



Test report no. : 190512-7

Item tested : KX-TG7741

**Type of equipment : UPCS Base Station
with Bluetooth Transceiver**

FCC ID : ACJ96NKX-TG7741

Client : Panasonic System Networks Co., Ltd.

FCC Part 15.247

Frequency Hopping Transmitters /
Digital Transmission System

RSS-210, Issue 8

Low Power Licence-Exempt
Radiocommunication Devices

22 November 2011

Authorized by : 

G. Suhanthakumar
Technical Vericator

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1 GENERAL INFORMATION

1.1 Testhouse Info

Name : Nemko AS
Address : Nemko Kjeller
Instituttveien 6, Box 96
NO-2007 Kjeller, NORWAY
Telephone : +47 64 84 57 00
Fax : +47 64 84 57 05
E-mail: comlab@nemko.com
FCC test firm registration # : 994405
IC OATS registration # : 2040D-1
Total Number of Pages: 26

1.2 Client Information

Name : Panasonic System Networks Co., Ltd.
Address : 1-62, 4-Chome, Minoshima, Hakata-ku, Fukuoka 812-8531 Japan
Telephone : +81-92-477-1405
Fax : +81-92-477-1487

Contact:

Name : Mr. Junji Sumi
Telephone : +81 92 477 1405
E-mail : sumi.junji@jp.panasonic.com

1.3 Responsible Manufacturer (if other than client)

Same as client.

2 Test Information

2.1 Tested Item

Name :	Panasonic
FCC ID :	ACJ96NKX-TG7741
Model/version :	KX-TG7741
Serial number :	/
Hardware identity and/or version:	/
Software identity and/or version :	/
Frequency Range :	2402 – 2480 MHz
Number of Channels :	From 79 to 20 (adaptive)
Operating Modes :	Frequency Hopping Spread Spectrum
Type of Modulation :	Digital (GFSK)
Rated Output Power :	1 mW Peak
Type of Power Supply :	Power Adaptors: PNLV226(FW) and PNLV226(UC)
Antenna Connector :	No (Integral antennas)
Number of Antennas :	1
Antenna Diversity Supported :	No
Desktop Charger :	None

2.2 Description of Tested Device(s)

The tested equipment is a Bluetooth Transceiver that is integrated into a DECT base station.

The BT module in the KX-TG7741 is identical to the BT part in the KX-TG7641 (previously certified under FCC ID: ACJ96NKX-TG7641), the module in KX-TG7741 also use the same antenna as the module in KX-TG7641.

The tested equipment has integral antennas only.

2.3 Theory of Operation

The tested EUT is a Frequency Hopping Transmitter that uses the Bluetooth protocols.

This version of Bluetooth normally uses all 79 BT channels, but will exclude channels or shift to 20 channels if interference is detected. When 20 channels are used they can be either in the lower, middle or upper part of the 2.4 GHz frequency band, depending on the interference.

2.4 Exposure Evaluation

The EUT is designed to be fixed to a wall etc. and the user manual contains text that it shall be mounted with a separation distance of at least 20cm from any persons. For the purposes of exposure evaluation this EUT is a mobile or fixed device. MPE Calculation at 20cm satisfying FCC requirements is submitted as a separate document.

The EUT is exempted from RF Exposure Evaluation to Industry Canada requirements since the output power complies with the power levels of section 2.5.1 of RSS-102 Issue 4.

2.5 Test Environment

2.5.1 Normal test condition

Temperature:	19.9 – 20.5 °C
Relative humidity:	41 - 43 %
Normal test voltage:	120 V AC

The values are the limit registered during the test period.

2.6 Test Period

Item received date: 2011-11-08

Test period : from 2011-11-14 to 2011-11-14

3 TEST REPORT SUMMARY

3.1 General

Manufacturer: Panasonic
Model No.: KX-TG7741
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.

All 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 1m.

A description of the test facility is on file with the FCC and Industry Canada.

- | | |
|---|---|
| <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 |
| DSS 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 #: 190512-7

TESTED BY: 
Frode Sveinsen, Test engineer

DATE: 22 November 2011

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3.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 8 reference	Result
Supply Voltage Variations	15.31(e)	8 (RSS-GEN)	Complies
Number of Operating Frequencies	15.31(m)	A8.1	Complies ¹
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	Complies
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2.2 (RSS-GEN)	Complies
Channel Separation	15.247(a)(1)	A8.1	Complies ¹
Pseudorandom Hopping Algorithm	15.247(a)(1)	A8.1	Complies ¹
Time of Occupancy	15.247(a)(1)(iii)	A8.1	Complies ¹
Occupied Bandwidth	15.247(a)(1)	A8.1	Complies ¹
Minimum 20 dB Bandwidth	15.247(a)(2)	A8.2	Complies ¹
Peak Power Output	15.247(b)	A8.4	Complies
Power Spectral Density	15.247(d)	A8.2	N/A ³
Spurious Emissions (Antenna Conducted)	15.247(c)	A8.5	Complies ¹
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	A8.5	Complies

¹ Covered by Nemko test report no. 141532-2

³ Not applicable for Frequency Hopping devices

3.3 Description of modification for Modification Filing

Not applicable.

3.4 Comments

This test covered only limited radiated tests since the BT module is identical to the previously certified BT module in Panasonic models KX-TG7641 and KX-TG6581. Radiated tests are covered by Nemko test report no. 161417-6, and onducted tests are covered by Nemko test report no. 141532-2.

This test report covers only the Bluetooth module of the tested device. The DECT part is covered by Nemko test report no. 190512-5.

The measurements were done with the EUT powered by 120 V AC. It was checked that power variations between 85% and 115% did not have any influence on the measurements.

All ports were populated during spurious emission measurements.

3.5 Family List Rational

Not Applicable.

4 TEST RESULTS

4.1 Power Line Conducted Emissions

Para. No.: 15.207 (a)

Test Performed By: Thomas Dangle	Date of Test: 11 Nov 2011
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Measurement procedure: ANSI C63.4-2009 using 50 μ H/50 ohms LISN.

Test Results: Complies

Measurement Data: See attached graph, (Peak detector).

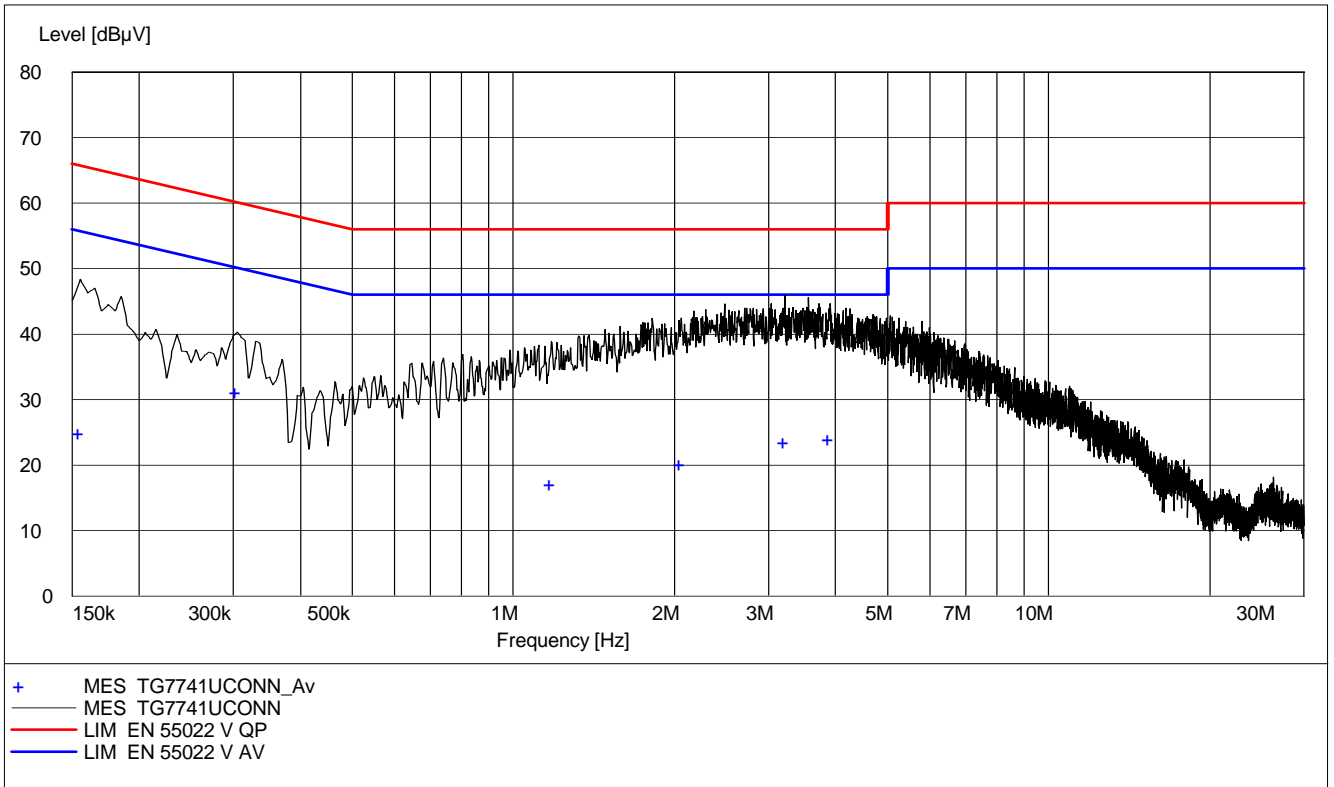
Highest measured value (L1 and N):

AC Adaptor PNLV226(UC):

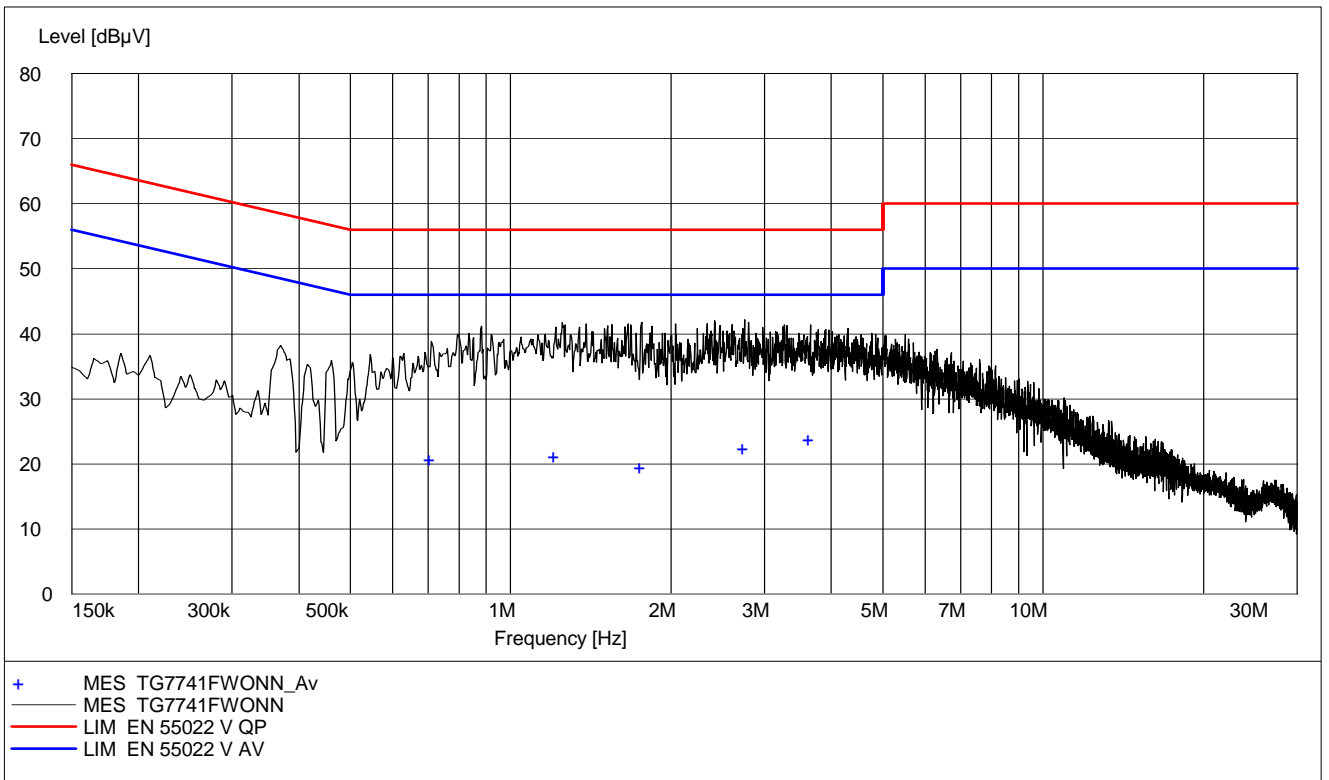
Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.155000	24.90	10.10	55.70	30.80	AV	N	Pass
0.305000	31.20	10.10	50.10	18.90	AV	N	Pass
1.180000	17.10	10.20	46.00	28.90	AV	N	Pass
2.060000	20.10	10.30	46.00	25.90	AV	N	Pass
3.220000	23.60	10.30	46.00	22.40	AV	L1	Pass
3.910000	24.00	10.40	46.00	22.00	AV	L1	Pass

AC Adaptor PNLV226(FW):

Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.710000	20.70	10.20	46.00	25.30	AV	N	Pass
1.215000	21.20	10.20	46.00	24.80	AV	L1	Pass
1.765000	19.50	10.20	46.00	26.50	AV	N	Pass
2.750000	22.50	10.30	46.00	23.50	AV	L1	Pass
3.655000	23.80	10.30	46.00	22.20	AV	N	Pass



Phase L1 and N, AC Adaptor PNLV226(UC)



Phase L1 and N, AC Adaptor PNLV226(FW)

4.2 Peak Power Output

Para. No.: 15.247 (b)

Test Performed By: Frode Sveinsen	Date of Test: 18-20 Jan 2010 14 Nov 2011
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Test Results: Complies

Measurement Data:

Maximum Conducted Peak Output Power

RF channel	0	39	79
Measured value (dBm)	0.86	0.80	0.40
Measured value (Watt)	0.0012	0.0012	0.0011

Maximum EIRP, Watts

RF channel	0	39	79
Measured EIRP (dBμV/m)	96.87	95.57	94.68
Measured EIRP (Watt)	0.0015	0.0011	0.0009
Antenna gain (dBi)	0.8	-0.5	-0.9

Conducted values are from Nemko report no. 141532-2.

Antenna gain = $10 \cdot \log(\text{EIRP}/\text{Conducted power})$ dBi

EIRP is calculated from measured field strength by the formula in DA00-705.

See attached graph.

Detachable antenna?

Yes No

If detachable, is the antenna connector non-standard?

Yes No

Type of antenna connector: N/A

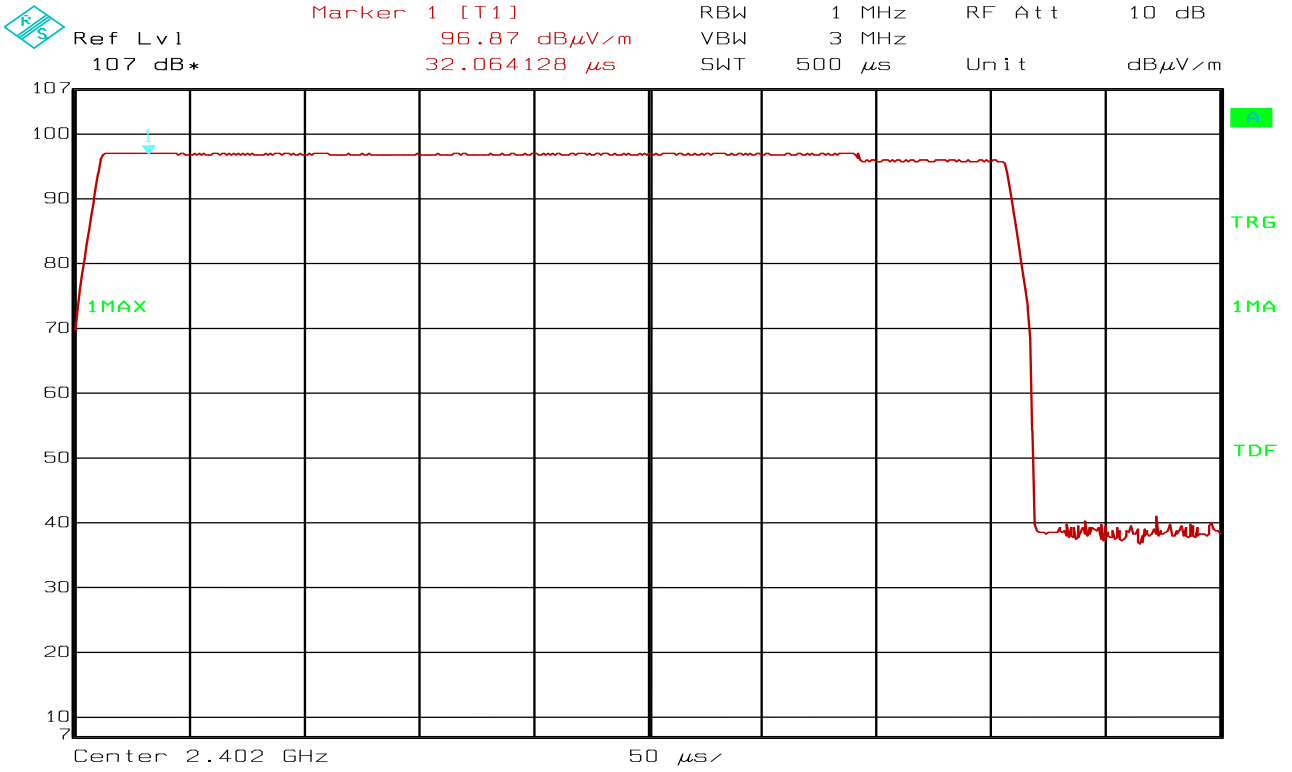
Requirements:

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

For frequency hopping systems employing at least 75 hopping channels: 1 Watt

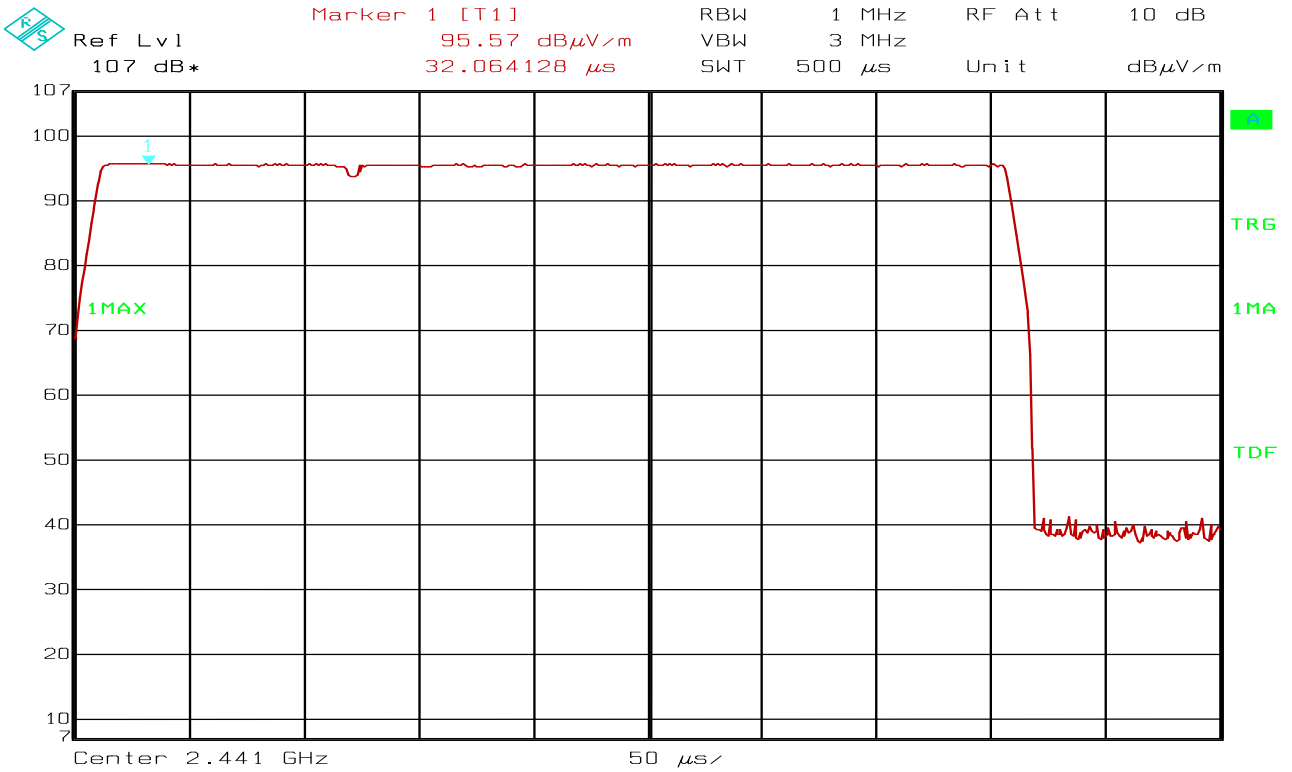
For all other frequency hopping systems in the 2400 - 2483.5 MHz band: 0.125 Watts

If transmitting antennas of dirctional 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.



Date: 14.NOV.2011 12:32:58

Radiated Output Power, 2402 MHz

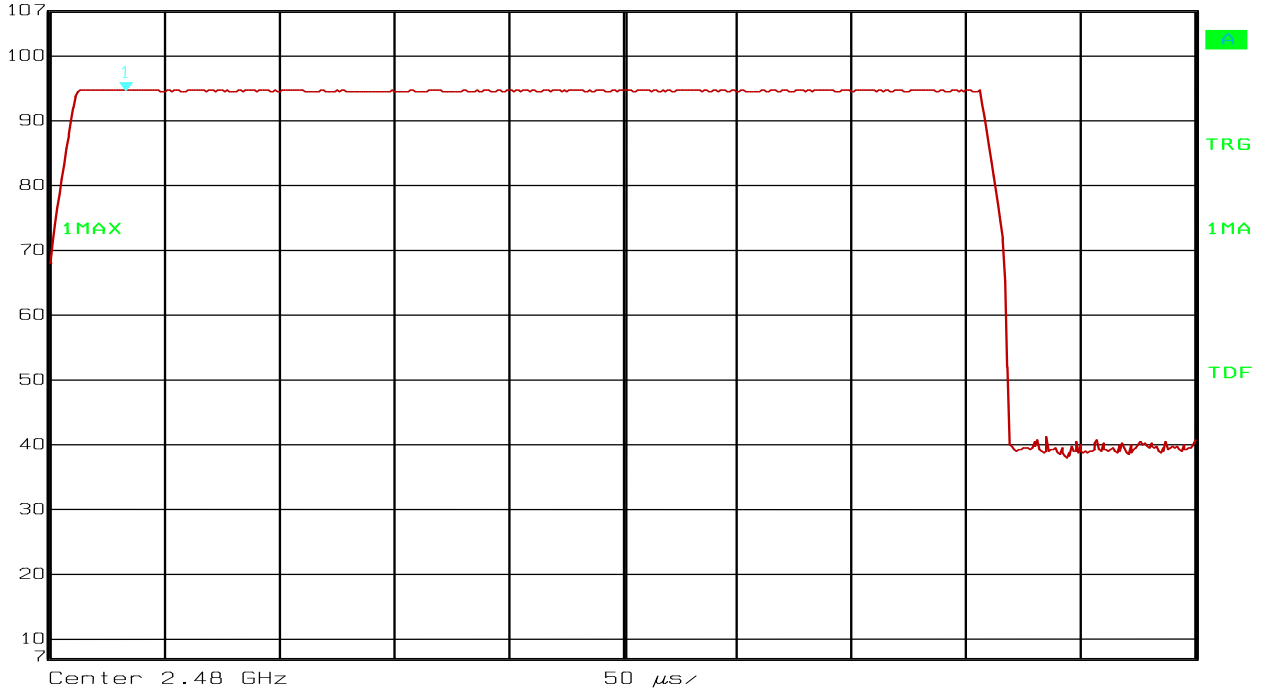


Date: 14.NOV.2011 13:17:09

Radiated Output Power, 2441 MHz



Ref Lvl 107 dB*
 Marker 1 [T1] 94.68 dB μ V/m
 33.066132 μ s
 RBW 1 MHz RF Att 10 dB
 VBW 3 MHz
 SWT 500 μ s Unit dB μ V/m



Date: 14.NOV.2011 13:41:59

Radiated Output Power, 2480 MHz

4.3 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Performed By: Frode Sveinsen	Date of Test: 14 Nov 2011
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Test Results: Complies

Measurement Data:

Radiated Emissions, 1-25 GHz, Peak

Measuring distance: 3m (1 – 8.5 GHz)
 1m (8.5 – 18 GHz)

A pre-scan was performed above 18 GHz and no spurious emissions were detected.

Peak Detector:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector, 3m	Duty cycle corr. factor	Limit	Margin
GHz	L,M,H	dB	dB μ V/m	dB	dB μ V/m	dB
4804	L	0	48.6	20	74	25.4
4880	M	0	48.2	20	74	25.8
4960	H	0	50.3	20	74	23.7
Other freqs	L,M,H	/	None detected	20	74	>20

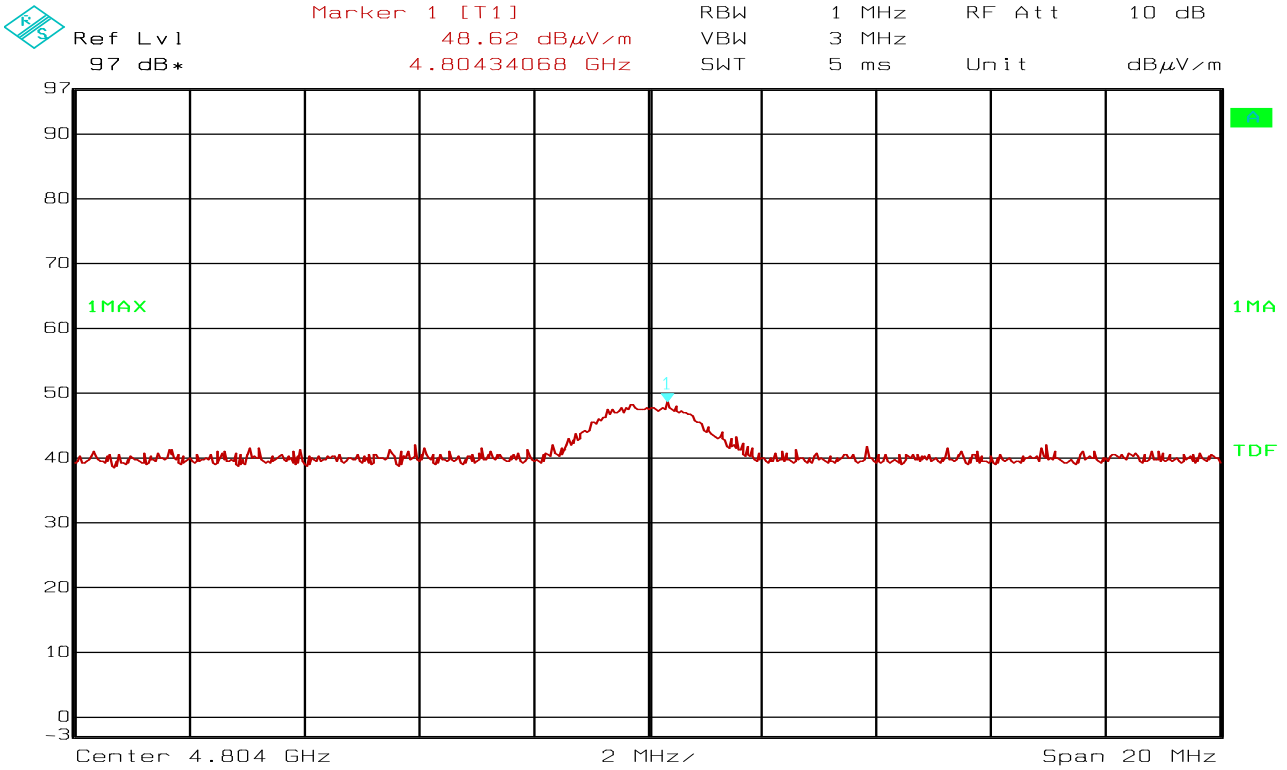
Average Detector, Calculated:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector, 3m	Duty cycle corr. factor	Limit	Margin
GHz	L,M,H	dB	dB μ V/m	dB	dB μ V/m	dB
4804	L	0	28.6	20	54	25.4
4880	M	0	28.2	20	54	25.8
4960	H	0	30.3	20	54	23.7
Other freqs	L,M,H	/	None detected	20	54	>20

Average Detector values are calculated from Peak values by Duty Cycle Correction Factor.

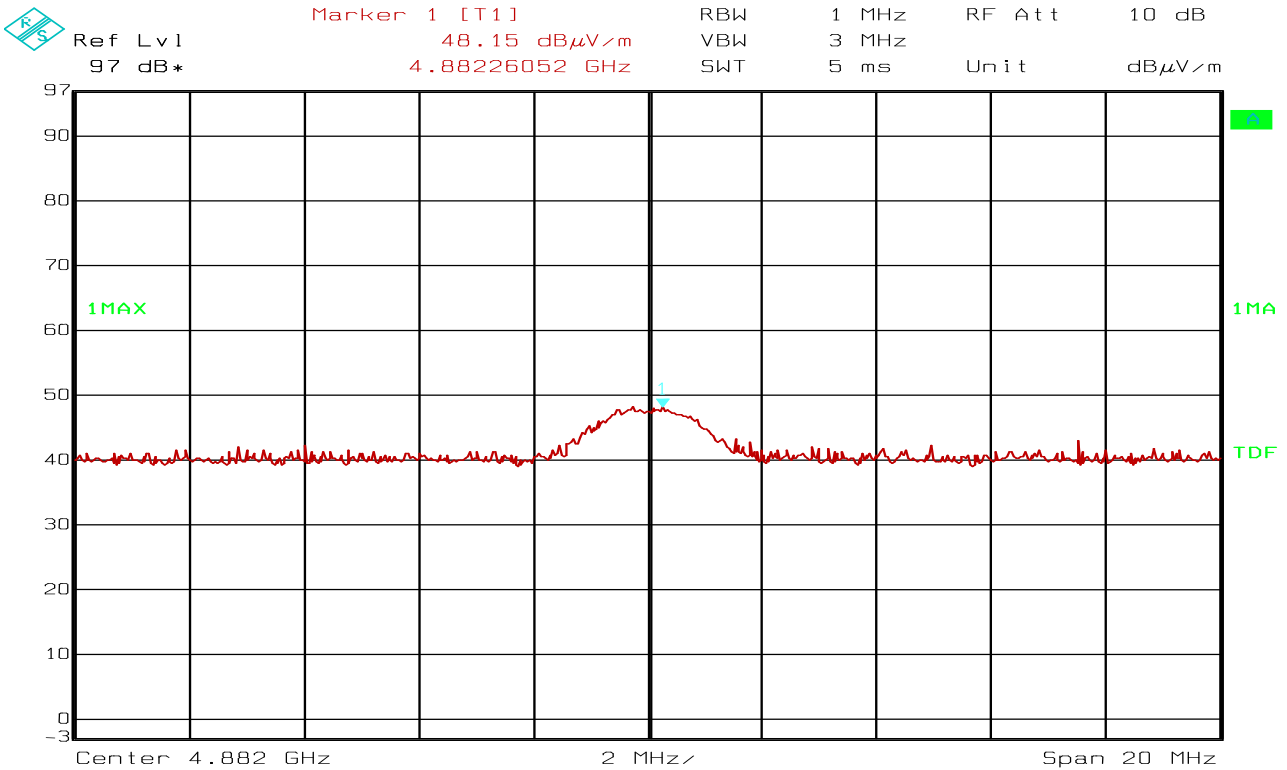
Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".

See plots.



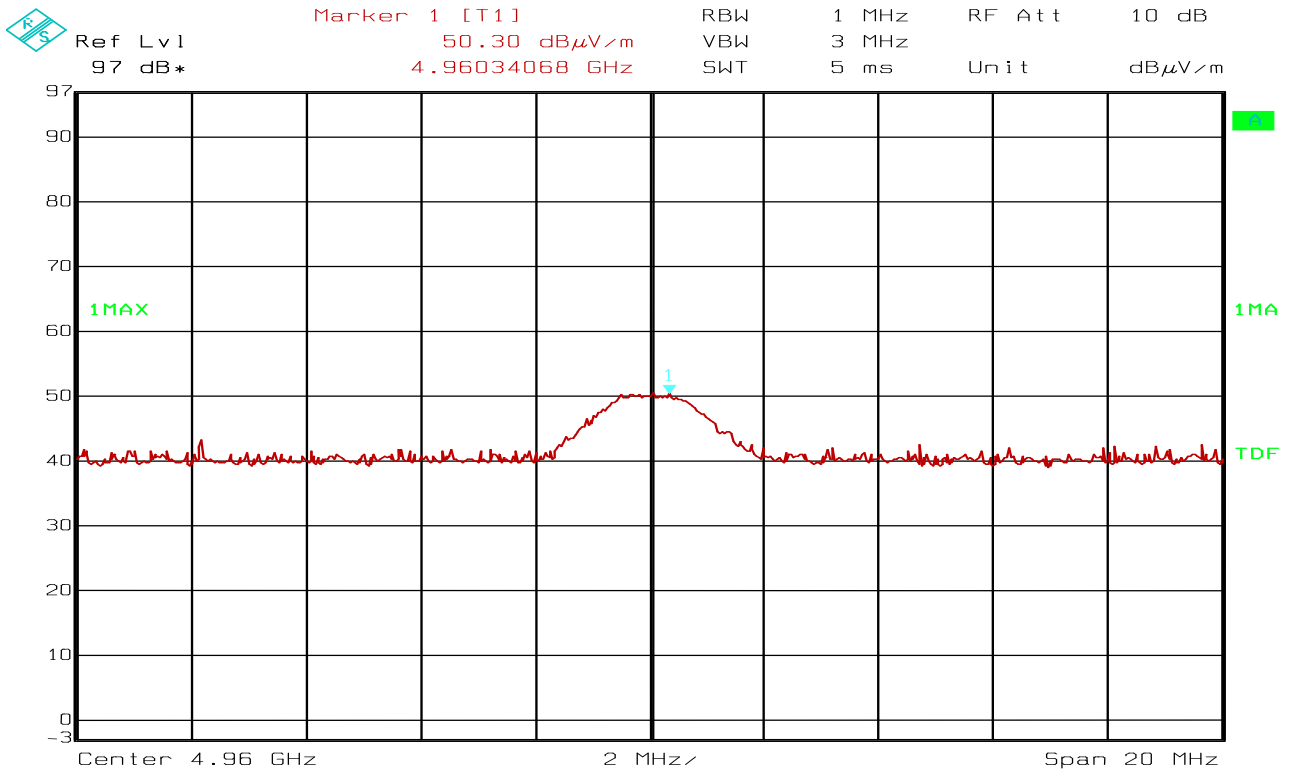
Date: 14.NOV.2011 14:55:52

Radiated Emissions, ch00, 4804 MHz



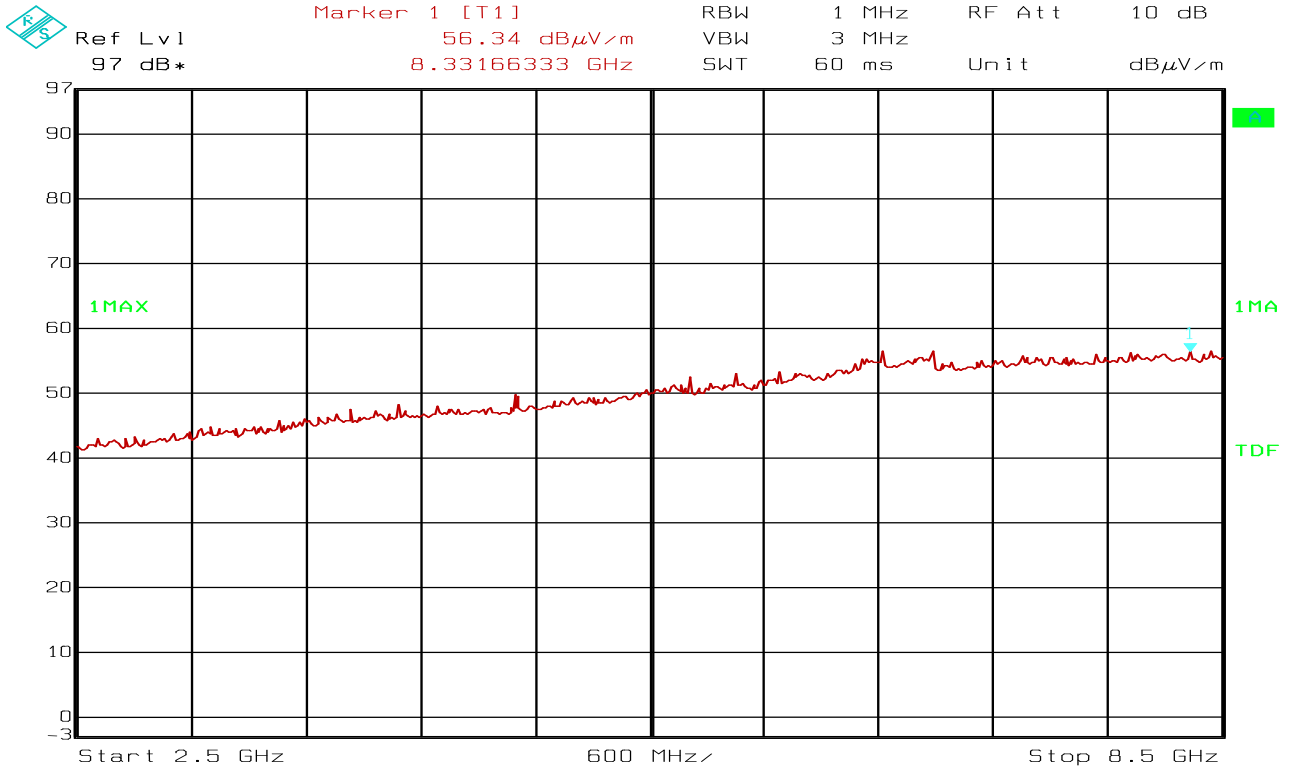
Date: 14.NOV.2011 15:07:58

Radiated Emissions, ch39, 4882 MHz



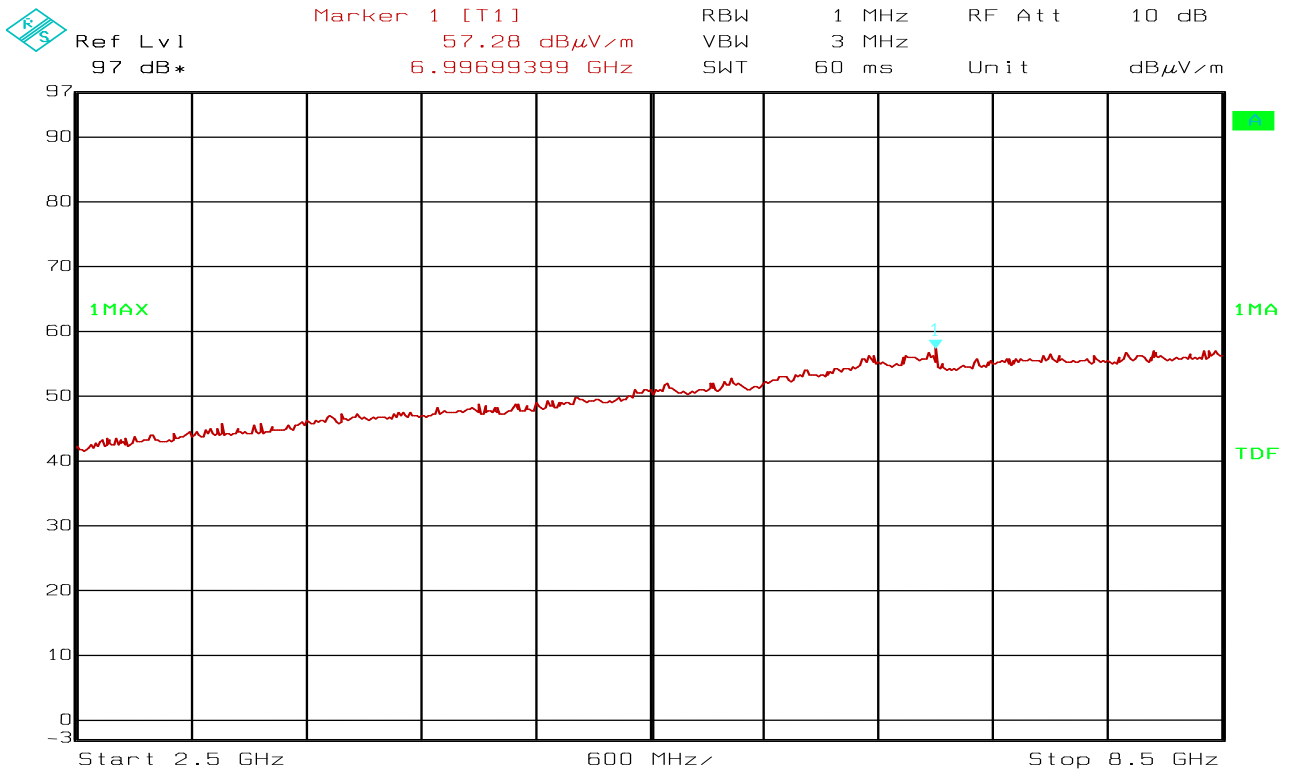
Date: 14.NOV.2011 15:21:36

Radiated Emissions, ch78, 4960 MHz



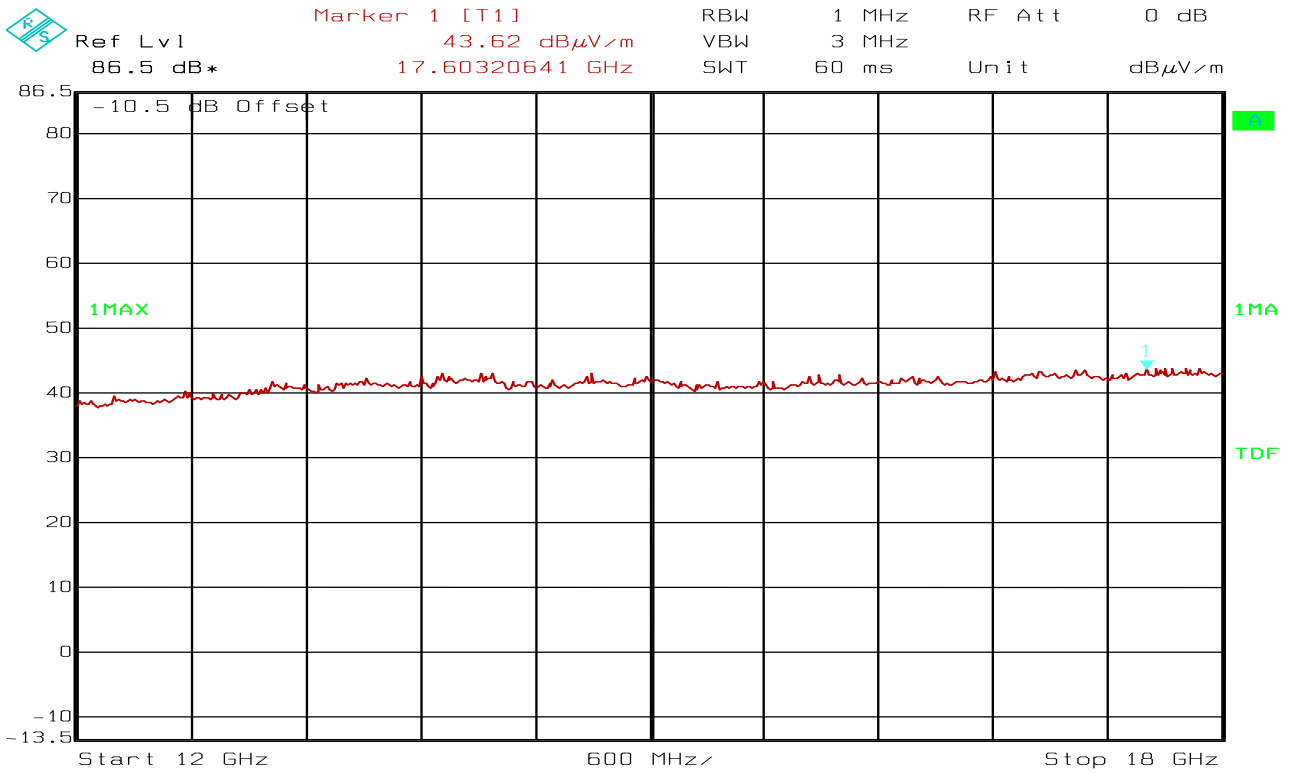
Date: 14.NOV.2011 14:45:33

Spurious emissions, 2.5 – 8.5 GHz, VP



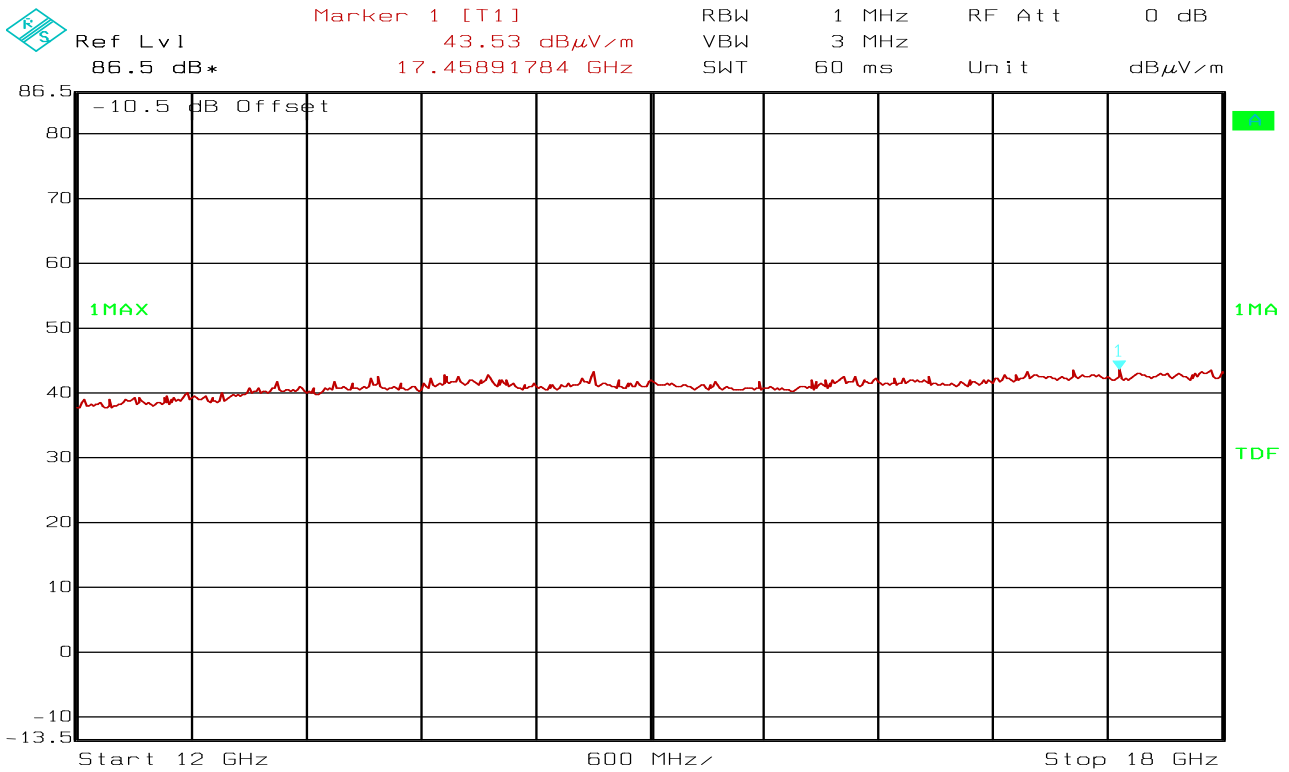
Date: 14.NOV.2011 14:43:26

Spurious emissions, 2.5 – 8.5 GHz, HP



Date: 14.NOV.2011 15:47:27

Spurious emissions, 12 – 18 GHz, VP, 1m



Date: 14.NOV.2011 15:50:17

Spurious emissions, 12 – 18 GHz, HP, 1m

Radiated Band-edge Power, Peak Detector

Frequency	Measured Field Strength, dB μ V/m		Limit	Margin
	Hopping Off	Hopping On		
GHz			dB	dB
2.39	42.3	/	74	31.7
2.4835	55.2	/	74	18.8

Calculated Radiated Band-edge Power, Average Detector

Frequency	Power below nearest channel, dBc		Limit	Margin
	Hopping Off	Hopping On		
GHz			dB	dB
2.4835	35.2	/	54	18.8

The Band Edge values are measured directly as radiated power with Peak Detector. Please see Nemko test report no. 161417-6 for values with hopping active.

See plots.

Duty Cycle Correction Factor Calculation:

See also Para 4.4 Occupancy Time.

RF duty cycle: Calculation according to RF burst Para 15.35 (c)

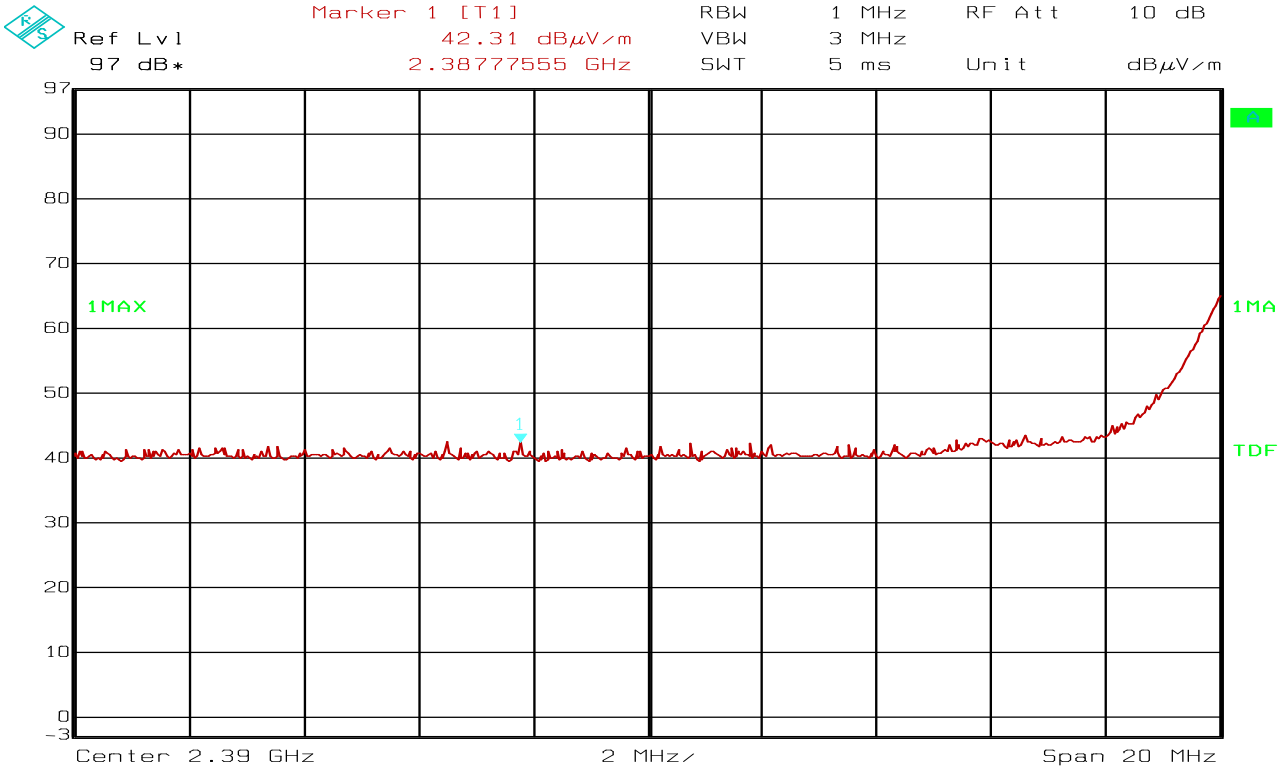
DH5 slots: 5 slots TX and 1 slot RX -> 5x0.625ms per frame -> frame length is 6x0.625ms = 3.75ms

Minimum number of hopping carriers: 20 -> The frame is repeated on the same channel every 74.5ms.

DC Correction factor = $-20 \times \log((5 \times 0.625\text{ms}) / 74.5\text{ms}) = 27.5 \text{ dB}$

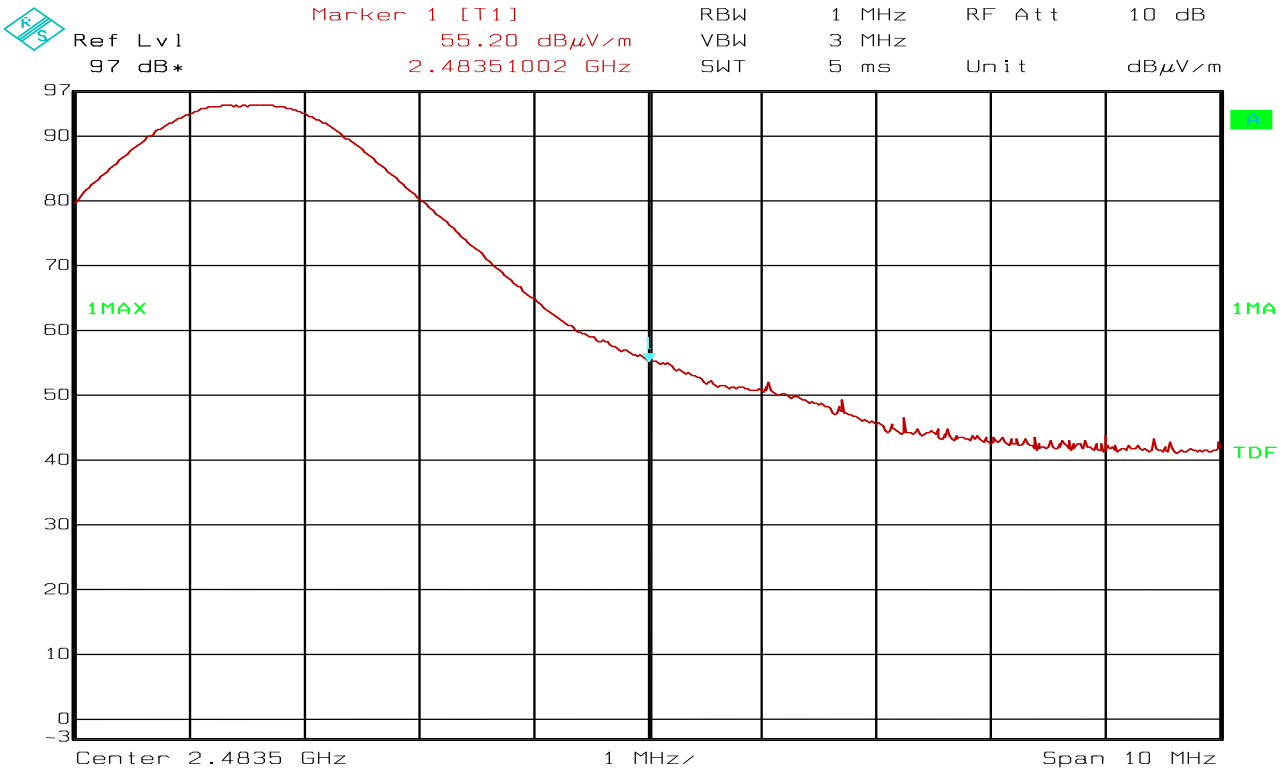
Maximum Duty Cycle Correction Factor according to Para 15.35 (b): 20 dB

This value is used for calculating the Average Detector values from the measured Peak Detector values for all emissions above 1 GHz.



Date: 14.NOV.2011 14:18:12

Band Edge, Lower, Peak Det.



Date: 14.NOV.2011 13:49:20

Band Edge, Upper, Peak Det.

Radiated emissions 30 – 1000 MHz.

Detector: Quasi Peak

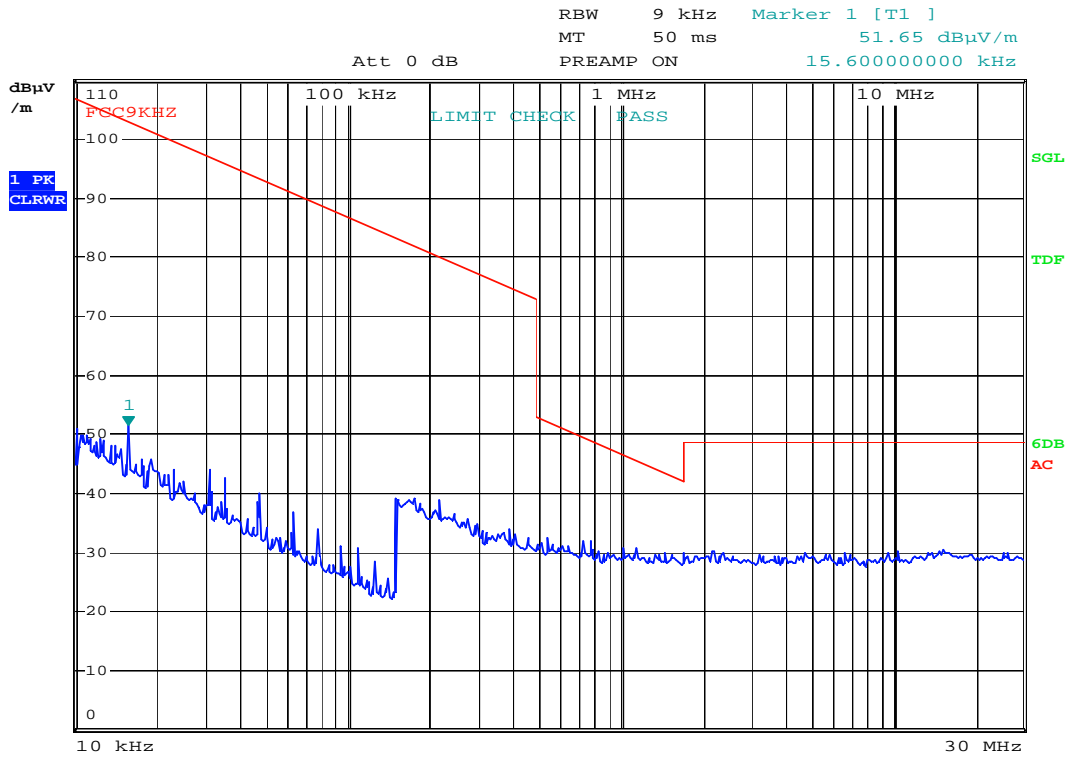
Measuring distance: 3m

Quasi Peak Det., AC Adaptor PNLV226(FW):

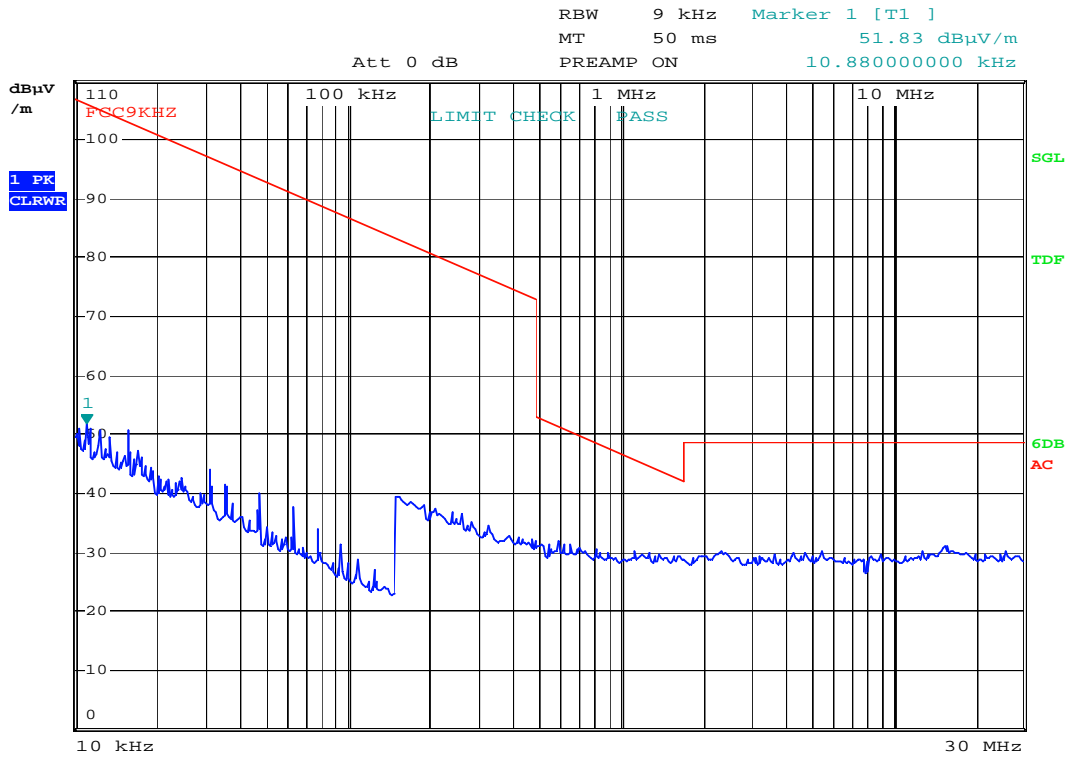
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
47.374041	23.3	1000.0	120.000	100.0	V	253.0	-9.3	16.7	40.0	
50.253869	27.9	1000.0	120.000	100.0	V	274.0	-9.5	12.1	40.0	
56.165250	18.0	1000.0	120.000	100.0	V	205.0	-9.7	22.0	40.0	
82.901405	23.4	1000.0	120.000	164.0	V	160.0	-12.8	16.6	40.0	
165.877926	22.6	1000.0	120.000	100.0	V	69.0	-12.9	20.9	43.5	
210.132781	15.5	1000.0	120.000	164.0	H	319.0	-10.5	28.0	43.5	
222.165466	21.4	1000.0	120.000	155.0	H	18.0	-10.1	24.6	46.0	

Quasi Peak Det., AC Adaptor PNLV226(UC):

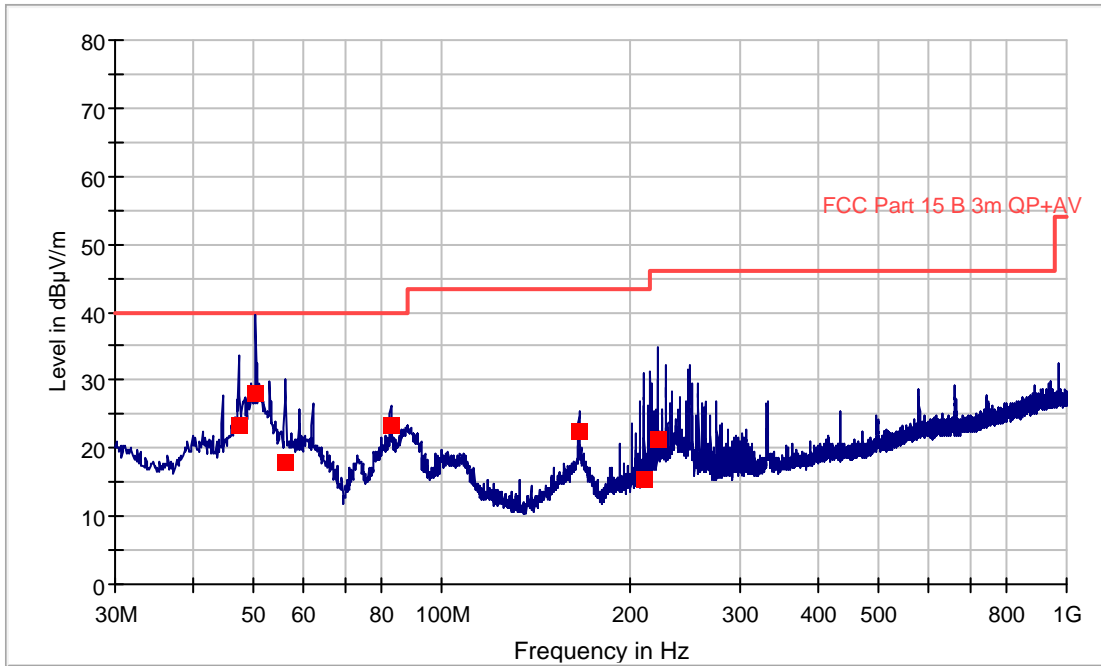
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
47.359292	26.5	1000.0	120.000	100.0	V	193.0	-9.3	13.5	40.0	
50.329342	27.0	1000.0	120.000	100.0	V	276.0	-9.5	13.0	40.0	
204.347285	17.4	1000.0	120.000	144.0	H	6.0	-10.7	26.1	43.5	
216.087182	17.7	1000.0	120.000	130.0	H	206.0	-10.3	28.3	46.0	
245.988494	19.7	1000.0	120.000	138.0	H	289.0	-9.2	26.3	46.0	



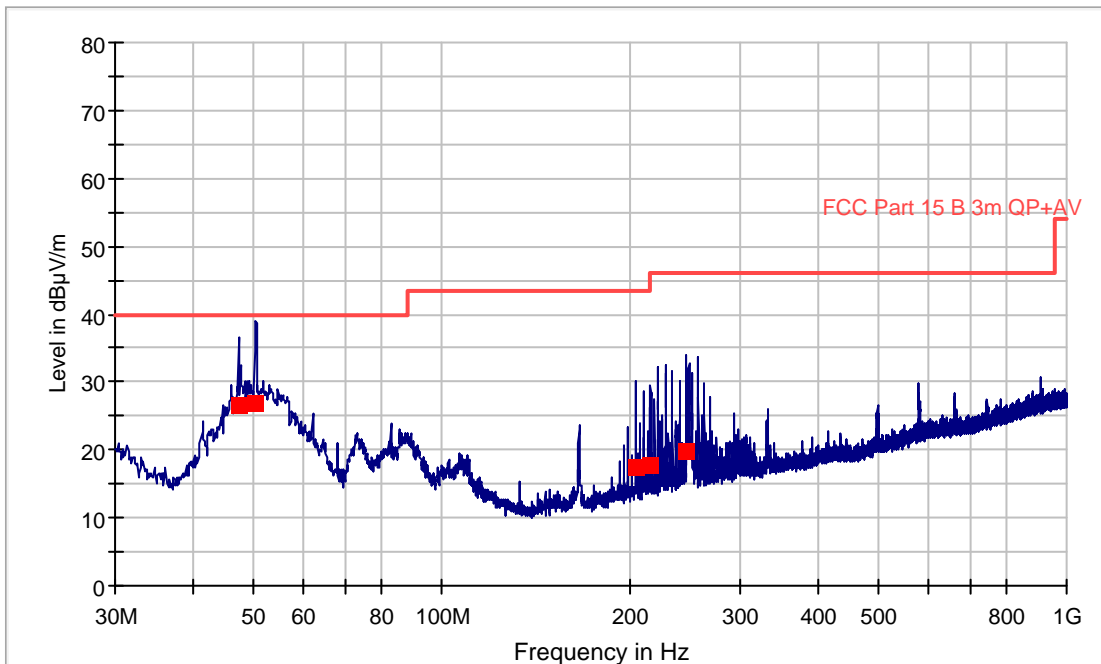
10 kHz - 30MHz, PNLV226(FW)



10 kHz - 30MHz, PNLV226(UC)



Radiated Emissions, 30 - 1000 MHz, PNLV226(FW)



Radiated Emissions, 30 - 1000 MHz, PNLV226(UC)

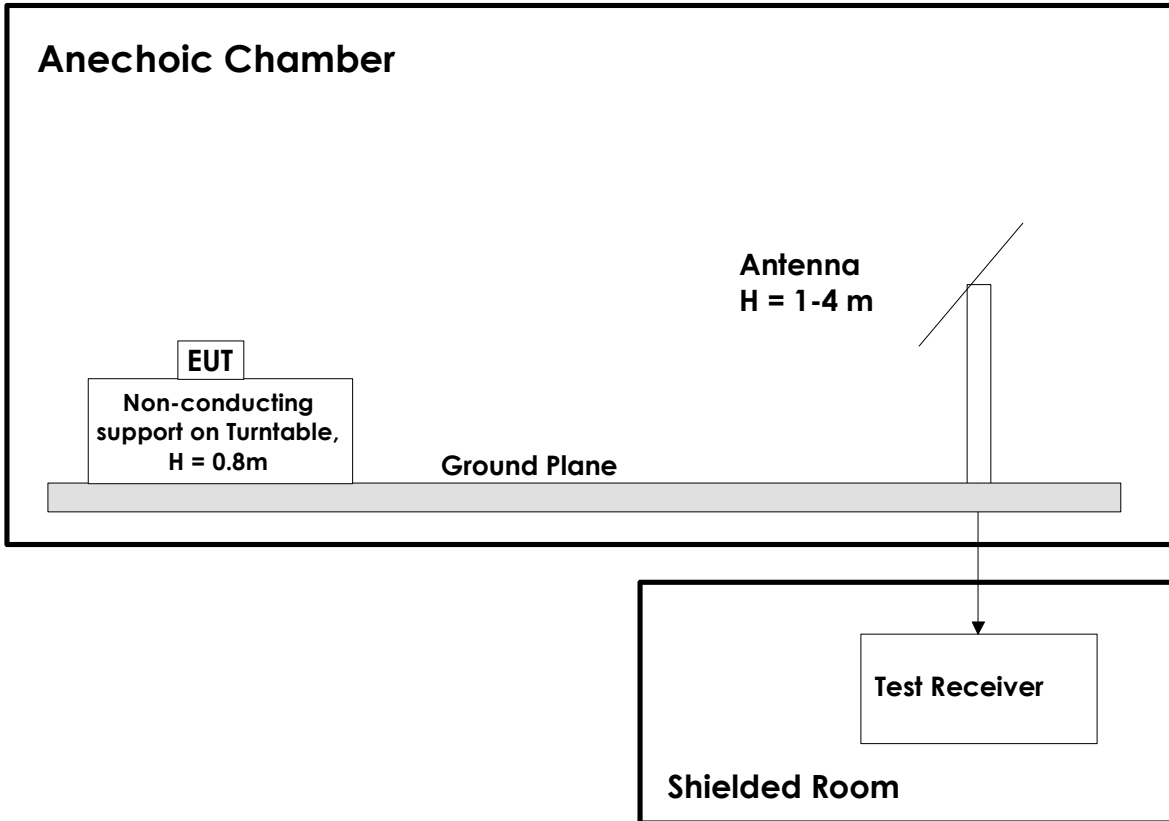
5 LIST OF TEST EQUIPMENT

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.	Model number	Description	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	6810.17B	Attenuator	Suhner	LR1212	2010.09.15	2012.09.15
4	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	LR 1076	2011.11.03	2013.11.03
5	80S	Signal Generator	Powertron	LT 502	Cal b4 use	
6	6812B	AC Power Source	Agilent	LR 1515	2011.04.13	2012.04.13
7	ESH3-Z2	Pulse Limiter	Rohde & Schwarz	LR 1074	2010.03.03	2012.03.03
8	ESCI	Measuring Receiver	Rohde & Schwarz	N-4259	2010.11.03	2012.11.03
9	VLUB	BiLog Antenna	Schwarzbeck	LR 1616	2011.08.29	2014.08.29
10	LNA6900	Pre-amplifier	Teseq	LR 1593	2010-11	2011-11
11	3115	Horn Antenna	EMCO	LR 1330	2010.08.05	2013.08.05
12	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2011.09.27	2012.09.27
14	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 285	2010-10-08	2013-10-08
15	Model 87 V	Multimeter	Fluke	LR1600	2010.12.15	2012.12.15

6 Block Diagrams

6.1 Test Site Radiated Emission



6.2 Power Line Conducted Emission

