AIS Operational and Performance Testing of the Ocean Signal ATB1 Class B Transceiver
In accordance with IEC 62287-2 2017

Prepared for: Ocean Signal
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COMMERCIAL-IN-CONFIDENCE

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
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Authorised Signatory	Matthew Russell	14 May 2019	*Russell*

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with IEC 62287-2 2017

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	26 October 2018
2	Addition of DSC functionality test results. Addition of Under voltage test.	10 May 2019
3	Addition of power supply test info to summary table, update to EUT modification record, confirmation of TSR ref for section 2.1 and 2.22	14 May 2019

1.2 Introduction

Applicant	Ocean Signal
Manufacturer	Ocean Signal
Model Number(s)	ATB1
Serial Number(s)	TA001 (TSR12), TA005 (TSR04), Not Serialised (TSR16), TA003 (TSR05) PCB02 (TSR19)
Hardware Version(s)	Refer to section 1.7
Software Version(s)	Refer to section 1.7
Number of Samples Tested	5
Test Specification/Issue/Date	IEC 62287-2 2017
Test Plan/Issue/Date	None
Order Number Date	PO3122-00 03-November-2016
Date of Receipt of EUT	18-April-2017
Start of Test	18-April-2017
Finish of Test	10-May-2019
Name of Engineer(s)	Nic Forsyth George Porter Martin Hardy

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with IEC 62287-2 2017 is shown below.

Section	Specification Clause	Test Description	Mod State	Date	Result
2.1	9.6	Under Voltage Test (Short Term)	24	10/05/2018	Pass
2.2	10.1.1	Tests by inspection	-	21/08/2018	Pass
	10.1.2	Safety of operation	6	17/07/2018	Pass
	10.1.3	Additional features	20	27/09/2018	Pass
2.3	10.2.1.1	Transmit position reports	0	18/04/2018	Pass
	10.2.1.2	Receive AIS Class A position reports	0	19/04/2018	Pass
	10.2.1.3	Receive AIS Class B "SO" position reports	0	19/04/2018	Pass
	10.2.1.4	Receive Class B "CS" position reports	6	19/04/2018	Pass
	10.2.1.5	Receive in time slot adjacent to own transmission	7	30/07/2018	Pass
	10.2.1.6	High VDL loading reception test	7	30/07/2018	Pass
	10.2.2.1	Transmit an addressed binary message	9	02/08/2018	Pass
	10.2.2.2	Transmit an addressed safety related Message 12	0	20/04/2018	Pass
	10.2.2.3	Acknowledgement of addressed Messages	0	20/04/2018	Pass
	10.2.2.4	Transmit a broadcast binary Message 8	9	02/08/2018	Pass
	10.2.2.5	Transmit a broadcast safety related Message 14	0	23/04/2018	Pass
	10.2.2.6	ITDMA and RATDMA transmission	3	30/05/2018	Pass
	10.2.3	Polled mode and interrogation response	3	30/05/2018	Pass
2.4	10.3.1	Valid channels	10	21/08/2018	Pass
	10.3.2	Invalid channels	8	03/08/2018	Pass
2.5	10.5.1	Information content	4	18/06/2018	Pass
	10.5.2.1	Autonomous reporting interval	3	31/05/2018	Pass
	10.5.2.2	Polite behaviour	13	03/09/2018	Pass
	10.5.2.3	Static data reporting interval	5	09/07/2018	Pass
2.6	10.6	Initialisation period	5	03/07/2018	Pass
2.7	10.7.1	Built in integrity test	14	05/09/2018	Pass
	10.7.2	Transceiver protection	1	14/05/2018	Pass
	10.7.3	Transmitter shutdown procedure	-	20/09/2018	Pass
	10.7.4	Position sensor fallback conditions	14	05/09/2018	Pass
2.8	10.8.1	Status indication	5	29/06/2018	Pass
	10.8.2	Message display	-	-	N/A
	10.8.3	Static data input	6	17/07/2018	Pass

Section	Specification Clause	Test Description	Mod State	Date	Result
2.9	12.1.1	Synchronisation test using UTC direct and indirect	7	30/07/2018	Pass
	12.1.2	Synchronisation test without UTC, EUT receiving semaphore	17	07/09/2018	Pass
2.10	12.2	Time division (frame format)	2	15/05/2018	Pass
2.11	12.3	Synchronisation jitter	6	16/07/2018	Pass
2.12	12.4	Data encoding (bit stuffing)	8	02/08/2018	Pass
2.13	12.5	Frame check sequence	8	02/08/2018	Pass
2.14	12.6.1	Network entry	2	18/05/2018	Pass
	12.6.2	Autonomous scheduled transmissions (SOTDMA)	2	05/06/2018	Pass
	12.6.3	Autonomous scheduled transmissions (ITDMA)	2	21/05/2018	Pass
	12.6.4	Transmission of Messages 24A and 24B (ITDMA)	2	22/05/2018	Pass
	12.6.5.1	Message 16 with slot assignment	13	03/09/2018	Pass
	12.6.5.2	Message 16 with rate assignment	16	06/09/2018	Pass
	12.6.5.3	Assigned mode using invalid reporting rates	14	05/09/2018	Pass
	12.6.5.4	Slot assignment to FATDMA reserved slots	18	20/09/2018	Pass
	12.6.6.1	Entering interval assignment	16	06/09/2018	Pass
	12.6.6.2	Assignment by region	15	05/09/2018	Pass
	12.6.6.3	Assignment by station type	15	05/09/2018	Pass
	12.6.6.4	Addressing by ship and cargo type	16	06/09/2018	Pass
	12.6.6.5	Quiet time command	16	06/09/2018	Pass
	12.6.6.6	Reverting from interval assignment	16	06/09/2018	Pass
	12.6.6.7	Assignment priority test – Message 16 and 23	16	06/09/2018	Pass
	12.6.6.8	Assignment priority test – Message 22 and 23	21	11/10/2018	Pass
	12.6.7	Base station reservations	20	28/09/2018	Pass
2.15	12.7.1	Received messages	6	16/07/2018	Pass
	12.7.2	Transmitted messages	8	03/08/2018	Pass
2.16	13.1	Regional area designation by VDL Message	20	27/09/2018	Pass
2.17	13.2	Channel management by addressed Message 22	10	21/08/2018	Pass
2.18	13.3	Invalid regional operating areas	11	22/08/2018	Pass
2.19	13.4	Continuation of autonomous mode reporting interval	19	25/09/2018	Pass
2.20	13.5	Slot reuse and FATDMA reservations	23	18/10/2018	Pass
2.21	13.6.1	Long-range broadcast	11	22/08/2018	Pass
	13.6.2	Multiple assignment operation	19	27/09/2018	Pass
2.22	A.4	DSC Functionality tests	24	23/04/2019	Pass

1.4 Declaration of Build Status

MAIN EUT	
MANUFACTURING DESCRIPTION	Class B AIS transponder
MANUFACTURER	Ocean Signal Ltd.
MODEL NAME/NUMBER	ATB1
PART NUMBER	762S-02700
SERIAL NUMBER	N/A
HARDWARE VERSION	See section 1.7
SOFTWARE VERSION	See section 1.7
PSU VOLTAGE/FREQUENCY/CURRENT	10.8-31.2Volts DC, 6 amps
HIGHEST INTERNALLY GENERATED / USED FREQUENCY	207.025MHz
FCC ID (if applicable)	N/A
INDUSTRY CANADA ID (if applicable)	N/A
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Class B AIS transponder
COUNTRY OF ORIGIN	United Kingdom
RF CHARACTERISTICS (if applicable)	
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	156.025 - 162.025 MHz
RECEIVER FREQUENCY OPERATING RANGE (MHz)	156.025 - 162.025 MHz
INTERMEDIATE FREQUENCIES	/30.875/21.4MHz, 455kHz
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	16K0GXW
MODULATION TYPES: (i.e. GMSK, QPSK)	GMSK
OUTPUT POWER (W or dBm)	5W
SEPARATE BATTERY/POWER SUPPLY (if applicable)	
MANUFACTURING DESCRIPTION	
MANUFACTURER	
TYPE	
PART NUMBER	
PSU VOLTAGE/FREQUENCY/CURRENT	
COUNTRY OF ORIGIN	

MODULES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
POWER			
FCC ID			
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
COUNTRY OF ORIGIN			

ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

I hereby declare that the information supplied is correct and complete.

Name: David Sheekey Position held: Type Approval Manager
Date: 5/4/18

1.5 Product Information

1.5.1 Technical Description

The Ocean Signal ATB1 Class B AIS Transceiver is a VHF transceiver used by ships to relay voyage and identification data to other vessels.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Hardware	Firmware	Modification/Fix Details	Date
0	TA001	v0.1.00	Fix for applying transmission offset to Msg. 19 when requested in interrogation Msg. 15	18/04/2018
1	TA001	v0.1.01	Multiple fixes including message 8, 18 and 24	30/04/2018
2	TA001	v0.1.01	Hardware Modifications	15/05/2018
3	TA001	v0.1.03	Binary messages	29/05/2018
4	TA001	v0.1.05	Message 26, SOG, default ship and base station reservations	13/05/2018
5	TA001	v0.1.06	NMEA port, message 15, loss of UTC and sync state	28/06/2018
6	TA001	v0.1.07	message 25 and 26, reception during loading and message 16 offset	11/07/2018
7	TA001	v0.1.08	ACA sentence behaviour	30/07/2018
8	TA005	v0.1.10	Assigned mode speed increase, COG/SOG in message 27 and assigned mode rate	31/07/2018
9	TSR016	v0.1.11	Incorrect SOG in message 18	02/08/2018
10	TA005	v0.1.13	Quiet time	21/08/2018
11	TA005	v0.1.14	Built in integrity test	21/08/2018
12	TSR 004	v0.1.14	Only sample changed, FW is the same	21/08/2018
13	TSR 004	v0.1.15	FATDMA reservations increment	03/09/2018
14	TSR 004	v0.1.16	Assignment priority	05/09/2018
15	TSR 004	v0.1.17	Fix for group assignment, area calculation	05/09/2018
16	TSR 004	v0.1.18	Fix for slot number missing in assigned mode, assigned mode extra message, quite time period	06/09/2018
17	TSR 004	v0.1.19	Semaphore and message 27 multiple group assignment	07/09/2018
18	TSR 004	v0.1.20	TZ, BS reservations	20/09/2018
19	TSR 004	v0.1.21	Long range and channel management	25/09/2018
20	TSR 004	v0.1.22	Channel management	27/09/2018
21	TSR 004	v0.1.26	Base station slot reservations	11/10/2018
22	TSR 004	v0.1.27	Slots used during loading	16/10/2018
23	TSR 004	v0.1.29	Slots used during loading	18/10/2018
24	TSR 019	V1.0.07	DSC functionality tests	23/04/2019

1.8   Test Location

TÜV SÜD conducted all tests at our Fareham Test Laboratory.

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Under Voltage Test (Short Term)

2.1.1 Specification Reference

IEC 62287-2, Clause 9.6

2.1.2 Equipment Under Test and Modification State

ATB1, S/N: 1234567Q (TSR0019) – See section 1.3 for modification states

2.1.3 Date of Test

10-May-2019

2.1.4 Test Results and Methods of Measurement

Method of Measurement

Operate the EUT at the nominal supply voltage as indicated by the manufacturer.
a) Reduce the supply voltage to 40 % of the nominal supply voltage over 1 s.
b) Increase the supply voltage back to 80 % of the nominal supply voltage over 1 s.

Nominal Supply Voltage: 12Vdc (as stated by the manufacturer)

40% of NSV: 4.8Vdc

80% of NSV: 9.6Vdc

Required Results

a) The unit shall not enter into any undefined or undesirable state as verified by a performance check.
b) The EUT shall recover and be fully operational as verified by a performance check.

Test Results

Performance Check

The EUT continued to transmit Messages 18 and 24 part A and B following the autonomous continuous schedules, alternating between channels A and B.

The EUT continuously received messages from a Class A AIS device.

2.2 General

2.2.1 Specification Reference

IEC 62287-2, Clause 10.1

2.2.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.2.3 Date of Test

17-July-2018 to 27-September-2018

2.2.4 Test Results and Methods of Measurement

Tests by inspection – Clause 10.1.1

Method of Measurement

By inspection of documentation.

Required Results

The relevant requirements shall be met.

Test Results

Clause	Title	Requirement	Verdict
4.1.2	Quality assurance	Manufacturers shall have a quality control system audited by a competent authority to ensure continuous compliance with the requirements of this document. Alternatively, the manufacturer may use final product verification procedures where a competent authority verifies compliance with the requirements of this document before the product is put to the market. NOTE ISO 9000 (all parts), as applicable, meets the requirements of a quality control system.	Pass
4.2	Manuals	The manuals shall include • the type of external connectors, if applicable, • the information for correct installation and positioning of the antennas, and • the information for compass safe distance.	Pass
4.3	Marking and identification	In addition to the requirements of IEC 60945:2002, 4.9, the markings shall include • details of the power supply from which the equipment is intended to be operated, and • if applicable, the date by which batteries need to be replaced.	Pass
6.1	Internal processes	The Class B "SO" AIS shall comprise • a communication processor, capable of operating in the VHF maritime mobile service band, • at least one transmitter and two receiving processes for TDMA operation, • a third receiving process for DSC channel management, • a means for automatic channel switching in the maritime mobile band (by Message 22 and by DSC) – manual channel switching shall not be provided –, and • an internal GNSS position sensor, which provides a resolution of one ten thousandth of a minute of arc and uses the WGS-84 datum only.	Pass

Safety of operation – Clause 10.1.2

Method of Measurement

By inspection.

Required Results

The requirements of 4.1.3 shall be met.

Test Results

The requirements of 4.1.3 are:

It shall not be possible for the operator to augment, amend or erase any program software required for operation in accordance with this document. The manufacturer may provide means to install software updates.

Data used during operation and stored in the system shall be protected in such a way that necessary modifications and amendments by the user cannot endanger its integrity and correctness.

Clause	Title	Requirement	Verdict
4.1.3	Safety of operation	The document does not contain information to allow the operator to augment, amend or erase the program software. Only data that can be set by standard NMEA sentences are allowed to be modified. The MMSI cannot be changed after it has been set from it's default value. See section 2.7, clause 10.8.3.	Pass

Additional features – Clause 10.1.3

Method of Measurement

Operate the EUT in standard test environment and enable any additional features provided. Repeat tests that might be affected by the additional feature.

Required Results

The requirements of 4.1.4 shall be met.

Where equipment provides a feature that is additional to the minimum requirements and options of this document, the operation and, as far as is reasonably practicable, the malfunction of such additional features shall not degrade the performance of the equipment.

Test Results

The EUT has the ability to connect to an application on a smartphone, streaming data via a wifi connection.

A transmission and reception performance check was made while the application and wifi, streaming data, were active. There was no loss in transmitted or received data.

2.3 Modes of operation

2.3.1 Specification Reference

IEC 62287-2, Clause 10.2

2.3.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.3.3 Date of Test

18-April-2018 to 02-August-2018

2.3.4 Test Results and Methods of Measurement

Autonomous Mode – Clause 10.2.1

Transmit Position Reports – Clause 10.2.1.1

Method of Measurement

Set up standard test environment. Record the VDL communication and check for messages of the EUT.

Required Results

Confirm that the EUT transmits Messages 18 and 24 part A and B following the autonomous continuous schedules, alternating between channels A and B and that Message 27 is not transmitted on the long-range channels when the default setting is used.

Test Results

Requirement	Result	Verdict
Message 18 transmitted alternating between A and B	!AIVDM,1,1,,A,B3OdpnP007vTpk7AfDL00011nE4r,0*79 !AIVDM,1,1,,B,B3OdpnP007vTpk7AfDL00021nDab,0*3D	Pass
Message 18 transmitted every 3 min	!AIVDM,1,1,,B,B3OdpnP007vTpk7AfDL00021nDab,0*3D	Pass
Message 24A and 24B transmitted alternating between A and B	!AIVDM,1,1,,A,H3OdpnP00000000000000000000,2*3A !AIVDM,1,1,,A,H3OdpnT019CP1000000000000004,0*12 !AIVDM,1,1,,B,H3OdpnP00000000000000000000,2*39 !AIVDM,1,1,,B,H3OdpnT019CP1000000000000004,0*11	Pass
Message 24A and 24B transmitted every 6 min	!AIVDM,1,1,,B,H3OdpnP00000000000000000000,2*39 !AIVDM,1,1,,B,H3OdpnT019CP1000000000000004,0*11	Pass
Message 27 not transmitted	Message 27 was not transmitted.	Pass

Receive AIS Class A position reports – Clause 10.2.1.2

Method of Measurement

Set up standard test environment. Perform the tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

Required Results

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface in accordance with IEC 61162-1 and, where provided, on the display.

Test Results

Test Targets	
Type	MMSI
Class A	321000000
Class A	231000501

Switch on test targets, and then start operation of the EUT.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class A received continuously	321000000	!AIVDM,1,1,,A,14j8B@0P00wrCPNM6qH00?v8282a,0*21 !AIVDM,1,1,,B,14j8B@0P00wrCPLM6qGh0?vN2H91,0*2A	10 s	Pass
Class A received continuously	231000501	!AIVDM,1,1,,A,13LC9e@2P:dtSF0l4Q@@02gvB085R,0*2D !AIVDM,1,1,,B,13LC9e@2P:dtSF0l4Q@@02gv`05bl,0*68	10 s	Pass

Start operation of the EUT, and then switch on test targets.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class A received continuously	321000000	!AIVDM,1,1,,A,34j8B@0P?w<tSF0l4Q@>4?wv02pQ,0*6A !AIVDM,1,1,,B,34j8B@0P?w<tSF0l4Q@>4?wp02uQ,0*6A	10 s	Pass
Class A received continuously	231000501	!AIVDM,1,1,,A,13LC9e@2P:dtSF0l4Q@@02gvB0@5R,0*55 !AIVDM,1,1,,B,13LC9e@2P:dtSF0l4Q@@02gv`0<00,0*6F	10 s	Pass

Transmit test targets using same time slots on channels A and B			
Channel	Slot	Received Message	Verdict
A	247	!AIVDM,1,1,,A,13LC9e@2P:dtSF0l4Q@@02gv<183o,0*69	Pass
B	247	!AIVDM,1,1,,B,14j8B@0P00wrCQ2M6qJh0?v<25@8,0*27	

Transmit test targets that are not synchronised to time slot boundaries on channels A and B			
Channel	Sync Diff	Received Message	Verdict
A	9.87 ms	!AIVDM,1,1,,B,14j8B@0P?w<tSF0l4Q@>4?wv1`Kq,0*23	Pass
B	10.14 ms	!AIVDM,1,1,,B,13LC9e@2P:dtSF0l4Q@@02gv40000,0*37	

Receive AIS Class B "SO" position reports – Clause 10.2.1.3

Method of Measurement

Set up standard test environment. Simulate at least one additional Class B "SO" test target (bit stuffing shall not exceed 4 bits). Perform the tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

Required Results

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface and, where provided, on the display.

Test Results

Test Targets	
Type	MMSI
Class B SO	444555666
Class B SO	777888999

Switch on test targets, and then start operation of the EUT.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class B received continuously	444555666	!AIVDM,1,1,,A,B6WuQTP007vR@hWAdd0000<P0000,0*64 !AIVDM,1,1,,B,B6WuQTP007vR@hWAdd0000900000,0*02	3 min	Pass
Class B received continuously	777888999	!AIVDM,1,1,,A,B;UnTqh0075i<H7AI:0000<00000,0*3F !AIVDM,1,1,,B,B;UnTqh0075i<H7AI:0000;P0000,0*5B	3 min	Pass

Start operation of the EUT, and then switch on test targets.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class B received continuously	444555666	!AIVDM,1,1,,A,B6WuQTP007vR@hWAdd0000DP0000,0*1C !AIVDM,1,1,,B,B6WuQTP007vR@hWAdd0000>P0000,0*65	3 min	Pass
Class B received continuously	777888999	!AIVDM,1,1,,A,B;UnTqh0075i<H7AI:0000GP0000,0*24 !AIVDM,1,1,,B,B;UnTqh0075i<H7AI:0000B00000,0*42	3 min	Pass

Transmit test targets using same time slots on channels A and B			
Channel	Slot	Received Message	Verdict
A	100	!AIVDM,1,1,,A,B59bTRh007vTpl7AfEd03wQ1p81T,0*65	Pass
B	100	!AIVDM,1,1,,B,B59bTS0007vUbh7Add0000101000,0*56	

Transmit test targets that are not synchronised to time slot boundaries on channels A and B			
Channel	Sync	Received Message	Verdict
A	+12.9 ms	!AIVDM,1,1,,A,B59bTS0007vUbh7Add00008P1000,0*3C	Pass
B	+12.9 ms	!AIVDM,1,1,,B,B59bTRh007vTp5WAfH403w`QnDiJ,0*77	

Receive Class B "CS" position reports – Clause 10.2.1.4

Method of Measurement

Set up standard test environment. Simulate at least one additional Class B "CS" test target (bit stuffing shall not exceed 4 bits). Perform the four tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

Required Results

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface and, where provided, on the display.

Test Results

Test Targets	
Type	MMSI
Class B CS	123456789
Class B CS	666666666

Switch on test targets, and then start operation of the EUT.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class B received continuously	123456789	!AIVDM,1,1,,A,B1mg=5@007vTp6WAfGd03wUUkP06,0*5E	3 min	Pass
		!AIVDM,1,1,,B,B1mg=5@007vTpl7AfDH03wU5kP06,0*28		
Class B received continuously	666666666	!AIVDM,1,1,,A,B9sj6bP00GvTo;7AfKL`7wP5kP06,0*1E	3 min	Pass
		!AIVDM,1,1,,B,B9sj6bP017vTp87AfA9AWwP5kP06,0*4E		

Start operation of the EUT, and then switch on test targets.				
Requirement	MMSI	Sample Messages	Rate	Verdict
Class B received continuously	123456789	!AIVDM,1,1,,A,B1mg=5@007vTpLWAfF@03wnUkP06,0*3A	3 min	Pass
		!AIVDM,1,1,,B,B1mg=5@007vTpFWAfFH03wn5kP06,0*5B		
Class B received continuously	666666666	!AIVDM,1,1,,A,B9sj6bP007vTowWAfHT03wSUkP06,0*6E	3 min	Pass
		!AIVDM,1,1,,B,B9sj6bP007vTor7AfGt03wTUkP06,0*20		

Transmit test targets using same time slots on channels A and B			
Channel	Slot	Received Message	Verdict
A	901	!AIVDM,1,1,,A,B1mg=5@007vTpG7AfGL03wcUkP06,0*51	Pass
B	901	!AIVDO,1,1,,B,14N6S0@2P:wle`2MEs7h2gvf1h>5,0*3E	
A	909	!AIVDO,1,1,,A,14N6S2@2P:wle`2MEs7h2gvf1h>=,0*37	Pass
B	909	!AIVDM,1,1,,B,B1mg=5@007vTowWAfEH03wd5kP06,0*7C	
Comments			
It is not possible to force two Class B CS to operate on the same slots on both channels. Therefore, the test was performed with 100% channel loading, first on channel B, where reception of Class B CS position reports was verified on channel A. The test was repeated with 100 % channel loading on Channel A and position reports received on channel B.			

Transmit test targets that are not synchronised to time slot boundaries on channels A and B			
Channel	Sync	Received Message	Verdict
A	12.9 ms	!AIVDM,1,1,,B,B1mg=5@007vTpLWAfE803wcUkP06,0*4F	Pass
B	12.9 ms	!AIVDM,1,1,,A,B9sj6bP007vTp>7AfFqDcwcUkP06,0*67	

Receive in time slot adjacent to own transmission – Clause 10.2.1.5

Method of Measurement

Set up standard test environment. Simulate 80 % VDL loading. The reporting interval of the EUT may be decreased for the purpose of this test.

Check the external interface of the EUT.

Required Result

Confirm that the EUT continuously receives messages in the slots before and after own transmission with an acceptable loss of 5 %.

Test Result

Requirement	Result	Verdict
Adjacent slot reception loss < 5%	Adjacent slot reception loss = 0 %	Pass

High VDL loading reception test – Clause 10.2.1.6

Method of Measurement

Set up standard test environment. Simulate 90 % VDL loading.

Check the external interface of the EUT.

Required Result

Confirm that the EUT continuously receives messages and outputs the received messages on the external interface with a loss of not more than 2 %.

Test Result

Requirement	Result	Verdict
Reception loss ≤ 2 % on Channel A	0.19 %	Pass
Reception loss ≤ 2 % on Channel B	0.17 %	Pass

Single messages – Clause 10.2.2

Transmit an addressed binary message – 10.2.2.1

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Initiate the transmission of an addressed binary Message 6 by the EUT using an ABM sentence input. An acknowledgement Message 7 shall be applied. Record the transmitted messages.
b) Repeat the test without acknowledgement.
c) Repeat test with a Message 6 exceeding 2 slots.
d) Apply more than 3 ABM sentences with 1 slot Message 6 to the EUT.
e) Repeat test a) with the addressed unstructured binary Message 25.
f) Repeat tests a), b) and d) with the addressed structured binary Message 25.
g) Repeat test a) with a single addressed unstructured binary Message 26.
h) Repeat tests a), b), c) and d) with a single addressed structured binary Message 26.

Required Results

Check that:

a) the EUT transmits Message 6 as appropriate within 30 s. Check the content of Message 6. Check that the EUT outputs the appropriate ABK sentence;
b) the EUT transmits Message 6 as appropriate. Check that the EUT outputs the appropriate ABK sentence indicating that no acknowledgment has been received. Check that the EUT does not retransmit Message 6;
c) the EUT does not transmit Message 6. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
d) the EUT transmits the first 3 Message 6s and does not transmit all following Message 6s within one frame. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
e) the EUT transmits Message 25 as appropriate;
f) the EUT transmits Message 25 as appropriate;
g) the EUT transmits Message 26 as appropriate;
h) the EUT transmits Message 26 as appropriate.

Test Results

a) Message 6 with acknowledgement	
Requirement	Verdict
Message sent to PI: !AIABM,1,1,2,321000000,1,6,04205@E=@IE=<4LD,2*2E	Pass
Message 6 transmitted within 30s.	Pass
Message transmitted by EUT on channel 1: !AIVDO,1,1,,A,659bTRq<R4T004205@E=@IE=<4LD,0*6A	Pass
Message "TESTMESSAGE" received by addressed station with MMSI = 321000000	Pass
Message 7 transmitted by addressed station with MMSI = 321000000	Pass
Message 7 received on channel 1: !AIVDM,1,1,,A,74j8B@1BJa8f,0*73	Pass
Acknowledge message output on PI, with type of acknowledgment = 0: $AIABK,321000000,A,6,2,0*29	Pass

b) Message 6 without acknowledgement	
Requirement	Verdict
Message sent to PI: !AIABM,1,1,2,321000001,1,6,04205@E=B0IE=<4LD,2*1D	Pass
Message transmitted by EUT on channel 1: !AIVDO,1,1,,A,63OdpnU<R4T404205@E=B0IE=<4LD0,4*22	Pass
Message 7 is not transmitted.	Pass
Acknowledge message output on PI, with type of acknowledgment = 1: $AIABK,321000001,A,6,1,1*2A	Pass

c) Message 6 exceeding 2 slots	
Requirement	Verdict
Message sent to PI: !AIABM,2,1,2,321000000,1,6,04205@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4L,2*04 !AIABM,2,2,2,321000000,1,6,04205@E=@IE=<4LE@E=@IE=<4LD,2*43	Pass
EUT does not transmit Message 6	Pass
ABK states message cannot be sent: $AIABK,321000000,A,6,2,2*2B	Pass

d) More than 3 ABM sentences	
Requirement	Verdict
Messages sent to PI on channel 1 with sequence number = 0-3: !AIABM,1,1,0,321000000,1,6,04205@E=@,2*38 !AIABM,1,1,1,321000000,1,6,04205@E=@,2*39 !AIABM,1,1,2,321000000,1,6,04205@E=@,2*3A !AIABM,1,1,3,321000000,1,6,04205@E=@,2*3B	Pass
3 x Message 6s transmitted by EUT on channel 1: !AIVDO,1,1,,A,6>jHD41<R4T004205@E=@0,4*0E !AIVDO,1,1,,A,6>jHD45<R4T004205@E=@0,4*0A !AIVDO,1,1,,A,6>jHD49<R4T004205@E=@0,4*06	Pass
ABK sentence output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent: $AIABK,321000000,A,6,3,2*2A	Pass
3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2: $AIABK,321000000,A,6,0,0*2B $AIABK,321000000,A,6,2,0*29 $AIABK,321000000,A,6,1,1*2B	Pass

e) Addressed Unstructured Binary Message 25	
Requirement	Verdict
Message sent to PI: !AIABM,1,1,2,412000000,1,70,bGEEEEMbRbVjbaTg,0*73	Pass
Message transmitted by EUT: !AIVDM,1,1,,A,I3OdpnaR>Wh0bGEEEEMbRbVjbaTg,0*5D	Pass
Message 25 transmitted within 30s	Pass
ABK sentence output on PI, with type of acknowledgment = 3: $AIABK,412000000,A,25,2,3*1C	Pass

f) Addressed Structured Binary Message 25	
Requirement	**Verdict**
Message sent to PI: !AIABM,1,1,2,412000000,1,25,0400:PbJQ`bJH8p`,0*7A	Pass
Message transmitted by EUT: !AIVDM,1,1,,A,I3OdpneR>Wh00400:PbJQ`bJH8p`,0*50	Pass
Message 25 transmitted within 30s	Pass
ABK sentence output on PI, with type of acknowledgment = 3: $AIABK,412000000,A,25,2,3*1C	Pass
Messages sent to PI on channel 1 with sequence number = 0-3: !AIABM,1,1,0,412000000,1,25,0400:PbJP,0*51 !AIABM,1,1,1,412000000,1,25,0400:PbJP,0*50 !AIABM,1,1,2,412000000,1,25,0400:PbJP,0*53 !AIABM,1,1,3,412000000,1,25,0400:PbJP,0*52	Pass
3 x Message 25s transmitted by EUT on channel 1: !AIVDO,1,1,,A,I3OdpneR>Wh00400:PbJP0000000,0*4B !AIVDO,1,1,,A,I3OdpneR>Wh00400:PbJP0000000,0*4B !AIVDO,1,1,,A,I3OdpneR>Wh00400:PbJP0000000,0*4B	Pass
ABK sentence output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent: $AIABK,412000000,A,25,3,2*1C	Pass
3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2: $AIABK,412000000,A,25,0,3*1E $AIABK,412000000,A,25,1,3*1F $AIABK,412000000,A,25,2,3*1C	Pass
Comments	
Step b) is not tested as the specification is incorrect, a message 25 shall not be acknowledged	

g) Single Addressed Unstructured Binary Message 26	
Requirement	**Verdict**
Message sent to PI: !AIABM,1,1,2,412000000,1,71,2EQEEBEG735FI000,4*28	Pass
Message transmitted by EUT: !AIVDO,1,1,,A,J3OdpnaR>Wh02EQEEBEG735F0000,0*7B	Pass
Message 26 transmitted within 30s	Pass
ABK sentence output on PI, with type of acknowledgment = 3: $AIABK,412000000,A,26,2,3*1F	Pass

h) Single Addressed Structured Binary Message 26	
Requirement	Verdict
Message sent to PI: !AIABM,1,1,2,412000000,1,26,0400:PbJV>@I000,4*55	Pass
Message transmitted by EUT: !AIABM,1,1,2,412000000,1,26,0400:PbJV>@I000,4*55	Pass
Message 26 transmitted within 30s	Pass
ABK sentence output on PI, with type of acknowledgment = 3: $AIABK,412000000,A,26,2,3*1F	Pass
Message exceeding two slots sent to PI: !AIABM,4,1,2,412000000,1,26,04008I0:@8JPbBHI000,4*4B !AIABM,4,2,2,412000000,1,26,04008I0:@8JPbBHI000,4*48 !AIABM,4,3,2,412000000,1,26,04008I0:@8JPbBHI000,4*49 !AIABM,4,4,2,412000000,1,26,04008I0:@8JPbBHI000,4*4E	Pass
EUT does not transmit Message 26.	Pass
ABK states message cannot be sent: $AIABK,412000000,A,26,2,2*1E	Pass
Messages sent to PI on channel 1 with sequence number = 0-3: !AIABM,1,1,0,412000000,1,26,0400:PI000,4*57 !AIABM,1,1,1,412000000,1,26,0400:PI000,4*56 !AIABM,1,1,2,412000000,1,26,0400:PI000,4*55 !AIABM,1,1,3,412000000,1,26,0400:PI000,4*54	Pass
3 x Message 26s transmitted by EUT on channel 1: !AIVDO,1,1,,A,J3OdpneR>Wh00400:PI000000000,0*79 !AIVDO,1,1,,A,J3OdpneR>Wh00400:PI000000000,0*79 !AIVDO,1,1,,A,J3OdpneR>Wh00400:PI000000000,0*79	Pass
ABK sentence output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent: $AIABK,412000000,A,26,3,2*1F	Pass
3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2: $AIABK,412000000,A,26,0,3*1D $AIABK,412000000,A,26,1,3*1C $AIABK,412000000,A,26,2,3*1F	Pass
Comments	
Step b) is not tested as the specification is incorrect, a message 26 shall not be acknowledged	

Transmit an addressed safety related Message 12 – Clause 10.2.2.2

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of an addressed binary Message 12 by the EUT using an ABM sentence input.

Required Result

Check that the EUT does not transmit Message 12.

Test Result

Requirement	Verdict
Transmission of addressed binary Message 12 by the EUT using ABM sentence input: !AIABM,1,1,2,321000000,1,12,D5CDP=5CC175,6*5D	Pass
The EUT does not transmit Message 12	Pass

Acknowledgement of addressed Messages – Clause 10.2.2.3

Method of Measurement

Operate standard test environment and the EUT in autonomous mode.

a) Apply an addressed binary Message 6 with the EUT as destination to the VDL on Channel A. Record transmitted messages on both channels.
b) Repeat for Message 12.
c) Repeat the test a) on channel B.

Required Results

Confirm that:

a) the EUT transmits a binary acknowledge Message 7, with the appropriate sequence numbers within 4 s on the channel where the Message 6 was received;
b) the EUT transmits a binary acknowledge Message 13, with the appropriate sequence numbers within 4 s on the channel where the Message 12 was received;
c) the EUT transmits a binary acknowledge Message 7 on channel B.

Test Results

a) Message 6 on channel A	Verdict
Message sent to EUT on channel 1 with sequence number = 0: !AIVDO,1,1,,A,66WuNv0os>=`04205@E=@0,4*0E	Pass
Message 7 transmitted by EUT with MMSI = 234567898: !AIVDO,1,1,,A,73OdpnQawGgP,0*22	Pass
Message 7 received on channel 1 within 4s: !AIVDM,1,1,,A,73OdpnQawGgP,0*20 after 3s	Pass
Sequence number in Message 7 = 0	Pass

b) Message 12	Verdict
Message sent to EUT on channel 1 with sequence number = 2: !AIVDO,1,1,,A,<6WuNv8os>=`D5CDP=C7Pijklm0,2*17	Pass
Message 13 transmitted by EUT with MMSI = 234567898: !AIVDO,1,1,,A,=3OdpnQawGgR,0*2A	Pass
Message 13 received on channel 1 within 4s: !AIVDM,1,1,,A,=3OdpnQawGgR,0*28 after 3s	Pass
Sequence number in Message 13 = 2	Pass

c) Message 6 on channel B	Verdict
Message sent to EUT on channel 2 with sequence number = 0: !AIVDO,1,1,,B,66WuNv0os>=`04205@E=@0,4*0D	Pass
Message 7 transmitted by EUT with MMSI = 234567898: !AIVDO,1,1,,B,73OdpnQawGgP,0*21	Pass
Message 7 received on channel 2 within 4s: !AIVDM,1,1,,B,73OdpnQawGgP,0*23 after 2s	Pass
Sequence number in Message 7 = 0	Pass

Transmit a broadcast binary Message 8 – Clause 10.2.2.4

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Initiate the transmission of a broadcast binary Message 8 by the EUT using a BBM sentence input. Record the transmitted messages.
b) Repeat test with a Message 8 exceeding 2 slots.
c) Apply more than 3 BBM sentences with 1 slot Message 8 to the EUT.
d) Repeat test a) with the broadcast unstructured binary Message 25.
e) Repeat tests a) and c) with the broadcast structured binary Message 25.
f) Repeat test a) with a single broadcast unstructured binary Message 26.
g) Repeat tests a), b) and c) with a single broadcast structured binary Message 26.

Required Results

Check that:

a) the EUT transmits Message 8 as appropriate within 30 s. Check the content of Message 8. Check that the EUT outputs the appropriate ABK sentence;
b) the EUT does not transmit Message 8. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
c) the EUT transmits the first 3 Message 8s and does not transmit all following Message 8s. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
d) the EUT transmits Message 25 as appropriate;
e) the EUT transmits Message 25 as appropriate;
f) the EUT transmits Message 26 as appropriate;
g) the EUT transmits Message 26 as appropriate.

Test Results

a) Message 8	
Requirement	Verdict
Message sent to PI on channel 1 with sequence number = 1: !AIBBM,1,1,2,1,8,04005@E=@,2	Pass
Message 8 transmitted within 30s	Pass
Message transmitted by EUT on channel 1 with sequence number = 1: !AIVDO,1,1,,A,83OdpnP0@00E1Dm0,0*57	Pass
Acknowledge message output on PI, with type of acknowledgment = 0 with sequence number = 1: $AIABK,,A,8,0,3*16	Pass

b) Message 8 exceeding 2 slots	
Requirement	Verdict
Message sent to PI: !AIBBM,2,1,2,1,8,04005@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4LD,2*53 !AIBBM,2,2,2,1,8,04005@E=@IE=<4LD,2*3D	Pass
EUT does not transmit Message 8	Pass
ABK states message cannot be sent: $AIABK,,A,8,2,2*15	Pass

c) More than 3 BBM sentences

Requirement	Verdict
Messages sent to PI on channel 1 with sequence number = 0-3: !AIBBM,1,1,0,1,8,04005@E=@,2*2B !AIBBM,1,1,1,1,8,04005@E=@,2*2A !AIBBM,1,1,2,1,8,04005@E=@,2*29 !AIBBM,1,1,3,1,8,04005@E=@,2*28	Pass
3 x Message transmitted by EUT on channel 1: !AIVDO,1,1,,A,859bTRh0@00E1Dm0,0*01 !AIVDO,1,1,,A,859bTRh0@00E1Dm0,0*01 !AIVDO,1,1,,A,859bTRh0@00E1Dm0,0*01	Pass
1 x Acknowledge message output on PI, with type of acknowledgement = 2 and the sequence number of the unsent BBM: $AIABK,,A,8,3,2*14	Pass
3 x Acknowledge message output on PI, with type of acknowledgment = 3 and sequence number = 0-2: $AIABK,,A,8,0,3*16 $AIABK,,A,8,1,3*17 $AIABK,,A,8,2,3*14	Pass

d) Broadcast Unstructured Binary Message 25

Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,70,bGEEEEMbRbVjbaTeQG`pGP,4*7C	Pass
Message 25 transmitted within 30s	Pass
Message transmitted by EUT: !AIVDO,1,1,,A,I3OdpnRaMEEEEnb:bK:bVBn5NSQN,0*1F	Pass
Acknowledge message output on PI, with type of acknowledgment = 3: $AIABK,,A,25,2,3*2B	Pass

e) Broadcast Structured Binary Message 25

Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,25,0400:PbJT1`bJH8pd6>FH0,4*60	Pass
Message 25 transmitted within 30s	Pass
Message transmitted by EUT: !AIVDO,1,1,,A,I3OdpnT0@00b2ab@6RaaPSRhHqIP,0*21	Pass
Acknowledge message output on PI, with type of acknowledgment = 3: $AIABK,,A,25,2,3*2B	Pass
Messages sent to PI on channel 1 with sequence number = 0-3: !AIBBM,1,1,0,1,25,0400:PbJT1`bJH8pd6>FH0,4*62 !AIBBM,1,1,1,1,25,0400:PbJT1`bJH8pd6>FH0,4*63 !AIBBM,1,1,2,1,25,0400:PbJT1`bJH8pd6>FH0,4*60 !AIBBM,1,1,3,1,25,0400:PbJT1`bJH8pd6>FH0,4*61	Pass
3 x Message transmitted by EUT on channel 1: !AIVDO,1,1,,A,I3OdpnT0@00b2ab@6RaaPSRhHqIP,0*21 !AIVDO,1,1,,A,I3OdpnT0@00b2ab@6RaaPSRhHqIP,0*21 !AIVDO,1,1,,A,I3OdpnT0@00b2ab@6RaaPSRhHqIP,0*21	Pass
1 x Acknowledge message output on PI, with type of acknowledgement = 2 and the sequence number of the unsent BBM: $AIABK,,A,25,3,2*2B	Pass
3 x Acknowledge message output on PI, with type of acknowledgment = 3 and sequence number = 0-2: $AIABK,,A,25,0,3*29 $AIABK,,A,25,1,3*28 $AIABK,,A,25,2,3*2B	Pass
Comments	
Step b) is not tested as the specification is incorrect, a message 25 shall not be acknowledged	

f) Single Broadcast Unstructured Binary Message 26

Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,71,2EQEEBEG735Fc2bbTP,4*1C	Pass
Message transmitted by EUT: !AIVDM,1,1,,A,J3OdpnP9F5EE9ELL<EJd:bbB0000,0*23	Pass
Message 26 transmitted within 30s	Pass
Acknowledge message output on PI, with type of acknowledgment = 3: $AIABK,,A,26,2,3*28	Pass

g) Single Broadcast Structured Binary Message 26	
Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,26,04008I0:@8JPbBN86@00,2*61	Pass
Message transmitted by EUT: !AIVDO,1,1,,A,J3OdpnT0@00QT0a0Qb2a9pPI0000,0*18	Pass
Message 26 transmitted within 30s	Pass
Acknowledge message output on PI, with type of acknowledgment = 3: $AIABK,,A,26,2,3*28	Pass
Message exceeding two slots sent to PI: !AIBBM,4,1,1,1,26,04008I0:@8JPbBN86@00,2*67 !AIBBM,4,2,1,1,26,04008I0:@8JPbBN86@00,2*64 !AIBBM,4,3,1,1,26,04008I0:@8JPbBN86@00,2*65 !AIBBM,4,4,1,1,26,04008I0:@8JPbBN86@00,2*62	Pass
EUT does not transmit Message 26.	Pass
ABK states message cannot be sent: $AIABK,,A,26,1,2*2A	Pass
Messages sent to PI on channel 1 with sequence number = 0-3: !AIBBM,1,1,0,1,26,0400:PbJP,2*48 !AIBBM,1,1,1,1,26,0400:PbJP,2*49 !AIBBM,1,1,2,1,26,0400:PbJP,2*4A !AIBBM,1,1,3,1,26,0400:PbJP,2*4B	Pass
3 x Message transmitted by EUT on channel 1 with sequence number = 0-2: !AIVDO,1,1,,A,J3OdpnT0@00b2ab0000000000000,0*2F !AIVDO,1,1,,A,J3OdpnT0@00b2ab0000000000000,0*2F !AIVDO,1,1,,A,J3OdpnT0@00b2ab0000000000000,0*2F	Pass
Acknowledge message output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent: $AIABK,,A,26,3,2*28	Pass
3 x Acknowledge message output on PI, with correct type of acknowledgment and sequence number = 0-2: $AIABK,,A,26,0,3*2A $AIABK,,A,26,1,3*2B $AIABK,,A,26,2,3*28	Pass
Comments	
Step b) is not tested as the specification is incorrect, a message 26 shall not be acknowledged	

Transmit a broadcast safety related Message 14 – Clause 10.2.2.5

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of a broadcast binary Message 14 by the EUT using an BBM sentence input.

Required Results

Check that the EUT does not transmit the Message 14.

Test Results

Requirement	Verdict
Transmission of broadcast binary Message 14 by the EUT using BBM sentence input: !AIBBM,1,1,2,1,14,D5CDP=5CC175,6	Pass
The EUT does not transmit Message 14	Pass

ITDMA and RATDMA transmission – Clause 10.2.2.6

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT less than 30 s before the next scheduled transmission. Record transmitted messages.
b) Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT more than 30 s before the next scheduled transmission. Record transmitted messages.

Required Results

Confirm that:

a) the EUT transmits the Message 8 within 30 s using ITDMA;
b) the EUT transmits the Message 8 within 30 s using RATDMA.

Test Results

Message 8 < 30s	
Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,8,04005@E=@,2	Pass
Message presented by EUT: !AIBBM,1,1,2,1,8,04005@E=@,2	Pass
Message 18 uses ITDMA to announce Message 8: !AIVDM,1,1,,A,B>jHD400vgvUg@WAIIt6t07Qj0<A,0*69	Pass
Message transmitted by EUT within 30s using ITDMA !AIVDM,1,1,,A,8>jHD400@00E1Dm0,0*5F	Pass

Message 8 > 30s	
Requirement	Verdict
Message sent to PI: !AIBBM,1,1,2,1,8,04005@E=@,2	Pass
Message transmitted by EUT: !AIVDM,1,1,,A,8>jHD400@00E1Dm0,0*5F	Pass
Message transmitted by EUT within 30s using RATDMA.	Pass

Polled mode and interrogation response – Clause 10.2.3

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Apply interrogation Message 15 with the EUT as destination:

a) interrogation for Message 19 with transmission offset = 0;
b) interrogation for Message 19 with transmission offset = 10;
c) interrogation for Message 18 with transmission offset = 0;
d) interrogation for Message 24 with transmission offset = 0.

Record transmitted messages and frame structure.

Required Results

Confirm that:

a) the EUT transmits the appropriate interrogation response message within 30 s;
b) the EUT transmits the appropriate interrogation response message as requested after defined transmission offset;
c) the EUT transmits the appropriate interrogation response Message 18 within 30 s;
d) the EUT transmits the appropriate interrogation response Messages 24A within 30 s and 24B within 1 min of Message 24A.

Confirm that the EUT transmits the response on the same channel as the interrogation was received.

Test Results

a) Interrogation for Message 19 with transmission offset = 0	
Requirement	Verdict
Transmission of interrogation Message 15 to the EUT for Message 19 with transmission offset = 0: !AIVDO,1,1,,A,?6WuNv0os>=a<00000000000000,2*47	Pass
EUT transmits appropriate interrogation response within 30s: !AIVDM,1,1,,A,C3OdpnP00?vUg@WAIIt0004P00000000000000000000000000030,0*18	Pass

b) Interrogation for Message 19 with transmission offset = 10	
Requirement	Verdict
Transmission of interrogation Message 15 to the EUT for Message 19 with transmission offset = 10: !AIVDO,1,1,,A,?6WuNv0os>=a<0`000000000000,2*17	Pass
The EUT transmits the appropriate interrogation response message as requested after defined transmission offset: !AIVDM,1,1,,A,C>jHD400I?vUg@WAIIt6t0J00000000000000000000020`7b<S0,0*5C	Pass

c) Interrogation for Message 18 with transmission offset = 0	
Requirement	Verdict
Transmission of interrogation Message 15 to the EUT for Message 18 with transmission offset = 0: !AIVDO,1,1,,A,?027`SSdV5118000000000000000,2*73	Pass
The EUT transmits the appropriate interrogation response message within 30 s: !AIVDM,1,1,,A,B>jHD4002gvUg@WAIIt000I1l000,0*0A	Pass

d) Interrogation for Message 24 with transmission offset = 0	
Requirement	Verdict
Transmission of interrogation Message 15 to the EUT for Message 24 with transmission offset = 0: !AIVDO,1,1,,A,?027`SSdV511P0000000000000000,2*1B	Pass
The EUT transmits the appropriate interrogation response Message 24A within 30 s and 24B within 1 min of 24A: !AIVDM,1,1,,A,H>jHD4000000000000000000000,2*30 !AIVDM,1,1,,A,H>jHD444ooo4N9000000001@?DI4,0*59	Pass

2.4 Channel selection

2.4.1 Specification Reference

IEC 62287-2, Clause 10.3

2.4.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.4.3 Date of Test

03-August-2018 to 21-August-2018

2.4.4 Test Results and Methods of Measurement

Valid channels – Clause 10.3.1

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Switch the EUT to different channels within the operating band as specified in 6.2 by transmission of channel management Message 22, broadcast and addressed to the EUT.

Record the VDL Messages on the designated channels and check "band flag" and "Message 22 flag" in Message 18.

Required Results

Confirm that the EUT switches to the correct channel and uses the correct "band flag" and "Message 22 flag".

Test Results

Broadcast Message 22	
Requirement	Verdict
Transmission of broadcast Message 22 to the EUT to assign channels 2084 and 2085: !AIVDO,1,1,,A,F027`SR2B2D7vm1oR?sD3bH2P000,0*53	-
EUT outputs text sentence ID 36 indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT transmits Message 18 on designated channels 2085 and 2086 when within region: !AIVDM,1,1,,C,B3OdpnP0I?vB8h7>En06t051lH6G,0*23 received on channel 2084 !AIVDM,1,1,,D,B3OdpnP0I?vB8h7>En06t0DQl@I8,0*3D received on channel 2085	Pass
Message 18 uses the correct "band flag" = 1.	Pass
Message 18 uses the correct "Message 22 flag" = 1.	Pass

Addressed Message 22	
Requirement	Verdict
Transmission of addressed Message 22 to the EUT to assign channels 2082 and 2083: !AIVDO,1,1,,A,F027`SR2:2<1gnLK@000000BP000,0*6D	-
EUT outputs text sentence indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT transmits Message 18 on designated channels 2082 and 2083: !AIVDM,1,1,,A,B3OdpnP0I?vUg@WAIlt6t03Ql5Id,0*53 received on channel 2082 !AIVDM,1,1,,B,B3OdpnP0I?vUg@WAIlt6t0B1l000,0*69 received on channel 2083	Pass
Message 18 uses the correct "band flag"	Pass
Message 18 uses the correct "Message 22 flag"	Pass

<u>*Invalid channels – Clause 10.3.2*</u>

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Apply a Message 22 with 25 kHz channels not specified in Recommendation ITU-R M. 1084-5.

Record the VDL messages on the designated channels.

Required Results

Confirm that the EUT disregards Message 22.

Test Results

Requirement	Verdict
Transmission of broadcast Message 22 to the EUT on invalid channels 2090 and 2091 !AIVDO,1,1,,A,F027\`SR2b2d7vP1oR?rb3bH2P000,0*49	-
Message received by EUT: !AIVDM,1,1,,A,F027\`SR2b2d7vP1oR?rb3bH2P000,0*4B	-
EUT does not output text sentence ID 36.	Pass
Transmissions continue on default channels.	Pass

2.5 AIS information

2.5.1 Specification Reference

IEC 62287-2, Clause 10.5

2.5.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

Date of Test

31-May-2018 to 03-September-2018

2.5.3 Test Results and Methods of Measurement

Information content - Clause 10.5.1

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Apply all static data to the EUT.

Record all Messages on VDL and check the content of position report Message 18 and static data reports, Messages 24A and 24B.

Required Results

Confirm that data transmitted by the EUT complies with static data and position sensor data.

Test Results

Ship Static Data (SSD) Assignment	
Requirement	Verdict
Apply all ship static data to the EUT: $AISPW,SSD,234567898,1,1111*11 $AISSD,1234567,TUV TEST B,1,2,3,4,1,AI*42	Pass
Transmission of Message 18: !AIVDO,1,1,,B,B59bTRh007vTpi7AfET03wg3nE2J,0*1B	Pass
Class B display flag (DTE flag) updates to 1 in Message 18 as specified in SSD sentence.	Pass
Transmission of Messages 24A and 24B: !AIVDO,1,1,,A,H59bTRiAEJ1@E=B080000000000,2*62 !AIVDO,1,1,,A,H59bTRlUooo4N90ijklmno08234t,0*00	Pass
"Dimension of ship/reference for position" is present in Message 24B according to SSD sentence.	Pass
"Call sign" is present in Message 24B according to SSD sentence.	Pass
Vessel's "name" is present in Message 24A according to SSD sentence.	Pass
Messages 18, 24A and 24B comply with ship static data.	Pass

Voyage Static Data (VSD) Assignment	
Requirement	Verdict
Apply all voyage static data to the EUT: $AISPW,VSD,234567898,1,1111*14 $AIVSD,10,5,8,FAREHAM,12000000,19,06,0,0*30	Pass
Transmission of Message 18: !AIVDO,1,1,,B,B59bTRh007vTpJ7AfGL03wuSnE<b,0*76	Pass
Transmission of Messages 24A and 24B: !AIVDO,1,1,,A,H59bTRiAEJ1@E=B080000000000,2*62 !AIVDO,1,1,,A,H59bTRl:ooo4N90ijklmno08234t,0*6F	Pass
Vessel's "type" is present in 24B.	Pass
Messages 18, 24A and 24B comply with voyage static data.	Pass

Information update intervals – Clause 10.5.2

Autonomous reporting interval – Clause 10.5.2.1

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode.

a) Start with own SOG of 1 kn; record all Messages on VDL for at least 30 min and evaluate reporting interval for position report of the EUT by calculating average transmission offset over test period.
b) Increase speed to 3 kn.
c) Increase speed to 15 kn.
d) Increase speed to 24 kn.
e) Reduce speed to 22 kn.
f) Reduce speed to 13 kn.
g) Reduce speed to 1 kn.

Record all messages on VDL and check transmission offset between two consecutive transmissions.

Required Results

Confirm that:

a) the reporting interval is 3 min (±10 s);
b) the reporting interval is 30 s (±3 s);
c) the reporting interval is 15 s (±1,5 s);
d) the reporting interval is 5 s (±0,5 s);
e) the reporting interval is 15 s;
f) the reporting interval is 30 s;
g) the reporting interval is 3 min.

Test Results

a) SOG of 1kn		
Requirement	Result	Verdict
The reporting interval is 3 min (±10 s).	Message 18: Min Rr = 176.9s Max Rr = 182.7 s Average Rr = 179.9 s	Pass

b) Increase speed to 3 kn		
Requirement	Result	Verdict
The reporting interval is 30 s (±3 s).	Message 18: Min Rr = 27.1s Max Rr = 35.2s Average Rr = 30.1s	Pass

c) Increase speed to 15 kn		
Requirement	Result	Verdict
The reporting interval is 15 s (±1,5 s).	Message 18: Min Rr = 13.2s Max Rr = 30.0s Average Rr = 15.1s	Pass

d) Increase speed to 24 kn		
Requirement	Result	Verdict
The reporting interval is 5 s (±0,5 s).	Message 18: Min Rr = 4.2s Max Rr = 16.4s Average Rr = 5.1s	Pass

e) Reduce speed to 22 kn		
Requirement	Result	Verdict
The reporting interval is 15 s.	Message 18: Min Rr = 12.5s Max Rr = 17.6s Average Rr = 15s	Pass

f) Reduce speed to 13 kn		
Requirement	Result	Verdict
The reporting interval is 30 s.	Message 18: Min Rr = 27.3s Max Rr = 32.7s Average Rr = 30.3s	Pass

g) Reduce speed to 1 kn		
Requirement	Result	Verdict
The reporting interval is 3 min.	Message 18: Min Rr = 176.8s Max Rr = 182.8s Average Rr = 179.8s	Pass

Polite behaviour – Clause 10.5.2.2

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Simulate a VDL loading of 55 %. Record all messages.

a) Start with own SOG of 1 kn.
b) Increase speed to 20 kn.
c) Reduce VDL loading to 40 %.
d) Reduce VDL loading to 30 %.
e) Increase VDL loading to 45 %.
f) Increase VDL loading to 55 %.
g) Increase speed to 30 kn.
h) Reduce VDL loading to 40 %.
i) Reduce VDL loading to 30 %.
j) Increase VDL loading to 45 %.
k) Increase VDL loading to 55 %.
l) Reduce speed to 10 kn.
m) Reduce VDL loading to 30 %.

Record all messages on the VDL.

Required Results

Confirm that:

a) the reporting interval is 3 min;
b) the reporting interval of 30 s has been established;
c) the reporting interval of 30 s is maintained;
d) the reporting interval decreases to 15 s within 4 min to 5 min;
e) the reporting interval of 15 s is maintained;
f) the reporting interval increases to 30 s within 4 min to 5 min;
g) the reporting interval decreases to 15 s;
h) the reporting interval of 15 s is maintained;
i) the reporting interval decreases to 5 s within 4 min to 5 min;
j) the reporting interval of 5 s is maintained;
k) the reporting interval increases to 15 s within 4 min to 5 min;
l) the reporting interval increases to 30 s;
m) the reporting interval of 30 s is maintained.

Test Results

	Requirement				Test System Configuration					EUT Results		
Step	SOG	Load %	Ri (s)	Time (min)	Targets	Gap	Block	Load %	Test Start Time	Time of Change	EUT Ri (s)	Verdict
a	1	55	180.0	-	42	33	75	56	12:57	-	178.2	Pass
b	20	55	30.0	-	42	33	75	56	13:14	-	29.4	Pass
c	20	40	30.0	-	30	45	75	40	13:18	-	29.5	Pass
d	20	30	15.0	4-5	23	52	75	31	13:22	13:26	15.1	Pass
e	20	45	15.0	-	34	41	75	45	13:33	-	15.1	Pass
f	20	55	30.0	4-5	42	33	75	56	13:38	13:44	30.0	Pass
g	30	55	15.0	-	42	33	75	56	14:10	-	15.0	Pass
h	30	40	15.0	-	30	45	75	40	14:25	-	15.0	Pass
i	30	30	5.0	4-5	23	52	75	31	14:36	14:41	5.0	Pass
j	30	45	5.0	-	34	41	75	45	14:48	-	5.0	Pass
k	30	55	15.0	4-5	42	33	75	56	15:09	15:14	15.0	Pass
l	10	55	30.0	-	42	33	75	56	15:17	-	30.0	Pass
m	10	30	30.0	-	23	52	75	31	15:24	-	30.0	Pass

Static data reporting interval – Clause 10.5.2.3

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Record the transmitted messages and check for static data Messages 24A and 24B.

Repeat the test at an assigned reporting interval of 5 s for Message 18.

Required Results

Confirm that the EUT transmits Messages 24A and 24B every 6 min. Confirm that Message 24B is transmitted within 1 min of transmission of Message 24A, and on the same channel. Transmissions shall alternate between channels A and B and shall be independent of the Message 18 reporting interval.

Test Results

Message 18 reporting interval. SOG = 0 kn.	
Requirement	Verdict
Transmission of Messages 24A and 24B: !AIVDO,1,1,,B,H59bTRiAEJ1@E=B080000000000,2*61 !AIVDO,1,1,,B,H59bTRl0ooo4N90ijklmno00000t,0*6B	Pass
Message 24A and 24B transmit every 6 min	Pass
Message 24B is transmitted within 1 min of the transmission of 24A.	Pass
Message 24B is transmitted on the same channel as 24A	Pass
Transmission of Message 24 pair alternates between channels A and B	Pass
Message 24 is independent of message 18	Pass

Message 18 assigned 5 s reporting interval at 16:00:00	
Requirement	Verdict
Transmission of Messages 24A and 24B: !AIVDO,1,1,,B,H3OdpliAEJ1@E=B080000000000,2*0D !AIVDO,1,1,,B,H3OdpllUooo4N90ijklmno082344,0*2F	Pass
Message 24A and 24B transmit every 6 min. 16:04:18, 16:10:22, 16:16:49, 16:22:35	Pass
Message 24B is transmitted within 1 min of the transmission of 24A. 16:04:30, 16:10:34, 16:16:59, 16:22:43	Pass
Message 24B is transmitted on the same channel as 24A	Pass
Transmission of Message 24 pair alternates between channels A and B.	Pass
Transmission of Message 24 is independent of Message 18 reporting interval.	Pass

2.6 Initialisation period

2.6.1 Specification Reference

IEC 62287-2, Clause 10.6

2.6.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.6.3 Date of Test

03-July-2018

2.6.4 Test Results and Method of Measurement

Method of Measurement

Set up standard test environment with SOG > 2 kn.

a) Switch on the EUT from cold (off-time minimum 1 h) with the EUT operating in autonomous mode.
b) Switch off the EUT for between 15 min to 60 min and switch on again.
c) Make the GNSS sensor position unavailable.

Record transmitted messages.

Required Results

Confirm that the EUT:

a) starts regular transmission of Message 18 within 2 min and valid position within 30 min after switch on;
b) starts regular transmission of Message 18 within 2 min and valid position within 5 min after switch on;
c) continues transmission with last known position and time stamp "63" (positioning system inoperative) with a reporting interval of 3 min. Change to default position values (91, 181) after 30 min.

Test Results

a) SOG = 10 kn, no power for at least 1 h. Time on: 13:06:59		
Time	Requirement	Verdict
13:08:57	Switched-on EUT transmits Message 18 within 2 min: !AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0LQn001,0*65	Pass
13:08:57	Switched-on EUT transmits a valid position in Message 18 within 30 min: !AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0LQn001,0*65	Pass

a) SOG = 10 kn, no power for at least 1 h – Message 18 within 2 min and valid position within 30 min decode	
!AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0LQn001,0*65	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567891
Reserved	0
SOG	10
Position Accuracy	1 - high (> 10 m)
Longitude	3 0 W
Latitude	51 50 N
COG	11.1
True Heading	0
Time Stamp	57
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	0
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	1

a) SOG = 10 kn, no power for at least 1 h – Message 18 within 2 min and valid position after 30 min decode	
!AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0LQn001,0*65	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567891
Reserved	0
SOG	10
Position Accuracy	1 - high (> 10 m)
Longitude	3 0 W
Latitude	51 50 N
COG	11.1
True Heading	0
Time Stamp	57
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	0
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	1

b) SOG = 10 kn, no power between 15 to 60 min. Time on: 12:34:48			
Time	Requirement	Time
13:36:39	Switched-on EUT transmits Message 18 within 2 min: !AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0CQj001,0*6E	Pass
13:36:39	Switched-on EUT transmits a valid position in Message 18 within 5 min: !AIVDO,1,1,,A,B3Odplh0I?tTAP7JS606t0CQj001,0*6E	Pass

b) SOG = 10 kn, no power for between 15 and 60 min – Message 18 within 2 min decode and valid position within 5 min decode

!AIVDO,1,1,,A,B3Odplh0l?tTAP7JS606t0CQj001,0*6E

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567891
Reserved	0
SOG	10
Position Accuracy	1 - high (> 10 m)
Longitude	3 0 W
Latitude	51 50 N
COG	11.1
True Heading	0
Time Stamp	39
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	0
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	1

c) GNSS sensor position unavailable. Time: 13:47:16	
Requirement	Verdict
Message 18 contains the last known position: !AIVDO,1,1,,A,B3Odplh3wotTAP7JS63Q00OQjJ<P,0*38	Pass
Message 18 contains time stamp "63": !AIVDO,1,1,,A,B3Odplh3wotTAP7JS63Q00OQjJ<P,0*38	Pass
Message 18 has a reporting interval of 3 min.	Pass
Message 18 position values change to "91, 181" after 30 min (14:17:16): !AIVDO,1,1,,B,B3Odplh3wk?8mP=18D3Q00OQjDIJ,0*3D	Pass

c) GNSS sensor position unavailable – Initial Message 18	
!AIVDO,1,1,,A,B3Odplh3wotTAP7JS63Q00OQjJ<P,0*38	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567891
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	3 0 W
Latitude	51 50 N
COG	360
True Heading	0
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	6706
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	0

c) GNSS sensor position unavailable – Message 18 decode after 30 min	
!AIVDO,1,1,,B,B3Odplh3wk?8mP=18D3Q00OQjDIJ,0*3D	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567891
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
COG	360
True Heading	0
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	5221
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

2.7   Alarms and indications, fall-back arrangements

2.7.1   Specification Reference

IEC 62287-2, Clause 10.7

2.7.2   Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.7.3   Date of Test

14-May-2018 to 20-September-2018

2.7.4   Test Results and Methods of Measurement

<u>*Built in integrity test – Clause 10.7.1*</u>

Method of Measurement

Check manufacturer's documentation on BIIT.

Required Results

Verify that an indication is provided if a malfunction is detected and the appropriate ALR sentence is output on the PI.

Test Results

LED	Description	Verdict
Flashing Green	After power cycling the EUT, while the unit is starting the LED flashes green. When deactivating long range mode, the LED flashes green.	Pass
Steady Green	Internal GNSS in use	Pass
Steady Orange	When the unit is sent a quiet time command by message 23, the LED changes to steady orange. When the unit is put in silent mode, by pressing the indicator for 2 seconds, when the next scheduled message due to be transmitted, the LED changes to steady orange.	Pass
Green / Amber Alternating	When activating long range mode, the LED flashes amber.	Pass
Steady Red	When the GNSS connection is removed, the unit stops transmitting and the LED changes steady red. The appropriate ALR sentence is output on the PI.	Pass
Flashing Red	VSWR ALR, disconnect antenna. The appropriate ALR sentence is output on the PI.	Pass
Green / Red Alternating	After applying a heading, the heading was removed. The appropriate ALR sentence is output on the PI.	Pass

Transceiver protection – Clause 10.7.2

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode with SOG > 23 kn.

a) Open circuit VHF-antenna terminals of the EUT for at least 5 min.
b) Short circuit VHF-antenna terminals of the EUT for at least 5 min.
c) Reconnect the VHF-antenna.

Required Results

Check that:

a) an alarm sentence ALR with alarm ID 002 is sent to the PI;
b) an alarm sentence ALR with alarm ID 002 is sent to the PI;
c) the EUT shall be operative again after refitting the antenna, without damage to the transceiver and check that an alarm sentence ALR with a deactivated alarm ID 002 is sent to the PI.

Test Results

a) Open circuit VHF-antenna terminals for at least 5 min.		
Requirement		Verdict
SOG of the EUT is set > 23 kn.		-
Time		
10:34:48	VHF antenna disconnected.	-
10:39:50	ALR sentence with ID 002 is sent to PI: $AIALR,103447.00,002,A,V,AIS: Antenna VSWR exceeds limit*57	Pass

b) Short circuit VHF-antenna terminals of the EUT for at least 5 min.		
Time	Requirement	Verdict
10:56:16	VHF antenna short-circuited.	-
11:01:30	ALR sentence with ID 002 is sent to PI: $AIALR,103447.00,002,A,V,AIS: Antenna VSWR exceeds limit*57	Pass

c) Reconnect the VHF-antenna.	
Requirement	Verdict
EUT operates without damage to the transceiver.	Pass
ALR sentence with ID 002 is deactivated according to the PI: $AIALR,110407.00,002,V,A,AIS: Antenna VSWR exceeds limit*51	Pass

Transmitter shutdown procedure – Clause 10.7.3

Method of Measurement

Check manufacturer's documentation on transmitter shutdown procedure.

Required Results

Verify that a transmitter shutdown procedure, independent of the operating software, is provided (see 6.6.2).
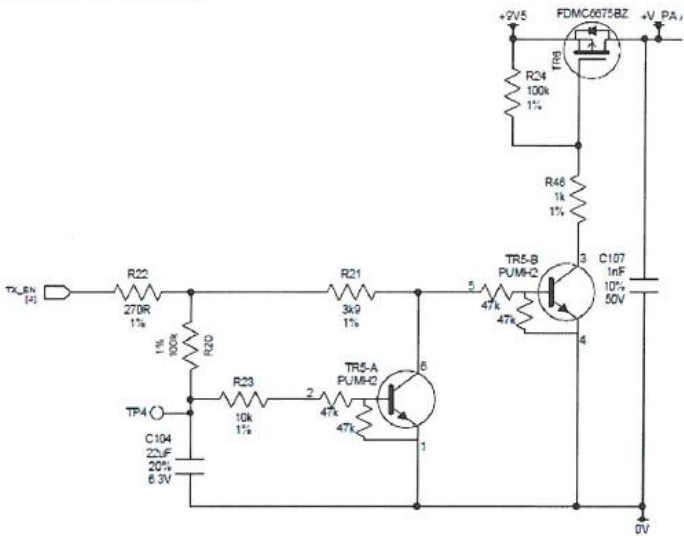
Test Results

Requirement	Verdict
Manufacturer's documentation details an automatic transmitter hardware shutdown procedure in the event that the transmitter continues to transmit for more than 2 s.	Pass
The shutdown procedure does not require software.	Pass

Circuit Description	Document No.	920S-02504
	Issue	01.00
	Date Last Amended	04/09/18
	Last Amended by	W. Card
Document Title	Circuit Desc: ATB1	

5.4 Transmit Time Out

Supply to the PA circuit is controlled by switching +9.5V through TR6. This control is performed by the TX_EN signal. To begin transmission TX_EN is taken high to turn on TR5B thus turning on TR6.

To ensure that a transmission can last no longer than 2 seconds, due to a fault; when the PA supply voltage is switched on, C104 is charged through R20. This charging voltage is compared to the input threshold of TR5A. When the threshold has been exceeded TR5A switches on, turning TR5B off, this in turn switches TR6 off thus removing the supply voltage from the PA and ending any further transmission.

Position sensor fallback conditions – Clause 10.7.4

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode.

Apply position sensor data such that the EUT operates as follows:

- internal DGNSS in use (corrected by Message 17);
- internal DGNSS in use (corrected by a beacon), if implemented;
- internal GNSS in use;
- no sensor position in use.

Check the position accuracy and RAIM flag in the VDL Message 18 and, where provided, the ALR sentence.

Required Results

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies with Table 3.

Verify that the position sensor status is maintained for the next scheduled report and changed for subsequent reports.

Verify that the EUT does not accept Message 17 from a station using a non-base station MMSI.

Test Results

A beacon receiver is not implemented in the Class B, which is an optional feature, therefore this requirement is not tested.

Test Step	Result	Verdict
No GNSS	EUT outputs alarm sentence indicating not position in use: $AIALR,091958.00,026,A,V,AIS: No position sensor in use*71	Pass
Comments		
EUT does not implement dead reckoning. Therefore, the time stamp is always 63, this is to be compliant with test case 10.6.1.		
Test Step	Result	Verdict
GNSS connected	EUT outputs alarm sentence with alarm status cleared: $AIALR,092342.00,026,V,A,AIS: No position sensor in use*73 Sentence is output indicating internal GNSS in use: $AITXT,01,01,25,AIS: internal GNSS in use*5C RAIM = 0, PA flag = 0, position is correct: !AIVDM,1,1,,B,B3OdpnP3wovTpI7AfGWQ3wwQjl9b,0*6F	Pass
Message 17 applied to EUT	Sentence is output indicating message 17 is in use: $AITXT,01,01,24,AIS: internal DGNSS in use (Message 17)*55 RAIM = 0, PA flag = 1, position is correct: !AIVDM,1,1,,A,B3OdpnP0UgvUg@WAllt6wwu1h<02,0*57	Pass

No GNSS message 18 decode	
!AIVDM,1,1,,B,B3OdpnP3wk?8mP=18D3Q3wwQjIFr,0*66	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
COG	360
True Heading	511 - not available
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	1
Communication State - ITDMA Slot Increment	5211
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

GNSS connected message 18 decode

!AIVDM,1,1,,A,B3OdpnP007vTpI7AfHh03wfQjDdb,0*45

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	0 - low (>10 m)
Longitude	1 14.6446 W
Latitude	50 52.174 N
COG	0
True Heading	511 - not available
Time Stamp	29
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	5298
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

Message 17 applied to EUT, message 18 decode

!AIVDM,1,1,,A,B3OdpnP0UgvUg@WAllt6wwu1h<02,0*57

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	15
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	11.1
True Heading	511 - not available
Time Stamp	58
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	3
Communication State - SOTDMA Sub Message	Received Stations = 2

2.8 User interface

2.8.1 Specification Reference

IEC 62287-2, Clause 10.8

2.8.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.8.3 Date of Test

29-June-2018 to 17-July-2018

2.8.4 Test Results and Methods of Measurement

Status indication – Clause 10.8.1

Method of Measurement

Perform the following.

a) Set up standard test environment and operate the EUT in autonomous mode.
b) Send Message 23 with a quiet time to EUT.
c) Disable GNSS reception.

Check status indications.

Required Results

Check that:

a) power indicator is on and the no transmission indicator is off;
b) no transmission indicator is on and reverts to off after quiet time elapse;
c) the error indicator is on.

Test Results

a) Set up standard test environment and operate the EUT in autonomous mode.	
Requirement	Verdict
The status indicator is green, indicating the power is on and the EUT is transmitting.	Pass

b) Send Message 23 with a quiet time to EUT.		
Time	Requirement	Verdict
15:11:55	Message 23 with quiet time of 5 min received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<0000000D0,2*45	Pass
15:12:53	The status indicator changes to orange, indicating no transmissions	Pass
15:17:02	The status indicator changes to green after quiet time has elapsed, indicating that the EUT is transmitting.	Pass

c) Disable GNSS reception.	
Requirement	Verdict
The status indicator changes to red, indicating an error.	Pass

Static data input – Clause 10.8.3

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode.

a) Enter all static data except MMSI.
b) Enter an MMSI outside the valid range.
c) Enter an MMSI according to the manufacturer's initialisation procedure.
d) Enter a new MMSI.
e) Enter all other static data.

Required Results

Verify that:

a) the static data is correctly stored according to the manufacturer's initialisation procedure;
b) the unit does not accept the MMSI;
c) the unit accepts the MMSI as entered by the user;
d) the unit does not accept the MMSI as entered by the user;
e) static data can be changed.

Test Results

a) Enter all static data except MMSI.	
Requirement	Verdict
Ship static data before test according to "$AIAIQ,SSD" NMEA sentence: $AISSD,1234567,TUV TEST B,1,2,3,4,1,AI*42	-
Message 24A and 24B prior to test: !AIVDO,1,1,,A,H59bTRiAEJ1@E=B080000000000,2*62 !AIVDO,1,1,,A,H59bTRI:ooo4N90ijklmno08234t,0*6F	-
SSD sentences are applied to the EUT to set all parameters except MMSI: $AISPW,SSD,234567898,3,OCIVAN*0F $AISSD,1111111,TSET VUT,5,5,5,5,0,AI*24	Pass
Static data has been stored according to "$AIAIQ,SSD" NMEA sentence: $AISSD,1111111,TSET VUT,5,5,5,5,0,AI*24	Pass
Message 24A and 24B match parameters set by SSD sentence: !AIVDO,1,1,,A,H59bTRiA<EB1IE@000000000000,2*68 !AIVDO,1,1,,A,H59bTRI:ooo4N90iiiiiii0`555t,0*36	Pass

a) Message 24A prior to testing decode	
!AIVDO,1,1,,A,H59bTRiAEJ1@E=B080000000000,2*62	
Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	345678987
Part Number	0
Name	TUV TEST B@@@@@@@@@@

a) Message 24B prior to testing decode	
!AIVDO,1,1,,A,H59bTRI:ooo4N90ijklmno08234t,0*6F	
Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	345678987
Part Number	1
Type of ship and cargo type	10
Vendor ID	777D^I@
Call Sign	1234567
Dimension of ship/reference for position	1,2,3,4
Spare	60

a) Message 24A after testing decode

!AIVDM,1,1,,A,H3OdpnQA<EB1IE@000000000000,2*3C

Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	234567898
Part Number	0
Name	TSET VUT@@@@@@@@@@@@

a) Message 24B after testing decode

!AIVDO,1,1,,A,H59bTRI:ooo4N90iiiiiii0`555t,0*36

Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	345678987
Part Number	1
Type of ship and cargo type	10
Vendor ID	777D^I@
Call Sign	1111111
Dimension of ship/reference for position	5,5,5,5
Spare	60

b) The MMSI was set to zero using a proprietary sentence, not available to the user:
$IISPW,OSG,,3,OCIVAN*20
$POSG,SET,MMSI Number,567890123,0*55

Test	Result	Verdict
Set MMSI outside of allowable range to 100000000: $AISPW,EPV,000000000,3,OCIVAN*00 $AIEPV,C,AI,000000000,106,100000000*1A	MMSI is unchanged at 0, this was verified with a proprietary sentence: $POSG,VAL,MMSI Number,,0*79	Pass
Set MMSI outside of allowable range to 800000000: $AISPW,EPV,000000000,3,OCIVAN*00 $AIEPV,C,AI,000000000,106,800000000*13	MMSI is unchanged at 0, this was verified with a proprietary sentence: $POSG,VAL,MMSI Number,,0*79	Pass
Set MMSI outside of allowable range to 988000000: $AISPW,EPV,000000000,3,OCIVAN*00 $AIEPV,C,AI,000000000,106,988000000*12	MMSI is unchanged at 0, this was verified with a proprietary sentence: $POSG,VAL,MMSI Number,,0*79	Pass

c) Enter an MMSI according to the manufacturer's initialisation procedure

Test	Result	Verdict
Set a valid MMSI: $AISPW,EPV,000000000,3,OCIVAN*00 $AIEPV,C,AI,000000000,106,788000000*1C	MMSI is set to 788000000: $AIEPV,R,AI,000000000,106,788000000*0D $POSG,VAL,MMSI Number,,788000000*7E	Pass

d) Enter a new MMSI

Test	Result	Verdict
Set a new, valid MMSI: $AISPW,EPV,788000000,3,OCIVAN*07 $AIEPV,C,AI,788000000,106,300000000*1F	EUT does not change MMSI: $AINAK,AI,106,788000000,11,Cannot fulfil request*3C $POSG,VAL,MMSI Number,,788000000*7E	Pass

e) Enter all static data except MMSI

Test	Result	Verdict
Current Ship static data query, $AIAIQ,SSD*39	$AISSD,1234567,TUV TEST B,1,2,3,4,1,AI*42	-
Message 24A and 24B prior to test:	!AIVDM,1,1,,B,H;gOe01AEJ1@E=B080000000000,2*15 !AIVDM,1,1,,B,H;gOe04Uooo4N90ijklmno082344,0*37	-
SSD sentences applied to the EUT: $AISPW,SSD,788000000,3,OCIVAN*00 $AISSD,1111111,OS CLASS B,5,5,5,5,0,AI*55	Static data has been stored, verified by query: $AISSD,1111111,OS CLASS B,5,5,5,5,0,AI*55	Pass
Message 24A and 24B match parameters set by SSD sentence:	!AIVDM,1,1,,B,H;gOe00u>0<h5=>080000000000,2*08 !AIVDM,1,1,,B,H;gOe04Uooo4N90iiiiiii0`5554,0*6E	Pass

2.9 TDMA synchronisation

2.9.1 Specification Reference

IEC 62287-2, Clause 12.1

2.9.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.9.3 Date of Test

30-July-2018 to 07-September-2018

2.9.4 Test Results and Methods of Measurement

Synchronisation test using UTC direct and indirect – Clause 12.1.1

Method of Measurement

Set up standard test environment; choose test conditions in a way that the EUT operates in the following synchronisation modes:

a) UTC direct;
b) UTC indirect (internal synchronisation source disabled; at least one other station UTC direct synchronised);
c) BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range);
d) UTC indirect (internal GNSS receiver disabled; only Class B SO station UTC direct synchronised).

Check all CommState parameters in position report. Check reporting interval.

Required Results

Confirm that:

a) the SynchState = 0,
b) the SynchState = 1,
c) the SynchState = 1,
d) the SynchState = 1,

Test Results

a) UTC direct	
Requirement	Verdict
EUT is synchronised with internal UTC source.	Pass
SynchState parameter in the CommState of Message 18 is 0: !AIVDM,1,1,,A,B3OdpnP007vTq;7AfC400IUQnDLb,0*43	Pass

a) UTC direct; Message 18 decode

!AIVDM,1,1,,A,B3OdpnP007vTq;7AfC400IUQnDLb,0*43

Parameter	Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	0 - low (>10 m)
Longitude	1 14.6346 W
Latitude	50 52.1649 N
COG	0
True Heading	51
Time Stamp	11
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	5234
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

b) UTC indirect (internal synchronisation source disabled; at least one other station UTC direct synchronised)

Requirement	Verdict
EUT internal UTC source disabled by disconnecting GPS antenna.	Pass
SynchState parameter in the CommState of Message 18 is 1: !AIVDM,1,1,,B,B3OdpnP3wk?8mP=18D3Q0IwQjlCb,0*4E	Pass

b) UTC indirect; Message 18 decode

!AIVDM,1,1,,B,B3OdpnP3wk?8mP=18D3Q0IwQjlCb,0*4E

Parameter	Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
COG	360
True Heading	51
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	1
Communication State - ITDMA Slot Increment	5198
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

c) BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range);	
Requirement	Verdict
EUT internal UTC source disabled by disconnecting GPS antenna.	Pass
SynchState parameter in the CommState of Message 18 is 1: !AIVDM,1,1,,A,B3OdpnP3wk?8mP=18D3Q0IwQjlgb,0*69	Pass

c) UTC indirect; Message 18 decode	
!AIVDM,1,1,,A,B3OdpnP3wk?8mP=18D3Q0IwQjlgb,0*69	
Parameter	Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
COG	360
True Heading	51
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	1
Communication State - ITDMA Slot Increment	5310
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

d) UTC indirect (internal GNSS receiver disabled; only Class B SO station UTC direct synchronised).	
Requirement	Verdict
EUT internal UTC source disabled by disconnecting GPS antenna.	Pass
SynchState parameter in the CommState of Message 18 is 1: !AIVDM,1,1,,A,B3OdpnP3wovTpJ7AfECQ3wwQjmA:,0*58	Pass

d) UTC indirect; Message 18 decode	
!AIVDM,1,1,,A,B3OdpnP3wovTpJ7AfECQ3wwQjmA:,0*58	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	1 14.6444 W
Latitude	50 52.1684 N
COG	360
True Heading	511 - not available
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	1
Communication State - ITDMA Slot Increment	5444
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

Synchronisation test without UTC, EUT receiving semaphore – Clause 12.1.2

Method of Measurement

Set up standard test environment; choose test conditions such that the EUT operates with other units acting as follows.

a) The EUT is receiving a mobile station that is acting as semaphore with no Base Stations being received.
b) Introduce a Base Station that is acting as a semaphore with different timing.
c) Enable internal synchronisation source.

Check all CommState parameters in position report. Check reporting interval.

Required Results

Confirm that:

a) transmitted SynchState = 3,
b) the EUT shall change synchronisation source to the Base Station, and
c) synchronisation mode shall revert to UTC direct, SynchState = 0.

Test Results

a) Mobile acting as a semaphore with no base stations	
Requirement	Verdict
SynchState parameter in the CommState of Message 18 is 3: !AIVDM,1,1,,A,B3OdpnP3wouQCh7E=C3Q3wwQkllb,0*13	Pass

a) Message 18 decode	
!AIVDM,1,1,,A,B3OdpnP3wouQCh7E=C3Q3wwQkllb,0*13	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	not available
Position Accuracy	0 - low (>10 m)
Longitude	2 10 W
Latitude	51 15 N
COG	360
True Heading	511 - not available
Time Stamp	63
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	3
Communication State - ITDMA Slot Increment	5330
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192

b) base station acting as a semaphore	
Requirement	Verdict
The EUT synchronises to the base station	Pass

c) GNSS re-connected to EUT	
Requirement	Verdict
SynchState parameter in the CommState of Message 18 is 0: !AIVDM,1,1,,A,B3OdpnP0I7vUg@WAIIt6t0JQh8Ck,0*2E	Pass

c) Message 18 decode	
!AIVDM,1,1,,A,B3OdpnP0I7vUg@WAIIt6t0JQh8Ck,0*2E	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	10
Position Accuracy	0 - low (>10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	11.1
True Heading	0
Time Stamp	53
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	2
Communication State - SOTDMA Sub Message	Slot Number = 1267

2.10 Time division (frame format)

2.10.1 Specification Reference

IEC 62287-2, Clause 12.2

2.10.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.10.3 Date of Test

15-May-2018

2.10.4 Test Results and Methods of Measurement

Method of Measurement

Set the EUT to maximum reporting interval of 5 s by applying a speed of > 23 kn. Record VDL Messages and check for used slots. Check parameter slot number in CommState of position report. Check slot length (transmission time).

Required Results

Slot number used and slot number indicated in CommState shall match. Slot number shall not exceed 2249. Slot length shall not exceed 26,67 ms.

Test Results

Requirement	Verdict
Reporting of Message 18 rate is 5 s.	Pass
The slot number in the CommState matches the transmitted slot number.	Pass
Slot number does not exceed 2249.	Pass
Slot length does not exceed 26.67 ms.	Pass

Message 18 decode, slot number = 0195	
!AIVDM,1,1,,A,B3OdpnP00?vUg@WAIIt0001Qh833,0*4E	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	3
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	2
Communication State - SOTDMA Sub Message	Slot Number = 195

2.11   Synchronisation jitter

2.11.1   Specification Reference

IEC 62287-2, Clause 12.3

2.11.2   Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.11.3   Date of Test

16-July-2018

2.11.4   Test Results and Methods of Measurement

Method of Measurement

Set up standard test environment. Set the EUT to 5 s reporting interval using

a)   UTC direct synchronisation, and
b)   UTC indirect synchronisation by disconnecting the synchronisation source of the EUT.

Record VDL Messages and measure the time between the nominal beginning of the slot (Nominal T0) and the start flag, and calculate it back to T0.
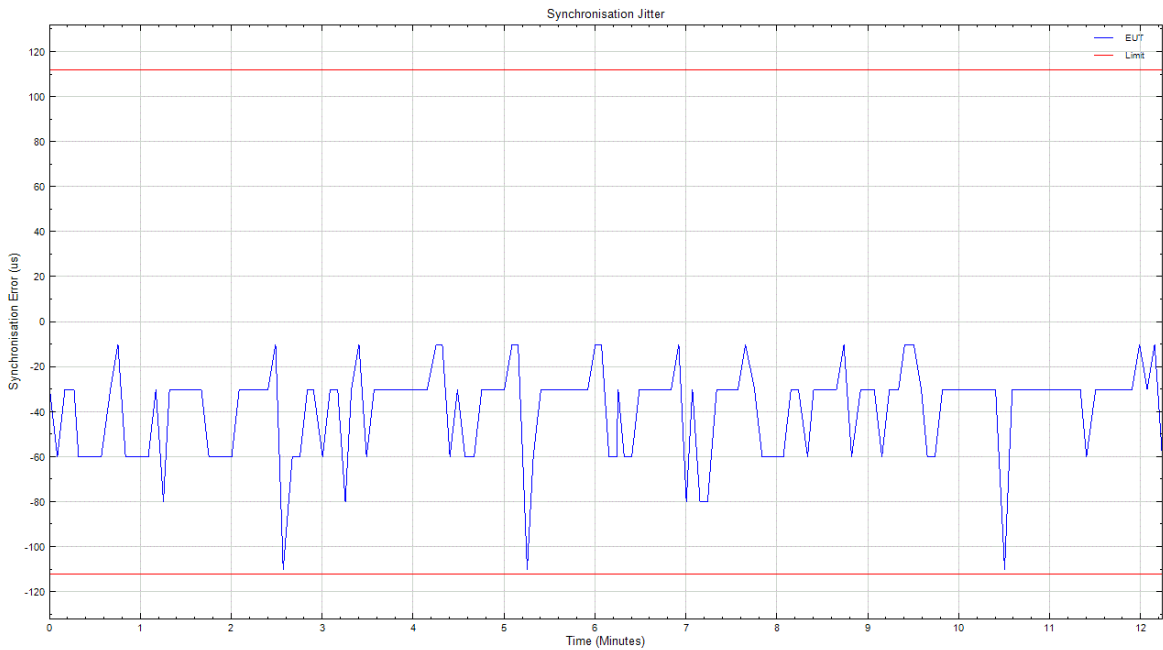
Required Results

The synchronisation jitter shall not exceed

a)   ±104 µs using UTC direct synchronisation, and
b)   ±312 µs using UTC indirect synchronisation.

Test Results

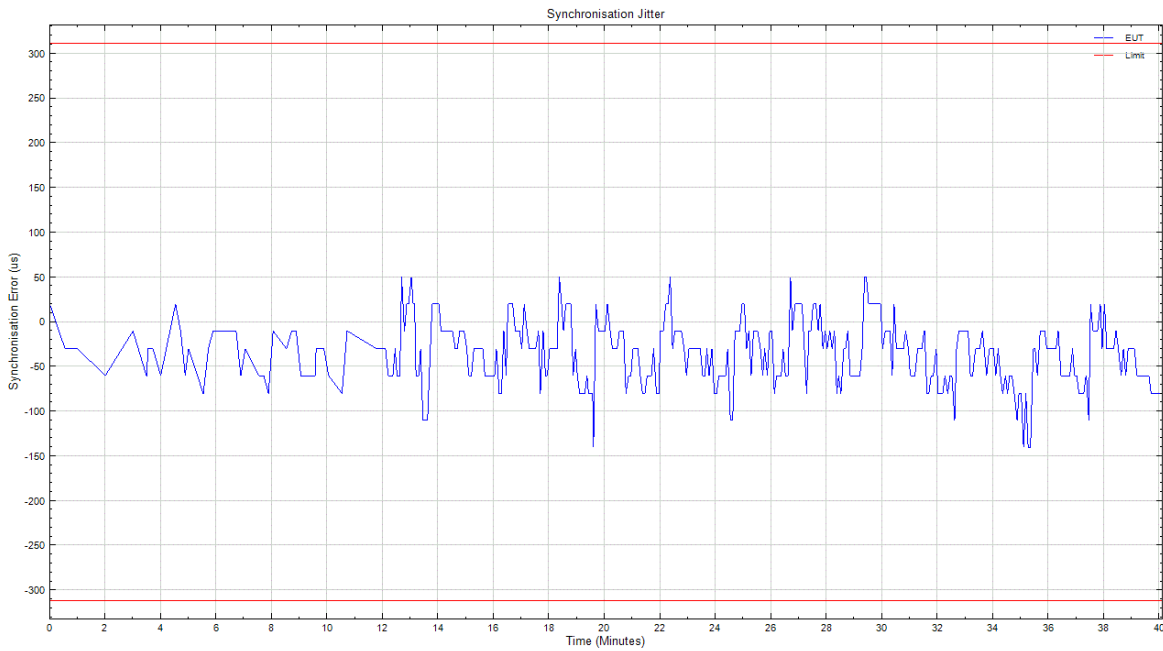| UTC Direct	
Requirement	Verdict
Confirm that the jitter does not exceed ±104 µs.	Pass

UTC Indirect	
Requirement	Verdict
Confirm that the jitter does not exceed ±312 µs.	Pass

Synchronisation Jitter – UTC Direct

Synchronisation Jitter – UTC Indirect

2.12 Data encoding (bit stuffing)

2.12.1 Specification Reference

IEC 62287-2, Clause 12.4

2.12.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.12.3 Date of Test

02-August-2018

2.12.4 Test Results and Methods of Measurement

Method of Measurement

Set up standard test environment.

Set ship's name to HEX-Values "7E 3B 3C 3E 7E" so that bit stuffing will be applied and check the VDL (note that this might require that the manufacturer provides means to input this data).

Required Results

Confirm that transmitted VDL Messages 24A and 24B conform to data input.

Test Results

Requirement	Verdict
The manufacturer provided a proprietary sentence to set the ship's name to "_#,<O'8"	Pass
Confirm that the correct Messages 24A and 24B is output by the PI: !AIVDM,1,1,,C,H3OdpnQv>khvOP0000000000000,2*2B !AIVDM,1,1,,D,H3OdpnTUooo4N90ijklmno082344,0*11	Pass

Message 24A decode	
!AIVDM,1,1,,C,H3OdpnQv>khvOP0000000000000,2*2B	
Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	234567898
Part Number	0
Name	_#,<O'8

Message 24B decode	
!AIVDM,1,1,,D,H3OdpnTUooo4N90ijklmno082344,0*11	
Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	234567898
Part Number	1
Type of ship and cargo type	37
Vendor ID	777D^I@
Call Sign	1234567
Dimension of ship/reference for position	1,2,3,4
Spare	4

2.13 Frame check sequence

2.13.1 Specification Reference

IEC 62287-2, Clause 12.5

2.13.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.13.3 Date of Test

02-August-2018

2.13.4 Test Results and Methods of Measurement

Method of Measurement

Apply simulated position report Messages with wrong CRC bit sequence to the VDL.

a) Check test output; if a display interface is provided, check this.
b) Repeat test 12.1.2 and check that a station transmitting Messages with wrong CRC is not used for synchronisation.

Required Results

Confirm that Messages with invalid CRC are not accepted by the EUT in cases a) and b) of 12.5.2.

Test Results

Step a) Message reception with invalid CRC	
Requirement	Verdict
Message 1 with valid CRC is received by the EUT and a VDM is output to the PI.	-
Message 1 with invalid CRC is not accepted by the EUT and a VDM is not output to the PI.	Pass

Step b) Synchronisation	
Requirement	Verdict
EUT without GNSS synchronises to a station transmitting message 1 with a valid CRC and continues transmissions.	-
EUT ceases to transmit when receiving message 1 with an invalid CRC.	Pass

2.14   Slot allocation (channel access protocols)

2.14.1   Specification Reference

IEC 62287-2, Clause 12.6

2.14.2   Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.14.3   Date of Test

18-May-2018 to 11-October-2018

2.14.4   Test Results and Methods of Measurement

Network entry – Clause 12.6.1

Method of Measurement

Set up standard test environment; switch on EUT. Record transmitted scheduled position reports for the first 3 min of transmission after initialisation period. Check CommState for channel access mode.

Required Results

EUT shall start autonomous transmissions of Message 18 (position report) with ITDMA CommState with KeepFlag set true for first minute of transmission and Message 18 with SOTDMA CommState thereafter.

Test Results

SOG = 25 kn, Rr = 5 s	
Requirement	Verdict
Verify that the first message is Message 18.	Pass
Check that the keep flag is set in Message 18 for the first minute.	Pass
Confirm that ITDMA CommState flag is set in Message 18 for the first minute.	Pass
Confirm that the ITDMA Message 18 is transmitted in the allocated slots in the next frame.	Pass
Confirm that SOTDMA CommState is used in the Message 18 following one minute.	Pass
Verify that the initial slot timeout of the SOTDMA Message 18 is between 3 and 7.	Pass
Confirm that the slot timeout values are decreased by one in the next frame the SOTDMA Message 18 transmits.	Pass

Initial ITDMA Message 18

!AIVDO,1,1,,A,B3OdpnP00OvUg@WAIIt0008Qj1Ki,0*1C

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0.1
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	17
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	Slot Increment = 367
Communication State - ITDMA Number of Slots	1
Communication State - ITDMA Keep Flag	1

SOTDMA Message 18 after one min

!AIVDM,1,1,,A,B3OdpnP00?vUg@WAIIt0008Qh@;6,0*32

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	17
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0
Communication State - Sync State	0
Communication State - Slot Timeout	4
Communication State - Sub Message	Slot Number = 710

Autonomous scheduled transmissions (SOTDMA) – Clause 12.6.2

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Record transmitted scheduled position reports Message 18 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters number of received stations, slot timeout, slot number and slot offset.
b) Repeat the test with 50 % channel loading ensuring there are at least 4 free slots in each SI.

Required Results

Check that the following is achieved:

a) nominal reporting interval is achieved ±20 % (allocating slots in selection interval SI). Confirm that the EUT allocates new slots NTS within SI after 3 min to 8 min. Check that slot offset indicated in CommState matches slots used for transmission. Check that Class B "CS" are not included in the number of received stations. Check that during DSC monitoring periods there are no time out values of "0";
b) only free slots are used for transmission.

Test Results

a) No VDL Load, SOG = 25 kn	
Requirement	Verdict
Confirm that position reports are transmitted every 5 seconds.	Pass
Verify that the allocated slots are correct according to the 5 second reporting rate.	Pass
Confirm that each position report slot interval is 187.5 ± 20%. Min = 156, Max = 223 over 51 frames	Pass
Confirm that each position report is transmitted on alternate channels.	Pass
Channel access mode is SOTDMA	Pass
Verify that the initial slot timeout is between 3 and 7.	Pass
Verify that for timeout values 3, 5 and 7, the sub message contains the number of received stations.	Pass
Verify that for timeout values 2, 4 and 6, the sub message contains the current slot number.	Pass
Verify that for timeout value 1, the sub message contains UTC hour and minute.	Pass
Verify that for timeout value 0, the sub message contains the next slot offset.	Pass
Confirm that after slot time-out is zero, the value indicated by slot offset is used in the following frame.	Pass
Check that Class B "CS" are not included in the number of received stations.	Pass

b) 50 % Load on Channel A with Message 18	
Requirement	Verdict
Position reports are transmitted every 5 seconds.	Pass
Only free slots used for transmission	Pass

b) 50 % Load on Channel B with Message 18	
Requirement	Verdict
Position reports are transmitted every 5 seconds.	Pass
Only free slots used for transmission	Pass

Autonomous scheduled transmissions (ITDMA) – Clause 12.6.3

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Set speed to less than 2 knots giving a reporting interval of 3 min. Record transmitted scheduled position reports.

Required Results

Check that EUT transmits Message 18 with ITDMA CommState and allocates slots using ITDMA and that slot offset indicated in CommState matches slots used for transmission.

Check that nominal reporting interval is achieved ±20 %.

Test Results

Requirement	Verdict
EUT transmits Message 18 using ITDMA	Pass
Reporting rate of Message 18 is 3 min	Pass
Slot offset is correct for the next transmitted slot	Pass
Slot interval is 6749 ± 20%. Min = 6610, Max = 6920 over 71 frames	Pass

ITDMA Message 18	
!AIVDM,1,1,,A,B3OdpnP00?vUg@WAllt0005QnDu:,0*7F	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	11
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	5364
Communication State - ITDMA Number of Slots	5 - 5 = 1 slot; offset = slot increment + 8 192
Communication State - ITDMA Keep Flag	0

Transmission of Messages 24A and 24B (ITDMA) – Clause 12.6.4

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Record transmitted messages.

Required Results

Confirm that EUT transmits Messages 24A and 24B using the ITDMA access scheme. The SOTDMA CommState of Messages 18 shall, as far as possible, be changed to ITDMA CommState to allocate slots for Messages 24A and 24B.

Test Results

SOG > 25, Rr = 5 s	
Requirement	Verdict
EUT transmits Message 24A and 24B using ITDMA	Pass
Reporting rate between Message 24A is 6 min	Pass
EUT transmits Message 18 using SOTDMA	Pass
EUT transmits Message 18 using ITDMA to allocate slots for Message 24A and 24B	Pass

ITDMA Message 18 allocating slots for Messages 24A	
!AIVDM,1,1,,B,B3OdpnP00?vUg@WAIIt000A1n0FQ,0*44	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	34
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	90
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	1

ITDMA Message 24A decode	
!AIVDM,1,1,,B,H3OdpnQAEJ1@E=B080000000000,2*35	
Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	234567898
Part Number	0
Name	TUV TEST B@@@@@@@@@@

ITDMA Message 18 allocating slots for Messages 24B

!AIVDM,1,1,,B,B3OdpnP00?vUg@WAllt000FQn0Ni,0*13

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	0
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	0
True Heading	0
Time Stamp	45
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	1 - RAIM in use
Comm State Flag	1 - ITDMA
Communication State - Sync State	0
Communication State - ITDMA Slot Increment	123
Communication State - ITDMA Number of Slots	0 - 0 = 1 slot
Communication State - ITDMA Keep Flag	1

ITDMA Message 24B decode

!AIVDM,1,1,,B,H3OdpnT0ooo02L@ijklmno000004,0*02

Parameter	Decoded Value
Message ID	24
Repeat Indicator	0
MMSI	234567898
Part Number	1
Type of ship and cargo type	0
Vendor ID	777@B\P
Call Sign	1234567
Dimension of ship/reference for position	0,0,0,0
Spare	4

Assigned operation – Clause 12.6.5

Message 16 with slot assignment – Clause 12.6.5.1

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode (SOG < 2 kn).

a) Transmit an assigned mode command Message 16 to the EUT with initial slot offset and increment.
b) Increase speed to 25 kn while still assigned to a reporting interval of 10 s.
c) Every 3 min, send further assignment Messages with the same slot assignment.
d) Transmit an assigned mode command Message 16 with a non-base station MMSI to the EUT with initial slot offset and increment.
e) Transmit an assigned mode command Message 16 to an MMSI different to the MMSI of the EUT with initial slot offset and increment.

Record transmitted Messages.

Required Results

Confirm that the following is achieved:

a) the EUT transmits a Message 18 in the designated slots. Check that the assigned mode flag is set to 1;
b) the EUT stays in assigned mode using the assigned slots;
c) the EUT continues in assigned mode when it receives a further assignment commands by Message 16. Verify that the slot timeout value is updated for every received Message 16;
d) the EUT ignores Message 16 and continues autonomous mode operation;
e) the EUT ignores Message 16 and continues autonomous mode operation.

Confirm that the EUT reverts to autonomous mode with autonomous reporting interval 4 min to 8 min after the last Message 16.

Test Results

a) Transmit an assigned mode command Message 16 to the EUT with initial slot offset and increment.	
Requirement	Verdict
Message 16 transmitted to EUT with slot offset = 100 and increment = 2 in slot 1829: !AIVDO,1,1,,A,@027`SPos>=`6@0P,0*5B	-
EUT transmits Message 18 in slot 1929: !AIVDM,1,1,,A,B3OdpnP0I?vUg@WAIlt6t0HQt@N9,0*1F	Pass
Assigned mode flag is set to 1.	Pass
Assigned mode reporting interval = 10 seconds	Pass

a) Message 16 decode

!AIVDO,1,1,,A,@027`SPos>=`6@0P,0*5B

Parameter	Decoded Value
Message ID	16
Repeat indicator	0
Source ID	2222222
Spare	0
Destination ID A	345678987
Offset A	500
Increment A	1
Destination ID B	0
Offset B	0
Increment B	0
Spare	0 Bits

a) Message 18 decode

!AIVDM,1,1,,A,B3OdpnP0I?vUg@WAIlt6t0HQt@N9,0*1F

Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	10
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	11.1
True Heading	0
Time Stamp	49
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	1
RAIM Flag	1 - RAIM in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	4
Communication State - SOTDMA Sub Message	Slot Number = 1929

b) Increase speed to 25 knots

Requirement	Verdict
The EUT stays in the assigned slots and does not increase the reporting rate	Pass

c) Every 3 min, send further assignment Messages

Requirement	Verdict
EUT currently in assigned mode, with slot timeout currently = 4: !AIVDM,1,1,,B,B3OdpnP0I?vUg@WAIlt6t02Qp@4E,0*64	-
Message 16 transmitted to EUT with slot offset = 100 and increment = 2 in slot 1829: !AIVDO,1,1,,A,@027`SPos>=`6@0P,0*5B	Pass
EUT updates timeout value to new value = 7: !AIVDM,1,1,,B,B3OdpnP0I?vUg@WAIlt6t02QpL02,0*1B	Pass

d) Non base station MMSI

Requirement	Verdict
Message 16 transmitted to EUT with MMSI = 333333333: !AIVDO,1,1,,A,@4uq3E@os>=`6@0P,0*0B	-
EUT ignores assigned mode message and continues in autonomous mode	Pass

e) Different MMSI

Requirement	Verdict
Message 16 transmitted to EUT with incorrect EUT MMSI = 234567899: !AIVDO,1,1,,A,@027`SPos>=d6@0P,0*5F	-
EUT ignores assigned mode message and continues in autonomous mode	Pass

Message 16 with rate assignment – Clause 12.6.5.2

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode (SOG < 2 kn).

a) Transmit an assigned mode command Message 16 to the EUT with a designated reporting interval of 5 s.
b) Transmit an assigned mode command Message 16 to the EUT with the assigned reporting interval of 10 s.
c) Increase speed to 25 kn while still assigned to a reporting interval of 10 s.
d) Every 3 min, send further assignment Messages with a reporting interval of 10 s.
e) Transmit an assigned mode command Message 16 to the EUT with a non-base station MMSI.

Record transmitted Messages.

Required Results

Confirm that the following is achieved:

a) the EUT transmits with the designated reporting interval of 5 s. Check that the assigned mode flag is set to 1;
b) the reporting interval is 10 s;
c) the EUT stays in assigned mode with a reporting interval of 10 s;
d) the EUT continues in assigned mode when it receives a further assignment commands by Message 16. Verify that the slot timeout value in the CommState is not updated by the received Message 16;
e) confirm that the EUT ignores Message 16 and continues autonomous mode operation.

Confirm that the EUT reverts to autonomous mode with autonomous reporting interval 4 min to 8 min after the last Message 16.

Test Results

a) Designated reporting interval of 5 s	
Requirement	Verdict
Message 16 transmitted to EUT with number of reports / 10 mins = 120 !AIVDO,1,1,,A,@027`SPos>=`7P00,0*2A	-
EUT enters assigned mode and sets mode flag = 1: !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t0@1pD02,0*76	Pass
Reporting interval changes to 5 seconds: 08:55:33 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t0@1pD02,0*76 08:55:38 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t0BQpD02,0*17 08:55:42 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t0DQpD02,0*12 08:55:47 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t0GQpD02,0*12 08:55:52 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t0J1pD02,0*7C 08:55:58 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t0LQpD02,0*19 08:56:02 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t011pD02,0*07 08:56:07 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t03QpD02,0*66 08:56:12 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t061pD02,0*00 08:56:17 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t08QpD02,0*6D 08:56:22 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAllt6t0:QpD02,0*6C 08:56:27 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAllt6t0=QpD02,0*68	Pass
EUT returns to autonomous mode after 4 to 8 minutes	Pass

b) Designated reporting interval of 10 s	
Requirement	Verdict
Message 16 received by EUT with number of reports / 10 mins = 60 !AIVDM,1,1,,A,@027`SPos>=`3h00,0*14	-
Reporting interval changes to 10 seconds: 09:04:17 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAIlt6t08Qp8:R,0*7B 09:04:29 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAIlt6t0>1p8@w,0*41 09:04:38 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAIlt6t0BQp8Fc,0*4C 09:04:50 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAIlt6t0HQp8MJ,0*67 09:04:59 – !AIVDM,1,1,,B,B3OdpnP057vUg@WAIlt6t0M1p8Rw,0*23 09:04:09 – !AIVDM,1,1,,A,B3OdpnP057vUg@WAIlt6t041p85C,0*0A	Pass
EUT returns to autonomous mode after 4 to 8 minutes	Pass

c) Change speed to 25 knots	
Requirement	Verdict
Reporting interval remains at 10 seconds.	Pass
EUT remains in assigned mode: !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t031p84;,0*57	Pass

d) Further assigned mode commands – Slot timeout value = 4 before message 16 is received	
Requirement	Verdict
Message 16 received by EUT with number of reports / 10 mins = 60 !AIVDM,1,1,,A,@027`SPos>=`3h00,0*14	Pass
EUT does not update the slot timeout value and remains in assigned mode: !AIVDM,1,1,,A,B3OdpnP057vUg@WAIlt6t0E1p@JD,0*7B	Pass

e) Non base station MMSI	
Requirement	Verdict
Message 16 received by EUT with a non base station MMSI = 222222222 !AIVDO,1,1,,A,@3CsGSPos>=`3h00,0*07	Pass
EUT ignores the message and remains in autonomous mode	Pass

Assigned mode using invalid reporting rates – Clause 12.6.5.3

Method of Measurement

Operate standard test environment and EUT in autonomous mode. Transmit an assigned mode command Message 16 using a base station MMSI to the EUT with

a) the number of reports per 10 min which is not a multiple of 20, and
b) the number of reports per 10 min which is higher than 120.

Required Results

Confirm that:

a) the EUT transmits position reports Message 18 at a reporting rate that corresponds to the next highest multiple of 20 reports per 10 min, and
b) the EUT transmits position reports Message 18 at a reporting interval of 5 s.

Test Results

a) Not a multiple of 20	
Requirement	Verdict
Message 16 transmitted to EUT with number of reports / 10 mins = 24 !AIVDM,1,1,,A,@027`SPos>=`1P00,0*2E	-
EUT transmits at the next multiple of 20, 40 = reporting interval = 15 seconds: 12:16:48 – !AIVDM,1,1,,B,B3OdpnP05GvUg@WAllt6t0GQp800,0*1C 12:17:03 – !AIVDM,1,1,,A,B3OdpnP05GvUg@WAllt6t00Qp5a4,0*30 12:17:17 – !AIVDM,1,1,,B,B3OdpnP05GvUg@WAllt6t07Qp5a4,0*34 12:17:32 – !AIVDM,1,1,,B,B3OdpnP05GvUg@WAllt6t0>Qp5a4,0*3D	Pass

b) Greater than 120	
Requirement	Verdict
Message 16 transmitted to EUT with number of reports / 10 mins = 200 !AIVDO,1,1,,A,@027`SPos>=`<P00,0*21	-
EUT transmits with a reporting interval = 5 seconds: 12:36:20 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t091p<02,0*77 12:36:25 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t0;1p<02,0*76 12:36:30 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t0>1p<02,0*70 12:36:36 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t0AQp<02,0*6C 12:36:40 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t0CQp<02,0*6D 12:36:45 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t0EQp<02,0*68 12:36:49 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t0GQp<02,0*69 12:36:55 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t0IQp<02,0*64 12:37:01 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t0LQp<02,0*62 12:37:06 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t021p<02,0*7F 12:37:11 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAllt6t04Qp<02,0*1A 12:37:15 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAllt6t06Qp<02,0*1B	Pass

Slot assignment to FATDMA reserved slots – Clause 12.6.5.4

Method of Measurement

Set up the standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (Message 20) using a base station MMSI to the EUT with slot offset and increment. Transmit an Assigned Mode Command (Message 16) using a base station MMSI to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

Required Results

Confirm that the EUT uses the slots commanded by Message 16 for own transmissions.

Test Results

Requirement	Verdict
EUT is transmitting with a 5 second reporting interval, in the following slots: Slot 0013 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0M1hD01,0*43 Slot 0199 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t01Qh<01,0*24 Slot 0382 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t041h<01,0*42 Slot 0578 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t06QhD01,0*5B Slot 0765 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t091h@;u,0*7C Slot 0940 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0;QhD01,0*56 Slot 1141 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0>1h8Am,0*61 Slot 1376 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0B1h<01,0*37 Slot 1521 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0CQh8Gi,0*7E Slot 1707 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0EQh0S2,0*3C Slot 1891 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0H1h<01,0*3E Slot 2077 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0JQh<01,0*5F	-
Message 20 received by EUT reserving slots ending in 0-4 over the entire frame !AIVDM,1,1,,A,D027`SP0aN0`,0*7B	-
EUT changes the slots it transmits in, to avoid the reserved slots: Slot 0015 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0M1h<01,0*3B Slot 0199 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t01Qh0S8,0*42 Slot 0396 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t041h86<,0*4D Slot 0578 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t06Qh892,0*2D Slot 0765 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t091h5s4,0*00 Slot 0949 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0;Qh<01,0*2E Slot 1127 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0>1h@AW,0*23 Slot 1376 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0AQh0RH,0*43 Slot 1516 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0C1h@Gd,0*6B Slot 1699 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0EQh5s4,0*1F Slot 1879 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0HQhD01,0*26 Slot 2077 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0JQh0S9,0*38	-
Message 16 received by EUT, with an offset of 10 and reporting interval of 375 slots: !AIVDM,1,1,,A,@027`SPos>=`0`0P,0*7F	-
EUT transmits in the assigned slots, which were reserved by message 20: Slot 0050 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0MQp@0j,0*64 Slot 0425 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t051p@6a,0*72 Slot 0800 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t09Qp@<P,0*26 Slot 1175 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0>Qp@BG,0*4B Slot 1550 – !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIIt6t0D1p@H>,0*21 Slot 1925 – !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIIt6t0HQp@N5,0*43	Pass

Group assignment – Clause 12.6.6

Entering interval assignment – Clause 12.6.6.1

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s (SOG = 15 kn). Perform the following tests after time-out of the previous test.

a) Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 30 s assigned.
b) Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.
c) Using a non-base station MMSI, transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.
d) Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 2 s assigned.11
e) Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval field setting 9 (next shorter autonomous reporting interval).
f) Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval field setting 10 (next longer autonomous reporting interval).

Monitor the VDL.

Required Results

Verify that:

a) EUT enters assigned operation mode and transmits position report Message 18 with 30 s reporting interval. Verify that EUT builds up the assigned transmission scheduled according to the network entry procedure. Verify that unused slots of the previous reporting schedule are released. Verify that the EUT reverts to autonomous mode after a time out of 4 min to 8 min building up the autonomous transmission schedule according to the network entry procedure and releases unused slots from previous schedule;
b) EUT enters assigned operation mode and transmits position report Message 18 with 5 s reporting interval. Verify that EUT builds up the assigned transmission scheduled according to network entry procedure. Verify that unused slots of the previous reporting schedule are released. Verify that the EUT reverts to autonomous mode after a time out of 4 min to 8 min building up the autonomous transmission schedule according to the network entry procedure and releases unused slots from the previous schedule;
c) EUT does not react on Message 23;
d) EUT does not react on Message 23;
e) EUT enters assigned operation mode and transmits position report Message 18 with 5 s reporting interval;
f) EUT enters assigned operation mode and transmits position report Message 18 with 30 s reporting interval.

Test Results

a) 30 Second reporting interval	
Requirement	Verdict
Message 23 with reporting interval 30 s received by EUT: 14:46:45 – !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000500,2*34	Pass
EUT transmits Message 18 with 30 s reporting interval: 14:47:51 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0I1p<02,0*07 14:48:23 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0:Qp<02,0*17	Pass
EUT transmits Message 18 with SOTDMA network entry: ITDMA used to announce new reporting interval: 14:46:51 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0I1r001,0*0A 14:47:23 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0:Qr001,0*1A	Pass

a) 30 Second reporting interval

Requirement	Verdict
EUT releases unused slot of old schedule, slot timeout and offset set to 0: 14:46:46 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0L1p000,0*0C 14:47:11 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t051p000,0*76 14:47:26 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0<Qp000,0*1C 14:47:41 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0CQp000,0*60	Pass
EUT reverts to a reporting interval of 15 s after 4 to 8 min: Initial slot timeout = 3, when slot timeout reached 0, the reporting rate changes back to 15 seconds.	Pass
Unused slots are released following 4 to 8 min: When slot timeout reaches 0, slot offset is = 0.	Pass

b) 5 Second reporting interval

Requirement	Verdict
Message 23 with reporting interval 5 s received by EUT: 14:57:45 – !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000800,2*39	Pass
EUT transmits Message 18 with 5 s reporting interval: 14:58:53 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0lQp<02,0*67 14:58:59 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0LQp<02,0*61 14:59:04 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t011p<02,0*7F 14:59:09 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t03Qp<02,0*1E 14:59:14 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t061p<02,0*78 14:59:19 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t081p<02,0*75 14:59:24 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0:Qp<02,0*14 14:59:29 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0=Qp<02,0*10 14:59:34 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0@1p<02,0*0E 14:59:39 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0BQp<02,0*6F 14:59:43 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0DQp<02,0*6A 14:59:49 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0GQp<02,0*6A	Pass
EUT transmits Message 18 with SOTDMA network entry: ITDMA used to announce new reporting interval: 14:57:53 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0lQr1Ri,0*51 14:57:59 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0LQr1Mi,0*48 14:58:04 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t011r1O1,0*0C 14:58:09 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t03Qr1OQ,0*0D 14:58:14 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t06Qr1L1,0*68 14:58:19 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t08Qr1JQ,0*03 14:58:24 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0;1r1PA,0*69 14:58:29 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0=Qr1P1,0*7C 14:58:34 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0@1r1FQ,0*14 14:58:39 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0BQr1MQ,0*7E 14:58:43 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0D1r001,0*07 14:58:49 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0H1r001,0*08	Pass
EUT releases unused slots of old schedule, slot timeout and offset set to 0: 14:58:01 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0MQp000,0*6D 14:58:16 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t071p000,0*74 14:58:30 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIIt6t0>Qp000,0*1E 14:58:45 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0F1p000,0*05	Pass
EUT reverts to a reporting interval of 15 s after 4 to 8 min: Initial slot timeout = 3, when slot timeout reached 0, the reporting rate changes back to 15 seconds.	Pass
Unused slots are released following 4 to 8 min: When slot timeout reaches 0, slot offset is = 0.	Pass

c) Non base station MMSI

Requirement	Verdict
Message 23 with reporting interval 5 s received by EUT, with non base station: MMSI:!AIVDM,1,1,,A,G0E<ESSwJPsi7ub1m<000000800,2*60	Pass
EUT does not change it's reporting interval and mode flag remains equal to zero: !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t081h89n,0*3C	Pass

d) 2 Second reporting interval

Requirement	Verdict
Message 23 with reporting interval 2 s received by EUT: !AIVDM,1,1,,A,G0E<ESSwJPsi7ub1m<000000;00,2*63	Pass
EUT does not change it's reporting interval and mode flag remains equal to zero: !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIIt6t0G1h8LN,0*16	Pass

e) Next shorter reporting interval	
Requirement	Verdict
Message 23 with next shorter reporting interval received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000900,2*38	Pass
EUT changes to a 5 second reporting interval: 10:19:06 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t021pH3U,0*6C 10:19:10 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t04QpH6L,0*15 10:19:16 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t071pH9L,0*7A 10:19:20 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t09QpH<;,0*65 10:19:26 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0<1pH?C,0*78 10:19:30 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0>QpHB7,0*10 10:19:36 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0A1pHE7,0*0B 10:19:41 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0D1pHH1,0*06 10:19:45 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0EQpHJo,0*38 10:19:50 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0HQpHMj,0*34 10:19:56 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0K1pHPp,0*53 10:20:00 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0M1pD02,0*78	Pass

f) Next longer reporting interval	
Requirement	Verdict
Message 23 with next longer reporting interval received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000:00,2*3B	Pass
EUT changes to a 30 second reporting interval: 10:39:24 – !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAIlt6t0:QpD02,0*6F 10:39:55 – !AIVDM,1,1,,A,B3OdpnP0UWvUg@WAIlt6t0JQpD02,0*1C	Pass

Assignment by region – Clause 12.6.6.2

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and use a base station MMSI to transmit Message 23.

a) Transmit a Group Assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is inside this region). Set the reporting rate to 5 s and apply message to VDL.
b) Transmit a Group Assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is outside this region). Set the reporting rate to 5 s and apply message to VDL.

Required Results

a) EUT switches to assigned mode and transmits position reports with 5 s interval. Verify that EUT reverts to normal operation mode after timeout period;
b) EUT declines Message 23.

Test Results

a) EUT inside region @ 50 52 N 1 13 W	
Requirement	Verdict
Message 23 with reporting interval 2 s received by EUT: !AIVDM,1,1,,A,G0E<ESSwJPsi7ub1m<000000800,2*60	Pass
EUT changes to a 5 second reporting interval	Pass

b) EUT outside region @ 51 52 N 1 13 W	
Requirement	Verdict
Message 23 with reporting interval 2 s received by EUT: !AIVDM,1,1,,A,G0E<ESSwJPsi7ub1m<000000800,2*60	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

<u>*Assignment by station type – Clause 12.6.6.3*</u>

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and transmit Message 23 with a reporting interval of 5 s.

a) Transmit a Group Assignment command with a station type to 0 (all stations).
b) Transmit a Group Assignment command with a station type to 1 (Class A).
c) Transmit a Group Assignment command with a station type to 2 (All Class B).
d) Transmit a Group Assignment command with a station type to 3 (SAR aircraft).
e) Transmit a Group Assignment command with a station type to 4 (Class B SO).
f) Transmit a Group Assignment command with a station type to 5 (Class B CS).
g) Transmit a Group Assignment command with a station type to 6 (Inland AIS).

Required Results

a) EUT switches to assigned mode with 5 s reporting interval;
b) EUT declines Message 23;
c) EUT switches to assigned mode with 5 s reporting interval;
d) EUT declines Message 23;
e) EUT switches to assigned mode with 5 s reporting interval;
f) EUT declines Message 23;
g) EUT declines Message 23.

Test Results

a) All stations	
Requirement	Verdict
Message 23 with station type = 0 received by EUT: !AIVDM,1,1,,A,G0E<ESSwJPsi7ub1m<000000800,2*60	Pass
EUT changes to a 5 second reporting interval	Pass

b) Class A	
Requirement	Verdict
Message 23 with station type = 1 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<100000800,2*38	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

c) All Class B	
Requirement	Verdict
Message 23 with station type = 2 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<200000800,2*3B	Pass
EUT changes to a 5 second reporting interval	Pass

d) SAR Aircraft	
Requirement	Verdict
Message 23 with station type = 3 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<300000800,2*3A	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

e) Class B SO	
Requirement	Verdict
Message 23 with station type = 4 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<400000800,2*3D	Pass
EUT changes to a 5 second reporting interval	Pass

f) Class B CS	
Requirement	Verdict
Message 23 with station type = 5 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<500000800,2*3C	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

g) Inland AIS	
Requirement	Verdict
Message 23 with station type = 6 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<600000800,2*3F	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

Addressing by ship and cargo type – Clause 12.6.6.4

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and use a base station MMSI to transmit Message 23.

a) Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo value to the value which is configured in the EUT.
b) Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo value to a value different to the value which is configured in the EUT.
c) Configure the ship and cargo type of the EUT to 72. Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo type value to 70.

Required Results

a) EUT switches to assigned mode and transmits position reports with 5 s reporting interval;
b) EUT declines Message 23;
c) EUT switches to assigned mode and transmits position reports with 5 s reporting interval.

Test Results

a) EUT ship and cargo type = 37	
Requirement	Verdict
Message 23 with ship and cargo type = 37 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<09@000800,2*40	Pass
EUT changes to a 5 second reporting interval	Pass

b) EUT ship and cargo type = 37	
Requirement	Verdict
Message 23 with ship and cargo type = 36 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<090000800,2*30	Pass
EUT does no change reporting interval and remains in autonomous mode.	Pass

c) EUT ship and cargo type = 72	
Requirement	Verdict
Message 23 with ship and cargo type = 70 received by EUT: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<0AP000800,2*28	Pass
EUT changes to a 5 second reporting interval	Pass

Quiet time command – Clause 12.6.6.5

Method of Measurement

Set up the standard test environment and operate EUT in autonomous mode with 15 s reporting interval.

Transmit a Group Assignment message (Message 23) to the EUT with a quiet time command.

Record transmitted messages.

Required Results

Confirm that the EUT continues transmission for one frame to release the allocated slots and then stops transmission. Confirm that the EUT starts transmission after the quiet time according to the network entry procedure. The quiet time period starts with the reception of Message 23.

Test Results

The requirements of this test are conflicting and incorrect. If, as stated, the quiet time period starts with the reception of message 23, it is not possible to have a quiet period of 1 minute. As it will take 1 frame to release the allocated slots. Therefore, to ensure a quiet time of 1 minute, as required by ITU-R M.1371-5, this test has been tested against the requirement that quiet time period shall start 1 frame after the reception of message 23.

Requirement	Verdict
Message 23 received by EUT with quiet time = 1 at 10:48:40: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000040,2*35	-
The EUT continues for one frame and releases slots	Pass
The EUT stops transmission for a period of time equal to the quiet time value, 1 frame after the reception of message 23.	Pass
The EUT starts transmission using a network entry procedure at 10:50:53	Pass

Reverting from interval assignment – Clause 12.6.6.6

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned. Monitor the VDL until at least 1 min after timeout occurred. Repeat 10 times (transmissions of Message 23 shall not be synchronised to the initial transmission schedule of the EUT).

Measure the time Trev between the reception of Message 23 and the first transmission after timeout.

Required Results

Verify that the time out is randomly distributed between 4 min and 8 min.

Test Results

Trev Results	Verdict
00:04:30	Pass
00:08:32*	Pass
00:05:15	Pass
00:06:35	Pass
00:06:01	Pass
00:08:23*	Pass
00:08:09*	Pass
00:04:21	Pass
00:07:16	Pass
00:05:17	Pass

* These values are acceptable due to the fact that the EUT was set to a 30 seconds reporting interval. The randomisation required when choosing the first slot for the start of autonomous mode, after assigned mode finishes, means that the first transmission can be up to 33 seconds after the end of assigned mode. In addition, the EUT tries to use currently allocated slots and change them to ITDMA in order to announce its new reporting schedule for assigned mode. Therefore, even though the time out is 8 minutes, it is possible to get an acceptable value of Trev of up to 9 minutes.

Assignment priority test – Message 16 and 23 – Clause 12.6.6.7

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode.

a) Transmit a Message 23, addressed to the EUT, to assign a reporting interval of 15 s. Check that the EUT reporting interval is 15 s. Transmit a Message 16, addressed to the EUT, assigning a reporting interval of 10 s while still assigned by Message 23.
b) Transmit a Message 16, addressed to the EUT, to assign a reporting interval of 15 s. Check that the EUT reporting interval is 15 s. Transmit a Message 23, addressed to the EUT, assigning a reporting interval of 10 s while still assigned by Message 16.

Required Results

a) the EUT adopts the reporting interval of Message 16;
b) the EUT continues with the reporting interval of Message 16.

Test Results

a) Message 23, then message 16	
Requirement	Verdict
Message 23 received by EUT with reporting interval = 15 seconds: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000600,2*37	-
Reporting interval is 15 seconds	Pass
Message 16 received by EUT with reporting interval = 10 seconds: !AIVDM,1,1,,A,@027`SPos>=`3h00,0*14	-
Reporting interval is change to 10 seconds	Pass

b) Message 16, then message 23	
Requirement	Verdict
Message 16 received by EUT with reporting interval = 15 seconds: !AIVDM,1,1,,A,@027`SPos>=`2P00,0*2D	-
Reporting interval is 15 seconds	Pass
Message 23 received by EUT with reporting interval = 10 seconds: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000700,2*36	-
Reporting interval is unchanged	Pass

Assignment priority test – Message 22 and 23 – Clause 12.6.6.8

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Transmit a Message 22 defining a region with the EUT inside that region Tx/Rx mode = 0.

a) Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1.
b) Transmit Message 22 to the EUT with regional settings specifying Tx/Rx mode 2.
c) Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1.
d) During assigned mode, transmit a Message 22 to the EUT individually addressed and specifying Tx/Rx mode 2.
e) Within 10 min, transmit a Message 22 with regional area settings specifying Tx/Rx mode 0.
f) Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1 every min for 15 min.
g) After timeout of the last Message 23, transmit a Message 22 with regional settings specifying Tx/Rx mode 0.

Record transmitted messages.

Required Results

The following results are required.

a) Check that Tx/Rx mode = 1. The Tx/Rx mode field setting of Message 23 takes precedence over the Tx/Rx mode field setting of Message 22.
b) Check that Tx/Rx mode = 1. The EUT reverts to the Tx/Rx mode = 2 defined by Message 22 after the timeout of Message 23.
c) Verify that Tx/Rx mode = 1.
d) Check that Tx/Rx mode = 2. The Tx/Rx mode field setting of Message 22 takes precedence over the Tx/Rx mode field setting of Message 23.
e) Check that Tx/Rx mode = 2. The Tx/Rx mode setting of Message 22 is ignored.
f) Check that the Tx/Rx mode remains at 2 min for 10 min after applying Message 22. Check that the Tx/Rx mode is changed to 1 when receiving Message 23 later than 10 min after Message 22. Check that after timeout of the last Message 23 the Tx/Rx mode reverts to 2 according to the individually addressed Message 22.
g) Check that Tx/Rx mode = 0. The Tx/Rx mode setting of Message 22 is accepted.

Test Results

a)	
Requirement	Verdict
Message 22 received by EUT with Tx/Rx mode = 0: !AIVDM,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*49	-
Message 23 received by EUT with Tx/Rx mode = 1: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*41	-
EUT transmits on channel A only	Pass

b)	
Requirement	Verdict
Message 22 received by EUT with Tx/Rx mode = 2: !AIVDM,1,1,,A,F027`SR2N2PWvm1oR?sD3bH2P000,0*29	-
EUT transmits on channel B only	Pass

c)	
Requirement	Verdict
Message 23 received by EUT with Tx/Rx mode = 1 !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*41	-
EUT transmits on channel A only	Pass

d)

Requirement	Verdict
Message 22 received by EUT with Tx/Rx mode = 2 !AIVDM,1,1,,A,F027`SR2N2PQgnLK@000000BP000,0*17	-
EUT transmits on channel B only	Pass

e)

Requirement	Verdict
Message 22 sent to EUT with Tx/Rx mode = 0 !AIVDO,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*4B	-
EUT ignores message 22 and continues in Tx/Rx mode 2	Pass

f)

Requirement	Verdict
Message 23 received by EUT with Tx/Rx mode = 1, every minute !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*41	-
EUT changes to Tx/Rx mode 1 after 10 minutes, after 10:17	Pass
EUT changes to Tx/Rx mode 2 after the timeout of assigned mode	Pass

g)

Requirement	Verdict
Message 22 received by EUT with Tx/Rx mode = 0: !AIVDM,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*49	-
EUT transmits on channels A and B	Pass

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode with 5 s reporting interval (SOG = 25 kn). Apply a Message 4 to the VDL using a base station MMSI.

a) Transmit a Data Link Management message (Message 20) on Channel A from a Base Station within 120 NM to the EUT with slot offset = 5 and increment = 10. Record transmitted messages.
b) Repeat the test with a Base Station beyond 120 NM.
c) Repeat the test without Base Station Report (Message 4).
d) Repeat the test reserving 100 % of the slots.
e) Repeat the test with a Base Station within 120 NM and maintain transmission of Message 20. Stop transmission Message 4.
f) Repeat test a) using a non-base station MMSI.

Required Results

The following results are required.

a) For the Base Station within 120 NM, confirm that EUT does not use slots allocated by Message 20 for own transmissions until timeout of 4 min to 8 min. Confirm that the EUT does not use the same slots on Channel B.
b) For the Base Station beyond 120 NM, confirm that the EUT treats the slots as free.
c) Confirm that the EUT treats the slots as free.
d) Confirm that the EUT stops transmission.
e) Confirm that the EUT ignores the slot reservations of a Message 20 which is received after the normal target time-out of Message 4.
f) Confirm that the EUT treats the slots as free.

Test Results

a) Transmit a Data Link Management Message 20, SOG = 25 kn	
Requirement	Verdict
Msg. 20 with slot offset = 5 and increment = 10, received on slot 5, using Base Station MMSI within 120 NM to EUT: !AIVDM,1,1,,A,D027`SP0EN0`,0*5F	-
EUT Starts releasing slots that were previously allocated on the reserved slots	Pass
EUT does not use slots allocated by Msg. 20 for own transmissions until the timeout of 4 min to 8 min.	Pass
EUT does not transmit on the slots allocated by Msg. 20 on Channel B.	Pass

a) Test Results					
Slot	Chan	MMSI	Msg	Sentence	Comments
61	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t001h@0u,0*7D	Schedule before message 20, using all available slots
246	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t031h<01,0*45	
432	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t05Qh<01,0*20	
624	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t081h89h,0*1A	
810	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t0:1h5B4,0*31	
998	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t0<Qh<01,0*2A	
1179	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t0?1h<01,0*4A	
1380	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t0AQh8ET,0*43	
1566	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t0DQh<01,0*51	
1748	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t0FQh5B4,0*2E	
1942	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t0IQh0Rw,0*74	
2122	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t0KQh0SA,0*42	
5	A	2222222	20	!AIVDO,1,1,,A,D027`SP0EN0`,0*5D	
61	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t001h0S7,0*2C	Slot released
246	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t02Qh83n,0*7C	
432	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t051h0S=,0*23	Slot released
624	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAIlt6t07Qh0S<,0*43	Slot released
810	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAIlt6t0:Qh0S6,0*47	Slot released

a) Test Results					
Slot	Chan	MMSI	Msg	Sentence	Comments
998	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0<Qh8?V,0*46	
1179	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0>Qh8BK,0*27	
1380	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0AQh0Rt,0*7C	Slot released
1566	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0D1h8HN,0*32	
1748	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0FQh0S8,0*36	
1931	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0IQh0S6,0*34	Slot released
2129	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0KQh@QA,0*30	
58	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t001hH0r,0*72	Reserved slots, ending in 0-4 are not used by the EUT
246	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t02Qh5B<,0*52	
435	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t051h@6k,0*60	
626	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t081hH9j,0*68	
806	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t09Qh@<V,0*3B	
998	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0<Qh5B<,0*5C	
1179	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0?1h5B<,0*3C	
1366	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0A1h<01,0*37	
1566	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0D1h5B<,0*47	
1746	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0FQh@KB,0*24	
1927	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0I1h<01,0*3C	
2129	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0KQh<01,0*5D	
a) Test Results – After 8 minutes					
Slot	Chan	MMSI	Msg	Sentence	Comments
56	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t001hD01,0*3D	
243	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t021h<01,0*44	Reserved slot used
437	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t04Qh86m,0*7F	
617	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t07QhL01,0*51	
816	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t09Qh<01,0*2C	
995	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0<1hD01,0*32	
1187	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0>Qh0S4,0*41	
1369	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0A1h0S6,0*5F	
1549	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0CQh0SL,0*44	
1739	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0F1h8K;,0*45	
1927	B	234567898	18	!AIVDM,1,1,,B,B3OdpnP0vWvUg@WAllt6t0HQh0S8,0*3B	
2127	A	234567898	18	!AIVDM,1,1,,A,B3OdpnP0vWvUg@WAllt6t0K1h5B`,0*17	

b) Base station > 120 NM

Requirement	Verdict
EUT continues transmitting on same slots and treats the slots as free	Pass

c) Without message 4

Requirement	Verdict
EUT continues transmitting on same slots and treats the slots as free	Pass

d) Reserving all slots

Requirement	Verdict
Msg. 20 with slot offset = 5 and increment = 5, received on slot 5, using Base Station MMSI within 120 NM to EUT: !AIVDM,1,1,,A,D027`SP0EN0D,0*7B	-
EUT stops transmitting.	Pass

e) Removal of message 4

Requirement	Verdict
Msg. 20 with slot offset = 5 and increment = 5, received on slot 5, using Base Station MMSI within 120 NM to EUT, every frame: !AIVDM,1,1,,A,D027`SP0EN0D,0*7B	-
EUT stops transmitting.	-
After removing message 4, the EUT begins transmissions 10 minutes later. Which is equal to the 3 minutes timeout of message 4 plus the timeout of 7 minutes of message 20.	Pass

f) Non base station MMSI

Requirement	Verdict
Message 4 sent to EUT with non base station MMSI = 222222222: !AIVDM,1,1,,A,43CsGSQv:N9;>wrFc0M6jh1P2000,0*60	-
Message 20 with slot offset = 5 and increment = 10, received on slot 5, using non Base Station MMSI = 222222222, within 120 NM to EUT: !AIVDM,1,1,,A,D3CsGSP0EN0`,0*4E	-
EUT continues using slots that are reserved by message 20.	Pass

2.15 Message formats

2.15.1 Specification Reference

IEC 62287-2, Clause 12.7

2.15.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.15.3 Date of Test

16-July-2018 to 03-September-2018

2.15.4 Test Results and Methods of Measurement

Received messages – Clause 12.7.1

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 8 to the VDL including multiple slot messages up to 5 slots. Record messages output by the PI of EUT.

Required Results

Confirm that EUT outputs corresponding message with correct field contents and format via the PI or responds as appropriate.

Test Results

Msg.	Requirement	Result	Verdict
1	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,13LC9e@2P:wsK20LW3P02gvR0000,0*19 Received message: !AIVDM,1,1,,A,13LC9e@2P:wsK20LW3P02gvR0000,0*1B	Pass
2	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,23LC9e@2P:dtSF0l4Q@02gw80000,0*38 Received message: !AIVDM,1,1,,A,23LC9e@2P:dtSF0l4Q@02gw80000,0*3A	Pass
3	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,33LC9e@2P:dtSF0l4Q@02gv<0000,0*3C Received message: !AIVDM,1,1,,A,33LC9e@2P:dtSF0l4Q@02gv<0000,0*3E	Pass
4	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,402=W=1v9ef5N<tSF0l4Q@100000,0*66 Received message: !AIVDM,1,1,,A,402=W=1v9ef5N<tSF0l4Q@100000,0*64	Pass
5	VDM sentence with the same content as transmitted, output to the PI.	Transmitted messages: !AIVDO,2,1,1,A,53LC9eD000037;?CGKM@E=@0000000000002b00000t0002QPDQB0C@0000000000000,2*27 !AIVDO,2,2,1,A,00000000000,2*27 Received message: !AIVDM,2,1,7,A,53LC9eD000037;?CGKM@E=@0000000000000002b00000t0002QPDQB0C@0000000000000,2*23 !AIVDM,2,2,7,A,00000000000,2*23	Pass

Msg.	Requirement	Result	Verdict
6	VDM sentence with the same content as transmitted, output to the PI. EUT responds to message 6 by transmitting message 7.	Transmitted message: !AIVDO,1,1,,A,65G=6N1BJa8d048j000000000000,0*77 Received message: !AIVDM,1,1,,A,65G=6N1BJa8d048j000000000000,0*75 Message 7 transmitted by EUT: !AIVDO,1,1,,A,759bTRiEkAWP,0*7A	Pass
7	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,76WuQTQBJa8e0000000000000000,0*67 Received message: !AIVDM,1,1,,A,76WuQTQBJa8e0000000000000000,0*65	Pass
8	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,84uwmjh0@00E1Dm0,0*58 Received message: !AIVDM,1,1,,A,84uwmjh0@00E1Dm0,0*5A	Pass
9	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,91b5;l7l1TdtSF0l4Q@7q:804000,0*1E Received message: !AIVDM,1,1,,A,91b5;l7l1TdtSF0l4Q@7q:804000,0*1C	Pass
10	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,:4uwmjiBJa8d,0*73 Received message: !AIVDM,1,1,,A,:4uwmjiBJa8d,0*71	Pass
11	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,;5tW4l1v9f<00<tSF0l4Q@100000,0*50 Received message: !AIVDM,1,1,,A,;5tW4l1v9f<00<tSF0l4Q@100000,0*52	Pass
12	VDM sentence with the same content as transmitted, output to the PI. EUT responds to message 12 by transmitting message 13.	Transmitted message: !AIVDO,1,1,,A,<>M46rABJa8dD5CDP=C7Pijklm0,2*0B Received message: !AIVDM,1,1,,A,<>M46rABJa8dD5CDP=C7Pijklm0,2*09 Message 13 transmitted by EUT: !AIVDO,1,1,,A,=59bTRkWA1fT,0*0F	Pass
13	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,=4uwmjiBJa8e0000000000000000,0*75 Received message: !AIVDM,1,1,,A,=4uwmjiBJa8e0000000000000000,0*77	Pass
14	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,>>M46rA@E=B0m<N37;?CD0,4*3E Received message: !AIVDM,1,1,,A,>>M46rA@E=B0m<N37;?CD0,4*3C	Pass
15	VDM sentence with the same content as transmitted, output to the PI. EUT responds to message 15 by transmitting message 24.	Transmitted message: !AIVDM,1,1,,A,?027`SR7ID<eP6@,2*0A Received message: !AIVDM,1,1,,A,?027`SR7ID<eP6@,2*0A Message 24A or 24B transmitted by EUT: !AIVDO,1,1,,A,H8MU@jiAEJ1@E=B080000000000,2*00 !AIVDO,1,1,,A,H8MU@jlUooo4N90ijklmno08234t,0*62	Pass
16	VDM sentence with the same content as transmitted, output to the PI. EUT enters assigned mode, with mode flag set to 1.	Transmitted message: !AIVDO,1,1,,A,@027`SR7ID<d6@1@,0*55 Received message: !AIVDM,1,1,,A,@027`SR7ID<d6@1@,0*57 EUT enters assigned mode: !AIVDO,1,1,,A,B8MU@jh3wk?8mP=18D3Q3wwSp@7e,0*01	Pass

Msg.	Requirement	Result	Verdict
17	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDM,1,1,,A,A027`SQb3Qba02J`Q3TP7O sk05hOwaT0:rbb,0*05 Received message: !AIVDM,1,1,,A,A027`SQb3Qba02J`Q0pP7O sl0EhOwa`0:rbb,0*61	Pass
18	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,B,4uwmjh02WvR@hWAdd00 0031T000,0*16 Received message: !AIVDM,1,1,,A,4uwmjh02WvR@hWAdd00 0031T000,0*14	Pass
19	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,C4uwmjh02WvUbh7Add00c wWP`:V`0000000000000000000000030,0*48 Received message: !AIVDM,1,1,,A,C4uwmjh02WvUbh7Add00c wWP`:V`0000000000000000000000030,0*4A	Pass
20	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,D027`SP38B<`00000000000 00000,0*23 Received message: !AIVDM,1,1,,A,D027`SP38B<`00000000000 00000,0*21	Pass
21	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,E>j3O450b7W00000000000 00000Ou;EP>SIH000000o03<0,2*60 Received message: !AIVDM,1,1,,A,E>j3O450b7W00000000000 00000Ou;EP>SIH000000o03<0,2*62	Pass
22	VDM sentence with the same content as transmitted, output to the PI. EUT outputs ACA and ACS sentences with the same regional settings as message 22.	Transmitted message: !AIVDO,1,1,,A,F027`SR2F2H7vm1qp?sD3g 41P000,0*1D Received message: !AIVDM,1,1,,A,F027`SR2F2H7vm1qp?sD3g 41P000,0*1F ACA and ACS sentence: $AIACA,0,5200.00,N,00100.00,W,5100.00, N,00200.00,W,4,2085,0,2086,0,0,0,B,0,000 000.00*3C $AIACS,0,2222222,132229.00,16,07,2018* 77	Pass
23	VDM sentence with the same content as transmitted, output to the PI. EUT enters assigned mode, with mode flag set to 1.	Transmitted message: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<00000 0700,2*34 Received message: !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<0000 00700,2*36 EUT enters assigned mode: !AIVDO,1,1,,A,B8MU@jh007vTpK7AfFL03w fSt@AU,0*51	Pass
24	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,H4uwmjh<h5=>0:1@E=@00 000000,2*16 !AIVDO,1,1,,A,H4uwmjm6ijkl000123400000 0000,0*06 Received message: !AIVDM,1,1,,A,H4uwmjh<h5=>0:1@E=@00 000000,2*14 !AIVDM,1,1,,A,H4uwmjm6ijkl000123400000 0000,0*04	Pass
25	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,I4uwmjl0@00b2ab@6RaaPS RhHqIP,0*2E Received message: !AIVDM,1,1,,A,I4uwmjl0@00b2ab@6RaaPS RhHqIP,0*2C	Pass

Msg.	Requirement	Result	Verdict
26	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,J4uwmjl0@00QT0a0Qb2a9p PI000,2*25Received message: !AIVDM,1,1,,A,J4uwmjl0@00QT0a0Qb2a9p PI000,2*27	Pass
27	VDM sentence with the same content as transmitted, output to the PI.	Transmitted message: !AIVDO,1,1,,A,KkLC9eL?ub3fLM2n,0*3B Received message: !AIVDM,1,1,,A,KkLC9eL?ub3fLM2n,0*39	Pass

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a mobile station according to Table 8 by the EUT. Record transmitted messages.

Required Results

Confirm that EUT transmits messages with correct field contents and format or responses as defined in Table 8.

Test Results

Requirement	Result	Verdict
EUT transmits message 6 when an ABM sentence is sent to the PI.	ABM Sentence: !AIABM,1,1,2,412000000,1,6,04205@E=B0lE=<4LD,2 Transmitted message: !AIVDO,1,1,,A,68MU@jqR>Wh004205@E=B0lE=<4LD0,4*53	Pass
EUT transmits message 7 after receiving a message 6 addressed to own station	Message received: !AIVDM,1,1,,A,64uwmjj7ID<d04204PDhht0,2*49 Transmitted message: !AIVDO,1,1,,A,78MU@ji?OuLd,0*5D	Pass
EUT transmits message 8 when a BBM sentence is sent to the PI.	BBM Sentence: !AIBBM,1,1,2,1,8,04005@E=@,2 Transmitted message: !AIVDO,1,1,,A,88MU@jh0@00E1Dm0,0*63	Pass
EUT transmits message 13 after receiving a message 12 addressed to own station	Message received: !AIVDM,1,1,,A,<4uwmjj7ID<dD5CDP=C7Pijklm0,2*47 Transmitted message: !AIVDO,1,1,,A,=8MU@ji?OuLd,0*57	Pass
EUT transmits Message 18 when operating in autonomous mode.	!AIVDM,1,1,,A,B8MU@jh007vTpK7AfFL03wVSnDM:,0*1E	Pass
EUT transmits Message 19 when interrogated by a Message 15 from a base station.	Message received: !AIVDM,1,1,,A,?027`SR7ID<e<38,2*1B Transmitted message: !AIVDO,1,1,,A,C8MU@jh007vTpK7AfFL03wj0`be0`:Va04000000000000411RO0,0*38	Pass
EUT transmits Messages 24 A and 24 B when operating in autonomous mode.	!AIVDM,1,1,,B,H8MU@jiAEJ1@E=B080000000000,2*01 Transmitted message: !AIVDM,1,1,,B,H8MU@jlUooo4N90ijklmno08234t,0*63	Pass
EUT transmits message 25 when an ABM sentence is sent to the PI.	ABM Sentence: !AIABM,1,1,0,412000000,1,25,0400:PbJP,0*51 Transmitted message: !AIVDO,1,1,,A,I3OdpneR>Wh00400:PbJP0000000,0*4B	Pass
EUT transmits message 26 when an ABM sentence is sent to the PI.	ABM Sentence: !AIABM,1,1,0,412000000,1,26,0400:PI000,4*57 Transmitted message: !AIVDO,1,1,,A,J3OdpneR>Wh00400:PI000000000,0*79	Pass
EUT transmits message 27 when LR is enabled.	!AIVDM,1,1,,D,K3Odpngwu7CfOP00,0*06	Pass

2.16 Regional area designation by VDL Message

2.16.1 Specification Reference

IEC 62287-2, Clause 13.1

2.16.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.16.3 Date of Test

27-September-2018

2.16.4 Test Results and Methods of Measurement

Method of Measurement

Set up the standard test environment.

a) With no Message 4. Apply channel management messages (Message 22) to the VDL defining two adjacent regional areas, 1 and 2, with different channel assignments for both regions and a transitional zone extending 4 NM either side of the regional boundary, Table 14 and Figure 11.
b) With a Base Station within 120 NM transmitting Message 4. Apply the same channel management Messages as in a). Make the EUT approach region 1 from outside region 2 more than 5 NM away from the region boundary, transmitting on default channels. Record transmitted Messages on all 6 channels. This can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.
c) Operate the unit in an area with Tx/Rx mode 1.
d) Operate the unit in an area with Tx/Rx mode 2.
e) Transmit Message 22 using a non-base station MMSI.
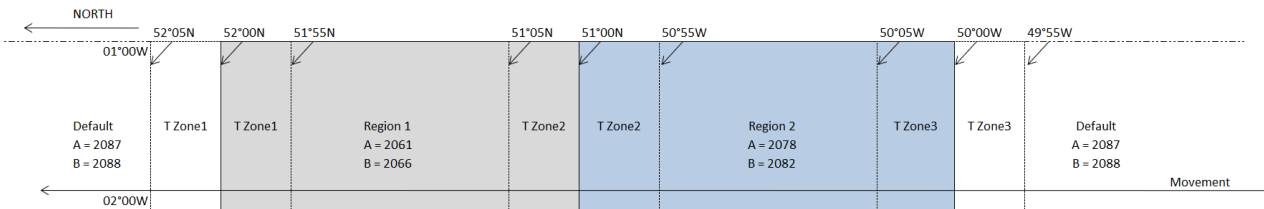
Required Results

The following results are required.

a) Check that the channel management regions are not stored and not used by the EUT.
b) Check that the EUT transmits and receives on the primary channels assigned for each region, alternating channels and halving the reporting interval when passing through the transitional zones (see Table 15). Check that the EUT reverts to default autonomous operation on the regional channels after leaving the transitional zones. Check that TXT and ACA sentences are output when defining the area, crossing the boundary of the area and on request. The In-use flag shall be set to "1" if the position is inside the area which is defined by the two corner points of the area setting (e.g. the grey area defining region 2 in Figure 11).
c) Check that the EUT transmits on only channel A with the nominal reporting interval (the number of transmissions doubles on the active channel when transmitting on one channel only).
d) Check that the EUT transmits on channel B only with the nominal reporting rate.
e) When using a non-base station MMSI, verify that the EUT does not accept the channel management.

Test Results

a) No message 4

Requirement	Result	Verdict
The following channel management messages were sent to the EUT: !AIVDO,1,1,,A,F027`SR1r287vm1oR?sD3bH20 000,0*7C !AIVDO,1,1,,A,F027`SR0n187vm1qp?sD3g420 000,0*27	The EUT does not use or store the settings.	Pass

b) Defining the area

Requirement	Result	Verdict
The following channel management messages were sent to the EUT: !AIVDO,1,1,,A,F027`SR1r287vm1oR?sD3bH20 000,0*7C !AIVDO,1,1,,A,F027`SR0n187vm1qp?sD3g420 000,0*27	The regions were accepted by the EUT	Pass

Test	Zone	Channel		Channel Use	Msg Check		PI Sentence	Reporting Interval	Position of Change	Verdict
1	HS-HSTZ3	A	2087	Continued	18 Reallocation	-	-	Halved	49°55.1	Pass
		B	2088	Ceased	18 Timeout	-	-			
		C	2078	Commenced	18 Allocation	-	-			
		D	2082	Not in Use	N/A	-	-			
2	HSTZ3-R2TZ3	A	2087	Continued	18	TXT	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Halved	-	Pass
		B	2088	Not in Use	N/A	ACA	$AIACA,1,5100.00,N,00100.00,W,5000.00,N,00200.00,W,5,2078,0,2082,0,0,0,B,1,122127.00*3C			
		C	2078	Continued	18	ACS	$AIACS,1,2222222,121927.00,27,09,2018*7D			
		D	2082	Not in Use	N/A	-				
3	R2TZ3-R2	A	2087	Ceased	18 Timeout	-	-	Normal	50°05.1	Pass
		B	2088	Not in Use	N/A	-	-			
		C	2078	Continued	18 Reallocation	-	-			
		D	2082	Commenced	18 Allocation	-	-			
4	R2-R2TZ2	A	2061	Commenced	18 Allocation	-	-	Halved	50°55.0	Pass
		B	2066	Not in Use	N/A	-	-			
		C	2078	Continued	18 Reallocation	-	-			
		D	2082	Ceased	18 Timeout	-	-			
5	R2TZ2-R1TZ2	A	2061	Continued	1	TXT	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Halved	-	Pass
		B	2066	Not in Use	N/A	ACA	$AIACA,2,5200.00,N,00100.00,W,5100.00,N,00200.00,W,5,2061,0,2066,0,0,0,B,1,122337.00*3C			
		C	2078	Continued	1	ACS	$AIACS,2,2222222,121930.00,27,09,2018*78			
		D	2082	Not in Use	N/A	-	-			
6	R2TZ2-R1	A	2061	Continued	18 Reallocation	-	-	Normal	51°05.1	Pass
		B	2066	Commenced	18 Allocation	-	-			
		C	2078	Ceased	18 Timeout	-	-			
		D	2082	Not in Use	N/A	-	-			
7	R1-R1TZ1	A	2061	Continued	18 Reallocation	-	-	Halved	51°55.0	Pass
		B	2066	Ceased	18 Timeout	-	-			
		C	2087	Commenced	18 Allocation	-	-			
		D	2088	Not in Use	N/A	-	-			
8	R1TZ1-HSTZ1	A	2061	Continued	1	TXT	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Halved	-	Pass
		B	2066	Not in Use	N/A	ACA	$AIACA,3,9000.00,N,18000.00,E,9000.00,S,18000.00,W,4,2087,25,2088,25,0,0,,1,122528.00*71			
		C	2087	Continued	1	ACS	$AIACS,3,234567898,000000.00,27,09,2018*7B			
		D	2088	Not in Use	N/A	-	-			
9	HSTZ1-HS	A	2061	Ceased	18 Timeout	-	-	Normal	52°05.0	Pass
		B	2066	Not in Use	N/A	-	-			
		C	2087	Continued	18 Reallocation	-	-			
		D	2088	Commenced	18 Allocation	-	-			

c) Tx/Rx mode 1		
Requirement	Result	Verdict
EUT is placed in a region with Tx/Rx mode 1	The EUT transmits on channel A only.	Pass

d) Tx/Rx mode 2		
Requirement	Result	Verdict
EUT is placed in a region with Tx/Rx mode 2	The EUT transmits on channel B only.	Pass

e) Incorrect MMSI = 222222222		
Requirement	Result	Verdict
The following base station report and channel management message were sent to the EUT: !AIVDO,1,1,,A,43CsGSQv:L9e0wrFc0M;c@10 2000,0*7C !AIVDO,1,1,,A,F3CsGSR2B2D7vm1oR?sD3bH 1P000,0*41	The EUT does not use or store the settings.	Pass

2.17 Channel management by addressed Message 22

2.17.1 Specification Reference

IEC 62287-2, Clause 13.2

2.17.2 Equipment Under Test and Modification State

ATB1 – See section 1.3 for modification states

2.17.3 Date of Test

21-August-2018

2.17.4 Test Results and Methods of Measurement

Method of Measurement

Set up a standard test environment and operate the EUT in autonomous mode.

a) Send Message 4 within 120 NM and Message 22 with valid regional operating settings that are different from the default operating settings to the EUT. The regional operating area includes the current position of own station.
b) Send an addressed Message 22 to the EUT with regional operating settings different from the previous command.
c) Move the EUT out of the regional operating area defined by the previous addressed command and into an area without regional operating settings.

Required Results

Check that:

a) the EUT uses the regional operating settings commanded to it in 13.2.2 a);
b) the EUT uses the regional operating settings commanded to it in 13.2.2 b);
c) the EUT reverts to default.

Test Results

Broadcast Message 22	
Requirement	Verdict
Transmission of broadcast Message 22 to the EUT to assign channels 2084 and 2085: !AIVDO,1,1,,A,F027`SR2B2D7vm1oR?sD3bH2P000,0*53	-
EUT outputs text sentence ID 36 indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT uses settings as indicated by the ACA sentence output to the PI: $AIACA,1,5100.00,N,00100.00,W,5000.00,N,00200.00,W,6,2084,0,2085,0,0,0,B,1,112257.00*3C	Pass
EUT transmits Message 18 on designated channels 2085 and 2086 when within region: !AIVDM,1,1,,C,B3OdpnP0I?vB8h7>En06t051lH6G,0*23 received on channel 2084 !AIVDM,1,1,,D,B3OdpnP0I?vB8h7>En06t0DQI@I8,0*3D received on channel 2085	Pass

Addressed Message 22	
Requirement	Verdict
Transmission of addressed Message 22 to the EUT to assign channels 2082 and 2083: !AIVDO,1,1,,A,F027`SR2:2<1gnLK@000000BP000,0*6D	-
EUT outputs text sentence indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT uses settings as indicated by the ACA sentence output to the PI: $AIACA,4,5100.00,N,00100.00,W,5000.00,N,00200.00,W,6,2082,0,2083,0,0,0,A,1,112559.00*33	Pass
EUT transmits Message 18 on designated channels 2082 and 2083: !AIVDM,1,1,,A,B3OdpnP0I?vUg@WAllt6t03Ql5Id,0*53 received on channel 2082 !AIVDM,1,1,,B,B3OdpnP0I?vUg@WAllt6t0B1l000,0*69 received on channel 2083	Pass

EUT moved out of regional area – 51 30 N 01 00 W	
Requirement	Verdict
EUT outputs text sentence ID 36 indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT uses default settings as indicated by the ACA sentence output to the PI: $AIACA,5,9000.00,N,18000.00,W,9000.00,S,19646.49,E,4,2087,25,2088,25,0,0,,1,114609.00*7A	Pass
EUT transmits Message 18 on designated channels 2087 and 2088 when within region: !AIVDM,1,1,,A,B3OdpnP0I?wkjh7GOj06t041I<01,0*29 received on channel 2087 !AIVDM,1,1,,B,B3OdpnP0I?wkjh7GOj06t0@QI<01,0*3E received on channel 2088	Pass

2.18 Invalid regional operating areas

2.18.1 Specification Reference

IEC 62287-2, Clause 13.3

2.18.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.18.3 Date of Test

22-August-2018

2.18.4 Test Results and Methods of Measurement

Method of Measurement

Set up standard test environment and operate the EUT in autonomous mode. Perform, after completion of all other tests related to change of regional operating settings, the following.

a) Send three different valid regional operating settings with adjacent regional operating areas, their corners within 8 NM of each other, to the EUT using Message 22. The current own position of the EUT shall be within the regional operating area of the third regional operating setting.
b) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

Required Results

Check that

a) the EUT uses the operating settings that were in use prior to receiving the third regional operating setting;
b) the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

Test Results

a) Three regional operating areas: 52 N 1 W, 51 N 2 W – F027`SR2:2<7vm1qp?sD3g42P000 52 N 0 W, 51 N 1 W – F027`SR2B2D0001qp?ub3g42P000 51 N 1 W, 50 N 2 W – F027`SR262H7vm1oR?sD3bH2P000	
Requirement	Verdict
EUT outputs text sentence ID 36 indicating that channel management parameters have changed after receiving the first message 22: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT outputs text sentence ID 36 indicating that channel management parameters have changed after receiving the second message 22: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT does not output text sentence ID 36 after receiving the third message 22	Pass
EUT uses the default operating settings after receiving the third message 22	Pass

b) EUT moved to 51 30 N 1 30 W, within the first region	
Requirement	Verdict
EUT outputs text sentence ID 36 indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT uses settings from the first region, as indicated by the ACA sentence output to the PI: $AIACA,3,5200.00,N,00100.00,W,5100.00,N,00200.00,W,6,2082,0,2083,0,0,0,B,1,154952.00*30	-
EUT transmits Message 18 on designated channels 2082 and 2083	Pass

b) EUT moved to 51 30 N 0 30 W, within the second region	
Requirement	Verdict
EUT outputs text sentence ID 36 indicating that channel management parameters have changed: $AITXT,01,01,36,AIS: Channel management parameters changed*1C	-
EUT uses settings from the second region, as indicated by the ACA sentence output to the PI: $AIACA,7,5200.00,N,00000.00,E,5100.00,N,00100.00,W,6,2084,0,2085,0,0,0,B,1,160222.00*2F	-
EUT transmits Message 18 on designated channels 2084 and 2085	Pass

2.19 **Continuation of autonomous mode reporting interval**

2.19.1 **Specification Reference**

IEC 62287-2, Clause 13.4

2.19.2 **Equipment Under Test and Modification State**

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.19.3 **Date of Test**

25-September-2018

2.19.4 **Test Results and Methods of Measurement**

Method of Measurement

When in the presence of an assigned mode command, and in a transition zone, check that the EUT continues to report at the autonomous reporting interval.

Required Result

Ensure that the autonomous reporting interval is maintained.

Test Results

Pre-Test that assigned mode is working	
Requirement	Verdict
Message 16 received by EUT: !AIVDM,1,1,,A,@027`SPos>=`0`0P,0*7F	-
EUT enters assigned mode.	Pass
Mode flag = 1.	

EUT placed @ 51 01 N 1 30 W after assigned mode is complete	
Requirement	Verdict
Message 22 received by EUT: !AIVDM,1,1,,A,F027`SR1r287vm1oR?sD3bH20000,0*7E	-
EUT halves it's reporting interval.	-
Message 16 received by EUT: !AIVDM,1,1,,A,@027`SPos>=`0`0P,0*7F	-
EUT ignores assigned mode message and remains at it's current reporting interval.	Pass
Mode flag = 0.	Pass

2.20 Slot reuse and FATDMA reservations

2.20.1 Specification Reference

IEC 62287-2, Clause 13.5

2.20.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.20.3 Date of Test

18-October-2018

2.20.4 Test Results and Methods of Measurement

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter.

a) Transmit test targets on channel A with 50 % channel load. Channel B is free. This test covers Rule 0 and 1.
b) Transmit near and distant test targets with 100 % channel load on channel A in all selection intervals which are under observation. Channel B is free. There shall be enough different targets to allow the EUT to meet the requirement to reuse only one slot of each target per frame.
c) Transmit near and distant test targets with 100 % channel load on channel B in all selection intervals which are under observation. Channel A is free.
d) Transmit Message 4 with a position distance < 120 NM and Message 20 with slot reservations on channel A. Transmit near and distant test targets in the unreserved slots on channel A. Channel B is free.

Required Results

Confirm the following.

a) Only free slots are used for transmission on channel A. Confirm that only slots which are free on channel A are used for transmissions on channel B.
b) Slots of the most distant test targets are used for transmission on channel A. Check that not more than one slot of a station is reused in a frame.
c) For transmission on channel A, the candidate slots on channel A are organized according to the most distance station on channel B.
d) Only unreserved slots are used on channel A. Confirm that slots of the most distant test targets are used for transmission. Confirm that for transmissions on channel B only slots which are not reserved on channel A are used after the next regular time-out 0.

Test Results

a) Channel A with 50% load, No. Targets = 5, Block Gap = 5	
Requirement	Verdict
Only free slots are used for transmission on Channel A.	Pass
Only slots that are free on Channel A are used for transmissions on Channel B.	Pass

b) Channel A with 100% load, No. Targets = 50, Block Gap = 0	
Requirement	Verdict
Slots of the most distant test targets are used for transmission on Channel A.	Pass
No more than one slot of a station is reused in a frame.	Pass

c) Channel B with 100% load, No. Targets = 50, Block Gap = 0

Requirement	Verdict
Slots of the most distant test targets on channel B are used for transmission on channel A.	Pass

d) Channel A with 100% load, No. Targets = 50, Block Gap = 0

Requirement	Verdict
Unreserved slots are used for transmission on channel A.	Pass
Slots of the most distant test targets are used for transmission on Channel A.	Pass
After the timeout of message 20, slots that were previously reserved are used.	Pass

2.21 Long-range application by broadcast

2.21.1 Specification Reference

IEC 62287-2, Clause 13.6

2.21.2 Equipment Under Test and Modification State

ATB1, S/N: TA UNIT 005 – See section 1.3 for modification states

2.21.3 Date of Test

22-August-2018 to 27-September-2018

2.21.4 Test Results and Methods of Measurement

Long-range broadcast – Clause 13.6.1

Method of Measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT. The long-range channels are channel 75 and channel 76.

a) Do not apply Message 4 and Message 23.
b) Apply the Message 4 with the long range control bit set to 1 and 0. Place the EUT inside the RF footprint (Message 4 receiving area) of a base station.
c) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the RF footprint area, but outside the base station coverage area.
d) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. Message 23 fields after station type shall not match current settings of EUT.
e) Repeat the test d) using different MMSIs for Message 4 and Message 23.
f) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min, remove transmissions of Message 23.
g) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min, remove transmissions of Message 4.

Required Results

Check that EUT transmits the appropriate messages. For example, in addition to the normal transmission of Messages 18 and 24 with adequate reporting interval on AIS 1 and AIS 2, confirm the following.

a) EUT transmits Message 27 alternating the long-range channels with 3 min reporting interval. Confirm that the content of Message 27 is correct.
b) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.
c) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.
d) EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval when the Message 4 long-range control bit is set to 1. EUT stops transmitting Message 27

when the Message 4 long-range control bit is set to 0. Verify fields after station type in received Message 23 are ignored.

e) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.

f) EUT begins transmission of Message 27 no sooner than 4 min and no later than 11 min (8 min timeout + 3 min transmission interval) after Message 23 was removed;

g) EUT begins transmission of Message 27 beyond 3 min after Message 4 was removed.

Test Results

The NavStatus is set to 15 "unknown" in Message 27. NavStatus is only provided by a Class A unit in Message 1.

Units without MMSI belonging to a base station or that of the EUT, *234567898*, are disregarded for the following tests.

a) Do not apply Message 4 and Message 23	
Requirement	Verdict
EUT transmits Message 27 alternating between 2075 and 2076: !AIVDM,1,1,,C,K3Odpngwu7CfOV2t,0*41 !AIVDM,1,1,,D,K3Odpngwu7CfOV2t,0*46	Pass
EUT transmits Message 27 with a 3 min reporting interval: 11:05:50, 11:08:50, 11:11:55, 11:14:57, 11:17:58, 11:21:01	Pass
Content of Message 27 is correct, see decode below.	Pass

a) Message 27 decode – EUT @ 50 52.7 N 1 13.9 W, SOG = 11.5, COG = 47.2	
!AIVDM,1,1,,C,K3Odpngwu7CfOV2t,0*41	
Parameter	Decoded Value
Message ID	27 - Position report for long-range applications
Repeat Indicator	0
MMSI	234567898
Position Accuracy	1
RAIM Flag	1
Navigation Status	15
Longitude	1 13.9 W
Latitude	50 52.7 N
SOG	1.2
COG	4.7
Position Latency	0
Spare	0

b) Apply Message 4 with long-range control bit set to 1, EUT inside RF footprint of base station	
Requirement	Verdict
Message 4 sent to the EUT: !AIVDO,1,1,,A,4027`SQv::hN?wrFc0M6jh102875,0*48	-
EUT transmits Message 27 alternating between 2075 and 2076: !AIVDM,1,1,,C,K3Odpngwu7CfOV2t,0*41 !AIVDM,1,1,,D,K3Odpngwu7CfOV2t,0*46	Pass
EUT transmits Message 27 with a 3 min reporting interval: 15:37:47, 15:40:48, 15:43:54, 15:46:56	Pass

b) Apply Message 4 with long-range control bit set to 0, EUT inside RF footprint of base station	
Requirement	Verdict
Message 4 sent to the EUT: !AIVDO,1,1,,A,4027`SQv::f1;wrFc0M6jh1020;K,0*47	-
EUT transmits Message 27 alternating between 2075 and 2076: !AIVDM,1,1,,C,K3Odpngwu7CfOV2t,0*41 !AIVDM,1,1,,D,K3Odpngwu7CfOV2t,0*46	Pass
EUT transmits Message 27 with a 3 min reporting interval: 15:25:33, 15:28:37, 15:31:40, 15:34:43	Pass

c) Apply Message 4 with long-range control bit set to 1, Message 23 with station type 10, EUT inside RF footprint but outside coverage area @ 51 05 N 1 13.9 W

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`SQv::f1;wrFc0M6jh1P2000,0*57	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000000,2*39	-
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass

c) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10, EUT inside RF footprint but outside coverage area

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`SQv::hN?wrFc0M6jh102000,0*42	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000000,2*39	-
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass

d) Apply Message 4 with long-range control bit set to 1, Message 23 with station type 10, EUT inside coverage area @ 50 50 N 1 13.9 W

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`SQv::f1;wrFc0M6jh1P2000,0*57	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E	-
Fields following "Station type" in received Message 23 are ignored, reporting rate and Tx/Rx mode remains the same.	Pass
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass

d) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10, EUT inside coverage area @ 50 50 N 1 13.9 W

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`SQv::hN?wrFc0M6jh102000,0*42	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E	-
Fields following "Station type" in received Message 23 are ignored, reporting rate and Tx/Rx mode remains the same.	Pass
EUT stops transmitting Message 27.	Pass

e) Apply Message 4 (MMSI: 2222333) with long-range control bit set to 1, Message 23 (MMSI: 2222222) with station type 10, EUT inside coverage area @ 50 50 N 1 13.9 W

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`wAv::f1;wrFc0M6jh1P2000,0*63	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E	-
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass

e) Apply Message 4 (MMSI: 2222333) with long-range control bit set to 0, Message 23 (MMSI: 2222222) with station type 10, EUT inside coverage area @ 50 50 N 1 13.9 W

Requirement	Verdict
Message 4 sent to EUT: !AIVDO,1,1,,A,4027`wAv::hN?wrFc0M6jh102000,0*76	-
Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E	-
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass

f) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10 with same MMSI, EUT inside coverage area, after 6 min stop transmission of Message 23 (Time: 10:38:53)

Time	Requirement	Verdict
10:46:00	EUT begins transmission of Message 27 no sooner than 7 min and no later than 11 min after Message 23 was removed.	Pass
-	EUT transmits Message 27 with a 3 min reporting interval alternating channels 2075 and 2076 with the correct content.	Pass

g) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10 with same MMSI, EUT inside coverage area, after 6 min stop transmission of Message 4 (Time: 11:14:12)

Time	Requirement	Verdict
11:22:58	EUT begins transmission of Message 27 after 3 min following the removal of Message 4.	Pass
-	EUT transmits Message 27 with a 3 min reporting interval alternating channels 2075 and 2076 with the correct content.	Pass

Multiple assignment operation – Clause 13.6.2

Method of Measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode with a reporting interval of 10 s. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT.

a) Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping their RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas not overlapping. Place the EUT inside the overlapped RF footprint area but outside the coverage area of both base stations.
b) Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas partially overlapping the base station coverage areas. Place the EUT inside the overlapped base station coverage area.
c) Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from one base station with station type 10 to define the base station coverage areas. Do not broadcast Message 23 from other base stations. Place the EUT inside the RF footprint area of base station not broadcasting Message 23 but outside the coverage area of the base station transmitting Message 23.

Required Results

Verify that

a) irrespective of the Message 4 long-range control bit status of both base stations, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval;
b) EUT transmits Message 27;
c) irrespective of the Message 4 long range control bit status of both base stations, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.

Test Results

a) EUT @ 51 15 N 2 10 W Base Station 1 @ 51 N 4 W - MMSI = 2222222 - LR = 0: 4027`SQv:;fN0wed80M;c@102000 Coverage area not overlapping: G027`SSuG@tgWr:Aos:00000000 Base Station 2 @ 51 N 0 W - MMSI = 2222333 - LR = 1: 4027`wAv:;fN0P0000M;c@1P2000 Coverage area not overlapping: G027`wCwwHtgWwJQos:00000000	
Requirement	Verdict
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass
Content of Message 27 is correct.	Pass

b) EUT @ 51 15 N 2 10 W
Base Station 1 @ 51 N 4 W - MMSI = 2222222 - LR = 0:
4027`SQv:;fN0wed80M;c@102000
Coverage area overlapping:
G027`SSvm0tgWtO1os:00000000
Base Station 2 @ 51 N 0 W - MMSI = 2222333 - LR = 1:
4027`wAv:;fN0P0000M;c@1P2000
Coverage area overlapping:
G027`wCw7htgWu4Qos:00000000

Requirement	Verdict
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass
Content of Message 27 is correct.	Pass

a) EUT @ 51 55 N 2 W
Base Station 1 @ 51 N 4 W - MMSI = 2222222 - LR = 0:
4027`SQv:;fN0wed80M;c@102000
One Coverage area:
G027`SSvm0tgWtO1os:00000000
Base Station 2 @ 51 N 0 W - MMSI = 2222333 - LR = 1:
4027`wAv:;fN0P0000M;c@1P2000

Requirement	Verdict
EUT transmits Message 27 alternating between 2075 and 2076.	Pass
EUT transmits Message 27 with a 3 min reporting interval.	Pass
Content of Message 27 is correct.	Pass

2.22 DSC Functionality Tests

2.22.1 Specification Reference

IEC 62287-2, Clause A.4

2.22.2 Equipment Under Test and Modification State

ATB1, S/N: 1234567Q (TSR0019) – See section 1.3 for modification states

2.22.3 Date of Test

23-April-2019

2.22.4 Test Results and Methods of Measurement

General – Clause A.4.1

Method of Measurement

Send a sequence of valid calls consisting of

• DSC test signal number 2,
• DSC test signal number 3,
• DSC test signal number 2,
• DSC test signal number 4, and
• DSC test signal number 2.

Required Results

Check that the EUT AIS operation is not affected by the interleaved calls.

Test Results

Requirement	Result	Verdict
Check that the EUT AIS operation is not affected by the interleaved calls	EUT operation is not affected.	Pass

Scheduling – Clause A.4.5

Method of Measurement

Send DSC test signal number 2 to the EUT, with EOS = 127 and another signal with EOS = 117 (RQ).

Required Results

Check that the EUT's AIS reporting is not affected during the DSC monitoring times.

Check that the EUT accepts the channel management, but a response is not transmitted in either case of EOS = 127 and 117.

Test Results

EUT SOG = 25 knots		
Requirement	Result	Verdict
The AIS reporting is not affected during monitoring times.	Message 18 is transmitted every 5 seconds during DSC monitoring times.	Pass
Check that the EUT accepts the channel management, but a response is not transmitted in either case of EOS = 127 and 117	No DSC response is transmitted.	Pass

DSC flag in Message 18 – Clause A.4.6

Method of Measurement

Perform the following:

a) enable DSC monitoring;
b) disable DSC monitoring.

Required Results

Check that

a) the DSC flag is set to one, and
b) the DSC flag is set to zero.

Test Results

Requirement	Result	Verdict
DSC flag set to one	!AIVDM,1,1,,C,B3OdpnP0vWvUg@WAIlt6t0<1h8>o,0*1C	Pass
DSC flag is set to zero	!AIVDM,1,1,,D,B3OdpnP0vWvUg@WAIlt6t040hD00,0*3F	Pass

a) DSC flag is set to one	
!AIVDM,1,1,,C,B3OdpnP0vWvUg@WAIlt6t0<1h8>o,0*1C	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	25
Position Accuracy	0 - low (>10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	11.1
True Heading	0
Time Stamp	24
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	1
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	2
Communication State - SOTDMA Sub Message	Slot Number = 951

b) DSC flag is set to zero	
!AIVDM,1,1,,D,B3OdpnP0vWvUg@WAIIt6t040hD00,0*3F	
Parameter	Decoded Value
Message ID	18
Repeat Indicator	0
MMSI	234567898
Reserved	0
SOG	25
Position Accuracy	0 - low (>10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
COG	11.1
True Heading	0
Time Stamp	8
Spare	0
Class B unit flag	0
Class B display flag	0
Class B DSC flag	0
Class B band flag	1
Class B Message 22 flag	1
Mode flag	0
RAIM Flag	0 - RAIM not in use
Comm State Flag	0 - SOTDMA
Communication State - Sync State	0
Communication State - SOTDMA Slot Timeout	5
Communication State - SOTDMA Sub Message	Received Stations = 0

DSC monitoring time plan – Clause A.4.7

Method of Measurement

Perform the following:

a) transmit DSC test signal 2 during monitoring time;
b) transmit DSC test signal 2 outside monitoring time.

Required Results

Check that

a) the DSC call is received, and
b) the DSC call is not received.

Test Results

A DSC test signal was transmitted every 10 seconds during two test periods, between 14:15:00 to 14:55:00 and 17:00:00 to 17:10:00. The following table shows when DSC calls were received.

Time	Result	Verdict
14:20:33	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:20:44	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:20:55	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:21:39	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:21:50	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:35:42	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:35:53	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:36:36	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:36:47	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:36:58	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:50:39	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:50:50	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:51:34	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:51:45	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
14:51:56	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:05:32	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:05:42	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:05:53	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:06:37	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:06:48	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
17:06:59	$AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

Replacement or erasure of dated or remote regional operating settings – Clause A.4.8

Method of Measurement

Set up standard test environment. Send a valid regional operating setting to the EUT by Message 22 with the regional operating area including the own position of the EUT. Consecutively send a further seven (7) valid regional operating settings to EUT, using both Message 22 and DSC test signal number 2, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown.

a) Send a ninth Message 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.
b) Step 1: set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.
   Step 2: send a tenth telecommand to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by step 1 but which does not include the own position of the EUT.
c) Step 1: move own position of EUT to a distance of more than 500 NM from all regions defined by previous commands.
   Step 2: consecutively set own position of EUT to within all regions defined by the previous telecommands.

Required Results

After the initialisation, the EUT shall operate according to the regional operating settings defined by the first Message 22 sent.

a) Check that the most distant area is removed.
b) Step 1: check that the EUT changes its operating settings to those of that region which includes own position of the EUT.
   Step 2: check that the EUT reverts to the default operating settings.
   NOTE Since the regional operating settings to which the EUT was set in step 1 are erased due to step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns to default.
c) Step 1: check that the EUT operates with the default settings.
   Step 2: check that the EUT operates with the default settings.

Test Results

a)		
Requirement	**Result**	**Verdict**
EUT sent 8 valid regional operating settings. EUT was queried for stored settings: $AIAIQ,ACA*3E	$AIACA,5,5100.00,N,00200.00,W,5040.00,N,00220.00,W,4,2082,0,2083,0,0,0,D,0,000000.00*3A $AIACA,6,5100.00,N,00140.00,W,5040.00,N,00200.00,W,4,2083,0,2084,0,0,0,D,0,000000.00*3A $AIACA,7,5100.00,N,00120.00,W,5040.00,N,00140.00,W,4,2084,0,2085,0,0,0,D,1,102156.00*3C $AIACA,8,5100.00,N,00100.00,W,5040.00,N,00120.00,W,4,2084,0,2085,0,0,0,D,0,000000.00*37 $AIACA,9,5030.00,N,00200.00,W,5000.00,N,00220.00,W,4,2085,0,2086,0,0,0,D,0,000000.00*32 $AIACA,0,5030.00,N,00140.00,W,5000.00,N,00200.00,W,4,2086,0,2087,0,0,0,D,0,000000.00*3C $AIACA,1,5030.00,N,00120.00,W,5000.00,N,00140.00,W,4,2087,0,2088,0,0,0,D,0,000000.00*32 $AIACA,2,5030.00,N,00100.00,W,5000.00,N,00120.00,W,4,2088,0,2087,0,0,0,D,0,000000.00*35	Pass
EUT moved to 50 50 N, 1 35 W. Ninth command sent to EUT. EUT was queried for stored settings: $AIAIQ,ACA*3E	$AIACA,2,5100.00,N,00200.00,W,5040.00,N,00220.00,W,4,2082,0,2083,0,0,0,D,0,000000.00*3D $AIACA,3,5100.00,N,00140.00,W,5040.00,N,00200.00,W,4,2083,0,2084,0,0,0,D,0,000000.00*3F $AIACA,4,5100.00,N,00120.00,W,5040.00,N,00140.00,W,4,2084,0,2085,0,0,0,D,1,102156.00*3F3 $AIACA,5,5100.00,N,00100.00,W,5040.00,N,00120.00,W,4,2084,0,2085,0,0,0,D,0,000000.00*3A $AIACA,6,4950.00,N,00200.00,W,4920.00,N,00220.00,W,4,2081,0,2082,0,0,0,D,0,000000.00*39 $AIACA,7,5030.00,N,00140.00,W,5000.00,N,00200.00,W,4,2086,0,2087,0,0,0,D,0,000000.00*3B $AIACA,8,5030.00,N,00120.00,W,5000.00,N,00140.00,W,4,2087,0,2088,0,0,0,D,0,000000.00*3B $AIACA,9,5030.00,N,00100.00,W,5000.00,N,00120.00,W,4,2088,0,2087,0,0,0,D,0,000000.00*3E	Pass
The most distant area is removed.	Area removed: 5030.00 N,00200.00,W 5000.00,N,00220.00,W	Pass

b) Step 1		
Requirement	**Result**	**Verdict**
EUT moved to second telecommand region	ACA/ACS/TXT sentences are output indicating settings of the second telecommand in use: $AIACA,0,5100.00,N,00140.00,W,5040.00,N,00200.00,W,4,2083,0,2084,0,0,0,D,1,122547.00*3A $AIACS,0,4661000,102110.00,01,04,2019*7E $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass
EUT moved to ninth telecommand region	ACA/ACS/TXT sentences are output indicating settings of the ninth telecommand in use: $AIACA,1,4950.00,N,00200.00,W,4920.00,N,00220.00,W,4,2081,0,2082,0,0,0,D,1,122718.00*30 $AIACS,1,4661000,113724.00,01,04,2019*7E $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

b) Step 2		
Requirement	**Result**	**Verdict**
EUT reverts to default settings	ACA/ACS/TXT sentences are output indicating default settings in use: $AIACA,1,9000.00,N,18000.00,E,9000.00,S,18000.00,W,4,2087,0,2088,0,0,0,,1,140741.00*7A $AIACS,1,232232232,000000.00,01,04,2019*7A $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

c)		
Requirement	Result	Verdict
EUT moved > 500 NM away to 40 41 N, 002 1 W. EUT was queried for stored settings: $AIAIQ,ACA*3E	ACA/ACS sentences are output indicating no stored regions and all previous regions have been deleted: $AIACA,0,9000.00,N,18000.00,E,9000.00,S,18000.00,W,4,2087,0,2088,0,0,0,,1,140741.00*7B $AIACS,0,232232232,000000.00,01,04,2019*7B	Pass
EUT moved to all other regions.	Default settings are in use.	Pass

Test of addressed telecommand – Clause A.4.9

Method of Measurement

Set up a standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order.

a) Send a DSC test signal number 2 with valid regional operating settings that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.
b) Send an addressed DSC channel management command to the EUT with different regional operating settings than the previous command.
c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

Required Results

Check that

a) the EUT uses the regional operating settings commanded to it in A.4.9.1 a);
b) the EUT uses the regional operating settings commanded to it in A.4.9.1 b);
c) the EUT reverts to default.

Test Results

a)		
Requirement	Result	Verdict
EUT sent DSC geographical call with region settings 51 00 N, 001 W, 50 30 N, 2 W, 2086 and 2087.	$AIACA,3,5100.00,N,00100.00,W,5030.00,N,00200.00,W,4,2086,0,2087,0,0,0,D,1,142728.00*31 $AIACS,3,4661000,142720.00,01,04,2019*7C $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

b)		
Requirement	Result	Verdict
EUT sent DSC addressed call with region settings 51 00 N, 001 W, 50 30 N, 2 W, 2084 and 2085.	$AIACA,5,5100.00,N,00100.00,W,5030.00,N,00200.00,W,4,2084,0,2085,0,0,0,D,0,000000.00*3C $AIACS,5,4661000,142808.00,01,04,2019*7F $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

c)		
Requirement	Result	Verdict
EUT moved out of regional area.	$AIACA,7,9000.00,N,18000.00,E,9000.00,S,18000.00,W,4,2087,0,2088,0,0,0,,1,145658.00*70 $AIACS,7,232232232,000000.00,01,04,2019*7C $AITXT,01,01,36,AIS: Channel management parameters changed*1C	Pass

Invalid regional operating areas – Clause A.4.10

Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

a) send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by DSC test signal number 2. The current own position of the EUT shall be within the regional operating area of the third regional operating setting;

b) move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

Required Results

Check that

a) the EUT uses the operating settings that were in use prior to receiving the third regional operating setting;

b) the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

Test Results

a)		
Requirement	Result	Verdict
Three regions were sent to the EUT 51 N 1 30 W, 50 30 N 2 W 51 N 1 W, 50 30 N 1 30 W 50 30 N 1 30 W, 50 N 2 W	The EUT uses default settings. The EUT stored the first two regions only: $AIACA,5,5100.00,N,00130.00,W,5030.00,N,00200.00,W,4,2086,0,2087,0,0,0,D,0,000000.00*3F $AIACS,5,4661000,153103.00,01,04,2019*7D $AIACA,6,5100.00,N,00100.00,W,5030.00,N,00130.00,W,4,2085,0,2086,0,0,0,D,1,153350.00*3D $AIACS,6,4661000,153129.00,01,04,2019*76	Pass

b)		
Requirement	Result	Verdict
EUT moved to region 1	EUT uses the settings of region 1: $AIACA,3,5100.00,N,00130.00,W,5030.00,N,00200.00,W,4,2086,0,2087,0,0,0,D,1,153240.00*39 $AIACS,3,4661000,153103.00,01,04,2019*7B	Pass
EUT moved to region 2	EUT uses the settings of region 2: $AIACA,4,5100.00,N,00100.00,W,5030.00,N,00130.00,W,4,2085,0,2086,0,0,0,D,1,153350.00*3F $AIACS,4,4661000,153129.00,01,04,2019*74	Pass

3 Test Equipment

List of absolute measuring and other principal items of test equipment.

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
AIS Test Unit	Attingimus	MK II	4057	-	OP MON
AIS Base Station	SAAB	R40	S/N:5006	-	OP MON
Power Supply	Rohde & Schwarz	HMP2020	4735	-	OP MON
Power Supply	Rohde & Schwarz	HMP4040	4736	-	OP MON
DVM	Fluke	179	4007	12	14-Sep-2018
DVM	Fluke	79	0611	12	07-Sep-2019

OP Mon – Output Monitored Using Calibrated Equipment

4   Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Synchronisation and jitter accuracy	± 20.1 us