DAT-P-002/91-02

Center for Quality Engineering

Test Report No.: B08B0007

Order No.: B08B **Pages:** 30 **Munich,** Jan 27, 2009

Client:	Rohde & Schwarz GmbH & Co. KG
Equipment Under Test:	XU4200 VHF Transceiver 6144.7400.02 / SN 100017
Manufacturer:	Rohde & Schwarz GmbH & Co. KG
Task:	Conformance test according to the below mentioned test specifications
Test Specification(s): [covered by accreditation]	EMC Tests 47 CFR Part 15, §15.109, Class B Part 15, §15.107, Class B Part 2, §2.1046
Test Specification(s): [not covered by accreditation]	47 CFR Part 87, §87.131
Result:	All tests performed have been passed.

The results relate only to the items tested as described in this test report.

approved by:	**Date**	**Signature**
Neuhäusler Manager Radio System Qualification	Jan 27, 2009	
Bauer Manager EMC	Jan 27, 2009	

This document was signed electronically.

edited by:	Date	Signature
Pauli Qualification Engineer	Jan 27, 2009	

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

November 12, 2008

Registration Number: 97242

SGS Germany GmbH
Center for Quality Engineering,
Hofmannstrasse 50,
81379 Munich
Germany

Attention: Josef Bauer

Re: Measurement facility located at Munich
Anechoic chamber No. 2 (3 m)
Date of Renewal: November 12, 2008

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Phyllis Parrish
Industry Analyst

CONTENTS

1 Summary

The tests have been performed to show compliance of VHF Transceiver XU4200 with the conducted and radiated emission requirements of FCC part 15, subpart B, section 107 and section 109, FCC part 2, section 1046, part 87 section 131.

The EUT is classified as a Class B device.

The measurements were performed with EUT connected to AC (115 V) and DC (28 V) redundant.
For details concerning the configuration see chapter 4.

Radiated emission tests (Configuration A +B)				
Chapter	**Test**	**Specification**	**Limits**	**Result**
6.1.1	Radiated 30 MHz-1000 MHz Test Distance: 3 meters	FCC Part 15 § 15.109	Class B	**passed**
6.1.2	Radiated 1 GHz-15 GHz Test Distance: 3 meters	FCC Part 15 § 15.109	Class B	**passed**

Conducted emission tests				
Chapter	**Test**	**Specification**	**Limits**	**Result**
6.1.3	Conducted,115 V AC	FCC Part 15 §15.107	Class B	**passed**

Chapter	Test	Specification	Limits	Result
6.2	RF Power Output	FCC Part 2 §2.1046	§ 87.131	compliant

2 References

2.1 Specifications

- 47 CFR Code of Federal Regulations Title 47 – Telecommunication
- FCC Part 15, § 15.109, Radiated Emission, 2007-9
- FCC Part 15, § 15.107, Conducted Emission, 2007-9
- FCC Part 87, § 87.131
- ANSI / TIA / EIA-603-A-2001 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

2.2 Glossary of Terms

EMC specific Abbreviations

AC	Alternating Current
AM	Amplitude Modulation
CE	CE-Conformity requirement
CM	Common Mode Coupling
DC	Direct Current
DM	Differential Mode coupling
DTAG	Deutsche Telekom AG
EFT	Electrical Fast Transient
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EN	European Standard
ES	ETSI Standard
ESD	Electro Static Discharge
ETS	European Telecommunication Standard
EUT	Equipment Under Test
FW	Firmware
HW	Hardware
IEC	International Electrotechnical Commission
ITU-T	International Telecommunication Union- Telecommunications sector
L > XX m	Line Length > XX m (Test applicable for lines with length > XX m)
LFC	Loss of Function Customer reset (performance criterion)
LFO	Loss of Function Operator reset (performance criterion)
LFS	Loss of Function Self recovery (performance criterion)
LISN	Line Impedance Stabilization Network
Loc	Location of the EUT, can be TC or OTC
LtG	Line to Ground coupling
LtL	Line to Line coupling
LVDS	Low Voltage Differential Signal
NP	Normal Performance (performance criterion)
OTC	Other than Telecommunication Center
PC	Power Contact
PF	Power Fault
PIL	Power Induction Long term
PIS	Power Induction Short term
PP	External Port to external Port test as defined in ITU-T K.44
propOJEC	proposed to publish in the Official Journal of the European Communities for CE Marking
R	Ring
RP	Reduced Performance (performance criterion)
SC	Short-Circuit
SW	Software
T	Tip
TC / ITC	Telecommunication Center
UL	Underwriter Laboratories

3 General Information

3.1 Identification of Client

Rohde & Schwarz GmbH & Co. KG
Mühldorfstraße 15
81671 München
Reiner Hausdorf

3.2 Test Laboratory

Center for Quality Engineering
SGS Germany GmbH
Hofmannstraße 50
81379 München

3.3 Time Schedule

Delivery of EUT: Jan 08, 2009
Start of test: Jan 08, 2009
End of test: Jan 09, 2009

3.4 Participants

Name	Function	Phone	E-Mail
Michael Sperling	Accredited testing	+49 89 722-32399	michael.sperling@sgs.com
Reiner Hausdorf	Setup of EUT	089 4129-13039	reiner.hausdorf@rohde-schwarz.com
Andreas Pauli	Accredited testing, Editor	+49 89 722 36302	andreas.pauli@sgs.com

4 Equipment Under Test

The EUT XU4200 VHF Transceiver is a radio communications device used for Air Traffic Control (ATC).

4.1 Operation Mode

During the test the EUT was operated in the transmitter mode.

4.1.1 Settings for conducted and radiated emission tests

- Carrier frequency: 130.100 MHz
- Bandwidth of carrier: 25 kHz
- Modulation frequency 1 kHz
- Modulation depth: 90%
- Output power TX: 50 Watt (+47 dBm) carrier power

The conducted and radiated emission tests were performed with 115V/50Hz.

4.1.2 Settings for RF power output Tests

The measurements were performed at 3 selected carrier frequencies for each modulation, according to the following table:

Table 4.1: Carrier Frequencies

Modulation / Frequency	A3E	A2D
Lowest possible carrier frequency [MHz]	112.000	118.000
Frequency at the middle of the band [MHz]	134.000	127.500
Highest possible carrier frequency [MHz]	155.975	136.975

For the RF power output Tests the EUT was operated with 230V/50Hz.

4.2 Photographs of EUT

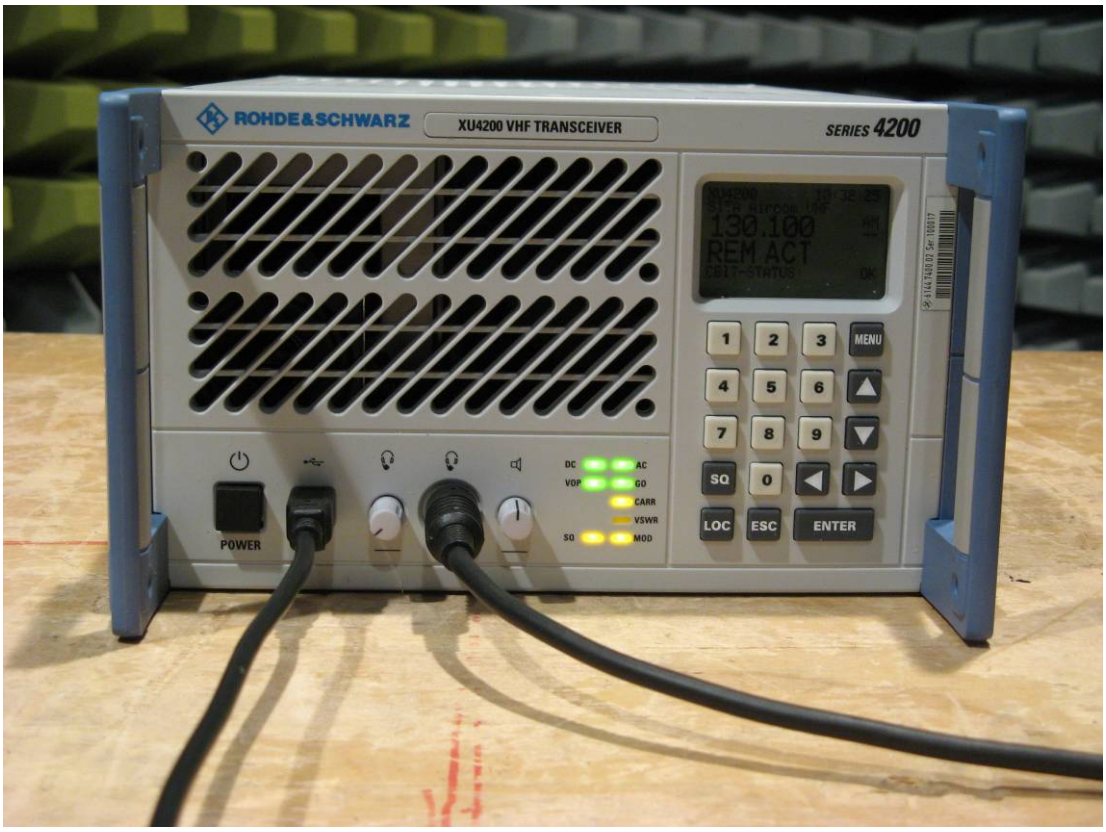

Figure 4-1: XU4200 VHF Transceiver (EUT), front view

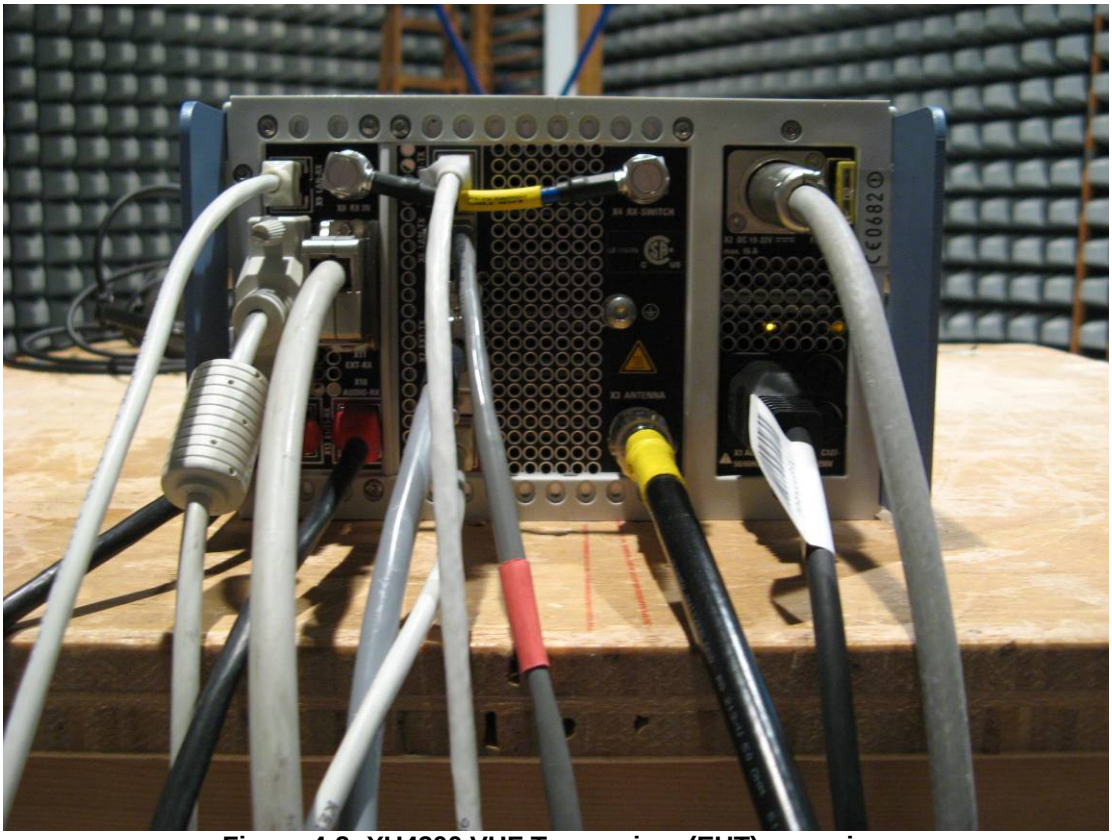

Figure 4-2: XU4200 VHF Transceiver (EUT), rear view

4.3 Configuration of the EUT

The following configuration lists was read out of the EUT before the beginning of the tests.

Table 4.2: Configuration of EUT

Index	Type	Component Name	Ident Number	Variant	Production Index	Serial Number	Production Date
0	DEV	XU4200 RADIO	6144.7400	2	02.02	100017	2008/09/30
1	SWMOD	DS4200	6144.7422	2	02.87	000000	2008/10/23
2	HWMOD	KK4250 OCXO	6144.7268	2	01.00	100023	2008/09/30
3	SW	MMI-CTRL	0000.0000	0	03.26	000000	2008/10/22
4	FW	MMI-FPGA	0000.0000	0	26.66	000000	2008/09/16
5	HWMOD	VU4250	6144.7280	2	02.01	100019	2008/11/06
6	SW	TX-CTRL	0000.0000	0	00.47	000000	2008/10/22
7	FW	TX-FPGA	0000.0000	0	01.39	000000	2008/10/03
8	FW	TX-DSP	0000.0000	0	01.05	000000	2008/10/09
9	HWMOD	EU4250	6144.7274	2	02.00	100022	2008/09/09
10	SW	RX-CTRL	0000.0000	0	00.47	000000	2008/10/22
11	FW	RX-FPGA	0000.0000	0	01.71	000000	2008/10/03
12	FW	RX-DSP	0000.0000	0	01.35	000000	2008/10/20
13	HWMOD	IN4240	6133.8522	0	01.00	A01001	2008/12/09

4.4 Ports and Cabling

For the tests, the following ports of the EUT and cables were used:

Port name	Module	Port	Used cable	Remarks
Ground	PA		Copper band, 1.5 m	Connection to ground reference plane (turntable)
USB	MMI	X20	USB cable, 2 m	Plugged in at the EUT during all tests, no external device connected (only for initial configuration)
Headset-Port	MMI	X21	Original cable of Headset GA015, Ident. No. 0583.6012.02, Ser.No. 101030, Sennheiser HMD 45-6)	---
AC power port (115 V, 50 Hz) Configuration A + B	PS	X1	Power supply cable, 3 m	
DC power port (30 V, 10 A in transmission mode)	PS	X2	Power supply cable, 3,5 m	
RX Antenna	RX	X8	BNC cable, 2m	Shielding connected to ground
RX-LAN (RX-module)	RX	X9	Shielded LAN-cable, 3 m	Connected to turntable, no external device, no traffic
Rx basic audio	RX	X10 (RJ-45-10)	Basic audio cable, 2 m	Shielding connected to ground
Rx extended audio	RX	X11	Extended audio cable, 2 m	Shielding connected to ground
RS 422	RX	X12	RS 422 cable, 2 m	Shielding connected to ground
E1-RX	RX	X13	Shielded E1/T1-cable, 3 m	Shielding and unused pins connected to ground
Common Antenna	PA	X3	Shielded coaxial cable, 2 m	-
Antenna switch	PA	X4	BNC cable, 2m	Shielding connected to ground
TX basic audio	TX	X5		Shielding connected to ground
TX-LAN (TX module)	TX	X6	Shielded LAN-cable, 3 m	connected to turntable, TX-communication is read out outside of the anechoic chamber (CBIT).
TX extended Audio	TX	X7	Basic and extended Audio cable on both modules, 2 m	connected to test-boxes (no own supply, static signals)
E1-TX	TX	X14	Shielded E1/T1-cable, 3 m	Shielding and unused pins connected to ground

4.5 Photos of the test setup EMC

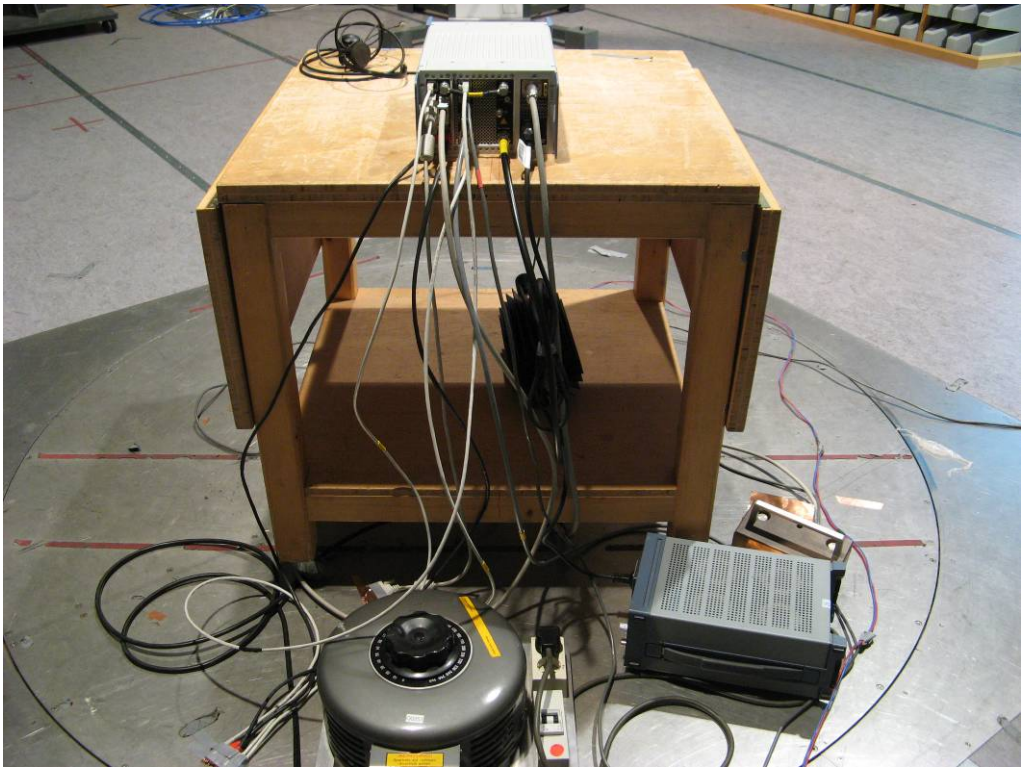

Figure 4-3: Test setup, rear view, cabling

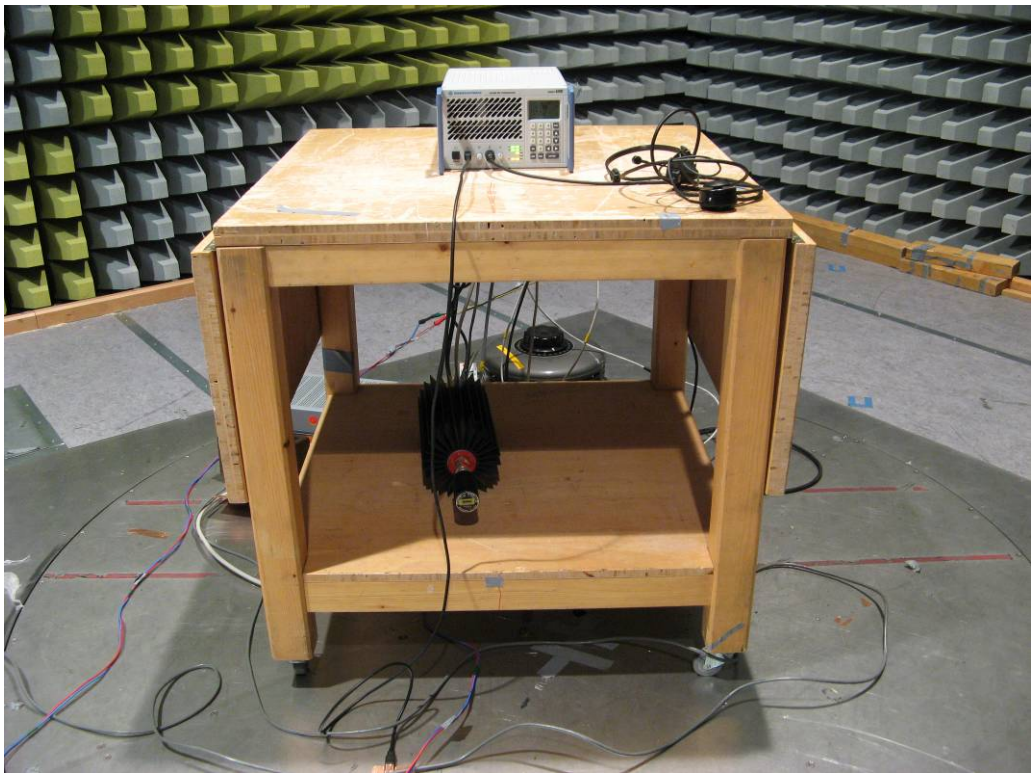

Figure 4-4: Test setup, front view

4.6 Measurement test configuration for RF power output tests

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below):

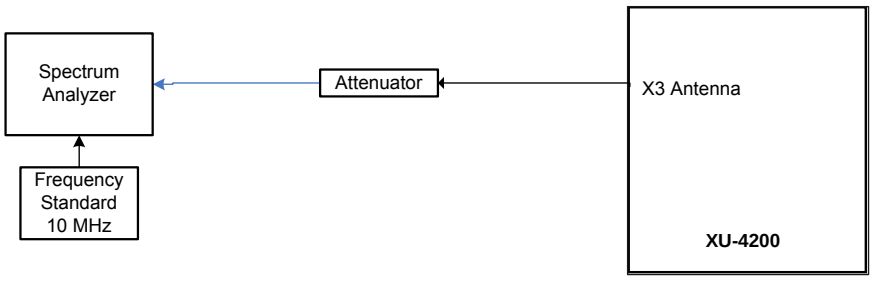

Figure 4-5: : Measurement Test Configuration

The RF output of the SU-4200 is connected to a spectrum analyzer (FSIQ26, Rohde&Schwarz) via a high power 30 dB attenuator (50Ω). The attenuator is used to protect the input of the spectrum analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements.
A complete list of the measurement equipment is included on page 16 of this measurement report.

5 Test Equipment

5.1 Test Facility

The EMC-tests are carried out in the shielded rooms of the Center for Quality Engineering, Hofmannstraße 50, 81379 München, Germany.

Chamber	1	2	3	4 / 5	6
Dimensions (net)	17.7 * 10.8 * 6.8m	9.6 * 8.5 * 5.3m	7.4 * 6.6 * 5.2m	4.1 * 3.5 * 3.5m	6.4 * 4.3 * 4.3m
Max. Door Exit	5.0 * 3.86m	3.9 * 4.0m	2.0 * 2.7m	0.9 * 2.25m	1.8 * 3.0mm
Shielding material	Sheet steel (Thickness:1.5mm on floor, 1.0mm on walls and ceiling)	Sheet steel	Sheet steel	Sheet steel	Sheet steel
Absorbers	• hybrid absorbers on walls and ceiling (TDK), length 1m	• hybrid absorbers on walls and ceiling (E+C), length 0.5m	• hybrid absorbers on walls and ceiling (E+C), length 0.3m	• without absorbers	• without absorbers
Floor	• metallic ground plane • floor load: 12 t/m²	• metallic ground plane • floor load: 1.5 t/m²	• metallic ground plane • floor load: 1 t/m²		
Specials	• measuring distance of max. 10m • turntable ∅ 4m / 6t **Test chamber no. 1 complies with:** ***Emission*** (10m distance and frequency range 30-1000MHz) - EN 55022 / 2006 - ANSI C63.4 / 2003 - NSA 30 – 1000 MHz & Site VSWR 1 – 18GHz acc. CISPR 16-1-4 (2007) - FCC-listed until June 2009, Reg. Nr.: 90932 ***Immunity*** (field uniformity in the frequency range 27-3000MHz) - EN 61000-4-3:2006	• measuring distance of 3m (max 5m) • turntable ∅ 3.2m / 1.5t **Test chamber no. 2 complies with:** ***Emission*** (3m distance and frequency range 30-1000MHz) - EN 55022 / 2006 - ANSI C63.4 / 2003 - FCC-listed until March 2009, Reg. Nr.: 97242 - NSA 30 – 1000 MHz & Site VSWR 1 – 18GHz acc. CISPR 16-1-4 (2007) - VCCI-listed until Oct. 2010, Reg. No. R-2623 ***Immunity*** (field uniformity in the frequency range 80-3000MHz) - EN 61000-4-3:2006	• measuring distance of max. 3m • turntable ∅ 2.0m / 1t **Test chamber no. 3 complies with:** ***Emission*** (3m distance and frequency range 30-1000MHz) - EN 55022 / 2006 - ANSI C63.4 / 2003 - NSA 30 – 1000 MHz & Site VSWR 1 – 18GHz acc. CISPR 16-1-4 (2007) - FCC-listed until March 2010, Reg. Nr.: 299569 ***Immunity*** (field uniformity in the frequency range 80-3000MHz) - EN 61000-4-3:2006		- VCCI-listed until Oct. 2010, Reg. No. C-2866 & No. T-326

Table 5-1: Anechoic chamber No. 2

5.2 Measurement Uncertainty

As far as the underlying standards include requirements concerning the uncertainty of measuring instruments or measuring methods, they are met.

The expanded measurement uncertainty of the measuring chain was calculated for all tests according to the “ISO Guide to the expression of uncertainty in measurement (GUM)”. The results are documented in an “internal controlled document” at CQE archives.

The measuring accuracy for all measuring devices is given in their technical description. The measuring instruments, including any accessories, are calibrated respectively verified to ensure the necessary accuracy. Depending on the kind of measuring equipment it is checked within regular intervals or directly before the measurement is performed. Adjustments are made and correction factors applied to measured data in accordance with the specifications of the specific instrument.

The expanded measurement instrumentation uncertainty of our Test Laboratory meets the requirements of IEC CISPR 16-4-2 (2003-11) " Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements" for all listed Tests.

5.2.1 Calibration of the measurement equipment

All relevant test equipment has a valid calibration from an external calibration laboratory. Additionally the spectrum analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network analyzer and taken into account for all measurements.

5.3 Measuring equipment

Rad. Emission 30 – 1000 MHz:

ID. No.	Equipment	Type	Manufacturer	Specification	Status	Last Cal.	Next Cal.
P0338	test chamber 3		Siemens	8.7 • 7.5 • 5.8 m; 0.4 m hybrid absorbers	chk	Jan 28, 2008	Jan 31, 2009
P1325	EMI receiver	ESPI-3	R&S	9 kHz - 3 GHz, with pre-selector	cal	Aug 17, 2007	Aug 31, 2009
P0311	antenna	CBL6111	Chase	30 - 1000 MHz E	chk	Feb 13, 2008	Feb 28, 2009

cal = Calibration, car = Calibration restricted use, chk = Check, chr = Check restricted use, cpu = Check prior to use, cnn = Calibration not necessary, ind = for indication only

Rad. Emission 1 – 15 GHz:

ID. No.	Equipment	Type	Manufacturer	Specification	Status	Last Cal.	Next Cal.
P0338	test chamber 3		Siemens	8.7 • 7.5 • 5.8 m; 0.4 m hybrid absorbers	chk	Jan 28, 2008	Jan 31, 2009
P1326	EMI receiver	ESU26	R&S	20Hz - 26.5GHz, FFT-Scan, Preamplifier 100kHz - 26.5GHz, 30dB	cal	Jul 17, 2008	Jul 31, 2010
P0030	antenna (MZ3)	96001	Ailtech	1 - 18 GHz	cal	Mar 14, 2007	Mar 31, 2009

cal = Calibration, car = Calibration restricted use, chk = Check, chr = Check restricted use, cpu = Check prior to use, cnn = Calibration not necessary, ind = for indication only

Cond. Emission Voltage on AC power port:

ID. No.	Equipment	Type	Manufacturer	Specification	Status	Last Cal.	Next Cal.
P0338	test chamber 3		Siemens	8.7 • 7.5 • 5.8 m; 0.4 m hybrid absorbers	chk	Jan 28, 2008	Jan 31, 2009
P1325	EMI receiver	ESPI-3	R&S	9 kHz - 3 GHz, with pre-selector	cal	Aug 17, 2007	Aug 31, 2009
P0488	pulse limiter	ESH3-Z2	R&S	10 dB	cal	Mar 19, 2008	Mar 31, 2010
P0439	LISN	ESH3-Z5	R&S	2 x 10 A; 50 Ohm	cal	Apr 14, 2008	Apr 30, 2010

cal = Calibration, car = Calibration restricted use, chk = Check, chr = Check restricted use, cpu = Check prior to use, cnn = Calibration not necessary, ind = for indication only

Functional Tests

ID. No.	Equipment	Type	Manufacturer		Status	Last Cal.	Next Cal.
F0848	Attenuator	BN745395	Spinner	50 Ohm	cnn	-	-
F0089	Spectrum Analyzer	FSIQ26	Rohde&Schwarz	-	cal	04/2007	08/2009
F0077	Frequency Standard	Rubi Source 2000	Datum GmbH	-	cal	07/2007	07/2010

cal = Calibration, cnn = Calibration not necessary

6 Test Specifications and Results

The test results in the report refer exclusively to the test object described in section 3.2 and the test period in section 3.3.

6.1 Radiated Emission Tests

6.1.1 Radiated Emission 30 MHz – 1 GHz

Specification:

- FCC Part 15 § 15.109 , Class B

The purpose of this test is to evaluate the electrical component of the electromagnetic field radiated by the EUT between 30MHz and 1000MHz.
The EUT was placed on a turntable in order to determine the direction of maximum field strength for each predominant emission around 360 degrees (step = 45 degrees). At each azimuth step, the antenna was raised from the height of 1 to 4m (step = 1m) with both, horizontal and vertical planes of polarisation. This measurement was made with an automatic test set. Pre-Scans were made with peak-detection with variation of turntable angle, antenna height and polarisation. The measuring distance was 3 m. The test set-up of **Figure 6-1** was used.
The detector function was set to peak, the measuring bandwidth was selected according to the following table:

Frequency Band	BW	step size
30 MHz to 1 GHz	120 kHz	60 kHz

Table 6-1: Resolution bandwidth in the range 30 MHz to 1 GHz

At frequencies with emission levels within a predefined acceptance range with respect to limit line, the level was automatically re-measured with a quasi-peak (QP) detector to verify compliance with the QP-limit.
A bilog-antenna covering the whole frequency range of 30MHz to 1000MHz was used.

The test was performed in two different operation modes:

- tone off
- tone on

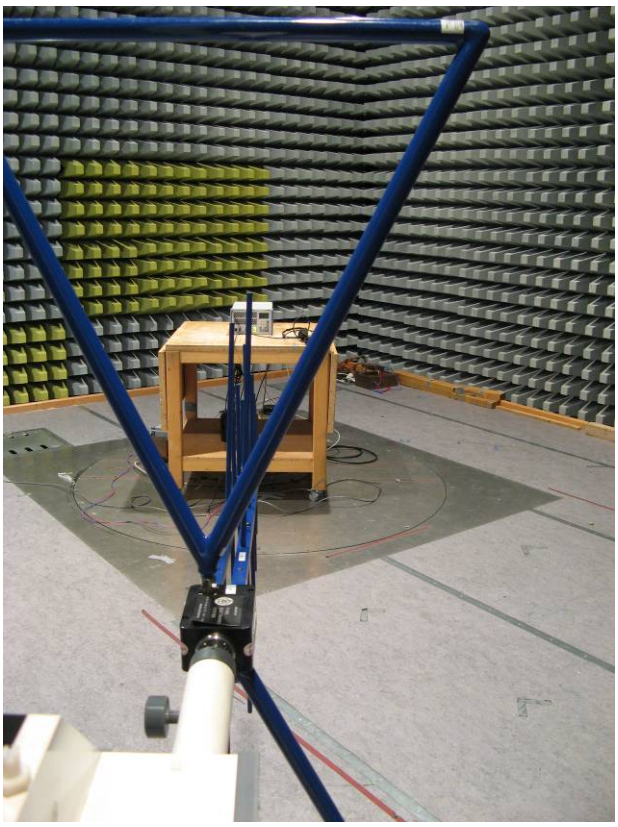

Figure 6-1: Test setup for radiated emission measurement, 30

MHz to 1000 MHz

6.1.1.1 Result for 30 MHz – 1 GHz (tone off):

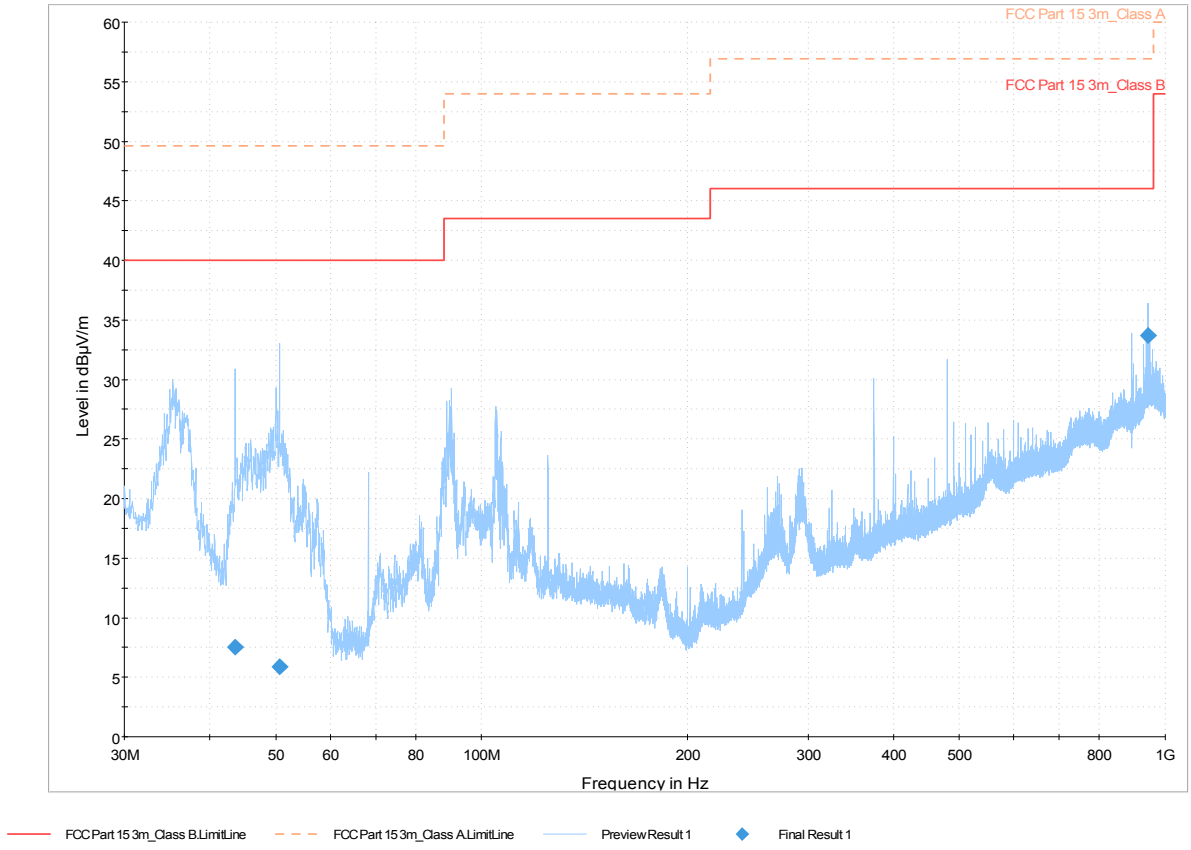

Figure 6-2: Radiated emission, 30 MHz - 1 GHz

Final result (quasipeak)

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
43.560000	7.5	1000.000	194.0	H	183.0	11.3	32.5	40.0
50.600000	5.9	1000.000	250.0	H	198.0	7.7	34.1	40.0
942.800000	33.7	1000.000	166.0	H	45.0	27.6	12.3	46.0

6.1.1.2 Result for 30 MHz – 1 GHz (tone on):

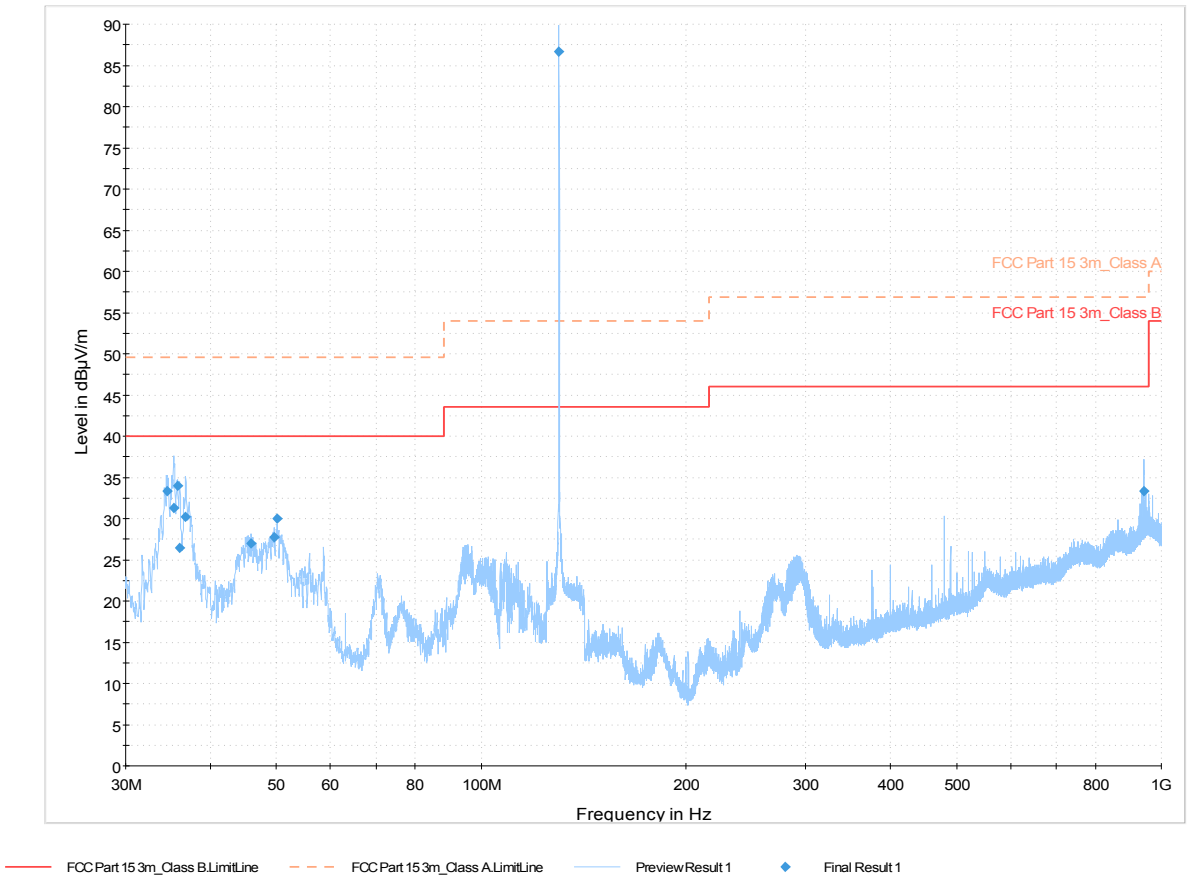

Figure 6-3: Radiated emission, 30 MHz - 1 GHz

Final result (quasipeak)

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
34.520000	33.3	1000.000	100.0	V	67.0	16.0	6.7	40.0
35.320000	31.3	1000.000	100.0	V	267.0	15.6	8.7	40.0
35.760000	34.0	1000.000	100.0	V	302.0	15.4	6.0	40.0
36.000000	26.4	1000.000	116.0	V	22.0	15.3	13.6	40.0
36.760000	30.2	1000.000	100.0	V	289.0	14.9	9.8	40.0
45.920000	27.0	1000.000	100.0	V	265.0	10.1	13.0	40.0
49.640000	27.7	1000.000	130.0	V	188.0	8.1	12.3	40.0
50.120000	30.0	1000.000	100.0	V	307.0	7.9	10.0	40.0
130.120000	86.7	1000.000	100.0	V	234.0	11.8	-43.2	43.5
942.800000	33.4	1000.000	100.0	H	230.0	27.6	12.6	46.0

The performance requirements according to FCC Part 15, §15.109 class B is **fulfilled.**

6.1.2 Radiated Emission 1 GHz – 15 GHz

Specification:

- FCC Part 15 § 15.109 , Class B

The purpose of this test is to evaluate the electrical component of the electromagnetic field radiated by the EUT between 1 GHz and 8 GHz.
The EUT was placed on a turntable in order to determine the direction of maximum field strength for each predominant emission around 360 degrees (step = 45 degrees). At each azimuth step, the antenna was raised from the height of 1 to 4m (step = 1m) with both, horizontal and vertical planes of polarisation. This measurement was made with an automatic test set. Pre-Scans were made with peak-detection with variation of turntable angle, antenna height and polarisation. The measuring distance was 3 m. The test set-up of **Figure 6-4** was used. During the test the EUT was operated in the mode “tone on”.
The detector function was set to peak and average. The measuring bandwidth was selected according to the following table:

Frequency Band	BW
1 GHz to 15 GHz	1 MHz

Table 6-2: Resolution bandwidth in the range 1 GHz to 15 GHz

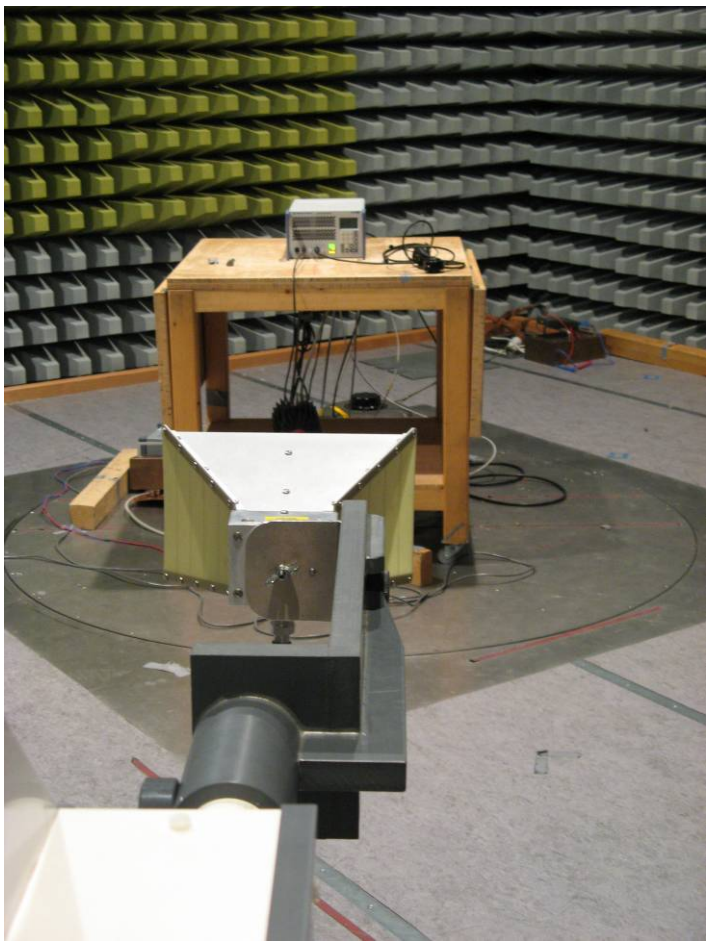

Figure 6-4: Test setup for radiated emission measurement, 1 GHz to 15 GHz

6.1.2.1 Result for 1 GHz – 15 GHz:

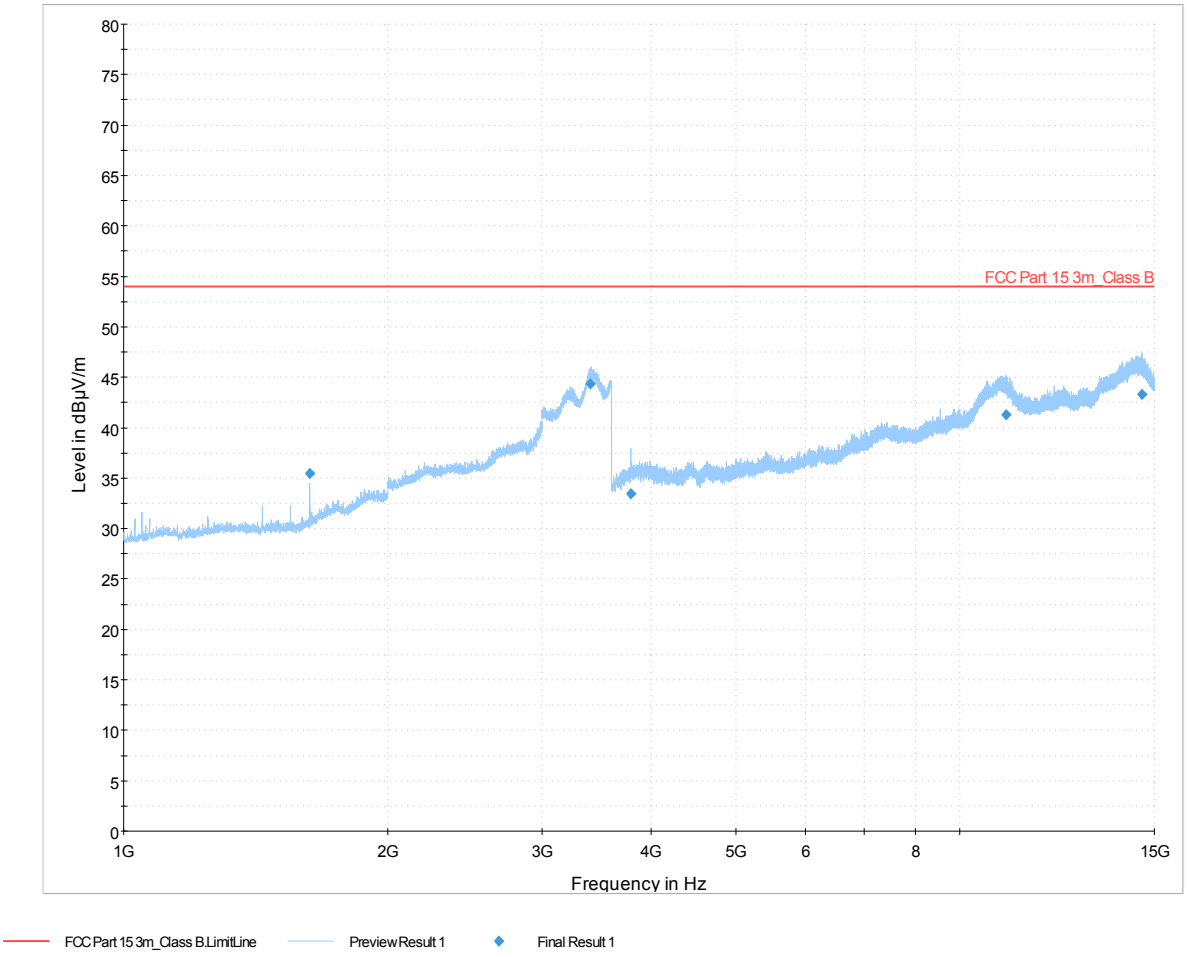

Figure 6-5: Radiated emission, 1 GHz – 15 GHz

Final result (average)

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1632.066667	35.4	1000.000	1000.000	100.0	V	-14.0	26.9	18.6	54.0
3411.000000	44.4	1000.000	1000.000	100.0	V	291.0	33.6	9.6	54.0
3789.866667	33.4	1000.000	1000.000	158.0	V	0.0	35.0	20.6	54.0
10153.466667	41.3	1000.000	1000.000	125.0	V	231.0	43.9	12.7	54.0
14515.733333	43.3	1000.000	1000.000	254.0	H	197.0	44.5	10.7	54.0

The performance requirements according to FCC Part 15, §15.109 class B is **fulfilled.**

6.1.3 Conducted Emission AC Power Port 0.15 – 30 MHz

Specification:

- FCC Part 15 § 15.107, Class B

The test is designed to evaluate the RF signals conducted on the AC power interface of the EUT and to confirm that there is no major spurious signal feedback between items of the equipment. The measurement method was as described in FCC Part 15.
The EUT was connected to the mains power supply inside the test chamber via a LISN. The interference voltage on the AC power interface was measured separately on each power phase (L1, N) with PE grounded and floating. The measurement results were combined to one test sheet by a peak hold function and the highest values were taken for examination with AV- and QP-detection. The resulting plot shows a worst case envelope of the measured spectrum. The test set-up of the following figures was used.

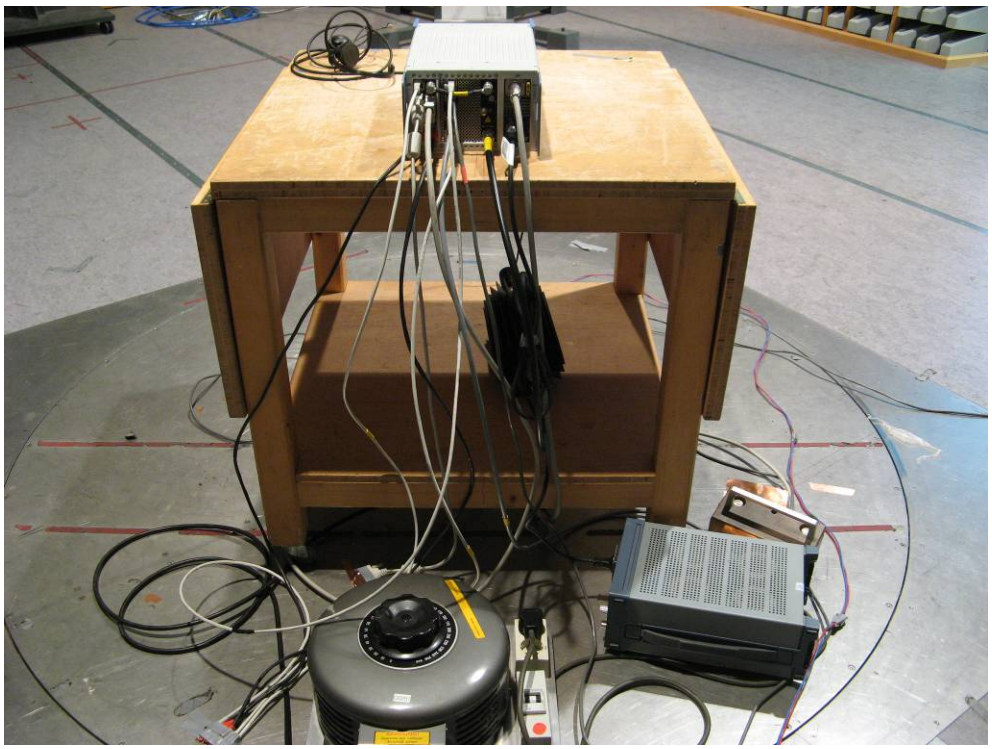

Figure 6-6: Test set-up for conducted emission measurement on the AC power port

The test was performed in two different operation modes:

- tone off
- tone on

Result

According to FCC Part 15 § 15.107 the **Class B** limits are **passed**.
For detailed results see the following pages.

6.1.3.1 Result for conducted emission on AC Power port (tone off):

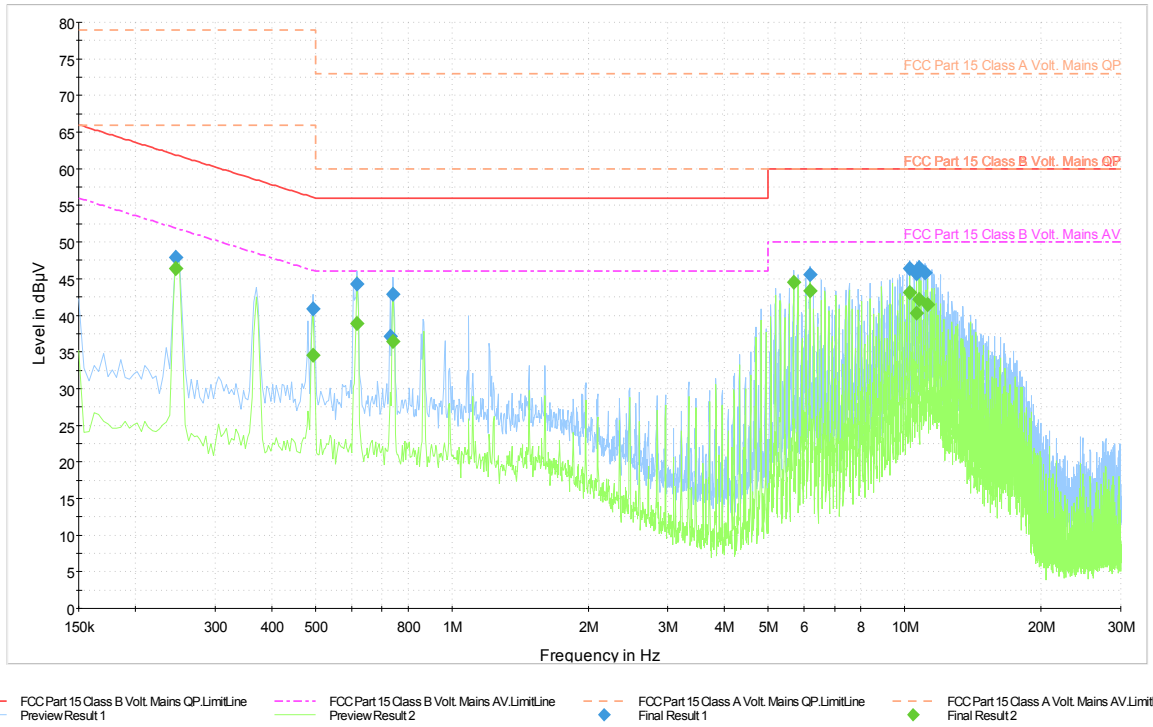

Figure 6-7: Conducted Emission Test AC Power Port (tone off)

Final result (quasipeak)

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.246000	47.9	1000.000	9.000	GN	N	10.1	14.0	61.9	
0.494000	40.9	1000.000	9.000	GN	N	10.1	15.2	56.1	
0.618000	44.2	1000.000	9.000	FLO	N	10.1	11.8	56.0	
0.730000	37.1	1000.000	9.000	FLO	L1	10.1	18.9	56.0	
0.742000	42.9	1000.000	9.000	FLO	L1	10.1	13.1	56.0	
6.178000	45.6	1000.000	9.000	GN	N	10.4	14.4	60.0	
10.254000	46.4	1000.000	9.000	GN	N	10.6	13.6	60.0	
10.626000	45.7	1000.000	9.000	GN	N	10.6	14.3	60.0	
10.746000	46.5	1000.000	9.000	GN	N	10.6	13.5	60.0	
11.110000	45.8	1000.000	9.000	GN	N	10.6	14.2	60.0	

Final result (Average)

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.246000	46.3	1000.000	9.000	GN	N	10.1	5.6	51.9	
0.494000	34.6	1000.000	9.000	GN	N	10.1	11.5	46.1	
0.618000	38.9	1000.000	9.000	FLO	N	10.1	7.1	46.0	
0.742000	36.5	1000.000	9.000	FLO	L1	10.1	9.5	46.0	
5.682000	44.5	1000.000	9.000	GN	N	10.4	5.5	50.0	
6.178000	43.3	1000.000	9.000	GN	N	10.4	6.7	50.0	
10.254000	43.1	1000.000	9.000	GN	N	10.6	6.9	50.0	
10.626000	40.3	1000.000	9.000	GN	N	10.6	9.7	50.0	
10.750000	42.2	1000.000	9.000	GN	N	10.6	7.8	50.0	
11.242000	41.5	1000.000	9.000	GN	L1	10.7	8.5	50.0	

6.1.3.2 Result for conducted emission on AC Power port (tone on):

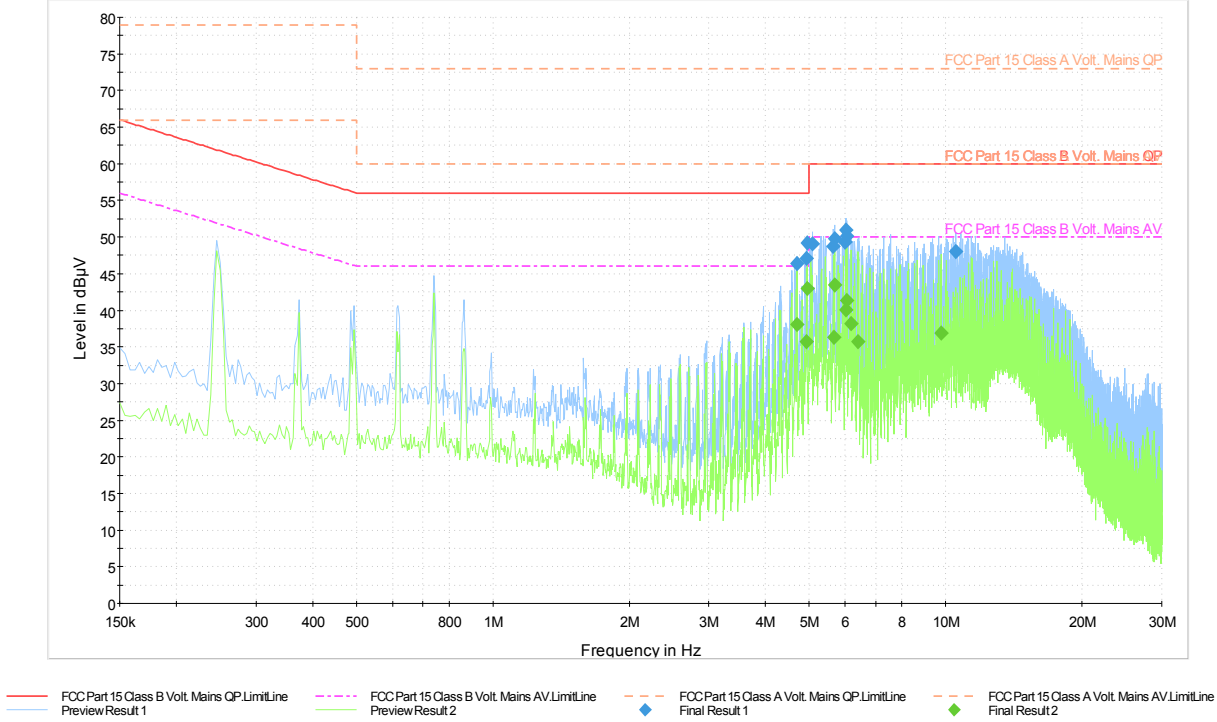

Figure 6-8: Conducted Emission Test AC Power Port (tone on)

Final result (quasipeak)

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
4.702000	46.4	1000.000	9.000	FLO	N	10.3	9.6	56.0	
4.922000	47.1	1000.000	9.000	FLO	N	10.3	8.9	56.0	
4.946000	49.2	1000.000	9.000	FLO	N	10.3	6.8	56.0	
5.074000	49.1	1000.000	9.000	FLO	N	10.3	10.9	60.0	
5.650000	48.7	1000.000	9.000	GN	N	10.4	11.3	60.0	
5.682000	49.8	1000.000	9.000	GN	N	10.4	10.2	60.0	
5.986000	49.3	1000.000	9.000	GN	N	10.4	10.7	60.0	
6.026000	51.0	1000.000	9.000	GN	N	10.4	9.0	60.0	
6.054000	50.1	1000.000	9.000	GN	N	10.4	9.9	60.0	
10.518000	48.0	1000.000	9.000	GN	N	10.6	12.0	60.0	

Final result (Average)

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
4.702000	38.1	1000.000	9.000	FLO	N	10.3	7.9	46.0	
4.922000	35.8	1000.000	9.000	GN	N	10.3	10.2	46.0	
4.946000	43.0	1000.000	9.000	FLO	N	10.3	3.0	46.0	
5.658000	36.3	1000.000	9.000	FLO	L1	10.4	13.7	50.0	
5.686000	43.4	1000.000	9.000	GN	L1	10.4	6.6	50.0	
6.026000	40.1	1000.000	9.000	GN	N	10.4	9.9	50.0	
6.054000	41.4	1000.000	9.000	GN	N	10.4	8.6	50.0	
6.182000	38.2	1000.000	9.000	GN	L1	10.4	11.8	50.0	
6.398000	35.7	1000.000	9.000	FLO	N	10.4	14.3	50.0	
9.766000	36.8	1000.000	9.000	GN	L1	10.6	13.2	50.0	

6.2 RF power output Test

6.2.1 Purpose

The RF power output measurements were performed pursuant to § 2.1046 in order to determine the RF output power of the EUT.

6.2.2 EUT operation condition

The EUT was configured and operating as described in section 4. The RF output power was determined at three selected carrier test frequencies according to section 4.1.2 of this application. For 8PSK the first 17 symbols are generated using specificaion ICAO, Annex 10, Vol III, Part I, chapter 6, other symbols are random.

6.2.3 Test configuration

The test configuration used is described in Figure 4-5: :, see page 13.

6.2.4 Measurement procedure

Using a spectrum analyzer the RF power is measured with a frequency sweep across the carrier (see screenshots on pages 26 – 29). The carrier power of the phase modulated signal (G1D) is the maximum indicated power level. For amplitude modulated signals (A3E, A2D) the mean power of the unmodulated carrier is determined.
The XU4200 output power is the sum of the measured carrier power and the external attenuation (cable loss of the test set up).
The RBW setting of the spectrum analyzer was increased until the measured power reached a stable upper limit (RBW = 1MHz).

6.2.5 Measurement results

The following table shows the measured output powers at the RF output terminal. Spectral plots are included on pages 26 – 29 of this report.

Note:
The offset value indicated on the spectral plots represents the external attenuation value that includes the fixed attenuator plus the cable loss.

Table 6.3: Results – RF power output (A3E modulation)

Carrier Frequency [MHz]	External Attenuation [dB]	Transmitter Output Power	Result
112.000	30.3	47.3 dBm = 53.7 W	compliant
134.000	30.3	47.2 dBm = 52.5 W	compliant
155.975	30.3	47.2 dBm = 52.5 W	compliant

Table 6.4: Results – RF power output (A2D modulation)

Carrier Frequency [MHz]	External Attenuation [dB]	Transmitter Output Power	Result
118.000	30.3	47.3 dBm = 53.7 W	compliant
127.500	30.3	47.3 dBm = 53.7 W	compliant
136.975	30.3	47.2 dBm = 52.5 W	compliant

Table 6.5: Results – RF power output (G1D modulation)

Carrier Frequency [MHz]	External Attenuation [dB]	Transmitter Output Power	Result
118.000	30.3	50.2 dBm = 104.7 W	compliant
127.500	30.3	50.2 dBm = 104.7 W	compliant
136.975	30.3	50.2 dBm = 104.7 W	compliant

The output power was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

6.2.6 Spectral plots

6.2.6.1 RF Power Output (AM A3E modulation)

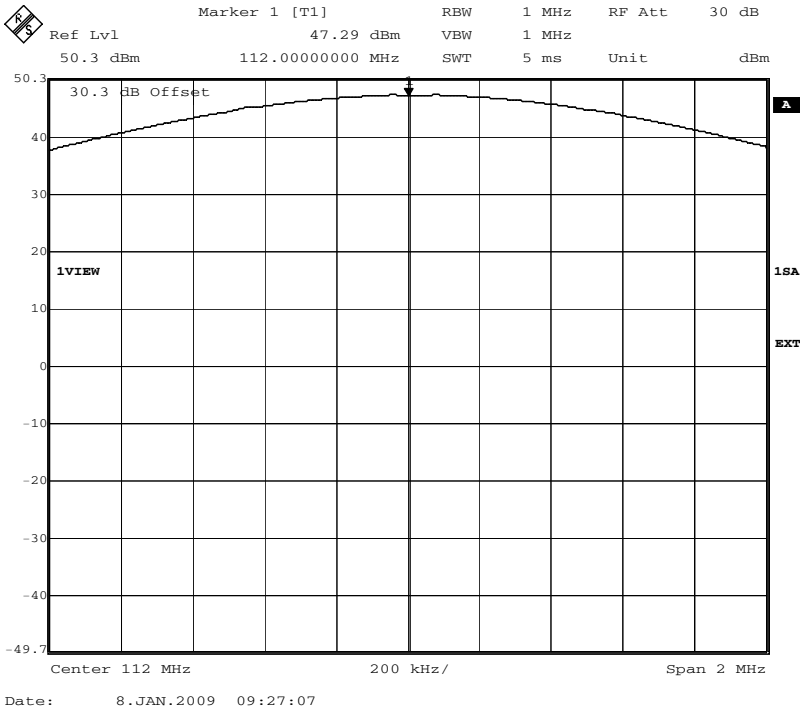

Fig. 1 –Output Power at the Antenna Connector (112.0 MHz)

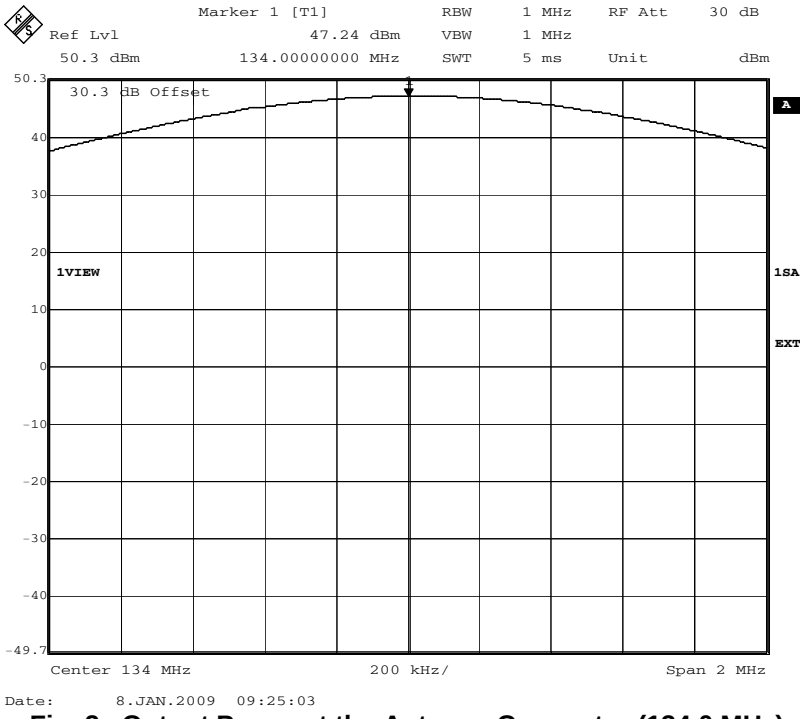

Fig. 2 –Output Power at the Antenna Connector (134.0 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during testing.

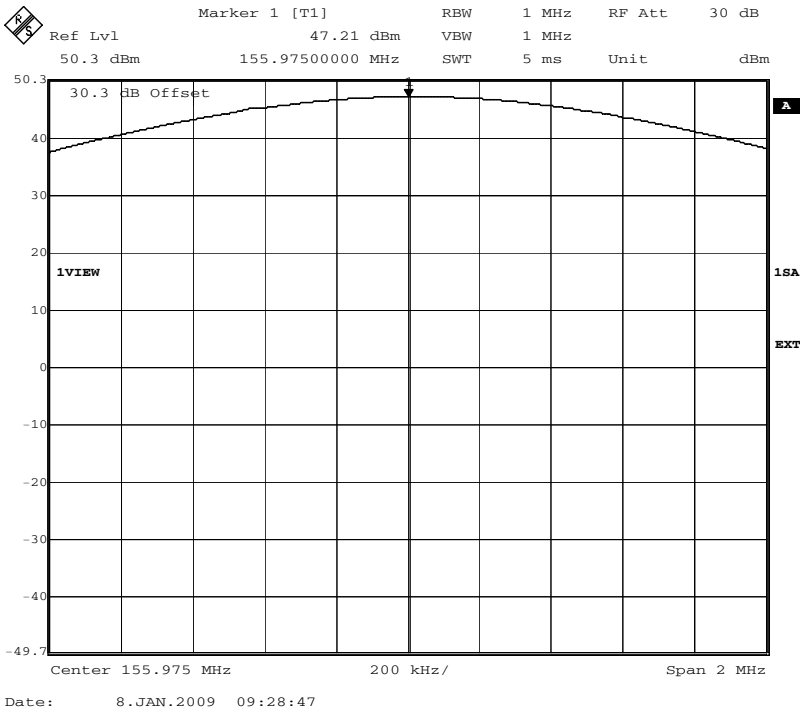

Fig. 3 – Output Power at the Antenna Connector (155.975 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plots. This accounts for the external attenuation and the cable loss during testing.

6.2.6.2 RF Power Output (AMMSK A2D modulation)

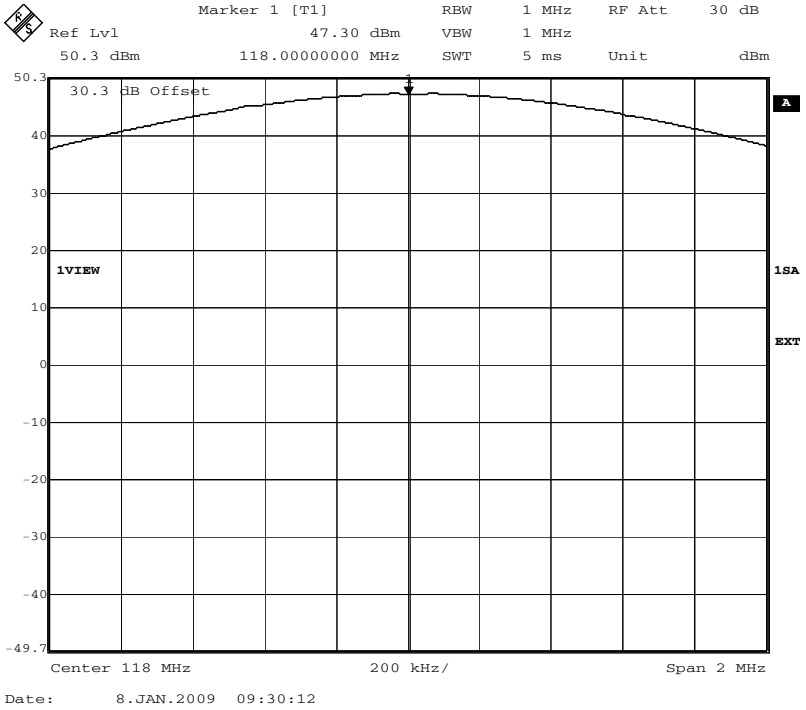

Fig. 4 – Output Power at the Antenna Connector (118.0 MHz)

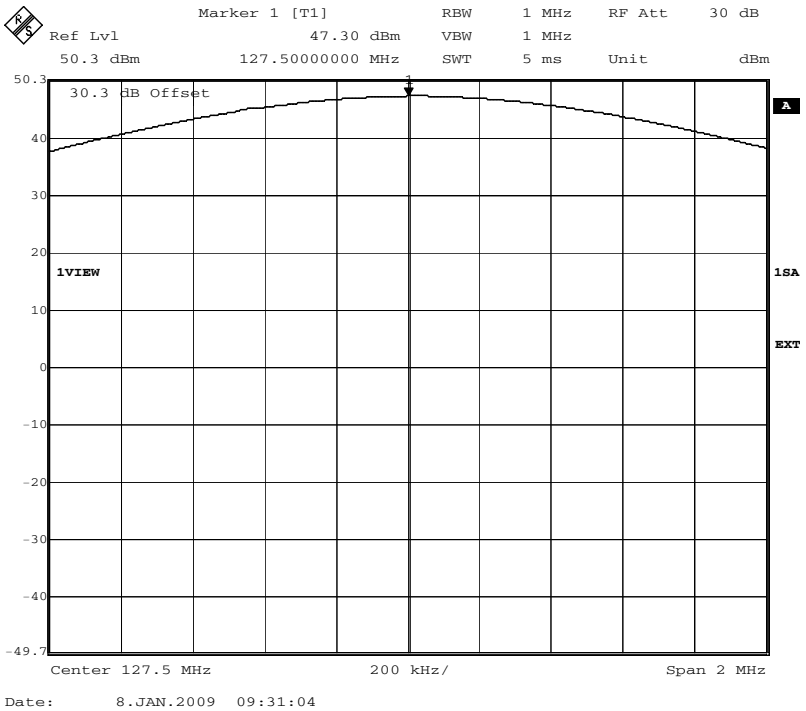

Fig. 5 – Output Power at the Antenna Connector (127.5 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plots. This accounts for the external attenuation and the cable loss during testing.

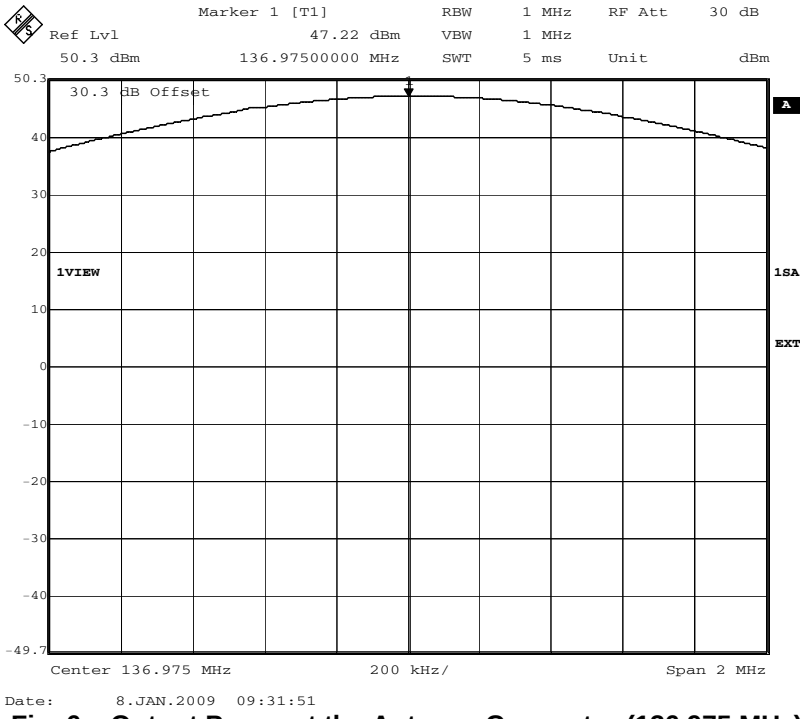

Fig. 6 – Output Power at the Antenna Connector (136.975 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during testing.

6.2.6.3 RF Power Output (D 8-PSK G1D modulation)

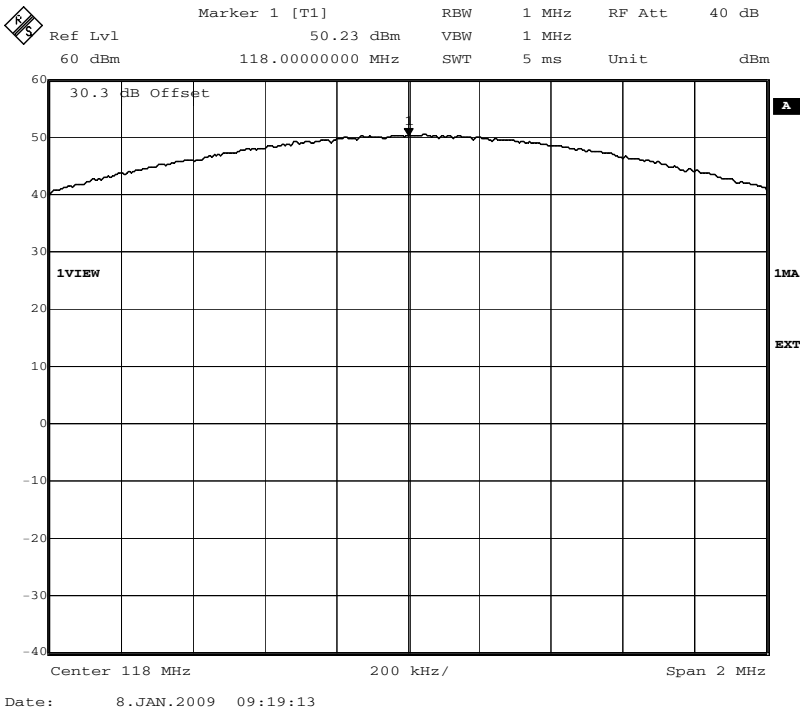

Fig. 7 – Output Power at the Antenna Connector (118.0 MHz)

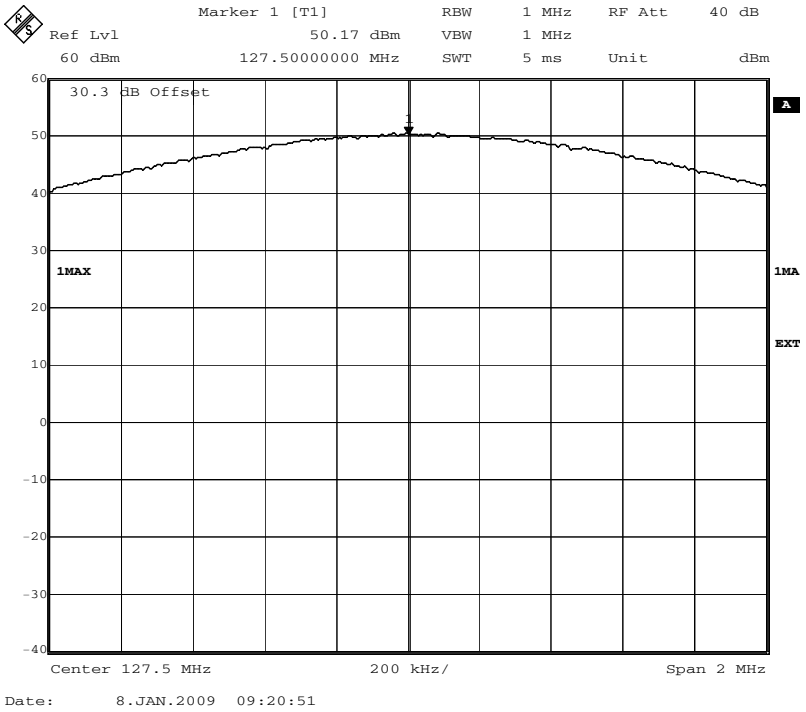

Fig. 8 – Output Power at the Antenna Connector (127.5 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during testing.

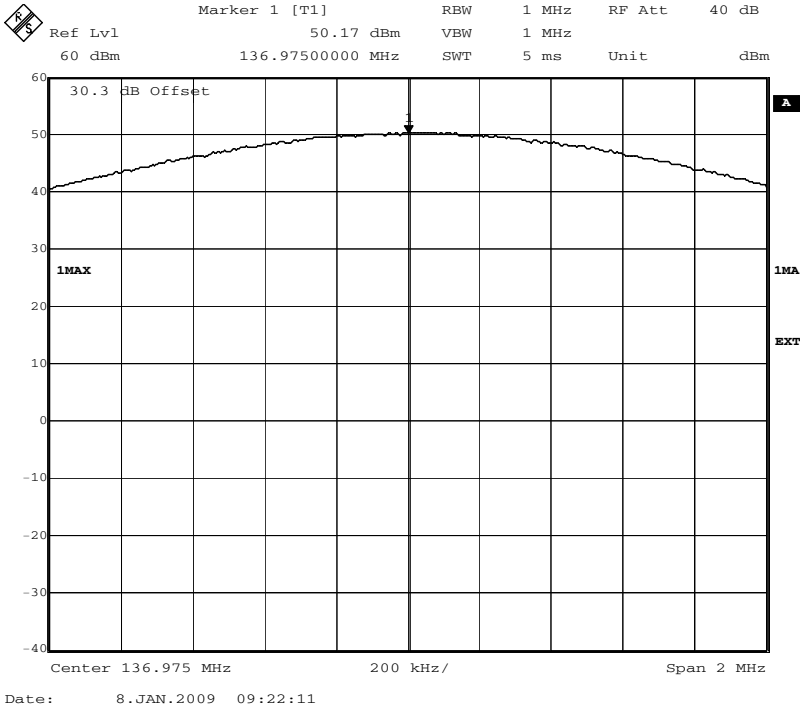

Fig. 9 – Output Power at the Antenna Connector (136.975 MHz)

Note: The external attenuation of 30.3 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during testing.