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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 submitted.

16. Abstract

This on-site investigation documents the multi-event crash of a 2022 Genesis GV70 that had a level 2 advanced driver assistance system (ADAS). The police crash report (PCR) stated that the Genesis sideswiped a 2019 Lincoln Nautilus causing both vehicles to depart the right side of the roadway and crash into a brush/tree line. The PCR reported that the Genesis had partial automation engaged during the crash. The Genesis driver reported during the SCI interview that he was operating the vehicle under manual control (ADAS not active) during the 2 minutes leading up to the crash. The belted 38-year-old male driver of the Genesis was uninjured and not transported to a medical facility. The belted 77-year-old male driver of the Lincoln had an arm laceration; however, he was not transported to a hospital. The Lincoln's belted 75-year-old female front passenger was transported by ambulance to a medical facility with police-reported incapacitating (A-level) injuries. The SCI investigation determined the crash most likely occurred due to a control loss on wet pavement and not due to ADAS features of the vehicle.

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Special Crash Investigations
On-Site Reported Advanced Driver Assistance System Crash Investigation
Office of Defects Investigation
Case Number: CR22010
Vehicle: 2022 Genesis GV70
Location: Michigan
Crash Date: June 2022

Background

This report documents the multi-event crash of a 2022 Genesis GV70 (Figure 1) that had a level 2 advanced driver assistance system (ADAS).[1] The police crash report (PCR) stated that the Genesis sideswiped a 2019 Lincoln Nautilus causing both vehicles to depart the right side of the roadway and crash into a brush/tree line. The PCR reported that the Genesis had partial automation engaged at the time of the crash. The belted 38-year-old male driver was uninjured and not transported to a medical facility. The belted 77-year-old male driver of the Lincoln had an arm laceration; however, he was not transported to a hospital. The Lincoln's belted 75-year-old female front passenger was transported by ambulance to a medical facility with police-reported incapacitating (A-level) injuries.

Figure 1. Left front oblique view of the Genesis

The Lincoln's occupants reported the crash and sent the PCR to NHTSA. The notification was forwarded to the Crash Investigation Division (CID) in June 2022 and the Special Crash Investigations (SCI) team at Crash Research & Analysis Inc. was assigned a follow-up investigation. The Hyundai Kia Technical Center, who owned the Genesis, cooperated with NHTSA and the SCI team to coordinate a June 2022 vehicle inspection of the Genesis. Several of the center's lead technicians attended the inspection. The on-site activities included inspection and assessment of the Genesis ADAS features; measurement of the exterior deformation, interior damage, and intrusion; documentation of the interior occupant contact evidence; and inspection of the manual and supplemental restraint systems. The Genesis had an event data recorder

[1] www.sae.org/blog/sae-j3016-update

(EDR), which was imaged by the manufacturer during the inspection process with the Global Information Technology (GIT) Hyundai EDR tool and the data file was shared with the SCI team. The vehicle was not equipped to record any other type of onboard data, still-camera images, or video.

The Lincoln was located at a tow facility near the crash site and was inspected in June 2022 to document its exterior and interior damage. The vehicle had an EDR supported by the Bosch Crash Data Retrieval (CDR) tool and its data was imaged during the inspection. The crash site was inspected and documented with a total station and digital photography.

The Genesis driver was a test engineer for the vehicle manufacturer and was operating the vehicle as part of his job. He was on the outbound leg of a test drive approximately 3 hours from the facility testing the vehicle's drive modes (comfort, sport, eco) and activated the vehicle's ADAS features in the different modes at various times during the test drive. The manufacturer's term for the ADAS features was Highway Driving Assist II (HDA II). HDA II required the use of the vehicle's smart cruise control (SCC), lane following assist, lane keeping assist, and recognition that the vehicle was operating on the interstate highway system. According to the vehicle manufacturer literature[2], SCC was operational within a speed range of approximately 10 to 200 km/h (5 to 120 mph). However, during the 2-minute period leading up to the crash, the driver stated that the ADAS features were turned off and he was operating the vehicle manually. The SCI on-site investigation determined that during the 5 seconds of EDR pre-crash recording, the Genesis was not operating with the ADAS features active and that the driver controlled the longitudinal and lateral movements of the vehicle, SCC was not engaged, the throttle was open 100 percent with increasing speed, and the vehicle was actively steered right and left. The crash was not related to the vehicle's ADAS features.

[2] www.genesis.com/uk/en/support-and-ownership/ownership/owner-manuals.html

Summary

Crash Site

The crash occurred in the afternoon in June 2022. At the time of the crash, it was daylight and the police reported that the roads were wet. The National Weather Service reported conditions were rain, no wind, and a temperature of 22.8ºC (73ºF). The Genesis driver reported intermittent puddles of standing water on the roadway. The crash occurred on the westbound lanes of a six-lane divided interstate roadway (Figure 2). There were three lanes in each direction separated by a grass median and a cable barrier. The roadway was straight, level, and bituminous. The westbound lanes measured 3.7 m (12.1 ft) wide and were separated by broken white lines. The lanes were bordered by a solid yellow edge line on the left and a solid white edge line on the right. The right shoulder was 2.7 m (8.9 ft) wide. The north roadside was a grass embankment that transitioned into a brush/tree line approximately 6 m (20 ft) from the edge of the pavement. The speed limit was 113 km/h (70 mph). A crash diagram is included at the end of this report.

Figure 2. Eastward lookback view of the interstate from the roadside

Pre-Crash

The Genesis was westbound in the left lane driven by a belted 38-year-old male at an EDR-reported speed of 133 km/h (82.6 mph) 5.0 seconds prior to algorithm enable (AE). The HDA II was off. The vehicle was accelerating at 100 percent throttle, reaching a speed of 148 km/h (92.0 mph) 3.0 seconds prior to AE as it approached the Lincoln forward of its position. The Lincoln was westbound in the left lane traveling at an EDR-reported speed of 127 km/h (78.9 mph). A belted 77-year-old male driver and a belted 75-year-old female front-right passenger occupied the Lincoln.

According to the driver of the Genesis, he was overtaking the vehicle in front of him and decided to go around the vehicle on the right. The forward crash warning was not active in the pre-crash according to the EDR report. Upon initiating the right steering, without the use of the turn signal, the Genesis' lane keeping assist activated to correct the vehicle's trajectory back to the center of the original travel lane. The driver recognized the correction from the Genesis and steered through it, while accelerating to complete the lane change. He reported to investigators: "then, I felt like I was driving on ice." It was likely the Genesis encountered standing water and experienced hydroplaning. At the -2.5 second time stamp, with a speed of 150 km/h (93.2 mph),

the EDR data indicated that the Genesis driver released the accelerator, began braking, and applied a large, rapid steer maneuver to the right and then back to the left over a 1-second interval. The (returning) left steer recorded at 2 seconds prior to AE resulted in an oversteer maneuver, initiating a lane change back to the left.

Crash

The left-front corner of the Genesis struck the right passenger compartment of the Lincoln (Event 1) as the Genesis encroached into the left travel lane while overtaking the Lincoln. The crash resulted in sideswipe-type damage with resultant directions of force of 12 o'clock for the Genesis and 5 o'clock for the Lincoln. Following this engagement, the vehicles separated and traveled to the right through the center and right lanes and departed the right road edge with the Genesis leading the off-road travel (Figure 3). The road departure of the Genesis enabled its EDR recording.

As the Genesis entered the brush along the roadside, the vehicle yawed counterclockwise. Rotating and tracking tire marks from the Lincoln were present on the grass roadside as the Lincoln followed the Genesis into the overgrown area that consisted of small diameter trees, brush, cattails, and a marshy area (Figure 4).

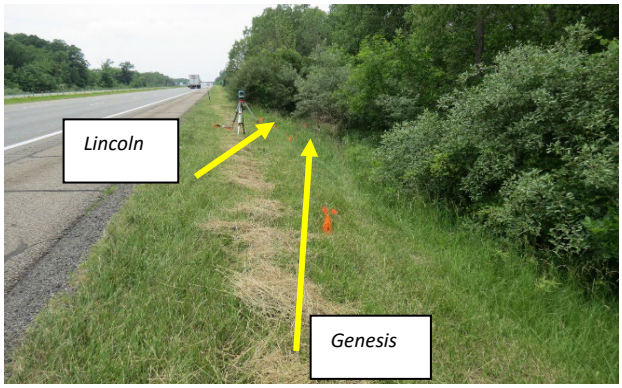


Figure 3. Southwest view of both vehicles' roadway departure

Figure 4. Facing Southwest at the path of the Genesis and Lincoln into the brush/tree line

The front plane/right aspect of the Genesis impacted, struck, and fractured a tree (Event 2) that damaged the right-front suspension area. Its undercarriage subsequently struck the soft ground (Event 3). Both impacts enhanced the counterclockwise rotation of the Genesis as it traveled to final rest. At rest, the Genesis had penetrated the brush/tree line approximately 23 m (75 ft).

The Lincoln entered the off-road area and struck two small diameter trees with the front-right area causing minor damage to the hood and leading edge of the right-front fender (Events 4 and 5). The front undercarriage engaged the soft ground (Event 6), fracturing the bumper fascia and damaging the lower aspect of the radiator and the air conditioner condenser. As the Lincoln continued forward, its left-front corner struck the back of the Genesis (Event 7) and came to rest. Directions of force for this event were 12 o'clock for the Lincoln and within the 7 o'clock sector for the Genesis. None of the crash events were of sufficient magnitude to deploy air bags or actuate seat belt pretensioners.

Post-Crash

The Genesis came to final rest facing in a southerly direction back toward the roadway. The Genesis driver was not injured. The driver exited the vehicle unassisted via the left-front door and checked the status of the Lincoln's occupants. He then waited for emergency responders to arrive.

The Lincoln came to final rest engaged against the back of the Genesis facing in a westerly direction. Both occupants of the Lincoln remained in the vehicle until EMS arrived. The driver then exited under his own power. The passenger was assisted from the vehicle by emergency personnel. The Lincoln's front-right passenger was transported by ambulance to a hospital where she was treated for A-level (incapacitating) injuries. The PCR listed the Lincoln driver with B-level (non-incapacitating) injuries; however, he was not transported from the scene by ambulance.

Following the on-scene police investigation, both vehicles were towed from the scene due to damage. The Genesis was subsequently transported back to the manufacturer's technical facility several hours from the crash site where it was inspected by SCI for this investigation. The Lincoln was inspected at a tow yard near the crash site.

2022 Genesis GV70

Description

The 2022 Genesis GV70 (Figure 5) was a four-door SUV manufactured by Hyundai in an unknown month of 2021. The Genesis did not have a Vehicle Identification Number (VIN) or certification label; however, the technical center assigned the partial VIN KMUMA4TB1MU as a general class number to obtain EDR data. The Genesis was constructed on a 287 cm (113.0 in) wheelbase and powered by a 2.5-liter, inline 4-cylinder gasoline engine linked to an 8-speed automatic transmission with rear-wheel drive. The service brakes were a power-assisted four-wheel disc system. Steering was a speed-sensitive electric rack and pinion system. It had an anti-lock braking system, electronic stability control, traction control, automatic crash notification, crash imminent braking, forward collision warning, pedestrian automatic emergency braking, blind spot detection and collision assist, lane departure warning, lane keeping assistance, lane centering assistance, lane following assist, highway driving assist, daytime running lights, and adaptive/smart cruise control.

Figure 5. Front view of the Genesis

The vehicle manufacturer's recommended tire size was 235/60R18 front and rear with a recommended cold tire pressure of 230 kPa (33 psi) for the front and 250 kPa (36 psi) for the rear. At the time of the SCI inspection, the Genesis had Dueler H/P Sport AS tires of the recommended size and mounted on OEM aluminum alloy wheels. All tire tread depths were 6 mm (7/32 in) or greater.

The Genesis had seating for five occupants, two in the front and three in the second row. At the time of the SCI inspection, the driver's seat was reclined approximately 20° aft of vertical. Due to the movement of the vehicle, this may not be the at-crash position. All seating surfaces were leather. All seat positions had 3-point lap and shoulder seat belts for manual restraints. Supplemental restraints were provided by front-seat-retractor and lower-anchor pretensioners, driver's and passenger's frontal air bags, driver knee bolster airbag, seat-mounted side impact air bags, and dual sensing (side impact and rollover) roof rail side inflatable curtain (IC) air bags for both front seating positions. No air bags deployed.

Vehicle History

According to the technical center, the Genesis had been operating at their facility since its manufacture date in 2021. The vehicle's odometer reading was 31,267 km (19,429 miles).

Exterior Damage

During the crash sequence the Genesis sustained damage to its front, right, and back planes. Minor damage was located at the front-left corner from the initial contact with the Lincoln (Figure 6, Event 1). The direct contact damage began 71 cm (28.0 in) left of the bumper fascia centerline and extended 18 cm (7.1 in) to the left corner. The direct contact damage continued along the left plane 47 cm (18.5 in). This corner impact did not involve any structural component of the Genesis. The direct contact damage from the Event 1 impact was limited to the left bumper fascia corner, headlight components, and left fender. The corner impact was outside the scope of the WinSMASH program. However, for crash reconstruction purposes the barrier equivalent speed of 22 km/h (14 mph) was calculated for this event. This is considered high due to the crash configuration and method of analysis. The Collision Deformation Classification (CDC) assigned to the damage pattern for Event 1 was 12FLEE2.[3]

Figure 6. Left plane/forward aspect of the Genesis

The Genesis sustained moderate damage at the front-right corner due to impact with a small diameter tree (Figure 7, Event 2). The direct contact damage began 71 cm (28.0 in) right of the bumper fascia centerline and extended 18 cm (7.1 in) to the right corner. The direct contact damage then extended along the right plane 354 cm (139.4 in) and involved impact damage to the right-front suspension, right aspect of the windshield, and minor body panel deformation of the right doors. There was no structural damage to the bumper or right frame rail. Much of the impact force was absorbed by the right-front suspension, which led to the separation of the wheel assembly from the stabilizing arm. This corner impact was also outside the scope of the barrier algorithm of the WinSMASH program. The CDC assigned to the damage pattern for Event 2 was 12FREE9.

[3] SAE J224_202205 – SAE recommended practice describing vehicle collision damage in an alphanumeric format.

Figure 7. Right front oblique view of the Genesis

Due to the soft terrain directly after the tree location for Event 2, the Genesis bottomed out and the undercarriage struck the ground (Event 3). There were abrasions across the undercarriage guard directed from the right-front corner to the left-rear corner indicating the Genesis was rotating counterclockwise on its path to final rest (Figures 8 and 9). The CDC assigned to the damage pattern for Event 3 was 00UDDW1.

Figure 8. Undercarriage damage across the front of the Genesis

Figure 9. Undercarriage damage to the center and rear of the Genesis

The back plane damage (Figure 10, Event 7) consisted of an 89 cm (35.0 in) wide damage pattern with a 4 cm (1.6 in) maximum crush. The maximum crush was located 12 cm (4.7 in) left of the centerline. The direct damage contact began 60 cm (23.6 in) left of center and extended to 29 cm (11.4 in) right of center. Paint transfer and damage flow was directed from the vehicle's left to its right. The rear bumper fascia was separated. The nature of the damage was consistent with the damage to the left-front corner of the Lincoln. The CDC assigned to the damage pattern was 07BDEW2.

Figure 10. Back plane of the Genesis

Event Data Recorder

The Genesis had an air bag control module (ACM) that monitored and controlled the diagnostic, sensing, and deployment commands for the vehicle's supplemental safety systems. The module had EDR capabilities. It was imaged with the tool version E-N-H-01-00-0067 of the GIT Hyundai EDR tool software by a technician from the Hyundai Kia Technology Center. The imaged data was shared with the SCI team and is reported with EDR002-R01 of the software and is attached at the end of this report as Appendix A.

The EDR could store up to two crash events, termed either non-deployment or deployment events. The data limitations stated non-deployment events occur when the recording trigger threshold is met or exceeded. Data from non-deployments can be overwritten by subsequent events. Deployment events cannot be overwritten from the ACM. This ACM also categorizes non-air bag deployment events, when there is an event in which non-air bag devices such as pretensioners, have actuated. This type of event can be overwritten given a subsequent air bag deployment event. Associative to each reported event was a 5.0-second pre-crash buffer. Several data points were recorded on a recurring basis of 0.5 seconds, including: vehicle speed, engine rpm, engine throttle (% full), accelerator pedal (% full), master cylinder pressure, service brake status, ABS activity, stability control activity, and steering input.

One non-deployment event was recorded by the EDR. It was determined that the pre-crash data was consistent with the SCI investigation and driver interview. The source of AE (time zero) was attributed to the road departure.

First Record

The ignition cycle count at the time of the recording was 2,063 and 2,073 at the time of imaging. The air bag warning lamp was off and the driver's seat belt was buckled. The maximum longitudinal delta V was -1 km/h (-0.6 mph), and the maximum lateral delta V was -3 km/h (-1.9 mph).

A portion of the overlapping event's 5.0-second pre-crash buffer is included in Table 1 below.

Table 1. Pre-Crash data for Event 1

Time (sec)	Vehicle Speed km/h (mph)	Engine rpm	Throttle % Full	Master Cylinder Pressure (bar)	Service Brake (on/off)	ABS Activity	Stability Control (on/off/ engaged)	Steering wheel Angle (deg.) (left positive)
-5.0	133 (82.6)	4300	100	0.0	OFF	OFF	OFF	-5
-4.5	136 (84.5)	4300	100	0.0	OFF	OFF	OFF	0
-4.0	139 (86.3)	4300	100	0.0	OFF	OFF	OFF	5
-3.5	142 (88.2)	4400	100	0.0	OFF	OFF	OFF	5
-3.0	148 (92.0)	4700	100	0.0	OFF	OFF	OFF	-5
-2.5	150 (93.2)	4700	0	0.0	OFF	OFF	OFF	-50
-2.0	133 (82.6)	4200	0	0.0	OFF	OFF	OFF	-140
-1.5	133 (82.6)	3900	0	0.4	OFF	ON	OFF	20
-1.0	110 (68.4)	3400	0	77.3	ON	OFF	Engaged	35
-0.5	104 (64.6)	2800	0	14.4	ON	ON	OFF	25
0	113 (70.2)	2900	0	28.3	ON	ON	OFF	0

The data trends reported that the Genesis was traveling at 133 km/h (82.6 mph) and accelerated to 150 km/h (93.2 mph) at 2.5 seconds prior to AE. Reconstruction of the crash determined that the Genesis driver lost control due to the large steering inputs beginning at the -2.5 second time stamp and braking at the -1.0 second time stamp on the wet roadway. The polarity of the steering indicated a rapid, large right steer followed by a left steer that increased to 35°. The oversteering to the left resulted in a lane change from the center to the left lane that precipitated the vehicle-to-vehicle impact.

The EDR was also capable of recording the status of the SCC and forward collision alert (FCA). For the entire pre-crash time sequence, the SCC was off, in a "ready" mode and was without error. The FCA was invalid or not supported. The off status of the SCC was an indicator that during the 5 seconds of pre-crash data, the Genesis was operated manually (driver assistance features were not active).

Table 2 below represents the roll angle of the Genesis for Event 1 in 0.2-second intervals.

Table 2. Roll angle for Event 2

Time (sec)	Roll Angle (degree)	Time (sec)	Roll Angle (degree)
-1.0	0	2.2	-1
-0.8	0	2.4	9
-0.6	0	2.6	10
-0.4	-1	2.8	-4

Time (sec)	Roll Angle (degree)	Time (sec)	Roll Angle (degree)
-0.2	-1	3.0	-8
0	0	3.2	1
0.2	3	3.4	3
0.4	5	3.6	-2
0.6	12	3.8	-4
0.8	16	4.0	-2
1.0	15	4.2	-1
1.2	12	4.4	-2
1.4	12	4.6	-2
1.6	10	4.8	-2
1.8	1	5.0	-2
2.0	-14		

Based upon the roll data collected from the Genesis, AE is aligned with the right-side roadway departure.

Interior Damage

There was no significant interior damage (Figure 11) associated with the exterior forces of the crash events. There were two possible contacts to the driver's lower knee bolster as well as post-crash mud and dirt on the driver's door panel. The center console was not bolted down prior to the crash to facilitate equipment changes to the test vehicle by the technical center.

Figure 11. Left view of the Genesis front-row interior

Manual Restraint Systems

The Genesis had 3-point continuous loop lap and shoulder seat belts for each of the five seat positions. The front row had sliding latch plates, adjustable D-rings, and retractor and lower anchor pretensioners for both seating positions. The second row used sliding latch plates and fixed D-rings.

The EDR and PCR reported that the driver of the Genesis was belted at the time of the crash. Due to the low severity of the crash events, there was no webbing transfer to the latch plate as well as no actuation on either pretensioner.

Supplemental Restraint Systems

The Genesis had dual-stage driver's and passenger's frontal, driver knee bolster, front outboard seat-mounted side impact, and IC air bags. There were no air bag deployments.

2022 Genesis GV70 Occupant

Driver Demographics

Age/sex:	38 years/male
Height:	196 cm (77 in)
Weight:	126 kg (277 lb)
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Mid-to-rear track position
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection, EDR, PCR
Air bags:	Driver's frontal, driver knee, seat-mounted, and IC air bags available; none deployed
Alcohol/drug involvement:	No test performed per police report
Egress from vehicle:	Exited without assistance
Transport from scene:	Refused transport
Type of medical treatment:	None

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Not injured	N/A	N/A	N/A

Driver Kinematics

The 38-year-old driver was belted and seated in an upright posture with the driver's seat adjusted in a mid-to-rear track position. He was operating the vehicle in the course of his employment as a test engineer. At the time of the crash, he was approximately 3 hours into the test drive and was controlling the vehicle's speed manually. Lane following assist and lane keeping assist were still active.

As he steered the vehicle to the right, in a passing maneuver, a control loss occurred due to the wet condition of the roadway. The Genesis reentered the left lane, and the vehicle's left corner struck the Lincoln's right side. The force of this impact was minor and likely insufficient to displace the driver; he remained in his seat. The vehicle departed the right side of the road and entered the brush/tree line. The driver rode out the forces of the impacts to the ground and small trees by loading the seat belt. His knees possibly contacted the knee bolster. After the vehicle came to rest, the back of the Genesis was struck by the front of the Lincoln causing the driver to likely load the seat back. He was not injured in the crash and exited the vehicle under his own power through the left-front door.

2019 Lincoln Nautilus

Description

The 2019 Lincoln Nautilus (Figure 12) was a front-wheel drive, 5-passenger, 4-door SUV identified by the VIN 2LMPJ6J93KBxxxxxx. It had a 2.0-liter, 4-cylinder engine, 8-speed shiftable automatic transmission, and was constructed on a 284 cm (111.8 in) wheelbase. The Lincoln had 4-wheel ABS, emergency brakes assist, stability and traction control, blind spot warning, lane departure warning, driver's and passenger's frontal and knee air bags, front seat-mounted side impact air bags, and IC air bags. The Lincoln also featured blind spot warning and lane departure warning. According to Canadian specs the Lincoln's curb weight was 1,953 kg (4,306 lb). The vehicle's information placard indicated a gross vehicle weight rating of 2,540 kg (5,600 lb) and front and rear weight ratings of 1,347 kg (2,970 lb) and 1,220 kg (2,690 lb). The vehicle manufacturer's recommended tire size was P245/60R18 and the vehicle had Michelin Latitude tires of the recommended size. The tread depths were 4 mm (5/32 in) or greater.

All seat positions had 3-point lap and shoulder seat belt systems for manual restraint. Retractor pretensioners for the seat belts in the front row provided supplemental restraint. Both the driver's and right-front passenger's seat tracks were found in the full rear positions during the inspection and are reported at the rearmost position in the EDR report.

Figure 12. Front right oblique view of the Lincoln

Figure 13. Right side view of the Lincoln

Exterior Damage

The Lincoln sustained contact damage to the right side (Figure 13) during the impact with the Genesis (Event 1). There was direct damage to the right doors and quarter panel. The direct damage started 312 cm (122.8 in) rear of the right-front axle and extended 197 cm (77.6 in) forward. Crush measurements were documented at the mid-door level and the Field L was 197 cm (77.6 in). The crush values were C1 = 3 cm (1.2 in), C2 = 3 cm (1.2 in), C3 = 0 cm, C4 = 5 cm (2.0 in), C5 = 1 cm (0.4 in), C6 = 1 cm (0.4 in). The maximum residual crush was 5 cm (2.0 in), occurring 177 cm (69.7 in) rear of the right-front axle. The CDC assigned to this damage pattern was 05RZEW1. The missing vehicle CDC algorithm of the WinSMASH program calculated the Lincoln's total delta V as 15 km/h (9 mph). The longitudinal and lateral velocity changes were 15 km/h (9 mph) and -5 km/h (-3 mph).

It appeared the Lincoln struck two small trees with its front-right corner with direct damage to the right aspect of the hood and fender. Direct damage for Event 4 started 50 cm (19.7 cm) right of the centerline and extended 6 cm (2.4 in) right. The maximum crush was 3 cm (1.2 in), occurring 53 cm (20.9 in) right of the centerline. The CDC for this damage pattern was 12FREN1. The Event 5 direct damage started 80 cm (31.5 in) right of the centerline and extended right 3 cm (1.2 in). The maximum crush was 4 cm (1.6 in), occurring 82 cm (32.3 in) right of the centerline on the front-right corner. The estimated CDC for this damage pattern was 12FREE2.

During the Lincoln's travel through the brush, the front and undercarriage struck soft ground and brush (Event 6, Figure 14). Direct damage was noted on the structures under the bumper, including the radiator and bumper fascia. The CDC for this damage pattern was 00UFDW1.

The front-left aspect of the Lincoln sustained damage during contact with the back plane of the Genesis at the end of the crash sequence (Event 7, Figure 15). The hood, bumper fascia, left fender, and head and turn lamp assembly all sustained minor direct contact damage. The direct damage began 50 cm (19.7 in) left of the centerline and extended 40 cm (15.7 in) to the left. Maximum crush was estimated to be 3 cm (1.2 in), located 72 cm (28.3 in) left of the centerline on the front-left corner. The CDC for this damage pattern was 12FLEE2.

Figure 14. Front view of the Lincoln

Figure 15. Left side view of the Lincoln

Event Data Recorder

The Lincoln had a restraint control module (RCM) that monitored and controlled the diagnostic, sensing, and deployment commands for the vehicle's supplemental safety systems. The module had EDR capabilities. The EDR component was imaged and reported with version 21.5.1 of the Bosch CDR software via the diagnostic link connector and the vehicle's electrical power. The imaged data is attached at the end of this report in Appendix B.

According to the Data Limitations section of the Lincoln's EDR, it could store up to two crash events, termed either non-deployment or deployment events. Non-deployment events occur when the recording trigger threshold is met or exceeded (minimum of 8 km/h [5 mph]). Data from non-deployments can be overwritten by subsequent events. Deployment events cannot be overwritten from the RCM. This RCM also categorizes non-air bag deployment events, when there is an event in which non-air bag devices, such as pretensioners, have actuated. This type of event can be overwritten given a subsequent air bag deployment event.

Associative to each reported event was a 5-second pre-crash buffer. Multiple data points were recorded on a recurring basis of 0.2 seconds, including vehicle speed, accelerator pedal (% full), service brake status, and engine rpm. High frequency stability control data (including longitudinal and lateral acceleration and yaw rate), ABS activity, and steering wheel angle were recorded in 0.1-second intervals.

The recorded EDR data consisted of two non-deployment events. Both events were completely recorded and were separated in time by 1.729 seconds. The driver and passenger seat belts were buckled during both events and both seat positions were reported as rearward. There were no diagnostics trouble codes. The air bag warning lamp was off during both events. The pre-crash data sets for each event were consistent and overlapped, offset by the 1.729 seconds between the events.

Record 1
The maximum longitudinal delta V was reported as -26.0 km/h (-16.1 mph), occurring 280 milliseconds after AE. This event record was attributed to Event 6 when the front and undercarriage of the Lincoln engaged the ground.

Record 2
The maximum longitudinal delta V was reported as -10.0 km/h (-6.2 mph), occurring 247.5 milliseconds after AE. This event record was linked to Event 7 when the Lincoln's front-left corner struck the back plane of the Genesis.

It is notable that the initial impact to the Lincoln's right plane was not recorded within the EDR data. It is possible that this event was recognized as a non-deployment, and subsequently overwritten by the later events in the crash sequence.

However, evidence of the timing of Event 1 was observed in the pre-crash data of Record 1 within the stability control data. Refer to Appendix B, page 10 of 75. At the 5.0-second pre-crash interval of the data, the Lincoln was traveling straight along the roadway with neutral steering. Note that the stability control lateral acceleration was relatively benign (-0.03g to -0.01g) until 4.4 seconds prior to AE, at which time the acceleration exceeds 1g and remained active, indicating the probable initial contact from the Genesis. Furthermore, the stability control yaw rate increased from a relatively benign rate (-0.57 deg/sec to 0.68 deg/sec) until 4.3 seconds prior to AE, when it became active, jumping to -14.91 deg/sec and increased to a maximum of -39.91

deg/sec at 3.7 seconds prior to AE. The negative value indicated a general clockwise yaw, which continued until 0.8 seconds prior to AE. At this point, the yaw rate became counterclockwise. Integration of the yaw rate indicated an approximate 20° to 30° clockwise heading change for the Lincoln.

At the 5.0-second pre-crash interval the steering wheel angle was -0.7° (nearly straight) with left steering initiated at the 4.3-second pre-crash interval. At the 4.0-second pre-crash interval, the steering wheel was initially turned 33.7° to the right during the contact phase and then was turned to a maximum 176.7° to the left at the 1.2-second pre-crash time stamp. It is likely that as the Lincoln traveled off the right side of the roadway, the Lincoln driver attempted to counter steer left in an effort to return the yawing vehicle back to the roadway. The reader is encouraged to refer to the EDR data that is provided in Appendix B.

Interior Damage

The Lincoln's interior did not sustain damage or intrusion from the exterior forces of the impacts with the Genesis and the off-road brush/tree line. No discernable occupant contacts were noted.

Manual Restraint Systems

The front row had lap and shoulder seat belts with retractor pretensioners, locking latch plates, and adjustable upper anchors. The driver's and front passenger's upper anchors were adjusted to the full-down position. Neither pretensioner actuated during the crash.

The driver was restrained by the lap and shoulder seat belt as evidenced by slight load marks on the latch plate belt guide. The front-right passenger was probably restrained by the lap and shoulder seat belt, despite no discernable evidence. The EDR indicated the driver and front passenger were buckled during the crash.

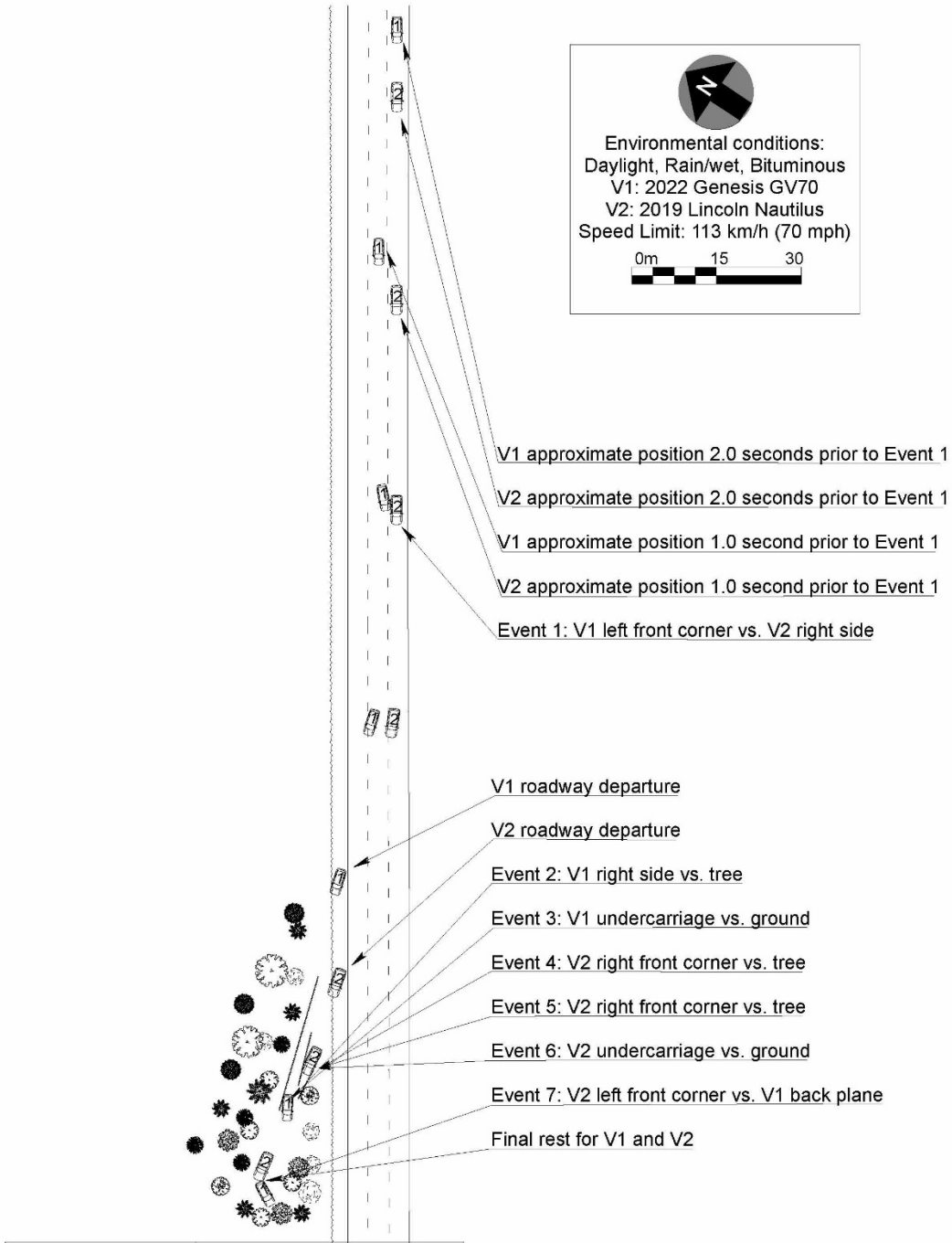
Supplemental Restraint Systems

The Lincoln had multi-stage frontal, knee, front seat-mounted side impact, and IC air bags. None of the air bags deployed during the crash sequence.

Occupant Data

The Lincoln was occupied by a 77-year-old male driver and 75-year-old female front passenger. The driver sustained police-reported B-level (non-incapacitating) injuries and the passenger sustained police-reported A-level (incapacitating) injuries. A surrogate source reported to NHTSA that the driver had an arm laceration, was not transported, and did not seek medical attention. This source also reported that the passenger was transported by ambulance to a hospital and admitted for an unknown length of time. It was reported that she suffered unspecified fractured vertebrae as a result of the crash. Specific injury and treatment details are unknown.

Crash Diagram



Appendix A: 2022 Genesis GV70 Event Data Recorder Report[4]

[4] The EDR was imaged during the SCI vehicle inspection by the manufacturer with the GIT Hyundai/Kia scan tool and the current version of the software available at the time of the inspection. The imaged file was shared with the SCI team and hexadecimal data has been sanitized to remove potential personally identifiable information.

Vehicle Information

HYUNDAI | GV70(xxx) | 2021 | AIRBAG SYSTEM	
VIN as Programmed into EMS	

Additional Information

User-entered VIN	KMUMA4TB1MU
User Name	
Case Number	
Crash Date	
Saved-on Date	2022-06-14 10:51
EDR Tool Version	E-D-H-01-00-0067
EDR Report Version	EDR002-R01
Tire Size(s)	
Memo	

Data Limitation

General Information:

Tools for downloading and interpreting the EDRs in Hyundai vehicles have been developed for vehicles produced after September 1, 2012. Currently, there is no tool for downloading and accurate interpreting data from the EDRs in Hyundai vehicles produced prior to this date.

The EDR Report requires Adobe Reader Version 9.00 or higher to open.

EDR(Event Data Recorder):

- The EDR function is part of the Airbag Control Unit(ACU).

- ACU can store up to two events.

- Event means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or any non-reversible deployable restraint to be deployed, whichever occurs first:

    1. Deployment Event:
       1) the event which is recorded if an airbag is commanded to deploy.
       2) the event is locked and cannot be overwritten.

    2. Non-deployment Event:
       1) the event which is recorded, but in which an airbag is not commanded to deploy
       2) the event is not locked and can be overwritten by a subsequent event (Deployment or Non-deployment event), for example, Pretensioner(s) only deployment
       3) An example of a non-deployment event is a pretensioner-only deployment with no airbag deployments

- Ignition cycle count will increment by 1 in the following cases

    1. the power mode change from OFF/Accessary to IGN ON/RUN

    2. EDR data download by tools

- The ACU can record data for all or some of the following events. But, depending on the vehicle's configurations, data for side crash and/or rollover crash(event) may not be recorded.

- If power supply to the ACU is lost during an event, all or part of the data may not be recorded.

Data Limitation

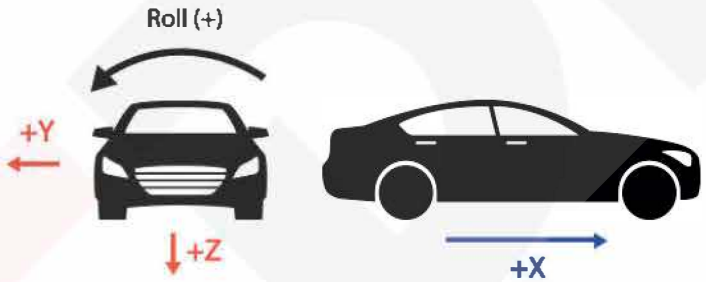
Data Element Sign Convention:

The following table provides an explanation of the sign notation for data elements that may be included in the EDR report. Directional references to sign convention are from the point of view of the driver.

Data element name	Positive sign	Note
* Longitudinal acceleration	Forward direction	+X at the figure 1
Delta V, longitudinal	Forward direction	+X at the figure 1
Lateral acceleration	Left to Right direction	+Y at the figure 1
Delta V, lateral	Left to Right direction	+Y at the figure 1
Normal(vertical) acceleration	Downward direction	+Z at the figure 1
Vehicle roll angle	Clockwise about the longitudinal axis	Roll(+) at the figure 1
Steering input	Counterclockwise rotation	-

* The forward direction of longitudinal acceleration for front side impact sensor may be different for each vehicle

Figure 1. Sign Conventions



Data Sources:

Many EDR data elements are sourced from other control modules in the vehicle.

1. Most of them can be measured and calculated by the ACU. For example, Delta-V and Rollover angle can be calculated from internal sensors in the ACU (if applicable).

2. The following pre-crash data can be transmitted to the ACU via the vehicle's communication network.
   - Vehicle Speed
   - Engine RPM
   - Engine Throttle
   - Acceleration Pedal
   - Service Brake
   - ABS Activity
   - Stability Control
   - Steering Input Angle

   *Note) Depending on the vehicle's configuration and the conditions described above, some items may not be recorded.

3. Pre-crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may be asynchronous to each other.

Data Limitation

Data Definitions:

- Data recorded by the ACU and imaged by the EDR tool is displayed relative to Time zero(T0). Time zero(T0) is not typically the time at which the vehicle made contact with another vehicle or object.
- Time zero (T0) means whichever of the following occurs first
  1. For systems with ‘‘wake-up’’ air bag control systems, the time at which the occupant restraint control algorithm is activated; or
  2. For continuously running algorithms,
     1) The first point in the interval where a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached within a 20msec time period; or
     2) For vehicles that record ‘‘delta-V, lateral,’’ the first point in the interval where a lateral cumulative delta-V of over 0.8 km/h (0.5 mph) is reached within a 5msec time period; or
  3. Deployment of a non-reversible deployable restraint.
- Multi-event crash means the occurrence of 2 events, the first and last of which begin not more than 5 seconds apart. If an event is not part of a multi-event crash, the value of this data element will be “1”.
- Service brake, on or off means the status of the device that is installed in or connected to the brake pedal system to detect whether the pedal was pressed. The device can include the brake pedal switch or other driver-operated service brake control,
- Engine RPM means
  1. For vehicles powered by internal combustion engines, the number of revolutions per minute of the main crankshaft of the vehicle's engine, and
  2. For vehicles not entirely powered by internal combustion engines, the number of revolutions per minute of the motor shaft at the point at which it enters the vehicle transmission gearbox.
- Engine Throttle is a measure of the throttle position.
- Accelerator Pedal is a measure of the accelerator pedal value.
- Seat belt status is determined by whether the buckle switch is open or closed.
- Delta-V means the cumulative change in velocity, and is calculated from internal sensors in the ACU
- 'Invalid data' means
  1. The data sources sent invalid data
  2. The data sources did not send data
  3. The data does not be recorded depending on design standard
  4. The data could not be recorded in some conditions such as the loss of power in vehicle
- ‘Not supported’ means : The system is not applied in that vehicle

EDR Information

Part No. (EOL Code) as programmed into ACU	95910-AR100(AR12)
ECU SW Version as programmed into ACU	A.02
EDR Version as programmed into ACU	0422

< Event 1 >

Event Status at Event

Multi-event, Number of Event (1 or 2)	1 event	
Time from Event 1 to 2 [msec]	0	
Completed File Recorded (Yes or No)	YES	
Ignition cycle, crash [cycle]	2063	
Ignition cycle, download [cycle]	2073	

Pre-Crash Information 1(-5 ~ 0 sec)

Time (sec)	Vehicle Speed [kph]	Engine RPM [rpm]	Engine Throttle [%]	Acceleration Pedal [%]	Master cylinder pressure [bar]	Service Brake [on/off]	ABS Activity [on/off]	Stability Control [on/off/engaged]	Steering Input [degree]
-5.0	133	4300	100	87	0.0	OFF	OFF	OFF	-5
-4.5	136	4300	100	87	0.0	OFF	OFF	OFF	0
-4.0	139	4300	100	87	0.0	OFF	OFF	OFF	5
-3.5	142	4400	100	87	0.0	OFF	OFF	OFF	5
-3.0	148	4700	100	87	0.0	OFF	OFF	OFF	-5
-2.5	150	4700	0	0	0.0	OFF	OFF	OFF	-50
-2.0	133	4200	0	0	0.0	OFF	ON	OFF	-140
-1.5	133	3900	0	0	0.4	OFF	OFF	OFF	20
-1.0	110	3400	0	0	77.3	ON	OFF	Engaged	35
-0.5	104	2800	0	0	14.4	ON	ON	OFF	25
0.0	113	2900	0	0	28.3	ON	ON	OFF	0

Pre-Crash Information 2 (-5 ~ 0 sec)

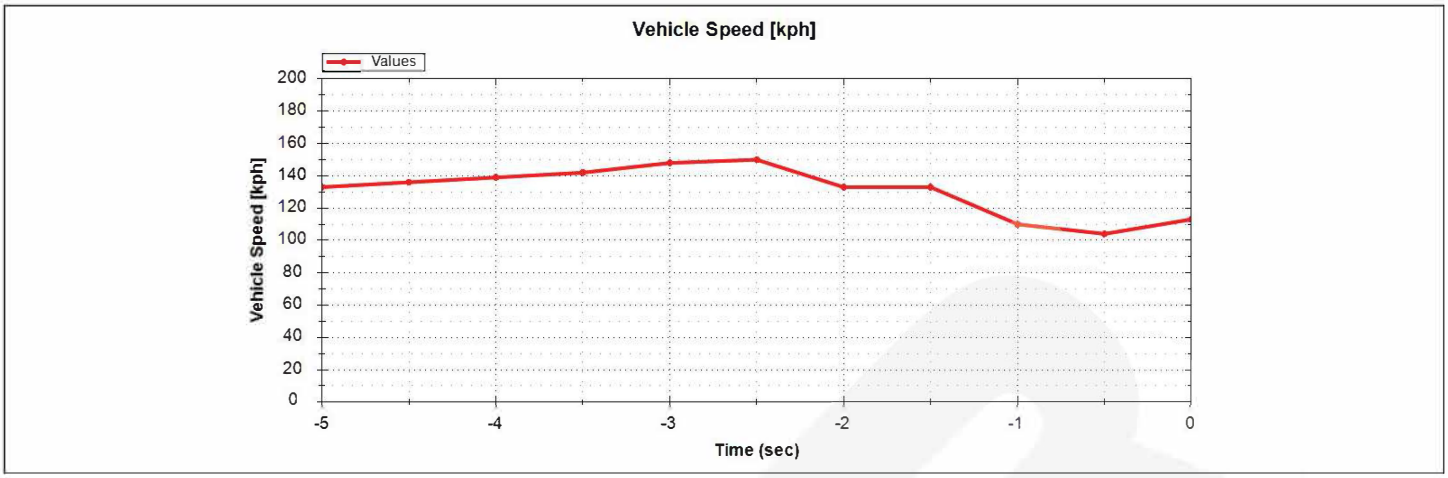
Time (sec)	Gear shift selector display	SCC information (Main switch status)	SCC information (Set Speed)	SCC information (SPEED UNIT)	SCC information (Mode status)	SCC information (Fail info)
-5.0	D	OFF	0	MPH	Ready	System without Error
-4.5	D	OFF	0	MPH	Ready	System without Error
-4.0	D	OFF	0	MPH	Ready	System without Error
-3.5	D	OFF	0	MPH	Ready	System without Error
-3.0	D	OFF	0	MPH	Ready	System without Error
-2.5	D	OFF	0	MPH	Ready	System without Error
-2.0	D	OFF	0	MPH	Ready	System without Error
-1.5	D	OFF	0	MPH	Ready	System without Error
-1.0	D	OFF	0	MPH	Ready	System without Error
-0.5	D	OFF	0	MPH	Ready	System without Error
0.0	D	OFF	0	MPH	Ready	System without Error

Pre-Crash Information 3 (-5 ~ 0 sec)

Time (sec)	FCA (Function status)	FCA (Warning Level)	FCA (Fail info)	Time (sec).	FCA (Function status).	FCA (Warning Level).	FCA (Fail info).
-5.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.9	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.4	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.8	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.3	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.7	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.2	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.6	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.1	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-2.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.4	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.9	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.3	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.8	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.2	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.7	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.1	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.6	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-4.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.9	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.4	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.8	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.3	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.7	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.2	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.6	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.1	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-1.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.4	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.9	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.3	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.8	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.2	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.7	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.1	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.6	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-3.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-2.9	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.4	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-2.8	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.3	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-2.7	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.2	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-2.6	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	-0.1	Invalid or Not supported	No Warning / Invalid or Not supported	Normal
-2.5	Invalid or Not supported	No Warning / Invalid or Not supported	Normal	0.0	Invalid or Not supported	No Warning / Invalid or Not supported	Normal

< Event 1 >

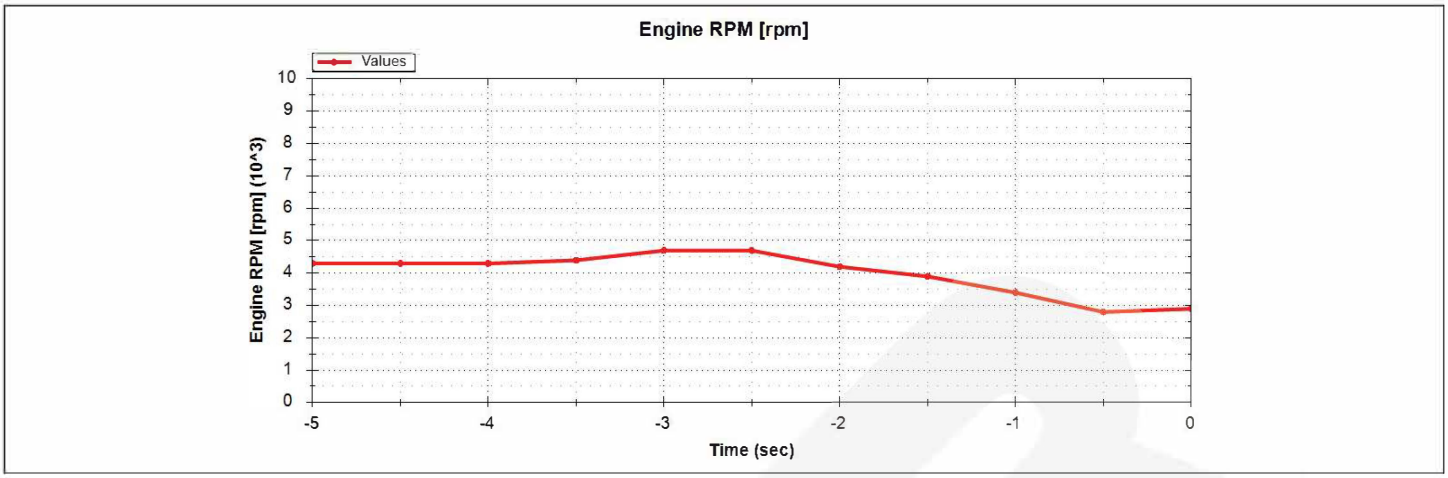
Vehicle Speed



Num	Time (sec)	Vehicle Speed [kph]	HEX
1	-5.0	133	
2	-4.5	136	
3	-4.0	139	
4	-3.5	142	
5	-3.0	148	
6	-2.5	150	
7	-2.0	133	
8	-1.5	133	
9	-1.0	110	
10	-0.5	104	
11	0.0	113	

< Event 1 >

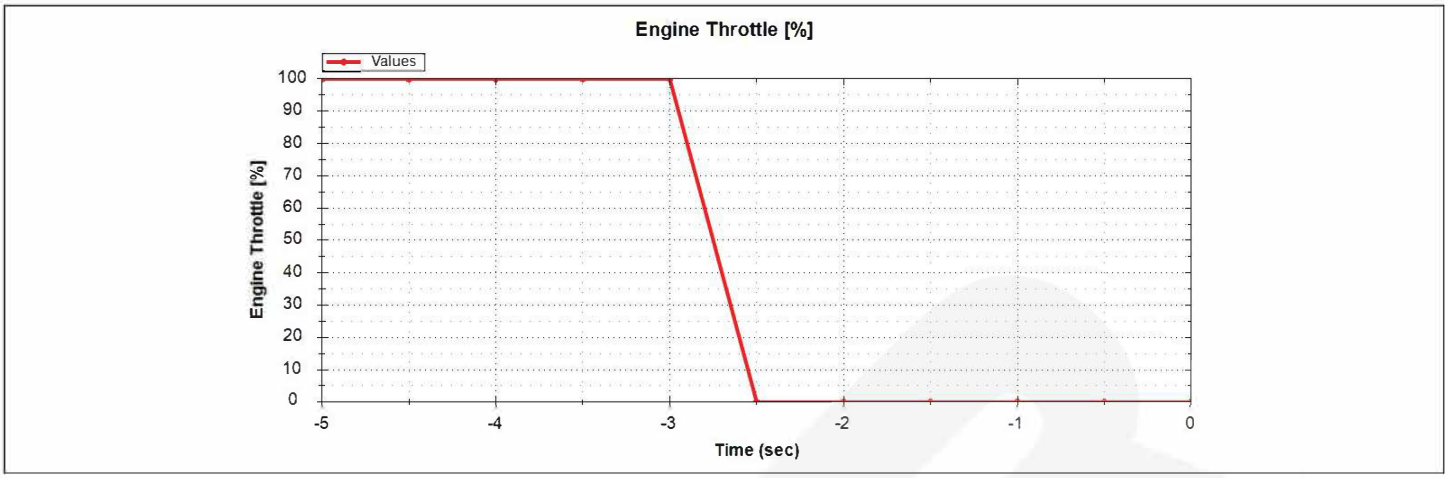
Engine RPM



Num	Time (sec)	Engine RPM [rpm]	HEX
1	-5.0	4300	
2	-4.5	4300	
3	-4.0	4300	
4	-3.5	4400	
5	-3.0	4700	
6	-2.5	4700	
7	-2.0	4200	
8	-1.5	3900	
9	-1.0	3400	
10	-0.5	2800	
11	0.0	2900	

< Event 1 >

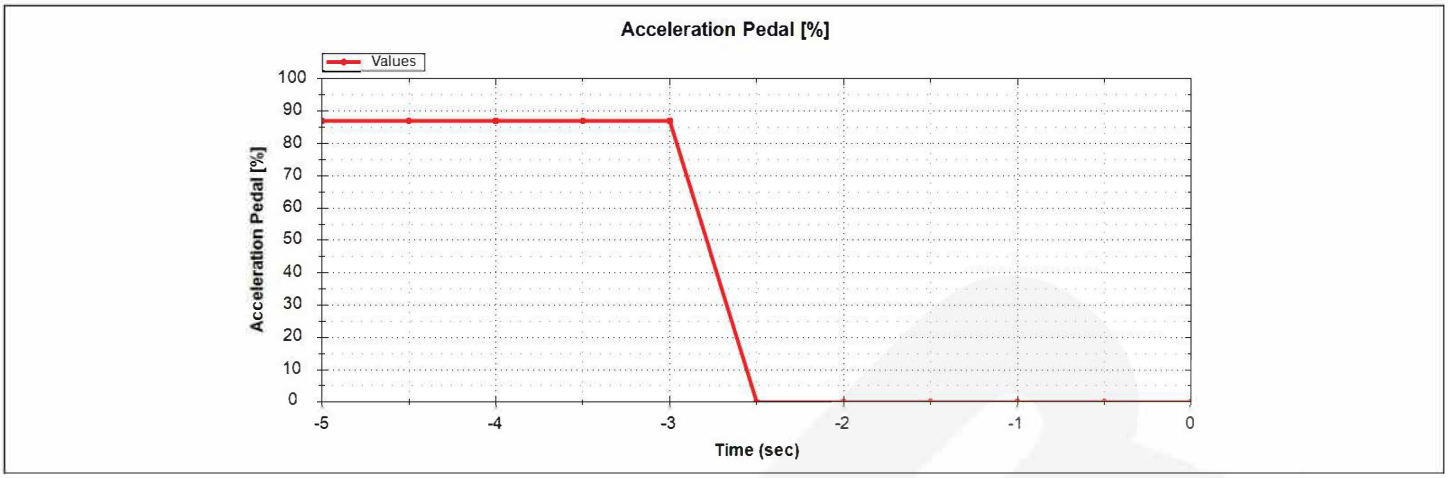
Engine Throttle



Num	Time (sec)	Engine Throttle [%]	HEX
1	-5.0	100	
2	-4.5	100	
3	-4.0	100	
4	-3.5	100	
5	-3.0	100	
6	-2.5	0	
7	-2.0	0	
8	-1.5	0	
9	-1.0	0	
10	-0.5	0	
11	0.0	0	

< Event 1 >

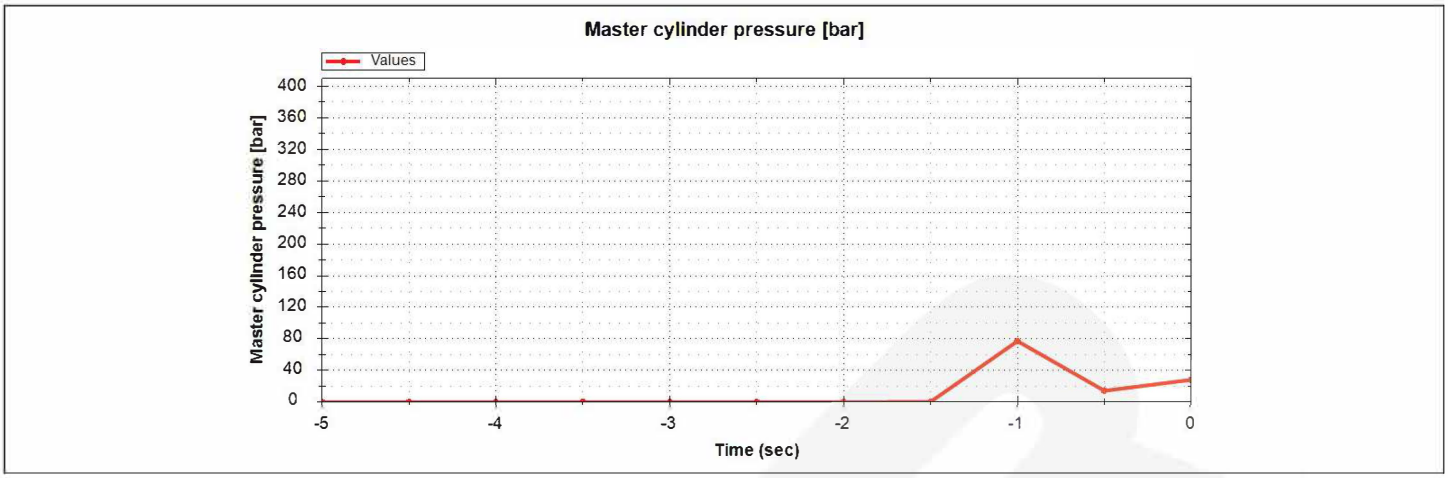
Acceleration Pedal



Num	Time (sec)	Acceleration Pedal [%]	HEX
1	-5.0	87	
2	-4.5	87	
3	-4.0	87	
4	-3.5	87	
5	-3.0	87	
6	-2.5	0	
7	-2.0	0	
8	-1.5	0	
9	-1.0	0	
10	-0.5	0	
11	0.0	0	

‹ Event 1 ›

Master cylinder pressure



Num	Time (sec)	Master cylinder pressure [bar]	HEX
1	-5.0	0.0	
2	-4.5	0.0	
3	-4.0	0.0	
4	-3.5	0.0	
5	-3.0	0.0	
6	-2.5	0.0	
7	-2.0	0.0	
8	-1.5	0.4	
9	-1.0	77.3	
10	-0.5	14.4	
11	0.0	28.3	

< Event 1 >

Service Brake

Num	Time (sec)	Service Brake [on/off]	HEX
1	-5.0	OFF	
2	-4.5	OFF	
3	-4.0	OFF	
4	-3.5	OFF	
5	-3.0	OFF	
6	-2.5	OFF	
7	-2.0	OFF	
8	-1.5	OFF	
9	-1.0	ON	
10	-0.5	ON	
11	0.0	ON	

ABS Activity

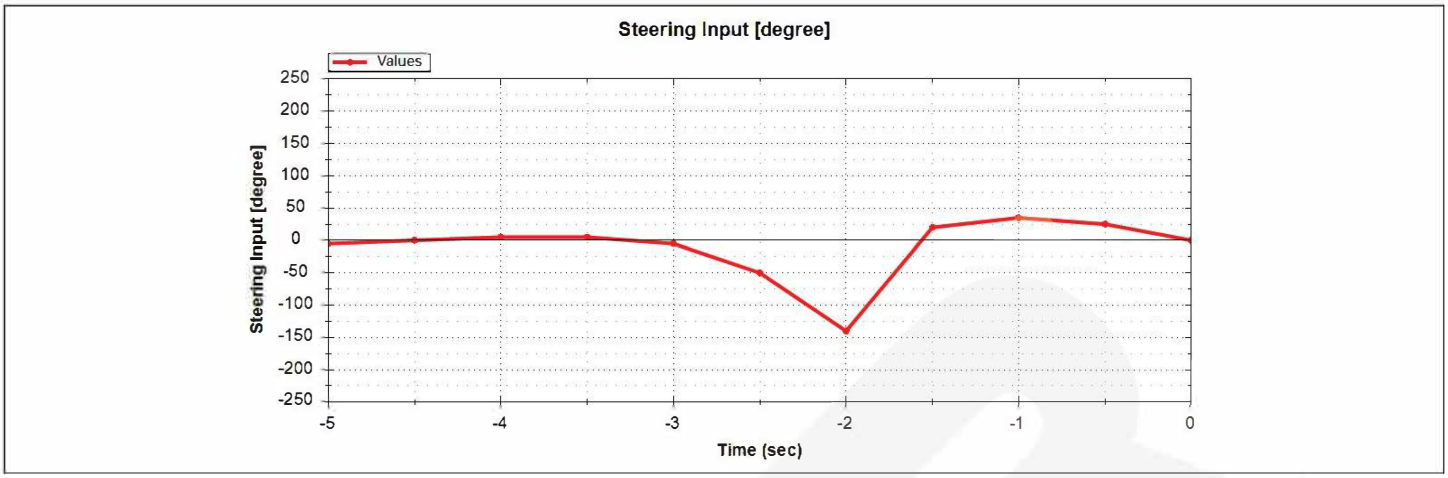
Num	Time (sec)	ABS Activity [on/off]	HEX
1	-5.0	OFF	
2	-4.5	OFF	
3	-4.0	OFF	
4	-3.5	OFF	
5	-3.0	OFF	
6	-2.5	OFF	
7	-2.0	ON	
8	-1.5	OFF	
9	-1.0	OFF	
10	-0.5	ON	
11	0.0	ON	

Stability Control

Num	Time (sec)	Stability Control [on/off/engaged]	HEX
1	-5.0	OFF	
2	-4.5	OFF	
3	-4.0	OFF	
4	-3.5	OFF	
5	-3.0	OFF	
6	-2.5	OFF	
7	-2.0	OFF	
8	-1.5	OFF	
9	-1.0	Engaged	
10	-0.5	OFF	
11	0.0	OFF	

< Event 1 >

Steering Input



Num	Time (sec)	Steering Input [degree]	HEX
1	-5.0	-5	
2	-4.5	0	
3	-4.0	5	
4	-3.5	5	
5	-3.0	-5	
6	-2.5	-50	
7	-2.0	-140	
8	-1.5	20	
9	-1.0	35	
10	-0.5	25	
11	0.0	0	

Note) Positive value(CCW), Negative value(CW)

‹ Event 1 ›

System Status at Event

Airbag warning lamp on/off	OFF
Safety seat belt status, driver	ON
Safety seat belt status, passenger	OFF
Seat track position switch foremost status, driver	Not Supported
Seat track position switch foremost status, passenger	Not Supported
Occupant size classification, driver (5% female or larger)	Not Supported
Occupant size classification, passenger (child)	YES

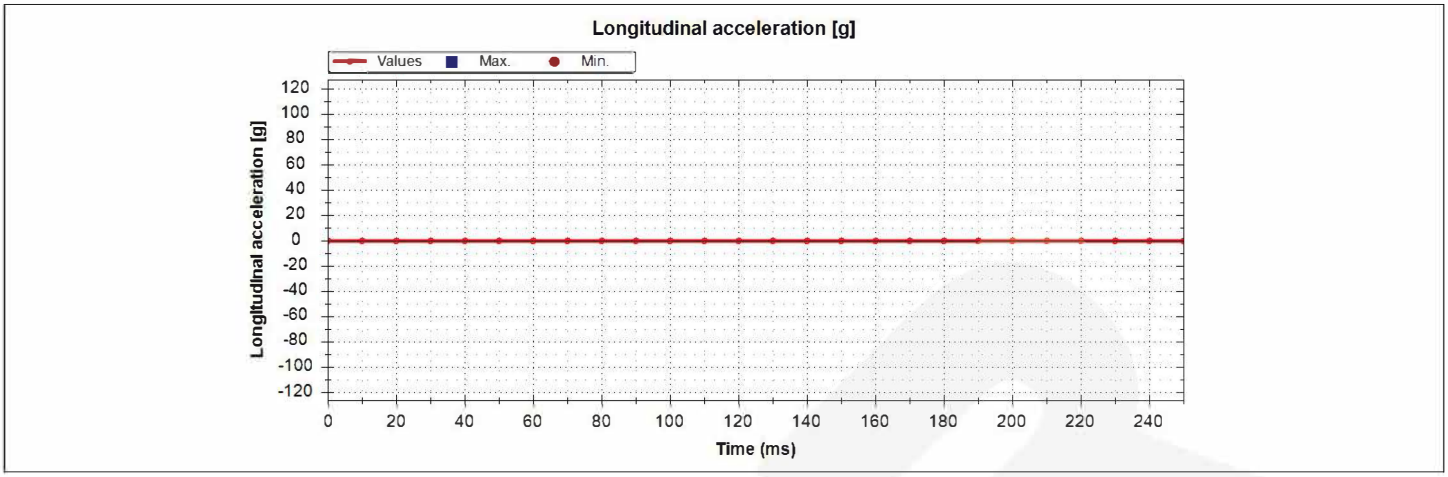
Deployment Command Data at Event

Front airbag deployment time, driver (first stage) [msec]	No deployment
Front airbag deployment time, passenger (first stage) [msec]	No deployment
Front airbag deployment time, driver (second stage) [msec]	No deployment
Front airbag deployment time, passenger (second stage) [msec]	No deployment
Front airbag deployment time, driver (third stage) [msec]	Not supported
Front airbag deployment time, passenger (third stage) [msec]	Not supported
Front airbag deployment time, passenger (4th stage) [msec]	Not supported
Front airbag disposal deployment, driver (second stage) (Yes or No)	NO
Front airbag disposal deployment, passenger (second stage) (Yes or No)	NO
Front airbag disposal deployment, driver (third stage) (Yes or No)	NO
Front airbag disposal deployment, passenger (third stage) (Yes or No)	NO
Front airbag disposal deployment, passenger (4th stage) (Yes or No)	NO
Knee airbag deployment time,driver [msec]	No deployment
Knee airbag deployment time,passenger [msec]	Not supported
Front side airbag deployment time, driver [msec]	No deployment
Front side airbag deployment time, passenger [msec]	No deployment
Rear side airbag deployment time,driver [msec]	Not supported
Rear side airbag deployment time,passenger [msec]	Not supported
Curtain airbag deployment time, driver [msec]	No deployment
Curtain airbag deployment time, passenger [msec]	No deployment
Rear curtain airbag deployment time,driver [msec]	Not supported
Rear curtain airbag deployment time,passenger [msec]	Not supported
Seat belt pretensioner deployment time, driver [msec]	No deployment
Seat belt pretensioner deployment time, passenger [msec]	No deployment
Rear belt pretensioner deployment time,driver [msec]	Not supported

Rear belt pretensioner deployment time,passenger [msec]	Not supported	
Anchor pretensioner deployment time,driver [msec]	Not supported	
Anchor pretensioner deployment time,passenger [msec]	Not supported	
Adaptive load limiter deployment time,driver [msec]	Not supported	
Adaptive load limiter deployment time,passenger [msec]	Not supported	
Front Center side airbag deployment time [msec]	No deployment	

‹ Event 1 ›

Longitudinal crash pulse_acceleration (g, 0 ~ 250msec)

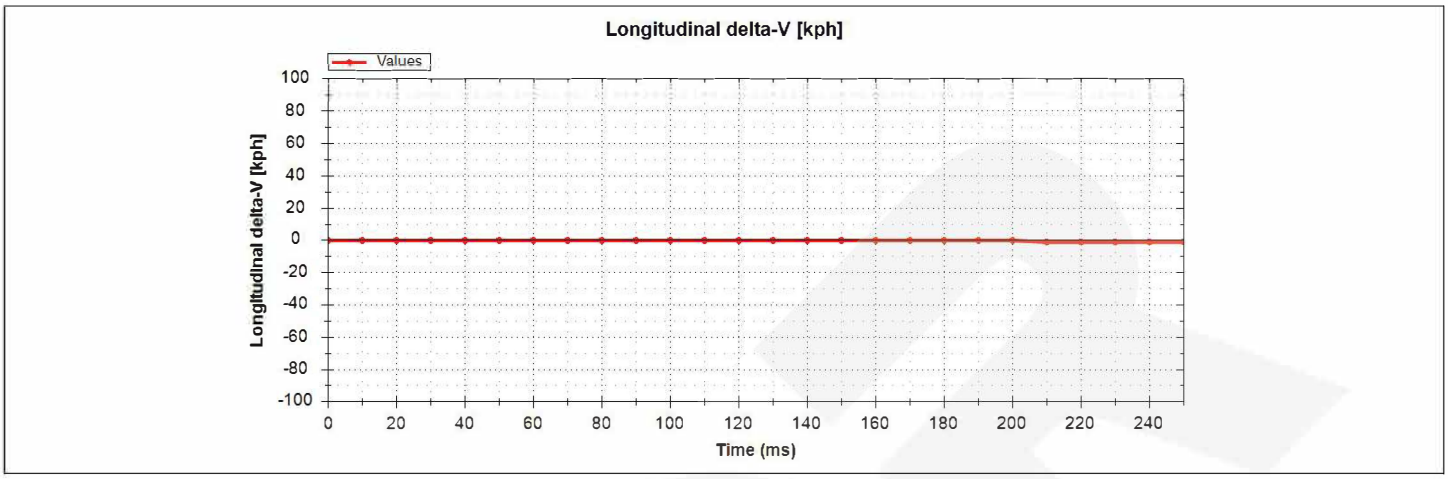


Num	Time (ms)	Longitudinal acceleration [g]	HEX
1	0.0	0.0	
2	10.0	0.0	
3	20.0	0.0	
4	30.0	0.0	
5	40.0	0.0	
6	50.0	0.0	
7	60.0	0.0	
8	70.0	0.0	
9	80.0	0.0	
10	90.0	0.0	
11	100.0	0.0	
12	110.0	0.0	
13	120.0	0.0	
14	130.0	0.0	
15	140.0	0.0	
16	150.0	0.0	
17	160.0	0.0	
18	170.0	0.0	
19	180.0	0.0	
20	190.0	0.0	
21	200.0	0.0	
22	210.0	0.0	
23	220.0	0.0	
24	230.0	0.0	
25	240.0	0.0	
26	250.0	0.0	

‹ Event 1 ›

Longitudinal crash pulse_delta-v (kph, 0 ~ 250msec)

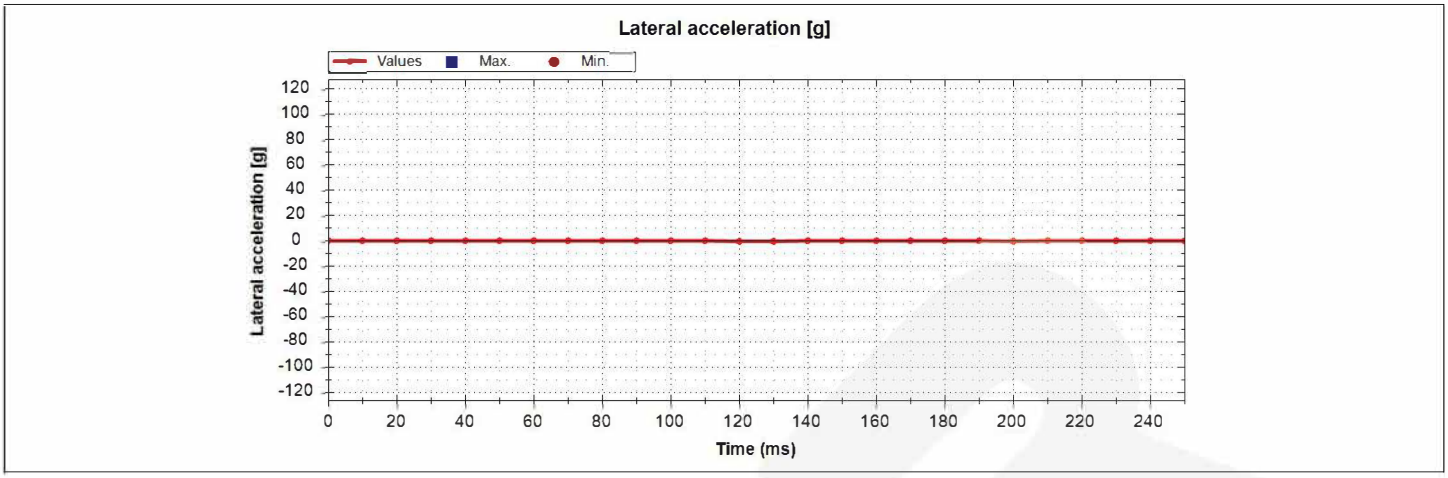
Max. delta-V [kph]	-1	
Time, Max. delta-V [msec]	300.0	



Num	Time (ms)	Longitudinal delta-V [kph]	HEX
1	0.0	0	
2	10.0	0	
3	20.0	0	
4	30.0	0	
5	40.0	0	
6	50.0	0	
7	60.0	0	
8	70.0	0	
9	80.0	0	
10	90.0	0	
11	100.0	0	
12	110.0	0	
13	120.0	0	
14	130.0	0	
15	140.0	0	
16	150.0	0	
17	160.0	0	
18	170.0	0	
19	180.0	0	
20	190.0	0	
21	200.0	0	
22	210.0	-1	
23	220.0	-1	
24	230.0	-1	
25	240.0	-1	
26	250.0	-1	

‹ Event 1 ›

Lateral crash pulse_acceleration (g, 0 ~ 250msec)

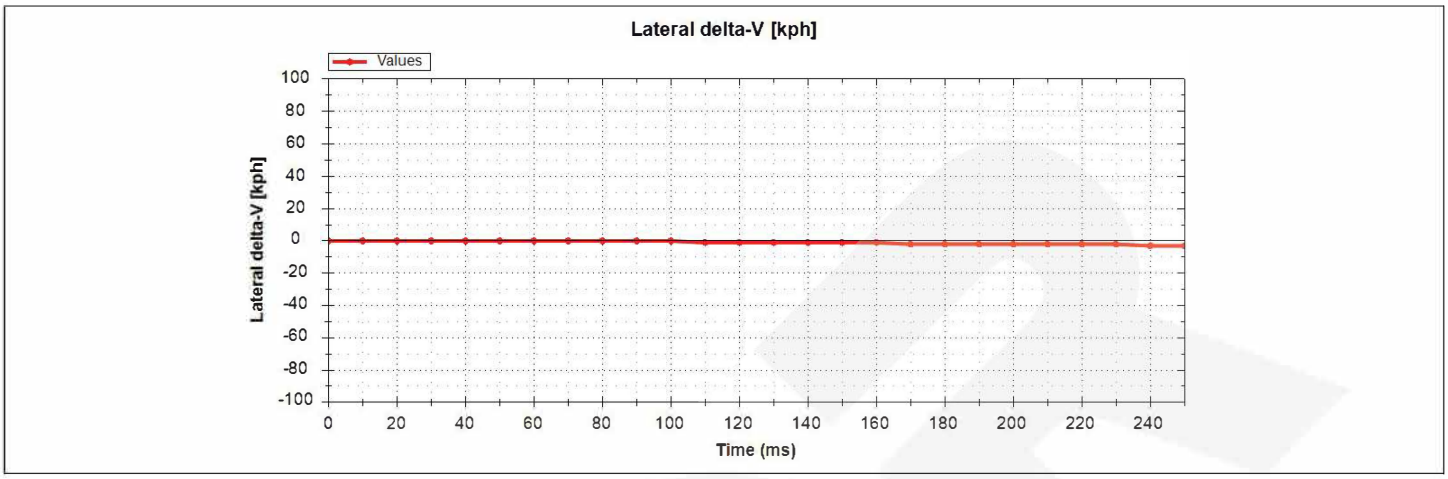


Num	Time (ms)	Lateral acceleration [g]	HEX
1	0.0	0.0	
2	10.0	0.0	
3	20.0	0.0	
4	30.0	0.0	
5	40.0	0.0	
6	50.0	0.0	
7	60.0	0.0	
8	70.0	0.0	
9	80.0	0.0	
10	90.0	0.0	
11	100.0	0.0	
12	110.0	0.0	
13	120.0	-0.5	
14	130.0	-0.5	
15	140.0	0.0	
16	150.0	0.0	
17	160.0	0.0	
18	170.0	0.0	
19	180.0	0.0	
20	190.0	0.0	
21	200.0	-0.5	
22	210.0	0.0	
23	220.0	0.0	
24	230.0	0.0	
25	240.0	0.0	
26	250.0	0.0	

< Event 1 >

Lateral crash pulse_delta-v (kph, 0 ~ 250msec)

Max. delta-V [kph]	-3	
Time, Max. delta-V [msec]	300.0	



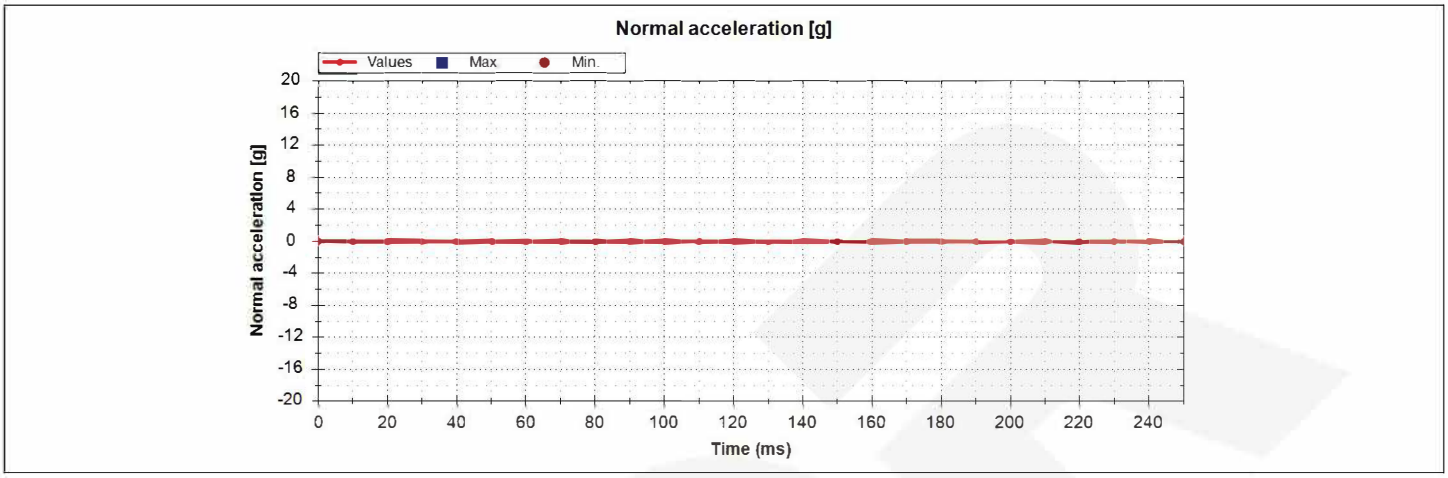
Num	Time (ms)	Lateral delta-V [kph]	HEX
1	0.0	0	
2	10.0	0	
3	20.0	0	
4	30.0	0	
5	40.0	0	
6	50.0	0	
7	60.0	0	
8	70.0	0	
9	80.0	0	
10	90.0	0	
11	100.0	0	
12	110.0	-1	
13	120.0	-1	
14	130.0	-1	
15	140.0	-1	
16	150.0	-1	
17	160.0	-1	
18	170.0	-2	
19	180.0	-2	
20	190.0	-2	
21	200.0	-2	
22	210.0	-2	
23	220.0	-2	
24	230.0	-2	
25	240.0	-3	
26	250.0	-3	

‹ Event 1 ›

Crash pulse Resultant, Time_Max. delta-V resultant (0 ~ 300 msec)

Time, Max. delta-V, resultant [msec]	300.0	

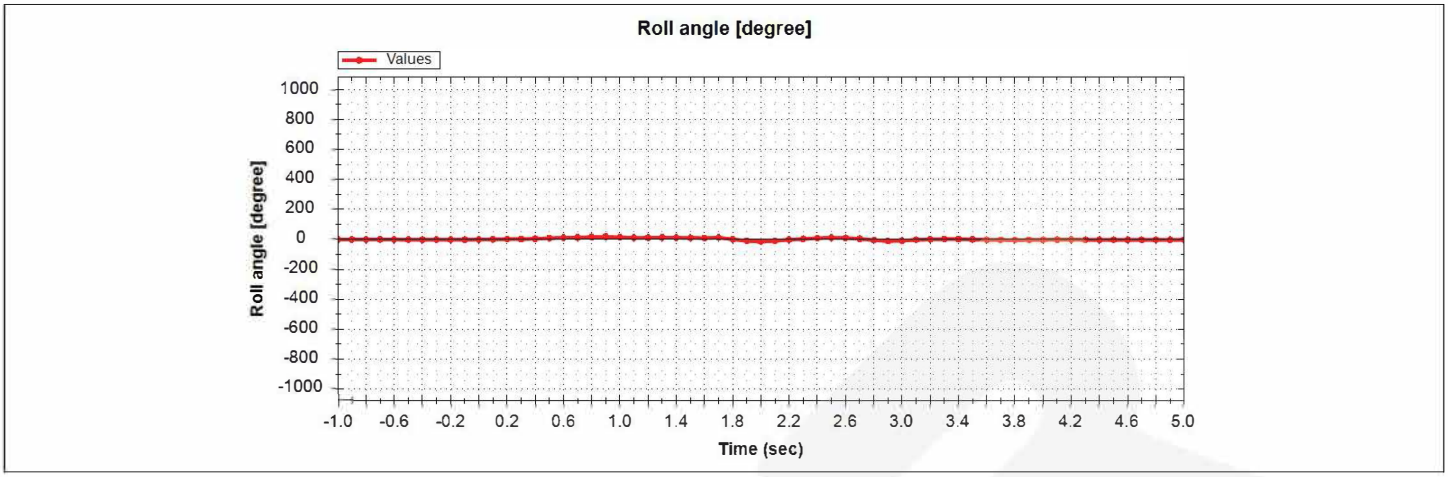
Normal acceleration (g, 0 ~ 250msec)



Num	Time (ms)	Normal acceleration [g]	HEX
1	0.0	0.0	
2	10.0	0.0	
3	20.0	0.0	
4	30.0	0.0	
5	40.0	0.0	
6	50.0	0.0	
7	60.0	0.0	
8	70.0	0.0	
9	80.0	0.0	
10	90.0	0.0	
11	100.0	0.0	
12	110.0	0.0	
13	120.0	0.0	
14	130.0	0.0	
15	140.0	0.0	
16	150.0	0.0	
17	160.0	0.0	
18	170.0	0.0	
19	180.0	0.0	
20	190.0	0.0	
21	200.0	0.0	
22	210.0	0.0	
23	220.0	0.0	
24	230.0	0.0	
25	240.0	0.0	
26	250.0	0.0	

< Event 1 >

Roll angle (degree, -1 ~ 5sec)

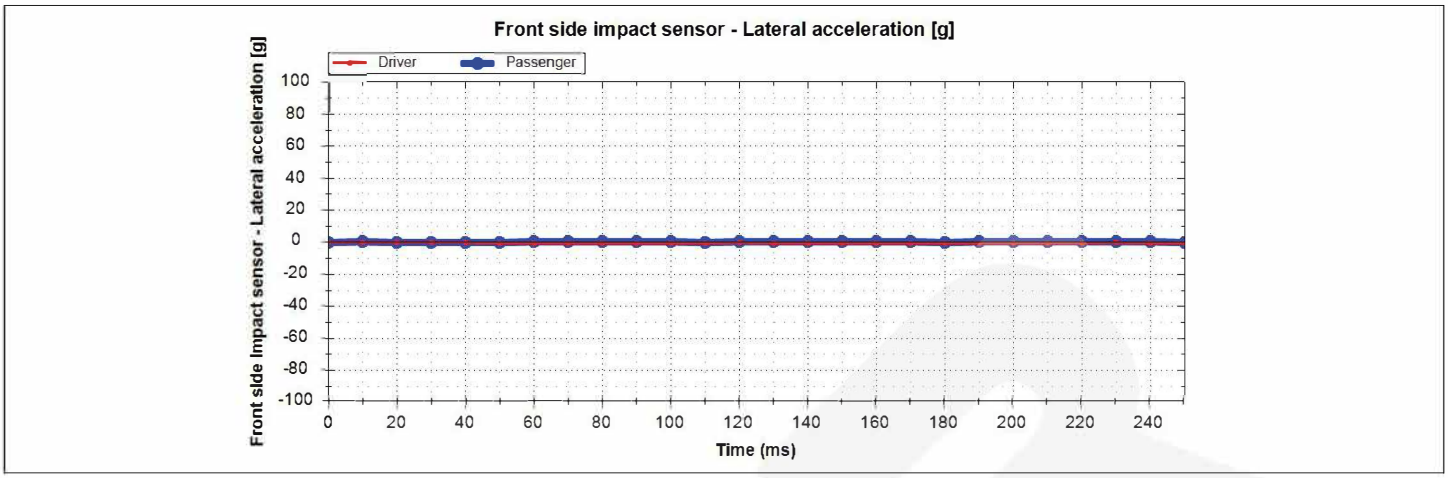


Num	Time (sec)	Roll angle [degree]	HEX
1	-1.0	0	
2	-0.9	0	
3	-0.8	0	
4	-0.7	0	
5	-0.6	0	
6	-0.5	-1	
7	-0.4	-1	
8	-0.3	-1	
9	-0.2	-1	
10	-0.1	-1	
11	0.0	0	
12	0.1	1	
13	0.2	3	
14	0.3	3	
15	0.4	5	
16	0.5	9	
17	0.6	12	
18	0.7	13	
19	0.8	16	
20	0.9	18	
21	1.0	15	
22	1.1	11	
23	1.2	12	
24	1.3	13	
25	1.4	12	
26	1.5	11	
27	1.6	10	
28	1.7	13	
29	1.8	1	
30	1.9	-9	
31	2.0	-14	

32	2.1	-9	
33	2.2	-1	
34	2.3	4	
35	2.4	9	
36	2.5	12	
37	2.6	10	
38	2.7	5	
39	2.8	-4	
40	2.9	-10	
41	3.0	-8	
42	3.1	-2	
43	3.2	1	
44	3.3	3	
45	3.4	3	
46	3.5	0	
47	3.6	-2	
48	3.7	-3	
49	3.8	-4	
50	3.9	-3	
51	4.0	-2	
52	4.1	-1	
53	4.2	-1	
54	4.3	-2	
55	4.4	-2	
56	4.5	-2	
57	4.6	-2	
58	4.7	-2	
59	4.8	-2	
60	4.9	-2	
61	5.0	-2	

‹ Event 1 ›

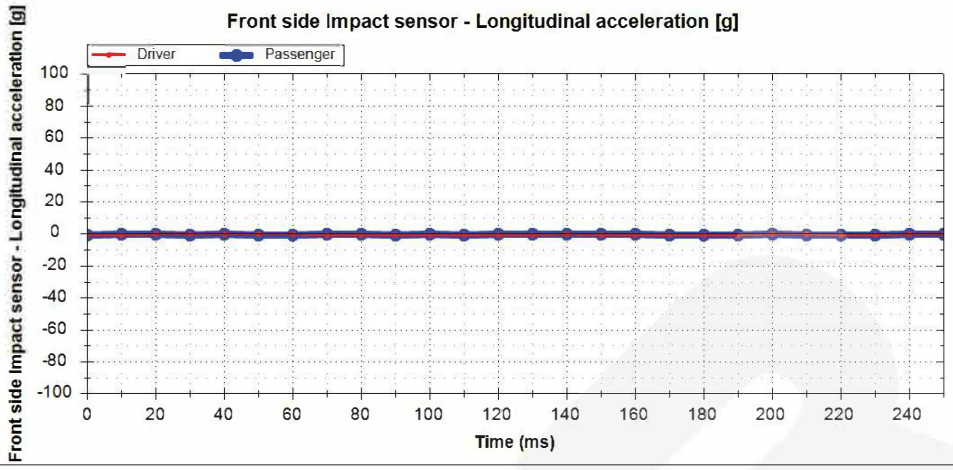
Front side impact sensor – Lateral acceleration (g, 0 ~ 250msec)



Num	Time (ms)	Front driver side impact sensor – Lateral acceleration [g]	HEX	Front passenger side impact sensor – Lateral acceleration [g]	HEX
1	0.0	0.0		0.0	
2	10.0	0.0		0.5	
3	20.0	0.0		0.0	
4	30.0	0.0		0.0	
5	40.0	0.0		0.0	
6	50.0	-0.5		0.0	
7	60.0	-0.5		0.5	
8	70.0	-0.5		0.5	
9	80.0	-0.5		0.5	
10	90.0	-0.5		0.5	
11	100.0	-0.5		0.5	
12	110.0	-0.5		0.0	
13	120.0	0.0		0.5	
14	130.0	-0.5		0.5	
15	140.0	-0.5		0.5	
16	150.0	-0.5		0.5	
17	160.0	-0.5		0.5	
18	170.0	-0.5		0.5	
19	180.0	-0.5		0.0	
20	190.0	-0.5		0.5	
21	200.0	-0.5		0.5	
22	210.0	-0.5		0.5	
23	220.0	-0.5		0.5	
24	230.0	0.0		0.5	
25	240.0	-0.5		0.5	
26	250.0	-0.5		0.0	

‹ Event 1 ›

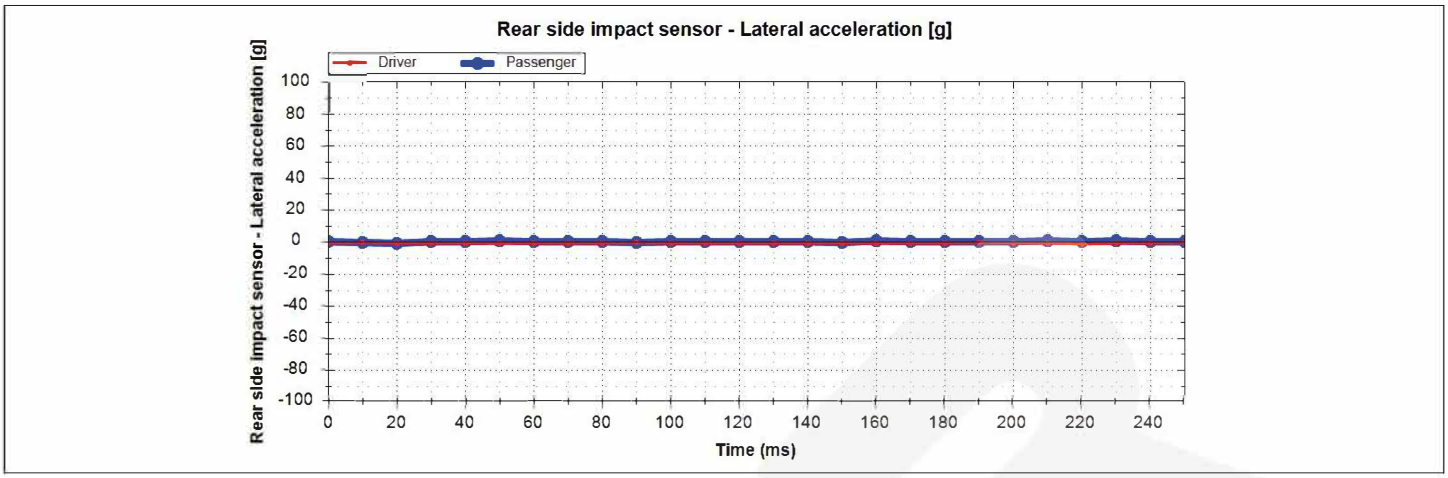
Front side Impact sensor – Longitudinal acceleration (g, 0 ~ 250msec)



Num	Time (ms)	Front driver side Impact sensor – Longitudinal acceleration [g]	HEX	Front passenger side Impact sensor – Longitudinal acceleration [g]	HEX
1	0.0	-0.5		-0.5	
2	10.0	-0.5		0.0	
3	20.0	0.0		0.0	
4	30.0	0.0		-0.5	
5	40.0	0.0		0.0	
6	50.0	0.0		-0.5	
7	60.0	0.0		-0.5	
8	70.0	-0.5		0.0	
9	80.0	-0.5		0.0	
10	90.0	-0.5		-0.5	
11	100.0	-0.5		0.0	
12	110.0	-0.5		-0.5	
13	120.0	-0.5		0.0	
14	130.0	-0.5		0.0	
15	140.0	0.0		0.0	
16	150.0	-0.5		0.0	
17	160.0	-0.5		0.0	
18	170.0	-0.5		-0.5	
19	180.0	-0.5		-0.5	
20	190.0	-0.5		-0.5	
21	200.0	0.0		0.0	
22	210.0	0.0		-0.5	
23	220.0	-0.5		-0.5	
24	230.0	-0.5		-0.5	
25	240.0	0.0		0.0	
26	250.0	0.0		0.0	

‹ Event 1 ›

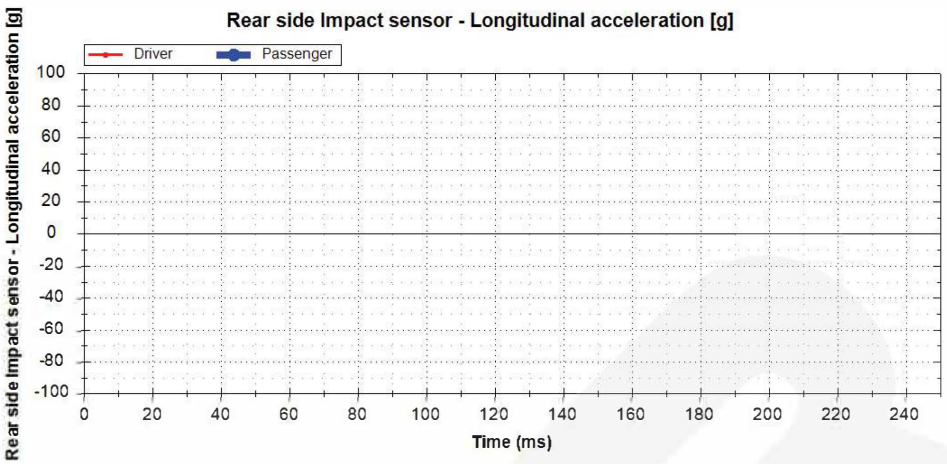
Rear side impact sensor – Lateral acceleration (g, 0 ~ 250msec)



Num	Time (ms)	Rear driver side impact sensor – Lateral acceleration [g]	HEX	Rear passenger side impact sensor – Lateral acceleration [g]	HEX
1	0.0	-0.5		0.5	
2	10.0	0.0		0.0	
3	20.0	-0.5		-0.5	
4	30.0	-0.5		0.5	
5	40.0	-0.5		0.5	
6	50.0	-0.5		1.0	
7	60.0	-0.5		0.5	
8	70.0	-0.5		0.5	
9	80.0	-0.5		0.5	
10	90.0	0.0		0.0	
11	100.0	-0.5		0.5	
12	110.0	-0.5		0.5	
13	120.0	-0.5		0.5	
14	130.0	-0.5		0.5	
15	140.0	-0.5		0.5	
16	150.0	-0.5		0.0	
17	160.0	-0.5		1.0	
18	170.0	-0.5		0.5	
19	180.0	-0.5		0.5	
20	190.0	0.0		0.5	
21	200.0	-0.5		0.5	
22	210.0	-0.5		1.0	
23	220.0	-1.0		0.5	
24	230.0	-0.5		1.0	
25	240.0	-0.5		0.5	
26	250.0	0.0		0.5	

‹ Event 1 ›

Rear side Impact sensor – Longitudinal acceleration (g, 0 ~ 250msec)



Num	Time (ms)	Rear driver side Impact sensor – Longitudinal acceleration [g]	HEX	Rear passenger side Impact sensor – Longitudinal acceleration [g]	HEX
1	0.0	Not supported		Not supported	
2	10.0	Not supported		Not supported	
3	20.0	Not supported		Not supported	
4	30.0	Not supported		Not supported	
5	40.0	Not supported		Not supported	
6	50.0	Not supported		Not supported	
7	60.0	Not supported		Not supported	
8	70.0	Not supported		Not supported	
9	80.0	Not supported		Not supported	
10	90.0	Not supported		Not supported	
11	100.0	Not supported		Not supported	
12	110.0	Not supported		Not supported	
13	120.0	Not supported		Not supported	
14	130.0	Not supported		Not supported	
15	140.0	Not supported		Not supported	
16	150.0	Not supported		Not supported	
17	160.0	Not supported		Not supported	
18	170.0	Not supported		Not supported	
19	180.0	Not supported		Not supported	
20	190.0	Not supported		Not supported	
21	200.0	Not supported		Not supported	
22	210.0	Not supported		Not supported	
23	220.0	Not supported		Not supported	
24	230.0	Not supported		Not supported	
25	240.0	Not supported		Not supported	
26	250.0	Not supported		Not supported	

‹ Event 1 ›

Raw Data

Hexadecimal data has been sanitized to remove potential personally identifiable information

‹ Event 2 ›

There is no recorded event.

Appendix B: 2019 Lincoln Nautilus Event Data Recorder Report[5]

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

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

CDR File Information

User Entered VIN	2LMPJ6J93KB******
User	
Case Number	
EDR Data Imaging Date	06/13/2022
Crash Date	
Filename	CR22010_V2_ACM.CDRX
Saved on	Monday, June 13 2022 at 09:52:45
Imaged with CDR version	Crash Data Retrieval Tool 21.5.1
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.5.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	No
Event(s) recovered	Event Record 1, Event Record 2

Comments

No comments entered.

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a court order or search warrant, as indicated by the CDR tool user on Monday, June 13 2022 at 09:52:45.

Data Limitations

Data Imaging:

CAUTION: When imaging data directly from the RCM on a bench top, make sure the RCM is placed on a flat surface without any movement (static) while connected to and powered by the CDR interface. Not following the above guideline for bench top imaging could risk inducing new events to be recorded in the RCM and possibly overwriting a Non airbag deployment.

Note that the RCM Adapter Detected during Download parameter equal to " Yes" indicates that the EDR data was collected directly from the RCM. When equal to "No", it indicates that the EDR data was collected through the OBD II from the vehicle.

Restraints Control Module (RCM) Recorded Crash Event(s):

The RCM can store up to two crash events. Event types are categorized as follow:

1. Non deployment trigger event is an event in which EDR recording trigger threshold is met or exceeded (minimum of 5 mph (8kph) Accumulated Delta Velocity within 150ms interval), but no device(s) have deployed. The data from such event can be overwritten by subsequent events.

2. Airbag deployment event is an event in which frontal, side or curtain airbags have deployed. Note that such event cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device(s), the RCM must be replaced.

3. Some RCM may also categorize Non airbag deployment event. This type is an event in which non airbag devices such as pretentioners, knee bolster etc… have deployed. Note that such event can be overwritten given a subsequent "deployment" event.

"Time zero" or Event Beginning of any event (First Record or Second Record) is defined as the first Algorithm wake up during that event. So all the Pre-Crash, At Event, Delta V Data, deployment times etc… are relative to "Time zero".

It is possible that conditions in a crash may result in an incomplete event data record.

EDR Data Elements Overview/Interpretation in CDR Report:

Under CDR File Information Section

- Event(s) recovered indicates if an event was detected and recorded by RCM. If no event is detected, it will indicate "none". If a trigger or non airbag deployment event is detected, it will indicate "unlocked event". If an airbag deployment is detected, it will indicate "locked frontal event", or "locked side event", or "locked rollover event".

Under System Status at Event Section

- Complete file recorded indicates if data from the recorded event has been fully written to the RCM memory.

- If the RCM detected a peripheral crash sensor was lost during an event, the crash sensor would be identified as well as the time it was lost during that event relative to Time zero. If no loss of a peripheral crash sensor, nothing would be displayed. Note in some vehicles, loss of a peripheral crash sensor may lead to the loss of another peripheral crash sensor due to shared communication

Under Deployment Data Section

- If the RCM commanded a deployment during an event, the deployment device(s) would be identified as well as the time the RCM commanded its deployment relative to Time zero. If no device was commanded to deploy by the RCM, nothing (no deployment device(s)) would be displayed.

Under Pre-Crash Data -5 to 0 sec

- Pre-Crash Data is recorded asynchronously and has a time resolution of 500ms. Therefore, the indicated time in this CDR report means that real time (in reference to T0) when the data point has been recorded is between indicated time and 500ms before.

- The “oldest” data set of Pre-Crash data, which is out of the 5sec window, has a low probability to be inexplicit, a plausibility check is recommended

- Steering Wheel Angle if Applicable: positive value indicates left turn, and negative value would indicate right turn.

- Stability Control Lateral Acceleration if Applicable: Lateral Acceleration (Y-direction) is the acceleration along the lateral axis of the vehicle, reported as positive when accelerating to the left.

- Stability Control Longitudinal Acceleration if Applicable: Longitudinal Acceleration (X-direction) is the acceleration along the longitudinal axis of the vehicle, reported as positive when accelerating in a forward direction.

- Stability Control Yaw Rate if Applicable: The Yaw Axis is the vertical axis of the vehicle, generally perpendicular to the plane of the road. A positive Yaw Rate is counter-clockwise when observing the vehicle from above.

- Stability Control Roll Rate if Applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Rate is counter-clockwise when observing the vehicle from the front.

- Quality Factors: Describe the status of signals that RCM receives by the vehicle network.

- Wheel Torque Requested: The calculated torque currently being delivered to all the axles at wheel level. It includes gear ratio, final drive ratio, and friction effects, but inertia effects are ignored.

- Total Arbitrated Brake Torque: Total torque applied by foundation brakes (not parking brake).

- ABS Activity: Indicates when ABS is active (engaged) or non-active (non-engaged).

- Extended Power Status: Indicates the status of the Extended Power Module.

- Large Driver Steering or Accelerator Pedal Input: Indicates that driver is intending to override Collision Mitigation by Braking (CMbB) feature.

Under Pre-Crash -1 Second Section

- Global Real Time: Time line generally begins with first key cycle at production facility on fully assembled vehicle after initialization.

Post-Crash Data

- Impact Event Feedback Status: Reflects the vehicle response to the RCM event notification.

Under Longitudinal Crash Pulse

- Delta-V, longitudinal: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a

rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

- Second Delta-V, longitudinal: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from the first deployment. It is not the speed the vehicle was traveling. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V. The data sample points for the Second Delta-V, longitudinal may not match the data sample points for Delta-V, longitudinal, due to different sample timing.

Under Longitudinal (High G) Acceleration

- **Longitudinal (High G) Acceleration:** SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

Under Lateral Crash Pulse

- Delta-V, lateral: SAE J211 sign convention, Positive value generally indicates a driver side crash and negative value generally indicates a passenger side crash. For Right Hand Drive (RHD) vehicles, the driver is on the right side of the vehicle. For RHD vehicles, positive value generally indicates a passenger side crash and negative value generally indicates a driver side crash.

- Second Delta-V, lateral: SAE J211 sign convention, Positive value generally indicates a driver side crash and negative value generally indicates a passenger side crash. The data sample points for the Second Delta-V, lateral may not match the data sample points for Delta-V, lateral, due to different sample timing.

Under Lateral (High G) Acceleration

- Lateral (High G) Acceleration: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

Under Rollover Sensor Data (if Applicable)

- Vehicle roll angle if applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Angle is counter-clockwise when observing the vehicle from the front.

Data Sources:

The Restraints Control Module (RCM) contains all recorded data on any event. Data collected from the RCM comes from multiple sources:

1. Internal to the RCM such as internal sensors for delta Velocity data, rollover angle data if applicable, etc… which are measured, calculated and stored internally.

2. External to the RCM but with a direct connection such as buckle switches, peripheral crash sensors, seat track switch(s) etc… which are measured, calculated and stored internally.

3. External Modules to the RCM such as Powertrain Control Module, Brake Control Module, etc… These modules communicate to the RCM via Vehicle Communication Network. The RCM stores the received data internally.

02017_RCM-AB12_r004

System Status at Time of Retrieval

VIN As Programmed into RCM at Factory	2LMPJ6J93KB******
Current VIN (From PCM)	2LMPJ6J93KB******
Ignition Cycle, Download (First Record)	2,974
Ignition Cycle, Download (Second Record)	2,974
Restraints Control Module Part Number	K2GT-14B321-FC
Restraints Control Module Serial Number	6L20632726AI
Restraints Control Module Software Part Number (Version)	KX7T-14C028-AA
Restraints Control Module Calibration Part Number (Version)	K2GT-14C098-FB
Driver Side/Center Frontal Restraints Sensor Serial Number	A72D9BC3583D
Driver, Row 1, Side Restraint Sensor 1 Serial Number	9F2B6E583852
Driver, Row 2, Side Restraint Sensor 2 Serial Number	A52D9BC34012
Passenger Frontal Restraints Sensor Serial Number	9B2D4ED43F0B
Passenger, Row 1, Side Restraint Sensor 1 Serial Number	C12D4F28301B
Passenger, Row 2, Side Restraint Sensor 2 Serial Number	A52D9BC35514
Steering Wheel Location	Left Hand Drive
Occupant Classification Sensor (OCS) Serial Number	1B5Z286125428355

System Status at Event (First Record)

Complete File Recorded (Yes,No)	Yes
Multi-Event, Number of Events	1
Time From Event 1 to 2 (msec)	N/A
Lifetime Operating Timer at Event Time Zero (sec)	3,758,043
Key-On Timer at Event Time Zero (sec)	1,784
Vehicle Voltage at Time Zero (V)	13.2
Energy Reserve Mode Entered During Event (Yes, No)	No
Time RCM longitudinal acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time RCM lateral acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time from Time zero to Frontal Algorithm Wake Up (msec)	9
Time from Time zero to Side Algorithm Wake Up (msec)	Wake up threshold reached at Time Zero
Time from Time zero to Rear Algorithm Wake Up (msec)	Wake up threshold not reached
Time from Time zero to Frontal Algorithm Reset (msec)	325
Time from Time zero to Side Algorithm Reset (msec)	200
Time from Time zero to Rear Algorithm Reset (msec)	Reset threshold not reached
Time from Time zero to Rollover Algorithm Reset (msec)	Reset threshold not reached
RCM number	47837D8FAB2D
RCM internal flag	0000001F

Faults Present at Start of Event (First Record)

No Faults Recorded

Deployment Data (First Record)

Maximum Delta-V, Longitudinal (MPH [km/h])	-16.16 [-26.00]
Time, Maximum Delta-V (msec)	280.0
RCM, side Driver (lateral), Safing Deployment	Yes
RCM, side Passenger (lateral), Safing Deployment	Yes
RCM, rollover, Safing Deployment	Yes

Pre-Crash Data -1 sec (First Record)

Ignition cycle, Crash	2,964
Frontal Air Bag Warning Lamp, On/Off	Off
Safety Belt Status, Driver	Belted
Seat Track Position Switch, Foremost, Status, Driver	Rearward
Seat Track Position Switch, Foremost, Status, Front Passenger	Rearward
Safety Belt Status, Front Passenger	Belted
Rear safety belt status, 2nd row driver side	Unbelted
Rear safety belt status, 2nd row passenger side	Unbelted
Brake Telltale	Off
ABS Telltale	Off
ESC/TC Telltale	Fast flash
ESC/TC Off Telltale	Default Mode
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL) Telltale	Unchanged Off
Global Real Time (seconds)	104,439,595.9

Pre-Crash Data -5 to 0 sec [2 samples/sec] (First Record)

Time (sec)	Driver Gear Selection (Auto Trans)	Wheel Torque Requested (Nm)	Total Arbitrated Brake Torque (Nm)	Ignition Status	Speed Control Status
- 5.0	Drive	432	0	Run	Off
- 4.5	Drive	416	0	Run	Off
- 4.0	Drive	356	60	Run	Off
- 3.5	Drive	76	1,508	Run	Off
- 3.0	Drive	-16	1,264	Run	Off
- 2.5	Drive	-36	1,048	Run	Off
- 2.0	Drive	-56	916	Run	Off
- 1.5	Drive	-12	1,772	Run	Off
- 1.0	Drive	28	2,636	Run	Off
- 0.5	Drive	-100	692	Run	Off
0.0	Drive	-20	2,064	Run	Off

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record) - Table 1 of 2

Time (sec)	ABS Activity (Engaged, Non-Engaged)	Brake Powertrain Torque Request 1	Brake Powertrain Torque Request 2	Traction Control via Brakes	Stability Control Lateral Acceleration (g)	Stability Control Longitudinal Acceleration (g)
- 5.0	Non-engaged	No	Inactive	No	-0.03	0.02
- 4.9	Non-engaged	No	Inactive	No	-0.05	0.02
- 4.8	Non-engaged	No	Inactive	No	-0.04	0.02
- 4.7	Non-engaged	No	Inactive	No	-0.05	0.00
- 4.6	Non-engaged	No	Inactive	No	-0.01	-0.02
- 4.5	Non-engaged	No	Inactive	No	-0.02	0.00
- 4.4	Non-engaged	No	Inactive	No	1.20	0.32
- 4.3	Non-engaged	Yes	Inactive	No	-1.07	-0.34
- 4.2	Non-engaged	Yes	Inactive	No	-0.44	-0.09
- 4.1	Non-engaged	Yes	Inactive	No	-0.49	-0.07
- 4.0	Non-engaged	Yes	Inactive	No	-0.48	-0.13
- 3.9	Non-engaged	Yes	Inactive	No	-0.26	-0.03
- 3.8	Non-engaged	Yes	Inactive	No	-0.47	0.08
- 3.7	Non-engaged	Yes	Inactive	No	-1.14	-0.08
- 3.6	Non-engaged	Yes	Inactive	No	-0.53	-0.32
- 3.5	Non-engaged	Yes	Inactive	No	-0.44	-0.17
- 3.4	Non-engaged	Yes	Inactive	No	-0.33	-0.25
- 3.3	Non-engaged	Yes	Inactive	No	-0.47	-0.23
- 3.2	Non-engaged	Yes	Inactive	No	-0.20	-0.18
- 3.1	Non-engaged	Yes	Inactive	No	-0.65	-0.25
- 3.0	Non-engaged	Yes	Inactive	No	-0.74	-0.23
- 2.9	Non-engaged	Yes	Inactive	No	-0.36	-0.08
- 2.8	Non-engaged	Yes	Inactive	No	-0.45	-0.18
- 2.7	Non-engaged	Yes	Inactive	No	-0.78	-0.24
- 2.6	Non-engaged	Yes	Inactive	No	-0.70	-0.28
- 2.5	Non-engaged	Yes	Inactive	No	-0.75	-0.17
- 2.4	Non-engaged	Yes	Inactive	No	-0.58	-0.25
- 2.3	Non-engaged	Yes	Inactive	No	-0.54	-0.11
- 2.2	Non-engaged	Yes	Inactive	No	-0.46	-0.22
- 2.1	Non-engaged	Yes	Inactive	No	-0.67	-0.28
- 2.0	Engaged	Yes	Inactive	No	-0.45	-0.40
- 1.9	Engaged	Yes	Inactive	No	-0.39	-0.22
- 1.8	Engaged	Yes	Inactive	No	-0.54	-0.23
- 1.7	Engaged	Yes	Inactive	No	-0.53	-0.16
- 1.6	Engaged	Yes	Inactive	No	-0.36	-0.14
- 1.5	Engaged	Yes	Inactive	No	-0.70	-0.16
- 1.4	Engaged	Yes	Inactive	No	-0.49	-0.11
- 1.3	Engaged	Yes	Inactive	No	-0.55	-0.21
- 1.2	Engaged	Yes	Inactive	No	-0.67	-0.23
- 1.1	Engaged	Yes	Inactive	No	-0.54	-0.14
- 1.0	Engaged	Yes	Inactive	No	-0.68	-0.34
- 0.9	Engaged	Yes	Inactive	No	-0.40	-0.21
- 0.8	Engaged	Yes	Inactive	No	-0.20	-0.20
- 0.7	Engaged	Yes	Inactive	No	-0.08	-0.20
- 0.6	Engaged	Yes	Inactive	No	-0.40	-0.08
- 0.5	Engaged	Yes	Inactive	No	0.00	-0.30
- 0.4	Engaged	Yes	Inactive	No	-0.37	-0.44
- 0.3	Engaged	Yes	Inactive	No	-0.52	0.25
- 0.2	Engaged	Yes	Inactive	No	-0.48	-0.61
- 0.1	Engaged	Yes	Inactive	No	-0.08	0.09
0.0	Engaged	Yes	Inactive	No	0.56	-0.69

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record) - Table 2 of 2

Time (sec)	Stability Control Yaw Rate (deg/sec)	Stability Control Roll Rate (deg/sec)	Steering Wheel Angle (deg)	Steering Wheel Angle Quality Factor
- 5.0	-0.06	-0.03	-0.7	OK
- 4.9	-0.05	-0.07	-0.1	OK
- 4.8	0.19	-0.01	0.0	OK
- 4.7	0.08	0.54	0.0	OK
- 4.6	0.49	0.30	0.3	OK
- 4.5	0.68	0.30	0.0	OK
- 4.4	-0.57	4.69	0.0	OK
- 4.3	-14.91	-42.57	2.9	OK
- 4.2	-10.40	-6.24	31.2	OK
- 4.1	-9.66	9.99	-1.1	OK
- 4.0	-7.35	-0.56	-33.7	OK
- 3.9	-5.61	-5.90	2.0	OK
- 3.8	-38.52	-12.35	20.7	OK
- 3.7	-39.91	4.62	25.0	OK
- 3.6	-38.80	8.31	16.9	OK
- 3.5	-33.24	-3.69	33.7	OK
- 3.4	-28.30	-5.77	48.3	OK
- 3.3	-24.36	4.95	44.2	OK
- 3.2	-10.32	7.17	46.3	OK
- 3.1	-3.03	-7.03	36.6	OK
- 3.0	-4.63	-7.41	39.8	OK
- 2.9	-9.27	4.44	43.6	OK
- 2.8	-11.09	8.17	55.3	OK
- 2.7	-10.27	1.33	43.0	OK
- 2.6	-8.38	-3.32	69.5	OK
- 2.5	-6.42	-5.04	88.2	OK
- 2.4	-6.49	8.29	82.0	OK
- 2.3	-6.61	9.47	78.0	OK
- 2.2	-1.91	4.06	82.6	OK
- 2.1	2.65	-4.08	86.3	OK
- 2.0	0.88	-1.00	102.9	OK
- 1.9	0.32	10.19	113.4	OK
- 1.8	3.38	1.99	107.3	OK
- 1.7	3.77	-9.57	110.3	OK
- 1.6	1.95	2.12	117.2	OK
- 1.5	2.68	5.76	131.9	OK
- 1.4	1.24	-6.19	147.7	OK
- 1.3	-2.17	0.33	168.0	OK
- 1.2	-3.93	5.66	176.7	OK
- 1.1	-7.80	-2.19	168.0	OK
- 1.0	-7.66	11.62	175.0	OK
- 0.9	-5.72	17.14	165.8	OK
- 0.8	4.49	37.41	161.6	OK
- 0.7	6.36	46.00	136.3	OK
- 0.6	9.45	30.98	121.3	OK
- 0.5	7.17	30.24	111.5	OK
- 0.4	7.58	-7.25	101.0	OK
- 0.3	16.23	-62.52	89.2	OK
- 0.2	18.47	19.12	83.7	OK
- 0.1	24.51	33.53	100.3	OK
0.0	21.48	9.70	105.7	OK

Pre-Crash Data -5 to 0 sec [5 samples/sec] (First Record) - Table 1 of 2

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 5.0	78.8 [127]	OK	28	OK	Off	OK	2,190	Cruise_Overridden
- 4.8	78.9 [127]	OK	28	OK	Off	OK	2,190	Cruise_Overridden
- 4.6	78.9 [127]	OK	27	OK	Off	OK	2,192	Cruise_Overridden
- 4.4	78.9 [127]	OK	27	OK	Off	OK	2,188	Cruise_Overridden
- 4.2	78.9 [127]	OK	16	OK	Off	OK	2,212	Cruise_Overridden
- 4.0	80.7 [130]	OK	0	OK	Off	OK	2,230	Cruise_Reg_Not_Overridden
- 3.8	77.8 [125]	OK	0	OK	Off	OK	2,146	Cruise_Reg_Not_Overridden
- 3.6	76.7 [123]	OK	0	OK	Off	OK	1,980	Cruise_Reg_Not_Overridden
- 3.4	61.0 [98]	OK	0	OK	Off	OK	1,540	Cruise_Reg_Not_Overridden
- 3.2	52.0 [84]	OK	0	OK	Off	OK	1,382	Cruise_Reg_Not_Overridden
- 3.0	49.5 [80]	OK	0	OK	Off	OK	1,416	Cruise_Reg_Not_Overridden
- 2.8	56.7 [91]	OK	0	OK	Off	OK	1,534	Cruise_Reg_Not_Overridden
- 2.6	49.9 [80]	OK	0	OK	Off	OK	1,210	Cruise_Reg_Not_Overridden
- 2.4	49.3 [79]	OK	0	OK	Off	OK	1,468	Cruise_Reg_Not_Overridden
- 2.2	49.0 [79]	OK	0	OK	Off	OK	1,286	Cruise_Reg_Not_Overridden
- 2.0	47.0 [76]	OK	0	OK	On	OK	1,300	Cruise_Reg_Not_Overridden
- 1.8	43.7 [70]	OK	0	OK	On	OK	1,054	Cruise_Reg_Not_Overridden
- 1.6	44.4 [71]	OK	0	OK	On	OK	1,062	Cruise_Reg_Not_Overridden
- 1.4	48.1 [77]	OK	0	OK	On	OK	1,138	Cruise_Reg_Not_Overridden
- 1.2	51.4 [83]	OK	0	OK	On	OK	1,280	Cruise_Reg_Not_Overridden
- 1.0	52.5 [85]	OK	0	OK	On	OK	1,578	Cruise_Reg_Not_Overridden

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 0.8	52.1 [84]	OK	0	OK	On	OK	1,600	Cruise_Reg_Not_Overridden
- 0.6	40.7 [66]	OK	0	OK	On	OK	1,246	Cruise_Reg_Not_Overridden
- 0.4	36.9 [59]	OK	0	OK	On	OK	1,040	Cruise_Reg_Not_Overridden
- 0.2	39.8 [64]	OK	0	OK	On	OK	1,070	Cruise_Reg_Not_Overridden
0.0	47.1 [76]	OK	0	OK	On	OK	1,160	Cruise_Reg_Not_Overridden

Pre-Crash Data -5 to 0 sec [5 samples/sec] (First Record) - Table 2 of 2

Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 5.0	No PreCharge Request	Normal	0	No	No	No	Yes
- 4.8	No PreCharge Request	Normal	0	No	No	No	Yes
- 4.6	No PreCharge Request	Normal	0	No	No	No	Yes
- 4.4	No PreCharge Request	Normal	0	No	No	No	Yes
- 4.2	No PreCharge Request	Normal	0	No	No	No	Yes
- 4.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.4	No PreCharge Request	Normal	0	No	Yes	No	Yes

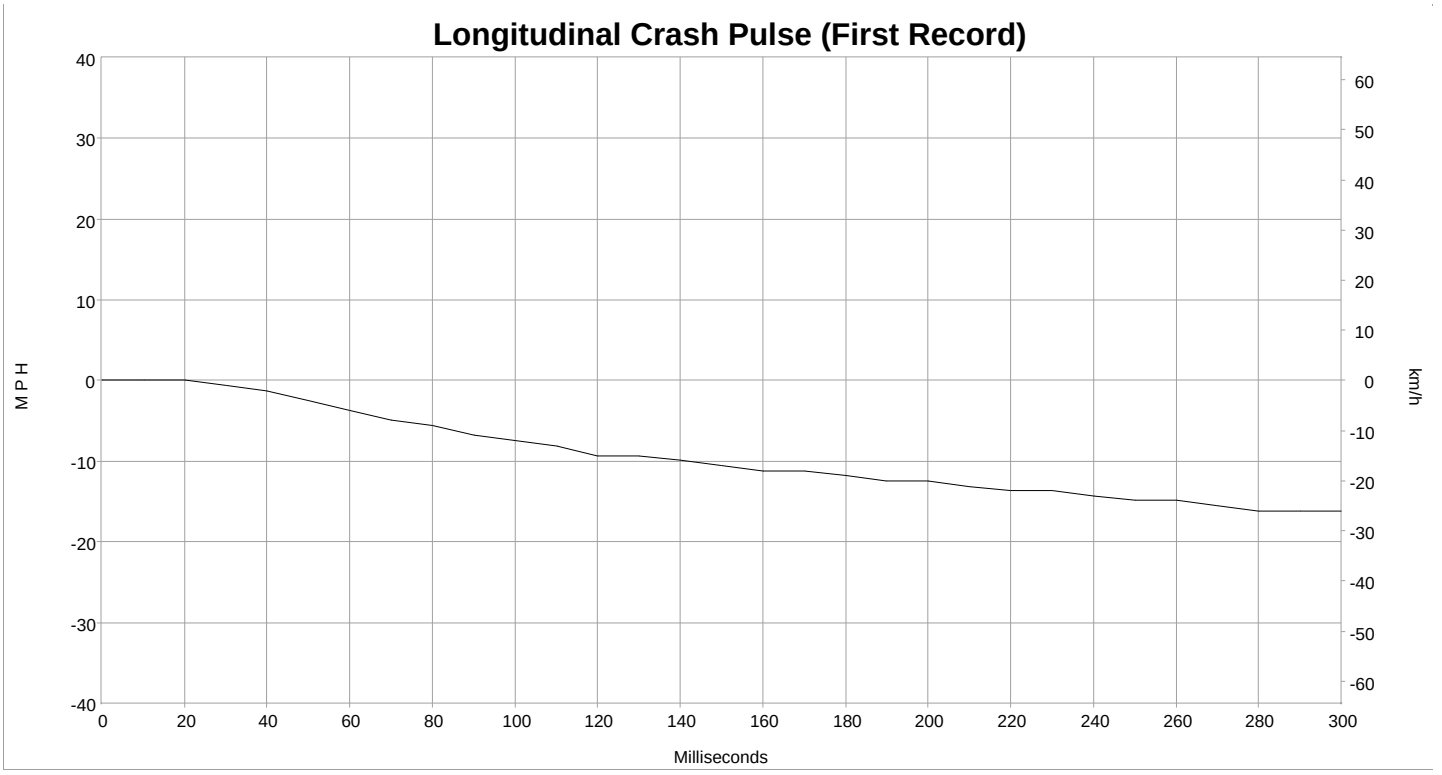
Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 1.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
0.0	No PreCharge Request	Normal	0	No	Yes	No	Yes

Pre-Crash Data -5 to 0 sec [1 sample/sec] (First Record)

Time (sec)	Occupant Size Classification, Front Passenger (Child size Yes/No [Hex value])	Extended Power Status
- 5.0	No [$01]	No Fault
- 4.0	No [$01]	No Fault
- 3.0	No [$01]	No Fault
- 2.0	No [$01]	No Fault
- 1.0	No [$01]	No Fault
0.0	No [$01]	No Fault

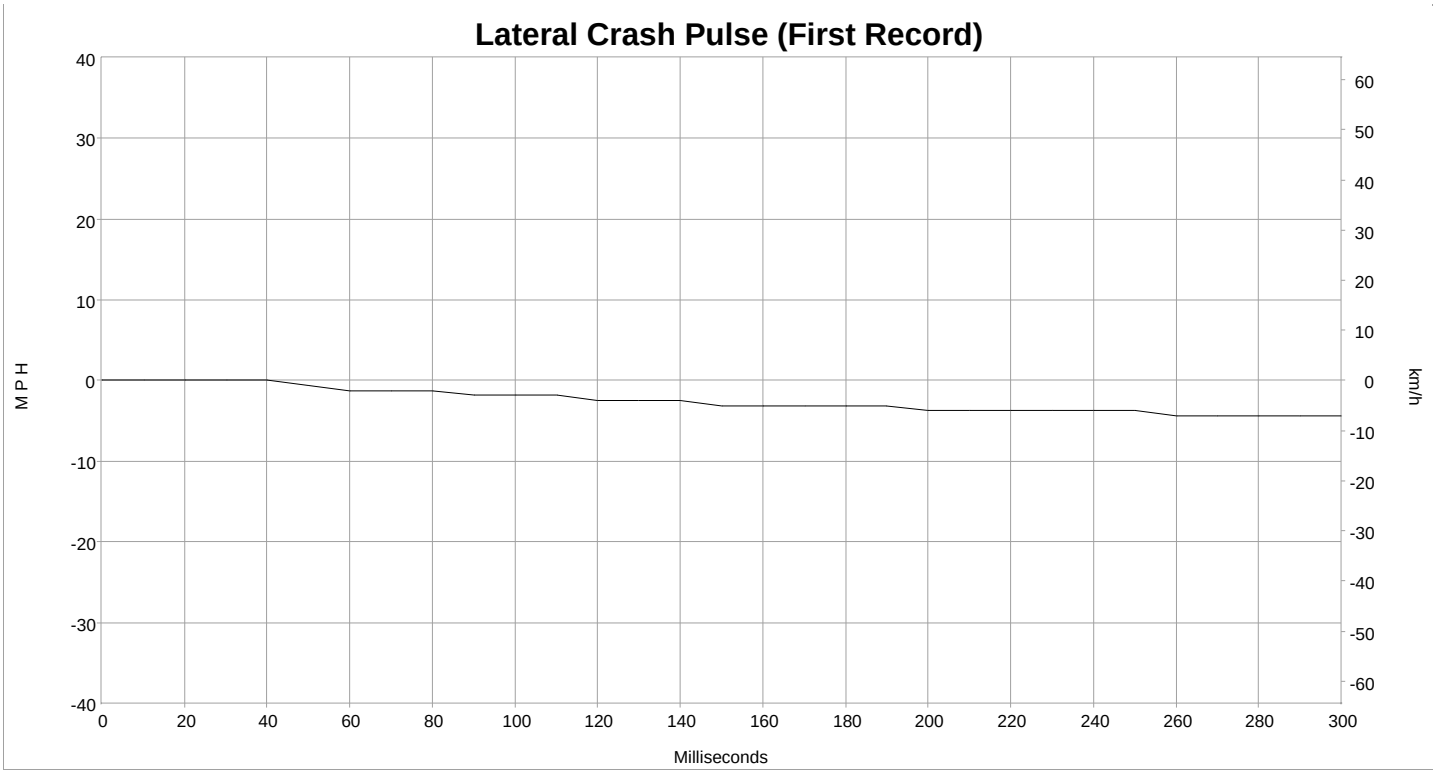
Post-Crash Data 0 to 5 sec [4 samples/sec] (First Record)

Time (sec)	Impact Event Feedback Status
0.00	Normal
0.25	Normal
0.50	Normal
0.75	Normal
1.00	Normal
1.25	Normal
1.50	Normal
1.75	Normal
2.00	Normal
2.25	Normal
2.50	Normal
2.75	Normal
3.00	Normal
3.25	Normal
3.50	Normal
3.75	Normal
4.00	Normal
4.25	Normal
4.50	Normal
4.75	Normal
5.00	Normal


Longitudinal Crash Pulse (First Record)
M P H
km/h
Milliseconds
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

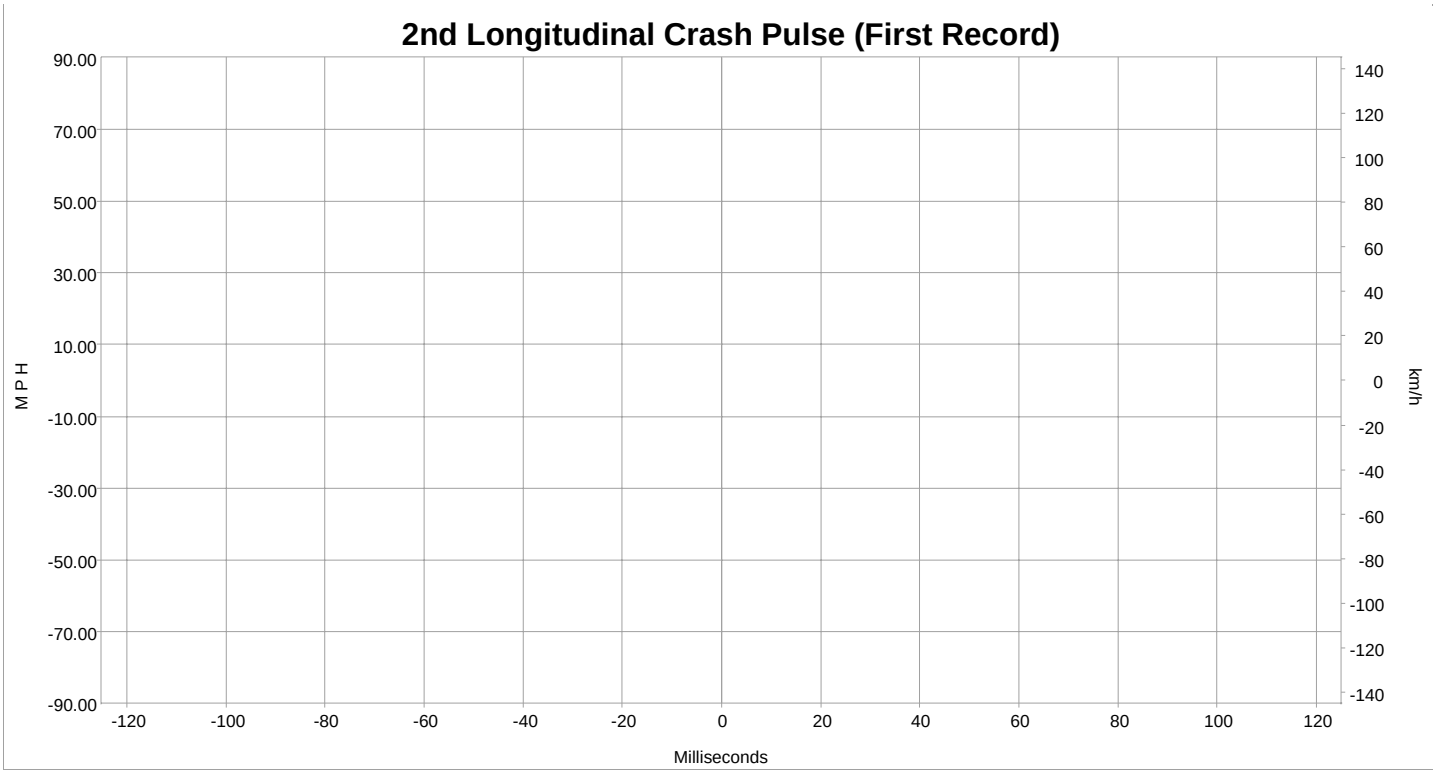
Longitudinal Crash Pulse (First Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
0	0.00	0.00
10	0.00	0.00
20	0.00	0.00
30	-0.62	-1.00
40	-1.24	-2.00
50	-2.49	-4.00
60	-3.73	-6.00
70	-4.97	-8.00
80	-5.59	-9.00
90	-6.84	-11.00
100	-7.46	-12.00
110	-8.08	-13.00
120	-9.32	-15.00
130	-9.32	-15.00
140	-9.94	-16.00
150	-10.56	-17.00
160	-11.18	-18.00
170	-11.18	-18.00
180	-11.81	-19.00
190	-12.43	-20.00
200	-12.43	-20.00
210	-13.05	-21.00
220	-13.67	-22.00
230	-13.67	-22.00
240	-14.29	-23.00
250	-14.91	-24.00
260	-14.91	-24.00
270	-15.53	-25.00
280	-16.16	-26.00
290	-16.16	-26.00
300	-16.16	-26.00


Lateral Crash Pulse (First Record)
MPH
km/h
Milliseconds
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

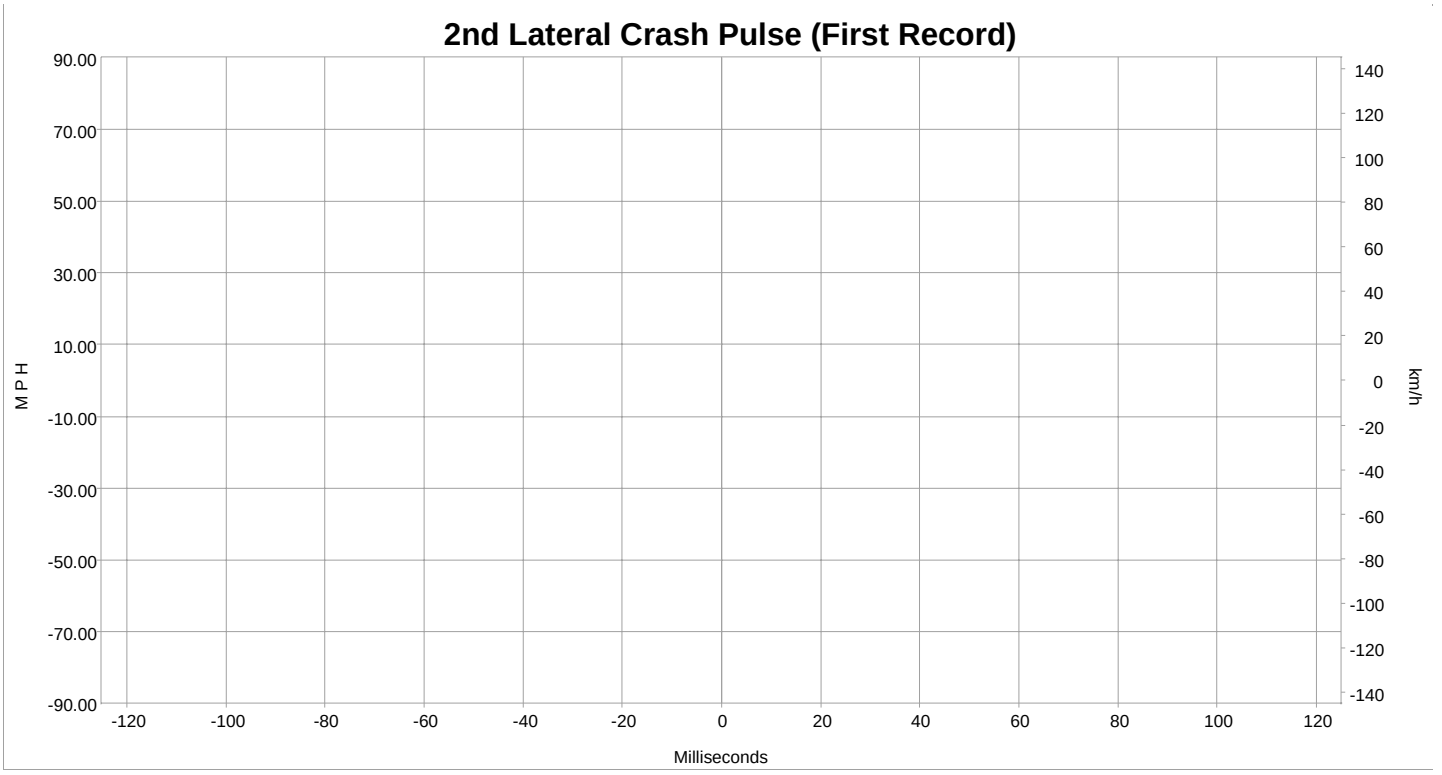
Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, Lateral (MPH)	Delta-V, Lateral (km/h)
0	0.00	0.00
10	0.00	0.00
20	0.00	0.00
30	0.00	0.00
40	0.00	0.00
50	-0.62	-1.00
60	-1.24	-2.00
70	-1.24	-2.00
80	-1.24	-2.00
90	-1.86	-3.00
100	-1.86	-3.00
110	-1.86	-3.00
120	-2.49	-4.00
130	-2.49	-4.00
140	-2.49	-4.00
150	-3.11	-5.00
160	-3.11	-5.00
170	-3.11	-5.00
180	-3.11	-5.00
190	-3.11	-5.00
200	-3.73	-6.00
210	-3.73	-6.00
220	-3.73	-6.00
230	-3.73	-6.00
240	-3.73	-6.00
250	-3.73	-6.00
260	-4.35	-7.00
270	-4.35	-7.00
280	-4.35	-7.00
290	-4.35	-7.00
300	-4.35	-7.00



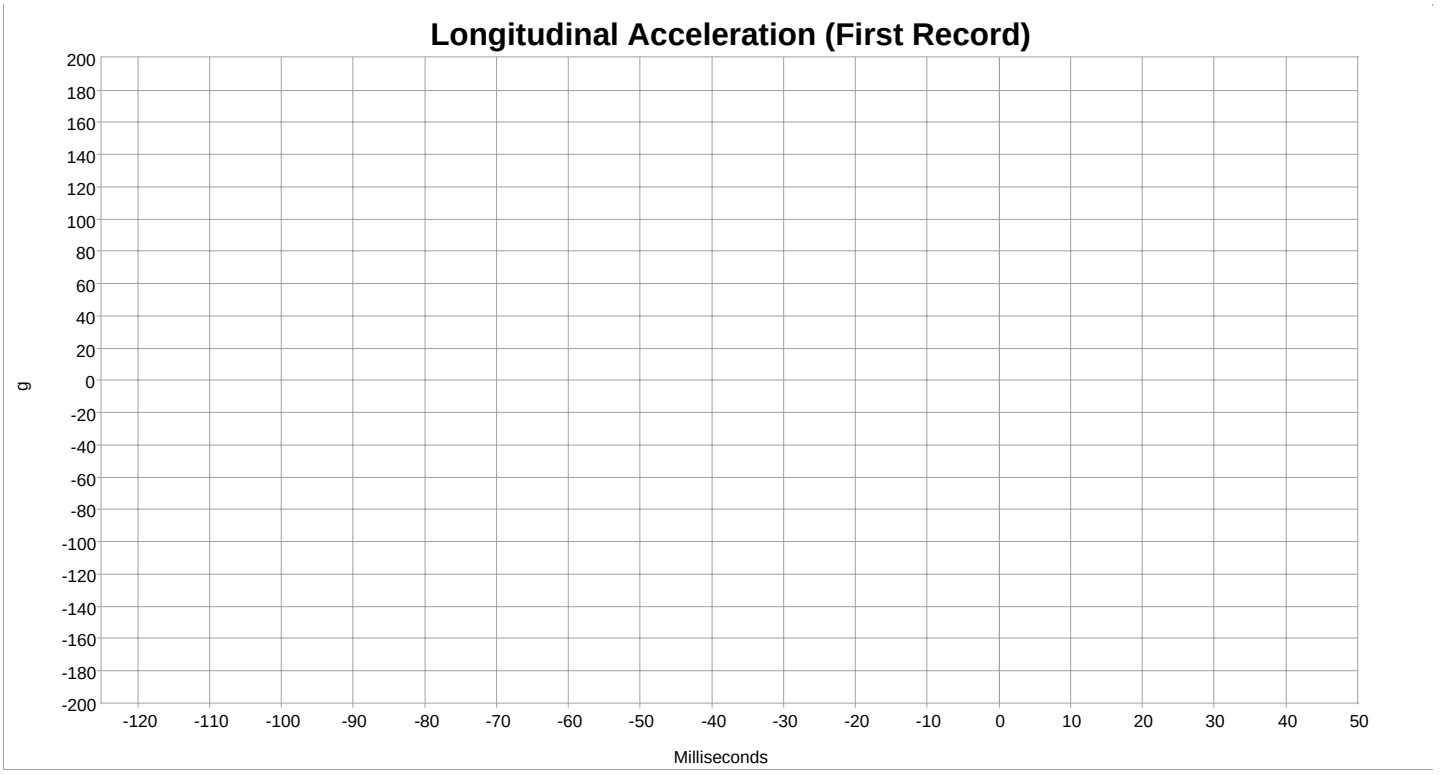
2nd Longitudinal Crash Pulse (First Record)

Time (msec)	2nd Delta-V, longitudinal (MPH)	2nd Delta-V, longitudinal (km/h)
-125	N/A	N/A
-115	N/A	N/A
-105	N/A	N/A
-95	N/A	N/A
-85	N/A	N/A
-75	N/A	N/A
-65	N/A	N/A
-55	N/A	N/A
-45	N/A	N/A
-35	N/A	N/A
-25	N/A	N/A
-15	N/A	N/A
-5	N/A	N/A
5	N/A	N/A
15	N/A	N/A
25	N/A	N/A
35	N/A	N/A
45	N/A	N/A
55	N/A	N/A
65	N/A	N/A
75	N/A	N/A
85	N/A	N/A
95	N/A	N/A
105	N/A	N/A
115	N/A	N/A
125	N/A	N/A



2nd Lateral Crash Pulse (First Record)

Time (msec)	2nd Delta-V, Lateral (MPH)	2nd Delta-V, Lateral (km/h)
-125	N/A	N/A
-115	N/A	N/A
-105	N/A	N/A
-95	N/A	N/A
-85	N/A	N/A
-75	N/A	N/A
-65	N/A	N/A
-55	N/A	N/A
-45	N/A	N/A
-35	N/A	N/A
-25	N/A	N/A
-15	N/A	N/A
-5	N/A	N/A
5	N/A	N/A
15	N/A	N/A
25	N/A	N/A
35	N/A	N/A
45	N/A	N/A
55	N/A	N/A
65	N/A	N/A
75	N/A	N/A
85	N/A	N/A
95	N/A	N/A
105	N/A	N/A
115	N/A	N/A
125	N/A	N/A


Longitudinal Acceleration (First Record)
g
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
Milliseconds

Time (msec)	Longitudinal Acceleration (g)
-125	16255.75
-124	16255.75
-123	16255.75
-122	16255.75
-121	16255.75
-120	16255.75
-119	16255.75
-118	16255.75
-117	16255.75
-116	16255.75
-115	16255.75
-114	16255.75
-113	16255.75
-112	16255.75
-111	16255.75
-110	16255.75
-109	16255.75
-108	16255.75
-107	16255.75
-106	16255.75
-105	16255.75
-104	16255.75
-103	16255.75
-102	16255.75
-101	16255.75
-100	16255.75
-99	16255.75
-98	16255.75
-97	16255.75
-96	16255.75
-95	16255.75
-94	16255.75
-93	16255.75
-92	16255.75
-91	16255.75
-90	16255.75
-89	16255.75
-88	16255.75
-87	16255.75
-86	16255.75
-85	16255.75
-84	16255.75
-83	16255.75
-82	16255.75
-81	16255.75
-80	16255.75
-79	16255.75
-78	16255.75
-77	16255.75
-76	16255.75
-75	16255.75
-74	16255.75
-73	16255.75
-72	16255.75
-71	16255.75
-70	16255.75
-69	16255.75

Time (msec)	Longitudinal Acceleration (g)
-68	16255.75
-67	16255.75

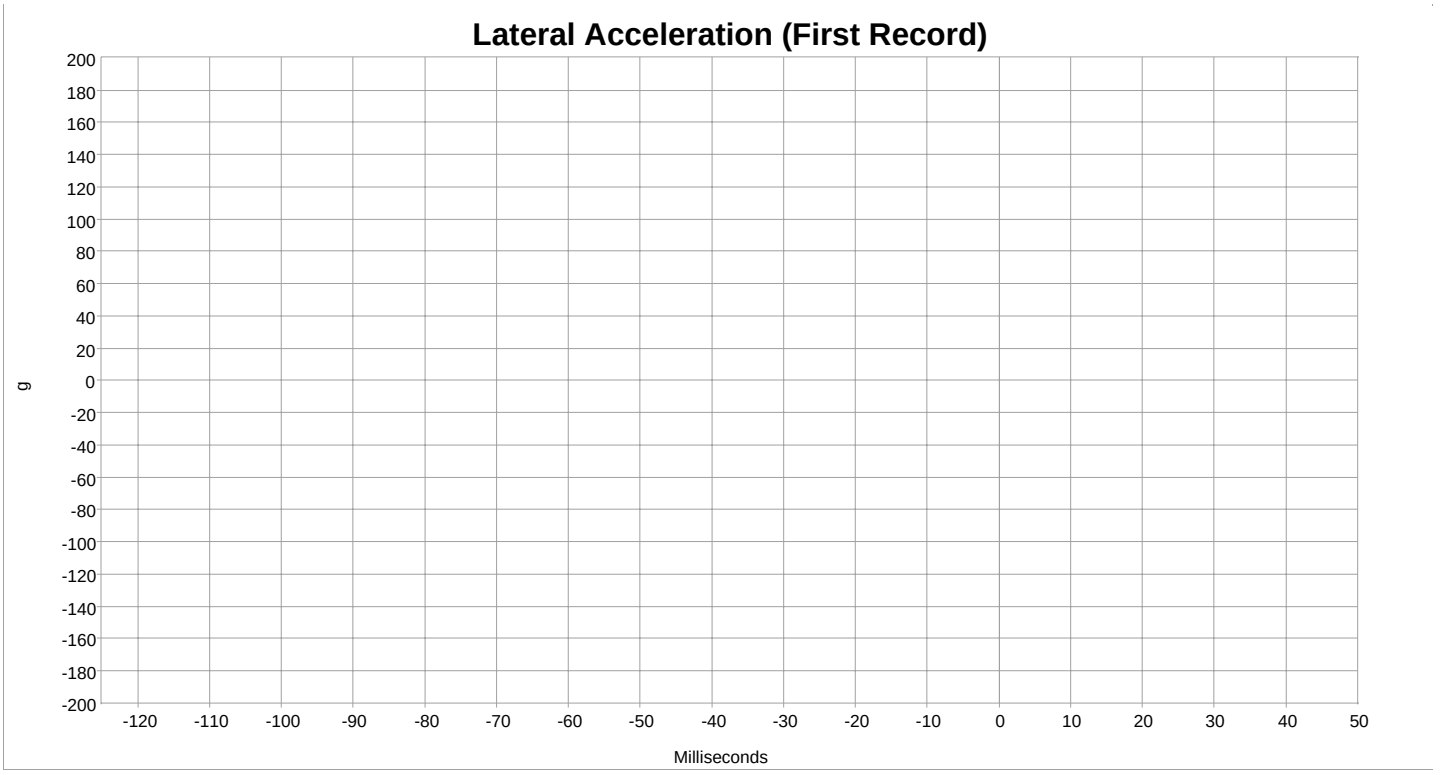
Longitudinal Acceleration (First Record)

Time (msec)	Longitudinal Acceleration (g)
-66	16255.75
-65	16255.75
-64	16255.75
-63	16255.75
-62	16255.75
-61	16255.75
-60	16255.75
-59	16255.75
-58	16255.75
-57	16255.75
-56	16255.75
-55	16255.75
-54	16255.75
-53	16255.75
-52	16255.75
-51	16255.75
-50	16255.75
-49	16255.75
-48	16255.75
-47	16255.75
-46	16255.75
-45	16255.75
-44	16255.75
-43	16255.75
-42	16255.75
-41	16255.75
-40	16255.75
-39	16255.75
-38	16255.75
-37	16255.75
-36	16255.75
-35	16255.75
-34	16255.75
-33	16255.75
-32	16255.75
-31	16255.75
-30	16255.75
-29	16255.75
-28	16255.75
-27	16255.75
-26	16255.75
-25	16255.75
-24	16255.75
-23	16255.75
-22	16255.75
-21	16255.75
-20	16255.75
-19	16255.75
-18	16255.75
-17	16255.75
-16	16255.75
-15	16255.75
-14	16255.75
-13	16255.75
-12	16255.75
-11	16255.75
-10	16255.75

Time (msec)	Longitudinal Acceleration (g)
-9	16255.75
-8	16255.75

Time (msec)	Longitudinal Acceleration (g)
-7	16255.75
-6	16255.75
-5	16255.75
-4	16255.75
-3	16255.75
-2	16255.75
-1	16255.75
0	16255.75
1	16255.75
2	16255.75
3	16255.75
4	16255.75
5	16255.75
6	16255.75
7	16255.75
8	16255.75
9	16255.75
10	16255.75
11	16255.75
12	16255.75
13	16255.75
14	16255.75
15	16255.75
16	16255.75
17	16255.75
18	16255.75
19	16255.75
20	16255.75
21	16255.75
22	16255.75
23	16255.75
24	16255.75
25	16255.75
26	16255.75
27	16255.75
28	16255.75
29	16255.75
30	16255.75
31	16255.75
32	16255.75
33	16255.75
34	16255.75
35	16255.75
36	16255.75
37	16255.75
38	16255.75
39	16255.75
40	16255.75
41	16255.75
42	16255.75
43	16255.75
44	16255.75
45	16255.75
46	16255.75
47	16255.75
48	16255.75
49	16255.75

Time (msec)	Longitudinal Acceleration (g)
50	16255.75


Lateral Acceleration (First Record)
g
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
Milliseconds

Time (msec)	Lateral Acceleration (g)
-125	16255.75
-124	16255.75
-123	16255.75
-122	16255.75
-121	16255.75
-120	16255.75
-119	16255.75
-118	16255.75
-117	16255.75
-116	16255.75
-115	16255.75
-114	16255.75
-113	16255.75
-112	16255.75
-111	16255.75
-110	16255.75
-109	16255.75
-108	16255.75
-107	16255.75
-106	16255.75
-105	16255.75
-104	16255.75
-103	16255.75
-102	16255.75
-101	16255.75
-100	16255.75
-99	16255.75
-98	16255.75
-97	16255.75
-96	16255.75
-95	16255.75
-94	16255.75
-93	16255.75
-92	16255.75
-91	16255.75
-90	16255.75
-89	16255.75
-88	16255.75
-87	16255.75
-86	16255.75
-85	16255.75
-84	16255.75
-83	16255.75
-82	16255.75
-81	16255.75
-80	16255.75
-79	16255.75
-78	16255.75
-77	16255.75
-76	16255.75
-75	16255.75
-74	16255.75
-73	16255.75
-72	16255.75
-71	16255.75
-70	16255.75
-69	16255.75

Time (msec)	Lateral Acceleration (g)
-68	16255.75
-67	16255.75

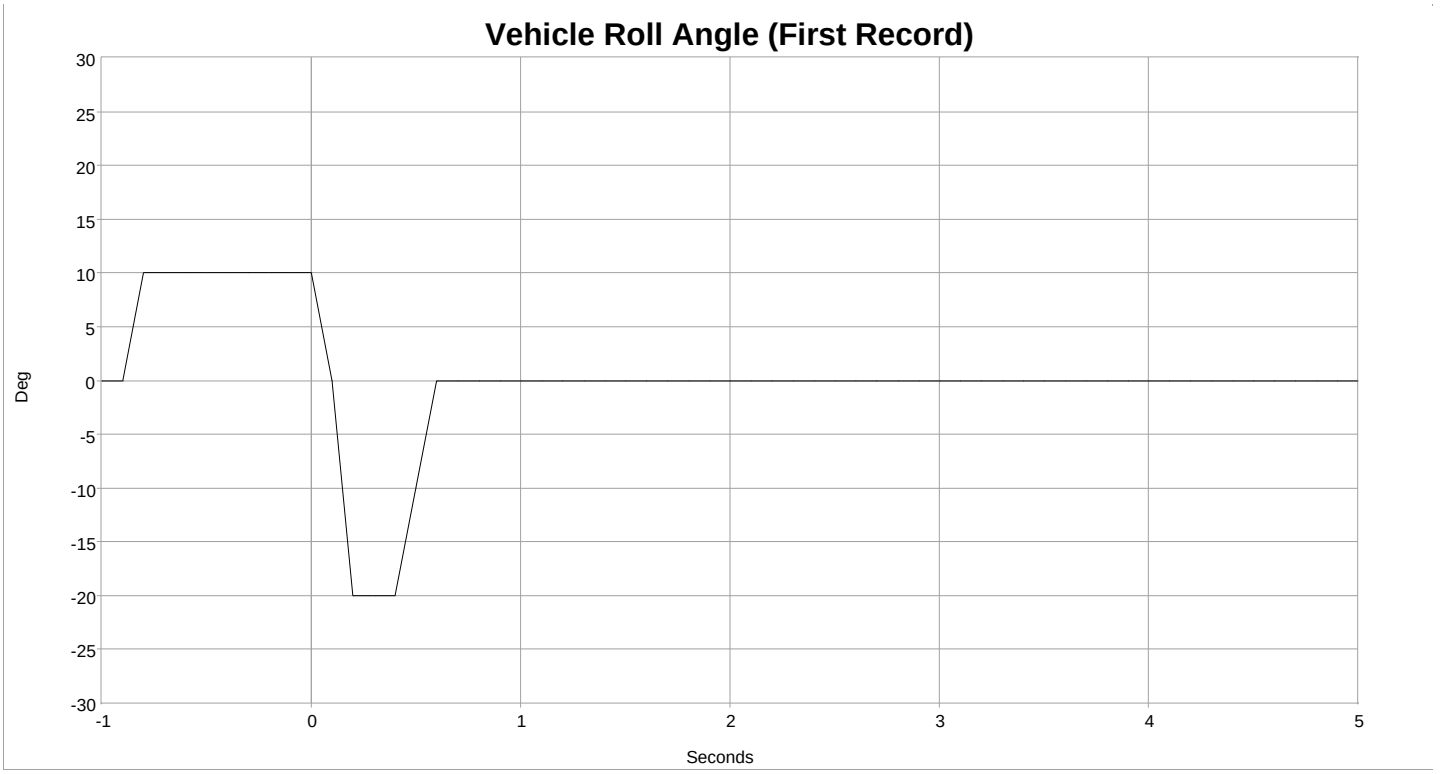
Lateral Acceleration (First Record)

Time (msec)	Lateral Acceleration (g)
-66	16255.75
-65	16255.75
-64	16255.75
-63	16255.75
-62	16255.75
-61	16255.75
-60	16255.75
-59	16255.75
-58	16255.75
-57	16255.75
-56	16255.75
-55	16255.75
-54	16255.75
-53	16255.75
-52	16255.75
-51	16255.75
-50	16255.75
-49	16255.75
-48	16255.75
-47	16255.75
-46	16255.75
-45	16255.75
-44	16255.75
-43	16255.75
-42	16255.75
-41	16255.75
-40	16255.75
-39	16255.75
-38	16255.75
-37	16255.75
-36	16255.75
-35	16255.75
-34	16255.75
-33	16255.75
-32	16255.75
-31	16255.75
-30	16255.75
-29	16255.75
-28	16255.75
-27	16255.75
-26	16255.75
-25	16255.75
-24	16255.75
-23	16255.75
-22	16255.75
-21	16255.75
-20	16255.75
-19	16255.75
-18	16255.75
-17	16255.75
-16	16255.75
-15	16255.75
-14	16255.75
-13	16255.75
-12	16255.75
-11	16255.75
-10	16255.75

Time (msec)	Lateral Acceleration (g)
-9	16255.75
-8	16255.75

Time (msec)	Lateral Acceleration (g)
-7	16255.75
-6	16255.75
-5	16255.75
-4	16255.75
-3	16255.75
-2	16255.75
-1	16255.75
0	16255.75
1	16255.75
2	16255.75
3	16255.75
4	16255.75
5	16255.75
6	16255.75
7	16255.75
8	16255.75
9	16255.75
10	16255.75
11	16255.75
12	16255.75
13	16255.75
14	16255.75
15	16255.75
16	16255.75
17	16255.75
18	16255.75
19	16255.75
20	16255.75
21	16255.75
22	16255.75
23	16255.75
24	16255.75
25	16255.75
26	16255.75
27	16255.75
28	16255.75
29	16255.75
30	16255.75
31	16255.75
32	16255.75
33	16255.75
34	16255.75
35	16255.75
36	16255.75
37	16255.75
38	16255.75
39	16255.75
40	16255.75
41	16255.75
42	16255.75
43	16255.75
44	16255.75
45	16255.75
46	16255.75
47	16255.75
48	16255.75
49	16255.75

Time (msec)	Lateral Acceleration (g)
50	16255.75



Vehicle Roll Angle (First Record)

Time (sec)	Vehicle Roll Angle (deg)
-1.0	0.00
-0.9	0.00
-0.8	10.00
-0.7	10.00
-0.6	10.00
-0.5	10.00
-0.4	10.00
-0.3	10.00
-0.2	10.00
-0.1	10.00
0.0	10.00
0.1	0.00
0.2	-20.00
0.3	-20.00
0.4	-20.00
0.5	-10.00
0.6	0.00
0.7	0.00
0.8	0.00
0.9	0.00
1.0	0.00

Time (sec)	Vehicle Roll Angle (deg)
1.1	0.00
1.2	0.00
1.3	0.00
1.4	0.00
1.5	0.00
1.6	0.00
1.7	0.00
1.8	0.00
1.9	0.00
2.0	0.00
2.1	0.00
2.2	0.00
2.3	0.00
2.4	0.00
2.5	0.00
2.6	0.00
2.7	0.00
2.8	0.00
2.9	0.00
3.0	0.00
3.1	0.00

Time (sec)	Vehicle Roll Angle (deg)
3.2	0.00
3.3	0.00
3.4	0.00
3.5	0.00
3.6	0.00
3.7	0.00
3.8	0.00
3.9	0.00
4.0	0.00
4.1	0.00
4.2	0.00
4.3	0.00
4.4	0.00
4.5	0.00
4.6	0.00
4.7	0.00
4.8	0.00
4.9	0.00
5.0	0.00

System Status at Event (Second Record)

Complete File Recorded (Yes,No)	Yes
Multi-Event, Number of Events	2
Time From Event 1 to 2 (msec)	1,729
Lifetime Operating Timer at Event Time Zero (sec)	3,758,045
Key-On Timer at Event Time Zero (sec)	1,786
Vehicle Voltage at Time Zero (V)	12.4
Energy Reserve Mode Entered During Event (Yes, No)	No
Time RCM longitudinal acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time RCM lateral acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time from Time zero to Frontal Algorithm Wake Up (msec)	Wake up threshold reached at Time Zero
Time from Time zero to Side Algorithm Wake Up (msec)	30
Time from Time zero to Rear Algorithm Wake Up (msec)	Wake up threshold not reached
Time from Time zero to Frontal Algorithm Reset (msec)	121
Time from Time zero to Side Algorithm Reset (msec)	135
Time from Time zero to Rear Algorithm Reset (msec)	Reset threshold not reached
Time from Time zero to Rollover Algorithm Reset (msec)	Reset threshold not reached
RCM number	47837D8FAB2D
RCM internal flag	0000001F

Faults Present at Start of Event (Second Record)

No Faults Recorded

Deployment Data (Second Record)

Maximum Delta-V, Longitudinal (MPH [km/h])	-6.21 [-10.00]
Time, Maximum Delta-V (msec)	247.5
RCM, side Driver (lateral), Safing Deployment	Yes
RCM, side Passenger (lateral), Safing Deployment	Yes
Driver or center, front satellite sensor, Safing Deployment	Yes
Passenger, front satellite sensor, Safing Deployment	Yes
RCM, rollover, Safing Deployment	Yes

Pre-Crash Data -1 sec (Second Record)

Ignition cycle, Crash	2,964
Frontal Air Bag Warning Lamp, On/Off	Off
Safety Belt Status, Driver	Belted
Seat Track Position Switch, Foremost, Status, Driver	Rearward
Seat Track Position Switch, Foremost, Status, Front Passenger	Rearward
Safety Belt Status, Front Passenger	Belted
Rear safety belt status, 2nd row driver side	Unbelted
Rear safety belt status, 2nd row passenger side	Unbelted
Brake Telltale	Off
ABS Telltale	Off
ESC/TC Telltale	Fast flash
ESC/TC Off Telltale	Default Mode
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL) Telltale	Unchanged Off
Global Real Time (seconds)	104,439,597.1

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Second Record)

Time (sec)	Driver Gear Selection (Auto Trans)	Wheel Torque Requested (Nm)	Total Arbitrated Brake Torque (Nm)	Ignition Status	Speed Control Status
- 5.0	Drive	-16	1,264	Run	Off
- 4.5	Drive	-36	1,048	Run	Off
- 4.0	Drive	-56	916	Run	Off
- 3.5	Drive	-12	1,772	Run	Off
- 3.0	Drive	28	2,636	Run	Off
- 2.5	Drive	-100	692	Run	Off
- 2.0	Drive	-20	2,064	Run	Off
- 1.5	Drive	-36	964	Run	Off
- 1.0	Drive	-20	1,848	Run	Off
- 0.5	Drive	-20	388	Run	Off
0.0	Drive	-20	416	Run	Off

Pre-Crash Data -5 to 0 sec [10 samples/sec] (Second Record) - Table 1 of 2

Time (sec)	ABS Activity (Engaged, Non-Engaged)	Brake Powertrain Torque Request 1	Brake Powertrain Torque Request 2	Traction Control via Brakes	Stability Control Lateral Acceleration (g)	Stability Control Longitudinal Acceleration (g)
- 5.0	Non-engaged	Yes	Inactive	No	-0.20	-0.18
- 4.9	Non-engaged	Yes	Inactive	No	-0.65	-0.25
- 4.8	Non-engaged	Yes	Inactive	No	-0.74	-0.23
- 4.7	Non-engaged	Yes	Inactive	No	-0.36	-0.08
- 4.6	Non-engaged	Yes	Inactive	No	-0.45	-0.18
- 4.5	Non-engaged	Yes	Inactive	No	-0.78	-0.24
- 4.4	Non-engaged	Yes	Inactive	No	-0.70	-0.28
- 4.3	Non-engaged	Yes	Inactive	No	-0.75	-0.17
- 4.2	Non-engaged	Yes	Inactive	No	-0.58	-0.25
- 4.1	Non-engaged	Yes	Inactive	No	-0.54	-0.11
- 4.0	Non-engaged	Yes	Inactive	No	-0.46	-0.22
- 3.9	Non-engaged	Yes	Inactive	No	-0.67	-0.28
- 3.8	Engaged	Yes	Inactive	No	-0.45	-0.40
- 3.7	Engaged	Yes	Inactive	No	-0.39	-0.22
- 3.6	Engaged	Yes	Inactive	No	-0.54	-0.23
- 3.5	Engaged	Yes	Inactive	No	-0.53	-0.16
- 3.4	Engaged	Yes	Inactive	No	-0.36	-0.14
- 3.3	Engaged	Yes	Inactive	No	-0.70	-0.16
- 3.2	Engaged	Yes	Inactive	No	-0.49	-0.11
- 3.1	Engaged	Yes	Inactive	No	-0.55	-0.21
- 3.0	Engaged	Yes	Inactive	No	-0.67	-0.23
- 2.9	Engaged	Yes	Inactive	No	-0.54	-0.14
- 2.8	Engaged	Yes	Inactive	No	-0.68	-0.34
- 2.7	Engaged	Yes	Inactive	No	-0.40	-0.21
- 2.6	Engaged	Yes	Inactive	No	-0.20	-0.20
- 2.5	Engaged	Yes	Inactive	No	-0.08	-0.20
- 2.4	Engaged	Yes	Inactive	No	-0.40	-0.08
- 2.3	Engaged	Yes	Inactive	No	0.00	-0.30
- 2.2	Engaged	Yes	Inactive	No	-0.37	-0.44
- 2.1	Engaged	Yes	Inactive	No	-0.52	0.25
- 2.0	Engaged	Yes	Inactive	No	-0.48	-0.61
- 1.9	Engaged	Yes	Inactive	No	-0.08	0.09
- 1.8	Engaged	Yes	Inactive	No	0.56	-0.69
- 1.7	Engaged	Yes	Inactive	No	-0.60	-1.34
- 1.6	Engaged	Yes	Inactive	No	0.40	-3.61
- 1.5	Engaged	Yes	Inactive	No	0.61	-1.97
- 1.4	Engaged	Yes	Inactive	No	0.08	-0.67
- 1.3	Engaged	Yes	Inactive	No	0.25	-0.25
- 1.2	Engaged	Yes	Inactive	No	-0.28	0.15
- 1.1	Engaged	Yes	Inactive	No	0.23	-0.50
- 1.0	Engaged	Yes	Inactive	No	-0.10	-0.56
- 0.9	Engaged	Yes	Inactive	No	0.65	-0.72
- 0.8	Engaged	Yes	Inactive	No	0.50	-1.37
- 0.7	Engaged	Yes	Inactive	No	-0.10	-0.57
- 0.6	Engaged	Yes	Inactive	No	-0.42	-0.52
- 0.5	Engaged	Yes	Inactive	No	-0.38	-0.53
- 0.4	Engaged	Yes	Inactive	No	0.38	-0.53
- 0.3	Engaged	Yes	Inactive	No	-0.14	-0.38
- 0.2	Engaged	Yes	Inactive	No	-0.11	-0.18
- 0.1	Engaged	Yes	Inactive	No	-0.35	-0.19
0.0	Engaged	Yes	Inactive	No	-0.40	-0.82

Pre-Crash Data -5 to 0 sec [10 samples/sec] (Second Record) - Table 2 of 2

Time (sec)	Stability Control Yaw Rate (deg/sec)	Stability Control Roll Rate (deg/sec)	Steering Wheel Angle (deg)	Steering Wheel Angle Quality Factor
- 5.0	-10.32	7.17	46.3	OK
- 4.9	-3.03	-7.03	36.6	OK
- 4.8	-4.63	-7.41	39.8	OK
- 4.7	-9.27	4.44	43.6	OK
- 4.6	-11.09	8.17	55.3	OK
- 4.5	-10.27	1.33	43.0	OK
- 4.4	-8.38	-3.32	69.5	OK
- 4.3	-6.42	-5.04	88.2	OK
- 4.2	-6.49	8.29	82.0	OK
- 4.1	-6.61	9.47	78.0	OK
- 4.0	-1.91	4.06	82.6	OK
- 3.9	2.65	-4.08	86.3	OK
- 3.8	0.88	-1.00	102.9	OK
- 3.7	0.32	10.19	113.4	OK
- 3.6	3.38	1.99	107.3	OK
- 3.5	3.77	-9.57	110.3	OK
- 3.4	1.95	2.12	117.2	OK
- 3.3	2.68	5.76	131.9	OK
- 3.2	1.24	-6.19	147.7	OK
- 3.1	-2.17	0.33	168.0	OK
- 3.0	-3.93	5.66	176.7	OK
- 2.9	-7.80	-2.19	168.0	OK
- 2.8	-7.66	11.62	175.0	OK
- 2.7	-5.72	17.14	165.8	OK
- 2.6	4.49	37.41	161.6	OK
- 2.5	6.36	46.00	136.3	OK
- 2.4	9.45	30.98	121.3	OK
- 2.3	7.17	30.24	111.5	OK
- 2.2	7.58	-7.25	101.0	OK
- 2.1	16.23	-62.52	89.2	OK
- 2.0	18.47	19.12	83.7	OK
- 1.9	24.51	33.53	100.3	OK
- 1.8	21.48	9.70	105.7	OK
- 1.7	17.70	-44.78	91.3	OK
- 1.6	7.29	-169.31	80.2	OK
- 1.5	-0.21	-105.75	91.6	OK
- 1.4	5.16	11.80	90.8	OK
- 1.3	8.26	53.12	95.0	OK
- 1.2	7.51	72.34	112.7	OK
- 1.1	3.49	71.70	111.6	OK
- 1.0	2.01	16.36	103.3	OK
- 0.9	-2.22	-64.68	94.9	OK
- 0.8	-12.10	-34.36	85.7	OK
- 0.7	-11.14	33.34	100.1	OK
- 0.6	-13.50	13.82	107.8	OK
- 0.5	-14.12	-24.06	104.5	OK
- 0.4	-11.78	-4.69	113.4	OK
- 0.3	-0.78	-4.23	117.6	OK
- 0.2	6.14	-6.01	114.8	OK
- 0.1	4.31	15.69	105.6	OK
0.0	2.18	4.53	107.8	OK

Pre-Crash Data -5 to 0 sec [5 samples/sec] (Second Record) - Table 1 of 2

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 5.0	52.0 [84]	OK	0	OK	Off	OK	1,382	Cruise_Reg_Not_Overridden
- 4.8	49.5 [80]	OK	0	OK	Off	OK	1,416	Cruise_Reg_Not_Overridden
- 4.6	56.7 [91]	OK	0	OK	Off	OK	1,534	Cruise_Reg_Not_Overridden
- 4.4	49.9 [80]	OK	0	OK	Off	OK	1,210	Cruise_Reg_Not_Overridden
- 4.2	49.3 [79]	OK	0	OK	Off	OK	1,468	Cruise_Reg_Not_Overridden
- 4.0	49.0 [79]	OK	0	OK	Off	OK	1,286	Cruise_Reg_Not_Overridden
- 3.8	47.0 [76]	OK	0	OK	On	OK	1,300	Cruise_Reg_Not_Overridden
- 3.6	43.7 [70]	OK	0	OK	On	OK	1,054	Cruise_Reg_Not_Overridden
- 3.4	44.4 [71]	OK	0	OK	On	OK	1,062	Cruise_Reg_Not_Overridden
- 3.2	48.1 [77]	OK	0	OK	On	OK	1,138	Cruise_Reg_Not_Overridden
- 3.0	51.4 [83]	OK	0	OK	On	OK	1,280	Cruise_Reg_Not_Overridden
- 2.8	52.5 [85]	OK	0	OK	On	OK	1,578	Cruise_Reg_Not_Overridden
- 2.6	52.1 [84]	OK	0	OK	On	OK	1,600	Cruise_Reg_Not_Overridden
- 2.4	40.7 [66]	OK	0	OK	On	OK	1,246	Cruise_Reg_Not_Overridden
- 2.2	36.9 [59]	OK	0	OK	On	OK	1,040	Cruise_Reg_Not_Overridden
- 2.0	39.8 [64]	OK	0	OK	On	OK	1,070	Cruise_Reg_Not_Overridden
- 1.8	47.1 [76]	OK	0	OK	On	OK	1,160	Cruise_Reg_Not_Overridden
- 1.6	34.6 [56]	OK	0	OK	On	OK	1,060	Cruise_Reg_Not_Overridden
- 1.4	23.9 [38]	OK	0	OK	On	OK	898	Cruise_Reg_Not_Overridden

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 1.2	10.2 [16]	OK	0	OK	On	OK	364	Cruise_Reg_Not_Overridden
- 1.0	13.3 [21]	OK	0	OK	On	OK	364	Cruise_Reg_Not_Overridden
- 0.8	14.3 [23]	OK	0	OK	On	OK	0	Cruise_Reg_Not_Overridden
- 0.6	11.5 [19]	OK	0	OK	On	OK	0	Cruise_Reg_Not_Overridden
- 0.4	13.9 [22]	OK	0	OK	On	OK	0	Cruise_Reg_Not_Overridden
- 0.2	17.8 [29]	OK	0	OK	On	OK	0	Cruise_Reg_Not_Overridden
0.0	15.0 [24]	OK	0	OK	On	OK	0	Cruise_Reg_Not_Overridden

Pre-Crash Data -5 to 0 sec [5 samples/sec] (Second Record) - Table 2 of 2

Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 5.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.4	No PreCharge Request	Normal	0	No	Yes	No	Yes

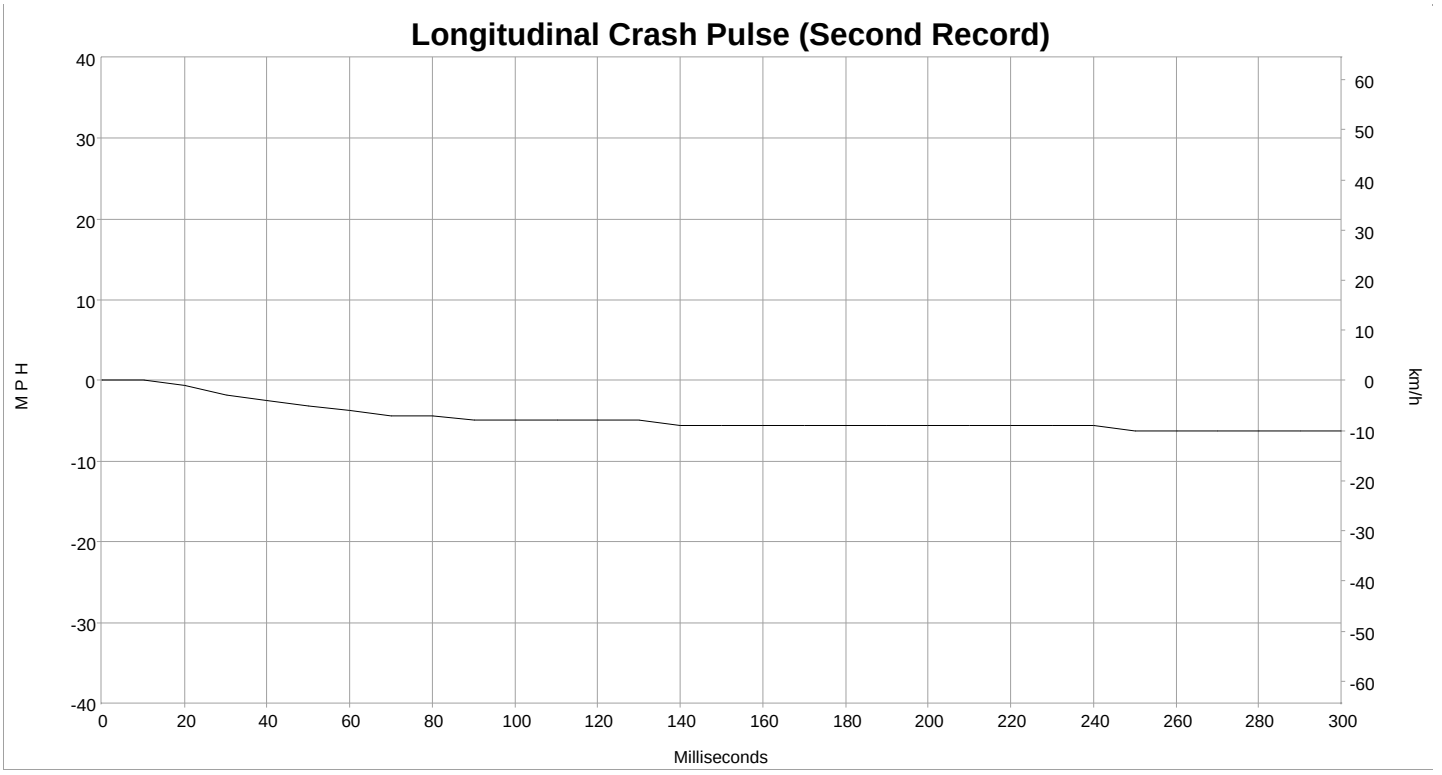
Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 1.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
0.0	No PreCharge Request	Normal	0	No	Yes	No	Yes

Pre-Crash Data -5 to 0 sec [1 sample/sec] (Second Record)

Time (sec)	Occupant Size Classification, Front Passenger (Child size Yes/No [Hex value])	Extended Power Status
- 5.0	No [$01]	No Fault
- 4.0	No [$01]	No Fault
- 3.0	No [$01]	No Fault
- 2.0	No [$01]	No Fault
- 1.0	No [$01]	No Fault
0.0	No [$01]	No Fault

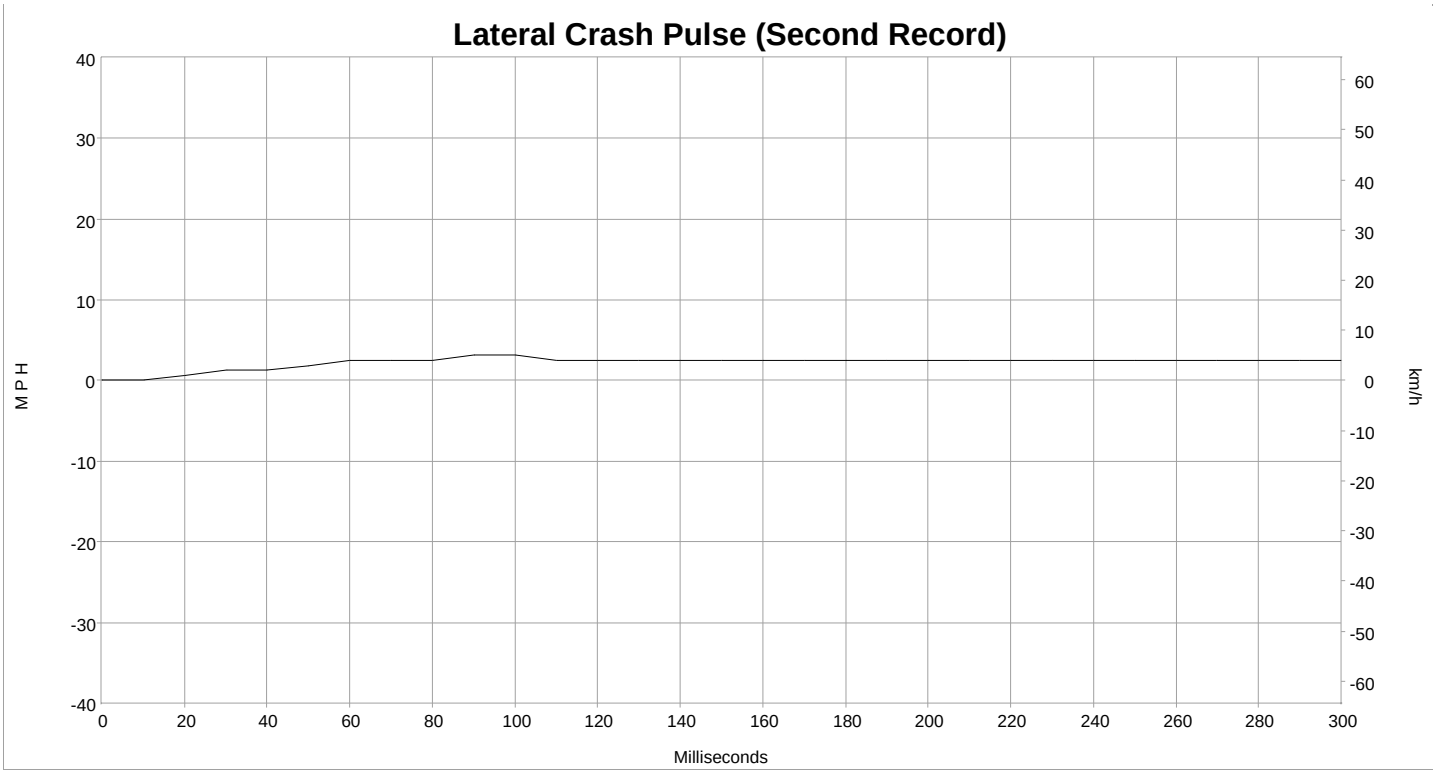
Post-Crash Data 0 to 5 sec [4 samples/sec] (Second Record)

Time (sec)	Impact Event Feedback Status
0.00	Normal
0.25	Normal
0.50	Normal
0.75	Normal
1.00	Normal
1.25	Normal
1.50	Normal
1.75	Normal
2.00	Normal
2.25	Normal
2.50	Normal
2.75	Normal
3.00	Normal
3.25	Normal
3.50	Normal
3.75	Normal
4.00	Normal
4.25	Normal
4.50	Normal
4.75	Normal
5.00	Normal


Longitudinal Crash Pulse (Second Record)
MPH
km/h
Milliseconds
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

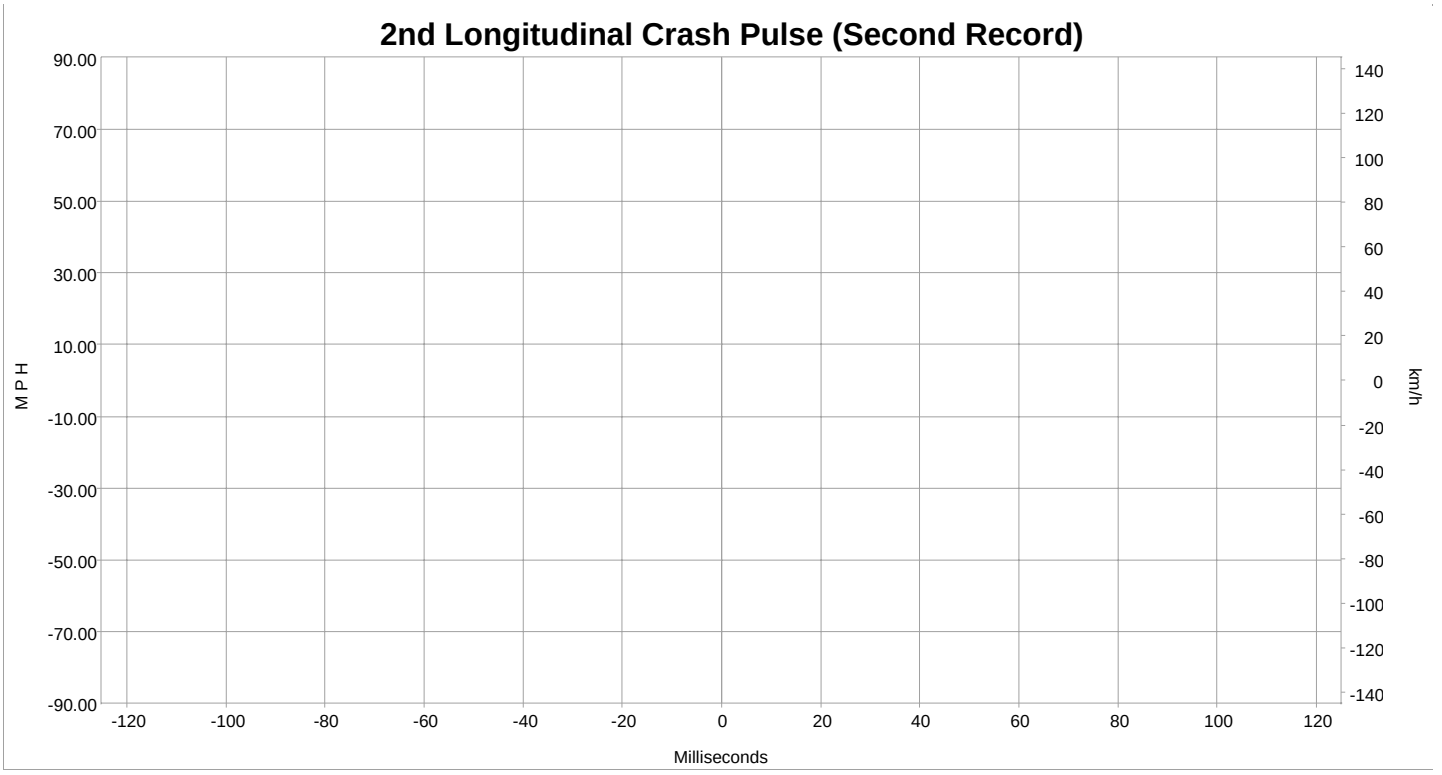
Longitudinal Crash Pulse (Second Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
0	0.00	0.00
10	0.00	0.00
20	-0.62	-1.00
30	-1.86	-3.00
40	-2.49	-4.00
50	-3.11	-5.00
60	-3.73	-6.00
70	-4.35	-7.00
80	-4.35	-7.00
90	-4.97	-8.00
100	-4.97	-8.00
110	-4.97	-8.00
120	-4.97	-8.00
130	-4.97	-8.00
140	-5.59	-9.00
150	-5.59	-9.00
160	-5.59	-9.00
170	-5.59	-9.00
180	-5.59	-9.00
190	-5.59	-9.00
200	-5.59	-9.00
210	-5.59	-9.00
220	-5.59	-9.00
230	-5.59	-9.00
240	-5.59	-9.00
250	-6.21	-10.00
260	-6.21	-10.00
270	-6.21	-10.00
280	-6.21	-10.00
290	-6.21	-10.00
300	-6.21	-10.00


Lateral Crash Pulse (Second Record)
MPH
km/h
Milliseconds
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

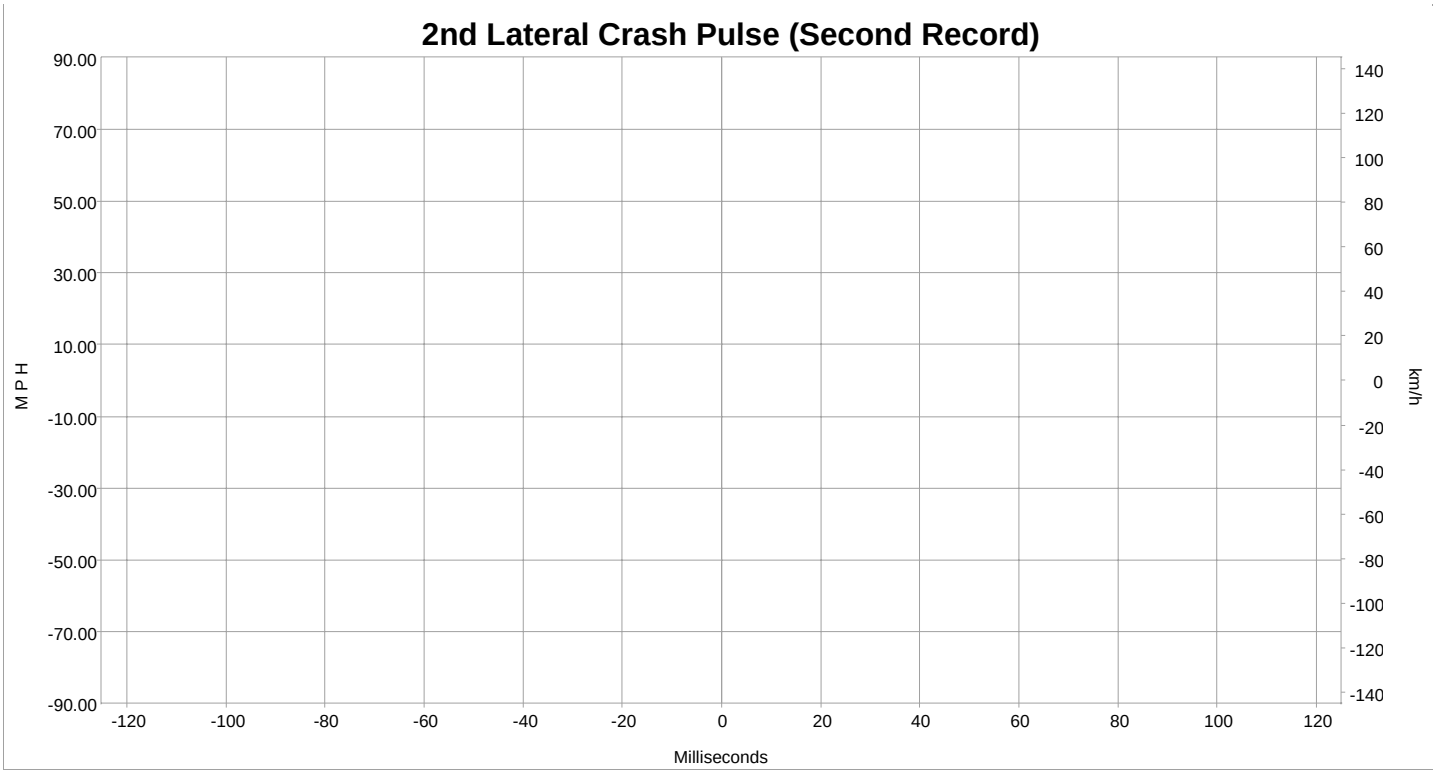
Lateral Crash Pulse (Second Record)

Time (msec)	Delta-V, Lateral (MPH)	Delta-V, Lateral (km/h)
0	0.00	0.00
10	0.00	0.00
20	0.62	1.00
30	1.24	2.00
40	1.24	2.00
50	1.86	3.00
60	2.49	4.00
70	2.49	4.00
80	2.49	4.00
90	3.11	5.00
100	3.11	5.00
110	2.49	4.00
120	2.49	4.00
130	2.49	4.00
140	2.49	4.00
150	2.49	4.00
160	2.49	4.00
170	2.49	4.00
180	2.49	4.00
190	2.49	4.00
200	2.49	4.00
210	2.49	4.00
220	2.49	4.00
230	2.49	4.00
240	2.49	4.00
250	2.49	4.00
260	2.49	4.00
270	2.49	4.00
280	2.49	4.00
290	2.49	4.00
300	2.49	4.00



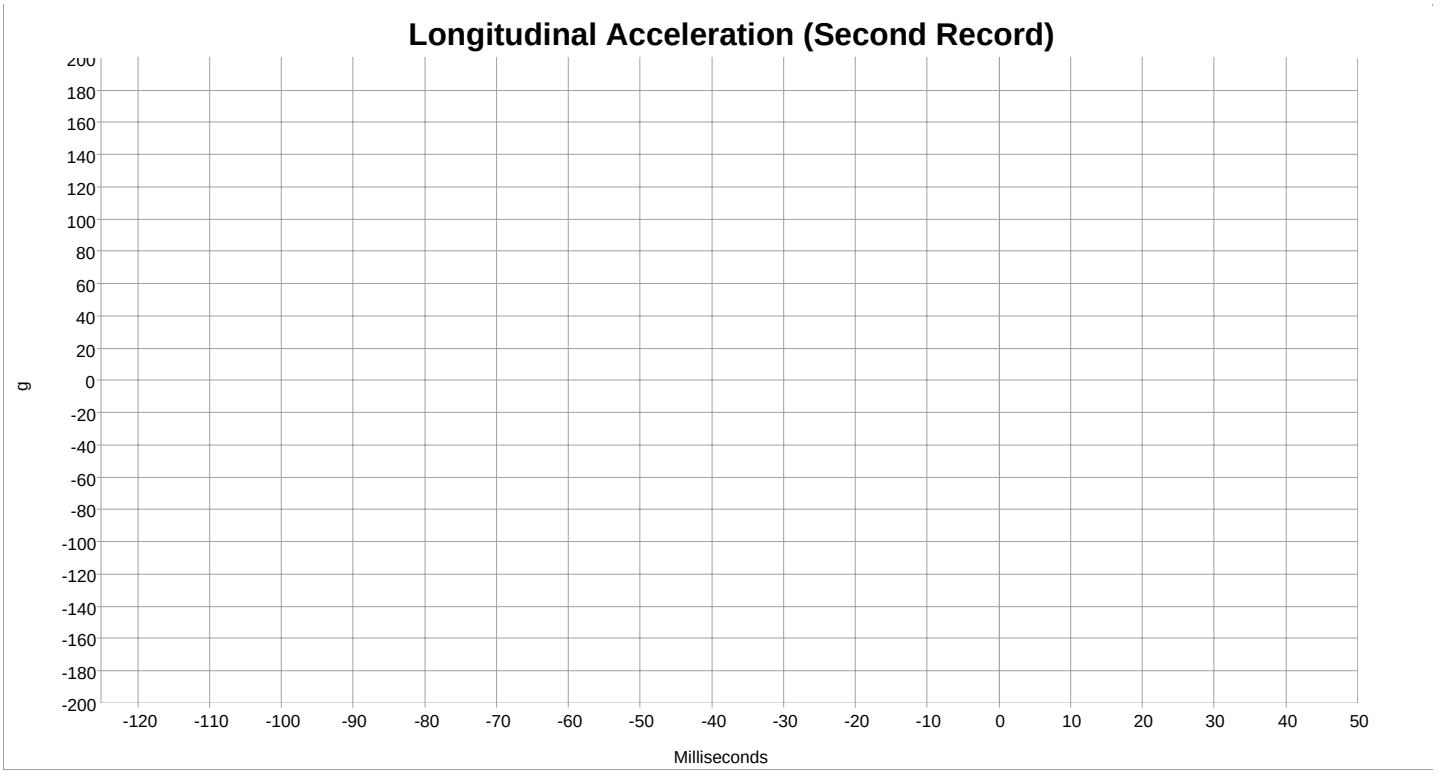
2nd Longitudinal Crash Pulse (Second Record)

Time (msec)	2nd Delta-V, longitudinal (MPH)	2nd Delta-V, longitudinal (km/h)
-125	N/A	N/A
-115	N/A	N/A
-105	N/A	N/A
-95	N/A	N/A
-85	N/A	N/A
-75	N/A	N/A
-65	N/A	N/A
-55	N/A	N/A
-45	N/A	N/A
-35	N/A	N/A
-25	N/A	N/A
-15	N/A	N/A
-5	N/A	N/A
5	N/A	N/A
15	N/A	N/A
25	N/A	N/A
35	N/A	N/A
45	N/A	N/A
55	N/A	N/A
65	N/A	N/A
75	N/A	N/A
85	N/A	N/A
95	N/A	N/A
105	N/A	N/A
115	N/A	N/A
125	N/A	N/A



2nd Lateral Crash Pulse (Second Record)

Time (msec)	2nd Delta-V, Lateral (MPH)	2nd Delta-V, Lateral (km/h)
-125	N/A	N/A
-115	N/A	N/A
-105	N/A	N/A
-95	N/A	N/A
-85	N/A	N/A
-75	N/A	N/A
-65	N/A	N/A
-55	N/A	N/A
-45	N/A	N/A
-35	N/A	N/A
-25	N/A	N/A
-15	N/A	N/A
-5	N/A	N/A
5	N/A	N/A
15	N/A	N/A
25	N/A	N/A
35	N/A	N/A
45	N/A	N/A
55	N/A	N/A
65	N/A	N/A
75	N/A	N/A
85	N/A	N/A
95	N/A	N/A
105	N/A	N/A
115	N/A	N/A
125	N/A	N/A


Longitudinal Acceleration (Second Record)
g
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
Milliseconds

Time (msec)	Longitudinal Acceleration (g)
-125	16255.75
-124	16255.75
-123	16255.75
-122	16255.75
-121	16255.75
-120	16255.75
-119	16255.75
-118	16255.75
-117	16255.75
-116	16255.75
-115	16255.75
-114	16255.75
-113	16255.75
-112	16255.75
-111	16255.75
-110	16255.75
-109	16255.75
-108	16255.75
-107	16255.75
-106	16255.75
-105	16255.75
-104	16255.75
-103	16255.75
-102	16255.75
-101	16255.75
-100	16255.75
-99	16255.75
-98	16255.75
-97	16255.75
-96	16255.75
-95	16255.75
-94	16255.75
-93	16255.75
-92	16255.75
-91	16255.75
-90	16255.75
-89	16255.75
-88	16255.75
-87	16255.75
-86	16255.75
-85	16255.75
-84	16255.75
-83	16255.75
-82	16255.75
-81	16255.75
-80	16255.75
-79	16255.75
-78	16255.75
-77	16255.75
-76	16255.75
-75	16255.75
-74	16255.75
-73	16255.75
-72	16255.75
-71	16255.75
-70	16255.75
-69	16255.75

Time (msec)	Longitudinal Acceleration (g)
-68	16255.75
-67	16255.75

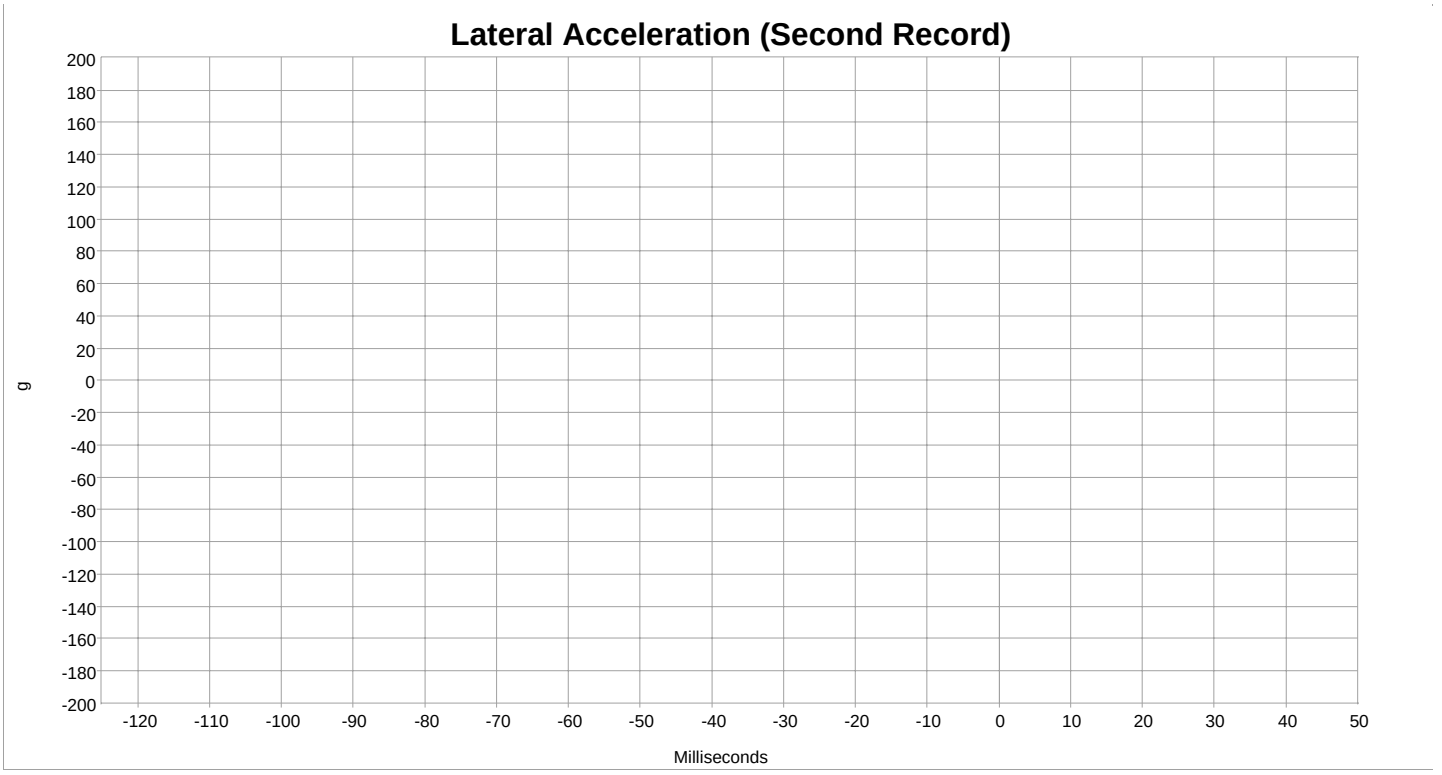
Longitudinal Acceleration (Second Record)

Time (msec)	Longitudinal Acceleration (g)
-66	16255.75
-65	16255.75
-64	16255.75
-63	16255.75
-62	16255.75
-61	16255.75
-60	16255.75
-59	16255.75
-58	16255.75
-57	16255.75
-56	16255.75
-55	16255.75
-54	16255.75
-53	16255.75
-52	16255.75
-51	16255.75
-50	16255.75
-49	16255.75
-48	16255.75
-47	16255.75
-46	16255.75
-45	16255.75
-44	16255.75
-43	16255.75
-42	16255.75
-41	16255.75
-40	16255.75
-39	16255.75
-38	16255.75
-37	16255.75
-36	16255.75
-35	16255.75
-34	16255.75
-33	16255.75
-32	16255.75
-31	16255.75
-30	16255.75
-29	16255.75
-28	16255.75
-27	16255.75
-26	16255.75
-25	16255.75
-24	16255.75
-23	16255.75
-22	16255.75
-21	16255.75
-20	16255.75
-19	16255.75
-18	16255.75
-17	16255.75
-16	16255.75
-15	16255.75
-14	16255.75
-13	16255.75
-12	16255.75
-11	16255.75
-10	16255.75

Time (msec)	Longitudinal Acceleration (g)
-9	16255.75
-8	16255.75

Time (msec)	Longitudinal Acceleration (g)
-7	16255.75
-6	16255.75
-5	16255.75
-4	16255.75
-3	16255.75
-2	16255.75
-1	16255.75
0	16255.75
1	16255.75
2	16255.75
3	16255.75
4	16255.75
5	16255.75
6	16255.75
7	16255.75
8	16255.75
9	16255.75
10	16255.75
11	16255.75
12	16255.75
13	16255.75
14	16255.75
15	16255.75
16	16255.75
17	16255.75
18	16255.75
19	16255.75
20	16255.75
21	16255.75
22	16255.75
23	16255.75
24	16255.75
25	16255.75
26	16255.75
27	16255.75
28	16255.75
29	16255.75
30	16255.75
31	16255.75
32	16255.75
33	16255.75
34	16255.75
35	16255.75
36	16255.75
37	16255.75
38	16255.75
39	16255.75
40	16255.75
41	16255.75
42	16255.75
43	16255.75
44	16255.75
45	16255.75
46	16255.75
47	16255.75
48	16255.75
49	16255.75

Time (msec)	Longitudinal Acceleration (g)
50	16255.75


Lateral Acceleration (Second Record)
g
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
Milliseconds

Time (msec)	Lateral Acceleration (g)
-125	16255.75
-124	16255.75
-123	16255.75
-122	16255.75
-121	16255.75
-120	16255.75
-119	16255.75
-118	16255.75
-117	16255.75
-116	16255.75
-115	16255.75
-114	16255.75
-113	16255.75
-112	16255.75
-111	16255.75
-110	16255.75
-109	16255.75
-108	16255.75
-107	16255.75
-106	16255.75
-105	16255.75
-104	16255.75
-103	16255.75
-102	16255.75
-101	16255.75
-100	16255.75
-99	16255.75
-98	16255.75
-97	16255.75
-96	16255.75
-95	16255.75
-94	16255.75
-93	16255.75
-92	16255.75
-91	16255.75
-90	16255.75
-89	16255.75
-88	16255.75
-87	16255.75
-86	16255.75
-85	16255.75
-84	16255.75
-83	16255.75
-82	16255.75
-81	16255.75
-80	16255.75
-79	16255.75
-78	16255.75
-77	16255.75
-76	16255.75
-75	16255.75
-74	16255.75
-73	16255.75
-72	16255.75
-71	16255.75
-70	16255.75
-69	16255.75

Time (msec)	Lateral Acceleration (g)
-68	16255.75
-67	16255.75

Lateral Acceleration (Second Record)

Time (msec)	Lateral Acceleration (g)
-66	16255.75
-65	16255.75
-64	16255.75
-63	16255.75
-62	16255.75
-61	16255.75
-60	16255.75
-59	16255.75
-58	16255.75
-57	16255.75
-56	16255.75
-55	16255.75
-54	16255.75
-53	16255.75
-52	16255.75
-51	16255.75
-50	16255.75
-49	16255.75
-48	16255.75
-47	16255.75
-46	16255.75
-45	16255.75
-44	16255.75
-43	16255.75
-42	16255.75
-41	16255.75
-40	16255.75
-39	16255.75
-38	16255.75
-37	16255.75
-36	16255.75
-35	16255.75
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-33	16255.75
-32	16255.75
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-30	16255.75
-29	16255.75
-28	16255.75
-27	16255.75
-26	16255.75
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-24	16255.75
-23	16255.75
-22	16255.75
-21	16255.75
-20	16255.75
-19	16255.75
-18	16255.75
-17	16255.75
-16	16255.75
-15	16255.75
-14	16255.75
-13	16255.75
-12	16255.75
-11	16255.75
-10	16255.75

Time (msec)	Lateral Acceleration (g)
-9	16255.75
-8	16255.75

Time (msec)	Lateral Acceleration (g)
-7	16255.75
-6	16255.75
-5	16255.75
-4	16255.75
-3	16255.75
-2	16255.75
-1	16255.75
0	16255.75
1	16255.75
2	16255.75
3	16255.75
4	16255.75
5	16255.75
6	16255.75
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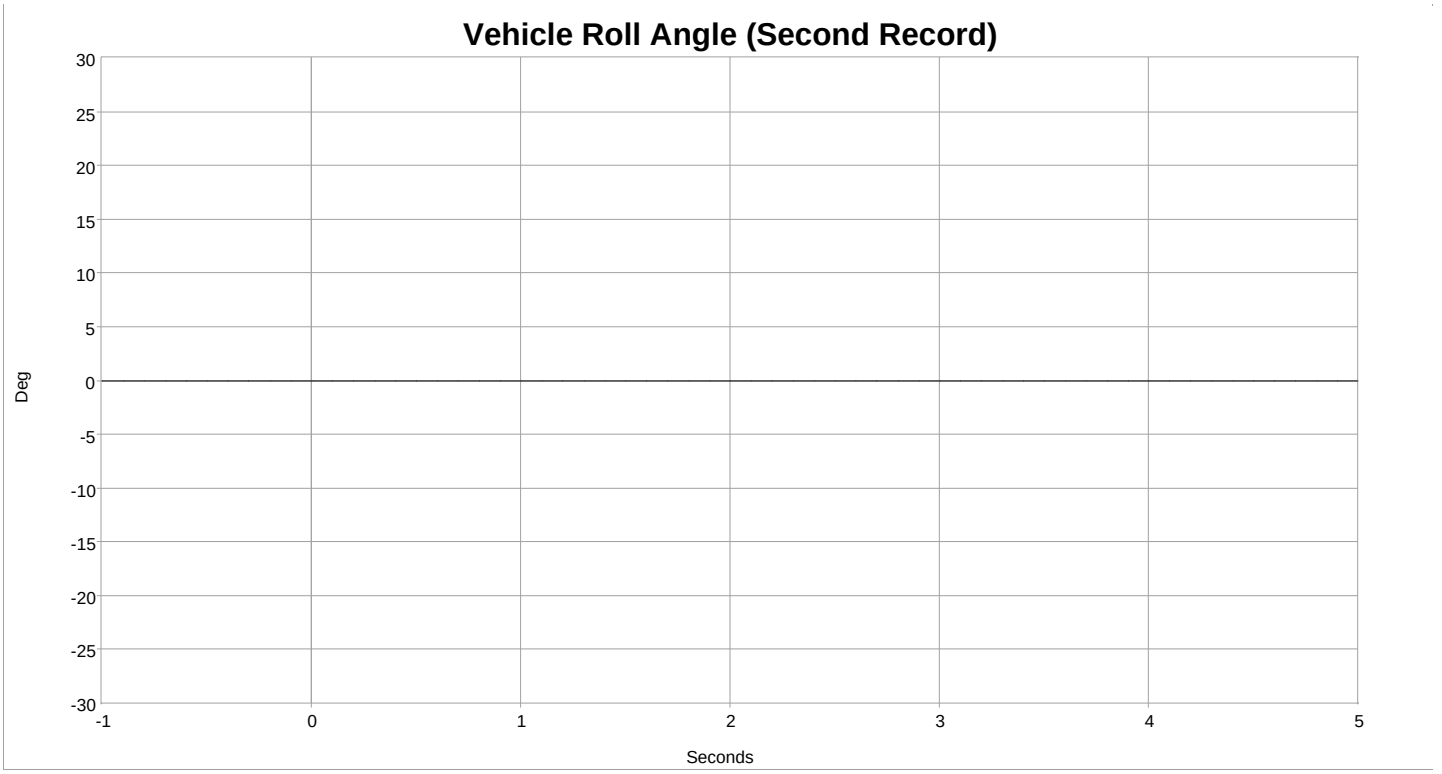
34	16255.75
35	16255.75
36	16255.75
37	16255.75
38	16255.75
39	16255.75
40	16255.75
41	16255.75
42	16255.75
43	16255.75
44	16255.75
45	16255.75
46	16255.75
47	16255.75
48	16255.75
49	16255.75

Time (msec)	Lateral Acceleration (g)
50	16255.75



Vehicle Roll Angle (Second Record)

Time (sec)	Vehicle Roll Angle (deg)
-1.0	0.00
-0.9	0.00
-0.8	0.00
-0.7	0.00
-0.6	0.00
-0.5	0.00
-0.4	0.00
-0.3	0.00
-0.2	0.00
-0.1	0.00
0.0	0.00
0.1	0.00
0.2	0.00
0.3	0.00
0.4	0.00
0.5	0.00
0.6	0.00
0.7	0.00
0.8	0.00
0.9	0.00
1.0	0.00

Time (sec)	Vehicle Roll Angle (deg)
1.1	0.00
1.2	0.00
1.3	0.00
1.4	0.00
1.5	0.00
1.6	0.00
1.7	0.00
1.8	0.00
1.9	0.00
2.0	0.00
2.1	0.00
2.2	0.00
2.3	0.00
2.4	0.00
2.5	0.00
2.6	0.00
2.7	0.00
2.8	0.00
2.9	0.00
3.0	0.00
3.1	0.00

Time (sec)	Vehicle Roll Angle (deg)
3.2	0.00
3.3	0.00
3.4	0.00
3.5	0.00
3.6	0.00
3.7	0.00
3.8	0.00
3.9	0.00
4.0	0.00
4.1	0.00
4.2	0.00
4.3	0.00
4.4	0.00
4.5	0.00
4.6	0.00
4.7	0.00
4.8	0.00
4.9	0.00
5.0	0.00

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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$5B17 - Event Type
00 00 00 00

$F113 - RCM Part Number
4B 32 47 54 2D 31 34 42 33 32 31 2D 46 43 00 00 00 00 00 00 00 00 00 00

$F18C - RCM Serial Number
36 4C 32 30 36 33 32 37 32 36 41 49 00 00 00 00

$F188 - RCM Software Part Number
4B 58 37 54 2D 31 34 43 30 32 38 2D 41 41 00 00 00 00 00 00 00 00 00 00

$F143 - Left/Center Frontal Restraints Sensor Serial Number
41 37 32 44 39 42 43 33 35 38 33 44 00 00 00 00

$F141 - Left Side Restraints Sensor One Serial Number
39 46 32 42 36 45 35 38 33 38 35 32 00 00 00 00

$F145 - Left Side Restraints Sensor Two Serial Number
41 35 32 44 39 42 43 33 34 30 31 32 00 00 00 00

$F144 - Right Frontal Restraints Sensor Serial Number
39 42 32 44 34 45 44 34 33 46 30 42 00 00 00 00

$F142 - Right Side Restraints Sensor One Serial Number
43 31 32 44 34 46 32 38 33 30 31 42 00 00 00 00

$F146 - Right Side Restraints Sensor Two Serial Number
41 35 32 44 39 42 43 33 35 35 31 34 00 00 00 00

$DE00 - Original VIN
32 4C 4D 50 4A 36 4A 39 33 4B 42 2A 2A 2A 2A 2A 2A

$F190 - Current VIN
32 4C 4D 50 4A 36 4A 39 33 4B 42 2A 2A 2A 2A 2A 2A 00 00 00 00 00 00 00

$DE01 - RCM Option Content
E7 68 EF 33 70 0C E6 09 00 00 00 00
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BOSCH

CDR CRASH DATA RETRIEVAL

$5817 - Event Record 1

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02 02 04 04 04 04 04 04 04 04 04 04 04 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
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3E 80 3E 80 3E 9D 3F B8 3E 75 3D 2F 3E 94 3F 4F 3F 7A 3F 29 3F D1 40 63 40 3A 40 4F 3F EE
40 0E 40 34 40 A9 40 2E 41 37 41 F2 41 B4 41 8C 41 BA 41 DF 42 85 42 EE 42 B1 42 CF 43 14
43 A7 44 45 45 10 45 67 45 10 45 56 44 FA 44 D0 43 D3 43 3D 42 DB 42 72 41 FC 41 C5 42 6B
42 A1 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
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02 39 02 80 03 15 03 20 02 6F 02 08 02 17 02 44 01 01 01 01 01 01 01 01 01 01 01 01 01 01
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7D 95 80 21 82 36 7F 25 84 8A 86 B2 8E 9D 91 F8 8C 1A 8B D0 7D 2B 67 94 87 78 8D 19 83 CA
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8C FC 8B 0E 89 84 84 08 81 2F 81 CF 83 9F 84 55 84 03 83 46 82 82 82 89 82 95 80 BF 7E F7
7F A8 7F E0 7E AE 7E 87 7F 3D 7E F4 7F 84 80 D9 81 89 83 0C 82 FE 82 3C 7E 3F 7D 84 7C 4F
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7F BD 7F 7D 7F DE 80 4D 7F AC 7E C2 7F 58 7F 02 7F 1B 7F 4B 7F 0A 7F 1C 7F B3 7F 49 7F 13
7E EB 7F 53 7F 04 7F 90 7F 25 7E E7 7E 70 7F 26 7F 16 7F 5F 7F 79 7F 62 7F 92 7F 33 7F 1D
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0B 94 00 00 0B 9E 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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$5818 - Event Record 2

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FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF 40 4F 3F EE 40 0E 40 34 40 A9
40 2E 41 37 41 F2 41 B4 41 8C 41 BA 41 DF 42 85 42 EE 42 B1 42 CF 43 14 43 A7 44 45 45 10
45 67 45 10 45 56 44 FA 44 D0 43 D3 43 3D 42 DB 42 72 41 FC 41 C5 42 6B 42 A1 42 11 41 A2
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02 02 02 02 02 02 02 02 02 02 02 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$F18C - OCS Serial Number
31 42 35 5A 32 38 36 31 32 35 34 32 38 33 35 35

$F124 - RCM Calibration Part Number
4B 32 47 54 2D 31 34 43 30 39 38 2D 46 42 00 00 00 00 00 00 00 00 00 00

$F14B - Internal Sensor Serial Number
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

$F14D - Driver Side Restraints Sensor 3 Serial Number
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

$F14E - Passenger Side Restraints Sensor 3 Serial Number
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$F14F - Driver Side Restraints Sensor 4 Serial Number
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$F150 - Passenger Side Restraints Sensor 4 Serial Number
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**National Highway
Traffic Safety
Administration**

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