

## Test Report

<b>Product</b>	Bluetooth Transceiver in UPCS Base Station	
<b>Name and address of the applicant</b>	Panasonic Corporation of North America	
<b>Name and address of the manufacturer</b>	Panasonic System Networks Co., Ltd. 1-62, 4-chome, Minoshima, Hakata-ku Fukuoka 812-8531, Japan	
<b>Model</b>	KX-TG9581	
<b>Rating</b>	120Vac, 60Hz	
<b>Trademark</b>	Panasonic	
<b>Serial number</b>	/	
<b>Additional information</b>	Bluetooth 1.1, DECT 6.0	
<b>Tested according to</b>	<b>FCC Part 15.247</b> Frequency Hopping Transmitters / Digital Transmission Systems <b>Industry Canada RSS-210, Issue 8</b> Low Power Licence-Exempt Radiocommunications Devices	
<b>Order number</b>	263544	
<b>Tested in period</b>	2014.05.20	
<b>Issue date</b>	2014.07.23	
<b>Name and address of the testing laboratory</b>	  Instituttveien 6 Kjeller, Norway	FCC No: 994405 IC OATS: 2040D-1  TEL: (+47) 22 96 03 30 FAX: (+47) 22 96 05 50
	 Prepared by [G.Suhanthakumar]	 Approved by [Frode Sveinsen]
This report shall not be reproduced except in full without the written approval of Nemko. Opinions and interpretations expressed within this report are not part of the current accreditation. This report was originally distributed electronically with digital signatures. For more information contact Nemko.		

## CONTENTS

<b>1</b>	<b>INFORMATION .....</b>	<b>3</b>
1.1	Test Item.....	3
1.2	Test Environment .....	4
1.2.1	Normal test condition .....	4
1.3	Test Engineer(s).....	4
1.4	Test Equipment .....	4
<b>2</b>	<b>TEST REPORT SUMMARY .....</b>	<b>5</b>
2.1	General.....	5
2.2	Test Summary .....	6
2.3	Description of modification for Modification Filing .....	6
2.4	Comments .....	6
2.5	Family List Rational .....	6
<b>3</b>	<b>TEST RESULTS.....</b>	<b>7</b>
3.1	Power Line Conducted Emissions.....	7
3.2	Channel Separation and 20dB Bandwidth.....	9
3.3	Pseudorandom Hopping Algorithm.....	11
3.4	Occupancy Time.....	14
3.5	Occupied Bandwidth.....	18
3.6	Peak Power Output .....	21
3.7	Spurious Emissions (Radiated) .....	28
<b>4</b>	<b>LIST OF TEST EQUIPMENT .....</b>	<b>49</b>
<b>5</b>	<b>BLOCK DIAGRAM .....</b>	<b>50</b>
5.1	Conducted Tests .....	50
5.2	Power Line Conducted Emission.....	50
5.3	Test Site Radiated Emission .....	51

# 1 INFORMATION

## 1.1 Test Item

Name :	Panasonic
FCC ID :	ACJ96NKX-TG9581
Industry Canada ID :	216A-KXTG9581
Model name :	KX-TG9581
Serial number :	/
Hardware identity and/or version:	PNLB1228xx
Software identity and/or version :	SW203
Tested to IC Radio Standard (RSS) :	RSS-210 Issue 8, RSS-GEN Issue 3
Test Site IC Reg. Number :	IC 2040D-1
Frequency Range :	2402 – 2480 MHz
Number of Channels :	79 RF Channels
Operating Modes :	FHSS
Type of Modulation :	Digital (GFSK)
User Frequency Adjustment :	None
Conducted Output Power :	0.0052 Watts (Peak)
Type of Power Supply :	AC adaptor model PNLV226
Antenna Connector :	None (integral)
Antenna Diversity Supported :	No
Number of Antennas :	1

### Description of Test Item

The EUT is a Bluetooth transceiver integrated into a UPCS base unit. This report covers only the Bluetooth part, UPCS is covered by separate test reports.

The BT transceiver supports BT 1.1 and GFSK Modulation only.

The BT transceiver covered by this report is identical to the BT transceiver in KX-TG9521 (Nemko Test Report no.: 238317-1), except for the antenna. Test results for conducted tests in this report are from Nemko report no. 238317-1.

### Exposure Evaluation

For the purposes of exposure evaluation this EUT is a mobile or fixed device. MPE Calculation at 20 cm 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 2.5.2 of RSS-102 Issue 4.

## 1.2 Test Environment

### 1.2.1 *Normal test condition*

Temperature:	21.4 – 22.0 °C
Relative humidity:	43 - 46 %
Normal test voltage:	120V ac, 60Hz

The values are the limit registered during the test period.

## 1.3 Test Engineer(s)

G.Suhanthakumar

## 1.4 Test Equipment

See list of test equipment in clause 4.

## 2 TEST REPORT SUMMARY

### 2.1 General

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.

Tests were performed in accordance with ANSI C63.4-2003 and DA 00-705 Filing and Guidelines for Frequency Hopping Spread Spectrum Systems.

Radiated tests were made in a semi-anechoic chamber at measuring distances of 3m and 10m.

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

New Submission

Production Unit

Class II Permissive Change

Pre-production Unit

**DSS** Equipment Code

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".

Nemko Group authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any reproduction of parts of this report requires approval in writing from Nemko Group.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

## 2.2 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
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 and 20 dB Bandwidth	15.247(a)(1)	A8.1	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)	A8.1	Complies
Time of Occupancy	15.247(a)(1)(iii)	A8.1	Complies
Occupied Bandwidth	15.247(a)(1)	A8.1	Complies
Minimum 6 dB Bandwidth	15.247(a)(2)	A8.2	N/A
Peak Power Output	15.247(b)	A8.4	Complies
Power Spectral Density	15.247(d)	A8.2	N/A
Spurious Emissions (Antenna Conducted)	15.247(c)	A8.5	Complies
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	A8.5	Complies

## 2.3 Description of modification for Modification Filing

Not applicable.

## 2.4 Comments

All ports were populated during spurious emission measurements.

## 2.5 Family List Rational

Not Applicable.

### 3 TEST RESULTS

#### 3.1 Power Line Conducted Emissions

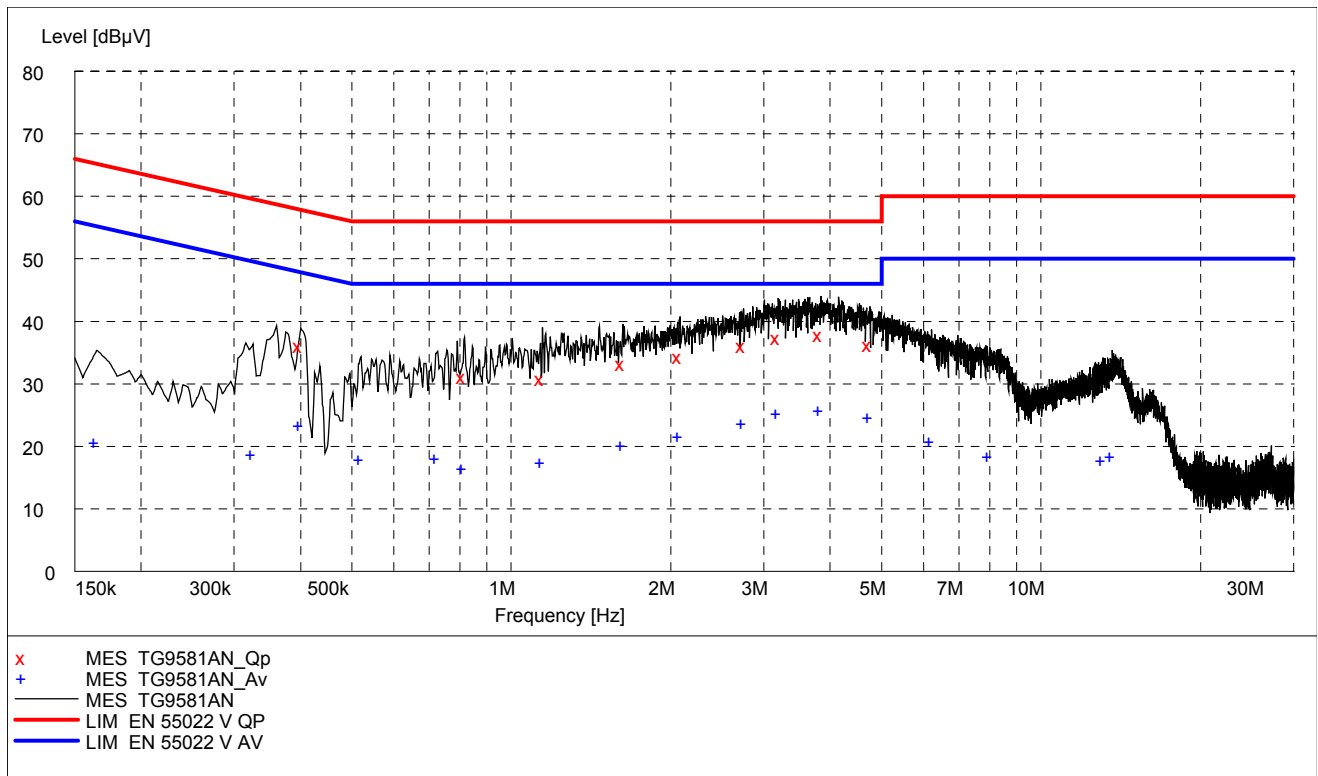
Para. No.: 15.207 (a)

Test Performed By: G.Suwanthakumar	Date of Test: 21 May 2014
------------------------------------	---------------------------

Measurement procedure: ANSI C63.4-2003 using 50  $\mu$ H/50 ohms LISN.

Test Results: Complies.

Measurement Data for base unit: See plot, (Peak detector).



Phase L1 and N, 120V 60Hz (Plot shows maximum of Phase L1 and N)

Measured values:

Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Detector	Position	Verdict [Pass/Fail]
0.400000	36.30	10.20	57.90	21.60	QP	N	Pass
0.815000	31.30	10.20	56.00	24.70	QP	N	Pass
1.145000	31.00	10.20	56.00	25.00	QP	N	Pass
1.625000	33.40	10.30	56.00	22.60	QP	N	Pass
2.085000	34.50	10.30	56.00	21.50	QP	N	Pass
2.745000	36.30	10.30	56.00	19.70	QP	N	Pass
3.195000	37.60	10.30	56.00	18.40	QP	N	Pass
3.845000	38.00	10.30	56.00	18.00	QP	N	Pass
4.755000	36.50	10.40	56.00	19.50	QP	N	Pass
0.165000	20.70	10.10	55.20	34.50	AV	N	Pass
0.325000	18.90	10.20	49.60	30.70	AV	N	Pass
0.400000	23.40	10.20	47.90	24.50	AV	N	Pass
0.520000	18.00	10.20	46.00	28.00	AV	N	Pass
0.725000	18.20	10.20	46.00	27.80	AV	N	Pass
0.815000	16.60	10.20	46.00	29.40	AV	N	Pass
1.145000	17.50	10.20	46.00	28.50	AV	N	Pass
1.625000	20.30	10.30	46.00	25.70	AV	N	Pass
2.085000	21.70	10.30	46.00	24.30	AV	N	Pass
2.745000	23.80	10.30	46.00	22.20	AV	N	Pass
3.195000	25.40	10.30	46.00	20.60	AV	N	Pass
3.845000	25.80	10.30	46.00	20.20	AV	N	Pass
4.755000	24.70	10.40	46.00	21.30	AV	N	Pass
6.215000	21.00	10.50	50.00	29.00	AV	N	Pass
7.995000	18.60	10.60	50.00	31.40	AV	N	Pass
13.115000	17.90	10.70	50.00	32.10	AV	L1	Pass
13.645000	18.50	10.80	50.00	31.50	AV	L1	Pass

### 3.2 Channel Separation and 20dB Bandwidth

Para. No.: 15.247 (a)(1)

**Test Results:** **Complies**

**Measurement Data:** Channel Separation: 1.000 MHz

20 dB Bandwidth (kHz)			
Modulation	2402 MHz	2442 MHz	2480 MHz
GFSK (DH5)	924.1	926.6	924.1

Test results for 20dB BW are from Nemko Test Report no. 238317-1.

**See attached plots**

**Channel Separation nominal value: 1.000 MHz**

**Requirement:**

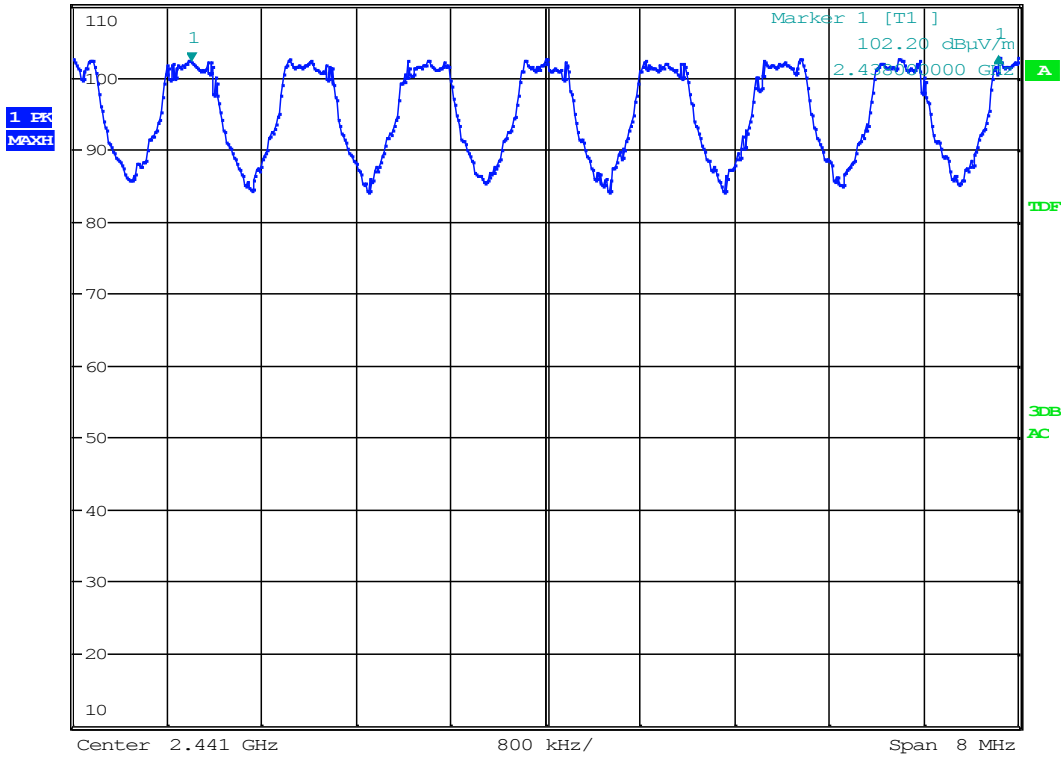
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

or:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the system operates with an output power no greater than 125 mW.

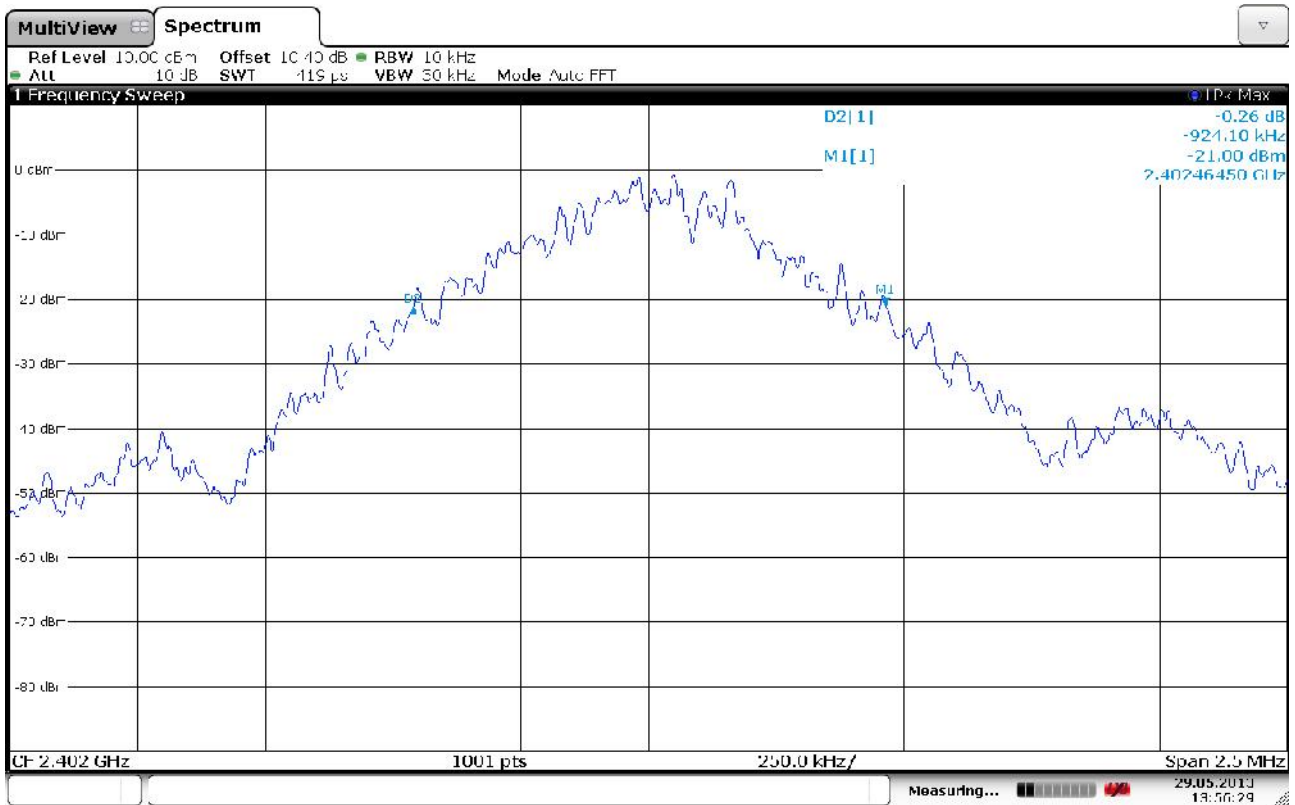


Ref 110 dB $\mu$ V/m      \*Att 10 dB      \*RBW 100 kHz      Delta 1 [T1 ]  
 VBW 300 kHz      0.51 dB  
 SWT 5 ms      6.833333333 MHz

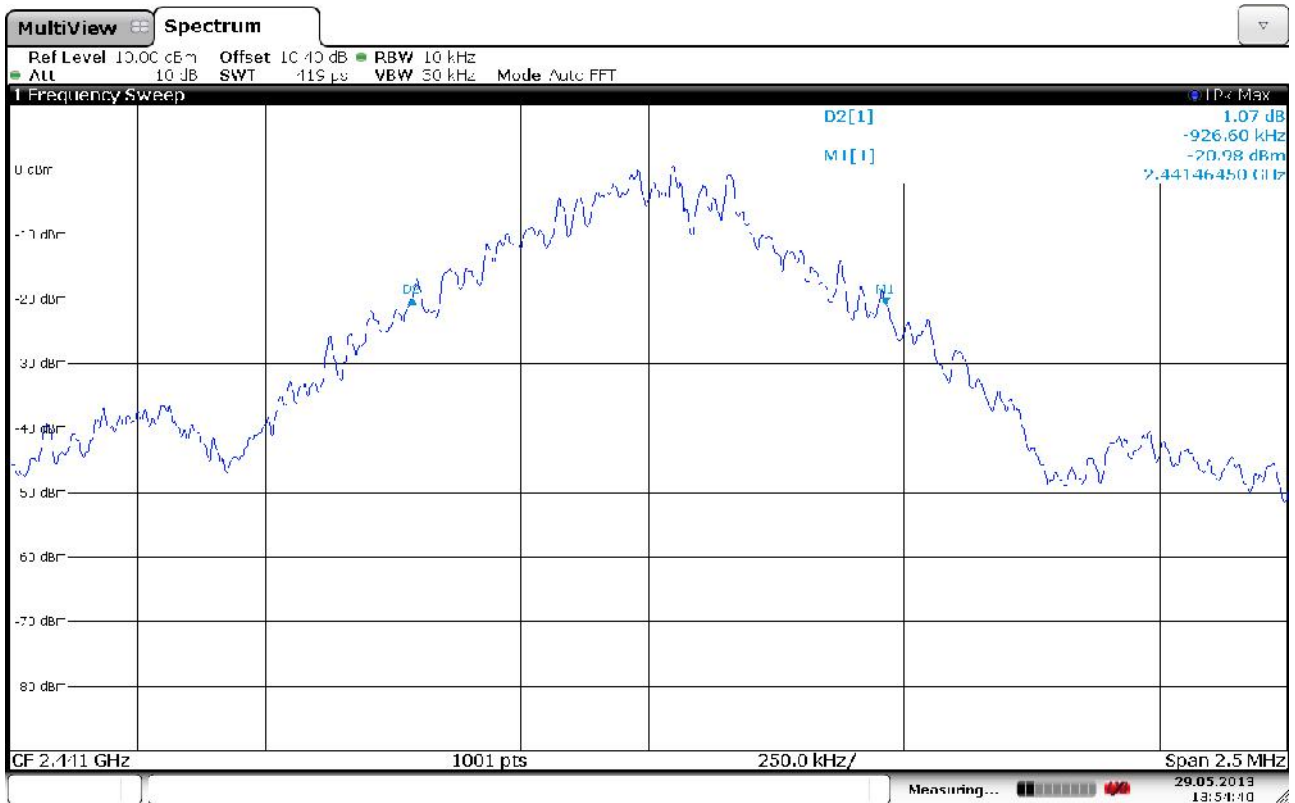


Date: 20.MAY.2014 10:27:51

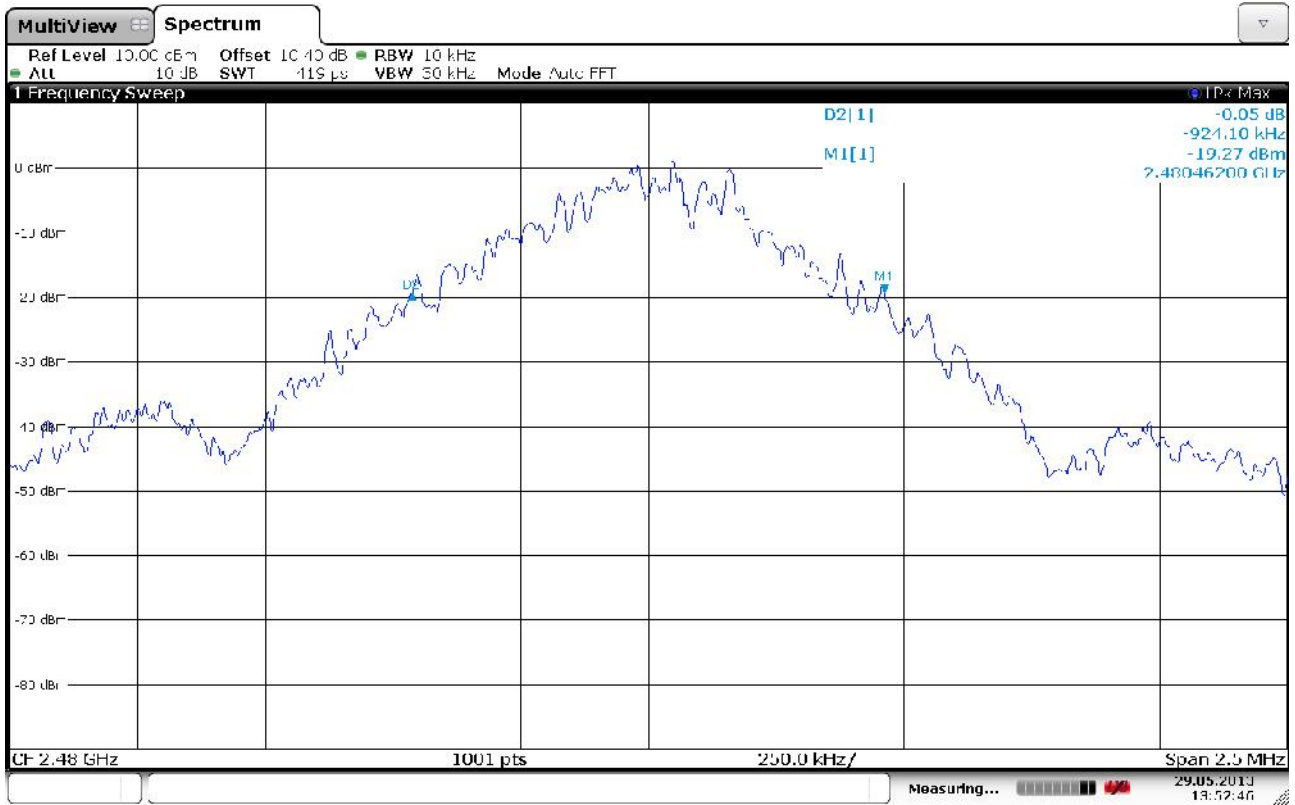
### Channel Separation



20dB Bandwidth, 2402MHz



20dB Bandwidth, 2441MHz



20dB Bandwidth, 2480MHz

### 3.3 Pseudorandom Hopping Algorithm

Para. No.: 15.247 (a)(1)

**Test Results:** Complies

**Measurement Data:** /

**Requirements:**

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

**Base Table Hopping Sequence**

To be described in manufacturer documentation.

### 3.4 Occupancy Time

Para. No.: 15.247 (a)(1)(iii)

**Test Results: Complies**

**Measurement Data:**

Minimum Number of RF Channels:	20
Maximum Number of RF Channels:	79
Maximum Length of RF Burst pr. channel	2.90 ms
Time between RF Burst on same RF Channel	74.6 ms (20 ch)
	294.67 ms (79 ch)
Time of Occupancy (20 and 79 ch mode)	311 ms

**20 Ch Mode:**

Time between RF burst on same channel:  $3.73 \times 20 \text{ ms} = 74.6 \text{ ms}$

Time of occupancy:  $(2.90 \times 400 \times 20) / 74.6 = 311 \text{ ms}$

**79 Ch Mode:**

Time between RF burst on same channel:  $3.73 \times 79 \text{ ms} = 294.7 \text{ ms}$

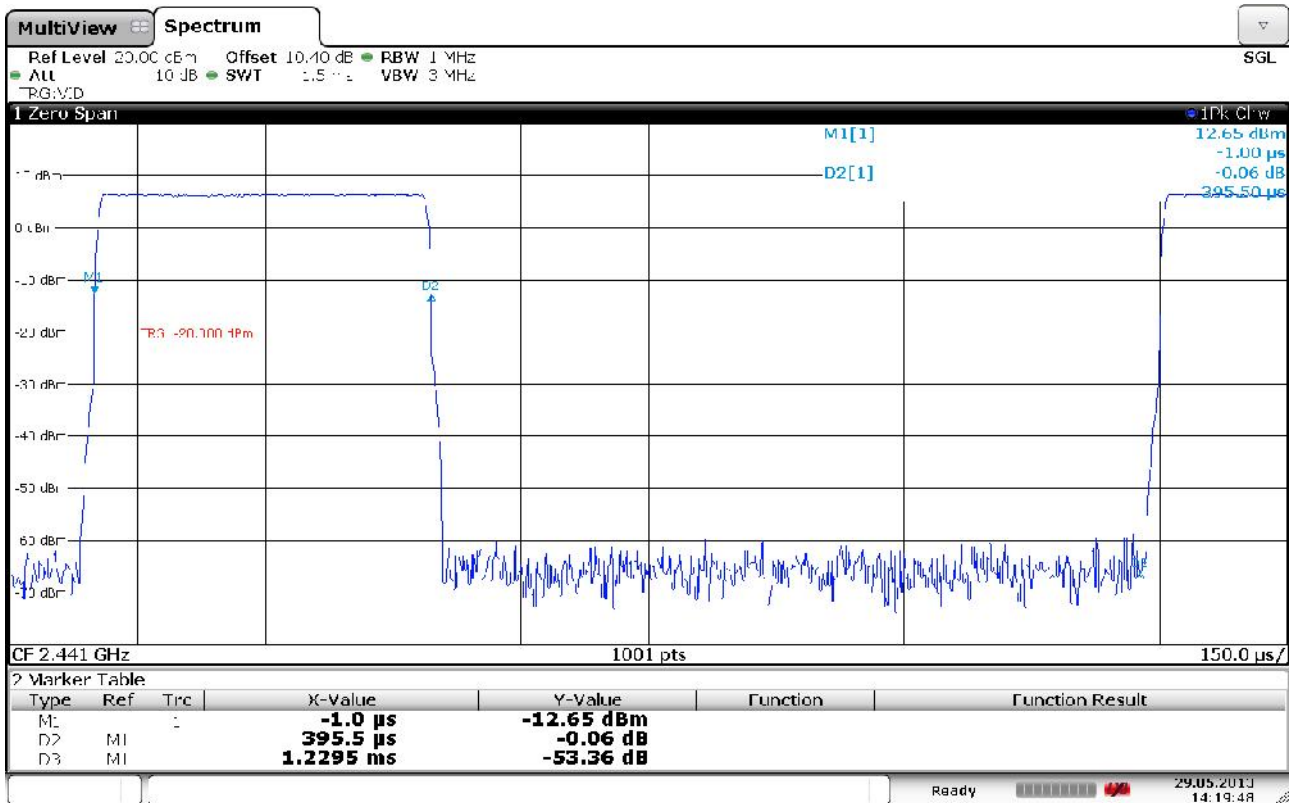
Time of occupancy:  $(2.90 \times 400 \times 79) / 294.67 = 311 \text{ ms}$

Test results above are from Nemko Test Report no. 238317-1.

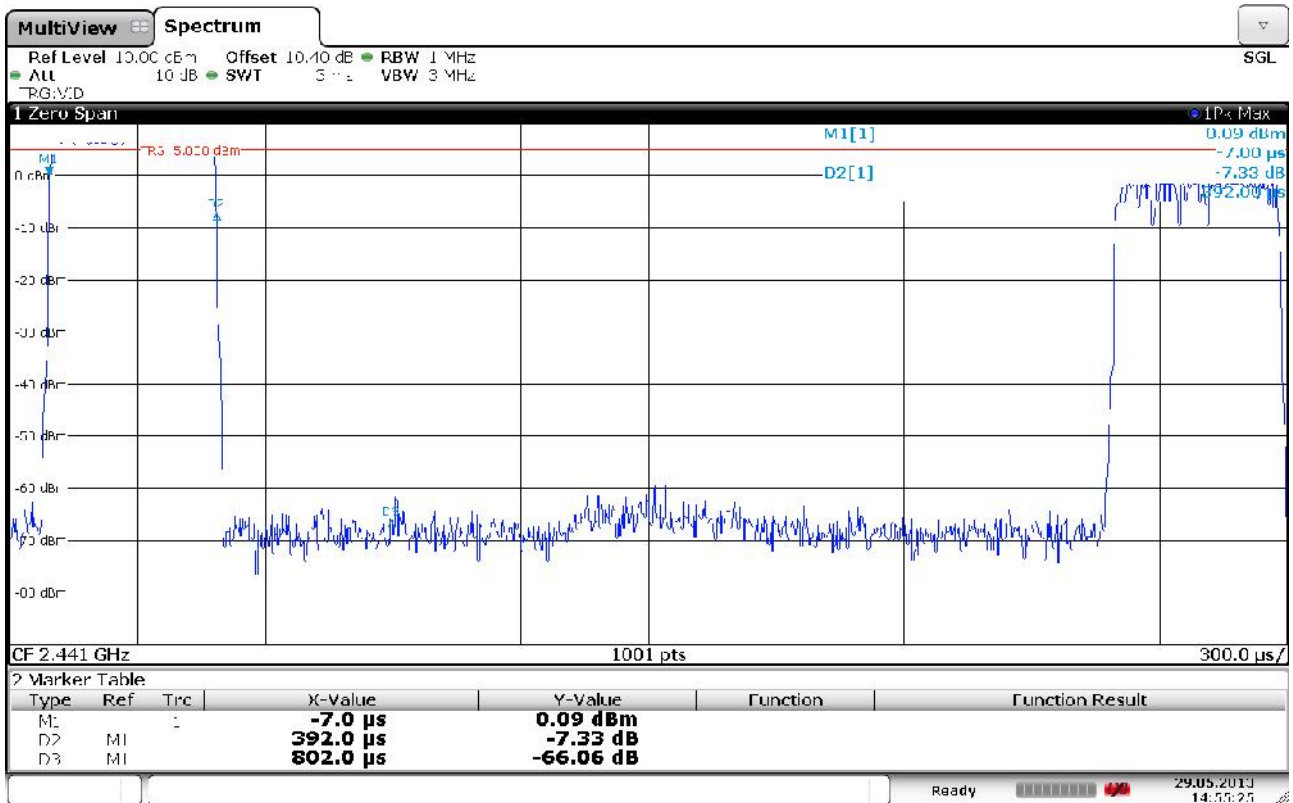
See plots.

**Requirements:**

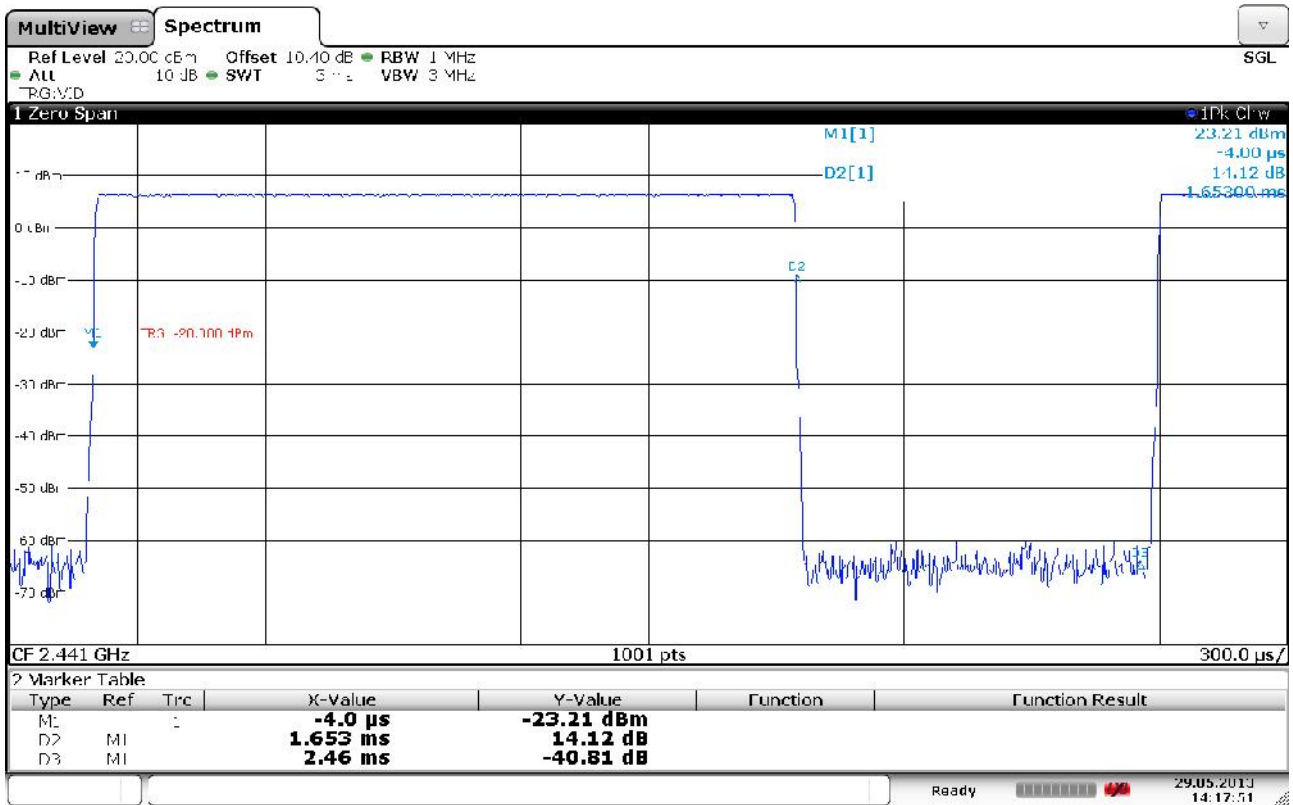
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.



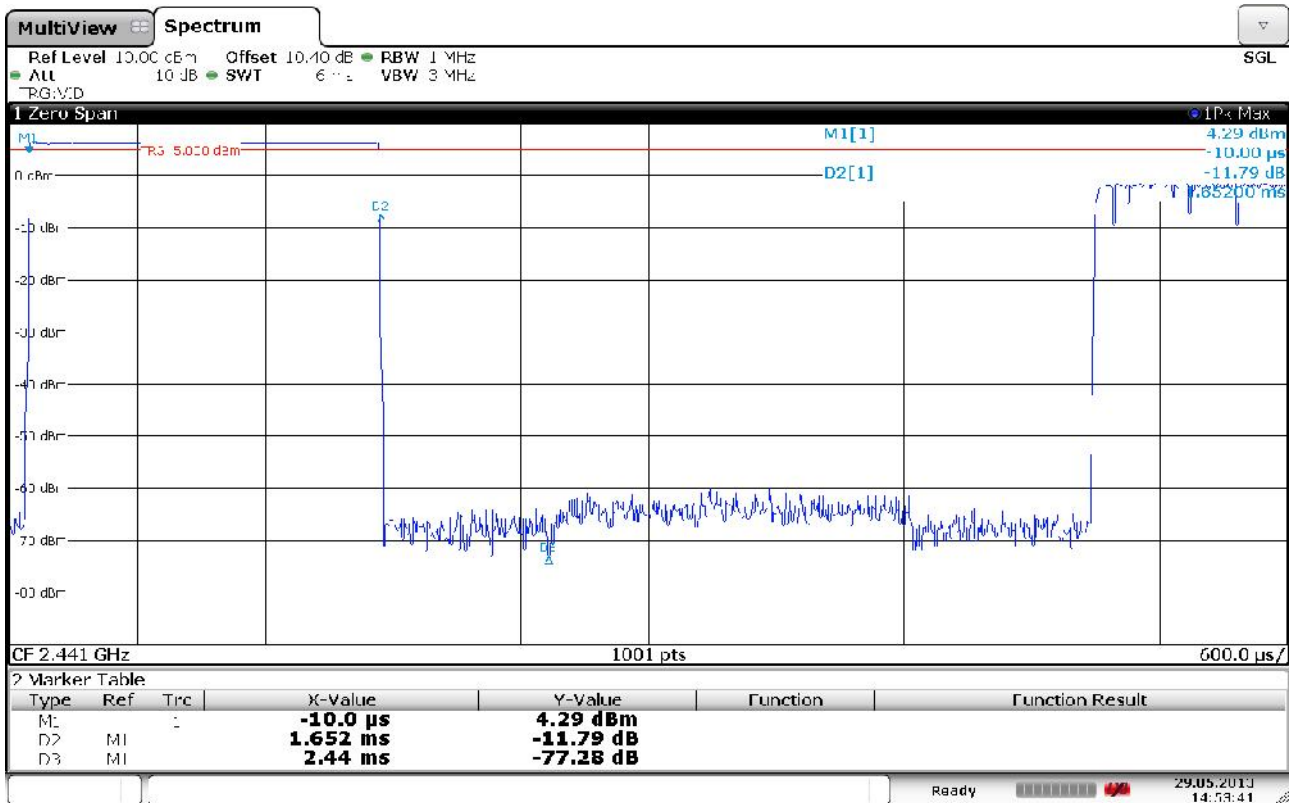
Burst Length, DH1



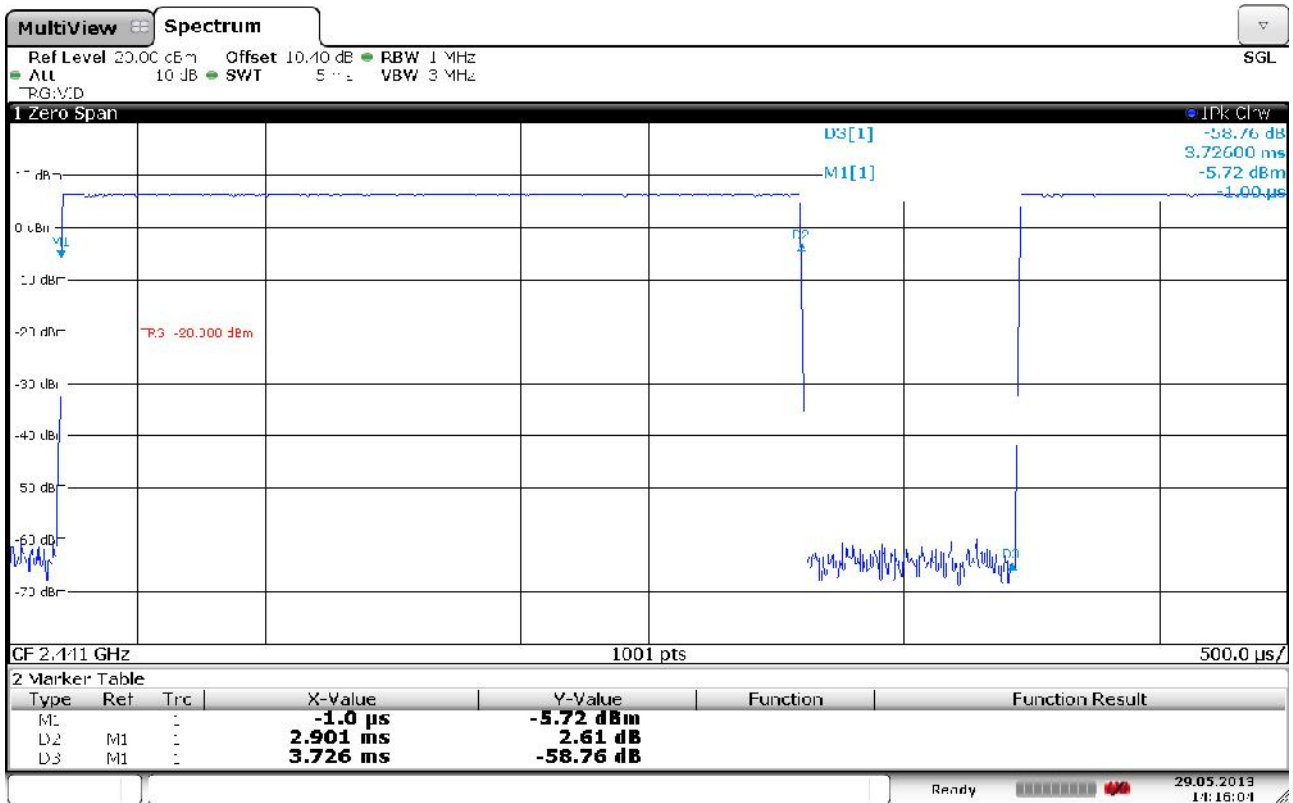
Dwell Time DH1, Hopping Ch 28 - 47



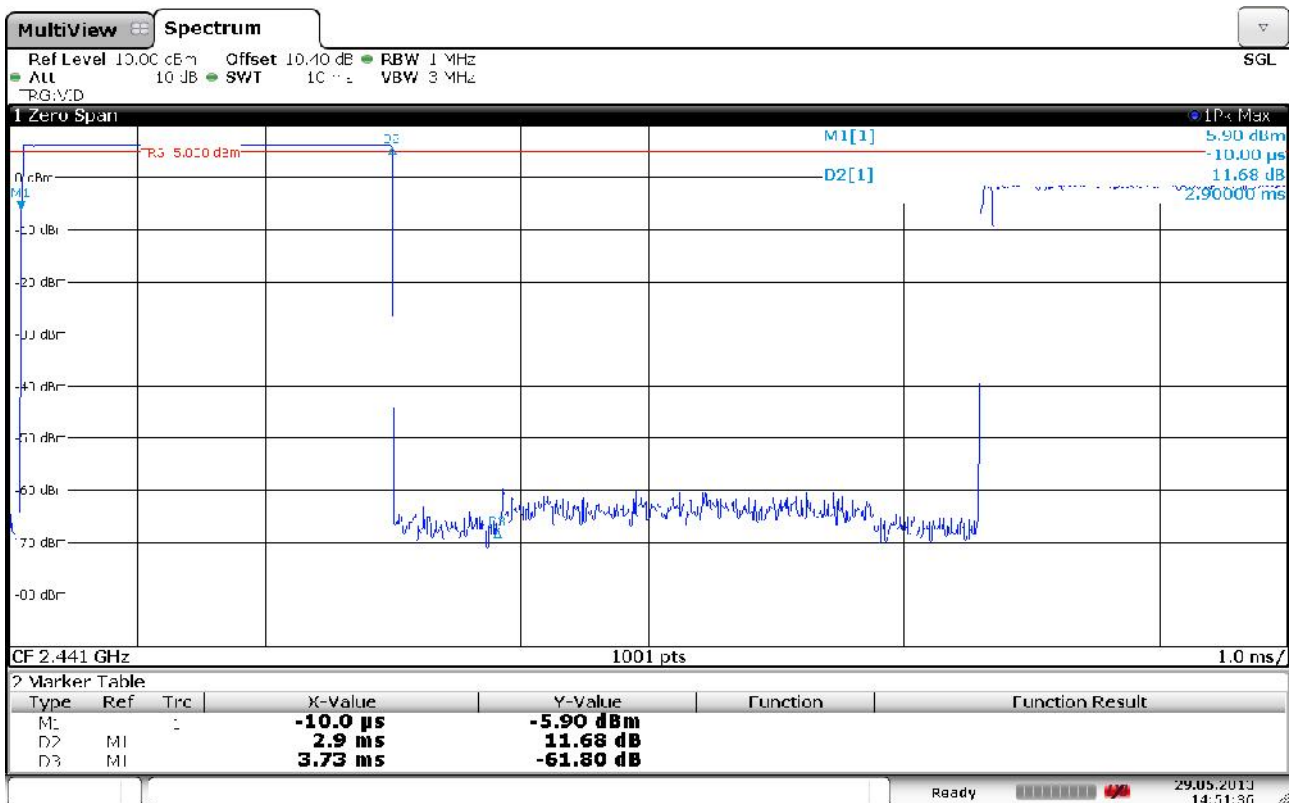
Burst Length, DH3



Dwell Time DH3, Hopping Ch 28 - 47



Burst Length, DH5



Dwell Time DH5, Hopping Ch 28 - 47

### 3.5 Occupied Bandwidth

Para. No.: 15.247 (a)(1)(iii)

**Test Results: Complies**

**Measurement Data:**

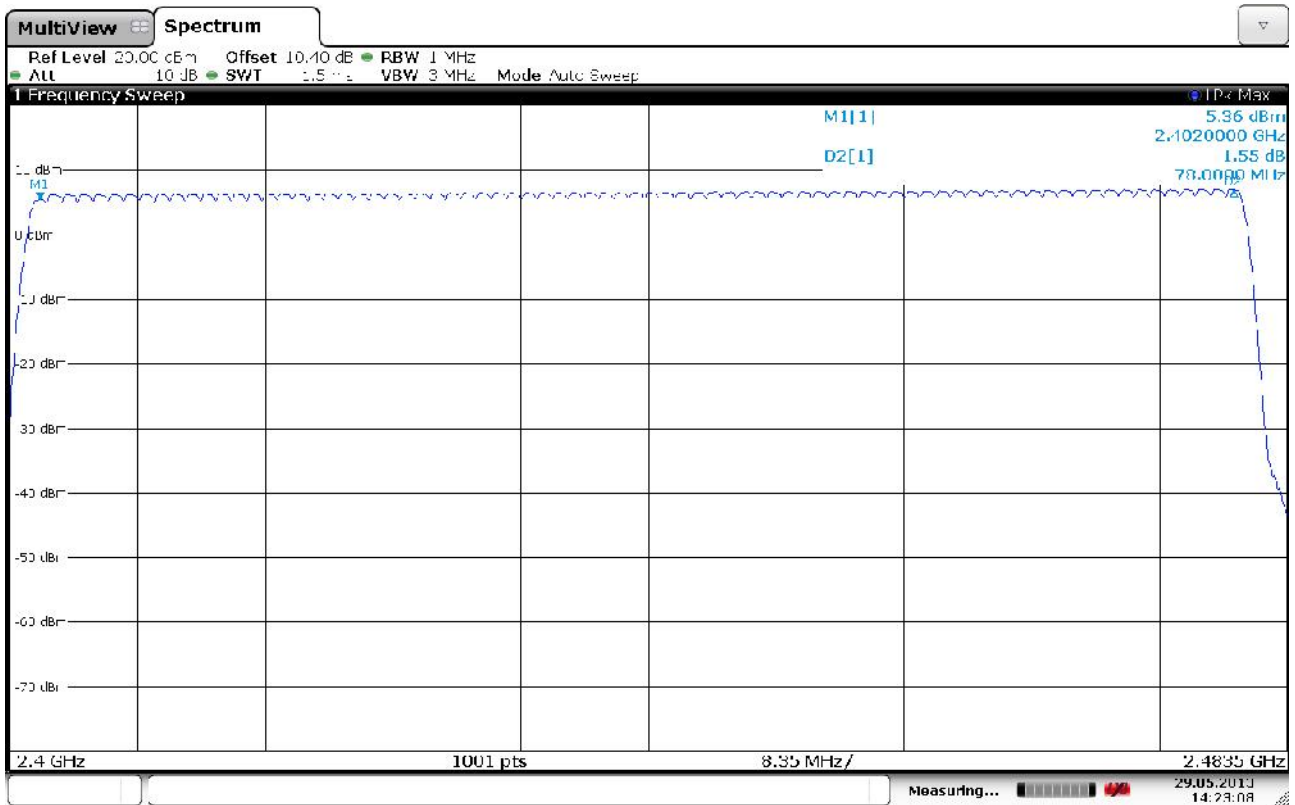
Number of RF Channels in use:	20 or 79 RF channels in use
Channel Centre Frequencies:	The channels are centered at each full MHz from 2402 to 2480 MHz

Test results above are from Nemko Test Report no. 238317-1.

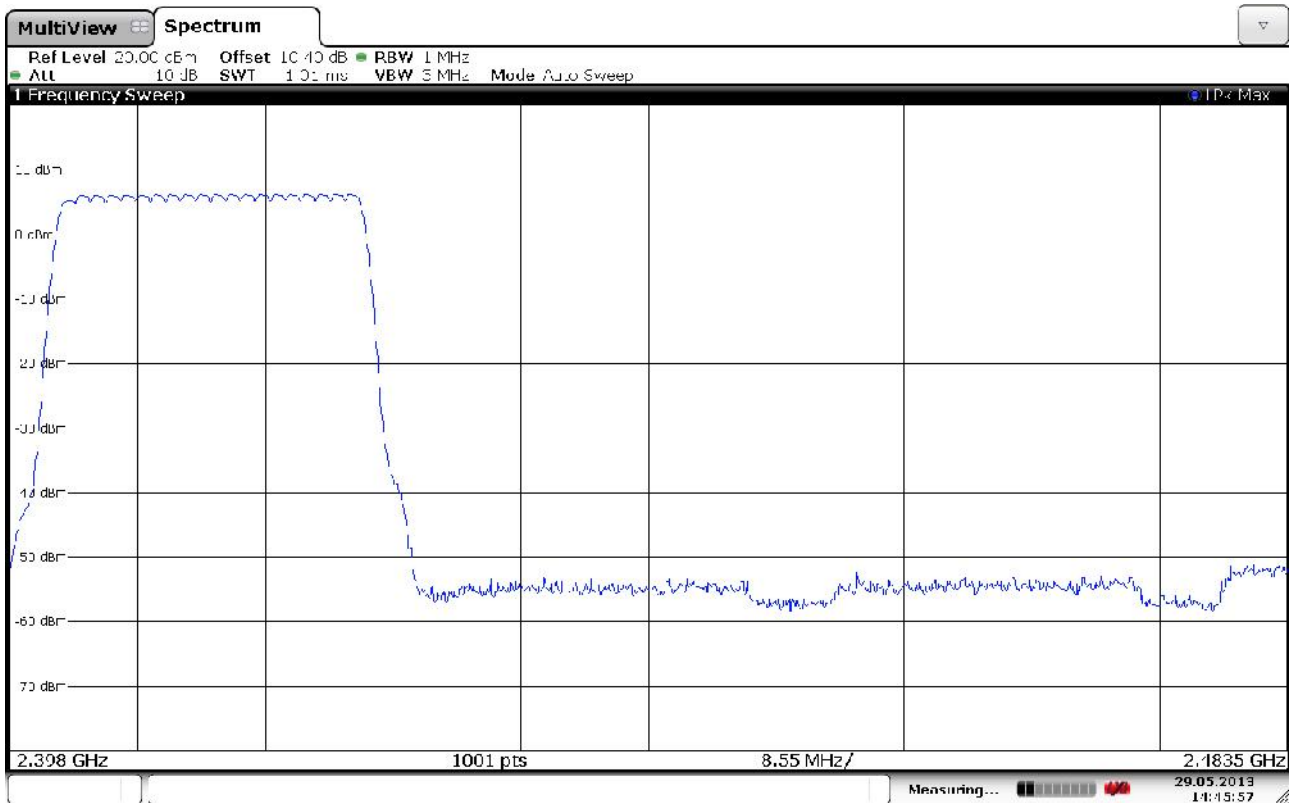
See plot.

**Requirements:**

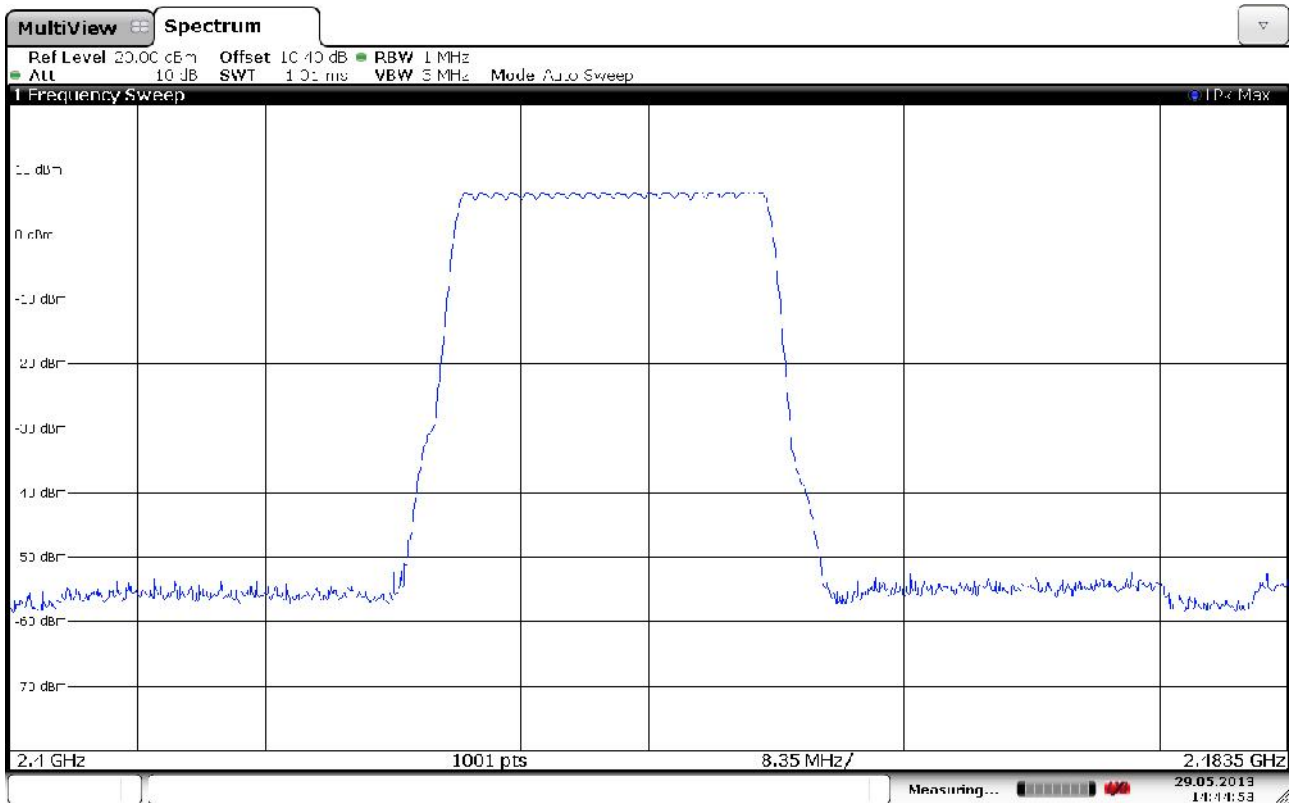
Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels. No requirements for bandwidth for this frequency band.



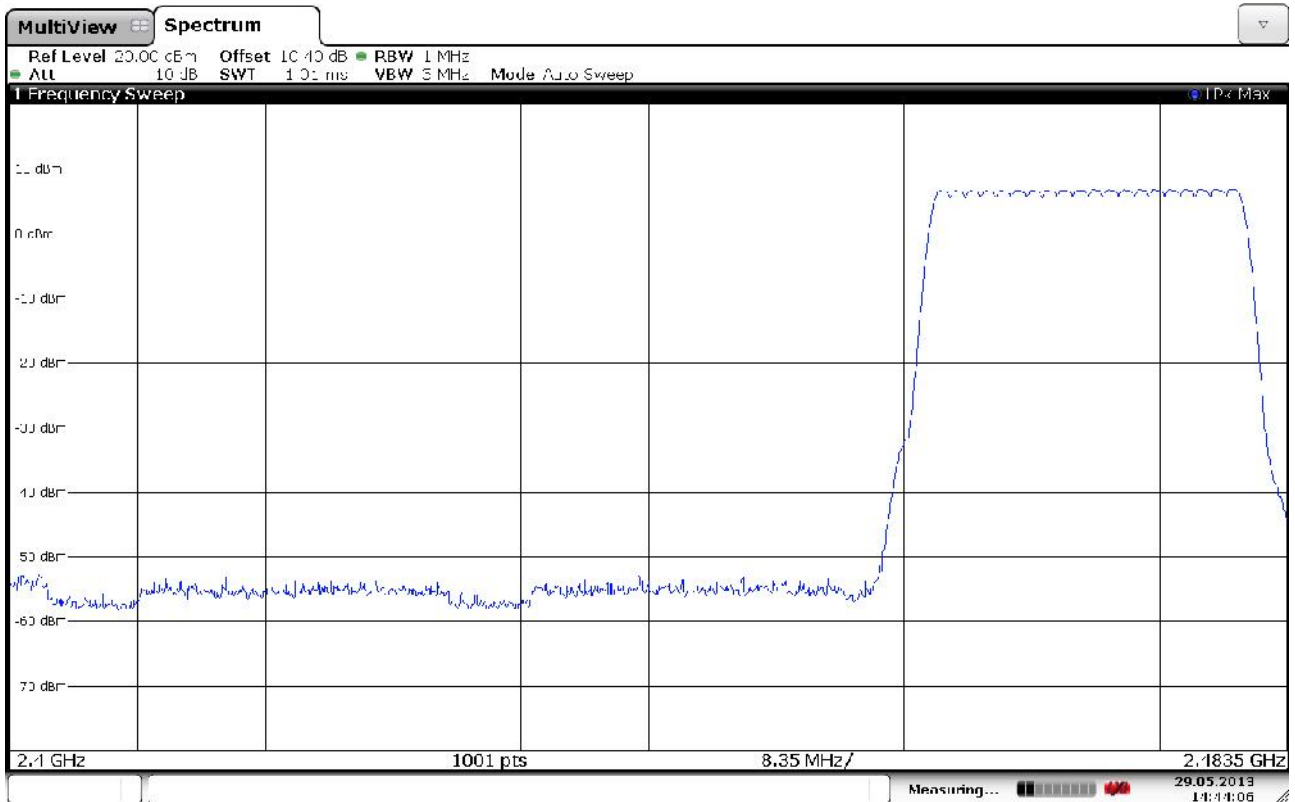
RF Channels in Use, Full Band



RF Channels in Use, 20 Channels, Lower



RF Channels in Use, 20 Channels, Middle



RF Channels in Use, 20 Channels, Upper

### 3.6 Peak Power Output

Para. No.: 15.247 (b)

Test Performed By: G.Suwanthakumar	Date of Test: 20 May 2014
------------------------------------	---------------------------

Test Results: Complies

Measurement Data:

	2402 MHz	2441 MHz	2480 MHz
Peak Power (dBm)	5.7	6.7	7.2
Peak Power (Watts)	0.0037	0.0047	0.0052
Field Strength (dBµV/m)	103.1	104.3	104,1
EIRP, Calculated (dBm)	7.9	9.0	8.8
EIRP, Calculated (Watts)	0.00614	0.00798	0.00766
Antenna gain (dBi)	2.2	2.3	1.6

Conducted Output Power values are from Nemko Test Report no. 238317-1.

Highest power level obtained in DH5

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

EIRP is calculated from measured field strength by the Free-Field Formula (See 558074 D01 Meas Guidance).

See attached graph.

Detachable antenna?  Yes  No

If detachable, is the antenna connector non-standard?  Yes  No

Type of antenna connector: N/A

#### Requirements:

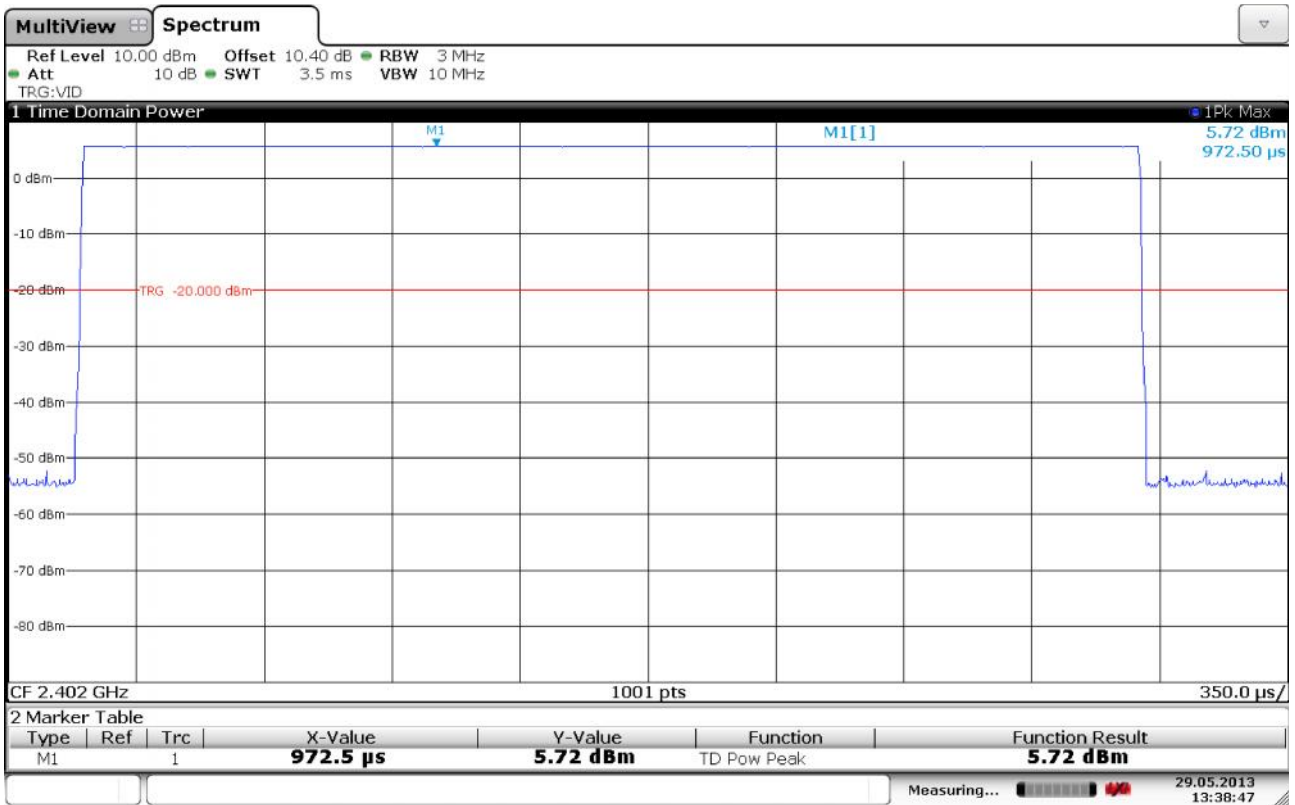
The maximum peak output power shall not exceed the following limits:

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

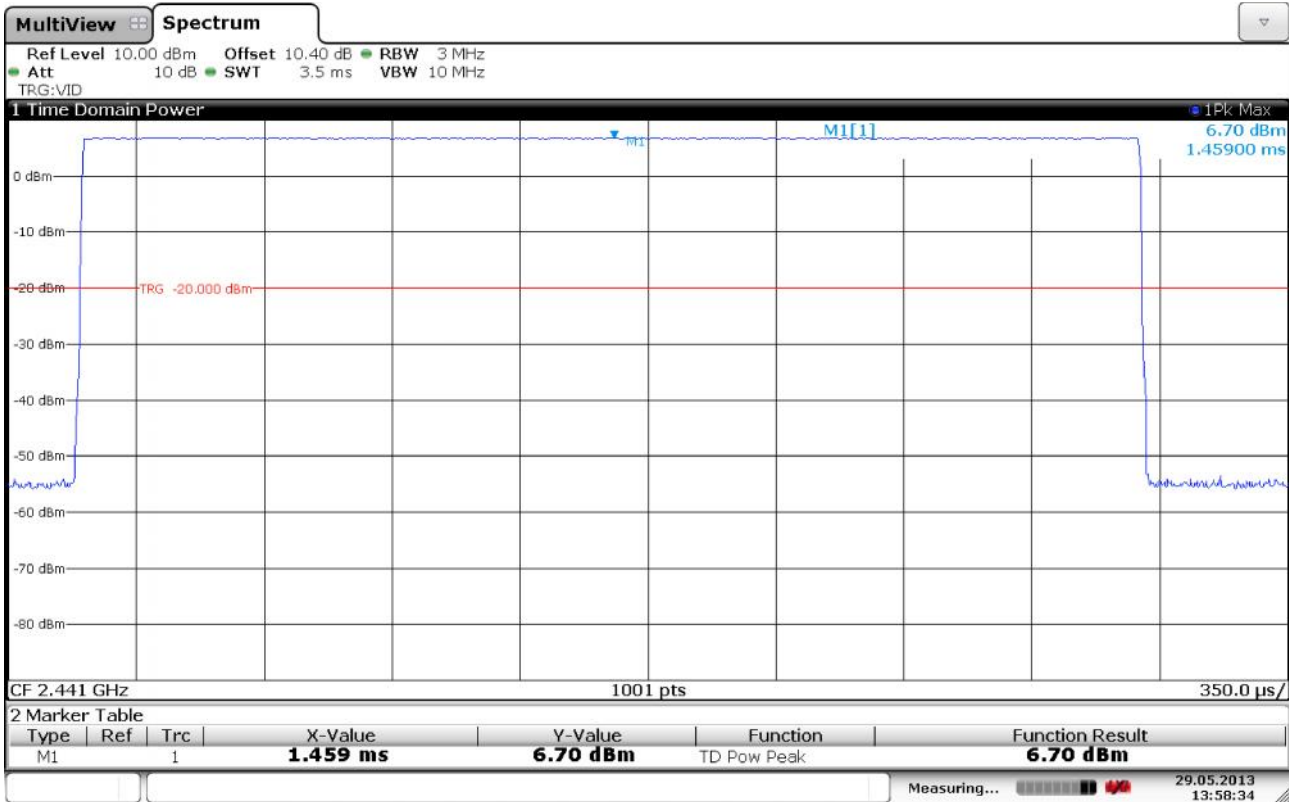
For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

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.



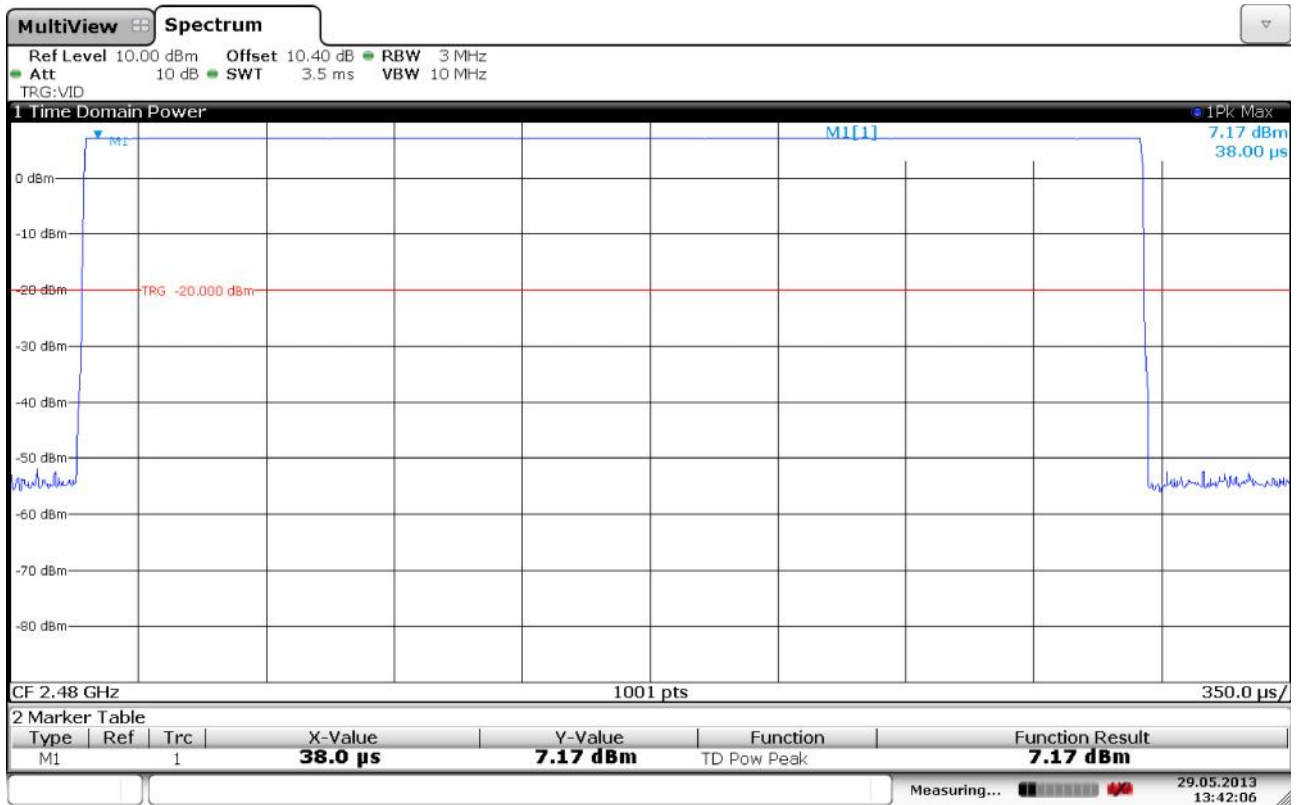
Date: 29.MAY.2013 13:38:47

**Conducted Output Power, 2402MHz**



Date: 29.MAY.2013 13:58:34

### Conducted Output Power, 2441MHz



Date: 29.MAY.2013 13:42:07

**Conducted Output Power, 2480MHz**

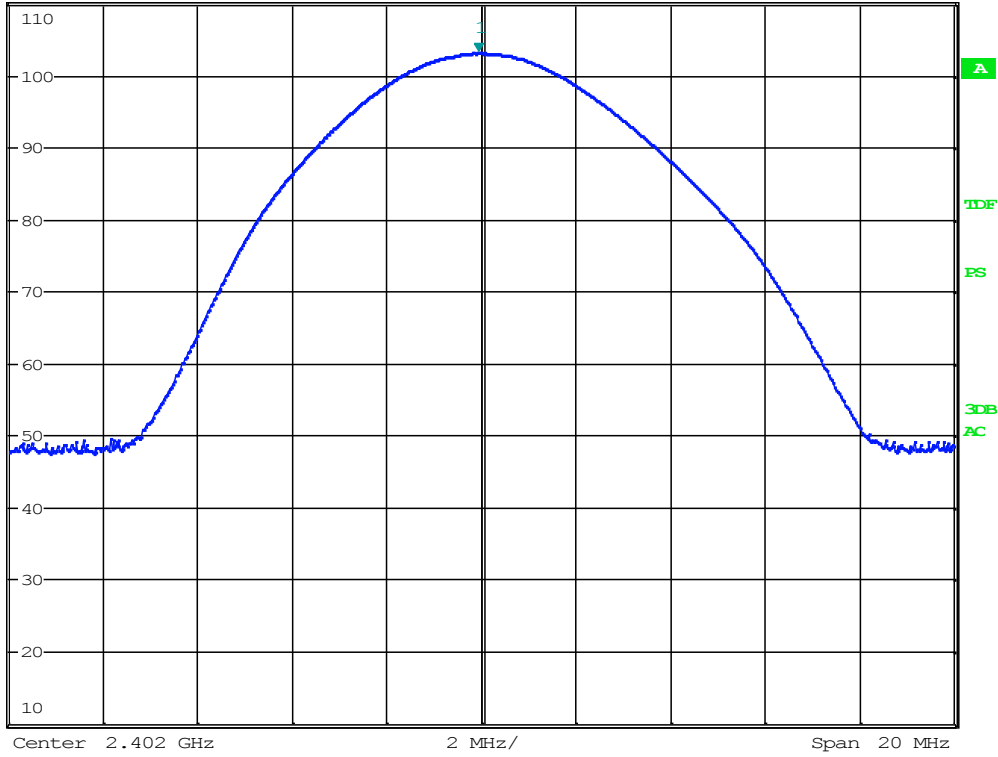


\*RBW 3 MHz      Marker 1 [T1 ]  
 \*VBW 10 MHz      103.11 dBμV/m  
 \*SWT 20 ms      2.401935897 GHz

Ref 110 dBμV/m

\*Att 15 dB

1 EK  
 MAXH



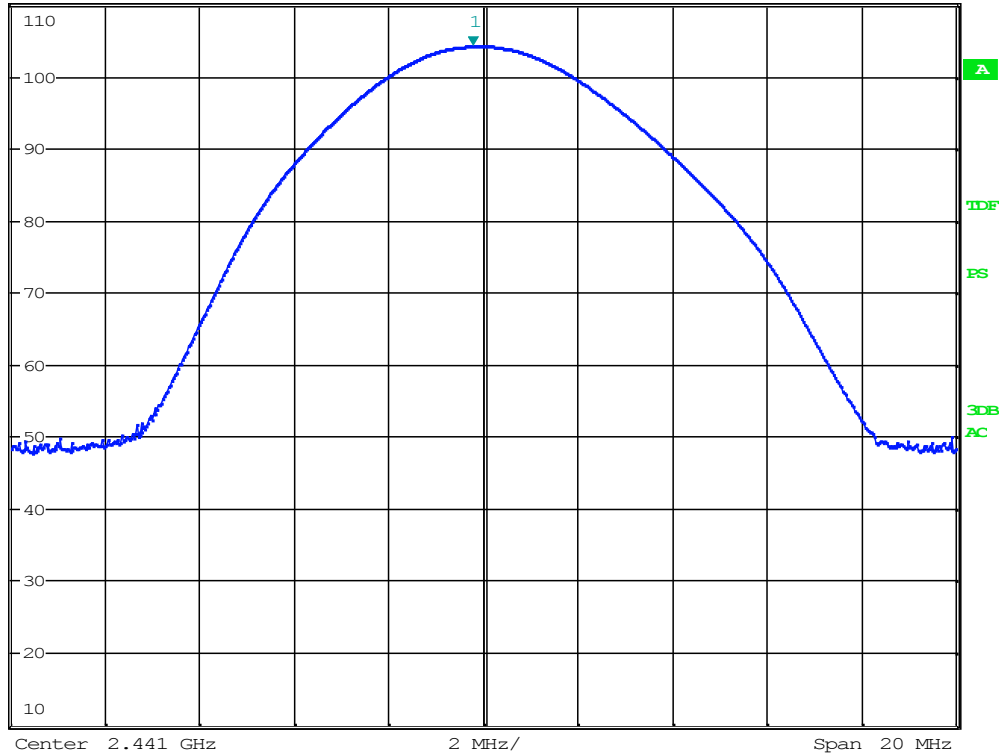
Date: 20.MAY.2014 17:06:04

**Maximum Field Strength, 2402MHz (Max: EUT XY plane, VP), DH5**



<b>MARKER 1</b>	*RBW 3 MHz	Marker 1 [T1 ]
2.440775641 GHz	VEW 10 MHz	104.25 dBµV/m
Ref 110 dBµV/m	*Att 15 dB	*SWI 20 ms
		2.440775641 GHz

1 PK  
MAXH



Date: 20.MAY.2014 17:19:49

**Maximum Field Strength, 2441MHz (Max: EUT XY plane, VP), DH5**

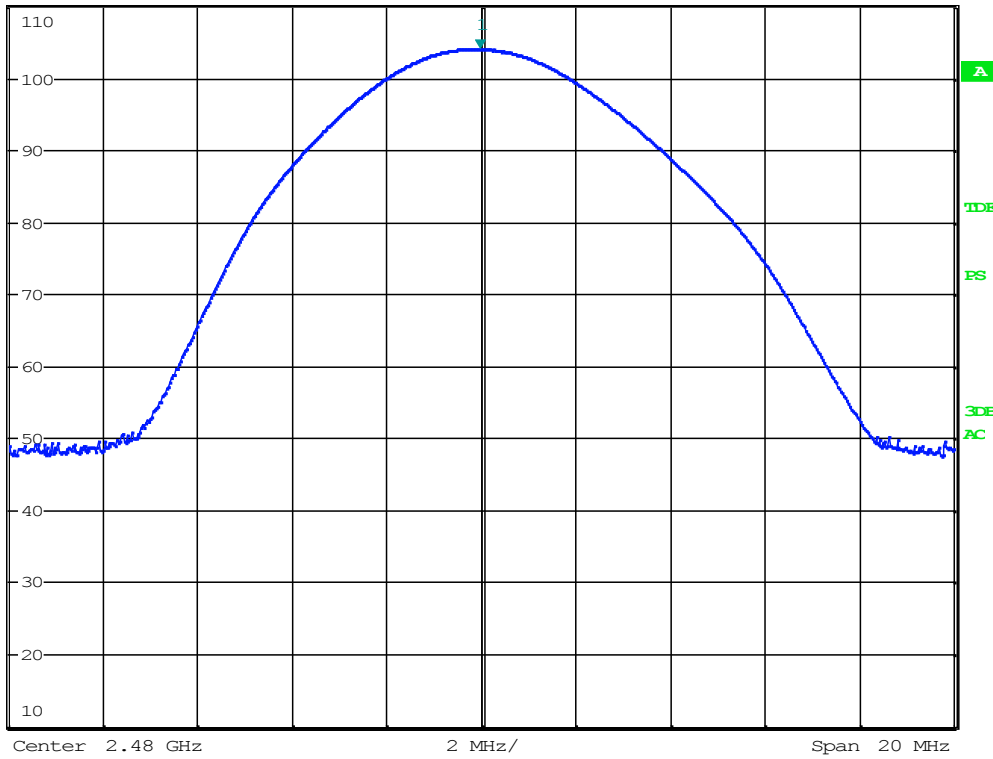


**MARKER 1**  
 2.479967949 GHz  
 Ref 110 dBµV/m \*Att 15 dB

\*RBW 3 MHz  
 VBW 10 MHz  
 \*SWT 20 ms

Marker 1 [T1 ]  
 104.07 dBµV/m  
 2.479967949 GHz

1 PK  
 MAXH



Date: 20.MAY.2014 17:24:29

**Maximum Field Strength, 2480MHz (Max: EUT XYplane, VP), DH5**

### 3.7 Spurious Emissions (Radiated)

Para. No.: 15.247 (c)

Test Results: Complies

Measurement Data:

Band-edge, Peak Detector

Frequency GHz	Field Strength, dB $\mu$ V/m		Limit dB	Margin dB
	Hopping Off	Hopping On		
2.39	42.7	43.0	74	31.0
2.4835	64.1	64.3	74	9.7

Band-edge, Average Detector

Frequency GHz	Field Strength, dB $\mu$ V/m		Limit dB	Margin dB
	Hopping Off	Hopping On		
2.39	22.7	23.0	54	31.0
2.4835	44.1	44.3	54	9.7

Average: (Peak dB $\mu$ V/m – 20) dB

See plots.

Measurements with Hopping On were only performed radiated, using the test method from KDB 558074 D01 v03r01, clause 12.2.2.

Reported value for Hopping On is the highest of the measurements.

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

**RF conducted power** to 25 GHz see attached plots.

Maximum RF level outside operating band:

RF ch 00: >50 dB/C, margin >30 dB

RF ch 39: >50 dB/C, margin >30 dB

RF ch 78: >50 dB/C, margin >30 dB

RF Conducted Emissions test results are from Nemko Test Report no. 238317-1.

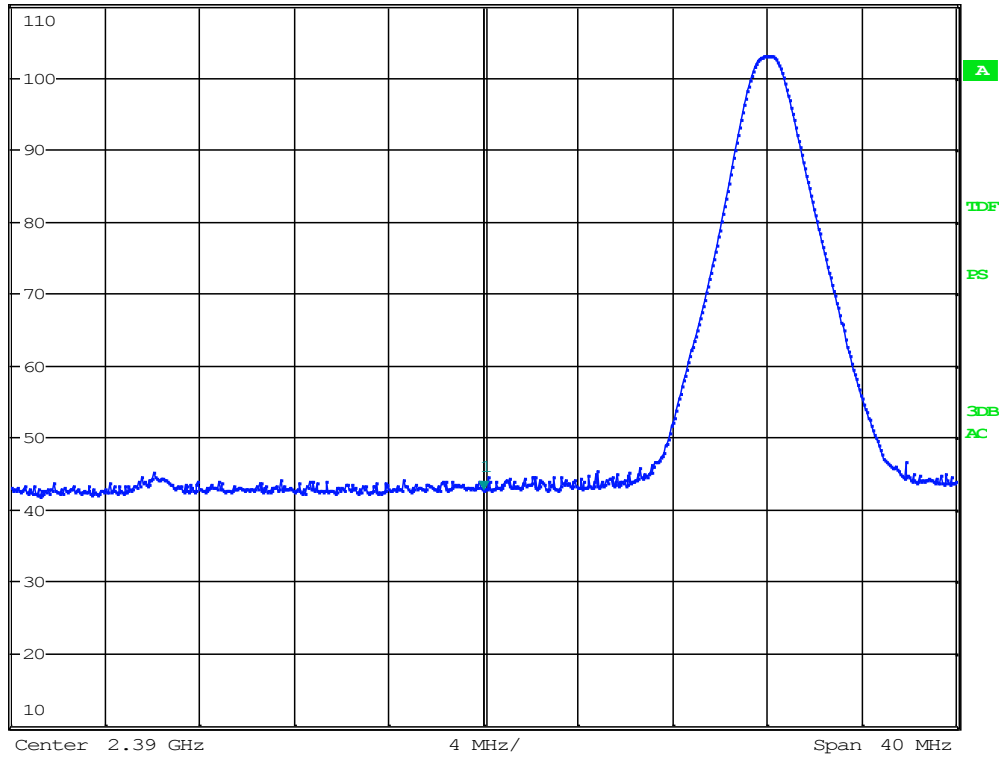


**MARKER 1**  
 2.39 GHz  
 Ref 110 dBµV/m \*Att 15 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 \*SWT 20 ms

Marker 1 [T1 ]  
 42.66 dBµV/m  
 2.390000000 GHz

1 PK  
 MAXH



Date: 20.MAY.2014 17:08:36

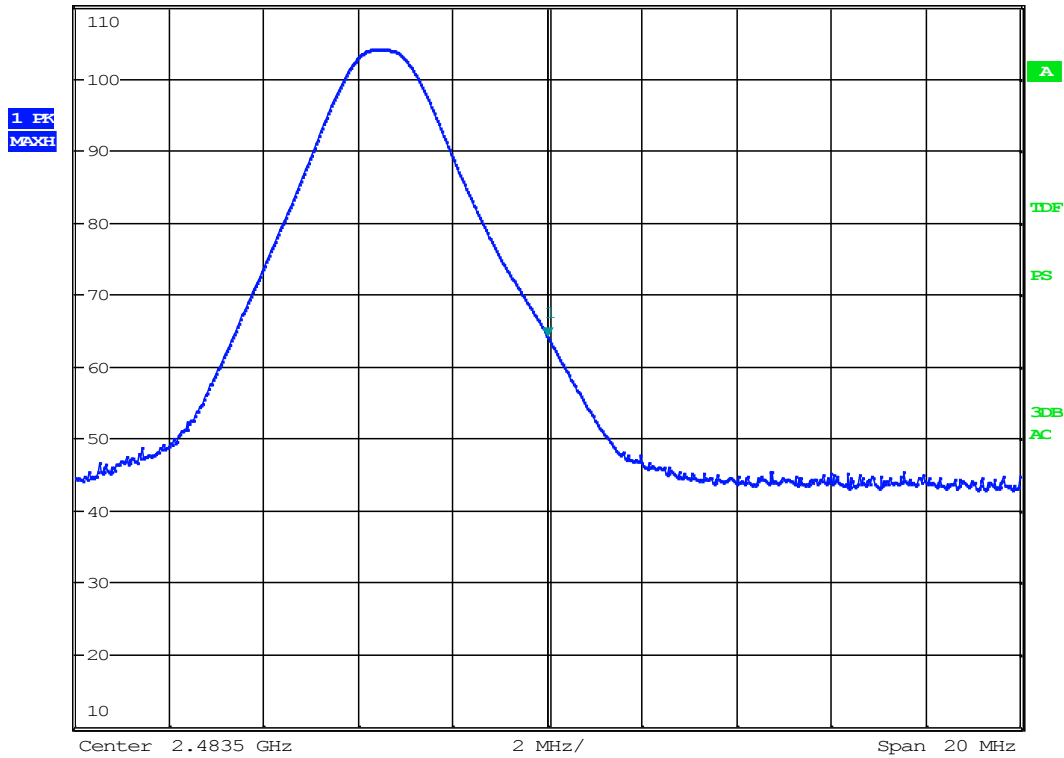
**Radiated Band Edge, Lower Channel**



**MARKER 1**  
 2.4835 GHz  
 Ref 110 dBµV/m \*Att 15 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 \*SWT 20 ms

Marker 1 [T1 ]  
 64.14 dBµV/m  
 2.483500000 GHz



Date: 20.MAY.2014 17:26:23

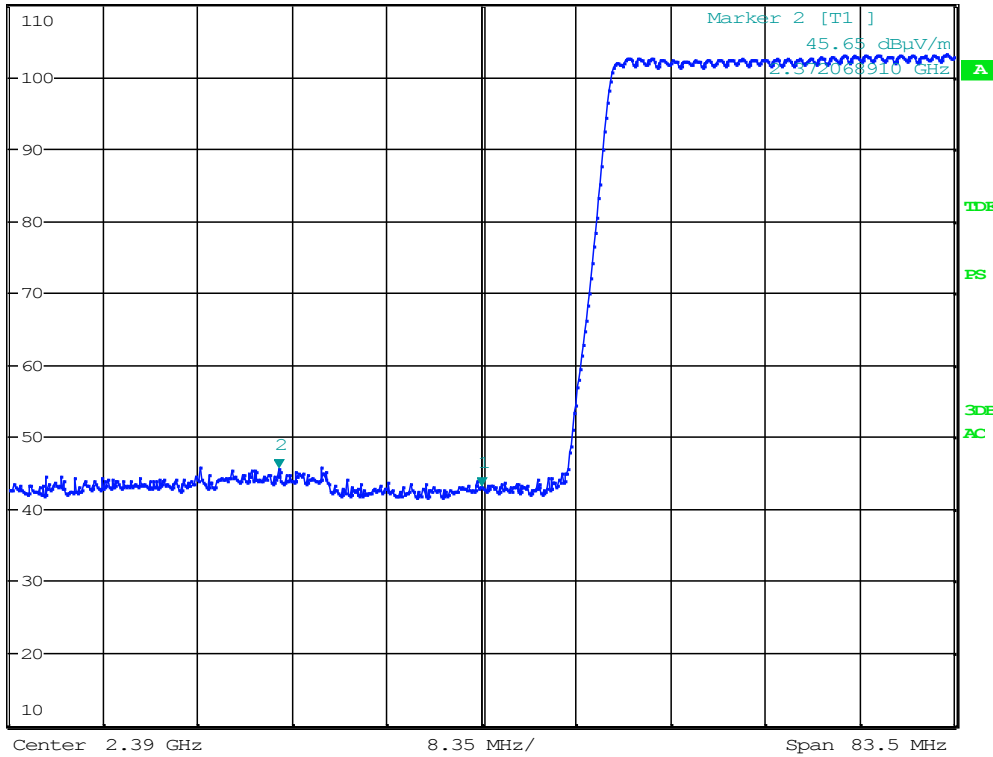
**Radiated Band Edge, Upper Channel**



**MARKER 1**  
 2.39 GHz  
 Ref 110 dBμV/m \*Att 10 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 VEW 3 MHz 43.04 dBμV/m  
 SWT 2.5 ms 2.390000000 GHz

1 PK  
 MAXH



Date: 20.MAY.2014 10:09:46

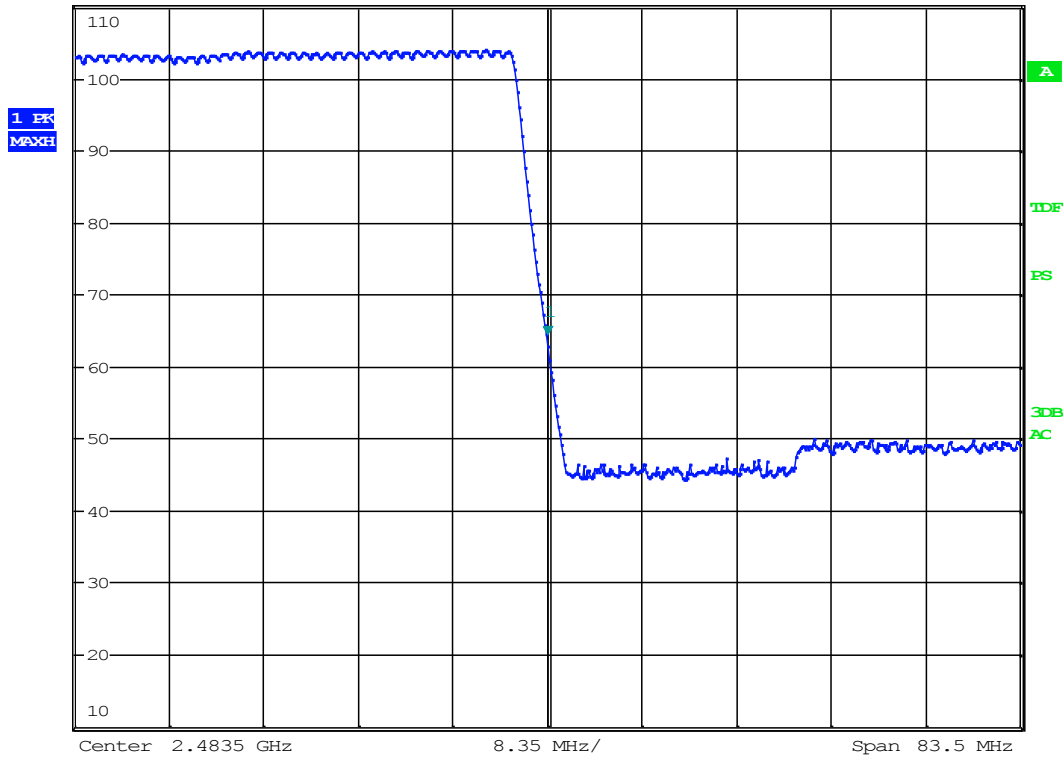
**Radiated Band Edge, Lower Channel, Hopping ON, DH5**



**MARKER 1**  
 2.4835 GHz  
 Ref 110 dBµV/m \*Att 10 dB

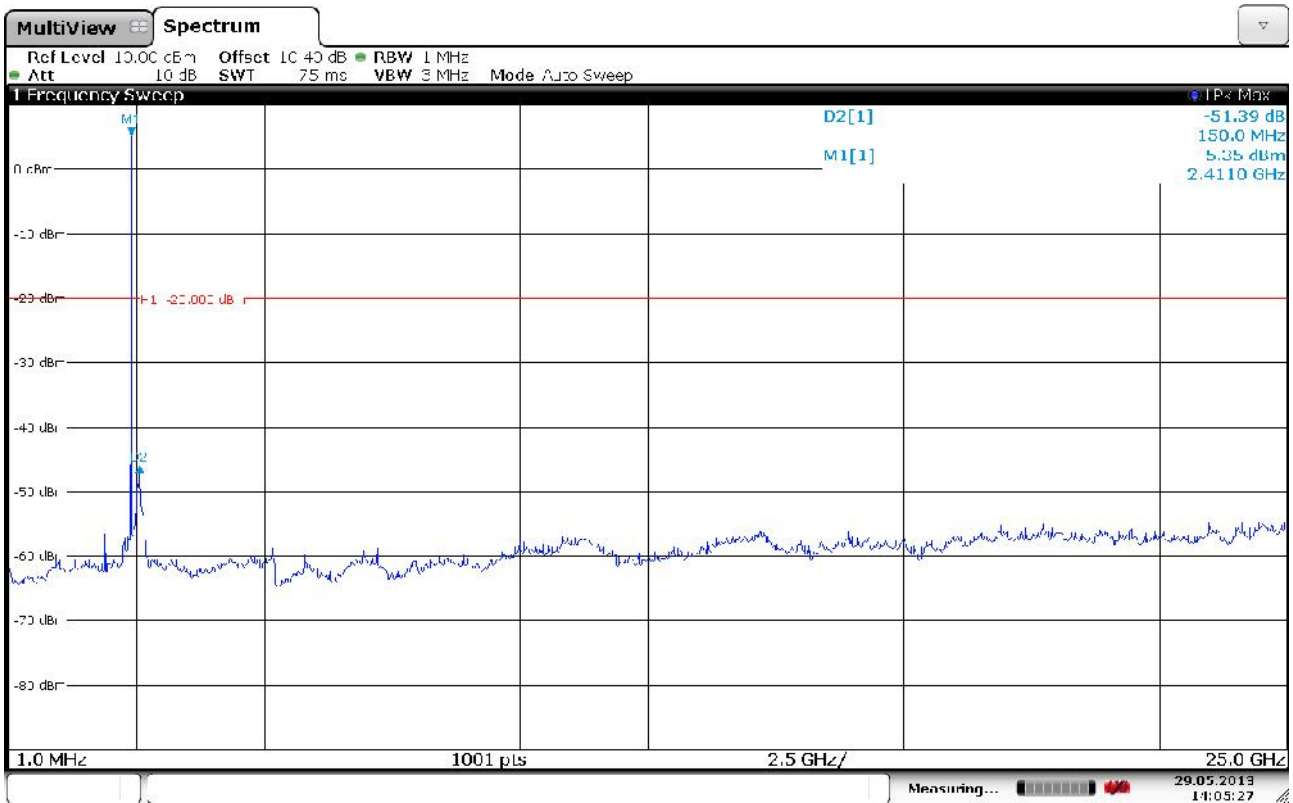
\*REW 1 MHz  
 VBW 3 MHz  
 SWT 2.5 ms

Marker 1 [T1 ]  
 64.27 dBµV/m  
 2.483500000 GHz

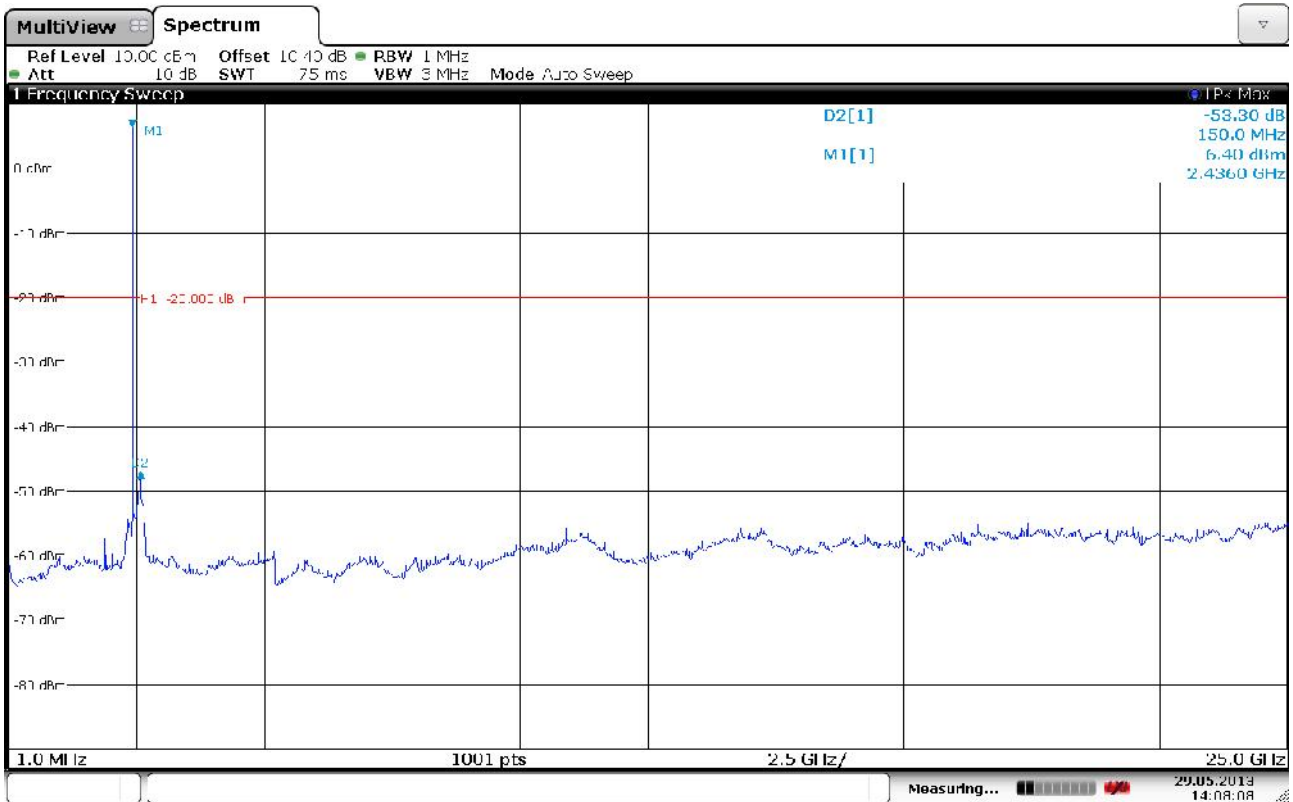


Date: 20.MAY.2014 10:12:56

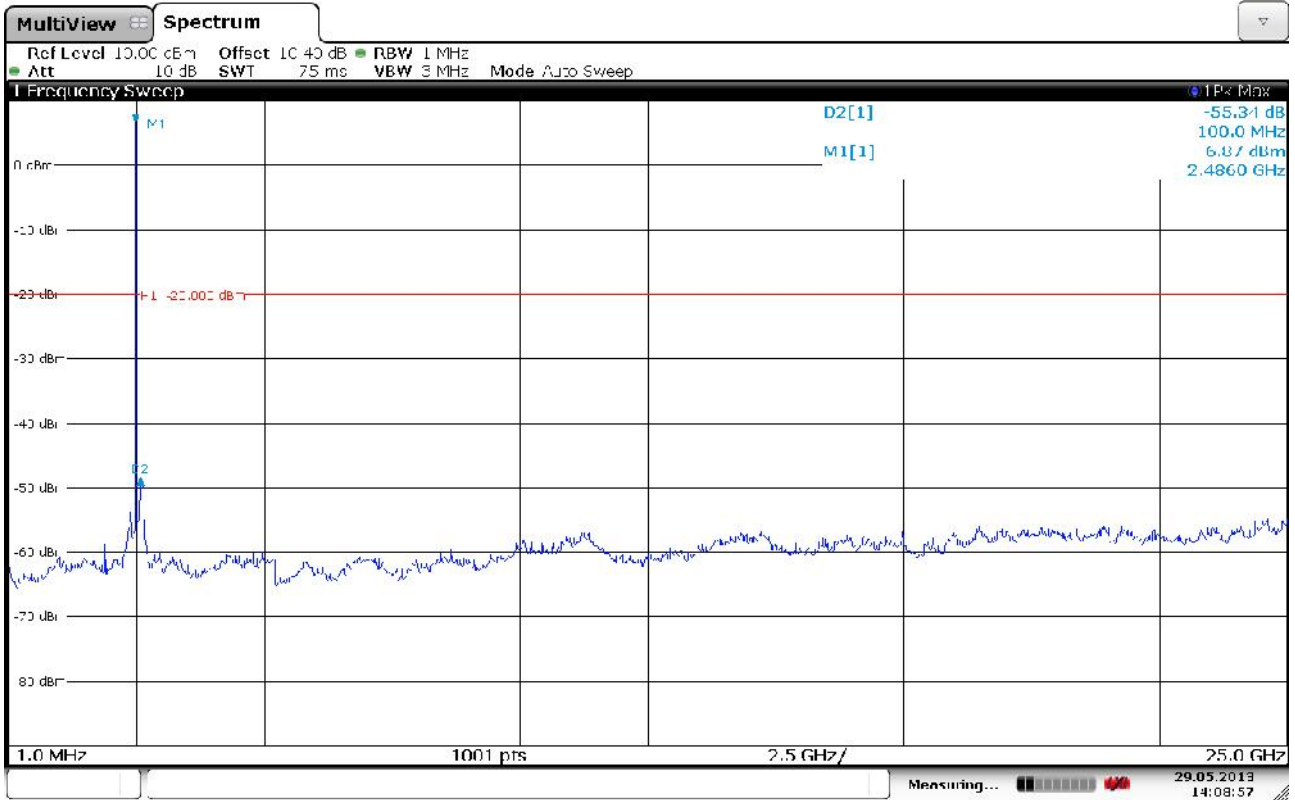
**Radiated Band Edge, Upper Channel, Hopping ON,DH5**



**Conducted Emissions, 1MHz -25GHz, 2402 MHz**



**Conducted Emissions, 1MHz -25GHz, 2441 MHz**



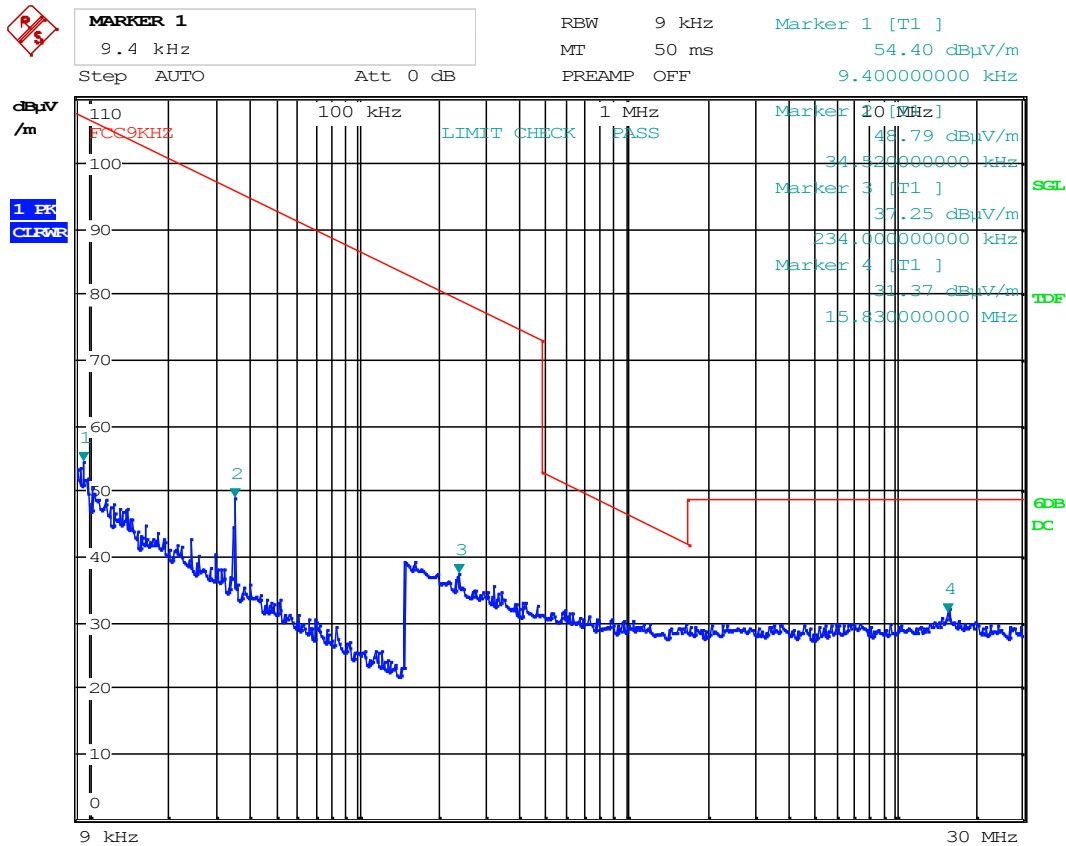
Conducted Emissions, 1MHz -25GHz, 2480 MHz

**Radiated emissions 10 kHz-30 MHz.**

Measuring distance 10 m, measured with Peak detector.

No component detected, see plot.

Limit is converted to 10 m using 40 dB/decade according to 15.31 (f) (2).



Date: 20.MAY.2014 17:54:00

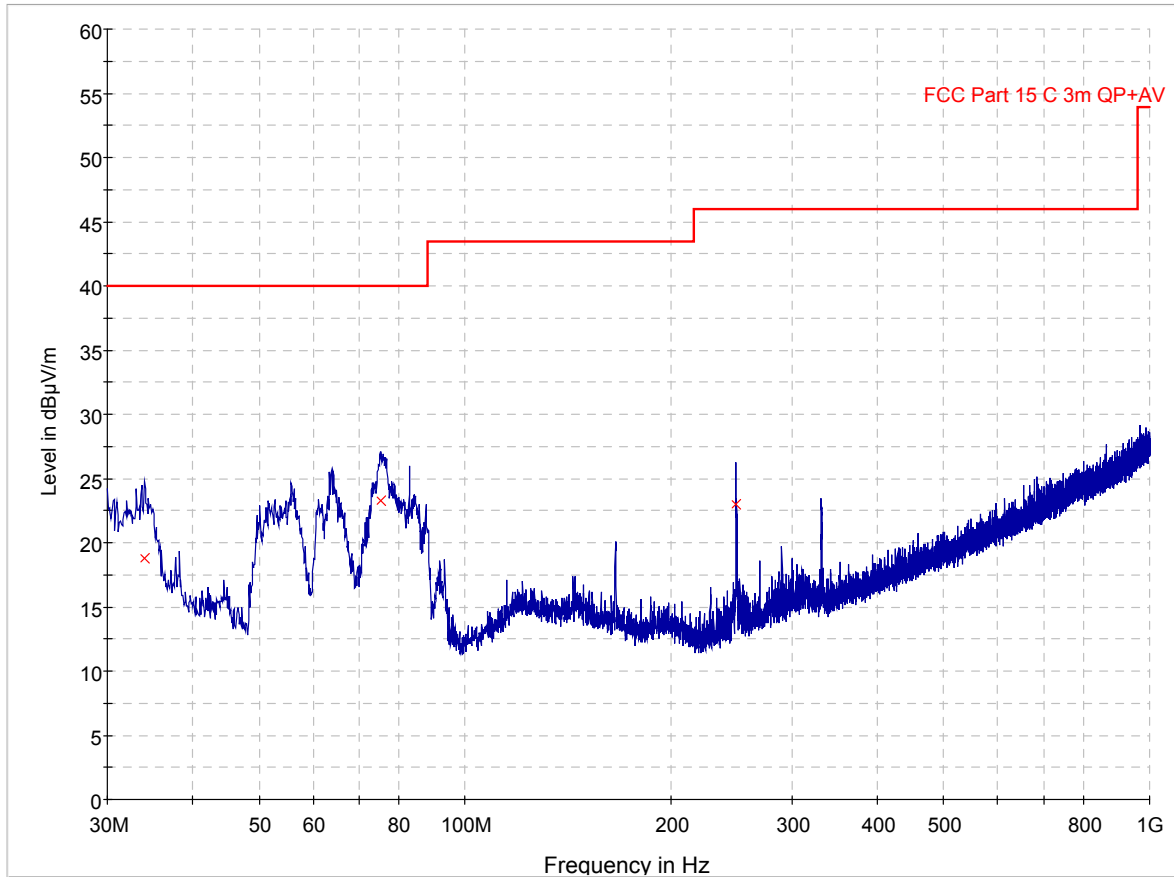
**Radiated Emissions, 0.010 -30MHz**

**Radiated emission 30 – 1000 MHz.**

Detector: Peak

Measuring distance: 3m

All values are below the limit even when measured with Peak Detector, RBW=100kHz, VBW=300kHz.



**Radiated Emissions, 30 -1000MHz, VP and HP @3m**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.955652	18.8	1000.0	120.000	100.0	V	207.0	-5.1	21.2	40.0	
75.341012	23.3	1000.0	120.000	100.0	V	64.0	-15.4	16.7	40.0	
248.832360	23.0	1000.0	120.000	128.0	H	283.0	-10.8	23.0	46.0	

### Radiated Emissions, 1-25 GHz

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	Field strength, Peak Detector, 3m	Limit	Margin
GHz	L,M,H	dB $\mu$ V/m	dB $\mu$ V/m	dB
All freqs	L	None detected	74	>20
All freqs	M	None detected	74	>20
All freqs	H	None detected	74	>20
Other freqs	L,M,H	None detected	74	>20

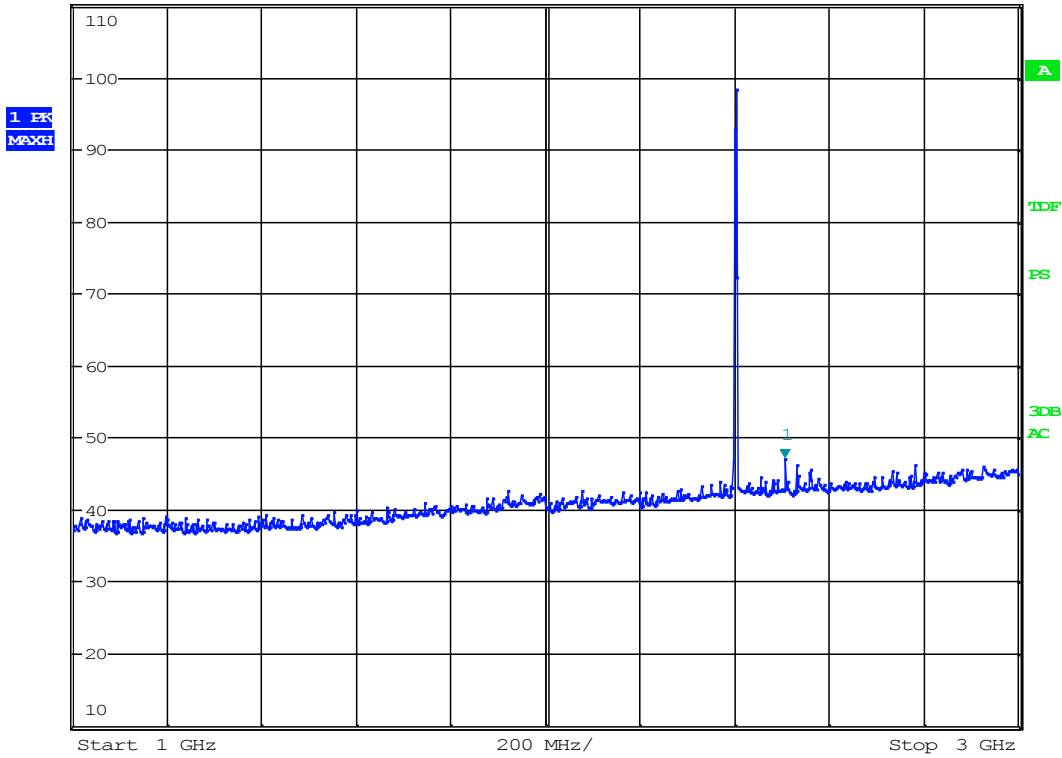
#### Average Detector:

Frequency	RF channel	Field strength, Average Detector, 3m	Limit	Margin
GHz	L,M,H	dB $\mu$ V/m	dB $\mu$ V/m	dB
All freqs	L	None detected	54	>20
All freqs	M	None detected	54	>20
All freqs	H	None detected	54	>20
Other freqs	L,M,H	None detected	54	>20

Average Detector values are calculated from Peak values by Duty Cycle Correction Factor (20 dB).  
 Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".  
 Distance correction factor is included in the plots at 1m.  
 See plots.



Ref 110 dB $\mu$ V/m \*Att 15 dB \*RBW 1 MHz \*SWT 20 ms  
 VBW 3 MHz Marker 1 [T1 ] 47.01 dB $\mu$ V/m  
 2.506410256 GHz



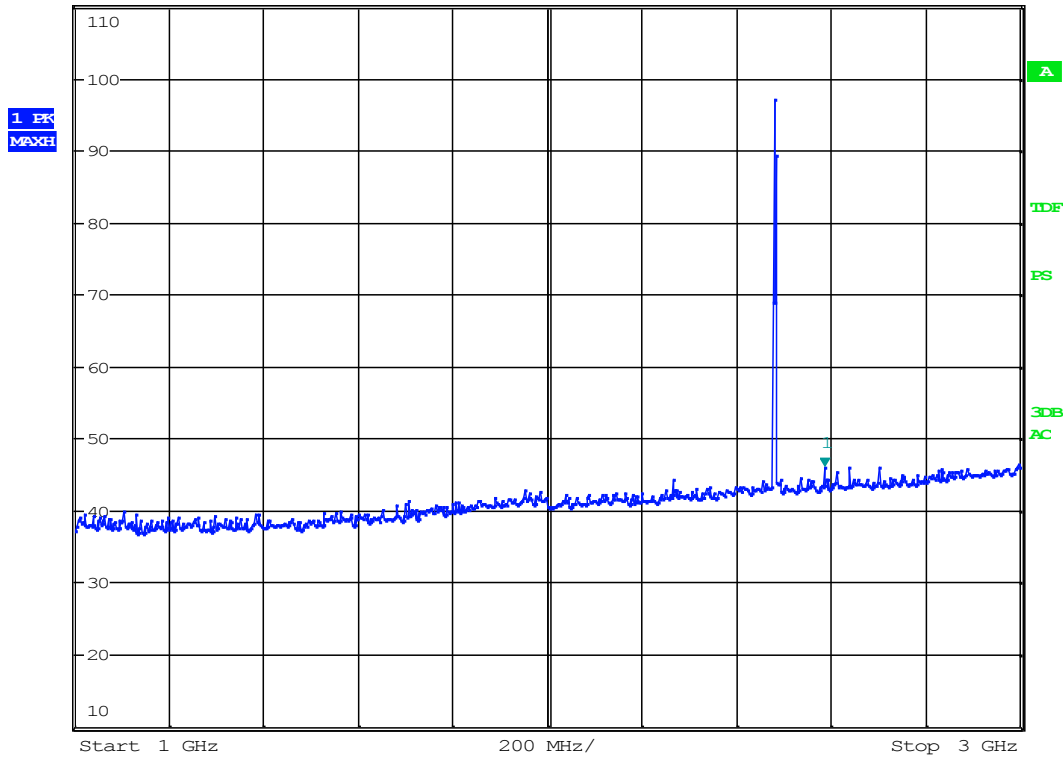
Date: 20.MAY.2014 17:13:52

**Radiated Emissions, 1000 -3000MHz, VP – Lower channel**





**MARKER 1**  
 2.586064103 GHz  
 Ref 110 dBµV/m \*Att 15 dB \*REW 1 MHz \*VEW 3 MHz \*SWT 20 ms  
 Marker 1 [T1 ]  
 46.00 dBµV/m  
 2.586064103 GHz



Date: 20.MAY.2014 17:29:57

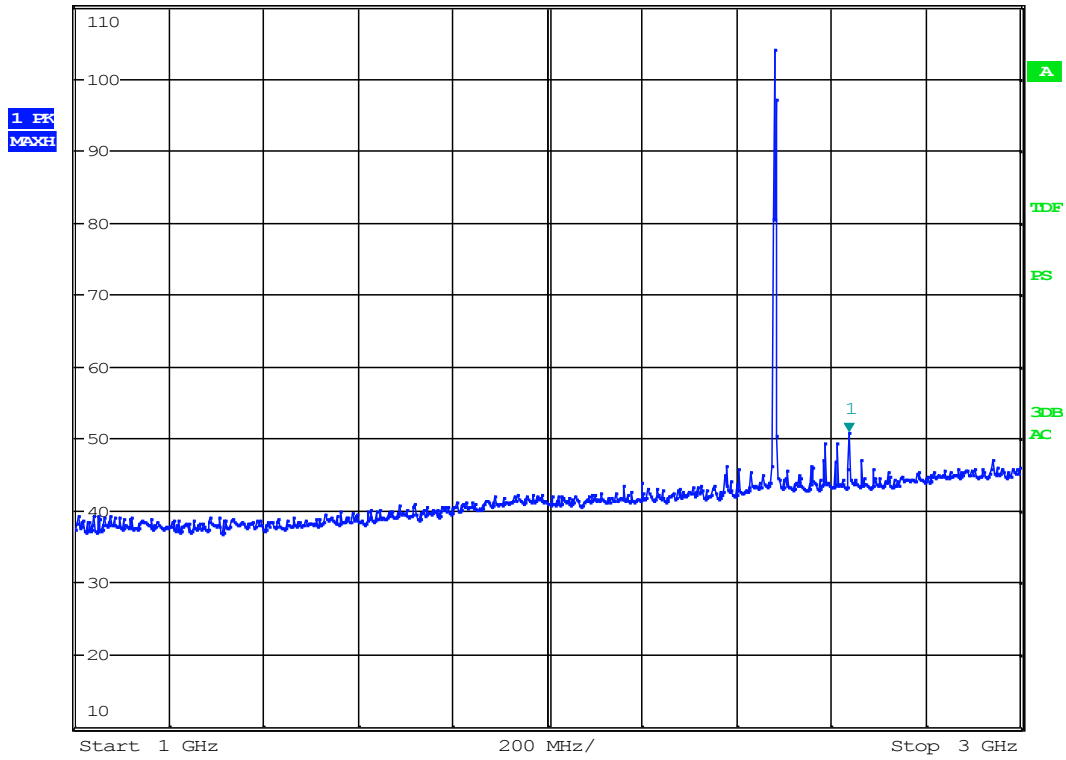
**Radiated Emissions, 1000 -3000MHz, VP- Upper channel**



**MARKER 1**  
 2.637019231 GHz  
 Ref 110 dBµV/m \*Att 15 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 \*SWT 20 ms

Marker 1 [T1 ]  
 50.92 dBµV/m  
 2.637019231 GHz



Date: 20.MAY.2014 17:24:59

**Radiated Emissions, 1000 -3000MHz, HP- Upper channel**

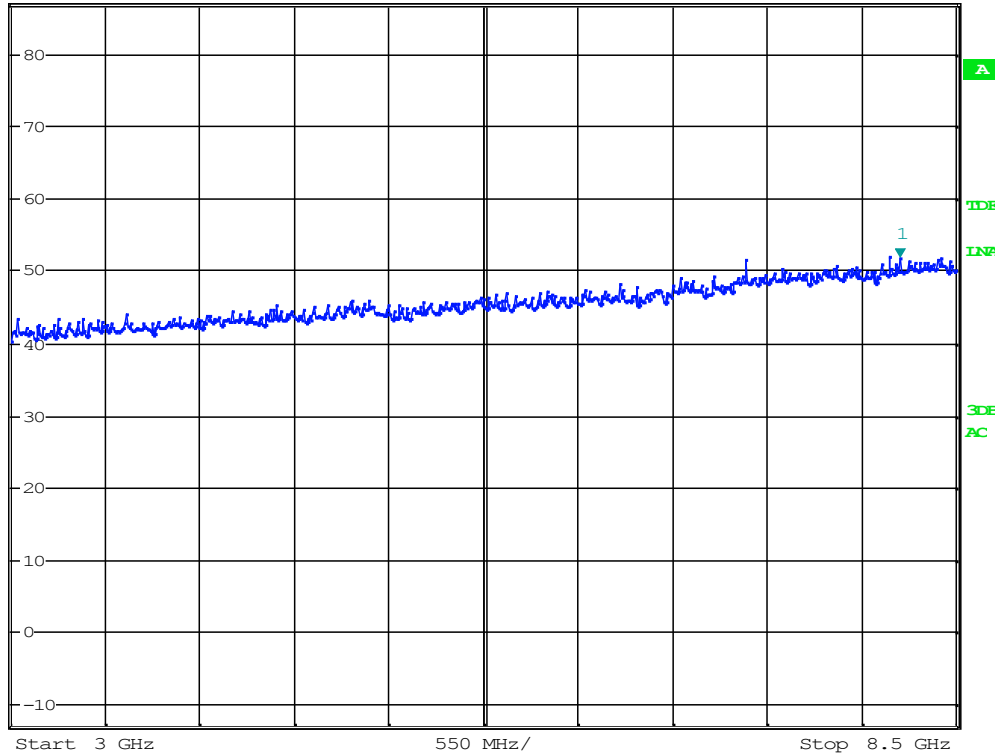


**MARKER 1**  
 8.173878205 GHz  
 Ref 87 dB $\mu$ V/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWI 35 ms

Marker 1 [T1 ]  
 51.88 dB $\mu$ V/m  
 8.173878205 GHz

1 PK  
 MAXH



Date: 20.MAY.2014 17:31:59

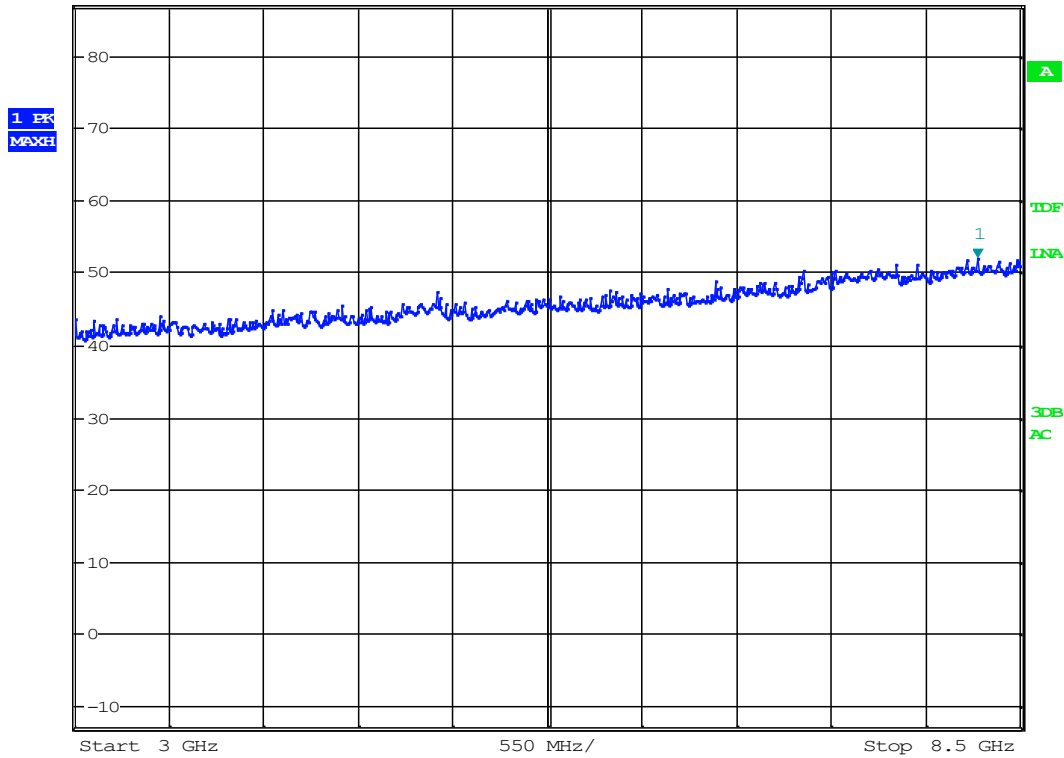
**Radiated Emissions, 3000 -8500MHz, VP**



**MARKER 1**  
 8.253205128 GHz  
 Ref 87 dB $\mu$ V/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 35 ms

Marker 1 [T1 ]  
 52.06 dB $\mu$ V/m  
 8.253205128 GHz



Date: 20.MAY.2014 17:32:28

**Radiated Emissions, 3000 -8500MHz, HP**

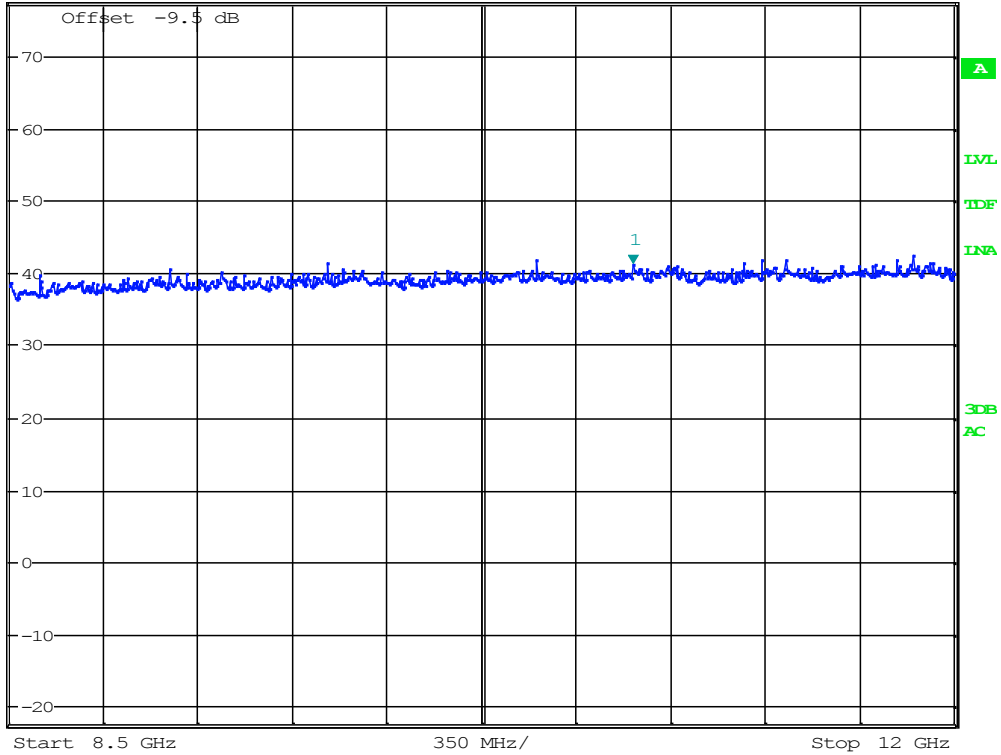


**MARKER 1**  
 10.81089744 GHz  
 Ref 77.5 dBµV/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 25 ms

Marker 1 [T1 ]  
 41.26 dBµV/m  
 10.810897436 GHz

1 EK  
 MAXH



Date: 20.MAY.2014 17:35:34

**Radiated Emissions, 8500 -12000MHz, VP, @1m**

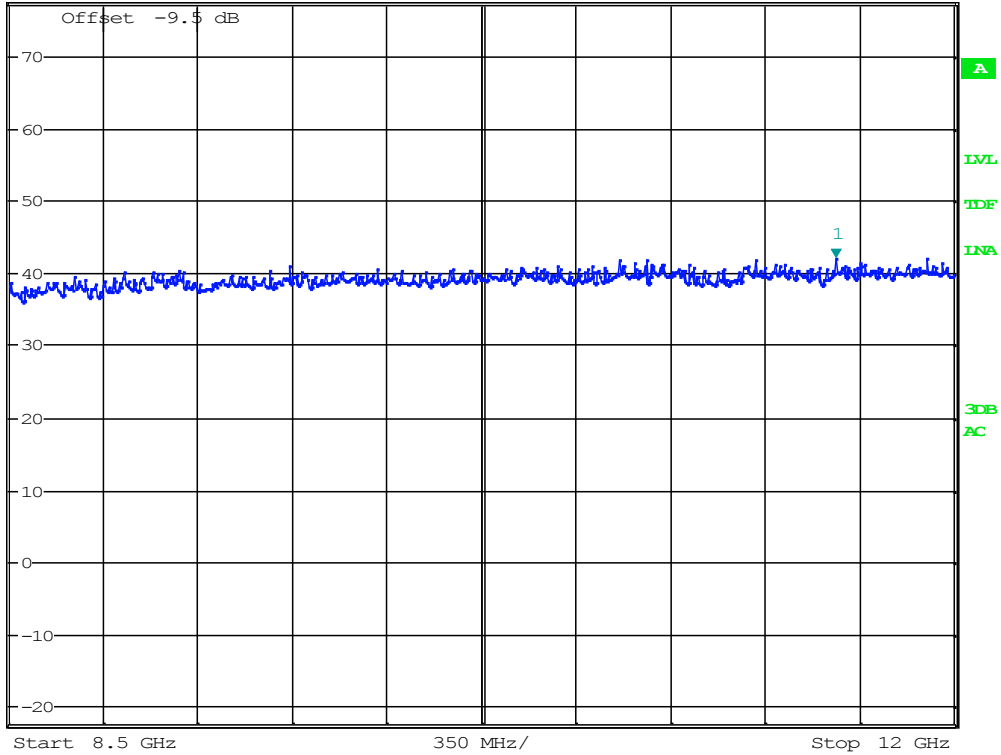


**MARKER 1**  
 11.5625 GHz  
 Ref 77.5 dBµV/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 25 ms

Marker 1 [T1 ]  
 42.13 dBµV/m  
 11.56250000 GHz

1 EK  
 MAXH



Date: 20.MAY.2014 17:35:06

**Radiated Emissions, 8500 -12000MHz, HP, @1m**

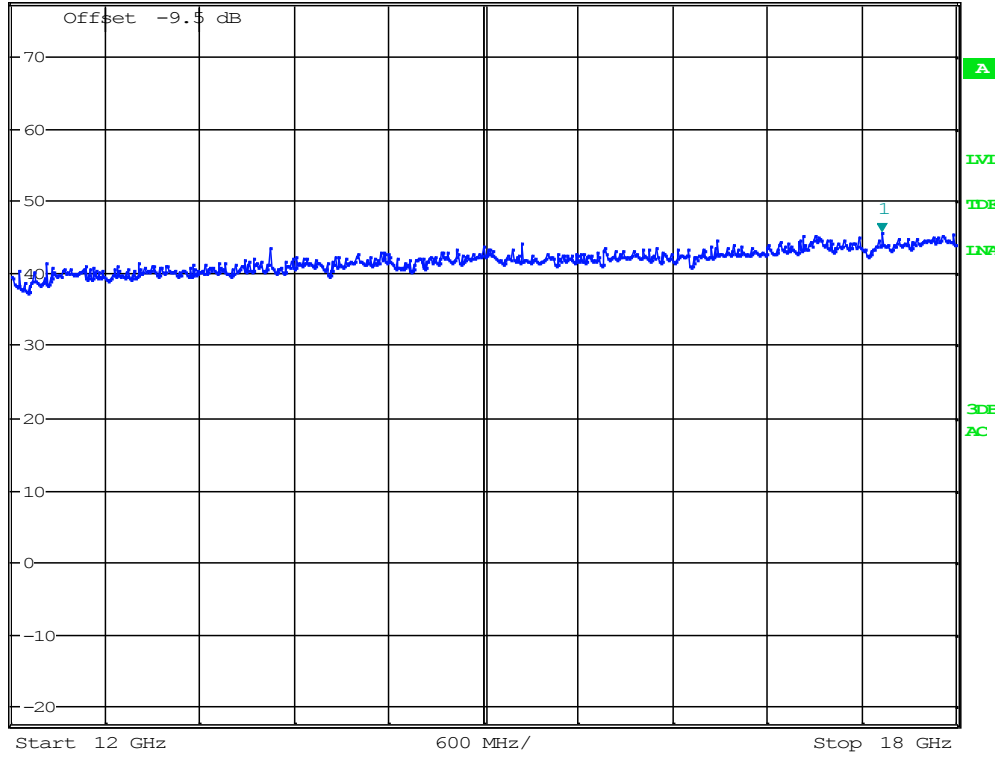


**MARKER 1**  
 17.52884615 GHz  
 Ref 77.5 dBµV/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 35 ms

Marker 1 [T1 ]  
 45.74 dBµV/m  
 17.528846154 GHz

1 EK  
 MAXH



Date: 20.MAY.2014 17:36:44

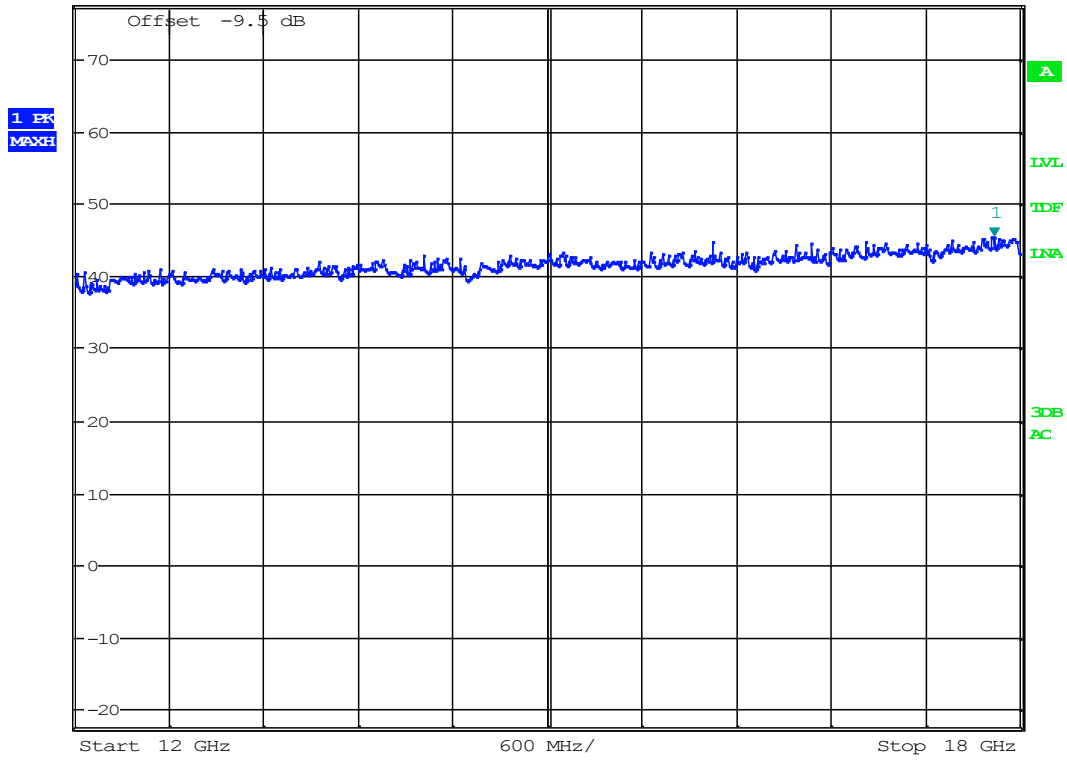
**Radiated Emissions, 12000 -18000MHz, VP, @1m**



**MARKER 1**  
 17.83653846 GHz  
 Ref 77.5 dBμV/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 35 ms

Marker 1 [T1 ]  
 45.55 dBμV/m  
 17.836538462 GHz



Date: 20.MAY.2014 17:36:08

**Radiated Emissions, 12000 -18000MHz, HP, @1m**

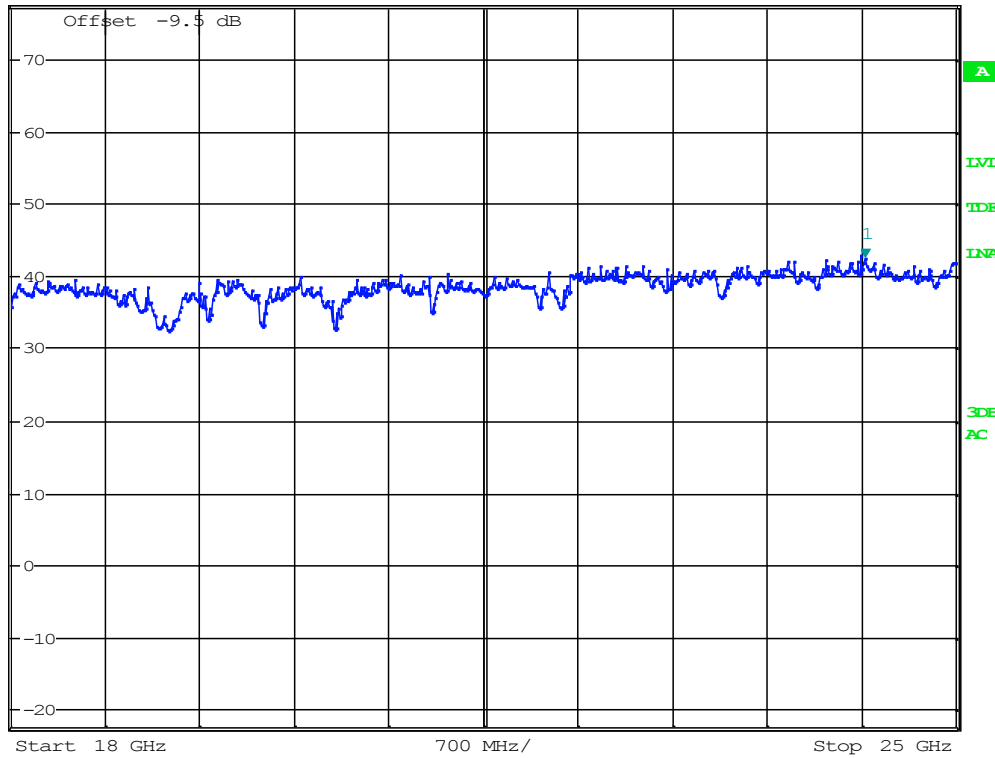


**MARKER 1**  
 24.32692308 GHz  
 Ref 77.5 dBµV/m \*Att 10 dB

\*RBW 1 MHz  
 VBW 3 MHz  
 SWT 45 ms

Marker 1 [T1 ]  
 42.45 dBµV/m  
 24.326923077 GHz

1 EK  
 MAXH



Date: 20.MAY.2014 17:38:06

**Pre-scan, 18000 -25000MHz**

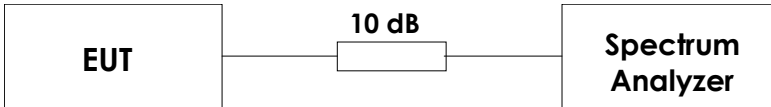
## 4 LIST OF TEST EQUIPMENT

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	ESU40	Spectrum Analyzer	Rohde & Schwarz	LR 1639	2013.09.24	2014.09.24
3	4768-10	Attenuator	Narda	LR1647	2013.06	2014.06
4	ESHS10	EMI receiver	Rohde & Schwarz	N3528	2013.09.09	2014.09.09
5	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	LR 1076	Cal b4 use	
6	80S	Signal Generator	Powertron	LT 502	Cal b4 use	
7	6812B	AC Power Source	Agilent	LR 1515	2013.10.28	2014.10.28
8	ESH3-Z2	Pulse Limiter	Rohde & Schwarz	LR 1074	Cal b4 use	
9	ESCI	Measuring Receiver	Rohde & Schwarz	N-4259	2013.03.21	2015.03.21
10	JB3	BiLog Antenna	Sunol Sciences	N-4525	2011.09.07	2014.09.07
11	LNA6900	Preamplifier	Teseq	LR 1593	Cal b4 use	
12	3115	Horn Antenna	EMCO	LR 1330	2010.08.05	2015.08.05
14	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2013.09	2014.09
15	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 285	2010.11	2015.11
16	PM7320X	Antenna horn	Siverts lab	LR 103	2014.01.26	2024.01.26
17	DBF-520-20	Antenna horn	Systron Donner	LR 101	2014.01.26	2024.01.26
18	638	Antenna horn	Narda	LR 1480	2010.06.17	2015.06.17
19	FSW26	Spectrum Analyzer	Rohde & Schwarz	LR 1640	2013.08.30	2014.08.30
20	Model 87 V	Multimeter	Fluke	LR 1599	2012.10.29	2014.10.29

## 5 BLOCK DIAGRAM

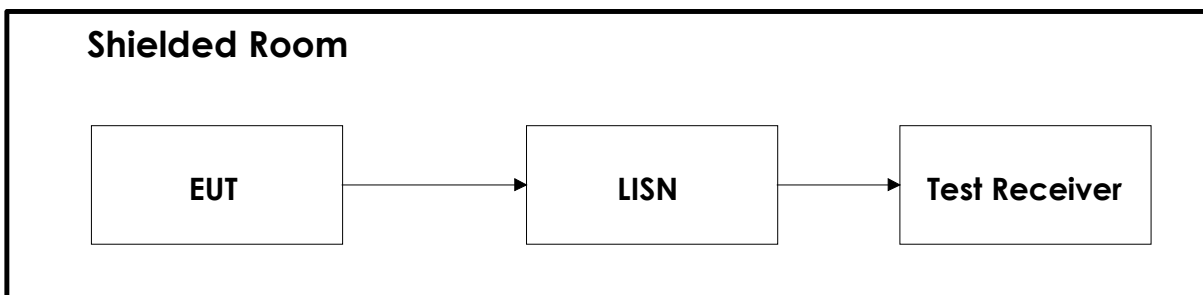
### 5.1 Conducted Tests



*Test equipment included: 1, 2, 19*

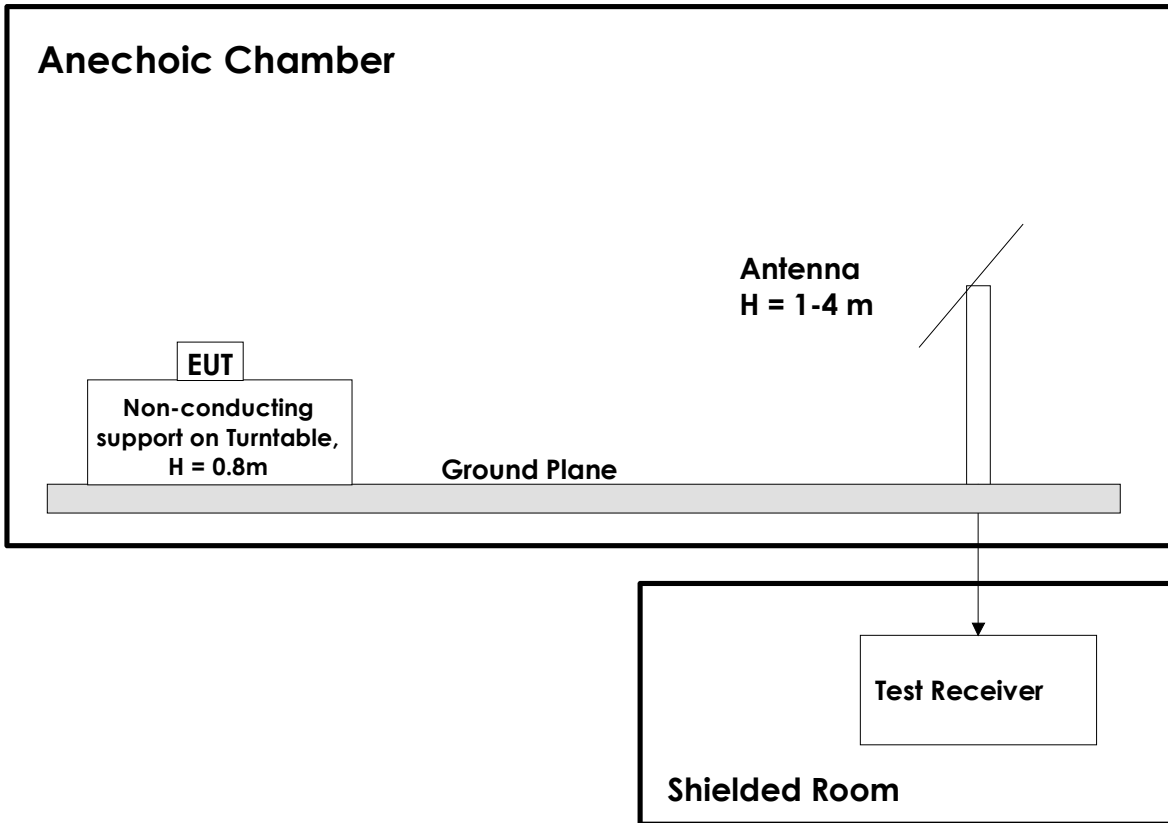
This setup is used for all measurements on 50 ohm antenna connector.

### 5.2 Power Line Conducted Emission



*Test equipment: 3, 4, 6, 7, 18*

### 5.3 Test Site Radiated Emission



*Test equipment: 1, 9, 10, 11, 12, 13, 14, 15, 16, 18,20*

This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10 m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz were measured with a Spectrum Analyzer and Horn Antenna and with the preamplifier after the antenna. For measurements above 18 GHz the test receiver is moved inside the anechoic chamber and located next to the antenna to minimize the cable loss.