U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

NHTSA

DOT HS 812 844

December 2019

Special Crash Investigations On-Site Small Overlap/Oblique Impact Investigation Vehicle: 2014 GMC Acadia Location: Missouri Crash Date: June 2016

DISCLAIMER

Suggested APA Format Citation:

Indiana University Transportation Research Center. (2019, December). *Special Crash Investigations: On-Site Small Overlap/Oblique Impact Investigation; Vehicle: 2014 GMC Acadia; Location: Missouri; Crash Date: June 2016* (Report No. DOT 812 844). National Highway Traffic Safety Administration.

Technical Report Documentation Page

1. Report No. DOT HS 812 844	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Special Crash Investigations On-Site Small Overlap/Oblique Impact Investigation Vehicle: 2014 GMC Acadia Location: Missouri Crash Date: June 2016		*5. Report Date:* December 2019 *6. Performing Organization Code*	
7. Author Indiana University Transportation Research Center		*8. Performing Organization Report No.* IN16027	
9. Performing Organization Name and Address Transportation Research Center Indiana University 501 South Madison Street, Suite 105 Bloomington, Indiana 47403-2452		*10. Work Unit No. (TRAIS)* *11. Contract or Grant No.* DTNH22-12-C-00270	
12. Sponsoring Agency Name and Address National Highway Traffic Safety Administration National Center for Statistics and Analysis (NSA-110) 1200 New Jersey Avenue SE Washington, D.C. 20590-0003		*13. Type of Report and Period Covered* Technical Report Crash Date: June 2016 *14. Sponsoring Agency Code*	
15. Supplementary Notes Each crash represents a unique sequence of events and 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 this report was published.			
16. Abstract This report documents the on-site investigation of a small overlap/oblique impact to a 2014 GMC Acadia. This crash occurred on a narrow, two-lane, rural roadway with no pavement markings. The GMC was a 4-door sport utility vehicle (SUV) equipped with multi-stage frontal air bags, front-center air bag, front seat-mounted side impact air bags, and rollover/side impact inflatable curtain (IC) air bags that were not compliant to Federal Motor Vehicle Safety Standard (FMVSS) No. 226, "Ejection Mitigation." An unbelted 41-year-old female drove the vehicle. The GMC was traveling east in the eastbound lane approaching a hill crest. A 2011 Chevrolet Cruze was traveling west and was partially in the eastbound lane. The GMC crested the hill as the Chevrolet was approaching the hill crest. The front left corner of the Chevrolet struck the front left corner of the GMC (Event 1). The impact resulted in a stage 1 and 2 deployment of the GMC's driver's frontal air bag and deployment of the both IC air bags. The GMC's Event Data Recorder (EDR) reported the maximum longitudinal and lateral velocity changes as -42 km/h (-26 mph) and 3 km/h (2 mph), respectively. The impact caused both vehicles to rotate counterclockwise (CCW). The rear portions of the GMC and Chevrolet then departed the south and north sides of the road, respectively, and the right quarter panel of each vehicle struck a woven wire fence (Events 2 and 3) as both vehicles came to final rest. The driver of the GMC sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center where she was treated in the emergency room for moderate severity injuries and released. A belted 21-year-old female driver occupied the Chevrolet. She sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center. The driver's injuries and level of treatment are not known. Both vehicles were towed from the crash scene due to damage.			
17. Key Words inflatable curtain air bag, motor vehicle traffic crash small overlap, impact oblique, moderate injury severity impact		*18. Distribution Statement* Document is available to the public from the National Technical Information Service, www.ntis.gov.	
19 Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 38	*22. Price*

Form DOT 1700.7 (8-72) Reproduction of completed page authorized

Table of Contents

Special Crash Investigations
On-Site Small Overlap/Oblique Impact Investigation
Case Number: IN16027
Vehicle: 2014 GMC Acadia
Location: Missouri
Crash Date: June 2016

BACKGROUND

This report documents the on-site investigation of a small overlap/oblique impact to a 2014 GMC Acadia (**Figure 1**). This crash investigation was undertaken by the National Highway Traffic Safety Administration in November 2016, after the crash was identified by the Special Crash Investigation (SCI) team at the Indiana University Transportation Research Center through an online search of Missouri crash report abstracts. This investigation was assigned in November 2016, when permission for the vehicle inspection was obtained from the insurance company. The crash occurred in June 2016 at 1200 hours in the afternoon in Missouri and was investigated by a local police agency. The crash involved the GMC and a 2011 Chevrolet Cruze. The GMC and crash scene were inspected in November 2016. The Chevrolet could not be inspected since it was sold for salvage.

Figure 1: The damaged 2014 GMC Acadia

This crash occurred on a narrow, two-lane, rural roadway with no pavement markings. The GMC was a 4-door sport utility vehicle (SUV) equipped with multi-stage frontal air bags, front- center air bag, front seat-mounted side impact air bags, and rollover/side impact inflatable curtain (IC) air bags that were not compliant to Federal Motor Vehicle Safety Standard (FMVSS) No. 226, "Ejection Mitigation." An unbelted 41-year-old female driver occupied the vehicle. The GMC was traveling east in the eastbound lane approaching a hill crest. The Chevrolet was traveling west and was partially in the eastbound lane. The GMC crested the hill as the Chevrolet was approaching the hill crest. The front left corner of the Chevrolet struck the front left corner of the GMC (Event 1). The impact resulted in a stage 1 and 2 deployment of the GMC's driver's frontal air bag and deployment of the both IC air bags. The GMC's event data recorder (EDR) reported the maximum longitudinal and lateral velocity changes as -42 km/h (-26 mph) and 3 km/h (2 mph), respectively. The impact caused both vehicles to rotate counterclockwise. The rear portions of the GMC and Chevrolet then departed the south and north sides of the road, respectively, and the right quarter panel of each vehicle struck a woven wire fence (Events 2 and 3) as both vehicles came to final rest. The driver of the GMC sustained police-reported "B" (non-

incapacitating) injuries and was transported by ambulance to a trauma center where she was treated in the emergency room for moderate severity injuries and released. A belted 21-year-old female driver occupied the Chevrolet. She sustained police- reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center. The driver's injuries and level of treatment are not known. Both vehicles were towed from the crash scene due to damage.

CRASH SUMMARY

Crash Site

This crash occurred during at noon on a narrow, two-lane, rural roadway with no pavement markings. The weather conditions were clear with 16 kilometers (10 miles) visibility, southwest winds at 21 km/h (13 mph), a temperature of 32.8 °C (91 °F), and a dew point of 22.2 °C (72 °F), according to local weather reports. The roadway traversed in an east\west direction and was bordered by an embankment and woven wire fence on each side. The total width of the roadway was only 3.7 m (12.1 ft), which would require at least one driver to pull slightly off the roadway before both vehicles could safety travel past one another. The point of impact occurred 6.0 m (19.7 ft) east of a hillcrest. A "Hill Blocks View" warning sign with a 24 km/h (15 mph) speed advisory sign was located 46.0 m (150.9 ft) east of the hillcrest. The grade on the eastbound and westbound approach to the hillcrest was 11 percent and 9 percent, respectively. The roadway surface was dry bituminous. There were no roadway pavement markings. The speed limit was 32 km/h (20 mph). The crash diagram is included at the end of this report.

Figure 2: Eastbound approach of the GMC

Pre-Crash

The GMC was traveling east in the eastbound lane (**Figure 2**) and the Chevrolet was traveling west (**Figure 3**). Each vehicle was approaching a hillcrest and the Chevrolet was partially in the GMC's travel lane. The GMC's EDR reported the vehicle's travel speed as 66 km/h (41 mph) at -5.0 sec prior to algorithm enable (AE) gradually decelerating to 58 km/h (36 mph) at -0.5 sec, which was the end of the pre-crash recording. The GMC crested the hill as the Chevrolet was approaching the hillcrest.

Figure 3: Westbound approach of the Chevrolet

Crash

The front left corner of the Chevrolet struck the front left corner of the GMC (Event 1). The impact occurred 0.4 m (1.3 ft) into the GMC's travel lane (**Figure 4**). The impact resulted in stage 1 and 2 deployment of the GMC's driver's frontal air bag and deployment of the both IC air bags. The vehicle's EDR reported the maximum longitudinal and lateral velocity changes as -42 km/h (-26 mph) and 3 km/h (2 mph), respectively. The missing vehicle algorithm of the WinSMASH program calculated the GMC's total delta-V as 15 km/h (9 mph). The longitudinal and lateral velocity changes were -15 km/h (-9 mph) and 0 km/h (1 mph), respectively. WinSMASH calculated the total delta-v for the Chevrolet as 23 km/h (14 mph). The longitudinal and lateral velocity changes were -23 km/h (–14 mph) and 0 km/h, respectively. The WinSMASH results were considered unreasonably low based on the damage to the GMC and the EDR-reported velocity change data.

Figure 4: View east to point of impact in GMC's travel lane

The frontal impact caused both vehicles to rotate counterclockwise. The rear portions of the GMC and Chevrolet then departed the south and north sides of the roadway, respectively, and the right quarter panel of each vehicle struck a woven wire fence (Events 2 and 3). Each vehicle then came to final rest partially on the roadway with the GMC heading northeast and Chevrolet heading southwest.

Post-Crash

The police were notified of the crash at 1207 hours and arrived on scene at 1221 hours. The GMC's driver sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center where she was treated in the emergency room for moderate severity injuries and released. The driver of the Chevrolet sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center. Her injuries and level of treatment are not known. Both vehicles were towed from the crash scene due to damage

2014 GMC ACADIA

Description

The GMC was an all-wheel drive, 7-occupant, 4-door, SUV with the VIN 1GKKVTKD1EJxxxxxx) that was manufactured in June 2013. The vehicle was equipped with a 3.6-liter, V-6 engine, 6-speed automatic transmission with sport shift feature, 4-wheel antilock brakes with electronic brake force distribution, brake assist, traction control, and electronic stability control (ESC). The vehicle was also equipped with forward collision alert, lane

departure warning, blind spot monitoring, cross traffic alert, multi-stage frontal air bags, front-center air bag, front seat-mounted side impact air bags, and rollover/side impact IC air bags that were not compliant with FMVSS No. 226, "Ejection Mitigation." The vehicle's steering assembly was equipped with a tilt/telescoping column. The tilt and telescoping adjustments at the time of the crash are not known. The specified wheelbase was 302 cm (118.9 in).

The vehicle manufacturer's recommended tire size was P255/55R20. The vehicle was equipped with Mastercraft Courser tires of the recommended size. The vehicle manufacturer's recommended cold tire pressure for the front and rear tires was 241 kPa (35 psi). The tires were all in good condition prior to the crash. The front row was equipped with driver and passenger leather-covered bucket seats with adjustable head restraints. The second row was equipped with leather-covered bucket seats with fixed head restraints. The third row was equipped with leather-covered split bench seats with folding backs and fixed head restraints in the outboard seating positions. The driver's seat track was adjusted between the middle and rear-most positions and the seat back was reclined 34 degrees aft of vertical. The remaining seats were not occupied at the time of the crash.

Exterior Damage

The front and left planes of the GMC were damaged during the impact with the Chevrolet. The direct damage to the front plane of the GMC involved the left corner of the front bumper, grille, and headlamp/turn signal assemblies. The direct damage was 50 cm (19.6 in) long beginning at the left corner of the bumper fascia. The Field L was 126 cm (49.6 in) long and began at the same location. The direct damage also extended onto the left fender and left front wheel. Crush measurements were taken on the bumper bar and the maximum residual crush was 8 cm (3.1 in) occurring at C_1, which was located at the left stub frame rail (**Figure 5**). The crush values were: C_1 = 8 cm (3.1 in), C_2 = 3 cm (1.2 in), C_3 = 0 cm, C_4 = 0 cm, C_5 = 0 cm, C_6 = 0 cm.

Figure 5: Left side view of the crush to the GMC's bumper bar

Damage Classification

The Collision Deformation Classification (CDC) was 12FLEW1 (0 degrees). The severity of the damage was moderate.

Exterior Damage Event 2
The right quarter panel sustained direct damage from impact with a woven wire fence. The direct damage began 34 cm (13.4 in) rear of the right rear axle and extended 58 cm (22.8 in) rearward on the quarter panel. The Field L was 58 cm (22.8 in) long and began at the same location. The damage consisted only of scratches. There was no crush from this impact.

Damage Classification Event 2
The CDC was 03RBEW2 (90 degrees). The severity of the damage was minor.

Event Data Recorder
The GMC's EDR was imaged with version 17.1 of the Bosch Crash Data Retrieval software and reported with version 17.6.1. The vehicle was without power and the EDR was imaged via the diagnostic link connector (DLC) by supplying power to the vehicle via the fuse block. The EDR reported a deployment event. The EDR report is attached at the end of this report as **Appendix A**.

The EDR reported that the crash record was locked and OnStar air bag deployment data was sent. A complete file was recorded and OnStar velocity change data was also sent. The driver's seat belt status was reported as "Not Buckled" and the frontal air bag warning lamp was reported as "Off." Data Trouble Code (DTC) B0052-00 (air bag deployment commanded) was reported. The ignition cycles at the crash and when the data were imaged were reported as 6,601 and 6,622, respectively.

Deployment Event: Deployment of both stages of the driver's frontal air bag and both ICes were reported. The times from AE to first and second stage deployment command for the driver's frontal air bag were 23 and 28 msec, respectively. The time to deployment command for both IC air bags was 28 msec. The maximum longitudinal and lateral delta-vs reported on the "System Status at Event" record were -42 km/h (-26 mph) and 3 km/h (2 mph), respectively occurring at 196 and 146 msec, respectively following AE.

Interior Damage
The interior of the GMC sustained no intrusion of the occupant compartment. The DLC housing on the lower left instrument panel was deformed from contact by the driver's left knee. No other discernable evidence of occupant contact was observed. There was no damage to any of the glazing. All of the doors and the tailgate remained closed and operational.

Manual Restraint Systems
The front and second rows were equipped with 3-point lap and shoulder seat belts with locking latch plates. The front row seat belts were equipped with adjustable upper anchors and retractor-mounted seat belt pretensioners. The driver's upper anchor was adjusted to the middle position and the pretensioner actuated during the crash. The remaining seating positions were unoccupied at the time of the crash.

The driver was not restrained by the lap and shoulder seat belt since the seat belt was pulled tautly into the retractor by pretensioner actuation. The vehicle's EDR also reported the driver's seat belt status as "Not Buckled."

Supplemental Restraint Systems

The GMC was equipped with multi-stage frontal air bags, front-center air bag, front seat-mounted side impact air bags, and rollover/side impact IC air bags that were not compliant with FMVSS No. 226, "Ejection Mitigation." The driver's frontal air bag and both IC air bags deployed during the frontal impact with the Chevrolet.

The driver's frontal air bag was located in the steering wheel hub. The air bag module had two cover flaps constructed of pliable vinyl. Each flap was 13 cm (5.1 in) high. The left flap was 4.5 cm (2.0 in) wide at the top and bottom and 1.5 cm (0.6 in) wide in the middle. The right flap was 5 cm (2.0 in) wide at the top and bottom and 8 cm wide (3.1 in) wide in the middle. The cover flaps opened at the designated tear seams and were undamaged. The deflated air bag was 60 cm (23.6 in) in diameter. Inspection of the air bag revealed no discernable evidence of occupant contact and no damage.

The IC air bags were located along the roof side rail inside the headliner and extended from the A-pillar to the D-pillar. The deflated left IC (**Figure 6**) was 225 cm (88.6 in) wide and 47 cm (18.5 in) high. The deflated IC extended 17 cm (6.7 in) below the beltline. There was a triangular-shaped gap between the front of the IC and the A-pillar that was 38 cm (15.0 in) wide at the beltline and 47 cm (18.5 in) high at the front of the IC. There was no discernable evidence of occupant contact to the left IC and no damage. The right IC was the same dimensions at the left. It sustained no damage during the crash.

Figure 6: The GMC's deflated left IC air bag

2014 GMC ACADIA OCCUPANT

Driver Demographics

Age/sex:	41 years/female
Height:	163 cm (64 in)
Weight:	59 kg (130 lbs)
Eyewear:	Glasses
Seat type:	Bucket
Seat track position:	Between middle and rear-most
Manual restraint usage:	None

Usage source:	Vehicle inspection, EDR
Air bags:	Driver's frontal and both ICs, deployed; seat-mounted side impact and front-center, not deployed.
Alcohol/drug involvement:	None
Egress from vehicle:	Unknown
Transport from scene:	Ambulance
Medical treatment:	Treated in trauma center emergency room and released

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Fracture,[1] transverse, through base of right medial malleolus without widening of ankle mortise	854361.2	Floor, foot controls	Certain
2	Abrasion on left shoulder, not further specified	710202.1	Air bag, driver's frontal	Probable
3	Burn from air bag exhaust gases across top of chest, not further specified	912000.1	Noncontact injury: air bag exhaust gases	Probable
4	Abrasion right knee, not further specified	810202.1	Left lower instrument panel (includes knee bolster), right of steering column	Certain
5	Abrasion left knee with tenderness, not further specified	810202.1	Left lower instrument panel (includes knee bolster), left of steering column	Certain
6	Contusion (ecchymosis) bilateral (medial and lateral) surfaces of right ankle	810402.1	Floor, foot controls	Certain

Sources: Emergency room records and EMS treatment record. Injury numbers 2 and 3 came only from EMS treatment record. Injury numbers 1 and 4 through 6 came only from emergency room records.

[1] Fracture was treated in emergency room with a posterior lower leg splint.

Driver Kinematics

The driver was not restrained by the lap and shoulder seat belt. The seat track was adjusted between the middle and rear-most positions and the seat back was reclined 34 degrees aft of vertical. The top of the head restraint was located 12 cm (4.7 in) above the top of the seat back. The front plane impact to the GMC resulted in stage 1 and 2 deployment of the driver's frontal air bag and deployment of both IC air bags. The driver was displaced forward and her chest and face loaded the frontal air bag resulting in an abrasion on the left shoulder. She also sustained a burn across the top of her chest from air bag exhaust gasses. The driver's knees contacted the lower instrument panel resulting in an abrasion to each knee. Her right foot contacted the foot controls and toe pan causing a fracture of the base of the right medial malleolus. She also sustained a contusion on the bilateral surfaces of the right ankle from contacting the foot controls. The driver then rebounded and was probably redirected to the right as the vehicle rotated counterclockwise and the rear portion of the vehicle departed the roadway where the right quarter panel struck a woven wire fence. The driver was transported by ambulance to a trauma center where she was treated in the emergency room and released.

2011 CHEVROLET CRUZE DATA

Description

The Chevrolet was a front-wheel drive, 5-occupant, 4-door sedan with the VIN 1G1PG5S98B7xxxxxx, equipped with a 1.4-liter, l-4 turbocharged engine, a 6-speed automatic transmission, 4-wheel antilock brakes with electronic brake force distribution, brake assist, traction control, and ESC. The vehicle was also equipped with multi-stage frontal air bags, driver and front row passenger knee air bags, front seat-mounted side impact air bags, and rollover/side impact IC air bags.

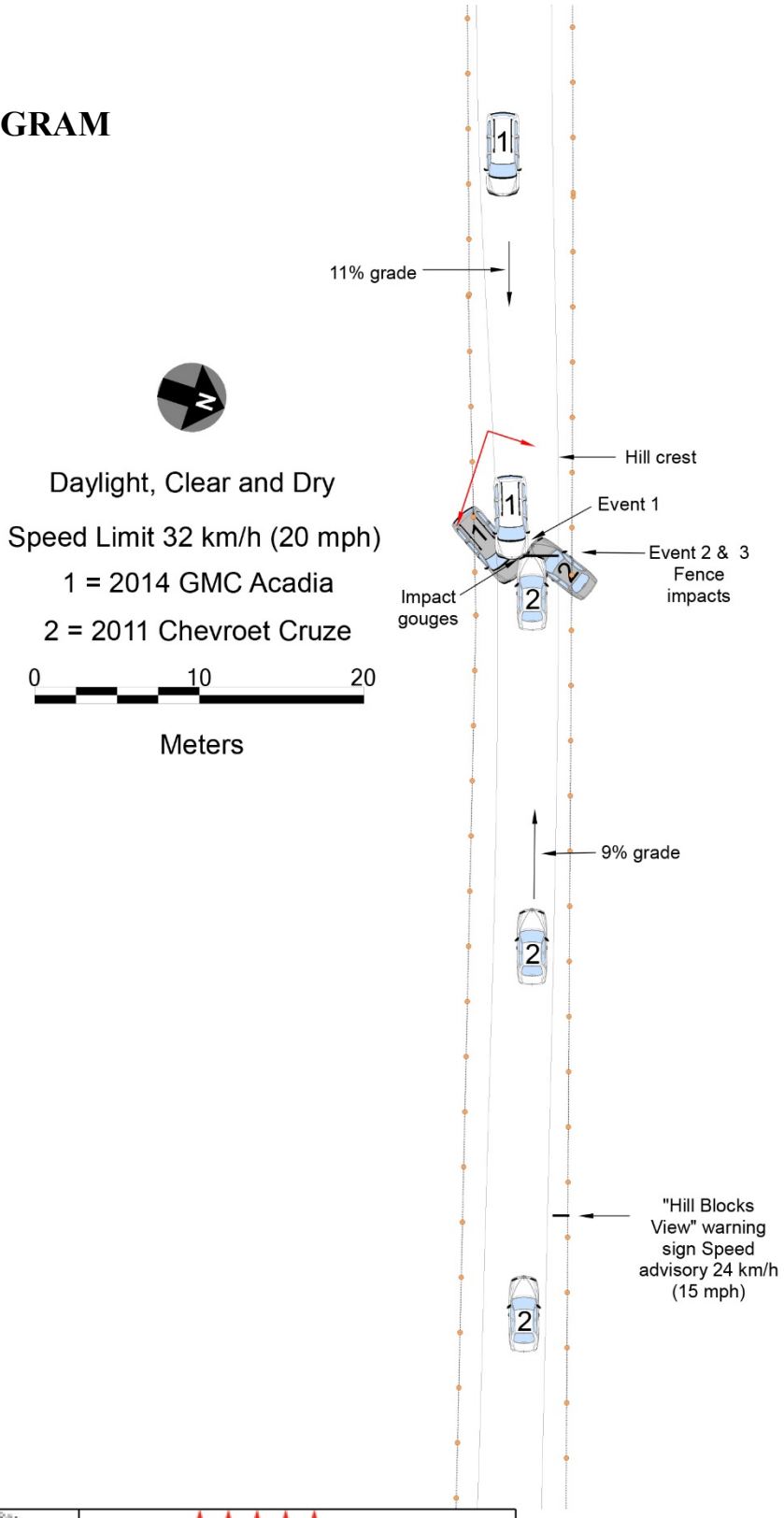
Exterior Damage

The Chevrolet was not inspected since it had been sold for salvage. The vehicle sustained damage to the front plane from the impact with the GMC and damage to the right plane from impact with a woven wire fence according to the police crash report.

Occupant Data

The driver (21-year-old female) was restrained by a lap and shoulder seat belt according to the police crash report. She sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center. Her injuries and level of treatment are not known.

CRASH DIAGRAM



	NHTSA www.nhtsa.gov
Case Number:	IN16027

APPENDIX A:
2014 GMC ACADIA EVENT DATA RECORDER (EDR) REPORT[2]

[2] 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	1GKKVTKD1EJ******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	IN16027_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.1
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 17.6.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	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 and Non-Deployment Events, the SDM will record up to 300 milliseconds of data after time zero. The SDM will also record up to 300 milliseconds of Vehicle Acceleration data after time zero.
For Rollover Events, the SDM may record Lateral Acceleration, Vertical 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 Rollover Deployment Events, the SDM will record up to 700 milliseconds of data before the Deployment criteria is met and 290 milliseconds after the Deployment criteria is met.
-Deployment loops may be displayed as being deployed in a Non-Deployment event record, if a Deployment event is qualified during the Non-Deployment event. That is, if two or more events are occurring at the same time and one is a Non-Deployment event and one of the others is a Deployment event, and the Deployment event is qualified while the Non-Deployment is still active, the deployed loops may be recorded in the Non-Deployment event record.
-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 Maximum SDM Recorded Vehicle Velocity Change may occur between the recorded 10 millisecond sample points of the

SDM Recorded Vehicle Velocity Change.
-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 Time Zero. That is to say, the last data point may have been captured just before Time Zero but no more than 0.5 second before Time Zero. 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.
-The GM parameter name is displayed in parentheses after the NHTSA Part 563 parameter name.
-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 by the 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 Acceleration	Forward
Longitudinal Velocity Change	Forward
Lateral Acceleration	Left to Right
Lateral Velocity Change	Left to Right
Vertical Acceleration	Downward
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.

01048_SDM11P-autoliv_r010

System Status at Time of Retrieval

Dynamic Deployment Event Counter	1
Multi-Event, Number of Events (Dynamic Event Counter)	1
Dynamic OnStar Notification Event Counter	1
Ignition Cycle, Download (Ignition Cycles at Investigation)	6622
End Model Part Number	00CF45AC
System Type	Autoliv
Software Module Identifier 1	00CF53F0
Software Module Identifier 2	0160D377
Manufacturing Traceability Data, Component Identifier	AS
Manufacturing Traceability Data, Part Number/Broadcast Code	3788
Manufacturing Traceability Data, Supplier Code	E
Manufacturing Traceability Data, Traceability Number	05******4
ESS # 1 Traceability Data, Component Identifier	AU
ESS # 1 Traceability Data, Part Number/Broadcast Code	2577
ESS # 1 Traceability Data, Supplier Code	E
ESS # 1 Traceability Data, Traceability Number	0180A1A52
ESS # 2 Traceability Data, Component Identifier	AT
ESS # 2 Traceability Data, Part Number/Broadcast Code	2577
ESS # 2 Traceability Data, Supplier Code	E
ESS # 2 Traceability Data, Traceability Number	0180D5C15
ESS # 3 Traceability Data, Component Identifier	AH
ESS # 3 Traceability Data, Part Number/Broadcast Code	2577
ESS # 3 Traceability Data, Supplier Code	E
ESS # 3 Traceability Data, Traceability Number	0180E8AA8
ESS # 4 Traceability Data, Component Identifier	AJ
ESS # 4 Traceability Data, Part Number/Broadcast Code	2577
ESS # 4 Traceability Data, Supplier Code	E
ESS # 4 Traceability Data, Traceability Number	0180EC7C3
ESS # 5 Traceability Data, Component Identifier	DA
ESS # 5 Traceability Data, Part Number/Broadcast Code	4936
ESS # 5 Traceability Data, Supplier Code	E
ESS # 5 Traceability Data, Traceability Number	0180D30C5
ESS # 6 Traceability Data, Component Identifier	DB
ESS # 6 Traceability Data, Part Number/Broadcast Code	4936
ESS # 6 Traceability Data, Supplier Code	E
ESS # 6 Traceability Data, Traceability Number	018188E86
ESS # 7 Traceability Data, Component Identifier	00
ESS # 7 Traceability Data, Part Number/Broadcast Code	0000
ESS # 7 Traceability Data, Supplier Code	E
ESS # 7 Traceability Data, Traceability Number	000000000
ESS # 8 Traceability Data, Component Identifier	00
ESS # 8 Traceability Data, Part Number/Broadcast Code	0000
ESS # 8 Traceability Data, Supplier Code	E
ESS # 8 Traceability Data, Traceability Number	000000000

System Status at Event (Event Record 1)

Event Record Type	Deployment
OnStar Deployment Status Data Sent	Yes
Complete file recorded (Event Recording Complete)	Yes
Crash Record Locked	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	1
Multi-Event, Number of Events (Event Counter)	1
OnStar Notification Event Counter	1
Time From Event 1 to 2 (Time Between Events) (seconds)	Data Not Available
Ignition Cycle, Crash (Ignition Cycles at Event)	6601
Algorithm Active: Frontal	Yes
Algorithm Active: Side	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Rear	No
Concurrent Event Flag Set	No
Event Severity Status: Frontal Pretensioner	Yes
Event Severity Status: Frontal Stage 1	Yes
Event Severity Status: Frontal Stage 2	Yes
Event Severity Status: Left Side	No
Event Severity Status: Right Side	No
Event Severity Status: Rear	No
Event Severity Status: Rollover	No
Safety Belt Status, Driver (Driver Belt Switch Circuit Status)	Not Buckled
Safety Belt Status, Right Front Passenger (Passenger Belt Switch Circuit Status)	Not Buckled
Center Front Row Belt Switch Circuit Status (If Equipped)	Data Not Available
Left Row 3 Belt Switch Circuit Status (If Equipped)	Data Not Available
Center Row 3 Belt Switch Circuit Status (If Equipped)	Data Not Available
Right Row 3 Belt Switch Circuit Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Occupant Size Right Front Passenger Child (Passenger Classification Status)	No (Not Applicable)
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp Status 0.5 Seconds Prior to Time Zero	Off
Frontal Air Bag Warning Lamp (SIR Warning Lamp Status 0.5 Seconds Prior to Time Zero)	Off
SIR Warning Lamp ON/OFF Time Continuously (seconds)	655330
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	6409
Ignition Cycles Since DTCs Were Last Cleared 0.5 Seconds Prior to Time Zero	253
Maximum Delta-V, Longitudinal (Maximum Longitudinal SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h]	-26 [-42]
Time, Maximum Delta-V (Time From FSR Time Zero to Maximum Longitudinal SDM Recorded Vehicle Velocity Change)(msec)	196
Maximum Delta-V, Lateral (Maximum Lateral SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h]	2 [3]
Time Maximum Delta-V, Lateral (Time From FSR Time Zero to Maximum Lateral SDM Recorded Vehicle Velocity Change)(msec)	146

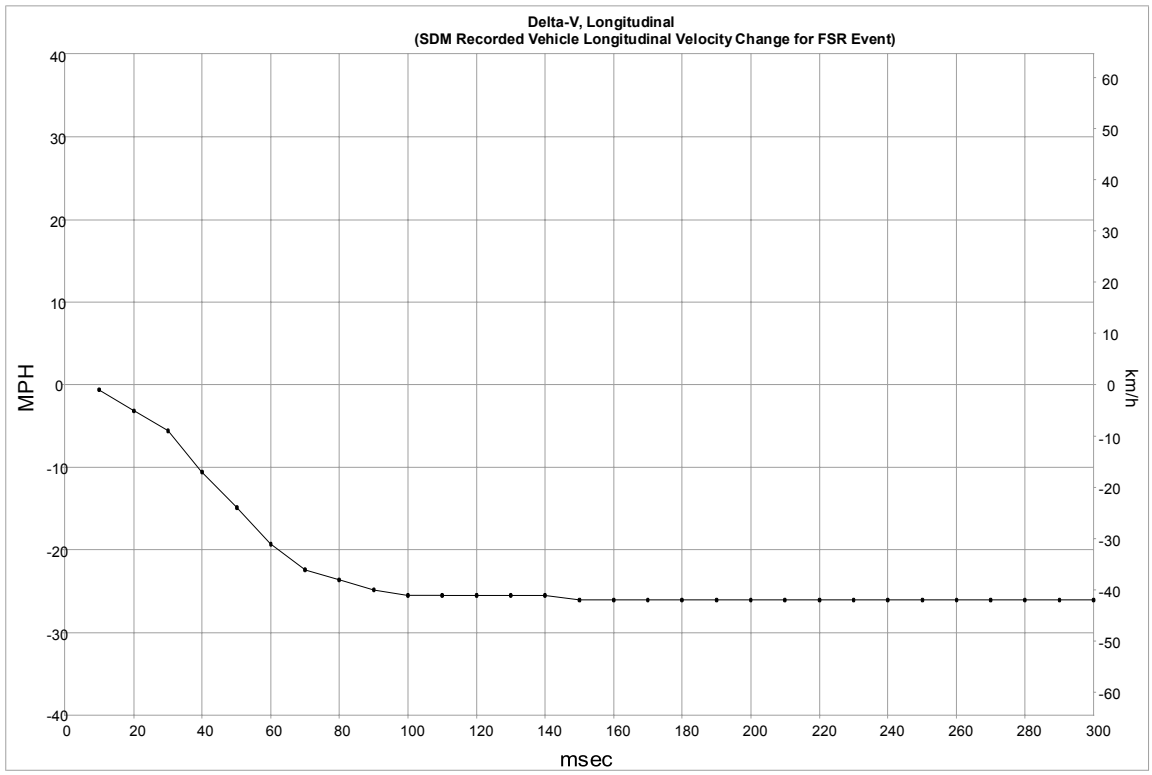
DTCs Present at Time of Event (Event Record 1)

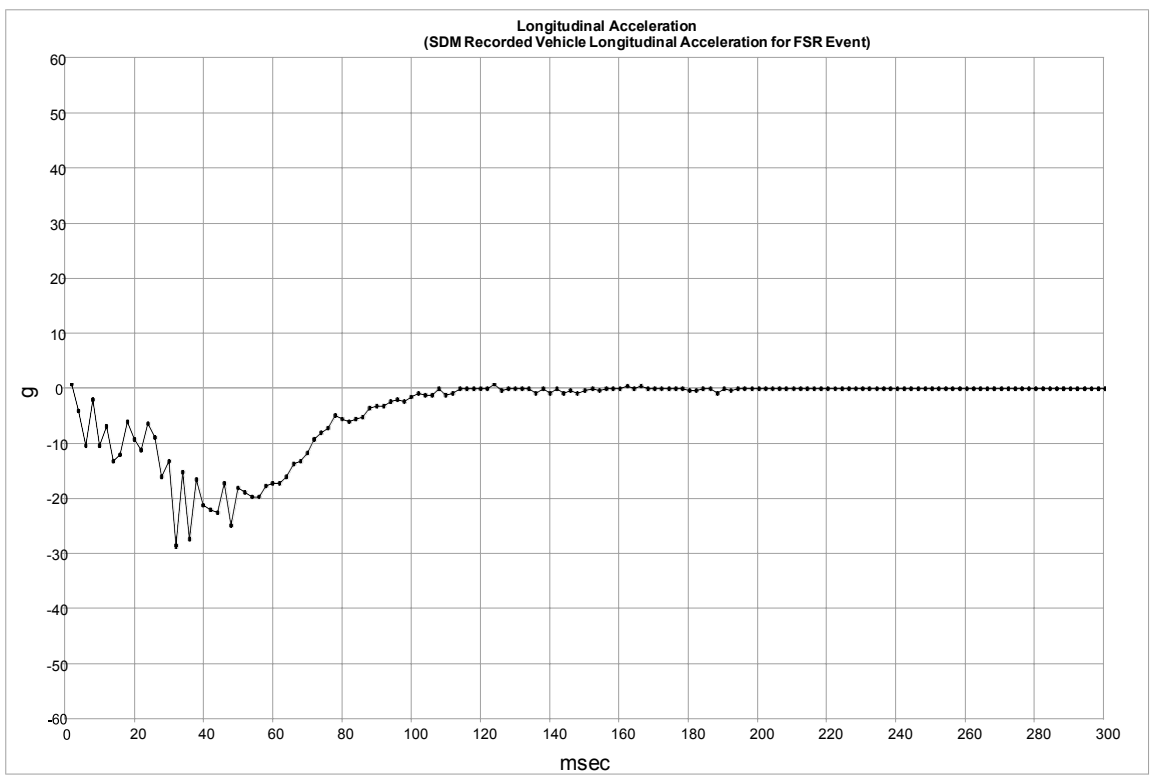
B0052-00

Event Data (Event Record 1)

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	Yes
Passenger Pretensioner Deployment Loop #2 Commanded	Yes
Driver Thorax Loop Commanded	No
Passenger Thorax Loop Commanded	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded	Yes
Right Row 1 Roof Rail/Head Curtain Loop Commanded	Yes
Frontal Air Bag Deployment, Time to 1st Stage Deployment, Driver (Driver 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	23
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (Driver 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	28
Frontal Air Bag Deployment, Time to 1st Stage Deployment, Right Front Passenger (Passenger 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	Data Not Available
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (Passenger 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	Data Not Available
Side air bag deployment, time to deploy, driver (Driver Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec)	28
Side air bag deployment, time to deploy, right front passenger (Passenger Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec)	28
Pretensioner Deployment, Time to Fire, Driver (Driver Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec)	14
Pretensioner Deployment, Time to Fire, Right Front Passenger (Passenger Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec)	14

Longitudinal Crash Pulse (Event Record 1)





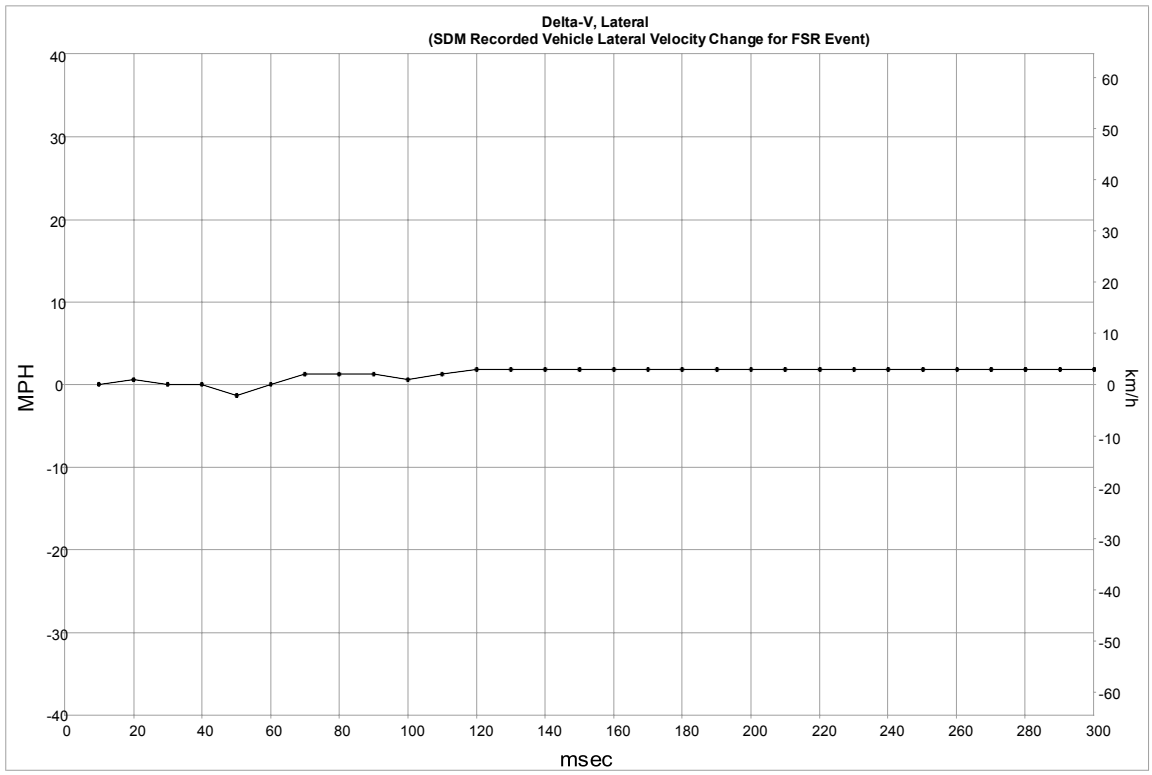
Longitudinal Crash Pulse (Event Record 1)

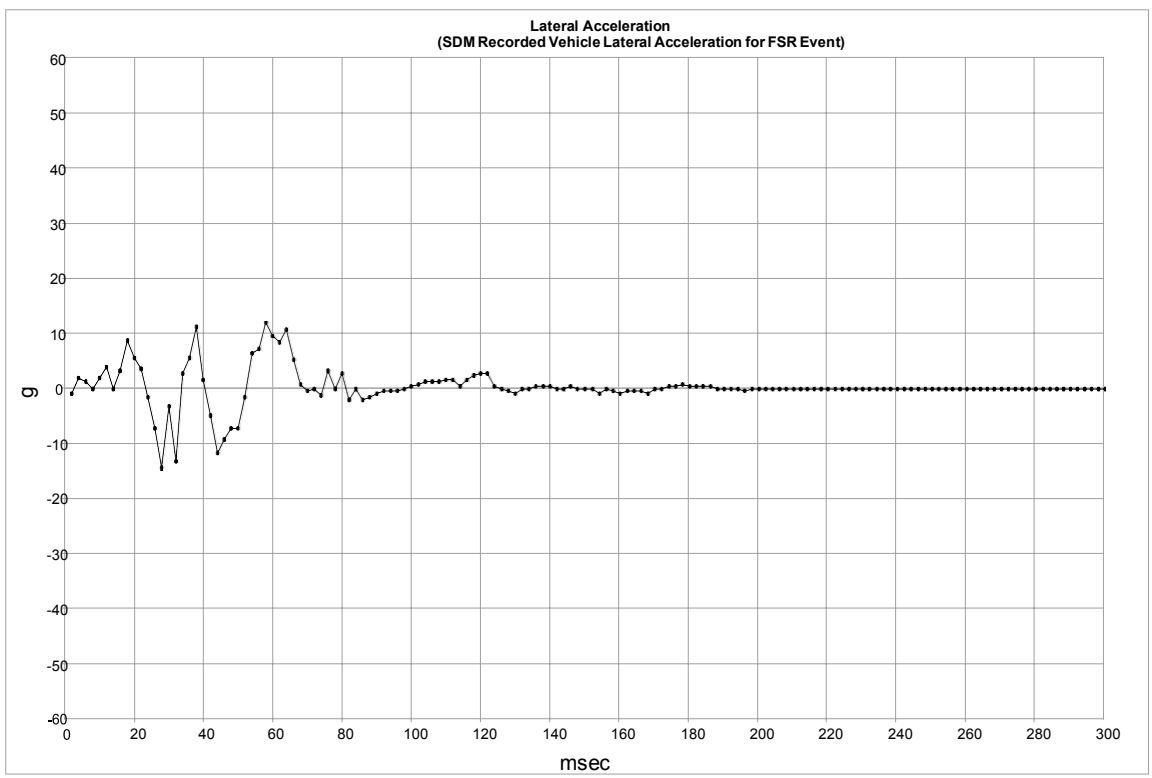
Time (msec)	Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (MPH)	Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (km/h)
10	-0.6	-1.0
20	-3.1	-5.0
30	-5.6	-9.0
40	-10.6	-17.0
50	-14.9	-24.0
60	-19.3	-31.0
70	-22.4	-36.0
80	-23.6	-38.0
90	-24.9	-40.0
100	-25.5	-41.0
110	-25.5	-41.0
120	-25.5	-41.0
130	-25.5	-41.0
140	-25.5	-41.0
150	-26.1	-42.0
160	-26.1	-42.0
170	-26.1	-42.0
180	-26.1	-42.0
190	-26.1	-42.0
200	-26.1	-42.0
210	-26.1	-42.0
220	-26.1	-42.0
230	-26.1	-42.0
240	-26.1	-42.0
250	-26.1	-42.0
260	-26.1	-42.0
270	-26.1	-42.0
280	-26.1	-42.0
290	-26.1	-42.0
300	-26.1	-42.0

Longitudinal Crash Pulse (Event Record 1)

Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)	Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)	Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)
2	0.6	102	-1.0	202	-0.2
4	-4.2	104	-1.4	204	-0.2
6	-10.6	106	-1.4	206	-0.2
8	-2.2	108	-0.2	208	-0.2
10	-10.6	110	-1.4	210	-0.2
12	-7.0	112	-1.0	212	-0.2
14	-13.4	114	-0.2	214	-0.2
16	-12.2	116	-0.2	216	-0.2
18	-6.2	118	-0.2	218	-0.2
20	-9.4	120	-0.2	220	-0.2
22	-11.4	122	-0.2	222	-0.2
24	-6.6	124	0.6	224	-0.2
26	-9.0	126	-0.6	226	-0.2
28	-16.2	128	-0.2	228	-0.2
30	-13.4	130	-0.2	230	-0.2
32	-28.6	132	-0.2	232	-0.2
34	-15.4	134	-0.2	234	-0.2
36	-27.4	136	-1.0	236	-0.2
38	-16.6	138	-0.2	238	-0.2
40	-21.4	140	-1.0	240	-0.2
42	-22.2	142	-0.2	242	-0.2
44	-22.6	144	-1.0	244	-0.2
46	-17.4	146	-0.6	246	-0.2
48	-25.0	148	-1.0	248	-0.2
50	-18.2	150	-0.6	250	-0.2
52	-19.0	152	-0.2	252	-0.2
54	-19.8	154	-0.6	254	-0.2
56	-19.8	156	-0.2	256	-0.2
58	-17.8	158	-0.2	258	-0.2
60	-17.4	160	-0.2	260	-0.2
62	-17.4	162	0.2	262	-0.2
64	-16.2	164	-0.2	264	-0.2
66	-13.8	166	0.2	266	-0.2
68	-13.4	168	-0.2	268	-0.2
70	-11.8	170	-0.2	270	-0.2
72	-9.4	172	-0.2	272	-0.2
74	-8.2	174	-0.2	274	-0.2
76	-7.4	176	-0.2	276	-0.2
78	-5.0	178	-0.2	278	-0.2
80	-5.8	180	-0.6	280	-0.2
82	-6.2	182	-0.6	282	-0.2
84	-5.8	184	-0.2	284	-0.2
86	-5.4	186	-0.2	286	-0.2
88	-3.8	188	-1.0	288	-0.2
90	-3.4	190	-0.2	290	-0.2
92	-3.4	192	-0.6	292	-0.2
94	-2.6	194	-0.2	294	-0.2
96	-2.2	196	-0.2	296	-0.2
98	-2.6	198	-0.2	298	-0.2
100	-1.8	200	-0.2	300	-0.2

Lateral Crash Pulse (Event Record 1)





Lateral Crash Pulse (Event Record 1)

Time (msec)	Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (MPH)	Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (km/h)
10	0.0	0.0
20	0.6	1.0
30	0.0	0.0
40	0.0	0.0
50	-1.2	-2.0
60	0.0	0.0
70	1.2	2.0
80	1.2	2.0
90	1.2	2.0
100	0.6	1.0
110	1.2	2.0
120	1.9	3.0
130	1.9	3.0
140	1.9	3.0
150	1.9	3.0
160	1.9	3.0
170	1.9	3.0
180	1.9	3.0
190	1.9	3.0
200	1.9	3.0
210	1.9	3.0
220	1.9	3.0
230	1.9	3.0
240	1.9	3.0
250	1.9	3.0
260	1.9	3.0
270	1.9	3.0
280	1.9	3.0
290	1.9	3.0
300	1.9	3.0

Lateral Crash Pulse (Event Record 1)

Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)	Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)	Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)
2	-1.0	102	0.6	202	-0.2
4	1.8	104	1.0	204	-0.2
6	1.0	106	1.0	206	-0.2
8	-0.2	108	1.0	208	-0.2
10	1.8	110	1.4	210	-0.2
12	3.8	112	1.4	212	-0.2
14	-0.2	114	0.2	214	-0.2
16	3.0	116	1.4	216	-0.2
18	8.6	118	2.2	218	-0.2
20	5.4	120	2.6	220	-0.2
22	3.4	122	2.6	222	-0.2
24	-1.8	124	0.2	224	-0.2
26	-7.4	126	-0.2	226	-0.2
28	-14.6	128	-0.6	228	-0.2
30	-3.4	130	-1.0	230	-0.2
32	-13.4	132	-0.2	232	-0.2
34	2.6	134	-0.2	234	-0.2
36	5.4	136	0.2	236	-0.2
38	11.0	138	0.2	238	-0.2
40	1.4	140	0.2	240	-0.2
42	-5.0	142	-0.2	242	-0.2
44	-11.8	144	-0.2	244	-0.2
46	-9.4	146	0.2	246	-0.2
48	-7.4	148	-0.2	248	-0.2
50	-7.4	150	-0.2	250	-0.2
52	-1.8	152	-0.2	252	-0.2
54	6.2	154	-1.0	254	-0.2
56	7.0	156	-0.2	256	-0.2
58	11.8	158	-0.6	258	-0.2
60	9.4	160	-1.0	260	-0.2
62	8.2	162	-0.6	262	-0.2
64	10.6	164	-0.6	264	-0.2
66	5.0	166	-0.6	266	-0.2
68	0.6	168	-1.0	268	-0.2
70	-0.6	170	-0.2	270	-0.2
72	-0.2	172	-0.2	272	-0.2
74	-1.4	174	0.2	274	-0.2
76	3.0	176	0.2	276	-0.2
78	-0.2	178	0.6	278	-0.2
80	2.6	180	0.2	280	-0.2
82	-2.2	182	0.2	282	-0.2
84	-0.2	184	0.2	284	-0.2
86	-2.2	186	0.2	286	-0.2
88	-1.8	188	-0.2	288	-0.2
90	-1.0	190	-0.2	290	-0.2
92	-0.6	192	-0.2	292	-0.2
94	-0.6	194	-0.2	294	-0.2
96	-0.6	196	-0.6	296	-0.2
98	-0.2	198	-0.2	298	-0.2
100	0.2	200	-0.2	300	-0.2

Rollover Crash Pulse (Event Record 1)
SDM Recorded Vehicle Roll Rate

Contains No Recorded Data

Rollover Crash Pulse (Event Record 1)
Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for Rollover Event)

Contains No Recorded Data

Vertical Crash Pulse (Event Record 1)
Normal Acceleration (SDM Recorded Vehicle Vertical Acceleration for Rollover Event)

Contains No Recorded Data

Pre-Crash Data -5.0 to -0.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal, % Full (Accelerator Pedal Position)	Service Brake (Brake Switch Circuit State)	Engine RPM (Engine Speed)	Engine Throttle, % Full (Throttle Position)	Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h])
-5.0	0	Off	1984	20	41 [66]
-4.5	0	On	1600	20	41 [66]
-4.0	0	On	1344	17	40 [65]
-3.5	0	Off	1344	17	40 [64]
-3.0	4	Off	1344	18	40 [64]
-2.5	4	Off	1344	18	39 [63]
-2.0	8	Off	1344	20	39 [62]
-1.5	13	Off	1408	26	39 [62]
-1.0	10	Off	1280	23	37 [59]
-0.5	15	Off	1280	27	36 [58]

Pre-Crash Data -2.0 to -0.5 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
-2.0	No	No	No	5 [7]	Off
-1.5	No	No	No	37 [50]	Off
-1.0	No	No	No	23 [31]	Off
-0.5	No	No	No	32 [43]	Off

Hexadecimal Data

```
DPID $11
FF F1 00 FC C0 7C 00

DPID $15
01 02 03 04 07 08 05

DPID $16
06 09 0A 0D 0E 00 00

DPID $17
00 22 00 00 00 00 00

DPID $32
00 FD 19 DE 00 00 00

DPID $35
78 00 00 00 00 00 00

DID $01
41 55 32 35 37 37 45 30 31 38 30 41 31 41 35 32

DID $03
41 54 32 35 37 37 45 30 31 38 30 44 35 43 31 35

DID $05
41 48 32 35 37 37 45 30 31 38 30 45 38 41 41 38

DID $07
41 4A 32 35 37 37 45 30 31 38 30 45 43 37 43 33

DID $09
44 41 34 39 33 36 45 30 31 38 30 44 33 30 43 35

DID $0B
44 42 34 39 33 36 45 30 31 38 31 38 38 45 38 36

DID $0D
30 30 30 30 30 30 45 30 30 30 30 30 30 30 30 30

DID $0F
30 30 30 30 30 30 45 30 30 30 30 30 30 30 30 30

DID $30
01 00 01 01

DID $9A
04 01

DID $B4
41 53 33 37 38 38 45 30 35 2A 2A 2A 2A 2A 2A 34

DID $C1
00 CF 53 F0

DID $C2
01 60 D3 77

DID $CB
00 CF 45 AC

DID $31
```

0000	A5	F0	01	00	01	01	07	19	C9	FF
0010	FF	00	00	00	0E	A3	C3	00	00	10
0020	0C	FC	FC	F0	00	00	C0	10	0F	0A
0030	0D	08	04	04	00	00	00	00	00	01
0040	40	00	00	00	00	14	14	16	15	15
0050	15	15	15	19	1F	06	F6	06	DE	07
0060	03	06	AE	1B	17	1A	14	12	12	11
0070	11	14	14	3A	3B	3E	3E	3F	40	40
0080	41	42	42	00	FF	FD	19	09	FD	00
0090	00	00	00	00	00	00	00	00	00	00
0100	00	00	00	00	00	00	00	00	00	00
0110	00	00	00	80	52	00	55	62	82	49
0120	17	1C	FF	FF	1C	1C	0E	0E	7E	7F
0130	7A	80	76	7F	6E	7F	67	7D	60	7F
0140	5B	81	59	81	57	81	56	80	56	81
0150	56	82	56	82	56	82	55	82	55	82
0160	55	82	55	82	55	82	55	82	55	82
0170	55	82	55	82	55	82	55	82	55	82
0180	55	82	55	82	55	82	55	82	81	7D
0190	75	84	65	82	7A	7F	65	84	6E	89
0200	5E	7F	61	87	70	95	68	8D	63	88
0210	6F	7B	69	6D	57	5B	5E	77	38	5E
0220	59	86	3B	8D	56	9B	4A	83	48	73
0230	47	62	54	68	41	6D	52	6D	50	7B
0240	4E	8F	4E	91	53	9D	54	97	54	94
0250	57	9A	5D	8C	5E	81	62	7E	68	7F
0260	6B	7C	6D	87	73	7F	71	86	70	7A
0270	71	7F	72	7A	76	7B	77	7D	77	7E
0280	79	7E	7A	7E	79	7F	7B	80	7D	81
0290	7C	82	7C	82	7F	82	7C	83	7D	83
0300	7F	80	7F	83	7F	85	7F	86	7F	86
0310	81	80	7E	7F	7F	7E	7F	7D	7F	7F
0320	7F	7F	7D	80	7F	80	7D	80	7F	7F
0330	7D	7F	7E	80	7D	7F	7E	7F	7F	7F
0340	7E	7D	7F	7F	7F	7E	7F	7D	80	7E
0350	7F	7E	80	7E	7F	7D	7F	7F	7F	7F
0360	7F	80	7F	80	7F	81	7E	80	7E	80
0370	7F	80	7F	80	7D	7F	7F	7F	7E	7F
0380	7F	7F	7F	7E	7F	7F	7F	7F	7F	7F
0390	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0400	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0410	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0420	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0430	7F	7F	7F	7F	7F	7F	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	7F	7F	FF	FF
0490	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0500	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0510	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0520	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0530	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0540	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0550	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0560	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0570	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0580	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0590	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0600	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0610	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0620	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0630	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

```
 0640   FF FF FF FF FF FF FF FF FF FF
 0650   FF FF FF FF FF FF FF FF FF FF
 0660   FF FF FF FF FF FF FF FF FF FF
 0670   FF FF FF FF FF FF FF FF FF FF
 0680   FF FF FF FF FF FF FF FF FF FF
 0690   FF FF FF FF FF FF FF FF FF FF
 0700   FF FF FF FF FF FF FF FF FF FF
 0710   FF FF FF FF FF FF FF FF FF FF
 0720   FF FF FF FF FF FF FF FF FF FF
 0730   FF FF FF FF FF FF FF FF FF FF
 0740   FF FF FF FF FF FF FF FF FF FF
 0750   FF FF FF FF FF FF FF FF FF FF
 0760   FF FF FF FF FF FF FF FF FF FF
 0770   FF FF FF FF FF FF FF FF FF FF
 0780   FF FF FF FF FF FF FF FF 21 00
 0790   21 00 11 21 00 00 00 30 00 00
 0800   00 41 00 22 00 12 24 00 00 00
 0810   3A 00 00 00 00 00 00 00 01 00
 0820   00 00 00 00 00 00 00 00 00 00
 0830   00 00 00 00 00 00 00 00 00 00
 0840   00 00 00 00 00 00 00 00 00 00
 0850   00 00 00 00 00 00 00 00 00 00
 0860   00 00 00 00 00 00 00 00 FF FF
 0870   FF FF FF FF FF FF FF FF FF FF
 0880   FF FF FF FF FF FF FF FF FF FF
 0890   FF FF FF FF FF FF FF FF FF FF
 0900   FF FF FF FF FF FF FF FF FF FF
 0910   FF FF FF FF FF FF FF FF FF FF
 0920   FF FF FF FF FF FF FF FF FF FF
 0930   FF FF FF FF FF FF FF FF FF FF
 0940   FF FF FF FF FF FF FF FF FF FF
 0950   FF FF FF FF FF FF FF FF FF FF
 0960   FF FF FF FF FF FF FF FF FF FF
 0970   FF FF FF FF FF FF FF FF FF FF
 0980   FF FF FF FF FF FF FF FF FF FF
 0990   FF FF FF FF FF FF FF FF FF FF
 1000   FF FF FF FF FF FF FF FF FF FF
 1010   FF FF FF FF FF FF FF FF FF FF
 1020   FF FF FF FF FF FF FF FF FF FF
 1030   FF FF FF FF FF FF FF FF FF FF
 1040   FF FF FF FF FF FF FF FF FF FF
 1050   FF FF FF FF FF FF FF FF FF FF
 1060   FF FF FF FF FF FF FF FF FF FF
 1070   FF FF FF FF FF FF FF FF FF FF
 1080   FF FF FF FF FF FF FF FF FF FF
 1090   FF FF FF FF FF FF FF FF FF FF
 1100   FF FF FF FF FF FF FF FF FF FF
 1110   FF FF FF FF FF FF FF FF FF FF
 1120   FF FF FF FF FF FF FF FF FF FF
 1130   FF FF FF FF FF FF FF FF FF FF
 1140   FF FF FF FF FF FF FF FF FF FF
 1150   FF FF FF FF FF FF FF FF FF FF
 1160   FF FF FF FF FF FF FF FF FF FF
 1170   FF FF FF FF FF FF FF FF FF FF
 1180   FF FF FF FF FF FF FF FF FF FF
 1190   FF FF FF FF FF FF FF FF FF FF
 1200   FF

DID $32

 0000   FF FF FF FF FF FF FF FF FF FF
 0010   FF FF FF FF FF FF FF FF FF FF
 0020   FF FF FF FF FF FF FF FF FF FF
 0030   FF FF FF FF FF FF FF FF FF FF
 0040   FF FF FF FF FF FF FF FF FF FF
```

```
0050   FF FF FF FF FF FF FF FF FF FF
0060   FF FF 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 FF
0090   FF FF FF FF FF FF FF FF FF FF
0100   FF FF FF FF FF FF FF FF FF FF
0110   FF FF FF FF FF FF FF FF FF FF
0120   FF FF FF FF FF FF FF FF FF FF
0130   FF FF FF FF FF FF FF FF FF FF
0140   FF FF FF FF FF FF FF FF FF FF
0150   FF FF FF FF FF FF FF FF FF FF
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 FF FF FF FF
0390   FF FF FF FF FF FF FF FF FF FF
0400   FF FF FF FF FF FF FF FF FF FF
0410   FF FF FF FF FF FF FF FF FF FF
0420   FF FF FF FF FF FF FF FF FF FF
0430   FF FF FF FF FF FF FF FF FF FF
0440   FF FF FF FF FF FF FF FF FF FF
0450   FF FF FF FF FF FF FF FF FF FF
0460   FF FF FF FF FF FF FF FF FF FF
0470   FF FF FF FF FF FF FF FF FF FF
0480   FF FF FF FF FF FF FF FF FF FF
0490   FF FF FF FF FF FF FF FF FF FF
0500   FF FF FF FF FF FF FF FF FF FF
0510   FF FF FF FF FF FF FF FF FF FF
0520   FF FF FF FF FF FF FF FF FF FF
0530   FF FF FF FF FF FF FF FF FF FF
0540   FF FF FF FF FF FF FF FF FF FF
0550   FF FF FF FF FF FF FF FF FF FF
0560   FF FF FF FF FF FF FF FF FF FF
0570   FF FF FF FF FF FF FF FF FF FF
0580   FF FF FF FF FF FF FF FF FF FF
0590   FF FF FF FF FF FF FF FF FF FF
0600   FF FF FF FF FF FF FF FF FF FF
0610   FF FF FF FF FF FF FF FF FF FF
0620   FF FF FF FF FF FF FF FF FF FF
0630   FF FF FF FF FF FF FF FF FF FF
0640   FF FF FF FF FF FF FF FF FF FF
0650   FF FF FF FF FF FF FF FF FF FF
0660   FF FF FF FF FF FF FF FF FF FF
0670   FF FF FF FF FF FF FF FF FF FF
0680   FF FF FF FF FF FF FF FF FF FF
0690   FF FF FF FF FF FF FF FF FF FF
```

```
 0700   FF FF FF FF FF FF FF FF FF FF
 0710   FF FF FF FF FF FF FF FF FF FF
 0720   FF FF FF FF FF FF FF FF FF FF
 0730   FF FF FF FF FF FF FF FF FF FF
 0740   FF FF FF FF FF FF FF FF FF FF
 0750   FF FF FF FF FF FF FF FF FF FF
 0760   FF FF FF FF FF FF FF FF FF FF
 0770   FF FF FF FF FF FF FF FF FF FF
 0780   FF FF FF FF FF FF FF FF FF FF
 0790   FF FF FF FF FF FF FF FF FF FF
 0800   FF FF FF FF FF FF FF FF FF FF
 0810   FF FF FF FF FF FF FF FF FF FF
 0820   FF FF FF FF FF FF FF FF FF FF
 0830   FF FF FF FF FF FF FF FF FF FF
 0840   FF FF FF FF FF FF FF FF FF FF
 0850   FF FF FF FF FF FF FF FF FF FF
 0860   FF FF FF FF FF FF FF FF FF FF
 0870   FF FF FF FF FF FF FF FF FF FF
 0880   FF FF FF FF FF FF FF FF FF FF
 0890   FF FF FF FF FF FF FF FF FF FF
 0900   FF FF FF FF FF FF FF FF FF FF
 0910   FF FF FF FF FF FF FF FF FF FF
 0920   FF FF FF FF FF FF FF FF FF FF
 0930   FF FF FF FF FF FF FF FF FF FF
 0940   FF FF FF FF FF FF FF FF FF FF
 0950   FF FF FF FF FF FF FF FF FF FF
 0960   FF FF FF FF FF FF FF FF FF FF
 0970   FF FF FF FF FF FF FF FF FF FF
 0980   FF FF FF FF FF FF FF FF FF FF
 0990   FF FF FF FF FF FF FF FF FF FF
 1000   FF FF FF FF FF FF FF FF FF FF
 1010   FF FF FF FF FF FF FF FF FF FF
 1020   FF FF FF FF FF FF FF FF FF FF
 1030   FF FF FF FF FF FF FF FF FF FF
 1040   FF FF FF FF FF FF FF FF FF FF
 1050   FF FF FF FF FF FF FF FF FF FF
 1060   FF FF FF FF FF FF FF FF FF FF
 1070   FF FF FF FF FF FF FF FF FF FF
 1080   FF FF FF FF FF FF FF FF FF FF
 1090   FF FF FF FF FF FF FF FF FF FF
 1100   FF FF FF FF FF FF FF FF FF FF
 1110   FF FF FF FF FF FF FF FF FF FF
 1120   FF FF FF FF FF FF FF FF FF FF
 1130   FF FF FF FF FF FF FF FF FF FF
 1140   FF FF FF FF FF FF FF FF FF FF
 1150   FF FF FF FF FF FF FF FF FF FF
 1160   FF FF FF FF FF FF FF FF FF FF
 1170   FF FF FF FF FF FF FF FF FF FF
 1180   FF FF FF FF FF FF FF FF FF FF
 1190   FF FF FF FF FF FF FF FF FF FF
 1200   FF

DID $33

 0000   FF FF FF FF FF FF FF FF FF FF
 0010   FF FF FF FF FF FF FF FF FF FF
 0020   FF FF FF FF FF FF FF FF FF FF
 0030   FF FF FF FF FF FF FF FF FF FF
 0040   FF FF FF FF FF FF FF FF FF FF
 0050   FF FF FF FF FF FF FF FF FF FF
 0060   FF FF 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 FF
 0090   FF FF FF FF FF FF FF FF FF FF
 0100   FF FF FF FF FF FF FF FF FF FF
```

```
0110   FF FF FF FF FF FF FF FF FF FF
0120   FF FF FF FF FF FF FF FF FF FF
0130   FF FF FF FF FF FF FF FF FF FF
0140   FF FF FF FF FF FF FF FF FF FF
0150   FF FF FF FF FF FF FF FF FF FF
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 FF FF FF FF
0390   FF FF FF FF FF FF FF FF FF FF
0400   FF FF FF FF FF FF FF FF FF FF
0410   FF FF FF FF FF FF FF FF FF FF
0420   FF FF FF FF FF FF FF FF FF FF
0430   FF FF FF FF FF FF FF FF FF FF
0440   FF FF FF FF FF FF FF FF FF FF
0450   FF FF FF FF FF FF FF FF FF FF
0460   FF FF FF FF FF FF FF FF FF FF
0470   FF FF FF FF FF FF FF FF FF FF
0480   FF FF FF FF FF FF FF FF FF FF
0490   FF FF FF FF FF FF FF FF FF FF
0500   FF FF FF FF FF FF FF FF FF FF
0510   FF FF FF FF FF FF FF FF FF FF
0520   FF FF FF FF FF FF FF FF FF FF
0530   FF FF FF FF FF FF FF FF FF FF
0540   FF FF FF FF FF FF FF FF FF FF
0550   FF FF FF FF FF FF FF FF FF FF
0560   FF FF FF FF FF FF FF FF FF FF
0570   FF FF FF FF FF FF FF FF FF FF
0580   FF FF FF FF FF FF FF FF FF FF
0590   FF FF FF FF FF FF FF FF FF FF
0600   FF FF FF FF FF FF FF FF FF FF
0610   FF FF FF FF FF FF FF FF FF FF
0620   FF FF FF FF FF FF FF FF FF FF
0630   FF FF FF FF FF FF FF FF FF FF
0640   FF FF FF FF FF FF FF FF FF FF
0650   FF FF FF FF FF FF FF FF FF FF
0660   FF FF FF FF FF FF FF FF FF FF
0670   FF FF FF FF FF FF FF FF FF FF
0680   FF FF FF FF FF FF FF FF FF FF
0690   FF FF FF FF FF FF FF FF FF FF
0700   FF FF FF FF FF FF FF FF FF FF
0710   FF FF FF FF FF FF FF FF FF FF
0720   FF FF FF FF FF FF FF FF FF FF
0730   FF FF FF FF FF FF FF FF FF FF
0740   FF FF FF FF FF FF FF FF FF FF
0750   FF FF FF FF FF FF FF FF FF FF
```

```
0760   FF FF FF FF FF FF FF FF FF FF
0770   FF FF FF FF FF FF FF FF FF FF
0780   FF FF FF FF FF FF FF FF FF FF
0790   FF FF FF FF FF FF FF FF FF FF
0800   FF FF FF FF FF FF FF FF FF FF
0810   FF FF FF FF FF FF FF FF FF FF
0820   FF FF FF FF FF FF FF FF FF FF
0830   FF FF FF FF FF FF FF FF FF FF
0840   FF FF FF FF FF FF FF FF FF FF
0850   FF FF FF FF FF FF FF FF FF FF
0860   FF FF FF FF FF FF FF FF FF FF
0870   FF FF FF FF FF FF FF FF FF FF
0880   FF FF FF FF FF FF FF FF FF FF
0890   FF FF FF FF FF FF FF FF FF FF
0900   FF FF FF FF FF FF FF FF FF FF
0910   FF FF FF FF FF FF FF FF FF FF
0920   FF FF FF FF FF FF FF FF FF FF
0930   FF FF FF FF FF FF FF FF FF FF
0940   FF FF FF FF FF FF FF FF FF FF
0950   FF FF FF FF FF FF FF FF FF FF
0960   FF FF FF FF FF FF FF FF FF FF
0970   FF FF FF FF FF FF FF FF FF FF
0980   FF FF FF FF FF FF FF FF FF FF
0990   FF FF FF FF FF FF FF FF FF FF
1000   FF FF FF FF FF FF FF FF FF FF
1010   FF FF FF FF FF FF FF FF FF FF
1020   FF FF FF FF FF FF FF FF FF FF
1030   FF FF FF FF FF FF FF FF FF FF
1040   FF FF FF FF FF FF FF FF FF FF
1050   FF FF FF FF FF FF FF FF FF FF
1060   FF FF FF FF FF FF FF FF FF FF
1070   FF FF FF FF FF FF FF FF FF FF
1080   FF FF FF FF FF FF FF FF FF FF
1090   FF FF FF FF FF FF FF FF FF FF
1100   FF FF FF FF FF FF FF FF FF FF
1110   FF FF FF FF FF FF FF FF FF FF
1120   FF FF FF FF FF FF FF FF FF FF
1130   FF FF FF FF FF FF FF FF FF FF
1140   FF FF FF FF FF FF FF FF FF FF
1150   FF FF FF FF FF FF FF FF FF FF
1160   FF FF FF FF FF FF FF FF FF FF
1170   FF FF FF FF FF FF FF FF FF FF
1180   FF FF FF FF FF FF FF FF FF FF
1190   FF FF FF FF FF FF FF FF FF FF
1200   FF
```

Disclaimer of Liability

The users of the CDR product and reviewers of the CDR reports and exported data shall ensure that data and information supplied is applicable to the vehicle, vehicle's system(s) and the vehicle ECU. Robert Bosch LLC and all its directors, officers, employees and members shall not be liable for damages arising out of or related to incorrect, incomplete or misinterpreted software and/or data. Robert Bosch LLC expressly excludes all liability for incidental, consequential, special or punitive damages arising from or related to the CDR data, CDR software or use thereof.

DOT HS 812 844
December 2019

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

14543-121619-v3