FINAL REPORT NUMBER 201UI-MGA-11-15

SAFETY COMPLIANCE TESTING FOR FMVSS 201
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
Toyota Sienna 3.5L
NHTSA No. CB5104

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: June 30-July 1, 2011
Report Date: July 7, 2011

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Accepted By: _____

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16. Abstract A compliance test series was conducted on the subject Toyota Sienna 3.5L, NHTSA No. CB5104, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201 compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on June 30-July 1, 2011. Test failures identified were as follows: None The data recorded indicates that the Toyota Sienna 3.5L tested appears to comply with the upper interior requirements of FMVSS 201.			
17. Key Words Compliance Testing Safety Engineering FMVSS 201UI Toyota Sienna 3.5L		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division, Mail Code: NPO-410 1200 New Jersey Avenue, SE West Building Washington, D.C. 20590	
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a Toyota Sienna 3.5L, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on June 30-July 1, 2011 on a Toyota Sienna 3.5L, manufactured by Toyota Motor Manufacturing, Indiana, Inc.

All tests were conducted in accordance with the U. S. Department of Transportation, National Highway Traffic Safety Administration's Laboratory Test Procedure TP-201U-01 dated April 3, 1998 and the corresponding MGA Research Corporation's FMVSS 201U procedure number MGATP201U_FRAME#2 dated November 9, 2009.

All tests were conducted at MGA Research Corporation in Troy, Michigan and were performed by MGA engineers and technicians. The FMVSS 201U impactor test machine was used to conduct the testing. Target locations were determined by using a Coordinate Measurement Machine in conjunction with the MGA EZ-Target™ program and MGA procedure MGATP201U_Test Series dated November 9, 2009.

2.0 COMPLIANCE TEST DATA SUMMARY

The Toyota Sienna 3.5L was equipped with A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, an adjustable seat belt anchorage on each O-pillar, fixed seat belt anchorages on each rear pillar, a grab handle located on each side rail in the first, second, and third row, and assist handles located on each B-pillar.

Upon completion of targeting the test vehicle, twelve (12) targets were chosen to be impacted based upon engineering judgment and certification test data provided by the manufacturer. The twelve (12) targets chosen were:

AP1	BP4	UR1@SR2B	UR4@SR3-3
AP3	OP1	UR2@2405	UR5@SR3-2
BP2	RH	UR3@BP	UR6@OP

The Toyota Sienna 3.5L tested appears to comply with the upper interior performance criteria for FMVSS 201. The HIC(d) measured using the Part 572L (Free Motion Headform) was below 1000 for each tested component.

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

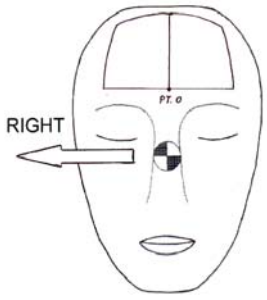
VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Left	245	42	18.5	556	517	16	11 Left
AP3	Right	159	46	18.9	459	388	15	0
BP2	Left	270	11	23.5	607	585	15	3 Left
BP4	Right	163	-8	23.8	618	598	11	3 Left
OP1	Right	90	3	24.0	601	576	19	3 Right
RH	Right	0	50	23.5	521	470	8	9 Right
UR1@SR2B	Right	90	50	23.8	519	467	32	5 Left
UR2@2405	Left	270	50	24.0	750	774	36	6 Left
UR3@BP	Right	90	50	23.7	763	791	25	5 Right
UR4@SR3-3	Left	270	50	23.8	582	551	30	3 Left
UR5@SR3-2	Right	90	50	23.6	647	637	22	2 Right
UR6@OP	Left	270	50	24.0	653	645	21	5 Left

Above and left/right refers to the position relative to reference pt. 0 where the target made contact with the Free Motion Headform. See the diagram below for details.



POST TEST COMMENTS:

The following description lists any post-test damage or other test observations for each target.

AP3 Right: Dislodged trim.

BP2 Left: Non functional seat belt adjuster; adjuster cover dislodged.

BP4 Right: Stress marks on grab handle.

OP1 Right: Dislodged anchorage adjuster cover, non functional anchorage adjuster, stress marks on anchorage adjuster cover.

RH Right: Dislodged trim.

UR1@SR2B Right: Headliner deformation, dislodged headliner, stress mark on grab handle.

UR2@2405 Left: Grab handle compression, headliner deformation, stress mark on grab handle.

UR3@BP Right: Stress mark on pillar trim.

UR4@SR3-3 Left: Headliner deformation; dislodged headliner.

UR5@SR3-2 Right: Headliner deformation.

REMARKS:

The targets listed were impacted in the following order:

Left: AP1, UR2@2405, BP2, UR6@OP, UR4@SR3-3

Right: RH, OP1, UR5@SR3-2, BP4, UR3@BP, UR1@SR2B, AP3

The 150 mm rule was observed for targets horizontal to each other and the 200 mm rule was observed for vertical components.

RECORDED BY: Nathaniel Newth DATE: June 1, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

INTERIOR TRIM INFORMATION: A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, an adjustable seat belt anchorage on each O-pillar, fixed seat belt anchorages on each rear pillar, a grab handle located on each side rail in the first, second, and third row, and assist handles located on each B-pillar.

SUNROOF INFORMATION:

Installed:	_____Yes	_X_ No
Operation:	_____Electric	____ Manual

SIDE RAIL CURTAIN AIRBAG INFORMATION:

Installed:	_X_Yes	___ No

ROLL-BAR INFORMATION:

Installed:	_____Yes	_X_ No
Padded:	_____Yes	_X_ No
Braces:	_____Yes	_X_ No

GENERAL INFORMATION:

Date Received: April 1, 2011; Odometer Reading 41 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Toyota Motor Manufacturing, Indiana, Inc.

Date of Manufacture: November, 2010; VIN: 5TDZK3DC4BS102036

GVWR: 2715 kg; GAWR FRONT: 1405 kg;

GAWR REAR: 1405 kg;

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 240 kPa REAR: 240 kPa

Recommended Tire Size: P235/60R17

Recommended Cold Tire Pressure:

FRONT: 240 kPa REAR: 240 kPa

Size of Tire on Test Vehicle: P235/60R17

Type of Spare Tire: T155/80R17; Space Saver: X; Standard__

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench__; Bucket X; Split Bench __

Number of Occupants: Front 2; Rear 5; TOTAL 7

VEHICLE CAPACITY WEIGHT:

Vehicle Capacity Weight (VCW) = 744 kg

No. of Occupants x 68 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) =268 kg (difference)

WEIGHT OF TEST VEHICLE AS DELIVERED AT LABORATORY: (with maximum fluids)

Right Front =	543.0 kg	Right Rear =	416.5 kg
Left Front =	558.5 kg	Left Rear =	426.0 kg
TOTAL FRONT =	1101.5 kg	TOTAL REAR =	842.5 kg
% Total Weight =	56.7 %	% Total Weight =	43.3 %

TOTAL DELIVERED WEIGHT = 1944.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1944.0 kg

Max. Test Cargo/Luggage Weight = 136.0 kg

Target Test Weight = 2080.0 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	535.5 kg	Right Rear =	497.5 kg
Left Front =	544.0 kg	Left Rear =	502.5 kg
TOTAL FRONT =	1079.5 kg	TOTAL REAR =	1000.0 kg
% Total Weight =	51.9 %	% Total Weight =	48.1 %

TOTAL TEST WEIGHT = 2079.5 kg

Weight of ballast secured in vehicle's cargo area = 135.5 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 772 mm; Left Front 764 mm;
Right Rear 784 mm; Left Rear 780 mm;
Pitch Angle at Right Door Sill = 0.5 Rear is higher
Pitch Angle at Left Door Sill = 0.6 Rear is higher
Roll Angle at Front Bumper = 0.2 Right is higher
Roll Angle at Rear Bumper = 0.2 Right is higher

FULLY LOADED: Right Front 776 mm; Left Front 771 mm;
Right Rear 759 mm; Left Rear 756 mm;
Pitch Angle at Right Door Sill = 0.1 Front is higher
Pitch Angle at Left Door Sill = 0.0
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.4 Right is higher

AS TARGETED: Right Front 906 mm; Left Front 904 mm;
Right Rear 894 mm; Left Rear 899 mm;
Pitch Angle at Right Door Sill = 0.1 Rear is higher
Pitch Angle at Left Door Sill = 0.0
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.2 Right is higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill =	0.3 Rear is higher
Pitch Angle at Left Door Sill =	0.2 Rear is higher
Roll Angle at Front Bumper =	0.0
Roll Angle at Rear Bumper =	0.2 Right is higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill =	0.4 Rear is higher
Pitch Angle at Left Door Sill =	0.4 Rear is higher
Roll Angle at Front Bumper =	0.2 Right is higher
Roll Angle at Rear Bumper =	0.4 Right is higher

VEHICLE WHEELBASE = 3028 mm

REMARKS: The seat travel distance was measured to be 240 mm for the driver front seat and 240 mm for the passenger front seat.

RECORDED BY: Nathaniel Newth DATE: June 22, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

	HORIZONTAL ANGLE SPECIFIED RANGE	MINIMUM HORIZONTAL ANGLE	MAXIMUM HORIZONTAL ANGLE
A-PILLAR	L 195º-255º	L 200.7º	L 245.3º
	R 105º-165º	R 115.9º	R 159.8º
B-PILLAR	L 195º-345º	L 196.2º	L 271.0º
	R 15º-165º	R 89.4º	R 163.7º

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Nathaniel Newth DATE: June 22, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
	FH2	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
SIDE RAIL	SR1	L 0º-50º	L 0º	L 16º
		R 0º-50º	R 0º	R 16º
	SR2A	L 0º-50º	L 0º	L 20º
		R 0º-50º	R 0º	R 20º
	SR2B	L 0º-50º	L 0º	L 21º
		R 0º-50º	R 0º	R 21º
	SR3-1	L 0º-50º	L 0º	L 30º
		R 0º-50º	R 0º	R 30º
	SR3-2	L 0º-50º	L 0º	L 30º
		R 0º-50º	R 0º	R 30º
	SR3-3	L 0º-50º	L 0º	L 30º
		R 0º-50º	R 0º	R 30º
	SR3-4	L 0º-50º	L 0º	L 30º
		R 0º-50º	R 0º	R 30º

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
SLIDING DOOR	SD	L 0º-50º	L 0º	L 22º
		R 0º-50º	R 0º	R 22º
REAR HEADER	RH	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
A-PILLAR	AP1	L -5º-50º	L -5º	L 42º
		R -5º-50º	R -5º	R 42º
	AP2	L -5º-50º	L -5º	L 46º
		R -5º-50º	R -5º	R 46º
	AP3	L -5º-50º	L -5º	L 46º
		R -5º-50º	R -5º	R 46º
B-PILLAR	BP1	L -10º-50º	L -10º	L 23º
		R -10º-50º	R -10º	R 23º
	BP2*	L 0º-50º	L 0º	L 11º
		R 0º-50º	R 0º	R 11º
	BP3	L -10º-50º	L -10º	L -6º
		R -10º-50º	R -10º	R -6º
	BP4	L -10º-50º	L -10º	L -8º
		R -10º-50º	R -10º	R -8º
OTHER PILLAR	OP1*	L 0º-50º	L 0º	L 3º
		R 0º-50º	R 0º	R 3º
	OP2	L -10º-50º	L -10º	L 3º
		R -10º-50º	R -10º	R 3º
REAR PILLAR	RP1	L -10º-50º	L -10º	L 33º
		R -10º-50º	R -10º	R 33º
	RP2*	L 0º-50º	L 0º	L 27º
		R 0º-50º	R 0º	R 29º
UPPER ROOF 1		0º-50º	0º	46º

	VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
UPPER ROOF 2	0º-50º	0º	50º
UPPER ROOF 3	0º-50º	0º	50º
UPPER ROOF 4	0º-50º	0º	50º
UPPER ROOF 5	0º-50º	0º	50º
UPPER ROOF 6	0º-50º	0º	50º

As determined using the Procedures specified in S8.13.4.2. *Targets BP2, OP1, and RP2 are seat belt anchorage locations.

RECORDED BY: Nathaniel Newth DATE: June 22, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	240 mm	240 mm
Tº	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	114.7º	--
A1º	360º - Tº	245.3º	--
Wº	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	200.7º	--
A2º	A2º = Wº	200.7º	--
Uº	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	271.0º	--
B1º	B1º = Uº	271.0º	--
Vº	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	196.2º	--
B2º	B2º = Vº	196.2º	--
Wº (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	159.8º
A1º (right)	A1º (right) = Wº (right)	--	159.8º
T º (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	244.1º
A2º (right)	360º-Tº (right)	--	115.9º
V º (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	163.7º
B1º (right)	B1º (right) = Vº (right)	--	163.7º
U º (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	89.4º
B2º (right)	B2º (right) = Uº (right)	--	89.4º
J	A-Pillar {(Plane 3) – (Plane 5)}	347.3 mm	346.7 mm
J/2	J ÷ 2	173.7 mm	173.4 mm
D1	Upper Roof {(Plane A) – (Plane B)}	2864.0 mm	
D1/2	D1 ÷ 2	1432.0 mm	

Measurement	Description	Left Side	Right Side
D2	Upper Roof {(Plane C) – (Plane D)}	1407.2 mm	
D2/2	D2 ÷ 2	703.6 mm	
.35D1	.35 x D1	1002.4 mm	
.35D2	.35 x D2	492.5 mm	
N	B-Pillar {(BPR) – (lowest point on daylight opening forward of B-Pillar)}	485.3 mm	486.7 mm
N/2	B-Pillar {(BP3) – (lowest point on daylight opening forward of B-Pillar)}	242.7 mm	243.4 mm
N/4	B-Pillar {(BP4) – (lowest point on daylight opening forward of B-Pillar)}	121.3 mm	121.7 mm
Q	O-Pillar (Plane 13 – Plane 14)	490.3 mm	492.4 mm
Q/2	Q / 2	245.2 mm	246.2 mm
D	R-Pillar (Point 7 – Point M)	1122.0 mm	1122.0 mm
3D/7	3*D / 7	480.9 mm	480.9 mm

As determined using the Procedures specified in S10.1-10.13.

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2344.0	-431.0	1477.3	2344.0	431.0	1460.0
2nd Row	3240.0	-445.0	1533.6	3240.0	445.0	1533.6
3rd Row	4086.0	-355.0	1557.3	4086.0	355.0	1557.3

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2344.0	-431.0	1477.3	2344.0	431.0	1460.0
2nd Row	3240.0	-445.0	1533.6	3240.0	445.0	1533.6
3rd Row	4086.0	-355.0	1557.3	4086.0	355.0	1557.3

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	X	y	z
CGF1	2264.0	-431.0	2137.3	2264.0	431.0	2120.0
CGF2	2504.0	-431.0	2137.3	2504.0	431.0	2120.0
2nd Row CGR	3400.0	-445.0	2193.6	3400.0	445.0	2193.6
3rd Row CGR	4246.0	-355.0	2217.3	4246.0	355.0	2217.3

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Front driver door striker upper bolt (x, y, z) = 2485.2, -893.4, 1660.1

Front driver seat front outboard bolt (x, y, z) = 1962.0, -642.0, 1138.4

Front passenger seat front outboard bolt (x, y, z) = 1962.0, 642.0, 1138.4

REMARKS:

RECORDED BY: Nathaniel Newth DATE: June 22, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: Toyota Sienna 3.5L

VEH. NHTSA NO.: CB5104 VIN: 5TDZK3DC4BS102036 COLOR: Predawn Gray Mica

VEH. BUILD DATE: November, 2010 TEST DATES: June 30-July 1, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
A-Pillar Left Side								
AP1	1953.2	-644.5	2255.1	--	--	Yes	--	--
REL	1963.1	-662.4	2237.5	245	42	--	1	Yes
AP2	1811.0	-702.3	2168.0	201	46	No	--	No
AP3	1638.3	-731.5	2081.9	201	46	No	--	No
A-Pillar Right Side								
AP1	1955.9	649.6	2253.6	--	--	Yes	--	--
REL	1963.1	662.4	2237.5	116	42	--	1	No
AP2	1808.1	701.7	2166.1	159	46	No	--	No
AP3	1638.9	733.3	2081.1	159	46	No	--	Yes
B-Pillar Left Side								
BP1	2537.9	-549.3	2327.9	270	23	No	--	No
BP2	2536.0	-682.1	2125.2	270	11	No	--	Yes
BP3	2502.0	-710.5	2085.3	270	-6	No	--	No
BP4	2661.0	-744.2	1964.5	197	-8	No	--	No
B-Pillar Right Side								
BP1	2536.8	550.4	2327.4	90	23	No	--	No
BP2	2535.2	682.4	2124.4	90	11	No	--	No
BP3	2505.1	711.2	2084.6	90	-6	No	--	No

SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
BP4	2657.2	744.4	1963.4	163	-8	No	--	Yes
Other Pillar Left Side								
OP1	3700.5	-671.6	2179.7	270	3	No	--	No
OP2	3707.8	-699.6	2133.2	--	--	Yes	--	--
REL	3699.7	-672.5	2174.8	270	3	--	2	No
Other Pillar Right Side								
OP1	3702.4	672.2	2178.7	90	3	No	--	Yes
OP2	3710.4	703.4	2132.3	--	--	Yes	--	--
REL	3704.6	673.3	2173.3	90	3	--	2	No
Rear Pillar Left Side								
RP1	4406.4	-582.5	2303.1	330	33	No	--	No
RP2	4460.6	-634.4	2209.3	330	27	No	--	No
Rear Pillar Right Side								
RP1	4409.6	585.3	2300.3	30	33	No	--	No
RP2	4591.8	594.2	2141.1	50	29	No	--	No
Front Header Left Side								
FH1	1904.5	-544.5	2294.1	180	50	No	--	No
FH2	1879.7	-396.2	2300.5	180	50	No	--	No
Front Header Right Side								
FH1	1905.1	545.4	2292.4	180	50	No	--	No
FH2	1882.1	399.4	2301.4	180	50	No	--	No
Side Rail Left Side								
SR1	2103.3	-585.9	2323.9	270	16	No	--	No
SR2A	2252.3	-589.2	2355.3	--	--	Yes	--	--
REL	2261.1	-570.1	2346.1	270	20	--	1	No
SR2B	2237.3	-573.3	2343.5	--	--	Yes	--	--
REL	2233.3	-586.5	2325.0	270	21	--	1	No
SR3-1	3124.6	-574.6	2357.3	270	30	No	--	No
SR3-2	3313.7	-571.5	2362.1	270	30	No	--	No

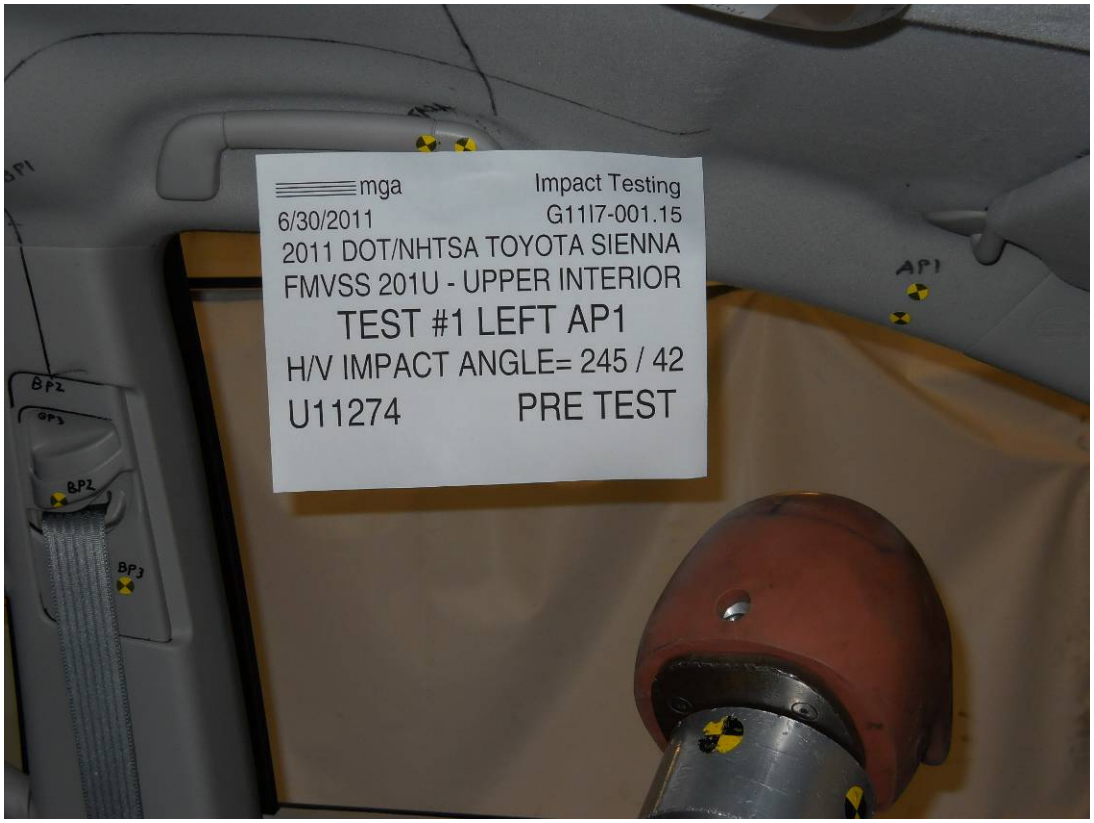
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
SR3-3	3968.6	-589.3	2342.4	270	30	No	--	No
SR3-4	4158.3	-586.5	2339.3	270	30	No	--	No
Side Rail Right Side								
SR1	2106.4	586.4	2322.8	90	16	No	--	No
SR2A	2255.7	586.4	2358.7	--	--	Yes	--	--
REL	2262.8	568.1	2341.6	90	20	--	1	No
SR2B	2236.6	570.0	2343.6	--	--	Yes	--	--
REL	2236.8	582.8	2324.0	90	21	--	1	No
SR3-1	3121.5	573.8	2355.6	90	30	No	--	No
SR3-2	3312.6	570.5	2363.6	90	30	No	--	No
SR3-3	3969.4	588.6	2341.1	90	30	No	--	No
SR3-4	4159.7	587.4	2337.4	90	30	No	--	No
Rear Header Left Side								
RH	4493.6	-356.0	2348.5	0	50	No	--	No
Rear Header Right Side								
RH	4420.6	354.6	2348.1	--	--	Yes	--	--
REL	4410.7	332.2	2343.3	0	50	--	1	Yes
Sliding Door Left Side								
SD	3102.2	-575.3	2385.0	--	--	Yes	--	--
REL	3120.8	-560.6	2371.7	270	22	--	1	No
Sliding Door Right Side								
SD	3098.9	580.7	2377.7	--	--	Yes	--	--
REL	3117.3	568.6	2363.0	90	22	--	1	No
Upper Roof Left Side								
UR2@2405	2405.0	-434.0	2411.1	270	50	No	--	Yes
UR4@SR3-3	3420.2	-426.3	2420.5	270	50	No	--	Yes
UR6@OP	3685.8	-443.4	2426.2	270	50	No	--	Yes

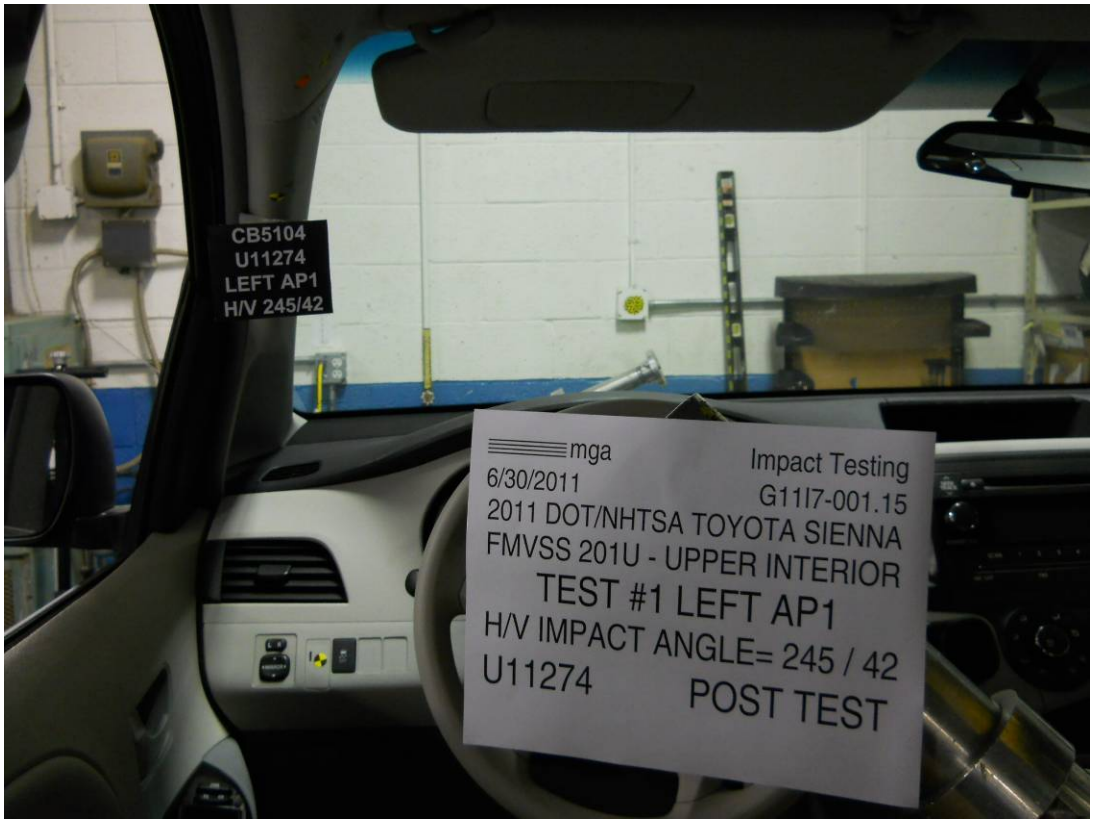
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
Upper Roof Right Side								
UR1@SR2B	2222.0	457.5	2378.2	90	50	No	--	Yes
UR3@BP	2554.5	485.0	2345.8	90	50	No	--	Yes
UR5@SR3-2	3302.2	429.9	2432.1	90	50	No	--	Yes

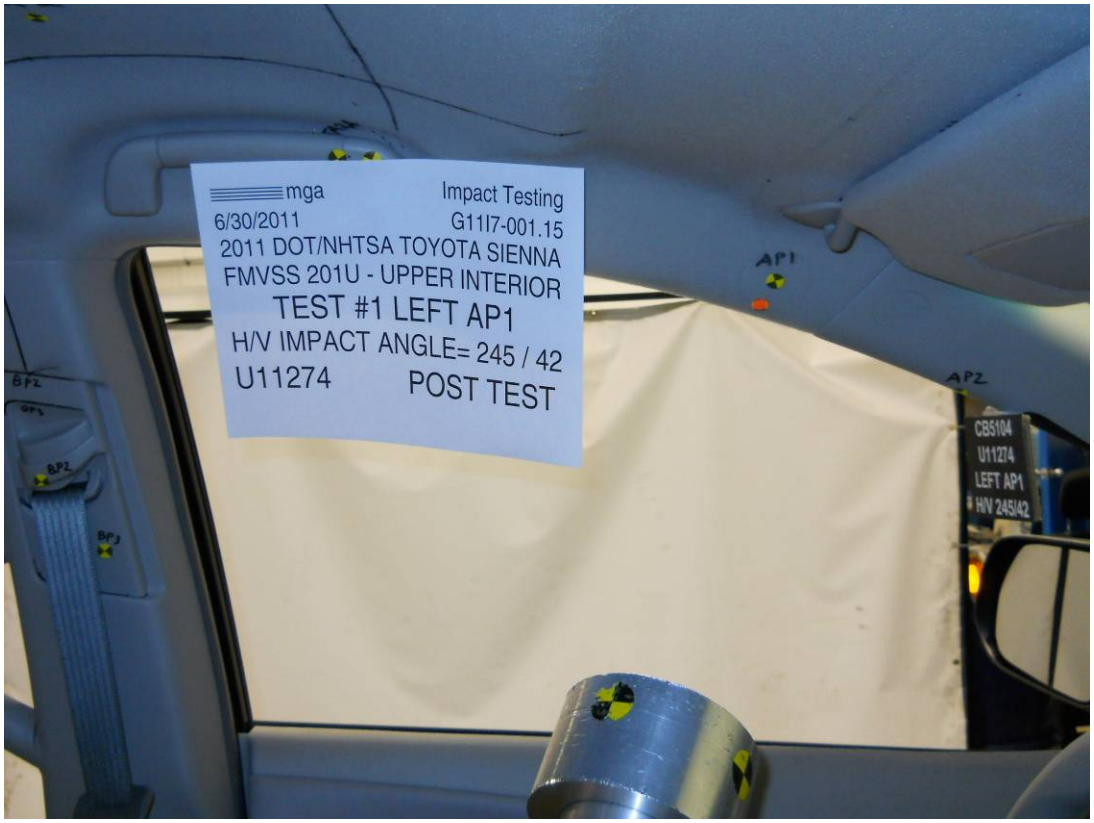
As determined using the Procedures specified in S10.1-10.13.

RECORDED BY: Nathaniel Newth DATE: June 22, 2011 APPROVED BY: Helen A. Kaleto

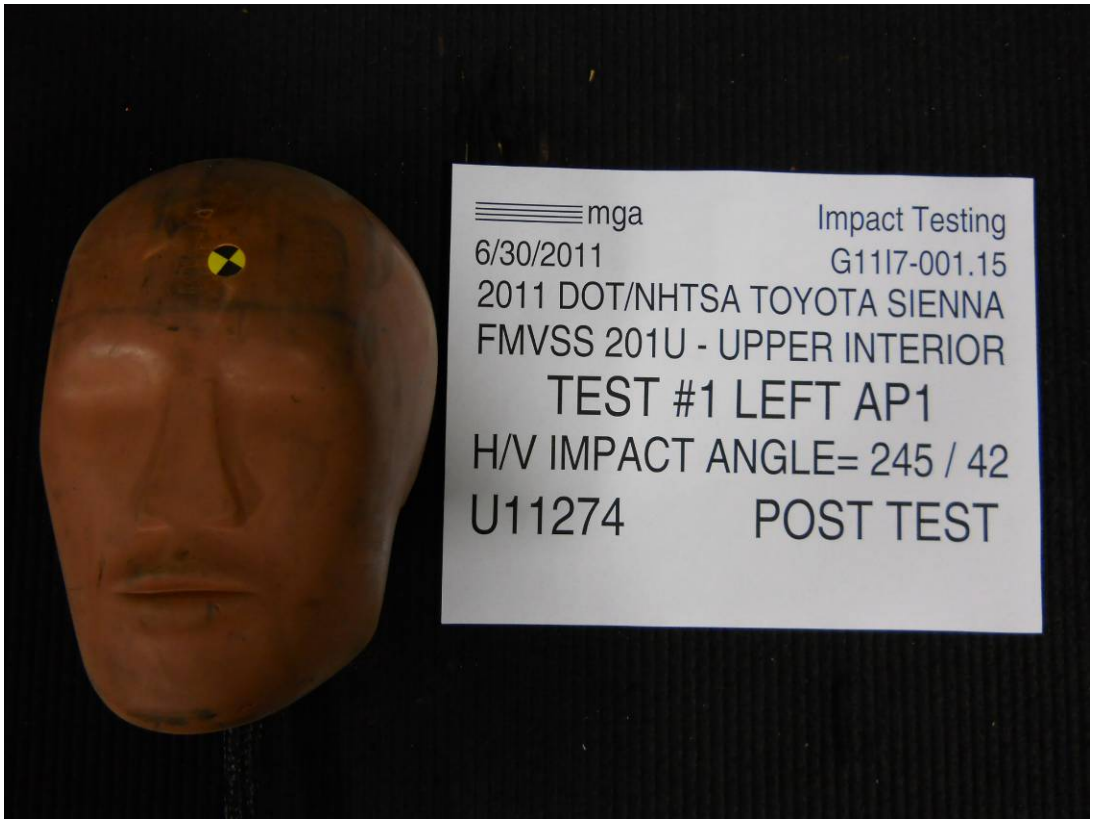
3.0 TEST DATA (Including Acceleration and Velocity Plots)




CB5104
U11274
LEFT AP1
H/V 245/42
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP1
H/V IMPACT ANGLE= 245 / 42
U11274
POST TEST


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP1
H/V IMPACT ANGLE= 245 / 42
U11274
POST TEST
AP1
AP2
CB5104
U11274
LEFT AP1
H/V 245/42


AP1
AP2


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP1
H/V IMPACT ANGLE= 245 / 42
U11274
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): AP1Left

Temperature:21.6C

MGA Test Reference No.:U11274

Humidity:55.1%

Approach Horizontal Angles:245º

Time of Test:10:09:16 AM

Approach Vertical Angles:42º

FMH Serial No:[035]

Additional Description:

TEST RESULTS:

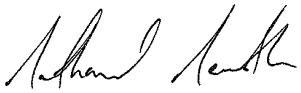
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
556	517	3.7	18.5	16	11 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.05
Y	6	J22664	94.2	0.85	0.86
Z	7	J35924	92.8	0.96	0.94

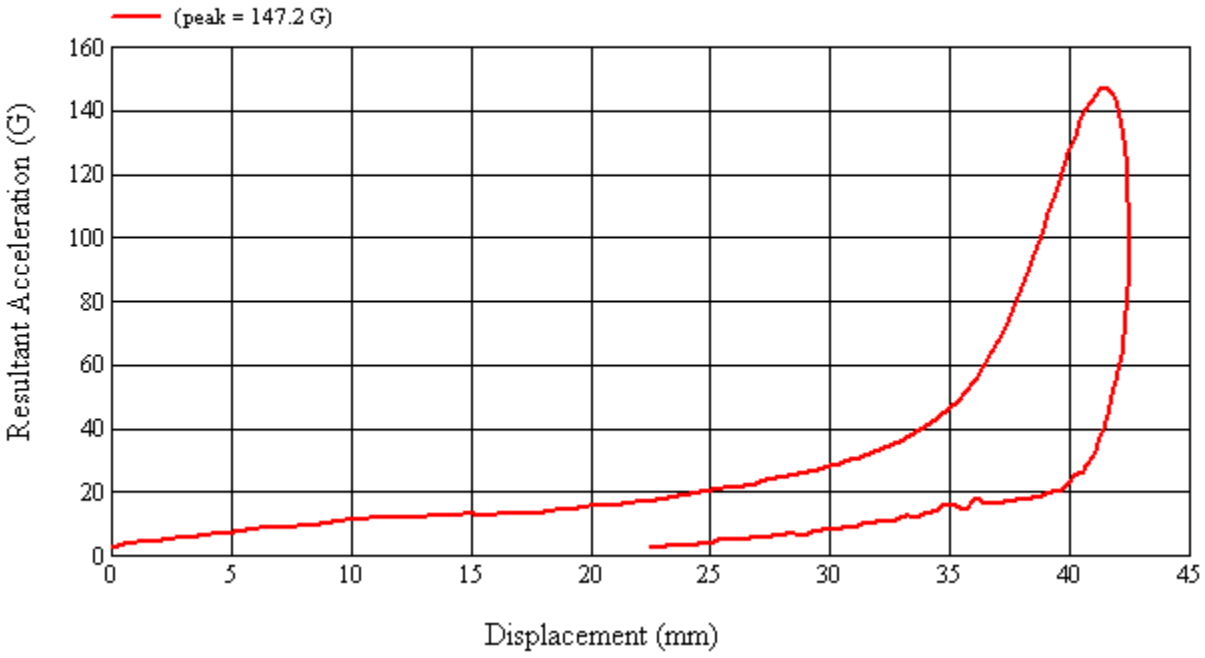
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

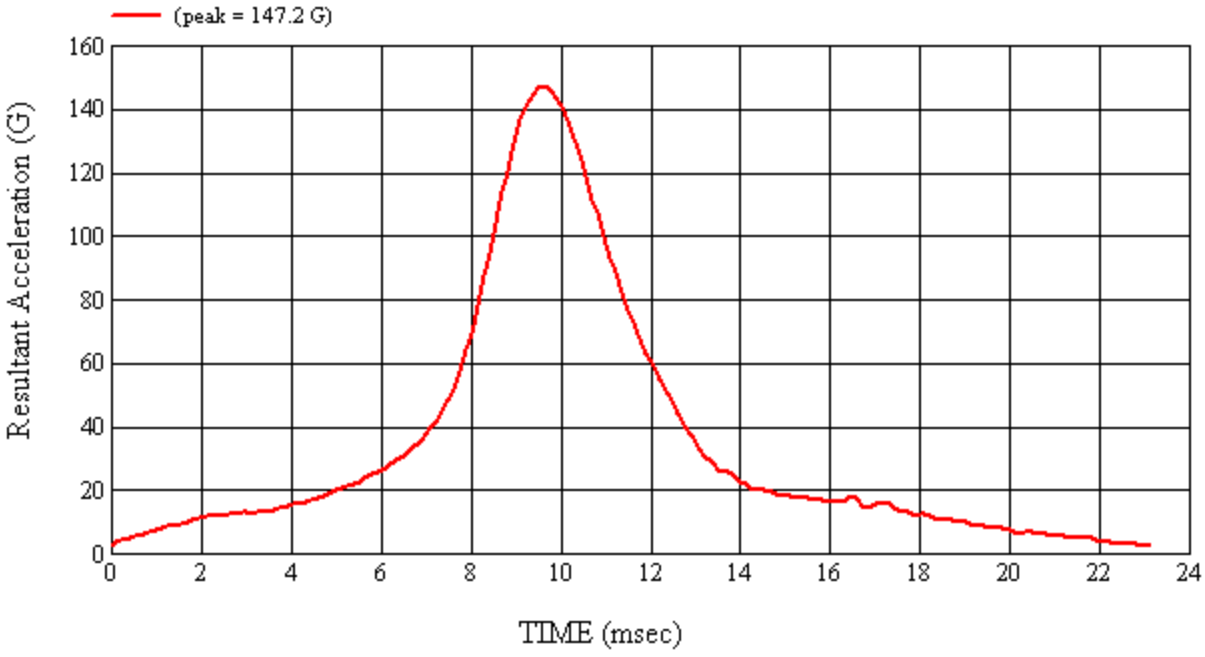
No visible damage

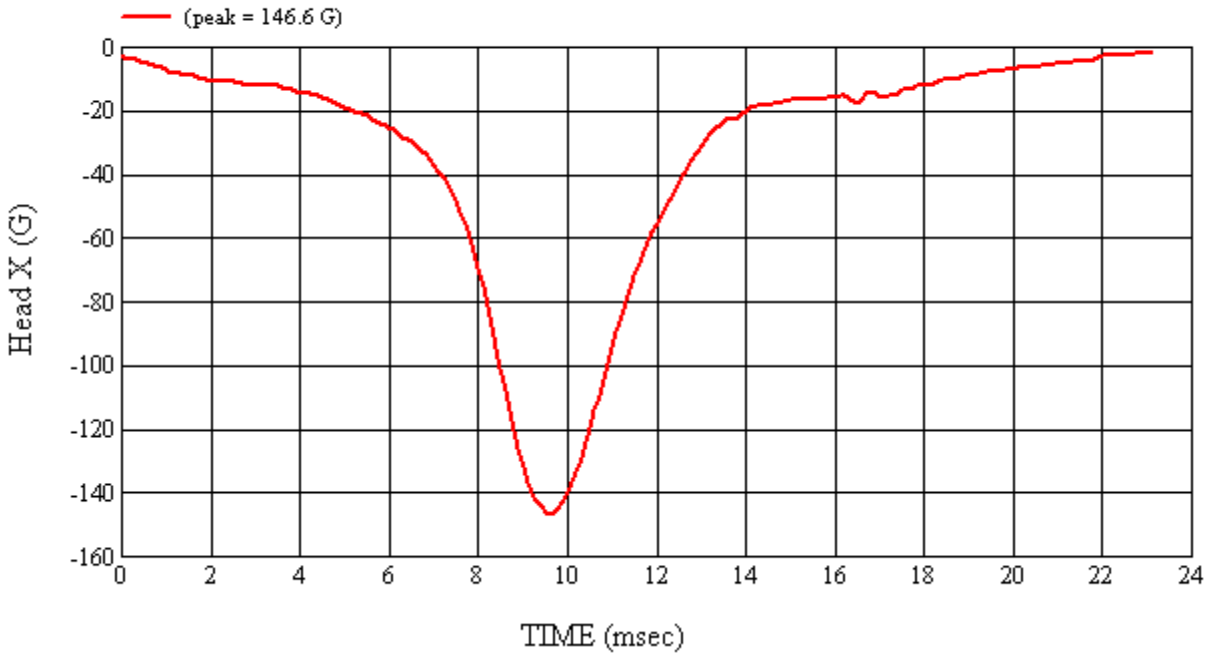
Recorded By:  Approved By*:  Date: 6/30/2011

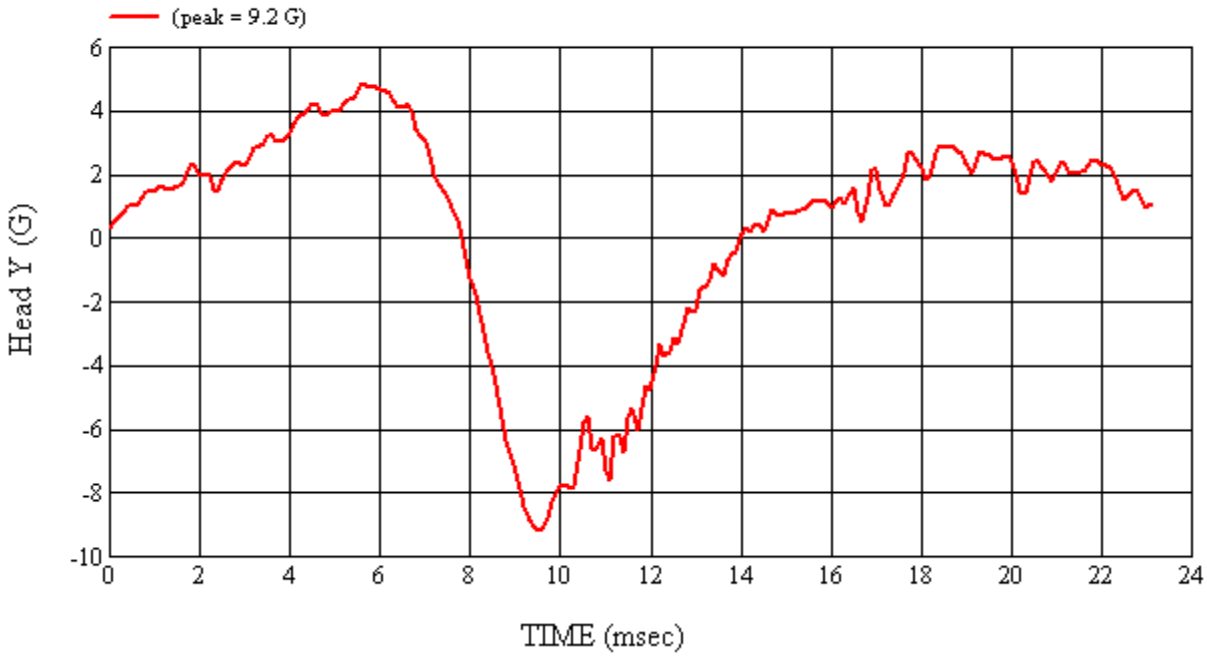
*Only necessary for NHTSA (Government) Compliance testing.

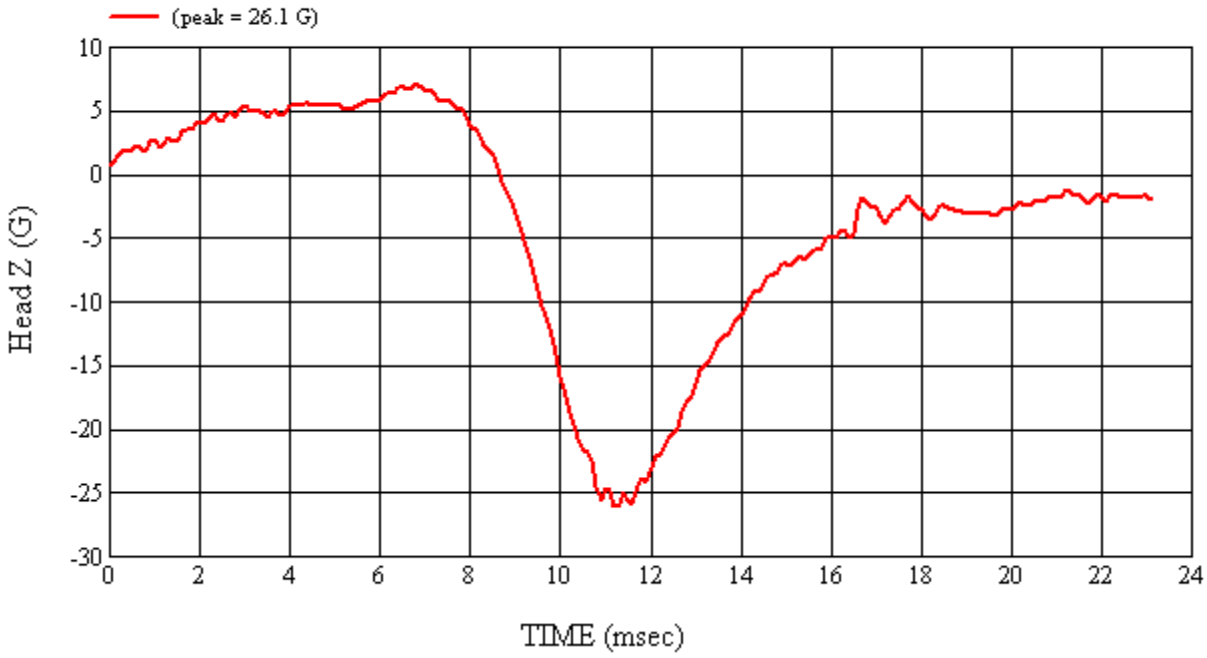
MGA Test #: U11274 Target Location: AP1, Left Side Test Date: 6/30/2011

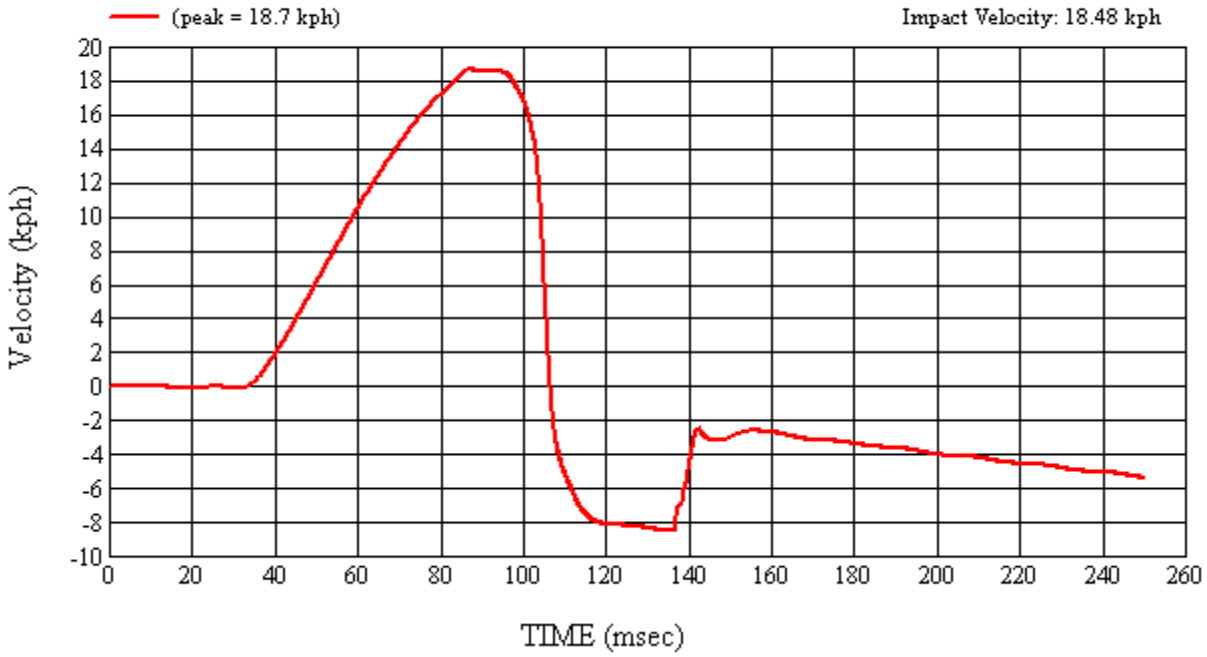


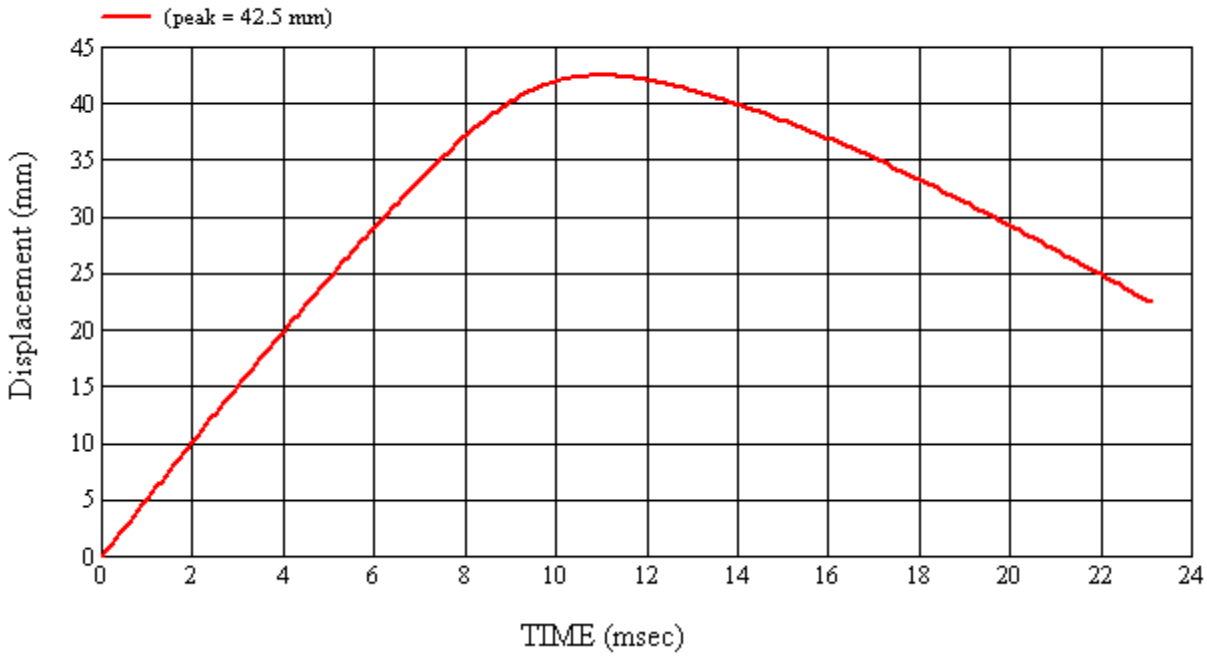


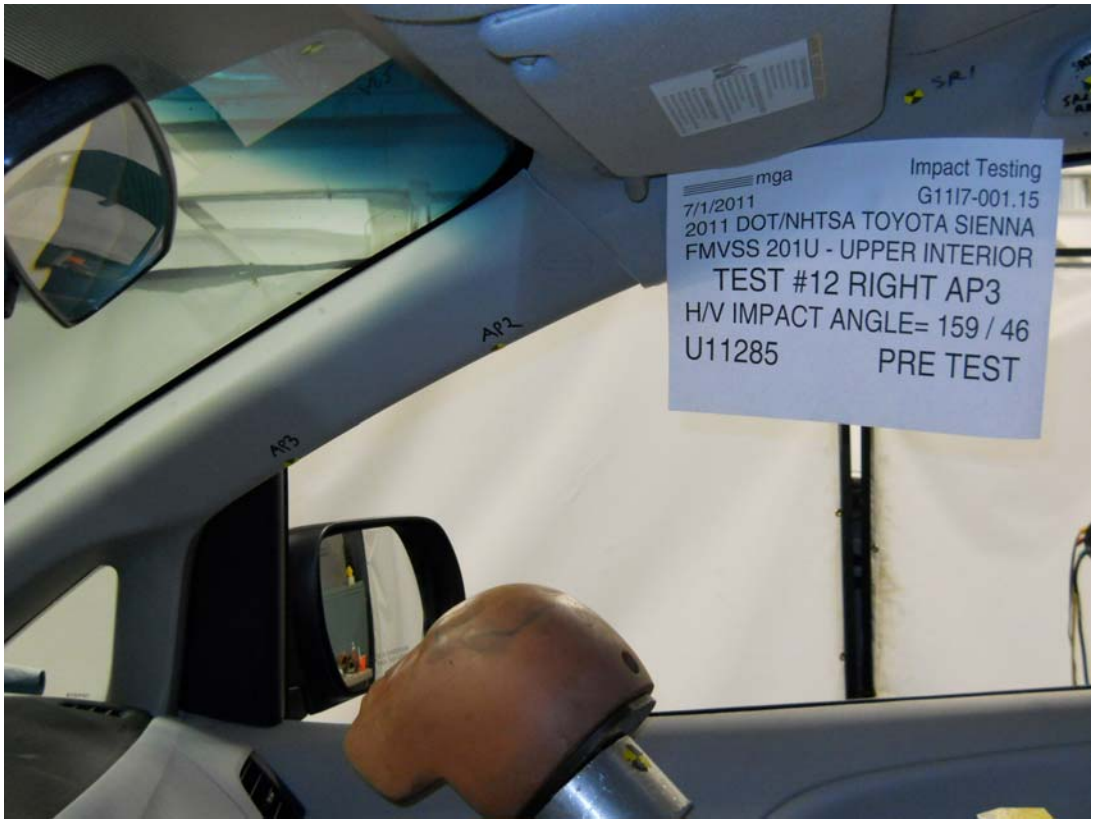

(peak = 146.6 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

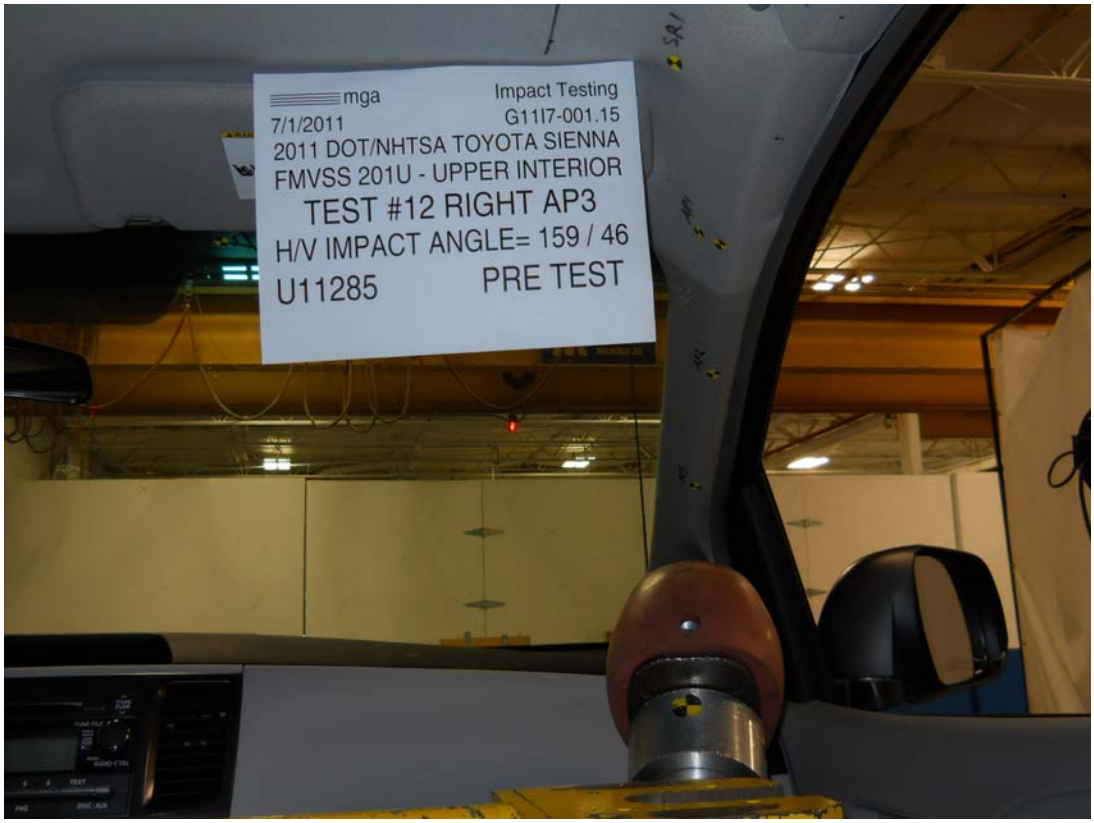

(peak = 9.2 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

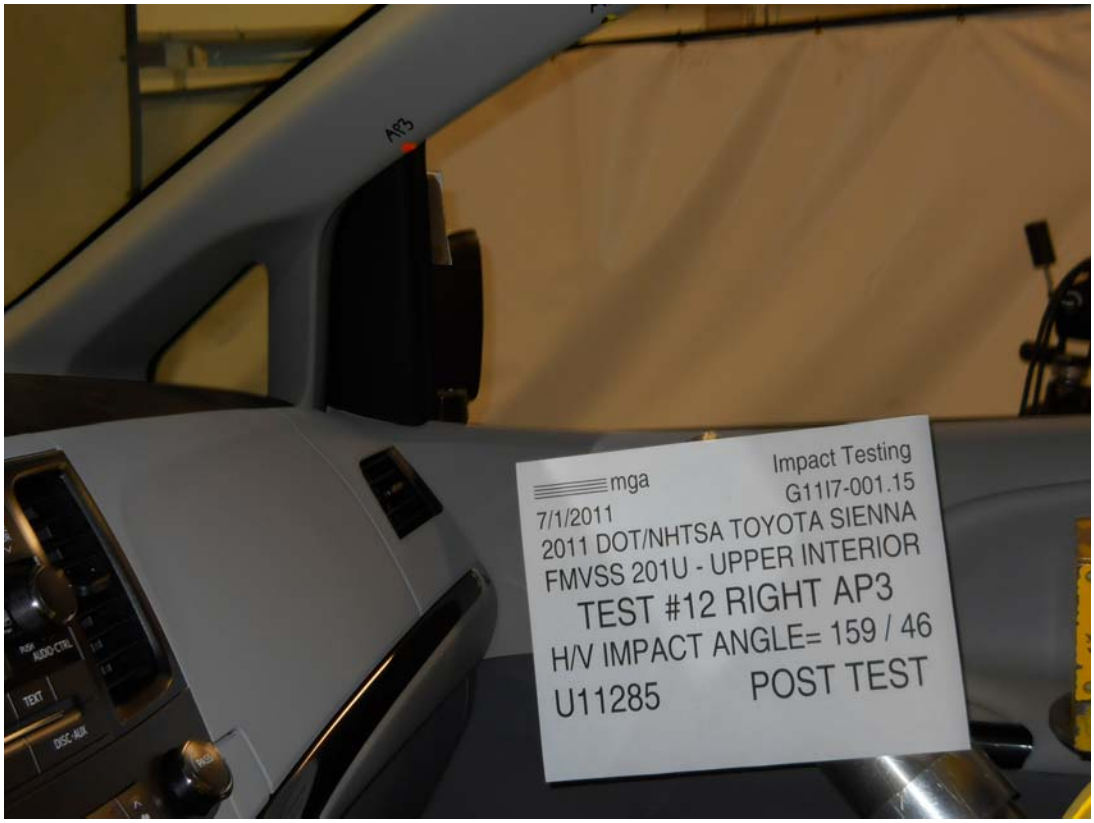

(peak = 26.1 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

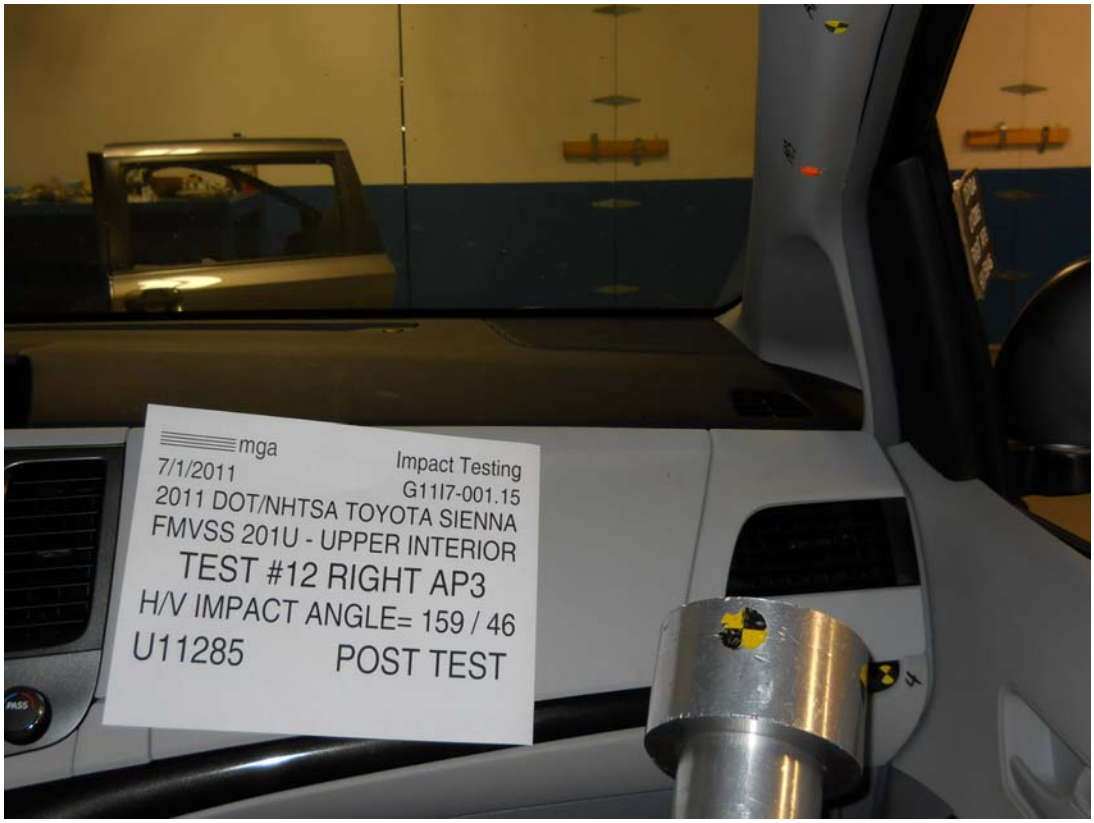

(peak = 18.7 kph)
Impact Velocity: 18.48 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 42.5 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT AP3
H/V IMPACT ANGLE= 159 / 46
U11285
PRE TEST
AP3
AP3


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT AP3
H/V IMPACT ANGLE= 159 / 46
U11285
PRE TEST


AP3
mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT AP3
H/V IMPACT ANGLE= 159 / 46
U11285
POST TEST


mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT AP3
H/V IMPACT ANGLE= 159 / 46
U11285
POST TEST


AP2
AP3


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT AP3
H/V IMPACT ANGLE= 159 / 46
U11285
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): AP3Right

Temperature:24.1C

MGA Test Reference No.:U11285

Humidity:52.3%

Approach Horizontal Angles:159º

Time of Test:2:54:40 PM

Approach Vertical Angles:46º

FMH Serial No:[035]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
459	388	4.8	18.9	15	0

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

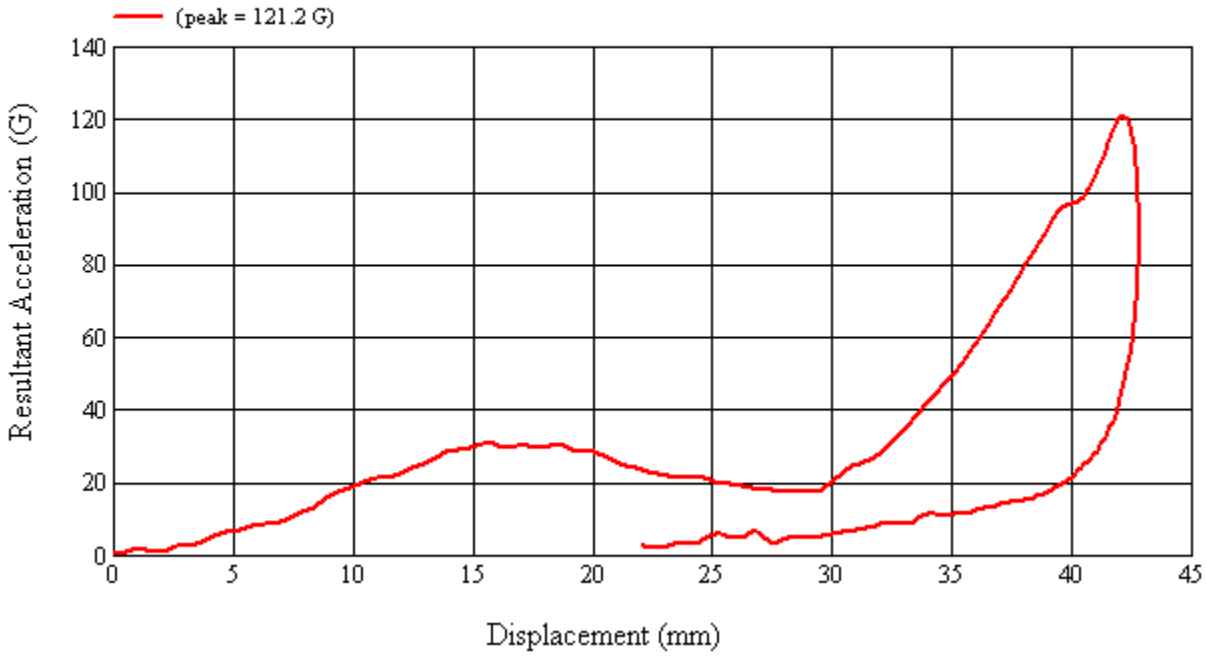
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

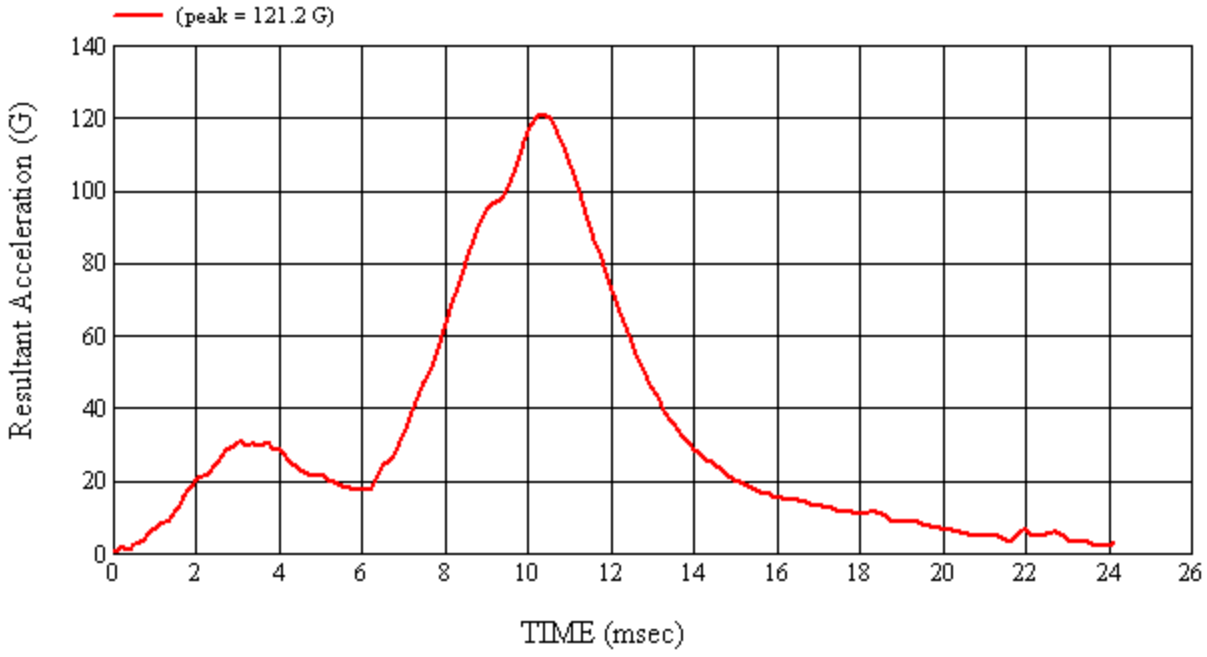
Dislodged trim

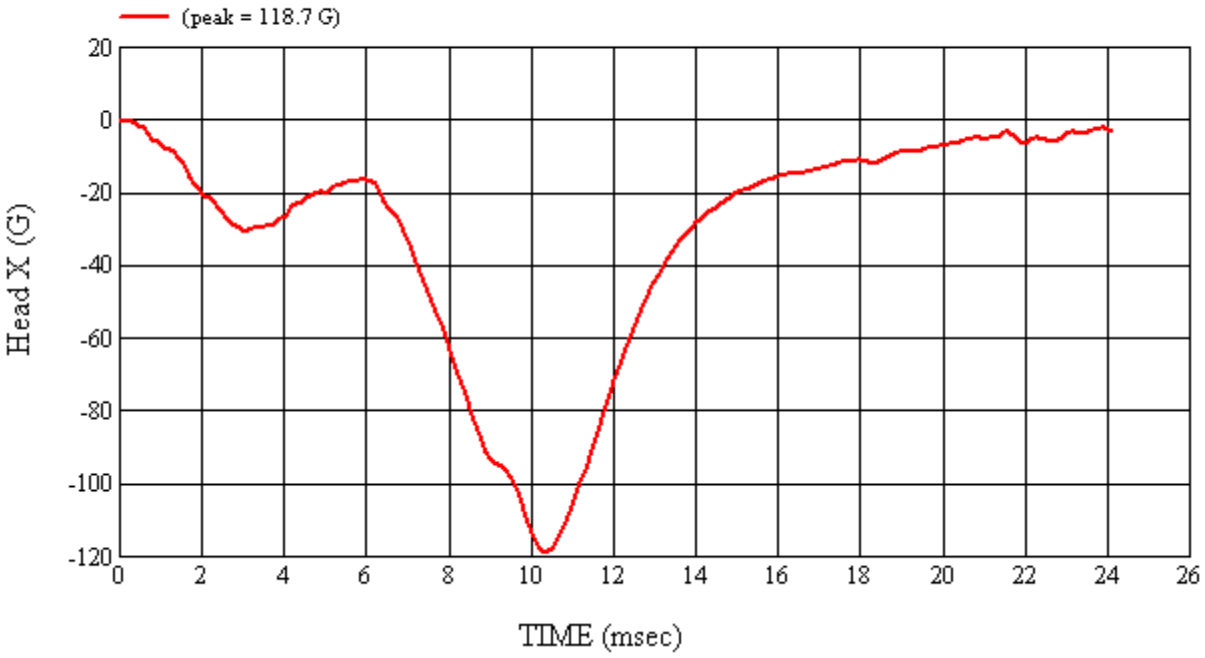
Recorded By: _____ Approved By*: _____ Date: 7/1/2011

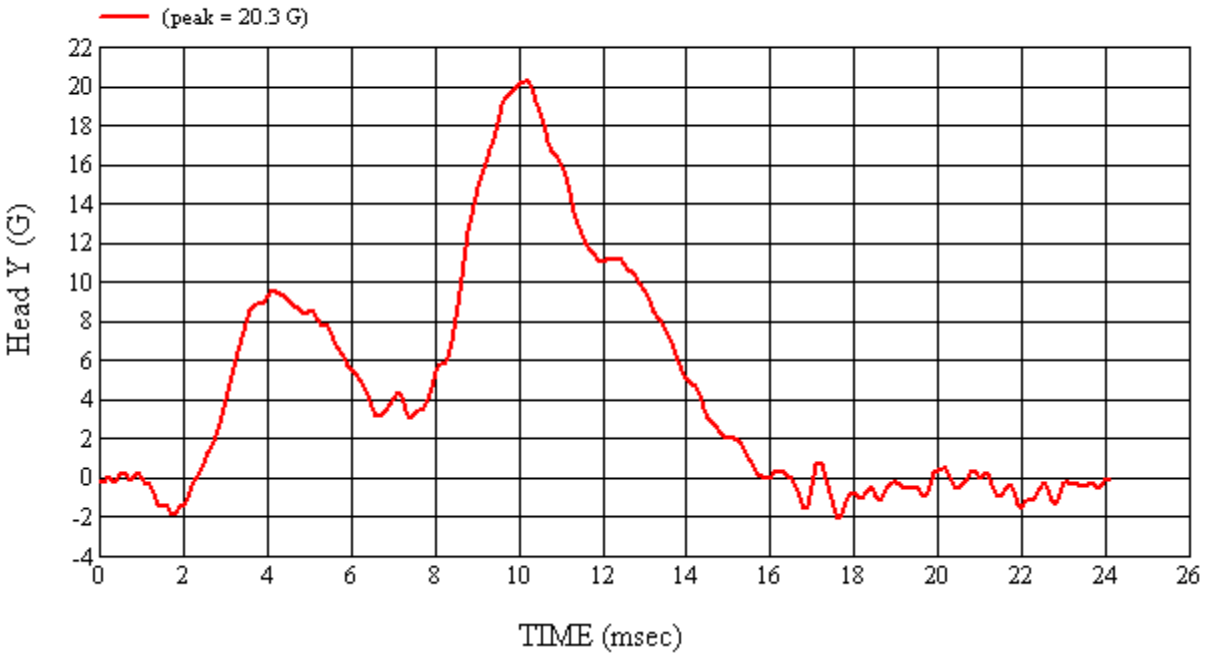
*Only necessary for NHTSA (Government) Compliance testing.

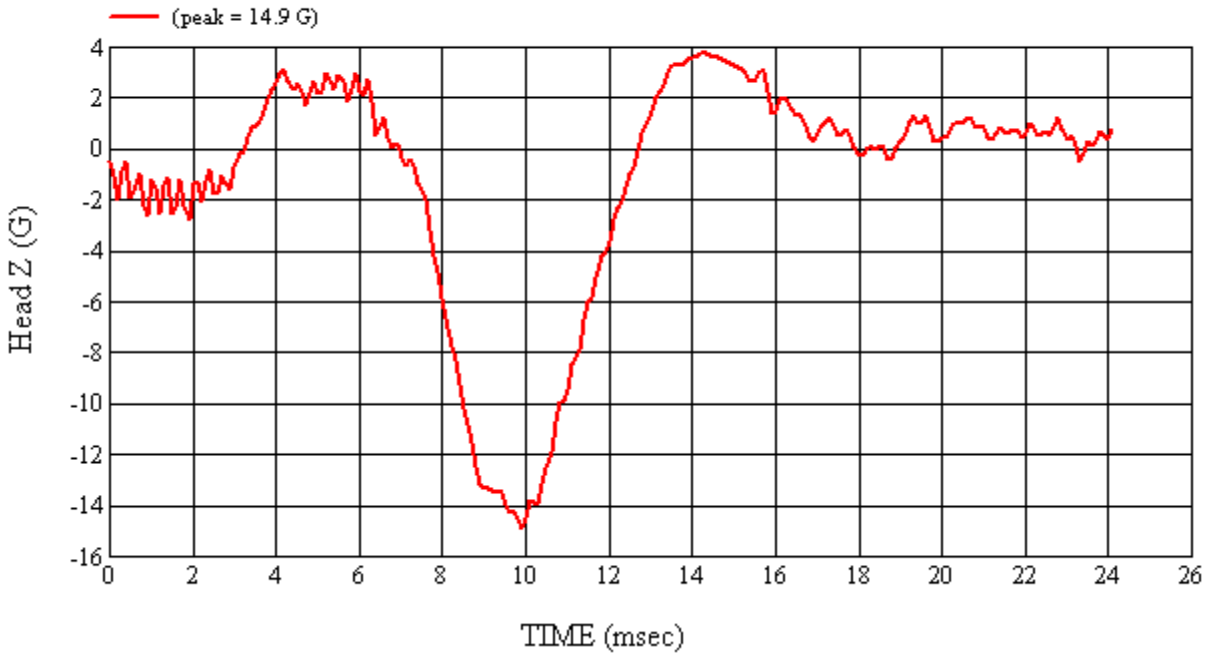
MGA Test #: U11285 Target Location: AP3, Right Side Test Date: 7/1/2011

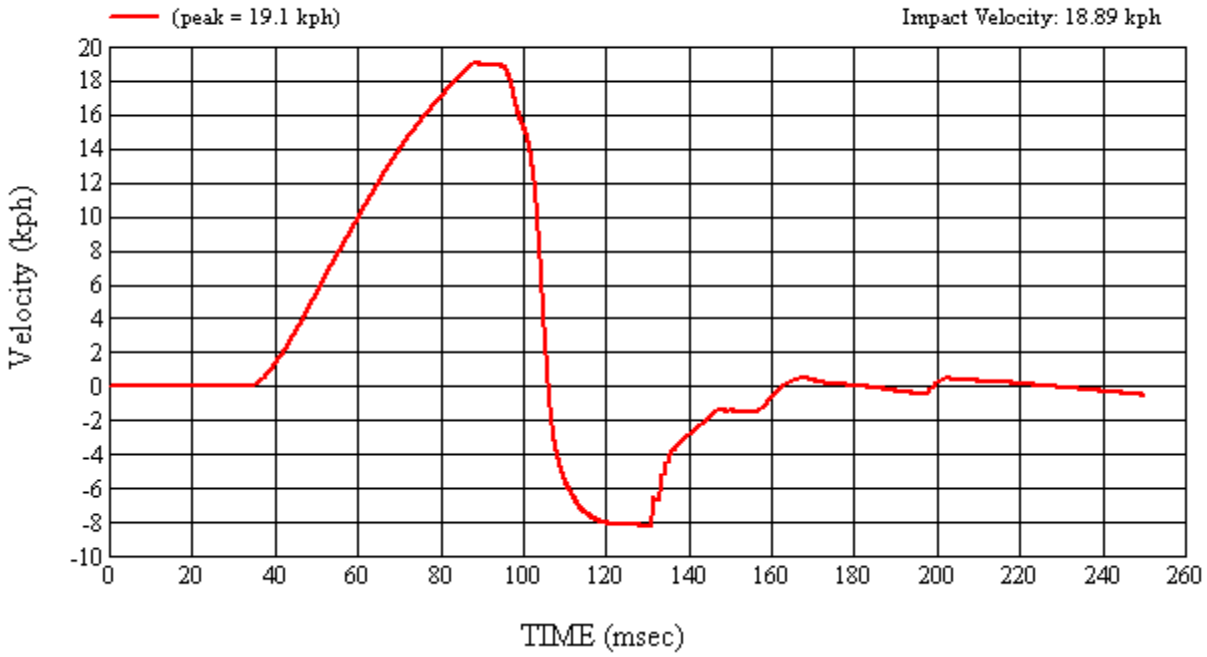


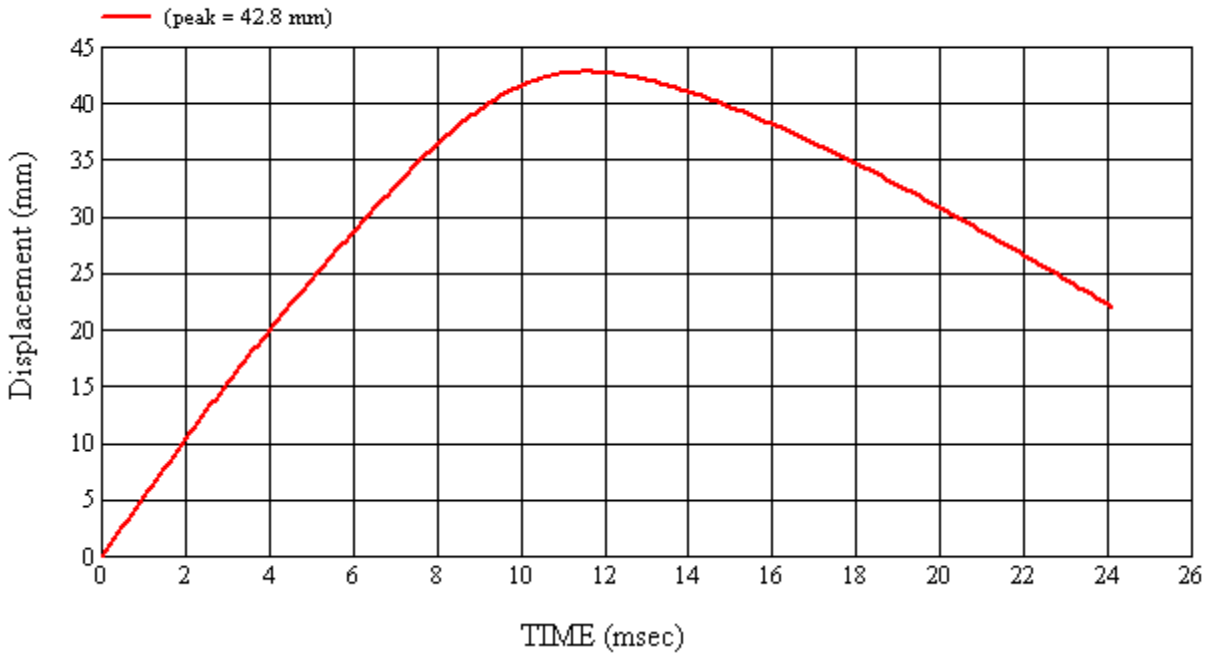



(peak = 118.7 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 20.3 G)
Head Y (G)
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

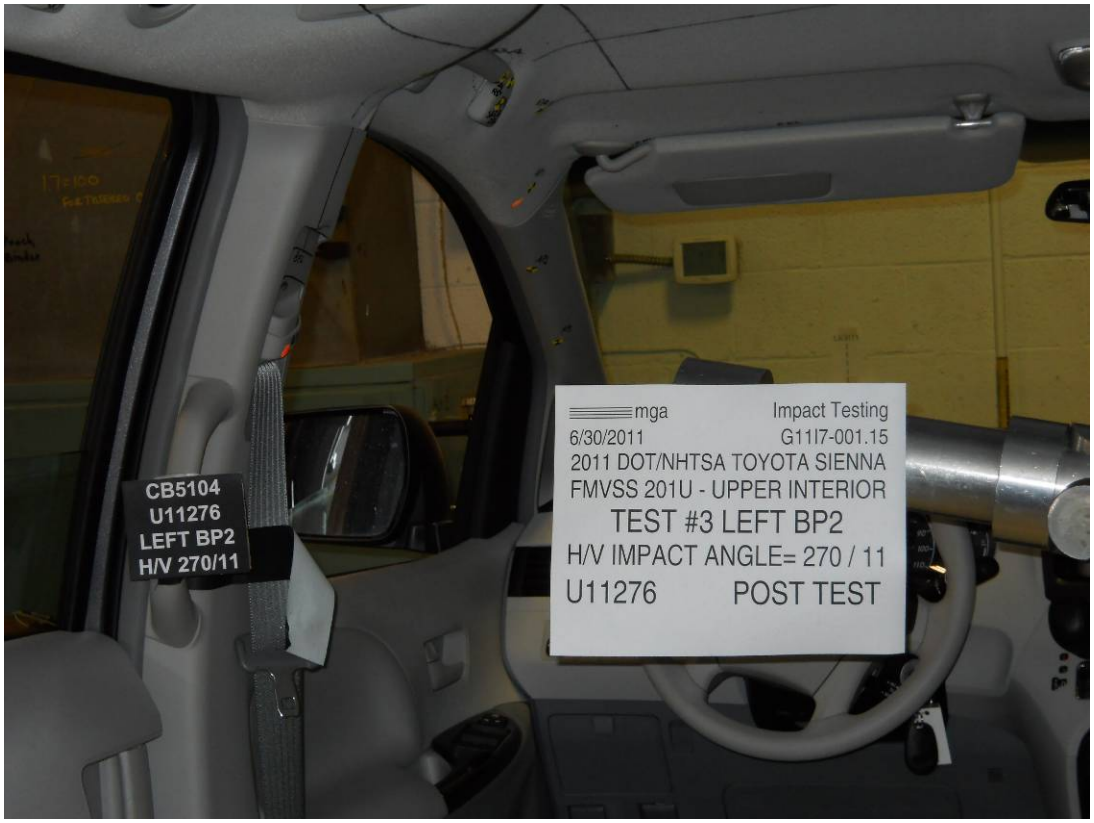

(peak = 14.9 G)
Head Z (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 19.1 kph)
Impact Velocity: 18.89 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 42.8 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


CB5104
U11276
LEFT BP2
H/V 270/11
mga
6/30/2011
Impact Testing
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP2
H/V IMPACT ANGLE= 270 / 11
U11276
PRE TEST


CB5104
U11276
LEFT BP2
H/V 270/11
BP2
BP3
BP2
mga
6/30/2011
Impact Testing
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP2
H/V IMPACT ANGLE= 270 / 11
U11276
PRE TEST


CB5104
U11276
LEFT BP2
H/V 270/11
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP2
H/V IMPACT ANGLE= 270 / 11
U11276
POST TEST


BP2
BP3
BP2
BP3
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP2
H/V IMPACT ANGLE= 270 / 11
U11276
POST TEST


BP2
BP3


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP2
H/V IMPACT ANGLE= 270 / 11
U11276
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): BP2Left

Temperature:21.7C

MGA Test Reference No.:U11276

Humidity:56.2%

Approach Horizontal Angles:270º

Time of Test:11:32:25 AM

Approach Vertical Angles:11º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
607	585	7.9	23.5	15	3 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.08	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

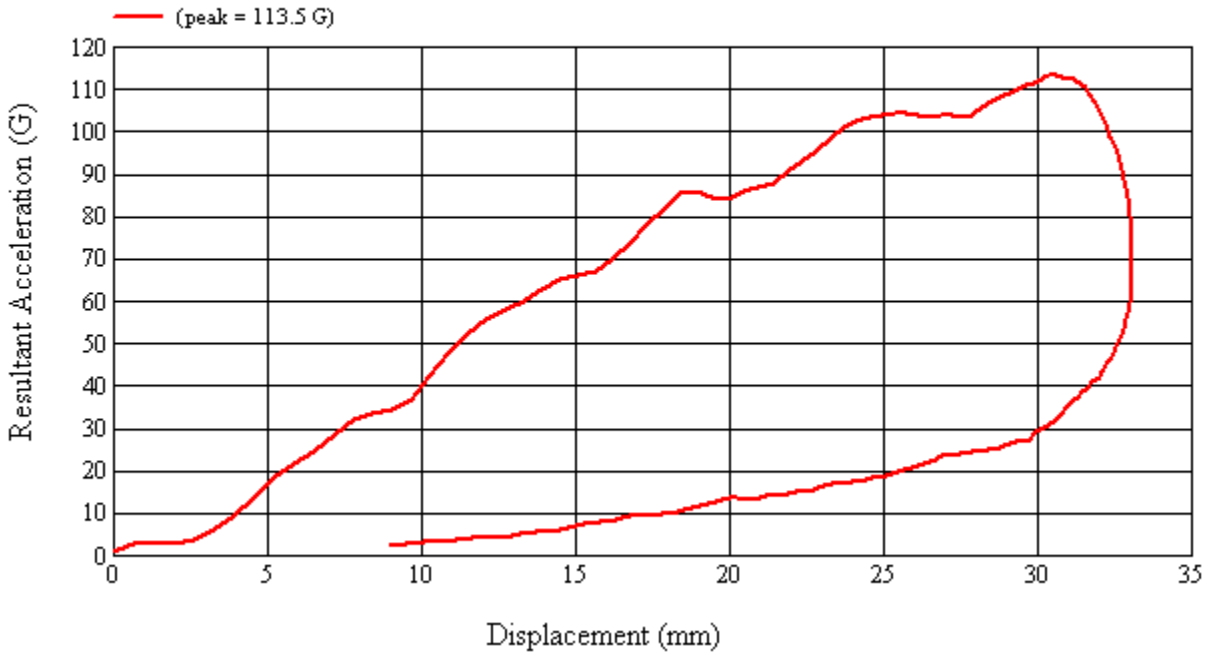
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

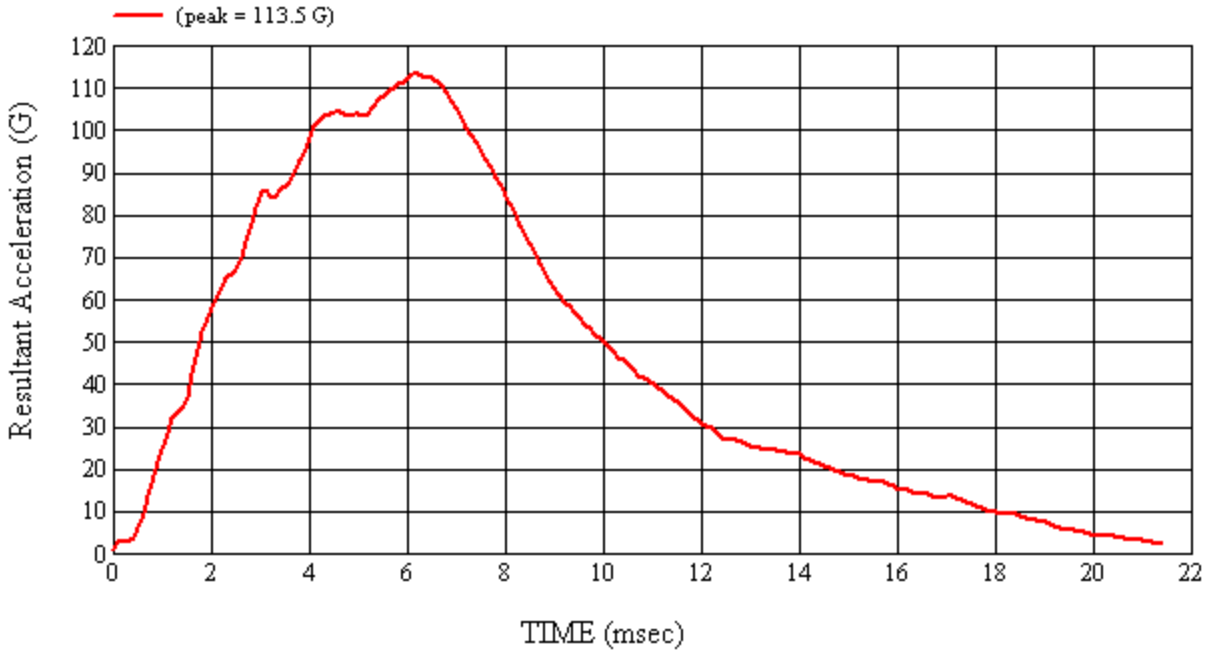
Non functional seat belt adjuster, adjuster cover dislodged

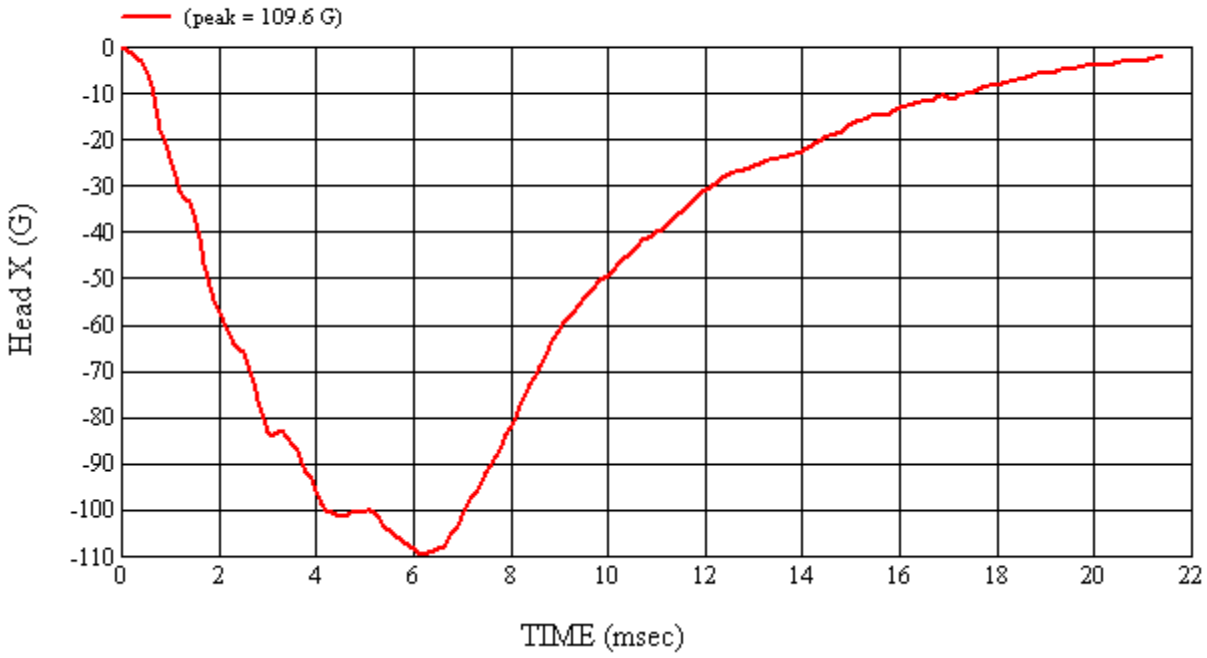
Recorded By: _____ Approved By*: _____ Date: 6/30/2011

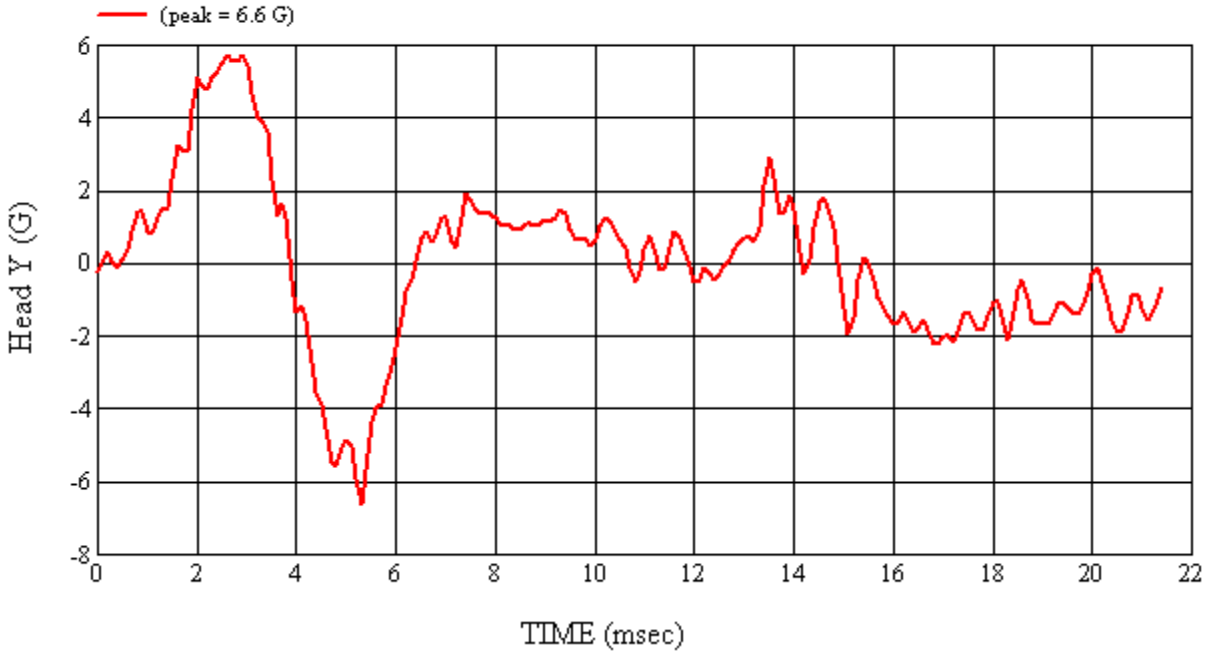
*Only necessary for NHTSA (Government) Compliance testing.

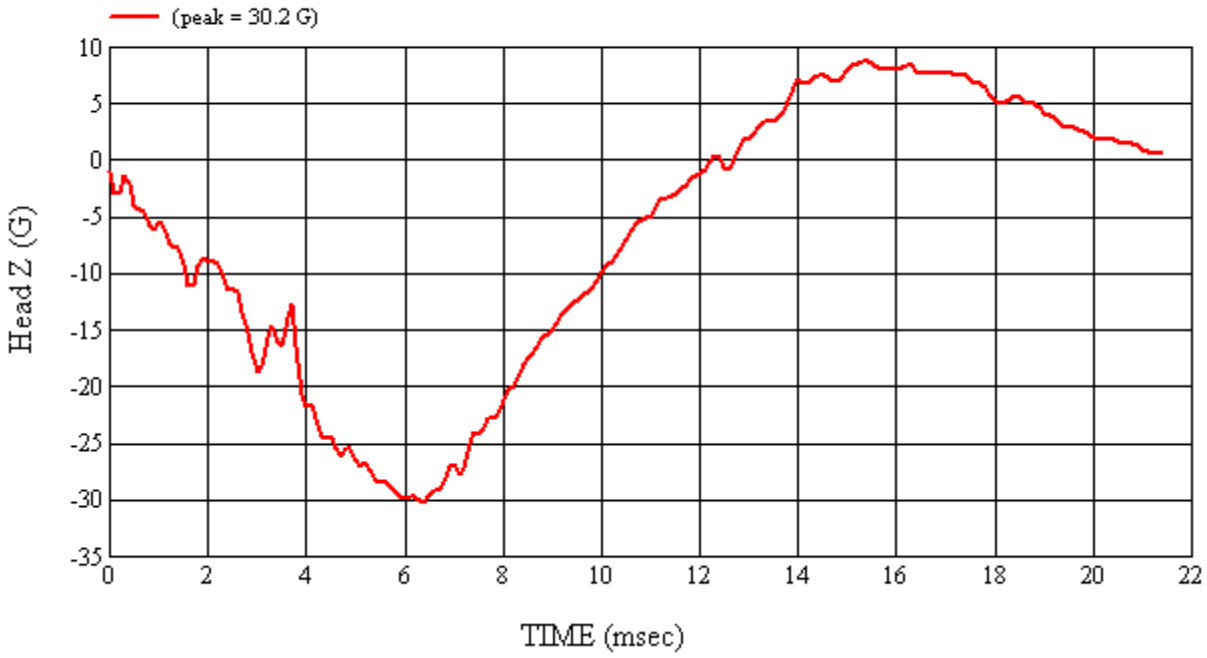
MGA Test #: U11276 Target Location: BP2, Left Side Test Date: 6/30/2011

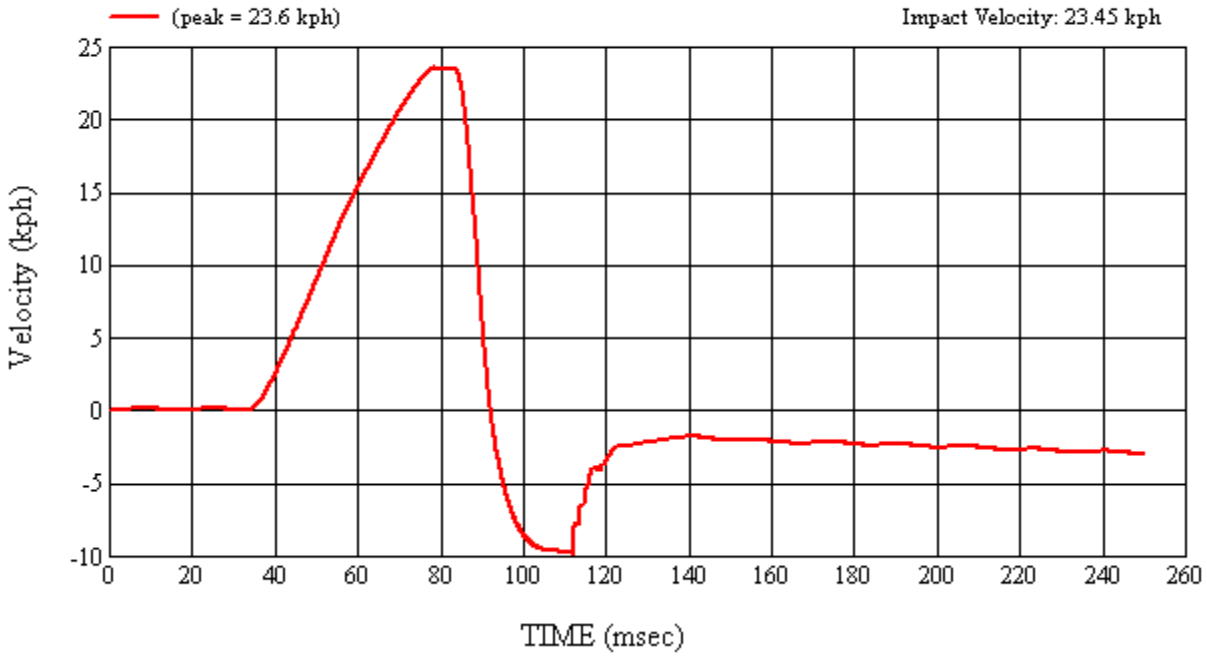


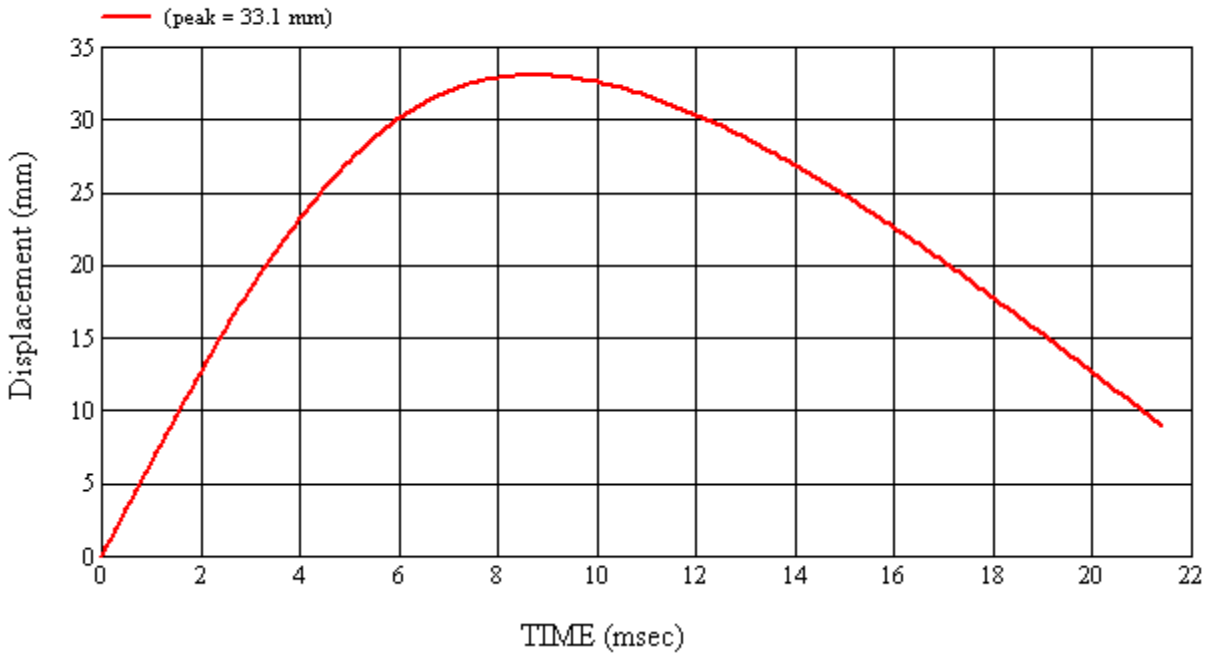


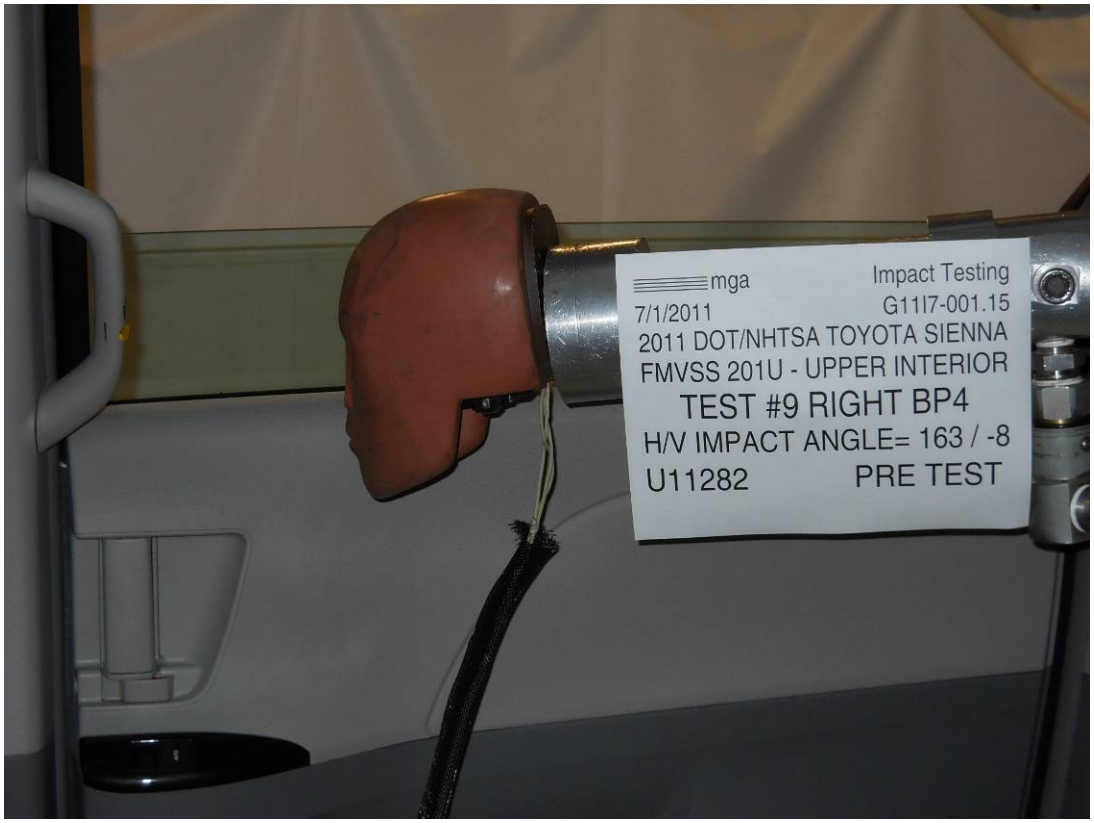

(peak = 109.6 G)
Head X (G)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

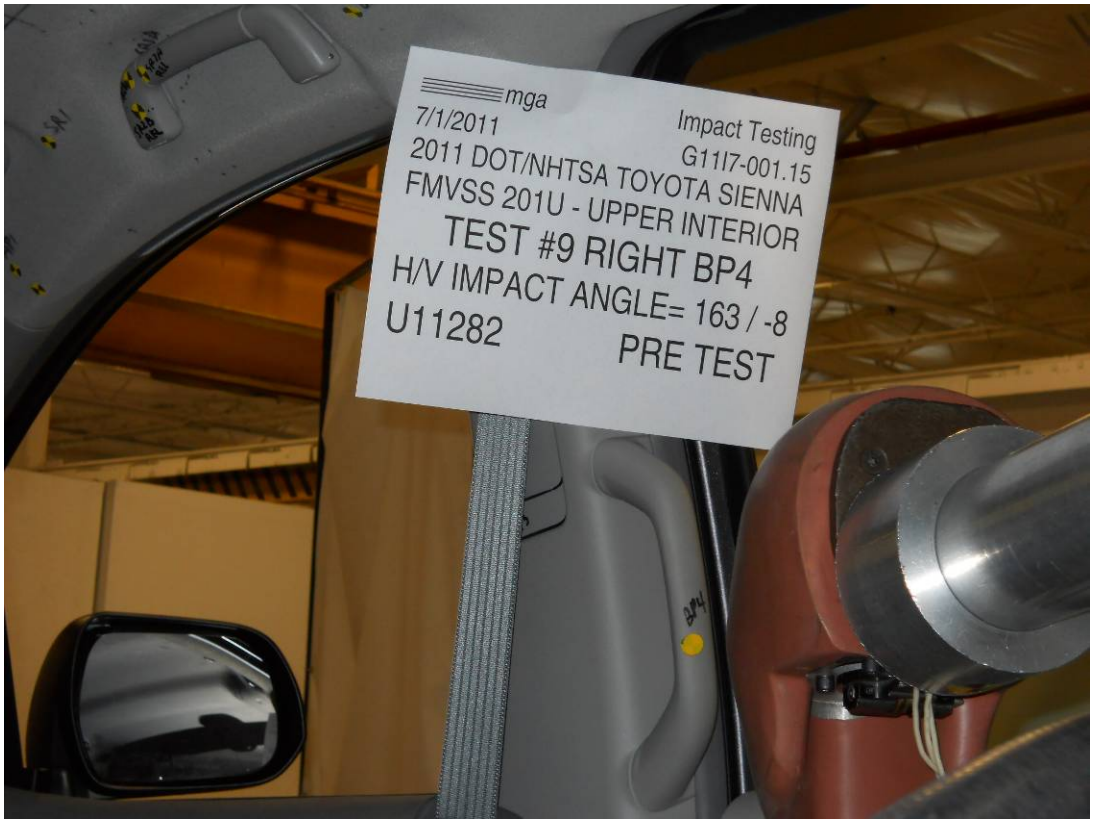

(peak = 6.6 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 30.2 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.6 kph)
Impact Velocity: 23.45 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 33.1 mm)
Displacement (mm)
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP4
H/V IMPACT ANGLE= 163 / -8
U11282
PRE TEST


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP4
H/V IMPACT ANGLE= 163 / -8
U11282
PRE TEST


CB5104
U11282
RIGHT BP4
H/V 163/-8
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP4
H/V IMPACT ANGLE= 163 / -8
U11282
POST TEST


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP4
H/V IMPACT ANGLE= 163 / -8
U11282
POST TEST


BP4


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP4
H/V IMPACT ANGLE= 163 / -8
U11282
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#9

Target (Vehicle Side): BP4Right

Temperature:22.2C

MGA Test Reference No.:U11282

Humidity:55.7%

Approach Horizontal Angles:163º

Time of Test:11:05:26 AM

Approach Vertical Angles:-8º

FMH Serial No:[035]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
618	598	6.6	23.8	11	3 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

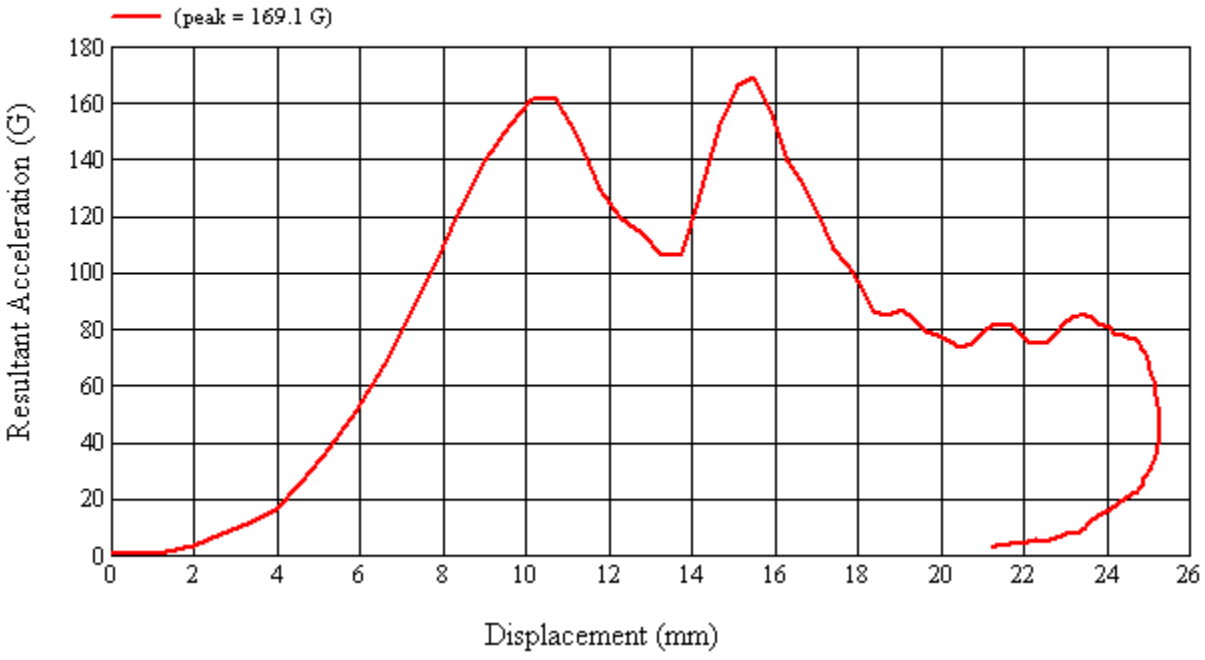
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

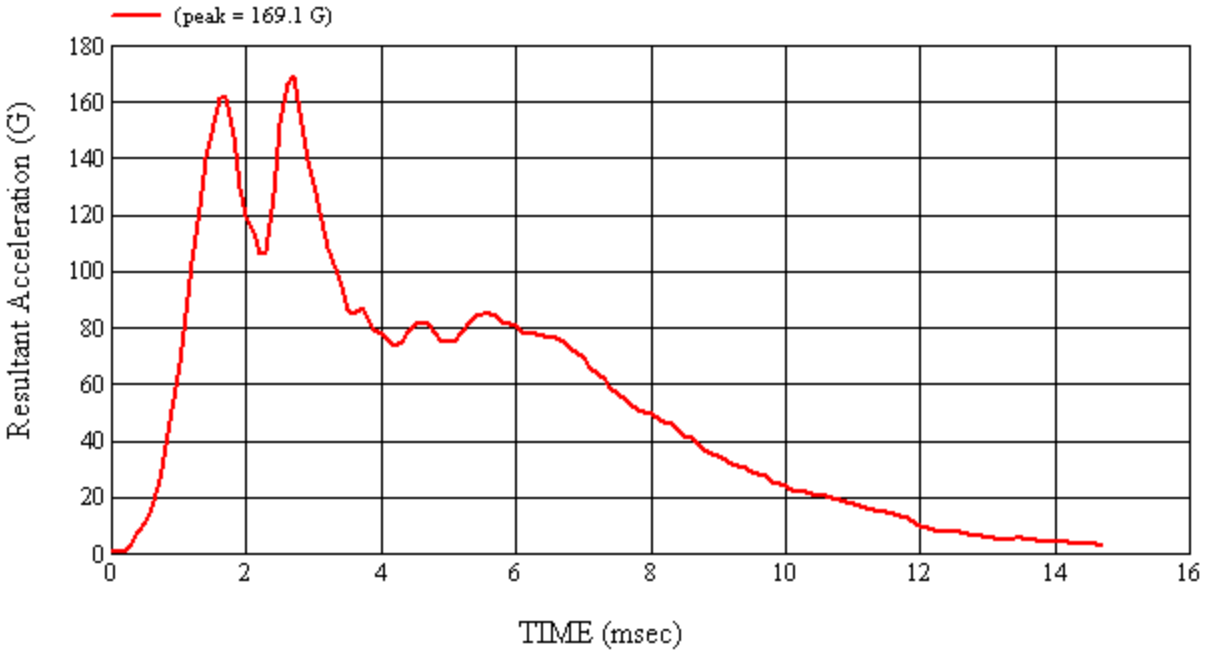
Stress marks on grab handle

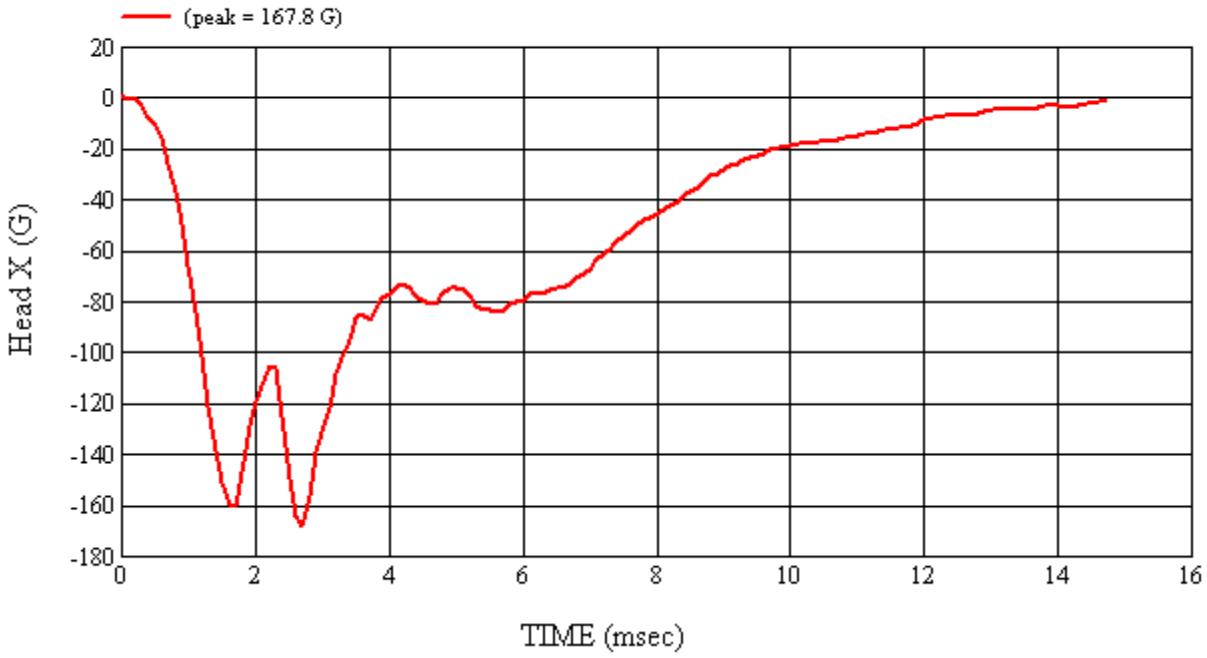
Recorded By: _____ Approved By*: _____ Date: 7/01/2011

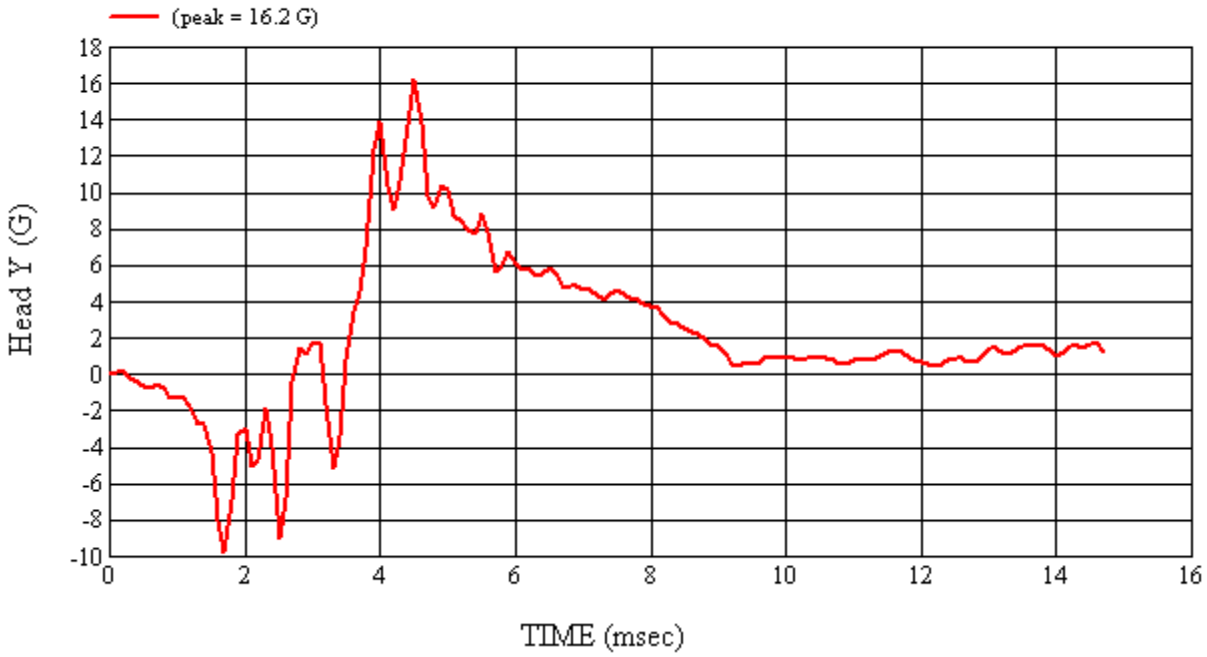
*Only necessary for NHTSA (Government) Compliance testing.

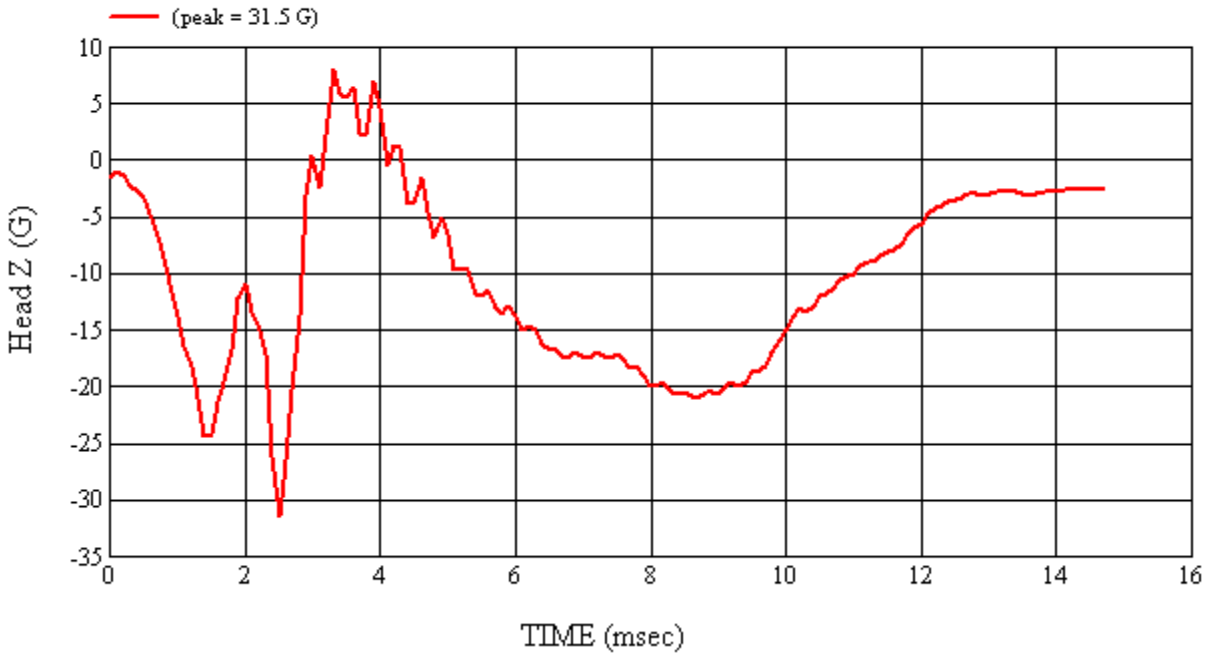
MGA Test #: U11282 Target Location: BP4, Right Side Test Date: 7/1/2011

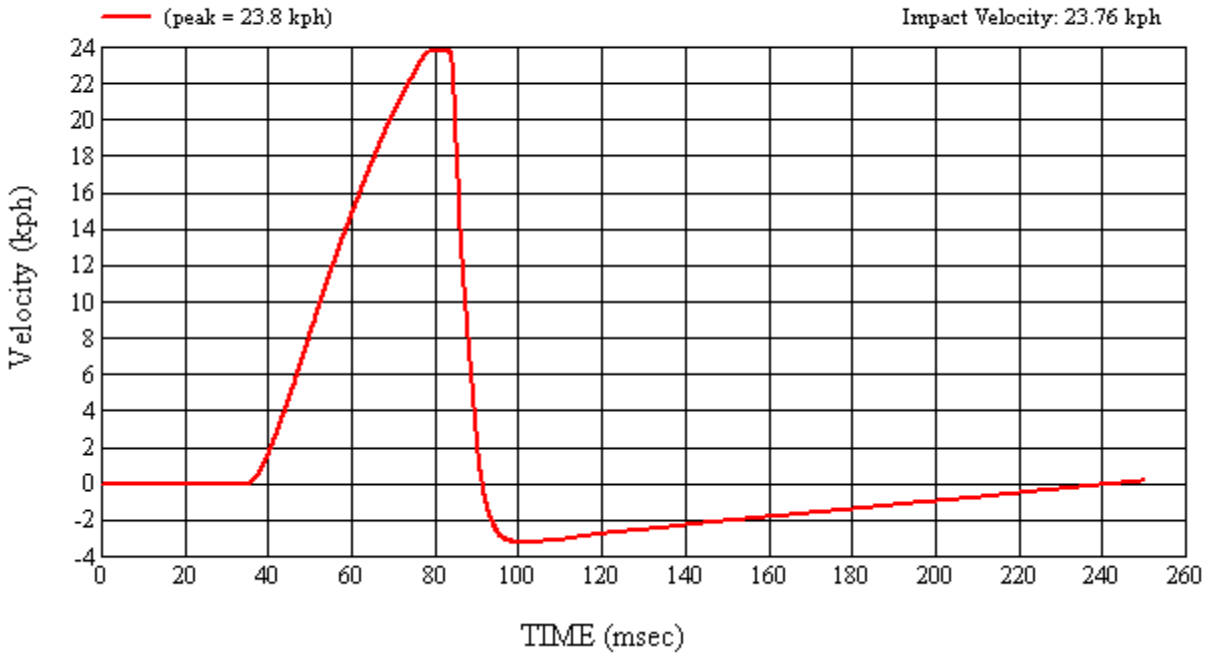


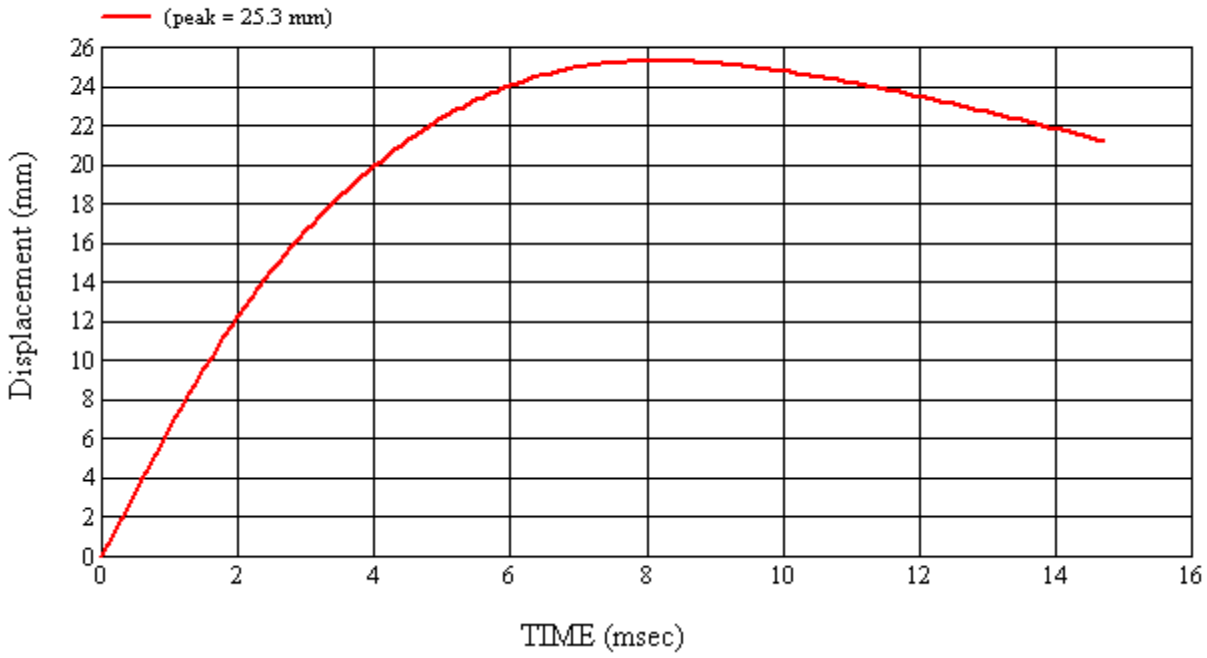


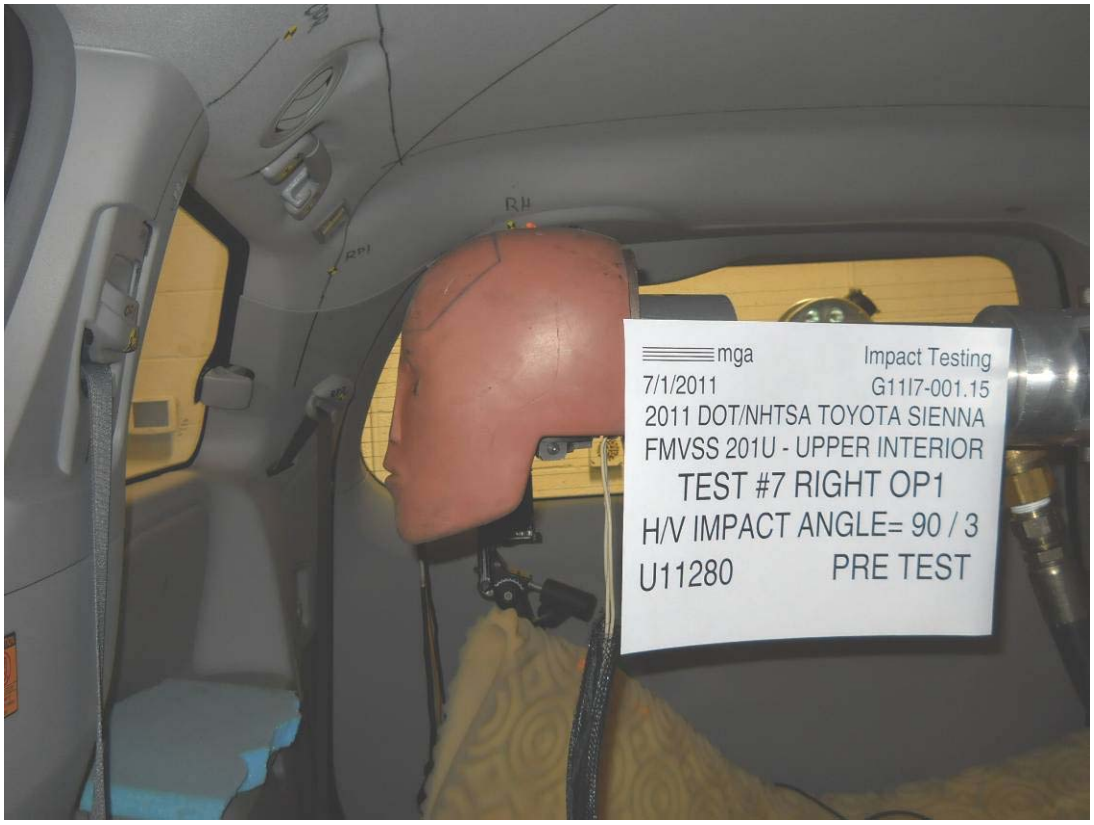

(peak = 167.8 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 16.2 G)
Head Y (G)
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 31.5 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.76 kph
Velocity (kph)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 25.3 mm)
Displacement (mm)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
0
2
4
6
8
10
12
14
16
TIME (msec)

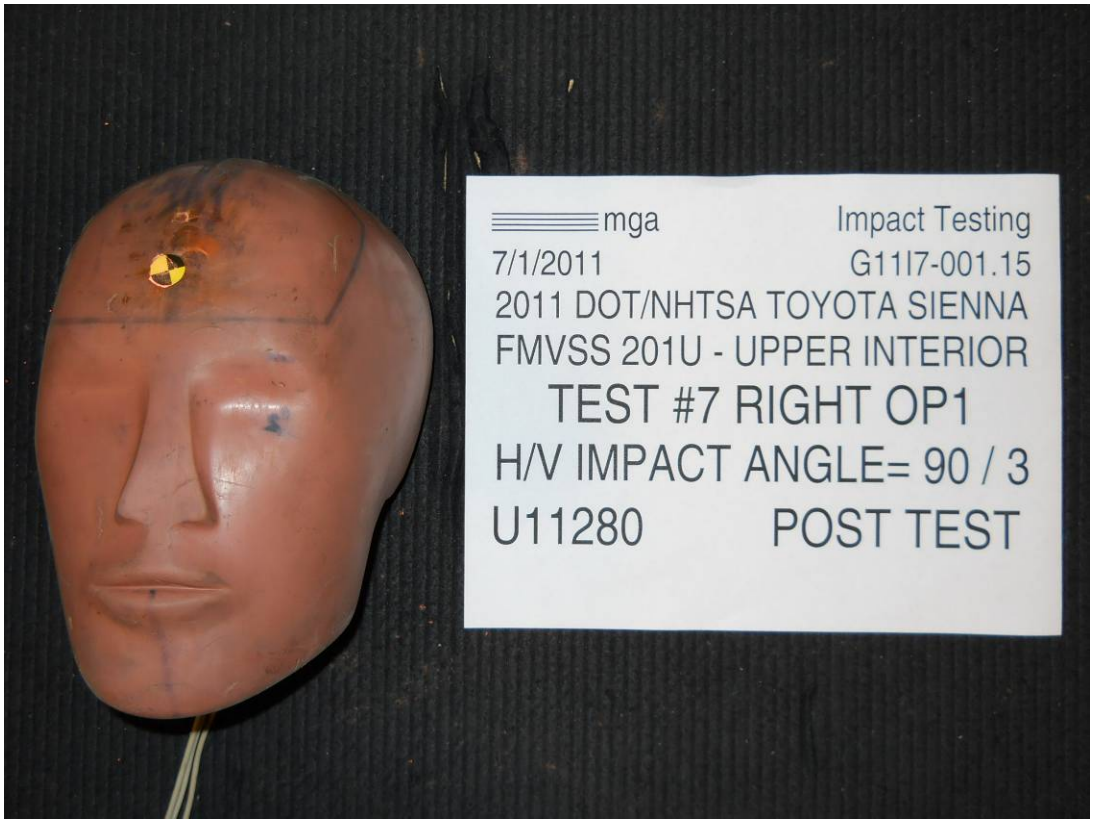

mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT OP1
H/V IMPACT ANGLE= 90 / 3
U11280
PRE TEST


mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT OP1
H/V IMPACT ANGLE= 90 / 3
PRE TEST
U11280
OPR
OP1
OP1


mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT OP1
H/V IMPACT ANGLE= 90 / 3
U11280
POST TEST


mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT OP1
H/V IMPACT ANGLE= 90 / 3
U11280
POST TEST
OPR
OP1
OP1


OP1
OP1


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT OP1
H/V IMPACT ANGLE= 90 / 3
U11280
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): OP1Right

Temperature:21.5C

MGA Test Reference No.:U11280

Humidity:57.7%

Approach Horizontal Angles:90º

Time of Test:9:16:39 AM

Approach Vertical Angles:3º

FMH Serial No:[037]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
601	576	10.1	24.0	19	3 Right

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.06	1.08
Y	6	J14103	93.9	0.86	0.84
Z	7	J35800	97.8	0.93	0.95

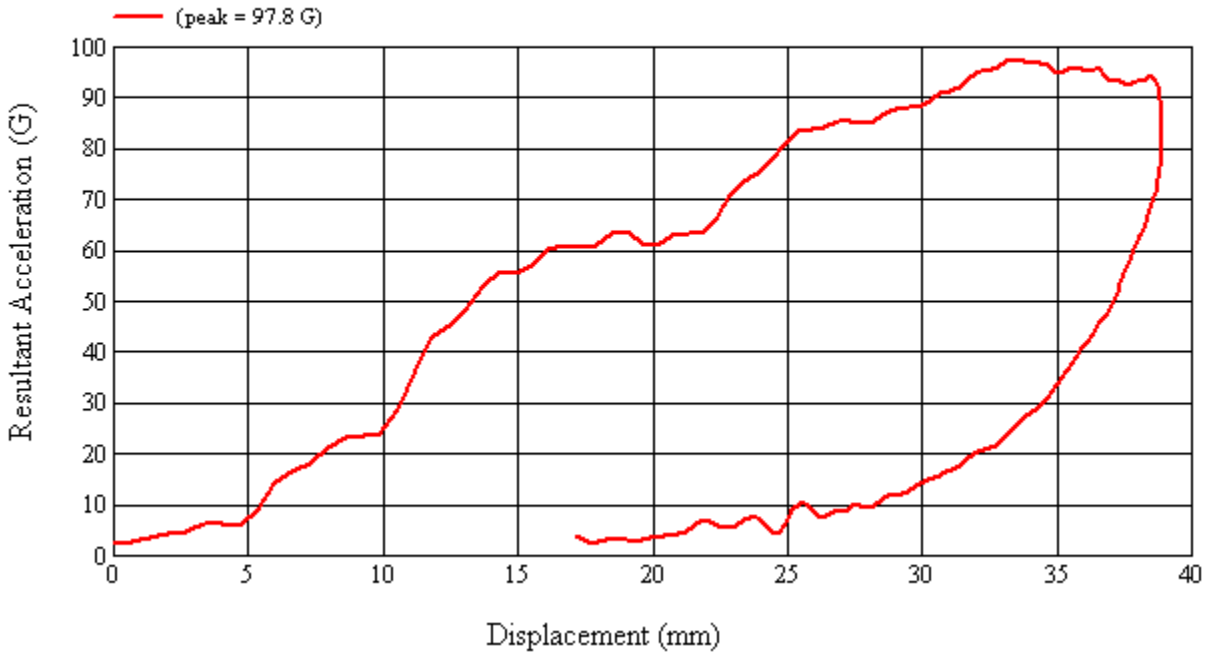
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

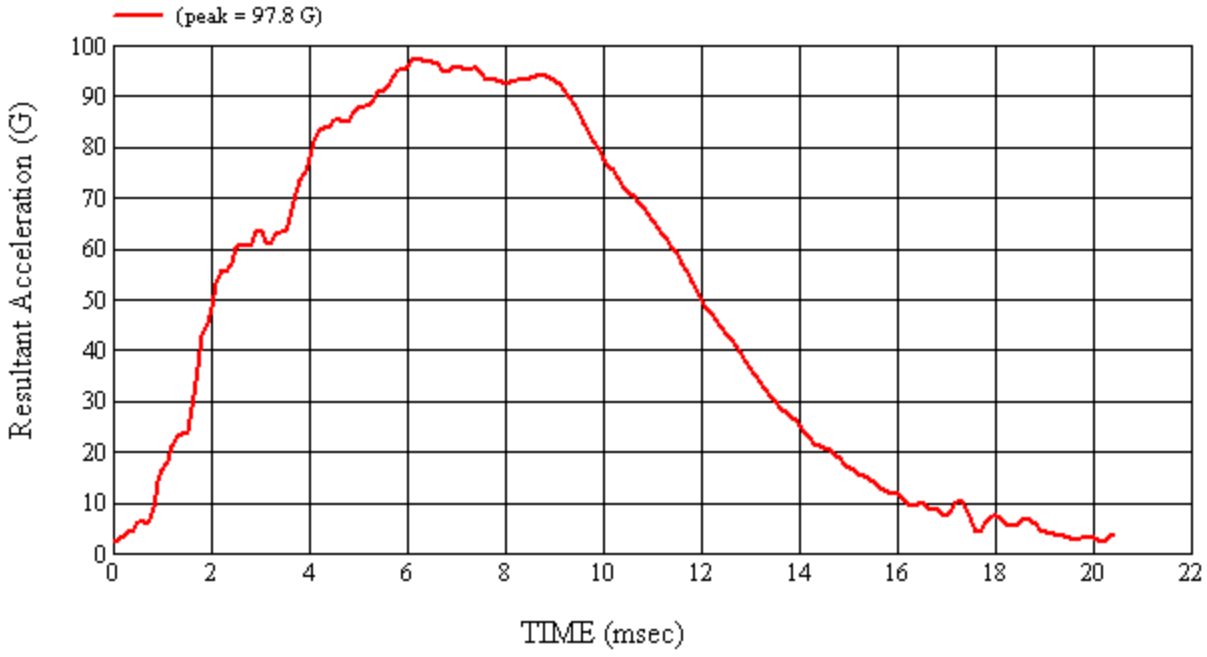
Dislodged anchorage adjuster cover, non funtional anchorage adjuster, stress marks on anchorage adjuster cover

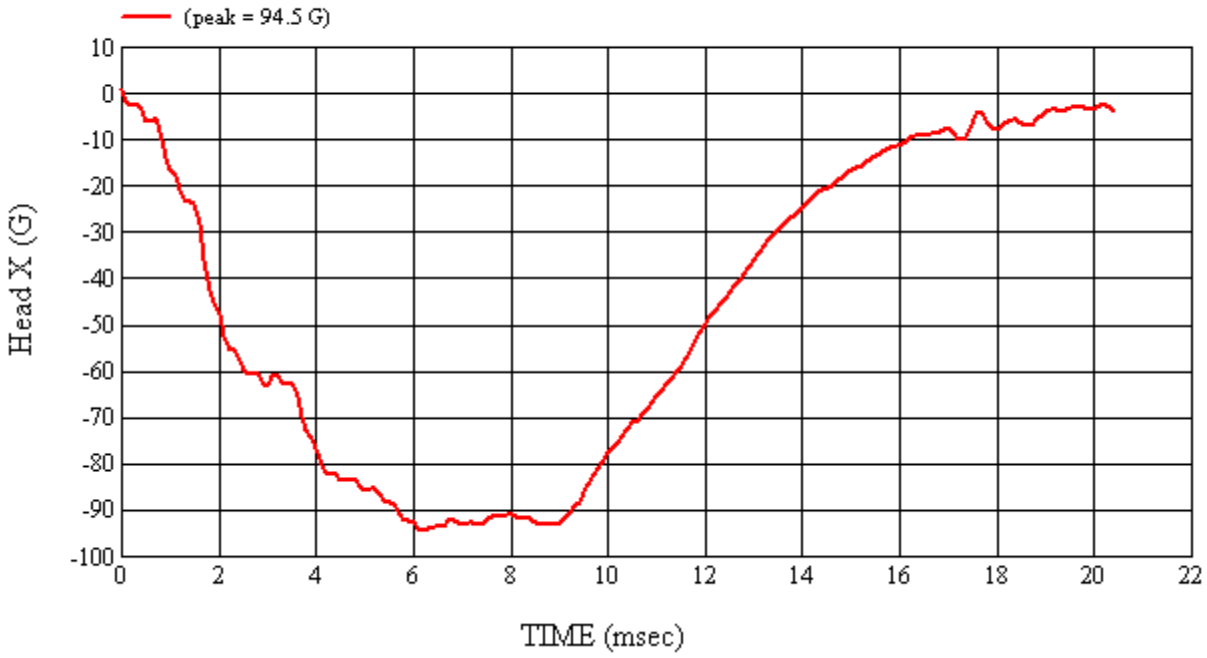
Recorded By: _____ Approved By*: _____ Date: 7/01/2011

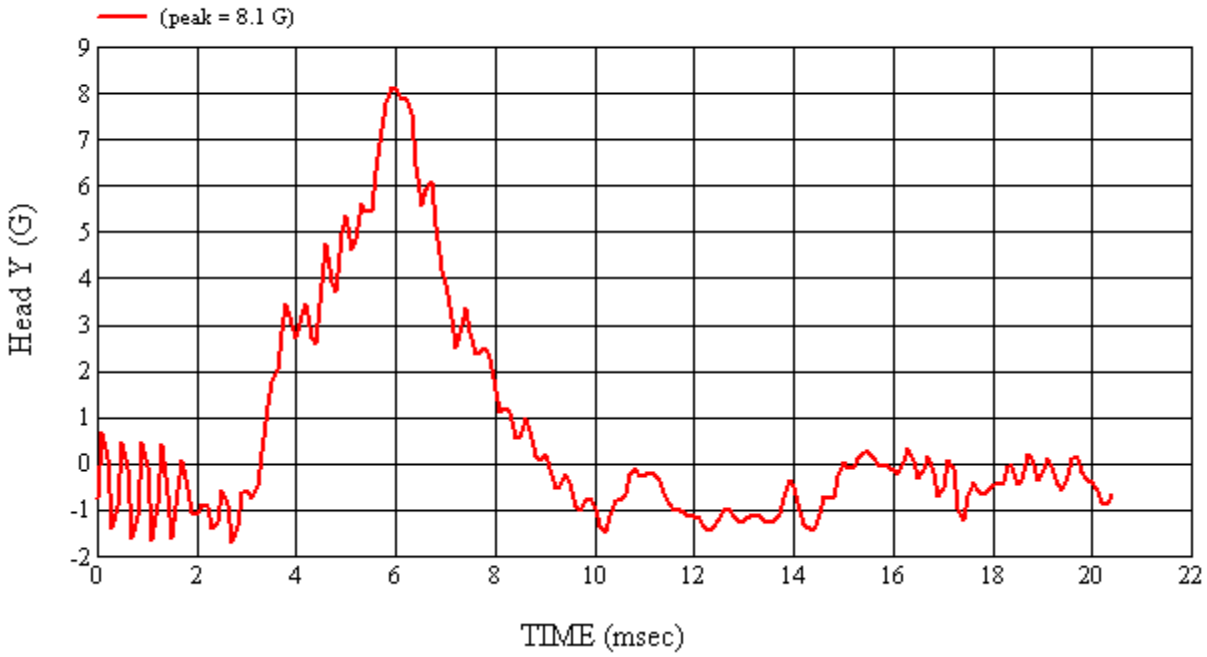
*Only necessary for NHTSA (Government) Compliance testing.

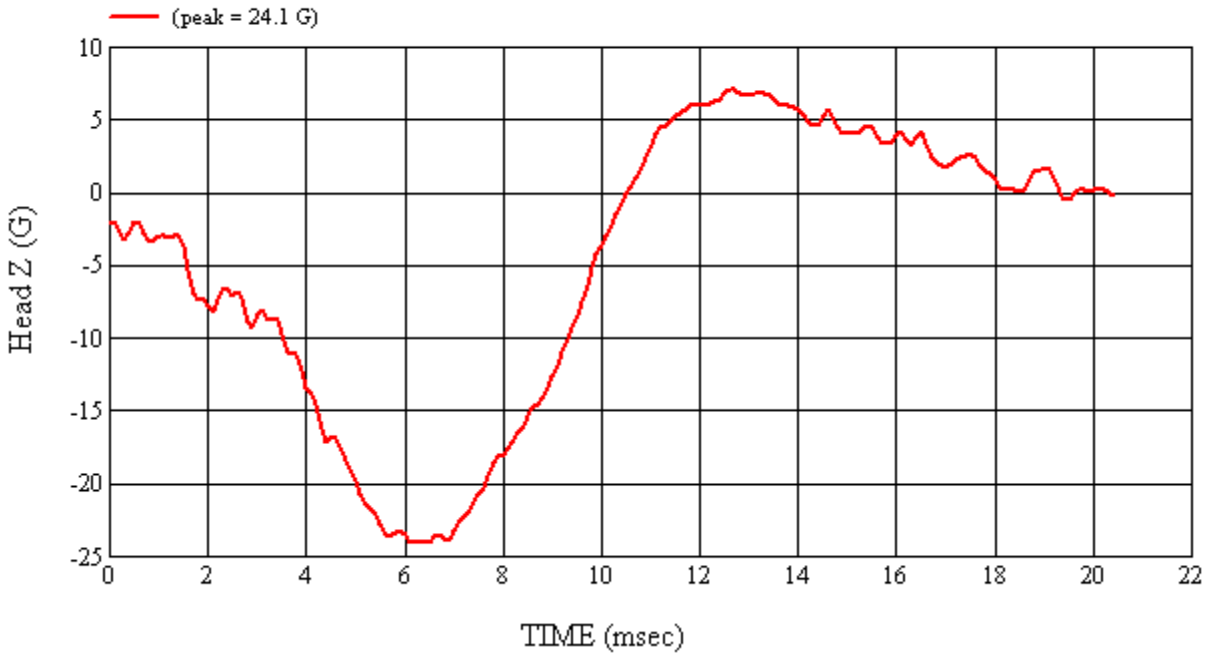
MGA Test #: U11280 Target Location: OP1, Right Side Test Date: 7/1/2011

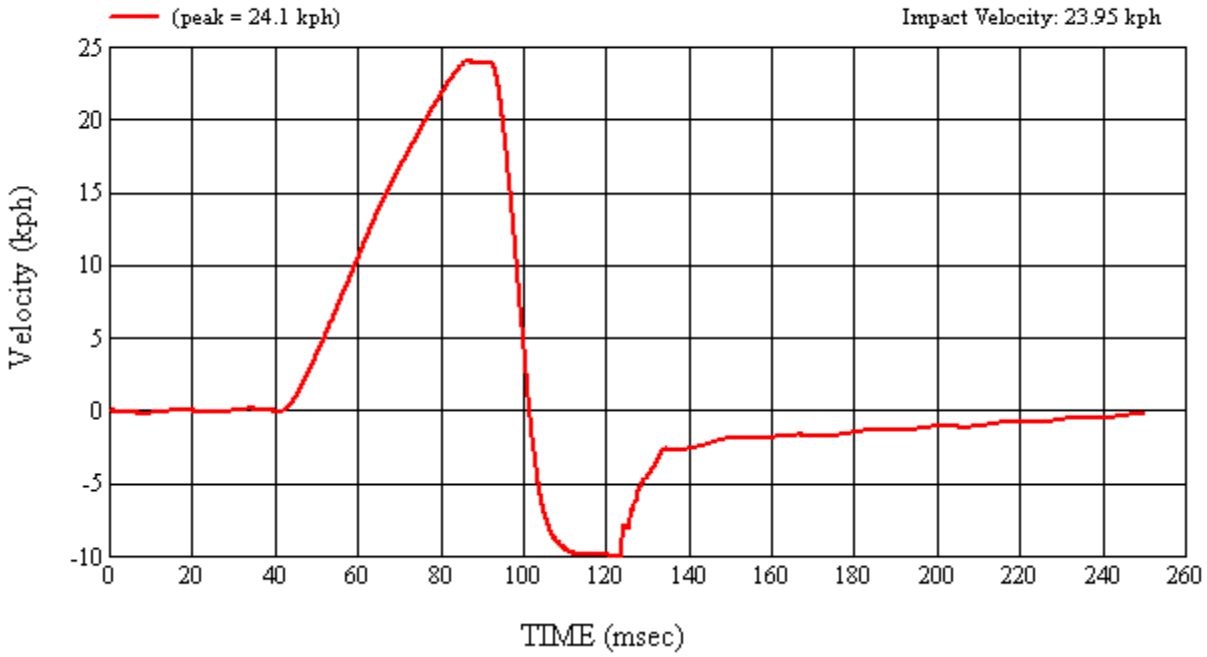


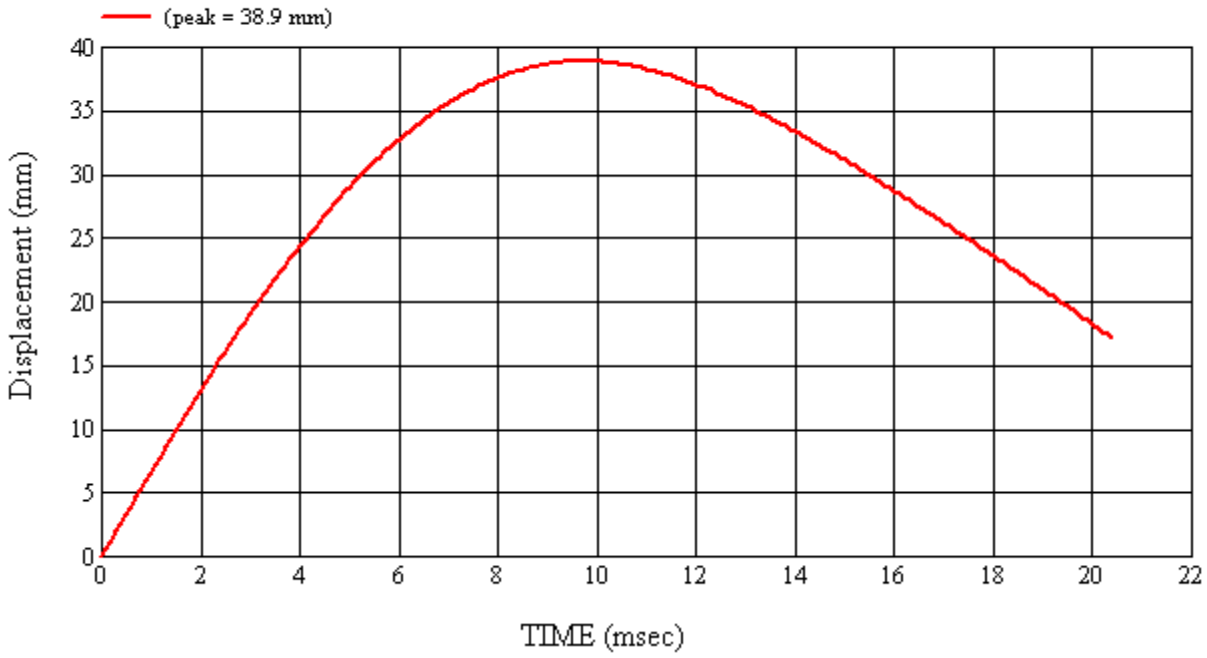



(peak = 94.5 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

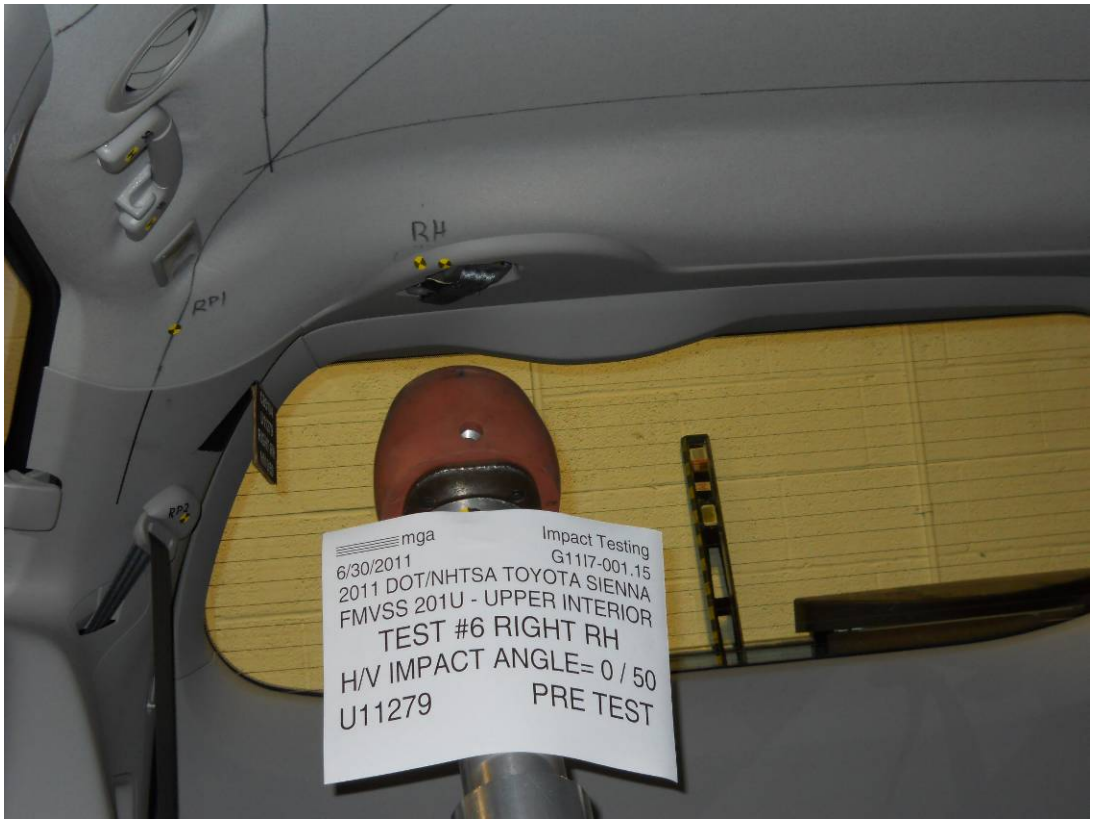

(peak = 8.1 G)
Head Y (G)
9
8
7
6
5
4
3
2
1
0
-1
-2
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

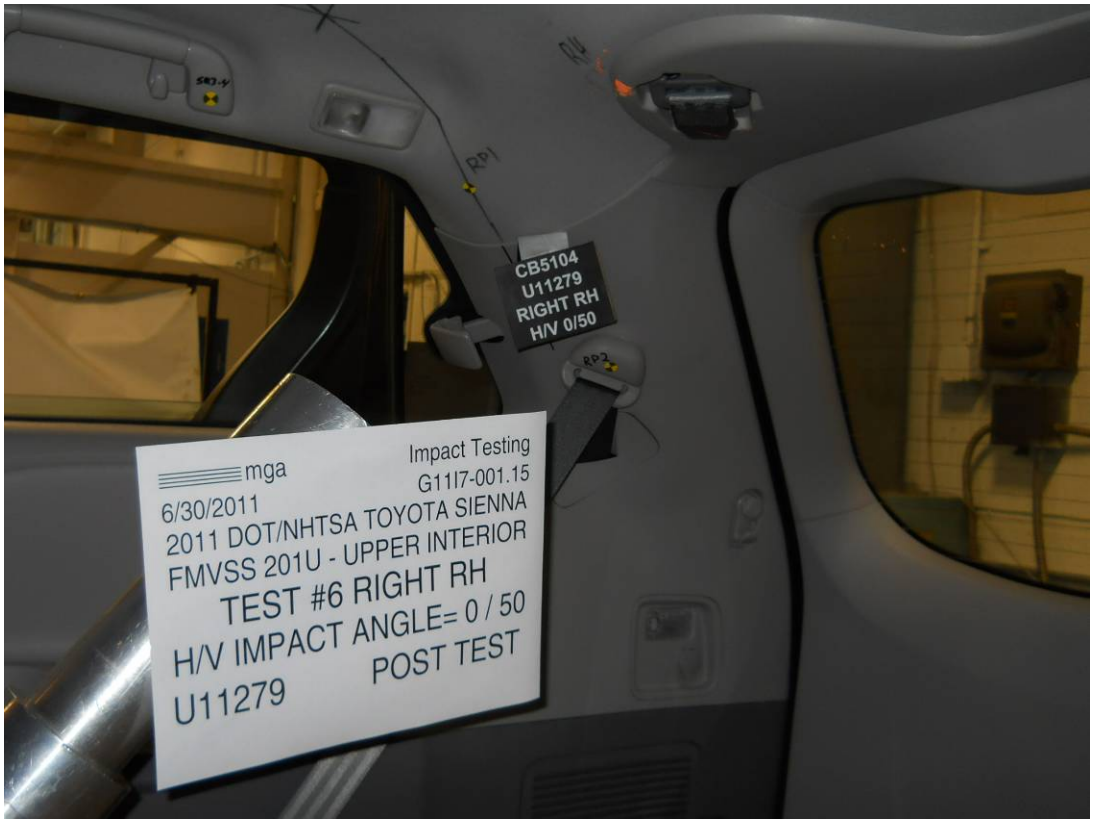

(peak = 24.1 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

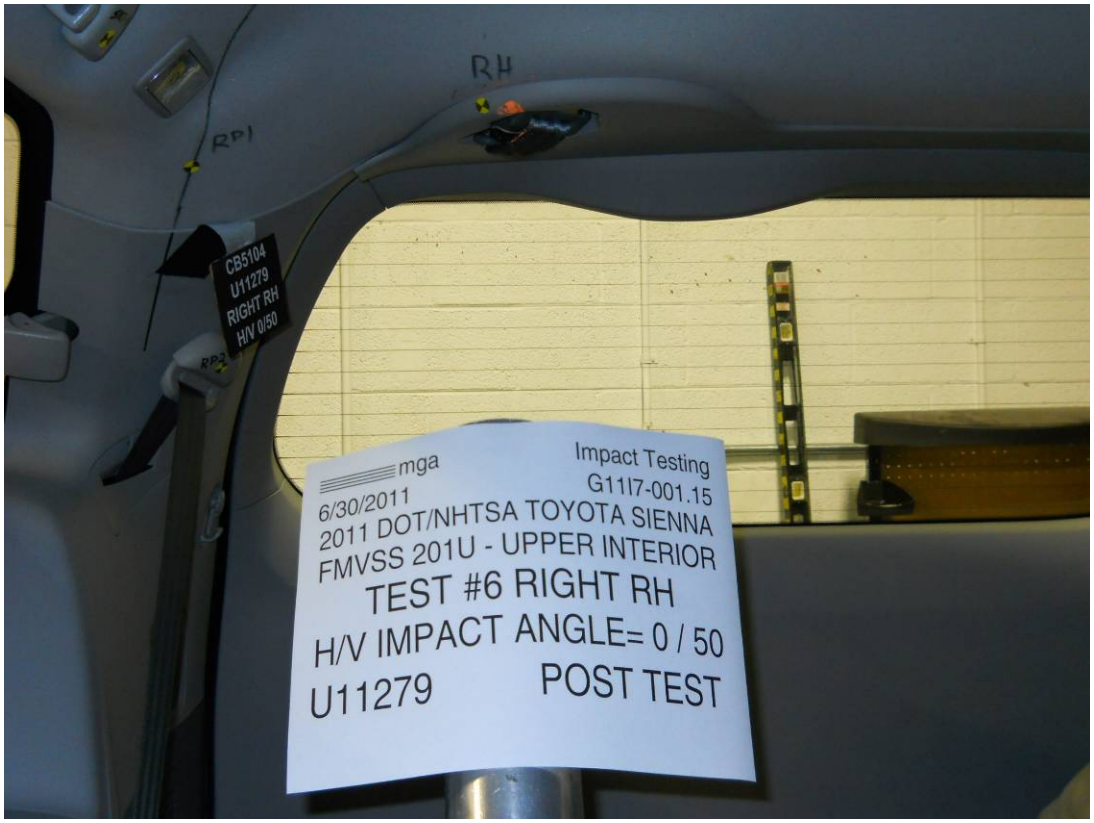

(peak = 24.1 kph)
Impact Velocity: 23.95 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 38.9 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


SR3-3
SR3-4
RH
RPI
CB5104
U11279
RIGHT RH
H/V 0/50
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
U11279
PRE TEST


RH
RPI
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
U11279
PRE TEST


RH
RP1
RP2
CB5104
U11279
RIGHT RH
H/V 0/50
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
U11279
POST TEST


RH
RP1
RP2
CB5104
U11279
RIGHT RH
H/V 0/50
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
U11279
POST TEST


RH
RPI
CB5104
U11279
RIGHT RH


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
U11279
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): RHRight

Temperature:24.8C

MGA Test Reference No.:U11279

Humidity:49.3%

Approach Horizontal Angles:0º

Time of Test:6:00:39 PM

Approach Vertical Angles:50º

FMH Serial No:[035]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
521	470	8.1	23.5	8	9 Right

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

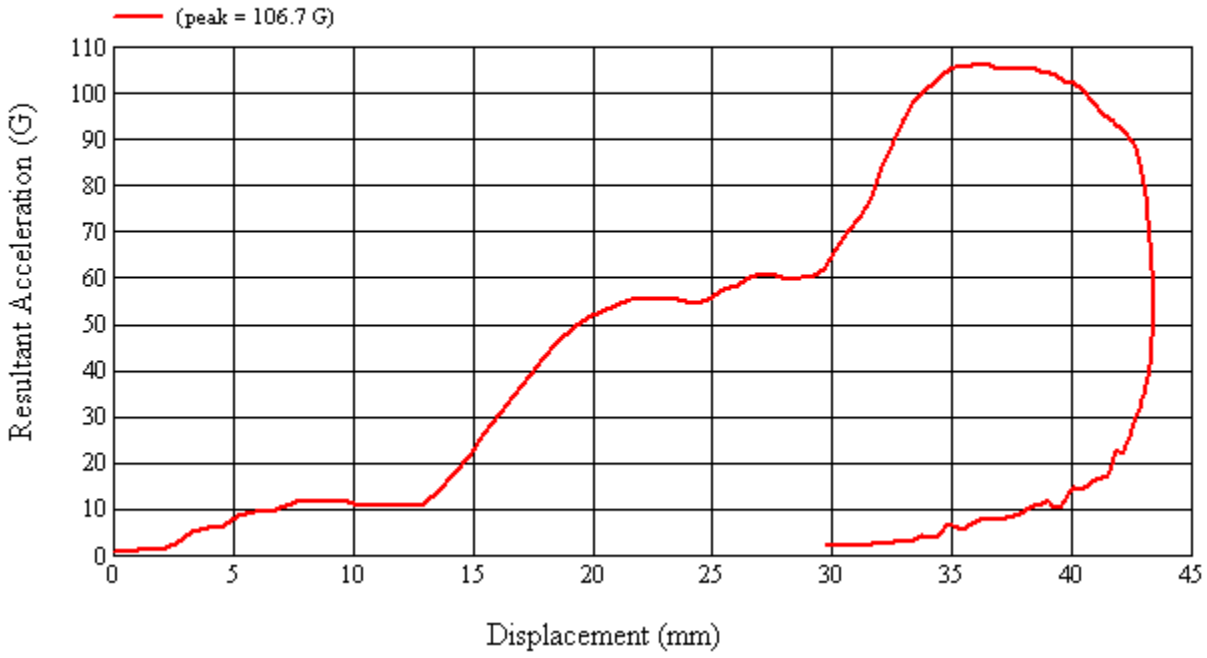
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

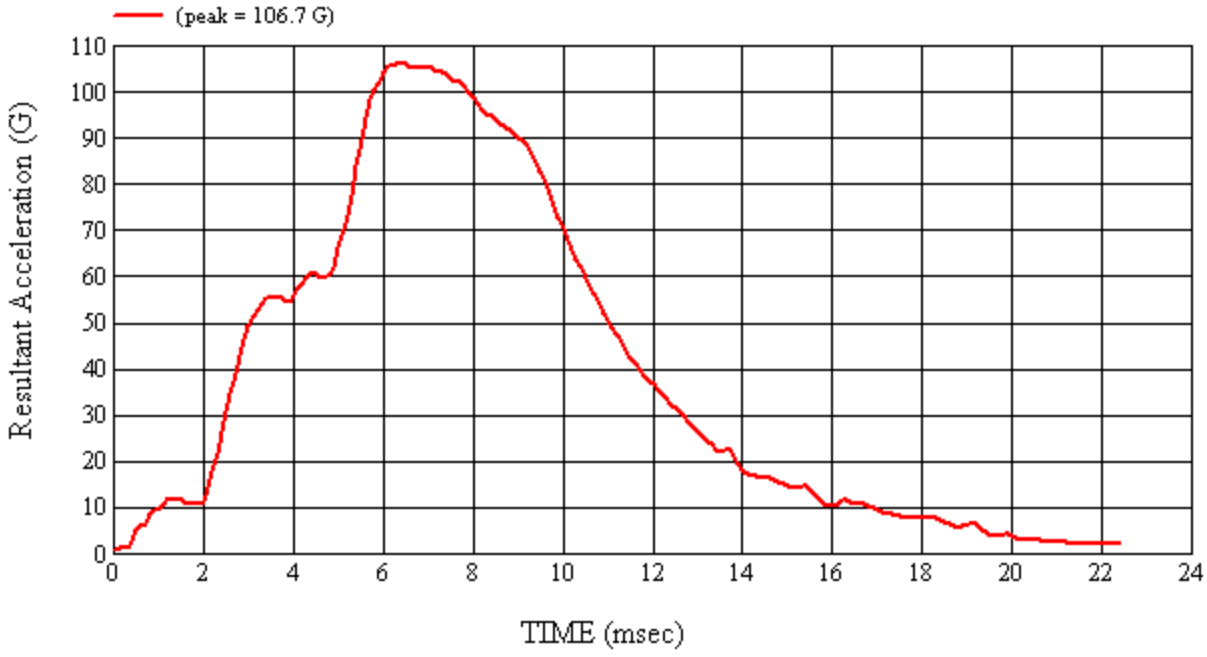
Dislodged trim,

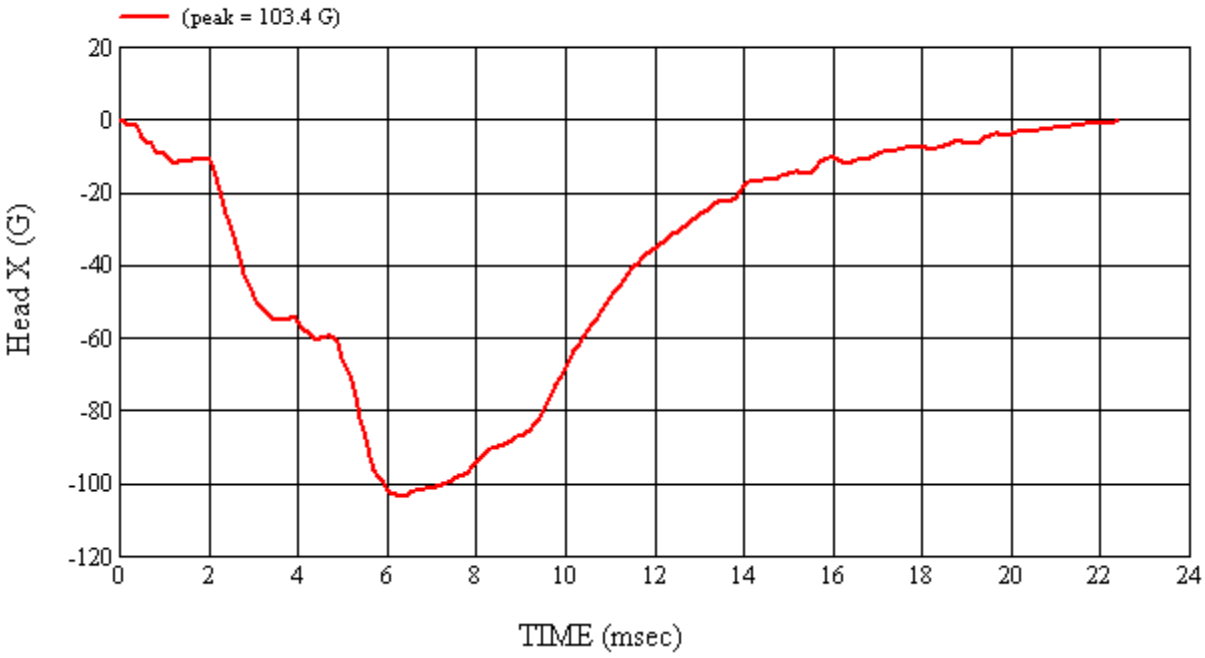
Recorded By: _____ Approved By*: _____ Date: 6/30/2011

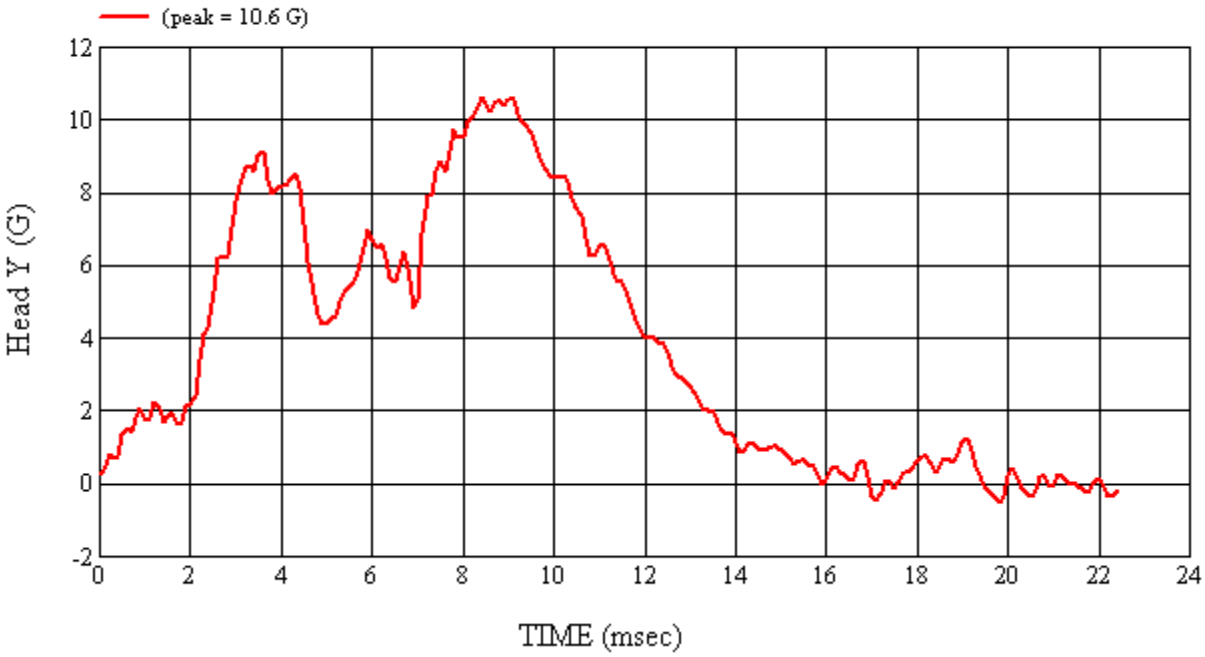
*Only necessary for NHTSA (Government) Compliance testing.

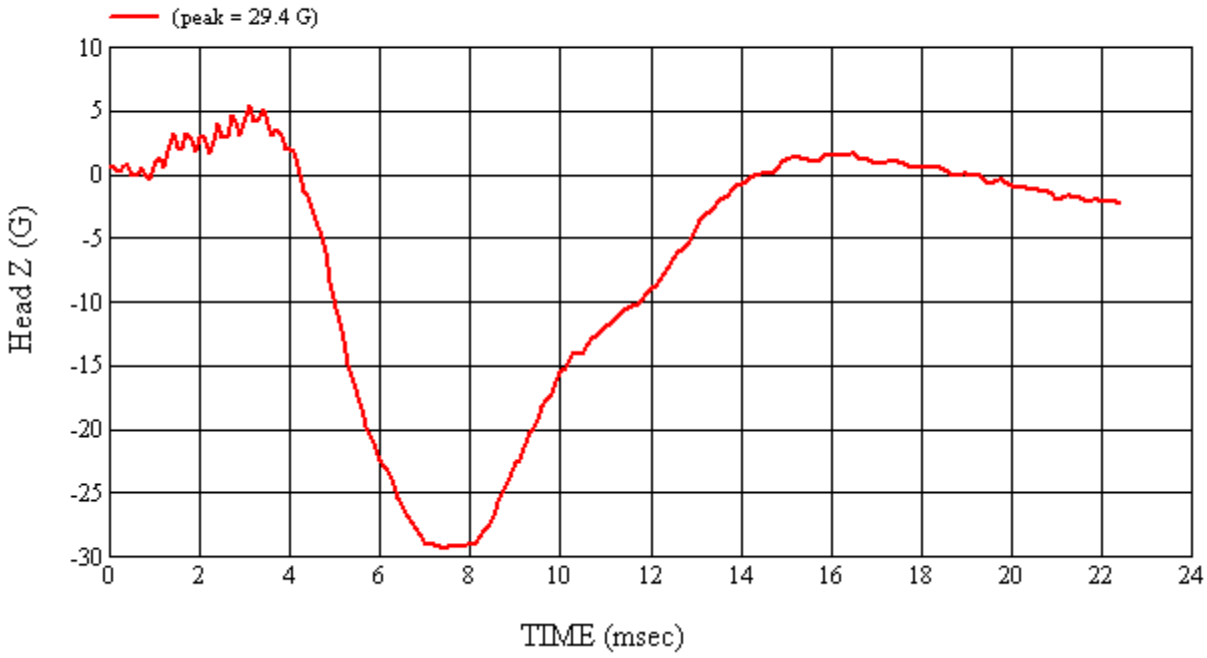
MGA Test #: U11279 Target Location: RH, Right Side Test Date: 6/30/2011

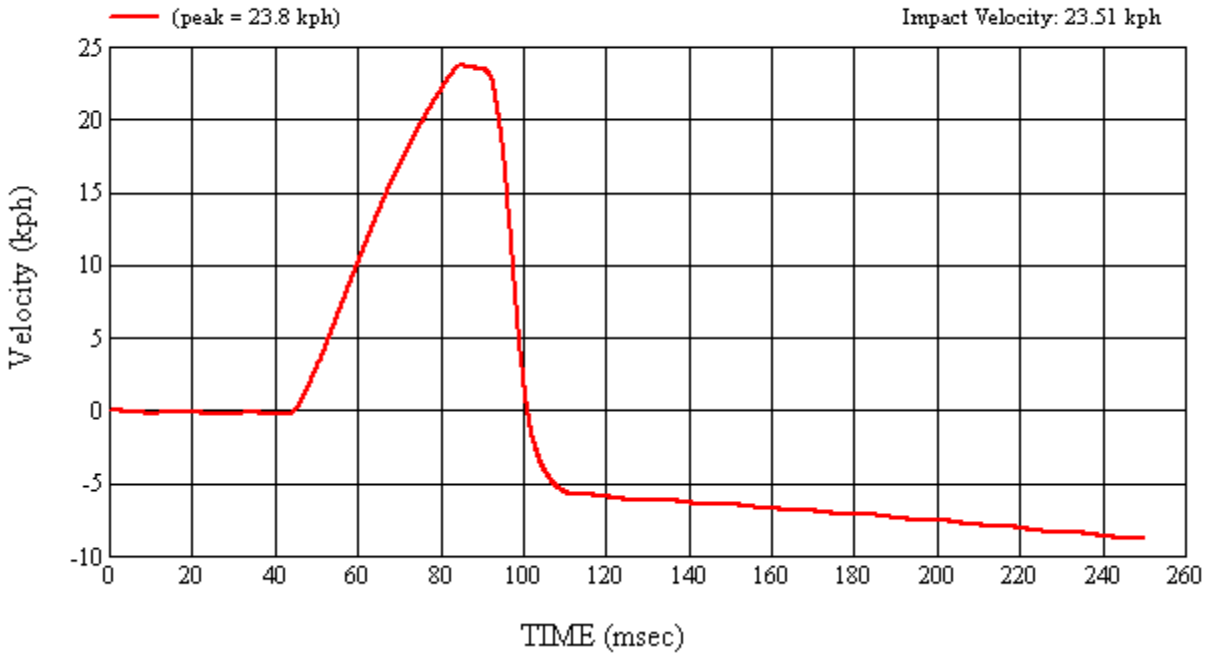


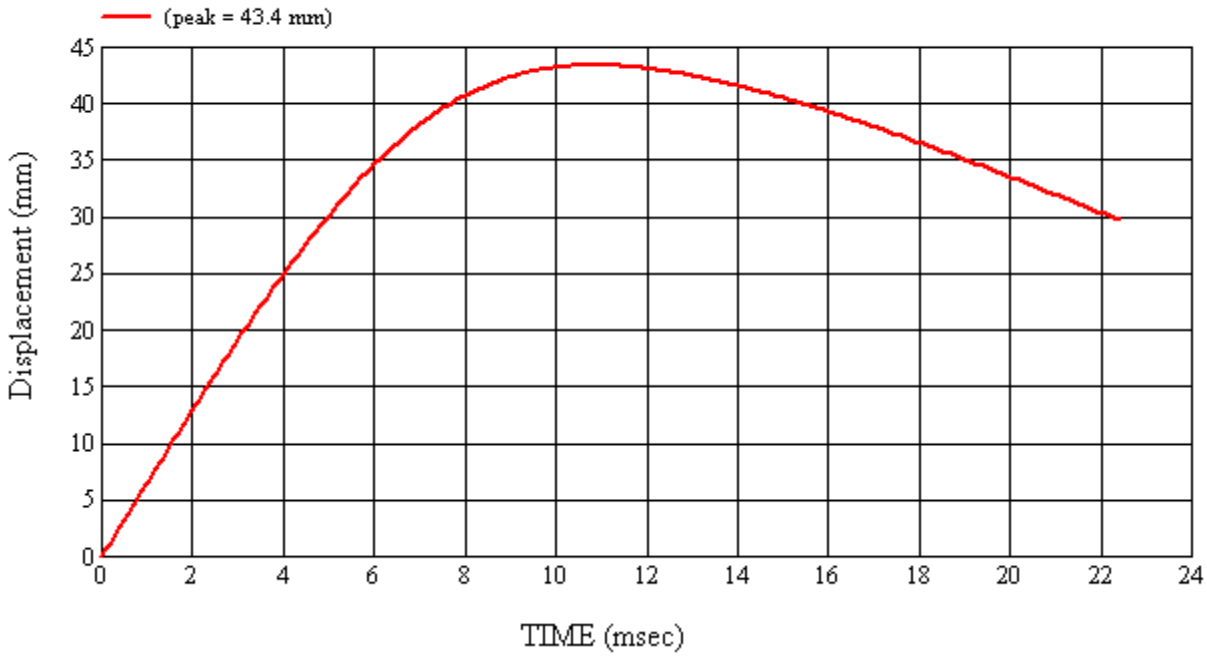



(peak = 103.4 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

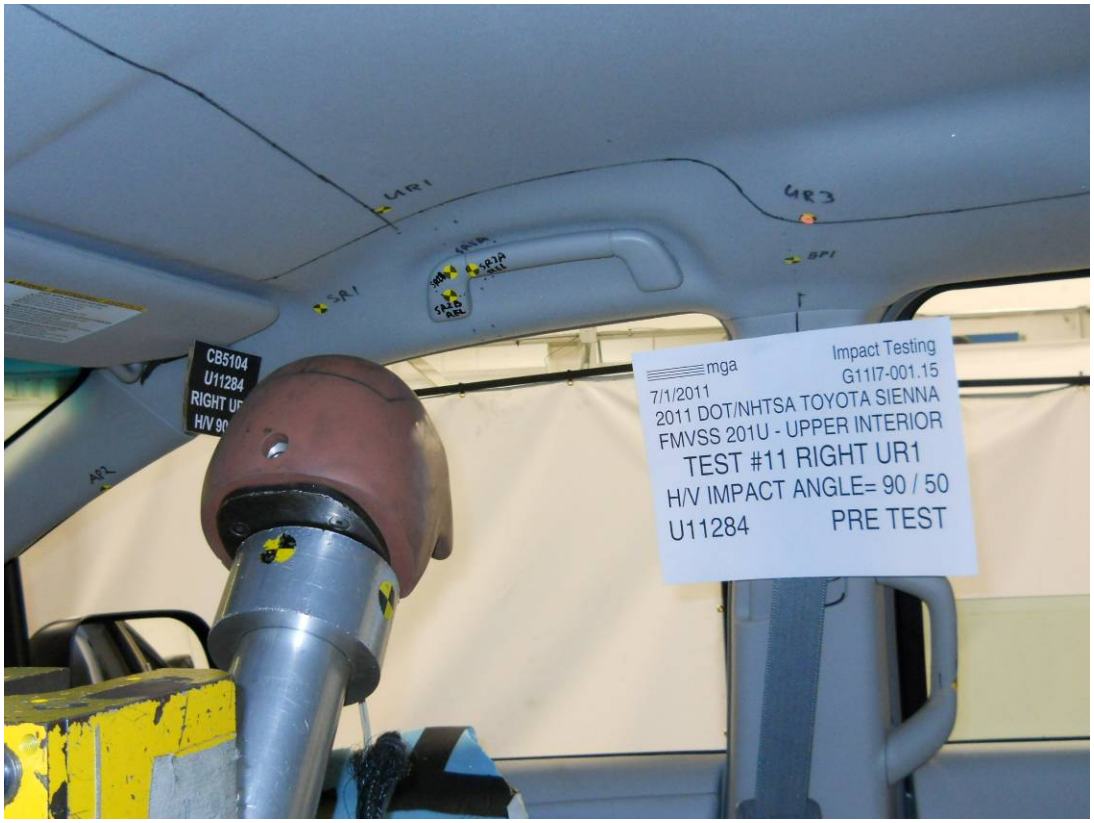

(peak = 10.6 G)
Head Y (G)
12
10
8
6
4
2
0
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 29.4 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.51 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)

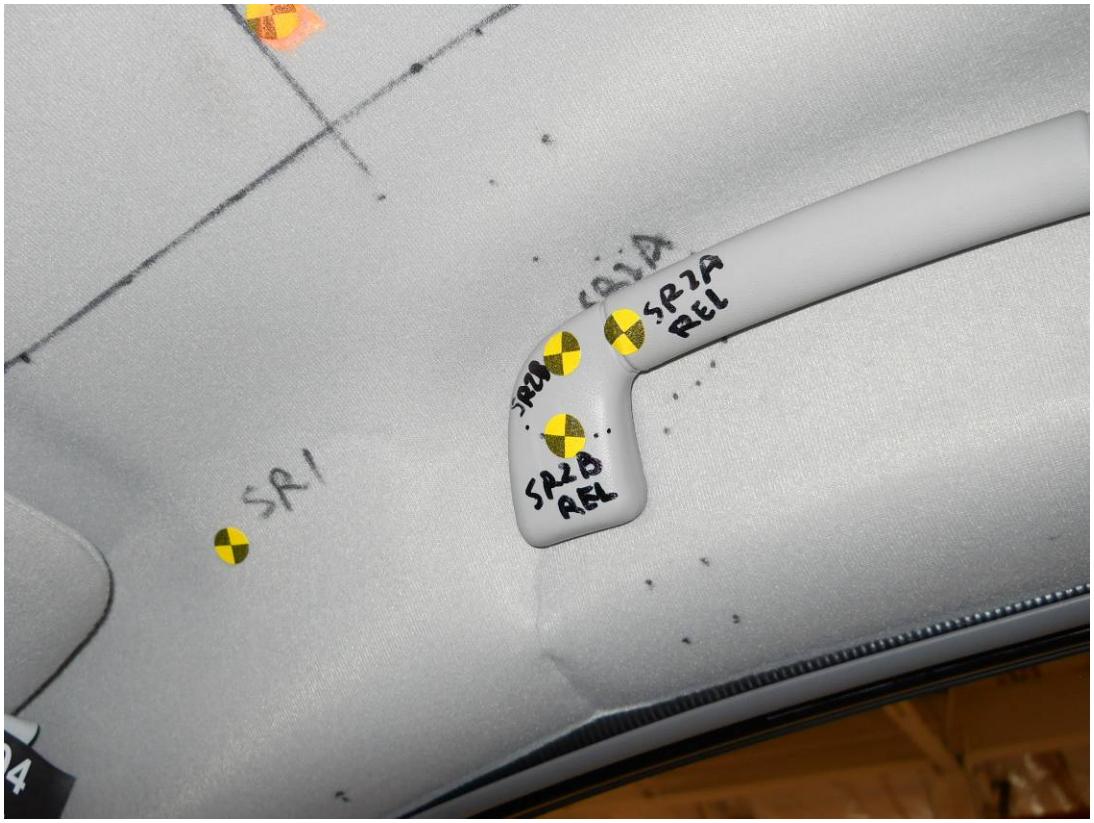

(peak = 43.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


CB5104
U11284
RIGHT UR1
H/V 90/50
mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR1
H/V IMPACT ANGLE= 90 / 50
U11284
PRE TEST


CB5104
U11284
mga
Impact Testing
G11I7-001.15
7/1/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR1
H/V IMPACT ANGLE= 90 / 50
U11284
PRE TEST


CB5104
U11284
RIGHT UR1
H/V 90/50
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR1
H/V IMPACT ANGLE= 90 / 50
U11284
POST TEST


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR1
H/V IMPACT ANGLE= 90 / 50
U11284
POST TEST


SR1
SR2A
REL
SR2B
SR2B
REL


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR1
H/V IMPACT ANGLE= 90 / 50
U11284
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#11

Target (Vehicle Side): UR1Right

Temperature:23.5C

MGA Test Reference No.:U11284

Humidity:54.2%

Approach Horizontal Angles:90º

Time of Test:1:58:06 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:@ SR2-B

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
519	467	9.6	23.8	32	5 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

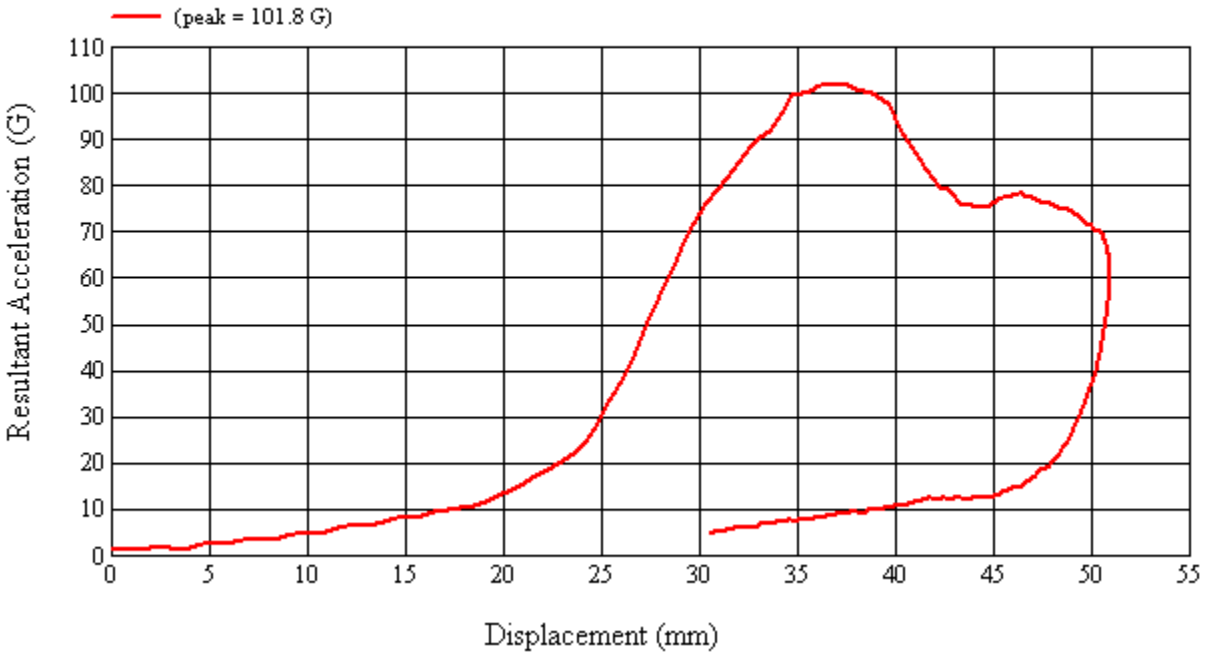
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

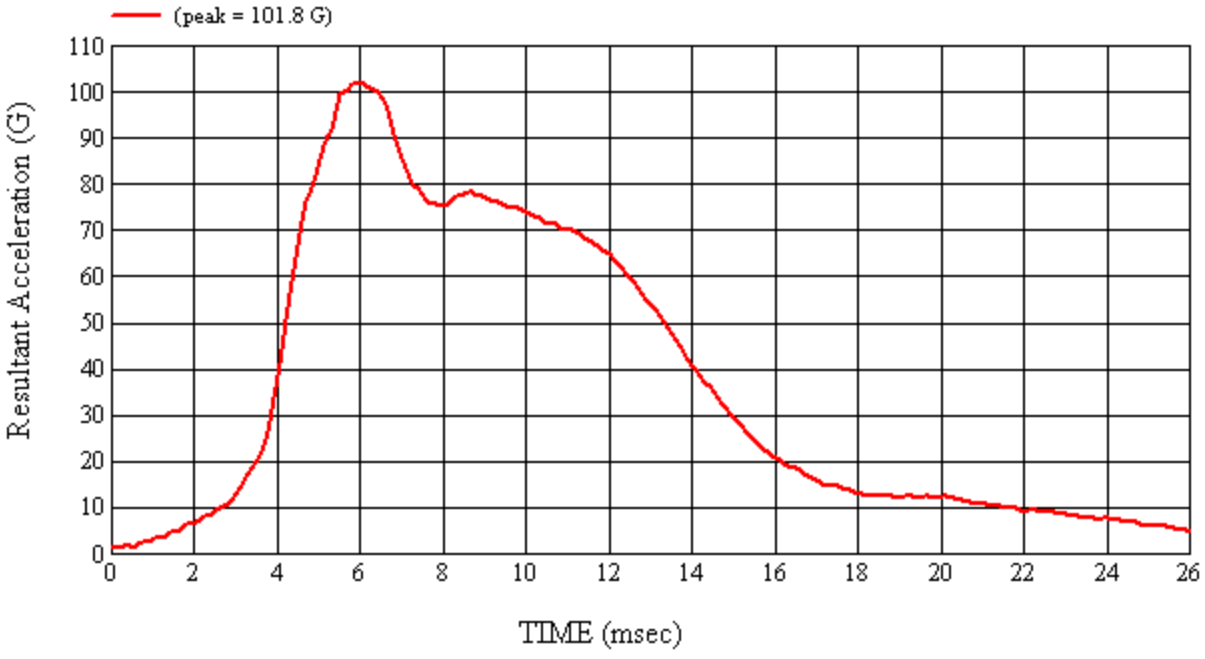
Headliner deformation, dislodged headliner, stress mark on grab handle

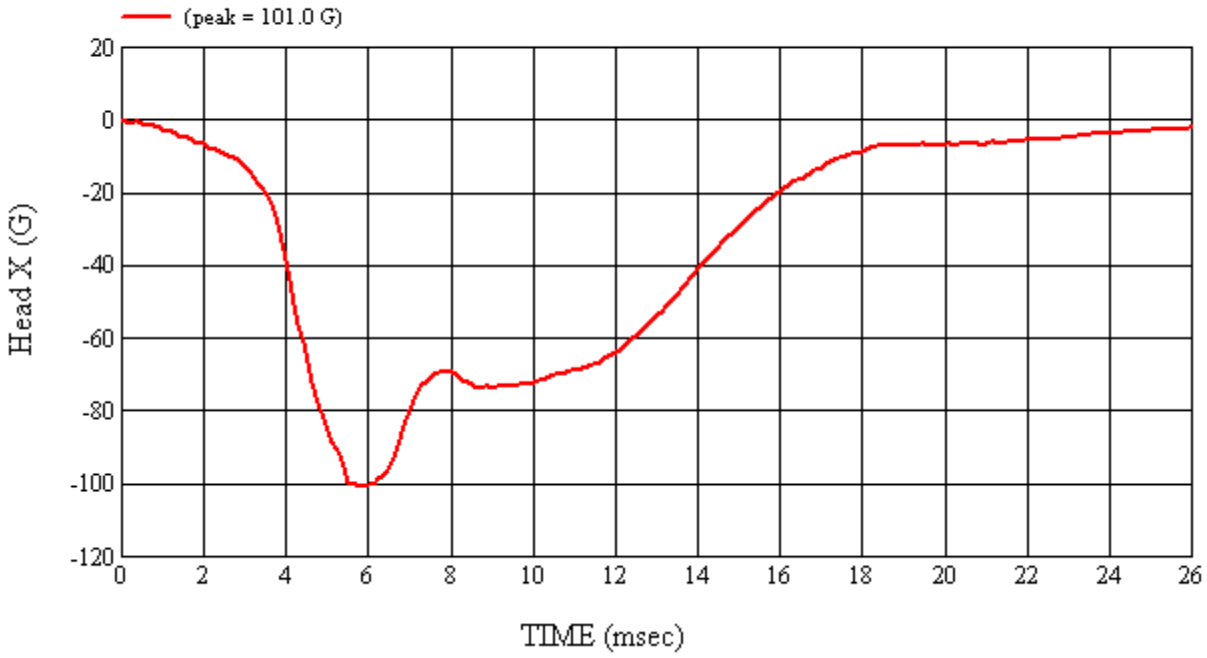
Recorded By: _____ Approved By*: _____ Date: 7/01/2011

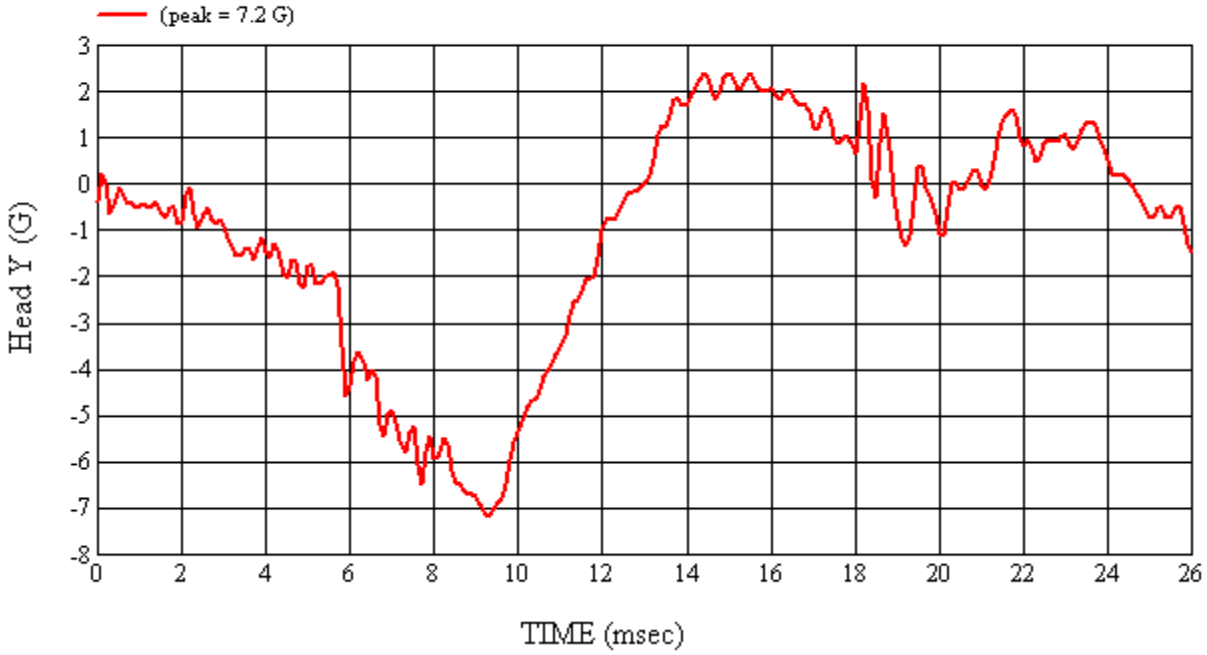
*Only necessary for NHTSA (Government) Compliance testing.

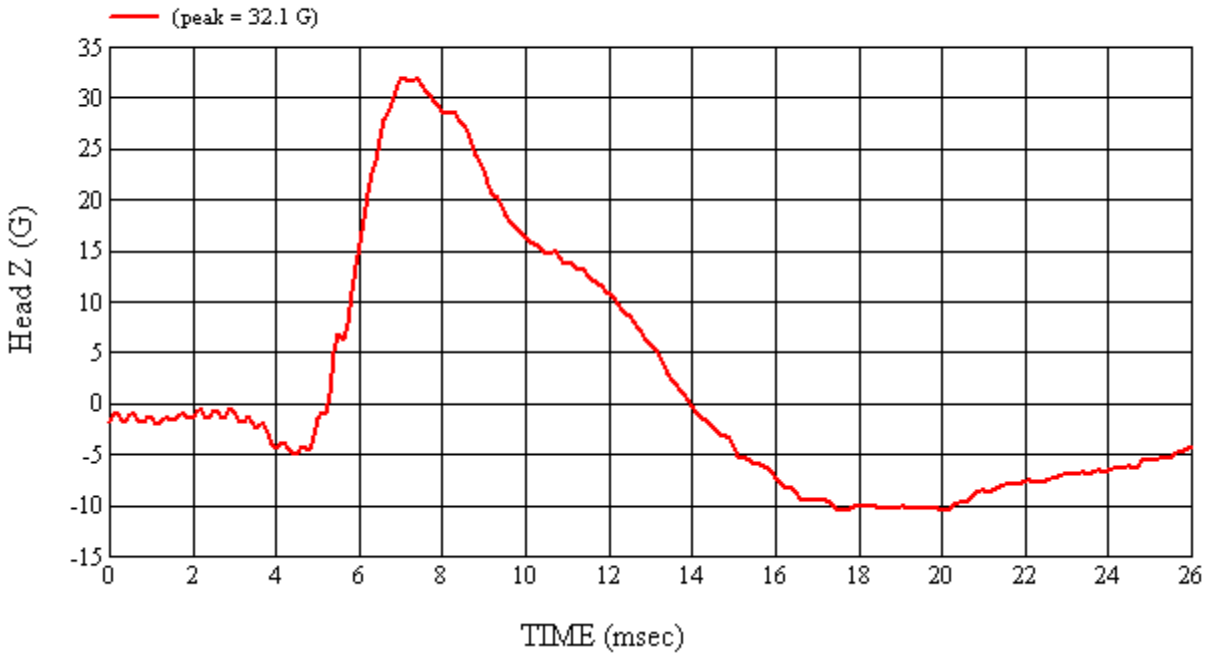
MGA Test #: U11284 Target Location: UR1, Right Side Test Date: 7/1/2011

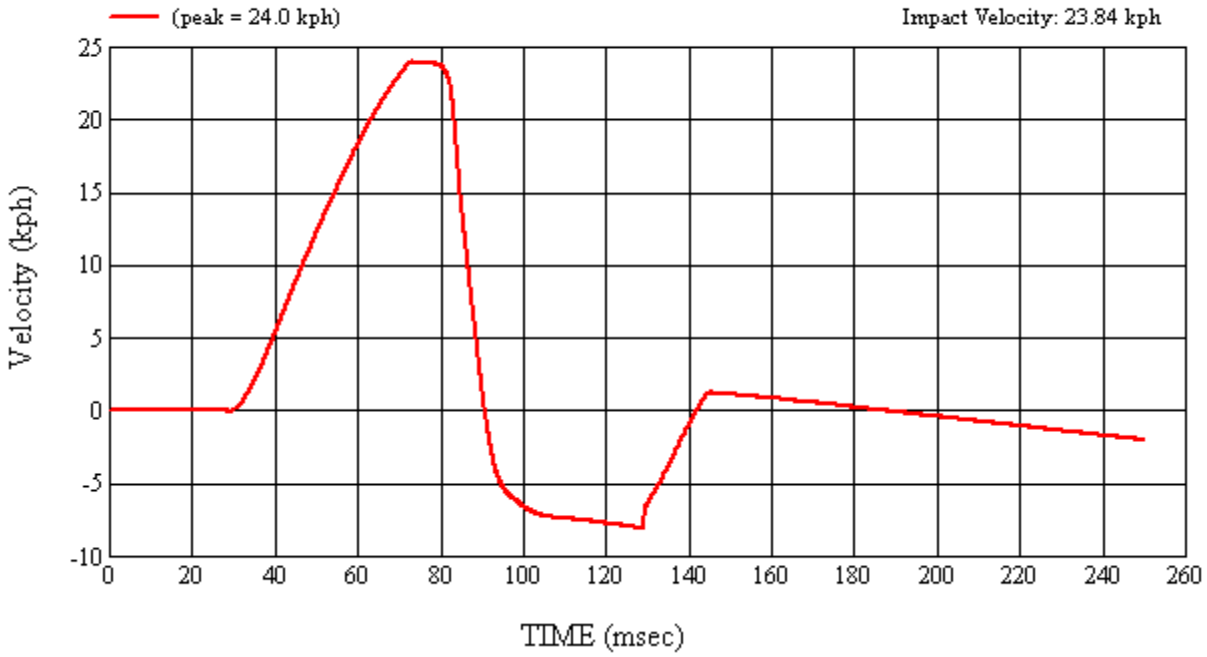


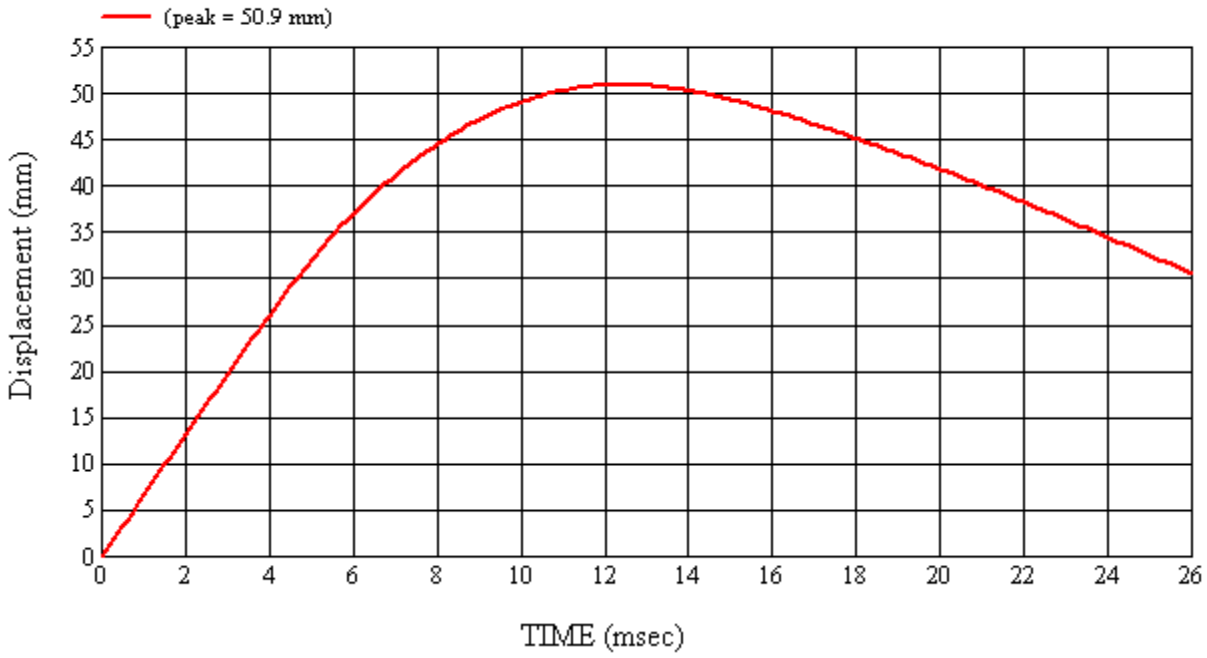


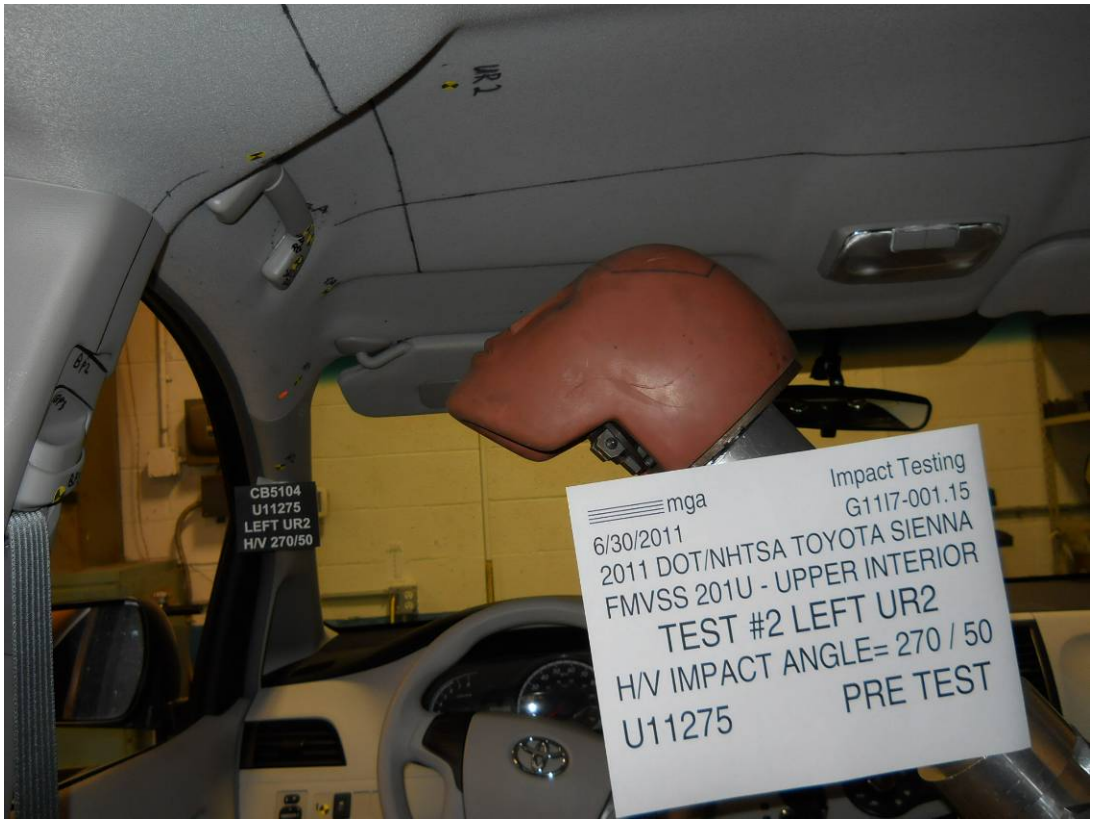

(peak = 101.0 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 7.2 G)
Head Y (G)
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

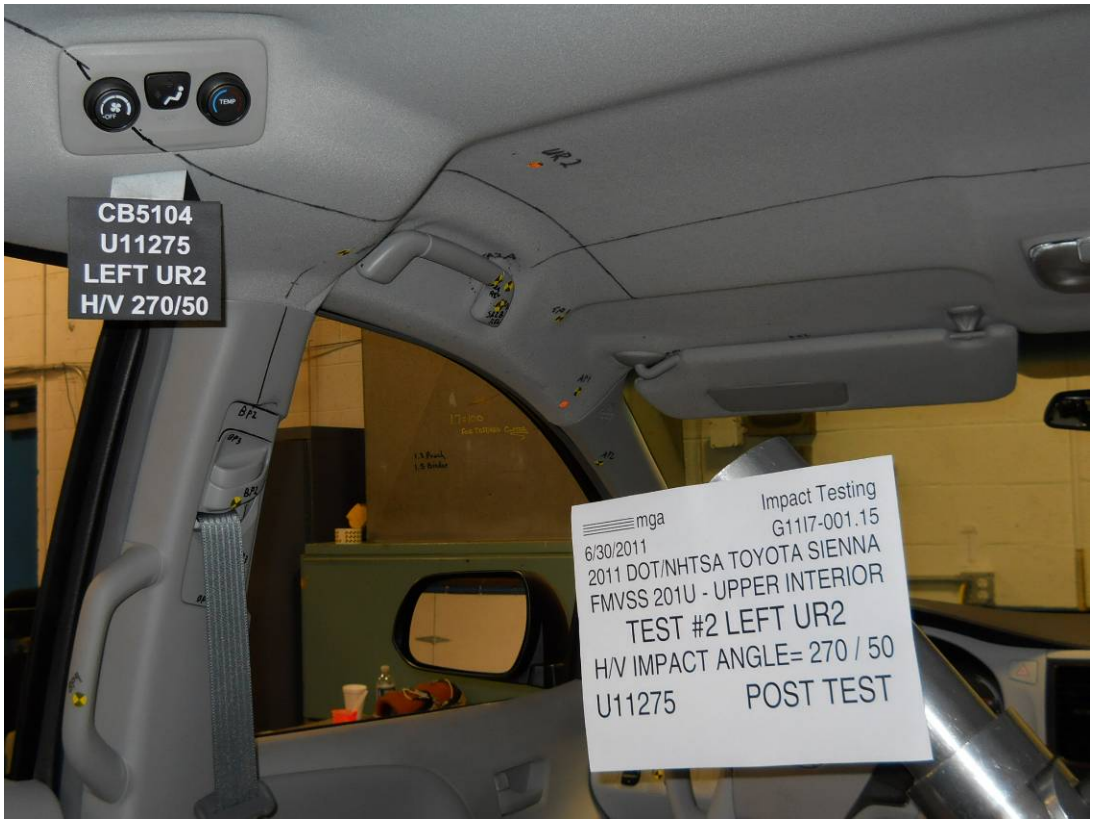

(peak = 32.1 G)
Head Z (G)
35
30
25
20
15
10
5
0
-5
-10
-15
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 24.0 kph)
Impact Velocity: 23.84 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)

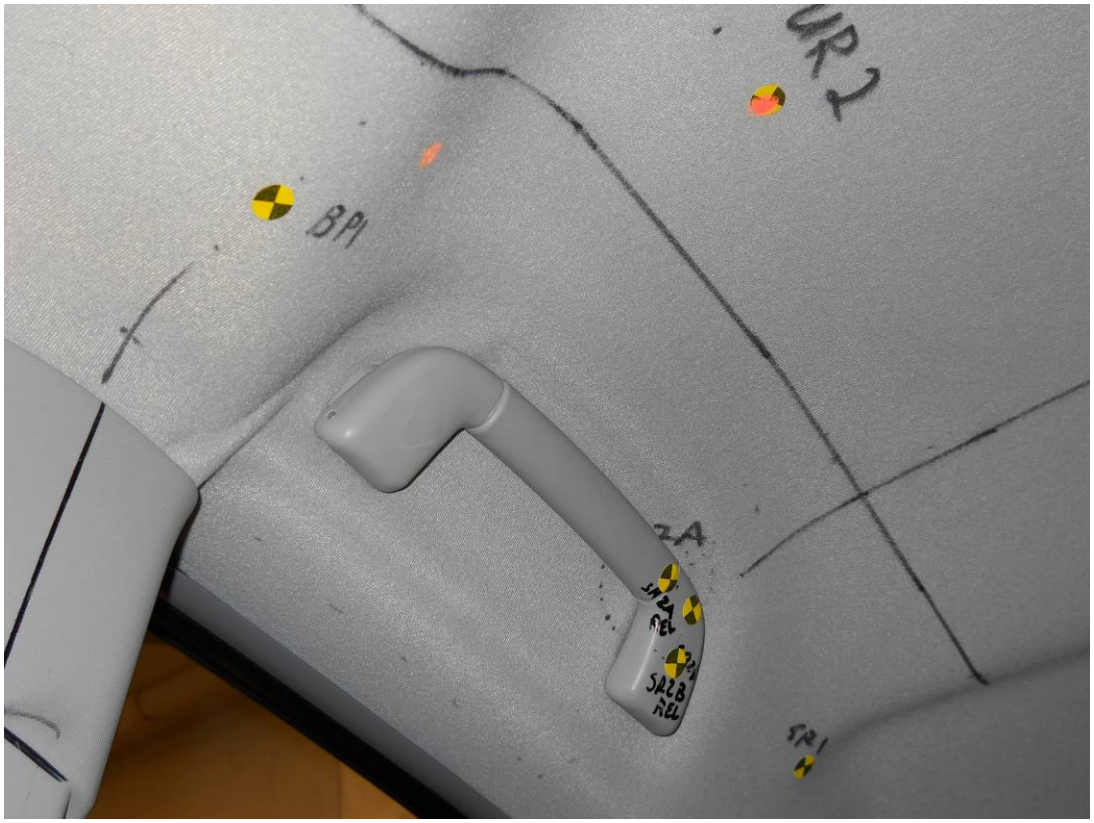

(peak = 50.9 mm)
Displacement (mm)
55
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

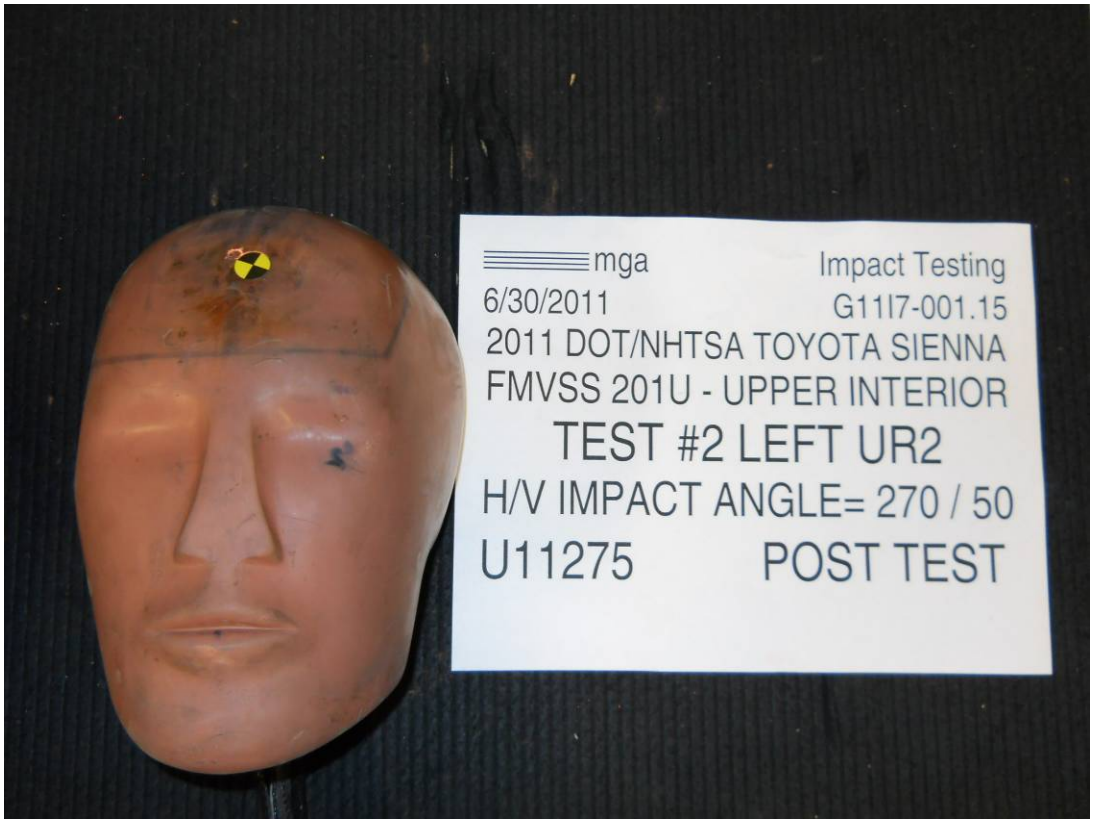

CB5104
U11275
LEFT UR2
H/V 270/50
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
U11275
PRE TEST


mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
U11275
PRE TEST


CB5104
U11275
LEFT UR2
H/V 270/50
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
U11275
POST TEST


UR2
BP1
mga
Impact Testing
G11I7-001.15
6/30/2011
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
U11275
POST TEST


UR2
BPI
SR1


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
U11275
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): UR2Left

Temperature:21.6C

MGA Test Reference No.:U11275

Humidity:55.1%

Approach Horizontal Angles:270º

Time of Test:10:55:17 AM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:@ 2405

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
750	774	7.1	24.0	36	6 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

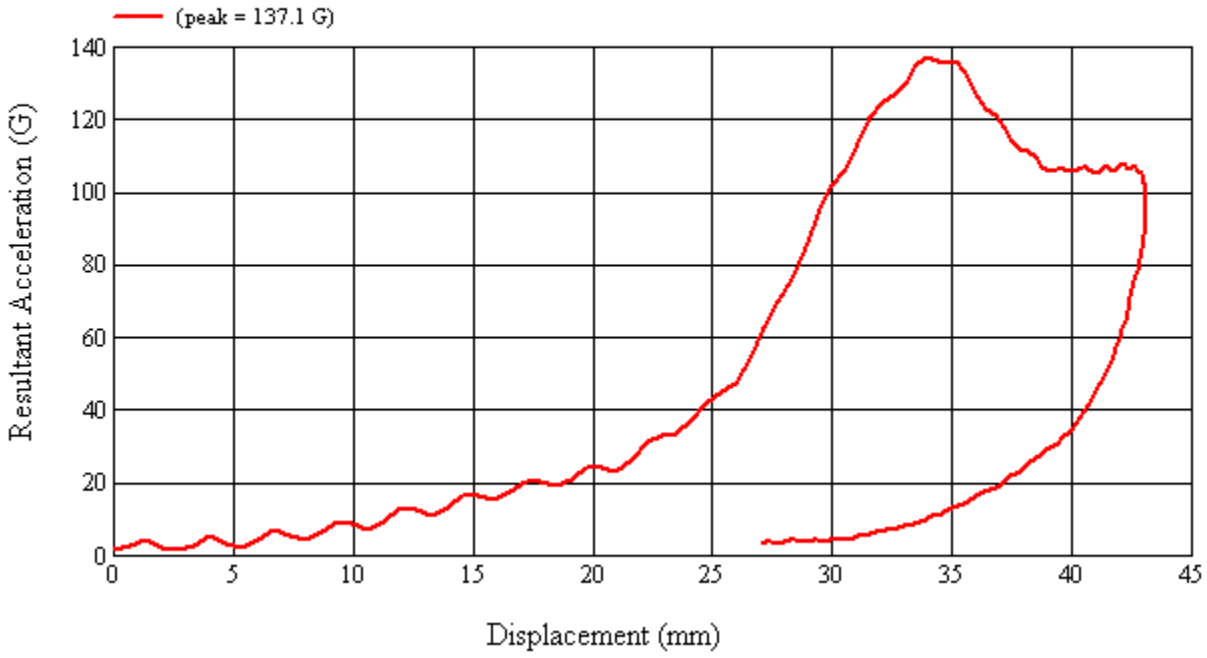
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

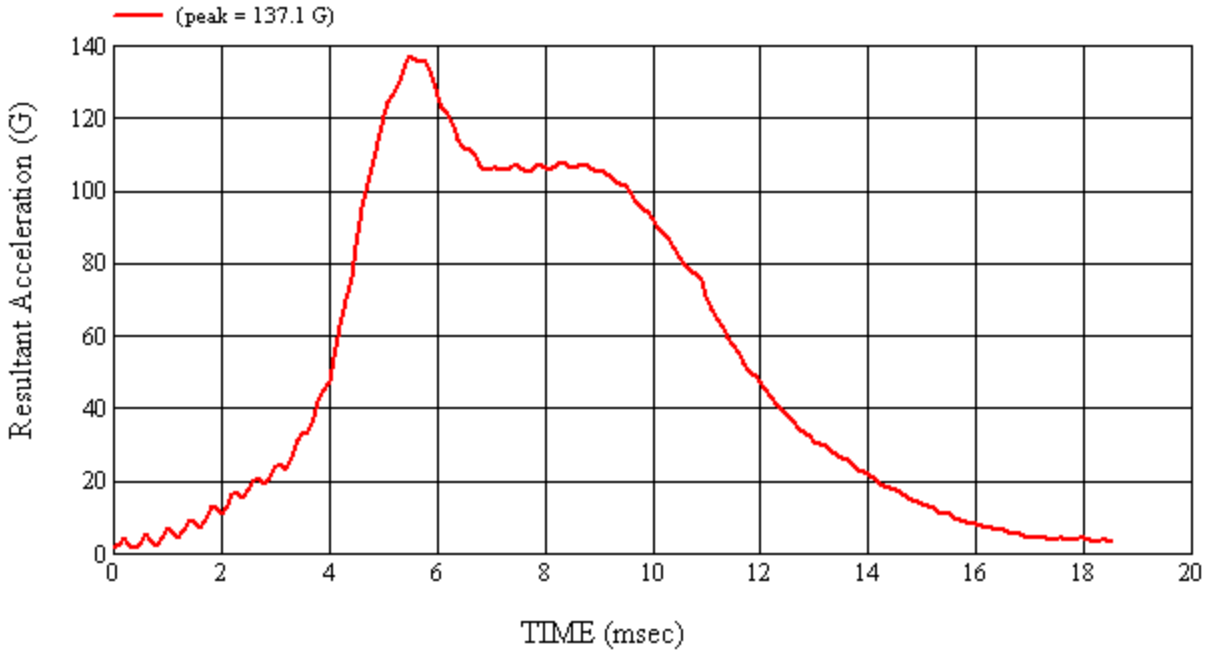
Grab handle compression, headliner deformation, stress mark on grab handle

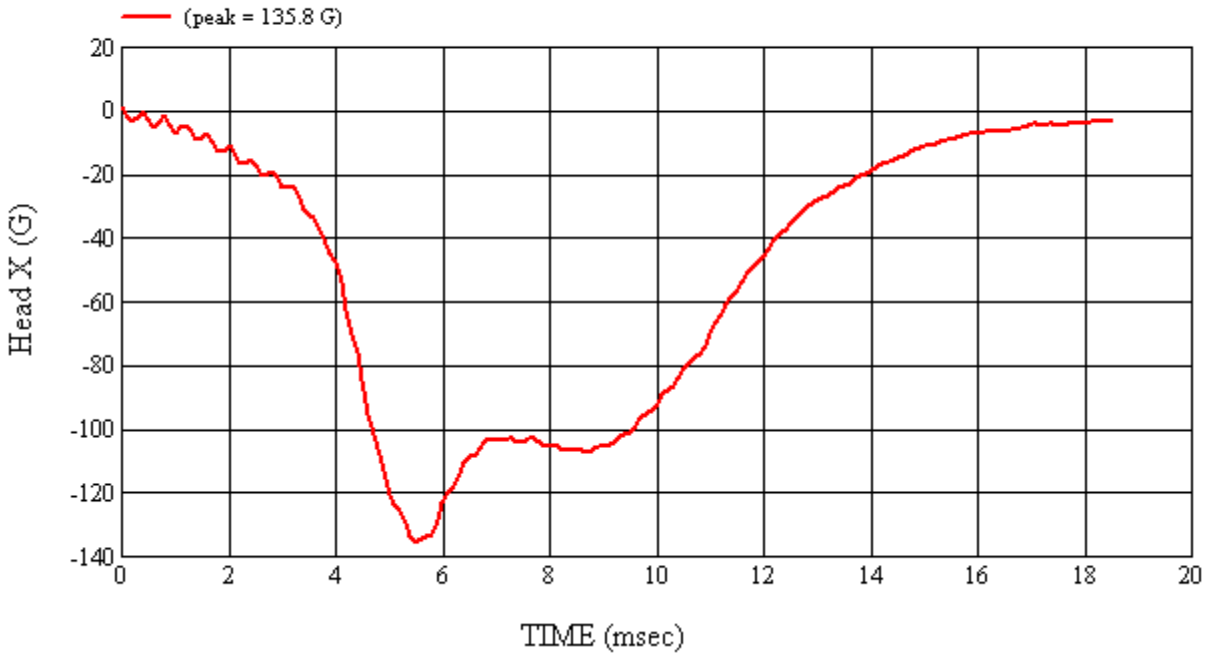
Recorded By: _____ Approved By*: _____ Date: 6/30/2011

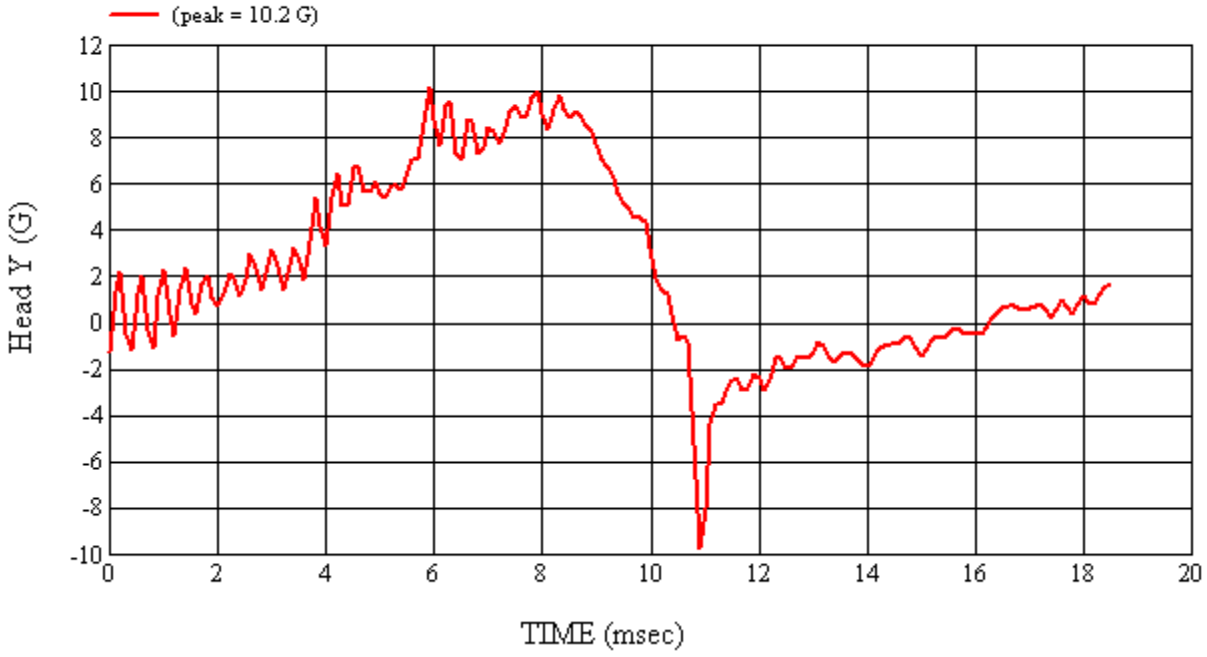
*Only necessary for NHTSA (Government) Compliance testing.

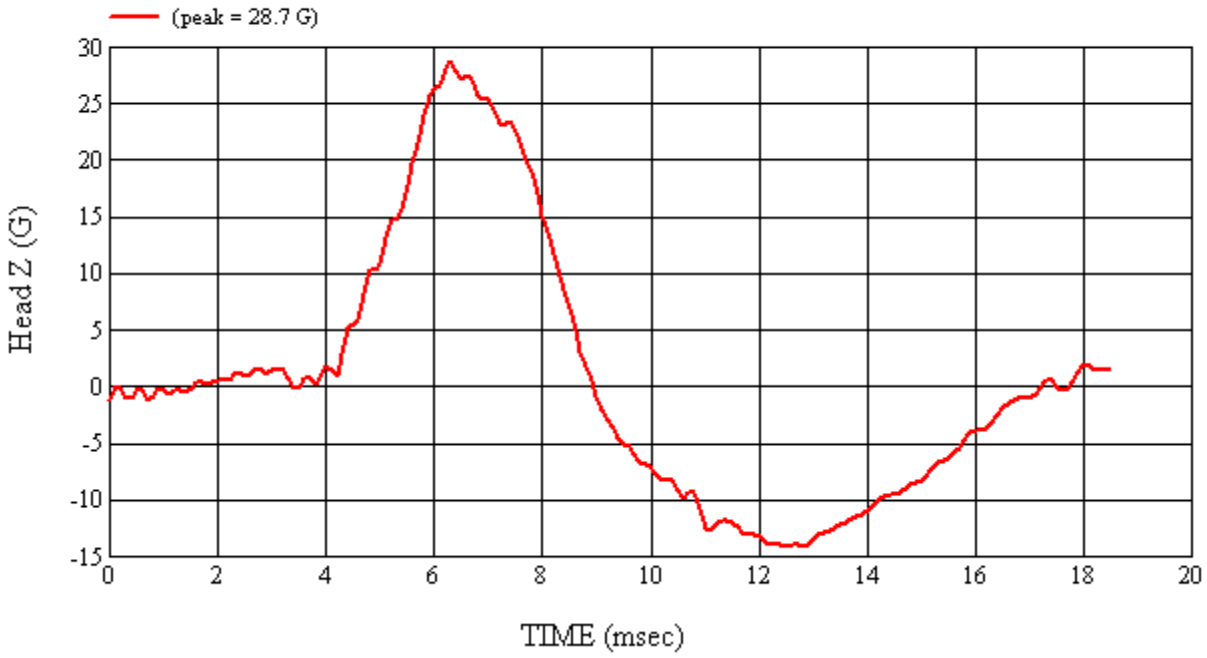
MGA Test #: U11275 Target Location: UR2, Left Side Test Date: 6/30/2011

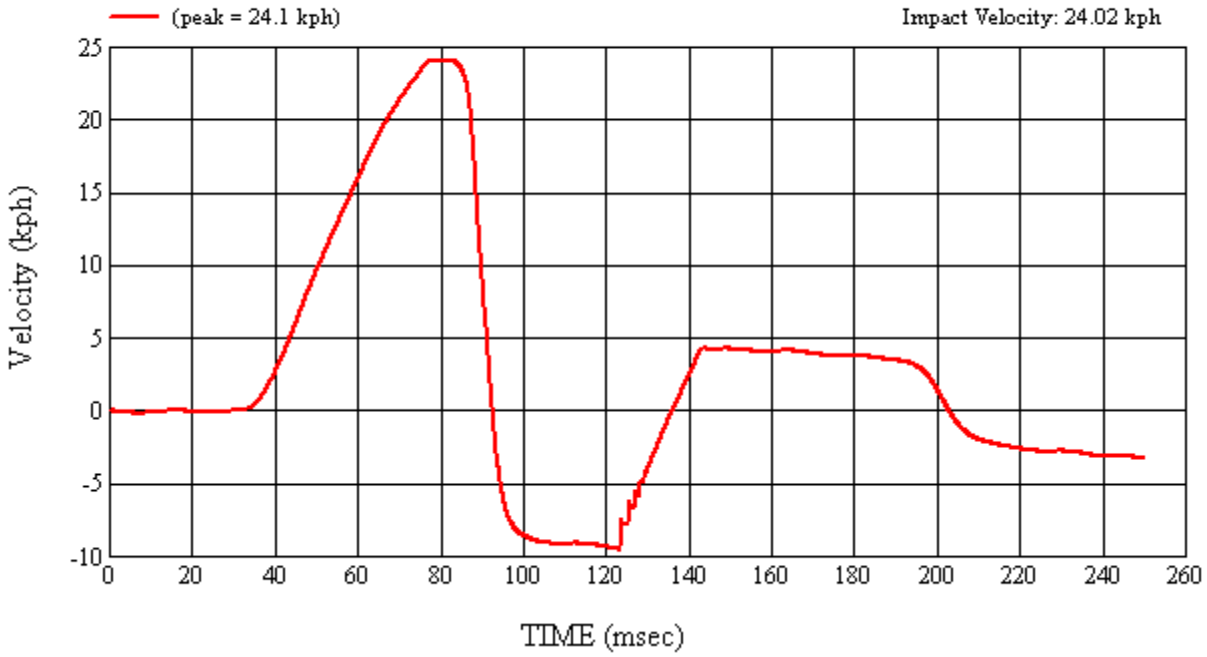


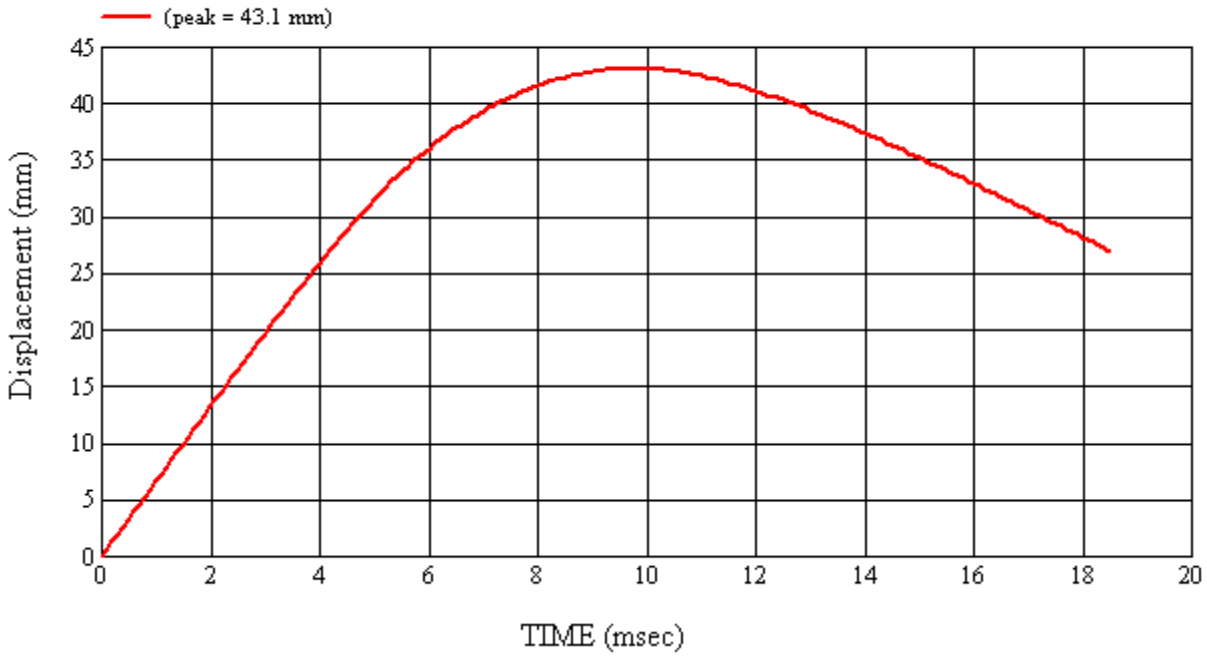



(peak = 135.8 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 10.2 G)
Head Y (G)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)

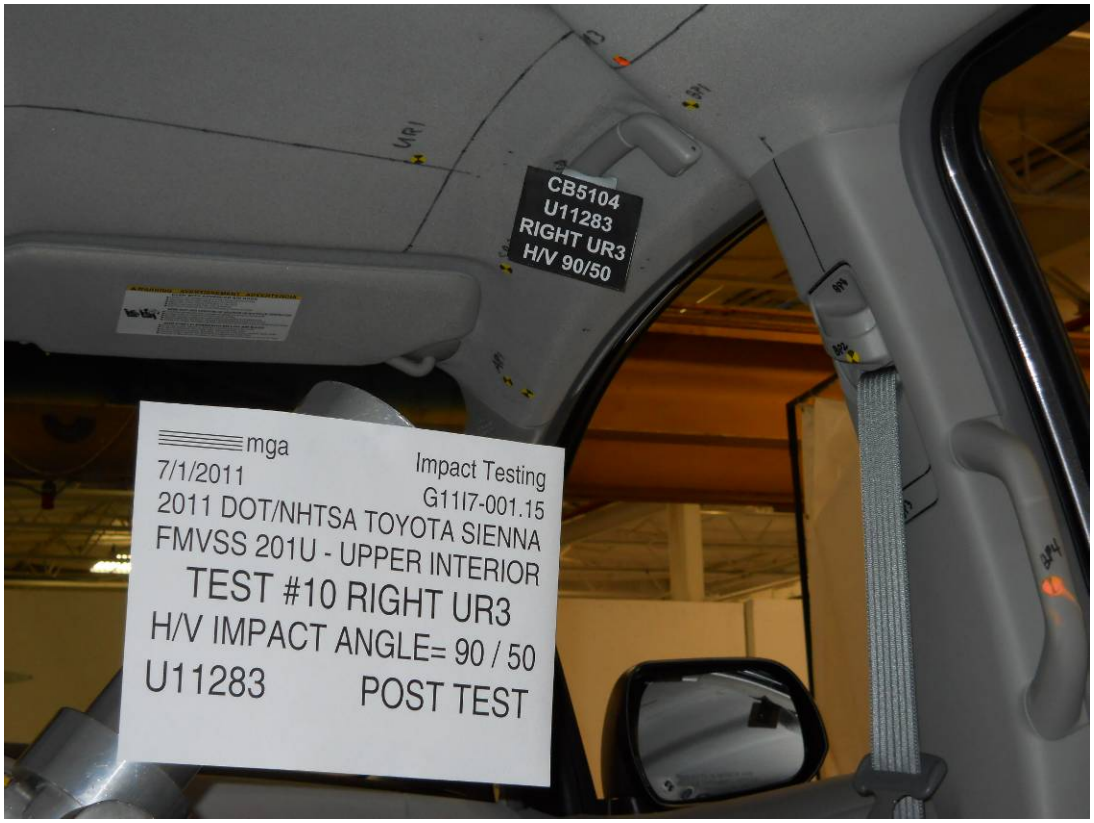

(peak = 28.7 G)
Head Z (G)
30
25
20
15
10
5
0
-5
-10
-15
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)

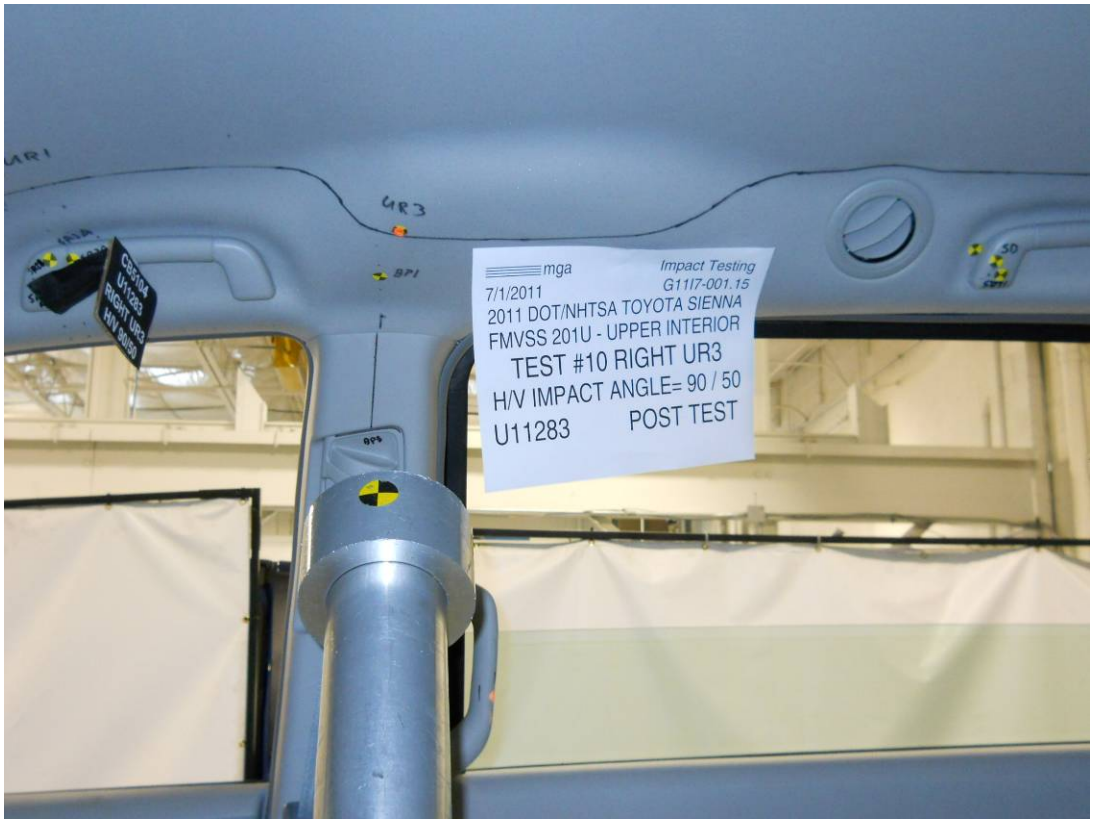

(peak = 24.1 kph)
Impact Velocity: 24.02 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)

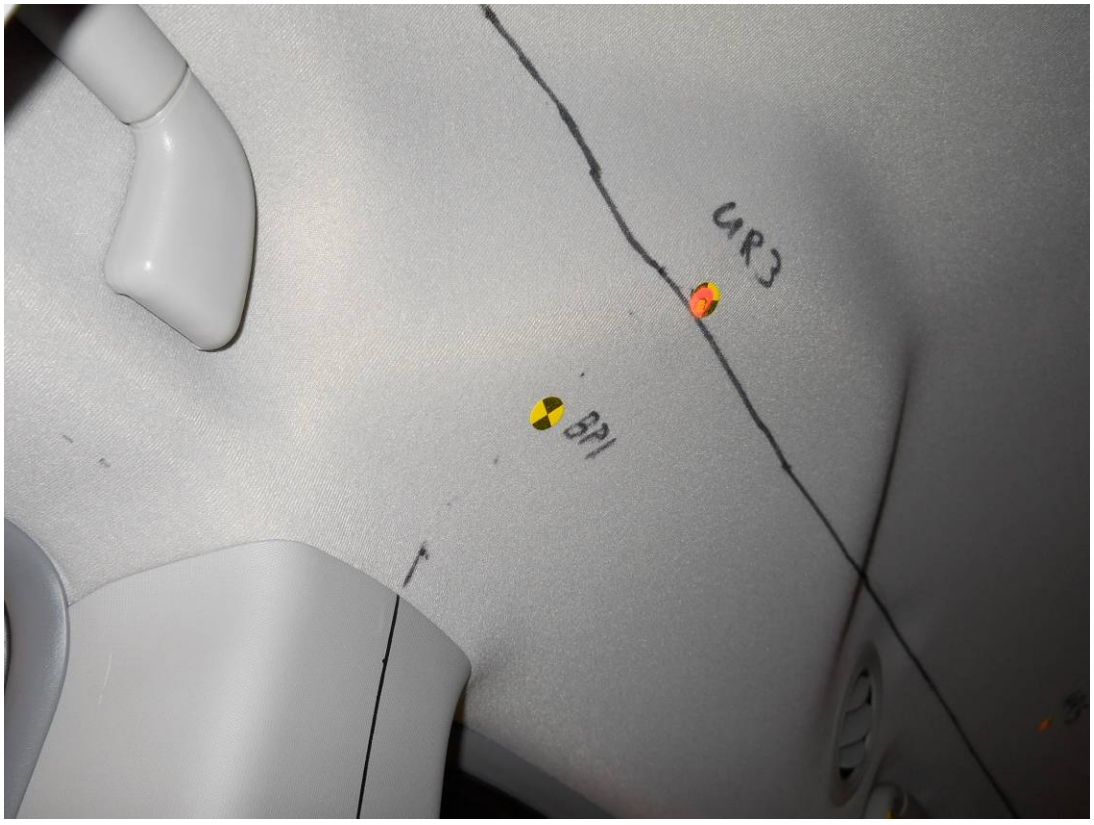

(peak = 43.1 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR3
H/V IMPACT ANGLE= 90 / 50
U11283
PRE TEST


UR3
BP1
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR3
H/V IMPACT ANGLE= 90 / 50
U11283
PRE TEST


CB5104
U11283
RIGHT UR3
H/V 90/50
mga
7/1/2011
Impact Testing
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR3
H/V IMPACT ANGLE= 90 / 50
U11283
POST TEST


UR3
mga
7/1/2011
Impact Testing
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR3
H/V IMPACT ANGLE= 90 / 50
U11283
POST TEST


UR3
BP1


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR3
H/V IMPACT ANGLE= 90 / 50
U11283
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:Sienna/DOT/NHTSA/Toyota

GENERAL TEST PARAMETERS:

Test Number:#10

Target (Vehicle Side): UR3Right

Temperature:23.0C

MGA Test Reference No.:U11283

Humidity:55.2%

Approach Horizontal Angles:90º

Time of Test:1:09:09 PM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:@ BP

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
763	791	6.4	23.7	25	5 Right

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

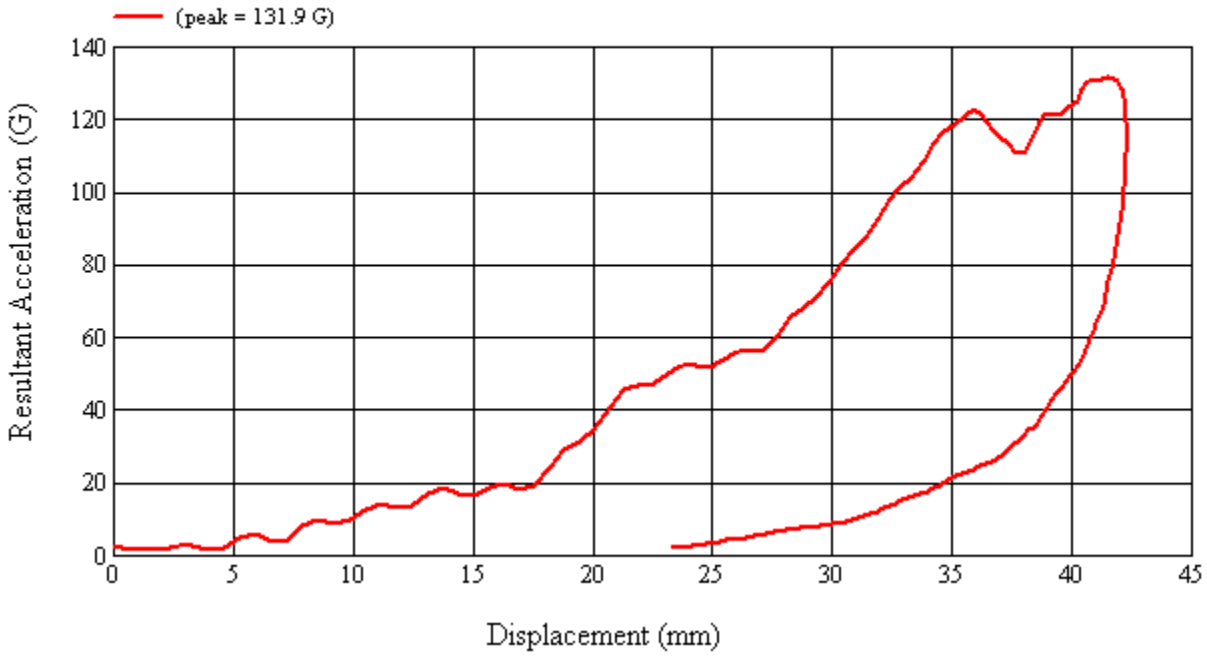
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

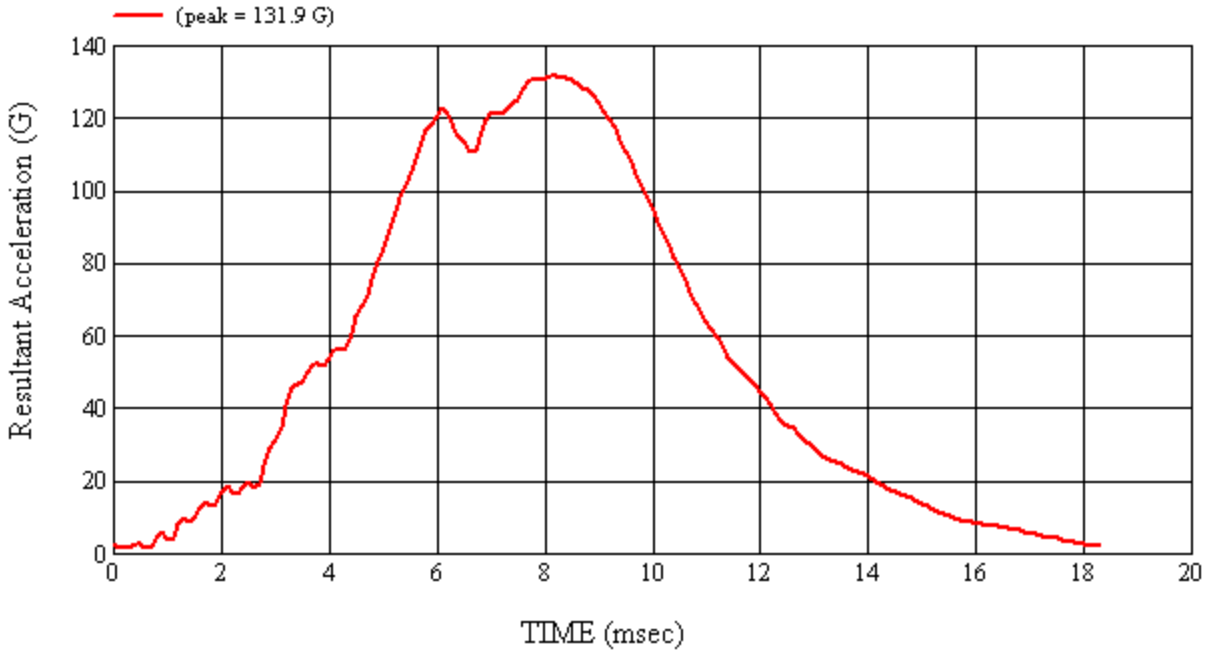
Stress mark on pillar trim

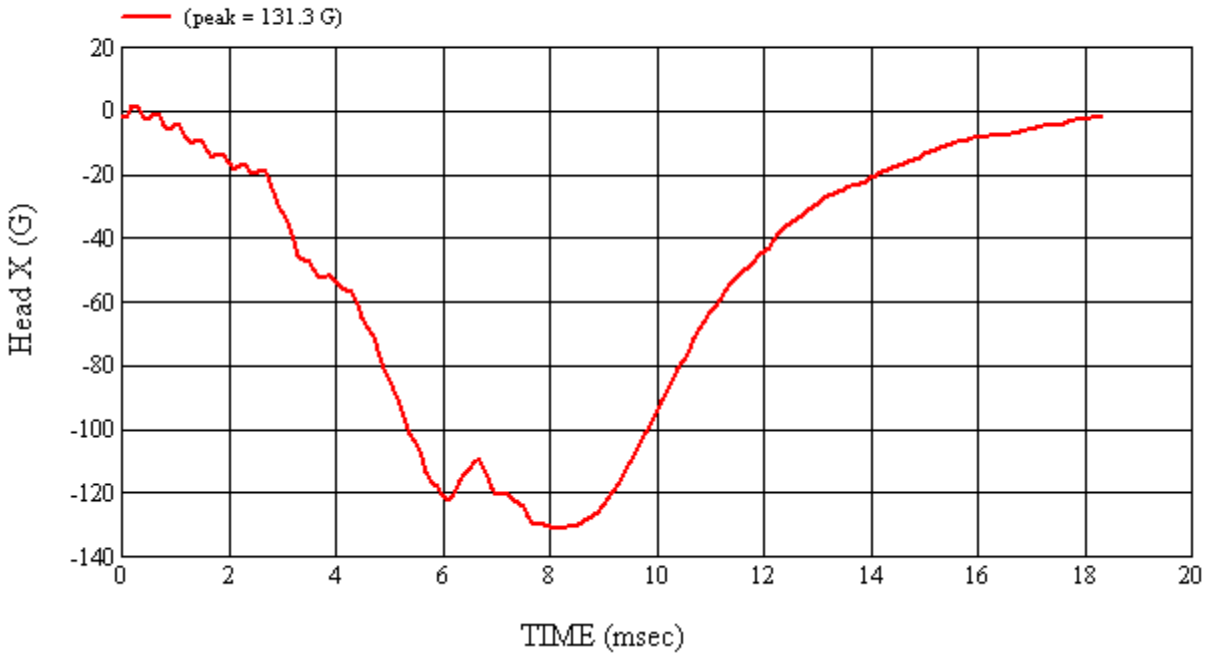
Recorded By: _____ Approved By*: _____ Date: 7/01/2011

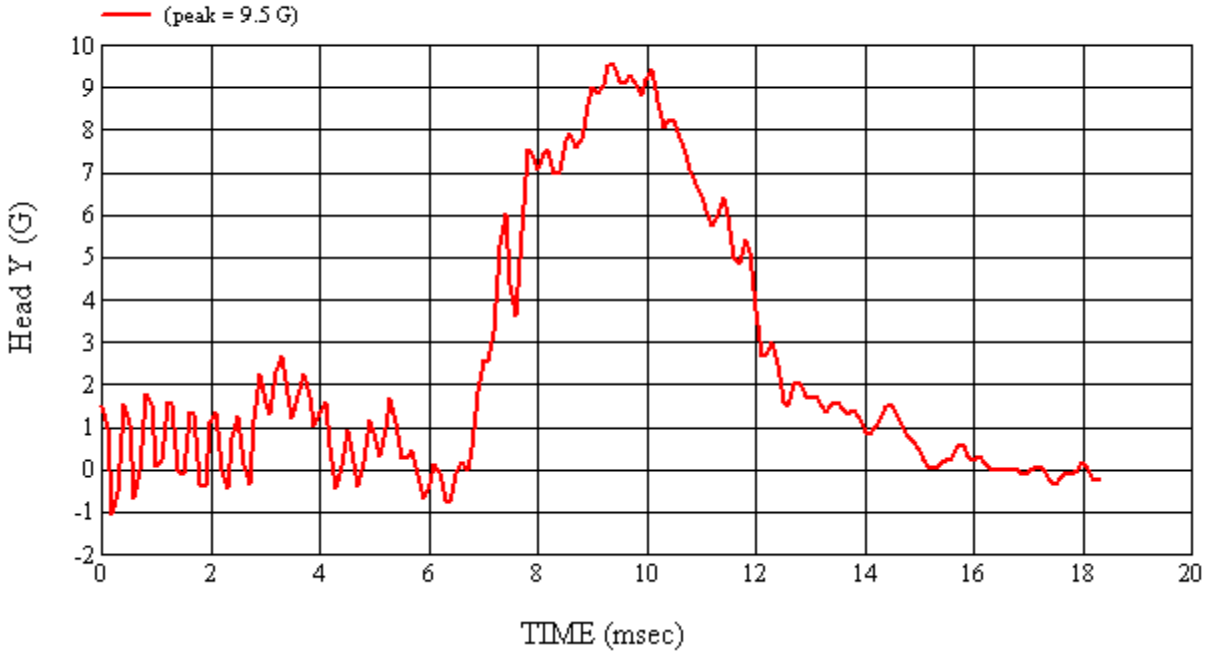
*Only necessary for NHTSA (Government) Compliance testing.

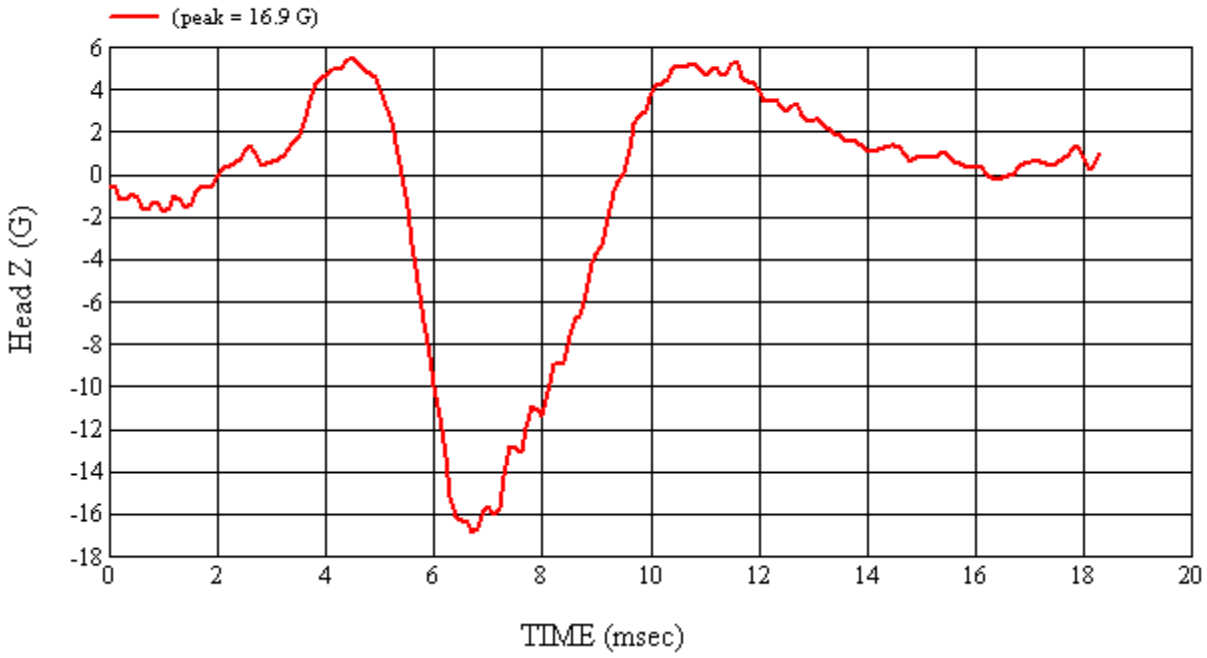
MGA Test #: U11283 Target Location: UR3, Right Side Test Date: 7/1/2011

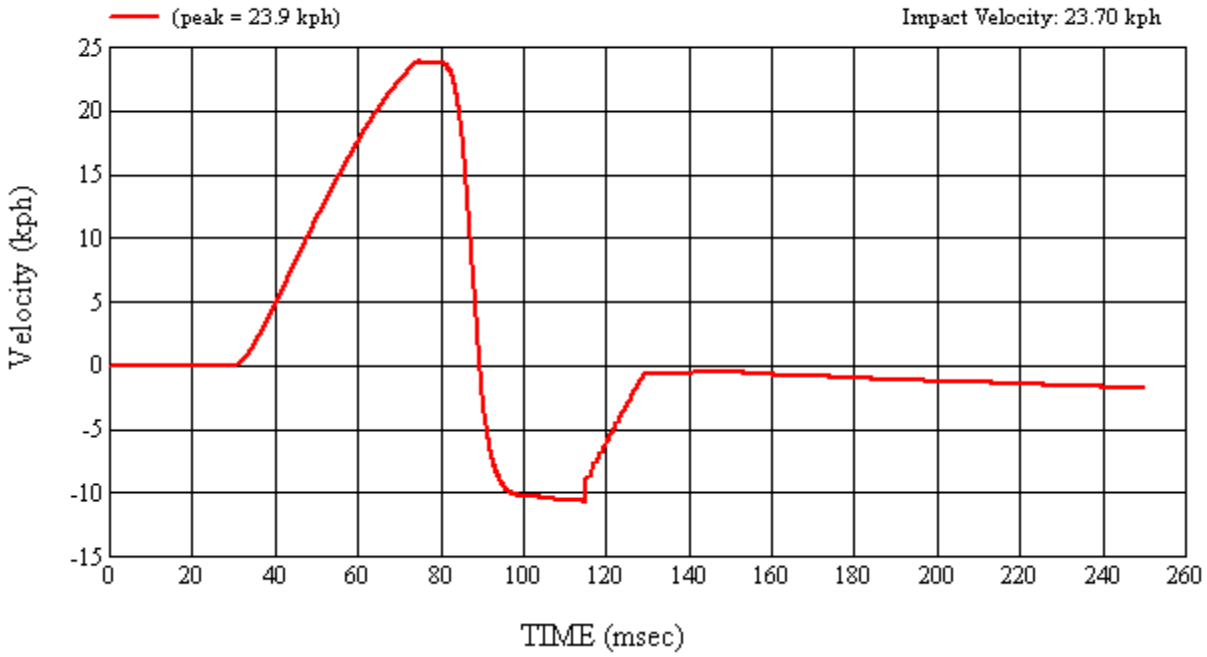


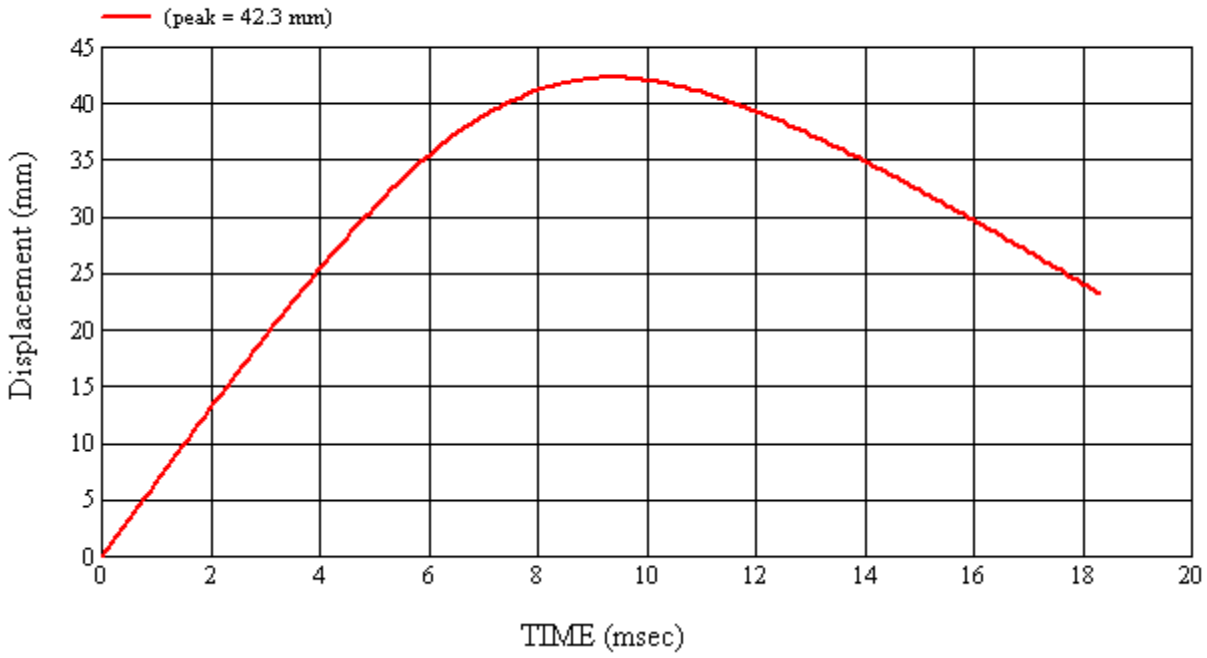



(peak = 131.3 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 9.5 G)
Head Y (G)
10
9
8
7
6
5
4
3
2
1
0
-1
-2
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 16.9 G)
Head Z (G)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 23.9 kph)
Impact Velocity: 23.70 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 42.3 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR4
H/V IMPACT ANGLE= 270 / 50
U11278
PRE TEST


UR4
UR 6
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR4
H/V IMPACT ANGLE= 270 / 50
U11278
PRE TEST


CB5104
U11278
LEFT UR4
H/V 270/50
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR4
H/V IMPACT ANGLE= 270 / 50
U11278
POST TEST


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR4
H/V IMPACT ANGLE= 270 / 50
U11278
POST TEST


SR3-3


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR4
H/V IMPACT ANGLE= 270 / 50
U11278
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): UR4Left

Temperature:23.7C

MGA Test Reference No.:U11278

Humidity:49.3%

Approach Horizontal Angles:270º

Time of Test:4:00:46 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:@ SR3-3

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
582	551	8.5	23.8	30	3 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

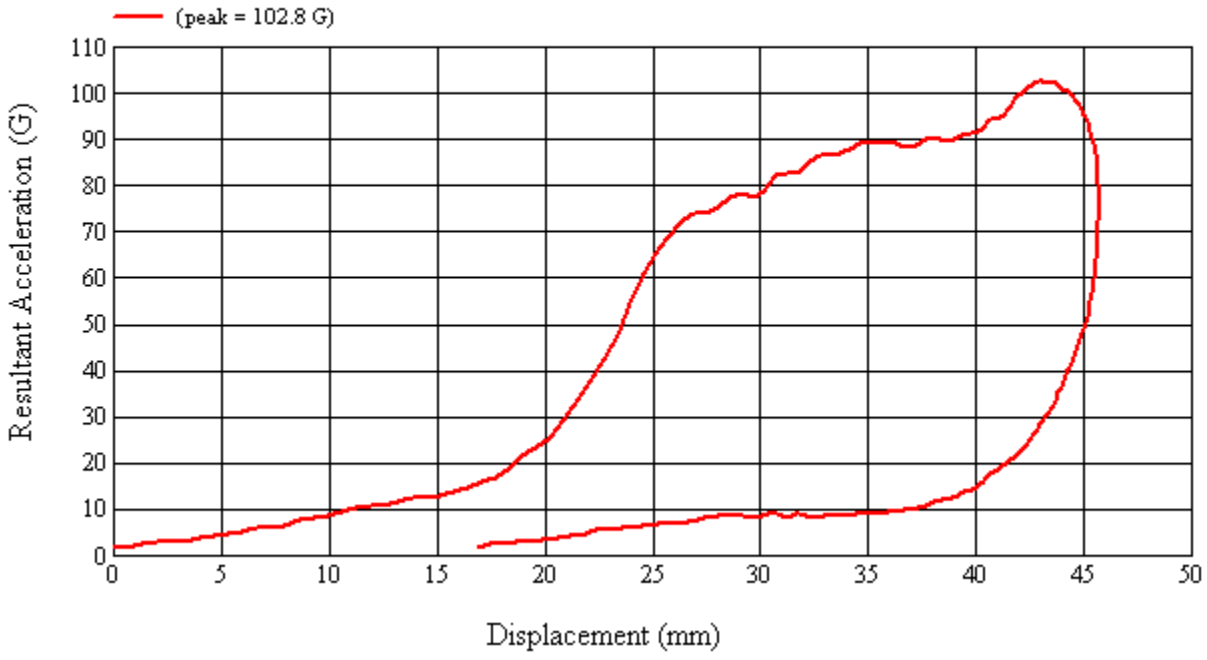
Headliner deformation, dislodged headliner

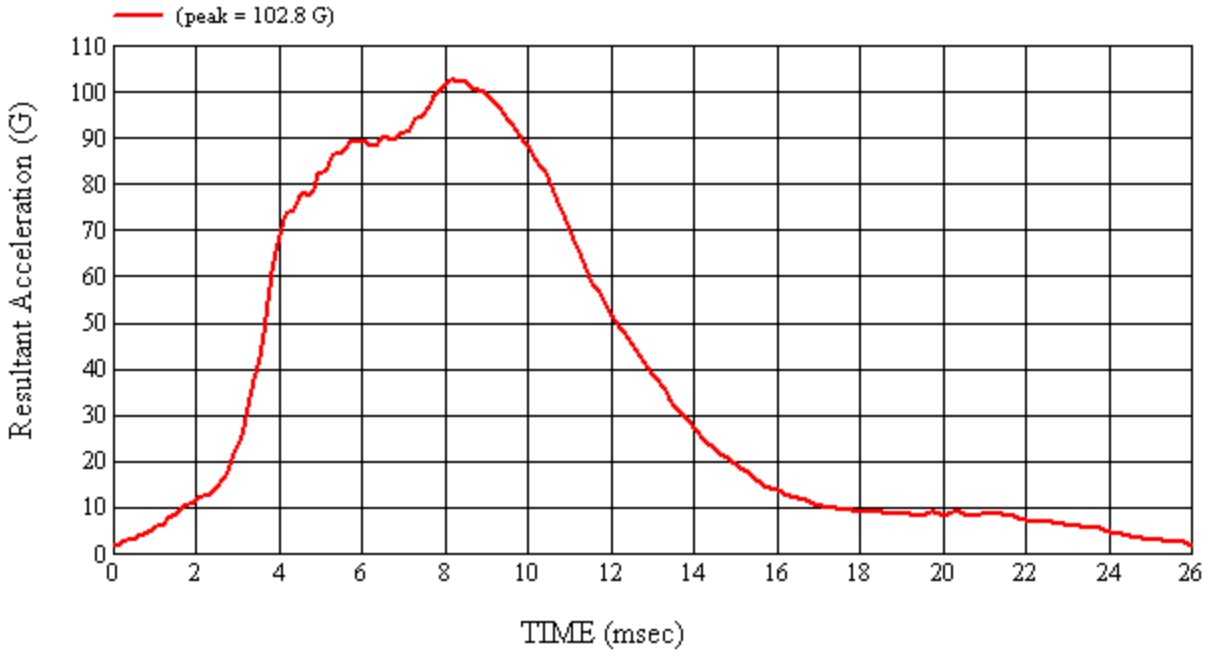
Recorded By: _____ Approved By*: _____ Date: 6/30/2011

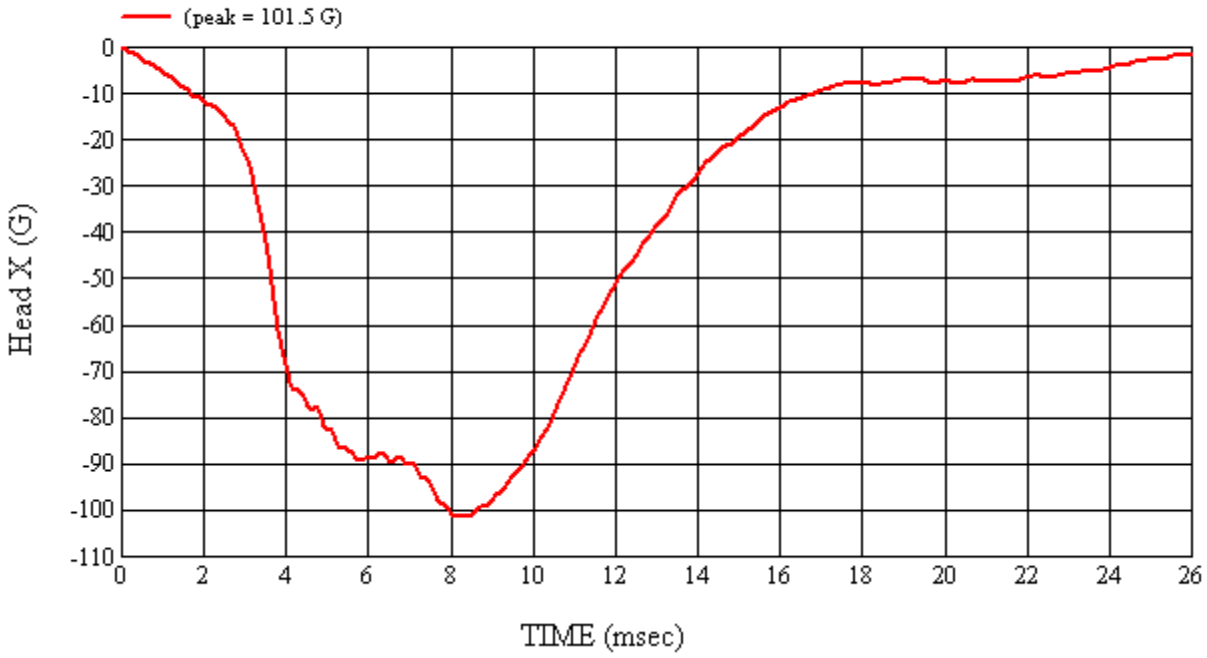
*Only necessary for NHTSA (Government) Compliance testing.

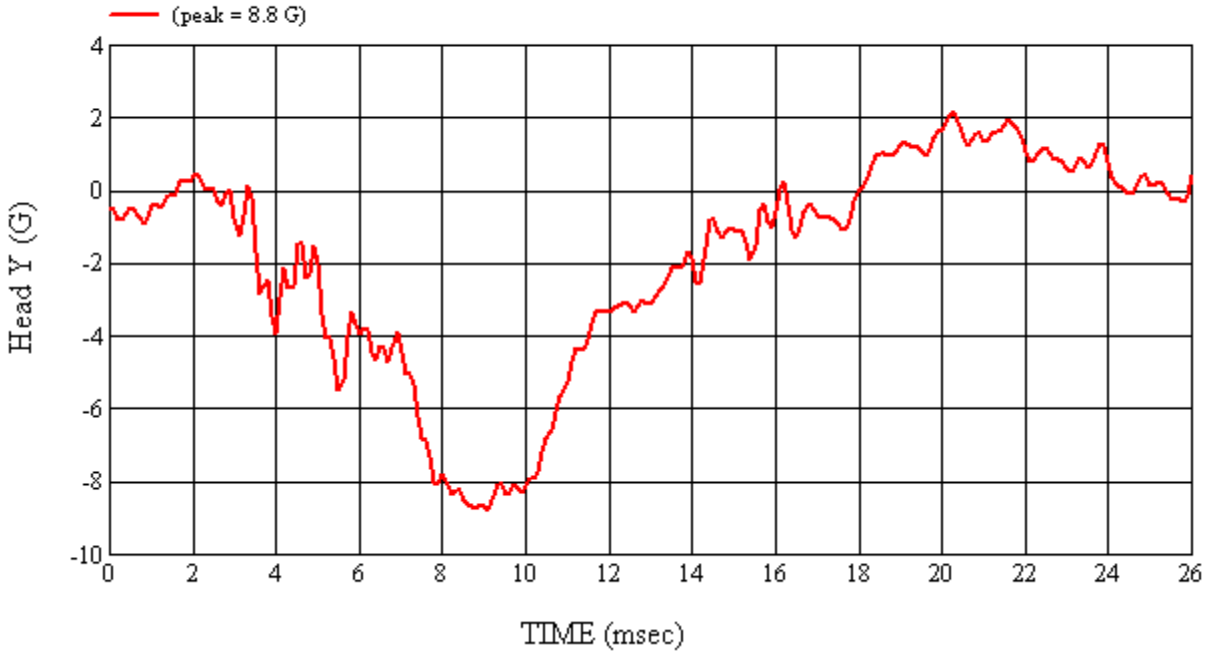
.

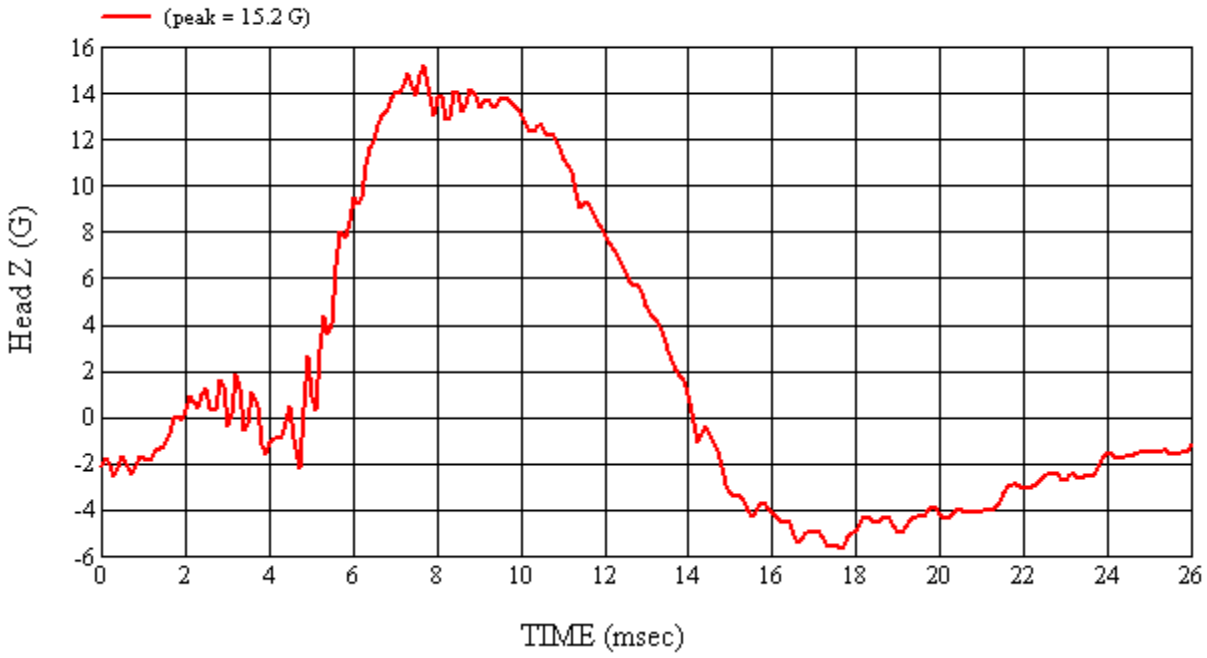
MGA Test #: U11278 Target Location: UR4, Left Side Test Date: 6/30/2011

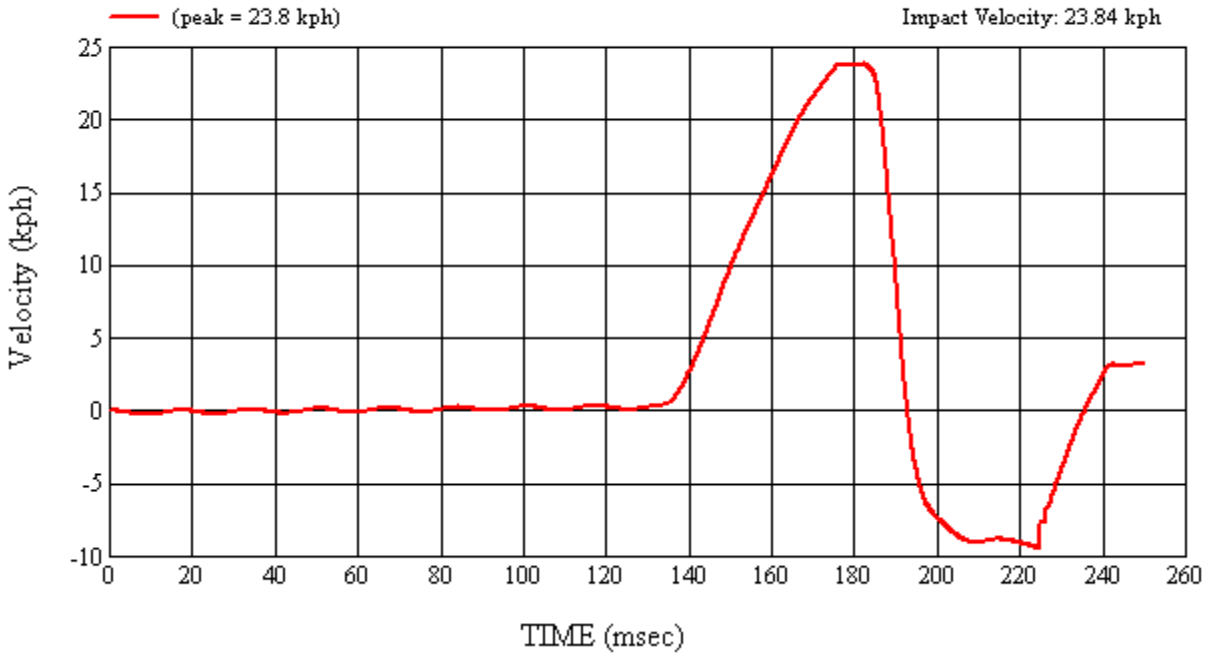


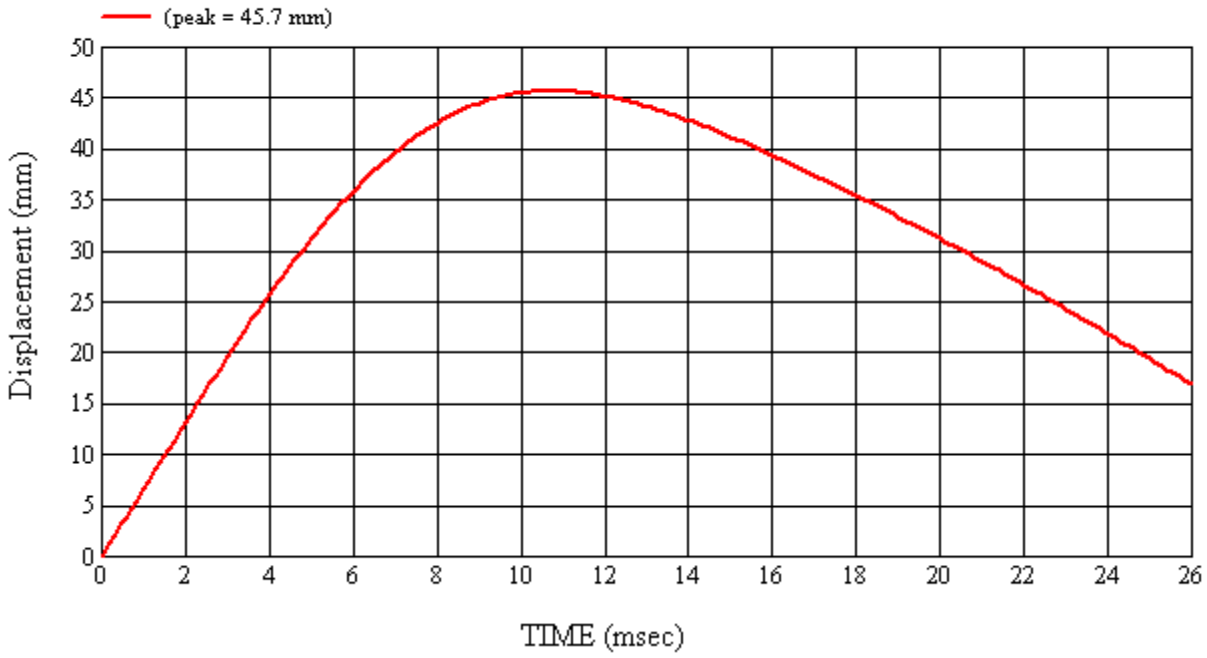


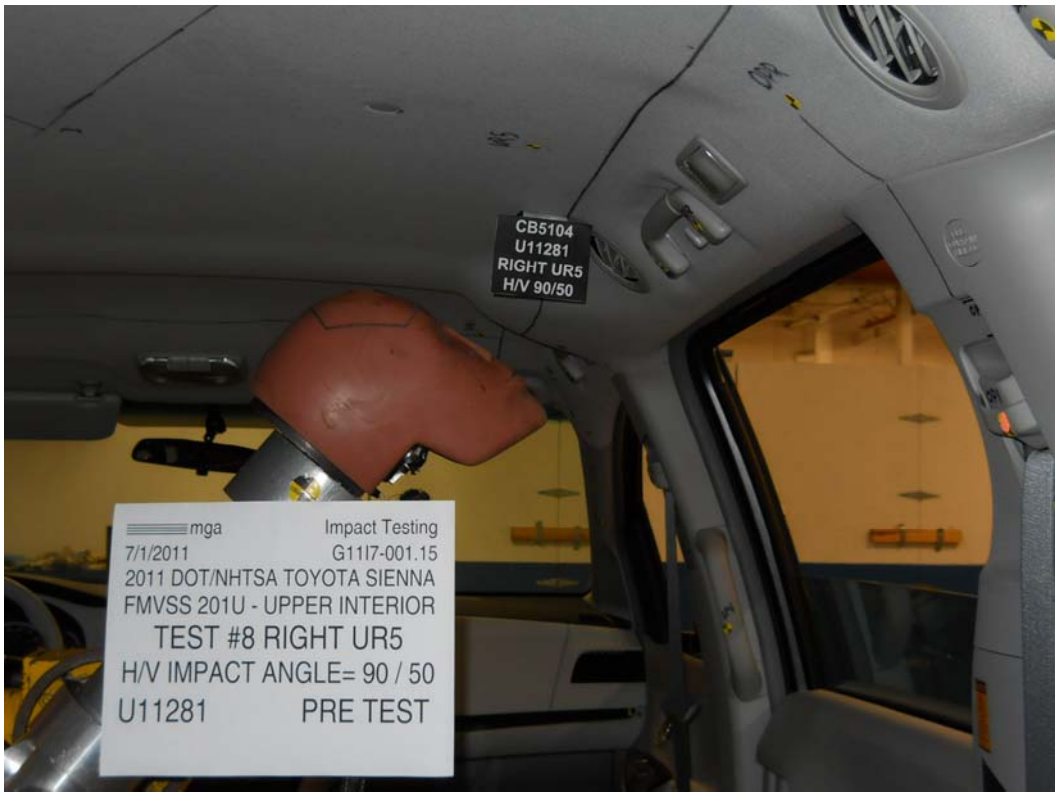

(peak = 101.5 G)
Head X (G)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

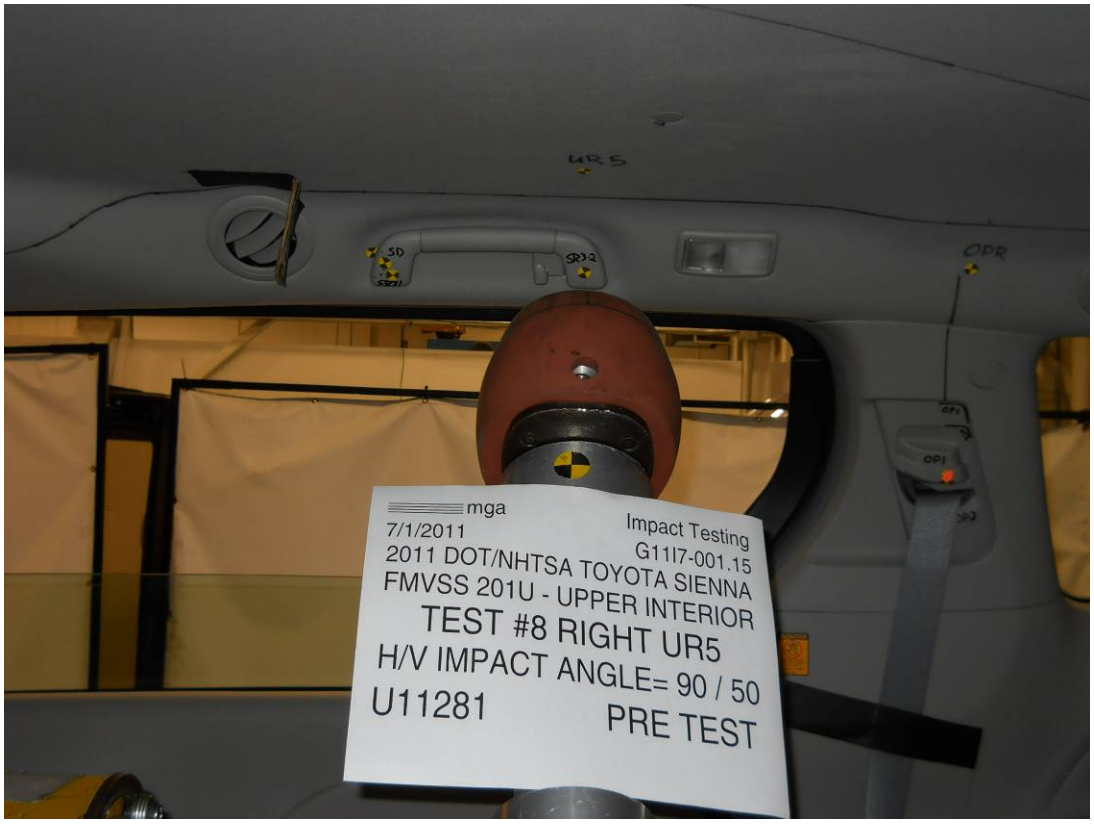

(peak = 8.8 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 15.2 G)
Head Z (G)
16
14
12
10
8
6
4
2
0
-2
-4
-6
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

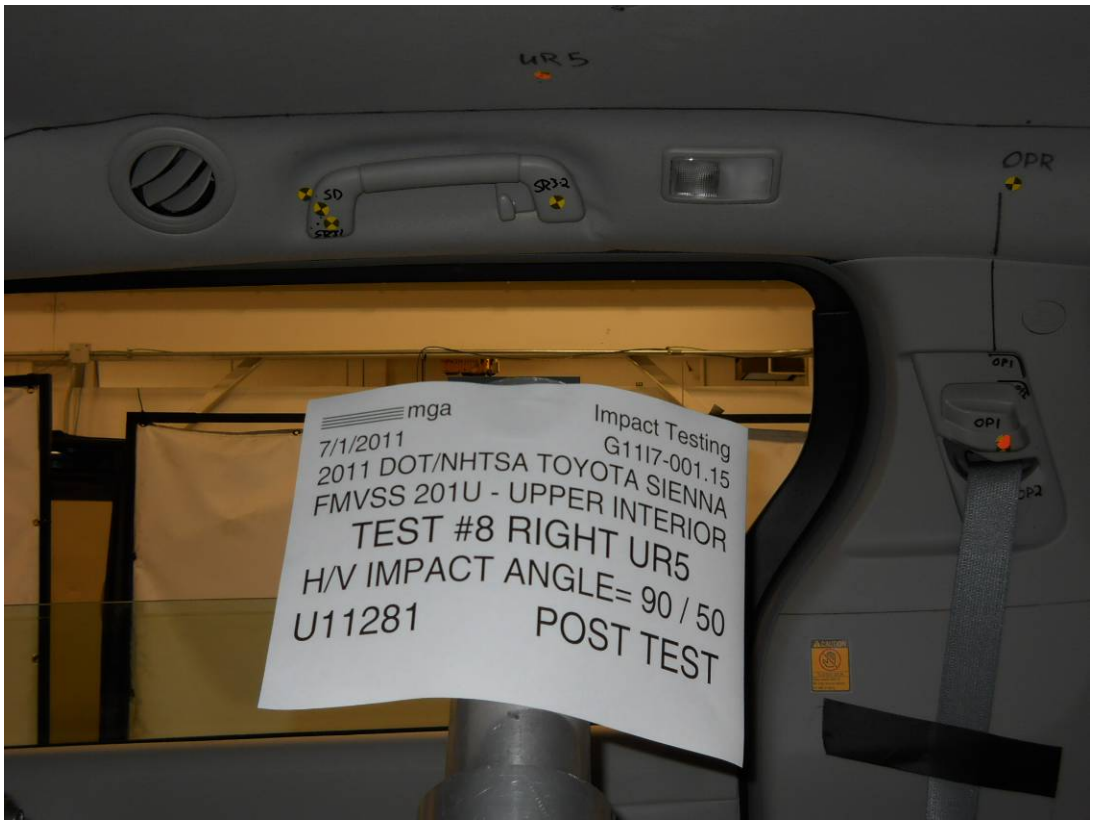

(peak = 23.8 kph)
Impact Velocity: 23.84 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 45.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


CB5104
U11281
RIGHT UR5
H/V 90/50
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT UR5
H/V IMPACT ANGLE= 90 / 50
U11281
PRE TEST


UR 5
SD
SR12
ODR
OP1
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT UR5
H/V IMPACT ANGLE= 90 / 50
U11281
PRE TEST


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT UR5
H/V IMPACT ANGLE= 90 / 50
U11281
POST TEST


UR5
OPR
SD
SR1
SR2
OP1
mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT UR5
H/V IMPACT ANGLE= 90 / 50
U11281
POST TEST


UR5


mga
Impact Testing
7/1/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT UR5
H/V IMPACT ANGLE= 90 / 50
U11281
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR5Right

MGA Test Reference No.:U11281

Approach Horizontal Angles:90º

Approach Vertical Angles:50º

Additional Description:@SR3-2

Test Number:#8

Temperature:21.8C

Humidity:56.8%

Time of Test:9:49:49 AM

FMH Serial No:[038]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
647	637	7.5	23.6	22	2 Right

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

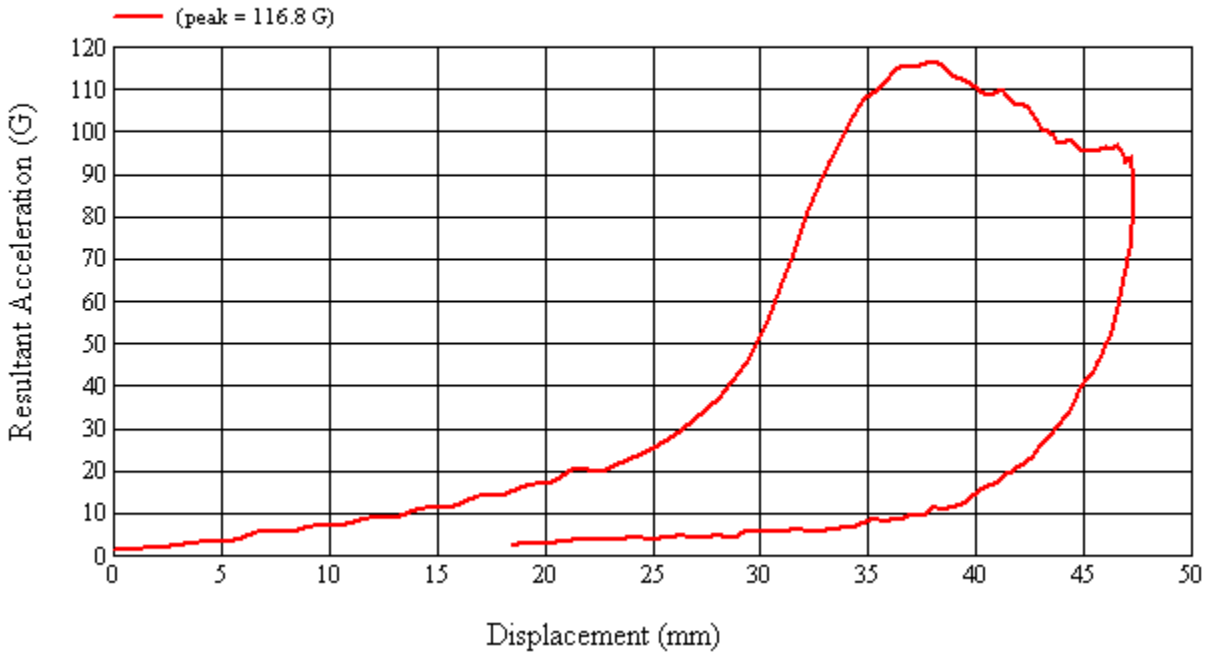
Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.08	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.93	0.94

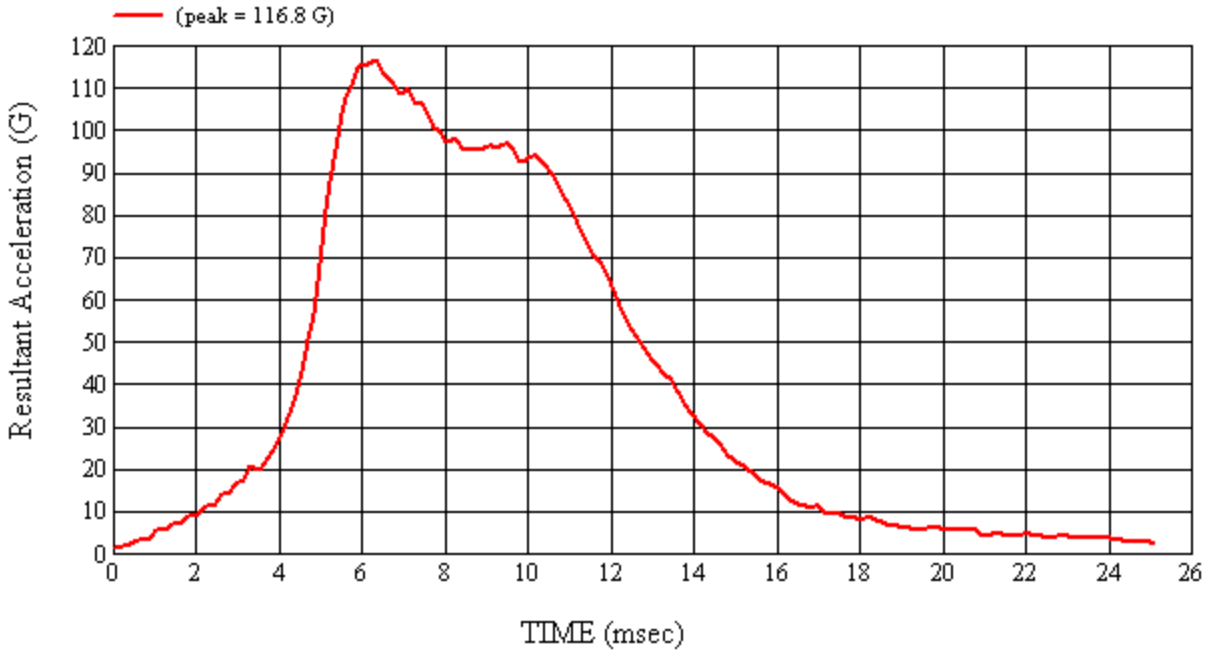
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

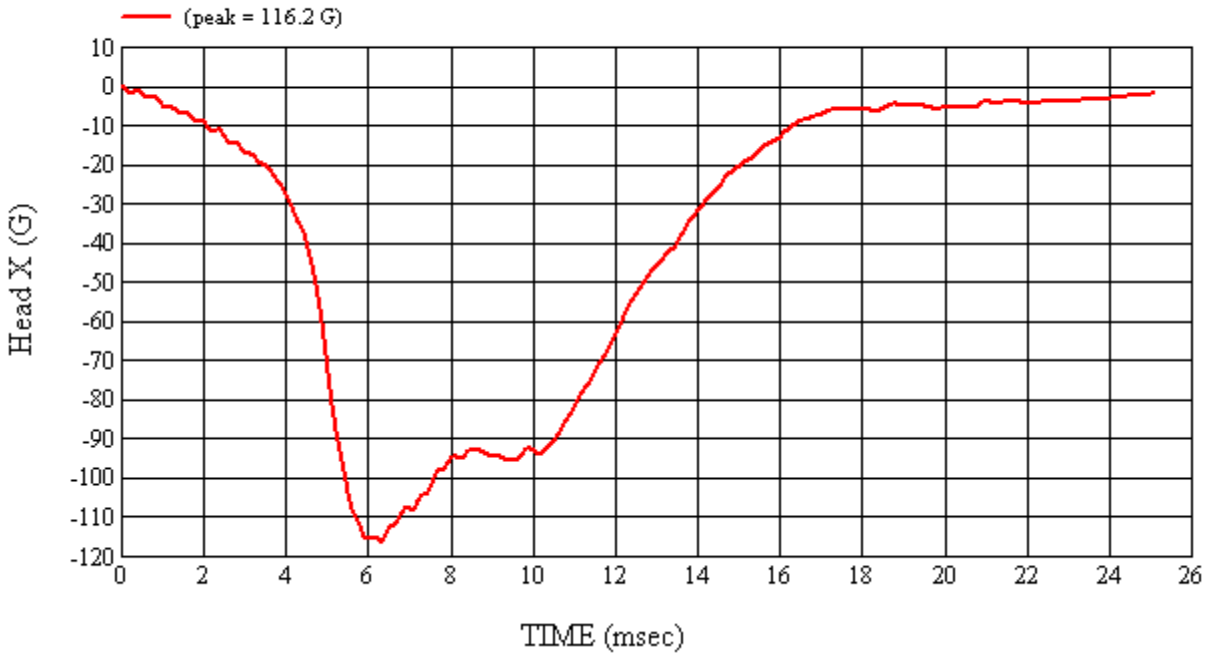
Headliner deformation

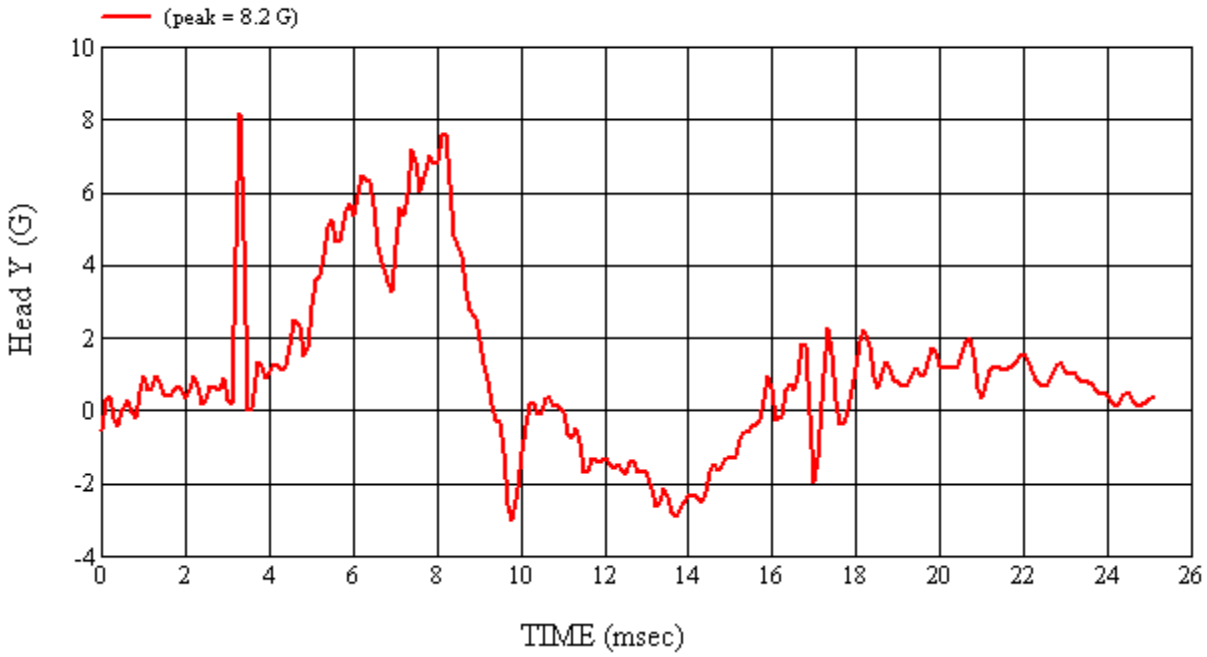
Recorded By: _____ Approved By*: _____ Date: 7/1/2011
*Only necessary for NHTSA (Government) Compliance testing.

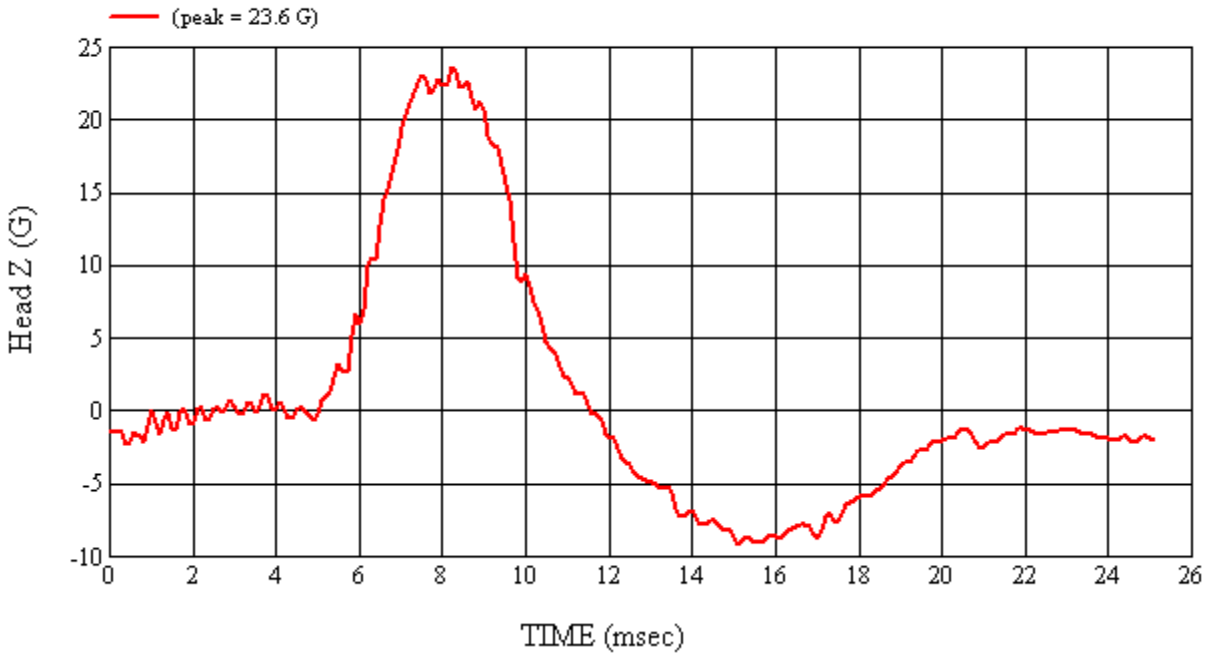
MGA Test #: U11281 Target Location: UR5, Right Side Test Date: 7/1/2011

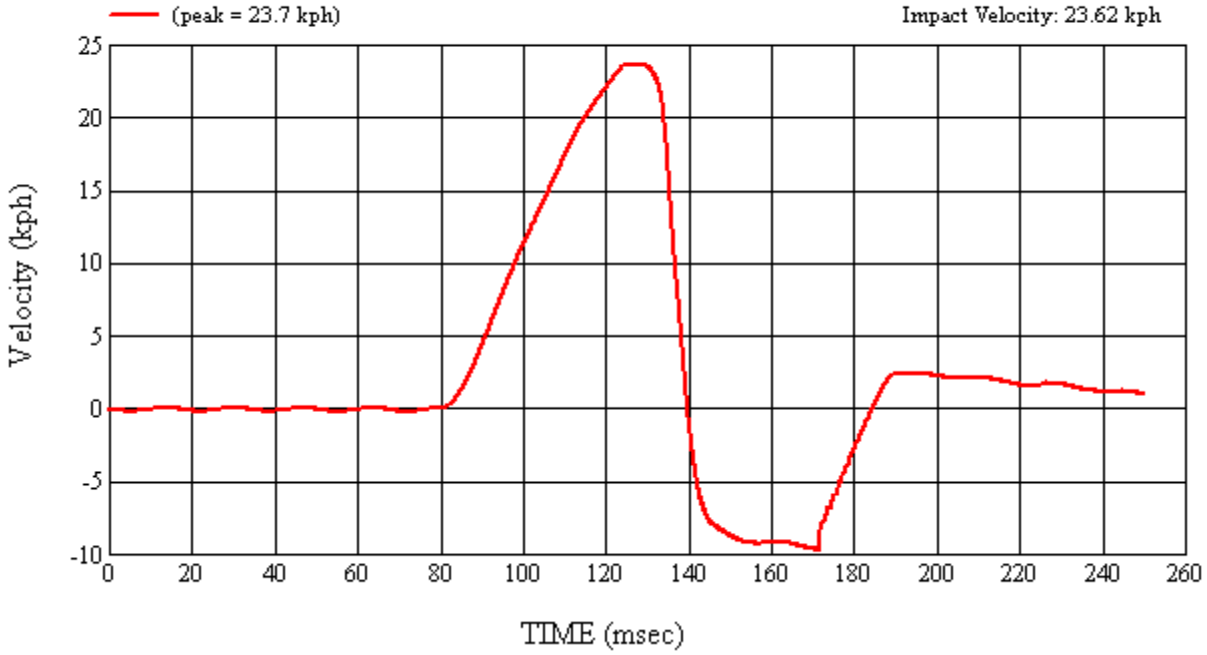


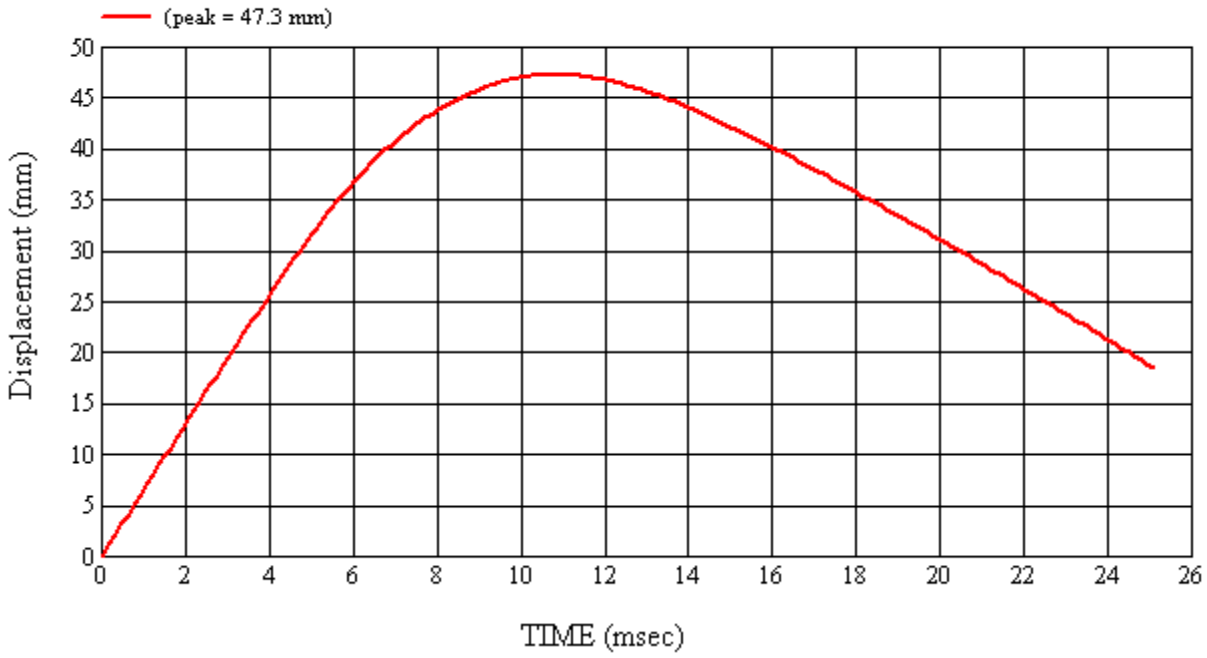



(peak = 116.2 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 8.2 G)
Head Y (G)
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 23.6 G)
Head Z (G)
25
20
15
10
5
0
-5
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 23.7 kph)
Impact Velocity: 23.62 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 47.3 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

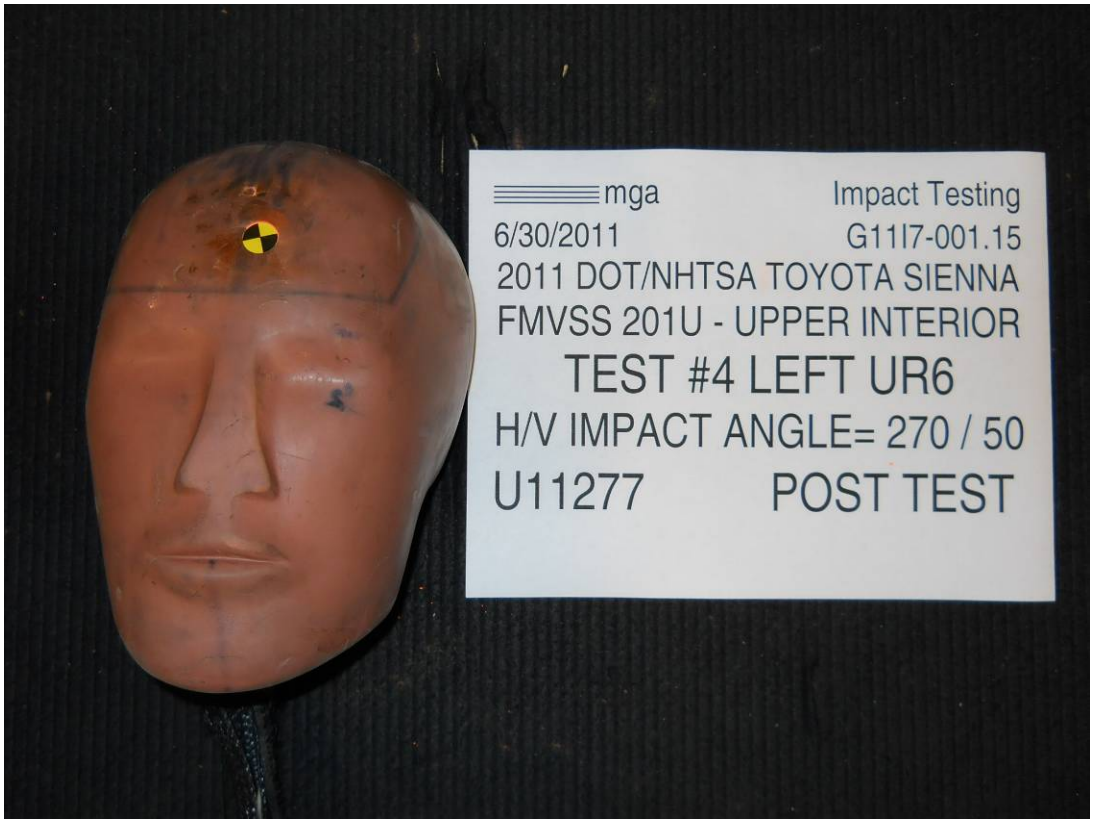

mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR6
H/V IMPACT ANGLE= 270 / 50
U11277
PRE TEST


OPR
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR6
H/V IMPACT ANGLE= 270 / 50
U11277
PRE TEST


CB5104
U11277
LEFT UR6
H/V 270/50
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR6
H/V IMPACT ANGLE= 270 / 50
U11277
POST TEST


CB5104
U11277
LEFT UR6
H/V 270/50
mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR6
H/V IMPACT ANGLE= 270 / 50
U11277
POST TEST


UR6


mga
Impact Testing
6/30/2011
G11I7-001.15
2011 DOT/NHTSA TOYOTA SIENNA
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR6
H/V IMPACT ANGLE= 270 / 50
U11277
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.15 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Toyota Sienna

GENERAL TEST PARAMETERS:

Test Number:#4

Target (Vehicle Side): UR6Left

Temperature:23.1C

MGA Test Reference No.:U11277

Humidity:50.7%

Approach Horizontal Angles:270º

Time of Test:3:04:24 PM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:@ OP

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
653	645	7.2	24.0	21	5 Left

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.08	1.07
Y	6	J14103	93.9	0.82	0.85
Z	7	J35800	97.8	0.96	0.94

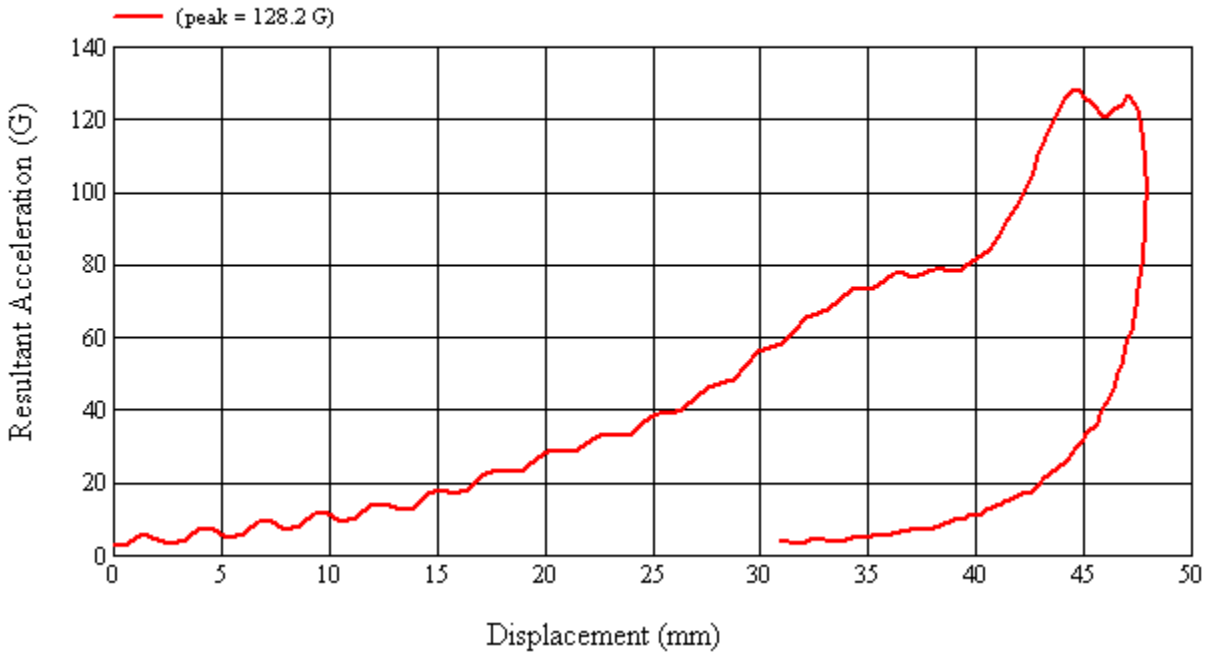
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

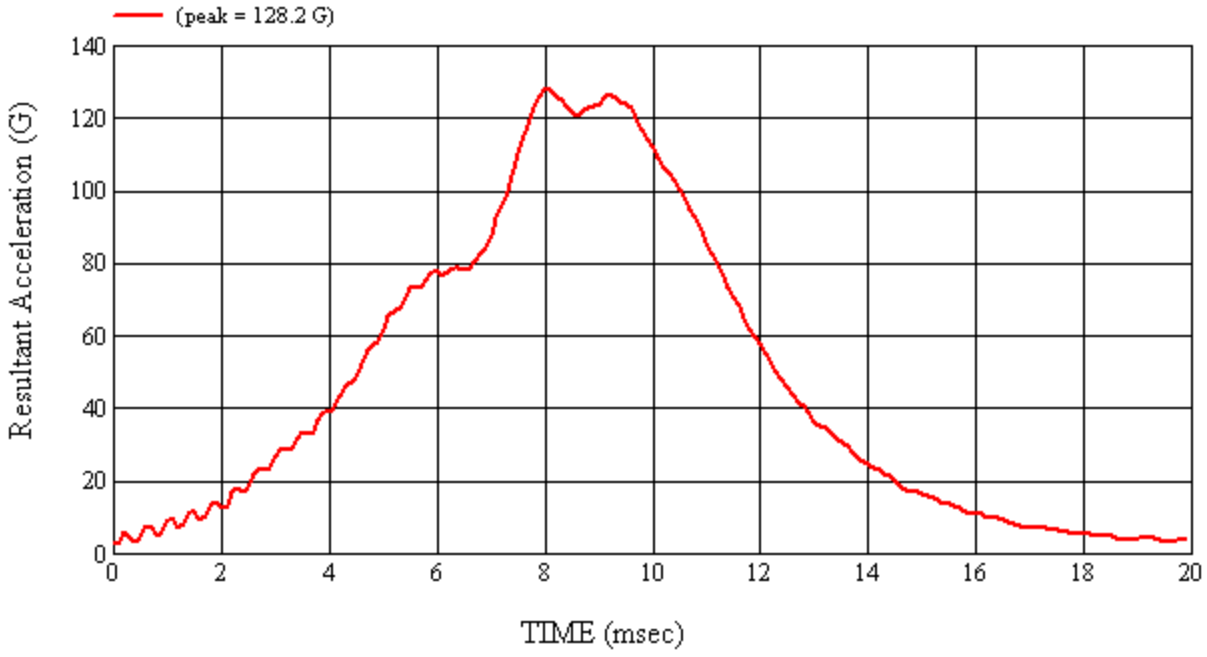
No visible damage

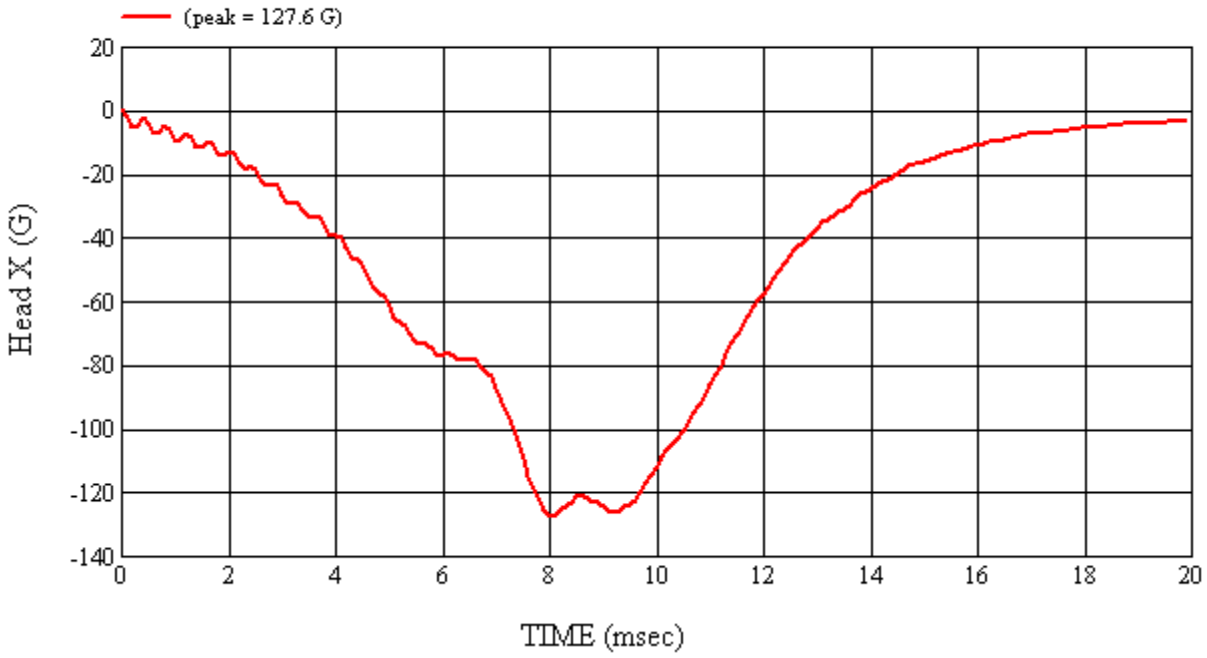
Recorded By: _____ Approved By*: _____ Date: 6/30/2011

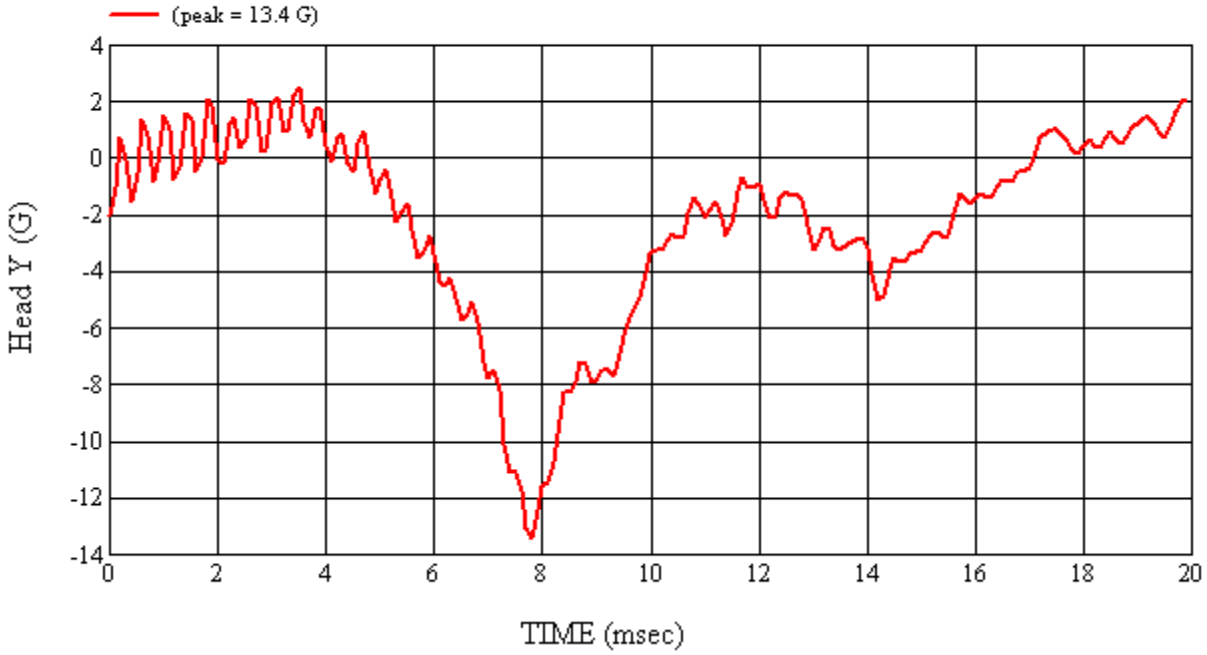
*Only necessary for NHTSA (Government) Compliance testing.

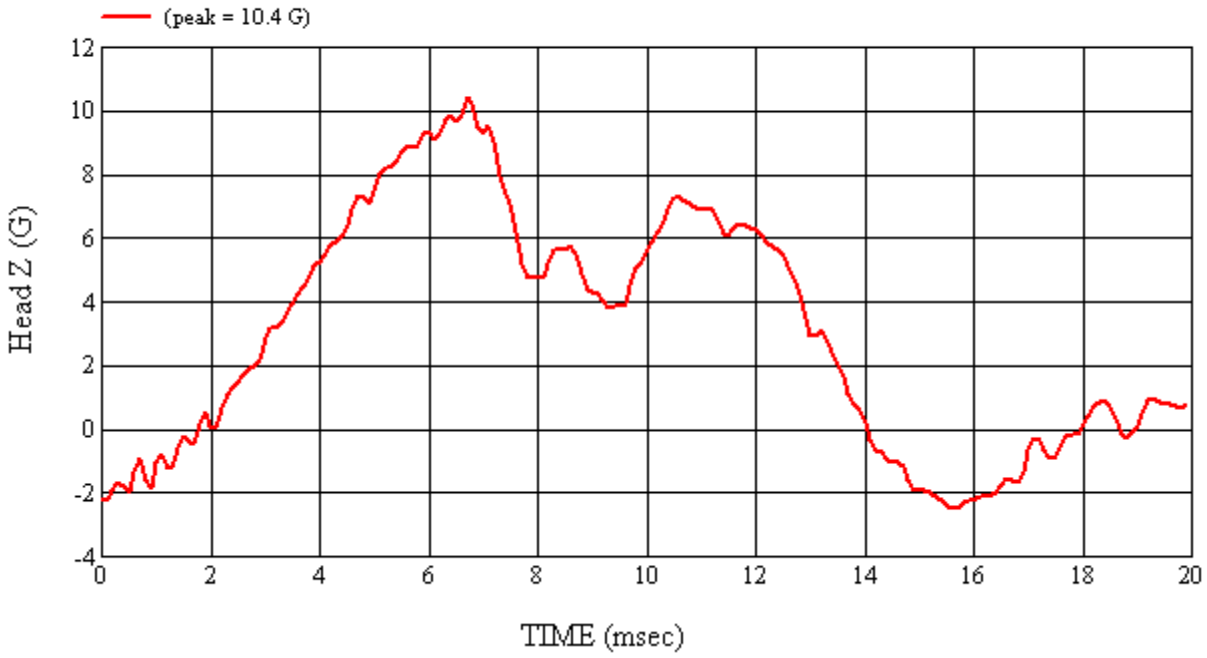
MGA Test #: U11277 Target Location: UR6, Left Side Test Date: 6/30/2011

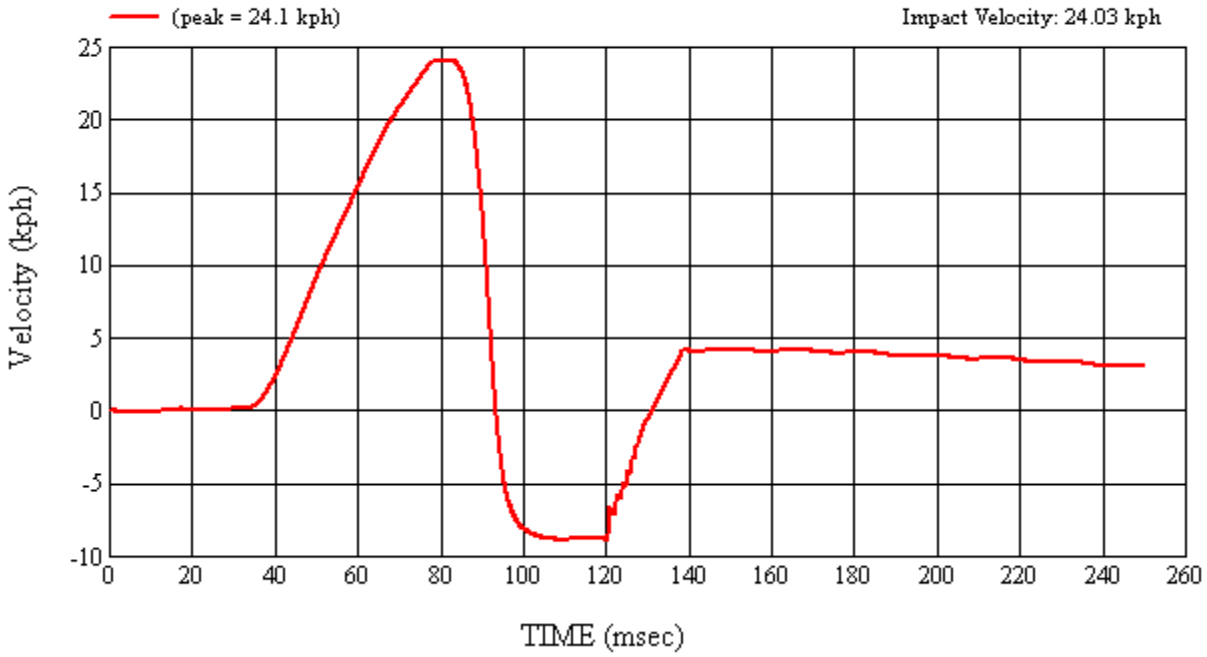


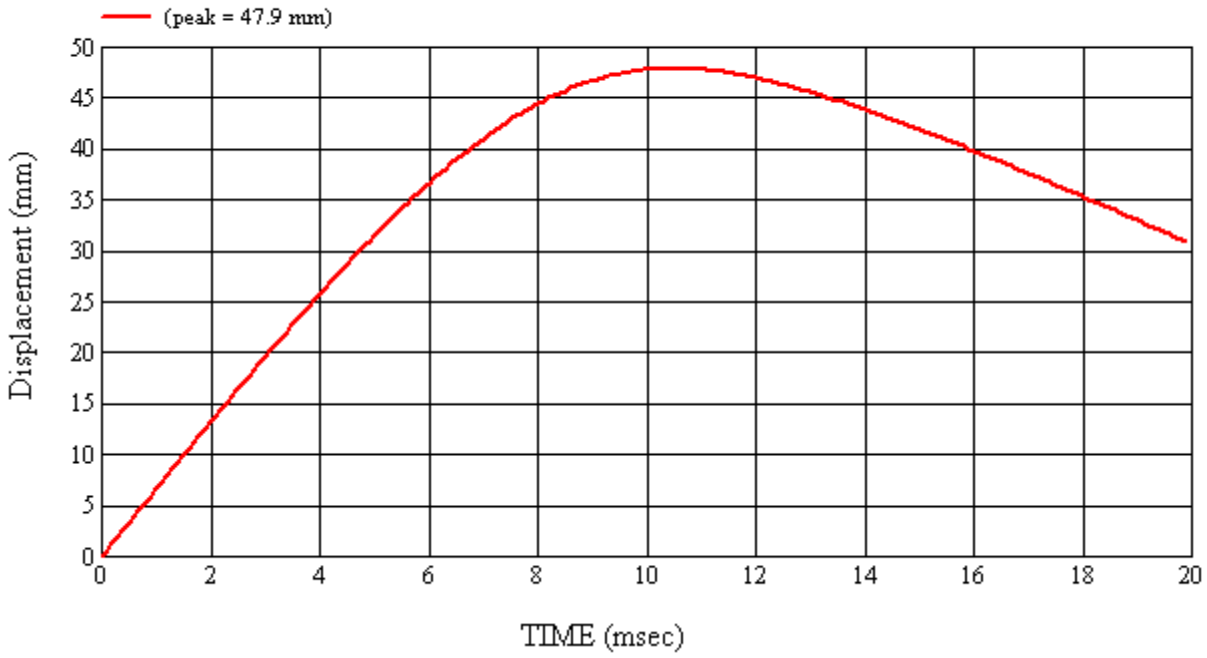



(peak = 127.6 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 13.4 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 10.4 G)
Head Z (G)
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 24.03 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 47.9 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the compliance test series. Items marked with an asterisk are calibrated by an external lab. An additional summary table is given for the pre and post-test calibration data for the Free Motion Headforms. The temperature trace to confirm testing was conducted between 66ºF and 78ºF (19ºC – 26ºC) is included in Appendix A. Calibration certificates can be found in Appendix B.

TABLE 4-1 LIST OF ITEMS USED

ITEM	MANUFACTURER NAME	MODEL #	FUNCTION OF ITEM	ACCURACY	CAL. INTERNAL
Head Drop Tower (includes test frame and DAS)	MGA Research Corp.	MGA-100-DC	FMH Calibration	N/A	N/A
Accelerometers	Endevco	7264-2000	Acceleration Data	±0.5%	6 months
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Vision Research	Miro Ex4	Record Event	N/A	N/A
*FARO™	Faro Technologies	S08059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Digital Protractor	 Stanley N/A Mitutoyo	 TPM112 -- MGA00049	 Measurement Targeting FMH setup Horizontal Measurement	 1 mm N/A 0.5°	Annual
*Temperature Recorder	Dickson	MGA00894	Record Temperature and Humidity	± 1°C ± 1% RH	Annual
* Scale	Detecto	MGA00081	Weigh FMH Head	± 0.01 lb	Annual
*Vehicle Scale	Intercomp	26032389	Weighing Vehicle	± .5 kg	Annual

Each headform was calibrated by an engineer after the headform had soaked in an environment of 66ºF to 78ºF (19ºC to 26ºC) for a period of at least four hours.

Each headform was found to comply with the performance criteria under Part 572L for pre and post-test calibrations. That is, the peak resultant acceleration was between 225 and 275 G's, the peak lateral acceleration was less than 15 G's, the headform weighed between 9.9 and 10.1 lbs., the pulse was determined to be unimodal, and there was no major damage to the headform.

TABLE 4-2 FMH CALIBRATION SUMMARY

FMH Serial #		Headform Calibration Date	Weight (lbs)	Temp (ºC)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#035	6/28/2011	9.90	22.0	64.1	250.2	5.9	Yes
Post	#035	7/5/2011	9.90	21.5	56.5	252.6	5.7	Yes
Pre	#037	6/28/2011	9.96	21.8	63.7	262.4	7.2	Yes
Post	#037	7/5/2011	9.96	21.5	56.3	263.3	7.9	Yes
Pre	#038	6/28/2011	9.90	21.9	58.0	268.6	12.7	Yes
Post	#038	7/5/2011	9.90	21.6	56.5	258.6	12.5	Yes

4-1 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

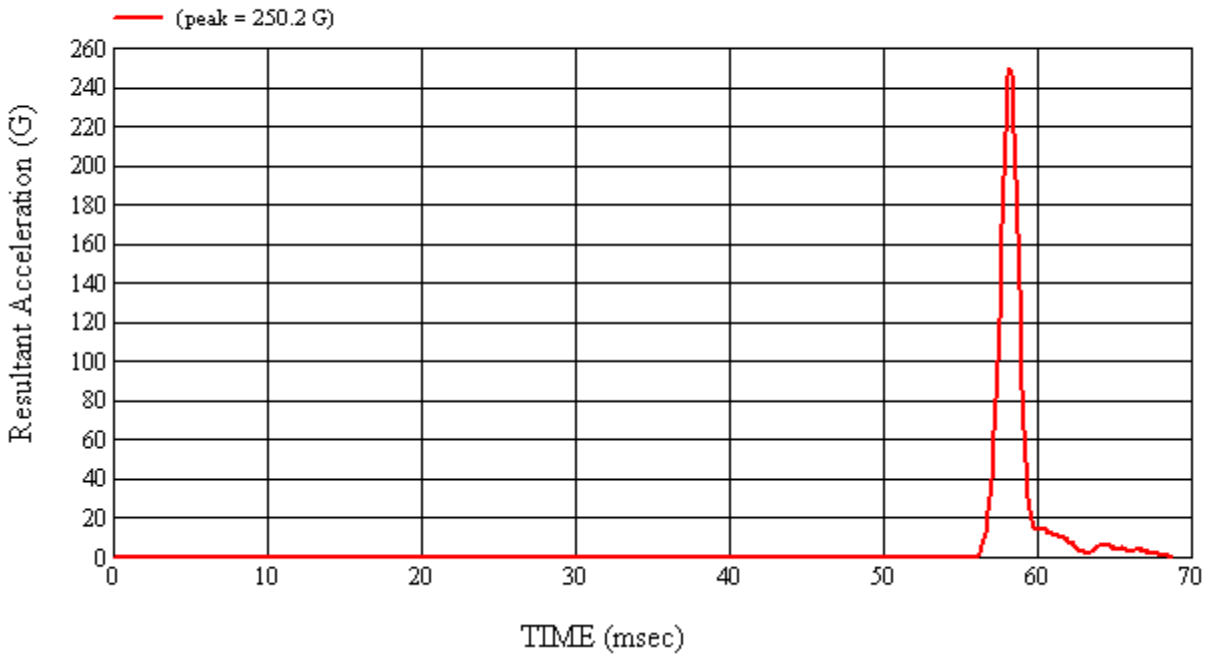
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 6/28/2011 CALIBRATION TIME: 9:15:52 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	22.0
Relative Humidity	10% to 70%	64.1
Peak Resultant Acceleration	225 G's to 275 G's	250.2
Peak Lateral Acceleration	15 G's Maximum	5.9
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35919	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J22664	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35924	02/04/11	08/04/11

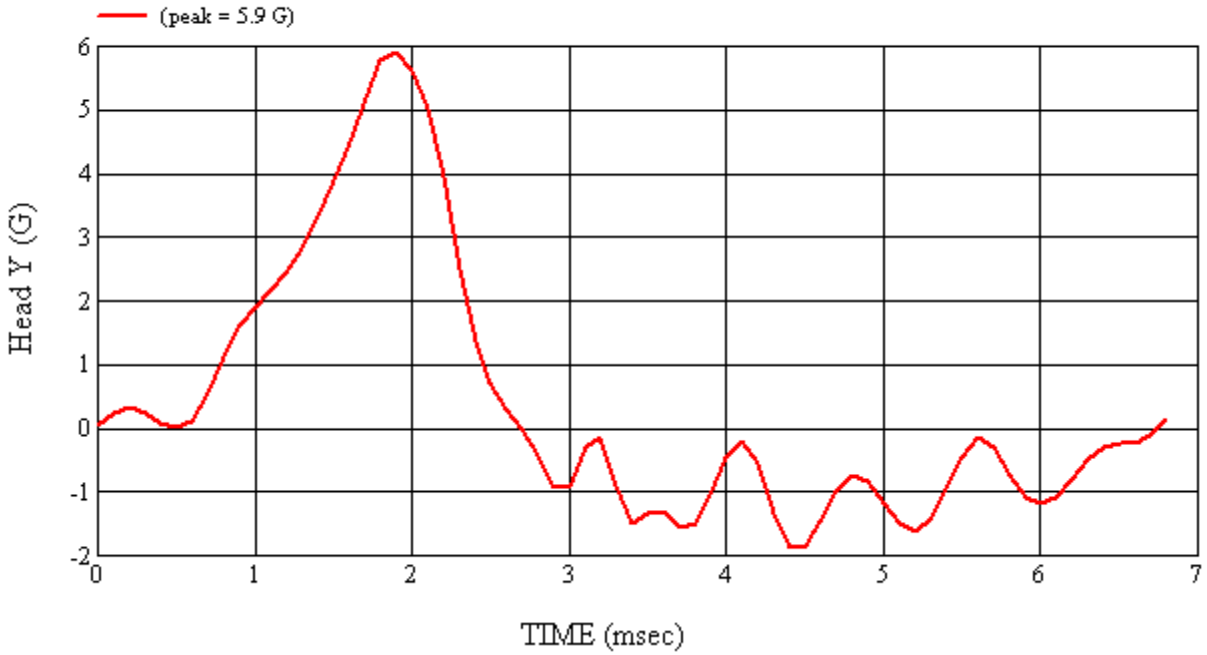
REMARKS:

RECORDED BY: _____ DATE: __6/28/2011____

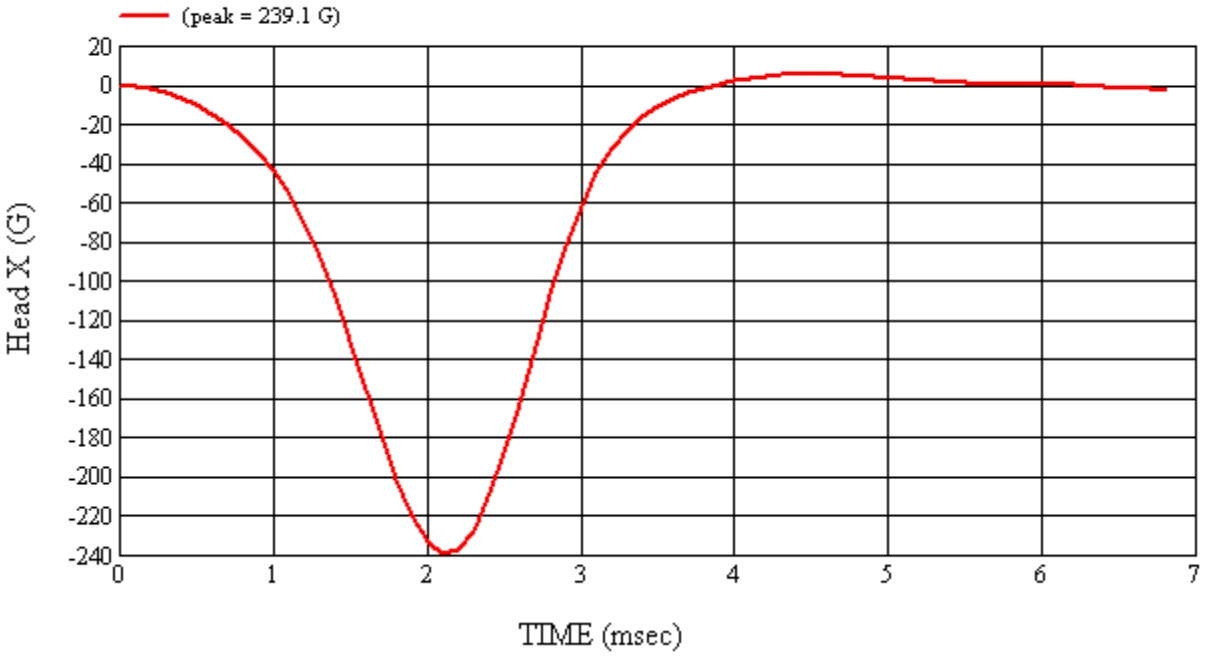
APPROVED BY: _____



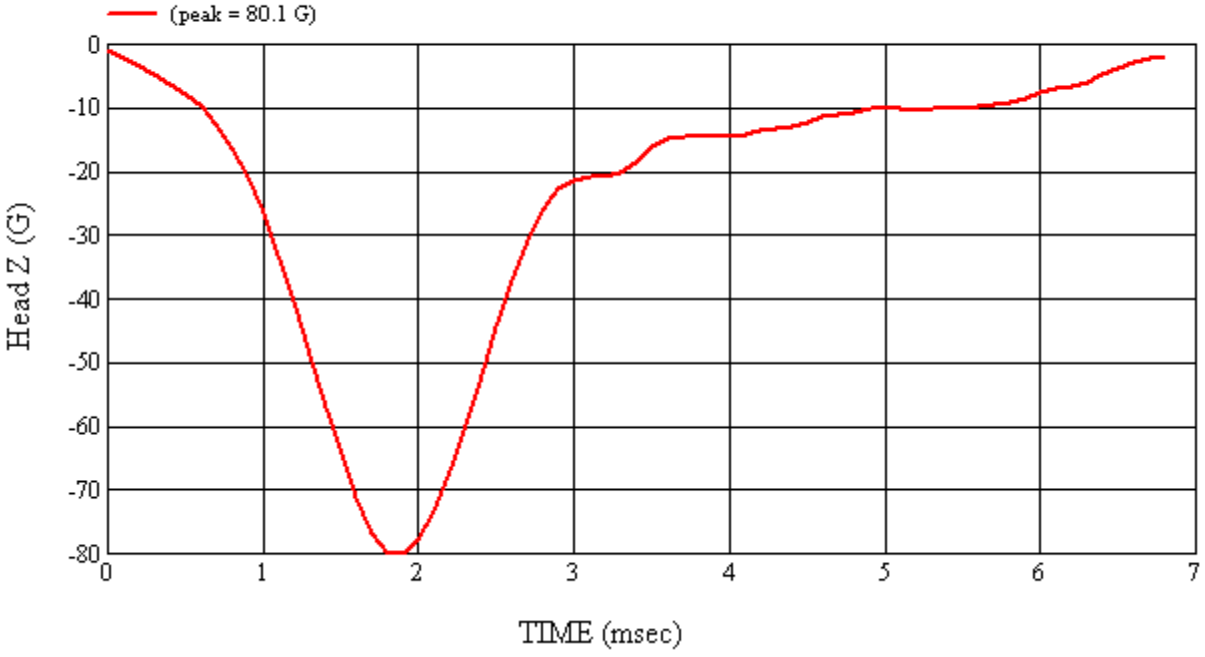
Head 035 (Pre) Calibration #H35035



Head 035 (Pre) Calibration #H35035



Head 035 (Pre) Calibration #H35035



Head 035 (Pre) Calibration #H35035

4-2 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

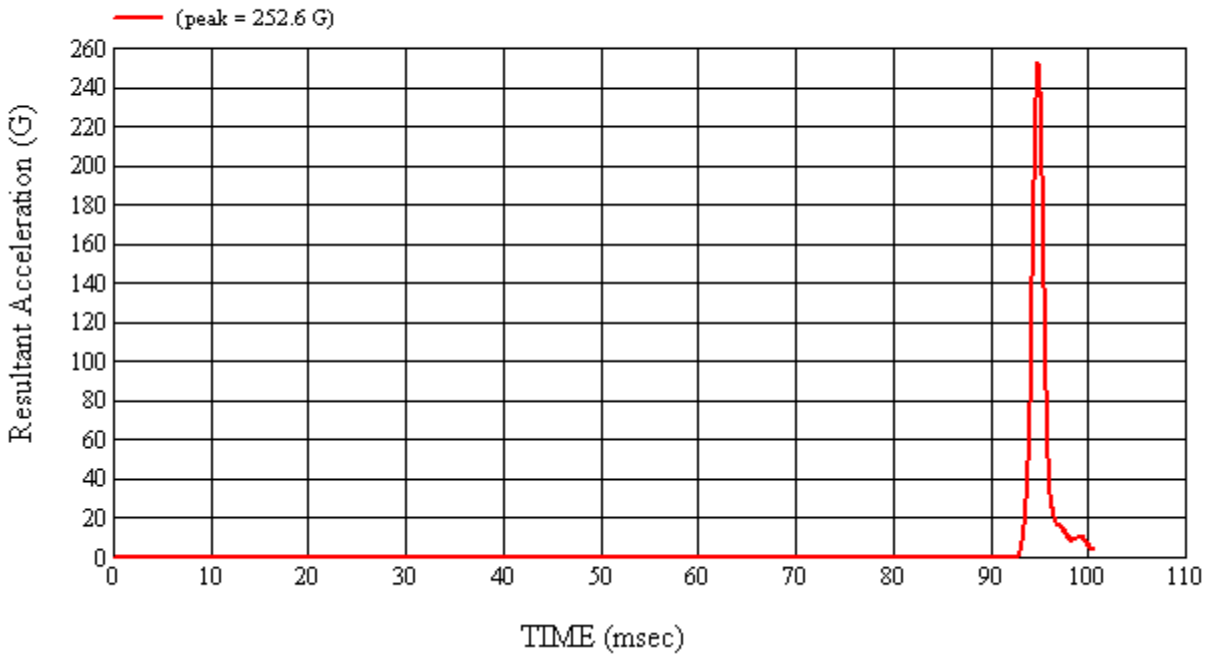
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 7/5/2011 CALIBRATION TIME: 9:26:12 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	21.5
Relative Humidity	10% to 70%	56.5
Peak Resultant Acceleration	225 G's to 275 G's	252.6
Peak Lateral Acceleration	15 G's Maximum	5.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35919	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J22664	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35924	02/04/11	08/04/11

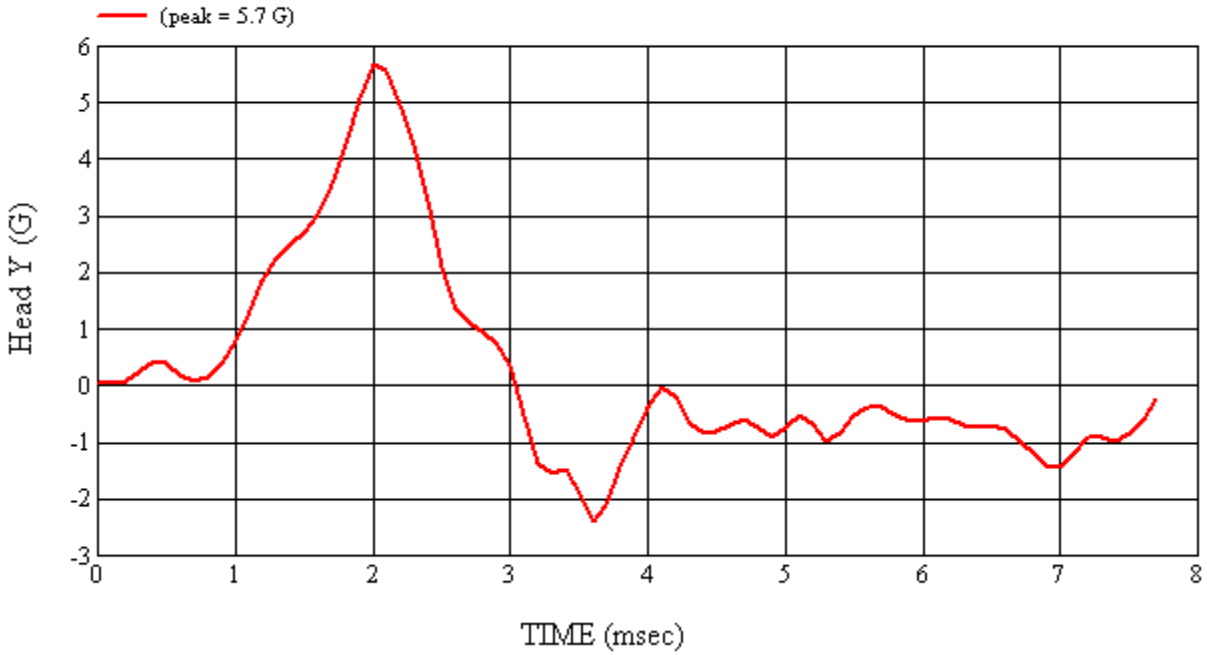
REMARKS:

RECORDED BY: _____ DATE: __7/5/2011____

APPROVED BY: _____



Head 035 (Post) Calibration #H35036



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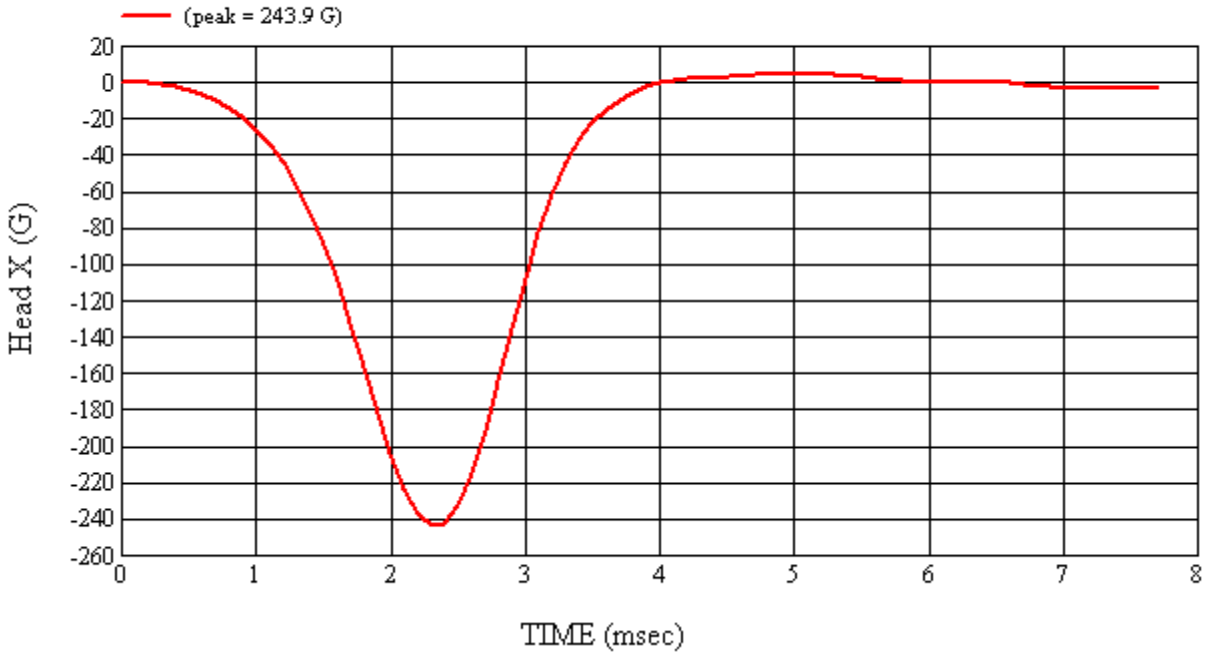
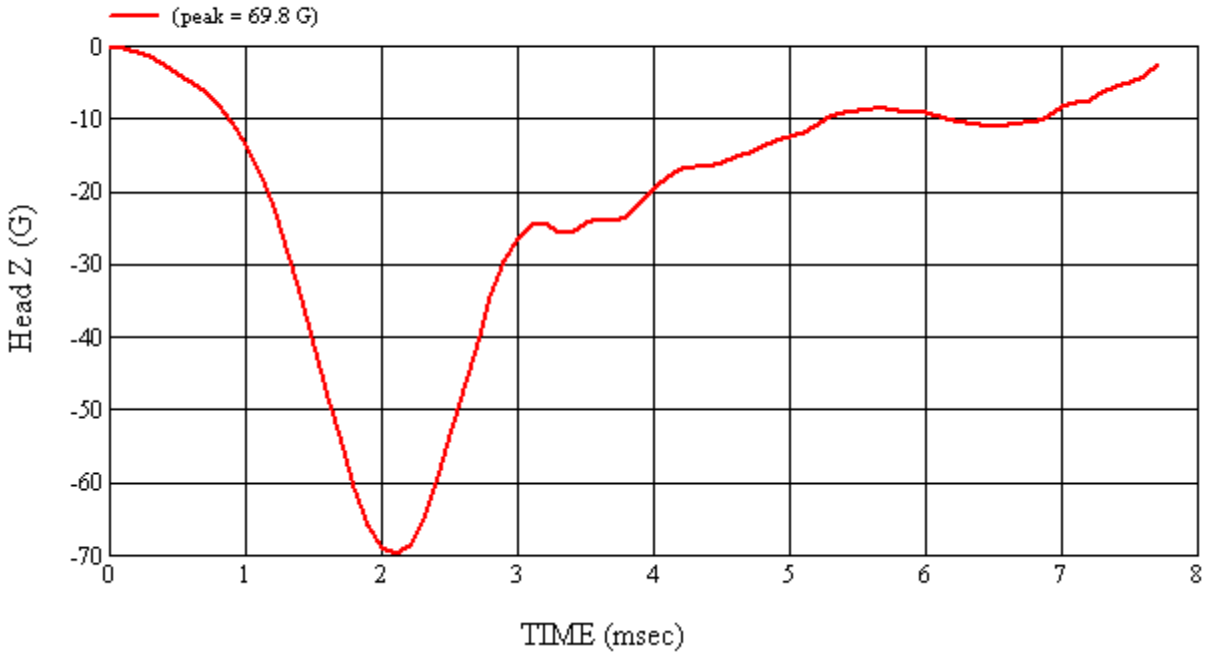


Head 035 (Post) Calibration #H35036



Head 035 (Post) Calibration #H35036

4-3 Pre-Test Calibration

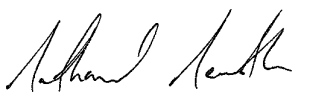
HEAD DROP TEST SUMMARY
PART 572L

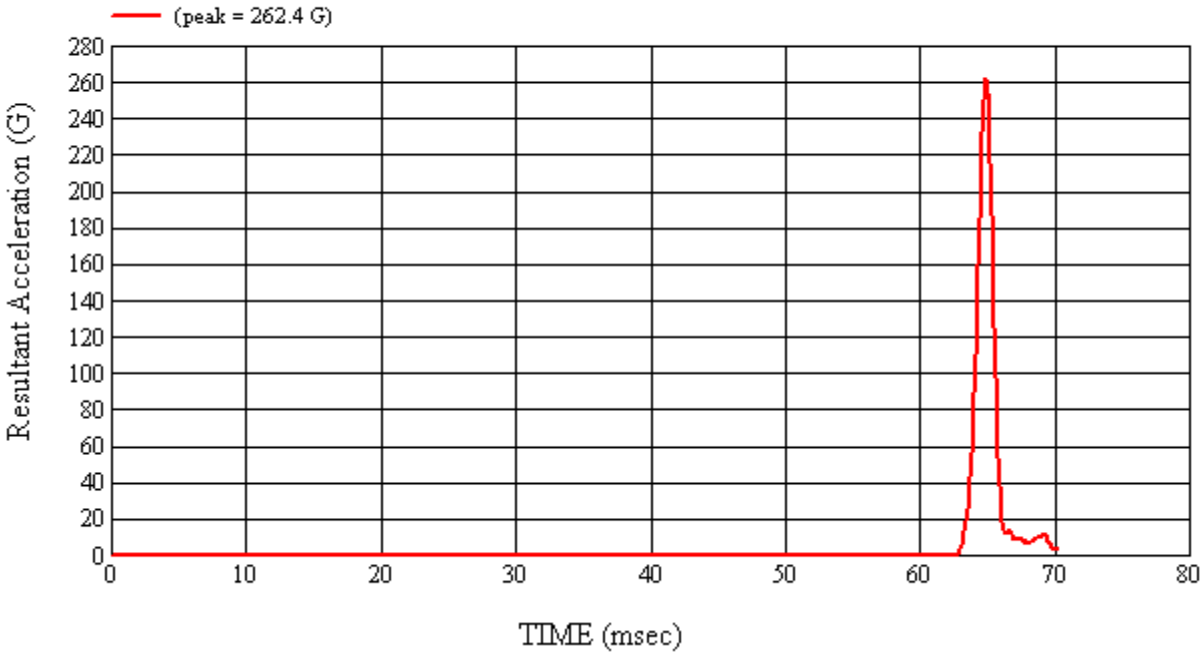
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 6/28/2011 CALIBRATION TIME: 9:38:47 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	21.8
Relative Humidity	10% to 70%	63.7
Peak Resultant Acceleration	225 G's to 275 G's	262.4
Peak Lateral Acceleration	15 G's Maximum	7.2
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J32177	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J14103	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35800	02/04/11	08/04/11

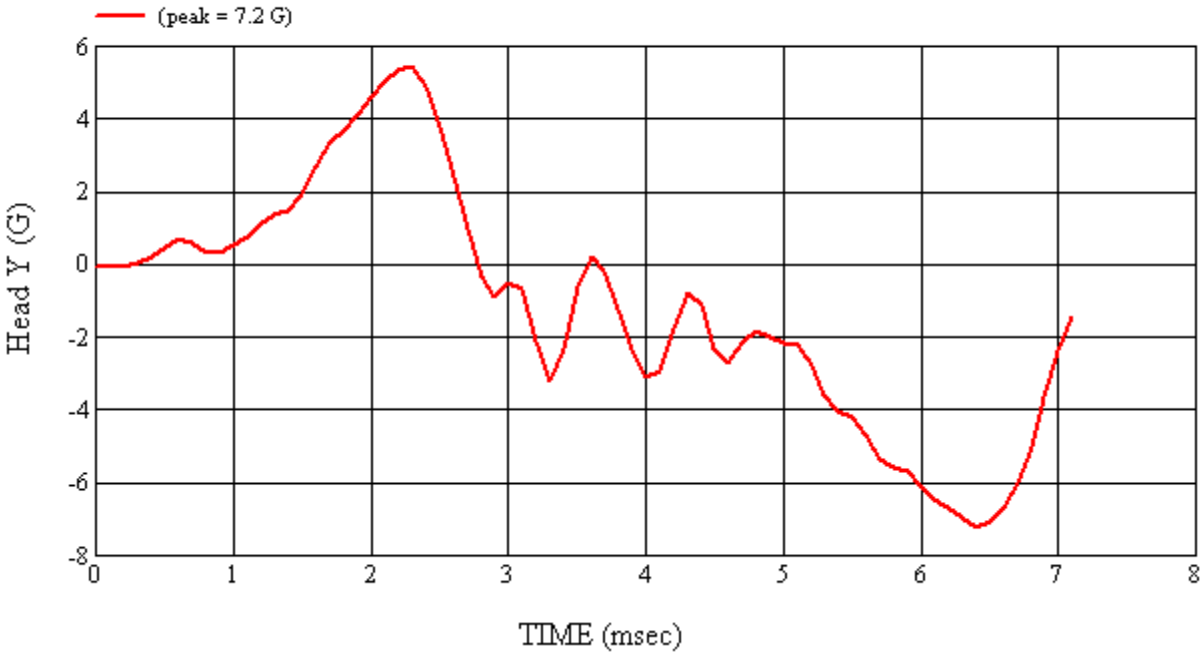
REMARKS:

RECORDED BY:  DATE: 6/28/2011

APPROVED BY: 



Head 037 (Pre) Calibration #H37035



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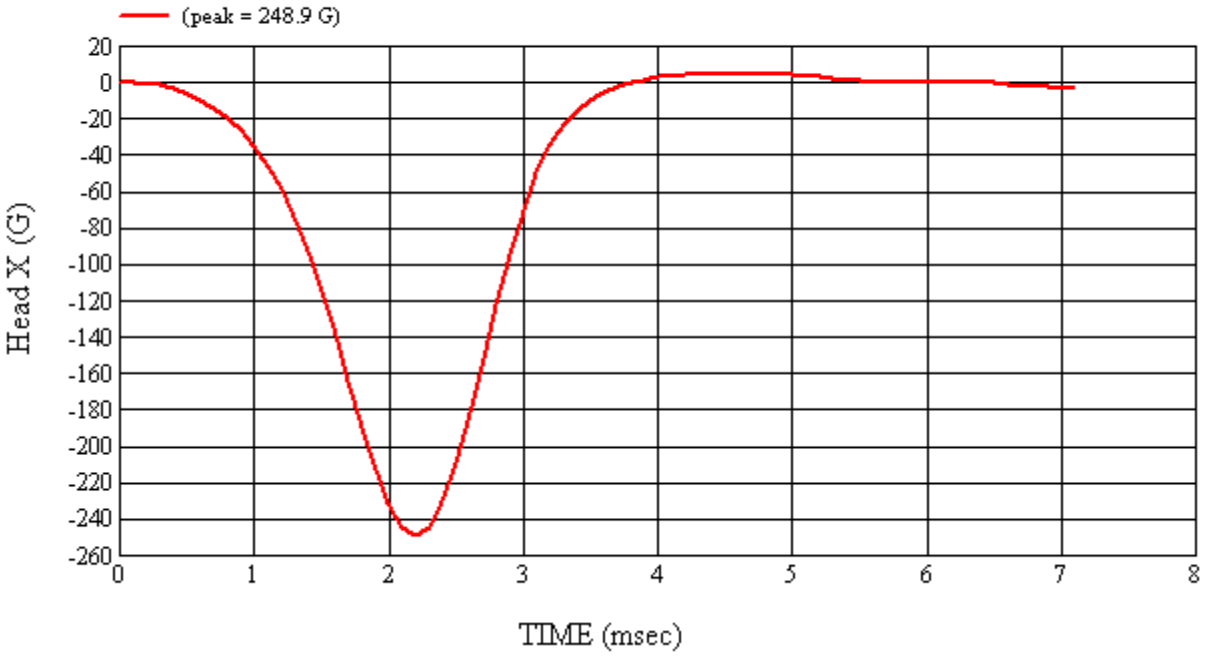

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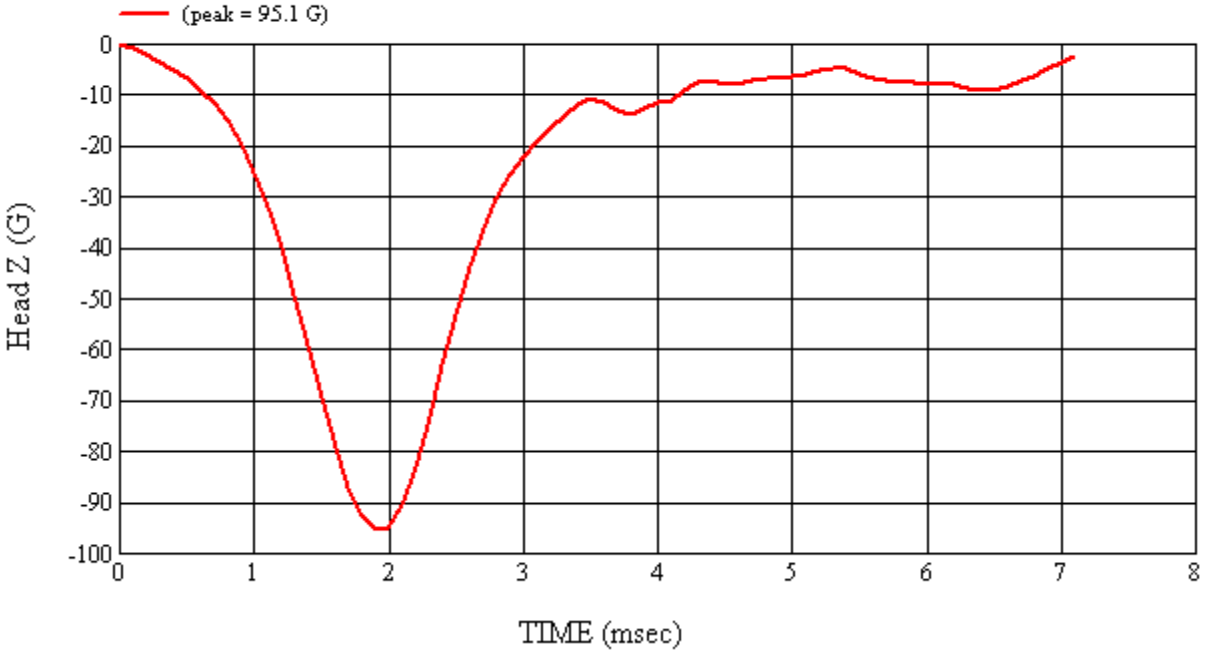


Head 037 (Pre) Calibration #H37035

4-4 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

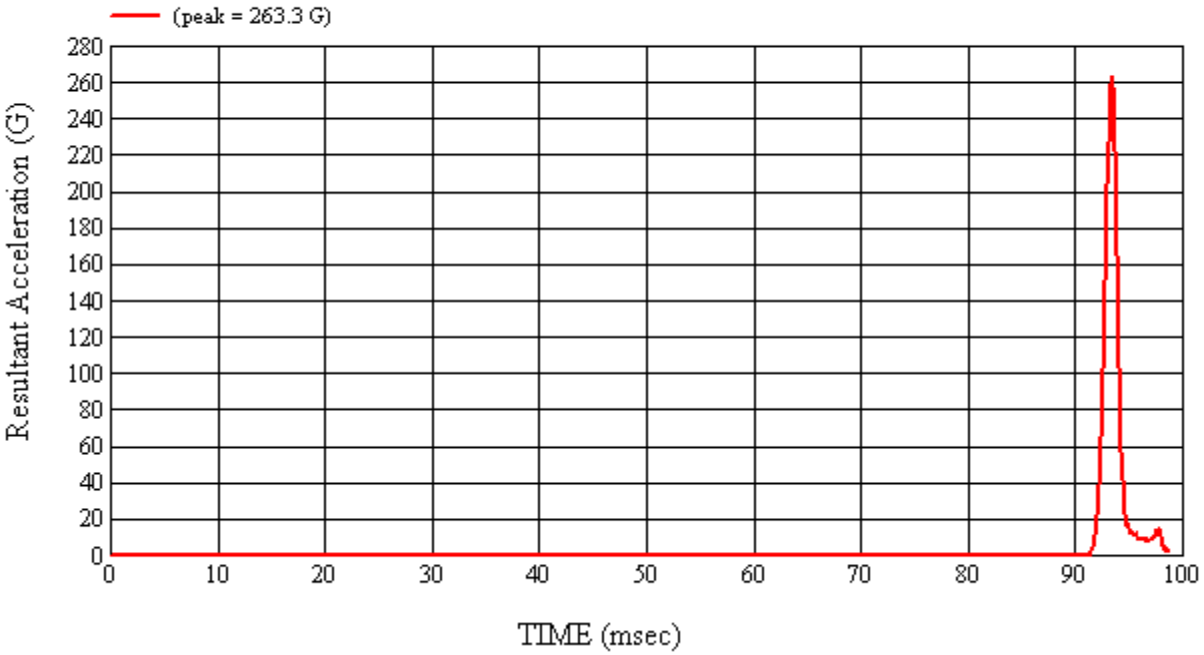
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 7/5/2011 CALIBRATION TIME: 8:59:36 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	21.5
Relative Humidity	10% to 70%	56.3
Peak Resultant Acceleration	225 G's to 275 G's	263.3
Peak Lateral Acceleration	15 G's Maximum	7.9
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J32177	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J14103	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35800	02/04/11	08/04/11

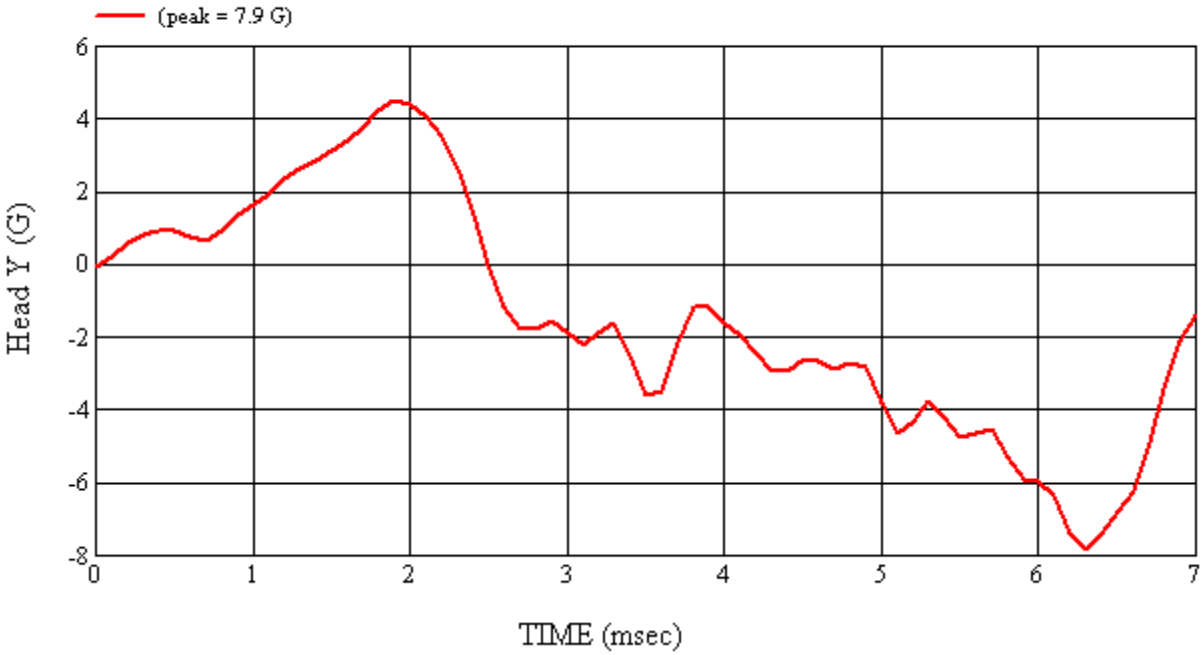
REMARKS:

RECORDED BY: _____ DATE: __7/5/2011____

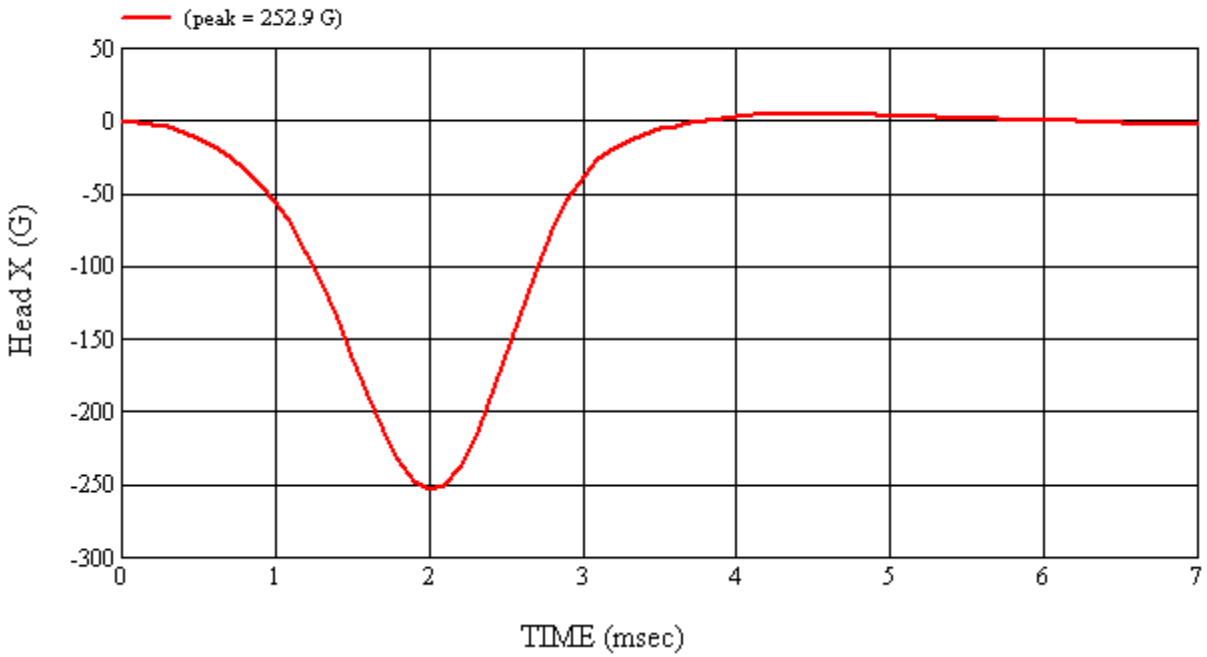
APPROVED BY: _____



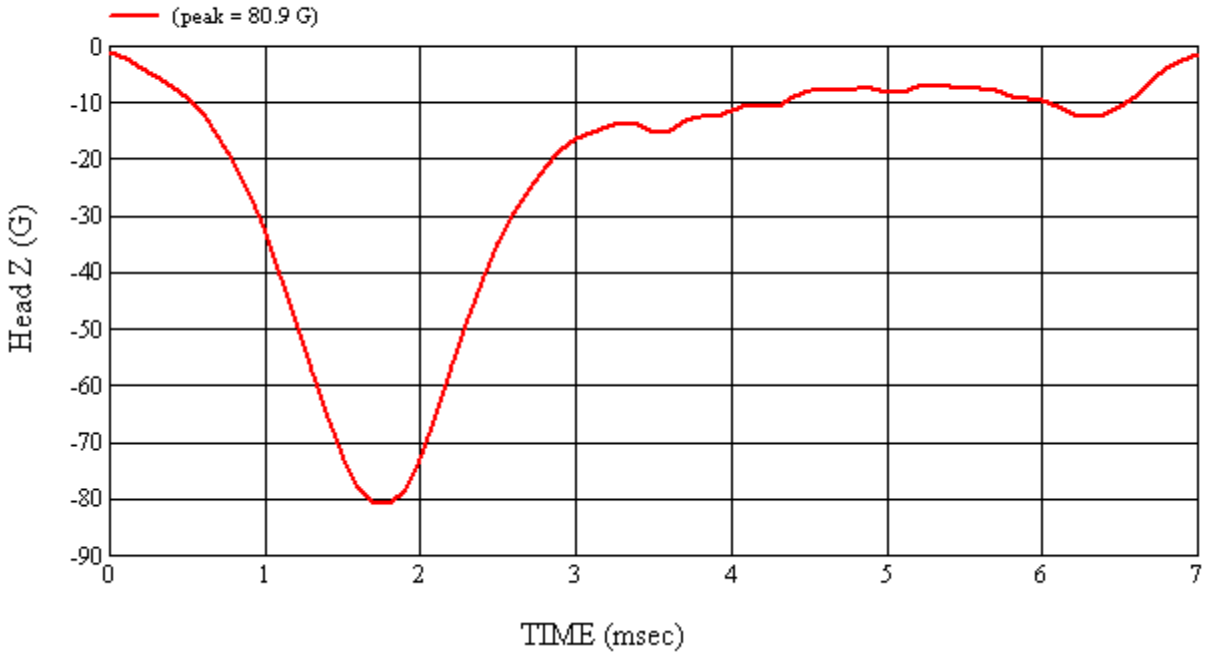
Head 037 (Post) Calibration #H37036



Head 037 (Post) Calibration #H37036



Head 037 (Post) Calibration #H37036



Head 037 (Post) Calibration #H37036

4-5 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

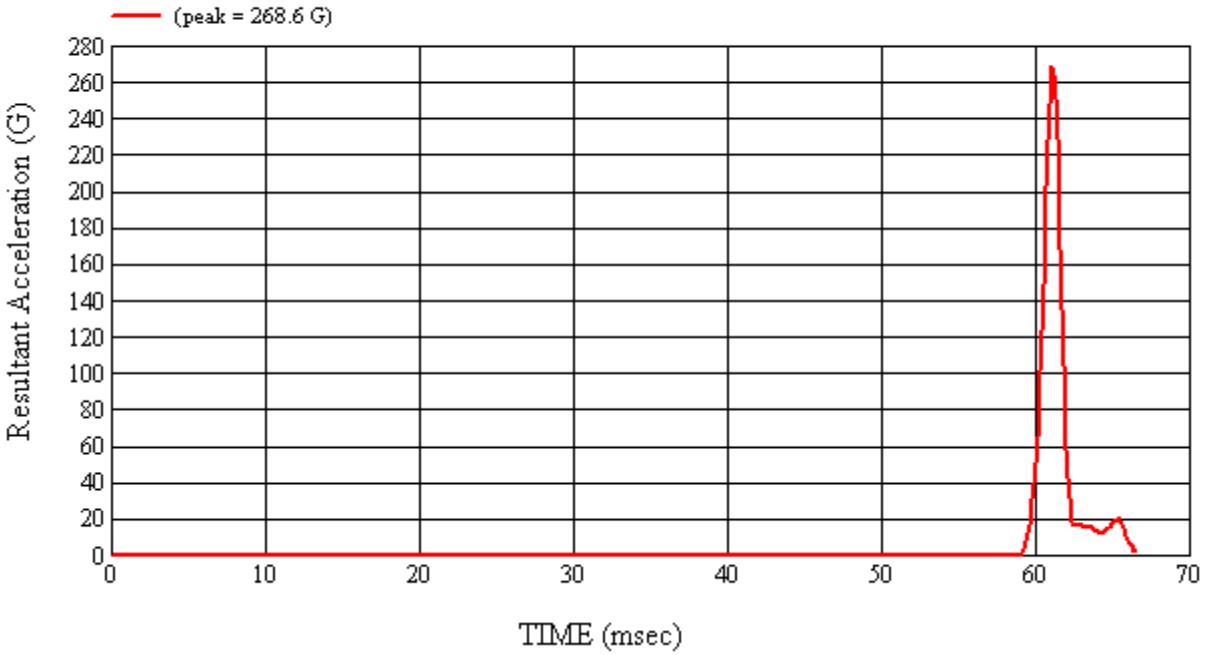
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 6/28/2011 CALIBRATION TIME: 10:05:39 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	21.9
Relative Humidity	10% to 70%	58.0
Peak Resultant Acceleration	225 G's to 275 G's	268.6
Peak Lateral Acceleration	15 G's Maximum	12.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J22700	02/07/11	08/07/11
2	ENDEVCO	7264-2000	J36197	02/07/11	08/07/11
3	ENDEVCO	7264-2000	J36353	02/07/11	08/07/11

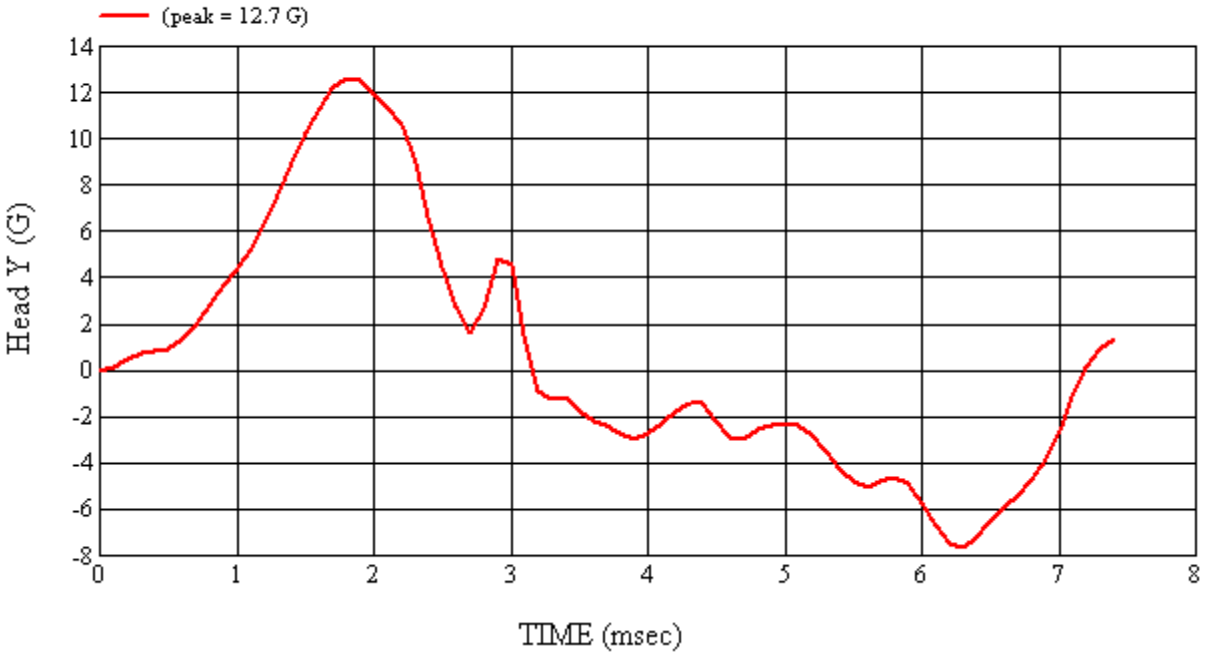
REMARKS:

RECORDED BY: _____ DATE: __6/28/2011____

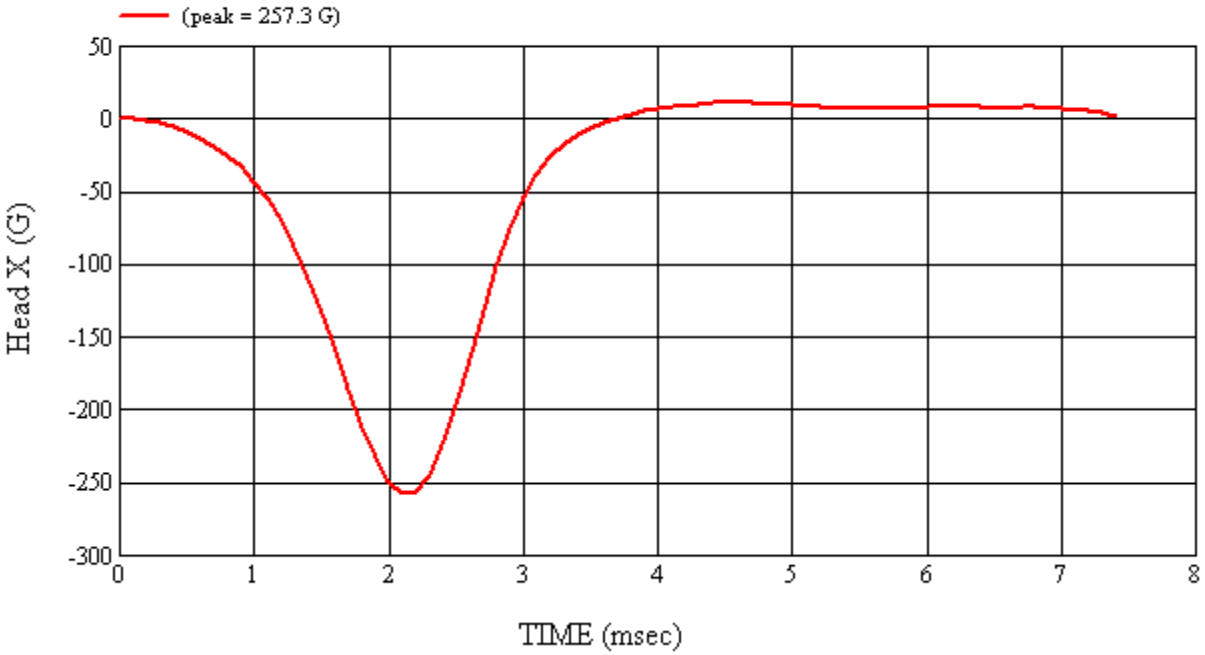
APPROVED BY: _____



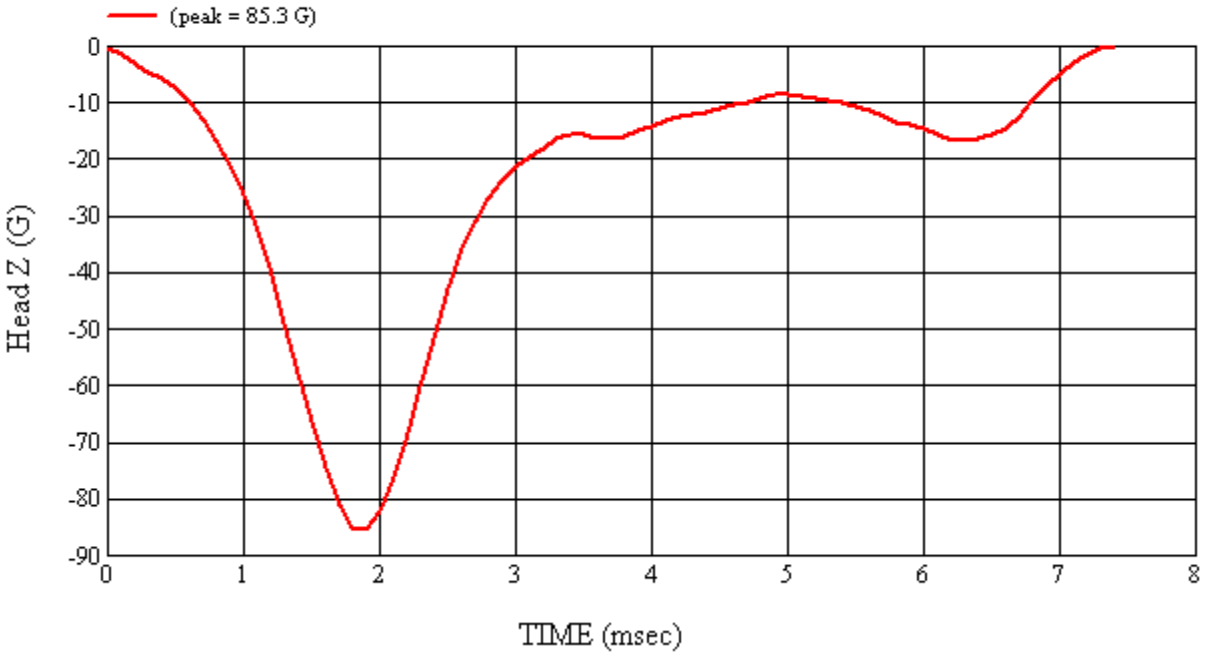
Head 038 (Pre) Calibration #H38035



Head 038 (Pre) Calibration #H38035



Head 038 (Pre) Calibration #H38035



Head 038 (Pre) Calibration #H38035

4-6 Post-Test Calibration

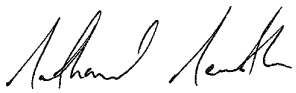
HEAD DROP TEST SUMMARY
PART 572L

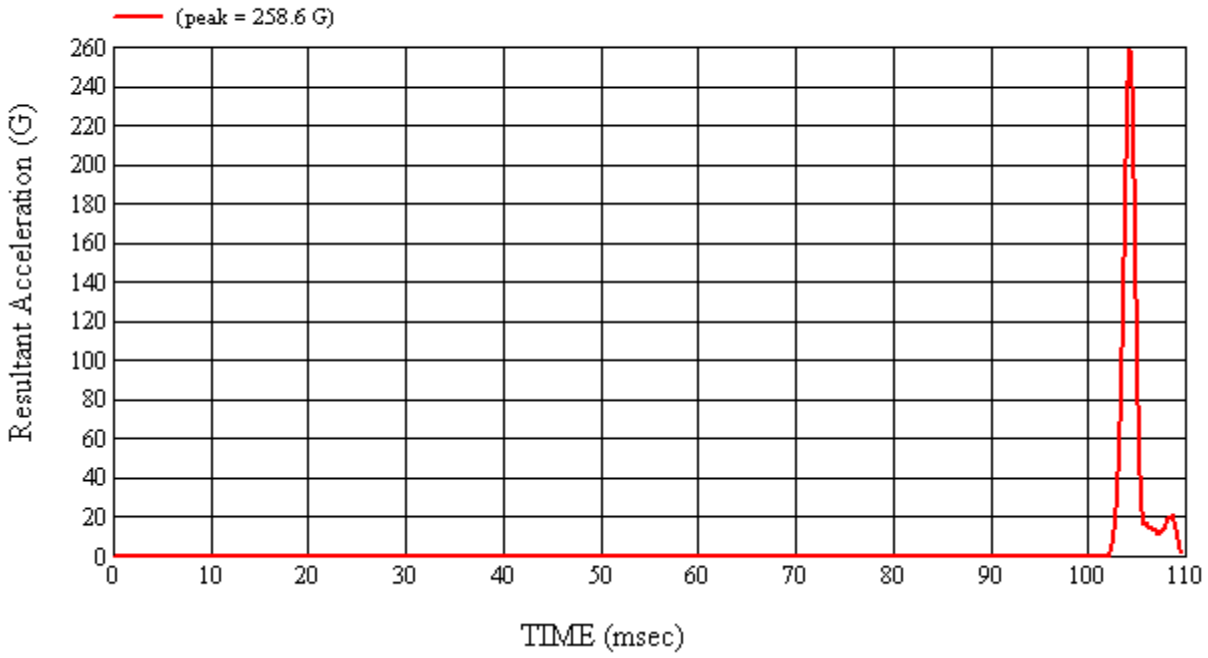
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 7/5/2011 CALIBRATION TIME: 9:17:16 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	21.6
Relative Humidity	10% to 70%	56.5
Peak Resultant Acceleration	225 G's to 275 G's	258.6
Peak Lateral Acceleration	15 G's Maximum	12.5
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J22700	02/07/11	08/07/11
2	ENDEVCO	7264-2000	J36197	02/07/11	08/07/11
3	ENDEVCO	7264-2000	J36353	02/07/11	08/07/11

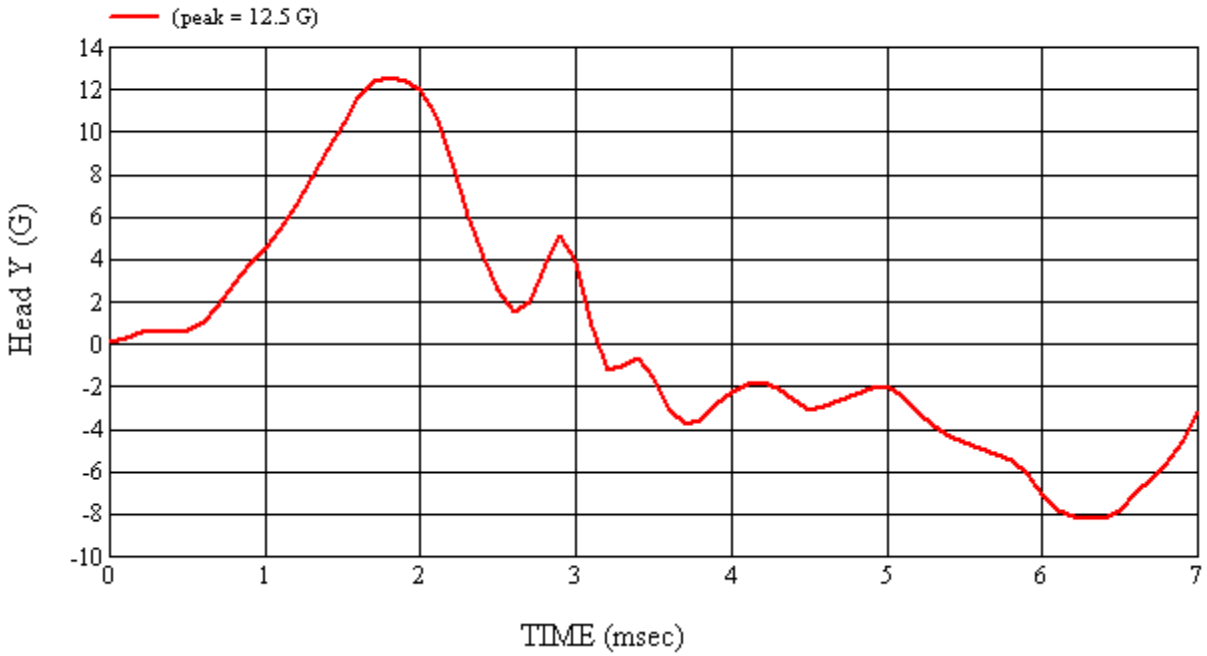
REMARKS:

RECORDED BY:  DATE: 7/5/2011

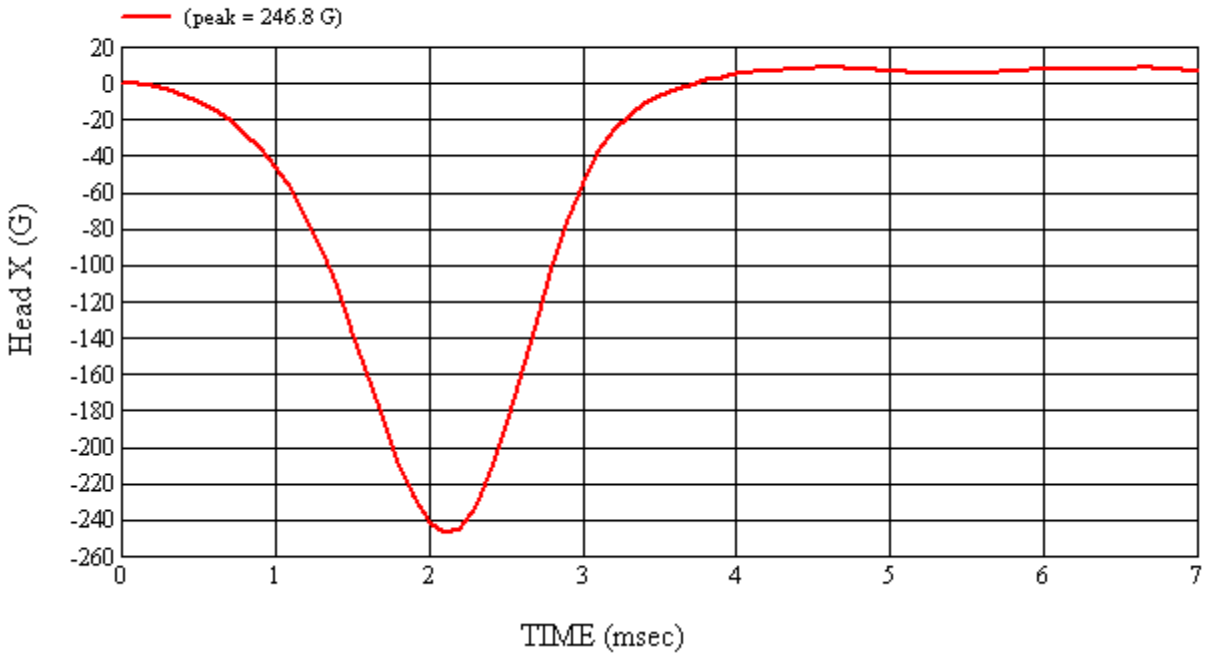
APPROVED BY: 



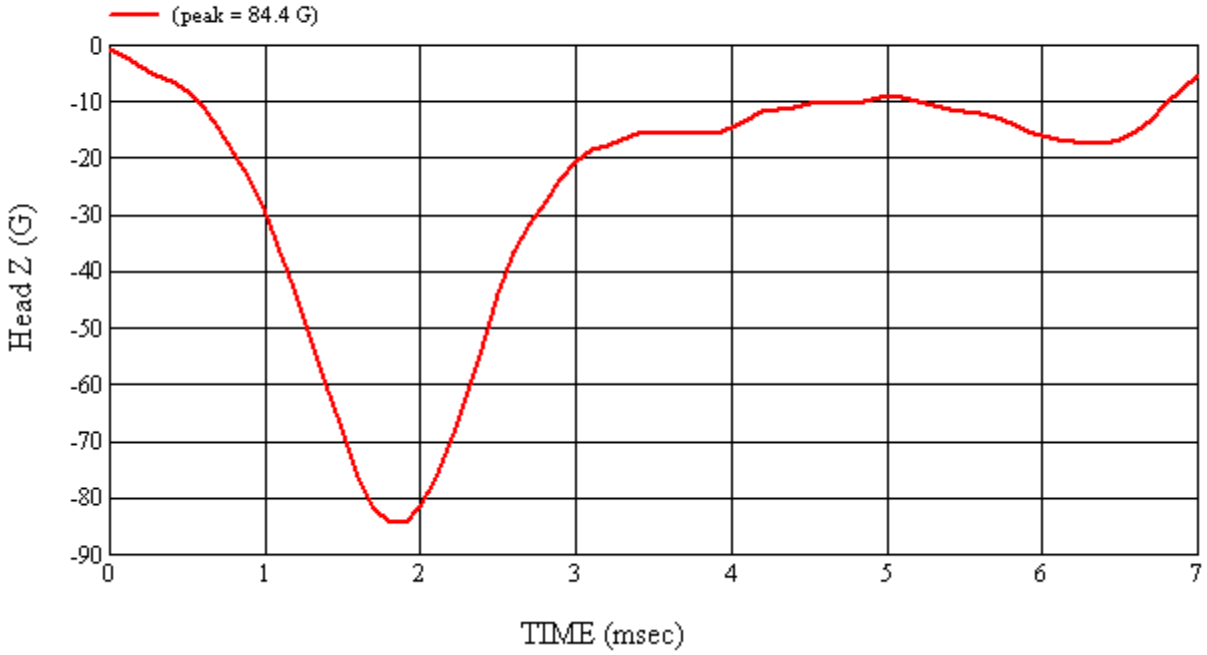
Head 038 (Post) Calibration #H38036



Head 038 (Post) Calibration #H38036



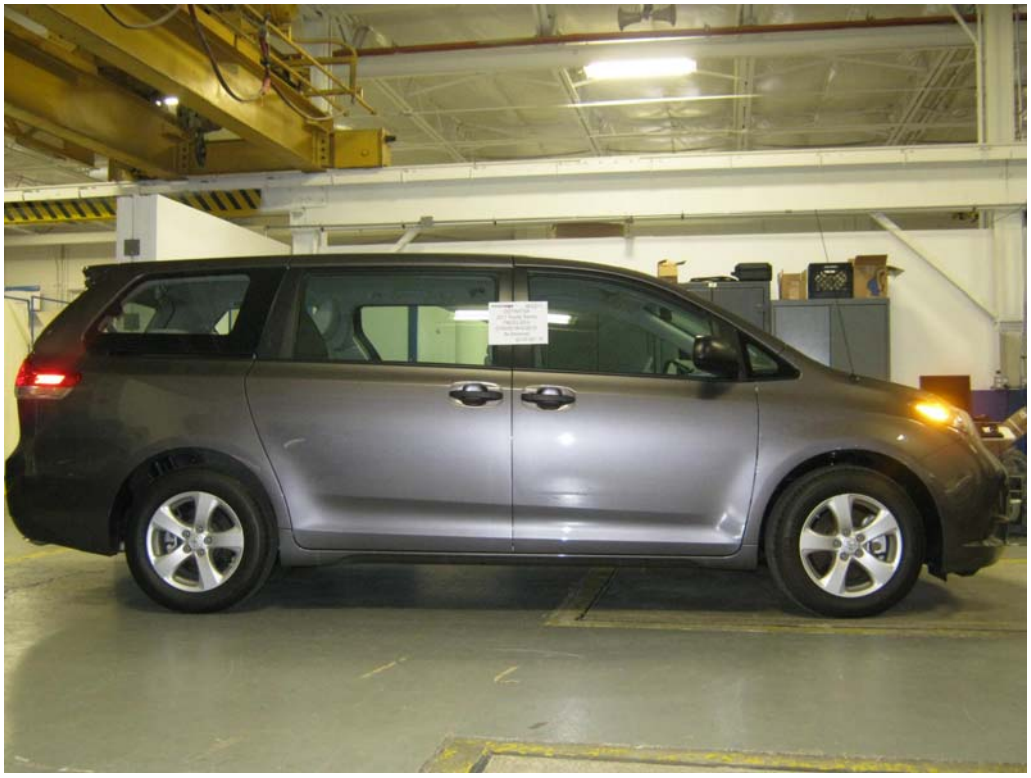
Head 038 (Post) Calibration #H38036



Head 038 (Post) Calibration #H38036

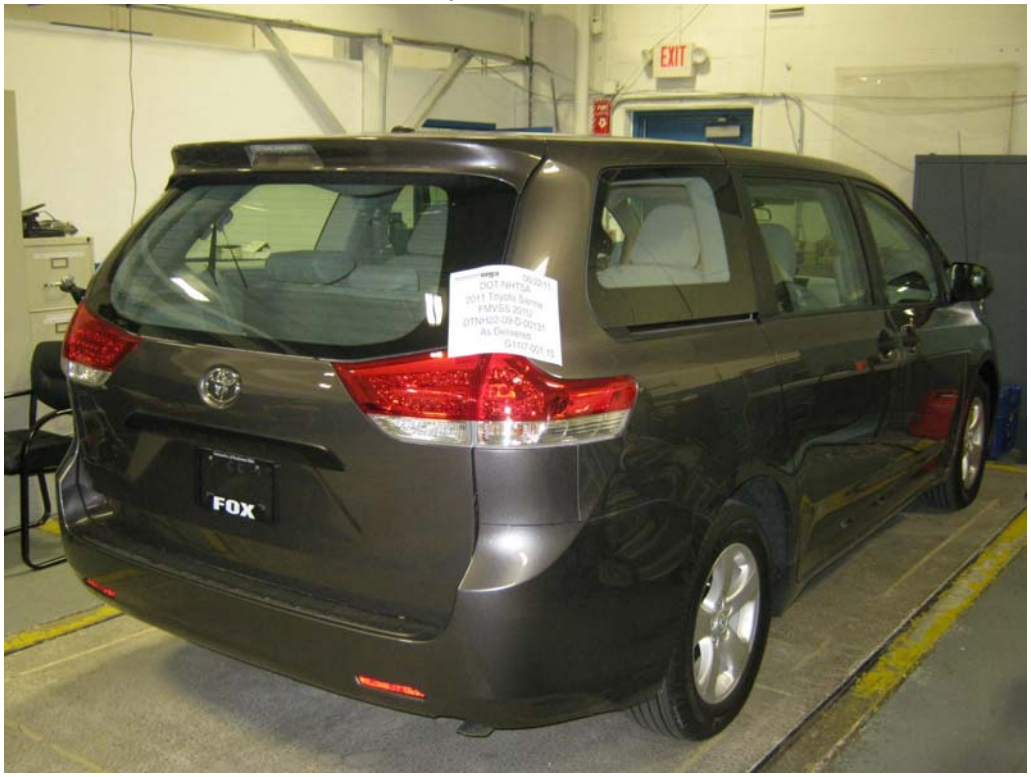
5.0 PHOTOGRAPHS

As Delivered – Left Side View



As Delivered – Right Side View

As Delivered – ¾ Front View From Left Side



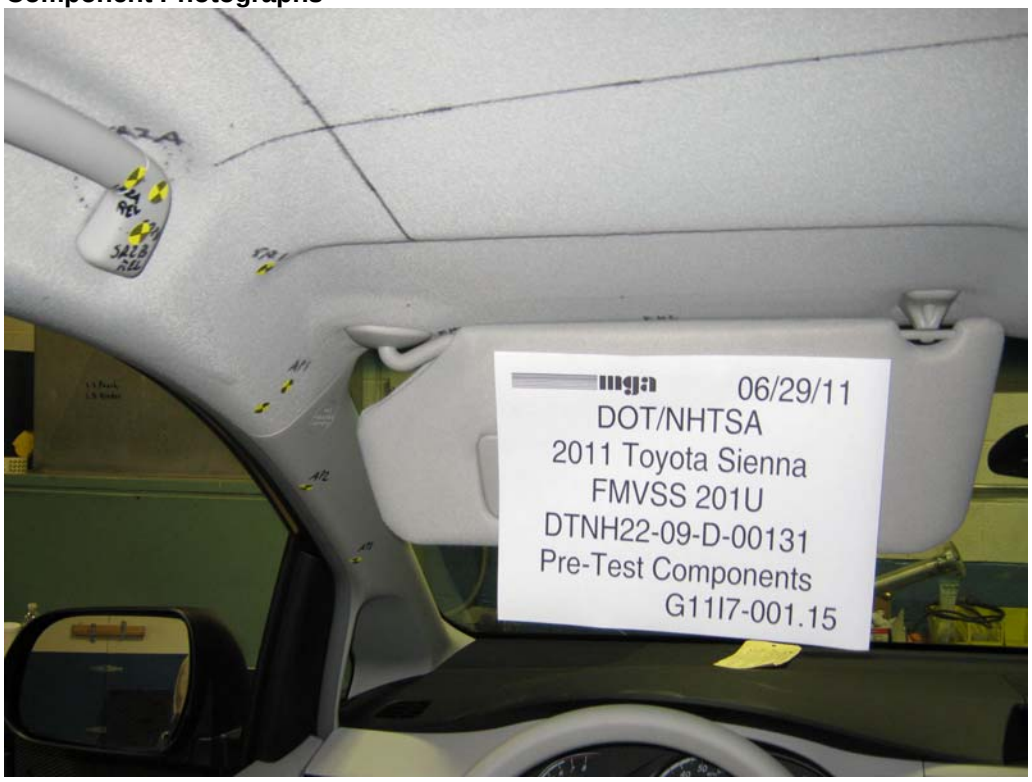
As Delivered – ¾ Rear View From Right Side

As Delivered – Vehicle's Certification Label

As Delivered – Vehicle's Tire Information Label

As Delivered – Vehicle's Caution Load Carrying Capacity Label

Pre-Test Component Photographs




06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15


URU
RPI
RU
RP2
06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15


RP1
RP2
RH
06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15


URS
OPR
06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15


UR1
UR3
SR1
RR1
AR2
AR3
mga
06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15


UR1
SR1
SR2A REL
SR2B REL
AR1
AR2
mga
06/29/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.15

Post-Test Component Photographs


mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


OPR
mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


RH
RP1
RP2
mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


RH
RP1
RP2
mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15

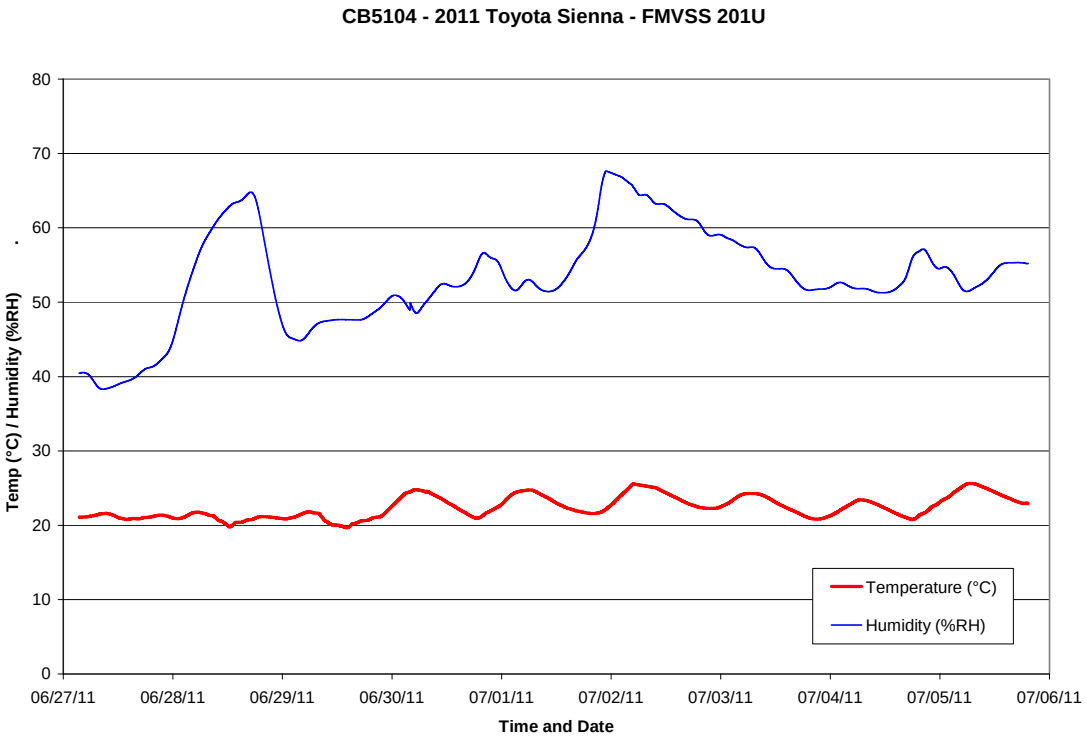

URL
UR C
OPR
mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


UR 2
mga
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15


UR 2
BPI
07/01/11
DOT/NHTSA
2011 Toyota Sienna
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.15

Appendix A – Temperature Trace



Appendix B – Calibration Certificates

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J35919
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	95.8
Linearity:[2]	0.99951
New vs Old Sensitivit (% Difference)	0.7
Temperature:	72 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.025975
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Edward A. Kalata

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J22664
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	94.2
Linearity:[2]	0.99938
New vs Old Sensitivit (% Difference)	1.2
Temperature:	72 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.026447
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Helen A. Kalata

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J35924
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S)[1] 100K SHUNT	92.8
Linearity:[2]	0.99947
New vs Old Sensitivit (% Difference)	1.2
Temperature:	72 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.026824
Calibrated By:	Ryan Jones

Signature: [signature]

Approved by: [signature]

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J32177
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	113.7
Linearity:[2]	0.9997
New vs Old Sensitivit (% Difference)	-0.2
Temperature:	72 ^{0}F
Humidity:	20 %
Sensitivity (mV/V/G):	0.021883
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Helen A. Kaleto

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J14103
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	93.9
Linearity:[2]	0.99955
New vs Old Sensitivit (% Difference)	-0.1
Temperature:	72 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.026479
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Helen A. Kalata

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J35800
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	97.8
Linearity:[2]	0.9995
New vs Old Sensitivit (% Difference)	0.6
Temperature:	72 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.025451
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Edward A. Kaleto

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J22700
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	96.4
Linearity: [2]	0.99966
New vs Old Sensitivit (% Difference)	0.5
Temperature:	70 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.025819
Calibrated By:	Chris Collins

Signature: Chris Collins

Approved by: Steven A. Kaleto

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J36197
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	108.7
Linearity:[2]	0.99976
New vs Old Sensitivit (% Difference)	0.9
Temperature:	70 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.022869
Calibrated By:	Chris Collins

Signature: Chris Collins

Approved by: Helen A. Kaleto

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J36353
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	99.1
Linearity:[2]	0.99988
New vs Old Sensitivit (% Difference)	0.9
Temperature:	70 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.025114
Calibrated By:	Chris Collins

Signature: Chris Collins

Approved by: Helen R. Kaleto

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

THE MODAL SHOP INC

~Calibration Certificate~

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph: 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information
Model Number: 352C03
Serial Number: 95980
Manufacturer: PCB
ID Number:
Description: ICP® Accelerometer

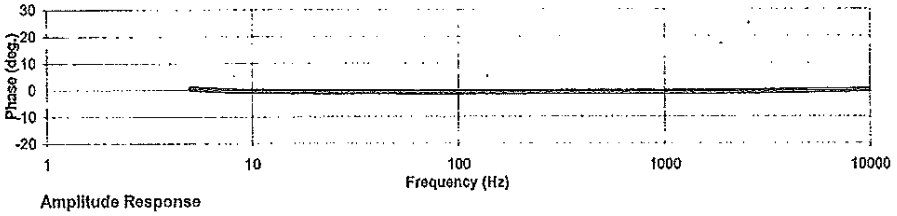
Calibration Data

Sensitivity @ 100 Hz:	9.94	mV/g
Phase @ 100 Hz:	-0.87	deg.
Test Level:	10.00	g

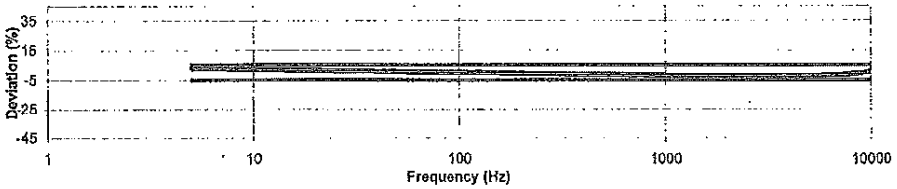
Transducer Specifications

Amp. Range:	± 500	g
Resolution:	0.0005	g
Resonant Freq:	≥ 50000	Hz
Temp. Range:	-54 to 121	°C
	-65 to 250	°F
Axis:	Uni-Axial	

Phase Response



Amplitude Response



Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
5	3.15	0.41
10	2.18	-0.36
30	0.99	-0.71
50	0.62	-0.68
100	0.00	-0.87
300	-0.88	-0.81
500	-1.29	-0.77
1000	-1.87	-0.77
2000	-2.45	-0.68
3000	-2.46	-0.61
4000	-2.59	-0.49
5000	-2.40	-0.40
6000	-2.09	-0.26
7000	-1.63	-0.23
8000	-1.10	-0.13
9000	-0.30	0.02
10000	0.76	-0.01

Notes
Results relate only to the items calibrated.
This certificate may not be reproduced except in full, without written permission.
Method: Calibration is performed in compliance with ISO 9001 and ISO 17025
This calibration was performed with TMS 9155C Calibration Workstation version 4.6.1
Calibration traceable to primary method which has been proficiency validated through interlaboratory comparison to NIST (project number 822/271196).
Back-to-Back Comparison Calibration per ISO16063-21 .
Procedure Used: PRD-P220
Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-4.99 Hz; ± 3.00%, 5-9.99 Hz; ± 2.50%, 10-99 Hz; ± 1.70%, 100 Hz; ± 1.25%, 101-920 Hz; ± 1.40%, 921-5000 Hz; ± 1.70%, 5001-10,000 Hz; ± 2.20%, 10,001-15,000 Hz; ± 3.65%, 15,001-20,000 Hz; ± 4.75%.

Customer
MGA Research Corp.

User Notes

Unit Condition
As Found: In Tolerance
As Left: In Tolerance

Lab Conditions
Temperature: 73 (23) °F (°C)
Humidity: 32 %

Approval Information
Technician: Ed Devlin
Approval:

Cal Date: 9/14/2010
Due Date:

ACCREDITED

Cal ID: 15800 264901

THE MODAL SHOP INC
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph: 513-351-9919
Fax: 513-458-2172
www.modalshop.com

~Calibration Certificate~

Sensor Information

Model Number	352C03
Serial Number	95980
Manufacturer	PCB
ID Number	

Note

This certificate may not be reproduced except in full, without written permission.

Standards and/or Equipment Used During Calibration

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	15004324	6/29/2011
Std Accelerometer	PCB	080A200	110553	12/8/2010
Air Bearing Shaker	PCB	396C11	603	n/a
Std Sig Conditioner	PCB	442A102	173	12/8/2010
SUT Signal Conditioner	PCB	443B101	379	9/19/2010
Power Amplifier	TMS	2100E21-C	1002	n/a

Technician: Ed Devlin

Cal Date: 9/14/2010

Customer: MGA Research Corp.

Due Date:

ACCREDITED

Cal ID: 16800 2849.01

Calibration Certificate

Part Description: Silver **Certification Date:** 10/19/2010 (M/d/yyyy) **Serial#:** S08-05-98-01273

Single Point - (Max-Min)/2 Specification: S08-05 .076mm (.0030") **Certificate#:** S0127340470

Volumetric (Max Deviation) Specification: S08-05 +/-.108mm (+/-.0042") **Temperature:** See attached data

Measurement Standards Traceability

Ball Bar Kit	Asset Number: 1039	Calibration Due: 10/23/2010	*SI Traceability: METAS-L20100204RG1
Thermometer	Asset Number: TQ023	Calibration Due: 11/20/2010	*SI Traceability: A2LA-1001059862
Reference Sphere	Asset Number: 1241	Calibration Due: 11/21/2011	*SI Traceability: NIST-821/276660-08

The artifacts above have been calibrated with a device traceable to the International System of Units (SI) through a National Metrological Institute (NMI) or through an ISO17025 Accredited Laboratory.
Measurement uncertainty is 3.9 + 3.0X micrometers, where X = length in meters.
Uncertainty is expressed at approximately a 95% Level of Confidence using k=2.00.

Calibration Results*

3 Single Point Articulation Tests at <=20%, 20%-80% and >=80% range.	PASSED
1 Effective diameter sphere test.	PASSED
20 Volumetric ball bar tests in 4 quadrants and 2 orientations.	PASSED

*Calibration conforms to procedures developed in accordance with ASME B89.4.22-2004. See attached data for measurement results.

Instrument condition as received: Not Within Specification

Instrument condition outgoing: Within specifications

Technician: Anthony Parker Date: 10/19/10

FARO Technologies, Inc:
PH1:1-800-736-2771
PH2:407-333-9911
FAX:407-333-8056
L-A-B Cert Number:L1147-1

125 Technology Park
Lake Mary, FL 32746
USA

FARO®

Page 1 of 6

LABORATORY ACCREDITATION BUREAU
ISO/IEC 17025 Accredited

MICHIGAN OPERATIONS
DATE: 2/7/04
SUPERCEDES: MGATPTMC.5

DOC. NO.: MGATP_TMC
REVISION NO.: 6
PAGE 3 OF 3

Tape Measure Calibration Certificate

Reference Steel Rule
Brand: SWANSON
S/N: MGA007999
Calibration Date: 1/15/10

Subject Tape Measure
Brand: STANLEY
S/N: TPM 112
Calibration Date: 12/13/10

Reference in (mm)	Subject Tape Measure	Difference	Reference in (mm)	Subject Tape Measure	Difference
0 (0)	0	0	18 (450)	450	0
1 (25)	25	0	19 (475)	475	0
2 (50)	50	0	20 (500)	500	0
3 (75)	75	0	21 (525)	525	0
4 (100)	100	0	22 (550)	550	0
5 (125)	125	0	23 (575)	575	0
6 (150)	150	0	24 (600)	600	0
7 (175)	175	0	25 (625)	625	0
8 (200)	200	0	26 (650)	650	0
9 (225)	225	0	27 (675)	675	0
10 (250)	250	0	28 (700)	700	0
11 (275)	275	0	29 (725)	725	0
12 (300)	300	0	30 (750)	750	0
13 (325)	325	0	31 (775)	775	0
14 (350)	350	0	32 (800)	800	0
15 (375)	375	0	33 (825)	825	0
16 (400)	400	0	34 (850)	850	0
17 (425)	425	0	35 (875)	875	0

If all differences are ± 1/32 of an inch (1 mm), then the tape measure is acceptable.
Pass X Fail ___ Maximum Difference = 0

Date: 12/13/2010 Performed By: [signature]

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ± 0.2%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

NovaStar SOLUTIONS

Calibration Certificate

ACCREDITED
CALIBRATION # 1277.01

Metrology Management Services
Remit to address:

35200 Plymouth Rd.
Livonia, MI 48150

Calibration Certificate #:
Z52545:1300708444

PRO PRO 360 PROTRACTOR

SERIAL NUMBER:	N/A	WORK ORDER:	1300708444
ASSET NUMBER:	Z52545		
CUST. ASSET NUM:	MGA00049		
PROCEDURE NAME:	PRO 3600		
PROCEDURE REV:	A	TEST RESULT:	PASS
CALIBRATED BY:	JOE McCONNAUGHHAY	PERFORMED ON:	3/21/2011
CUSTOMER:	MGA RESEARCH	CAL DUE DATE:	3/21/2012
	446 Executive Drive	DATA TYPE:	FOUND-LEFT
	Troy, MI 48083	TEMPERATURE:	21.00 °C
PRIMARY CONTACT:	BOB MILLER	HUMIDITY:	38 %

This instrument has been processed and calibrated in accordance with the NovaStar Solutions Quality System Manual and is traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. The NovaStar Solutions quality system is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994.

The results reported herein apply only to the calibration of the item described above. No sampling plan was used for this calibration.

The ratio of the tolerance of the instrument or parameter being calibrated to the expanded uncertainty of the standard (TUR) is greater than 4:1 unless otherwise specified. Expanded uncertainties are expressed at the approximate 95% level of confidence using a K=2.
Due to any number of factors, the recommended due date on the item does not imply continuing conformance to specifications during the recommended interval. Unless otherwise stated the unit under test meets or exceeds manufacturer specifications.

For range and best measurement capability specifications for the standards used to perform this calibration, see the most recent calibration report maintained by this calibration laboratory (available upon request).

As Received Condition: IN TOLERANCE **As Returned Condition:** IN TOLERANCE

Action Taken: FULL CALIBRATION

REMARKS:

Standards Used

Asset #	Cert#	Description	Cal Date	Due Date
1437	1437:1232010439	PHASE 2 220-006 ROTARY TABLE	1/15/2009	1/15/2013
1541	1541:1300372477	NEWPORT CT485AL HYGROTHERMOGRAPH	3/17/2011	3/17/2012
1577	1577:1297694647	RAHN SUPER 100 SURFACE PLATE	2/14/2011	2/14/2012

***** End of Certificate *****

@ 3/28/11

QA approved: Steve Hall **Date:** 3-22-11
Signature:

Asset Barcode:

NovaStar SOLUTIONS

Calibration Certificate

ACCREDITED
CALIBRATION # 1277.01

Metrology Management Services
Remit to address:
35200 Plymouth Rd.
Livonia, MI 48150

Calibration Certificate #: Z52549:1300715528

DICKSON TM325 TEMP/HUMD DISP

SERIAL NUMBER:	N/A	WORK ORDER:	1300715528
ASSET NUMBER:	Z52549		
CUST. ASSET NUM:	MGA00894		
PROCEDURE NAME:	1012		
PROCEDURE REV:	A	TEST RESULT:	PASS
CALIBRATED BY:	JOE McCONNAUGHHAY	PERFORMED ON:	3/21/2011
CUSTOMER:	MGA RESEARCH 446 Executive Drive Troy, MI 48083	CAL DUE DATE:	3/21/2012
		DATA TYPE:	FOUND-LEFT
		TEMPERATURE:	21.00 °C
PRIMARY CONTACT:	BOB MILLER	HUMIDITY:	38 %

This instrument has been processed and calibrated in accordance with the NovaStar Solutions Quality System Manual and is traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. The NovaStar Solutions quality system is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994.

The results reported herein apply only to the calibration of the item described above. No sampling plan was used for this calibration.

The ratio of the tolerance of the instrument or parameter being calibrated to the expanded uncertainty of the standard (TUR) is greater than 4:1 unless otherwise specified. Expanded uncertainties are expressed at the approximate 95% level of confidence using a K=2.
Due to any number of factors, the recommended due date on the item does not imply continuing conformance to specifications during the recommended interval. Unless otherwise stated the unit under test meets or exceeds manufacturer specifications.

For range and best measurement capability specifications for the standards used to perform this calibration, see the most recent calibration report maintained by this calibration laboratory (available upon request).

As Received Condition: IN TOLERANCE **As Returned Condition:** IN TOLERANCE

Action Taken: FULL CALIBRATION

REMARKS:

Standards Used

Asset #	Cert#	Description	Cal Date	Due Date
1504	1504:1296548177	HART SCIENTIFIC 1502A THERMOMETER READOUT	2/7/2011	2/7/2012
1541	1541:1300372477	NEWPORT CT485AL HYGROTHERMOGRAPH	3/17/2011	3/17/2012
1717	1717:1297150241	HART SCIENTIFIC 5614 PRT	2/7/2011	2/7/2012
1917	1917:1296319659	VAISALA M170/HMP76 MEASUREMENT INDICATOR/PROBE	1/29/2011	1/29/2012

***** End of Certificate *****

@ 3/28/11

QA approved: Stan Hall **Date:** 3-22-11

Signature:

Asset Barcode:

NovaStar SOLUTIONS
Metrology Managment Services

Calibration Data Sheet

Page 1 of 1
35200 Plymouth Rd.
Livonia, MI 48150
734-453-8003

Inst. Type	TEMP/HUMD DISP	**Mfr.**	Dickson	**W.O.**	1300715528
Last Cal Date	Unknown	**Mod.**	TM325	**Date**	3/21/2011
Form Number	25054 Rev A	**S/N**	N/A	**Test Eng'r**	JM
		ID#	MGA00894		

Note

Function	Calibration Point	Unit		As Found	Note	As Left	Low Limit	Hi Limit	Unit
Temperature	71.8	°F		71.2		71.2	70.0	73.6	°F
%RH	16.7	%RH		18.4		18.4	14.7	18.7	%RH
	43.7	%RH		44.3		44.3	41.7	45.7	%RH
	68.3	%RH		69.4		69.4	66.3	70.3	%RH

1300715528

MetroCal inc.

ACCREDITED
CALIBRATION CERT #0513.01

4700 Barden Court SE, Kentwood MI 49512, Telephone: 616-698-3124, Fax: 616-698-2364, www.metrocal.com

Certificate of Calibration

MGA Research
446 Executive Drive
Troy, MI 48083

Order Number: **69158**
Certificate Number: **100817600**
Page: **1 of 1**

Gauge Number: **MGA00081**
Gauge Desc: **0 to 20lb x 0.01lb Digital Scale**
Manufacturer: **Cardinal Detecto**
Model Number: **AP-20**
Serial Number: **E33603-0213**

Customer PO: **N/A**
Last Calibration: **7/29/09**
Calibration Date: **8/17/10**
Next Calibration: **8/17/11**

As Found Condition: **In Tolerance**

As Left Condition: **In Tolerance**

MetroCal Inc. maintains reference standards of measurement which are traceable to the National Institute of Standards and Technology, or other authorized National Standards. Calibration was performed in accordance with MetroCal Procedure CP042 and relevant sections of the manufacturer's manual. This calibration complies with ISO/IEC 17025 and ANSI/NCSL Z540-1 Standards. Results shall not be reproduced except in full without the written approval of MetroCal Inc. Results relate only to the item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired. Statements of compliance made using simple acceptance rule.

Standard Used	Cal. Date	Due Date	Traceable No.	Calibration Procedure Uncertainty Expressed at 95% confidence , (K=2)
Weight Set	9/3/08	9/3/10	ID# 2463	+/-0.001% of Load

Results:
Tolerance used: ± 0.02lb

Units: lbs **TI Division/Increment:** 0.01 lb

	As Found				As Left		
Weight Test	**Nominal**	**Indication**	**Deviation**		**Nominal**	**Indication**	**Deviation**
Zero	0.00	0.00	0.00		0.00	0.00	0.00
0-25% fs	5.00	5.00	0.00		5.00	5.00	0.00
26-50% fs	10.00	9.99	-0.01		10.00	9.99	-0.01
51-75% fs	15.00	14.99	-0.01		15.00	14.99	-0.01
76-100% fs	20.00	19.98	-0.02		20.00	19.98	-0.02
1/2 load test	10.00	9.99	-0.01		10.00	9.99	-0.01
return to zero	0.00	0.00	0.00		0.00	0.00	0.00
4 quad/Shift Test:	Pass			**4 quad/Shift Test:**	Pass		

Comments: Environmental conditions during calibration: 78 °F, 51 % RH.
No adjustment required.

Karen Shipley
Calibration Technician

Issued: 8/17/10

☐ Checked box indicate this calibration was performed at the customers facility.

@ 8/20/10

Sterling Scale Co., Inc.
20950 Boening St.
Southfield, MI 48075

Certificate of Calibration

F410/12-3
Rev. Date 11/23/05

calibration cert. 1448.01

Customer: MGA Research ***Cert#*** 10-6914 ***Temp/Humidity:*** ok
Location of Calibration: 2839 Elliot Rd Troy MI 48083
Calibration Date: 7/21/2010 ***Due Date:*** Jul-11 ***Condition of Item:*** Fair
Equipment Make: Intercomp ***Model:*** SW Deluxe ***Serial Number*** 26032389 ***Capacity:*** 2200 lb x 1 lb Per weigh pad
8800 lb x 1 lb Scale system total capacity

Applied Test Wt	*Before Adustment*	*Tolerance*	*In-Tolerance Y/N*	*After Adjustment*	*In-Tolerance Y/N*	*Unc*	
10 lb	9 lb	1 lb	y	n/a	y	0.002 lb	Right Rear Pad
100 lb	100 lb	1 lb	y	n/a	y	0.11 lb	
1000 lb	1000 lb	2 lb	y	n/a	y	0.14 lb	
10 lb	10 lb	1 lb	y	n/a	y	0.002 lb	Right Front Pad
100 lb	100 lb	1 lb	y	n/a	y	0.11 lb	
1000 lb	999 lb	2 lb	y	n/a	y	0.14 lb	

shift test
n/a

Platform #1	*Platform #2*	*Platform #3*
☐ Pass	☐ Pass	☐ Pass
☐ Fail	☐ Fail	☐ Fail

Tests performed: ☑ Repeatability ☑ Linearity ☐ Sensitivity ☑ Discrimination

Technician COMMENTS/ weights used
This scale is a wheel weigh system, there are a total of 4 wheel pads. Each pad has a capacity of 2200lb. A lb. All 4 pads together have a total capacity of 8800 lb.
Scale passes tests
sn on file

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☑ Scale Certified ☐ Scale Rejected

Sterling Scale Service Rep: E.Denny **Date:** 7/21/2010 1 of 1

The above item has been calibrated using the relevant EPO or OEM procedures utilizing test weights
Traceable to International Systems of Units (SI), through the Michigan Department of Agriculture.
Test numbers on file. Expanded uncertainty(k=2) confidence level of 95% as reported.
Results relate only to items listed.
The reported uncertainty is valid only for the environment in which it is determined.
Any number of factors may cause the item to drift out of calibration before recommended interval has expired
This report shall not be reproduced, except in full without approval of the laboratory
Tolerances followed are maintenance/acceptance per HB 44 or as detremined by the customer
Sterling Scale does not warranty calibration.