Ambient temperature +20°C Relative humidity 49%

CARRIER POWER

IEC 61993-2, CLAUSE 15.1.2
Extreme supply IEC 61993-2, CLAUSE 10.2.2

TEST CONDITIONS		TDMA Transmitter Carrier Power (Low/High) (Watts)			
		156.025 MHz	157.4125 MHz	160.6375 MHz	162.025 MHz
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Low: 2 High: 12	Low: 2 High: 12	Low: 2 High: 11.8	Low: 2 High: 12
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Low: 1.75 High: 11	Low: 2.1 High: 12.5	Low: 2.25 High: 12.5	Low: 1.95 High: 13
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Low: 2 High: 11	Low: 2.25 High: 11	Low: 2.25 High: 10.6	Low: 1.95 High: 10.3
Measurement uncertainty (dB)		± 1.5 dB			

Required results:

Normal conditions	The carrier power (conducted) under normal conditions shall be within ±1.5 dB of the rated carrier power (conducted).
Extreme conditions	The carrier power (conducted) under extreme conditions shall be within +2 dB and –3 dB of the rated carrier power (conducted).

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 50, 64

.....

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

See plots on following pages.

Required results:

The modulation spectrum shall be within the mask shown on each of the plots.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74, 75

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM

IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

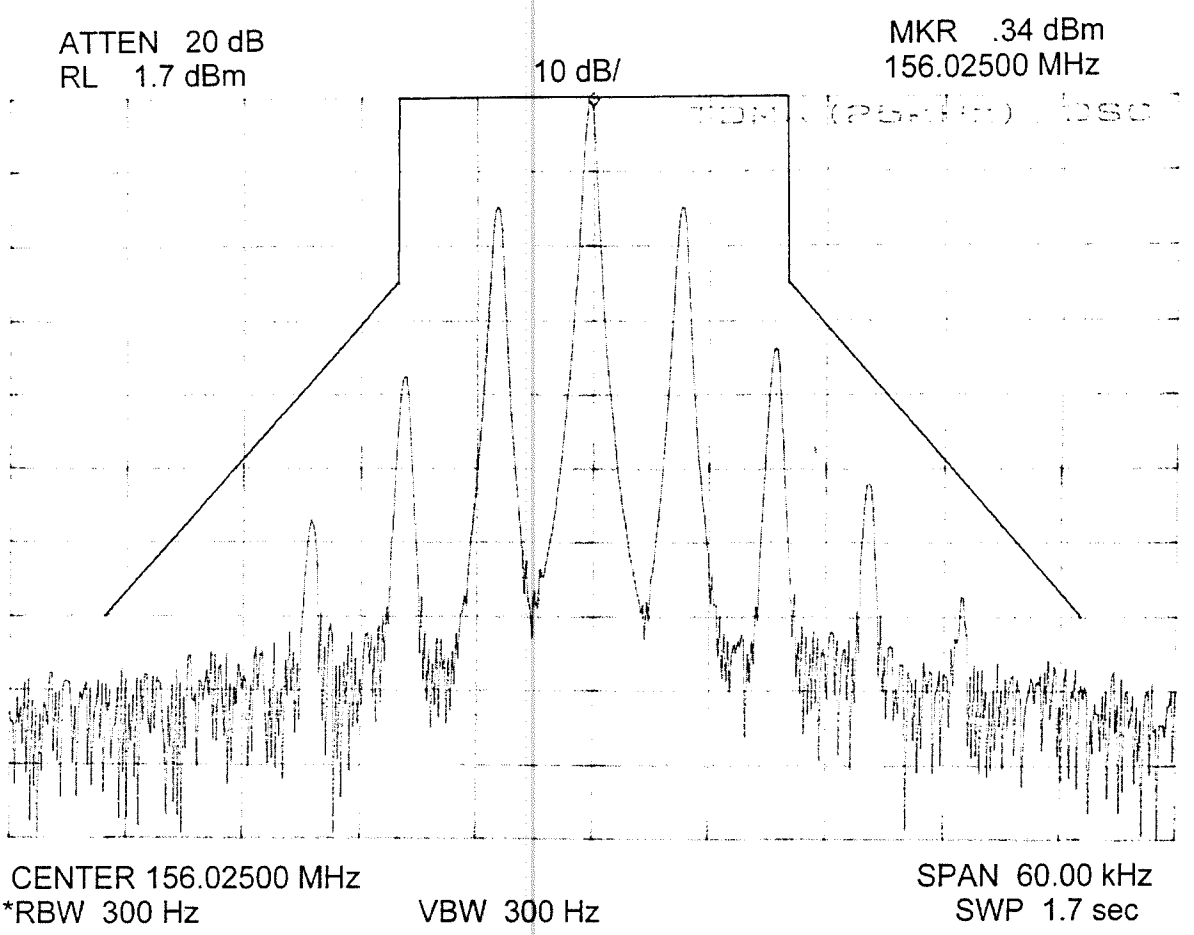

Figure x. Modulation Spectrum, EUT in 25 kHz mode, operating frequency 156.025 MHz, modulation: dot pattern 10101010

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

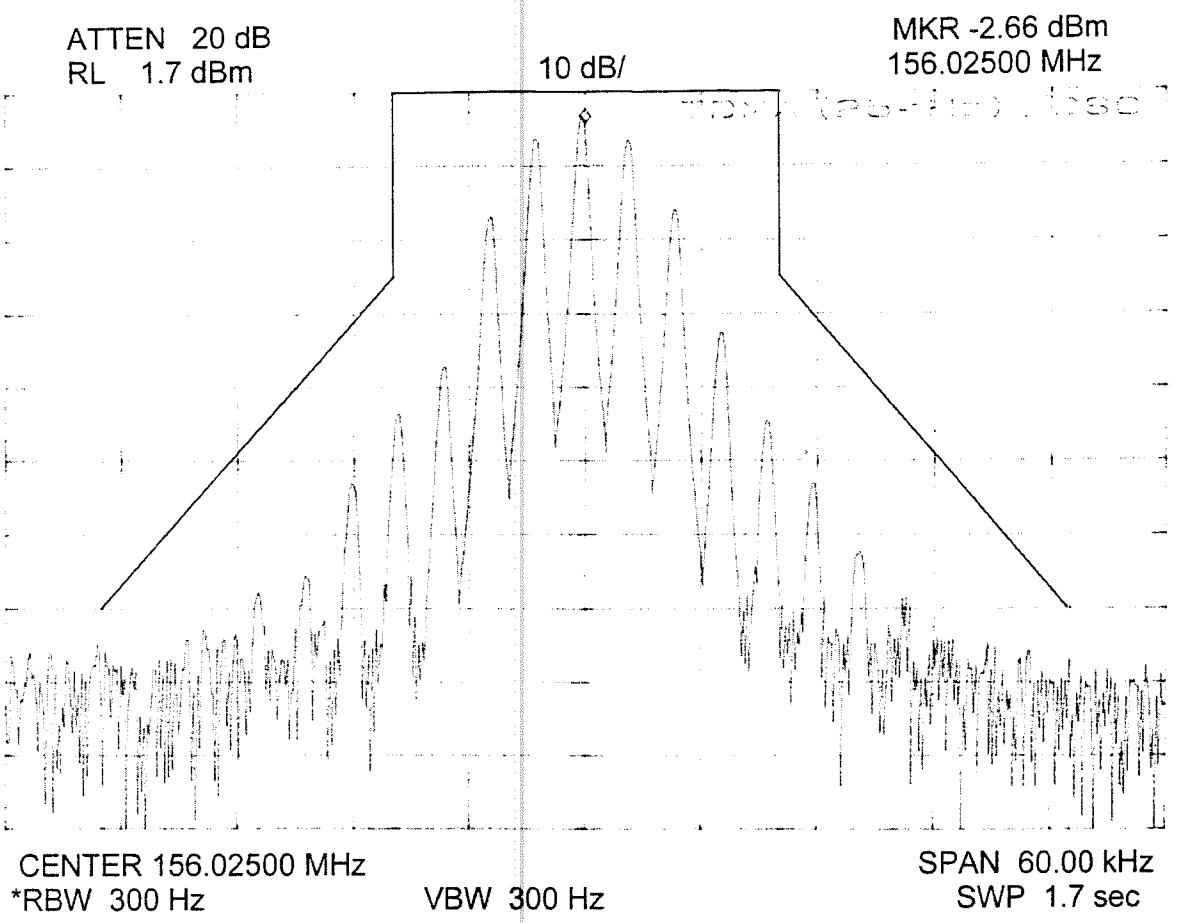

Figure x. Modulation Spectrum, EUT in 25 kHz mode, operating frequency 156.025 MHz, modulation: dot pattern 11001100

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

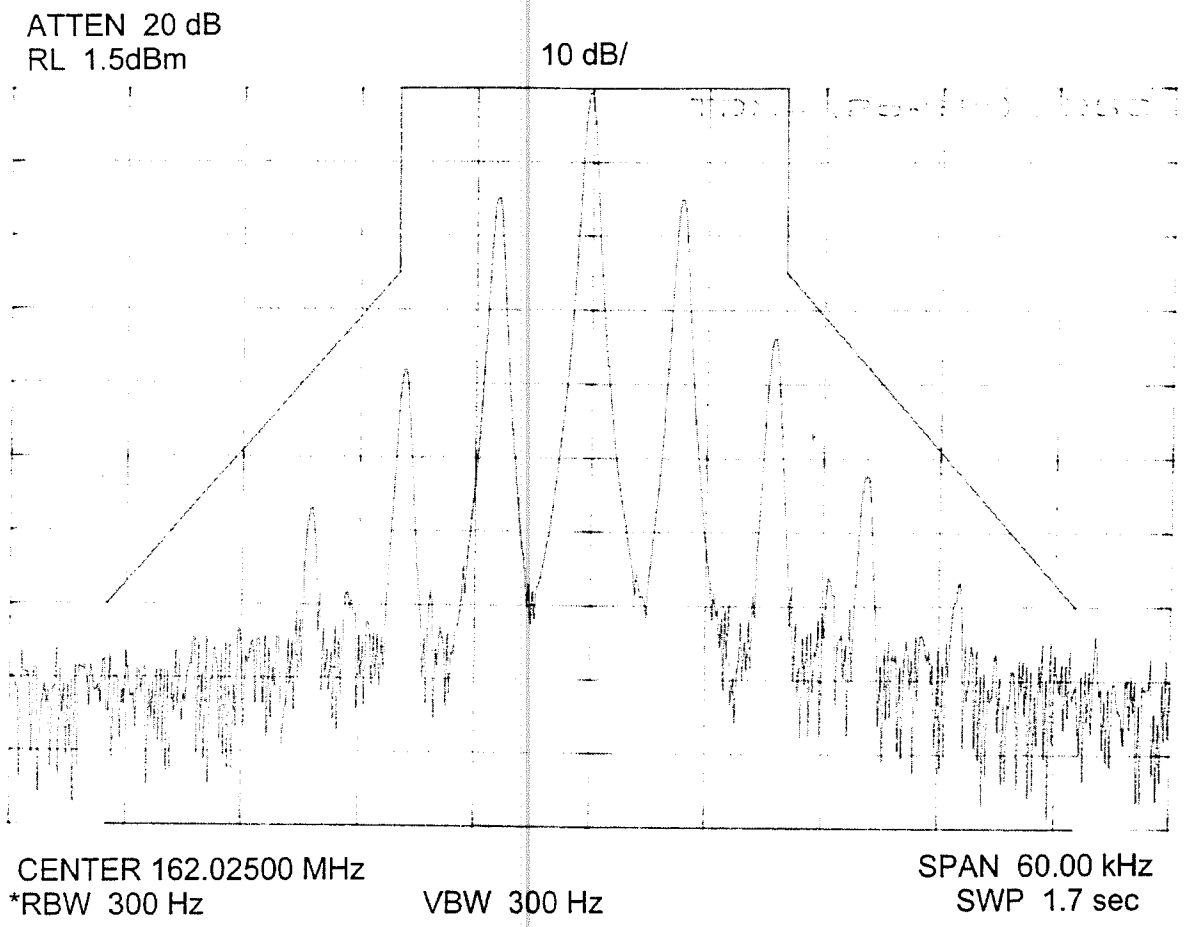

Figure x. Modulation Spectrum, EUT in 25 kHz mode, operating frequency 162.025 MHz, modulation: dot pattern 10101010

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

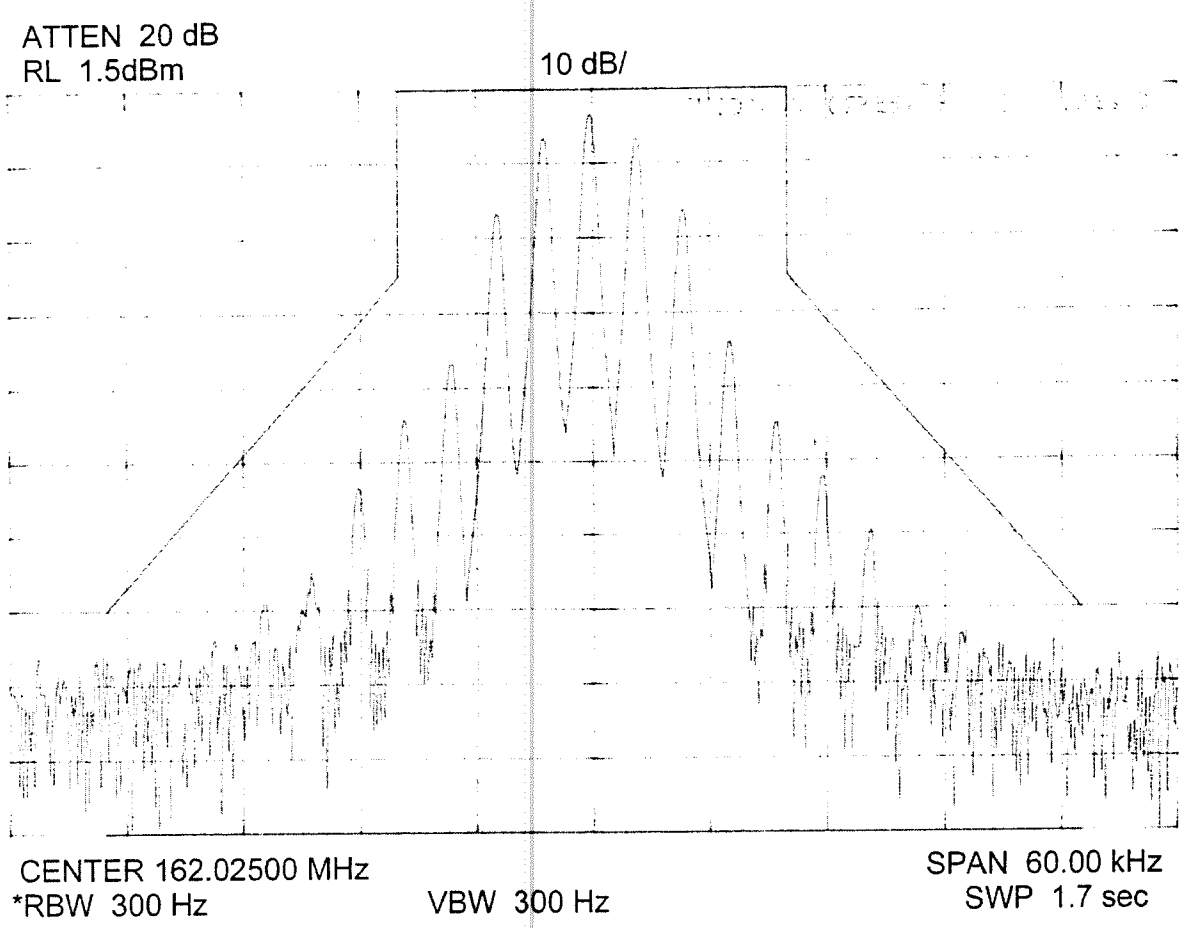

Figure x. Modulation Spectrum, EUT in 25 kHz mode, operating frequency 162.025 MHz, modulation: dot pattern 11001100

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.3

25 kHz Channel Mode

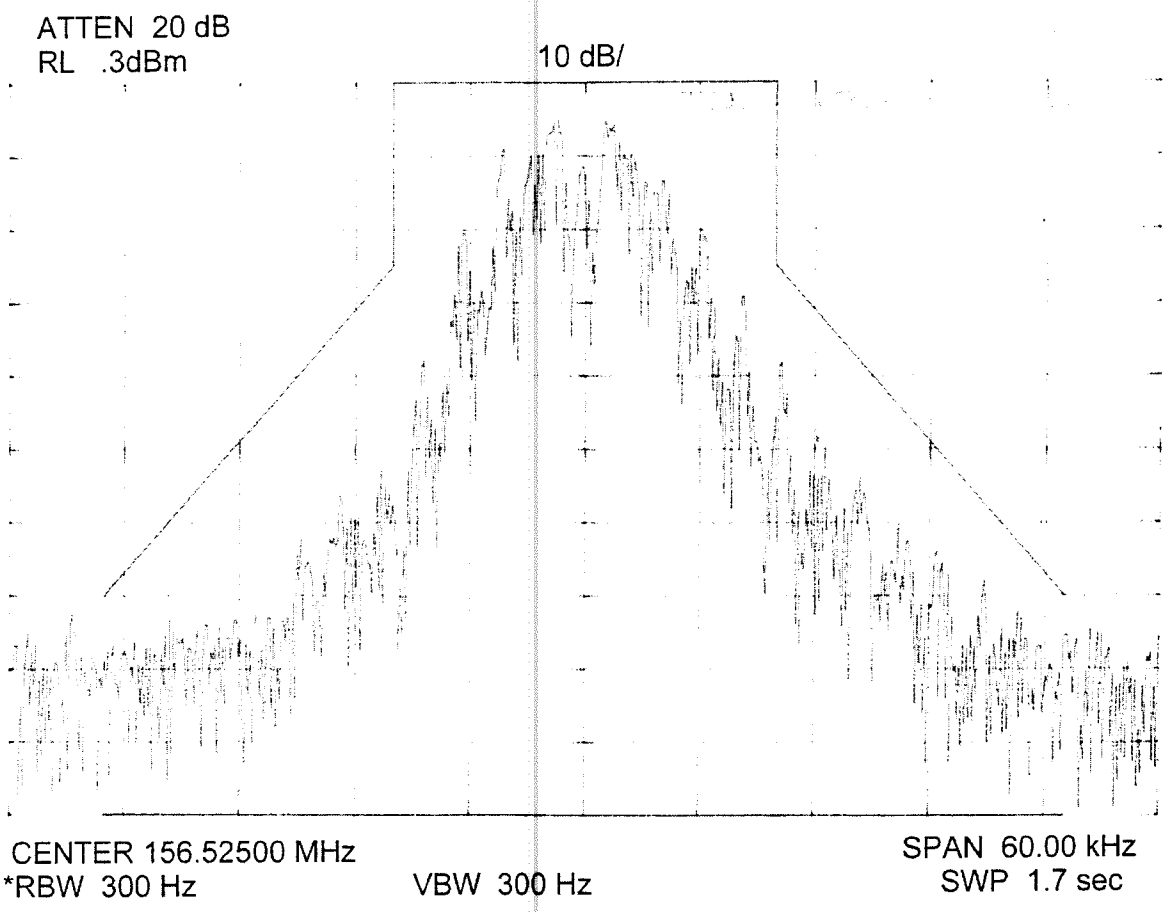

Figure x. Modulation Spectrum, EUT in 25 kHz mode (DSC), operating frequency 156.525 MHz, modulation: standard test signal No. 1

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.4

12.5 kHz Channel Mode

See plots on following pages.

Required results

The modulation spectrum shall be within the mask shown on each of the plots.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74, 75
.....

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.4

12.5 kHz Channel Mode

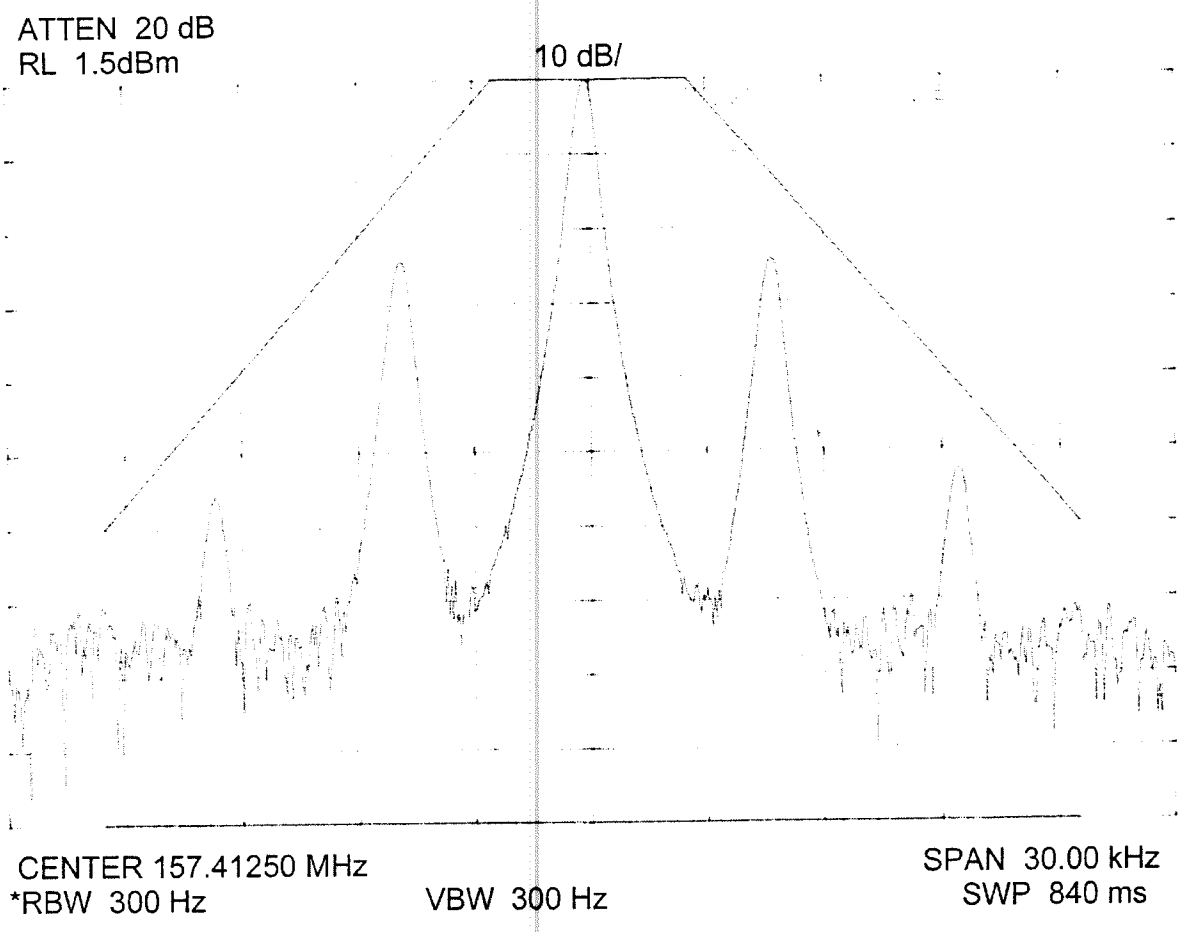

Figure x. Modulation Spectrum, EUT in 12.5 kHz mode, operating frequency 157.4125 MHz, modulation: dot pattern 10101010

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.4

12.5 kHz Channel Mode

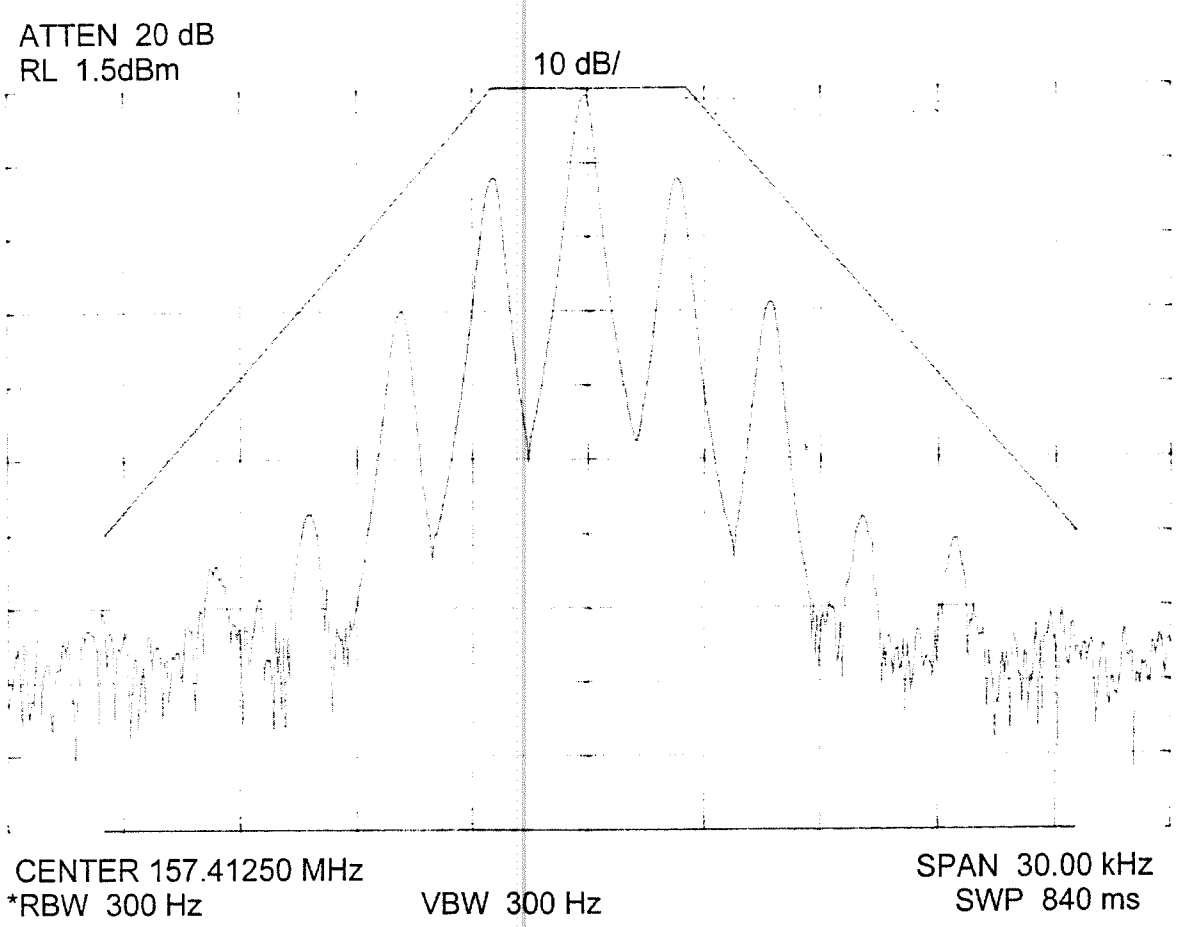

Figure x. Modulation Spectrum, EUT in 12.5 kHz mode, operating frequency 157.4125 MHz, modulation: dot pattern 11001100

Ambient temperature +20°C Relative humidity 49%

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.4

12.5 kHz Channel Mode

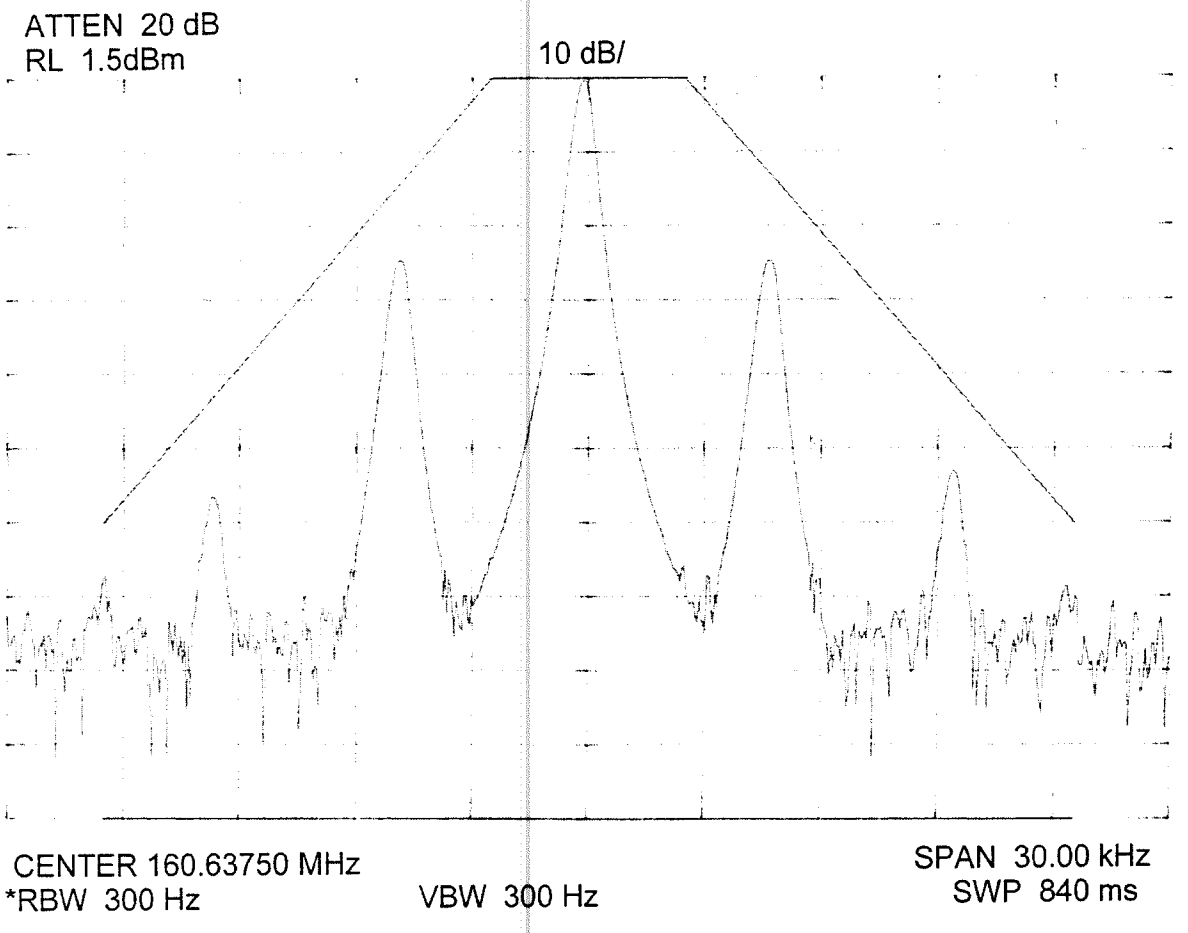

Figure x. Modulation Spectrum, EUT in 12.5 kHz mode, operating frequency 160.6375 MHz, modulation: dot pattern 10101010

MODULATION SPECTRUM IEC 61993-2, CLAUSE 15.1.4

12.5 kHz Channel Mode

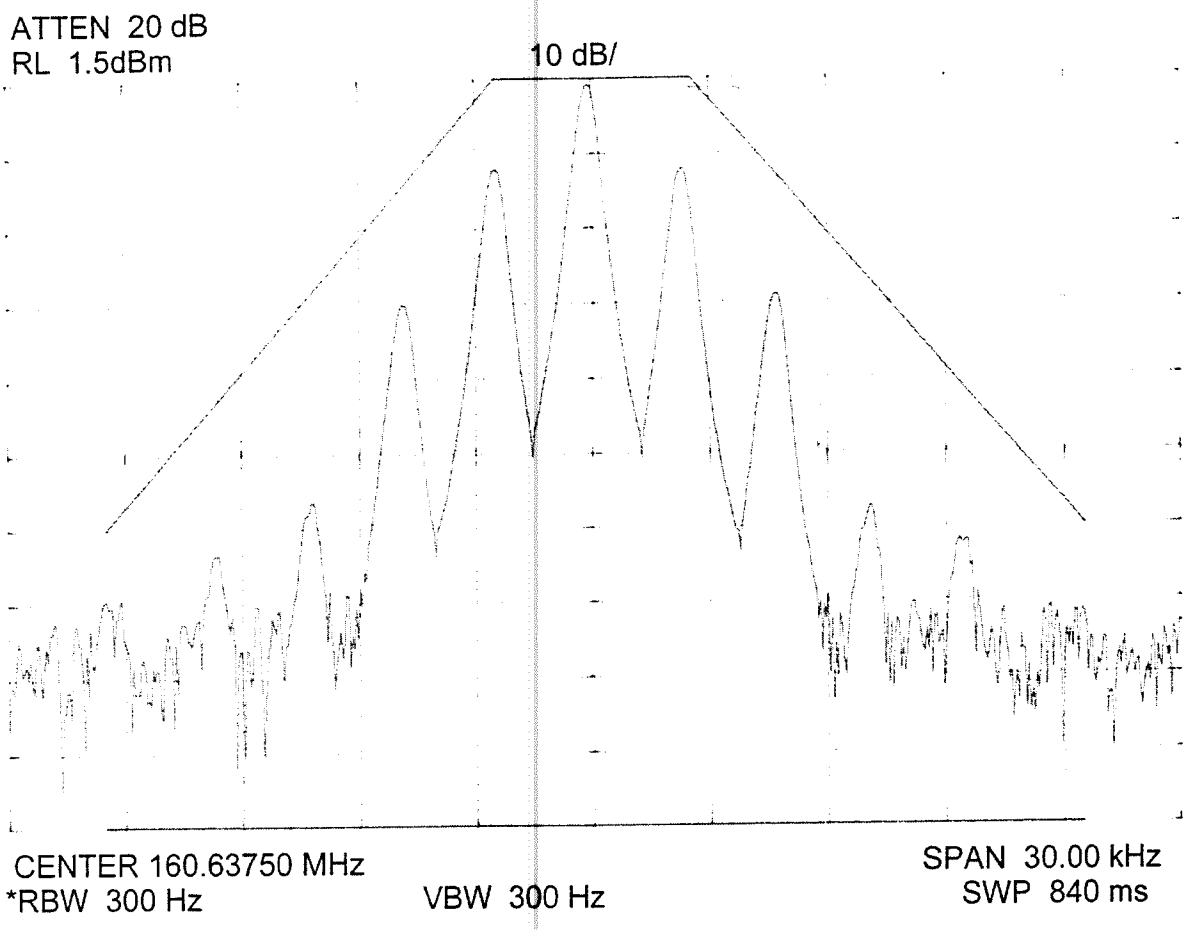

Figure x. Modulation Spectrum, EUT in 12.5 kHz mode, operating frequency 160.6375 MHz, modulation: dot pattern 11001100

Ambient temperature +20°C Relative humidity 49%

TRANSMITTER ATTACK TIME

IEC 61993-2, CLAUSE 15.1.5
Extreme supply IEC 61993-2, CLAUSE 10.2.2

Operating Frequency 162.025 MHz

TEST CONDITIONS		TDMA Transmitter Attack Time		
		Attack time (ms)	Power level deviation (dB)	Frequency error after 1 ms (±kHz)
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	0.314	0.2	-0.2, +0.5
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	0.38	0.4	-0.2, +0.5
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	0.29	0.3	-0.5, +0.5
Measurement uncertainty		±5%		

Required results

The Transmitter Attack Time shall not exceed 1 ms and the transient power level shall not exceed ± 1.5 dB of its final value at any time. The carrier frequency shall not exceed ± 1 kHz of its required value after 1 ms.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 47, 53, 55, 56, 64, 74

TRANSMITTER ATTACK TIME

IEC 61993-2, CLAUSE 15.1.5
Extreme supply IEC 61993-2, CLAUSE 10.2.2

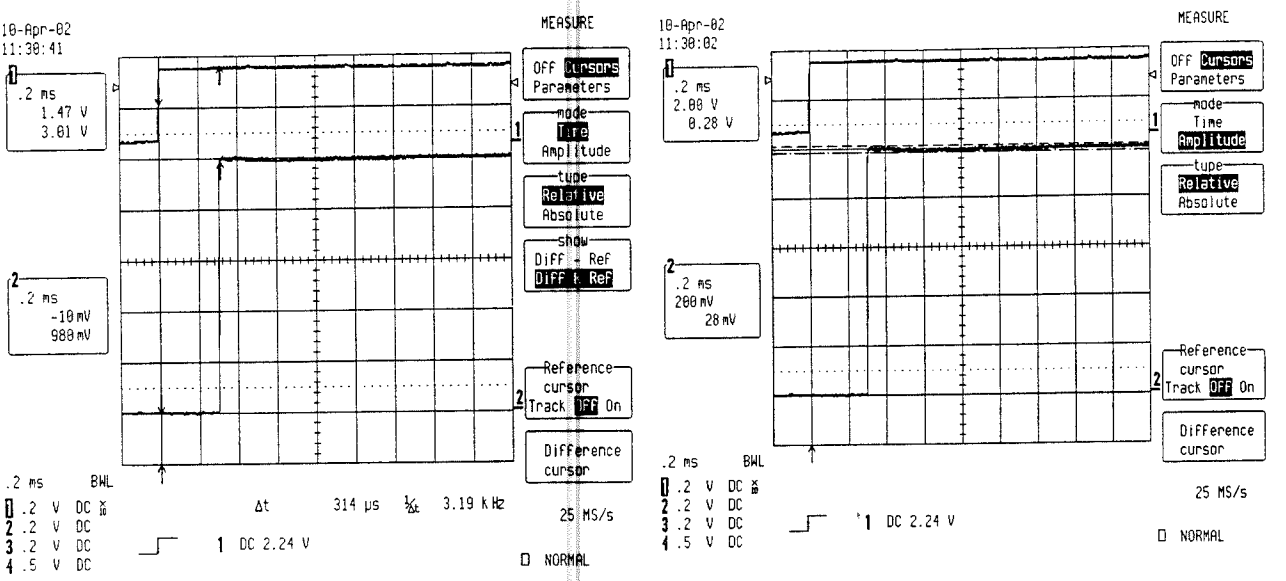

Figure x. Transmitter attack time and frequency characteristics at ambient temperature.

Ambient temperature +20°C Relative humidity 49%

TRANSMITTER ATTACK TIME

IEC 61993-2, CLAUSE 15.1.5
Extreme supply IEC 61993-2, CLAUSE 10.2.2

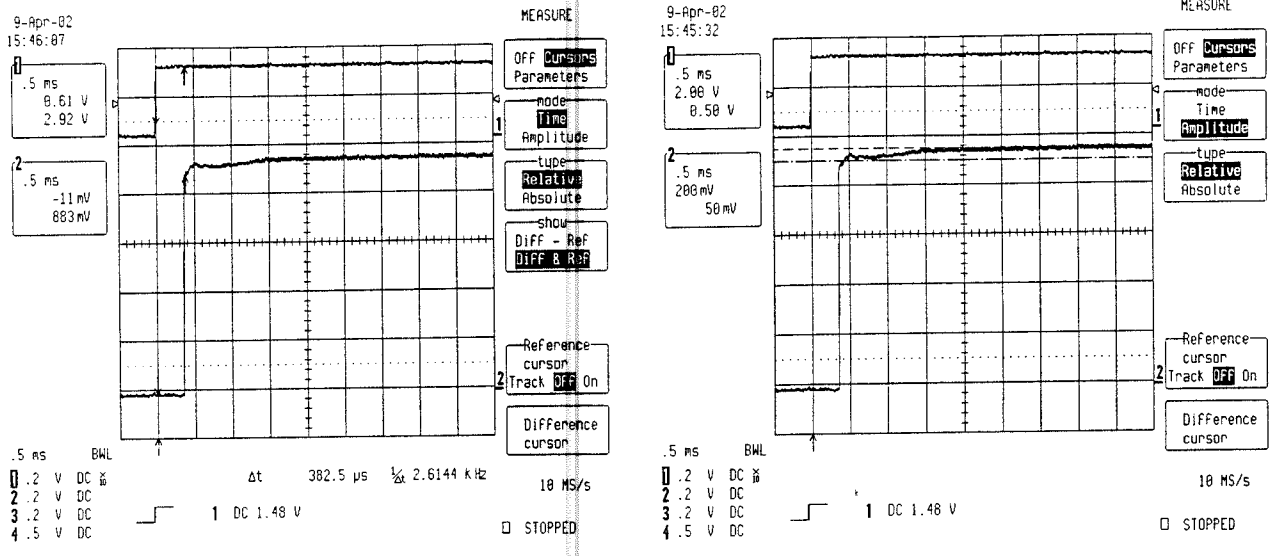

Figure x. Transmitter attack time and frequency characteristics at –25°C.

Ambient temperature +20°C Relative humidity 49%

TRANSMITTER ATTACK TIME

IEC 61993-2, CLAUSE 15.1.5
Extreme supply IEC 61993-2, CLAUSE 10.2.2

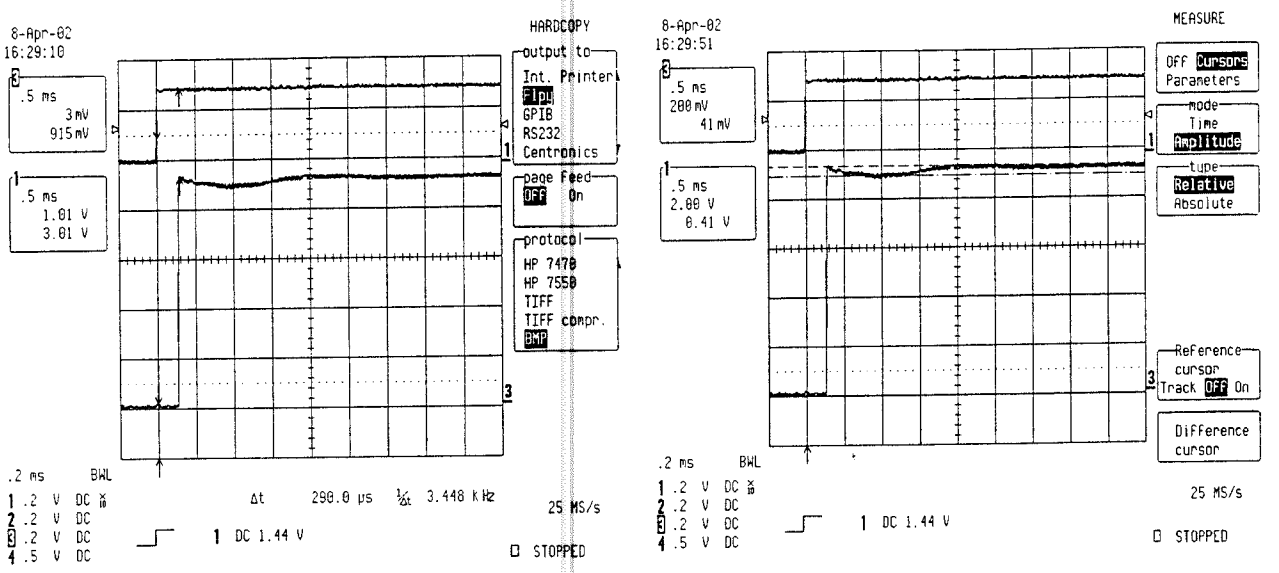

Figure x. Transmitter attack time and frequency characteristics at +55°C.

Ambient temperature +20°C Relative humidity 49%

TRANSMITTER RELEASE TIME

IEC 61993-2, CLAUSE 15.1.6
Extreme supply IEC 61993-2, CLAUSE 10.2.2

Operating Frequency 162.025 MHz

TEST CONDITIONS		TDMA Transmitter Release Time (ms)
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	0.0381
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	0.0263
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	0.127
Measurement uncertainty		±5%

Required results:

The Transmitter Release Time shall not exceed 1 ms.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 49, 53, 55, 64

.....

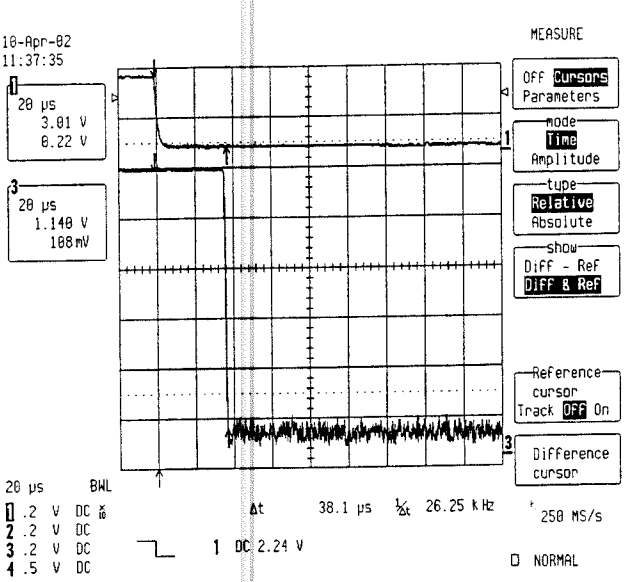

Figure x. Transmitter release time at ambient temperature.

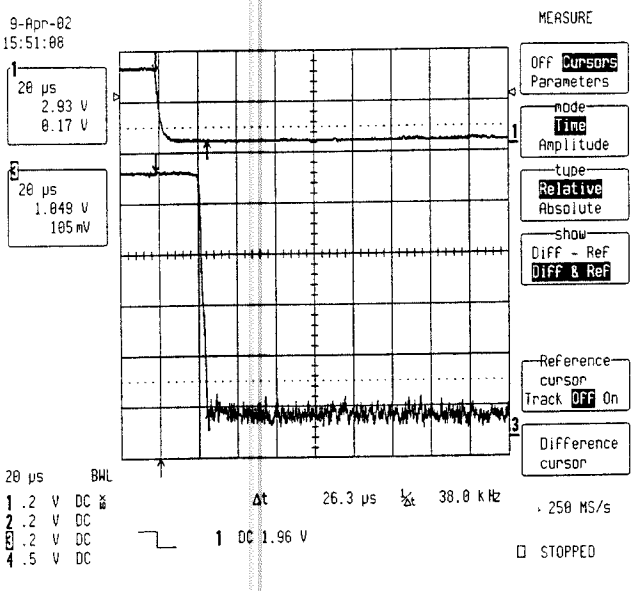

Figure x. Transmitter release time at –25°C.

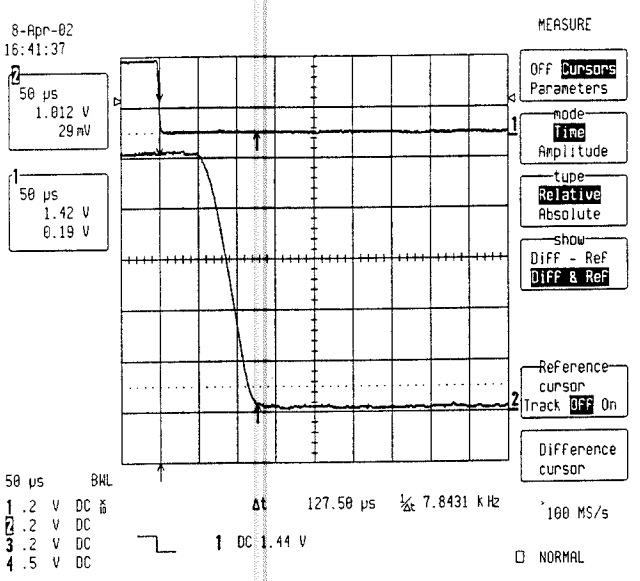

Figure x. Transmitter release time at +55°C.

Ambient temperature +20°C Relative humidity 49%

FREQUENCY ERROR OF THE DSC SIGNAL

IEC 61993-2, CLAUSE 15.2.1
Extreme supply IEC 61993-2, CLAUSE 10.2.2

TEST CONDITIONS		Frequency Error (Hz)	
		Mark (Y)	Space (B)
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	+0.049	+0.220
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	+0.050	+0.219
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	+0.049	+0.219
Measurement uncertainty (Hz)		±0.15	

Required results

The B and Y state frequencies for both normal and extreme conditions shall be within ±1%.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 51, 52, 55, 64

.....

Ambient temperature +20°C Relative humidity 49%

MODULATION RATE IEC 61993-2, CLAUSE 15.2.2

TEST CONDITIONS		Baud Rate (bits/s)
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	1200.002
Measurement uncertainty (Hz)		±0.0013

Required results

The Baud rate shall be 1200 bits per second ±30 ppm.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 50, 51, 64

.....

Ambient temperature +27°C Relative humidity 36%

TDMA RECEIVER SENSITIVITY

IEC 61993-2, CLAUSE 15.3.1
Extreme supply IEC 61993-2, CLAUSE 10.2.2

25 kHz operation

TEST CONDITIONS		Sensitivity (dBm)			
Frequency		156.025 MHz	156.025 MHz	162.025 MHz	162.025 MHz
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: -110 Ch B: -110	Ch A: -111 Ch B: -110	Ch A: -111 Ch B: -109.5	Ch A: -114 Ch B: -113
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: -106 Ch B: -106	Ch A: -106 Ch B: -105	Ch A: -106 Ch B: -106	Ch A: -107 Ch B: -106
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: -105 Ch B: -105	Ch A: -104 Ch B: -104	Ch A: -107 Ch B: -107	Ch A: -105.5 Ch B: -105.5
Measurement uncertainty (dB)		±1.1			

Required results

The sensitivity shall be –107dBm under normal conditions and –101dBm under extreme conditions when operating on a 25 kHz channel with a PER of 20%.

Remarks

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 46, 64

.....

Ambient temperature +27°C Relative humidity 36%

TDMA RECEIVER SENSITIVITY

IEC 61993-2, CLAUSE 15.3.2
Extreme supply IEC 61993-2, CLAUSE 10.2.2

12.5 kHz operation

TEST CONDITIONS		Sensitivity (dBm)			
Frequency		157.4125 MHz	157.4125 MHz	160.6375 MHz	160.6375 MHz
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: -102.0 Ch B: -100.0	Ch A: -103.0 Ch B: -101.5	Ch A: -102.0 Ch B: -100.5	Ch A: -102.5 Ch B: -101.5
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: -94.0 Ch B: -99.0	Ch A: -100.0 Ch B: -100.0	Ch A: -92.0 Ch B: -99.0	Ch A: -100.0 Ch B: -100.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: -99.0 Ch B: -99.0	Ch A: -95.0 Ch B: -94.0	Ch A: -99.0 Ch B: -99.0	Ch A: -95.0 Ch B: -95.0
Measurement uncertainty (dB)		±1.1			

Required results

The sensitivity shall be –98 dBm under normal conditions and –92 dBm under extreme conditions when operating on a 12.5 kHz channel with a PER of 20%.

Remarks

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 46, 64

.....

Ambient temperature +27°C Relative humidity 37%

TDMA RECEIVER ERROR BEHAVIOUR AT HIGH INPUT LEVELS IEC 61993-2, CLAUSE 15.3.3

25 kHz operation

TEST CONDITIONS		Messages received			
Frequency		156.025 MHz	156.025 MHz	162.025 MHz	162.025 MHz
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	-77 dBm I/P Ch A: 1000 Ch B: 1000	-77 dBm I/P Ch A: 1000 Ch B: 1000	-77 dBm I/P Ch A: 1000 Ch B: 1000	-77 dBm I/P Ch A: 1000 Ch B: 1000
		-7 dBm I/P Ch A: 1000 Ch B: 1000	-7 dBm I/P Ch A: 1000 Ch B: 1000	-7 dBm I/P Ch A: 1000 Ch B: 1000	-7 dBm I/P Ch A: 999 Ch B: 1000

Required results

Out of 1000 sent messages, the number of messages not correctly received (lost or corrupted) at –7 dBm shall not differ by more than 10 from that recorded at –77 dBm.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 4, 17, 45, 46, 64

.....

Ambient temperature +27°C Relative humidity 37%

TDMA RECEIVER CO-CHANNEL REJECTION RATIO IEC 61993-2, CLAUSE 15.3.4

TEST CONDITIONS	Rejection Ratio (dB)					
T_{nom}(+20°C)	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025
V_{nom}(100 V, 50 Hz)	Pat 10101010	Pat 10101010	Pat 10101010	Pat 11001100	Pat 11001100	Pat 11001100
25kHz operation.	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM
	156.025	156.022	156.028	156.025	156.022	156.028
	Ch A: -7.5	Ch A: -9.0	Ch A: -9.0	Ch A: -6.5	Ch A: -9.0	Ch A: -7.5
	Ch B: -8.0	Ch B: -8.5	Ch B: -10.0	Ch B: -6.5	Ch B: -6.5	Ch B: -9.0
	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025
	Pat 10101010	Pat 10101010	Pat 10101010	Pat 11001100	Pat 11001100	Pat 11001100
	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM	SG(B) FM
	162.025	162.022	162.028	162.025	162.022	162.028
	Ch A: -8.0	Ch A: -9.5	Ch A: -9.5	Ch A: -6.5	Ch A: -9.5	Ch A: -7.5
	Ch B: -8.5	Ch B: -8.5	Ch B: -10.0	Ch B: -7.0	Ch B: -7.0	Ch B: -9.0
	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025	SG(A)156.025
	Pat 10101010	Pat 10101010	Pat 10101010	Pat 11001100	Pat 11001100	Pat 11001100
	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK
	156.025	156.022	156.028	156.025	156.022	156.028
	Ch A: +1.0	Ch A: -9.5	Ch A: -8.5	Ch A: 0.0	Ch A: -9.0	Ch A: -9.0
	Ch B: +1.0	Ch B: -8.5	Ch B: -10.0	Ch B: +1.5	Ch B: -8.5	Ch B: -9.0
	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025	SG(A)162.025
	Pat 10101010	Pat 10101010	Pat 10101010	Pat 11001100	Pat 11001100	Pat 11001100
	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK	SG(B) GMSK
	162.025	162.022	162.028	162.025	162.022	162.028
	Ch A: +1.0	Ch A: -10.0	Ch A: -9.0	Ch A: 0.0	Ch A: -10.0	Ch A: -9.0
	Ch B: +1.0	Ch B: -9.5	Ch B: -10.0	Ch B: 0.0	Ch B: -8.5	Ch B: -9.0
Measurement uncertainty (dB)	±1.7					

Required results

The value of the co-channel rejection ratio, expressed in dB, at the signal displacements given in the method of measurement, shall be between –10 dB and 0 dB. Any positive value is also acceptable.

Remarks

The EUT satisfied the requirements of this test.
Software used: 73

TEST EQUIPMENT USED:
1, 4, 17, 45 to 47, 57, 64, 79

.....

Ambient temperature +27°C Relative humidity 37%

TDMA RECEIVER CO-CHANNEL REJECTION RATIO IEC 61993-2, CLAUSE 15.3.5

TEST CONDITIONS	Rejection Ratio (dB)					
T_{nom}(+20°C) V_{nom}(100 V, 50 Hz) 12.5kHz operation.	SG(A)157.4125 Pat 10101010 SG(B) FM 157.4125	SG(A)157.4125 Pat 10101010 SG(B) FM 157.411	SG(A)157.4125 Pat 10101010 SG(B) FM 157.414	SG(A)157.4125 Pat 11001100 SG(B) FM 157.4125	SG(A)157.4125 Pat 11001100 SG(B) FM 157.411	SG(A)157.4125 Pat 11001100 SG(B) FM 157.414
	Ch A: -13.0 Ch B: -14.0	Ch A: -17.0 Ch B: -17.5	Ch A: -16.5 Ch B: -18.0	Ch A: -11.5 Ch B: -12.5	Ch A: -15.0 Ch B: -16.0	Ch A: -15.0 Ch B: -17.0
	SG(A)160.6375 Pat 10101010 SG(B) FM 160.6375	SG(A)160.6375 Pat 10101010 SG(B) FM 160.636	SG(A)160.6375 Pat 10101010 SG(B) FM 160.639	SG(A)160.6375 Pat 11001100 SG(B) FM 160.6375	SG(A)160.6375 Pat 11001100 SG(B) FM 160.636	SG(A)160.6375 Pat 11001100 SG(B) FM 160.639
	Ch A: 12.5 Ch B: -13.5	Ch A: -17.0 Ch B: -17.0	Ch A: -16.5 Ch B: -18.0	Ch A: -11.0 Ch B: -12.5	Ch A: -15.5 Ch B: -16.0	Ch A: -15.0 Ch B: -16.5
	SG(A)157.4125 Pat 10101010 SG(B) GMSK 157.4125	SG(A)157.4125 Pat 10101010 SG(B) GMSK 157.411	SG(A)157.4125 Pat 10101010 SG(B) GMSK 157.414	SG(A)157.4125 Pat 11001100 SG(B) GMSK 157.4125	SG(A)157.4125 Pat 11001100 SG(B) GMSK 157.411	SG(A)157.4125 Pat 11001100 SG(B) GMSK 157.414
	Ch A: 0.0 Ch B: -1.0	Ch A: -15.0 Ch B: -16.0	Ch A: -14.0 Ch B: -16.0	Ch A: +0.5 Ch B: 0.0	Ch A: -13.5 Ch B: -14.5	Ch A: -12.5 Ch B: -15.0
	SG(A)160.6375 Pat 10101010 SG(B) GMSK 160.6375	SG(A)160.6375 Pat 10101010 SG(B) GMSK 160.636	SG(A)160.6375 Pat 10101010 SG(B) GMSK 160.639	SG(A)160.6375 Pat 11001100 SG(B) GMSK 160.6375	SG(A)160.6375 Pat 11001100 SG(B) GMSK 160.636	SG(A)160.6375 Pat 11001100 SG(B) GMSK 160.639
	Ch A: -1.0 Ch B: 0.0	Ch A: -15.0 Ch B: -15.5	Ch A: -14.0 Ch B: -15.5	Ch A: +1.5 Ch B: +0.5	Ch A: -13.5 Ch B: -14.5	Ch A: -12.5 Ch B: -14.5
Measurement uncertainty (dB)	±1.7					

Required results

The value of the co-channel rejection ratio, expressed in dB, at the signal displacements given in the method of measurement, shall be between –18 dB and 0 dB. Any positive value is also acceptable.

Remarks

The EUT satisfied the requirements of this test.
Software used: 73

TEST EQUIPMENT USED:
1, 4, 17, 45 to 47, 57, 64, 79

.....

Ambient temperature +27°C Relative humidity 36%

TDMA RECEIVER ADJACENT CHANNEL SELECTIVITY

IEC 61993-2, CLAUSE 15.3.6
Extreme supply IEC 61993-2, CLAUSE 10.2.2

25 kHz operation on 156.025 MHz

TEST CONDITIONS		Adjacent Channel Selectivity (dB)			
SG (A) Frequency (MHz)		156.025	156.025	156.025	156.025
SG (B) Frequency (MHz)		156.050	156.050	156.000	156.000
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: 73.5	Ch A: 74.0	Ch A: 73.0	Ch A: 73.0
		Ch B: 75.5	Ch B: 77.5	Ch B: 77.5	Ch B: 80.0
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: 70.0	Ch A: 71.0	Ch A: 71.0	Ch A: 71.0
		Ch B: 75.0	Ch B: 75.0	Ch B: 77.0	Ch B: 76.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: 68.0	Ch A: 66.0	Ch A: 68.5	Ch A: 67.0
		Ch B: 72.0	Ch B: 70.0	Ch B: 73.0	Ch B: 71.0
Measurement uncertainty (dB)		±1.7			

Required results

The adjacent channel selectivity shall not be less than 70 dB under normal test conditions and 60 dB under extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45 to 47, 57, 78

.....

Ambient temperature +27°C Relative humidity 36%

TDMA RECEIVER ADJACENT CHANNEL SELECTIVITY

IEC 61993-2, CLAUSE 15.3.6
Extreme supply IEC 61993-2, CLAUSE 10.2.2

25 kHz operation on 162.025 MHz

TEST CONDITIONS		Adjacent Channel Selectivity (dB)			
	SG (A) Frequency (MHz)	162.025	162.025	162.025	162.025
	SG (B) Frequency (MHz)	162.050	162.050	162.000	162.000
	Pattern	10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: 72.0 Ch B: 75.0	Ch A: 73.0 Ch B: 77.0	Ch A: 71.5 Ch B: 76.0	Ch A: 72.0 Ch B: 78.5
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: 69.0 Ch B: 75.0	Ch A: 70.0 Ch B: 74.0	Ch A: 70.0 Ch B: 76.0	Ch A: 69.0 Ch B: 75.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: 67.0 Ch B: 72.0	Ch A: 66.0 Ch B: 70.0	Ch A: 68.0 Ch B: 73.0	Ch A: 66.5 Ch B: 71.0
Measurement uncertainty (dB)		±1.7			

Required results

The adjacent channel selectivity shall not be less than 70 dB under normal test conditions and 60 dB under extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45 to 47, 57, 64

.....

Ambient temperature +27°C Relative humidity 36%

TDMA RECEIVER ADJACENT CHANNEL SELECTIVITY

IEC 61993-2, CLAUSE 15.3.7
Extreme supply IEC 61993-2, CLAUSE 10.2.2

12.5 kHz operation on 157.4125 MHz

TEST CONDITIONS		Adjacent Channel Selectivity (dB)			
SG (A) Frequency (MHz)		157.4125	157.4125	157.4125	157.4125
SG (B) Frequency (MHz)		157.425	157.425	157.400	157.400
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: 55.0	Ch A: 55.0	Ch A: 53.5	Ch A: 53.5
		Ch B: 54.0	Ch B: 55.0	Ch B: 57.0	Ch B: 57.5
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: 51.0	Ch A: 58.0	Ch A: 51.0	Ch A: 55.0
		Ch B: 51.0	Ch B: 52.0	Ch B: 60.0	Ch B: 60.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: 53.0	Ch A: 51.0	Ch A: 53.2	Ch A: 50.2
		Ch B: 53.0	Ch B: 50.3	Ch B: 53.6	Ch B: 50.2
Measurement uncertainty (dB)		±1.7			

Required results

The adjacent channel selectivity shall not be less than 50 dB under normal test conditions and extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45 to 47, 57, 64

.....

Ambient temperature +24°C Relative humidity 49%

TDMA RECEIVER ADJACENT CHANNEL SELECTIVITY

IEC 61993-2, CLAUSE 15.3.7
Extreme supply IEC 61993-2, CLAUSE 10.2.2

12.5 kHz operation on 160.6375 MHz

TEST CONDITIONS		Adjacent Channel Selectivity (dB)			
SG (A) Frequency (MHz)		160.6375	160.6375	160.6375	160.6375
SG (B) Frequency (MHz)		160.650	160.650	160.625	160.625
Pattern		10101010	11001100	10101010	11001100
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Ch A: 53.5	Ch A: 54.0	Ch A: 52.5	Ch A: 53.0
		Ch B: 54.0	Ch B: 56.0	Ch B: 56.5	Ch B: 58.0
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	Ch A: 50.0	Ch A: 57.0	Ch A: 50.0	Ch A: 55.0
		Ch B: 50.0	Ch B: 63.0	Ch B: 59.0	Ch B: 62.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	Ch A: 53.0	Ch A: 50.1	Ch A: 53.5	Ch A: 51.0
		Ch B: 53.0	Ch B: 50.0	Ch B: 54.0	Ch B: 50.0
Measurement uncertainty (dB)		±1.7			

Required results

The adjacent channel selectivity shall not be less than 50 dB under normal test conditions and extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 2, 4, 17, 45 to 47, 57, 64

.....

Test Conditions	TDMA Receiver Spurious Response Rejection (dB)			
T_{nom} (+20°C) V_{nom} (100 V, 50 Hz)	SG_A:156.025MHz SG_B:45MHz IF1	SG_A:156.025MHz SG_B:0.455MHz IF2	SG_A:156.025MHz SG_B:246.025MHz RF+2*IF1	SG_A:156.025MHz SG_B:156.935MHz RF+2*IF2
	Ch_A 74.0	Ch_A >80.0	Ch_A 72.0	Ch_A 79.0
	SG_A:162.025MHz SG_B:45MHz IF1	SG_A:162.025MHz SG_B:0.455MHz IF2	SG_A:162.025MHz SG_B:252.025MHz RF+2*IF1	SG_A:162.025MHz SG_B:162.935MHz RF+2*IF2
	Ch_A >80.0	Ch_A >80.0	Ch_A >80.0	Ch_A >80.0
	SG_A:156.025MHz SG_B:58.1MHz IF1	SG_A:156.025MHz SG_B:0.455MHz IF2	SG_A:156.025MHz SG_B:39.825MHz RF-2*IF1	SG_A:156.025MHz SG_B:155.115MHz RF-2*IF2
	Ch_B 70.0	Ch_B >80.0	Ch_B >80.0	Ch_B >80.0
	SG_A:162.025MHz SG_B:58.1MHz IF1	SG_A:162.025MHz SG_B:0.455MHz IF2	SG_A:162.025MHz SG_B:45.825MHz RF-2*IF1	SG_A:162.025MHz SG_B:161.115MHz RF-2*IF2
	Ch_B 72.0	Ch_B >80.0	Ch_B >80.0	Ch_B >80.0
Measurement Uncertainty (dB)	±1.7			

Required results:

At any frequency separated from the nominal frequency of the receiver by two channels or more, the spurious response rejection shall not be less than 70 dB.

(continued)

Test Conditions	TDMA Receiver Spurious Response Rejection (dB)			
T_{nom} (+20°C) V_{nom} (100 V, 50 Hz)	SG_A:156.025MHz SG_B:357.05MHz 2*LO1-IF1	SG_A:156.025MHz SG_B:447.05MHz 2*LO1+IF1	SG_A:156.025MHz SG_B:89.545MHz 2*IF1-IF2	SG_A:156.025MHz SG_B:88.635MHz 2*LO2-IF2
	Ch_A >80.0	Ch_A 70.5	Ch_A >80.0	Ch_A >80.0
	SG_A:162.025MHz SG_B:369.05MHz 2*LO1-IF1	SG_A:162025MHz SG_B:459.05MHz 2*LO1+IF1	SG_A:162.025MHz SG_B:89.545MHz 2*IF1-IF2	SG_A:162.025MHz SG_B:88.635MHz 2*LO2-IF2
	Ch_A >80.0	Ch_A 70.5	Ch_A >80.0	Ch_A >80.0
	SG_A:156.025MHz SG_B:137.75MHz 2*LO1-IF1	SG_A:156.025MHz SG_B:253.95MHz 2*LO1+IF1	SG_A:156.025MHz SG_B:115.745MHz 2*IF1-IF2	SG_A:156.025MHz SG_B:114.835MHz 2*LO2-IF2
	Ch_B 74.0	Ch_B 79.0	Ch_B >80.0	Ch_B >80.0
	SG_A:162.025MHz SG_B:149.75MHz 2*LO1-IF1	SG_A:162.025MHz SG_B:265.95MHz 2*LO1+IF1	SG_A:162.025MHz SG_B:115.745MHz 2*IF1-IF2	SG_A:162.025MHz SG_B:114.835MHz 2*LO2-IF2
	Ch_B >80.0	Ch_B >80.0	Ch_B >80.0	Ch_B >80.0
Measurement Uncertainty (dB)	±1.7			

Required results:

At any frequency separated from the nominal frequency of the receiver by two channels or more, the spurious response rejection shall not be less than 70 dB.

The EUT satisfied the requirements of this test.

Software used: 73
TEST EQUIPMENT USED:
1, 4, 17, 45 to 47, 57, 78

.....

Ambient temperature +29°C Relative humidity 39%

TDMA RECEIVER
INTERMODULATION RESPONSE REJECTION AND BLOCKING IEC 61993-2, CLAUSE 15.3.9

25 kHz operation

TEST CONDITIONS		Test Result (% Error)			
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	Test #1 SG(A): 156.025 Pat 10101010 SG(B): 156.525 SG(C): 157.025 SG(D): 161.750	Test #1 SG(A): 156.025 Pat 11001100 SG(B): 156.525 SG(C): 157.025 SG(D): 161.750	Test #2 SG(A): 162.025 Pat 10101010 SG(B): 161.525 SG(C): 161.025 SG(D): 156.300	Test #2 SG(A): 162.025 Pat 11001100 SG(B): 161.525 SG(C): 161.025 SG(D): 156.300
		Ch A: 0% CH: B: 0%	Ch A: 0% CH: B: 0%	Ch A: 0% CH: B: 0.1%	Ch A: 0% CH: B: 0.1%

Required results

The packet error rate, with the outputs of signal generators B, C and D switched on, shall be 20% or less.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73

TEST EQUIPMENT USED:
1, 4, 17, 45 to 47, 57, 76 to 78, 80

Ambient temperature +27°C Relative humidity 37%

TDMA RECEIVER
TRANSMIT TO RECEIVE SWITCHING TIME

IEC 61993-2, CLAUSE 15.3.10

25 kHz operation

TEST CONDITIONS		Test Result (% PER)			
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	156.025 MHz Pat. 10101010	156.025 MHz Pat.11001100	162.025 MHz Pat. 10101010	162.025 MHz Pat. 11001100
		Ch A: 4.2 Ch: B: 17.6	Ch A: 1.8 Ch: B: 5.2	Ch A: 0.4 Ch: B: 1.2	Ch A: 0 Ch: B: 0.2
Measurement uncertainty (dB)		±1.7			

Required results

The sensitivity shall be –107 dBm with a PER of no greater than 20% under normal test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 73, 82, 83

TEST EQUIPMENT USED:
1, 4, 6, 7, 10, 11, 17, 45, 46, 55, 78

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER MAXIMUM USABLE SENSITIVITY

IEC 61993-2, CLAUSE 15.4.1
Extreme supply IEC 61993-2, CLAUSE 10.2.2

Operation on 156.525 MHz

TEST CONDITIONS		Maximum Usable Sensitivity (dBm)		
		156.5235 MHz	156.525 MHz	156.5265 MHz
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	-111.0	-113.0	-111.5
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	-111.5	-114.0	-112.9
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	-115.0	-117.0	-115.0
Measurement uncertainty (dB)		±1.7		

Required results

The Maximum Usable Sensitivity shall not be less than –107 dBm under normal test conditions and –101 dBm under extreme test conditions. The test shall be repeated at the nominal carrier frequency (156.525 MHz) ±1.5 kHz.
The bit error rate (BER) shall not exceed 10^{-2}.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 71

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 48, 52, 60, 63, 64, 68

.....

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER ERROR BEHAVIOUR AT HIGH INPUT LEVELS IEC 61993-2, CLAUSE 15.4.2

Normal supply conditions.

Operation on 156.525 MHz

TEST CONDITIONS		Bit Error Rate
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	2.55×10^{-5}
Measurement uncertainty (dB)		±1.7

Required results

The Bit Error Rate shall not exceed 10^{-2}.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 72

TEST EQUIPMENT USED:
1, 4, 17, 45, 48, 60, 63, 64, 68

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER CO-CHANNEL REJECTION RATIO IEC 61993-2, CLAUSE 15.4.3

Operation on 156.525 MHz

TEST CONDITIONS		Rejection Ratio (dB)		
		SG(A) 156.525 MHz SG(B) 156.522 MHz	SG(A) 156.525 MHz SG(B) 156.525 MHz	SG(A) 156.525 MHz SG(B) 156.528 MHz
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	-6.0	-7.0	-6.0
Measurement uncertainty (dB)		±1.7		

Required results

The value of the co-channel rejection ratio, expressed in dB, at the signal displacements given in the method of measurement, shall be between –10 dB and 0 dB. The BER shall not exceed 10^{-2}.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 72

TEST EQUIPMENT USED:
1, 4, 17, 45, 47, 48, 60, 63, 64, 68, 77

.....

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER ADJACENT CHANNEL SELECTIVITY

IEC 61993-2, CLAUSE 15.4.4
Extreme supply IEC 61993-2, CLAUSE 10.2.2

Operation on 156.525 MHz

TEST CONDITIONS		Adjacent Channel Selectivity (dB)	
		SG (A)156.525 MHz SG (B)156.500 MHz	SG (A)156.525 MHz SG (B)156.550 MHz
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	76.5	77.0
T_{min}(-25°C)	V_{min}(90 V, 47.5 Hz)	79.0	80.0
T_{max}(+55°C)	V_{max}(242 V, 63 Hz)	76.0	76.0
Measurement uncertainty (dB)		±1.7	

Required results

The Adjacent Channel Selectivity for different channel separations shall be no less than 70 dB under normal test conditions and 60 dB under extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 72

TEST EQUIPMENT USED:
1, 2, 4, 17, 45, 47, 48, 60, 63, 64, 68, 77

Ambient temperature + 22°C Relative humidity 31%

DSC RECEIVER SPURIOUS RESPONSE REJECTION IEC 61993-2, CLAUSE 15.4.5

EUT operating on 156.525 MHz

TEST CONDITIONS	Unwanted Frequency (MHz)	Spurious Response Rejection ratio (dB)
T_{nom} +20°C, V_{nom} 100 V, 50 Hz $f_{unwanted}$ = 100 kHz to 2 GHz in 10 kHz steps.	131.95	71.0
	155.20	75.0
	181.10	75.5
	230.25	76.5

Required results

At any frequency separated from the nominal frequency of the receiver by two channels or more, the spurious response rejection shall not be less than 70dB.

There were no other responses between 100 kHz and 2 GHz.

The EUT satisfied the requirements of this test.

Software used: 69, 72, 101

TEST EQUIPMENT USED:
1, 4, 17, 47, 48, 60, 63, 64, 68, 77, 99

.....

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER INTERMODULATION RESPONSE REJECTION IEC 61993-2, CLAUSE 15.4.6

Normal supply.

Operation on 156.525 MHz

TEST CONDITIONS		Intermodulation Response Rejection Ratio (dB)	
		SG (A)156.525 MHz SG (B)156.575 MHz SG(C) 156.625 MHz	SG (A)156.525 MHz SG (B)156.475 MHz SG(C) 156.425 MHz
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	69.5	69.5
Measurement uncertainty (dB)		±1.7	

Required results

The intermodulation response rejection ratio shall not be less than 65 dB. The BER shall not exceed 10^{-2}.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 72

TEST EQUIPMENT USED:
1, 4, 17, 45, 47, 48, 60, 63, 64, 68, 76, 77

.....

Ambient temperature +27°C Relative humidity 32%

DSC RECEIVER BLOCKING OR DESENSITISATION IEC 61993-2, CLAUSE 15.4.7

Normal supply.

Operation on 156.525 MHz

TEST CONDITIONS		Blocking Ratio (dB)					
		SG(A) 156.525 SG(B) 146.525	SG(A) 156.525 SG(B) 151.525	SG(A) 156.525 SG(B) 155.525	SG(A) 156.525 SG(B) 157.525	SG(A) 156.525 SG(B) 161.525	SG(A) 156.525 SG(B) 166.525
T_{nom}(+20°C)	V_{nom}(100 V, 50 Hz)	103.0	88.5	90.5	90.5	90.0	98.5
Measurement uncertainty (dB)		±1.7					

Required results

The blocking ratio for any frequency within the specified ranges shall not be less than 84 dB, except at frequencies at which the spurious responses are found. The BER shall not exceed 10^{-2}.

Remarks

The EUT satisfied the requirements of this test.

Software used: 69, 72

TEST EQUIPMENT USED:
1, 4, 17, 45, 47, 48, 60, 63, 64, 68, 77

Ambient temperature +20°C Relative humidity 49%

SPURIOUS EMISSIONS FROM THE RECEIVER IEC 61993-2, CLAUSE 15.5.1

Receiver operating on 156.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
24.3	-66.5
38.3	-63.50
49.0	-64.0
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-57 dBm (2 nW)
1 GHz to 2 GHz	-47 dBm (20 nW)

Remarks

No other emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 64, 74

.....

Ambient temperature +20°C Relative humidity 49%

SPURIOUS EMISSIONS FROM THE TRANSMITTER IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 156.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
83.0	-44.67
90.0	-44.67
133.0	-40.17
147.0	-39.50
150.0	-37.50
157.0	-43.83
160.0	-36.67
177.0	-44.67
312.05	-41.33
468.075	< -46.00
780.0	-45.67
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No other emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74

.....

Ambient temperature +20°C Relative humidity 49%

SPURIOUS EMISSIONS FROM THE TRANSMITTER IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 157.4125 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
150.0	-37.67
163.0	-39.00
200.0	-45.33
314.825	-44.50
472.2375	< -46.00
787.0	-44.50
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No other emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74

.....

Ambient temperature +20°C Relative humidity 49%

SPURIOUS EMISSIONS FROM THE TRANSMITTER IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 160.6375 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
93.0	-41.67
137.0	-44.67
153.0	-42.67
157.0	-43.67
167.0	-45.67
321.275	-39.83
481.9125	< -46.00
803.0	-44.33
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No other emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74

.....

Ambient temperature +20°C Relative humidity 49%

SPURIOUS EMISSIONS FROM THE TRANSMITTER IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 162.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
97.0	-43.00
140.0	-41.50
150.0	-43.17
153.0	-40.00
157.0	-38.67
163.0	-39.67
167.0	-42.67
170.0	-42.33
324.05	-39.67
486.075	< -46.00
810.0	-44.50
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No other emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:
1, 4, 17, 45, 55, 64, 74

.....

Ambient temperature +25°C Relative humidity 24%

SPECIFIC TESTS OF LINK LAYER — IEC 61993-2, CLAUSE 16 (7.3)
TDMA SYNCHRONISATION — IEC 61993-2, CLAUSE 16.1 (M.1371-1 A2/3.1.1)
SYNCHRONISATION TEST USING UTC — IEC 61993-2, CLAUSE 16.1.1 (M.1371-1 A2/3.1.3.4.1)

(1) Method of measurement

Set up standard test environment; choose test conditions in a way that the EUT operates in following synchronisation modes:
– UTC direct
– UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronized)
– BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range)
Check CommState Parameter SyncState in position report and reporting rate.

(2) Required result

Transmitted Communication state shall fit the synchronisation mode.

(3) Test results

Conditions	Results
UTC direct	√
UTC indirect	√
BASE direct	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

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Ambient temperature +25°C Relative humidity 24%

SYNCHRONISATION TEST WITHOUT UTC, SEMAPHORE IEC 61993-2, CLAUSE 16.1.2 (M.1371-1 A2/3.1.1.4)

(1) Method of measurement

Set up standard test environment without UTC available.
Let EUT operate as a sync source (semaphore) for other stations.
Check CommState Parameter SyncState in position report and reporting rate.

(2) Required results

Transmitted CommState shall fit the Synchronisation mode.
The EUT shall increase reporting rate to 2 s when acting as a semaphore.

(3) Test results

Conditions	Results
Without UTC available, operate EUT as a semaphore	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

SYNCHRONISATION TEST WITHOUT UTC IEC 61993-2, CLAUSE 16.1.3 (M.1371-1 A2/3.1.1)

(1) Method of measurement

Set up standard test environment; choose test conditions in a way that the EUT operates in following sync modes:
a) BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range),
b) mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range),
c) Enable internal GNSS in synchronisation modes other than UTC direct
Check CommState Parameter SyncState in position report and reporting rate.

(2) Required results

a) Transmitted Communication state shall fit the Synchronisation mode
b) Transmitted Communication state shall fit the Synchronisation mode
c) Synchronisation mode shall revert to UTC direct

(3) Test results

Conditions	Results
BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range)	√
mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range)	√
Enable internal GNSS in synchronisation modes other than UTC direct	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

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TIME DIVISION (FRAME FORMAT) IEC 61993-2, CLAUSE 16.2 (M.1371-1 A2/3.1.2)

(1) Method of measurement

Set the EUT to max reporting rate of 2 s by applying a speed of >23 knots and a ROT of >20°/s.
Record VDL messages and check for used slots.
Check parameter slot number in CommState of position report.
Check slot length (transmission time)

(2) 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.

(3) Test results

Conditions	Results
SOG > 23 knots, ROT > 20°/s	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +23°C Relative humidity 28%

SYNCHRONISATION JITTER IEC 61993-2, CLAUSE 16.3 (M.1371-1 A2/3.2.2.8.4)

Definition

Synchronisation jitter (transmission timing error) is the time between nominal slot start as determined by the UTC synchronisation source and the initiation of the "transmitter on" function (T_o see figure 3.2.2.10 in Rec. ITU-R M.1371-1).

(1) Method of measurement

Set up standard test environment.
Set the EUT to 25 kHz bandwidth, max reporting rate of 2 s and using
a) UTC direct synchronisation
b) UTC indirect synchronisation by disconnecting the GNSS antenna of the EUT.
Record VDL messages and measure the time between the nominal beginning of the slot interval and the initiation of the "transmitter on" function. Alternative methods, e.g. by evaluating the start flag and calculating back to T_o are allowed.
Repeat the test for 12.5 kHz bandwidth.

(2) Required results

The synchronisation jitter shall not exceed
a) ±104 µs using UTC direct synchronisation
b) ±312 µs using UTC indirect synchronisation.

(3) Test results

Conditions	Results: 25 kHz bandwidth	Results: 12.5 kHz bandwidth
UTC direct	-8 µs	+32 µs
UTC indirect	-205 µs	+260 µs

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 55, 56, 68, 89 to 92, 98, 100

.....

DATA ENCODING (BIT STUFFING) IEC 61993-2, CLAUSE 16.4

(1) Method of measurement

Set up standard test environment.
– apply a binary broadcast message (msg 8) to the VDL containing the HEX-values "7E 3B 3C 3E 7E" in the data portion and check Presentation Interface output of EUT
– apply a BBM message to the EUT initiating the transmission of msg 8 containing the HEX-values as above in the data portion and check the VDL

(2) Required results

Confirm that
– Data output on the presentation interface conforms to transmitted data
– transmitted VDL message conforms to data input on the Presentation Interface

(3) Test results

Conditions	Results
Apply msg 8 to the VDL, "7E 3B 3C 3E 7E" in the data portion	√
Apply BBM message to the PI, "7E 3B 3C 3E 7E" in the data portion	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 92, 98, 100
.....

Ambient temperature +25°C Relative humidity 24%

FRAME CHECK SEQUENCE IEC 61993-2, CLAUSE 16.5 (M.1371-1 A2/3.2.3)

(1) Method of measurement

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

(2) Required results

Confirm that this message is not forwarded to the PI by the EUT.

(3) Test results

Conditions	Results
Apply msg 3 with wrong CRC to the VDL	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

SLOT ALLOCATION (CHANNEL ACCESS PROTOCOLS) IEC 61993-2, CLAUSE 16.6 (M.1371-1 A2/3.3.1)
NETWORK ENTRY IEC 61993-2, CLAUSE 16.6.1

(1) Method of measurement

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

(2) Required results

EUT shall start autonomous transmissions of msg 3 (position report) with ITDMA CommState with KeepFlag set true for first frame and msg 1 with SOTDMA CommState for consecutive frames.

(3) Test results

Conditions	Results
The first frame after initialisation period	√
Consecutive frames	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

AUTONOMOUS SCHEDULED TRANSMISSIONS (SOTDMA) IEC 61993-2, CLAUSE 16.6.2 (M.1371-1 A2/3.3.2)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Record transmitted scheduled position reports msg 1 and check frame structure.
Check CommState of transmitted messages for channel access mode and parameters slot timeout, slot number and slot offset.

(2) Required results

Check that nominal reporting rate 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.

(3) Test results

Conditions	Results
Under consecutive operation	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +23°C Relative humidity 28%

SAFETY RELATED/BINARY MESSAGE TRANSMISSION (RATDMA)

IEC 61993-2, CLAUSE 16.6.3 (M.1371-1 A2/3.3.2)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
a) Apply a 1 slot Binary Broadcast message (msg 8) to the PI of the EUT. Record transmitted messages.
b) Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message (msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message (msg 12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.

(2) Required results

a) Confirm that EUT transmits this msg 8 within max. 4 s. Retry with 90 % channel load.
b) Confirm that maximum 20 slots can be used per frame for unannounced messages using RATDMA access scheme and that messages using the twenty-first slot and above are rejected. Confirm that message ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected.

(3) Test results

Conditions	Results
Apply BBM message to the PI for 1 slot message	√
Apply BBM message to the PI for 1 slot message with 90% channel load.	√
Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message (msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message (msg 12) to the PI of the EUT	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

ASSIGNED OPERATION IEC 61993-2, CLAUSE 16.6.4 (M.1371-1 A2/3.3.6)
ASSIGNED MODE USING REPORTING RATES IEC 61993-2, CLAUSE 16.6.4.1

(1) Method of measurement

Operate standard test environment and EUT in autonomous mode.
Transmit an Assigned mode command message msg16 to the EUT with:
a) the number of reports per 10 min which is not a multiple of 20
b) the number of reports per 10 min which is higher than 600

(2) Required results:

a) Confirm that the EUT transmits position reports message msg2 at a report rate that corresponds to the next highest multiple of 20.
b) Confirm that the EUT transmits position reports message msg2 at a report rate of one report per second.

(3) Test results

Conditions	Results
Set NavStatus to "at anchor" Transmit msg 16 with the number of reports 25 per 10 min to EUT. (Slot offset: 25, Increment: 0)	√
Set NavStatus to "at anchor" Transmit msg 16 with the number of reports 1000 per 10 min to EUT. (Slot offset: 1000, Increment: 0)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

RECEIVING TEST IEC 61993-2, CLAUSE 16.6.4.2

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Transmit an Assigned mode command (msg 16) to the EUT with:
– slot offset and increment
– designated reporting rate.
Record transmitted messages.

(2) Required results

Confirm that EUT transmits position report msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 to 8 min (ITU-R M.1371-1 A2/3.3.8.2.12).

(3) Test results

Conditions	Results
Same as clause 14.1.3	Same as clause 14.1.3

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

ASSIGNMENT SELECTIVITY IEC 61993-2, CLAUSE 16.6.4.3 (M.1371-1 A2/3.3.6)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Check frame structure.
Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT.
Record transmitted messages.

(2) Required results

Confirm that EUT does not allocate slots on a msg 16 addressed to other stations.

(3) Test results

Conditions	Results
Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 24%

SLOT ASSIGNMENT TO FATDMA RESERVED SLOTS IEC 61993-2, CLAUSE 16.6.4.4 (M.1371-1 A2/3.3.6)
A test to check the combined operation of msg16 assignment to slots reserved by msg 20.

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

(2) Required results
Confirm that the EUT uses the slots commanded by msg 16 for own transmissions.

(3) Test results

Conditions	Results
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Transmit an Assigned Mode Command (msg 16) to the EUT and command it to use one or more of those FATDMA allocated slots.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
.....

Ambient temperature +25°C Relative humidity 24%

FIXED ALLOCATED TRANSMISSIONS (FATDMA) IEC 61993-2, CLAUSE 16.6.5 (M.1371-1 A2/3.3.6)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment.
Record transmitted messages.

(2) Required results

Confirm that EUT does not use slots allocated by msg 20 for own transmissions until timeout of 4 min to 8 min.

(3) Test results

Conditions	Results
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

MESSAGE FORMATS — IEC 61993-2, CLAUSE 16.7 (M.1371-1 A2/3.3.7)
RECEIVED MESSAGES — IEC 61993-2, CLAUSE 16.7.1

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Apply messages according to table 7 to the VDL.
Record messages output by the PI of EUT.

(2) Required results

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

(3) Test results

Conditions	Results
msg1	√
msg2	√
msg3	√
msg4	√
msg5	√
msg6 already tested, see 14.1.4.2	√
msg7	√
msg8 already tested, see 16.4	√
msg9	√
msg10	√
msg11	√
msg12	√
msg13	√
msg14	√
msg15 already tested, see 14.1.3.2	√
msg16 already tested, see 14.4.3	√
msg17 already tested, see 14.9.3.1	√
msg18	√
msg19	√
msg20 already tested, see 16.6.4.4	√
msg21	√
msg22 already tested, see 14.7	√

The EUT satisfied the requirements of this test.
Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
.....

Ambient temperature +25°C Relative humidity 24%

TRANSMITTED MESSAGES IEC 61993-2, CLAUSE 16.7.2 (M.1371-1 A2/3.3.7)

(1) 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 7 by the EUT.
Record transmitted messages.

(2) Required results

Confirm that EUT transmits messages with correct field contents and format or responses as appropriate.
Confirm that messages 4, 9, 16, 17, 18, 19, 20, 21, 22 are NOT being transmitted by the EUT.

(3) Test results

Conditions	Results
msg1	√
msg2	√
msg3	√
msg4 (NO)	√
msg5	√
msg6	√
msg7	√
msg8	√
msg9 (NO)	√
msg10	√
msg11	√
msg12	√
msg13	√
msg14	√
msg15	√
msg16 (NO)	√
msg17 (NO)	√
msg18 (NO)	√
msg19 (NO)	√
msg20 (NO)	√
msg21 (NO)	√
msg22 (NO)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +22°C Relative humidity 48%

SPECIFIC TESTS OF NETWORK LAYER
DUAL CHANNEL OPERATION
ALTERNATE TRANSMISSIONS

IEC 61993-2, CLAUSE 17 (7.4)
IEC 61993-2, CLAUSE 17.1 (M.1371-1 A2/4.1)
IEC 61993-2, CLAUSE 17.1.1

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode on default channels AIS1, AIS2.
Record transmitted scheduled position reports on both channels.
Check CommState for slot allocation.

(2) Required results

Confirm that EUT allocates slots in both channels alternating.
Repeat check for data link access period.

(3) Test results

Conditions	Results
Under normal operation	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
.....

Ambient temperature +22°C Relative humidity 48%

REGIONAL AREA DESIGNATION BY VDL MESSAGE IEC 61993-2, CLAUSE 17.2 (M.1371-1 A2/4.1)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Apply Channel management messages (msg 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 nautical miles either side of the regional boundary.
At least one channel shall be 12.5 kHz channel.
Let the EUT approach region 1 from outside region 2 more than 5 nautical miles away from region boundary transmitting on default channels.
Record transmitted messages on all 6 channels.

(2) Required results

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones.
EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

(3) Test results

Conditions	Results
Default region	√
Fist transitional zone	√
Region 2	√
Second transitional zone	√
Region 1	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
.....

Ambient temperature +22°C Relative humidity 48%

REGIONAL AREA DESIGNATION BY SERIAL MESSAGE IEC 61993-2, CLAUSE 17.3 (M.1371-1 A2/4.1.3)

(1) Method of measurement
Repeat test 17.2 using ACA serial message for channel assignment.

(2) Required results
Same as test 17.2

(3) Test results

Conditions	Results
Default region	√
Fist transitional zone	√
Region 2	√
Second transitional zone	√
Region 1	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +22°C Relative humidity 48%

POWER SETTING IEC 61993-2, CLAUSE 17.4

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Transmit channel management message (msg 22) defining output power high/low.
Repeat test using ACA and manual input.

(2) Required result

Check that EUT sets output power as defined.

(3) Test results

Conditions	Results
msg22	√
ACA sentence	√
manual input	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 49, 65, 66, 68, 89 to 91, 98, 100

.....

MESSAGE PRIORITY HANDLING IEC 61993-2, CLAUSE 17.5 (M.1371-1 A2/4.1.8)

(1) Method of measurement

Set up standard test environment and operate test equipment with 90 % channel load.
Set the EUT to max reporting rate of 2 s by applying a speed of >23 knots and a ROT of >20 °/s.
Record VDL messages and check for used slots.
Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT.
Record transmitted messages on both channels.

(2) Required results

Check that EUT transmits the messages in correct order according to their priority (ITU-R M.1371-1 A/3.3.8.1 table 13).

(3) Test results

Conditions	Results
90 % channel load. Applying a speed of >23 knots and a ROT of >20 °/s. Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

SLOT REUSE (LINK CONGESTION) IEC 61993-2, CLAUSE 17.6 (M.1371-1 A2/4.4)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment to allocate slots for a base station. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter. Record transmitted messages and check frame structure. Set up additional test targets to simulate a VDL load of >90 % until slot reuse by EUT is observed.

(2) Required results

Check that the nominal reporting rate for Position Report msg 1 is achieved ±10 % (allocating slots in selection interval SI) under link congestion conditions.
Confirm that the slot occupied by the most distant station (within selection interval) is used by the slot reuse algorithm.
Check that a station is not subject to slot reuse more than once a frame.
Check that slots allocated by a local base station are not subject to slot reuse.

(3) Test results

Conditions	Results
Msg20 & >90% VDL load	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
.....

MANAGEMENT OF RECEIVED REGIONAL OPERATING SETTINGS IEC 61993-2, CLAUSE 17.7 (7.4.1)

TEST FOR REPLACEMENT OR ERASURE OF DATED OR REMOTE REGIONAL OPERATING SETTINGS
IEC 61993-2, CLAUSE 17.7.1 (7.4.1)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Send a valid regional operating setting to the EUT by msg 22 with the regional operating area including the own position of the EUT.
Consecutively send a total of seven (7) valid regional operating settings to EUT, using both msg 22 and DSC telecommands, with regional operating areas not overlapping to the first and to each other.
Perform the following in the order shown:
a) Send a ninth msg 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 miles from all regions defined by previous commands.
Step 2: Consecutively set own position of EUT to within all regions defined by the previous telecommands.

(2) Required results

After the initialization, the EUT should operate according to the regional operating settings defined by the first msg 22 sent.
a) The EUT shall return to the default operating settings.
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 shall be erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT shall return 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.

(3) Test results

Conditions	Results
a) Send ninth msg 22, not overlapping with the previous eight areas	√
b-1) Set own position into any of the regional areas	√
b-2) Send a tenth telecommand, partly overlaps the regional operating area, not include the own position	√
c-1) Move own position to a distance of more than 500 miles from all regions	√
c-2) Set own position to within all regions defined by the previous telecommands	√

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +22°C Relative humidity 48%

TEST OF CORRECT INPUT VIA PRESENTATION INTERFACE OR MKD

IEC 61993-2, CLAUSE 17.7.2 (7.4.1)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Perform the following tests in the following order:
a) Send msg 22 or a DSC telecommand with valid regional operating settings to the EUT with a regional operating area, which contains the current position of own station.
b) Input a different, valid regional operating setting via the MKD.
c) Send a different regional operating setting with a regional operating area which partly overlaps the regional operating area input via the MKD to the EUT via the Presentation Interface in the previous step, and which contains the present position of own station.
d) Input the default operating settings via the MKD for the regional operating area, which was received by the previous command via the Presentation Interface.
e) Send msg 22 or a DSC telecommand with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station.
f) Within two hours, after e), send a different regional operating setting to the EUT via Presentation Interface with a valid regional operating area overlapping the regional operating area sent to the EUT by msg 22 or a DSC telecommand.

(2) Required results

a) Confirm that the EUT uses the regional operating settings commanded by msg 22 or DSC telecommand.
b) Step 1: Confirm that the regional operating settings of the previous msg 22 or DSC telecommand are displayed to the user on the MKD for editing.
Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings. Check, that the EUT does not accept incomplete or invalid regional operating settings. Check, that the EUT accepts a complete and valid regional operating setting.
Step 3: Check, that the EUT prompt the user to confirm the intended change of regional operating settings. Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.
Step 4: Check, that the EUT uses the regional operating settings input via the MKD.
c) Check, that the EUT uses the regional operating settings received via the Presentation Interface.
d) Check, that the EUT accepts the default operating settings for the regional operating area received in c). Check, that the EUT uses the default operating settings.
e) Check, that the EUT uses the regional operating settings commanded to it by msg 22 or DSC telecommand.
f) Check, that the EUT does not use the regional operating setting commanded to it via the Presentation Interface.

(3) Test results

Conditions	Results
a) Send msg 22 or a DSC telecommand	√
b) Input a valid regional operating setting via the MKD) b-1) Regional operating settings are displayed on the MKD for editing	√
b-2) EUT allows the user to edit, EUT does not accept invalid settings, EUT accepts a complete and valid setting	√ √ √
b-3) EUT prompt the user to confirm the intended change of regional operating settings.	√
b-4) EUT uses the regional operating settings input via the MKD.	√
c) Send a regional operating area setting via the Presentation Interface, partly overlaps the area input via the MKD	√

Ambient temperature +22°C . Relative humidity 48%

TEST OF CORRECT INPUT VIA PRESENTATION INTERFACE OR MKD
IEC 61993-2, CLAUSE 17.7.2 (7.4.1)

(Continued)

Conditions	Results
d) Input the default operating settings via the MKD for the regional operating area	√
e) Send msg 22 or a DSC telecommand	√
f) Send a different regional operating setting via Presentation Interface, overlapping the regional operating area by msg 22 or a DSC telecommand.	√

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 65, 66, 68, 89 to 91, 98, 100

Ambient temperature +22°C Relative humidity 48%

TEST OF ADDRESSED TELECOMMAND IEC 61993-2, CLAUSE 17.7.3 (7.4.1)

(1) 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 msg 22 or a DSC telecommand 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 msg 22 or an addressed DSC telecommand 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.

(2) Required results

a) Check, that the EUT uses the regional operating settings commanded to it in a).
b) Check, that the EUT uses the regional operating settings commanded to it in b).
c) Check, that the EUT reverts to default.

(3) Test results

Conditions	Results
a) Send msg 22 or a DSC telecommand	√
b) Send an addressed msg 22 or an addressed DSC telecommand	√
c) Move the EUT out of the regional operating area	√

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 65, 66, 68, 89 to 91, 98, 100
.....

Ambient temperature +22°C Relative humidity 48%

TEST FOR INVALID REGIONAL OPERATING AREAS
(three regional operating areas with same corner) IEC 61993-2, CLAUSE 17.7.4 (7.4.1)

(1) 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 msg 22 or DSC telecommand, Presentation Interface input and manual input via MKD. 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.

(2) Required test results

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

(3) Test results

Conditions	Results
a) Send three different valid regional operating settings	√
b) Move current own position of the EUT	√

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 65, 66, 68, 89 to 91, 98, 100

The fulfillment of all other conditions of clause 7.4.1 shall be self-certified by the manufacturer.

A signed and dated certificate/declaration covering the requirements of this clause has been provided by Japan Radio Company Limited.

See Annex A

CONTINUATION OF AUTONOMOUS MODE REPORTING RATE IEC 61993-2, CLAUSE 17.8
(M.1371-1 A2/3.3.6, IALA Technical clarifications to recommendation ITU-R M.1371-1)

(1) Method of test

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

(2) Required result

Ensure that the autonomous reporting rate is maintained.

(3) Test results

Conditions	Results
Message 16 sent to EUT whilst in transition zone.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

Ambient temperature +23°C Relative humidity 44%

SPECIFIC TESTS OF TRANSPORT LAYER ADDRESSED MESSAGES TRANSMISSION

IEC 61993-2, CLAUSE 18 (7.5)
IEC 61993-2, CLAUSE 18.1 (M.1371-1 A2/5.3.1)
IEC 61993-2, CLAUSE 18.1.1 (M.1371-1 A2/5.3)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Set up a test target for scheduled transmissions on channel AIS1 only.
Initiate the transmission of an addressed binary message (msg 6) by the EUT (test target as destination).
Record transmitted messages on both channels.

(2) Required results

Check that the EUT transmits msg 6 on channel AIS1.
Repeat test for AIS2.

(3) Test results

Conditions	Results
on channel AIS1	√
on channel AIS2	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

Ambient temperature +23°C Relative humidity 44%

ACKNOWLEDGEMENT IEC 61993-2, CLAUSE 18.1.2

(1) Method of measurement

Operate standard test environment and EUT in autonomous mode.
Apply up to 4 addressed binary messages (msg 6; EUT as destination) to the VDL on Channel AIS 1.
Record transmitted messages on both channels.
Repeat with AIS2.

(2) Required results

Confirm that EUT transmits a binary acknowledge message (msg 7) with the appropriate sequence numbers within 4 seconds on the channel where the msg 6 was received.
Confirm that EUT transmits the result with an appropriate message to PI.

(3) Test results

Conditions	Results
Transmits msg 7	√
Output to PI within 4 seconds (4 times for ch A, 4 times for ch B)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

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Ambient temperature +23°C Relative humidity 44%

TRANSMISSION RETRY IEC 61993-2, CLAUSE 18.1.3 (M.1371-1 A2/5.3.1)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Initiate the transmission of up to 4 addressed binary messages by the EUT, which will not be acknowledged (i.e. destination not available).
Record transmitted messages.

(2) Required results

Confirm that EUT retries the transmission up to 3 times (configurable) for each addressed binary message.
Confirm that the time between transmissions is 4 to 8 seconds.
Confirm that EUT transmits the overall result with an appropriate message to PI.

(3) Test results

Conditions	Results
Retries the transmission up to 3 times.	√
Configurability.	Configurable 0, 1, 2, 3
Time between transmissions is 4 to 8 seconds	√
Output to PI.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100