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Special Crash Investigations: On-Site Reported Unintended Acceleration Crash Investigation; Vehicle: 2010 Chevrolet Silverado; Location: Florida; Crash Date: April 2018

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15. Supplementary Notes

Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicles 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 claim of an unintended acceleration of a 2010 Chevrolet Silverado 1500 driven by a belted 21-year-old male and occupied by a belted 25-year-old male front-right passenger. The Chevrolet was traveling at high speeds on a multi-lane roadway when it struck the rear of a 2018 Dodge Grand Caravan stopped in the left-turn-only lane at an intersection. The vehicles were displaced through the intersection and into the northbound lanes, where a 2017 Buick Encore struck the right plane of the Dodge. A piece of debris from the crash struck and damaged a passing 2010 Buick Enclave. The Chevrolet driver was treated at the crash scene and was not medically transported, while the front-right passenger was transported by ambulance to a local hospital for reported incapacitating (A-level) injuries and was hospitalized for 2 days. There were four occupants in the Dodge, including a 50-year-old belted male driver, a 42-year-old belted female front-row right occupant, an 8-year-old belted male second-row left occupant, and a 6-year-old female belted second-row right occupant. All four Dodge occupants sustained fatal injuries and were pronounced deceased at the crash site. An unbelted 49-year-old female driver and belted 16-year-old male front-row right occupant of the Buick Encore reportedly sustained non-incapacitating (B-level) injuries, but neither was medically transported from the crash scene. Through the course of this investigation, the SCI investigator found no evidence to support the claim of unintended acceleration.

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Background

This report documents the on-site investigation of a reported claim of an unintended acceleration of a 2010 Chevrolet Silverado 1500 (Figure 1) driven by a belted 21-year-old male with a belted 25-year-old male front-right passenger. The Chevrolet was traveling south at high speeds on a multi-lane roadway when it struck the rear of a 2018 Dodge Grand Caravan stopped in the left-turn-only lane at an intersection. The vehicles were displaced through the intersection and into the northbound lanes, where a 2017 Buick Encore struck the right plane of the Dodge. All three vehicles came to rest on the east roadside. A piece of debris from the crash struck and damaged a passing 2010 Buick Enclave.

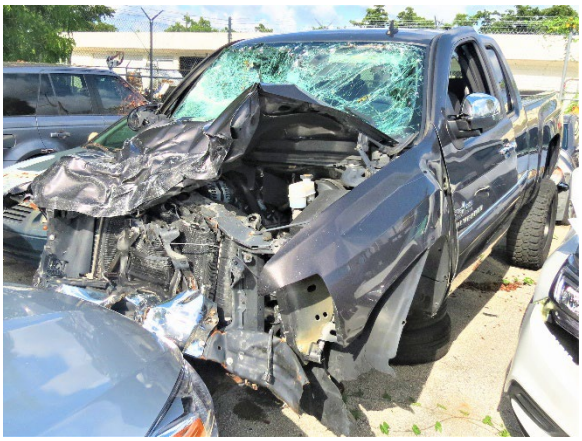


Figure 1. Left-front oblique view of the involved 2010 Chevrolet Silverado at the time of the SCI inspection

The Chevrolet driver was treated at the crash scene and not medically transported, while the front-right passenger was transported by ambulance to a local hospital for reported incapacitating (A-level) injuries and was hospitalized for 2 days.

There were four people in the Dodge: a 50-year-old belted male driver, a 42-year-old belted female front-row right passenger, an 8-year-old belted male second-row left passenger, and a 6-year-old female belted second-row right passenger. All four Dodge occupants sustained fatal injuries and were pronounced deceased at the crash site.

The unbelted 49-year-old female driver and belted 16-year-old male front-row right occupant of the Buick Encore reportedly sustained non-incapacitating (B-level) injuries, but neither was medically transported from the crash scene.

Notification of the crash was received by the Crash Investigation Division of the National Highway Traffic Safety Administration in May 2018 through a news media search. The

Chevrolet driver and his attorney had made statements to news media outlets claiming the Chevrolet's accelerator pedal became stuck in the downward position and that the speed of the Chevrolet could not be controlled through braking input. The notification was forwarded to the Special Crash Investigations (SCI) group and assigned to the team at Crash Research & Analysis, Inc., for on-site investigation. The SCI established contact with the investigating law enforcement agency, which ultimately provided full access to the involved vehicles for inspection and a review of their documentation of the crash.

The on-site portion of this investigation took place in June 2018 and consisted of an inspection of the Chevrolet to document its exterior and interior damage, identify any points of occupant contact, assess the manual and supplemental restraint systems, and inspect the vehicle's foot controls, floor mats/carpeting, and throttle system. The SCI investigator also completed exterior damage inspections of the Dodge and Buick Encore. The Buick Enclave could not be located for inspection. During the law enforcement investigation, the event data recorder (EDR) modules were removed from all three vehicles and retained as evidence prior to the SCI on-site activities. The law enforcement agency provided electronic CDRX files of the imaged data to the SCI investigator, along with numerous on-scene and reconstruction images. The SCI investigator traveled to the crash site and documented the physical environment using a total station mapping system and photographs. Telephone requests for interview of the driver and front-row right occupant of the Chevrolet were refused. Medical records for the front-right occupant were obtained from the treating facility.

The SCI vehicle inspection revealed that the foot controls of the Chevrolet operated smoothly and in normal limits. There were no floor mats, carpeting, or other objects to impede or otherwise restrict the operation of the foot controls. Data imaged from the Chevrolet reported that the accelerator pedal was fully depressed over the entire pre-crash buffer data intervals, without depression of the brake pedal. The investigating law enforcement agency allowed the SCI investigator to watch video surveillance footage from businesses and commercial establishments that showed the Chevrolet operating at high speed for a significant distance leading up to the crash. Post-crash examination of the driver's blood conducted by the law enforcement agency indicated the presence of a substance (difluoroethane) in the sample. The specific level of difluoroethane was not reported in the law enforcement documents, only that it was detected. At the time this report was written, adjudication of the criminal aspects surrounding the crash were not resolved. The driver of the Chevrolet was charged with 11 criminal counts, including 4 counts of DUI manslaughter and 4 counts of vehicular homicide. Several civil lawsuits are also pending. As of February 2, 2022, none of these legal matters have been resolved.

Through the course of this investigation, the SCI investigator found no evidence to support the claim of unintended acceleration.

Crash Summary

Crash Site

The crash occurred on an urban, multi-lane, divided roadway in early evening daylight. According to the National Weather Service, conditions in the locale at the time of the crash included clear skies with a temperature of 27 °C (80 °F), an easterly breeze of 10 km/h (6 mph), and relative humidity of 58 percent. Conditions reported by the investigating law enforcement agency included clear skies, dry roadway surfaces, and daylight. The physical environment of the roadway and crash site were documented during the SCI crash site inspection using photographs and a Nikon Nivo 5.M+ total station mapping system. The roadway was oriented north/south with two primary travel lanes in each direction. It was divided by a narrow median with raised concrete curbs. Numerous intersecting local roadways and commercial property entrances were accompanied by sporadic designated right turn and left turn lanes for each travel direction.

Figure 2. North-facing lookback view of the southbound travel lanes

Figure 3. South-facing view of the southbound travel lanes and left turn lane on approach to the intersection

The crash occurred at the intersection of the multi-lane roadway with a crossing local road. The intersection was uncontrolled for north/south traffic, but contained left-turn-only lanes for both the northbound and southbound approaches. The southbound travel lanes were 3.5 m (11.5 ft) wide, and the left turn lane was 3.0 m (9.8 ft) wide. Broken white lines divided the travel lanes, with a single solid white line demarcating the turn lane. A single solid yellow line bordered the curb of the 1.3 m (4.3 ft) wide concrete median. The left turn lane was approximately 70 m (230 ft) long at full width, and was clearly designated by three painted left arrows along its length. Figure 2 shows a northbound lookback view of the southbound travel lanes, while Figure 3 shows a south-facing view of the southbound approach to the uncontrolled intersection. Speed on the multi-lane roadway was controlled by a posted limit of 72 km/h (45 mph). A crash diagram is included at the end of this report.

Pre-Crash

The belted 21-year-old male driver and belted 25-year-old male front-row right passenger occupied the Chevrolet as it traveled southbound on the multi-lane roadway. Based on video surveillance footage from businesses and commercial establishments along the roadway, the law

enforcement agency's investigation of the crash ultimately determined the Chevrolet traveled southbound at speeds in excess of 129 km/h (80 mph) for a distance of at least 3 km (2 mi) prior to reaching the location of where the crash occurred. Witnesses made recorded statements to the law enforcement agency that they saw the Chevrolet weaving in and out of traffic at high speeds.

The Dodge traveled south on the same multi-lane roadway, well in advance of the Chevrolet. It was driven by the belted 50-year-old male with a belted 42-year-old female front-row right occupant, belted 8-year-old male second-row left occupant, and belted 6-year-old female second-row right occupant. The Dodge driver steered into the left turn lane and brought the vehicle to a controlled stop at the mouth of the intersection, waiting to turn left.

The Buick Encore traveled north in the northbound right lane of the multi-lane roadway, driven by the unbelted 49-year-old female with a belted 16-year-old male front-row right passenger. The Buick Encore maintained its speed and straight trajectory as it approached the intersection with the intent of proceeding through the intersection and continuing northbound.

As the Chevrolet approached the intersection at a high speed, traffic traveling at speeds near the posted limit congested the roadway in front of the Chevrolet. Its driver steered the vehicle left into the left-turn-only lane while maintaining speed and southbound trajectory. The Chevrolet rapidly approached the back of the stopped Dodge. There was no avoidance input by the Chevrolet driver prior to impact.

Data imaged from the Chevrolet's EDR reported that the Chevrolet's accelerator pedal was fully depressed (99%) for all data intervals within the entire 2.5-second pre-crash buffer. There was no attempt by the driver to apply the brakes, as the brake switch circuit state was reported "off" for all data intervals of the pre-crash buffer. The SCI investigator used the speed data reported by the Chevrolet's EDR and calculated that the actual speed of the Chevrolet, which was equipped with oversize tires not in the vehicle manufacturer's recommendations, was 169 km/h (105 mph)[1] at 0.5-seconds prior to algorithm enable (AE).

Crash

The first crash event (Event 1) occurred as the front of the Chevrolet struck the back of the Dodge in an aligned front-to-rear configuration. Due to the mass and high speed of the Chevrolet, the Dodge was displaced forward by the crash. Post-manufacturer modifications to the Chevrolet -- the addition of oversized tires, body lift, and suspension modifications -- aligned the Chevrolet's front bumper with the lower aspect of the Dodge's rear lift-gate well above the height of its rear bumper beam. This resulted in engagement of the Chevrolet's front plane/frame with the body of the Dodge, rather than the frame-to-frame engagement that otherwise would have resulted if the vehicles' bumper heights were in alignment. This produced massive deformation to the Dodge with catastrophic occupant compartment intrusion. The Dodge and Chevrolet were displaced southward through the intersection. Figure 4 shows a south-facing view of the roadway at the area of initial impact.

[1] Due to differences in the recommended versus actual tire sizes of the Chevrolet, the reported vehicle speed values within the EDR data likely were not the actual speed of the vehicle. The estimated actual speed of a vehicle can be computed by dividing the actual tire diameter by the recommended tire diameter, then multiplying by the reported vehicle speed *(whereas, Estimated Actual Speed* $= \left[\frac{Actual\ tire\ diameter}{Recommended\ tire\ diameter}\right] \times$ *Reported Vehicle Speed*).

Figure 4. South-facing view of the roadway and intersection immediately north of the initial impact area

The Chevrolet and Dodge continued through the intersection as a combined unit, then departed the intersection toward the median. The second crash event (Event 2) occurred when the undercarriage of the Dodge contacted the exposed concrete surface of the raised median. The Chevrolet remained engaged with the Dodge and the two vehicles continued to be displaced to the south.

As a combined unit, the Chevrolet and Dodge were directed across the northbound travel lanes south of the intersection. Their trajectory was evidenced by a pattern of gouge marks and tire marks that were documented by the SCI investigator during the crash site inspection (Figure 5). While the Chevrolet and Dodge were involved in their crash sequence, the Buick Encore continued northbound. Its driver saw the impact of the Chevrolet and Dodge, and saw the vehicles as they were displaced through the intersection and into the northbound lanes. The Buick Encore driver released her accelerator pedal and initiated an emergency braking application, while providing a right steering input. These circumstances were supported by the data imaged from the Buick's EDR, and evidenced by a skidding tire mark that extended from the right travel lane across the east shoulder and departed the right road edge. Speed data from the Buick indicated a reduction in speed from 69 km/h (43 mph) to 9 km/h (6 mph) at 0.5-seconds prior to AE. The third and final crash event occurred as the front plane, left aspect of the Buick Encore struck the right plane, front half of the Dodge in the area of the east shoulder.

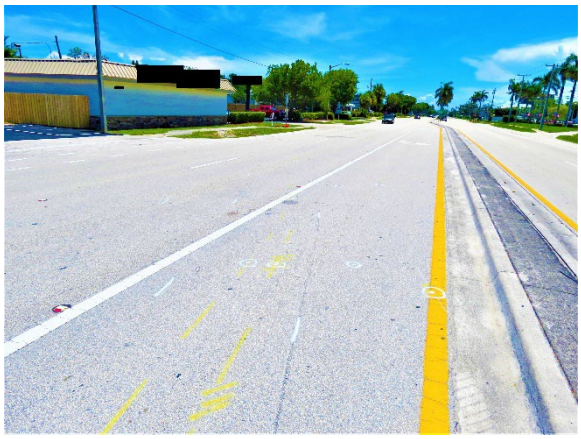


Figure 5. South-facing view of the northbound lanes and crash trajectory evidence (yellow and white markings within the travel lanes)

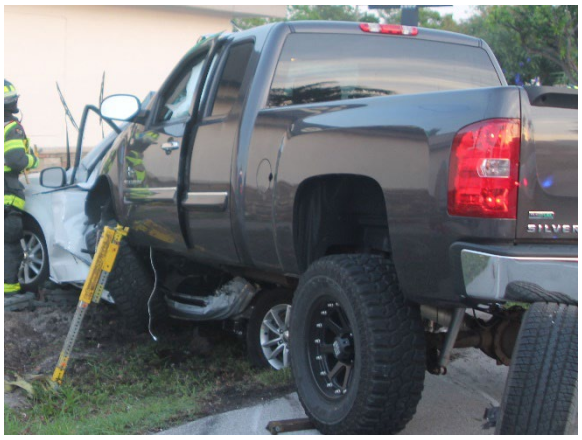


Figure 6. View of the Chevrolet with its front plane embedded into the Dodge at final rest (on-scene image provided by the investigating law enforcement agency)

The Chevrolet and Dodge departed the east road edge and slid to final rest as a combined mass, while the Buick rotated slightly clockwise and came to rest parallel to the Dodge. At rest, the entire front of the Chevrolet was embedded in the occupant space of the Dodge. The deformed front bumper beam of the Chevrolet had penetrated the Dodge from the rear to the center aspect of the front row, in front of the B-pillars. Figure 6 is an on-scene image of the vehicles at final rest.

At some point during the crash sequence, a piece of debris was projected toward passing traffic. The debris struck the roof of a passing 2010 Buick Enclave, which shattered its sunroof. The Buick Enclave reportedly stopped a short distance from the crash scene. However, its driver did not report its indirect involvement in the crash until the following day.

Post-Crash

There were numerous witnesses, some of whom used their cell phones and called local law enforcement prior to the crash to report the Chevrolet and its high-speed travel prior to the collision. Additional witnesses who saw the crash also notified the local emergency response system. Local law enforcement, the fire department, and emergency medical services personnel were dispatched to the crash scene. The occupants of the Chevrolet remained in the vehicle until the emergency response units arrived. The four occupants of the Dodge were entrapped in the vehicle, but the occupants of the Buick had exited without assistance.

Crash forces and the penetration of the Chevrolet into the Dodge's occupant compartment were not survivable for the four occupants of the Dodge. All were pronounced deceased at the crash site, with no medical care rendered. The Chevrolet driver was treated on-scene but not medically transported, while the Chevrolet's front-right passenger was assisted from the vehicle and transported by ambulance to a local hospital for the evaluation and treatment of reported incapacitating (A-level) injuries. The occupants of the Buick Encore both reportedly sustained non-incapacitating (B-level) injuries, but neither was medically transported from the crash site.

The crash scene was documented and reconstructed by the investigating law enforcement agency. As part of its investigation, it obtained recorded statements from witnesses concerning

the pre-crash travel of the Chevrolet and the crash circumstances. The agency also retrieved video surveillance footage from commercial establishments that captured traffic on the multi-lane roadway in the area of the crash. All three vehicles were recovered from the scene and retained by the law enforcement agency to support its criminal investigation.

According to law enforcement documents, difluoroethane was detected in the driver's post-crash blood. An ingredient in a variety of commercially available aerosol products, difluoroethane is the primary ingredient of a product called Dust-Off, an aerosol used to clean dust and lint from electronics. This and other aerosol/compressed gas products can be intentionally inhaled to achieve a mental/euphoric high, a form of inhalation abuse commonly known as "huffing." Symptoms of huffing include lightheadedness, dizziness, euphoria, hallucinations, delusions, and impaired judgement. Based on the difluoroethane in his system and other evidence gathered by the investigating law enforcement agency, the driver was criminally charged with four counts of vehicular homicide, four counts of manslaughter while driving under the influence (DUI), and three counts of DUI resulting in property damage and/or injury. As of the date of this report, the outcome of the criminal case had not yet been determined.

2010 Chevrolet Silverado 1500

Description

The 2010 Chevrolet Silverado 1500 (Figure 7) was manufactured in November 2009 and was identified by the Vehicle Identification Number (VIN) 1GCSCSE01AZxxxxxx. The electronic odometer reading remains unknown due to electrical system inoperability at the time of the SCI inspection. It was a 4-door extended cab pickup built on a 365 cm (143.7 in) wheelbase with a 5.3-liter, V-8, gasoline engine. The Chevrolet was a rear-wheel-drive platform and had the LT Texas Edition trim package. Aftermarket modifications to the vehicle included oversize tires, a body lift, and suspension modifications. The Chevrolet had a gross vehicle weight rating (GVWR) of 3,085 kg (6,800 lb). Front and rear axle ratings were 1,633 kg (3,600 lb) and 1,792 kg (3,750 lb), respectively. The curb weight was 2,233 kg (4,924 lb). Placarding on the frame of the left front door stated that the vehicle manufacturer's recommended tire size and cold tire pressure for all four axle positions was P275/55R20 at 210 kPa (30 PSI). At the time of the SCI inspection, the vehicle was equipped with MudClaw Extreme MT tires of size 35x12.5R18 at all four axle positions, which had matching tire identification numbers (TINs) of "KAFW D47X" and significant tread depth of 9 mm (11/32 in) or greater. These equipped tires had a much larger diameter of 88.9 cm (35.0 in) than the recommended size of 78.2 cm (30.8 in).

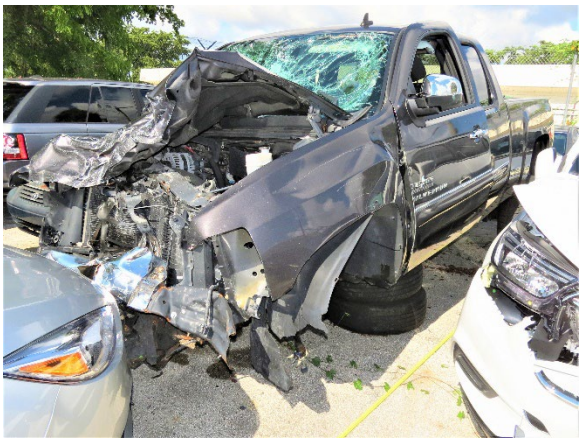


Figure 7. Front-left oblique view of the 2010 Chevrolet Silverado 1500 at the time of the SCI vehicle inspection

The Chevrolet had seating of up to six occupants (3/3). The front row consisted of forward-facing bucket seats with adjustable head restraints for the driver and front-row right positions, with a center bench seat that had a folding seat back which doubled as a center armrest/console. The Chevrolet's second row consisted of a non-adjustable bench seat that had a capacity of three occupants, with adjustable head restraints for the outboard positions. Manual safety features included 3-point lap and shoulder seat belts for the driver, front-row right, and all three second row seat positions. The front-row center position was equipped only with a lap belt. Front-row seat belts were also equipped with retractor pretensioners. Supplemental restraints included a Certified Advanced 208-Compliant (CAC) frontal air bag system, front seat-mounted side impact air bags, and dual-sensing (side impact and rollover) inflatable curtain (IC) air bags.

At the time of the SCI inspection, all three seat positions of the front row had been unsecured from the vehicle and displaced by the investigating law enforcement agency. This was done

during their efforts to remove the vehicle's sensing and diagnostic control module (SDM) for its securement into evidence due to the EDR data it contained

Exterior Damage

Damage to the exterior of the Chevrolet was located on the front plane, associative to the frontal impact with the back plane of the Dodge. Direct contact spanned the entire 196 cm (77.2 in) undeformed end width of the vehicle. In the damage pattern was longitudinal deformation to the bumper beam, hood, and surrounding components. Both front headlight assemblies and the grille/fascia were disintegrated. Underlying frame rail extensions were deformed in their respective crumple zones, and the frontal engine compartment supports were deformed. Direct contact wrapped onto the forward aspect of the right plane, as well as to the undercarriage of the vehicle. According to baseline measurements obtained during the SCI vehicle inspection, the right-front axle position was displaced rearward 47 cm (18.5 in). Direct contact body surface abrasions and white paint transfer were visible on the Chevrolet's right plane, from the front bumper corner rearward to the center aspect of the right front door.

The SCI investigator used the Nikon Nivo 5.M+ total station mapping system to document the front crush profile of the Chevrolet. From a front plane perspective, the width of the direct and induced damage (Field-L) measured 188 cm (74.0 in). A residual crush profile documented to the bumper beam produced the following resultant measurements: C1 = 7 cm (2.8 in), C2 = 23 cm (9.1 in), C3 = 29 cm (11.4 in), C4 = 37 cm (14.6 in), C5 = 26 cm (10.2 in), and C6 = 37 cm (14.6 in). Maximum crush was located at the right front bumper corner. Based on the observed damage profile, the collision deformation classification (CDC) assigned for the Event 1 impact with the back plane of the Dodge was 12FDEW2. Figure 8 shows the front damage profile to the Chevrolet, while Figure 9 shows an overhead perspective of the damage.

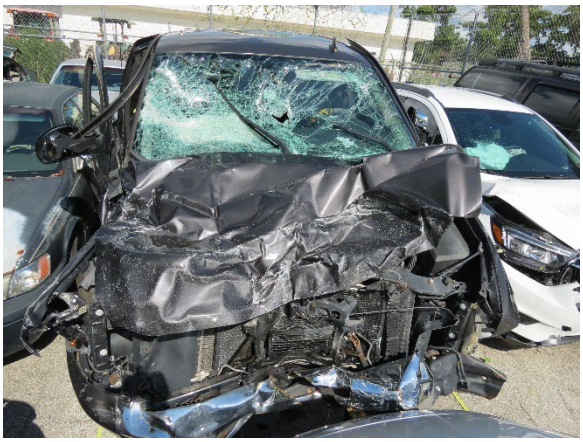


Figure 8. Front-plane view of the damage profile to the 2010 Chevrolet Silverado

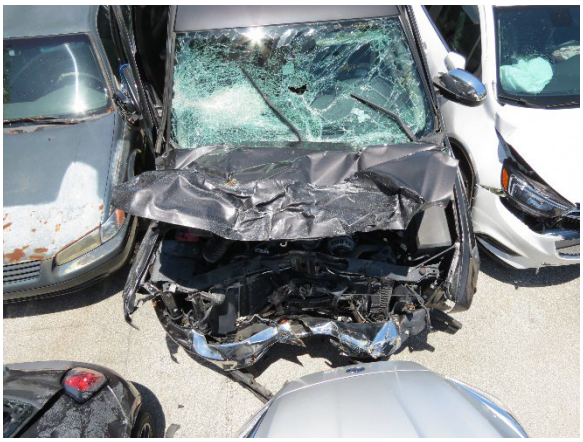


Figure 9. Damage pattern to the front plane of the Chevrolet from an overhead perspective

The damage algorithm of the WinSMASH model was used to calculate the severity of the crash for analysis purposes. The total calculated delta V of the Chevrolet for the front crash event with the Dodge was -100 km/h (-62 mph). Respective longitudinal and lateral components of the calculated delta V were -100 km/h (-62 mph) and 0 km/h (0 mph). Based on the data imaged

from the Chevrolet's EDR and SCI expertise, the borderline WinSMASH results were over-estimated.

Event Data Recorder

The 2010 Chevrolet Silverado 1500 had an SDM mounted to the center tunnel beneath the front-row center seat position. The SDM monitored the diagnostic functions of the vehicle's supplemental restraint systems (air bags and safety belt pretensioners) and controlled the deployment/actuation of those devices dependent upon crash event severity. The Chevrolet's SDM had EDR capabilities and was supported by the Bosch Crash Data Retrieval (CDR) tool. The SDM was removed by the investigating law enforcement agency and retained as evidence prior to the on-site SCI investigation. An electronic CDRX copy of the imaged data was provided to the SCI investigator. The data had been imaged by the law enforcement agency using software version 17.3, and was later reported by the SCI investigator using software version 19.5. The imaged data is included as Appendix A at the end of this report.

The Chevrolet's SDM monitored and measured vehicle acceleration in both the longitudinal and lateral directions. The threshold minimal crash pulse was a measured vehicle velocity change of 8 km/h (5 mph). The EDR could record two different event types, termed "non-deployment" or "deployment," and had the capacity to store a combination of up to three events. By definition, non-deployment events included all those where no supplemental restraint device deployments were commanded, as well as pretensioner actuation-only events. Non-deployment events could be overwritten if all three data records were full, the oldest recorded event was older than approximately 250 ignition cycles, and any of the following three conditions occurred: (1) another non-deployment event of greater severity, (2) any deployment event, or (3) any subsequent non-deployment event. Deployment events became locked to memory and could not be overwritten. If power to the SDM was lost during or immediately following a crash event, all or part of the data may not have been recorded to memory.

At algorithm enable (AE) and recognition of a longitudinal or lateral event, the EDR had the capacity to record longitudinal and lateral delta V data in 10 millisecond intervals. Up to 300 milliseconds was recorded for a non-deployment event, while up to 70 milliseconds before criteria were met and up to 220 milliseconds after criteria were met was recorded for deployment event types. Associated to each event was a 2.5-second pre-crash buffer that recorded accelerator pedal position (%), brake switch circuit state, engine speed (rpm), engine throttle position (%), and vehicle speed (mph) data. For the 0.5 and 1-second pre-crash intervals, the EDR also recorded cruise control usage, engine torque, and reduced engine power mode data.

The imaged data contained one deployment event and one non-deployment event, both of which occurred on ignition cycle 15,178. Complete recording was reported for both events, with a time between event triggers reported as 1.8 seconds. The diagnostic trouble code (DTC) B0052-00 was present at the time of the events, indicative of the occurrence of a crash event that resulted in supplemental restraint deployment. It was associated to the recognized and recorded deployment event, and caused the air bag warning light to illuminate following the deployment event and remain on at the time of the non-deployment event. The driver and passenger belt switch circuit states were reported as "buckled" for both events.

Other pre-crash data associated with the first recorded event included:

Time	Accelerator Pedal	Service Brake	Engine rpm	Engine Throttle*	Vehicle Speed**
-2.5	99%	OFF	5,056	99%	155 km/h (96 mph)
-2.0	99%	OFF	5,056	99%	155 km/h (96 mph)
-1.5	99%	OFF	5,056	99%	157 km/h (98 mph)
-1.0	99%	OFF	4,992	41%	156 km/h (97 mph)
-0.5	99%	OFF	4,928	41%	154 km/h (96 mph)

**Engine throttle speed variation attributable to asynchronous data recording and/or vehicle self-regulation*
***Vehicle speed data are calculated based on the vehicle manufacturer's recommended tire size*

Associated with the deployment event were the following actuation and deployment commands:

Device	Time Commanded After AE
Driver seat belt pretensioner	6 milliseconds
Passenger's seat belt pretensioner	6 milliseconds
Driver frontal air bag (1st stage)	6 milliseconds
Passenger's frontal air bag (1st stage)	6 milliseconds
Driver frontal air bag (2nd stage)	9 milliseconds
Passenger's frontal air bag (2nd stage)	9 milliseconds
Left inflatable curtain	6 milliseconds
Right inflatable curtain	6 milliseconds

The maximum recorded vehicle velocity change (delta V) for the deployment event occurred 220 milliseconds after AE. The longitudinal component was -85 km/h (-53 mph), while the lateral component was -2 km/h (-1 mph). It was apparent to the SCI investigator that the recorded deployment event was related to Event 1 of the crash. Pre-crash data associated with the second recorded event included:

Time	Accelerator Pedal	Service Brake	Engine rpm	Engine Throttle	Vehicle Speed*
-2.5	99%	OFF	4,992	41%	156 km/h (97 mph)
-2.0	99%	OFF	4,928	41%	154 km/h (96 mph)
-1.5	DATA NOT AVAILABLE				
-1.0					
-0.5					

**Vehicle speed data are calculated based on the vehicle manufacturer's recommended tire size*

No supplemental restraint actuation/deployment commands were associated with the recorded non-deployment event. The maximum recorded delta V occurred 770 milliseconds after AE. The longitudinal component was -9 km/h (-6 mph), while the lateral component was -13 km/h (-8 mph). It was apparent to the SCI investigator that the recorded non-deployment event was related to Event 3 of the crash, where the forces associated with the impact between the Buick and Dodge were translated through the Dodge to the Chevrolet.

Interior Damage

The interior of the Chevrolet was inspected for crash-related damage, including occupant compartment intrusion and contact evidentiary of occupant kinematics. As previously mentioned, all three seat positions of the front row were unsecured from the vehicle and displaced about the Chevrolet's interior. This had occurred during the law enforcement agency's efforts to remove the vehicle's SDM. All four doors of the Chevrolet remained closed during the crash and were operational at the time of the SCI vehicle inspection.

The front row windows were both fully open at the time of the crash, with no damage to either glazing concealed in the front doors at inspection. The windshield of the Chevrolet was fractured across its entire height and width, resultant from forces associated with the crash. There was no evidence of occupant contact to any of the Chevrolet's glazing.

Minor occupant compartment intrusion was observed, biased to the front-right aspect of the Chevrolet's interior, relative to the severe frontal impact with the Dodge. Documented intrusions included, in descending order of magnitude, 12 cm (4.7 in) longitudinal intrusion of the right floor pan, 8 cm (3.1 in) longitudinal intrusion of the right lower instrument panel, and 5 cm (2.0 in) longitudinal intrusion of the right and center aspects of the instrument panel. There were no measured vertical or lateral intrusions to the Chevrolet's interior. Figure 10 shows the floor area of the front-row right position, with visibility of the longitudinal intrusion of the floor/toe pan.

An inspection of the Chevrolet's interior for evidence of occupant contact revealed that there was minimal evidence from the occupants. Aside from loading evidence on the vehicle's manual restraint systems and a small area of blood on the front-right passenger's frontal air bag, the SCI investigator was unable to discern any other evidence in the Chevrolet to support definitive contact from the vehicle's occupants. Figure 11 shows an overall view of the front components for the Chevrolet's driver position.

Figure 10. Visible longitudinal intrusion of the floor/toe pan at the Chevrolet's front-row right position

Figure 11. Front components within the Chevrolet at the driver's seat position

Manual Restraint Systems

The Chevrolet was equipped with 3-point lap and shoulder seat belt systems for the driver, front-right passenger, and all three second-row seat positions. The front-center position was equipped only with a lap belt. Both the driver and front-right passenger seat belt systems used

continuous loop webbing with sliding latch plates and adjustable D-rings. The driver's seat belt system retracted onto a floor-mounted emergency locking retractor (ELR), while the front-right passenger's seat belt used a floor-mounted ELR/automatic locking retractor (ALR). Both outboard front seat belt systems were equipped with retractor pretensioners.

At the time of the SCI inspection, the webbing of both the driver's and front-right passenger's seat belt systems had been cut in at least one location. The retractors of both systems were locked in position, presumably as a result of pretensioner actuation. The driver's seat belt system was cut 26 cm (10.2 in) above the lap anchor and 91 cm (35.8 in) above the retractor (Figure 12), creating an 85 cm (33.5 in) free-floating section that contained the sliding latch plate. Abrasions in the belt path evidenced loading by the driver during the crash. The front-right passenger's seat belt system was cut 69 cm (27.2 in) above the lap anchor and 153 cm (60.2 in) above the retractor (Figure 13). The latch plate could not be found in the Chevrolet for inspection. Based on the observed condition of the driver and front-right passenger seat belt systems in the Chevrolet, it was the SCI investigator's expert opinion that both systems were in use by their respective occupants at the time of the crash. This conclusion was supported by the data imaged from the Chevrolet's EDR and law enforcement documentation (PAR).

Figure 12. Upper cut point to the shoulder portion of the driver's seat belt system within the Chevrolet

Figure 13. Cut portion of webbing extending from the retractor of the Chevrolet's front-right passenger seat belt

Supplemental Restraint Systems

The Chevrolet was equipped with a CAC frontal air bag system that consisted of air bags for the driver and front-right passenger positions, with seat belt buckle switch sensors, seat track position sensors, and a front-right occupant presence (weight) sensor. The vehicle was further equipped with front seat-mounted side impact and dual-sensing (side impact and rollover) IC air bags. Both frontal and both IC air bags deployed as a result of the crash.

The driver's frontal air bag deployed from the steering wheel hub-mounted module through the I-configuration cover flaps without damage. The air bag measured 72 cm (28.3 in) in overall diameter in its deflated state, and was internally tethered via a 14 cm (5.5 in) diameter circular center stitch pattern. A pair of 3 cm (1.2 in) diameter vents were located on the back of the air bag at the 11 and 1 o'clock positions. Maximum excursion of the air bag measured 25 cm (9.8 in) at its center tethered aspect. There was no discernable occupant contact or other damage to the deployed driver's air bag (Figure 14).

Figure 14. Deployed driver's frontal air bag within the Chevrolet

Figure 15. Deployed passenger's frontal air bag within the Chevrolet

The passenger's frontal air bag deployed from the top instrument panel-mounted module through the H-configuration cover flaps without damage. The air bag's overall measurements were 66 cm (26.0 in) tall by 44 cm (17.3 in) wide in its deflated state (Figure 15). The maximum rearward excursion from the module measured 50 cm (19.7 in) at its center aspect. A cluster of five vent ports, including one 5 cm (2.0 in) in diameter and four 2 cm (0.8 in) in diameters, was located on each side of the air bag. A droplet of blood was observed on the center-left aspect of the air bag's face, suggestive of contact by the front-right passenger.

Both of the IC air bags in the Chevrolet deployed from their respective roof side rails and extended downward to provide outboard protection for the front and second rows. At the time of the SCI inspection, both IC air bags were observed to have been cut along their entire length, immediately below the roof side rail. The remnants of the air bags were not available for SCI inspection. Figure 16 shows the left roof side rail of the Chevrolet and protruding cut remnants of the left IC air bag.

Figure 16. Remnants of the left IC air bag visible along the left-roof side rail of the Chevrolet

NHTSA Recalls and Investigations

A query of this specific 2010 Chevrolet Silverado 1500's VIN on www.safercar.gov identified that there were no open investigations concerning this specific vehicle as of the date of this report. However, there was one open recall, identified by the NHTSA Campaign Number 16V381 and manufacturer recall number 2049151. The recall concerned the potential for the Chevrolet to be equipped with a defective passenger air bag inflator. Associated with the recall was an open Petition for Inconsequentiality by the manufacturer, awaiting determination by NHTSA since August 2017.

Unintended Acceleration Discussion

This SCI investigation included an examination of the Chevrolet's foot controls and throttle body in reference to the claim of unintended acceleration. The Chevrolet's foot controls were suspended pedals, separated laterally by a 7 cm (2.8 in) gap and longitudinally by a 6 cm (2.4 in) step over. With reference to the driver, the accelerator pedal was to the right of the brake pedal and behind (farther away). The accelerator pedal measured 5 cm (2.0 in) wide by 13 cm (5.1 in) tall, and was covered by a rubber pad. The brake pedal measured 13 cm (5.1 in) wide and was 5 cm (2.0 in) tall. There was no rubber padding on the pedal (Figure 17), and scratches and embedded dirt on the exposed metal surface of the pedal indicated that the padding had been off the brake pedal for some time.

Figure 17. View of the driver foot controls within the Chevrolet, depicting their size and separation

Figure 18. Driver's foot/floor area within the Chevrolet, without floor mats or any foreign objects

The SCI investigator observed that there were no floor mats in the Chevrolet (Figure 18) at the time of the SCI inspection. There were no foreign objects or other material either adjacent or in close proximity to the foot controls that could potentially restrict or otherwise impede the operation of the foot controls. The SCI investigator was able to freely depress both pedals, and observed that they returned freely and responsively to an undepressed/unapplied position. The SCI investigator observed that the Chevrolet's engine and air intake system were involved in the collision damage. The polymer intake ducting was fractured in locations and separated from the throttle body. The SCI investigator was able to move the throttle plate freely, with restriction only by the static condition of the internal electronic motor (not energized).

As previously discussed, video surveillance obtained as part of the law enforcement investigation captured pre-crash circumstances, vehicle trajectory, and impact events of the crash. The SCI investigator was able to watch the video and observe the Chevrolet traveling at high speed prior to the crash. It was visible to the SCI investigator that the brake lights of the Chevrolet did not appear to be illuminated at any time leading up to the crash. It was reported by the imaged EDR data that the brake switch was "off" for the entire pre-crash buffer. According to the law enforcement documents, difluoroethane was detected in the driver's post-crash blood sample. He was later criminally charged in relation to the outcome of the crash.

During the SCI vehicle inspection the SCI investigator attempted to energize the Chevrolet's electrical system for the purpose of energizing the instrument cluster and reading potential DTC data using a commercially available scan tool. However, the SCI investigator was unsuccessful in energizing the vehicle, likely due to the extensive frontal damage to the Chevrolet.

Based on the data gathered through the course of this SCI investigation, the following observations were made concerning the Chevrolet and the reported unintended acceleration.

1. Video surveillance footage and other data gathered by the local law enforcement agency showed that the Chevrolet was traveling at high speed and weaving in and out of traffic for a distance greater than 3 km (2 mi) when the crash occurred.
2. The Chevrolet's foot controls operated freely and without restriction. Despite the missing rubber padding and corresponding exposed metal surface of the brake pedal, there were no objects in contact with or adjacent to the foot controls to interfere with or otherwise impede their operation.
3. The Chevrolet's throttle moved freely in the throttle body, and its operation was not restricted or otherwise impeded.
4. The imaged EDR data reported that the brake switch status was OFF for all data sample intervals across the entire pre-crash recording buffer.
5. The imaged EDR data reported that the accelerator pedal was fully depressed (99%) for all data sample intervals across the entire pre-crash recording buffer.
6. There was no evidence found during the course of this SCI investigation to support the claim of unintended acceleration.

2010 Chevrolet Silverado 1500 Occupant Data

Driver Demographics

Age/sex:	21 years/male
Height:	Unknown
Weight:	Unknown
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Rear-third position (Source: EDR data)
Manual restraint usage:	3-point lap and shoulder seat belt system
Usage source:	Vehicle inspection, imaged EDR data
Air bags:	Frontal, seat-mounted side impact, and IC air bags available; Frontal and IC air bags deployed
Alcohol/drug involvement:	Difluoroethane
Egress from vehicle:	Assisted from vehicle
Transport from scene:	None
Type of medical treatment:	On-scene treatment only

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
N/A	Unknown	-	-	-

Source – Police crash report

Driver Kinematics

The 21-year-old male was operating the Chevrolet with the seat track adjusted to a rear-third position according to the data imaged from the vehicle's EDR, and he used the available 3-point lap and shoulder seat belt system. Several sources of data gathered, reviewed, and examined as part of this investigation determined that the Chevrolet driver was operating the vehicle at high speeds for an extended distance as he traveled south on the multi-lane roadway.

The driver operated the Chevrolet southbound along the multi-lane roadway. As he approached slower moving traffic, he steered the vehicle left and into the left-turn-only lane in an attempt to navigate the Chevrolet around other vehicles and continue southbound. At impact with the back plane of the Dodge, the driver initiated a forward trajectory. Pretensioners in the Chevrolet actuated, and air bags deployed. The driver's body loaded the seat belt system, while his head and face contacted and loaded the deployed driver's frontal air bag. The driver remained forward and loaded the seat belt system and deployed frontal air bag as the Chevrolet engaged the Dodge and displaced it to the south. Although the left IC air bag deployed, the driver's kinematic response did not subject him to interaction with the deployed left IC air bag.

Subsequent impact of the Dodge's undercarriage with the concrete median did not affect the Chevrolet. The driver remained forward as the Chevrolet displaced the Dodge across the northbound travel lanes. However, the impact of the Dodge and Buick was associated with crash forces that were translated through the Dodge to the Chevrolet. These forces were recognized as a secondary event by the Chevrolet's SDM, and wrote EDR data to memory. Minor severity

forces associated with this induced crash pulse were of insufficient severity to illicit further response from the Chevrolet's occupants.

The driver remained restrained by the manual seat belt system and in the driver's seat position as the Chevrolet came to final rest. The webbing of the driver's seat belt system was cut in locations and he was assisted from the vehicle by arriving law enforcement and emergency response personnel. The driver received on-scene treatment, but was not medically transported from the crash scene.

Front-Row Right Occupant Demographics

Age/sex:	25 years/male
Height:	181 cm (71.0 in)
Weight:	77 kg (170 lb)
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	3-point lap and shoulder seat belt system
Usage source:	Vehicle inspection; imaged EDR data
Air bags:	Frontal, seat-mounted side impact, and IC air bags available; Frontal and IC air bags deployed
Alcohol/drug involvement:	No test given
Egress from vehicle:	Assisted from vehicle
Transport from scene:	Ambulance to local hospital
Type of medical treatment:	Hospitalized for 2 days

Front-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Lung contusion-> unilateral NFS, Left Lung Lobe 1	441406.2	Shoulder portion of seat belt webbing	Probable
2	Clavicle fracture Clavicle shaft fracture-> simple, Right No Further Specificity	750651.2	Shoulder portion of seat belt webbing	Certain
3	Skin/subcutaneous/muscle abrasion, Right Shoulder	710202.1	Shoulder portion of seat belt webbing	Certain
4	Skin/subcutaneous/muscle contusion; hematoma, Right Cheek	210402.1	Deployed frontal air bag	Certain
5	Skin/subcutaneous/muscle abrasion, Forehead	210202.1	Deployed frontal air bag	Certain
6	Skin/subcutaneous/muscle (Thorax) contusion; hematoma, Right Chest	410402.1	Shoulder portion of seat belt webbing	Certain
7	Skin/subcutaneous/muscle [except closed abdominal muscle injuries] (Abdomen) contusion; hematoma, No Further Specificity	510402.1	Lap portion of seat belt	Certain

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
8	Cervical spinous ligament injury, No Further Specificity	640284.1	Lap portion of seat belt	Probable
9	Skin/subcutaneous/muscle contusion; hematoma, Right Hand	710402.1	Right instrument panel	Possible
10	Skin/subcutaneous/muscle abrasion, Right Hip	810202.1	Right door panel, rear lower quadrant	Possible
11	Skin/subcutaneous/muscle abrasion, Right Knee	810202.1	Right lower instrument panel	Certain

Source – Hospital records

Front-Row Right Occupant Kinematics

The 25-year-old male occupied the Chevrolet in the front row, right position. Specific pre-crash adjustments of his seat position remain unknown. The front-right passenger was restrained by the available 3-point lap and shoulder seat belt system. At impact with the back plane of the Dodge, the front-right occupant initiated a forward trajectory. Pretensioners in the Chevrolet actuated, and air bags deployed. His body loaded the seat belt system, while his head and face contacted and loaded the deployed passenger's frontal air bag. The front-right occupant remained forward and loaded the seat belt system and deployed frontal air bag as the Chevrolet engaged the Dodge and displaced it to the south. These contacts and corresponding loading, over the duration of the crash pulse, resulted in injuries to the driver's face, thorax, and abdomen. His legs extended forward and loaded the floor/toe pan as intrusion toward the occupant occurred. His right knee engaged the right lower instrument panel, resulting in a soft tissue injury. Although the right IC air bag deployed, the front-right passenger's kinematic response did not subject him to interaction with the deployed right IC air bag.

Subsequent impact of the Dodge's undercarriage with the concrete median did not affect the Chevrolet. The front-right occupant remained forward as the Chevrolet displaced the Dodge across the northbound travel lanes. However, the impact of the Dodge and Buick was associated with crash forces that were translated through the Dodge to the Chevrolet. These forces were recognized as a secondary event by the Chevrolet's SDM, and wrote EDR data to memory. Minor severity forces associated with this induced crash pulse were of insufficient severity to illicit further response from the Chevrolet's occupants.

The front-right occupant remained restrained by the manual seat belt system and in the front-row seat position as the Chevrolet came to final rest. Emergency response personnel cut the webbing of the front-right passenger's seat belt system, then assisted him from the vehicle. The front-right occupant was transported by ambulance to a local hospital, where he was evaluated for reported incapacitating (A-level) injuries and hospitalized for 2 days.

2018 Dodge Grand Caravan

Description

The 2018 Dodge Grand Caravan (Figure 19) was identified by the VIN 2C4RDGCG7JRxxxxxx. According to data imaged from the Dodge's EDR, the electronic odometer reading at the time of the crash was 1,953 km (1,213.6 mi). The Dodge was a 4-door minivan built on a 308 cm (121.3 in) wheelbase with a 3.6-liter, V-6 gasoline engine. It was a front-wheel-drive platform and had a curb weight of 2,050 kg (4,519 lb). No specifics concerning the vehicle's weight rating or manufacturer tire size/pressure recommendations were available due to vehicle damage from the crash that concealed the vehicle's placards. At the time of the SCI inspection, the Dodge was equipped with Yokohama Avid S33 tires of size P225/65R17 at all four axle positions. The tires had ample tread of 3 mm (4/32 in) or greater and matching TINs of "4UF5 6CH 3717." All were flat as a result of damage sustained during the crash.

Figure 19. Front-right oblique view of the 2018 Dodge Grand Caravan at the time of the SCI vehicle inspection

The interior of the Dodge was configured for the seating of up to seven occupants (2/2/3). Manual safety features included 3-point lap and shoulder seat belts for all seat positions. Front row seat belts were also equipped with retractor and lower anchor pretensioners. Supplemental restraints included front row active head restraints and a CAC frontal air bag system, driver knee air bag, front seat-mounted side impact air bags, and IC air bags.

Exterior Damage

Damage to the exterior of the Dodge due to the impact by the front plane of the Chevrolet was located on the back plane. Direct contact spanned the entire 166 cm (65.4 in) undeformed end width of the vehicle. In the damage pattern was massive longitudinal deformation to the occupant compartment of the Dodge, including longitudinal displacement of the bumper beam, roof, rear lift gate, and surrounding components.

The SCI investigator used the Nikon Nivo 5.M+ total station mapping system to document the back plane crush profile of the Dodge. Due to the fact that the direct damage and crush were all above bumper beam level because of the height of the impacting Chevrolet, residual crush to the Dodge was measured both at bumper beam level and at the structure of the backlight header.

The width of the direct and induced damage (Field-L) for the crush profile measured 115 cm (45.3 in) across the entire width of the header. The resultant crush profile consisted of the following measurements: C1 = 160 cm (63.0 in), C2 = 149 cm (58.7 in), C3 = 138 cm (54.3 in), C4 = 127 cm (50.0 in), C5 = 112 cm (44.1 in), and C6 = 69 cm (27.2 in). Maximum crush was located at the left D-pillar.

On-scene images showed that the front plane of the Chevrolet had penetrated the back plane of the Dodge with a longitudinal extent that intruded into the front row of the vehicle. The documented crush profile therefore reflected significant post-crash restitution. An approximate minimum magnitude of the actual maximum crush measured 260 cm (102.4 in). Based on the observed damage profile, the CDC assigned to the Dodge for the Event 1 impact with the front plane of the Chevrolet was 06BDAW9. Figure 20 shows the back-plane damage profile to the Dodge, while Figure 21 shows an overhead perspective of the damage.

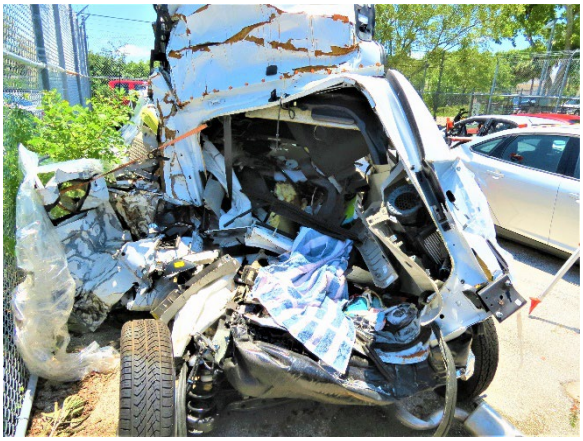


Figure 20. Back plane view of the damage profile to the 2018 Dodge Grand Caravan

Figure 21. Damage pattern to the Dodge from an overhead perspective

The damage algorithm of the WinSMASH model was used to calculate the severity of the crash for analysis purposes. The total calculated delta V of the Dodge for the back-plane crash event by the Chevrolet's front plane was 117 km/h (73 mph). Respective longitudinal and lateral components of the calculated delta V were 117 km/h (73 mph) and 0 km/h (0 mph). Based on the data imaged from the Dodge's EDR and SCI expertise, the borderline WinSMASH results seemed largely over-estimated.

The Dodge sustained undercarriage damage as a result of contact with the raised concrete curb and median (Event 2). The vehicle's undercarriage was not inspected as part of this investigation; therefore, specifics concerning the damage remain unknown. The estimated CDC assigned to the Dodge for the undercarriage impact was 00UDDW99. No WinSMASH calculations could be computed for the unknown undercarriage impact.

Damage to the Dodge associated with the Event 3 impact with the front plane of the Buick was located on the forward aspect of the Dodge's right plane. Direct contact began at the right-front bumper corner and extended approximately 180 cm (70.9 in) rearward to the center aspect of the Dodge's right-front door. There was minor lateral crush to the Dodge's right-front fender, and the right-front axle position was canted due to fracture of the right-front suspension by induced loading from the impact. Removal of the right-front door of the Dodge by emergency response personnel and the overall condition of the Dodge prevented detailed crush profile documentation

by the SCI investigator. The estimated CDC assigned to the Dodge for the Event 3 impact with the Buick was 03RYEW2.

The “missing vehicle” algorithm of the WinSMASH model was used to calculate a borderline reconstruction of the crash for analysis purposes. The total calculated delta V of the Dodge for the right-plane crash event with the Buick was 21 km/h (13 mph). Respective longitudinal and lateral components of the calculated delta V were 0 km/h (0 mph) and -21 km/h (-13 mph). Based on SCI expertise, the borderline WinSMASH results were over-estimated.

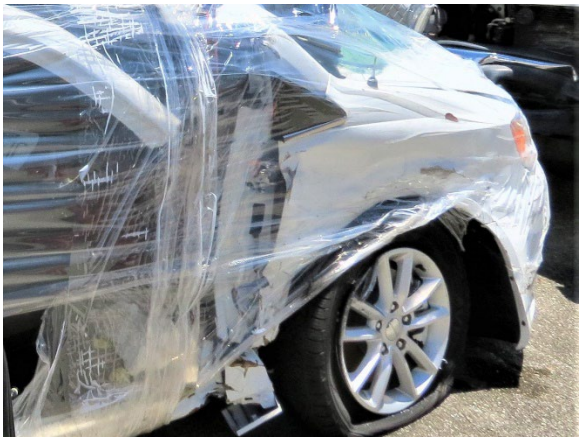


Figure 22. Damage pattern to the right plane of the Dodge from the impact with the Buick

Event Data Recorder

The 2018 Dodge Grand Caravan had an air bag control module (ACM) mounted in the center stack, beneath the instrument panel. The ACM monitored the diagnostic functions of the vehicle’s supplemental restraint systems (air bags and seat belt pretensioners) and controlled the deployment/actuation of those devices dependent upon crash event severity. The Dodge’s ACM had EDR capabilities, which were supported by the Bosch CDR tool. Prior to the on-site SCI investigation, the ACM was removed from the Dodge by the investigating law enforcement agency and retained as evidence. An electronic CDRX copy of the imaged data was provided to the SCI investigator. The data had been imaged by the law enforcement agency using software version 17.6, and was later reported by the SCI investigator using software version 19.5. The imaged data is included as Appendix B at the end of this report.

The Dodge’s ACM monitored and measured vehicle acceleration in both the longitudinal and lateral directions, as well as angular rate around the longitudinal axis. The threshold minimal crash pulse for event recording was a measured vehicle velocity change of 8 km/h (5 mph) in a 150 millisecond interval. The EDR could record two different event types, termed “Non-Deployment” or “Deployment,” and had the capacity to store a combination of up to three events.

By definition, non-deployment events included all those where no supplemental restraint device deployments were commanded. Non-deployment events could be overwritten, but deployment events became locked to memory. If power to the ACM was lost during or immediately following a crash event, all or part of the data may not be recorded to memory. Associated to each event was a 2.5-second pre-crash buffer that recorded vehicle speed (mph), accelerator pedal position (%), engine speed (rpm), engine throttle position (%), service brake state, and

steering angle (degrees) data. Other recorded pre-crash data samples included individual wheel speed, stability control, traction control, yaw rate, cruise control, and gear position data.

The imaged data contained two events, termed "Most Recent" and "1st Prior," both of which occurred on ignition cycle 162. Event recording was reported complete for both recovered events. The SCI investigator determined that the first prior event was related to the initial impact to the Dodge's back plane by the Chevrolet. The most recent event occurred 0.3 seconds afterward, and appeared to be artifact that occurred during the Dodge's displacement into the intersection. The driver and passenger belt switch circuit states were reported as "buckled" for both events. Other pre-crash data associated with the first prior event included:

Time	Vehicle Speed	Accelerator Pedal	Engine rpm	Engine Throttle	Service Brake
-5.0	0 km/h (0 mph)	0%	623	3	ON
-4.5	0 km/h (0 mph)	0%	605	3	ON
-4.0	0 km/h (0 mph)	0%	597	3	ON
-3.5	0 km/h (0 mph)	0%	601	3	ON
-3.0	0 km/h (0 mph)	0%	603	3	ON
-2.5	0 km/h (0 mph)	0%	602	3	ON
-2.0	0 km/h (0 mph)	0%	602	3	ON
-1.5	0 km/h (0 mph)	0%	605	3	ON
-1.0	0 km/h (0 mph)	0%	612	2	ON
-0.5	0 km/h (0 mph)	0%	637	2	ON

There were no supplemental restraint device actuation/deployment commands associated with the first prior event. The maximum recorded longitudinal vehicle velocity change (delta V) was 89 km/h (55.0 mph), which occurred 190 milliseconds after AE. The lateral component at the same time interval was 16 km/h (9.7 mph).

Occupant Data

The Dodge was occupied by four people as it traveled south on the multi-lane roadway and came to a stop at the intersection in the mouth of the left turn lane. They were the belted 50-year-old male driver, belted 42-year-old female front-row right occupant, belted 8-year-old male second-row left occupant, and belted 6-year-old female second-row right occupant. All four occupants sustained fatal injuries as a result of the severe back-plane impact and extreme occupant compartment intrusion. They were pronounced deceased at the crash site and did not receive any medical treatment/transport.

2017 Buick Encore

Description

The 2017 Buick Encore (Figure 23) was identified by the VIN KL4CJASB6HBxxxxxx. It was a 4-door SUV built on a 256 cm (100.8 in) wheelbase with a 1.4-liter, inline 4-cylinder gasoline engine, manufactured in Korea in March 2017. The electronic odometer reading was not obtained during the SCI inspection. The Buick was a front-wheel drive platform with a GVWR of 1,944 kg (4,286 lb). Respective front and rear axle ratings were 1,065 kg (2,348 lb) and 995 kg (2,194 lb). The Buick's curb weight was 1,468 kg (3,237 lb). Placarding on the frame of the left front door declared that the vehicle manufacturer's recommended tire size and cold tire pressure for all four axle positions was P215/55R18 at 240 kPa (35 PSI). At the time of the SCI inspection, the vehicle was equipped with Continental ContiPro Contact tires of the recommended size at all four axle positions. The tires had matching TINs of "LM0A BN7 4616." All had ample tread and remained inflated; none were damaged or restricted by the crash.

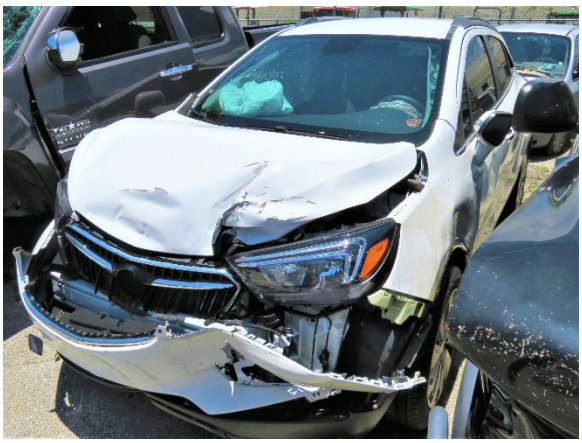


Figure 23. Front-left oblique view of the 2017 Buick Encore at the time of the SCI vehicle inspection

The interior of the Buick was configured for the seating of up to five occupants (2/3). Manual safety features included 3-point lap and shoulder seat belts for all seat positions, with lower anchor and retractor pretensioners for the front row seat belts. Supplemental restraints included a CAC frontal air bag system, front knee air bags, seat-mounted side impact air bags for the front row and second row outboard positions, and IC air bags. The Buick's front seat belt pretensioners, frontal air bags, front knee air bags, and IC air bags were all actuated/deployed as a result of the crash.

Exterior Damage

Damage to the exterior of the Buick was located on the front plane, associative to the frontal impact with the right plane of the Dodge. Direct contact began 44 cm (17.3 in) right of center and extended 122 cm (48.0 in) to the left-front bumper corner. In the damage pattern was minor deflection of the bumper beam, the hood was dented and deformed, and the bumper fascia and grille were fractured and partially separated from the vehicle. A circular black rubber transfer was visible in the center-aspect of the Buick's front bumper fascia, which aligned the Buick with the right front tire/wheel of the Dodge at impact. Direct and induced damage spanned the entire 156 cm (61.4 in) width of the front plane.

The SCI investigator used the Nikon Nivo 5.M+ total station mapping system to document the front crush profile of the Buick. From a front-plane perspective, the width of the direct and induced damage (Field-L) for the crush profile measured 101 cm (39.8 in) across the width of the front bumper beam. A residual crush profile documented to the bumper beam of the Buick produced the following resultant measurements: C1 = 4 cm (1.6 in), C2 = 8 cm (3.1 in), C3 = 9 cm (3.5 in), C4 = 8 cm (3.1 in), C5 = 4 cm (1.6 in), and C6 = 0 cm. Maximum crush was located on the bumper beam approximately 20 cm left of the vehicle's centerline. Based on the observed damage profile, the CDC assigned to the Buick for the Event 3 impact with the right plane of the Dodge was 12FDEW1. Figure 24 shows the front damage profile to the Buick, while Figure 25 shows an overhead view of the damage.

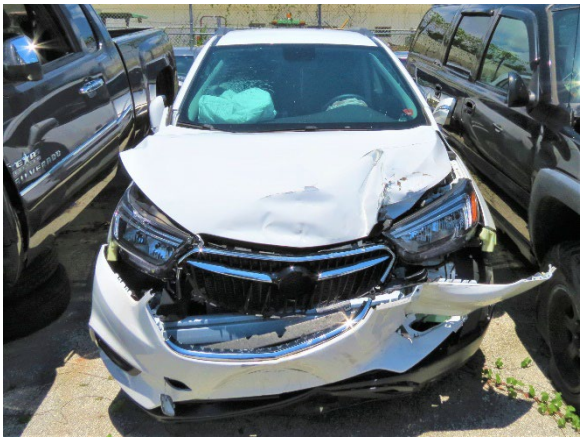


Figure 24. Front-plane view of the damage profile to the 2017 Buick Encore

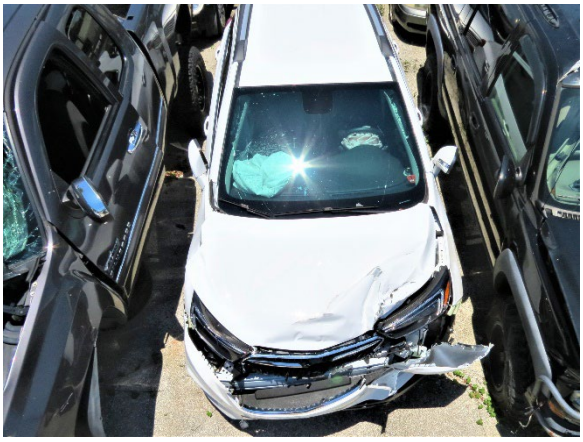


Figure 25. Front-plane view of the damage profile to the 2017 Buick Encore

The damage algorithm of the WinSMASH model was used to calculate the severity of the crash for analysis purposes. The total calculated delta V of the Buick for the front crash event with the Dodge was 30 km/h (19 mph). Respective longitudinal and lateral components of the calculated delta V were -30 km/h (-19 mph) and 0 km/h (0 mph). Based on the data imaged from the Buick's EDR and SCI expertise, the borderline WinSMASH results were over-estimated.

Event Data Recorder

The 2017 Buick Encore was equipped with an SDM that was mounted to the center tunnel beneath the center console, between the front row seats. The SDM monitored the diagnostic functions of the vehicle's supplemental restraint systems (air bags and seat belt pretensioners) and controlled the deployment/actuation of those devices dependent upon crash event severity. The Buick's SDM had EDR capabilities, which were supported by the Bosch CDR tool. The SDM was removed by the investigating law enforcement agency and retained as evidence prior to the on-site SCI investigation. An electronic CDRX copy of the imaged data was provided to the SCI investigator. The data had been imaged by the law enforcement agency using software version 17.3, and was later reported by the SCI investigator using software version 19.5. The imaged data is included as Appendix C at the end of this report.

The Buick's SDM monitored and measured vehicle acceleration in both the longitudinal and lateral directions. The threshold minimal crash pulse was a measured vehicle velocity change [delta V] of 8 km/h (5 mph). The EDR could record two different event types, termed "Non-Deployment" or "Deployment," and had the capacity to store a combination of up to three

events. By definition, non-deployment events included all those where no supplemental restraint device deployments were commanded, as well as pretensioner actuation-only events, active head restraint deployment events (if equipped), and battery cut-off command events (if equipped). Non-deployment events could be overwritten if all three data records were full and the oldest recorded event was older than approximately 250 ignition cycles and any of three conditions occurred: (1) another non-deployment event of greater severity, (2) any deployment event, or (3) any subsequent non-deployment event. Deployment events became locked to memory and could not be overwritten. If power to the SDM was lost during or immediately following a crash event, all or part of the data may not be recorded to memory.

At AE and recognition of a longitudinal or lateral event, the EDR had the capacity to record longitudinal and lateral delta V data in 10 millisecond intervals. Up to 300 milliseconds was recorded for deployment and non-deployment events, while up to 700 milliseconds before criteria and up to 290 milliseconds after criteria were met was recorded for rollover deployment event types. Associated to each event was a 5-second pre-crash buffer that recorded accelerator pedal position (%), brake switch circuit state, engine speed (rpm), engine throttle position (%), and vehicle speed (mph) data. For the final 2-seconds of the buffer, EDR also recorded cruise control usage, engine torque, and reduced engine power mode data.

The imaged data contained one deployment event, which occurred on ignition cycle 1,140. Event recording was reported complete. One diagnostic trouble code (DTC), identified as B0052-00, was present at the time of the event. This was indicative of the occurrence of a crash event that resulted in supplemental restraint deployment, and was associated to the recognized and recorded deployment event. Associative to this DTC, the air bag warning light would have illuminated. The driver's belt switch circuit status was reported as "not buckled," while the passenger's belt switch was reported as "buckled." Other pre-crash data included:

Time	Accelerator Pedal	Service Brake	Engine rpm	Engine Throttle	Vehicle Speed
-5.0	16%	OFF	1,920	37%	69 km/h (43 mph)
-4.5	16%	OFF	1,920	37%	69 km/h (43 mph)
-4.0	16%	OFF	1,920	37%	69 km/h (43 mph)
-3.5	0%	ON	1,408	9%	69 km/h (43 mph)
-3.0	0%	ON	1,216	7%	63 km/h (39 mph)
-2.5	0%	ON	1,408	13%	54 km/h (34 mph)
-2.0	0%	ON	1,024	11%	42 km/h (26 mph)
-1.5	0%	ON	1,024	10%	29 km/h (18 mph)
-1.0	0%	ON	768	10%	17 km/h (11 mph)
-0.5	0%	ON	704	18%	9 km/h (6 mph)

Associated with the deployment event were the following actuation and deployment commands:

Device	Time Commanded After AE
Driver seat belt pretensioners	23 milliseconds
Passenger's seat belt pretensioners	23 milliseconds
Driver frontal air bag (1st stage)	28 milliseconds
Passenger's frontal air bag (1st stage)	28 milliseconds
Driver frontal air bag (2nd stage)	31 milliseconds

Device	Time Commanded After AE
Passenger's frontal air bag (2nd stage)	31 milliseconds
Driver knee air bag	28 milliseconds
Passenger knee air bag	28 milliseconds
Left inflatable curtain	28 milliseconds
Right inflatable curtain	28 milliseconds

The maximum recorded vehicle velocity change (delta V) for the deployment event occurred 122 milliseconds after AE. The longitudinal component was -17 km/h (-11 mph), while the lateral component was 10 km/h (6 mph). It was apparent to the SCI investigator that the recorded deployment event was related to Event 3 of the crash.

Occupant Data

The Buick was occupied by the unbelted 49-year-old female driver and the belted 16-year-old male front-row right passenger when the crash occurred. Data imaged from the Buick indicated that the driver aggressively applied the brakes and steered the vehicle to the right over the final 2.5 seconds. She likely had observed the crash between the Chevrolet and Dodge and identified their displacement toward her intended travel path. The Buick had nearly come to a complete controlled stop on the right roadway edge when it was struck by the displaced Dodge. Pretensioners actuated and air bags in the Buick deployed. The occupants reportedly sustained non-incapacitating (B-level) injuries; however, they refused medical treatment at the scene, and were not medically transported from the crash site.

2010 Buick Enclave

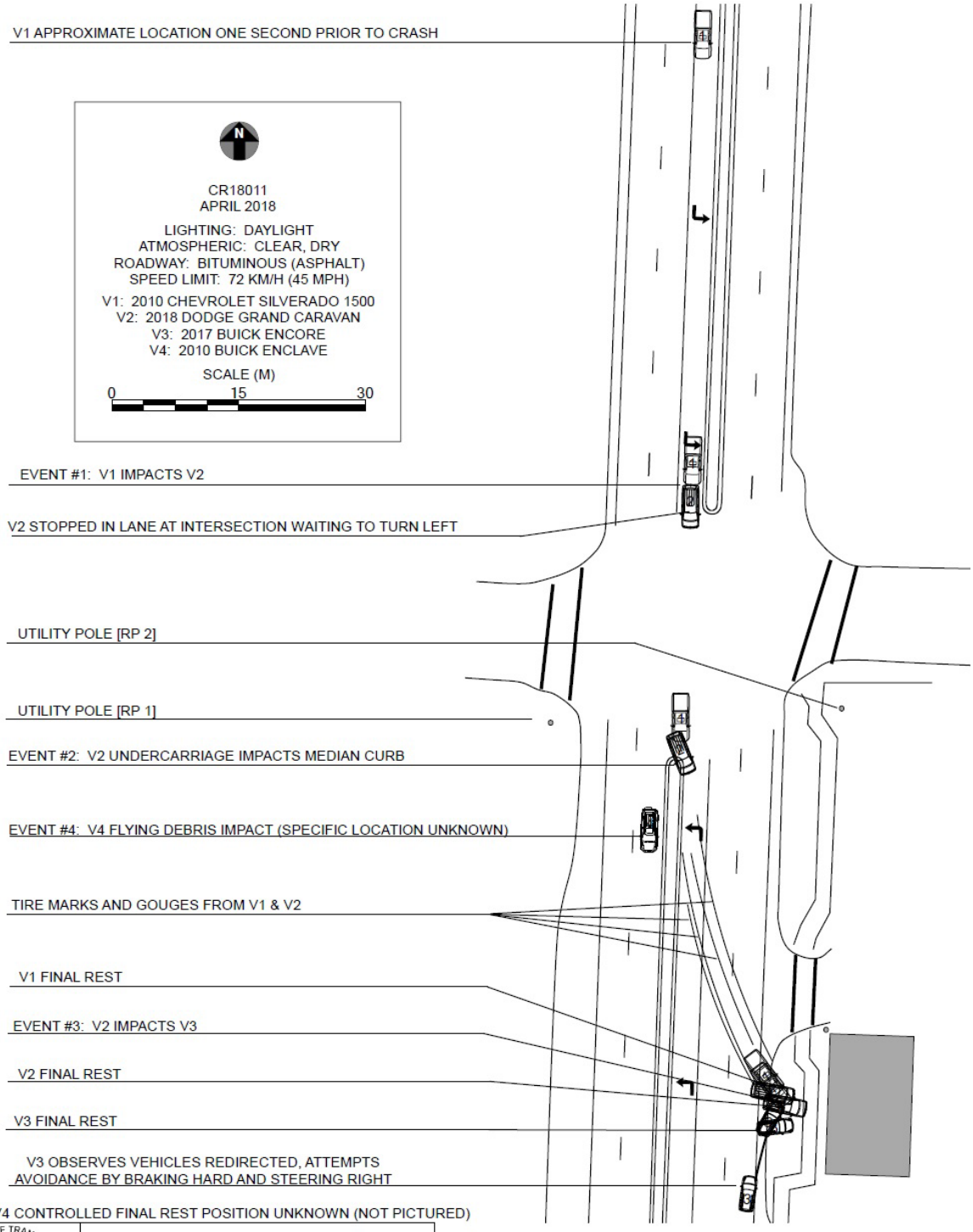
Description

The 2017 Buick Enclave was a 4-door SUV identified by the VIN 5GALRCED1AJxxxxxx. Its owner contacted the law enforcement agency investigating the crash and reported that the Buick Enclave was struck by a piece of debris from the crash of the Chevrolet and Dodge as it passed through the intersection where the crash occurred. The person reported that the debris landed on the Buick Enclave's roof and shattered the roof glazing. The Buick Enclave could not be located as part of this SCI investigation, and no images of the vehicle or damage were available.

Occupant Data

No information concerning the occupants of the 2010 Buick Enclave was available.

Crash Diagram



DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA	NHTSA
Case Number:	CR18011

Appendix A: 2010 Chevrolet Silverado 1500
Event Data Recorder Report

The law enforcement agency imaged the EDR and provide the CDRX file to SCI. The EDR report contained in this technical report is reported by SCI using the current version of the Bosch CDR software at the time of publication. The CDR report contained in the associated CISSWEB 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	1GCSCSE01AZ******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR18011_V1_SDM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.3
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 19.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	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:

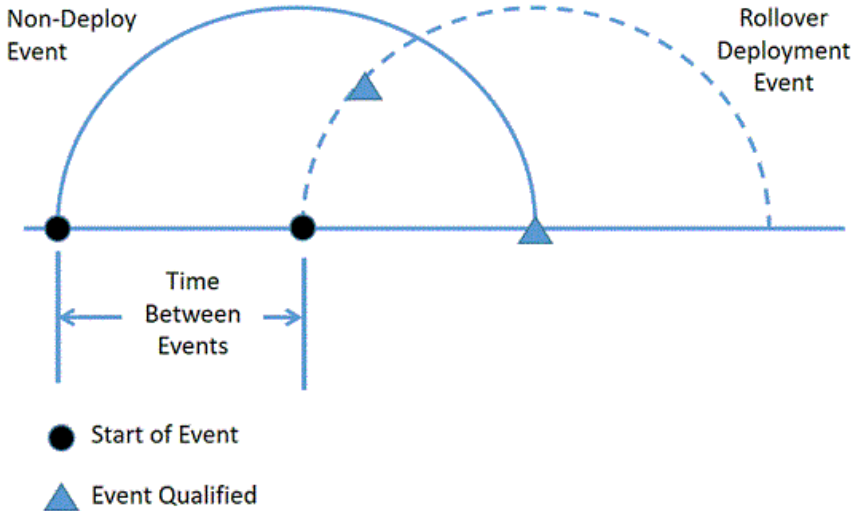
-Pretensioner(s) only Deployment
-Head Rest Deployment
-Battery Cut-Off Deployment

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	15182
ESS # 1 Traceability Data	AU000000000000000
ESS # 2 Traceability Data	AT000000000000000
ESS # 3 Traceability Data	AH000000000000000
ESS # 4 Traceability Data	AJ000000000000000
ESS # 5 Traceability Data	DA000000000000000
ESS # 6 Traceability Data	DB000000000000000
ESS # 7 Traceability Data	??000000000000000
ESS # 8 Traceability Data	??000000000000000
Dynamic Deployment Event Counter	1
Dynamic Event Counter	2
Dynamic OnStar Notification Event Counter	2
Vehicle Identification Number	???????????******
System Type	Delphi
Manufacturing Traceability Data	AS0674KZ93104ZEW
Software Module Identifier 1	00CE1158
Software Module Identifier 2	013F3442
Software Module Identifier 3	01AE4BE4
End Model Part Number	00CE0102

Event Data (Event Record 1)

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	1
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	15178
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	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	Yes
Driver 2nd Stage Deployment Loop Commanded	Yes
Passenger 2nd Stage Deployment Loop Commanded	Yes
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)	Buckled
Driver Seat Position Status (If Equipped)	Rearward
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Occupied
Passenger Classification Status	Small Adult
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	On
Passenger Air Bag OFF Indicator Status	Off

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	862
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	220
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-53 [-85]
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)	6
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	9
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	6
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	9
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	6
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	6
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	6
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	6

DTCs Present at Time of Event (Event Record 1)

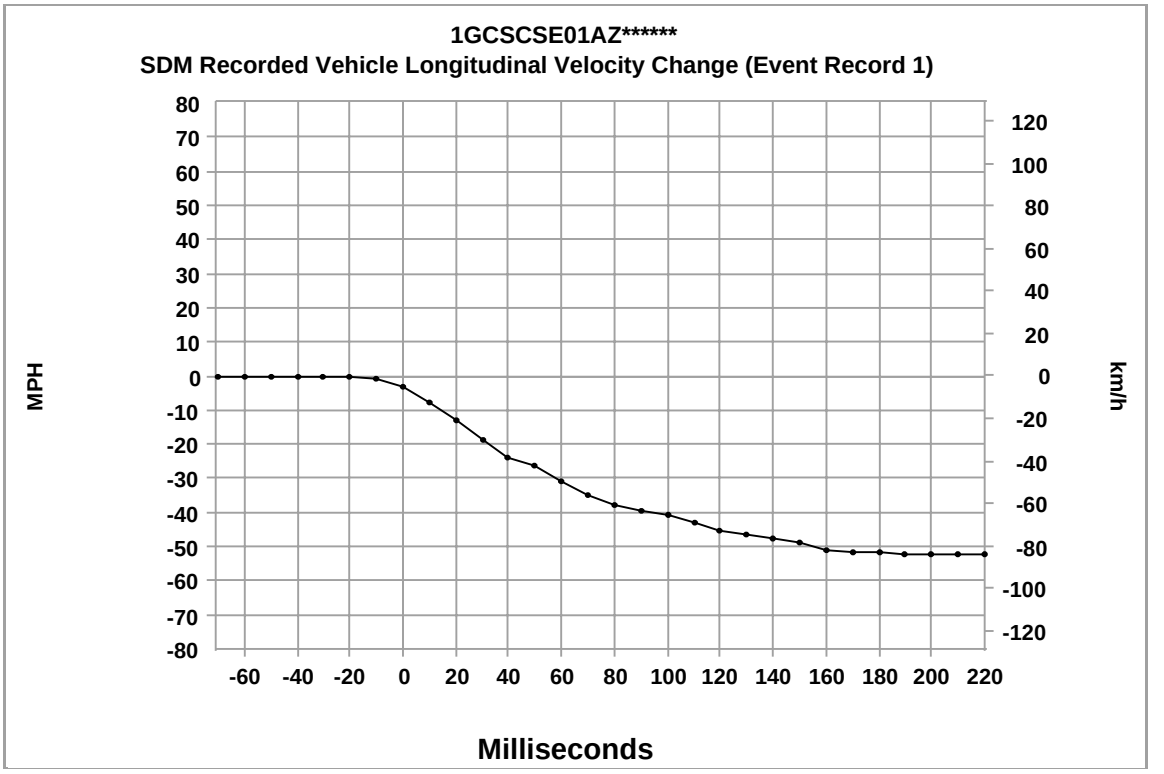
B0052-00

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	124 [168]	Off
-0.5	Data Not Available	Data Not Available	Data Not Available	146 [198]	Off

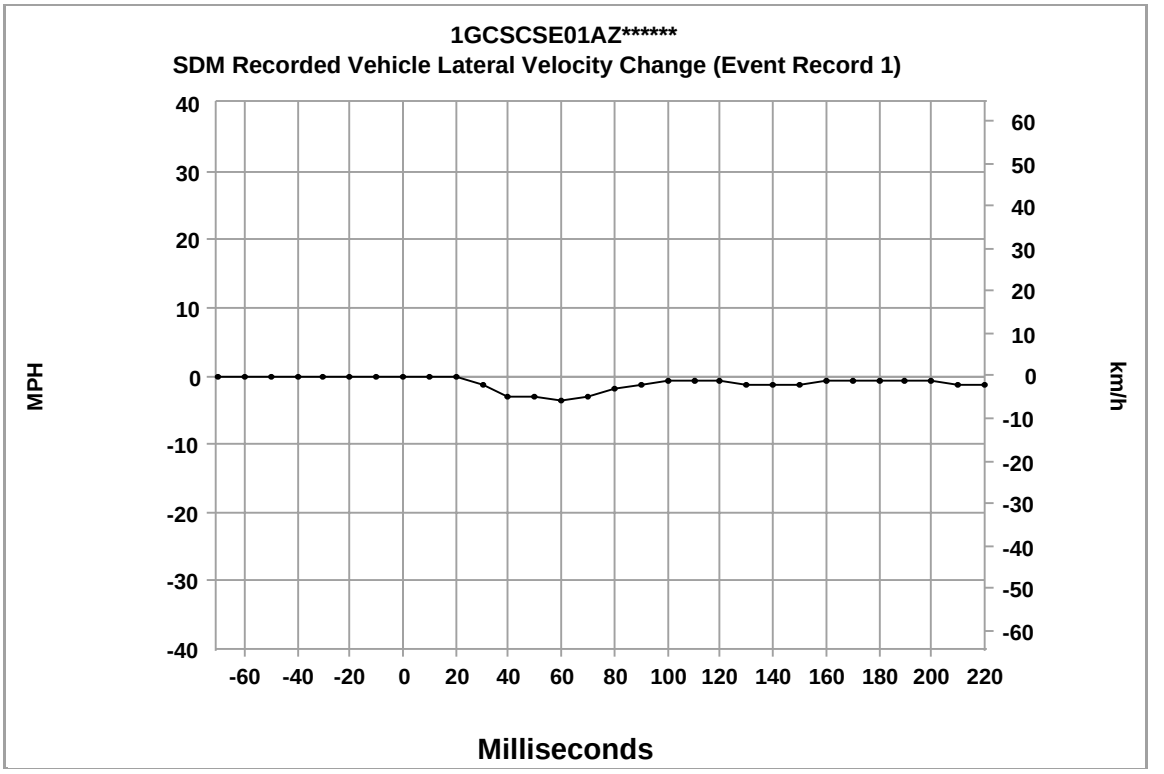
Pre-Crash Data -2.5 to -.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	99	Off	5056	99	96 [155]
-2.0	99	Off	5056	99	96 [155]
-1.5	99	Off	5056	99	98 [157]
-1.0	99	Off	4992	41	97 [156]
-0.5	99	Off	4928	41	96 [154]



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	-3.1	-5.0
10	-8.1	-13.0
20	-13.0	-21.0
30	-18.6	-30.0
40	-24.2	-39.0
50	-26.1	-42.0
60	-31.1	-50.0
70	-34.8	-56.0
80	-37.9	-61.0
90	-39.8	-64.0
100	-41.0	-66.0
110	-42.9	-69.0
120	-45.4	-73.0
130	-46.6	-75.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
140	-47.8	-77.0
150	-49.1	-79.0
160	-51.0	-82.0
170	-51.6	-83.0
180	-51.6	-83.0
190	-52.2	-84.0
200	-52.2	-84.0
210	-52.2	-84.0
220	-52.2	-84.0



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	-1.2	-2.0
40	-3.1	-5.0
50	-3.1	-5.0
60	-3.7	-6.0
70	-3.1	-5.0
80	-1.9	-3.0
90	-1.2	-2.0
100	-0.6	-1.0
110	-0.6	-1.0
120	-0.6	-1.0
130	-1.2	-2.0

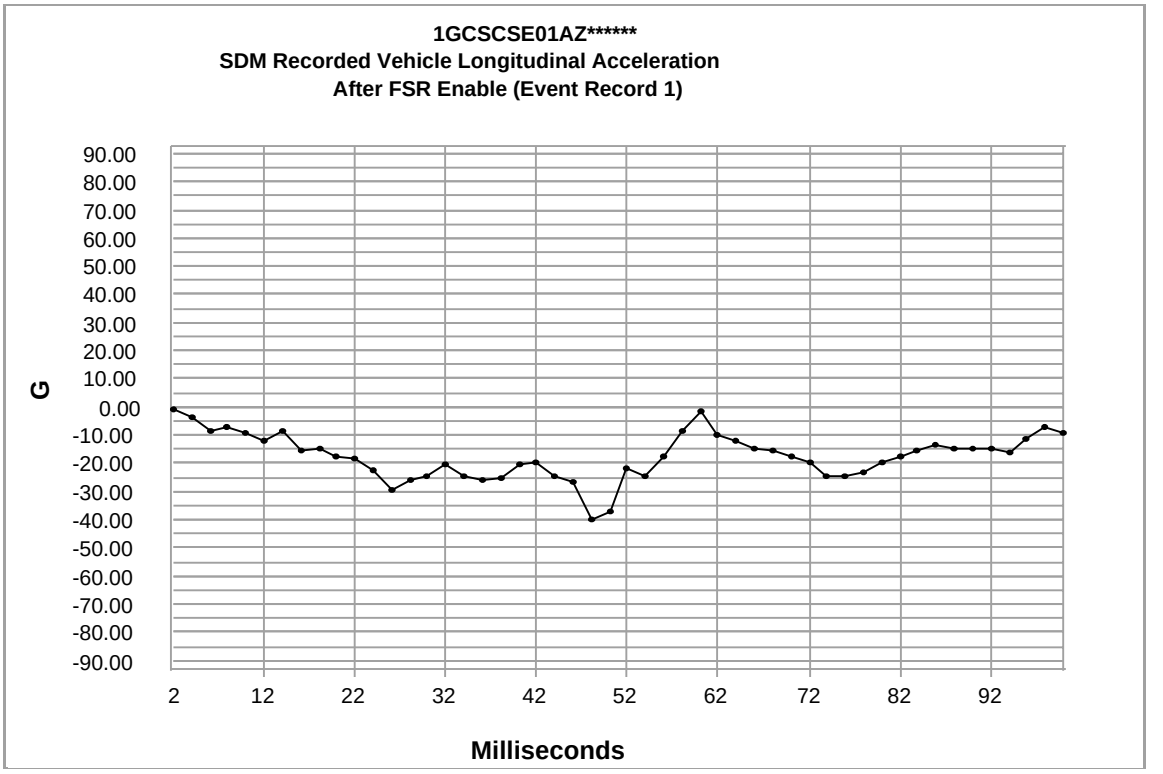
Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
140	-1.2	-2.0
150	-1.2	-2.0
160	-0.6	-1.0
170	-0.6	-1.0
180	-0.6	-1.0
190	-0.6	-1.0
200	-0.6	-1.0
210	-1.2	-2.0
220	-1.2	-2.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 1)

Contains No Recorded Data

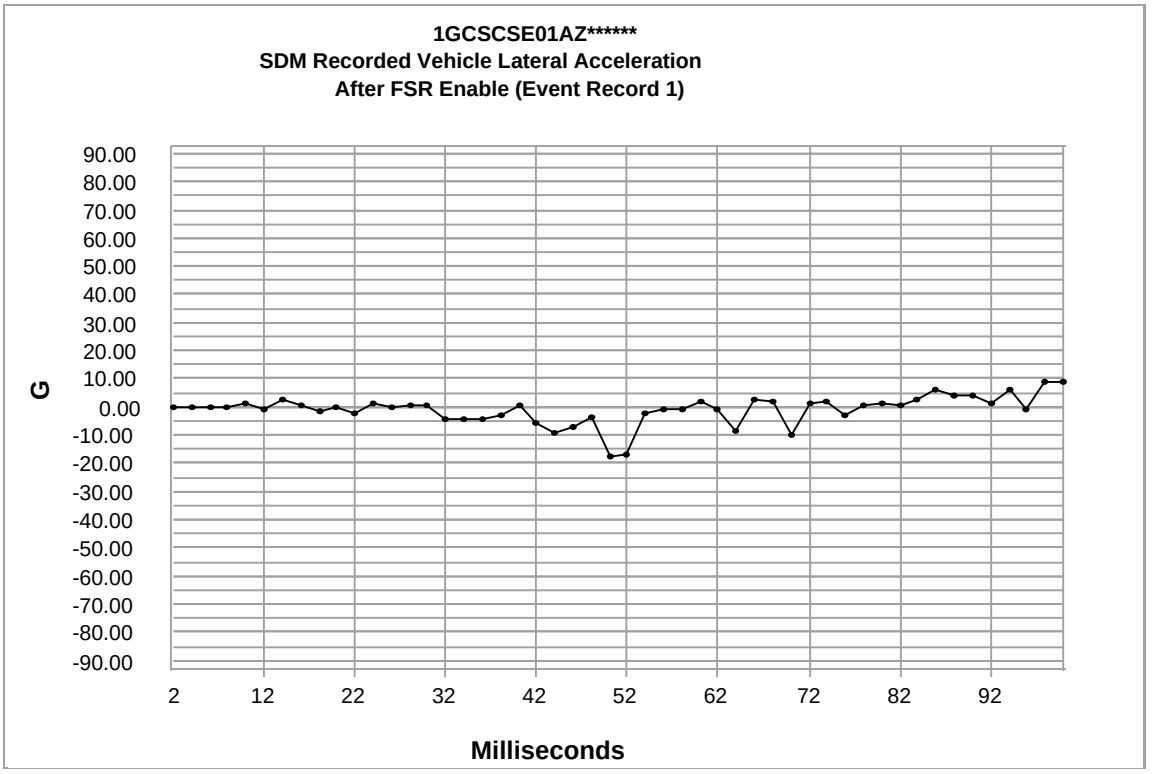
SDM Recorded Vehicle Roll Rate (Event Record 1)

Contains No Recorded Data



Time	G
2	-0.7
4	-3.6
6	-8.7
8	-7.3
10	-9.4
12	-12.4
14	-8.7
16	-15.3
18	-14.5
20	-17.4
22	-18.2
24	-22.5
26	-29.8
28	-26.2
30	-24.7
32	-20.4
34	-24.7
36	-26.2
38	-25.4
40	-20.4
42	-19.6
44	-24.7
46	-26.9
48	-40.0
50	-37.1

Time	G
52	-21.8
54	-24.7
56	-17.4
58	-8.7
60	-1.5
62	-10.2
64	-12.4
66	-14.5
68	-15.3
70	-17.4
72	-19.6
74	-24.7
76	-24.7
78	-23.3
80	-19.6
82	-17.4
84	-15.3
86	-13.1
88	-14.5
90	-14.5
92	-14.5
94	-16.0
96	-11.6
98	-7.3
100	-9.4



Time	G
2	0.0
4	0.0
6	0.0
8	0.0
10	1.5
12	-0.7
14	2.9
16	0.7
18	-1.5
20	0.0
22	-2.2
24	1.5
26	0.0
28	0.7
30	0.7
32	-4.4
34	-4.4
36	-4.4
38	-2.9
40	0.7
42	-5.8
44	-9.4
46	-7.3
48	-3.6
50	-17.4

Time	G
52	-16.7
54	-2.2
56	-0.7
58	-0.7
60	2.2
62	-0.7
64	-8.7
66	2.9
68	2.2
70	-10.2
72	1.5
74	2.2
76	-2.9
78	0.7
80	1.5
82	0.7
84	2.9
86	5.8
88	4.4
90	4.4
92	1.5
94	5.8
96	-0.7
98	8.7
100	8.7

Event Data (Event Record 2)

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	Yes
Deployment Event Counter	1
Event Counter	2
OnStar Notification Event Counter	2
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	15178
Time Between Events (sec)	1.8
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)	Buckled
Driver Seat Position Status (If Equipped)	Rearward
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Unknown
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	On
Passenger Air Bag OFF Indicator Status	Off

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)	770
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-6 [-9]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-8 [-13]
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 2)

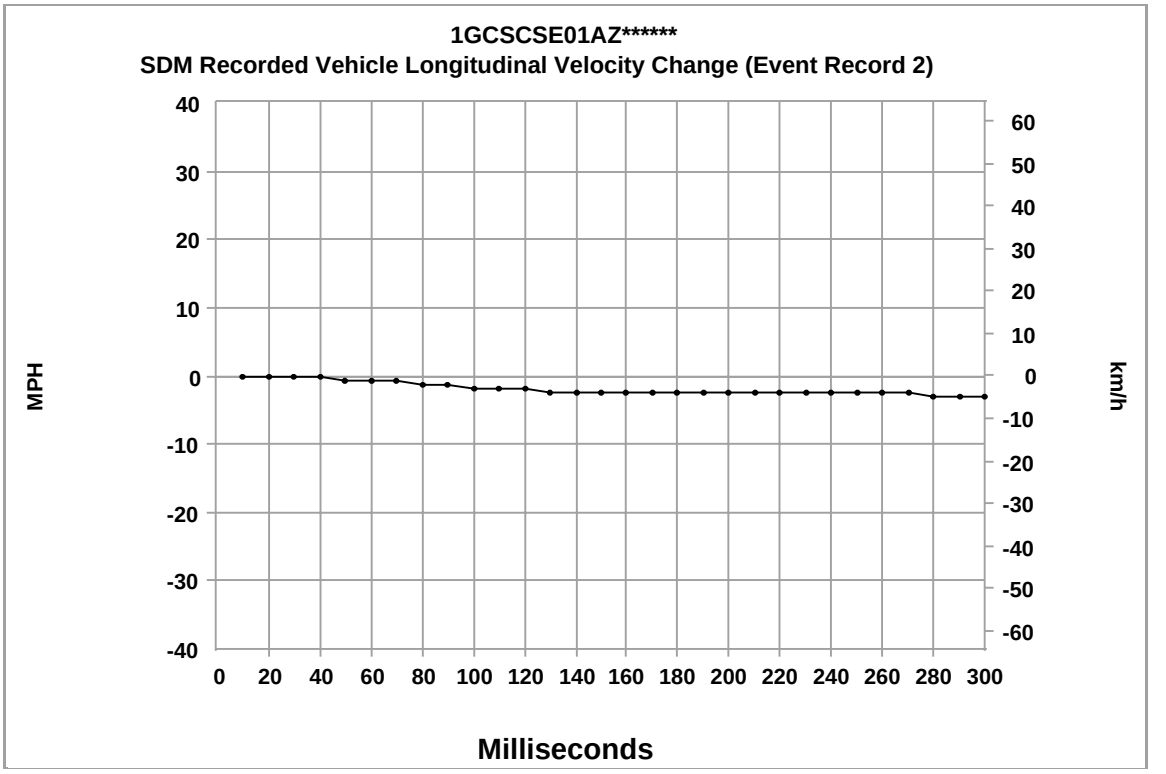
B0052-00

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	Data Not Available	Data Not Available
-0.5	Data Not Available	Data Not Available	Data Not Available	Data Not Available	Data Not Available

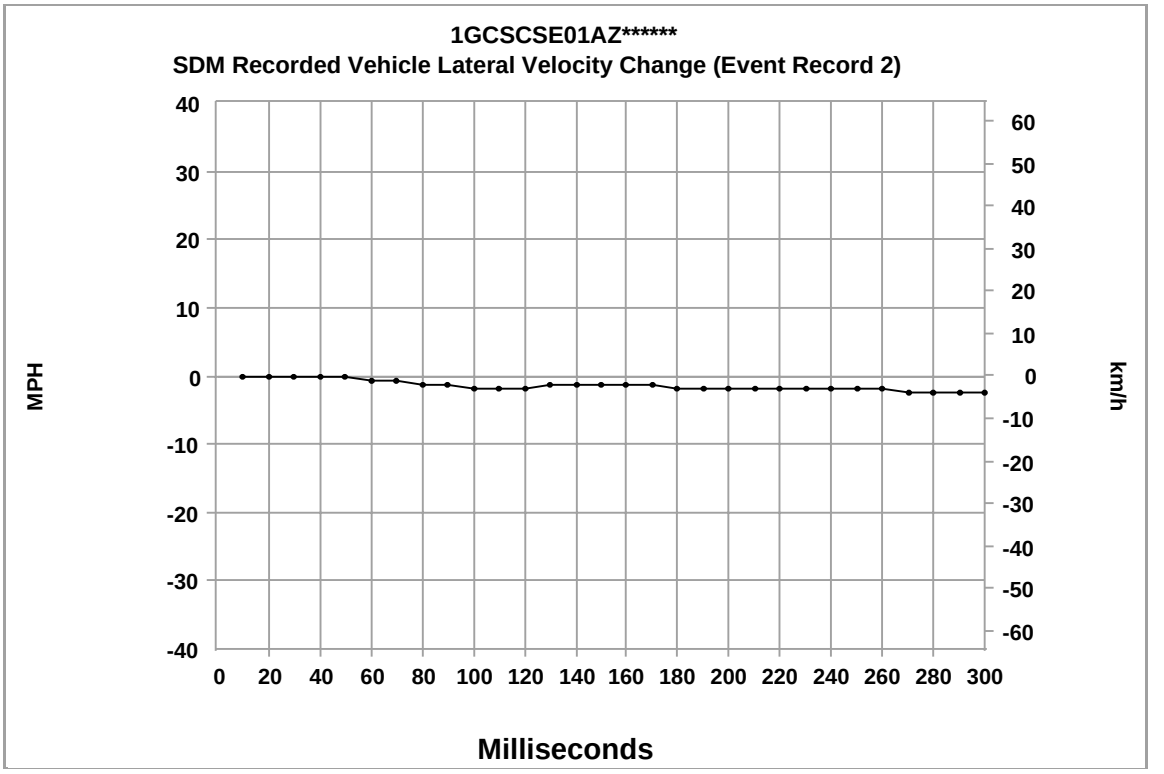
Pre-Crash Data -2.5 to -.5 sec (Event Record 2)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	99	Off	4992	41	97 [156]
-2.0	99	Off	4928	41	96 [154]
-1.5	Data Not Available	Data Not Available	Data Not Available	Data Not Available	Data Not Available
-1.0	Data Not Available	Data Not Available	Data Not Available	Data Not Available	Data Not Available
-0.5	Data Not Available	Data Not Available	Data Not Available	Data Not Available	Data Not Available



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	-0.6	-1.0
60	-0.6	-1.0
70	-0.6	-1.0
80	-1.2	-2.0
90	-1.2	-2.0
100	-1.9	-3.0
110	-1.9	-3.0
120	-1.9	-3.0
130	-2.5	-4.0
140	-2.5	-4.0
150	-2.5	-4.0
160	-2.5	-4.0
170	-2.5	-4.0
180	-2.5	-4.0
190	-2.5	-4.0
200	-2.5	-4.0
210	-2.5	-4.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-2.5	-4.0
230	-2.5	-4.0
240	-2.5	-4.0
250	-2.5	-4.0
260	-2.5	-4.0
270	-2.5	-4.0
280	-3.1	-5.0
290	-3.1	-5.0
300	-3.1	-5.0



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	-0.6	-1.0
70	-0.6	-1.0
80	-1.2	-2.0
90	-1.2	-2.0
100	-1.9	-3.0
110	-1.9	-3.0
120	-1.9	-3.0
130	-1.2	-2.0
140	-1.2	-2.0
150	-1.2	-2.0
160	-1.2	-2.0
170	-1.2	-2.0
180	-1.9	-3.0
190	-1.9	-3.0
200	-1.9	-3.0
210	-1.9	-3.0

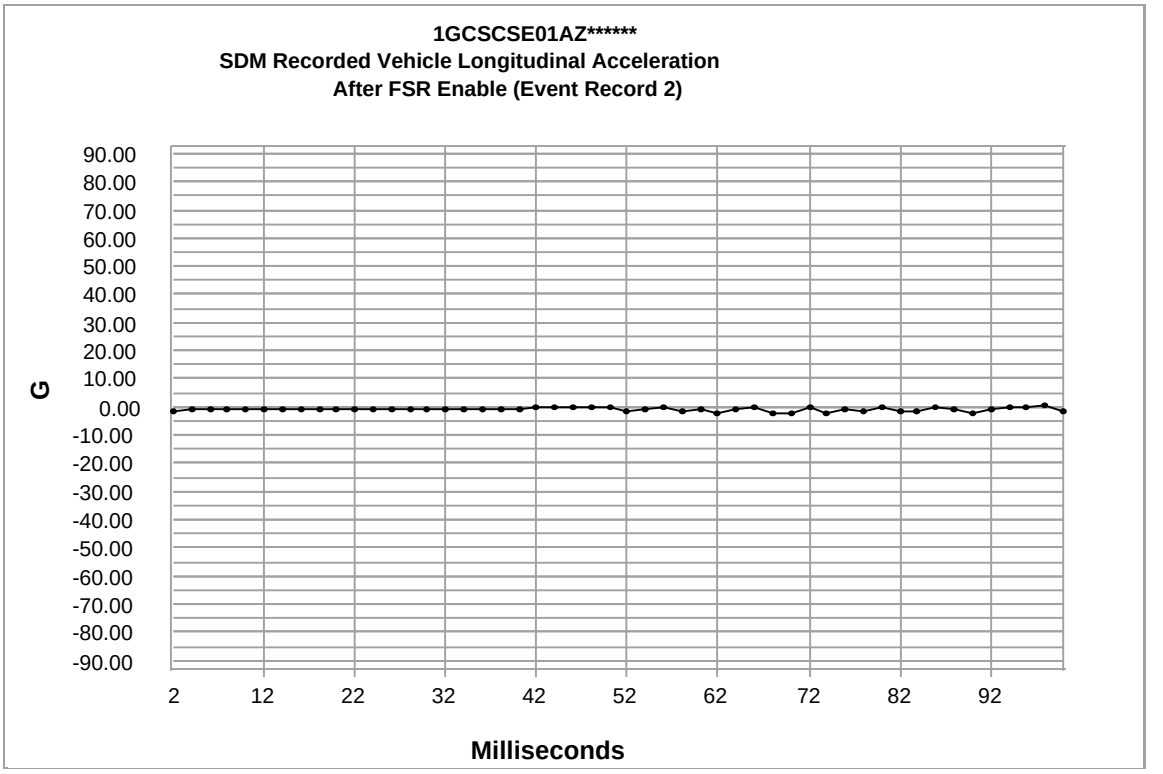
Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	-1.9	-3.0
230	-1.9	-3.0
240	-1.9	-3.0
250	-1.9	-3.0
260	-1.9	-3.0
270	-2.5	-4.0
280	-2.5	-4.0
290	-2.5	-4.0
300	-2.5	-4.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 2)

Contains No Recorded Data

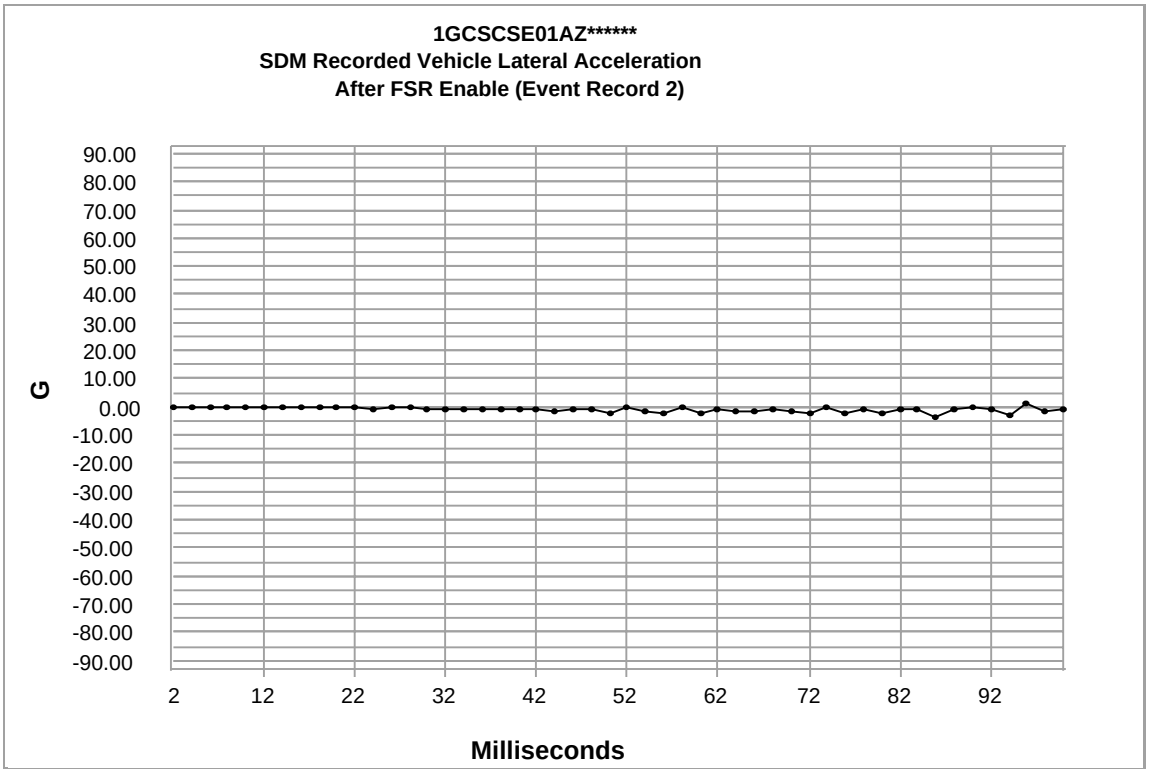
SDM Recorded Vehicle Roll Rate (Event Record 2)

Contains No Recorded Data



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

Time	G
52	-1.5
54	-0.7
56	0.0
58	-1.5
60	-0.7
62	-2.2
64	-0.7
66	0.0
68	-2.2
70	-2.2
72	0.0
74	-2.2
76	-0.7
78	-1.5
80	0.0
82	-1.5
84	-1.5
86	0.0
88	-0.7
90	-2.2
92	-0.7
94	0.0
96	0.0
98	0.7
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	-0.7
26	0.0
28	0.0
30	-0.7
32	-0.7
34	-0.7
36	-0.7
38	-0.7
40	-0.7
42	-0.7
44	-1.5
46	-0.7
48	-0.7
50	-2.2

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

Hexadecimal Data

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DPID $15
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DPID $17
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DPID $32
00 FF 3B 4E 00 00 00

DPID $35
78 00 00 00 00 00 00

DID $01
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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
01 00 30 30 30 30 30 30 30 30 30 30 30 30 30

DID $30
01 00 02 02

DID $90
00 00 00 00 00 00 00 00 00 00 00 2A 2A 2A 2A 2A 2A

DID $9A
06 01

DID $B4
41 53 30 36 37 34 4B 5A 39 33 31 30 34 5A 45 57

DID $C1
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DID $C2
01 3F 34 42

DID $C3
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01 AE 4B E4

DID $CB
00 CE 01 02

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 0050   63 9A 9C 9D 9B 9B 0C FF FD 03
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 0120   61 7D 58 7A 55 7A 4D 79 47 7A
 0130   42 7C 3F 7D 3D 7E 3A 7E 36 7E
 0140   34 7D 32 7D 30 7D 2D 7E 2C 7E
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DID $32

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DID $33

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0490   00 00 00 00 00 00 00 00 00 00
```

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.

Appendix B: 2018 Dodge Grand Caravan
Event Data Recorder Report

The law enforcement agency imaged the EDR and provide the CDRX file to SCI. The EDR report contained in this technical report is reported by SCI using the current version of the Bosch CDR software at the time of publication. The CDR report contained within the associated CISSWEB 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	2C4RDGCG7JR******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR18011_V2_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.6
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 19.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Most Recent Event, Non-Deployment Event 1st Prior Event, Deployment Event

Comments

No comments entered.

Data Limitations

AIRBAG CONTROL MODULE (ACM) DATA LIMITATIONS:

GENERAL INFORMATION:

CAUTION: During direct-to-module imaging where the Airbag Control Module (ACM) is disconnected and removed from a vehicle, make sure the ACM is not moved, tilted or turned over while connected to and powered by the CDR Interface Module (with appropriate adaptors in place, where required). Also, after a CDR imaging process, wait 2 minutes after power is removed from the ACM before attempting to move the module. Not following these general ACM guidelines for direct-to-module imaging may cause new events to be recorded in the ACM.

- For additional definitions, please refer to the CDR Help File Glossary.
- As the VIN may be used to determine the configuration of the restraint system, it is imperative that the correct VIN be entered into the CDR Tool during the imaging process.
- If a DLC adapter has to be used with the CDR Tool, the "Read VIN from Vehicle" feature in the CDR Tool will not work. The VIN will have to be manually entered.
- If a 2021 or later MY Dodge Durango was imaged with a CDR Tool version 19.4 or older, the ACM will need to be reimaged as not all the peripheral sensor data will have been retrieved.
- The 2019 MY RAM 1500 may take up to 30 minutes to retrieve the EDR data. The ignition will time out within 20 minutes so the vehicle flashers must be turned on within 20 minutes to keep the ignition and communication bus active.
- Lateral Delta V will not be displayed for the 2013 MY Jeep Compass and Patriot.
- Ignition Cycle, download/crash
  - For RAMs and Dodge Vipers, there are 2 internal ignition counters in the ACM. It is possible for the ignition cycles at download to be different than the ignition cycles at event due to the 2 different counters.
  - Note that the ignition cycle count in an ACM may differ from the ignition cycle count in a Pedestrian Protection Module (PPM) in the same vehicle due to the fact that the ACM has an energy reserve while the PPM does not.

The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. All directional references to sign notation are 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
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right

Angular Rate	Clockwise rotation around the longitudinal axis
Peripheral Sensors, X and Y	Outside to Inside
Pressure Sensors	Compression of air
Internal Y Acceleration	Left to Right
Low-g Z Acceleration	Downward
Steering Input	Steering wheel turned counter clockwise
Yaw Rate	Counter clockwise rotation

CDR FILE INFORMATION:

- An event will be stored when the delta V is approximately 5 mph (8 km/h) or greater within a 150 ms interval.
- For non-NAFTA ACMs that control pedestrian protection devices, a non-deployment event will be stored when the pedestrian protection devices are activated.
- A non-deployment event may be stored with activation of the Active Head Restraints. See AHR explanation under System Configuration at Retrieval/Event section.

Event(s) Recovered definitions:
- None - There are no stored events in the ACM
- Not Retrievable - Event Data may be stored in the ACM but is not retrievable by the CDR Tool.
- Most Recent Event - Data of the most recent event is displayed in the report
- 1st Prior Event - Two events are stored in the ACM, Data displayed is of the first prior event.
- 2nd Prior Event - Three events are stored in the ACM, Data displayed is of the second prior event.
- For 2013 and 2014 MY Dodge Journey and Fiat Freemont:
  - Event Record 1 - Data from an event is stored in the ACM (not necessarily in chronological order)
  - Event Record 2 - Data from another event is stored in the ACM (not necessarily in chronological order)
- For TRW modules:
  - If there is a side impact, two EDR events may be stored for the one side impact event. The second event may be recorded due to the Lateral Delta V exceeding 5 mph (8 km/h) within a 150 ms interval after the side deployment occurred.
- For some Fiat vehicles:
  - Two EDR events may be stored for one impact event. The second event may be recorded due to the deployment of the frontal airbag, 3rd stage passenger.
- During an event, if power to the ACM is lost, all or part of the event data record may not be recorded. An indication may be observed in the recorded data under this condition: The restraint data is recorded first and then the vehicle data.
  - "None" may be displayed in the "Event(s) Recovered" section of the report indicating no pre-crash vehicle data.
  - An event may be displayed in the "Event(s) Recovered" section of the report and "Interrupted" will be displayed for Pre-Crash Recorder Status.

SYSTEM STATUS AT RETRIEVAL:

- Original VIN - The VIN is captured by the ACM and then recorded as the Original VIN after 10 consecutive ignition cycles of capturing the same number. Once it has been recorded, this number cannot be changed.

SYSTEM CONFIGURATION AT RETRIEVAL/EVENT:

- The System Configuration data tables indicate the components that the ACM for a particular vehicle monitors and/or controls.
- Active Head Restraint (AHR) - This refers to some active head restraint systems that are electronically controlled by the ACM. AHRs may activate but not store an EDR Record if the delta V does not exceed the minimum delta V threshold. It is possible that the AHRs may activate after the EDR record has been stored and written, based on achieving the minimum delta V. This condition will result in an EDR but no record of the AHR activation in the CDR report. Activation of only the AHRs, if stored, will be a non-deployment event.

SYSTEM STATUS AT EVENT:

- Number, Total Events - Cumulative number of events that the ACM has recorded, including those non-deployment events that have been overwritten by a subsequent event.
- Occupant Size Classification, Outboard Front Passenger - "Child" status may be used to indicate anything weighing less than a 5th percentile female adult crash dummy, including an empty seat; "Not Child" indicates anything weighing the same as or more than a 5th percentile female adult crash dummy.
- Odometer at Event - Vehicle odometer at the time of the event
- Operation via Energy Reserve Only -"Yes" indicates that the ACM had lost power at or before T0 and was only operating on energy reserve

at T0.
- Safety Belt Status, Outboard Front Passenger - For vehicles sold outside of North America which do not contain a buckle switch for the outboard front passenger, the safety belt status, outboard front passenger will default to "not buckled/unbuckled".
- System Voltage at Event, ACM - Voltage at the ACM as measured by the ACM.
- System Voltage at Event, Bused - Voltage of the vehicle system, communicated on the communication bus to other electronic modules in the vehicle.
- Temperature, Outside - Ambient Air Temperature.
- Time, Airbag Warning Lamp On - This is a cumulative time. It indicates the total amount of time that the ACM has requested the Airbag Warning Lamp be turned on.
    - This time does not include the warning lamp bulb check time, which occurs at every ignition cycle
    - For 2013 MY Minivans and new 2017+ MY Jeep Compass, this time is only cumulative for the past 10 ignition cycles.
- Time from event 1 to 2 -
    - If only one event is stored, either a value of 0 or >5 may be displayed for this data element.
    - For the 2018+ MY Promaster and 2019+ MY RAM 1500, a value of 0 may be displayed for the first event or for events >5 seconds apart.
    - If multiple events exist in the EDR, the time from event 1 to event 2 is defined as:
        - For Bosch and TRW modules, the time from the prior recorded event (even if it has been overwritten) to the current recorded event.
        - For Continental modules, the time from the prior existing recorded event (as long as it is still displayed in the CDR report) to the current recorded event. If the prior event in a multi-event condition is overwritten by a subsequent event, the multi-event status will no longer be displayed.
        - For the 2019+ MY RAM 1500, the time from event 1 to 2 may utilize a non-stored event as event 1. In this case, the total number of events and multi-event data elements will not include the non-stored event in the number of events. However, the time from event 1 to 2 will be shown as time from that non-stored event.
- Time, Operation System Time - This is a cumulative lifetime timer for the ACM. It indicates the total amount of time the ACM has been powered up.
    - For 2019 and later MY RAMs, this time is only cumulative for the current ignition cycle.
- VIN at Event, Last 8 Digits- Last 8 digits of the VIN of the vehicle at the time the ACM records the event.

DEPLOYMENT COMMAND DATA:

- A "Yes" for a particular item indicates that the ACM commanded the deployment /activation of the associated device.
- The phrase "Exceeded Storage Range" for a particular time to deploy indicates that the deployment time is equal to or greater than the 255 milliseconds that can be stored.
- If a device is not deployed, the "time to deploy" for that device will display 0, SNA, N/A or 255.
- In vehicles with Bosch ACMs, once a device has been deployed in an ignition cycle, it is possible that the ACM will not attempt to re-deploy any already deployed device during subsequent events in that same ignition cycle.

DTCs PRESENT AT START OF EVENT:

- If any DTCs (diagnostic trouble codes) are present in the ACM at the start of the event, these will be listed in this section. A dealership service manual can be used to decode the DTCs.
    - DTCs Present at Start of Event are not present in the Alfa Romeo Giulia, Fiat 500X, and the Jeep Renegade.

SENSOR DATA:

- The design range for the angular rate data is:
    - +/- 240 deg/sec for Bosch ACMs, unless specifically called out below
    - +/- 300 deg/sec for TRW ACMs, the 2019 MY RAM 1500, and the 2018+ MY Dodge Journey
    - +/- 290 deg/sec for 2008+ MY minivans and 2009-2017 MY Dodge Journey
    - +/- 340 deg/sec for 2017+ MY Chrysler Pacifica and new 2017+ MY Jeep Compass
    - -416.67 deg/sec to +413.41 deg/sec for 2014+ MY Jeep Cherokee
- For vehicles that store peripheral sensor data, t0 for the peripheral sensors is the same as the t0 for the delta V.
- Internal y acceleration is stored prior to t0 so the internal y acceleration data will usually be zero unless the rollover sensing algorithm has triggered storage of the EDR event.
- The words "Sensor Design Range Exceeded" and a vertical line will be displayed on the Longitudinal and Lateral Delta-V graphs the first time the applicable sensor range is exceeded.

PRE-CRASH DATA:

- The recorded Event may contain Pre-Crash data. Pre-Crash data from the various electronic control modules in the vehicle is transmitted to the Airbag Control Module via the vehicle's communication bus.
- In the Pre-Crash Data graph, data transmitted at a rate other than 0.1 seconds will be shown as dots for each available data point. Only data transmitted at a rate of 0.1 seconds will have the dots connected by a line.

(if equip.) - If a parameter name is followed by the words (if equip.), then the parameter is only valid for vehicles equipped with the associated

parameter/vehicle system.
- The MIL (Malfunction Indicator Lamp) Status for the various recorded systems indicates the requested state of the applicable malfunction indicator lamp at the time that the data was captured. Note: Some fault codes could be stored due to component/system damage from the accident. The appropriate diagnostic tool should be used to read any stored Diagnostic Trouble Codes (DTC's) in the various electronic modules (ACM, PCM, ABS, TCM, etc., where applicable) for use in interpretation of some vehicle specific recorded data.
- ABS Activity - "Yes" indicates an active ABS event in which the ABS is actively controlling the brakes.
- ABS MIL- This indicates the ABS fault indicator lamp status. It will only be "On" when there is a fault in the ABS system. The Electronic brake module DTC's should be read and recorded for final system interpretation.
- Accelerator Pedal, % Full - This indicates the actual position of the accelerator pedal. It will be "SNA" if the vehicle is in the power free mode which limits acceleration.
- Accelerator Pedal (Derived), % Full - This indicates the calculated value of the accelerator pedal for battery electric vehicles only.
- Accelerator Pedal/Engine Throttle, % Full - This indicates the actual position of the accelerator pedal unless the cruise control is engaged. If the cruise control is engaged, this indicates the actual position of the engine throttle blade.
- Braking System, Maximum Braking -- "Yes" indicates that ABS is active on all 4 wheels at the same time.
- Cruise Control:
    - Note that the following two Cruise Control data elements are only valid for vehicles not equipped with Adaptive Cruise Control (ACC). For vehicles equipped with ACC, the ACC data elements are used for both regular Cruise Control and ACC.
    - Cruise Control System/Lamp Status -"On" indicates that the Cruise Control system is turned on.
    - Cruise Control Engaged Status/Active - "Engaged"/"Yes" indicates the Cruise Control system is actively controlling vehicle speed. "Not Engaged"/"No" indicates the system is NOT controlling vehicle speed.
    - Adaptive Cruise Control (ACC) Status (if equip.)- "Off" indicates that all cruise control functionality is disabled; "NCC_On" indicates that the Normal Cruise Control system is turned on; "NCC_Set" indicates the Normal Cruise Control is actively controlling vehicle speed; "ACC_On" indicates that ACC is turned on; "ACC_Set" indicates that the ACC is actively controlling vehicle speed. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
    - ACC Speed Set (if equip.)- This indicates the desired speed in mph that was input by the driver for the ACC system. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
    - ACC Faulted - "Yes" indicates that the ACC system will not function and the ACC warning lamp is lit; "No" indicates that the ACC system is functional and the ACC warning lamp is off;
    - For new 2017+ MY Jeep Compass, cruise control data elements are only available for vehicles NOT equipped with ACC.
- Drive Mode - This indicates the driver selected mode of operation (e.g. normal, sport, track, …)
- Electronic Brake/Stability Control information:
    - Stability Control - This is the status of the ESC symbol - "car with squiggly lines" indicator lamp. "On" indicates that the ESC system is functional. "Off" indicates that the ESC system was turned off either by the driver or due to a fault or thermal mode shutdown. "Engaged" indicates an active ESC/TCS event. "Partial Off" indicates that engine management has been turned off but brake traction control is still functional.
        - For the Jeep Renegade, if the Stability Control is "Off", the ESC Button Status is "Disabled", and the vehicle speed exceeds 40 mph, the stability control system will operate in a reduced functionality mode with traction control turned off ("partial off" mode) even though the user disabled it. For all other conditions, when the Stability Control is "Off", the stability control system will be off.
        - ESC Button Status - This indicates the driver selected mode for the ESC system. "Disabled" indicates that the driver pressed the ESC Button to disable engine management. "Enabled" is the default state for the ESC system.
            - SRT and some Fiat products have the ability to fully disable the ESC system if the ESC button has been pressed and held for a specific amount of time. Additional system analysis is required.
        - ESP Feature is Completely Disabled - This indicates that the stability control system has turned off engine management, traction control, and stability control.
        - ESC/ESP MIL - This indicates the ESC/ESP fault indication lamp status. It will only be "On" when there is a fault or thermal mode shutdown in the ESC/ESP system. The ESC/ESP module DTC's should be read and recorded for final system interpretation.
        - Brake Intervention by ESP - "Yes" indicates that the stability control system has engaged the brakes.
        - Engine Torque Applied - "No" indicates no engine torque output was applied (as in Park/Neutral for Automatic transmissions or clutch depressed on manual or during an ESP/Traction Control event). If "Yes", then engine torque output was applied.
        - Traction Control Active - "Yes" indicates that the traction control system is actively controlling the vehicle's wheels.
- Electronic Park Brake (EPB):
    - Park Brake Engaged - "Yes" indicates that the park brake is applied.
    - EPB MIL - "On" indicates that there is a fault in the Electronic Park Brake System.
- Engine RPM - For the RAM ProMaster City, the minimum resolution for Engine RPM is 32 rpm.
- Engine Throttle, % Full - This indicates the actual position of the Engine Throttle blade. This data element is not supported by vehicles with diesel engines. Thus a value of "SNA" will be displayed if the vehicle has a diesel engine.
- ETC Lamp - Lamp "ON "indicates there is an active Electronic Throttle DTC.
- ETC Lamp Flashing - "Yes" indicates that the ETC is in the limp-in mode.
- Forward Collision Warning (FCW) (if equip.):
    - Object of Interest Distance - This indicates the actual forward distance to the main object being tracked by the FCW system. "FCW present but not tracking" indicates that the FCW system is not currently tracking an object. If the value is SNA for all time stamps, then the vehicle is not equipped with FCW.
    - FCW System Operating State - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On"; "On" indicates that the FCW system is fully on with active braking as well as the audible and visual warnings enabled.
    - FCW System Status - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On". "On-braking" indicates that the FCW system is on with active braking enabled but there will no FCW audible or visual warnings in an FCW event. "On-warning" indicates that the FCW system is on but active braking is disabled. In an FCW event, the driver will only receive FCW audible and

visual warnings. "On-full" indicates that the FCW system is fully on with active braking as well as the audible and visual warnings enabled. SNA indicates that the vehicle is not equipped with FCW.

- Gear Position - For all vehicles except the RAM ProMaster City, this indicates the current transmission gear.
  For the RAM ProMaster City, this indicates the status of the gear shift lever.
- Master Cylinder Pressure - This indicates the brake pressure applied to the brakes through the brake pedal.
- PCM MIL - This indicates the PCM fault indicator lamp status. It will only be "On" when there is a fault in the PCM. "Flashing" indicates misfire detection. The Powertrain Control Module DTC's should be read and recorded for final system interpretation.
- Pre-Crash Recorder Complete - Due to the interruption of data recording in one section, this data element may display "Interrupted" for all sections when some data sections are actually complete.
  - For the 2014 MY Jeep Grand Cherokee and Dodge Durango, if recording of angular rate data is interrupted, the entire EDR record will display "Interrupted" even though the rest of the data may be complete.
- PRND/PRNDL/PRNDS Status - This indicates the status of the Shifter Position.
- Raw Manifold Pressure - This indicates engine load in kPa.
- Reverse Gear - For manual transmission vehicles only, "Yes" indicates the transmission is in the reverse gear.
- Service Brake - "On" indicates that the brake pedal is physically depressed. Braking from the ABS or FCW systems will not be reported in this data element.
- Speed, Vehicle Indicated - This indicates the average of the wheel speeds of the drive wheels.
  - The reporting resolution for Speed, Vehicle Indicated is 1 km/h.
  - To display this data element in mph, the CDR Tool converts the km/h to mph and reports a rounded value in mph.
  - The accuracy of the recorded Speed, Vehicle Indicated may be affected by a significant change of the tire size for the drive wheels or the final drive axle ratio of the transmission from the factory build specifications, wheel lockup, wheel slip, or wheel spin.
  - On some vehicles capable of speeds in excess of 255km/h (about 158mph), the actual vehicle speed may have exceeded the reporting range. It is always prudent to check the reported wheel speeds and other parameters to confirm the Speed, Vehicle Indicated value(s).
- Tire Information:
  - XX where LF = Left Front Tire, RF = Right Front Tire, LR = Left Rear Tire, and RR = Right Rear Tire.
  - Tire X Location - This indicates the location of the tire pressure sensor data being displayed for that time stamp. Default is used to indicate that the location of the tire pressure sensor is unknown or there is no tire pressure sensor in that wheel. Vehicles with Base Tire Pressure Monitoring systems will display SNA for both Tire Locations as these vehicles do not send actual pressure values across the communication bus.
  - Tire X Pressure/Tire Pressure Status, XX -This indicates the actual pressure status of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Possible values are LOW, NORMAL, HIGH, or SNA for this parameter. Vehicles with Base Tire Pressure Monitoring systems may display NORMAL even though these vehicles do not send actual pressure values across the communication bus.
  - Tire X Pressure/Tire Pressure Value, XX (psi) - This indicates the actual tire pressure value of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Vehicles with Base Tire Pressure Monitoring systems will display N/A for this parameter as these vehicles do not send actual pressure values across the communication bus.
    - For the following vehicles, the tire location, if displayed, may not be accurate if the tires have been rotated:
      -2013 MY Ram
      -2013-2017 MY Jeep Patriot
      -2013-2014 MY Chrysler 200
      -2013-2017 MY Jeep Compass
      -2013-2016 MY Dodge Dart
    - For the 2013 MY Ram, if the values for tire pressure status and the tire pressure are SNA, the EDR does not store tire pressure monitoring data.
    - Tire pressure is not stored in the EDR for the following vehicles:
      -2014-2018 MY RAM 1500
      -2014+ MY RAM (all but 1500)
      -2013+ MY Jeep Wrangler
      -2013 MY Jeep Grand Cherokee
      -2013 MY Dodge Durango
      -2013-2014 MY Dodge Challenger
      -2013-2016 MY Chrysler Town and Country
      -2013+ MY Dodge Grand Caravan
      -2015+ MY Fiat 500
    - Wheel Speed, XX - This indicates the speed value of a particular tire as denoted by XX.
- Tire Pressure Monitor Indicator Lamp/Faults - "On" indicates a fault in the tire pressure monitoring system. The TPM module DTC's should be read and recorded for final system interpretation.
- "T0" ("Time zero" where '0' is seen as subscript) is defined as "beginning of the crash event". T0 is the time at which the ACM algorithm is activated, a specific Delta-V is exceeded, or a non-reversible restraint device is deployed. T0 may be defined differently for front, side, rear and roll-over events.
  - If multiple algorithm decisions (i.e.: frontal, side, rear and/or rollover) are made before the first recorded event ends, all of those events are part of the same event record and "T0" is defined as the "T0" from the first recorded event.
  - In the Pre-Crash data tables, the relative time marker "-0.1s" or "-0.25s" respectively represents the last set of data captured in the buffer prior to "T0."
- Torque Information:
  - Axle Torque - This indicates the E-Motor Torque multiplied by the gear ratio for battery electric vehicles only.
  - E-Motor Torque - This indicates the calculated torque from the output shaft of the electric motor in battery electric vehicles only.
- Traction Control Intervention Active - "Active" indicates wheel slippage was occurring during vehicle acceleration.

APPLICATION INFORMATION:

- Alfa Romeo Giulia, Alfa Romeo Stelvio, Fiat 500L, Fiat 500X, and Jeep Renegade are only CDR supported in the United States, Canada, and Saudi Arabia markets.
- Fiat 500/500e is only CDR supported in the United States, Canada, Mexico, and Brazil markets.

03002_Chrysler_ r043

System Status at Retrieval

Original VIN	2C4RDGCG7JR******
Current VIN	2C4RDGCG7JR******
Ignition Cycle, Download	163
ECU Part Number	68371578AB
ECU Serial Number	T14JF0548G009B
Supplier Identification	Continental Corporation
ECU Supply Voltage at Time of Retrieval	11.6

System Configuration at Retrieval

Configured for Driver/Passenger Frontal Airbags	Yes
Configured for Rollover Sensing	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver/Passenger Retractor Pretensioner	Yes
Configured for Driver/Passenger Buckle Pretensioner	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Outboard Front Passenger Seat Track Position Sensor	No
Configured for Passenger Knee Airbag	No
Configured for Left/Right Side Seat Airbag	Yes
Configured for Left/Right Side Curtain Airbag	Yes
Configured for Left/Right Up Front Sensors	Yes
Configured for Left/Right Side Pressure Sensors	Yes
Configured for Left/Right Side B-Pillar Acceleration Sensors	Yes
Configured for Left/Right Side C-Pillar Acceleration Sensors	Yes
Configured for Left/Right Side D-Pillar Acceleration Sensors	Yes
Configured for Driver/Passenger Active Head Restraint	Yes
Configured for Passenger Buckle Switches	Yes

System Configuration at Event (Most Recent Event)

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Frontal Airbag	Yes
Configured for Rollover Sensing	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Driver Seatbelt Buckle Pretensioner	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Outboard Front Passenger Seat Track Position Sensor	No
Configured for Outboard Front Passenger Knee Airbag	No
Configured for Outboard Front Passenger Retractor Pretensioner	Yes
Configured for Outboard Front Passenger Seatbelt Buckle Pretensioner	Yes
Configured for Left Side Seat Airbag	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Seat Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Left/Right Up Front Sensors	Yes
Configured for Left/Right Side Pressure Sensors	Yes
Configured for Left/Right Side Acceleration Sensors	Yes
Configured for Driver/Passenger Active Head Restraint	Yes
Configured for Passenger Buckle Switches	Yes

System Status at Event (Most Recent Event)

Deployment Data Status	Complete
Complete File Recorded (Yes, No)	Yes
Ignition Cycle, Crash	162
Safety Belt Status, Driver	SNA
Safety Belt Status, Outboard Front Passenger	Buckled
Frontal Airbag Warning Lamp, On/Off	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	Not Present
Maximum Delta-V Longitudinal (MPH [km/h])	-2.9 [-5]
Time, Maximum Delta-V, Longitudinal (msec)	112
Maximum Delta-V Lateral (MPH [km/h])	-0.5 [-1]
Time, Maximum Delta-V, Lateral (msec)	60
Time, Operation System Time (sec)	169262.9
Time, Airbag Warning Lamp On (min)	0
Number, Event	2
Time from Event 1 to 2 (sec)	0.3
Multi-Event, Number of Events (1,2,3)	2
Number, Total Events	2
Operation Via Energy Reserve Only (Yes, No)	No
System Voltage at Event, Bussed (V)	13.1
Supply Voltage at Event, ECU (V)	12.3
Odometer at Event (miles [km])	SNA
VIN at Event (last 8 digits)	JR******

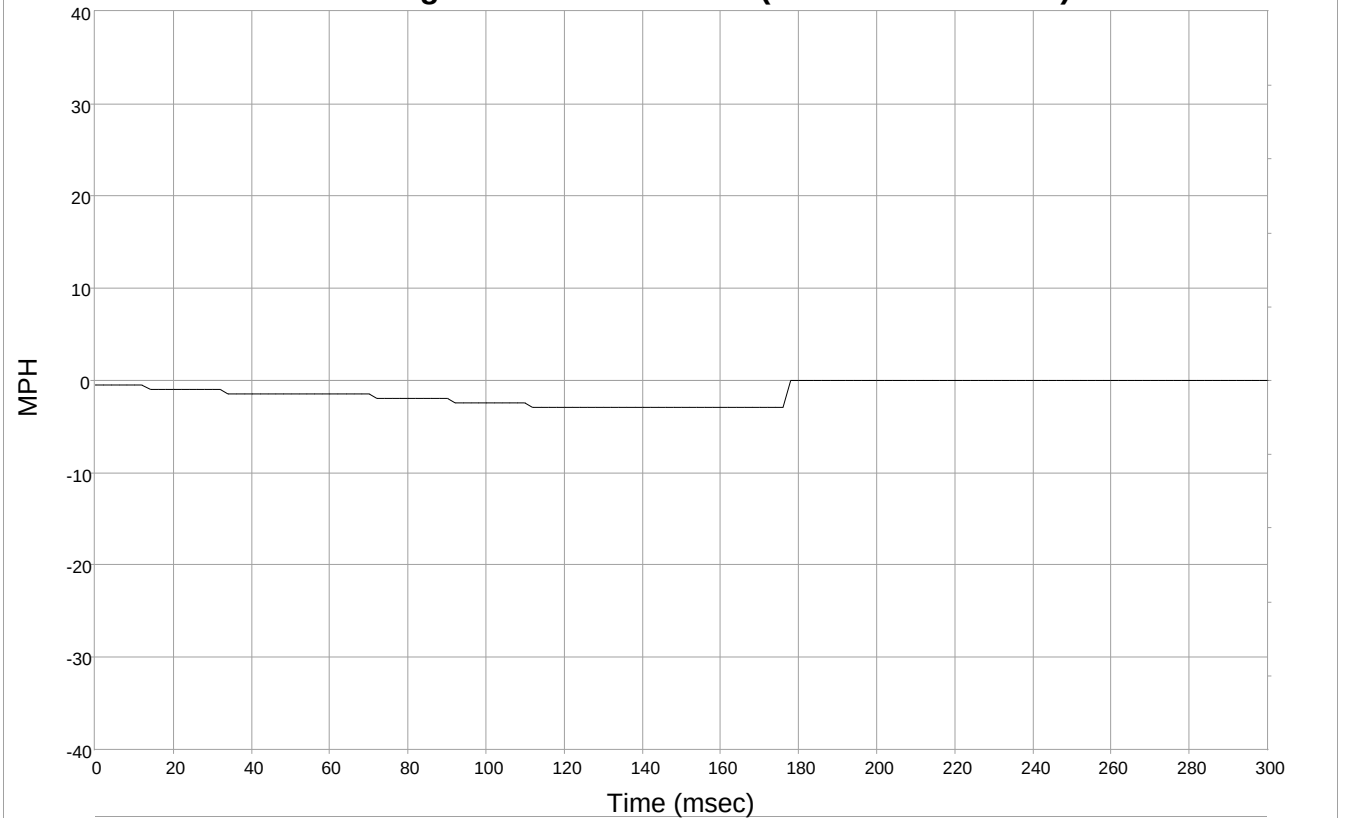
Deployment Command Data (Most Recent Event)

Frontal Airbag Deployment, 1st Stage, Driver	No
Frontal Airbag Deployment, 2nd Stage, Driver	No
Frontal Airbag Deployment, Time to First Stage Deployment, Driver (msec)	SNA
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Driver (msec)	SNA
Knee Airbag Deployment, Driver	No
Retractor Pretensioner, Driver	No
Seatbelt Buckle Pretensioner, Driver	No
Frontal Airbag Deployment, 1st Stage, Passenger	No
Frontal Airbag Deployment, 2nd Stage, Passenger	No
Frontal Airbag Deployment, Time to First Stage Deployment, Passenger (msec)	SNA
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Passenger (msec)	SNA
Retractor Pretensioner, Outboard Front Passenger	No
Seatbelt Buckle Pretensioner, Outboard Front Passenger	No
Side Seat Airbag Deployment, Left	No
Side Seat Airbag Deployment, Right	No
Side Curtain Airbag Deployment, Left	No
Side Curtain Airbag Deployment, Right	No
Active Headrest Deployment, Driver	No
Active Headrest Deployment, Passenger	No

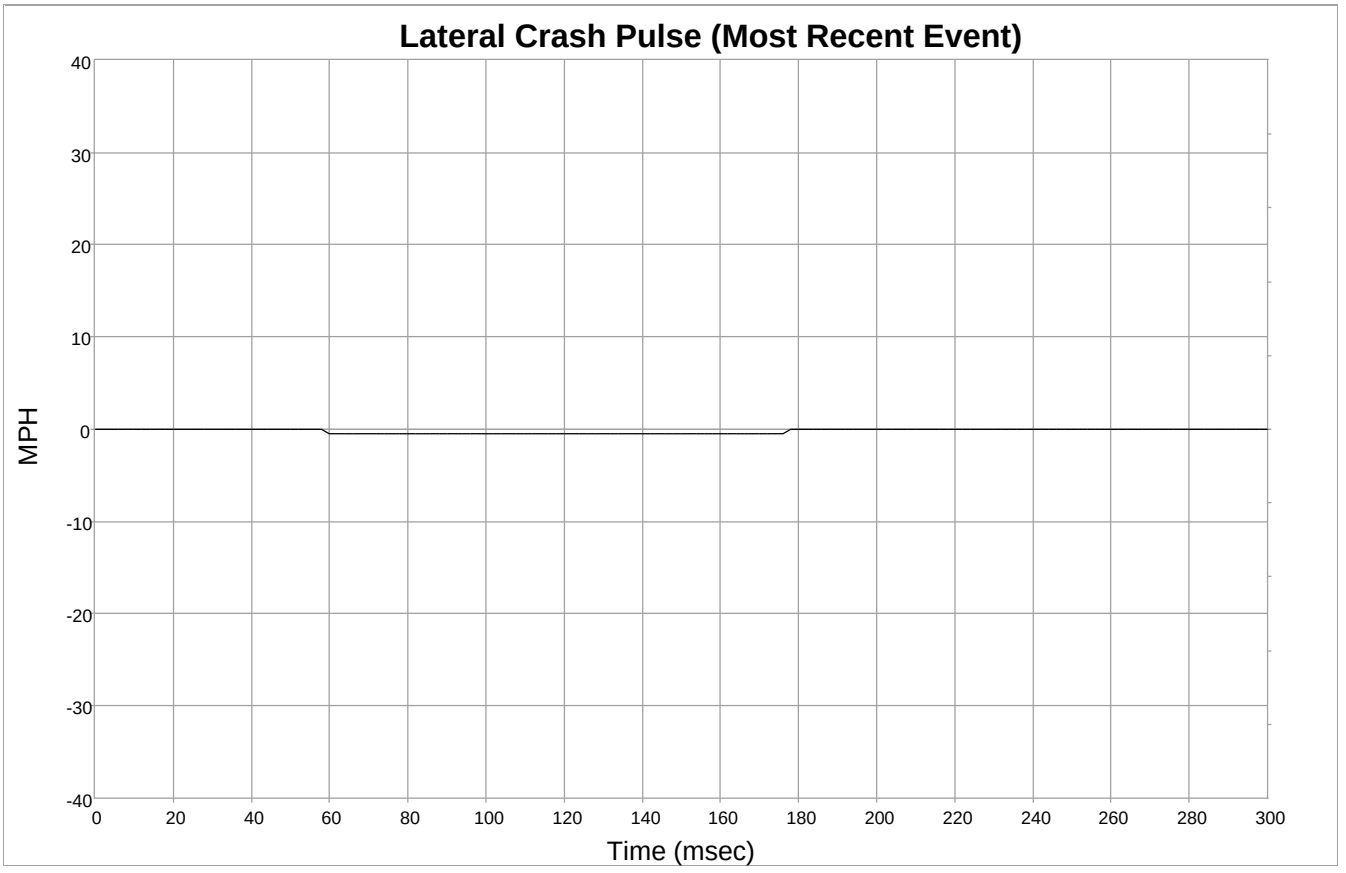
DTCs Present at Start of Event (Most Recent Event)

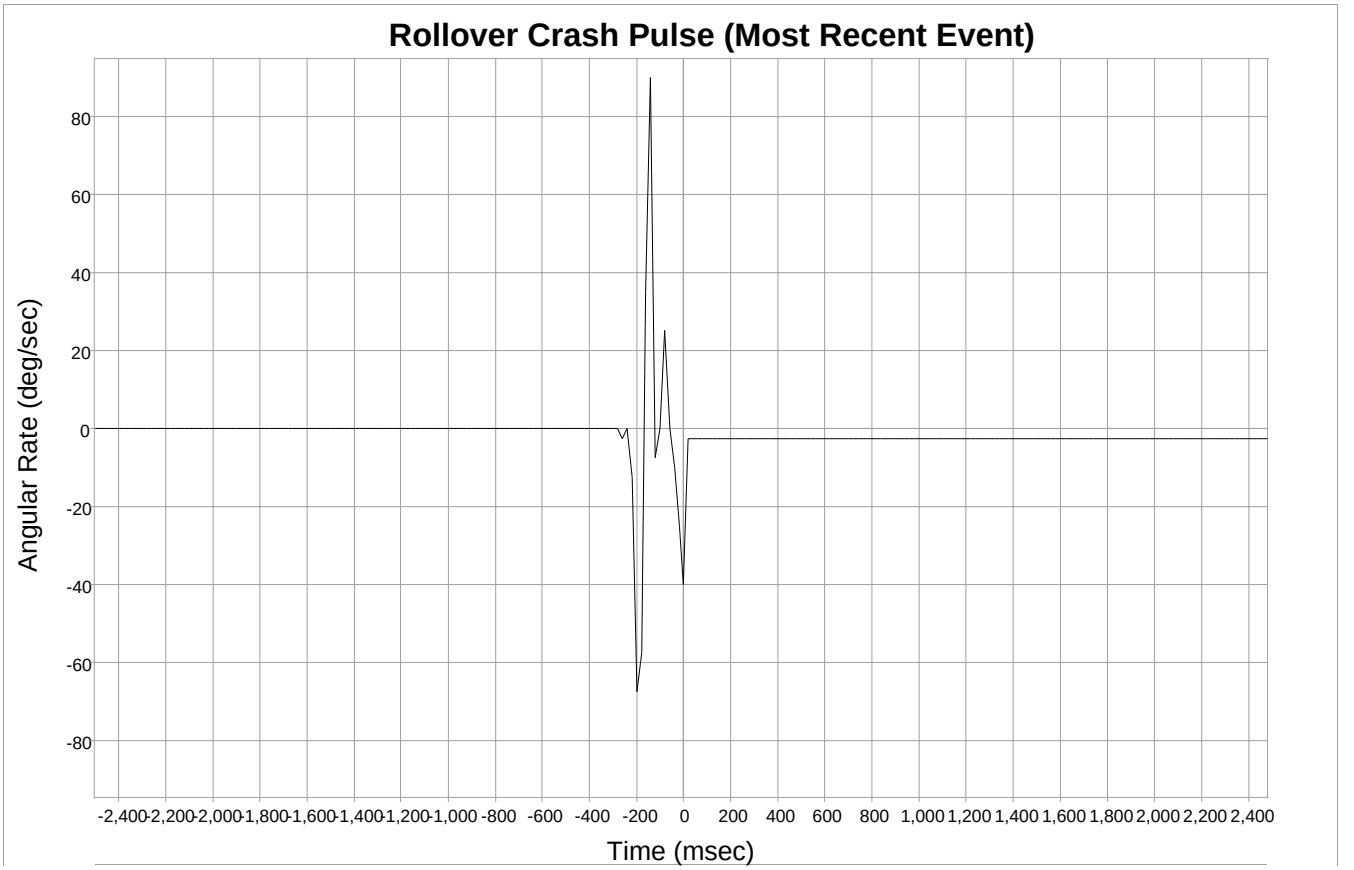
No DTCs Present

Longitudinal Crash Pulse (Most Recent Event)



Lateral Crash Pulse (Most Recent Event)




Rollover Crash Pulse (Most Recent Event)
Angular Rate (deg/sec)
80
60
40
20
0
-20
-40
-60
-80
-2,400 -2,200 -2,000 -1,800 -1,600 -1,400 -1,200 -1,000 -800 -600 -400 -200 0 200 400 600 800 1,000 1,200 1,400 1,600 1,800 2,000 2,200 2,400
Time (msec)

Longitudinal Crash Pulse (Most Recent Event)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])
0	-0.5 [-1]
2	-0.5 [-1]
4	-0.5 [-1]
6	-0.5 [-1]
8	-0.5 [-1]
10	-0.5 [-1]
12	-0.5 [-1]
14	-1.0 [-2]
16	-1.0 [-2]
18	-1.0 [-2]
20	-1.0 [-2]
22	-1.0 [-2]
24	-1.0 [-2]
26	-1.0 [-2]
28	-1.0 [-2]
30	-1.0 [-2]
32	-1.0 [-2]
34	-1.4 [-2]
36	-1.4 [-2]
38	-1.4 [-2]
40	-1.4 [-2]
42	-1.4 [-2]
44	-1.4 [-2]
46	-1.4 [-2]
48	-1.4 [-2]
50	-1.4 [-2]
52	-1.4 [-2]
54	-1.4 [-2]
56	-1.4 [-2]
58	-1.4 [-2]
60	-1.4 [-2]
62	-1.4 [-2]
64	-1.4 [-2]
66	-1.4 [-2]
68	-1.4 [-2]
70	-1.4 [-2]
72	-1.9 [-3]
74	-1.9 [-3]
76	-1.9 [-3]
78	-1.9 [-3]
80	-1.9 [-3]
82	-1.9 [-3]
84	-1.9 [-3]
86	-1.9 [-3]
88	-1.9 [-3]
90	-1.9 [-3]
92	-2.4 [-4]
94	-2.4 [-4]
96	-2.4 [-4]
98	-2.4 [-4]

Time (msec)	Delta-V, Longitudinal (MPH [km/h])
100	-2.4 [-4]
102	-2.4 [-4]
104	-2.4 [-4]
106	-2.4 [-4]
108	-2.4 [-4]
110	-2.4 [-4]
112	-2.9 [-5]
114	-2.9 [-5]
116	-2.9 [-5]
118	-2.9 [-5]
120	-2.9 [-5]
122	-2.9 [-5]
124	-2.9 [-5]
126	-2.9 [-5]
128	-2.9 [-5]
130	-2.9 [-5]
132	-2.9 [-5]
134	-2.9 [-5]
136	-2.9 [-5]
138	-2.9 [-5]
140	-2.9 [-5]
142	-2.9 [-5]
144	-2.9 [-5]
146	-2.9 [-5]
148	-2.9 [-5]
150	-2.9 [-5]
152	-2.9 [-5]
154	-2.9 [-5]
156	-2.9 [-5]
158	-2.9 [-5]
160	-2.9 [-5]
162	-2.9 [-5]
164	-2.9 [-5]
166	-2.9 [-5]
168	-2.9 [-5]
170	-2.9 [-5]
172	-2.9 [-5]
174	-2.9 [-5]
176	-2.9 [-5]
178	0.0 [0]
180	0.0 [0]
182	0.0 [0]
184	0.0 [0]
186	0.0 [0]
188	0.0 [0]
190	0.0 [0]
192	0.0 [0]
194	0.0 [0]
196	0.0 [0]
198	0.0 [0]

Time (msec)	Delta-V, Longitudinal (MPH [km/h])
200	0.0 [0]
202	0.0 [0]
204	0.0 [0]
206	0.0 [0]
208	0.0 [0]
210	0.0 [0]
212	0.0 [0]
214	0.0 [0]
216	0.0 [0]
218	0.0 [0]
220	0.0 [0]
222	0.0 [0]
224	0.0 [0]
226	0.0 [0]
228	0.0 [0]
230	0.0 [0]
232	0.0 [0]
234	0.0 [0]
236	0.0 [0]
238	0.0 [0]
240	0.0 [0]
242	0.0 [0]
244	0.0 [0]
246	0.0 [0]
248	0.0 [0]
250	0.0 [0]
252	0.0 [0]
254	0.0 [0]
256	0.0 [0]
258	0.0 [0]
260	0.0 [0]
262	0.0 [0]
264	0.0 [0]
266	0.0 [0]
268	0.0 [0]
270	0.0 [0]
272	0.0 [0]
274	0.0 [0]
276	0.0 [0]
278	0.0 [0]
280	0.0 [0]
282	0.0 [0]
284	0.0 [0]
286	0.0 [0]
288	0.0 [0]
290	0.0 [0]
292	0.0 [0]
294	0.0 [0]
296	0.0 [0]
298	0.0 [0]
300	0.0 [0]

Lateral Crash Pulse (Most Recent Event)

Time (msec)	Delta-V, Lateral (MPH [km/h])
0	0.0 [0]
2	0.0 [0]
4	0.0 [0]
6	0.0 [0]
8	0.0 [0]
10	0.0 [0]
12	0.0 [0]
14	0.0 [0]
16	0.0 [0]
18	0.0 [0]
20	0.0 [0]
22	0.0 [0]
24	0.0 [0]
26	0.0 [0]
28	0.0 [0]
30	0.0 [0]
32	0.0 [0]
34	0.0 [0]
36	0.0 [0]
38	0.0 [0]
40	0.0 [0]
42	0.0 [0]
44	0.0 [0]
46	0.0 [0]
48	0.0 [0]
50	0.0 [0]
52	0.0 [0]
54	0.0 [0]
56	0.0 [0]
58	0.0 [0]
60	-0.5 [-1]
62	-0.5 [-1]
64	-0.5 [-1]
66	-0.5 [-1]
68	-0.5 [-1]
70	-0.5 [-1]
72	-0.5 [-1]
74	-0.5 [-1]
76	-0.5 [-1]
78	-0.5 [-1]
80	-0.5 [-1]
82	-0.5 [-1]
84	-0.5 [-1]
86	-0.5 [-1]
88	-0.5 [-1]
90	-0.5 [-1]
92	-0.5 [-1]
94	-0.5 [-1]
96	-0.5 [-1]
98	-0.5 [-1]
100	-0.5 [-1]
102	-0.5 [-1]
104	-0.5 [-1]
106	-0.5 [-1]
108	-0.5 [-1]
110	-0.5 [-1]
112	-0.5 [-1]
114	-0.5 [-1]
116	-0.5 [-1]
118	-0.5 [-1]
120	-0.5 [-1]
122	-0.5 [-1]
124	-0.5 [-1]
126	-0.5 [-1]
128	-0.5 [-1]
130	-0.5 [-1]
132	-0.5 [-1]
134	-0.5 [-1]
136	-0.5 [-1]
138	-0.5 [-1]
140	-0.5 [-1]
142	-0.5 [-1]
144	-0.5 [-1]
146	-0.5 [-1]
148	-0.5 [-1]
150	-0.5 [-1]
152	-0.5 [-1]
154	-0.5 [-1]
156	-0.5 [-1]
158	-0.5 [-1]
160	-0.5 [-1]
162	-0.5 [-1]
164	-0.5 [-1]
166	-0.5 [-1]
168	-0.5 [-1]
170	-0.5 [-1]
172	-0.5 [-1]
174	-0.5 [-1]
176	-0.5 [-1]
178	0.0 [0]
180	0.0 [0]
182	0.0 [0]
184	0.0 [0]
186	0.0 [0]
188	0.0 [0]
190	0.0 [0]
192	0.0 [0]
194	0.0 [0]
196	0.0 [0]
198	0.0 [0]
200	0.0 [0]
202	0.0 [0]
204	0.0 [0]
206	0.0 [0]
208	0.0 [0]
210	0.0 [0]
212	0.0 [0]
214	0.0 [0]
216	0.0 [0]
218	0.0 [0]
220	0.0 [0]
222	0.0 [0]
224	0.0 [0]
226	0.0 [0]
228	0.0 [0]
230	0.0 [0]
232	0.0 [0]
234	0.0 [0]
236	0.0 [0]
238	0.0 [0]
240	0.0 [0]
242	0.0 [0]
244	0.0 [0]
246	0.0 [0]
248	0.0 [0]
250	0.0 [0]
252	0.0 [0]
254	0.0 [0]
256	0.0 [0]
258	0.0 [0]
260	0.0 [0]
262	0.0 [0]
264	0.0 [0]
266	0.0 [0]
268	0.0 [0]
270	0.0 [0]
272	0.0 [0]
274	0.0 [0]
276	0.0 [0]
278	0.0 [0]
280	0.0 [0]
282	0.0 [0]
284	0.0 [0]
286	0.0 [0]
288	0.0 [0]
290	0.0 [0]
292	0.0 [0]
294	0.0 [0]
296	0.0 [0]
298	0.0 [0]
300	0.0 [0]

Rollover Crash Pulse (Most Recent Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)
-2500	0.00
-2480	0.00
-2460	0.00
-2440	0.00
-2420	0.00
-2400	0.00
-2380	0.00
-2360	0.00
-2340	0.00
-2320	0.00
-2300	0.00
-2280	0.00
-2260	0.00
-2240	0.00
-2220	0.00
-2200	0.00
-2180	0.00
-2160	0.00
-2140	0.00
-2120	0.00
-2100	0.00
-2080	0.00
-2060	0.00
-2040	0.00
-2020	0.00
-2000	0.00
-1980	0.00
-1960	0.00
-1940	0.00
-1920	0.00
-1900	0.00
-1880	0.00
-1860	0.00
-1840	0.00
-1820	0.00
-1800	0.00
-1780	0.00
-1760	0.00
-1740	0.00
-1720	0.00
-1700	0.00
-1680	0.00
-1660	0.00
-1640	0.00
-1620	0.00
-1600	0.00
-1580	0.00
-1560	0.00
-1540	0.00
-1520	0.00

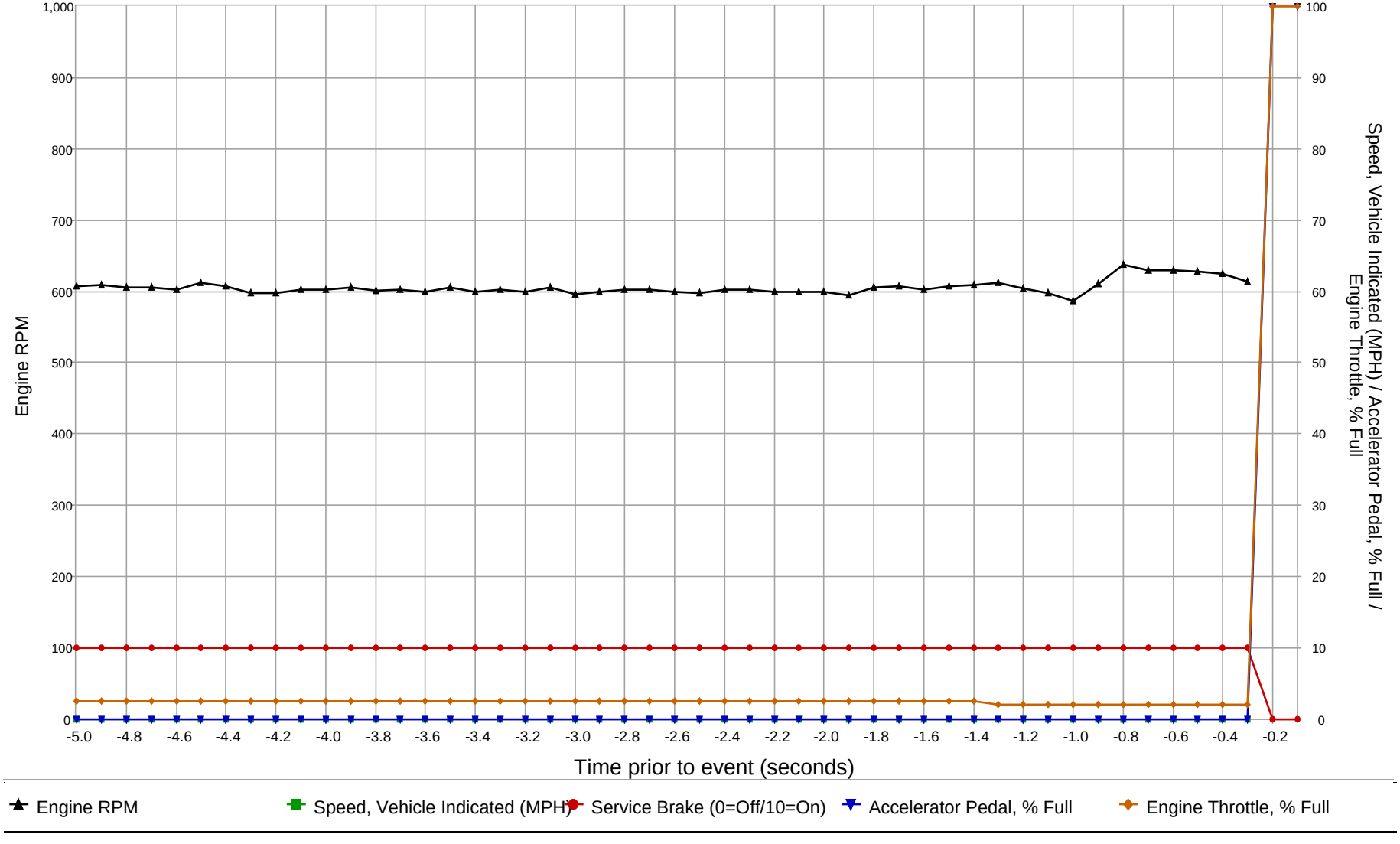
Time (msec)	Angular Rate (deg/sec)
-1500	0.00
-1480	0.00
-1460	0.00
-1440	0.00
-1420	0.00
-1400	0.00
-1380	0.00
-1360	0.00
-1340	0.00
-1320	0.00
-1300	0.00
-1280	0.00
-1260	0.00
-1240	0.00
-1220	0.00
-1200	0.00
-1180	0.00
-1160	0.00
-1140	0.00
-1120	0.00
-1100	0.00
-1080	0.00
-1060	0.00
-1040	0.00
-1020	0.00
-1000	0.00
-980	0.00
-960	0.00
-940	0.00
-920	0.00
-900	0.00
-880	0.00
-860	0.00
-840	0.00
-820	0.00
-800	0.00
-780	0.00
-760	0.00
-740	0.00
-720	0.00
-700	0.00
-680	0.00
-660	0.00
-640	0.00
-620	0.00
-600	0.00
-580	0.00
-560	0.00
-540	0.00
-520	0.00

Time (msec)	Angular Rate (deg/sec)
-500	0.00
-480	0.00
-460	0.00
-440	0.00
-420	0.00
-400	0.00
-380	0.00
-360	0.00
-340	0.00
-320	0.00
-300	0.00
-280	0.00
-260	-2.50
-240	0.00
-220	-12.50
-200	-67.50
-180	-57.50
-160	35.00
-140	90.00
-120	-7.50
-100	0.00
-80	25.00
-60	0.00
-40	-10.00
-20	-25.00
0	-40.00
20	-2.50
40	-2.50
60	-2.50
80	-2.50
100	-2.50
120	-2.50
140	-2.50
160	-2.50
180	-2.50
200	-2.50
220	-2.50
240	-2.50
260	-2.50
280	-2.50
300	-2.50
320	-2.50
340	-2.50
360	-2.50
380	-2.50
400	-2.50
420	-2.50
440	-2.50
460	-2.50
480	-2.50

Rollover Crash Pulse (Most Recent Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)	Time (msec)	Angular Rate (deg/sec)
500	-2.50	1500	-2.50
520	-2.50	1520	-2.50
540	-2.50	1540	-2.50
560	-2.50	1560	-2.50
580	-2.50	1580	-2.50
600	-2.50	1600	-2.50
620	-2.50	1620	-2.50
640	-2.50	1640	-2.50
660	-2.50	1660	-2.50
680	-2.50	1680	-2.50
700	-2.50	1700	-2.50
720	-2.50	1720	-2.50
740	-2.50	1740	-2.50
760	-2.50	1760	-2.50
780	-2.50	1780	-2.50
800	-2.50	1800	-2.50
820	-2.50	1820	-2.50
840	-2.50	1840	-2.50
860	-2.50	1860	-2.50
880	-2.50	1880	-2.50
900	-2.50	1900	-2.50
920	-2.50	1920	-2.50
940	-2.50	1940	-2.50
960	-2.50	1960	-2.50
980	-2.50	1980	-2.50
1000	-2.50	2000	-2.50
1020	-2.50	2020	-2.50
1040	-2.50	2040	-2.50
1060	-2.50	2060	-2.50
1080	-2.50	2080	-2.50
1100	-2.50	2100	-2.50
1120	-2.50	2120	-2.50
1140	-2.50	2140	-2.50
1160	-2.50	2160	-2.50
1180	-2.50	2180	-2.50
1200	-2.50	2200	-2.50
1220	-2.50	2220	-2.50
1240	-2.50	2240	-2.50
1260	-2.50	2260	-2.50
1280	-2.50	2280	-2.50
1300	-2.50	2300	-2.50
1320	-2.50	2320	-2.50
1340	-2.50	2340	-2.50
1360	-2.50	2360	-2.50
1380	-2.50	2380	-2.50
1400	-2.50	2400	-2.50
1420	-2.50	2420	-2.50
1440	-2.50	2440	-2.50
1460	-2.50	2460	-2.50
1480	-2.50	2480	-2.50

Pre-Crash Data (Most Recent Event)



SNA values will not be plotted on the graph

Pre-Crash Data (Most Recent Event - table 1 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Pre-Crash Recorder Status	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % Full	Engine RPM	Engine Throttle, % Full	Raw Manifold Pressure (kPa)	Service Brake	Brake Lamp On
-5.0	Complete	0 [0]	0	608	3	47	On	Brake On
-4.9	Complete	0 [0]	0	609	3	47	On	Brake On
-4.8	Complete	0 [0]	0	605	3	47	On	Brake On
-4.7	Complete	0 [0]	0	605	3	47	On	Brake On
-4.6	Complete	0 [0]	0	603	3	47	On	Brake On
-4.5	Complete	0 [0]	0	612	3	47	On	Brake On
-4.4	Complete	0 [0]	0	608	3	47	On	Brake On
-4.3	Complete	0 [0]	0	597	3	47	On	Brake On
-4.2	Complete	0 [0]	0	598	3	47	On	Brake On
-4.1	Complete	0 [0]	0	602	3	47	On	Brake On
-4.0	Complete	0 [0]	0	603	3	47	On	Brake On
-3.9	Complete	0 [0]	0	605	3	47	On	Brake On
-3.8	Complete	0 [0]	0	601	3	48	On	Brake On
-3.7	Complete	0 [0]	0	602	3	48	On	Brake On
-3.6	Complete	0 [0]	0	600	3	48	On	Brake On
-3.5	Complete	0 [0]	0	606	3	48	On	Brake On
-3.4	Complete	0 [0]	0	599	3	48	On	Brake On
-3.3	Complete	0 [0]	0	603	3	48	On	Brake On
-3.2	Complete	0 [0]	0	600	3	48	On	Brake On
-3.1	Complete	0 [0]	0	605	3	48	On	Brake On
-3.0	Complete	0 [0]	0	596	3	48	On	Brake On
-2.9	Complete	0 [0]	0	600	3	48	On	Brake On
-2.8	Complete	0 [0]	0	602	3	48	On	Brake On
-2.7	Complete	0 [0]	0	602	3	48	On	Brake On
-2.6	Complete	0 [0]	0	600	3	48	On	Brake On
-2.5	Complete	0 [0]	0	598	3	48	On	Brake On
-2.4	Complete	0 [0]	0	603	3	48	On	Brake On
-2.3	Complete	0 [0]	0	602	3	48	On	Brake On
-2.2	Complete	0 [0]	0	599	3	48	On	Brake On
-2.1	Complete	0 [0]	0	599	3	48	On	Brake On
-2.0	Complete	0 [0]	0	599	3	49	On	Brake On
-1.9	Complete	0 [0]	0	595	3	49	On	Brake On
-1.8	Complete	0 [0]	0	605	3	49	On	Brake On
-1.7	Complete	0 [0]	0	608	3	49	On	Brake On
-1.6	Complete	0 [0]	0	602	3	49	On	Brake On
-1.5	Complete	0 [0]	0	608	3	49	On	Brake On
-1.4	Complete	0 [0]	0	609	3	49	On	Brake On
-1.3	Complete	0 [0]	0	612	2	48	On	Brake On
-1.2	Complete	0 [0]	0	604	2	47	On	Brake On
-1.1	Complete	0 [0]	0	598	2	46	On	Brake On
-1.0	Complete	0 [0]	0	587	2	45	On	Brake On
-0.9	Complete	0 [0]	0	611	2	44	On	Brake On
-0.8	Complete	0 [0]	0	637	2	44	On	Brake On
-0.7	Complete	0 [0]	0	629	2	42	On	Brake On
-0.6	Complete	0 [0]	0	629	2	42	On	Brake On
-0.5	Complete	0 [0]	0	628	2	42	On	Brake On
-0.4	Complete	0 [0]	0	625	2	41	On	Brake On
-0.3	Complete	0 [1]	0	614	2	41	On	Brake On
-0.2	Complete	SNA	100	SNA	100	SNA	Off	SNA
-0.1	Complete	SNA	100	SNA	100	SNA	Off	SNA

Pre-Crash Data (Most Recent Event - table 2 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Panic Brake Assist Active (if equip.)	PCM MIL	ABS MIL	ESP MIL	Stability Control	Steering Input (deg)	Yaw Rate (deg/sec) (if equip.)
-5.0	False	Off	Off	Off	On	118	0.00
-4.9	False	Off	Off	Off	On	118	0.00
-4.8	False	Off	Off	Off	On	118	0.00
-4.7	False	Off	Off	Off	On	118	0.00
-4.6	False	Off	Off	Off	On	118	0.00
-4.5	False	Off	Off	Off	On	118	0.00
-4.4	False	Off	Off	Off	On	118	0.00
-4.3	False	Off	Off	Off	On	118	0.00
-4.2	False	Off	Off	Off	On	118	0.00
-4.1	False	Off	Off	Off	On	118	0.00
-4.0	False	Off	Off	Off	On	118	0.12
-3.9	False	Off	Off	Off	On	118	0.12
-3.8	False	Off	Off	Off	On	118	0.00
-3.7	False	Off	Off	Off	On	118	0.00
-3.6	False	Off	Off	Off	On	118	0.00
-3.5	False	Off	Off	Off	On	118	0.00
-3.4	False	Off	Off	Off	On	118	0.12
-3.3	False	Off	Off	Off	On	118	0.12
-3.2	False	Off	Off	Off	On	118	0.12
-3.1	False	Off	Off	Off	On	118	-0.12
-3.0	False	Off	Off	Off	On	118	0.00
-2.9	False	Off	Off	Off	On	118	0.00
-2.8	False	Off	Off	Off	On	118	0.00
-2.7	False	Off	Off	Off	On	118	0.00
-2.6	False	Off	Off	Off	On	118	0.12
-2.5	False	Off	Off	Off	On	118	0.00
-2.4	False	Off	Off	Off	On	118	0.00
-2.3	False	Off	Off	Off	On	118	0.12
-2.2	False	Off	Off	Off	On	118	0.00
-2.1	False	Off	Off	Off	On	118	0.00
-2.0	False	Off	Off	Off	On	118	0.12
-1.9	False	Off	Off	Off	On	118	0.12
-1.8	False	Off	Off	Off	On	118	0.00
-1.7	False	Off	Off	Off	On	118	0.12
-1.6	False	Off	Off	Off	On	118	0.00
-1.5	False	Off	Off	Off	On	118	0.00
-1.4	False	Off	Off	Off	On	118	0.12
-1.3	False	Off	Off	Off	On	118	0.00
-1.2	False	Off	Off	Off	On	118	-0.12
-1.1	False	Off	Off	Off	On	118	0.00
-1.0	False	Off	Off	Off	On	118	0.12
-0.9	False	Off	Off	Off	On	118	0.00
-0.8	False	Off	Off	Off	On	118	0.00
-0.7	False	Off	Off	Off	On	118	0.12
-0.6	False	Off	Off	Off	On	118	0.00
-0.5	False	Off	Off	Off	On	118	0.00
-0.4	False	Off	Off	Off	On	118	0.12
-0.3	False	Off	Off	Off	On	122	-17.59
-0.2	False	SNA	On	Off	Off	SNA	SNA
-0.1	False	SNA	On	Off	Off	SNA	SNA

Pre-Crash Data (Most Recent Event - table 3 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Wheel Speed LF (RPM)	Wheel Speed RF (RPM)	Wheel Speed LR (RPM)	Wheel Speed RR (RPM)	ETC Lamp	ETC Lamp Flashing	Engine Torque Applied	Gear Position Display (Auto Trans. Only)
-5.0	0	0	0	0	Off	No	Yes	Drive
-4.9	0	0	0	0	Off	No	Yes	Drive
-4.8	0	0	0	0	Off	No	Yes	Drive
-4.7	0	0	0	0	Off	No	Yes	Drive
-4.6	0	0	0	0	Off	No	Yes	Drive
-4.5	0	0	0	0	Off	No	Yes	Drive
-4.4	0	0	0	0	Off	No	Yes	Drive
-4.3	0	0	0	0	Off	No	Yes	Drive
-4.2	0	0	0	0	Off	No	Yes	Drive
-4.1	0	0	0	0	Off	No	Yes	Drive
-4.0	0	0	0	0	Off	No	Yes	Drive
-3.9	0	0	0	0	Off	No	Yes	Drive
-3.8	0	0	0	0	Off	No	Yes	Drive
-3.7	0	0	0	0	Off	No	Yes	Drive
-3.6	0	0	0	0	Off	No	Yes	Drive
-3.5	0	0	0	0	Off	No	Yes	Drive
-3.4	0	0	0	0	Off	No	Yes	Drive
-3.3	0	0	0	0	Off	No	Yes	Drive
-3.2	0	0	0	0	Off	No	Yes	Drive
-3.1	0	0	0	0	Off	No	Yes	Drive
-3.0	0	0	0	0	Off	No	Yes	Drive
-2.9	0	0	0	0	Off	No	Yes	Drive
-2.8	0	0	0	0	Off	No	Yes	Drive
-2.7	0	0	0	0	Off	No	Yes	Drive
-2.6	0	0	0	0	Off	No	Yes	Drive
-2.5	0	0	0	0	Off	No	Yes	Drive
-2.4	0	0	0	0	Off	No	Yes	Drive
-2.3	0	0	0	0	Off	No	Yes	Drive
-2.2	0	0	0	0	Off	No	Yes	Drive
-2.1	0	0	0	0	Off	No	Yes	Drive
-2.0	0	0	0	0	Off	No	Yes	Drive
-1.9	0	0	0	0	Off	No	Yes	Drive
-1.8	0	0	0	0	Off	No	Yes	Drive
-1.7	0	0	0	0	Off	No	Yes	Drive
-1.6	0	0	0	0	Off	No	Yes	Drive
-1.5	0	0	0	0	Off	No	Yes	Drive
-1.4	0	0	0	0	Off	No	Yes	Drive
-1.3	0	0	0	0	Off	No	Yes	Drive
-1.2	0	0	0	0	Off	No	Yes	Drive
-1.1	0	0	0	0	Off	No	Yes	Drive
-1.0	0	0	0	0	Off	No	Yes	Drive
-0.9	0	0	0	0	Off	No	Yes	Drive
-0.8	0	0	0	0	Off	No	Yes	Drive
-0.7	0	0	0	0	Off	No	Yes	Drive
-0.6	0	0	0	0	Off	No	Yes	Drive
-0.5	0	0	0	0	Off	No	Yes	Drive
-0.4	0	0	0	0	Off	No	Yes	Drive
-0.3	28	20	287	27	Off	No	Yes	Drive
-0.2	8,192	8,192	8,192	8,192	Off	No	No	SNA
-0.1	8,192	8,192	8,192	8,192	Off	No	No	SNA

Pre-Crash Data (Most Recent Event - table 4 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Cruise Control Status	Cruise Control Engaged
-5.0	Off	Not Engaged
-4.9	Off	Not Engaged
-4.8	Off	Not Engaged
-4.7	Off	Not Engaged
-4.6	Off	Not Engaged
-4.5	Off	Not Engaged
-4.4	Off	Not Engaged
-4.3	Off	Not Engaged
-4.2	Off	Not Engaged
-4.1	Off	Not Engaged
-4.0	Off	Not Engaged
-3.9	Off	Not Engaged
-3.8	Off	Not Engaged
-3.7	Off	Not Engaged
-3.6	Off	Not Engaged
-3.5	Off	Not Engaged
-3.4	Off	Not Engaged
-3.3	Off	Not Engaged
-3.2	Off	Not Engaged
-3.1	Off	Not Engaged
-3.0	Off	Not Engaged
-2.9	Off	Not Engaged
-2.8	Off	Not Engaged
-2.7	Off	Not Engaged
-2.6	Off	Not Engaged
-2.5	Off	Not Engaged
-2.4	Off	Not Engaged
-2.3	Off	Not Engaged
-2.2	Off	Not Engaged
-2.1	Off	Not Engaged
-2.0	Off	Not Engaged
-1.9	Off	Not Engaged
-1.8	Off	Not Engaged
-1.7	Off	Not Engaged
-1.6	Off	Not Engaged
-1.5	Off	Not Engaged
-1.4	Off	Not Engaged
-1.3	Off	Not Engaged
-1.2	Off	Not Engaged
-1.1	Off	Not Engaged
-1.0	Off	Not Engaged
-0.9	Off	Not Engaged
-0.8	Off	Not Engaged
-0.7	Off	Not Engaged
-0.6	Off	Not Engaged
-0.5	Off	Not Engaged
-0.4	Off	Not Engaged
-0.3	Off	Not Engaged
-0.2	Off	Not Engaged
-0.1	Off	Not Engaged

System Configuration at Event (1st Prior Event)

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Frontal Airbag	Yes
Configured for Rollover Sensing	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Driver Seatbelt Buckle Pretensioner	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Outboard Front Passenger Seat Track Position Sensor	No
Configured for Outboard Front Passenger Knee Airbag	No
Configured for Outboard Front Passenger Retractor Pretensioner	Yes
Configured for Outboard Front Passenger Seatbelt Buckle Pretensioner	Yes
Configured for Left Side Seat Airbag	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Seat Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Left/Right Up Front Sensors	Yes
Configured for Left/Right Side Pressure Sensors	Yes
Configured for Left/Right Side Acceleration Sensors	Yes
Configured for Driver/Passenger Active Head Restraint	Yes
Configured for Passenger Buckle Switches	Yes

System Status at Event (1st Prior Event)

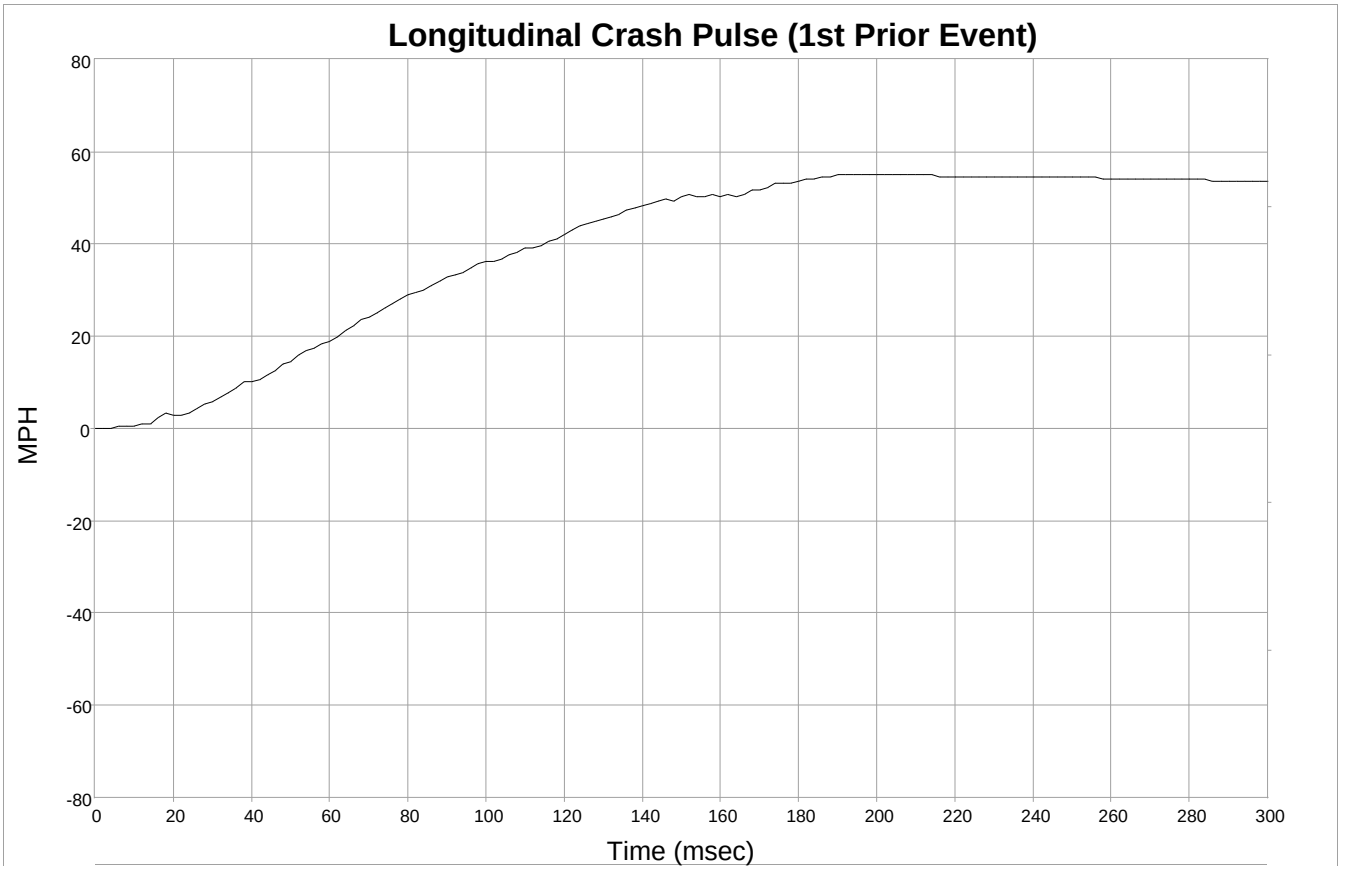
Deployment Data Status	Complete
Complete File Recorded (Yes, No)	Yes
Ignition Cycle, Crash	162
Safety Belt Status, Driver	Buckled
Safety Belt Status, Outboard Front Passenger	Buckled
Frontal Airbag Warning Lamp, On/Off	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	Not Present
Maximum Delta-V Longitudinal (MPH [km/h])	55.0 [89]
Time, Maximum Delta-V, Longitudinal (msec)	190
Maximum Delta-V Lateral (MPH [km/h])	9.7 [16]
Time, Maximum Delta-V, Lateral (msec)	180
Time, Operation System Time (sec)	169262.6
Time, Airbag Warning Lamp On (min)	0
Number, Event	1
Time from Event 1 to 2 (sec)	>5
Multi-Event, Number of Events (1,2,3)	1
Number, Total Events	2
Operation Via Energy Reserve Only (Yes, No)	No
System Voltage at Event, Bussed (V)	13.9
Supply Voltage at Event, ECU (V)	13.9
Odometer at Event (miles [km])	1213.6 [1953]
VIN at Event (last 8 digits)	JR******

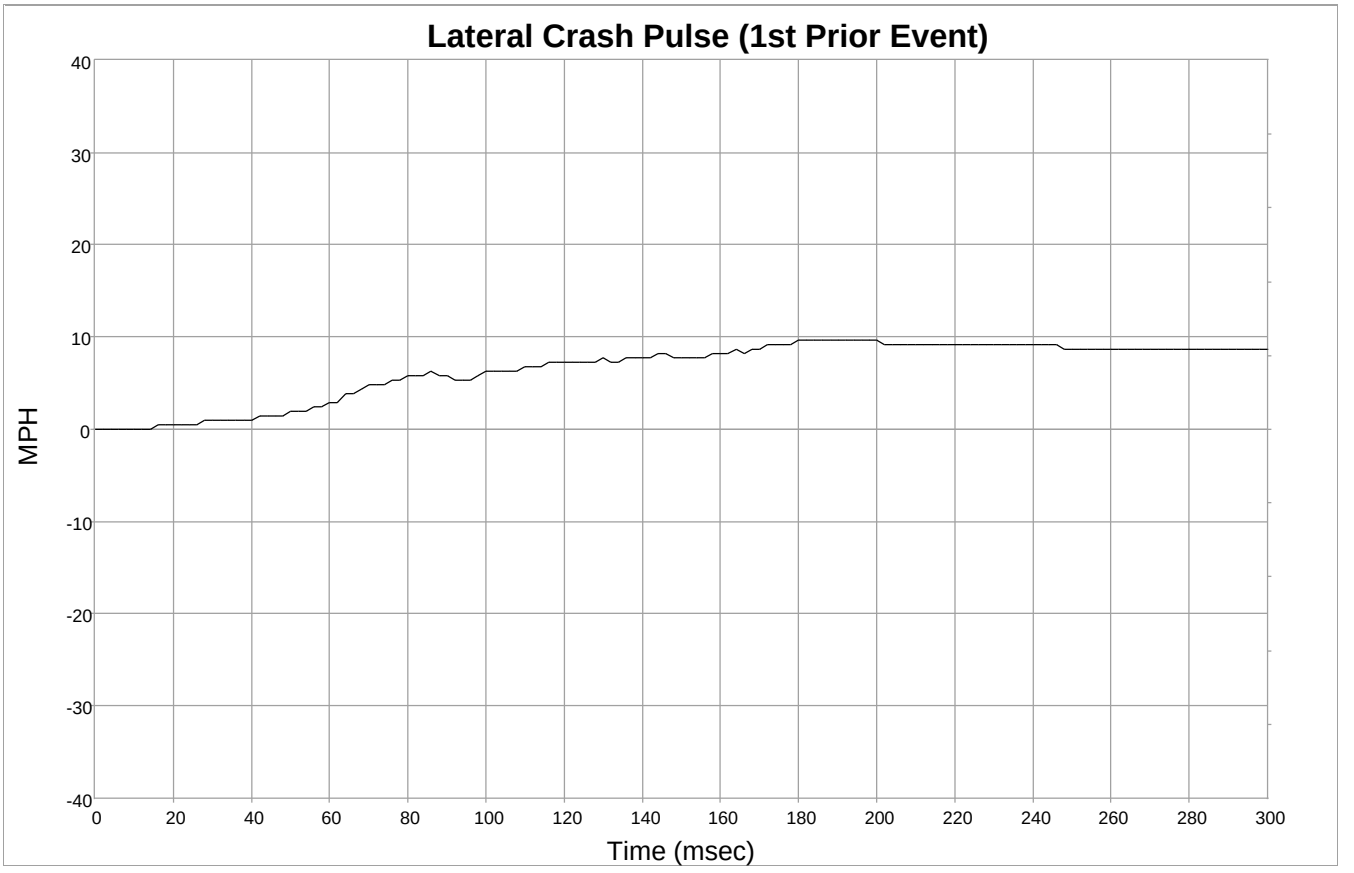
Deployment Command Data (1st Prior Event)

Frontal Airbag Deployment, 1st Stage, Driver	No
Frontal Airbag Deployment, 2nd Stage, Driver	No
Frontal Airbag Deployment, Time to First Stage Deployment, Driver (msec)	SNA
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Driver (msec)	SNA
Knee Airbag Deployment, Driver	No
Retractor Pretensioner, Driver	Yes
Seatbelt Buckle Pretensioner, Driver	Yes
Frontal Airbag Deployment, 1st Stage, Passenger	No
Frontal Airbag Deployment, 2nd Stage, Passenger	No
Frontal Airbag Deployment, Time to First Stage Deployment, Passenger (msec)	SNA
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Passenger (msec)	SNA
Retractor Pretensioner, Outboard Front Passenger	Yes
Seatbelt Buckle Pretensioner, Outboard Front Passenger	Yes
Side Seat Airbag Deployment, Left	Yes
Side Seat Airbag Deployment, Right	No
Side Curtain Airbag Deployment, Left	Yes
Side Curtain Airbag Deployment, Right	No
Active Headrest Deployment, Driver	Yes
Active Headrest Deployment, Passenger	Yes

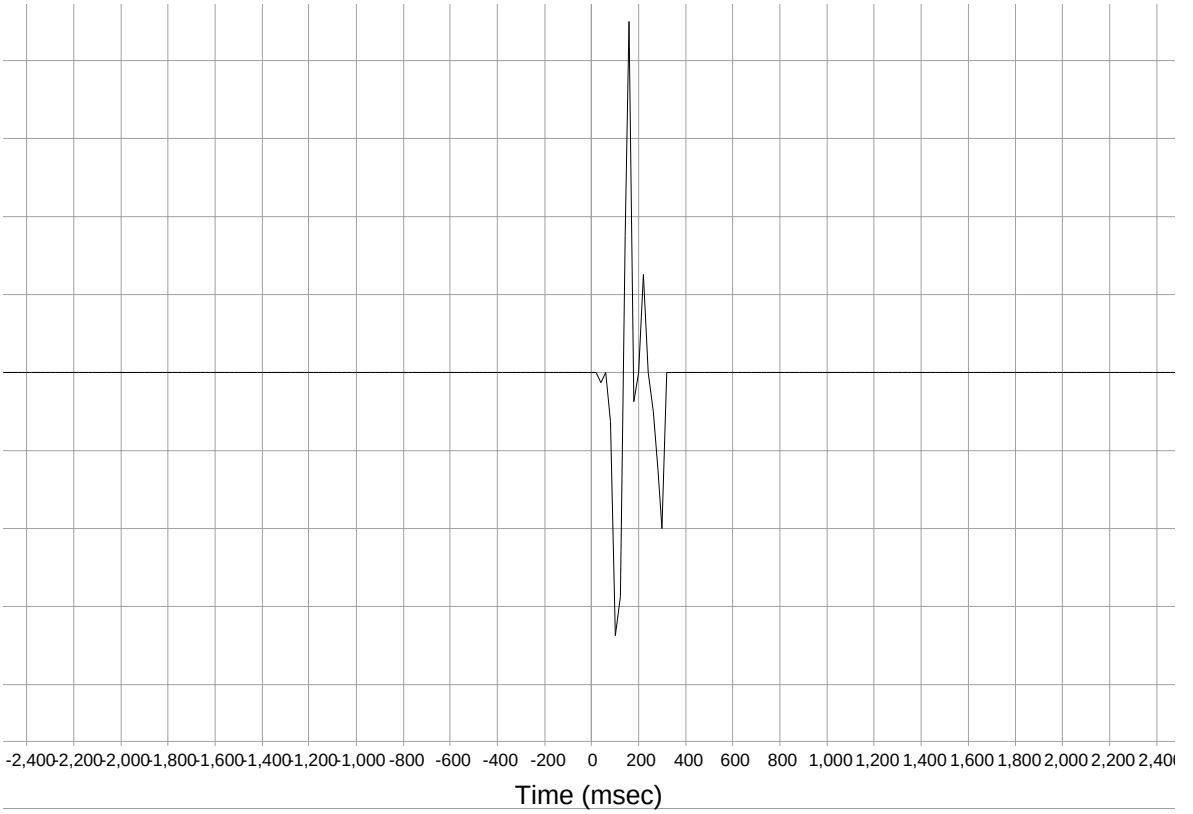
DTCs Present at Start of Event (1st Prior Event)

No DTCs Present


Longitudinal Crash Pulse (1st Prior Event)
MPH
80
60
40
20
0
-20
-40
-60
-80
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Time (msec)


Lateral Crash Pulse (1st Prior Event)
MPH
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Time (msec)

Rollover Crash Pulse (1st Prior Event)



Longitudinal Crash Pulse (1st Prior Event)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])
0	0.0 [0]
2	0.0 [0]
4	0.0 [0]
6	0.5 [1]
8	0.5 [1]
10	0.5 [1]
12	1.0 [2]
14	1.0 [2]
16	2.4 [4]
18	3.4 [5]
20	2.9 [5]
22	2.9 [5]
24	3.4 [5]
26	4.3 [7]
28	5.3 [9]
30	5.8 [9]
32	6.8 [11]
34	7.7 [12]
36	8.7 [14]
38	10.1 [16]
40	10.1 [16]
42	10.6 [17]
44	11.6 [19]
46	12.6 [20]
48	14.0 [23]
50	14.5 [23]
52	15.9 [26]
54	16.9 [27]
56	17.4 [28]
58	18.3 [30]
60	18.8 [30]
62	19.8 [32]
64	21.2 [34]
66	22.2 [36]
68	23.7 [38]
70	24.1 [39]
72	25.1 [40]
74	26.1 [42]
76	27.0 [44]
78	28.0 [45]
80	29.0 [47]
82	29.4 [47]
84	29.9 [48]
86	30.9 [50]
88	31.9 [51]
90	32.8 [53]
92	33.3 [54]
94	33.8 [54]
96	34.8 [56]
98	35.7 [57]
100	36.2 [58]
102	36.2 [58]
104	36.7 [59]
106	37.7 [61]
108	38.1 [61]
110	39.1 [63]
112	39.1 [63]
114	39.6 [64]
116	40.6 [65]
118	41.0 [66]
120	42.0 [68]
122	43.0 [69]
124	43.9 [71]
126	44.4 [71]
128	44.9 [72]
130	45.4 [73]
132	45.9 [74]
134	46.3 [75]
136	47.3 [76]
138	47.8 [77]
140	48.3 [78]
142	48.8 [78]
144	49.2 [79]
146	49.7 [80]
148	49.2 [79]
150	50.2 [81]
152	50.7 [82]
154	50.2 [81]
156	50.2 [81]
158	50.7 [82]
160	50.2 [81]
162	50.7 [82]
164	50.2 [81]
166	50.7 [82]
168	51.7 [83]
170	51.7 [83]
172	52.1 [84]
174	53.1 [85]
176	53.1 [85]
178	53.1 [85]
180	53.6 [86]
182	54.1 [87]
184	54.1 [87]
186	54.6 [88]
188	54.6 [88]
190	55.0 [89]
192	55.0 [89]
194	55.0 [89]
196	55.0 [89]
198	55.0 [89]
200	55.0 [89]
202	55.0 [89]
204	55.0 [89]
206	55.0 [89]
208	55.0 [89]
210	55.0 [89]
212	55.0 [89]
214	55.0 [89]
216	54.6 [88]
218	54.6 [88]
220	54.6 [88]
222	54.6 [88]
224	54.6 [88]
226	54.6 [88]
228	54.6 [88]
230	54.6 [88]
232	54.6 [88]
234	54.6 [88]
236	54.6 [88]
238	54.6 [88]
240	54.6 [88]
242	54.6 [88]
244	54.6 [88]
246	54.6 [88]
248	54.6 [88]
250	54.6 [88]
252	54.6 [88]
254	54.6 [88]
256	54.6 [88]
258	54.1 [87]
260	54.1 [87]
262	54.1 [87]
264	54.1 [87]
266	54.1 [87]
268	54.1 [87]
270	54.1 [87]
272	54.1 [87]
274	54.1 [87]
276	54.1 [87]
278	54.1 [87]
280	54.1 [87]
282	54.1 [87]
284	54.1 [87]
286	53.6 [86]
288	53.6 [86]
290	53.6 [86]
292	53.6 [86]
294	53.6 [86]
296	53.6 [86]
298	53.6 [86]
300	53.6 [86]

Lateral Crash Pulse (1st Prior Event)

Time (msec)	Delta-V, Lateral (MPH [km/h])
0	0.0 [0]
2	0.0 [0]
4	0.0 [0]
6	0.0 [0]
8	0.0 [0]
10	0.0 [0]
12	0.0 [0]
14	0.0 [0]
16	0.5 [1]
18	0.5 [1]
20	0.5 [1]
22	0.5 [1]
24	0.5 [1]
26	0.5 [1]
28	1.0 [2]
30	1.0 [2]
32	1.0 [2]
34	1.0 [2]
36	1.0 [2]
38	1.0 [2]
40	1.0 [2]
42	1.4 [2]
44	1.4 [2]
46	1.4 [2]
48	1.4 [2]
50	1.9 [3]
52	1.9 [3]
54	1.9 [3]
56	2.4 [4]
58	2.4 [4]
60	2.9 [5]
62	2.9 [5]
64	3.9 [6]
66	3.9 [6]
68	4.3 [7]
70	4.8 [8]
72	4.8 [8]
74	4.8 [8]
76	5.3 [9]
78	5.3 [9]
80	5.8 [9]
82	5.8 [9]
84	5.8 [9]
86	6.3 [10]
88	5.8 [9]
90	5.8 [9]
92	5.3 [9]
94	5.3 [9]
96	5.3 [9]
98	5.8 [9]
100	6.3 [10]
102	6.3 [10]
104	6.3 [10]
106	6.3 [10]
108	6.3 [10]
110	6.8 [11]
112	6.8 [11]
114	6.8 [11]
116	7.2 [12]
118	7.2 [12]
120	7.2 [12]
122	7.2 [12]
124	7.2 [12]
126	7.2 [12]
128	7.2 [12]
130	7.7 [12]
132	7.2 [12]
134	7.2 [12]
136	7.7 [12]
138	7.7 [12]
140	7.7 [12]
142	7.7 [12]
144	8.2 [13]
146	8.2 [13]
148	7.7 [12]
150	7.7 [12]
152	7.7 [12]
154	7.7 [12]
156	7.7 [12]
158	8.2 [13]
160	8.2 [13]
162	8.2 [13]
164	8.7 [14]
166	8.2 [13]
168	8.7 [14]
170	8.7 [14]
172	9.2 [15]
174	9.2 [15]
176	9.2 [15]
178	9.2 [15]
180	9.7 [16]
182	9.7 [16]
184	9.7 [16]
186	9.7 [16]
188	9.7 [16]
190	9.7 [16]
192	9.7 [16]
194	9.7 [16]
196	9.7 [16]
198	9.7 [16]
200	9.7 [16]
202	9.2 [15]
204	9.2 [15]
206	9.2 [15]
208	9.2 [15]
210	9.2 [15]
212	9.2 [15]
214	9.2 [15]
216	9.2 [15]
218	9.2 [15]
220	9.2 [15]
222	9.2 [15]
224	9.2 [15]
226	9.2 [15]
228	9.2 [15]
230	9.2 [15]
232	9.2 [15]
234	9.2 [15]
236	9.2 [15]
238	9.2 [15]
240	9.2 [15]
242	9.2 [15]
244	9.2 [15]
246	9.2 [15]
248	8.7 [14]
250	8.7 [14]
252	8.7 [14]
254	8.7 [14]
256	8.7 [14]
258	8.7 [14]
260	8.7 [14]
262	8.7 [14]
264	8.7 [14]
266	8.7 [14]
268	8.7 [14]
270	8.7 [14]
272	8.7 [14]
274	8.7 [14]
276	8.7 [14]
278	8.7 [14]
280	8.7 [14]
282	8.7 [14]
284	8.7 [14]
286	8.7 [14]
288	8.7 [14]
290	8.7 [14]
292	8.7 [14]
294	8.7 [14]
296	8.7 [14]
298	8.7 [14]
300	8.7 [14]

Rollover Crash Pulse (1st Prior Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)
-2500	0.00
-2480	0.00
-2460	0.00
-2440	0.00
-2420	0.00
-2400	0.00
-2380	0.00
-2360	0.00
-2340	0.00
-2320	0.00
-2300	0.00
-2280	0.00
-2260	0.00
-2240	0.00
-2220	0.00
-2200	0.00
-2180	0.00
-2160	0.00
-2140	0.00
-2120	0.00
-2100	0.00
-2080	0.00
-2060	0.00
-2040	0.00
-2020	0.00
-2000	0.00
-1980	0.00
-1960	0.00
-1940	0.00
-1920	0.00
-1900	0.00
-1880	0.00
-1860	0.00
-1840	0.00
-1820	0.00
-1800	0.00
-1780	0.00
-1760	0.00
-1740	0.00
-1720	0.00
-1700	0.00
-1680	0.00
-1660	0.00
-1640	0.00
-1620	0.00
-1600	0.00
-1580	0.00
-1560	0.00
-1540	0.00
-1520	0.00

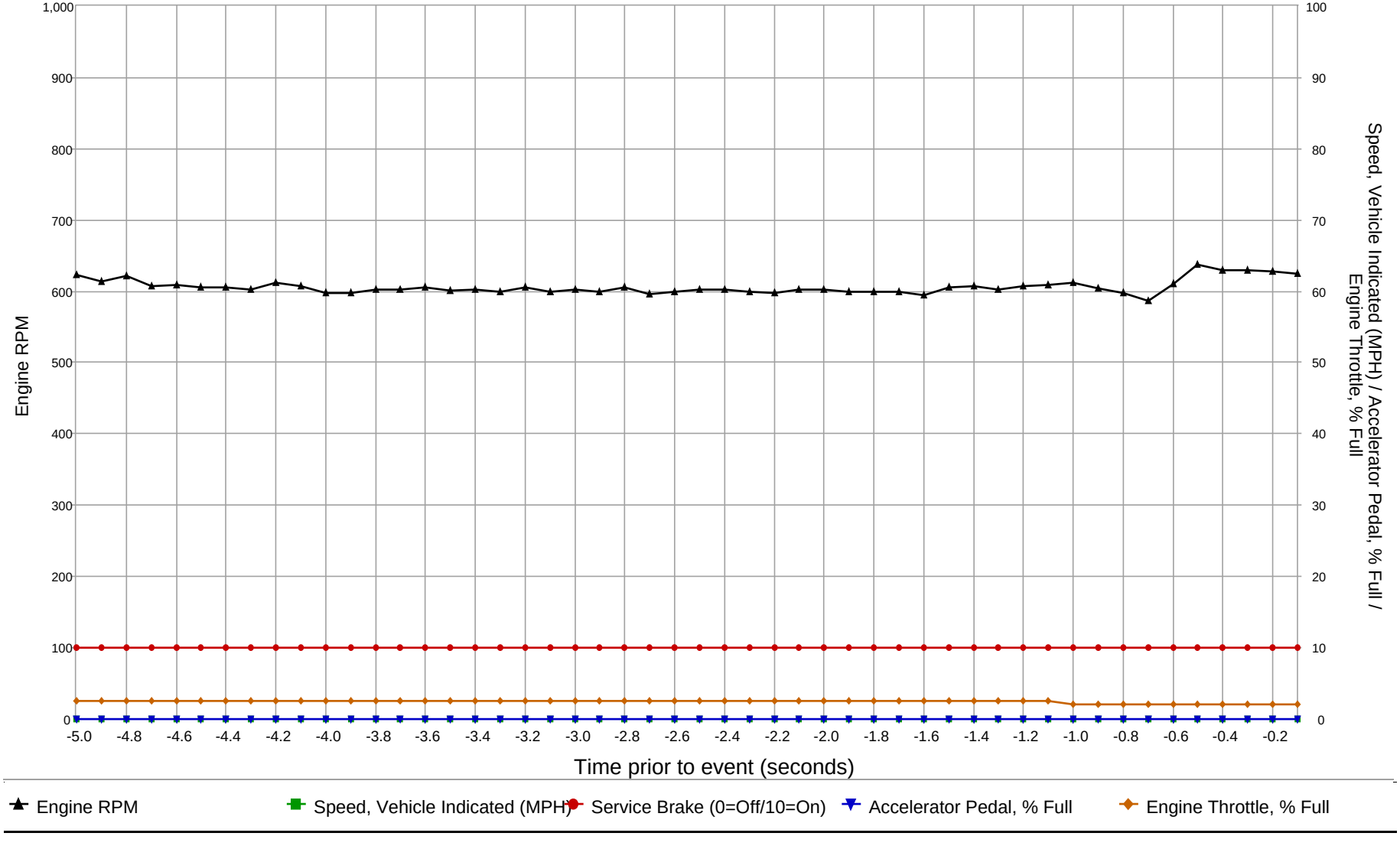
Time (msec)	Angular Rate (deg/sec)
-1500	0.00
-1480	0.00
-1460	0.00
-1440	0.00
-1420	0.00
-1400	0.00
-1380	0.00
-1360	0.00
-1340	0.00
-1320	0.00
-1300	0.00
-1280	0.00
-1260	0.00
-1240	0.00
-1220	0.00
-1200	0.00
-1180	0.00
-1160	0.00
-1140	0.00
-1120	0.00
-1100	0.00
-1080	0.00
-1060	0.00
-1040	0.00
-1020	0.00
-1000	0.00
-980	0.00
-960	0.00
-940	0.00
-920	0.00
-900	0.00
-880	0.00
-860	0.00
-840	0.00
-820	0.00
-800	0.00
-780	0.00
-760	0.00
-740	0.00
-720	0.00
-700	0.00
-680	0.00
-660	0.00
-640	0.00
-620	0.00
-600	0.00
-580	0.00
-560	0.00
-540	0.00
-520	0.00

Time (msec)	Angular Rate (deg/sec)
-500	0.00
-480	0.00
-460	0.00
-440	0.00
-420	0.00
-400	0.00
-380	0.00
-360	0.00
-340	0.00
-320	0.00
-300	0.00
-280	0.00
-260	0.00
-240	0.00
-220	0.00
-200	0.00
-180	0.00
-160	0.00
-140	0.00
-120	0.00
-100	0.00
-80	0.00
-60	0.00
-40	0.00
-20	0.00
0	0.00
20	0.00
40	-2.50
60	0.00
80	-12.50
100	-67.50
120	-57.50
140	35.00
160	90.00
180	-7.50
200	0.00
220	25.00
240	0.00
260	-10.00
280	-25.00
300	-40.00
320	0.00
340	0.00
360	0.00
380	0.00
400	0.00
420	0.00
440	0.00
460	0.00
480	0.00

Rollover Crash Pulse (1st Prior Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)	Time (msec)	Angular Rate (deg/sec)
500	0.00	1500	0.00
520	0.00	1520	0.00
540	0.00	1540	0.00
560	0.00	1560	0.00
580	0.00	1580	0.00
600	0.00	1600	0.00
620	0.00	1620	0.00
640	0.00	1640	0.00
660	0.00	1660	0.00
680	0.00	1680	0.00
700	0.00	1700	0.00
720	0.00	1720	0.00
740	0.00	1740	0.00
760	0.00	1760	0.00
780	0.00	1780	0.00
800	0.00	1800	0.00
820	0.00	1820	0.00
840	0.00	1840	0.00
860	0.00	1860	0.00
880	0.00	1880	0.00
900	0.00	1900	0.00
920	0.00	1920	0.00
940	0.00	1940	0.00
960	0.00	1960	0.00
980	0.00	1980	0.00
1000	0.00	2000	0.00
1020	0.00	2020	0.00
1040	0.00	2040	0.00
1060	0.00	2060	0.00
1080	0.00	2080	0.00
1100	0.00	2100	0.00
1120	0.00	2120	0.00
1140	0.00	2140	0.00
1160	0.00	2160	0.00
1180	0.00	2180	0.00
1200	0.00	2200	0.00
1220	0.00	2220	0.00
1240	0.00	2240	0.00
1260	0.00	2260	0.00
1280	0.00	2280	0.00
1300	0.00	2300	0.00
1320	0.00	2320	0.00
1340	0.00	2340	0.00
1360	0.00	2360	0.00
1380	0.00	2380	0.00
1400	0.00	2400	0.00
1420	0.00	2420	0.00
1440	0.00	2440	0.00
1460	0.00	2460	0.00
1480	0.00	2480	0.00

Pre-Crash Data (1st Prior Event)



SNA values will not be plotted on the graph

Pre-Crash Data (1st Prior Event - table 1 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Pre-Crash Recorder Status	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % Full	Engine RPM	Engine Throttle, % Full	Raw Manifold Pressure (kPa)	Service Brake	Brake Lamp On
-5.0	Complete	0 [0]	0	623	3	47	On	Brake On
-4.9	Complete	0 [0]	0	613	3	47	On	Brake On
-4.8	Complete	0 [0]	0	621	3	47	On	Brake On
-4.7	Complete	0 [0]	0	608	3	47	On	Brake On
-4.6	Complete	0 [0]	0	609	3	47	On	Brake On
-4.5	Complete	0 [0]	0	605	3	47	On	Brake On
-4.4	Complete	0 [0]	0	605	3	47	On	Brake On
-4.3	Complete	0 [0]	0	603	3	47	On	Brake On
-4.2	Complete	0 [0]	0	612	3	47	On	Brake On
-4.1	Complete	0 [0]	0	608	3	47	On	Brake On
-4.0	Complete	0 [0]	0	597	3	47	On	Brake On
-3.9	Complete	0 [0]	0	598	3	47	On	Brake On
-3.8	Complete	0 [0]	0	602	3	47	On	Brake On
-3.7	Complete	0 [0]	0	603	3	47	On	Brake On
-3.6	Complete	0 [0]	0	605	3	47	On	Brake On
-3.5	Complete	0 [0]	0	601	3	48	On	Brake On
-3.4	Complete	0 [0]	0	602	3	48	On	Brake On
-3.3	Complete	0 [0]	0	600	3	48	On	Brake On
-3.2	Complete	0 [0]	0	606	3	48	On	Brake On
-3.1	Complete	0 [0]	0	599	3	48	On	Brake On
-3.0	Complete	0 [0]	0	603	3	48	On	Brake On
-2.9	Complete	0 [0]	0	600	3	48	On	Brake On
-2.8	Complete	0 [0]	0	605	3	48	On	Brake On
-2.7	Complete	0 [0]	0	596	3	48	On	Brake On
-2.6	Complete	0 [0]	0	600	3	48	On	Brake On
-2.5	Complete	0 [0]	0	602	3	48	On	Brake On
-2.4	Complete	0 [0]	0	602	3	48	On	Brake On
-2.3	Complete	0 [0]	0	600	3	48	On	Brake On
-2.2	Complete	0 [0]	0	598	3	48	On	Brake On
-2.1	Complete	0 [0]	0	603	3	48	On	Brake On
-2.0	Complete	0 [0]	0	602	3	48	On	Brake On
-1.9	Complete	0 [0]	0	599	3	48	On	Brake On
-1.8	Complete	0 [0]	0	599	3	48	On	Brake On
-1.7	Complete	0 [0]	0	599	3	49	On	Brake On
-1.6	Complete	0 [0]	0	595	3	49	On	Brake On
-1.5	Complete	0 [0]	0	605	3	49	On	Brake On
-1.4	Complete	0 [0]	0	608	3	49	On	Brake On
-1.3	Complete	0 [0]	0	602	3	49	On	Brake On
-1.2	Complete	0 [0]	0	608	3	49	On	Brake On
-1.1	Complete	0 [0]	0	609	3	49	On	Brake On
-1.0	Complete	0 [0]	0	612	2	48	On	Brake On
-0.9	Complete	0 [0]	0	604	2	47	On	Brake On
-0.8	Complete	0 [0]	0	598	2	46	On	Brake On
-0.7	Complete	0 [0]	0	587	2	45	On	Brake On
-0.6	Complete	0 [0]	0	611	2	44	On	Brake On
-0.5	Complete	0 [0]	0	637	2	44	On	Brake On
-0.4	Complete	0 [0]	0	629	2	42	On	Brake On
-0.3	Complete	0 [0]	0	629	2	42	On	Brake On
-0.2	Complete	0 [0]	0	628	2	42	On	Brake On
-0.1	Complete	0 [0]	0	625	2	41	On	Brake On

Pre-Crash Data (1st Prior Event - table 2 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Panic Brake Assist Active (if equip.)	PCM MIL	ABS MIL	ESP MIL	Stability Control	Steering Input (deg)	Yaw Rate (deg/sec) (if equip.)
-5.0	False	Off	Off	Off	On	118	0.00
-4.9	False	Off	Off	Off	On	118	0.00
-4.8	False	Off	Off	Off	On	118	0.12
-4.7	False	Off	Off	Off	On	118	0.00
-4.6	False	Off	Off	Off	On	118	0.00
-4.5	False	Off	Off	Off	On	118	0.00
-4.4	False	Off	Off	Off	On	118	0.00
-4.3	False	Off	Off	Off	On	118	0.00
-4.2	False	Off	Off	Off	On	118	0.00
-4.1	False	Off	Off	Off	On	118	0.00
-4.0	False	Off	Off	Off	On	118	0.00
-3.9	False	Off	Off	Off	On	118	0.00
-3.8	False	Off	Off	Off	On	118	0.00
-3.7	False	Off	Off	Off	On	118	0.12
-3.6	False	Off	Off	Off	On	118	0.12
-3.5	False	Off	Off	Off	On	118	0.00
-3.4	False	Off	Off	Off	On	118	0.00
-3.3	False	Off	Off	Off	On	118	0.00
-3.2	False	Off	Off	Off	On	118	0.00
-3.1	False	Off	Off	Off	On	118	0.12
-3.0	False	Off	Off	Off	On	118	0.12
-2.9	False	Off	Off	Off	On	118	0.12
-2.8	False	Off	Off	Off	On	118	-0.12
-2.7	False	Off	Off	Off	On	118	0.00
-2.6	False	Off	Off	Off	On	118	0.00
-2.5	False	Off	Off	Off	On	118	0.00
-2.4	False	Off	Off	Off	On	118	0.00
-2.3	False	Off	Off	Off	On	118	0.12
-2.2	False	Off	Off	Off	On	118	0.00
-2.1	False	Off	Off	Off	On	118	0.00
-2.0	False	Off	Off	Off	On	118	0.12
-1.9	False	Off	Off	Off	On	118	0.00
-1.8	False	Off	Off	Off	On	118	0.00
-1.7	False	Off	Off	Off	On	118	0.12
-1.6	False	Off	Off	Off	On	118	0.12
-1.5	False	Off	Off	Off	On	118	0.00
-1.4	False	Off	Off	Off	On	118	0.12
-1.3	False	Off	Off	Off	On	118	0.00
-1.2	False	Off	Off	Off	On	118	0.00
-1.1	False	Off	Off	Off	On	118	0.12
-1.0	False	Off	Off	Off	On	118	0.00
-0.9	False	Off	Off	Off	On	118	-0.12
-0.8	False	Off	Off	Off	On	118	0.00
-0.7	False	Off	Off	Off	On	118	0.12
-0.6	False	Off	Off	Off	On	118	0.00
-0.5	False	Off	Off	Off	On	118	0.00
-0.4	False	Off	Off	Off	On	118	0.12
-0.3	False	Off	Off	Off	On	118	0.00
-0.2	False	Off	Off	Off	On	118	0.00
-0.1	False	Off	Off	Off	On	118	0.12

Pre-Crash Data (1st Prior Event - table 3 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Wheel Speed LF (RPM)	Wheel Speed RF (RPM)	Wheel Speed LR (RPM)	Wheel Speed RR (RPM)	ETC Lamp	ETC Lamp Flashing	Engine Torque Applied	Gear Position Display (Auto Trans. Only)
-5.0	0	0	0	0	Off	No	Yes	Drive
-4.9	0	0	0	0	Off	No	Yes	Drive
-4.8	0	0	0	0	Off	No	Yes	Drive
-4.7	0	0	0	0	Off	No	Yes	Drive
-4.6	0	0	0	0	Off	No	Yes	Drive
-4.5	0	0	0	0	Off	No	Yes	Drive
-4.4	0	0	0	0	Off	No	Yes	Drive
-4.3	0	0	0	0	Off	No	Yes	Drive
-4.2	0	0	0	0	Off	No	Yes	Drive
-4.1	0	0	0	0	Off	No	Yes	Drive
-4.0	0	0	0	0	Off	No	Yes	Drive
-3.9	0	0	0	0	Off	No	Yes	Drive
-3.8	0	0	0	0	Off	No	Yes	Drive
-3.7	0	0	0	0	Off	No	Yes	Drive
-3.6	0	0	0	0	Off	No	Yes	Drive
-3.5	0	0	0	0	Off	No	Yes	Drive
-3.4	0	0	0	0	Off	No	Yes	Drive
-3.3	0	0	0	0	Off	No	Yes	Drive
-3.2	0	0	0	0	Off	No	Yes	Drive
-3.1	0	0	0	0	Off	No	Yes	Drive
-3.0	0	0	0	0	Off	No	Yes	Drive
-2.9	0	0	0	0	Off	No	Yes	Drive
-2.8	0	0	0	0	Off	No	Yes	Drive
-2.7	0	0	0	0	Off	No	Yes	Drive
-2.6	0	0	0	0	Off	No	Yes	Drive
-2.5	0	0	0	0	Off	No	Yes	Drive
-2.4	0	0	0	0	Off	No	Yes	Drive
-2.3	0	0	0	0	Off	No	Yes	Drive
-2.2	0	0	0	0	Off	No	Yes	Drive
-2.1	0	0	0	0	Off	No	Yes	Drive
-2.0	0	0	0	0	Off	No	Yes	Drive
-1.9	0	0	0	0	Off	No	Yes	Drive
-1.8	0	0	0	0	Off	No	Yes	Drive
-1.7	0	0	0	0	Off	No	Yes	Drive
-1.6	0	0	0	0	Off	No	Yes	Drive
-1.5	0	0	0	0	Off	No	Yes	Drive
-1.4	0	0	0	0	Off	No	Yes	Drive
-1.3	0	0	0	0	Off	No	Yes	Drive
-1.2	0	0	0	0	Off	No	Yes	Drive
-1.1	0	0	0	0	Off	No	Yes	Drive
-1.0	0	0	0	0	Off	No	Yes	Drive
-0.9	0	0	0	0	Off	No	Yes	Drive
-0.8	0	0	0	0	Off	No	Yes	Drive
-0.7	0	0	0	0	Off	No	Yes	Drive
-0.6	0	0	0	0	Off	No	Yes	Drive
-0.5	0	0	0	0	Off	No	Yes	Drive
-0.4	0	0	0	0	Off	No	Yes	Drive
-0.3	0	0	0	0	Off	No	Yes	Drive
-0.2	0	0	0	0	Off	No	Yes	Drive
-0.1	0	0	0	0	Off	No	Yes	Drive

Pre-Crash Data (1st Prior Event - table 4 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Cruise Control Status	Cruise Control Engaged
-5.0	Off	Not Engaged
-4.9	Off	Not Engaged
-4.8	Off	Not Engaged
-4.7	Off	Not Engaged
-4.6	Off	Not Engaged
-4.5	Off	Not Engaged
-4.4	Off	Not Engaged
-4.3	Off	Not Engaged
-4.2	Off	Not Engaged
-4.1	Off	Not Engaged
-4.0	Off	Not Engaged
-3.9	Off	Not Engaged
-3.8	Off	Not Engaged
-3.7	Off	Not Engaged
-3.6	Off	Not Engaged
-3.5	Off	Not Engaged
-3.4	Off	Not Engaged
-3.3	Off	Not Engaged
-3.2	Off	Not Engaged
-3.1	Off	Not Engaged
-3.0	Off	Not Engaged
-2.9	Off	Not Engaged
-2.8	Off	Not Engaged
-2.7	Off	Not Engaged
-2.6	Off	Not Engaged
-2.5	Off	Not Engaged
-2.4	Off	Not Engaged
-2.3	Off	Not Engaged
-2.2	Off	Not Engaged
-2.1	Off	Not Engaged
-2.0	Off	Not Engaged
-1.9	Off	Not Engaged
-1.8	Off	Not Engaged
-1.7	Off	Not Engaged
-1.6	Off	Not Engaged
-1.5	Off	Not Engaged
-1.4	Off	Not Engaged
-1.3	Off	Not Engaged
-1.2	Off	Not Engaged
-1.1	Off	Not Engaged
-1.0	Off	Not Engaged
-0.9	Off	Not Engaged
-0.8	Off	Not Engaged
-0.7	Off	Not Engaged
-0.6	Off	Not Engaged
-0.5	Off	Not Engaged
-0.4	Off	Not Engaged
-0.3	Off	Not Engaged
-0.2	Off	Not Engaged
-0.1	Off	Not Engaged

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 system.

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62 F1 00 00 05 01 03

62 F1 32 36 38 33 37 31 35 37 38 41 42

62 F1 50 17 30 00

62 F1 51 17 06 00 17 34 00 17 33 00

62 F1 8C 54 31 34 4A 46 30 35 34 38 47 30 30 39 42

62 F1 54 00 C6

62 F1 90 32 43 34 52 44 47 43 47 37 4A 52 2A 2A 2A 2A 2A 2A

62 F1 A0 32 43 34 52 44 47 43 47 37 4A 52 2A 2A 2A 2A 2A 2A

62 02 50 00 A3 00 02 95 DF 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

62 FA 01 02 CC 01 02 05 00 00 25 F9 00 33 A7 A4 00 00 0F 00 00 A2 00 4C 4B 72 5F 14 5A 04 00
7C E0 40 44 F8 8B D0 00 00 00 00 00 00 FE FF FE FF FF 8B 00 00 00 00 00 00 00 00 00 00 00 00
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2A 2A 2A FF FF 17 06 00 F8 B1 EF C1 14 58 FF 14 02 48 4C 44 02 48 4C 44 03 48 4C 44 02 48 4C
44 00 00 00 30 81 00 F0 0E 00 00 00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

62 FA 02 01 CC 02 02 07 00 00 25 F9 00 33 A7 AA 00 00 0F 00 00 A2 FF FF FF FA 38 FF 1E 03 FE
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2A 2A 2A 0B C2 17 06 00 F8 B1 EF C1 14 58 FF 14 02 48 4C 44 02 48 4C 44 03 48 4C 44 02 48 4C
44 00 00 00 30 01 00 00 00 00 00 00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

62 FA 03 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
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62 FA 04 01 7F 02 5F 00 00

62 F1 0B 00 14 01 02 AB A9 F0 0F DC 89 58 22 48 4C 44 02 48 4C 44 03 48 4C 44 02 48 4C 44 00
00 00 00 00 00 07 01 02 15 10 4D FD 56 47 00 00 08 00 00 07 00 90 01 80 E7 19 0E 00 00 0C 03
00 01 D8 FE 04 00 00 0B 1E 00 00 01 00 00 00 AD 01 03 00 00 00

62 A0 0E 17 3B 01 8D 01 8D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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62 A0 0F FF FF FF FF FF FF 00 FF 00 00 00 FF FF 00 00 00 FF FF 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 FF 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 21 A2 21 CC 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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71 01 03 01 01 00 CC FF FF FF AB 3F FF 3F FF 3F FF 3F FF FF FF FE FF FE FF FF FF FF FF FF FF
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FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

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FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 02 CC FF 02 66 81 00 35 02 3D 00 38 00 27 79 21 FA FF FE FD FF 1D E2 16 0A 33
04 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 F4 FF 00 48 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 03 CC FF 02 71 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1D E1 16 0B 33
04 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
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71 01 03 01 01 04 CC FF 02 74 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0B 34
04 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 05 CC FF 02 75 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0B 35
04 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 06 CC FF 02 75 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1D E1 16 0B 35
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 07 CC FF 02 7D 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0A 37
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
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71 01 03 01 01 08 CC FF 02 63 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0B 37
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
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71 01 03 01 01 09 CC FF 02 4B 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1D E1 16 0B 38
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
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71 01 03 01 01 0A CC FF 02 56 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0A 39
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 0B CC FF 02 5C 81 00 00 00 00 00 00 00 00 7F F4 FA FF FE FD FF 1D E1 16 0B 3B
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 0C CC FF 02 64 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1D E1 16 0B 3C
04 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 0D CC FF 02 61 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 0E CC FF 02 60 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C1 2F C2 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
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71 01 03 01 01 0F CC FF 02 5A 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 10 CC FF 02 60 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1F E0 16 0B 3D
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05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 11 CC FF 02 5D 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 12 CC FF 02 53 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 13 CC FF 02 57 81 00 00 00 00 00 00 00 00 80 0C FA FF FE FD FF 1F E0 16 0B 3D
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 14 CC FF 02 57 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1F E0 16 0B 3C
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

71 01 03 01 01 15 CC FF 02 57 81 00 00 00 00 00 00 00 00 80 00 FA FF FE FD FF 1F E0 16 0B 3C
05 00 CC FE 44 FD C3 2F C4 2E C0 00 FF 10 EC FF 00 00 F8 FE 7C FF FF FF FF FF FF FF FF FF
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Appendix C: 2017 Buick Encore
Event Data Recorder Report

The law enforcement agency imaged the EDR and provide the CDRX file to SCI. The EDR report contained in this technical report is reported by SCI using the current version of the Bosch CDR software at the time of publication. The CDR report contained within the associated CISSWEB 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	KL4CJASB6HB******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR18011_V3_SDM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.3
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 19.5
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. The SDM will only record Maximum SDM Recorded Vehicle Velocity Change for the first 300 milliseconds of the event.
-If the SDM Recorded Vehicle Velocity Change data exceeds the max output range of -127 km/h then the exceeded values will be displayed with an offset of a +256 km/h. If the SDM Recorded Vehicle Velocity Change data exceeds the max output range of +126 km/h then the exceeded values will be displayed with an offset of a -256 km/h.
-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 engine.
-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.
-In an event where the module is operating on energy reserve, the Dynamic counters may report a value that is less than the actual value. If the stored values in the Dynamic counters are less than the counter values in the event records or if more than one event record has the same counter value as another, the module may have been operating on its energy reserve.
-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 Rollover event begins. Before the Rollover event is qualified, a Non-Deployment event begins and is qualified. Sometime after the Non-Deployment event is qualified, the Rollover event is qualified. The Non-Deployment event will be recorded in the first open record even though the Rollover event enabled before the Non-Deployment event. The Rollover event will be recorded in the next open record. The "Concurrent Event Flag Set" parameter will indicate "Yes" for the Rollover event. The "Time Between Events" parameter will indicate the time from the start of the Rollover event to the start of the Non-Deployment event.

-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.
-Due to a CDR Tool data imaging issue, all CDR files imaged from SDM-30 Delphi airbag control modules (ACM) using version 17.6 software are invalid and the ACM must be re-imaged using CDR version 17.6.1 and later software.
-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.

01050_SDM30-delphi_r019

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
Vehicle Identification Number (VIN)	KL4CJASB6HB******
Ignition Cycle, Download (Ignition Cycles at Investigation)	1142
End Model Part Number	00CE44C8
System Type	Delphi with integrated IMU
Software Module Identifier 1	00CE44C1
Software Module Identifier 2	02896919
Software Module Identifier 3	05AAF27F
Manufacturing Traceability Data, LineID	A
Manufacturing Traceability Data, ShiftID	1
Manufacturing Traceability Data, Year	17
Manufacturing Traceability Data, DayOfTheYear	037
Manufacturing Traceability Data, Serial/Lot/BatchNumber	390ZCSZ00
ESS # 1 Traceability Data, Component Identifier	AU
ESS # 1 Traceability Data, Part Number/Broadcast Code	8677
ESS # 1 Traceability Data, Supplier Code	D
ESS # 1 Traceability Data, Traceability Number	P00000000
ESS # 2 Traceability Data, Component Identifier	AT
ESS # 2 Traceability Data, Part Number/Broadcast Code	8677
ESS # 2 Traceability Data, Supplier Code	D
ESS # 2 Traceability Data, Traceability Number	P00000000
ESS # 3 Traceability Data, Component Identifier	AH
ESS # 3 Traceability Data, Part Number/Broadcast Code	8678
ESS # 3 Traceability Data, Supplier Code	D
ESS # 3 Traceability Data, Traceability Number	A00000000
ESS # 4 Traceability Data, Component Identifier	AJ
ESS # 4 Traceability Data, Part Number/Broadcast Code	8678
ESS # 4 Traceability Data, Supplier Code	D
ESS # 4 Traceability Data, Traceability Number	A00000000
ESS # 5 Traceability Data, Component Identifier	DA
ESS # 5 Traceability Data, Part Number/Broadcast Code	8678
ESS # 5 Traceability Data, Supplier Code	D
ESS # 5 Traceability Data, Traceability Number	A00000000
ESS # 6 Traceability Data, Component Identifier	DB
ESS # 6 Traceability Data, Part Number/Broadcast Code	8678
ESS # 6 Traceability Data, Supplier Code	D
ESS # 6 Traceability Data, Traceability Number	A00000000
ESS # 7 Traceability Data, Component Identifier	??
ESS # 7 Traceability Data, Part Number/Broadcast Code	0000
ESS # 7 Traceability Data, Supplier Code	D
ESS # 7 Traceability Data, Traceability Number	A00000000
ESS # 8 Traceability Data, Component Identifier	??
ESS # 8 Traceability Data, Part Number/Broadcast Code	0000
ESS # 8 Traceability Data, Supplier Code	D
ESS # 8 Traceability Data, Traceability Number	A00000000

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)	1140
Algorithm Active: Frontal	Yes
Algorithm Active: Side	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Rear	Yes
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)	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	Occupied
Occupant Size Right Front Passenger Child (Passenger Classification Status)	No (Small Adult)
Passenger Air Bag ON Indicator Status	On
Passenger Air Bag OFF Indicator Status	Off
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	1107
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]	-11 [-17]
Time, Maximum Delta-V (Time From FSR Time Zero to Maximum Longitudinal SDM Recorded Vehicle Velocity Change)(msec)	122
Maximum Delta-V, Lateral (Maximum Lateral SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h]	6 [10]
Time Maximum Delta-V, Lateral (Time From FSR Time Zero to Maximum Lateral SDM Recorded Vehicle Velocity Change)(msec)	134
High Voltage Disable Notification Sent	No
Deployment Commanded in Energy Reserve Mode	No

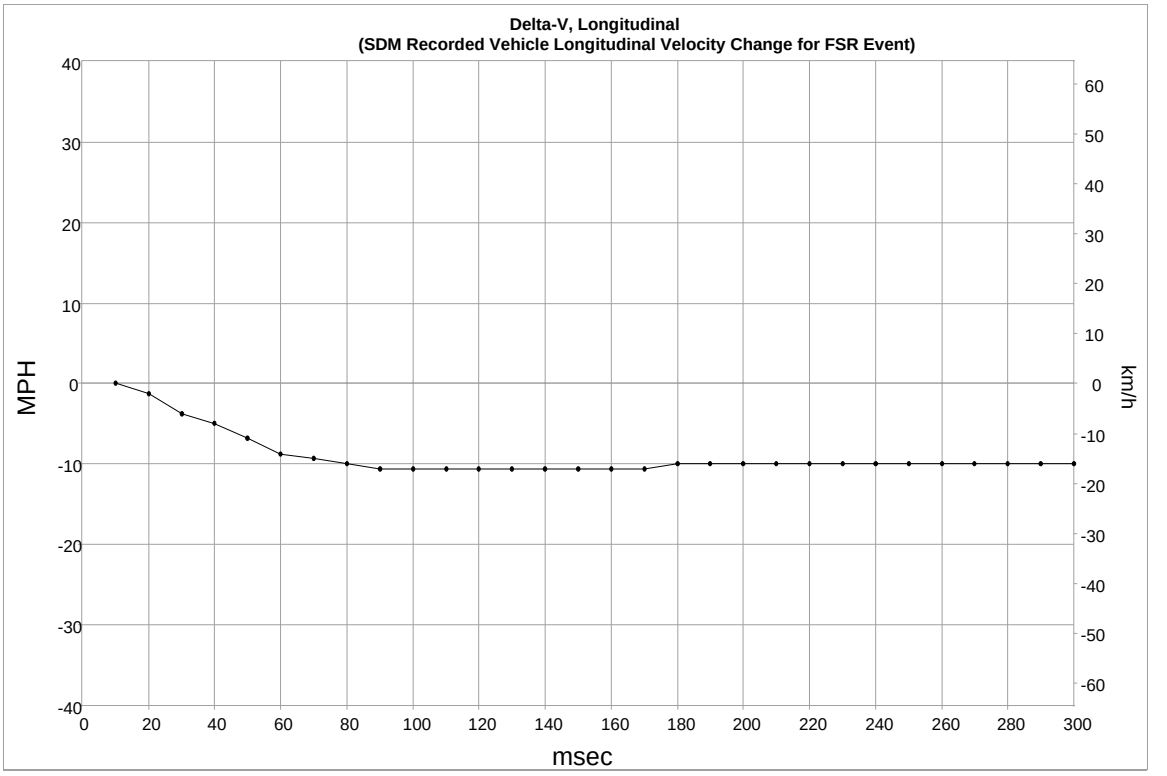
DTCs Present at Time of Event (Event Record 1)

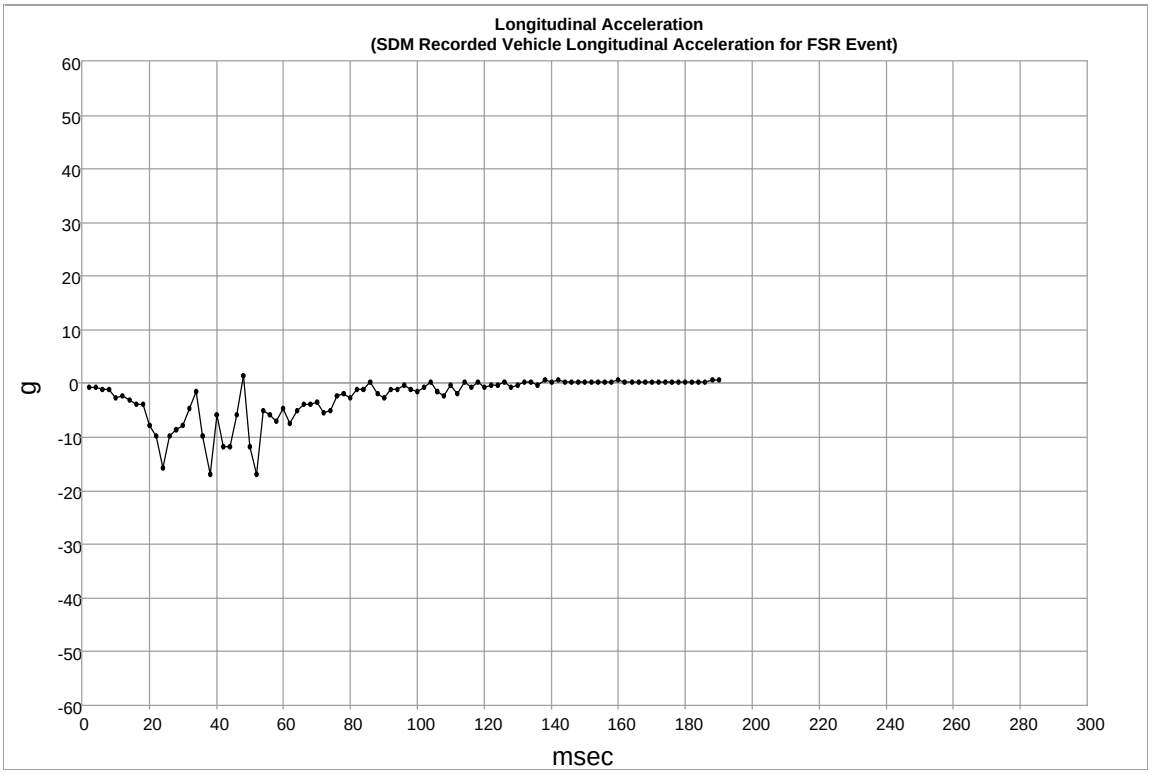
B0052-00

Event Data (Event Record 1)

Driver 1st Stage Deployment Loop Commanded	Yes
Passenger 1st Stage Deployment Loop Commanded	Yes
Driver 2nd Stage Deployment Loop Commanded	Yes
Passenger 2nd Stage Deployment Loop Commanded	Yes
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 2 Thorax Loop Commanded	No
Right Row 2 Thorax Loop Commanded	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded	Yes
Right Row 1 Roof Rail/Head Curtain Loop Commanded	Yes
Driver Knee Deployment Loop Commanded	Yes
Passenger Knee Deployment 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)	28
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (Driver 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	31
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)	28
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (Passenger 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec)	31
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)	23
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)	23

Longitudinal Crash Pulse (Event Record 1)





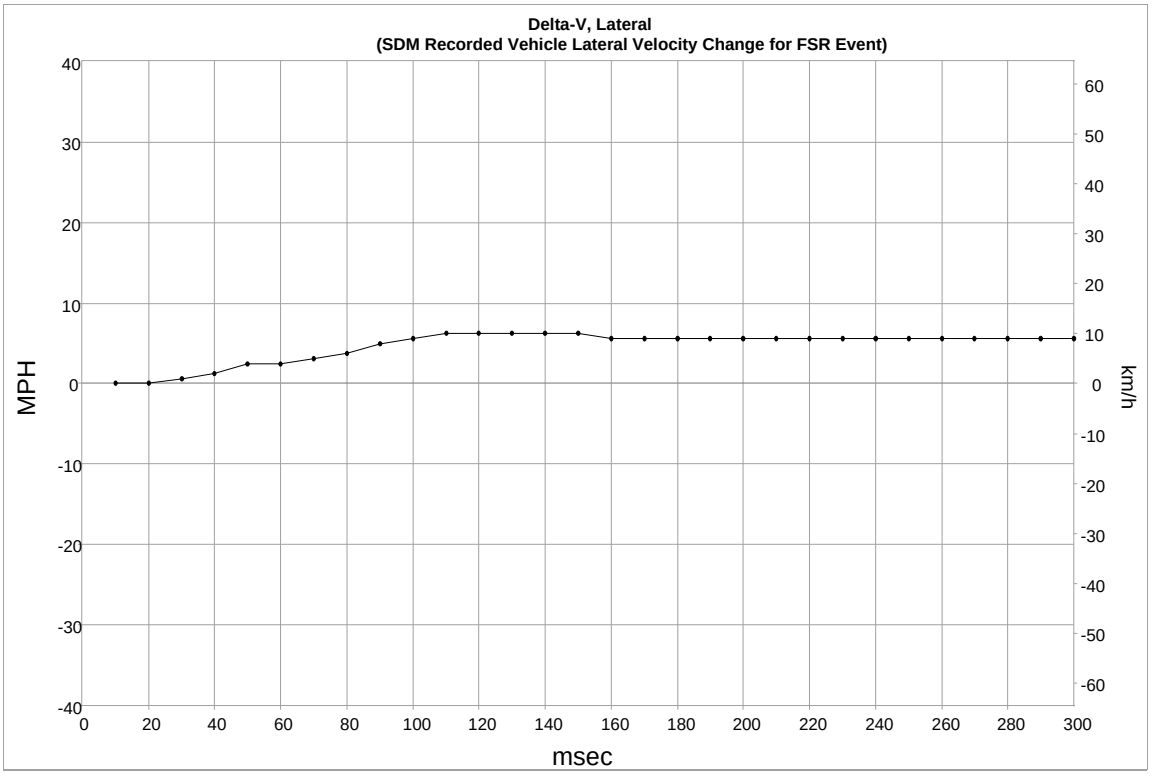
Longitudinal Crash Pulse (Event Record 1)

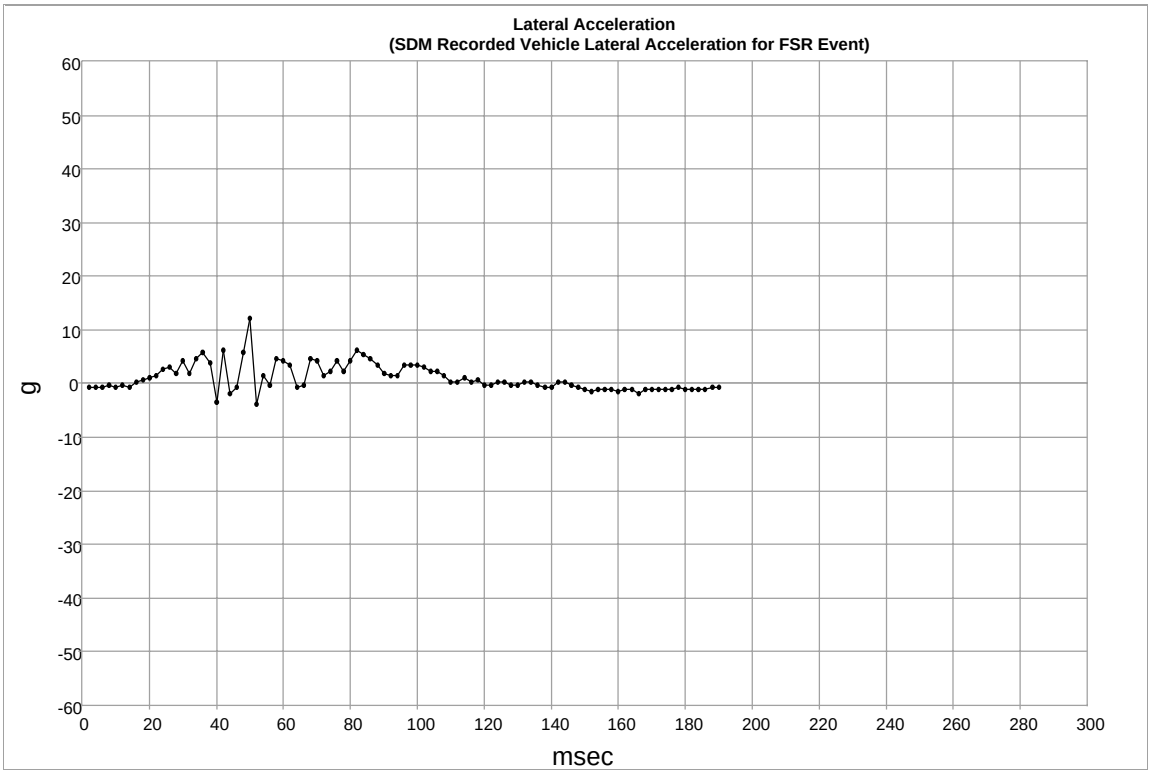
Time (msec)	Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (MPH)	Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (km/h)
10	0.0	0.0
20	-1.2	-2.0
30	-3.7	-6.0
40	-5.0	-8.0
50	-6.8	-11.0
60	-8.7	-14.0
70	-9.3	-15.0
80	-9.9	-16.0
90	-10.6	-17.0
100	-10.6	-17.0
110	-10.6	-17.0
120	-10.6	-17.0
130	-10.6	-17.0
140	-10.6	-17.0
150	-10.6	-17.0
160	-10.6	-17.0
170	-10.6	-17.0
180	-9.9	-16.0
190	-9.9	-16.0
200	-9.9	-16.0
210	-9.9	-16.0
220	-9.9	-16.0
230	-9.9	-16.0
240	-9.9	-16.0
250	-9.9	-16.0
260	-9.9	-16.0
270	-9.9	-16.0
280	-9.9	-16.0
290	-9.9	-16.0
300	-9.9	-16.0

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	-0.6	202	Data Not Available
4	-0.6	104	0.2	204	Data Not Available
6	-1.0	106	-1.4	206	Data Not Available
8	-1.0	108	-2.2	208	Data Not Available
10	-2.6	110	-0.2	210	Data Not Available
12	-2.2	112	-1.8	212	Data Not Available
14	-3.0	114	0.2	214	Data Not Available
16	-3.8	116	-0.6	216	Data Not Available
18	-3.8	118	0.2	218	Data Not Available
20	-7.8	120	-0.6	220	Data Not Available
22	-9.8	122	-0.2	222	Data Not Available
24	-15.8	124	-0.2	224	Data Not Available
26	-9.8	126	0.2	226	Data Not Available
28	-8.6	128	-0.6	228	Data Not Available
30	-7.8	130	-0.2	230	Data Not Available
32	-4.6	132	0.2	232	Data Not Available
34	-1.4	134	0.2	234	Data Not Available
36	-9.8	136	-0.2	236	Data Not Available
38	-17.0	138	0.6	238	Data Not Available
40	-5.8	140	0.2	240	Data Not Available
42	-11.8	142	0.6	242	Data Not Available
44	-11.8	144	0.2	244	Data Not Available
46	-5.8	146	0.2	246	Data Not Available
48	1.4	148	0.2	248	Data Not Available
50	-11.8	150	0.2	250	Data Not Available
52	-17.0	152	0.2	252	Data Not Available
54	-5.0	154	0.2	254	Data Not Available
56	-5.8	156	0.2	256	Data Not Available
58	-7.0	158	0.2	258	Data Not Available
60	-4.6	160	0.6	260	Data Not Available
62	-7.4	162	0.2	262	Data Not Available
64	-5.0	164	0.2	264	Data Not Available
66	-3.8	166	0.2	266	Data Not Available
68	-3.8	168	0.2	268	Data Not Available
70	-3.4	170	0.2	270	Data Not Available
72	-5.4	172	0.2	272	Data Not Available
74	-5.0	174	0.2	274	Data Not Available
76	-2.2	176	0.2	276	Data Not Available
78	-1.8	178	0.2	278	Data Not Available
80	-2.6	180	0.2	280	Data Not Available
82	-1.0	182	0.2	282	Data Not Available
84	-1.0	184	0.2	284	Data Not Available
86	0.2	186	0.2	286	Data Not Available
88	-1.8	188	0.6	288	Data Not Available
90	-2.6	190	0.6	290	Data Not Available
92	-1.0	192	Data Not Available	292	Data Not Available
94	-1.0	194	Data Not Available	294	Data Not Available
96	-0.2	196	Data Not Available	296	Data Not Available
98	-1.0	198	Data Not Available	298	Data Not Available
100	-1.4	200	Data Not Available	300	Data Not Available

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	0.0	0.0
30	0.6	1.0
40	1.2	2.0
50	2.5	4.0
60	2.5	4.0
70	3.1	5.0
80	3.7	6.0
90	5.0	8.0
100	5.6	9.0
110	6.2	10.0
120	6.2	10.0
130	6.2	10.0
140	6.2	10.0
150	6.2	10.0
160	5.6	9.0
170	5.6	9.0
180	5.6	9.0
190	5.6	9.0
200	5.6	9.0
210	5.6	9.0
220	5.6	9.0
230	5.6	9.0
240	5.6	9.0
250	5.6	9.0
260	5.6	9.0
270	5.6	9.0
280	5.6	9.0
290	5.6	9.0
300	5.6	9.0

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	-0.6	102	3.0	202	Data Not Available
4	-0.6	104	2.2	204	Data Not Available
6	-0.6	106	2.2	206	Data Not Available
8	-0.2	108	1.4	208	Data Not Available
10	-0.6	110	0.2	210	Data Not Available
12	-0.2	112	0.2	212	Data Not Available
14	-0.6	114	1.0	214	Data Not Available
16	0.2	116	0.2	216	Data Not Available
18	0.6	118	0.6	218	Data Not Available
20	1.0	120	-0.2	220	Data Not Available
22	1.4	122	-0.2	222	Data Not Available
24	2.6	124	0.2	224	Data Not Available
26	3.0	126	0.2	226	Data Not Available
28	1.8	128	-0.2	228	Data Not Available
30	4.2	130	-0.2	230	Data Not Available
32	1.8	132	0.2	232	Data Not Available
34	4.6	134	0.2	234	Data Not Available
36	5.8	136	-0.2	236	Data Not Available
38	3.8	138	-0.6	238	Data Not Available
40	-3.4	140	-0.6	240	Data Not Available
42	6.2	142	0.2	242	Data Not Available
44	-1.8	144	0.2	244	Data Not Available
46	-0.6	146	-0.2	246	Data Not Available
48	5.8	148	-0.6	248	Data Not Available
50	12.2	150	-1.0	250	Data Not Available
52	-3.8	152	-1.4	252	Data Not Available
54	1.4	154	-1.0	254	Data Not Available
56	-0.2	156	-1.0	256	Data Not Available
58	4.6	158	-1.0	258	Data Not Available
60	4.2	160	-1.4	260	Data Not Available
62	3.4	162	-1.0	262	Data Not Available
64	-0.6	164	-1.0	264	Data Not Available
66	-0.2	166	-1.8	266	Data Not Available
68	4.6	168	-1.0	268	Data Not Available
70	4.2	170	-1.0	270	Data Not Available
72	1.4	172	-1.0	272	Data Not Available
74	2.2	174	-1.0	274	Data Not Available
76	4.2	176	-1.0	276	Data Not Available
78	2.2	178	-0.6	278	Data Not Available
80	4.2	180	-1.0	280	Data Not Available
82	6.2	182	-1.0	282	Data Not Available
84	5.4	184	-1.0	284	Data Not Available
86	4.6	186	-1.0	286	Data Not Available
88	3.4	188	-0.6	288	Data Not Available
90	1.8	190	-0.6	290	Data Not Available
92	1.4	192	Data Not Available	292	Data Not Available
94	1.4	194	Data Not Available	294	Data Not Available
96	3.4	196	Data Not Available	296	Data Not Available
98	3.4	198	Data Not Available	298	Data Not Available
100	3.4	200	Data Not Available	300	Data Not Available

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	16	Off	1920	37	43 [69]
-4.5	16	Off	1920	37	43 [69]
-4.0	16	Off	1920	37	43 [69]
-3.5	0	On	1408	9	43 [69]
-3.0	0	On	1216	7	39 [63]
-2.5	0	On	1408	13	34 [54]
-2.0	0	On	1024	11	26 [42]
-1.5	0	On	1024	10	18 [29]
-1.0	0	On	768	10	11 [17]
-0.5	0	On	704	18	6 [9]

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	-11 [-14]	Off
-1.5	No	No	No	-10 [-14]	Off
-1.0	No	No	No	1 [1]	Off
-0.5	No	No	No	13 [17]	Off

Hexadecimal Data

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DPID $11
FF FD 40 FC C0 7C 04

DPID $15
01 02 03 04 05 06 07

DPID $16
08 09 0A 0D 0E 13 14

DPID $17
27 0C 27 0B 27 27 00

DPID $32
00 FF 04 76 00 00 00

DPID $35
78 00 00 00 00 00 00

DID $01
41 55 38 36 37 37 44 50 30 30 30 30 30 30 30 30

DID $03
41 54 38 36 37 37 44 50 30 30 30 30 30 30 30 30

DID $05
41 48 38 36 37 38 44 41 30 30 30 30 30 30 30 30

DID $07
41 4A 38 36 37 38 44 41 30 30 30 30 30 30 30 30

DID $09
44 41 38 36 37 38 44 41 30 30 30 30 30 30 30 30

DID $0B
44 42 38 36 37 38 44 41 30 30 30 30 30 30 30 30

DID $0D
01 00 30 30 30 30 44 41 30 30 30 30 30 30 30 30

DID $0F
01 00 30 30 30 30 44 41 30 30 30 30 30 30 30 30

DID $30
01 00 01 01

DID $90
4B 4C 34 43 4A 41 53 42 36 48 42 2A 2A 2A 2A 2A 2A

DID $9A
0B 12

DID $B4
41 31 31 37 30 33 37 33 39 30 5A 43 53 5A 30 30

DID $C1
00 CE 44 C1

DID $C2
02 89 69 19

DID $C3
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05 AA F2 7F

DID $CB
00 CE 44 C8

DID $31

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 0000   A5 F0 01 00 01 01 0F 04 74 FF
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 0030   00 00 00 00 00 10 10 10 55 54
 0040   00 00 00 00 00 0B 0C 10 10 16
 0050   13 16 1E 1E 1E 06 C2 06 A2 06
 0060   84 06 83 12 0A 0A 0B 0D 07 09
 0070   25 25 25 09 11 1D 2A 36 3F 45
 0080   45 45 45 00 FF FD 04 53 FD 80
 0090   52 00 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 6E 3D 89 43
 0120   1C 1F 1C 1F 1C 1C 17 17 7F 7F
 0130   7D 7F 79 80 77 81 74 83 71 83
 0140   70 84 6F 85 6E 87 6E 88 6E 89
 0150   6E 89 6E 89 6E 89 6E 89 6E 88
 0160   6E 88 6F 88 6F 88 6F 88 6F 88
 0170   6F 88 6F 88 6F 88 6F 88 6F 88
 0180   6F 88 6F 88 6F 88 6F 88 7E 7E
 0190   7E 7E 7D 7E 7D 7F 79 7E 7A 7F
 0200   78 7E 76 80 76 81 6C 82 67 83
 0210   58 86 67 87 6A 84 6C 8A 74 84
 0220   7C 8B 67 8E 55 89 71 77 62 8F
 0230   62 7B 71 7E 83 8E 62 9E 55 76
 0240   73 83 71 7F 6E 8B 74 8A 6D 88
 0250   73 7E 76 7F 76 8B 77 8A 72 83
 0260   73 85 7A 8A 7B 85 79 8A 7D 8F
 0270   7D 8D 80 8B 7B 88 79 84 7D 83
 0280   7D 83 7F 88 7D 88 7C 88 7E 87
 0290   80 85 7C 85 7A 83 7F 80 7B 80
 0300   80 82 7E 80 80 81 7E 7F 7F 7F
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 0320   80 80 7F 7F 81 7E 80 7E 81 80
 0330   80 80 80 7F 80 7E 80 7D 80 7C
 0340   80 7D 80 7D 80 7D 81 7C 80 7D
 0350   80 7D 80 7B 80 7D 80 7D 80 7D
 0360   80 7D 80 7D 80 7E 80 7D 80 7D
 0370   80 7D 80 7D 81 7E 81 7E FF FF
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 0910   00 00 00 00 00 00 00 00 00 2B
 0920   08 06 13 1D 00 00 00 00 05 EE
 0930   05 E0 00 00 00 00 00 00 00 00
 0940   05 DE 00 00 00 02 5E 05 00 00
 0950   03 00 00 00 05 DE 07 58 05 EE
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 1160   00 05 71 F8 00 00 03 03 FF 00
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DID $32

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DOT HS 813 273
March 2022

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

15450-022422-v2