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January 8, 2010

Prüfbericht / *Test Report*

Nr. / No. 70464-00843-2 (Edition 5)

Auftraggeber <i>Applicant</i>	Assdev GmbH
Geräteart <i>Type of equipment</i>	AIS600
Typenbezeichnung <i>Type designation</i>	Class B AIS Transceiver
Auftragsnummer / <i>Order No.</i>	
Prüfgrundlage <i>Test standards</i>	IEC 62287-1 Edition 1 Final Draft, Clause 11 FCC Code of Federal Regulations, CFR 47, Part 80, Section 80.281 Industry Canada Radio Standard Specification RSS-182 Issue 4, Section 6



Summary

Prüfergebnisse / Test Results	Auftragsnummer / Order No.
--------------------------------------	----------------------------

Die Prüfungen wurden nach folgenden Vorschriften durchgeführt:
Tests were performed according to:
IEC 62287-1 Edition 1 Final Draft, Clause 11
CFR 47 Part 80.231
IC RSS-182 Issue 4, Section 4

Durchgeführte Prüfung <i>Test performed</i>	Prüfergebnis <i>Test result</i>			
	Erfüllt <i>Passed</i>	Nicht erfüllt <i>Not Passed</i>	Nicht zutreffend <i>Not applicable</i>	Kriterium <i>Criterion</i>
Transmitter: Frequency error	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Transmitter: Carrier power	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Transmitter: Transmission spectrum	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Transmitter: Modulation accuracy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Transmitter output power versus time function	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Sensitivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Error behaviour at high input levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Co-channel rejection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Adjacent channel selectivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Spurious response rejection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Intermodulation response rejection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Receiver: Blocking or desensitisation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spurious emissions for the receiver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Radiated Spurious emissions for the receiver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spurious emissions for the transmitter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Bemerkungen / Remarks:

According to CFR 47 Part 80.231 Class B Automatic Identification System (AIS) equipment must meet the technical requirements of the International Electrotechnical Commission (IEC) 62280-1.

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / Date	Geprüft von / Tested by	Freigabe durch / Checked by	Prüfergebnis / Test Result <input checked="" type="checkbox"/> Erfüllt / Passed <input type="checkbox"/> Nicht erfüllt / Not passed
2010-01-08	 Martin Steindl Responsible for testing	 Johann Roidt Laboratory manager	



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1 Administrative Data

Application details

Applicant:	Assdev GmbH Boschstr. 5 D-91301 Forchheim
Contact person:	Mr. Hans Hofmann, GF
Order number:	
Receipt of EUT:	2009-09-17 2009-09-24 2009-12-14
Return of EUT:	2009-09-17 2009-09-24 2009-12-14
Date(s) of test:	2009-09-17 2009-09-24 2009-12-14
Note(s):	Mr. Wolfgang Werner representing the applicant attended all testings. The EUT was in the applicants care the whole time. the transmitter tests had been performed after the receiver tests on the unit. The transmitter tests had been repeated after a small, but necessary modification of the transmitter loop filter. In accordance between the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie - BSH) in Hamburg, Germany and TUEV SUED SENTON GmbH, Straubing, Germany this is accepted because receiver section and transmitter section of the device are completely separated from each other. An influence of the transmitter modification to the receiver parameters is therefore excluded.
Responsible for testing:	Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl
Test report checked by:	Mr. Johann Roidt

Report details

Report number:	70464-00843-2
Edition:	5
Issue date:	2010-01-08



2 Details about the Test Laboratory

Details about the Test Laboratory

Company name:	TÜV SÜD SENTON GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-PL-171/94-03
Contact:	Mr. Johann Roidt
	Phone: +49 9421 5522-0 Fax: +49 9421 5522-99



3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	AIS600
Parts of the system:	--
Options and accessories:	--
Type of equipment:	Class B AIS Transceiver
Serial number:	00014
Hardware revision:	2
AIS software version:	1.1.0
Firmware version:	G.0.11
Frequency range:	156.025 MHz - 162.025 MHz
Channel spacing:	25 kHz
Manufacturer:	Assdev GmbH & Co. KG Boschstr. 5 91301 Forchheim Germany
Power supply:	Battery supply (regulated lead-acid) Nominal: 12 V DC Minimal: 9.6 V DC Maximal: 31.2 V DC Nominal frequency: ---
Version of EUT:	Hardware status according to manufacturers documentation.

Declaration of manufacturer	
1	According IEC 62287-1, 8.4.1.5 (Waiver for receivers) the manufacturer hereby declares, that the two used TDMA receivers are setup identical. Therefore the tests of the second receiver (receiver B) have been waived.
2	According IEC 62287-1, C.4 (DSC receiver tests) the manufacturer hereby declares, that the DSC receiver is identical to the TDMA receiver (time shared use). Therefore the DSC receiver tests C.4.1 to C.4.6 have been waived.

4 Operation Mode and Configuration of EUT

Operation Mode(s)

Testings were performed with two operation modes separately:

- reception / autonomous mode
- forced transmit mode with unmodulated carrier
- forced transmit mode with test signal 2
- forced transmit mode with test signal 3
- forced transmit mode with test signal 4
- forced transmit mode with test signal 5

All estimations were taken by Mr. Wolfgang Werner, representing the applicant.

List of ports and cables

No.	Description	Classification ¹	Cable type	Cable length
D1	power supply cable	dc power	Unshielded	1,0 m
S1	NMEA0183 interface cable	signal/control port	Shielded	20,0 m
S2	SRM interface cable	signal/control port	Shielded	1,0 m
S3	USB interface cable	signal/control port	Shielded	1,0 m
S4	N2K interface cable	signal/control port	Shielded	2,0 m
S5	GPS interface cable	signal/control port	Shielded	25,0 m
S6	VHF antenna cable	signal/control port	Shielded	15 m
S7	VHF radio antenna cable	signal/control port	Shielded	Optional - Not connected

List of devices connected to EUT

No.	Description	Type designation	Serial no. or ID	Manufacturer

¹ Ports shall be classified as ac power, dc power or signal/control port.



List of support devices

<i>No.</i>	<i>Description</i>	<i>Type designation</i>	<i>Serial no. or ID</i>	<i>Manufacturer</i>
1		AIS Baseband Signal Generator		Weatherdock
2	Radio Communication Monitor	CMS 54	--	Rohde & Schwarz



5 Performance Criteria and Methods of Observation

Methods of Observation			
<i>Function</i>	<i>Observed size</i>	<i>Permissible range</i>	<i>Observation method</i>
PER (Packet Error Rate) of received AI5 test signal (test signal 5)	PER value	< 20 %	"Garmin_AIS600_DEV" test program



6 Referenced Regulations

<i>European publication</i>	<i>International publication</i>	<i>Title</i>
	IEC 62287-1 Edition 1 Final Draft:	Maritime navigation and radiocommunication equipment and systems - Class B shipborne equipment of the automatic identification system (AIS) - Part 1: Carrier-sense time division multiple access (CSTDMA) techniques

<i>National publication</i>	<i>Title</i>	<i>Date</i>
CFR 47 Part 80	Code of Federal Regulations Part 80 (Stations in the maritime services) of the Federal Communications Commission (FCC)	November 2009
RSS-182 Issue 4 (2009-09)	Radio Standard Specification RSS-182 Issue 4 for Maritime Radio Transmitters and Receivers in the Band 156 - 162.5 MHz	September 2009

7 Measurement Uncertainty Values

Radio Interference Emission Testing			
Test	k_p	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5μH NetznachbildungAMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz	2	± 3.9 dB	1
Radiated Emission			
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.8 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.8 dB	1
300 MHz to 1 GHz	2	± 4.6 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			
			4
Voltage Changes, Voltage Fluctuations and Flicker			
			4



Immunity Testing			
<i>Test</i>	k_p	<i>Expanded Uncertainty</i>	<i>Note</i>
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2.05	+21.9 / -18.0 %	3
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields	2	+30.3 / -23.2 %	2
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Electrical Transient Transmission in Road Vehicles			4

RF Testing			
<i>Test</i>	k_p	<i>Expanded Uncertainty</i>	<i>Note</i>
RF frequency	1.7	±10 Hz	5
RF power		±0,6 dB	4
Adjacent channel power		±2 dB	4
Conducted spurious emissions			
of the transmitter		±2 dB	4
of the receiver		±2 dB	4
Two-signal measurement		±2 dB	4
Three-signal measurement		±3 dB	4
Radiated emissions			
of the transmitter		±3 dB	4
of the receiver		±3 dB	4
Transmitter timing characteristics		±40 µs	4
Transmitter transient frequency (frequency difference)		±7.5 Hz	4

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$, providing a level of confidence of $p = 95.45\%$

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95 % confidence.

Note 5:

The expanded uncertainty reported according to ETSI TR 100 028-1 V1.4.1 (2001-12) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.7$, providing a level of confidence of $p = 95.45\%$

8 Test Results Overview

8.1 Requirements according to IEC 62287-1

TDMA Transmitters

IEC 62287-1 Clause 11.1			
Section(s)	Test performed	Page	Test Result
11.1.1	Frequency error	16	Test passed
11.1.2	Carrier power	20	Test passed
11.1.3	Transmission spectrum	24	Test passed
11.1.4	Modulation accuracy	29	Test passed
11.1.5	Transmitter output power versus time function	39	Test passed

TDMA Receivers

IEC 62287-1 Clause 11.2			
Section(s)	Test performed	Page	Test Result
11.2.1	Sensitivity	43	Test passed
11.2.2	Error behaviour at high input levels	47	Test passed
11.2.3	Co-channel rejection	51	Test passed
11.2.4	Adjacent channel selectivity	55	Test passed
11.2.5	Spurious response rejection	59	Test passed
11.2.6	Intermodulation response rejection	63	Test passed
11.2.7	Blocking or desensitisation	67	Test passed

Conducted spurious emissions

IEC 62287-1 Clause 11.3			
Section(s)	Test performed	Page	Test Result
11.3.1	Spurious emissions for the receiver	71	Test passed
11.3.2	Spurious emissions for the transmitter	80	Test passed

8.2 Requirements according to RSS-182

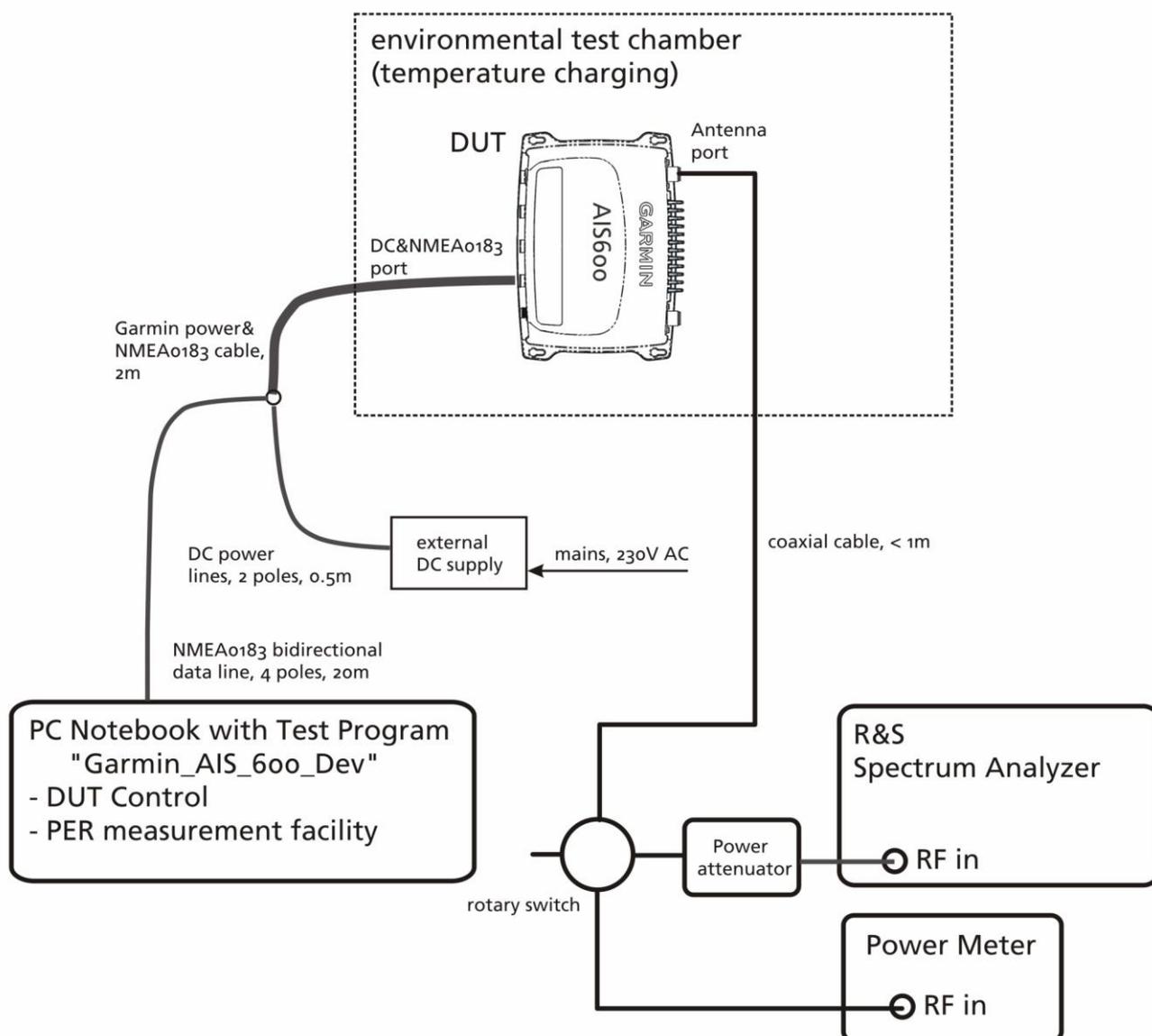
RSS-182 Issue 4			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
6.1	Frequency Stability	16	Test passed
6.2	Transmitter Output Power	20	Test passed
6.3	Transmitter Unwanted Emissions	24	Test passed
6.4	Audio Filter	---	Not applicable
6.5	Transmitters Not Exceeding 120 Milliwatts	---	Not applicable
6.6	Data Modem	---	Not applicable
6.7(a)	Receiver Spurious Emissions (radiated)	76	Test passed
6.7(b)	Receiver Spurious Emissions (conducted)	71	Test passed
6.8	Receiver Performance Specifications	---	Not applicable

9 Test Results

9.1 Frequency Error

9.1.1 Test Setup





Frequency Error and Carrier Power:

Temperature was set to

- normal room temperature inside testhouse building (chamber switched off),
- -20°C and
- +70°C

Operating modes of the DUT:

- forced transmission with unmodulated carrier



9.1.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.1.3 Test Results

Results for frequency error are documented as listed below.



Frequency Error

Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft RSS-182 Issue 4, Section 6.1(a)
Betriebsart / <i>Operation mode:</i>	Transmitting continuously without modulation
Kommentar / <i>Comment:</i>	Frequency deviations and limits in kHz is for IEC requirement. Frequency deviations and limits in ppm is for RSS-182 requirement.

<i>Test conditions</i>	<i>Frequency</i>	<i>Frequency deviation</i>	<i>Limit</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	156,025206 MHz	+0.206 kHz	±0.5 kHz	Passed	1
		+1.32 ppm	±10 ppm	Passed	1, 3
-20 °C, 9.6 V	156,025187 MHz	+0.187 kHz	±1.0 kHz	Passed	1
+70 °C, 31.2 V	156,025345 MHz	+0.345 kHz	±1.0 kHz	Passed	1
+20 °C, 12.0 V	162,025194 MHz	+0.194 kHz	±0.5 kHz	Passed	2
		+1.20 ppm	±10 ppm	Passed	2, 3
-20 °C, 9.6 V	162,025172 MHz	+0.172 kHz	±1.0 kHz	Passed	2
+70 °C, 31.2 V	162,025355 MHz	+0.355 kHz	±1.0 kHz	Passed	2

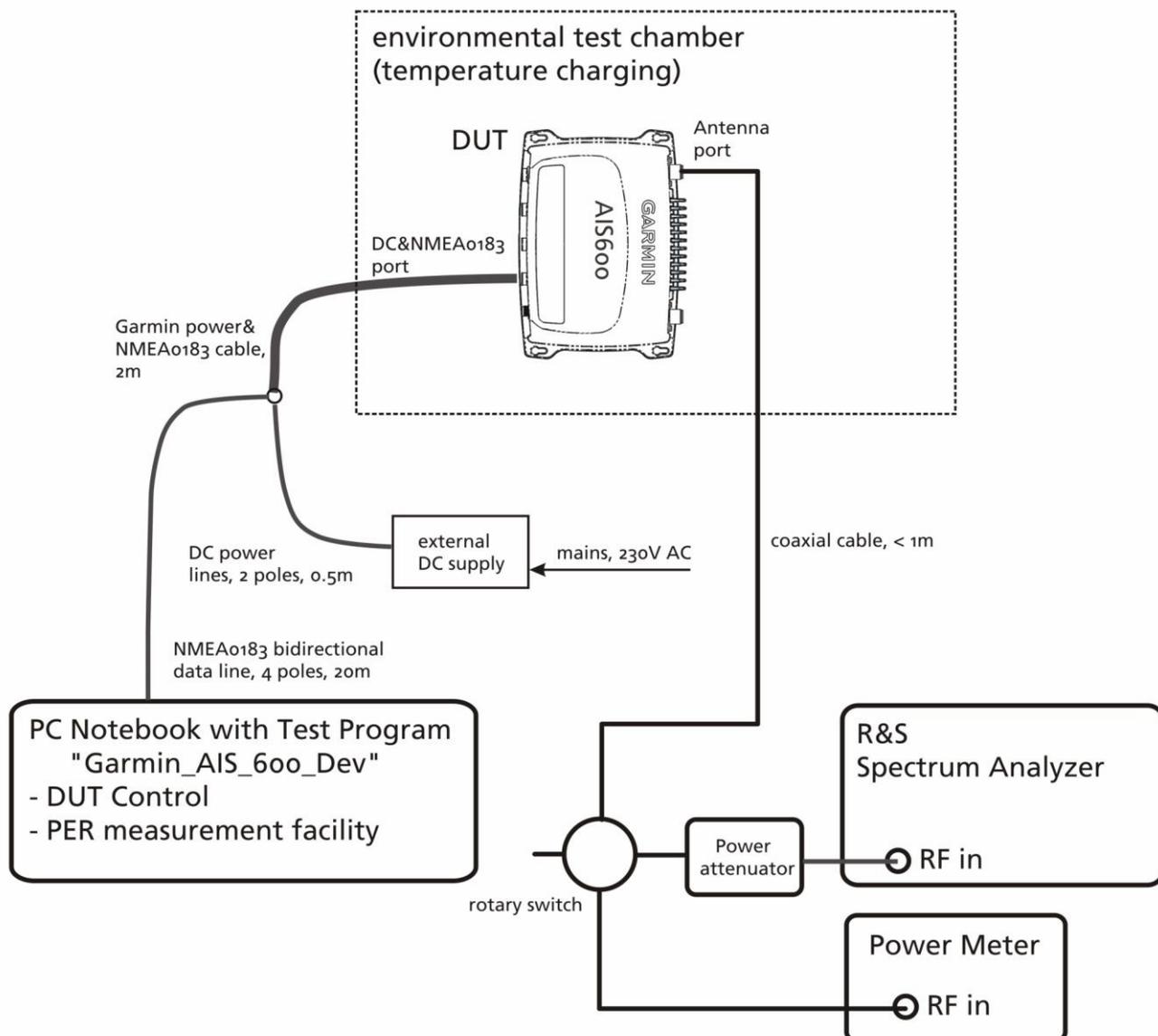
Note(s):

- 1 Nominal carrier frequency: 156.025 MHz
- 2 Nominal carrier frequency: 162.025 MHz
- 3 Applicable for RSS-182 Issue 4

9.2 Carrier Power

9.2.1 Test Setup





Frequency Error and Carrier Power:

Temperature was set to

- normal room temperature inside testhouse building (chamber switched off),
- -20°C and
- +70°C

Operating modes of the DUT:

- forced transmission with unmodulated carrier



9.2.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input checked="" type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input checked="" type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.2.3 Test Results

Results for carrier power are documented as listed below.



Carrier Power

Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft RSS-182 Issue 4, Section 6.2
Betriebsart / <i>Operation mode:</i>	Transmitting continuously with signal number 4
Kommentar / <i>Comment:</i>	

<i>Test conditions</i>	<i>Carrier power</i>	<i>Carrier power deviation</i>	<i>Limit</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	33.09	+0.09	33 dBm ± 1.5 dB	Passed	1, 3
-20 °C, 9.6 V	33.36	+0.36	33 dBm ± 3.0 dB	Passed	1
+70 °C, 31.2 V	31.77	-1.23	33 dBm ± 3.0 dB	Passed	1
+20 °C, 12.0 V	32.90	-0.10	33 dBm ± 1.5 dB	Passed	2, 3
-20 °C, 9.6 V	33.31	+0.31	33 dBm ± 3.0 dB	Passed	2
+70 °C, 31.2 V	31.64	-1.36	33 dBm ± 3.0 dB	Passed	2

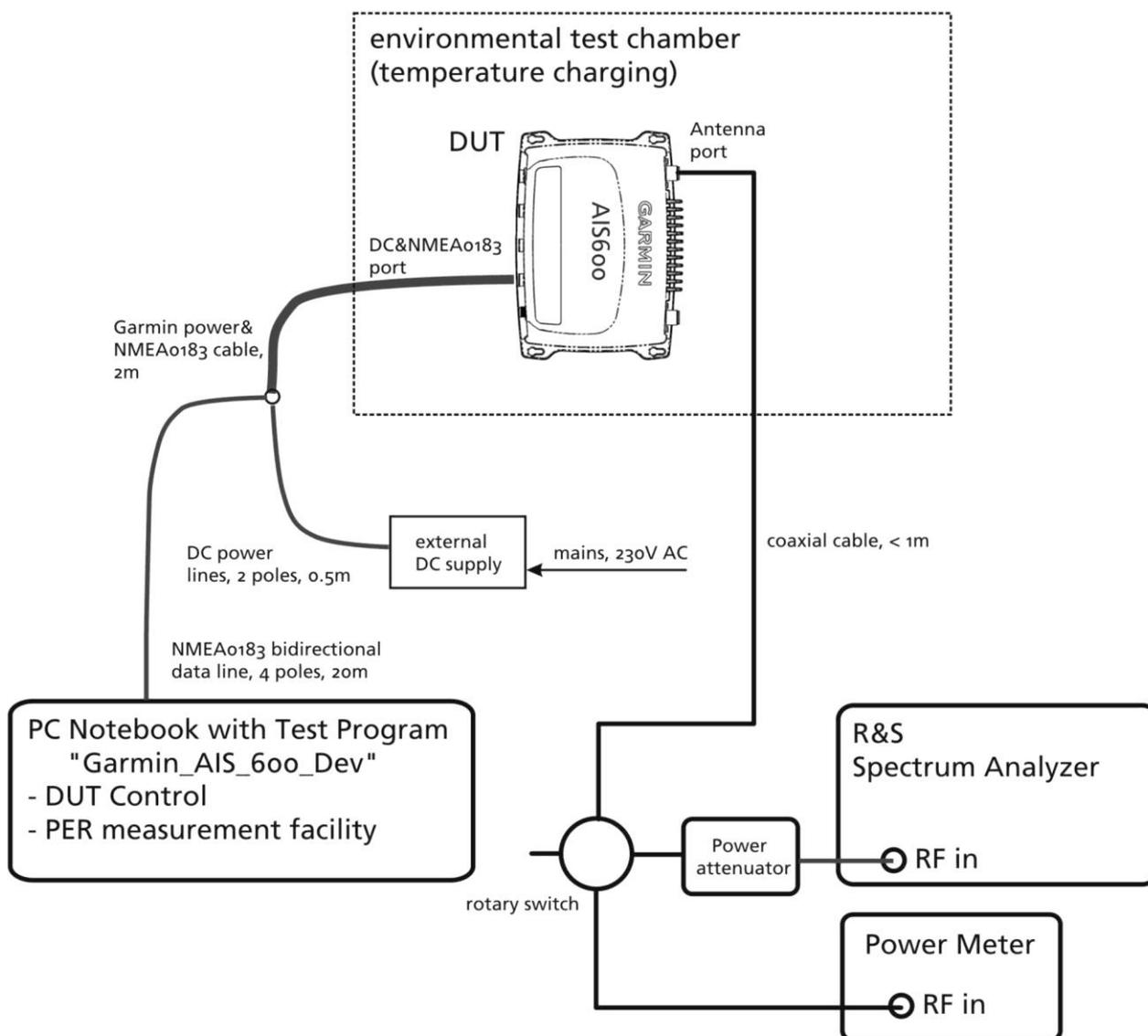
Note(s):

- 1 Nominal carrier frequency: 156.025 MHz
- 2 Nominal carrier frequency: 162.025 MHz
- 3 Applicable for RSS-182 Issue 4 with a rated output power of 33 dBm

9.3 Transmission Spectrum

9.3.1 Test Setup





Transmission spectrum measurement (emission mask):

- DUT was set to AIS2 (162.025MHz = channel 2088) and 156.025MHz (channel 1060)
- normal operating conditions
- slotted transmission with test signal 4



9.3.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.3.3 Test Results

Results for transmission spectrum are documented as listed below.

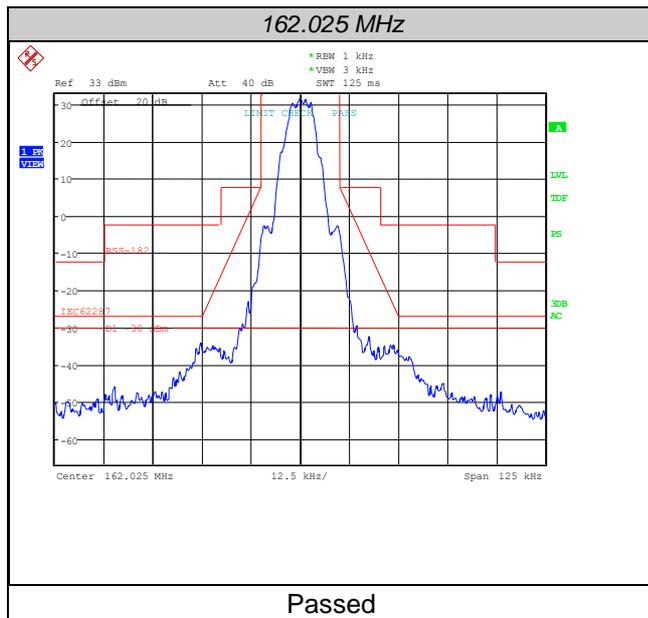
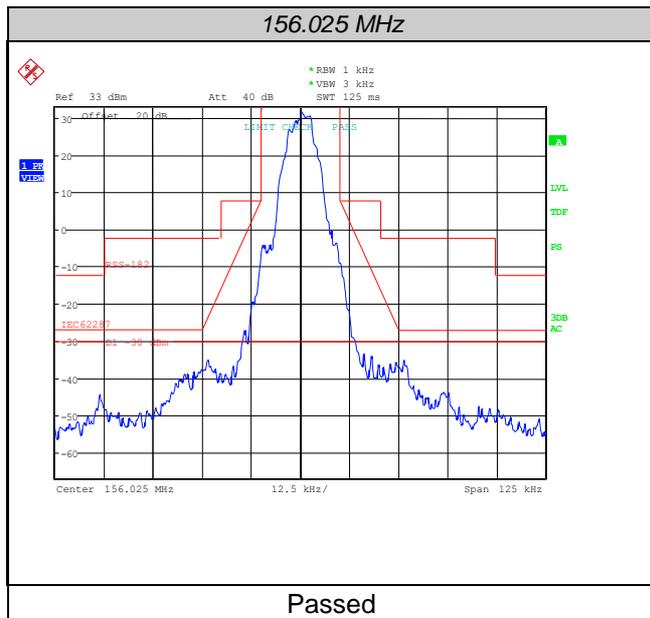


Transmission Spectrum

Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

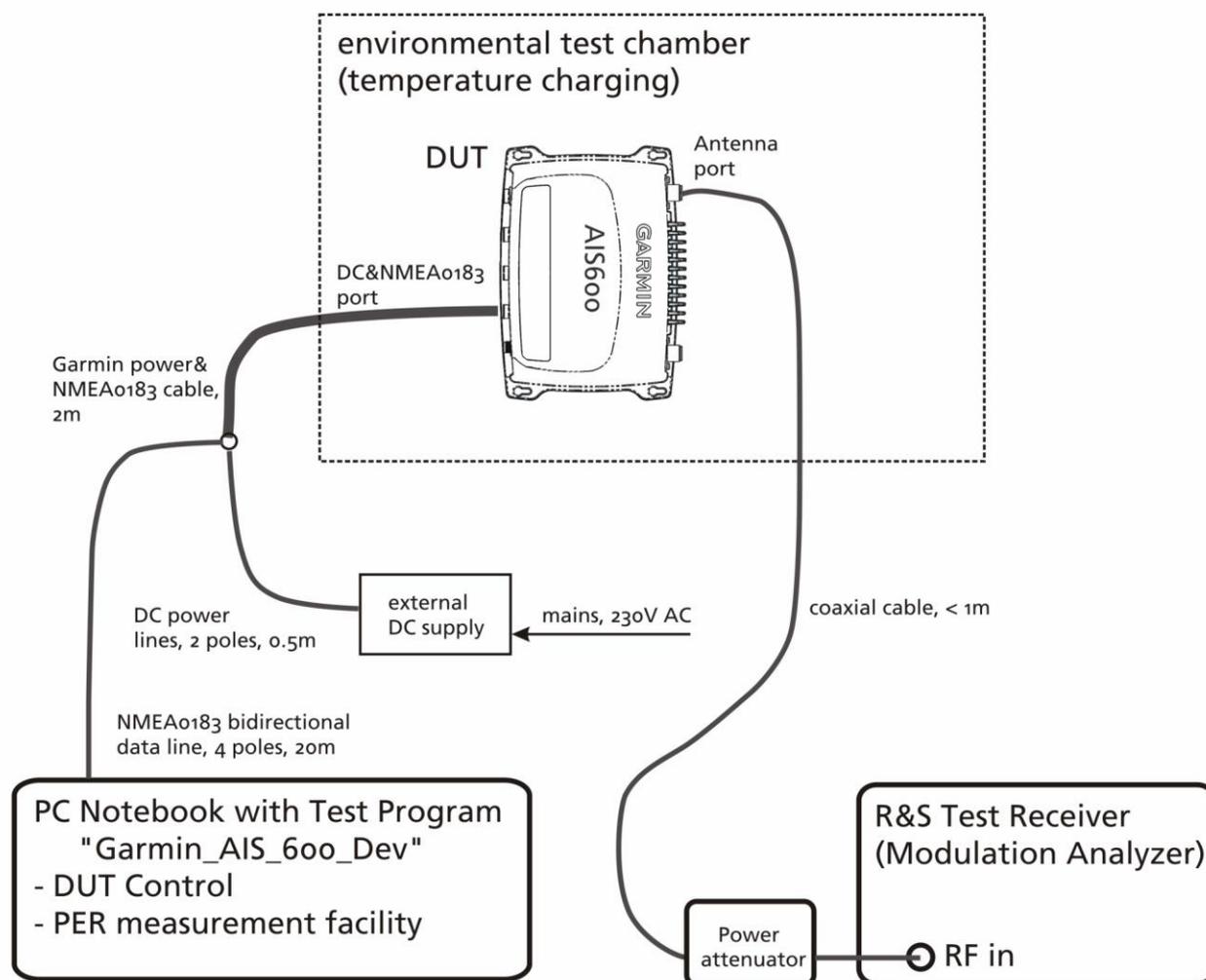
Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft RSS-182 Issue 4, Section 6.3.1
Betriebsart / <i>Operation mode:</i>	Transmitting continuously with signal number 4
Anforderung nach / <i>Requirement acc. to</i> IEC 62287-1:	In the region between the carrier and ± 10 kHz removed from the carrier, the modulation and transient sidebands shall below 0 dBc. At ± 10 kHz removed from the carrier, the modulation and transient sidebands shall be below -25 dBc. At ± 25 kHz to ± 62.5 kHz removed from the carrier, the modulation and transient sidebands shall be below the lower value of -60 dBc or -30 dBm. In the region between ± 10 kHz and ± 25 kHz removed from the carrier, the modulation and transient sidebands shall be below a line specified between these two points.
Anforderung nach / <i>Requirement acc. to</i> RSS-182:	This mask is intended for transmitters complying to the 25 kHz channel spacing IMO standard, having an authorized bandwidth of 16 kHz for voice and 20 kHz for data. The power of any emission must be attenuated below the transmitter mean power as follows: On any frequency removed from the carrier frequency by more than 50 % but not more than 100 % of the authorized bandwidth: at least 25 dB with a bandwidth of 300 Hz. On any frequency removed from the carrier frequency by more than 100 % but not more than 250 % of the authorized bandwidth: at least 35 dB, measured with a bandwidth of 300 Hz. On any frequency removed from the carrier frequency by more than 250 % of the authorized bandwidth: at least $(43 + 10 \log_{10}(P))$ dB, measured with a bandwidth of 30 kHz
Kommentar / <i>Comment:</i>	



9.4 Modulation Accuracy

9.4.1 Test Setup





During the tests the DUT was set to the following operating conditions:

Transmitter modulation accuracy measurements:

- DUT was set to AIS2 (162.025MHz = channel 2088) and 156.025MHz (channel 1060)
- operating voltage was set to
- 12V -20% = 9.6V and
- 24V + 30% = 31.2V

Temperature was set to

- normal room temperature inside testhouse building (chamber switched off),
- -20°C and
- +70°C

Operating modes of the DUT:

- forced transmission with
 - test signal 2
 - test signal 3



9.4.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.4.3 Test Results

Results for modulation accuracy are documented as listed below.



Modulation Accuracy

Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

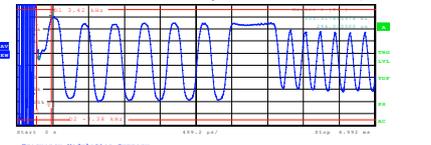
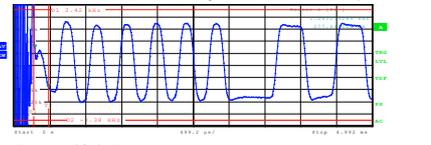
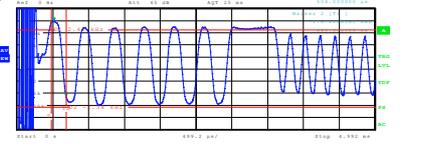
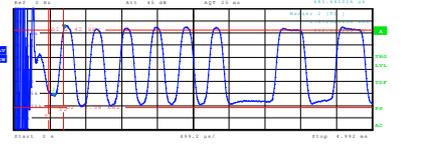
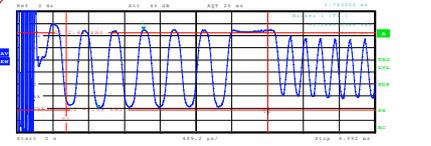
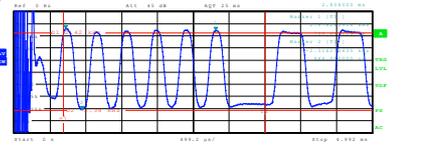
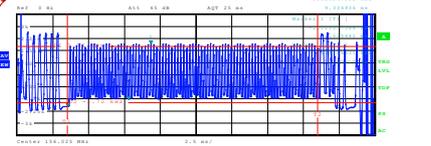
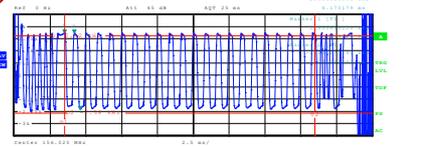
Prüfergebnis / Test Result	
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<input type="checkbox"/>	Nicht erfüllt / Not passed

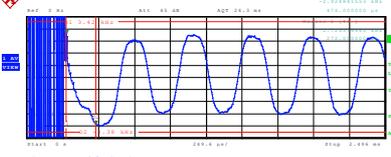
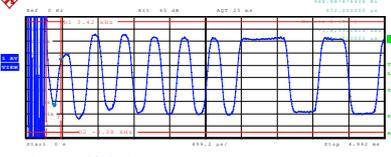
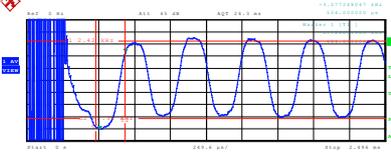
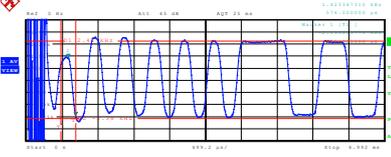
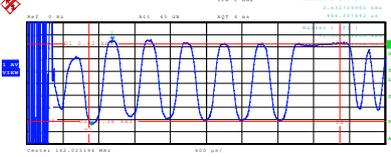
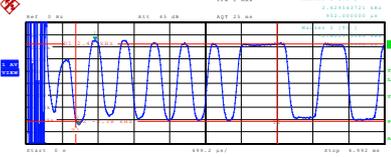
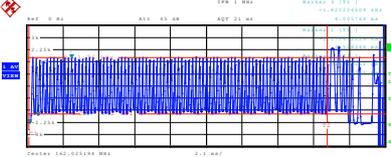
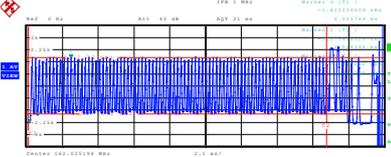
Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft				
Betriebsart / <i>Operation mode:</i>	Transmitting continuously with signal number 2 and 3				
Anforderung / <i>Requirement:</i>	<i>Period (center of bit)</i>	<i>Test signal 2</i>		<i>Test signal 3</i>	
		<i>Normal</i>	<i>Extreme</i>	<i>Normal</i>	<i>Extreme</i>
	0 - 1	< 3400 Hz			
	2 - 3	2400 ± 480 Hz			
	4 - 31	2400 ± 240 Hz	2400 ± 480 Hz	2400 ± 240 Hz	2400 ± 480 Hz
32 - 199	1740 ± 175 Hz	1740 ± 350 Hz	2400 ± 240 Hz	2400 ± 480 Hz	
Kommentar / <i>Comment:</i>					

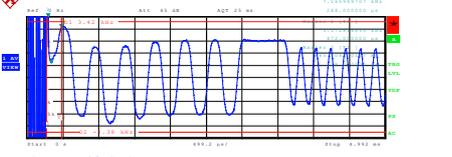
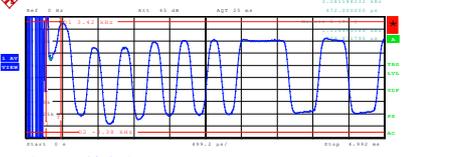
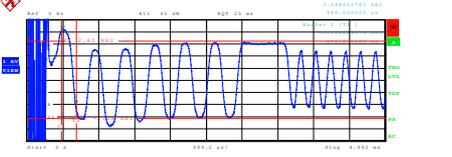
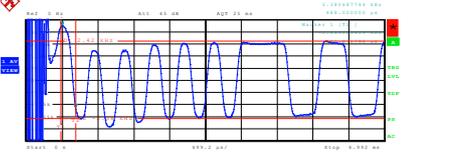
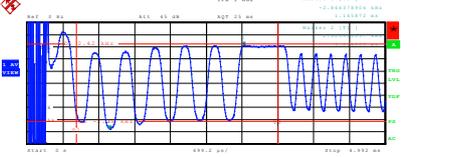
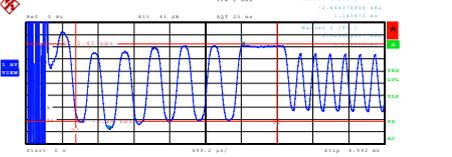
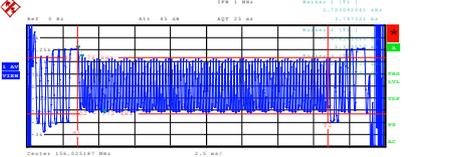
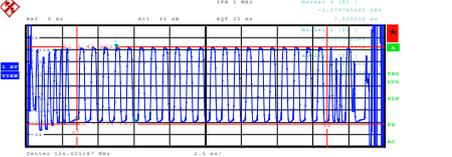
<i>Test conditions</i>	<i>Measurement</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	See plots on page 33 for details	Passed	1, 5, 6
-20 °C, 9.6 V	See plots on page 35 for details	Passed	1, 5, 6
+70 °C, 31.2 V	See plots on page 37 for details	Passed	1, 5, 6
+20 °C, 12.0 V	See plots on page 34 for details	Passed	2, 5, 6
-20 °C, 9.6 V	See plots on page 36 for details	Passed	2, 5, 6
+70 °C, 31.2 V	See plots on page 38 for details	Passed	2, 5, 6
+20 °C, 12.0 V	See plots on page 33 for details	Passed	3, 5, 6
-20 °C, 9.6 V	See plots on page 35 for details	Passed	3, 5, 6
+70 °C, 31.2 V	See plots on page 37 for details	Passed	3, 5, 6
+20 °C, 12.0 V	See plots on page 34 for details	Passed	4, 5, 6
-20 °C, 9.6 V	See plots on page 36 for details	Passed	4, 5, 6
+70 °C, 31.2 V	See plots on page 38 for details	Passed	4, 5, 6

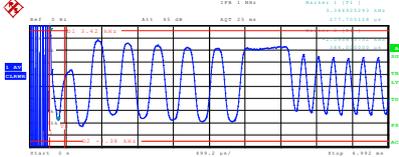
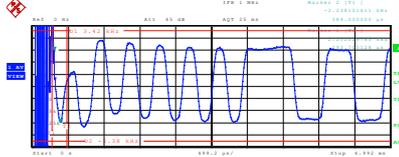
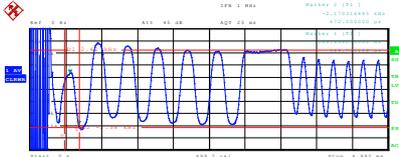
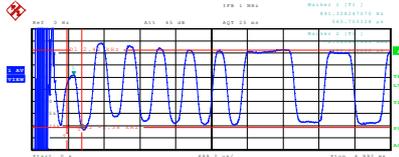
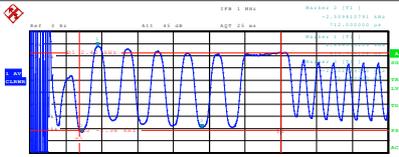
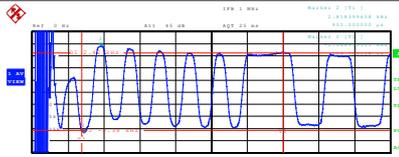
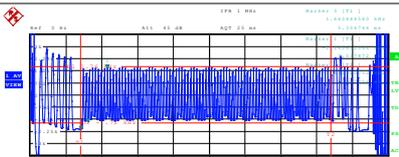
Note(s):

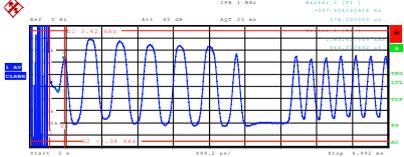
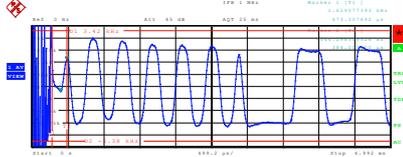
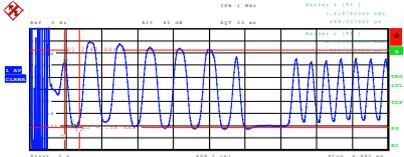
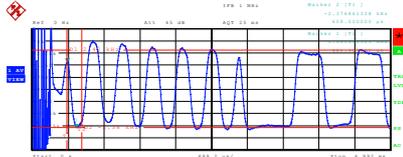
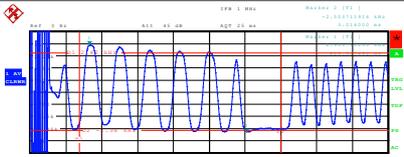
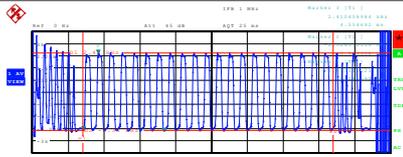
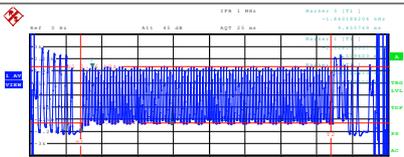
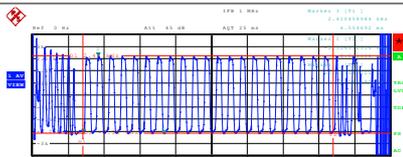
- 1 Nominal carrier frequency: 156.025 MHz and test signal number 2
- 2 Nominal carrier frequency: 162.025 MHz and test signal number 2
- 3 Nominal carrier frequency: 156.025 MHz and test signal number 3
- 4 Nominal carrier frequency: 162.025 MHz and test signal number 3
- 5 Final evaluation by the German "Bundesamt für Seeschifffahrt und Hydrographie", Hamburg, Germany
- 6 See measurement plots for details

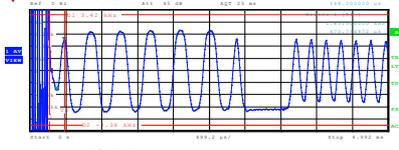
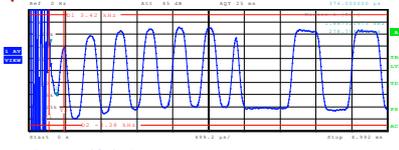
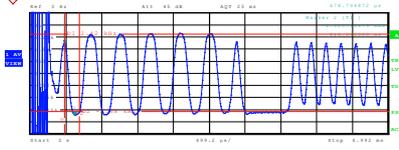
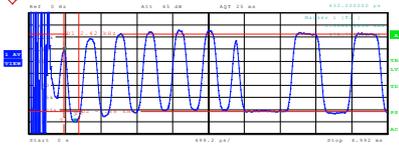
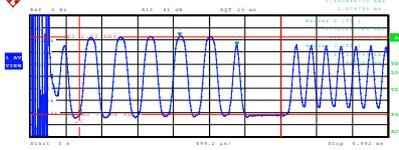
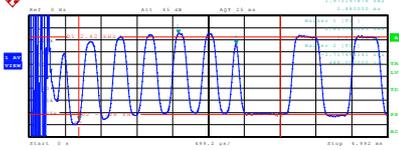
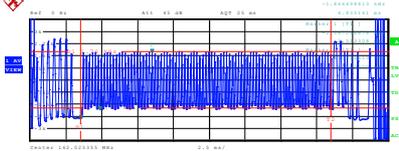
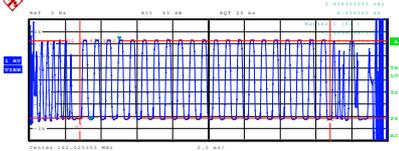
Measured period	156.025 MHz Signal 2 20 °C 12 V	156.025 MHz Signal 3 20 °C 12 V																																																
Bit 0 to bit 1	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>192.45 Hz</td></tr> <tr><td>Deviation</td><td>+peak -80.32 kHz</td><td>Carrier Power</td><td>32.20 dBm</td></tr> <tr><td></td><td>-peak -80.42 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td></td><td>Span#1/2 80.37 kHz</td><td>Sampling Rate</td><td>220 kHz</td></tr> <tr><td>RMS</td><td>7.442 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Demod Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:48:21</p>	Coupling	DC	Carrier Offset	192.45 Hz	Deviation	+peak -80.32 kHz	Carrier Power	32.20 dBm		-peak -80.42 kHz	Modulation Frequency	---		Span#1/2 80.37 kHz	Sampling Rate	220 kHz	RMS	7.442 kHz	Record Length	3124			Demod Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>236.15 Hz</td></tr> <tr><td>Deviation</td><td>+peak 71.48 kHz</td><td>Carrier Power</td><td>32.148 dBm</td></tr> <tr><td></td><td>-peak -81.47 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td></td><td>Span#1/2 76.48 kHz</td><td>Sampling Rate</td><td>220 kHz</td></tr> <tr><td>RMS</td><td>7.118 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Demod Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 10:01:23</p>	Coupling	DC	Carrier Offset	236.15 Hz	Deviation	+peak 71.48 kHz	Carrier Power	32.148 dBm		-peak -81.47 kHz	Modulation Frequency	---		Span#1/2 76.48 kHz	Sampling Rate	220 kHz	RMS	7.118 kHz	Record Length	3124			Demod Bandwidth	100 kHz
Coupling	DC	Carrier Offset	192.45 Hz																																															
Deviation	+peak -80.32 kHz	Carrier Power	32.20 dBm																																															
	-peak -80.42 kHz	Modulation Frequency	---																																															
	Span#1/2 80.37 kHz	Sampling Rate	220 kHz																																															
RMS	7.442 kHz	Record Length	3124																																															
		Demod Bandwidth	100 kHz																																															
Coupling	DC	Carrier Offset	236.15 Hz																																															
Deviation	+peak 71.48 kHz	Carrier Power	32.148 dBm																																															
	-peak -81.47 kHz	Modulation Frequency	---																																															
	Span#1/2 76.48 kHz	Sampling Rate	220 kHz																																															
RMS	7.118 kHz	Record Length	3124																																															
		Demod Bandwidth	100 kHz																																															
Bit 2 to Bit 3	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>192.45 Hz</td></tr> <tr><td>Deviation</td><td>+peak -80.32 kHz</td><td>Carrier Power</td><td>32.20 dBm</td></tr> <tr><td></td><td>-peak -80.42 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td></td><td>Span#1/2 80.37 kHz</td><td>Sampling Rate</td><td>220 kHz</td></tr> <tr><td>RMS</td><td>7.442 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Demod Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:49:54</p>	Coupling	DC	Carrier Offset	192.45 Hz	Deviation	+peak -80.32 kHz	Carrier Power	32.20 dBm		-peak -80.42 kHz	Modulation Frequency	---		Span#1/2 80.37 kHz	Sampling Rate	220 kHz	RMS	7.442 kHz	Record Length	3124			Demod Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>236.15 Hz</td></tr> <tr><td>Deviation</td><td>+peak 71.48 kHz</td><td>Carrier Power</td><td>32.148 dBm</td></tr> <tr><td></td><td>-peak -81.47 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td></td><td>Span#1/2 76.48 kHz</td><td>Sampling Rate</td><td>220 kHz</td></tr> <tr><td>RMS</td><td>7.118 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Demod Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 10:02:29</p>	Coupling	DC	Carrier Offset	236.15 Hz	Deviation	+peak 71.48 kHz	Carrier Power	32.148 dBm		-peak -81.47 kHz	Modulation Frequency	---		Span#1/2 76.48 kHz	Sampling Rate	220 kHz	RMS	7.118 kHz	Record Length	3124			Demod Bandwidth	100 kHz
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Coupling	DC	Carrier Offset	192.45 Hz																																															
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Measured period	162.025 MHz Signal 2 20 °C 12 V	162.025 MHz Signal 3 20 °C 12 V																																																
Bit 0 to bit 1	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>-3.9332 Hz</td></tr> <tr><td>Deviation</td><td>+peak 352.7 kHz</td><td>Carrier Power</td><td>30.37 dBm</td></tr> <tr><td></td><td>-peak -138.0 kHz</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td>SpkA/R/D</td><td>352.7 kHz</td><td>Sampling Rate</td><td>250 kHz</td></tr> <tr><td>SW</td><td>7.447 kHz</td><td>Record Length</td><td>6074</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>200 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:25:17</p>	Coupling	DC	Carrier Offset	-3.9332 Hz	Deviation	+peak 352.7 kHz	Carrier Power	30.37 dBm		-peak -138.0 kHz	Modulation Frequency	-- Hz	SpkA/R/D	352.7 kHz	Sampling Rate	250 kHz	SW	7.447 kHz	Record Length	6074			Record Bandwidth	200 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>40.743 Hz</td></tr> <tr><td>Deviation</td><td>+peak 85.24 kHz</td><td>Carrier Power</td><td>22.44 dBm</td></tr> <tr><td></td><td>-peak -86.45 kHz</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td>SpkA/R/D</td><td>85.24 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>SW</td><td>4.960 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:02:07</p>	Coupling	DC	Carrier Offset	40.743 Hz	Deviation	+peak 85.24 kHz	Carrier Power	22.44 dBm		-peak -86.45 kHz	Modulation Frequency	-- Hz	SpkA/R/D	85.24 kHz	Sampling Rate	125 kHz	SW	4.960 kHz	Record Length	3124			Record Bandwidth	100 kHz
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Bit 32 to bit 199	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>1.7059 Hz</td></tr> <tr><td>Deviation</td><td>+peak 63.48 kHz</td><td>Carrier Power</td><td>30.37 dBm</td></tr> <tr><td></td><td>-peak -87.04 kHz</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td>SpkA/R/D</td><td>63.48 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>SW</td><td>3.851 kHz</td><td>Record Length</td><td>2624</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:43:38</p>	Coupling	DC	Carrier Offset	1.7059 Hz	Deviation	+peak 63.48 kHz	Carrier Power	30.37 dBm		-peak -87.04 kHz	Modulation Frequency	-- Hz	SpkA/R/D	63.48 kHz	Sampling Rate	125 kHz	SW	3.851 kHz	Record Length	2624			Record Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>1.7059 Hz</td></tr> <tr><td>Deviation</td><td>+peak 63.48 kHz</td><td>Carrier Power</td><td>30.37 dBm</td></tr> <tr><td></td><td>-peak -87.04 kHz</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td>SpkA/R/D</td><td>63.48 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>SW</td><td>3.851 kHz</td><td>Record Length</td><td>2624</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 09:43:38</p>	Coupling	DC	Carrier Offset	1.7059 Hz	Deviation	+peak 63.48 kHz	Carrier Power	30.37 dBm		-peak -87.04 kHz	Modulation Frequency	-- Hz	SpkA/R/D	63.48 kHz	Sampling Rate	125 kHz	SW	3.851 kHz	Record Length	2624			Record Bandwidth	100 kHz
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Measured period	156.025 MHz Signal 2 -20 °C 9.6 V	156.025 MHz Signal 3 -20 °C 9.6 V																																																
Bit 0 to bit 1	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>3.7925 Hz</td></tr> <tr><td>Deviation</td><td>+peak</td><td>Carrier Power</td><td>30.45 dBm</td></tr> <tr><td></td><td>-peak</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td></td><td>SpkA/R/D</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td></td><td>RMS</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 11:44:47</p>	Coupling	DC	Carrier Offset	3.7925 Hz	Deviation	+peak	Carrier Power	30.45 dBm		-peak	Modulation Frequency	-- Hz		SpkA/R/D	Sampling Rate	125 kHz		RMS	Record Length	3124			Record Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>55.000 Hz</td></tr> <tr><td>Deviation</td><td>+peak</td><td>Carrier Power</td><td>32.67 dBm</td></tr> <tr><td></td><td>-peak</td><td>Modulation Frequency</td><td>-- Hz</td></tr> <tr><td></td><td>SpkA/R/D</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td></td><td>RMS</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 11:07:12</p>	Coupling	DC	Carrier Offset	55.000 Hz	Deviation	+peak	Carrier Power	32.67 dBm		-peak	Modulation Frequency	-- Hz		SpkA/R/D	Sampling Rate	125 kHz		RMS	Record Length	3124			Record Bandwidth	100 kHz
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Coupling	DC	Carrier Offset	3.4343 Hz																																															
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Measured period	162.025 MHz Signal 2 -20 °C 9.6 V	162.025 MHz Signal 3 -20 °C 9.6 V																																																
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Bit 32 to bit 199	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>10.038 Hz</td></tr> <tr><td>Deviation</td><td>+peak 312.4 kHz</td><td>Carrier Power</td><td>30.76 dBm</td></tr> <tr><td></td><td>-peak -87.06 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>SpkWR/D</td><td>80.00 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>SR</td><td>7.427 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 11:22:08</p>	Coupling	DC	Carrier Offset	10.038 Hz	Deviation	+peak 312.4 kHz	Carrier Power	30.76 dBm		-peak -87.06 kHz	Modulation Frequency	---	SpkWR/D	80.00 kHz	Sampling Rate	125 kHz	SR	7.427 kHz	Record Length	3124			Record Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>56.484 Hz</td></tr> <tr><td>Deviation</td><td>+peak 102.5 kHz</td><td>Carrier Power</td><td>32.74 dBm</td></tr> <tr><td></td><td>-peak -100.2 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>SpkWR/D</td><td>100.3 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>SR</td><td>7.592 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 11:04:54</p>	Coupling	DC	Carrier Offset	56.484 Hz	Deviation	+peak 102.5 kHz	Carrier Power	32.74 dBm		-peak -100.2 kHz	Modulation Frequency	---	SpkWR/D	100.3 kHz	Sampling Rate	125 kHz	SR	7.592 kHz	Record Length	3124			Record Bandwidth	100 kHz
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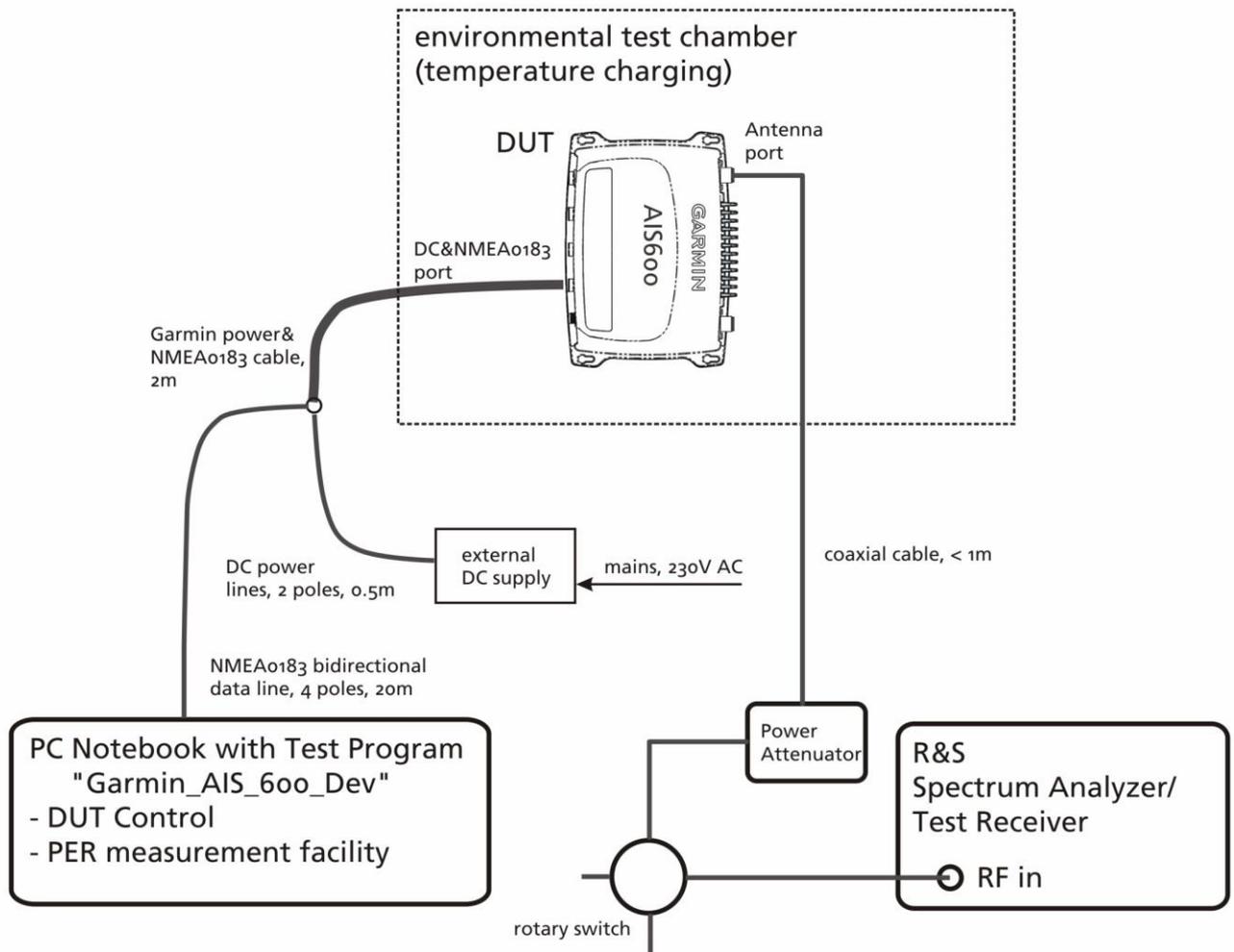
Measured period	156.025 MHz Signal 2 70 °C 31.2 V	156.025 MHz Signal 3 70 °C 31.2 V																																																
Bit 0 to bit 1	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>-64.788 Hz</td></tr> <tr><td>Deviation</td><td>+peak 89.12 kHz</td><td>Carrier Power</td><td>31.31 dBm</td></tr> <tr><td></td><td>-peak -70.42 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>Spkwr/2</td><td>80.27 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>RMS</td><td>7.140 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 13:18:32</p>	Coupling	DC	Carrier Offset	-64.788 Hz	Deviation	+peak 89.12 kHz	Carrier Power	31.31 dBm		-peak -70.42 kHz	Modulation Frequency	---	Spkwr/2	80.27 kHz	Sampling Rate	125 kHz	RMS	7.140 kHz	Record Length	3124			Record Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>-17.434 Hz</td></tr> <tr><td>Deviation</td><td>+peak 77.67 kHz</td><td>Carrier Power</td><td>31.14 dBm</td></tr> <tr><td></td><td>-peak -79.02 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>Spkwr/2</td><td>78.44 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>RMS</td><td>7.181 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 13:17:30</p>	Coupling	DC	Carrier Offset	-17.434 Hz	Deviation	+peak 77.67 kHz	Carrier Power	31.14 dBm		-peak -79.02 kHz	Modulation Frequency	---	Spkwr/2	78.44 kHz	Sampling Rate	125 kHz	RMS	7.181 kHz	Record Length	3124			Record Bandwidth	100 kHz
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Bit 2 to Bit 3	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>-64.788 Hz</td></tr> <tr><td>Deviation</td><td>+peak 89.12 kHz</td><td>Carrier Power</td><td>31.31 dBm</td></tr> <tr><td></td><td>-peak -70.42 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>Spkwr/2</td><td>80.27 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>RMS</td><td>7.140 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 13:20:39</p>	Coupling	DC	Carrier Offset	-64.788 Hz	Deviation	+peak 89.12 kHz	Carrier Power	31.31 dBm		-peak -70.42 kHz	Modulation Frequency	---	Spkwr/2	80.27 kHz	Sampling Rate	125 kHz	RMS	7.140 kHz	Record Length	3124			Record Bandwidth	100 kHz	 <p>Frequency Modulation Summary</p> <table border="1"> <tr><td>Coupling</td><td>DC</td><td>Carrier Offset</td><td>-17.434 Hz</td></tr> <tr><td>Deviation</td><td>+peak 77.67 kHz</td><td>Carrier Power</td><td>31.14 dBm</td></tr> <tr><td></td><td>-peak -79.02 kHz</td><td>Modulation Frequency</td><td>---</td></tr> <tr><td>Spkwr/2</td><td>78.44 kHz</td><td>Sampling Rate</td><td>125 kHz</td></tr> <tr><td>RMS</td><td>7.181 kHz</td><td>Record Length</td><td>3124</td></tr> <tr><td></td><td></td><td>Record Bandwidth</td><td>100 kHz</td></tr> </table> <p>Date: 24.SEP.2009 13:16:27</p>	Coupling	DC	Carrier Offset	-17.434 Hz	Deviation	+peak 77.67 kHz	Carrier Power	31.14 dBm		-peak -79.02 kHz	Modulation Frequency	---	Spkwr/2	78.44 kHz	Sampling Rate	125 kHz	RMS	7.181 kHz	Record Length	3124			Record Bandwidth	100 kHz
Coupling	DC	Carrier Offset	-64.788 Hz																																															
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Measured period	162.025 MHz Signal 2 70 °C 31.2 V	162.025 MHz Signal 3 70 °C 31.2 V																																																
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9.5 Transmitter Output Power Versus Time Function

9.5.1 Test Setup





Transmitter output power versus time measurement:

- normal conditions

Operating mode of the DUT:

- forced transmission with test signal 2
- transmit frequency set to AIS2 (162.025MHz) and 156.025MHz (channel 1060)



9.5.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.5.3 Test Results

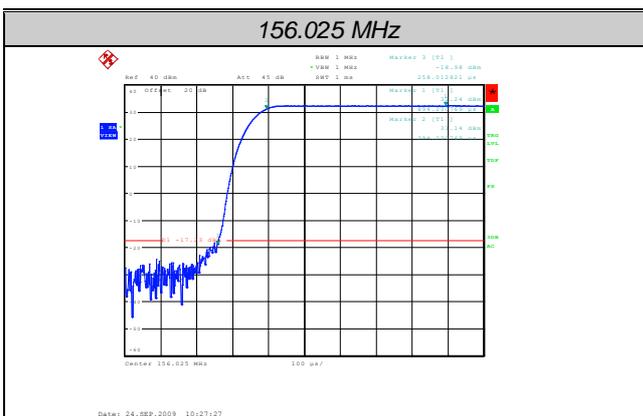
Results for transmitter output power versus time function are documented as listed below.

Transmitter Output Power Versus Time Function

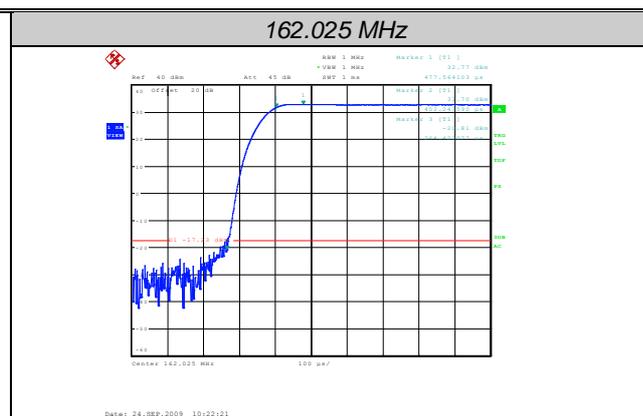
Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

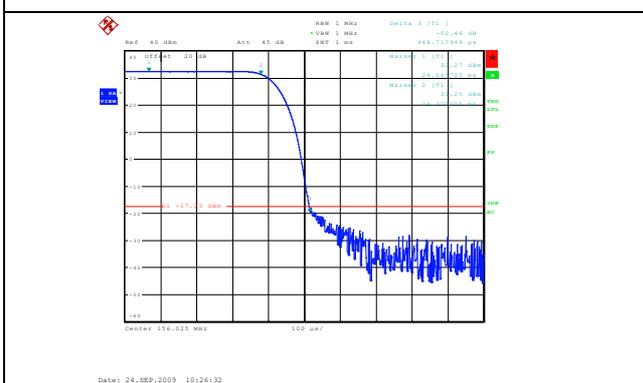
Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Transmitting continuously with signal number 2
Anforderung / <i>Requirement:</i>	According to figure 3 and table 6 of EN 62297-1
Kommentar / <i>Comment:</i>	



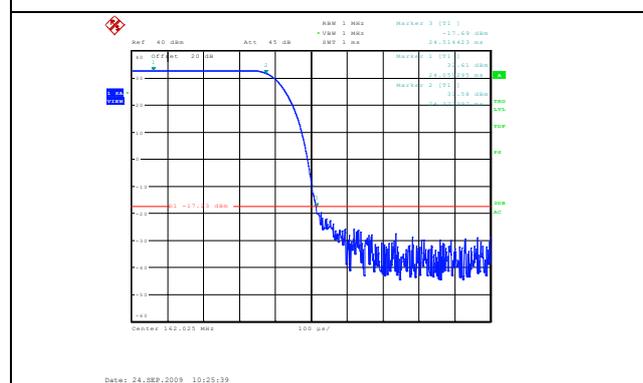
<i>Transmitter delay</i>	<i>Transmitter attack time</i>
258.012 µs	136.218 µs



<i>Transmitter delay</i>	<i>Transmitter attack time</i>
265.423 µs	137.821 µs



<i>Transmitter release time</i>	<i>Transmission duration</i>
136.218 µs	24.25641 ms



<i>Transmitter release time</i>	<i>Transmission duration</i>
141.116 µs	24.25000 ms

Passed

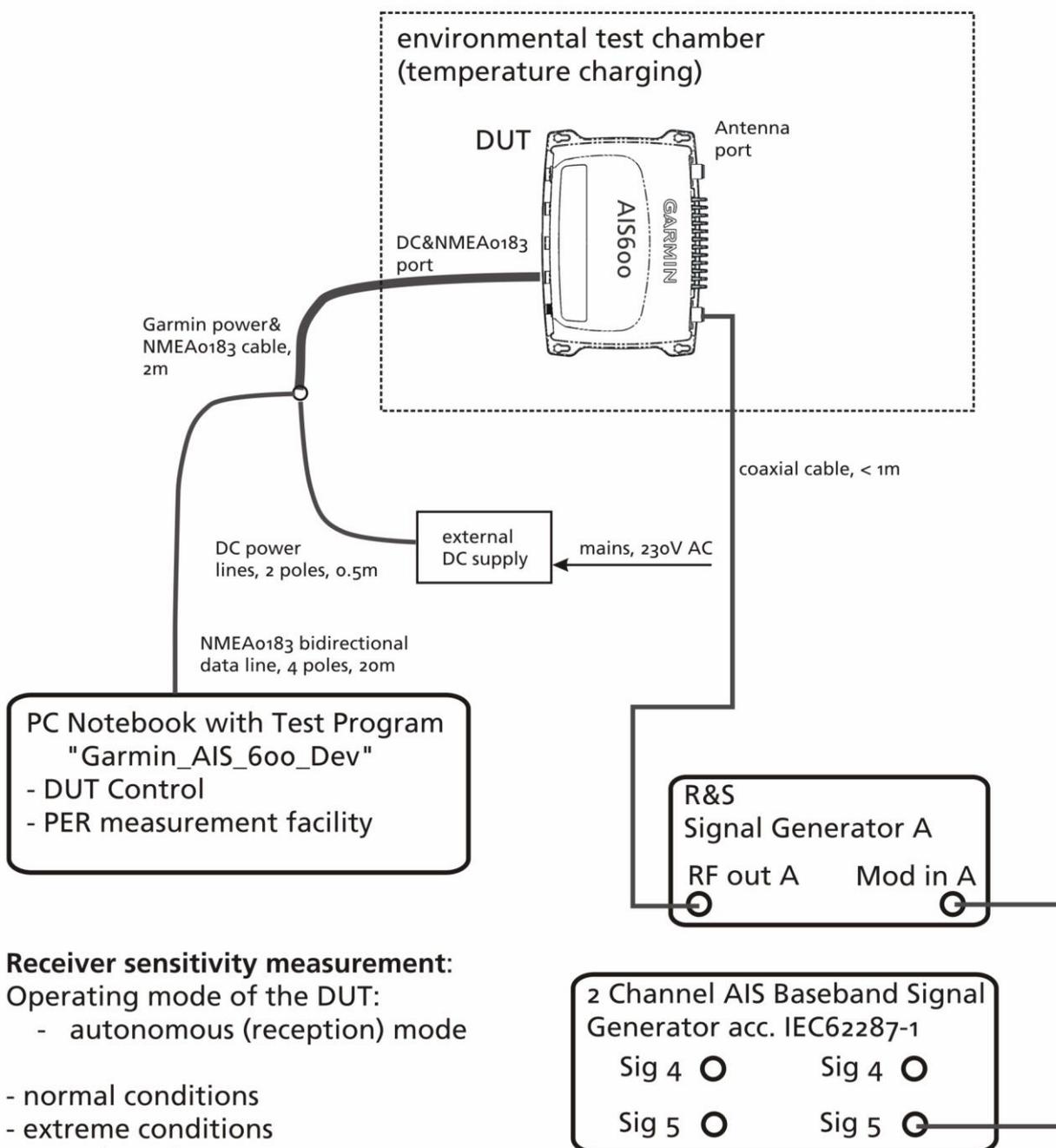
Note:

Final evaluation by the German "Bundesamt für Seeschifffahrt und Hydrographie", Hamburg, Germany

9.6 Sensitivity

9.6.1 Test Setup





Receiver sensitivity measurement:

Operating mode of the DUT:

- autonomous (reception) mode

- normal conditions
- extreme conditions
- test of receiver A

- f_{RXA} set to AIS2 (162.025MHz) and 156.025MHz (channel 1060)

Generator A set to

- $f = f_{RXA}$ and $f = f_{RXA} \pm 500\text{Hz}$
- $P = -107\text{ dBm}$ @ DUT_input for $f = f_{RXA}$
- $P = -104\text{ dBm}$ @ DUT_input for $f = f_{RXA} \pm 500\text{Hz}$
- $P = -101\text{ dBm}$ @ DUT_input for $f = f_{RXA}$ and extreme conditions
- Generator A modulated with test signal 5



9.6.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input checked="" type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.6.3 Test Results

Results for sensitivity are documented as listed below.



Sensitivity

Prüfdatum / <i>Date of test:</i>	2009-09-17
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

<i>Test conditions</i>	<i>Input power level</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	-107 dBm	0.0 %	< 20 %	Passed	1
+20 °C, 12.0 V	-104 dBm	0.0 %	< 20 %	Passed	2
+20 °C, 12.0 V	-104 dBm	0.0 %	< 20 %	Passed	3
-20 °C, 9.6 V	-101 dBm	0.9 %	< 20 %	Passed	1
+70 °C, 31.2 V	-101 dBm	0.4 %	< 20 %	Passed	1
+20 °C, 12.0 V	-107 dBm	0.0 %	< 20 %	Passed	4
+20 °C, 12.0 V	-104 dBm	0.4 %	< 20 %	Passed	5
+20 °C, 12.0 V	-104 dBm	0.4 %	< 20 %	Passed	6
-20 °C, 9.6 V	-101 dBm	0.0 %	< 20 %	Passed	4
+70 °C, 31.2 V	-101 dBm	0.0 %	< 20 %	Passed	4

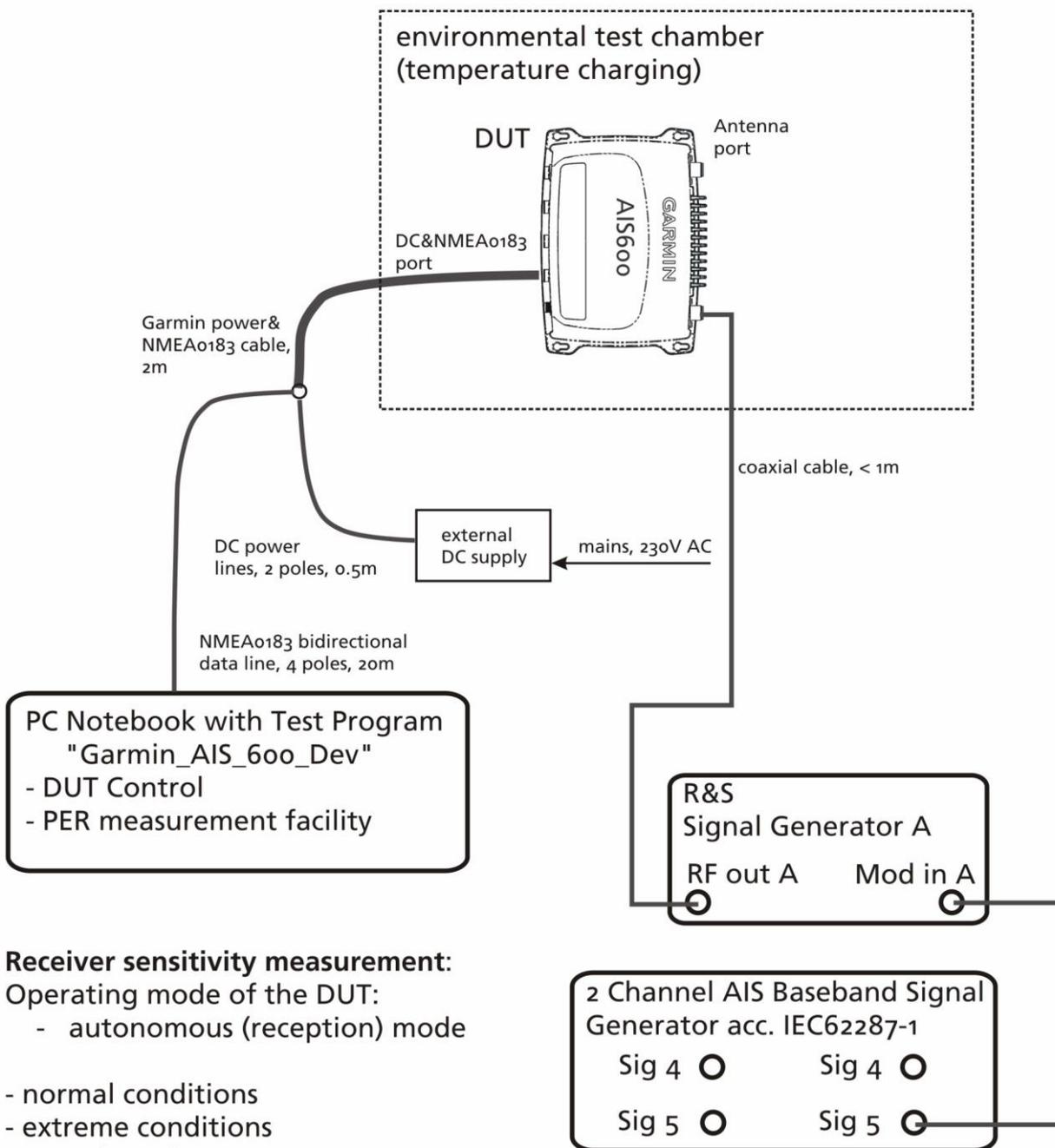
Note(s):

- 1 Test frequency 156.025 MHz
- 2 Test frequency 156.0245 MHz
- 3 Test frequency 156.0255 MHz
- 4 Test frequency 162.025 MHz
- 5 Test frequency 162.0245 MHz
- 6 Test frequency 162.0255 MHz

9.7 Error Behaviour At High Input Levels

9.7.1 Test Setup





Receiver sensitivity measurement:

Operating mode of the DUT:

- autonomous (reception) mode

- normal conditions
- extreme conditions
- test of receiver A

- f_{RXA} set to AIS2 (162.025MHz) and 156.025MHz (channel 1060)

Generator A set to

- $f = f_{RXA}$ and $f = f_{RXA} \pm 500\text{Hz}$
- $P = -107\text{ dBm}$ @ DUT_input for $f = f_{RXA}$
- $P = -104\text{ dBm}$ @ DUT_input for $f = f_{RXA} \pm 500\text{Hz}$
- $P = -101\text{ dBm}$ @ DUT_input for $f = f_{RXA}$ and extreme conditions
- Generator A modulated with test signal 5

Note: Test was performed with input levels of -77 dBm and -7 dBm for $f = f_{RXA}$



9.7.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.7.3 Test Results

Results for error behaviour at high input levles are documented as listed below.



Error Behaviour At High Input Levels

Prüfdatum / <i>Date of test:</i>	2009-09-17
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

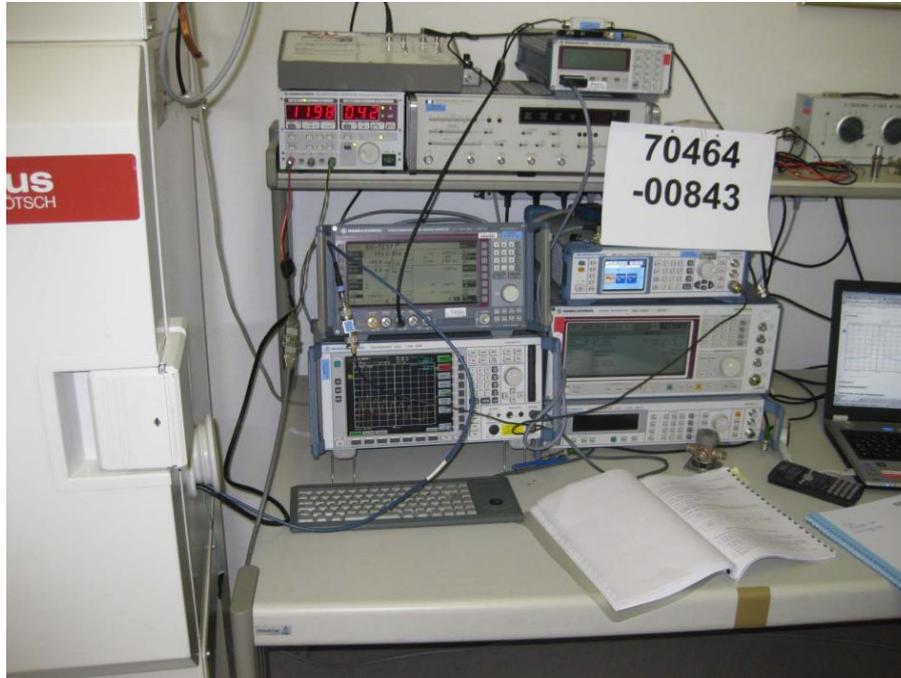
Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

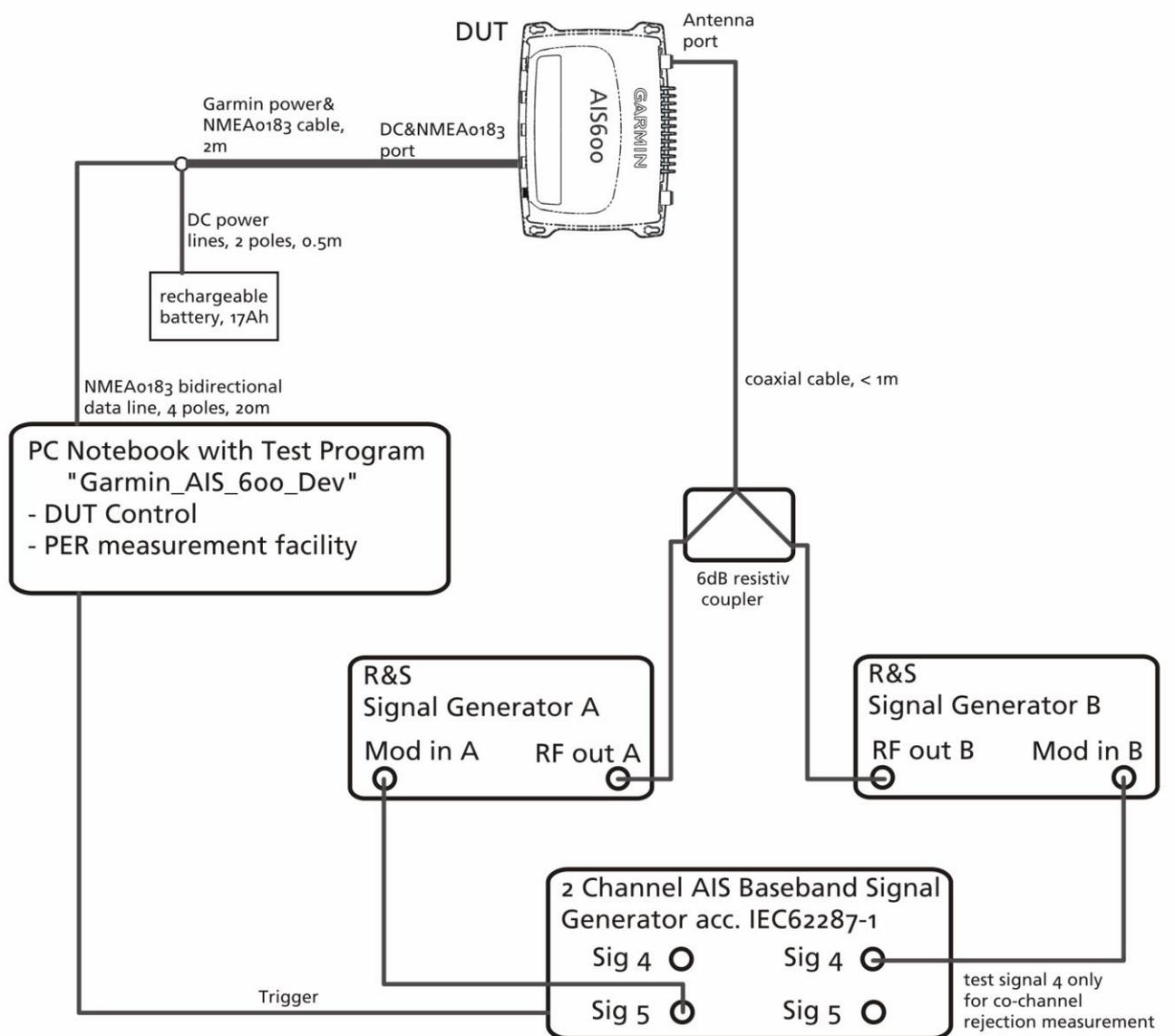
<i>Test conditions</i>	<i>Input power level</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	-77 dBm	0.0 %	< 2 %	Passed	1
+20 °C, 12.0 V	-7 dBm	0.0 %	< 10 %	Passed	1
+20 °C, 12.0 V	-77 dBm	0.0 %	< 2 %	Passed	2
+20 °C, 12.0 V	-7 dBm	0.0 %	< 10 %	Passed	2

<i>Note(s):</i>					
1	Test frequency 156.025 MHz				
2	Test frequency 162.025 MHz				

9.8 Co-Channel Rejection

9.8.1 Test Setup





Test with Receiver A of DUT:

- normal conditions

Operating mode of the DUT:

Co-Channel rejection

- autonomous (reception) mode
- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = f_{RXA} \pm 1\text{kHz}$, $P = -111\text{dBm}$ @ DUT_input, test signal 4
- $f_{RXA} = 156.025\text{ MHz}$ & AIS2 (162.025 MHz)

Adjacent Channel rejection:

- autonomous (reception) mode
- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = f_{RXA} \pm 25\text{kHz}$, $P = -31\text{dBm}$ @ DUT_input
- Generator B modulated with 400Hz sine wave, deviation $\pm 3\text{kHz}$
- $f_{RXA} = 156.025\text{ MHz}$ & AIS2 (162.025 MHz)

for adjacent channel rejection measurement generator B is modulated internally



9.8.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.8.3 Test Results

Results for co-channel rejection are documented as listed below.



Co-Channel Rejection

Prüfdatum / <i>Date of test:</i>	2009-09-17, 2009-12-14
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

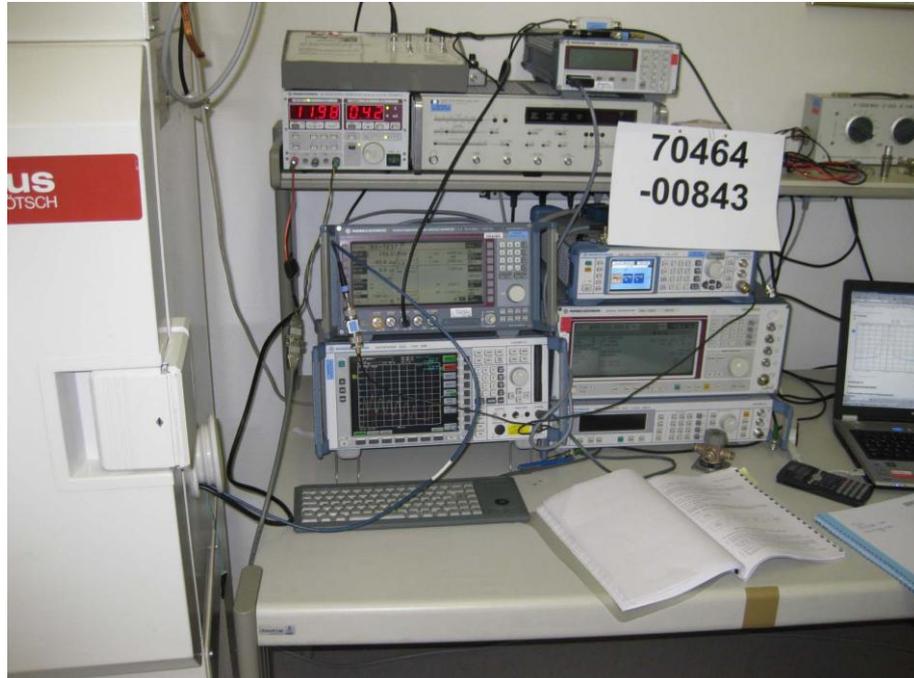
<i>Test conditions</i>	<i>Input power level</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note(s)</i>
+20 °C, 12.0 V	-111 dBm	1.8 %	< 20 %	Passed	1, 5
+20 °C, 12.0 V	-111 dBm	0.0 %	< 20 %	Passed	1, 3, 6
+20 °C, 12.0 V	-111 dBm	0.0 %	< 20 %	Passed	1, 4, 6
+20 °C, 12.0 V	-111 dBm	0.4 %	< 20 %	Passed	2, 5
+20 °C, 12.0 V	-111 dBm	0.0 %	< 20 %	Passed	2, 3, 6
+20 °C, 12.0 V	-111 dBm	0.0 %	< 20 %	Passed	2, 4, 6

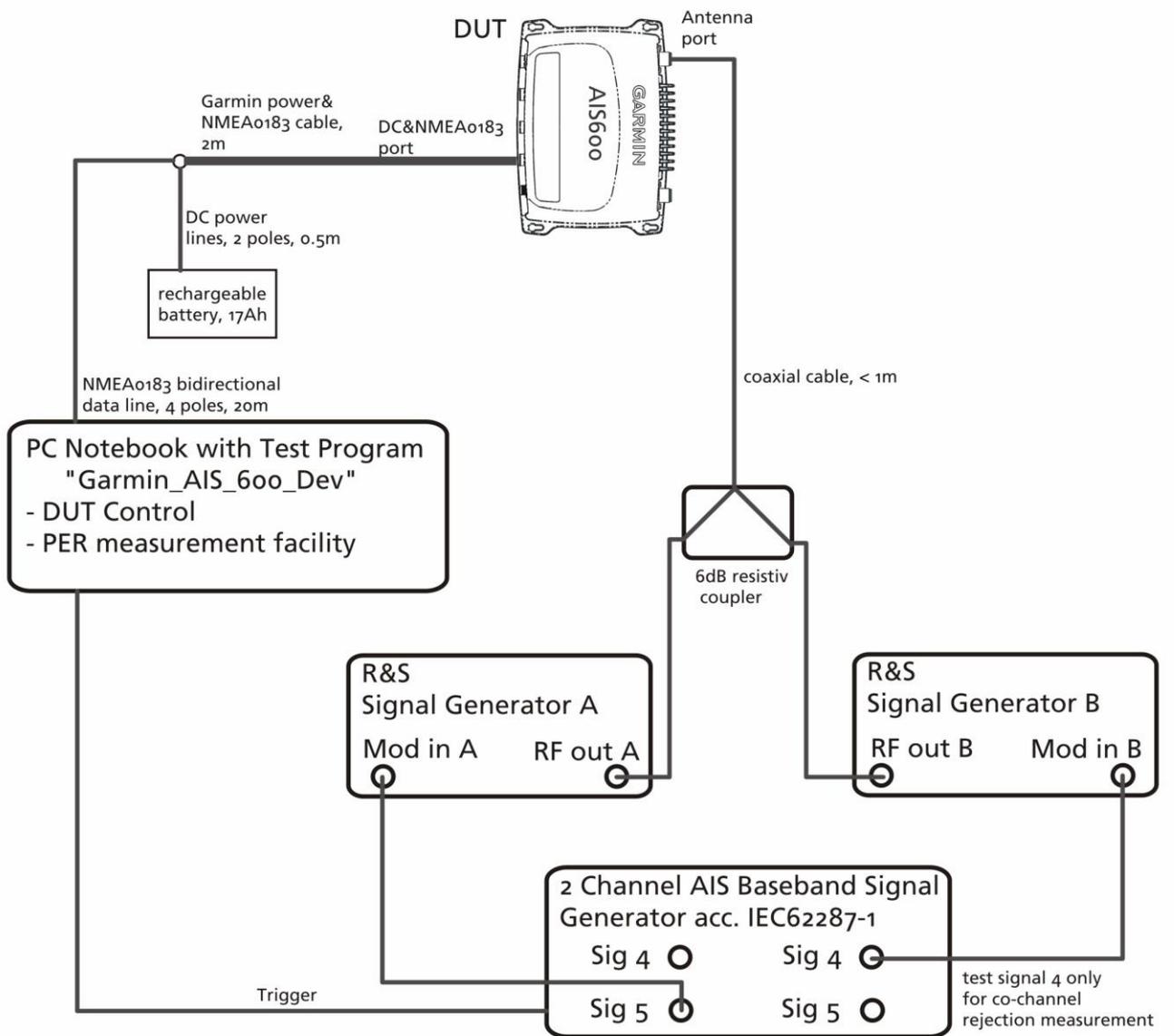
Note(s):

- 1 Test frequency 156.025 MHz (wanted signal)
- 2 Test frequency 162.025 MHz (wanted signal)
- 3 Frequency offset of unwanted signal: +1 kHz
- 4 Frequency offset of unwanted signal: -1 kHz
- 5 Tested on 2009-09-17
- 6 Tested on 2009-12-14

9.9 Adjacent Channel Selectivity

9.9.1 Test Setup





Test with Receiver A of DUT:

- normal conditions

Operating mode of the DUT:

Co-Channel rejection

- autonomous (reception) mode
- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = f_{RXA} \pm 1\text{kHz}$, $P = -111\text{dBm}$ @ DUT_input, test signal 4
- $f_{RXA} = 156.025\text{ MHz}$ & AIS2 (162.025 MHz)

Adjacent Channel rejection:

- autonomous (reception) mode
- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = f_{RXA} \pm 25\text{kHz}$, $P = -31\text{dBm}$ @ DUT_input
- Generator B modulated with 400Hz sine wave, deviation $\pm 3\text{kHz}$
- $f_{RXA} = 156.025\text{ MHz}$ & AIS2 (162.025 MHz)

for adjacent channel rejection measurement generator B is modulated internally



9.9.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.9.3 Test Results

Results for Adjacent channel selectivity are documented as listed below.



Adjacent Channel Selectivity

Prüfdatum / <i>Date of test:</i>	2009-09-17
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

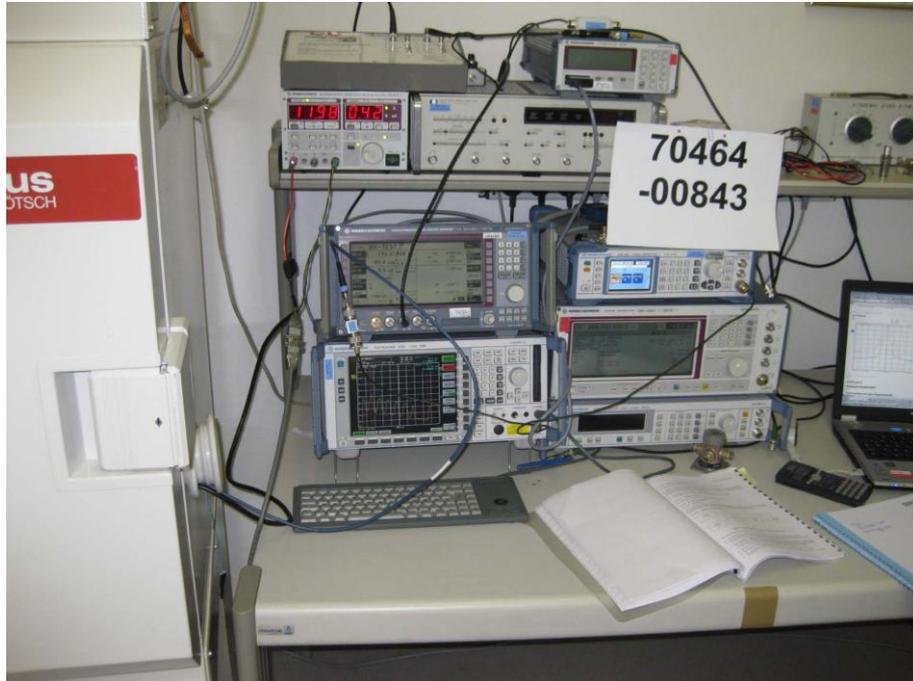
<i>Test conditions</i>	<i>Adjacent Channel</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	156.000 MHz	0.0 %	< 20 %	Passed	1
+20 °C, 12.0 V	156.050 MHz	0.4 %	< 20 %	Passed	1
+20 °C, 12.0 V	162.000 MHz	0.0 %	< 20 %	Passed	2
+20 °C, 12.0 V	162.050 MHz	0.0 %	< 20 %	Passed	2

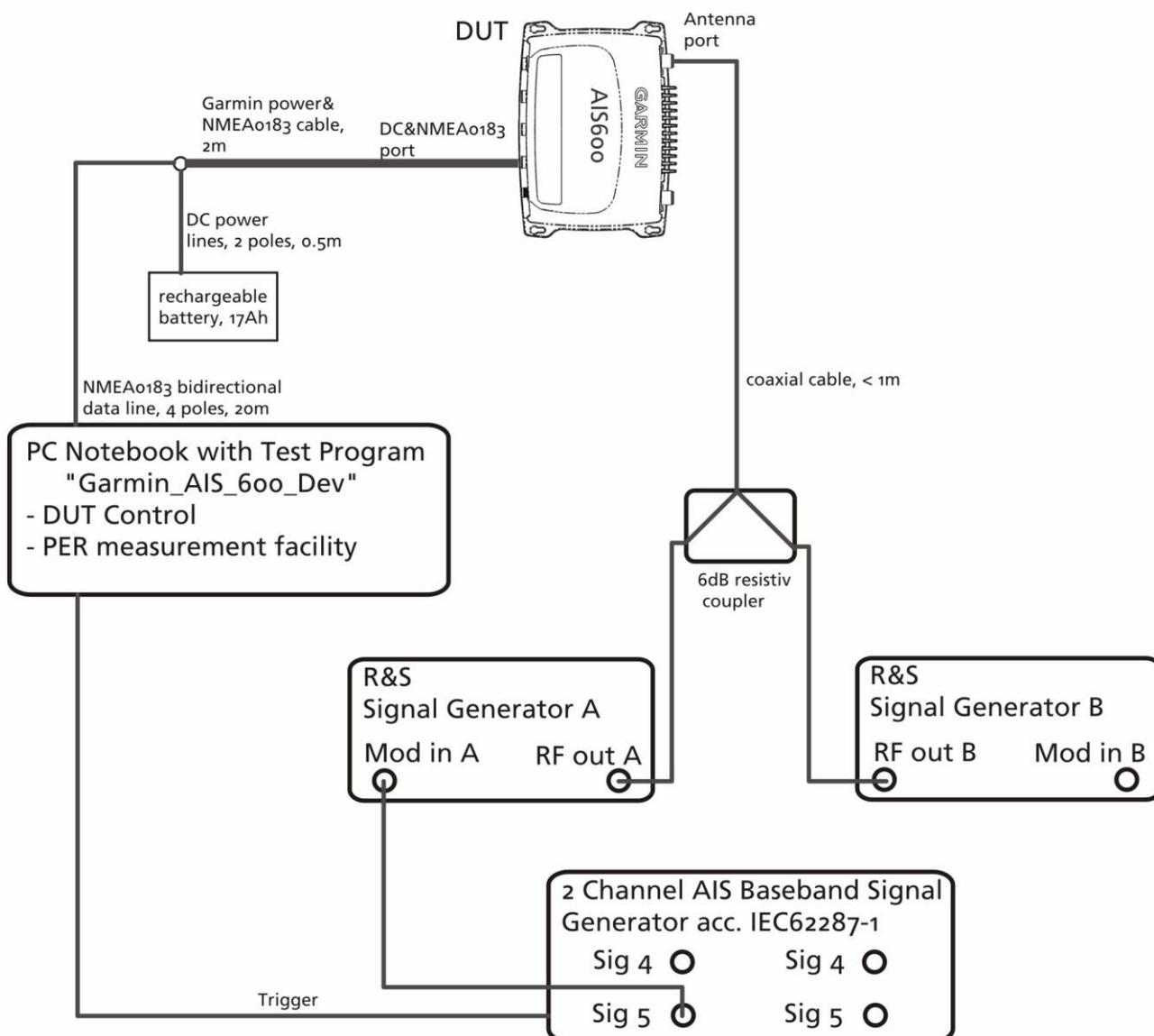
Note(s):

- 1 Test frequency 156.025 MHz
- 2 Test frequency 162.025 MHz

9.10 Spurious Response Rejection

9.10.1 Test Setup





Operating mode of the DUT:

- autonomous (reception) mode
- normal conditions

Spurious response rejection:

- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = \text{LFR}_{\text{low}}$ to LFR_{high} in 5kHz steps, $P = -27\text{dBm}$ @ DUT_input
- Generator B modulated with 400Hz sine wave, deviation +/- 3kHz



9.10.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.10.3 Test Results

Results for spurious response rejection are documented as listed below.



Spurious Response Rejection

Prüfdatum / <i>Date of test:</i>	2009-12-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft		
Betriebsart / <i>Operation mode:</i>	Receiving mode		
Kommentar / <i>Comment:</i>	Frequency sweep was performed for 156.025 MHz only		
Zwischenfrequenzen / <i>Intermediate frequencies:</i>	38.855 MHz, 455 kHz		
Erfassungsbereich des Empfängers / <i>Switching range of the receiver:</i>	6 MHz (156.025 MHz - 162.025 MHz)		
Frequenz des lokalen Oszillators / <i>Local Oscillator frequency:</i>	<i>for lowest frequency</i>	117.17 MHz	
	<i>for highest frequency</i>	123.17 MHz	
Frequenzen von besonderem Interesse / <i>Specific Frequencies of Interest:</i>	<i>for lowest frequency</i>	195.485 MHz, 312.655 MHz, 429.825 MHz	
	<i>for highest frequency</i>	285.195 MHz, 408.365 MHz, 531.535 MHz	
Frequenzdurchlauf im eingeschränkten Frequenzbereich / <i>Frequency sweep in the Limited Frequency Band:</i>	Eingeschränkter Frequenzbereich / <i>Limited Frequency Range:</i>	74.86 MHz - 165.48 MHz	
	Ausnahmeband / <i>ExclusionBand:</i>	155.9625 MHz - 156.0875 MHz	
	Ergebnis des Frequenzdurchlaufs / <i>Conclusion of frequency sweep:</i>	Testing at other frequencies than Specific Frequencies of Interest not necessary.	

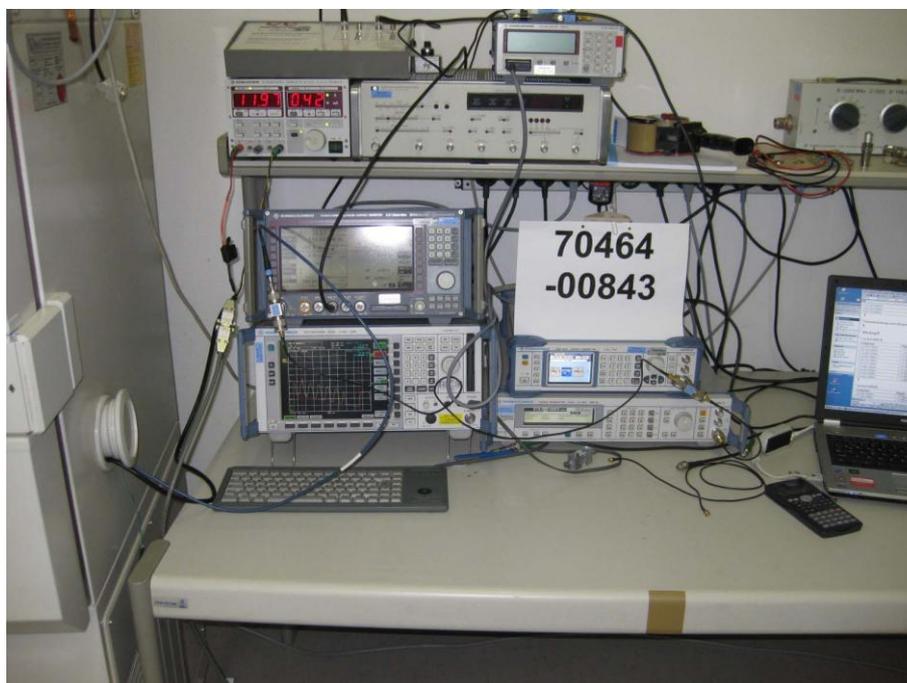
Test conditions	Tested frequency	PER rate	Limit PER	Result	Note
+20 °C, 12.0 V	195.485 MHz	0.0 %	< 20 %	Passed	1
+20 °C, 12.0 V	285.195 MHz	0.0 %	< 20 %	Passed	2
+20 °C, 12.0 V	312.655 MHz	0.0 %	< 20 %	Passed	1
+20 °C, 12.0 V	408.365 MHz	0.0 %	< 20 %	Passed	2
+20 °C, 12.0 V	429.825 MHz	0.0 %	< 20 %	Passed	1
+20 °C, 12.0 V	531.535 MHz	0.4 %	< 20 %	Passed	2

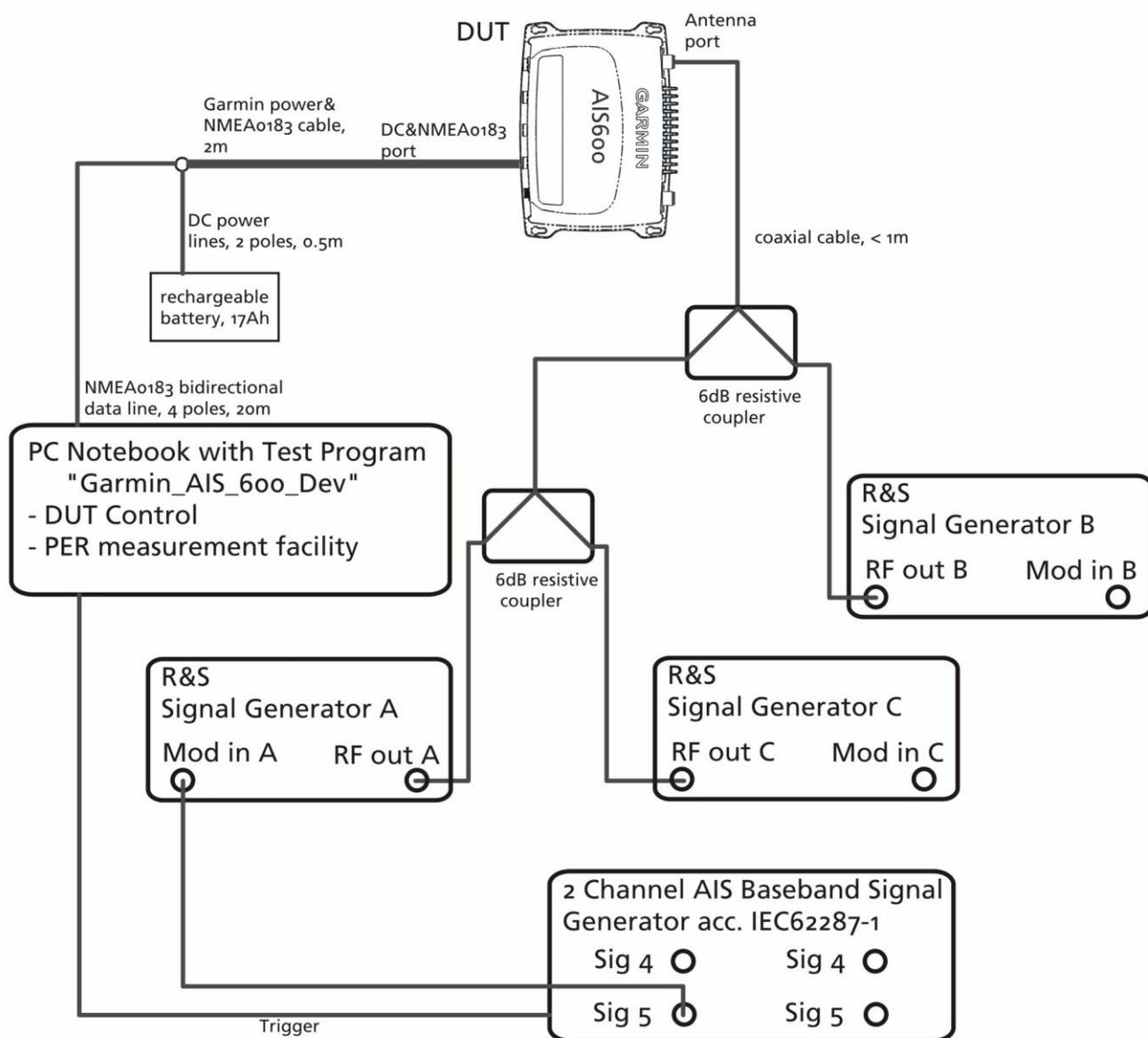
Note(s):

- 1 Wanted signal: 156.025 MHz
- 2 Wanted signal: 162.025 MHz

9.11 Intermodulation Response Rejection

9.11.1 Test Setup





Operating mode of the DUT:

- autonomous (reception) mode
- normal conditions

Intermodulation response rejection:

- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $f = f_{RXA} \pm 50\text{kHz}$, $P = -36\text{dBm}$ @ DUT_input, unmodulated
- Generator C: $f = f_{RXA} \pm 100\text{kHz}$, $P = -36\text{dBm}$ @ DUT_input
- Generator C modulated internally with 400Hz sine wave, deviation $\pm 3\text{kHz}$
- f_{RXA} set to AIS2 (162.025 MHz) and 156.025 MHz (channel 1060)



9.11.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.11.3 Test Results

Results for intermodulation response rejection are documented as listed below.



Intermodulation Response Rejection

Prüfdatum / <i>Date of test:</i>	2009-09-17
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

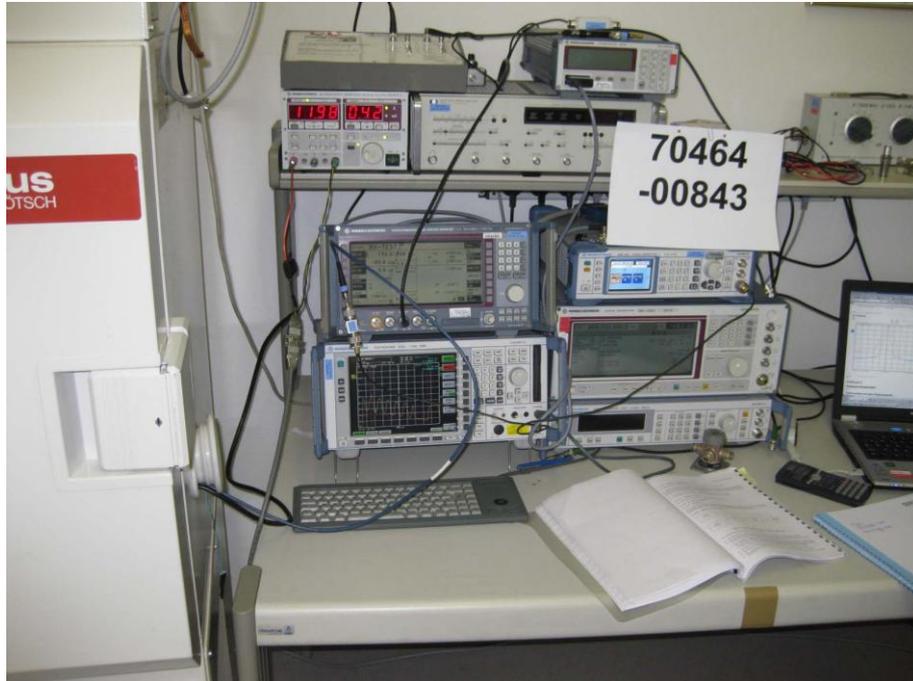
<i>Test conditions</i>	<i>Test No.</i>	<i>Frequency B</i>	<i>Frequency C</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	1	162.075 MHz	162.125 MHz	0.4 %	< 20 %	Passed	2
+20 °C, 12.0 V	2	161.075 MHz	161.925 MHz	0.9 %	< 20 %	Passed	2
+20 °C, 12.0 V	3	156.075 MHz	156.125 MHz	0.4 %	< 20 %	Passed	1
+20 °C, 12.0 V	4	155.975 MHz	161.925 MHz	0.4 %	< 20 %	Passed	1

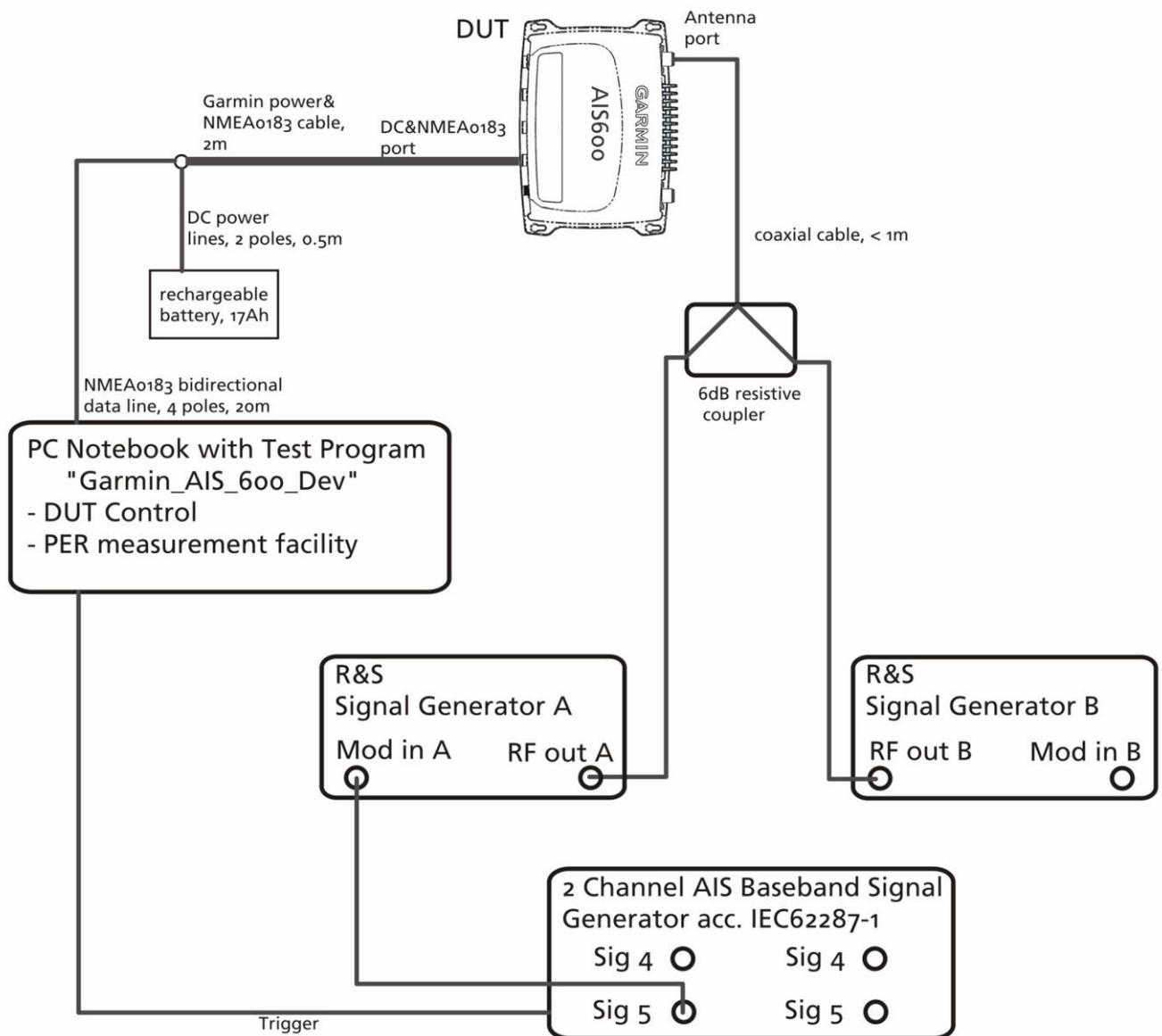
Note(s):

- 1 Test frequency 156.025 MHz
- 2 Test frequency 162.025 MHz

9.12 Blocking Or Desensitisation

9.12.1 Test Setup





Operating mode of the DUT:

- autonomous (reception) mode
- normal conditions
- test with receiver A

Blocking/Desensitisation rejection:

- Generator A: $f = f_{RXA}$, $P = -101\text{dBm}$ @ DUT_input, test signal 5
- Generator B: $P = -23\text{dBm}$ @ DUT_input for $|f_{RXA} - f_{GenB}| < 5\text{MHz}$, unmodulated
- Generator B: $P = -15\text{dBm}$ @ DUT_input for $|f_{RXA} - f_{GenB}| \geq 5\text{MHz}$, unmodulated
- Generator B: $f = f_{RXA} \pm 500\text{kHz}$, $\pm 1\text{MHz}$, $\pm 2\text{MHz}$, $\pm 5\text{MHz}$, $\pm 10\text{MHz}$
- f_{RXA} set to AIS2 (162.025 MHz) and 156.025 MHz (channel 1060)

9.12.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input checked="" type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Temperature test chamber	HT 4010	1271	07065550	Heraeus
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.12.3 Test Results

Results for blocking or desensitisation are documented as listed below.



Blocking Or Desensitisation

Prüfdatum / <i>Date of test:</i>	2009-09-17
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft
Betriebsart / <i>Operation mode:</i>	Receiving mode
Kommentar / <i>Comment:</i>	

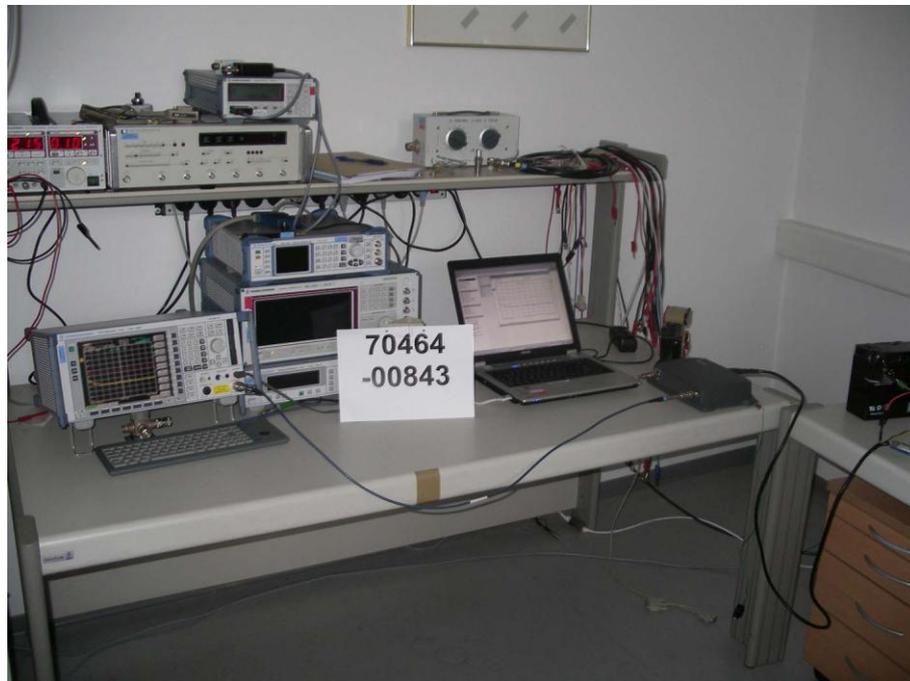
<i>Test conditions</i>	<i>Frequency of unwanted signal</i>	<i>Level of unwanted signal</i>	<i>PER rate</i>	<i>Limit PER</i>	<i>Result</i>	<i>Note</i>
+20 °C, 12.0 V	146.025 MHz	-15 dBm	0.4 %	< 20 %	Passed	1
+20 °C, 12.0 V	151.025 MHz	-15 dBm	0.9 %	< 20 %	Passed	1
+20 °C, 12.0 V	154.025 MHz	-23 dBm	0.9 %	< 20 %	Passed	1
+20 °C, 12.0 V	155,025 MHz	-23 dBm	0,9 %	< 20 %	Passed	1
+20 °C, 12.0 V	155,525 MHz	-23 dBm	0,4 %	< 20 %	Passed	1
+20 °C, 12.0 V	156,525 MHz	-23 dBm	0,4 %	< 20 %	Passed	1
+20 °C, 12.0 V	157,025 MHz	-23 dBm	0,9 %	< 20 %	Passed	1
+20 °C, 12.0 V	158,025 MHz	-23 dBm	0,9 %	< 20 %	Passed	1
+20 °C, 12.0 V	161,025 MHz	-15 dBm	0,4 %	< 20 %	Passed	1
+20 °C, 12.0 V	166,025 MHz	-15 dBm	0,4 %	< 20 %	Passed	1
+20 °C, 12.0 V	152,025 MHz	-15 dBm	0,4 %	< 20 %	Passed	2
+20 °C, 12.0 V	157,025 MHz	-15 dBm	0,4 %	< 20 %	Passed	2
+20 °C, 12.0 V	160,025 MHz	-23 dBm	0,0 %	< 20 %	Passed	2
+20 °C, 12.0 V	161,025 MHz	-23 dBm	0,9 %	< 20 %	Passed	2
+20 °C, 12.0 V	161,525 MHz	-23 dBm	0,9 %	< 20 %	Passed	2
+20 °C, 12.0 V	162,525 MHz	-23 dBm	0,9 %	< 20 %	Passed	2
+20 °C, 12.0 V	163,025 MHz	-23 dBm	0,9 %	< 20 %	Passed	2
+20 °C, 12.0 V	164,025 MHz	-23 dBm	0,4 %	< 20 %	Passed	2
+20 °C, 12.0 V	167,025 MHz	-15 dBm	0,0 %	< 20 %	Passed	2
+20 °C, 12.0 V	172,025 MHz	-15 dBm	0,4 %	< 20 %	Passed	2

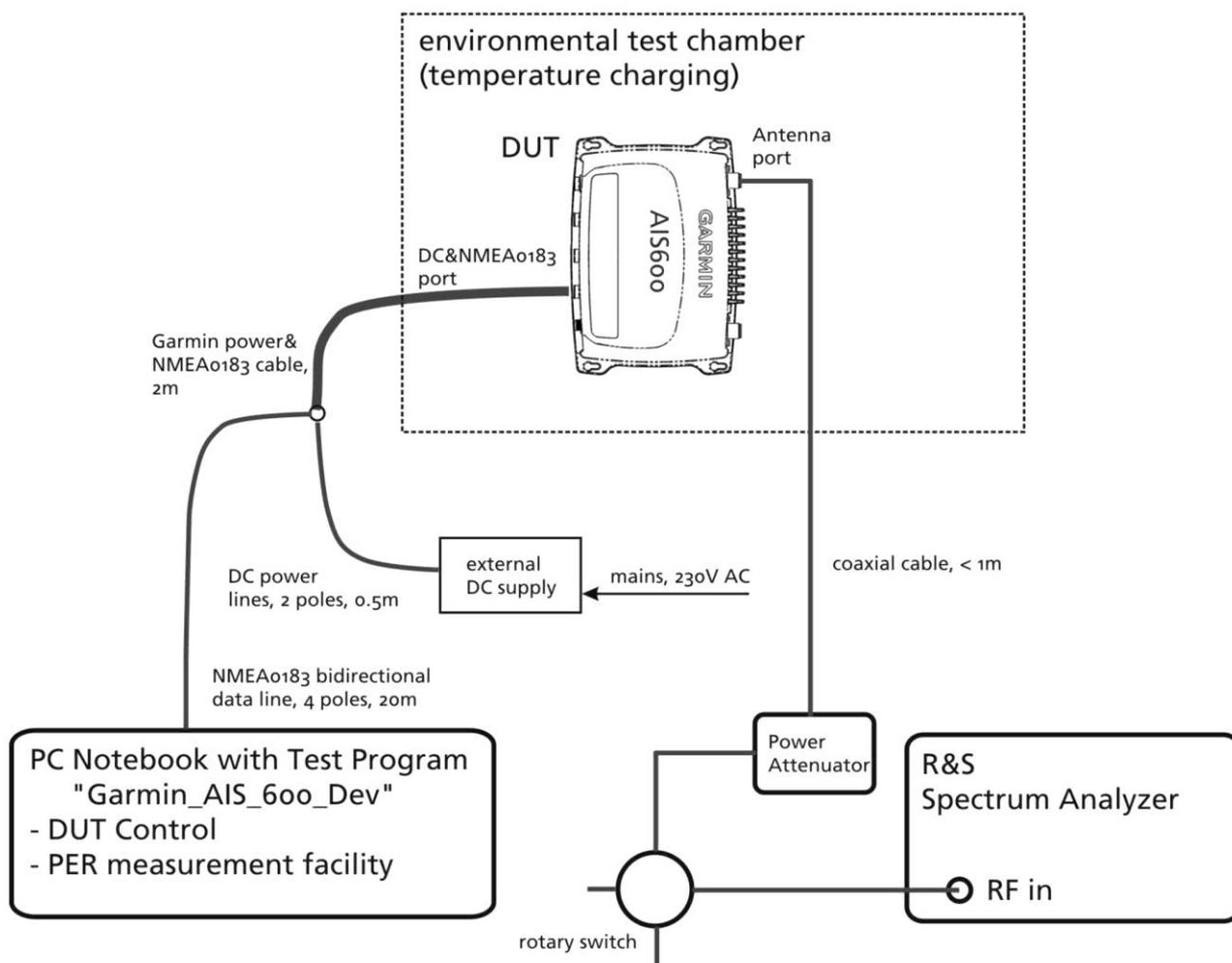
Note(s):

- 1 Test frequency 156.025 MHz
- 2 Test frequency 162.025 MHz

9.13 Spurious Emissions For Receiver

9.13.1 Test Setup





Transmitter/Receiver spurious measurement:

- normal conditions

Operating mode of the DUT:

- forced transmission with test signal 5
- reception mode

9.13.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.13.3 Test Results

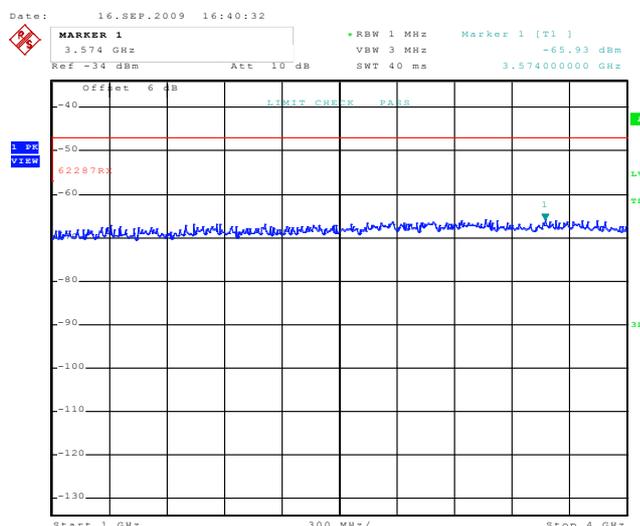
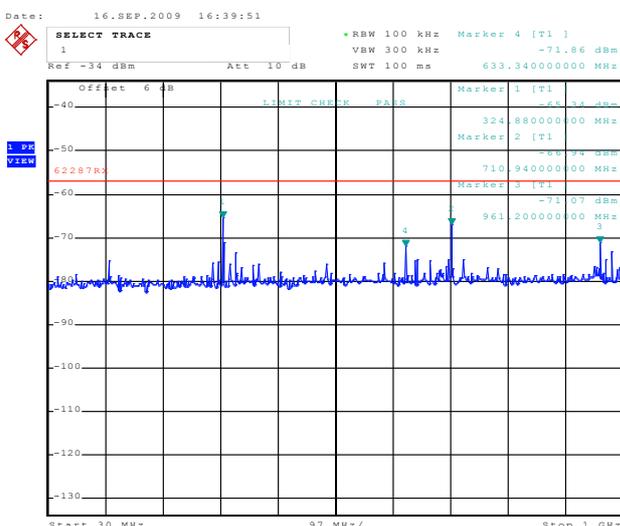
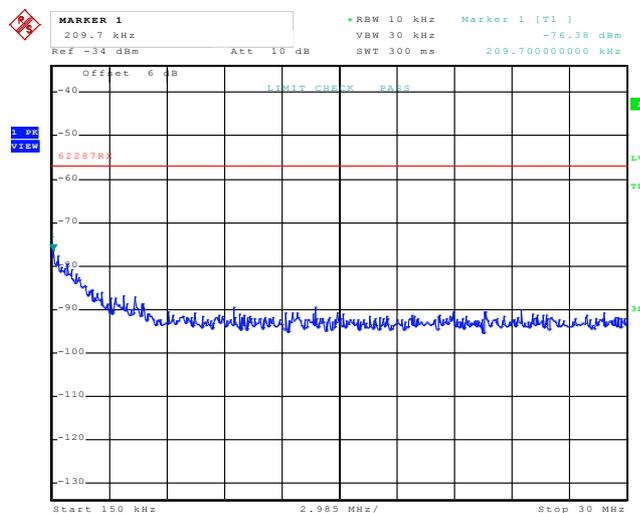
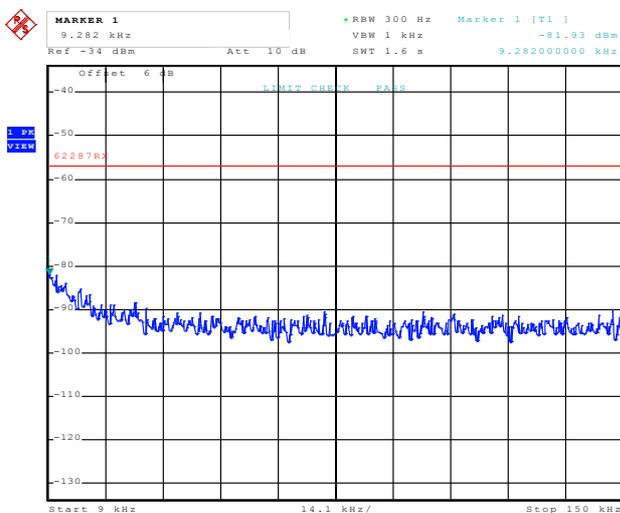
Results for spurious emissions for receiver are documented as listed below.

Spurious Emissions for Receiver

Prüfdatum / Date of test:	2009-09-16
Prüfer / Operator:	Martin Steindl
Messplatz / Test site:	Non shielded room

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Prüfgrundlage / Specifications:	IEC 62287-1 Edition1 Final Draft RSS-182 Issue 4 Section 6.7(b)	
Betriebsart / Operation mode:	Receiving mode	
Grenzwert / Limit:	Frequency range	Limit
	9 kHz - 1 GHz	-57 dBm
	1 GHz - 4 GHz	-47 dBm
Kommentar / Comment:		



Date: 16.SEP.2009 16:35:58

Date: 16.SEP.2009 16:38:59



<i>Peak</i>					
<i>Frequency (MHz)</i>	<i>Reading (dBm)</i>	<i>Correction (dB)</i>	<i>Level (dBm)</i>	<i>Limit (dBm)</i>	<i>Margin (dB)</i>
324.88	-65.34	0.00	-65.34	-57.00	8.34
633.34	-71.86	0.00	-71.86	-57.00	14.86
710.94	-66.94	0.00	-66.94	-57.00	9.94
961.20	-71.07	0.00	-71.07	-57.00	14.07

9.14 Radiated Spurious Emissions For Receiver

9.14.1 Test Setup



9.14.2 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/>	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/>	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/>	EMI test receiver	Cabin no. 3 ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/>	EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input checked="" type="checkbox"/>	Test receiver	ESVP	1025	881120/024	Rohde & Schwarz
<input type="checkbox"/>	Test receiver	ESVP	2031	891846/003	Rohde & Schwarz
<input type="checkbox"/>	Spectrum analyzer	FSP30	(R&S)	101159	Rohde & Schwarz
<input checked="" type="checkbox"/>	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
<input checked="" type="checkbox"/>	Preamplifier	Cabin no. 2 CPA9231A	1651	3393	Schaffner
<input type="checkbox"/>	Preamplifier	Cabin no. 2 AFS3-00100800-32-LN	1684	847743	Miteq
<input type="checkbox"/>	Preamplifier	Cabin no. 2 ACO/180-3530	1484	32641	CTT
<input type="checkbox"/>	Preamplifier	CPA9231A	1716	3557	Schaffner
<input type="checkbox"/>	Preamplifier	R14601	1142	13120026	Advantest
<input type="checkbox"/>	Preamplifier	AMF-4D-005080-25-13P	1685	860149	Miteq
<input type="checkbox"/>	Magnetic Field Pickup Coil	HZ-10	1605	827129/013	Rohde & Schwarz
<input type="checkbox"/>	Loop antenna	HFH2-Z2	1016	882964/1	Rohde & Schwarz
<input type="checkbox"/>	Rod antenna	HFH2-Z6	1017	893053/001	Rohde & Schwarz
<input checked="" type="checkbox"/>	Trilog antenna	Cabin no. 2 VULB 9163	1722	9163-188	Schwarzbeck
<input type="checkbox"/>	Trilog antenna	Cabin no. 3 VULB 9163	1802	9163-214	Schwarzbeck
<input type="checkbox"/>	Biconical antenna	Cabin no. 3 HK 116	1261	836239/02	Rohde & Schwarz
<input type="checkbox"/>	Log. per. antenna	Cabin no. 3 HL 223	1262	834408/12	Rohde & Schwarz
<input checked="" type="checkbox"/>	Biconical antenna	EG 1 HK 116	1518	842204/001	Rohde & Schwarz
<input checked="" type="checkbox"/>	Log. per. antenna	EG 1 HL 223	1519	841516/023	Rohde & Schwarz
<input type="checkbox"/>	Shielded room	No. 1	1451	---	Albatross
<input checked="" type="checkbox"/>	Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/>	Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/>	Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/>	Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/>	Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/>	Shielded room	No. 7	1866	---	Albatross
<input checked="" type="checkbox"/>	Open field test site	EG 1	1450	---	Senton



Prüfdatum / <i>Date of test:</i>	November 12, 2009
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Open field test site, EG 1

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

Prüfgrundlage / <i>Specifications:</i>	IC RSS-182 Issue 4, section 6.7(a)		
Grundnorm / <i>Guide:</i>	ANSI C63.4		
Grenzwert / <i>Limit:</i>	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0

Prüfergebnis / <i>Test Result:</i>	Test passed
------------------------------------	-------------

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
76.800	vertical	Quasi-Peak	17.5	9.6	27.1	40.0	12.9
134.400	horizontal	Quasi-Peak	25.1	13.2	38.3	43.5	5.2

Sample calculation of field final values:

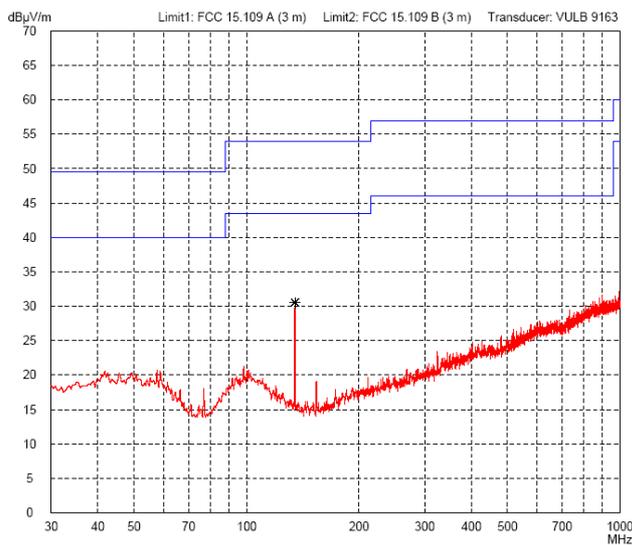
$$\text{Final Value (dBµV/m)} = \text{Reading Value (dBµV)} + \text{Correction Factor (dB/m)}$$

Radiated Emission Test (Prescans)

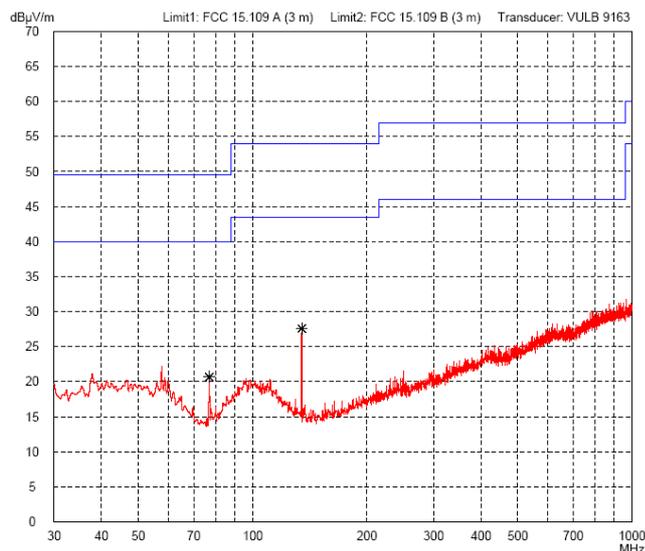
Prüfdatum / <i>Date of test:</i>	November 12, 2009
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Fully anechoic room, cabin no. 2

Vormessungen / *Prescans*

Horizontal Polarization

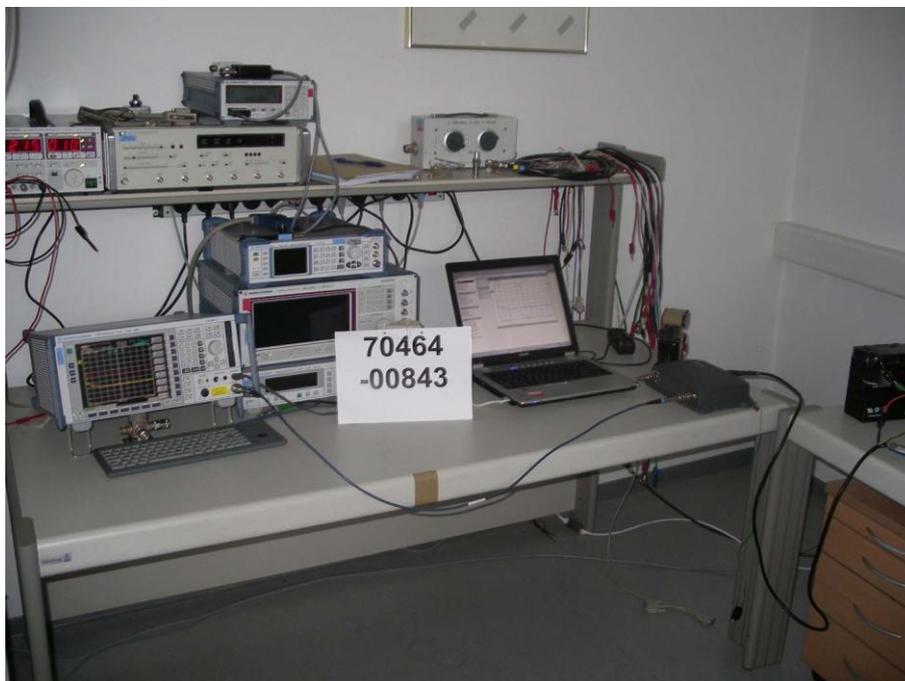


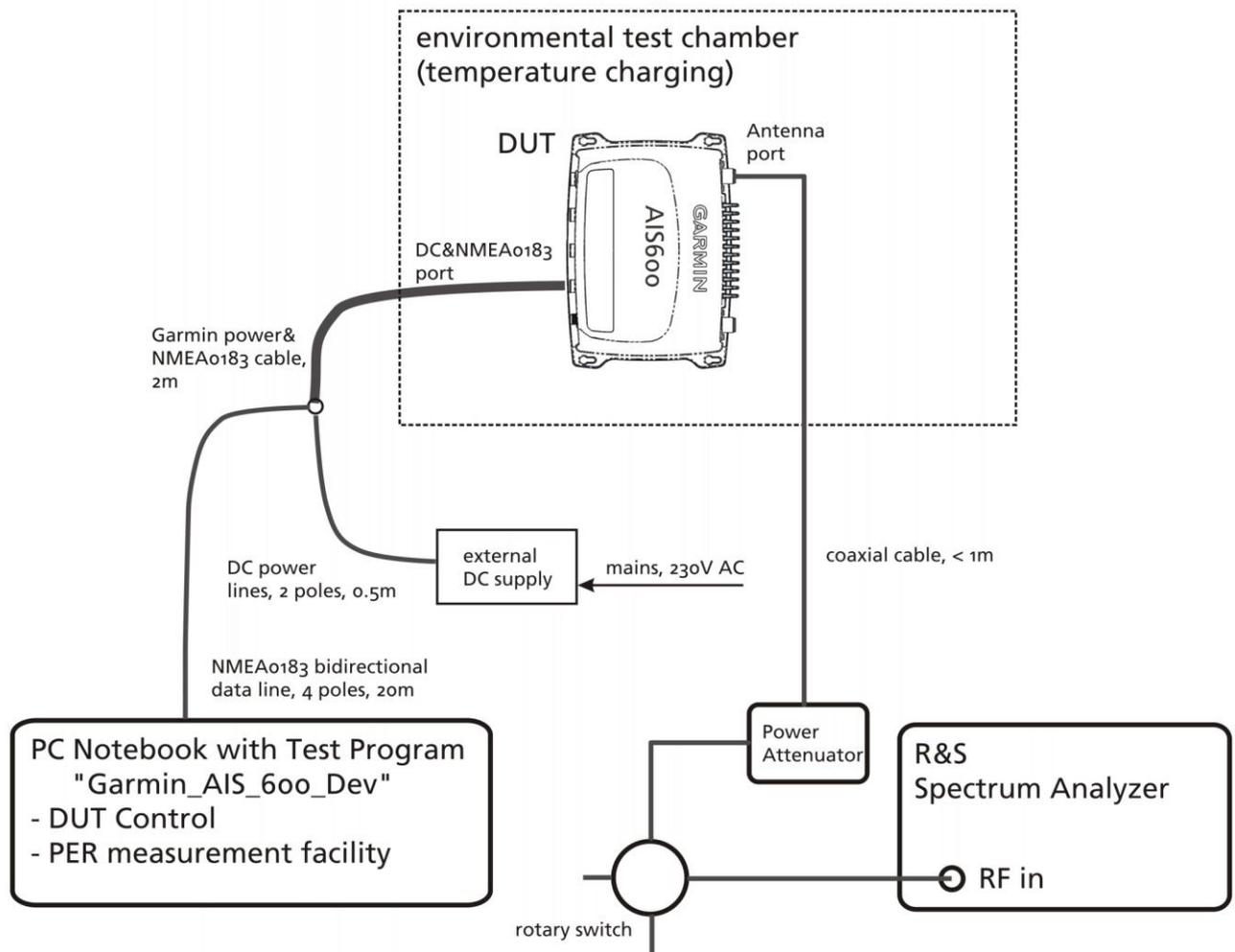
Vertical Polarization



9.15 Spurious Emissions For Transmitter

9.15.1 Test Setup





Transmitter spurious measurement:

- normal conditions

Operating mode of the DUT:

- forced transmission with test signal 5



9.15.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input checked="" type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU	2044	100232	Rohde & Schwarz
<input type="checkbox"/> Radio Communication Monitor	CMS 54	1531	838384/030	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SML 02	1772	101023	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMT03	1517	837961/0015	Rohde & Schwarz
<input type="checkbox"/> Signal Generator	SMB 100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1670	ME798	Weinschel Corp.
<input type="checkbox"/> Broadband Resistive Power Divider	ME798	1671	ME827	Weinschel Corp.
<input type="checkbox"/> Power meter	NRVS	1264	836856/015	Rohde & Schwarz
<input type="checkbox"/> Power sensor	NRV-Z51	1986	826293/027	Rohde & Schwarz
<input type="checkbox"/> Peak-Power sensor	NRV-Z31	1701	8579604.03	Rohde & Schwarz
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

9.15.3 Test Results

Results for spurious emissions for transmitter are documented as listed below.



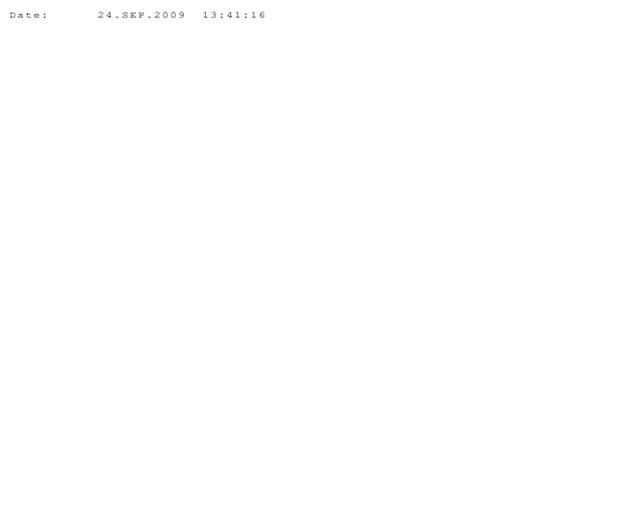
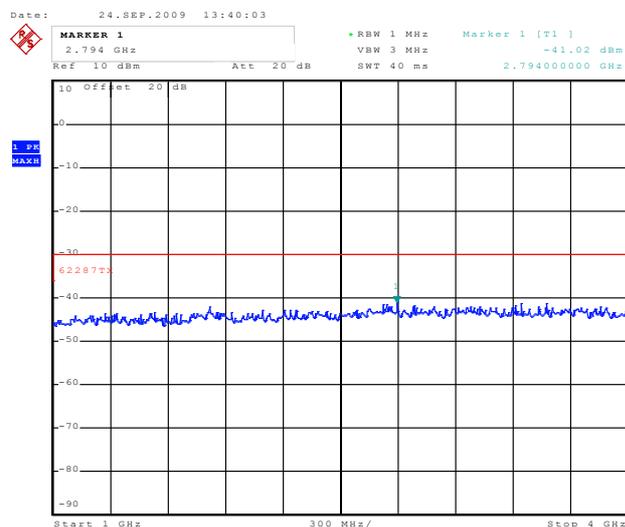
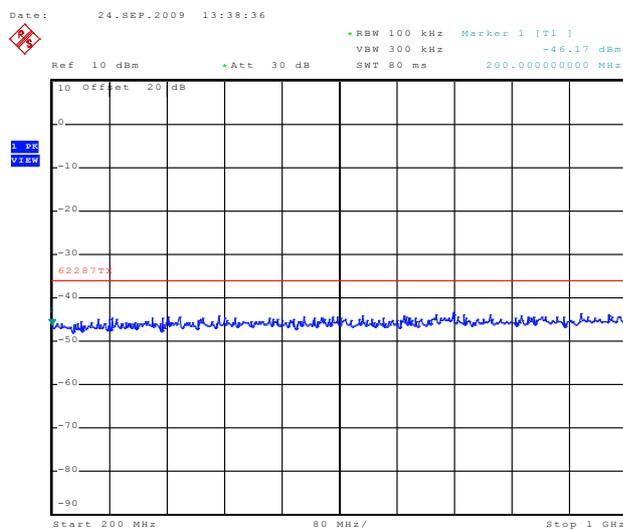
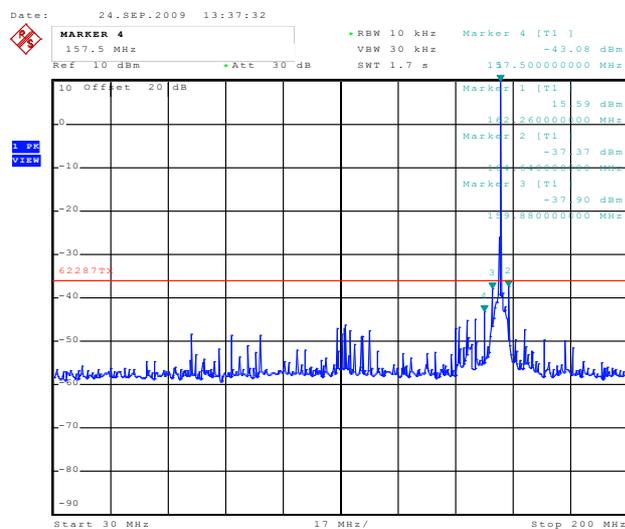
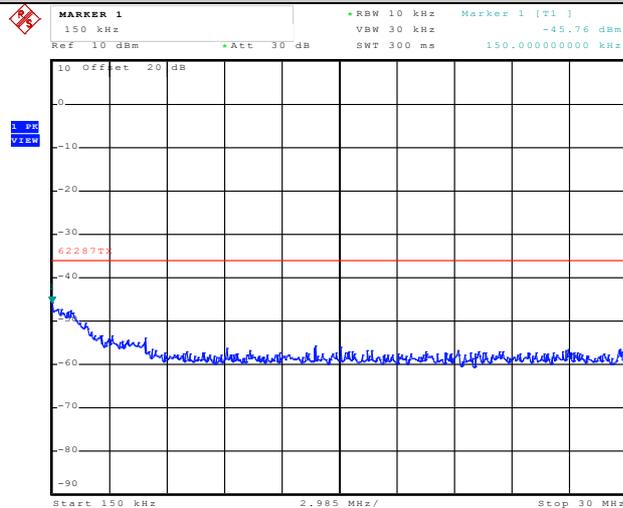
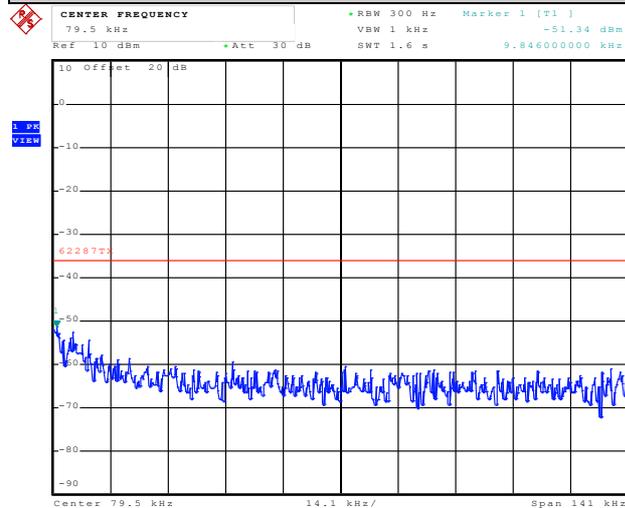
Spurious Emissions For Transmitter

Prüfdatum / <i>Date of test:</i>	2009-09-24
Prüfer / <i>Operator:</i>	Martin Steindl
Messplatz / <i>Test site:</i>	Non shielded room

Prüfergebnis / <i>Test Result</i>	
<input checked="" type="checkbox"/>	Erfüllt / <i>Passed</i>
<input type="checkbox"/>	Nicht erfüllt / <i>Not passed</i>

Prüfgrundlage / <i>Specifications:</i>	IEC 62287-1 Edition1 Final Draft	
Betriebsart / <i>Operation mode:</i>	Transmitting continuously with signal number 4 at 156.025 MHz and 162.025 MHz	
Grenzwert / <i>Limit:</i>	<i>Frequency range</i>	<i>Limit</i>
	9 kHz - 1 GHz	-36 dBm
	1 GHz - 4 GHz	-30 dBm
Ausnahmeband / <i>Exclusion Band:</i>	156.025 MHz : 155.9875 MHz - 156.0625 MHz 162.025 MHz : 161.9875 MHz - 162.0625 MHz	
Kommentar / <i>Comment:</i>		

156.025 MHz

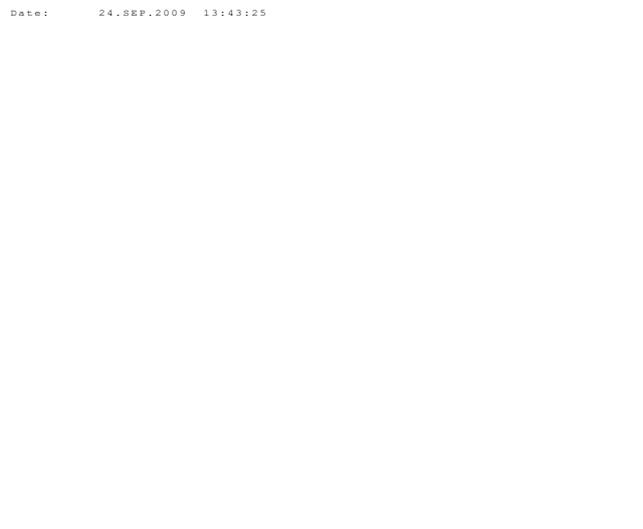
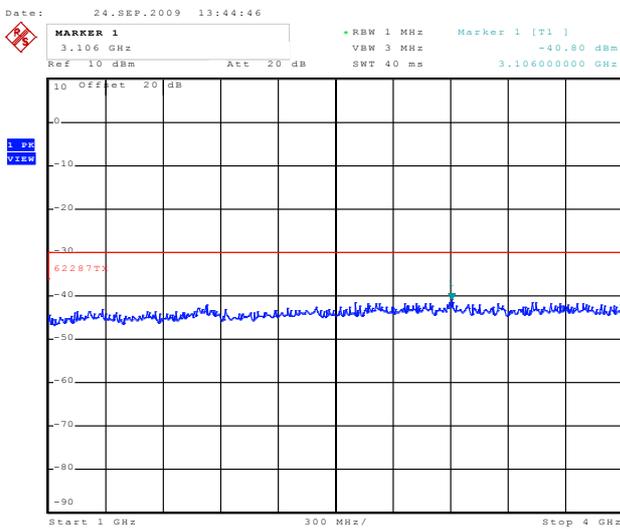
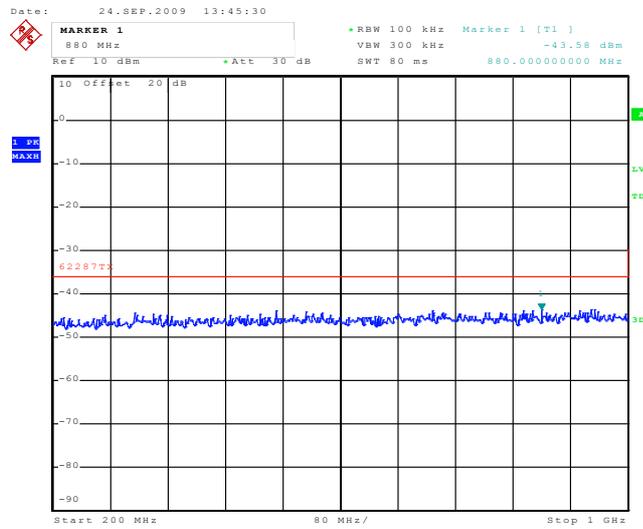
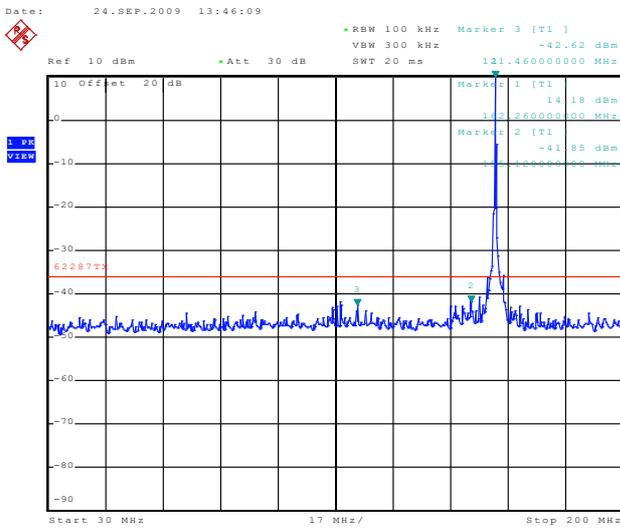
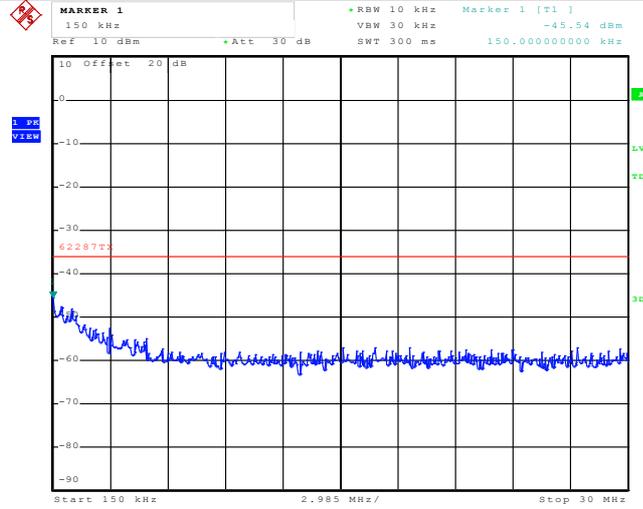
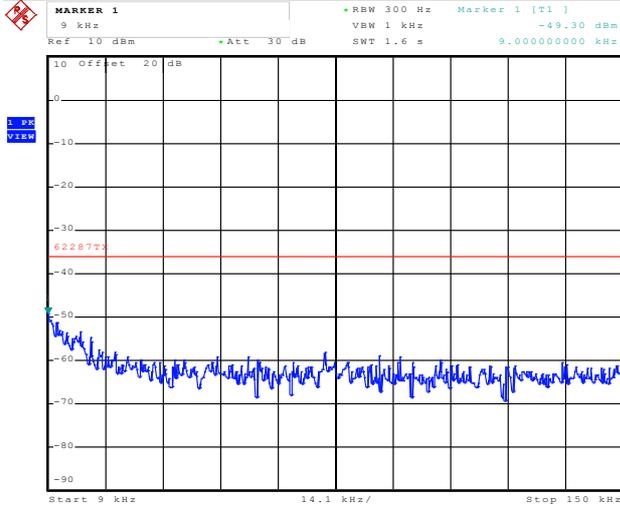


Date: 24.SEP.2009 13:41:51



<i>Peak</i>					
<i>Frequency (MHz)</i>	<i>Reading (dBm)</i>	<i>Correction (dB)</i>	<i>Level (dBm)</i>	<i>Limit (dBm)</i>	<i>Margin (dB)</i>
157.50	-43.08	0.00	-43.08	-36.00	7.08
159.88	-37.90	0.00	-37.90	-36.00	1.90
164.64	-37.37	0.00	-37.37	-36.00	1.37

162.025 MHz



Date: 24.SEP.2009 13:42:51



<i>Peak</i>					
<i>Frequency (MHz)</i>	<i>Reading (dBm)</i>	<i>Correction (dB)</i>	<i>Level (dBm)</i>	<i>Limit (dBm)</i>	<i>Margin (dB)</i>
155.12	-41.85	0.00	-41.85	-36.00	5.85
121.46	-42.62	0.00	-42.62	-36.00	6.62



10 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	29.10.09	Martin Steindl (cj)	First Edition
2	13.11.09	Martin Steindl	Correction of Limit for "Error Behaviour At High Input Levels"
3	18.11.09	Christa Jäger	Edition 3 Modification required by Mr. Zimmermann / email November 18, 2009 Name of applicant changed
4	15.12.09	Martin Steindl	Edition 4 Corrections and additional testings according to advice of "BSH". Additional requirements for FCC and IC added.
5	8.1.10	M. Steindl	Correction of graphics for description of measurement setups. Spectrum mask for RSS-182 added.