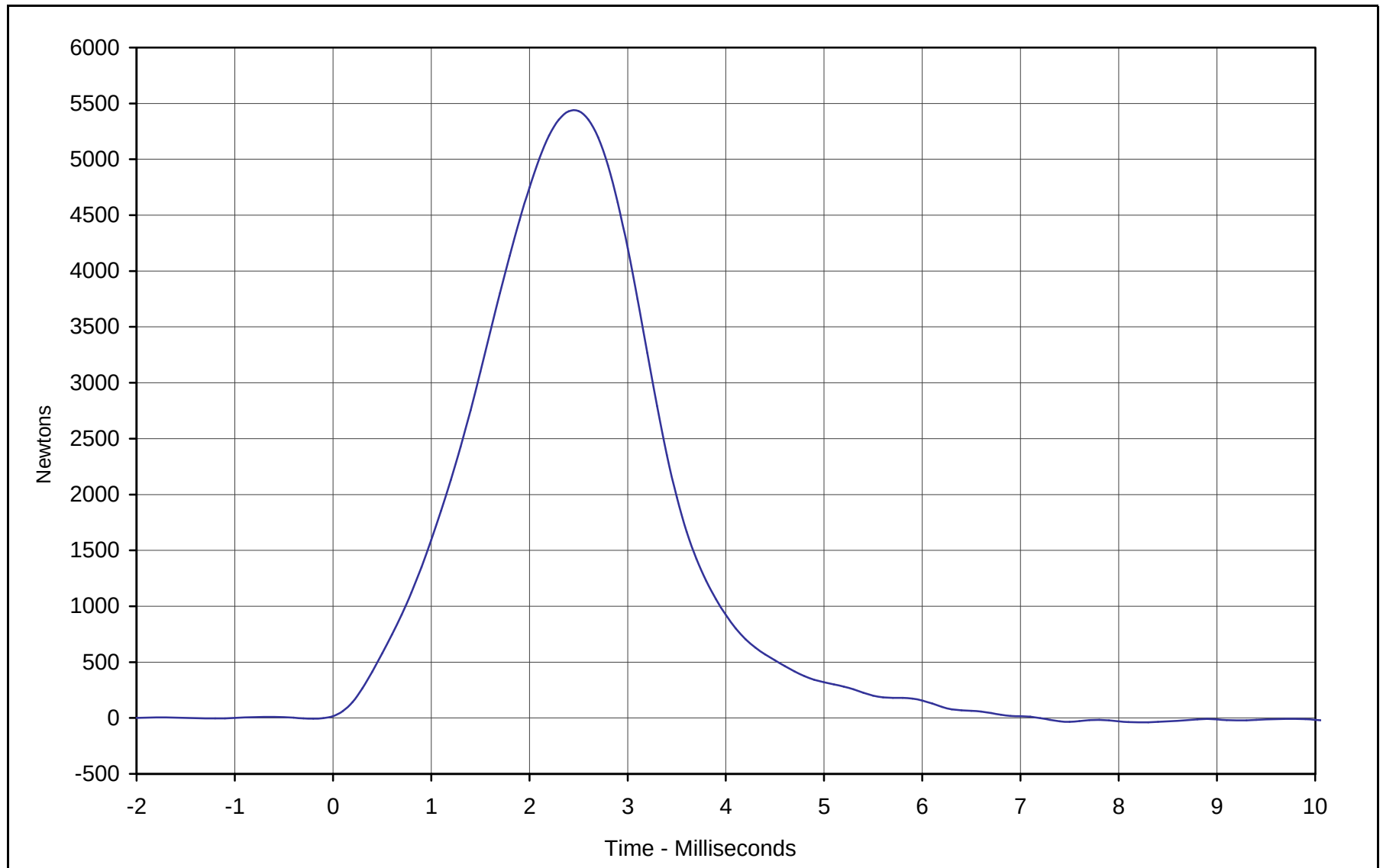
Test I.D.: RK01A

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.5  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.10   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5695   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

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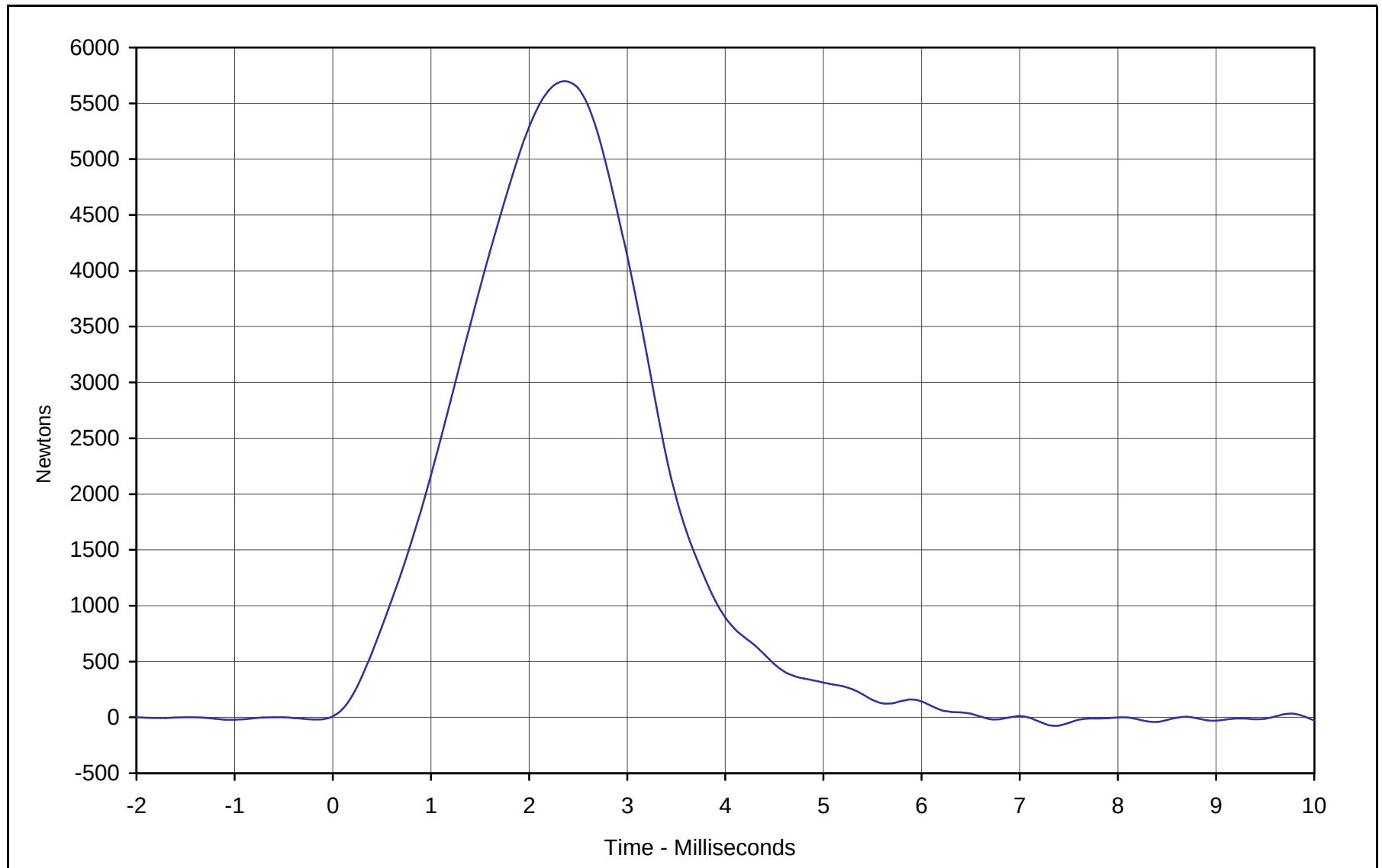
Test Date



Curve Description: Probe Force  
Maximum Value: 5431.0 at 2.5 Milliseconds  
Minimum Value: -33.5 at 7.5 Milliseconds  
SAE Filter Class: 600  
Date of Test: 4/1/02  
ATD Serial No.: 034

Test Program: Hybrid III Knee Impact Test  
Test Information: Location: Left Knee Test I.D.: LK01A





Curve Description: Probe Force

Maximum Value: 5694.7 at 2.4 Milliseconds

Minimum Value: -72.8 at 7.4 Milliseconds

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 034

Test Program: Hybrid III Knee Impact Test

Test Information: Location: Right Knee Test I.D.: RK01A





# Hybrid III Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Slider Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: KS001

| Tested Parameter             |       | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|-------|---------------|--------|-----------|
| Laboratory Temperature       |       | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity |       | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     |       | m/sec | 2.70 to 2.80  | 2.77   | Pass      |
| Impact Force at:             | 10 mm | kN    | 1.26 to 1.72  | 1.68   | Pass      |
|                              | 18 mm | kN    | 2.27 to 3.096 | 2.98   | Pass      |
| Overall Test Results         |       |       |               |        | Pass      |

ATD Serial No.: 034

Location: Right Knee

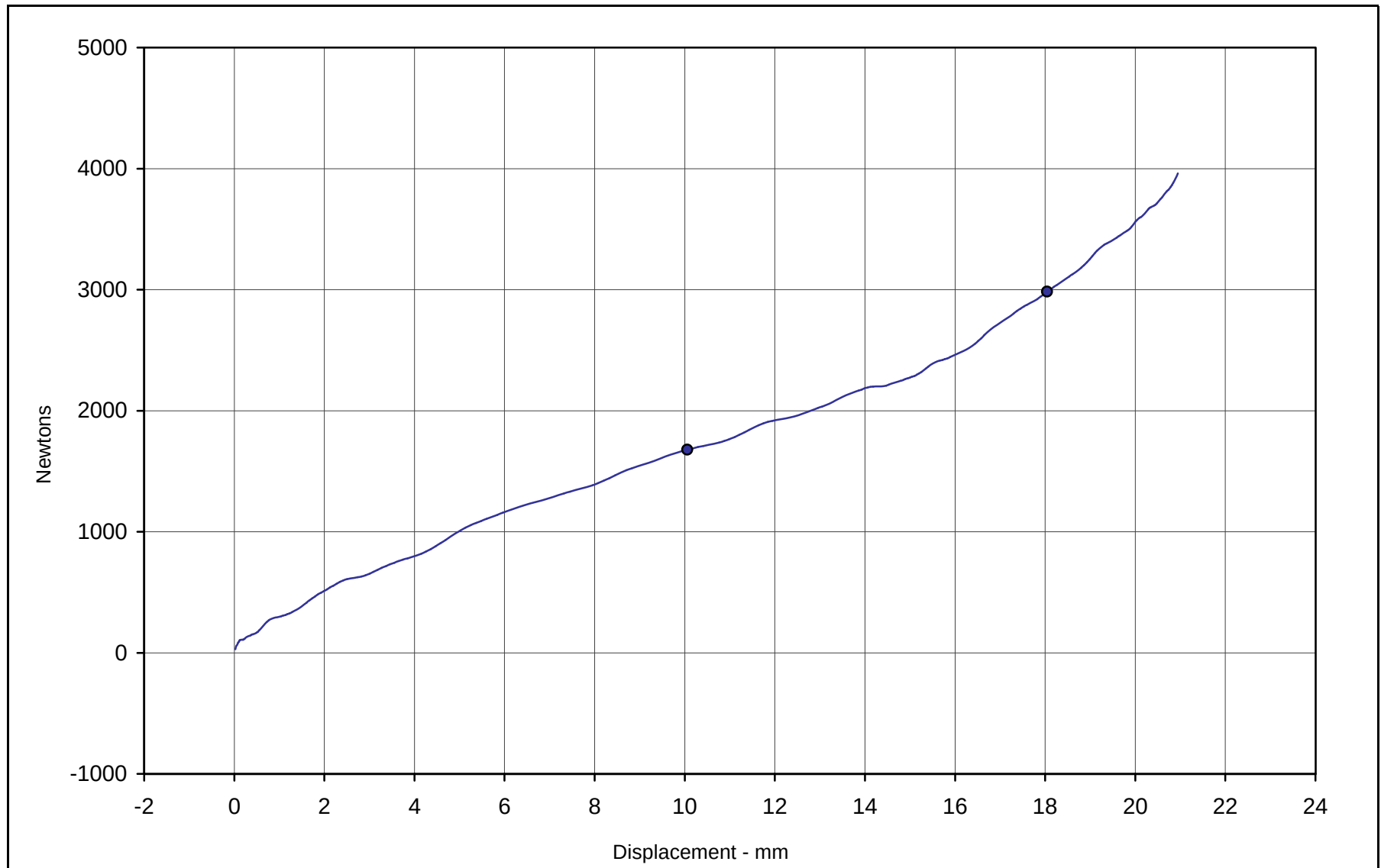
Test I.D.: KS002

| Tested Parameter             |       | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|-------|---------------|--------|-----------|
| Laboratory Temperature       |       | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity |       | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     |       | m/sec | 2.70 to 2.80  | 2.71   | Pass      |
| Impact Force at:             | 10 mm | kN    | 1.26 to 1.72  | 1.55   | Pass      |
|                              | 18 mm | kN    | 2.27 to 3.096 | 2.94   | Pass      |
| Overall Test Results         |       |       |               |        | Pass      |

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Test Date



Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1677 at 10.0 mm

Femur Force: 2983 at 18.0 mm

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 034

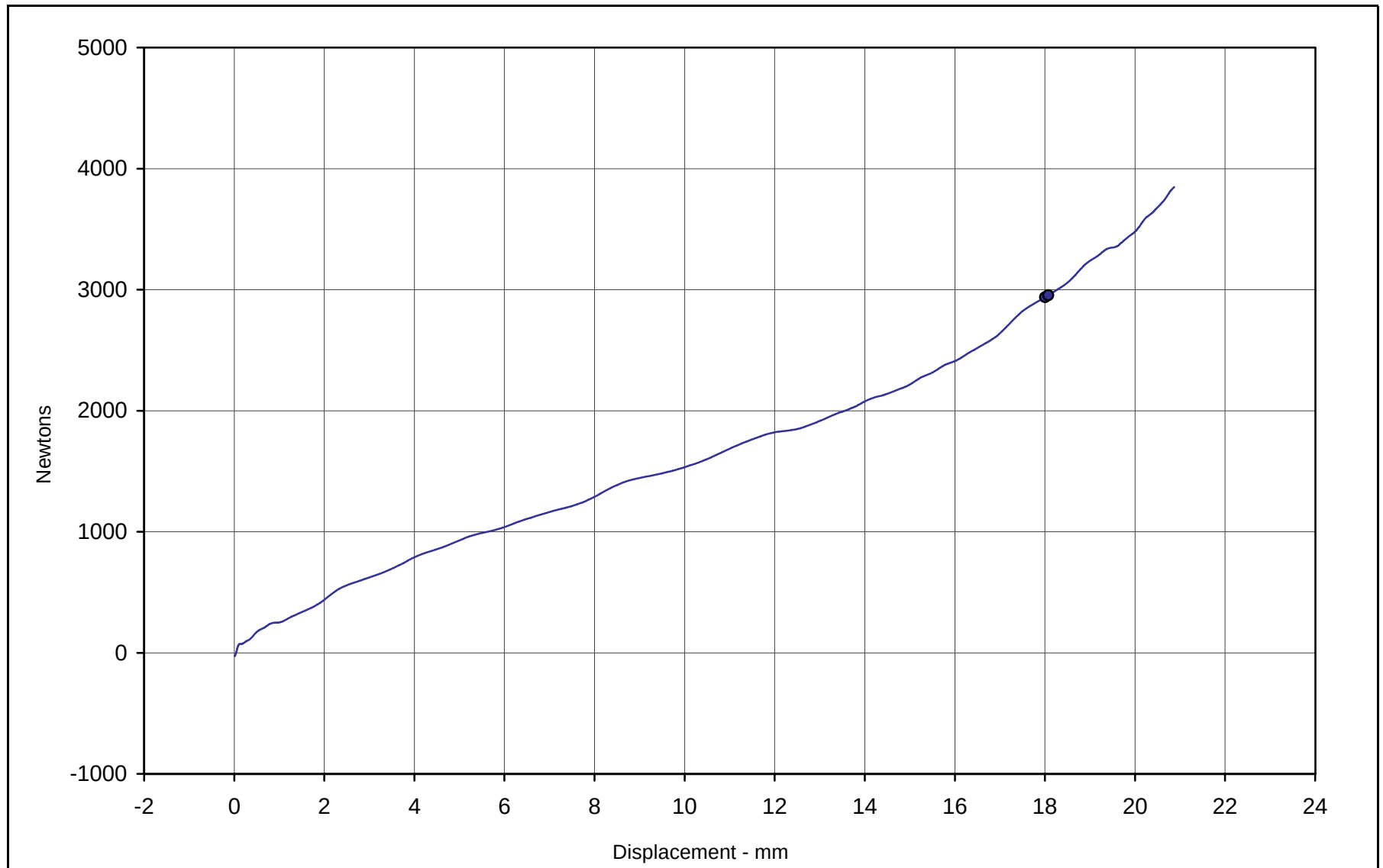
Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Left Knee Test I.D.: KS001





Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1546 at 10.0 mm

Femur Force: 2938 at 18.0 mm

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 034

Test Program: Hybrid III Knee Shear Test

Test Information: Location: Right Knee Test I.D.: KS002





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Head Drop Calibration

ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: HD01A

| Tested Parameter             | Units  | Specification  | Result | Pass/Fail |
|------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature       | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration  | G's    | 225.0 to 275.0 | 244.3  | Pass      |
| Peak Lateral Acceleration    | G's    | ≤15.0          | 2.0    | Pass      |
| Is Acceleration Unimodal?    | Yes/No | Yes            | Yes    | Pass      |
| Overall Test Results         |        |                |        | Pass      |

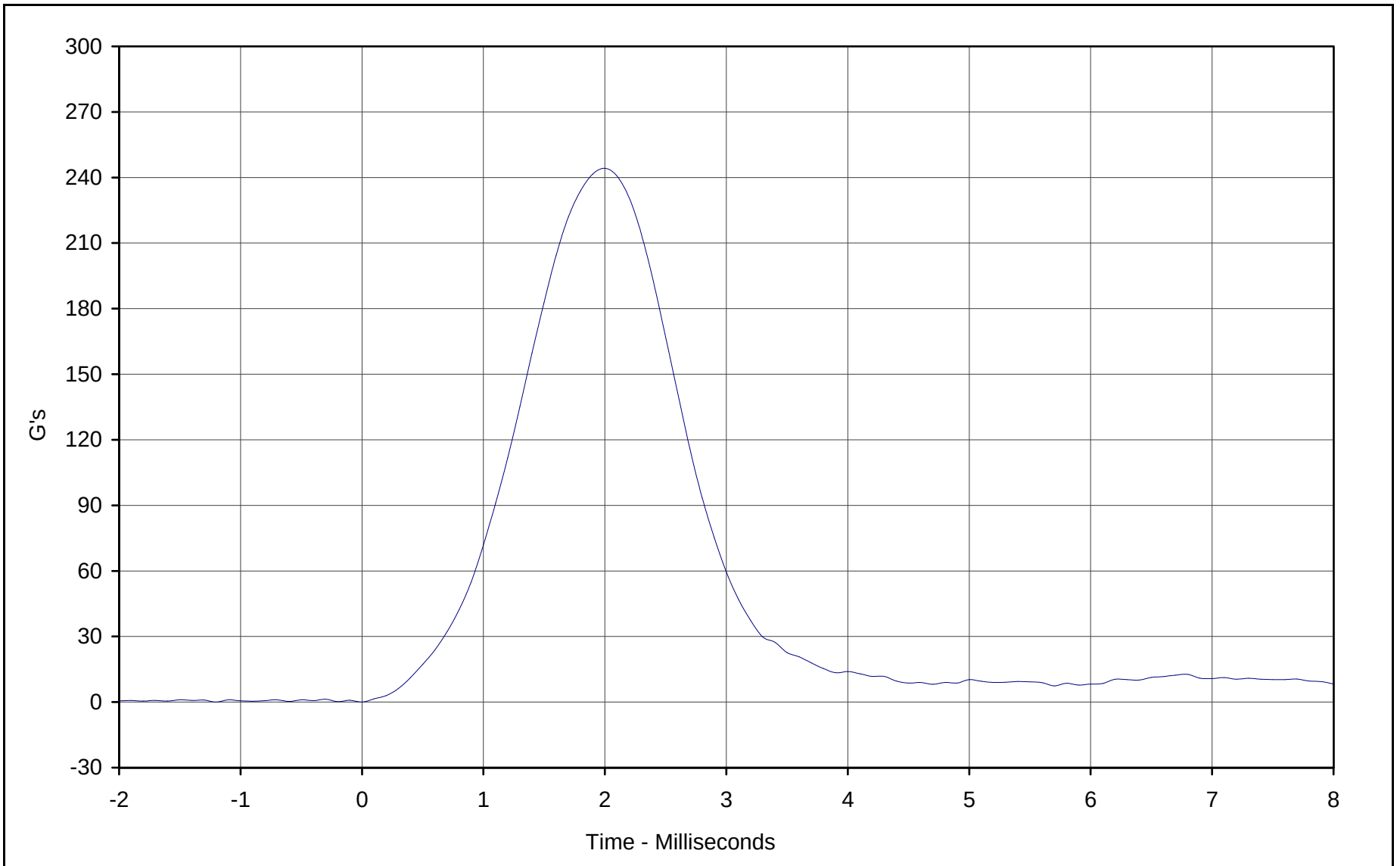
\_\_\_\_\_  
Laboratory Technician

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April 1, 2002

\_\_\_\_\_  
Test Date



E-8



Curve Description: Head Resultant Acceleration

|                   |               |    |             |              |
|-------------------|---------------|----|-------------|--------------|
| Maximum Value:    | <u>244.3</u>  | at | <u>2.0</u>  | Milliseconds |
| Minimum Value:    | <u>0.0</u>    | at | <u>-1.2</u> | Milliseconds |
| SAE Filter Class: | <u>1000</u>   |    |             |              |
| Date of Test:     | <u>4/1/02</u> |    |             |              |
| ATD Serial No.:   | <u>034</u>    |    |             |              |

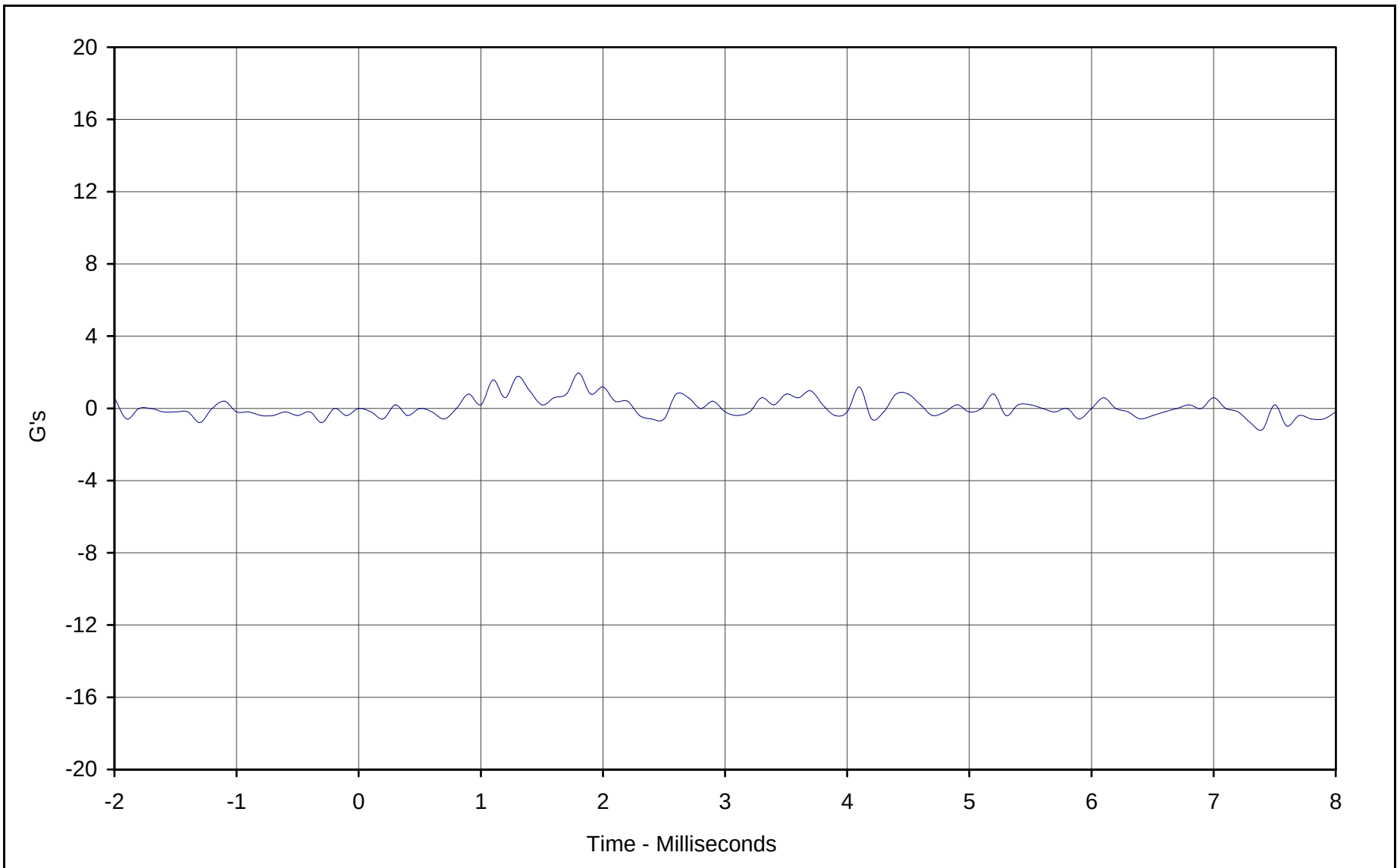
Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD01A



KAR22001-03

E-9



Curve Description: Head Acceleration Y Axis

Maximum Value: 2.0 at 1.8 Milliseconds

Minimum Value: -1.2 at 7.4 Milliseconds

SAE Filter Class: 1000

Date of Test: 4/1/02

ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD01A



KAR22001-03



# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Thorax Impact Test

ATD Serial No.: 034

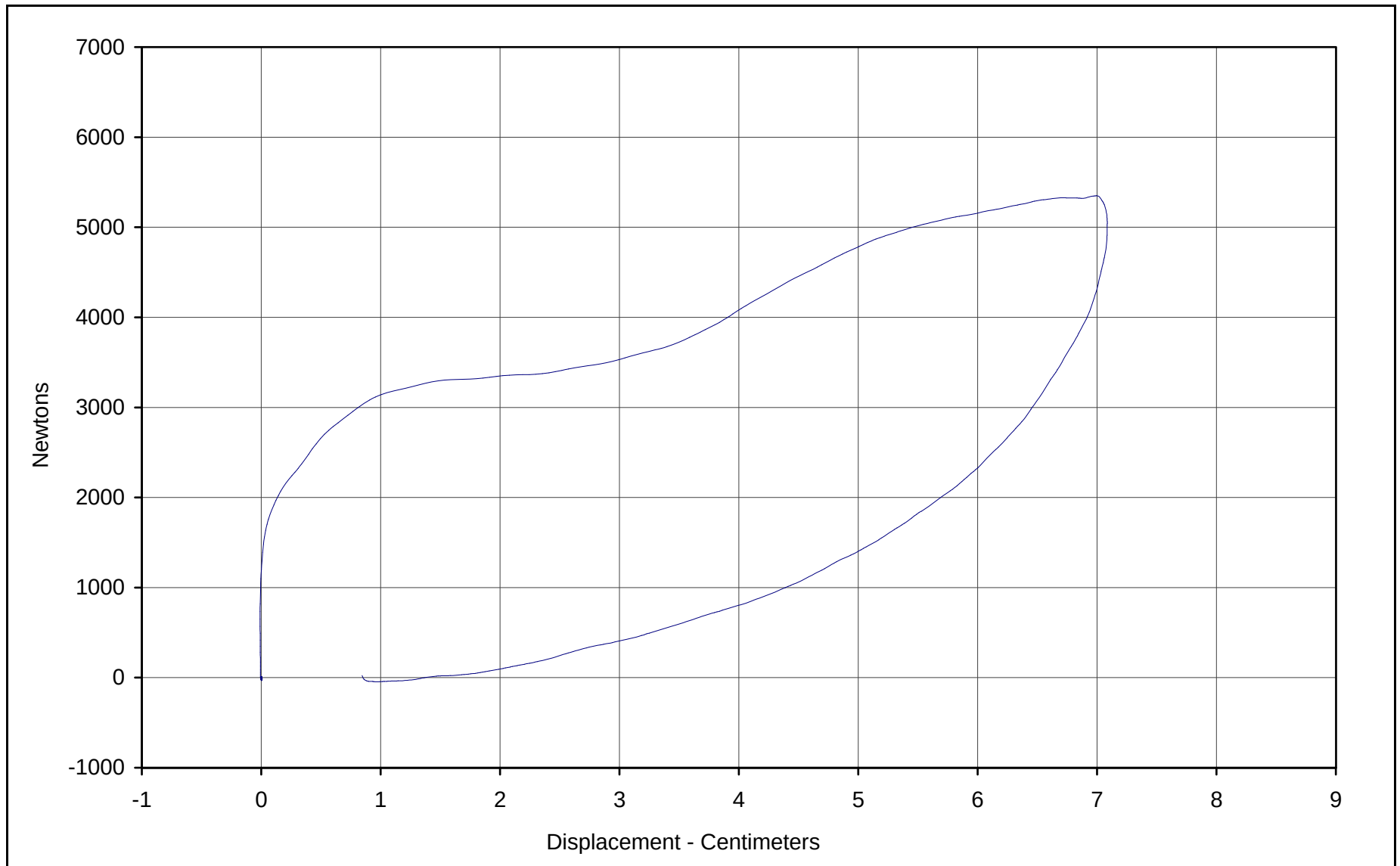
Part Serial No.: N/A

Test I.D.: CH01A

| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity               | m/s     | 6.58 to 6.82  | 6.68   | Pass      |
| Peak Probe Force             | Newtons | 5159 to 5893  | 5349   | Pass      |
| Peak Sternum Displacement    | CM      | 6.35 to 7.26  | 7.09   | Pass      |
| Internal Hysteresis          | %       | 69 to 85      | 74.0   | Pass      |
| Overall Test Results         |         |               |        | Pass      |

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April 2, 2002  
Test Date



Curve Description: Probe Force vs. Chest Displacement

Probe Force: 5348.9 Newtons

Chest Displ.: 7.09 Centimeters

SAE Filter Class: 180

Date of Test: 4/2/02

ATD Serial No.: 034

Testing Program: Hybrid III Thorax Impact Test

Test Information: S/N of Part: N/A Test I.D.: CH01A





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Neck Flexion Test

ATD Serial No.: 034

Part Serial No.: N/A

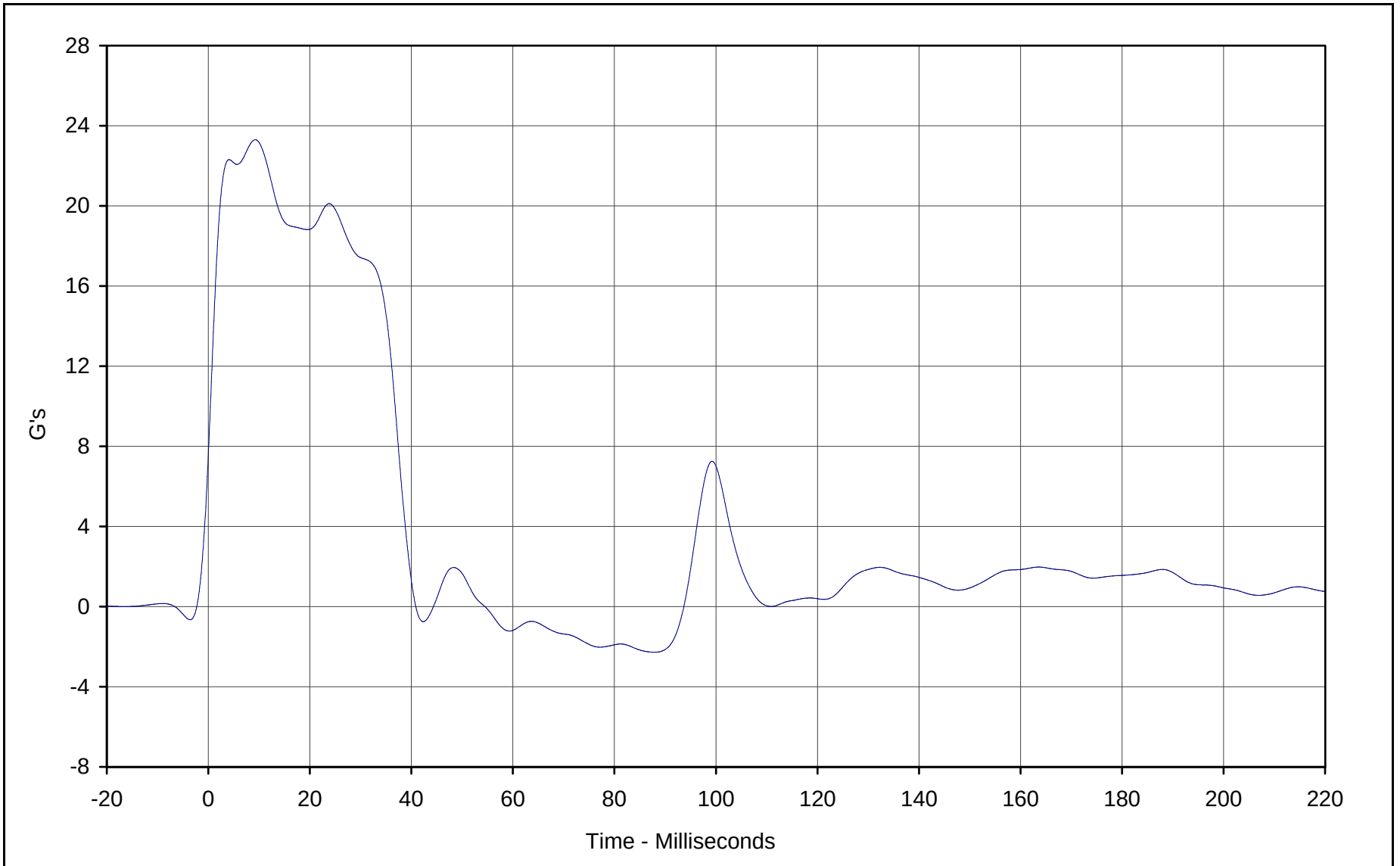
Test I.D.: NF02A

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 7.04   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 23.2   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 18.8   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 17.4   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 17.4   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 38.5   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 64.0 to 78.0   | 72.0   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 60.6   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 118.6  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | N•m     | 84.1 to 108.5  | 88.8   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 56.3   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 101.8  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

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\_\_\_\_\_  
April 2, 2002

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Test Date



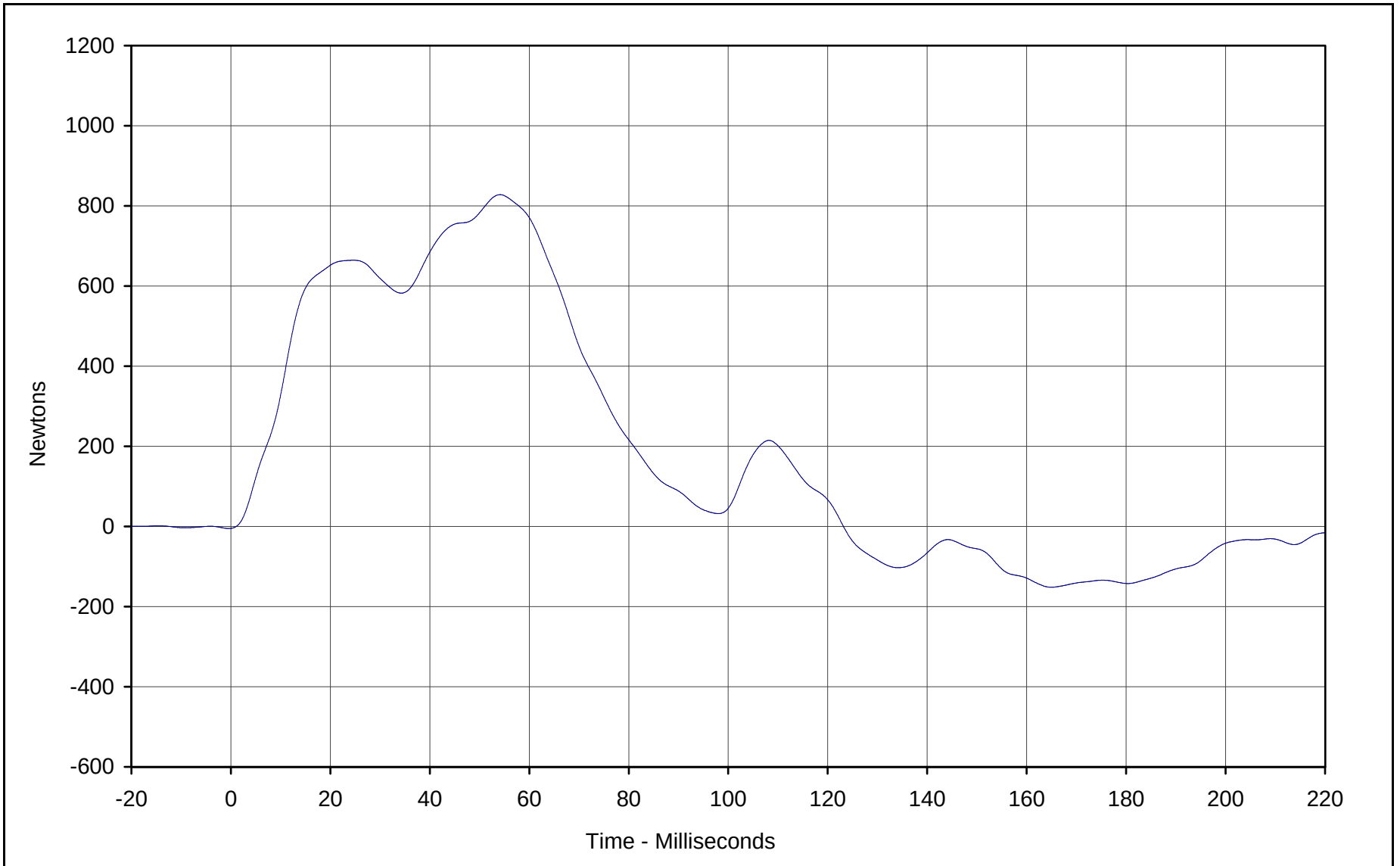
Curve Description: Pendulum Deceleration

|                   |               |    |             |              |
|-------------------|---------------|----|-------------|--------------|
| Maximum Value:    | <u>23.3</u>   | at | <u>9.2</u>  | Milliseconds |
| Minimum Value:    | <u>-2.3</u>   | at | <u>87.9</u> | Milliseconds |
| SAE Filter Class: | <u>60</u>     |    |             |              |
| Date of Test:     | <u>4/2/02</u> |    |             |              |
| ATD Serial No.:   | <u>034</u>    |    |             |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02A





Curve Description: Neck Force X

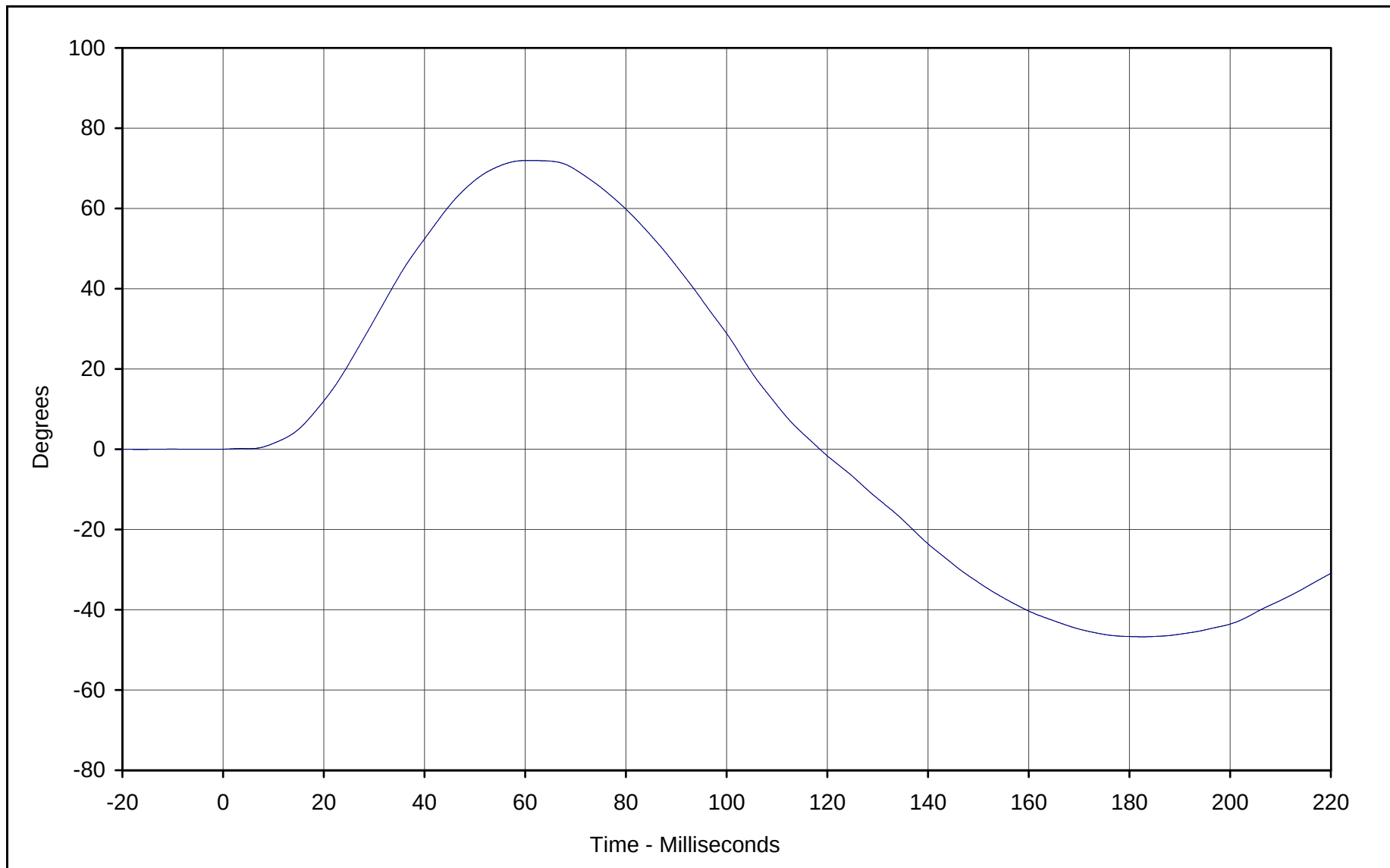
|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 828.0  | at | 54.1  | Milliseconds |
| Minimum Value:    | -151.7 | at | 164.9 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 034    |    |       |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02A







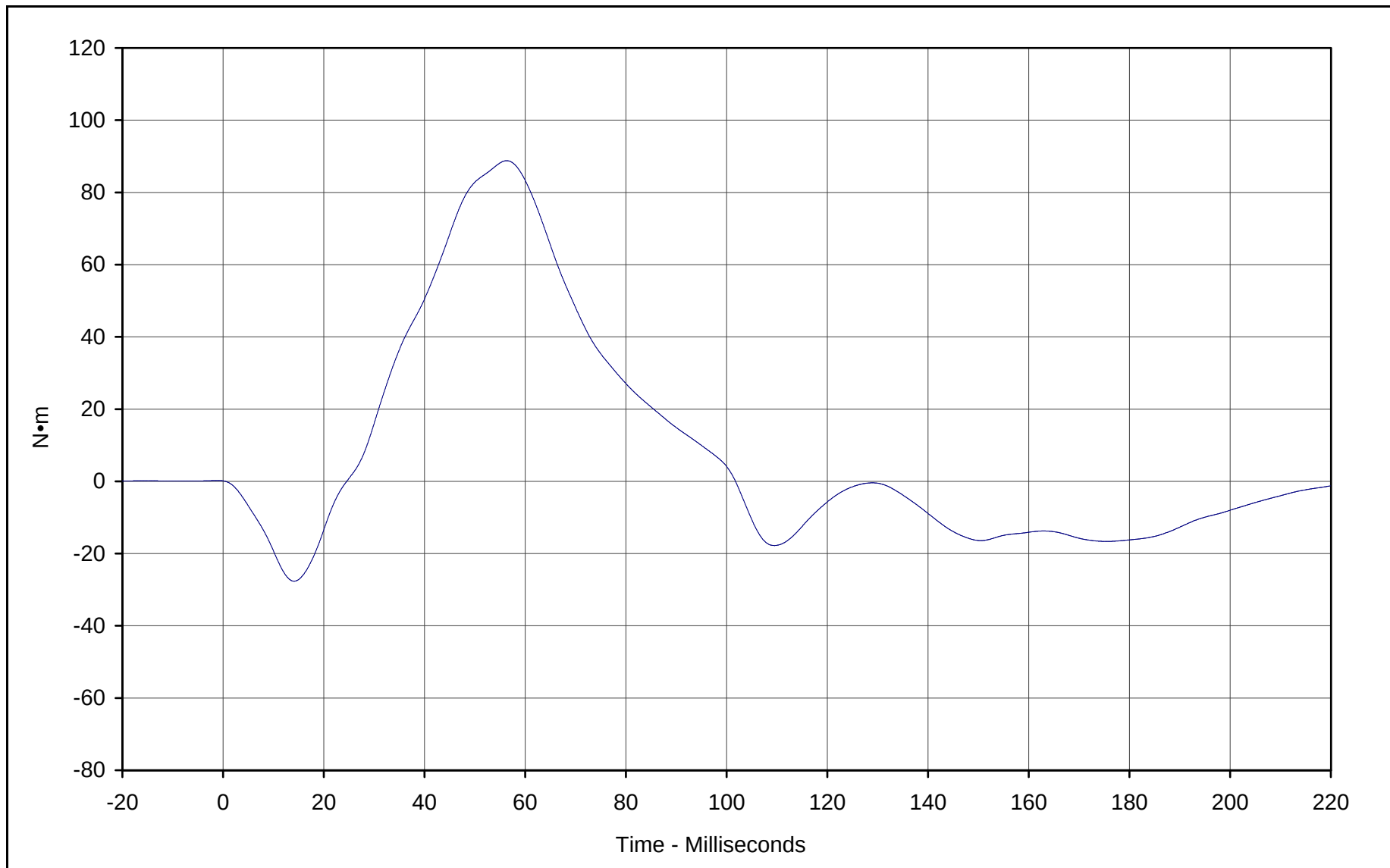
Curve Description: "D" Plane Rotation

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 72.0   | at | 60.6  | Milliseconds |
| Minimum Value:    | -46.7  | at | 182.6 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 034    |    |       |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02A





Curve Description: Moment About Occipital Condyles

Maximum Value: 88.8 at 56.3 Milliseconds

Minimum Value: -27.6 at 14.1 Milliseconds

SAE Filter Class: 60

Date of Test: 4/2/02

ATD Serial No.: 034

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02A





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Neck Extension Test

ATD Serial No.: 034

Part Serial No.: N/A

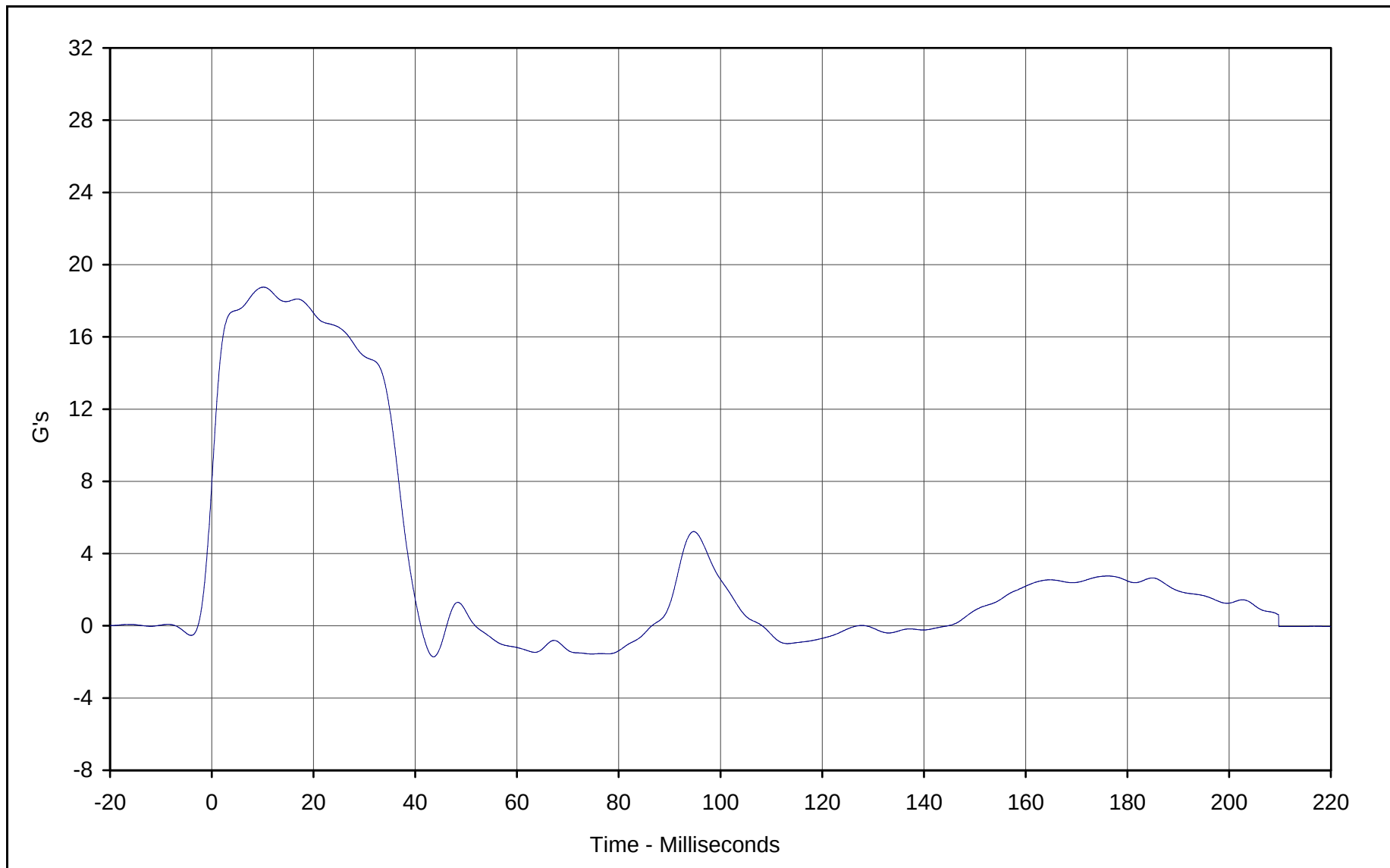
Test I.D.: NE01C

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.95 to 6.19   | 6.02   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 18.8   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 17.3   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 14.9   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 14.9   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 38.1   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 81.0 to 106.0  | 88.5   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 78.8   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 148.3  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | N•m     | -52.9 to- 79.9 | -74.2  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 67.6   | Pass      |
| Negative Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 133.2  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

\_\_\_\_\_  
April 2, 2002

\_\_\_\_\_  
Test Date

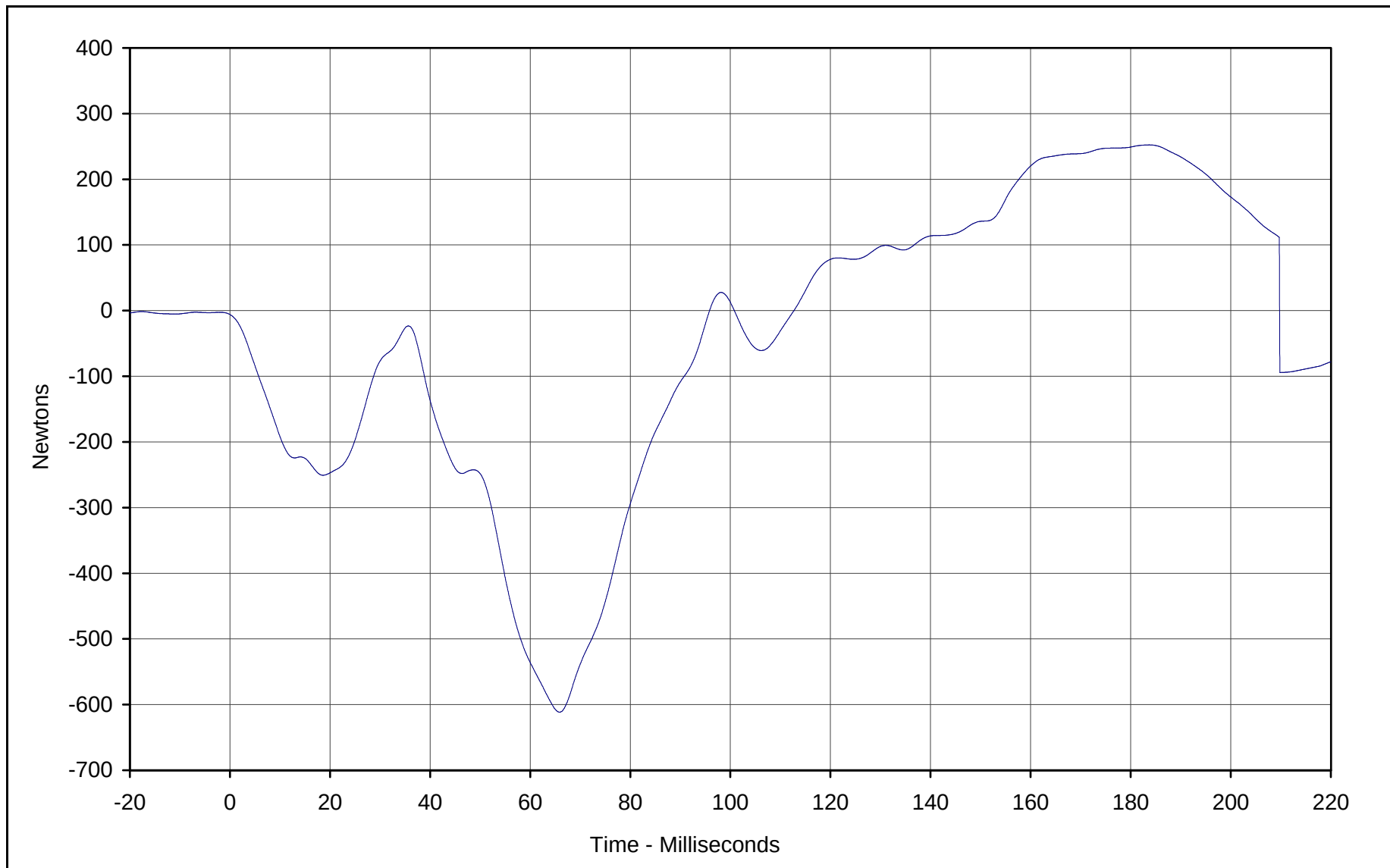


|                    |                       |    |                   |
|--------------------|-----------------------|----|-------------------|
| Curve Description: | Pendulum Deceleration |    |                   |
| Maximum Value:     | 18.8                  | at | 10.2 Milliseconds |
| Minimum Value:     | -1.7                  | at | 43.6 Milliseconds |
| SAE Filter Class:  | 60                    |    |                   |
| Date of Test:      | 4/2/02                |    |                   |
| ATD Serial No.:    | 034                   |    |                   |

|                  |                                       |
|------------------|---------------------------------------|
| Testing Program: | Hybrid III Neck Extension Test (Male) |
|------------------|---------------------------------------|

|                   |                                   |
|-------------------|-----------------------------------|
| Test Information: | S/N of Part: N/A Test I.D.: NE01C |
|-------------------|-----------------------------------|





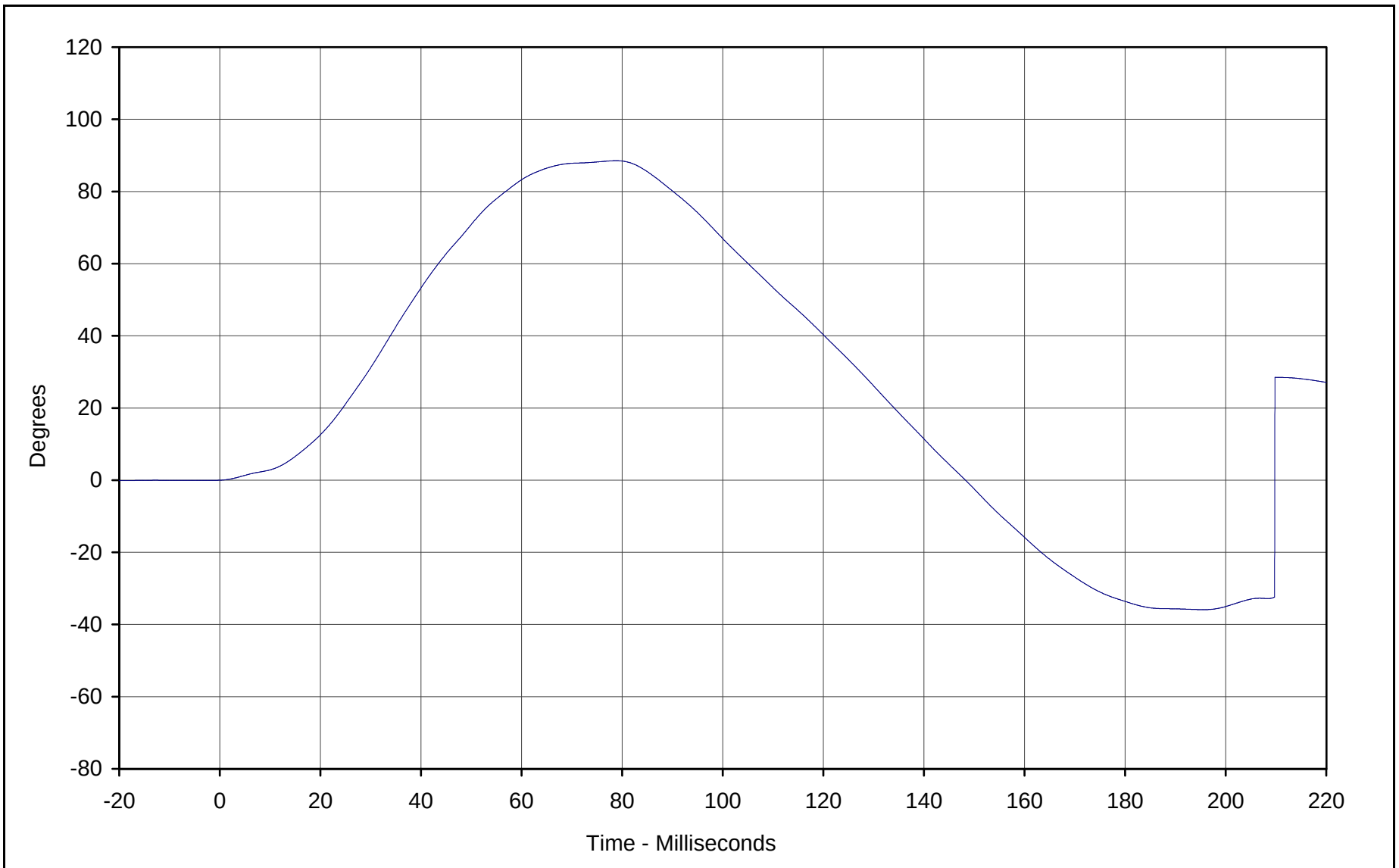
Curve Description: Neck Force X

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 252.4  | at | 183.7 | Milliseconds |
| Minimum Value:    | -611.6 | at | 65.9  | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 034    |    |       |              |

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01C





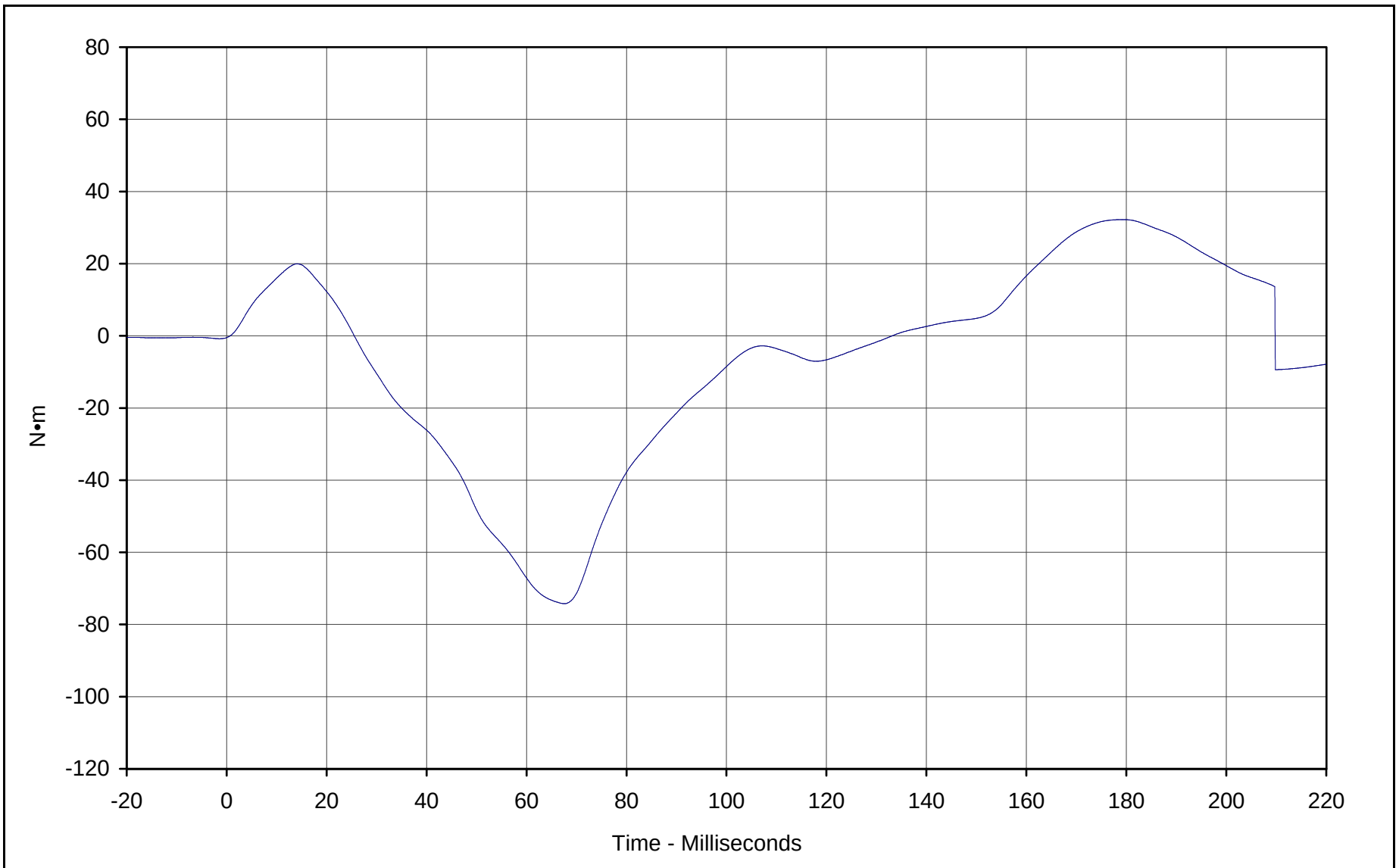
Curve Description: "D" Plane Rotation

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 88.5   | at | 78.8  | Milliseconds |
| Minimum Value:    | -35.9  | at | 195.5 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 034    |    |       |              |

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01C





Curve Description: Moment About Occipital Condyles

Maximum Value: 32.2 at 179.2 Milliseconds

Minimum Value: -74.2 at 67.6 Milliseconds

SAE Filter Class: 60

Date of Test: 4/2/02

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01C







# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### External Measurements

ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: N/A

| External Measurement Data             |       |               |        |           |
|---------------------------------------|-------|---------------|--------|-----------|
| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
| Laboratory temperature                | °C    | 20.4 to 22.1  | 20.9   | Pass      |
| Laboratory relative humidity          | %     | 10 to 70      | 35     | Pass      |
| A - Total sitting height              | mm    | 879 to 889    | 880    | Pass      |
| B - Shoulder pivot height             | mm    | 505 to 521    | 520    | Pass      |
| C - "H" point height                  | mm    | 84 to 89      | 85     | Pass      |
| D - "H" point from seat back          | mm    | 135 to 140    | 135    | Pass      |
| E - Shoulder pivot from back          | mm    | 84 to 94      | 85     | Pass      |
| F - Thigh clearance                   | mm    | 140 to 155    | 150    | Pass      |
| G - Elbow back to wrist pivot         | mm    | 290 to 305    | 295    | Pass      |
| H - Skull cap to back line            | mm    | 41 to 46      | 45     | Pass      |
| I - Shoulder to elbow length          | mm    | 330 to 345    | 335    | Pass      |
| J - Elbow rest height                 | mm    | 190 to 211    | 200    | Pass      |
| K - Buttock to knee length            | mm    | 579 to 604    | 585    | Pass      |
| L - Popliteal length                  | mm    | 429 to 455    | 445    | Pass      |
| M - Knee pivot height                 | mm    | 485 to 500    | 490    | Pass      |
| N - Buttock popliteal length          | mm    | 452 to 477    | 460    | Pass      |
| O - Chest depth                       | mm    | 213 to 229    | 220    | Pass      |
| P - Foot length                       | mm    | 251 to 267    | 260    | Pass      |
| V - Shoulder breadth                  | mm    | 422 to 437    | 430    | Pass      |
| W - Foot breadth                      | mm    | 91 to 107     | 95     | Pass      |
| Y - Chest circumference               | mm    | 970 to 1001   | 995    | Pass      |
| Z - Waist circumference               | mm    | 836 to 866    | 850    | Pass      |
| AA - Location for chest circumference | mm    | 429 to 434    | 430    | Pass      |
| BB - Location for waist circumference | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                  |       |               |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

\_\_\_\_\_  
April 3, 2002

\_\_\_\_\_  
Test Date



# Hybrid III Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Impact Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: LK01B

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.5  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.10   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5561   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

ATD Serial No.: 035

Location: Right Knee

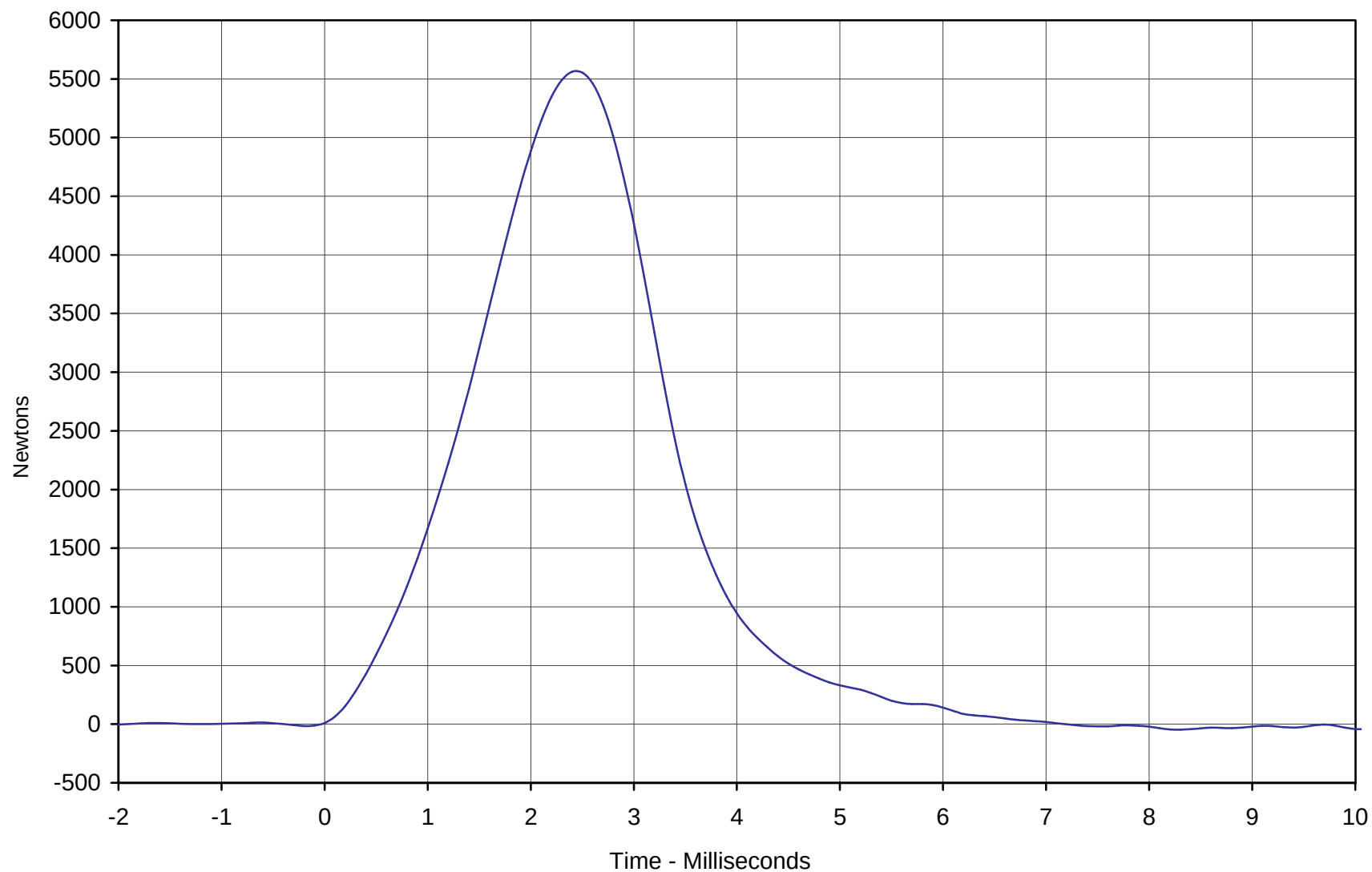
Test I.D.: RK01B

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.5  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.09   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5624   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

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April 1, 2002

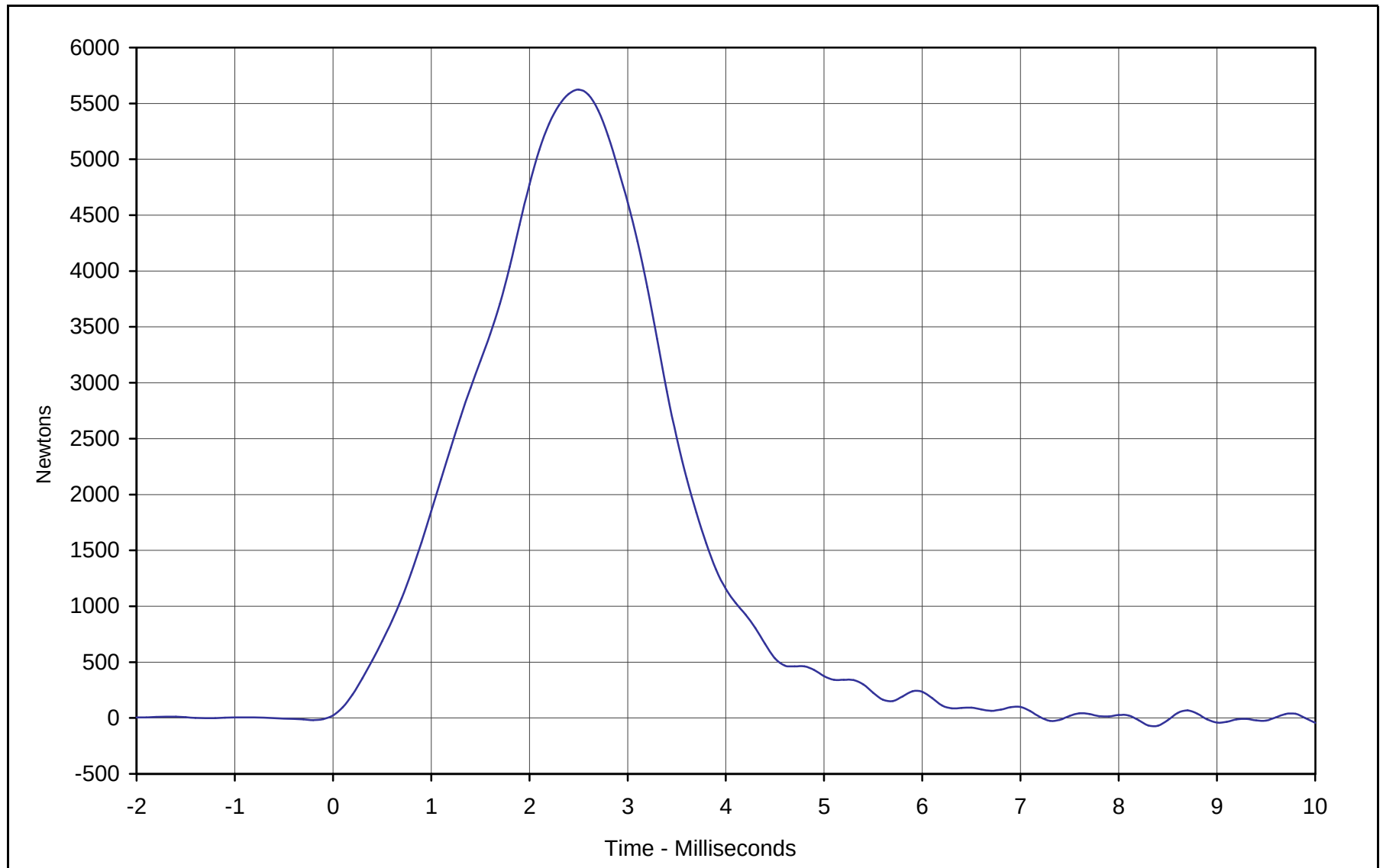
Test Date



Curve Description: Probe Force  
Maximum Value: 5560.7 at 2.4 Milliseconds  
Minimum Value: -22.1 at 8.0 Milliseconds  
SAE Filter Class: 600  
Date of Test: 4/1/02  
ATD Serial No.: 035

Test Program: Hybrid III Knee Impact Test  
Test Information: Location: Left Knee Test I.D.: LK01B





Curve Description: Probe Force

Maximum Value: 5623.6 at 2.5 Milliseconds

Minimum Value: -25.3 at 7.3 Milliseconds

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 035

Test Program: Hybrid III Knee Impact Test

Test Information: Location: Right Knee Test I.D.: RK01B





# Hybrid III Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Slider Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: KS003

| Tested Parameter             |       | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|-------|---------------|--------|-----------|
| Laboratory Temperature       |       | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity |       | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     |       | m/sec | 2.70 to 2.80  | 2.73   | Pass      |
| Impact Force at:             | 10 mm | kN    | 1.26 to 1.72  | 1.69   | Pass      |
|                              | 18 mm | kN    | 2.27 to 3.096 | 2.98   | Pass      |
| Overall Test Results         |       |       |               |        | Pass      |

ATD Serial No.: 035

Location: Right Knee

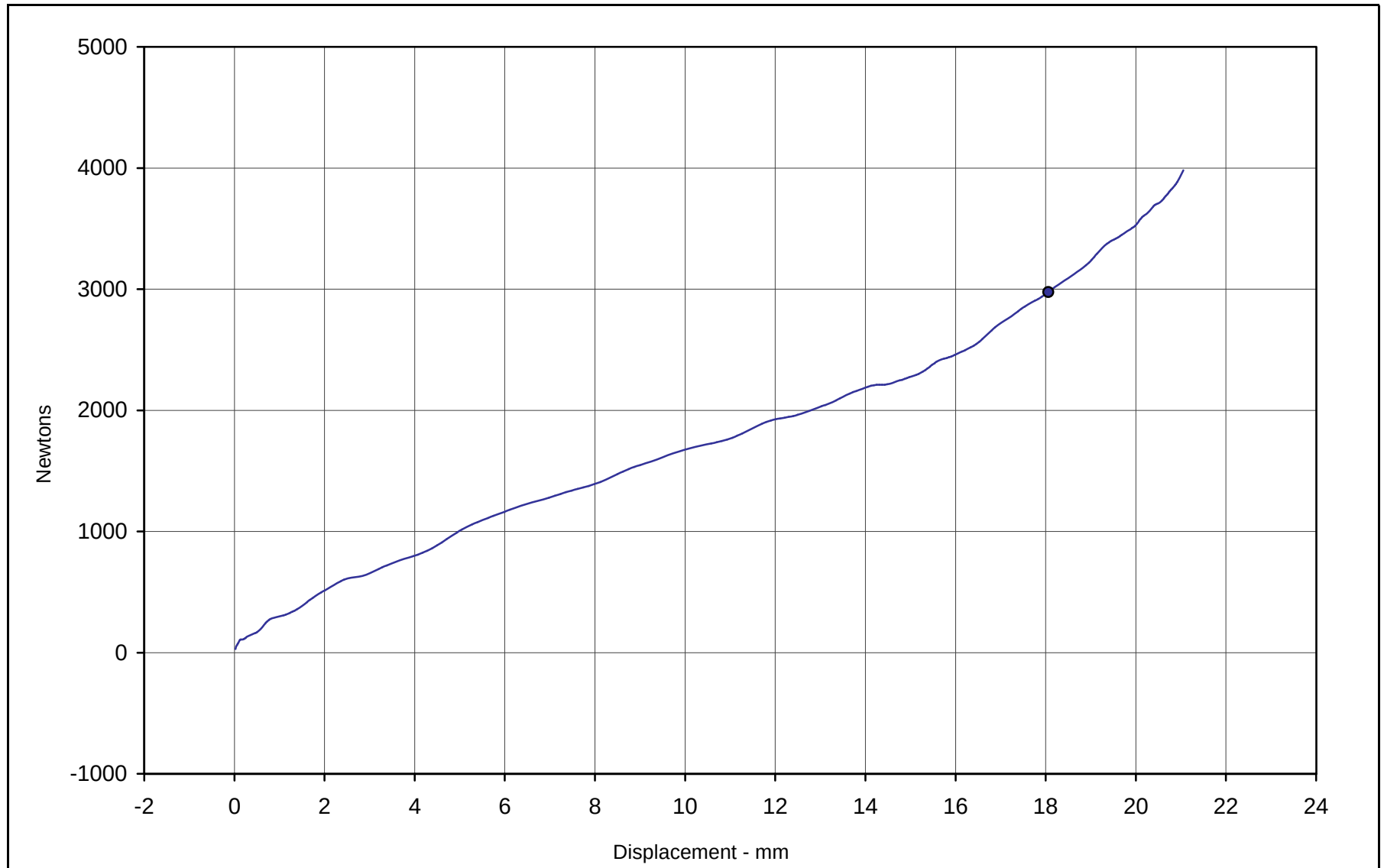
Test I.D.: KS004

| Tested Parameter             |       | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|-------|---------------|--------|-----------|
| Laboratory Temperature       |       | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity |       | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     |       | m/sec | 2.70 to 2.80  | 2.78   | Pass      |
| Impact Force at:             | 10 mm | kN    | 1.26 to 1.72  | 1.54   | Pass      |
|                              | 18 mm | kN    | 2.27 to 3.096 | 2.94   | Pass      |
| Overall Test Results         |       |       |               |        | Pass      |

Laboratory Technician

April 1, 2002

Test Date



Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1686 at 10.0 mm

Femur Force: 2977 at 18.0 mm

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 035

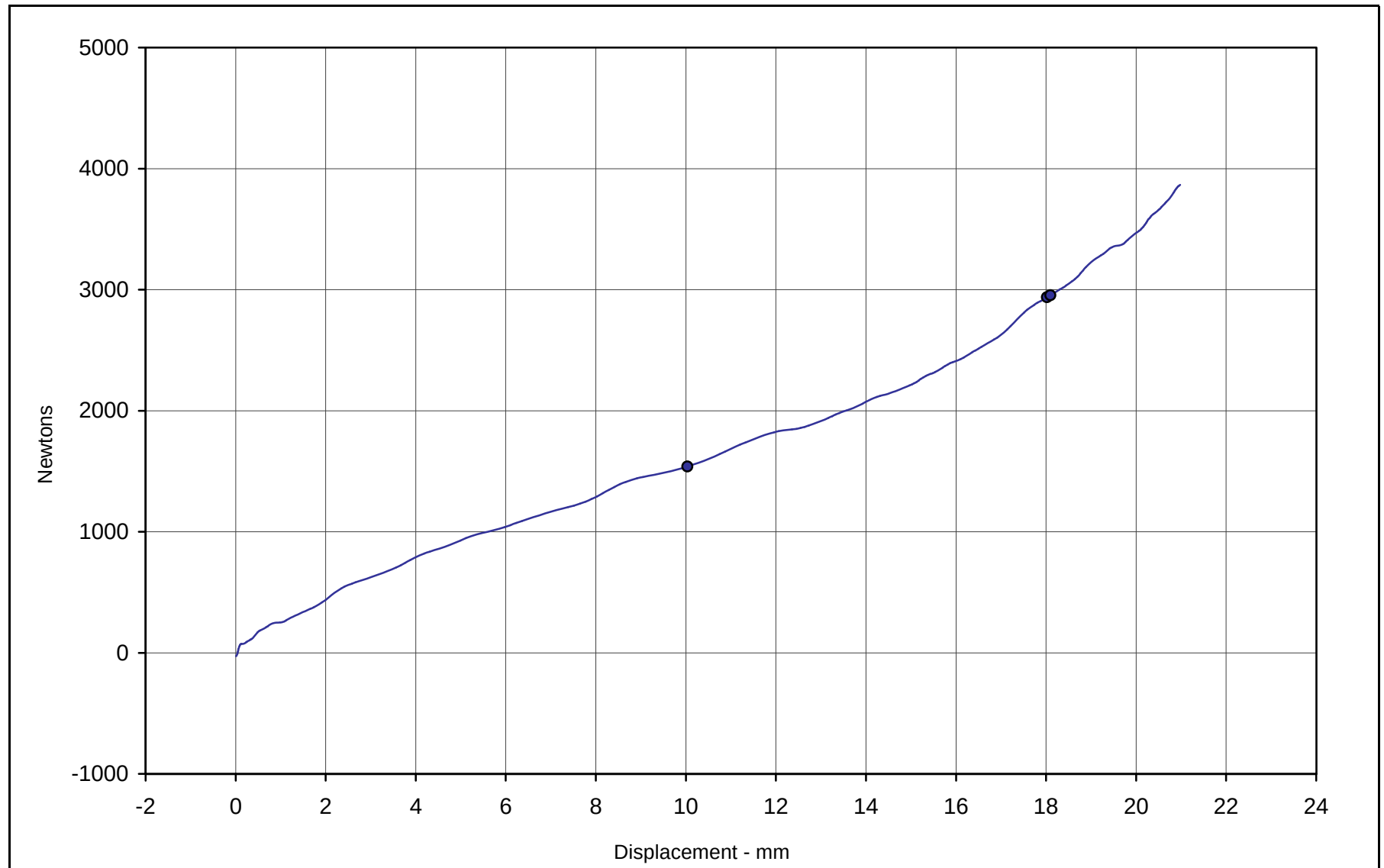
Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Left Knee Test I.D.: KS003





Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1539 at 10.0 mm

Femur Force: 2937 at 18.0 mm

SAE Filter Class: 600

Date of Test: 4/1/02

ATD Serial No.: 035

Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Right Knee Test I.D.: KS004







# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Head Drop Calibration

ATD Serial No.: 035

Part Serial No.: N/A

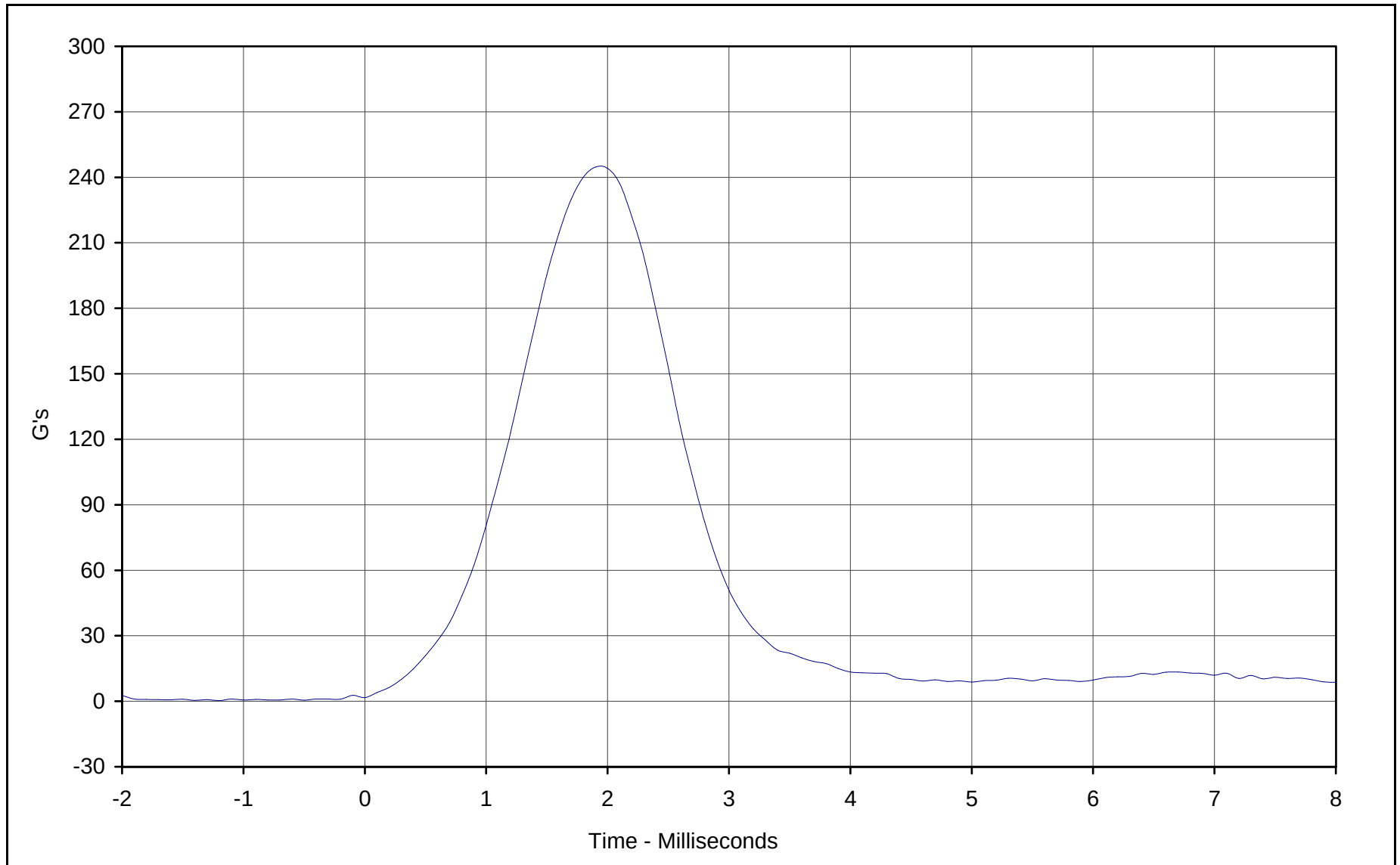
Test I.D.: HD01B

| Tested Parameter             | Units  | Specification  | Result | Pass/Fail |
|------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature       | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration  | G's    | 225.0 to 275.0 | 244.7  | Pass      |
| Peak Lateral Acceleration    | G's    | ≤15.0          | 1.4    | Pass      |
| Is Acceleration Unimodal?    | Yes/No | Yes            | Yes    | Pass      |
| Overall Test Results         |        |                |        | Pass      |

\_\_\_\_\_  
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April 1, 2002

\_\_\_\_\_  
Test Date



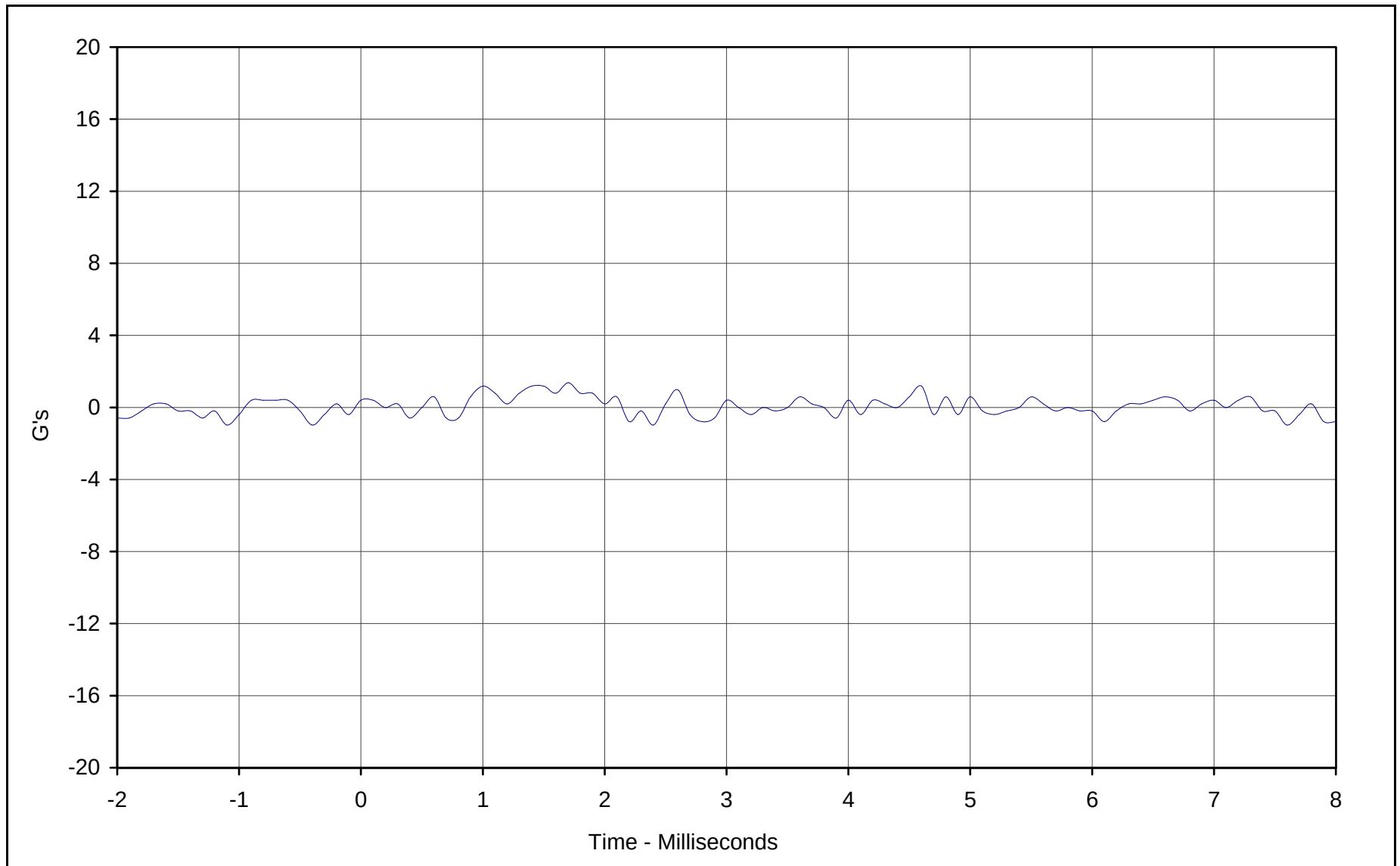
Curve Description: Head Resultant Acceleration

|                   |               |    |             |              |
|-------------------|---------------|----|-------------|--------------|
| Maximum Value:    | <u>244.7</u>  | at | <u>1.9</u>  | Milliseconds |
| Minimum Value:    | <u>0.3</u>    | at | <u>-1.2</u> | Milliseconds |
| SAE Filter Class: | <u>1000</u>   |    |             |              |
| Date of Test:     | <u>4/1/02</u> |    |             |              |
| ATD Serial No.:   | <u>035</u>    |    |             |              |

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD01B





Curve Description: Head Acceleration Y Axis

Maximum Value: 1.4 at 1.7 Milliseconds

Minimum Value: -1.0 at -1.1 Milliseconds

SAE Filter Class: 1000

Date of Test: 4/1/02

ATD Serial No.: 035

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD01B





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Thorax Impact Test

ATD Serial No.: 035

Part Serial No.: N/A

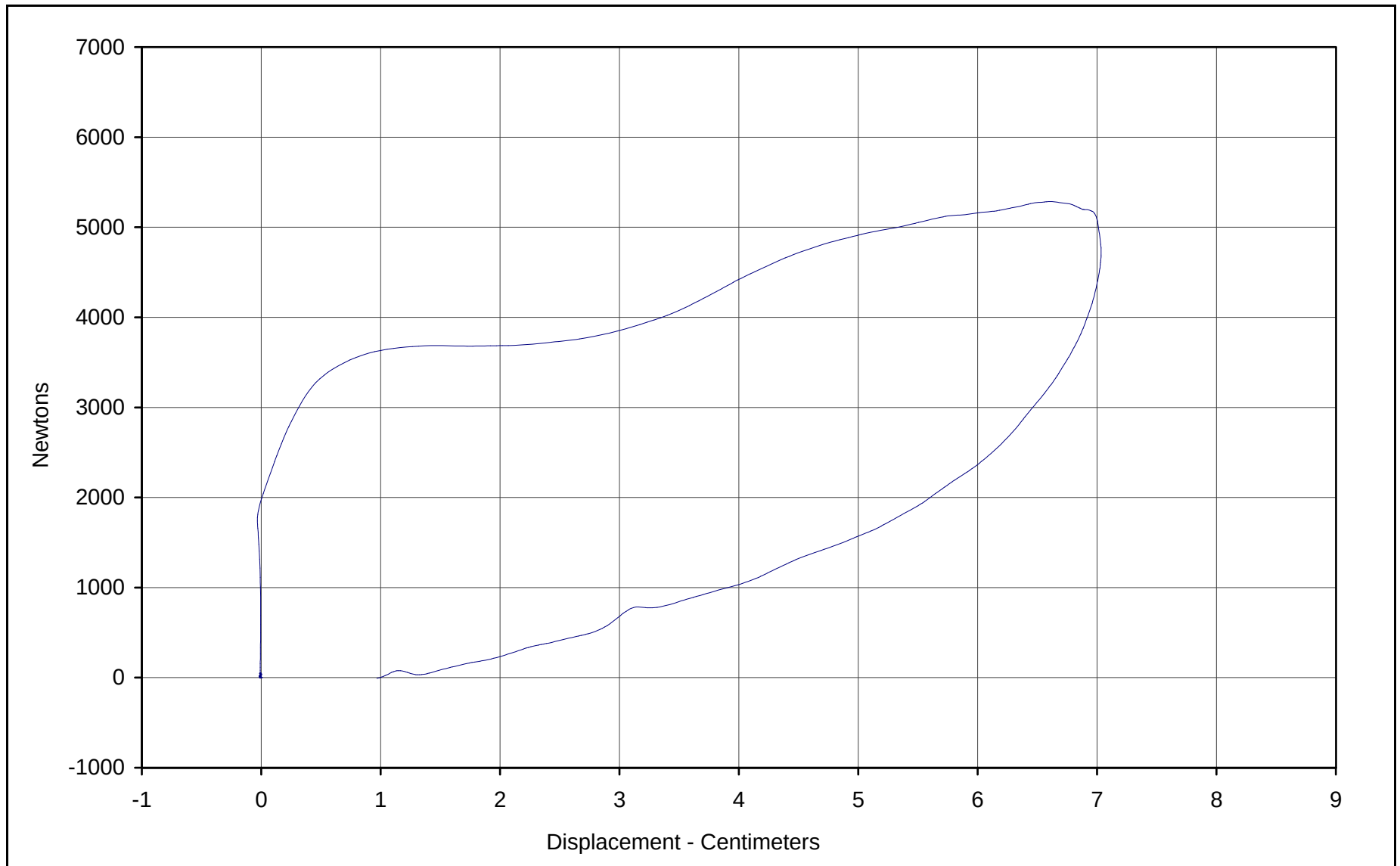
Test I.D.: CH01B

| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity               | m/s     | 6.58 to 6.82  | 6.74   | Pass      |
| Peak Probe Force             | Newtons | 5159 to 5893  | 5285   | Pass      |
| Peak Sternum Displacement    | CM      | 6.35 to 7.26  | 7.03   | Pass      |
| Internal Hysteresis          | %       | 69 to 85      | 73.3   | Pass      |
| Overall Test Results         |         |               |        | Pass      |

\_\_\_\_\_  
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\_\_\_\_\_  
April 2, 2002

\_\_\_\_\_  
Test Date



Curve Description: Probe Force vs. Chest Displacement

Probe Force: 5285.3 Newtons

Chest Displ.: 7.03 Centimeters

SAE Filter Class: none

Date of Test: 4/2/02

ATD Serial No.: 035

Testing Program: Hybrid III Thorax Impact Test

Test Information: S/N of Part: N/A Test I.D.: CH01B





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Neck Flexion Test

ATD Serial No.: 035

Part Serial No.: N/A

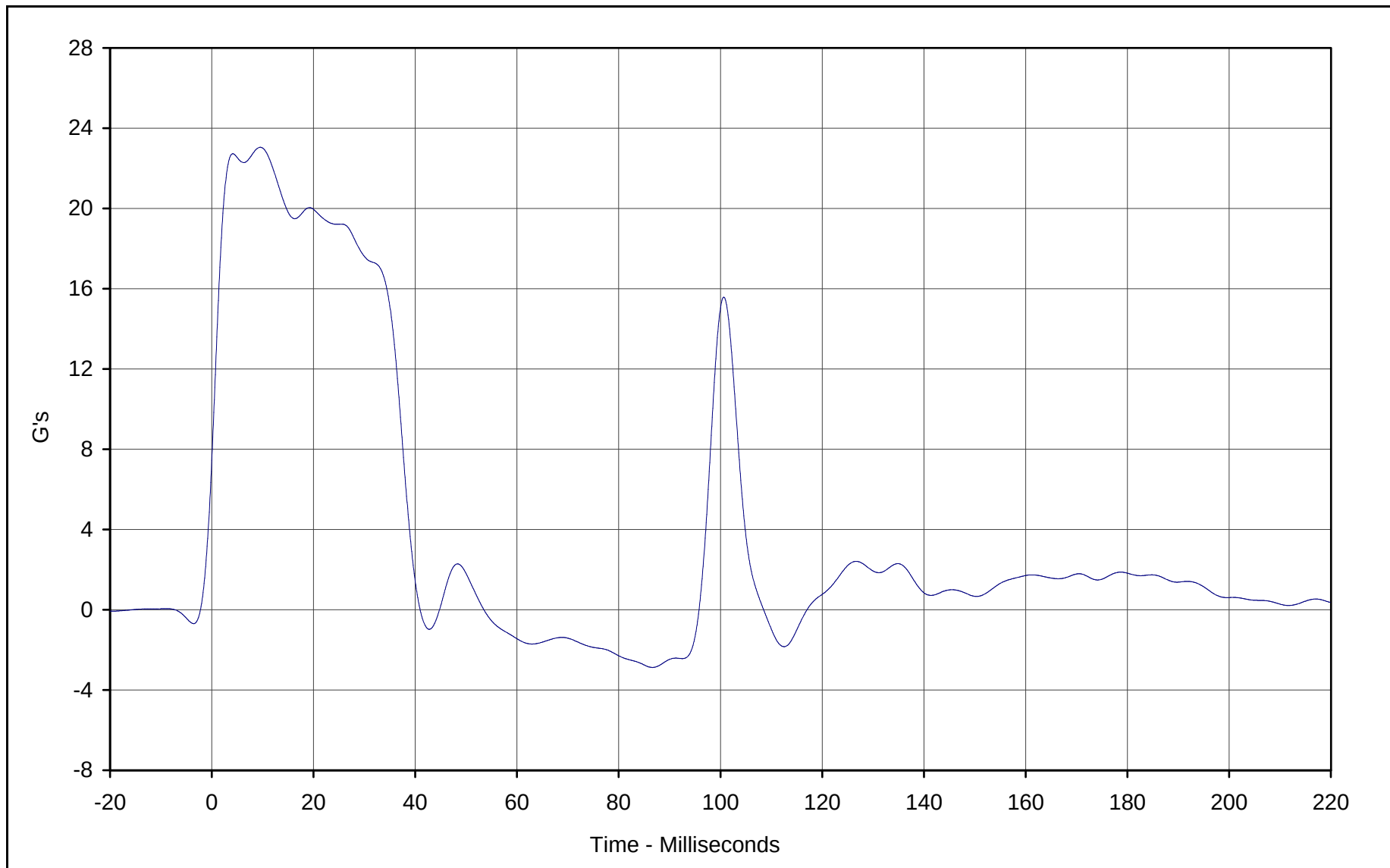
Test I.D.: NF02B

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 7.04   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 23.0   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 20.0   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 17.6   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 17.6   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 38.6   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 64.0 to 78.0   | 67.2   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 60.5   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 116.7  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | N•m     | 84.1 to 108.5  | 86.8   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 52.5   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 101.0  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

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April 2, 2002

\_\_\_\_\_  
Test Date



Curve Description: Pendulum Deceleration

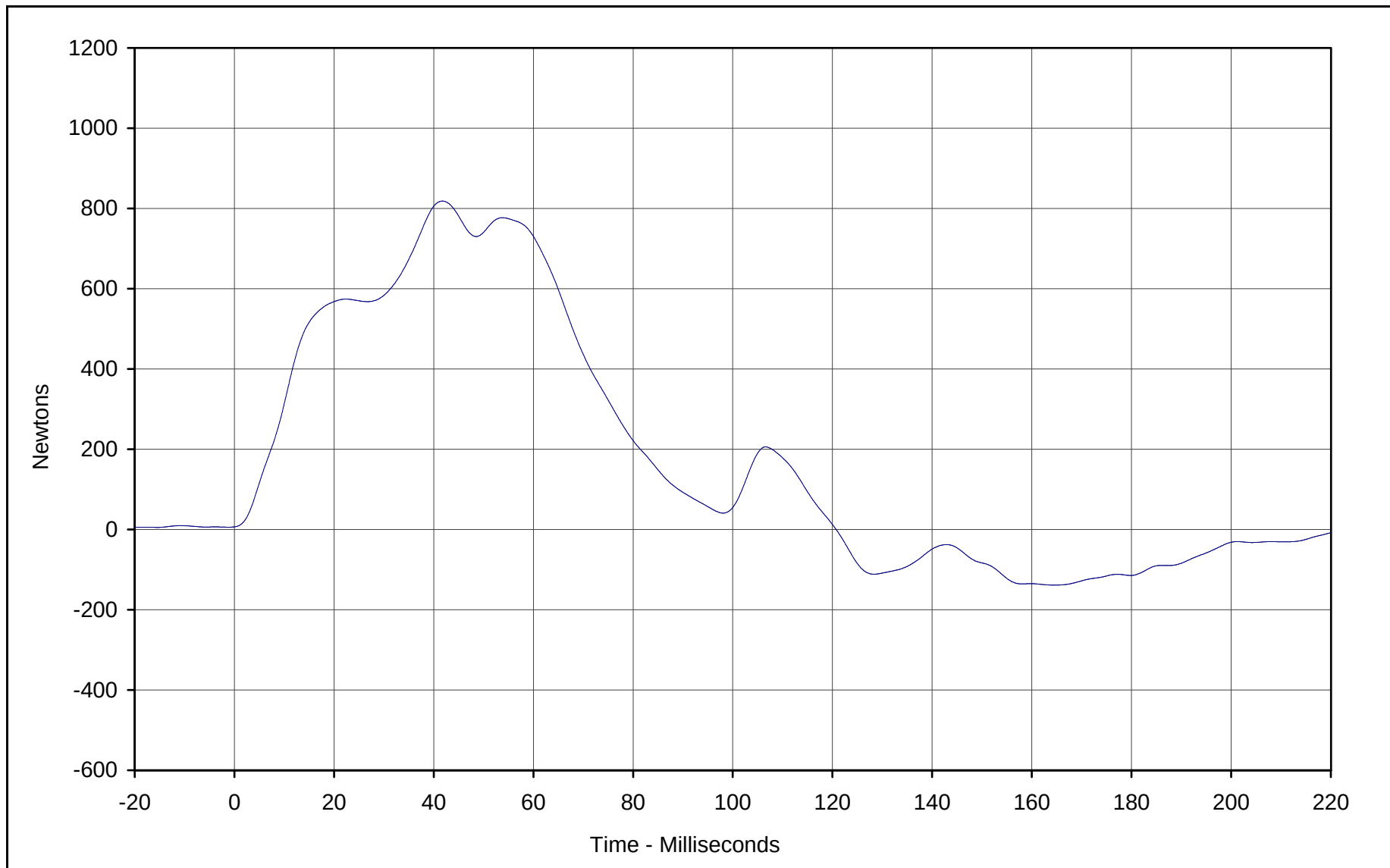
|                   |               |    |             |              |
|-------------------|---------------|----|-------------|--------------|
| Maximum Value:    | <u>23.0</u>   | at | <u>9.5</u>  | Milliseconds |
| Minimum Value:    | <u>-2.9</u>   | at | <u>86.6</u> | Milliseconds |
| SAE Filter Class: | <u>60</u>     |    |             |              |
| Date of Test:     | <u>4/2/02</u> |    |             |              |
| ATD Serial No.:   | <u>035</u>    |    |             |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02B







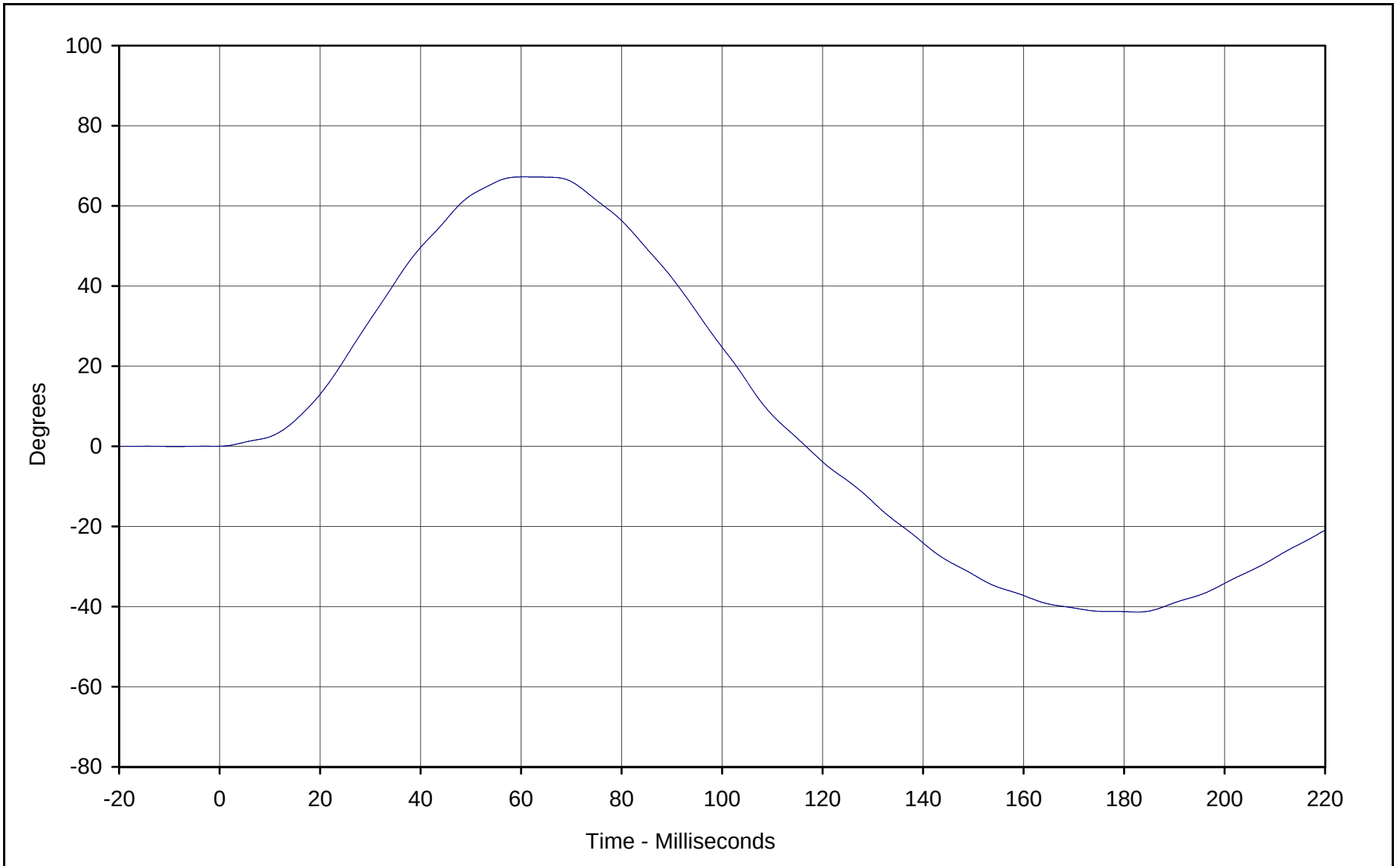
Curve Description: Neck Force X

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 818.4  | at | 41.7  | Milliseconds |
| Minimum Value:    | -138.6 | at | 164.5 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 035    |    |       |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02B





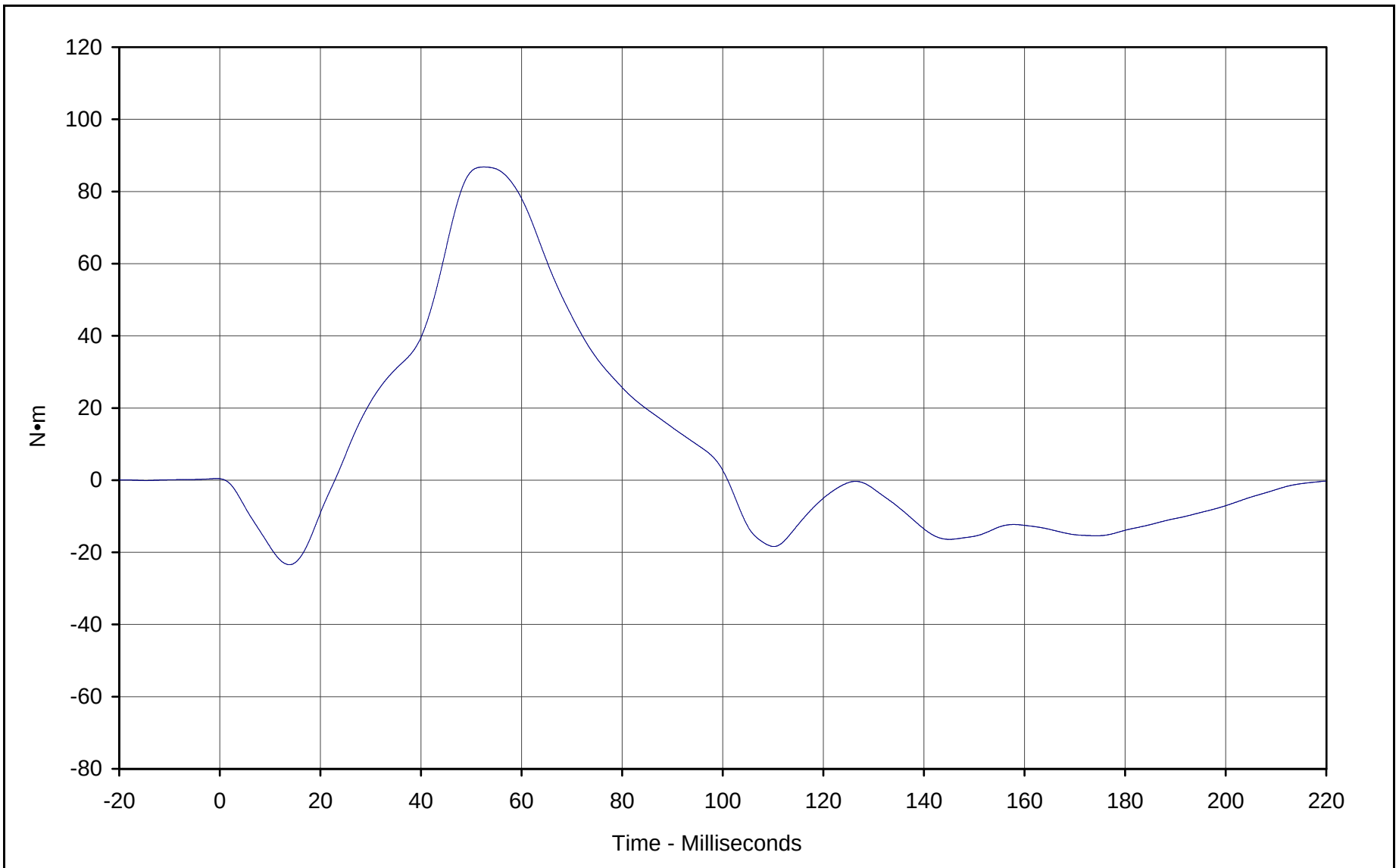
Curve Description: "D" Plane Rotation

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 67.2   | at | 60.5  | Milliseconds |
| Minimum Value:    | -41.3  | at | 182.7 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 035    |    |       |              |

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02B





Curve Description: Moment About Occipital Condyles

Maximum Value: 86.8 at 52.5 Milliseconds

Minimum Value: -23.4 at 13.8 Milliseconds

SAE Filter Class: 60

Date of Test: 4/2/02

ATD Serial No.: 035

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF02B





# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### Neck Extension Test

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: NE01D

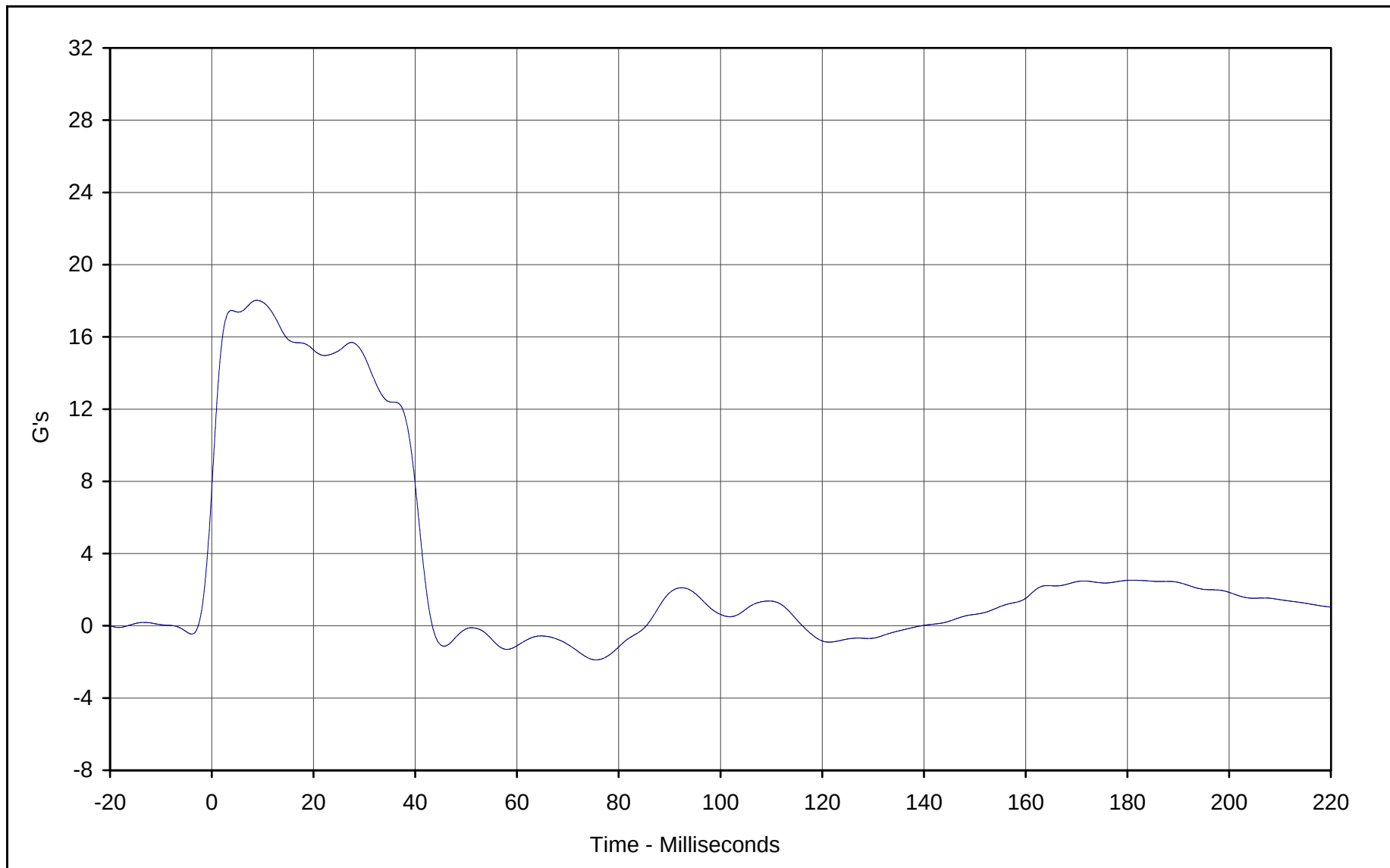
| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.95 to 6.19   | 6.10   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 17.9   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 15.3   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 14.9   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 14.9   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 41.1   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 81.0 to 106.0  | 88.2   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 76.9   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 152.8  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | N•m     | -52.9 to- 79.9 | -71.4  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 66.5   | Pass      |
| Negative Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 139.0  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

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April 2, 2002

\_\_\_\_\_  
Test Date

E-40



|                    |                       |    |                   |
|--------------------|-----------------------|----|-------------------|
| Curve Description: | Pendulum Deceleration |    |                   |
| Maximum Value:     | 18.0                  | at | 8.9 Milliseconds  |
| Minimum Value:     | -1.9                  | at | 75.5 Milliseconds |
| SAE Filter Class:  | 60                    |    |                   |
| Date of Test:      | 4/2/02                |    |                   |
| ATD Serial No.:    | 035                   |    |                   |

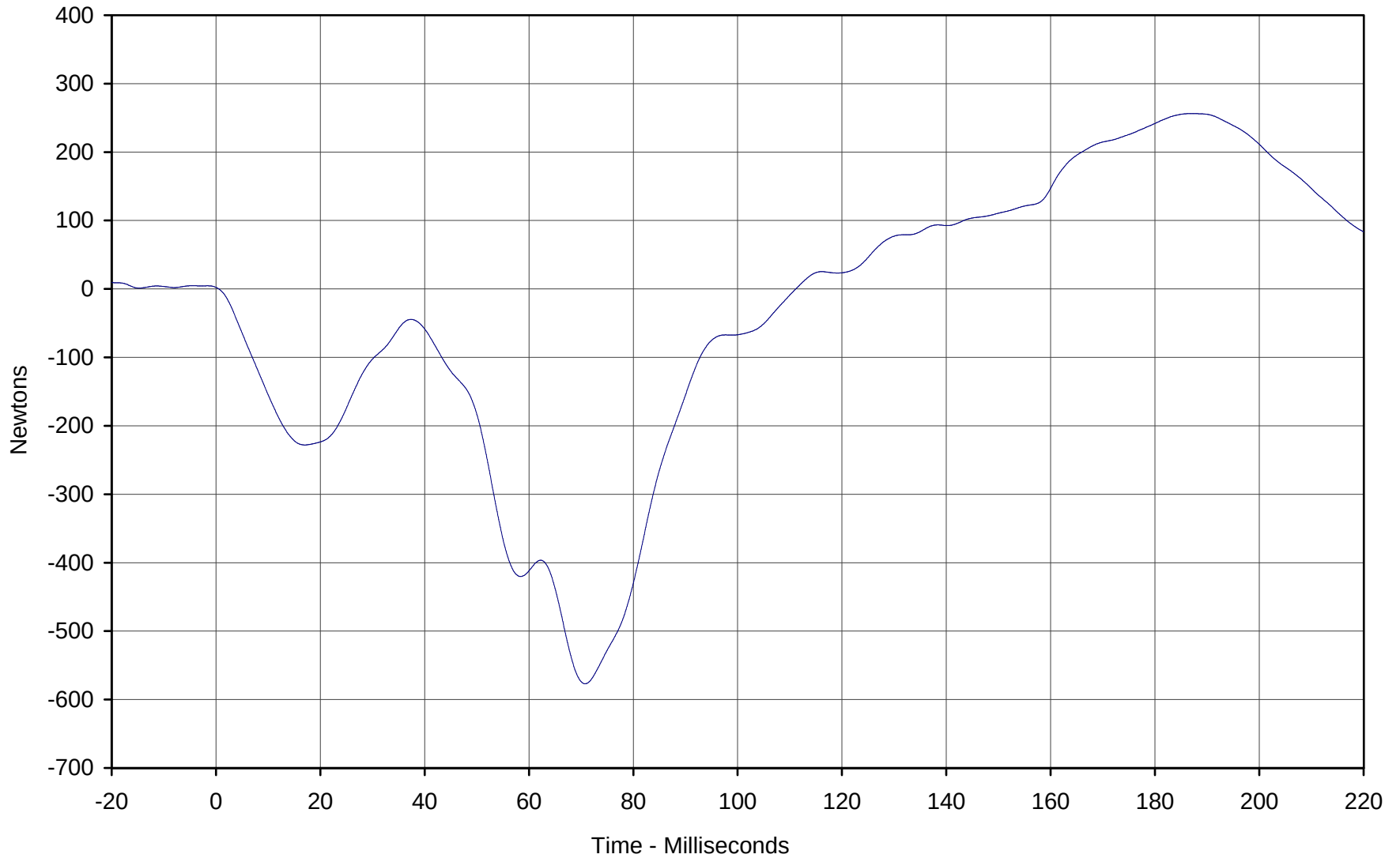
Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01D



KAR22001-03

E-41

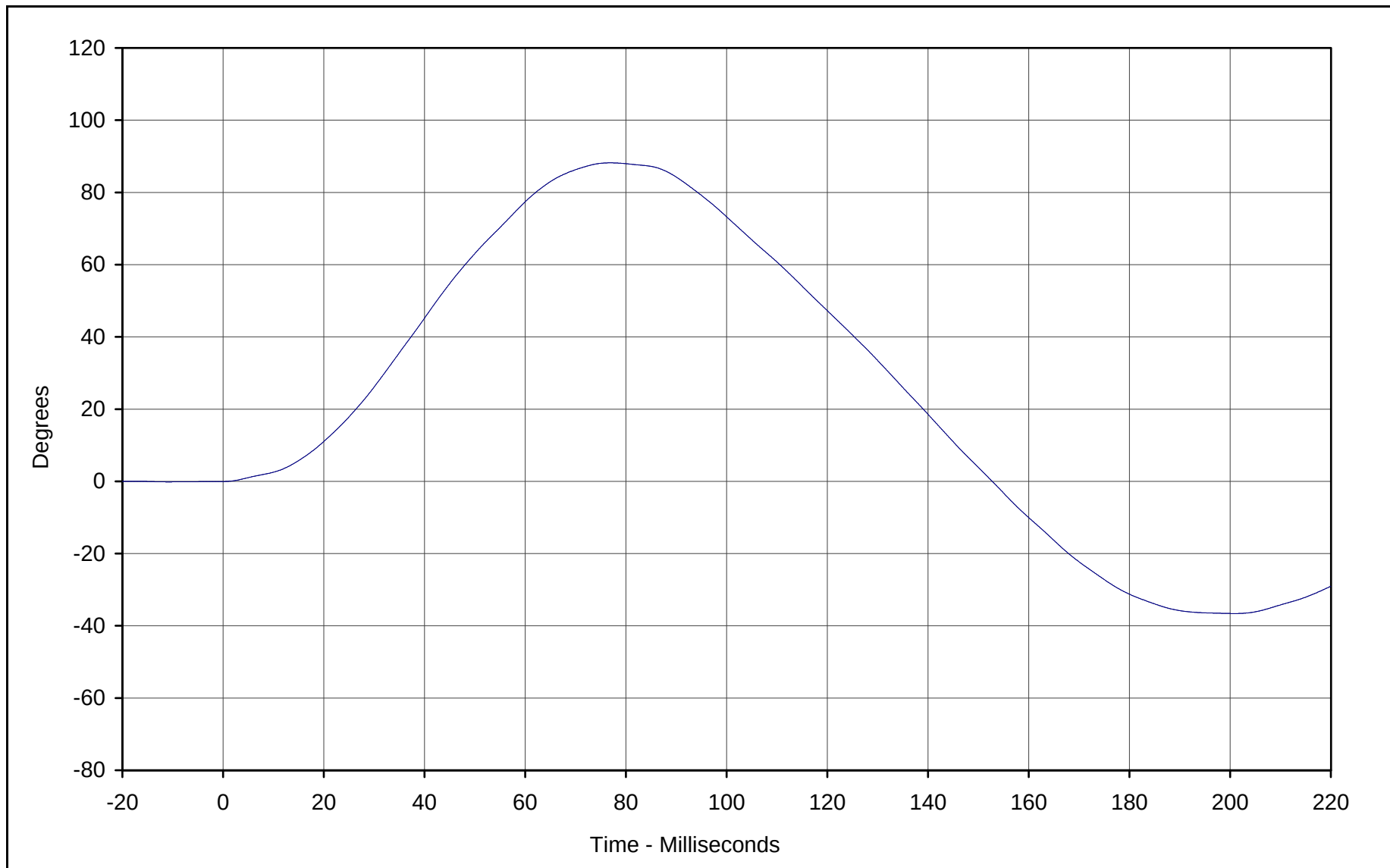


|                    |              |    |                    |
|--------------------|--------------|----|--------------------|
| Curve Description: | Neck Force X |    |                    |
| Maximum Value:     | 256.2        | at | 186.9 Milliseconds |
| Minimum Value:     | -577.0       | at | 70.8 Milliseconds  |
| SAE Filter Class:  | 60           |    |                    |
| Date of Test:      | 4/2/02       |    |                    |
| ATD Serial No.:    | 035          |    |                    |

|                   |                                       |
|-------------------|---------------------------------------|
| Testing Program:  | Hybrid III Neck Extension Test (Male) |
| Test Information: | S/N of Part: N/A Test I.D.: NE01D     |



KAR22001-03



Curve Description: "D" Plane Rotation

|                   |        |    |       |              |
|-------------------|--------|----|-------|--------------|
| Maximum Value:    | 88.2   | at | 76.9  | Milliseconds |
| Minimum Value:    | -36.6  | at | 200.9 | Milliseconds |
| SAE Filter Class: | 60     |    |       |              |
| Date of Test:     | 4/2/02 |    |       |              |
| ATD Serial No.:   | 035    |    |       |              |

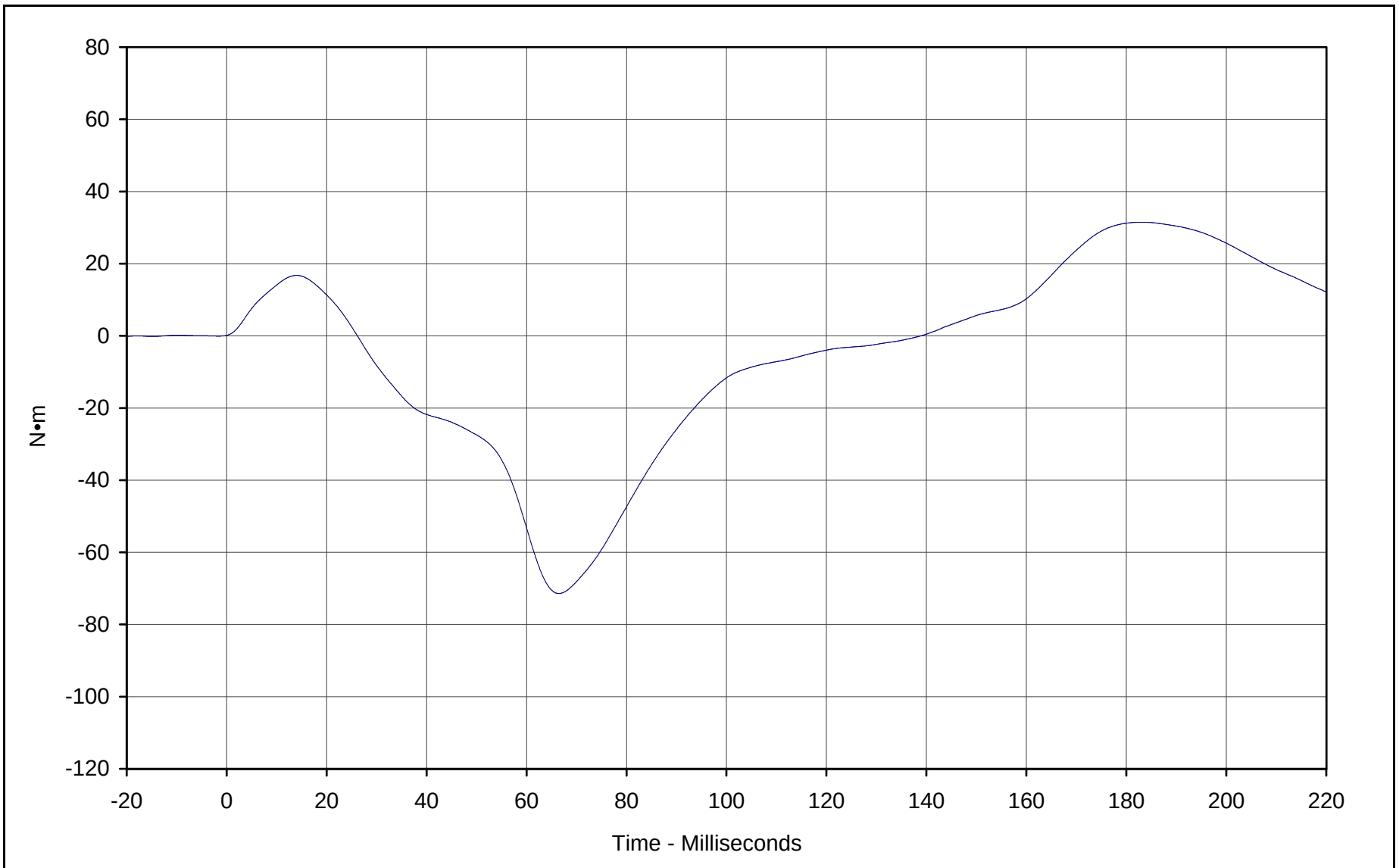
Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01D





E-43



Curve Description: Moment About Occipital Condyles  
Maximum Value: 31.5 at 183.2 Milliseconds  
Minimum Value: -71.4 at 66.5 Milliseconds  
SAE Filter Class: 60  
Date of Test: 4/2/02  
ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)  
Test Information: S/N of Part: N/A Test I.D.: NE01D



KAR22001-03



# Hybrid III Calibration Data Sheet

## 50<sup>TH</sup> Percentile Male

### External Measurements

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: N/A

| External Measurement Data             |       |               |        |           |
|---------------------------------------|-------|---------------|--------|-----------|
| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
| Laboratory temperature                | °C    | 20.4 to 22.1  | 20.9   | Pass      |
| Laboratory relative humidity          | %     | 10 to 70      | 35     | Pass      |
| A - Total sitting height              | mm    | 879 to 889    | 885    | Pass      |
| B - Shoulder pivot height             | mm    | 505 to 521    | 515    | Pass      |
| C - "H" point height                  | mm    | 84 to 89      | 85     | Pass      |
| D - "H" point from seat back          | mm    | 135 to 140    | 135    | Pass      |
| E - Shoulder pivot from back          | mm    | 84 to 94      | 90     | Pass      |
| F - Thigh clearance                   | mm    | 140 to 155    | 145    | Pass      |
| G - Elbow back to wrist pivot         | mm    | 290 to 305    | 300    | Pass      |
| H - Skull cap to back line            | mm    | 41 to 46      | 45     | Pass      |
| I - Shoulder to elbow length          | mm    | 330 to 345    | 340    | Pass      |
| J - Elbow rest height                 | mm    | 190 to 211    | 195    | Pass      |
| K - Buttock to knee length            | mm    | 579 to 604    | 600    | Pass      |
| L - Popliteal length                  | mm    | 429 to 455    | 440    | Pass      |
| M - Knee pivot height                 | mm    | 485 to 500    | 495    | Pass      |
| N - Buttock popliteal length          | mm    | 452 to 477    | 470    | Pass      |
| O - Chest depth                       | mm    | 213 to 229    | 225    | Pass      |
| P - Foot length                       | mm    | 251 to 267    | 255    | Pass      |
| V - Shoulder breadth                  | mm    | 422 to 437    | 425    | Pass      |
| W - Foot breadth                      | mm    | 91 to 107     | 105    | Pass      |
| Y - Chest circumference               | mm    | 970 to 1001   | 980    | Pass      |
| Z - Waist circumference               | mm    | 836 to 866    | 860    | Pass      |
| AA - Location for chest circumference | mm    | 429 to 434    | 430    | Pass      |
| BB - Location for waist circumference | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                  |       |               |        | Pass      |

\_\_\_\_\_  
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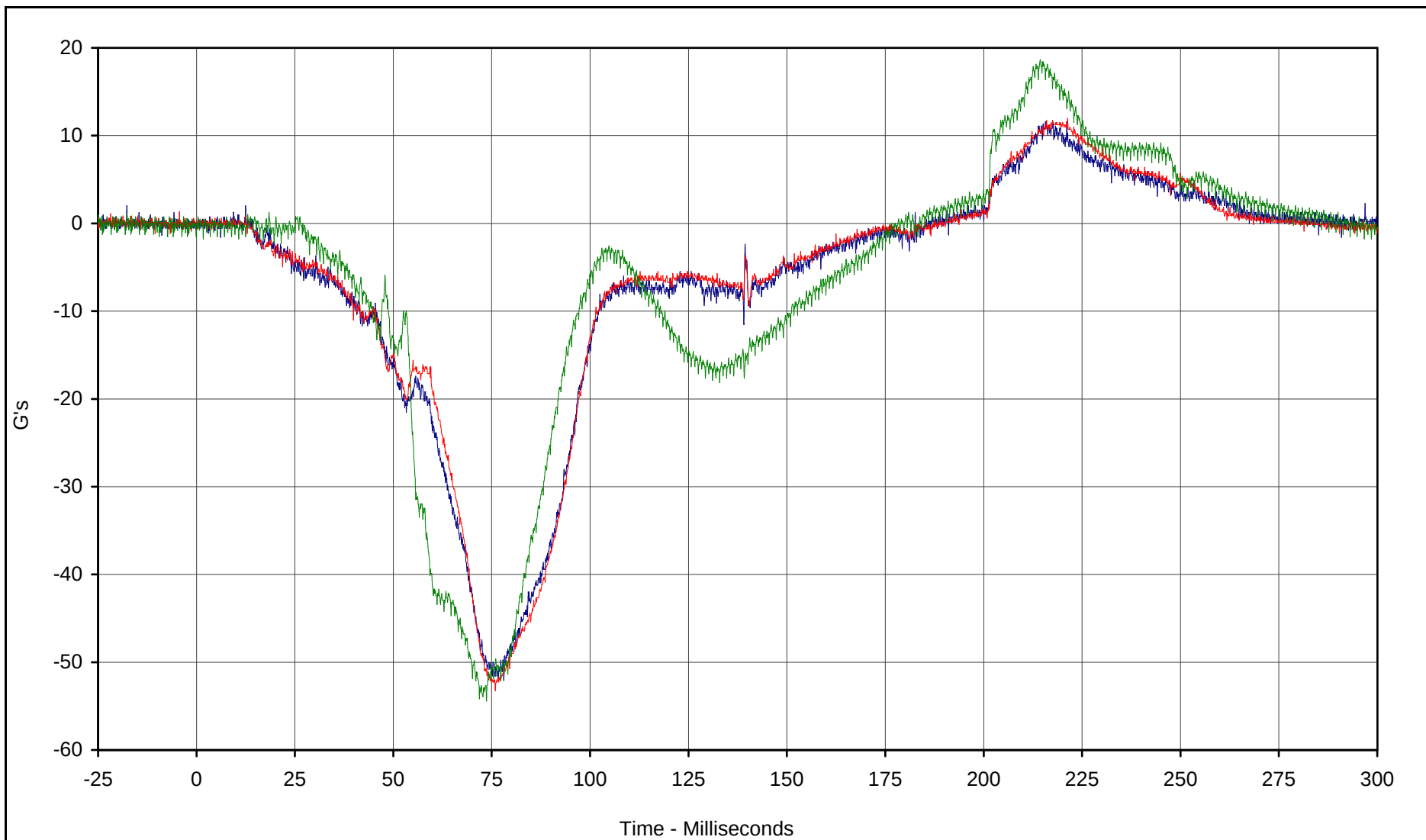
\_\_\_\_\_  
April 3, 2002

\_\_\_\_\_  
Test Date

## **APPENDIX G**

### **NINE ACCELEROMETER HEAD ARRAY DATA**

G-1



| Curve Description     | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|------|-------|-------|------|-----------|
| Driver Head Primary X | 134   | FIL  | G's   | 11.6 | 215.7 | -52.1 | 78.1 | 1000      |
| Driver NAHA Yarm-X    | 138   | FIL  | G's   | 12.0 | 221.3 | -53.3 | 75.9 | 1000      |
| Driver NAHA Zarm-X    | 141   | FIL  | G's   | 18.7 | 214.4 | -54.4 | 73.7 | 1000      |



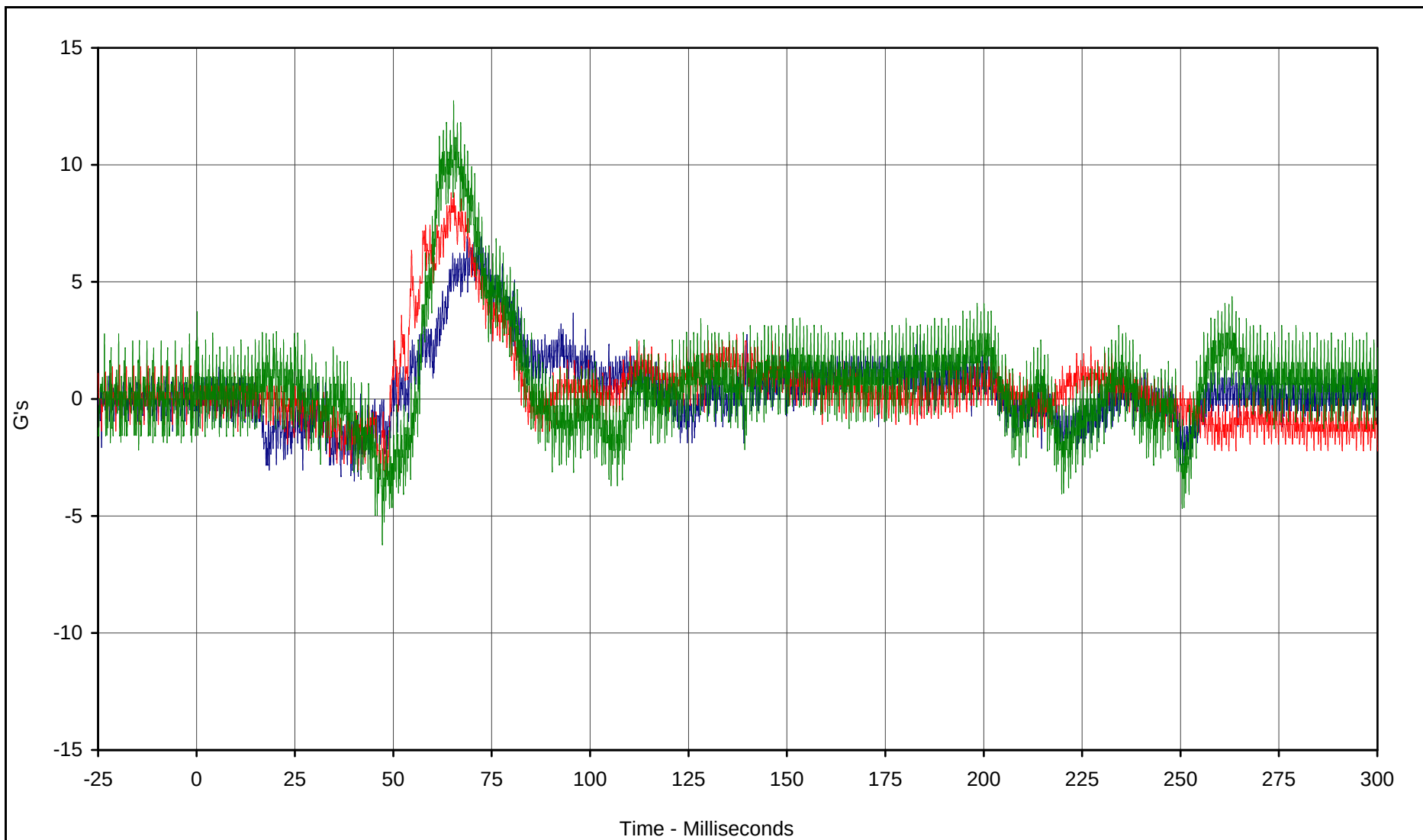
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105

KAR22001-03



| Curve Description     | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Head Primary Y | 135   | FIL  | G's   | 6.9  | 68.7 | -3.5 | 40.1 | 1000      |
| Driver NAHA Xarm-Y    | 140   | FIL  | G's   | 8.8  | 64.7 | -3.3 | 46.5 | 1000      |
| Driver NAHA Zarm-Y    | 142   | FIL  | G's   | 12.7 | 65.3 | -6.2 | 47.2 | 1000      |

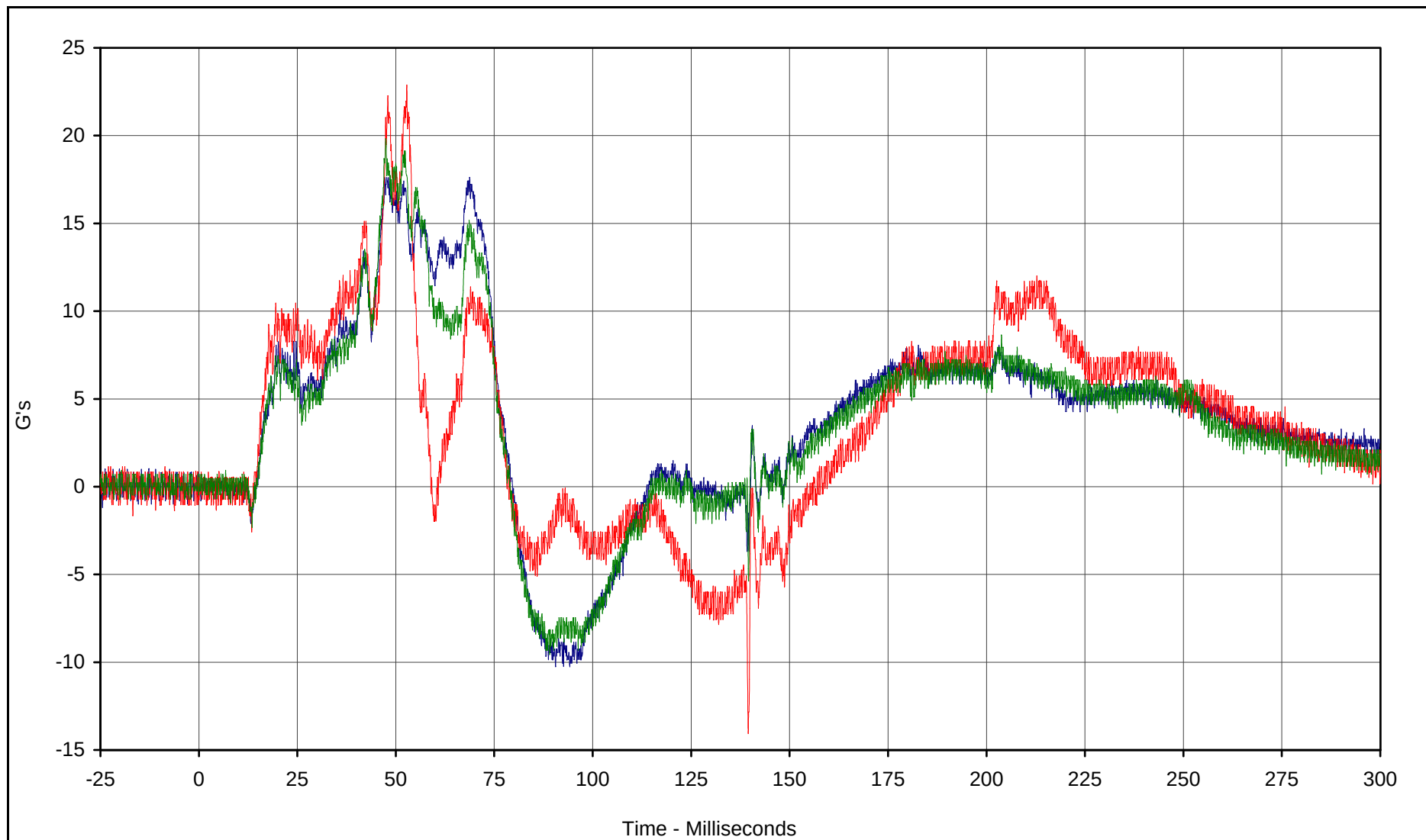


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description     | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-----------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Head Primary Z | 136   | FIL  | G's   | 17.6 | 47.2 | -10.2 | 90.6  | 1000      |
| Driver NAHA Xarm-Z    | 139   | FIL  | G's   | 22.9 | 52.8 | -14.1 | 139.5 | 1000      |
| Driver NAHA Yarm-Z    | 137   | FIL  | G's   | 19.8 | 47.4 | -9.6  | 89.1  | 1000      |

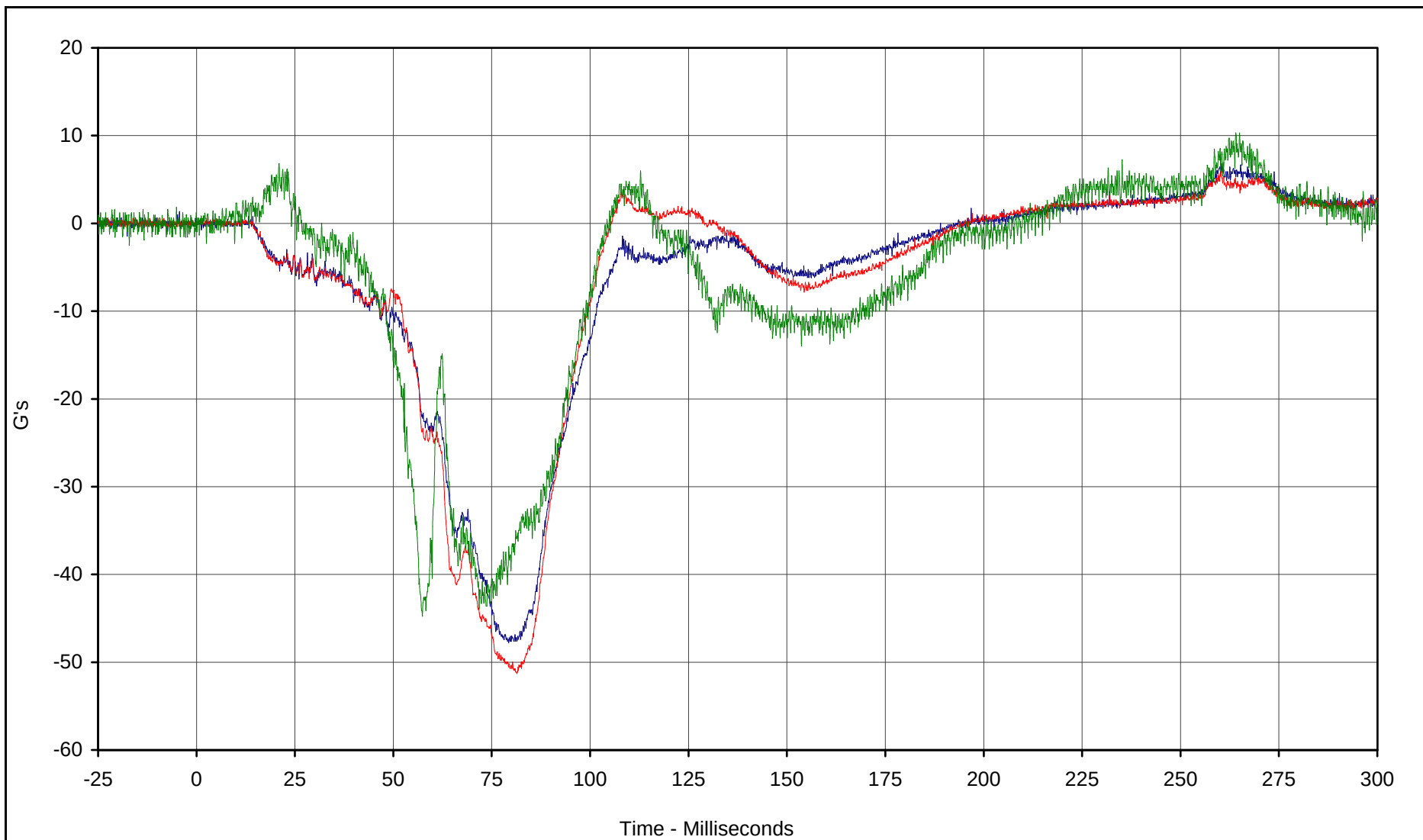


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Head Primary X | 143   | FIL  | G's   | 6.8  | 260.4 | -47.8 | 79.3 | 1000      |
| Passenger NAHA Yarm-X    | 147   | FIL  | G's   | 5.9  | 260.3 | -51.3 | 81.4 | 1000      |
| Passenger NAHA Zarm-X    | 150   | FIL  | G's   | 10.3 | 264.0 | -44.8 | 57.4 | 1000      |



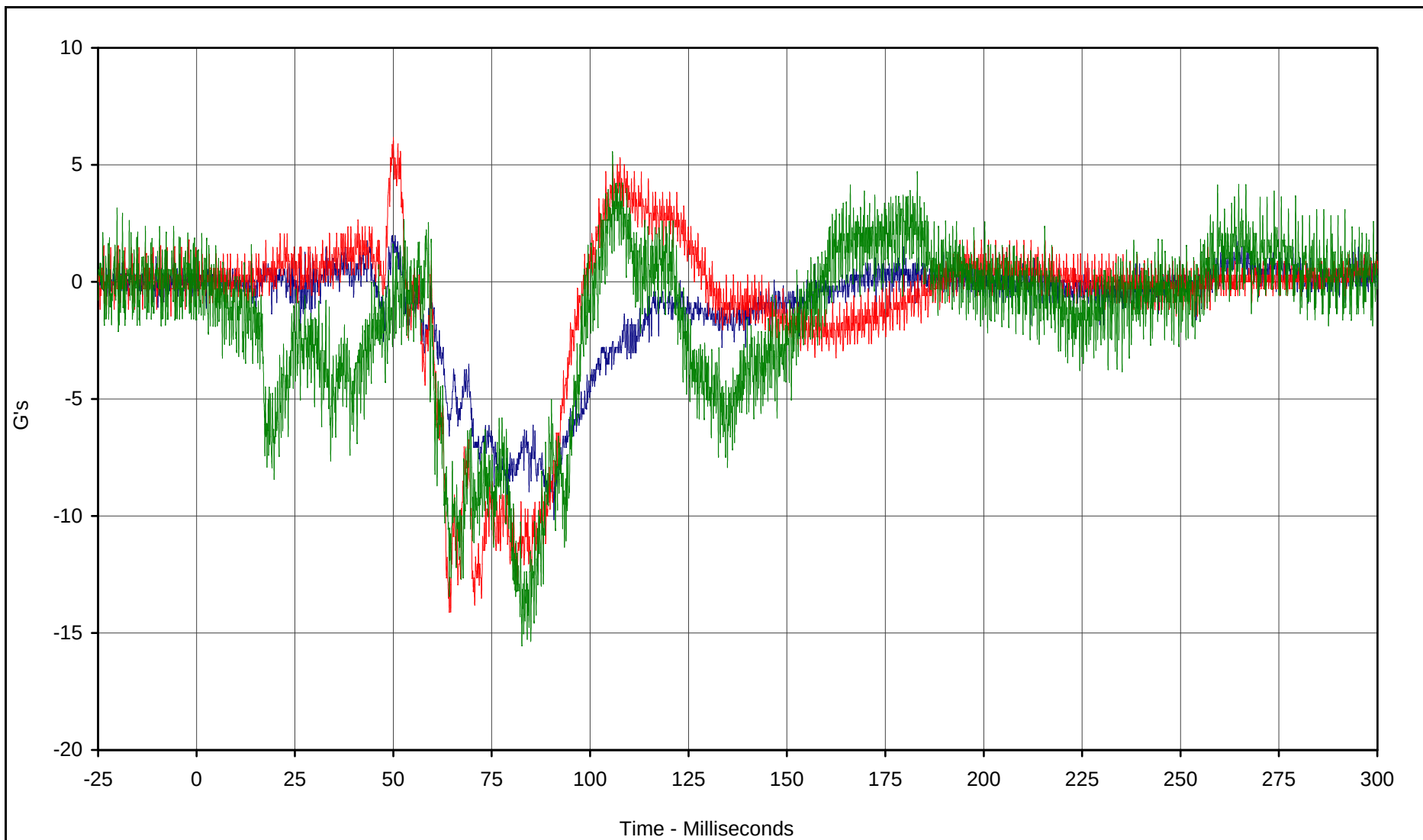
Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105





| Curve Description        | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Primary Y | 144   | FIL  | G's   | 2.0 | 49.6  | -10.2 | 90.8 | 1000      |
| Passenger NAHA Xarm-Y    | 149   | FIL  | G's   | 6.2 | 50.0  | -14.1 | 64.2 | 1000      |
| Passenger NAHA Zarm-Y    | 151   | FIL  | G's   | 5.5 | 105.7 | -15.5 | 82.7 | 1000      |

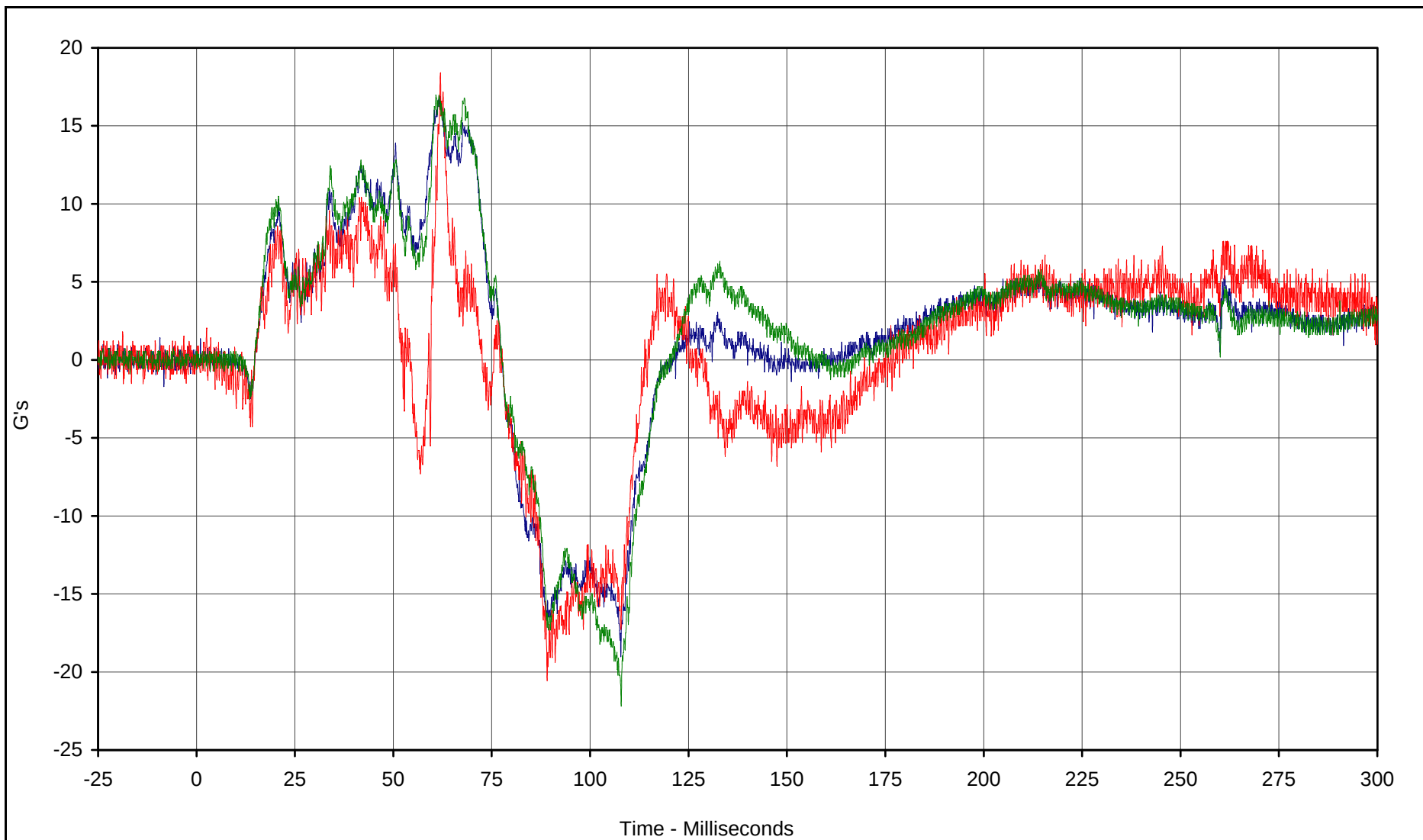


Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105



| Curve Description        | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Primary Z | 145   | FIL  | G's   | 16.9 | 61.7 | -19.0 | 107.8 | 1000      |
| Passenger NAHA Xarm-Z    | 148   | FIL  | G's   | 18.4 | 62.0 | -20.6 | 89.1  | 1000      |
| Passenger NAHA Yarm-Z    | 146   | FIL  | G's   | 17.0 | 60.8 | -22.2 | 107.9 | 1000      |



Test Vehicle: 2003 Toyota Matrix 4 Door Wagon

Test Date: 4/9/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M35105