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Special Crash Investigations On-Site Guardrail End Terminal Investigation Vehicle: 2010 Chevrolet Silverado Location: Missouri Crash Date: April 2016

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date the report was published.

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15. Supplementary Notes

On-site guardrail end treatment investigation involving a 2010 Chevrolet Silverado. The investigation was conducted by Special Crash Investigations Team 2.

16. Abstract

This report documents the onsite investigation of a pickup truck impact to an ET-2000 guardrail end terminal. This crash occurred in an interchange area of a four-lane, divided, interstate highway. The Chevrolet was a 4-door crew cab pickup truck equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags. A belted 37-year-old male driver occupied the vehicle. The Chevrolet was traveling northwest in the left northwest-bound lane and a 2006 Pontiac Montana was in the adjacent lane. The driver of the Chevrolet changed lanes to the right lane and the front plane struck the back plane of the Pontiac (Event 1). The Chevrolet departed the right side of the road and its front plane struck a mile marker (Event 2). The impact displaced the mile marker and it struck the hood and windshield (Event 3). The vehicle continued northwest through the grassy roadside and the front plane struck a delineator (Event 4). The vehicle then crossed an entrance ramp to the interstate highway and continued northwest with the left side wheels on the shoulder of the interstate and the right-side wheels on the grass. The front plane then struck a second delineator (Event 5). The vehicle continued northwest and the front plane struck the end terminal (Event 6). The vehicle remained in contact with the end terminal and 14.8 m (48.7 ft) of guardrail was extruded prior to the vehicle coming to final rest heading west with the end terminal remaining in contact with the front plane. The Pontiac came to final rest on the shoulder of the entrance ramp heading west. The driver of the Chevrolet sustained police-reported "C" (possible) injuries and was transported by ambulance to a hospital where he was treated in the emergency room for minor injuries and released. The Chevrolet was towed from the crash scene due to damage. The 45-year-old male driver of the Pontiac sustained no police-reported injuries. The driver drove the Pontiac from the crash scene.

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INDIANA UNIVERSITY
TRANSPORTATION RESEARCH CENTER
ON-SITE GUARDRAIL END TERMINAL INVESTIGATION
CASE NUMBER - IN16010
VEHICLE - 2010 CHEVROLET SILVERADO
LOCATION - MISSOURI
CRASH DATE - APRIL 2016

BACKGROUND

This report documents the on-site investigation of an ET-2000 end terminal (**Figure 1**) that was struck by a 2010 Chevrolet Silverado crew cab pickup truck (**Figure 2**). This crash was identified by an engineer with the Missouri Department of Transportation (MoDOT), who submitted photographs of the vehicle and the damaged guardrail end terminal to the Federal Highway Administration. The FHWA determined that the guardrail end terminal and crash type were of interest. This crash investigation was then initiated by the National Highway Traffic Safety Administration in April 2016, and assigned to the Special Crash Investigation team at the Indiana University Transportation Research Center. This crash involved the Chevrolet and a 2006 Pontiac Montana. The crash occurred in Missouri in April 2016 at night and was investigated by a local police agency. The guardrail, crash scene, and Chevrolet were inspected in April 2016.

Figure 1: The damaged end terminal and guardrail, view west

Figure 2: The damaged 2010 Chevrolet Silverado

This crash occurred in an interchange area of a four-lane, divided, interstate highway. The Chevrolet was a 4-door crew cab pickup truck equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags. A belted 37-year-old male driver occupied the vehicle. The Chevrolet was traveling northwest in the left northwest-bound lane and was approaching the Pontiac, which was traveling in the adjacent lane. The driver of the Chevrolet changed lanes to the right lane and the front plane struck the back plane of the Pontiac (Event 1). The Chevrolet departed the right side of the road and its front plane struck a mile marker (Event 2). The impact displaced the mile marker and it struck the hood and windshield (Event 3). The vehicle continued northwest through the grassy roadside and the front plane struck a delineator (Event 4). The vehicle then crossed an entrance ramp to the interstate highway and continued northwest

with the left side wheels on the shoulder of the interstate and the right-side wheels on the grass. The front plane then struck a second delineator (Event 5). The vehicle continued northwest and the front plane struck the end terminal (Event 6). The vehicle remained in contact with the end terminal and 14.8 m (48.7 ft) of guardrail was extruded prior to the vehicle coming to final rest heading west with the end terminal remaining in contact with the front plane. The Pontiac came to final rest on the shoulder of the entrance ramp heading west. The driver of the Chevrolet sustained police- reported "C" (possible) injuries and was transported by ambulance to a hospital, where he was treated in the emergency room for minor injuries and released. The Chevrolet was towed from the crash scene due to damage. The 45-year-old male driver of the Pontiac sustained no police- reported injuries. The driver drove the Pontiac from the crash scene.

CRASH SUMMARY

Crash Site: This crash occurred at night in an interchange area of a four-lane, divided, interstate highway. The weather conditions were clear with 16 kilometers (10 miles) visibility, northerly winds at 14 km/h (10 mph), a temperature of 11.6 °C (53 °F), and a dew point of -4.4 °C (24 °F), according to local weather reports. The interstate had two bituminous northwest-bound through lanes and two bituminous southeast-bound through lanes on the approach to the area of the impact between the Chevrolet and the Pontiac. A blocked-out, W- beam guardrail equipped with an ET-2000 end terminal was located on the north side the road adjacent to an entrance ramp acceleration lane. The two northwest-bound through lanes and acceleration lane were each 3.7 m (12.1 ft) wide and were bordered by a 0.8 m (2.6 ft) wide bituminous median shoulder. The outside shoulder was also bituminous and was 3.4 m (11.2 ft) wide in the area of the initial impact and 2.9 m (9.5 ft) wide adjacent to the guardrail. The interstate was divided by a grass median. The speed limit was 89 km/h (55 mph). The crash diagram is included at the end of this report.

Pre-Crash: The Chevrolet was traveling northwest in the northwest-bound left lane at an event data recorder (EDR) -reported speed of 110 km/h (68 mph) at -2.5 sec prior to algorithm enable (AE) increasing to 111 (69 mph) at -2.0 sec and was approaching the Pontiac, which was traveling northwest in the right northwest-bound lane. The driver of the Chevrolet initiated a lane change into the right lane as the vehicle approached the Pontiac. The Chevrolet's pre-crash data reported no braking and the speed remained at 111 km/h (69 mph) to -0.5 sec, which was the end of the recording.

Crash: The front right corner of the Chevrolet struck the back left corner of the Pontiac (Event 1). The force direction on the Chevrolet was in the 12 o'clock sector and the EDR -reported maximum longitudinal and lateral delta-Vs were -12 km/h (-7.5 mph) and 0 km/h, respectively. The impact was not of sufficient severity to deploy the driver's frontal air bag or actuate his safety belt pretensioner according to the EDR report. The Chevrolet departed the right side of the roadway and traveled approximately 52 m (171 ft) and the front plane struck a mile marker (**Figure 3**, event 2). The impact displaced the mile marker and it struck the windshield (Event 3). The vehicle then traveled 43.9 m (144.0 ft) through the grassy roadside as it approached the entrance ramp for the northwest-bound lanes of the interstate and the front plane struck a delineator (**Figure 4**, event 4). The vehicle continued across the entrance ramp as it traveled an additional 22.4 m (73.5 ft) and the front plane struck a second delineator (**Figure 5**, event 5). The vehicle continued northwest with the left side wheels on the shoulder

and right-side wheels on the grass for 30.1 m (98.7 ft) and the center of the front plane (**Figure 6**) struck the end terminal (**Figures 7** and **8**, event 6). The impact speed was estimated to be 84 km/h (52 mph)[1] based on the EDR-reported speed of the vehicle at -0.5 sec prior to AE, which was the end of the pre-crash recording. The impact resulted in actuation of the driver's safety belt pretensioner and a stage 2 deployment of the driver's frontal air bag and deployment of both IC air bags. The maximum EDR-reported longitudinal and lateral velocity changes were - 23.0 km/h (-14.3 mph) and 1.0 km/h (0.6 mph). The vehicle remained in contact with the ET- 2000 and 14.8 m (48.7 ft) of guardrail was extruded. The Chevrolet came to final rest heading west (**Figure 7**) with the ET-2000 remaining in contact with the damaged front plane. The police crash schematic showed the final rest position of the Pontiac on the shoulder of the entrance ramp.

Post-Crash: The police were notified of the crash at 2054 hours and arrived on scene at 2105 hours. Emergency responders cut the left IC air bag and either removed or assisted the driver out of the vehicle through the left front door. The driver sustained police-reported "C" (possible) injuries and was transported by ambulance to a hospital where he was treated in the emergency room for minor injuries and released. The driver's medical records stated that he told emergency responders he had smoked marijuana and drank alcohol prior to the crash. However, the medical records reported no test for alcohol or drugs. The Chevrolet was towed from the crash scene due to damage. The driver of the Pontiac sustained no police-reported injuries and drove the vehicle from the crash scene.

Figure 3: Northwest-bound approach of the Chevrolet to impact with a mile marker (arrow)

Figure 4: Impact with first delineator, view west

Figure 5: Impact with second delineator and approach to impact with end terminal, view west

[1] The EDR reported no pre-crash braking prior to this event. While it is possible that a brake application could have occurred during the unreported time increment between -0.5 sec and 0.0 sec, this was considered unlikely since only a rolling tire print on the grass from the right side tires was found at the SCI crash scene inspection prior to the impact with the end terminal. Also, the size of the tires on the vehicle at the time of the crash is not known since the owner removed the wheels prior to the SCI vehicle inspection. If the tire size was different from the original tires, then the EDR-reported speed may be inaccurate. A "significant change" in the tire's rolling radius would be required to affect the speed accuracy according to the EDR data limitations.

END TERMINAL AND GUARDRAIL DAMAGE

A sticker located on the end terminal identified the manufacturer as Syro, Inc.[1] The front plane impact of the Chevrolet to the ET-2000 resulted in only minor surface damage to the face of the extruder head (**Figure 8**). There was no damage to the connection of the feeder channel to the extruder head and no welds were broken. The impact extruded 14.8 m (48.7 ft) of guardrail (**Figure 9**) toward the field side of the guardrail. Wood posts 0 to 7[2] were fractured and separated from the ground and the guardrail (**Figure 10**). The anchor bolts for posts 1 to 7 were pulled through the guardrail. The remaining posts were constructed of steel and had wood offset blocks. Post 8 was slightly displaced in the ground and the offset block was fractured and displaced from the guardrail, but still attached to the post. The remaining posts were undamaged. The anchor cable was displaced from the guardrail and found at post 3. The total length of damaged guardrail was 17.9 m (58.7 ft). There were no kinks in the guardrail downstream of the end terminal. The feeder channel width of the end terminal was 13 cm (5.0 in) and the guide chute exit height was 39 cm (15.5 in). The FHWA guardrail form is attached to the end of this report as **Appendix A.**

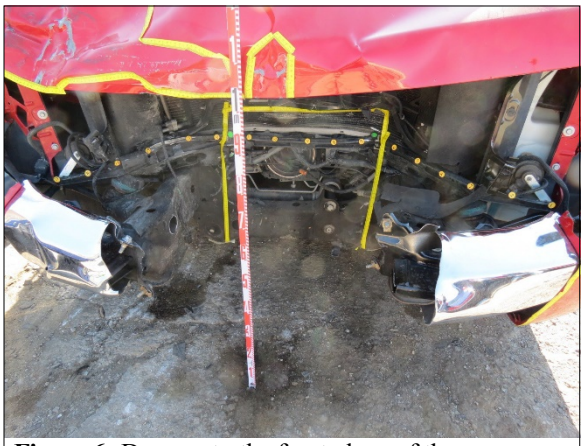

Figure 6: Damage to the front plane of the Chevrolet from impact with the end terminal

Figure 7: The damaged end terminal, extruded guardrail, and final rest location of the Chevrolet

Figure 8: Minor damage to the face of the ET-2000

2010 CHEVROLET SILVERADO

DESCRIPTION

The Chevrolet was a rear-wheel drive, 5-occupant, 4-door pickup truck with the VIN 3GCRCSEA9AGxxxxxx, manufactured in March 2010. The vehicle was equipped with a 4.8-liter, V-8 engine, automatic transmission, 4-wheel antilock brakes with electronic brake force distribution, brake assist, traction control, and electronic stability control. The vehicle was also equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, side impact IC air bags, and a tilt steering column that

[1] Formerly Syro Steel Company, and acquired by Trinity Highway Products LLC in 1992.

[2] Due to a misunderstanding of a post numbering protocol change that occurred just prior to this investigation, post 1 was mistakenly numbered as post 0. The post number references in this report and the "In Service End Treatment Evaluation Data Collection Form" retains the post 1 reference as post 0 since otherwise it would not correspond to the photographic documentation.

impact IC air bags, and a tilt steering column that was adjusted between the center and full-down positions. The specified wheelbase was 365 cm (143.7 in).

The vehicle manufacturer's recommended tire size was P245/70R17. The make, model, and size of the tires that were on the vehicle at the time of the crash could not be determined. The tow operator stated that the owner had removed them and replaced them with the wheels that were on the vehicle at the time of the SCI vehicle inspection.

Figure 9: View upstream (east) to the extruded guardrail

The front row was equipped with a cloth-covered split bench seat with adjustable head restraints in the outboard seating positions. The second row was equipped with a cloth-covered split bench seat with fixed backs, folding cushions, and adjustable head restraints in the outboard seating positions. The driver's seat track was adjusted to the full-rear position and the seat back was slightly reclined. The remaining seats were unoccupied at the time of the crash.

Figure 10: Fractured and displaced post locations; view west

EXTERIOR DAMAGE

Exterior Damage Events 1: The Chevrolet sustained direct damage to the right corner of the front plane during the impact with the back plane of the Pontiac. The width of the direct damage could not be determined since the bumper fascia was off the Chevrolet and not present at the SCI vehicle inspection. There was also overlapping damage to the front bumper in this area from the mile marker impact. The damage from the impact with the Pontiac also extended 387 cm (152.4 in) down the right plane of the Chevrolet.

Damage Classification Event 1: The Collision Deformation Classification (CDC) was 12FRES9. The extent zone was based on the length of contact down the right plane of the vehicle. The severity of the damage was minor.

Exterior Damage Events 2 and 3: The front plane sustained direct damage from the impact with the mile marker post. The direct damage resided on the front bumper beginning 59 cm (23.2 in) right of the centerline of the vehicle. The hood was also damaged. The impact displaced a section of the mile marker and it struck the windshield and hood near the windshield. A crush profile for the bumper damage could not be determined due to overlapping damage from the impact with the Pontiac and end terminal.

Damage Classification Events 2 and 3: The CDC was 12FZEW1 (0 degrees) for the initial impact with the mile marker and 12FRGW6 for the impact to the windshield by the displaced section of the mile marker. The severity of the damage was minor for both events.

Exterior Damage Event 4: The front plane sustained direct damage from an impact with a delineator. The direct damage was 29 cm (11.4 in) long beginning 64 cm (25 in) left of the vehicle's centerline and was located on the bumper fascia. There was no damage to the hood from this impact. A crush profile could not be determined due to overlapping damage from the guardrail impact.

Damage Classification Event 4: The CDC was 12FLLE1 (0 degrees). The severity of the damage was minor.

Exterior Damage Event 5: The front plane also sustained direct damage from an impact with a second delineator. The direct damage was 7 cm (2.8 in) long beginning 2 cm (25 in) right of the vehicle's centerline. A crush profile could not be determined due to overlapping damage from the guardrail impact.

Damage Classification Event 5: The CDC was 12FCEN1 (0 degrees). The severity of the damage was minor.

Exterior Damage Event 6: The impact with the end terminal involved the front plane of the vehicle and the direct damage was 51 cm (20.1 in) long beginning 59 cm (23.2 in) right of the left corner of the front bumper. The impact site on the bumper was located between the vehicle's frame rails and this section of the bumper was cut and displaced from the vehicle (**Figure 11**) by the impact. The end terminal then contacted the radiator and lower radiator frame crushing it rearward 32 cm (12.6 in). The total depth of penetration of the end terminal through the bumper and into the radiator was approximately 55 cm (21.7 in).

Figure 11: Area of contact to Chevrolet's front bumper by the end terminal

Damage Classification Event 6: The CDC was 12FCEW3 (0 degrees). The severity of the damage was moderate.

EVENT DATA RECORDER

The Chevrolet's EDR was imaged with version 16.5 of the Bosch Crash Data Retrieval software and reported with version 17.9. The data was imaged via direct connection to the air bag control module (ACM) since attempts to power the vehicle via the fuse block were unsuccessful. The EDR report is attached at the end of this report as **Appendix B.**

The EDR was capable of storing deployment or non-deployment events for front, rear, side, or rollover crash types. A deployment event will be recorded when an air bag deploys. A deployment event cannot be overwritten by a subsequent event. A non-deployment event will be recorded if an air bag did not deploy. A non-deployment event could be overwritten by a succeeding deployment event. The EDR recorded two non-deployment and one deployment event in this crash. The ignition cycles at event for each of the three events were reported as 17,058. The ignition cycles at investigation were 17,066.

Event 1: This was a non-deployment event and was recorded during the impact with the Pontiac. The recording status was reported as "Complete" and no Diagnostic Trouble Codes (DTC) were reported. No "OnStar" velocity change data was sent. The air bag warning lamp was reported as "Off." The driver's safety belt circuit switch status was reported as "Buckled" and the driver's seat position was reported as "Rearward." The impact speed was estimated to be approximately 111 km/h (69 mph) based on the pre-crash speed reported at -0.5 sec prior to AE. The EDR reported the maximum longitudinal and lateral velocity changes as -12 km/h (-7.5 mph) and 0 km/h, respectively, occurring at 100 msec after AE.

Event 2: This was a deployment event and was recorded during the impact with the end terminal. The time between this event and the first event was reported as 39.15 sec. The event recording was reported as "Complete" and "OnStar" velocity change data was sent. The rear, rollover, side and frontal algorithms were all reported as "active." Deployment was reported for the first and second stages of the driver's frontal air bag, both IC air bags, and the driver's and front row passenger's safety belt pretensioners. The times from AE to the "Deployment Command Critera Met" (DCCM) for the first and second stages of the driver's frontal air bag were 12 and 15 msec, respectively. Time from AE to DCCM for the IC air bags and safety belt pretensioners was 12 msec. The maximum longitudinal and lateral velocity changes reported on the "Event Data (Event Record 2)" page were -52 km/h (-32 mph) and 2 km/h (1 mph), respectively occurring at 880 msec after air bag deployment. The impact speed was estimated to be approximately 84 km/h (52 mph) based on the pre-crash speed reported at -0.5 sec prior to AE. The maximum longitudinal and lateral velocity changes reported on the velocity change graphs were -23.0 km/h (-14.3 mph) and 1.0 km/h (0.6 mph) occurring 220 msec after air bag deployment.

Event 3: This was a non-deployment event and was recorded during the guardrail impact as the guardrail was deformed and displaced. The time between this event and event 2 was reported as 0.99 sec. The event recording was reported as "Complete" and the maximum longitudinal and lateral velocity changes reported on the event record were -23 km/h (-14 mph) and 0 km/h, respectively occurring at 400 msec. The maximum longitudinal and lateral velocity changes reported on the velocity change graphs were -13.0 km/h (-8.1 mph) and 0 km/h occurring at 300 msec after AE, which was the end of the data reported on the graph.

INTERIOR DAMAGE

The interior of the Chevrolet sustained no intrusions during the crash and there was no discernable evidence of occupant contact. All the doors remained closed and operational. The windshield was cracked from impact by the displaced mile marker.

MANUAL RESTRAINT SYSTEMS

The front row was equipped with driver and front passenger three-point lap and shoulder belts. The middle seating position was equipped with a lap belt. The second row was equipped with three-point lap and shoulder safety belts in all three seating positions. The driver's and front passenger's safety belts were equipped with retractor-mounted pretensioners and adjustable upper anchors. The driver's upper anchor was adjusted to the full-down position. Both pretensioners actuated during the crash.

The driver was restrained by the lap and shoulder safety belt as evidenced by a minor load mark on the latch plate belt guide. There also was a length of belt webbing extended out of the partially locked retractor consistent with usage. The vehicle's EDR reported the driver's "Belt Switch Circuit Status" as "Buckled."

SUPPLEMENTAL RESTRAINT SYSTEMS

The Chevrolet was equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact IC air bags. Both stages of the driver's frontal air bag and both IC air bags deployed during the impact with the end terminal. A section of left IC air bag had been cut by emergency responders. There was no damage to the driver's frontal air bag or the right IC air bag.

2010 CHEVROLET SILVERADO OCCUPANT

DRIVER DEMOGRAPHICS

Age/Sex:	37 years/male
Height:	185 cm (73 in)
Weight:	75 kg (165 lbs)
Eyewear:	Unknown
Seat Type:	Bucket
Seat Track Position:	Rear-most
Manual Restraint Usage:	Lap and shoulder safety belt
Usage Source:	Vehicle inspection, EDR
Air Bags:	Frontal and both IC air bags, deployed; seat-mounted side impact, not deployed
Alcohol/Drug Involvement:	Alcohol and Marijuana use reported by driver to medical personnel, not tested
Egress From Vehicle:	Removed by emergency responders
Transport From Scene:	Ambulance to hospital
Medical Treatment:	Treated in emergency room and released

DRIVER INJURIES

Injury No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Injury head involving headache, not further specified	110009.1	Air bag, driver's frontal	Probable
2	Strain, acute, cervical with cervicalgia and straightening of normal lordosis[3] with mild reversal at C_5-C_6, not further specified	640278.1	Air bag, driver's frontal	Probable

Sources: Emergency room records, EMS treatment record, and interviewee data–same person. Injury Number 1 came only from interviewee data.[4] Injury Number 2 came from a combination of interviewee data and emergency room records.

DRIVER KINEMATICS

The driver was restrained by the lap and shoulder safety belt. The seat track was adjusted to the rear-most position and the seat back was slightly reclined. The impact with the back plane of the Pontiac displaced the driver forward in his safety belt. The subsequent impacts with the mile marker and two delineators were minor and probably had little affect on displacing the driver. The impact with the end terminal resulted in a first and second sage deployment of the driver's frontal air bag, actuation of his safety belt pretensioner, and deployment of both IC air bags. The driver was displaced forward and loaded the safety belt. His face and chest probably loaded the frontal air bag and he sustained an unspecified head injury involving a headache and a cervical strain. Emergency responders cut the left IC air bag and either removed or assisted the driver out of the vehicle through the left front door. The driver was transported by ambulance to a hospital where he was treated in the emergency room for minor injuries and released.

2006 PONTIAC MONTANA

DESCRIPTION

The Pontiac was an all-wheel drive, 7-occupant, minivan with the VIN 1GMDX33L16Dxxxxxx, equipped with a 3.5-liter, V-6 engine, 4-speed automatic transmission, 4-wheel antilock brakes with brake force distribution, electronic stability control, and dual stage frontal air bags.

EXTERIOR DAMAGE

The Pontiac was driven from the crash scene and was not inspected. It sustained damage to the back plane according to the police crash report.

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[3] The following term is defined in *Dorland's Illustrated Medical Dictionary* as follows:

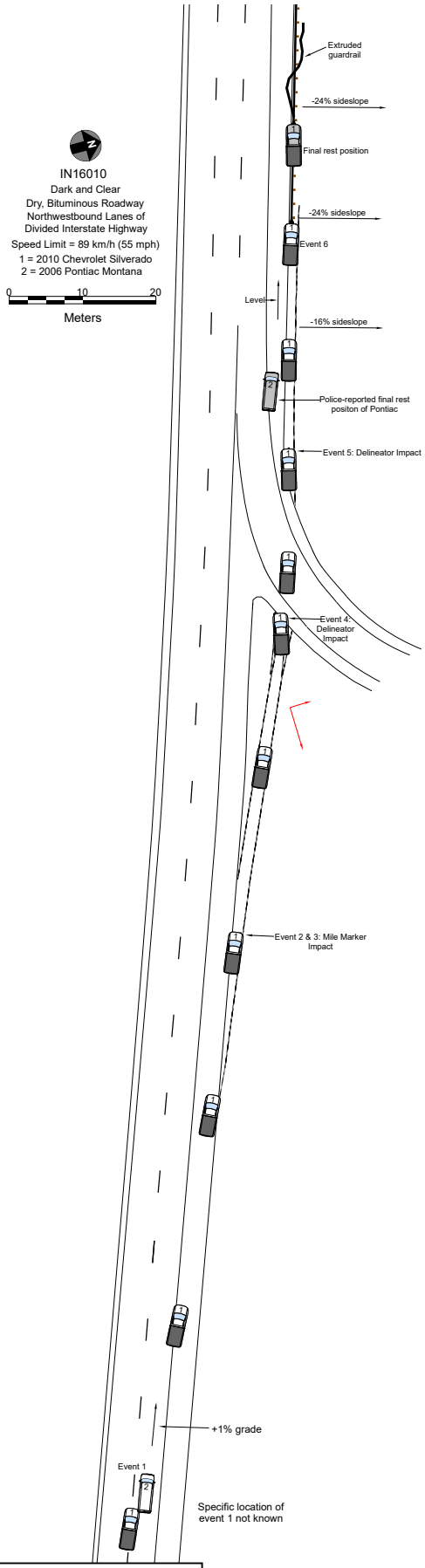
lordosis (lor-do/sis): 1. the anterior concavity in the curvature of the lumbar and cervical spine as viewed from the side. 2. abnormal increase in this curvature; called also *hollow back*, *saddle back*, and *swayback*.

[4] This lesion is assigned as interviewee reported only. The driver specifically indicated he had a headache whereas the medical records noted only head pain. In the emergency room the driver's vital signs were measured and neurological checks made and no diagnosis of any head injury was mentioned. The driver also admitted in the ER that he had smoked some marijuana and earlier drank some alcohol; however, there is no indication that any test was ordered.

OCCUPANT DATA

The 45-year-old male driver was restrained by a lap and shoulder safety belt according to the police crash report. The driver sustained no police-reported injuries.

Crash Diagram



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Case Number:	IN16010

APPENDIX A
FHWA Guardrail Form

Case No.: IN16010

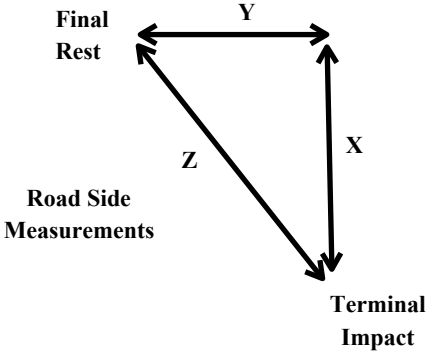
PREPOPULATED DATA (BY OTHERS)			
Date of Crash	April 2016	**TIME OF CRASH (MILITARY)**	Night time hours
Case Number	IN16010	**State**	Missouri
Traffic Route	Interstate	**Direction (Southbound = SB)**	WB
Ambient Conditions (at time of crash)			
Temperature (°F)	53	**Lighting**	Dark
Atmospheric	Clear		

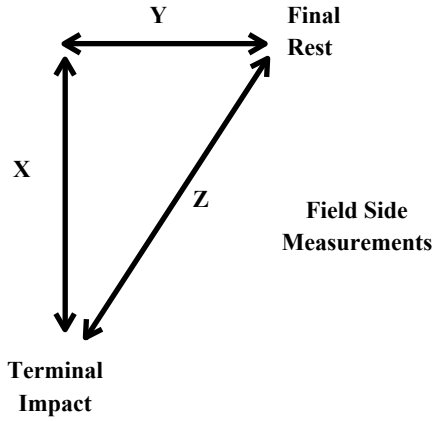
SCENE INFORMATION	
Type of area where crash occurred	❒Urban ❒Rural ☒Suburban
Terminal on a horizontal curve?	☒No ❒Curve/LT ❒Curve/RT
Estimated or Reconstructed Speed at Impact (mph)	52 mph, (Estimated based on EDR)
Est. distance (straight line) from terminal impact to COM final rest position (ft.)	Z = 32.1 ft (Post 0 to COM)
Est. distance (longitudinal) along guardrail from terminal impact to COM final resting location (ft.)	X = 32.1 ft (Post 0 to COM)
Est. distance (normal) from either 1. the white paint line; or 2. roadway/shoulder/pavement edge to COM rest position (ft.)	Y = 10.8 ft
Super elevation	❒+2% ❒-2% ☒ NONE or FLAT
Curve Radius (ft.)	N/A

KEY:

a. COM - Center of Mass of Vehicle

b. Distance Measurements





Case No.: IN16010

ON-SCENE INFORMATION							
End Treatment Type	❒Extruder	☒ET2000	❒ET-PLUS 4in	❒ET-PLUS 5in	❒SKT	❒FLEAT	❒SOFT STOP
	❒Telescope	❒X-LITE	❒X-TENSION				
Curb?	☒No ❒Yes	❒AASHTO Type A	❒AASHTO Type B	❒AASHTO Type C	❒AASHTO Type D	❒AASHTO Type E	
		❒AASHTO Type F	❒AASHTO Type G	❒AASHTO Type H			
Curb Height:							

GUARDRAIL INSTALLATION									
Post No. (See note pg 4)	Post		Offset Block		PRE-Existing Damage		Offset to post or post hole (ft.)		Spacing to next post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
0	Wood	7 x 5.5	None		Unk		10.7		0
1	Wood	7.5 x 5.5	None		Unk		10.5		6 ft 3 in
2	Wood	7 x 5	Wood	Unk	Unk		11.0		6 ft 0 in

Case No.: IN16010

Post No.	Post		Offset Block		PRE-Existing Damage		Offset to post or post hole (ft.)		Spacing to next post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
3	Wood	7.5 x 5	Wood	Unk	Unk		11.0		6 ft 4 in
4	Wood	8 x 6	Wood	Unk	Unk		10.9		6 ft 3 in
5	Wood	7.5 x 6	Wood	Unk	Unk		10.9		6 ft 4 in
6	Wood	7.5 x 6	Wood	Unk	Unk		10.8		6 ft 3 in
7	Wood	8 x 5	Wood	Unk	Unk		10.6		6 ft 3 in
8	Steel	6 x 4	Wood	7 x 6	No		10.8		6 ft 3 in

Case No.: IN16010

Post No.	Post		Offset Block		PRE-Existing Damage		Offset to post or post hole (ft.)		Spacing to next post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
9	Steel	6 x 4	Wood	8 x 5.5	No		10.3		6 ft 3 in
10	Steel	6 x 4	Wood	8 x 6	No		10.7		6 ft 3 in
11	Steel	6 x 4	Wood	7.5 x 6	No		10.8		6 ft 4 in
12	Steel	6 x 4	Wood	7.5 x 6	No		10.8		6 ft 3 in

Additional Comments:

Due to a misunderstanding of a post numbering protocol change that occurred just prior to this investigation, post 1 was mistakenly identified as post 0. This data form retains the identification of the first post as post 0 so that this form is consistent with the post numbering in the photographic documentation.

Case No.: IN16010

EXTRUDER			
Feeder Channel Width at impact head	❒4inches ☒5 inches ❒Other _____		
Guide Chute Exit Height (in.)	15.5 in		
Connection of feeder channels to head damaged?	☒No ❒Yes	Are Welds Broken?	☒No ❒Yes
Anchor Cable Present?	❒No ☒Yes	Connected?	☒No ❒Yes
Rail Extrusion?	❒No ☒Yes	Length (ft. in.)	48 ft 8 in
Rail Extrusion Direction	❒Traffic Side ☒Field Side		
Total Length of Rail Damaged (ft.) [total length would include extruded rail plus damaged rail downstream from head.]	59.7 ft		

TELESCOPE				
Rail Displacement	❒No	❒Yes; Length:	No of Panels Displaced	❒1 ❒2 ❒3 ❒4 ❒5 ❒6

ALL-SYSTEM PERFORMANCE			
Railkinks Downstream of Head?	☒No	❒Yes;	No. of Kinks in Rail:
Was there intrusion into the Occupant Compartment by foreign object (guardrail)?	☒No ❒Yes		
Did vehicle impact other objects after impact with terminal?	☒No ❒Yes		
Object Contacted			

ALL-SYSTEM PERFORMANCE ENVIRONMENT			
SIDESLOPE	**50 ft in advance of Post 0**	**At Post 0**	**50 ft Past Post 0**
Percent - %	-16%	-24%	-15%
Adjacent Lane Width (ft)	3.7		
Lane Type (NAS EDS Variable: Sur. Type)	Bituminous		
Shoulder Type	Bituminous		
Shoulder Width (ft)	9.5		

Guardrail Height (in)	24.5

VEHICLE INFORMATION		
Vehicle Type (NHTSA Input)	Large Pickup	
Vehicle Identification Number (VIN)	3GCRCSEA9AGxxxxxx	
Vehicle Mass (NASS var.: veh.wgt)	5,108 lb (Includes approximate weight of driver.)	
Vehicle orientation upon impact	☒Case Type 1 ❒ Case Type 2 ❒Case Type 3 ❒ Case Type 4 ❒ Case Type 5 ❒ Case Type 6 ❒ Case Type 7 ❒ Case Type 8 ❒ Other	
If 'Other', describe		
Collision Deformation Classification	12FCEW3	
Delta-V	-32 mph longitudinal, 1 mph lateral (EDR data)	
Occupant Compartment Penetration of rail	☒No	❒Yes; Describe:
Quarter Turns (NASS EDS variable: Rollover)	❒1 ❒2 ❒3 ❒4 ❒5 ❒6 ❒7 ❒8 ❒9 ❒10 ❒11 ❒12 ❒13 ❒14 ❒15 ❒16 ❒17+	
Object Precipitating Rollover, (NASS EDS variable: Rollobj)	No rollover	
Rollover Type, Terhune Scale, (NASS EDS variable: rolintyp)	N/A	

APPENDIX B
2010 Chevrolet Silverado
Event Data Recorder Report[7]

[7] The EDR report contained in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection. The CDR report contained in the associated Crash Viewer application may differ relative to this report.

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	3GCRCSEA9AG******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	201650S2IN16010_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 16.5
Reported with CDR version	Crash Data Retrieval Tool 17.9
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Non-Deployment, Deployment, Non-Deployment

Comments

No comments entered.

Data Limitations

Recorded Crash Events:

There are two types of recorded crash events for Front, Side, and Rear (FSR) Events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The minimum SDM Recorded Vehicle Velocity Change, that is needed to record a Non-Deployment Event, is five MPH [8 km/h]. A Non-Deployment Event contains Pre-Crash and Crash data. The oldest Non-Deployment event can be overwritten by a Deployment Event, if all three records are full and the Non-Deployment Event is not locked. A Non-Deployment Event can be overwritten by a more recent Non-Deployment Event if all three records are full and the Non-Deployment is older than approximately 250 ignition cycles. Also, a Non-Deployment event can be recorded if one of the following occurs without the Deployment of any of the frontal air bags, side air bags, or roll bars:

-Pretensioner(s) only Deployment
-Head Rest Deployment
-Battery Cut-Off Deployment

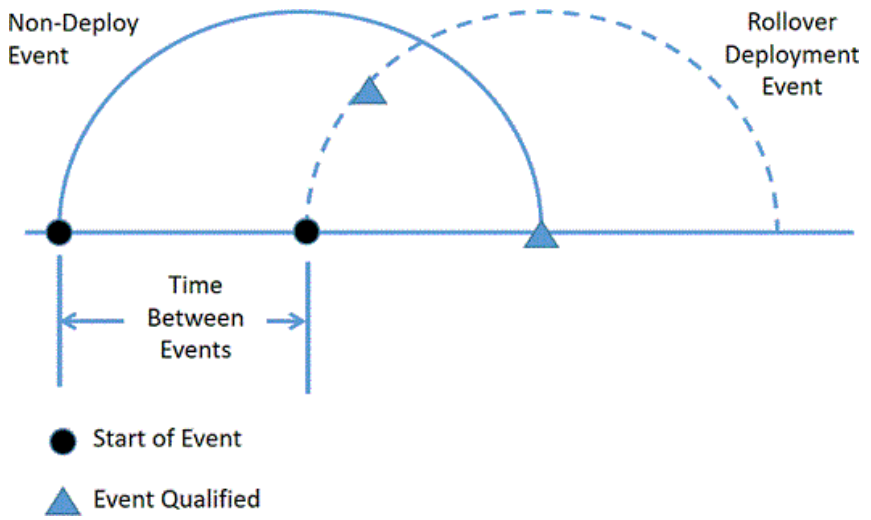
The second type of SDM recorded crash event for FSR Events is the Deployment Event. It also contains Pre-Crash and Crash data. Deployment Events cannot be overwritten or cleared by the SDM.
Rollover Events contains Pre-Crash and Crash data. Rollover event follow the same rules as FSR Deployment events.
The SDM can store up to three Events.

Data:

For FSR Events, SDM Recorded Vehicle Velocity Change reflects the change in velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. For Deployment Events, the SDM will record 220 milliseconds of data after the Deployment criteria is met and up to 70 milliseconds before the Deployment criteria is met. For Non-Deployment Events, the SDM will record the first 300 milliseconds of data after algorithm enable.
For Rollover Events, the SDM may record Lateral Acceleration and Roll Rate data, if the SDM is rollover capable. This data reflects what the sensing system experienced during the recorded portion of the event. For Deployment Events, the SDM will record up to 490 milliseconds of data before the Deployment criteria is met and 250 milliseconds after the Deployment criteria is met.
-Time between events is recorded in 10 msec intervals and is displayed in seconds for a maximum time of 655.33 seconds. The counter measures the time from the start of one event to the start of the next event if both events occur within the same ignition cycle.
-The CDR tool displays time from Algorithm Enable (AE) to time of Deployment command in a Deployment event and AE to time of maximum SDM recorded vehicle velocity change in a Non-Deployment event. Time from AE begins when the first air bag system enable threshold is met and ends when Deployment command criteria is met or at maximum SDM recorded vehicle velocity change. Any air bag systems may be a source of an enable.
-Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change is captured when the largest, absolute value of either the Longitudinal or Lateral Recorded Vehicle Velocity Change occurs. The Maximum may occur between the recorded 10 millisecond sample points.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected by various factors, including but not limited to the following:

-Significant changes in the tire's rolling radius

-Final drive axle ratio changes
-Wheel lockup and wheel slip
-Brake Switch Circuit Status indicates the open/closed state of the brake switch circuit.
-Pre-Crash data is recorded asynchronously. The 0.5 second Pre-crash data value (most recent recorded data point) is the data point last sampled before AE. That is to say, the last data point may have been captured just before AE but no more than 0.5 second before AE. All subsequent Pre-crash data values are referenced from this data point.
-Pre-Crash Electronic Data Validity Check Status indicates “Data Invalid” if:
-The SDM receives a message with an “invalid” flag from the module sending the pre-crash data
-Pre-Crash Electronic Data Validity Check Status indicates “Data Not Available” if:
-No data is received from the module sending the pre-crash data
-For diesel powered vehicles, the data displayed as Throttle Position (%) is actually the data for the Air Inlet Flap Position. This is not the same as the throttle position for a gasoline powered engines.
-Belt Switch Circuit Status indicates the status of the seat belt switch circuit.
-The ignition cycle counter will increment when the power mode cycles from OFF/Accessory to RUN. Applying and removing of battery power to the module will not increment the ignition cycle counter.
-Ignition Cycles Since DTCs Were Last Cleared can record a maximum value of 253 cycles and can only be reset by a scan tool.
-Dynamic Deployment Event Counter tracks the number of Deployment events that have occurred during the SDM’s lifetime.
-Dynamic Event Counter tracks the number of qualified events (either Deployments, Non-deploy, or Rollover events) that have occurred during the SDM’s lifetime.
-For Deployment Events, DTC B0052 (Deployment commanded) shall be recorded with the remainder of the data for this event even though it occurred after Event Enable.
-Once a firing loop has been commanded to be deployed, it will not be commanded to be deployed again during the same ignition cycle. Firing loop times for subsequent deployment type events, during the same ignition cycle, will record the deployment times as N/A.
-A Concurrent Event is when two events are happening nearly simultaneously. The “Concurrent Event Flag Set” parameter will indicate “Yes” if one event begins, but before that event is qualified, another event begins and is qualified.
A Non-Deployment event typically becomes qualified if that event exceeds the 5 MPH (8 km/h) delta V recording threshold and the event has concluded. A deployment event (FSR or Rollover) becomes qualified when a deployment has been commanded for that event.
Example of a Concurrent Event:
A Non-Deployment event begins. Before the Non-Deployment event is qualified, a Rollover Deployment event begins and is qualified. Sometime after the Rollover event is qualified, the Non-Deployment event is qualified. The Rollover event will be recorded in the first open record even though the Non-Deployment event enabled before the Rollover event. The Non-Deployment event will be recorded in the next open record. The “Concurrent Event Flag Set” parameter will indicate “Yes” for the Non-Deployment event. The “Time Between Events” parameter will indicate the time from the start of the Non-Deployment event to the start of the Rollover event.



Event Record #1	Event Record #2
Event record Type = Rollover	Non-deployment
Concurrent Event Flag = No	Concurrent Event Flag = Yes
Time Between Events = N/A	Time Between Events = XX seconds

-The reported range of the longitudinal and lateral acceleration values is approximately ± 50 g.
-All data should be examined in conjunction with other available physical evidence from the vehicle and scene.

Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Status Data (Pre-Crash) is transmitted to the SDM, by Body Control Module, via the vehicle’s communication network.
-The Belt Switch Circuit is wired directly to the SDM.

Data Element Sign Convention:
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. Directional references to sign notation are all from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Data Element Name	Positive Sign Notation Indicates
Longitudinal Velocity Change	Forward
Lateral Acceleration	Left to Right
Lateral Velocity Change	Left to Right
Roll Rate	Clockwise Rotation

Hexadecimal Data:
Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR tool.

01041_SDM11-delphi_r021

Event Data (General)

Ignition Cycles At Investigation	17066
ESS # 1 Traceability Data	AU00000000000000
ESS # 2 Traceability Data	AT00000000000000
ESS # 3 Traceability Data	AH00000000000000
ESS # 4 Traceability Data	AJ00000000000000
ESS # 5 Traceability Data	DA00000000000000
ESS # 6 Traceability Data	DB00000000000000
ESS # 7 Traceability Data	??00000000000000
ESS # 8 Traceability Data	??00000000000000
Dynamic Deployment Event Counter	1
Dynamic Event Counter	3
Dynamic OnStar Notification Event Counter	2
Vehicle Identification Number	???????????******
System Type	Delphi
Manufacturing Traceability Data	AS0674KZ00689UKW
Software Module Identifier 1	00CE1158
Software Module Identifier 2	013EE2D6
Software Module Identifier 3	01AE4BE4
End Model Part Number	00CE0102

Event Data (Event Record 1)

Event Recording Complete	Yes
Event Record Type	Non-Deployment
Crash Record Locked	No
OnStar Deployment Status Data Sent	No
OnStar SDM Recorded Vehicle Velocity Change Data Sent	No
Deployment Event Counter	0
Event Counter	1
OnStar Notification Event Counter	0
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	17058
Time Between Events (sec)	Data Not Available
Concurrent Event Flag Set	No
Event Severity Status: Rollover	No
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Pretensioner	No
Driver 1st Stage Deployment Loop Commanded	No
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	No
Passenger Pretensioner Deployment Loop #1 Commanded	No
Driver Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
High Voltage Battery Cutoff Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Rearward
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Data Not Available
SIR Warning Lamp Status	Off

SIR Warning Lamp ON/OFF Time Continuously (seconds)	655330
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	4636
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	120
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-7 [-12]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	0 [0]
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available

DTCs Present at Time of Event (Event Record 1)

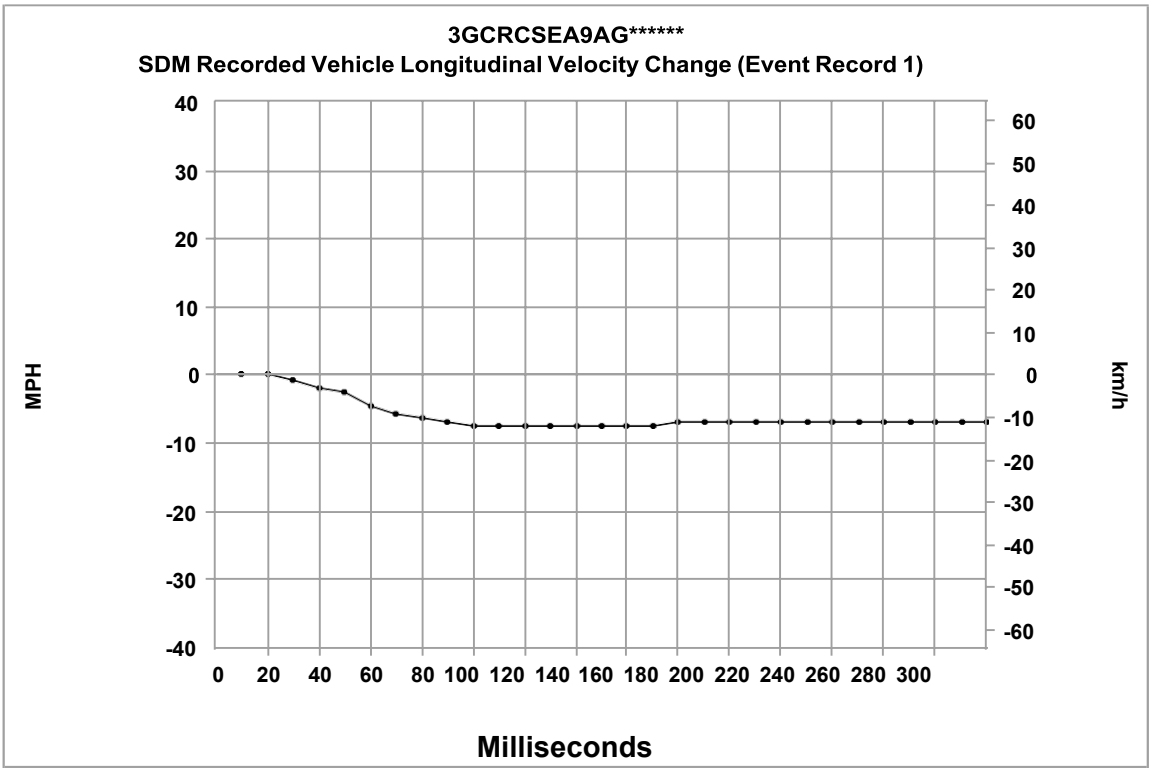
No Diagnostic Trouble Codes

Pre-Crash Data -1 to -.5 sec (Event Record 1)

Times (sec)	Cruise Control Active	Cruise Control Resume Switch Active	Cruise Control Set Switch Active	Engine Torque (lb-ft [N-m])	Reduced Engine Power Mode Indicator
-1.0	Data Not Available	Data Not Available	Data Not Available	249 [338]	Off
-0.5	Data Not Available	Data Not Available	Data Not Available	248 [336]	Off

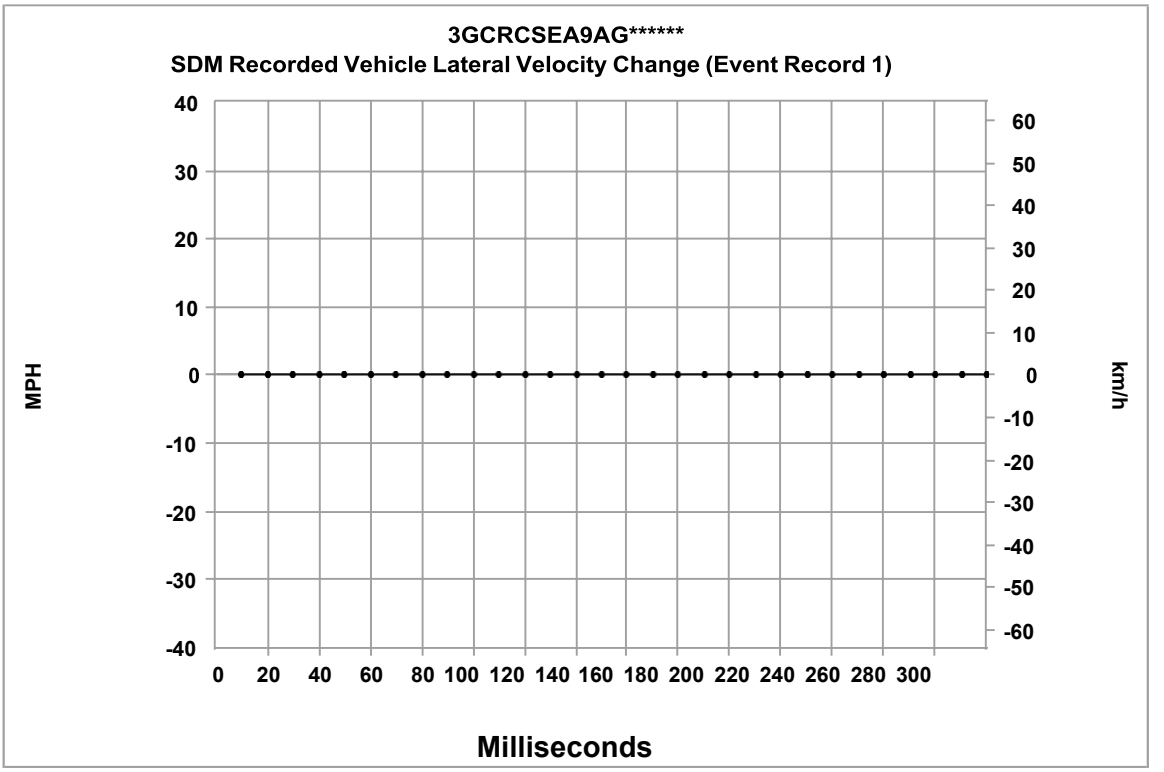
Pre-Crash Data -2.5 to -.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	34	Off	1728	47	68 [110]
-2.0	34	Off	1728	47	69 [111]
-1.5	34	Off	1728	47	69 [111]
-1.0	34	Off	1728	47	69 [111]
-0.5	34	Off	1728	47	69 [111]



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	0.0	0.0
20	0.0	0.0
30	-0.6	-1.0
40	-1.9	-3.0
50	-2.5	-4.0
60	-4.3	-7.0
70	-5.6	-9.0
80	-6.2	-10.0
90	-6.8	-11.0
100	-7.5	-12.0
110	-7.5	-12.0
120	-7.5	-12.0
130	-7.5	-12.0
140	-7.5	-12.0
150	-7.5	-12.0
160	-7.5	-12.0
170	-7.5	-12.0
180	-6.8	-11.0
190	-6.8	-11.0
200	-6.8	-11.0
210	-6.8	-11.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-6.8	-11.0
230	-6.8	-11.0
240	-6.8	-11.0
250	-6.8	-11.0
260	-6.8	-11.0
270	-6.8	-11.0
280	-6.8	-11.0
290	-6.8	-11.0
300	-6.8	-11.0



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	0.0	0.0
60	0.0	0.0
70	0.0	0.0
80	0.0	0.0
90	0.0	0.0
100	0.0	0.0
110	0.0	0.0
120	0.0	0.0
130	0.0	0.0
140	0.0	0.0
150	0.0	0.0
160	0.0	0.0
170	0.0	0.0
180	0.0	0.0
190	0.0	0.0
200	0.0	0.0
210	0.0	0.0

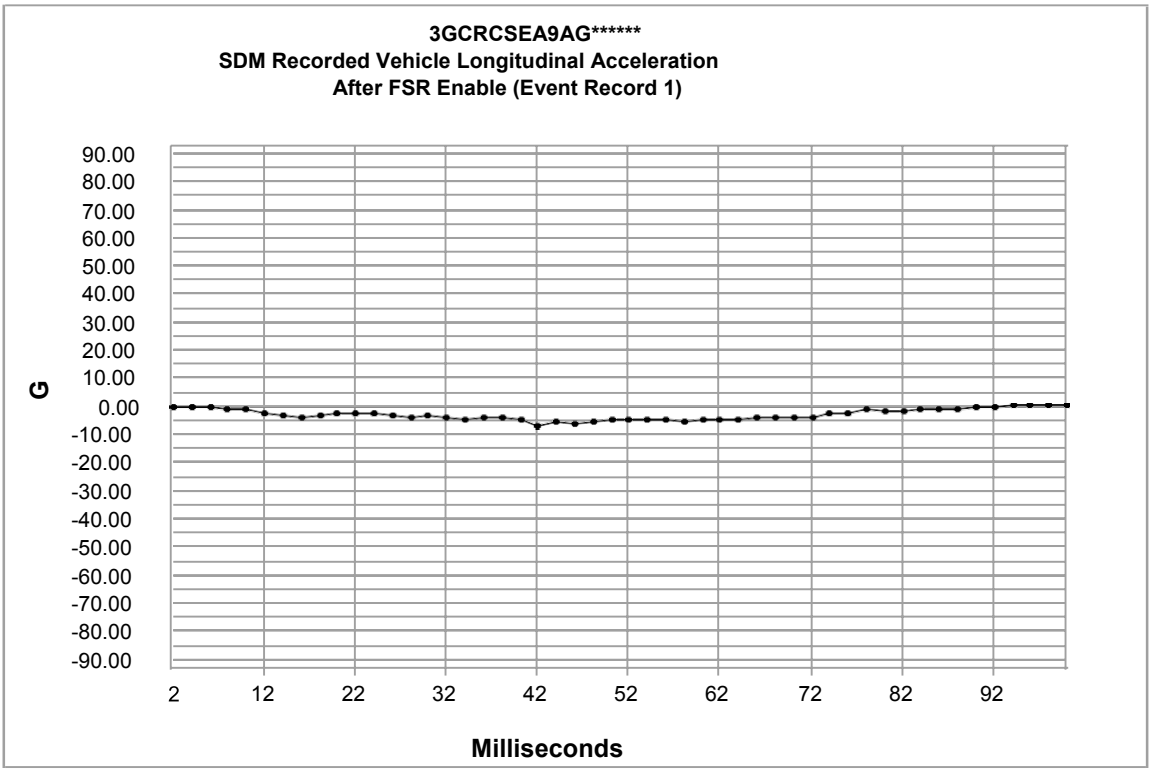
Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	0.0	0.0
230	0.0	0.0
240	0.0	0.0
250	0.0	0.0
260	0.0	0.0
270	0.0	0.0
280	0.0	0.0
290	0.0	0.0
300	0.0	0.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 1)

Contains No Recorded Data

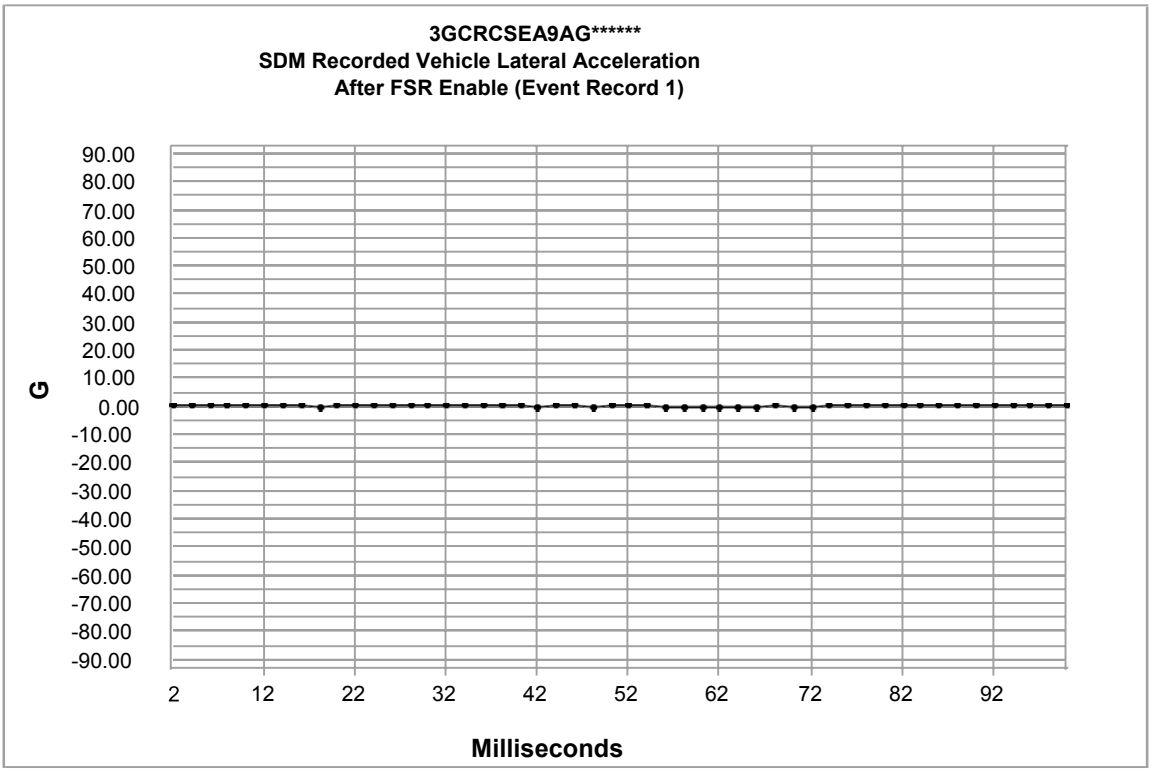
SDM Recorded Vehicle Roll Rate (Event Record 1)

Contains No Recorded Data



Time	G
2	-0.7
4	-0.7
6	-0.7
8	-1.5
10	-1.5
12	-2.9
14	-3.6
16	-4.4
18	-3.6
20	-2.9
22	-2.9
24	-2.9
26	-3.6
28	-4.4
30	-3.6
32	-4.4
34	-5.1
36	-4.4
38	-4.4
40	-5.1
42	-7.3
44	-5.8
46	-6.5
48	-5.8
50	-5.1

Time	G
52	-5.1
54	-5.1
56	-5.1
58	-5.8
60	-5.1
62	-5.1
64	-5.1
66	-4.4
68	-4.4
70	-4.4
72	-4.4
74	-2.9
76	-2.9
78	-1.5
80	-2.2
82	-2.2
84	-1.5
86	-1.5
88	-1.5
90	-0.7
92	-0.7
94	0.0
96	0.0
98	0.0
100	0.0



Time	G
2	0.0
4	0.0
6	0.0
8	0.0
10	0.0
12	0.0
14	0.0
16	0.0
18	-0.7
20	0.0
22	0.0
24	0.0
26	0.0
28	0.0
30	0.0
32	0.0
34	0.0
36	0.0
38	0.0
40	0.0
42	-0.7
44	0.0
46	0.0
48	-0.7
50	0.0

Time	G
52	0.0
54	0.0
56	-0.7
58	-0.7
60	-0.7
62	-0.7
64	-0.7
66	-0.7
68	0.0
70	-0.7
72	-0.7
74	0.0
76	0.0
78	0.0
80	0.0
82	0.0
84	0.0
86	0.0
88	0.0
90	0.0
92	0.0
94	0.0
96	0.0
98	0.0
100	0.0

Event Data (Event Record 2)

Event Recording Complete	Yes
Event Record Type	Deployment
Crash Record Locked	Yes
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	1
Event Counter	2
OnStar Notification Event Counter	1
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	17058
Time Between Events (sec)	39.15
Concurrent Event Flag Set	No
Event Severity Status: Rollover	No
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	Yes
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Pretensioner	No
Driver 1st Stage Deployment Loop Commanded	Yes
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	Yes
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	Yes
Passenger Pretensioner Deployment Loop #1 Commanded	Yes
Driver Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
High Voltage Battery Cutoff Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Rearward
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Data Not Available
SIR Warning Lamp Status	Off

SIR Warning Lamp ON/OFF Time Continuously (seconds)	655330
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	4636
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	880
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-32 [-52]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	1 [2]
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	12
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	15
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	12
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	12
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	12
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	12

DTCs Present at Time of Event (Event Record 2)

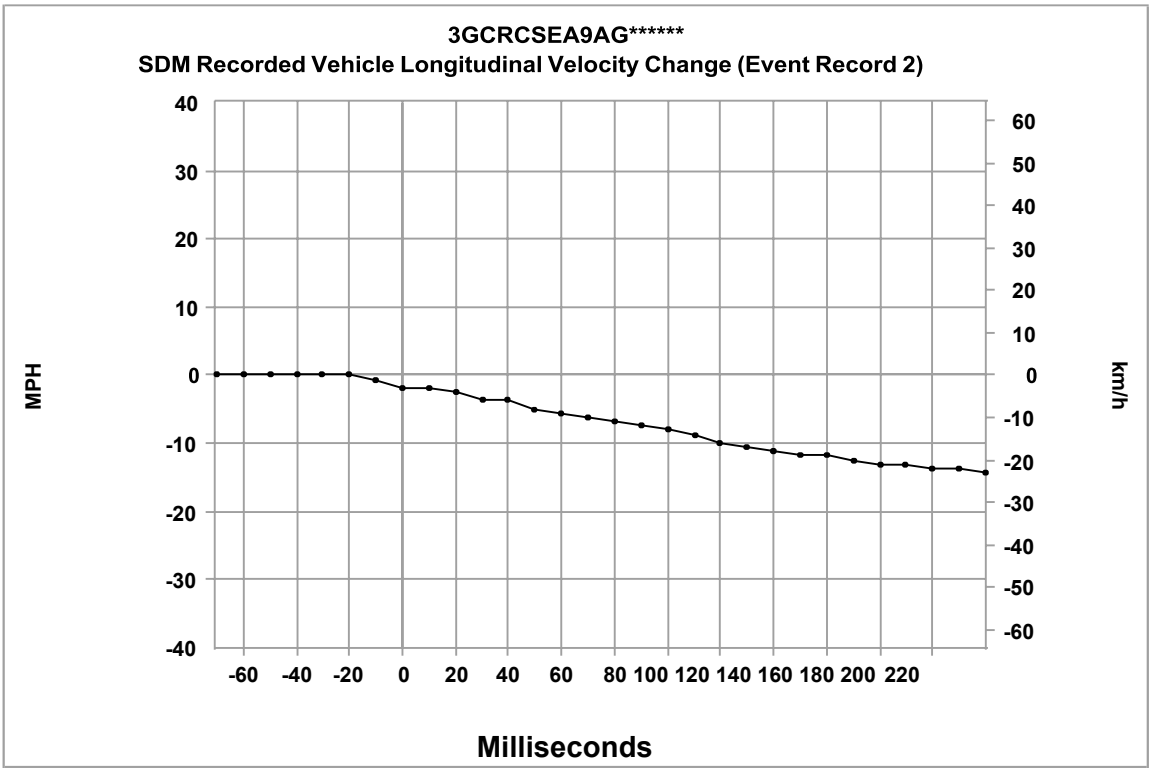
B0052-00

Pre-Crash Data -1 to -.5 sec (Event Record 2)

Times (sec)	Cruise Control Active	Cruise Control Resume Switch Active	Cruise Control Set Switch Active	Engine Torque (lb-ft [N-m])	Reduced Engine Power Mode Indicator
-1.0	Data Not Available	Data Not Available	Data Not Available	156 [211]	Off
-0.5	Data Not Available	Data Not Available	Data Not Available	145 [197]	Off

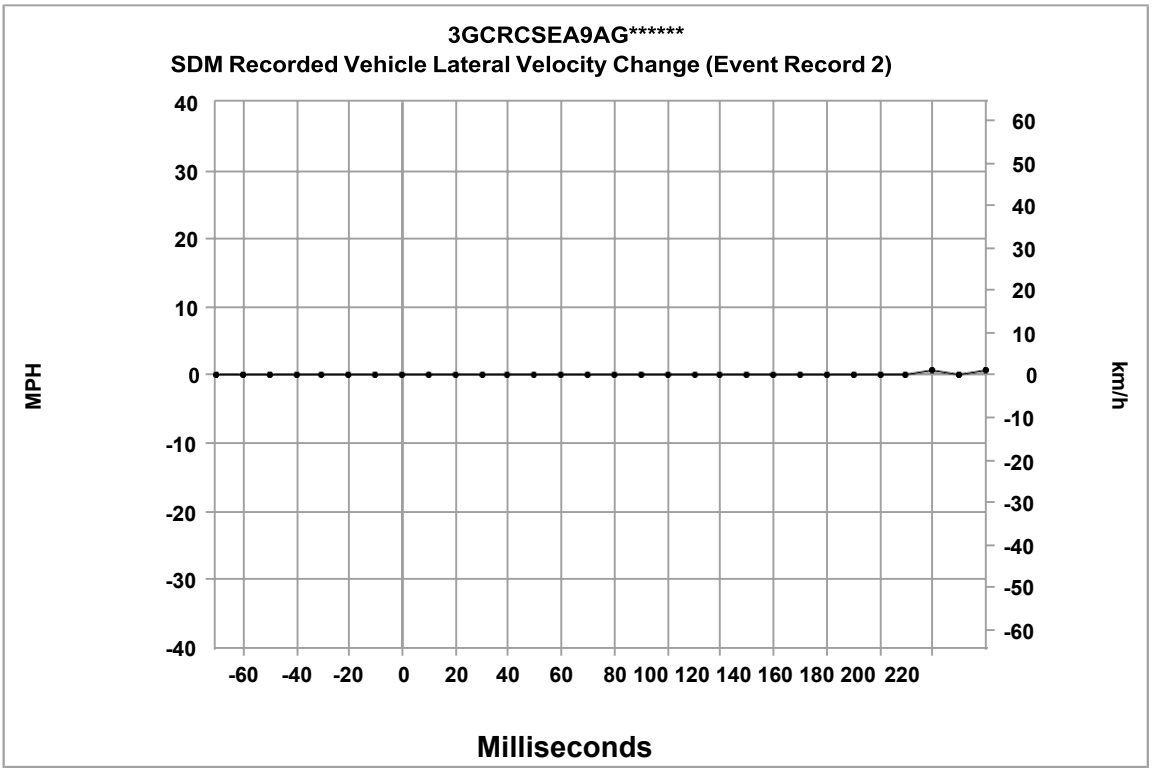
Pre-Crash Data -2.5 to -.5 sec (Event Record 2)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	62	Off	1920	39	55 [89]
-2.0	73	Off	1984	27	53 [85]
-1.5	46	Off	2880	41	52 [83]
-1.0	19	Off	3136	36	53 [86]
-0.5	19	Off	3136	35	52 [84]



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
-70	0.0	0.0
-60	0.0	0.0
-50	0.0	0.0
-40	0.0	0.0
-30	0.0	0.0
-20	0.0	0.0
-10	-0.6	-1.0
0	-1.9	-3.0
10	-1.9	-3.0
20	-2.5	-4.0
30	-3.7	-6.0
40	-3.7	-6.0
50	-5.0	-8.0
60	-5.6	-9.0
70	-6.2	-10.0
80	-6.8	-11.0
90	-7.5	-12.0
100	-8.1	-13.0
110	-8.7	-14.0
120	-9.9	-16.0
130	-10.6	-17.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
140	-11.2	-18.0
150	-11.8	-19.0
160	-11.8	-19.0
170	-12.4	-20.0
180	-13.0	-21.0
190	-13.0	-21.0
200	-13.7	-22.0
210	-13.7	-22.0
220	-14.3	-23.0



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
-70	0.0	0.0
-60	0.0	0.0
-50	0.0	0.0
-40	0.0	0.0
-30	0.0	0.0
-20	0.0	0.0
-10	0.0	0.0
0	0.0	0.0
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	0.0	0.0
60	0.0	0.0
70	0.0	0.0
80	0.0	0.0
90	0.0	0.0
100	0.0	0.0
110	0.0	0.0
120	0.0	0.0
130	0.0	0.0

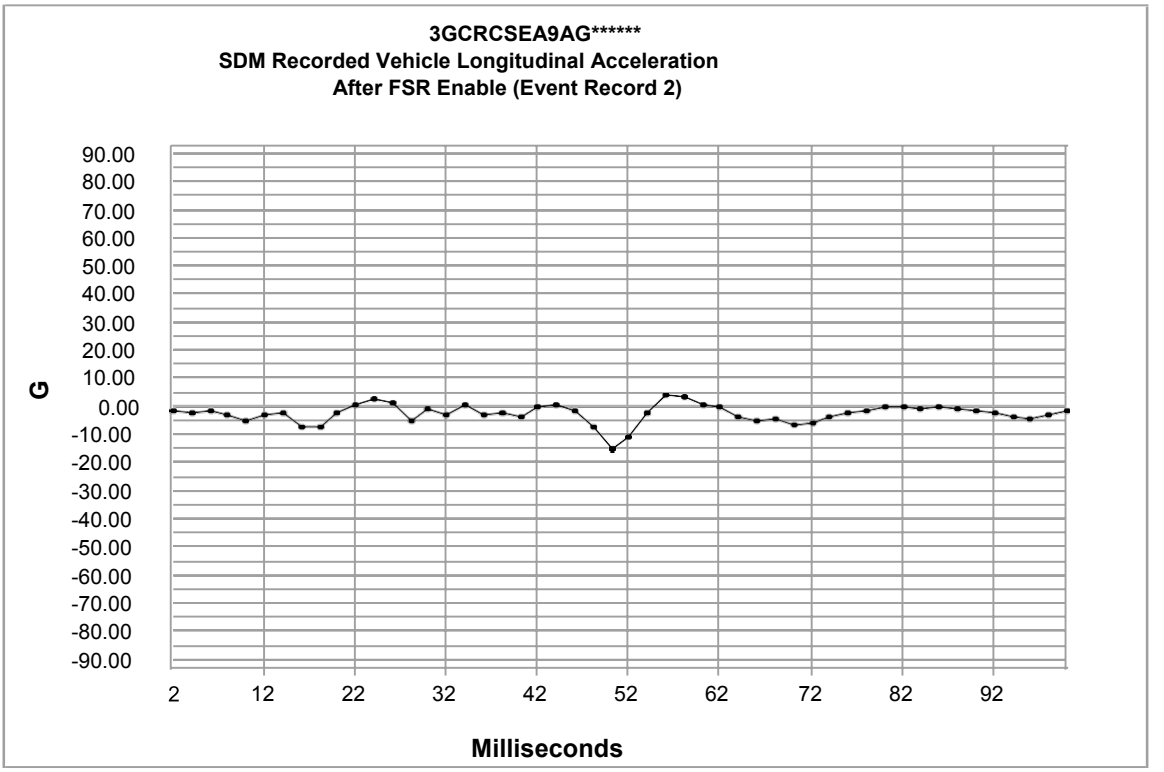
Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
140	0.0	0.0
150	0.0	0.0
160	0.0	0.0
170	0.0	0.0
180	0.0	0.0
190	0.0	0.0
200	0.6	1.0
210	0.0	0.0
220	0.6	1.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 2)

Contains No Recorded Data

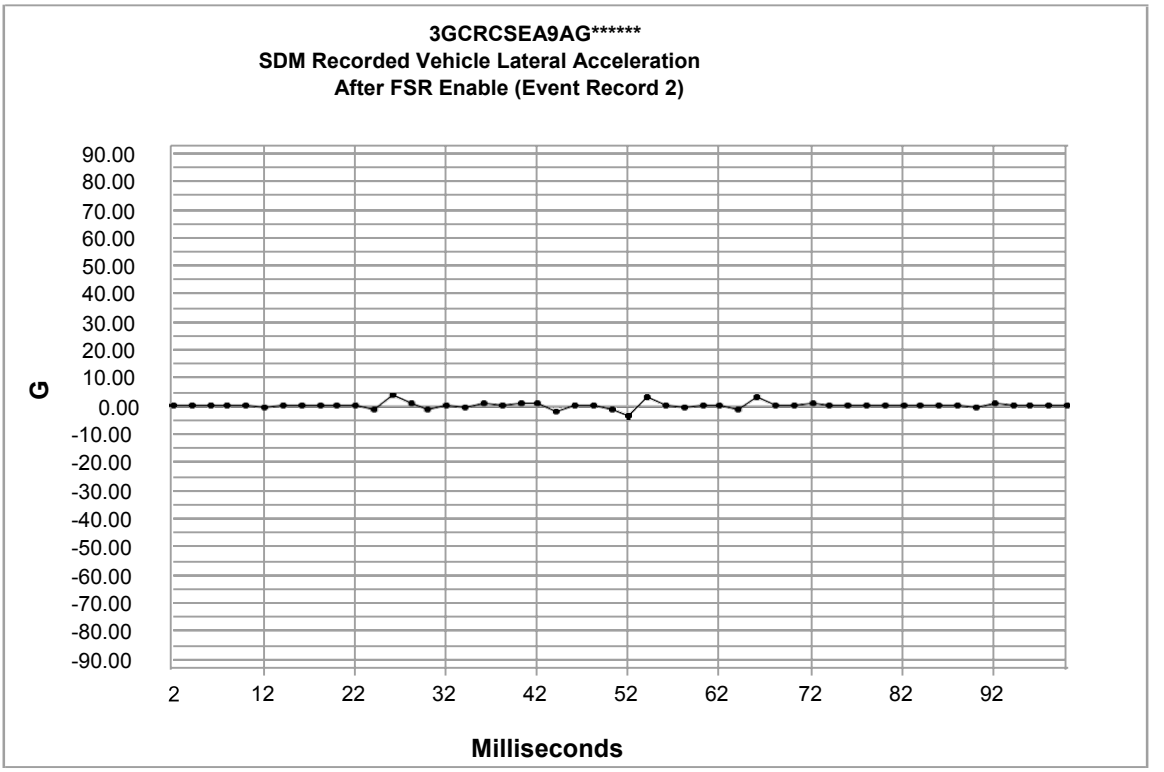
SDM Recorded Vehicle Roll Rate (Event Record 2)

Contains No Recorded Data



Time	G
2	-2.2
4	-2.9
6	-2.2
8	-3.6
10	-5.8
12	-3.6
14	-2.9
16	-8.0
18	-8.0
20	-2.9
22	0.0
24	2.2
26	0.7
28	-5.8
30	-1.5
32	-3.6
34	0.0
36	-3.6
38	-2.9
40	-4.4
42	-0.7
44	0.0
46	-2.2
48	-8.0
50	-15.3

Time	G
52	-11.6
54	-2.9
56	3.6
58	2.9
60	0.0
62	-0.7
64	-4.4
66	-5.8
68	-5.1
70	-7.3
72	-6.5
74	-4.4
76	-2.9
78	-2.2
80	-0.7
82	-0.7
84	-1.5
86	-0.7
88	-1.5
90	-2.2
92	-2.9
94	-4.4
96	-5.1
98	-3.6
100	-2.2



Time	G
2	0.0
4	0.0
6	0.0
8	0.0
10	0.0
12	-0.7
14	0.0
16	0.0
18	0.0
20	0.0
22	0.0
24	-1.5
26	3.6
28	0.7
30	-1.5
32	0.0
34	-0.7
36	0.7
38	0.0
40	0.7
42	0.7
44	-2.2
46	0.0
48	0.0
50	-1.5

Time	G
52	-3.6
54	2.9
56	0.0
58	-0.7
60	0.0
62	0.0
64	-1.5
66	2.9
68	0.0
70	0.0
72	0.7
74	0.0
76	0.0
78	0.0
80	0.0
82	0.0
84	0.0
86	0.0
88	0.0
90	-0.7
92	0.7
94	0.0
96	0.0
98	0.0
100	0.0

Event Data (Event Record 3)

Event Recording Complete	Yes
Event Record Type	Non-Deployment
Crash Record Locked	No
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	1
Event Counter	3
OnStar Notification Event Counter	2
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	No
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	17058
Time Between Events (sec)	0.99
Concurrent Event Flag Set	No
Event Severity Status: Rollover	No
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Pretensioner	No
Driver 1st Stage Deployment Loop Commanded	No
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	No
Passenger Pretensioner Deployment Loop #1 Commanded	No
Driver Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
High Voltage Battery Cutoff Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Rearward
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Data Not Available
SIR Warning Lamp Status	On

SIR Warning Lamp ON/OFF Time Continuously (seconds)	0
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	0
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	400
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-14 [-23]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	0 [0]
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available

DTCs Present at Time of Event (Event Record 3)

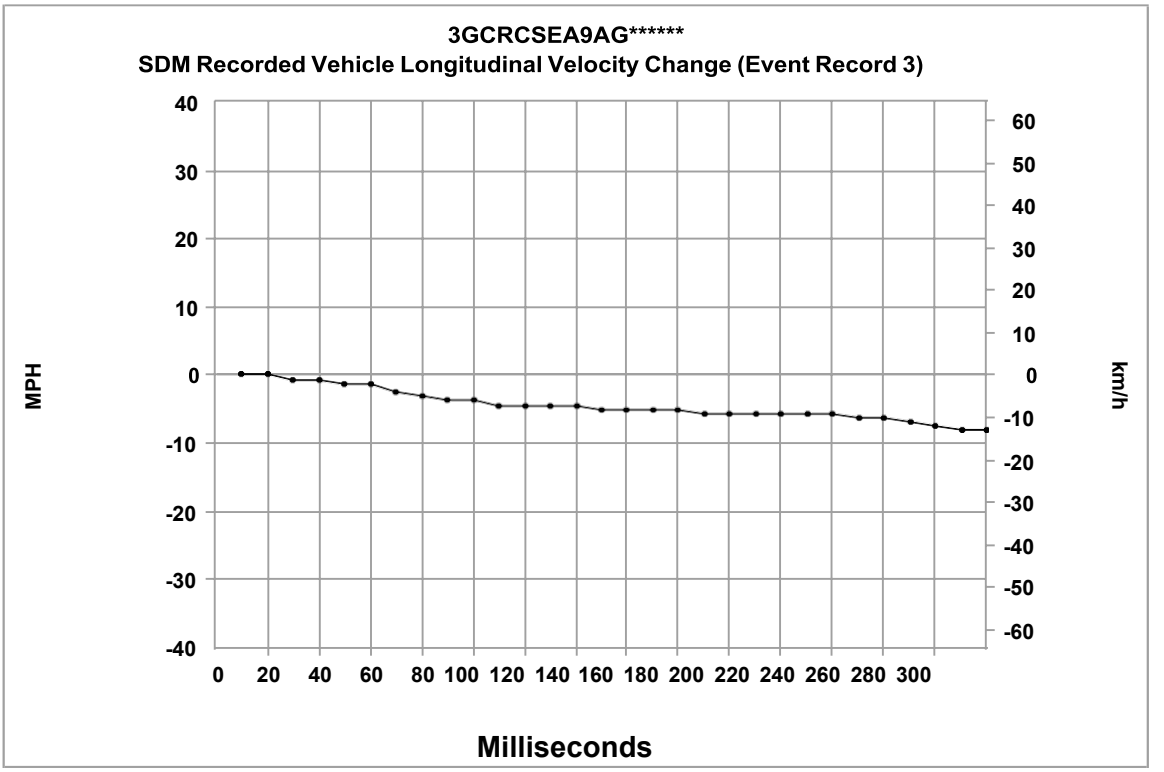
B0052-00

Pre-Crash Data -1 to -.5 sec (Event Record 3)

Times (sec)	Cruise Control Active	Cruise Control Resume Switch Active	Cruise Control Set Switch Active	Engine Torque (lb-ft [N-m])	Reduced Engine Power Mode Indicator
-1.0	Data Not Available	Data Not Available	Data Not Available	135 [183]	Off
-0.5	Data Not Available	Data Not Available	Data Not Available	166 [224]	Off

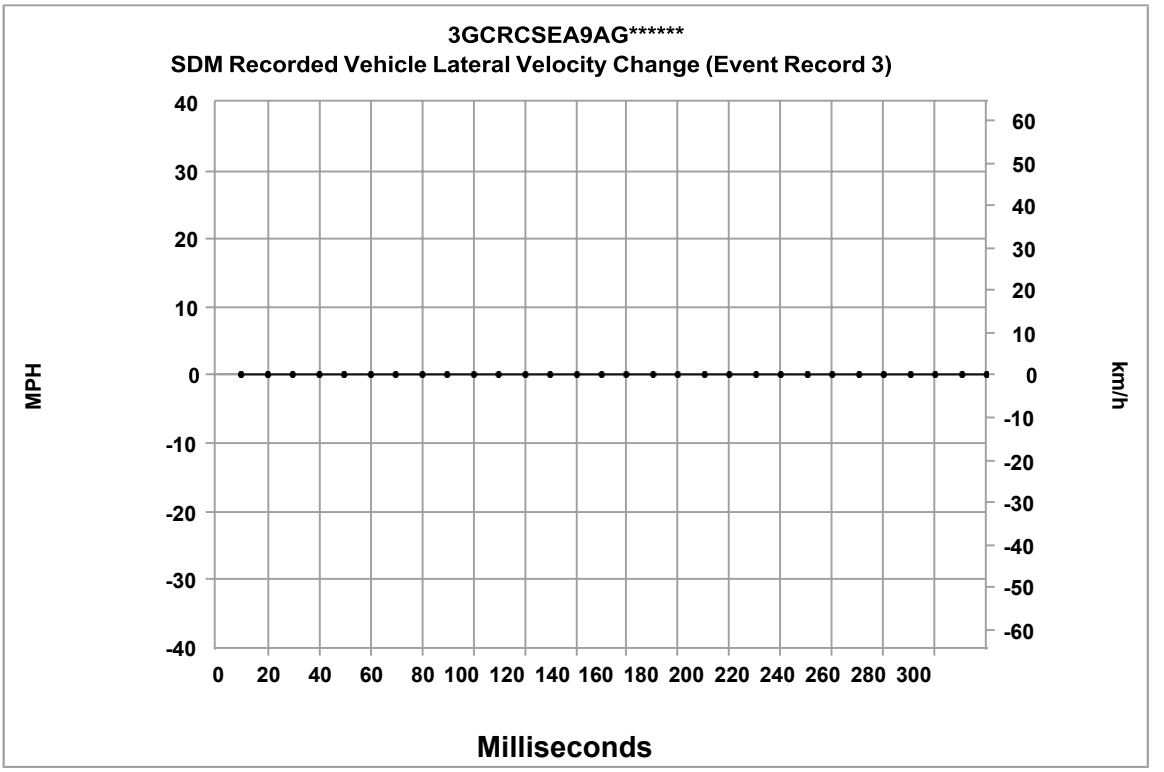
Pre-Crash Data -2.5 to -.5 sec (Event Record 3)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	46	Off	2880	41	52 [83]
-2.0	19	Off	3136	36	53 [86]
-1.5	99	On	2496	99	47 [76]
-1.0	99	On	2816	99	25 [41]
-0.5	99	On	2560	99	24 [38]



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	0.0	0.0
20	0.0	0.0
30	-0.6	-1.0
40	-0.6	-1.0
50	-1.2	-2.0
60	-1.2	-2.0
70	-2.5	-4.0
80	-3.1	-5.0
90	-3.7	-6.0
100	-3.7	-6.0
110	-4.3	-7.0
120	-4.3	-7.0
130	-4.3	-7.0
140	-4.3	-7.0
150	-5.0	-8.0
160	-5.0	-8.0
170	-5.0	-8.0
180	-5.0	-8.0
190	-5.6	-9.0
200	-5.6	-9.0
210	-5.6	-9.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-5.6	-9.0
230	-5.6	-9.0
240	-5.6	-9.0
250	-6.2	-10.0
260	-6.2	-10.0
270	-6.8	-11.0
280	-7.5	-12.0
290	-8.1	-13.0
300	-8.1	-13.0



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	0.0	0.0
60	0.0	0.0
70	0.0	0.0
80	0.0	0.0
90	0.0	0.0
100	0.0	0.0
110	0.0	0.0
120	0.0	0.0
130	0.0	0.0
140	0.0	0.0
150	0.0	0.0
160	0.0	0.0
170	0.0	0.0
180	0.0	0.0
190	0.0	0.0
200	0.0	0.0
210	0.0	0.0

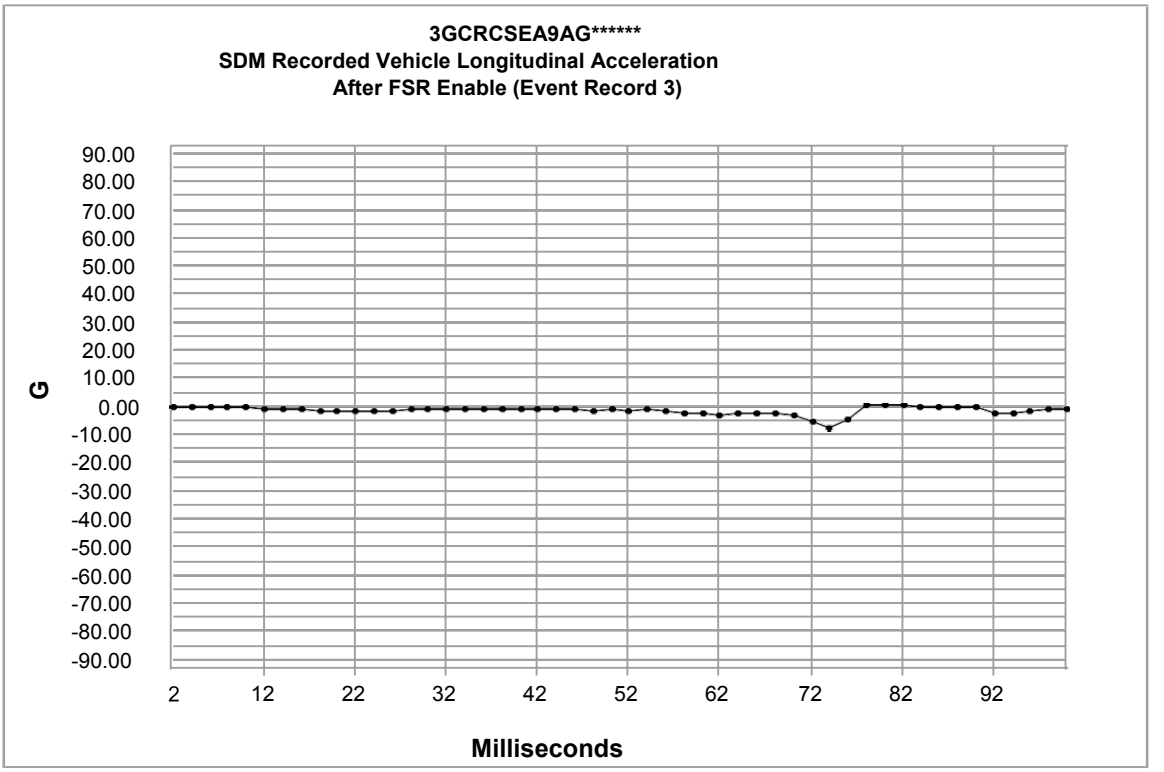
Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	0.0	0.0
230	0.0	0.0
240	0.0	0.0
250	0.0	0.0
260	0.0	0.0
270	0.0	0.0
280	0.0	0.0
290	0.0	0.0
300	0.0	0.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 3)

Contains No Recorded Data

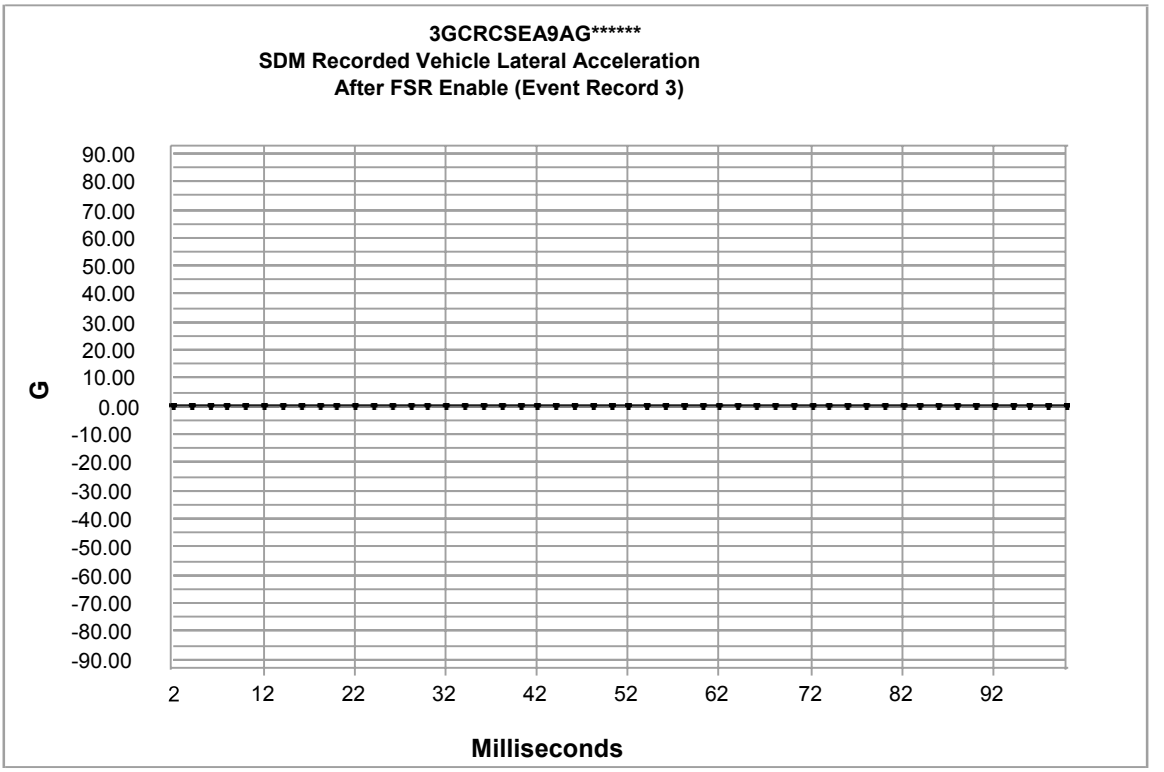
SDM Recorded Vehicle Roll Rate (Event Record 3)

Contains No Recorded Data



Time	G
2	-0.7
4	-0.7
6	-0.7
8	-0.7
10	-0.7
12	-1.5
14	-1.5
16	-1.5
18	-2.2
20	-2.2
22	-2.2
24	-2.2
26	-2.2
28	-1.5
30	-1.5
32	-1.5
34	-1.5
36	-1.5
38	-1.5
40	-1.5
42	-1.5
44	-1.5
46	-1.5
48	-2.2
50	-1.5

Time	G
52	-2.2
54	-1.5
56	-2.2
58	-2.9
60	-2.9
62	-3.6
64	-2.9
66	-2.9
68	-2.9
70	-3.6
72	-5.8
74	-8.0
76	-5.1
78	0.0
80	0.0
82	0.0
84	-0.7
86	-0.7
88	-0.7
90	-0.7
92	-2.9
94	-2.9
96	-2.2
98	-1.5
100	-1.5



Time	G
2	0.0
4	0.0
6	0.0
8	0.0
10	0.0
12	0.0
14	0.0
16	0.0
18	0.0
20	0.0
22	0.0
24	0.0
26	0.0
28	0.0
30	0.0
32	0.0
34	0.0
36	0.0
38	0.0
40	0.0
42	0.0
44	0.0
46	0.0
48	0.0
50	0.0

Time	G
52	0.0
54	0.0
56	0.0
58	0.0
60	0.0
62	0.0
64	0.0
66	0.0
68	0.0
70	0.0
72	0.0
74	0.0
76	0.0
78	0.0
80	0.0
82	0.0
84	0.0
86	0.0
88	0.0
90	0.0
92	0.0
94	0.0
96	0.0
98	0.0
100	0.0

Hexadecimal Data

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DPID $15
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DPID $16
22 09 0A 0D 0E 22 22

DPID $17
22 22 22 22 00 00 00

DPID $32
00 FF 42 AA 00 00 00

DPID $35
78 00 00 00 00 00 00

DID $01
41 55 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $03
41 54 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $05
41 48 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $07
41 4A 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $09
44 41 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $0B
44 42 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $0D
01 00 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $0F
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DID $30
01 00 03 02

DID $90
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DID $9A
06 01

DID $B4
41 53 30 36 37 34 4B 5A 30 30 36 38 39 55 4B 57

DID $C1
00 CE 11 58

DID $C2
01 3E E2 D6

DID $C3
01 AE 4B E4

DID $CB
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00 CE 01 02

DID $31

0000	A5	00	00	00	01	00	0F	42	A2	FF
0010	FF	00	FF	FF	00	00	00	00	00	00
0020	4C	FC	FC	30	00	00	C0	10	22	22
0030	22	22	22	00	00	FF	F0	1B	1B	1B
0040	1B	1B	09	40	09	43	2F	2F	2F	2F
0050	2F	6F	6F	6F	6F	6E	0C	FF	FD	12
0060	1C	FD	FF	FF	FF	FF	FF	FF	FF	FF
0070	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0080	FF	FF	FF	FF	FF	FF	FF	FF	FF	0C
0090	73	7F	FF	FF	FF	FF	FF	FF	FF	FF
0100	7F	7F	7F	7F	7E	7F	7C	7F	7B	7F
0110	78	7F	76	7F	75	7F	74	7F	73	7F
0120	73	7F	73	7F	73	7F	73	7F	73	7F
0130	73	7F	73	7F	74	7F	74	7F	74	7F
0140	74	7F	74	7F	74	7F	74	7F	74	7F
0150	74	7F	74	7F	74	7F	74	7F	74	7F
0160	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0170	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0180	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0190	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0200	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0210	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0220	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0230	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0240	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0250	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0260	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0270	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0280	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0290	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0300	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0310	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0320	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0330	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0340	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0350	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0360	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0370	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0380	FF	FF	FF	FF	FF	FF	7E	7E	7E	7D
0390	7D	7B	7A	79	7A	7B	7B	7B	7A	79
0400	7A	79	78	79	79	78	75	77	76	77
0410	78	78	78	78	77	78	78	78	79	79
0420	79	79	7B	7B	7D	7C	7C	7D	7D	7D
0430	7E	7E	7F	7F	7F	7F	7F	7F	7F	7F
0440	7F	7F	7F	7F	7E	7F	7F	7F	7F	7F
0450	7F	7F	7F	7F	7F	7F	7E	7F	7F	7E
0460	7F	7F	7F	7E	7E	7E	7E	7E	7E	7F
0470	7E	7E	7F	7F	7F	7F	7F	7F	7F	7F
0480	7F	7F	7F	7F	7F	7F	00	00	00	00
0490	00	00	00	00	00	00	00	00	00	00

DID $32

0000	A5	F0	01	00	02	01	0F	42	A2	0F
0010	4B	00	FF	FF	08	A3	03	00	00	00
0020	4C	FC	FC	30	00	00	C0	10	13	13
0030	2E	49	3E	00	00	FF	F0	31	31	2D
0040	1F	1E	08	2A	08	46	23	24	29	1B
0050	27	54	56	53	55	59	0C	FF	FD	12
0060	1C	FD	80	52	00	FF	FF	FF	FF	FF
0070	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0080	FF	FF	FF	FF	FF	FF	FF	FF	FF	58
0090	4B	81	04	05	FF	FF	04	04	04	04
0100	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F

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 0110   7F 7F 7E 7F 7C 7F 7C 7F 7B 7F
 0120   79 7F 79 7F 77 7F 76 7F 75 7F
 0130   74 7F 73 7F 72 7F 71 7F 6F 7F
 0140   6E 7F 6D 7F 6C 7F 6C 7F 6B 7F
 0150   6A 7F 6A 7F 69 80 69 7F 68 80
 0160   FF FF FF FF FF FF FF FF FF FF
 0170   FF FF FF FF FF FF FF FF FF FF
 0180   FF FF FF FF FF FF FF FF FF FF
 0190   FF FF FF FF FF FF FF FF FF FF
 0200   FF FF FF FF FF FF FF FF FF FF
 0210   FF FF FF FF FF FF FF FF FF FF
 0220   FF FF FF FF FF FF FF FF FF FF
 0230   FF FF FF FF FF FF FF FF FF FF
 0240   FF FF FF FF FF FF FF FF FF FF
 0250   FF FF FF FF FF FF FF FF FF FF
 0260   FF FF FF FF FF FF FF FF FF FF
 0270   FF FF FF FF FF FF FF FF FF FF
 0280   FF FF FF FF FF FF FF FF FF FF
 0290   FF FF FF FF FF FF FF FF FF FF
 0300   FF FF FF FF FF FF FF FF FF FF
 0310   FF FF FF FF FF FF FF FF FF FF
 0320   FF FF FF FF FF FF FF FF FF FF
 0330   FF FF FF FF FF FF FF FF FF FF
 0340   FF FF FF FF FF FF FF FF FF FF
 0350   FF FF FF FF FF FF FF FF FF FF
 0360   FF FF FF FF FF FF FF FF FF FF
 0370   FF FF FF FF FF FF FF FF FF FF
 0380   FF FF FF FF FF FF 7C 7B 7C 7A
 0390   77 7A 7B 74 74 7B 7F 82 80 77
 0400   7D 7A 7F 7A 7B 79 7E 7F 7C 74
 0410   6A 6F 7B 84 83 7F 7E 79 77 78
 0420   75 76 79 7B 7C 7E 7E 7D 7E 7D
 0430   7C 7B 79 78 7A 7C 7F 7F 7F 7F
 0440   7F 7E 7F 7F 7F 7F 7F 7D 84 80
 0450   7D 7F 7E 80 7F 80 80 7C 7F 7F
 0460   7D 7A 83 7F 7E 7F 7F 7D 83 7F
 0470   7F 80 7F 7F 7F 7F 7F 7F 7F 7F
 0480   7E 80 7F 7F 7F 7F 00 00 00 00
 0490   00 00 00 00 00 00 00 00 00 00

DID $33

 0000   A5 30 01 00 03 02 0D 42 A2 00
 0010   63 00 FF FF 00 00 00 00 00 00
 0020   4C FC FC 30 00 00 C0 10 63 63
 0030   63 13 2E 54 00 FF F0 28 2C 27
 0040   31 2D 08 61 08 0E 63 63 63 24
 0050   29 26 29 4C 56 53 0D 00 00 00
 0060   00 FD 80 52 00 FF FF FF FF FF
 0070   FF FF FF FF FF FF FF FF FF FF
 0080   FF FF FF FF FF FF FF FF FF 28
 0090   68 7F FF FF FF FF FF FF FF FF
 0100   7F 7F 7F 7F 7E 7F 7E 7F 7D 7F
 0110   7D 7F 7B 7F 7A 7F 79 7F 79 7F
 0120   78 7F 78 7F 78 7F 78 7F 77 7F
 0130   77 7F 77 7F 77 7F 76 7F 76 7F
 0140   76 7F 76 7F 76 7F 76 7F 75 7F
 0150   75 7F 74 7F 73 7F 72 7F 72 7F
 0160   FF FF FF FF FF FF FF FF FF FF
 0170   FF FF FF FF FF FF FF FF FF FF
 0180   FF FF FF FF FF FF FF FF FF FF
 0190   FF FF FF FF FF FF FF FF FF FF
 0200   FF FF FF FF FF FF FF FF FF FF
 0210   FF FF FF FF FF FF FF FF FF FF
 0220   FF FF FF FF FF FF FF FF FF FF
 0230   FF FF FF FF FF FF FF FF FF FF
 0240   FF FF FF FF FF FF FF FF FF FF
 0250   FF FF FF FF FF FF FF FF FF FF
```

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0260   FF FF FF FF FF FF FF FF FF FF
0270   FF FF FF FF FF FF FF FF FF FF
0280   FF FF FF FF FF FF FF FF FF FF
0290   FF FF FF FF FF FF FF FF FF FF
0300   FF FF FF FF FF FF FF FF FF FF
0310   FF FF FF FF FF FF FF FF FF FF
0320   FF FF FF FF FF FF FF FF FF FF
0330   FF FF FF FF FF FF FF FF FF FF
0340   FF FF FF FF FF FF FF FF FF FF
0350   FF FF FF FF FF FF FF FF FF FF
0360   FF FF FF FF FF FF FF FF FF FF
0370   FF FF FF FF FF FF FF FF FF FF
0380   FF FF FF FF FF FF 7E 7E 7E 7E
0390   7E 7D 7D 7D 7C 7C 7C 7C 7C 7D
0400   7D 7D 7D 7D 7D 7D 7D 7D 7D 7C
0410   7D 7C 7D 7C 7B 7B 7A 7B 7B 7B
0420   7A 77 74 78 7F 7F 7F 7E 7E 7E
0430   7E 7B 7B 7C 7D 7D 7F 7F 7F 7F
0440   7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
0450   7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
0460   7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
0470   7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
0480   7F 7F 7F 7F 7F 7F 00 00 00 00
0490   00 00 00 00 00 00 00 00 00 00
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April 2019

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

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