ICS 43.040.10

T 36

National Standard of the People's Republic of China

GB XXXX—XXXX

Event Data Recorder **System**

汽车事件数据记录系统

（English Translation）

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Foreword

SAC/TC 114 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

The entire context of this standard is mandatory.

This standard is drafted in accordance with the rules given in the GB/T 1.1-2009.

This standard was proposed by and was prepared by Ministry of Industry and Information Technology of the People's Republic of China.

学习

Event Data Recorder

1 Scope

This standard specifies terms and definitions, technical requirements, test methods and requirements, appearance and identification, extension of approval of the vehicle type, manual and **implementation** of event data recorder of category M_1 vehicles.

This standard applies for the vehicles of category M_1 installed with event data recorder. Other vehicles could take it as reference.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB 11551-2014 The protection of the occupants in the event of a frontal collision for motor vehicle

GB 14166 Safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems for occupants of power-driven vehicles

GB 20071 The protection of the occupants in the event of a lateral collision

GB/T 20913 The protection of the occupants in the event of an off-set frontal collision for passenger car

GB/T 30038 Road vehicles - Degrees of electrical equipment protection (IP-Code)

GB/T 34589-2017Road vehicles - Diagnostic connector

*ISO 14229-1:20**20** Road vehicles -- Unified diagnostic services (UDS) -- Part 1: Specification and requirements*

ISO 14230-1 Road vehicles -- Diagnostic communication over K-Line (DoK-Line) -- Part 1: Physical layer

ISO 14230-2 Road vehicles -- Diagnostic communication over K-Line (DoK-Line) -- Part 2: Data link layer

ISO 14230-3:1999 Road vehicles -- Diagnostic systems -- Keyword Protocol 2000 -- Part 3: Application layer

ISO 15765-2:2016 Road vehicles -- Diagnostic communication over Controller Area Network (DoCAN) -- Part 2: Transport protocol and network layer services）

3 Terms and Definitions

For the purpose of this document, the terms and definitions given in GB 14166 and following terms and definitions apply.

3.1 Impact event

The impact or other physical event that causes the trigger threshold to be met or exceeded, or any other event which causes non-reversible restraint is deployed, whichever occurs first.

3.2 Event data recorder system (EDR)

A device or system composed **of** one more on-board electronic modules that with functions of monitoring, collecting and recording the vehicle and the occupant protection system data just prior to, during and after a crash

3.3 EDR controller

An on-board electronic module is used to monitor, collect and record a vehicle’s time-series data during a crash

3.4 Lateral acceleration

The Y-component of the vector acceleration of a point in the vehicle. The lateral acceleration is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel, see Figure 1

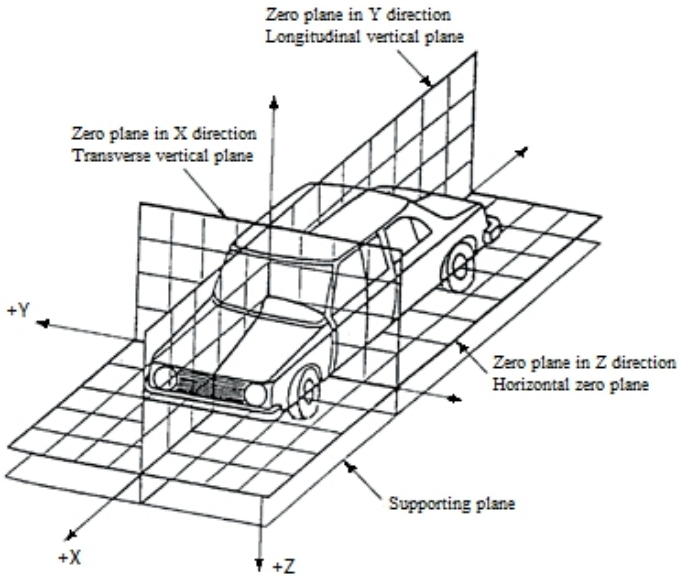


Figure 1 Coordinate system of the vehicle

3.5 Longitudinal acceleration

The X-component of the vector acceleration of a point in the vehicle. The longitudinal acceleration is positive in the direction of forward vehicle travel, see Figure 1

3.6 Normal acceleration

The Z-component of the vector acceleration of a point in the vehicle. The normal acceleration is positive in a downward direction, see Figure 1

3.7 Delta-V (Change in Velocity)

The cumulate change in vehicle velocity. The calculation formula of delta-V is as follow:

$$delta - V = \sum_{i=0}^{i=n} G(i)dt$$

In which:

i-**The index of samples in time sequence**;

G-Acceleration.

3.8 EDR record

The time series data stored in one or more specific ECUs that record EDR data after **triggered** by an impact event

3.9 Trigger threshold

The conditions meeting the requirements to record/store an EDR record

3.10 Locked event

The event recorded by EDR that meets the locking condition. **It shall not be overwritten by subsequent events**

3.11 Unlocked event

The event recorded by EDR that does not meet the locking condition. It **can** be **overwritten by subsequent events**

3.12 Time zero (T_0)

The beginning of time point for an impact event defined in EDR

3.13 Protection system

The interior fittings and devices intended to restrain the occupants

[GB 11551-2014, definition 3.1]

3.14 Occupant protection control algorithm

The impact sensing logic that activates occupant protection devices as necessary, not a pre-impact sensing logic

3.15 Non-reversible restraint

The restraint device that cannot be recovered to reuse condition through automatic recovery or manual adjustment

3.16 Translating

EDR data retrieval tools **converting** data stored in an EDR record and **rendering** it into a human-readable report

3.17 EDR data retrieval tool

An electronic tool consisting of the hardware and software which meets below functions and is used for read EDR record data:

-**To make a connection to the vehicle's connector** that meets requirements defined in GB/ t34589-2017 road vehicle diagnostic connector

-**To read the EDR record**;

-**To** authenticate and save the un-translated binary EDR record to a file on a PC;

-**To open** and authenticate a saved, un-translated file(s) containing an EDR record(s) and translate it into a human-readable report

3.18 EDR record retrieval

The procedure that EDR data retrieval tool reads and translates EDR record and output report

3.19 EDR record report

The human-readable report containing the vehicle EDR record translated and output by the EDR data retrieval tool

3.20 Upper control limit (UCL)

The upper limit set for compliance test of a variable

3.21 Lower control limit (LCL)

The lower limit set for compliance test of a variable

4 Technical Requirements

4.1 Impact event requirements

4.1.1 Trigger threshold

4.1.1.1 When vehicle reaches the following trigger threshold conditions, the event shall be recorded:

-For vehicles that record "delta-V, longitudinal" only, trigger threshold means a change in vehicle velocity in the X-axis direction that is not less than 8km/h within a 150ms interval.

-For vehicles that record "delta-V, lateral" also, trigger threshold means a change in vehicle velocity in either the X-axis or Y-axis direction that is not less than 8km/h within a 150ms interval.

4.1.1.2 For both cases above, if the event is less than 150 ms in duration, when a change in vehicle velocity is not less than 8 km/h, that is, the trigger threshold is reached.

4.1.1.3 When the manufacturer sets other trigger thresholds, the requirements of 4.1.1.1 and 4.1.1.2 shall also be met.

4.1.2 Locking condition

4.1.2.1 EDR shall choose either of the following as the locking condition, and the event data shall not be **overwritten** by a subsequent event:

-Non-reversible restraint deployment;

-The vehicle velocity change in X-axis direction is not less than 25km/h within 150ms interval.

4.1.2.2 In case of occurrence of rear-impact, it is permitted to adopt the locking condition of the control algorithm at discretion of the manufacturer as locking condition. In case of lateral impact, it is necessary to take deployment of lateral non-reversible restraint as locking condition. If vehicle is not configured with lateral non-reversible restraint, vehicle manufacturer shall determine whether to lock.

4.1.2.3 If the manufacturer sets other locking conditions, the requirements of 4.1.2.1 and 4.1.2.2 shall also be met.

4.1.3 Beginning of impact event

Beginning of impact event (time zero T_0) shall meet any of the following requirements, as shown in Figure 2:

a) For systems with “wake-up” occupant protection control algorithms, T_0 is the time at which the occupant protection control algorithm is activated.

b) For systems with “continuously running” occupant protection control algorithms, T_0 is the time when the cumulative delta-V of not less than 0.8km/h is reached within a 20ms interval in the longitudinal direction for a frontal/rear event; or the cumulative delta-V of not less than 0.8km/h is reached within a 5ms interval in the lateral direction for a lateral impact event. As shown in Table 1.

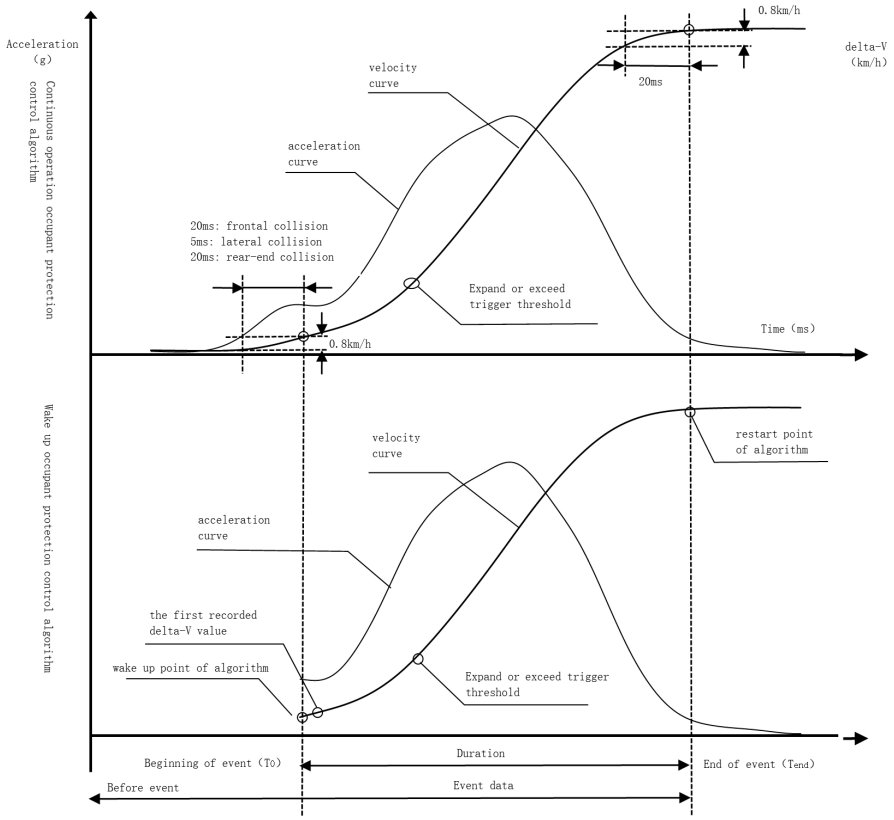
c) A deployment starting time of a non-reversible restraint.

d) If EDR function is not realized through airbag controller, then clause b) shall be taken as the beginning of an impact event.

e) The second stage (or higher stage) firing of airbag shall not be taken as the beginning of an impact event, and shall not trigger another EDR record.

f) If clause c) is adapted as the beginning of impact event, impact event data before the deployment of a non-reversible restraint shall be collected and recorded as well.

Note 1: “Wake-up” occupant protection control algorithm refers to that occupant protection control algorithm starts to operate after satisfaction of certain conditions and activation; “continuously running” occupant protection control algorithm refers to start of operation after power-on of occupant protection control algorithm.



Note: The figure is not plotted as per proportion, depending on impact direction, delta-V and acceleration data may be positive value or negative value.

Figure 2 Common Referencing Data Points of an Impact Event

Table 1 Threshold for Beginning of Each Impact Event (continuously running algorithm)

Items	Impact type		
	Front impact	Lateral impact	Rear impact
Direction of Acceleration	Longitudinal	Lateral	Longitudinal
Cumulative Delta-V within a Time Interval	Within 20ms interval	Within 5ms interval	Within 20ms interval
	≤-0.8km/h	≥+0.8km/h or ≤-0.8km/h	≥+0.8km/h

4.1.4 End of impact event

End of impact event (T_{end}) shall meet the following requirements:

a)For “wake-up” occupant protection control algorithms, T_{end} occurs at the moment when the occupant protection control algorithm resets itself. If this condition **has** not **been** met **by** the end of record period, T_{end} **may** be defined as **the last recorded data point**.

b)For “continuously running” occupant protection control algorithms, Tend occurs when the longitudinal and lateral (if recorded) cumulative delta-V, within a 20 ms time period, becomes 0.8 km/h **or less.** If this condition **has** not **been** met **by** the end of record period, T_{end} **may** be defined as **the last recorded data point** .

c)If EDR function is not realized through airbag controller, then b) shall be taken as the end of an impact event.

4.1.5 Duration of impact event

The duration of an impact event is the time interval between the beginning of an impact event (T_0) and the end of the impact event (T_{end}).

Note: The duration of an impact event may exceed the time recording capability of the EDR.

4.2 Data record requirements

The EDR record data elements are divided into two levels according to the following requirements:

-Level A data element: Data that shall be recorded when vehicles are equipped with EDR system. See name of Level A data element, minimum recording interval, minimum recording frequency and definition as per Table 2.

-Level B data element: Data shall be recorded when vehicles equipped with an EDR system and equipped with relevant device or have relevant function. See name of Level B data element, minimum recording interval, minimum recording frequency and definition as per Table 3.

Table 2 Level A Data Element

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
1	Longitudinal Delta-V [a]	0 to 250 ms, relative to time zero (+/- 5 ms) OR 0 to End of Impact Event Time plus 30 ms, whichever is shorter	100Hz	The cumulate change in longitudinal vehicle velocity. Longitudinal delta-V is only the longitudinal component of the total delta-V.
2	Maximum Recorded Longitudinal delta-V [a]		—	The maximum value of the cumulative change in vehicle velocity, as recorded by the EDR, of the vehicle along the X-axis. This data shall be used in combination with time to the maximum recorded delta-V, longitudinal.
3	Time to Maximum Recorded Delta-V, Longitudinal [a]		—	Means the time from time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the X-axis. This data shall be used in combination with the maximum recorded delta-V, longitudinal.
4	Clipping Flag [b]		—	Indicates the time at which the acceleration (longitudinal and lateral) captured by EDR reaches the maximum value of the specific sensor range for the first time.
5	Vehicle Velocity	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	Wheel edge linear velocity or vehicle velocity acquired by other way.
6	Service Brake, On and Off	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	It is used to detect whether or not the brake pedal was pressed by the driver.

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
7	Driver Safety Belt Status		—	The status of the driver's seatbelt buckle switch.
8	Accelerator Pedal Position, Percent Full [c, d]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The percentage of the actual position of the accelerator pedal relative to fully depressed position based on the driver's input.
9	Revolution Per Minute (RPM) [d, e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The number of revolutions per minute of the main crankshaft of the vehicle's engine.
10	Ignition Cycle at Event	-	-	The number of power cycles in the ECU which records EDR data from the first use of the ECU to the time when the event occurred. An example of a power cycle is when **switching the ignition from OFF/accessory mode to the ON/RUN mode.**
11	Ignition Cycle at Imaging	-	-	The number of power cycles in the ECU recording EDR data at the time of the reading since the first use of the ECU recording EDR data. An example of a power cycle is when **switching the ignition from OFF/accessory mode to the ON/RUN mode.**
12	Event Data Recording Complete Status	-	-	The status indication of ECU whether event data is completely recorded and saved into ECU that records EDR data.
13	Time interval between this event and last event	-	-	If two events occur within 5 seconds, this time is the time elapsed from the start of event X to the start of event X-1.
14	Vehicle Identification Number	-	-	Vehicle identification number (VIN) designated by the vehicle manufacturer.
15	ECU(s) Hardware Part Number(s),which records EDR data	-	-	There may be more than one ECU that implements the EDR recording function in the vehicle.
16	ECU(s) Serial Number(s),which records EDR data	-	-	There may be more than one ECU that implements the EDR recording function in the vehicle.
17	ECU(s) Software Part Number(s),which records EDR data	-	-	There may be more than one ECU that implements the EDR recording function in the vehicle.

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
[a] In case of longitudinal acceleration parameter in Table 3 recorded, longitudinal delta-V, maximum recorded longitudinal delta-V, Time to the maximum recorded delta-V longitudinal, the square of the maximum recorded resultant delta-V and Time to maximum recorded delta-V resultant may not be recorded. In case of lateral acceleration parameter in Table 3 recorded, lateral delta-V, maximum recorded lateral delta-V, Time to the maximum recorded delta-V lateral, the square of the maximum recorded resultant delta-V and Time to maximum recorded delta-V resultant may not be recorded. [b] In case of lateral or longitudinal acceleration parameter in Table 3 recorded, clipping flag parameter may not be required to record. [c] In case of engine throttle location parameter in Table 3 recorded, accelerator pedal position parameter may not be required to record. [d] Vehicles with K lines or without airbags may not be required to record. [e] Battery electric vehicle or plug in hybrid electric vehicle may not required to record.				

Table 3 Level B Data Element

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
1	Longitudinal acceleration [a]	0 to 250 ms relative to time zero (+/- 5 ms) or End of Event Time plus 30ms, whichever is shorter.	500Hz	The component of the vector acceleration at a point on the vehicle in the X-axis direction.
2	Lateral Acceleration [a, b]	0 to 250 ms relative to time zero (+/- 5 ms) or End of Event Time plus 30ms, whichever is shorter.	500Hz	The component of the vector acceleration at a point on the vehicle in the Y-axis direction.
3	Lateral Delta-V [b]	0 to 250 ms, relative to time zero (+/- 5 ms) OR 0 to End of Impact Event Time plus 30 ms, whichever is shorter	100Hz	The lateral delta-V of the vehicle lateral velocity is only the component of the total delta-V in the Y-axis direction.
4	Maximum Recorded Lateral Delta-V [b]		—	The maximum value of The cumulative change in vehicle velocity, as recorded by the EDR, of the vehicle along the Y-axis. This data shall be used in combination with “time to maximum delta-V, lateral”.
5	The Square of Maximum Recorded Resultant Delta-V [b]		—	The maximum of the sum of the squares of the longitudinal delta-V and the lateral delta-V recorded by EDR.
6	Time to Maximum Recorded Delta-V, Lateral [b]		—	The time from time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the Y-axis. This data shall be used in combination with "maximum recorded lateral delta-V".
7	Time to Maximum Recorded Delta-V^2, Resultant [b]		—	The time from time zero to the point where the maximum delta-V resultant occurs. This data shall be used in combination with "square of the maximum recorded resultant delta-V".

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
8	Yaw Rate	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The change in angle of the vehicle about its Z-axis prior to and during an event. A positive value indicates clockwise. Apply for vehicle with electronic stability control system.
9	Steering Angle	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The angular position of the steering wheel where the value of zero (0º) indicates its neutral position (during the straight driving). A positive value indicates the steering wheel is turned **counterclockwise** (i.e. toward left). Apply for vehicles with the steering angle sensor.
10	T_{end}		—	End of the impact event, if the condition is not met until the end of the recording period, T_{end} can be defined as the moment of the last recorded data point.
11	Year [c]	-	—	The year when the event occurred
12	Month [c]	-	—	The month when the event occurred
13	Day [c]	-	—	The day when the event occurred
14	Hour [c]	-	—	The hours portion of the time of the day when the event occurred.
15	Minute [c]	-	—	The minutes portion of the time of the day when the event occurred.
16	Second [c]	-	—	The seconds portion of the time of the day when the event occurred.
17	Gear Position	-5.0 to 0 sec relative to time zero (-1.1 / 0 sec)	2Hz	Actual gear, applicable for vehicle with this signal on bus.
18	Engine Throttle Position, Percent Full [d]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The percentage of engine throttle opening.
19	Brake Pedal Position	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The actual position of brake pedal within the range from not **pressed** to **fully-pressed**. **It may be explained in the EDR Retrieval Report** the fact that the vehicle's braking system may achieve 100% brake application when the brake pedal

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
				position is less than 100%. It applies for vehicles with brake pedal position sensor.
20	Parking Brake Switch Status	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	Used for detecting whether parking brake is activated or not. It is applicable for vehicles with the parking system status on bus.
21	Turn Signal Switch Status	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	**The status of the switch used to indicate the vehicle's intention to turn or change lanes.** It is applicable for vehicles with the turn signal on bus.
22	Pretensioner Deployment, Time to Fire, Driver		—	The time from the beginning of the event (T0) to the driver's seat belt pretensioner deployment command.
23	Frontal Air Bag Deployment, Time to Deploy/ First Stage, Driver		—	The time from the beginning of the event (T0) to the phase 1 of driver's front airbag deployment command.
24	Frontal Air Bag Deployment, Time to Deploy/Second Stage, Driver		—	The time from the beginning of the event (T0) to the phase 2 of driver's front airbag deployment command.
25	Side air bag deployment, time to deploy, driver		—	Means the time from the beginning of the event (T0) to the driver's side airbag deployment command.
26	Side curtain/tube air bag deployment, time to deploy, driver		—	The time from the beginning of the event (T0) to the driver's side curtain airbag deployment command.
27	Safety Belt Status, Front Passenger.		—	The status of the frontal-row passenger's seat belt buckle switch, apply for vehicle with safety belt reminder device .
28	Pretensioner deployment, time to fire, right front passenger		—	The time from the beginning of the event (T0) to the frontal-row passenger's seat belt pretensioner deployment command.
29	**Frontal-row passenger's front airbag suppression status**		—	Means suppression status of the frontal-row passenger's front airbag, apply for vehicle with front airbag suppression switch.
30	Frontal air bag deployment, time to deploy/first stage, right front passenger		—	The time from the beginning of the event (T0) to the phase 1 of frontal-row passenger's front airbag deployment command.

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
31	Frontal air bag deployment, time to deploy/second stage, right front passenger		—	The time from the beginning of the event (T0) to the phase 2 of frontal-row passenger's front airbag deployment command.
32	Side air bag deployment, time to deploy, right front passenger		—	The time from the beginning of the event (T0) to the frontal-row passenger's side airbag deployment command.
33	Side curtain/tube air bag deployment, time to deploy, right font passenger		—	The elapsed time since the beginning of the event (time zero) until the frontal-row passenger's side curtain airbag deployment command.
34	Occupant Protection System Warning Lamp Status		—	Means the occupant protection system malfunction status. It is applicable for vehicle with this warning status on the bus.
35	Tire Pressure Monitoring System Warning Lamp Status		—	The warning status when the on-board tire pressure monitoring system has detected that the tire pressure in one or more tire(s) is**(are)** low. It is applicable for vehicle with this warning status on the bus.
36	Brake System Warning Indicator Status [e]		—	The status of braking system. It is applicable for vehicle with this warning status on the bus.
37	Cruise Control System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of the cruise control system.
38	Adaptive Cruise Control System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of the adaptive cruise control system.
39	Anti-Lock Brake System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of ABS. It is applicable for vehicle with this system status on the bus.
40	Autonomous Emergency Braking System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of the AEB system.
41	Electronic Stability Control System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of the electronic stability control system.
42	Traction Control System Status [e]	-5.0 to 0 sec relative to time zero (-1.1 ~ 0 sec)	2Hz	The operative status of the traction control system.

No.	Name of data element	Minimum Recording Interval	Minimum Recording Frequency	Definition
43	Pre-Event Synchronization Timer		—	The relative time from last data sampling point before T0 to T0, apply for vehicles with pre-event synchronization timing function. Used to align different data in time.

[a] If the longitudinal delta-V, the maximum recorded longitudinal delta-V, and the time to the maximum recorded delta-V longitudinal in Table 2 are recorded, the longitudinal acceleration may not be recorded; if the lateral delta-V, the maximum recorded lateral delta-V, and the time to the maximum recorded delta-V lateral is recorded, the lateral acceleration may not be recorded.

[b] It **shall be recorded if** side airbag or side curtain is equipped.

[c] It **shall be recorded if** satellite positioning device is equipped before **vehicle leaves** the factory.

[d] If accelerator pedal position parameter in Table 2 is recorded, engine throttle position parameter might not be recorded.

[e] If this function is integrated in other system, it **may** be represented with the status of other system, shall meet the requirement in chapter 8.

4.2.2 In impact event, data elements recorded by EDR shall meet the requirements in Annex A, and the EDR record data shall meet the test requirements of 5.1, 5.2 and 5.3.

4.3EDR record function requirements

4.3.1 Storage medium requirements

EDR data shall be recorded in non-volatile storage medium.

4.3.2 EDR trigger requirements

When vehicle reaches the trigger threshold specified in 4.1.1, EDR controller shall trigger the recording of data, and meet the test requirements after the test is carried out in accordance with 5.3.2.

4.3.3 Requirements on number of storage events

The EDR system shall record at least three consecutive impact event data. After the test is carried out according to 5.3.3, the test requirements shall be met.

4.3.4 Requirements on storage **overwrite** mechanism

4.3.4.1 If no further space is available for EDR to record an event, the unlocked event data shall be **overwritten** by the current event data **in chronological order**. But locked event data shall not be overwritten by subsequent event data. After performing test as per 5.3.4, test requirements shall be met.

4.3.4.2 For unlocked events, **manufacturer can specify other event overwritten condition** .

4.3.5 Requirements on power-off storage

In case of occurrence of collision, if power supply circuit of vehicle cannot supply power normally due to the impact event, the EDR system itself shall have the power supply capability. This power supply capability shall satisfy the collision in a single direction, when all relevant **firing loops** (if available) are fully deployed within (150 ± 10) ms after power failure (or cut-off), the EDR system shall meet at least the requirements for recording all data before T0 and data from T0 to (150 ± 10) ms after power failure (or cut-off), and satisfy the test requirements of 5.3.5.

4.4 Requirements on data retrieval

4.4.1 General requirements

After event, data recorded by EDR shall be retrieved and be protected from tampering or deletion.

4.4.2 Requirements on data retrieval port

EDR data retrieval port shall be in compliance with the port definition in GB/T 34589-2017, the terminal arrangement is shown in Table 4. Data read directly from EDR controller shall meet requirements of d) in Chapter 8.

Table 4 Terminal Arrangement

Terminal serial No.	Purpose	Terminal serial No.	Purpose
1	Customized	9	Customized
2	Customized	10	Customized
3	Customized	11	Customized
4	Power supply “grounding”	12	Customized
5	Signal “grounding”	13	Customized
6	CAN - Line H	14	CAN - Line L
7	Line K	15	Line L
8	Customized	16	Power supply “positive”

学习

4.4.3 Requirements on data retrieval protocol

4.4.3.1 Read data based on controller area network (CAN)

4.4.3.1.1 General requirements

Based on CAN read data, 11-bit CAN identifier or 29-bit CAN identifier could be used to read data, 11-bit CAN identifier for reading data shall comply with 4.4.3.1.2, 29-bit CAN identifier for reading data shall comply with 4.4.3.1.3.

4.4.3.1.2 11-bit CAN identifier read data

4.4.3.1.2.1 Function addressing

In case of function addressing, the EDR data retrieval tool shall use the 0x22“through the data identifier read data” service in **11.2 of ISO 14229-1:2020** to read the EDR data. Table 5 specifies the definition of 11-bit CAN identifier.

Table 5 Definition of 11-bit CAN Identifier in Function Addressing

CAN ID	Description
$7DF_{16}$	The CAN identifier that EDR data retrieval tool sends the function addressing request information.
$7XX_{16}$	The CAN Identifier that the ECU that records EDR data sends the physical response information to the EDR data retrieval tool.
$7XX_{16}$-8_{16}	The CAN Identifier that the EDR data retrieval tool sends the physical request information to the ECU that records EDR data.
Note: For physical response ID of ECU recording EDR data reply, EDR data retrieval tool uses the principle of ID minus 8 to send the physical request information.	

Example:

EDR data retrieval tool sends function addressing EDR request data command:7DF16 03 22 FA 13 00 00 00 00

ECU recording EDR data sends EDR response data to EDR data retrieval tool:7XX 1X XX 62 FA 13 XX XX XX

EDR data retrieval tool sends physical addressing **CF** EDR request data command:7XX-8 30 00 00 00 00 00 00 00

ECU recording EDR data sends remaining CF EDR response data to EDR data retrieval tool: 7XX 21 XX XX XX XX XX XX XX

Note: The amount of remaining CF depends on the length of the ECU recording EDR data sending EDR response data to EDR data retrieval tool.

4.4.3.1.2.2 Physical addressing

In case of physical addressing, the EDR data retrieval tool shall use the 0x22 “through the data identifier read data” service in **11.2 of ISO 14229-1:2020** to read the EDR data. Table 6 specifies the definition of 11-bit CAN identifier.

Table 6 Definition of 11-bit CAN Identifier in Physical Addressing

CAN ID	Description
$7F1_{16}$	The CAN identifier that EDR data retrieval tool sends the physical request information to the ECU that records EDR data
$7F9_{16}$	The CAN Identifier that the ECU that records EDR data sends the physical response information to the EDR data retrieval tool

4.4.3.1.3 29-bit CAN identifier read data

The EDR data retrieval tool shall use the 0x22 “through the data identifier read data” service in 10.2 of ISO 14229-1:2013. The 29-bit CAN identifier shall conform to the conventional fixed addressing format defined in Annex A of ISO 15765-2:2016. Table 7 specifies the definition of the 29-bit CAN identifier, Table 8 specifies the definition of the 29-bit conventional fixed addressing CAN identifier format, Table 9 specifies the CAN identifier definition for 29-bit physical addressing ECU recording EDR data.

Table 7 Definition of the 29-bit CAN Identifier

CAN ID	Description
$18_{16}DB_{16}FF_{16}F1_{16}$	The CAN Identifier that the EDR data retrieval tool sends the function addressing request information to the ECU(FF_{16}) that records EDR data
$18_{16}DA_{16}F1_{16}XX_{16}$	The CAN Identifier that the ECU(XX_{16}) that records EDR data sends the physical response information to the EDR data retrieval tool
$18_{16}DA_{16}XX_{16}F1_{16}$	The CAN Identifier that the EDR data retrieval tool sends the physical request information to the ECU(xx_{16}) that records EDR data
Note 1:ECU recording EDR data (FF_{16}) is ECU recording EDR data diagnostic address for function addressing. Note 2:$F1_{16}$ is EDR data retrieval tool SA. Note 3:ECU recording EDR data (XX_{16}) is ECU recording EDR data diagnostic address for physical address. Note 4:Refer to Table 8 for the definition of ECU recording EDR data (XX_{16}).	

Table 8 Definition of the 29-bit Conventional Fixed Addressing CAN Identifier

CAN ID	28..24	23..16	15..8	7..0	CAN **data field**
CAN identifier for function addressing	1816	DB16	TA	SA	N_PCI, N_Data
CAN identifier for physical address	1816	DA16	TA	SA	N_PCI, N_Data

Table 9 CAN Identifier Definition for 29-bit Physical Addressing

ECU recording EDR data (XX16)	Description
00_{16}–32_{16}	To be customized by manufacturer
34_{16}-EF_{16}	To be customized by manufacturer

Example:

EDR data retrieval tool sends function addressing EDR request data command:$18_{16}DB_{16}FF_{16}F1_{16}$ 03 22 FA 13 00 00 00 00

ECU recording EDR data sends EDR response data to EDR data retrieval tool:$18_{16}DA_{16}F1_{16}XX_{16}$ 1X XX 62 FA 13 XX XX XX

EDR data retrieval tool sends physical addressing FC EDR request data command:$18_{16}DA_{16}XX_{16}F1_{16}$ 3000 00 00 00 00 00 00

ECU recording EDR data sends remaining CF EDR response data to EDR data retrieval tool:$18_{16}DA_{16}$F116XX16 21XX XX XX XX XX XX XX

Note: The amount of remaining CF depends on the length of the ECU recording EDR data sending EDR response data to EDR data retrieval tool.

4.4.3.2 Read data based on Line K

4.4.3.2.1 Physical layer requirements:

The physical layer shall be in compliance with the requirements in ISO 14230-1.

4.4.3.2.2 Data link layer requirements:

The data link layer shall be in compliance with the requirements in ISO 14230-2 and shall meet the following requirements:

- Lead byte: shall include 4 bytes, namely format byte, target address byte, source address byte, solo length byte.
- Format byte: A1 and A0 shall be 1 and 0. Namely, address mode is “address information available, physical address”.
- Address information: shall meet the following requirements: EDR controller address is C016; EDR data retrieval tool address is F116.
- Initialization: Initialization of EDR controller shall accept “quick initialization”.

4.4.3.2.3 Application layer requirements:

The application layer shall be in compliance with the requirements of “Read data through public identifier” 22_{16} service in 7.2 of ISO 14230-3:1999.

4.4.4 Data retrieval identifier requirements

4.4.4.1 Retrieval data based on Controller Area Network (CAN)

EDR data retrieval identifiers based on Controller Area Network (CAN) shall be in conformity with the requirements in Annex B.1, assign an event identifier to each of the stored **events**, which shall be 0xFA13,

0xFA14 and 0xFA15 respectively. Where 0xFA13 is the identifier of the **latest** event, 0xFA14 is the identifier of the event that occurred the second **to** last, and 0xFA15 is the identifier of the event that occurred the third **to** last.

4.4.4.2 Retrieval data based on Line K data

EDR data retrieval identifiers based on Line K shall be in conformity with the requirements in Annex B.2, assign an identifier to the stored public data, and 3 event identifiers for each of the stored event, which shall be: 0XFA10 is identifier for the public data, and 0XFA21, 0XFA31 and 0XFA41 are the identifiers for the **latest** event, 0XFA22, 0XFA32 and 0XFA42 are the identifiers of the event that occurred the second **to** last, 0XFA23, 0XFA33 and 0XFA43 are the identifiers of the event that occurred the third last.

4.4.5 Data translating requirements

The data recorded by EDR shall comply with the requirements of Table A.1 of Annex A and shall be translated according to the data arrangement of Table B.1 in Annex B.

4.4.6 Storage time limit requirements

If the EDR storage unit has not been replaced, the event data stored by EDR system shall be readable in the entire life cycle of the vehicle.

4.4.7 Other data retrieval requirements

If the EDR data is dispersed and stored in different onboard electronic modules, the time synchronization of recorded data shall be guaranteed.

4.5 Protective performance requirements

The protective performance of EDR controller that record**s** EDR data shall meet the functional status requirements defined in GB/T 30038, as shown in Table 10.

Table 10 Enclosure Protection Requirements

Location of ECU that recording EDR data	Enclosure classification	Description
Engine compartment	IP5k6	Dust protection, ultra-high velocity water injection.
Interior of the vehicle	IP5k1	Dust protection, vertically dripping water.
Luggage compartment	IP5k1	Dust protection, vertically dripping water.

5 Test Methods and Requirements

5.1 Impact test

5.1.1 Before test, **test laboratory's** lateral or longitudinal acceleration sensor of the vehicle shall be installed in or near the longitudinal center plane of the vehicle by. If the EDR controller to which vehicle acceleration sensor belongs is within this plane, the acceleration sensor for test **laboratory** shall be installed on the surface or in adjacency of the EDR controller, the distance between sensor and the controller surface shall be less than 30mm; otherwise, the acceleration sensor for test **laboratory** shall be installed on rigid fixture part surface in occupant compartment, and shall be in front of lateral plane of R-point of driver's seat, and the distance shall less than 30mm.

5.1.2 Vehicle equipped with frontal airbag shall be tested in accordance with the requirements of GB 11551-2014 or GB/T 20913, and make record of the deployment time of non-reversible restraint equipped for vehicle.

5.1.3 Vehicle equipped with side airbag **or side air curtain** shall be tested in accordance with the requirements of GB 20071, and make record of the deployment time of non-reversible restraint equipped for vehicle.

5.1.4 Vehicle unequipped with frontal airbag, side airbag and side curtain shall be tested in accordance with the requirements of GB 11551-2014 or GB/T 20913.

5.1.5 After the test, the EDR data shall be saved in the format of Annex A and read by the EDR data retrieval tool, and the read data shall meet the following requirements:

-The acquired delta-V or acceleration data shall meet the conformity requirements of delta-V curve in Annex C and delta-V data shall not produce clipping, or acceleration data shall not exceed range of acceleration sensor;

-EDR system shall completely record all data required in Annex A.

5.2 Driving operation data test

5.2.1 In test, engine of the vehicle is at operation status (battery electric vehicles or hybrid electric vehicles are at power-on status), vehicle electronic/electric system recorded by EDR shall maintain operation status, relevant parts shall be configured as follows at least:

-Brake pedal and accelerator pedal shall maintain certain stroke, and shall avoid empty stroke position;

-Steering wheel shall be fixed at certain angle, and shall avoid empty stroke position;

-Safety belt buckle shall be under locked status;

-Lamp required to be recorded shall be **at** ON status.

5.2.2 Impact threshold can be triggered by adopting but not limited to four methods as follows in test:

-Impact vehicle in such a way that vehicle reaches trigger threshold;

-Fix vehicle on trolley and impact trolley in such a way that vehicle reaches trigger threshold;

-Physically trigger EDR system of the vehicle in such a way that vehicle reaches trigger threshold;

-Input the trigger signal to EDR system of the vehicle in such a way that vehicle reaches trigger threshold.

5.2.3 The EDR system shall be triggered and data shall be recorded, and the data shall meet the recording requirements of 4.2. At the same time, the records of relevant data shall be **identical** with the settings in 5.2.1

5.3 Bench test

5.3.1 Test preparation

5.3.1.1 Manufacturer shall provide test box used for connecting with EDR controller, this test box used for simulating peripheral signal and load in actual vehicle status to EDR controller, shall meet below requirements:

-Test box shall have bus signals simulation function, simulating actual vehicle **signal** and send to EDR controller;

-Test box shall have necessary peripheral sensor, load and hardware connection parts connected with EDR controller, to guarantee the normal work of EDR controller;

-The power supply for EDR controller test shall be provided by the test bench rather than the test box.

5.3.1.2 EDR controller and its accessories are installed **on table of test** bench according to the connection status with real vehicles, connected with test box, and supplied by power via test bench.

5.3.1.3 The simulation signal and load provided by test box shall be pre-set and confirmed. The device that is in operation during vehicle operation and is triggered to operate under certain arithmetic logic shall be pre-set as activated.

5.3.2 EDR system trigger test

5.3.2.1 **The storage space of the EDR controller shall be enough to record a complete event before the test**.

5.3.2.2 Apply **impact** in accordance with impact waveform in Annex D.1 to longitudinal direction of EDR controller through test bench, and acquire the longitudinal acceleration through test lab acceleration sensor.

5.3.2.3 The EDR controller **shall** be triggered to work, its record data shall be identical with pre-set data in 5.3.1.3.

5.3.3 Test of number of storage events

5.3.3.1 Prior to test, EDR controller **shall have** storage space to record at least 3 complete events.

5.3.3.2 **To a**pply **impact** in accordance with any impact waveform in Annex D to longitudinal direction of EDR controller through impact bench, and **to** acquire the acceleration through test lab acceleration sensor.

5.3.3.3 **To p**erform at least 3 impact tests as per the requirements of 5.3.**3**.2, with each test interval more than 5s.

5.3.3.4 EDR controller shall be trigger to work, and shall be able to record the latest consecutive 3 events, its data shall be consistent with the pre-setting of 5.3.1.3, and EDR controller shall newly add 3 events data record.

5.3.4 Storage **overwrite** mechanism test

5.3.4.1 Unlocked event **overwrite** test

5.3.4.1.1 Prior to test, EDR controller shall have no sufficient storage space for recording a complete event, and there is only one unlocked event in the stored events, and this unlocked event shall be one of the latest 3 events.

5.3.4.1.2 **To a**pply impact in accordance with impact waveform in Annex D.1 to longitudinal direction of EDR controller through test bench (impact bench), and **to** acquire the acceleration through test lab acceleration sensor.

5.3.4.1.3 EDR controller shall be trigger to work, EDR record data overwrite the existing unlocked event data, and its record data shall be identical with pre-set data in 5.3.1.3.

5.3.4.2 Locked event **overwrite** test

5.3.4.2.1 Prior to test, EDR controller shall have no sufficient storage space for recording a complete event, and all stored events are locked events

5.3.4.2.2 **To a**pply **impact** in accordance with corresponding locking impact waveform in Figure D.2 to longitudinal direction of EDR controller through test bench (impact bench), and **to** acquire the acceleration through test lab acceleration sensor.

5.3.4.2.3 **Check data record of the EDR after the test. The data before test shall not be overwritten by test 5.3.4.2.2**.

5.3.5 Power-off storage test

5.3.5.1 Prior to test, EDR controller storage space shall be able to record at least 1 event.

5.3.5.1 **To a**pply **impact** in accordance with power-off impact waveform in Figure D.3 to longitudinal direction of EDR controller through test bench, and **to** collect acceleration through test lab acceleration sensor. At the same time of **applying** impact waveform, **to** disconnect power supply to EDR controller.

5.3.5.3 EDR controller shall be triggered to work, its record data shall be **identical to** pre-set data in 5.3.1.3.

6 Appearance and Identification

Vehicle manufacturer information and controller manufacturer information (**allowing** to mark abbreviation or logo), specification and model, and unique number of ECU recording EDR data shall be marked on surface of EDR controller, by means of nameplate, label, punching or mould, logo is clear and easy to see, durable and difficult to replace.

7 Extension of Approval of the Vehicle Type

7.1 General

For vehicle models that have passed type inspection as per this standard, the results can be extended to other vehicle models conforming to the determination condition of 7.2. After vehicle model is granted with extension, the extension vehicle model shall not be extended further to other vehicle models.

7.2 Determinant condition

7.2.1 Vehicle manufacturer is identical.

7.2.2 EDR controller manufacturer is identical.

7.2.3 EDR controller model is identical.

7.2.4 For complete vehicle impact test, the following conditions are included too:

a) The length of the vehicle portion in front of lateral plane passing R-point of driver's seat remains unchanged basically.

b) The arrangement of EDR controller on complete vehicle is identical.

c) **The sensors from which the EDR acceleration come shall have same or higher range and accuracy, the arrangement shall be identical** .

d) The arrangement and configuration of the non-reversible restraint such as vehicle airbags and belts pre-tensioners related to the direction of impact are identical or its quantity decreases.

e) EDR software version number shall be identical, but it could be modified with the exception of the situation that its change does not influence airbag control strategy and EDR storage strategy.

Note: **Influence factors for** airbag control strategy includes continuous/wakeup algorithm, airbag quantity, location and quantity of related sensor.

7.2.5 For drive operation test, the following conditions are included too:

Data resource and transmission strategy**(refers to data sources such as buses or hardwires, sensors, etc.)** of information involving driver's operation such as brake, accelerate steering signal are identical.

7.2.6 For bench test, difference of software number is permitted, the following conditions are included too:

a) Except **of** driver's operation information, amount of record data is identical or is decreased, the acquisition mode (refers to data sources such as buses or hardwires, sensors, etc.) shall be identical.

b) The arrangement and configuration of the non-reversible restraint such as airbags and belts pre-tensioners related to the direction of impact are identical or its quantity decreases.

c) Storage strategy is identical (lock, override, concentrated or distributed), number of storages, storage controller and model and storage medium shall be identical.

c) The range and accuracy of sensor from which EDR acquires acceleration are equivalent or higher.

d) The energy storage capacitor of EDR storage unit is equivalent or increased (only applicable to power-off storage test).

8 Manual

8.1 For vehicles fitted with EDR, its product manual shall at least include:

a) Declaration such as “this vehicle is fitted with EDR”;

b) Explanation for meaning and possible purpose of EDR record**ed** data item;

c) Explanation of the supplier and accessible path for EDR data retrieval tool;

d) Description of the method of extracting data from the EDR controller;

e) Explanation for data source of the vehicle velocity in Level A data element.

f) Description of unlocked event storage overwrite mechanism and event types that can be overwritten.

g) Declaration of the realization method of intelligent control functions and related data elements.

8.2 It is deemed as satisfaction if d) ~ g) can be obtained by other publicly available methods (such as maintenance manual or official website).

Annex A
(Normative)
Data Element Format

Table A.1 gives the data element format to be monitored, acquired and recorded by EDR.

Table A.1 Data Element Format

No.	Name of data element	Unit	Resolution	Minimum Range	Minimum Accuracy	Recording Reference Time
1	Longitudinal Delta-V	km/h	1	-100 to +100	+/-10% of the full range	
2	Maximum Recorded Longitudinal Delta-V	km/h	1	-100 to +100	+/-10% of the full range	A data point within a minimum of 0 to 300 ms (relative to time zero)
3	Time to Maximum Recorded Delta-V, Longitudinal	ms	2.5	0 to 300 or 0 to End of Impact Event Time plus 30, whichever is shorter	+/-5	Time zero
4	Clipping Flag	ms	same as the resolution of the applicable sensor, XX	over the recorded period of the applicable sensor, XX	Twice the resolution of the applicable sensor, XX	Time zero
5	Vehicle velocity	km/h	1	0 to 250	+/- 1	
6	Service Brake, On and Off	Not applicable	On or Off	Not applicable	Not applicable	
7	Driver Safety Belt Status	Not applicable	Buckled, Unbuckled	Not applicable	Not applicable	-1.1 sec to 0 sec relative to time zero
8	Accelerator Pedal Position, Percent Full	%	1	0 to 100	+/- 5	
9	Revolution Per Minute (RPM)	rpm	100	0 to 10000 0 至 10000	+/- 100	
10	Ignition Cycle at Event	Cycles	1	0 to 60,000	+/- 1	-1.1 sec to 0 sec relative to time zero
No.	**Name of data element**	**Unit**	**Resolution**	**Minimum Range**	**Minimum Accuracy**	**Recording Reference Time**

11	Ignition Cycle at Imaging	Cycles	1	0 to 60,000	+/- 1	At imaging
12	Event Data Recording Complete Status	Not applicable	Yes or No	Not applicable	Not applicable	The end of the record
13	Time interval between this event and last event	s	0.1	0 to 5.0 0 至 5.0	+/- 0.1	Time zero
14	Vehicle Identification Number	Not applicable	Not applicable	Not applicable	Not applicable	At imaging
15	**ECU(s) Hardware Part Number(s),which records EDR data**	Not applicable	Not applicable	Not applicable	Not applicable	At imaging
16	**ECU(s) Serial Number(s),which records EDR data**	Not applicable	Not applicable	Not applicable	Not applicable	At imaging
17	**ECU(s) Software Part Number(s),which records EDR data**	Not applicable	Not applicable	Not applicable	Not applicable	At imaging
18	Longitudinal Acceleration	G	1	-50 to +50	+/- 10% of the range of the physical sensor	-
19	Lateral Acceleration	G	1	-50 to +50	+/- 10% of the range of the physical sensor	-
20	Lateral Delta-V	km/h	1	-100 to +100 -100 至 +100	+/-10% of the full range	-
21	Maximum Recorded Lateral Delta-V	km/h	1	-100 to +100	+/-10% of the full range	A data point within a minimum of 0 to 300 ms (relative to time zero)
22	The Square of Maximum Recorded Resultant Delta-V	（km/h）^2	1	0 to +20000	+/-10% of the full range	A data point within a minimum of 0 to 300 ms (relative to time zero)

23	Time to Maximum Recorded Delta-V, Lateral	ms	2.5	0 to 300 or 0 to End of Impact Event Time plus 30, whichever is shorter	+/-5	-1.1 sec to 0 sec relative to time zero
No.	**Name of data element**	**Unit**	**Resolution**	**Minimum Range**	**Minimum Accuracy**	**Recording Reference Time**
24	Time to Maximum Recorded Delta-V^2, Resultant	ms	2.5	0 to 300 or 0 to End of Impact Event Time plus 30, whichever is shorter	+/-5	time zero
25	Yaw Rate	degrees per sec	0.1	-75(counter-clock wise) to +75(clockwise)	+/- 10%	-
26	Steering Angle	degrees	5	-250 (clockwise) to +250 (counter-clockwise)	+/-5% of the full range	-
27	T_{end}	ms	2.5	0 to 300 0至 300	+/- 3	Time zero
28	Year	Year	1	2000 to 2253	+/- 1	-1.1 sec to 0 sec relative to time zero
29	Month	Month	1	1 to 12	+/- 1	-1.1 sec to 0 sec relative to time zero
30	Day	Day	1	1 to 31	+/- 1	-1.1 sec to 0 sec relative to time zero
31	Hour	Hour	1	0 to 23	+/- 1	-1.1 sec to 0 sec relative to time zero
32	Minute	Minute	1	0 to 59	+/- 1	-1.1 sec to 0 sec relative to time zero
33	Second	Second	1	0 to 59	+/- 1	-1.1 sec to 0 sec relative to time zero
34	Gear Position	Not applicable	P/R/N/D	Not applicable	Not applicable	-
35	Engine Throttle Position, Percent Full	%	1	0 to 100 0 至 100	+/- 5	-
36	Brake Pedal Position	Percentage	5	0 to 100	+/- 10% of the full range	-

37	Parking Brake Switch Status	Not applicable	On，faulted，Off	Not applicable	Not applicable	-
38	Turn Signal Switch Status	Not applicable	Off, Left, Right, Double Flash	Not applicable	Not applicable	
No.	**Name of data element**	**Unit**	**Resolution**	**Minimum Range**	**Minimum Accuracy**	**Recording Reference Time**
39	Pretensioner Deployment, Time to Fire, Driver	ms	1	0 to 250 0 至 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
40	Frontal Air Bag Deployment, Time to Deploy/ First Stage, Driver	ms	1	0 to 250 0 至 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
41	Frontal Air Bag Deployment, Time to Deploy/Second Stage, Driver	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
42	Side air bag deployment, time to deploy, driver	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
43	Side curtain/tube air bag deployment, time to deploy, driver	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
44	Safety Belt Status, Front Passenger	Not applicable	Buckled or Unbuckled	Not applicable	Not applicable	**relative to time zero (-1.1s ~ 0s)**
45	Pretensioner deployment, time to fire, right front passenger	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**

46	Passenger Frontal Airbag Disabled Indicator Status	Not applicable	On (airbag disabled/suppressed) or Off (airbag enabled)	Not applicable	Not applicable	**relative to time zero (-1.1s ~ 0s)**
No.	**Name of data element**	**Unit**	**Resolution**	**Minimum Range**	**Minimum Accuracy**	**relative to time zero (-1.1s ~ 0s)**
47	Frontal air bag deployment, time to deploy/ first stage, right front passenger	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
48	Frontal air bag deployment, time to deploy/ second stage, right front passenger	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
49	Side air bag deployment, time to deploy, right front passenger	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
50	Side curtain/tube air bag deployment, time to deploy, right front passenger	ms	1	0 to 250	+/- 2	**relative to time zero (-1.1s ~ 0s)**
51	Occupant Protection System Warning Lamp Status	Not applicable	On or Off	Not applicable	Not applicable	**relative to time zero (-1.1s ~ 0s)**
52	Tire Pressure Monitoring System Warning Lamp Status	Not applicable	On or Off	Not applicable	Not applicable	**relative to time zero (-1.1s ~ 0s)**

53	Brake System Warning Indicator Status	Not applicable	On or Off	Not applicable	Not applicable	-1.1 sec to 0 sec relative to time zero
54	Cruise Control System Status	Not applicable	On, Active；On, Inactive；Commanded Off；Fault；Reserve	Not applicable	Not applicable	
No.	**Name of data element**	**Unit**	**Resolution**	**Minimum Range**	**Minimum Accuracy**	**Recording Reference Time**
55	Adaptive Cruise Control System Status	Not applicable	On, Active；On, Inactive；Commanded Off；Fault；Reserve	Not applicable	Not applicable	-
56	Anti-Lock Brake System Status	Not applicable	Active；Inactive；Commanded Off；Fault；Reserve	Not applicable	Not applicable	
57	Autonomous Emergency Braking System Status	Not applicable	On, Active；On, Inactive；Commanded Off；Fault；Reserve	Not applicable	Not applicable	
58	Electronic Stability Control System Status	Not applicable	On, Active；On, Inactive；Commanded Off；Fault；Reserve	Not applicable	Not applicable	

59	Traction Control System Status	Not applicable	On, Active ; On, Inactive; Commanded Off ; Fault ; Reserve	Not applicable	Not applicable	
60	Pre-Event Synchronization Timer	ms	1	0 to 499	+/- 2	Time zero
Note: The minimum accuracy is the allowable error range of the data element						

Annex B
(Normative)
Data Element Arrangement

Tables B.1 and B.2 indicate the data element conversion formats that EDRs based on CAN and K-line communications shall read, respectively. The value cannot be obtained means that the data element cannot be obtained, and is represented by FF. Invalid value means that the data is invalid. For data elements that do not significantly define a fault state, FE **is used** to indicate the invalid value; for data elements that have significantly defined a fault state, FE **is used** to indicate the cause of the situation other than the fault state. Invalid value.

Multiple sampling data corresponding to the same signal in the same event shall be read in chronological order.

When the EDR storage data is empty, the values of the data elements returned by the EDR to the extraction tool shall all be FF16.

Table B.1 Data Element Arrangement

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA13 0xFA14 0xFA15	Longitudinal Delta-V	km/h	A	8	1	26	26	0～25	E=N-127	FF_{16}	FE_{16}
	Maximum Recorded Longitudinal Delta-V	km/h	A	8	1	1	1	26	E=N-127	FF_{16}	FE_{16}
	Time to Maximum Recorded Delta-V, Longitudinal	ms	A	8	1	1	1	27	E=N*2.5	FF_{16}	FE_{16}
	Clipping Flag	ms	A	16	2	1	2	28～29	E=N 1stbyte: longitudinal acceleration	**1st byte: longitudinal acceleration clipping flag FF_{16};**	**1st byte: longitudinal acceleration clipping flag**

									clipping flag; 2nd byte: lateral acceleration clipping flag	**2nd byte: lateral acceleration clipping flag FF_{16}**	**FF_{16}; 2nd byte: lateral acceleration clipping flag FF_{16}**

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA13 0xFA14 0xFA15	Vehicle velocity	km/h	A	8	1	11	11	30～40	E=N	FF_{16}	FE_{16}
	Service Brake, On and Off	Not applicable	A	8	1	11	11	41～51	0: OFF 1: ON	FF_{16}	FE_{16}
	Driver Safety Belt Status	Not applicable	A	8	1	1	1	52	0: Buckled 1: Unbuckled	FF_{16}	FE_{16}
	Accelerator Pedal Position, Percent Full	%	A	8	1	11	11	53～63	E=N	FF_{16}	FE_{16}
	Revolution Per Minute (RPM) – (Internal Combustion engines only)	rpm	A	8	1	11	11	64～74	E=N*100	FF_{16}	FE_{16}
	Ignition Cycle at Event	Cycles	A	16	2	1	2	75～76	E=N	$FFFF_{16}$	$FFFE_{16}$
	Ignition Cycle at Imaging	Cycles	A	16	2	1	2	77～78	E=N	$FFFF_{16}$	$FFFE_{16}$

	Event Data Recording Complete Status	Not applicable	A	8	1	1	1	79	0: Uncompleted 1: Completed	FF_{16}	FE_{16}
	Time interval between this event and last event	s	A	8	1	1	1	80	E=N*0.1	FF_{16}	FE_{16}
	Vehicle Identification Number	Not applicable	A	136	17	1	17	81～97	ASCII	FF_{16} for all 17 bytes	FF16for previous 16 bytes, and FE16for the last one
	ECU(s) Hardware Part Number(s),which records EDR data	Not applicable	A	512	64	1	64	98～161	ASCII，When the number of bytes is less than 64, 0x20 padding is applied, and the padding bit is on the left	FF_{16} for all 64 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the last one

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA130xFA140xFA15	**ECU(s) Serial Number(s),which records EDR data**	Not applicable	A	512	64	1	64	162～225	ASCII，When the number of bytes is less than 64, 0x20 padding is applied, and the padding bit is on the left	FF_{16} for all 64 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the last one
	ECU(s) Software	Not	A	512	64	1	64	226～289	ASCII，When the	FF_{16} for all 64 bytes	FF_{16} for previous 63

	Part Number(s),which records EDR data	applicable							number of bytes is less than 64, 0x20 padding is applied, and the padding bit is on the left		bytes, and FE_{16} for the last one
	Longitudinal Acceleration	G	B	8	1	126	126	290～415	E=N-127	FF_{16}	FE_{16}
	Lateral Acceleration	G	B	8	1	126	126	416～541	E=N-127	FF_{16}	FE_{16}
	Lateral Delta-V	km/h	B	8	1	26	26	542～567	E=N-127	FF_{16}	FE_{16}
	Maximum Recorded Lateral Delta-V	km/h	B	8	1	1	1	568	E=N-127	FF_{16}	FE_{16}
	The Square of Maximum Recorded Resultant Delta-V	$(km/h)^2$	B	16	2	1	2	569～570	E=N	FF_{16}	FE_{16}
	Time to Maximum Recorded Delta-V, Lateral	ms	B	8	1	1	1	571	E=N*2.5	FF_{16}	FE_{16}
	Time to Maximum Recorded Delta-V^2, Resultant	ms	B	8	1	1	1	572	E=N*2.5	FF_{16}	FE_{16}
	Yaw Rate	°/s	B	16	2	11	22	573～594	E=N*0.1-300	$FFFF_{16}$	$FFFE_{16}$
	Steering Angle	°	B	16	2	11	22	595～616	E=N*5-780	$FFFF_{16}$	$FFFE_{16}$

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA13 0xFA14 0xFA15	T_{end}	ms	B	8	1	1	1	617	E=N*2.5	FF_{16}	FE_{16}
	Year	Year	B	8	1	1	1	618	E=N+2000	FF_{16}	FE_{16}
	Month	Month	B	8	1	1	1	619	E=N	FF_{16}	FE_{16}
	Day	Day	B	8	1	1	1	620	E=N	FF_{16}	FE_{16}
	Hour	Hour	B	8	1	1	1	621	E=N	FF_{16}	FE_{16}
	Minute	Minute	B	8	1	1	1	622	E=N	FF_{16}	FE_{16}
	Second	Second	B	8	1	1	1	623	E=N	FF_{16}	FE_{16}
	Gear Position	Not applicable	B	8	1	11	11	624～634	0:P,1:R,2:N,3:D	FF_{16}	FE_{16}
	Engine Throttle Position, Percent Full	%	B	8	1	11	11	635～645	E=N	FF_{16}	FE_{16}
	Brake Pedal Position	%	B	8	1	11	11	646～656	E=N*5	FF_{16}	FE_{16}
	Parking Brake Switch Status	Not applicable	B	8	1	11	11	657～667	0: ON,1: Faulted, 2: OFF	FF_{16}	FE_{16}
	Turn Signal Switch Status	Not applicable	B	8	1	11	11	668～678	0: OFF, 1: Left 2: Right, 3: Flasher	FF_{16}	FE_{16}

	Pretensioner Deployment, Time to Fire, Driver	ms	B	16	2	1	2	679～680	E=N	FF_{16}	FE_{16}

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA130xFA140xFA15	Frontal Air Bag Deployment, Time to Deploy/ First Stage, Driver	ms	B	16	2	1	2	681～682	E=N	FF_{16}	FE_{16}
	Frontal Air Bag Deployment, Time to Deploy/Second Stage, Driver	ms	B	16	2	1	2	683～684	E=N	FF_{16}	FE_{16}
	Side air bag deployment, time to deploy, driver	ms	B	16	2	1	2	685～686	E=N	FF_{16}	FE_{16}
	Side curtain/tube air bag deployment, time to deploy, driver	ms	B	16	2	1	2	687～688	E=N	FF_{16}	FE_{16}

	Safety Belt Status, Front Passenger	Not applicable	B	8	1	1	1	689	0: Buckled 1: Unbuckled	FF_{16}	FE_{16}
	Pretensioner deployment, time to fire, right front passenger	ms	B	16	2	1	2	690～691	E=N	FF_{16}	FE_{16}
	Frontal-row passenger's front airbag suppression status	Not applicable	B	8	1	1	1	692	0: OFF(air bag enabled) 1:ON(air bag disabled/**suppressed**)	FF_{16}	FE_{16}
	Frontal air bag deployment, time to deploy/ first stage, right front passenger	ms	B	16	2	1	2	693～694	E=N	FF_{16}	FE_{16}
	Frontal air bag deployment, time to deploy/ second stage, right front passenger	ms	B	16	2	1	2	695～696	E=N	FF_{16}	FE_{16}

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA13 0xFA14 0xFA15	Side air bag deployment, time to deploy, right front passenger	ms	B	16	2	1	2	697～698	E=N	FF_{16}	FE_{16}
	Side curtain/tube air bag deployment, time to deploy, right front passenger	ms	B	16	2	1	2	699～700	E=N	FF_{16}	FE_{16}
	Occupant Protection System Warning Lamp Status	Not applicable	B	8	1	1	1	701	0: OFF 1: ON	FF_{16}	FE_{16}
	Tire Pressure Monitoring System Warning Lamp Status	Not applicable	B	8	1	1	1	702	0: OFF 1: ON	FF_{16}	FE_{16}
	Brake System Warning Indicator Status	Not applicable	B	8	1	1	1	703	0: OFF 1: ON	FF_{16}	FE_{16}
	Cruise Control System Status	Not applicable	B	8	1	11	11	704～714	0: On but not active, 1: On and active, 2: Command Off,	FF_{16}	FE_{16}

									3: Faulted 4～253: Reserve		
	Adaptive Cruise Control System Status	Not applicable	B	8	1	11	11	715～725	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}

Table B.1-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA130xFA140xFA15	Anti-Lock Brake System Status	Not applicable	B	8	1	11	11	726～736	0: Not active， 1: Active， 2: Faulted， 3～253: **Self-define**	FF_{16}	FE_{16}
	Autonomous Emergency Braking System Status	Not applicable	B	8	1	11	11	737～747	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}
	Electronic Stability Control System Status	Not applicable	B	8	1	11	11	748～758	0: On but not active, 1: On and active, 2: Command Off,	FF_{16}	FE_{16}

									3: Faulted 4～253: **Self-define**		
	Traction Control System Status	Not applicable	B	8	1	11	11	759～769	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}
	Pre-Event Synchronization Timer	ms	B	16	2	1	2	770～771	E=N	$FFFF_{16}$	$FFFE_{16}$
Note：N: Original data read by EDR, E: EDR data translated from N with conversion formula by retrieval tool.											

Table B.2 EDR Data Element Arrangement Based on Line K Communication

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA10	Vehicle Identification Number	Not applicable	A	136	17	1	17	0～16	ASCII	FF_{16} for all 17 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the last one
	ECU(s) Hardware Part	Not applicable	A	512	64	1	64	17～80	ASCII, When the number of bytes is less	FF_{16} for all 64 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the

	Number(s),which records EDR data								than 64, 0x20 padding is applied, and the padding bit is on the left		last one
	ECU(s) Serial Number(s),which records EDR data	Not applicable	A	512	64	1	64	81～144	ASCII, When the number of bytes is less than 64, 0x20 padding is applied, and the padding bit is on the left	FF_{16} for all 64 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the last one
	ECU(s) Software Part Number(s),which records EDR data	Not applicable	A	512	64	1	64	145～208	ASCII, When the number of bytes is less than 64, 0x20 padding is applied, and the padding bit is on the left	FF_{16} for all 64 bytes	FF_{16} for previous 63 bytes, and FE_{16} for the last one
0xFA21 0xFA22 0xFA23	Longitudinal Delta-V	km/h	A	8	1	26	26	0～25	E=N-127	FF_{16}	FE_{16}
	Maximum Recorded Longitudinal Delta-V	km/h	A	8	1	1	1	26	E=N-127	FF_{16}	FE_{16}
	Time to Maximum Recorded Delta-V, Longitudinal	ms	A	7	1	1	1	27	E=N*2.5	FF_{16}	FE_{16}
	Clipping Flag	ms	A	16	2	1	2	28～29	E=N 1stbyte: longitudinal acceleration clipping flag; 2nd byte: lateral acceleration	**1st byte: longitudinal acceleration clipping flag FF_{16}; 2nd byte: lateral acceleration clipping flag FF_{16}**	**1st byte: longitudinal acceleration clipping flag FF_{16}; 2nd byte: lateral acceleration clipping flag FF_{16}**

									clipping flag		
	Vehicle velocity	km/h	A	8	1	11	11	30～40	E=N	FF_{16}	FE_{16}

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Table B.2-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA21 0xFA22 0xFA23	Service Brake, On and Off	Not applicable	A	8	1	11	11	41～51	0: OFF 1: ON	FF_{16}	FE_{16}
	Driver Safety Belt Status	Not applicable	A	8	1	1	1	52	0: Buckled 1: Unbuckled	FF_{16}	FE_{16}
	Accelerator Pedal Position, Percent Full	%	A	8	1	11	11	53～63	E=N	FF_{16}	FE_{16}
	Revolution Per Minute (RPM)	rpm	A	8	1	11	11	64～74	E=N*100	FF_{16}	FE_{16}
	Ignition Cycle at Event	Cycles	A	16	2	1	2	75～76	E=N	$FFFF_{16}$	$FFFE_{16}$
	Ignition Cycle at Imaging	Cycles	A	16	2	1	2	77～78	E=N	$FFFF_{16}$	$FFFE_{16}$
	Event Data Recording Complete Status	Not applicable	A	1	1	1	1	79	0: Uncompleted 1: Completed	FF_{16}	FE_{16}
	Time interval between this event and last event	s	A	8	1	1	1	80	E=N*0.1	FF_{16}	FE_{16}
0xFA31	Longitudinal Acceleration	G	B	8	1	126	126	0～125	E=N-127	FF_{16}	FE_{16}
0xFA32 0xF	Lateral Acceleration	G	B	8	1	126	126	126～251	E=N-127	FF_{16}	FE_{16}

A33											
0xFA41 0xFA42 0xFA43	Lateral Delta-V	km/h	B	8	1	26	26	0～25	E=N-127	FF_{16}	FE_{16}
	Maximum Recorded Lateral Delta-V	km/h	B	8	1	1	1	26	E=N-127	FF_{16}	FE_{16}
	The Square of Maximum Recorded Resultant Delta-V	$(km/h)^2$	B	16	2	1	2	27～28	E=N	FF_{16}	FE_{16}
	Time to Maximum Recorded Delta-V, Lateral	ms	B	8	1	1	1	29	E=N*2.5	FF_{16}	FE_{16}

Table B.2-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA41 0xFA42 0xFA43	Time to Maximum Recorded Delta-V^2, Resultant	ms	B	8	1	1	1	30	E=N*2.5	FF_{16}	FE_{16}
	Yaw Rate	°/s	B	16	2	11	22	31～52	E=N*0.1-300	$FFFF_{16}$	$FFFE_{16}$
	Steering Angle	°	B	16	2	11	22	53～74	E=N*5-780	FF_{16}	FE_{16}
	T_{end}	ms	B	8	1	1	1	75	E=N*2.5	FF_{16}	FE_{16}
	Year	Year	B	8	1	1	1	76	E=N+2000	FF_{16}	FE_{16}
	Month	Month	B	8	1	1	1	77	E=N	FF_{16}	FE_{16}
	Day	Day	B	8	1	1	1	78	E=N	FF_{16}	FE_{16}
	Hour	Hour	B	8	1	1	1	79	E=N	FF_{16}	FE_{16}
	Minute	Minute	B	8	1	1	1	80	E=N	FF_{16}	FE_{16}

	Second	Second	B	8	1	1	1	81	E=N	FF_{16}	FE_{16}
	Gear Position	Not applicable	B	8	1	11	11	82～92	0: P, 1: R, 2: N, 3:D	FF_{16}	FE_{16}
	Engine Throttle Position, Percent Full	%	B	8	1	11	11	93～103	E=N	FF_{16}	FE_{16}
	Brake Pedal Position	%	B	8	1	11	11	104～114	E=N*5	FF_{16}	FE_{16}
	Parking Brake Switch Status	Not applicable	B	8	1	11	11	115～125	0: ON,1: Faulted, 2: OFF	FF_{16}	FE_{16}
	Turn Signal Switch Status	Not applicable	B	8	1	11	11	126～136	0: OFF, 1: Left 2: Right, 3: Flasher	FF_{16}	FE_{16}
	Frontal Air Bag Deployment, Time to Deploy/ First Stage, Driver	ms	B	16	2	1	2	137～138	E=N	FF_{16}	FE_{16}

Table B.2-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA41 0xFA42 0xFA43	Frontal Air Bag Deployment, Time to Deploy/Second Stage, Driver	ms	B	16	2	1	2	139～140	E=N	FF_{16}	FE_{16}
	Side air bag deployment, time to deploy, driver	ms	B	16	2	1	2	141～142	E=N	FF_{16}	FE_{16}
	Side curtain/tube air bag deployment, time to deploy, driver	ms	B	16	2	1	2	143～144	E=N	FF_{16}	FE_{16}
	Pretensioner Deployment, Time to Fire, Driver	ms	B	16	2	1	2	145～146	E=N	FF_{16}	FE_{16}
	Frontal air bag deployment, time to deploy/ first stage, right front passenger	ms	B	16	2	1	2	147～148	E=N	FF_{16}	FE_{16}
	Frontal air bag	ms	B	16	2	1	2	149～150	E=N	FF_{16}	FE_{16}

	deployment, time to deploy/ second stage, right front passenger										
	Side air bag deployment, time to deploy, right front passenger	ms	B	16	2	1	2	151～152	E=N	FF_{16}	FE_{16}
	Side curtain/tube air bag deployment, time to deploy, right front passenger	ms	B	16	2	1	2	153～154	E=N	FF_{16}	FE_{16}
	Pretensioner deployment, time to fire, right front passenger	ms	B	16	2	1	2	155～156	E=N	FF_{16}	FE_{16}
	Safety Belt Status, Front Passenger	Not applicable	B	8	1	1	1	157	0: Buckled 1: Unbuckled	FF_{16}	FE_{16}
	Frontal-row passenger's front airbag suppression status	Not applicable	B	8	1	1	1	158	0: OFF(air bag enabled) 1:ON(air bag disabled/**suppressed**)	FF_{16}	FE_{16}

Table B.2-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value

0xFA41 0xFA42 0xFA43	Occupant Protection System Warning Lamp Status	Not applicable	B	8	1	1	1	159	0: OFF 1: ON	FF_{16}	FE_{16}
	Tire Pressure Monitoring System Warning Lamp Status	Not applicable	B	8	1	1	1	160	0: OFF 1: ON	FF_{16}	FE_{16}
	Brake System Warning Indicator Status	Not applicable	B	8	1	1	1	161	0: OFF 1: ON	FF_{16}	FE_{16}
	Cruise Control System Status	Not applicable	B	8	1	11	11	162～172	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: Reserve	FF_{16}	FE_{16}
	Adaptive Cruise Control System Status	Not applicable	B	8	1	11	11	173～183	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}
	Anti-Lock Brake System Status	Not applicable	B	8	1	11	11	184～194	0: Not active， 1: Active， 2: Faulted， 3～253: **Self-define**	FF_{16}	FE_{16}
	Autonomous Emergency Braking System Status	Not applicable	B	8	1	11	11	195～205	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted	FF_{16}	FE_{16}

									4～253: **Self-define**		

Table B.2-continued

ID	Name of data element	Unit	Level	Single signal length (bit)	Single signal length（Byte）	Single Signal number	Single event length（Byte）	Serial Number of Byte	Formula	Unobtainable Value	Invalid Value
0xFA41 0xFA42 0xFA43	Electronic Stability Control System Status	Not applicable	B	8	1	11	11	206～216	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}
	Traction Control System Status	Not applicable	B	8	1	11	11	217～227	0: On but not active, 1: On and active, 2: Command Off, 3: Faulted 4～253: **Self-define**	FF_{16}	FE_{16}
	Pre-Event Synchronization Timer	ms	B	16	2	1	2	228～229	E=N	$FFFF_{16}$	$FFFE_{16}$
Note：N: Original data read by EDR, E: EDR data translated from N with conversion formula by retrieval tool.											

Annex C
(Normative)
Delta-V Curve Compliance Determination

The compliance of delta-V curve obtained in test shall be determined as per the following steps:

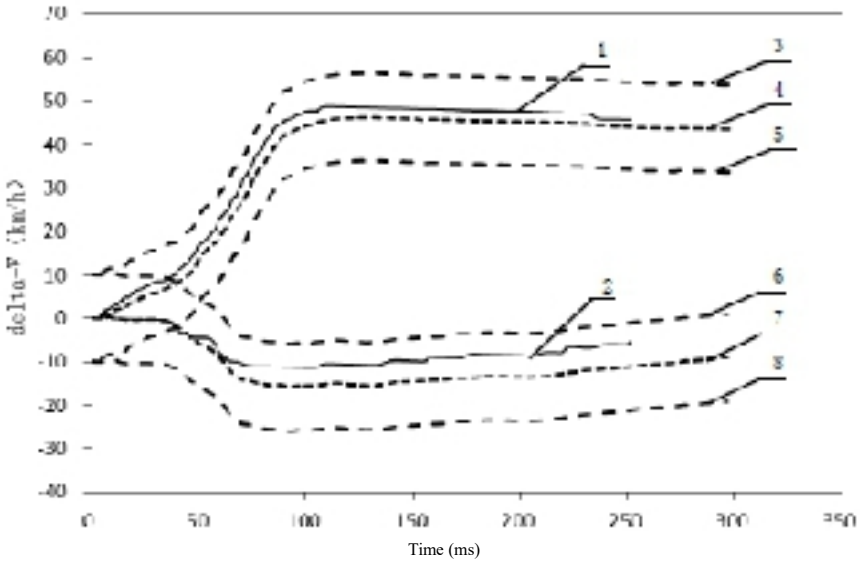
a) Integration calculation shall be performed for longitudinal (or lateral) acceleration data measured in laboratory to obtain reference longitudinal (or lateral) delta-V in laboratory;

b) Tak**ing** laboratory reference longitudinal (or lateral) delta-V as reference signal and determin**ing** upper/lower control limits, longitudinal (or lateral) delta-V plus 10km/h is upper control **limit**, and longitudinal (lateral) delta-V minus 10km/h is lower control **limit**;

c) EDR longitudinal (or lateral) delta-V and laboratory reference longitudinal (or lateral) delta-V are superimposed as follows:

- the time at which the non-reversible restraint device is deployed is used as an alignment point, that is, the ignition timing measured by the laboratory (such as the time when the current clamp detects the deployment of the non-reversible restraint device) shall be aligned with the deployment time of the irreversible restraint device recorded by the EDR;
- For “continuously running” occupant protection control algorithm EDR system, it is permitted to use T_0 as alignment point.

d) EDR longitudinal (or lateral) delta-V shall be in interval of upper/lower control limits of longitudinal (or lateral) delta-V. See the delta-V curve compliance determination drawing as per Figure C.1.



Description:

1-EDR longitudinal delta-V: The vehicle longitudinal delta-V recorded by EDR (or calculated through longitudinal acceleration **recorded by EDR**);

2-EDR lateral delta-V: The vehicle lateral delta-V recorded by EDR (or calculated through lateral acceleration **recorded by EDR**);

3-Longitudinal delta-V upper control limits;

4-The laboratory reference longitudinal delta-V: The vehicle longitudinal delta-V obtained through laboratory measurement and integration calculation of the vehicle longitudinal acceleration;

5-Longitudinal delta-V lower control **limit**;

6-Lateral delta-V upper control **limit**;

7-The laboratory reference lateral delta-V: The vehicle lateral delta-V obtained through laboratory measurement and calculation of the vehicle lateral acceleration;

8-Lateral delta-V lower control **limit**.

Figure C.1 Delta-V Curve Compliance Determination Diagram

Annex D
(Normative)
Bench Test Impact Waveform

D.1 Trigger Threshold Impact Waveform

D.1.1 Trigger threshold impact waveform shall meet the following requirements:

a) Meet the requirements of 4.1.1.1 on trigger threshold, with consideration of the reason of actual error, the velocity change is **from** 8km/h to 8.8km/h within 150ms, and the T_0 shall be no later than 150ms;

b) After end of impact, EDR shall be not recorded as locked event;

c) If multiple events are recorded due to other reasons such as impact bench braking, the event reaching threshold value record for the first time prevails;

d) The initial and final acceleration and velocity of the waveform shall be 0;

e) During the process in which impact is imposed, the displacement of the impact bench surface shall be one-way without reciprocation; distance between the final stopping position and the starting position shall take account of the stroke limit of impact bench, the displacement shall not exceed 250mm;

f) It is acceptable provided that the maximum acceleration of waveform meets the wake-up algorithm and is not more than 7g (the maximum acceleration of the braking waveform after reaching the trigger threshold is not subject to this limit, but shall not exceed the maximum acceleration limit of the impact bench);

g) In order to avoid substantial deviation between the actual physical impact caused by steep waveform and the ideal value, the waveform shall consist of semi-sinusoid, semi-cosine or their combination.

D.1.2 Recommended trigger threshold **impact** waveform consists of negative semi-sinusoidal and positive semi-sinusoidal, see key data point as per Table D.1, the curve diagram is shown in Figure D.1. If the recommended waveform cannot realize algorithm wakeup due to the reason of manufacturer's algorithm strategy, self-waveform can be adopted, but the waveform shall meet the requirements of a) to g) of D.1.1.

Table D.1 The Key Data Point of Trigger Threshold Waveform

Time(ms)	0	75	150	167.8	185.5
Acceleration(g)	0	$-2.37^{0}_{-0.24}$	0	10^{1}_{0}	0

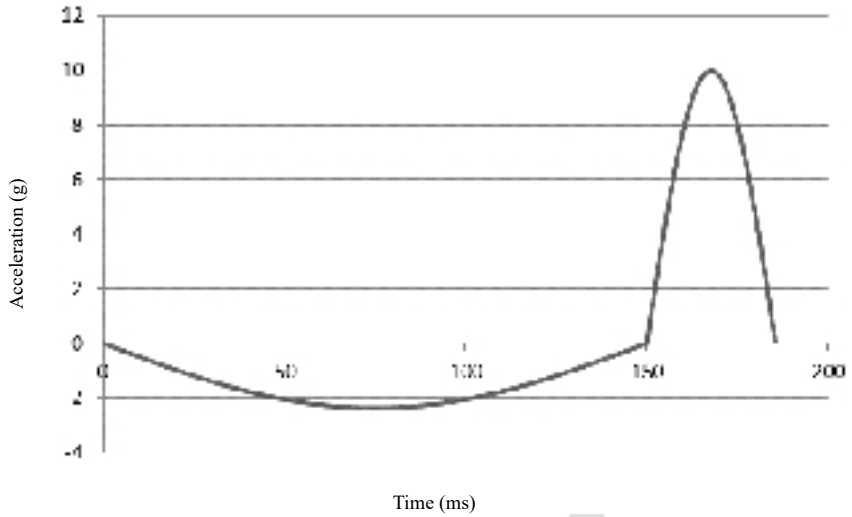


Figure D.1 Trigger Threshold Impact Waveform

D.2 Locking Condition Impact Waveform

D.2.1 For EDR system that takes “deployment of non-reversible restraint” in 4.1.2.1as locking condition, acceleration change is more than or equivalent to 40g for test waveform at time interval of 10ms. The locking waveform consists of negative semi-sinusoidal and positive semi-sinusoidal, see key data point as per Table D.2, see locking waveform drawing in Figure D.2.

Table D.2 The Key Data Point of Locking Condition (Non-reversible Restraint) Waveform

Time(ms)	（ms）	0	10	20	30	40
Acceleration(g)	（g）	0	-40±2	0	40±2	0

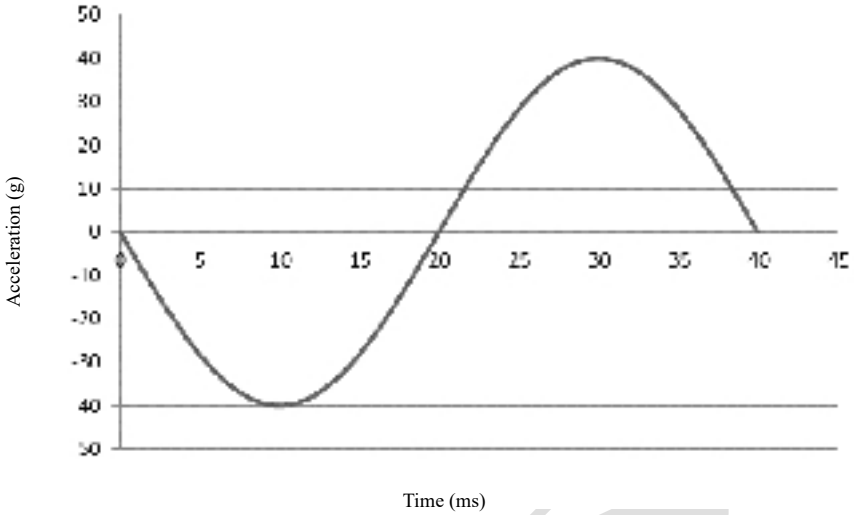


Figure D.2 Locking Condition Impact Waveform (Non-reversible Restraint)

D.2.2 For EDR system that takes "vehicle velocity change along X-axis direction equivalent to or exceeding 25km/h within time interval of 150ms" in 4.1.2.1as locking condition, velocity change is 25km/h when test waveform is at 150ms. For the physical impact applied by impact bench during test, the velocity tolerance at 150ms is 25km/h to 27.5km/h. The locking waveform consists of 1 **positive** semi-sinusoidal, 2 **negative** semi-sinusoidal and 1 **positive** semi-sinusoidal. See key data point as per Table D.3, see the locking waveform drawing in Figure D.3.

Table D.3 The Key Data Point of Locking Condition Waveform

Time(ms)	（ms）	0	45	90	110	130	140	150	163.9	177.8
Acceleration(g)	（g）	0	$3.45^{0}_{-0.34}$	0	$-15.57^{0}_{-1.56}$	0	-40^{0}_{-4}	0	40^{4}_{0}	0

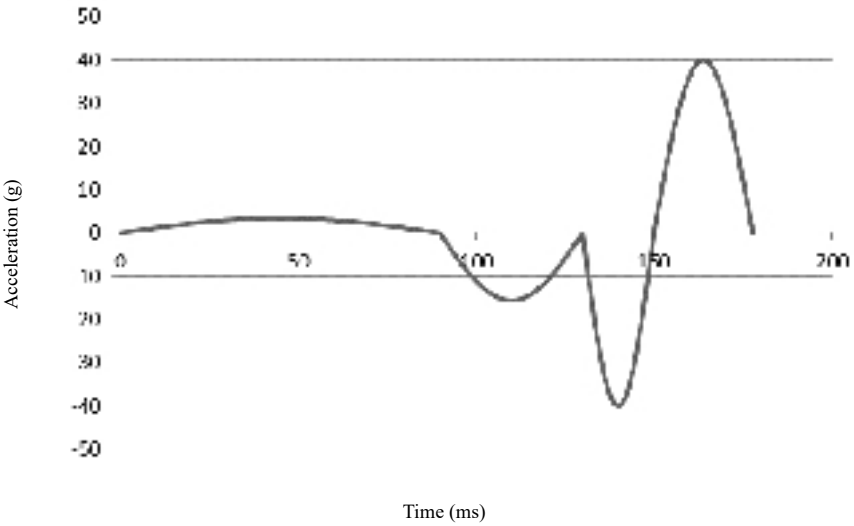


Figure D.3 Locking Condition Impact Waveform (Velocity Change Equivalent to 25km/h of 150ms)

D.3 Power-off Storage Waveform

The acceleration change within the first 10ms of test waveform shall be more than or equivalent to 40g, waveform length is 150ms and acceleration value shall not be 0g continuously.

The power-off storage waveform consists of 1 negative semi-sinusoidal, 1 positive semi-sinusoidal and 1 cycle of sine wave, the acceleration at 10ms is -40±2g. See key data point as per Table D.4, see the power-off storage waveform drawing in Figure D.4.

Table D.4 The Key Data Point of Power-off Storage Waveform

Time(ms)	时间（ms）	0	10	40	82.5	127.5	150
Acceleration(g)	加速度（g）	0	-40±2	20±1	-1.5±0.08	1.5±0.08	0

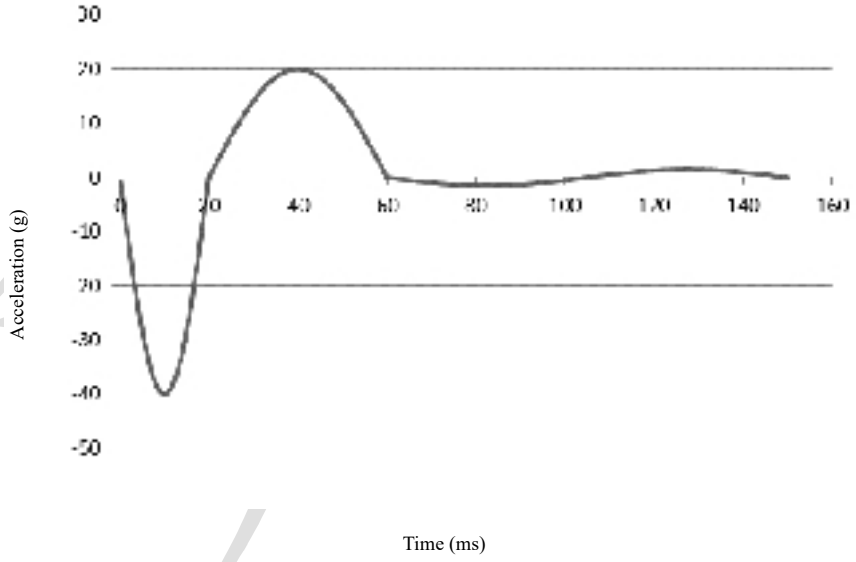


Figure D.4 Power-off Storage Waveform Drawing