Conformance test specifications for

SAE J2945/1 - On-board System Requirements for V2V Safety Communications

Test Suite Structure and Test Purposes (TSS & TP)

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Table of Contents

1 Scope

This document provides the Test Suite Structure and Test Purposes for Basic Safety Message structure, content, and transmission as defined in SAE J2945/1 [1].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [3] and ISO/IEC 9646-2 [4]) as well as the ETSI rules for conformance testing (ETS 300 406 [5]) are used as a basis for the test methodology.

2 References

2.1   Normative References

The following referenced documents are necessary for the application of the present document.

[1]   SAE J2945/1 (2016-03): "Surface Vehicle Standard: On-board Systems Requirements for V2V Safety Communications"

[2]   SAE J2735 (2016-01): "Dedicated Short Range Communication (DSRC) Message Set Dictionary"

[3]   ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 1: General concepts".

[4]   ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[5]   ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[6]   IEEE Std 1609.3-2016 "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Network Services".

[7]   IEEE Std. 1609.2-2016: "IEEE Draft Standard for Wireless Access in Vehicular Environments - security Services for Applications and Management Messages".

[8]   IEEE Std. 1609.4-2016 "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) -- Multi-Channel Operation".

[9]   IEEE Std. 1609.12-2016 "IEEE Standard for Wireless Access in Vehicular Environments – Identifier Allocations".

2.2   Informative References

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1]   ETSI EG 202 798 (V1.1.1): "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".

3 Definitions and Abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions are given in SAE J2735 [2] and SAE J2945/1 [1]

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BI   Behavior Invalid
BSM   Basic Safety Message
BV   Behavior Valid
CH   Channel
EDCA   Enhanced Distributed Channel Access
ITS   Intelligent Transport Systems
IUT   Implementation Under Test
MAC   Medium Access Control
SAE   Society of Automotive Engineers
SCMS   Security Certificate Management System
TAI   International Atomic Time
TCI   Test Control Interface
TP   Test Purposes
TSS   Test Suite Structure
V2V   Vehicle-to-Vehicle
V2X   Vehicle-to-Device
WAAS   Wide Area Augmentation System
WAVE   Wireless Access in Vehicular Environments
WGS   World Geodetic System

4 Prerequisites and Test Configurations

4.1   Test Configurations

This clause introduces the test configurations that are used for the definition of test purposes. The test configurations cover the various scenarios of the J2945/1 tests for BSM conformance. Distance between the IUT and the Test System shall not exceed five meters. In all test configurations antenna locations are located at an unspecified measured location and the test system is configured to account for the location.
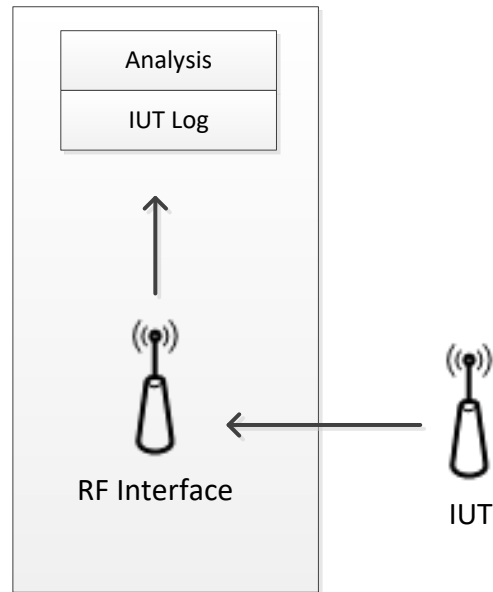
Figure 1: Test Configuration 1 (TC1)

TC1 is used for bench tests that only require monitoring transmitted messages from a single isolated IUT. This configuration should be used for testing the functionality of the IUT in a non-strenuous environment.
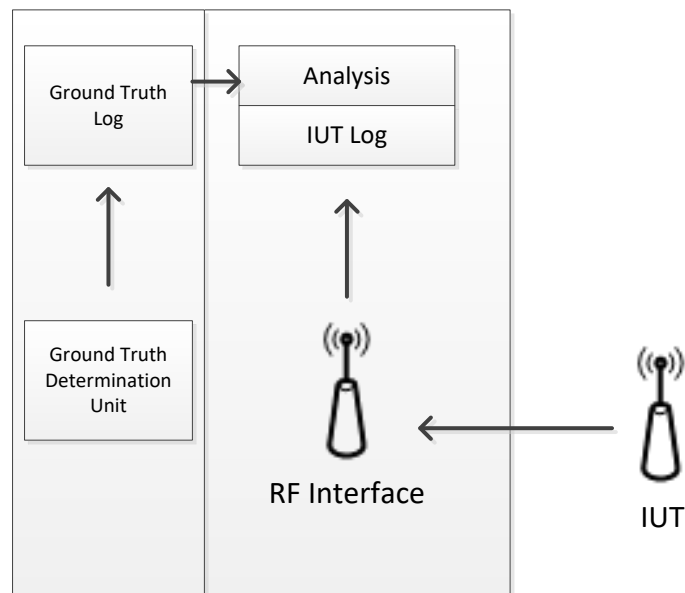

Figure 2: Test Configuration 2 (TC2)

TC2 is used for moving vehicle tests, related to event conditions and data accuracy. Both the IUT and test tool are mounted inside of the test vehicle.

Figure 3: Test Configuration 3 (TC3)

TC3 is used for situations in which the test operator requires the Test Control Interface (TCI) to execute tests on the IUT. This configuration should be used to test fringe cases that would be difficult to cause in a physical vehicle.
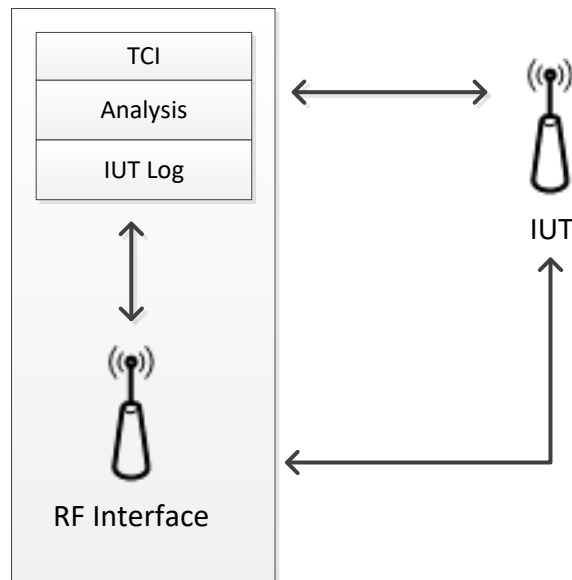
Figure 4: Test Configuration 4 (TC4)

TC4 is required for situations in which the IUT responds to BSMs sent from another source. The IUT, RF Interface, and Test System are located close enough to exchange messages.

4.2   Feature Restriction and Pre-Enrolment

4.2.1   Feature Restriction

In this clause all feature restrictions are listed:

- No external DSRC units within range of IUT, DSRC Test System, and DSRC Reference Unit are transmitting outside of the test setup.
- WAAS corrections are present for all devices.
- Signature and certificate content is assumed to be tested and validated through 1609.2 test method.
- Any reference to VehicleEventFlags only accounts for the Critical Event Flags: Hard Braking, ABS, Traction Control, and Stability Control. Testing is not required for any other VehicleEventFlags. All possible combinations of Critical Event Flags are organized in Section 7.6 of the Appendix.

States in Initial Conditions

Each TP contains a pre-test condition. The pre-test condition defines the initial state in which the IUT has to be to apply the actual TP. Most of the TPs start from the "initial state" which is defined as follows:

- The IUT is powered up
- GNSS in open-sky conditions[1] is being received.
- Unless otherwise stated, the IUT is transmitting
- Unless otherwise stated, Congestion Control is enabled
- Unless otherwise stated, the IUT has the certificates available to successfully transmit BSMs for the duration of the test.
- Unless otherwise stated, the IUT is configured to transmit BSMs on a 10 MHz channel at vChannelNumber according to the built-in configuration and logic
- Unless otherwise stated, the IUT is configured to transmit BSMs using an 802.11 data rate of vDataRate

Some TPs start from a different initial condition which is explicitly defined in the TP. However, the "initial state" defined above is the starting point before the different initial conditions are established.

When the execution of the pre-test condition does not succeed, it leads to the assignment of an Inconclusive verdict.

4.3   Variants, Variables and Snippet Naming Convention

The TPs use the concept of variants. Their definition, how they are used and their naming conventions are defined in this clause.

Variants: In cases where for a single field multiple values can be tested, then a table is appended after the TP. This table lists all the different values which need to be tested. The TP identifier is appended with –X (e.g. **TP-BSM-ST-BV-01-X**).

Vendor Tests: In cases where requirements cannot be tested through black-box field tests (for example, hardware security or internal clock representation) these tests require hardware vendors to report on and confirm the functionality of the IUT. The TP identifier is appended with –V.

5 Test Suite Structure (TSS)

5.1   Structure for Content and Accuracy Tests

Table 1 shows the Test Suite Structure (TSS) including its subgroups defined for conformance testing.

Table 1: TSS for BSM

Root	Group	category
BSM	Stationary Test	Valid
BSM	Stationary Test	Invalid
BSM	Moving Vehicle	Valid
BSM	Moving Vehicle	Invalid

The test suite is structured as a tree with the root defined as BSM. The tree is of rank 2 with the first rank a group and the second a category. The third rank is the standard ISO conformance test categories.

5.2   Test Groups

The test suite has a total of three levels. The first level is the root. The second level separates the root based on the IUT's operating condition. The third level is the standard ISO conformance test categories.

5.2.1   Root

The root identifies the on-board system requirements for V2V Safety Communications given in SAE J2945/1 [1].

5.2.2   Groups

This level contains two message types identified as:

Stationary Test: The IUT is tested without a vehicle
Moving Vehicle: The IUT must be connected to a test vehicle at all times during the test

5.2.3   Categories

This level contains the standard ISO conformance test categories limited to the behavior valid event and behavior invalid event.

6 Test Purposes (TP)

6.1   Introduction

6.1.1   TP Definition Conventions

The TP definition is built according to EG 202 798 [i.1].

The TPs are defined by the rules shown in table 2.

Table 2: TP definition rules

TP ID	The TP ID is a unique identifier. It shall be specified according to the TP naming conventions defined in the clause below.
Test Objective	Short description of test purpose objective according to the requirements from the base standard.
References	The reference indicates the sub-clauses of the reference standard specifications in which the conformance requirement is expressed.
Test Configuration	References the test configuration selected for this TP
Pre-test conditions	Define the initial state the IUT has to be in to apply the actual TP. In the corresponding Test Case, when the execution of the initial condition does not succeed, it leads to the assignment of an Inconclusive verdict.
Test Sequence	Definition of the events, which are parts of the TP objective, and the IUT are expected to perform in order to conform to the base specification. In the corresponding Test Case, Pass or Fail verdicts can be assigned there.
Event Types	
Stimulus	Corresponds to an event that forces an IUT to proceed with a specific protocol action
Check	Ensures the conditions are appropriate to move to the next step in the test procedure,

	e.g. the receipt of protocol messages on reference points (i.e. output of the test system) with valid content, typically before the IUT stimulus is triggered. These events are not associated with the verdict evaluation (i.e. Pass/Fail)	
Configure	Performs some internal modification of the IUT that places it in a specific behavior state	
Verify	Consists of verifying that the IUT behaves according to the expected behavior (for instance the IUT behavior shows that it receives the expected message). Outcome of this event typically evaluate for verdict (i.e. Pass/Fail)	
Procedure	Procedural action directing the flow of TP execution.	

6.1.2 TP Identifier Naming Conventions

The identifier of the TP is built according to table 2.

Table 3: TP naming convention

Identifier	TP-<root>-<gr>-<x>-<nn>		
	<root> = root	BSM	
	<gr> = group	ST	Stationary Test
		MV	Moving Vehicle
	<x> = type of testing	BV	Valid Behaviour tests
		BI	Invalid Syntax or Behaviour Tests
	<nn> = sequential number		01 to 99

6.1.3 Rules for the Behavior Description

The description of the TP is built according to EG 202 798 [i.1].

The base standards are not using finite state machine concept. As consequence, the test purposes use a generic "Initial State" that corresponds to a state where the IUT is ready for starting the test execution.

Being in the "Initial State" refers to the starting point of the initial device configuration. There are no pending actions, instantiated buffers, or variables which could disturb the execution of a test.

6.1.4 Sources of TP Definitions

All TPs are specified according to SAE J2735 [2] and SAE J2945/1 [1].

6.2 Test Purposes for BSM

6.2.1 Transmission Requirements

Identifier	TP-BSM-ST-BV-01-X	
Test Objective	Verify that DE_VehicleEventFlags is only included if an event is occurring and is not included if an event is not occurring	
Test Configuration	TC3	
Reference:	V2V-BSMTX-BSMCONT-006, V2V-STD-J2735-040	
Pre-test conditions		
● The IUT is in the initial state		
● No conditions corresponding to an event flag are met		
Test Sequence		
Step	**Type**	**Description**	**Verdict**
1	Verify	A BSM is transmitted with the DE_VehicleEventFlags element not included	Pass / Fail
2	Stimulus	One set of conditions (**X**) corresponding to an **Event Flag** is met as per Section 7.4	
3	Verify	A BSM is transmitted with the DE_VehicleEventFlags element included within time period = 50 ms	Pass / Fail
4	Verify	A BSM is transmitted with the DE_VehicleEventFlags element included with corresponding bits set according to **Bit Location** as per Section 7.4	Pass / Fail
5	Stimulus	The previously set of **Event Flags** are removed	
6	Verify	The BSM contains no DE_VehicleEventFlags within time period = vEventDetectLatency	Pass / Fail
7	Procedure	Steps 2 – 6 are repeated for variants from the Variants table in Section 7.4	

Identifier	TP-BSM-ST-BV-02	
Test Objective	Verify that the first BSM transmitted after device restart uses a random time	
Test Configuration	TC3	
Reference:	V2V-BSMTX-GENTIM-001	
Pre-test conditions		
● The IUT is configured to transmit BSMs automatically upon restart		
● The IUT is in the initial state		
Test Sequence		
Step	**Type**	**Description**	**Verdict**
1	Stimulus	The device is restarted	
2	Verify	The BSM is transmitted and the time stamp from the sniffer on reception is recorded	Pass / Fail
3	Procedure	Steps 1 – 2 are repeated enough times to ensure a statistically significant sample size, as defined in Section 7.1	
4	Verify	The sample of start times is deemed sufficiently random according to criteria set in Section 7.1, where the tolerance for the average is 5 hz +/- .875 hz and the tolerance for the standard deviation is 28.9 hz +/- 6.67 hz	Pass / Fail

Identifier	TP-BSM-ST-BV-03-X
Test Objective	Verify BSMs are transmitted with correct contents and transmission parameters
Test Configuration	TC1
Reference:	[1] V2V-BSMTX-BSMCONT-[001-004], V2V-BSMTX-CHDATARATE-[001-002], V2V-STD-J2735-[001-015, 020-039, 041-045], V2V-BSMTX-DATAACC-001, V2V-BSMTX-MINTX-001

Pre-test conditions
● The IUT is in the initial state
● Congestion Control is turned off

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	A BSM is transmitted	
2	Verify	The BSM is signed using credentials defined by 1609.2 [6]	Pass / Fail
3	Verify	The BSM is transmitted using a WAVE Short Message containing WSM version =3	Pass / Fail
4	Verify	The BSM is encoded using Unaligned Packed Encoding Rules (UPER)	Pass / Fail
5	Verify	The BSM contains **X_BSM_CONTENT** with value **X_FRAME_VALUE**	Pass / Fail
6	Procedure	Repeat steps 1-5 for all variants of **X_BSM_CONTENT** and **X_FRAME_VALUE**	
7	Verify	The BSMs are transmitted on vChannelNumber	Pass / Fail
8	Verify	The BSMs are transmitted at a data rate of vDataRate	Pass / Fail

Variants		
X	**X_BSM_CONTENT**	**X_FRAME_VALUE**
1	DE_DSRC_MessageID, contained within Part I [V2V-STD-J2735-002]	20
2	DF_BSMcoreData, contained within Part I [V2V-STD-J2735-007]	Valid Frame
3	DF_PositionalAccuracy, contained within DF_BSMcoreData [V2V-STD-J2735-012]	Valid Frame
4	DE_SemiMajorAxisAccuracy, contained within DF_PositionalAccuracy [V2V-STD-J2735-030]	$0 \leq Value \leq 255$
5	DE_SemiMajorAxisOrientation, contained within DF_PositionalAccuracy [V2V-STD-J2735-031]	$0 \leq Value \leq 65535$
6	DE_SemiMinorAxisAccuracy, contained within DF_PositionalAccuracy [V2V-STD-J2735-032]	$0 \leq Value \leq 255$
7	DE_DSecond, contained within DF_BSMcoreData [V2V-STD-J2735-021]	$0 \leq Value \leq 60999$
8	DE_Elevation, contained within DF_BSMcoreData [V2V-STD-J2735-022]	$-4096 \leq Value \leq 61439$
9	DE_Heading, contained within DF_BSMcoreData [V2V-STD-J2735-024]	$0 \leq Value \leq 28800$
10	DE_Latitude, contained within DF_BSMcoreData [V2V-STD-J2735-025]	$-900000000 \leq Value \leq 900000001$
11	DE_Longitude, contained within DF_BSMcoreData [V2V-STD-J2735-026]	$-1799999999 \leq Value \leq 1800000001$
12	DE_MsgCount, contained within DF_BSMcoreData [V2V-STD-J2735-027]	$0 \leq Value \leq 127$
13	DE_Speed, contained within DF_BSMcoreData [V2V-STD-J2735-033]	$0 \leq Value \leq 8191$
14	DE_SteeringWheelAngle, contained within DF_BSMcoreData [V2V-STD-J2735-035]	$-126 \leq Value \leq 127$

15	DE_TemporaryID, contained within DF_BSMcoreData [V2V-STD-J2735-036]	Octet String, Size 4
16	DE_TransmissionState, contained within DF_BSMcoreData [V2V-STD-J2735-039]	Enumerated (0 - 7)
17	DF_BrakeSystemStatus, contained within DF_BSMcoreData [V2V-STD-J2735-006]	Valid Frame
18	DE_TractionControlStatus, contained within DF_BrakeSystemStatus [V2V-STD-J2735-038]	Enumerated (0 - 3)
19	DE_StabilityControlStatus, contained within DF_BrakeSystemStatus [V2V-STD-J2735-034]	Enumerated (0 - 3)
20	DF_AccelerationSet4Way, contained within DF_BSMcoreData [V2V-STD-J2735-005]	Valid Frame
21	DE_Acceleration (Lateral), contained within DF_AccelerationSet4Way [V2V-STD-J2735-015]	-2000 <= Value <= 2001
22	DE_Acceleration (Longitudinal), contained within DF_AccelerationSet4Way [V2V-STD-J2735-015]	-2000 <= Value <= 2001
23	DE_VerticalAcceleration, contained within DF_AccelerationSet4Way [V2V-STD-J2735-043]	-127 <= Value <= 127
24	DE_YawRate, contained within DF_AccelerationSet4Way [V2V-STD-J2735-045]	-32767 <= Value <= 32767
25	DF_VehicleSize, contained within DF_BSMcoreData [V2V-STD-J2735-014]	Valid Frame
26	DE_VehicleLength, contained within DF_VehicleSize [V2V-STD-J2735-041]	0 <= Value <= 4095
27	DE_VehicleWidth, contained within DF_VehicleSize [V2V-STD-J2735-042]	0 <= Value <= 1023
28	DF_VehicleSafetyExtensions, contained within Part II [V2V-STD-J2735-013]	Valid Frame
29	DF_PathHistory, contained within DF_VehicleSafetyExtensions [V2V-STD-J2735-008]	Valid Frame
30	DF_PathHistoryPointList, contained within DF_PathHistory [V2V-STD-J2735-009]	Valid Frame
31	DE_OffsetLL-B18, contained within DF_PathHistoryPointList [V2V-STD-J2735-028]	-131072 <= Value <= 131071
32	DF_PathHistoryPoint, contained within DF_PathHistoryPointList [V2V-STD-J2735-010]	Valid Frame
33	DE_TimeOffset, contained within DF_PathHistoryPoint [V2V-STD-J2735-037]	1 <= Value <= 65535
34	DE_VertOffset-B12, contained within DF_PathHistoryPoint [V2V-STD-J2735-044]	-2048 <= Value <= 2047
35	DE_ExteriorLights, contained within DF_VehicleSafetyExtensions [V2V-STD-J2735-023]	Bit String, Size (9, …)
36	DF_PathPrediction, contained within DF_VehicleSafetyExtensions [V2V-STD-J2735-011]	Valid Frame
37	DE_Confidence, contained within DF_PathPrediction [V2V-STD-J2735-020]	0 <= Value <= 200
38	DE_RadiusOfCurvature, contained within DF_PathPrediction [V2V-STD-J2735-029]	-32767 <= Value <= 32767

Identifier	TP-BSM-ST-BV-04

Test Objective	Verify that BSMs are generated randomly within *–vBSMRateTolerance* and *+vBSMRateTolerance* of their scheduled generation time
Test Configuration	TC1
Reference:	V2V-BSMTX-GENTIM-002

Pre-test conditions			
● There are no external messages being transmitted that influence the Congestion Control			
● The IUT is configured to transmit BSMs automatically upon restart			
● The IUT is in the initial state			

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The device is restarted	
2	Check	A BSM is transmitted at 10 hz nominally and the sniffer timestamp at reception is recorded	
3	Verify	The exact transmission time of the BSM has been modified by -vBSMRateTolerance and +vBSMRateTolerance	Pass / Fail
4	Procedure	Step 3 is repeated a statisticially significant amount of times as defined by Section 7.1 to ensure that the modified time of each BSM is random	

6.2.2   Message Identification

Identifier	TP-BSM-ST-BV-05
Test Objective	Verify identification data is randomized to facilitate user privacy after certificate expiration
Test Configuration	TC1
Reference:	V2V-BSMTX-DATAACC-[003,006], V2V-SECPRIV-IDRAND-002, V2V-SECPRIV-BSMSIGN-008

Pre-test conditions			
● The IUT is in its initial state			

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	Two BSMs are transmitted without a certificate change	
2	Verify	DE_MsgCount is incremented between BSMs	Pass / Fail
3	Verify	DSRC MAC address does not change	Pass / Fail
4	Verify	DE_TemporaryID does not change	Pass / Fail
5	Stimulus	Certificate expiration causes a certificate change	
6	Stimulus	A first BSM is transmitted after certificate change	
7	Verify	The IUT populates a value for DE_MsgCount	Pass / Fail
8	Verify	The IUT populates a value for DE_TemporaryID	Pass / Fail
9	Verify	The IUT populates a value for DSRC MAC Address	Pass / Fail
10	Verify	A full certificate is attached to the BSM	Pass / Fail
11	Procedure	Steps 5 – 10 are repeated a statistically significant amount of times as defined by Section 7.1	
12	Verify	DE_MsgCount's values over the previous iterations are random according to criteria set in Section 7.1, where the tolerance for the average is 127.5 +/- 2.43 and the tolerance for the standard deviation is 73.6 +/- 17	Pass / Fail
13	Verify	DE_TemporaryID's values over the previous iterations are random according to criteria set in Section 7.1, where the tolerance for the average is 2.1 billion +/- 28.5 million and the tolerance for the standard deviation is 1.2 billion +/- 80 million	Pass / Fail

| 14 | Verify | DSRC MAC Address' values over the previous iterations are random according to criteria set in Section 7.1, where the tolerance for the average is 9.223372e+18 +/- 2.465e+12 and the tolerance for the standard deviation is 8.1254827e+13 +/- 1.8764811e+13 | Pass / Fail |

Identifier	TP-BSM-ST-BV-06		
Test Objective	Verify DE_MsgCount is properly incremented and rolls over when reaching 127 and DE_TemporaryID is not changed		
Test Configuration	TC1		
Reference:	V2V-BSMTX-DATAACC-[004, 007]		
Pre-test conditions			

● The IUT is in the initial state
● The IUT is configured to transmit BSMs, with the first's DE_MsgCount less than 127
● The security certificate does not change during this test

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	Two BSMs are transmitted, the first with a DE_MsgCount less than 127	
2	Verify	The DE_TemporaryIDs of both BSMs are identical	Pass / Fail
3	Verify	DE_MsgCount of the second of the two BSMs is one greater than first DE_MsgCount	Pass / Fail
4	Procedure	The IUT continues to send BSMs until the DE_MsgCount of a BSM is exactly 127	
5	Stimulus	A BSM is transmitted	
6	Verify	DE_TemporaryID has not changed	Pass / Fail
7	Verify	DE_MsgCount of the previous BSM is 0	Pass / Fail

Identifier	TP-BSM-ST-BV-07		
Test Objective	Verify identification data is randomized to facilitate user privacy after device restart		
Test Configuration	TC3		
Reference:	V2V-BSMTX-DATAACC-[002,005], V2V-SECPRIV-IDRAND-001		
Pre-test conditions			

● The IUT is in its initial state

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	The IUT is restarted	
2	Stimulus	A BSM is transmitted	
3	Verify	The IUT populates a value for DE_MsgCount	Pass / Fail
4	Verify	The IUT populates a value for DE_TemporaryID	Pass / Fail
5	Verify	The IUT populates a value for DSRC MAC Address	Pass / Fail
6	Procedure	Steps 1 – 5 are repeated a statistically significant amount of times as defined in Section 7.1	
7	Verify	DE_MsgCount's values over the past iterations are random according to criteria set in Section 7.1, where the tolerance for the average is 127.5 +/- 2.43 and the tolerance for the standard deviation is 73.6 +/- 17	Pass / Fail
8	Verify	DE_TemporaryID's values over the past iterations are random according to criteria set in Section 7.1, where the tolerance for the	Pass / Fail

		average is 2.1 billion +/- 28.5 million and the tolerance for the standard deviation is 1.2 billion +/- 80 million	
9	Verify	DSRC MAC Address' values over the past iterations are random according to criteria set in Section 7.1, where the tolerance for the average is 9.223372e+18 +/- 2.465e+12 and the tolerance for the standard deviation is 8.1254827e+13 +/- 1.8764811e+13	Pass / Fail

6.2.3 Security

Identifier	TP-BSM-ST-BV-08		
Test Objective	Verify the IUT signs every BSM and attaches a certificate or certificate digest to every BSM		
Test Configuration	TC1		
Reference:	V2V-SECPRIV-BSMSIGN-[001-002]		
Pre-test conditions			
● The IUT is in the initial state			
Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	A BSM is transmitted	
2	Verify	A full certificate or certificate digest is attached to the BSM	Pass / Fail
3	Verify	The BSM is signed by the certificate stored in the IUT	Pass / Fail

Identifier	TP-BSM-ST-BV-09		
Test Objective	Verify the IUT attaches full certificates after vMaxCertDigestInterval or more has passed since the previous transmission of a certificate		
Test Configuration	TC1		
Reference:	V2V-SECPRIV-BSMSIGN-003		
Pre-test conditions			
● The IUT is in the initial state			
Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	A BSM is transmitted with a full certificate	
2	Stimulus	Wait for the next BSM with full certificate attached to be transmitted	
3	Verify	A BSM is transmitted with a full certificate attached within interval not exceeding vMaxCertDigestInterval	Pass / Fail

Identifier	TP-BSM-ST-BV-10-X		
Test Objective	Verify the IUT attaches a full certificate when a Critical Event Flag is set		
Test Configuration	TC3		
Reference:	V2V-SECPRIV-BSMSIGN-004		
Pre-test conditions			
● The IUT is in the initial state			
● No event conditions are present			
Test Sequence			
Step	Type	Description	Verdict
1	Verify	The IUT transmits BSMs containing no DE_VehicleEventFlags element	Pass / Fail
2	Stimulus	A critical **Event Flag** set is raised	
3	Verify	The BSM contains a full certificate attached to the BSM is transmitted	Pass / Fail

| 4 | Stimulus | The critical Event Flag set is cleared | |
| 5 | Procedure | Steps 1 – 4 are repeated for all critical event flag sets from the Variants table in Section 7.4 | |

Identifier	TP-BSM-ST-BV-11	
Test Objective	Verify the IUT does not transmit BSMs if no certificates are available	
Test Configuration	TC1	
Reference:	V2V-SECPRIV-BSMSIGN-[005, 006]	

Pre-test conditions
● The IUT is in the initial state
● One certificate is available on the IUT
● The radio is prevented from receiving new certificates
● Certificate expiration does not occur unless explicitly stated

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Check	At least one BSM is transmitted	
2	Stimulus	Certificate validity has expired in the IUT and no other certificates are made available	
3	Verify	BSMs are not transmitted for 5 seconds	Pass / Fail

Identifier	TP-BSM-ST-BV-12	
Test Objective	Verify the IUT does not transmit BSMs with certificates on a revocation list	
Test Configuration	TC1	
Reference:	V2V-SECPRIV-CERTREV-001	

Pre-test conditions
● The IUT is in the initial state
● One certificate is available on the IUT

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	At least one BSM is transmitted	Pass / Fail
2	Stimulus	The one certificate is placed on the revocation list	
3	Configure	The IUT received and verifies an update certificate revocation list	
4	Verify	The IUT does not transmit BSMs with that revoked certificate for 5 seconds	Pass / Fail

Identifier	TP-BSM-ST-BV-13	
Test Objective	After a device startup, the first BSM transmitted by the IUT has an entire certificate attached	
Test Configuration	TC3	
Reference:	V2V-SECPRIV-BSMSIGN-007	

Pre-test conditions
● The IUT is in the initial state

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	The IUT is restarted	
2	Verify	The IUT transmits the first BSM	Pass / Fail
3	Verify	The first BSM contains a full certificate	Pass / Fail

Identifier	TP-BSM-ST-BV-14-V

Test Objective	Verify storage of certificates
Test Configuration	TC1
Reference:	V2V-SECMGMT-CERTSTORE-[001-004], V2V-SECMGMT-CRLLOAD-[001-002]

Pre-test conditions
● The IUT is off

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The IUT is turned on	
2	Verify	The vendor's report indicates that the IUT has at least vCertNvMemSize of non-volatile memory for storage of pseudonym certificates	Pass / Fail
3	Verify	The vendor's report indicates that the IUT has at least vCrlStoreSize of non-volatile memory for storing the Certificate Revocation List	Pass / Fail
4	Verify	The vendor's report indicates that the IUT has at least vSecMemSize of secure memory available for data requiring secure storage	Pass / Fail
5	Stimulus	The IUT retrieves an individual pseudonym certificate, RA address, RA intermediate CA, PCA certificate, System configuration, and security policy	
6	Configure	The IUT retrieves Root CA certificate, Enrollment certificate, and system private keys	
7	Verify	The vendor's report indicates that the data retrieved in Step 5 is contained within secure, tamper-evident, non-volatile memory	Pass / Fail
8	Stimulus	The IUT retrieves a Certificate Revocation List	
9	Verify	The vendor's report indicates that the Certificate Relocation List is stored in non-volatile memory	Pass / Fail

Identifier	TP-BSM-ST-BV-15
Test Objective	Verify the IUT's ability to verify incoming BSMs
Test Configuration	TC4
Reference:	V2V-SECPRIV-BSMVERIFY-001

Pre-test conditions
● The IUT is in the initial state
● IUT is configured to verify all BSMs

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	A signed BSM with a full certificate is transmitted from the reference unit to the IUT	
2	Verify	The IUT verifies the BSM, resulting in success	Pass / Fail
3	Stimulus	A signed BSM with a certificate digest of the previous BSM's certificate is transmitted from the reference unit to the IUT	
4	Verify	The IUT verifies the BSM using the previous BSM's full certificate, resulting in success	Pass / Fail

Identifier	TP-BSM-ST-BV-16-V
Test Objective	Verify the IUT's ability to securely update root CA certificates
Test Configuration	TC1
Reference:	V2V-SECMGMT-CERTLOAD-001

Pre-test conditions
● The IUT is in the initial state

Test Sequence

Step	Type	Description	Verdict
1	Configure	The computer interface makes an updated root CA certificate available on the SCMS device	
2	Configure	The IUT is configured to attempt to update its root CA certificate	
3	Verify	The IUT's root CA is updated with the SCMS device's CA	Pass / Fail
4	Verify	The vendor's report indicates that the IUT's root CA is updated securely	Pass / Fail

Identifier	TP-BSM-ST-BV-17-X		
Test Objective	Verify certificate is not changed during event conditions unless the certificate expires		
Test Configuration	TC3		
Reference:	V2V-SECPRIV-CERTCHG-002		
Pre-test conditions			
● The IUT is in the initial state			
● Certificate expiration does not occur unless explicitly stated			
● No event flag on the IUT is set			
Test Sequence			
Step	Type	Description	Verdict
1	Verify	The IUT transmits BSMs with the DE_VehicleEventFlags element not included	Pass / Fail
2	Stimulus	One critical set of **Event Flag** from Section 7.4 is set	
3	Verify	The IUT transmits BSM containing full security certificate	Pass / Fail
4	Verify	The certificate of the BSM Transmitted in Step 1 and the BSM Transmitted in Step 3 are identical	Pass / Fail
5	Stimulus	The certificate expiration time passes while the **Event Flag** set remains persistent	
6	Stimulus	vCertChangeInterval time passes while the **Event Flag** set remains persistent	
7	Stimulus	The IUT transmits at least one BSM	
8	Verify	The certificate of Step 7's BSM and Step 3's BSM are different	Pass / Fail
9	Procedure	Steps 1 – 7 are repeated for all critical event sets from Section 7.4	

Identifier	TP-BSM-MV-BV-01		
Test Objective	Verify certificate is not changed if travel distance is less that vCertChangeDistance unless reset or the certificate expires		
Test Configuration	TC2		
Reference:	V2V-SECPRIV-CERTCHG-[001, 003]		
Pre-test conditions			
● The IUT is in the initial state			
● Certificate change does not occur unless explicitly stated			
Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The IUT travels vCertChangeDistance while continually transmitting BSMs over the course of vCertChangeInterval	
2	Verify	All BSMs transmitted in Step 1 have identical certificates	Pass / Fail
3	Stimulus	The IUT travels more than vCertChangeDistance from the starting point	
4	Stimulus	vCertChangeInterval time passes	

4	Verify	BSMs transmitted after vCertChangeInterval time passes have a different certificate than those transmitted before traveling more than vCertChangeDistance from the starting point	Pass / Fail
5	Stimulus	Time passes until certificate expiration	
6	Verify	BSMs transmitted after certificate expiration have a different certificate than those transmitted after traveling more than vCertChangeDistance from the starting point	Pass / Fail
7	Stimulus	The IUT is reset	
8	Verify	BSMs transmitted after reset have a different certificate than those transmitted after certificate expiration	Pass / Fail

6.2.4 Data Accuracy

Identifier	TP-BSM-ST-BV-18		
Test Objective	Verify data retention across IUT restart		
Test Configuration	TC3		
Reference:	V2V-BSMTX-DATAPERSIST-[001-004]		
Pre-test conditions			
● The IUT is in the initial state			
● The IUT has a last known heading value and a last known path history			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	The IUT travels at a speed greater than vHeadingSpeedThresh to allow the IUT to lock its heading	
2	Verify	The IUT transmits at least one BSM	Pass / Fail
3	Stimulus	The IUT is restarted	
4	Check	The IUT completes restart	
5	Verify	The IUT transmits at least one BSM	Pass / Fail
6	Verify	The last known headings of both BSMs are identical	Pass / Fail
7	Verify	The last known path histories of both BSMs are identical	Pass / Fail

Identifier	TP-BSM-MV-BV-02-V		
Test Objective	Verify accuracy of localization data provided by IUT		
Test Configuration	TC2		
Reference:	V2V-POSTIM-WAAS-001, V2V-POSTIM-COORDSYSREF-001, V2V-BSMTX-DATAACC-[011-014, 017, 024-027], V2V-POSTIM-POSDETER-001		
Pre-test conditions			
● The IUT is in the initial state			
● WAAS is available to the IUT (Note: Because WAAS must always available to the IUT to achieve the required accuracy, the effects of removing WAAS cannot be tested)			
● All tests to be conducted are Open Sky and all road test conditions are of a grade less than .2% and a cross-slope less than .2%			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	A statistically significant amount of BSMs are transmitted by the IUT as defined by Section 7.1	
2	Verify	The IUT transmits BSMs with the correct coordinates and confidences based on the GNSS positioning system	Pass / Fail
3	Verify	The vendor's report indicates that the GNSS reading is supplemented with WAAS correction	Pass / Fail

4	Verify	The horizontal position is given with reference to the WGS-84 coordinate system	Pass / Fail
5	Verify	The DE_Longitude and DE_Latitude values are within vPosAccuracy of the baseline position under open sky conditions over 68% of the test measurements as compared to the 2D position of Ground Truth	Pass / Fail
7	Verify	The DE_Elevation value is set to the "Height above Reference Ellipsoid" above or below the WGS-84 reference ellipsoid	Pass / Fail
8	Verify	The DE_Elevation data element is within vElevAccuracy of the reference elevation over 68% of the test measurements as compared to the Ground Truth	Pass / Fail
9	Verify	The DE_Speed data element is within vSpeedAccuracy of the actual vehicle speed under open sky conditions 68% of the test measurements as compared to the Ground Truth	Pass / Fail
11	Verify	If the IUT supports the DE_SteeringWheelAngle element, DE_SteeringWheelAngle is accurate to within vStWhAnAccuracy of the actual vehicle steering wheel angle over 95% of test measurements as compared to the Ground Truth. If the IUT does not support DE_SteeringWheelAngle, it is set to unavailable	Pass / Fail
12	Verify	DE_Acceleration (Longitudinal) and DE_Acceleration (Lateral) are accurate to within vAccelAccuracy over 68% of test measurements as compared to the Ground Truth	Pass / Fail
13	Verify	DE_VerticalAcceleration is accurate to within vVertAccelAccuracy over 68% of test measurements as compared to the Ground Truth	Pass / Fail
14	Verify	DE_YawRate is accurate to within vYawRateAccuracy over 68% of test measurements as compared to the Ground Truth	Pass / Fail

Identifier	TP-BSM-MV-BV-03
Test Objective	Verify accuracy of DE_Heading element provided by IUT when vehicle speed is less than or equal to vHeadingSpeedThresh
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[019, 020]

Pre-test conditions
● The IUT is in the initial state
● The vehicle speed is less than or equal to vHeadingSpeedThresh
● Test is conducted as an Open Sky Test where road test conditions are of a grade less than .2% and a cross-slope less than .2%

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	At least a statistically significant amount of BSMs are transmitted by the IUT as defined in Section 7.1 with speed less than or equal to vHeadingSpeedThresh	
2	Verify	The DE_Heading data element is accurate to within vHeadAccuracyB of actual heading, indicated as clockwise from north, over 68% of test measurements as compared to the Ground Truth	Pass / Fail

Identifier	TP-BSM-MV-BV-04
Test Objective	Verify accuracy of DE_Heading element provided by IUT when vehicle speed is greater than vHeadingSpeedThresh

Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[019, 021]

Pre-test conditions
● The IUT is in the initial state
● The vehicle speed is greater than vHeadingSpeedThresh
● Test is conducted as an Open Sky Test where road test conditions are of a grade less than .2% and a cross-slope less than .2%

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	At least a statistically significant amount of BSMs are transmitted by the IUT as defined in Section 7.1 with speed greater than vHeadingSpeedThresh	
2	Verify	The DE_Heading data element is accurate to within vHeadAccuracyA of actual heading, indicated as clockwise from north, over 68% of test measurements as compared to the Ground Truth	Pass / Fail

Identifier	TP-BSM-MV-BV-05
Test Objective	Verify the heading latches and unlatches properly at low speed
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[022-023]

Pre-test conditions
● The IUT is in the initial state
● The value of DE_Heading is set to the last known heading value when the speed was above vHeadLatchThresh

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The vehicle's speed drops below vHeadLatchThresh	
2	Verify	The value of DE_Heading does not change	Pass / Fail
3	Stimulus	The vehicle's speed goes above vHeadUnlatchThresh	
4	Verify	DE_Heading updates with vehicle angle	Pass / Fail

Identifier	TP-BSM-MV-BV-06
Test Objective	Verify content of DF_PathHistory and DF_PathPrediction
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[036-048]

Pre-test conditions
● The IUT is in the initial state
● The vehicle is moving in a steady curve above vStationarySpeedThresh

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	A BSM is transmitted	
2	Verify	DF_PathHistory is populated with itemCnt: Count	Pass / Fail
3	Verify	DF_PathHistory is populated with crumbData: DF_PathHistoryPointList	Pass / Fail
4	Verify	DF_PathHistory does not include any additional data elements or frames	Pass / Fail
5	Verify	DF_PathHistory is populated with the minimum number of path history points such that the represented PH distance is at least vMinPHistDistance and no more than vMaxPHistDistance unless there is less than vMinPHistDistance of PH available	Pass / Fail

6	Verify	A vehicle path is maintained that is comprised of data elements derived from the positioning system sampled at a periodic time interval, and interpolated in between by circular arcs	Pass / Fail
7	Verify	DF_PathHistory points are chosen as the minimum set of points such that the perpendicular distance between any point on the vehicle path and the straight line connecting two consecutive PH points is less than vPathPerpendicularDist	Pass / Fail
8	Verify	DF_PathHistory points are ordered chronologically, such that the first PH point is the closest in time to the current UTC time	Pass / Fail
9	Verify	DF_PathHistory points does not contain more than vMaxPHistPoints regardless of other requirements	Pass / Fail
10	Verify	DF_PathPrediction is populated with radiusOfCurve: Integer	Pass / Fail
11	Verify	DF_PathPrediction is populated with confidence: Integer	Pass / Fail
12	Verify	DF_PathPrediction is populated with a calculated radius that has less than vPPredRadiusError error from the actual radius when the vehicle is in steady state (change of yaw rate less than 0.5 deg/s/s) conditions over a range from vMinCurveRadius to vMaxCurveRadius in magnitude	Pass / Fail
13	Verify	DF_PathPrediction is repopulated after a transition from the original constant radius R1 to the target constant radius R2 within vPPredTransitionTime under the maximum allowable error bound defined above	Pass / Fail
14	Stimulus	The vehicle speed drops below vStationarySpeedThresh	
15	Verify	The IUT reports a radius of value 32,767 and a confidence of 100%	Pass / Fail

Identifier	TP-BSM-MV-BV-07-X
Test Objective	Verify proper critical event flags are set in an acceptable time
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[034-035]
Pre-test conditions	

● The IUT is in the initial state
● The IUT can communicate with the vehicle through the CAN interface

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The vehicle undergoes a critical event set (**X**) as listed in the table in Section 7.4 at time T0	
2	Verify	The first BSM with the DE_VehicleEventFlags taken from the CAN interface corresponding to the **Event Flag** is transmitted at time T1	Pass / Fail
3	Verify	The difference between T1 and T0 is less than or equal to vEventDetectLatency	Pass / Fail
4	Procedure	Repeat steps 1-3 for all critical event sets (**X**) in Section 7.4	

Identifier	TP-BSM-MV-BV-08
Test Objective	Verify proper values of Traction, ABS, SCS, brakeBoost, and auxBrakes
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-[028, 032], V2V-STD-J2735-[016-017, 019]
Pre-test conditions	

● The IUT is in the initial state
● The vehicle bus is available
● Braking status is available

- Traction, ABS, SCS, brakeBoost, and auxBrakes are either unavailable or available and off
- The IUT can communicate with the vehicle through the CAN interface

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	A BSM is transmitted	
2	Verify	The IUT uses the vehicle CAN bus as the data source for DF_BrakeSystemStatus	Pass / Fail
3	Verify	Traction, ABS, SCS, brakeBoost, and auxBrakes fields are set in accordance with J2735 [2]	Pass / Fail
4	Verify	Traction is correctly reported as off and available or unavailable if not available	Pass / Fail
5	Stimulus	The vehicle turns on Traction, if available	
6	Verify	Traction is correctly reported as on and available or unavailable if not available	Pass / Fail
7	Stimulus	The vehicle engages Traction, if available	
8	Verify	Traction is correctly reported as engaged or unavailable if not available	Pass / Fail
9	Procedure	Steps 4 – 8 are repeated for ABS, SCS, brakeBoost, and auxBrakes	

Identifier	TP-BSM-MV-BV-09
Test Objective	Verify proper value of wheelBrakesUnavailable when no braking status is available
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-031

Pre-test conditions

- The IUT is in the initial state
- There is no braking status available
- The IUT can communicate with the vehicle through the CAN interface

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	A BSM is transmitted	
2	Verify	wheelBrakesUnavailable field populated from the CAN interface is set to 1	Pass / Fail

Identifier	TP-BSM-MV-BV-10
Test Objective	Verify proper values of DE_ExteriorLights
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-049, V2V-BSMTX-BSMCONT-005

Pre-test conditions

- The IUT is in the initial state
- DE_ExteriorLights data is available
- All exterior lights are off
- The IUT can communicate with the vehicle through the CAN interface

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	A BSM is transmitted	
2	Verify	The DF_VehicleSafetyExtensions data frame does not include DE_ExteriorLights	Pass / Fail
3	Stimulus	At least one exterior light is turned on	
4	Stimulus	A BSM is transmitted	

5	Verify	The DF_VehicleSafetyExtensions data frame includes DE_ExteriorLights populated from the CAN interface	Pass / Fail
6	Verify	DE_ExteriorLights data element has bits set corresponding to the turned on lights	Pass / Fail
7	Procedure	Steps 3 – 6 are repeated for all exterior lights	

Identifier	TP-BSM-MV-BV-11		
Test Objective	Verify proper values of wheelBrakes and wheelBrakesUnavailable when braking status for each wheel is available		
Test Configuration	TC2		
Reference:	V2V-BSMTX-DATAACC-029, V2V-STD-J2735-018		
Pre-test conditions			
● The IUT is in the initial state			
● Braking status is available for each wheel			
● The IUT can communicate with the vehicle through the CAN interface			
Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The vehicle carrying the IUT applies its brakes and changes the overall brake status of the IUT	
2	Stimulus	A BSM is transmitted	
3	Verify	Bits within the wheelBrakes field are set depending on braking status received from the CAN interface	Pass / Fail
4	Verify	wheelBrakesUnavailable is set to false	Pass / Fail
5	Stimulus	The vehicle carrying the IUT releases its brakes	
6	Stimulus	A BSM is transmitted	
7	Verify	Bits within the wheelBrakes field received from the CAN interface are all set to false	Pass /Fail

Identifier	TP-BSM-MV-BV-12		
Test Objective	Verify proper values of wheelBrakes and wheelBrakesUnavailable when only a single braking status indication is available		
Test Configuration	TC2		
Reference:	V2V-BSMTX-DATAACC-030		
Pre-test conditions			
● The IUT is in the initial state			
● A single braking status indication is available			
● ABS and Stability Control is disabled on the vehicle			
● The IUT can communicate with the vehicle through the CAN interface			
Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The vehicle carrying the IUT applies its brakes	
2	Verify	At least one BSM is transmitted within 3*vEventDetectLatency	Pass / Fail
3	Verify	Bits for all wheels are set on and populated from the CAN interface	Pass / Fail
4	Verify	wheelBrakesUnavailable is set to false	Pass / Fail
5	Stimulus	The IUT removes brakes	
6	Verify	At least one BSM is transmitted within 3*vEventDetectLatency	Pass / Fail
7	Verify	Bits for all wheels are set off and populated from the CAN interface	Pass / Fail

Identifier	TP-BSM-MV-BV-13

Test Objective	Verify vehicle transmission is properly reported if available
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-018

Pre-test conditions

- The IUT is in the initial state
- The IUT is in some unspecified initial transmission state
- The IUT can communicate with the vehicle through the CAN interface

Test Sequence

Step	Type	Description	Verdict
1	Stimulus	The vehicle changes transmission state	
2	Verify	At least one BSM is transmitted within 3*vEventDetectLatency	Pass / Fail
3	Verify	DE_TransmissionState properly reflects the new transmission state or not available as taken from the CAN interface	Pass / Fail
4	Procedure	Steps 1 – 2 are repeated for each transmission state on the vehicle as defined in J2735	

Identifier	TP-BSM-MV-BV-14
Test Objective	Verify vehicle length and width are accurate
Test Configuration	TC2
Reference:	V2V-BSMTX-DATAACC-033

Pre-test conditions

- The IUT is in the initial state

Test Sequence

Step	Type	Description	Verdict
1	Stimulus	A BSM is transmitted	
2	Verify	DE_VehicleLength and DE_VehicleWidth are accurate to within vSizeAccuracy of actual vehicle length and width	Pass / Fail

Identifier	TP-BSM-ST-BI-19
Test Objective	Verify IUT does not send data elements/frames not required in the J2945/1 specification
Test Configuration	TC1
Reference:	V2V-BSMTX-DATAACC-050

Pre-test conditions

- The IUT is in the initial state

Test Sequence

Step	Type	Description	Verdict
1	Stimulus	A BSM is sent	
2	Verify	There are no unallowed data elements contained within the BSM	Pass / Fail

6.2.5 Internal Timing and Prioritization

Identifier	TP-BSM-ST-BV-20-V
Test Objective	Verify the IUT's system clock is synchronized to facilitate communication
Test Configuration	TC1
Reference:	V2V-POSTIM-SYSTIMCOORD-[001-002]

Pre-test conditions

● The IUT is in the initial state		

Test Sequence			
Step	Type	Description	Verdict
1	Verify	The output of the IUT's reference clock conforms to UTC	Pass / Fail
2	Verify	The vendor verifies that the IUT's system clock is within vTimeAccuracy ms of UTC	Pass / Fail

Identifier	TP-BSM-ST-BV-21-V
Test Objective	Verify timing of message transmissions
Test Configuration	TC1
Reference:	V2V-BSMTX-DATAACC-[008-010, 015-016], V2V-POSTIM-SYSTIMCOORD-003

Pre-test conditions
● The IUT is in the initial state

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	A BSM is transmitted by the IUT	
2	Verify	The vendor verifies that the time represented by DE_DSecond is the time at which BSM Part I IUT location data was determined, using the UTC-conformant reference by the reference positioning system	Pass / Fail
3	Verify	The difference between DE_Dsecond and the transmit time is less than vMaxPosAge	Pass / Fail
4	Verify	DF_PositionalAccuracy is set with values corresponding to its accuracy estimate for the position data included in the corresponding BSM	Pass / Fail
5	Verify	DF_PositionalAccuracy provides the errors for the semi-major and semi-minor axes of the error ellipsoid at one standard deviation, as well as the orientation of the semi-major axis	Pass / Fail

Identifier	TP-BSM-ST-BV-22
Test Objective	Verify the IUT position updates at the proper frequency
Test Configuration	TC1
Reference:	V2V-POSTIM-POSDETER-002

Pre-test conditions
● The IUT is in the initial state
● The IUT is not moving throughout the duration of the test

Test Sequence			
Step	Type	Description	Verdict
1	Stimulus	The IUT determines its location	
2	Stimulus	The IUT redetermines its location	
3	Stimulus	The IUT redetermines its location	
4	Verify	The frequency of position updates is greater than or equal to vPosDetRate	Pass / Fail
5	Verify	Each sequential position has a sufficiently accurate DE_DSecond value	Pass / Fail

6.2.6 Hardware

Identifier	TP-BSM-ST-BV-23-V
Test Objective	Verify that all private key operations are performed within secure hardware

Test Configuration	TC1
Reference:	V2V-SECMGMT-SECHW-[001-002]

Pre-test conditions				
● The IUT is in the initial state				

Test Sequence				
Step	**Type**	**Description**	**Verdict**	
1	Configure	The IUT and computer interface is configured to attempt a private key operation		
2	Verify	The IUT completes the operation	Pass / Fail	
3	Verify	The vendor indicates that all steps of the operation utilizing the private key is done within secure hardware	Pass / Fail	
4	Procedure	Repeat steps 1 – 3 for all available private key operations		

Identifier	TP-BSM-ST-BV-24
Test Objective	Verify DSRC Receiver Sensitivity
Test Configuration	TC1
Reference:	V2V-RFPERF-DSRCRXSENS-[001-002]

Pre-test conditions		
● The IUT is in the initial state		
● The environment is at room temperature (21º Celsius, +/- 5º)		

Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The IUT is configured to receive packets with a PSDU length of 400	
2	Configure	The IUT is configured to receive at input level vRxSense	
3	Configure	The computer interface is configured to execute a packet test	
4	Stimulus	The computer interface sends test packets to the IUT and tracks the amount of successfully sent packets	
5	Verify	At the end of the test, at least 90% of the packets were received with no error	Pass / Fail
6	Verify	The DSRC Radio Subsystem complies with the standard (dot11ACRType = 1) adjacent and non-adjacent channel rejection requirements for 6 Mbps (QPSK with ½ rate coding), as specified in 802.11. The minimum input levels are measured at the antenna connector of the System housing.	Pass / Fail

7 Appendix

7.1 Determining Randomness of Value Sets

For the purposes of testing the randomness of the values in the context of DSRC certification, a limited battery of tests will be run against a representative sample of values generated by the IUT.

$$SS = \frac{(Z^2 * (p) * (1 - p))}{c^2}$$

SS = sample size

Z = confidence level

p = a priori judgement (0.5 represents the worst case, unknown a priori)
c = confidence interval

Assuming no a priori judgement on the randomness of the dataset, **a p of 0.5 is used.** Substituting values for a 95% confidence with an interval of 5%, **a sample size of 385 is necessary to achieve a statistically significant result.**

In order to determine pass/fail, both the average and standard deviation of the data set will be used.

Take the average of the data over the sample set and determine whether the average is within an acceptable tolerance of the medium of the range. **For this test document, the tolerance is .019 of the medium of the range.** In the representation of the values, all values are considered unsigned.

Take the standard deviation of the values and determine if the sample's standard deviation is within a given tolerance. **For this test document, the tolerance is .066 of the maximum of the range divided by the square root of 12.** In the representation of the values, all values are considered unsigned.

7.2 Requirements Traceability Matrix (Requirement to Scenario)

Requirement	Test Procedure	Scenario
6.1.6-V2V-STD-J2735-001	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-002	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-003	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-004	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-005	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-006	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-007	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-008	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-009	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-010	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-011	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-012	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-013	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-014	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-015	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-016	TP-BSM-MV-BV-08	All Scenarios
6.1.6-V2V-STD-J2735-017	TP-BSM-MV-BV-08	All Scenarios
6.1.6-V2V-STD-J2735-018	TP-BSM-MV-BV-11	All Scenarios
6.1.6-V2V-STD-J2735-019	TP-BSM-MV-BV-08	All Scenarios
6.1.6-V2V-STD-J2735-020	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-021	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-022	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-023	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-024	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-025	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-026	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-027	TP-BSM-ST-BV-03-X	All Scenarios

6.1.6-V2V-STD-J2735-028	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-029	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-030	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-031	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-032	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-033	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-034	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-035	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-036	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-037	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-038	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-039	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-040	TP-BSM-ST-BV-01-X	All Scenarios
6.1.6-V2V-STD-J2735-041	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-042	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-043	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-044	TP-BSM-ST-BV-03-X	All Scenarios
6.1.6-V2V-STD-J2735-045	TP-BSM-ST-BV-03-X	All Scenarios
6.2.1-V2V-POSTIM-POSDETER-001	TP-BSM-MV-BV-02-V	Positioning
6.2.1-V2V-POSTIM-POSDETER-002	TP-BSM-ST-BV-22	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.2.2-V2V-POSTIM-WAAS-001	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.2.3-V2V-POSTIM-COORDSYSREF-001	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.2.4-V2V-POSTIM-SYSTIMCOORD-001	TP-BSM-ST-BV-20-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning

6.2.4-V2V-POSTIM-SYSTIMCOORD-002	TP-BSM-ST-BV-20-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.2.4-V2V-POSTIM-SYSTIMCOORD-003	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-001	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-002	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-003	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-004	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-005	TP-BSM-MV-BV-10	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.1-V2V-BSMTX-BSMCONT-006	TP-BSM-ST-BV-01-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist,

		CLW - Control Loss Warning
6.3.2-V2V-BSMTX-CHDATARATE-001	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.2-V2V-BSMTX-CHDATARATE-002	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.3-V2V-BSMTX-GENTIM-001	TP-BSM-ST-BV-02	BSM Exchange
6.3.3-V2V-BSMTX-GENTIM-002	TP-BSM-ST-BV-04	BSM Exchange
6.3.4-V2V-BSMTX-UPEDCA-001	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.4-V2V-BSMTX-UPEDCA-002	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.4-V2V-BSMTX-UPEDCA-003	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.5-V2V-BSMTX-MINTX-001	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-001	TP-BSM-ST-BV-03-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist,

		LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-002	TP-BSM-ST-BV-07	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-003	TP-BSM-ST-BV-05	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-004	TP-BSM-ST-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-005	TP-BSM-ST-BV-07	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-006	TP-BSM-ST-BV-05	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-007	TP-BSM-ST-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-008	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning

6.3.6-V2V-BSMTX-DATAACC-009	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-010	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-011	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-012	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-013	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-014	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-015	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-016	TP-BSM-ST-BV-21-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist,

		LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-017	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-018	TP-BSM-MV-BV-13	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-019	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-020	TP-BSM-MV-BV-03	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-021	TP-BSM-MV-BV-04	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-022	TP-BSM-MV-BV-05	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-023	TP-BSM-MV-BV-05	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning

6.3.6-V2V-BSMTX-DATAACC-024	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-025	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-026	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-027	TP-BSM-MV-BV-02-V	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-028	TP-BSM-MV-BV-08	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-029	TP-BSM-MV-BV-11	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-030	TP-BSM-MV-BV-12	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-031	TP-BSM-MV-BV-09	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist,

		LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-032	TP-BSM-MV-BV-08	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-033	TP-BSM-MV-BV-14	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-034	TP-BSM-MV-BV-07-X	EEBL - Lead Vehicle Decelerating
6.3.6-V2V-BSMTX-DATAACC-035	TP-BSM-MV-BV-07-X	EEBL - Lead Vehicle Decelerating
6.3.6-V2V-BSMTX-DATAACC-036	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-037	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-038	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-039	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-040	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning,

		IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-041	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-042	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-043	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-044	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-045	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-046	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-047	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning

6.3.6-V2V-BSMTX-DATAACC-048	TP-BSM-MV-BV-06	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-049	TP-BSM-MV-BV-10	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-050	TP-BSM-ST-BI-19	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.6-V2V-BSMTX-DATAACC-051	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.3.7-V2V-BSMTX-DATAPERSIST-001	TP-BSM-ST-BV-18	Shutdown
6.3.7-V2V-BSMTX-DATAPERSIST-002	TP-BSM-ST-BV-18	Startup
6.3.7-V2V-BSMTX-DATAPERSIST-003	TP-BSM-ST-BV-18	Shutdown
6.3.7-V2V-BSMTX-DATAPERSIST-004	TP-BSM-ST-BV-18	Startup
6.3.8-V2V-BSMTX-CONGCTRL-001	N/A	BSM Exchange, EEBL - Lead Vehicle Decelerating, FCW- Forward, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.4.1-V2V-RFPERF-DSRCTX-001	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning

6.4.1-V2V-RFPERF-DSRCTX-002	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.4.1-V2V-RFPERF-DSRCTX-003	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.4.1-V2V-RFPERF-DSRCTX-004	N/A	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.4.2-V2V-RFPERF-DSRCRXSENS-001	TP-BSM-ST-BV-24	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.4.2-V2V-RFPERF-DSRCRXSENS-002	TP-BSM-ST-BV-24	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.5.1-V2V-SECPRIV-IDRAND-001	TP-BSM-ST-BV-07	Startup
6.5.1-V2V-SECPRIV-IDRAND-002	TP-BSM-ST-BV-05	Privacy
6.5.2-V2V-SECPRIV-BSMSIGN-001	TP-BSM-ST-BV-08	Security
6.5.2-V2V-SECPRIV-BSMSIGN-002	TP-BSM-ST-BV-08	Security
6.5.2-V2V-SECPRIV-BSMSIGN-003	TP-BSM-ST-BV-09	Security
6.5.2-V2V-SECPRIV-BSMSIGN-004	TP-BSM-ST-BV-10-X	EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.5.2-V2V-SECPRIV-BSMSIGN-005	TP-BSM-ST-BV-11	Security

6.5.2-V2V-SECPRIV-BSMSIGN-006	TP-BSM-ST-BV-11	Security
6.5.2-V2V-SECPRIV-BSMSIGN-007	TP-BSM-ST-BV-13	Security
6.5.2-V2V-SECPRIV-BSMSIGN-008	TP-BSM-ST-BV-05	Security
6.5.3-V2V-SECPRIV-CERTCHG-001	TP-BSM-MV-BV-01	Privacy
6.5.3-V2V-SECPRIV-CERTCHG-002	TP-BSM-ST-BV-17-X	Privacy
6.5.3-V2V-SECPRIV-CERTCHG-003	TP-BSM-MV-BV-01	Privacy
6.5.4-V2V-SECPRIV-BSMVERIFY-001	TP-BSM-ST-BV-15	Security, EEBL - Lead Vehicle Decelerating, Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning
6.5.5-V2V-SECPRIV-CERTREV-001	TP-BSM-ST-BV-12	
6.6.2-V2V-SECMGMT-CERTLOAD-001	TP-BSM-ST-BV-16-V	Security
6.6.3-V2V-SECMGMT-CERTSTORE-001	TP-BSM-ST-BV-14-V	Security
6.6.3-V2V-SECMGMT-CERTSTORE-002	TP-BSM-ST-BV-14-V	Security
6.6.3-V2V-SECMGMT-CERTSTORE-003	TP-BSM-ST-BV-14-V	Security
6.6.3-V2V-SECMGMT-CERTSTORE-004	TP-BSM-ST-BV-14-V	Security
6.6.4-V2V-SECMGMT-CRLLOAD-001	TP-BSM-ST-BV-14-V	
6.6.4-V2V-SECMGMT-CRLLOAD-002	TP-BSM-ST-BV-14-V	
6.6.5-V2V-SECMGMT-SECHW-001	TP-BSM-ST-BV-23-V	Security
6.6.5-V2V-SECMGMT-SECHW-002	TP-BSM-ST-BV-23-V	Security

7.3 Requirements traceability Matrix (Scenario to Test Procedure)

Scenario	Test Procedure	Requirement
Startup	TP-BSM-ST-BV-18	6.3.7-V2V-BSMTX-DATAPERSIST-002
	TP-BSM-ST-BV-18	6.3.7-V2V-BSMTX-DATAPERSIST-004
	TP-BSM-ST-BV-07	6.5.1-V2V-SECPRIV-IDRAND-001
Shutdown	TP-BSM-ST-BV-18	6.3.7-V2V-BSMTX-DATAPERSIST-001

	TP-BSM-ST-BV-18	6.3.7-V2V-BSMTX-DATAPERSIST-003
Security	TP-BSM-ST-BV-08	6.5.2-V2V-SECPRIV-BSMSIGN-001
	TP-BSM-ST-BV-08	6.5.2-V2V-SECPRIV-BSMSIGN-002
	TP-BSM-ST-BV-09	6.5.2-V2V-SECPRIV-BSMSIGN-003
	TP-BSM-ST-BV-11	6.5.2-V2V-SECPRIV-BSMSIGN-005
	TP-BSM-ST-BV-11	6.5.2-V2V-SECPRIV-BSMSIGN-006
	TP-BSM-ST-BV-13	6.5.2-V2V-SECPRIV-BSMSIGN-007
	TP-BSM-ST-BV-05	6.5.2-V2V-SECPRIV-BSMSIGN-008
	TP-BSM-ST-BV-15	6.5.4-V2V-SECPRIV-BSMVERIFY-001
	TP-BSM-ST-BV-16-V	6.6.2-V2V-SECMGMT-CERTLOAD-001
	TP-BSM-ST-BV-14-V	6.6.3-V2V-SECMGMT-CERTSTORE-001
	TP-BSM-ST-BV-14-V	6.6.3-V2V-SECMGMT-CERTSTORE-002
	TP-BSM-ST-BV-14-V	6.6.3-V2V-SECMGMT-CERTSTORE-003
	TP-BSM-ST-BV-14-V	6.6.3-V2V-SECMGMT-CERTSTORE-004
	TP-BSM-ST-BV-23-V	6.6.5-V2V-SECMGMT-SECHW-001
	TP-BSM-ST-BV-23-V	6.6.5-V2V-SECMGMT-SECHW-002
BSM Exchange	TP-BSM-ST-BV-02	6.3.3-V2V-BSMTX-GENTIM-001
	TP-BSM-ST-BV-04	6.3.3-V2V-BSMTX-GENTIM-002
	N/A	6.3.8-V2V-BSMTX-CONGCTRL-001
Privacy	TP-BSM-ST-BV-05	6.5.1-V2V-SECPRIV-IDRAND-002
	TP-BSM-MV-BV-01	6.5.3-V2V-SECPRIV-CERTCHG-001
	TP-BSM-ST-BV-17-X	6.5.3-V2V-SECPRIV-CERTCHG-002
	TP-BSM-MV-BV-01	6.5.3-V2V-SECPRIV-CERTCHG-003
Positioning	TP-BSM-MV-BV-02-V	6.2.1-V2V-POSTIM-POSDETER-001
EEBL - Lead Vehicle Decelerating	TP-BSM-ST-BV-22	6.2.1-V2V-POSTIM-POSDETER-002
	TP-BSM-MV-BV-02-V	6.2.2-V2V-POSTIM-WAAS-001
	TP-BSM-MV-BV-02-V	6.2.3-V2V-POSTIM-COORDSYSREF-001
	TP-BSM-ST-BV-20-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-001
	TP-BSM-ST-BV-20-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-002
	TP-BSM-ST-BV-21-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-003

	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-001
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-002
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-003
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-004
	TP-BSM-MV-BV-10	6.3.1-V2V-BSMTX-BSMCONT-005
	TP-BSM-ST-BV-01-X	6.3.1-V2V-BSMTX-BSMCONT-006
	TP-BSM-ST-BV-03-X	6.3.2-V2V-BSMTX-CHDATARATE-001
	TP-BSM-ST-BV-03-X	6.3.2-V2V-BSMTX-CHDATARATE-002
	N/A	6.3.4-V2V-BSMTX-UPEDCA-001
	N/A	6.3.4-V2V-BSMTX-UPEDCA-002
	N/A	6.3.4-V2V-BSMTX-UPEDCA-003
	TP-BSM-ST-BV-03-X	6.3.5-V2V-BSMTX-MINTX-001
	TP-BSM-ST-BV-03-X	6.3.6-V2V-BSMTX-DATAACC-001
	TP-BSM-ST-BV-07	6.3.6-V2V-BSMTX-DATAACC-002
	TP-BSM-ST-BV-05	6.3.6-V2V-BSMTX-DATAACC-003
	TP-BSM-ST-BV-06	6.3.6-V2V-BSMTX-DATAACC-004
	TP-BSM-ST-BV-07	6.3.6-V2V-BSMTX-DATAACC-005
	TP-BSM-ST-BV-05	6.3.6-V2V-BSMTX-DATAACC-006
	TP-BSM-ST-BV-06	6.3.6-V2V-BSMTX-DATAACC-007
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-008
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-009
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-010
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-011
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-012
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-013
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-014
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-015
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-016
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-017
	TP-BSM-MV-BV-13	6.3.6-V2V-BSMTX-DATAACC-018

	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-019
	TP-BSM-MV-BV-03	6.3.6-V2V-BSMTX-DATAACC-020
	TP-BSM-MV-BV-04	6.3.6-V2V-BSMTX-DATAACC-021
	TP-BSM-MV-BV-05	6.3.6-V2V-BSMTX-DATAACC-022
	TP-BSM-MV-BV-05	6.3.6-V2V-BSMTX-DATAACC-023
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-024
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-025
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-026
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-027
	TP-BSM-MV-BV-08	6.3.6-V2V-BSMTX-DATAACC-028
	TP-BSM-MV-BV-11	6.3.6-V2V-BSMTX-DATAACC-029
	TP-BSM-MV-BV-12	6.3.6-V2V-BSMTX-DATAACC-030
	TP-BSM-MV-BV-09	6.3.6-V2V-BSMTX-DATAACC-031
	TP-BSM-MV-BV-08	6.3.6-V2V-BSMTX-DATAACC-032
	TP-BSM-MV-BV-14	6.3.6-V2V-BSMTX-DATAACC-033
	TP-BSM-MV-BV-07-X	6.3.6-V2V-BSMTX-DATAACC-034
	TP-BSM-MV-BV-07-X	6.3.6-V2V-BSMTX-DATAACC-035
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-036
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-037
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-038
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-039
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-040
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-041
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-042
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-043
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-044
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-045
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-046
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-047
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-048

	TP-BSM-MV-BV-10	6.3.6-V2V-BSMTX-DATAACC-049
	TP-BSM-ST-BI-19	6.3.6-V2V-BSMTX-DATAACC-050
	N/A	6.3.6-V2V-BSMTX-DATAACC-051
	N/A	6.3.8-V2V-BSMTX-CONGCTRL-001
	N/A	6.4.1-V2V-RFPERF-DSRCTX-001
	N/A	6.4.1-V2V-RFPERF-DSRCTX-002
	N/A	6.4.1-V2V-RFPERF-DSRCTX-003
	N/A	6.4.1-V2V-RFPERF-DSRCTX-004
	TP-BSM-ST-BV-24	6.4.2-V2V-RFPERF-DSRCRXSENS-001
	TP-BSM-ST-BV-24	6.4.2-V2V-RFPERF-DSRCRXSENS-002
	TP-BSM-ST-BV-10-X	6.5.2-V2V-SECPRIV-BSMSIGN-004
	TP-BSM-ST-BV-15	6.5.4-V2V-SECPRIV-BSMVERIFY-001
FCW-Forward	N/A	6.3.8-V2V-BSMTX-CONGCTRL-001
Crash Warning, BSW /LCW- Blind Spot Warning/Lane Change Warning, IMA-Intersection Movement Assist, LTA - Left Turn Assist, CLW - Control Loss Warning	TP-BSM-ST-BV-22	6.2.1-V2V-POSTIM-POSDETER-002
	TP-BSM-MV-BV-02-V	6.2.2-V2V-POSTIM-WAAS-001
	TP-BSM-MV-BV-02-V	6.2.3-V2V-POSTIM-COORDSYSREF-001
	TP-BSM-ST-BV-20-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-001
	TP-BSM-ST-BV-20-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-002
	TP-BSM-ST-BV-21-V	6.2.4-V2V-POSTIM-SYSTIMCOORD-003
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-001
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-002
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-003
	TP-BSM-ST-BV-03-X	6.3.1-V2V-BSMTX-BSMCONT-004
	TP-BSM-MV-BV-10	6.3.1-V2V-BSMTX-BSMCONT-005
	TP-BSM-ST-BV-01-X	6.3.1-V2V-BSMTX-BSMCONT-006
	TP-BSM-ST-BV-03-X	6.3.2-V2V-BSMTX-CHDATARATE-001
	TP-BSM-ST-BV-03-X	6.3.2-V2V-BSMTX-CHDATARATE-002

	N/A	6.3.4-V2V-BSMTX-UPEDCA-001
	N/A	6.3.4-V2V-BSMTX-UPEDCA-002
	N/A	6.3.4-V2V-BSMTX-UPEDCA-003
	TP-BSM-ST-BV-03-X	6.3.5-V2V-BSMTX-MINTX-001
	TP-BSM-ST-BV-03-X	6.3.6-V2V-BSMTX-DATAACC-001
	TP-BSM-ST-BV-07	6.3.6-V2V-BSMTX-DATAACC-002
	TP-BSM-ST-BV-05	6.3.6-V2V-BSMTX-DATAACC-003
	TP-BSM-ST-BV-06	6.3.6-V2V-BSMTX-DATAACC-004
	TP-BSM-ST-BV-07	6.3.6-V2V-BSMTX-DATAACC-005
	TP-BSM-ST-BV-05	6.3.6-V2V-BSMTX-DATAACC-006
	TP-BSM-ST-BV-06	6.3.6-V2V-BSMTX-DATAACC-007
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-008
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-009
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-010
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-011
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-012
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-013
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-014
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-015
	TP-BSM-ST-BV-21-V	6.3.6-V2V-BSMTX-DATAACC-016
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-017
	TP-BSM-MV-BV-13	6.3.6-V2V-BSMTX-DATAACC-018
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-019
	TP-BSM-MV-BV-03	6.3.6-V2V-BSMTX-DATAACC-020
	TP-BSM-MV-BV-04	6.3.6-V2V-BSMTX-DATAACC-021
	TP-BSM-MV-BV-05	6.3.6-V2V-BSMTX-DATAACC-022
	TP-BSM-MV-BV-05	6.3.6-V2V-BSMTX-DATAACC-023
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-024
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-025
	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-026

	TP-BSM-MV-BV-02-V	6.3.6-V2V-BSMTX-DATAACC-027
	TP-BSM-MV-BV-08	6.3.6-V2V-BSMTX-DATAACC-028
	TP-BSM-MV-BV-11	6.3.6-V2V-BSMTX-DATAACC-029
	TP-BSM-MV-BV-12	6.3.6-V2V-BSMTX-DATAACC-030
	TP-BSM-MV-BV-09	6.3.6-V2V-BSMTX-DATAACC-031
	TP-BSM-MV-BV-08	6.3.6-V2V-BSMTX-DATAACC-032
	TP-BSM-MV-BV-14	6.3.6-V2V-BSMTX-DATAACC-033
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-036
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-037
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-038
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-039
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-040
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-041
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-042
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-043
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-044
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-045
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-046
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-047
	TP-BSM-MV-BV-06	6.3.6-V2V-BSMTX-DATAACC-048
	TP-BSM-MV-BV-10	6.3.6-V2V-BSMTX-DATAACC-049
	TP-BSM-ST-BI-19	6.3.6-V2V-BSMTX-DATAACC-050
	N/A	6.3.6-V2V-BSMTX-DATAACC-051
	N/A	6.3.8-V2V-BSMTX-CONGCTRL-001
	N/A	6.4.1-V2V-RFPERF-DSRCTX-001
	N/A	6.4.1-V2V-RFPERF-DSRCTX-002
	N/A	6.4.1-V2V-RFPERF-DSRCTX-003
	N/A	6.4.1-V2V-RFPERF-DSRCTX-004
	TP-BSM-ST-BV-24	6.4.2-V2V-RFPERF-DSRCRXSENS-001
	TP-BSM-ST-BV-24	6.4.2-V2V-RFPERF-DSRCRXSENS-002

	TP-BSM-ST-BV-10-X	6.5.2-V2V-SECPRIV-BSMSIGN-004
	TP-BSM-ST-BV-15	6.5.4-V2V-SECPRIV-BSMVERIFY-001
All Scenarios	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-001
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-002
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-003
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-004
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-005
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-006
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-007
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-008
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-009
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-010
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-011
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-012
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-013
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-014
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-015
	TP-BSM-MV-BV-08	6.1.6-V2V-STD-J2735-016
	TP-BSM-MV-BV-08	6.1.6-V2V-STD-J2735-017
	TP-BSM-MV-BV-11	6.1.6-V2V-STD-J2735-018
	TP-BSM-MV-BV-08	6.1.6-V2V-STD-J2735-019
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-020
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-021
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-022
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-023
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-024
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-025
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-026
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-027
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-028

	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-029
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-030
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-031
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-032
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-033
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-034
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-035
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-036
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-037
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-038
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-039
	TP-BSM-ST-BV-01-X	6.1.6-V2V-STD-J2735-040
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-041
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-042
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-043
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-044
	TP-BSM-ST-BV-03-X	6.1.6-V2V-STD-J2735-045

7.4 Critical Event Flag Variant Table

Critical Event Flag Variants		
X	**Event Flag**	**Bit Location**
1	ABS Activated	2
2	Traction Control Loss	3
3	Stability Control Activated	4
4	Hard Braking	7
5	ABS Activated, Traction Control Loss	2, 3
6	ABS Activated, Stability Control Activated	2, 4
7	ABS Activated, Hard Braking	2, 7
8	Traction Control Loss, Stability Control Activated	3, 4
9	Traction Control Loss, Hard Braking	3, 7
10	Stability Control Activated, Hard Braking	4, 7

11	ABS Activated, Traction Control Loss, Stability Control Activated	2, 3, 4
12	ABS Activated, Traction Control Loss, Hard Braking	2, 3, 7
13	ABS Activated, Stability Control Activated, Hard Braking	2, 4, 7
14	Traction Control Loss, Stability Control Activated, Hard Braking	3, 4, 7
15	ABS Activated, Traction Control Loss, Stability Control Activated, Hard Braking	2, 3, 4, 7

Revision History

V0.1.0	Aug 2015	Initial Draft
V0.2.0	Jan 2016	Updated to agreed upon format and Draft 5 of the J2945/1 standard
V0.3.0	Feb 2016	Updated based on comments received from USDOT and walkthrough
V0.4.0	April 2016	Updated based on comments received from industry review
V0.5.0	March 2017	Updated based on concerns before May Plugfest
V0.5.1	March 2017	Updated based on Plugfest comments
V0.5.2	April 2017	Updated based on Plugfest comments
V0.5.3	April 2017	Updated based on Plugfest comments

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