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EMC TEST REPORT

COMPANY: AGA RANGEMASTER LIMITED

PRODUCT : TESTING TO CFR47 PART15:249 and RSS210 ISSUE 8 ON A TOTAL CONTROL (CONTROLLER)

REPORT : 11055686LHD-001b

WRITTEN BY:	**G Aldridge**	
REVIEWED BY:	**D Legge**	
TEST ENGINEER:	**G Aldridge**	
ISSUE: 1	**DATE: 17th April 2012**	**TOTAL PAGES: 63**

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TABLES

GRAPHS

1. JOB DESCRIPTION

Equipment:	Cooker Controller
Equipment Model No.:	AE4M280168
Equipment Serial No.:	6331
Phase:	Compliance
Customer:	AGA Rangemaster Limited Station Road Ketley Telford TF1 5AQ United Kingdom
Test Plan Reference:	-
Test Standards:	CFR 47 Part 15:249, RSS 210 Issue 8
FCC : Ident	A2M-AGA-TC3
IC: Ident	10181AAGATC3
Test Location:	Intertek ETL Semko (Leatherhead) Unit D Randalls Way Leatherhead Surrey KT22 7SB
Test Work Started:	7th December 2011
Test Work Completed:	23rd January 2012

2. TEST SUMMARY

2.1. AGA Total Control Controller

2.1.1. CFR 47 Part 15:249 and RSS210 Issue 8

TEST STANDARD	TEST	COMMENT
CFR47:Part15:249.a	Fundamental Radiated Field Strength	Pass
CFR47:Part15:249a &d	Harmonic Radiated Field Strength	Pass
CFR47:Part15:247.4.d	Restricted Band Emissions	Pass
RSS 210: A8.4.4	Transmitter Effective Radiated Power	Pass
RSS 210: A8.5	100kHz out of band emissions	Pass
RSS 210:2.2	Restricted Band Emissions	Pass
RSS – Gen: 4.6.1	Occupied Bandwidth	Pass

2.1.2. CFR 47 Part 15:249 and RSS 210 Issue 8

TEST STANDARD	TEST	COMMENT
CFR47 15: 209	Radiated Emissions (Note 1)	Pass
CFR47 15: 205	Restricted Bands of Operation	Pass
RSS 210:2.2	Restricted Bands of Operation	Pass
RSS 210.2.5	Radiated Emissions(note1)	Pass

Note 1:This test was carried out in a FCC registered test chamber, which complies with FCC limits for Radiated Emissions over the frequency range 30MHz to 1000MHz. The test chamber is also registered with Industry Canada.

All the above tests have been carried out to meet the requirements of ANSI C63.4:2003 Test procedures.

3. EQUIPMENT UNDER TEST (EUT)

3.1. Description of the EUT

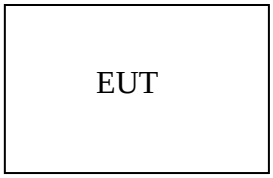
The Equipment Under Test (EUT) was a wireless controller for an electric cooker.

3.2. EUT's Modes of Operation

Mode 1: Continuously transmitting for transmit mode.

Mode 2: Powered and on but not transmitting.

3.3. EUT Configuration Diagram



3.4. EUT Support Equipment

None

3.5. Cables Associated With the EUT

None

4. TESTS

4.1. Transmitter Output Power (Conducted)

There was no external antenna connector and therefore this test was not carried out.

4.2. Radiated Peak Powers: CFR47 Part 15:249.a

These tests were carried out in a semi lined Anechoic chamber at a distance of three metres, using a bi-log antenna and N type cables. For the purpose of this test the transmitter was set to constant. Before formal testing commenced investigation showed that the higher field levels were in the horizontal plane.The following plots show corrected data incorporating all transducer factors.

Table 1 Radiated Emissions Test Results – TX Mode - 30-1000MHz Vertical Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.96 MHz	28.72	-11.27
1 Quasi Peak	113.32 MHz	22.32	-21.17
1 Quasi Peak	539.44 MHz	32.14	-13.87
1 Quasi Peak	750.56 MHz	33.57	-12.44
1 Quasi Peak	914.56 MHz	83.77	-10.23
1 Quasi Peak	979.12 MHz	35.58	-18.39

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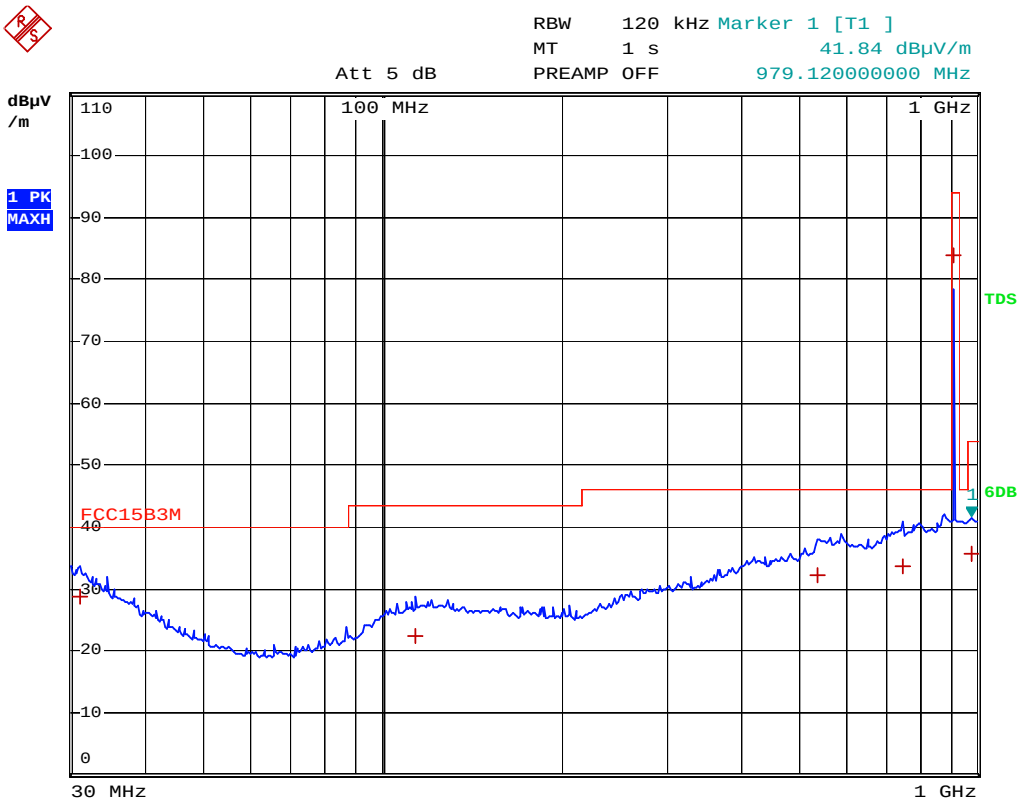
Date: 23.JAN.2012 15:00:12

Graph 1 Radiated Emissions Test Results – TX Mode - 30-1000MHz - Vertical



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Date: 23.JAN.2012 15:00:29

Table 2 Radiated Emissions Test Results – TX Mode - 30-1000MHz Horizontal Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.12 MHz	29.38	-10.62
1 Quasi Peak	123.36 MHz	22.73	-20.76
1 Quasi Peak	232.08 MHz	21.81	-24.20
1 Quasi Peak	547.12 MHz	32.53	-13.48
1 Quasi Peak	914.56 MHz	80.08	-13.91
1 Quasi Peak	951.6 MHz	35.63	-10.39

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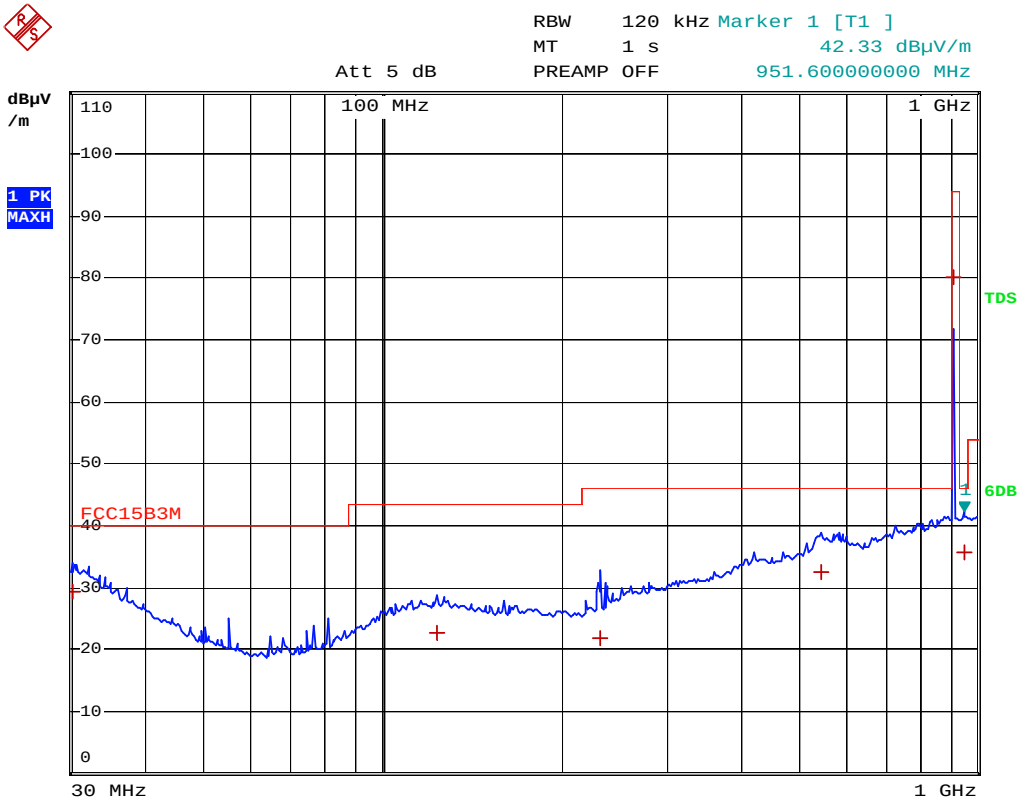
Date: 23.JAN.2012 15:11:18

Graph 2 Radiated Emissions Test Results – TX Mode - 30-1000MHz - Horizontal



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5. RADIATED EMISSIONS – CFR 47 PART15:209

5.1. Radiated Emissions Test Method

The testing was performed in accordance with ANSI C63.4:2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

Testing was conducted in a semi-anechoic chamber which meets the NSA requirements of CISPR 16 and CISPR 22. An emissions signature was obtained with the measuring antenna placed 3m from the EUT. Final measurements were carried out at frequencies falling within 10dB of the limit line.

5.2. Radiated Emissions Test Results

The results are given in Tables 3 to 8 and Graphs 3 to 40.

5.3. Radiated Emissions Conclusions

The EUT complied with the limits of FCC part 15, Clause 209 Class B.

5.4. Measurement Uncertainty

30MHz to 1000MHz ±5.7dB

The measurement uncertainties have been determined at a confidence level of not less than 95%.

Table 3 Radiated Emissions Test Results – TX Mode - 30-1000MHz Vertical Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.96 MHz	28.72	-11.27
1 Quasi Peak	113.32 MHz	22.32	-21.17
1 Quasi Peak	539.44 MHz	32.14	-13.87
1 Quasi Peak	750.56 MHz	33.57	-12.44
1 Quasi Peak	914.56 MHz	83.77	-10.23
1 Quasi Peak	979.12 MHz	35.58	-18.39

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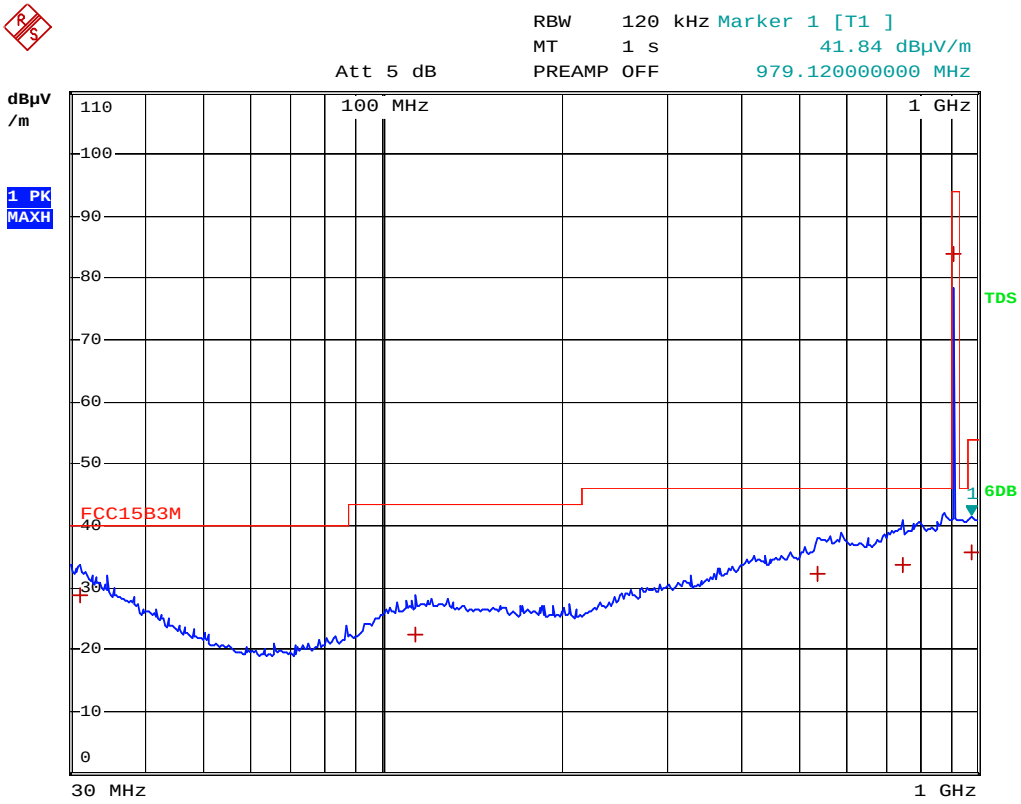
Date: 23.JAN.2012 15:00:12

Graph 3 Radiated Emissions Test Results – TX Mode - 30-1000MHz Vertical



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Date: 23.JAN.2012 15:00:29

Table 4 Radiated Emissions Test Results – TX Mode - 30-1000MHz Horizontal Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

EDIT PEAK LIST (Final Measurement Results)

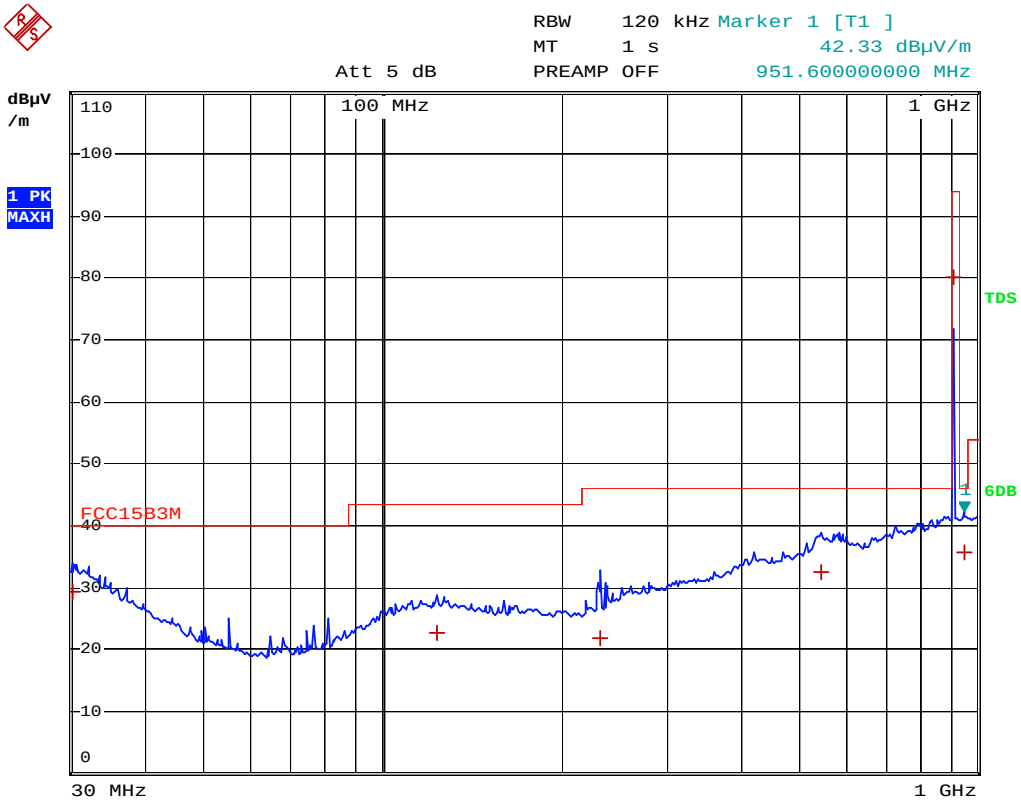
Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.12 MHz	29.38	-10.62
1 Quasi Peak	123.36 MHz	22.73	-20.76
1 Quasi Peak	232.08 MHz	21.81	-24.20
1 Quasi Peak	547.12 MHz	32.53	-13.48
1 Quasi Peak	914.56 MHz	80.08	-13.91
1 Quasi Peak	951.6 MHz	35.63	-10.39

50C

Date: 23.JAN.2012 15:11:18

Graph 4 Radiated Emissions Test Results – TX Mode - 30-1000MHz - Horizontal



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Date: 23.JAN.2012 15:11:40

Table 5 Radiated Emissions Test Results – Standby Mode - 30-1000MHz Vertical Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

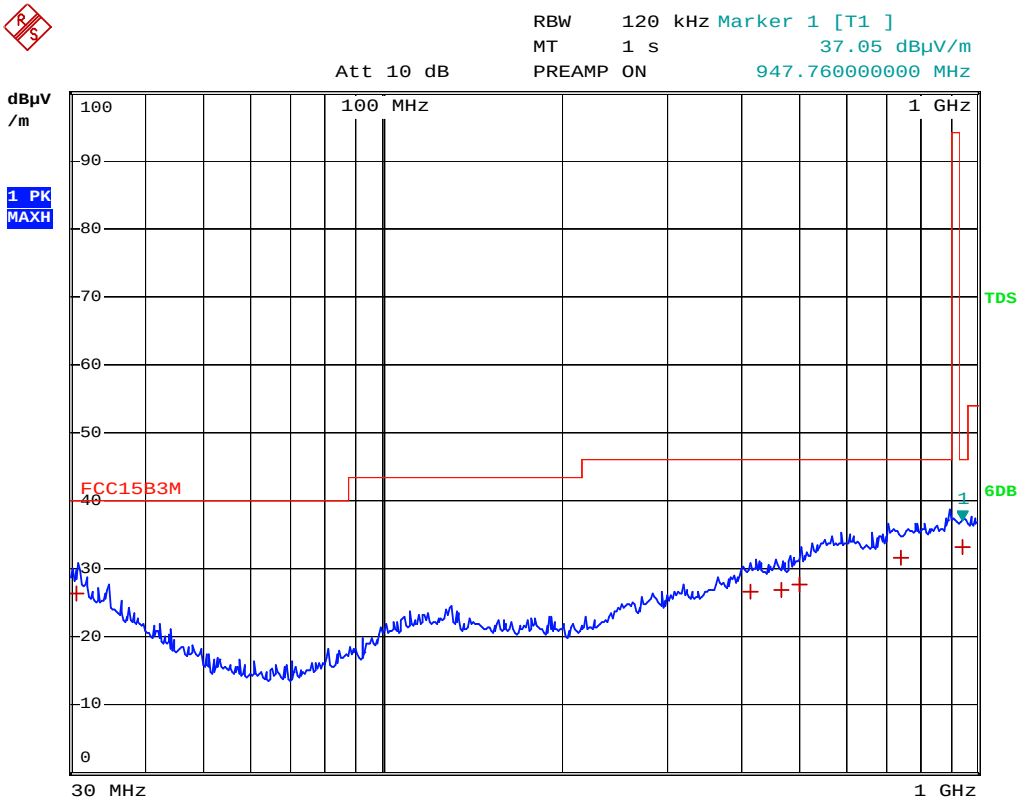
EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.6 MHz	26.39	-13.61
1 Quasi Peak	416.16 MHz	26.65	-19.36
1 Quasi Peak	468.08 MHz	27.02	-19.00
1 Quasi Peak	504.16 MHz	27.56	-18.45
1 Quasi Peak	743.68 MHz	31.63	-14.38
1 Quasi Peak	946.24 MHz	33.08	-12.94

Date: 13.DEC.2011 11:12:27

Graph 5 Radiated Emissions Test Results – Standby Mode - 30-1000MHz Vertical



Date: 13.DEC.2011 11:12:58

Table 6 Radiated Emissions Test Results – Standby Mode - 30-1000MHz Horizontal Polarisation

Standard: FCC Part 15

Test: Radiated Emissions

Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBµV/m

Bandwidth: 120kHz

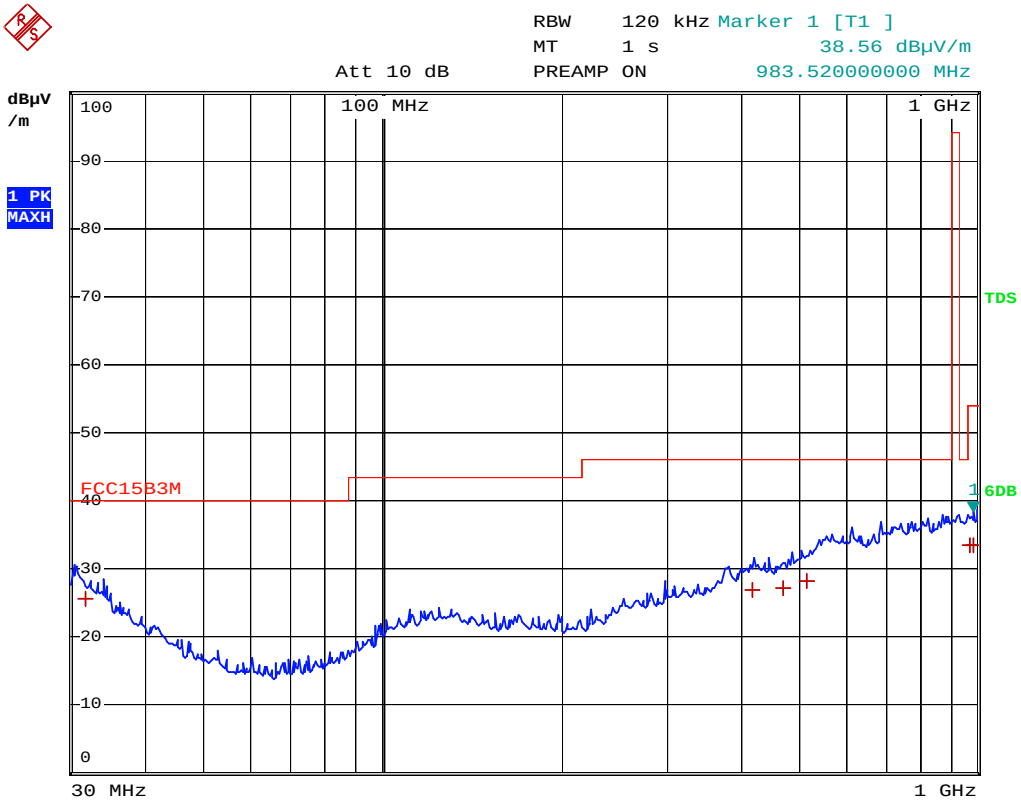
EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15B3M
Trace2: ---
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	31.7 MHz	25.59	-14.40
1 Quasi Peak	417.92 MHz	26.82	-19.19
1 Quasi Peak	470.72 MHz	27.12	-18.89
1 Quasi Peak	519.12 MHz	28.14	-17.87
1 Quasi Peak	971.2 MHz	33.33	-20.64
1 Quasi Peak	985.6 MHz	33.38	-20.59

Date: 13.DEC.2011 11:01:00

Graph 6 Radiated Emissions Test Results – Standby Mode - 30-1000MHz Horizontal



Date: 13.DEC.2011 11:01:40

Table 7 Radiated Emissions Test Results – TX Mode - 1 - 10GHz
Vertical & Horizontal Polarisations

Standard: FCC Part 15

Test: Radiated Emissions

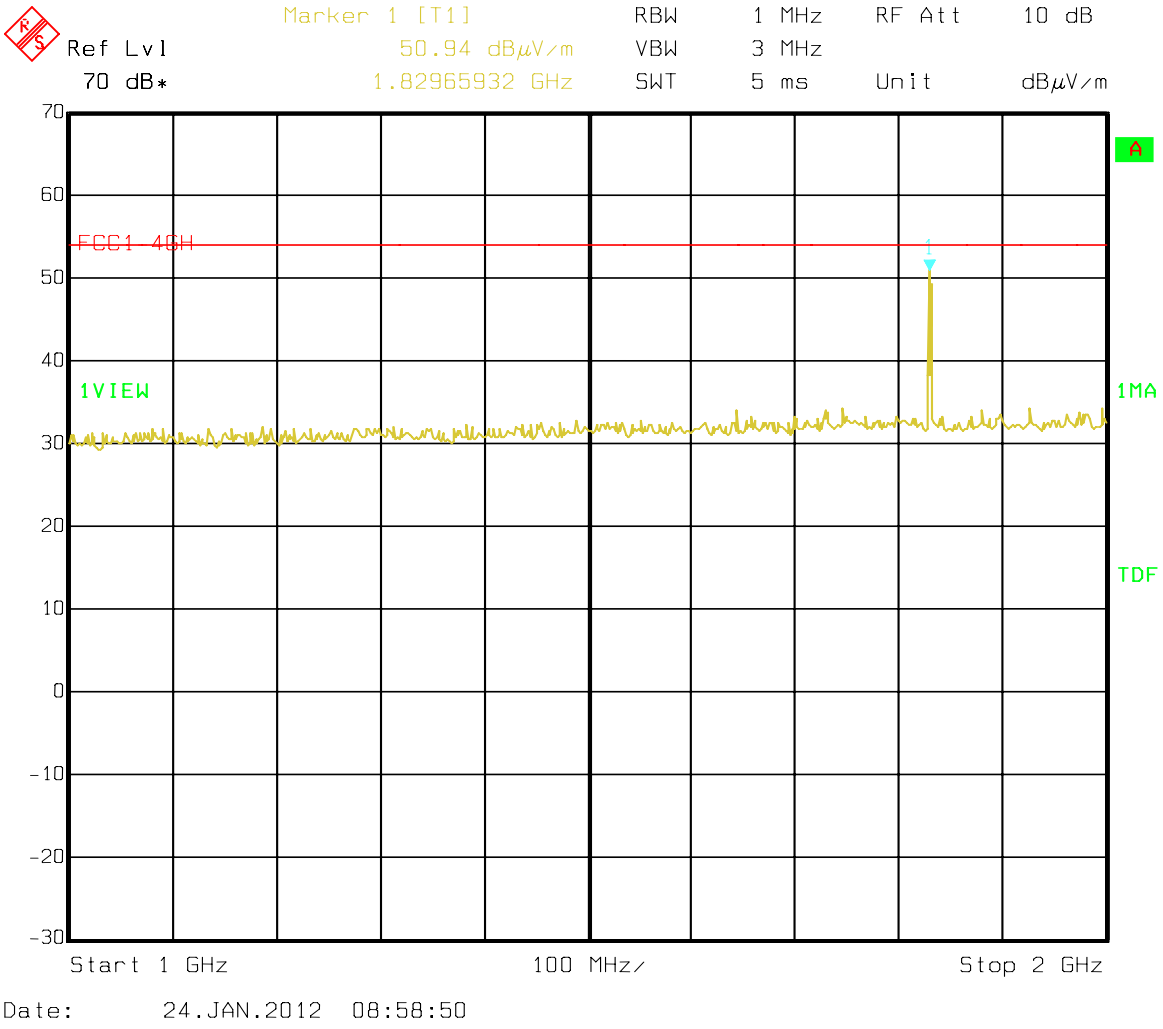
Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBμV/m

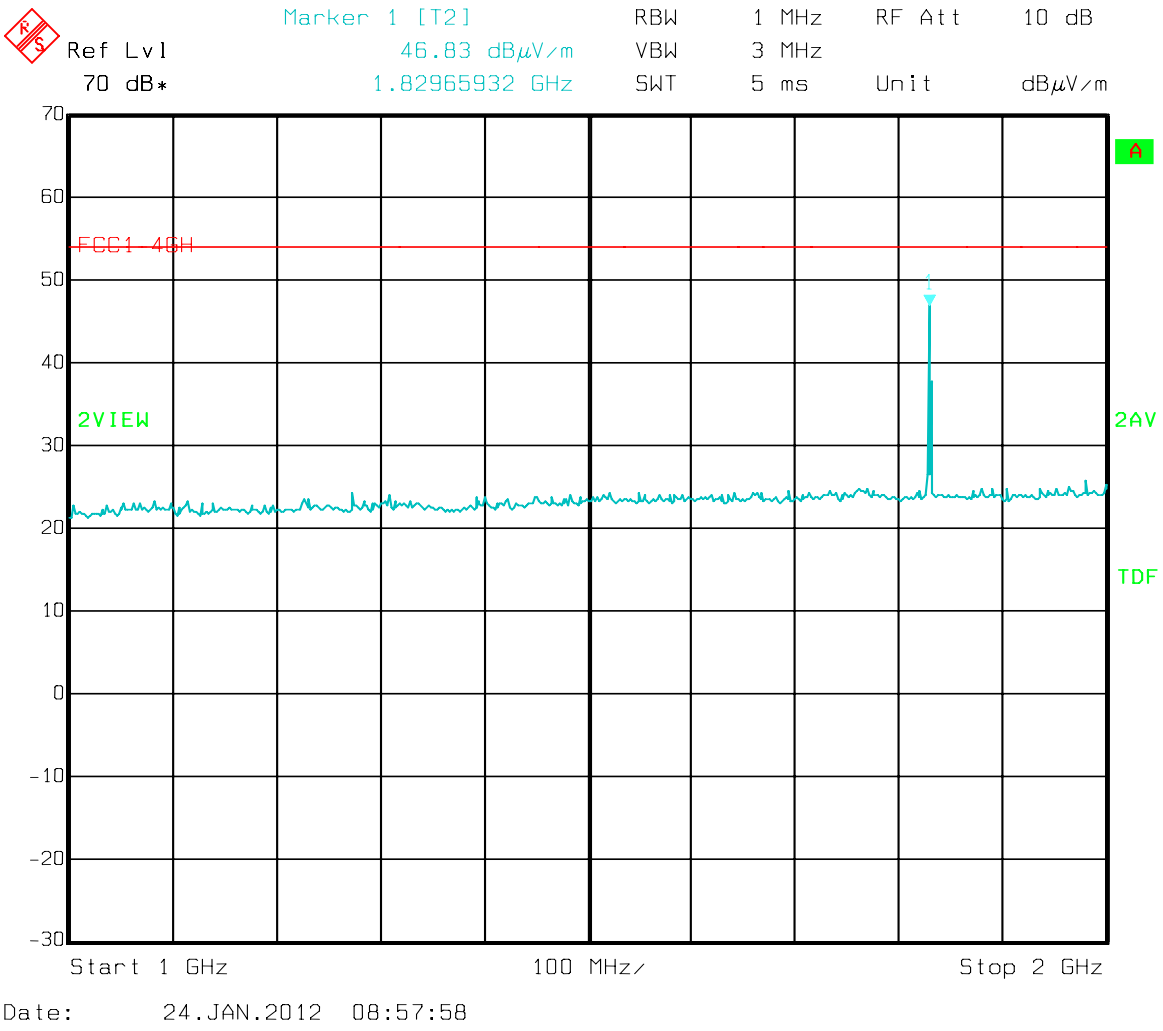
Bandwidth: 1MHz

No measurements were made as all emissions were >6dB from the limit line.

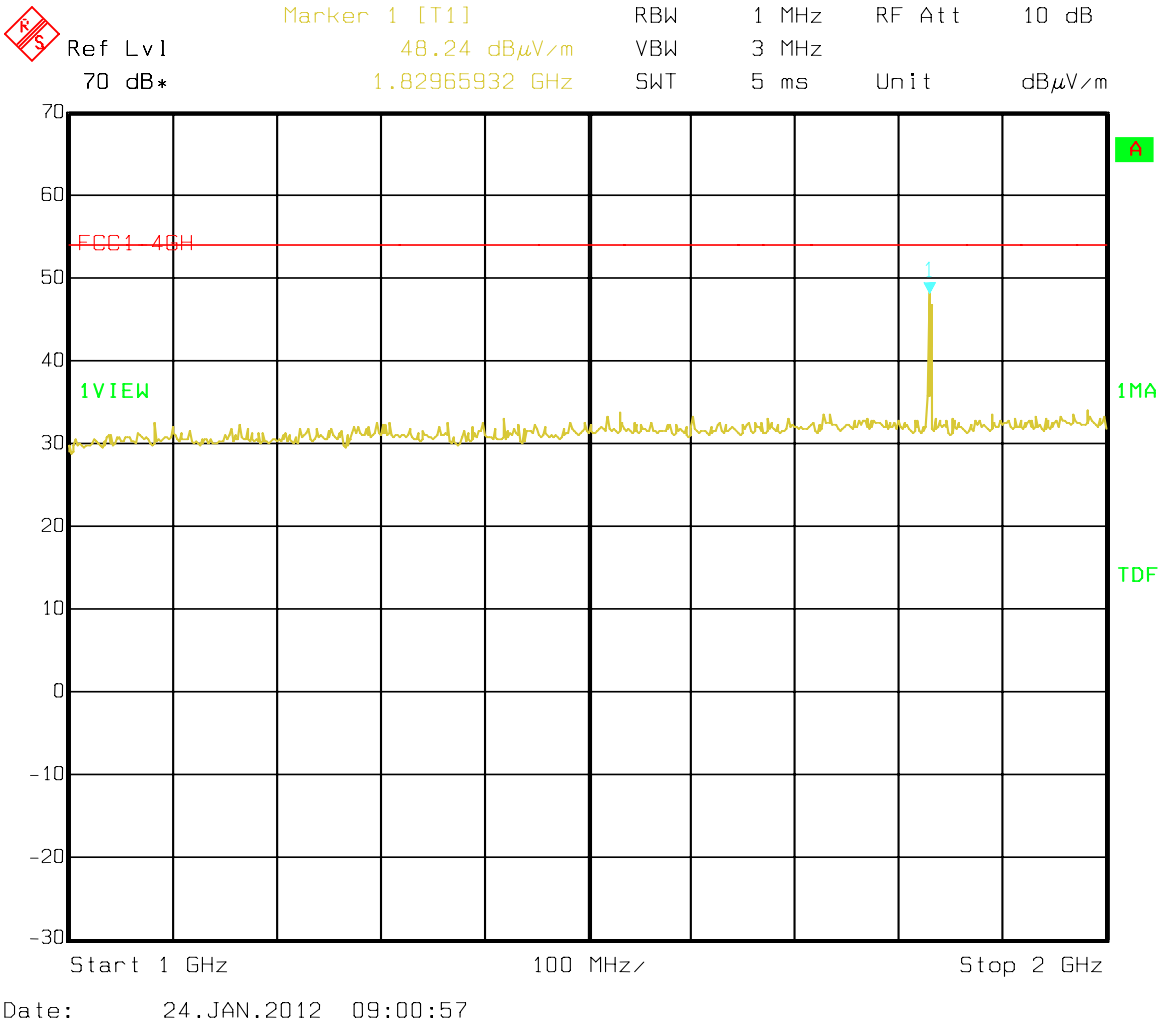
Graph 7 Radiated Emissions Test Results – TX Mode - 1 - 2GHz Vertical – Peak



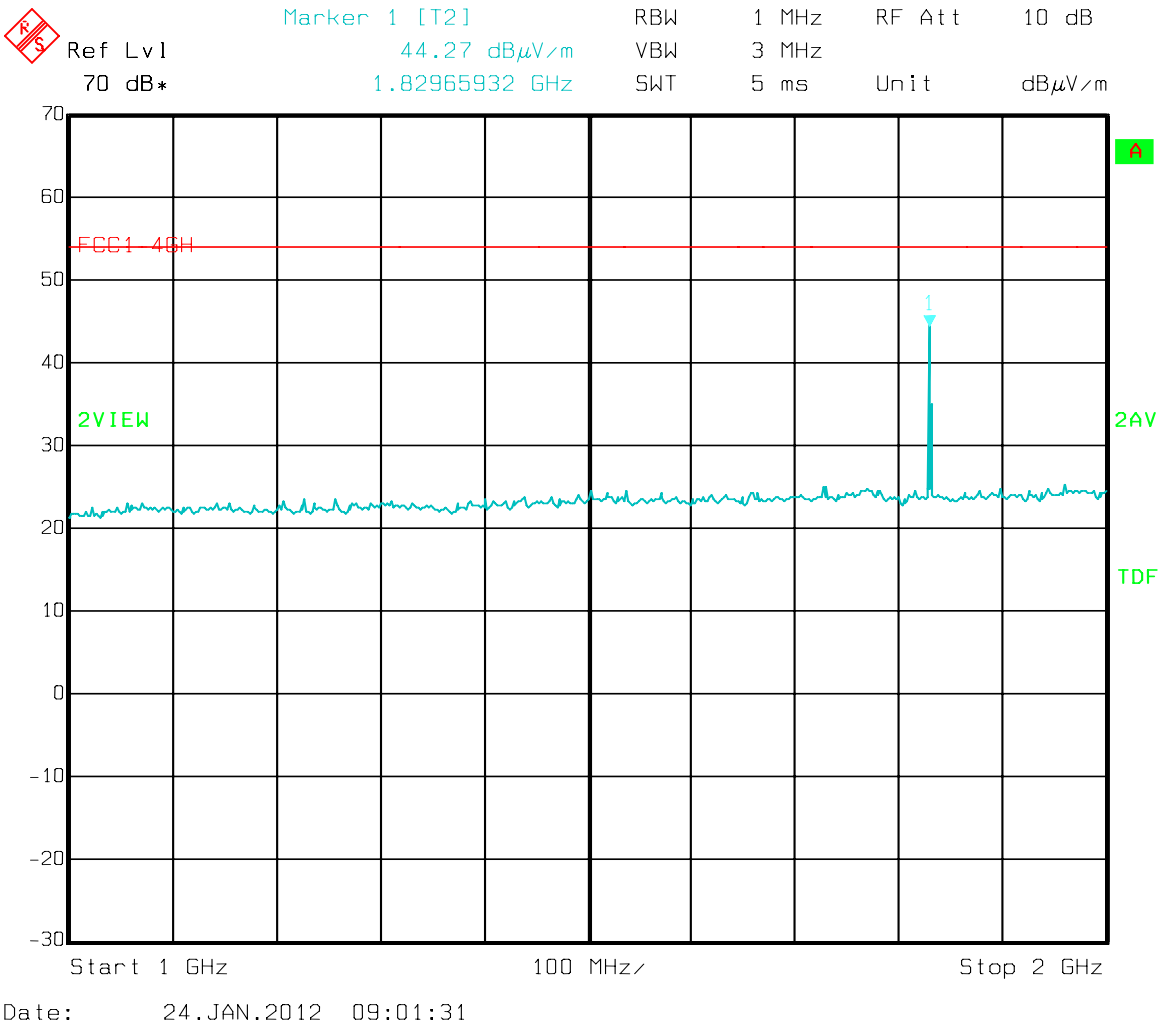
Graph 8 Radiated Emissions Test Results – TX Mode - 1 - 2GHz Vertical – Average



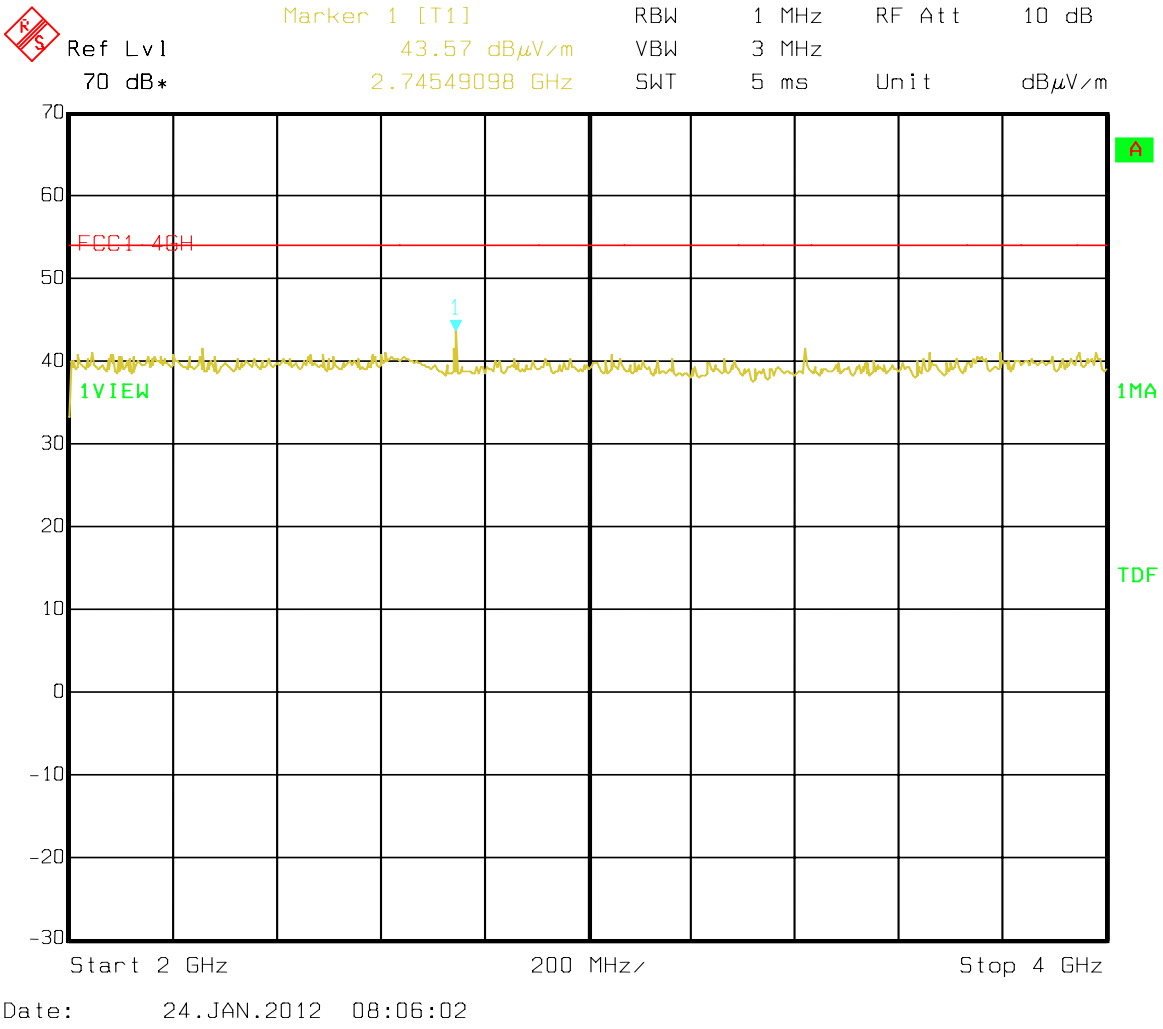
Graph 9 Radiated Emissions Test Results – TX Mode - 1 - 2GHz Horizontal – Peak



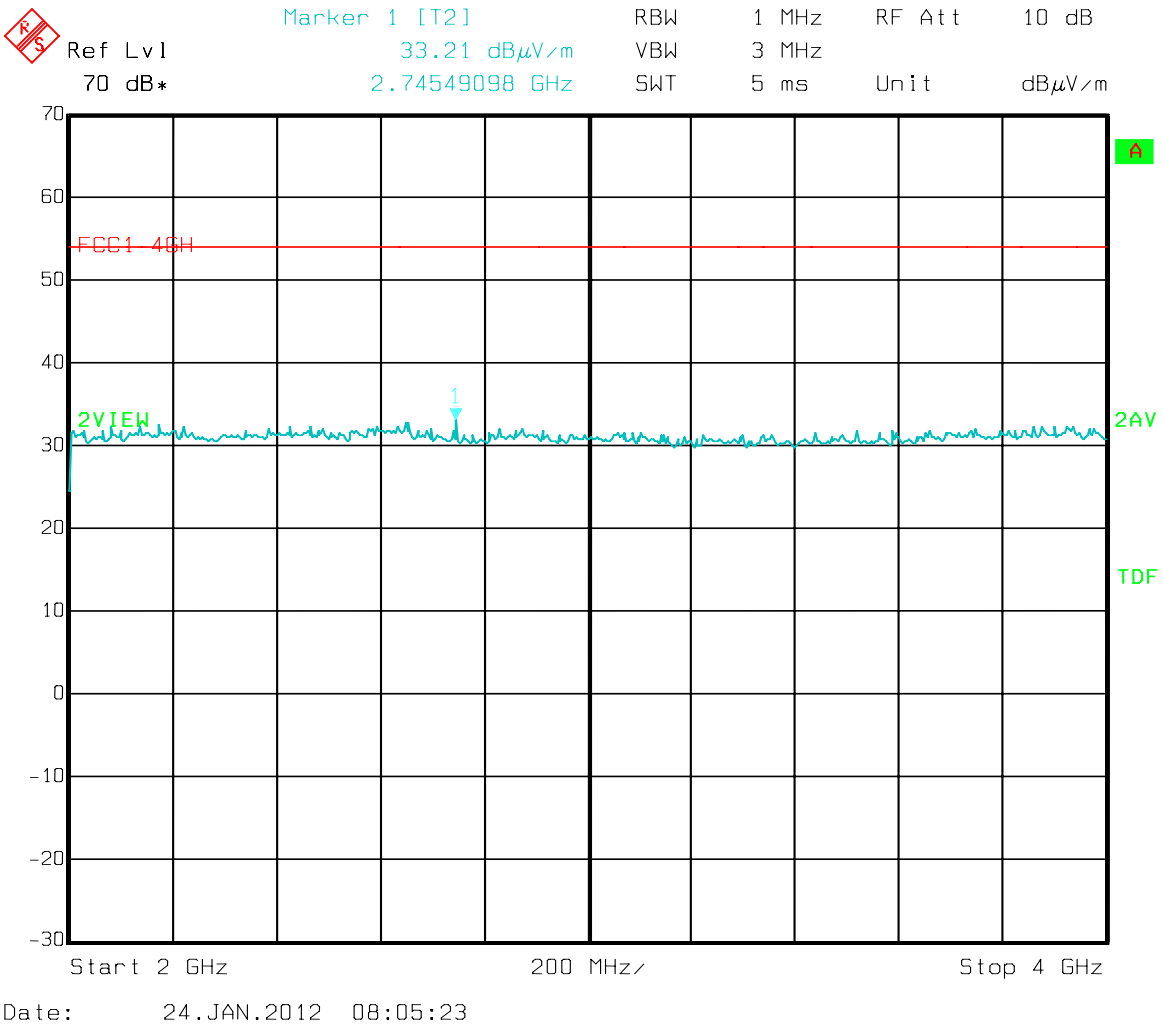
Graph 10 Radiated Emissions Test Results – TX Mode - 1 - 2GHz Horizontal – Average



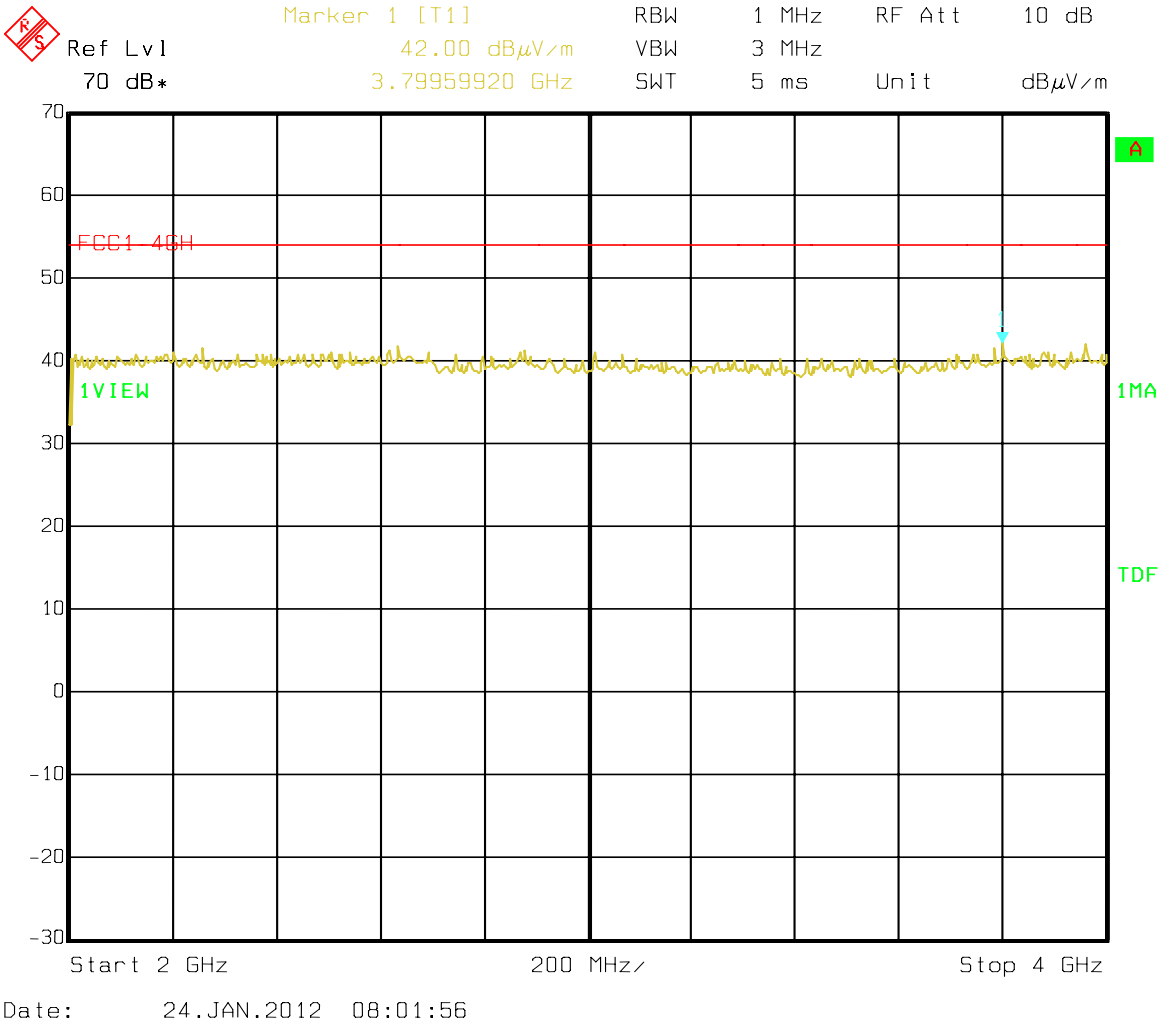
Graph 11 Radiated Emissions Test Results – TX Mode - 2 - 4GHz Vertical – Peak



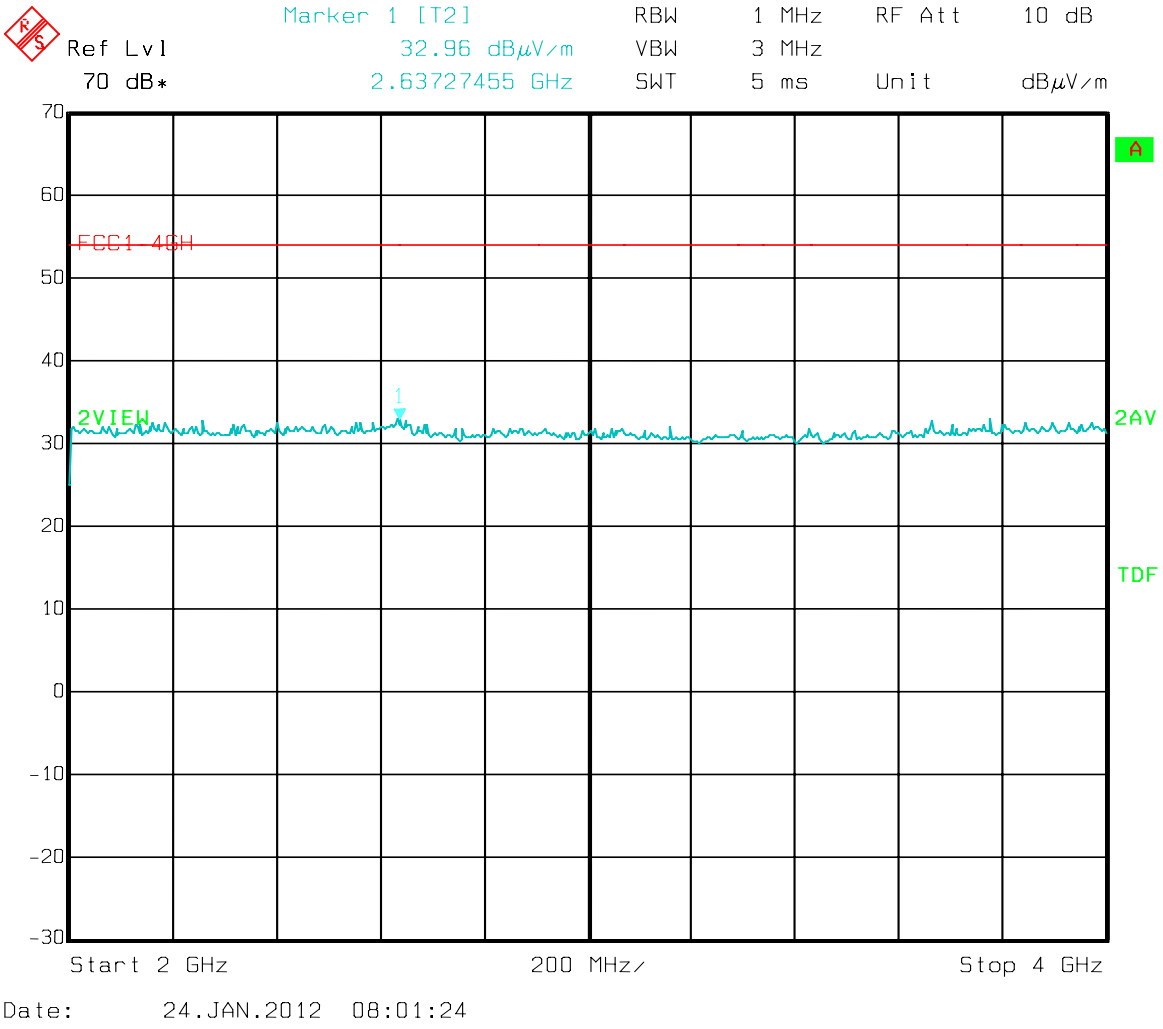
Graph 12 Radiated Emissions Test Results – TX Mode - 2 - 4GHz Vertical – Average



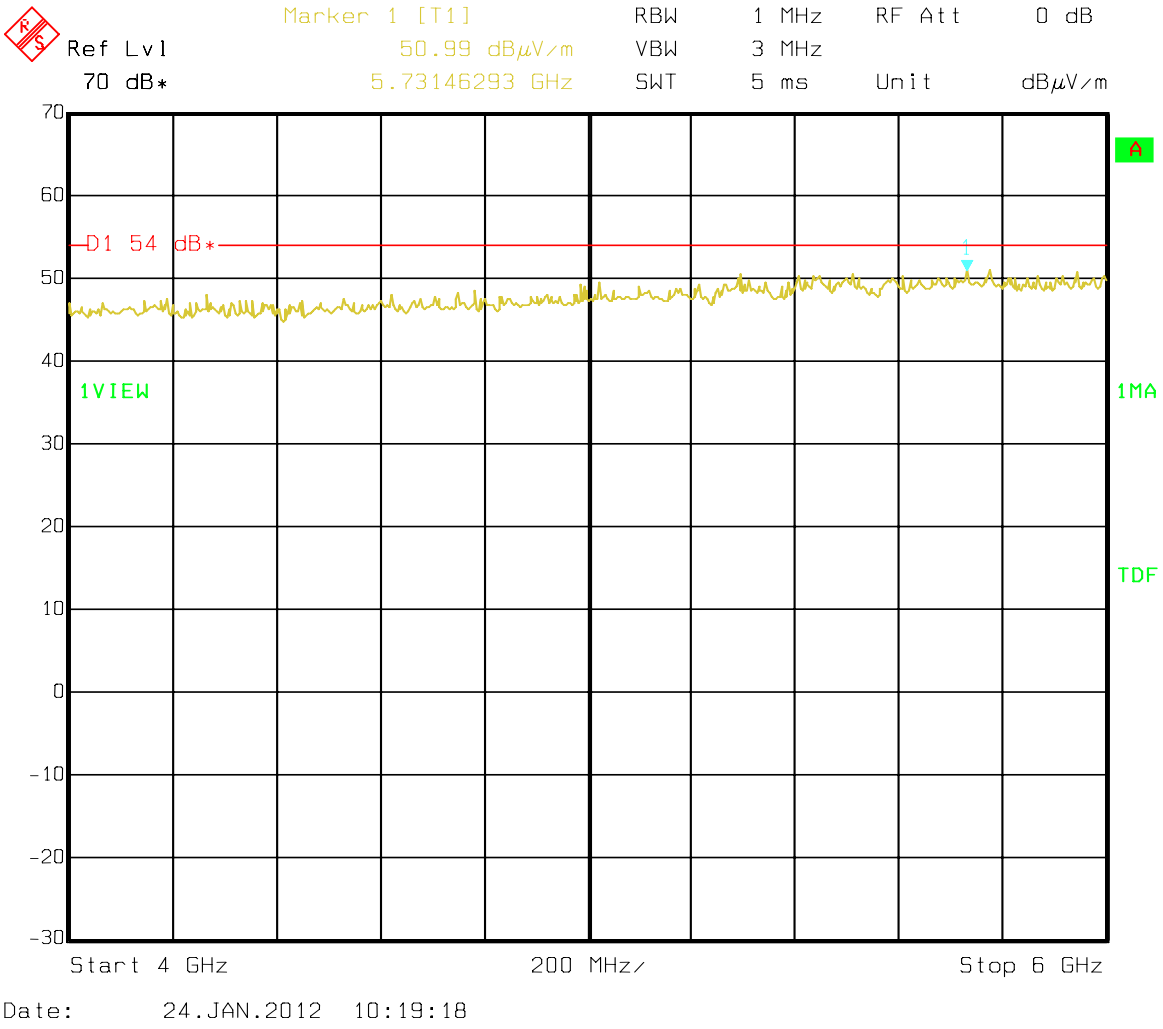
Graph 13 Radiated Emissions Test Results – TX Mode - 2 - 4GHz Horizontal – Peak



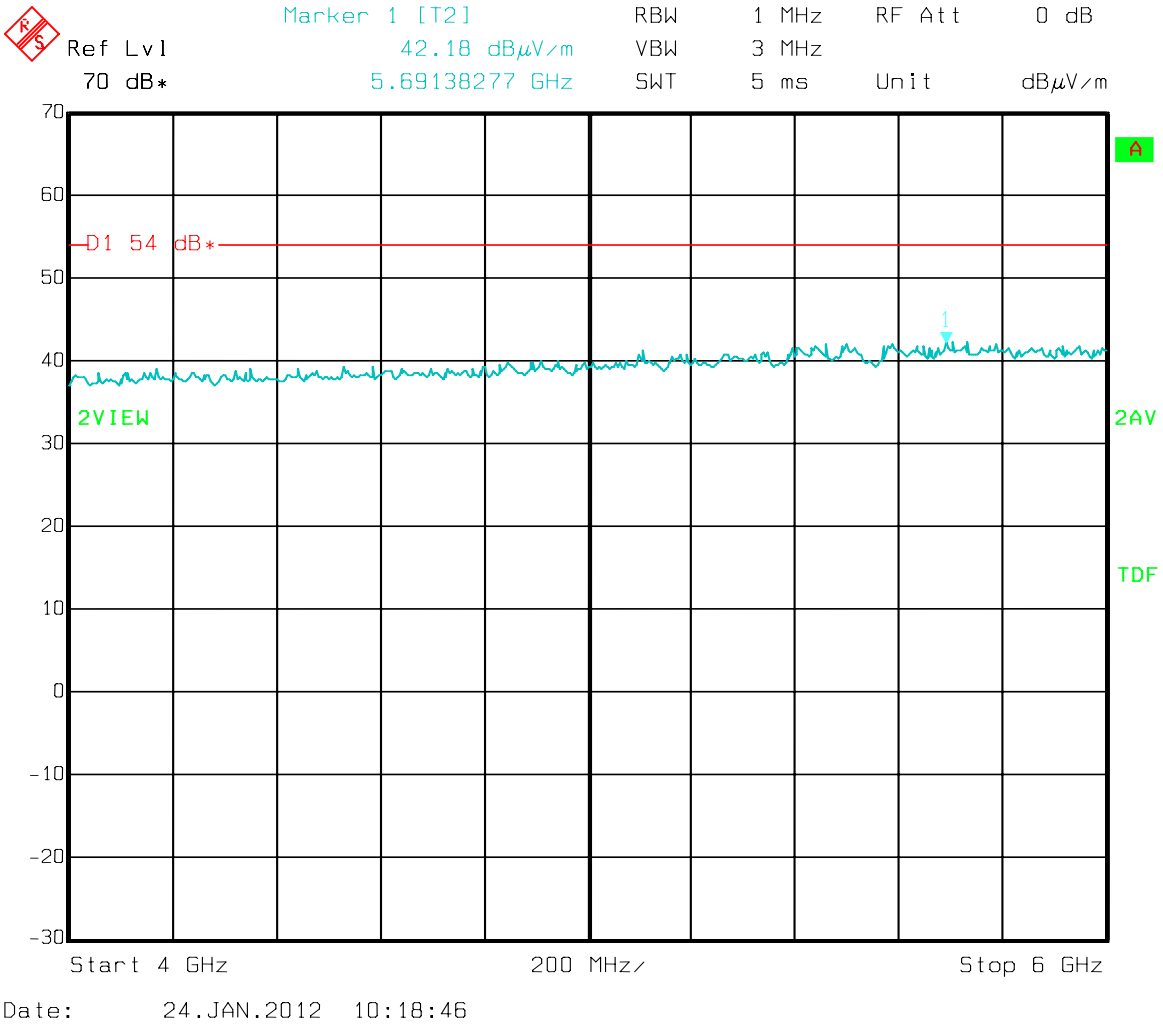
Graph 14 Radiated Emissions Test Results – TX Mode - 2 - 4GHz Horizontal – Average



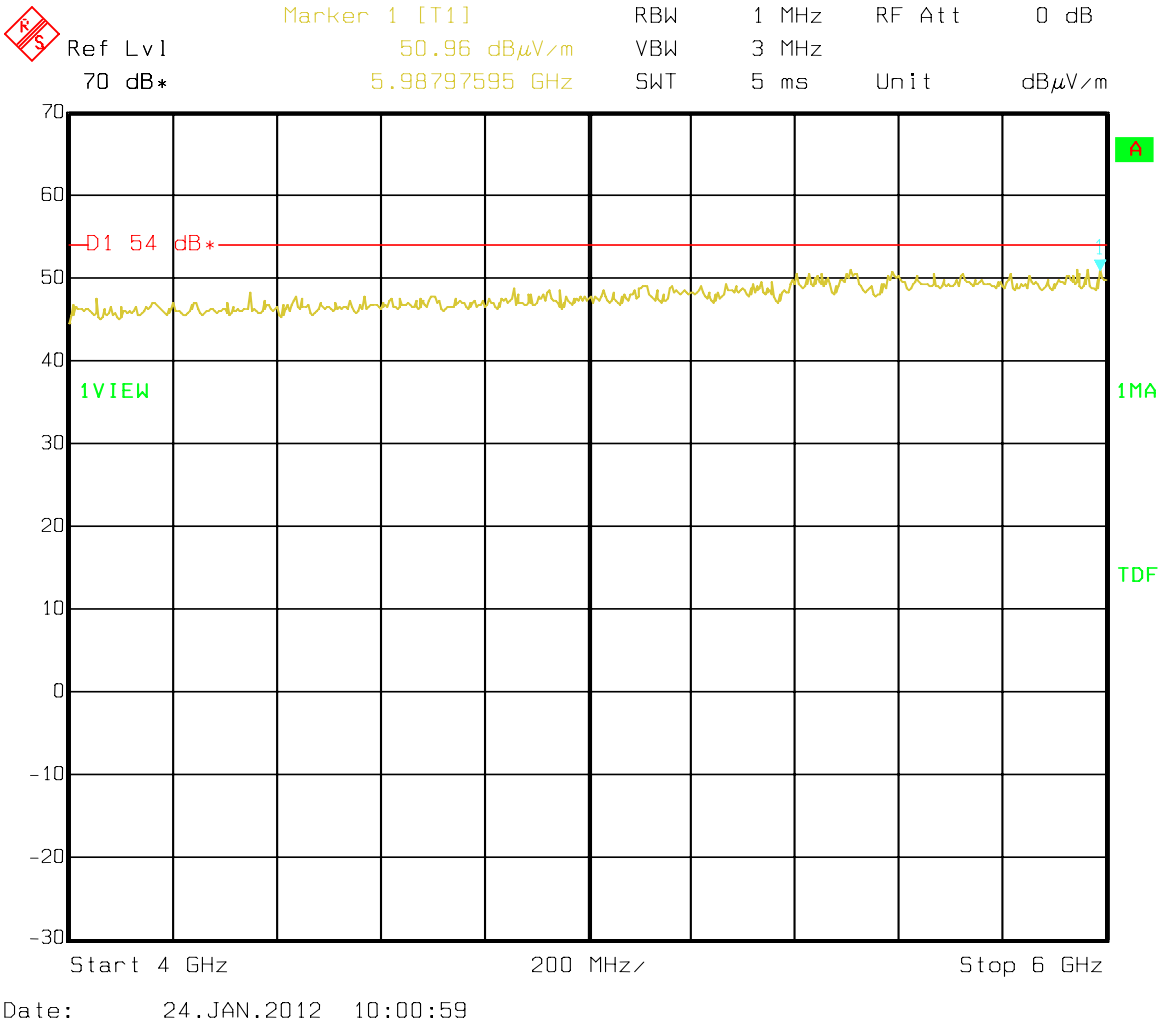
Graph 15 Radiated Emissions Test Results – TX Mode - 4 - 6GHz Vertical – Peak



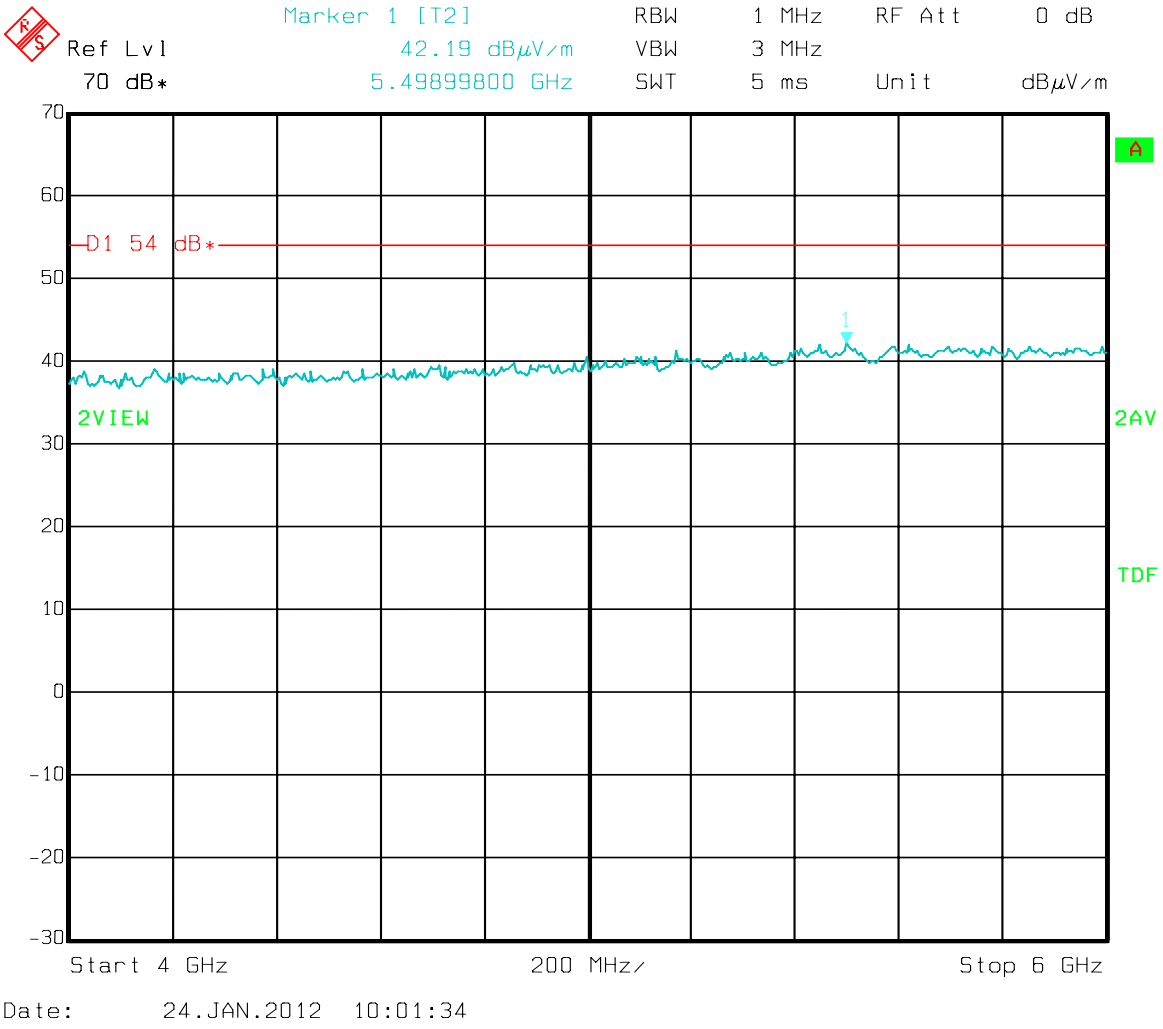
Graph 16 Radiated Emissions Test Results – TX Mode - 4 - 6GHz Vertical – Average



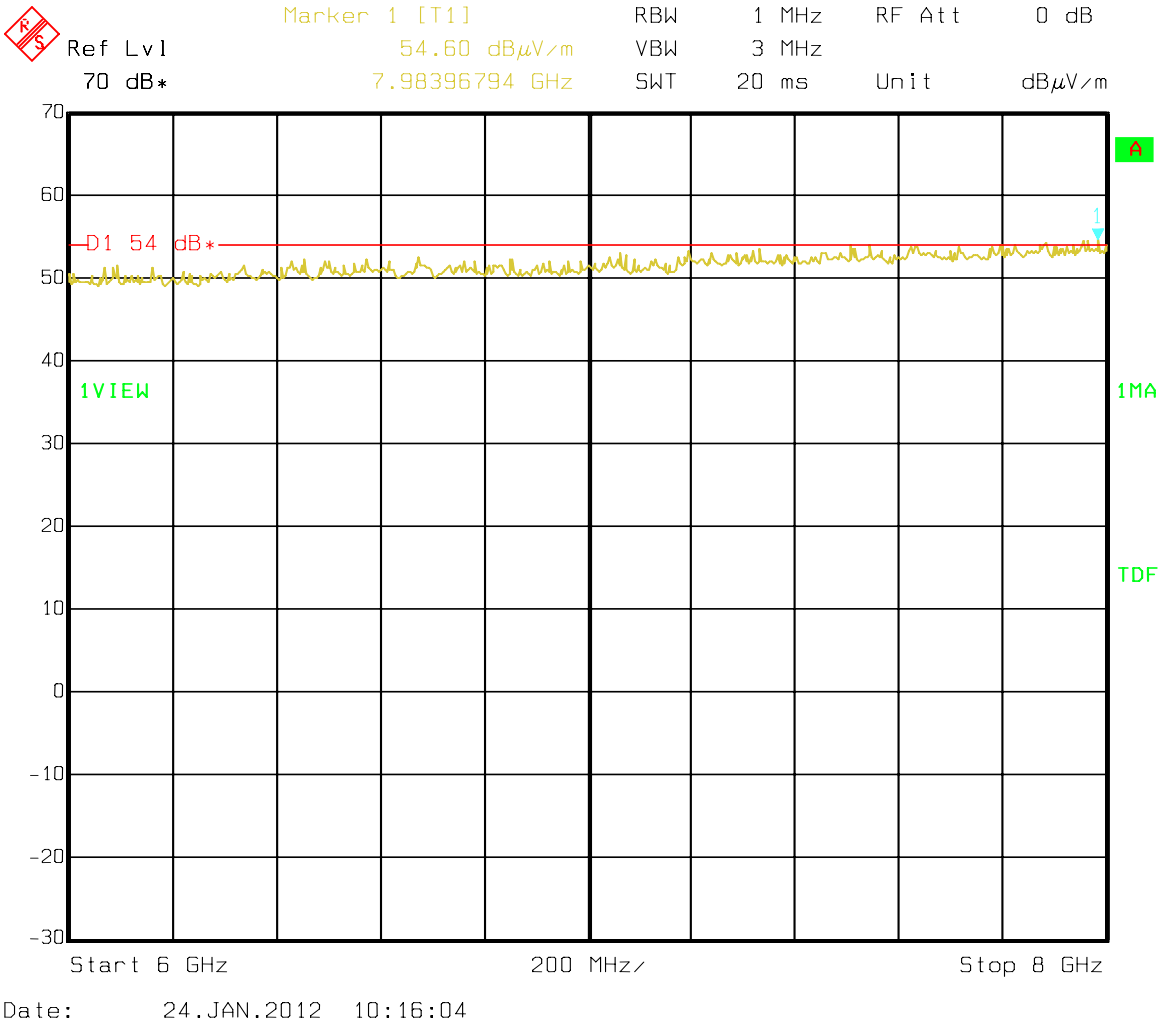
Graph 17 Radiated Emissions Test Results – TX Mode - 4 - 6GHz Horizontal – Peak



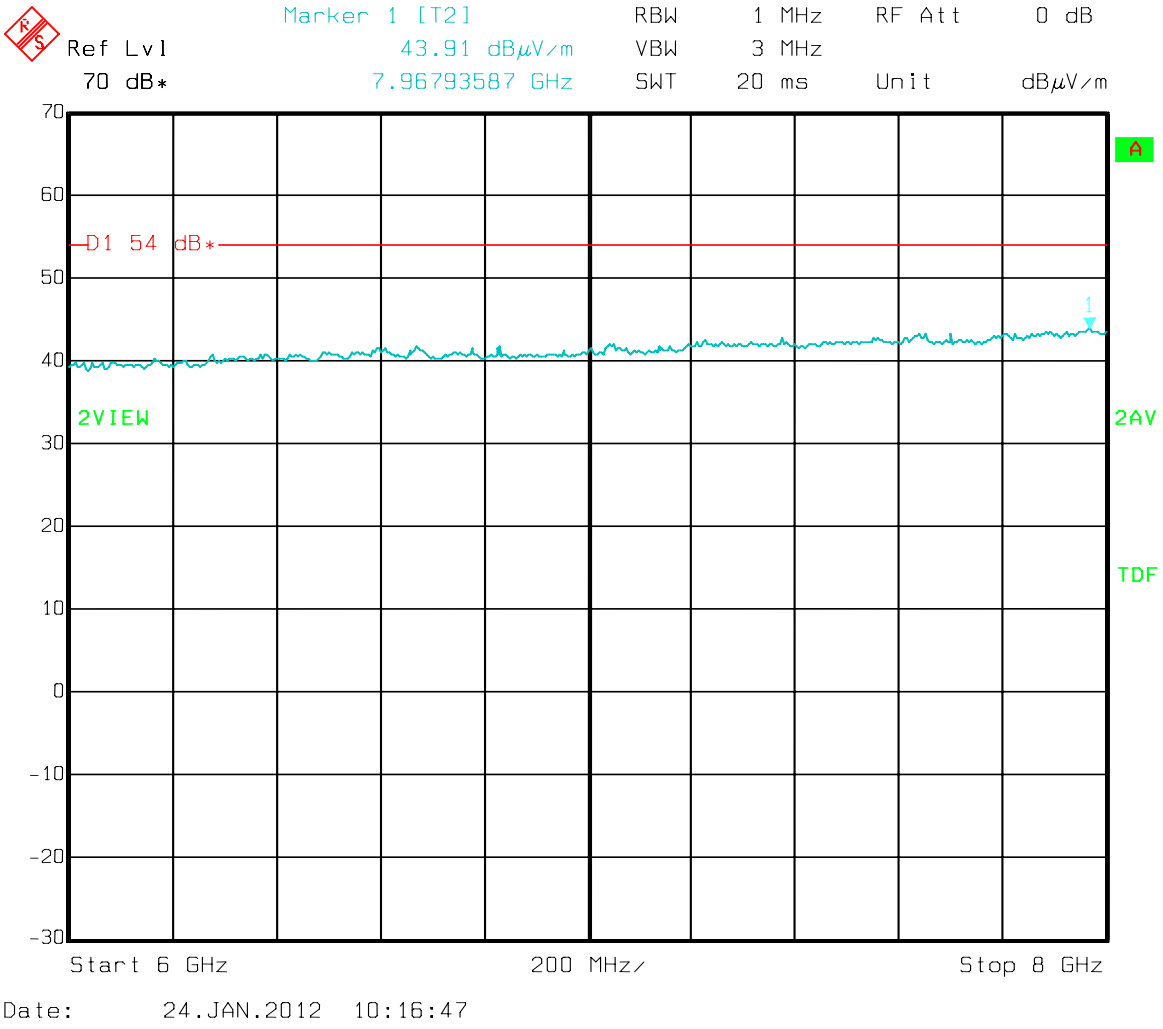
Graph 18 Radiated Emissions Test Results – TX Mode - 4 - 6GHz Horizontal – Average



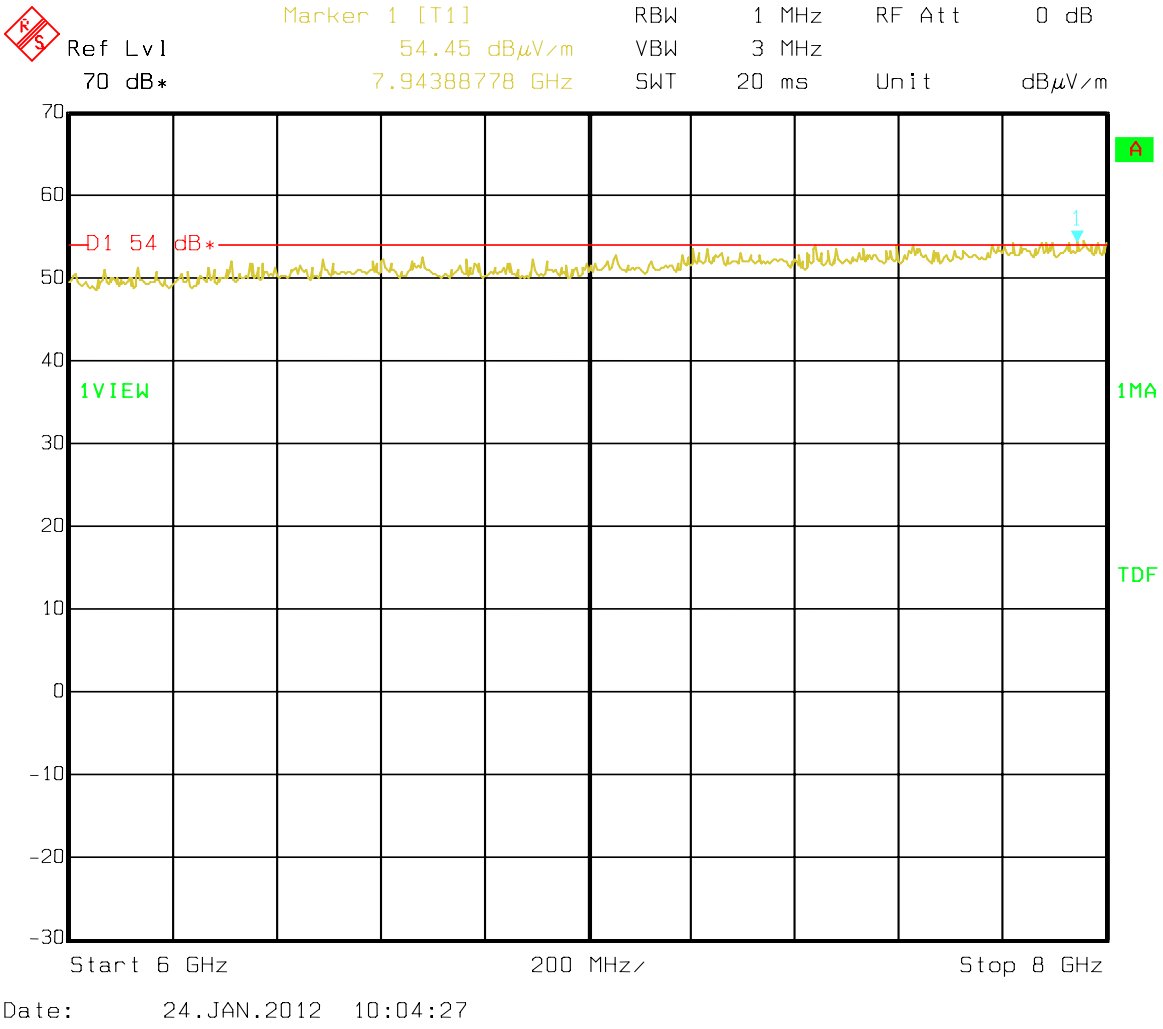
Graph 19 Radiated Emissions Test Results – TX Mode - 6 - 8GHz Vertical – Peak



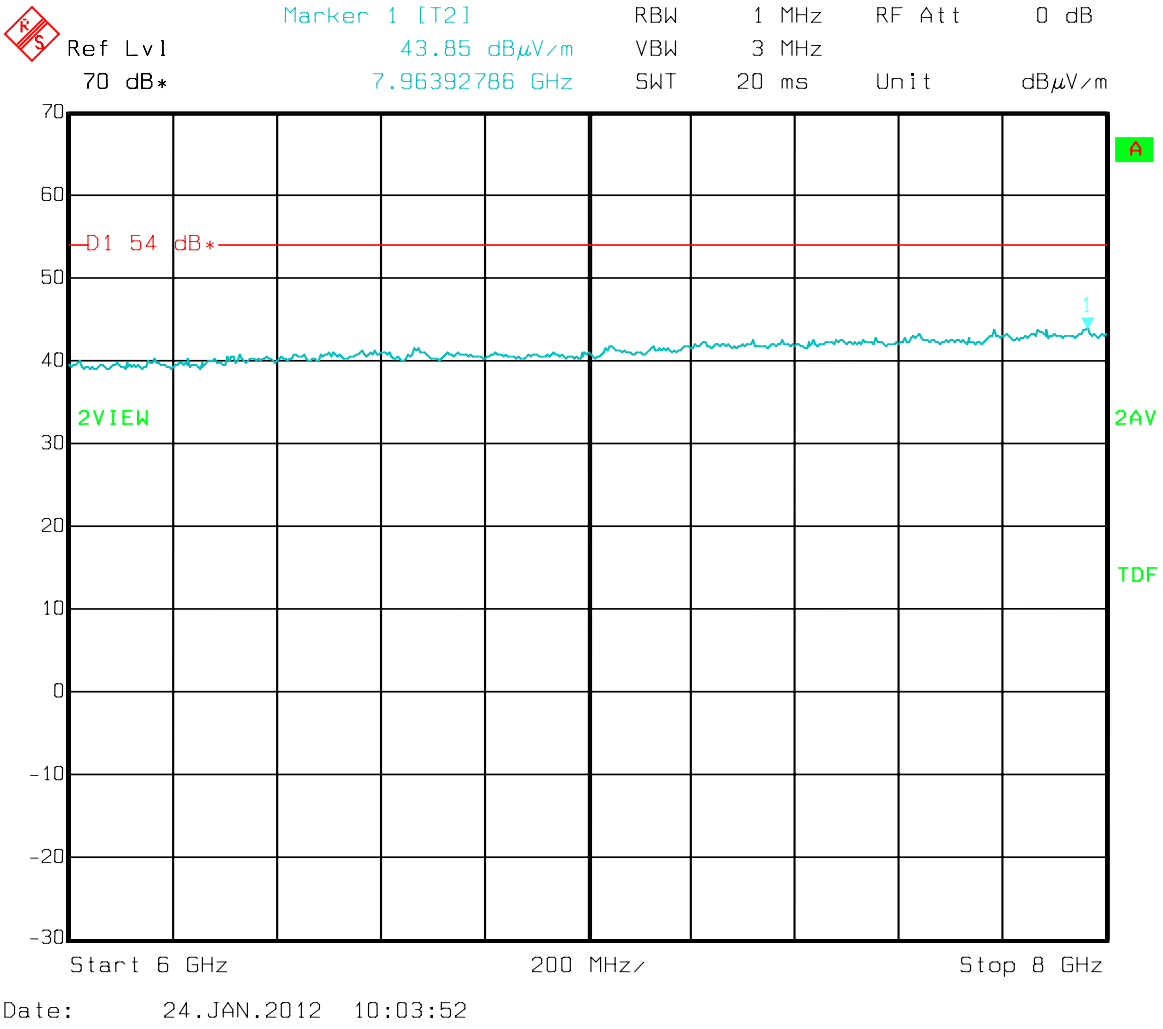
Graph 20 Radiated Emissions Test Results – TX Mode - 6 - 8GHz Vertical – Average



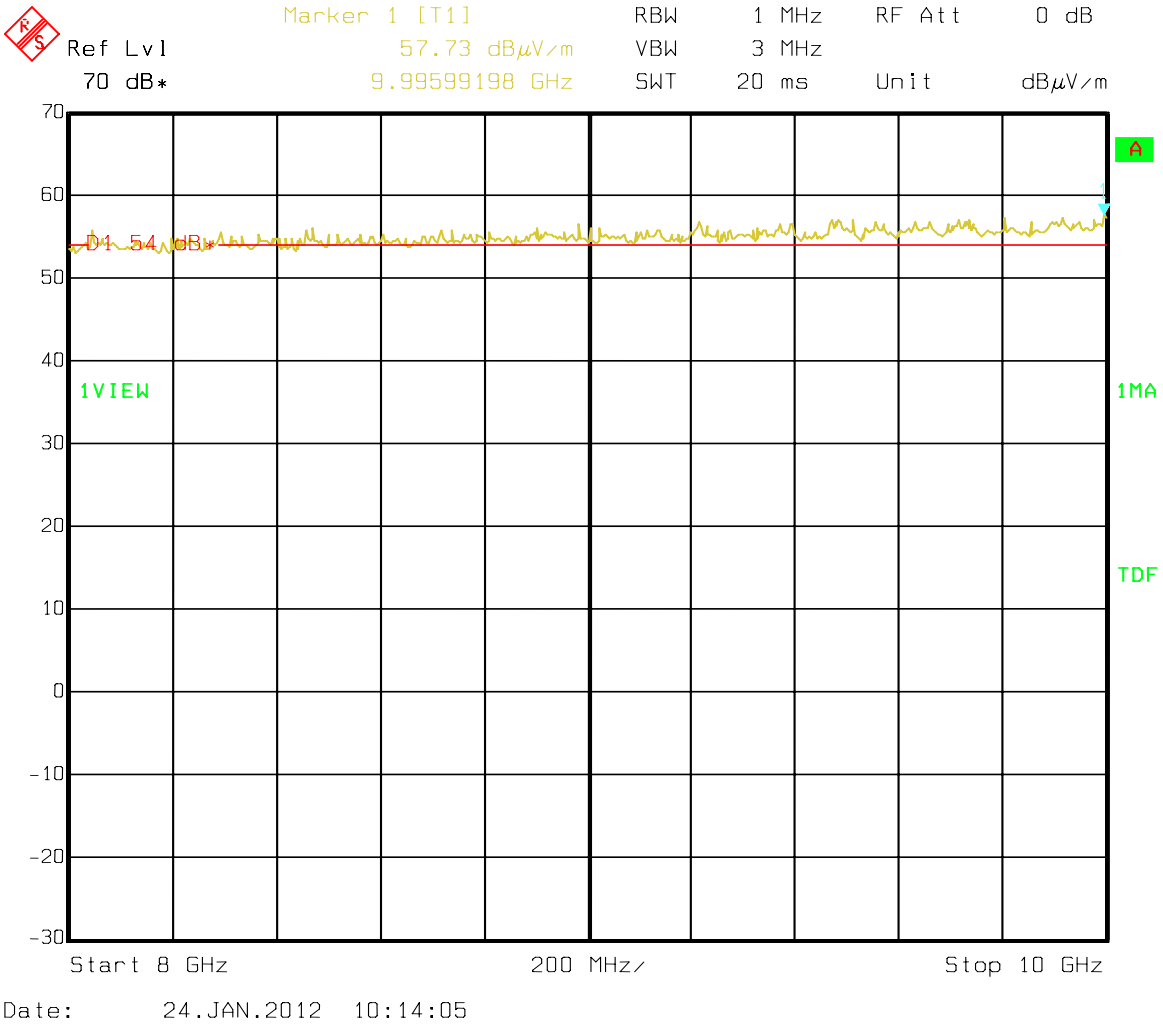
Graph 21 Radiated Emissions Test Results – TX Mode - 6 - 8GHz Horizontal – Peak



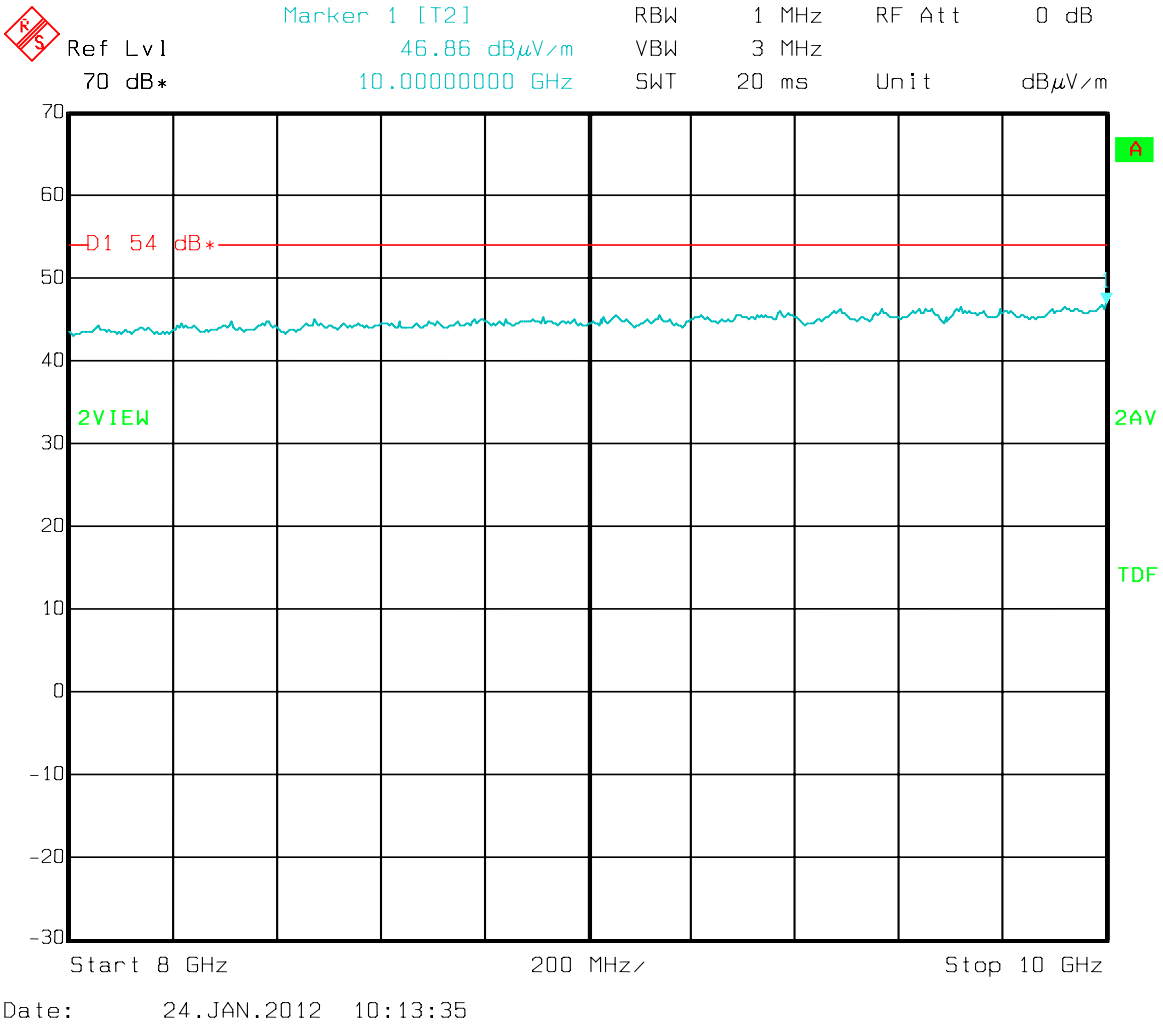
Graph 22 Radiated Emissions Test Results – TX Mode - 6 - 8GHz Horizontal – Average



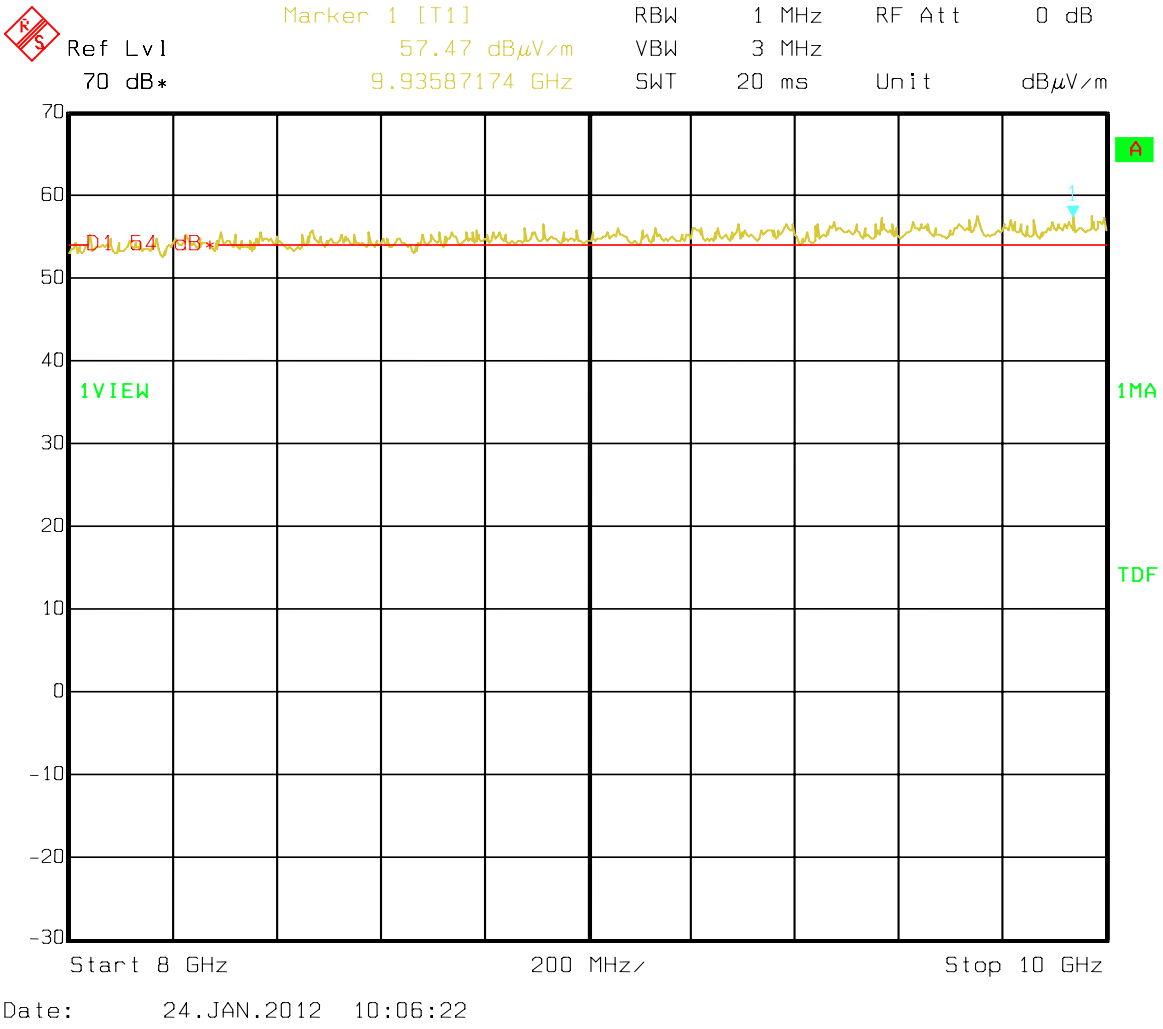
Graph 23 Radiated Emissions Test Results – TX Mode - 8 - 10GHz Vertical – Peak



Graph 24 Radiated Emissions Test Results – TX Mode - 8 - 10GHz Vertical – Average



Graph 25 Radiated Emissions Test Results – TX Mode - 8 - 10GHz Horizontal – Peak



Graph 26 Radiated Emissions Test Results – TX Mode - 8 - 10GHz Horizontal – Average

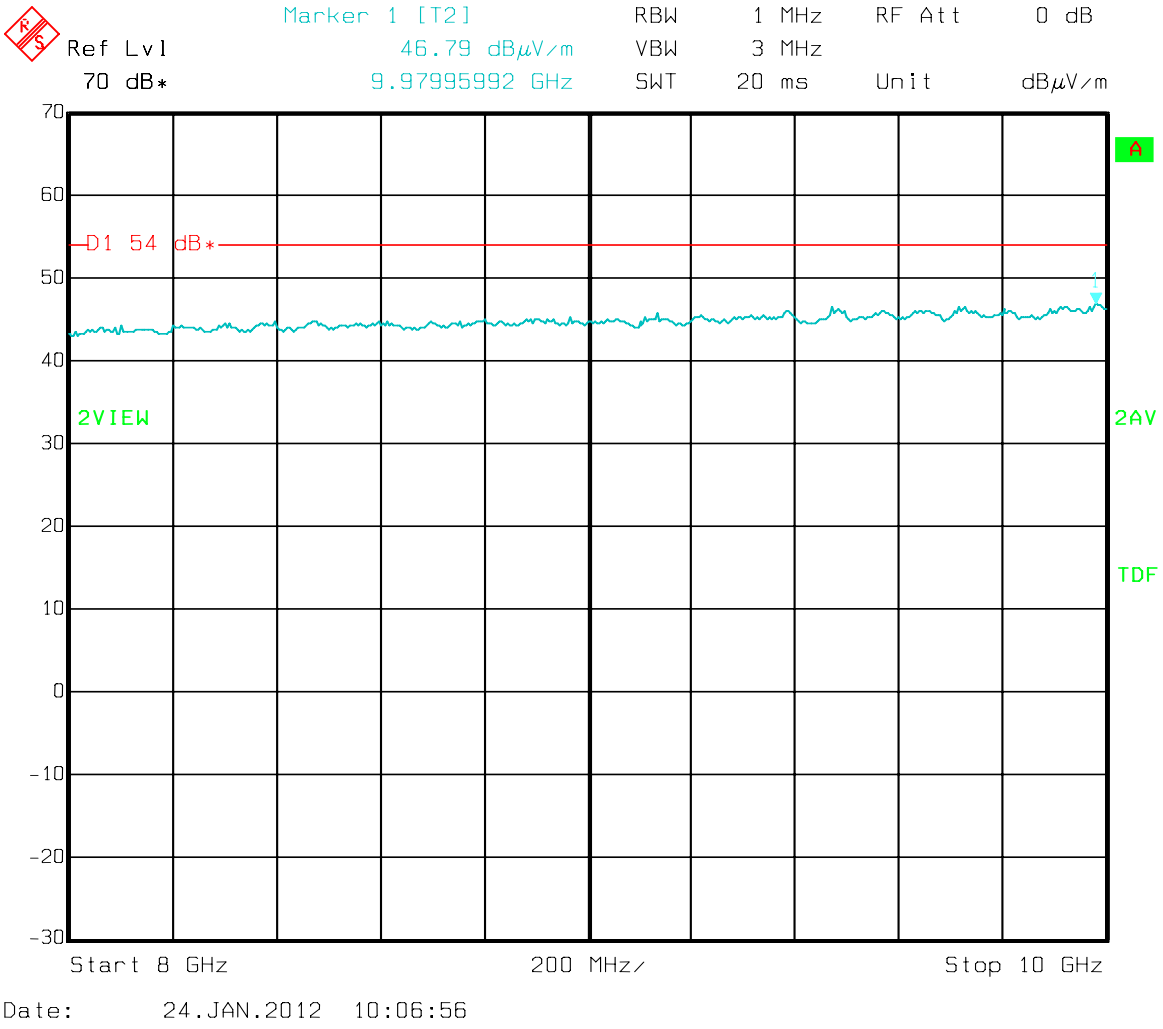


Table 8 Radiated Emissions Test Results – Standby Mode - 1 - 10GHz Vertical & Horizontal

Standard: FCC Part 15

Test: Radiated Emissions

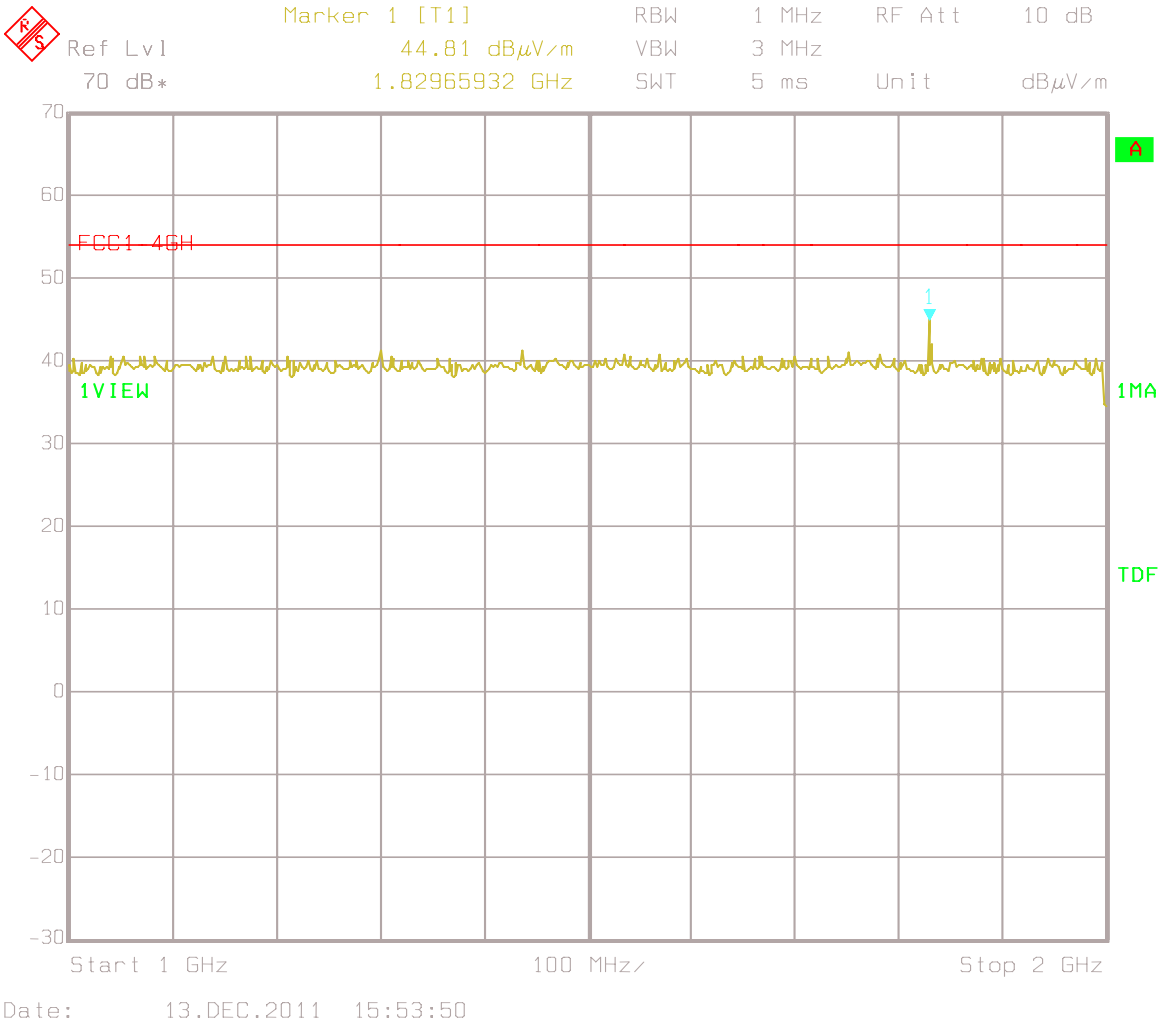
Port: Enclosure

Units of measurement:
Frequency: MHz Amplitude: dBμV/m

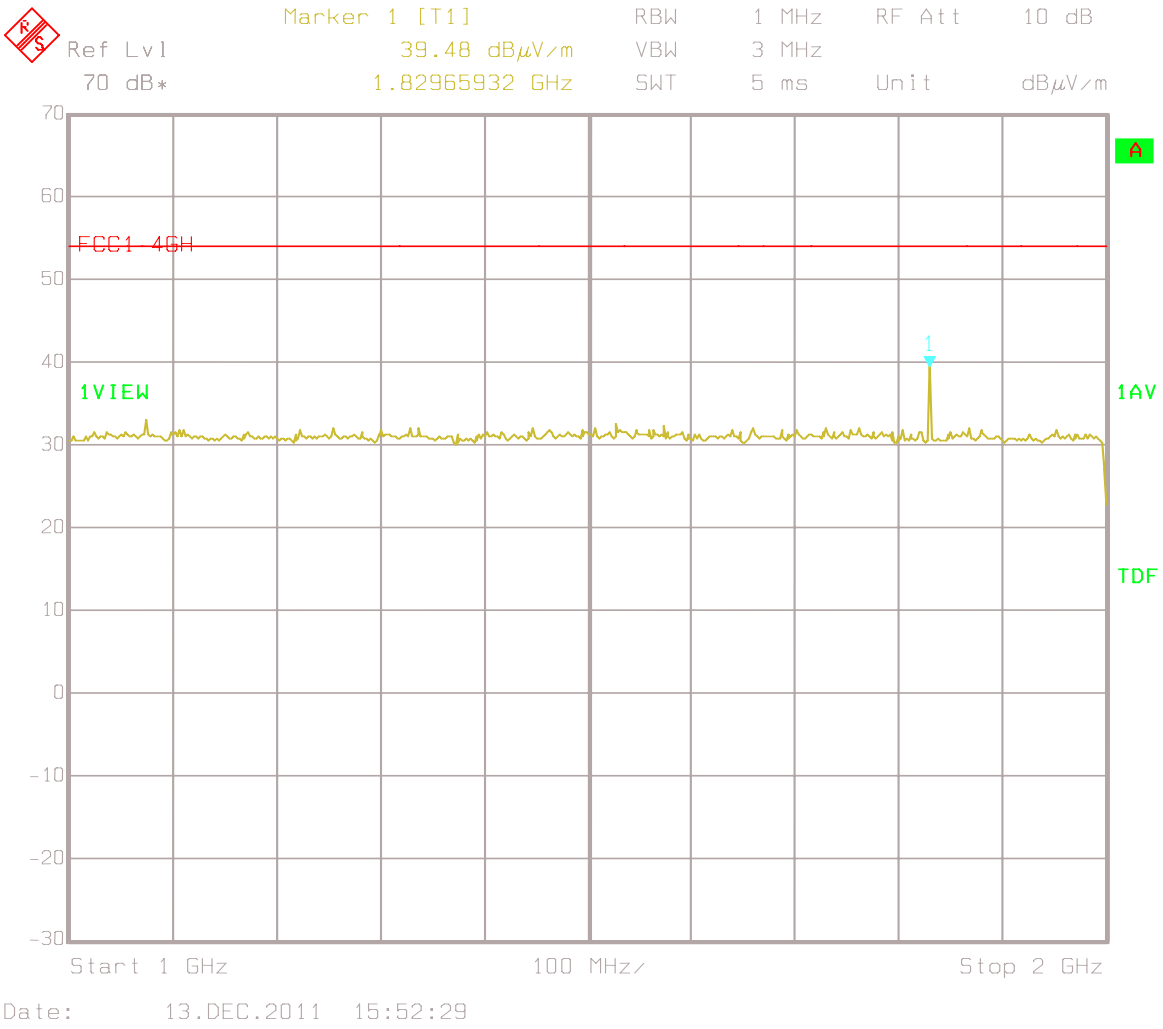
Bandwidth: 1MHz

No measurements were made as all emissions were >6dB from the limit line.

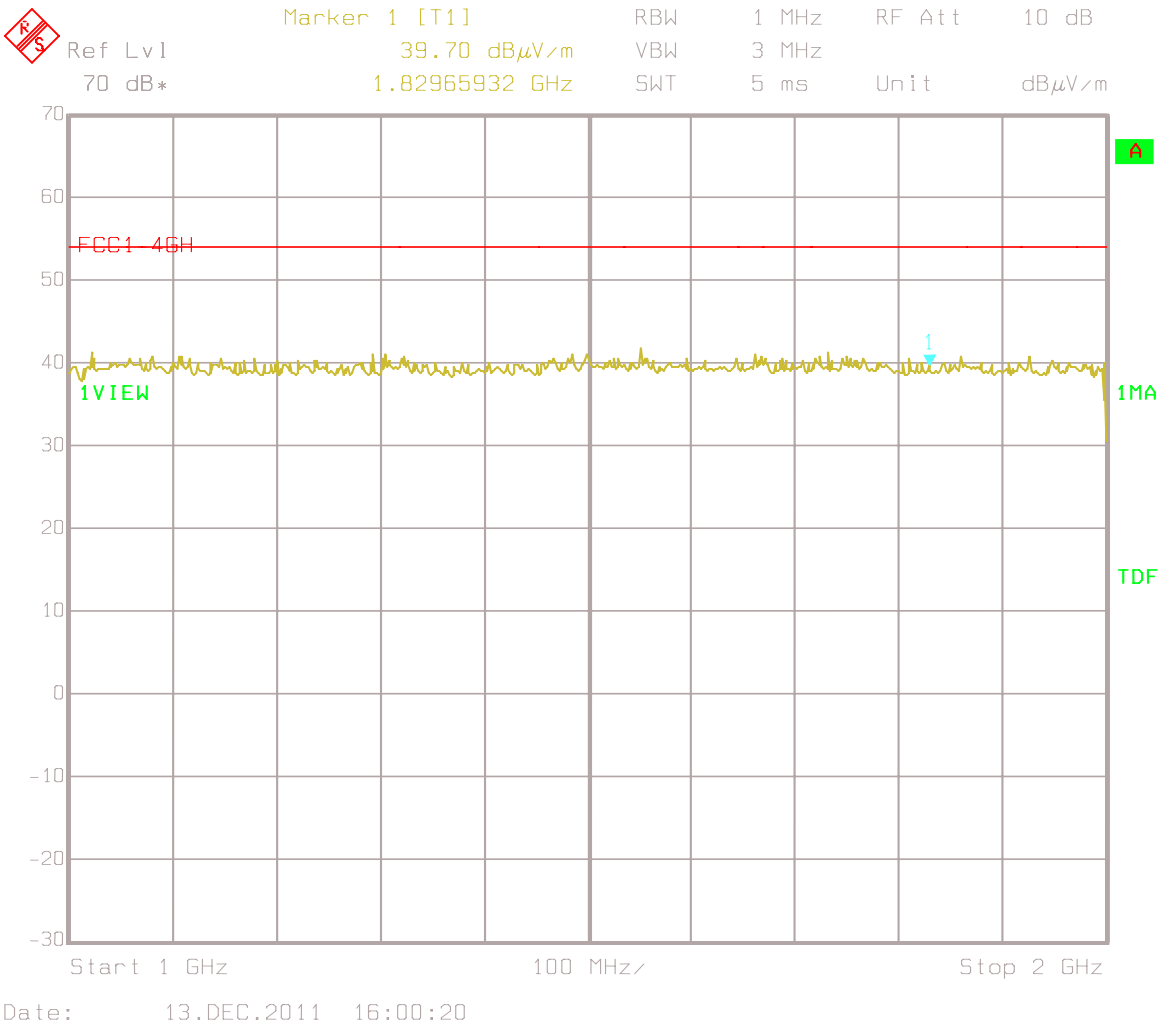
Graph 27 Radiated Emissions Test Results – Standby Mode - 1 - 2GHz Vertical – Peak



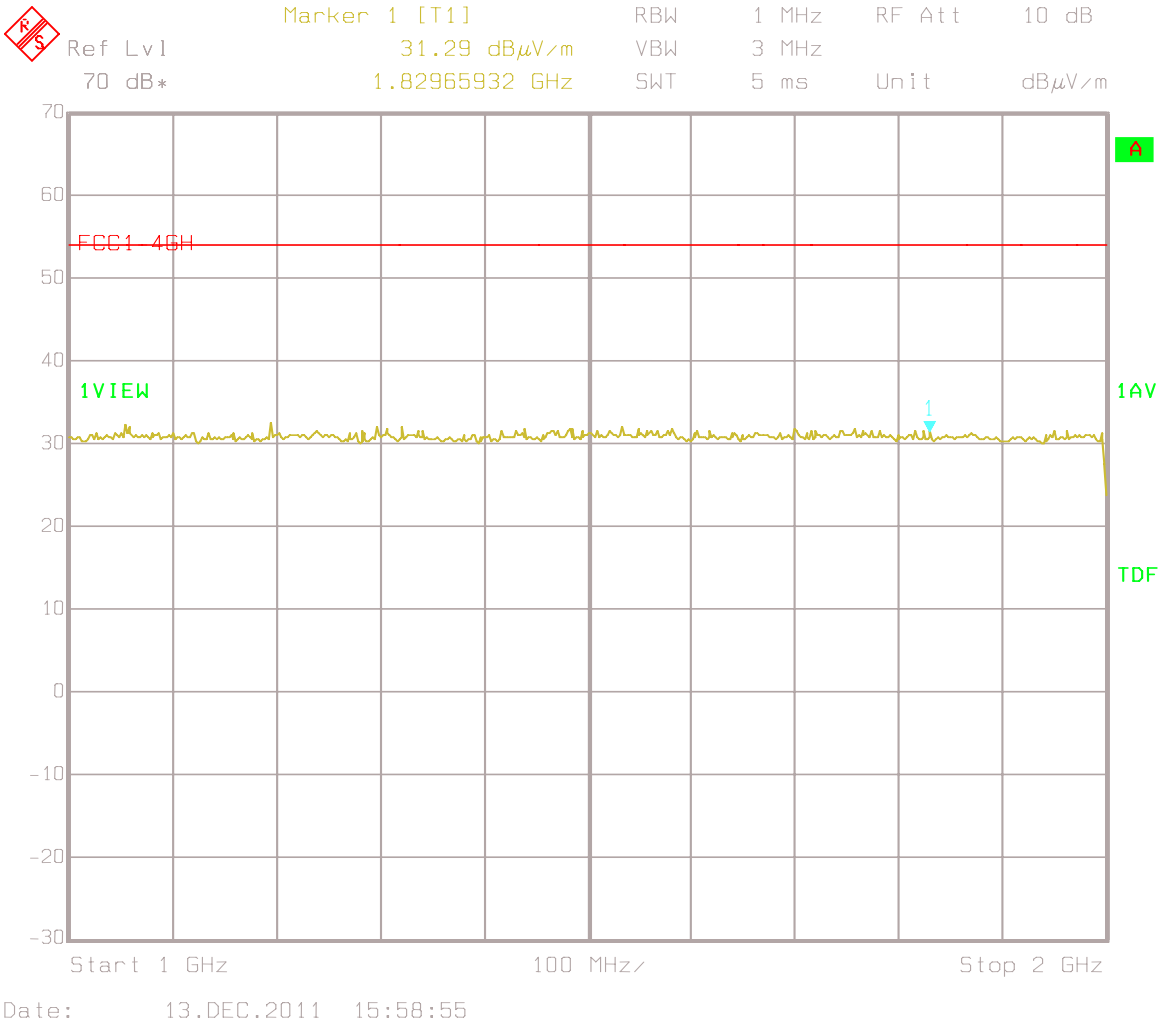
Graph 28 Radiated Emissions Test Results – Standby Mode - 1 - 2GHz Vertical – Average



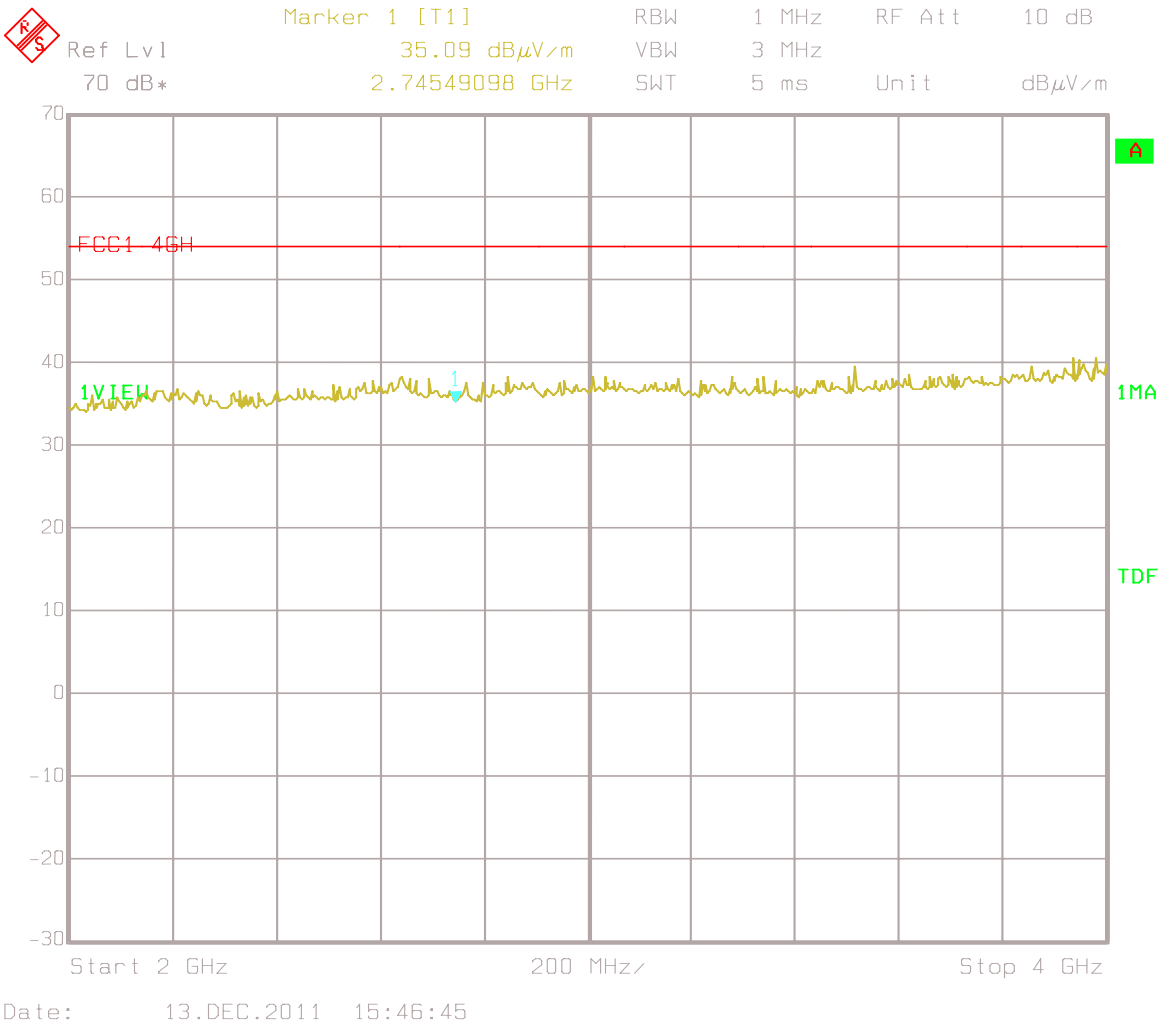
Graph 29 Radiated Emissions Test Results – Standby Mode - 1 - 2GHz – Horizontal – Peak



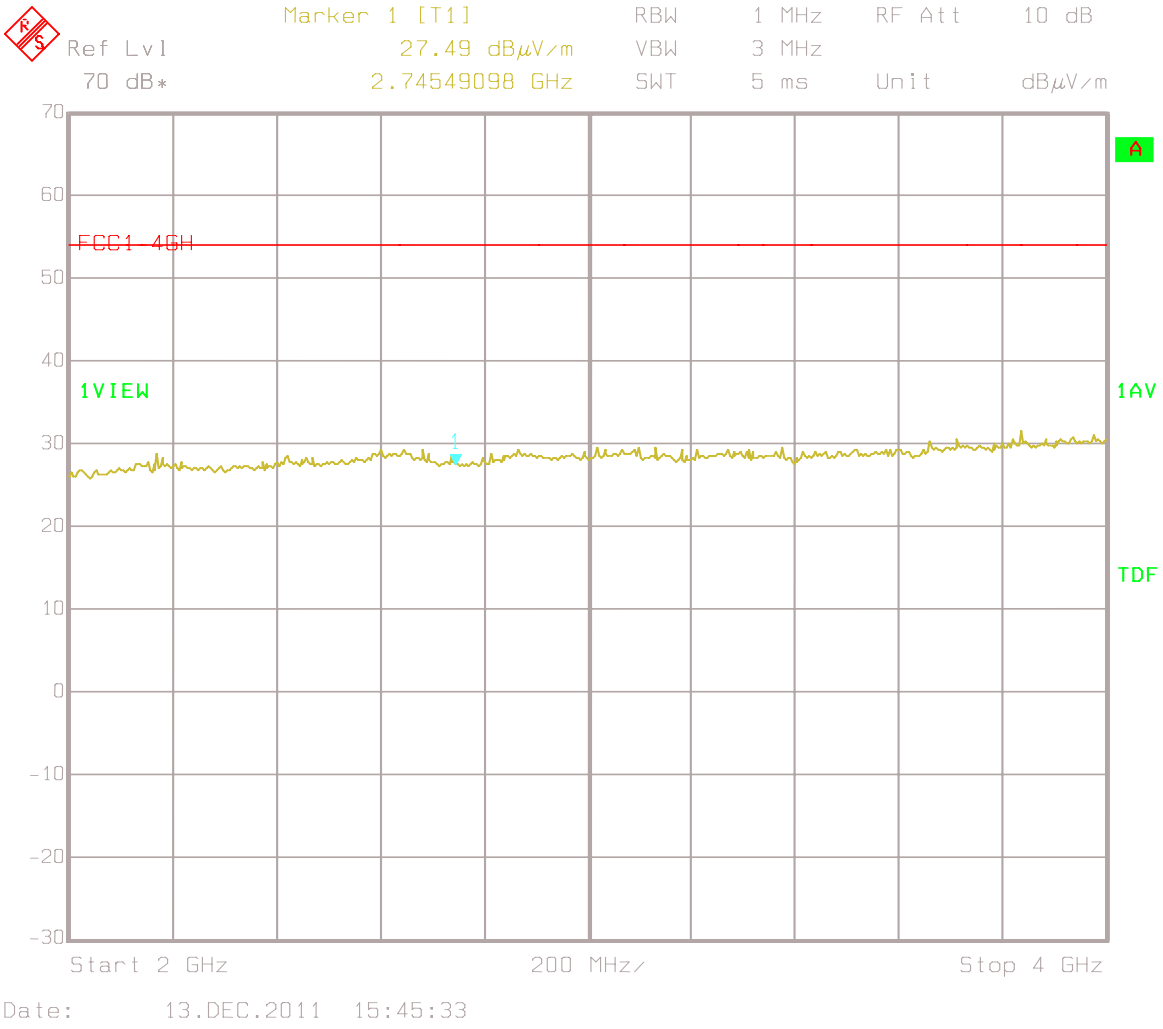
Graph 30 Radiated Emissions Test Results – Standby Mode - 1 - 2GHz – Horizontal – Average



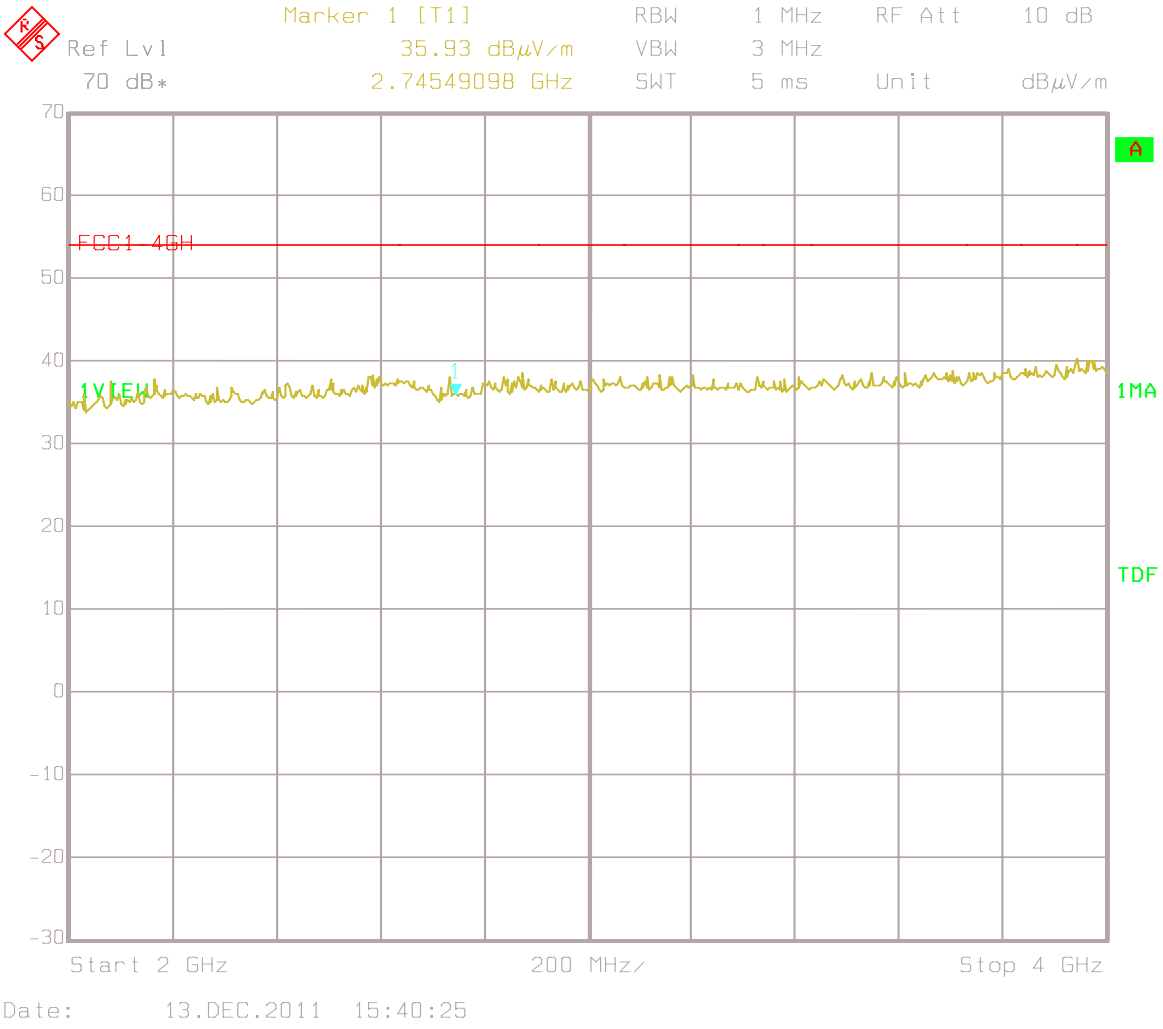
Graph 31 Radiated Emissions Test Results – Standby Mode - 2 - 4GHz – Vertical – Peak



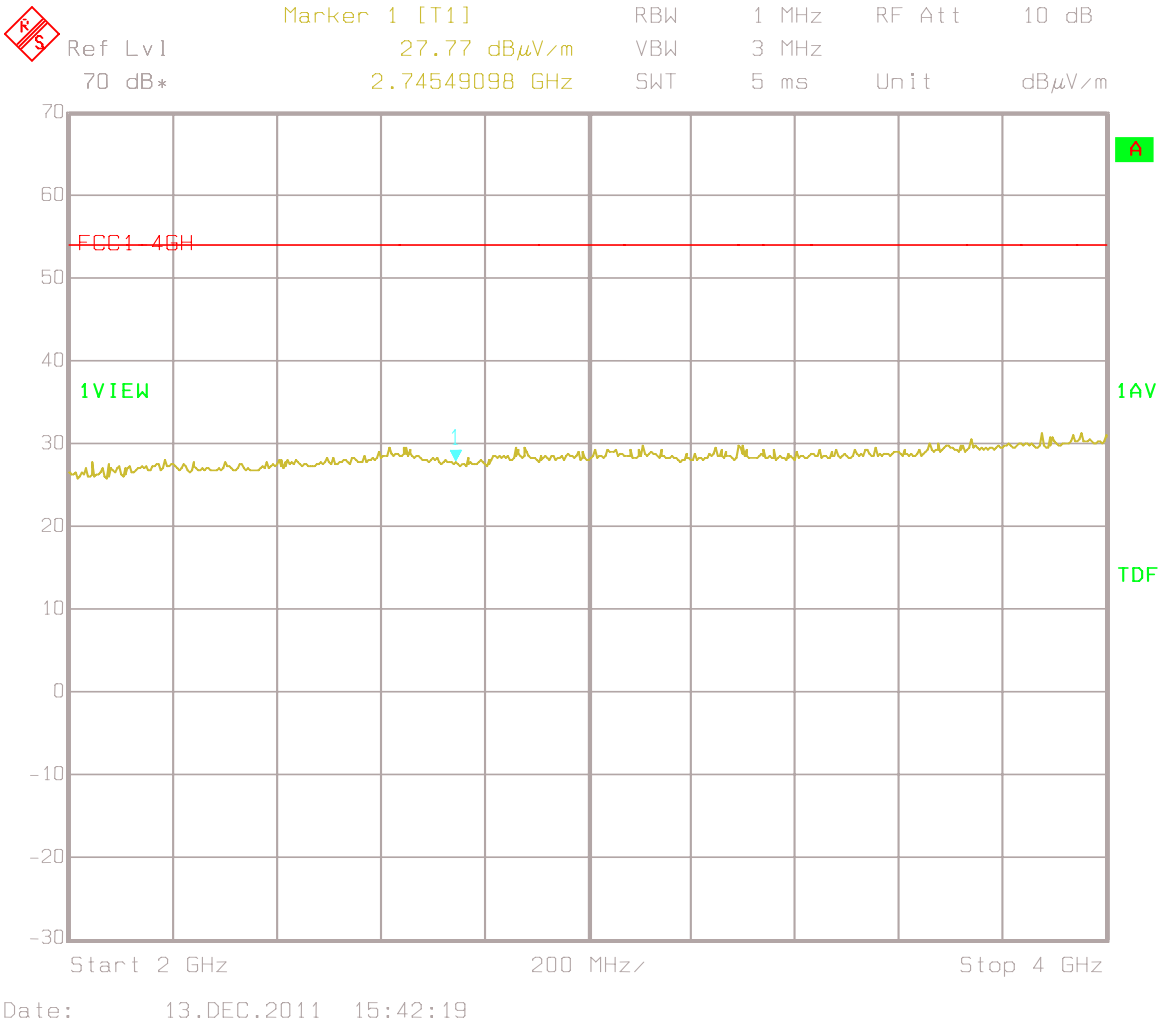
Graph 32 Radiated Emissions Test Results – Standby Mode - 2 - 4GHz – Vertical – Average



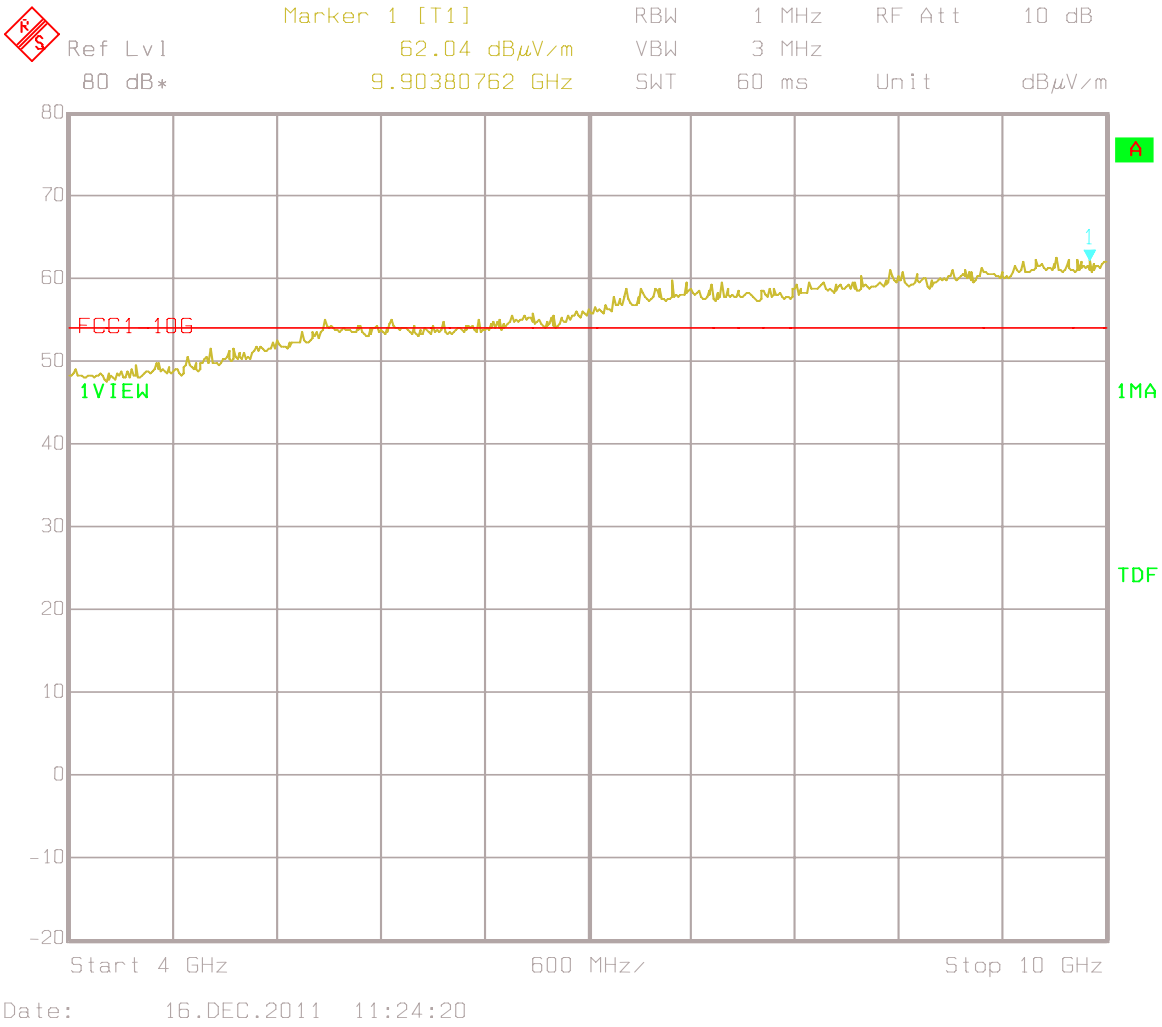
Graph 33 Radiated Emissions Test Results – Standby Mode - 2 - 4GHz – Horizontal – Peak



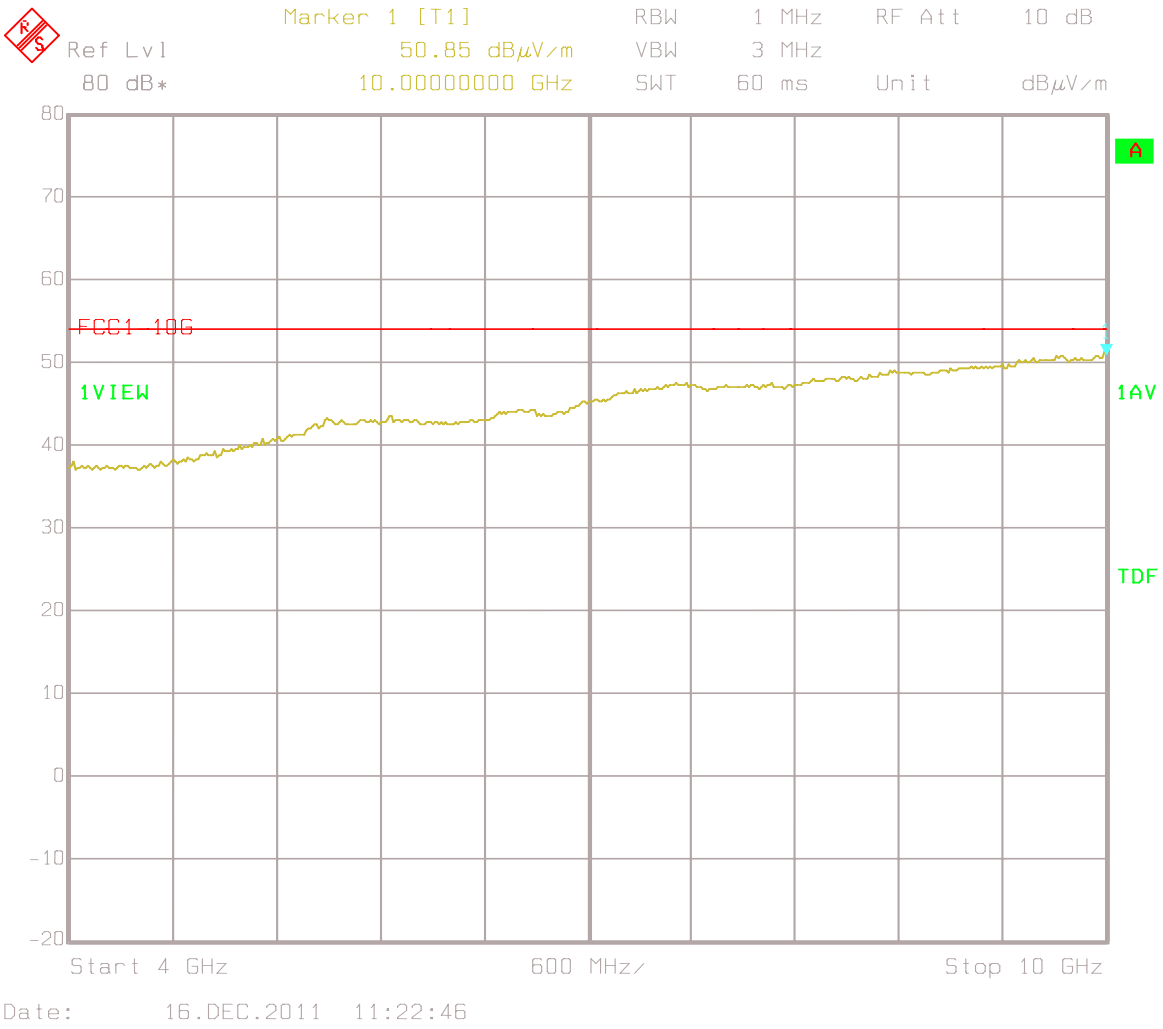
Graph 34 Radiated Emissions Test Results – Standby Mode - 2 - 4GHz – Horizontal – Average



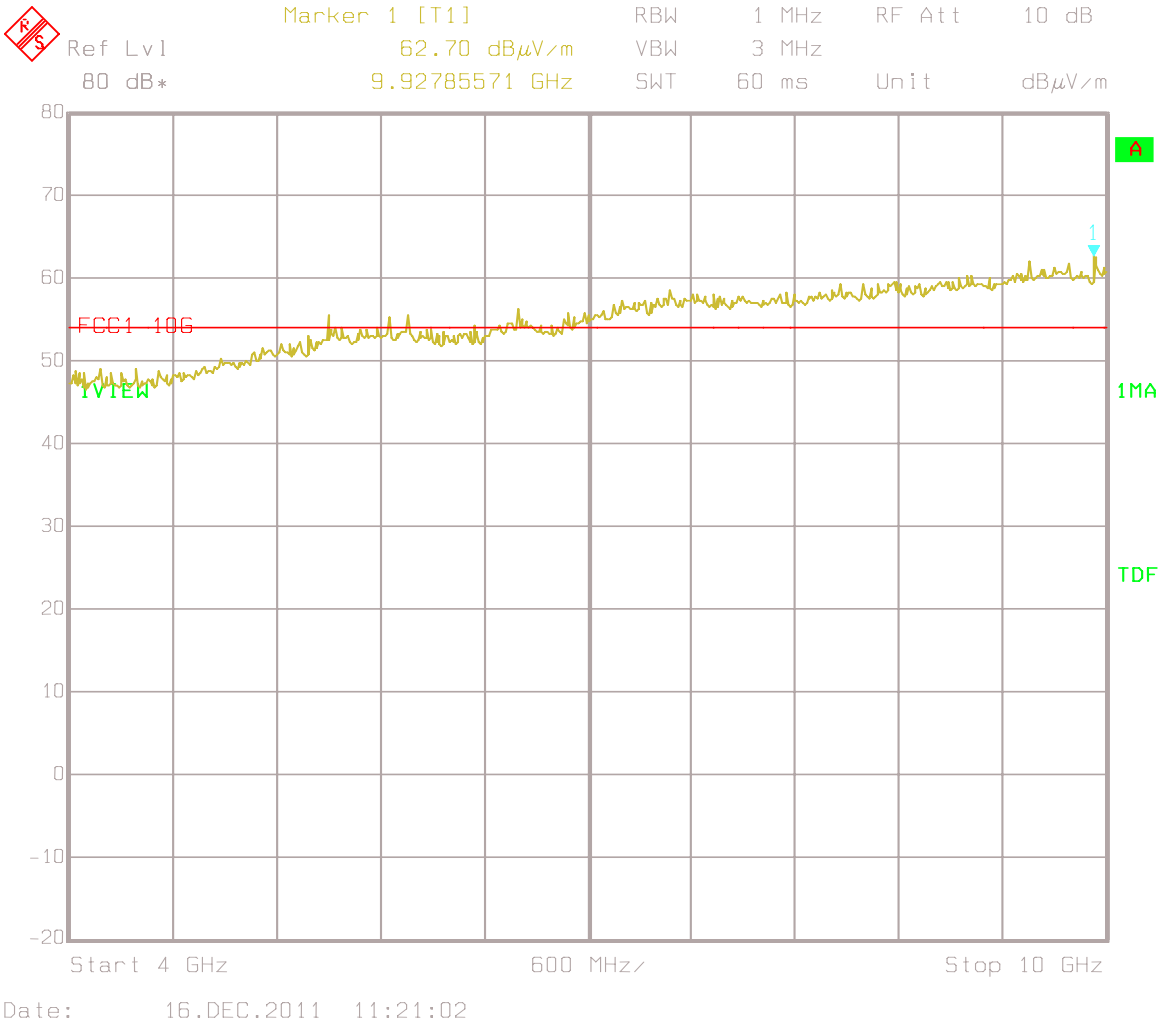
Graph 35 Radiated Emissions Test Results – Standby Mode - 4 - 10GHz – Vertical – Peak



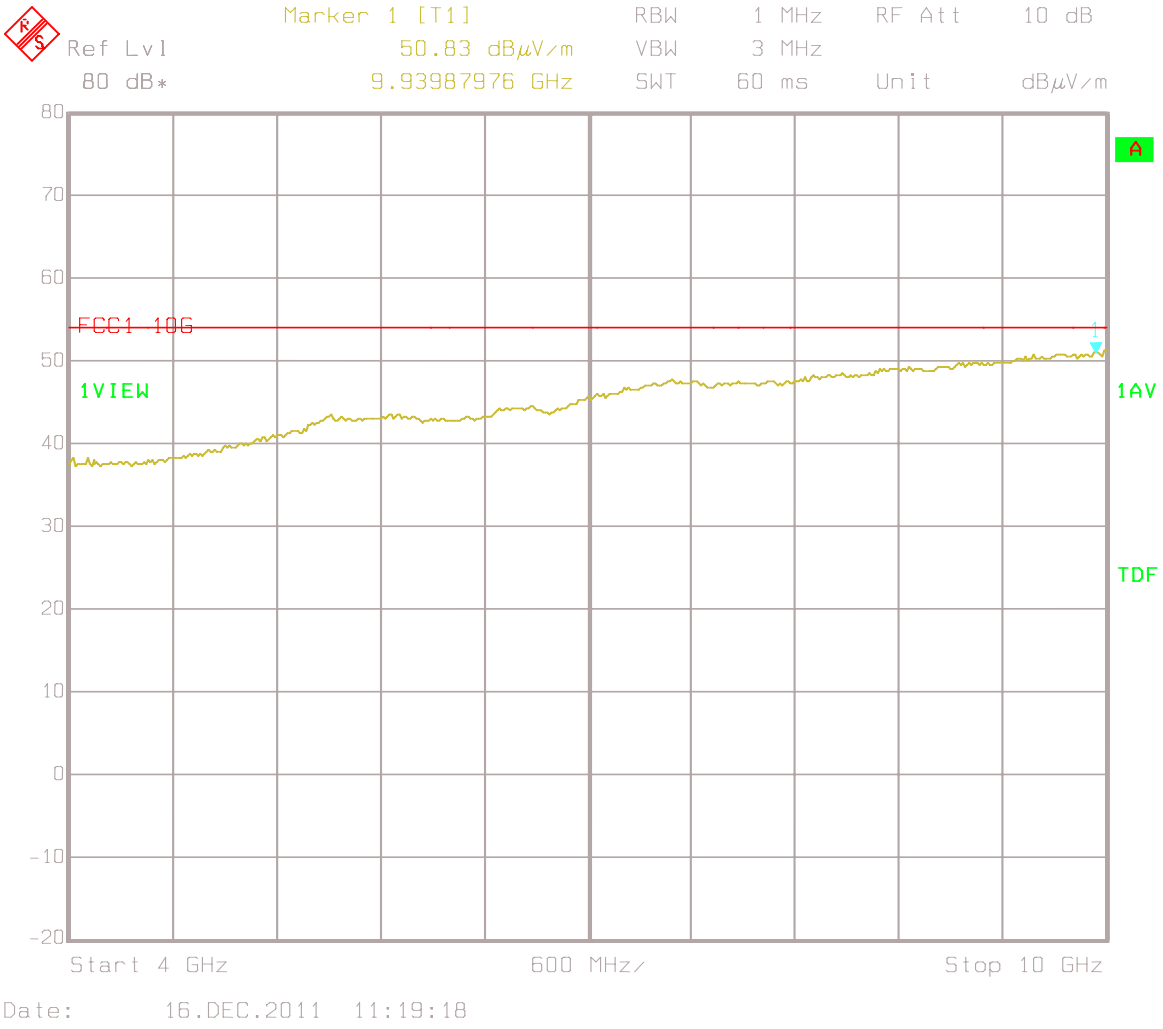
Graph 36 Radiated Emissions Test Results – Standby Mode - 4 - 10GHz – Vertical – Average



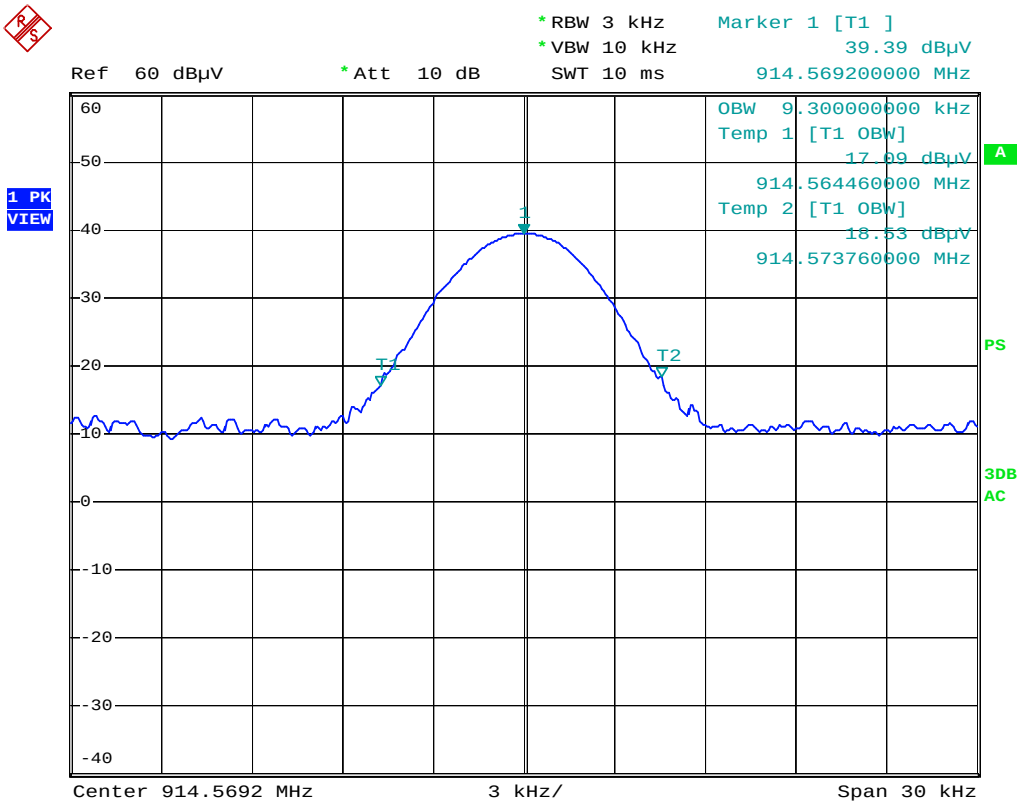
Graph 37 Radiated Emissions Test Results – Standby Mode - 4 - 10GHz – Horizontal – Peak



Graph 38 Radiated Emissions Test Results – Standby Mode - 4 - 10GHz – Horizontal – Average



Graph 39 – Occupied bandwidth

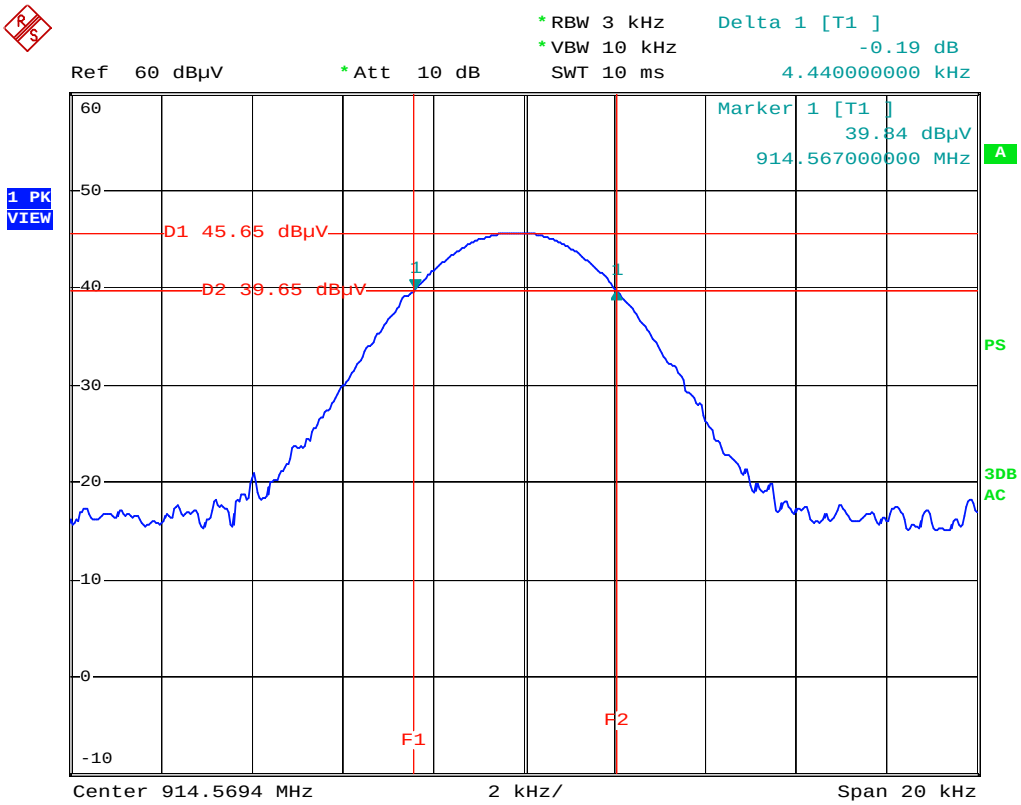


50C

Date: 20.FEB.2012 14:56:40

Occupied Bandwidth = 7.2kHz

Graph 40 – 6dB Bandwidth



50C

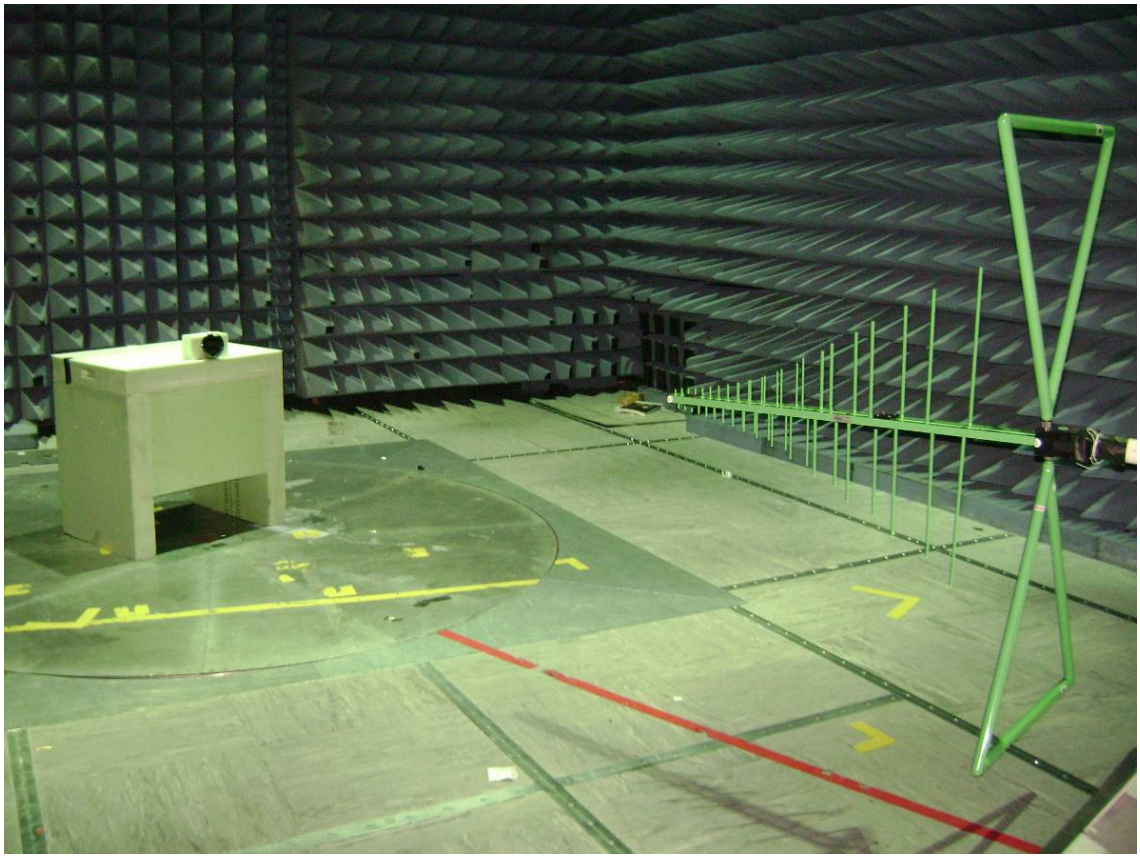
Date: 20.FEB.2012 14:41:17

- 6 dB Bandwidth = 4.44kHz

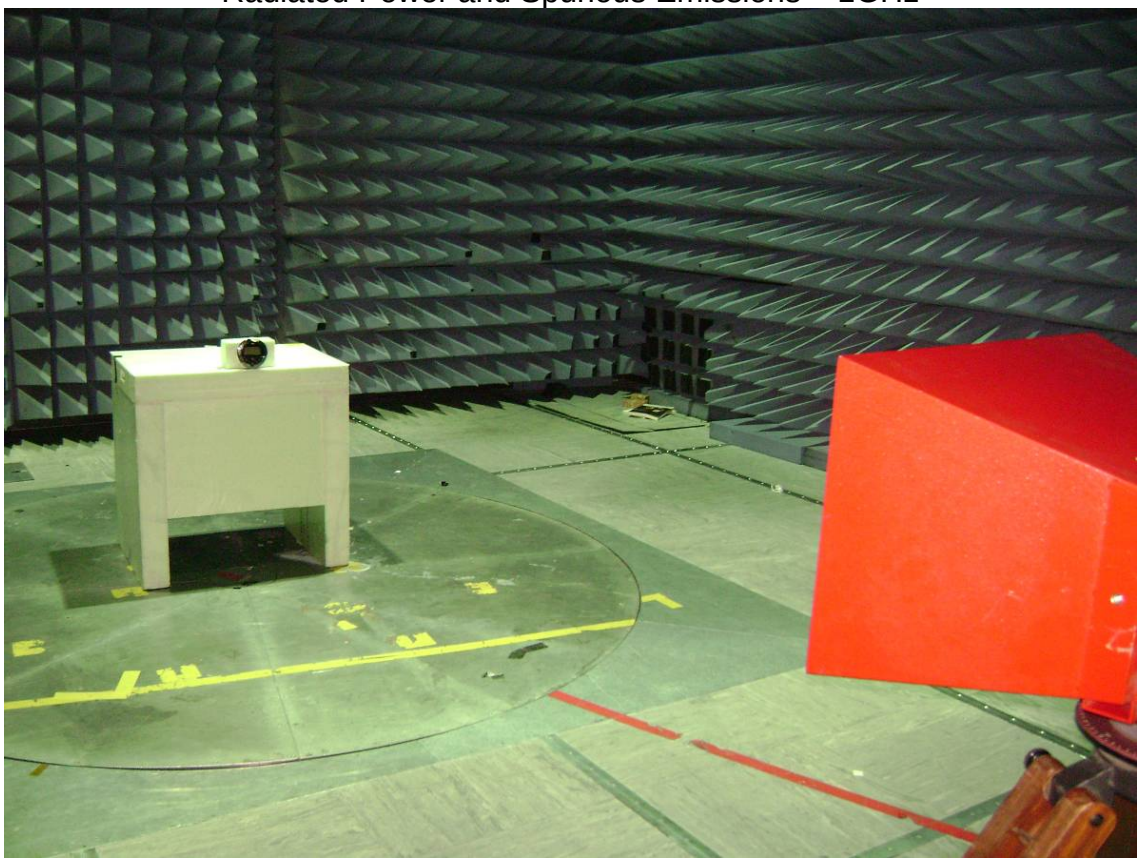
Uncertainty Budget Calculation(s)

Symbol	Source of Uncertainty	Value	Probability distribution	Divisor	c_i	u_i(y)	$(u_i(y))^2$	v_i or v_{eff}	ui^4(y)
RI	Receiver Indication	0.05	normal 2	2.000	1	0.03	0.001	∞	0
dVsw	Receiver Sine Wave	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVpa	Receiver Pulse Amplitude	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVpr	Receiver Pulse repetition	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVnf	Noise Floor Proximity	1.60	normal 2	2.000	1	0.80	0.640	∞	0
AF	Antenna Factor Calibration	1.20	normal 2	2.000	1	0.60	0.360	∞	0
CL	Cable Loss	0.50	normal 2	2.000	1	0.25	0.063	∞	0
AD	Antenna Directivity	3.00	rectangular	1.732	1	1.73	3.000	∞	0
AH	Antenna Factor Height Dependence	1.00	rectangular	1.732	1	0.58	0.333	∞	0
AP	Antenna Phase Centre Variation	0.50	rectangular	1.732	1	0.29	0.083	∞	0
AI	Antenna Factor Frequency Interpolation	0.68	rectangular	1.732	1	0.39	0.154	∞	0
SI	Site Imperfections	4.00	triangular	2.449	1	1.63	2.667	∞	0
DV	Measurement Distance Variation	0.60	rectangular	1.732	1	0.35	0.120	∞	0
Fstep	Frequency step error	0.00	rectangular	1.732	1	0.00	0.000	∞	0
M	Mismatch	-1.99	U-shaped	1.414	1	-1.41	1.990	∞	0
	Receiver VRC 0.216		-						0
	Antenna +Cable VRC 0.95		-						0
R_S	Measurement System Repeatability	0.96	normal 1	1.000	1	0.96	0.922	13	0.065334351
R_{EUT}	Repeatability of EUT	0.00	normal 1	1.000	1	0.00	0.000		0
$u_c(F_S)$	Combined Standard Uncertainty		normal			3.50	12.252	2298	0.065334351
$U(F_S)$	**Expanded Uncertainty**		**normal k=**	**1.64**		**5.7**		2298	

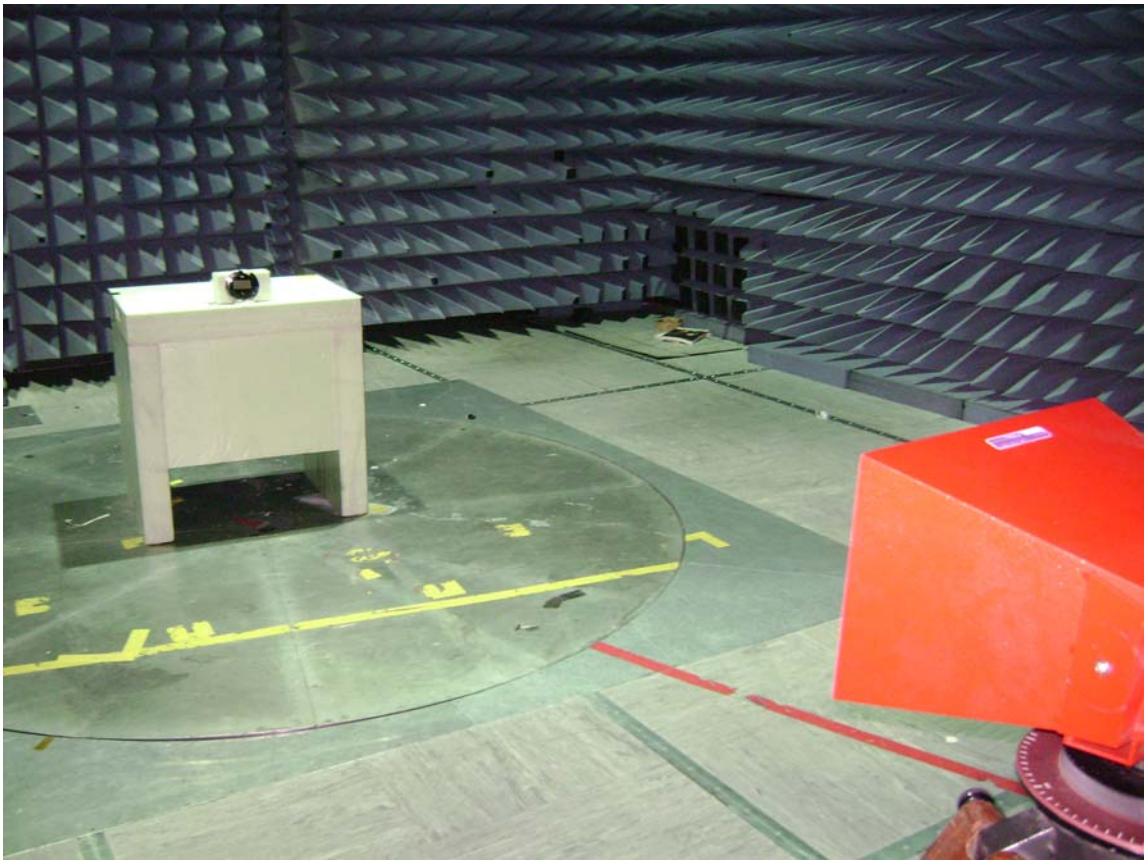
6. PHOTOGRAPHS OF TEST SETUP



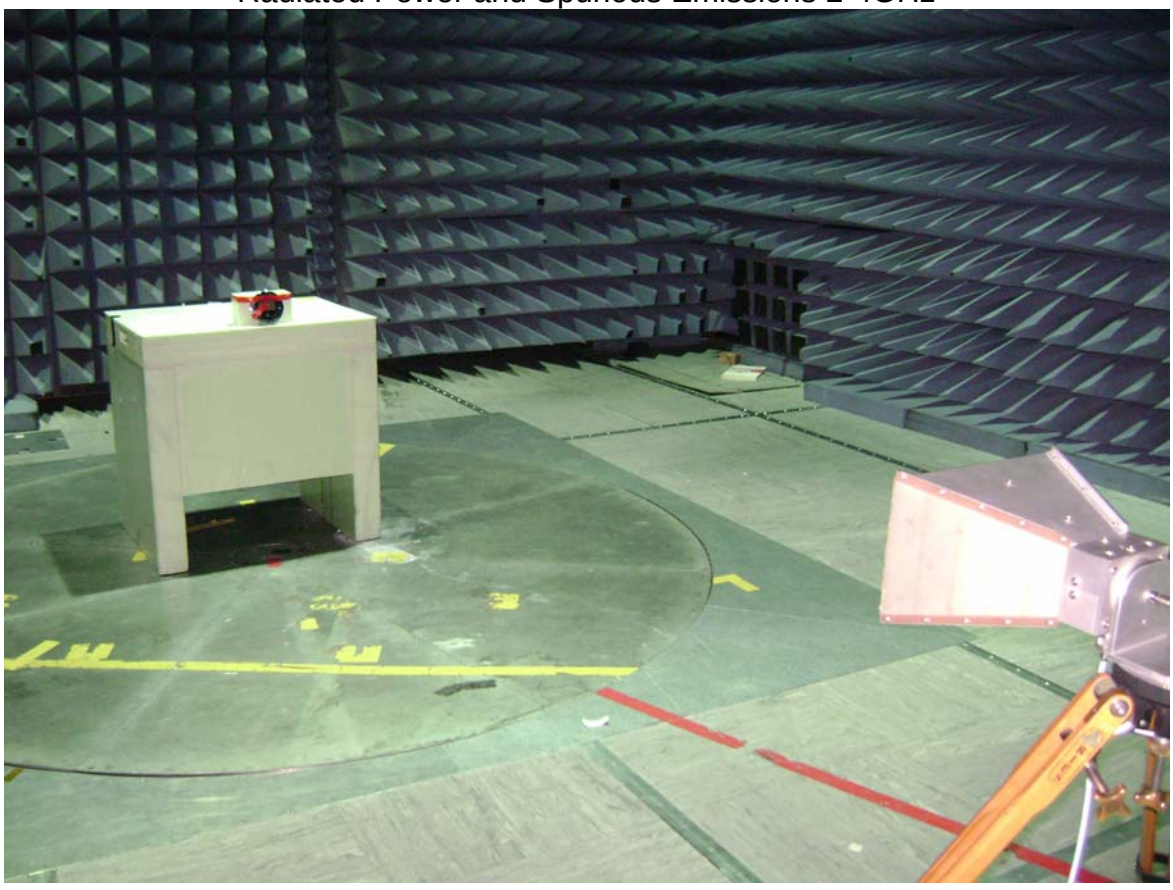
Radiated Power and Spurious Emissions < 1GHz



Radiated Power and Spurious Emissions 1-2GHz



Radiated Power and Spurious Emissions 2-4GHz



Radiated Power and Spurious Emissions 4-10GHz

7. TEST EQUIPMENT

Equipment	Type	ID
Test Bay 1	Environment	7400
Chase Bilog	Antenna	8164
3115 Horn	Antenna	7512
ETS Lindgren Horn	Antenna	8327
ETS Lindgren Horn	Antenna	8334
Rohde & Schwarz FSEK	Spectrum Analyser	7811
Rohde & Schwarz ESCI	EMC Receiver	8283
ERA Microwave Pre-amp	WBA3-4	7534
Oregon Scientific	Environmental Sensor	7729
Cable	N Type	7602
Cable	N Type	8183
Cable	N Type	7569
Cable	N Type	7287
Cable	Microwave	7176
Cable	Microwave	7177

All test equipment used was within its calibration period.

ANNEX A REGISTRATION SITES

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

March 27, 2009

Registration Number: 737726

Intertek
Unit D,
Imperial Park,
Leatherhead, KT22 7TS
United Kingdom

Attention: David Feasey

Re: Measurement facility located at Leatherhead, United Kingdom

Date of Listing: March 27, 2009

Dear Sir or Madam:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to 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. Please also note that this registration does not recognize the measurement facility to perform testing for products authorized under the Declaration of Conformity (DoC) process. In order to test products subject to DoC authorization process, a measurement facility must be accredited and recognized by the FCC.

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,

Katie Hawkins

Katie Hawkins
Electronics Engineer

Industry Canada Industrie Canada

February 7, 2011

OUR FILE: 46405-2042
Submission No: 145396

Intertek Commercial & Electrical
Unit D Imperial Park Randalls Way
Leatherhead, SRY, KT22 7SB
United Kingdom

Attention: Dave Feasey

Dear Sir/Madame:

The Bureau has received your application for the renewal of a 3m alternative test site. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought **(Site# 2042F-1).** Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- The company address code associated to the site(s) located at the above address is: **2042F**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to **exceed three years**. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;
http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html.

If you have any questions, you may contact the Bureau by e-mail at certification.bureau@ic.gc.ca Please reference our file and submission number above for all correspondence.

Yours sincerely,

Dalwinder Gill

Dalwinder Gill
For: Wireless Laboratory Manager
Certification and Engineering Bureau
3701 Carling Ave., Building 94
P.O. Box 11490, Station "H"
Ottawa, Ontario K2H 8S2
Email: dalwinder.gill@ic.gc.ca
Tel. No. (613) 998-8363
Fax. No. (613) 990-4752