

# TEST REPORT

**IEC 61993-2:  
MARITIME NAVIGATION AND  
RADIOCOMMUNICATION EQUIPMENT  
AND SYSTEMS**

**Automatic Identification Systems (AIS)**

**Part 2: Class A shipborne installation of the  
Universal Automatic Identification System (AIS)  
Operational and performance requirements,  
Methods of test and required test results**

**Test Report Reference: F123924E1**

**Equipment under Test:**

**AIS-Class-A-Transponder: CAMINO-701**

**Serial Number: A2K7000010**

**Applicant: Alltek Marine Electronics Corp**

**Manufacturer: Alltek Marine Electronics Corp**

TEST REPORT REFERENCE: F123924E1

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## 2 IDENTIFICATION

### 2.1 APPLICANT

Name:	Alltek Marine Electronics Corp
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### 2.2 MANUFACTURER

Name:	Alltek Marine Electronics Corp
Address:	7F, No.605, Ruei-Guang Rd., Neihu, Taipei
Country:	Taiwan, R.O.C.
Name for contact purposes:	Y.Y. Chiou
Tel:	+886 2 2627 1599 ext.109
Fax:	+886 2 2627 1600
e-mail address:	yychiou@alltekmarine.com

### 2.3 DATES

Date of Receipt of Test Sample:	8 October 2012
Start of test:	8 October 2012
Finish of test:	12 October 2012

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## 2.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TEST-LAB GmbH**  
**Königswinkel 10**  
**D-32825 Blomberg**                      **Tel: +49 (0) 52 35 / 95 00-0**  
**Germany**                                      **Fax: +49 (0) 52 35 / 95 00-10**

Accredited by DATech in der TGA GmbH in compliance with DIN EN ISO/IEC 17025.

Test engineer:	Raimund BLASK		19 October 2012
	<small>Name</small>	<small>Signature</small>	<small>Date</small>
Authorized reviewer:	Michael DINTER		22 October 2012
	<small>Name</small>	<small>Signature</small>	<small>Date</small>

## 2.5 RESERVATION

This test report is only valid in the original form.

Any reproduction of it's contents without written permission of the accredited test laboratory PHOENIX TEST-LAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions draw from these test results and concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page contains the PHOENIX TESTLAB Logo and the TEST REPORT REFERENCE.

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### 3 TECHNICAL DATA OF EQUIPMENT

Type:	AIS-Class-A-Transponder		
Type designation:	Camino-701		
Serial No.:	A2K7000010		
Alignment range:	156.025 to 162.025 MHz		
Switching range:	156.025 to 162.025 MHz		
Channel separation:	25 kHz		
Rated RF output power:	Nominal low power: 1.0 W / 30 dBm Nominal high power: 12.5 W / 41 dBm		
Supply Voltage:	$U_{nom} = 12.0$ V DC	$U_{min} = 9.6$ V DC	$U_{max} = 31.2$ V DC
Temperature range:	-15°C to +55°C		
Printed circuit designation:	Power-Supply-Unit: M-PCB-AISAPOWRV4 AIS-Main-Board: M-PCB-AISAMBV4		
Software:	1.0.6		

#### Ports/Connectors

Identification	Connector		Length
	EUT	Ancillary	
DC-power-supply	Customized	-	1.5 m
GPS-antenna	TNC	SMA	10 m
VHF-antenna	SO-239 (M-Type)	N-Connector	10 m
USB-Port	USB	USB	1.8 m
Junction Box	D-Sub	Not in use	Not in use

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## 4 ADDITIONAL INFORMATION

### General:

Full tests were carried out at 156.025 MHz and 162.025 MHz.  
The EUT was powered by an external 12 V-DC-Power-Supply.

### Wanted signal:

#### AIS-Mode:

The Test-Signals 2 to 5 were generated by the AIS-Simulator "Attingimus".  
For the Receiver-Tests the Output-Signal of the Simulator was used to modulate a calibrated RF-Generator from Phoenix TESTLAB. The received Data-Telegrams were compared transmitted Data-Telegrams.  
A number of 200 Packets (unless otherwise stated) were used to calculate the Packet Error Rate PER.

#### DSC-Mode:

The Test-Signals 1 was generated by the Signal-Generator AFG320 from SONY-Tektronix.  
A number of 100 Packets (unless otherwise stated) were used to calculate the Bit Error Rate BER.

### Test-signal overview:

Test-signal:	Mode:	Bit pattern:
1	DSC	010101 (dotting pattern, refer to ITU-R M.825)
2	AIS (TDMA)	01010101 (defined in part 10.2)
3	AIS (TDMA)	00001111 (defined in part 10.3)
4	AIS (PRBS)	Pseudo Random Bit Sequence (defined in part 10.4)
5	AIS (PRBS)	Pseudo Random Bit Sequence (defined in part 10.5)

### Unwanted signal:

All unwanted-signals were generated by the RF-Generators from Phoenix Test-Lab.

### Test Report History:

Test Report Number:	Date of issue:	Report Status:
F123924E1	16 October 2012	First issue
-	-	-
-	-	-

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## 5 TEST OVERVIEW

<b>Part 15</b>	<b>Physical Tests</b>		
	<b>Transmitter requirements</b>		
<b>15.1</b>	<b>TDMA Transmitter</b>		
15.1.1	Frequency error	Applicable	Passed
15.1.2	Carrier power	Applicable	Passed
15.1.3	Slotted transmission spectrum	Applicable	Passed
15.1.4	Modulation accuracy	Applicable	Passed
15.1.5	Transmitter output power characteristic	Applicable	Passed
	<b>Receiver requirements</b>		
<b>15.2</b>	<b>TDMA Receiver</b>		
15.2.1	Sensitivity	Applicable	Passed
15.2.2	Error behaviour at high input level	Applicable	Passed
15.2.3	Co-channel rejection	Applicable	Passed
15.2.4	Adjacent channel selectivity	Applicable	Passed
15.2.5	Spurious response rejection	Applicable	Passed
15.2.6	Intermodulation response rejection and blocking	Applicable	Passed
15.2.7	Transmit to receive switching time	Applicable	Passed
15.2.8	Immunity to out-of-band energy	Applicable	Passed
<b>15.3</b>	<b>Conducted spurious emissions</b>		
15.3.1	Spurious Emissions from the Transmitter	Applicable	Passed
15.3.2	Spurious Emissions from the Receiver	Applicable	Passed
<b>D.2</b>	<b>DSC Receiver Test</b>		
D.2.1	Maximum sensitivity	Applicable	Passed
D.2.2	Error behaviour at high input level	Applicable	Passed
D.2.3	Co-channel rejection	Applicable	Passed
D.2.4	Adjacent channel selectivity	Applicable	Passed
D.2.5	Spurious response rejection	Applicable	Passed
D.2.6	Intermodulation response rejection	Applicable	Passed
D.2.7	Blocking or Desensitisation	Applicable	Passed
D.2.8	Conducted spurious emission from the receiver	Applicable	Passed

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## 6 TRANSMITTER REQUIREMENTS

### 6.1 FREQUENCY ERROR

### SUBCLAUSE 15.1.1

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Continuous transmission without modulation, f = 156.025 MHz

TEST CONDITIONS		FREQUENCY	FREQUENCY ERROR
Temperature	Voltage		
T <sub>nom</sub> (+20°C)	U <sub>nom</sub> (12.0 V DC)	156.025144 MHz	+144 Hz
T <sub>min</sub> (-15°C)	U <sub>min</sub> (9.6 V DC)	156.024615 MHz	-385 Hz
	U <sub>max</sub> (31.2 V DC)	156.024613 MHz	-387 Hz
T <sub>max</sub> (+55°C)	U <sub>min</sub> (9.6 V DC)	156.025302 MHz	+302 Hz
	U <sub>max</sub> (31.2 V DC)	156.025305 MHz	+305 Hz
Maximum frequency error		-387 Hz / +305 Hz	
Measurement uncertainty		± 10 Hz	

Operation mode: Continuous transmission without modulation, f = 162.025 MHz

TEST CONDITIONS		FREQUENCY	FREQUENCY ERROR
Temperature	Voltage		
T <sub>nom</sub> (+20°C)	U <sub>nom</sub> (12.0 V DC)	162.025150 MHz	+150 Hz
T <sub>min</sub> (-15°C)	U <sub>min</sub> (9.6 V DC)	162.024612 MHz	-388 Hz
	U <sub>max</sub> (31.2 V DC)	162.024613 MHz	-387 Hz
T <sub>max</sub> (+55°C)	U <sub>min</sub> (9.6 V DC)	162.025308 MHz	+308 Hz
	U <sub>max</sub> (31.2 V DC)	162.025308 MHz	+308 Hz
Maximum frequency error		-388 Hz / +308 Hz	
Measurement uncertainty		± 10 Hz	

LIMITS: SUBCLAUSE 15.1.1.3

The frequency error shall not exceed ± 0.5 kHz under normal and ± 1 kHz under extreme conditions.

TEST EQUIPMENT USED:

4, 14, 16, 23-24, 28-30



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## 6.2 CARRIER POWER

## SUBCLAUSE 15.1.2

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Continuous transmission with modulation, f = 156.025 MHz

Test conditions		Carrier power (Conducted)		
		30.0 dBm	33.0 dBm	41.0 dBm
T <sub>nom</sub> (+20°C)	U <sub>nom</sub> (12.0 V DC)	29.7 dBm	33.1 dBm	41.3 dBm
T <sub>max</sub> (-15°C)	U <sub>min</sub> (9.6 V DC)	29.8 dBm	33.2 dBm	40.8 dBm
	U <sub>max</sub> (31.2 V DC)	29.7 dBm	33.2 dBm	40.8 dBm
T <sub>max</sub> (+55°C)	U <sub>min</sub> (9.6 V DC)	30.7 dBm	33.4 dBm	40.5 dBm
	U <sub>max</sub> (31.2 V DC)	30.7 dBm	33.5 dBm	40.5 dBm
Maximum difference to rated power		-0.3 dB / +0.7 dB	-0.0 dB / +0.5 dB	-0.5 dB / +0.0 dB
Measurement uncertainty		+ 0.66 dB / - 0.72 dB		

Operation mode: Continuous transmission with modulation, f = 162.025 MHz

Test conditions		Carrier power (Conducted)		
		30.0 dBm	33.0 dBm	41.0 dBm
T <sub>nom</sub> (+20°C)	U <sub>nom</sub> (12.0 V DC)	29.5 dBm	32.8 dBm	41.0 dBm
T <sub>max</sub> (-15°C)	U <sub>min</sub> (9.6 V DC)	28.4 dBm	32.9 dBm	40.8 dBm
	U <sub>max</sub> (31.2 V DC)	29.0 dBm	33.0 dBm	41.1 dBm
T <sub>max</sub> (+55°C)	U <sub>min</sub> (9.6 V DC)	30.7 dBm	33.2 dBm	40.5 dBm
	U <sub>max</sub> (31.2 V DC)	30.8 dBm	33.1 dBm	40.5 dBm
Maximum difference to rated power		-1.6 dB / +0.8 dB	-0.2 dB / +0.2 dB	-0.0 dB / +0.5 dB
Measurement uncertainty		+ 0.66 dB / - 0.72 dB		

LIMITS: SUBCLAUSE 15.1.2.3

At all test frequencies, the carrier output power shall be  $\pm 1.5$  dB of its nominal power levels under normal test conditions.

At all test frequencies, the carrier output power shall be  $\pm 3.0$  dB of its nominal power levels under extreme test conditions.

TEST EQUIPMENT USED:

4, 14, 16, 23-24, 28-30

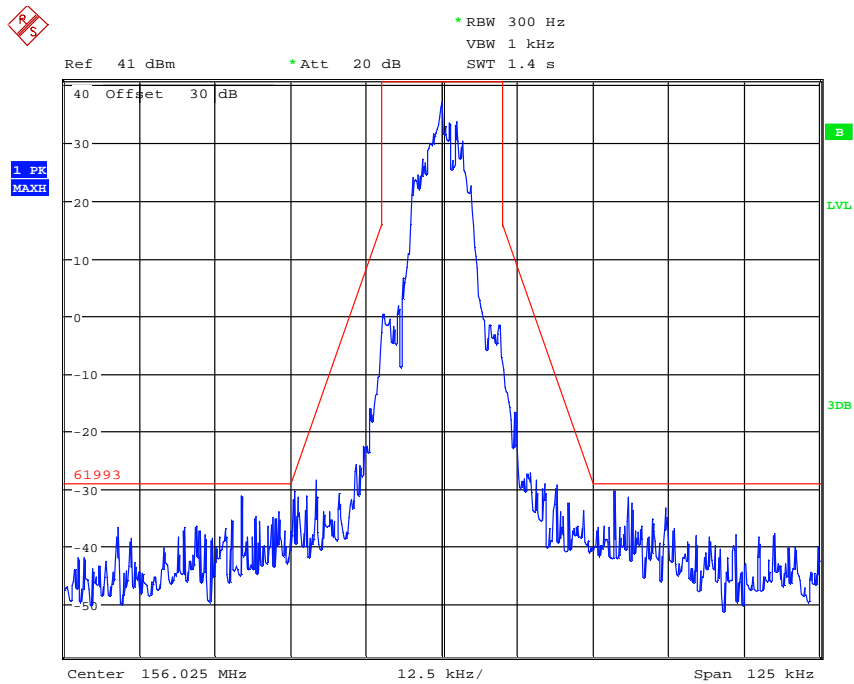
TEST REPORT REFERENCE: F123924E1

### 6.3 SLOTTED TRANSMISSION SPECTRUM

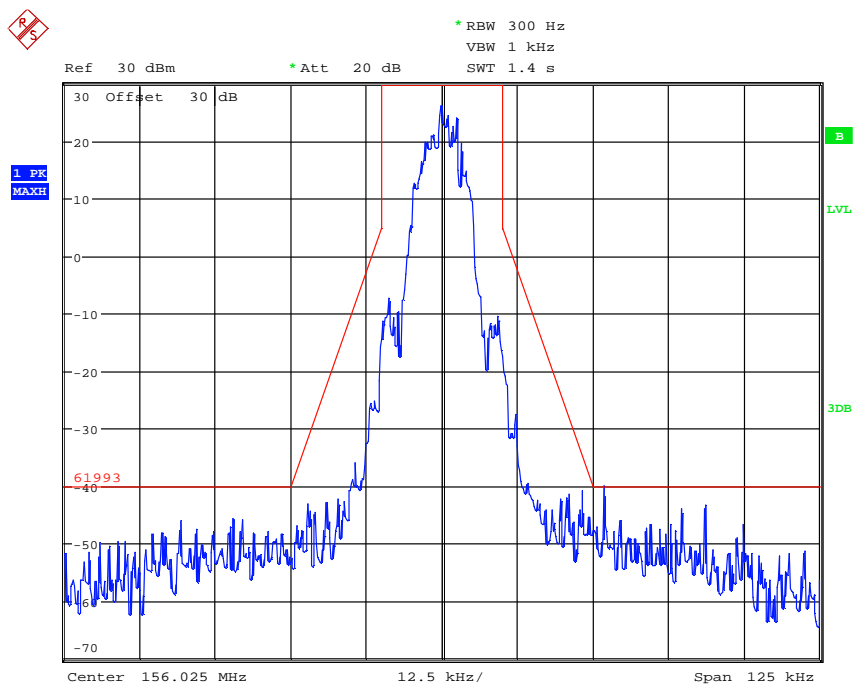
### SUBCLAUSE 15.1.3

Ambient temperature	20 °C	Relative humidity	45 %
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Operation mode: Transmit in AIS-mode, test-signal number 4, f = 156.025 MHz



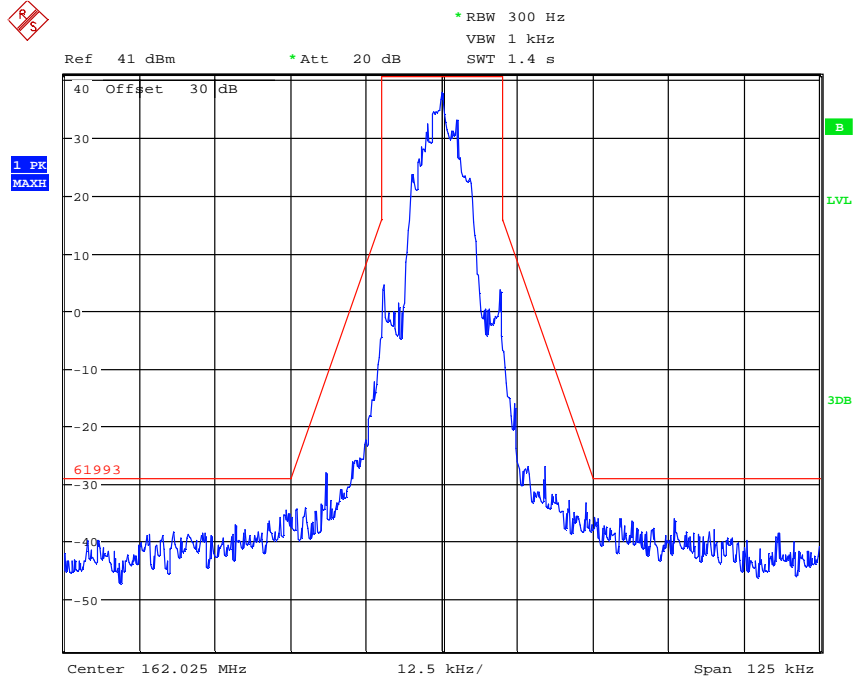
156tx3.wmf: P = 12.5 W



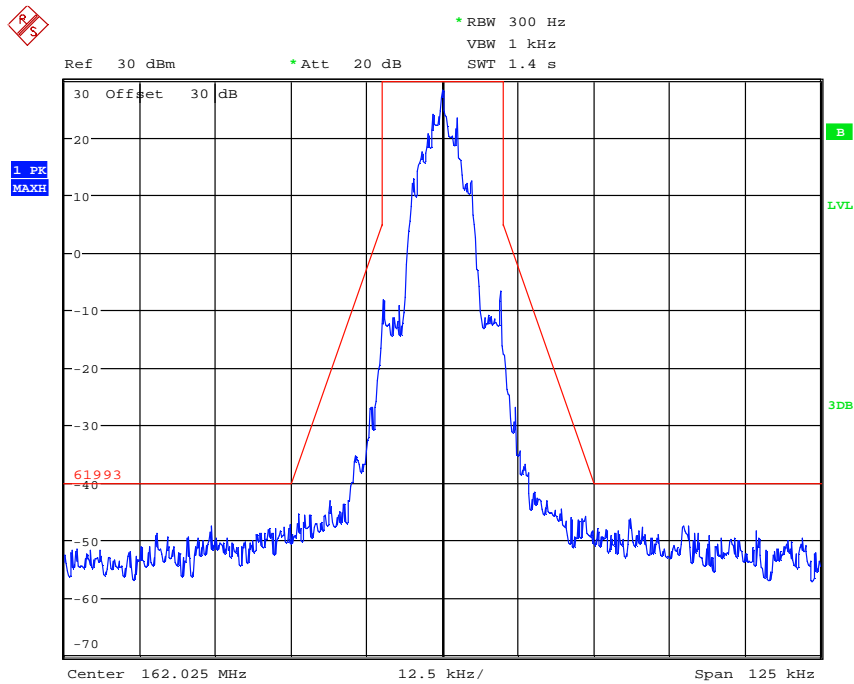
156tx4.wmf: Low Power, P = 1 W

TEST REPORT REFERENCE: F123924E1

Operation mode: Transmit in AIS-mode, test-signal number 4,  $f = 162.025$  MHz



162tx2.wmf: P = 12.5 W



162tx1.wmf: P = 1 W

TEST REPORT REFERENCE: F123924E1

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LIMITS: SUBCLAUSE 15.1.3.3

In the region between the carrier and  $\pm 10$  kHz removed from the carrier, the modulation and transient sidebands shall be below 0 dBc.

At  $\pm 10$  kHz removed from the carrier, the modulation and transient sideband shall be below - 25 dBc.

At  $\pm 25$  kHz to  $\pm 62.5$  kHz removed from the carrier, the modulation and transient sideband shall be below the lower value of -70 dBc.

In the region  $\pm 10$  kHz and  $\pm 25$  kHz removed from the carrier, the modulation and transients sidebands shall be below a line specified between these two points.

TEST EQUIPMENT USED:

4, 14, 23-24, 28-30

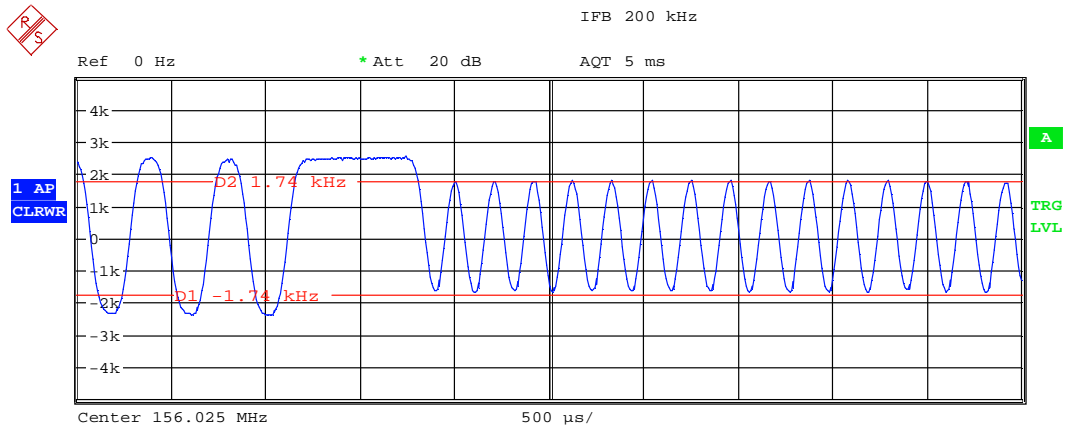
TEST REPORT REFERENCE: F123924E1

## 6.5 MODULATION ACCURACY

## SUBCLAUSE 15.1.4

Ambient temperature	20 °C	Relative humidity	45 %
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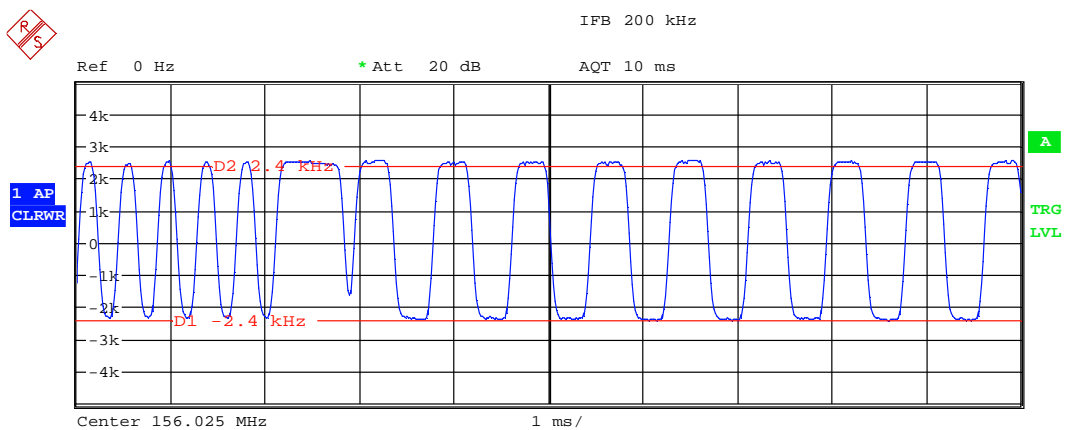
Operation mode: Transmit in AIS-mode



### Frequency Modulation Summary

Coupling	DC	Carrier Offset	364.83 Hz
Deviation	+peak 2.514 kHz	Carrier Power	40.75 dBm
	-peak -2.407 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.460 kHz	Sampling Rate	250 kHz
	RMS 1.578 kHz	Record Length	1251
		Demod Bandwidth	200 kHz

156\_2TX\_H.wmf: f = 156.025 MHz, U = 12.0 V, T = 20°C, test-signal 2

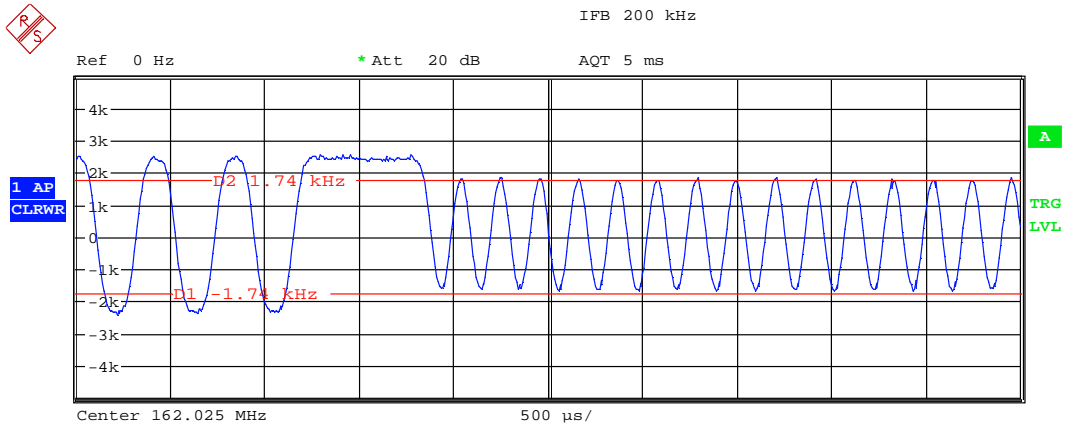


### Frequency Modulation Summary

Coupling	DC	Carrier Offset	187.18 Hz
Deviation	+peak 2.554 kHz	Carrier Power	40.69 dBm
	-peak -2.434 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.494 kHz	Sampling Rate	250 kHz
	RMS 2.119 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_3TX\_H.wmf: f = 156.025 MHz, U = 12.0 V, T = 20°C, test-signal 3

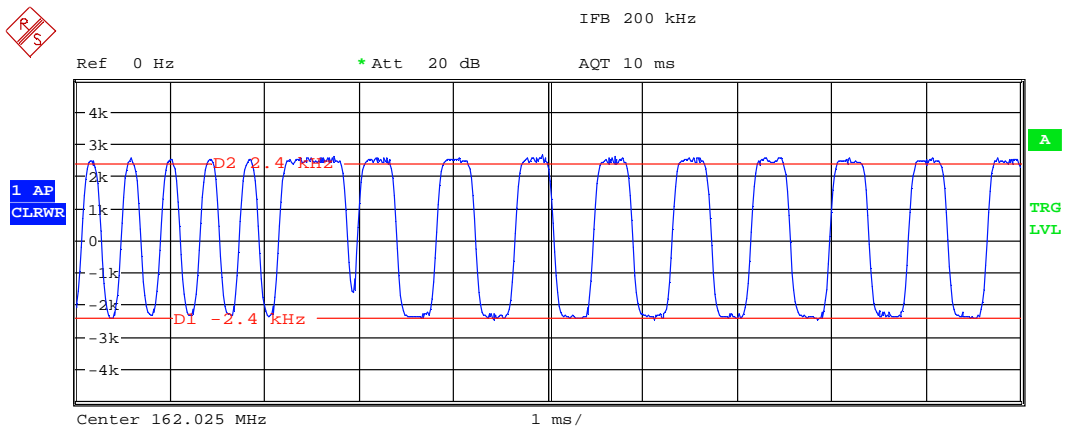
TEST REPORT REFERENCE: F123924E1



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	400.67 Hz
Deviation	+peak	Carrier Power	41.05 dBm
	-peak	Modulation Frequency	---
	⊕peak/2	Sampling Rate	250 kHz
	RMS	Record Length	1251
		Demod Bandwidth	200 kHz

156\_2TX\_H1.wmf: f = 162.025 MHz, U = 12.0 V, T = 20°C, test-signal 2

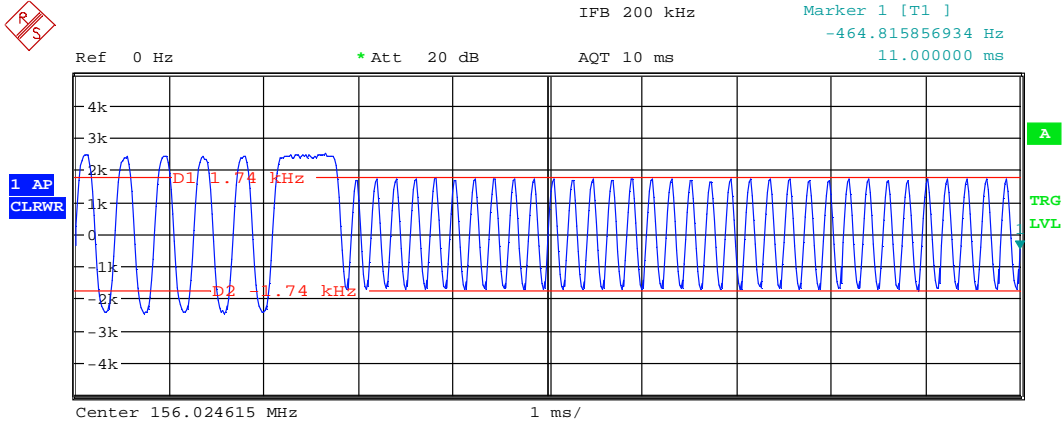


**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	183.83 Hz
Deviation	+peak	Carrier Power	41.00 dBm
	-peak	Modulation Frequency	---
	⊕peak/2	Sampling Rate	250 kHz
	RMS	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H1.wmf: f = 162.025 MHz, U = 12.0 V, T = 20°C, test-signal 3

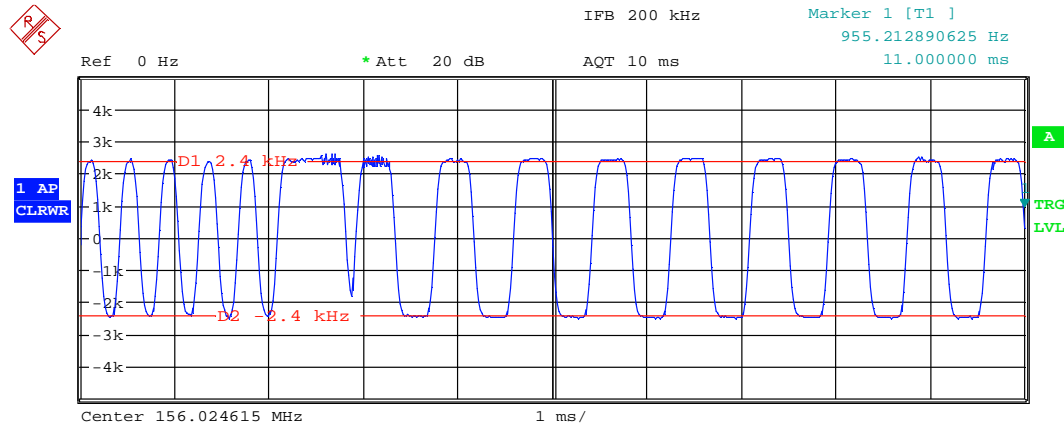
TEST REPORT REFERENCE: F123924E1



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	62.315 Hz
Deviation	+peak 2.471 kHz	Carrier Power	40.75 dBm
	-peak -2.481 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.476 kHz	Sampling Rate	250 kHz
	RMS 1.467 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H\_L.wmf: f = 156.025 MHz, U = 9.6 V, T = -15°C, test-signal 2

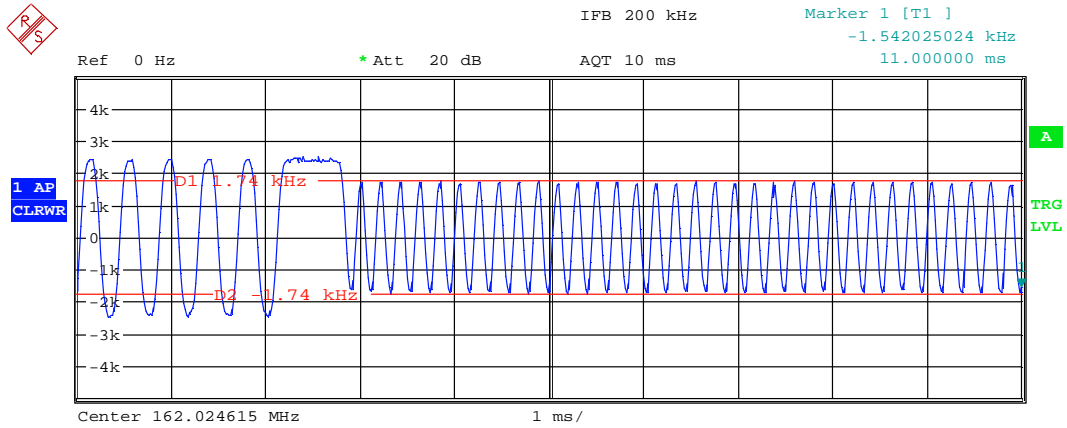


**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	90.447 Hz
Deviation	+peak 2.589 kHz	Carrier Power	40.74 dBm
	-peak -2.544 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.566 kHz	Sampling Rate	250 kHz
	RMS 2.115 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_3TX\_H\_L.wmf: f = 156.025 MHz, U = 9.6 V, T = -15°C, test-signal 3

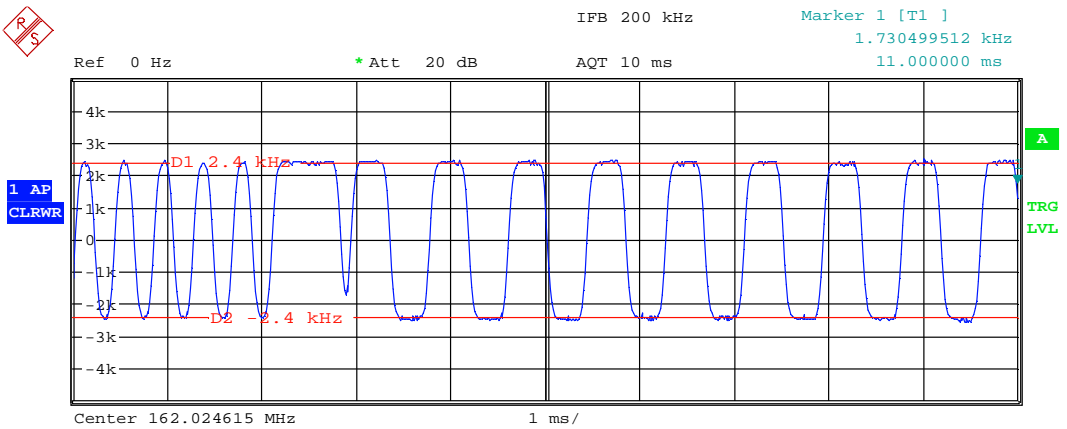
TEST REPORT REFERENCE: F123924E1



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	67.462 Hz
Deviation	+peak 2.480 kHz	Carrier Power	41.04 dBm
	-peak -2.495 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.488 kHz	Sampling Rate	250 kHz
	RMS 1.462 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H1\_L.wmf: f = 162.025 MHz, U = 9.6 V, T = -15°C, test-signal 2



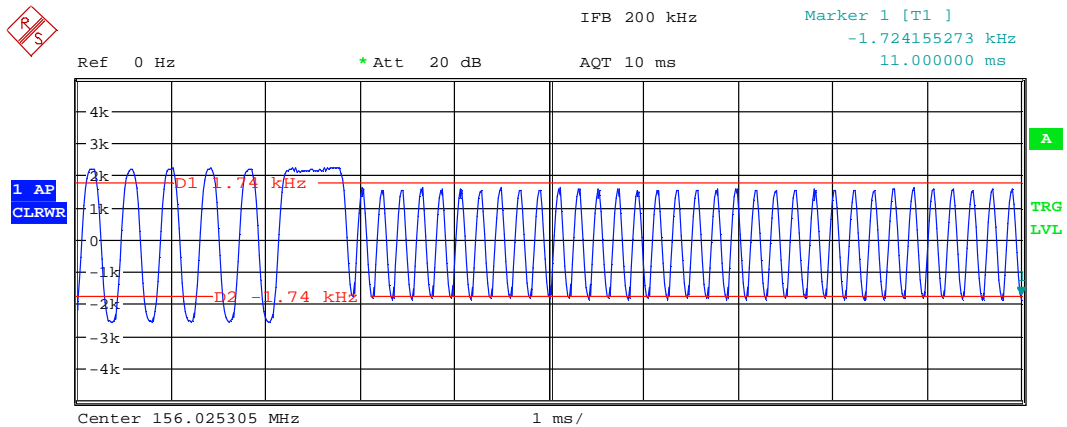
**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	78.279 Hz
Deviation	+peak 2.506 kHz	Carrier Power	41.08 dBm
	-peak -2.590 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.548 kHz	Sampling Rate	250 kHz
	RMS 2.101 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_3TX\_H1\_L.wmf: f = 162.025 MHz, U = 9.6 V, T = -15°C, test-signal 3



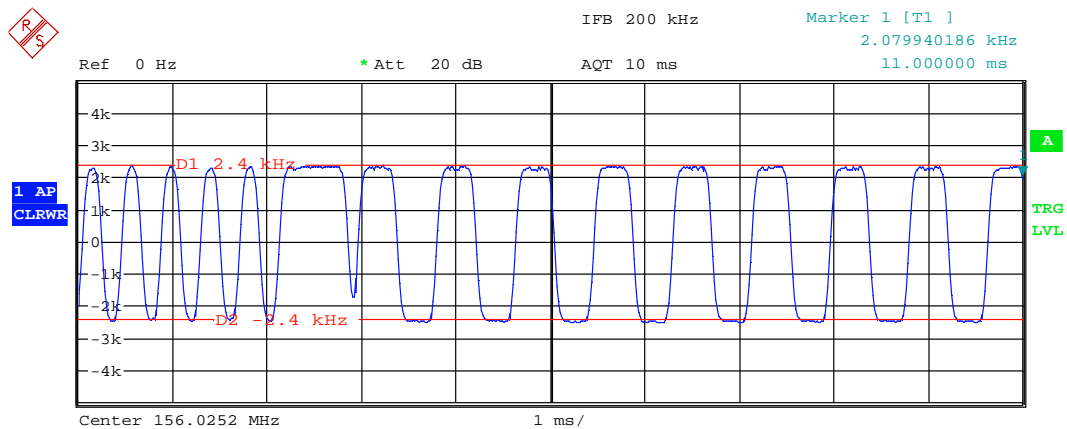
TEST REPORT REFERENCE: F123924E1



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	-46.867 Hz
Deviation	+peak 2.227 kHz	Carrier Power	40.53 dBm
	-peak -2.585 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.406 kHz	Sampling Rate	250 kHz
	RMS 1.443 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H\_H.wmf: f = 156.025 MHz, U = 31.2 V, T = 55°C, test-signal 2

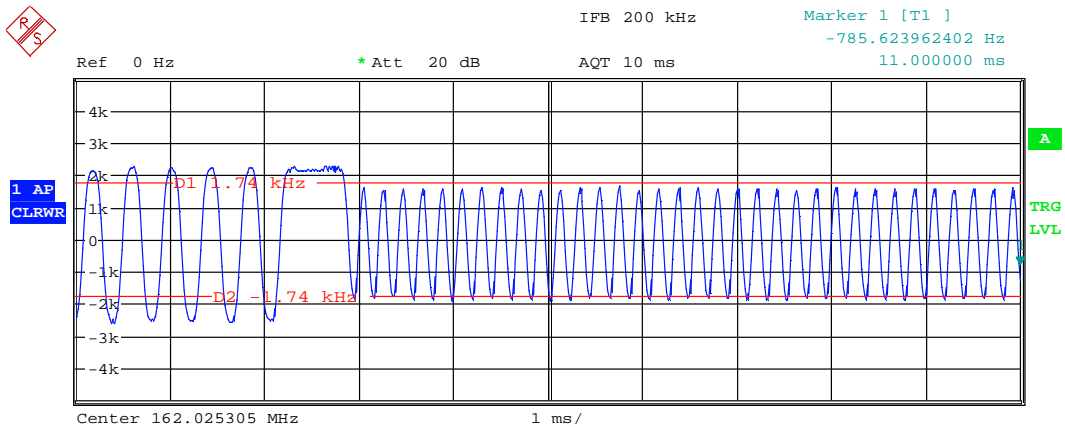


**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	34.280 Hz
Deviation	+peak 2.335 kHz	Carrier Power	40.51 dBm
	-peak -2.551 kHz	Modulation Frequency	--- Hz
	↑peak/2 2.443 kHz	Sampling Rate	250 kHz
	RMS 2.066 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_3TX\_H\_H.wmf: f = 156.025 MHz, U = 31.2 V, T = 55°C, test-signal 3

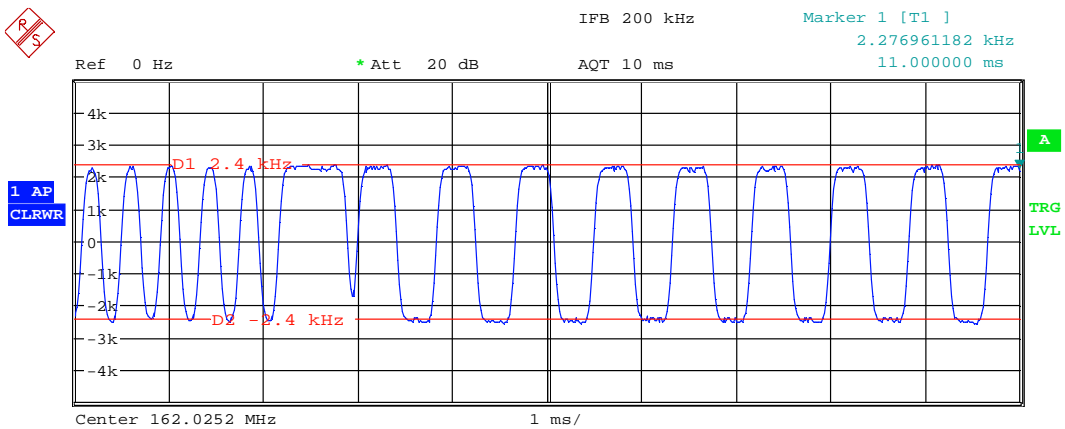
TEST REPORT REFERENCE: F123924E1



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	-38.651 Hz
Deviation	+peak      2.275 kHz	Carrier Power	40.41 dBm
	-peak      -2.631 kHz	Modulation Frequency	--- Hz
	↑peak/2    2.453 kHz	Sampling Rate	250 kHz
	RMS      1.445 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H1\_H.wmf: f = 162.025 MHz, U = 31.2 V, T = 55°C, test-signal 2



**Frequency Modulation Summary**

Coupling	DC	Carrier Offset	33.349 Hz
Deviation	+peak      2.344 kHz	Carrier Power	40.42 dBm
	-peak      -2.588 kHz	Modulation Frequency	--- Hz
	↑peak/2    2.466 kHz	Sampling Rate	250 kHz
	RMS      2.059 kHz	Record Length	2501
		Demod Bandwidth	200 kHz

156\_2TX\_H1\_H.wmf: f = 162.025 MHz, U = 31.2 V, T = 55°C, test-signal 3

TEST REPORT REFERENCE: F123924E1

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Additional information:

Pretests have shown that the modulation accuracy is not depending on the output power. Therefore only the "high-power-plots" are stated in this report. For extreme test conditions the plots (low temperature and low voltage / high temperature and high voltage) are documented as worst case in this report.

LIMITS: SUBCLAUSE 15.1.4.3

Test signal 2		Test signal 3	
Normal	Extreme	Normal	Extreme
1740 Hz ± 175 Hz	1740 Hz ± 350 Hz	2400 Hz ± 240 Hz	2400 Hz ± 480 Hz

TEST EQUIPMENT USED:

4, 14, 16, 23-24, 28-30
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TEST REPORT REFERENCE: F123924E1

## 6.7 TRANSMITTER OUTPUT POWER CHARACTERISTIC

## SUBCLAUSE 15.1.5

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Transmit with modulation, f = 156.025 MHz

	Limit	Output power	
		1W	12.5W
Transmitter ramp-up time	833 $\mu$ s	486 $\mu$ s	439 $\mu$ s
Transmitter ramp-down time	833 $\mu$ s	309 $\mu$ s	251 $\mu$ s
Measurement uncertainty	$\pm 2 \mu$ s		

Remark: For more details see also Annex B (page 14 to 17) of this test-report.

Operation mode: Transmit with modulation, f = 162.025 MHz

	Limit	Output power	
		1W	12.5W
Transmitter ramp-up time	833 $\mu$ s	539 $\mu$ s	596 $\mu$ s
Transmitter ramp-down time	833 $\mu$ s	226 $\mu$ s	238 $\mu$ s
Measurement uncertainty	$\pm 2 \mu$ s		

Remark: For more details see also Annex B (page 14 to 17) of this test-report.

LIMITS: SUBCLAUSE 15.1.5.3

The transmitter power shall remain within the mask shown in Figure 2 and associated timings given in Table 10.
--

TEST EQUIPMENT USED:

4, 14, 23-24, 28-30
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TEST REPORT REFERENCE: F123924E1

## 7 TDMA RECEIVER

### 7.1 SENSITIVITY

### SUBCLAUSE 15.2.1

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in AIS-mode, f = 156.025 MHz  
Wanted signal: Test signal 5

TEMPERATURE	VOLTAGE	PACKET ERROR RATE	RECEIVER SENSITIVITY
T <sub>nom</sub> (+ 20°C)	U <sub>nom</sub> (12.0 V DC)	4.8%	-107 dBm @ 156.025000 MHz
		3.9%	-104 dBm @ 156.024500 MHz
		5.8%	-104 dBm @ 156.025500 MHz
T <sub>min</sub> (- 15°C)	U <sub>min</sub> (9.6 V DC)	1.3%	-101 dBm @ 156.025000 MHz
	U <sub>max</sub> (31.2 V DC)	2.2%	-101 dBm @ 156.025000 MHz
T <sub>max</sub> (+ 55°C)	U <sub>min</sub> (9.6 V DC)	1.3%	-101 dBm @ 156.025000 MHz
	U <sub>max</sub> (31.2 V DC)	1.8%	-101 dBm @ 156.025000 MHz
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in AIS-mode, f = 162.025 MHz  
Wanted signal: Test signal 5

TEMPERATURE	VOLTAGE	PACKET ERROR RATE	RECEIVER SENSITIVITY
T <sub>nom</sub> (+ 20°C)	U <sub>nom</sub> (12.0 V DC)	3.5%	-107 dBm @ 162.025000 MHz
		6.5%	-104 dBm @ 162.024500 MHz
		7.2%	-104 dBm @ 162.025500 MHz
T <sub>min</sub> (- 15°C)	U <sub>min</sub> (9.6 V DC)	1.8%	-101 dBm @ 162.025000 MHz
	U <sub>max</sub> (31.2 V DC)	2.7%	-101 dBm @ 162.025000 MHz
T <sub>max</sub> (+ 55°C)	U <sub>min</sub> (9.6 V DC)	0.9%	-101 dBm @ 162.025000 MHz
	U <sub>max</sub> (31.2 V DC)	1.8%	-101 dBm @ 162.025000 MHz
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE 15.2.1.3

The PER shall not exceed 20%.
-------------------------------

TEST EQUIPMENT USED:

1-3, 14, 16, 21-23, 28-30
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TEST REPORT REFERENCE: F123924E1

## 7.2 ERROR BEHAVIOUR AT HIGH INPUT LEVELS

## SUBCLAUSE 15.2.2

Ambient temperature	20°C
---------------------	------

Relative humidity	45%
-------------------	-----

Operation mode: Receive in AIS-mode, f = 156.025 MHz  
Wanted signal: Test signal 5

RF-INPUT SIGNAL LEVEL	NUMBER OF MESSAGES NOT SUCCESSFULLY RECORDED
- 77 dBm	0.4%
- 7 dBm	0.2%

Operation mode: Receive in AIS-mode, f = 162.025 MHz  
Wanted signal: Test signal 5

RF-INPUT SIGNAL LEVEL	NUMBER OF MESSAGES NOT SUCCESSFULLY RECORDED
- 77 dBm	0.4%
- 7 dBm	0.2%

LIMITS: SUBCLAUSE 15.2.2.3

The PER shall not exceed 1%.
------------------------------

TEST EQUIPMENT USED:

1-3, 14, 21-23, 28-30
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TEST REPORT REFERENCE: F123924E1

### 7.3 CO-CHANNEL REJECTION

### SUBCLAUSE 15.2.3

Ambient temperature	20°C	Relative humidity	45%
---------------------	------	-------------------	-----

Operation mode: Receive in AIS-mode, f = 156.025 MHz  
 Wanted signal: Test-signal 5, P = -104 dBm  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

Unwanted signal frequency:	Unwanted signal level:	Signal ratio:	Packet error rate:
156.024 MHz	-114 dBm	10 dB	5.8%
156.025 MHz	-114 dBm	10 dB	4.4%
156.026 MHz	-114 dBm	10 dB	6.7%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in AIS-mode, f = 162.025 MHz  
 Wanted signal: Test-signal 5, P = -104 dBm  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

Unwanted signal frequency:	Unwanted signal level:	Signal ratio:	Packet error rate:
162.024 MHz	-114 dBm	10 dB	6.4%
162.025 MHz	-114 dBm	10 dB	5.5%
162.026 MHz	-114 dBm	10 dB	8.0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE 15.2.3.3

The PER shall not exceed 20%.
-------------------------------

TEST EQUIPMENT USED:

1-3, 6, 11, 14, 21-23, 28-30
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TEST REPORT REFERENCE: F123924E1

## 7.4 ADJACENT CHANNEL SELECTIVITY

## SUBCLAUSE 15.2.4

Ambient temperature	20°C	Relative humidity	45%
---------------------	------	-------------------	-----

Operation mode: Receive in AIS mode  
 Wanted signal: Test-signal 5  
 P = -104 dBm (normal conditions) / -98 dBm (extreme conditions)  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

TEMPERATURE	VOLTAGE	WANTED SIGNAL	UNWANTED SIGNAL	SIGNAL RATIO	PACKET ERROR RATE
T <sub>nom</sub> (+20°C)	U <sub>nom</sub> (12.0 V DC)	156.025 MHz	156.000 MHz	70dB	7.3%
			156.050 MHz	70dB	7.6%
		162.025 MHz	162.000 MHz	70dB	1.1%
			162.050 MHz	70dB	2.2%
T <sub>min</sub> (-15°C)	U <sub>min</sub> (9.6 V DC)	156.025 MHz	156.000 MHz	60dB	1.3%
			156.050 MHz	60dB	1.3%
	U <sub>max</sub> (31.2 V DC)	156.025 MHz	156.000 MHz	60dB	1.4%
			156.050 MHz	60dB	1.5%
	U <sub>min</sub> (9.6 V DC)	162.025 MHz	162.000 MHz	60dB	2.2%
			162.050 MHz	60dB	1.8%
	U <sub>max</sub> (31.2 V DC)	162.025 MHz	162.000 MHz	60dB	2.3%
			162.050 MHz	60dB	1.6%
T <sub>max</sub> (+55°C)	U <sub>min</sub> (9.6 V DC)	156.025 MHz	156.000 MHz	60dB	2.2%
			156.050 MHz	60dB	1.3%
	U <sub>max</sub> (31.2 V DC)	156.025 MHz	156.000 MHz	60dB	2.7%
			156.050 MHz	60dB	2.2%
	U <sub>min</sub> (9.6 V DC)	162.025 MHz	162.000 MHz	60dB	3.6%
			162.050 MHz	60dB	1.8%
	U <sub>max</sub> (31.2 V DC)	162.025 MHz	162.000 MHz	60dB	2.7%
			162.050 MHz	60dB	1.3%
Measurement uncertainty				+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE 15.2.4.3

The PER shall not exceed 20%.

TEST EQUIPMENT USED:

1-3, 6, 11, 14, 16, 21-23, 28-30



TEST REPORT REFERENCE: F123924E1

## 7.5 SPURIOUS RESPONSE REJECTION

## SUBCLAUSE 15.2.5

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in AIS-mode,  $f = 156.025$  MHz (Receiver 1 in use,  $IF=21.700$  MHz)  
 Wanted signal: Test-signal 5,  $P = -104$  dBm  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

DEFINITION	UNWANTED FREQUENCY	SIGNAL RATIO	PACKET ERROR RATE
IF	21.700 MHz	70dB	0.2%
1 <sup>st</sup> LO-Freq. - IF	112.625 MHz	70dB	0.7%
2 x 1 <sup>st</sup> LO-Freq. - IF	246.950 MHz	70dB	1.6%
2 x 1 <sup>st</sup> LO-Freq. + IF	290.350 MHz	70dB	2.4%
3 x 1 <sup>st</sup> LO-Freq. - IF	381.275 MHz	70dB	3.3%
3 x 1 <sup>st</sup> LO-Freq. + IF	424.675 MHz	70dB	4.0%
4 x 1 <sup>st</sup> LO-Freq. - IF	515.600 MHz	70dB	3.1%
4 x 1 <sup>st</sup> LO-Freq. + IF	559.000 MHz	70dB	2.7%
-	No other spurious response rejection frequencies found		-
-			-
-			-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Remark: The "limited frequency range" was calculated according to the procedure as described in the standard. The intermediate frequencies are based on the applicant's declaration but checked by the test-engineer.

Continued next page:

TEST REPORT REFERENCE: F123924E1

Continued:

Operation mode: Receive in AIS-mode,  $f = 162.025$  MHz (Receiver 2 in use,  $IF=28.850$  MHz)  
 Wanted signal: Test-signal 5,  $P = -104$  dBm  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

DEFINITION	UNWANTED FREQUENCY	SIGNAL RATIO	PACKET ERROR RATE
IF	28.850 MHz	70dB	0.2%
1st LO-Freq. - IF	104.325 MHz	70dB	0.2%
2 x 1st LO-Freq. - IF	237.500 MHz	70dB	4.8%
2 x 1st LO-Freq. + IF	295.200 MHz	70dB	8.0%
3 x 1st LO-Freq. - IF	370.675 MHz	70dB	8.2%
3 x 1st LO-Freq. + IF	428.375 MHz	70dB	7.8%
4 x 1st LO-Freq. - IF	503.850 MHz	70dB	6.7%
4 x 1st LO-Freq. + IF	561.550 MHz	70dB	4.0%
-	No other spurious response rejection frequencies found		-
-			-
-			-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Remark: The "limited frequency range" was calculated according to the procedure as described in the standard. The intermediate frequencies are based on the applicant's declaration but checked by the test-engineer.

LIMITS: SUBCLAUSE 15.2.5.8

At any frequency separated from the nominal frequency of the receiver by two channels or more, the spurious response rejection ratio shall not result a PER of greater than 20%.

TEST EQUIPMENT USED:

1-3, 6, 11, 14, 21-23, 28-30

TEST REPORT REFERENCE: F123924E1

## 7.6 INTERMODULATION RESPONSE REJECTION AND BLOCKING SUBCLAUSE 15.2.6

Ambient temperature	20°C	Relative humidity	45%
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Wanted signal A: Test-signal 5, P = -101 dBm  
 Unwanted signal B: Modulated 400 Hz / 3 kHz, RF-level -27 dBm  
 Unwanted signal C: Unmodulated, RF-level -27 dBm  
 Unwanted signal D: Unmodulated, RF-level -15 dBm

Operation mode: Receive in AIS-mode, f = 156.025 MHz

FREQUENCIES OF THE UNWANTED SIGNALS			PACKET ERROR RATE
Generator B	Generator C	Generator D	
156.525 MHz	157.025 MHz	161.750 MHz	7%
Measurement uncertainty			+ 0.66 dB / - 0.72 dB

Operation mode: Receive in AIS-mode, f = 162.025 MHz

FREQUENCIES OF THE UNWANTED SIGNALS			PACKET ERROR RATE
Generator B	Generator C	Generator D	
161.525 MHz	161.025 MHz	156.300 MHz	4%
Measurement uncertainty			+ 0.66 dB / - 0.72 dB

LIMITS: SUBCLAUSE 15.2.6.3

The PER shall not exceed 20%.
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TEST EQUIPMENT USED:

1-3, 6-8, 14, 21-23, 28-32, 34-38
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TEST REPORT REFERENCE: F123924E1

## 7.7 TRANSMIT TO RECEIVE SWITCHING TIME

## SUBCLAUSE 15.2.7

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in the Time Slot after Transmission; f = 156.025 MHz  
 Wanted signal: Test-signal 5

OPERATION MODE	RECEIVER SENSITIVITY	PACKET ERROR RATE
Receive in Time-Slot after Transmission	-107 dBm	7.6%
Measurement uncertainty	+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in the Time Slot after Transmission; f = 162.025 MHz  
 Wanted signal: Test-signal 5

OPERATION MODE	RECEIVER SENSITIVITY	PACKET ERROR RATE
Receive in Time-Slot after Transmission	-107 dBm	1.3%
Measurement uncertainty	+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE 15.2.7.3

The PER shall not exceed 20%.
-------------------------------

TEST EQUIPMENT USED:

1-3, 14, 21-23, 28-30, 34
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TEST REPORT REFERENCE: F123924E1

**7.8 IMMUNITY TO OUT-OF-BAND ENERGY**

**SUBCLAUSE 15.2.8**

Ambient temperature	20°C
---------------------	------

Relative humidity	45%
-------------------	-----

Operation mode: Receive in AIS-mode, f = 156.025 MHz  
 Wanted signal A: Test-signal 5  
 Unwanted signal B: Unmodulated

GENERATOR FREQUENCY	SIGNAL LEVEL	PACKET ERROR RATE
A: 156.025 MHz	-101 dBm	11%
B: 174.000 MHz	-5 dBm	
Measurement uncertainty	+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in AIS-mode, f = 162.025 MHz  
 Wanted signal A: Test-signal 5  
 Unwanted signal B: Unmodulated

GENERATOR FREQUENCY	SIGNAL LEVEL	PACKET ERROR RATE
A: 162.025 MHz	-101 dBm	7%
B: 174.000 MHz	-5 dBm	
Measurement uncertainty	+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE 15.2.8.3

The PER shall not exceed 20%.
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TEST EQUIPMENT USED:

1-3, 6, 11, 21-23, 28-30, 34-35
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TEST REPORT REFERENCE: F123924E1

**7.9 CONDUCTED SPURIOUS EMISSIONS**

**SUBCLAUSE 15.3**

**7.10 SPURIOUS EMISSIONS FROM THE TRANSMITTER**

**SUBCLAUSE 15.3.1**

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Continuous transmission with modulation, f = 156.025 MHz, P = 30 dBm

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	Limit	Margin	Result
312.050 MHz	-47 dBm	100 kHz	-36 dBm	11 dB	passed
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

Operation mode: Continuous transmission with modulation, f = 156.025 MHz, P = 41 dBm

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	Limit	Margin	Result
312.050 MHz	-42 dBm	100 kHz	-36 dBm	6 dB	passed
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

Operation mode: Continuous transmission with modulation, f = 162.025 MHz, P = 30 dBm

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	Limit	Margin	Result
324.050 MHz	-52 dBm	100 kHz	-36 dBm	16 dB	passed
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

TEST REPORT REFERENCE: F123924E1

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Operation mode: Continuous transmission with modulation,  $f = 162.025$  MHz,  $P = 41$  dBm

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	Limit	Margin	Result
324.050 MHz	-39 dBm	100 kHz	-36 dBm	3 dB	passed
486.075 MHz	-45 dBm	100 kHz	-36 dBm	9 dB	passed
-	-	-	-	-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

LIMITS: SUBCLAUSE 15.3.1.3

Frequency range	150 kHz to 1 GHz	1 to 4 GHz
TX operating	0.25 $\mu$ W (- 36 dBm)	1 $\mu$ W (- 30 dBm)

TEST EQUIPMENT USED:

4, 14, 19-20, 23, 25-26, 39
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TEST REPORT REFERENCE: F123924E1

## 7.11 SPURIOUS EMISSIONS FROM THE RECEIVER SUBCLAUSE 15.3.2 AND SUBCLAUSE D.2.8

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receiver 1: f = 156.025 MHz, AIS-mode  
Receiver 2: f = 162.025 MHz, AIS-mode  
Receiver 3: f = 156.525 MHz, DSC-mode

SPURIOUS EMISSIONS LEVEL (CONDUCTED)					
f	Level	Bandwidth	Limit	Margin	Result
1865.000 MHz	-57.0 dBm	1 MHz	-47 dBm	10 dB	passed
1995.000 MHz	-55.0 dBm	1 MHz	-47 dBm	8 dB	passed
2263.000 MHz	-56.0 dBm	1 MHz	-47 dBm	9 dB	passed
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB			

Additional information:

This measurement includes the spurious emission results of all 3 integrated receiver (AIS1: 156.025 MHz; AIS2:162.025 MHz and DSC: 156.525 MHz).

LIMITS: SUBCLAUSE 15.3.2.3

Conducted emissions:

Frequency range	150 kHz to 1 GHz	1 to 4 GHz
Rx operating	2 nW (- 57 dBm)	20 nW (- 47 dBm)

TEST EQUIPMENT USED:

4, 14, 23, 25-26



TEST REPORT REFERENCE: F123924E1

### 7.13 MAXIMUM SENSITIVITY

### SUBCLAUSE D.2.1

Ambient temperature	20°C
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Relative humidity	45%
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Operation mode: Receive in DSC-mode,  $f = 156.525$  MHz

Wanted signal: Test-signal 1

TEMPERATURE	VOLTAGE	SIGNAL LEVEL	BIT ERROR RATE
$T_{\text{nom}}$ (+20°C)	$U_{\text{nom}}$ (12.0 V DC)	-107 dBm	0%
$T_{\text{min}}$ (-15°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
$T_{\text{max}}$ (+55°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in DSC-mode,  $f = 156.525$  MHz + 1.5 kHz

Wanted signal: Test-signal 1

TEMPERATURE	VOLTAGE	SIGNAL LEVEL	BIT ERROR RATE
$T_{\text{nom}}$ (+20°C)	$U_{\text{nom}}$ (12.0 V DC)	-107 dBm	0%
$T_{\text{min}}$ (-15°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
$T_{\text{max}}$ (+55°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Continued next page:

TEST REPORT REFERENCE: F123924E1

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Continued:

Operation mode: Receive in DSC-mode,  $f = 156.525 \text{ MHz} - 1.5 \text{ kHz}$

Wanted signal: Test-signal 1

TEMPERATURE	VOLTAGE	SIGNAL LEVEL	BIT ERROR RATE
$T_{\text{nom}}$ (+20°C)	$U_{\text{nom}}$ (12.0 V DC)	-107 dBm	0.22%
$T_{\text{min}}$ (-15°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
$T_{\text{max}}$ (+55°C)	$U_{\text{min}}$ (9.6 V DC)	-101 dBm	0%
	$U_{\text{min}}$ (31.2 V DC)		0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE D.2.1.3

The BER shall not exceed 1%.
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TEST EQUIPMENT USED:

6, 14, 16, 21-22, 28-30, 40
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TEST REPORT REFERENCE: F123924E1

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## 7.14 ERROR BEHAVIOUR AT HIGH INPUT LEVELS

## SUBCLAUSE D.2.2

Ambient temperature	20°C	Relative humidity	45%
---------------------	------	-------------------	-----

Operation mode: Receive in DSC-mode, f = 156.525 MHz  
 Wanted signal: Test-signal 1

RF-INPUT SIGNAL LEVEL	NUMBER OF MESSAGES NOT SUCCESSFULLY RECORDED
- 77 dBm	0%
- 7 dBm	0%
Measurement uncertainty	+ 0.66 dB / - 0.72 dB

LIMITS: SUBCLAUSE D.2.2.3

The BER shall not exceed 1%.
------------------------------

TEST EQUIPMENT USED:

6, 14, 21-22, 28-30, 40
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TEST REPORT REFERENCE: F123924E1

## 7.15 CO-CHANNEL REJECTION

## SUBCLAUSE D.2.3

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in DSC-mode, f = 156.525 MHz  
 Wanted signal: Test-signal 1, P = -104 dBm  
 Unwanted signal: Modulated with 400 Hz / 3 kHz deviation

Unwanted signal frequency:	Unwanted signal level:	Signal ratio:	Bit error rate:
156.522 MHz	-114 dBm	-10 dB	0.26%
156.525 MHz	-114 dBm	-10 dB	0.42%
156.528 MHz	-114 dBm	-10 dB	0.21%
Measurement uncertainty	+ 0.66 dB / - 0.72 dB		

LIMITS: SUBCLAUSE D.2.3.3

The BER shall not exceed 1%.
------------------------------

TEST EQUIPMENT USED:

6-7, 11, 14, 21-22, 28-30, 40
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TEST REPORT REFERENCE: F123924E1

## 7.16 ADJACENT CHANNEL SENSITIVITY

## SUBCLAUSE D.2.4

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in DSC-mode,  $f = 156.525$  MHz  
 Wanted signal: Test-signal 1,  $P = -104$  dBm  
 Unwanted signal:  $f = 156.500$  MHz, modulated with 400 Hz and a deviation of 3 kHz.

TEMPERATURE	VOLTAGE	SIGNAL RATIO	BIT ERROR RATE
$T_{nom}$ (+ 20 °C)	$U_{nom}$ (12.0 V)	70 dB	0%
$T_{min}$ (- 15 °C)	$U_{min}$ (9.6 V DC)	60 dB	0%
	$U_{min}$ (31.2 V DC)		0%
$T_{max}$ (+ 55 °C)	$U_{min}$ (9.6 V DC)	60 dB	0%
	$U_{min}$ (31.2 V DC)		0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

Operation mode: Receive in DSC-mode,  $f = 156.525$  MHz  
 Wanted signal: Test-signal 1,  $P = -104$  dBm  
 Unwanted signal:  $f = 156.550$  MHz, modulated with 400 Hz and a deviation of 3 kHz.

TEMPERATURE	VOLTAGE	SIGNAL RATIO	BIT ERROR RATE
$T_{nom}$ (+ 20 °C)	$U_{nom}$ (12.0 V)	70 dB	0%
$T_{min}$ (- 15 °C)	$U_{min}$ (9.6 V DC)	60 dB	0%
	$U_{min}$ (31.2 V DC)		0%
$T_{max}$ (+ 55 °C)	$U_{min}$ (9.6 V DC)	60 dB	0%
	$U_{min}$ (31.2 V DC)		0%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB	

LIMITS: SUBCLAUSE D.2.4.3

The BER shall not exceed 1%.
------------------------------

TEST EQUIPMENT USED:

6-7, 11, 14, 16, 21-22, 28-30, 40
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TEST REPORT REFERENCE: F123924E1

## 7.17 SPURIOUS RESPONSE REJECTION

## SUBCLAUSE D.2.5

Ambient temperature	20°C	Relative humidity	45 %
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Operation mode: Receive in DSC-mode, f = 156.525 MHz  
 Wanted signal: Test-signal 1, P = -104 dBm  
 Unwanted signal: Modulated with 400 Hz and a deviation of 3 kHz

DEFINITION	UNWANTED FREQUENCY	BIT ERROR RATE
IF	30.375 MHz	0%
1st LO-Freq. - IF	95.775 MHz	0%
2 x 1st LO-Freq. - IF	221.925 MHz	0%
2 x 1st LO-Freq. + IF	282.675 MHz	0%
3 x 1st LO-Freq. - IF	348.075 MHz	0%
3 x 1st LO-Freq. + IF	408.825 MHz	0%
4 x 1st LO-Freq. - IF	474.225 MHz	0%
4 x 1st LO-Freq. + IF	534.975 MHz	0%
-	No other spurious response rejection frequencies found	-
-		-
-		-
Measurement uncertainty		+ 0.66 dB / - 0.72 dB

LIMITS: SUBCLAUSE D.2.5.5

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

TEST EQUIPMENT USED:

6-7, 11, 14, 21-22, 28-30, 40

TEST REPORT REFERENCE: F123924E1

## 7.18 INTERMODULATION RESPONSE REJECTION

## SUBCLAUSE D.2.6

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in DSC-mode,  $f = 156.525$  MHz  
 Wanted signal A: Test-signal 1,  $P = -104$  dBm  
 Unwanted signal B: Unmodulated,  $P = -39$  dBm  
 Unwanted signal C: Modulated with 400 Hz and 3 kHz deviation,  $P = -39$  dBm

FREQUENCIES OF THE UNWANTED SIGNALS		BIT ERROR RATE
Generator B	Generator C	
+ 50 kHz	+ 100 kHz	0.24%
- 50 kHz	- 100 kHz	0.37%
Measurement uncertainty		+ 0.66 dB / - 0.72 dB

LIMITS: SUBCLAUSE D.2.6.3

The BER shall not exceed 1%.
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TEST EQUIPMENT USED:

6-8, 14, 21-22, 28-32, 38, 40
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TEST REPORT REFERENCE: F123924E1

## 7.19 BLOCKING OR DESENSITISATION

## SUBCLAUSE D.2.7

Ambient temperature	20°C	Relative humidity	45%
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Operation mode: Receive in DSC-mode, f = 156.525 MHz  
 Wanted signal A: Test-signal 1, P = -104 dBm  
 Unwanted signal B: Unmodulated, P = -20 dBm

FREQUENCIES OF THE UNWANTED SIGNALS	BIT ERROR RATE BER
157.525 MHz	0%
155.525 MHz	0%
158.525 MHz	0%
154.525 MHz	0%
161.525 MHz	0%
151.525 MHz	0%
166.525 MHz	0%
146.525 MHz	0%
Measurement uncertainty	+ 0.66 dB / - 0.72 dB

LIMITS: SUBCLAUSE D.2.7.3

The BER shall not exceed 1%.
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TEST EQUIPMENT USED:

6-7, 11, 14, 21-22, 28-30, 40
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TEST REPORT REFERENCE: F123924E1

## 8 TEST EQUIPMENT

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
1	AIS-Equipment-Tester	-	Attingimus	-	-
2	AIS-Test-Software	AIStherm	Attingimus	-	-
3	AIS-Test-Software	AISmain	Attingimus	-	-
4	Spectrum Analyser	FSU	Rohde & Schwarz	200125	480956
5	Measuring Receiver	ESI 40	Rohde & Schwarz	837808/007	480335
6	Signal generator	SMG	Rohde & Schwarz	833449/029	480016
7	Signal generator	SMG	Rohde & Schwarz	833449/030	480013
8	Radio communication analyser	CMTA 54	Rohde & Schwarz	841904/011	480169
9	Oscilloscope 2 channel	54520A	Hewlett Packard	3344A00390	480007
10	Signal generator	TOE 7704	TOELLNER	39385	480008
11	Combiner	ZFSC-2-11	Mini Circuits	-	410089
12	Combiner	ZFSC-2-11	Mini Circuits	-	410090
13	Power splitter	-	Suhner	-	410070
14	Power supply	TOE 8872	Toellner	61005	480833
15	Power supply	TOE 8852	Toellner	51712	480233
16	Climatic chamber	-	Binder	-	480462
17	Double circulator	-	Motorola	-	-
18	Directional coupler	ZFDC-2O-5	Mini Circuits	-	410092
19	High Pass Filter	HP-1000	Dirk Fischer Elektronik	-	410147
20	Notch Filter	TTR 190-3EE	TELONIC Berkeley	97284-6	480331
21	Variable Attenuator / 0-11 dB	8494B	Hewlett Packard	3308A38264	480264
22	Variable Attenuator 0 - 110 dB	8496B	Hewlett Packard	3308A71365	480265
23	Attenuator / 10 dB / 25 W	33-10-34	Weinschel	BH 4856	410130
24	Attenuator / 20 dB / 10 W	WA8-20	Weinschel	7539	410113
25	RF-cable No. 1	RTK 081	Rosenberger	-	410093
26	RF-cable No. 2	RTK 081	Rosenberger	-	410094
27	RF-cable No. 3	RTK 081	Rosenberger	-	410095
28	RF-cable No. 8	RG223	Phoenix-Test-Lab	-	410100
29	RF-cable No. 9	RG223	Phoenix-Test-Lab	-	410101
30	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102
31	RF-cable No. 11	RG223	Phoenix-Test-Lab	-	410103
32	RF-cable No. 12	RG223	Phoenix-Test-Lab	-	410104
33	RF-cable No. 30	RTK 081	Rosenberger	-	410141

TEST REPORT REFERENCE: F123924E1

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34	Zirkulator	156-162MHz	DFE	-	410162
35	Zirkulator	156-162MHz	DFE	-	410163
36	Zirkulator	156-162MHz	DFE	-	410164
37	Zirkulator	156-162MHz	DFE	-	410165
38	Combiner	ZFSC-4-1	Mini-Circuits	-	410171
39	Power-Attenuator	WA47-20-34	Weinschel	A1169	481452
40	Signal-Generator	AFG320	SONY-Tektronix	J3103045	480910

