



Test report no. : 182240-5

Item tested : CC85xxHEADSET

Type of equipment : 2.4GHz Transceiver

FCC ID : ZAT85XXHEADSET

Client : Texas Instruments Norway AS

FCC Part 15.247

Digital Transmission System

RSS-210, Issue 8

Low Power Licence-Exempt
Radiocommunication Devices

2012-09-27

Authorized by :

Geir Antonsen
Geir Antonsen
Technical Verificator

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1 GENERAL INFORMATION

1.1 Testhouse Info

Name : Nemko AS
Address : Nemko Kjeller
Instituttveien 6, Box 96
NO-2027 Kjeller, NORWAY
Telephone : +47 64 84 57 00
Fax : +47 64 84 57 05
E-mail: comlab@nemko.com
FCC test firm : 994405
IC OATS : 2040D-1
Total Number of Pages: 33

1.2 Client Information

Name : Texas Instruments Norway AS
Address : Gaustadalléen 21,
NO-0349 Oslo, Norway
Telephone : +47 22 95 85 44
Fax : +47 22 95 85 46

Contact:

Name : Fredrik Kervel
Telephone : +47 22 95 8362
E-mail : f.kervel@ti.com

1.3 Responsible Manufacturer (If other than client)

Same as client.

2 Test Information

2.1 Test Item

Name :	Texas Instruments
FCC ID :	ZAT85XXHEADSET
Model/version :	CC85xxHEADSET
Serial number :	/
Hardware identity and/or version:	/
Software identity and/or version :	/
Frequency Range :	2406.5 – 2474.5 MHz
Number of Channels :	18
Output Power :	20.4 mW (calculated conducted)
Type of Modulation :	Digital
User Frequency Adjustment :	None
Type of Power Supply :	Powered from Secondary Battery (3.7V Li-Ion)
Antenna Connector :	None (Integral Antenna)
Antenna Diversity Supported :	No
Desktop Charger :	None

Description of Test Item

The tested EUT is a 2.4GHz wireless audio transceiver.

2.2 Test Environment

2.2.1 Normal test condition

Temperature:	20 - 22 °C
Relative humidity:	42 - 52 %
Normal test voltage:	3.7 V DC

The radiated tests were performed with the EUT powered from fully charged batteries.
The values are the limit registered during the test period.

2.3 Test Period

Item received date:	2011-08-15
Test period :	from 2011-08-12 to 2011-08-22

3 TEST REPORT SUMMARY

3.1 General

Manufacturer: Texas Instruments
Model No.: CC85xxHEADSET
Serial No.: /

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247 and Industry Canada RSS-210 Issue 8.

Radiated tests were conducted in accordance with ANSI C63.4-2009 and ANSI C63.10-2009. The radiated tests were made in a semi-anechoic chamber at measuring distances of 3m and 10m.

- | | |
|---|---|
| <input checked="" type="checkbox"/> New Submission | <input checked="" type="checkbox"/> Production Unit |
| <input type="checkbox"/> Class II Permissive Change | <input type="checkbox"/> Pre-production Unit |
| DTS Equipment Code | <input type="checkbox"/> Family Listing |

THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.
Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".



TEST REPORT #: 182225-5

TESTED BY: Frode Sveinsen
Frode Sveinsen, Test engineer

DATE: 2012-09-27

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3.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 8 reference	Result
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	Pass
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2.2 (RSS-GEN)	N/A ¹
Minimum 6 dB Bandwidth	15.247(a)(2)	A8.2	Pass
Peak Power Output	15.247(b)	A8.4	Pass
Power Spectral Density	15.247(d)	A8.2	Pass
Spurious Emissions (Antenna Conducted)	15.247(c)	A8.5	Pass
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	A8.5	Pass ²
Receiver Emissions (Radiated)	N/A	2.3	Pass

¹ The EUT is battery powered.

² This test is passed as long as the Duty-Cycle is less than 0.708.

3.3 Description of modification for Modification Filing

Not applicable.

3.4 Comments

All ports were populated during spurious emission measurements.

Radiated Spurious Emissions is Pass on the condition that the Duty Cycle is less than 0.708.

3.5 Family List Rational

Not Applicable.

4 TEST RESULTS

4.1 Minimum 6 dB Bandwidth

Para. No.: 15.247 (a)(2)

Test Performed By: Frode Sveinsen	Date of Test: 16 Aug 2011
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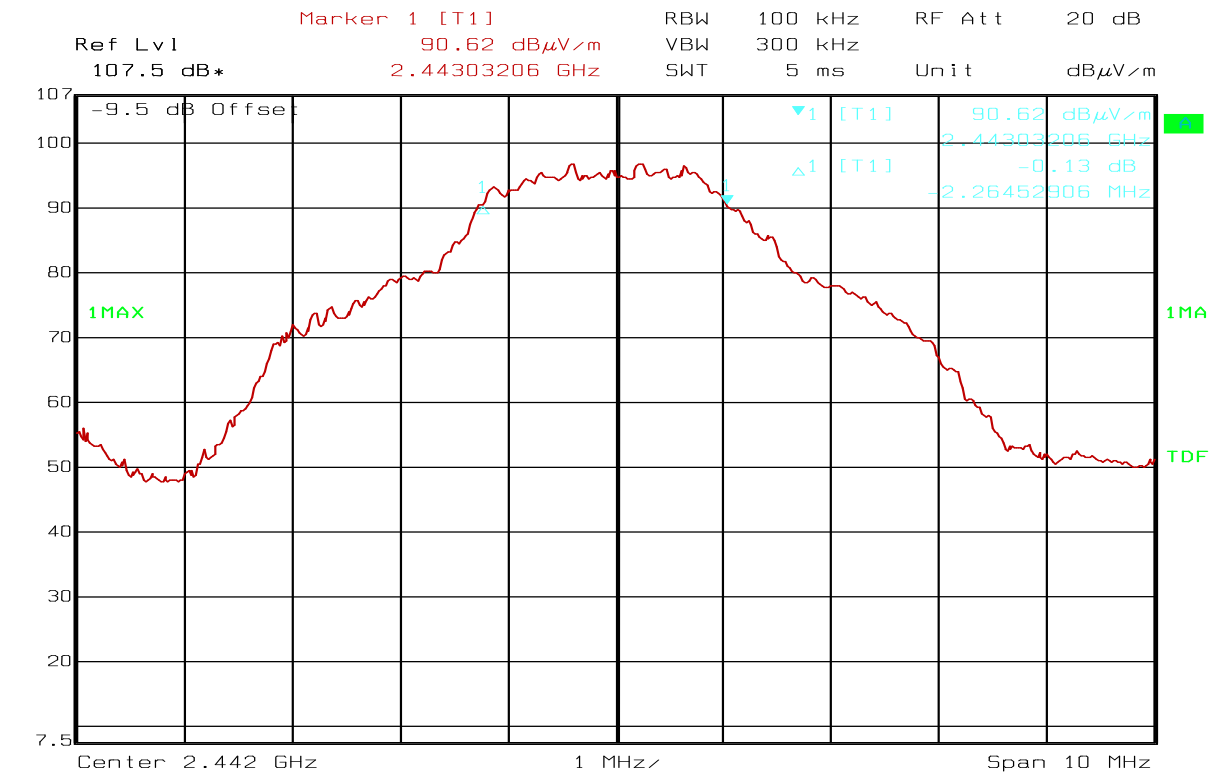
Test Results: Complies

Measurement Data:

Measured 6 dB Bandwidth (MHz)		
/	2440 MHz	/
/	2.26	/

Requirements:

For Digital Transmission Systems in the 2400-2483.5 MHz band the minimum 6 dB bandwidth shall be at least 500 KHz.



Date: 16.AUG.2011 14:29:49

6 dB Bandwidth at 2440 MHz

4.2 20 dB Bandwidth

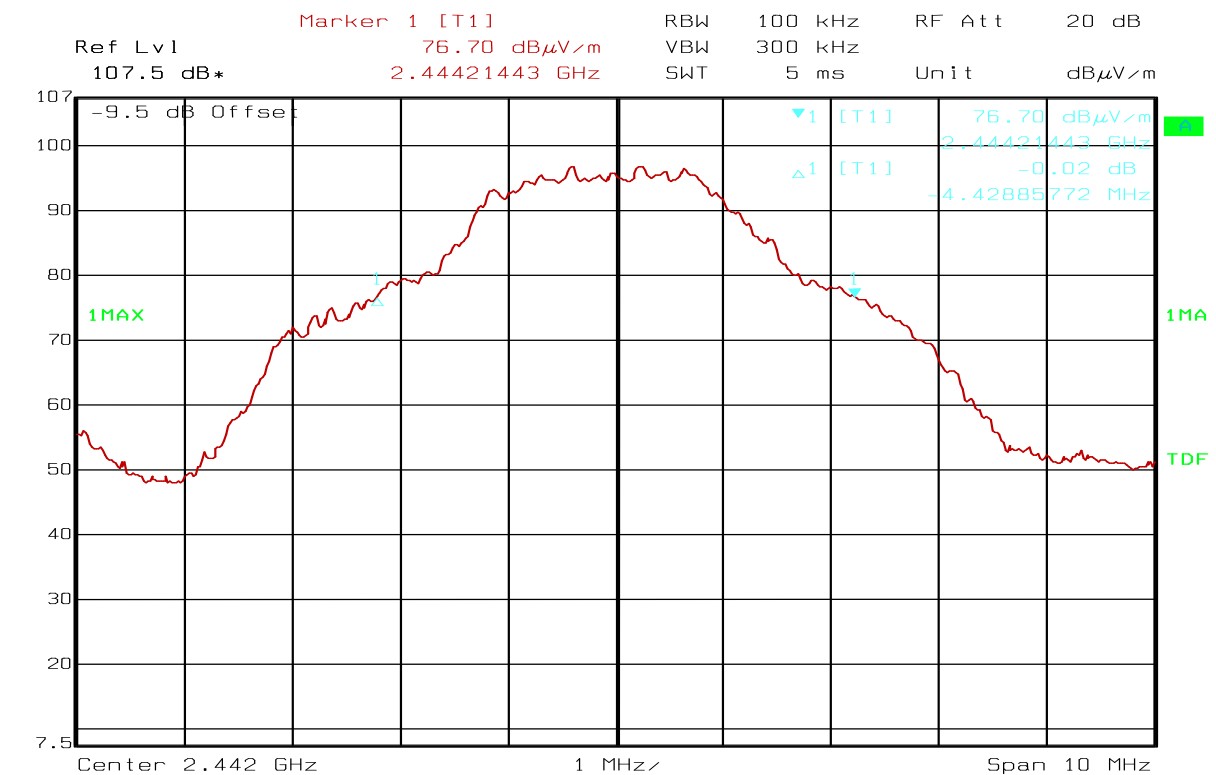
Test Performed By: Frode Sveinsen	Date of Test: 16 Aug 2011
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Measurement Data:

Measured 20 dB Bandwidth (MHz)
2442 MHz
4.42

Requirements:

No requirements. Reported for information only.



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20 dB Bandwidth at 2442 MHz

4.3 Peak Power Output

Para. No.: 15.247 (b)

Test Performed By: Frode Sveinsen	Date of Test: 16 Aug 2011
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Test Results: Complies

Measurement Data:

RF channel	2406.5 MHz	2442 MHz	2474.5 MHz
Measured EIRP (dBµV/m)	110.8	111.8	110.6
Calculated EIRP (dBm)	15.6	16.6	15.4
Conducted Power (dBm)	12.1	13.1	11.9
Conducted Power (W)	0.0162	0.0204	0.0155
Antenna Gain (dBi)	3.5	3.5	3.5

Antenna Gain is value declared by applicant.

Output Power is calculated from measured Field Strength by the method described in "KDB 412172 D01 Determining ERP and EIRP V01".

See attached plots.

Detachable antenna?

Yes No

If detachable, is the antenna connector non-standard?

Yes No

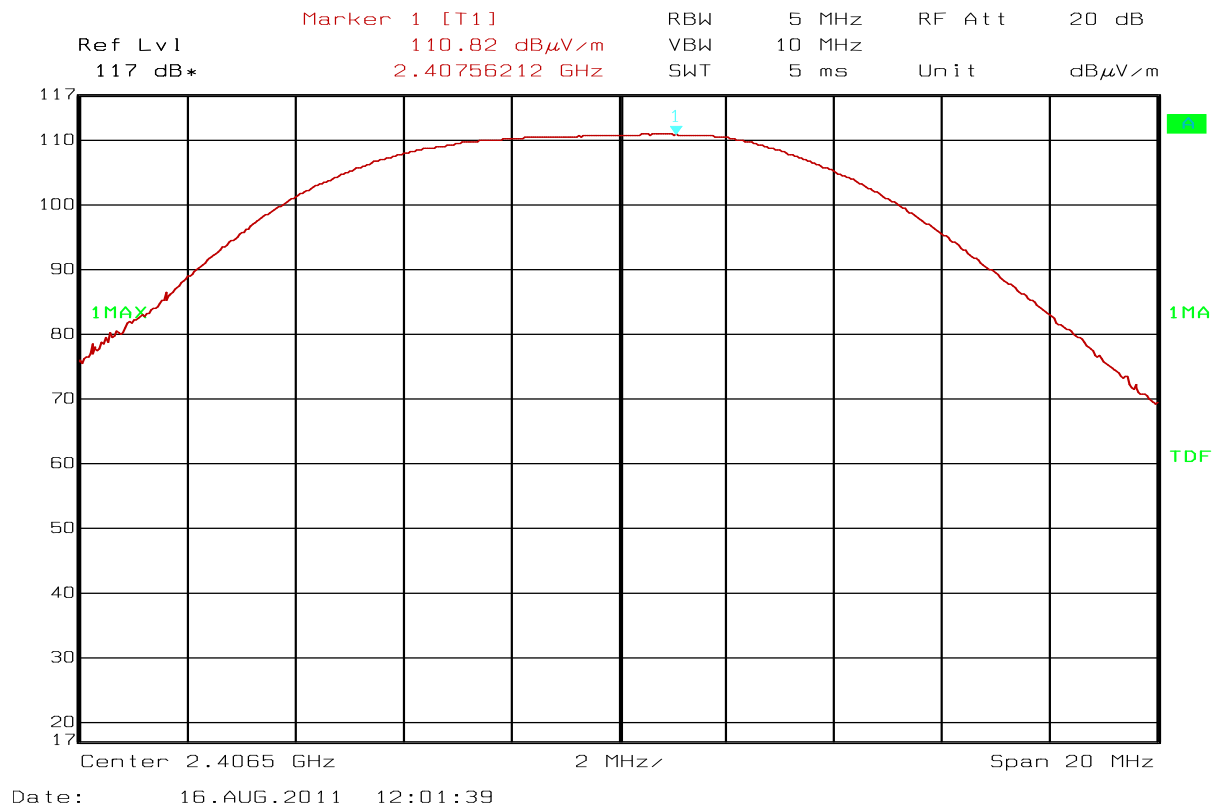
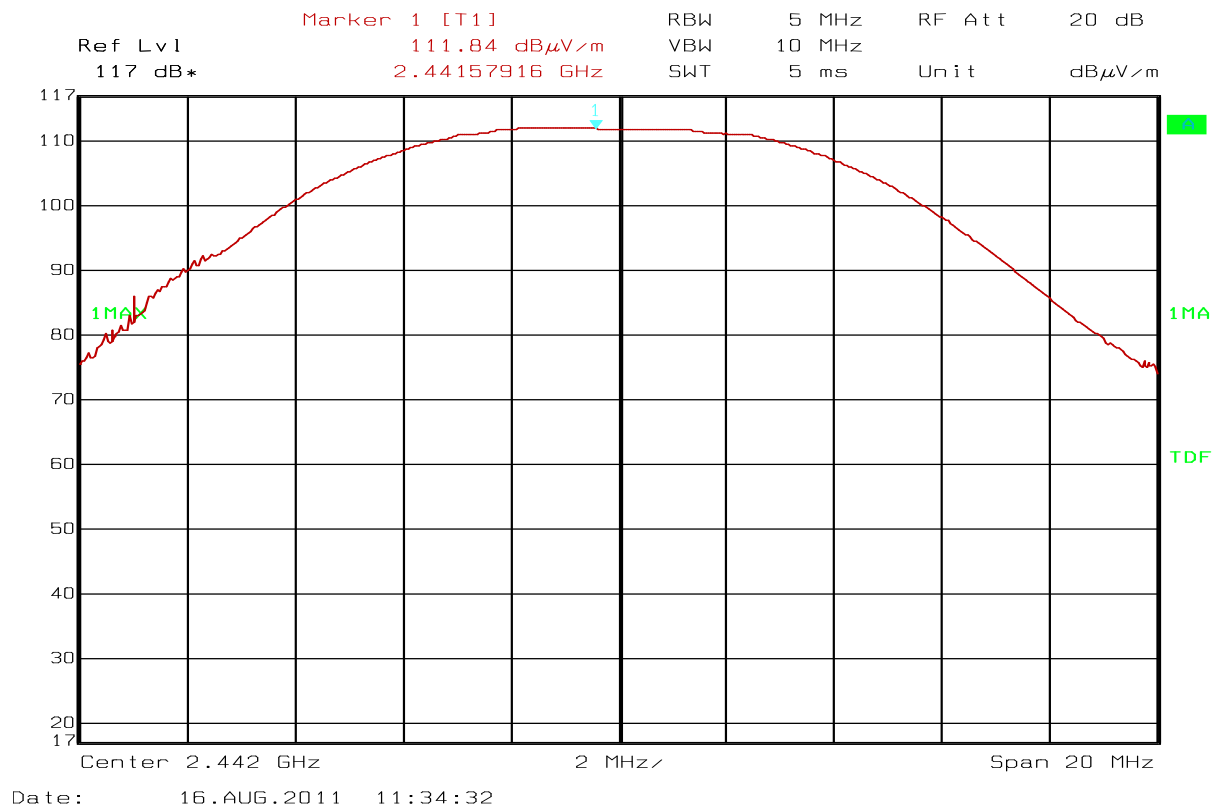
Type of antenna connector: None (PCB antenna).

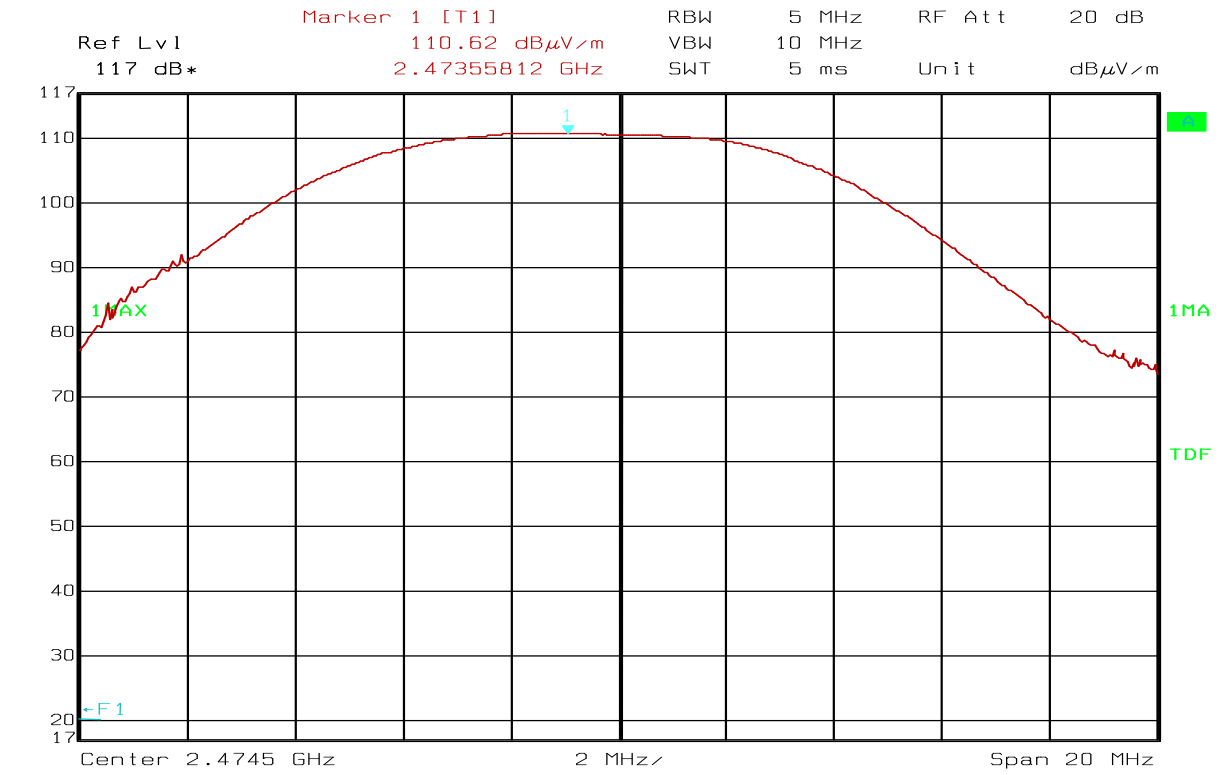
Requirements:

The maximum peak output power shall not exceed the following limits:

For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.


Output Power, 2406.5 MHz

Output Power, 2442 MHz



Date: 16.AUG.2011 12:10:45

Output Power, 2474.5 MHz

4.4 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Performed By: Frode Sveinsen	Date of Test: 16 Aug 2011
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Test Results: Complies

Measurement Data:

Band-edge, @3m

Frequency	Measured Field Strength @3m, dB μ V/m	Detector	Limit dB μ V/m	Margin dB
2.39 GHz	41.0	AV	54	13.0
	55.0	PK	74	19.0
2.4835 GHz	45.3	AV	54	8.7
	67.5	PK	74	6.5

Duty Cycle Correction factor 14.0 dB is included in Average Detector values above.

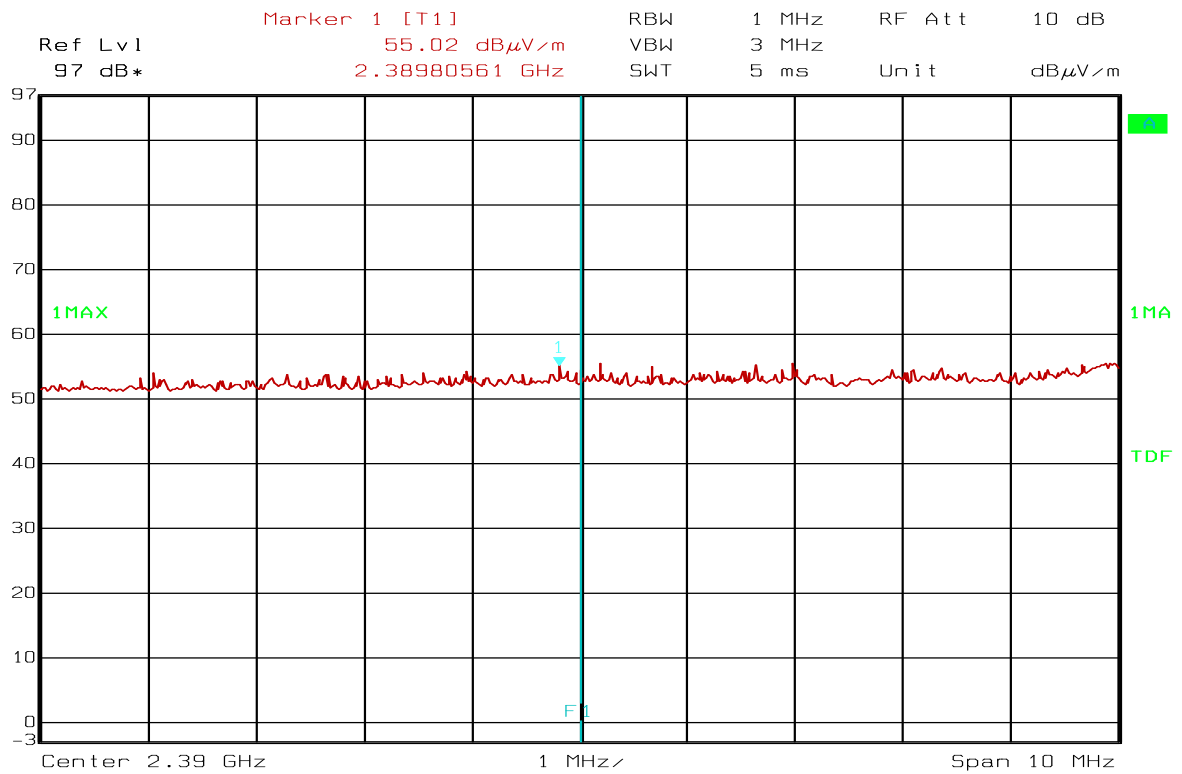
See attached plots.

RF conducted power to 25 GHz see attached graph.

Scan performed radiated with 100 kHz Bandwidth.

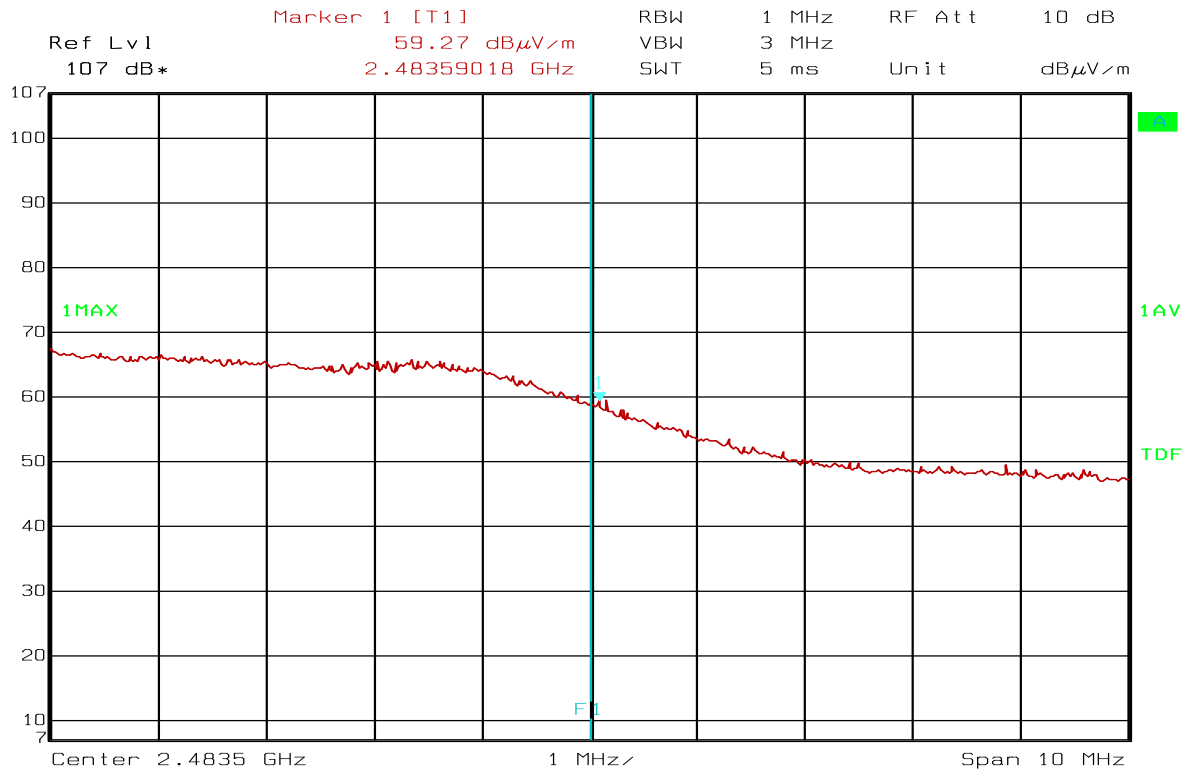
All emissions are more than 20dB below carrier.

See plots.



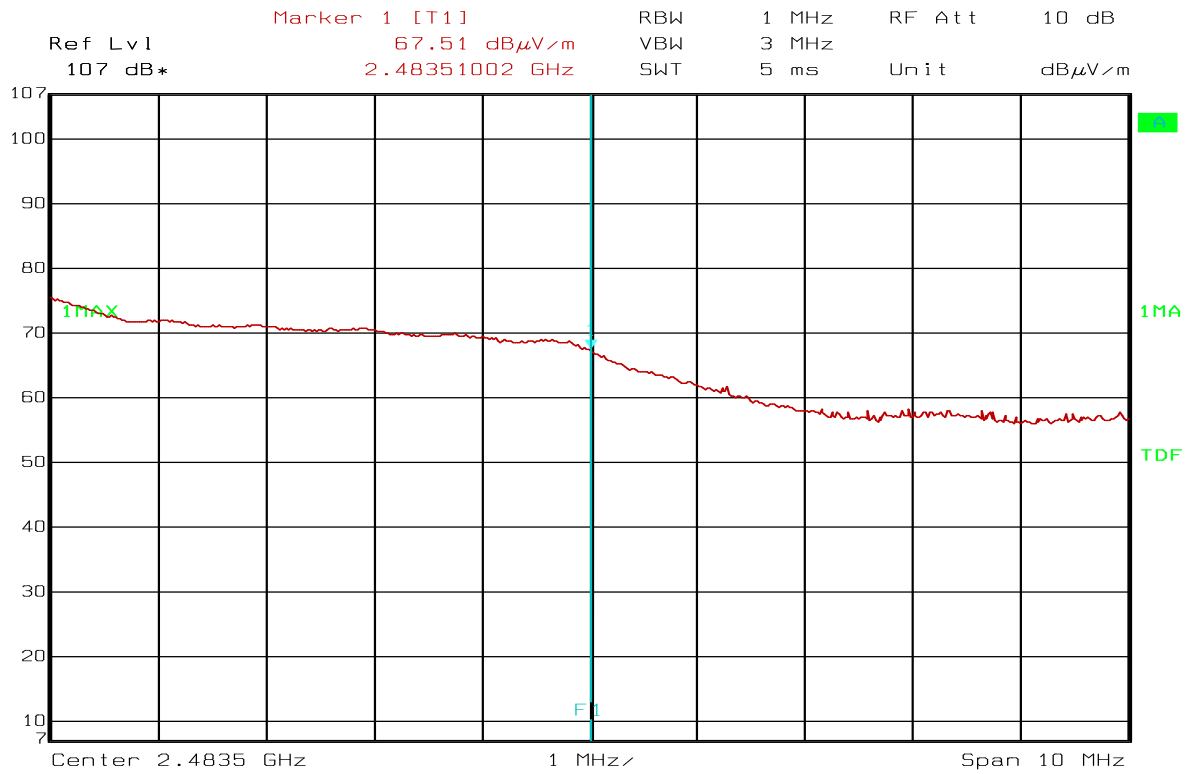
Date: 16.AUG.2011 12:06:39

Band Edge, 2390 MHz, Peak Detector



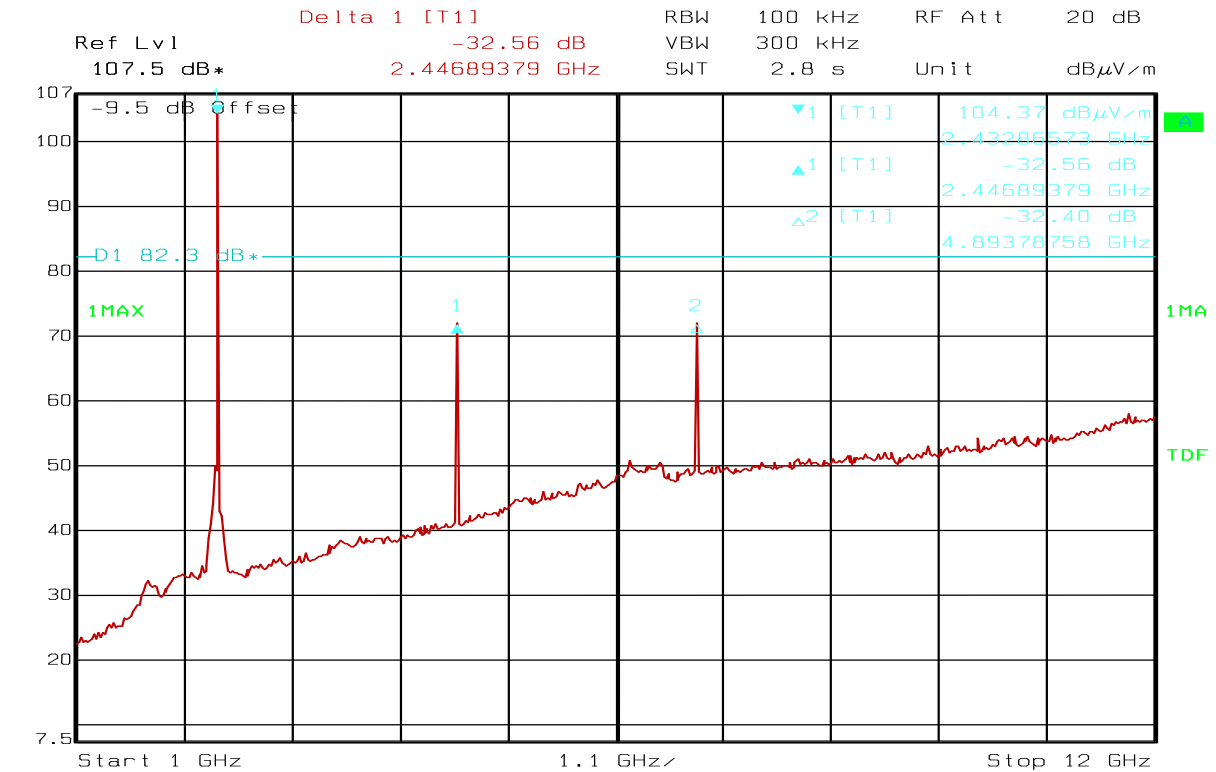
Date: 16.AUG.2011 12:16:16

Band Edge, 2483.5 MHz, Average Detector



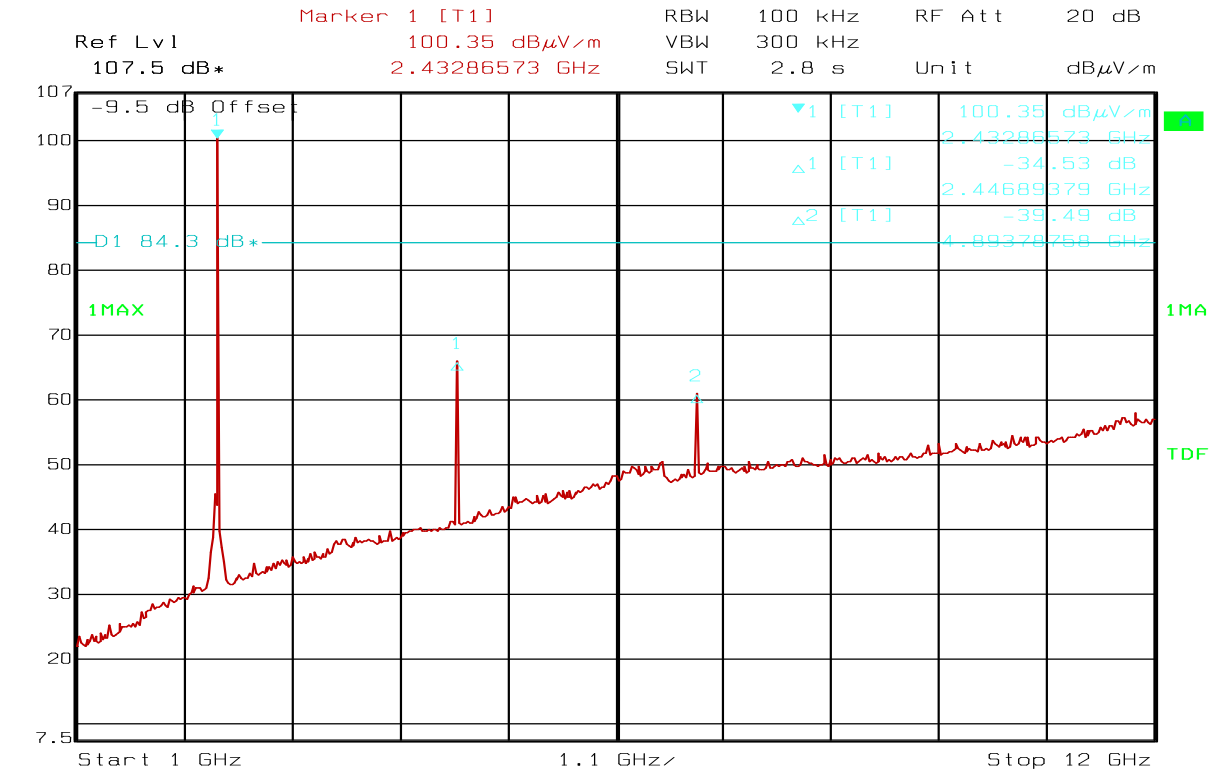
Date: 16.AUG.2011 12:12:54

Band Edge, 2483.5 MHz, Peak Detector



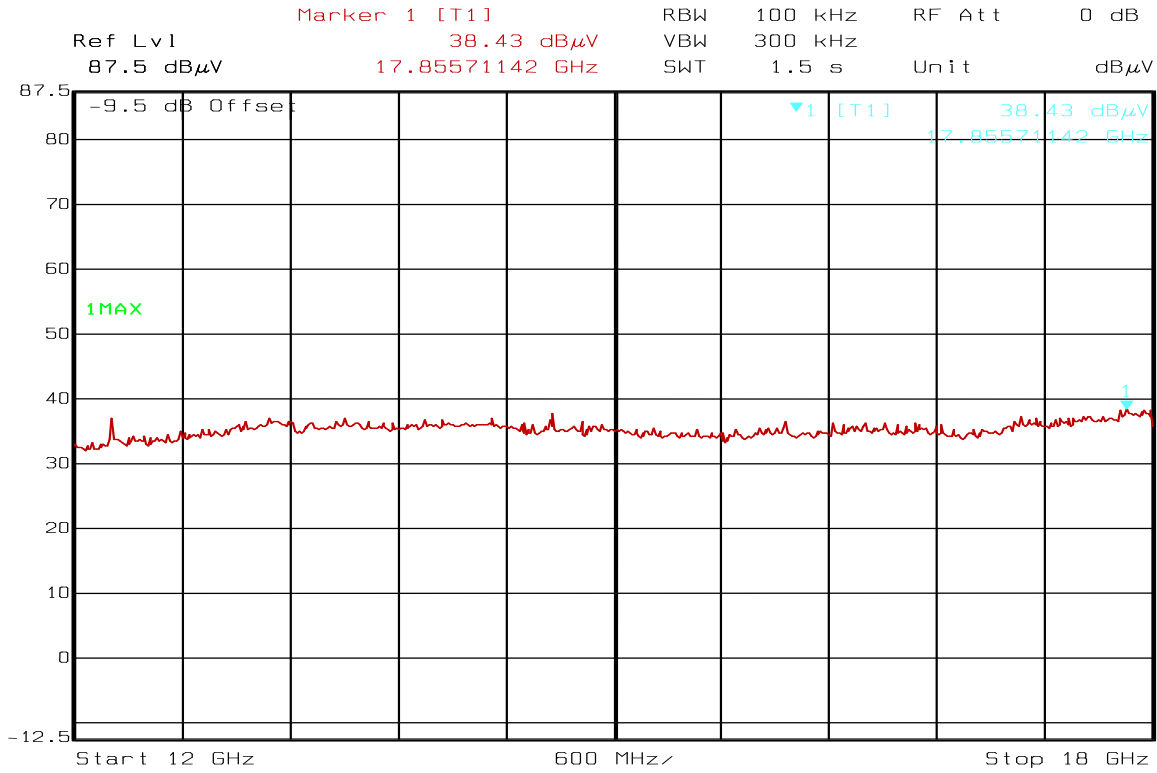
Date: 16.AUG.2011 14:17:06

Radiated Emissions 100kHz, VP, 1 – 12 GHz



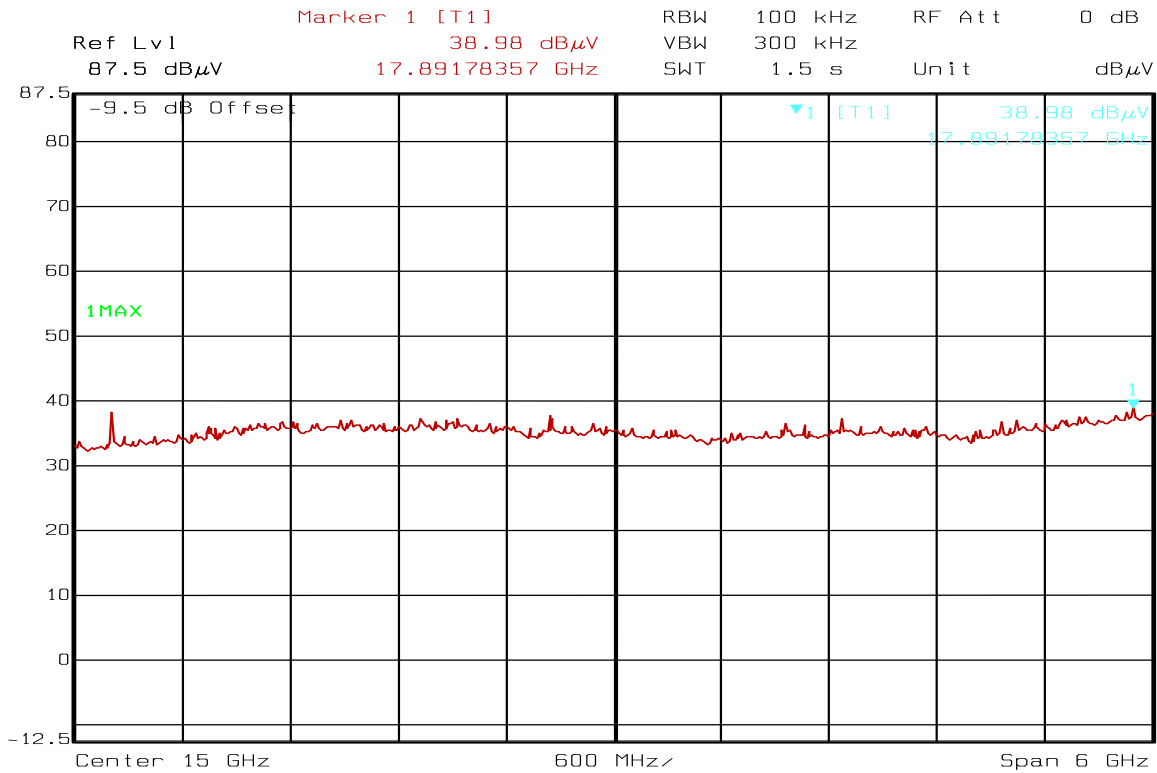
Date: 16.AUG.2011 14:20:30

Radiated Emissions 100kHz, HP, 1 – 12 GHz



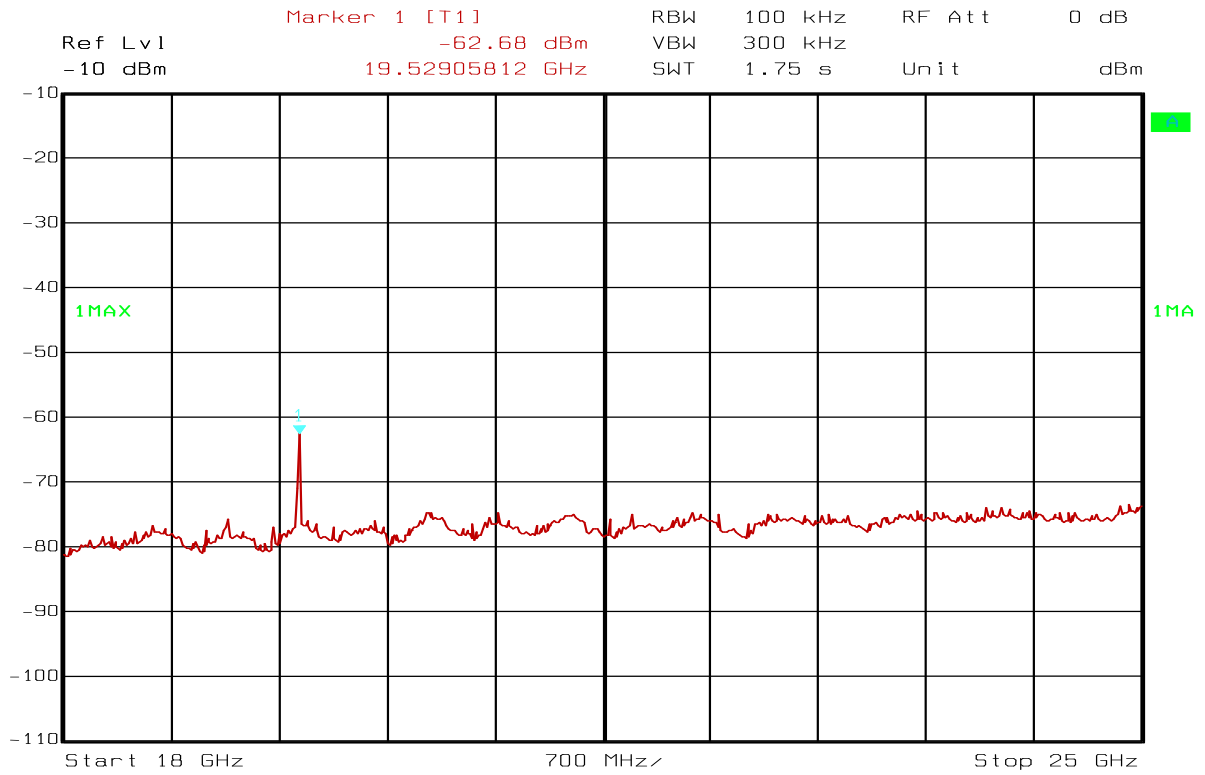
Date: 18.AUG.2011 13:25:59

Radiated Emissions 100kHz, VP, 12 – 18 GHz



Date: 18.AUG.2011 13:27:52

Radiated Emissions 100kHz, HP, 12 – 18 GHz



Date: 23.AUG.2011 09:29:32

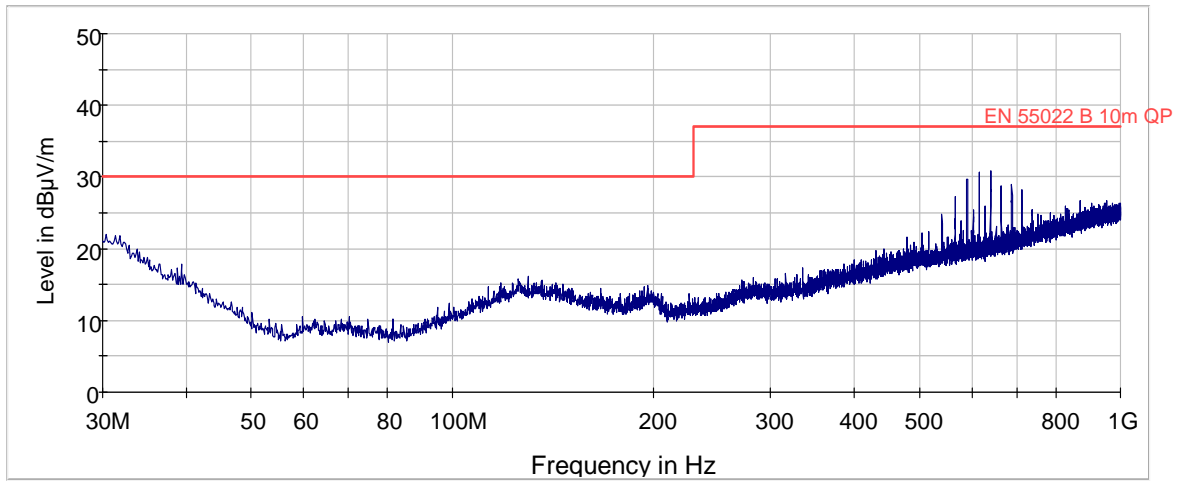
Radiated Emissions 100kHz, 18 – 25 GHz

Radiated emission 30 – 1000 MHz.

Detector: Quasi-Peak

Measuring distance 10 m according to CISPR 22.

See attached plot.



Radiated Emissions, 30 – 1000 MHz, VP and HP, @10m

Radiated Emissions, 1-25 GHz

Scans performed at distance of 1m.

Measurements performed at 3m.

Peak Detector:

Frequency MHz	Field strength @3m dBµV/m	Limit dBµV/m	Margin dB
4812	62.1	74	11.9
4884	61.8	74	12.2
4948	62.5	74	11.5

Average Detector:

Frequency MHz	Measured Field strength @3m dBµV/m	Duty-Cycle Correction Factor dB	Corrected value dBµV/m	Limit dBµV/m	Margin dB
4812	57.0	14.0	43.0	54	11.0
4884	56.6	14.0	42.6	54	11.4
4948	55.1	14.0	41.1	54	12.9

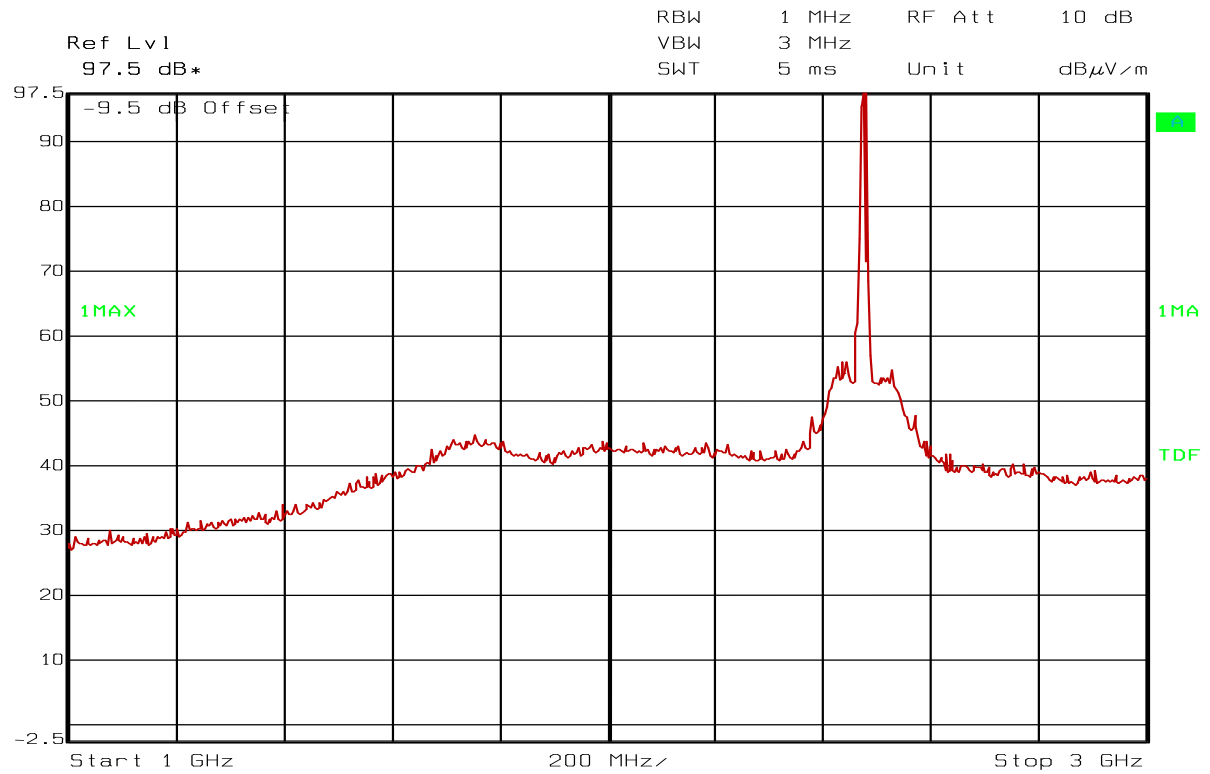
Duty Cycle: EUT transmits 20ms per 100ms

Duty Cycle Correction Factor: $20 \times \log(20/100) = 14.0$ dB

Distance Correction factor of 9.5 dB for scans at 1m is included in plots.

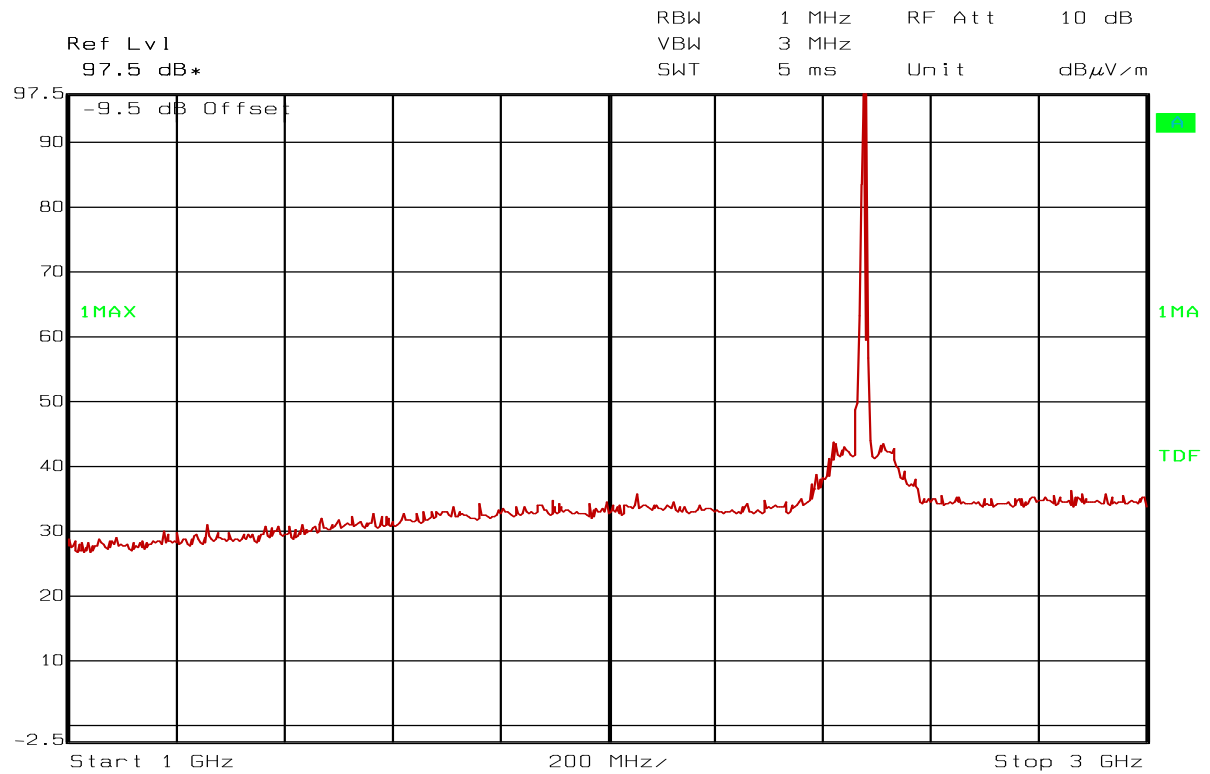
Antenna factor, amplifier gain and cable loss are included in Spectrum Analyzer "Transducer factor".

See attached graphs.



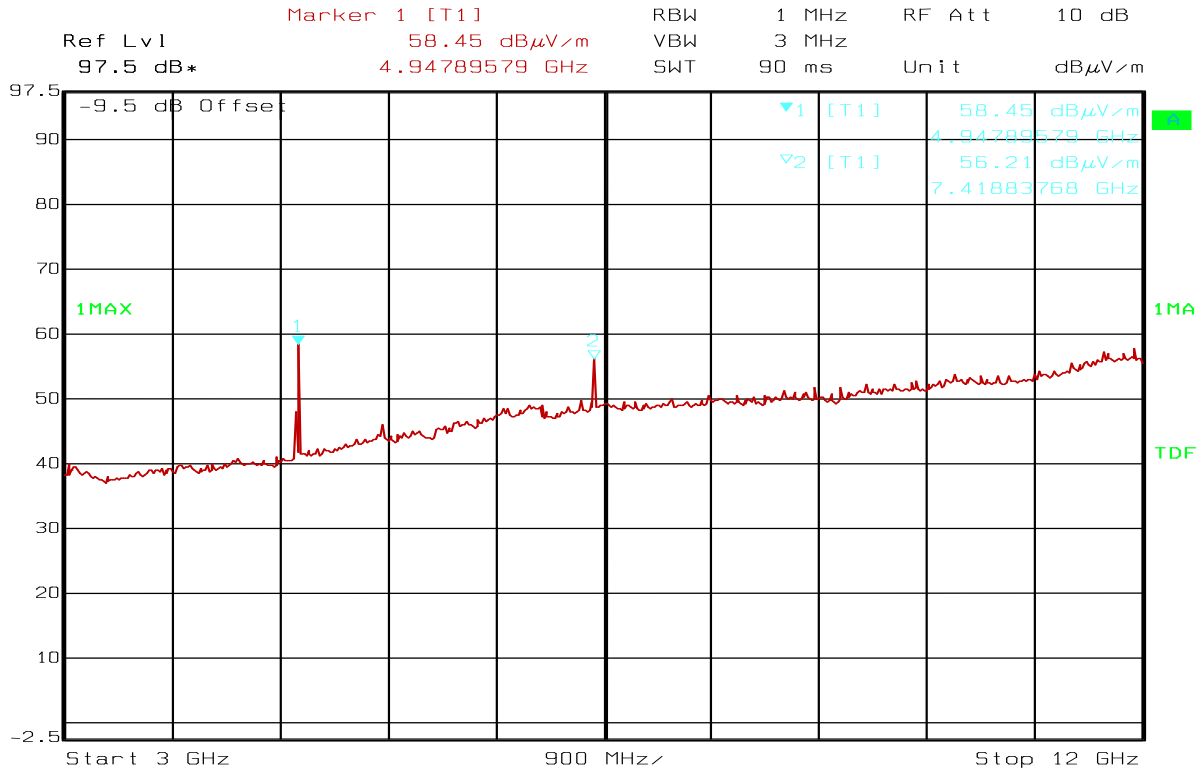
Date: 16.AUG.2011 12:59:58

Radiated Emissions, 1 – 3 GHz, VP



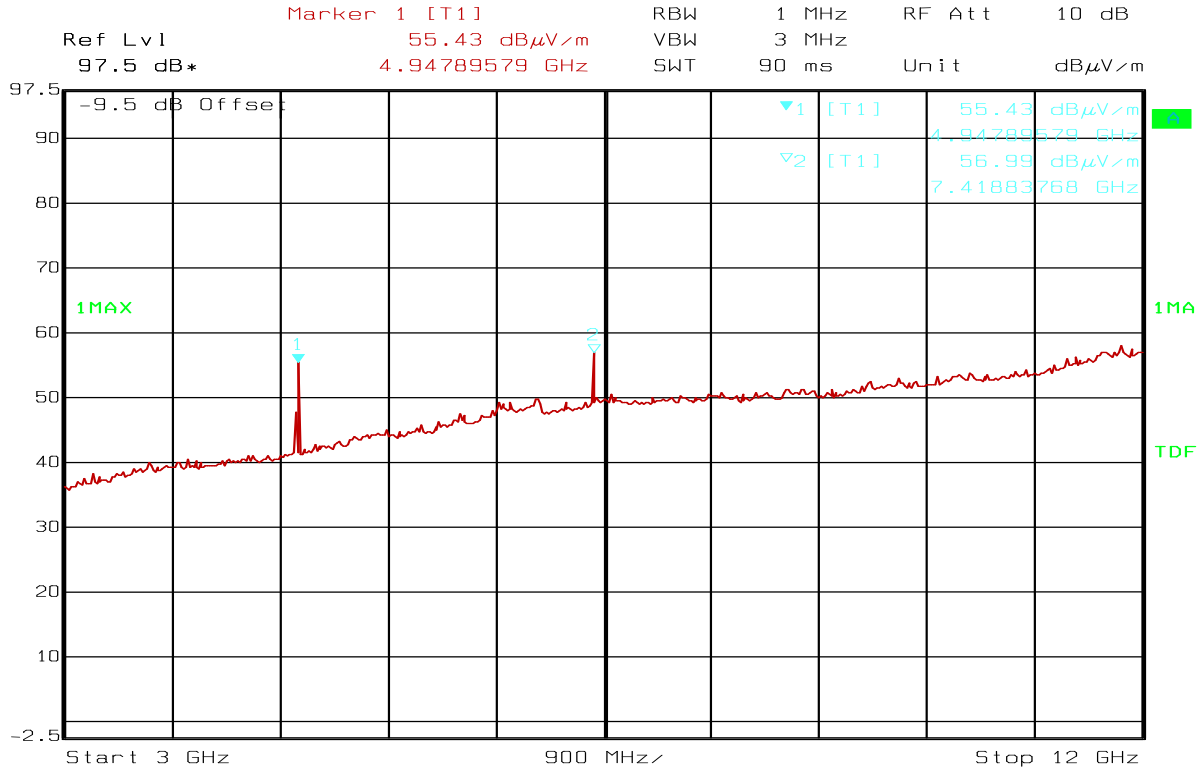
Date: 16.AUG.2011 13:02:59

Radiated Emissions, 1 – 3 GHz, HP



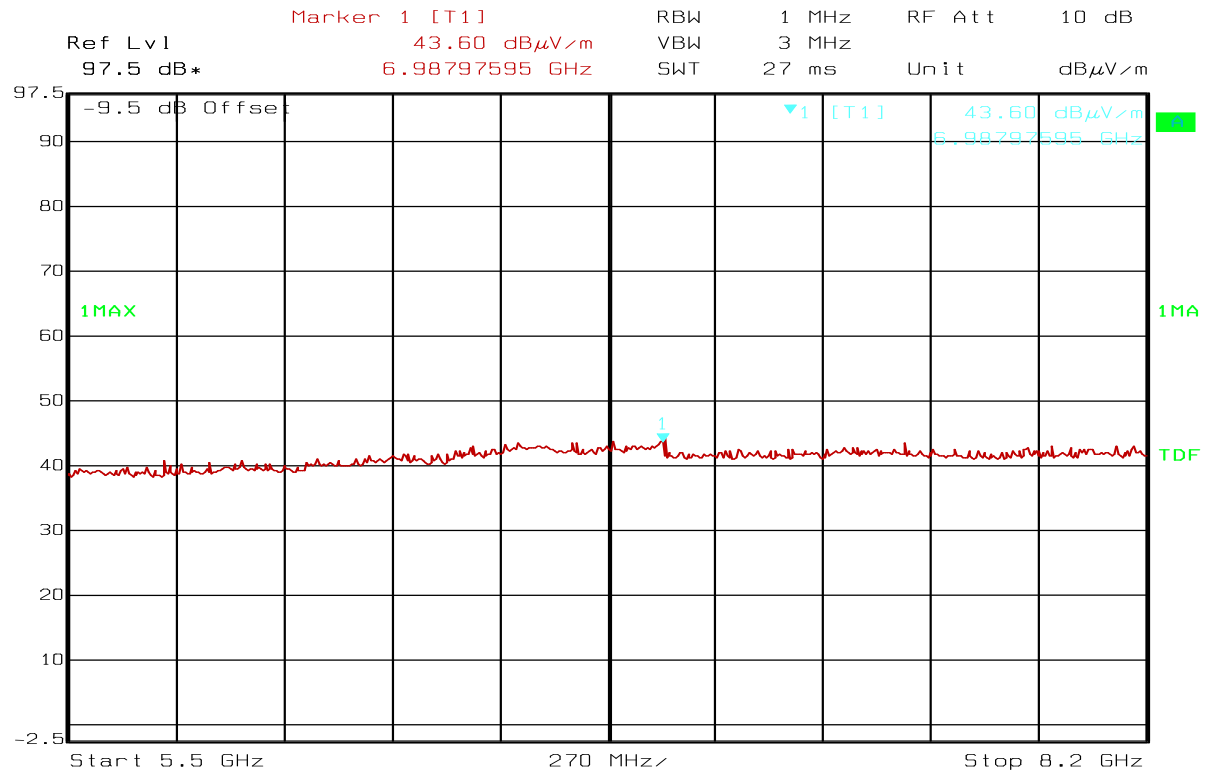
Date: 16.AUG.2011 13:08:03

Radiated Emissions, 3 – 12 GHz, VP



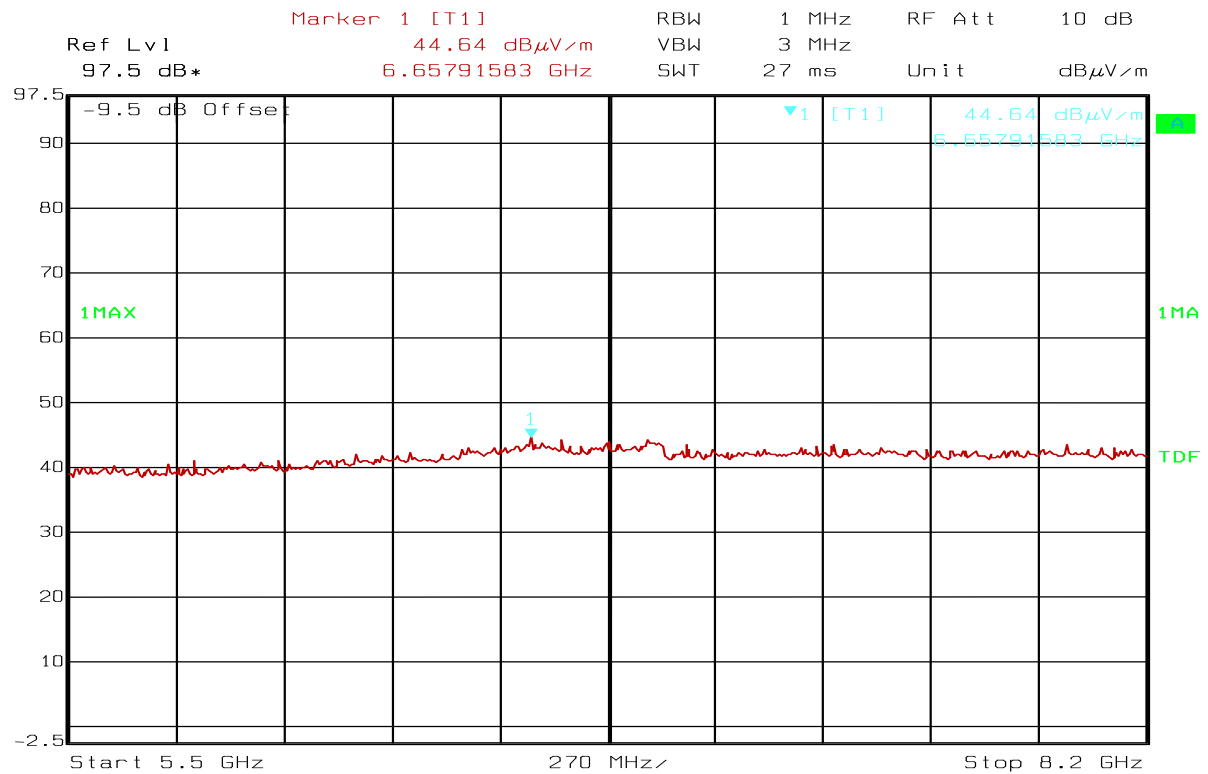
Date: 16.AUG.2011 13:23:26

Radiated Emissions, 3 – 12 GHz, HP



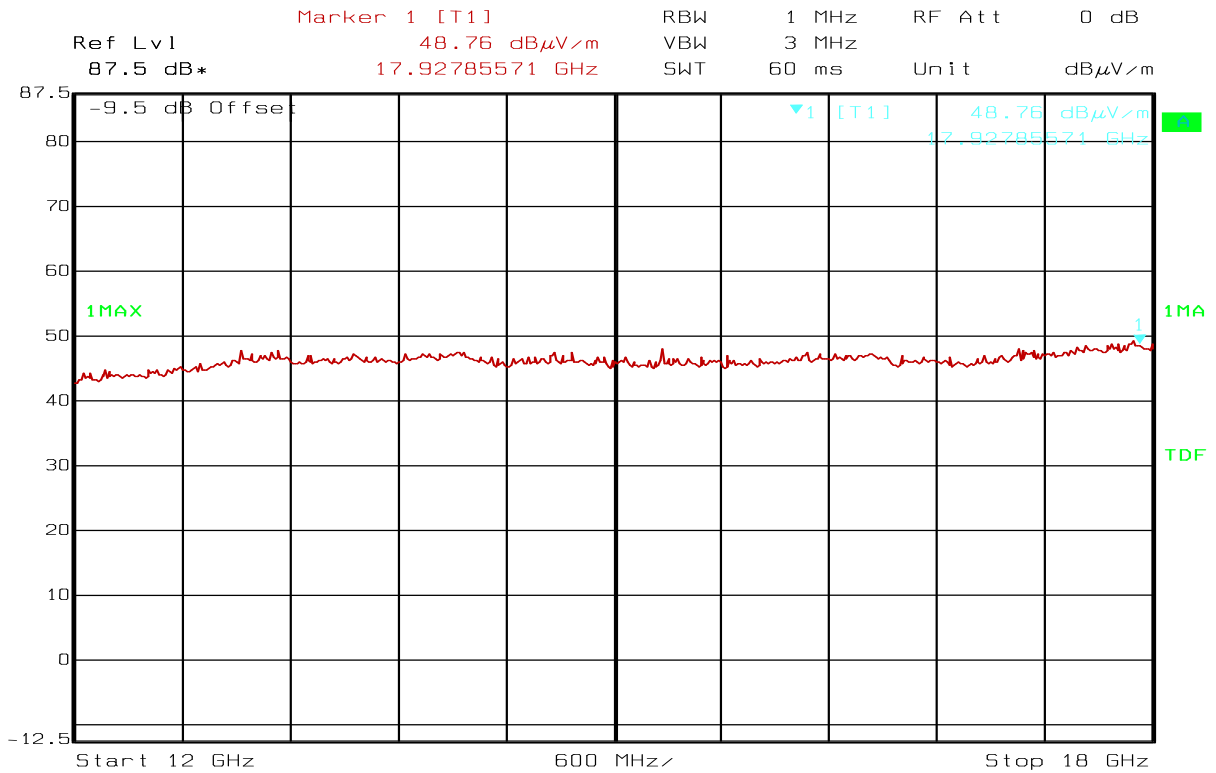
Date: 16.AUG.2011 13:42:51

Radiated Emissions, 5.5 – 8.2 GHz, VP



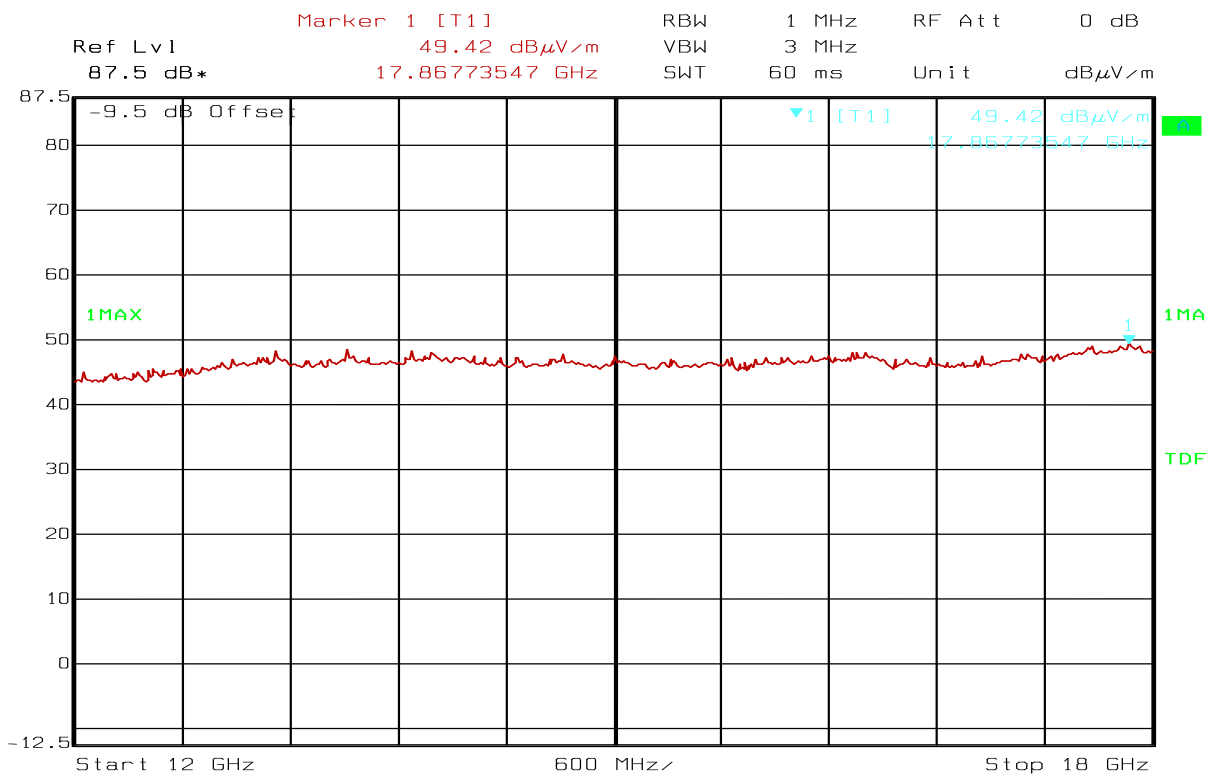
Date: 16.AUG.2011 13:47:59

Radiated Emissions, 5.5 – 8.2 GHz, HP



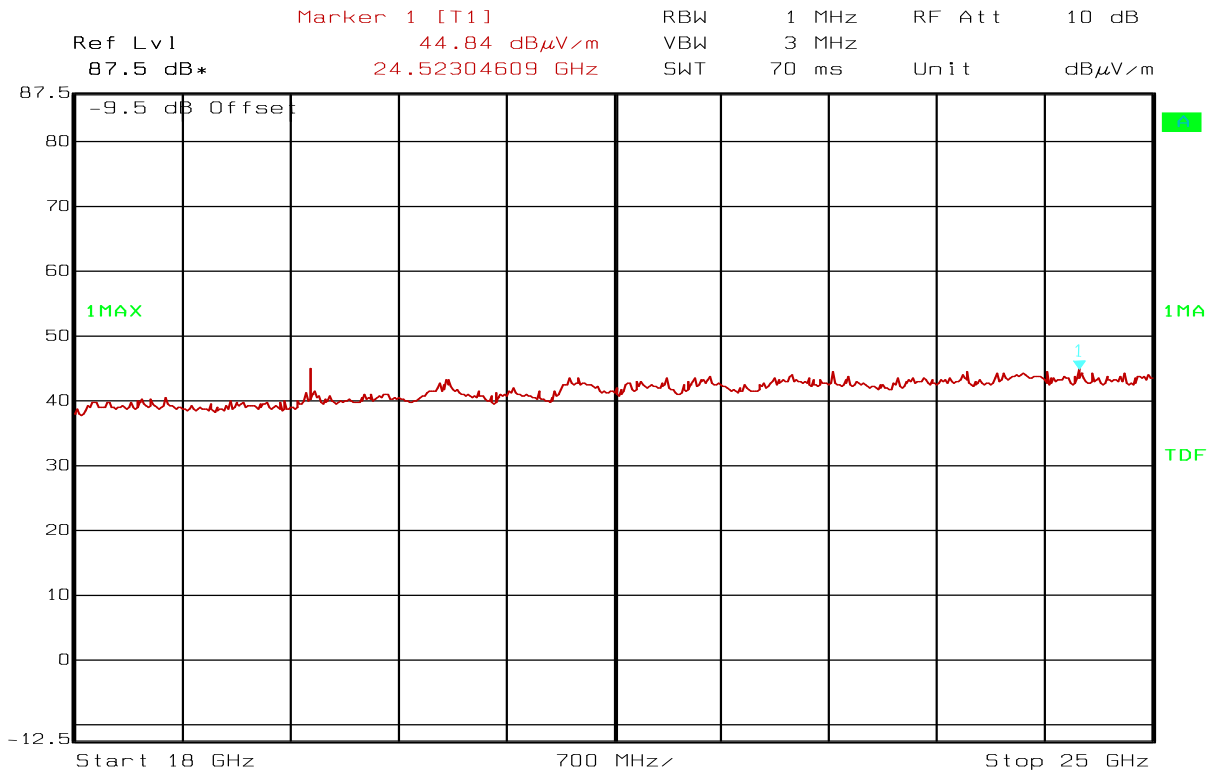
Date: 16.AUG.2011 13:54:44

Radiated Emissions, 12 – 18 GHz, VP



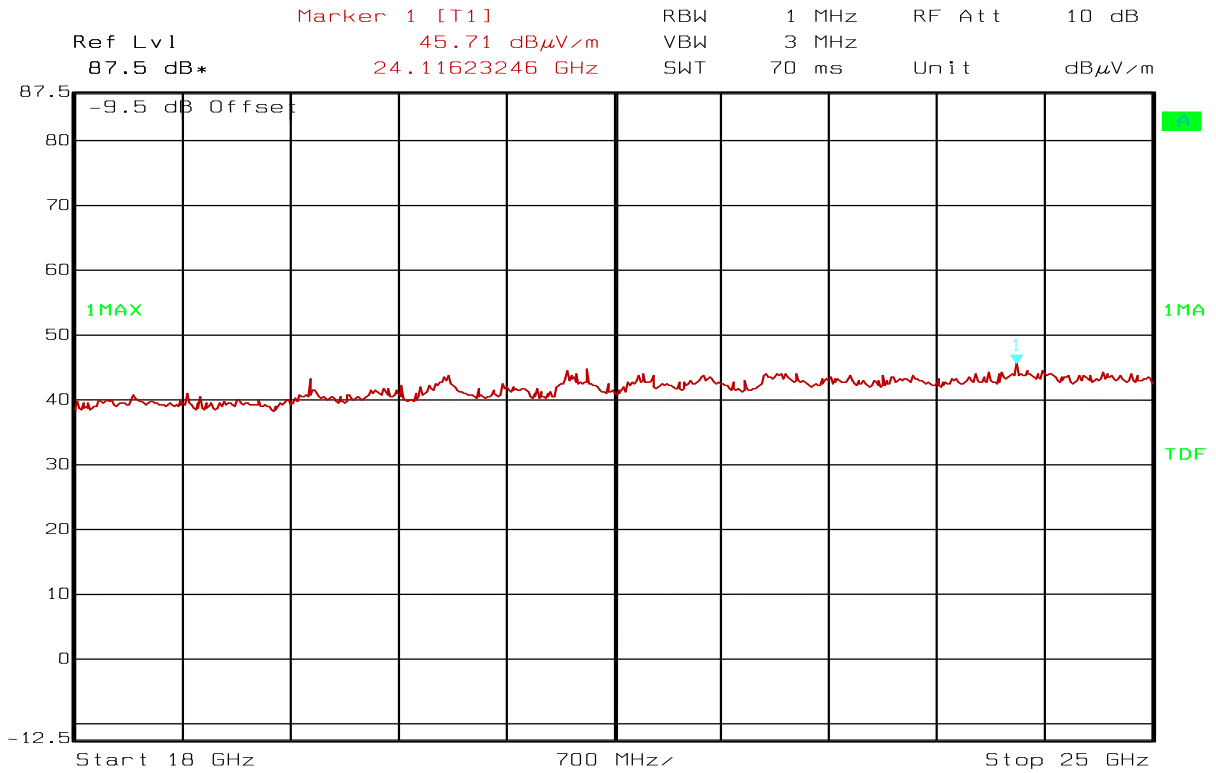
Date: 16.AUG.2011 14:02:55

Radiated Emissions, 12 – 18 GHz, HP



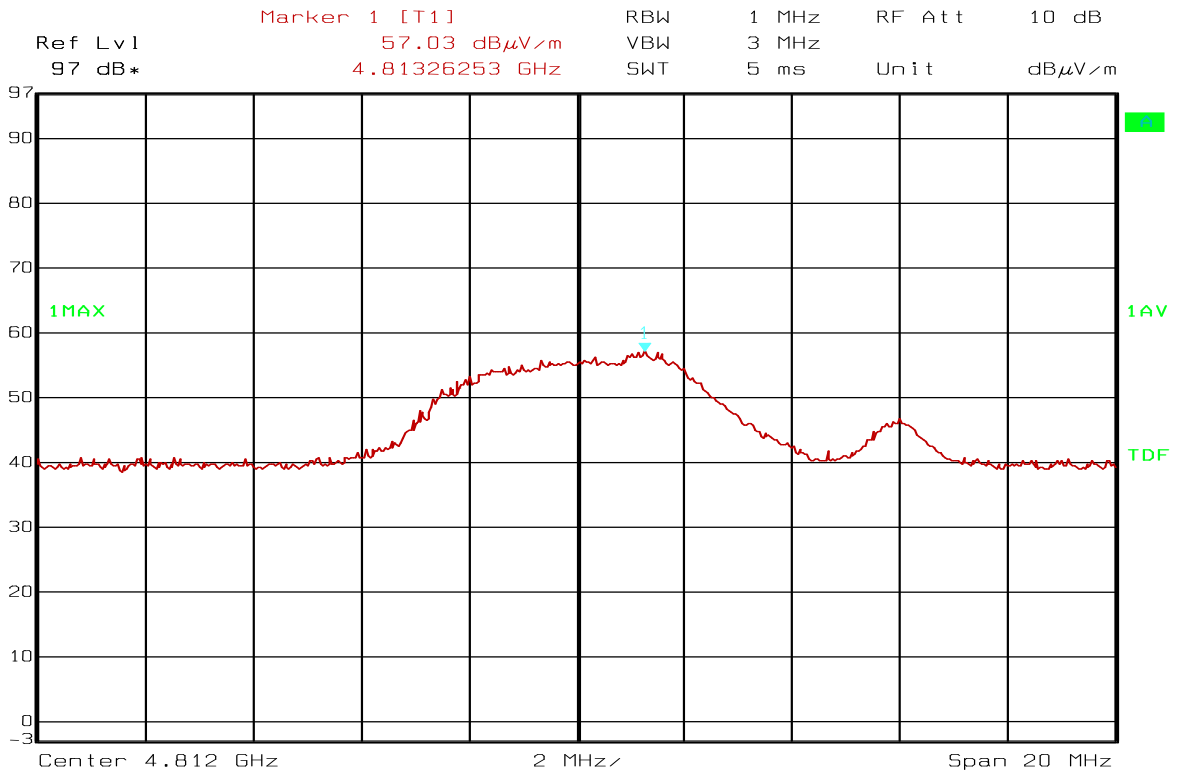
Date: 09.SEP.2011 13:02:47

Radiated Emissions, 18 – 25 GHz, VP



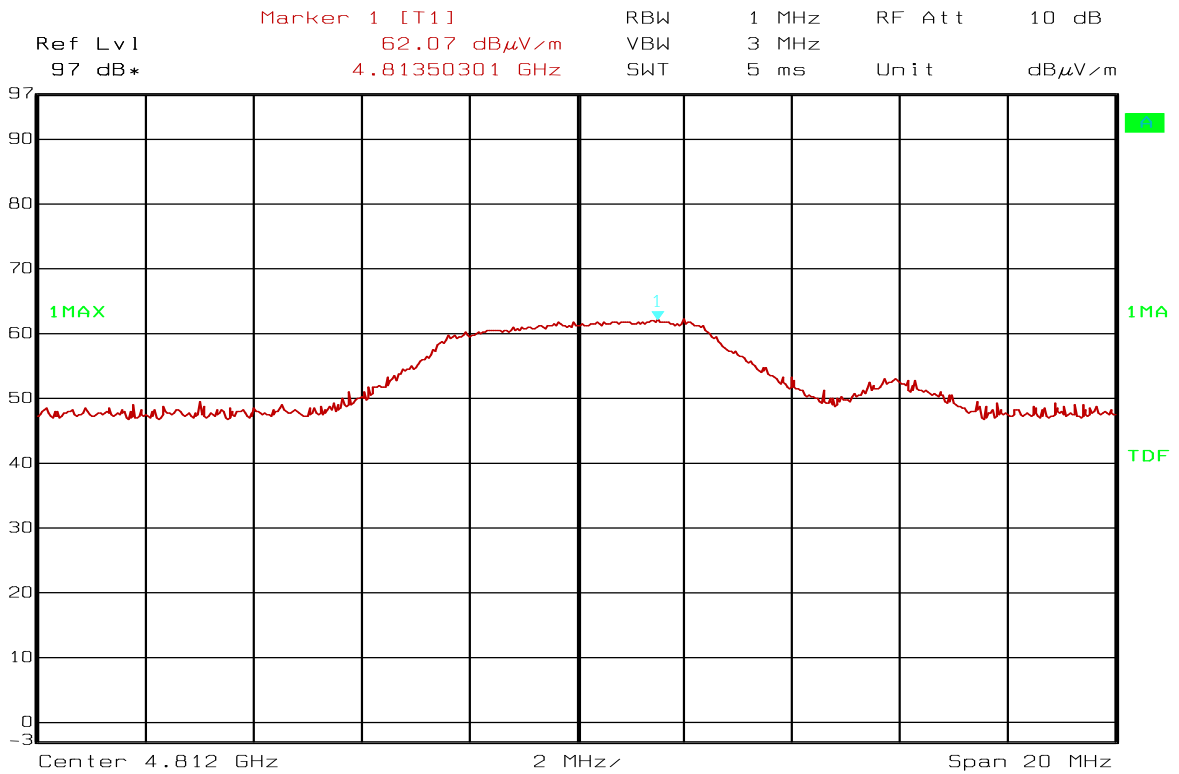
Date: 09.SEP.2011 13:01:16

Radiated Emissions, 18 – 25 GHz, HP



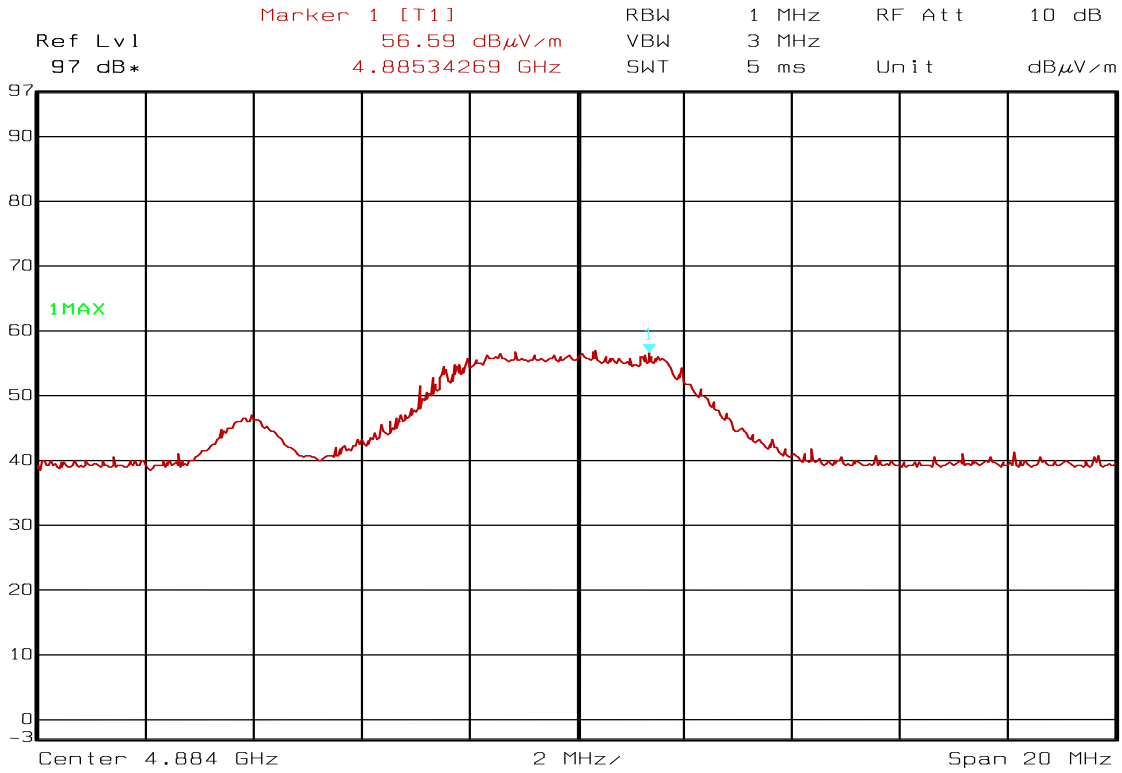
Date: 16.AUG.2011 12:43:07

Radiated Emissions, 4812 MHz, Av Det



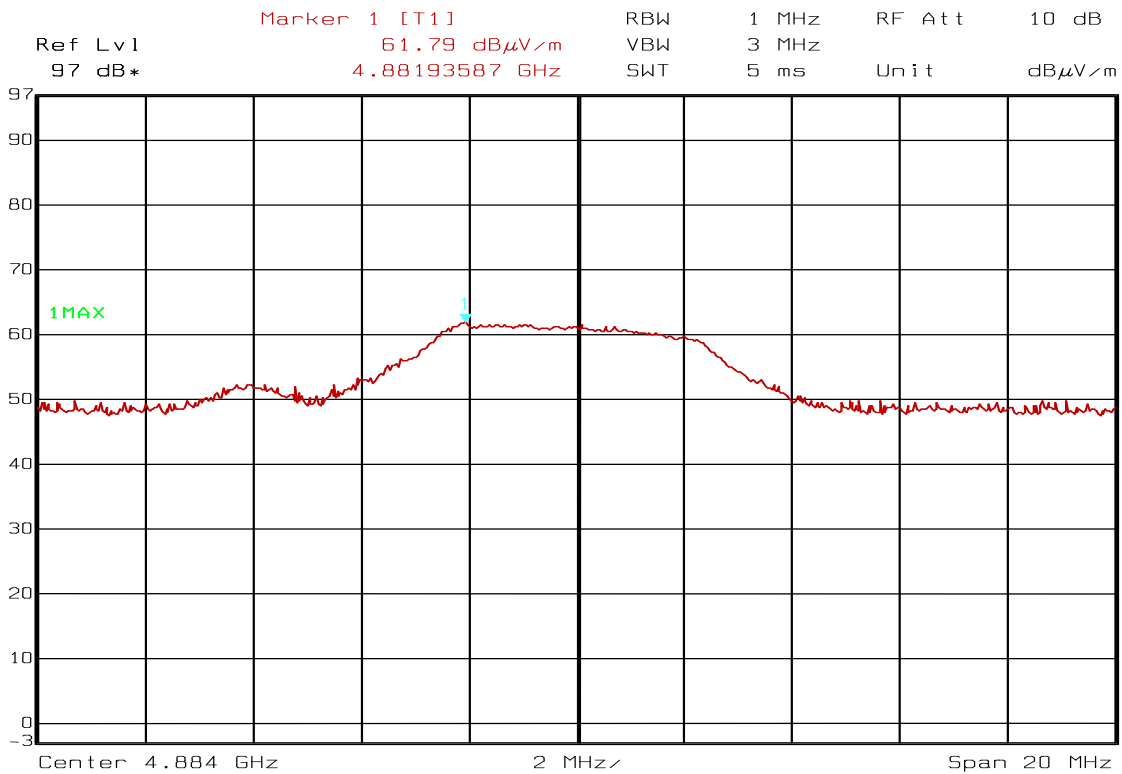
Date: 16.AUG.2011 12:44:09

Radiated Emissions, 4812 MHz, Pk Det



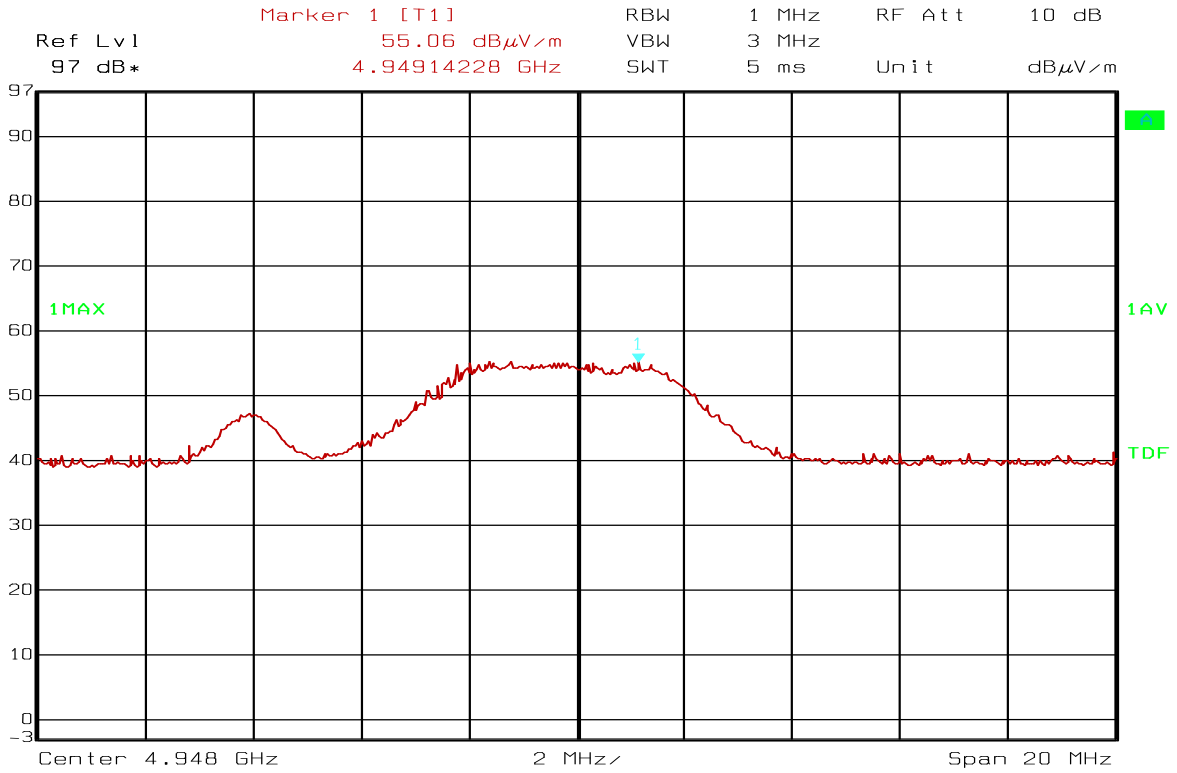
Date: 16.AUG.2011 12:40:23

Radiated Emissions, 4884 MHz, Av Det



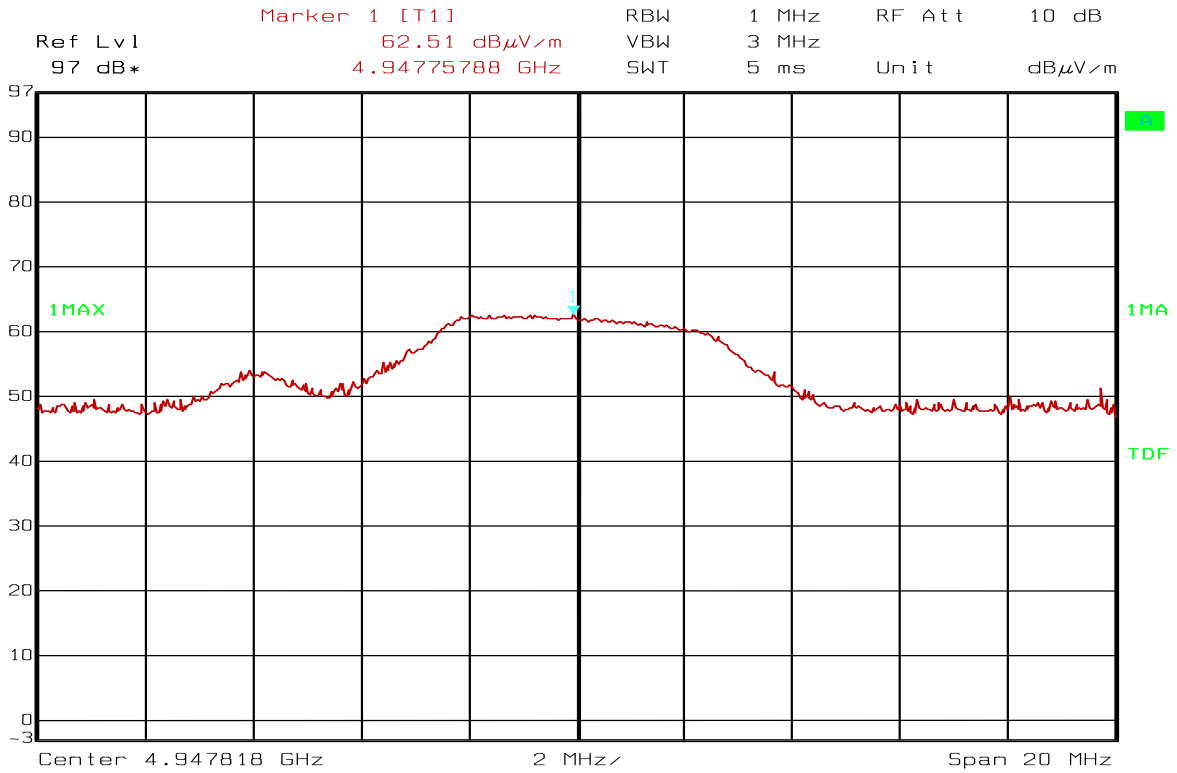
Date: 16.AUG.2011 12:39:20

Radiated Emissions, 4884 MHz, Pk Det



Date: 16.AUG.2011 12:46:39

Radiated Emissions, 4948 MHz, Av Det



Date: 16.AUG.2011 12:31:05

Radiated Emissions, 4948 MHz, Pk Det

4.5 Receiver Spurious Emissions

Measurement Procedure:

Industry Canada RSS-210 paragraph 2.3 and RSS-GEN paragraphs 4.10 and 6.

Test results:

Frequency MHz	Carrier Freq. MHz	Measured Value Radiated dBuV/m @3m	Limit dBuV/m @3m	Margin dB
30 – 1000	all	None found	/	/
> 1000	all	None found	54	/

The measurement was performed radiated with the EUT in receive-only mode.

Requirements, RSS-GEN Issue 3, clause 6

The measurement can be performed either radiated or conducted.

When measured Conducted: no spurious signals appearing at the antenna terminals shall exceed 2 nW per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nW above 1 GHz.

When measured Radiated: See Table 2 in RSS-GEN Issue 3, clause 6.

4.6 Power Spectral Density (PSD)

Para. No.: 15.247 (d)

Test Performed By: Frode Sveinsen	Date of Test: 16 Aug 2011
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Test Results: Passed

Measured and Calculated Data:

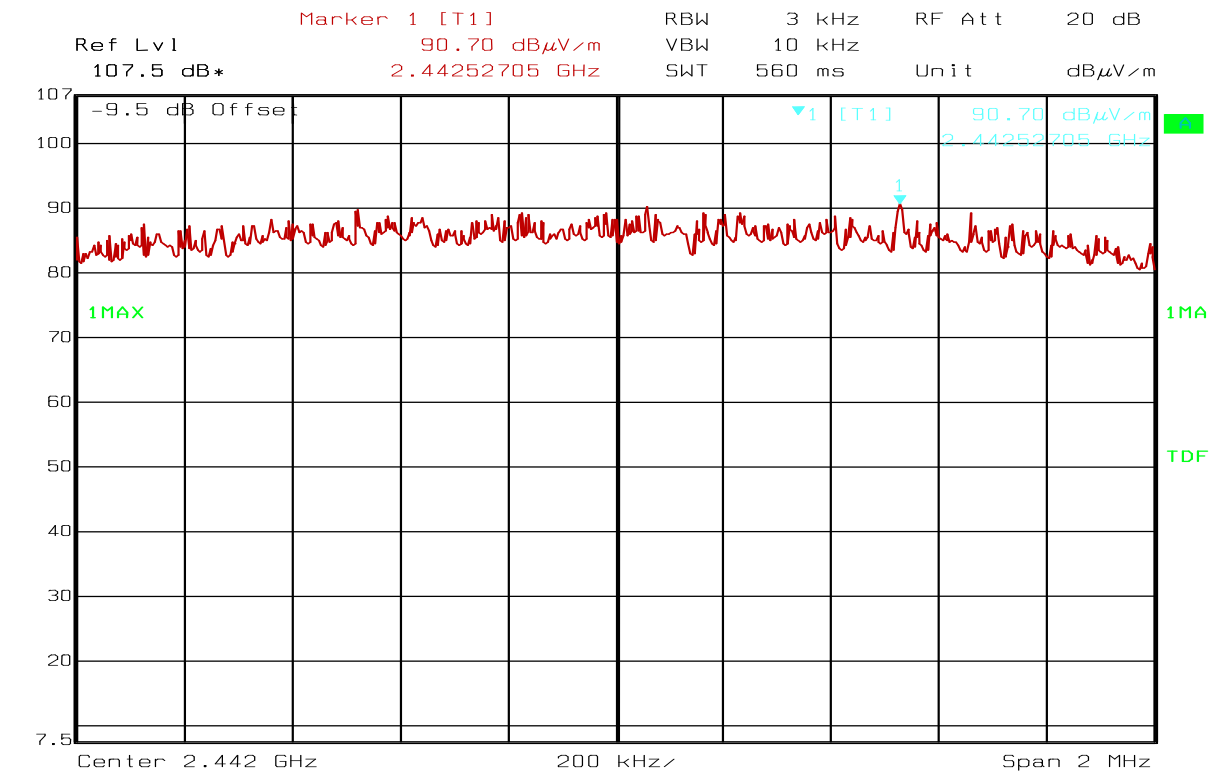
The alternative test procedures in point 2) A , B and formula 1 described in guidance on measurements for Digital Transmission Systems is used.

	Measured Field Strength @3m dB μ V/m	Calculated PSD dBm
Power Spectral Density @2440 MHz	91.0	-4.2

PSD in dBm is calculated from the field strength value using the Free Field Formula.

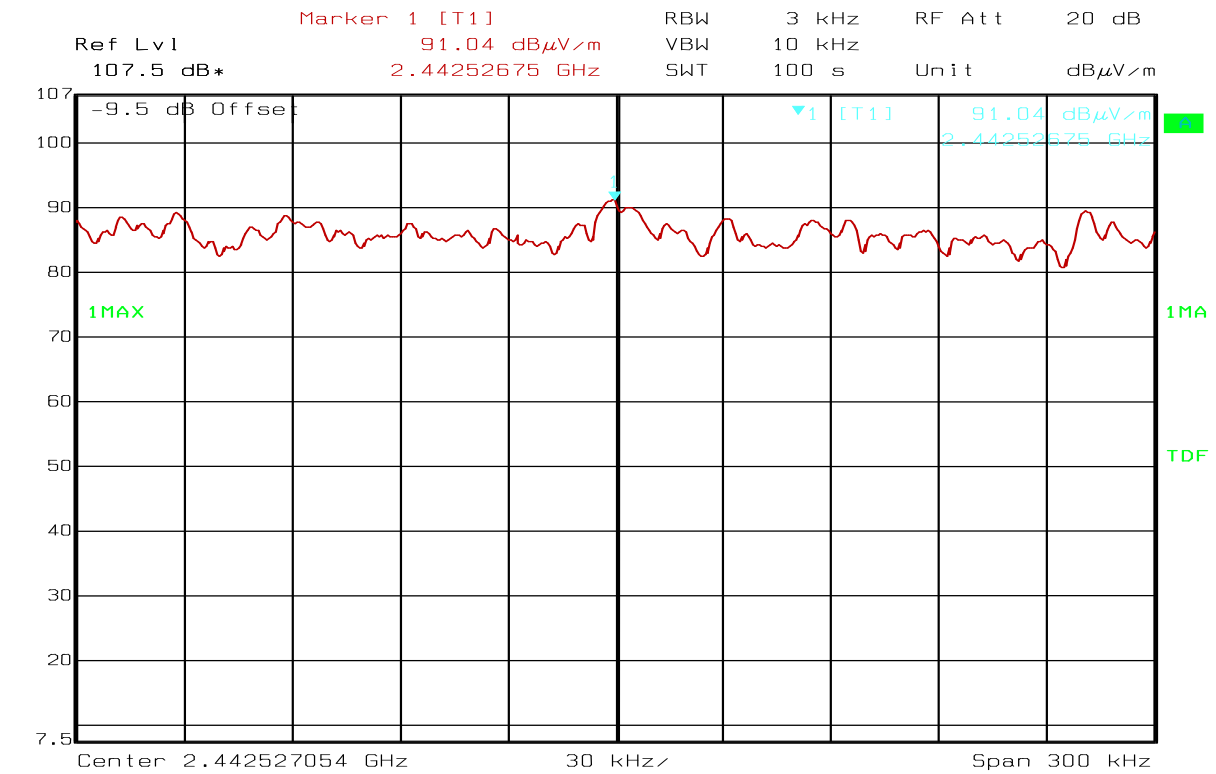
Requirements:

The Power Spectral Density of a Digital Transmission System shall be no greater than +8 dBm in any 3 kHz band.



Date: 16.AUG.2011 14:47:21

PSD Overview



Date: 16.AUG.2011 14:51:46

PSD Measurement

5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal. Date	Cal. Due
1	FSEK	Spectrum Analyzer	Rohde & Schwarz	LR 1337	2010.12.15	2012.12.15
2	ESHS10	Spectrum Analyzer	Rohde & Schwarz	LR 1090	2011.06.21	2012.06.21
3	3115	Antenna horn	EMCO	LR 1330	2010.08.05	2013.08.05
4	643	Antenna horn	Narda	LR 093	2009.01.26	2012.01.26
5	642	Antenna horn	Narda	LR 220	2009.01.26	2012.01.26
6	PM7320X	Antenna horn	Siverts lab	LR 103	2009.01.26	2012.01.26
7	DBF-520-20	Antenna horn	Systron Donner	LR 101	2009.01.26	2012.01.26
8	638	Antenna horn	Narda	LR 098	2010.06.17	2015.06.17
9	JB3	Antenna BiLog	Sunol Sciences	N-4525	2010-09	2011-09
10	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2011-09-27	2012-09-27
11	LNA6900	Pre-amplifier	Teseq	LR 1593	2010-11	2011-11
12	ESCI	Test Receiver	Rohde & Schwarz	N-4529	2010.11.08	2011.11.02
13	ESH3-Z3	LISN	Rohde & Schwarz	LR 1076	2009-10-22	2011-10-22
14	80S	Signal Generator	Powertron	LT 502	Cal b4 use	
15	Model 87 V	Multimeter	Fluke	LR 1598	2010-12-14	2011-12-14

6 BLOCK DIAGRAM

6.1 Test Site Radiated Emission

