

**SIDE AIRBAG OCCUPANT RISK PROGRAM
OCCUPANT OUT-OF-POSITION TESTS**

**NISSAN MOTOR CORPORATION
2005 NISSAN MAXIMA 3.5 SE
4-DOOR SEDAN**

NHTSA NUMBER: M55201TWG2

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



JUNE 10, 2005

FINAL REPORT

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16. Abstract			
A static side airbag deployment was conducted on a 2005 Nissan Maxima 3.5 SE 4-Door Sedan at KARCO Engineering, LLC on 6/10/2005. This test was conducted to obtain data indicant of TWG Side Airbag Out-of-Position Injury criteria.			
Measurement Description	Units	Threshold	Hybrid III 6 Year Old ATD
Head Injury Criteria (HIC ₁₅)		700	5.0
Max. Thorax Accel. (3 msec clip)	G's	60	20.4
17. Key Words		18. Distribution Statement	
TWG Occupant Out-of-Position Test Section 3.3.3.5 New Car Assessment Program (NCAP) 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No. M55201		Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5111 Washington, D.C. 20590	
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SECTION 1

PURPOSE AND SUMMARY OF TEST M55201TWG2

1.1 PURPOSE

This occupant out-of-position injury test is part of the Occupant Injury Risk from Deploying Side Airbags 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 occupant injury data for a side airbag deployment.

The occupant out-of-position side airbag test was conducted in accordance with the Technical Working Group Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

1.2 SUMMARY

The effects of a seat-mounted torso and roof rail mounted airbag deployment in a 2005 Nissan Maxima 3.5 SE 4-Door Sedan with an out-of-position Hybrid III 6 Year-Old Child dummy were evaluated. The test was performed at Karco Engineering, LLC on June 10, 2005. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Two high speed digital cameras were used to document the side and curtain airbag deployment. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

One Part 572N, Hybrid III 6-Year-Old child anthropomorphic test device (ATD), was placed in the front passenger seat, positioned facing forward according to the dummy placement instructions (3.3.3.5) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The ATD was instrumented with head, chest and pelvic triaxial accelerometers, a chest displacement potentiometer, and a six-axis upper neck transducer.

Sixteen (16) channels of data were recorded using an on-board data acquisition system. Appendix A contains Photographs. Appendix B contains dummy response data traces. Appendix C contains the Instrumentation Data Channel assignments.

The passenger side doors remained closed during the deployment and were operable after the deployment.

The Hybrid III 6-Year-Old Child Dummy's visible contact points were as follows: The side airbag contacted the middle and lower portion of the ATD's back. The curtain airbag contacted the top of the ATD's head.

Out of Position Occupant injury data is contained in table below.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅	Clip (g)	Chest Disp (mm)
Passenger	5.0	20.4	1.5

Orientation of the Hybrid III 6 Year-old Child Dummy was in the forward facing position leaning against the passenger door. The dummy spine was aligned with the deploying trajectory of the airbag. The lower legs were extended. Synthetic foam was used to raise the dummy. This orientation complies with section 3.3.3.5 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2
Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

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 ²	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

TEST SUMMARY

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2

Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

TEST DUMMY INFORMATION

Description	Passenger Seat Inboard Facing
Dummy Type / Serial No.	027
Head Contact	Curtain Airbag
Chest Contact	Torso Airbag
Abdomen Contact	No
Pelvis	No
Left Knee Contact	No
Right Knee Contact	No

16mm MOVIE COVERAGE

High Speed Digital	2
Total	2

DATA CHANNELS

Child ATD Sensors	16
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	16

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2
 Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

TEST VEHICLE INFORMATION

Make	Nissan
Model	Maxima
Body Style	4-Door 3.5 SE
NHTSA No.	M55201
VIN	1N4BA41E85C806932
Color	Bronze
Delivery Date	12/14/2004
Odometer Reading (mile)	146
Dealer	Empire Nissan
Transmission	Automatic
Final Drive	Front
Type/Number Cylinders	V-6
Engine Displacement (L)	3.5
Engine Placement	Transverse

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Side Curtain Airbag	Yes
Pass. Front Airbag	Yes
Pass.Side Airbag	Yes
Pass. Curtain Airbag	Yes
Power Brakes	Yes
Power Steering	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
Tilt Steering Wheel	Yes
Power Windows	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motors Corporations	GVWR (kg)	2062
Date of Manufacture	August-04	GAWR Front (kg)	1120
		GAWR Rear (kg)	951

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	221	221
Recommend Tire Size	P245/45R18	P245/45R18
Tire Size on Vehicle	P245/45R18	P245/45R18
Tire Manufacturer	Goodyear	Goodyear

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	None	
Number of Occupants	2	3	0	3
Capacity Wt. (VCW) (kg)				390
Cargo Weight (RCLW) (kg)				50

* Vehicle had undergone New Car Assessment Program Frontal Impact Testing on January 1, 2005

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

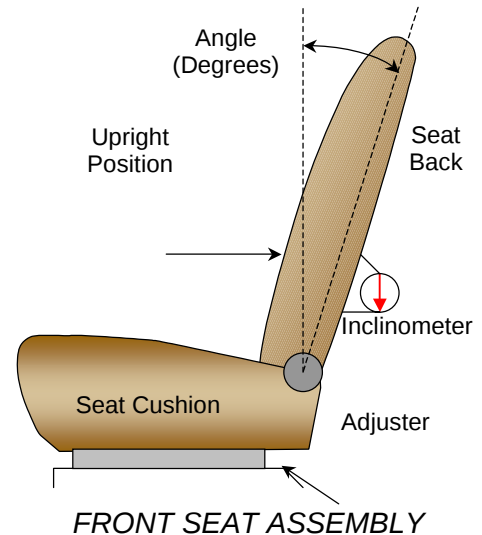
Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2
Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

NOMINAL DESIGN RIDING POSITION

The passenger seat back is positioned to section 3.3.3.5 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	11.7



SEAT FORE/AFT POSITIONS

The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for the passenger seat.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	21 Detents	21st Detent

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2

Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Hybrid III 6-Year-Old Child Dummy	
		Length (mm)	Angle (°)
SA	Seat Back Angle		11.7
AMW	Side Airbag Module Diameter	25	
ABW	Side Airbag Width	360	
AML	Side Airbag Module Length	180	
ABL	Side Airbag Length	470	
AN	Top of Airbag Module to Head/Neck Junction	320	
HD	Head CG to Door Panel/ Window	270	
HSC	Head to Seat Back Centerline	480	
HB	Head to B-Pillar	135	
HZ	Head to Roof (Z)	350	
HHD	Head to Header	480	
ND	Nose to Dash	725	
NS	Nose to Seat Back	430	
NR	Nose to Header	490	
CD	Chest to Dash	750	
CS	Chest to Seat Back	340	
RACL	Right Arm to Seat Back Centerline	460	0
LACL	Left Arm to Seat Back Centerline	140	0
RA	Right Arm to Door Panel	0	
LA	Left Arm to Door Panel	220	
KK	Knee to Knee	150	
TT	Toe to Toe	150	
KSCR	Right Knee to Seat Cushion Centerline	110	
KSCL	Left Knee to Seat Cushion Centerline	0	
TSCR	Right Toe to Seat Cushion Centerline	60	
TSCL	Left Toe to Seat Cushion Centerline	60	

DATA SHEET NO. 5 - HYBRID III ATD INJURY CRITERIA AND SENSOR DATATest Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door SedanNHTSA No.: M55201TWG2Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)Test Date: 6/10/05**HEAD PEAK ACCELERATIONS**

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Head CG	X	G's	12.4	17.8	-13.1	12.1
Head CG	Y	G's	31.7	11.8	-18.6	12.1
Head CG	Z	G's	9.9	12.0	-11.1	20.0
Head CG Resultant	N/A	G's	32.6	11.9		

CHEST PEAK ACCELERATIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	23.7	5.6	-7.5	17.6
Chest CG	Y	G's	2.9	21.7	-18.2	5.5
Chest CG	Z	G's	3.4	13.4	-1.4	4.7
Chest CG Resultant	N/A	G's	29.7	5.7		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	157.7	22.4	-67.5	9.8
Neck Force	Y	Newtons	31.4	6.6	-232.5	18.1
Neck Force	Z	Newtons	0.7	3.0	-679.3	18.1
Neck Force Resultant	N/A	Newtons	729.8	18.2		
Neck Moment	X	Nm	5.0	121.8	-14.4	18.5
Neck Moment	Y	Nm	20.3	19.6	-4.8	41.2
Neck Moment	Z	Nm	3.4	20.3	-5.2	73.7
Neck Moment Resultant	N/A	Nm	24.8	19.0		

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	24.0	6.9	-2.3	7.9
Pelvis	Y	G's	2.5	33.6	-27.0	7.7
Pelvis	Z	G's	6.4	10.7	-16.5	6.4
Pelvis Resultant	N/A	G's	31.7	7.1		

DATA SHEET NO. 5...(CONTINUED)Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door SedanNHTSA No.: M55201TWG2Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)Test Date: 6/10/05**HEAD INJURY CRITERIA (HIC15)**

Location	Passenger			
	HIC	T ¹	T ²	Avg G
Head CG	5.0	11.3	26.3	10.2

PRIMARY CHEST CLIP (3MSEC)

Location	Passenger		
	CLIP	T ¹	T ²
Chest CG	20.4	7.2	10.2

CHEST PEAK DEFLECTIONS

Location	Axis	Units	Passenger			
			Max	Time	Min	Time
Chest	X	MM	1.5	19.0	-1.4	9.4

DATA SHEET NO. 6**CAMERA LOCATIONS**Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan NHTSA No.: M55201TWG2Test Program: TWG Testing (Forward Facing Hybrid III 6 Yr.) Test Date: 6/10/05

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Digital Side View	0	-2600	-930	0.0	35	1000
2	High Speed Digital Front View	1110	-250	-1200	-2.0	20.00	1000

* Cameras aligned to the center of seat back as reference

APPENDIX A

PHOTOGRAPHS



Figure A-1: Right Front $\frac{3}{4}$ View, As Received

MANUFACTURED BY NISSAN MOTOR CO., LTD.

DATE 08/04 GVWR 4546 LB
GAWR FR. 2469 LB GAWR RR. 2097 LB

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR
VEHICLE SAFETY, BUMPER AND THEFT PREVENTION STANDARDS
IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION.

VIN: 1N4BA41E85C806932 PASSENGER CAR

COLOR	TRIM	TRANS	AXLE	ENGINE
KY2	K	RESF22A	GA24	VQ35DE 3498CC

MODEL: BLJALTN-EU5 752 02000



1N4BA41E85C806932

Figure A-2: Vehicle Certification Label



Figure A-3: Post-Test Right Front $\frac{3}{4}$ View of Frontal NCAP Test



Figure A-4: Post-Test Right Side View of Frontal NCAP Test



Figure A-5: Pre-Test Dummy Position, Left Side View



Figure A-6: Pre-Test Dummy Position, $\frac{3}{4}$ View



Figure A-7: Pre-Test Dummy Position, Front View



Figure A-8: Post-Test Dummy Position and Airbags, Left Side View



Figure A-9: Post-Test Airbags, Left Side View



Figure A-10: Post-Test Airbags, Left Side Close-up View

APPENDIX B

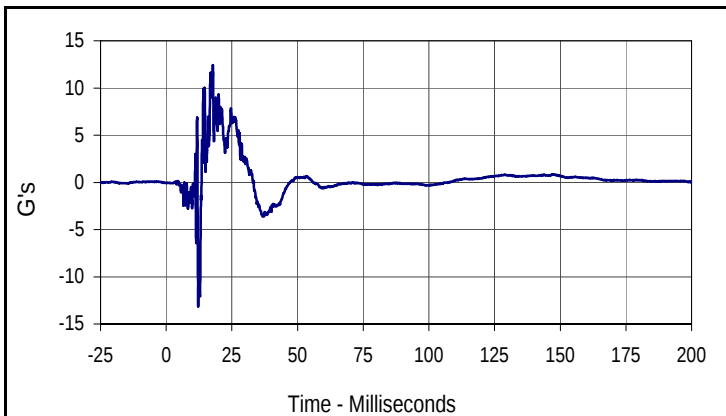
DATA PLOTS

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan

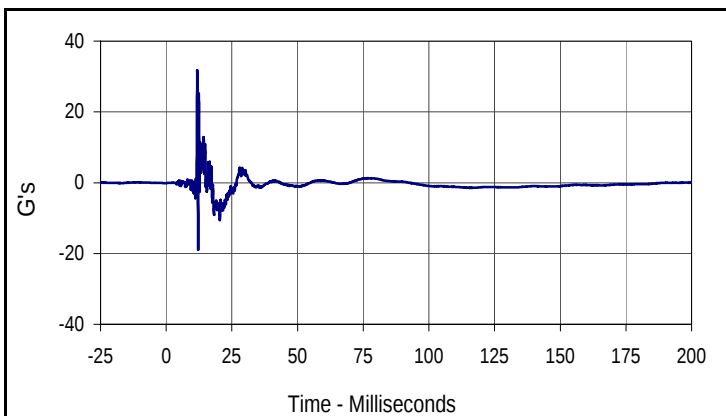
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Test Date: 6/10/05

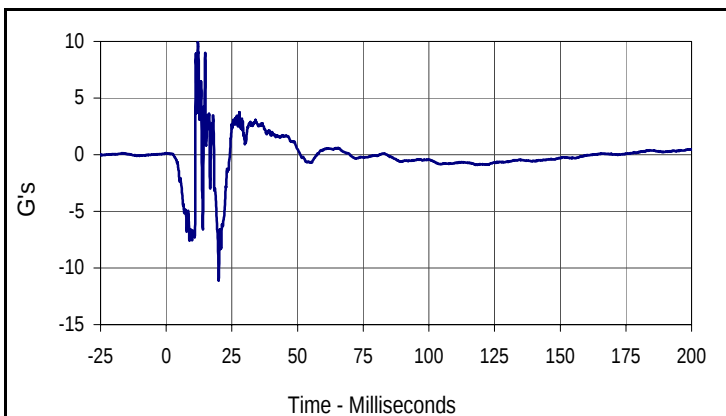
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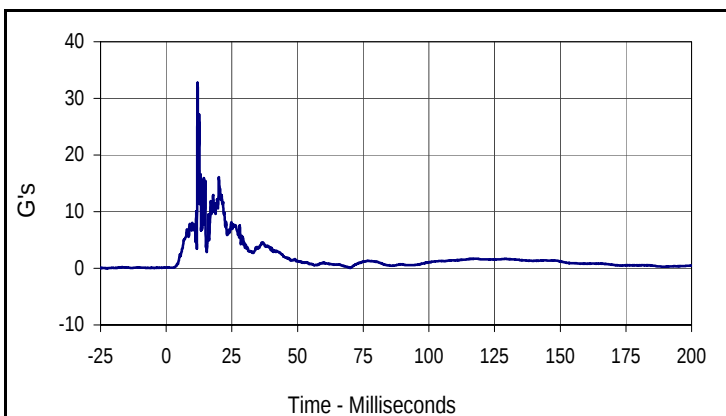
Curve Description			
Passenger Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
12.4	17.8	-13.1	12.1



Curve Description			
Passenger Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
31.7	11.8	-18.6	12.1



Curve Description			
Passenger Head Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
9.9	12.0	-11.1	20.0



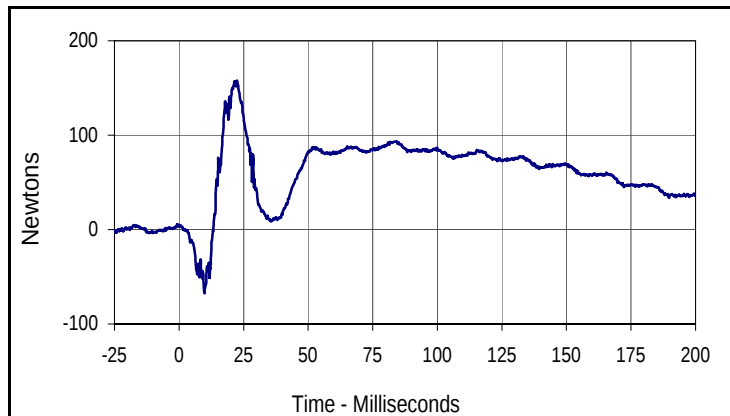
Curve Description			
Passenger Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
32.6	11.9	0.1	70.0

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan

Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)

Test Date: 6/10/05

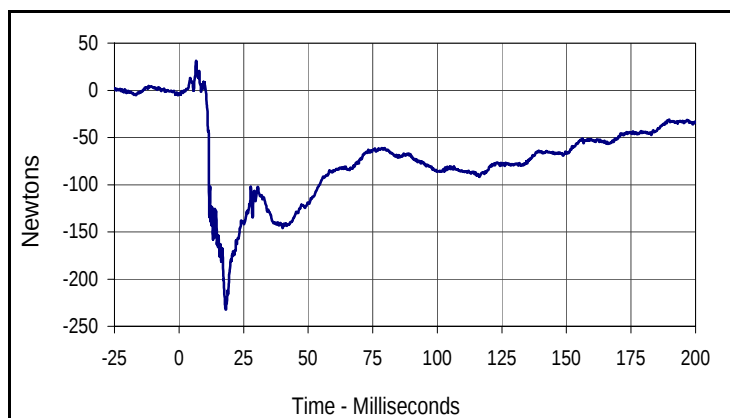
NHTSA No.: M55201TWG2



Curve Description

Passenger Upper Neck Force X

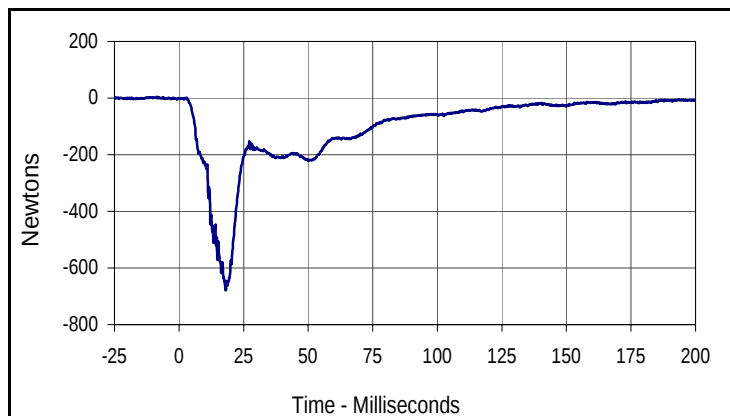
CURNO	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
157.7	22.4	-67.5	9.8



Curve Description

Passenger Upper Neck Force Y

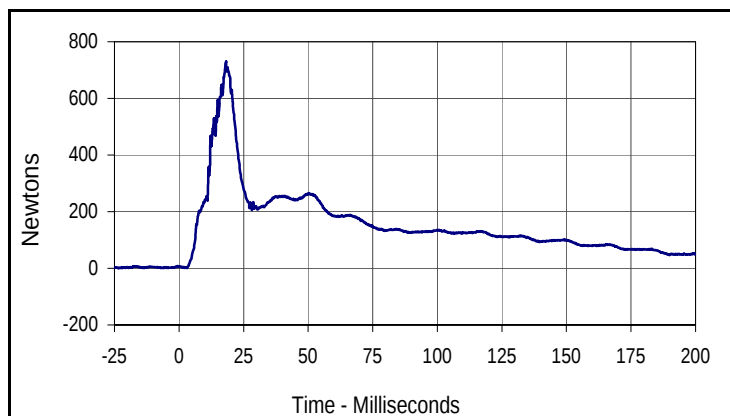
CURNO	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
31.4	6.6	-232.5	18.1



Curve Description

Passenger Upper Neck Force Z

CURNO	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
0.7	3.0	-679.3	18.1



Curve Description

Passenger Upper Neck Force Resultant

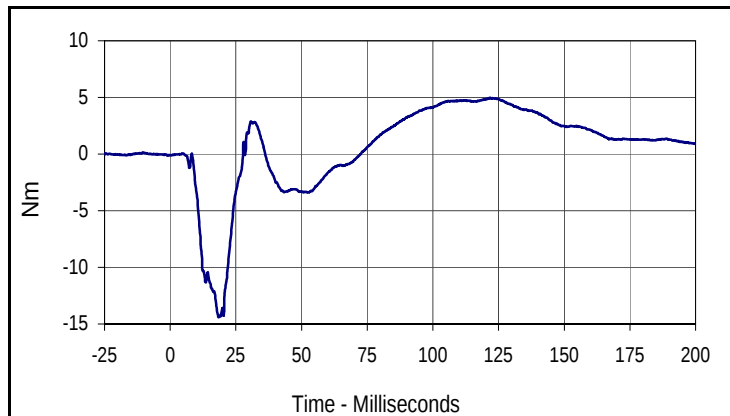
CURNO	Type	SAE Class	Units
004	RES	1000	Newtons
Max	Time	Min	Time
729.8	18.2	1.3	2.2

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan

Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)

Test Date: 6/10/05

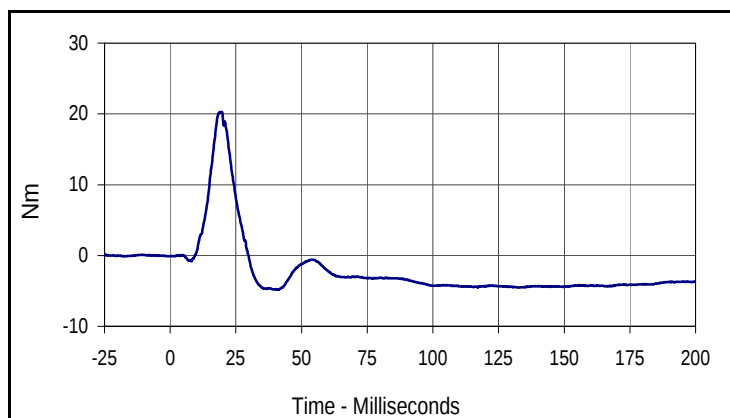
NHTSA No.: M55201TWG2



Curve Description

Passenger Upper Neck Moment X

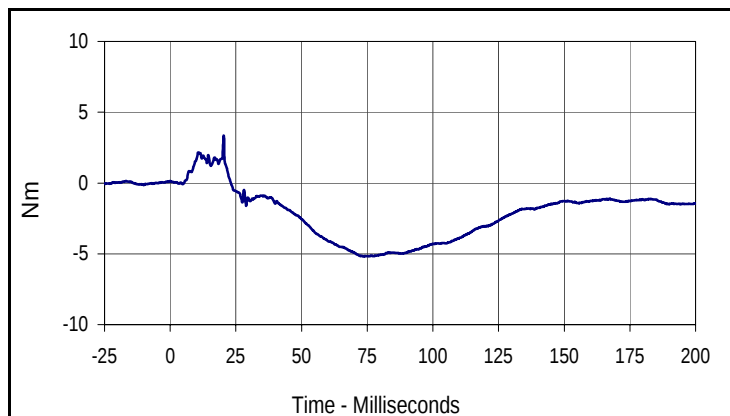
CURNO	Type	SAE Class	Units
007	FIL	600	Nm
Max	Time	Min	Time
5.0	121.8	-14.4	18.5



Curve Description

Passenger Upper Neck Moment Y

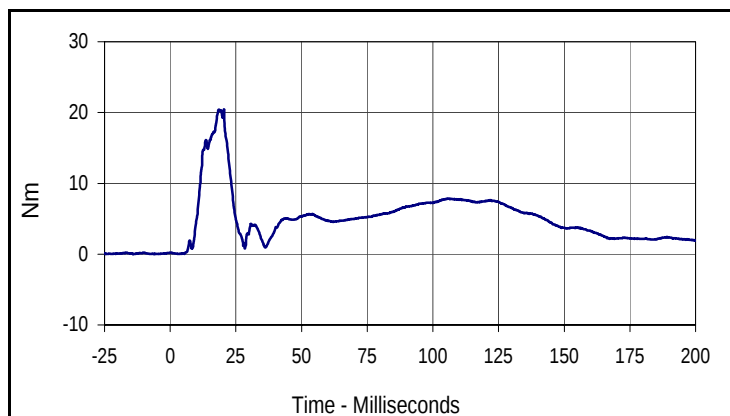
CURNO	Type	SAE Class	Units
008	FIL	600	Nm
Max	Time	Min	Time
20.3	19.6	-4.8	41.2



Curve Description

Passenger Upper Neck Moment Z

CURNO	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
3.4	20.3	-5.2	73.7



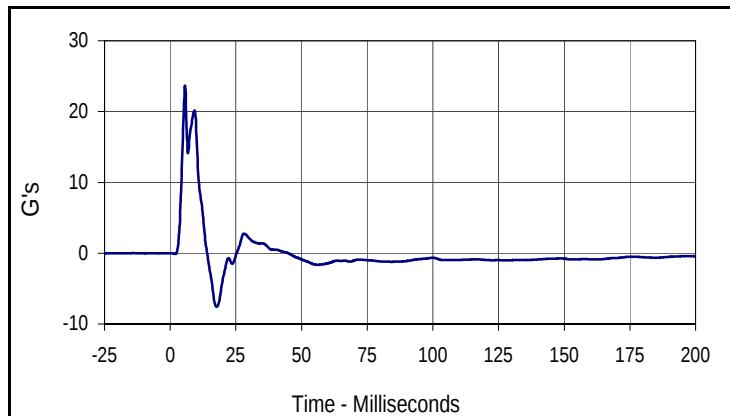
Curve Description

Passenger Upper Neck Moment Resultant

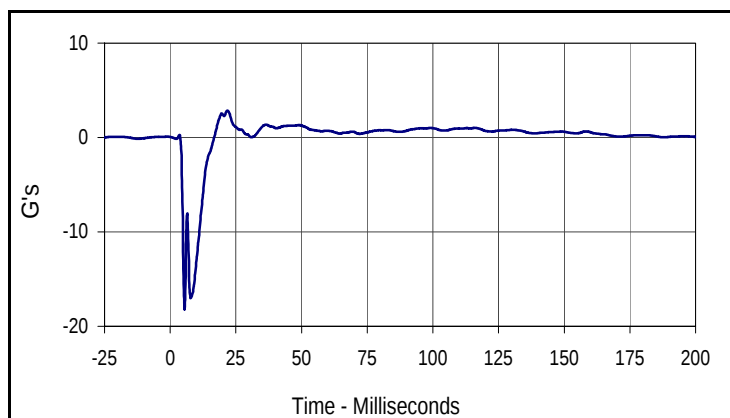
CURNO	Type	SAE Class	Units
007	RES	600	Nm
Max	Time	Min	Time
24.9	19.0	0.0	4.4

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan
 Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)

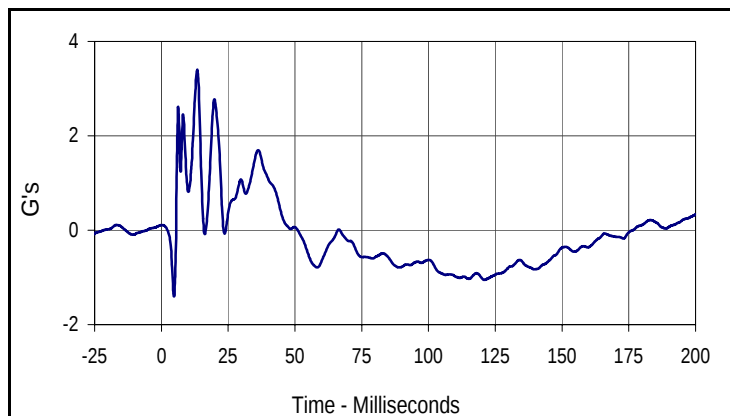
Test Date: 6/10/05
 NHTSA No.: M55201TWG2



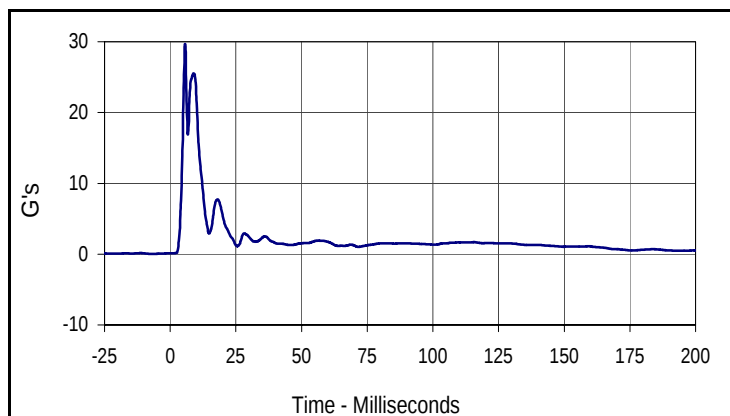
Curve Description			
Passenger Chest X			
CURNO	Type	SAE Class	Units
010	FIL	180	G's
Max	Time	Min	Time
23.7	5.6	-7.5	17.6



Curve Description			
Passenger Chest Y			
CURNO	Type	SAE Class	Units
011	FIL	180	G's
Max	Time	Min	Time
2.9	21.7	-18.2	5.5



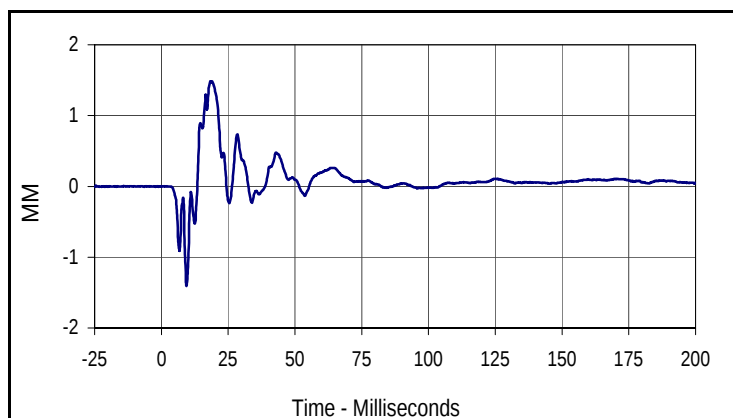
Curve Description			
Passenger Chest Z			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
3.4	13.4	-1.4	4.7



Curve Description			
Passenger Chest Resultant			
CURNO	Type	SAE Class	Units
010	RES	180	G's
Max	Time	Min	Time
29.7	5.7	0.1	1.1

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan
Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)

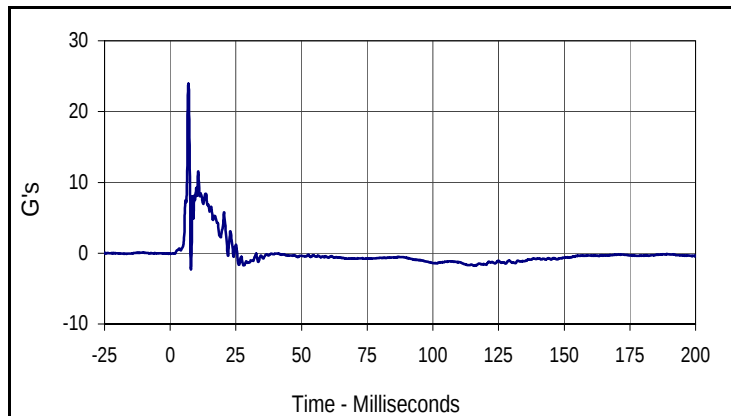
Test Date: 6/10/05
NHTSA No.: M55201TWG2



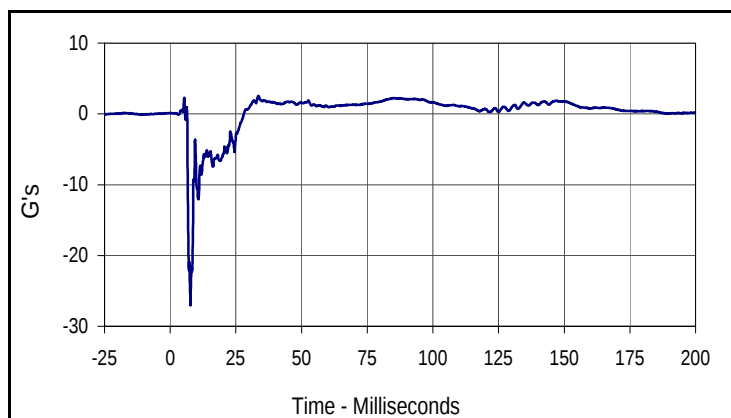
Curve Description			
Passenger Chest Deflection			
CURNO	Type	SAE Class	Units
013	FIL	600	MM
Max	Time	Min	Time
1.5	19.0	-1.4	9.4

Test Vehicle: 2005 Nissan Maxima 3.5 SE 4-Door Sedan
 Test Program: TWG Testing (Forward Facing HIII 6 Yr. Old)

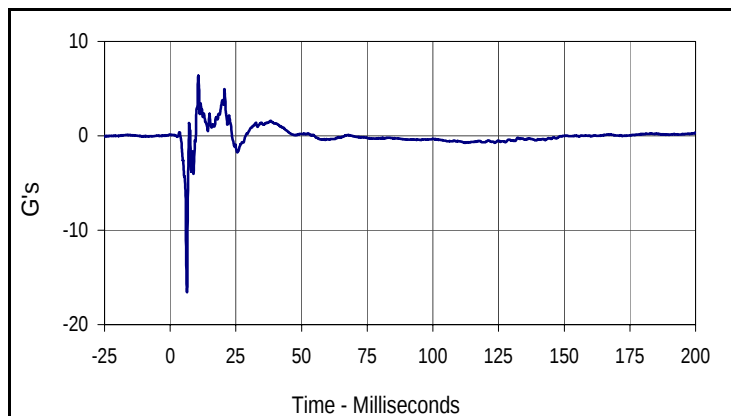
Test Date: 6/10/05
 NHTSA No.: M55201TWG2



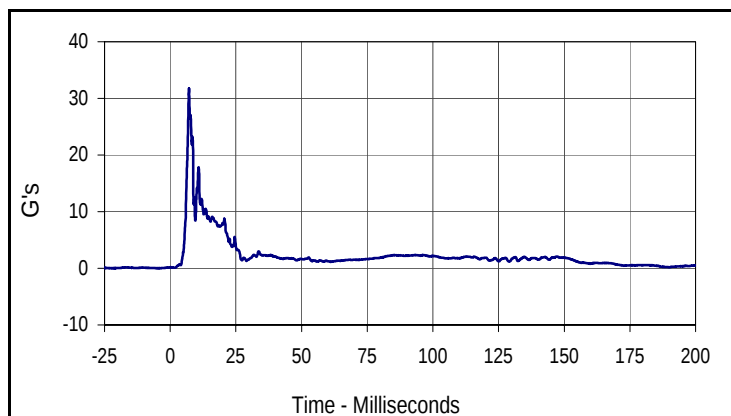
Curve Description			
Passenger Pelvis X			
CURNO	Type	SAE Class	Units
014	FIL	1000	G's
Max	Time	Min	Time
24.0	6.9	-2.3	7.9



Curve Description			
Passenger Pelvis Y			
CURNO	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
2.5	33.6	-27.0	7.7



Curve Description			
Passenger Pelvis Z			
CURNO	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
6.4	10.7	-16.5	6.4



Curve Description			
Passenger Pelvis Resultant			
CURNO	Type	SAE Class	Units
014	RES	1000	G's
Max	Time	Min	Time
31.7	7.1	0.1	1.4

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG Testing (Forward Facing HIII 6 Yr. Old)
Instrumentation Data Channel Assignments
A.T.D. Serial Number 027
6/10/05
2005 Nissan Maxima 3.5 SE 4-Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD, PRIMARY	X	027HDX	Accel.,1/2 bridge	Endevco	7264-2000	G
2	HEAD, PRIMARY	Y	027HDY	Accel.,1/2 bridge	Endevco	7264-2000	G
3	HEAD, PRIMARY	Z	027HDZ	Accel.,1/2 bridge	Endevco	7264-2000	G
4	UPPER NECK FORCE	X	027UNFX	Load cell, six axis neck	R. A. Denton	IF-234	N
5	UPPER NECK FORCE	Y	027UNFY	Load cell, six axis neck	R. A. Denton	IF-234	N
6	UPPER NECK FORCE	Z	027UNFZ	Load cell, six axis neck	R. A. Denton	IF-234	N
7	UPPER NECK MOMENT	X	027UNMX	Load cell, six axis neck	R. A. Denton	IF-234	Nm
8	UPPER NECK MOMENT	Y	027UNMY	Load cell, six axis neck	R. A. Denton	IF-234	Nm
9	UPPER NECK MOMENT	Z	027UNMZ	Load cell, six axis neck	R. A. Denton	IF-234	Nm
10	CHEST , PRIMARY	X	027CHX	Accel., Full Bridge	Entran	2000JF	G
11	CHEST , PRIMARY	Y	027CHY	Accel., Full Bridge	Entran	2000JF	G
12	CHEST , PRIMARY	Z	027CHZ	Accel., Full Bridge	Entran	2000JF	G
13	CHEST DISPLACEMENT	X	027CP	Rotary Pot Chest	Servo	14CBI	MM
14	PELVIS, PRIMARY	X	027PELX	Accel., Full Bridge	Entran	2000JF	G
15	PELVIS, PRIMARY	Y	027PELY	Accel., Full Bridge	Entran	2000JF	G
16	PELVIS, PRIMARY	Z	027PELZ	Accel., Full Bridge	Entran	2000JF	G