

**Vehicle Research and Test Center
Oblique Side Pole Impact
WorldSID
2011 Hyundai Tucson
TRC Inc. Test Number: 110817**

**Prepared By:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319**

**Final Report
August – September 2011**

**Prepared For
Vehicle Research and Test Center
P. O. Box 37
East Liberty, OH 43319**

Notice

Transportation Research Center Inc. does not endorse or certify products of manufacturers. The manufacturer's name appears solely to identify the test article. Transportation Research Center Inc. assumes no liability for the report or use thereof. It is responsible for the facts and the accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United State Government does not endorse products or manufacturers.

TRC TEST NUMBER: 110817

Project Manager, Margaret Susan

Report Approved September 21, 2011 by:

A handwritten signature in cursive script that reads "Margaret Susan".

Transportation Research Center Inc.

Final Report Accepted by:

_____ Date: _____
Allison Loudon
Project Engineer
Vehicle Research & Test Center

Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
1	Purpose and Test Procedure	1-1
2	Side Impact Test Results	2-1
3	Summary of Test Results	3-1
4	Occupant and Vehicle Information	4-1
Appendix A	Photographs	A-1
Appendix B	Data Plots	B-1
Appendix C	WorldSID Configuration and Performance Verification Data	C-1
Appendix D	Miscellaneous Test Information	D-1

List of Tables

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	General Vehicle Test Parameter Data	3-2
2	Test Vehicle Tire Information	3-6
3	Post-Test Observations	3-7
4	WorldSID Instrumentation Data	4-2
5	WorldSID Position Relative to Striker	4-8
6	Vehicle Structural Measurements	4-10
7	Vehicle Exterior Crush Profiles - All Levels	4-12
8	Test Vehicle Accelerometer Locations and Data Summary	4-15

List of Figures

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	WorldSID Longitudinal Clearance Dimensions	4-6
2	WorldSID Lateral Clearance Dimensions	4-7
3	Vehicle Pre-Test and Post-Test Measurements	4-9
4	Vehicle Side Measurements	4-11
5	Test Vehicle Accelerometer Locations and Data Summary	4-14
6	Pole Load Cell Locations	4-17
7	High-Speed Camera Locations and Data	4-18

List of Photographs

<u>Description</u>	<u>Figure</u>
Pre-Test Front View	A-1
Post-Test Front View	A-2
Pre-Test Left Front View	A-3
Post-Test Left Front View	A-4
Pre-Test Left Front Tight View – Photograph Not Taken	A-5
Post-Test Left Front Tight View	A-6
Pre-Test Left Side View	A-7
Post-Test Left Side View	A-8
Pre-Test Left Rear View	A-9
Post-Test Left Rear View	A-10
Pre-Test Left Rear Tight View – Photograph Not Taken	A-11
Post-Test Left Rear Tight View	A-12
Pre-Test Rear View	A-13
Post-Test Rear View	A-14
Pre-Test Right Side View	A-15
Post-Test Right Side View	A-16
Pre-Test Overhead View	A-17
Post-Test Overhead View	A-18
Pre-Test Impact Point View	A-19
Post-Test Impact Point View	A-20
Pre-Test Front Underbody View	A-21
Post-Test Front Underbody View	A-22
Pre-Test Front Mid Underbody View	A-23
Post-Test Front Mid Underbody View	A-24
Pre-Test Mid Underbody View	A-25
Post-Test Mid Underbody View	A-26
Pre-Test Rear Mid Underbody View	A-27
Post-Test Rear Mid Underbody View	A-28

List of Photographs, Continued

<u>Description</u>	<u>Figure</u>
Pre-Test Rear Underbody View	A-29
Post-Test Rear Underbody View	A-30
Pre-Test Driver Dummy - View 1	A-31
Post-Test Driver Dummy - View 1	A-32
Pre-Test Driver Dummy - View 2	A-33
Post-Test Driver Dummy - View 2 – Photograph Not Taken	A-34
Pre-Test Driver Dummy - View 3	A-35
Pre-Test Driver Dummy - View 4	A-36
Post-Test Driver Dummy - View 4	A-37
Pre-Test Driver Dummy - View 5	A-38
Post-Test Driver Dummy - View 5	A-39
Pre-Test Driver Door Panel View	A-40
Post-Test Driver Door Panel View	A-41
Post-Test Driver Dummy Contact - View 1	A-42
Post-Test Driver Dummy Contact - View 2	A-43
Post-Test Driver Dummy Contact - View 3	A-44
Post-Test Driver Dummy Contact - View 4	A-45
Post-Test Driver Dummy Overall View	A-46
Vehicle Certification Label	A-47
Tire Pressure Label	A-48

Section 1.0

Purpose and Test Procedure

Purpose

This side impact test is part of FMVSS 214 Oblique Pole Side Impact Protection. It was conducted for the National Highway Traffic Safety Administration (NHTSA) and Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC Inc.). The purpose of this test was to refine the seating procedure for the 50th male WorldSID dummy and begin to evaluate the performance of the post-FMVSS 214 fleet with the new dummy. The test was conducted in accordance with the National Highway Traffic Safety Administration's test procedure TP-214P-00 Draft4FR, August 2007.

Section 2.0

Side Impact Test

Summary of Side Impact Test

A 2011 Hyundai Tucson impacted an oblique rigid pole barrier at an angle of 75.5° between the line of forward motion and the centerline of the vehicle, at a velocity of 32.2 km/h (20.2 mph). The pole was aligned with the dummy's head center of gravity. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, Ohio on August 17, 2011. Pre-test and post-test photographs of the test vehicle, the rigid pole barrier, and the side impact dummy (WorldSID) are included in Appendix A.

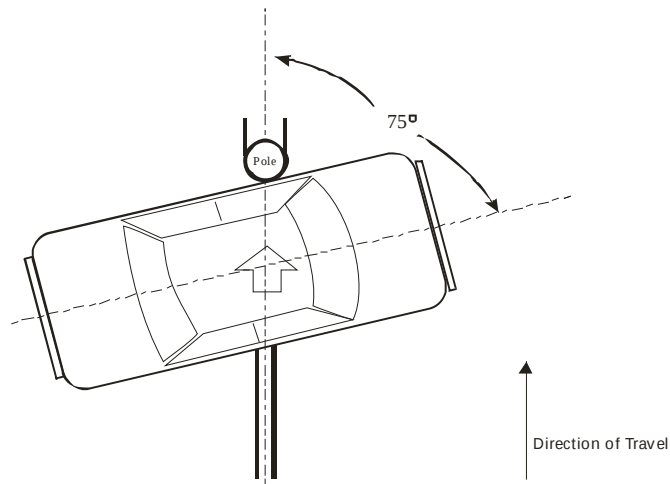
One restrained Side Impact Dummy (WorldSID) S/N 014, was placed in the driver (Position #1) designated seating position according to the instructions specified in the WorldSID Seating Procedure Draft 5.1. The WorldSID was calibrated prior to this test. The side impact test was documented by one (1) real-time camera and nine (9) high-speed digital cameras. Camera locations and other pertinent camera information are included in this report.

The driver front airbag, passenger front airbag, and passenger side curtain and torso airbags were disabled prior to the test performance.

The WorldSID instrumentation is detailed in Table 4. Ninety (90) dummy channels of acceleration, force, moment, and displacement data were collected for this test.

A summary of the side impact dummy (WorldSID) configuration and verification test data can be found in Appendix C. A total of 130 channels of data were recorded. Appendix B contains the vehicle, barrier, and dummy response data traces.

Test Results Summary



	Front WorldSID (#014)
HIC36 CFC 1000	452
Thorax Rib Deflection (mm) CFC 600	
Rib 1	35
Rib 2	33
Rib 3	32
Abdomen Rib Deflection (mm) CFC 600	
Rib 1	28
Rib 2	26
Lower Spine Resultant (g) CFC 180	56.8
Pubic Symph. Force (N) CFC 600	936

	2011 Hyundai Tucson
Vehicle Test Weight	1578.2 kg (3479.3 lbs)
Impact Point (Horizontal)-behind center of front axle	1230 mm
Impact Angle	75.5
Maximum Crush	345 mm Level 3
Impact Speed	32.2 km/h

Data Acquisition Explanations

The Lumbar Moment about the Z-axis data is suspect.

The Sacro-Iliac Right X-axis force data exceeded full scale and is suspect at 83 ms.

The Vehicle Center of Gravity X-axis and Y-axis roll rate sensor data exceeded full scale at 63 and 48 ms respectively. The X-, Y-, and Z-axis data is suspect at 105 ms.

The Left Lower A-Pillar Y-axis acceleration is suspect at 80 ms.

The Left Side Sill at Rear Seat Y-axis acceleration is suspect after 87 ms.

The Left Front Door Upper Centerline Y-axis accelerometer was damaged at 15 ms.

Section 3

Summary of Test Results

Table 1 General Test Vehicle Parameter Data

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

TEST VEHICLE INFORMATION

Make	Hyundai
Model	Tucson
Body Style	4-door
VIN	KM8JT3AB6BU120924
Color	White
Odometer Reading	238
Transmission	Manual
Final Drive	Front wheel drive
Number of Cylinders	4
Engine Displacement	2.0L
Engine Placement	Transverse
Air Conditioning	Yes
Power Windows	Yes
Power Seats	No
Cruise Control	No
Tinted Glass	Yes
Keyless Entry	Yes

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes ¹
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	--- ²
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Anti-lock Brakes	Yes
Traction Control	No
Bucket Seats	Yes
Rear Defroster	Yes
2-Door/4-Door	4
AM/FM Radio	Yes
CD Player	Yes
Sun Roof	No
Telescoping Steering Wheel/Column	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Co.
Date of Manufacture	5/10

GVWR (kg)	4365
GAWR Front (kg)	2326
GAWR Rear (kg)	2480

Measured Parameter	Front	Mid	Rear	Total
Type of Seats	Bucket	Not Applicable	Split Bench	
Number Of Occupants	2	Not Applicable	3	5
Capacity Wt. (VCW) (kg)				926

¹ Airbags were disabled prior to the test performance

² Not applicable to test mode.

Table 1 General Test Vehicle Parameter Data, Continued

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

TEST VEHICLE WEIGHTS

	Units	As Delivered (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	414.0	309.8		465.2	332.0	
Right	kg	415.4	291.6		455.4	325.6	
Ratio	%	58.0	42.0		58.3	41.7	
Totals	kg	829.4	601.4	1430.8	920.6	657.6	1578.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight	kg	1430.8
Weight of WorldSID ATD	kg	76.0
Rated Cargo/Luggage Weight (RCLW)	kg	80.0
Calculated Vehicle Target Weight (TVTW)	kg	1586.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	749	749	746	750	1100
As Tested	mm	736	733	734	741	1100

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheelbase	mm	2640
Total Vehicle Length at Left Side	mm	4158
Total Vehicle Length at Centerline	mm	4370
Total Vehicle Length at Right Side	mm	4157
Weight of Ballast	kg	5.2
Amount of Stoddard Solvent in Fuel Tank	liters	54.9

TEST VEHICLE IMPACT ACCURACY DATA

Measurement Description	Units	Intended	Actual	Difference
Impact Reference Line From Front Axle	mm	1225	1230	5
Impact Point Angle	Degrees	75	75.5	.5

Table 1 General Test Vehicle Parameter Data, Continued

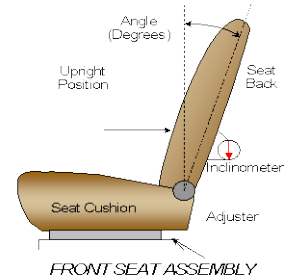
Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

WORLD SID RIDING POSITION

The driver seat back is positioned according to the procedure defined in SAE J826, "Devices for use in Defining and Measuring Vehicle Seating Accommodation", November, 2008.

Driver seat back angle: The back was adjusted to 5.8° as measured at torso angle with Oscar. The angle as measured at the head restraint post was 9°.

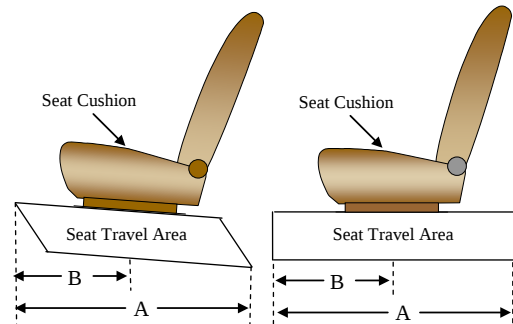


SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position to rearmost position, irrespective of vertical seat height in those positions. The seat was set at the longitudinal mid position with vertical adjustment at the lowest position obtainable for the driver. The rear seating position was not tested.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	15 of 25	20 mm rear of mid
Rear Seat	Not applicable	Not applicable



SEAT BELT UPPER ANCHORAGE

	Total No. of Positions	Placed in Position No.
Driver Seat	4	1
Rear Seat	Not applicable	Not applicable

Position number one is the uppermost adjustment position.

Table 1 General Test Vehicle Parameter Data, Continued

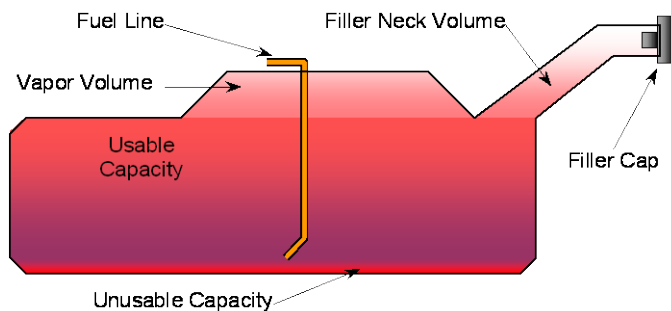
Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	15.3
Usable Capacity used for FMVSS 301	14.1-14.4
Actual Amount of Solvent used	14.5

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.

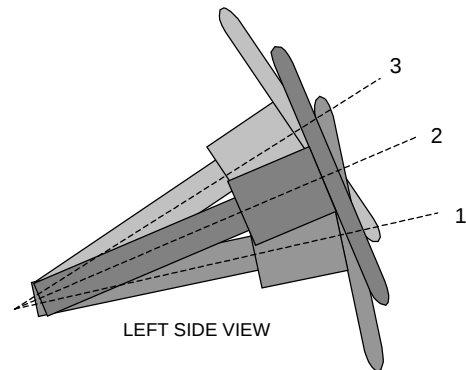


VEHICLE FUEL TANK ASSEMBLY

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.

Steering Column Tilt Position	Degrees
Lowermost Position	26.7
Geometric Center Position	24.8
Uppermost Position	30.7



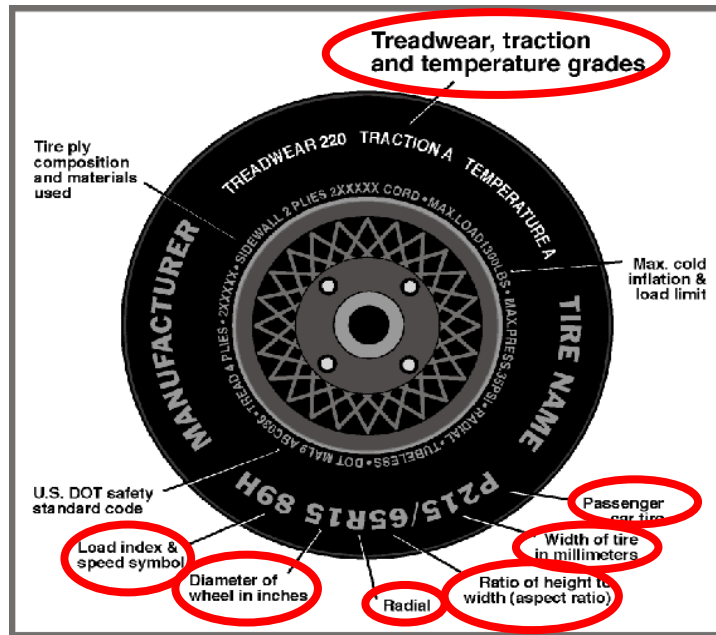
STEERING COLUMN ASSEMBLY

Steering Column Telescoping Position	(mm)
Full In Position	No Feature
Full Out Position	No Feature
Test Position	No Feature

Table 2 Test Vehicle Tire Information

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	228	228
Recommended Tire Size	P225/60R17	P225/60R17
Tire Size on Vehicle	P225/60R17	P225/60R17
Tire Manufacturer	Kumho	Kumho
Tire Name	Solus	Solus
Radial	Yes	Yes
Wheel Diameter	17	17
Load Index & Speed Symbol	99H	99H
Treadwear	680	680
Traction Grade	A	A
Temperature Grade	B	B

Table 3 Post-Test Observations

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat WorldSID
Dummy Type / Serial No.	WorldSID / 014
Head Contact	Side curtain airbag, head restraint
Upper Torso Contact	Side seat airbag
Lower Torso Contact	Door panel
Left Knee Contact	Door panel
Right Knee Contact	None

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Unlocked	Unlocked
Left Side Door Opening	Jammed and latched	Jammed and latched
Right Side Door Opening	Closed and latched	Closed and latched
Seat Movement	None	None
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Did not separate from vehicle
Sill Separation	Did not separate from vehicle
Windshield Damage	Windshield cracked
Window Damage	Driver's side window shattered
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 01	
	Installed	Operation
Front Airbag	Yes	No ¹
Torso Airbag	Yes	Yes
Head Airbag	No	Not applicable
Curtain Airbag	Yes	Yes
Seat Belt Pretensioner	Yes	Unknown
Seat Belt Load Limiter	No	Not applicable

¹ The driver front airbag was disabled for this test.

Section 4

Occupant and Vehicle Information

Table 4 WorldSID Instrumentation Data

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Driver Dummy Serial Number: 014

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	2.9	158.1	-23.3	56.9
	Y	61.9	56.4	-9.3	144.3
	Z	17.7	45.3	-2.6	63.8
	R	66.5	56.4		
Head Angular Displacement (rad/sec ²)	X	3476.9	53.9	-2498.6	36.0
	Y	886.0	64.5	-1177.7	36.9
	Z	2034.7	68.9	-1821.2	53.3
Upper Neck Force (N)	X	372.5	57.4	-116.9	159.3
	Y	314.4	274.2	-374.1	144.2
	Z	83.2	13.3	-801.1	45.0
Upper Neck Moment (N-m)	X	29.7	63.2	-24.7	262.9
	Y	10.4	260.8	-27.4	55.3
	Z	14.5	62.6	-8.8	124.7
Lower Neck Force (N)	X	219.5	138.8	-481.6	55.6
	Y	595.5	55.4	-447.5	120.3
	Z	238.4	155.1	-953.6	45.9
Lower Neck Moment (N-m)	X	78.2	274.2	-89.6	147.4
	Y	48.6	56.4	-38.2	161.0
	Z	9.7	65.8	-13.5	179.4
Shoulder Force (N)	X	76.3	265.6	-610.8	46.3
	Y	2080.8	35.4	-80.9	160.4
	Z	155.9	104.0	-442.4	42.3
Shoulder Displacement (mm)	Y	55.2	51.7	-2.7	16.6
Shoulder Acceleration (g)	X	111.6	14.0	-111.3	16.9
	Y	141.7	20.0	-99.0	13.6
	Z	228.4	14.0	-118.1	14.7
	R	276.7	14.0		

Table 4 WorldSID Instrumentation Data, Continued

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Driver Dummy Serial Number: 014

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
T1 Acceleration (g)	X	3.0	149.9	-10.1	41.8
	Y	40.2	47.1	-7.9	114.8
	Z	8.0	58.6	-4.3	95.3
	R	41.3	47.1		
T4 Acceleration (g)	X	3.6	60.6	-9.4	38.2
	Y	39.4	47.1	-8.9	91.4
	Z	8.5	58.3	-4.6	94.8
	R	40.0	47.1		
T12 Acceleration (g)	X	13.1	58.1	-14.4	34.4
	Y	55.0	36.7	-12.5	82.7
	Z	5.6	59.5	-7.1	96.9
	R	56.8	36.6		
Thorax Rib 1 Displacement (mm)	Y	35.3	42.4	-1.0	192.4
Thorax Rib 1 Acceleration (g)	X	29.8	78.0	-42.8	38.9
	Y	82.5	22.9	-109.5	26.8
	Z	52.5	26.6	-61.1	26.9
	R	109.8	26.8		
Thorax Rib 2 Displacement (mm)	Y	33.3	40.1	-3.9	140.2
Thorax Rib 2 Acceleration (g)	X	53.0	13.1	-35.0	18.4
	Y	95.3	27.2	-73.4	35.4
	Z	39.2	28.7	-56.9	35.5
	R	96.2	27.2		
Thorax Rib 3 Displacement (mm)	Y	32.4	40.1	-3.5	138.7
Thorax Rib 3 Acceleration (g)	X	76.6	12.9	-77.7	15.9
	Y	75.5	28.2	-81.1	35.4
	Z	34.9	35.3	-64.4	35.5
	R	89.8	35.5		

Table 4 WorldSID Instrumentation Data, Continued

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Driver Dummy Serial Number: 014

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Abdominal Rib 1 Displacement (mm)	Y	28.0	40.8	-3.3	131.7
Abdominal Rib 1 Acceleration ¹ (g)	X	82.8	12.9	-96.5	15.5
	Y	96.1	13.2	-65.8	16.8
	Z	39.5	29.5	-50.0	12.8
	R	116.6	15.4		
Abdominal Rib 2 Displacement (mm)	Y	25.9	40.0	-4.3	259.7
Abdominal Rib 2 Acceleration (g)	X	56.8	13.0	-126.6	14.8
	Y	164.8	14.9	-66.8	18.7
	Z	30.9	17.2	-52.1	37.6
	R	205.8	14.9		
Lumbar Force (N)	X	408.7	58.6	-209.3	16.7
	Y	722.4	41.5	-163.0	84.7
	Z	5.0	104.2	-1806.2	59.1
Lumbar Moment ¹ (N-m)	X	43.1	52.2	-7.6	21.2
	Y	7.7	17.4	-22.9	58.7
	Z	0.0	41.8	0.0	229.0
Pelvis Acceleration (g)	X	7.2	46.4	-8.0	16.3
	Y	54.2	37.4	-17.0	84.3
	Z	8.7	16.2	-16.2	48.1
	R	54.4	37.4		
Sacro-Iliac Left Force (N)	X	147.7	16.8	-573.6	41.5
	Y	3349.7	39.4	-3.8	-18.6
	Z	83.8	109.3	-635.0	60.5

¹ See Data Acquisition Explanations

Table 4 WorldSID Instrumentation Data, Continued

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Driver Dummy Serial Number: 014

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Sacro-Iliac Left Moment (N-m)	X	35.4	61.5	-72.4	38.5
	Y	30.0	46.2	-8.7	148.6
	Z	63.7	36.1	-21.8	59.9
Sacro-Iliac Right Force ¹ (N)	X	10132.8	83.7	-487.9	35.6
	Y	1694.1	39.4	-12.6	219.3
	Z	6.8	37.0	-1103.0	59.8
Sacro-Iliac Right Moment (N-m)	X	69.1	59.9	-44.8	39.2
	Y	15.3	41.8	-16.3	93.0
	Z	60.2	36.3	-22.4	59.9
Pubic Force (N)	Y	936.0	44.5	-10.8	269.9
Left Mid Femur Force (N)	X	17.7	19.2	-219.1	79.7
	Y	15.3	281.1	-560.8	49.5
	Z	55.5	17.4	-1282.7	49.3
Left Mid Femur Moment (N-m)	X	95.8	47.4	-6.9	17.8
	Y	27.0	48.9	-24.3	88.4
	Z	11.3	130.6	-28.9	42.5
Left Femoral Neck Force (N)	X	357.5	82.6	-121.0	20.2
	Y	835.7	46.3	-109.9	74.5
	Z	1997.4	46.2	-3.1	-19.1
Left Knee Outboard Force (N)	Y	248.5	58.5	-189.3	37.9
Left Knee Inboard Force (N)	Y	27.7	20.9	-1129.2	72.2
Right Femoral Neck Force (N)	X	409.1	70.6	-99.6	292.3
	Y	650.8	46.4	-316.8	69.3
	Z	151.1	89.7	-1178.2	61.3

Positive Direction

Longitudinal: Forward
Lateral: Rightward
Vertical: Downward

Negative Direction

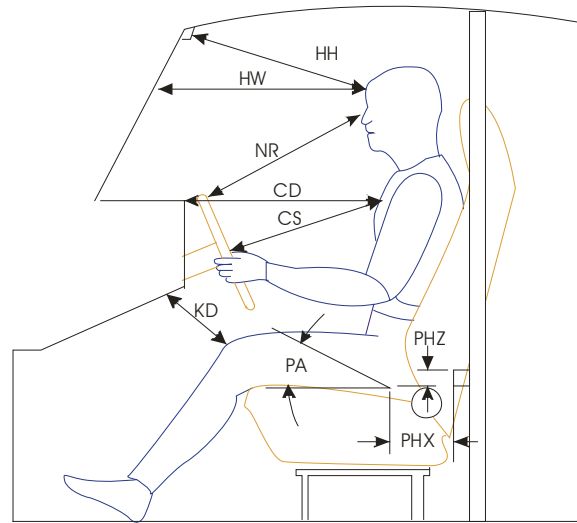
Longitudinal: Rearward
Lateral: Leftward
Vertical: Upward

¹ See Data Acquisition Explanations

Figure 1 WorldSID Longitudinal Clearance Dimensions

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



Left Side View

Note: All measurements are in millimeters with tolerance of ± 0.1 mm

Measurement	Driver WorldSID # 014
HH	438
HW	752
HZ	225
NR ¹	537
CD	667
CS	N/D
KDL(KDA°)	135/(19.1°)
KDR(KDA°)	126/(16.2°)
PHX	207
PHZ	196

Note: 2-door vehicle shown. Rear dummy PHX and PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

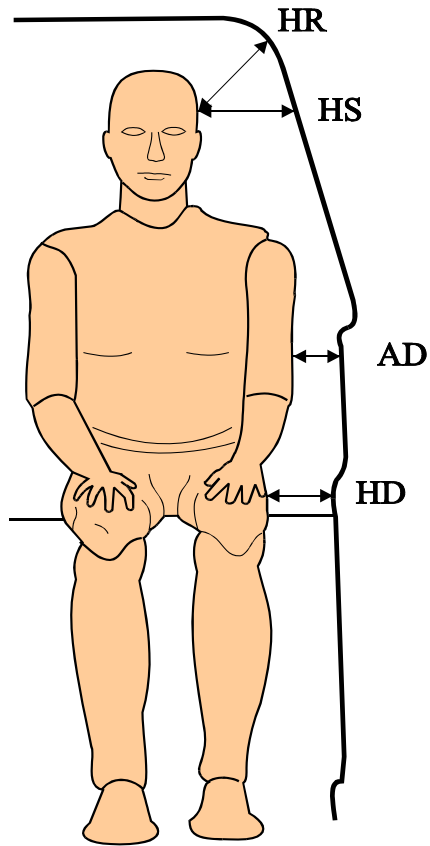
Location	Measurement
Head X-Angle	-1.0°
Head Y-Angle	0.8°
Thorax X-Angle	-0.1°
Thorax Y-Angle	0.0°
Pelvis X-Angle	-0.5°
Pelvis Y-Angle	3.0°

Note: Measurements recorded from WorldSID tilt sensors. The neck was moved forward 1 notch to level the head.

Figure 2 WorldSID Lateral Clearance Dimensions

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



Note: All measurements are in millimeters with tolerance of ± 0.1 mm

Measurement	Driver WorldSID # 014	
HR	225	
HS	331	
AD	Lower: 132	Upper: 114
HD	122	

Table 5 WorldSID Position Relative to Striker

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Driver Dummy Serial Number: 014

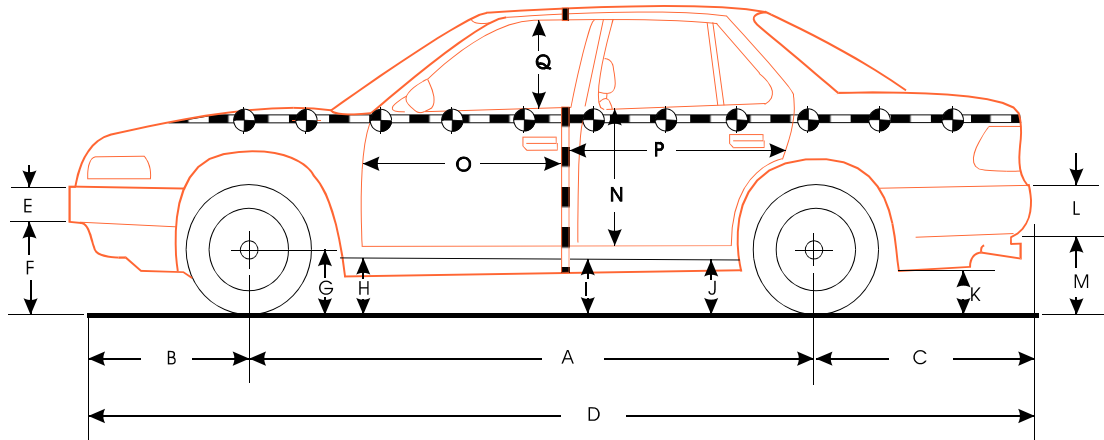
Location	Longitudinal X (mm)	Vertical Z (mm)
M_HEAD CG	23.3	-463.6
M_SHOULDER BOLT	NA	NA
M_ELBOW	NA	NA
M_H POINT	207.0	195.6
M_KNEE	629.7	61.0
M_ANKLE	887.0	388.8
M_LOWER NECK	43.8	-286.1
M_SHOULDER	NA	NA
M_RIB 1	77.1	-246.3
M_RIB 2	114.6	-168.5
M_RIB 3	153.9	-103.6
M_RIB 4	175.9	-53.5
M_RIB 5	210.3	42.0

Note: All measurements are in millimeters with tolerance of ± 0.1 mm
Positive values are forward and down relative to the striker.

Figure 3 Vehicle Pre-Test And Post-Test Measurements

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



Left Side View

Note: Measurements were achieved by using a tape measure.

All dimensions are in millimeters with tolerance of ± 0.1 mm

	Pre-Test (as delivered)	Pre-Test (as tested)	Post-Test (as tested)	Change
A	2640	2640	2580	60
B	865	865	865	0
C	865	865	865	0
D	4370	4370	4349	21
E	100	100	100	0
F	447	442	480	-38
G	330	331	333	-2
G1	371	362	393	-31
H	373	366	390	-24
I	388	378	400	-22
J1	264	262	301	-39
J2	413	407	462	-55
K	372	366	420	60
L	143	143	143	0
M	442	442	478	-36
N	802	802	800	2
O	840	840	840	0
P	1225	1225	1210	15
Q	407	407	380	27
R	4157	4157	4125	32
S	4158	4158	4100	58
T	1310	1310	1090	220

D = Length at centerline

E and L = Bumper Thickness

R = Right Side Length

S = Left Side Length

T = Width at B-pillar

J1 = To Pinch Weld

J2 = To Sill

Table 6 Vehicle Structural Measurements^{1,2}

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

	Elements	Pre-Test
1	Total Length	4370
2	Total Width	1790
3	Bumper Top Height	540
4	Bumper Bottom Height	449
5	Longitudinal Member Top Height	455
6	Longitudinal Member Bottom Height	450
7	Distance Between Longitudinal Members	1062
7'	Longitudinal Member Width	55
8	Engine Top Height	890
9	Engine Bottom Height	230
10	Engine and Gearbox Width	580
11	Front Bumper - Engine Distance	392
12	Front Shock Absorber Fixing Height	912
13	Bonnet Leading Edge Height	875
14	Front Shock Absorber Fixing Width	1200
15	Front Bumper - Front Axle Distance	865
16	Front Axle - A Pillar Distance	525
17	A Pillar - B Pillar Distance	1020
18	B Pillar - Rear Axle Distance	1105
19	B Pillar - C Pillar Distance	950
20	Roof Sill Bottom Height	1512
21	Roof Sill Top Height	1540
22	Floor Sill Bottom Height	395
23	Floor Sill Top Height	435

All distance measurements are in millimeters and achieved by using a tape measure.

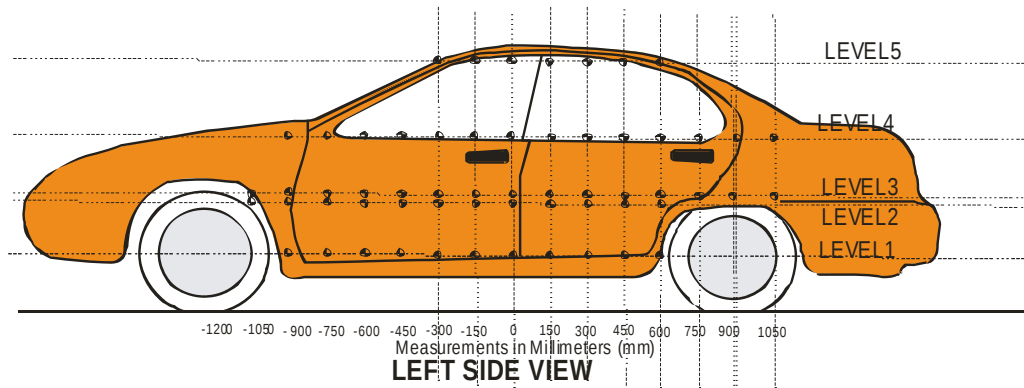
¹ Taken from INSIA report, "Structural Survey of Cars, Methodology of the Main Resistant Elements in the Car Body", March 1999.

² The vertical measurements from the ground are adjusted based on the test vehicle's pre-test attitude measurements.

Figure 4 Vehicle Side Measurements from Impact Point

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



Measurements are taken when the vehicle is in the "As Tested" configuration.

Measurements vehicle forward of the impact line are negative.

All measurements below in mm.

The target impact point was 89 mm rearward of the crush grid zero point taken at level 2.

Level	Measurement Description	Height Above Ground
5	Window Top	1581
4	Window Sill	1109
3	Mid Door	776
2	Occupant H-Point	700
1	Side Sill	443

Table 7 Vehicle Exterior Crush Profiles - All Levels

Vehicle: 2011 Hyundai Tucson

		(mm) From Impact Point																
Location	Height		-1500	-1350	-1200	-1050	-900	-750	-600	-450	-300	-150	0	150	300	450	600	750
Level 1 Side Sill	443	Pre						890	884	883	881	880	880	880	881	880	879	878
		Post						886	834	782	733	679	580	577	672	747	797	842
		Crush						4	50	101	148	201	300	303	209	133	82	36
Level 2 H-Point	700	Pre					911	900	896	895	895	895	894	893	892	889	887	884
		Post					922	910	837	778	721	656	567	552	705	744	778	815
		Crush					-11	-10	59	117	174	239	327	341	187	145	109	69
Level 3 Mid-Door	776	Pre				915	908	900	898	898	898	897	897	897	895	893	890	887
		Post				936	921	917	837	766	709	648	563	552	707	747	782	812
		Crush				-21	-13	-17	61	132	189	249	334	345	188	146	108	75
Level 4 ¹ Window Sill	1109	Pre				798	807	812	814	818	822	825	829	832	834	833	834	835
		Post				831	828	820	807	757	691	623	549	528	641	690	726	760
		Crush				-33	-21	-8	7	61	131	202	280	304	193	143	108	75
Level 5 Window Top	1581	Pre					793	764	734	701	670	642	620	610	603	600	600	600
		Post					818	779	737	691	638	579	504	465	504	529	543	560
		Crush					-25	-15	-3	10	32	63	116	145	99	71	57	40

All measurements were recorded using TRC Inc.'s FARO Arm with a tolerance of ± 0.1 mm.

Note: Negative measurements are vehicle forward of the impact point.

The crush profile grid is established prior to test day based on an estimated impact point.

¹ The target impact point was 89 mm rearward of the crush grid zero line.

Table 7 Vehicle Exterior Crush Profiles - All Levels, Continued

Vehicle: 2011 Hyundai Tucson

Location	Height		(mm) From Impact Point												
			900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700
Level 1 Side Sill	443	Pre	881												
		Post	901												
		Crush	-20												
Level 2 H-Point	700	Pre	888	901											
		Post	857	915											
		Crush	31	-14											
Level 3 Mid-Door	776	Pre	886	896	906	908	906								
		Post	846	899	893	898	898								
		Crush	40	-3	13	10	8								
Level 4 Window Sill	1109	Pre	844	846	846	845	841								
		Post	816	866	910	838	836								
		Crush	28	-20	-64	7	5								
Level 5 Window Top	1581	Pre	603	607	612	618	625								
		Post	579	592	600	609	617								
		Crush	24	15	12	9	8								

All measurements were recorded using TRC Inc.'s FARO Arm with a tolerance of ± 0.1 mm.

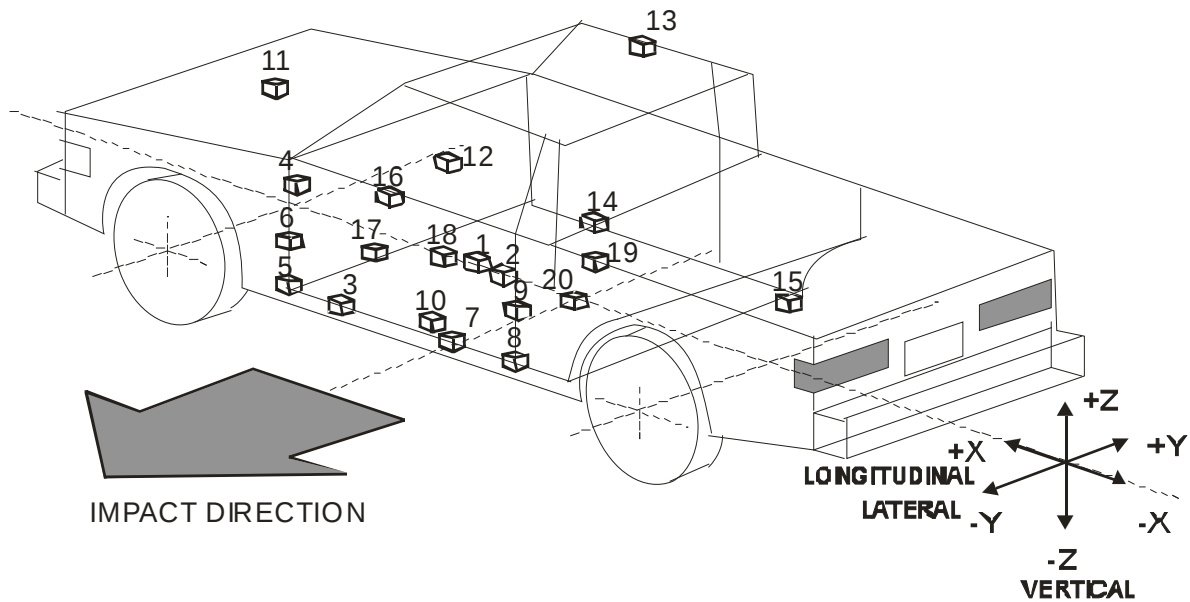
The crush profile grid is established prior to test day based on an estimated impact point.

¹ The target impact point was 89 mm rearward of the crush grid zero line.

Figure 5 Test Vehicle Accelerometer Locations and Data Summary

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



- 1-Vehicle Center of Gravity
- 2-Vehicle Center of Gravity Gyroscopes
- 3-Left Floor Sill Between A-Pillar and Impact Line
- 4-Left Side Sill at A-Pillar
- 5-Left Side Lower A-Pillar
- 6-Left Side Middle A-Pillar
- 7-Left Side Sill at Rear Seat
- 8-Left Side Lower B-Pillar
- 9-Left Side Middle B-Pillar

- 10-Left Side Front Seat Track at H-point
- 11-Top of Engine
- 12-Center Firewall
- 13-Right Side Roof Rail
- 14-Right Side Floor Sill
- 15-Rear Deck Behind Rear Axle
- 16-Front Door Upper Centerline
- 17-Front Door Centerline
- 18-Front Door Mid Rear
- 19-Rear Door Upper Centerline
- 20-Rear Door Mid Rear

Table 8 Test Vehicle Accelerometer Locations and Data Summary

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Location		Coordinates (mm)			Positive Direction Max. Time		Negative Direction Max. Time	
		X	Y	Z	(g)	(ms)	(g)	(ms)
1	Vehicle CG	2460	10	422				
	Longitudinal				4.2	69.3	-10.5	46.3
	Lateral				26.1	46.7	-1.9	72.9
	Vertical				12.9	43.9	-6.8	63.8
	Resultant				28.9	46.6		
2	Vehicle CG Gyroscopes ¹	2460	-10	422				
	Longitudinal °/sec				213.4	50.4	-351.4	38.8
	Lateral °/sec				869.6	49.0	-151.9	34.9
	Vertical °/sec				376.3	115.4	-86.8	250.3
3	Left Side Sill Between A-Pillar and Impact Line ¹	2828	680	399				
	Lateral				50.5	20.1	-16.2	62.7
4	Left Side Sill at A-Pillar	3105	690	399				
	Lateral				19.3	31.4	-0.4	219.1
5	Left Side Lower A-Pillar	3155	-820	605				
	Lateral				47.4	82.3	-13.2	52.2
6	Left Side Middle A-Pillar	3157	800	1005				
	Lateral				13.4	14.5	-2.0	1.7
7	Left Side Sill at Rear Seat	1875	683	385				
	Lateral				64.8	43.8	-50.4	39.5
8	Left Side Lower B-Pillar ¹	2110	820	610				
	Lateral				64.2	9.8	-1.5	290.6
9	Left Side Middle B-Pillar	2090	800	1037				
	Lateral				55.5	16.6	-3.6	54.1

Table 8 Test Vehicle Accelerometer Locations and Data Summary, Continued

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max. (g)	Time (ms)	Max. (g)	Time (ms)
10	Left Side Front Seat Track at H-Point	2263	583	467				
	Lateral				91.0	30.7	-11.4	35.6
11	Top of Engine	3861	-15	840				
	Longitudinal				5.3	103.8	-17.1	28.2
	Lateral				11.3	68.0	-3.8	206.5
12	Firewall	3631	-45	978				
	Lateral				11.7	42.1	-1.4	3.6
13	Right Side Roof Rail	2475	-590	453				
	Lateral				25.1	37.2	-1.8	286.2
14	Right Side Sill	2555	-680	388				
	Lateral				15.8	13.4	-0.9	223.2
15	Rear Deck Behind Rear Axle	1195	0	538				
	Longitudinal				3.2	39.0	-6.5	30.5
	Lateral				16.3	53.2	-1.1	244.4
16	Front Door Upper Centerline	2640	755	1110				
	Lateral				95.6	9.6	-39.8	33.5
17	Front Door Centerline	2565	785	810				
	Lateral				138.6	19.2	-47.9	23.5
18	Front Door Mid Rear ¹	2292	760	810				
	Lateral				48.0	6.1	-922.9	300.5
19	Rear Door Upper Centerline	1665	723	1180				
	Lateral				28.1	20.2	-4.4	43.7
20	Rear Door Mid Rear	1391	750	848				
	Lateral				37.3	28.8	-1.9	236.9

Reference: X: + Forward from rear bumper
Y: + Rightward from vehicle centerline
Z: + Upward from ground level

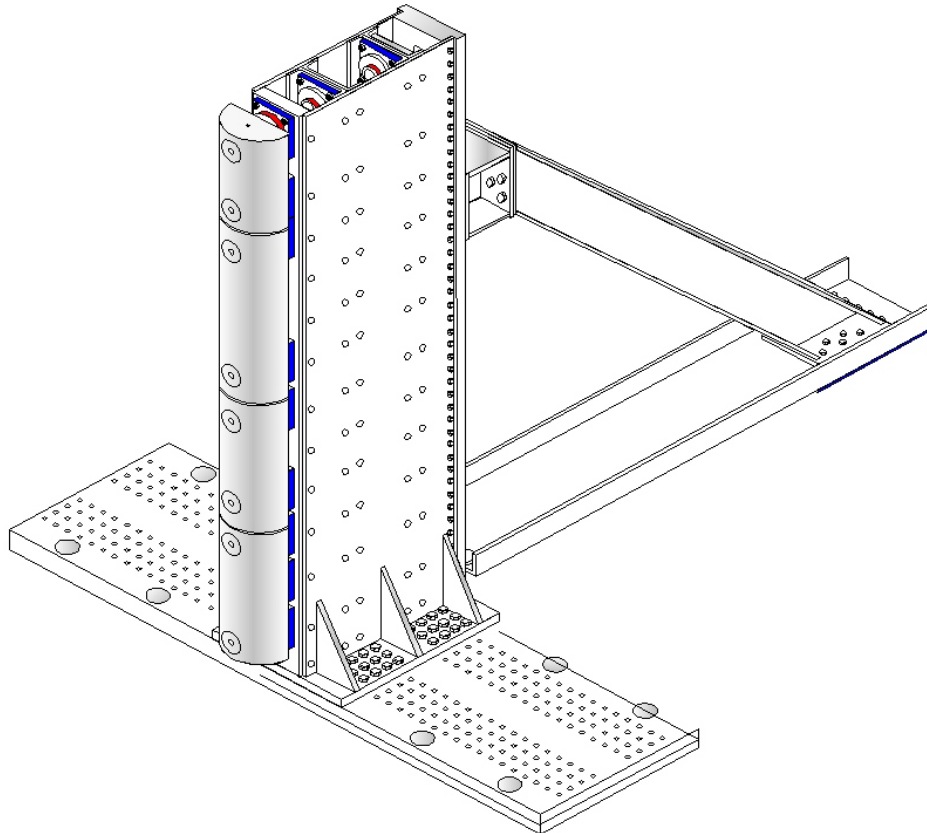
For acceleration data sign convention see Report Sign Convention in Appendix D.

Figure 6 Pole Load Cell Locations

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11

FOIL 300K RIGID POLE

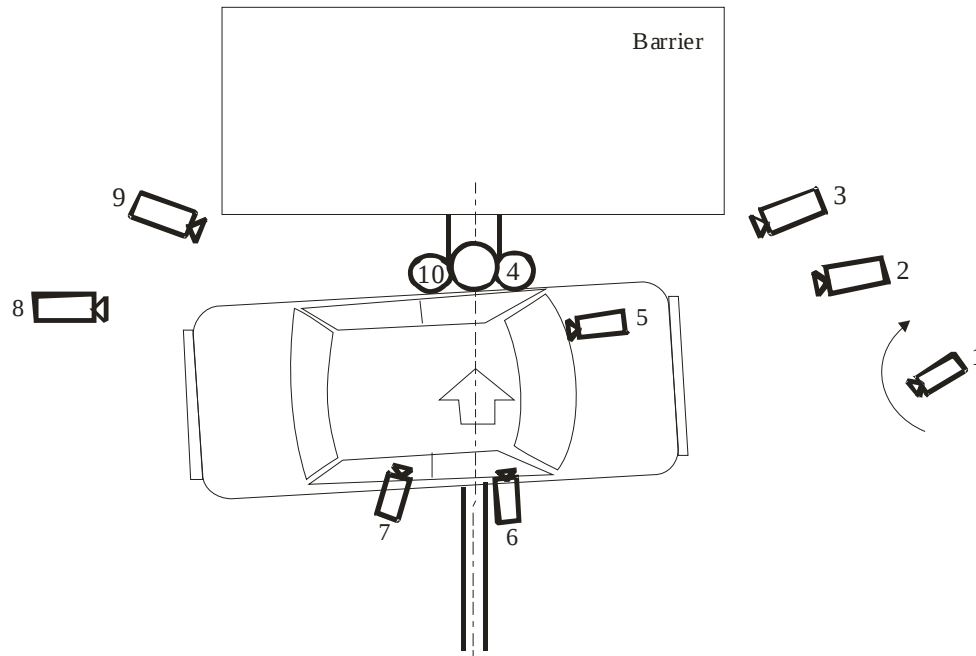


Load Cell Locations	
ID	Height From Top of Carrier (mm)
1	87
2	468
3	648
4	978
5	1168
6	1651
7	1816
8	2057

Figure 6 High-Speed Camera Locations and Data Summary

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



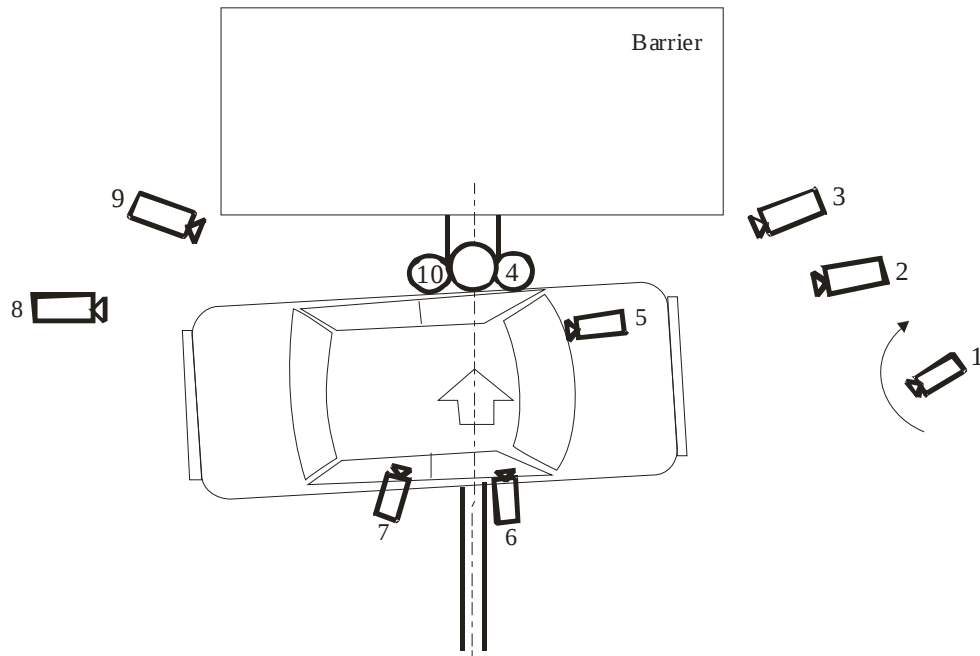
No.	Camera View	Lens (mm)	Speed (fps)
1	Real-time	Zoom	30
2	Front view	25	1000
3	Front oblique	12.5	1000
4	Overhead tight	25	1000
5	Onboard vehicle front	12.5	1000
6	Onboard right front door	8.5	1000
7	Onboard right rear door	6.0	1000
8	Rear view	25	1000
9	Rear oblique view	16	1000
10	Overhead wide view	8.5	1000

Vehicle was at a 75° angle to the rigid pole.

Figure 6 High-Speed Camera Locations and Data Summary

Test Vehicle: 2011 Hyundai Tucson

Test Date: 08/17/11



No.	Camera View	Lens (mm)	Speed (fps)
1	Real-time	Zoom	30
2	Front view	25	1000
3	Front oblique	12.5	1000
4	Overhead tight	25	1000
5	Onboard vehicle front	12.5	1000
6	Onboard right front door	8.5	1000
7	Onboard right rear door	6.0	1000
8	Rear view	25	1000
9	Rear oblique view	16	1000
10	Overhead wide view	8.5	1000

Vehicle was at a 75° angle to the rigid pole.

Appendix A

Photographs



Figure A-1 Pre-Test Front View

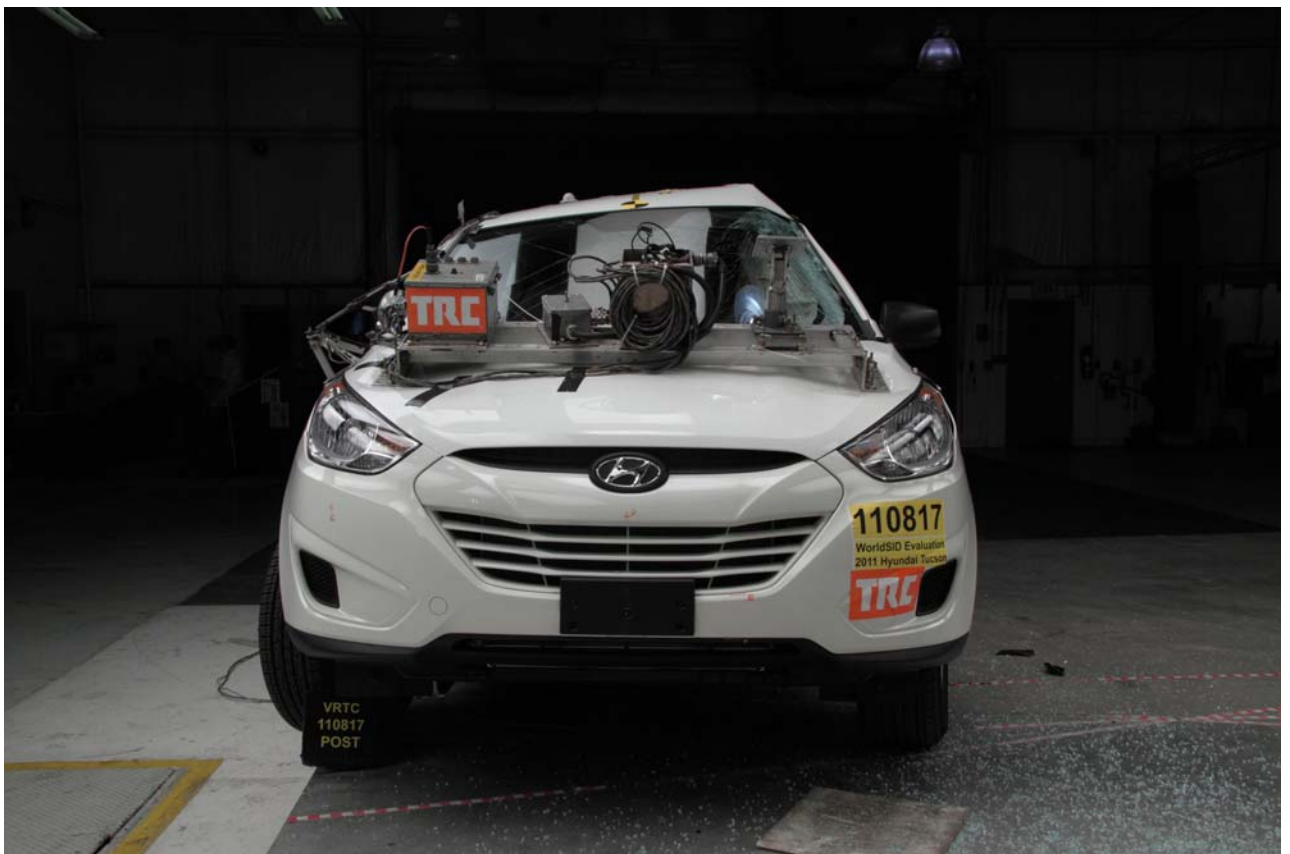


Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Front View



Figure A-4 Post-Test Left Front View

Photograph Not Taken

Figure A-5 Pre-Test Left Front Tight View



Figure A-6 Post-Test Left Front Tight View



Figure A-7 Pre-Test Left Side View



Figure A-8 Post-Test Left Side View



Figure A-9 Pre-Test Left Rear View



Figure A-10 Post-Test Left Rear View

Photograph Not Taken

Figure A-11 Pre-Test Left Rear Tight View



Figure A-12 Post-Test Left Rear Tight View



Figure A-13 Pre-Test Rear View

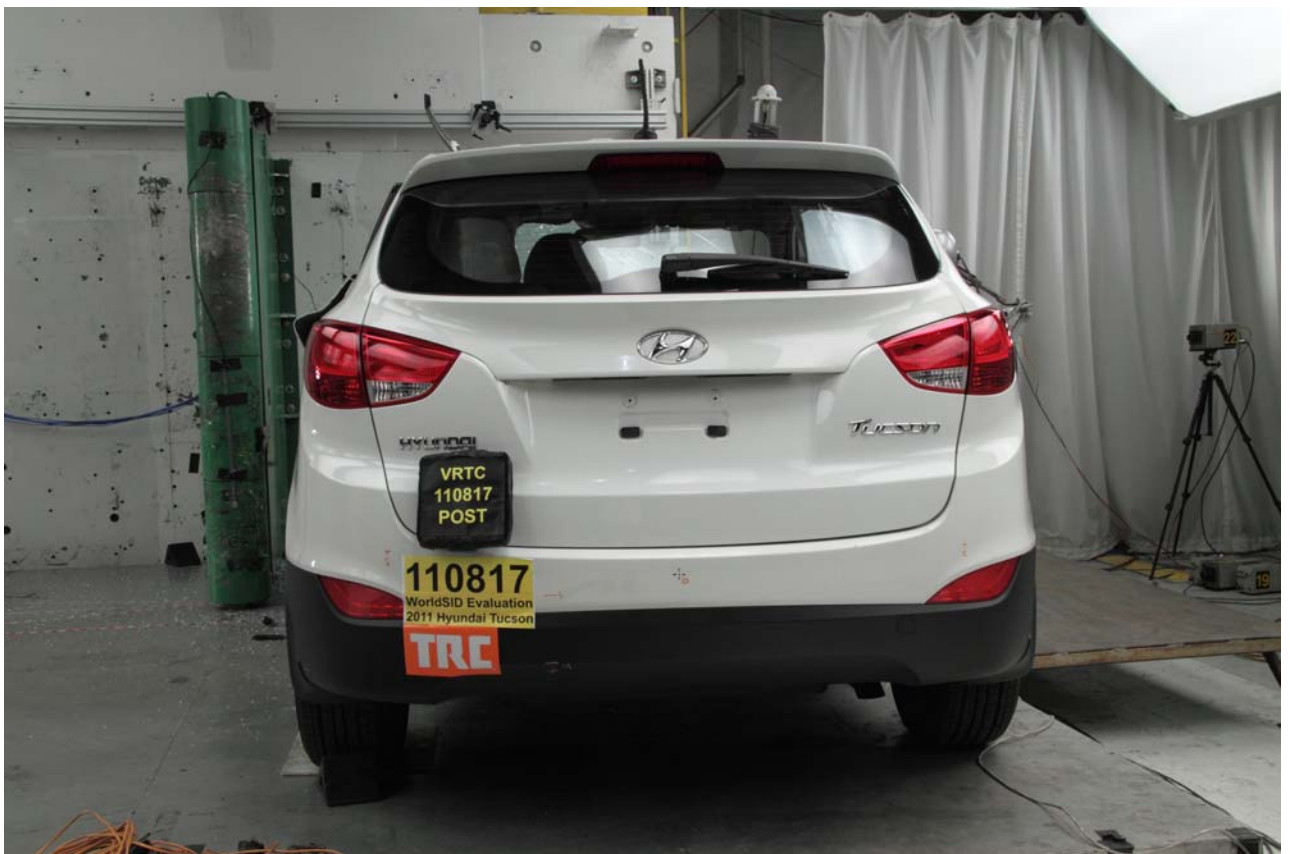


Figure A-14 Post-Test Rear View



Figure A-15 Pre-Test Right Side View



Figure A-16 Post-Test Right Side View

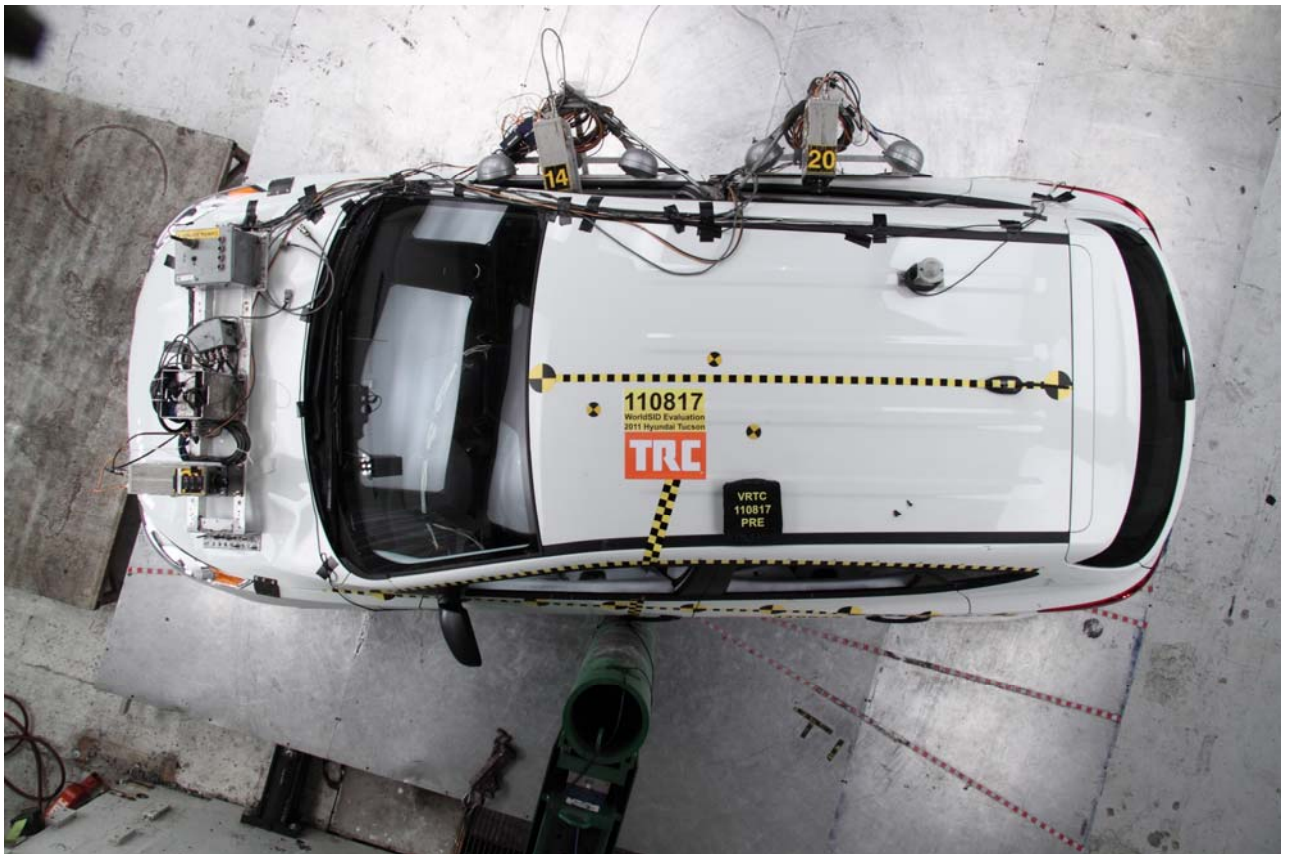


Figure A-17 Pre-Test Overhead View

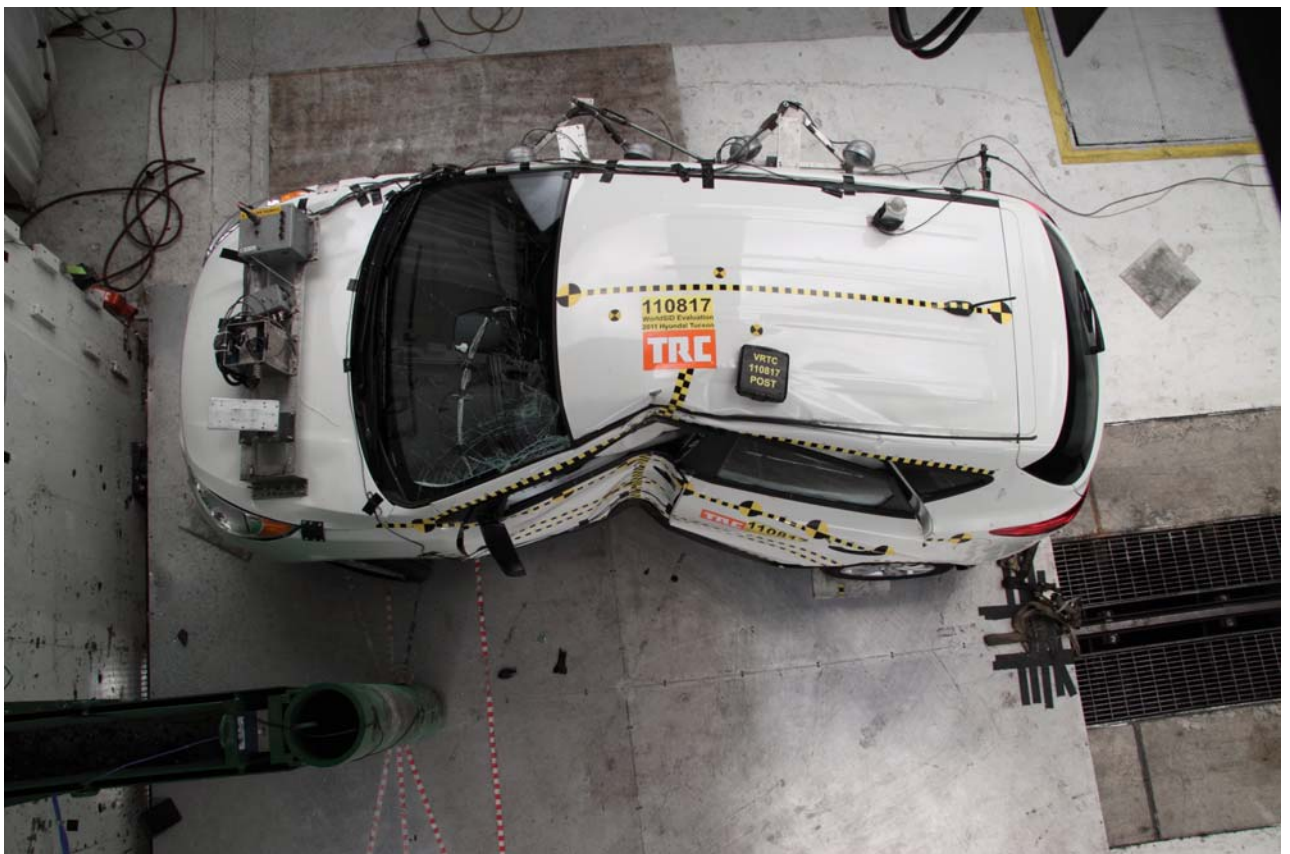


Figure A-18 Post-Test Overhead View



Figure A-19 Pre-Test Impact Point View



Figure A-20 Post-Test Impact Point View

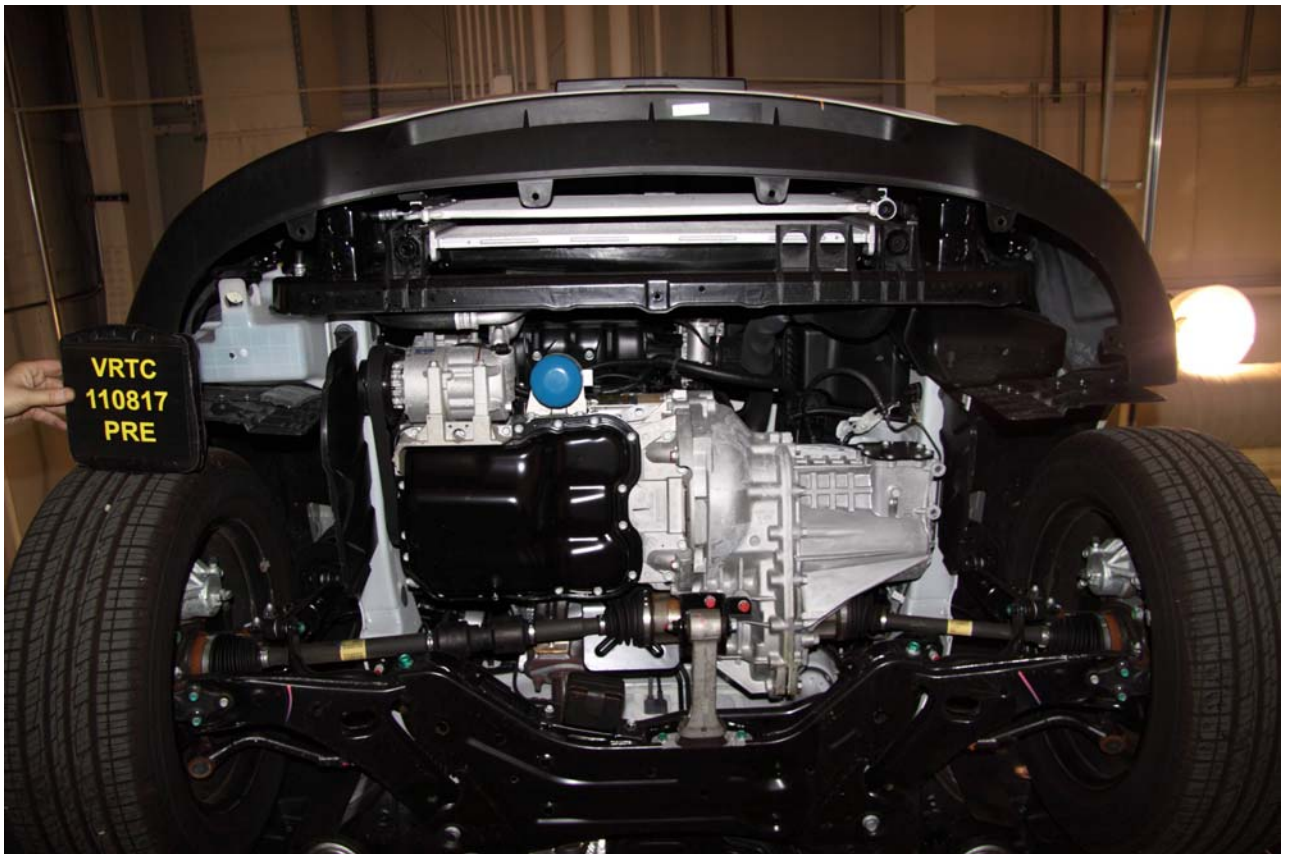


Figure A-21 Pre-Test Front Underbody View

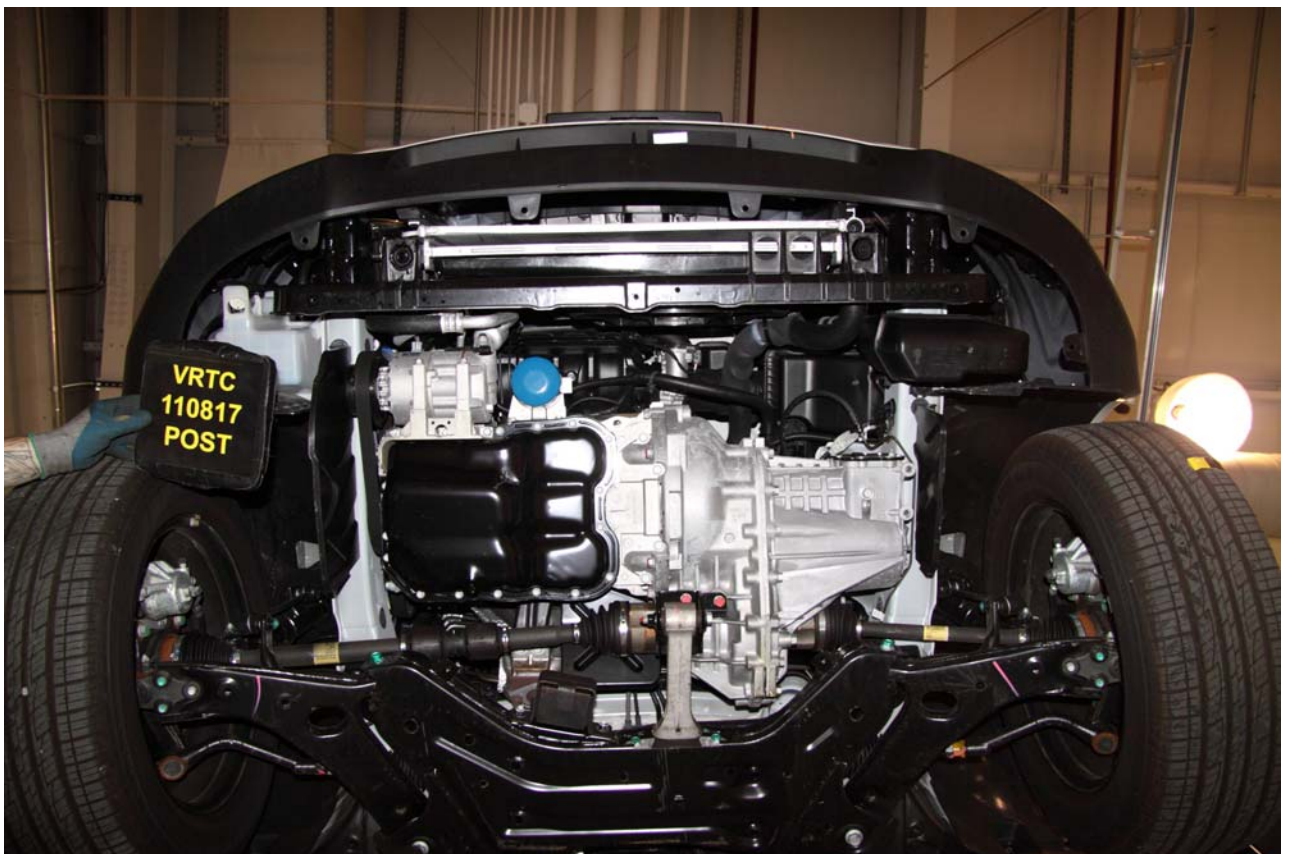


Figure A-22 Post-Test Front Underbody View

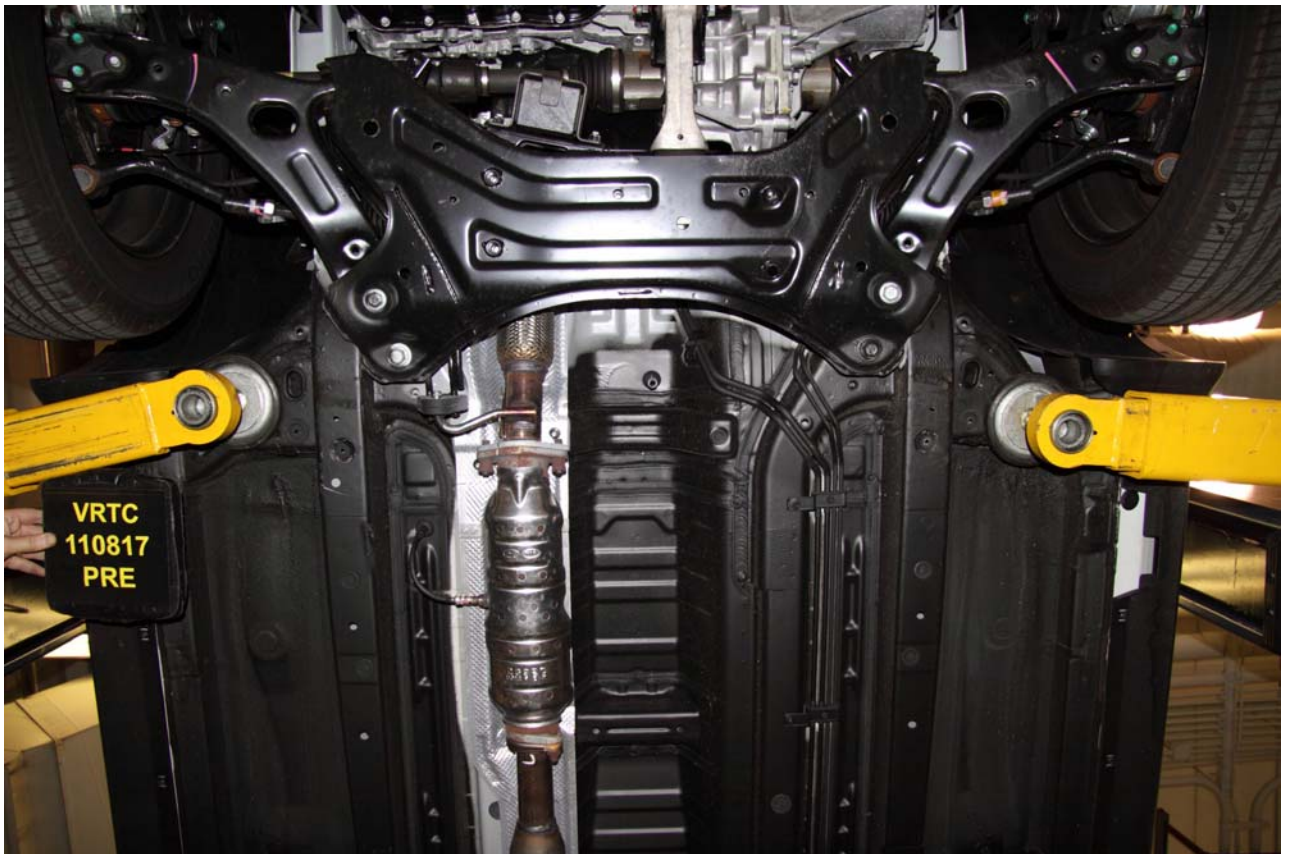


Figure A-23 Pre-Test Front Mid Underbody View

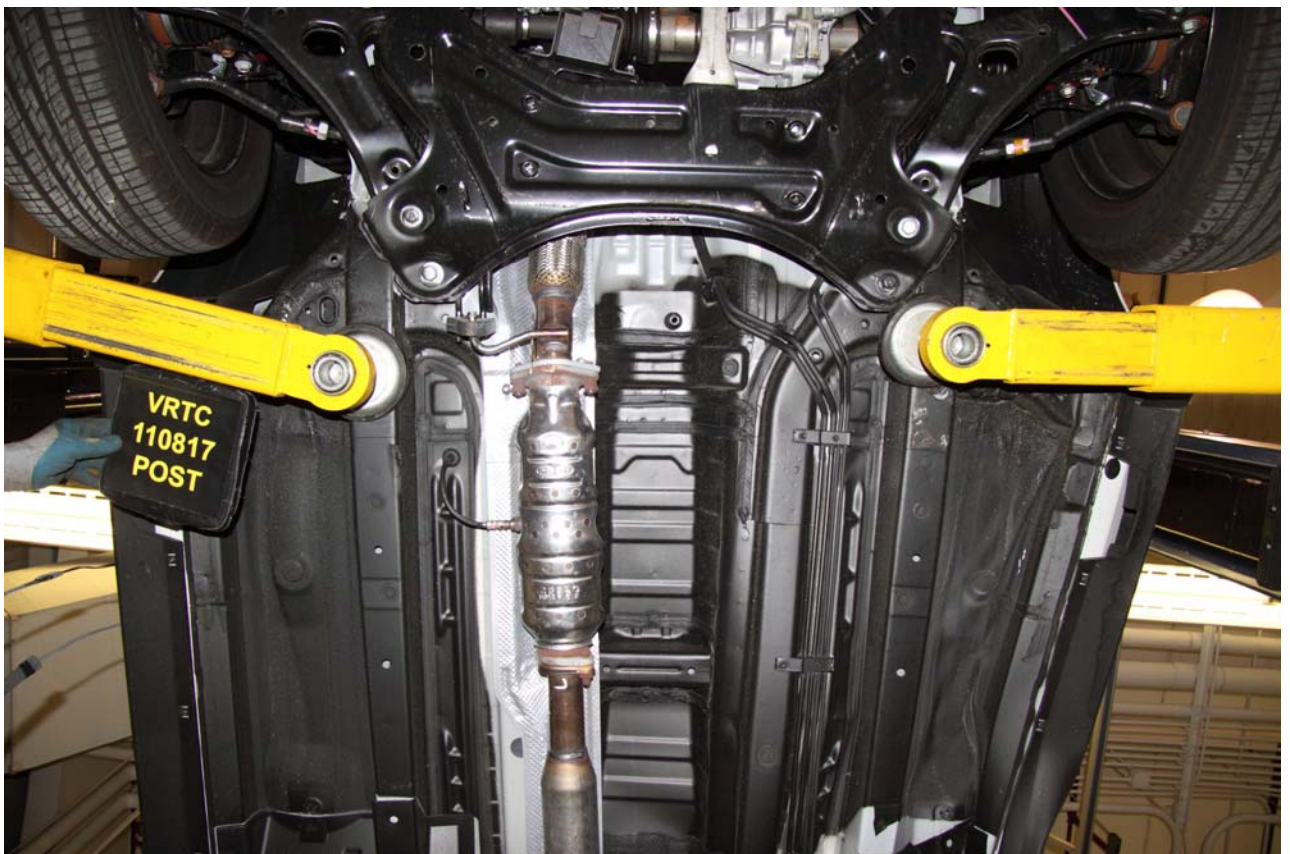


Figure A-24 Post-Test Front Mid Underbody View



Figure A-25 Pre-Test Mid Underbody View



Figure A-26 Post-Test Mid Underbody View



Figure A-27 Pre-Test Rear Mid Underbody View



Figure A-28 Post-Test Rear Mid Underbody View

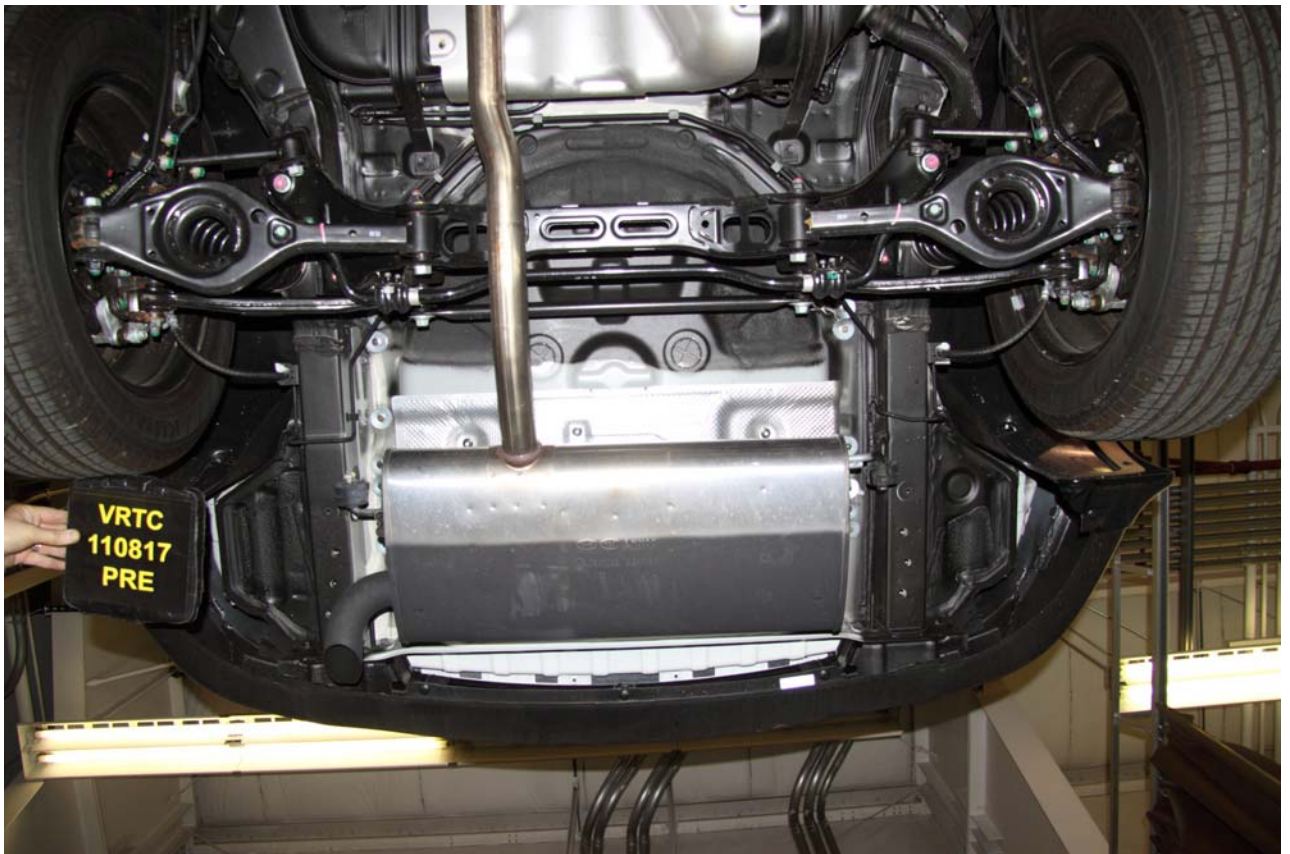


Figure A-29 Pre-Test Rear Underbody View

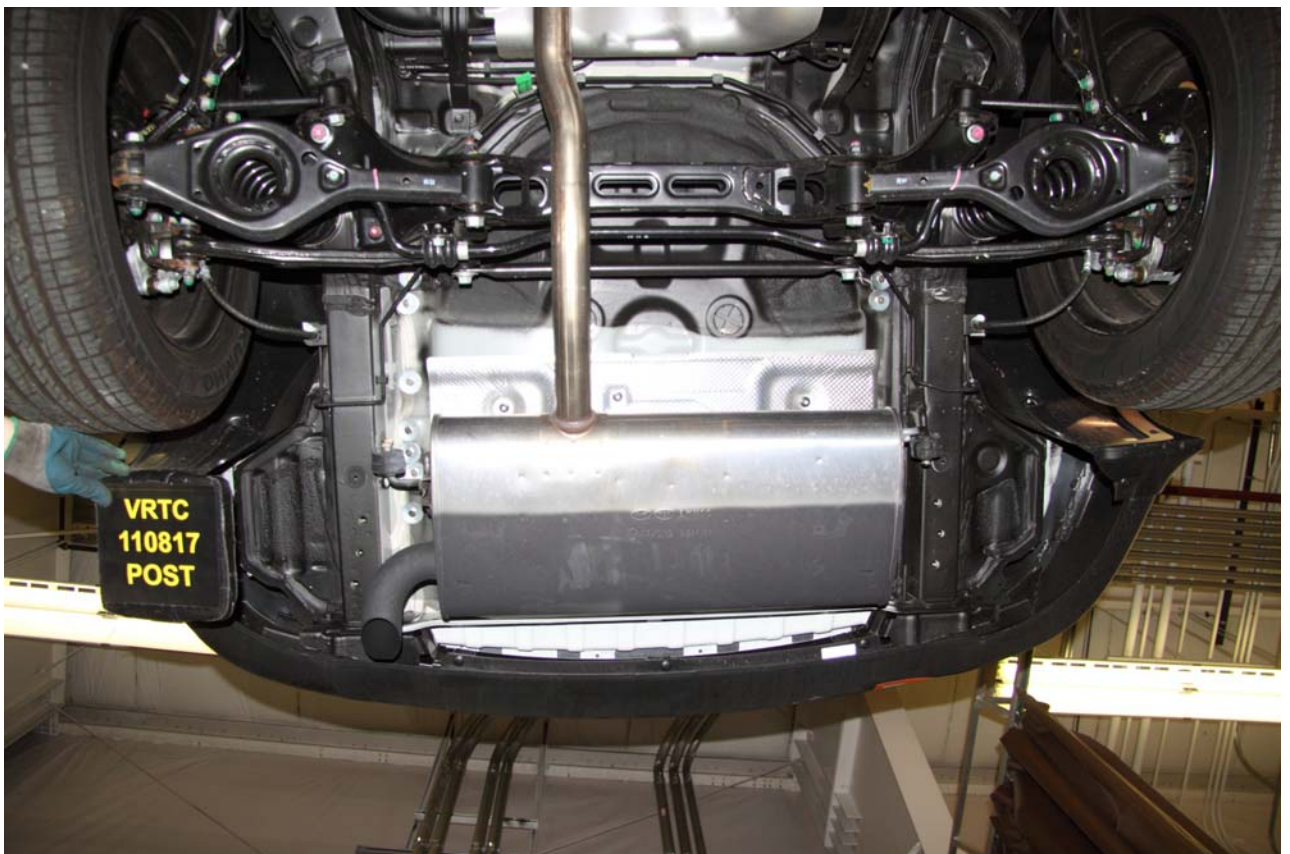


Figure A-30 Post-Test Rear Underbody View



Figure A-31 Pre-Test Driver Dummy - View 1



Figure A-32 Post-Test Driver Dummy - View 1



Figure A-33 Pre-Test Driver Dummy - View 2

Photograph Not Taken

Figure A-34 Post-Test Driver Dummy - View 2



Figure A-35 Pre-Test Driver Dummy - View 3

Intentionally Left Blank



Figure A-36 Pre-Test Driver Dummy - View 4

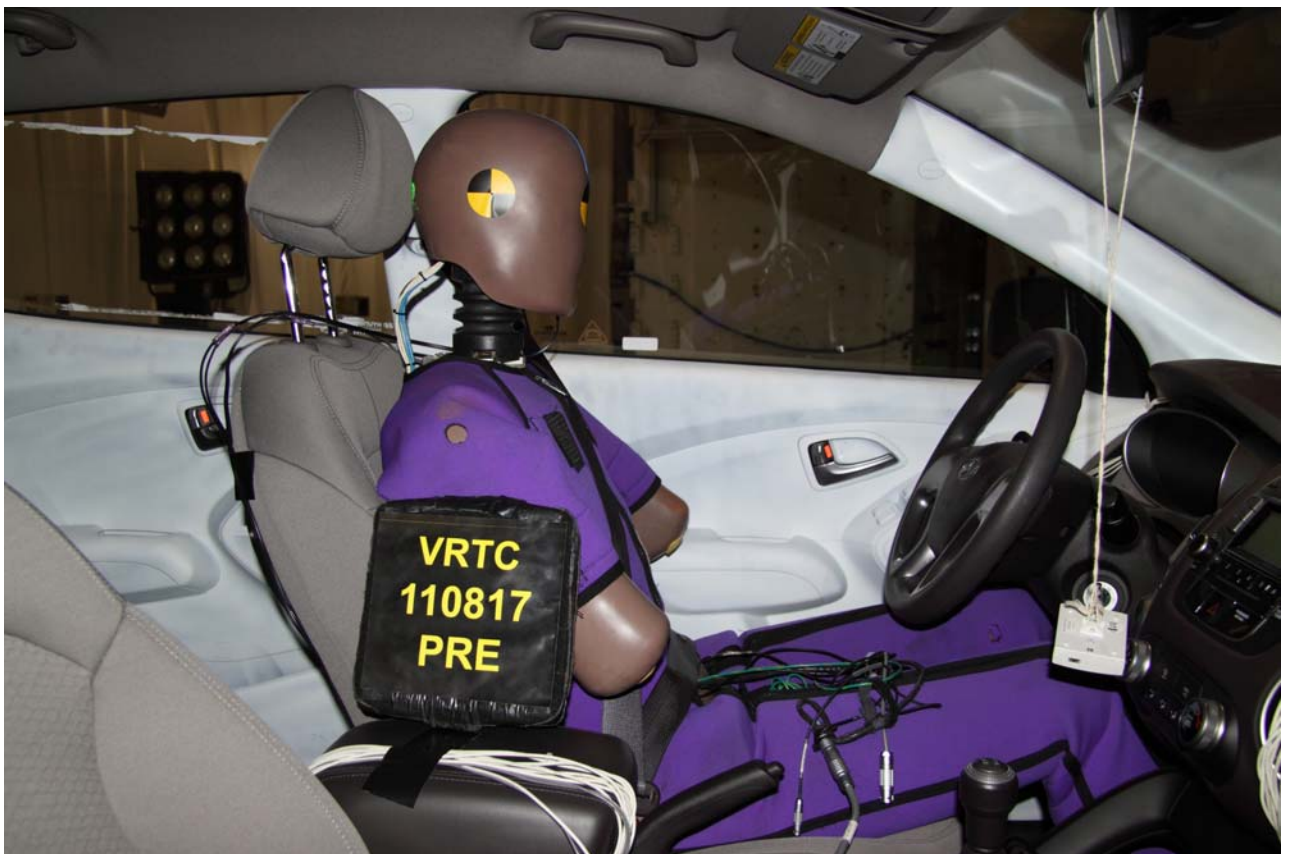


Figure A-37 Post-Test Driver Dummy - View 4



Figure A-38 Pre-Test Driver Dummy - View 5



Figure A-39 Post-Test Driver Dummy - View 5



Figure A-40 Pre-Test Driver Door Panel View



Figure A-41 Post-Test Driver Door Panel View



Figure A-42 Post-Test Driver Dummy Contact - View 1



Figure A-43 Post-Test Driver Dummy Contact - View 2



Figure A-44 Post-Test Driver Dummy Contact - View 3



Figure A-45 Post-Test Driver Dummy Contact - View 4

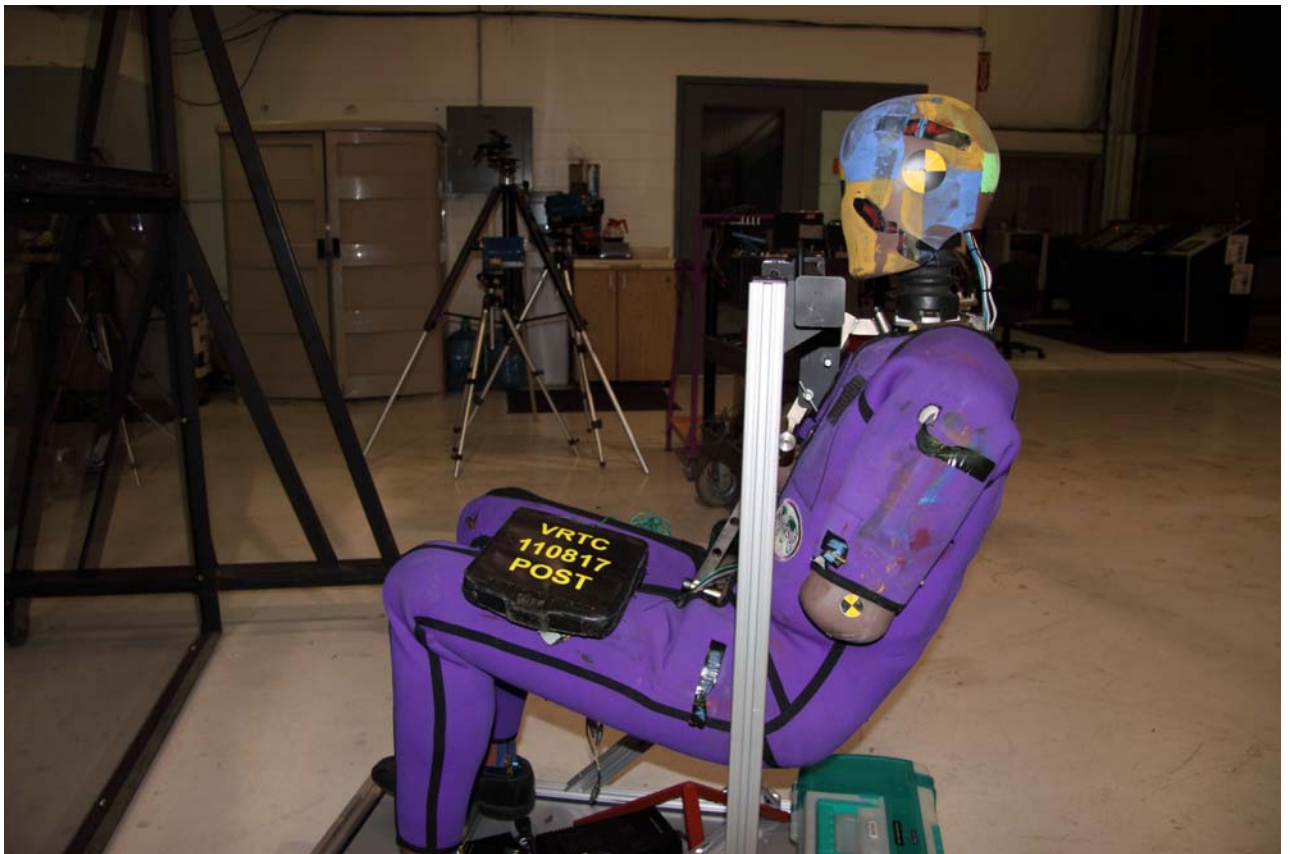


Figure A-46 Post-Test Driver Dummy Overall View



Figure A-47 Vehicle Certification Label



Figure A-48 Tire Pressure Label

Appendix B

Data Plots



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

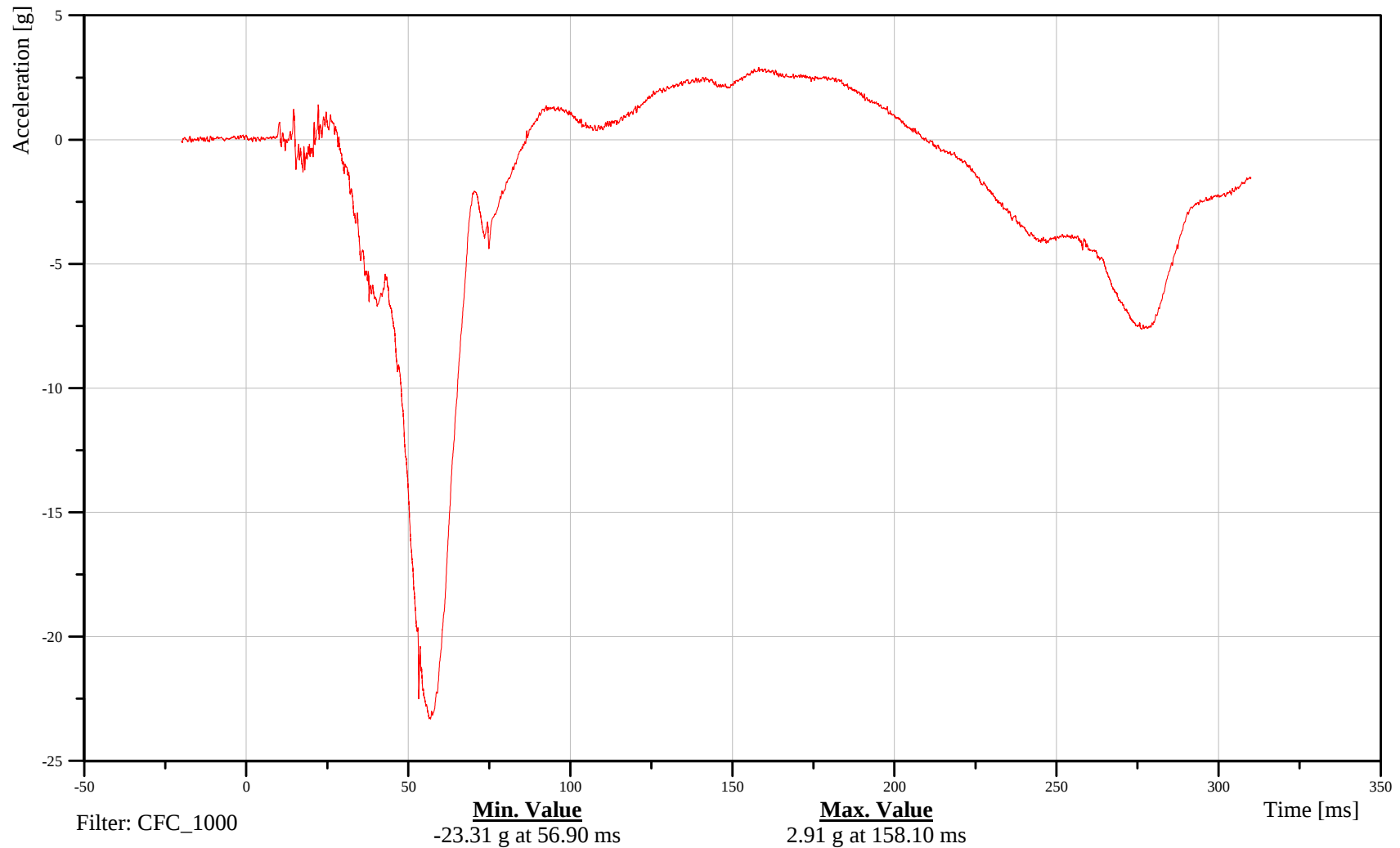
Head X-Axis Acceleration

Customer: VRTC

11HEADCG00WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-2

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

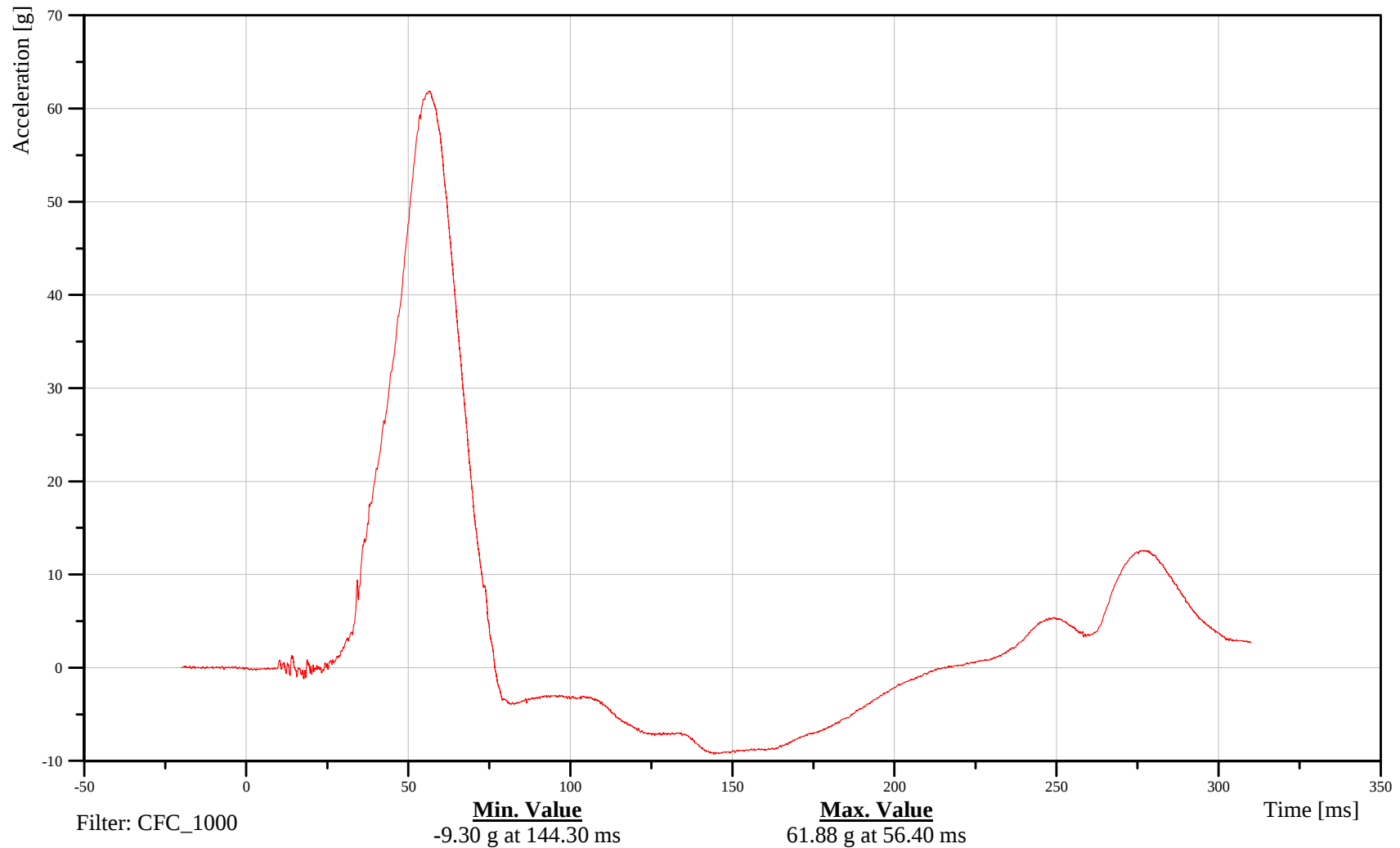
Head Y-Axis Acceleration

Customer: VRTC

11HEADCG00WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-3

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

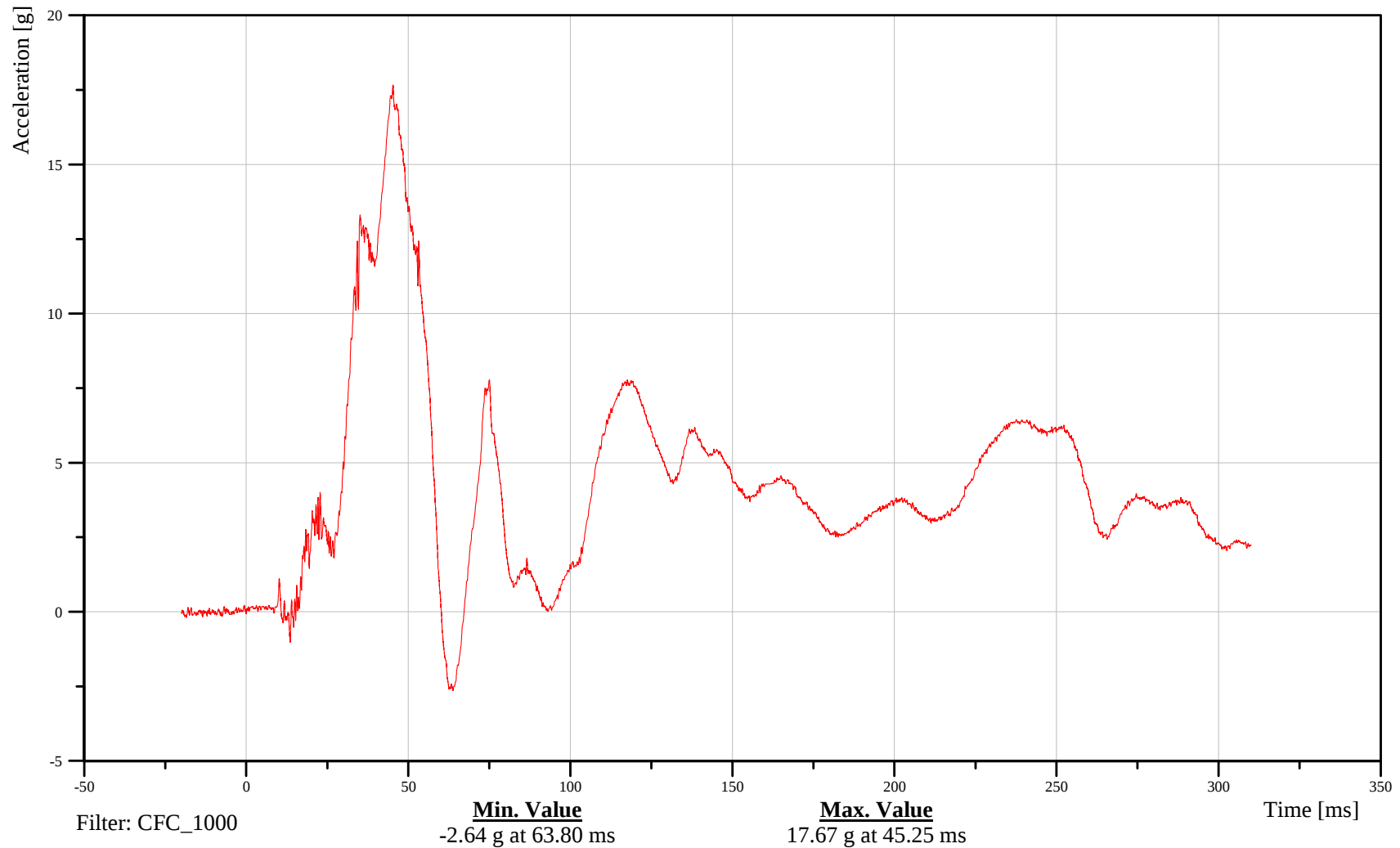
Head Z-Axis Acceleration

Customer: VRTC

11HEADCG00WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-4

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

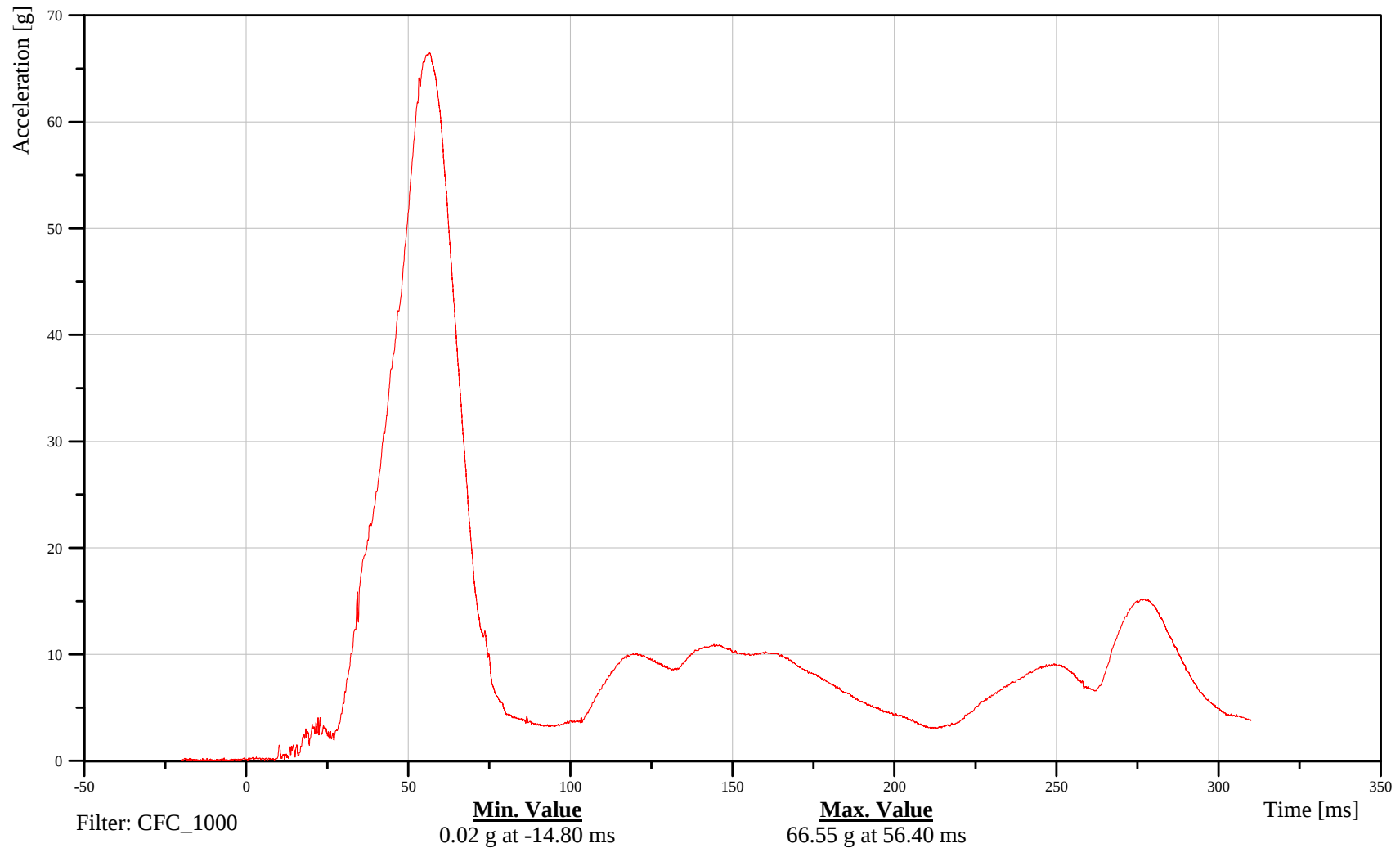
Head Resultant Acceleration

Customer: VRTC

11HEADCG00WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-5

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

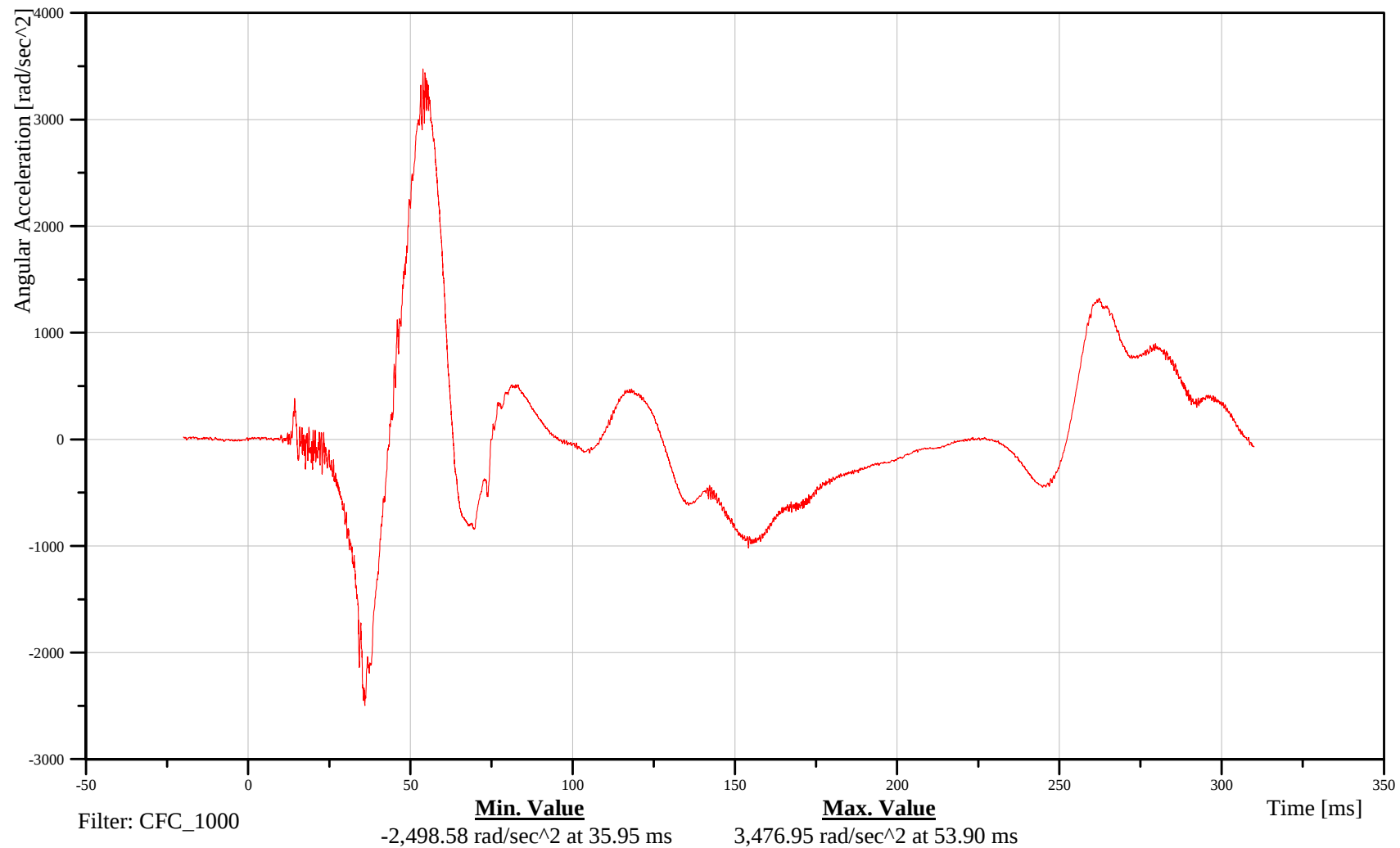
Head X-Axis Angular Displacement

Customer: VRTC

11HEADCG00WSAAXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-6

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

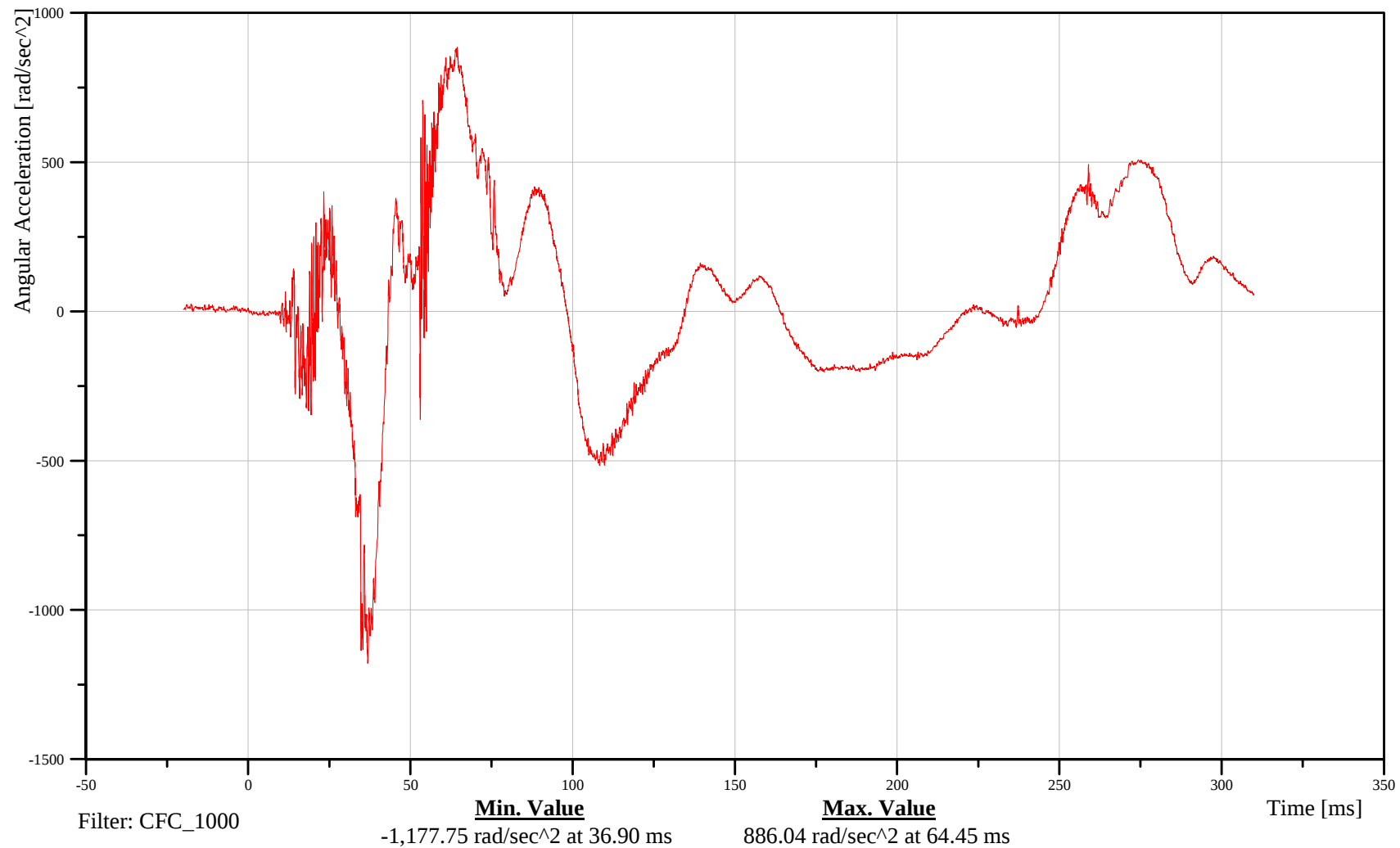
Head Y-Axis Angular Displacement

Customer: VRTC

11HEADCG00WSAAYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-7

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

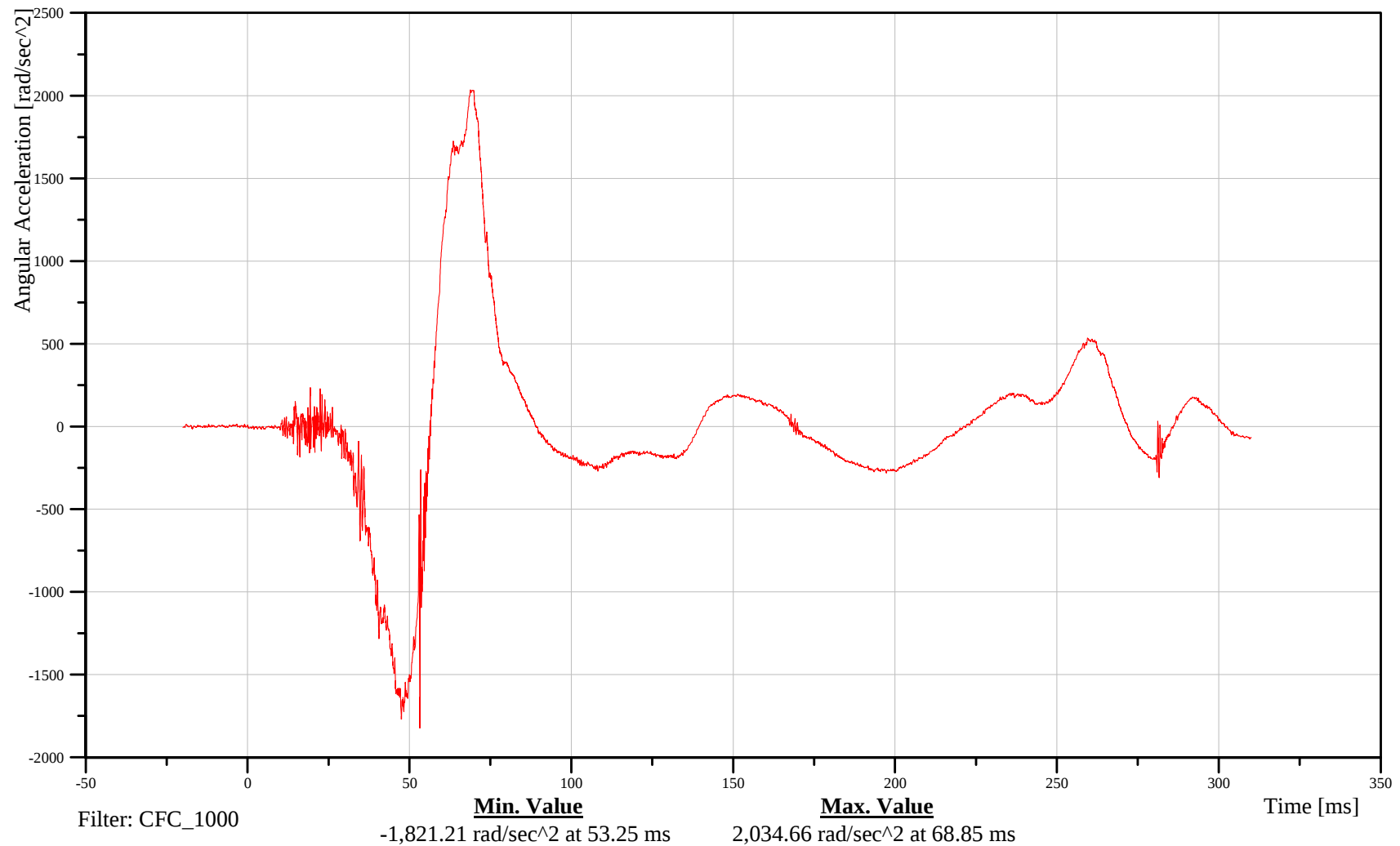
Head Z-Axis Angular Displacement

Customer: VRTC

11HEADCG00WSAAZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-8

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

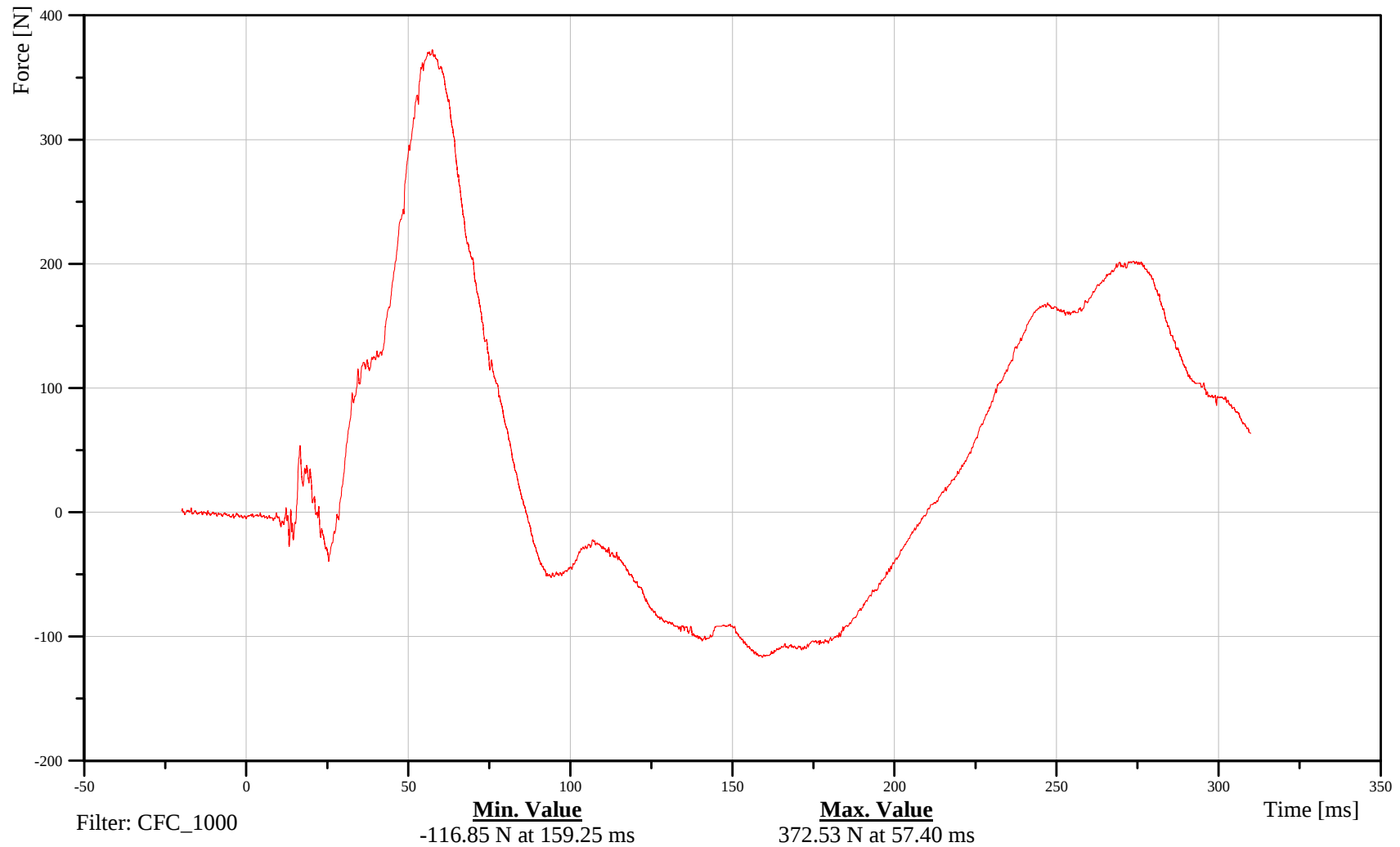
Upper Neck X-Axis Force

Customer: VRTC

11NECKUP00WSFOXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-9

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

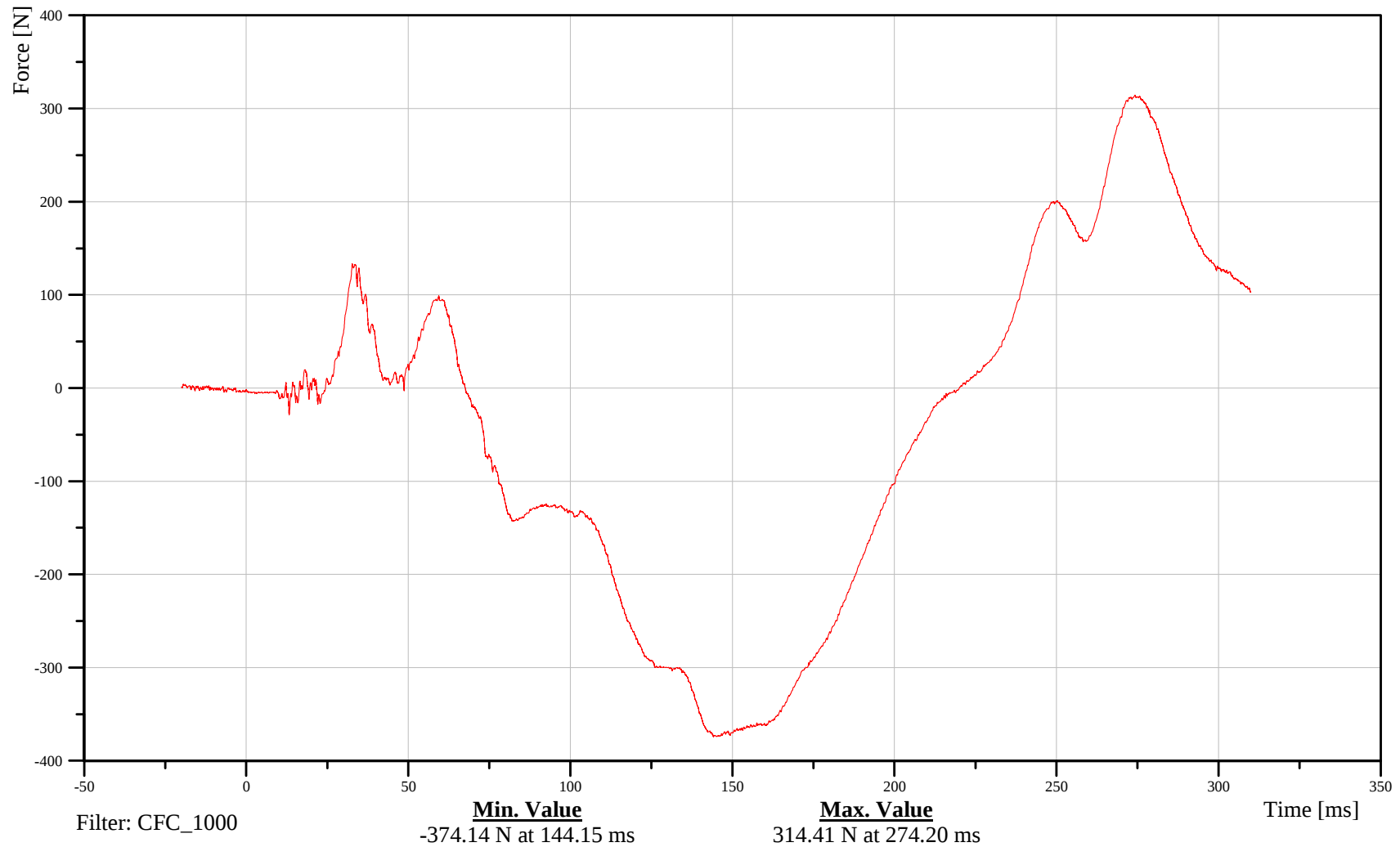
Upper Neck Y-Axis Force

Customer: VRTC

11NECKUP00WSFOYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-10

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

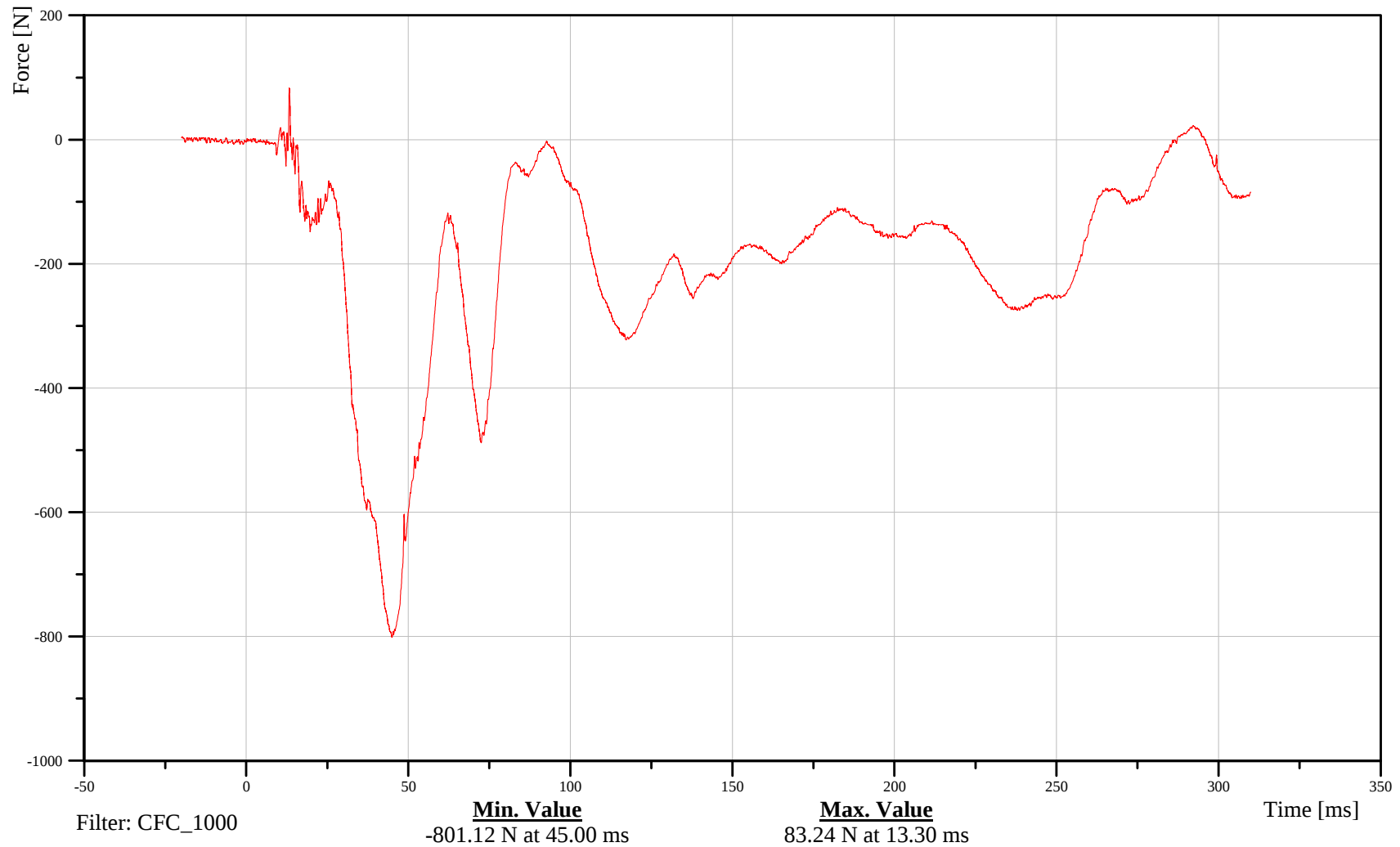
Upper Neck Z-Axis Force

Customer: VRTC

11NECKUP00WSFOZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-11

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

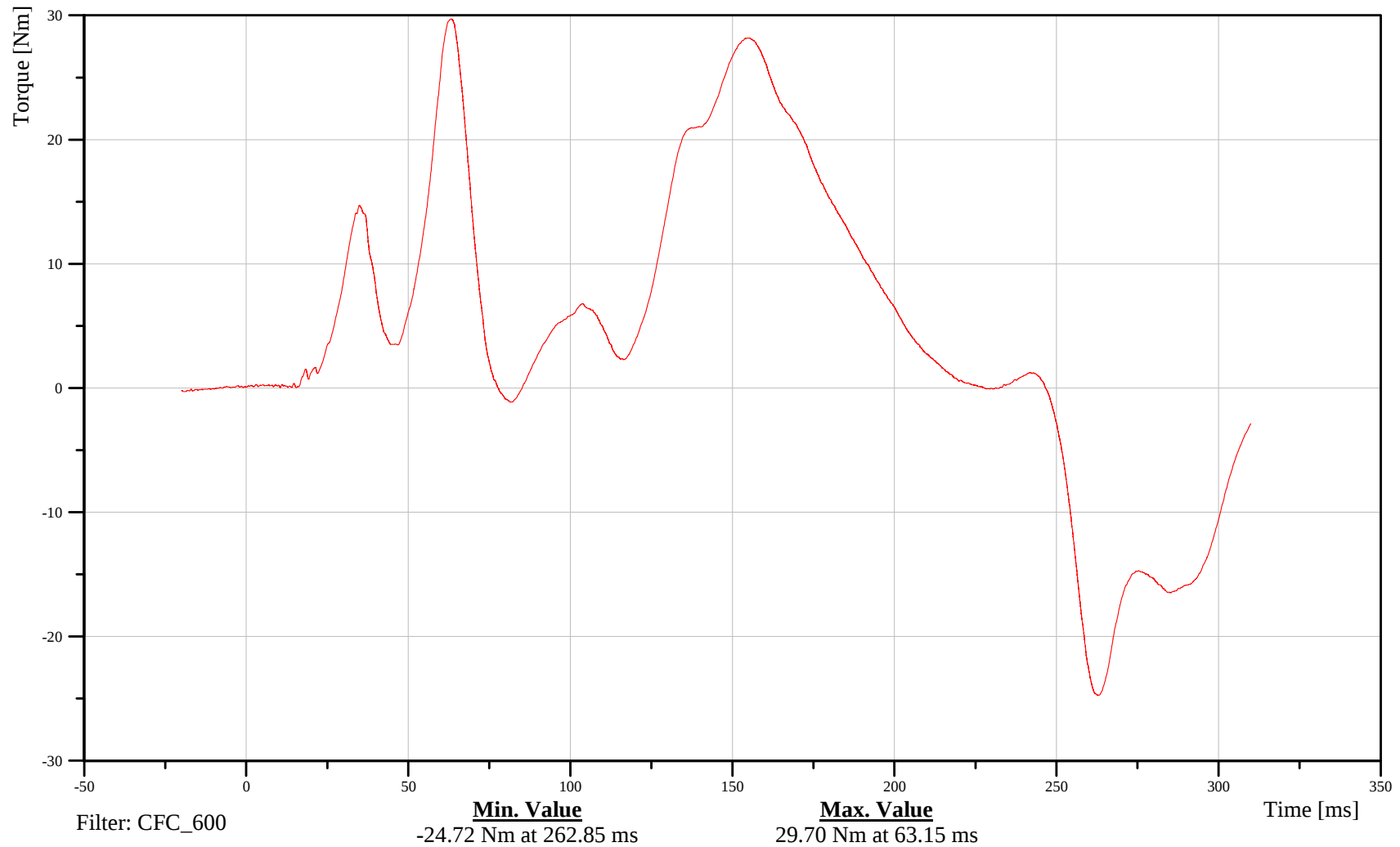
Upper Neck Moment About X Axis

Customer: VRTC

11NECKUP00WSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-12

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

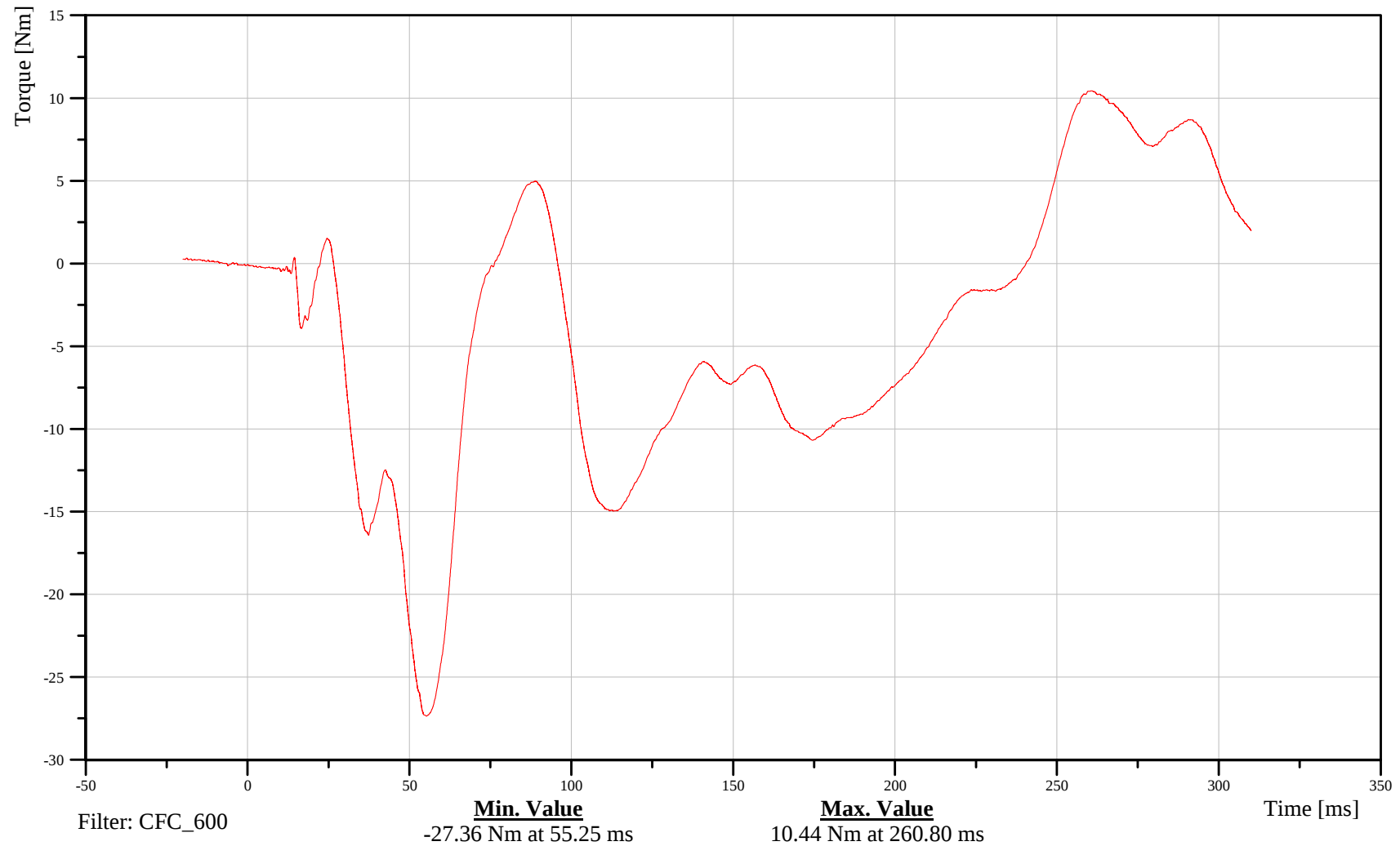
Upper Neck Moment About Y Axis

Customer: VRTC

11NECKUP00WSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-13

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

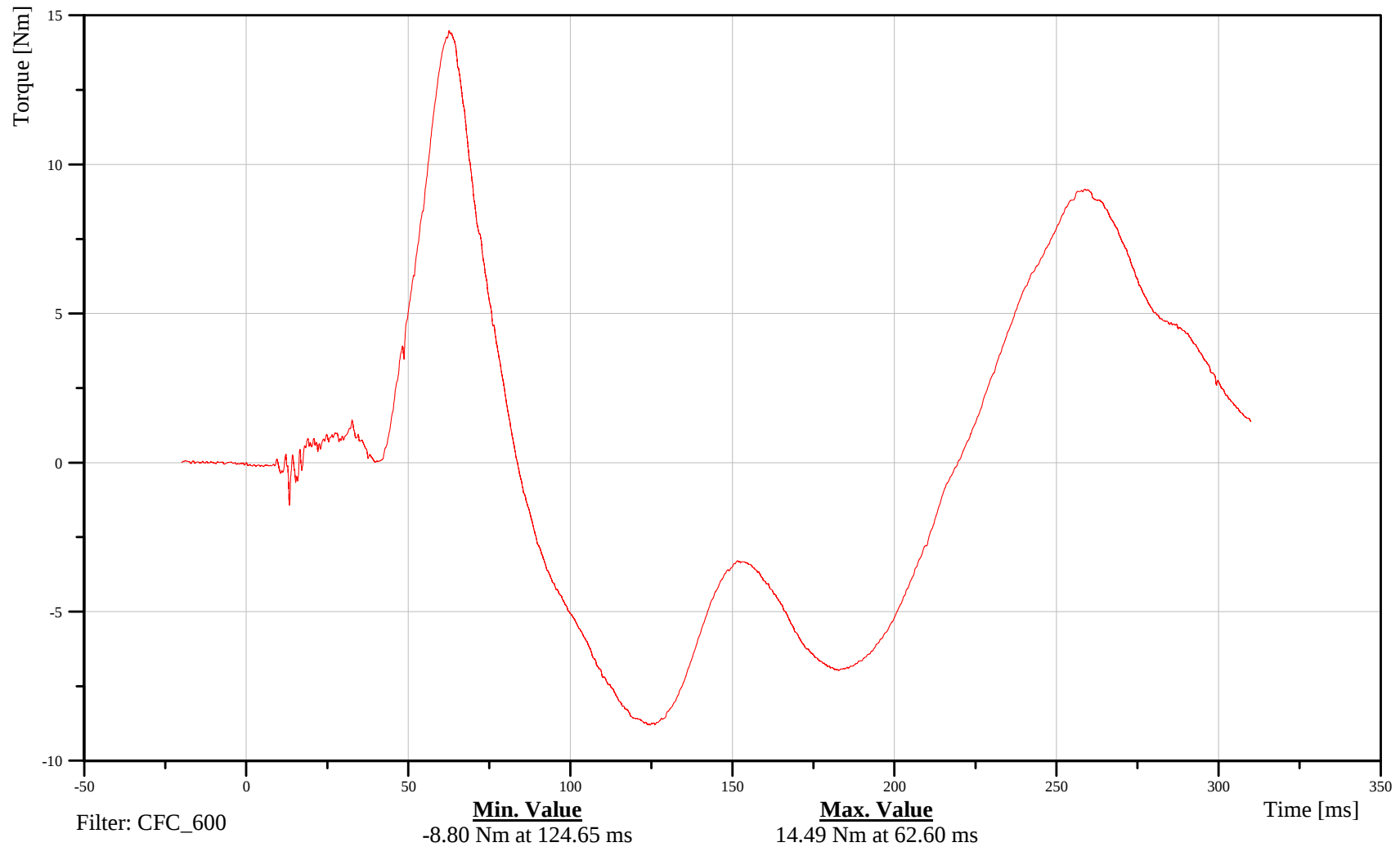
Upper Neck Moment About Z Axis

Customer: VRTC

11NECKUP00WSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-14

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

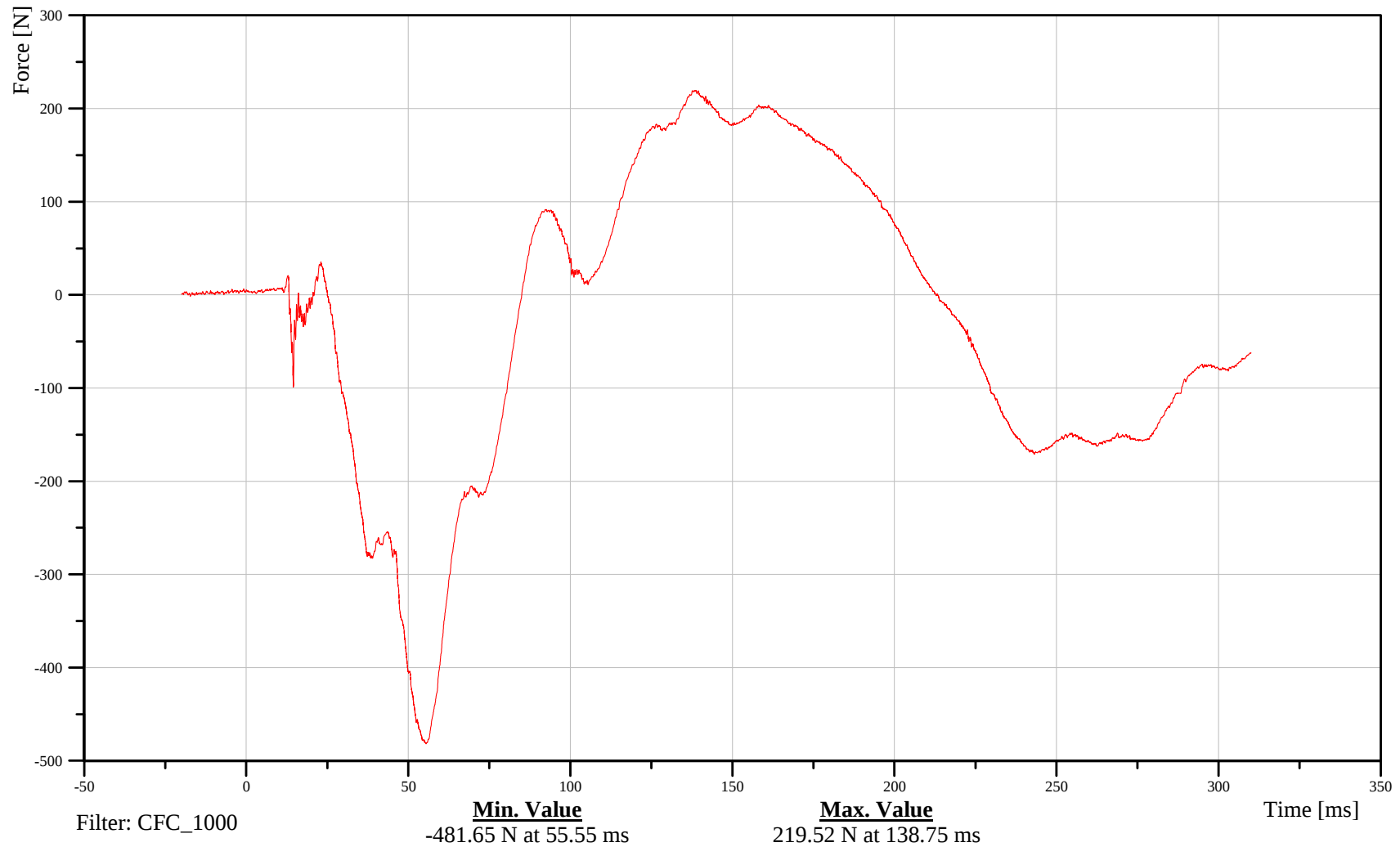
Lower Neck X-Axis Force

Customer: VRTC

11NECKLO00WSFOXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-15

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

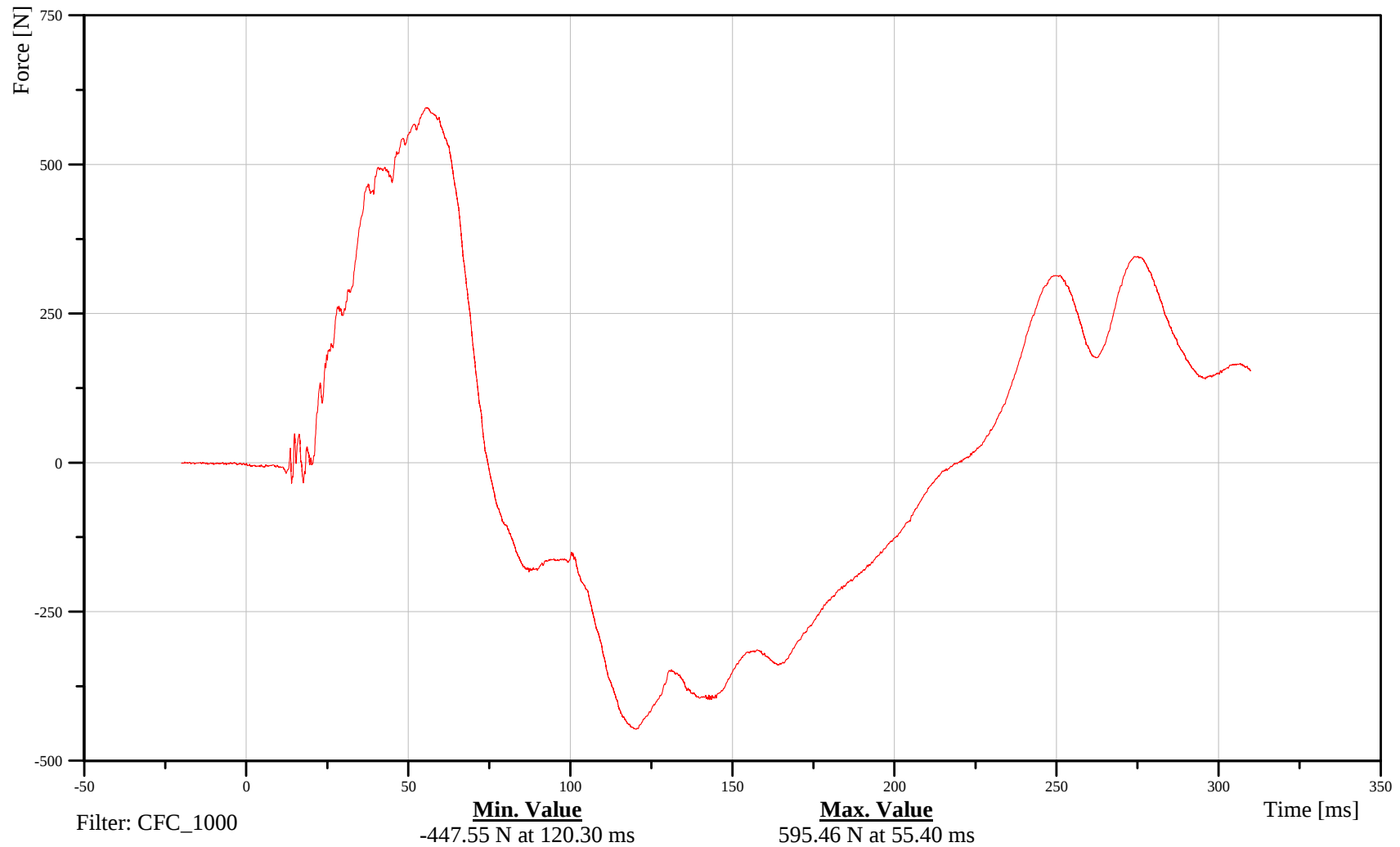
Lower Neck Y-Axis Force

Customer: VRTC

11NECKLO00WSFOYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-16

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

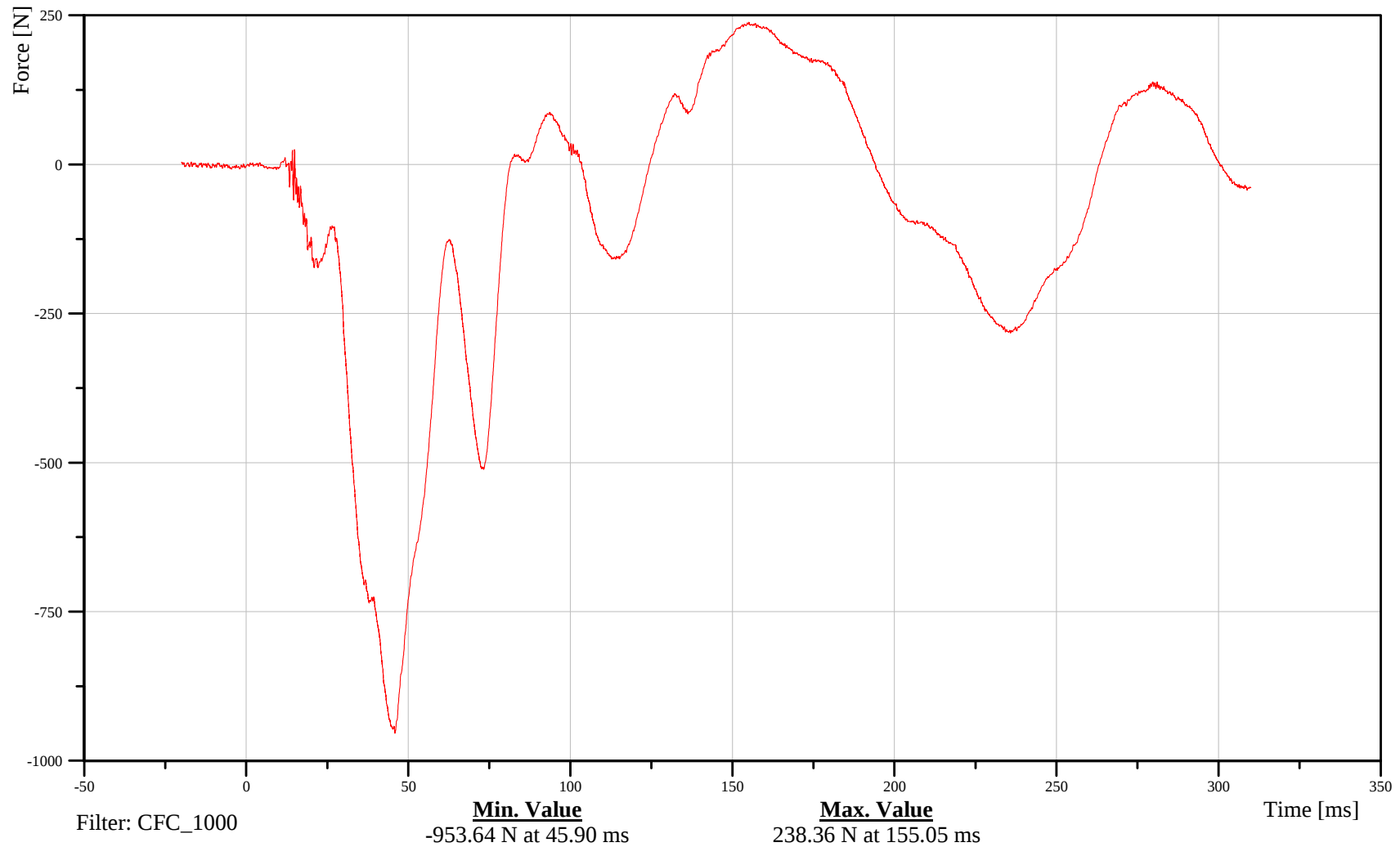
Lower Neck Z-Axis Force

Customer: VRTC

11NECKLO00WSFOZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-17

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

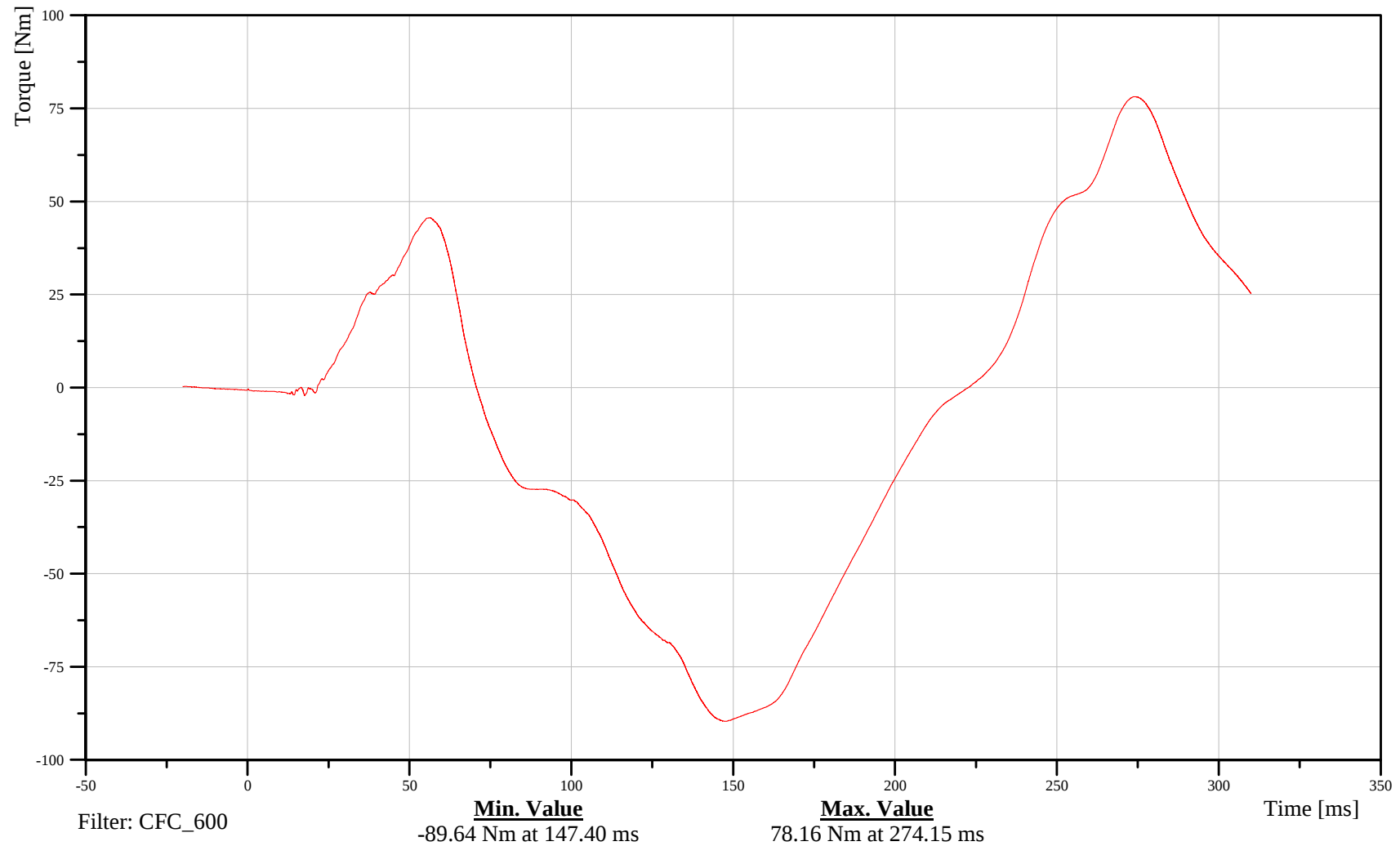
Lower Neck Moment About X Axis

Customer: VRTC

11NECKLO00WSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-18

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

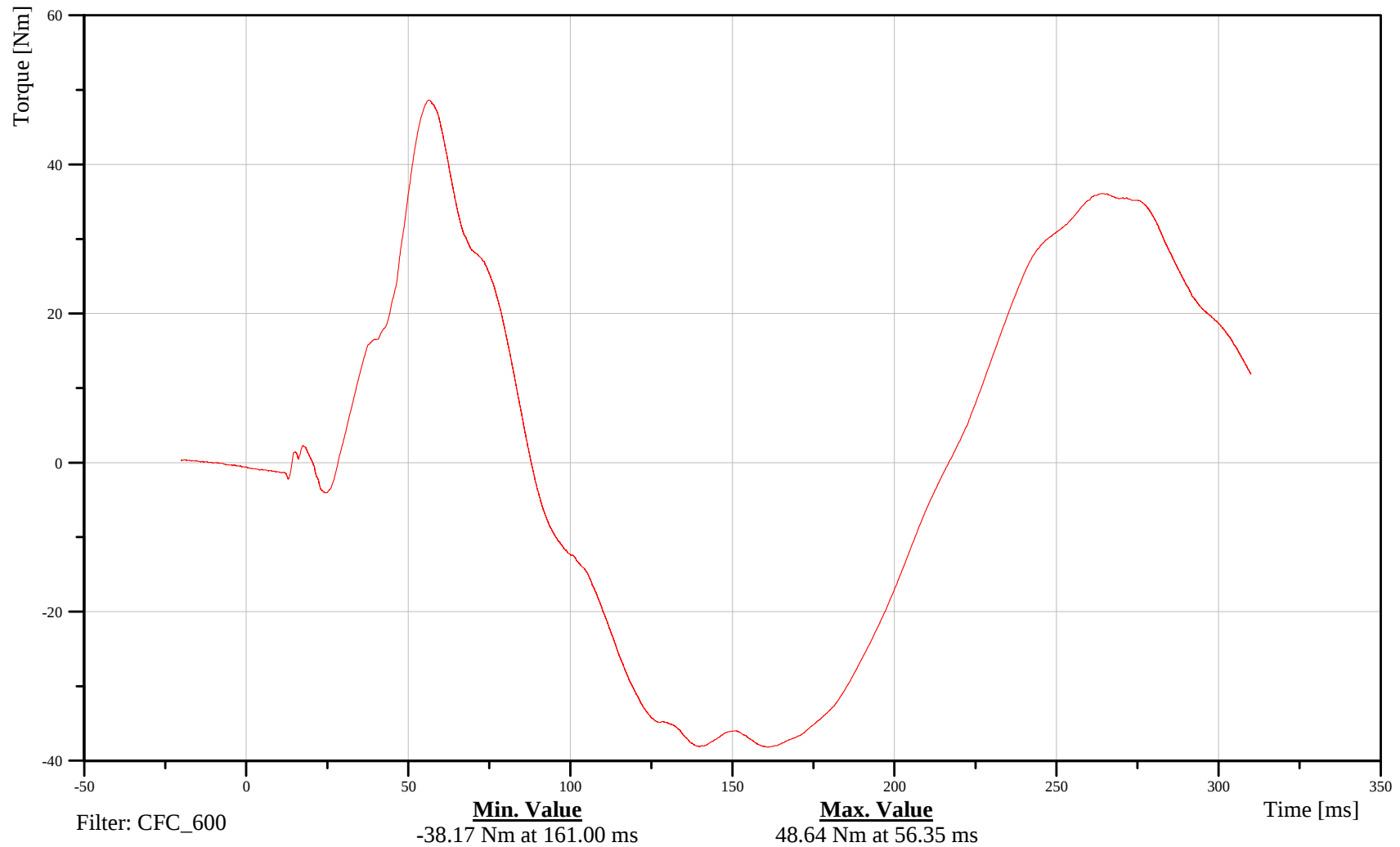
Lower Neck Moment About Y Axis

Customer: VRTC

11NECKLO00WSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-19

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

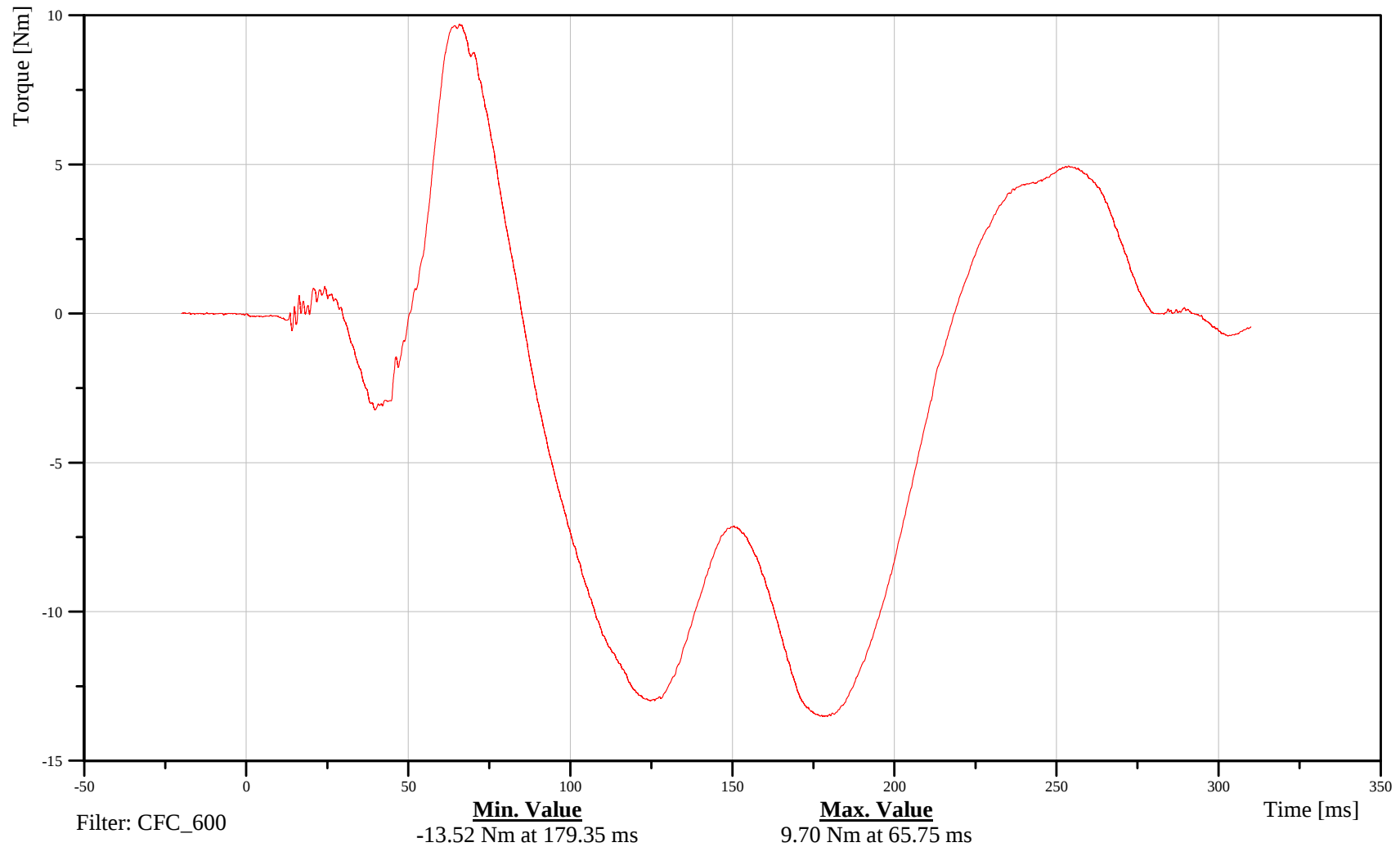
Lower Neck Moment About Z Axis

Customer: VRTC

11NECKLO00WSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-20

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

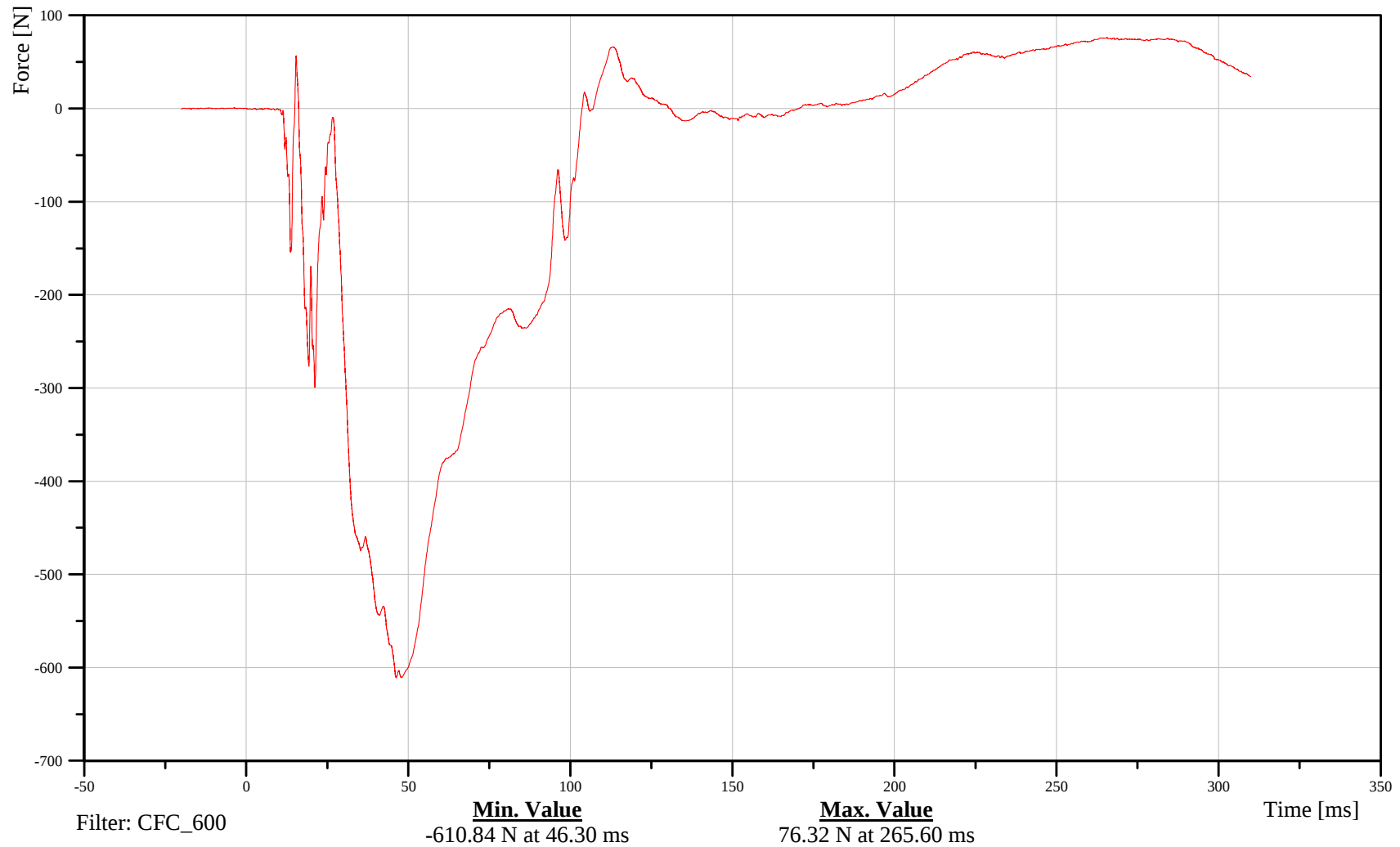
Shoulder X-Axis Force

Customer: VRTC

11SHLDLE00WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-21

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

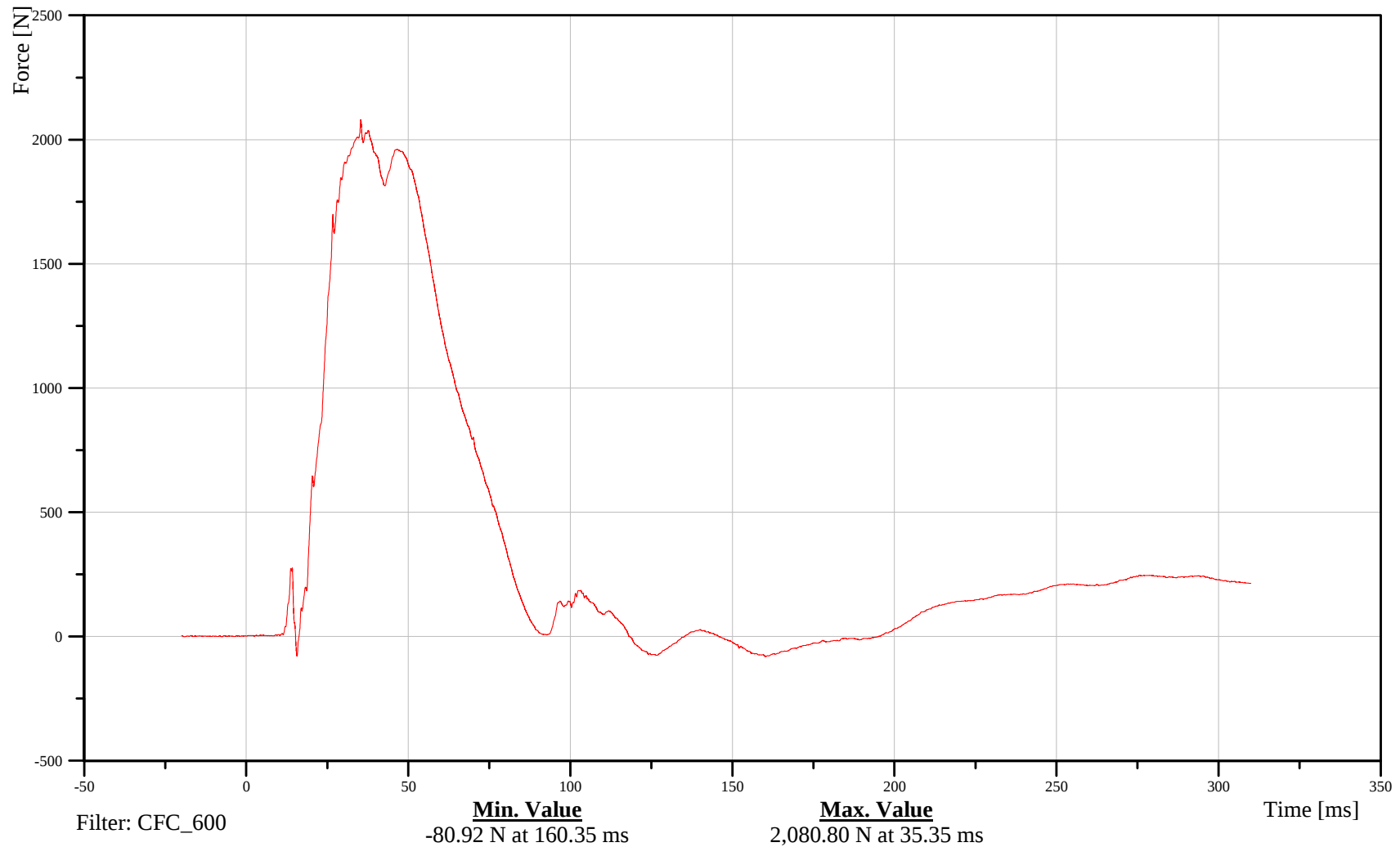
Shoulder Y-Axis Force

Customer: VRTC

11SHLDLE00WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-22

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

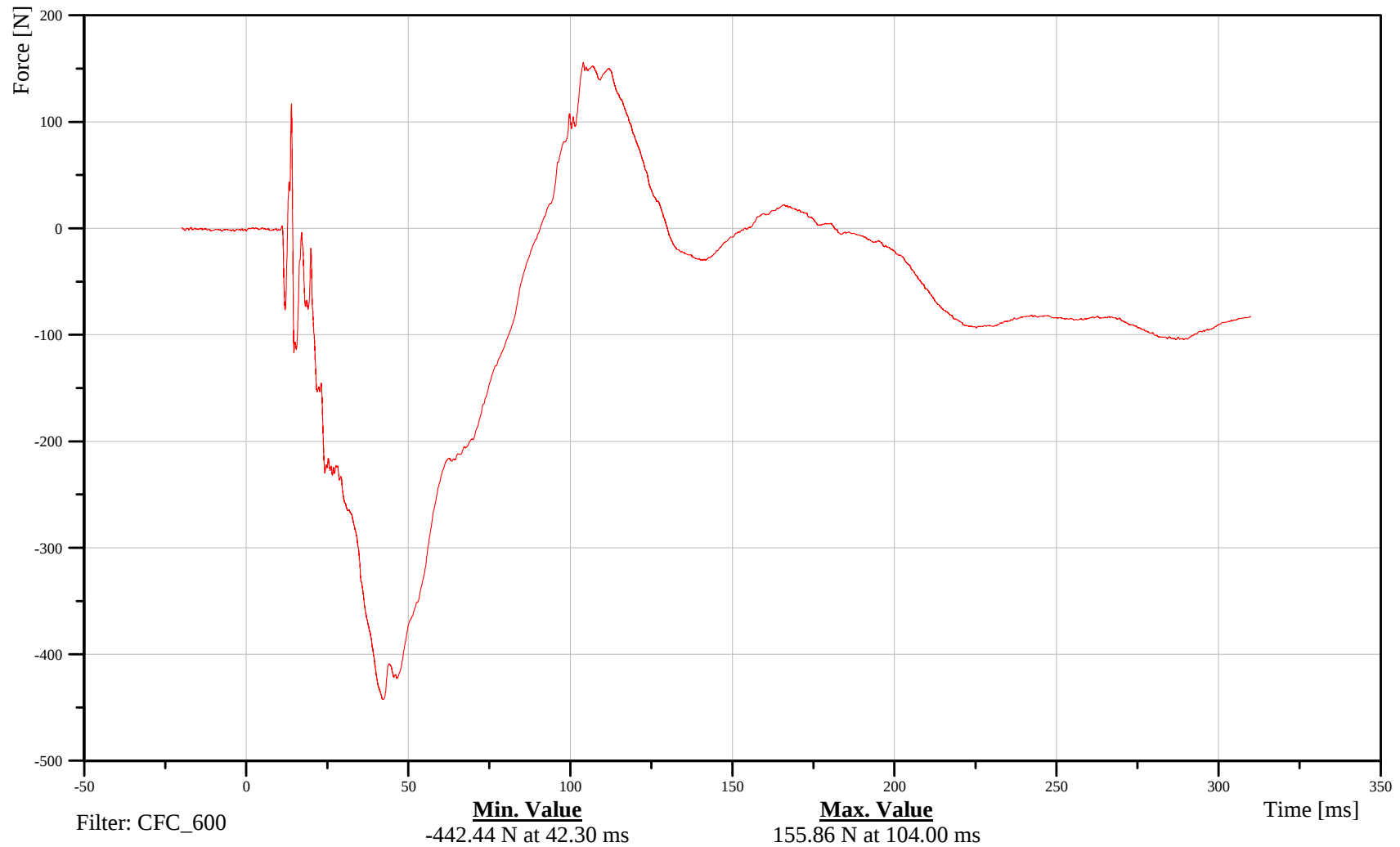
Shoulder Z-Axis Force

Customer: VRTC

11SHLDLE00WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-23

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

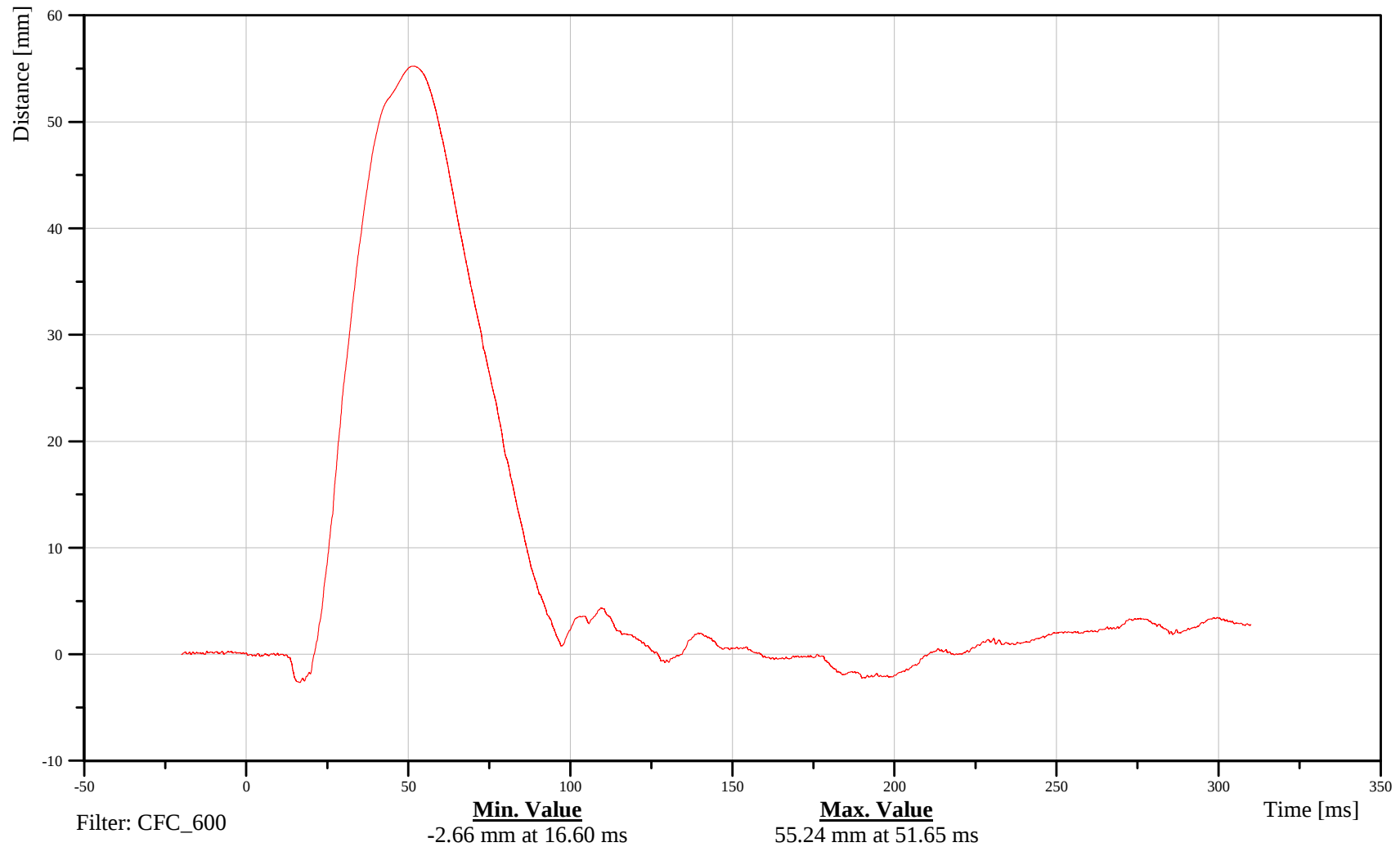
Shoulder Y-Axis Displacement

Customer: VRTC

11SHLDLE00WSDSYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-24

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

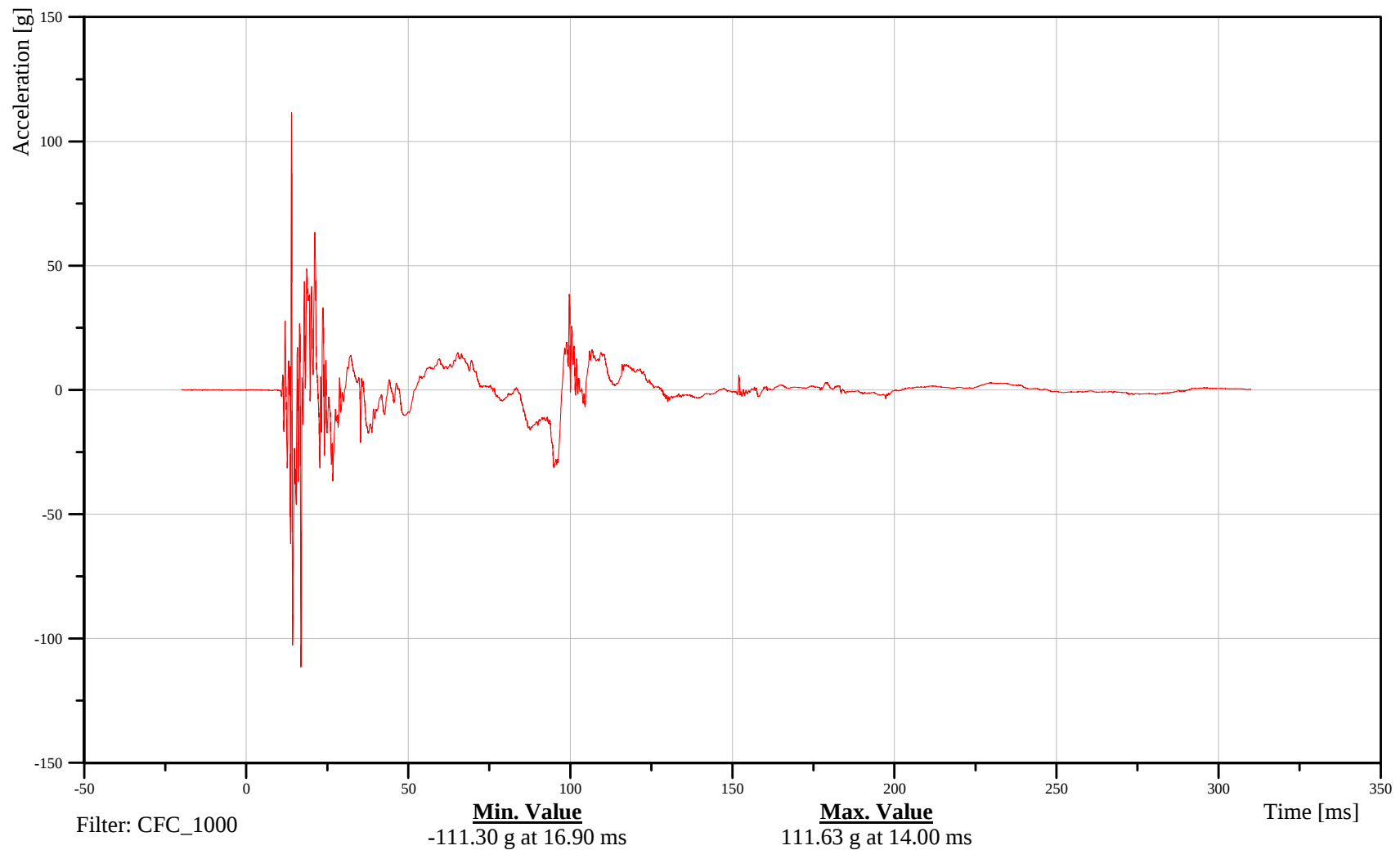
Shoulder X-Axis Acceleration

Customer: VRTC

11SHLDLE00WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-25

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

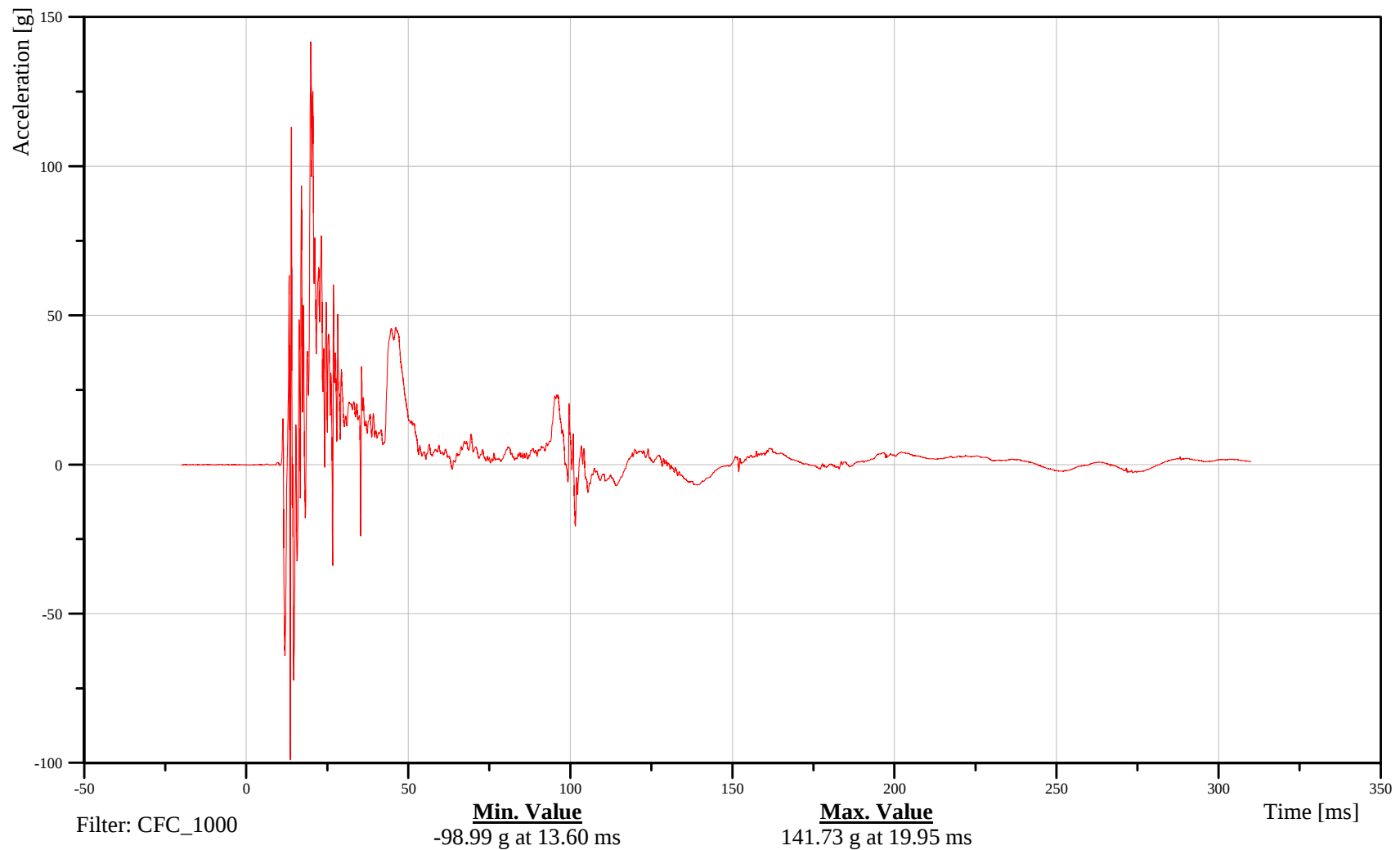
Shoulder Y-Axis Acceleration

Customer: VRTC

11SHLDLE00WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-26

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

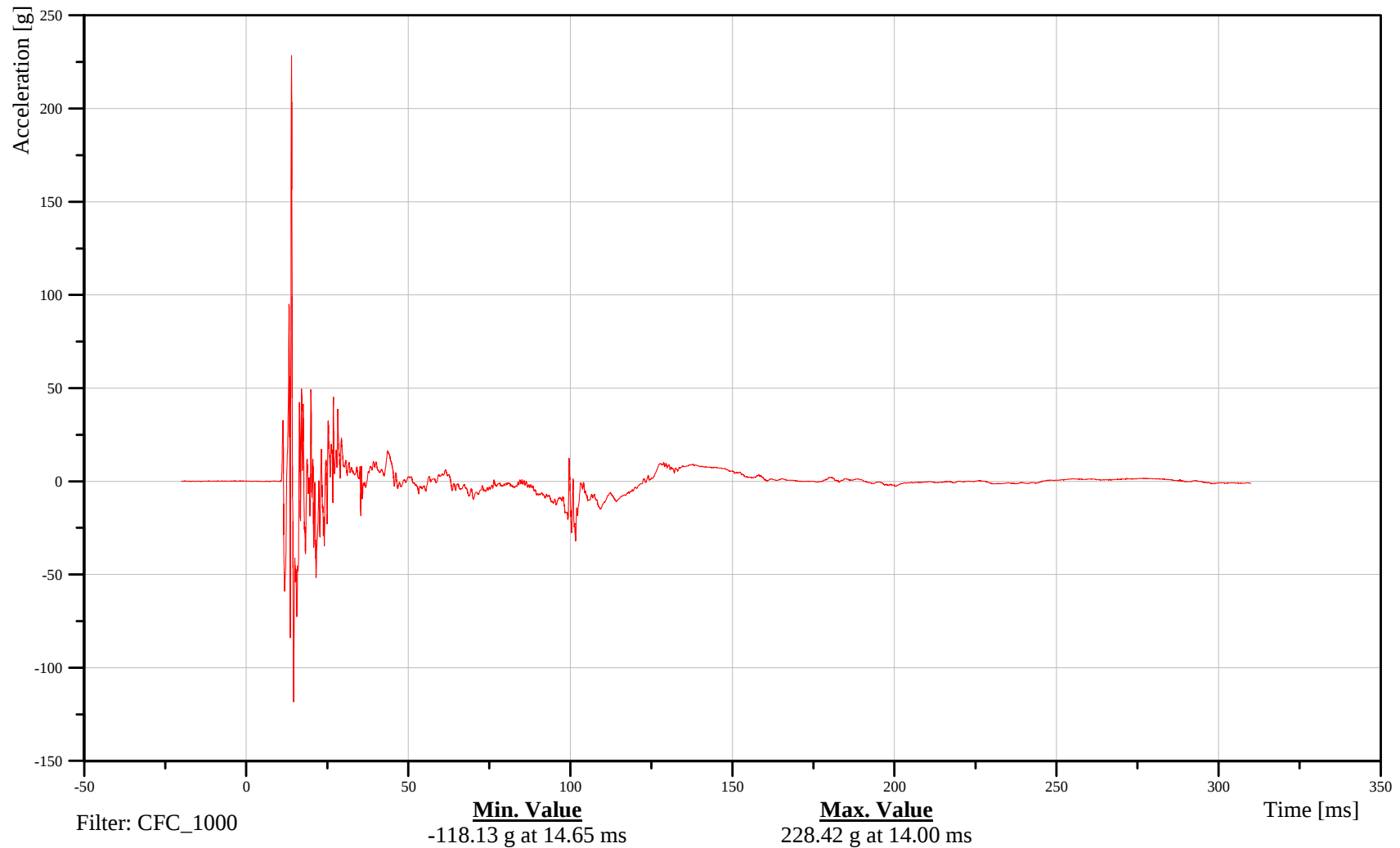
Shoulder Z-Axis Acceleration

Customer: VRTC

11SHLDLE00WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-27

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

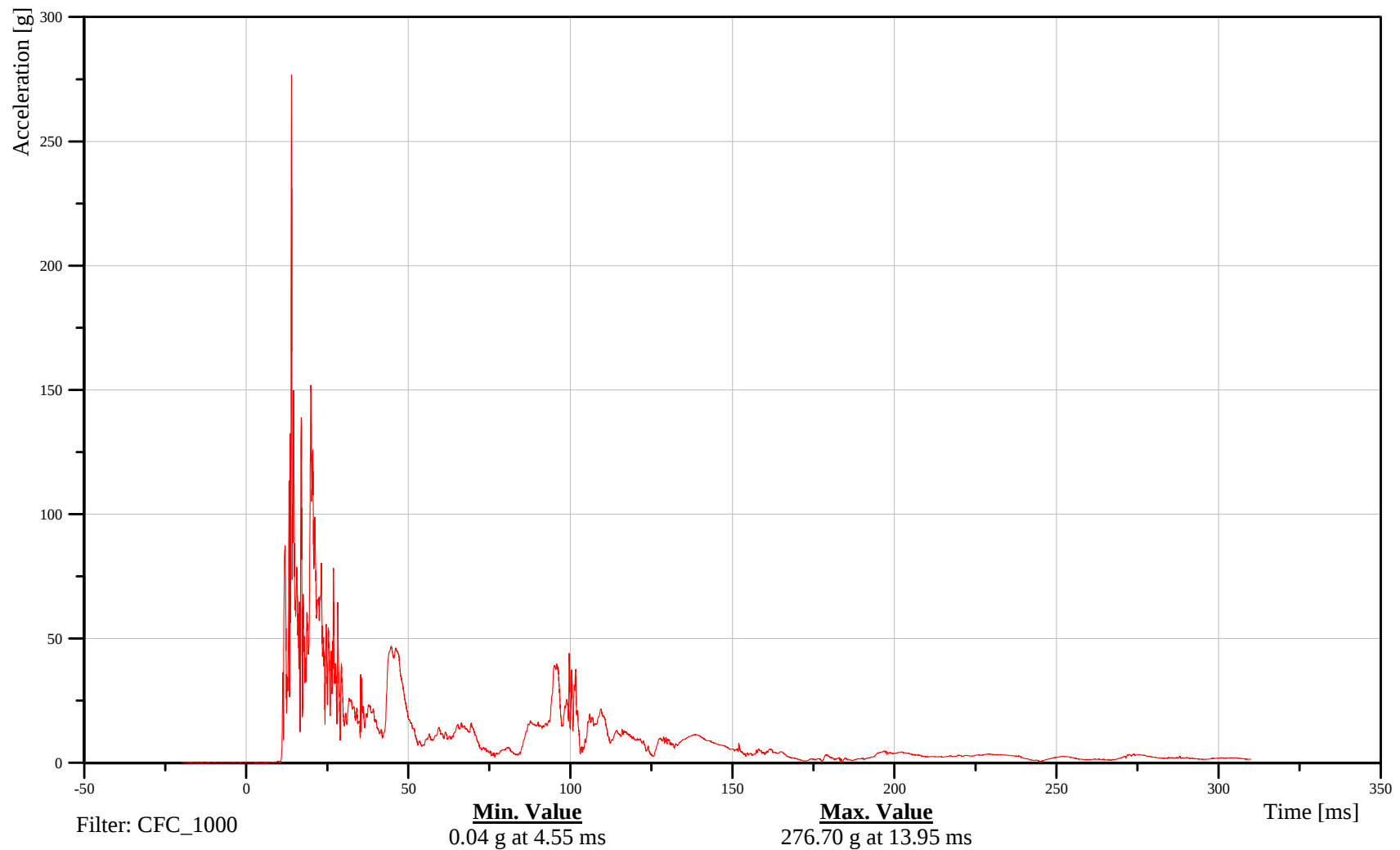
Shoulder Resultant Acceleration

Customer: VRTC

11SHLDLE00WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-28

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

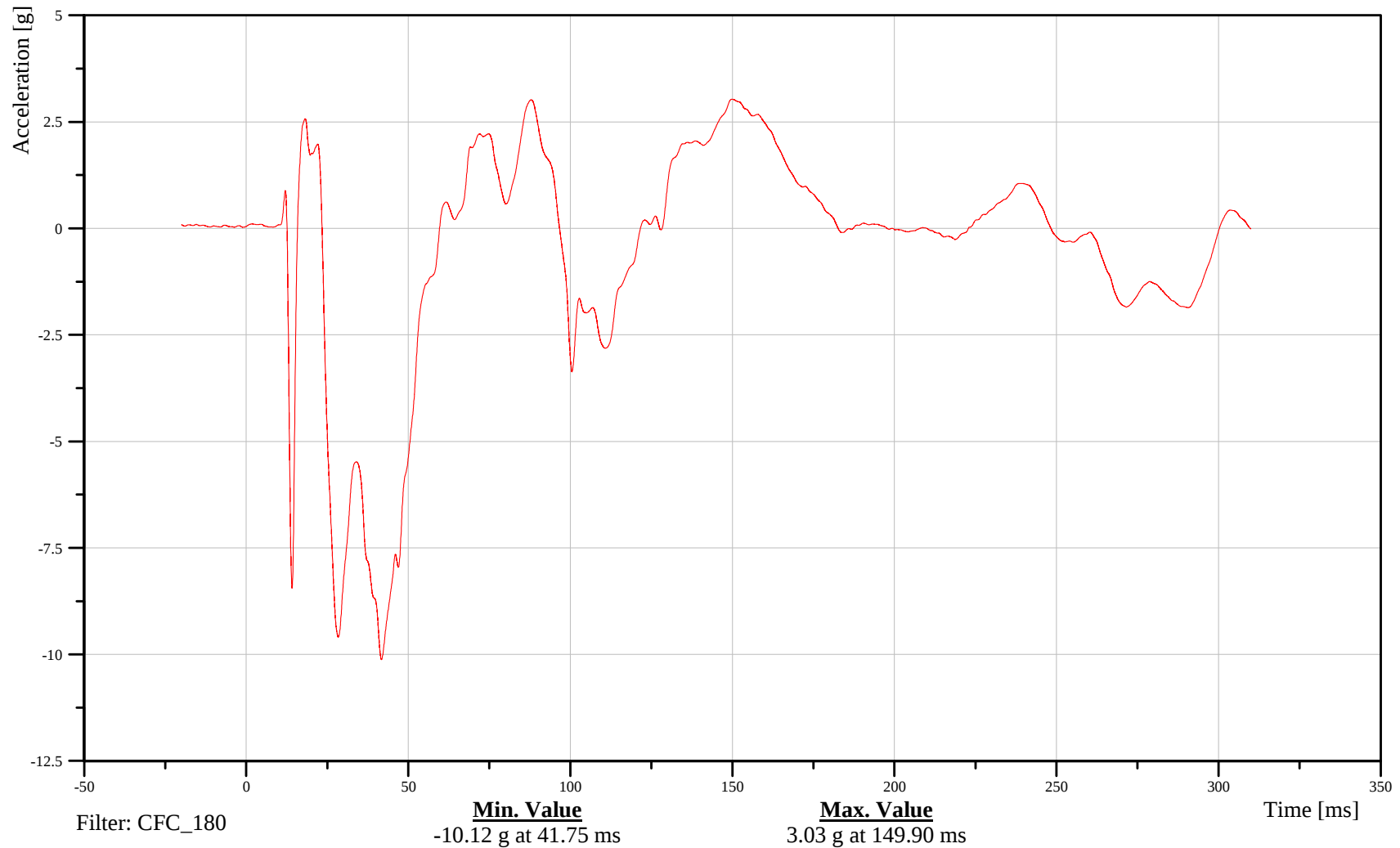
T1 X-Axis Acceleration

Customer: VRTC

11THSP0100WSACXC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-29

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

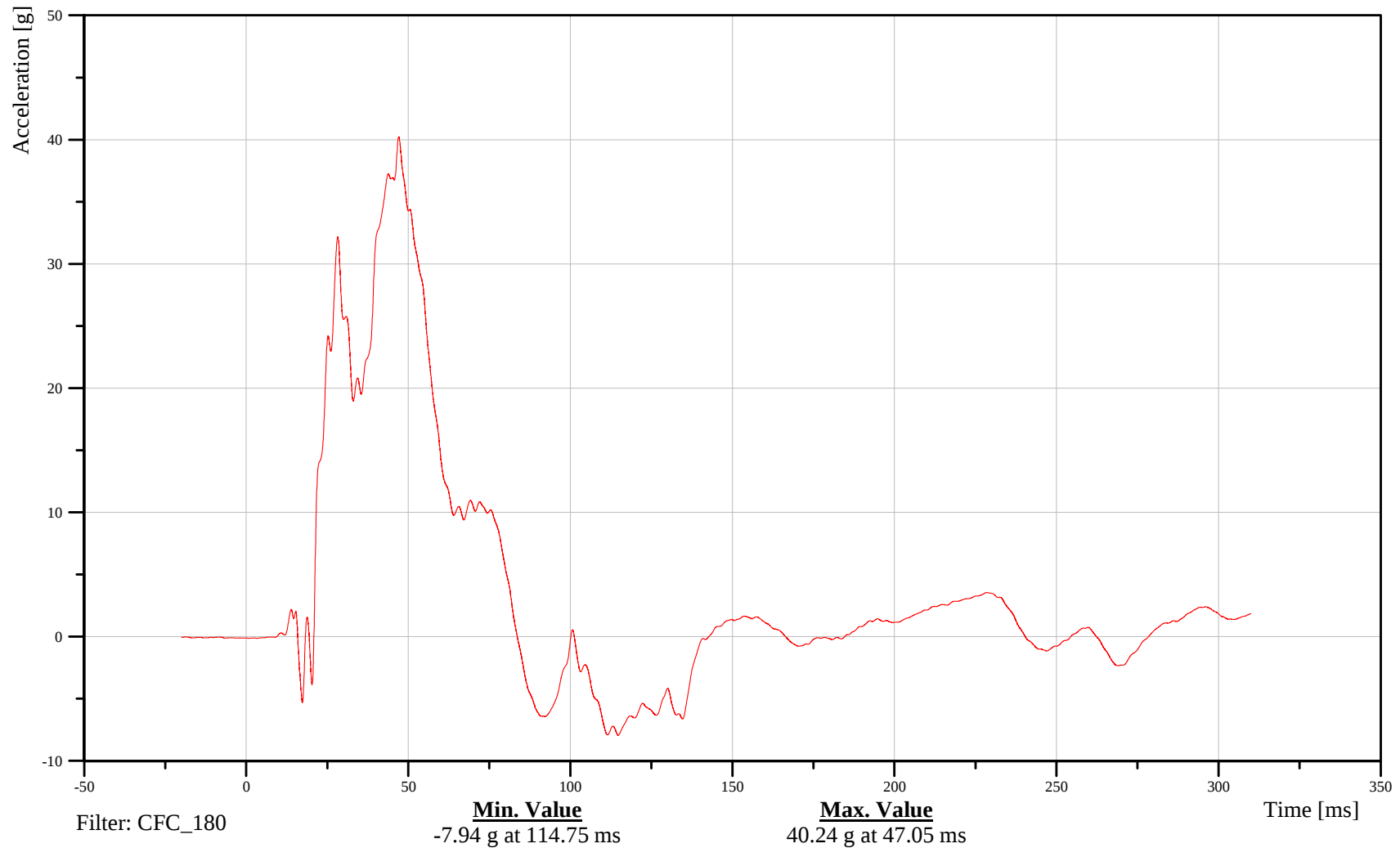
T1 Y-Axis Acceleration

Customer: VRTC

11THSP0100WSACYC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-30

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

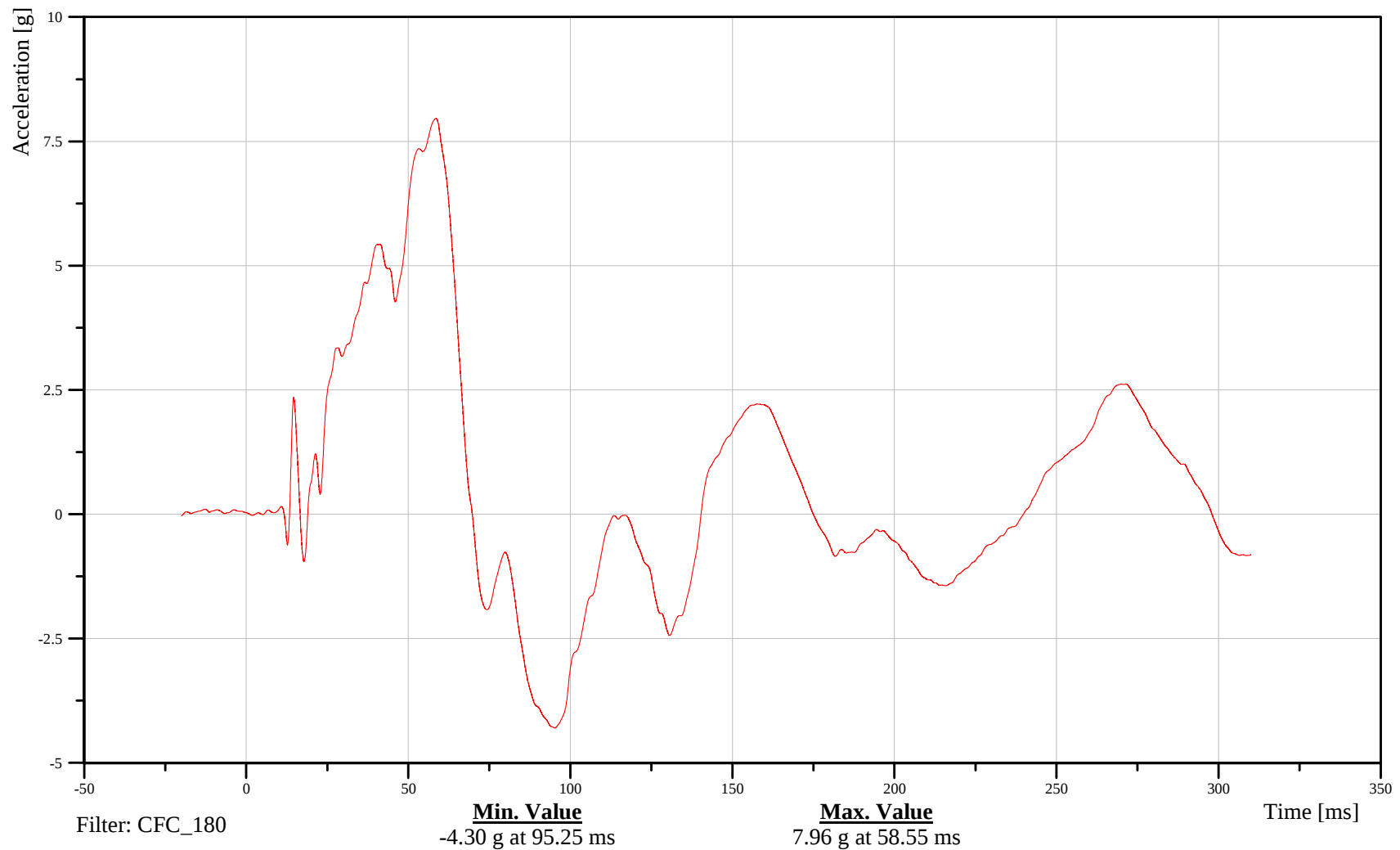
T1 Z-Axis Acceleration

Customer: VRTC

11THSP0100WSACZC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-31

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

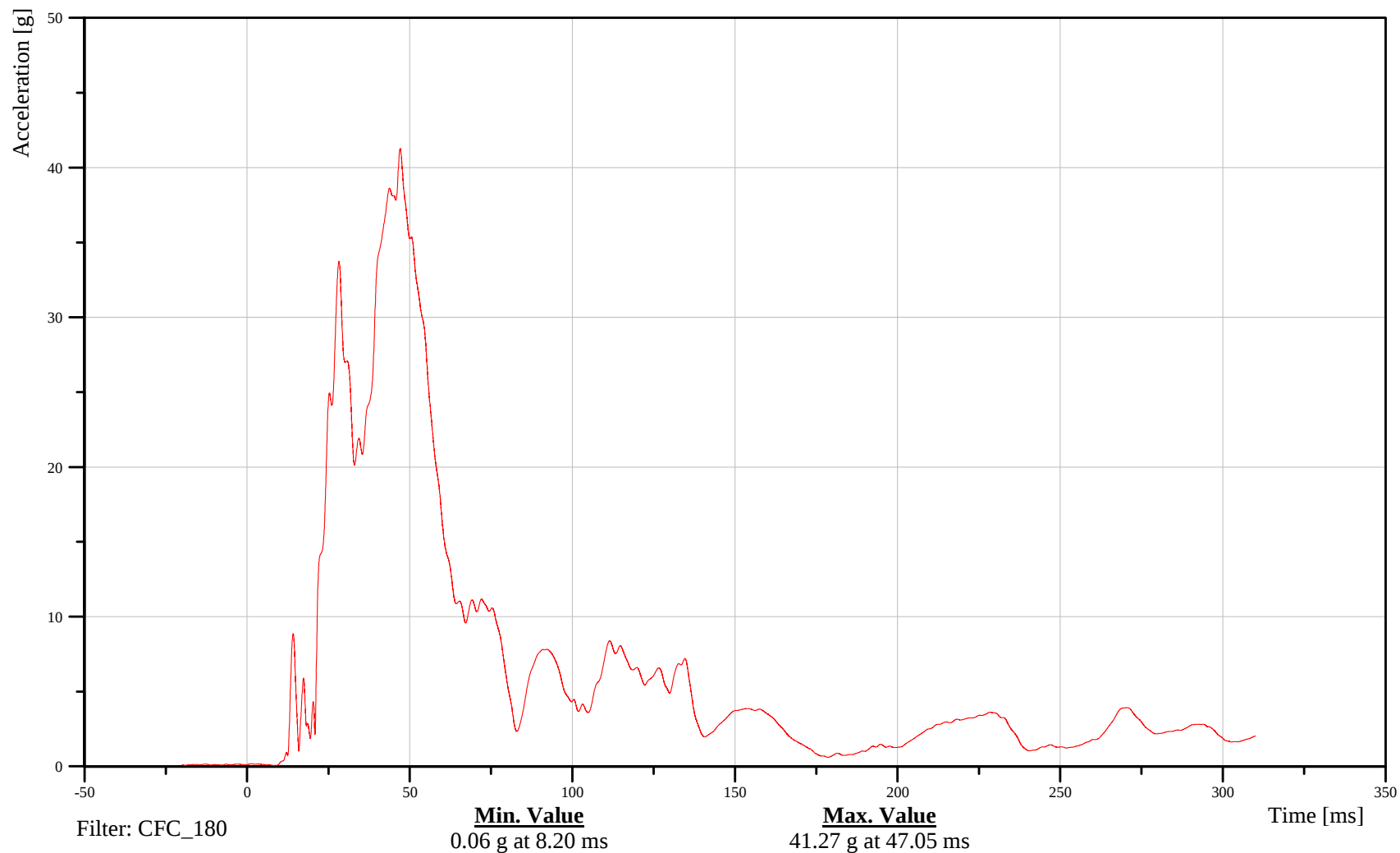
T1 Resultant Acceleration

Customer: VRTC

11THSP0100WSACRC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-32

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

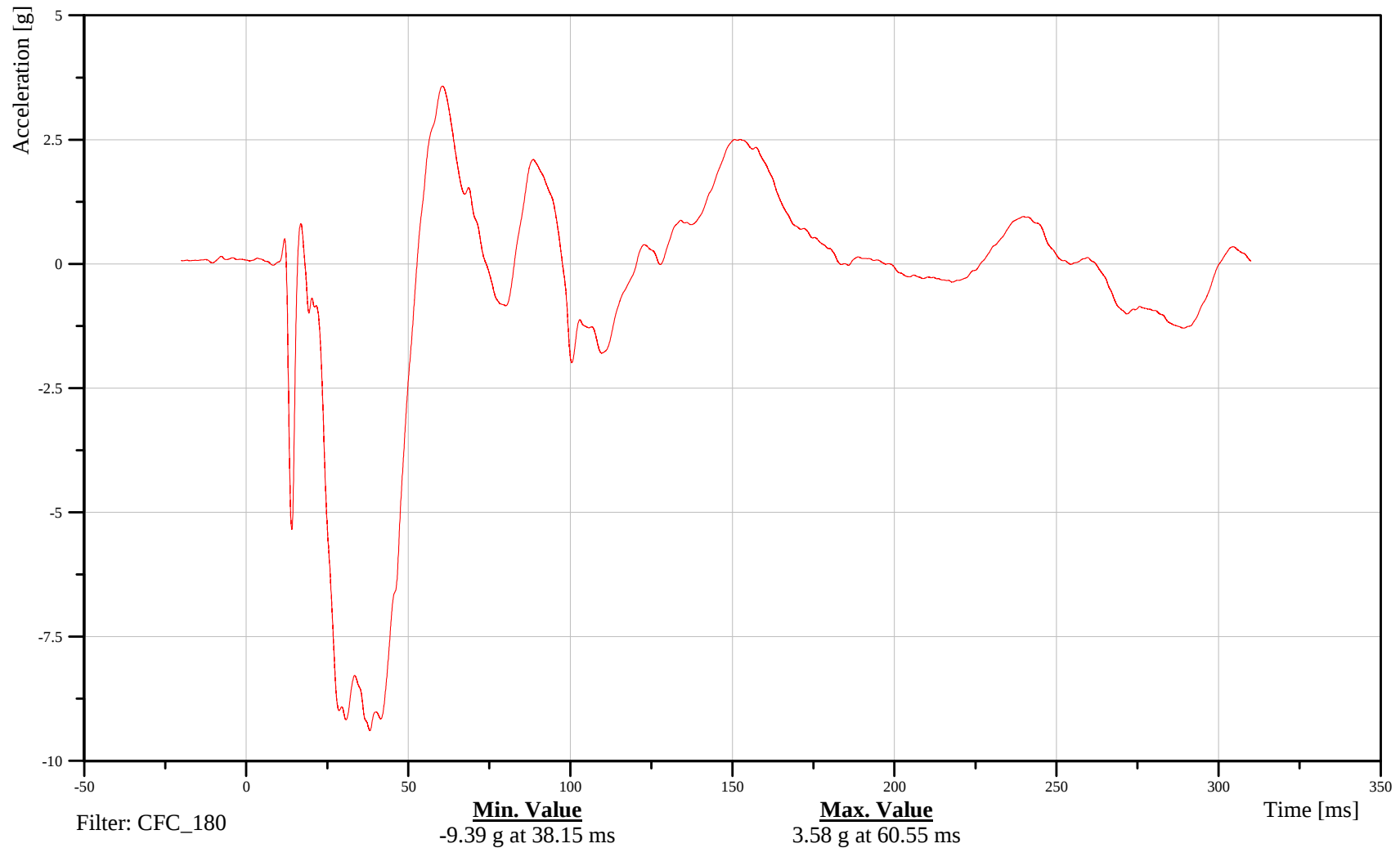
T4 X-Axis Acceleration

Customer: VRTC

11THSP0400WSACXC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-33

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

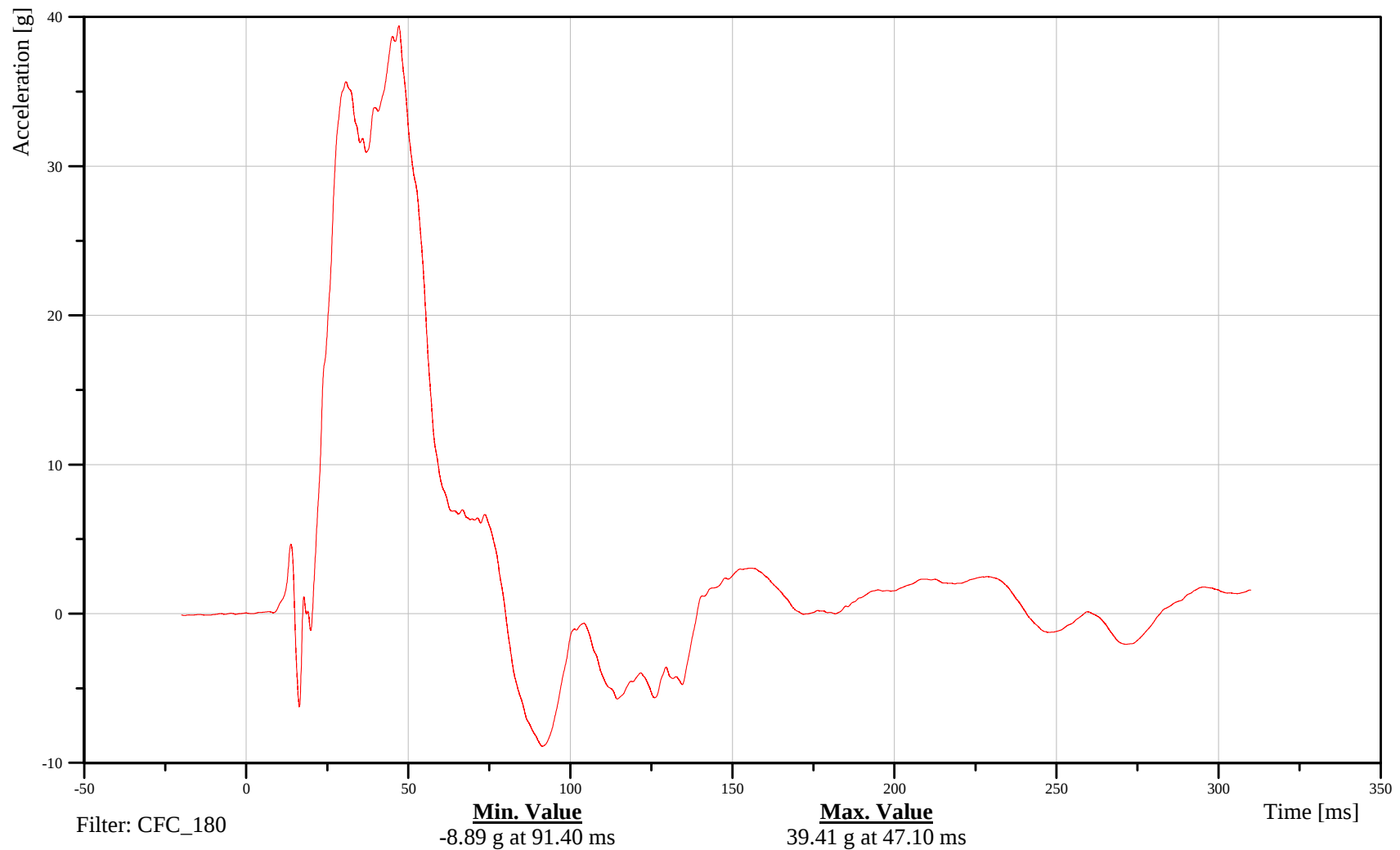
T4 Y-Axis Acceleration

Customer: VRTC

11THSP0400WSACYC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-34

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

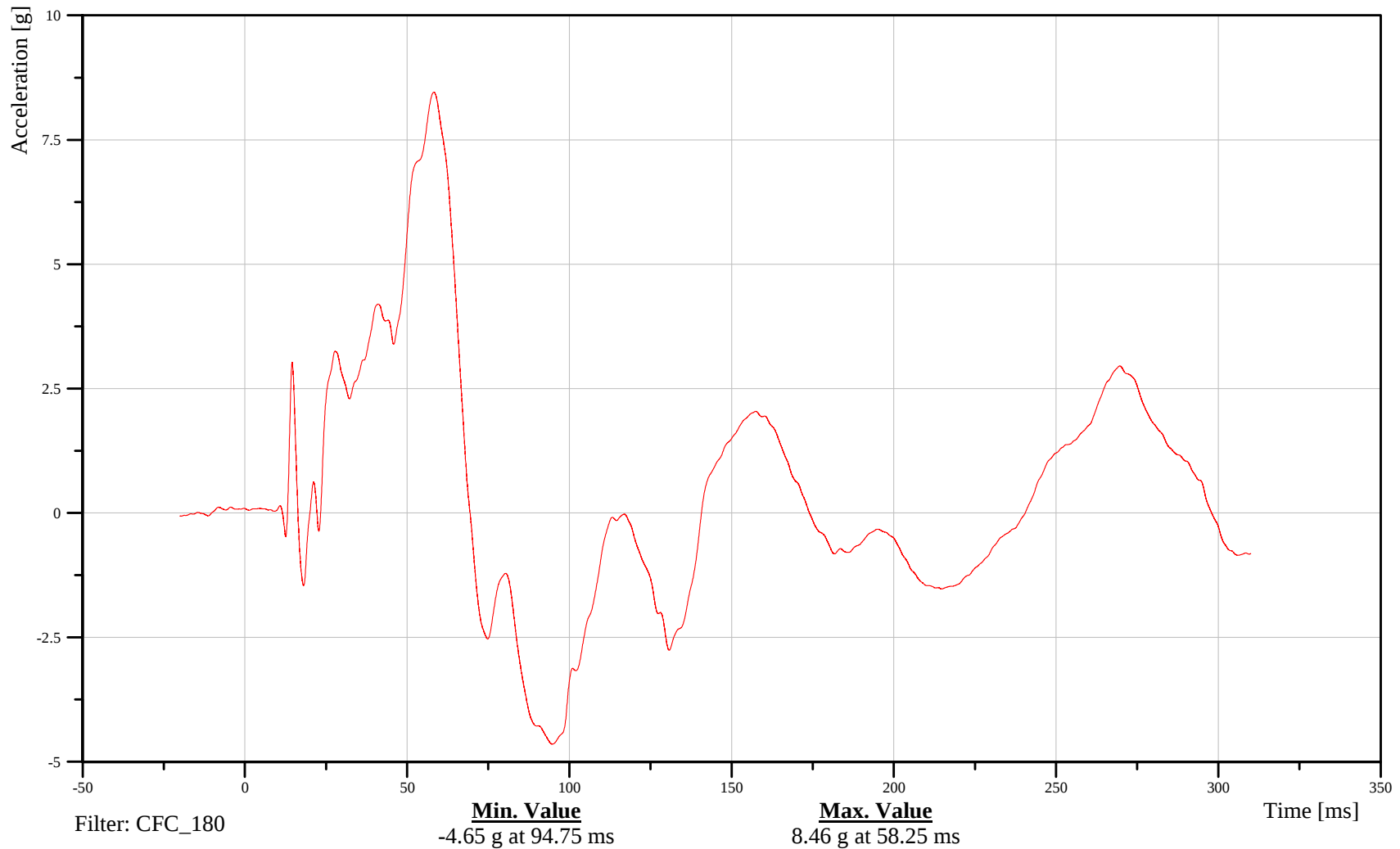
T4 Z-Axis Acceleration

Customer: VRTC

11THSP0400WSACZC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-35

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

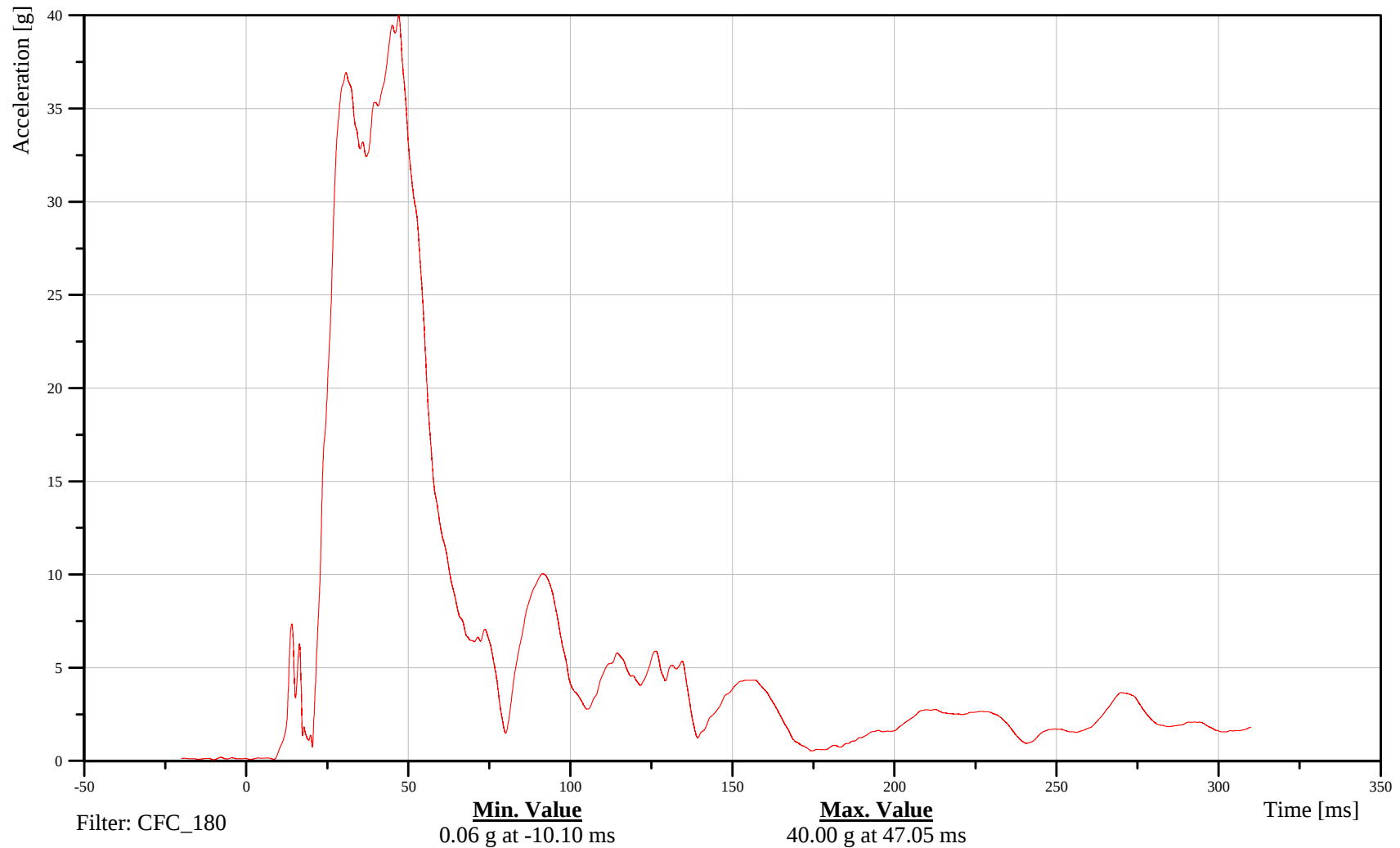
T4 Resultant Acceleration

Customer: VRTC

11THSP0400WSACRC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-36

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

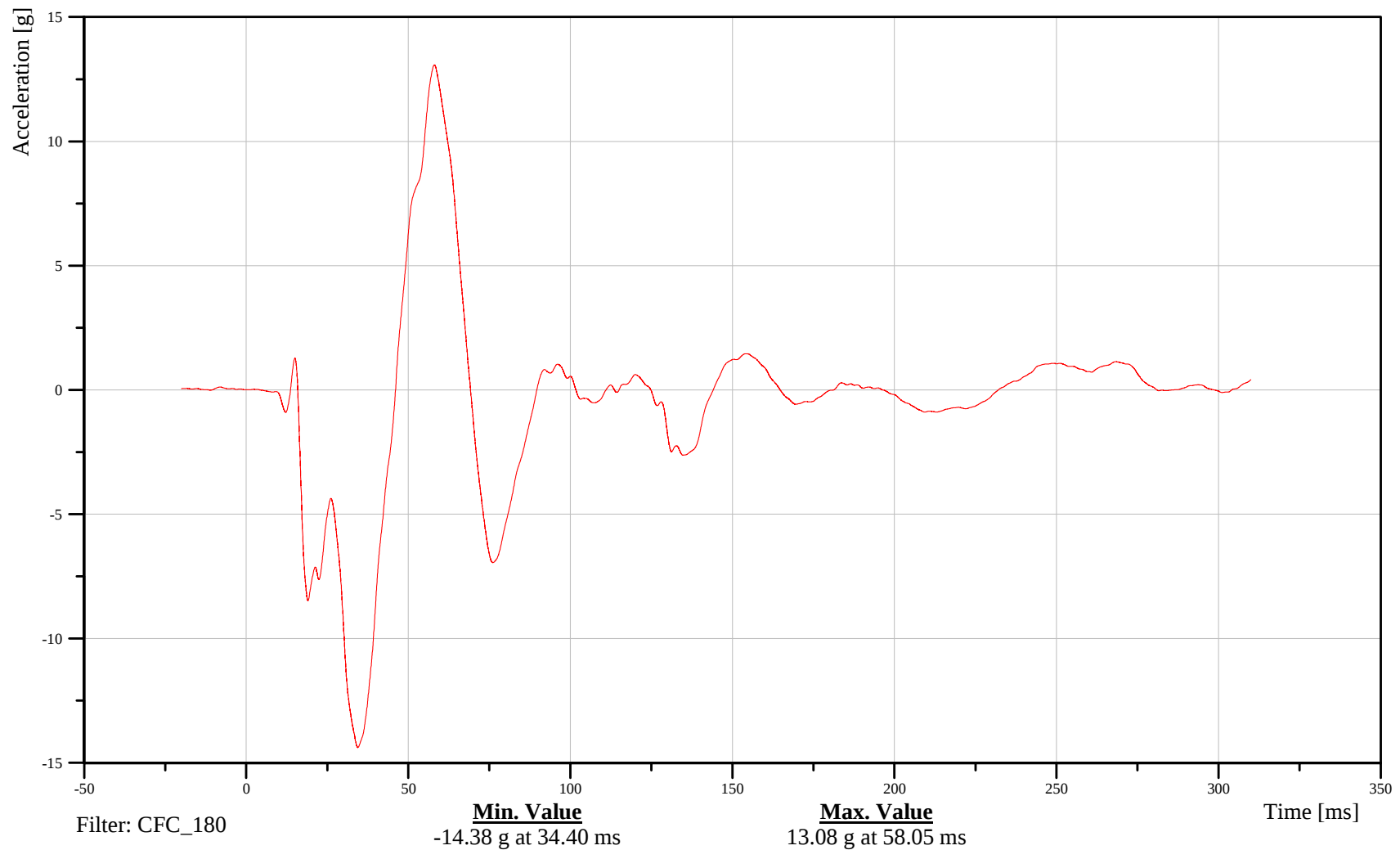
T12 X-Axis Acceleration

Customer: VRTC

11THSP1200WSACXC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-37

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

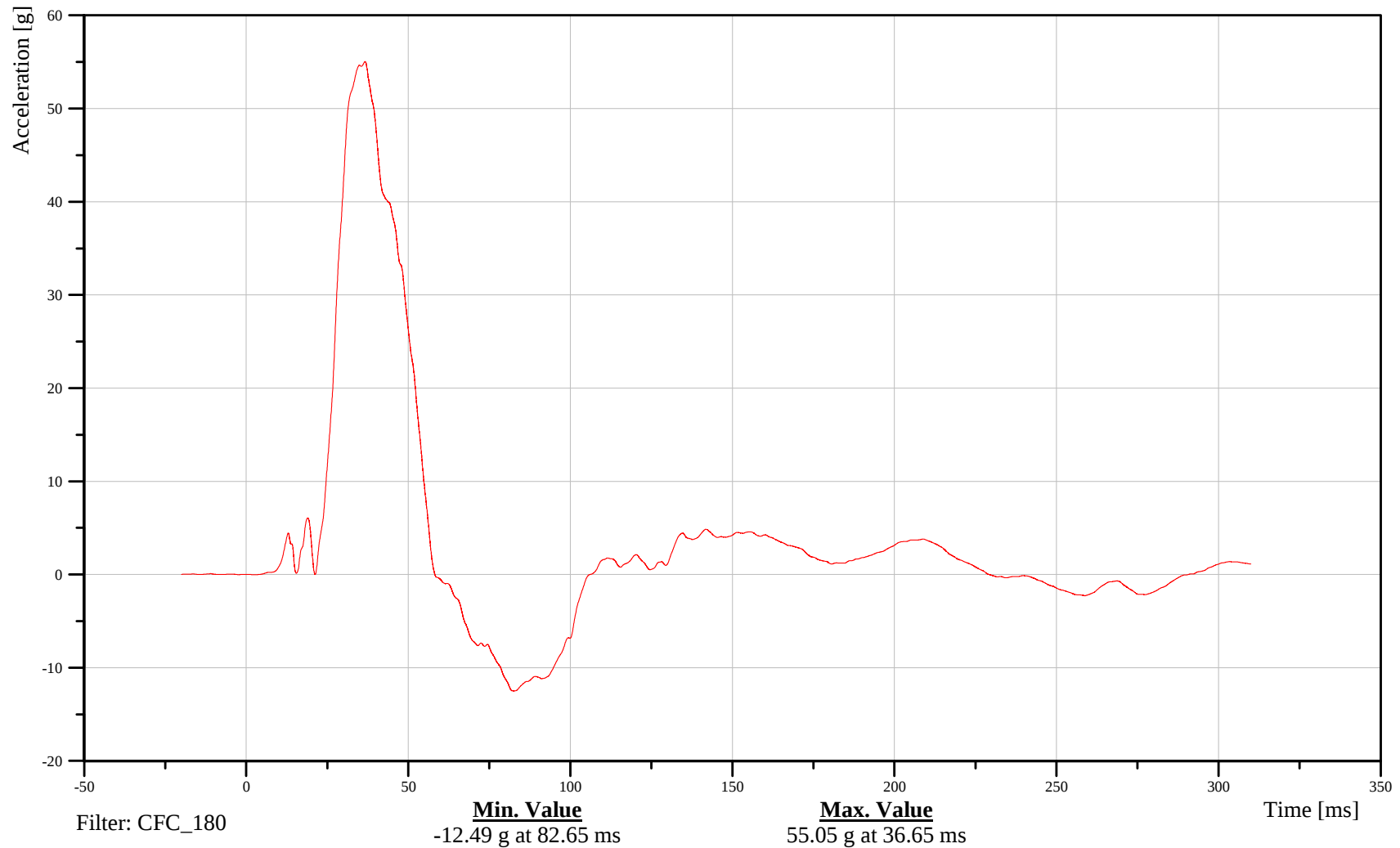
T12 Y-Axis Acceleration

Customer: VRTC

11THSP1200WSACYC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-38

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

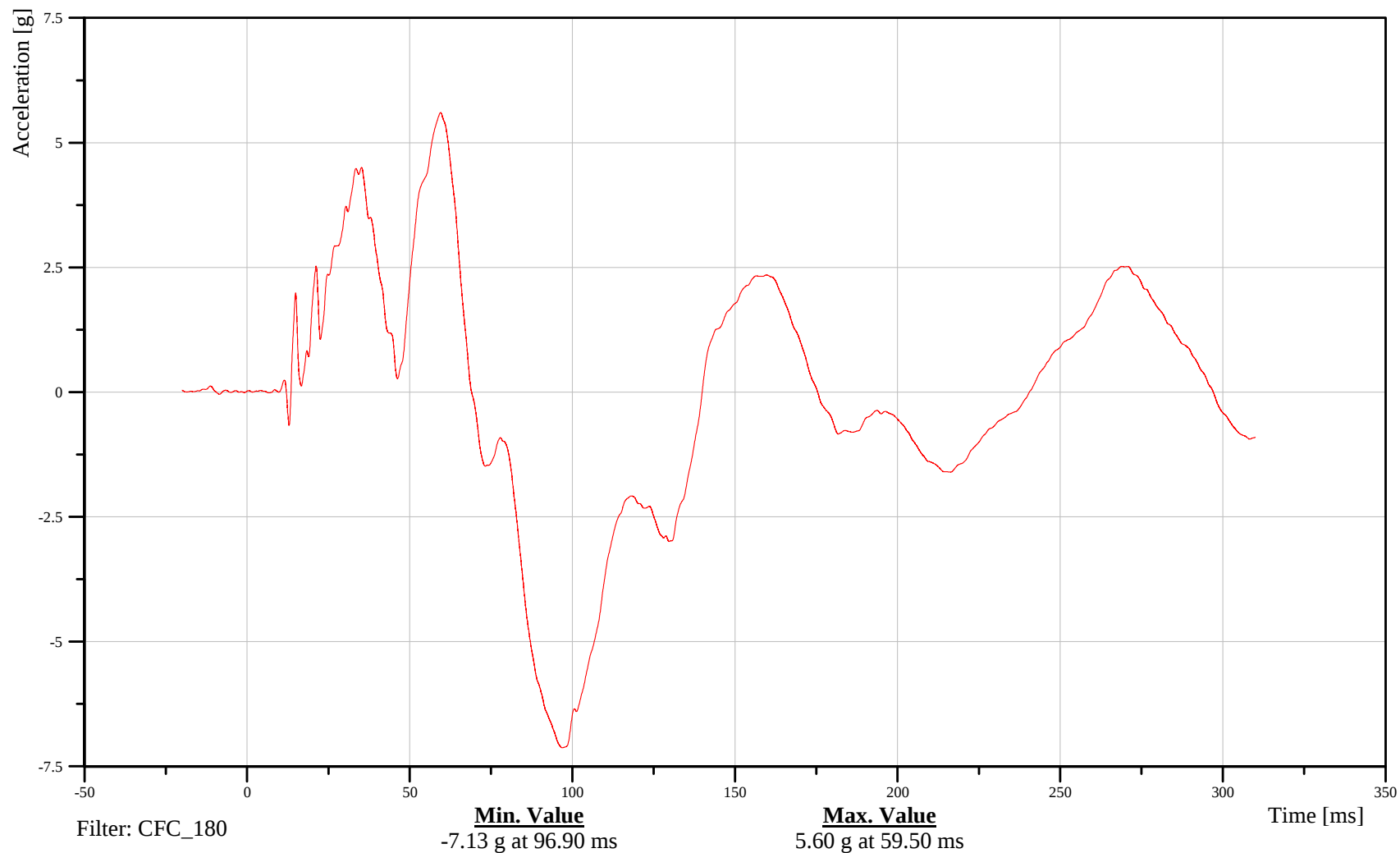
T12 Z-Axis Acceleration

Customer: VRTC

11THSP1200WSACZC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-39

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

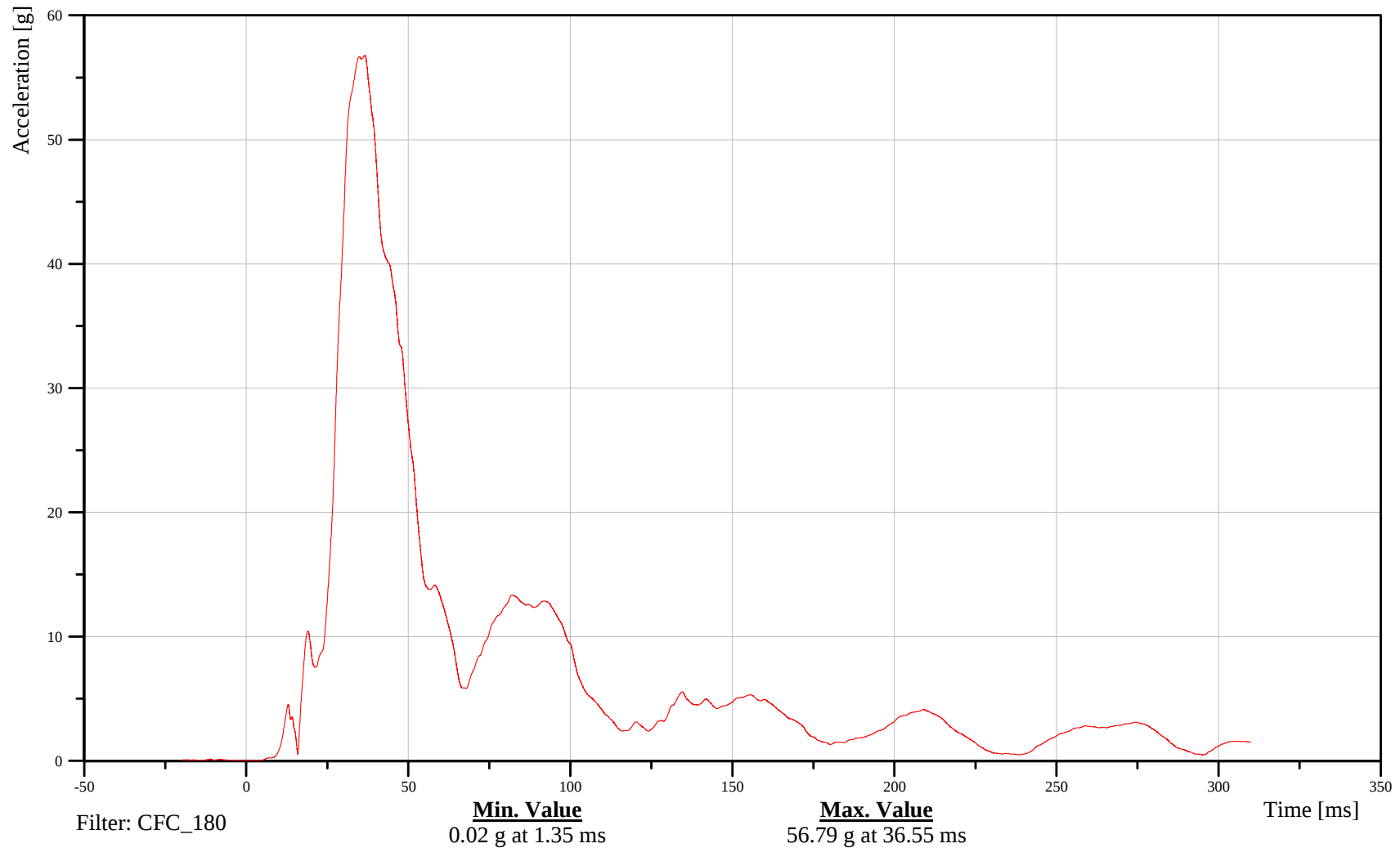
T12 Resultant Acceleration

Customer: VRTC

11THSP1200WSACRC

TRC Inc. Test Lab: CTF

Test Number: 110817



B-40

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

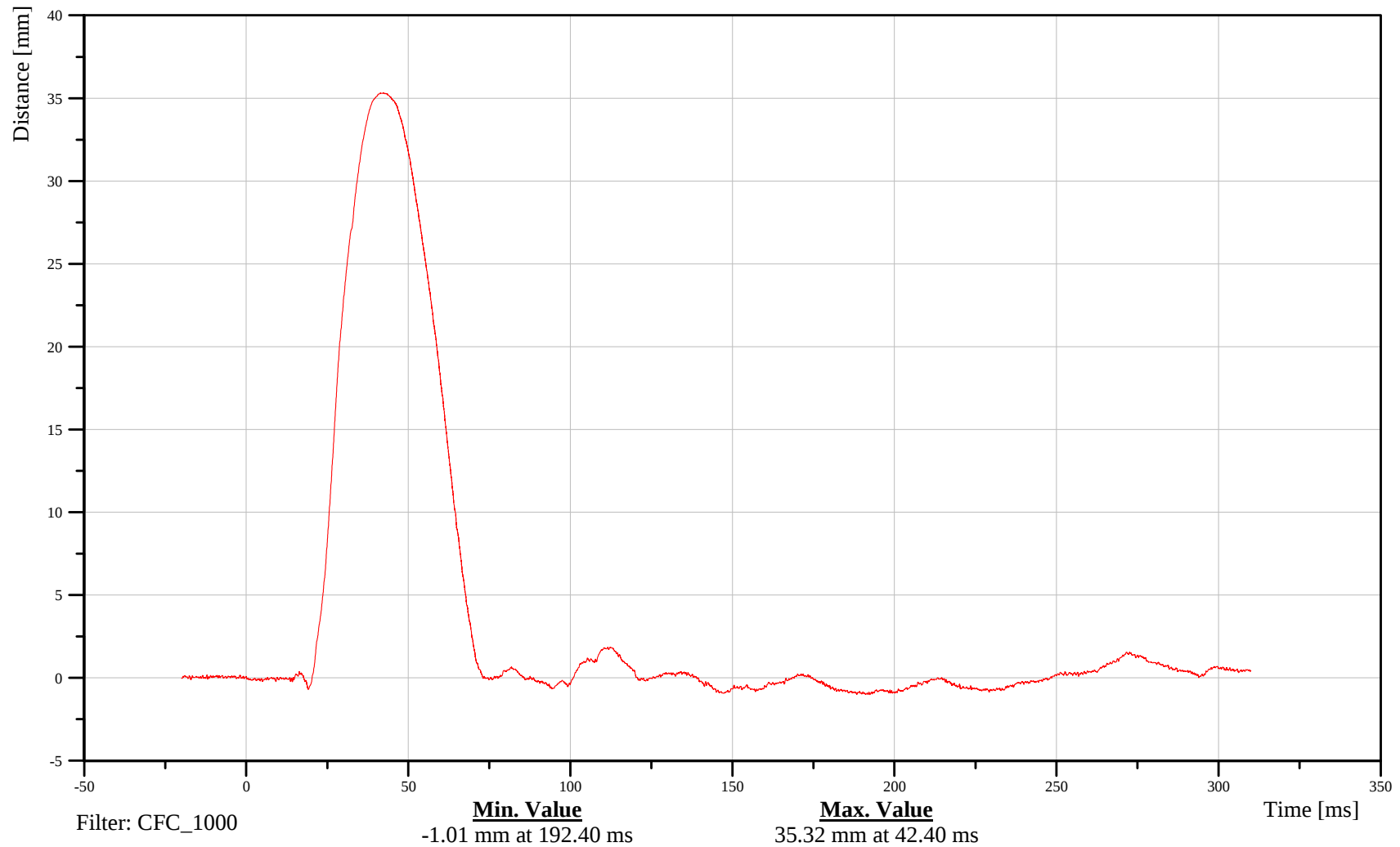
Thorax Rib 1 Y-Axis Displacement

Customer: VRTC

11TRRILE01WSDSYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-41

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

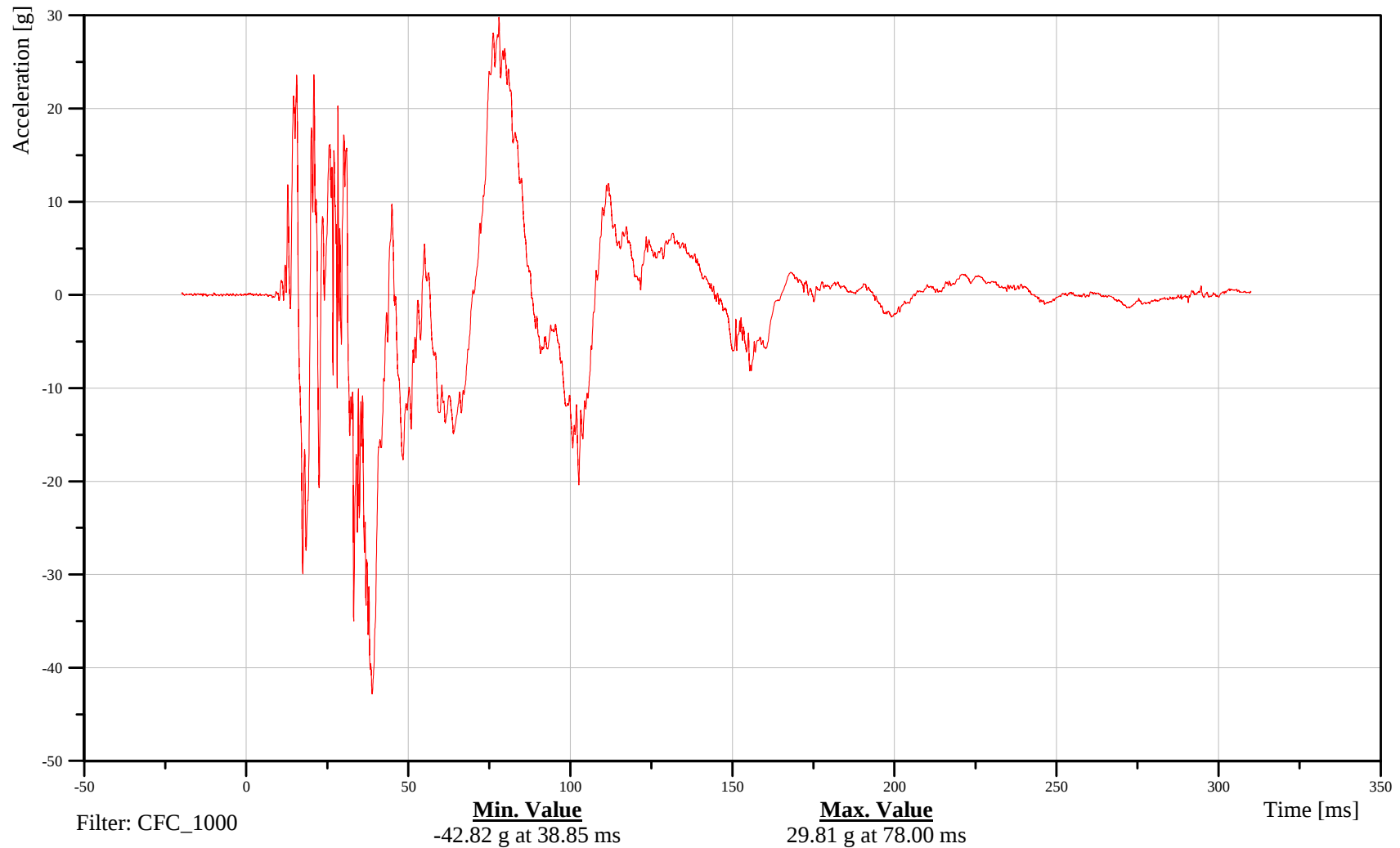
Thorax Rib 1 X-Axis Acceleration

Customer: VRTC

11TRRILE01WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-42

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

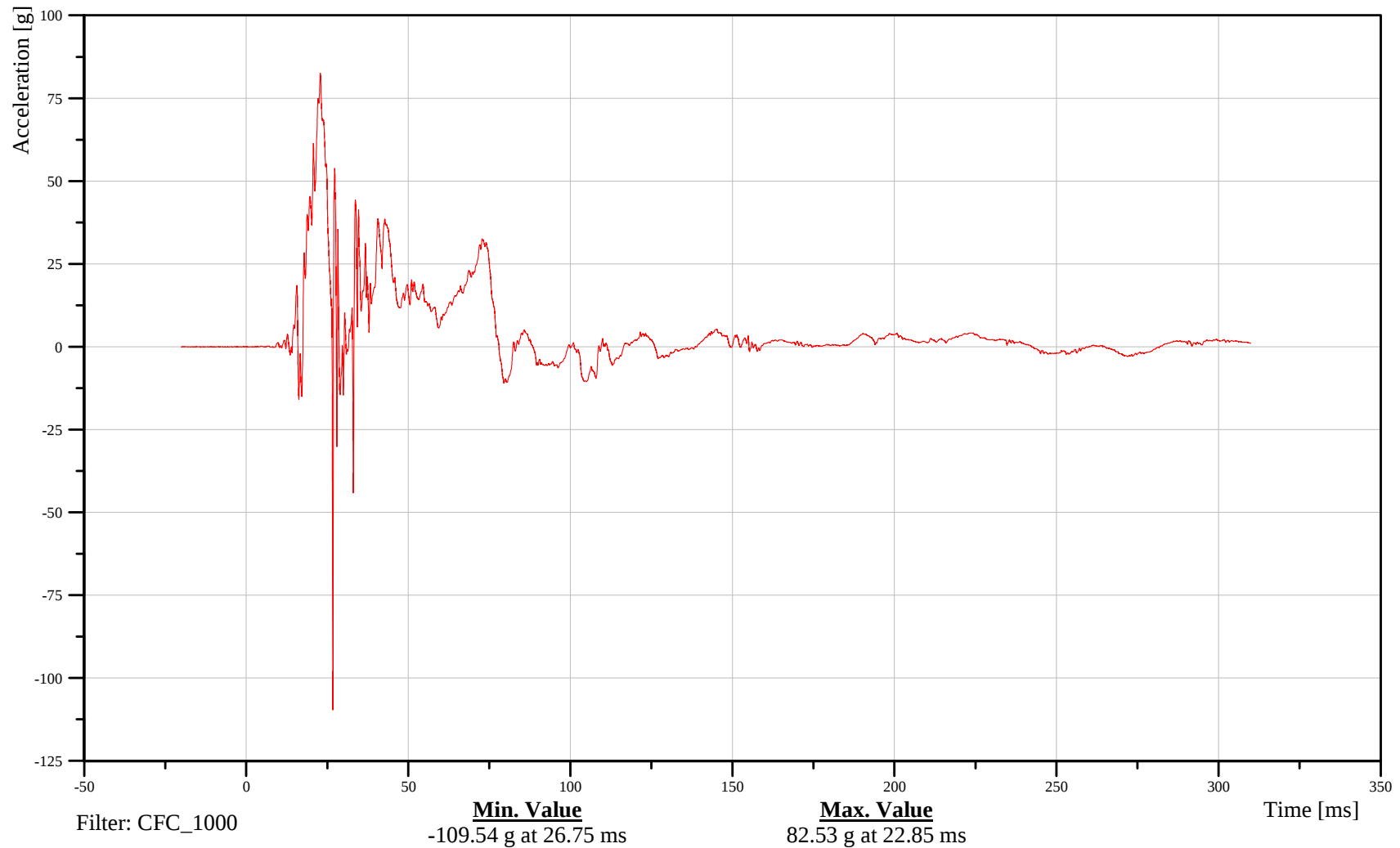
Thorax Rib 1 Y-Axis Acceleration

Customer: VRTC

11TRRILE01WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-43

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

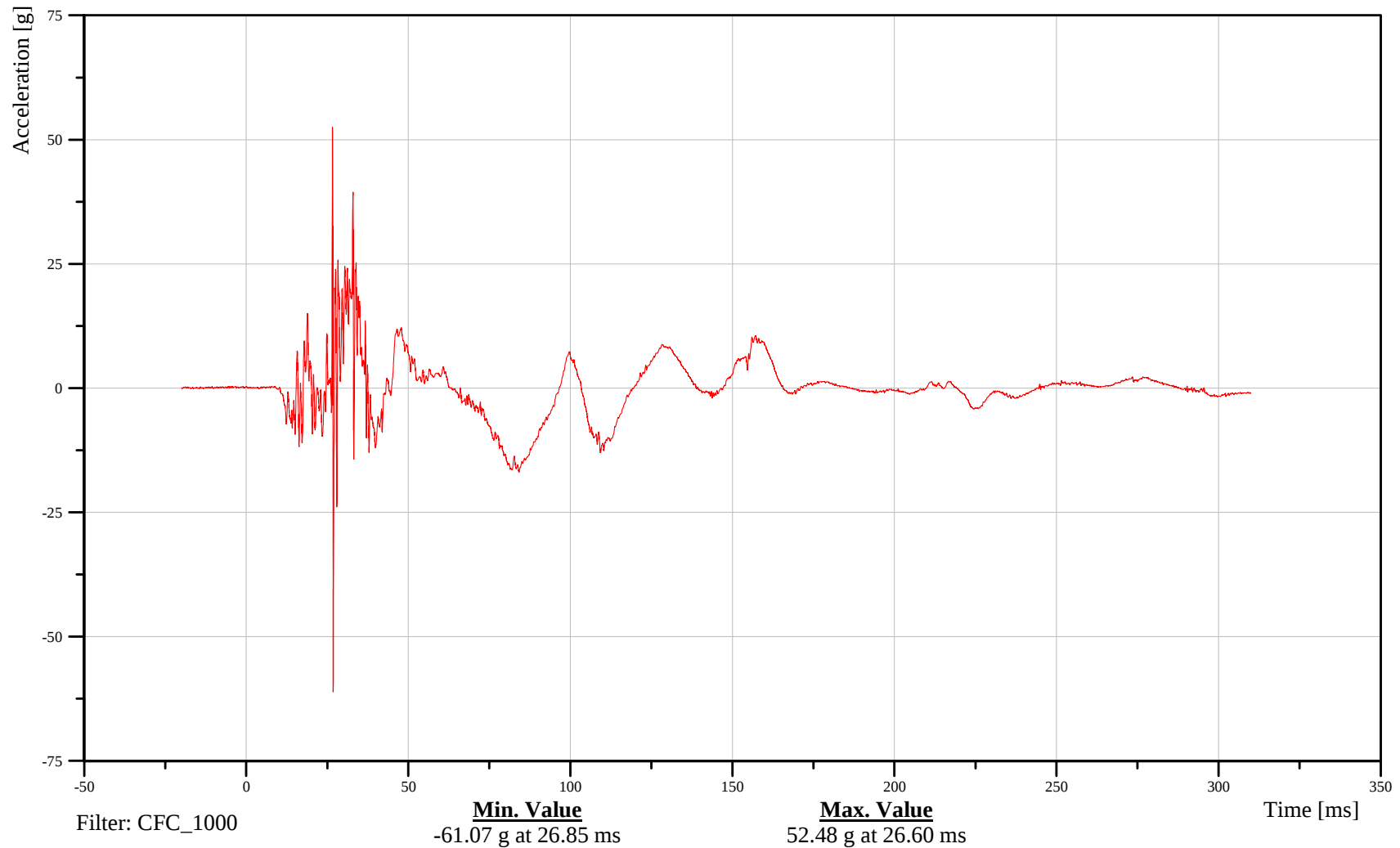
Thorax Rib 1 Z-Axis Acceleration

Customer: VRTC

11TRRILE01WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-44

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

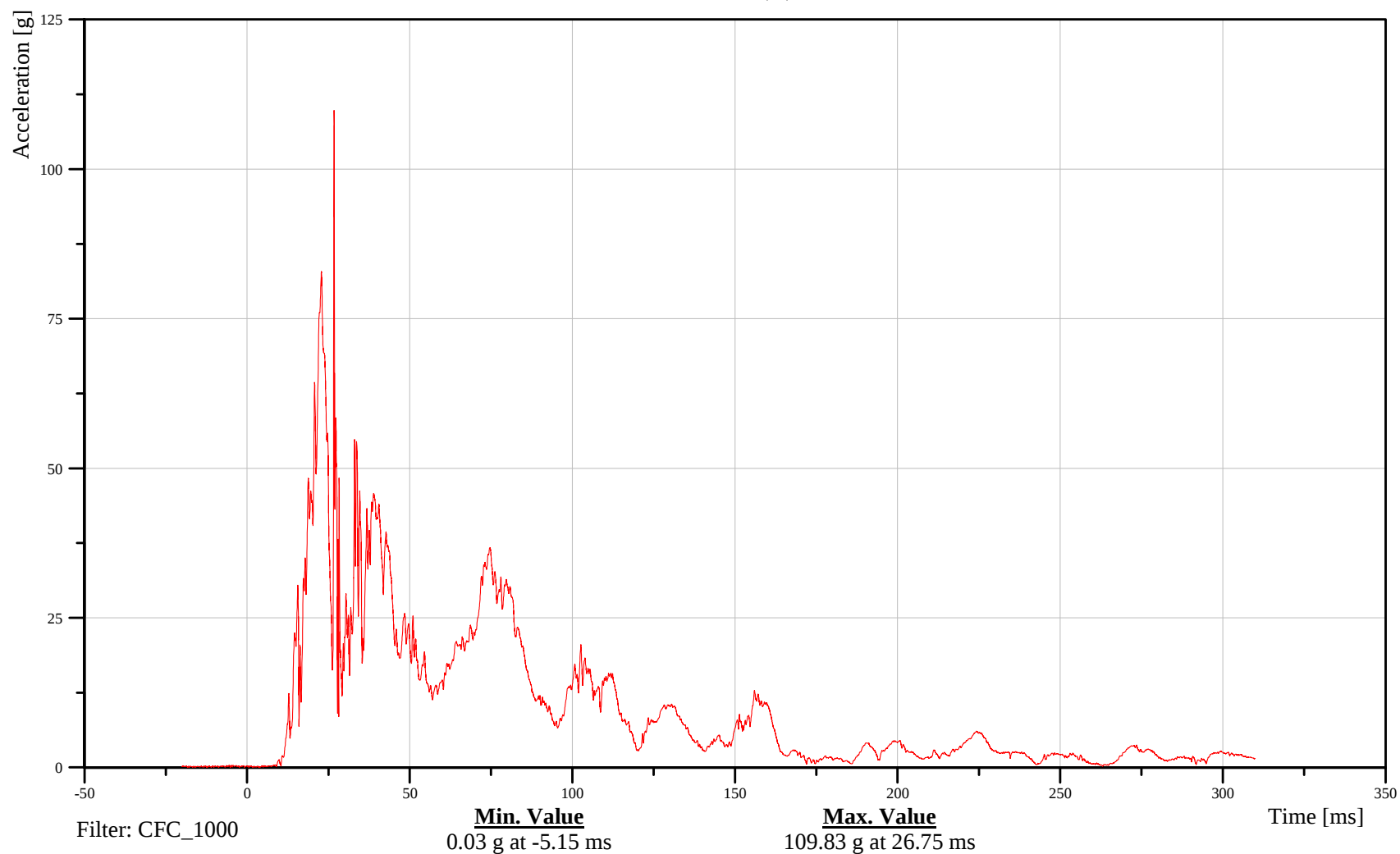
Thorax Rib 1 Resultant Acceleration

Customer: VRTC

11TRRILE01WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-45

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

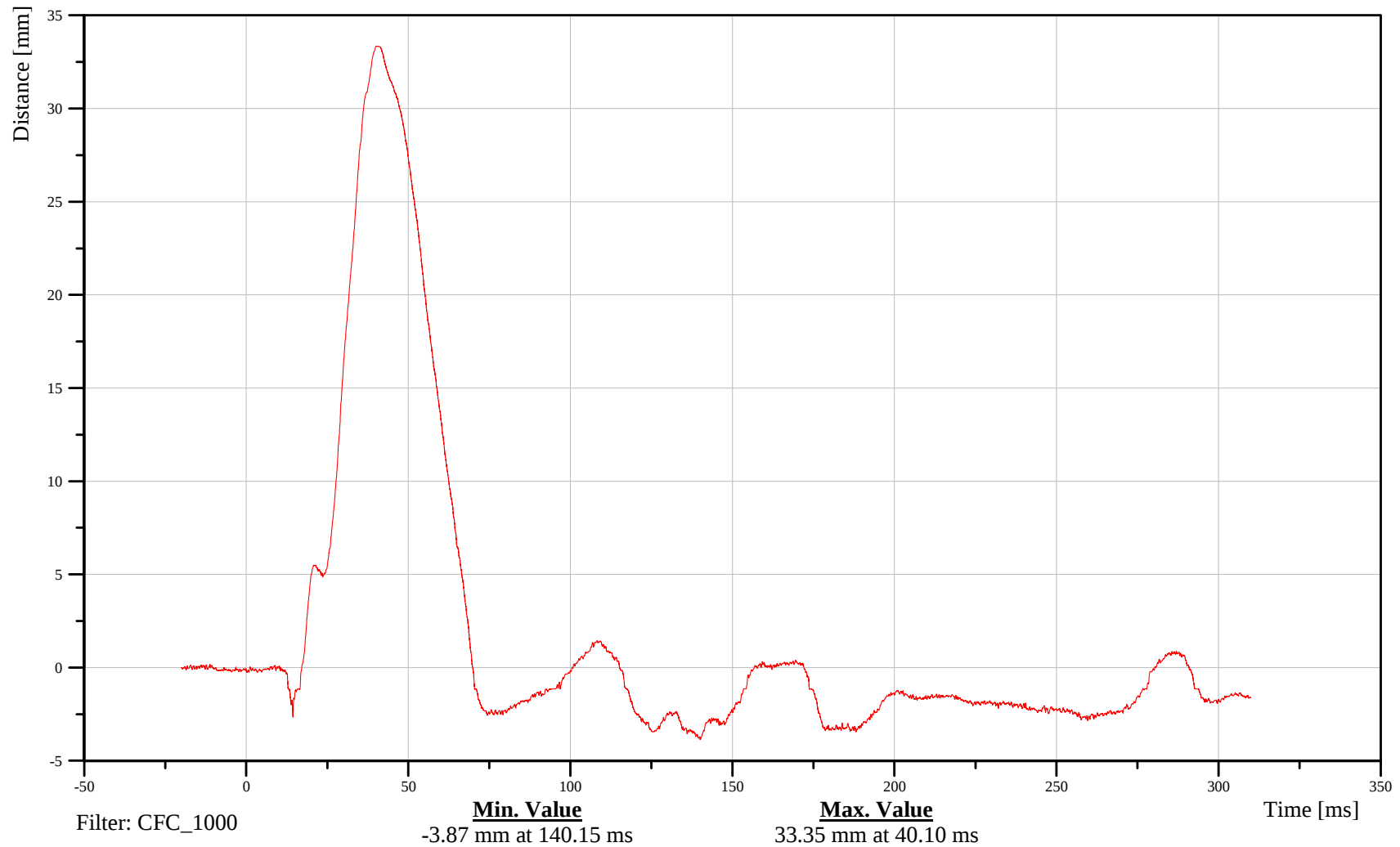
Thorax Rib 2 Y-Axis Displacement

Customer: VRTC

11TRRILE02WSDSYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-46

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

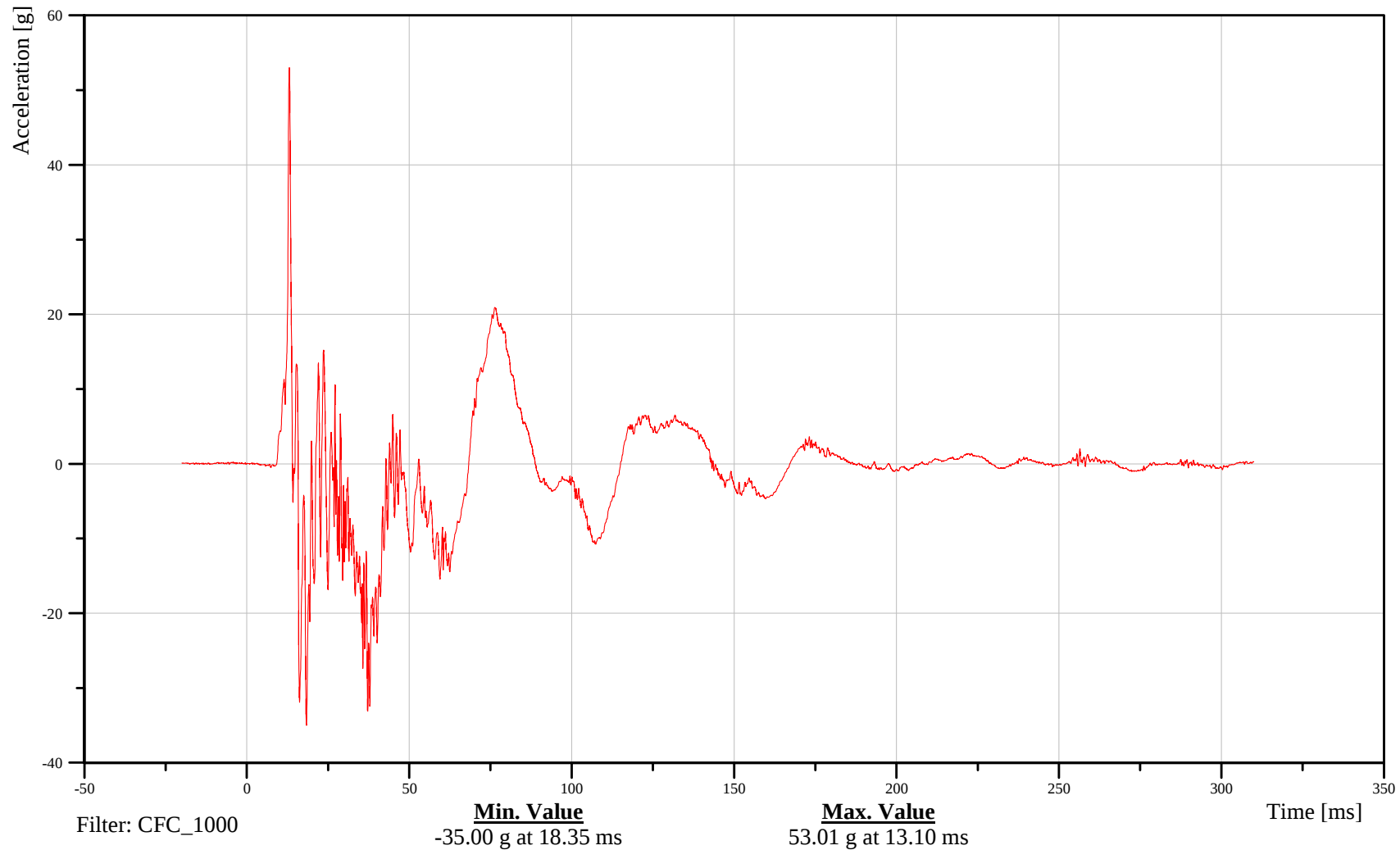
Thorax Rib 2 X-Axis Acceleration

Customer: VRTC

11TRRILE02WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-47

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

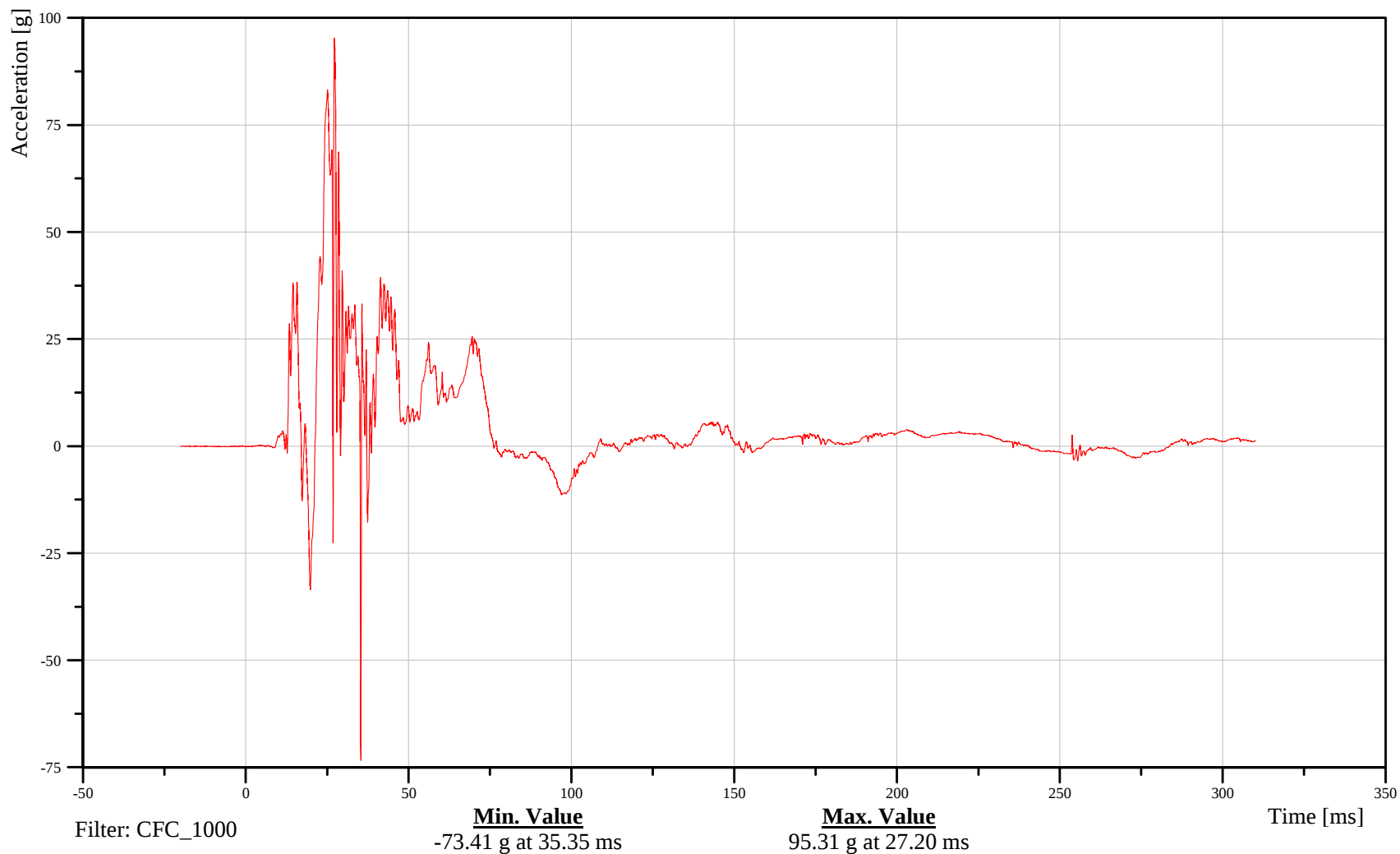
Thorax Rib 2 Y-Axis Acceleration

Customer: VRTC

11TRRILE02WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-48

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

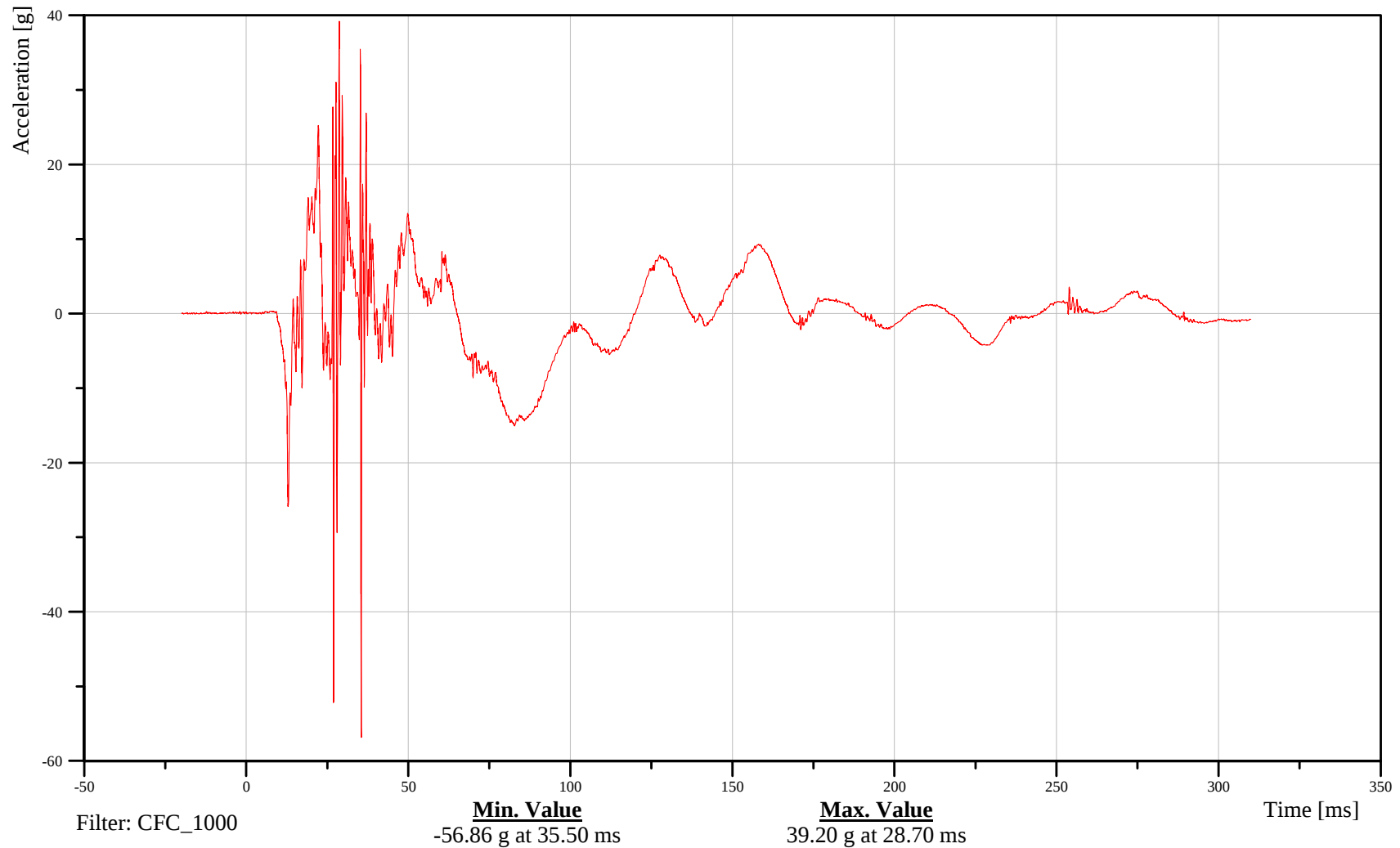
Thorax Rib 2 Z-Axis Acceleration

Customer: VRTC

11TRRILE02WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-49

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

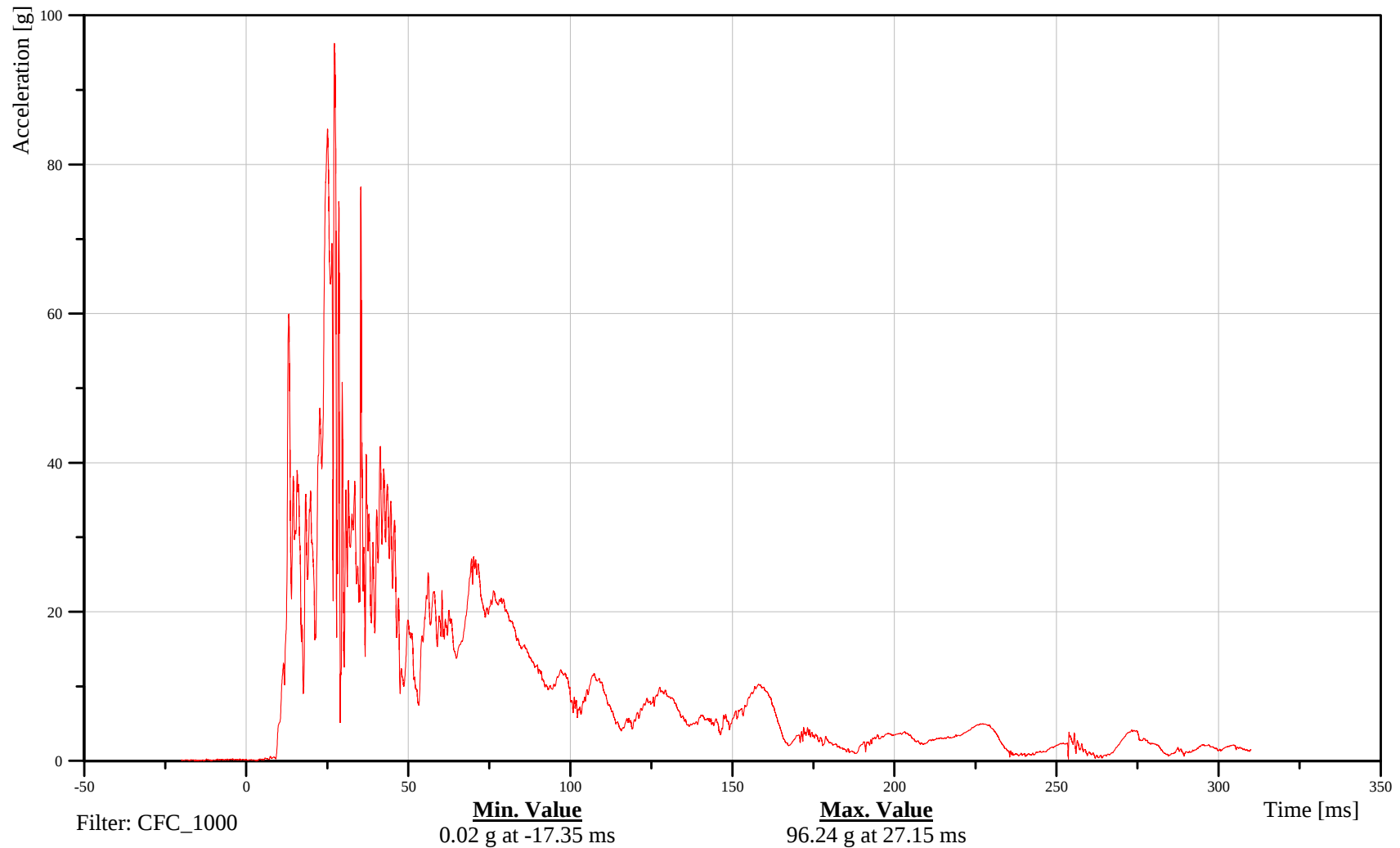
Thorax Rib 2 Resultant Acceleration

Customer: VRTC

11TRRILE02WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-50

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

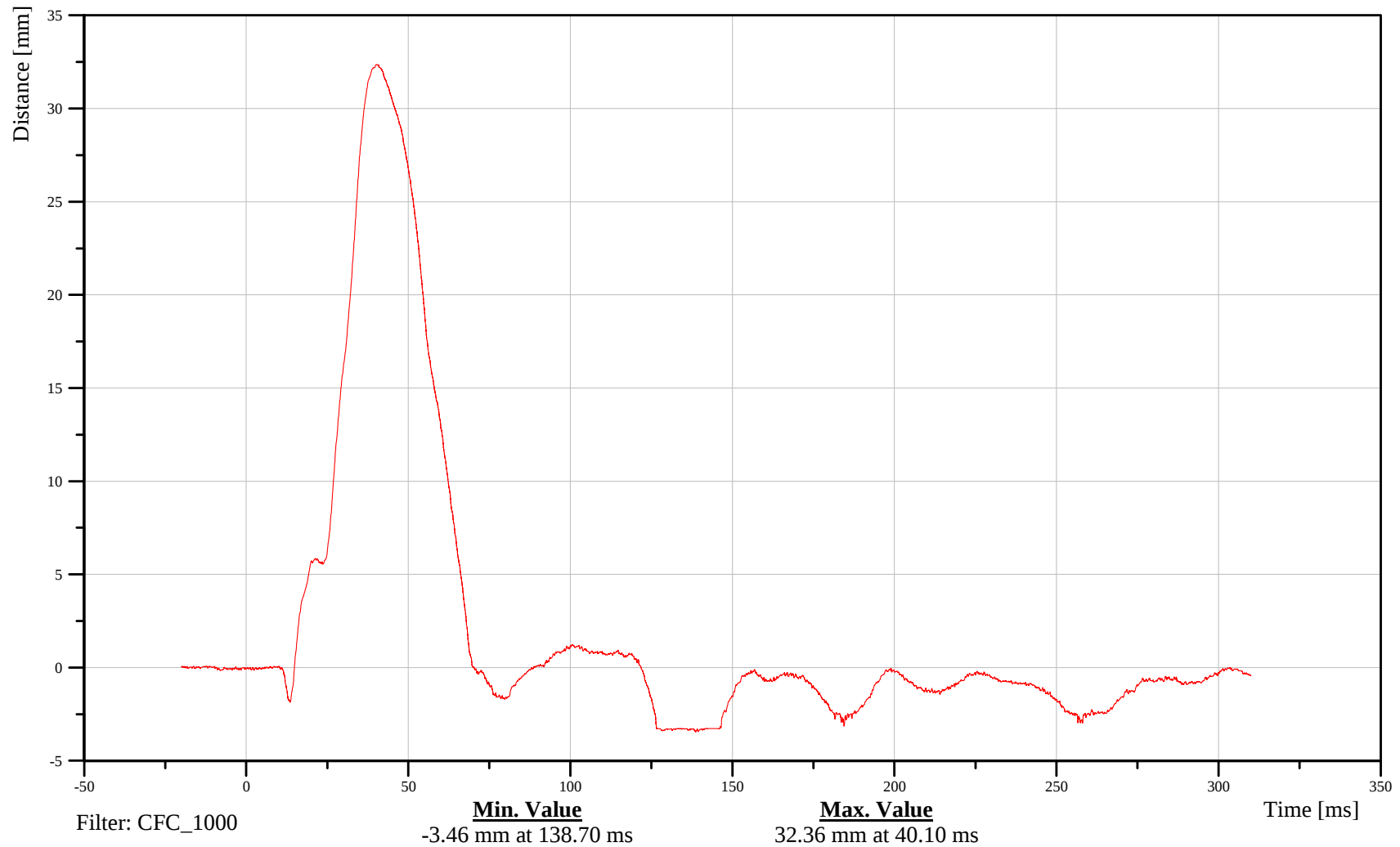
Thorax Rib 3 Y-Axis Displacement

Customer: VRTC

11TRRILE03WSDSYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-51

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

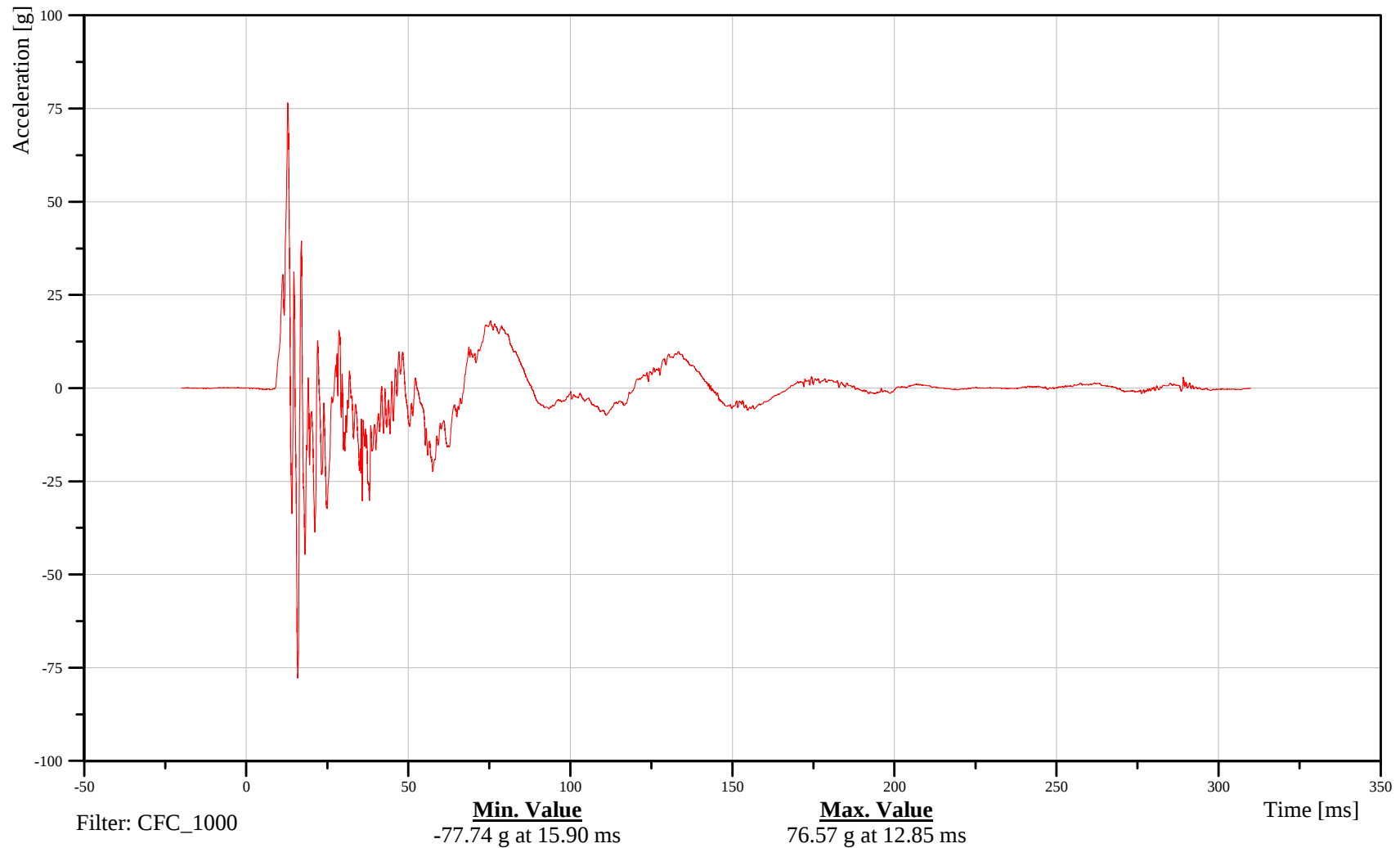
Thorax Rib 3 X-Axis Acceleration

Customer: VRTC

11TRRILE03WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-52

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

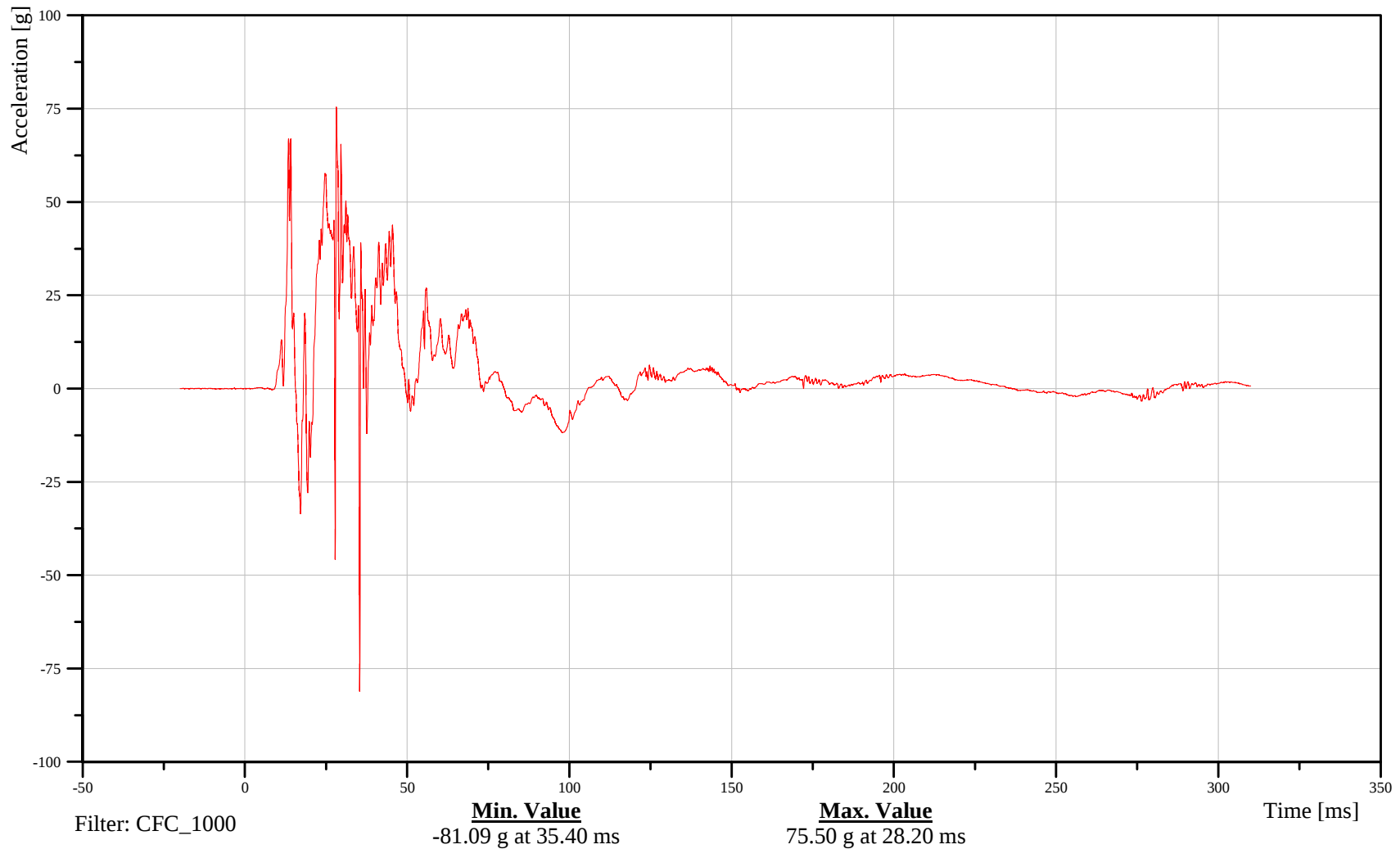
Thorax Rib 3 Y-Axis Acceleration

Customer: VRTC

11TRRILE03WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-53

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

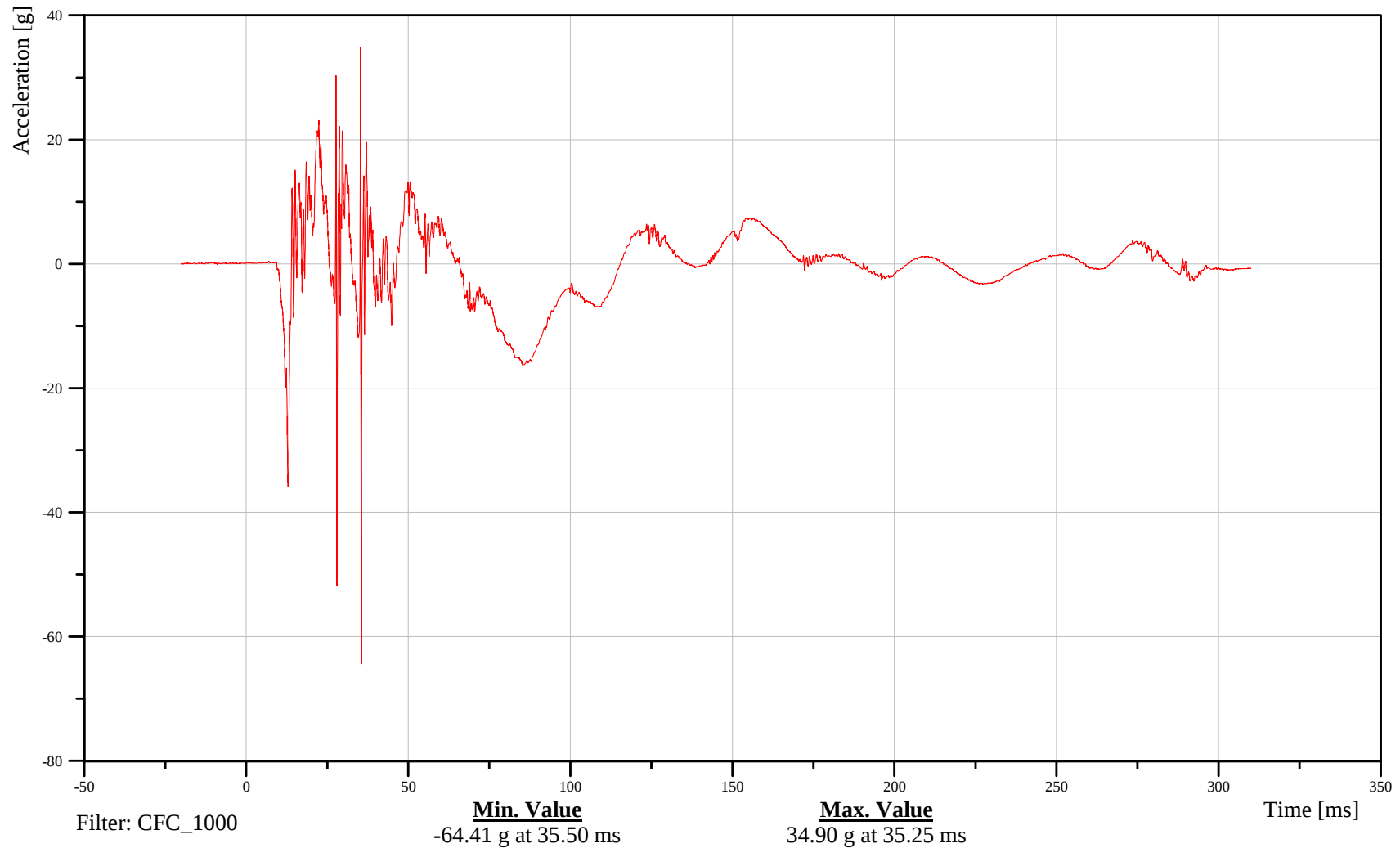
Thorax Rib 3 Z-Axis Acceleration

Customer: VRTC

11TRRILE03WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-54

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

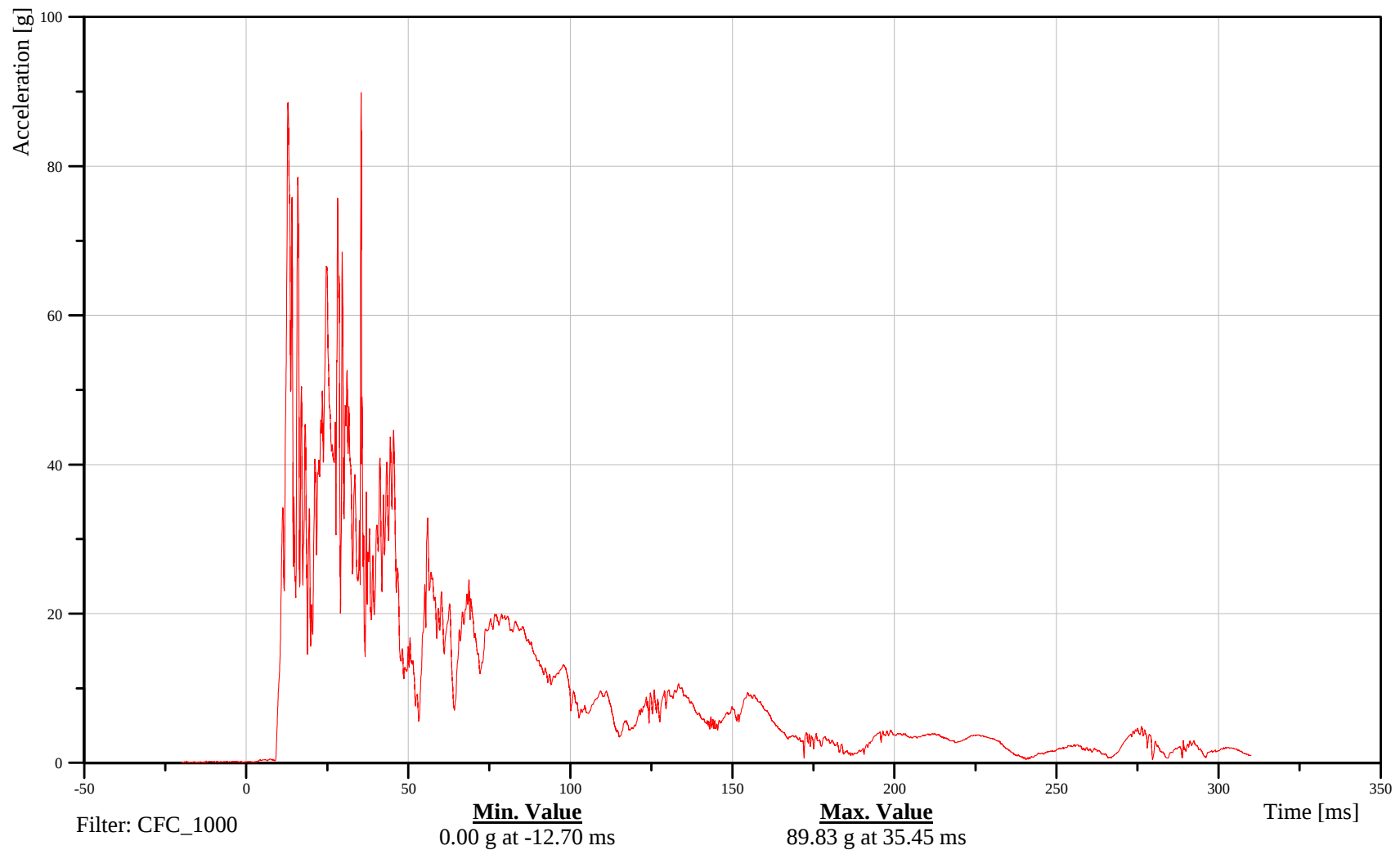
Thorax Rib 3 Resultant Acceleration

Customer: VRTC

11TRRILE03WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-55

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

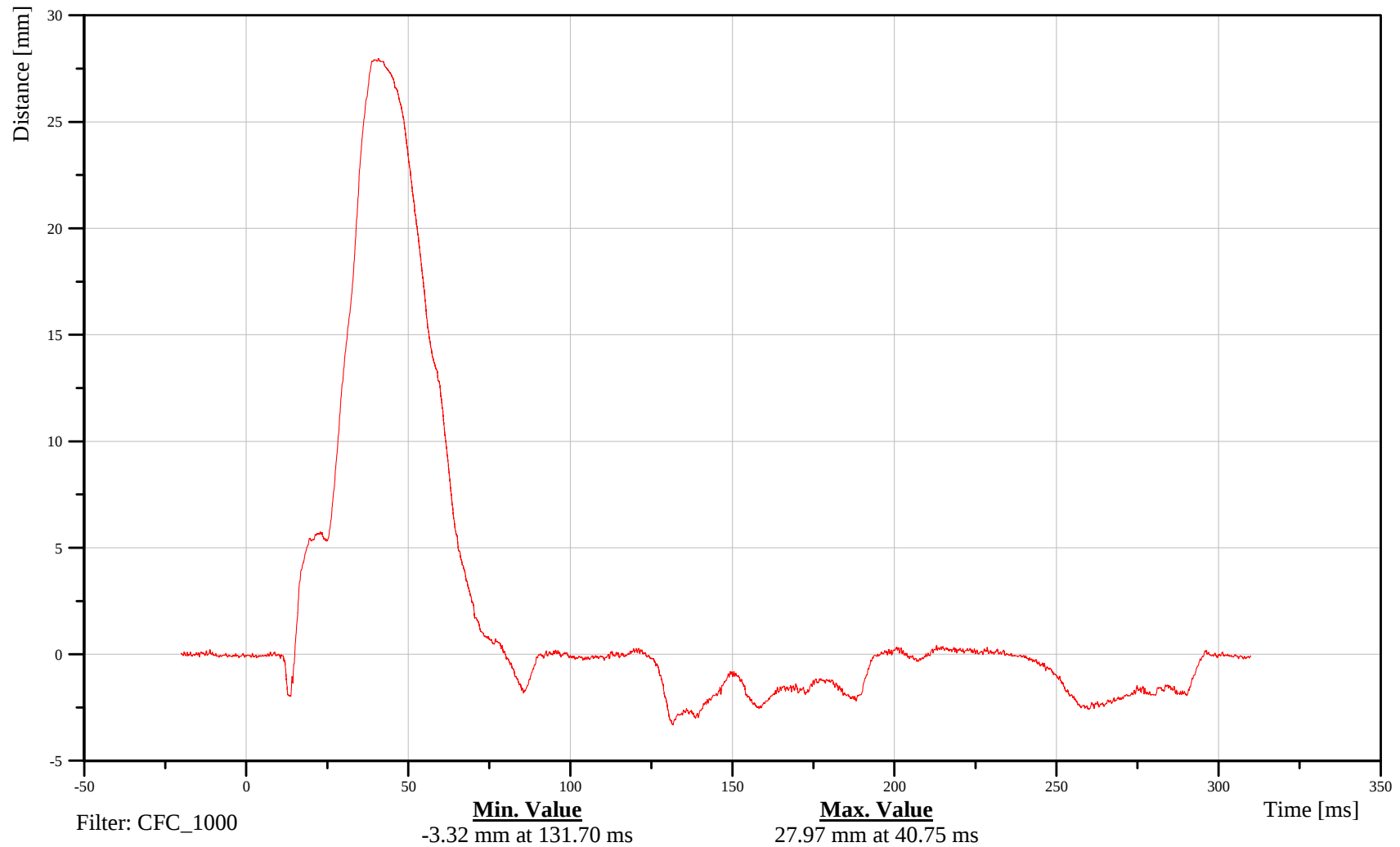
Abdominal Rib 1 Y-Axis Displacement

Customer: VRTC

11ABRILE01WSDSYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-56

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

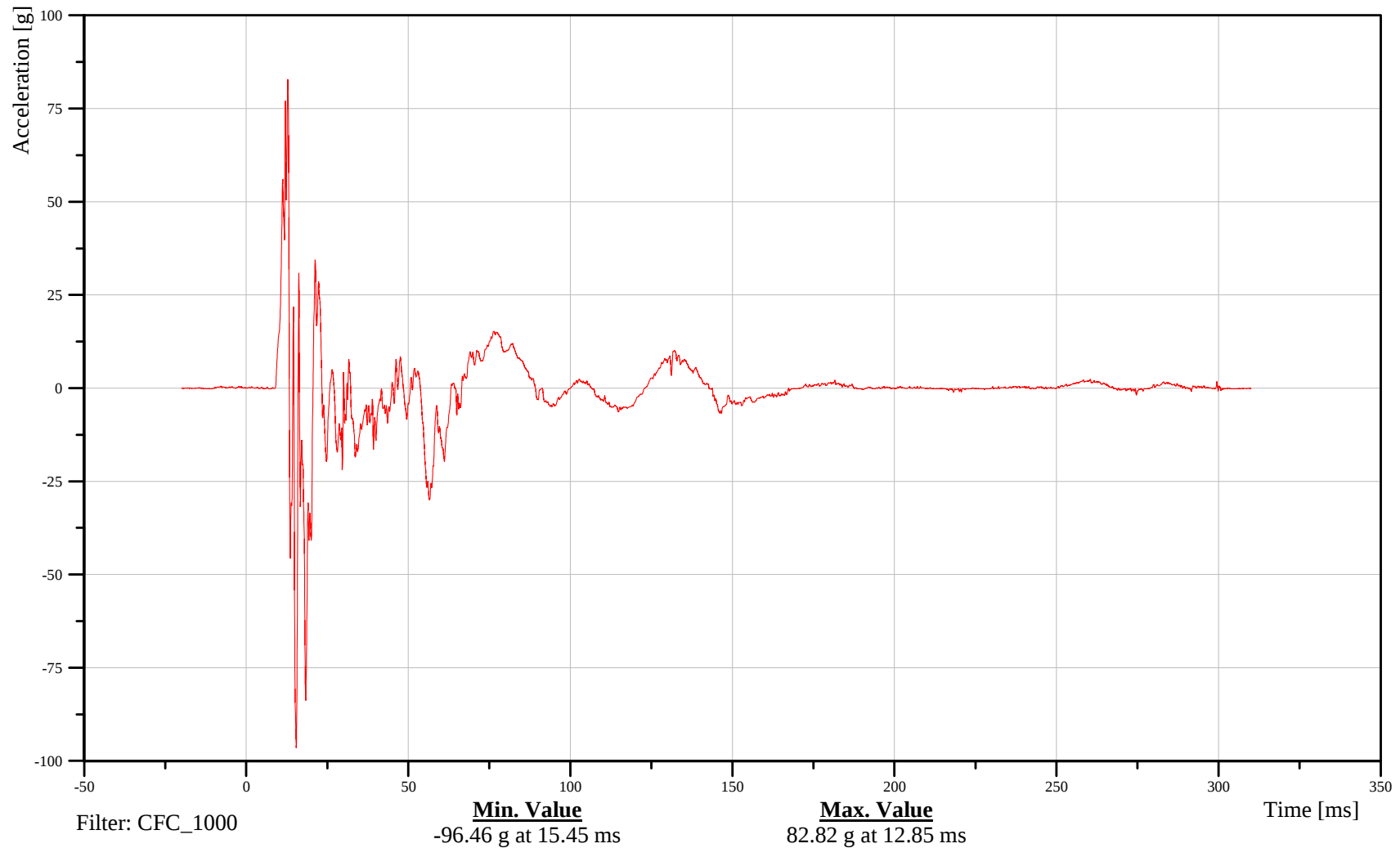
Abdominal Rib 1 X-Axis Acceleration

Customer: VRTC

11ABRILE01WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-57

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

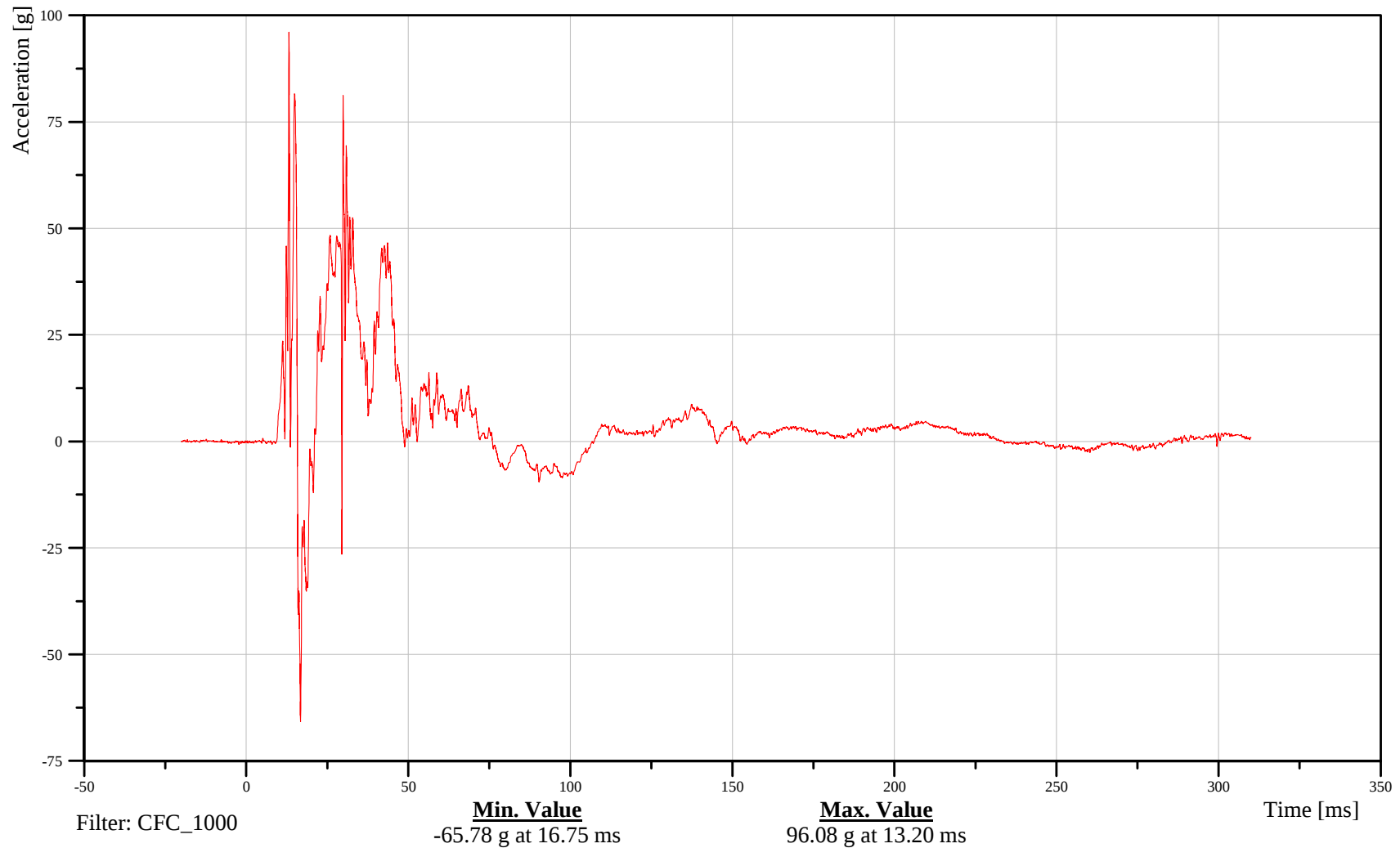
Abdominal Rib 1 Y-Axis Acceleration

Customer: VRTC

11ABRILE01WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-58

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

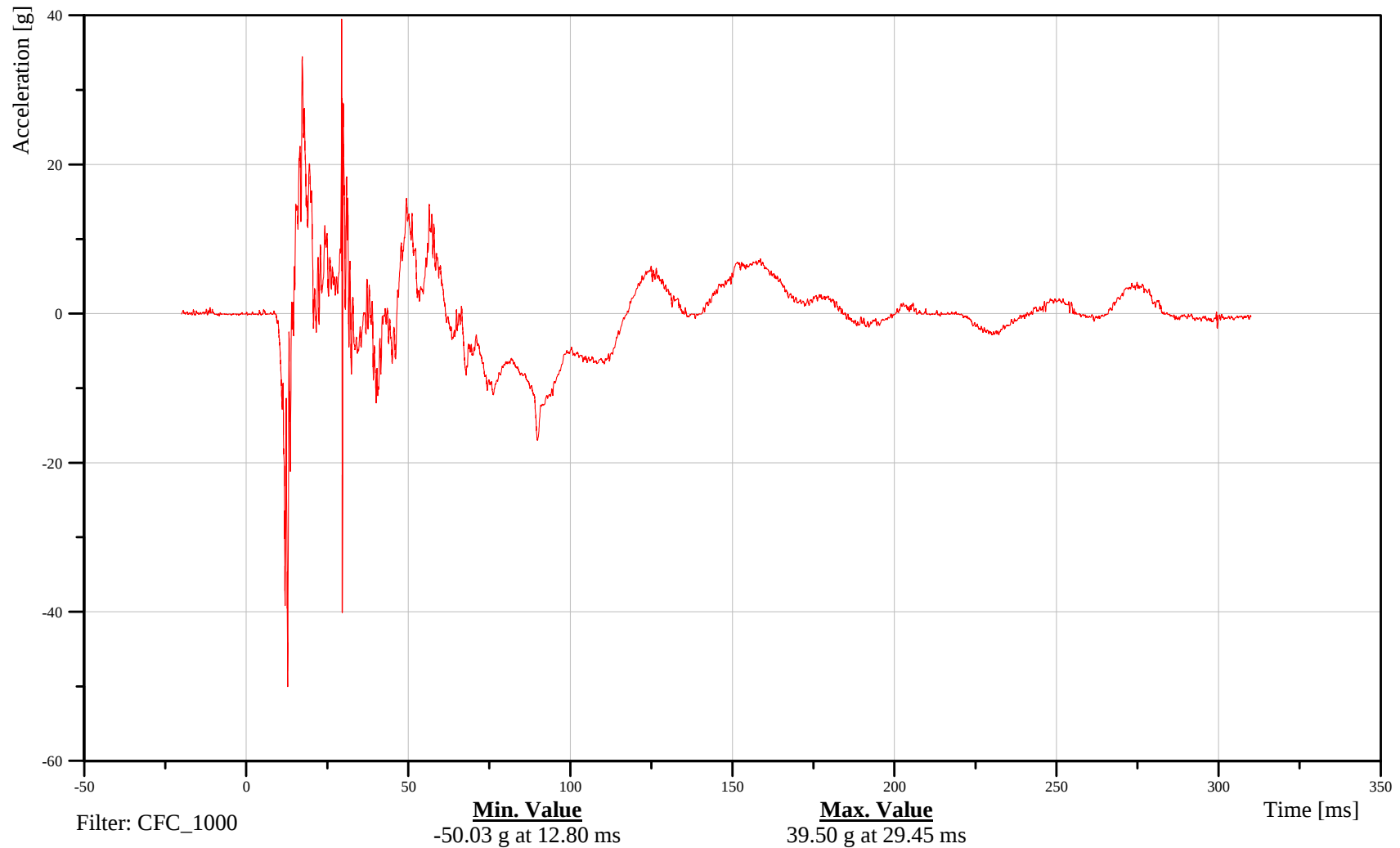
Abdominal Rib 1 Z-Axis Acceleration

Customer: VRTC

11ABRILE01WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-59

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

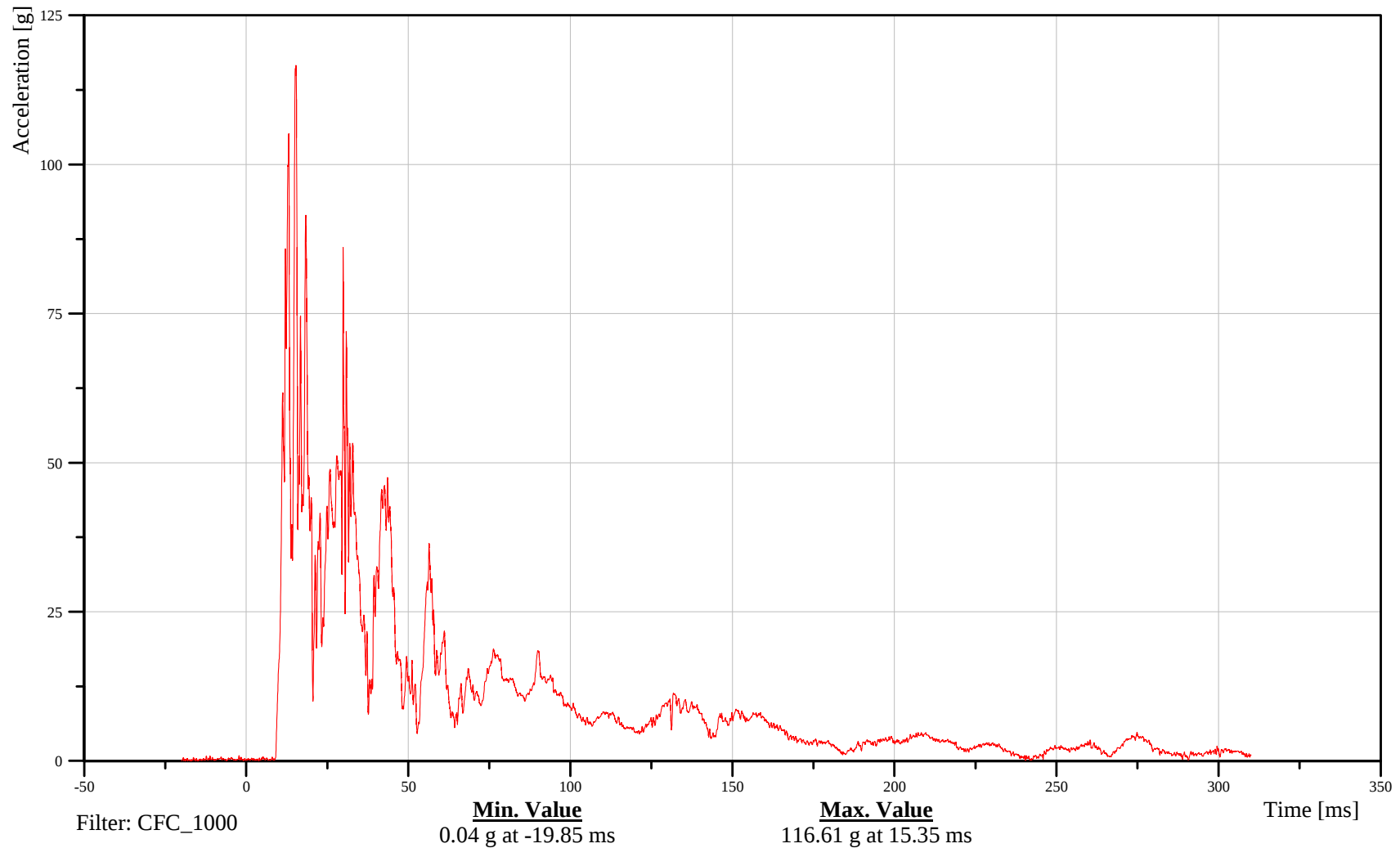
Abdominal Rib 1 Resultant Acceleration

Customer: VRTC

11ABRILE01WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-60

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

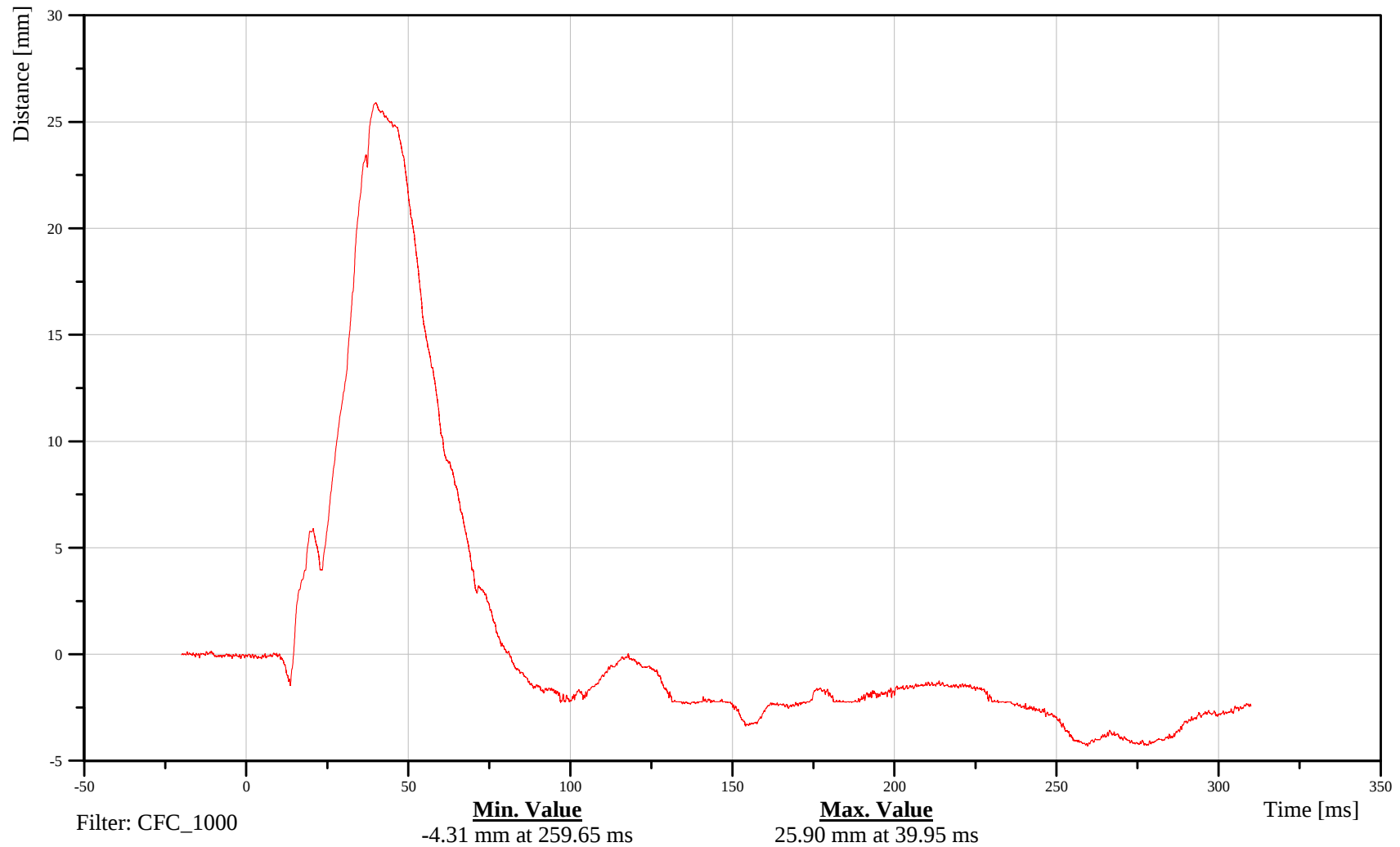
Abdominal Rib 2 Y-Axis Displacement

Customer: VRTC

11ABRILE02WSDSYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-61

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

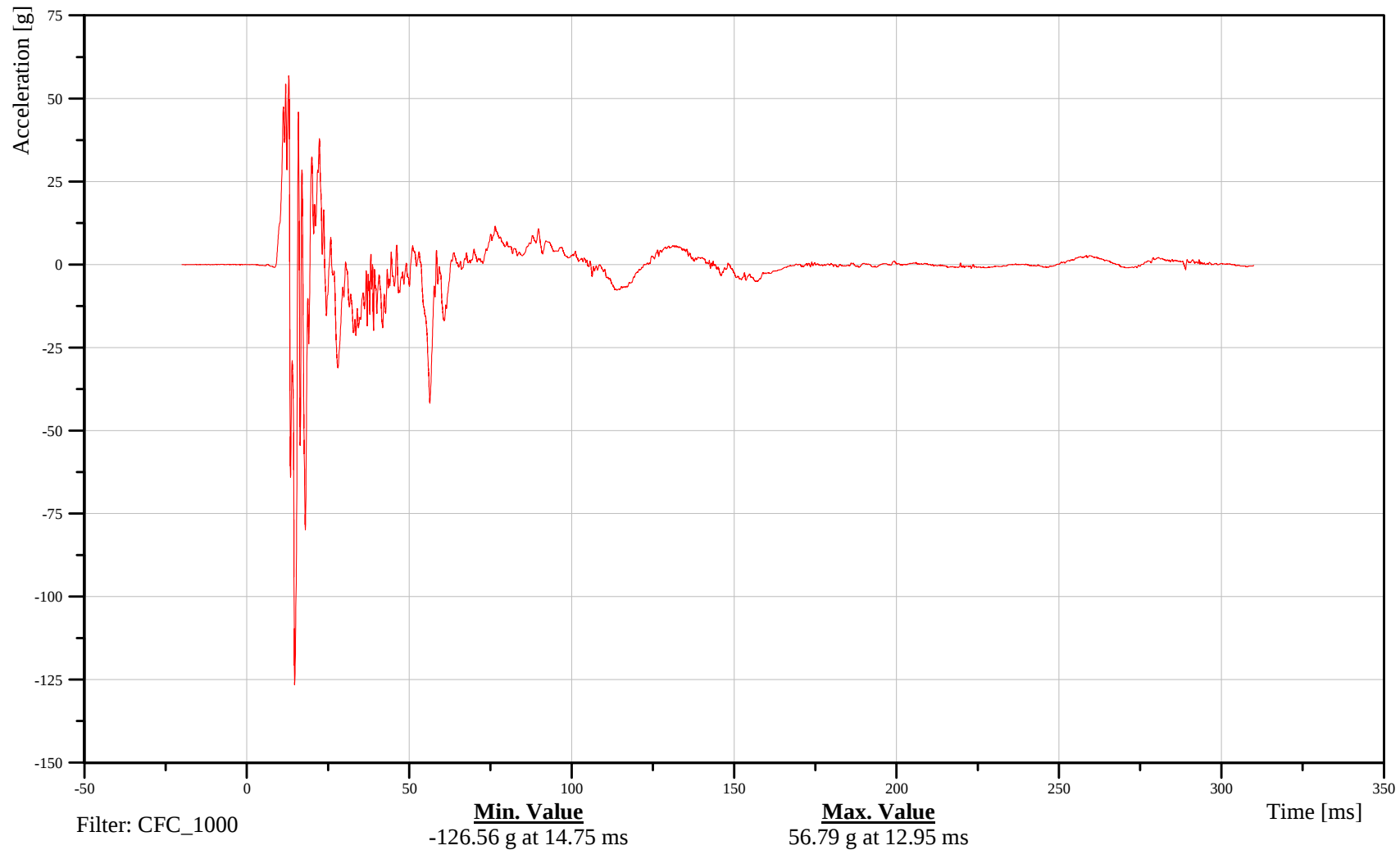
Abdominal Rib 2 X-Axis Acceleration

Customer: VRTC

11ABRILE02WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-62

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

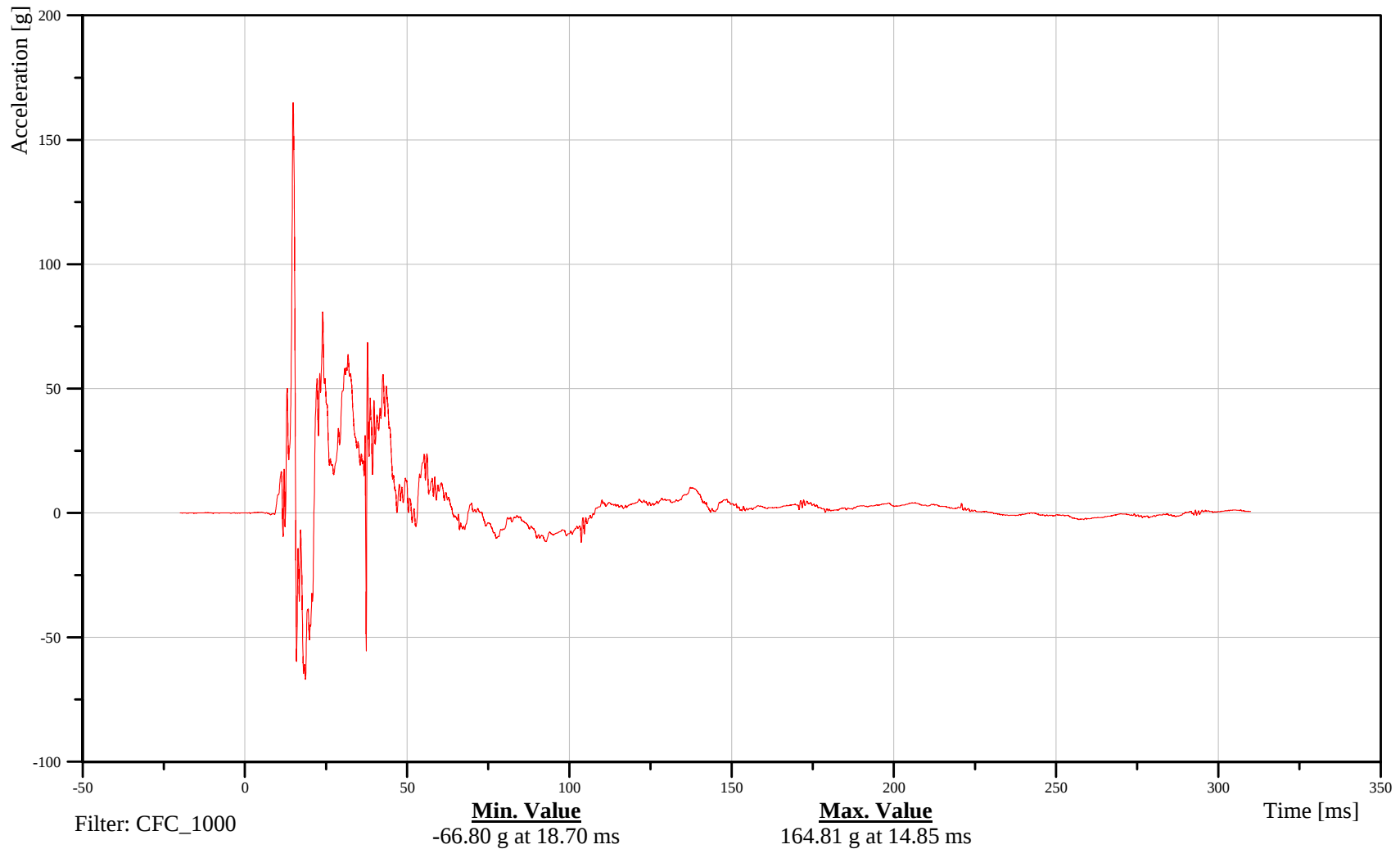
Abdominal Rib 2 Y-Axis Acceleration

Customer: VRTC

11ABRILE02WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-63

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

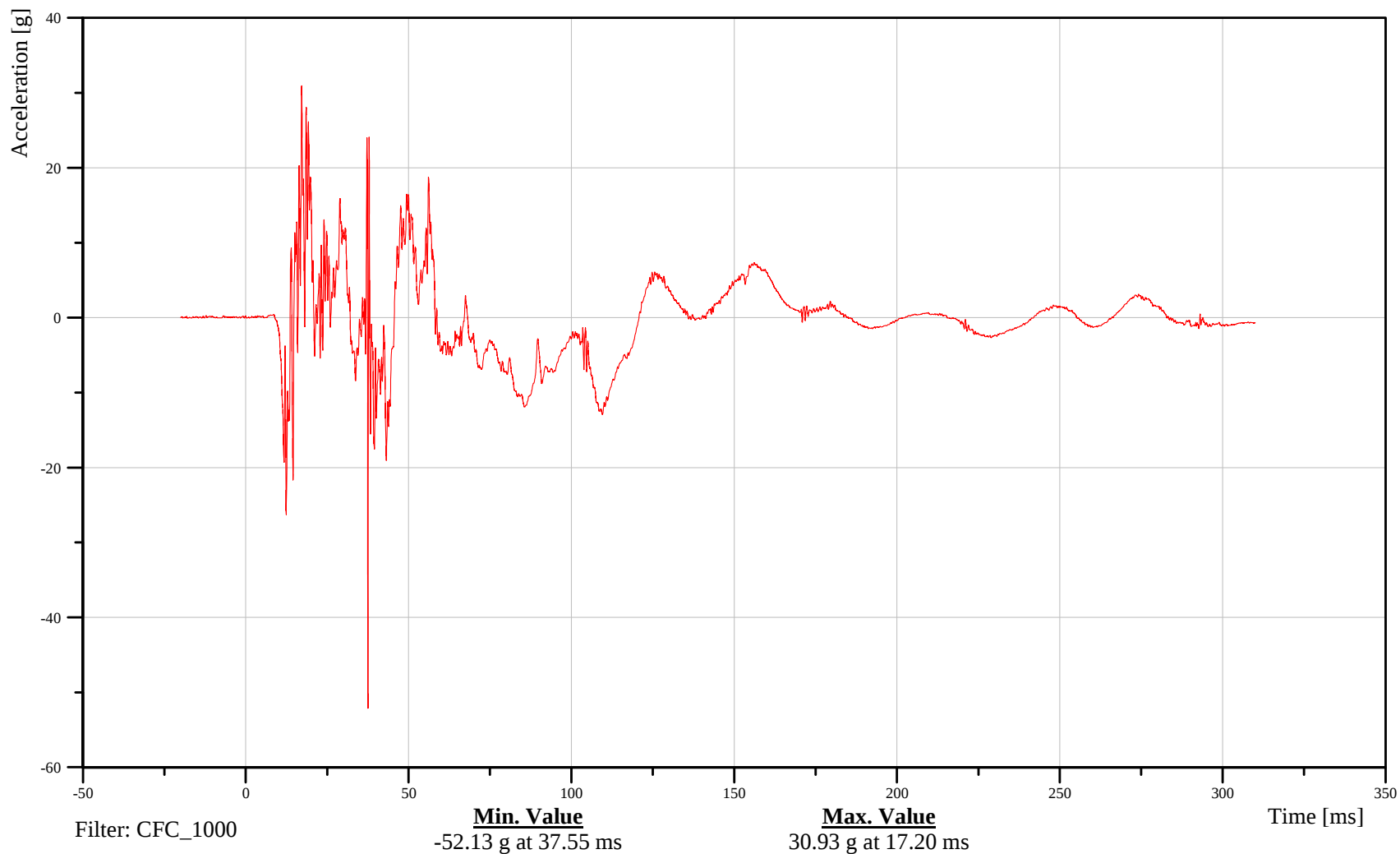
Abdominal Rib 2 Z-Axis Acceleration

Customer: VRTC

11ABRILE02WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-64

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

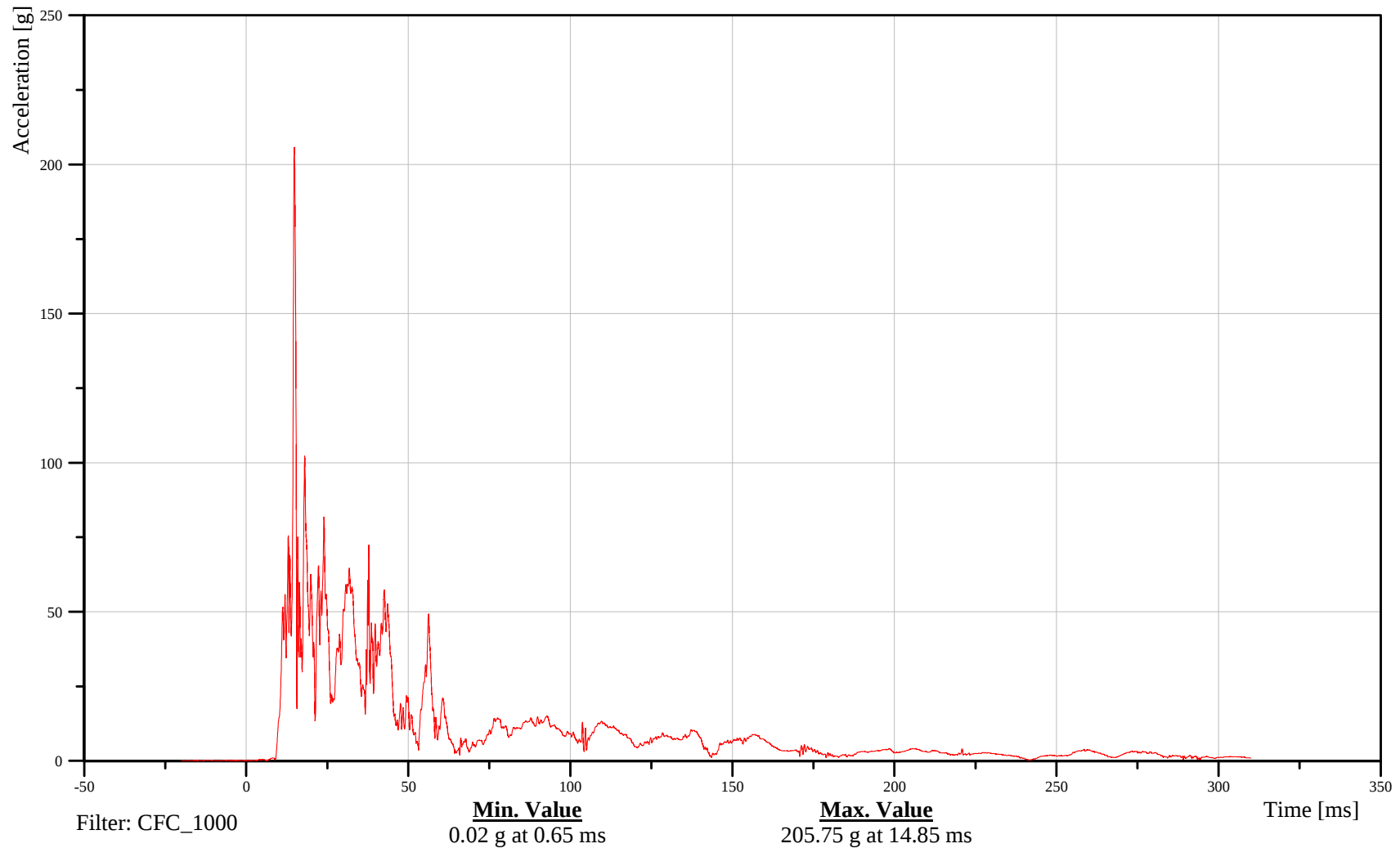
Abdominal Rib 2 Resultant Acceleration

Customer: VRTC

11ABRILE02WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-65

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

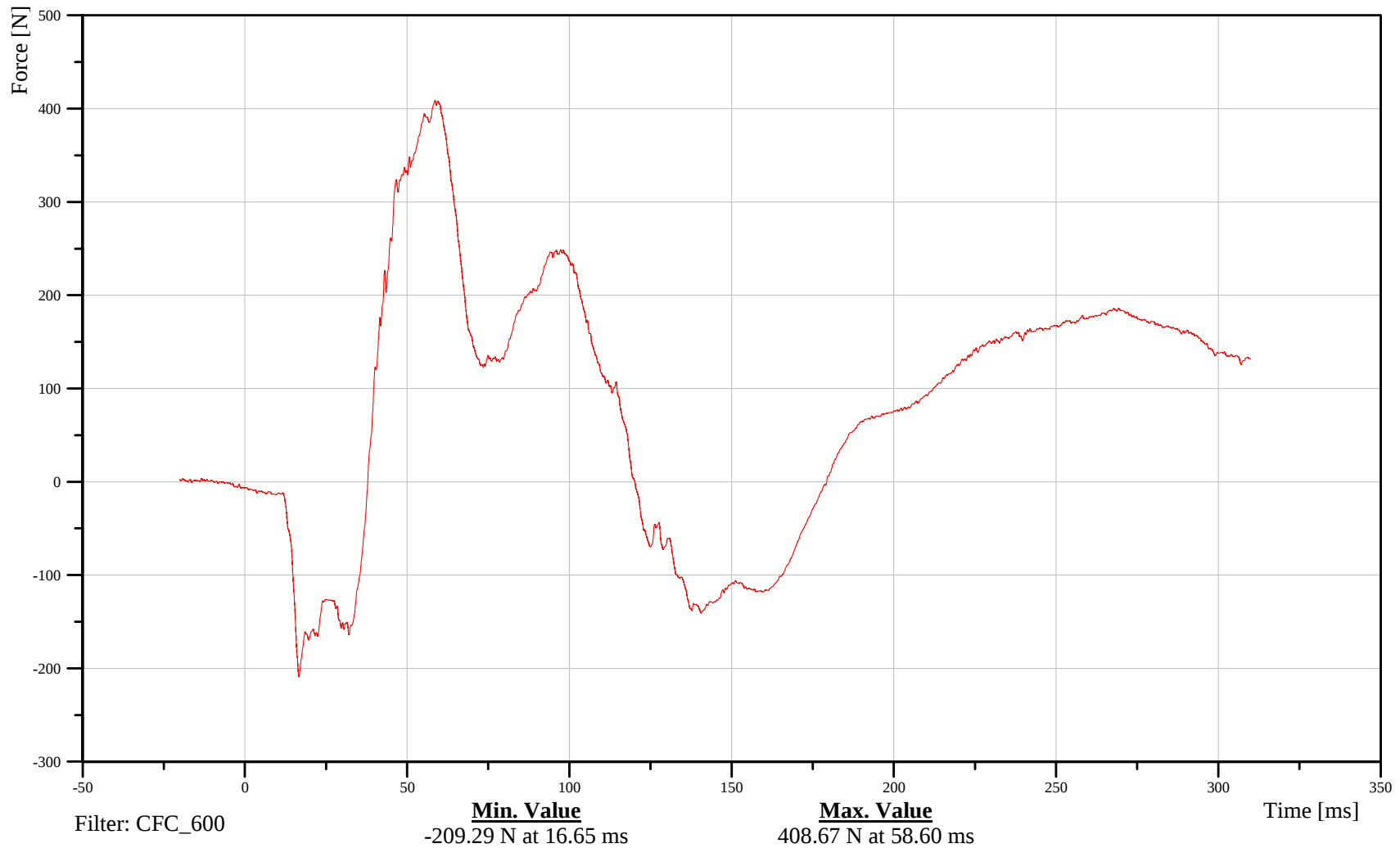
Lumbar X-Axis Force

Customer: VRTC

11LUSP0000WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-66

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

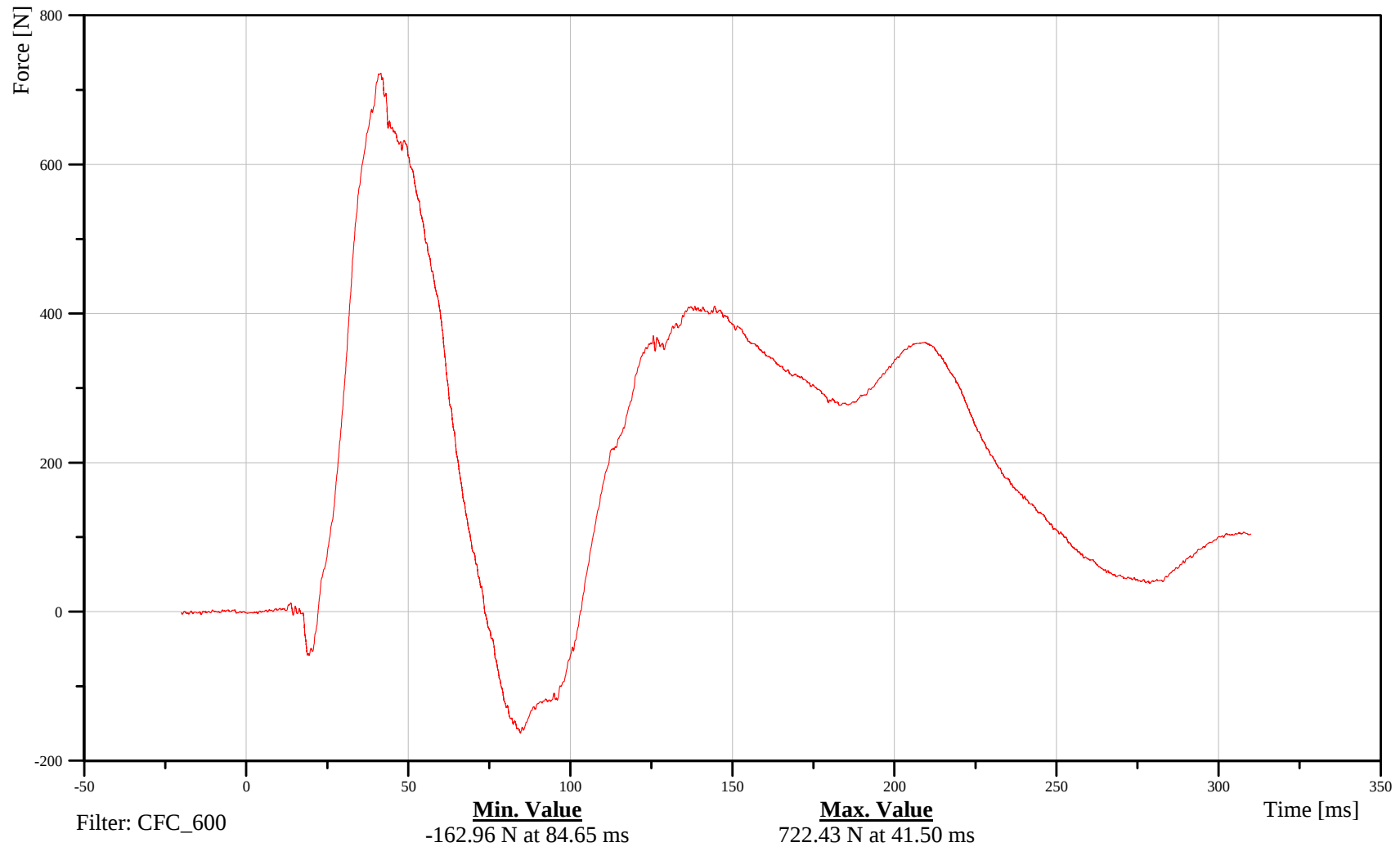
Lumbar Y-Axis Force

Customer: VRTC

11LUSP0000WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-67

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

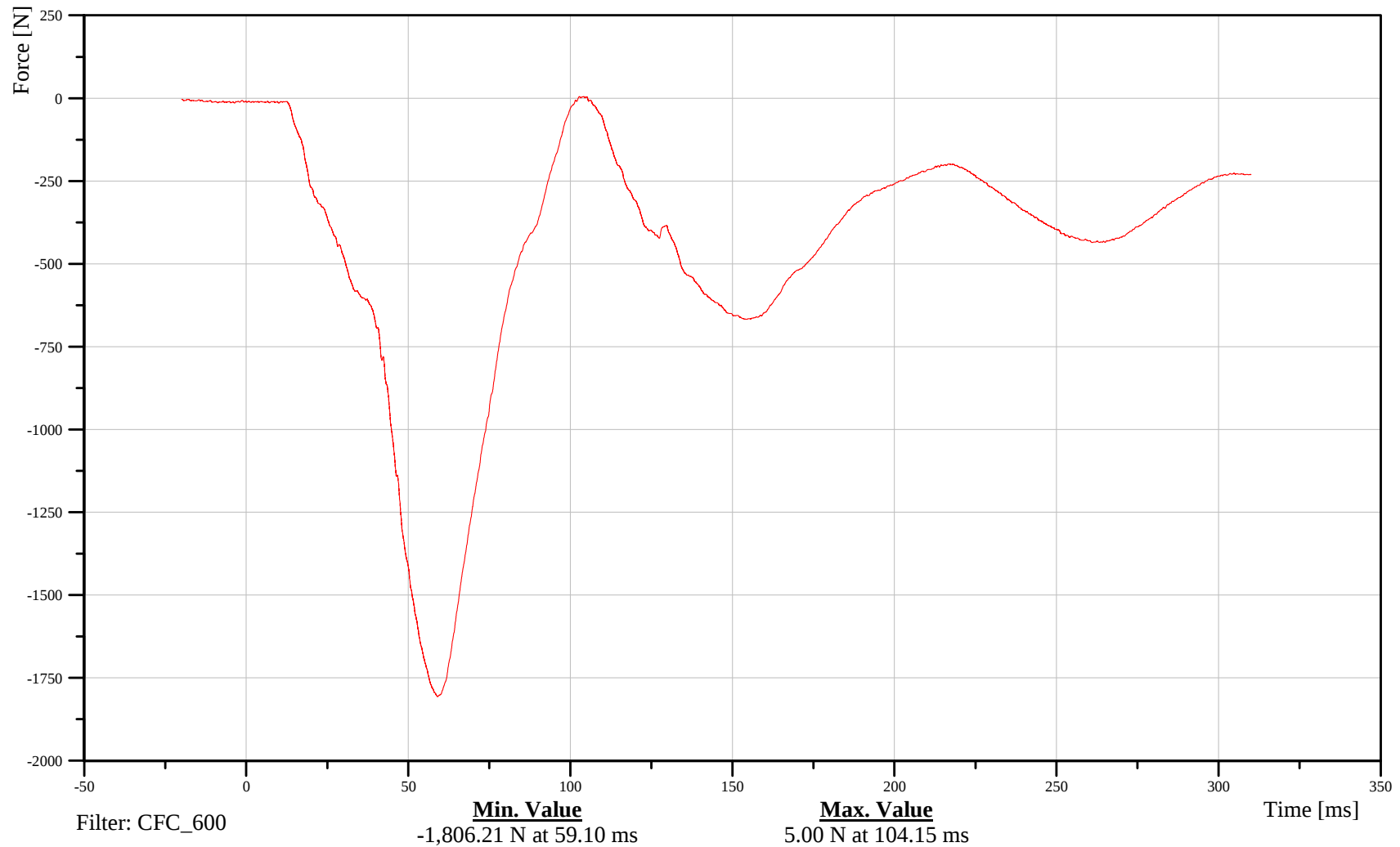
Lumbar Z-Axis Force

Customer: VRTC

11LUSP0000WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-68

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

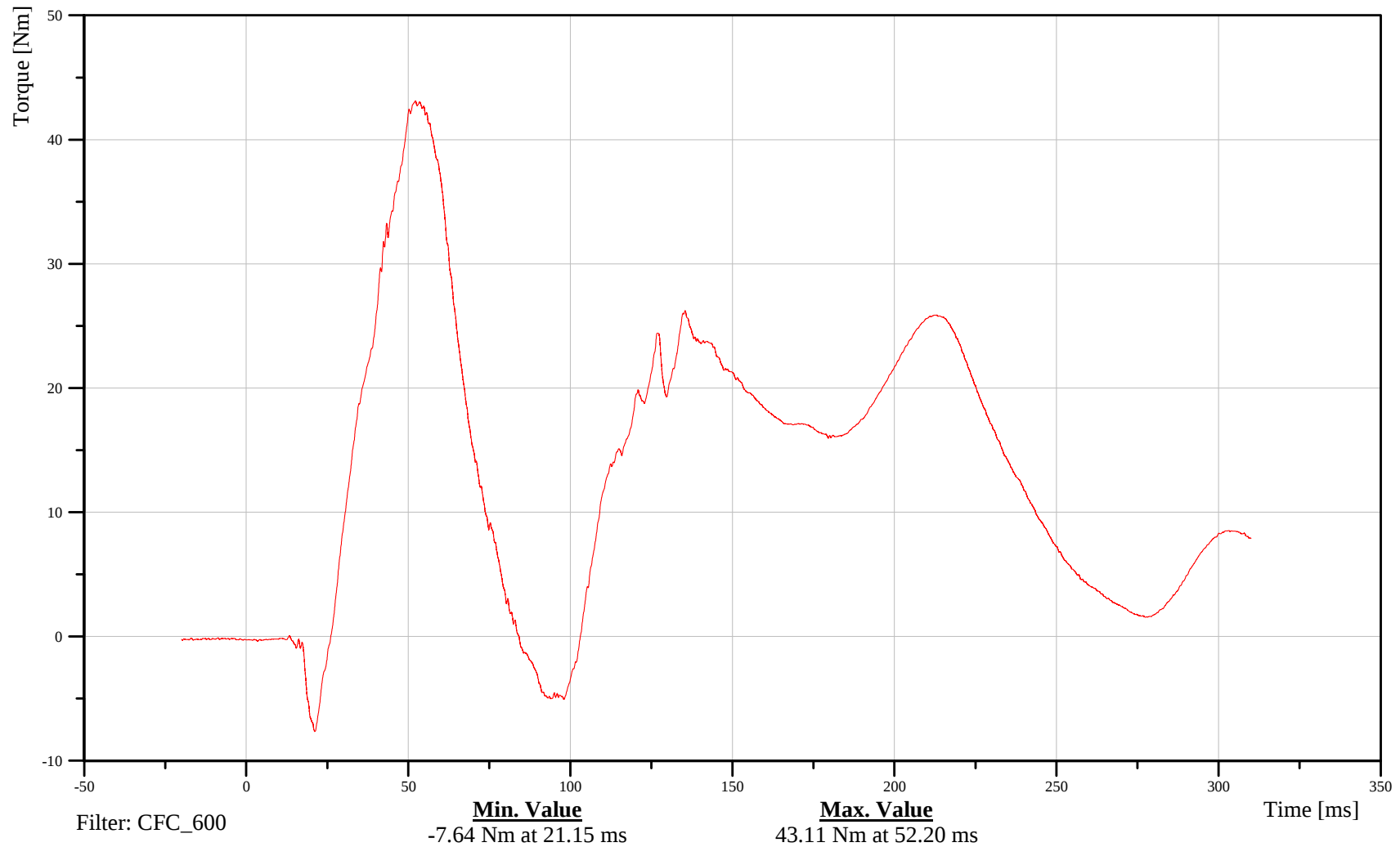
Lumbar Moment About X Axis

Customer: VRTC

11LUSP0000WSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-69

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

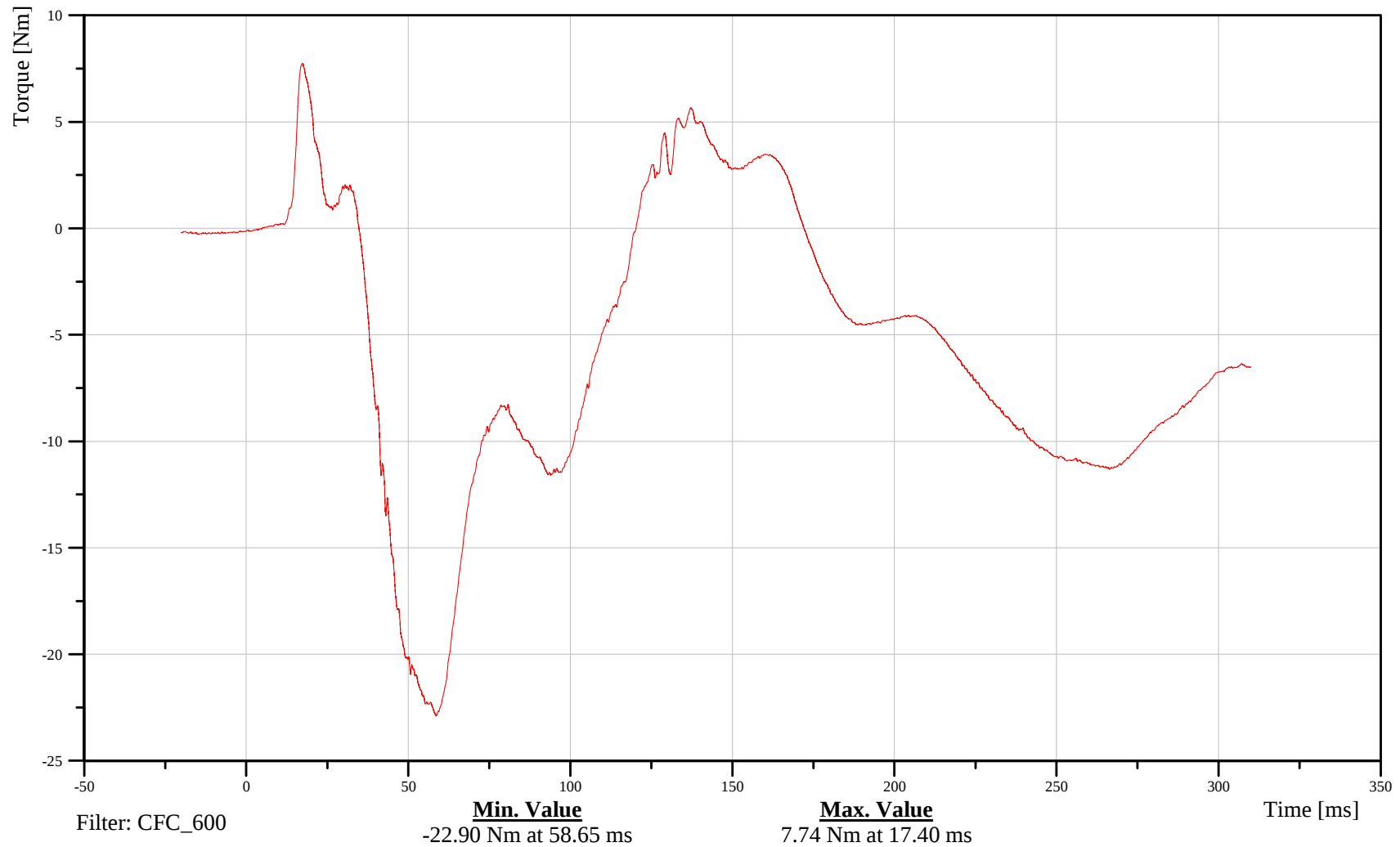
Lumbar Moment About Y Axis

Customer: VRTC

11LUSP0000WSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-70

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

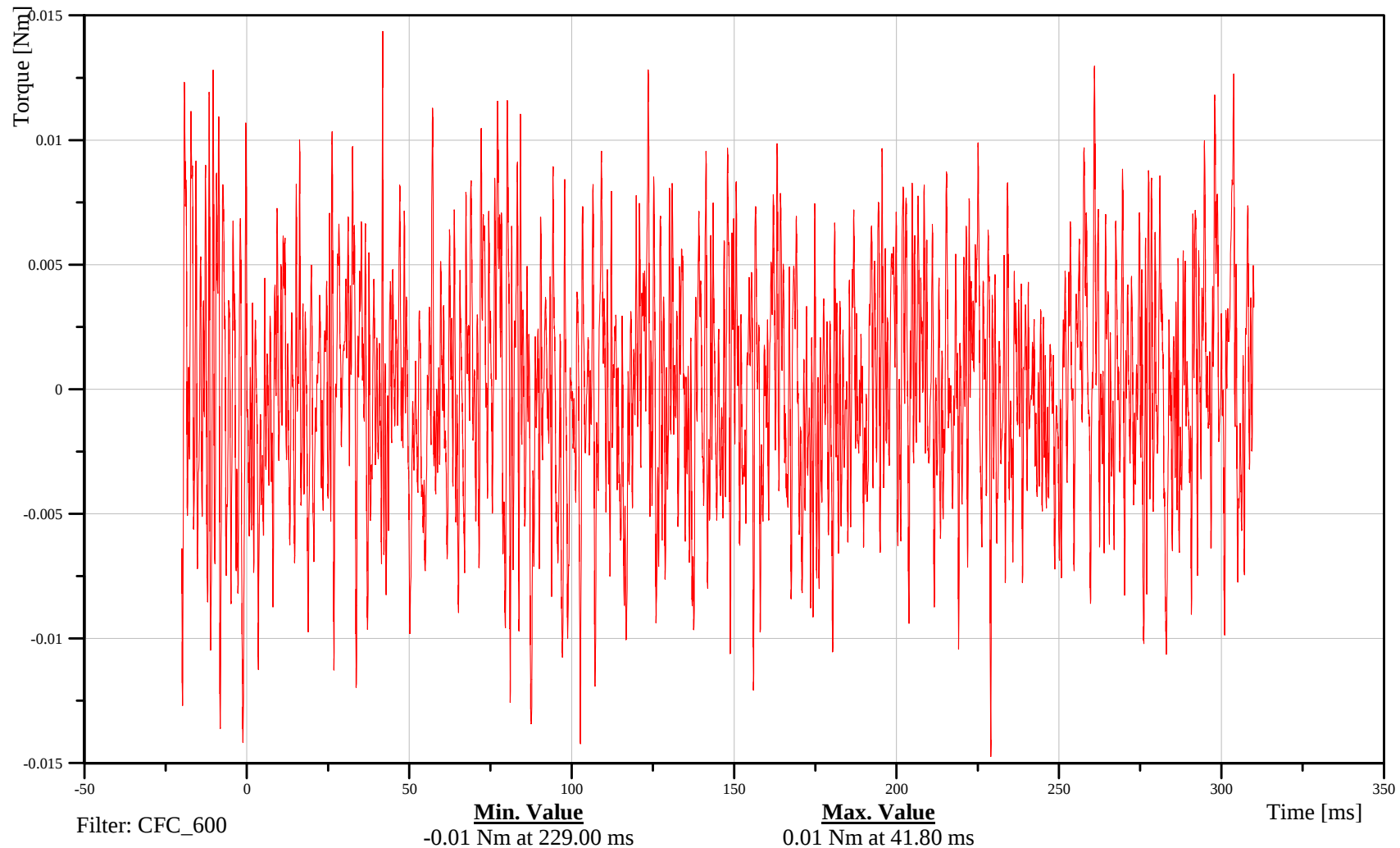
Lumbar Moment About Z Axis

Customer: VRTC

11LUSP0000WSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-71

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

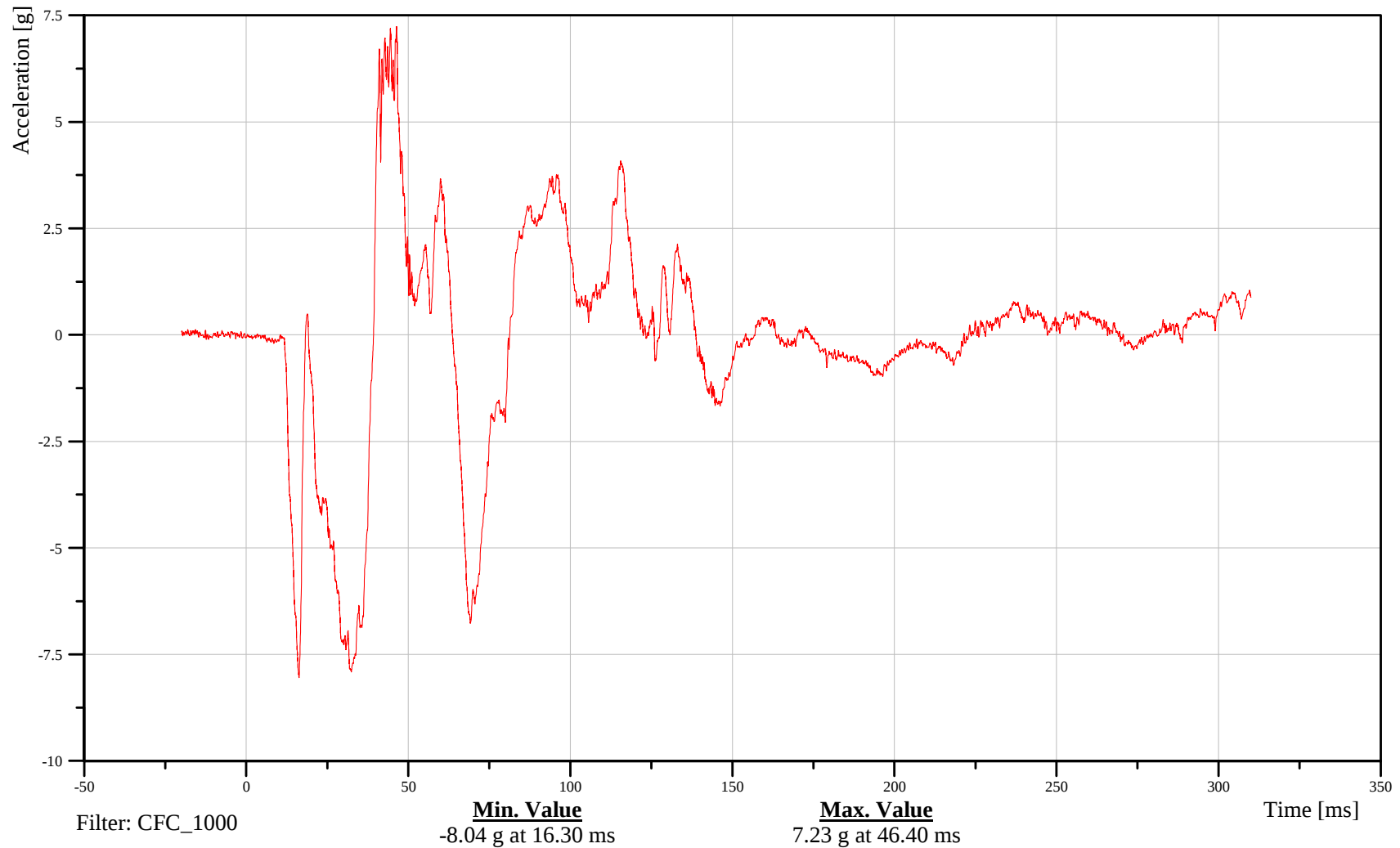
Pelvis X-Axis Acceleration

Customer: VRTC

11PELVCG00WSACXA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-72

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

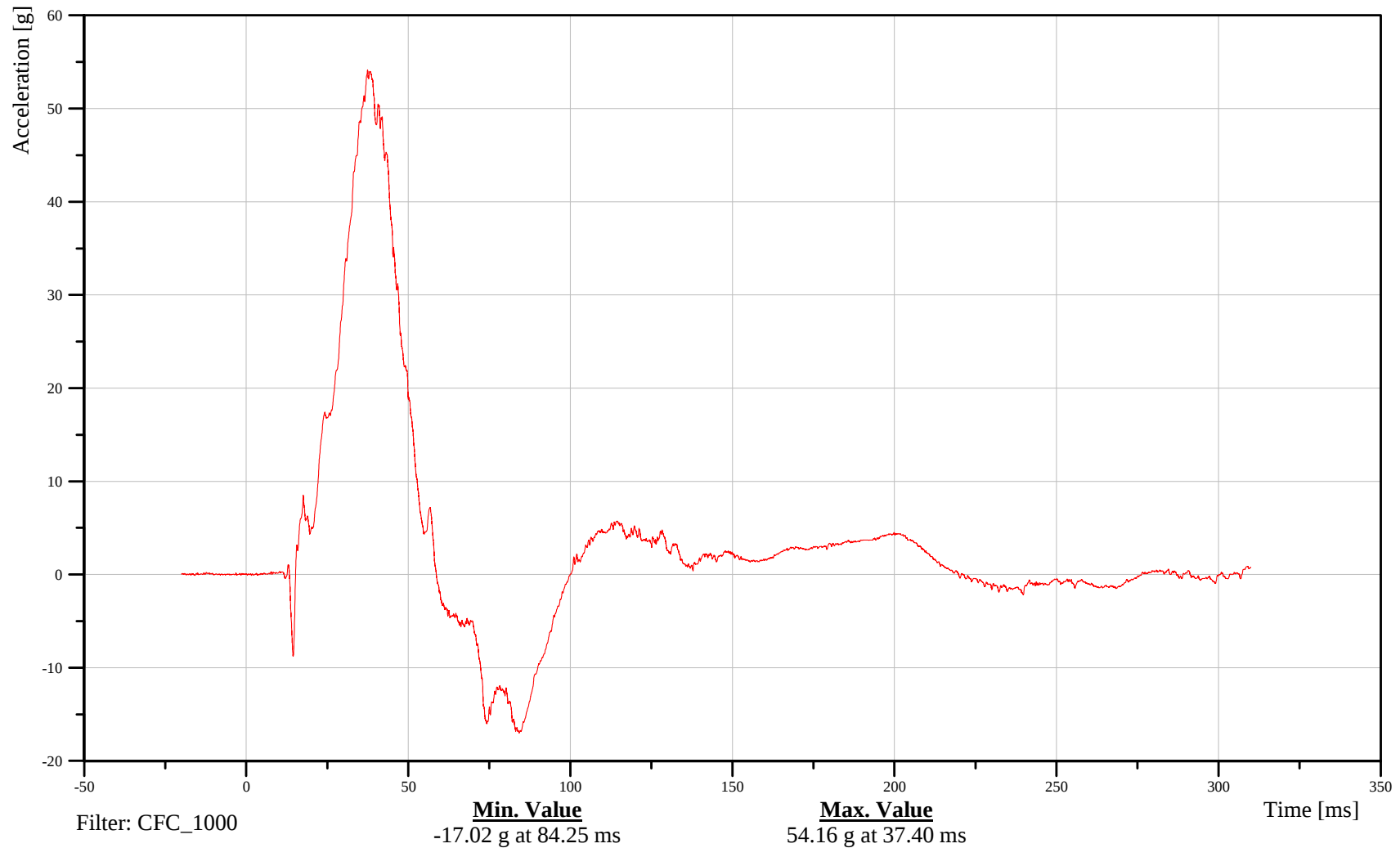
Pelvis Y-Axis Acceleration

Customer: VRTC

11PELVCG00WSACYA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-73

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

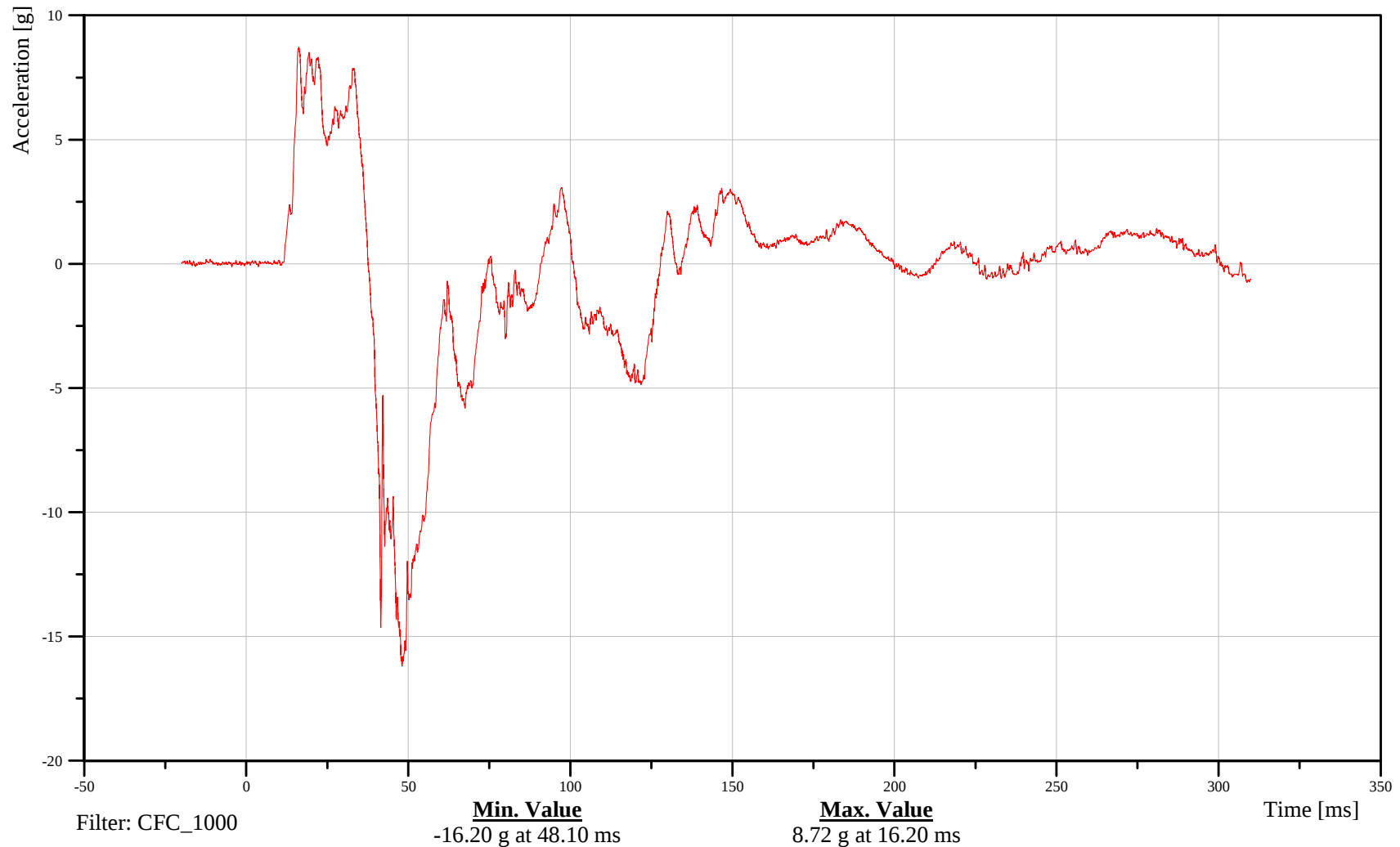
Pelvis Z-Axis Acceleration

Customer: VRTC

11PELVCG00WSACZA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-74

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

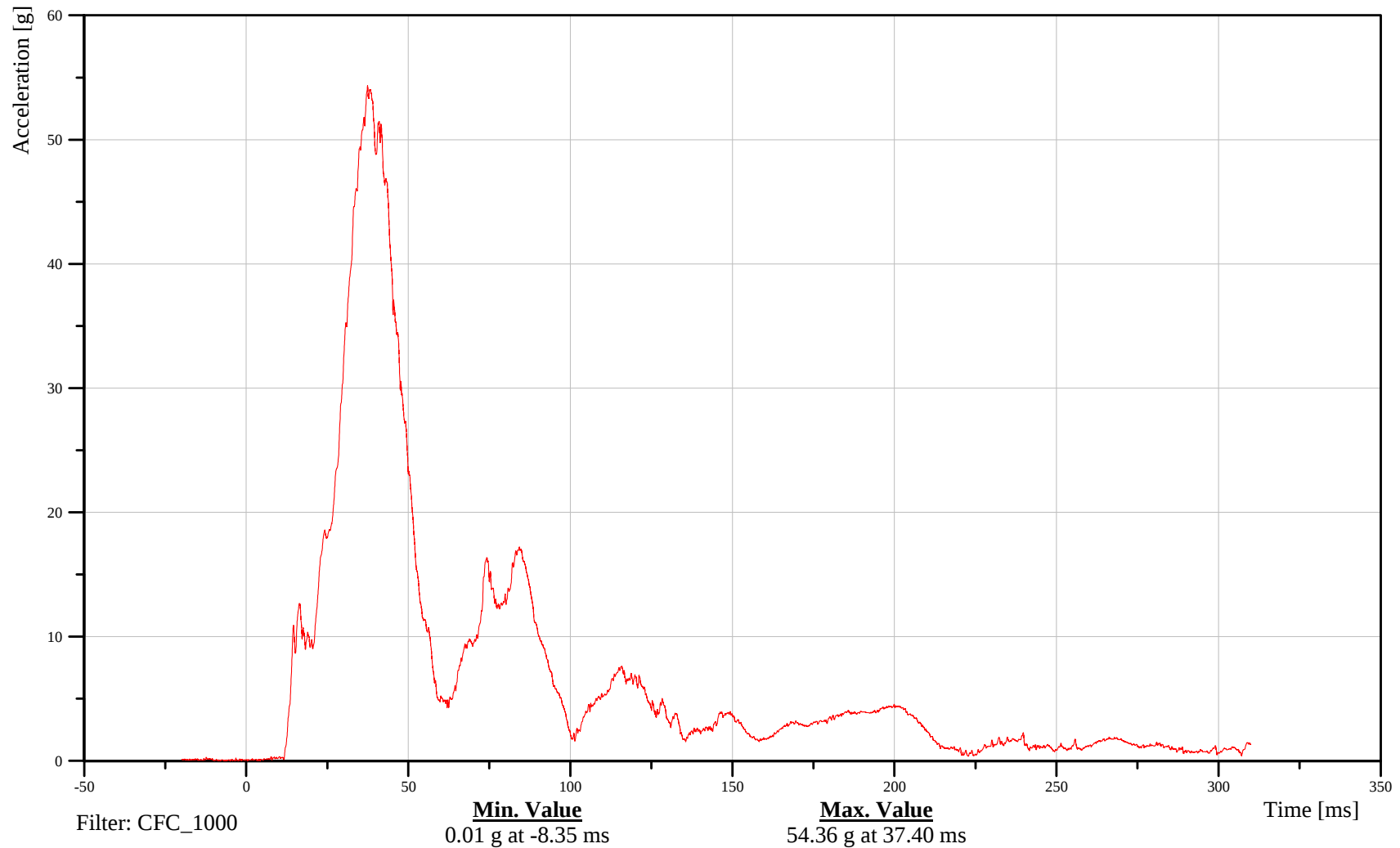
Pelvis Resultant Acceleration

Customer: VRTC

11PELVCG00WSACRA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-75

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

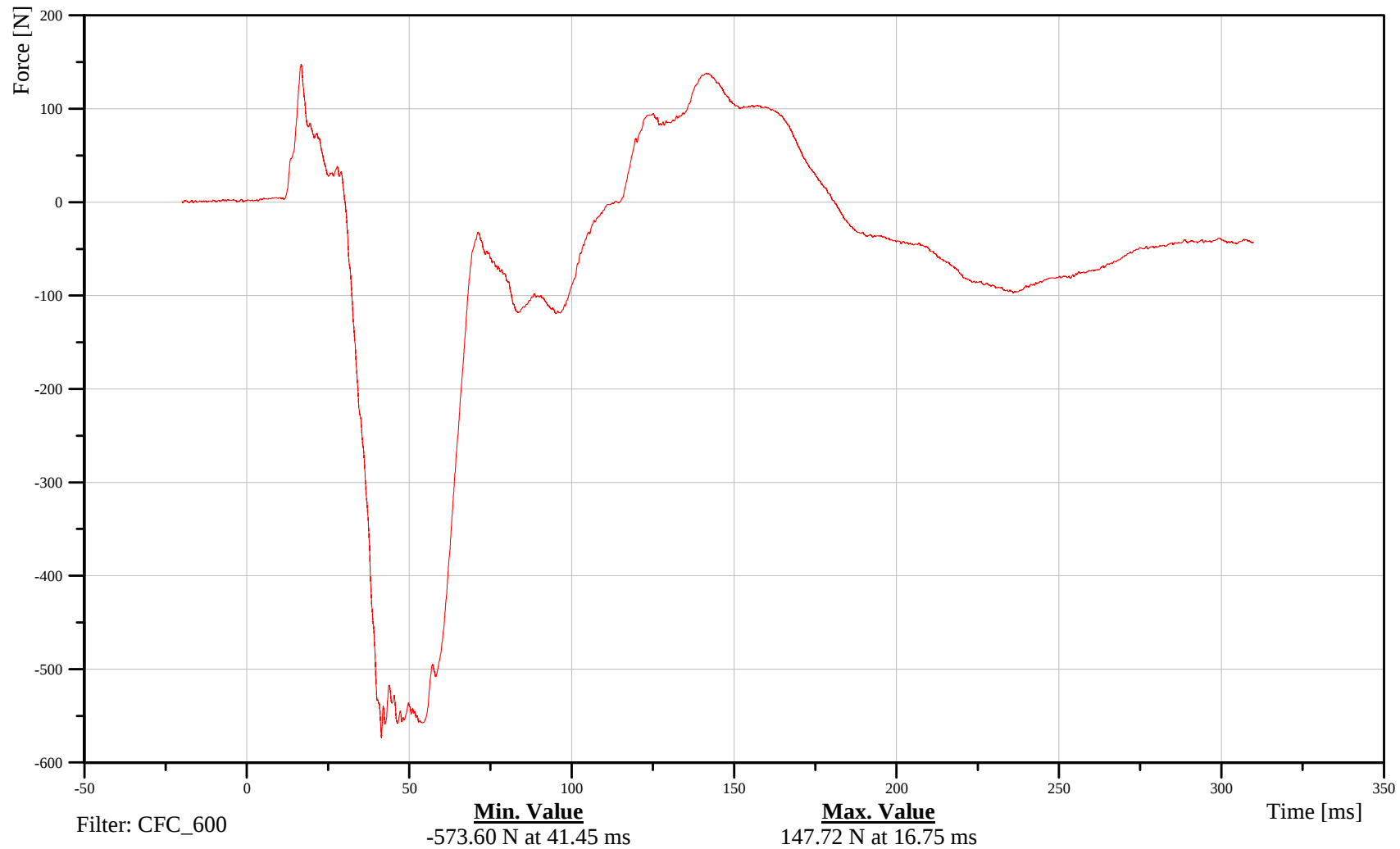
Sacro-Iliac Left X-Axis Force

Customer: VRTC

11SACRLE00WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-76

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

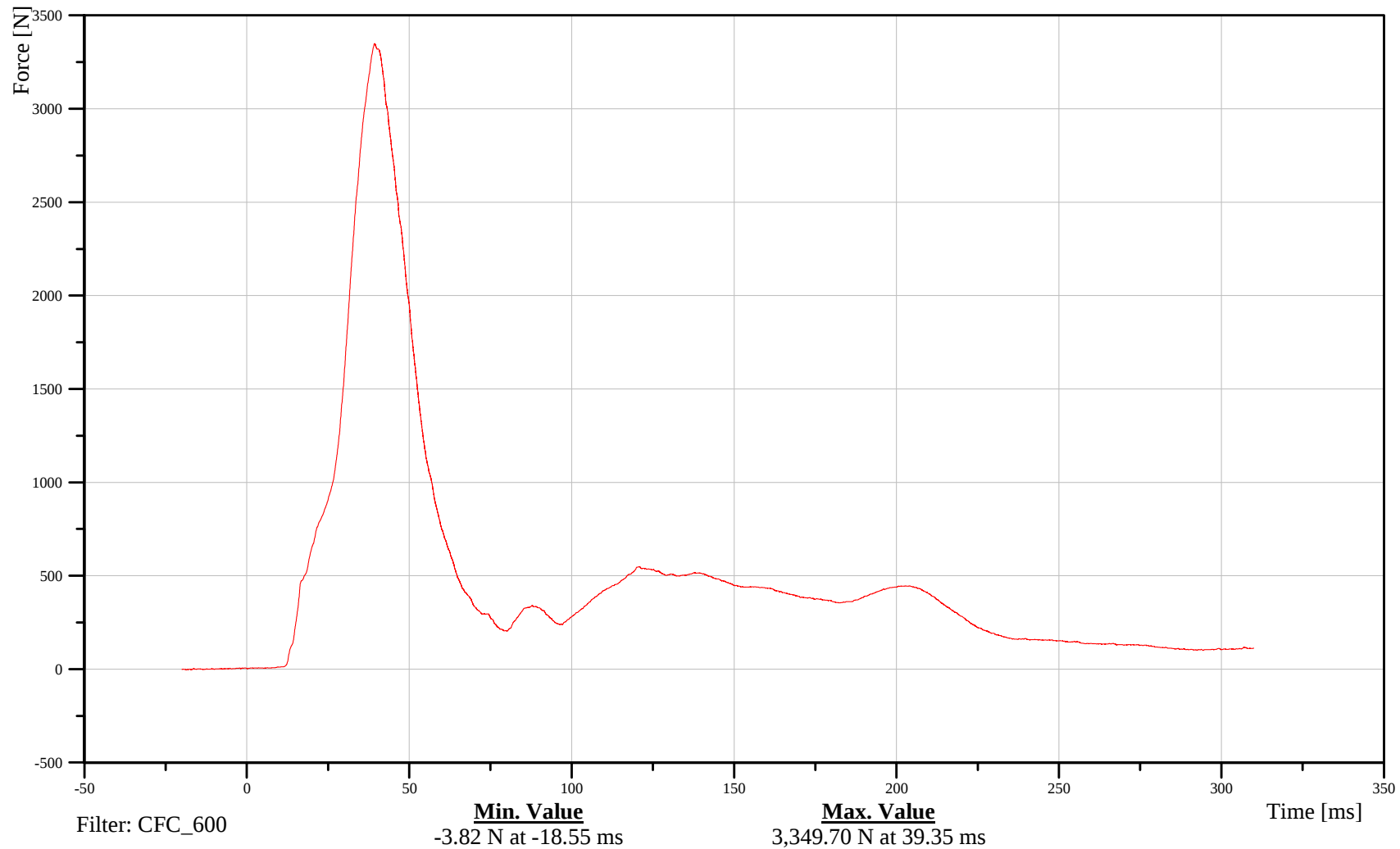
Sacro-Iliac Left Y-Axis Force

Customer: VRTC

11SACRLE00WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-77

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

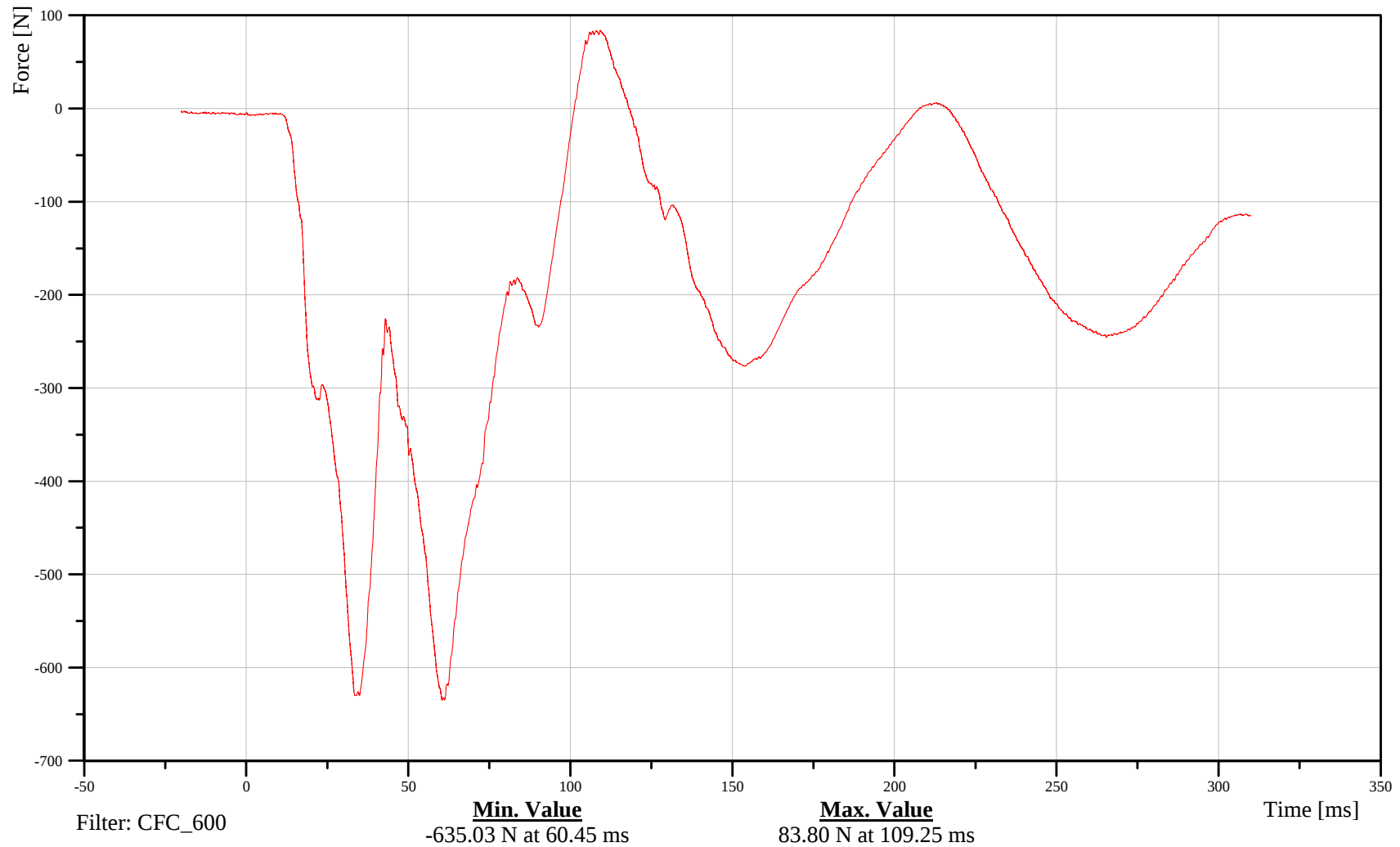
Sacro-Iliac Left Z-Axis Force

Customer: VRTC

11SACRLE00WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-78

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

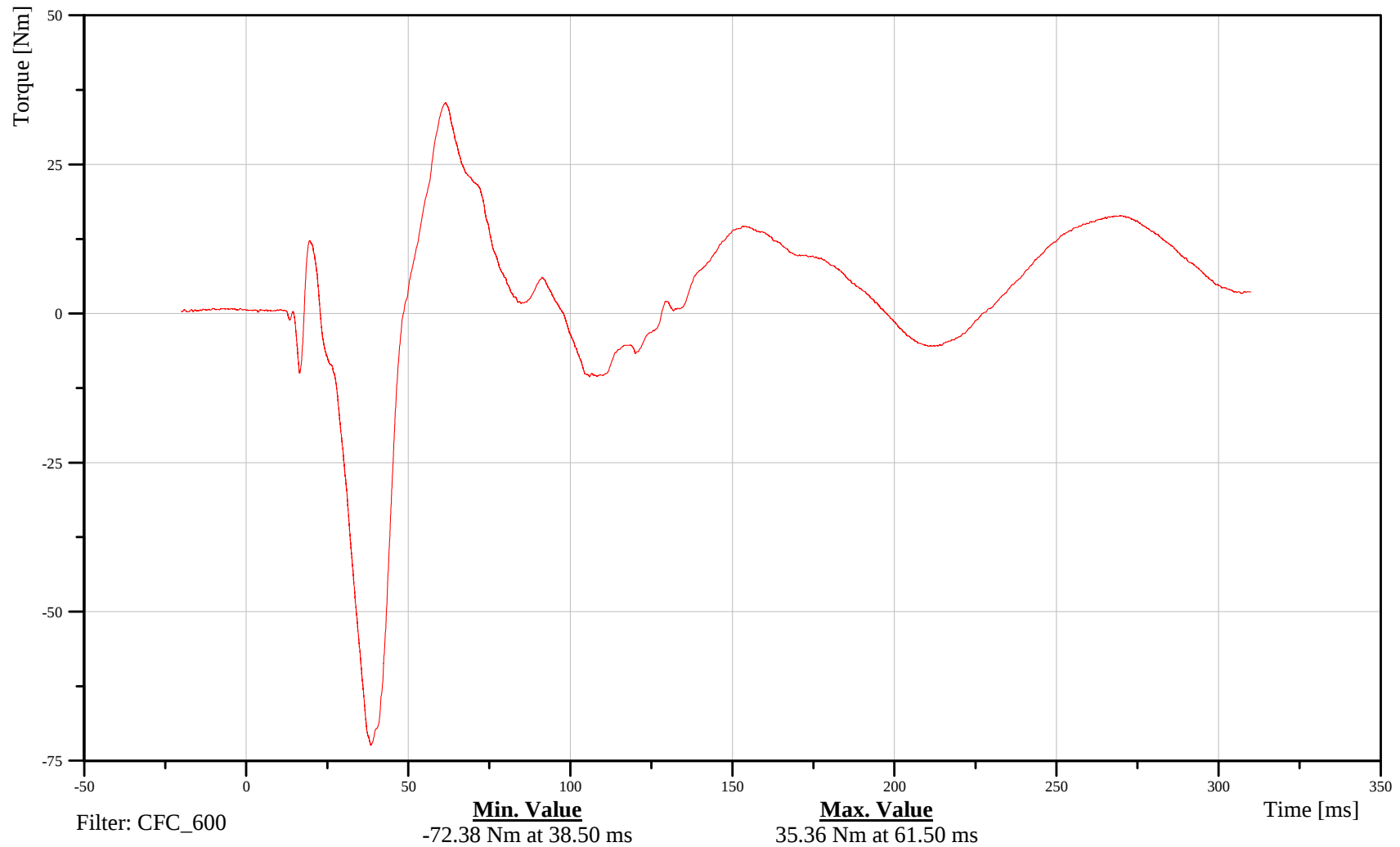
Sacro-Iliac Left Moment About X Axis

Customer: VRTC

11SACRLE00WSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-79

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

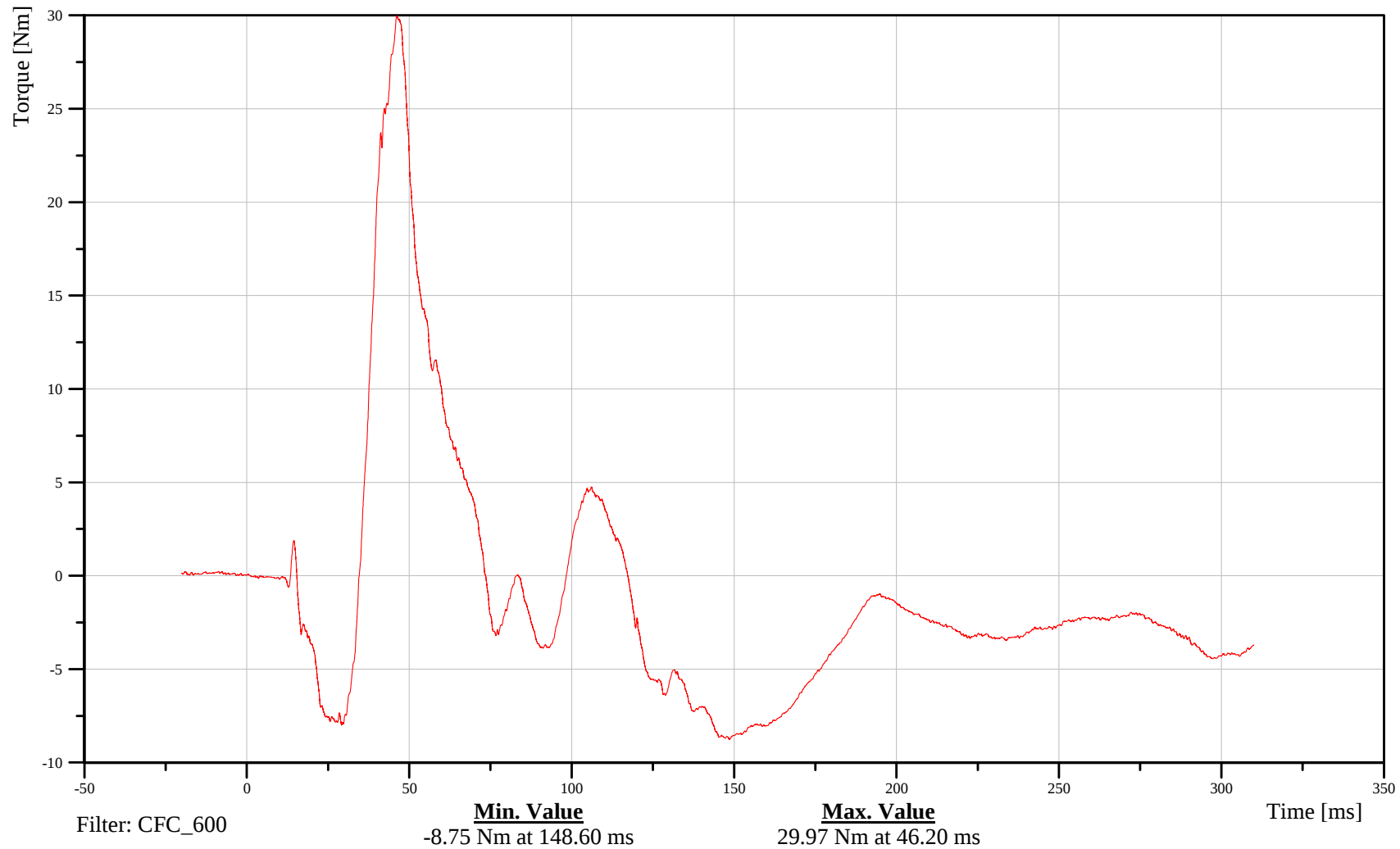
Sacro-Iliac Left Moment About Y Axis

Customer: VRTC

11SACRLE00WSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-80

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

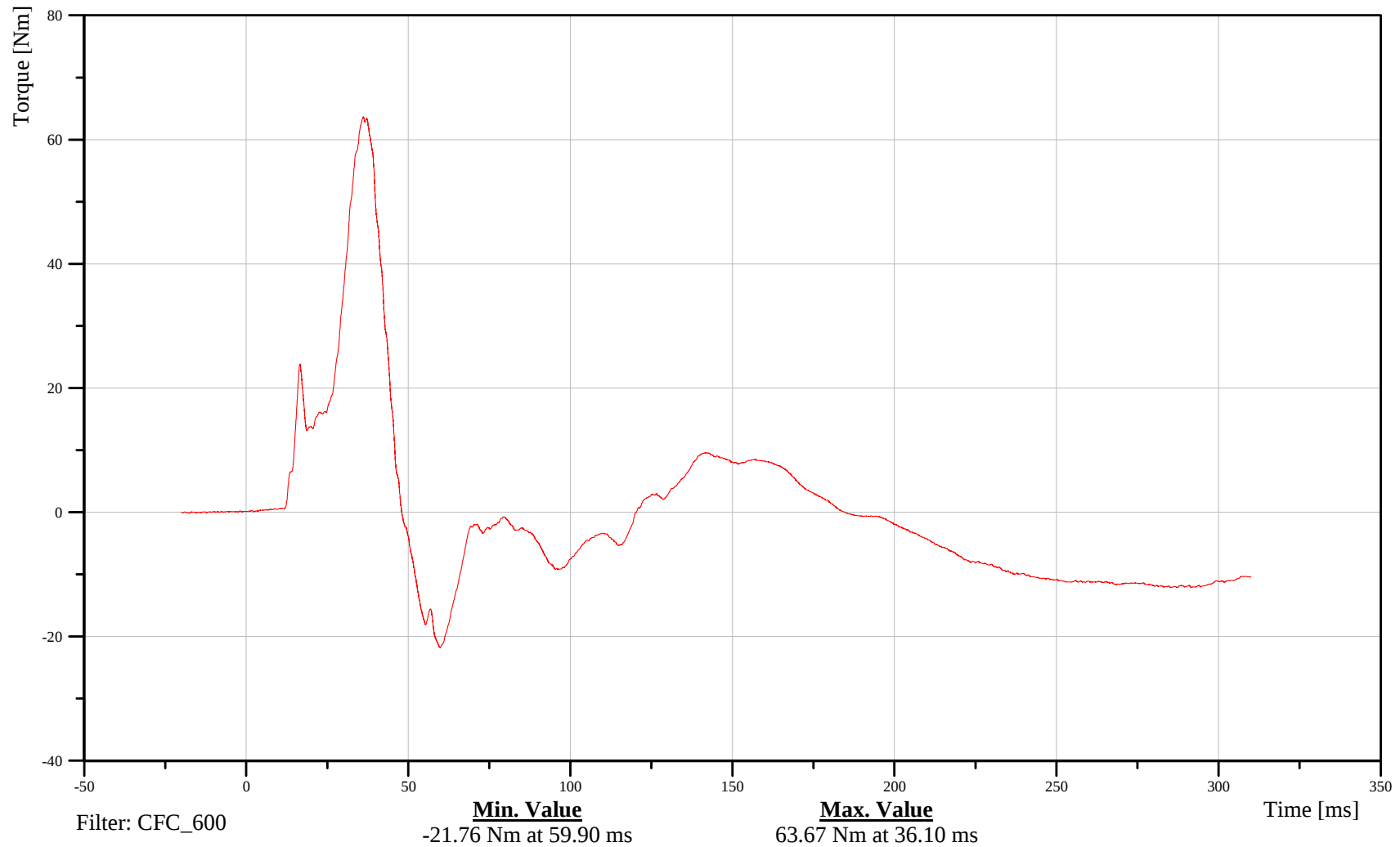
Sacro-Iliac Left Moment About Z Axis

Customer: VRTC

11SACRLE00WSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-81

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

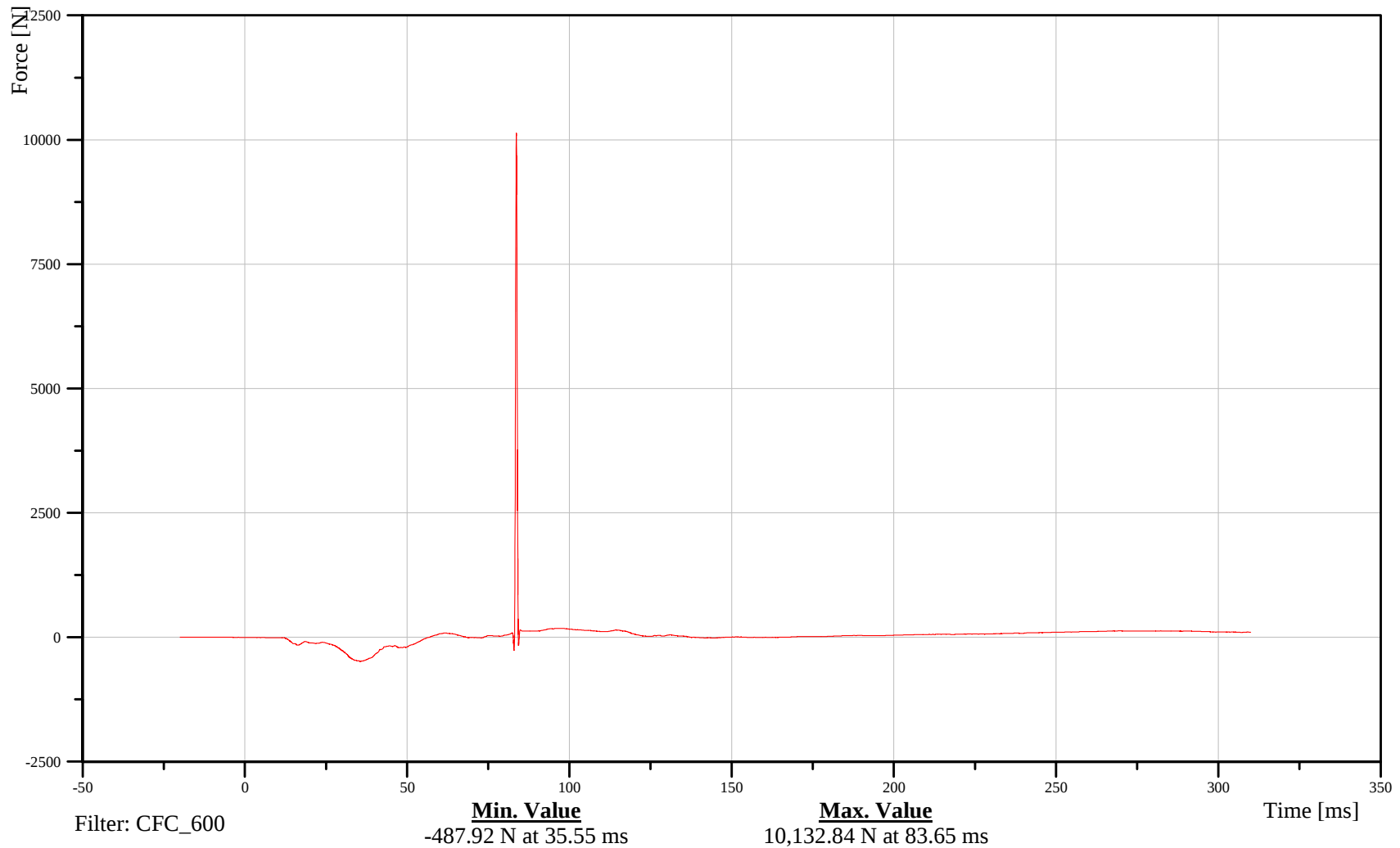
Sacro-Iliac Right X-Axis Force

Customer: VRTC

11SACRRI00WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-82

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

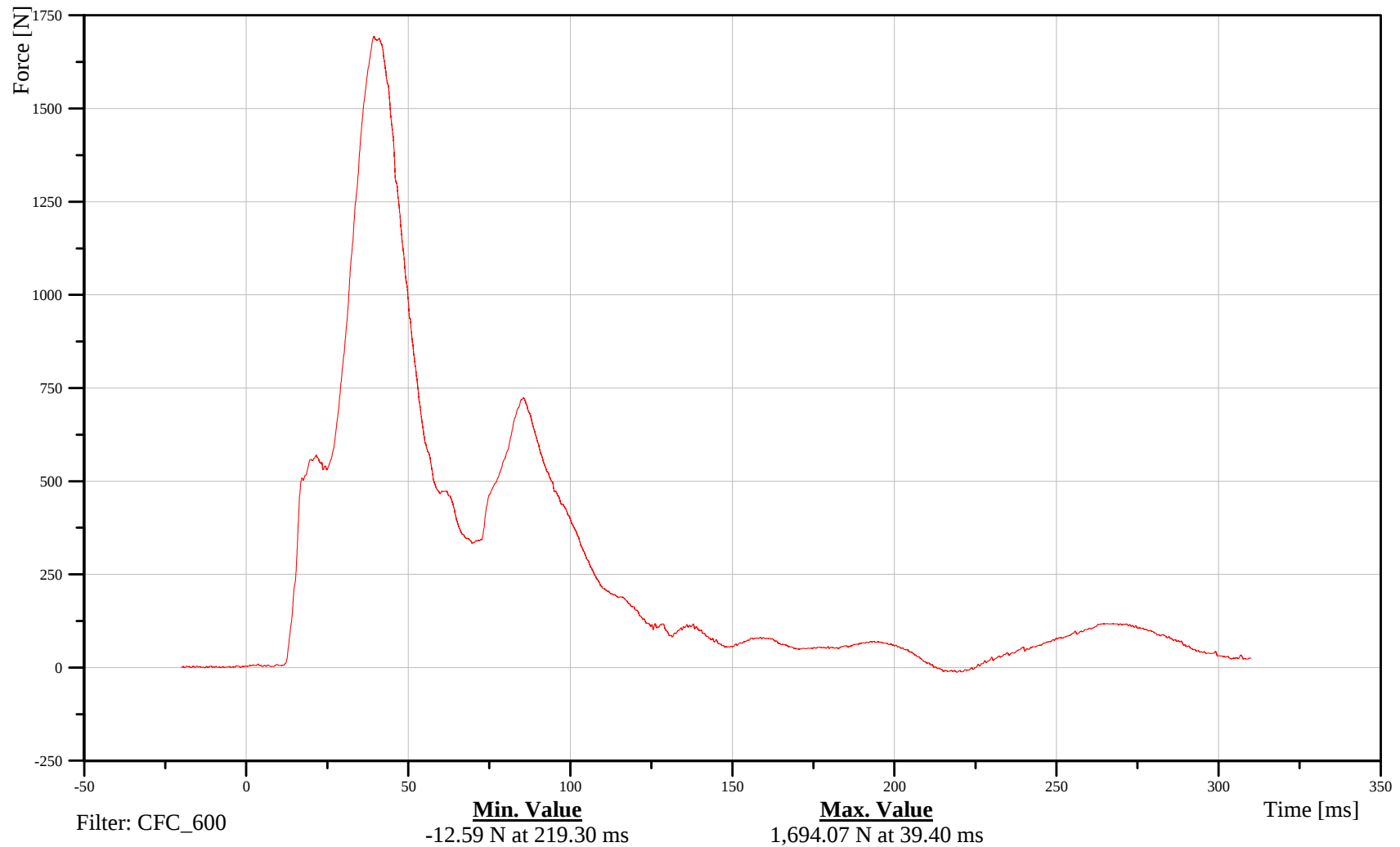
Sacro-Iliac Right Y-Axis Force

Customer: VRTC

11SACRRI00WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-83

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

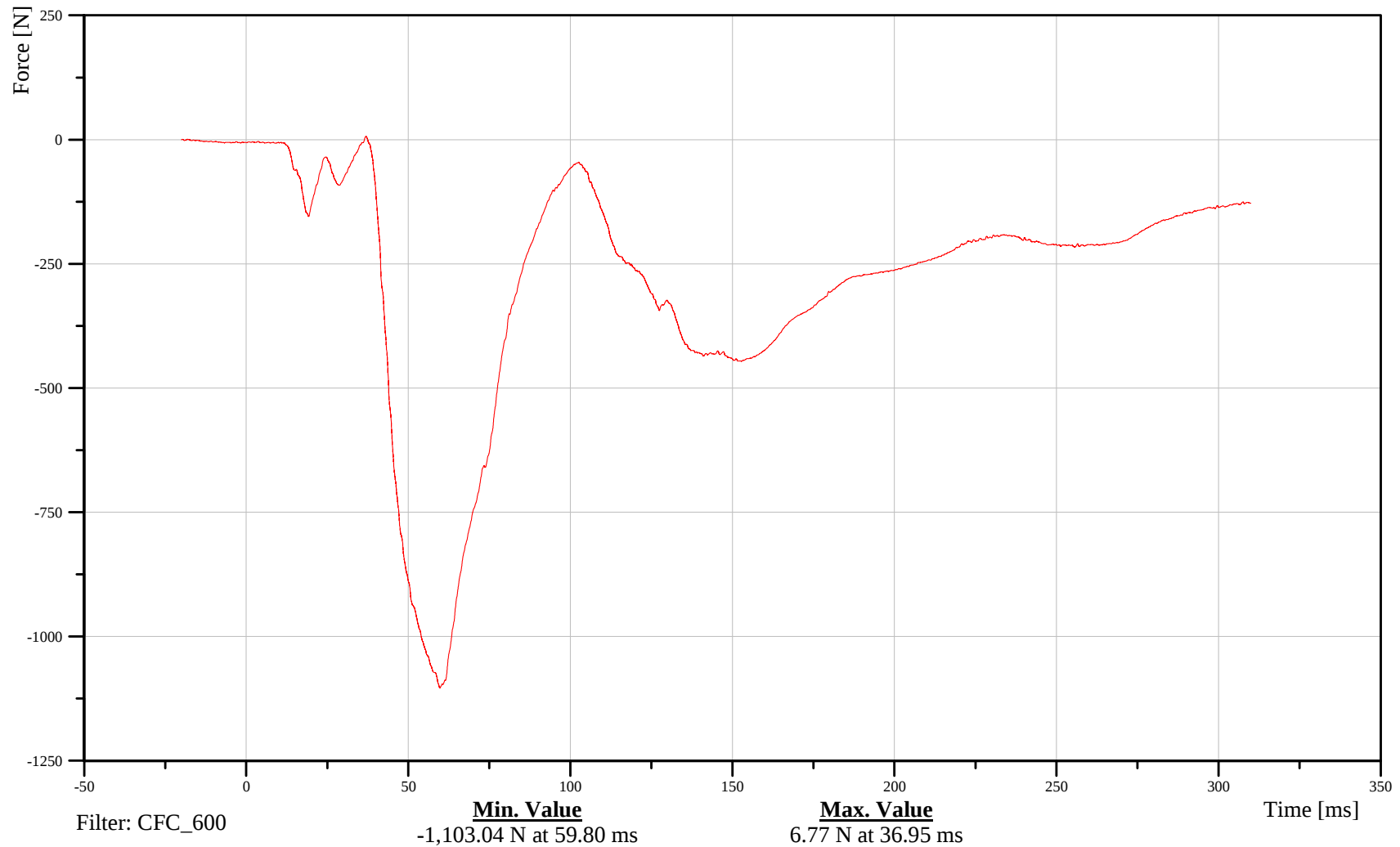
Sacro-Iliac Right Z-Axis Force

Customer: VRTC

11SACRRI00WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-84

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

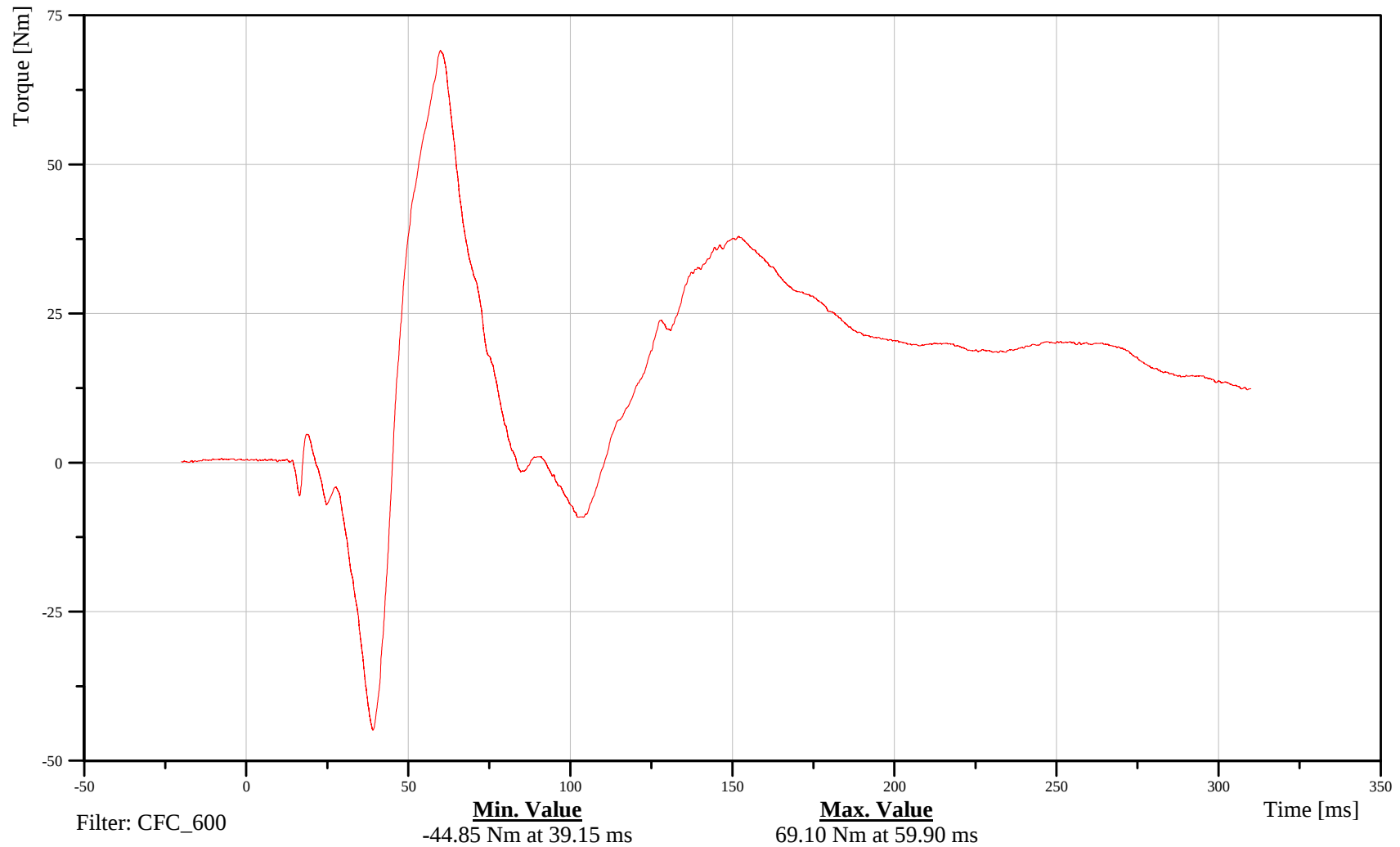
Sacro-Iliac Right Moment About X Axis

Customer: VRTC

11SACRRI00WSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-85

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

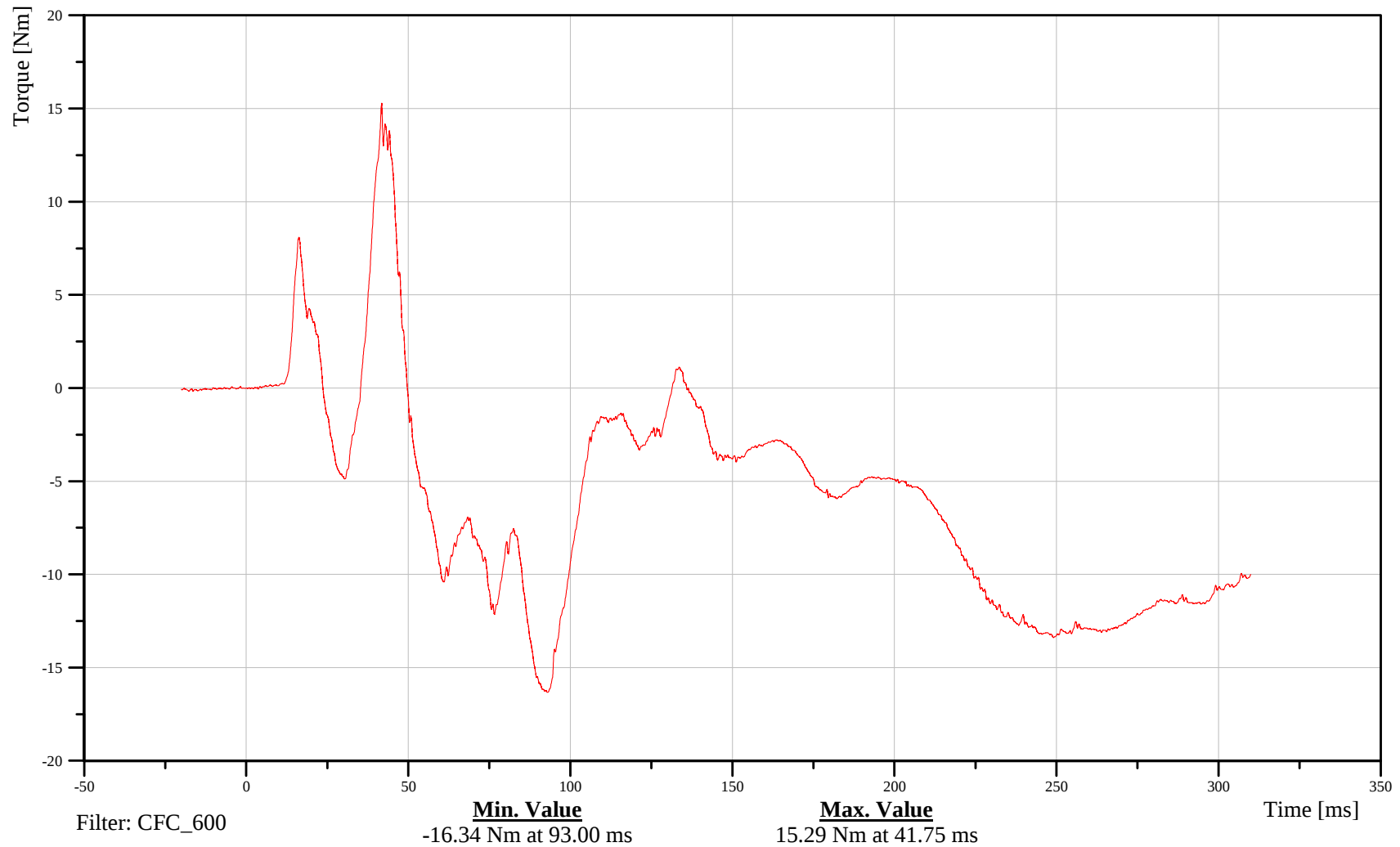
Sacro-Iliac Right Moment About Y Axis

Customer: VRTC

11SACRRI00WSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-86

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

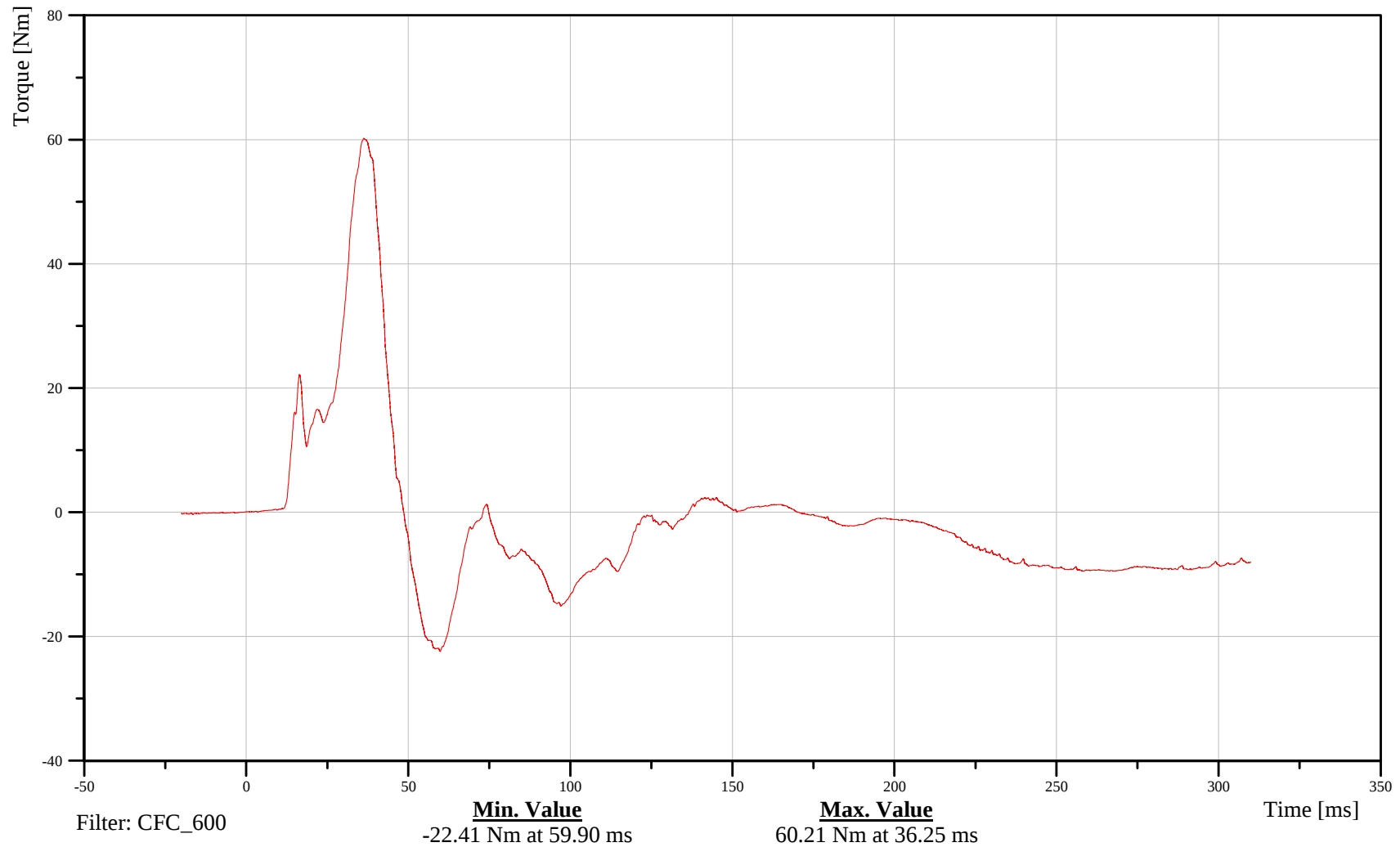
Sacro-Iliac Right Moment About Z Axis

Customer: VRTC

11SACRRI00WSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-87

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

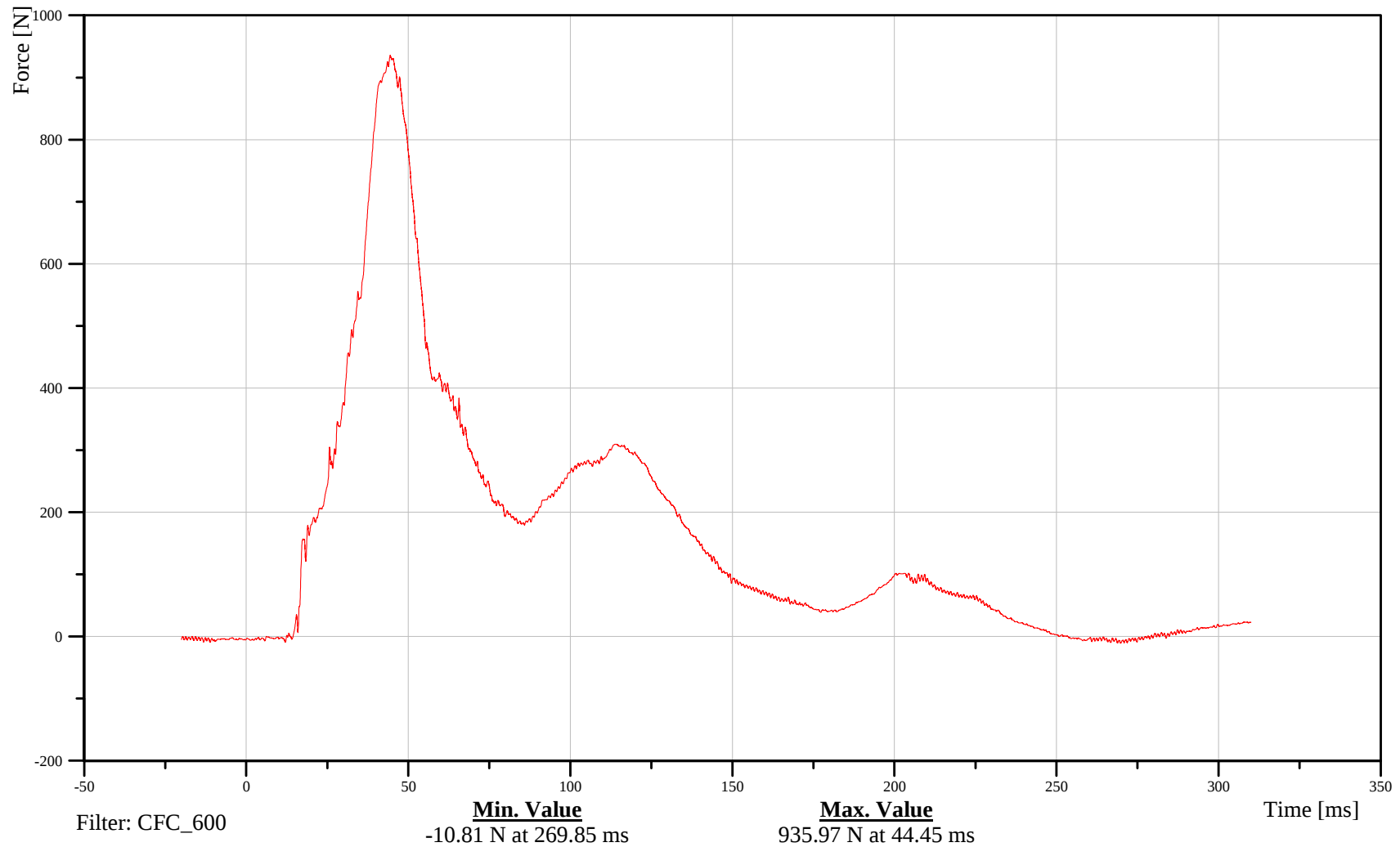
Pubic Symphysis Y-Axis Force

Customer: VRTC

11PUBC0000WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-88

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

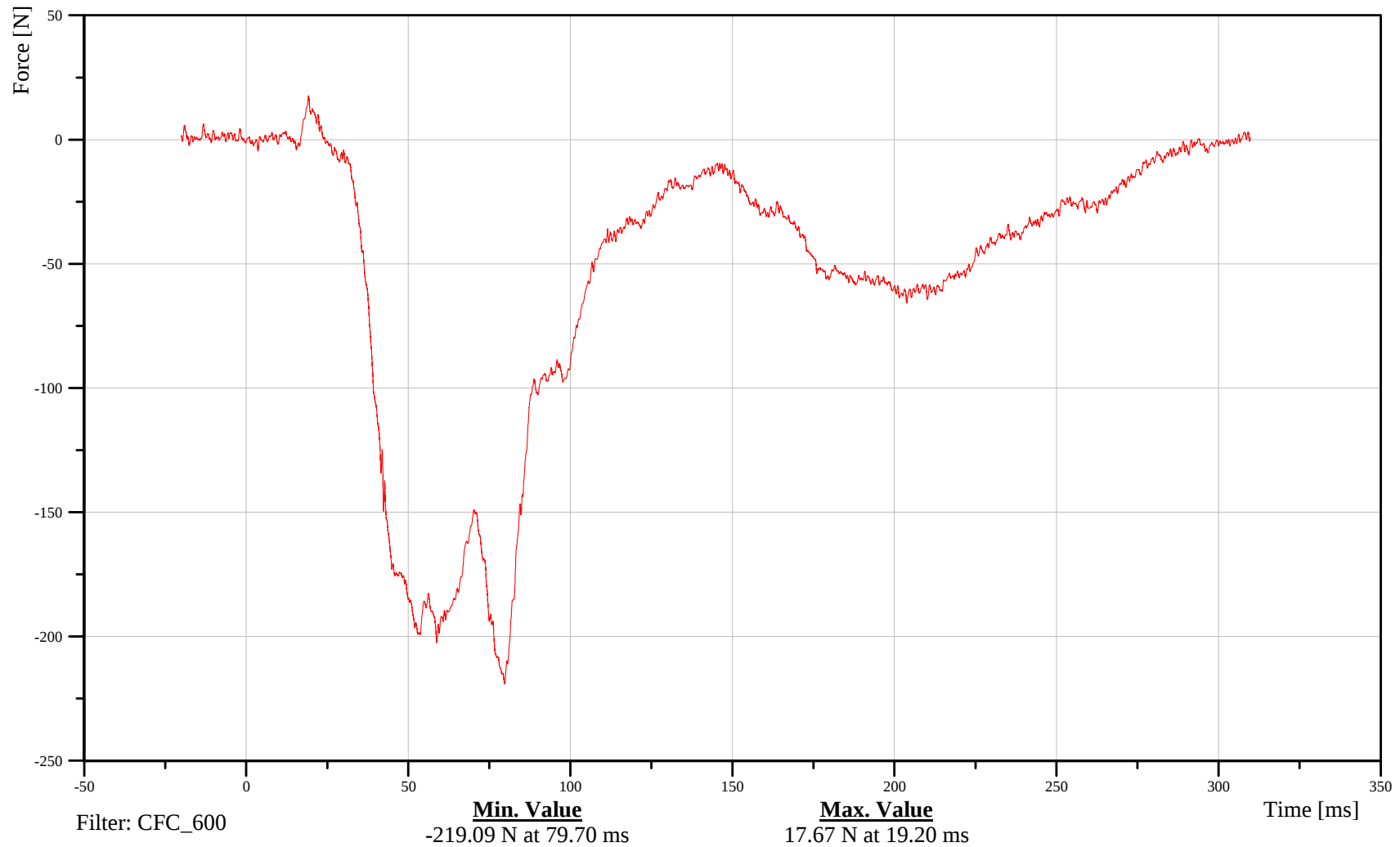
Left Mid Femur X-Axis Force

Customer: VRTC

11FEMRLEMIWSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-89

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

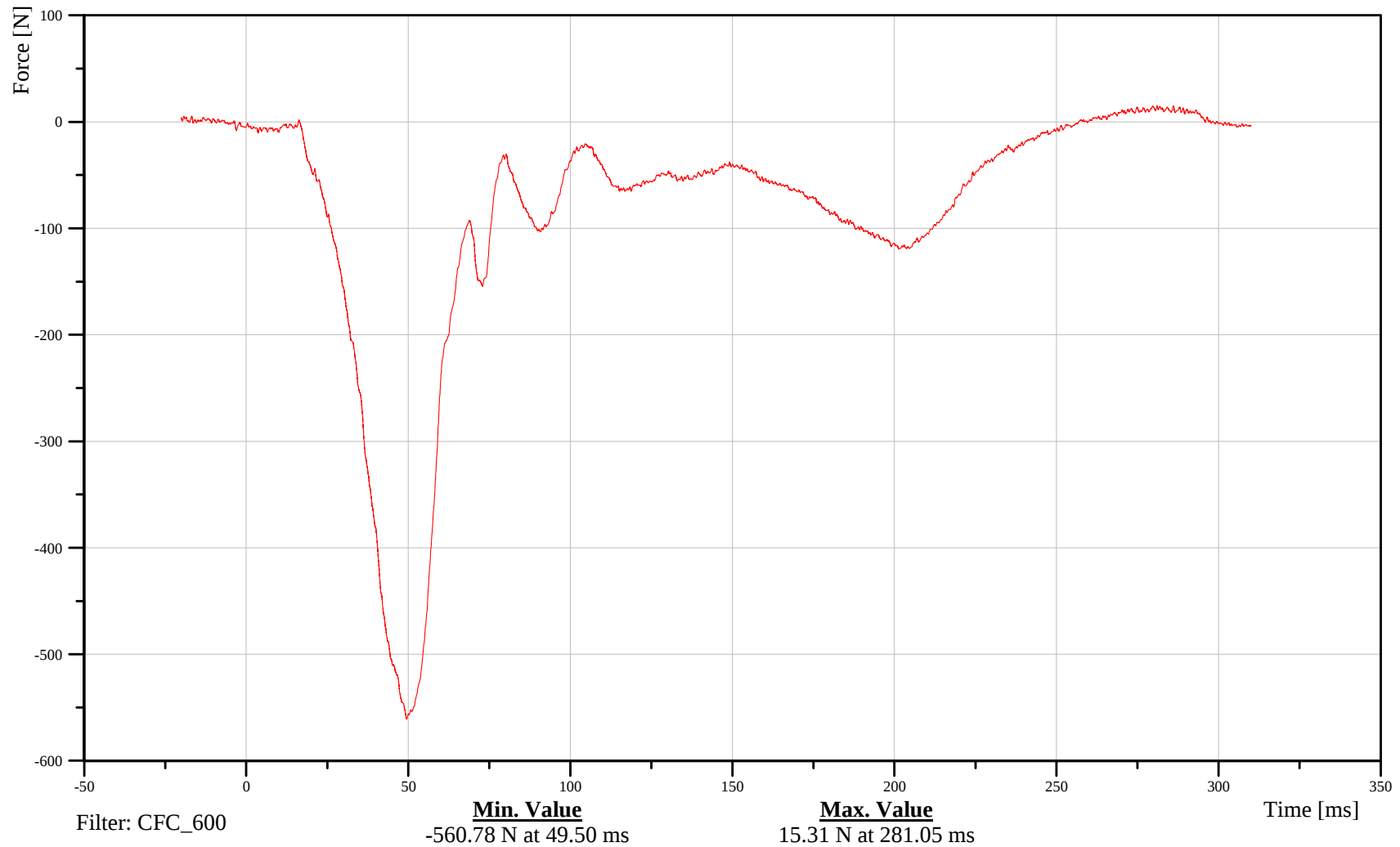
Left Mid Femur Y-Axis Force

Customer: VRTC

11FEMRLEMIWSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-90

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

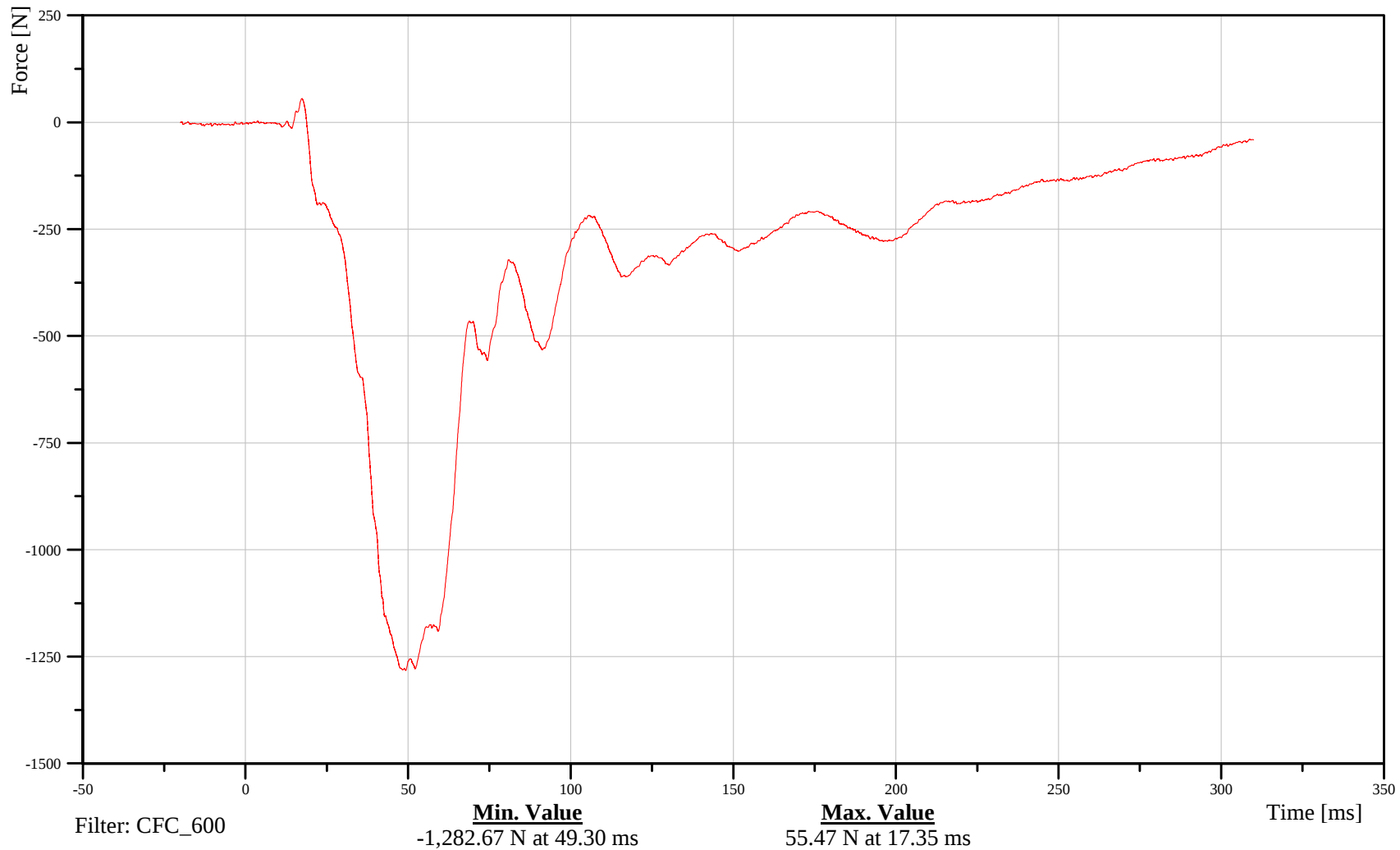
Left Mid Femur Z-Axis Force

Customer: VRTC

11FEMRLEMIWSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-91

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

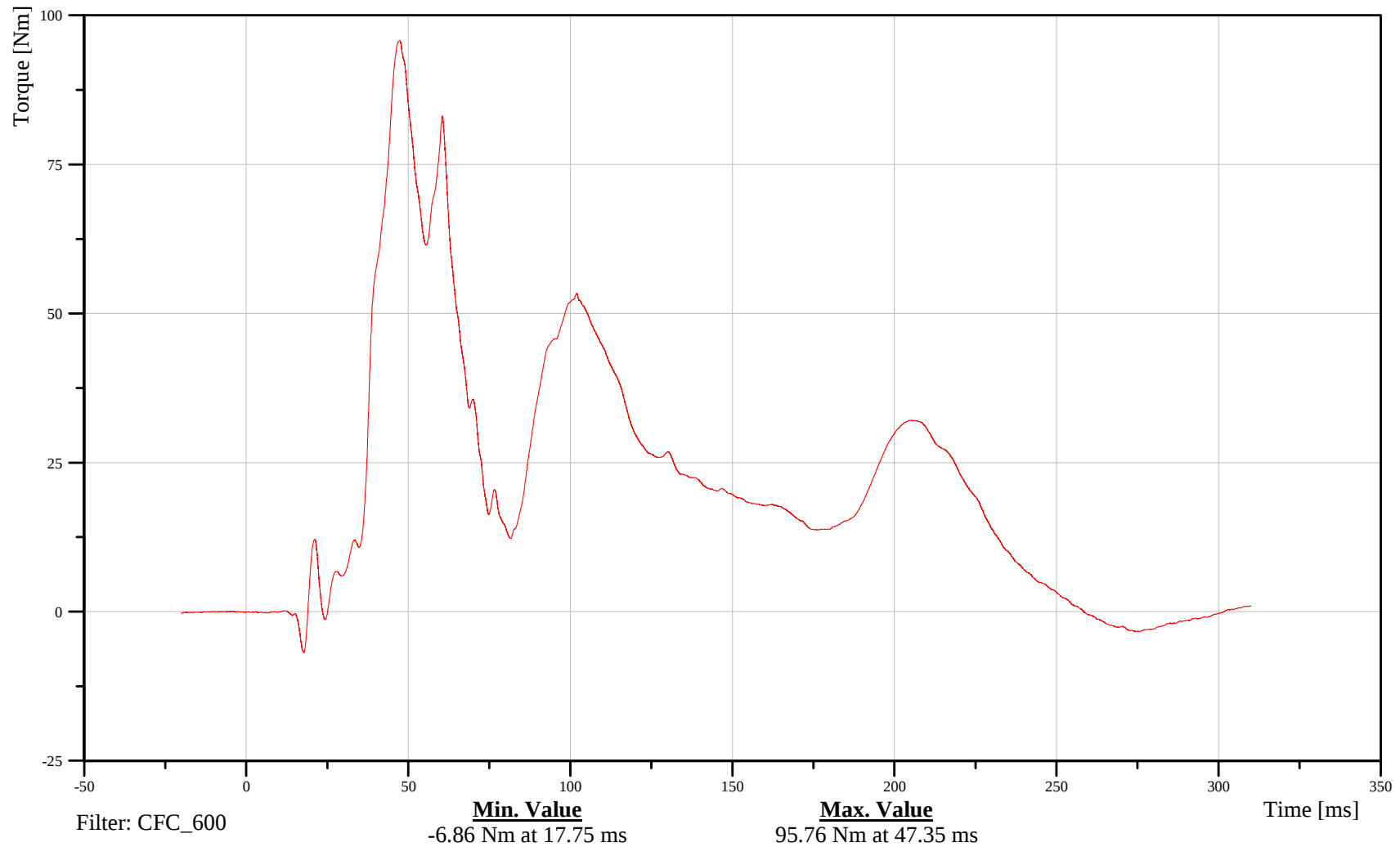
Left Mid Femur Moment Mx

Customer: VRTC

11FEMRLEMIWSMOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-92

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

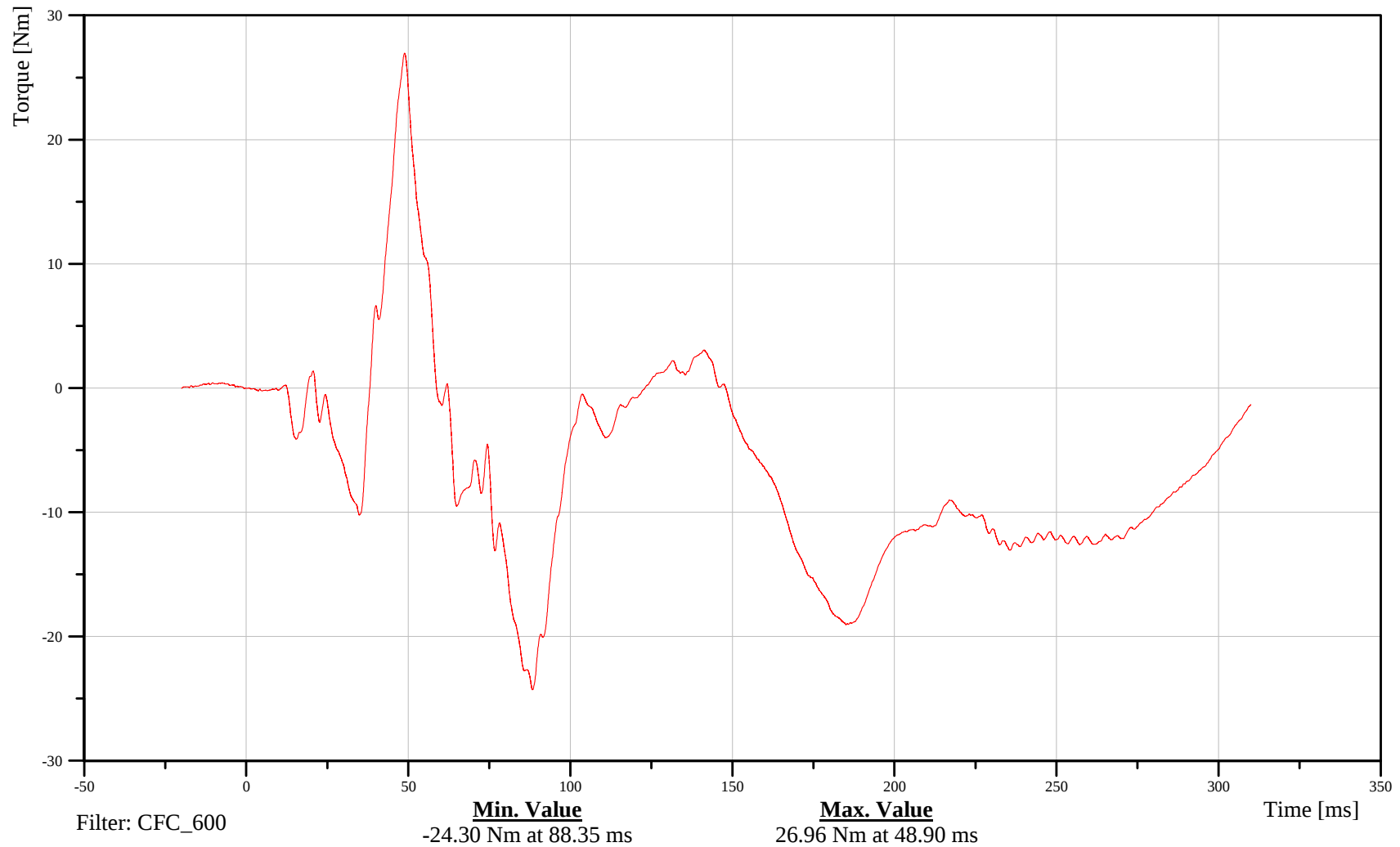
Left Mid Femur Moment My

Customer: VRTC

11FEMRLEMIWSMOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-93

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

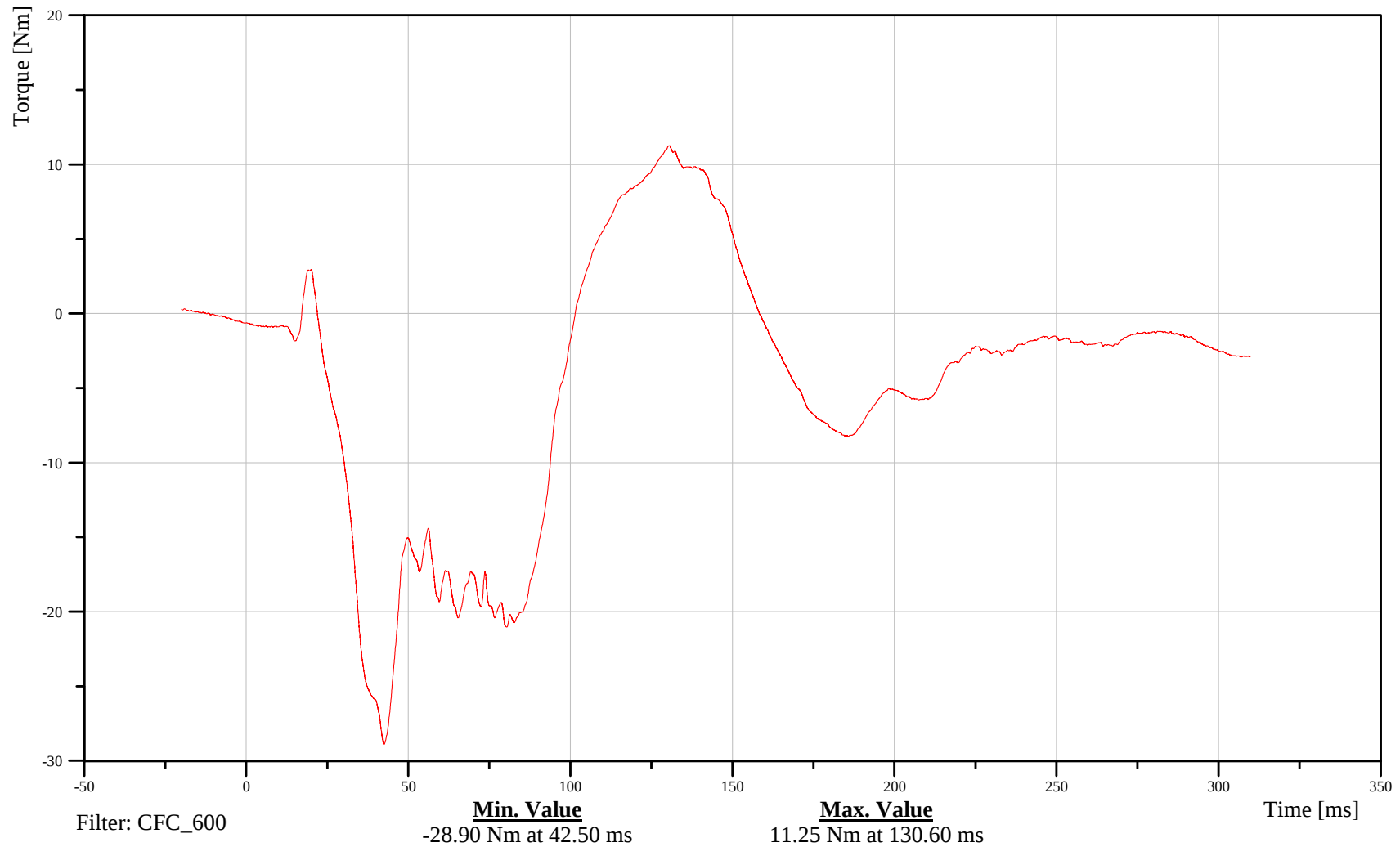
Left Mid Femur Moment Mz

Customer: VRTC

11FEMRLEMIWSMOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-94

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

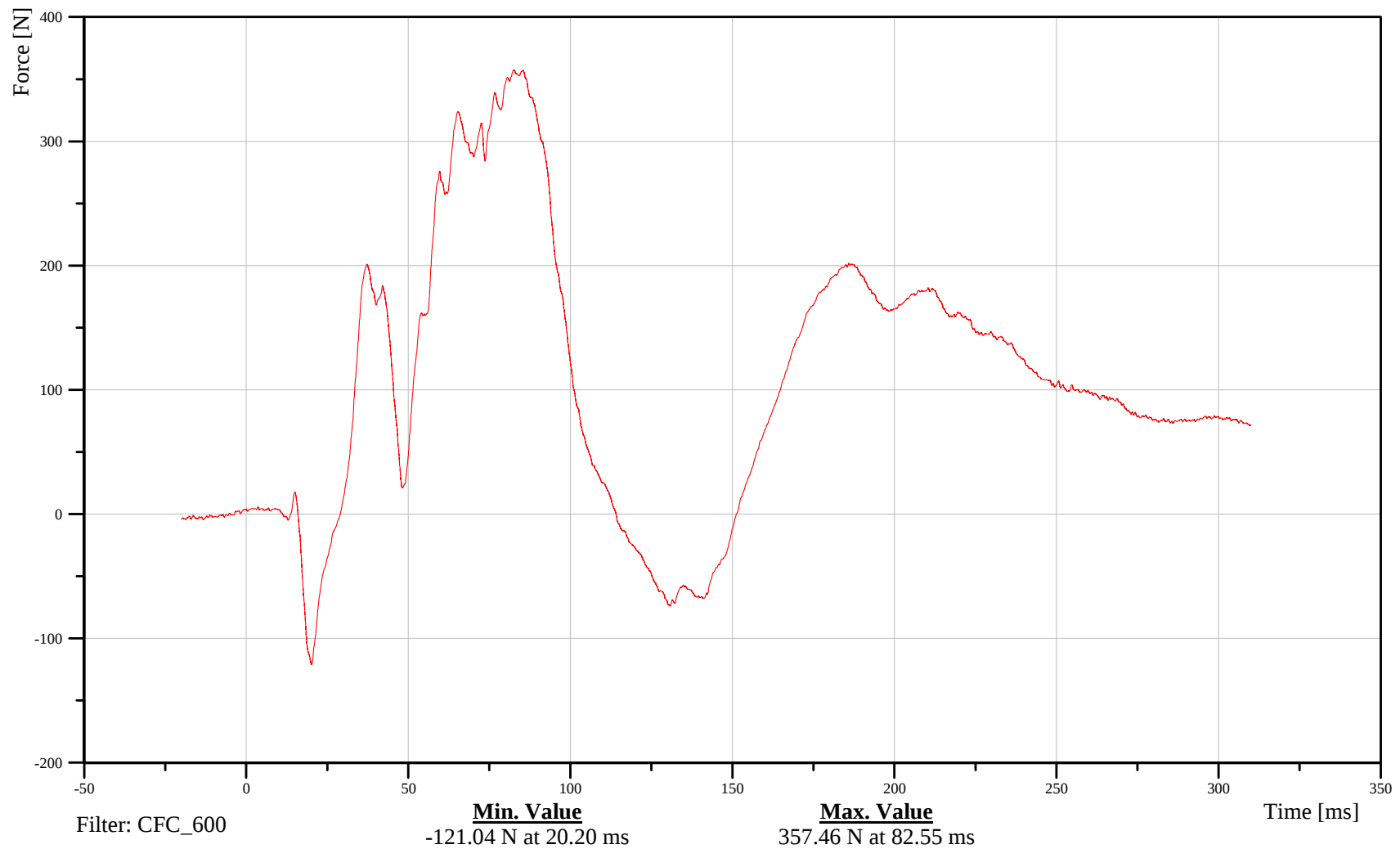
Left Femoral Neck X-Axis Force

Customer: VRTC

11FEMRLL00WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-95

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

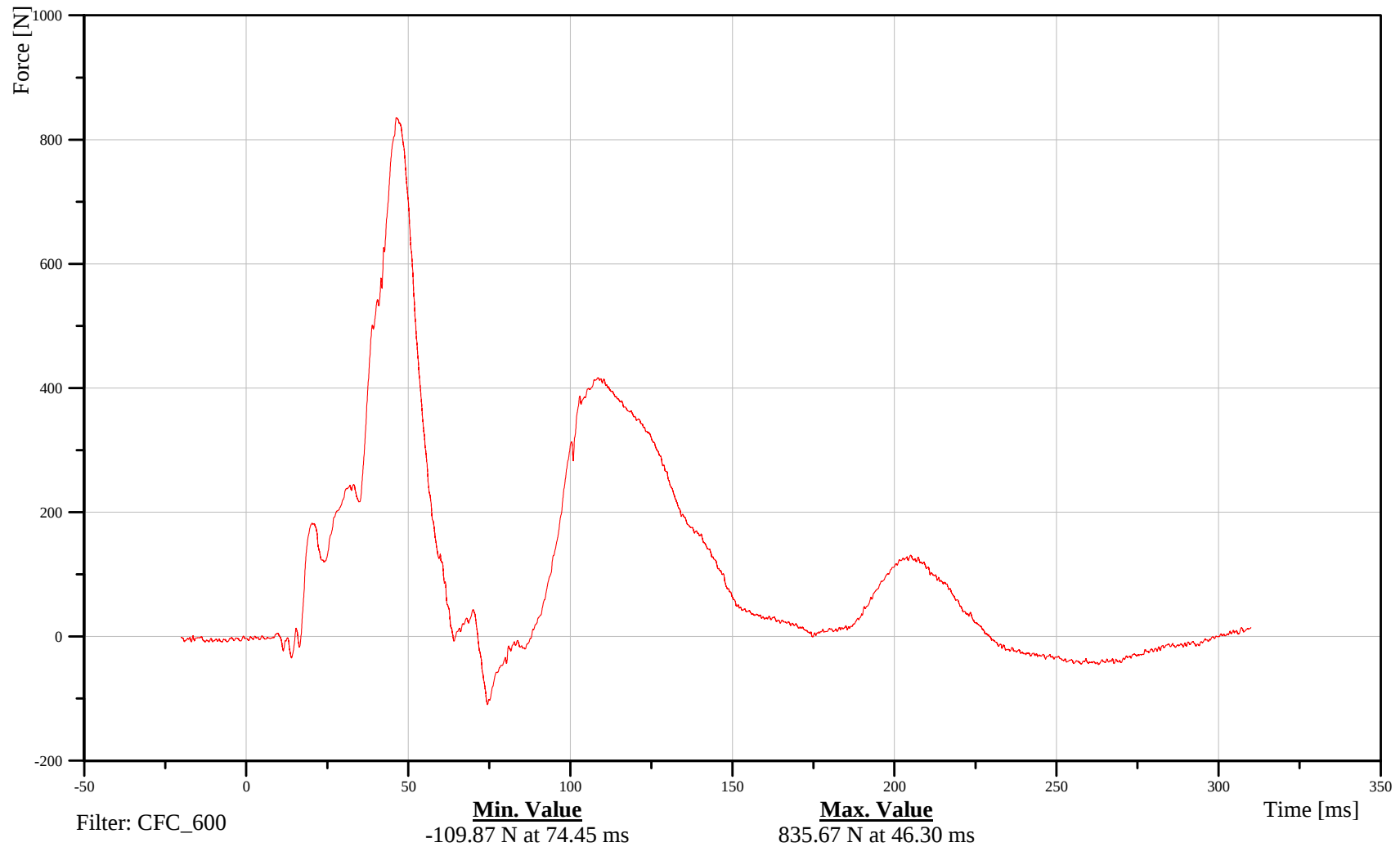
Left Femoral Neck Y-Axis Force

Customer: VRTC

11FEMRLL00WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-96

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

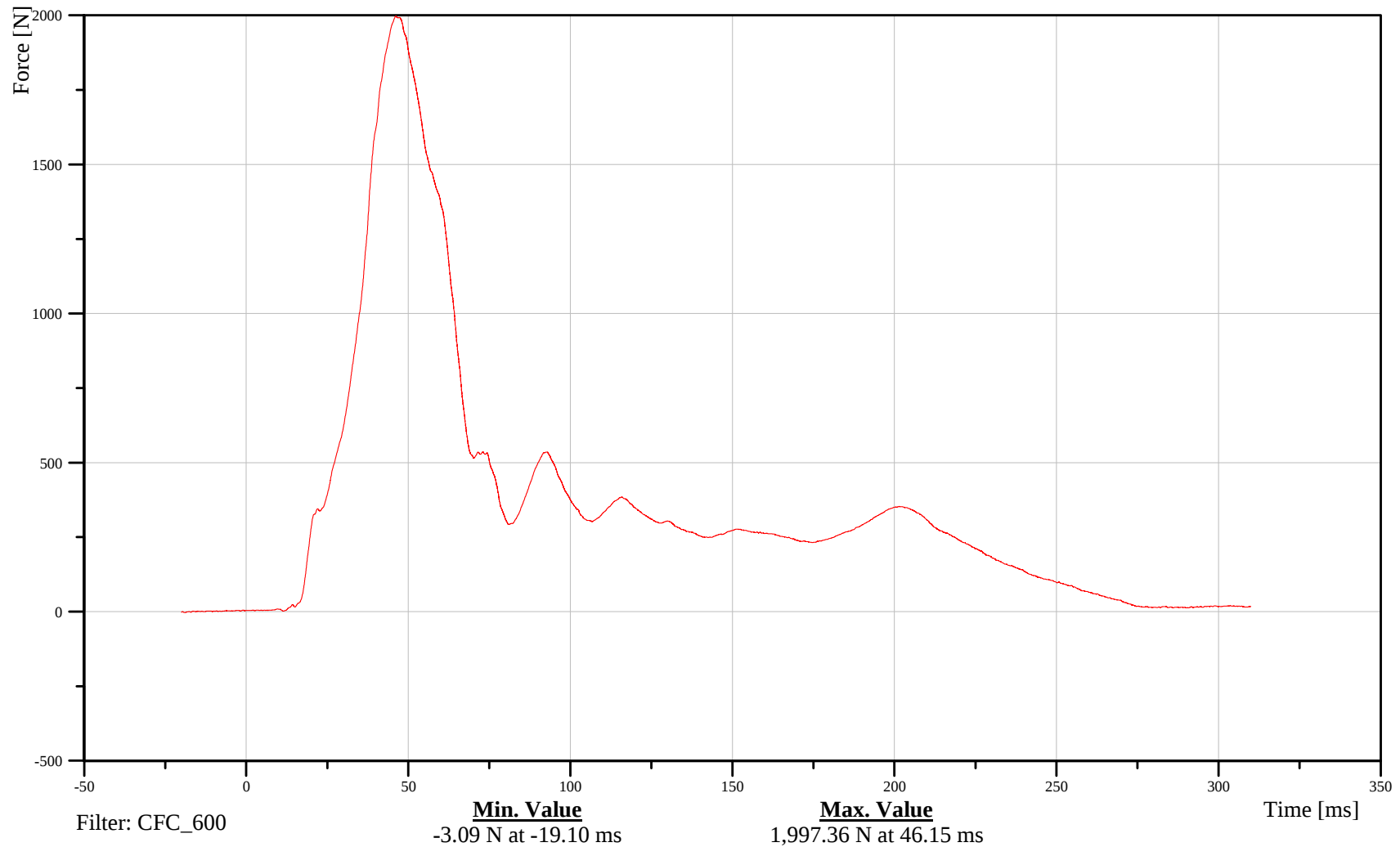
Left Femoral Neck Z-Axis Force

Customer: VRTC

11FEMRLL00WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-97

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

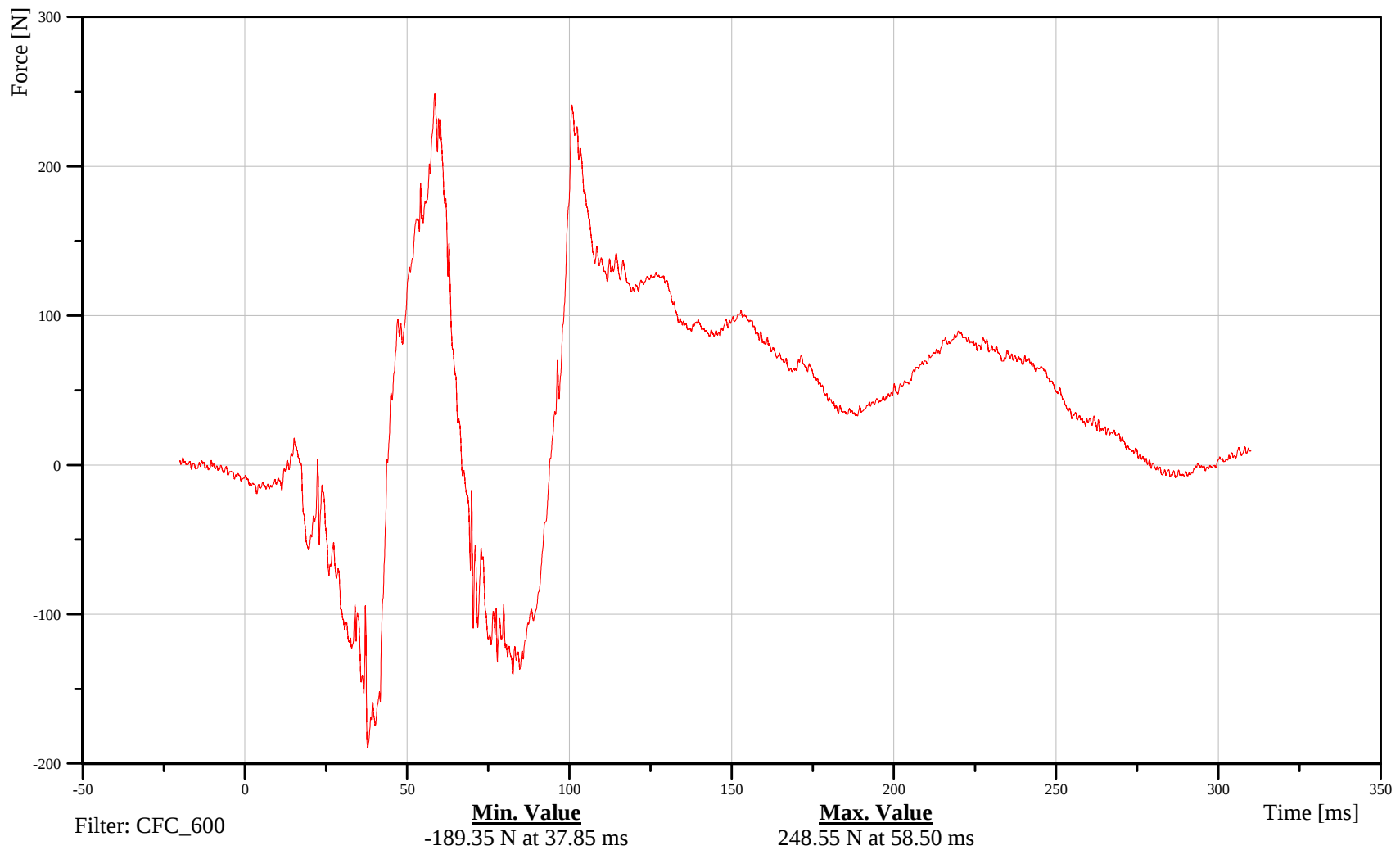
Left Knee Outboard Y-Axis Force

Customer: VRTC

11KNEELEOUWSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-98

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

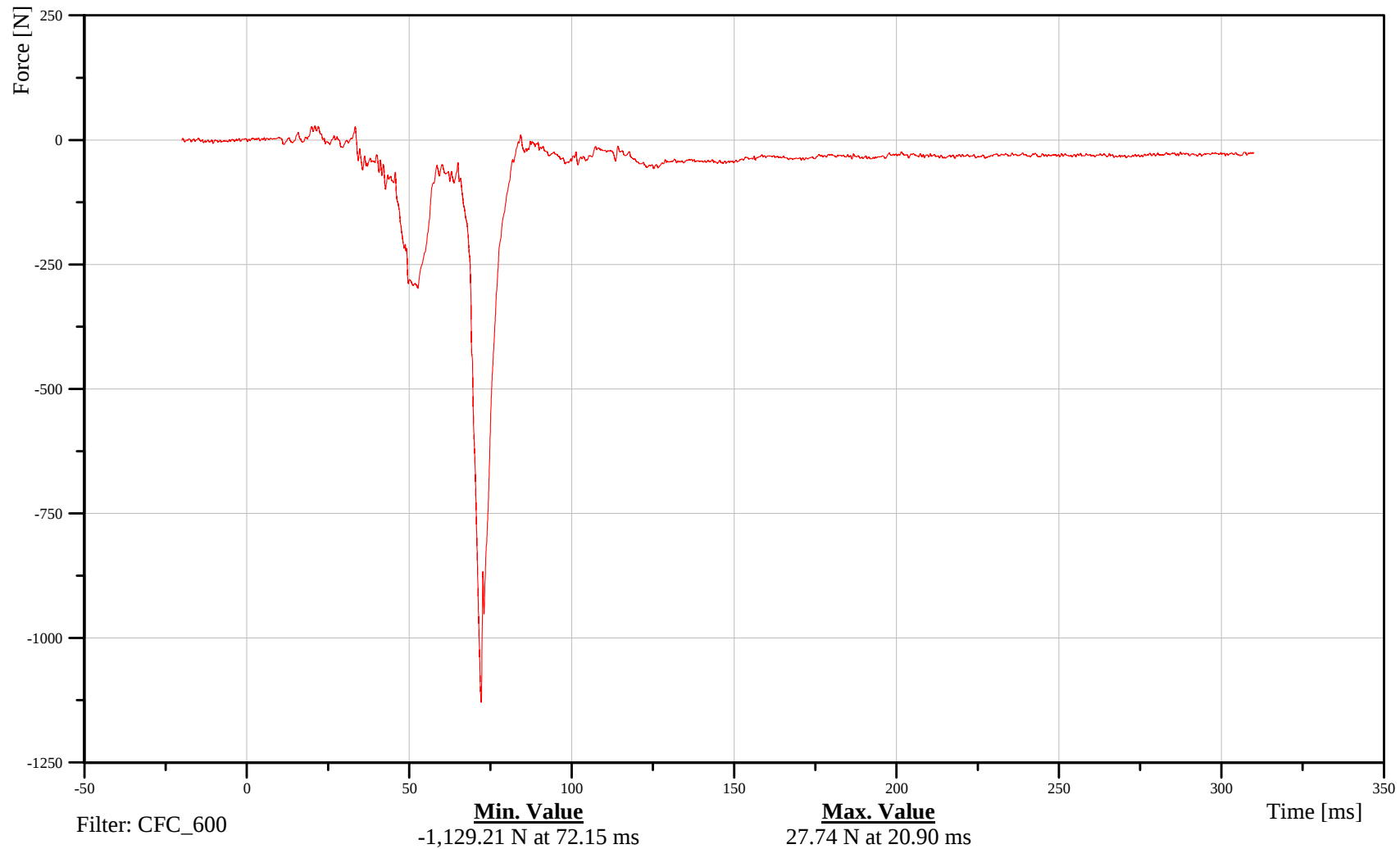
Left Knee Inboard Y-Axis Force

Customer: VRTC

11KNEELEINWSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-99

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

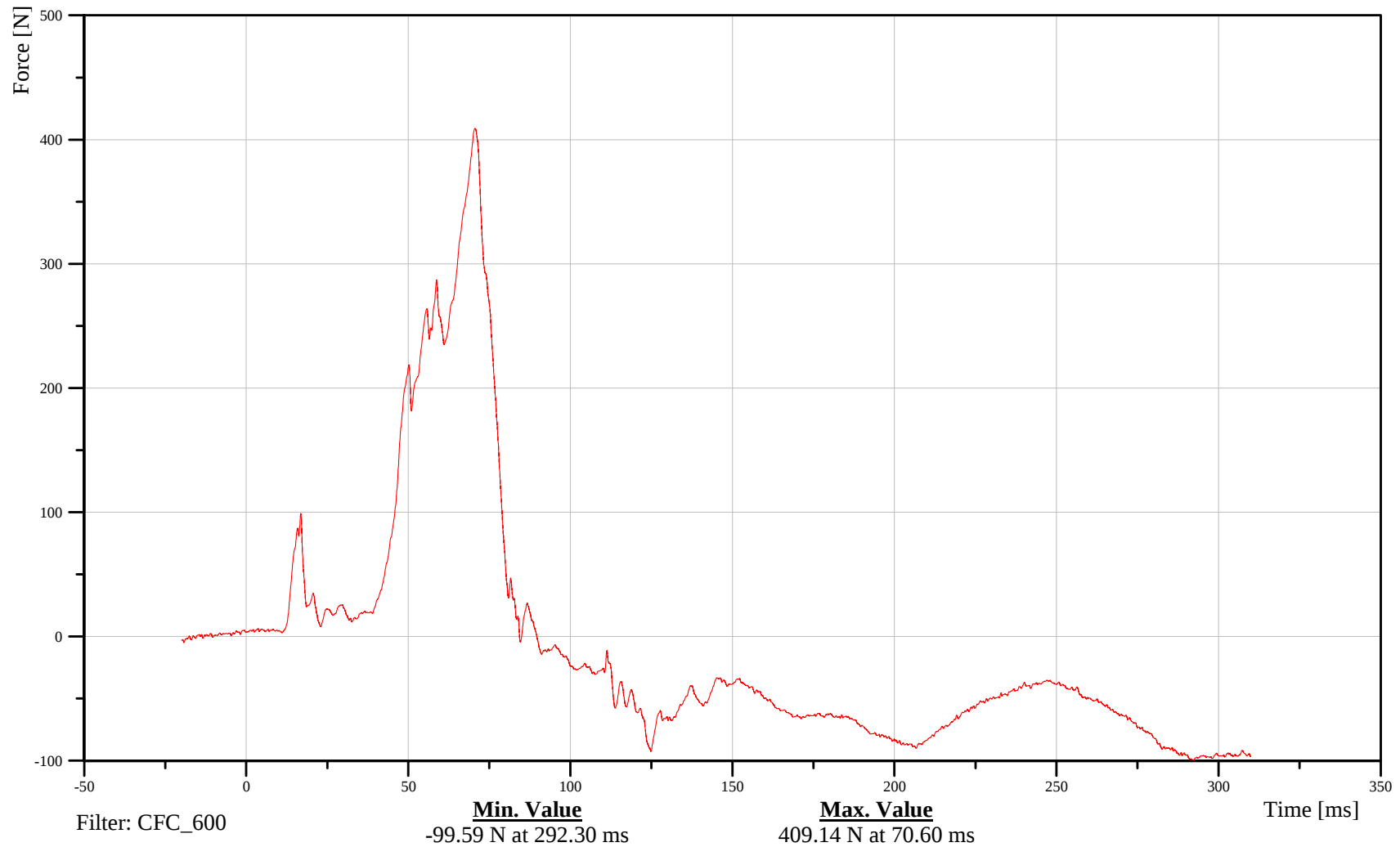
Right Femoral Neck X-Axis Force

Customer: VRTC

11FEMRRL00WSFOXB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-100

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

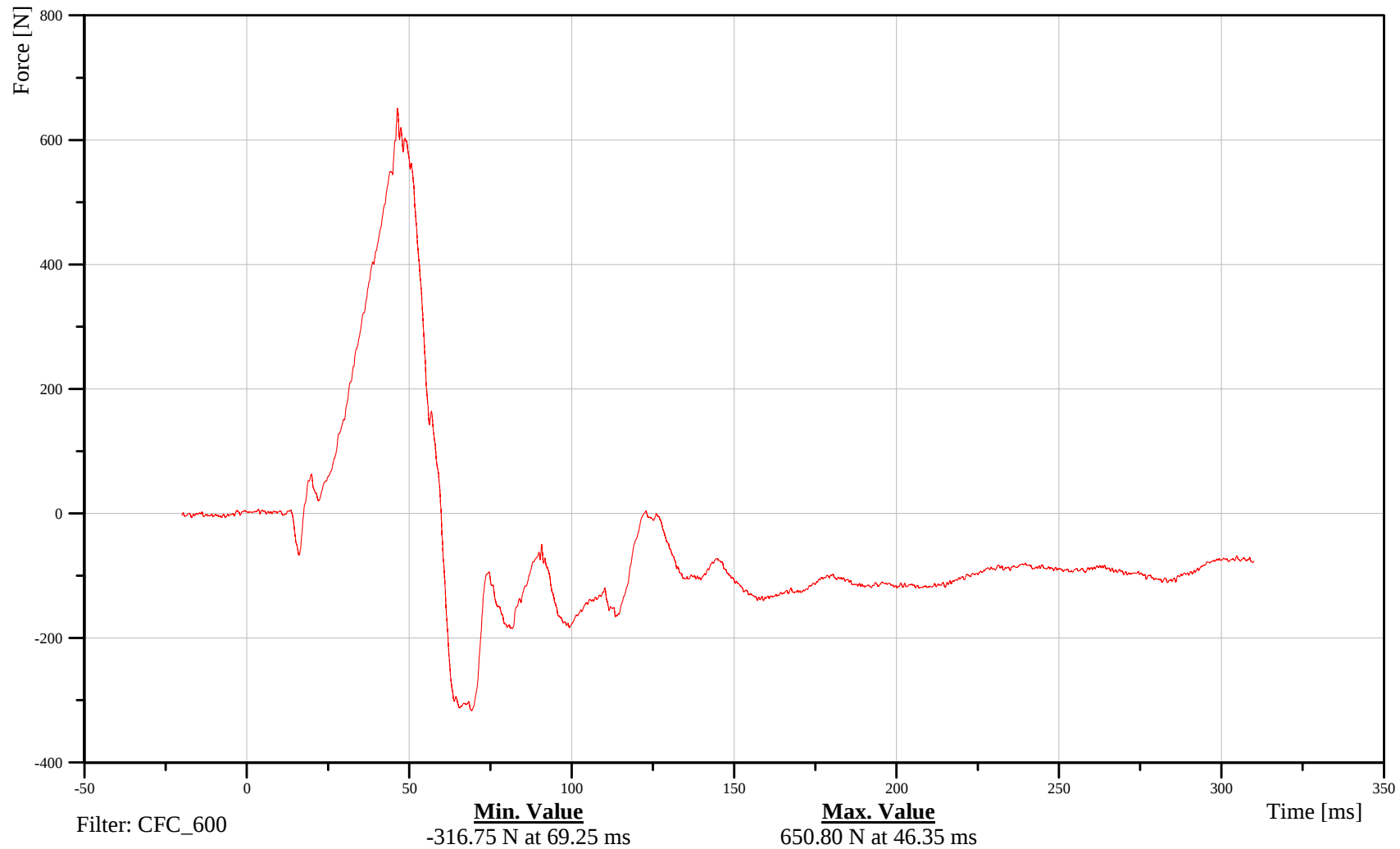
Right Femoral Neck Y-Axis Force

Customer: VRTC

11FEMRRL00WSFOYB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-101

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

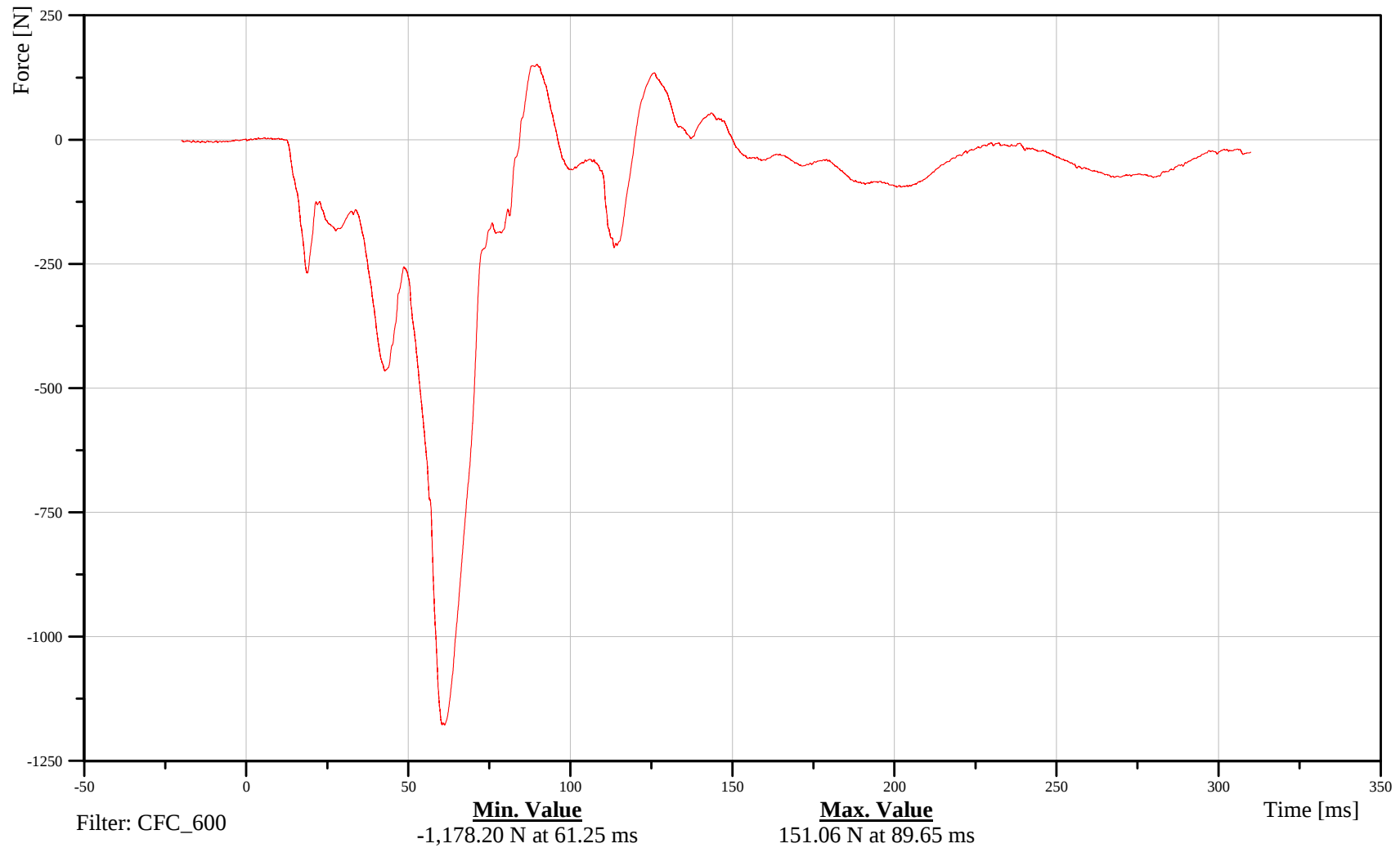
Right Femoral Neck Z-Axis Force

Customer: VRTC

11FEMRRL00WSFOZB

TRC Inc. Test Lab: CTF

Test Number: 110817



B-102

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

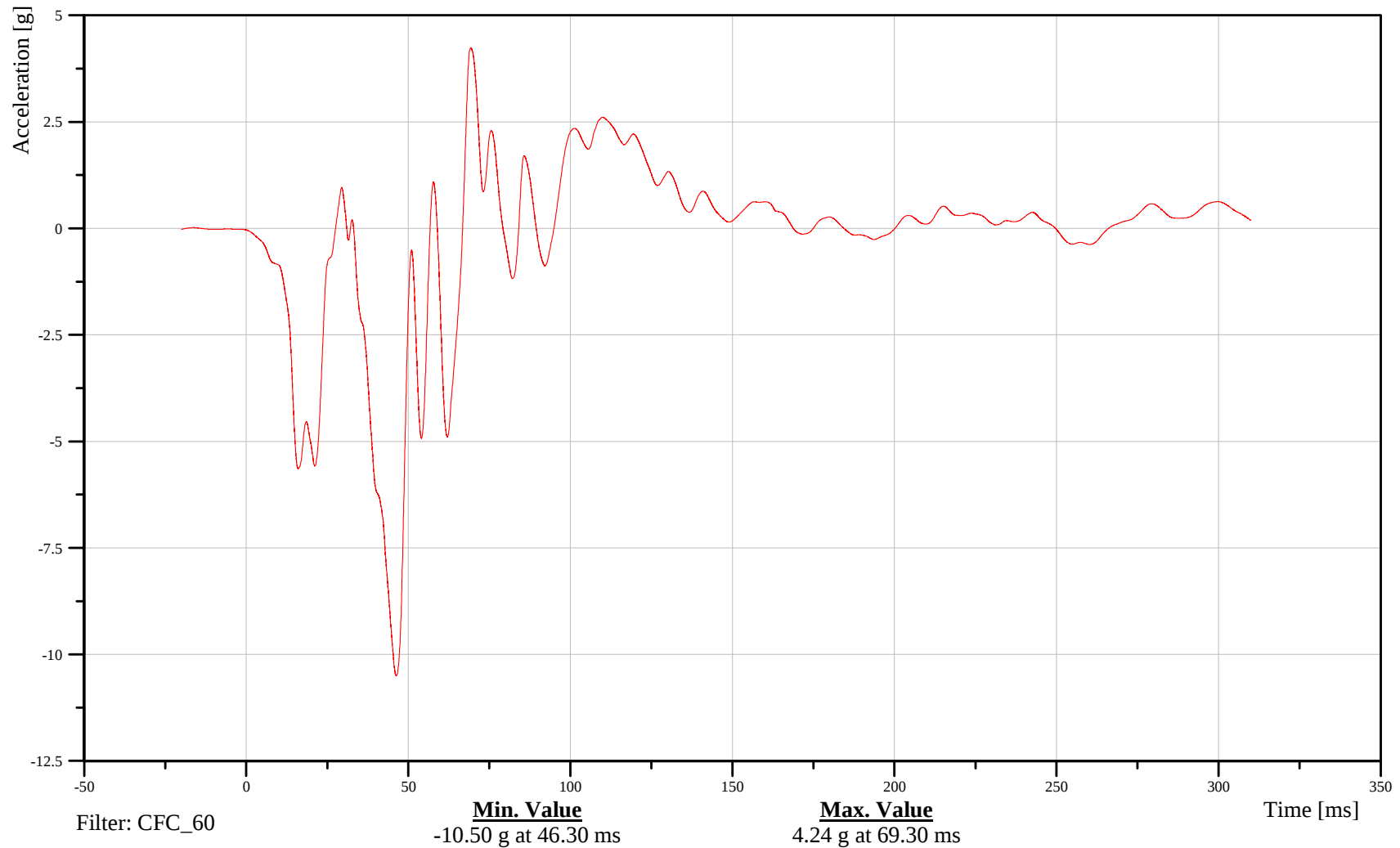
Vehicle Center of Gravity X-Axis Acceleration

Customer: VRTC

10VEHCCG0000ACXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-103

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

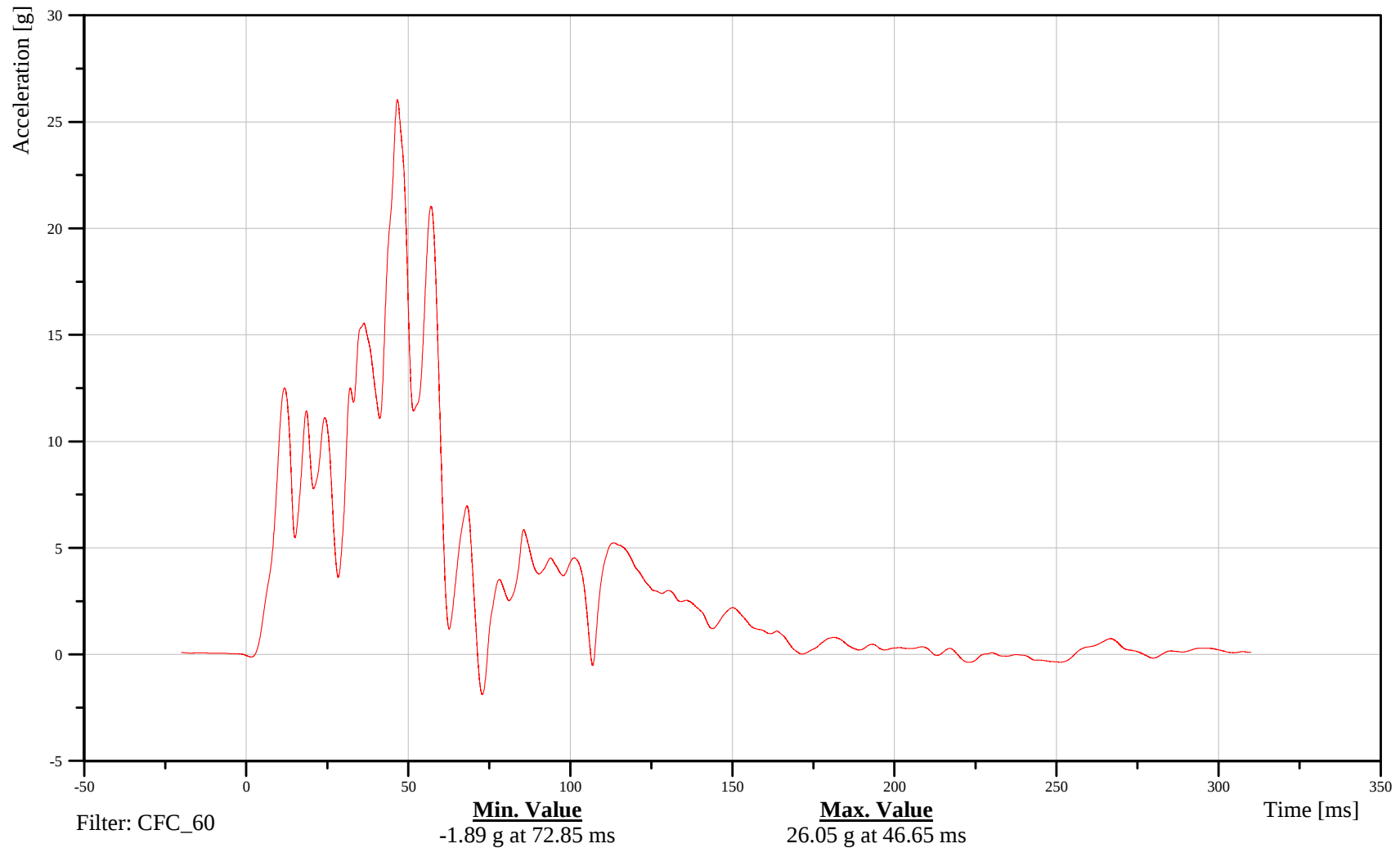
Vehicle Center of Gravity Y-Axis Acceleration

Customer: VRTC

10VEHCCG0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-104

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

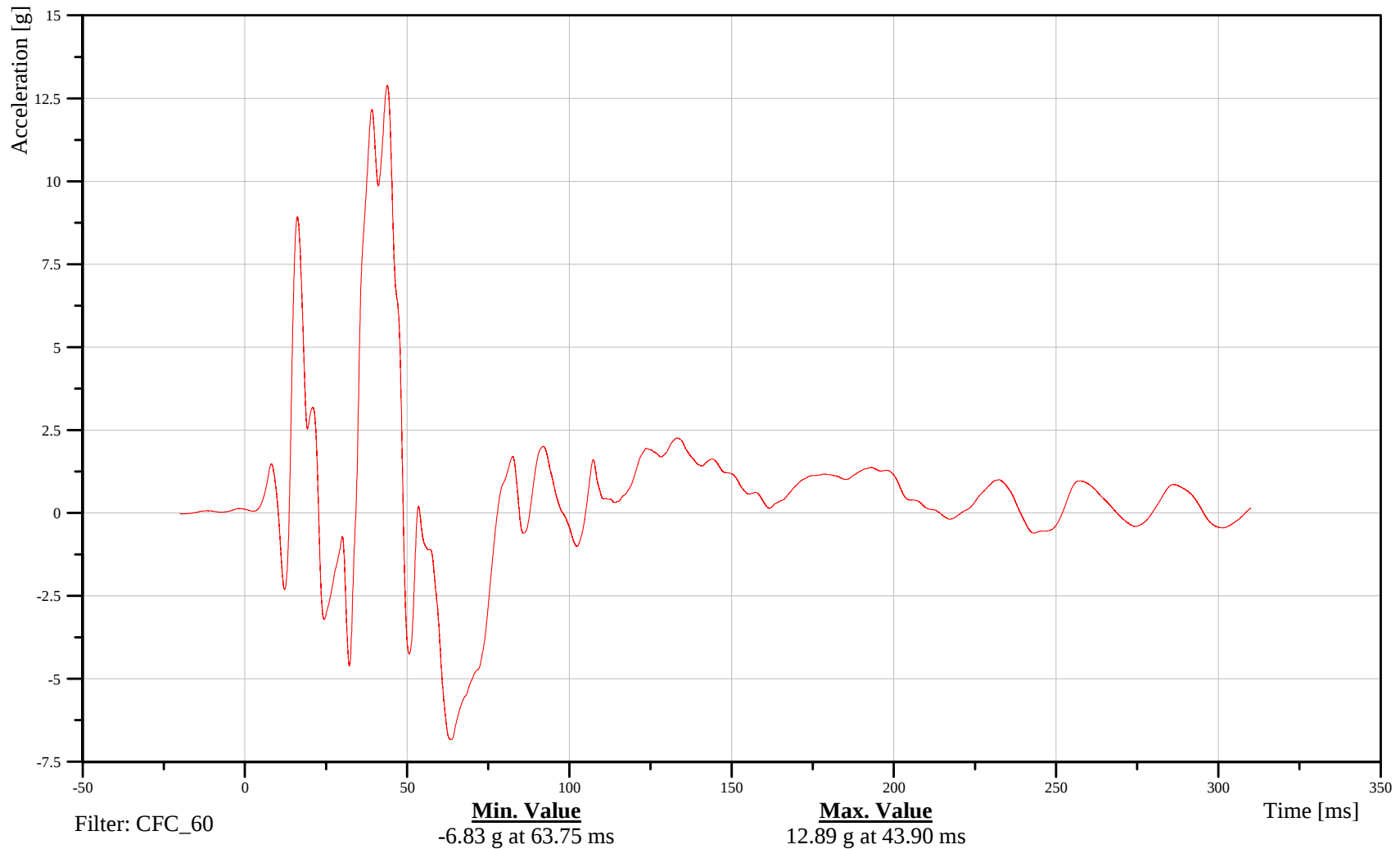
Vehicle Center of Gravity Z-Axis Acceleration

Customer: VRTC

10VEHCCG0000ACZD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-105

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

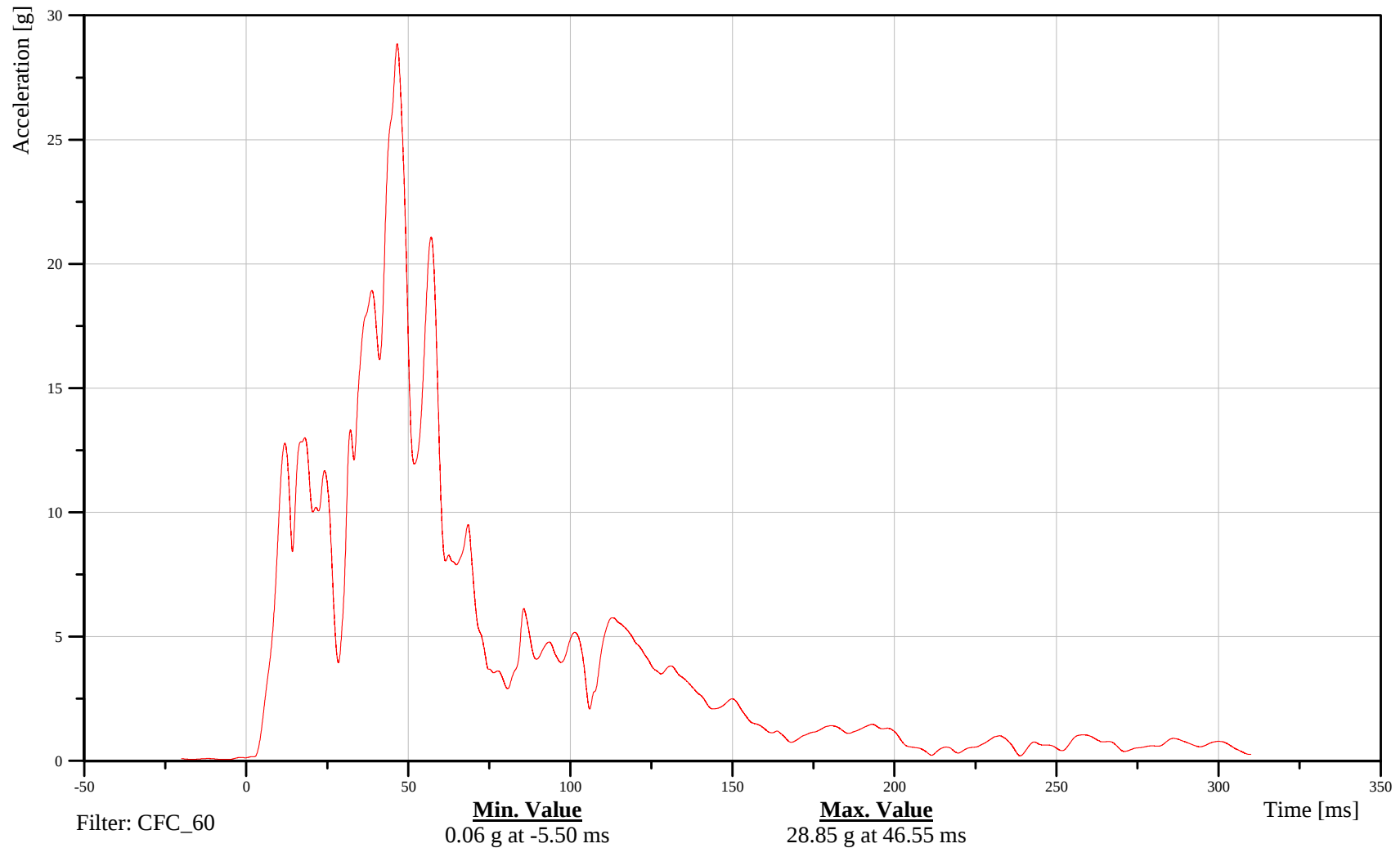
Vehicle Center of Gravity Resultant Acceleration

Customer: VRTC

10VEHCCG0000ACRD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-106

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

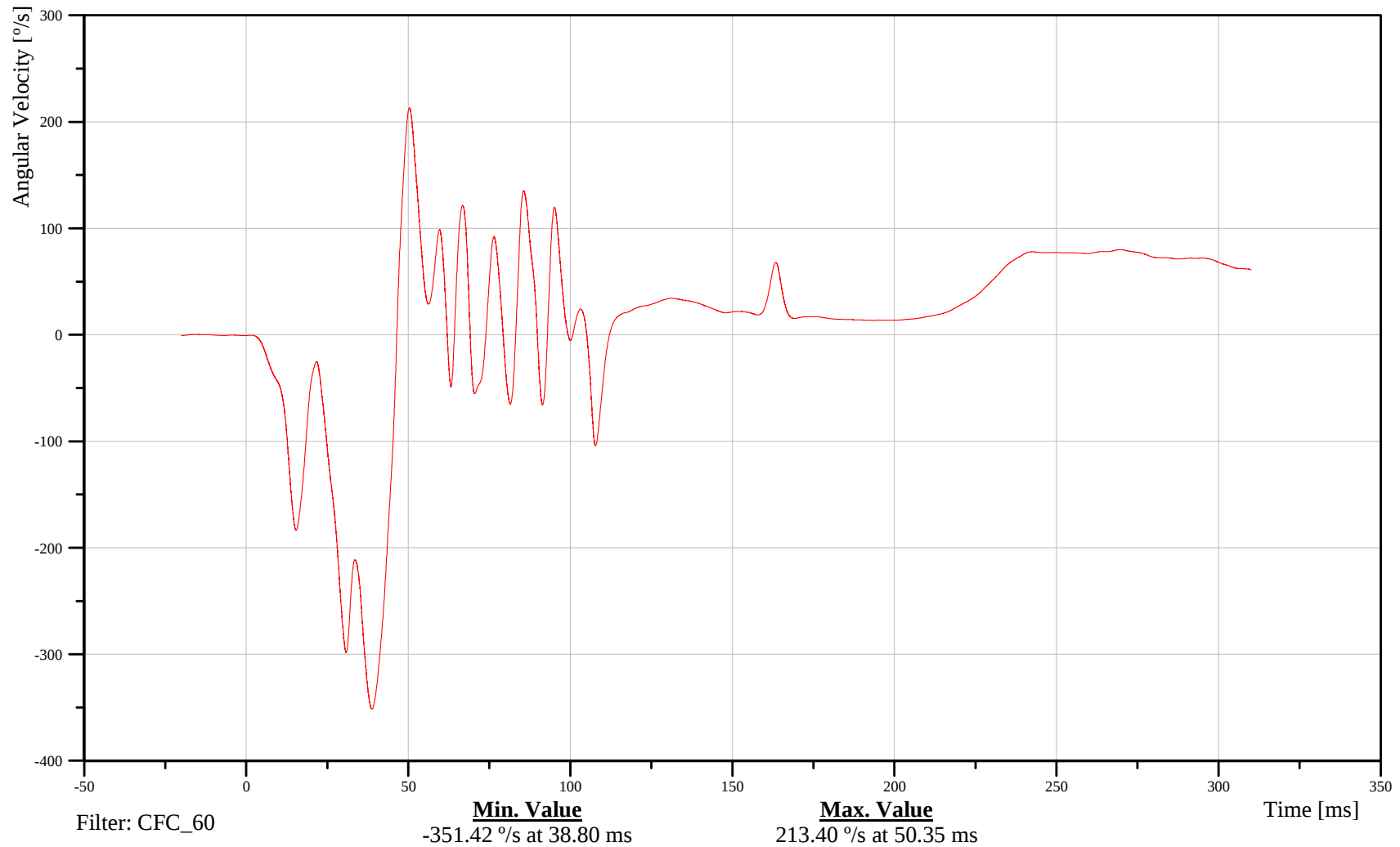
Vehicle Center of Gravity Roll Rate Gyroscope

Customer: VRTC

10VEHCCG0000AVXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-107

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

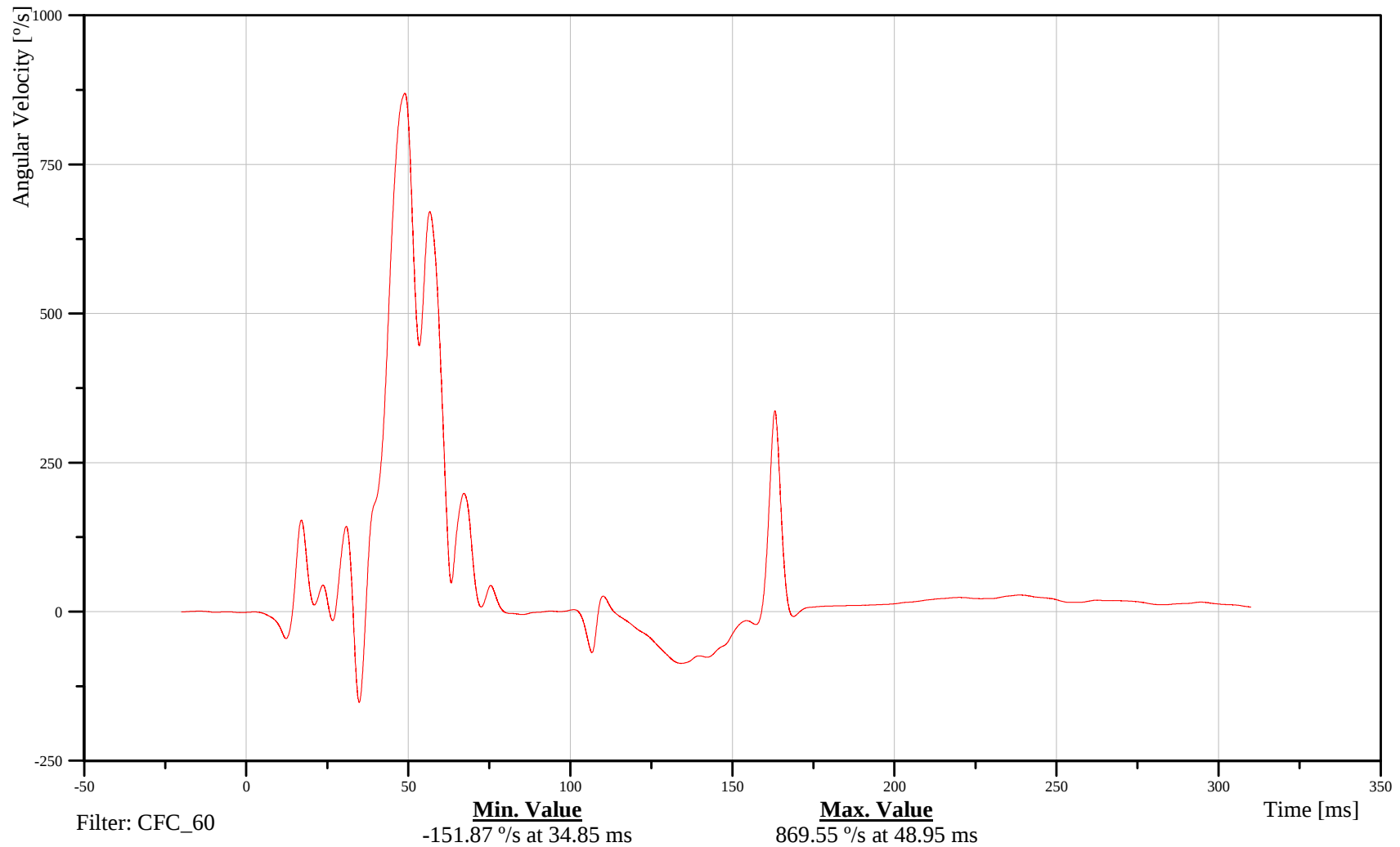
Vehicle Center of Gravity Pitch Rate Gyroscope

Customer: VRTC

10VEHCCG0000AVYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-108

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

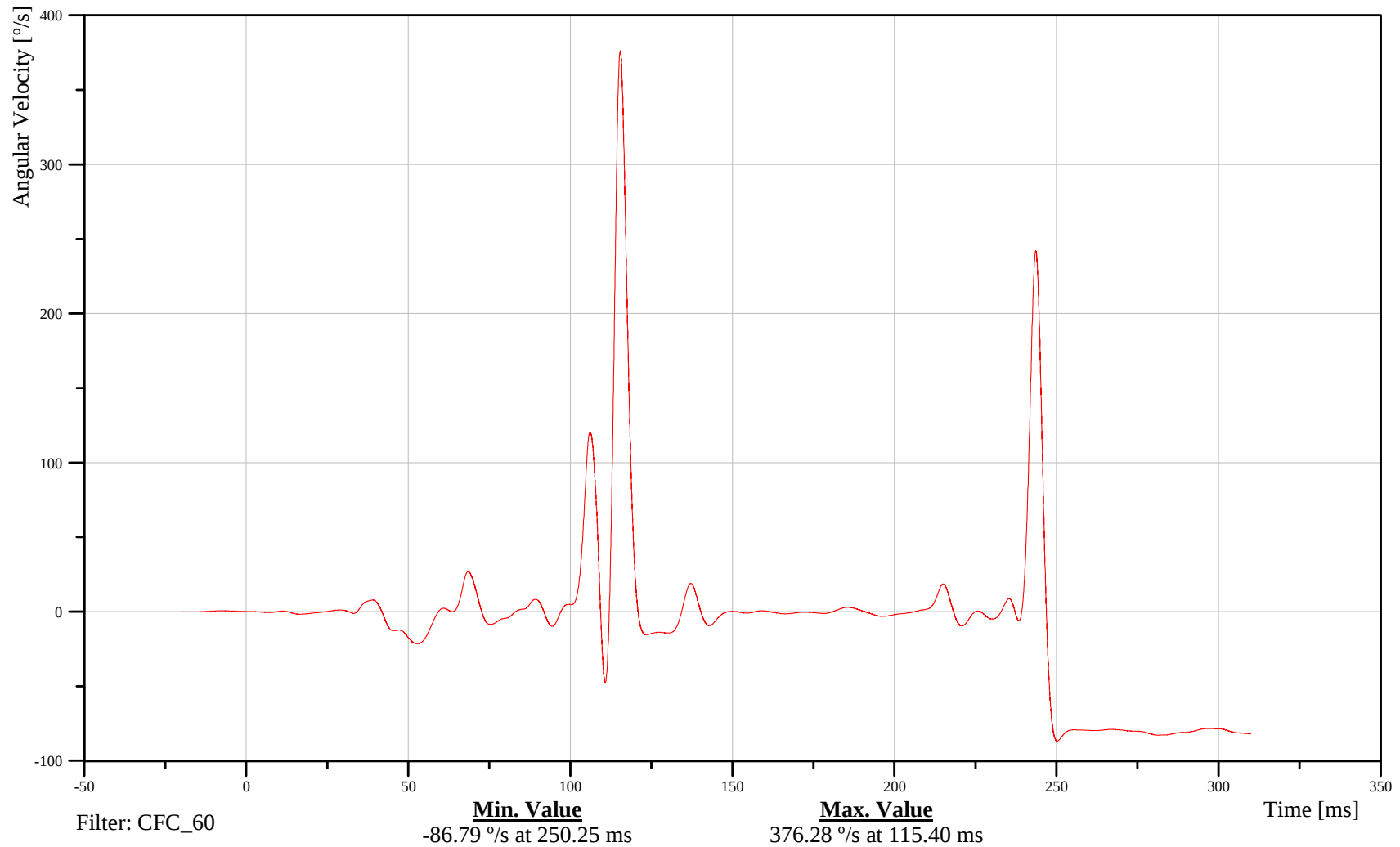
Vehicle Center of Gravity Yaw Rate Gyroscope

Customer: VRTC

10VEHCCG0000AVZD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-109

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

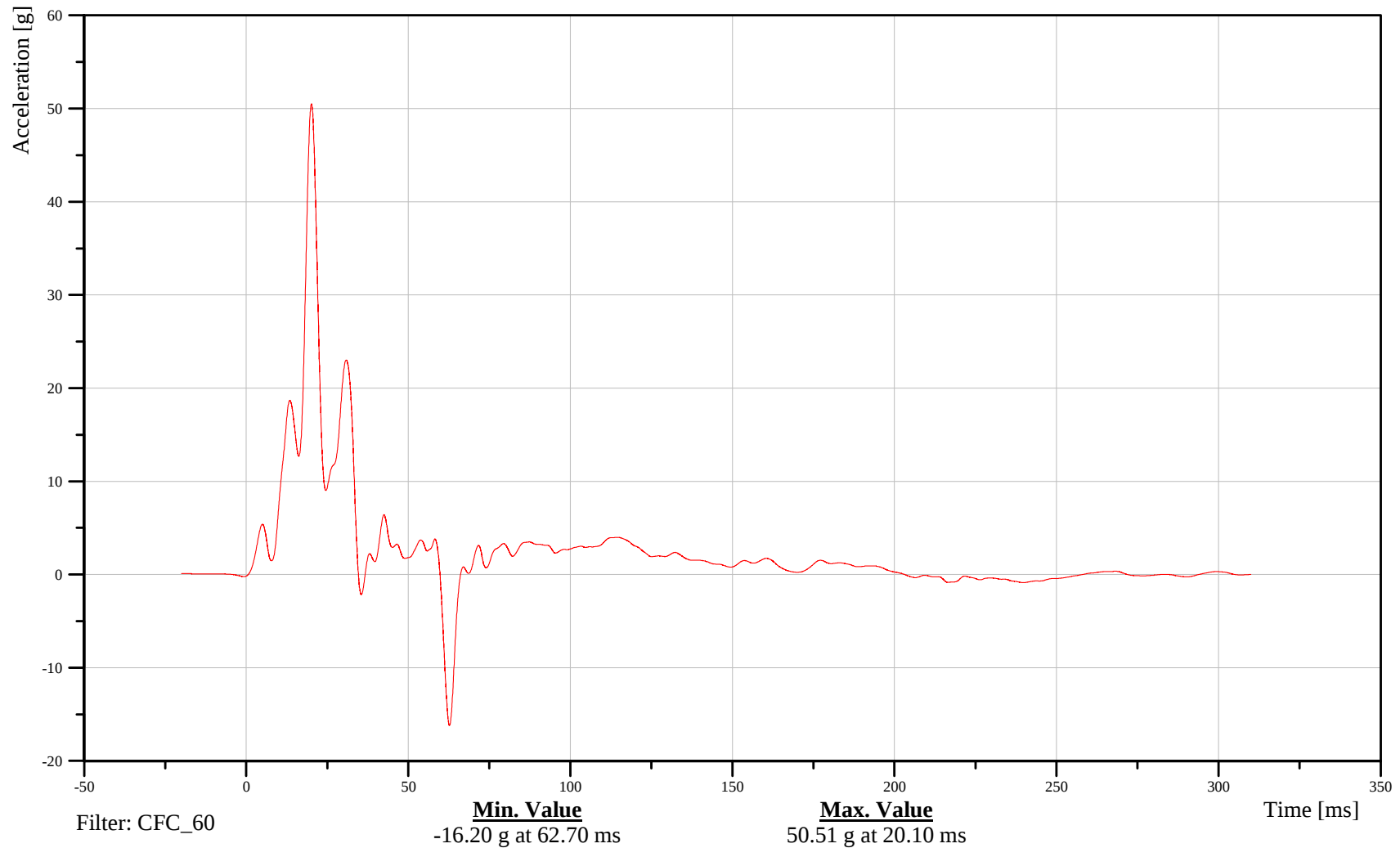
Left Side Sill Near Impact Point Y-Axis Acceleration

Customer: VRTC

11SILBRE0100ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-110

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

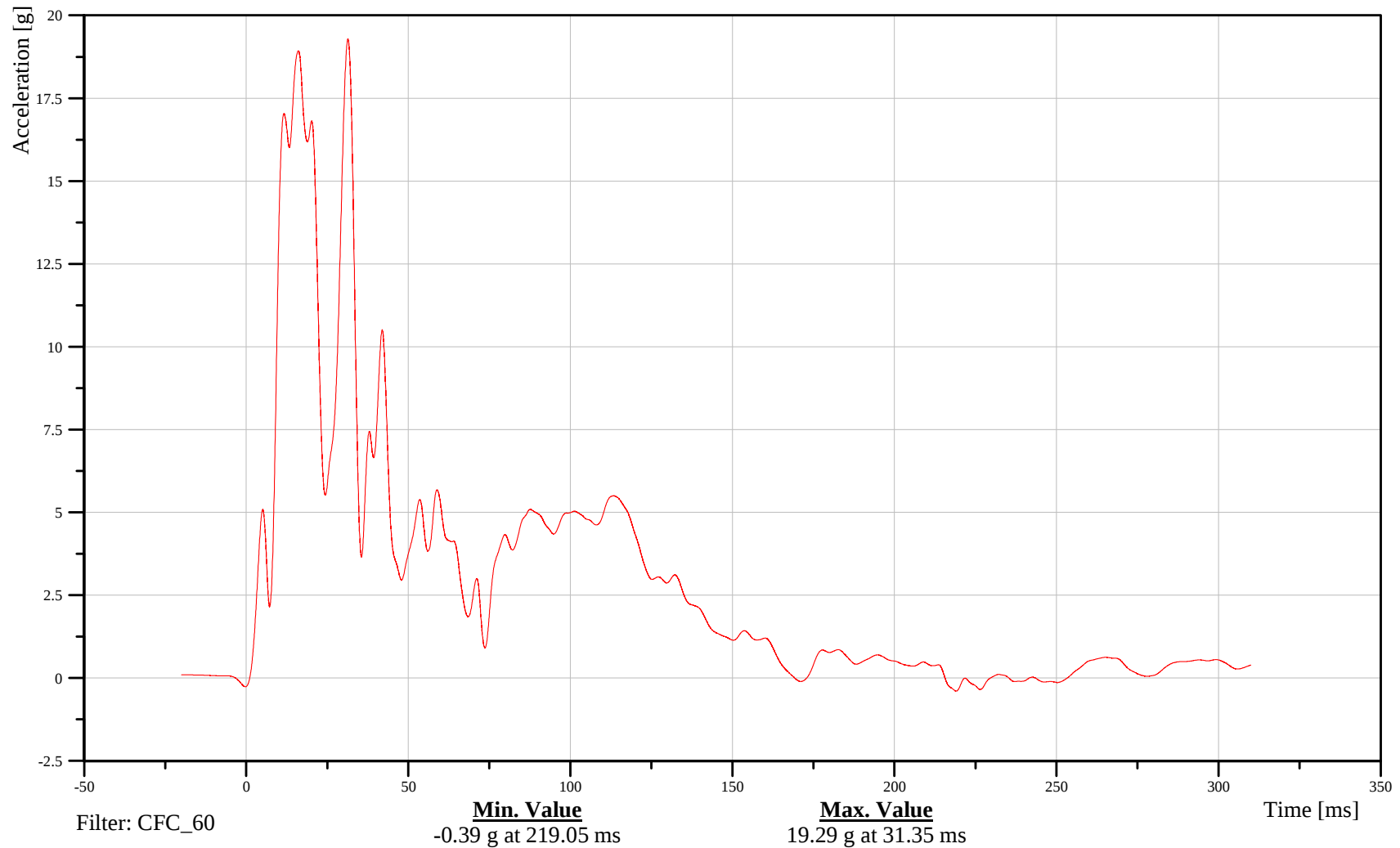
Left A-Pillar Side Sill Y-Axis Acceleration

Customer: VRTC

14SILBFR0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-111

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

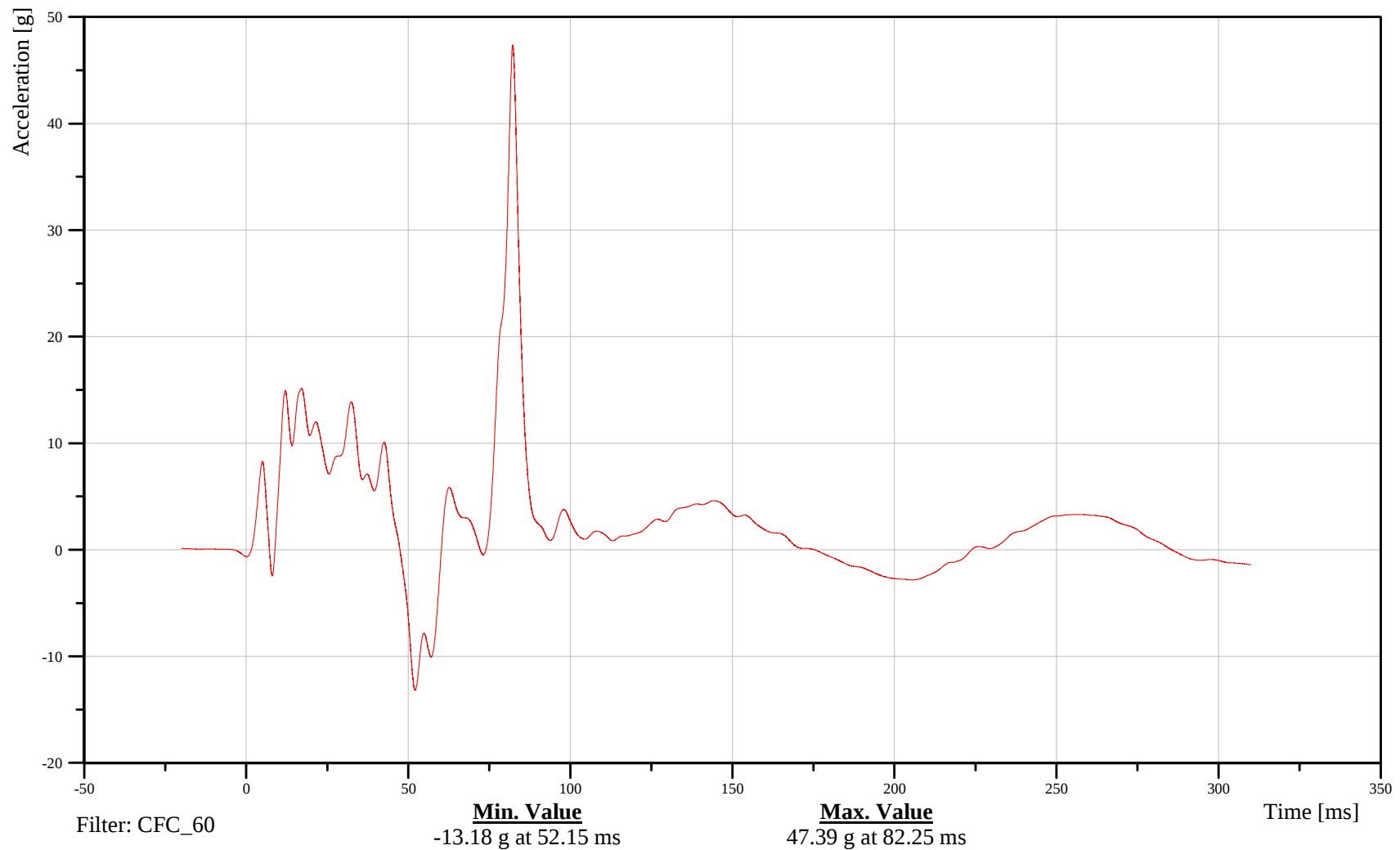
Left Lower A-Pillar Y-Axis Acceleration

Customer: VRTC

11APILLO0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-112

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

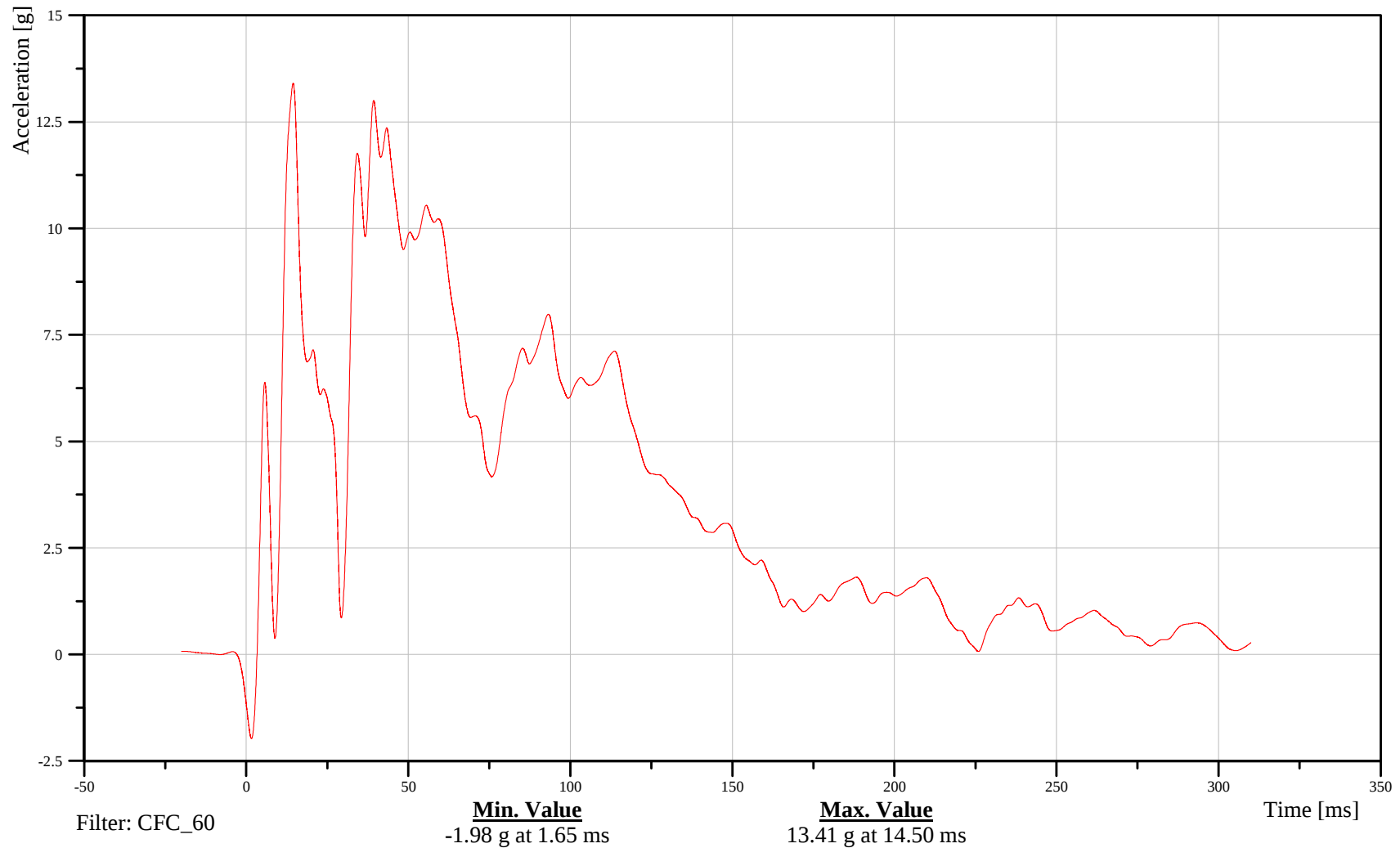
Left Mid A-Pillar Y-Axis Acceleration

Customer: VRTC

11APILMI0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-113

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

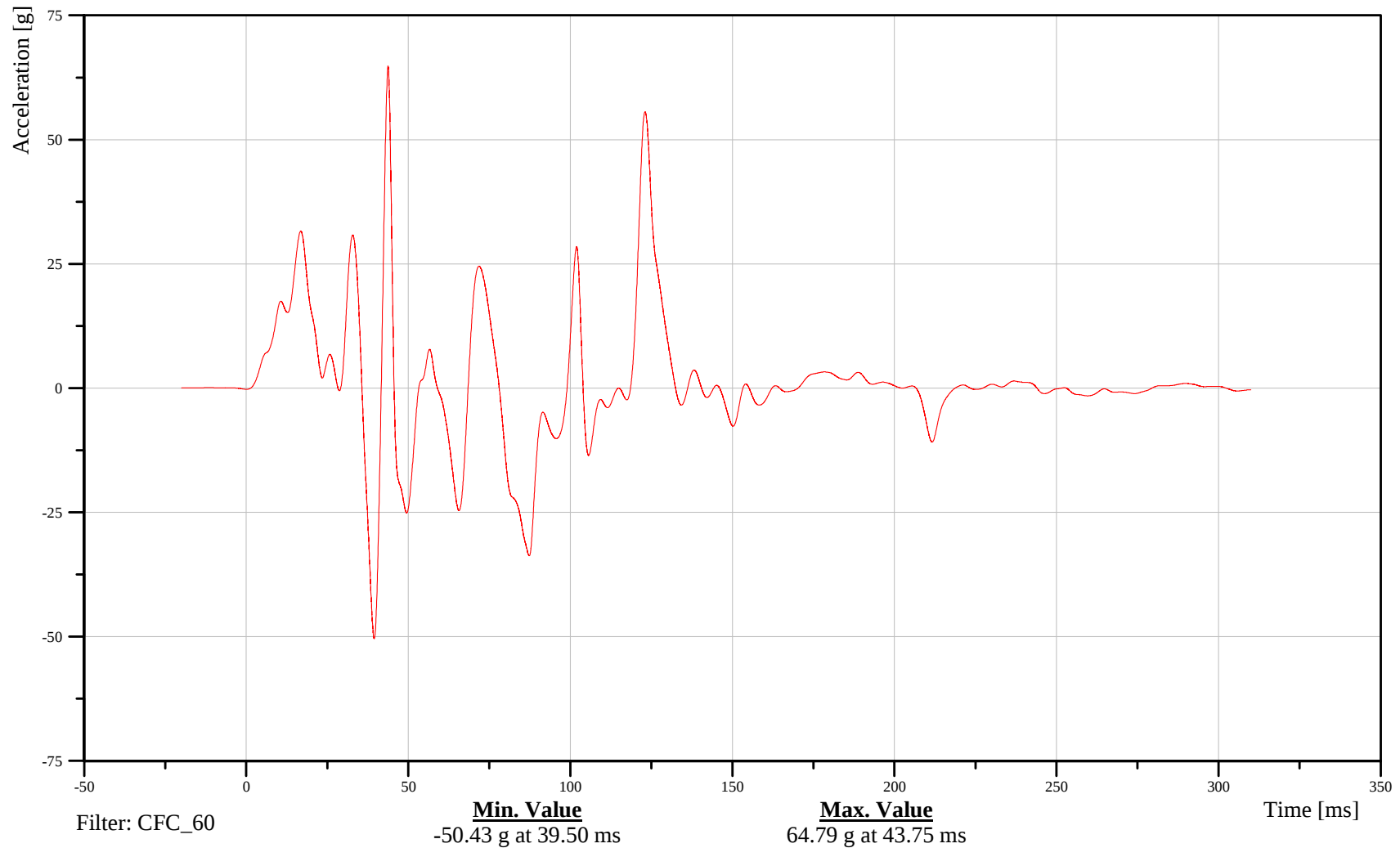
Left Side Sill at Rear Seat Y-Axis Acceleration

Customer: VRTC

14SILBRE0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-114

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

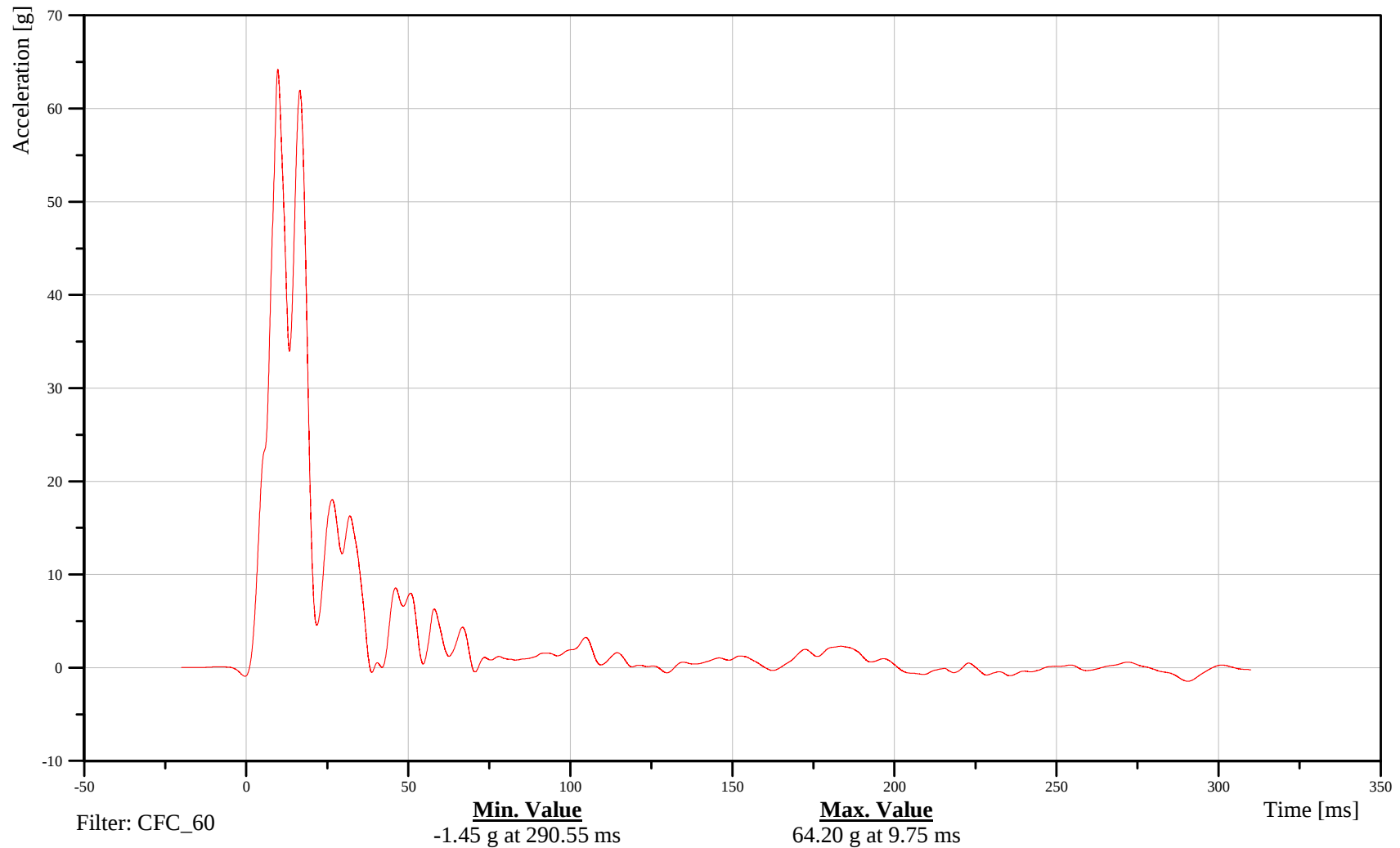
Left Lower B-Pillar Y-Axis Acceleration

Customer: VRTC

14BPILLO0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-115

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

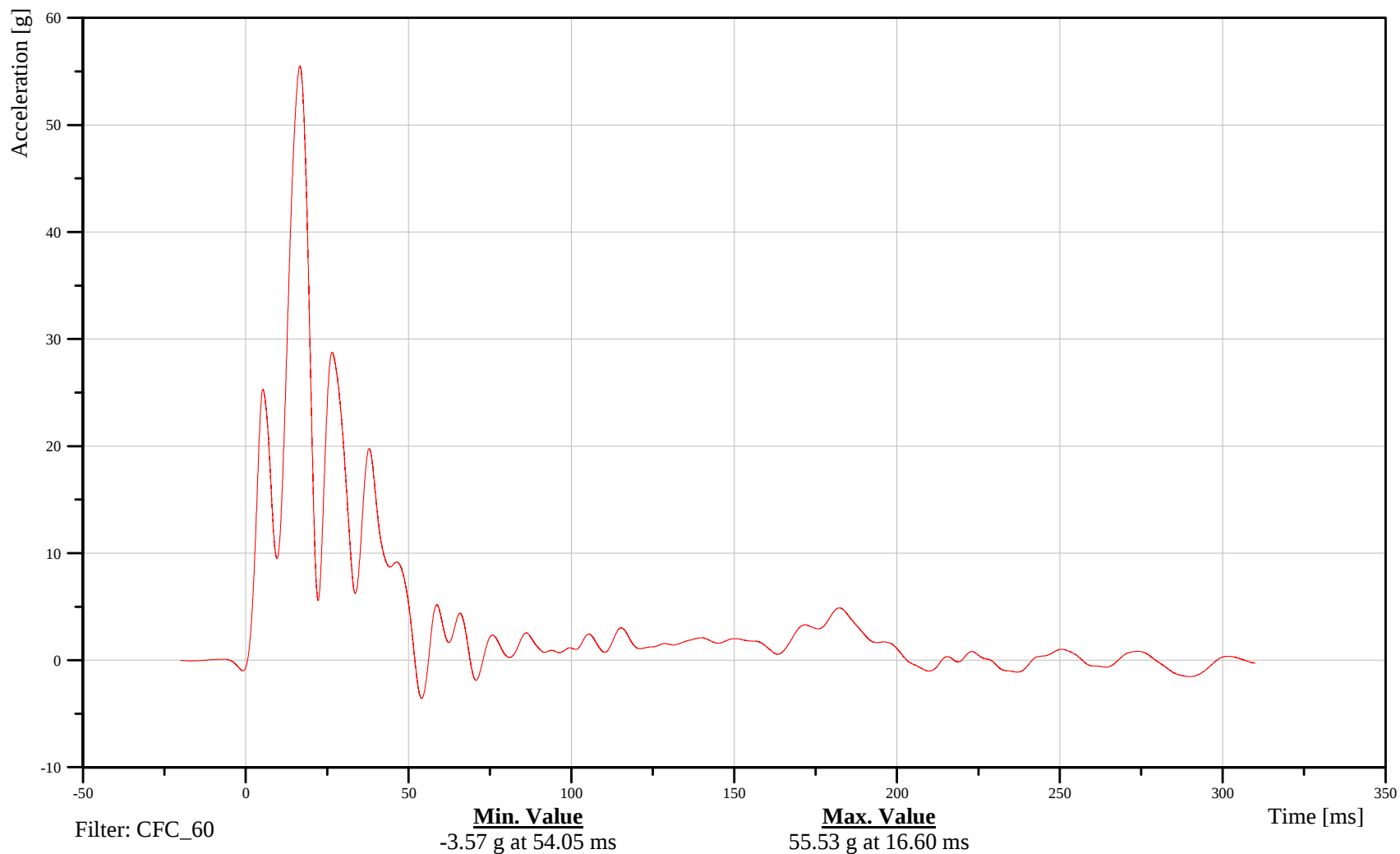
Left Mid B-Pillar Y-Axis Acceleration

Customer: VRTC

14BPILMI0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-116

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

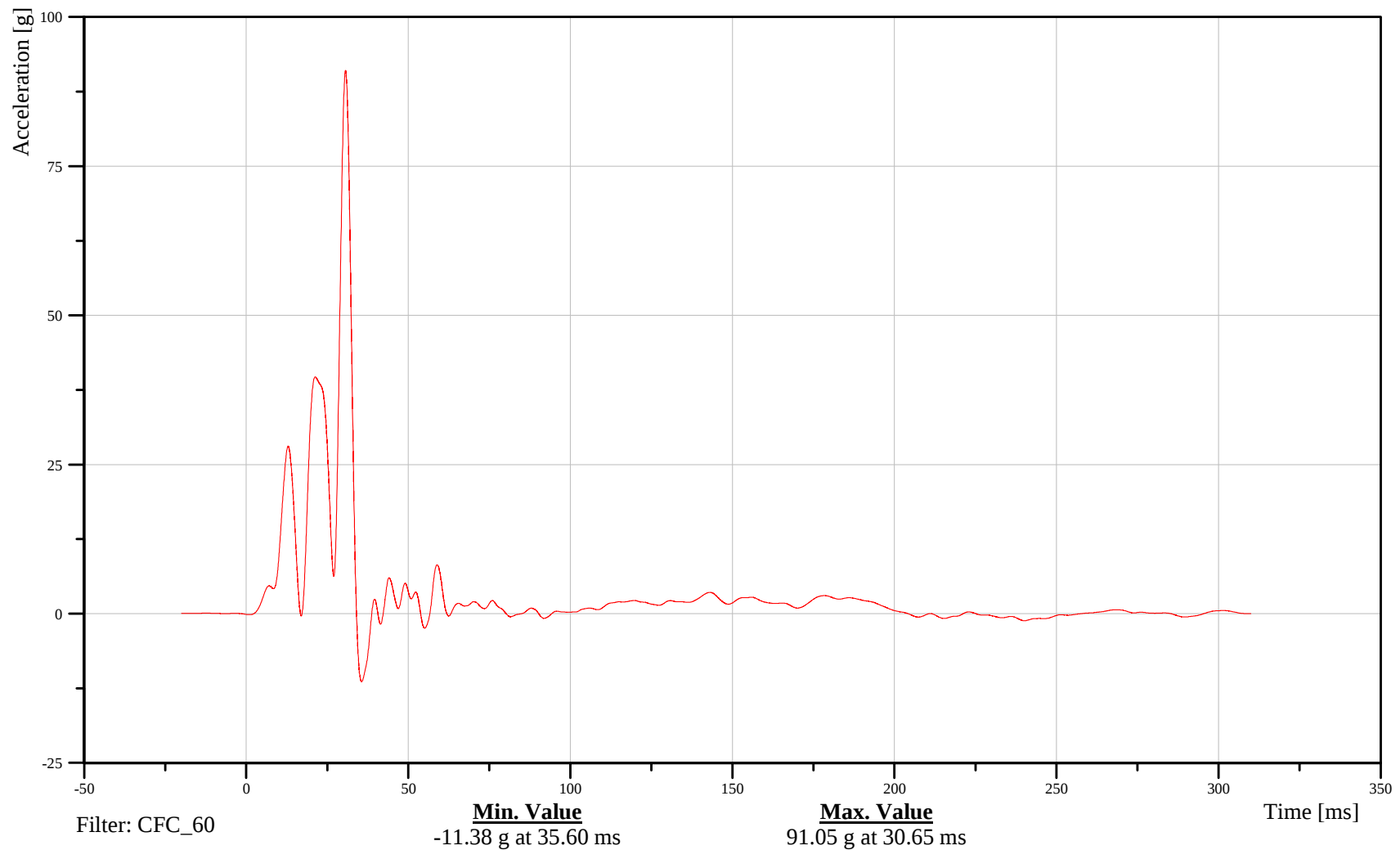
Left Front Seat Track at H-Point Y-Axis Acceleration

Customer: VRTC

11SETRFR0000ACVD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-117

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

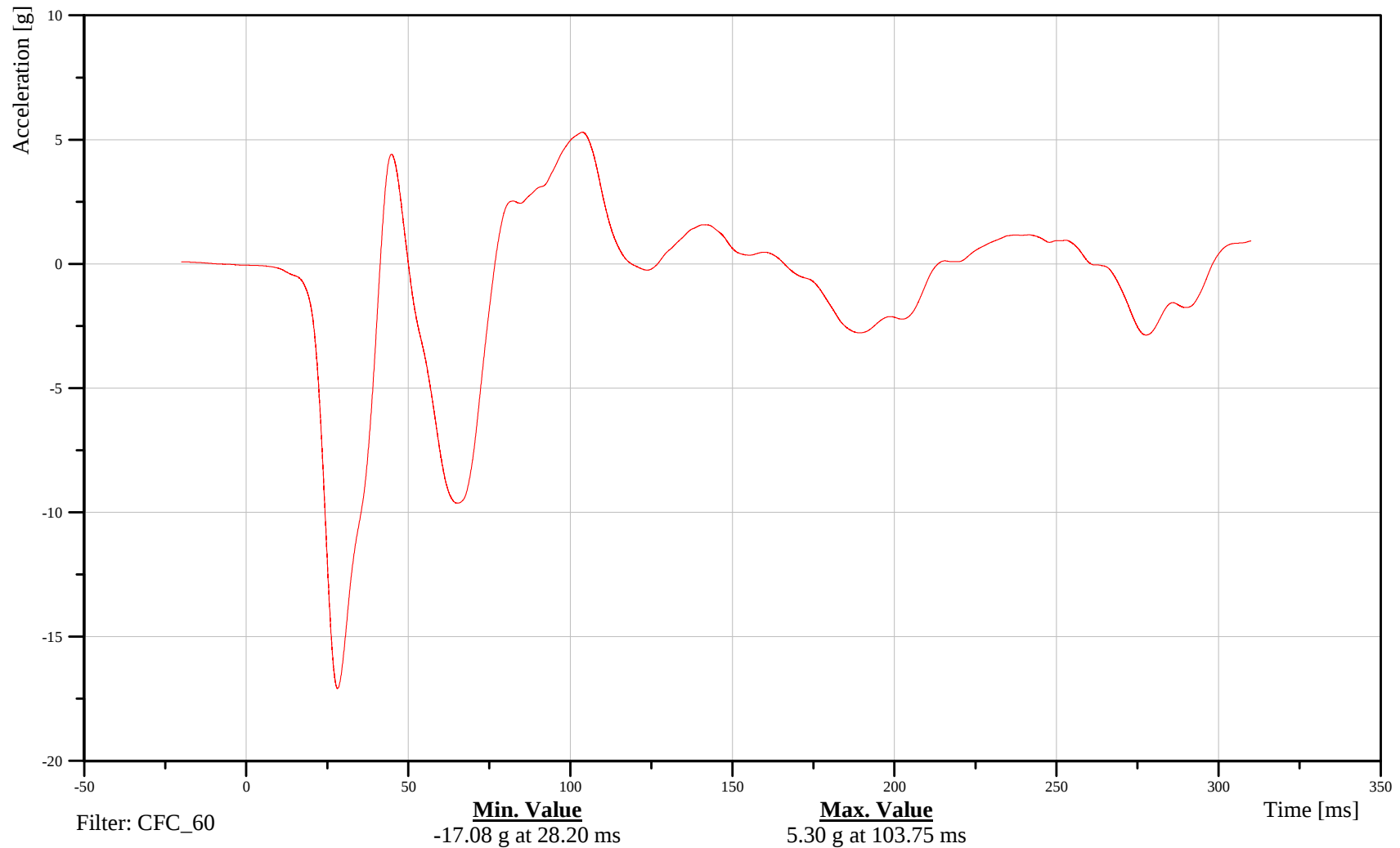
Top of Engine X-Axis Acceleration

Customer: VRTC

12ENGNTTP0000ACXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-118

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

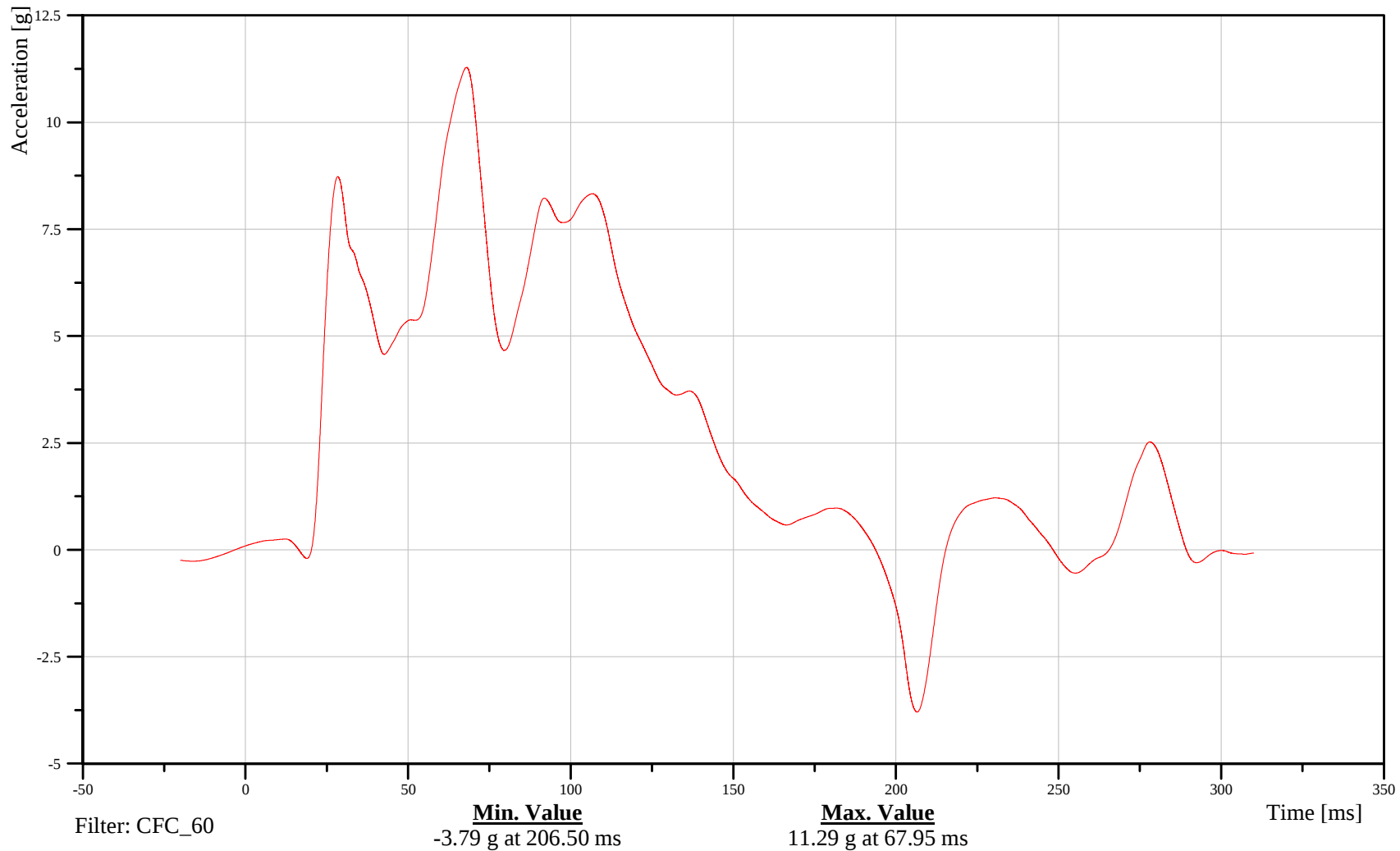
Top of Engine Y-Axis Acceleration

Customer: VRTC

12ENGNTTP0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-119

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

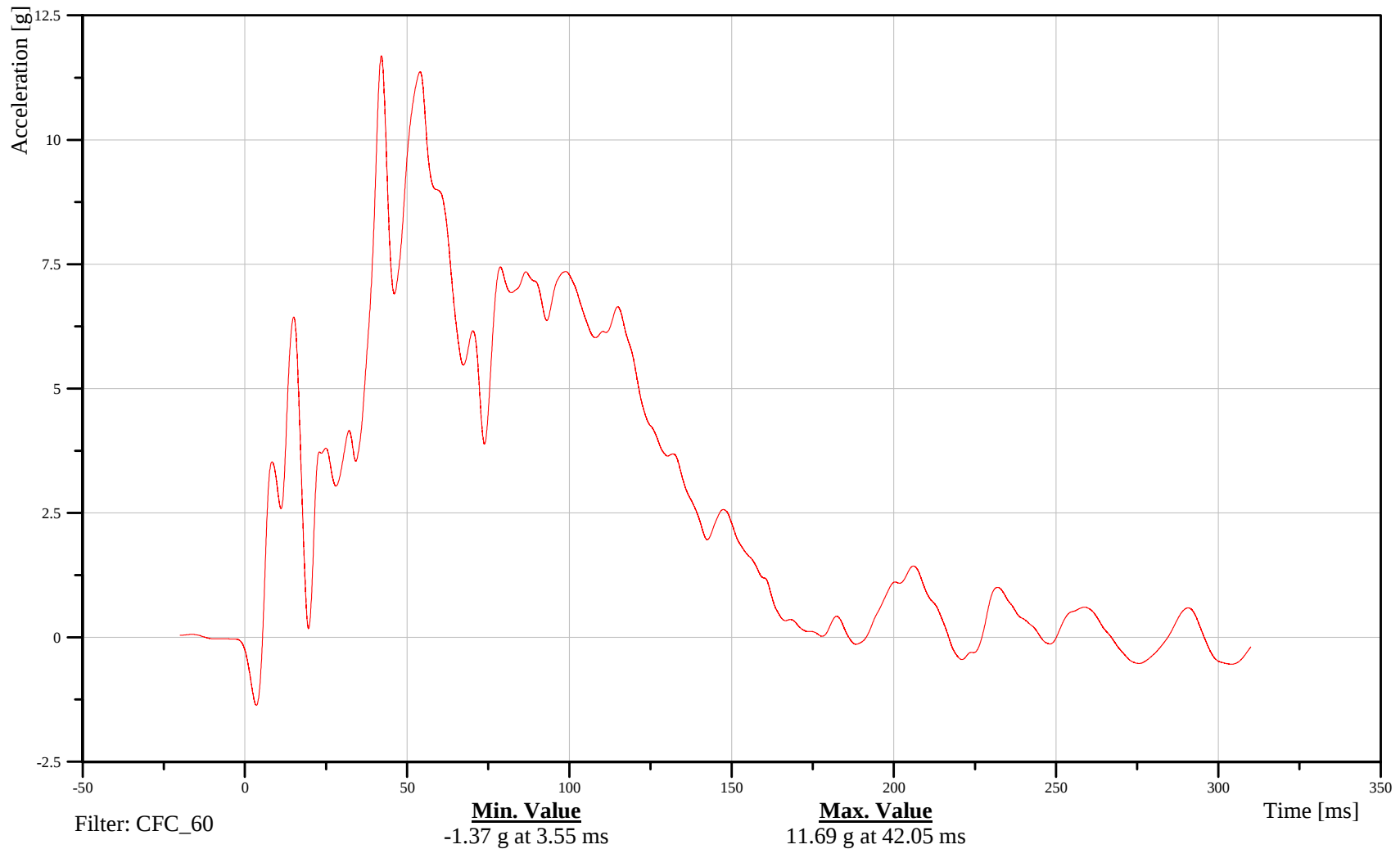
Firewall Y-Axis Acceleration

Customer: VRTC

12VEHC000000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-120

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

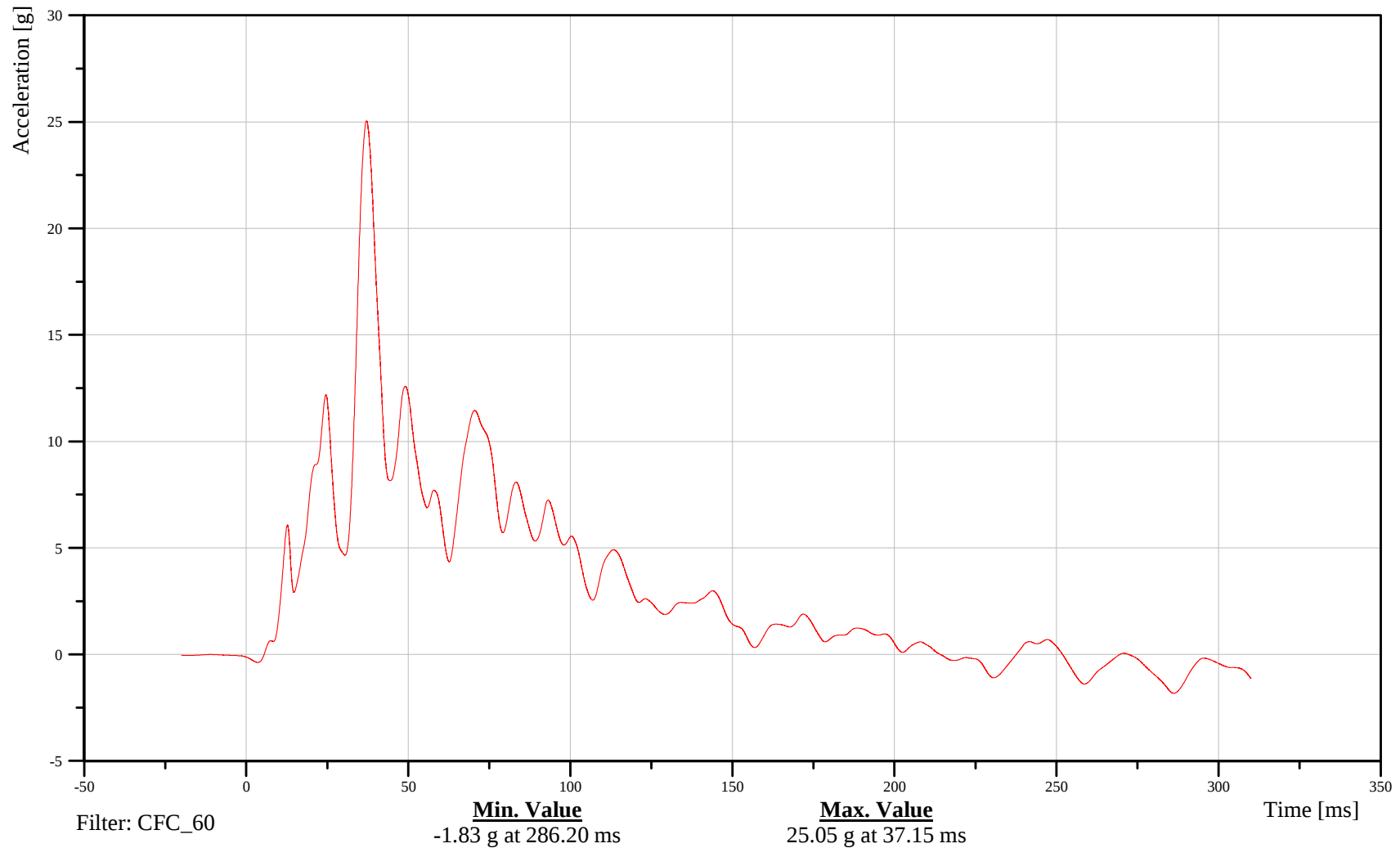
Right Side Roof Rail Y-Axis Acceleration

Customer: VRTC

13ROOF000000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-121

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

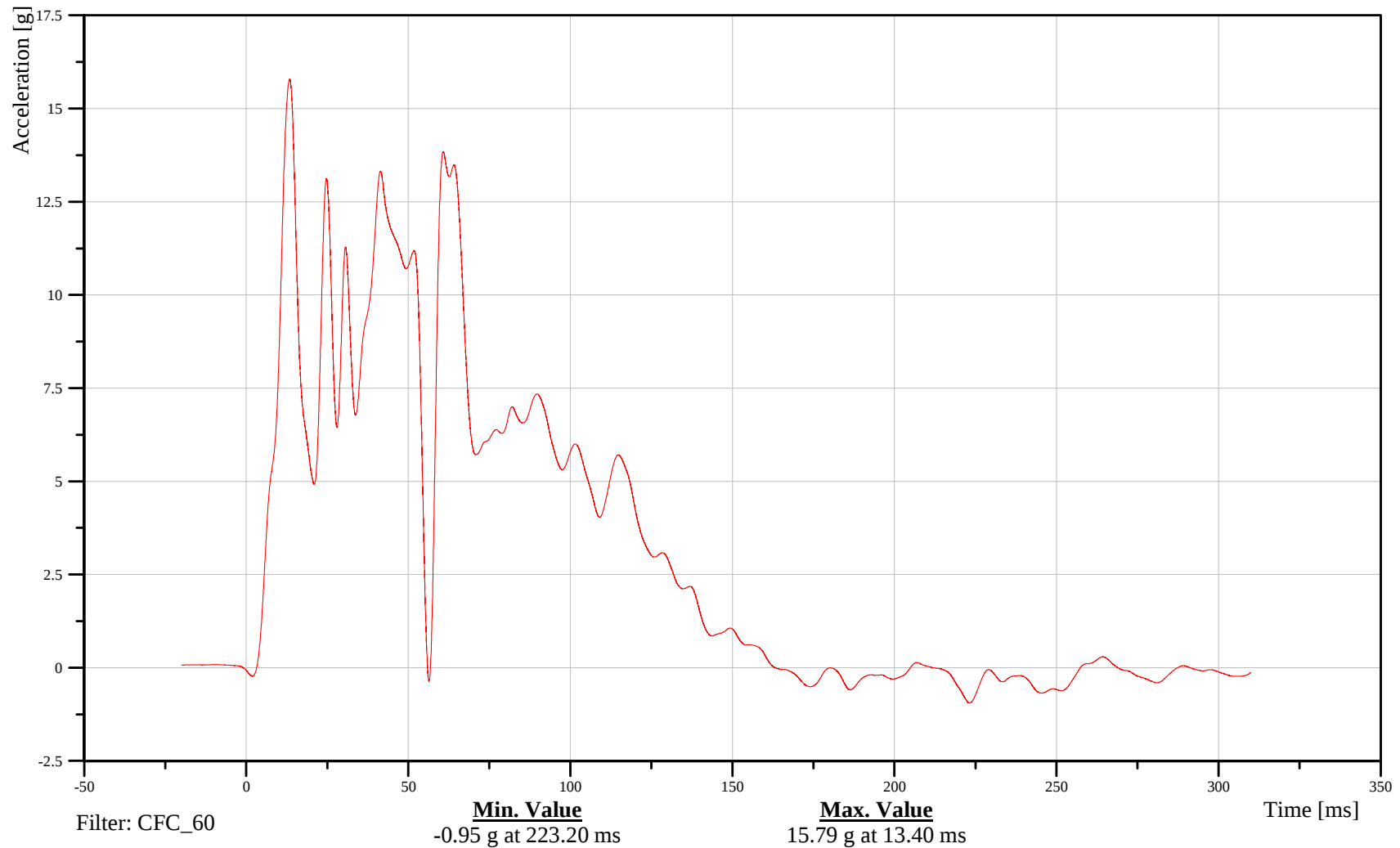
Right Side Sill Y-Axis Acceleration

Customer: VRTC

13SILBFR0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-122

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

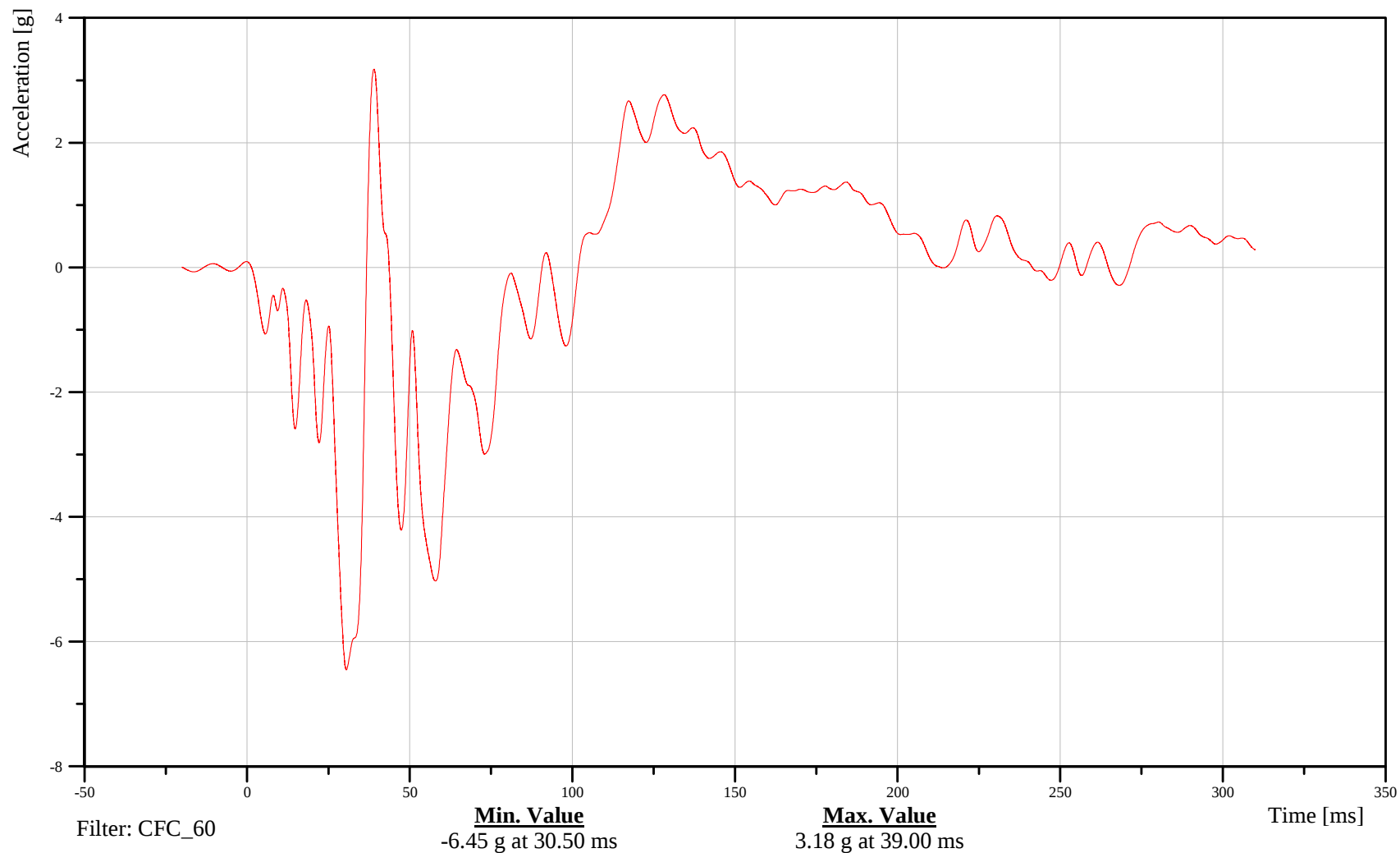
Rear Deck Behind Rear Axle X-Axis Acceleration

Customer: VRTC

18DECK000000ACXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-123

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

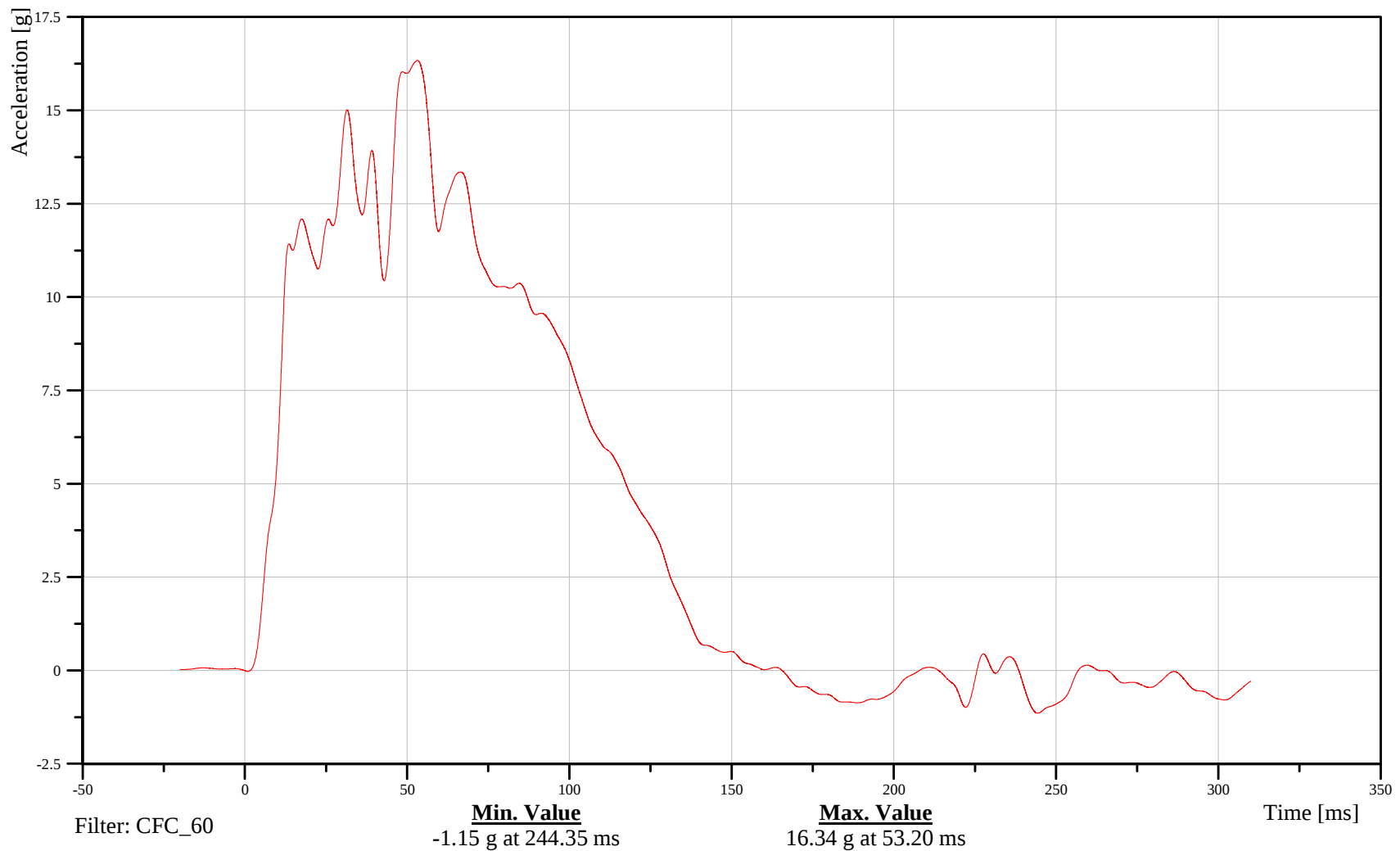
Rear Deck Behind Rear Axle Y-Axis Acceleration

Customer: VRTC

18DECK000000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-124

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

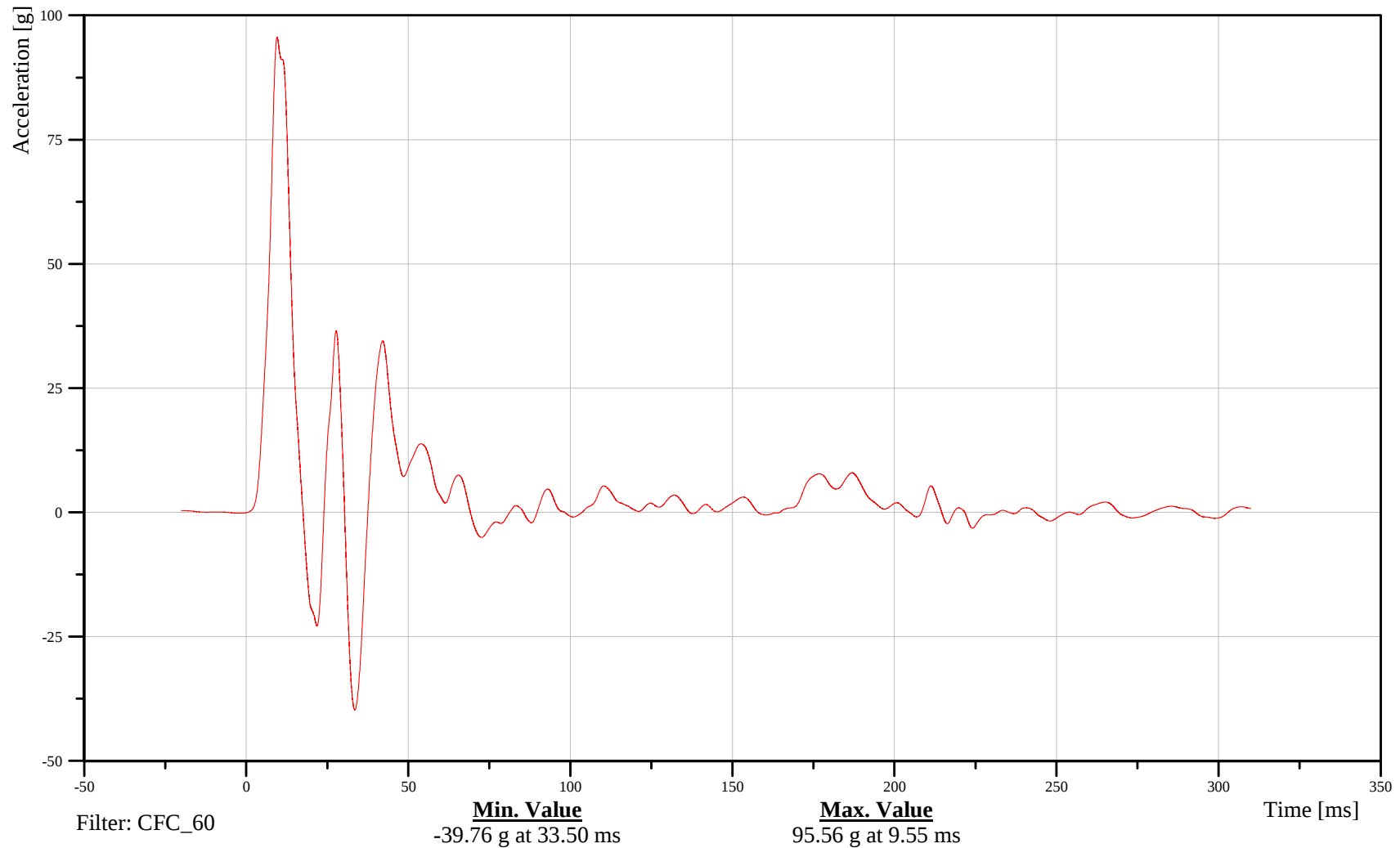
Left Front Door on Center Line X-Axis Acceleration

Customer: VRTC

11DOORFR0000ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-125

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

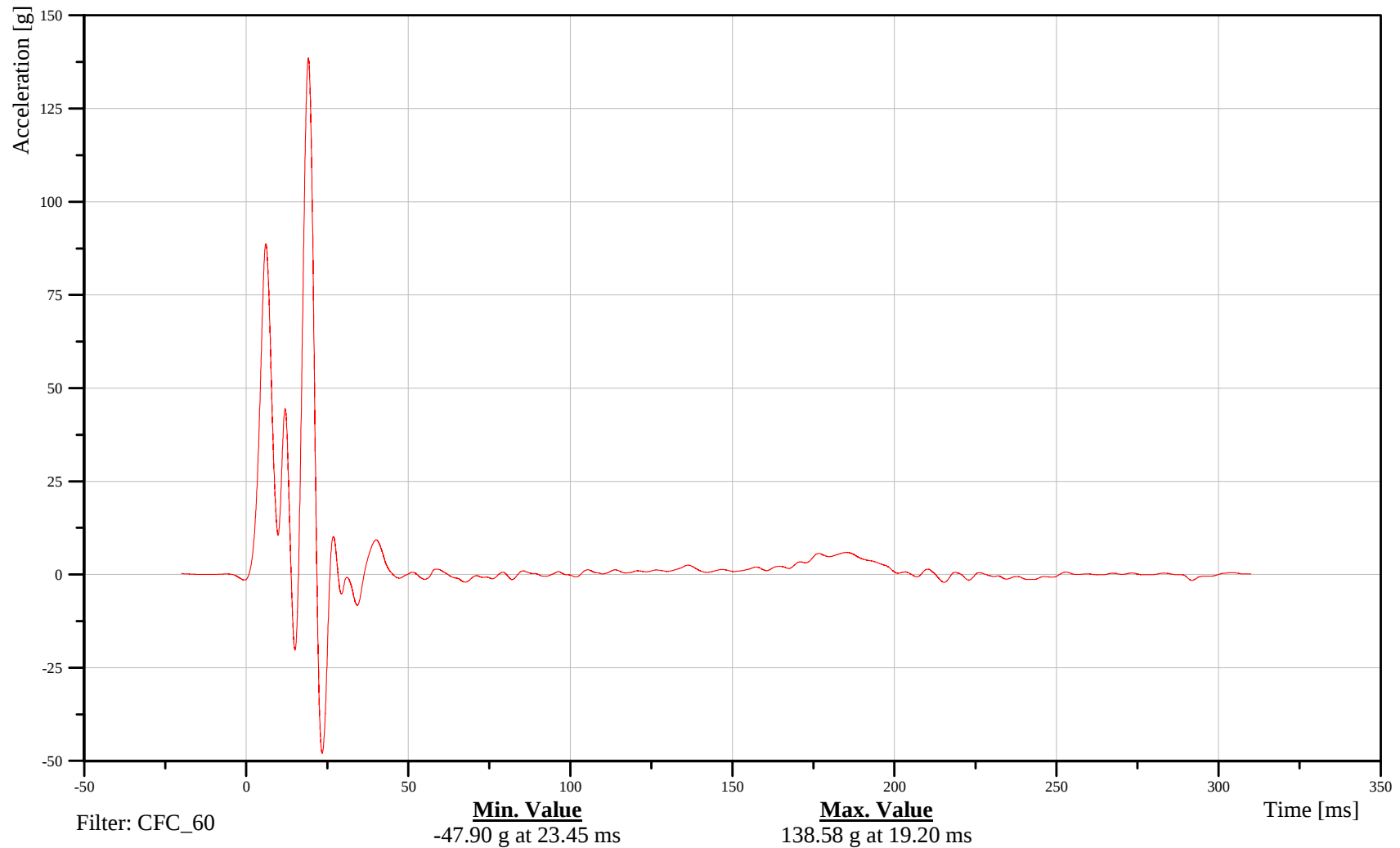
Midrear of Left Front Door Y-Axis Acceleration

Customer: VRTC

11DOORMIRE00ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-126

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

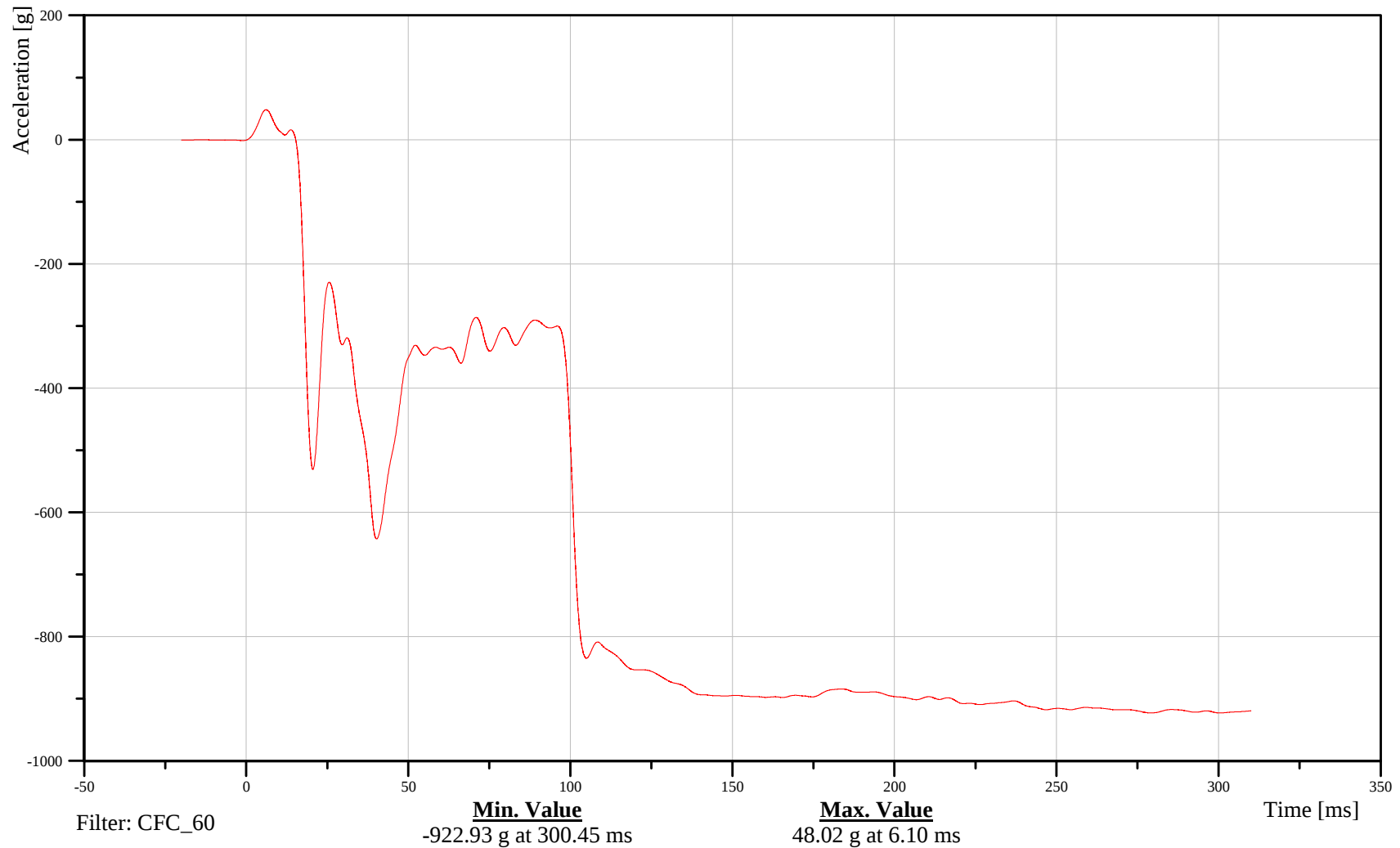
Left Front Door Upper Centerline Y-Axis Acceleration

Customer: VRTC

11DOORLEFRUPACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-127

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

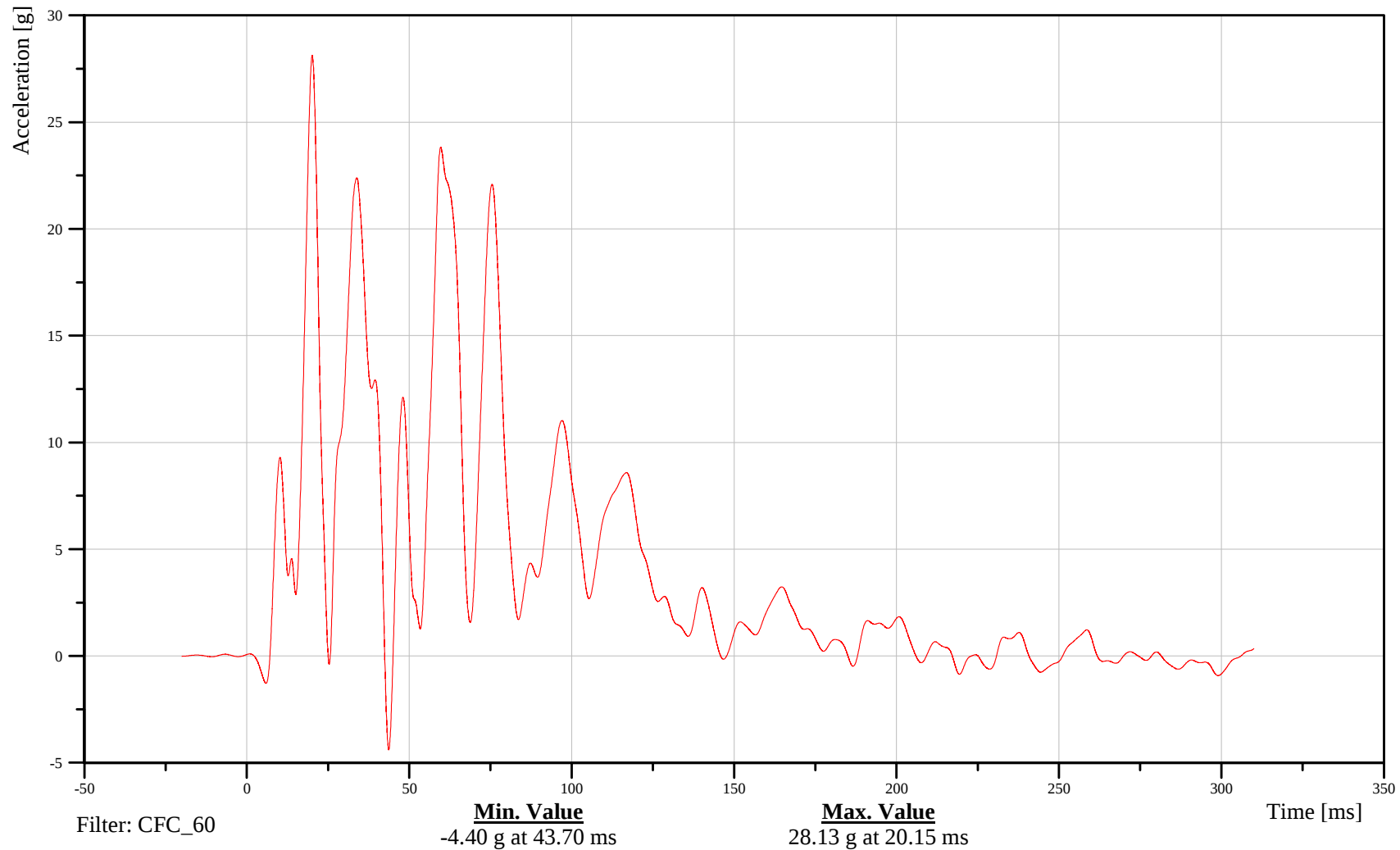
Midrear of Left Rear Door Y-Axis Acceleration

Customer: VRTC

14DOORMIRE00ACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-128

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

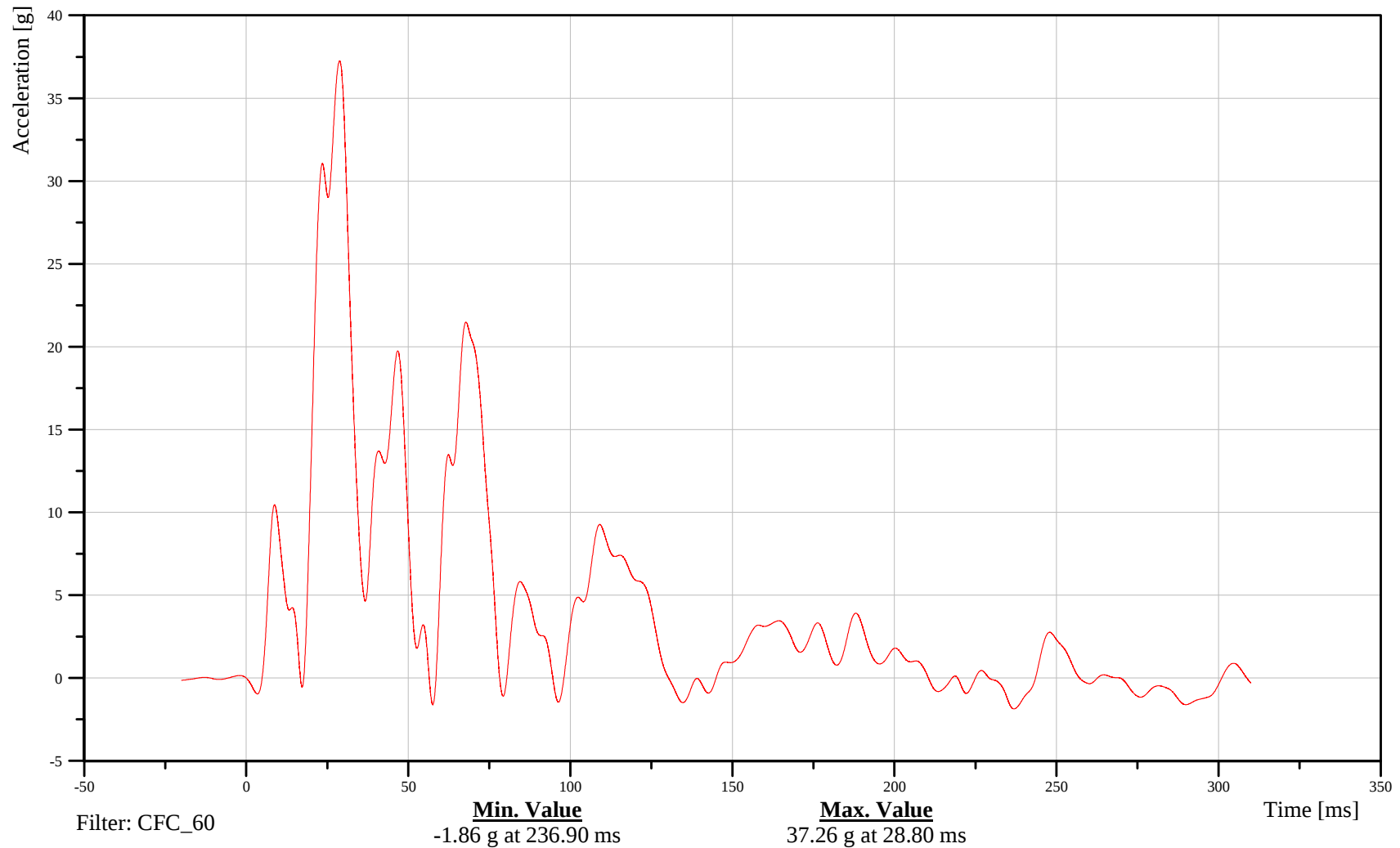
Left Rear Door Upper Centerline Y-Axis Acceleration

Customer: VRTC

14DOORLEREUPACYD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-129

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

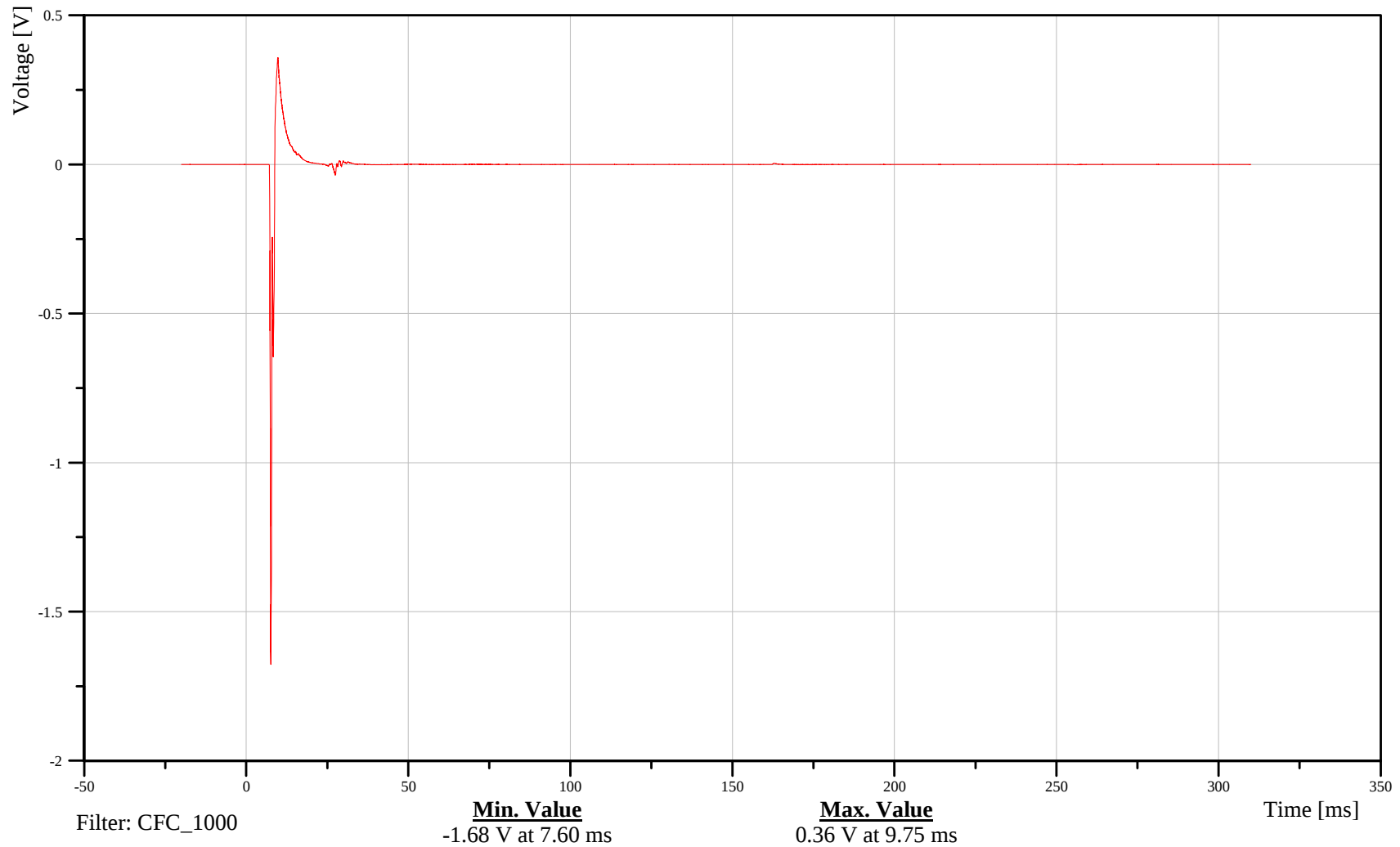
Driver Side Curtain Inductor

Customer: VRTC

11AIRBTPLE00EV0A

TRC Inc. Test Lab: CTF

Test Number: 110817



B-130

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

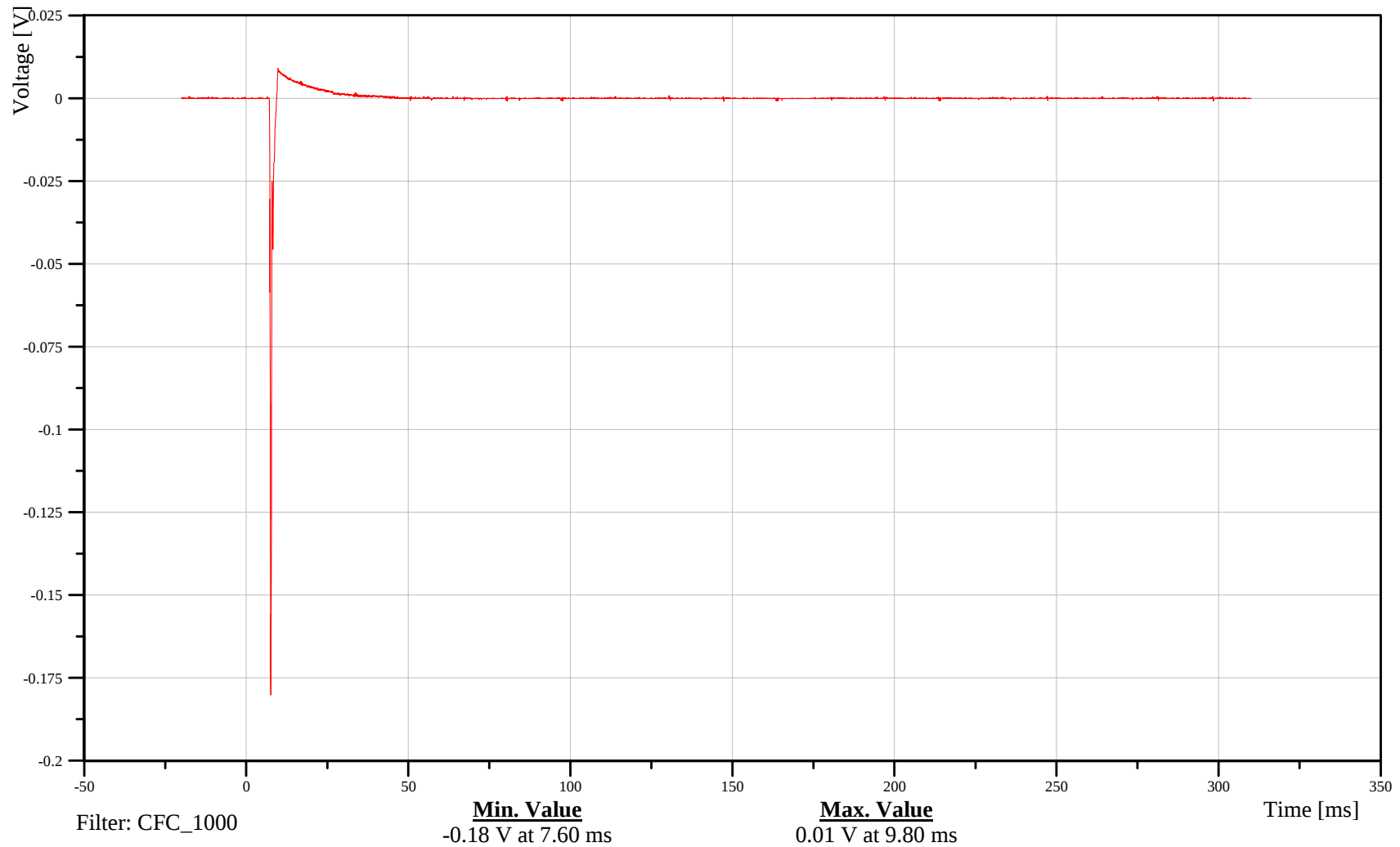
Driver Torso Airbag Fire Inductor

Customer: VRTC

11AIR02N0000EVOA

TRC Inc. Test Lab: CTF

Test Number: 110817



B-131

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

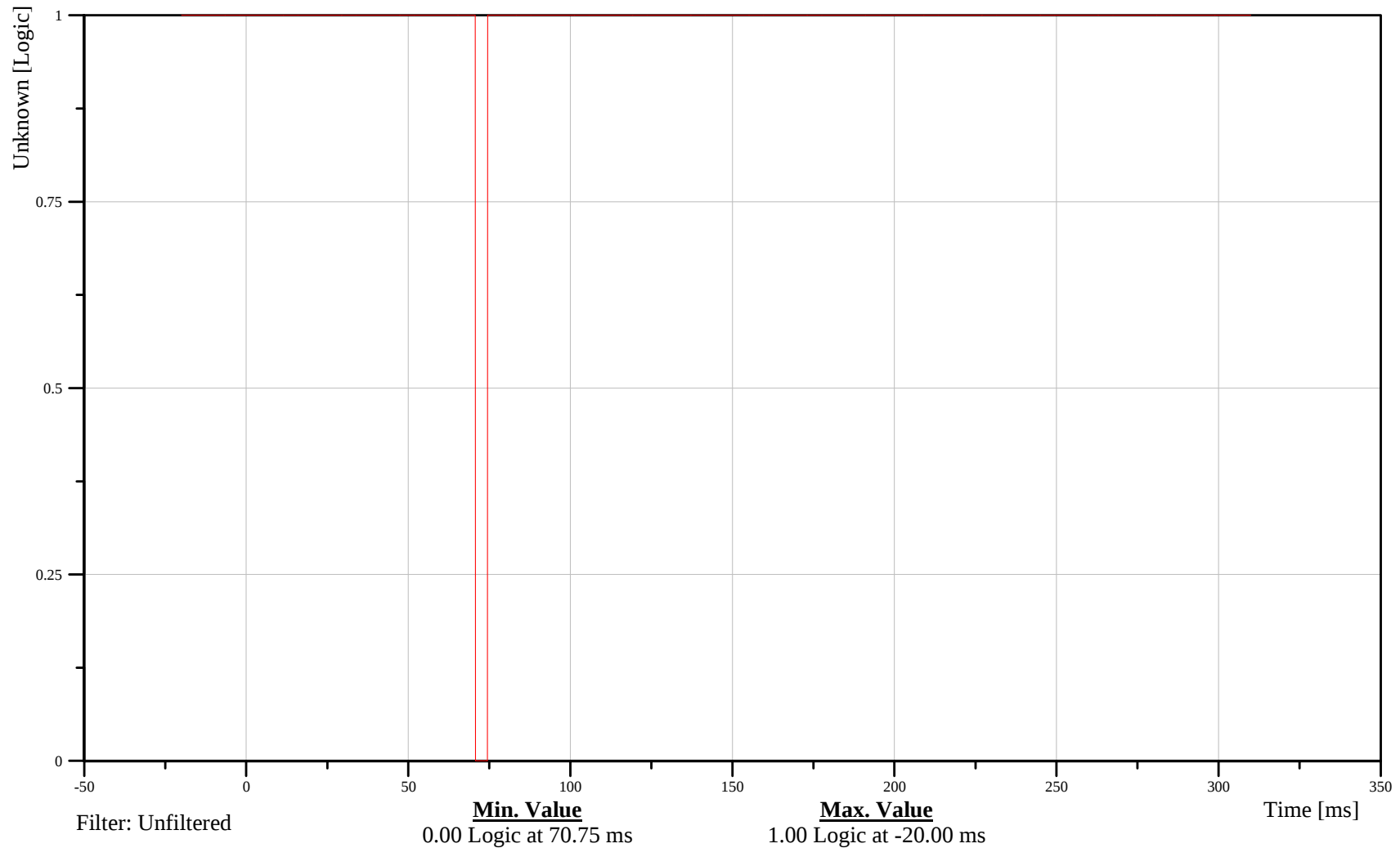
Head Contact Switch

Customer: VRTC

11CONT000001VO00

TRC Inc. Test Lab: CTF

Test Number: 110817



B-132

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

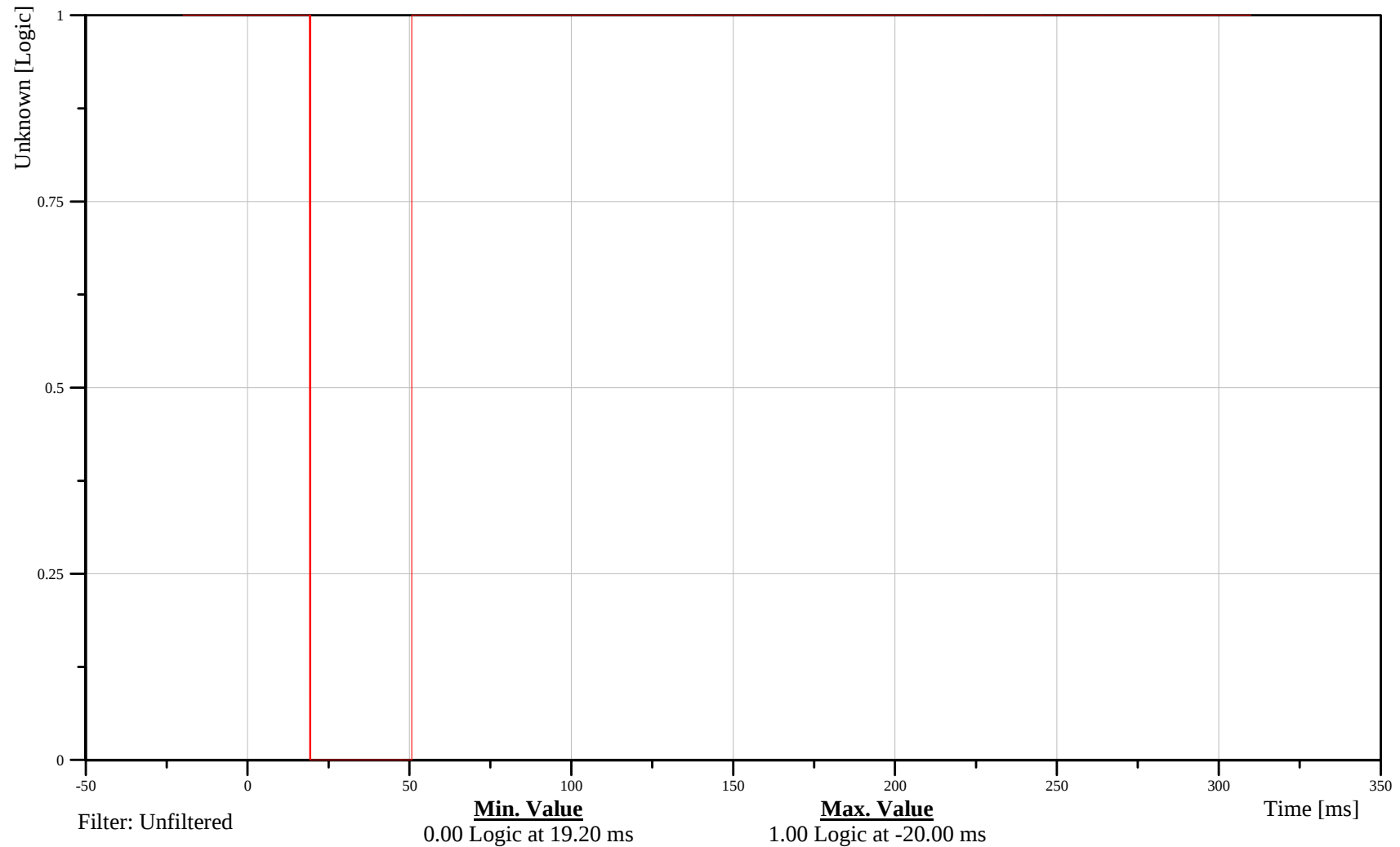
Shoulder Contact Switch

Customer: VRTC

11CONT000002VO00

TRC Inc. Test Lab: CTF

Test Number: 110817



B-133

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

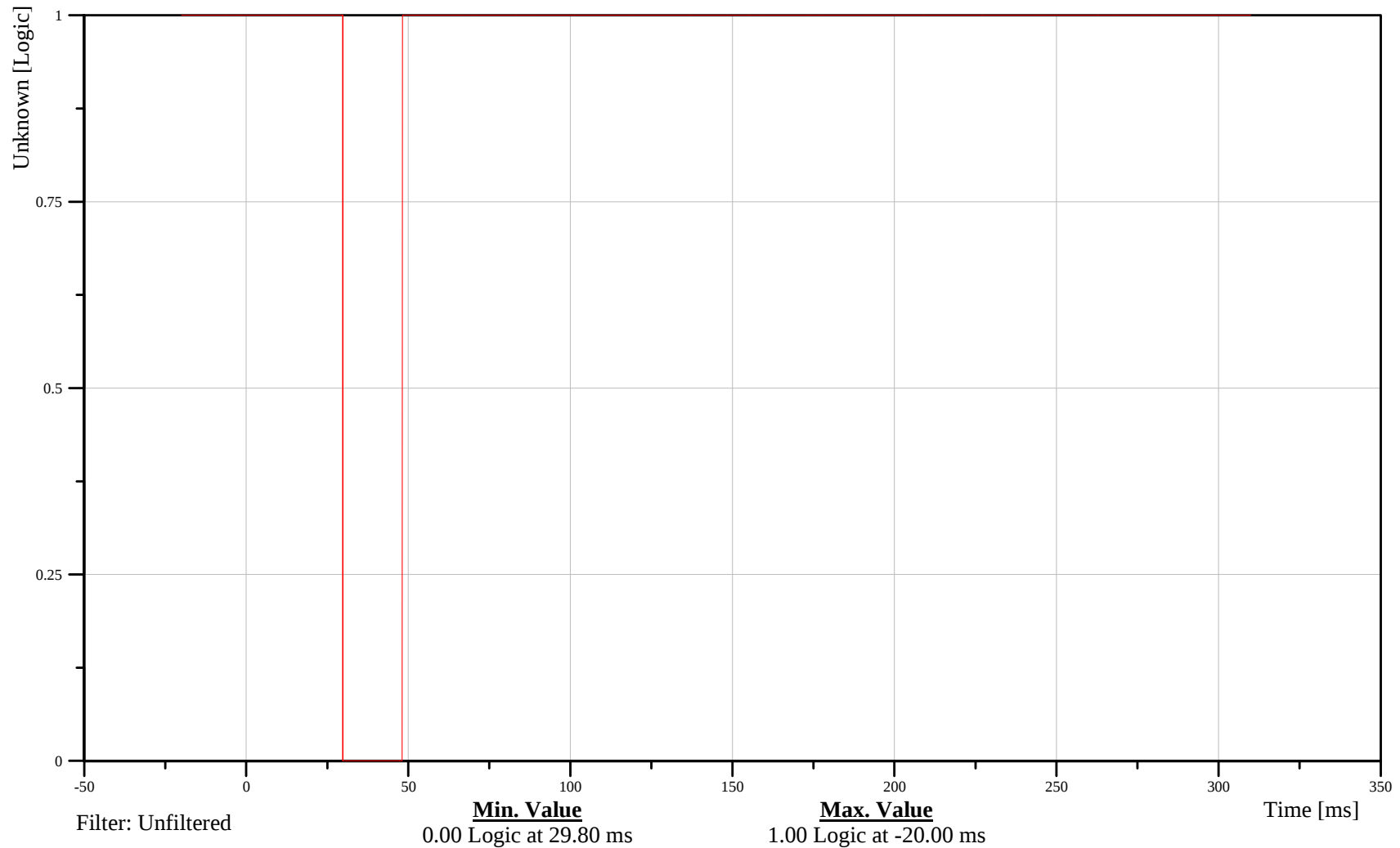
Torso Contact Switch

Customer: VRTC

11CONT000003VO00

TRC Inc. Test Lab: CTF

Test Number: 110817



B-134

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

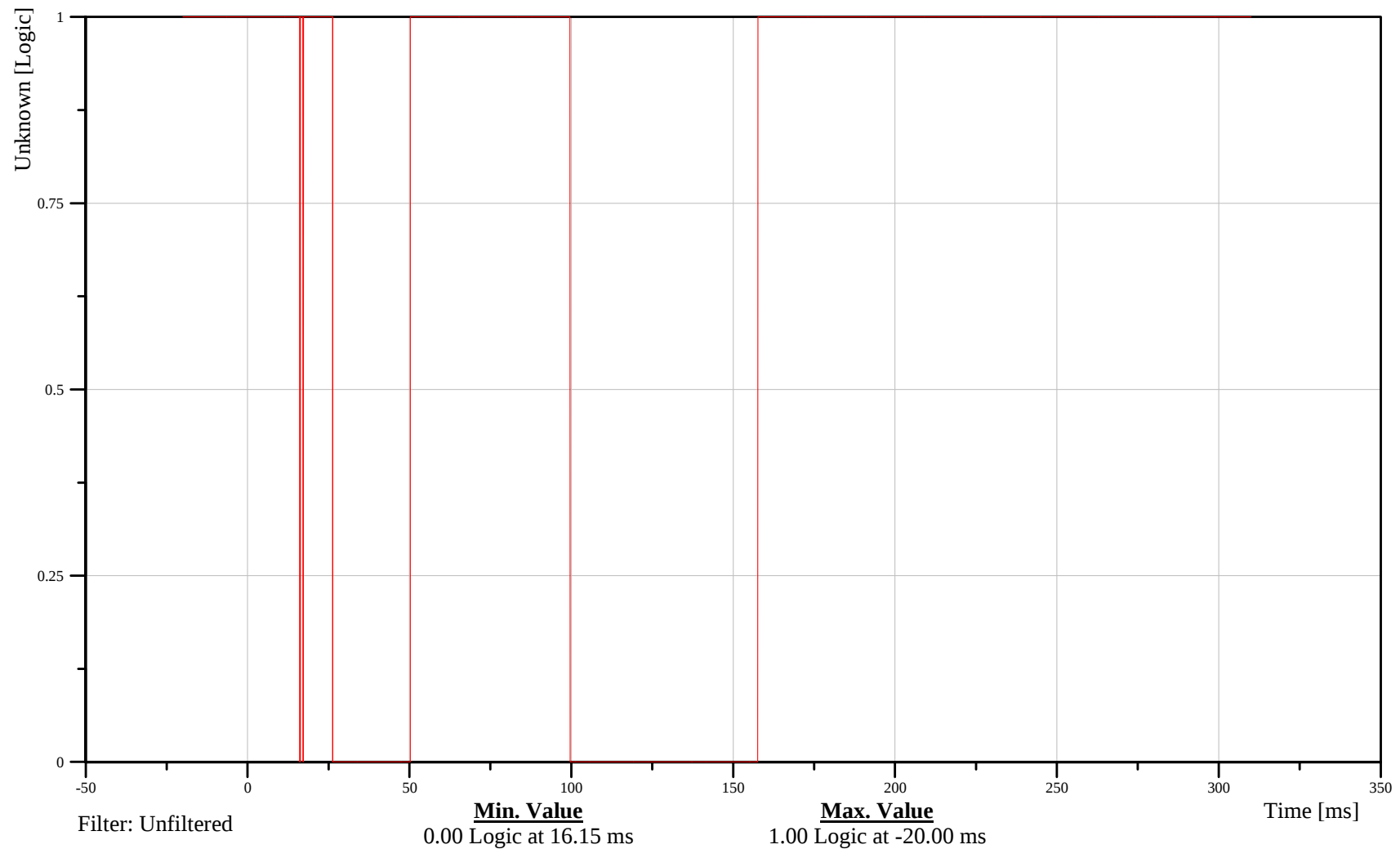
Left Contact Switch

Customer: VRTC

11CONT000004VO00

TRC Inc. Test Lab: CTF

Test Number: 110817



B-135

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

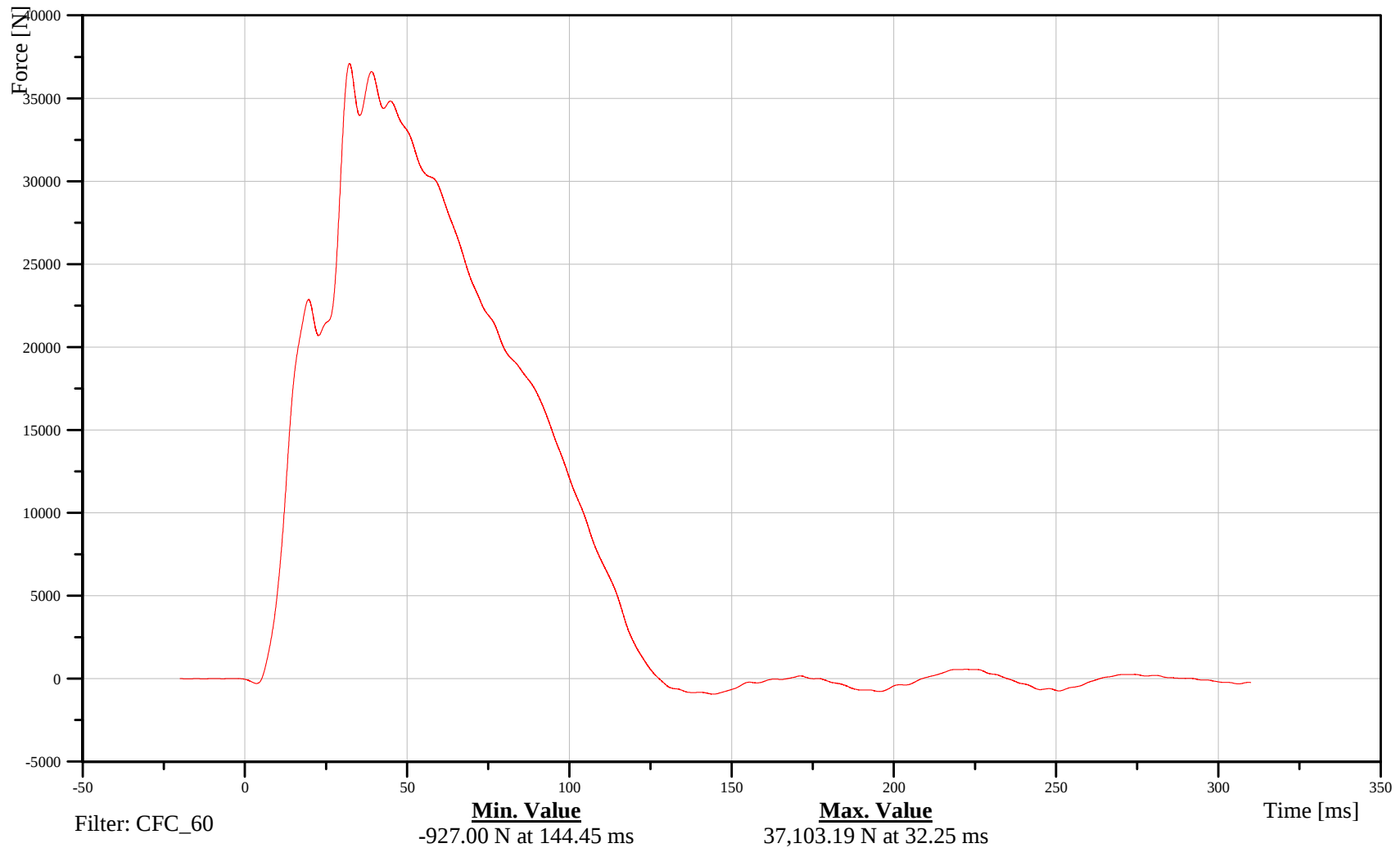
Pole Load Cell 1

Customer: VRTC

K0FBAR010000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-136

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Pole Load Cell 2

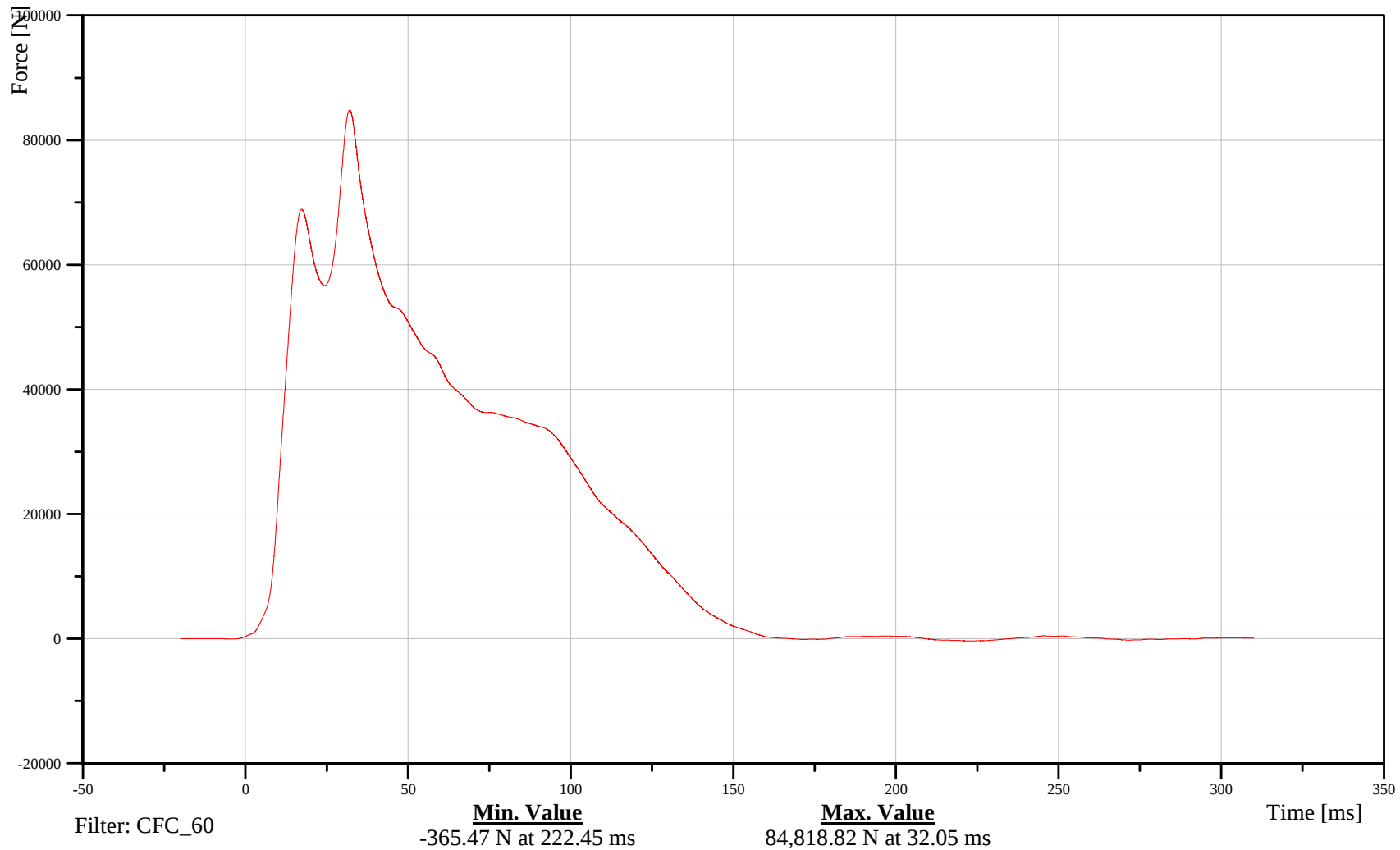
Date: 08/17/2011
Time: 14:32

Customer: VRTC

K0FBAR020000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-137

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

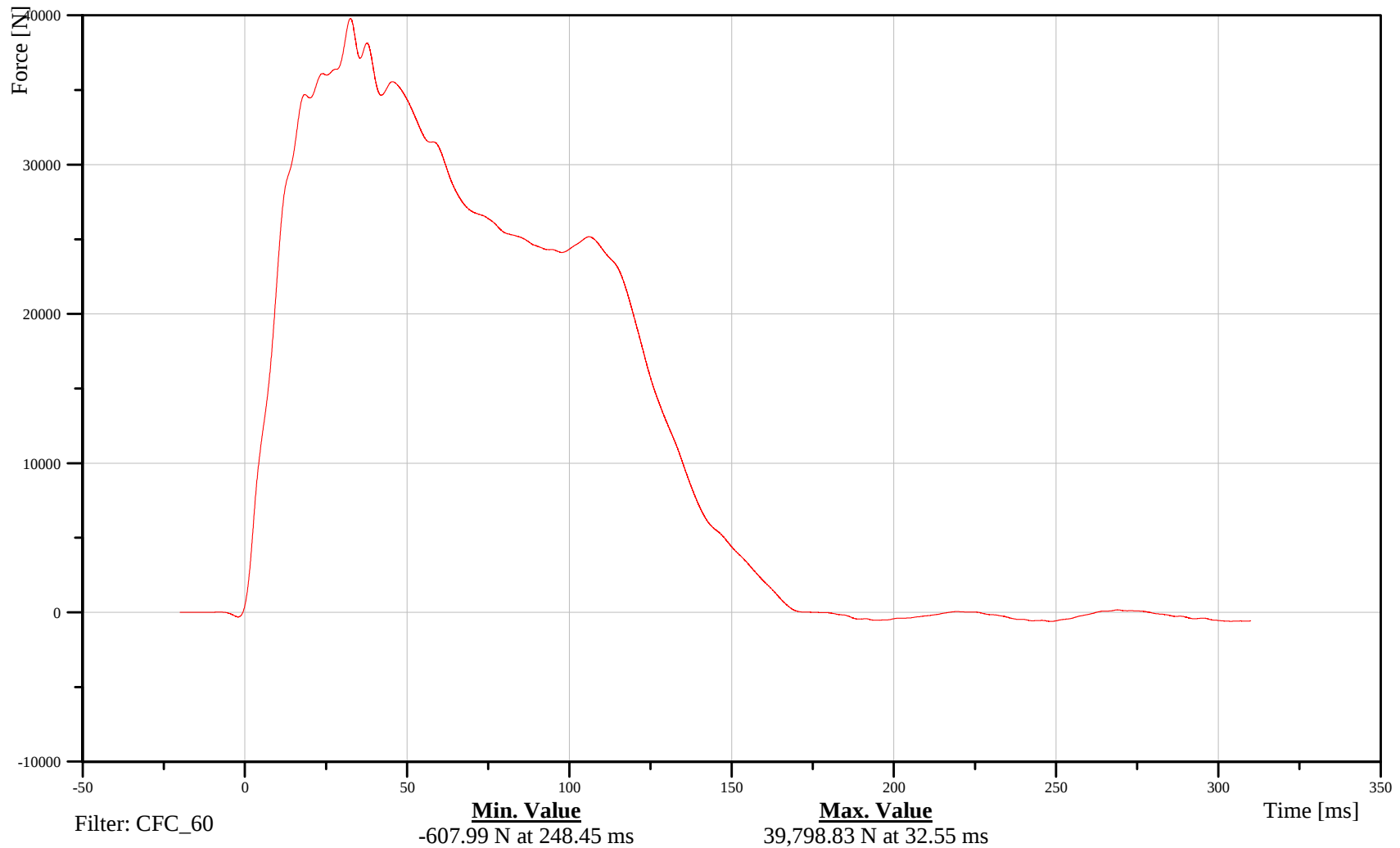
Pole Load Cell 3

Customer: VRTC

K0FBAR030000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-138

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

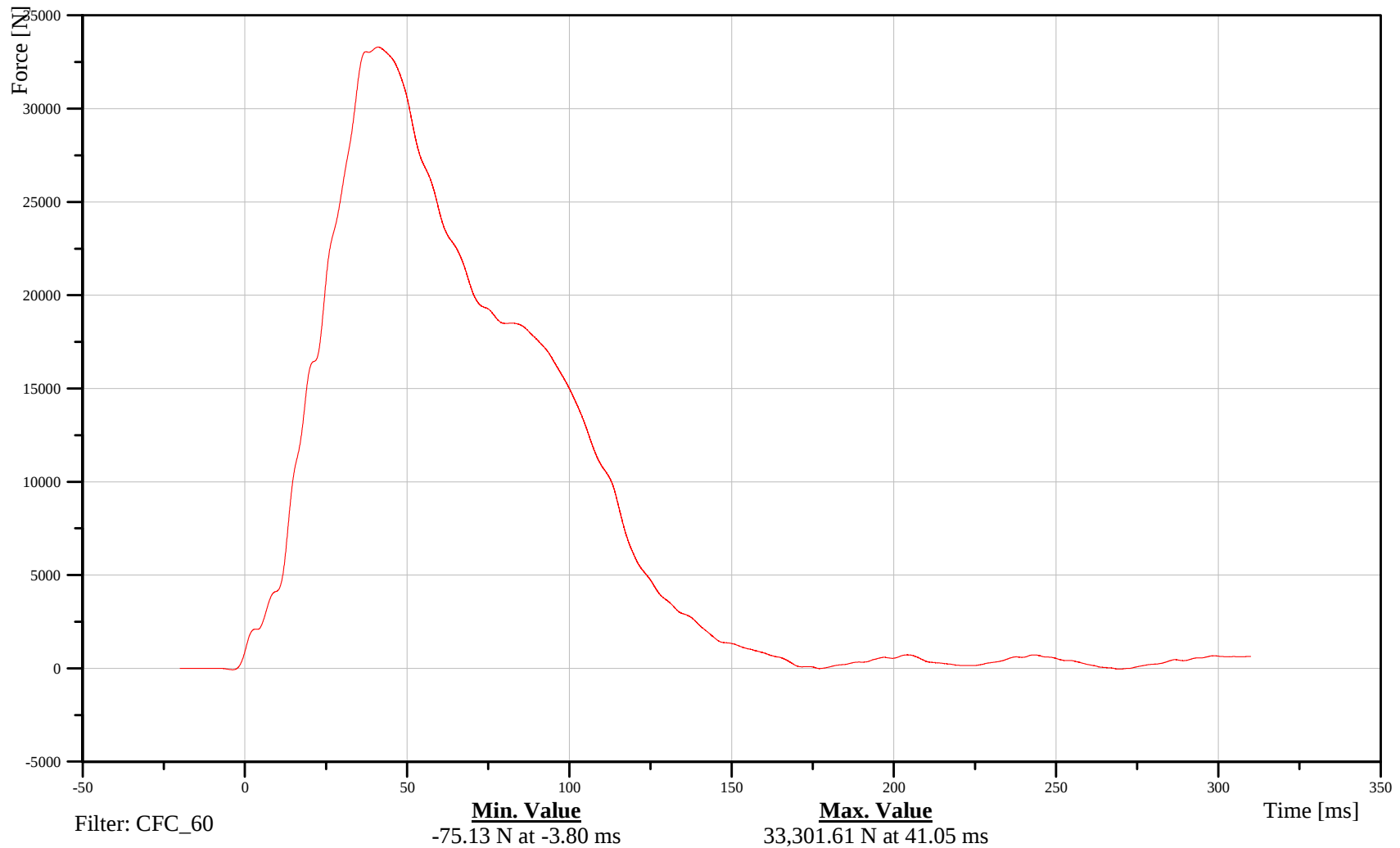
Pole Load Cell 4

Customer: VRTC

K0FBAR040000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-139

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

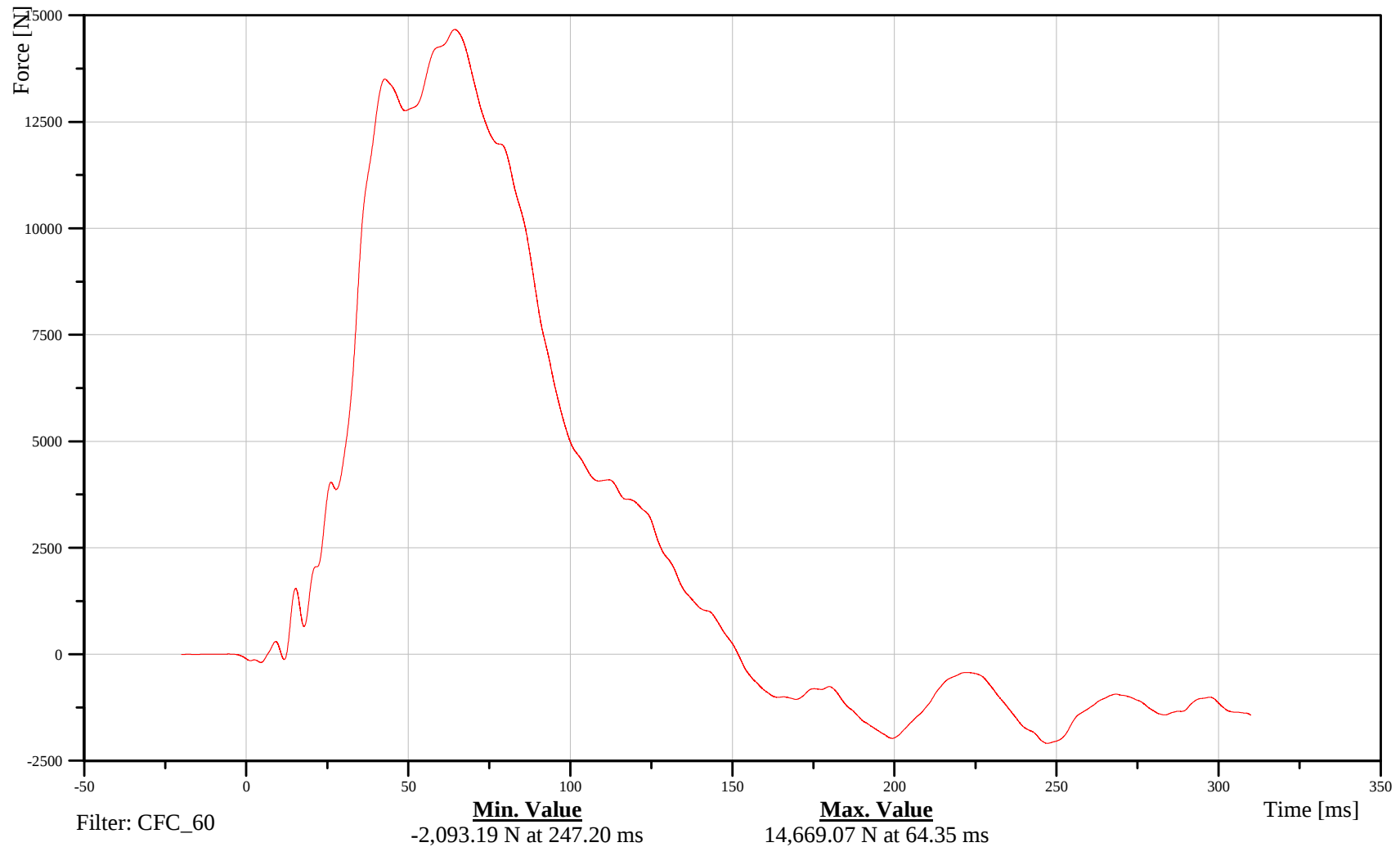
Pole Load Cell 5

Customer: VRTC

K0FBAR050000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-140

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

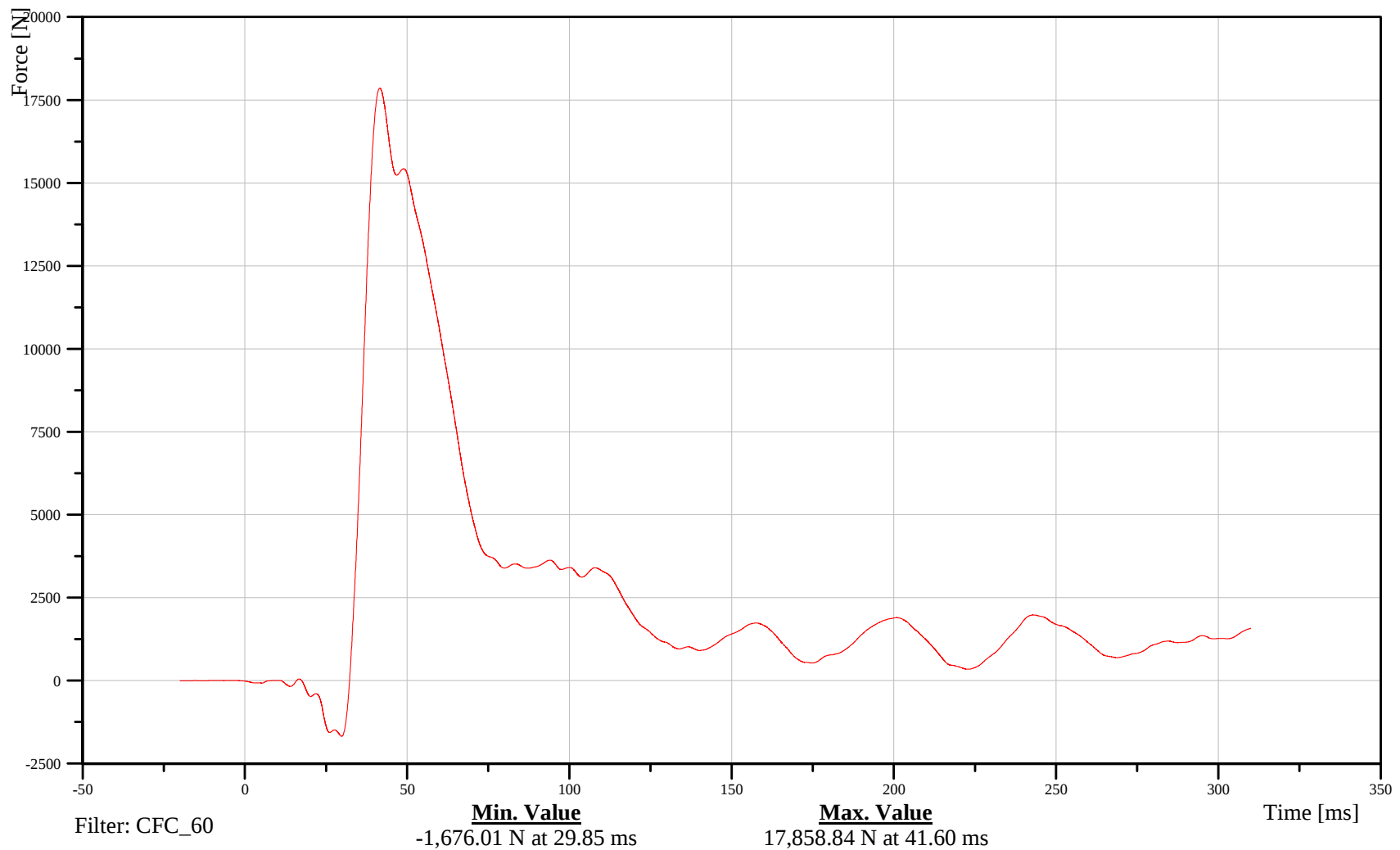
Pole Load Cell 6

Customer: VRTC

K0FBAR060000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-141

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

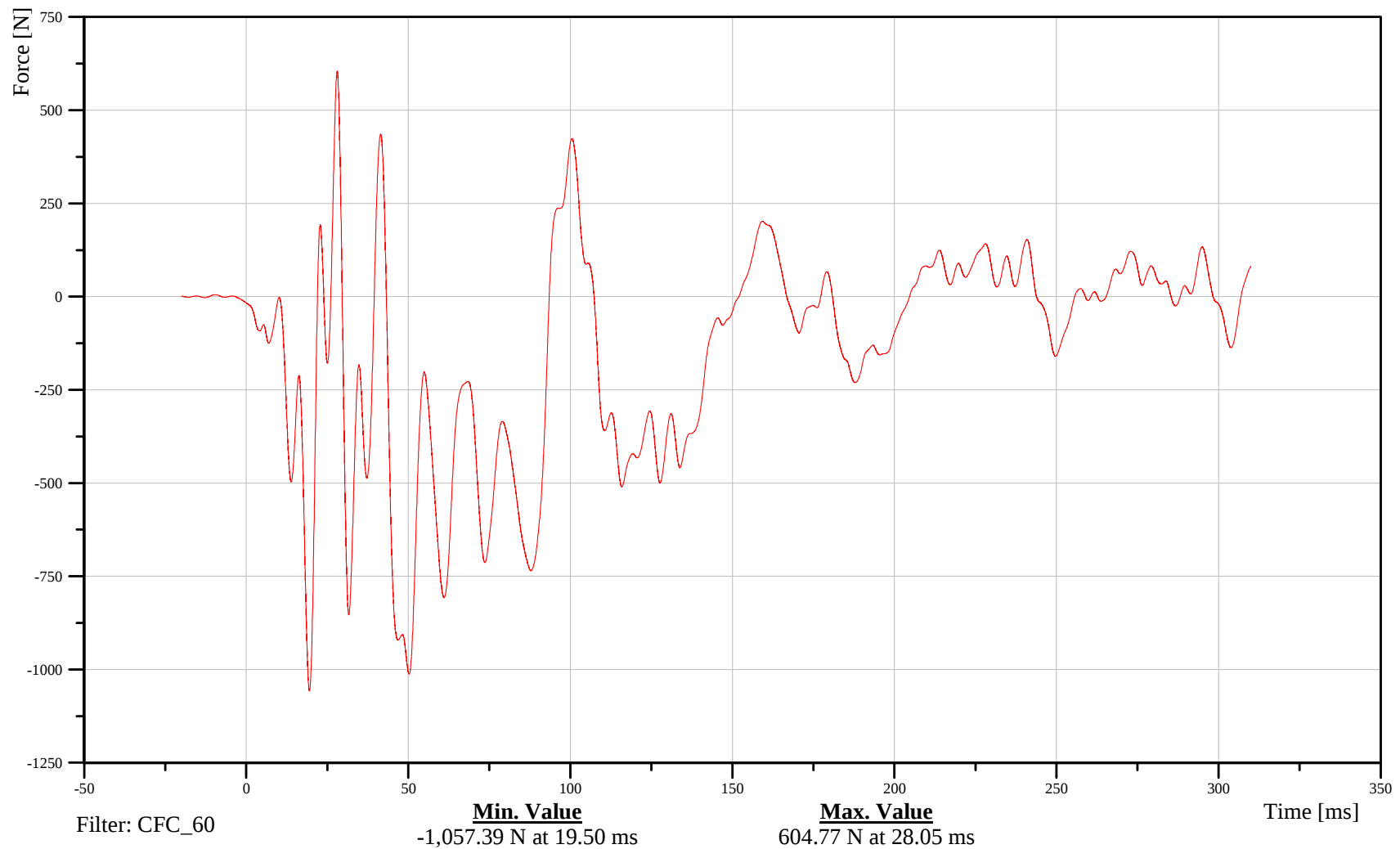
Pole Load Cell 7

Customer: VRTC

K0FBAR070000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-142

110817



2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph

Date: 08/17/2011
Time: 14:32

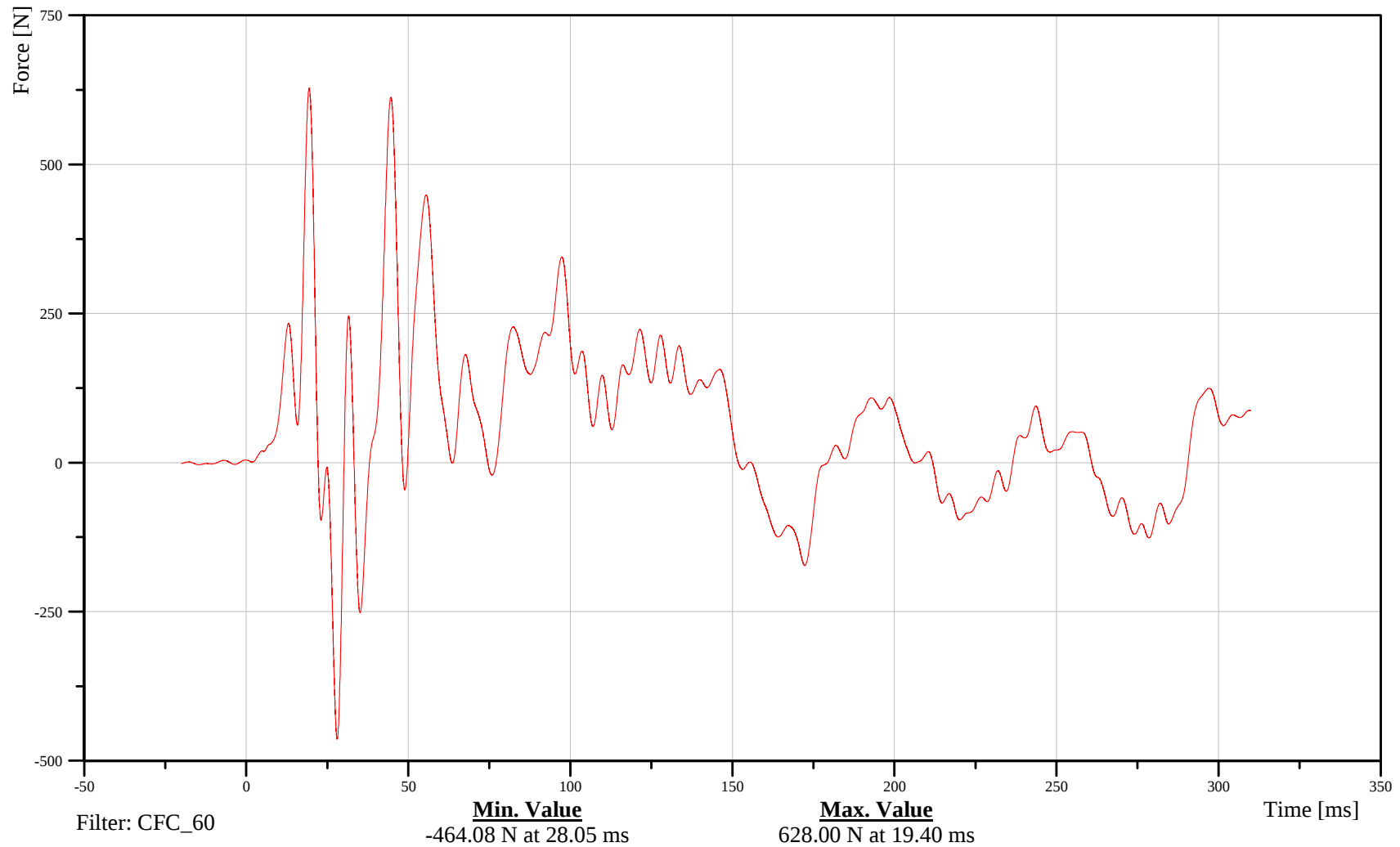
Pole Load Cell 8

Customer: VRTC

K0FBAR080000FOXD

TRC Inc. Test Lab: CTF

Test Number: 110817



B-143

110817

Appendix C

World SID Configuration and Performance Verification Data

Calibration Test Results

Pre-Test

World SID: 014

Configured for Left Side Impact

Transportation Research Center Inc.

Front Head Drop

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

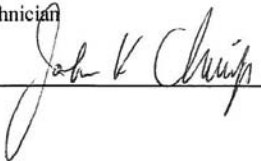
Test Date: 8/12/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	256.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-5.5 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

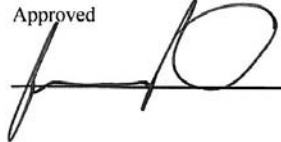
Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 10:42:19 614

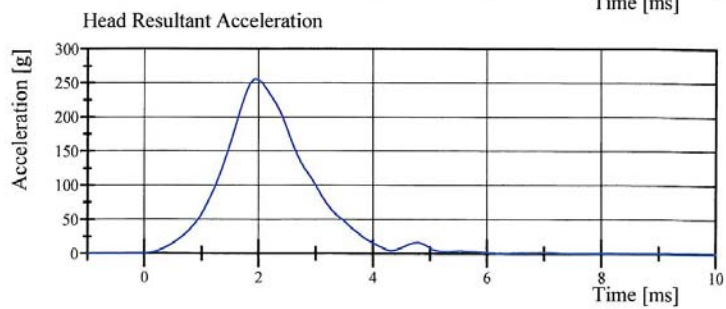
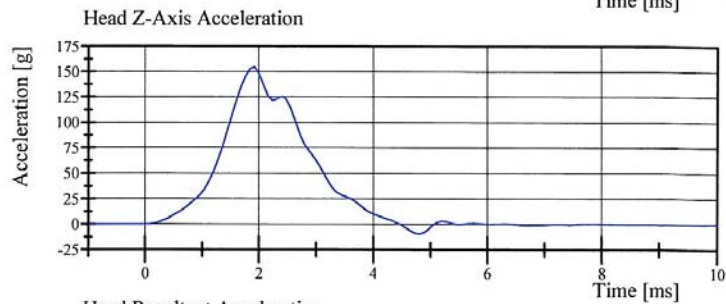
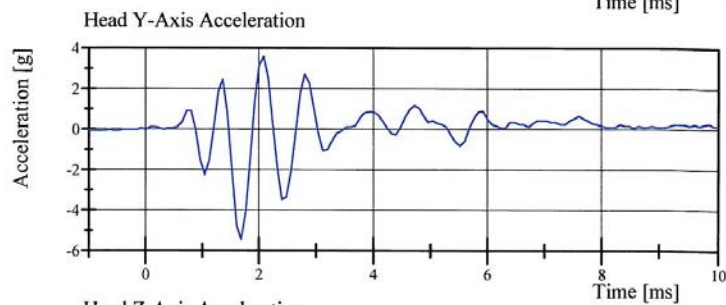
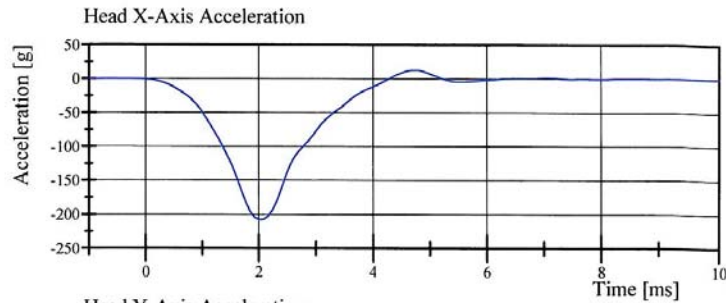


Transportation Research Center Inc.

Front Head Drop

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

Test Date: 8/12/2011



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 10:42:36 614



Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-4

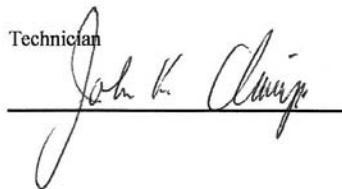
Test Date: 8/12/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Peak Head Resultant Acceleration	99 - 121 g	115.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	3.5 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

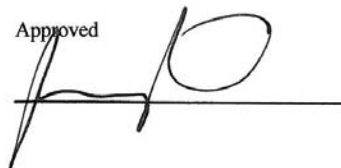
Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 13:26:00 605

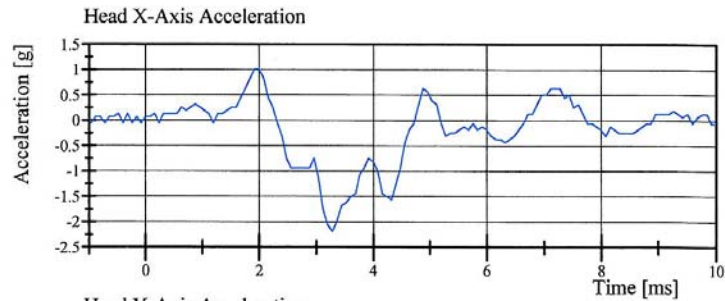


Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-4

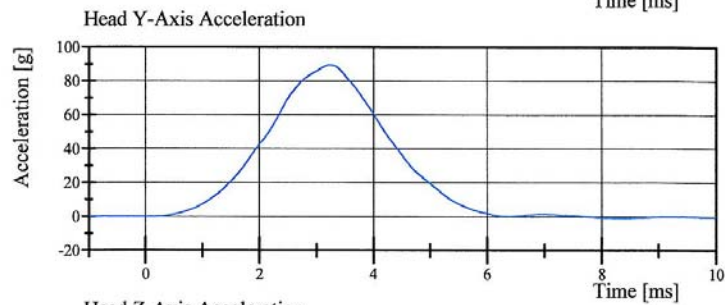
Test Date: 8/12/2011



Filter Class: CFC_1000

Max: 1.0 gn at 1.9 ms

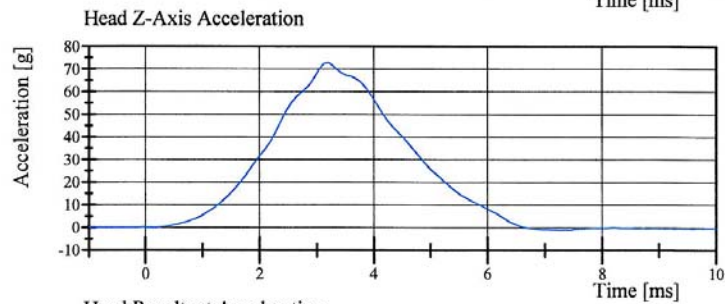
Min: -2.2 gn at 3.3 ms



Filter Class: CFC_1000

Max: 89.5 gn at 3.3 ms

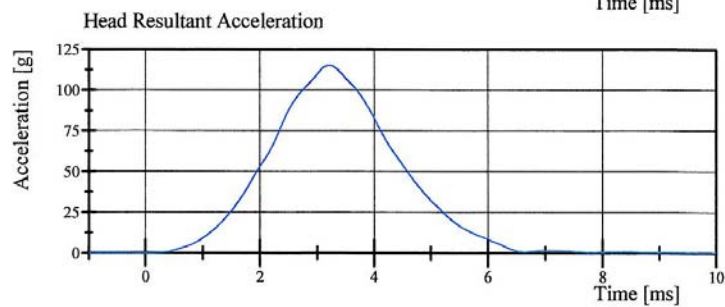
Min: -0.8 gn at 8.2 ms



Filter Class: CFC_1000

Max: 72.8 gn at 3.2 ms

Min: -1.0 gn at 7.3 ms



Filter Class: CFC_1000

Max: 115.3 gn at 3.2 ms

Min: 0.1 gn at -1.0 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 13:26:21 605



Transportation Research Center Inc.

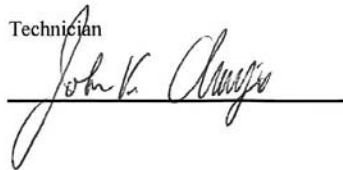
Right Lateral Head Drop
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2
Test Date: 8/12/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Peak Head Resultant Acceleration	99 - 121 g	114.5 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-3.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

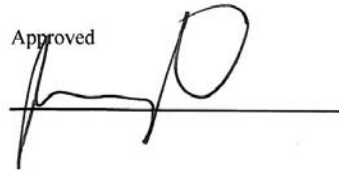
Test meets specifications.

Comments:

Technician



Approved



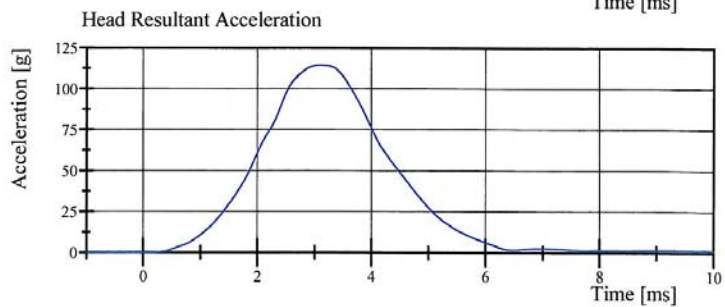
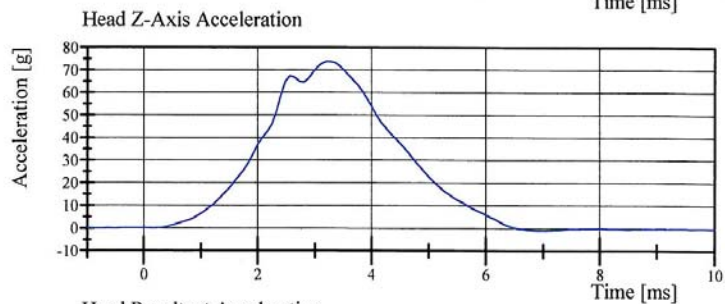
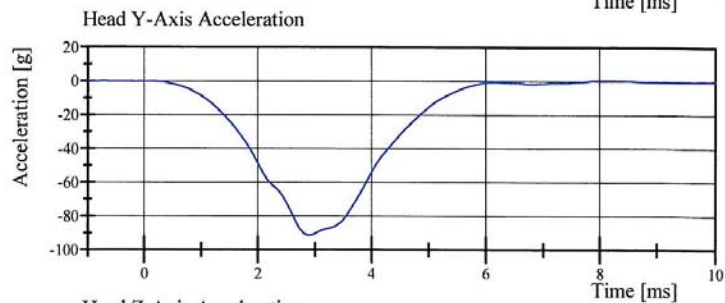
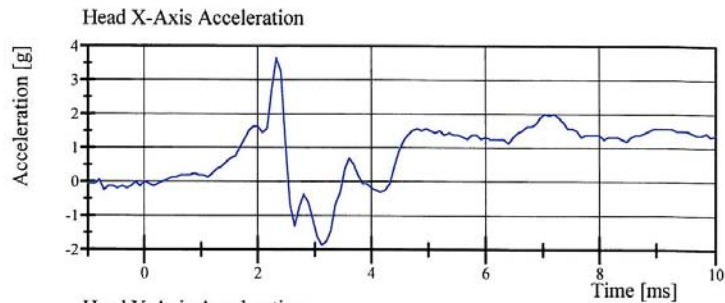
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 10:16:33 606



Transportation Research Center Inc.

Right Lateral Head Drop
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2
Test Date: 8/12/2011



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.12.2011 10:16:58 606



Transportation Research Center Inc.

Left Lateral Neck

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Pendulum Velocity	(-3.3) - (-3.5) m/s	-3.45 m/s	Yes
Pendulum Integrated Velocity Change at 4 ms	0.77 - 1.04 m/s	0.991 m/s	Yes
Change at 8 ms	1.6 - 2.16 m/s	2.059 m/s	Yes
Change at 12 ms	2.43 - 3.29 m/s	3.238 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-51.7 deg	Yes
Headform Flexion Decay - from Peak to Zero Degrees	58 - 72 ms	60.2 ms	Yes
Total Neck Occipital Condyles Moment	55 - 68 N·m	63.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	79.0 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-32.1 °	Yes
Time of Peak	56 - 68 ms	61.0 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-30) - (-37) °	-32.2 °	Yes
Time of Peak	56 - 68 ms	56.6 ms	Yes

Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.15.2011 10:27:55 1321

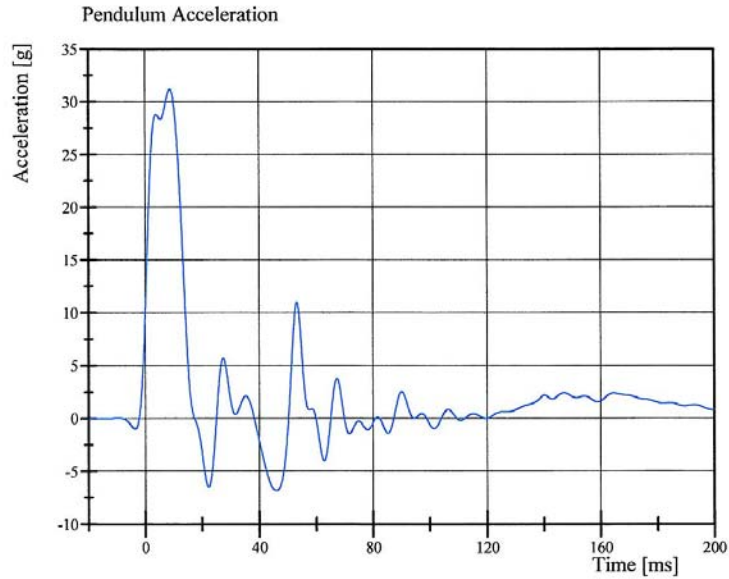


Transportation Research Center Inc.

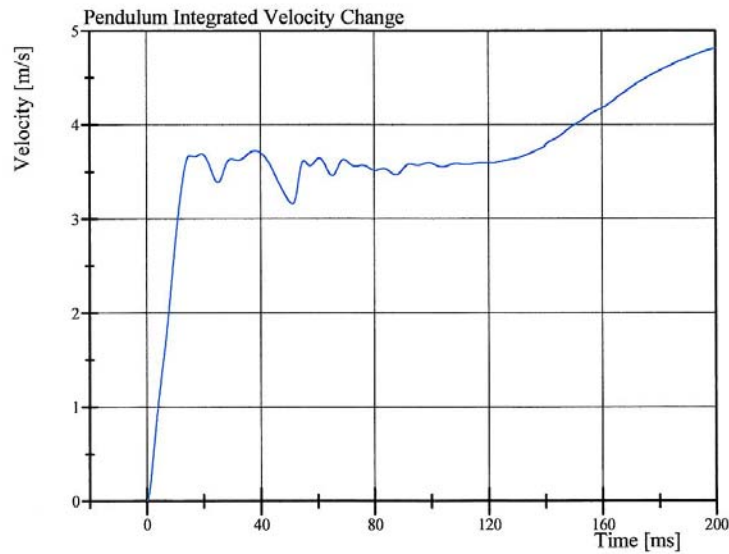
Left Lateral Neck

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

Test Date: 8/15/2011



Filter Class: CFC_60
Max: 31.2 gn at 8.9 ms
Min: -6.8 gn at 45.9 ms



Filter Class: CFC_180
Max: 4.8 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.15.2011 10:28:06 1321

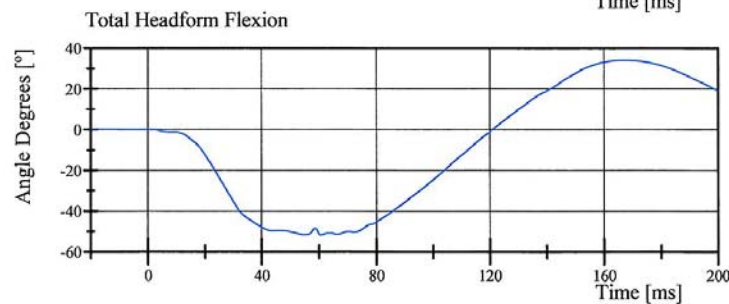
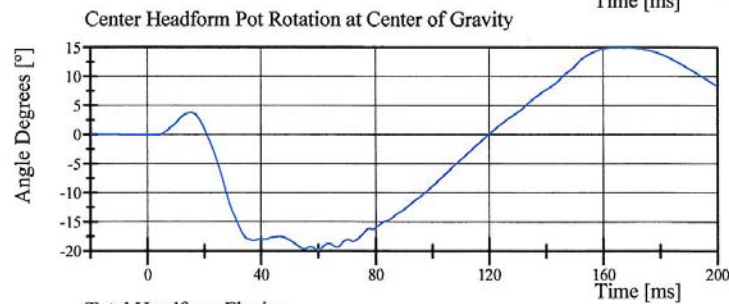
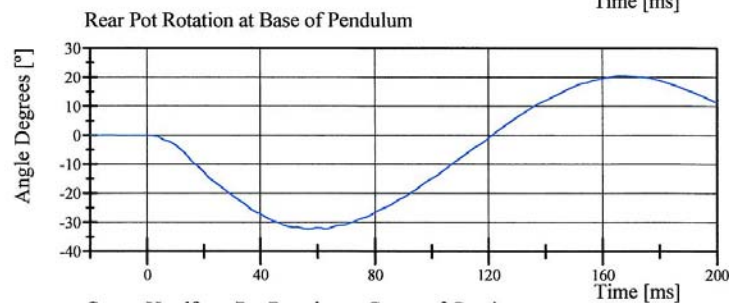
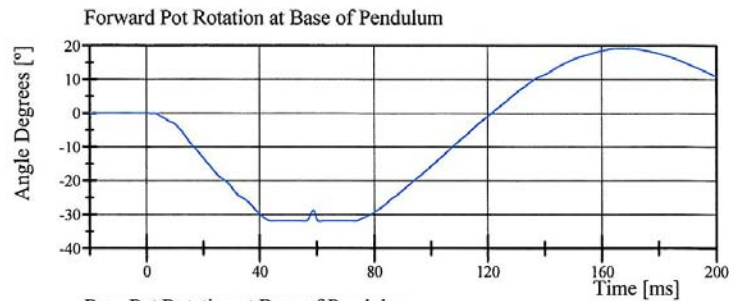


Transportation Research Center Inc.

Left Lateral Neck

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

Test Date: 8/15/2011



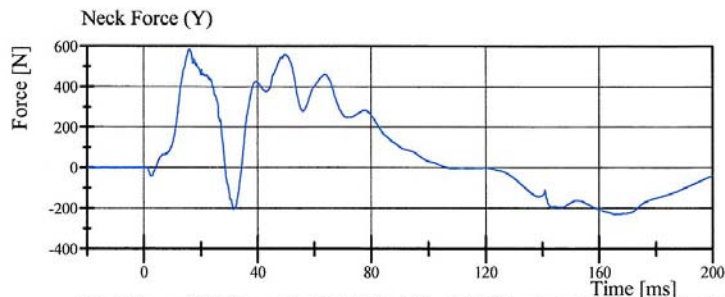
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.15.2011 10:28:06 1321

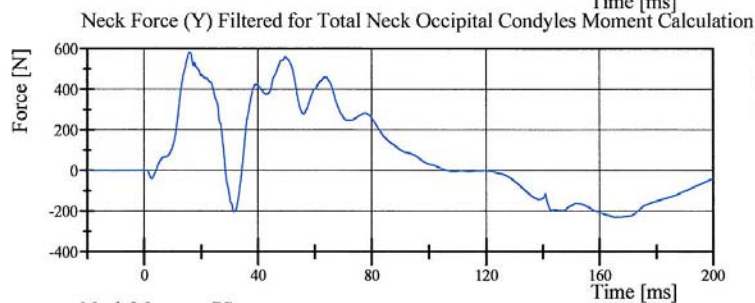


Transportation Research Center Inc.

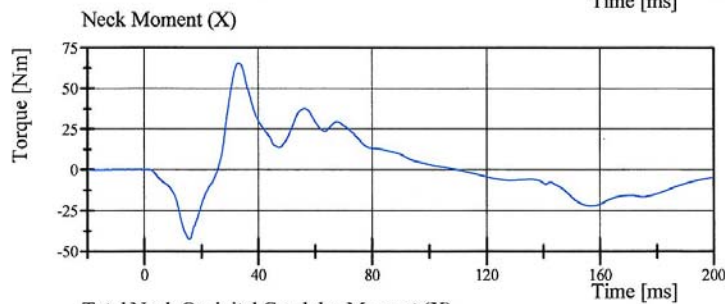
Left Lateral Neck
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2
Test Date: 8/15/2011



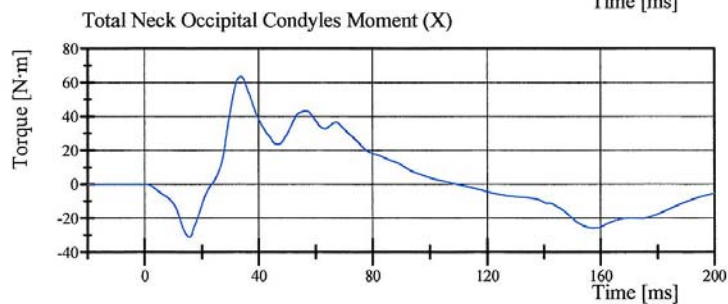
Filter Class: CFC_1000
Max: 584.7 N at 16.0 ms
Min: -229.3 N at 165.6 ms



Filter Class: CFC_600
Max: 584.6 N at 16.1 ms
Min: -228.9 N at 165.6 ms



Filter Class: CFC_600
Max: 65.6 Nm at 33.0 ms
Min: -42.5 Nm at 15.8 ms



Filter Class: Without_(Consta
Max: 63.5 N·m at 33.7 ms
Min: -31.2 N·m at 15.7 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.15.2011 10:28:07 1321



Transportation Research Center Inc.

Left Lateral Shoulder

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1

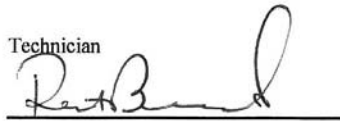
Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Force	(-2,600) - (-3,300) N	-3,149.1 N	Yes
Shoulder Displacement	35 - 44 mm	38.1 mm	Yes

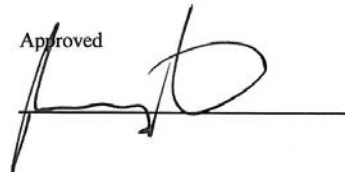
Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:05:54 3997

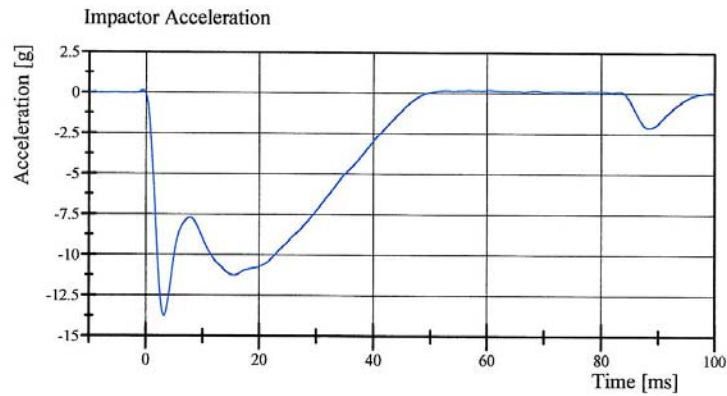


Transportation Research Center Inc.

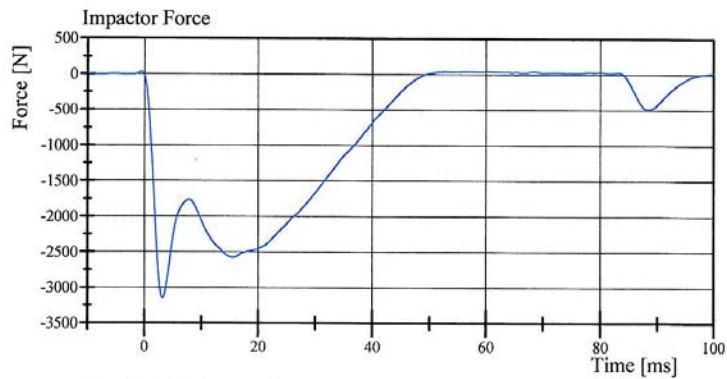
Left Lateral Shoulder

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1

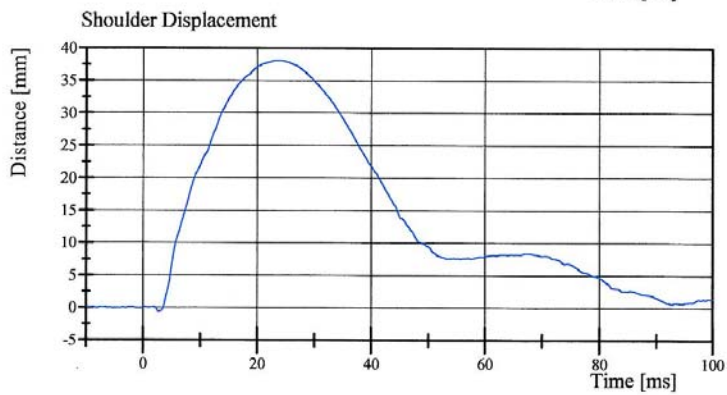
Test Date: 8/15/2011



Filter Class: CFC_180
Max: 0.2 gn at 60.5 ms
Min: -13.7 gn at 3.3 ms



Filter Class: CFC_180
Max: 43.5 N at 60.5 ms
Min: -3,149.1 N at 3.3 ms



Filter Class: CFC_600
Max: 38.1 mm at 23.7 ms
Min: -0.6 mm at 2.8 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:06:03 3997



Transportation Research Center Inc.

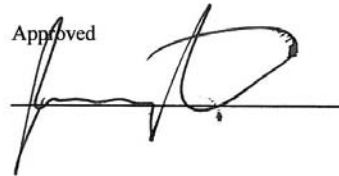
Left Lateral Thorax with Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1
Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.77 m/s	Yes
Impactor Force	(-4,900) - (-5,800) N	-5,258.1 N	Yes
Upper Thorax Rib Displacement	35 - 47 mm	41.3 mm	Yes
Center Thorax Rib Displacement	46 - 56 mm	47.3 mm	Yes
Lower Thorax Rib Displacement	39 - 46 mm	40.7 mm	Yes
Upper Spine Lateral Acceleration	28 - 37 g	27.9 g	No
Lower Spine Lateral Acceleration	22 - 28 g	23.1 g	Yes

Test does not meet specifications.

Comments:

Technician


Approved


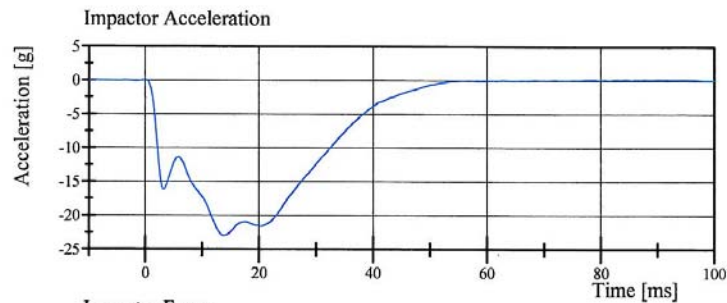
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:10:11 4000

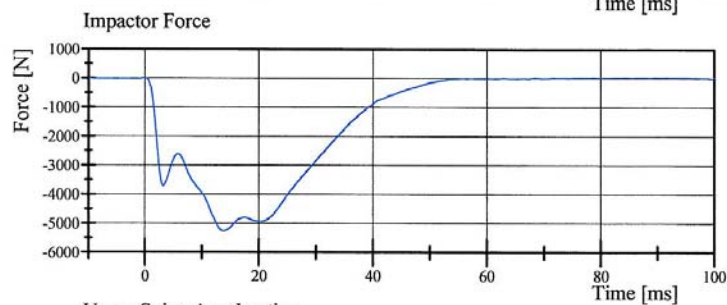


Transportation Research Center Inc.

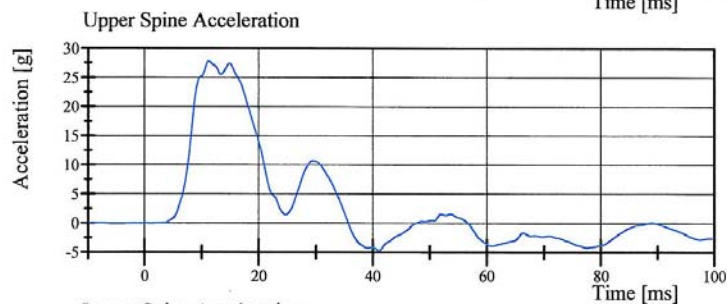
Left Lateral Thorax with Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1
Test Date: 8/15/2011



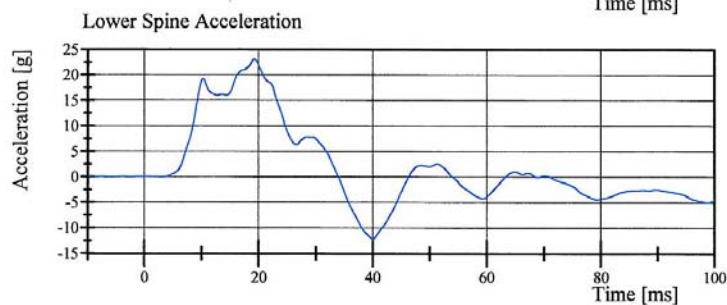
Filter Class: CFC_180
Max: 0.2 gn at 89.8 ms
Min: -23.0 gn at 13.8 ms



Filter Class: CFC_180
Max: 43.1 N at 89.8 ms
Min: -5,258.1 N at 13.8 ms



Filter Class: CFC_180
Max: 27.9 gn at 11.3 ms
Min: -4.7 gn at 41.1 ms



Filter Class: CFC_180
Max: 23.1 gn at 19.3 ms
Min: -12.1 gn at 40.0 ms

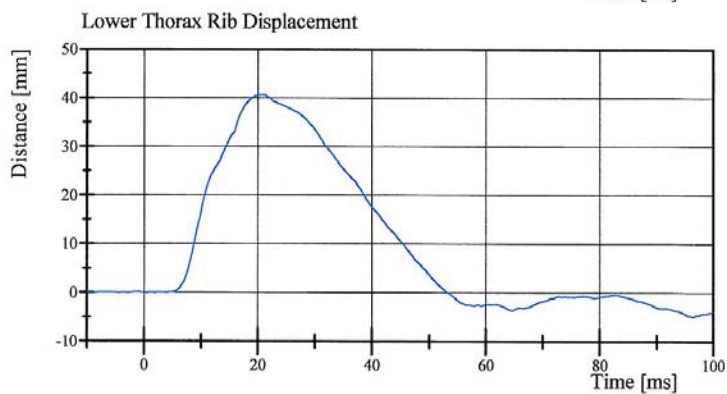
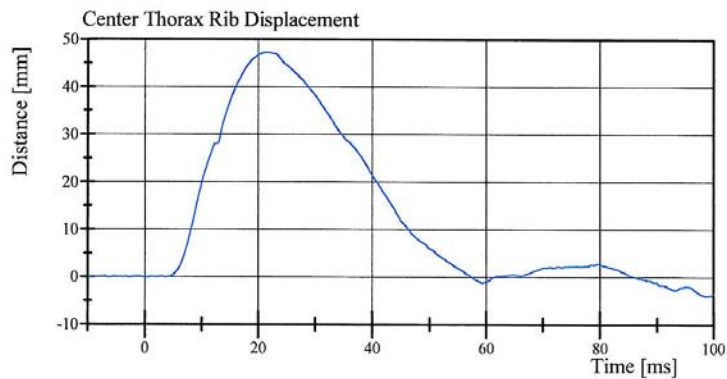
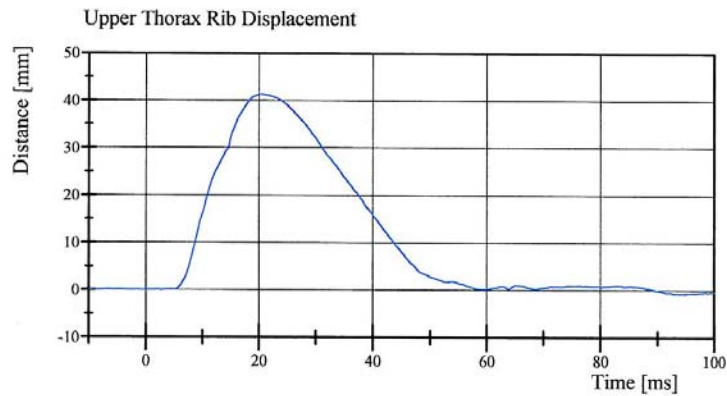
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:10:43 4000



Transportation Research Center Inc.

Left Lateral Thorax with Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1
Test Date: 8/15/2011



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:10:44 4000



Transportation Research Center Inc.

Left Lateral Thorax without Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-3
Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.382 m/s	Yes
Impactor Force	(-3,200) - (-3,800) N	-3,460.0 N	Yes
Upper Thorax Rib Displacement	33 - 43 mm	39.9 mm	Yes
Center Thorax Rib Displacement	35 - 43 mm	40.6 mm	Yes
Lower Thorax Rib Displacement	32 - 40 mm	37.2 mm	Yes
Upper Spine Lateral Acceleration	14 - 20 g	14.5 g	Yes
Lower Spine Lateral Acceleration	14 - 22 g	15.5 g	Yes

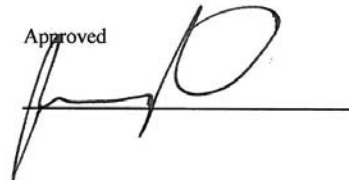
Test meets specifications.

Comments:

Technician



Approved



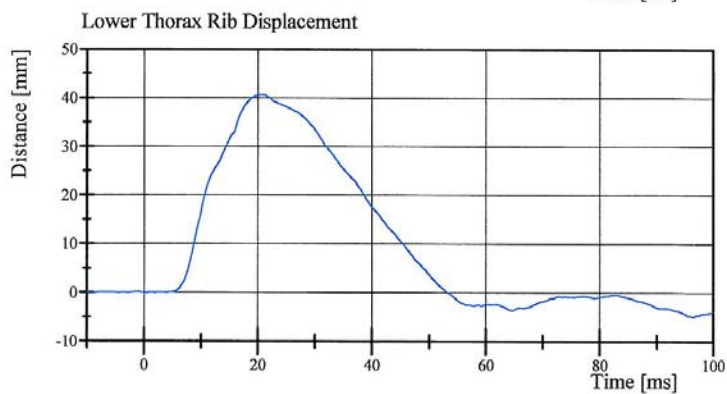
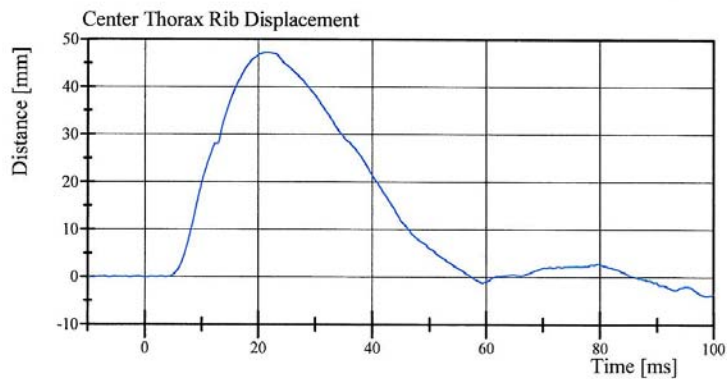
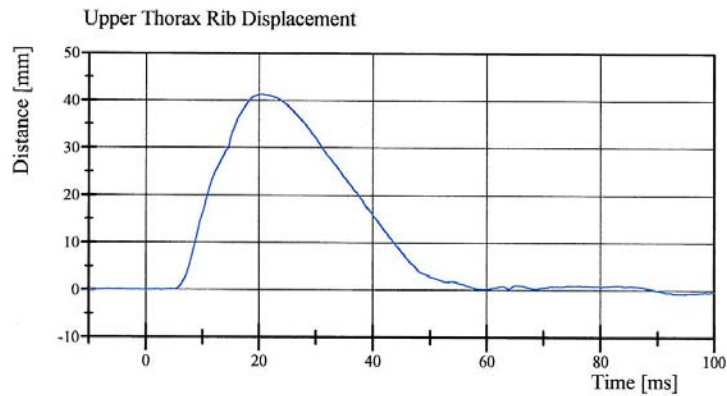
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:08:08 4000



Transportation Research Center Inc.

Left Lateral Thorax with Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1
Test Date: 8/15/2011



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:10:44 4000



Transportation Research Center Inc.

Left Lateral Thorax without Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-3
Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.382 m/s	Yes
Impactor Force	(-3,200) - (-3,800) N	-3,460.0 N	Yes
Upper Thorax Rib Displacement	33 - 43 mm	39.9 mm	Yes
Center Thorax Rib Displacement	35 - 43 mm	40.6 mm	Yes
Lower Thorax Rib Displacement	32 - 40 mm	37.2 mm	Yes
Upper Spine Lateral Acceleration	14 - 20 g	14.5 g	Yes
Lower Spine Lateral Acceleration	14 - 22 g	15.5 g	Yes

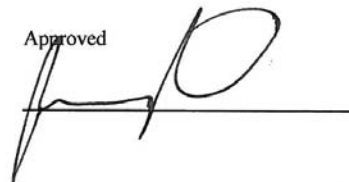
Test meets specifications.

Comments:

Technician



Approved



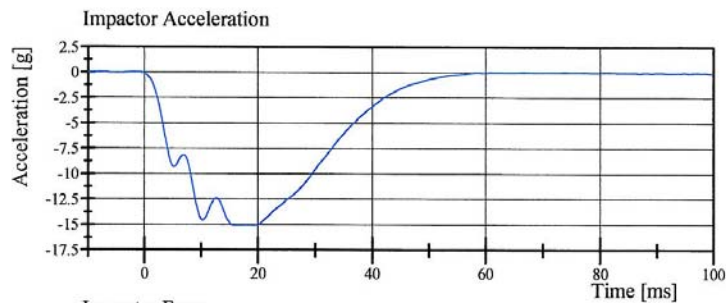
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:08:08 4000

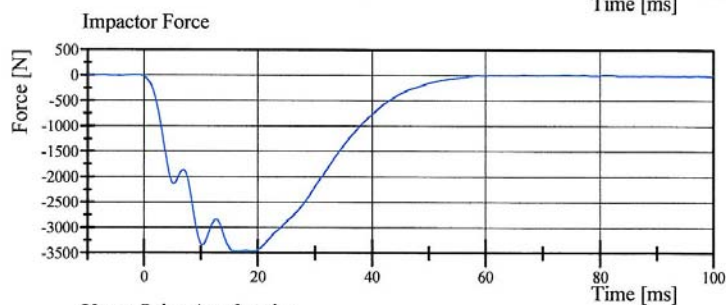


Transportation Research Center Inc.

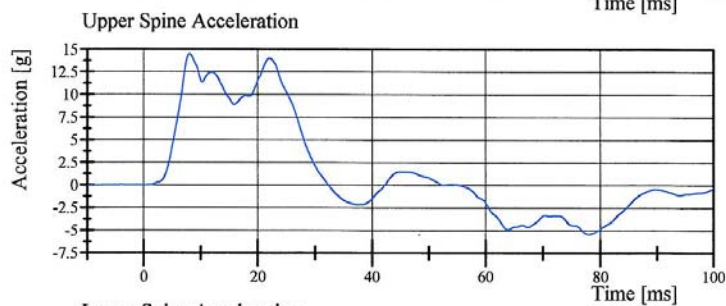
Left Lateral Thorax without Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-3
Test Date: 8/15/2011



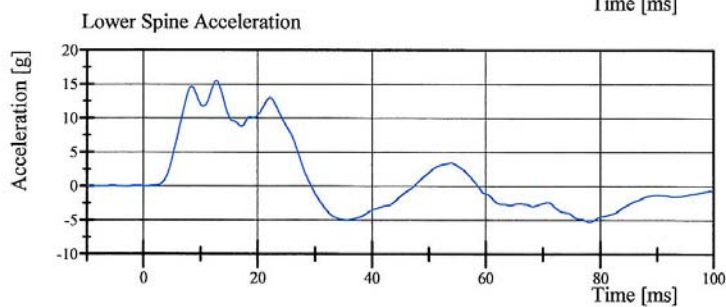
Filter Class: CFC_180
Max: 0.1 gn at 81.1 ms
Min: -15.1 gn at 15.9 ms



Filter Class: CFC_180
Max: 14.3 N at 81.1 ms
Min: -3,460.0 N at 15.9 ms



Filter Class: CFC_180
Max: 14.5 gn at 8.1 ms
Min: -5.4 gn at 78.0 ms



Filter Class: CFC_180
Max: 15.5 gn at 12.8 ms
Min: -5.3 gn at 78.2 ms

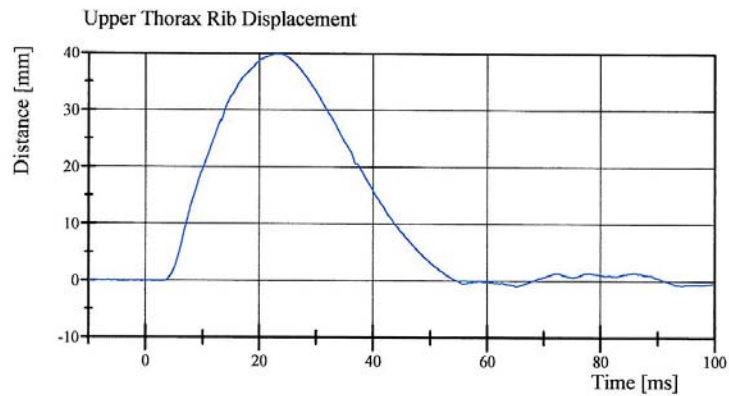
Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:08:17 4000

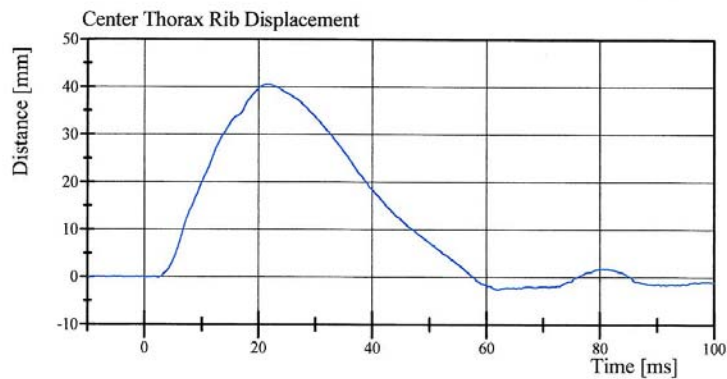


Transportation Research Center Inc.

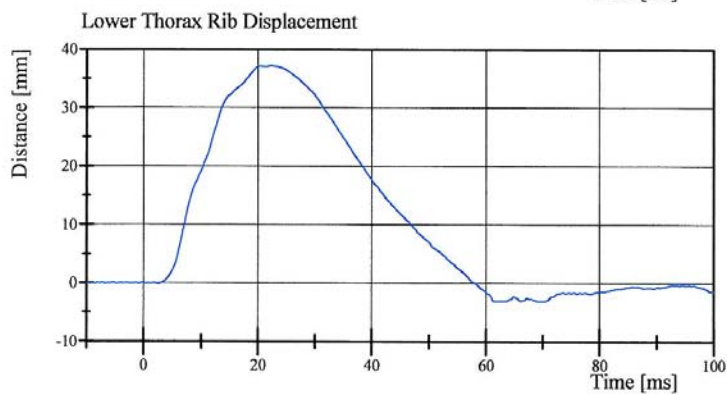
Left Lateral Thorax without Arm
WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-3
Test Date: 8/15/2011



Filter Class: CFC_600
Max: 39.9 mm at 23.3 ms
Min: -1.0 mm at 65.2 ms



Filter Class: CFC_600
Max: 40.6 mm at 21.8 ms
Min: -2.6 mm at 62.0 ms



Filter Class: CFC_600
Max: 37.2 mm at 22.4 ms
Min: -3.1 mm at 61.5 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:08:18 4000



Transportation Research Center Inc.

Left Lateral Abdomen

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

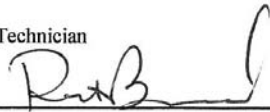
Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.39 m/s	Yes
Impactor Force	(-2,700) - (-3,100) N	-2,911.1 N	Yes
Upper Abdominal Rib Displacement	33 - 40 mm	33.2 mm	Yes
Lower Abdominal Rib Displacement	30 - 36 mm	31.8 mm	Yes
Lower Spine Lateral Acceleration	15 - 20 g	16.9 g	Yes

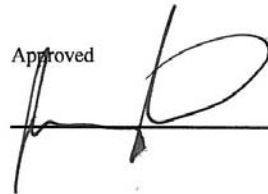
Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:13:05 4003

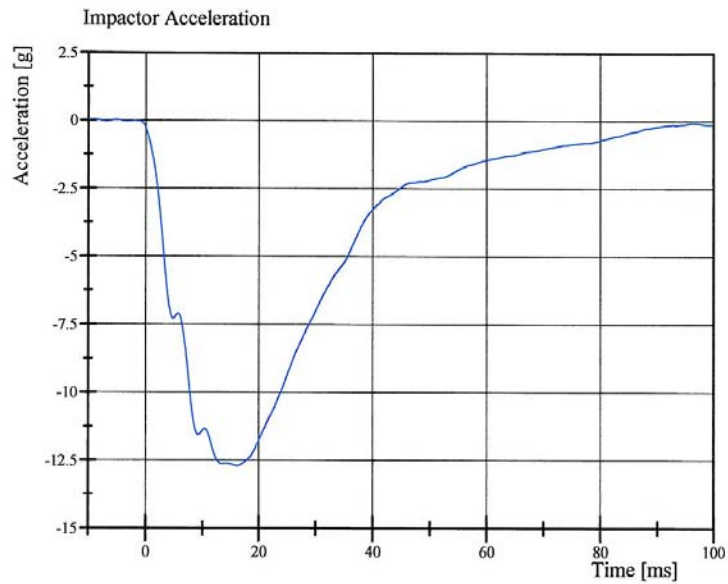


Transportation Research Center Inc.

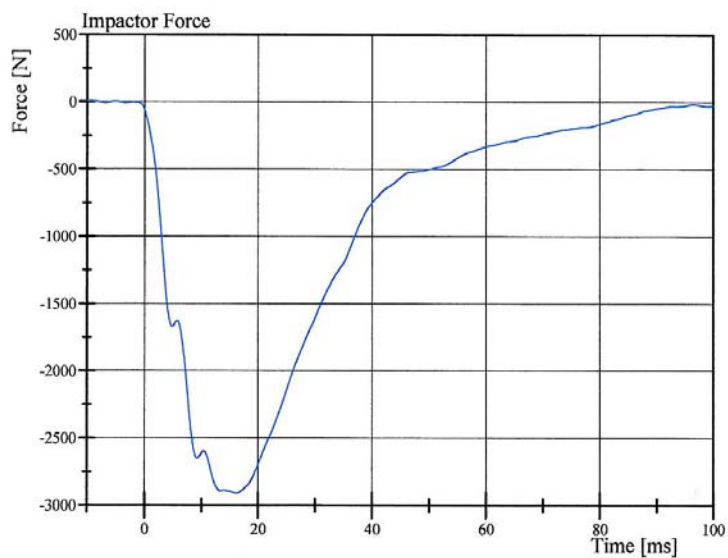
Left Lateral Abdomen

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

Test Date: 8/15/2011



Filter Class: CFC_180
Max: 0.0 gn at -9.4 ms
Min: -12.7 gn at 16.2 ms



Filter Class: CFC_180
Max: 8.6 N at -9.4 ms
Min: -2,911.1 N at 16.2 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:13:13 4003



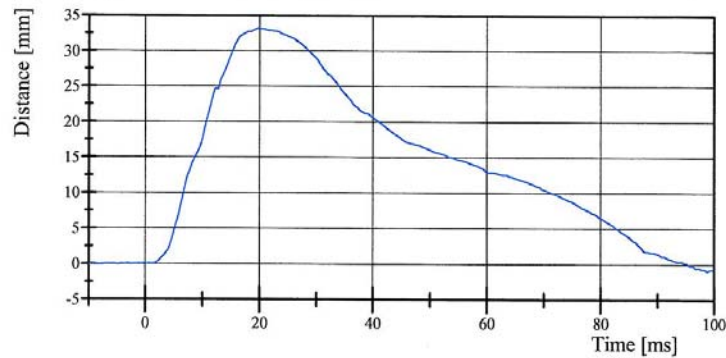
Transportation Research Center Inc.

Left Lateral Abdomen

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-2

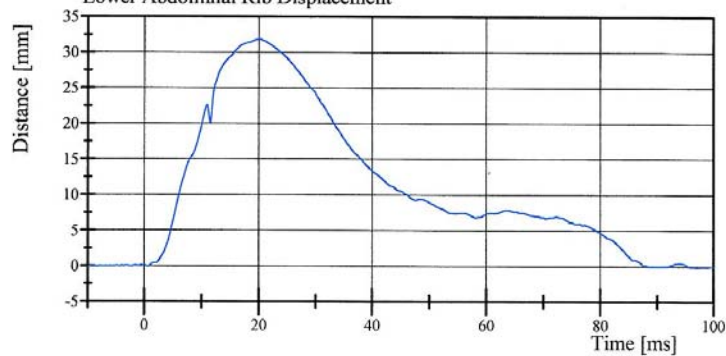
Test Date: 8/15/2011

Upper Abdominal Rib Displacement



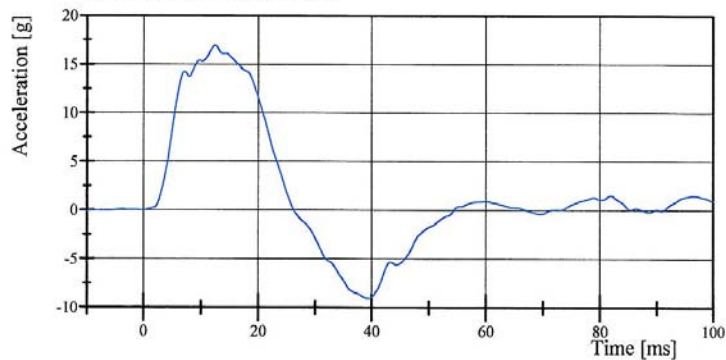
Filter Class: CFC_600
Max: 33.2 mm at 19.9 ms
Min: -0.9 mm at 98.9 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 31.8 mm at 20.3 ms
Min: -0.2 mm at 97.1 ms

Lower Spine Acceleration (Y)



Filter Class: CFC_180
Max: 16.9 gn at 12.5 ms
Min: -9.1 gn at 39.5 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:13:14 4003



Transportation Research Center Inc.

Left Lateral Pelvis

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1

Test Date: 8/15/2011

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.77 m/s	Yes
Impactor Force	(-6,300) - (-7,800) N	-7,472.8 N	Yes
Pelvis Lateral Acceleration	41 - 51 g	48.7 g	Yes
Lower Spine Lateral Acceleration	10 - 14 g	11.9 g	Yes

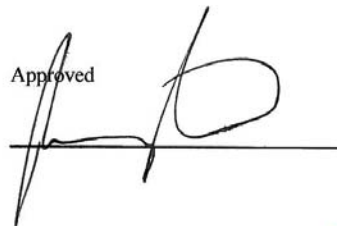
Test meets specifications.

Comments:

Technician



Approved



Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:16:01 3992

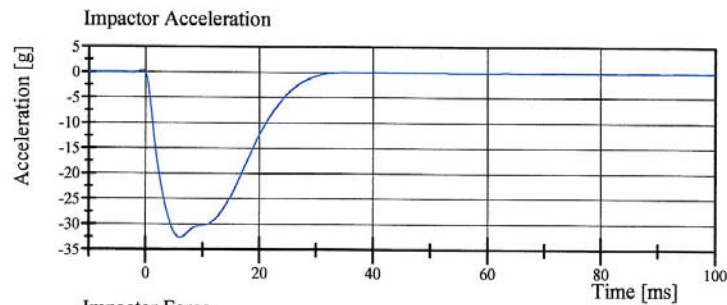


Transportation Research Center Inc.

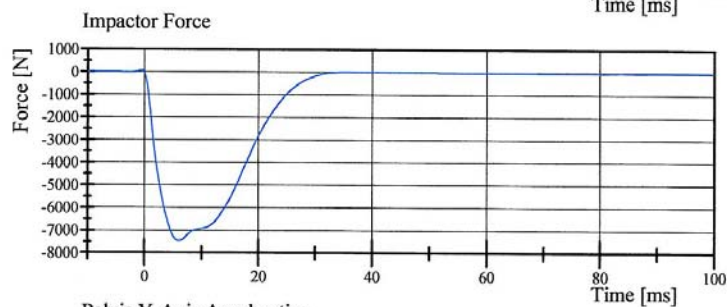
Left Lateral Pelvis

WorldSID ISO 15830-2 Serial No. 014 Certification No. 8-1

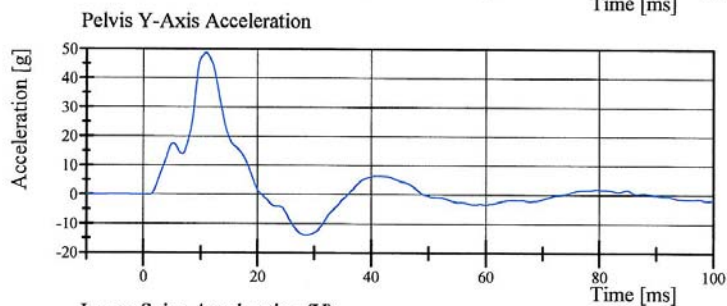
Test Date: 8/15/2011



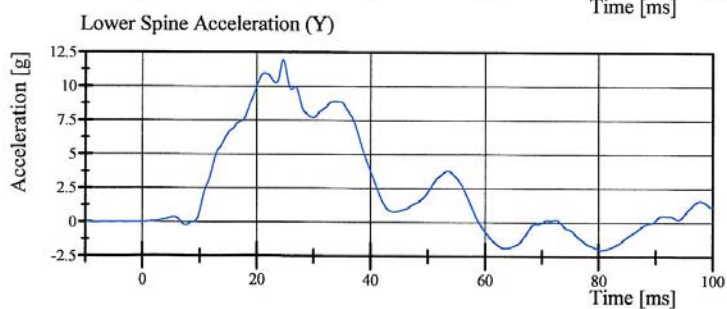
Filter Class: CFC_180
Max: 0.4 gn at -0.5 ms
Min: -32.6 gn at 6.1 ms



Filter Class: CFC_180
Max: 83.2 N at -0.5 ms
Min: -7,472.8 N at 6.1 ms



Filter Class: CFC_180
Max: 48.7 gn at 11.0 ms
Min: -14.0 gn at 28.6 ms



Filter Class: CFC_180
Max: 11.9 gn at 24.7 ms
Min: -2.0 gn at 80.4 ms

Specification Source: ISO 15830-2, dated 02/10/2009
with Polarity in accordance with J211

08.16.2011 11:16:12 3992



Appendix D

Test Equipment List and Calibration Information

Sign Convention
SAE J211 MAR95

Accelerometers:

+X: Forward
+Y: Rightward
+Z: Downward

Potentiometers:

+Chest longitudinal deflection: Outward
+Chest lateral deflection: Rightward
+Seat belt displacement: Outward
+Seat belt extension: Elongation
+Knee slider displacement: Distance between femur and tibia
increased (in relation to a seated
dummy)

Rotation potentiometers:

+About the X-axis: Left foot-eversion
Right foot-inversion
+About the Y-axis: Left/right foot-dorsiflexion
+About the Z-axis: Left foot-internal
Right foot-external

Load cells:

+Femur force: Tension
+Seat belt force: Tension
+Barrier force: Tension

Neck load cells:

+X force: Head pushed rearward
+Y force: Head pushed leftward
+Z force: Head pulled upward (tension on neck)
+X moment: Left ear rotating toward left shoulder
+Y moment: Chin rotating toward chest
+Z moment: Chin rotating toward left shoulder

Tibia load cells:

+X force: Ankle forward, knee rearward
+Y force: Ankle rightward, knee leftward
+Z force: Tension
+X moment: Bottom of tibia moving leftward
+Y moment: Bottom of tibia moving rearward

Sign Convention (Continued)
SAE J211 MAR95

<u>Lumbar load cells:</u>	+X force:	Chest rearward, pelvis forward
	+Y force:	Chest leftward, pelvis rightward
	+Z force:	Chest upward, pelvis downward
	+X moment:	Left shoulder toward left hip
	+Y moment:	Sternum toward front of legs
	+Z moment:	Right shoulder forward, left shoulder rearward

Frequency Response Classes
SAE J211 MAR95

<u>Typical Test Measurements</u>	<u>Channel Class</u>
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	600
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Head Form Accelerations	1000

The direction column on the following sheets describes the transducer output as mounted and wired in the test location. The polarity column indicates whether a polarity change occurred during data acquisition to conform to J211 MAR95. See Report Sign Convention sheet for description of data output as presented in the report: occasionally channels have been adjusted in post-acquisition processing to conform to J211 MAR95.

Channel Report Test Number 110817

Ref	Transducer ID	Description	ISO Signal I.D.	Polarity	FScale	Units	Assembly
1	Trig D1	EVENT	10ZERO000000VO0A	Bipolar		1 Logic	
2	P69075	Vehicle Center of Gravity X-Axis Acceleration	10VEHCCG0000ACXA	Bipolar	1000	g	
3	P73566	Vehicle Center of Gravity Y-Axis Acceleration	10VEHCCG0000ACYA	-Bipolar	1000	g	
4	P73567	Vehicle Center of Gravity Z-Axis Acceleration	10VEHCCG0000ACZA	-Bipolar	1000	g	
5	P68762	LEFT SIDE SILL Between A-Pillar & Impact Poi	00FOOTRI00H3ACXA	Bipolar	2000	g	
6	P68761	Left A Pillar Side Sill Y-Axis Acceleration (Locat	14SILBFR0000ACYA	-Bipolar	1000	g	
7	P62559	Left Lower A-Pillar Y-Axis Acceleration 1/3 from	11APILLO0000ACYA	-Bipolar	2000	g	
8	P67027	Left Mid A-Pillar Y-Axis Acceleration 2/3 from fl	11APILMI0000ACYA	-Bipolar	2000	g	
9	P66705	Left Side Sill at Rear Seat Y-Axis Acceleration	14SILBRE0000ACYA	Bipolar	1000	g	
10	P57155	Left Lower B-Pillar Y-Axis Acceleration 1/3 from	14BPILLO0000ACYA	-Bipolar	2000	g	
11	P57127	Left Mid B-Pillar Y-Axis Acceleration 2/3 from fl	14BPILMI0000ACYA	-Bipolar	2000	g	
12	P62671	Left Front Seat Track @ H-Point Y-Axis Acceler	11SETFRF0000ACYA	Bipolar	2000	g	
13	P57150	Top of Engine X-Axis Acceleration (Location 10	12ENGNTF0000ACXA	Bipolar	1000	g	
14	P57139	Top of Engine Y-Axis Acceleration (Location 10	12ENGNTF0000ACYA	-Bipolar	1000	g	
15	P68548	Firewall Centerline Y-Axis Acceleration (Locatio	12VEHC000000ACYA	Bipolar	1000	g	
16	P57178	Right Side Roof Rail (in line with impact point)	13R00F000000ACYA	-Bipolar	1000	g	
17	P57176	Right Side Floor Sill (in-line with impact locati	13SILBFR0000ACYA	-Bipolar	1000	g	
18	P57144	Rear Deck Centerline Behind Rear Axle X-Axis	18DECK000000ACXA	Bipolar	1000	g	
19	P57165	Rear Deck Centerline Behind Rear Axle Y-Axis	18DECK000000ACYA	Bipolar	1000	g	
20	ARS-1500-ARS0665	VEHICLE CENTER OF GRAVITY (X) ROLL R	10VEHCCG0000AVXA	Bipolar	1500	%s	
21	ARS-1500-ARS1091	VEHICLE CENTER OF GRAVITY (Y) PITCH R	10VEHCCG0000AVYA	Bipolar	1500	%s	
22	ARS-1500-ARS2609	VEHICLE CENTER OF GRAVITY (Z) YAW R	10VEHCCG0000AVZA	Bipolar	1500	%s	
23	P68764	Left Front Door on Center Line Y-Axis Accelera	11DOORFR0000ACYA	Bipolar	2000	g	
24	P68558	Midrear of Left Front Door Y-Axis Acceleration	11DOORMIRE00ACYA	Bipolar	2000	g	
25	P69052	Left Front Door Upper Centerline Y-Axis Accele	11DOORLEFRUPACYA	Bipolar	2000	g	
26	P68767	Midrear of Left Rear Door Y-Axis Acceleration	14DOORMIRE00ACYA	Bipolar	2000	g	
27	P68766	Left Rear Door Upper Centerline Y-Axis Accele	14DOORLEREUPACYA	Bipolar	2000	g	
28	IP123	Driver Side Curtain Fire Inductor	11AIRBTPL000EVOA	Bipolar	5	V	
29	IP1010	LH Torso Airbag Fire Inductor	11AIR02N0000EVOA	Bipolar	5	V	
30	Bit.00	Head Contact Switch	11CONT000001VO00	Bipolar	1	Logic	
31	Bit.01	Shoulder Contact Switch	11CONT000002VO00	Bipolar	1	Logic	
32	Bit.02	Torso Contact Switch	11CONT000003VO00	Bipolar	1	Logic	
33	Bit.03	Leg Contact Switch	11CONT000004VO00	Bipolar	1	Logic	
34	5763-86-FX	POLE LOAD CELL 1	K0FBAR010000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.001
35	5763-91-FX	POLE LOAD CELL 2	K0FBAR020000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.002
36	5763-89-FX	POLE LOAD CELL 3	K0FBAR030000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.003
37	5763-77-FX	POLE LOAD CELL 4	K0FBAR040000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.004
38	5763-90-FX	POLE LOAD CELL 5	K0FBAR050000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.005

Channel Report Test Number 110817

Ref	Transducer ID	Description
39	5763-88-FX	POLE LOAD CELL 6
40	5763-92-FX	POLE LOAD CELL 7
41	5763-78-FX	POLE LOAD CELL 8

ISO Signal I.D.	Polarity	FScale	Units	Assembly
K0FBAR060000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.006
K0FBAR070000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.007
K0FBAR080000FOXA	Bipolar	200000	N	0-Barrier Segmented Pole.008

Command File Test Number 110817

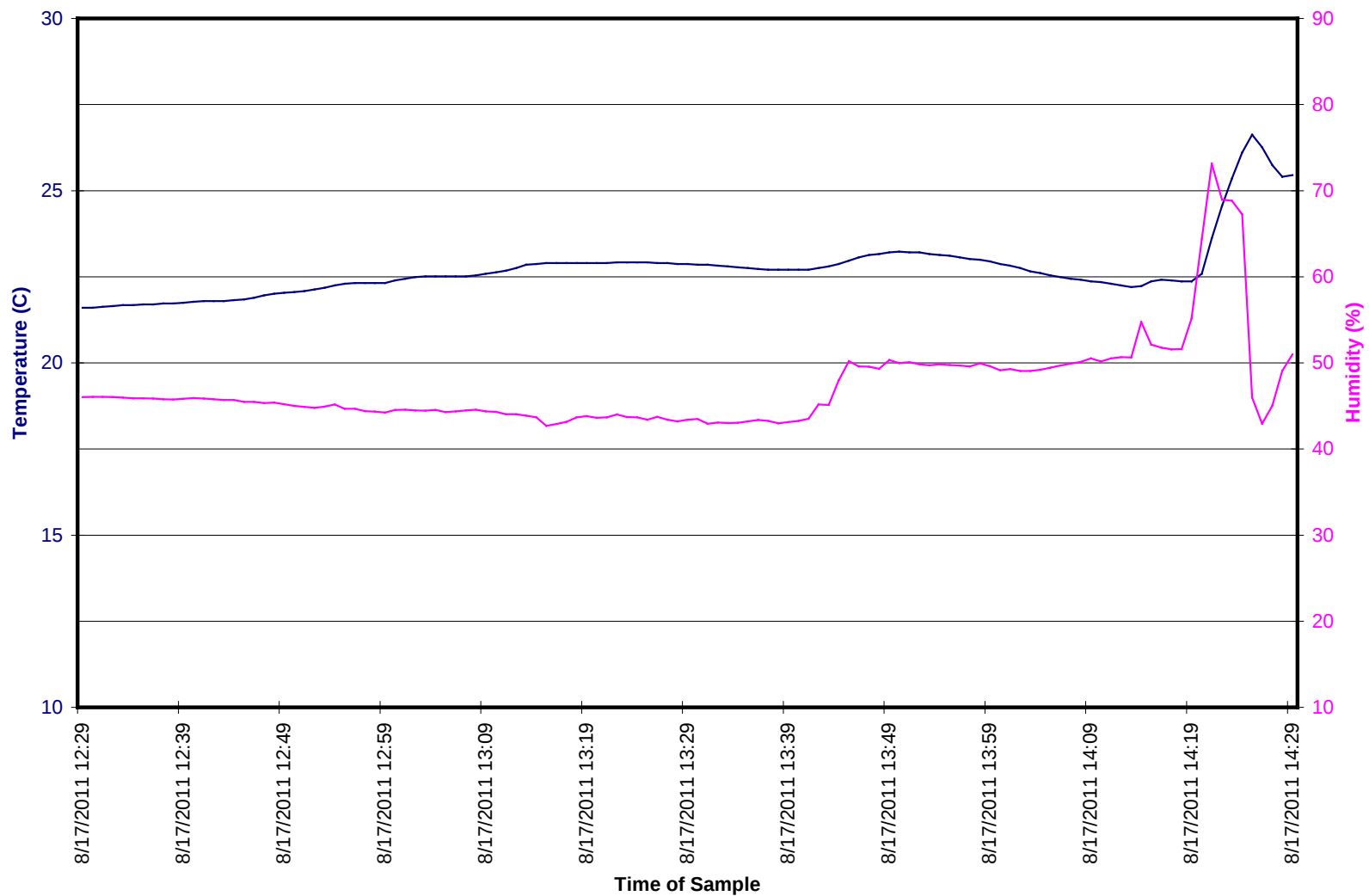
Channel	ISO mnemonic	Channel Title	Filter	Flip	Zero	Full Scale	V5 Index
1	11HEADCG00WSACXF	Head X-Axis Acceleration	1000	+	yes	400	1
2	11HEADCG00WSACYF	Head Y-Axis Acceleration	1000	+	yes	400	2
3	11HEADCG00WSACZF	Head Z-Axis Acceleration	1000	+	yes	400	3
3A	11HEADCG00WSACR/	Head Resultant Acceleration	1000				
4	11HEADCG00WSAAXF	Head X-Axis Angular Displacement	1000	+	yes	50000	4
5	11HEADCG00WSAAYF	Head Y-Axis Angular Displacement	1000	+	yes	50000	5
6	11HEADCG00WSAAZF	Head Z-Axis Angular Displacement	1000	+	yes	50000	6
7	11NECKUP00WSFOXF	Upper Neck X-Axis Force	1000	+	yes	10000	7
8	11NECKUP00WSFOYF	Upper Neck Y-Axis Force	1000	+	yes	10000	8
9	11NECKUP00WSFOZF	Upper Neck Z-Axis Force	1000	+	yes	12000	9
10	11NECKUP00WSMOXF	Upper Neck Moment About X Axis	600	+	yes	300	10
11	11NECKUP00WSMOYF	Upper Neck Moment About Y Axis	600	+	yes	300	11
12	11NECKUP00WSMOZF	Upper Neck Moment About Z Axis	600	+	yes	200	12
13	11NECKLO00WSFOXF	Lower Neck X-Axis Force	1000	+	yes	10000	13
14	11NECKLO00WSFOYF	Lower Neck Y-Axis Force	1000	+	yes	10000	14
15	11NECKLO00WSFOZF	Lower Neck Z-Axis Force	1000	+	yes	12000	15
16	11NECKLO00WSMOXF	Lower Neck Moment About X Axis	600	+	yes	300	16
17	11NECKLO00WSMOYF	Lower Neck Moment About Y Axis	600	+	yes	300	17
18	11NECKLO00WSMOZF	Lower Neck Moment About Z Axis	600	+	yes	200	18
19	11SHLDLE00WSFOXP	Shoulder X-Axis Force	600	+	yes	5000	19
20	11SHLDLE00WSFOYP	Shoulder Y-Axis Force	600	+	yes	10000	20
21	11SHLDLE00WSFOZP	Shoulder Z-Axis Force	600	+	yes	5000	21
22	11SHLDLE00WSDSYP	Shoulder Y-Axis Displacement	600	+	yes	90	22
23	11SHLDLE00WSACXP	Shoulder X-Axis Acceleration	1000	+	yes	400	23
24	11SHLDLE00WSACYP	Shoulder Y-Axis Acceleration	1000	+	yes	400	24
25	11SHLDLE00WSACZP	Shoulder Z-Axis Acceleration	1000	+	yes	400	25
25A	11SHLDLE00WSACRA	Shoulder Resultant Acceleration	1000				
26	11THSP0100WSACXP	T1 X-Axis Acceleration	180	+	yes	400	26
27	11THSP0100WSACYP	T1 Y-Axis Acceleration	180	+	yes	400	27
28	11THSP0100WSACZP	T1 Z-Axis Acceleration	180	+	yes	400	28
28A	11THSP0100WSACRA	T1 Resultant Acceleration	180				
29	11THSP0400WSACXP	T4 X-Axis Acceleration	180	+	yes	400	29
30	11THSP0400WSACYP	T4 Y-Axis Acceleration	180	+	yes	400	30
31	11THSP0400WSACZP	T4 Z-Axis Acceleration	180	+	yes	400	31
31A	11THSP0400WSACRA	T4 Resultant Acceleration	180				
32	11THSP1200WSACXP	T12 X-Axis Acceleration	180	+	yes	400	32
33	11THSP1200WSACYP	T12 Y-Axis Acceleration	180	+	yes	400	33
34	11THSP1200WSACZP	T12 Z-Axis Acceleration	180	+	yes	400	34

Channel	ISO mnemonic	Channel Title	Filter	Flip	Zero	Full Scale	V5 Index
34A	11THSP1200WSACRA	T12 Resultant Acceleration	180				
35	11TRRILE01WSDSYP	Thorax Rib 1 Y-Axis Displacement	600	+	yes	90	35
36	11TRRILE01WSACXP	Thorax Rib 1 X-Axis Acceleration	1000	+	yes	400	36
37	11TRRILE01WSACYP	Thorax Rib 1 Y-Axis Acceleration	1000	+	yes	400	37
38	11TRRILE01WSACZP	Thorax Rib 1 Z-Axis Acceleration	1000	+	yes	400	38
38A	11TRRILE01WSACRA	Thorax Rib 1 Resultant Acceleration	1000				
39	11TRRILE02WSDSYP	Thorax Rib 2 Y-Axis Displacement	600	+	yes	90	39
40	11TRRILE02WSACXP	Thorax Rib 2 X-Axis Acceleration	1000	+	yes	400	40
41	11TRRILE02WSACYP	Thorax Rib 2 Y-Axis Acceleration	1000	+	yes	400	41
42	11TRRILE02WSACZP	Thorax Rib 2 Z-Axis Acceleration	1000	+	yes	400	42
42A	11TRRILE02WSACRA	Thorax Rib 2 Resultant Acceleration	1000				
43	11TRRILE03WSDSYP	Thorax Rib 3 Y-Axis Displacement	600	+	yes	90	43
44	11TRRILE03WSACXP	Thorax Rib 3 X-Axis Acceleration	1000	+	yes	400	44
45	11TRRILE03WSACYP	Thorax Rib 3 Y-Axis Acceleration	1000	+	yes	400	45
46	11TRRILE03WSACZP	Thorax Rib 3 Z-Axis Acceleration	1000	+	yes	400	46
46A	11TRRILE03WSACRA	Thorax Rib 3 Resultant Acceleration	1000				
47	11ABRILE01WSDSYP	Abdominal Rib 1 Y-Axis Displacement	600	+	yes	90	47
48	11ABRILE01WSACXP	Abdominal Rib 1 X-Axis Acceleration	1000	+	yes	400	48
49	11ABRILE01WSACYP	Abdominal Rib 1 Y-Axis Acceleration	1000	+	yes	400	49
50	11ABRILE01WSACZP	Abdominal Rib 1 Z-Axis Acceleration	1000	+	yes	400	50
50A	11ABRILE01WSACRA	Abdominal Rib 1 Resultant Acceleration	1000				
51	11ABRILE02WSDSYP	Abdominal Rib 2 Y-Axis Displacement	600	+	yes	90	51
52	11ABRILE02WSACXP	Abdominal Rib 2 X-Axis Acceleration	1000	+	yes	400	52
53	11ABRILE02WSACYP	Abdominal Rib 2 Y-Axis Acceleration	1000	+	yes	400	53
54	11ABRILE02WSACZP	Abdominal Rib 2 Z-Axis Acceleration	1000	+	yes	400	54
54A	11ABRILE02WSACRA	Abdominal Rib 2 Resultant Acceleration	1000				
55	11LUSP0000WSFOXP	Lumbar X-Axis Force	600	+	yes	10000	55
56	11LUSP0000WSFOYP	Lumbar Y-Axis Force	600	+	yes	10000	56
57	11LUSP0000WSFOZP	Lumbar Z-Axis Force	600	+	yes	12000	57
58	11LUSP0000WSMOXP	Lumbar Moment About X Axis	600	+	yes	300	58
59	11LUSP0000WSMOYP	Lumbar Moment About Y Axis	600	+	yes	300	59
60	11LUSP0000WSMOZP	Lumbar Moment About Z Axis	600	+	yes	200	60
61	11PELVCG00WSACXP	Pelvis X-Axis Acceleration	1000	+	yes	400	61
62	11PELVCG00WSACYP	Pelvis Y-Axis Acceleration	1000	+	yes	400	62
63	11PELVCG00WSACZP	Pelvis Z-Axis Acceleration	1000	+	yes	400	63
63A	11PELVCG00WSACRA	Pelvis Resultant Acceleration	1000				
64	11SACRLE00WSFOXP	Sacro-Iliac Left X-Axis Force	600	+	yes	6000	64
65	11SACRLE00WSFOYP	Sacro-Iliac Left Y-Axis Force	600	+	yes	6000	65
66	11SACRLE00WSFOZP	Sacro-Iliac Left Z-Axis Force	600	+	yes	6000	66

Channel	ISO mnemonic	Channel Title	Filter	Flip	Zero	Full Scale	V5 Index
67	11SACRLE00WSMOXF	Sacro-Iliac Left Moment About X Axis	600	+	yes	1000	67
68	11SACRLE00WSMOYF	Sacro-Iliac Left Moment About Y Axis	600	+	yes	400	68
69	11SACRLE00WSMOZF	Sacro-Iliac Left Moment About Z Axis	600	+	yes	400	69
70	11SACRRI00WSFOXP	Sacro-Iliac Right X-Axis Force	600	+	yes	6000	70
71	11SACRRI00WSFOYP	Sacro-Iliac Right Y-Axis Force	600	+	yes	6000	71
72	11SACRRI00WSFOZP	Sacro-Iliac Right Z-Axis Force	600	+	yes	6000	72
73	11SACRRI00WSMOXP	Sacro-Iliac Right Moment About X Axis	600	+	yes	1000	73
74	11SACRRI00WSMOYP	Sacro-Iliac Right Moment About Y Axis	600	+	yes	400	74
75	11SACRRI00WSMOZP	Sacro-Iliac Right Moment About Z Axis	600	+	yes	400	75
76	11PUBC000WSFOYP	Pubic Symphysis Y-Axis Force	600	+	yes	12000	76
77	11FEMRLEMIWSFOXP	Left Mid Femur X-Axis Force	600	+	yes	15000	77
78	11FEMRLEMIWSFOYP	Left Mid Femur Y-Axis Force	600	+	yes	15000	78
79	11FEMRLEMIWSFOZP	Left Mid Femur Z-Axis Force	600	+	yes	15000	79
80	11FEMRLEMIWSMOXF	Left Mid Femur Moment Mx	600	+	yes	350	80
81	11FEMRLEMIWSMOYF	Left Mid Femur Moment My	600	+	yes	350	81
82	11FEMRLEMIWSMOZF	Left Mid Femur Moment Mz	600	+	yes	300	82
83	11FEMRLL00WSFOXP	Left Femoral Neck X-Axis Force	600	+	yes	10000	83
84	11FEMRLL00WSFOYP	Left Femoral Neck Y-Axis Force	600	+	yes	25000	84
85	11FEMRLL00WSFOZP	Left Femoral Neck Z-Axis Force	600	+	yes	10000	85
86	11KNEELE0UWSFOYF	Left Knee Outboard Y-Axis Force	600	+	yes	20000	86
87	11KNEELEINWSFOYP	Left Knee Inboard Y-Axis Force	600	+	yes	20000	87
88	11FEMRRL00WSFOXP	Right Femoral Neck X-Axis Force	600	+	yes	10000	88
89	11FEMRRL00WSFOYP	Right Femoral Neck Y-Axis Force	600	+	yes	25000	89
90	11FEMRRL00WSFOZP	Right Femoral Neck Z-Axis Force	600	+	yes	10000	90
91	10VEHCCG0000ACXA	Vehicle Center of Gravity X-Axis Acceleration	60	+	yes	1000	91
92	10VEHCCG0000ACYA	Vehicle Center of Gravity Y-Axis Acceleration	60	+	yes	1000	92
93	10VEHCCG0000ACZA	Vehicle Center of Gravity Z-Axis Acceleration	60	+	yes	1000	93
93A	10VEHCCG0000ACRA	Vehicle Center of Gravity Resultant Acceleration	60				
94	10VEHCCG0000AVXA	Vehicle Center of Gravity Roll Rate Gyroscope	60	+	yes	1500	94
95	10VEHCCG0000AVYA	Vehicle Center of Gravity Pitch Rate Gyroscope	60	+	yes	1500	95
96	10VEHCCG0000AVZA	Vehicle Center of Gravity Yaw Rate Gyroscope	60	+	yes	1500	96
97	11SILBRE0100ACYA	Left Side Sill Near Impact Point Y-Axis Acceleration	60	+	yes	2000	97
98	14SILBFR0000ACYA	Left A-Pillar Side Sill Y-Axis Acceleration	60	+	yes	1000	98
99	11APILLO0000ACYA	Left Lower A-Pillar Y-Axis Acceleration	60	+	yes	2000	99
100	11APILMI0000ACYA	Left Mid A-Pillar Y-Axis Acceleration	60	+	yes	2000	100
101	14SILBRE0000ACYA	Left Side Sill at Rear Seat Y-Axis Acceleration	60	+	yes	1000	101
102	14BPILLO0000ACYA	Left Lower B-Pillar Y-Axis Acceleration	60	+	yes	2000	102
103	14BPILMI0000ACYA	Left Mid B-Pillar Y-Axis Acceleration	60	+	yes	2000	103
104	11SETRFR0000ACYA	Left Front Seat Track at H-Point Y-Axis Acceleration	60	+	yes	2000	104

Channel	ISO mnemonic	Channel Title	Filter	Flip	Zero	Full Scale	V5 Index
105	12ENGNT0000ACXA	Top of Engine X-Axis Acceleration	60	+	yes	1000	105
106	12ENGNT0000ACYA	Top of Engine Y-Axis Acceleration	60	+	yes	1000	106
107	12VEHC000000ACYA	Firewall Y-Axis Acceleration	60	+	yes	1000	107
108	13ROOF000000ACYA	Right Side Roof Rail Y-Axis Acceleration	60	+	yes	1000	108
109	13SILBFR0000ACYA	Right Side Sill Y-Axis Acceleration	60	+	yes	1000	109
110	18DECK000000ACXA	Rear Deck Behind Rear Axle X-Axis Acceleration	60	+	yes	1000	110
111	18DECK000000ACYA	Rear Deck Behind Rear Axle Y-Axis Acceleration	60	+	yes	1000	111
112	11DOORFR0000ACYA	Left Front Door on Center Line X-Axis Acceleration	60	+	yes	2000	112
113	11DOORMIRE00ACYA	Midrear of Left Front Door Y-Axis Acceleration	60	+	yes	2000	113
114	11DOORLEFRUPACYA	Left Front Door Upper Centerline Y-Axis Acceleration	60	+	yes	2000	114
115	14DOORMIRE00ACYA	Midrear of Left Rear Door Y-Axis Acceleration	60	+	yes	2000	115
116	14DOORLEREUPACYA	Left Rear Door Upper Centerline Y-Axis Acceleration	60	+	yes	2000	116
117	11AIRBTPLE00EVOA	Driver Side Curtain Inductor	1000	+	no	5	117
118	11AIR02N0000EVOA	Driver Torso Airbag Fire Inductor	1000	+	no	5	118
119	11CONT000001VO00	Head Contact Switch	0	+	no	1	119
120	11CONT000002VO00	Shoulder Contact Switch	0	+	no	1	120
121	11CONT000003VO00	Torso Contact Switch	0	+	no	1	121
122	11CONT000004VO00	Left Contact Switch	0	+	no	1	122
123	K0FBAR010000FOXA	Pole Load Cell 1	60	+	yes	200000	123
124	K0FBAR020000FOXA	Pole Load Cell 2	60	+	yes	200000	124
125	K0FBAR030000FOXA	Pole Load Cell 3	60	+	yes	200000	125
126	K0FBAR040000FOXA	Pole Load Cell 4	60	+	yes	200000	126
127	K0FBAR050000FOXA	Pole Load Cell 5	60	+	yes	200000	127
128	K0FBAR060000FOXA	Pole Load Cell 6	60	+	yes	200000	128
129	K0FBAR070000FOXA	Pole Load Cell 7	60	+	yes	200000	129
130	K0FBAR080000FOXA	Pole Load Cell 8	60	+	yes	200000	130
131	K0FBAR040000FOXA	Pole Load Cell 4	60	+	yes	200000	131
132	K0FBAR050000FOXA	Pole Load Cell 5	60	+	yes	200000	132
133	K0FBAR060000FOXA	Pole Load Cell 6	60	+	yes	200000	133
134	K0FBAR070000FOXA	Pole Load Cell 7	60	+	yes	200000	134
135	K0FBAR080000FOXA	Pole Load Cell 8	60	+	yes	200000	135

2011 Hyundai Tucson Left Side FMVSS 214 Pole Impact 32 kph 110817; Test Time 14:29



D-12

110817