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April 2019

Special Crash Investigations
Alleged Unintended Acceleration Crash Investigation
Vehicle: 2015 Toyota Yaris
Location: California
Crash Date: December 2015

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

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

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This report documents an on-site investigation of an alleged unintended acceleration of a 2015 Toyota Yaris involved in a crash with a 2007 Toyota Solara.

16. Abstract

This two-vehicle crash occurred in December 2015 at 1900 hours in the intersection of an urban roadway and interstate off-ramp. The Yaris was being driven by a belted 51-year-old female. There were three additional belted passengers in the Yaris: a 7-year-old male, a 16-year-old male, and a 12-year-old female. The second vehicle was a 2007 Toyota Solara. The Yaris was traveling eastbound on the interstate roadway. The driver of the Yaris reported that she was unable to slow or stop her vehicle. She exited the interstate onto an off-ramp to her right. The Yaris traveled southeast along the ramp until the ramp intersected a north/south street. The Solara was traveling northbound on the north/south street approaching the same intersection. As the Yaris approached the intersection, the vehicle struck a curb. The Yaris continued into the intersection, crossed the southbound travel lanes, and struck the left side of the Solara. The Solara rotated counterclockwise and struck a traffic sign. The Yaris traveled east of the roadway and struck a fence and a tree before coming to rest in the parking area of a gas station. The driver, the 16-year-old male, and the 12-year-old female occupants of the Yaris were seriously injured and transported from the scene. The 7-year-old male in the Yaris was fatally injured. All four occupants of the Solara were fatally injured. There was no active safety equipment installed in the Yaris. Based on the available data it appears that the cause of the crash was a result of pedal misapplication.

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BACKGROUND

This report documents the on-site investigation of an alleged unintended acceleration of a 2015 Toyota Yaris (**Figure 1)** involved in a front plane to side plane crash with a 2007 Toyota Solara (**Figure 2**). This investigation was initiated by the Office of Defects Investigation (ODI). The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration assigned the case to Dynamic Science, Inc., in January 2016. The Yaris and Solara were placed on a police hold pending their investigation and inspection. The vehicle inspection took place later in the month. Present during the inspection were four members of the police major accident investigation team, a police mechanical expert, and five representatives from Toyota. The inspections included vehicle measurements, photographs, and a partial tear-down of the Yaris. A complete mechanical inspection by the police agency took place later. The mechanical inspection did not disclose any preexisting conditions of the service brakes, suspension, throttle, steering, fuel system, or the electrical system. Both vehicles were supported by the Bosch Crash Data Retrieval (CDR) system and the vehicles' event data recorders (EDRs) were removed and imaged by the police prior to the inspection. Electronic and hard-copy copies of the data were obtained by SCI during the vehicle inspections. Based on the available data it appears that the cause of the crash was a result of pedal misapplication.

Figure 1. 2015 Toyota Yaris, frontal damage.

Figure 2. 2007 Toyota Solara, left side damage.

This two-vehicle crash occurred in December 2015 in the evening in the intersection of an urban roadway and interstate off-ramp. The Yaris was being driven by a belted 51-year-old female. There were three additional belted passengers in the Yaris: a 7-year-old male, a 16-year-old male, and a 12-year-old female. The second vehicle was a 2007 Toyota Solara driven by a belted 30-year-old male. There were three additional passengers in the Solara: two 29-year-old males and a 37-year-old female.

The Yaris was traveling eastbound on the interstate roadway at a driver-reported speed of 96 to 104 km/h (60 to 65 mph) in the middle travel lane. The driver began to gradually move to get into the right lane in preparation for transitioning to a different interstate roadway approximately 14 km (9 miles) ahead. After being in the right lane for approximately one minute the driver alleged that the vehicle began accelerating on its own. The driver of the Yaris reported that she was unable to slow or stop her vehicle. She indicated that she braked several times and each time the brake went to the floor. She also reported that she had attempted to use the hand brake at one point. As the vehicle continued eastbound she reported that she passed slower traffic by steering onto the right shoulder. As she realized that the vehicle was overtaking slower traffic she decided to exit the interstate. At the first available exit she departed the interstate onto an off-ramp to her right. Her intent was to turn right when reaching the end of the ramp. The Yaris traveled southeast along the ramp until the ramp intersected a north/south street. The Solara was traveling northbound on the north/south street approaching the same intersection. As the Yaris approached the intersection, the vehicle struck a curb.

The Yaris continued into the intersection, crossed the southbound travel lanes, and struck the left side of the Solara. The Solara rotated counterclockwise and struck a traffic sign. The Yaris traveled east of the roadway and struck a fence and a tree before coming to rest in the parking area of a gas station.

The driver, the 16-year-old male, and the 12-year-old female occupants of the Yaris were seriously injured and transported from the scene. The driver sustained “A” (Severe) injuries and was hospitalized for 5 days. The 16-year-old male sustained “A” (Severe) injuries and was treated and released. The 7-year-old male in the Yaris was fatally injured. The 12-year-old female sustained “A” (Severe) injuries and was hospitalized for a day. All four occupants of the Solara were fatally injured.

SUMMARY

Crash Site

The crash site was the intersection of an interstate off-ramp and an urban roadway. The off-ramp departed from an east/west interstate highway and extended approximately 335 m (1,100 ft) from the interstate exit to the intersection. The interstate speed limit was 105 km/h (65 mph). The ramp was oriented to the east with a +3.1 percent grade. The asphalt three-lane undivided ramp was initially straight and then began curving to the left 40 m (131 ft) from the intersection (**Figure 3**). There were surface markings for left, left/straight/right, and right traffic movement. The ramp was bordered by white fog lines and asphalt curbs. As the ramp neared the intersection, the right

Figure 3. Eastbound approach along ramp.

asphalt curb transitioned to a 20 cm (8 in) concrete curb return. The divided urban roadway was oriented north/south and was configured with three northbound travel lanes, a painted center median, and two southbound travel lanes (**Figure 4**). The northbound asphalt roadway was straight with a +5.9 percent grade. The posted speed limit was 72 km/h (45 mph). The roadway was bordered on the right by a concrete curb and sidewalk. East of the sidewalk there was an area of low lying vegetation bordered by a metal fence, a row of palm trees, and a planter box. East of the planter box was a gas station parking area.

Figure 4. Northbound approach.

The crash occurred at 1900 hours during nighttime conditions. Artificial lighting from two overhead luminaires at the intersection provided spot streetlight illumination. Additional ambient lighting was provided by local businesses. The intersection was controlled by 3-phase traffic signals. The weather at the nearest reporting station was 10 degrees C (51 degrees F), 27 percent humidity, 16 km (10 miles) visibility, clear, with winds out of the southeast at 14.8 km/h (9.2 mph). A Crash Diagram is attached at the end of this technical report.

Pre-Crash

The Yaris was a rental fleet vehicle that had been rented by the driver and her husband on the date of the crash at approximately 1500 hours. After packing, picking up the child occupant from a daycare facility, and having dinner, the driver began driving east toward Nevada. The Yaris was traveling eastbound on the interstate roadway at a driver-reported speed of 96 to 104 km/h (60 to 65 mph) in the middle travel lane. The driver began to gradually move from lane to lane to get into the right lane in preparation for transitioning to a different interstate roadway approximately 14 km (9 miles) ahead. After being in the right lane for approximately one minute the driver alleged that the vehicle began accelerating on its own. The driver of the Yaris reported that she was unable to slow or stop her vehicle. She indicated that she braked several times and each time the brake went to the floor. She also reported that she had attempted to use the hand brake at one point. As the vehicle continued eastbound she reported that she passed slower traffic by steering onto the right shoulder. As she realized that the vehicle was overtaking slower traffic she decided to exit the interstate. At the first available exit she departed the interstate onto an off-ramp to her right. Her intent was to turn right when reaching the end of the ramp.

The Yaris was traveling eastbound on the off-ramp in the right lane at an EDR-reported speed of 158 km/h (98.6 mph) 4.6 seconds prior to algorithm enable (AE). Just prior to AE, the vehicle had accelerated to 165 km/h (102.5 mph). The driver reported that she attempted to stop the vehicle both by using the service brakes and applying the parking brake. There was no evidence of braking at the scene and the EDR reported the service brake status as “Off” and the brake oil pressure was 0. The EDR also reported the accelerator pedal at 100 percent, engine throttle at

99.5 percent, and the RPM at 6500 (redline). Witnesses behind the Yaris reported to the police that they did not see any brake lights. An overview of the vehicle speed and distance traveled as reported by the EDR.

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
4.6	158	98.2	NA	NA	NA	NA
4.1	157	97.6	21.8	71.5	21.8	71.5
3.6	156	96.9	21.6	71	43.4	142.5
3.1	156	96.9	21.6	71	65.1	213.5
2.6	155	96.3	21.5	70.6	86.6	284.1
2.1	153	95.1	21.2	69.7	107.8	353.8
1.6	153	95.1	21.2	69.7	129.1	423.5
1.1	152	94.4	21.1	69.2	150.2	492.7
0.6	161	100	22.3	73.3	172.5	566
0.1	160	99.4	22.2	72.9	194.7	638.9
0	165	102.5	4.6	15	199.3	653.9

Crash

As the Yaris neared the intersection and the roadway angled to the left, the Yaris continued forward and struck a concrete curb (**Figure 5**) on the right side of the roadway (Event 1).

Figure 5. Right curb impact.

After impacting the curb, the Yaris steered left, began a slight counterclockwise yaw, continued in a southeast direction into the intersection, crossed the southbound travel lanes, and entered the northbound travel lanes south of the intersection (**Figure 6**). The Solara was traveling northbound in the right lane approaching the four-leg intersection. The Yaris crossed the first two northbound travel lanes and did not brake before striking the left plane of the Solara with its front plane (Event 2). The missing vehicle algorithm[1] of the WinSMASH program calculated a total delta-V of 74 km/h (46 mph) for the Yaris. The longitudinal and lateral components were -74 km/h (-46 mph) and -13 km/h (-8 mph), respectively. The results are borderline. The

Figure 6. Yaris path southeast into northbound travel lanes.

[1] Damage to the Solara was catastrophic and no crush measurements were taken.

damage to the Solara was severe. The EDR in the Yaris reported a maximum longitudinal delta-V of -89.9 km/h (-55.9 mph) that stopped recording at 250 ms, indicating the results would be low. The frontal air bags and seat cushion air bags deployed and front seat belts pretensioners actuated during this impact.

The WinSMASH program calculated a total delta-V of 49 km/h (31 mph) for the Solara. The longitudinal and lateral components were -25 km/h (-15 mph) and 43 km/h (26 mph), respectively. The EDR in the Solara reported a maximum longitudinal of -14.0 km/h (-8.7 mph). The longitudinal components appear reasonable.

The Solara was displaced to the right and began a counterclockwise rotation. The right rear wheel struck a concrete curb (Event 3). The Solara continued the rotation onto the roadside and struck a wooden sign post with its right plane (Event 4). The Solara came to rest facing west with its front wheels on the roadway at the curb and the rear tires on the roadside (**Figure 7**). The Yaris began a counterclockwise rotation. The right rear wheel struck the concrete curb as it rotated (Event 5) and departed the roadway in a southeastern direction. The EDR reported a maximum lateral acceleration at side satellite sensor 2 of -134.1 m/sec/sec at 14 ms for the curb impact.

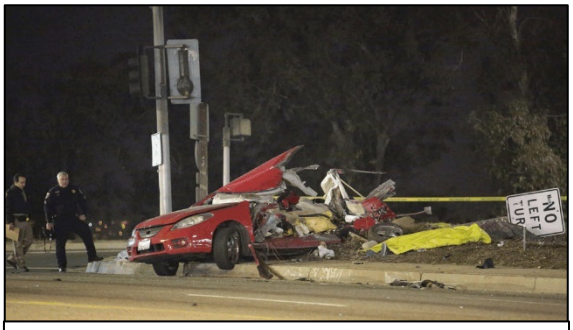


Figure 7. 2007 Toyota Solara, final rest, looking northeast (news photo).

Figure 8. Final rest positions, looking northeast (police photo); 2015 Toyota Yaris (green arrow), 2007 Toyota Solara (red arrow).

The Yaris continued rotating as it traveled across the ground cover until it struck a chain link fence with its front right (Event 6) and a palm tree (Event 7) nearly simultaneously. The tree was knocked down and the Yaris rotated clockwise and then struck a planter box with its left lower sill (Event 8). The Yaris crossed over the longitudinal planter box and then came to rest facing west in a gas station parking area (**Figure 8**).

Post-Crash

The driver of the Yaris sustained police-reported "A" (Severe) injuries that included a fractured vertebrae and multiple contusions and lacerations and was transported from the scene by ambulance. The front right seat occupant sustained police-reported "A" (Severe) injuries that included a clavicle fracture and multiple contusions and a laceration and was transported from the scene by ambulance. The second row left seat occupant sustained "K" (Fatal) injuries. The second-row right occupant sustained police-reported "A" (Severe) injuries that included spinal

and left humerus fractures and was transported from the scene by ambulance.

All four occupants of the Solara were fatally injured.

Both vehicles were towed from the scene and placed on a police hold.

2015 TOYOTA YARIS LE

Description

The 2015 Toyota Yaris LE was a 5-door 5-passenger hatchback. The vehicle was identified by the Vehicle Identification Number VNKKTUD32FAxxxxxx. The vehicle was manufactured in February 2015 and the vehicle mileage was 24,585 km (15,277 miles). The vehicle was equipped with a 4-cylinder, 1.5-liter gasoline engine coupled to a 4-speed automatic transmission and was configured with front-wheel drive and stability control. The vehicle was designed with Smart Stop Technology (SST) that recognizes conditions where the accelerator and brake are used simultaneously and reduces engine power. SST steps in when the accelerator is depressed first and the brake pedal is pressed firmly for longer than one-half second when the vehicle is traveling more than 5 mph. This brake override technology is standard equipment. The vehicle manufacturer's recommended tire size was P175/65R15 with a cold pressure of 228 kPa (33 psi) and the Yaris was equipped with Goodyear Assurance tires of the recommended size. The specific tire information was as follows.

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Tire Flat	6 mm (8/32 in)	Yes	Holed
LR	228 kPa (33 psi)	5 mm (6/32 in)	No	None
RR	Tire Flat	5 mm (6/32 in)	No	Holed
RF	214 kPa (31 psi)	6 mm (8/32 in)	No	Debeaded

The Yaris was configured with seating for five occupants. The front row was equipped with bucket seats with adjustable head restraints. Both head restraints had been removed prior to the vehicle inspection. The driver's seat was adjusted to between full forward and middle track position. The front right seat was adjusted to between full rearward and middle track position. The second row was a bench seat with folding backs.

Exterior Damage

The Yaris sustained minor contact damage to the right front tire from the impact with the off-ramp curb. There was possible contact/damage to the right rear tire but any damage was masked by a second curb impact. The Collision Deformation Classification (CDC) for this impact was 12FRWN3.

The Yaris sustained major front plane damage from the impact to the left plane of the Solara (**Figure 9**). The direct damage began at the left bumper corner and extended to the right bumper corner. The Field L began at the left bumper corner and extended 115 cm (45.2 in) to the right. Fourteen measurements were taken at bumper level by the Nikon Total Station and the Faro Blitz program computed crush measurements in six increments as follows: C1 = 36 cm (14.1 in), C2 = 31 cm (12.2 in), C3 = 31 cm (12.2 in), C4 = 29 cm (11.4 in), C5 = 29 cm (11.4 in), C6 = 39 cm (15.3 in). The CDC was 12FDEW3.

Figure 9. 2015 Toyota Yaris, frontal damage.

The Yaris sustained minor damage to the right rear wheel that occurred when the vehicle rotated counterclockwise into a concrete curb (**Figure 10**). The CDC for this impact was 03RBWN1. There was damage along the fender above the wheel that was likely caused when the vehicle traveled through a fence later in the crash sequence.

Figure 10. 2015 Toyota Yaris, right rear wheel damage.

The Yaris sustained minor damage to the front end from the impacts to the fence and the tree. This damage was masked by the front plane impact.

The Yaris sustained minor damage to the left plane along sill as it rotated over the planter box adjacent to the parking area (**Figure 11**). The direct damage was located 143 cm (56.2 in) forward of the rear axle and extended 31 cm (12.2 in) forward. The CDC for this impact was 09LPMN1.

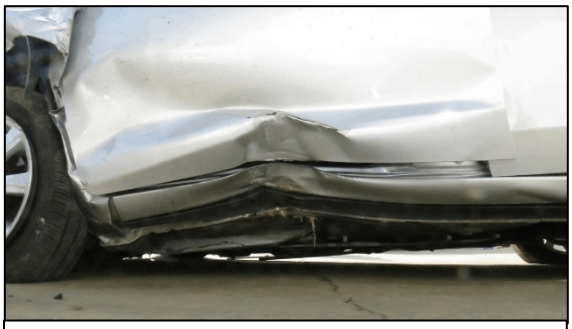


Figure 11. 2015 Toyota Yaris, left sill damage.

Event Data Recorder

The Yaris was equipped with an air bag electronic control unit that had EDR capability and was configured to store deployment and non-deployment events. Both types of events can contain pre-crash and crash data. For the pre- crash data there is a 4.6-second buffer that records vehicle speed, accelerator pedal, percentage of engine throttle, engine and motor RPM, service

brake status, brake oil pressure, longitudinal acceleration, yaw rate, steering input, shift position, cruise control status, and drive modes.

The data from the Yaris' EDR was imaged using the Bosch Crash Data Retrieval Tool version 16.3 direct to the module by the investigating police agency and reported below using version 17.7.2. Four events were recovered for ignition cycle 2,021. The following table maps the EDR events to the crash events.

EDR Event	Crash Event Number	Object Struck
Most Recent Event	6/7	Tree/fence
1st Prior Event	5	Curb along northbound roadway
2nd Prior Event	2	Vehicle 2
3rd Prior Event	1	Curb along ramp

The Bosch CDR report is included at the end of this report and the EDR-reported data not discussed elsewhere in this report was summarized as follows.

The Most Recent Event resulted from the impact with the tree/fence near final rest. The crash type was described as a front/rear crash. The maximum longitudinal delta-V was -11.3 km/h (-7 mph) at 190 ms. The maximum lateral acceleration for the frontal/rear crash, floor sensor was - m/sec/sec. This calculated to 5.6 km/h (-3.5 mph).

The 1st Prior Event resulted from the impact of the right rear tire to the curb along the northbound roadway. This occurred while the vehicle was rotating counterclockwise. The crash type was described as right side. The maximum lateral acceleration at side satellite sensor 2 was -134.1 m/sec/sec at 18 ms. The negative sign notation indicates a right to left configuration.

The 2nd Prior event resulted from the impact of the Yaris front plane to the left side plane of the Solara. The crash type was described as a front/rear crash. The maximum longitudinal delta-V was -89 km/h (-55.9 mph) and the values were rising when they stopped recording at 250 ms. The maximum later acceleration at side satellite sensor 2 was 143.7 m/sec/sec at 50 ms. The negative sign notation indicates a right to left configuration. The frontal and seat cushion air bags deployed and both front seat belt pretensioners actuated during this event.

The 3rd Prior Event resulted from the impact of the right front tire to the curb along the off-ramp. The recorded side was classified at right side. The maximum lateral acceleration for a side crash at the floor sensor was -168.6 m/sec/sec at 43 ms.

The data record reported the seat belt status for the driver and front passenger as "On" and the

occupant classification for the front passenger as “AM50 (not child).”

The pre-crash data recorded at 0 (TRG) was identical for all four events. The System Status at each event indicated that the linked pre-crash page was 1. It is believed that the pre-crash data is related to the deployment event. The pre-crash data is as follows:

Vehicle Speed (mph[km/h]):	102.5 [165]
Accelerator Pedal, % Full:	100.0
Percentage of Engine Throttle (%):	42.5
Engine rpm:	6,500
Motor rpm:	Invalid
Service Brake, ON/OFF:	OFF
Brake Oil Pressure (Mpa)[2]:	00.0
Longitudinal Acceleration, VSC Sensor (m/sec/sec):	-5.025
Yaw Rate (deg/sec)	32.7
Steering Input (degrees):	-100.5
Shift Position:	3
Cruise Control Status	OFF
Drive Modes:	OFF

NHTSA Recalls and Investigations

There were no related open recalls or investigations at the time this report was completed.

Alleged Unintended Acceleration

The driver reported that the vehicle experienced an unintended acceleration incident. She reported to police that as she tried to brake, the pedal would rebound back to her. She was wearing Nike sneakers and reported that she did not look at the foot controls at any time during the crash sequence. During the on-scene vehicle inspection, the CTS accelerator pedal, brake pedal, floor mat, and throttle body were examined. Subsequent to that inspection, the investigating police agency conducted a full mechanical tear-down and inspection. The initial status of the floor controls and a floor mat is shown in **Figure 12.** There was some movement of the carpet to the right of the foot controls that occurred while the EDR was being removed by the police. The driver’s floor mat was a non- original equipment manufacturer (OEM) after-market product. The rubber mat was 68 cm (26.7 in) in length and 44 cm (17.3 in) in width. The vehicle was designed with floor mounted mat attachments located immediately in front of the driver’s seat track. The mat was not

Figure 12. Toe pan, 2015 Toyota Yaris.

[2] Source of brake pressure not known. The range is from 0 to 12.14 MPa.

designed to use those attachment points. At the time of the vehicle inspection, the mat was flat on the floor and not restricting the movement of the accelerator or brake pedal.

The inspection of the brake and accelerator pedals revealed no deformation to either pedal. There was toe pan intrusion that restricted the full movement of both pedals. The CTS accelerator (part number 78110-0D110 for LHD) functioned normally and did not bind. The distance from the floor board to the pedal measured 8.5 cm (3.3 in) and it measured 4.5 cm (1.8 in) in the depressed position in contact with the intruded toe pan (**Figures 13-14**).

Figure 13. Accelerator pedal, up position, 2015 Toyota Yaris.

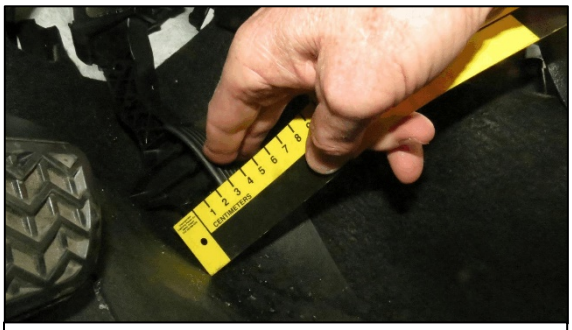


Figure 14. Accelerator pedal, depressed position, 2015 Toyota Yaris.

During the inspection, the vehicle was powered up and the accelerator operated. The butterfly valve at the throttle body was somewhat restricted due to damage but did exhibit motion. The accelerator pedal, the throttle body, and the electronic control module were removed from the vehicle by the police and placed into evidence. The only way to fully test the components would have been to install them on an exemplar vehicle. Toyota accessed the engine control module (ECM) to obtain post collision system and sensor data. The ECM maintains volatile memory only and has no fault code memory storage capability following an electrical system failure. Once battery power was lost, all historical trouble codes would have been lost.

Figure 15. 2015 Toyota Yaris, left front rotor.

Accessing the ECM through the DLC and utilizing Toyota diagnostic software, the accelerator/throttle system components were tested. The ECM did not report any data indicating a deficiency related to throttle operation. The vehicle was equipped with brake override software. The software would shut down throttle body operations whenever a brake application was performed, regardless of pedal position. The software uses ECM inputs from the brake lamp switch and brake system hydraulic pressure. The hydraulic system of the vehicle, as well as the brake lamp activation system, were found to be operating properly.

The brake pedal measured 10 cm (3.9 in) in width and 4 cm (1.5 in) in height. There were no marks or heavy scuffing. The toe pan intrusion restricted any significant movement.

A visual inspection of front brake rotors did not reveal any overheating (**Figure 15**). There was no evidence of melted brake pad material found. The mechanical inspection by the police included a tear down of the service and emergency brakes. The vehicle was equipped with front disc and rear drum brakes. The front rotors exceeded the rotor manufacturer's minimum thickness specifications. The brake pads material thickness of each pad exceeded the Federal Vehicle In Use Inspection Standard (FVIUIS). The rear brake shoe linings were measured and exceeded the FVIUIS standard (**Figure 16**). When the service brake was applied the brakes operated as designed and the wheels could not be rotated. The vehicle was equipped with a hand actuated mechanical braking system. The system utilized several cables to actuate the service brake shoes at both sides of the rear axle. With the parking brake lever in the up (applied) position, the rear brake drums could not be rotated. With the parking brake lever in the released position, rotation of the drums was possible.

Figure 16. 2015 Toyota Yaris, right rear brake shoes.

Based on available data, it appears that the driver of the Yaris tried but was unable to brake or slow down the vehicle. She did not actually push the brake pedal and the crash was most likely a result of pedal misapplication. The rationale for this conclusion is as follows:

- The EDR reported that the accelerator pedal was fully applied and no brake pedal application occurred during all the pre-crash recorded samples.
- An extensive mechanical inspection of the vehicle did not disclose any preexisting conditions in the service brakes, suspension, throttle, steering, engine, fuel system or electrical system that would have been a contributing factor in this crash or resulted in the unintended acceleration of the vehicle.
- An examination of the carpets/mats and other interior items adjacent to the accelerator foot pedal mechanism revealed no obstruction that may have interfered with pedal operation.
- The vehicle was equipped with functioning SST software that serves as a brake override system.

- Witness statements to police reporting that they were traveling behind the Yaris and did not see any brake lights prior to the crash.

Interior Damage

The Yaris sustained moderate interior damage as a result of intrusions, occupant contacts, and air bag deployments. The instrument panel and center console were displaced during EDR removal. The front row head restraints had been removed during extrication.

The vehicle sustained intrusions to the left toe pan and to the instrument panel. There was loading to the steering wheel. The driver's door had been jammed then forced open. The remaining doors remained closed and operational. The windshield was in place and cracked from impact forces. The remaining glazing was undamaged. There was loading evidence documented to the driver's, front right passenger's, and second row left passenger's seat belts. The second row left seat belt had been cut and partially removed. There were occupant contacts to the backs of both front row seats and to the right windshield header. The ignition key was bent but remained inserted into the ignition key tumbler.

Manual Restraint Systems

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and a non-adjustable upper anchor. The front right passenger's seat belt was equipped the same as the driver's belt, but had a switchable ELR/automatic locking retractor (ALR). The front seat positions were equipped with retractor- mounted seat belt pretensioners which actuated during the crash. Both seat belts were locked in the spooled-out position. Inspection of the driver's seat belt assembly revealed historical usage scratches on the latch plate and an area of abrasion that was located 33 cm (12.2 in) above the stop button (**Figure 17**). The vehicle's EDR reported the driver's seat belt status as "On." Inspection of the passenger's seat belt assembly revealed historical usage scratches on the latch plate and two areas of abrasion. The first measured 36 cm (14.1 in) and was located at the anchor (**Figure 18**). The second measured 16 cm (6.2 in) and was located 5 cm (1.9 in) above the stop button. The vehicle's EDR reported the passenger's seat belt status as "On."

Figure 17. Driver's seat belt, 2015 Toyota Yaris.

Figure 18. Front right passenger's seat belt, 2015 Toyota Yaris.

The second row was equipped with lap and shoulder seat belts for all three positions. The left seat belt had been cut by emergency personnel 83 cm (32.6 in) above the stop button. The right seat belt revealed a loading abrasion that was 28 cm (11.0 in) long and was located 5 cm (1.9 in) above the stop button.

Supplemental Restraint Systems

The Yaris' Supplemental Restraint Systems included an air bag electronic control unit, driver's and passenger's frontal air bags, driver knee air bag, front row seat cushion air bags, front row seat-mounted side impact air bags, and front and second row side impact Inflatable Curtain (IC) air bags. The frontal, seat cushion and driver knee air bags deployed during the impact with the Solara.

Figure 19. Driver air bag, 2015 Toyota Yaris.

The driver's frontal air bag deployed from the steering wheel hub through H-configured cover flaps. The air bag measured 55 cm (21.6 in) in width seam-to-seam in its deflated status and was configured with two vent ports (**Figure 19**).

The passenger's frontal air bag deployed from the top of the instrument panel. The air bag measured 48 cm (18.8 in) in width seam to seam and an excursion of 63 cm (24.8 in). There were no contacts or damage to the air bag.

Figure 20. Driver's knee air bag, 2015 Toyota Yaris.

The driver knee air bag deployed from the lower instrument panel (**Figure 20**). The air bag measured 59 cm (23.2 in) wide and 26 cm (10.2 in) height.

According to Toyota, the front row seat cushion air bags deployed. These air bags are small and when deflated cannot be seen without detrimming the seat.

2015 TOYOTA YARIS OCCUPANTS

Driver Demographics

Age/sex:	51 years/female
Height:	155 cm (61 in)
Weight:	64 kg (141 lbs)
Eyewear:	None
Seat type:	Bucket
Seat track position:	Between full forward and mid
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection, EDR data
Air bags:	Frontal, knee, seat cushion air bag deployed, seat-mounted side air bag and IC air bag did not deploy
Alcohol/drug data:	None
Egress from vehicle:	Under own power
Transport from scene:	Ambulance to hospital
Type of medical treatment:	Hospitalized for 5 days

Driver Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Fracture, minor compression, lumbar spine L5	650632.2	Primary - Seat cushion Alternative - Seat belt	Possible Possible
2	Abrasions, nose	210202.1	Driver's air bag	Certain
3	Abrasion, left neck	310202.1	Seat belt	Probable
4	Abrasion, right abdomen	510202.1	Seat belt	Certain
5	Abrasion, left abdomen	510202.1	Seat belt	Certain
6	Abrasion, right hand	710202.1	Left IP	Possible
7	Abrasion, right wrist hand	710202.1	Left IP	Possible
8	Abrasion, left hand	710202.1	Left IP	Possible
9	Abrasion, left lower leg (shin)	810202.1	Lower left IP	Probable
	GCS=15 no blood given			

Source: Medical records and police report.

Driver Kinematics

The restrained 51-year-old female driver was seated in an unknown posture. The seat was adjusted to between full forward and mid-track position. At impact with the ramp curb, the driver was probably displaced slightly forward and to the right. Based on the EDR report, she was then steering to the left and the vehicle was in a slight counterclockwise yaw. At impact with the Solara, the driver was displaced forward, loading the pretensioned seat belt and contacting the deployed frontal air bag with her face. Both of her hands likely came off the steering wheel and contacted the left instrument panel. As the vehicle rotated counterclockwise, the driver was displaced to the right. This motion continued as the right rear wheel struck the roadside curb. The driver was displaced slightly forward as the vehicle struck a palm tree and fence. The driver remained buckled in her seat throughout the crash sequence and as the vehicle came to rest. The driver was assisted from the vehicle by passersby.

Front Row Right Occupant Demographics

Age/sex:	16 years/male
Height:	Unknown
Weight:	150 kg (330 lbs)
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Mid to full rear
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Vehicle inspection, EDR report
Air bags:	Frontal air bag and seat cushion air bag deployed, seat-mounted side air bag and IC air bag did not deploy
Egress from vehicle:	Assisted by passersby
Transport from scene:	Ambulance to hospital
Type of medical treatment:	Treated and released

Front Row Right Occupant Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Fractured left clavicle, mid (moderately displaced, angulated, overriding)	750500.2	Instrument panel	Possible
2	Laceration, forehead, right eyebrow	210602.1	Air bag	Probable
3	Abrasion, left knee	810202.1	Lower right IP	Probable
4	Abrasion, left upper thigh	810202.1	Air bag	Possible
5	Abrasion, left brow	210202.1	Air bag	Probable
6	Left hip strain	873010.1	Lower right IP	Probable
7	Tooth fracture (#9), front central incisor	251404.1	Air bag	Probable
8	Hip abrasion, left	810202.1	Seat belt	Probable

Source: ER and radiology records.

Front Row Right Occupant Kinematics

The restrained 16-year-old male front row right occupant was seated in an unknown posture. The seat was adjusted to the mid to full rear track position. At impact with the ramp curb, he was probably displaced slightly forward and to the right. The vehicle began a slight counterclockwise yaw. At impact with the Solara, he was displaced forward, heavily loading the pretensioned seat belt. He likely attempted to stop his forward progress with his hands and fractured his left clavicle. As the vehicle rotated counterclockwise, he was displaced to the right. This motion continued as the right rear wheel struck the roadside curb. He was then displaced slightly forward as the vehicle struck a palm tree and fence. The front row right occupant remained buckled in his seat throughout the crash sequence and as the vehicle came to rest. He was able to extricate himself with assistance prior to the arrival of emergency services. The ambulance was dispatched at 1915 hours and arrived on-scene at 1924 hours and was with the patient at 1935. The ambulance departed the scene 8 minutes later and the patient arrived at the trauma center at 2008 hours with a GCS score of 15. He was treated and then released later that day.

Second Row Left Occupant Demographics

Age/sex:	7 years/male
Height:	112 cm (44.5 in)
Weight:	18 kg (39 lbs)
Eyewear:	None
Seat type:	Bench with folding back
Seat track position:	NA
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection
Air bags:	IC air bag did not deploy
Egress from vehicle:	Removed due to injuries
Transport from scene:	Ambulance
Type of medical treatment:	Transported, treated, declared deceased

Second Row Left Occupant Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Fracture, third cervical vertebra, with underlying spinal cord transection	610232.6	Other seating position seat back	Certain
2	Diffuse subarachnoid hemorrhage	140629.3	Other seating position seat back	Certain
3	Bilateral pulmonary contusions	441410.3	Seat belt webbing	Probable
4	Subcutaneous hemorrhage, mid frontal, mid parietal, right and left occipital scalp	110402.1	Other seating position seat back	Certain
5	Abrasion, 3.8 cm (1.5 in), center of forehead	210202.1	Other seating position seat back	Certain
6	Contusion, entire lower abdomen side to side	510402.1	Seat belt webbing	Certain
7	Abrasion, left of midline to left side chest	410202.1	Seat belt webbing	Certain
8	Contusion, anterior left lower leg	810402.1	Other seating position seat back	Probable

9	Abrasion, 0.6 cm (0.25 in), upper left eyelid	210202.1	Other seating position seat back	Certain
10	Abrasion, right face	210202.1	Other seating position seat back	Certain

Source: Coroner's report.

Second Row Left Occupant Kinematics

The belted 7-year-old male second row left occupant was seated in an unknown posture. At impact with the ramp curb, he was probably displaced slightly forward and to the right. At impact with the Solara, he was displaced forward. He loaded the seat belt, causing chest and abdomen injuries. He contacted the back of the driver's seat, causing a hyperflexion of his neck and the spinal injuries.

As the vehicle rotated counterclockwise, he was displaced to the right. This motion continued as the right rear wheel struck the roadside curb. He was then displaced slightly forward as the vehicle struck a palm tree and fence. He remained buckled in his seat throughout the crash sequence and as the vehicle came to rest. His seat belt was cut by passersby and he was removed from the vehicle. The ambulance run sheet provided the following data.

Dispatch notified:	1903 hours
Enroute:	1904 hours
At scene:	1911 hours
At patient:	1912 hours
Depart:	1920 hours
Arrive hospital:	1931 hours

The paramedics arrived on scene to find the child on the ground in cardiac arrest with fire department personnel doing CPR. The child was pulseless and not breathing. Paramedics performed basic life support (BLS) and advanced life support (ALS) protocols at the scene and during transport. The child was treated at the hospital with no improvement and was pronounced dead at 1947 hours. An autopsy was conducted and the cause of death was blunt force injuries of the head and neck.

Second Row Right Occupant Demographics

Age/sex:	12 years/female
Height:	Unknown
Weight:	36 kg (79 lbs)
Eyewear:	Unknown
Seat type:	Bench with folding back
Seat track position:	NA
Manual restraint usage:	Lap and shoulder

Usage source: Vehicle inspection
Air bags: IC air bag did not deploy
Egress from vehicle: Assisted from vehicle by passersby
Transport from scene: Ambulance
Type of medical treatment: Hospitalized for 1 day

Second Row Right Occupant Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Medially displaced fracture, left humeral neck with overriding segments	751171.2	Other seating position seat back	Probable
2	L2 Chance fracture[3]	650632.2	Lap seat belt Seat cushion	Probable Possible
3	Abrasions, left lower abdomen, left flank	510202.1	Lap seat belt	Certain
4	Abrasion, left lower shin	810202.1	Other seating position seat back	Probable
5	Abrasion, right hand and thumb	710202.1	Other seating position seat back	Probable
	Paresthesia, left, 1st and 2nd digit	Not codeable		

Source: Discharge summary, radiology report.

Second Row Right Occupant Kinematics

The restrained 12-year-old female second row left occupant was seated in an unknown posture. At impact with the ramp curb, she was probably displaced slightly forward and to the right. At impact with the Solara, she was displaced forward, loading the seat belt and contacting the back of the front right occupant's seat. As the vehicle rotated counterclockwise, she was displaced to the right. This motion continued as the right rear wheel struck the roadside curb. She was then displaced slightly forward as the vehicle struck a palm tree and a fence. She remained buckled in her seat throughout the crash sequence and as the vehicle came to rest.

The ambulance was dispatched at 1907 hours and arrived on-scene at 1915 hours and was with the patient at 1923. The ambulance departed the scene 9 minutes later and the patient arrived at the trauma center at 2009 hours with a GCS score of 15. She was treated and hospitalized till the following morning.

[3] Flexion type injury

2007 TOYOTA SOLARA

Description

The 2007 Toyota Solara was a 2-door coupe. The vehicle was identified by the VIN 4T1CE30P27Uxxxxxx. The vehicle was equipped with a 4-cylinder, 2.4-liter gasoline engine coupled to an automatic transmission. The vehicle manufacturer's recommended tire size was P215/55R17 with a cold pressure of 221 kPa (32 psi). The vehicle was equipped with Michelin tires of the recommended size. The specific tire information was as follows.

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Tire Flat	5 mm (6/32 in)	No	Debeaded
LR	Tire Flat	4 mm (5/32 in)	No	Off vehicle, cut tread, debeaded
RR	Tire Flat	3 mm (4/32 in)	Unknown	Debeaded
RF	Tire Flat	4 mm (5/32 in)	No	Debeaded

Exterior Damage

The Solara sustained catastrophic left plane damage as a result of the frontal impact of the Yaris (**Figure 21**). The damage could not be measured. The estimated CDC was 10LZAW9. The vehicle's right wheel was deformed as it struck a curb during rotation. The CDC for the tire impact was 03RBWN2. The vehicle also struck a wood signpost but that damage could not be located on the vehicle.

Figure 21. Back and left side damage, 2007 Toyota Solara.

EDR

The Solara was equipped with an air bag electronic control unit that had EDR capability and was configured to store deployment and non-deployment events. No pre-crash data was collected or present. The data from the Solara's EDR was imaged using the Bosch Crash Data Retrieval Tool version 16.3 direct to the module by the investigating police agency and reported in this report using version 17.7.2. Three events were recovered. The following table maps the EDR events to the crash events.

EDR Event	Crash Event Number	Object Struck
Most Recent Frontal/Rear Event	Unknown	Unknown
1st Prior Frontal/Rear Event	3	Curb
Prior Frontal/Rear Event	2	Vehicle 1

The Bosch CDR report is included at the end of this report and the EDR-reported data not discussed elsewhere in this report was summarized as follows:

The source for the Most Recent Event is not known. It may have also been related to a wheel impact to the curb. The maximum longitudinal delta-V was -6.9 km/h (-4.3 mph) at 150 ms. Lateral values were not reported.

The 1st Prior Frontal/Rear Event resulted from the right-side wheel/curb impact during rotation. The maximum longitudinal delta-V was -4.1 km/h (-2.6 mph) at 150 ms. Lateral values were not reported.

The Prior Frontal/Rear Event resulted from the left plane impact to the front of the Yaris. The maximum longitudinal delta-V was -14.0 km/h (-8.7 mph) at 150 ms. Lateral values were not reported.

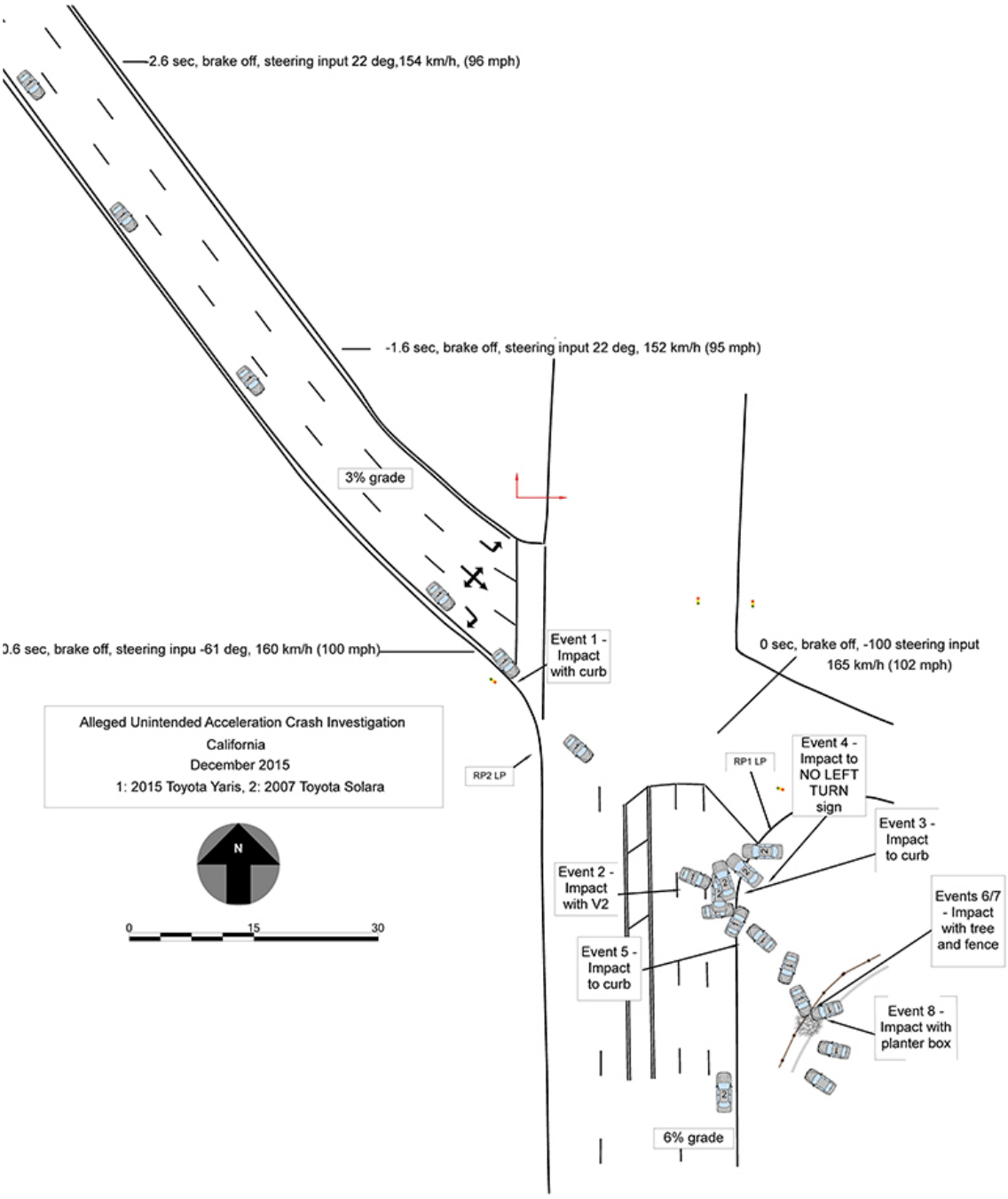
Both frontal air bags and both front/second row IC air bags deployed during the crash sequence.

The system status at event reported the driver buckle switch as "Buckled," the passenger buckle switch status as "Unbuckled," and the passenger occupancy status as "Not Occupied." The occupancy status is contrary to data in the police report which indicated a 37-year-old restrained female in that position.

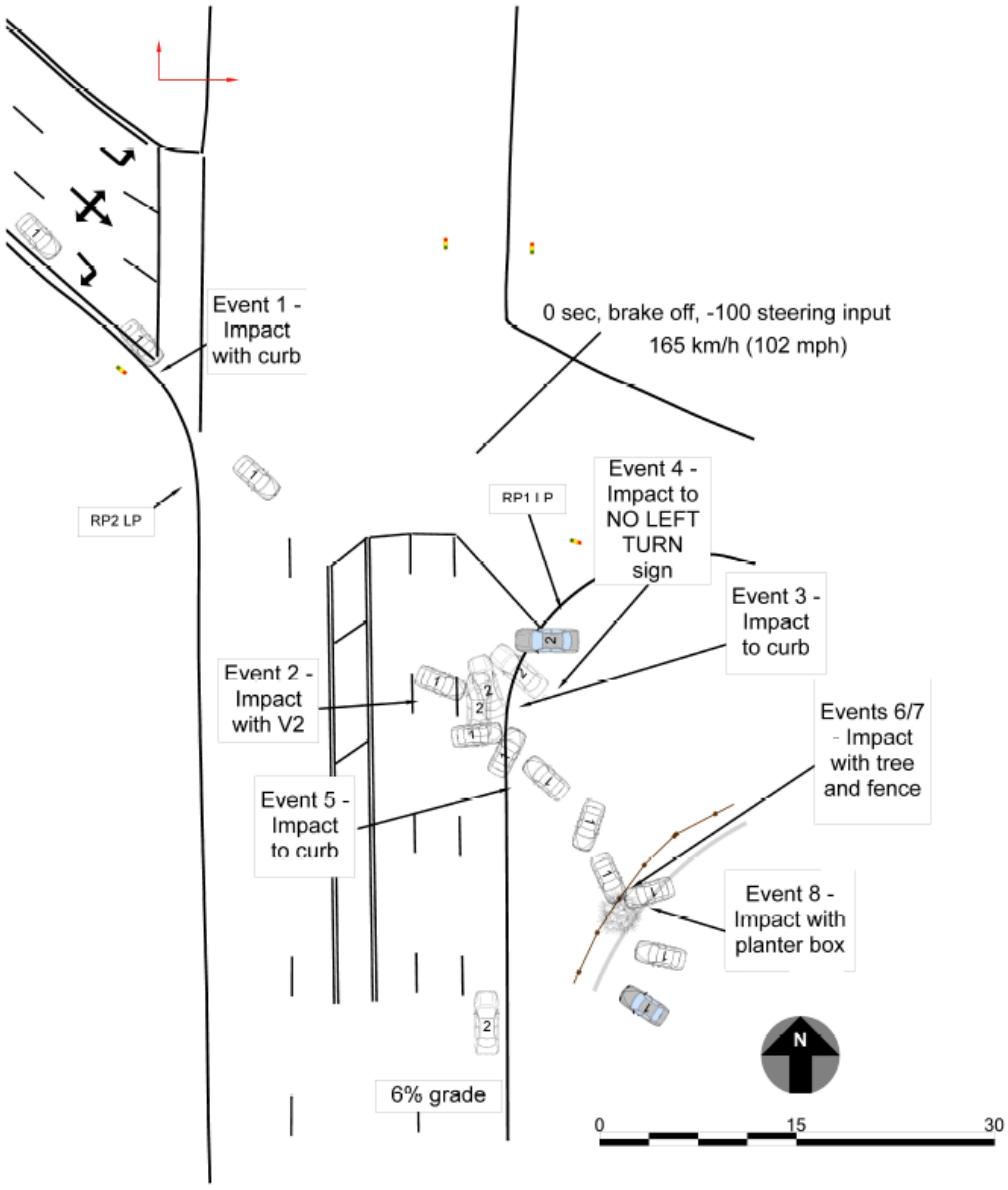
Occupant Data

There were four occupants in the Solara. All were fatally injured. The driver was a belted 30-year-old male. The front right seat was occupied by a belted 37-year-old female. The second row left seat was occupied by a belted 29-year-old male. The second-row right seat was occupied by a belted 29-year-old male. The coroner declared them deceased at 1919 hours. The causes of death were determined to be "multiple blunt force injuries, occurring simultaneously."

CRASH DIAGRAM



	NHTSA www.nhtsa.gov
Case Number:	DS16001



	NHTSA www.nhtsa.gov
Case Number:	DS16001

APPENDIX A: Event Data Recorder Report 2015 Toyota Yaris[4]

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

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

CDR File Information

User Entered VIN/Frame Number	VNKKTUD32FA******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS16001_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 16.3
Reported with CDR version	Crash Data Retrieval Tool 17.7.2
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Front/Rear (2), Side (2)

Comments

No comments entered.

Data Limitations

CDR Record Information:

- Due to limitations of the data recorded by the airbag ECU, such as the resolution, data range, sampling interval, time period of the recording, and the items recorded, the information provided by this data may not be sufficient to capture the entire crash.
- Pre-Crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may not be synchronous to each other.
- Airbag ECU data should be used in conjunction with other physical evidence obtained from the vehicle and the surrounding circumstances.
- If any of the front passenger seat airbags, side airbags, or Curtain Shield Airbags have deployed, data will not be overwritten or deleted by the airbag ECU following that event. If none of the airbags have deployed, the data of that event may be overwritten by a following event even if other airbags (pretensioner, rear seat airbag, etc.) have deployed.
- If power supply to the airbag ECU is lost during an event, all or part of the data may not be recorded.
- "Diagnostic Trouble Codes" are information about faults when a recording trigger is established. Various diagnostic trouble codes could be set and recorded due to component or system damage during an accident.
- The airbag ECU records only diagnostic information related to the airbag system. It does not record diagnostic information related to other vehicle systems.
- The TaSCAN, Global Tech Stream, or Intelligent Tester II devices (or any other Toyota genuine diagnostic tool) can be used to obtain detailed information on the diagnostic trouble codes from the airbag system, as well as diagnostic information from other systems. However, in some cases, the diagnostic trouble codes of the airbag system recorded by the airbag ECU when the event occurred may not match the diagnostic trouble codes read out when the diagnostic tool is used.

General Information:

- The data recording specifications of Toyota's airbag ECUs are divided into the following categories. The specifications for 12EDR or later are designed to be compatible with NHTSA's 49CFR Part 563 rule.
  - 00EDR / 02EDR / 04EDR / 06EDR / 10EDR / 12EDR / 13EDR / 15EDR / 17EDR
- The airbag ECU records data for all or some of the following accident types: frontal crash, rear crash , side crash, and rollover events. Depending on the installed airbag ECU, data for side crash and/or rollover events may not be recorded.
- This airbag ECU records record pre-crash data and post-crash data.
  - If a single event occurs independently, the data for that event is recorded on a one-to-one basis.
  - If multiple events occur successively (within a period of approximately 500ms), the establishment of the recording trigger for the first event is defined as the "pre-crash recording trigger". Pre-crash data for the first event and post-crash data for each successive event is then recorded.
- The airbag ECU has two recording pages (memory maps) to store pre-crash data. Additionally, to store post-crash data, the airbag ECU has two recording pages for each accident type: two pages for frontal and rear crash, two pages for a side crash, and two pages for rollover event.
- The data recorded by the airbag ECU includes correlating information between each previously occurring event (i.e., information that clarifies the collision event sequence. This correlation information consists of the following items.
  - Time from Previous Pre-Crash TRG
  - Linked Pre-Crash Page
  - Time from Pre-Crash TRG
  - TRG Count
  - Previous Crash Type
- In frontal and rear collision events, the first point where a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached is regarded as time zero for the recorded data. In side impact collision and rollover events, the point in time at which the recording trigger is established is

regarded as time zero for the recorded data.

- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or rollover event).
- Some of the data recorded by the airbag ECU is transmitted to the airbag ECU from various vehicle control modules by the vehicle's Controller Area Network (CAN).
- In some cases, the airbag ECU part number printed on the ECU label may not match the airbag ECU part number that the CDR tool reports. The part number retrieved by the CDR tool should be considered as the official ECU part number.
- In frontal and rear collision events, the record time varies depending on the period during which a longitudinal cumulative delta-V of over 0.8 km/h (0.5 mph) is reached, and time series data is recorded for up to 250 ms. The record time described above is indicated as "Length of Delta-V". "Delta-V, Longitudinal" outside the record time is indicated by area shaded in the table, and not indicated in the graph.

Data Element Sign Convention:
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report.

Data Element Name	Positive Sign Notation Indicates
Maximum Delta-V, Longitudinal	Forward
Delta-V, Longitudinal	Forward
Lateral Acceleration for Frontal/Rear Crash, Floor Sensor	Left to Right
Lateral Acceleration, Side Satellite Sensor 1	Left to Right
Lateral Acceleration, Side Satellite Sensor 2	Left to Right
Lateral Acceleration, Side Satellite Sensor 3	Left to Right
Lateral Acceleration, Side Satellite Sensor 4	Left to Right
Lateral Acceleration for Side Crash, Floor Sensor	Left to Right
Roll Angle Peak	Clockwise Rotation
Roll Angle at the Time of TRG	Clockwise Rotation
Roll Rate	Clockwise Rotation
Lateral Acceleration for Rollover, Floor Sensor	Left to Right
Longitudinal Acceleration , VSC Sensor	Forward
Yaw Rate	Left Turn
Steering Input	Left Turn

Data Definitions:
1)

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- If the "Occupant Size Classification, Front Passenger" displays "Child" or "Not Occupied", "Side Air Bag Deployment, Time to Deploy" and "Pretensioner Deployment, Time to Fire" may indicate a time even if deployment did not occur on the for following part no's:
  - 89170-07280, 35400, 35410, 35470, 42660, 0R120, 0R080, 0R081, 0R150
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 12,800 rpm. Resolution is 100 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 700 rpm.
- If the electric vehicle is using a calculated/virtual engine RPM for drivetrain control, "Engine RPM" may be recorded, but should not be used during data analysis.
- The upper limit for the recorded "Vehicle Speed" value is 200 km/h (125mph). Resolution is 1km/h (0.6mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
  - Significant changes in the tire's rolling radius
  - Wheel lock and wheel slip
- "Accelerator Pedal" has two recording specifications. Both the recorded value increases as the driver depresses the accelerator.
  - Percentage of accelerator pedal depressed (recorded as 0-100(%)).
  - Output voltage of accelerator pedal module (recorded as 0-5(V)).
- If M/T transmission vehicle of some limited model, "Shift Position" may display "Drive" regardless of the actual shift position.
- Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupant Size Classification, Front Passenger" will be utilized.
  - Occupied / Not Occupied
  - AM50 / AF05 / Child / Not Occupied
  - AM50 / AF05 / Child or Not Occupied
- "Cruise Control Status" indicates whether the cruise control system is actuated or not. OFF indicates that the cruise control system is not actuated, but can also indicates that the vehicle is not equipped with the system.
- "Air Bag Warning Lamp, On/Off", "Ignition Cycle, Crash", "Seat Track Position Switch, Foremost, Status, Driver", "Occupant Size Classification, Front Passenger", "Safety Belt Status, Driver", "Safety Belt Status, Front Passenger", "Frontal Air Bag Suppression Switch Status, Front Passenger", and "RSCA Disable Switch" indicate the state approximately 1 second before time zero. They may not always indicate the state at the moment of collision.
- The upper and lower limits for the recorded value of "Motor RPM" is 17,500 rpm and -7,500 rpm respectively. Resolution is 100 rpm and the value is rounded down and recorded.
- "Brake Oil Pressure" has an upper limit of 12.14 Mpa. In the case of the vehicle that has not VSC system, "0 Mpa" or "Invalid" may be displayed.
- "Longitudinal Acceleration , VSC Sensor" has upper and lower limits for the recorded value of 8.973 m/s^2 and -8.973 m/s^2 respectively. This acceleration sensor does not sense collisions.
- "Sequential Shift Range" displaying "Undetermined" indicates the shift range is undetermined or was not being used.
- Some vehicles will not be equipped with all "Drive Mode" types indicated in the "Drive Mode" table. If some or all drive modes are not applicable to vehicle, "OFF" or "Invalid" may be displayed. The item in the "Drive Mode" table may not match the name of switch or indicator that equipped

the vehicle.

- The upper and lower limits for the recorded value of "Steering Input" is 375 deg and -375 deg respectively. Resolution is 1.5 deg and the value is rounded down and recorded.
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Delta-V, Longitudinal" indicates the change in forward speed after time zero. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the time zero.
- "Location of Side Satellite Sensor" shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "Time from Previous Pre-Crash TRG" indicates the time between the establishment of an event's pre-crash recording trigger to the establishment of a more recent event's pre-crash recording trigger. The upper limit for the recorded value is 16,381 milliseconds. In the event of establishment of the first pre-crash recording trigger after the ignition is switched ON, the upper limit value(max value) is recorded.
- "TRG Count" indicates a calculated value of the number of times recording triggers have been established for all crash types. The sequence in which each event occurred can be verified from the "TRG Count". The smaller the "TRG Count" value, the older the data. The upper limit for the recorded value is 65,533 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- "Linked Pre-Crash Page" is used to link 'paged" pre-crash data with 'paged" post-crash data. When old pre-crash data is overwritten by new pre-crash data, the "Linked Pre-Crash Page" value may record a page number that is not actually linked.
- Resolution of the "Time from Pre-Crash to TRG" is 50 [ms], and the value is rounded up and recorded.
- "Roll Angle at the Time of TRG" and "Roll Angle Peak" do not represent the actual roll angle of the vehicle. These values are used internally by the airbag ECU for sensing a rollover.

05013_ToyotaS00std_r026

System Status at Time of Retrieval

ECU Part Number	89170-0D730
EDR Generation	13EDR
Complete File Recorded	Yes
Freeze Signal	ON
Freeze Signal Factor	Front Airbag Deployment
Diagnostic Trouble Codes Exist	No
Ignition Cycle ,Download (times)	2023
Multi-event, number of events (times)	2 or greater
Time from event 1 to 2 (s)	0.202
Time from Previous Pre Crash TRG (msec)	878
Latest Pre-Crash Page	1
Contains Unlinked Pre-Crash Data	Yes

Event Record Summary at Retrieval

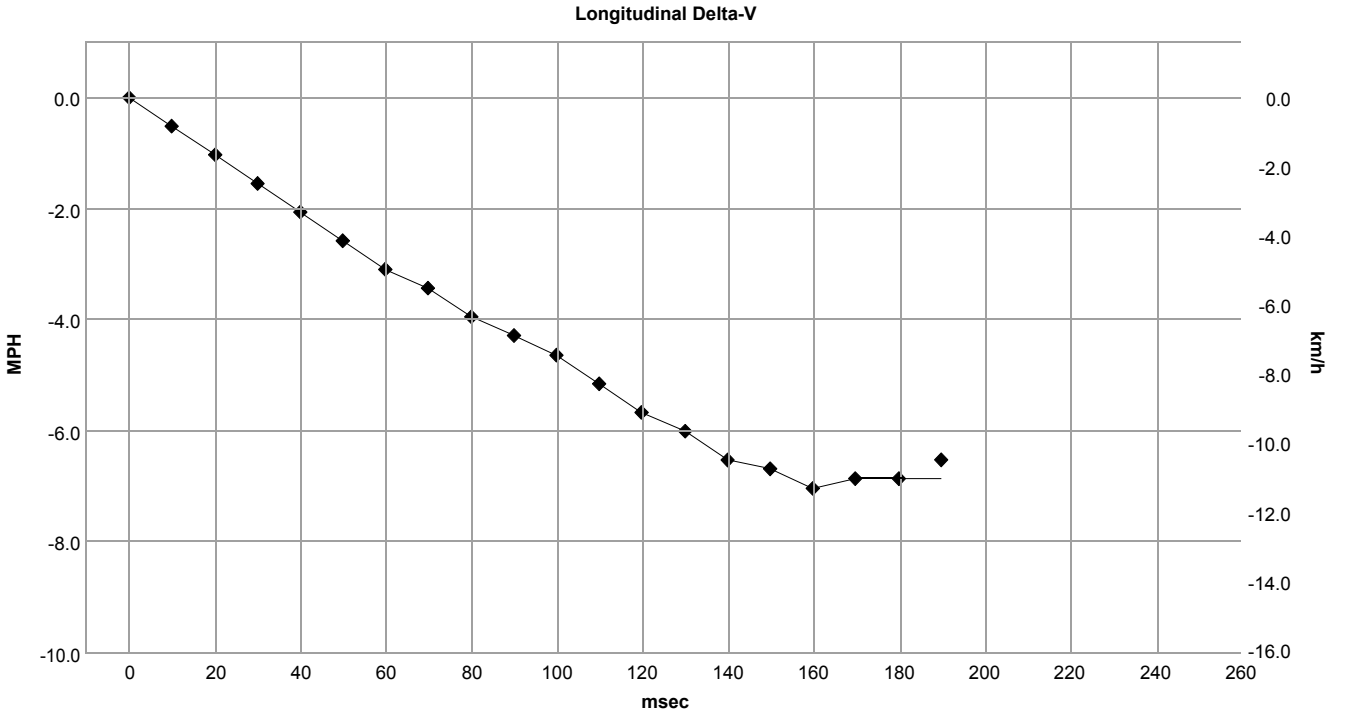
Events Recorded	TRG Count	Crash Type	Time (msec)	Pre-Crash & DTC Data Recording Status	Event & Crash Pulse Data Recording Status
Most Recent Event	11	Front/Rear Crash	0	Complete (Page 1)	Complete (Front/Rear Page 1)
1st Prior Event	10	Side Crash	-202	Complete (Page 1)	Complete (Side Page 0)
2nd Prior Event	9	Front/Rear Crash	-300	Complete (Page 1)	Complete (Front/Rear Page 0)
3rd Prior Event	8	Side Crash	-298	Complete (Page 1)	Complete (Side Page 1)

System Status at Event (Most Recent Event, TRG 11)

Recording Status, Front/Rear Crash Info.	Complete
Crash Type	Front/Rear Crash
TRG Count (times)	11
Previous Crash Type	Side Crash
Time from Pre-Crash TRG (msec)	398
Linked Pre-Crash Page	1
Frontal Airbag Deployment, Time to 1st Stage Deployment, Driver (msec)	No
Frontal Airbag Deployment, Time to 1st Stage Deployment, Front Passenger (msec)	No
Pretensioner Deployment, Time to Fire, Driver (msec)	No
Pretensioner Deployment, Time to Fire, Front Passenger (msec)	No
Frontal Airbag Deployment, Time to 2nd Stage, Driver (msec)	N/A
Frontal Airbag Deployment, Time to 2nd Stage, Front Passenger (msec)	N/A
Active Head Restraint, Time to Deploy, Driver (msec)	SNA
Active Head Restraint, Time to Deploy, Front Passenger (msec)	SNA
Side Curtain Airbag Deployment, Time to Deploy, Driver (msec)	SNA
Side Curtain Airbag Deployment, Time to Deploy, Passenger (msec)	SNA
Side Airbag Deployment, Time to Deploy, Driver (msec)	SNA
Side Airbag Deployment, Time to Deploy, Passenger (msec)	SNA
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

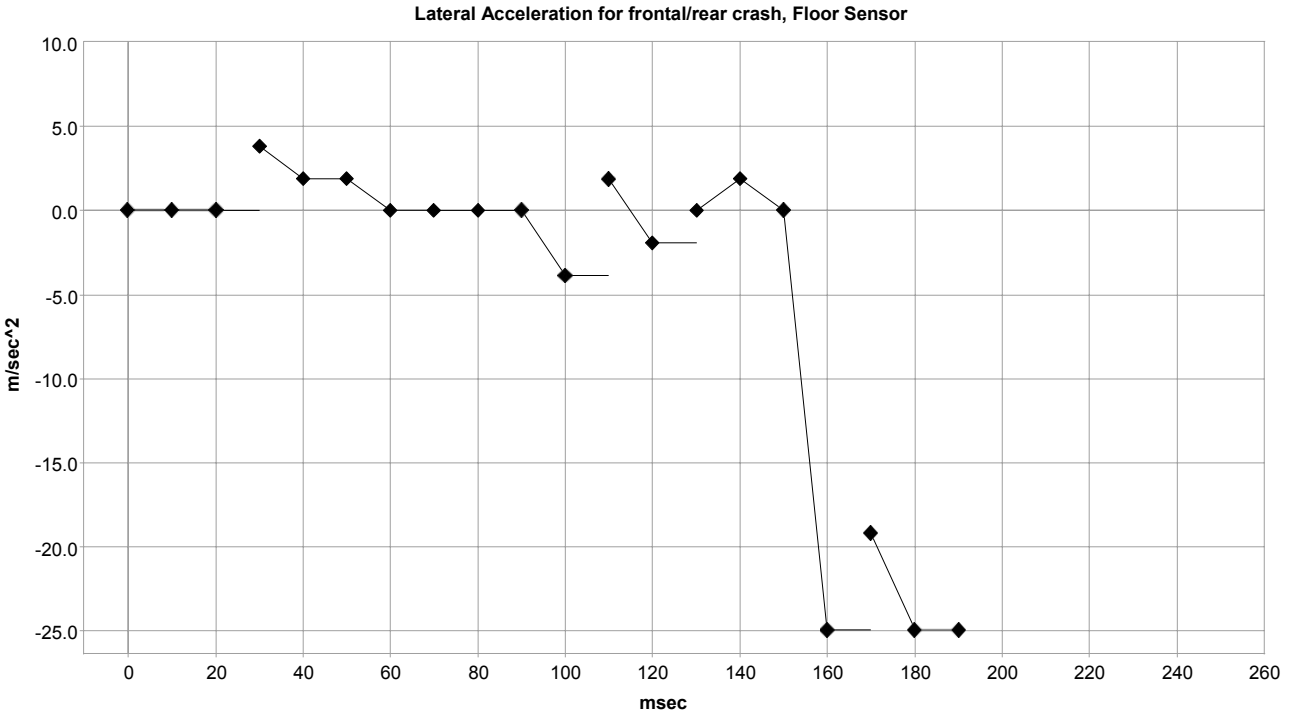
Longitudinal/Lateral Crash Pulse (Most Recent Event, TRG 11 - table 1 of 2)

Recording Status, Time Series Data	Complete
Time from Time Zero to TRG (msec)	99.5
Length of Delta-V (msec)	190
Max. Longitudinal Delta-V (MPH [km/h])	-7 [-11.3]
Time, Maximum Delta-V, Longitudinal (msec)	155.5
Power Supply Status at Max. Delta-V	OFF
Clipping Time of Longitudinal Delta-V (msec)	No
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	No



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB

Longitudinal/Lateral Crash Pulse (Most Recent Event, TRG 11 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])	Lateral Acceleration for Frontal/Rear Crash, Floor Sensor (m/sec^2)	Power Supply Status
0	0.0 [0.0]	0.0	OFF
10	-0.5 [-0.8]	0.0	OFF
20	-1.0 [-1.7]	0.0	OFF
30	-1.5 [-2.5]	3.8	OFF
40	-2.1 [-3.3]	1.9	OFF
50	-2.6 [-4.1]	1.9	OFF
60	-3.1 [-5.0]	0.0	OFF
70	-3.4 [-5.5]	0.0	OFF
80	-3.9 [-6.3]	0.0	OFF
90	-4.3 [-6.9]	0.0	OFF
100	-4.6 [-7.4]	-3.8	OFF
110	-5.1 [-8.3]	1.9	OFF
120	-5.7 [-9.1]	-1.9	OFF
130	-6.0 [-9.7]	0.0	OFF
140	-6.5 [-10.5]	1.9	OFF
150	-6.7 [-10.8]	0.0	OFF
160	-7.0 [-11.3]	-24.9	OFF
170	-6.9 [-11.0]	-19.2	OFF
180	-6.9 [-11.0]	-24.9	OFF
190	-6.5 [-10.5]	-24.9	OFF
200	0.0 [0.0]	0.0	ON
210	0.0 [0.0]	0.0	ON
220	0.0 [0.0]	0.0	ON
230	0.0 [0.0]	0.0	ON
240	0.0 [0.0]	0.0	ON
250	0.0 [0.0]	0.0	ON

DTCs Present at Time of Event (Most Recent Event, TRG 11)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (Most Recent Event, TRG 11)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	100
TRG Count when Pre-crash TRG was Established (times)	8
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	ON
Occupant Size Classification, Front Passenger	AM50 (Not Child)
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	2021

Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 11)

Time (sec)	-4.6	-4.1	-3.6	-3.1	-2.6	-2.1	-1.6	-1.1	-0.6	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	98.2 [158]	97.6 [157]	96.9 [156]	96.9 [156]	96.3 [155]	95.1 [153]	95.1 [153]	94.4 [152]	100 [161]	99.4 [160]	102.5 [165]
Accelerator Pedal, % Full (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Engine Throttle (%)	99.5	99.5	100.0	99.5	99.5	99.5	99.5	99.5	63.5	43.0	42.5
Engine RPM (RPM)	6,300	6,200	6,200	6,200	6,100	6,100	6,100	6,000	6,300	6,300	6,500
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.359	-0.215	-0.359	-0.502	0.359	-0.072	-0.359	0.646	-2.512	-2.369	-5.025
Yaw Rate (deg/sec)	-1.95	-1.95	5.37	0.00	4.39	-2.44	6.83	-3.42	-4.39	32.70	32.70
Steering Input (degrees)	-10.5	-4.5	24.0	12.0	22.5	4.5	22.5	-7.5	-61.5	-100.5	-100.5
Shift Position	3	3	3	3	3	3	3	3	3	3	3
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

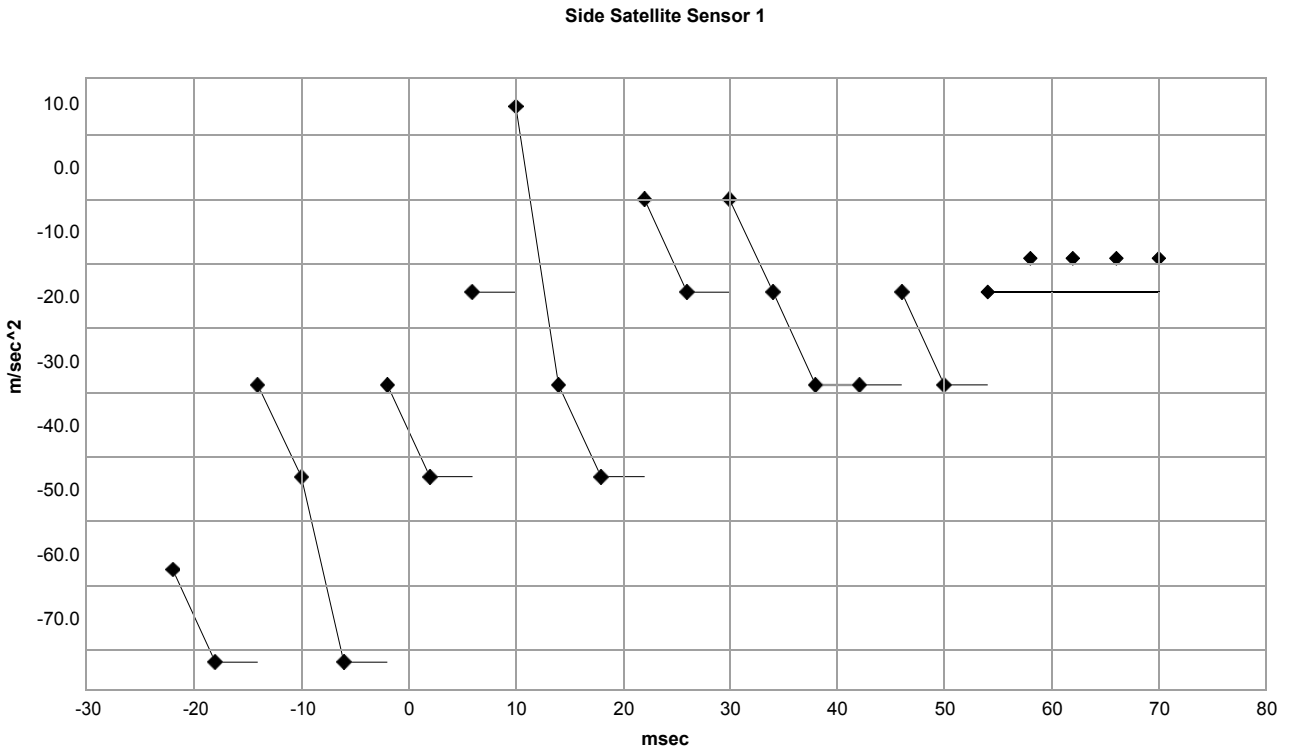
Fuel Injection Quantity (mm3/st)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

System Status at Event (1st Prior Event, TRG 10)

Recording Status, Side Crash Info.	Complete
Crash Type	Side Crash
TRG Count (times)	10
Previous Crash Type	Front/Rear Crash
Time from Pre-Crash TRG (msec)	96
Linked Pre-Crash Page	1
Side Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Side Curtain Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Pretensioner Deployment, Time to Fire (msec)	No
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

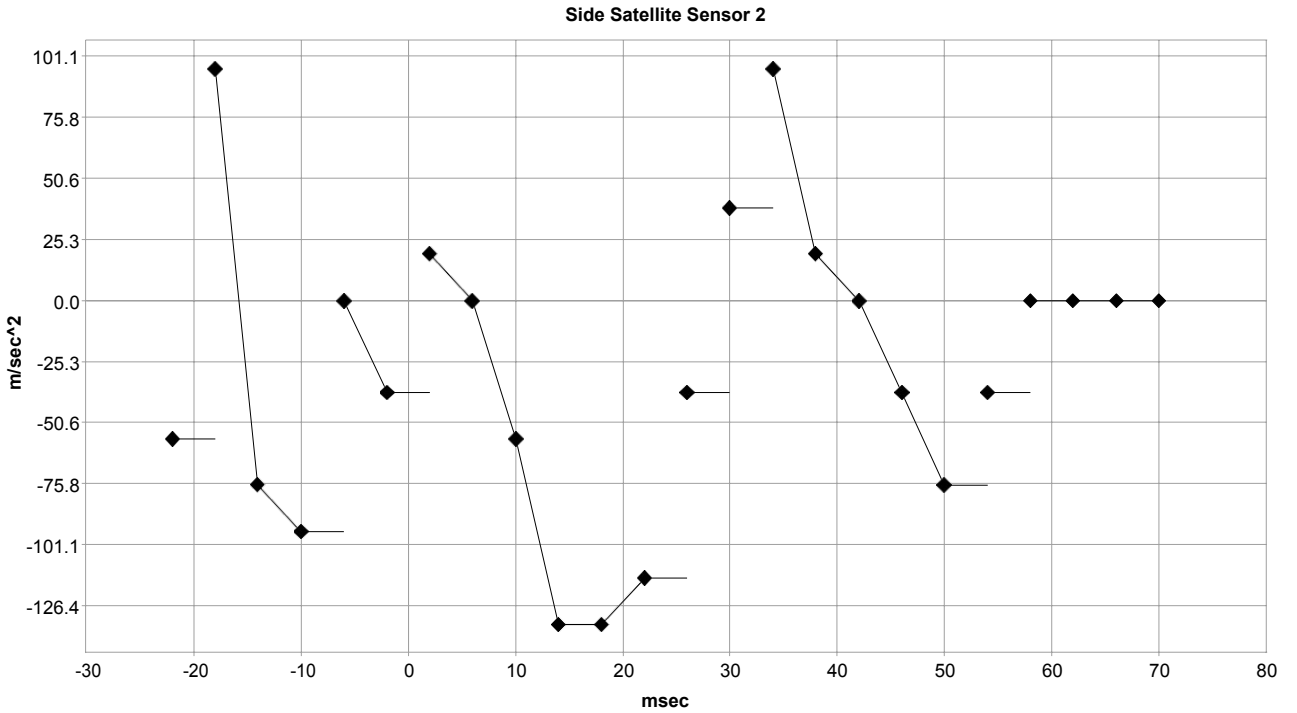
Lateral Crash Pulse (1st Prior Event, TRG 10 - table 1 of2)

Recording Status, Time Series Data	Complete
Recorded Side	Right Side
Time from TRG to Next Sample (msec)	2
Location of Side Satellite Sensor 1	B-Pillar
Location of Side Satellite Sensor 2	Front Door
Location of Side Satellite Sensor 3	C-Pillar
Location of Side Satellite Sensor 4	Not Equipped
Location of Floor Sensor	Airbag ECU
Clipping Time of Lateral Acceleration, Side Satellite Sensor 1 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 2 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 3 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 4 (msec)	SNA
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	No



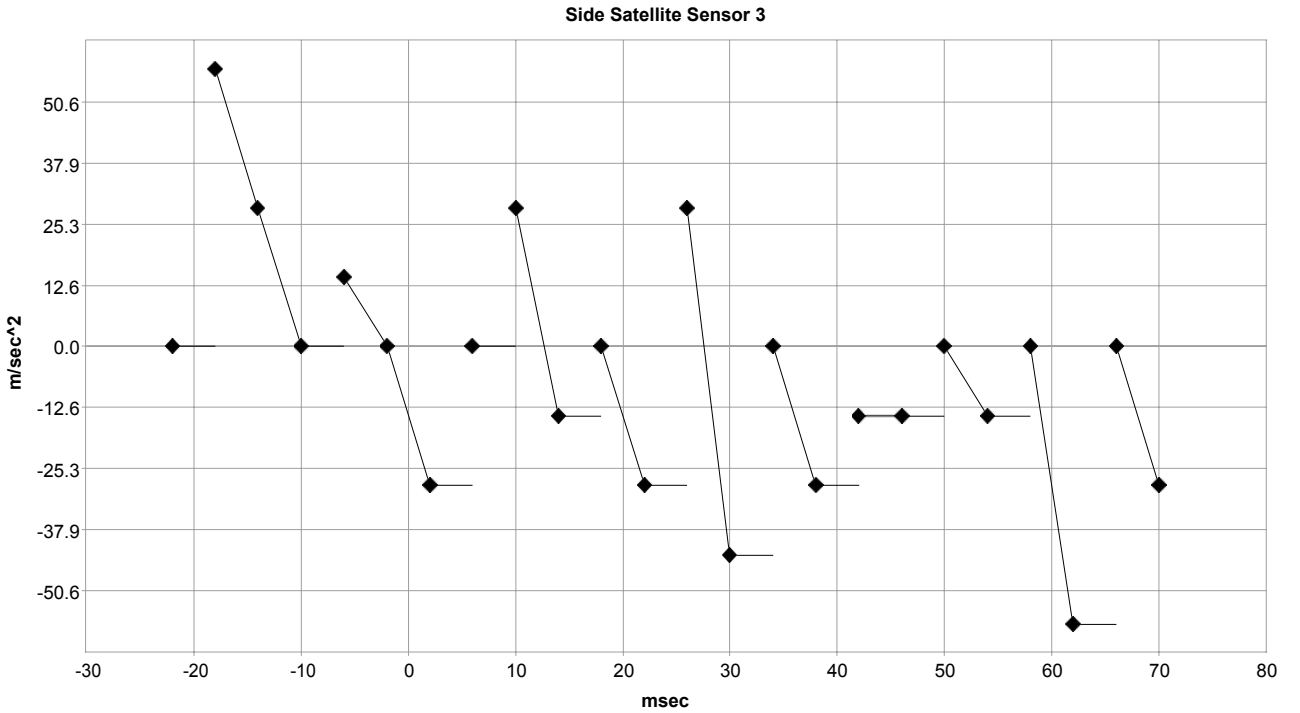
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time



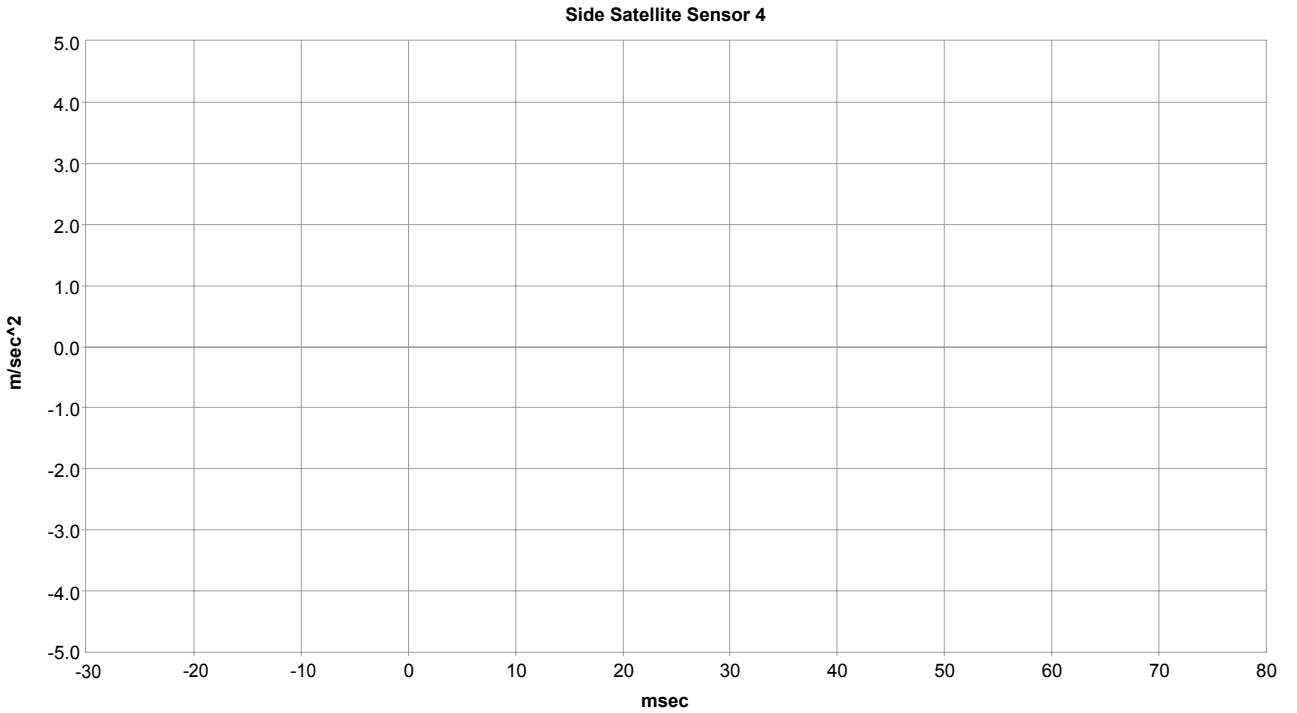
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time



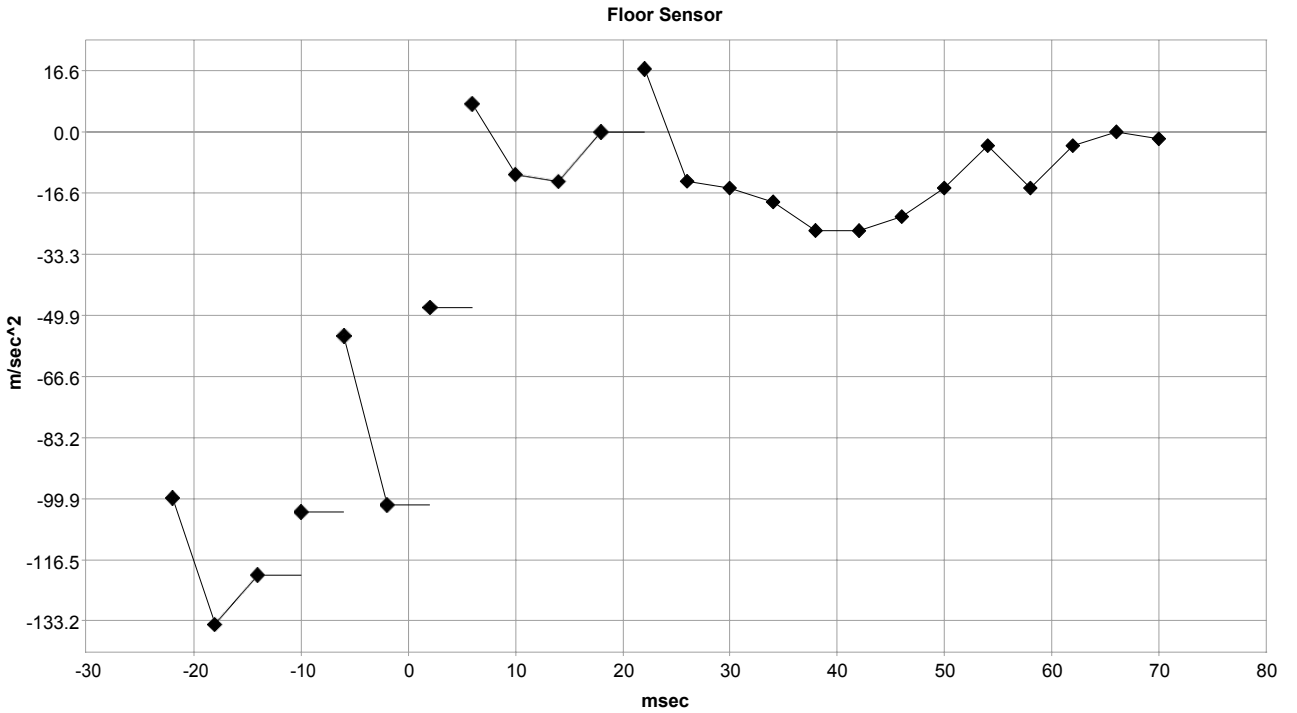
Deployment Time Marker Key

1	Side Curtain Airbag



Deployment Time Marker Key

1	Side Curtain Airbag



Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time
4	Side Curtain Airbag

Lateral Crash Pulse (1st Prior Event, TRG 10 - table 2 of 2)

Time (msec)	Lateral Acceleration, Side Satellite Sensor 1 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 2 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 3 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 4 (m/sec^2)	Lateral Acceleration for Side Crash, Floor Sensor (m/sec^2)
-22	-57.5	-57.5	0.0	SNA	-99.6
-18	-71.9	95.8	57.5	SNA	-134.1
-14	-28.7	-76.6	28.7	SNA	-120.7
-10	-43.1	-95.8	0.0	SNA	-103.4
-6	-71.9	0.0	14.4	SNA	-55.5
-2	-28.7	-38.3	0.0	SNA	-101.5
2	-43.1	19.2	-28.7	SNA	-47.9
6	-14.4	0.0	0.0	SNA	7.7
10	14.4	-57.5	28.7	SNA	-11.5
14	-28.7	-134.1	-14.4	SNA	-13.4
18	-43.1	-134.1	0.0	SNA	0.0
22	0.0	-114.9	-28.7	SNA	17.2
26	-14.4	-38.3	28.7	SNA	-13.4
30	0.0	38.3	-43.1	SNA	-15.3
34	-14.4	95.8	0.0	SNA	-19.2
38	-28.7	19.2	-28.7	SNA	-26.8
42	-28.7	0.0	-14.4	SNA	-26.8
46	-14.4	-38.3	-14.4	SNA	-23.0
50	-28.7	-76.6	0.0	SNA	-15.3
54	-14.4	-38.3	-14.4	SNA	-3.8
58	-14.4	0.0	0.0	SNA	-15.3
62	-14.4	0.0	-57.5	SNA	-3.8
66	-14.4	0.0	0.0	SNA	0.0
70	-14.4	0.0	-28.7	SNA	-1.9

DTCs Present at Time of Event (1st Prior Event, TRG 10)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (1st Prior Event, TRG 10)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	100
TRG Count when Pre-crash TRG was Established (times)	8
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	ON
Occupant Size Classification, Front Passenger	AM50 (Not Child)
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	2021

Pre-Crash Data, -5 to 0 seconds (1st Prior Event, TRG 10)

Time (sec)	-4.6	-4.1	-3.6	-3.1	-2.6	-2.1	-1.6	-1.1	-0.6	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	98.2 [158]	97.6 [157]	96.9 [156]	96.9 [156]	96.3 [155]	95.1 [153]	95.1 [153]	94.4 [152]	100 [161]	99.4 [160]	102.5 [165]
Accelerator Pedal, % Full (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Engine Throttle (%)	99.5	99.5	100.0	99.5	99.5	99.5	99.5	99.5	63.5	43.0	42.5
Engine RPM (RPM)	6,300	6,200	6,200	6,200	6,100	6,100	6,100	6,000	6,300	6,300	6,500
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.359	-0.215	-0.359	-0.502	0.359	-0.072	-0.359	0.646	-2.512	-2.369	-5.025
Yaw Rate (deg/sec)	-1.95	-1.95	5.37	0.00	4.39	-2.44	6.83	-3.42	-4.39	32.70	32.70
Steering Input (degrees)	-10.5	-4.5	24.0	12.0	22.5	4.5	22.5	-7.5	-61.5	-100.5	-100.5
Shift Position	3	3	3	3	3	3	3	3	3	3	3
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

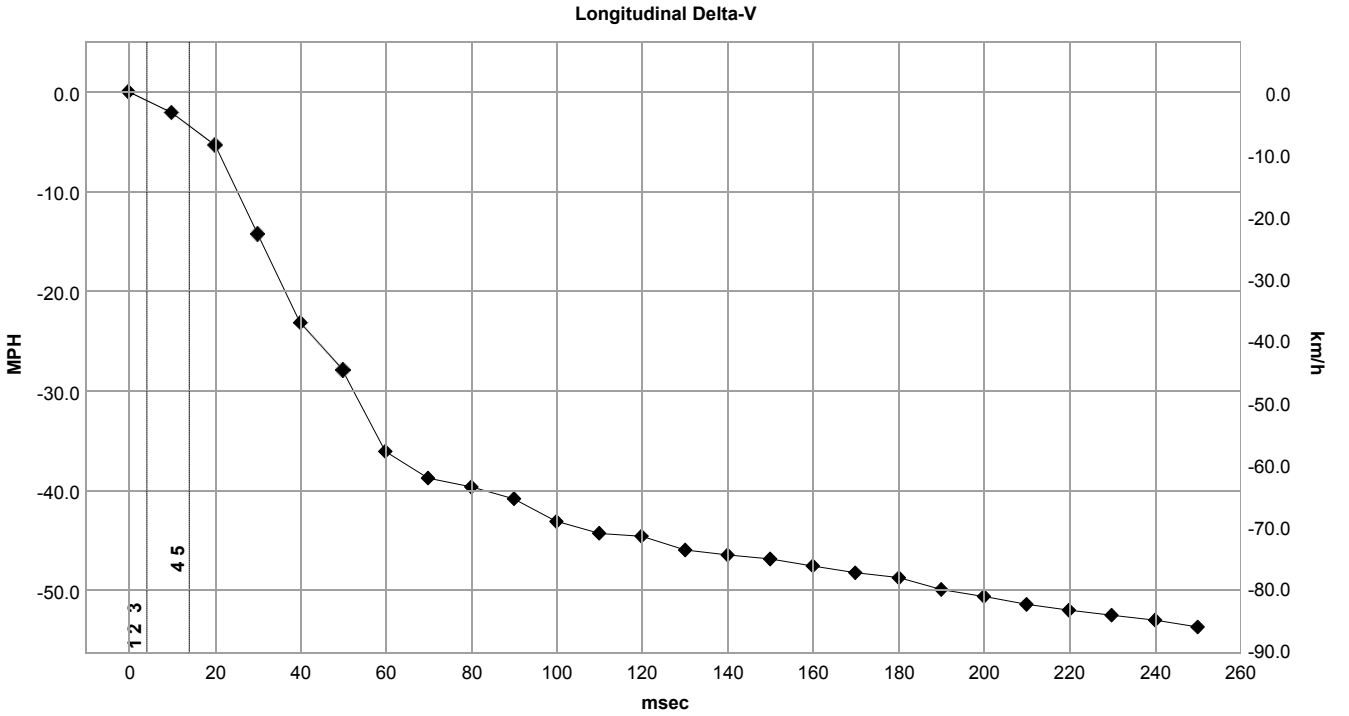
Fuel Injection Quantity (mm3/st)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

System Status at Event (2nd Prior Event, TRG 9)

Recording Status, Front/Rear Crash Info.	Complete
Crash Type	Front/Rear Crash
TRG Count (times)	9
Previous Crash Type	Side Crash
Time from Pre-Crash TRG (msec)	3
Linked Pre-Crash Page	1
Frontal Airbag Deployment, Time to 1st Stage Deployment, Driver (msec)	4
Frontal Airbag Deployment, Time to 1st Stage Deployment, Front Passenger (msec)	4
Pretensioner Deployment, Time to Fire, Driver (msec)	4
Pretensioner Deployment, Time to Fire, Front Passenger (msec)	4
Frontal Airbag Deployment, Time to 2nd Stage, Driver (msec)	14
Frontal Airbag Deployment, Time to 2nd Stage, Front Passenger (msec)	14
Active Head Restraint, Time to Deploy, Driver (msec)	SNA
Active Head Restraint, Time to Deploy, Front Passenger (msec)	SNA
Side Curtain Airbag Deployment, Time to Deploy, Driver (msec)	SNA
Side Curtain Airbag Deployment, Time to Deploy, Passenger (msec)	SNA
Side Airbag Deployment, Time to Deploy, Driver (msec)	SNA
Side Airbag Deployment, Time to Deploy, Passenger (msec)	SNA
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

Longitudinal/Lateral Crash Pulse (2nd Prior Event, TRG 9 - table 1 of 2)

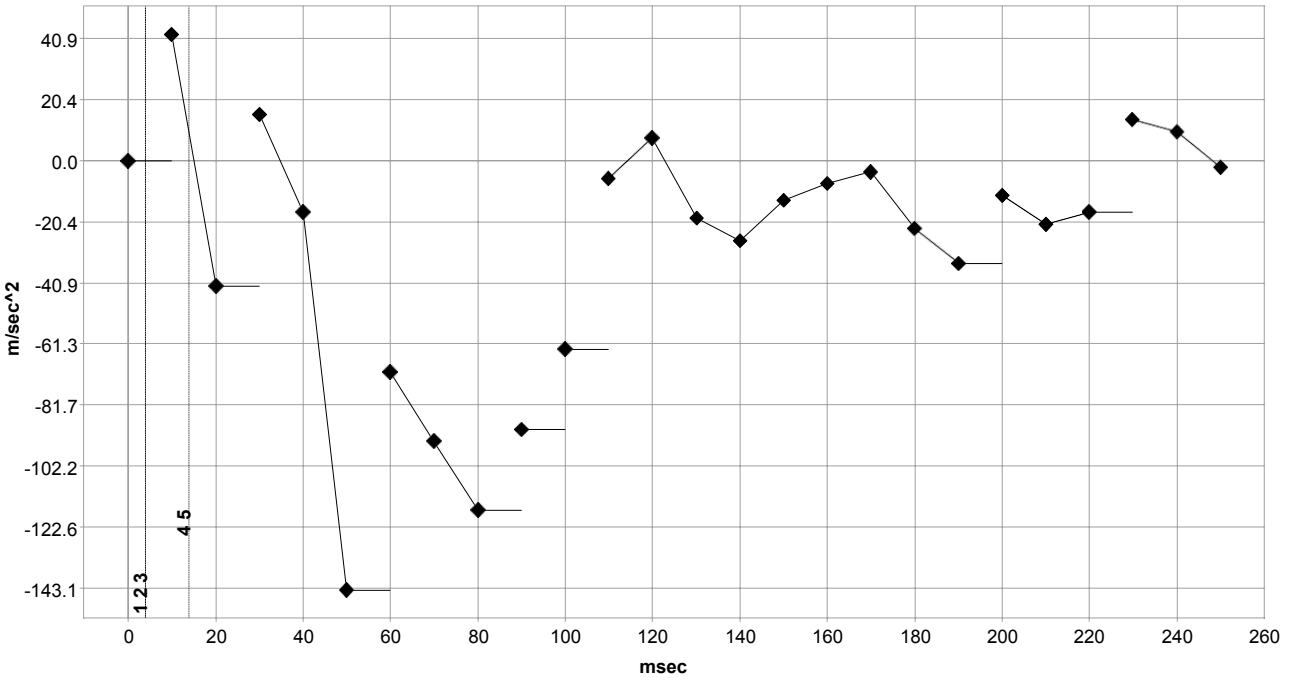
Recording Status, Time Series Data	Complete
Time from Time Zero to TRG (msec)	4.5
Length of Delta-V (msec)	250
Max. Longitudinal Delta-V (MPH [km/h])	-55.9 [-89.9]
Time, Maximum Delta-V, Longitudinal (msec)	297.0
Power Supply Status at Max. Delta-V	OFF
Clipping Time of Longitudinal Delta-V (msec)	58.0
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	16.5



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB

Lateral Acceleration for frontal/rear crash, Floor Sensor



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AHR
7	Driver CSA
8	Passenger CSA
9	Rear Window Airbag Deployment Time
10	Driver SAB
11	Passenger SAB

Longitudinal/Lateral Crash Pulse (2nd Prior Event, TRG 9 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])	Lateral Acceleration for Frontal/Rear Crash, Floor Sensor (m/sec^2)	Power Supply Status
0	0.0 [0.0]	0.0	ON
10	-2.1 [-3.3]	42.1	ON
20	-5.3 [-8.6]	-42.1	ON
30	-14.2 [-22.9]	15.3	OFF
40	-23.1 [-37.2]	-17.2	OFF
50	-27.9 [-45.0]	-143.7	OFF
60	-36.0 [-57.9]	-70.9	OFF
70	-38.7 [-62.3]	-93.9	OFF
80	-39.6 [-63.7]	-116.8	OFF
90	-40.8 [-65.6]	-90.0	OFF
100	-43.0 [-69.2]	-63.2	OFF
110	-44.2 [-71.2]	-5.7	OFF
120	-44.6 [-71.7]	7.7	OFF
130	-45.9 [-73.9]	-19.2	OFF
140	-46.4 [-74.7]	-26.8	OFF
150	-46.8 [-75.3]	-13.4	OFF
160	-47.5 [-76.4]	-7.7	OFF
170	-48.2 [-77.5]	-3.8	OFF
180	-48.7 [-78.3]	-23.0	OFF
190	-49.9 [-80.3]	-34.5	OFF
200	-50.6 [-81.4]	-11.5	OFF
210	-51.4 [-82.7]	-21.1	OFF
220	-51.9 [-83.6]	-17.2	OFF
230	-52.4 [-84.4]	13.4	OFF
240	-53.0 [-85.2]	9.6	OFF
250	-53.6 [-86.3]	-1.9	OFF

DTCs Present at Time of Event (2nd Prior Event, TRG 9)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (2nd Prior Event, TRG 9)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	100
TRG Count when Pre-crash TRG was Established (times)	8
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	ON
Occupant Size Classification, Front Passenger	AM50 (Not Child)
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	2021

Pre-Crash Data, -5 to 0 seconds (2nd Prior Event, TRG 9)

Time (sec)	-4.6	-4.1	-3.6	-3.1	-2.6	-2.1	-1.6	-1.1	-0.6	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	98.2 [158]	97.6 [157]	96.9 [156]	96.9 [156]	96.3 [155]	95.1 [153]	95.1 [153]	94.4 [152]	100 [161]	99.4 [160]	102.5 [165]
Accelerator Pedal, % Full (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Engine Throttle (%)	99.5	99.5	100.0	99.5	99.5	99.5	99.5	99.5	63.5	43.0	42.5
Engine RPM (RPM)	6,300	6,200	6,200	6,200	6,100	6,100	6,100	6,000	6,300	6,300	6,500
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.359	-0.215	-0.359	-0.502	0.359	-0.072	-0.359	0.646	-2.512	-2.369	-5.025
Yaw Rate (deg/sec)	-1.95	-1.95	5.37	0.00	4.39	-2.44	6.83	-3.42	-4.39	32.70	32.70
Steering Input (degrees)	-10.5	-4.5	24.0	12.0	22.5	4.5	22.5	-7.5	-61.5	-100.5	-100.5
Shift Position	3	3	3	3	3	3	3	3	3	3	3
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

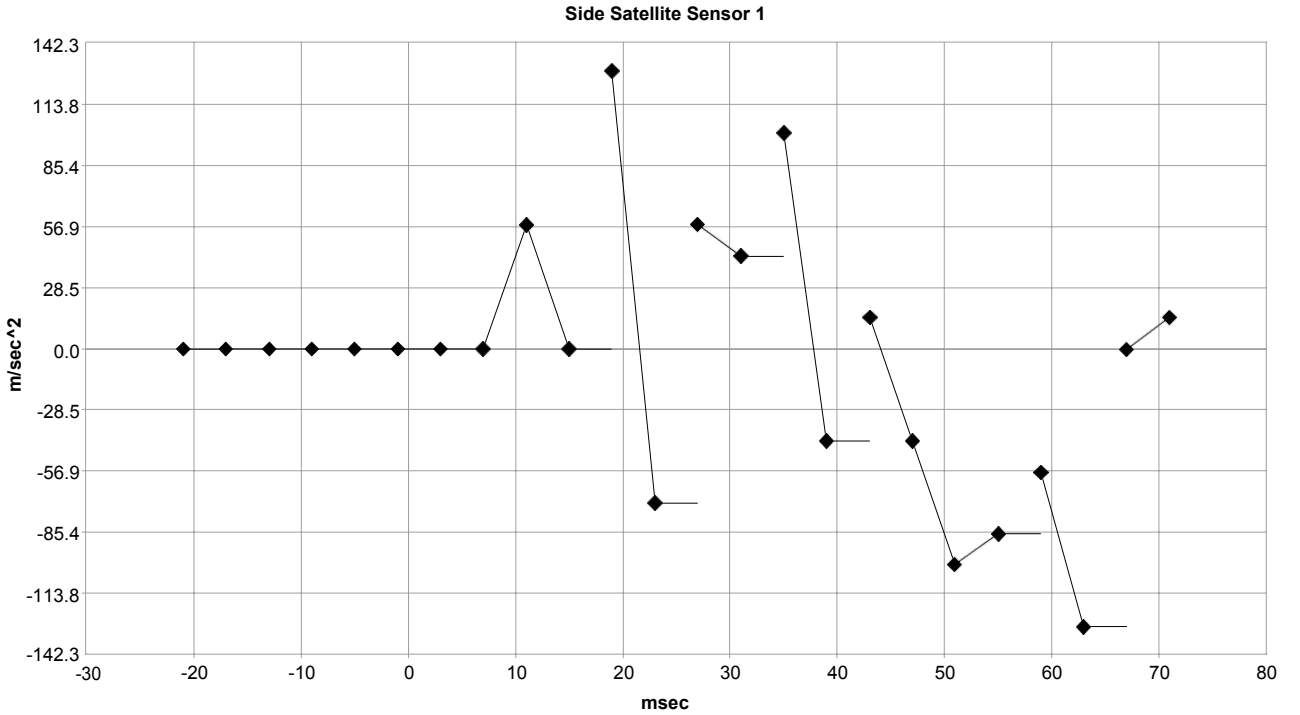
Fuel Injection Quantity (mm3/st)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

System Status at Event (3rd Prior Event, TRG 8)

Recording Status, Side Crash Info.	Complete
Crash Type	Side Crash
TRG Count (times)	8
Previous Crash Type	Side Crash
Time from Pre-Crash TRG (msec)	0
Linked Pre-Crash Page	1
Side Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Side Curtain Airbag Deployment, Time to Deploy (If Equipped) (msec)	No
Pretensioner Deployment, Time to Fire (msec)	No
Rear Window Airbag Deployment, Time to Deploy (msec)	SNA

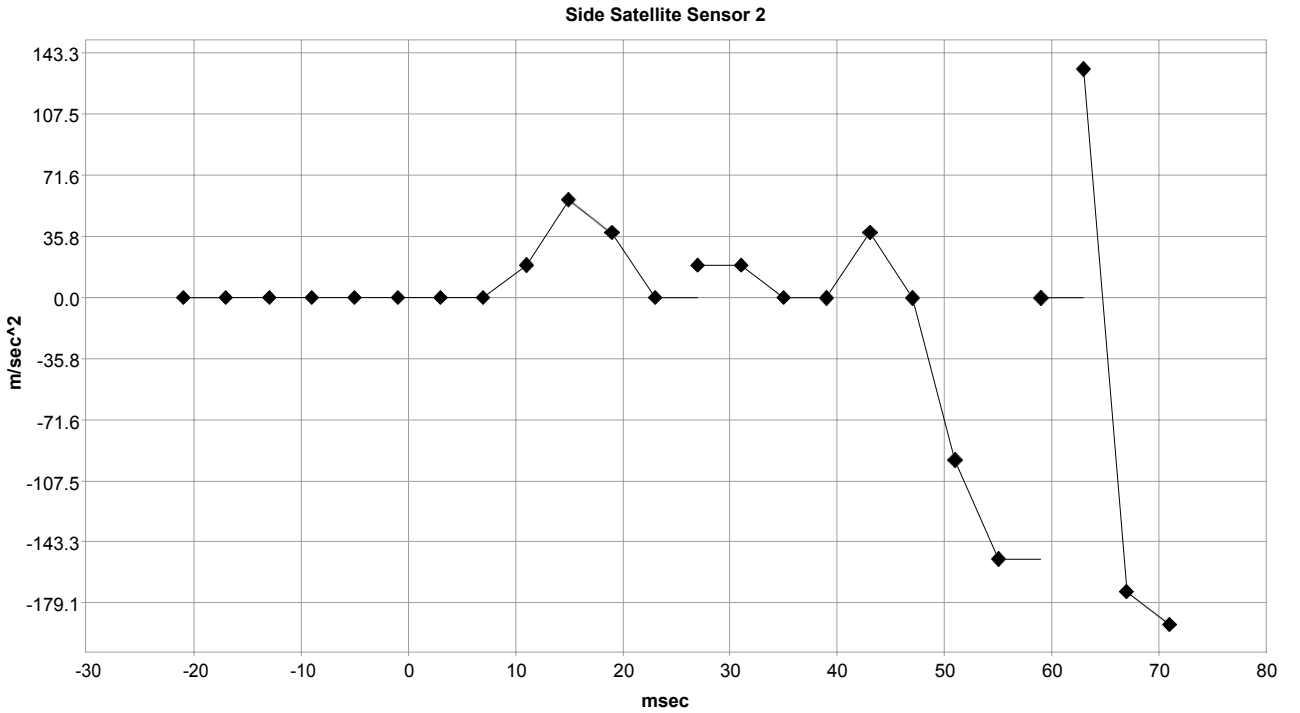
Lateral Crash Pulse (3rd Prior Event, TRG 8 - table 1 of2)

Recording Status, Time Series Data	Complete
Recorded Side	Right Side
Time from TRG to Next Sample (msec)	3
Location of Side Satellite Sensor 1	B-Pillar
Location of Side Satellite Sensor 2	Front Door
Location of Side Satellite Sensor 3	C-Pillar
Location of Side Satellite Sensor 4	Not Equipped
Location of Floor Sensor	Airbag ECU
Clipping Time of Lateral Acceleration, Side Satellite Sensor 1 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 2 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 3 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 4 (msec)	SNA
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	15.0



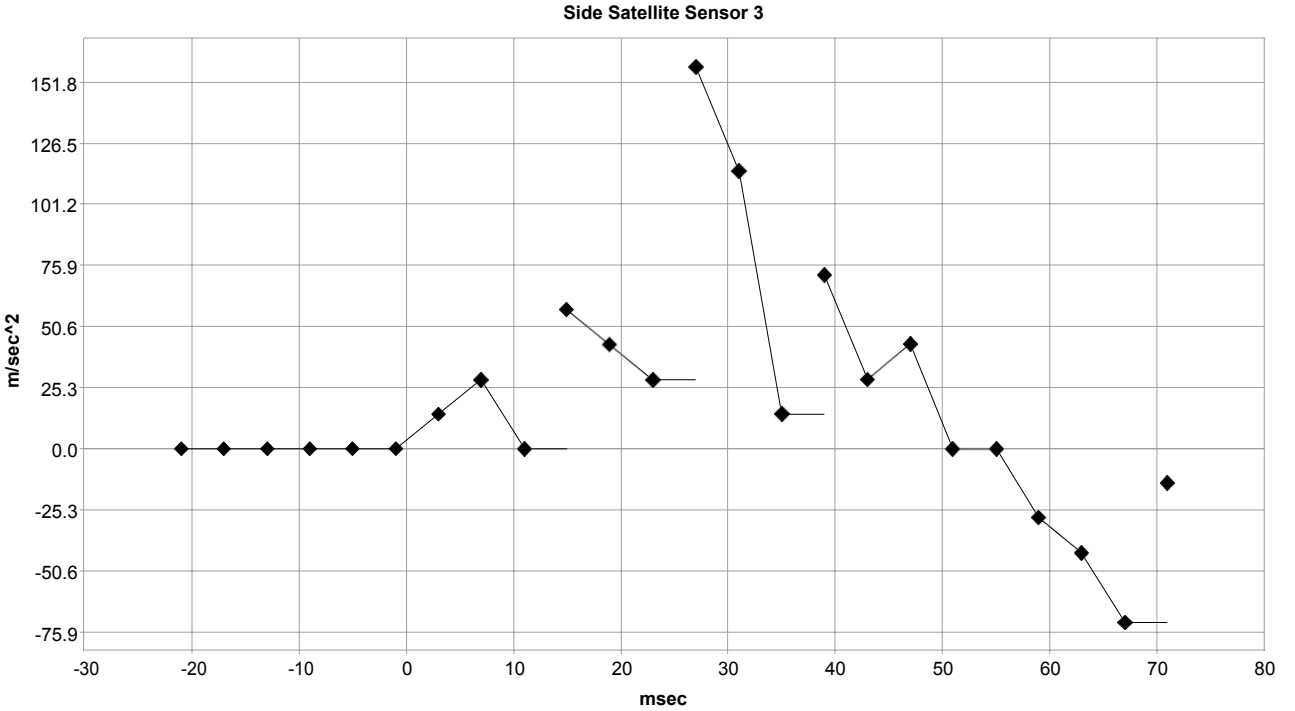
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time



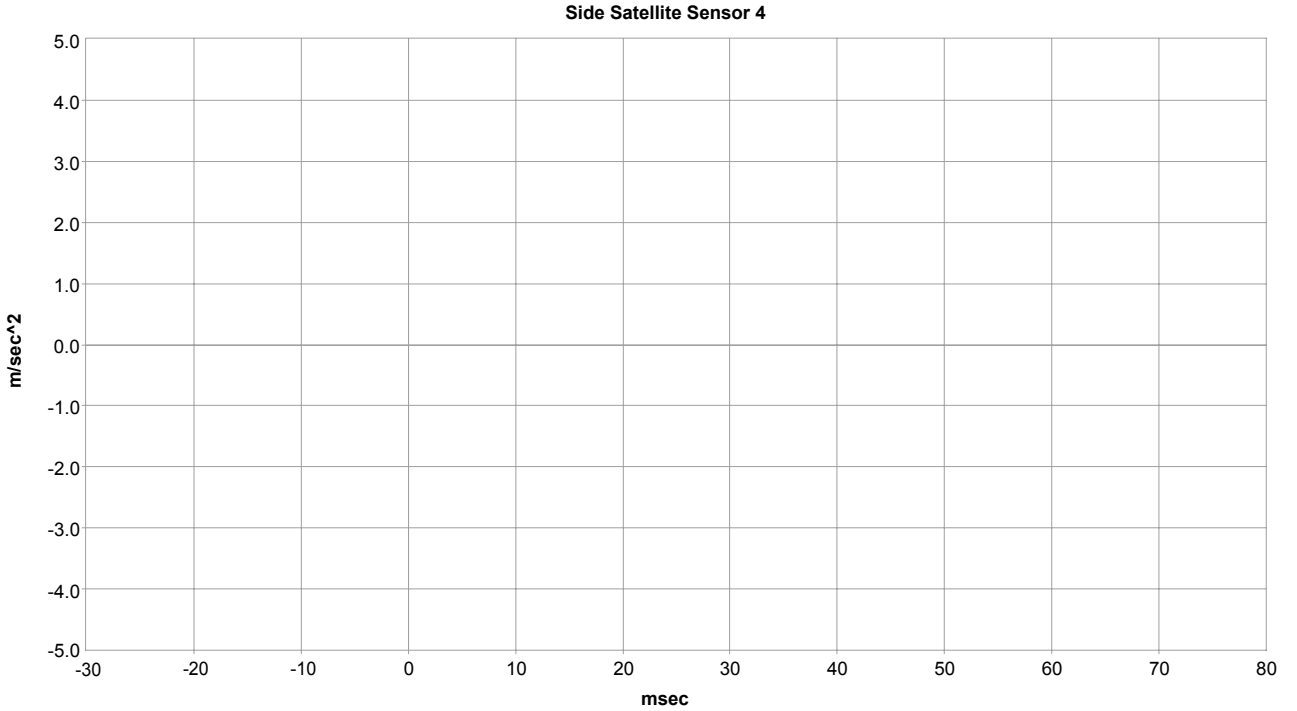
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time



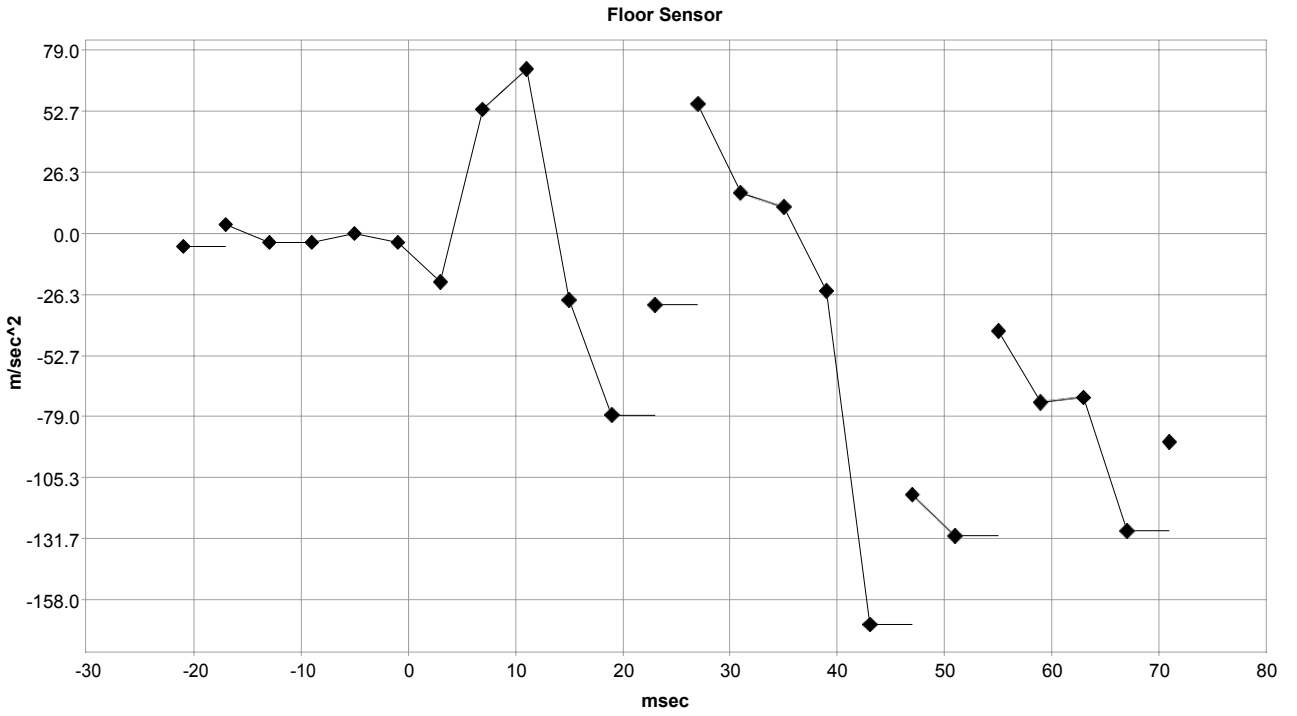
Deployment Time Marker Key

1	Side Curtain Airbag



Deployment Time Marker Key

1	Side Curtain Airbag



Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time
4	Side Curtain Airbag

Lateral Crash Pulse (3rd Prior Event, TRG 8 - table 2 of 2)

Time (msec)	Lateral Acceleration, Side Satellite Sensor 1 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 2 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 3 (m/sec^2)	Lateral Acceleration, Side Satellite Sensor 4 (m/sec^2)	Lateral Acceleration for Side Crash, Floor Sensor (m/sec^2)
-21	0.0	0.0	0.0	SNA	-5.7
-17	0.0	0.0	0.0	SNA	3.8
-13	0.0	0.0	0.0	SNA	-3.8
-9	0.0	0.0	0.0	SNA	-3.8
-5	0.0	0.0	0.0	SNA	0.0
-1	0.0	0.0	0.0	SNA	-3.8
3	0.0	0.0	14.4	SNA	-21.1
7	0.0	0.0	28.7	SNA	53.6
11	57.5	19.2	0.0	SNA	70.9
15	0.0	57.5	57.5	SNA	-28.7
19	129.3	38.3	43.1	SNA	-78.5
23	-71.9	0.0	28.7	SNA	-30.6
27	57.5	19.2	158.1	SNA	55.5
31	43.1	19.2	115.0	SNA	17.2
35	100.6	0.0	14.4	SNA	11.5
39	-43.1	0.0	71.9	SNA	-24.9
43	14.4	38.3	28.7	SNA	-168.6
47	-43.1	0.0	43.1	SNA	-113.0
51	-100.6	-95.8	0.0	SNA	-130.2
55	-86.2	-153.2	0.0	SNA	-42.1
59	-57.5	0.0	-28.7	SNA	-72.8
63	-129.3	134.1	-43.1	SNA	-70.9
67	0.0	-172.4	-71.9	SNA	-128.3
71	14.4	-191.5	-14.4	SNA	-90.0

DTCs Present at Time of Event (3rd Prior Event, TRG 8)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (3rd Prior Event, TRG 8)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	100
TRG Count when Pre-crash TRG was Established (times)	8
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	ON
Occupant Size Classification, Front Passenger	AM50 (Not Child)
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	2021

Pre-Crash Data, -5 to 0 seconds (3rd Prior Event, TRG 8)

Time (sec)	-4.6	-4.1	-3.6	-3.1	-2.6	-2.1	-1.6	-1.1	-0.6	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	98.2 [158]	97.6 [157]	96.9 [156]	96.9 [156]	96.3 [155]	95.1 [153]	95.1 [153]	94.4 [152]	100 [161]	99.4 [160]	102.5 [165]
Accelerator Pedal, % Full (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Engine Throttle (%)	99.5	99.5	100.0	99.5	99.5	99.5	99.5	99.5	63.5	43.0	42.5
Engine RPM (RPM)	6,300	6,200	6,200	6,200	6,100	6,100	6,100	6,000	6,300	6,300	6,500
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.359	-0.215	-0.359	-0.502	0.359	-0.072	-0.359	0.646	-2.512	-2.369	-5.025
Yaw Rate (deg/sec)	-1.95	-1.95	5.37	0.00	4.39	-2.44	6.83	-3.42	-4.39	32.70	32.70
Steering Input (degrees)	-10.5	-4.5	24.0	12.0	22.5	4.5	22.5	-7.5	-61.5	-100.5	-100.5
Shift Position	3	3	3	3	3	3	3	3	3	3	3
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

Fuel Injection Quantity (mm3/st)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

DTCs Present at Time of Event (Unlinked, Page 0)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (Unlinked, Page 0)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	200
TRG Count when Pre-crash TRG was Established (times)	7
Safety Belt Status, Driver	ON
Safety Belt Status, Front Passenger	ON
Occupant Size Classification, Front Passenger	AM50 (Not Child)
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	SNA
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	2021

Pre-Crash Data, -5 to 0 seconds (Unlinked, Page 0)

Time (sec)	-4.7	-4.2	-3.7	-3.2	-2.7	-2.2	-1.7	-1.2	-0.7	-0.2	0 (TRG)
Vehicle Speed (MPH [km/h])	98.8 [159]	98.8 [159]	98.2 [158]	97.6 [157]	96.9 [156]	96.9 [156]	96.3 [155]	95.1 [153]	95.1 [153]	94.4 [152]	97.6 [157]
Accelerator Pedal, % Full (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Engine Throttle (%)	99.5	99.5	99.5	99.5	100.0	99.5	99.5	99.5	99.5	99.5	99.5
Engine RPM (RPM)	6,300	6,300	6,300	6,200	6,200	6,200	6,100	6,100	6,100	6,000	6,100
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.718	-0.359	-0.359	-0.215	-0.359	-0.502	0.359	-0.072	-0.359	0.646	-0.861
Yaw Rate (deg/sec)	-5.37	-3.42	-1.95	-1.95	5.37	0.00	4.39	-2.44	6.83	-3.42	-4.88
Steering Input (degrees)	-22.5	-18.0	-10.5	-4.5	24.0	12.0	22.5	4.5	22.5	-7.5	-15.0
Shift Position	3	3	3	3	3	3	3	3	3	3	3
Sequential Shift Range	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
Cruise Control Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, PWR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, ECO	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Sport	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, Snow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Drive Mode, EV	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

Fuel Injection Quantity (mm3/st)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

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.

PIDs	PID	Data
	00	BC 60 00 01
	01	00
	03	30 44 37 33 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30
	04	FF FF FF
	05	01
	06	02
	0A	01
	0B	00
	20	80 00 00 01
	21	03 9F
	40	00 00 00 01
	60	FF FF F0 01
	61	03 05 C8 00 B2 40 05 00 03 55 03 55 02 80 02 80 03 55 03 55 00 00 00 00 19 00 00 00 00 00 40 00
	62	A5 01 43 6E 07 E7 00 00 00 00
	63	55 0C 07 E5 03 11 00 00 66 66 66 66 66 60 9F 9F 9E 9D 9C 9C 9B 99 99 98 9D C8 C8 C8 C8 C8 C8 C8 C8 C8 C8 C8 00 00 00 3F 3F 3F 3E 3E 3E 3D 3D 3D 3C 3D 00 00 00 00 00 00 00 07
	64	55 04 07 E5 03 11 00 00 66 66 66 66 66 60 9E 9D 9C 9C 9B 99 99 98 A1 A0 A5 C8 C8 C8 C8 C8 C8 C8 C8 C8 C8 C8 00 00 00 3F 3E 3E 3E 3D 3D 3D 3C 3F 3F 41 00 00 00 00 00 00 00 08
	65	55 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	66	55 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	67	55 14 03 00 09 04 04 04 0A 0A 55 FD FD FF FE FF FE FF FE FF FE 00 74
	68	55 15 8E 00 0B FE FE FE FE FE 55 FD FD FF FE FF FE FF FE FF FE 03 FE
	69	00 09 DA 00 00 00 0C 00 1F C0 53 C0 87 C0 A3 C0 D2 C0 E2 C0 E7 C0 EE C0 FB C1 02 C1 04 C1 0C C1 0F C1 11 C1 15 C1 19 C1 1C C1 23 C1 27 C1 2C C1 2F C1 32 C1 35 C1 39 C1 46 0E 52
	6A	00 C7 D4 C0 00 C0 03 C0 06 C0 09 C0 0C C0 0F C0 12 C0 14 C0 17 C0 19 C0 1B C0 1E C0 21 C0 23 C0 26 C0 27 C0 29 C0 28 C0 28 C0 26 00 00 00 00 00 00 00 00 00 00 00 00 C0 29 0D 37
	6B	55 04 60 00 0A FE FE FE FE 55 12 04 05 02 03 05 02 03 01 FF 02 03 00 01 00 01 02 02 01 02 01 01 01 01 01 00 FC FE 00 FF 00 02 00 FE 01 00 02 FE 03 00 02 01 01 00 01 00 04 00 02
	6C	55 14 00 00 08 FE FE FE FE 55 13 00 00 00 00 00 00 00 00 FC 00 F7 05 FC FD F9 03 FF 03 07 06 04 09 00 FF 00 00 00 00 00 00 FF FE 00 FC FD FE F5 F8 FF FB FE FD 00 00 02 03 05 01
	6D	03 FB 04 05 00 02 FF 00 03 07 07 06 02 FE FB FF 00 02 04 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FE 01 FE 01 FE 01 FE 01 FE
	6E	00 00 00 00 00 00 00 00 FF FD FE 00 FF FF 00 00 FE 00 05 08 00 F9 09 0A 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 FE 01 FE 01 FE 01 FE 01 FE
	6F	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	70	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	71	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	72	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	73	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 F5 F9 FC FC 0B 00 09 FB 0E F9 F6 F6 FB FB FD FB F9 05 FF FB 09 F4 C7 C7 C7 C7 C8 C7 C7 C7 C7 C7 C7 00 00 00
	74	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

```
      FC FC 0B 00 09 FB 0E F9 F7 43 43 FB FD FB F9 05 FF FB 09 DD DF BA
      C7 C7 C8 C7 C7 C7 C7 C7 7F 56 55 00 00 00
80    00 00 00 01
A0    0C 00 1F 81
A5    00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40
      FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE
      FE FE FE FE FE FE FE FE FE FE FE
A6    00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40 00 40
      FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE FE
      FE FE FE FE FE FE FE FE FE FE FE
B4    34 46 3F 36 1D 35 19 FC 06 07 00 F7 07 08 0A 0E 0E 0C 08 02 08 02
      00 01 01 FE
B5    03 FE 02 02 00 02 0B E4 DB 0F 29 10 E3 F7 FA 0D 58 3B 44 16 26 25
      43 2F 00 1E
B6    00 EA 16 F8 09 4B 25 31 3D 2F 21 03 FC 0A 0E 07 04 02 0C 12 06 0B
      09 F9 FB 01 00 21
B7    00 00 00 FE FF FF 00 00 00 00 02 FF 01 00 FF 00 0D 0A 0D 0D 00 00
      00 00 00 00 03 FE
B8    03 F1 03 F4 03 F9 03 FD 00 10 00 08 00 0F 00 03 00 0F 03 FB 03 F6

B9    03 F9 03 FD 00 10 00 08 00 0F 00 03 00 0F 03 FB 03 D7 03 BD 03 BD
```

Disclaimer of Liability

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

APPENDIX B: Event Data Recorder Report 2007 Toyota Solara[5]

[5] The Event Data Record (EDR) report published as part of this technical report is the latest software version of the Bosch CDR Tool at the time of publication. The CDR report contained within the associated CISSWEB application may be of an earlier software version of the Bosch CDR Tool and 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/Frame Number	4T1CE30P27U******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS16001_V2_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 16.3
Reported with CDR version	Crash Data Retrieval Tool 17.7.2
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Front/Rear (3)

Comments

No comments entered.

Data Limitations

CDR Record Information:

- Due to limitations of the data recorded by the airbag ECU, such as the resolution, data range, sampling interval, time period of the recording, and the items recorded, the information provided by this data may not be sufficient to capture the entire crash.
- Pre-Crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may not be synchronous to each other.
- Airbag ECU data should be used in conjunction with other physical evidence obtained from the vehicle and the surrounding circumstances.
- If the airbags did not deploy or the pretensioners did not operate during an event that meets a specified recording threshold, it is called a Non-Deployment Event. Data from a Non-Deployment Event can be overwritten by a succeeding event that meets the specified recording threshold. If the airbag(s) deploy or the pretensioners are operated, it is called a Deployment Event. Deployment Event data cannot be overwritten or deleted by the airbag ECU following that event.
- If power supply to the airbag ECU is lost during an event, all or part of the data may not be recorded.
- "Diagnostic Trouble Codes" are information about faults when a recording trigger is established. Various diagnostic trouble codes could be set and recorded due to component or system damage during an accident.
- The airbag ECU records only diagnostic information related to the airbag system. It does not record diagnostic information related to other vehicle systems.
- The TaSCAN, Global Tech Stream, or Intelligent Tester II devices (or any other Toyota genuine diagnostic tool) can be used to obtain detailed information on the diagnostic trouble codes from the airbag system, as well as diagnostic information from other systems. However, in some cases, the diagnostic trouble codes of the airbag system recorded by the airbag ECU when the event occurred may not match the diagnostic trouble codes read out when the diagnostic tool is used.

General Information:

- The data recording specifications of Toyota's airbag ECUs are divided into the following categories. The specifications for 12EDR or later are designed to be compatible with NHTSA's 49CFR Part 563 rule.
  - 00EDR / 02EDR / 04EDR / 06EDR / 10EDR / 12EDR / 13EDR / 15EDR / 17EDR
- The airbag ECU records data for all or some of the following accident types: frontal crash, rear crash , side crash, and rollover events. Depending on the installed airbag ECU, data for side crash and/or rollover events may not be recorded.
- The airbag ECU records post-crash data and may record pre-crash data in the event of a frontal/rear crash. In addition, it may record post-crash data in the event of a side crash or rollover.
- The airbag ECU has the following recording pages (memory maps) for each accident type to store event data: three pages for frontal or rear crash, one page for a side crash (if airbag ECU is applicable) , and one page for rollover events. (if airbag ECU is applicable)
- The data recorded by the airbag ECU in the event of a frontal/rear crash includes information that indicates the sequence and interval of each previously-occurring frontal/rear crash event.
  - Time from Previous TRG
  - TRG Count
- The point in time at which the recording trigger is established is regarded as time zero for the recorded data. For the time indicated in "Lateral Delta-V", "Roll Angle" or "Lateral Acceleration", the first sampling point after the recording trigger establishment is regarded as time zero. The time zero of the data and the recording trigger establishment do not always occur simultaneously.
- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or rollover event).
- Some of the data recorded by the airbag ECU is transmitted to the airbag ECU from various vehicle control modules by the vehicle's Controller Area Network (CAN).

- In some cases, the airbag ECU part number printed on the ECU label may not match the airbag ECU part number that the CDR tool reports. The part number retrieved by the CDR tool should be considered as the official ECU part number.
- The sampling interval of "Roll Angle" and "Lateral Acceleration" is 8 [ms] or 128 [ms]. A field indicating the sampling interval is not provided. The graph scaling can assist with derterming the sample rate. The time zero is indicated by count (0).
- "Prior Event" is the event that occurred before the "1st Prior Event" that reached the greatest MAX Delta-V. Therefore, "Prior Event" is not always the prior event of "1st Prior Event".

Data Element Sign Convention:
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report.

Data Element Name	Positive Sign Notation Indicates
Max. Longitudinal Delta-V	Forward
Longitudinal Delta-V	Forward
Roll Angle Peak	Clockwise Rotation
Roll Angle	Clockwise Rotation
Lateral Acceleration , Airbag ECU Sensor *	Right to Left

* For sensing a rollover

Data Definitions:
1)

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- "Time to Deployment Command" indicates the time between recording trigger establishment and the determination of airbag deployment. This value may differ from the actual time it takes for the airbag to fully deploy.
- Even if an airbag/pretensioner did not deploy due to the "front passenger airbag disable switch and/or "RSCA Disable Switch" in the ON position or other disabling criteria are met, the "Time to deployment command" data element for that airbag/pretensioner may still be recorded.
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 6,000 rpm. Resolution is 400 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 400 rpm.
- The upper limit for the recorded "Vehicle Speed" value is 126 km/h (78.3mph). Resolution is 2km/h (1.2mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
  - Significant changes in the tire's rolling radius
  - Wheel lock and wheel slip
- The "Accelerator Rate" value is recorded as a voltage or level. In the case of voltage, the voltage increases as the driver depresses the accelerator. In case of the level, the following three levels are recorded.
  - FULL / MIDDLE / OFF
- "Accelerator Rate" may be recorded as "OFF" even if the accelerator pedal is depressed lightly. In addition, "FULL" may be recorded when the accelerator pedal is depressed strongly but not fully.
- The "Drive" setting for the "Shift Position" value indicates the shift position state is other than "R,"(Reverse), "N" (Neutral), or "P" (Park). It also includes communication disruption. Regardless of an actual shift position, "Drive" is always set for M/T vehicles because the shift position signal is not available.
- Depending on the type of occupant sensor installed in the vehicle, one of the following three recording formats for "Occupancy Status, Passenger" will be utilized.
  - Occupied / Not Occupied
  - Adult / Child / Not Occupied
  - AM50 / AF05 / Child / Not Occupied
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Longitudinal Delta-V" indicates the change in forward speed after establishment of the recording trigger. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the recording trigger.
- "Roll Angle peak" may not always match the peak value within the "Roll Angle" sampling points due to differences in data calculation method.
- For "Lateral Delta-V", the sensor location (B-pillar, front door, C-pillar, and slide door) shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "TRG Count" indicates the number of frontal/rear recording triggers that have been established. The calculated value does not include the number of times side or rollover recording triggers have been established. The sequence in which each frontal/rear event occurred can be verified from the "TRG Count". The lesser the "TRG Count" value, the older the data. The upper limit for the recorded value is 255 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- Resolution of the "Time from Pre-Crash to TRG" is 100 [ms], and the value is rounded down and recorded.
- For "Time from Previous TRG", the recording trigger of side crash and rollover is not considered. The upper limit for the recorded value is 5000 [ms] or 5100 [ms] depending on the ECU part number. Resolution is 20 [ms] and the value is rounded down and recorded. When it's displayed as 5100ms, the actual "Time from Previous TRG" may be longer than what is displayed for that event.
- If 2 or more frontal/rear events occur successively within a period of 5000ms (or 5120ms for ECUs with 1.024 data sampling intervals), the actual sample time before the trigger is not displayed for subsequent events. The sample time before trigger will only be displayed for the first event of the successive events. For subsequent events (i.e second event or later events), the pre-crash "Time (sec)" data is replaced by integers -5 through -1 and the heading "Time (sec)" is replaced with "Sample Count". The time between "Sample Count" integers (-5 through -1) cannot be determined. The time between the last integer and TRG cannot be determined.
- "Pre-Crash Data Status" indicates data communication status of the vehicle. If communication disruption or other failure is occur, "Invalid" is set. Moreover, "Invalid" is set for some M/T vehicles because the shift position signal is not transmitted for them even if the other data is valid.

05002_ToyotaDENSO_r026

System Status at Time of Retrieval

ECU Part Number	89170-06242
ECU Generation	02EDR
Recording Status, All Pages	Complete
Diagnostic Trouble Codes Exist	No
Total Number of Front/Rear Crash Events	3
Freeze Signal	ON

Front/Rear Event Record Summary at Retrieval

Events Recorded	TRG Count	Crash Type	Time (msec)	Event & Crash Pulse Data Recording Status
Most Recent Frontal/Rear Event	6	Front/Rear Crash	0	Complete (Front/Rear Page 1)
1st Prior Frontal/Rear Event	5	Front/Rear Crash	-240	Complete (Front/Rear Page 0)
Prior Frontal/Rear Event	4	Front/Rear Crash	N/A	Complete (Front/Rear Page 2)

System Status at Front Airbag Deployment

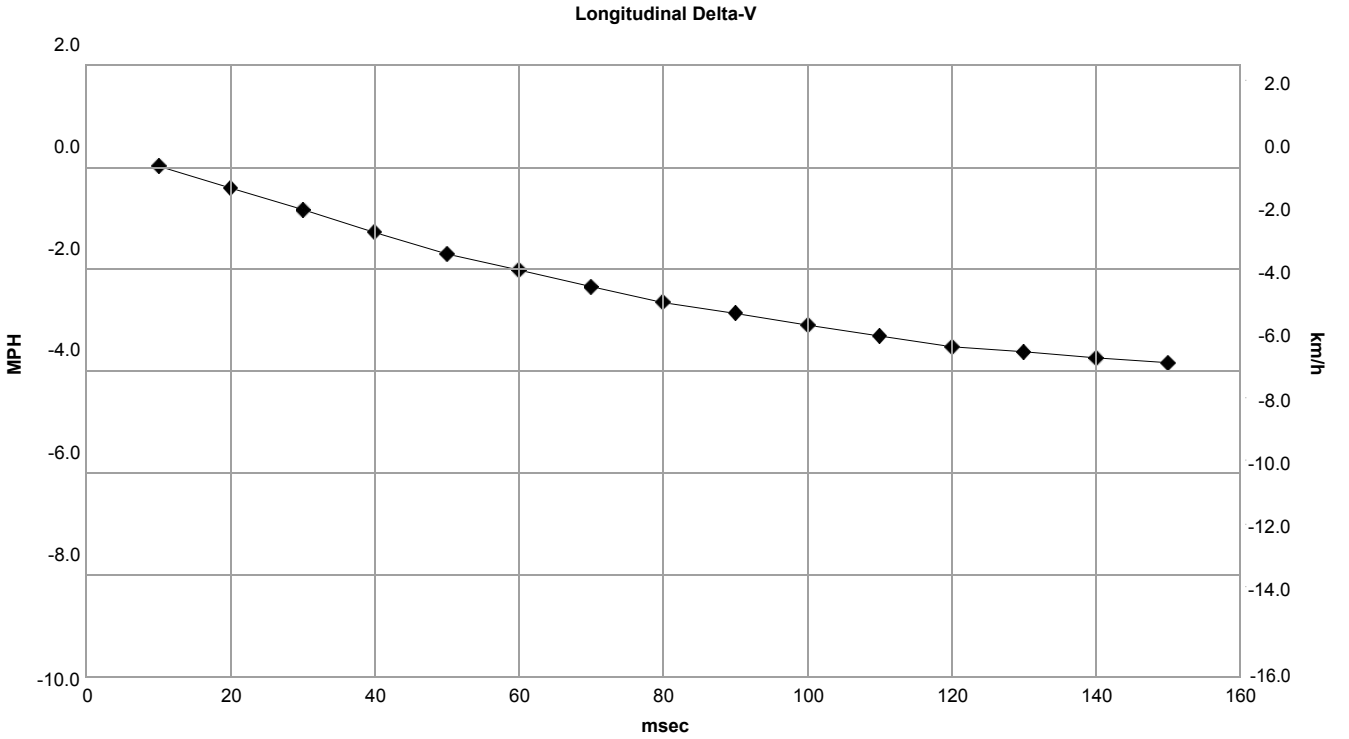
Time to Deployment Command, Front Airbag, Driver (msec)	0
Time to Deployment Command, Front Airbag, Passenger (msec)	0
Event Severity Status, Driver	N/A
Event Severity Status, Passenger	N/A

System Status at Event (Most Recent Frontal/Rear Event, TRG 6)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	6
Time From Previous TRG (msec)	240
Buckle Switch, Driver	Buckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 6 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])	-4.3 [-6.9]



Longitudinal Crash Pulse (Most Recent Frontal/Rear Event, TRG 6 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.9 [-1.4]
30	-1.3 [-2.1]
40	-1.7 [-2.8]
50	-2.1 [-3.4]
60	-2.5 [-4.0]
70	-2.8 [-4.5]
80	-3.1 [-5.0]
90	-3.3 [-5.3]
100	-3.5 [-5.7]
110	-3.7 [-6.0]
120	-4.0 [-6.4]
130	-4.1 [-6.6]
140	-4.2 [-6.7]
150	-4.3 [-6.9]

DTCs Present at Start of Event (Most Recent Frontal/Rear Event, TRG 6)

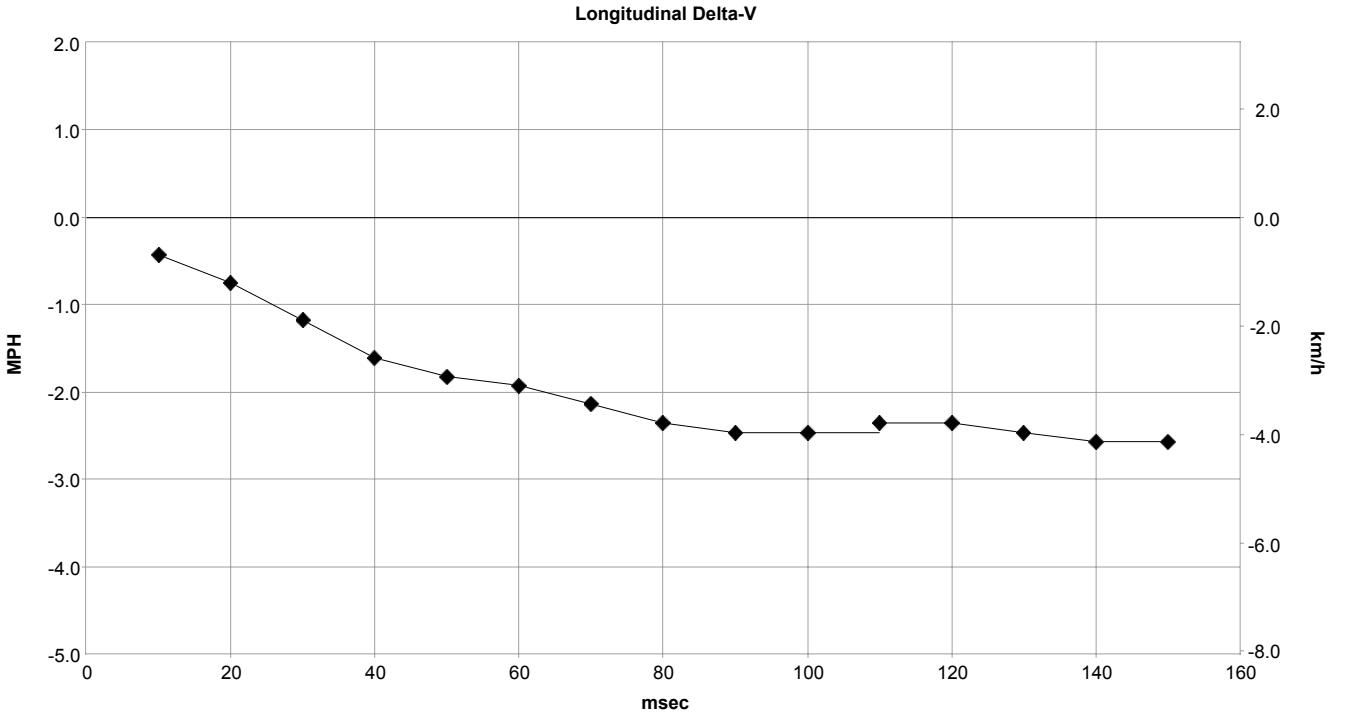
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

System Status at Event (1st Prior Frontal/Rear Event, TRG 5)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	5
Time From Previous TRG (msec)	5000 or greater
Buckle Switch, Driver	Buckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 5 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])	-2.6 [-4.1]



Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 5 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-0.8 [-1.2]
30	-1.2 [-1.9]
40	-1.6 [-2.6]
50	-1.8 [-2.9]
60	-1.9 [-3.1]
70	-2.1 [-3.4]
80	-2.4 [-3.8]
90	-2.5 [-4.0]
100	-2.5 [-4.0]
110	-2.4 [-3.8]
120	-2.4 [-3.8]
130	-2.5 [-4.0]
140	-2.6 [-4.1]
150	-2.6 [-4.1]

DTCs Present at Start of Event (1st Prior Frontal/Rear Event, TRG 5)

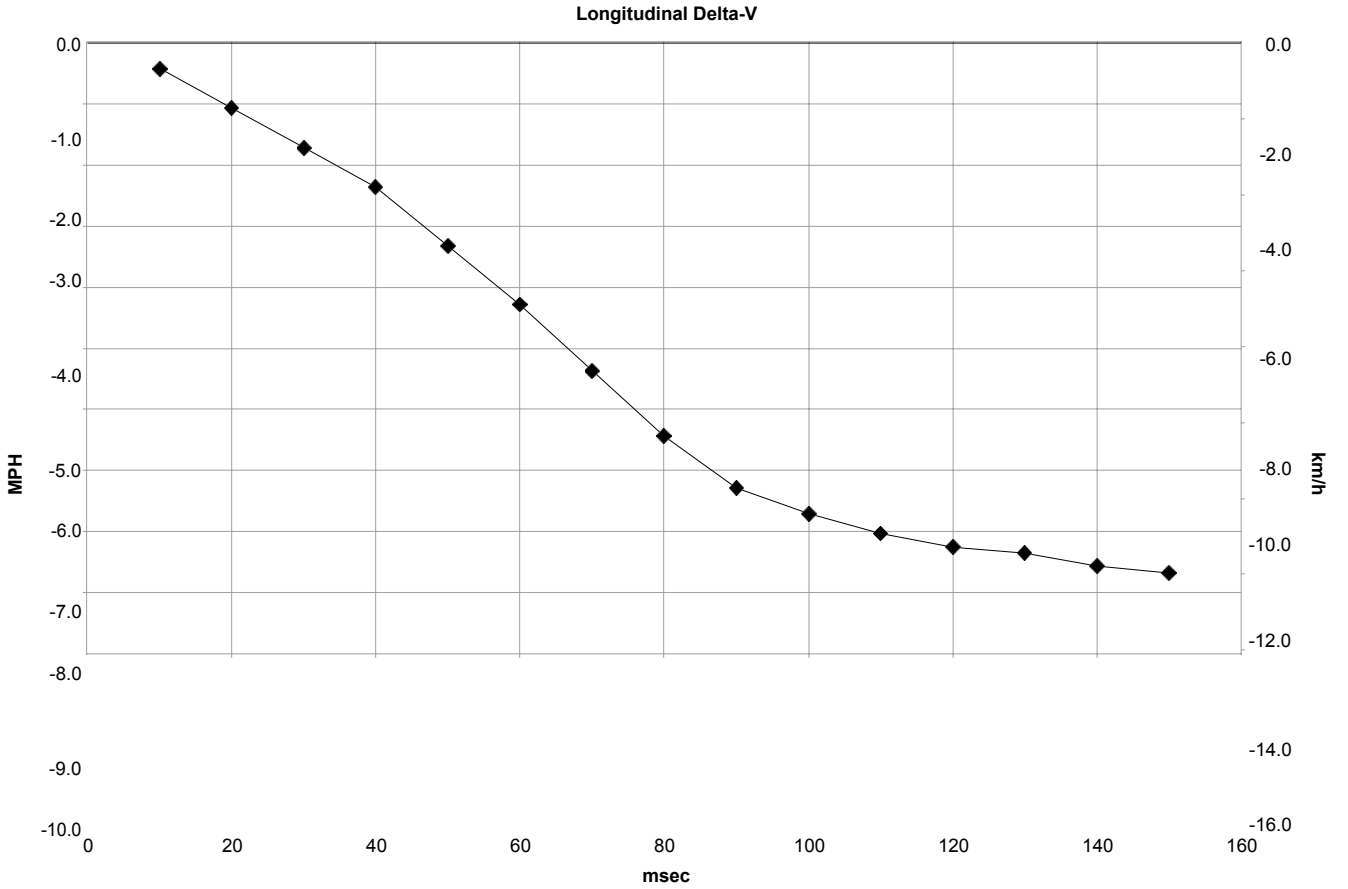
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

System Status at Event (Prior Frontal/Rear Event, TRG 4)

Recording Status, Front/Rear Crash Info.	Complete
TRG Count	4
Time From Previous TRG (msec)	5000 or greater
Buckle Switch, Driver	Buckled
Buckle Switch, Passenger	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward

Longitudinal Crash Pulse (Prior Frontal/Rear Event, TRG 4 - table 1 of 2)

Max Longitudinal Delta-V (MPH [km/h])	-8.7 [-14.0]



Longitudinal Crash Pulse (Prior Frontal/Rear Event, TRG 4 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.4 [-0.7]
20	-1.1 [-1.7]
30	-1.7 [-2.8]
40	-2.4 [-3.8]
50	-3.3 [-5.3]
60	-4.3 [-6.9]
70	-5.4 [-8.6]
80	-6.4 [-10.3]
90	-7.3 [-11.7]
100	-7.7 [-12.4]
110	-8.0 [-12.9]
120	-8.2 [-13.3]
130	-8.4 [-13.4]
140	-8.6 [-13.8]
150	-8.7 [-14.0]

DTCs Present at Start of Event (Prior Frontal/Rear Event, TRG 4)

Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

* "Invalid" may be set for M/T vehicle

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.

```
PIDs          PID    Data
               00    BC 00 00 01
               01    00
               03    30 36 32 34 32 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30
                     30 30 30 30 30 30 30 30 30 30 30 30 30 30
               04    FF FF FF FF
               05    02
               06    00
               20    80 00 00 01
               21    00 01
               40    00 00 00 01
               60    00 00 00 01
               80    00 00 00 01
               A0    00 00 00 01
               C0    00 00 00 01
               E0    C0 10 00 00
               E1    14 14
               E2    00 5B 1F 11 00
               EC    FF

EEPROM     Address  Data (-- = data not imaged from ECU)
                         (** = no response from ECU)

                0    -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
               10    -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
               20    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 00 06
               30    00 00 FF FF 00 80 00 09 A5 00 00 00 00 00 FF FF
               40    A9 04 54 03 00 04 00 04 00 02 00 01 00 02 00 02
               50    00 01 00 00 00 FF 00 00 00 01 00 01 00 00 00 01
               60    00 FA 04 05 00 00 00 00 00 00 00 00 00 00 00 00
               70    00 00 00 00 00 00 00 00 A9 04 54 04 00 04 00 04
               80    00 04 00 03 00 03 00 03 00 02 00 02 00 02 00 02
               90    00 01 00 01 00 01 00 02 00 0C 02 06 00 00 00 00
               A0    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               B0    A9 04 54 06 00 06 00 06 00 09 00 09 00 0A 00 0A
               C0    00 08 00 04 00 03 00 02 00 01 00 02 00 01 00 05
               D0    00 FA 03 04 00 00 00 00 00 00 00 00 00 00 00 00
               E0    00 00 00 00 00 00 00 00
```

Disclaimer of Liability

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

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**National Highway
Traffic Safety
Administration**

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