




Test Report

Product	LEGO MINDSTROMS Brick with Bluetooth wireless Transceiver	
Name and address of the applicant	LEGO System A/S Åstvej 1, 7190 Billund, Denmark	
Name and address of the manufacturer	LEGO System A/S Åstvej 1, 7190 Billund, Denmark	
Model	EV3 P-Brick	
Rating	6 - 10Vdc, 400mA (AA primary batteries) or 7.4Vdc/2200mAh Li-Ion Rechargeble battery pack	
Trademark	LEGO	
Serial number	/	
Additional information	Tested EUT contains Bluetooth basic rate and EDR transceiver.	
Tested according to	FCC Part 15.247 Frequency Hopping Transmitters / Digital Transmission Systems Industry Canada RSS-247, Issue 2 Low Power Licence-Exempt Radiocommunications Devices	
Order number	317836	
Tested in period	2017.02.23 - 2017.02.27	
Issue date	2017.09.25	
Name and address of the testing laboratory	 <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> Instituttveien 6 Kjeller, Norway </div> <div style="width: 45%;"> FCC No: 994405 IC OATS: 2040D-1 TEL: +47 22 96 03 30 FAX: +47 22 96 05 50 </div> </div>	
	 Prepared by [G.Suhanthakumar]	 Approved by [Roy Uggerud]
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1 INFORMATION

1.1 Test Item

Name :	LEGO MINDSTROMS
FCC ID :	NPI95646A
Industry Canada ID :	3072A-95646A
Model/version :	EV3 P-Brick
Serial number :	/
Hardware identity and/or version:	2.00
Software identity and/or version :	1.09H
Frequency Range :	2402 – 2480MHz
Tunable Bands :	None
Number of Channels :	79
Operating Modes :	Basicrate with enhanced data rates
Type of Modulation :	Frequency Hopping (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
User Frequency Adjustment :	None
Rated Output Power :	11.59 mW
Type of Power Supply :	Primary batteries (AA, 6x1.5V)
Antenna Connector :	N/A (integral antenna)
Number of Antennas :	1
Antenna Diversity Supported :	N/A
Desktop Charger :	N/A

Description of Test Item

The EUT is a Bluetooth Transceiver with Bluetooth v2.1 +EDR, class 1.5 with integral antenna.

1.2 Normal test condition

Temperature: 20 - 24 °C
Relative humidity: 20 - 50 %
Normal test voltage: 9 V DC

The values are the limit registered during the test period.

1.3 Test Engineer(s)

G.Suhandhakumar

1.4 Description of modification for Modification Filing

Not applicable.

1.5 Family List Rational

Not Applicable.

1.6 Antenna Requirement

Is the antenna detachable?

Yes No

If detachable, is the antenna connector non-standard?

Yes No

Type of antenna connector: N/A

Ref. FCC §15.203

1.7 Worst-Case Configuration and Mode

Radiated Emissions and Power Line Conducted Emissions were performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario.

1.8 Comments

All measurements were done with the EUT powered by a fully charged battery.

All ports were populated during spurious emission measurements.

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-247 Issue 2.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

Radiated tests were made in a semi-anechoic chamber at measuring distances of 1m, 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".

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2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247 Issue 2, RSS-GEN Issue 4 reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	N/A ¹
Number of Operating Frequencies	15.31(m)	5.1 (d) (RSS-247)	Complies
Antenna Requirement	15.203	8.3 (RSS-GEN)	N/A ²
Power Line Conducted Emission	15.107(a) 15.207(a)	8.8 (RSS-GEN)	Complies ³
Channel Separation	15.247(a)(1)	5.1 (b) (RSS-247)	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)	5.1 (a) (RSS-247)	Complies
Time of Occupancy	15.247(a)(1)(iii)	5.1 (d) (RSS-247)	Complies
Occupied Bandwidth	15.247(a)(1)	5.1 (a) (RSS-247)	Complies
Occupied Bandwidth	N/A	6.6 (RSS-GEN)	N/A ⁴
Minimum 6 dB Bandwidth	15.247(a)(2)	5.2 (a) (RSS-247)	N/A ⁴
Peak Power Output	15.247(b)	5.4(b) (RSS-247)	Complies
Power Spectral Density	15.247(d)	5.2 (b) (RSS-247)	N/A ⁴
Spurious Emissions (Antenna Conducted)	15.247(c)	5.5 (RSS-247)	Complies
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	5.5 (RSS-247) 6.13 (RSS-GEN) 8.9 (RSS-GEN)	Complies

N/A¹: Primary battery or Li-ion rechargeable battery

N/A²: Integral antenna

3 : For rechargeable battery.

N/A³: FHSS

3 TEST RESULTS

3.1 Power Line Conducted Emissions

Para. No.: 15.207 (a)

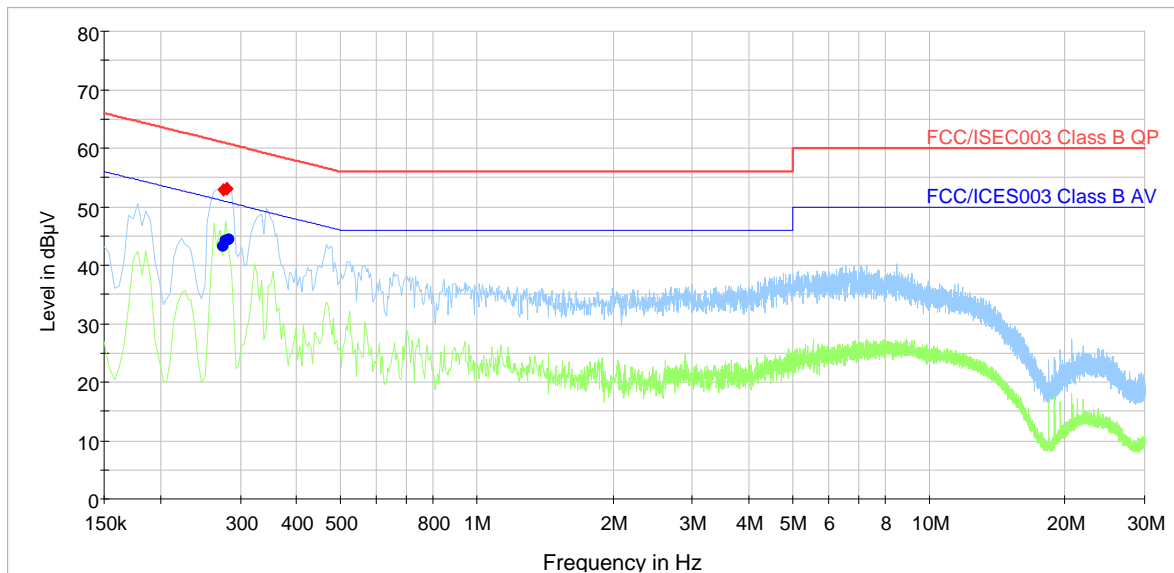
Test Performed By: G.Suhanthakumar	Date of Test: 2017.01.27
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Measurement procedure: ANSI C63.4-2014 using 50 µH/50 ohms LISN.

Test Results: Complies.

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

AC/DC adapter type: PI TOY ; Model: PS-605-02



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.272	---	43.49	51.06	7.56	1000.0	9.000	L1	GND	10.1
0.276	---	44.59	50.94	6.34	1000.0	9.000	L1	GND	10.1
0.276	52.85	---	60.94	8.09	1000.0	9.000	L1	GND	10.1
0.280	---	44.77	50.82	6.04	1000.0	9.000	L1	GND	10.1
0.280	52.98	---	60.82	7.83	1000.0	9.000	L1	GND	10.1

3.2 Channel Separation

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

Test Performed By: G.Suhanthakumar

Date of Test: 2017.01.27

Test Results: **Complies**

Measurement Data:

Channel Separation:	1 MHz
Nominal value for Channel Separation	1 MHz

See attached plots

Requirement:

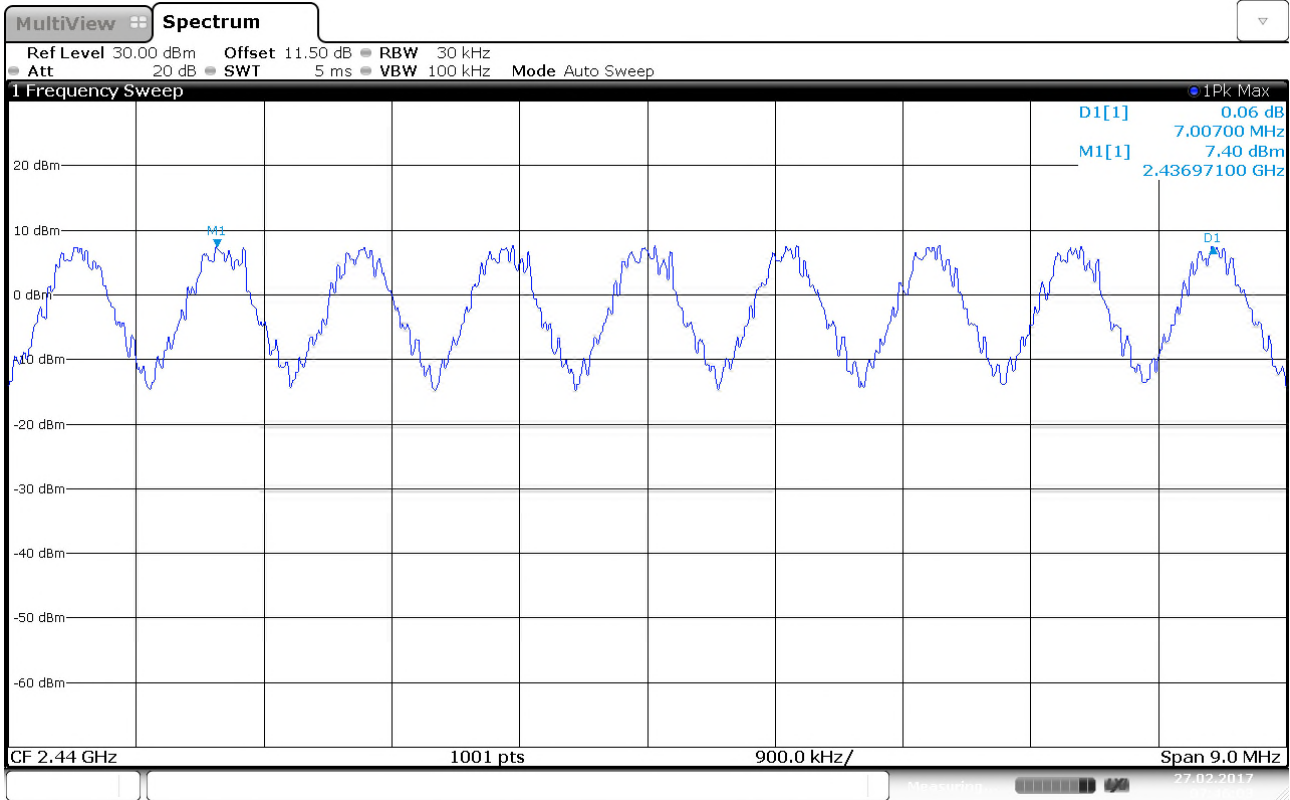
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

No requirements for Digital Transmission Systems.

Channel Separation



3.3 Pseudorandom Hopping Algorithm

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

Test Results: Complies

Measurement Data: /

The hopping sequence follows the Bluetooth standard.

Requirements:

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

No requirements for Digital Transmission Systems.

3.4 Occupancy Time

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

Test Performed By: G.Suhanthakumar	Date of Test: 2017.01.27
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Test Results: **Complies**

Measurement Data:

	BR-DH5	EDR -3DH3	EDR- 3DH5
Number of RF Channels:	79	79	79
Maximum Length of RF Burst pr. Channel,ms	2.89	1.65	2.89
Minimum Time between RF Burst on same RF Channel,ms	395.4	190.2	263.97
Time of Occupancy, S	0.231	0.274	0.346

BT, 79 Ch Mode:

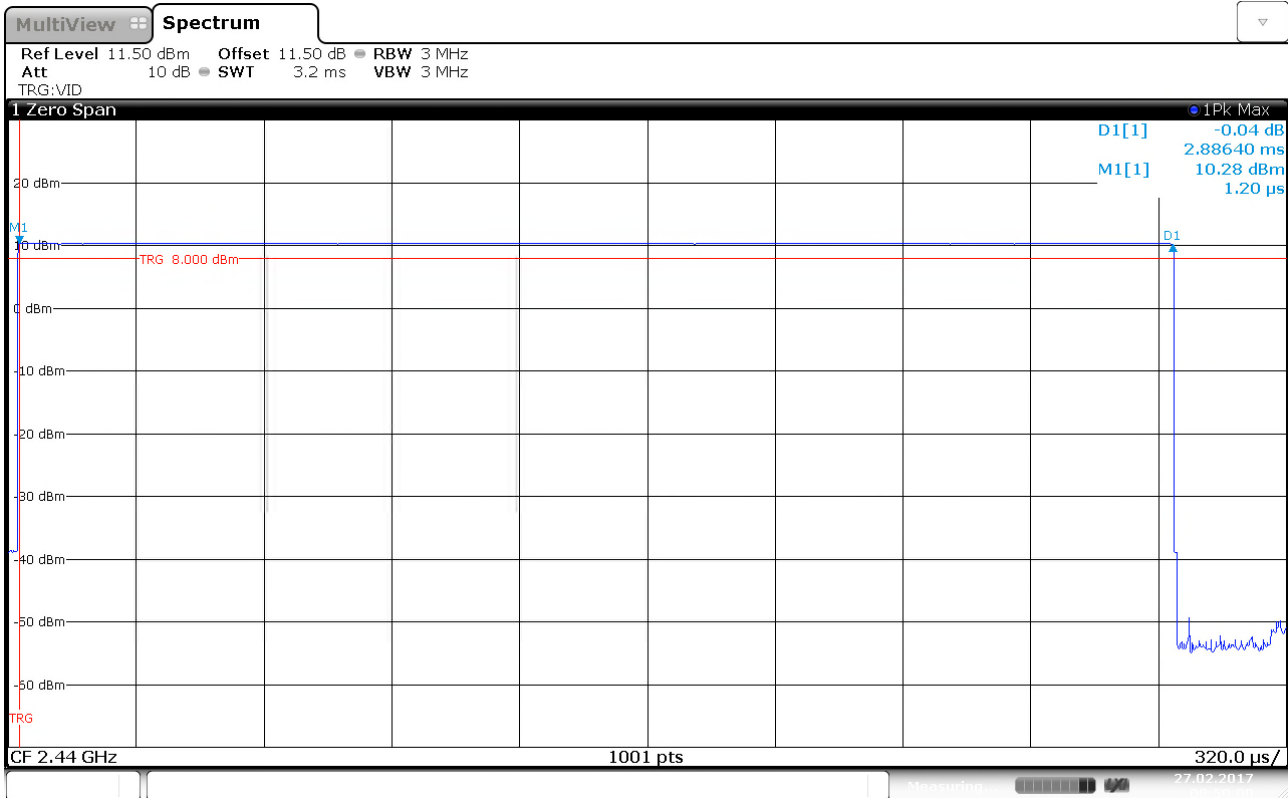
Time of occupancy: $(2.89 \times 400 \times 79) / 395.4 = 231\text{ms}$

See attached graph.

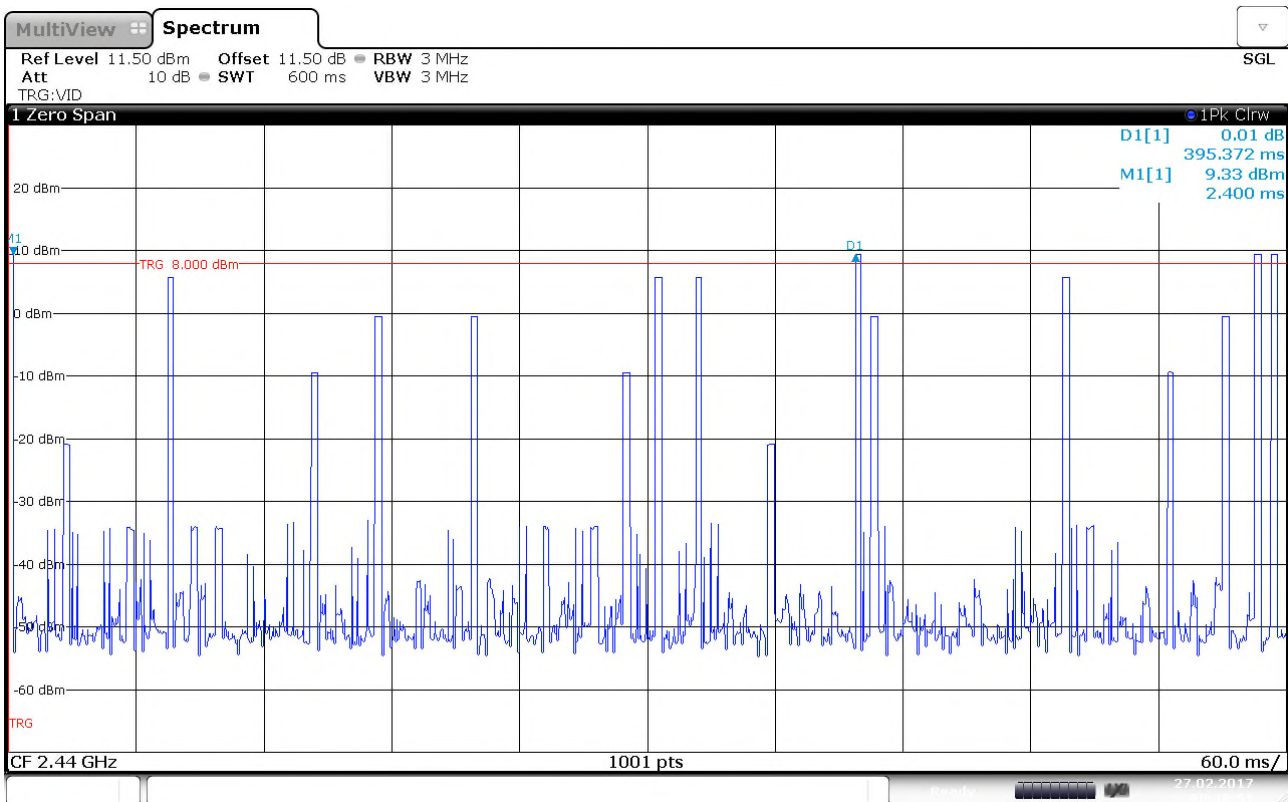
Requirements:

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.

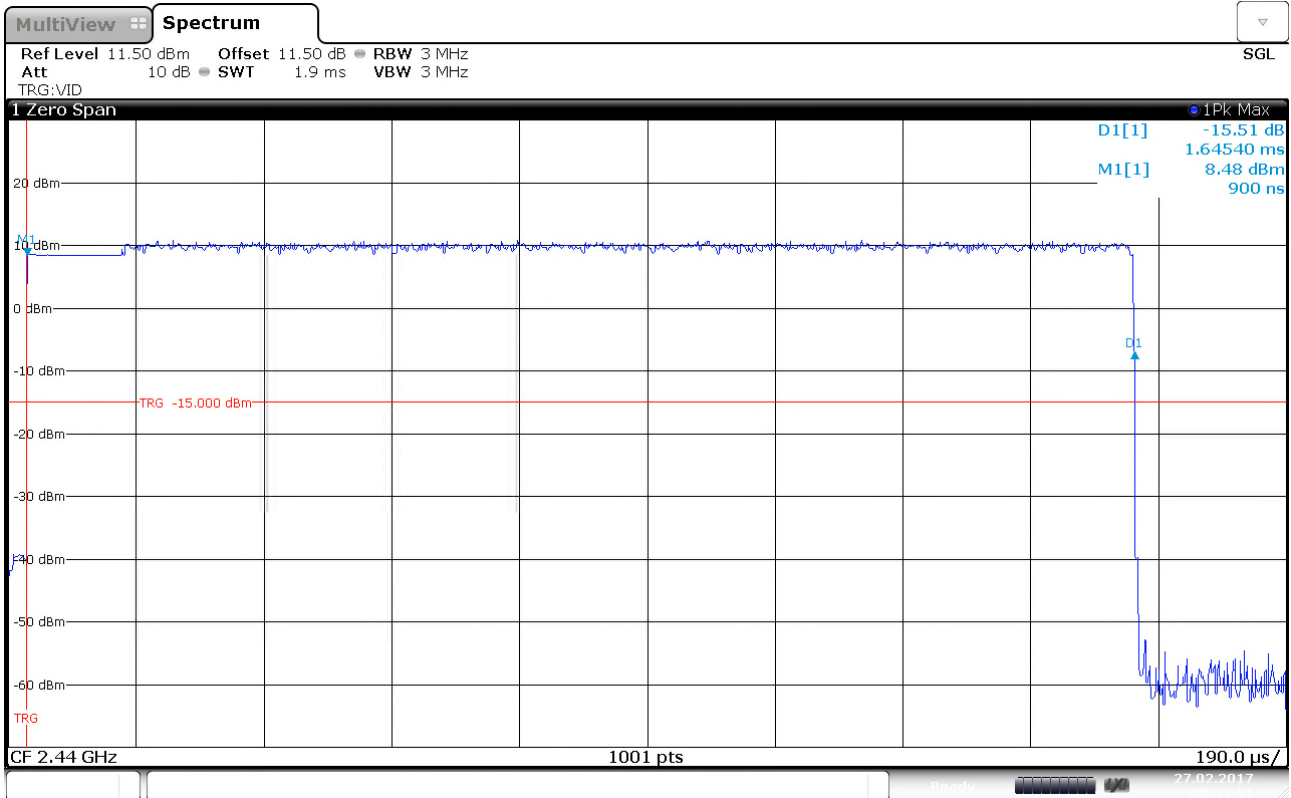
No requirements for Digital Transmission Systems.



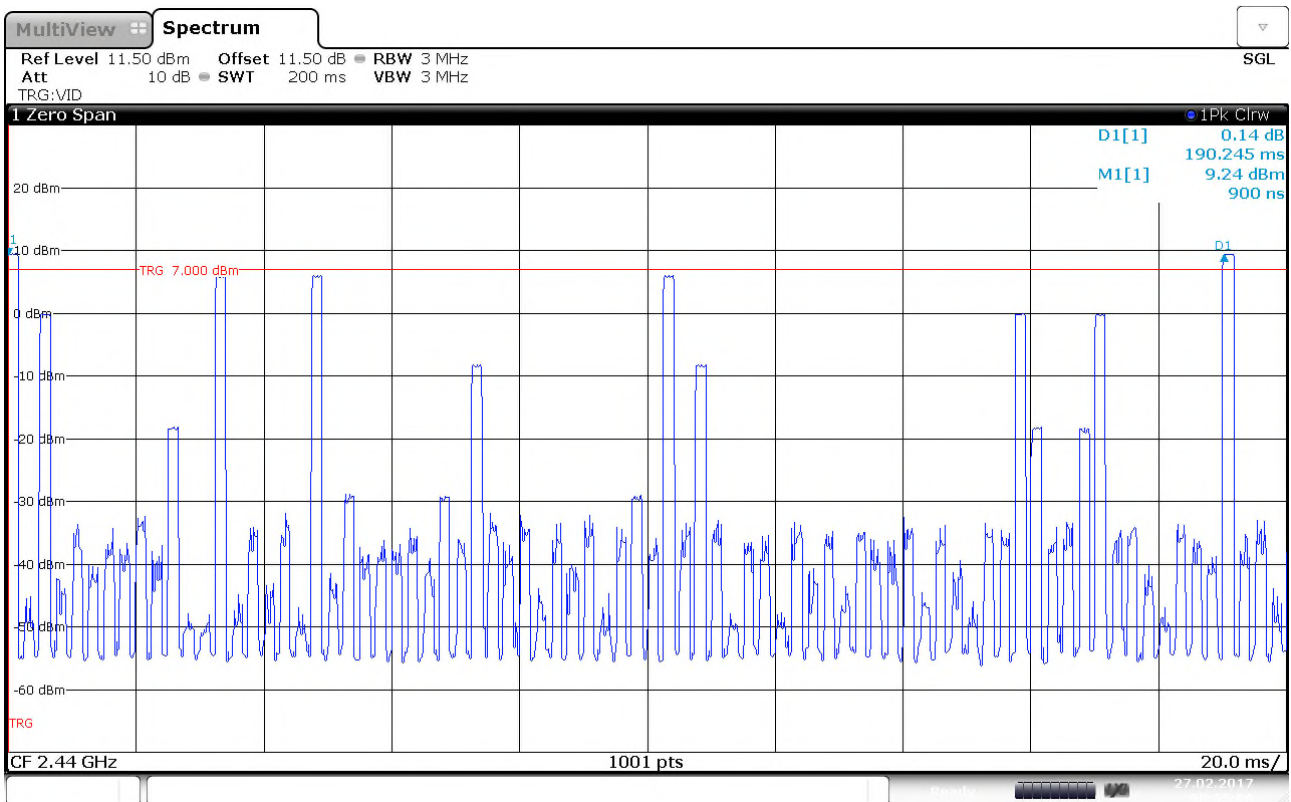
Burst Length – BR-DH5



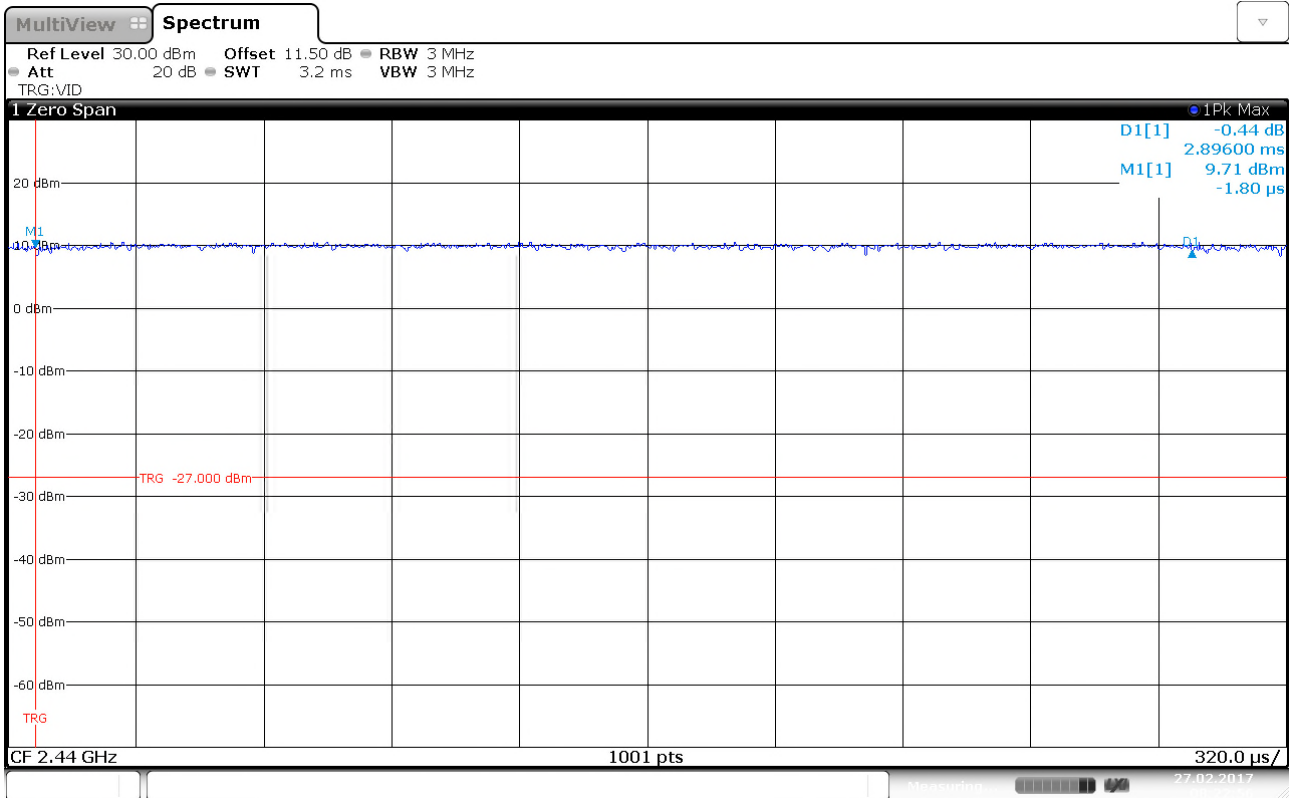
Dwell Time – BR-DH5



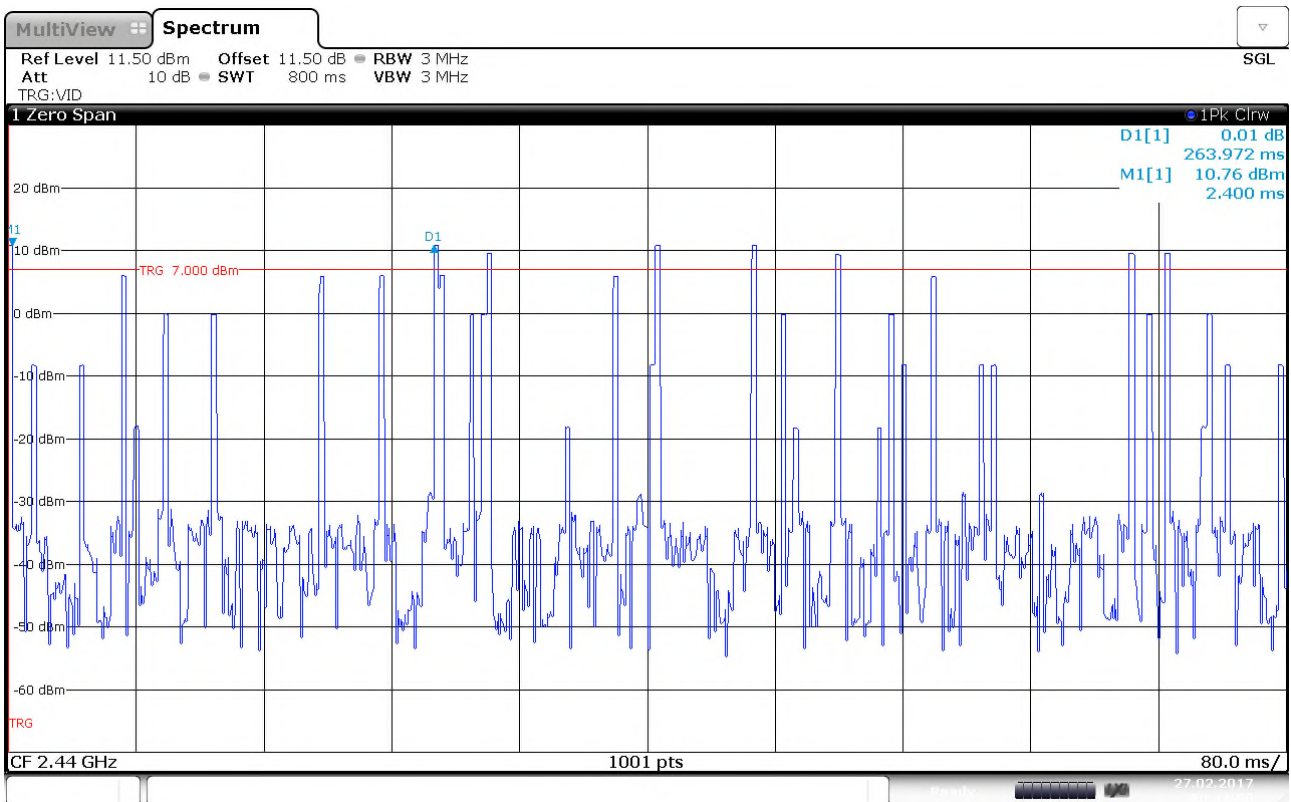
Burst Length – EDR-3DH3



Dwell Time – EDR-3DH3



Burst Length – EDR-3DH5



Dwell Time – EDR-3DH5

3.5 Occupied Bandwidth

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

Test Performed By: G.Suhanthakumar	Date of Test: 2017.01.27
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Test Results: **Complies**

Measurement Data:

Number of RF Channels in use:	79	79	79
Channel Centre Frequencies:	2402 to 2480 MHz	2402 to 2480 MHz	2402 to 2480 MHz
99% BW Measured on Centre Channel ,MHz	0.929	1.24	1.24

RF channel has no influence on 20 dB bandwidth.

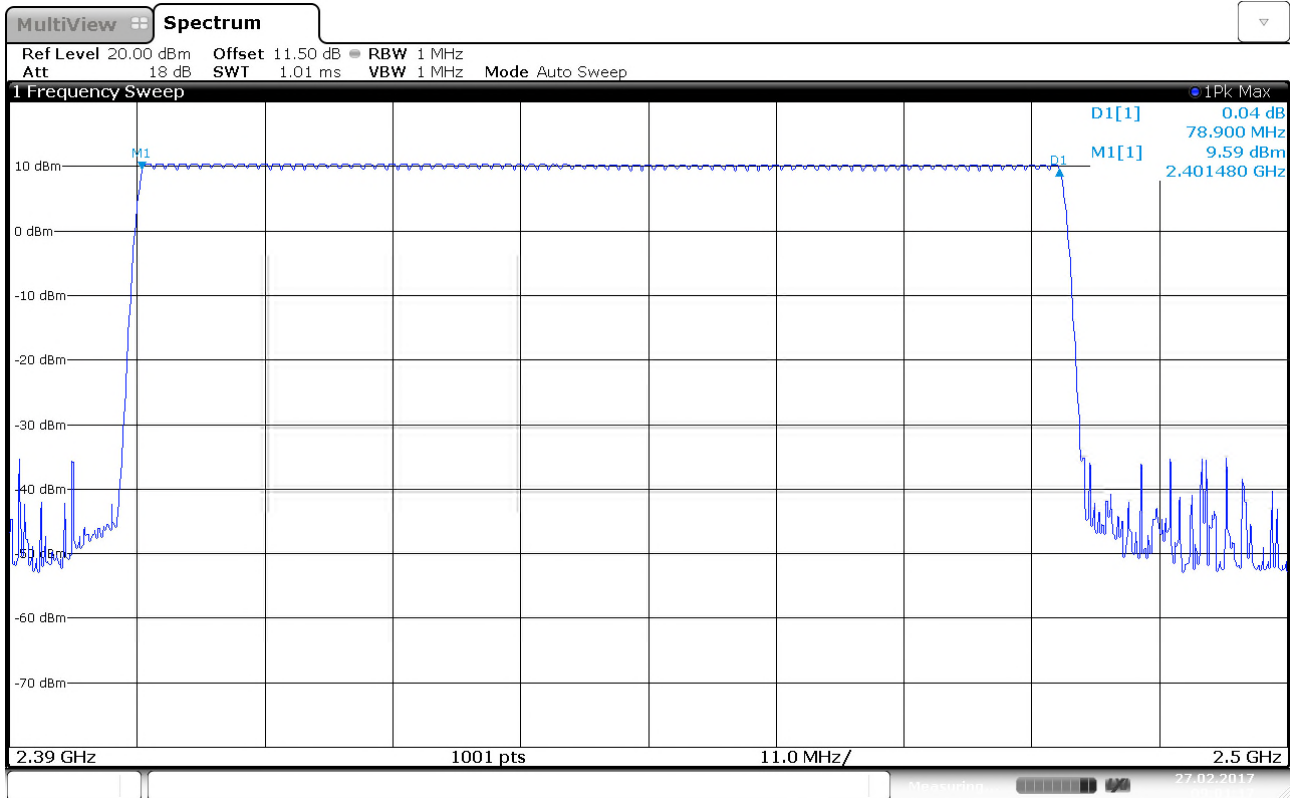
See attached plots.

Requirements:

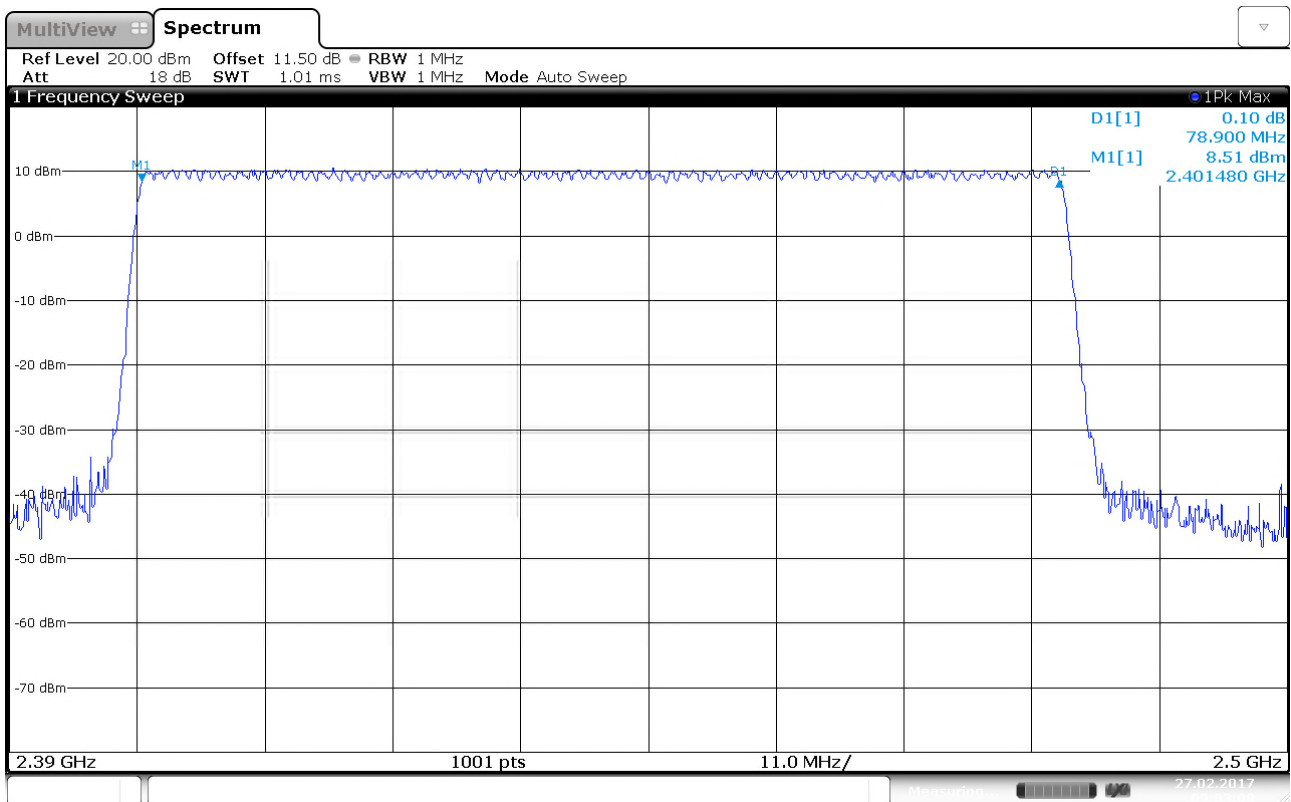
Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels. No requirements for bandwidth for this frequency band.

No requirements for Digital Transmission Systems.

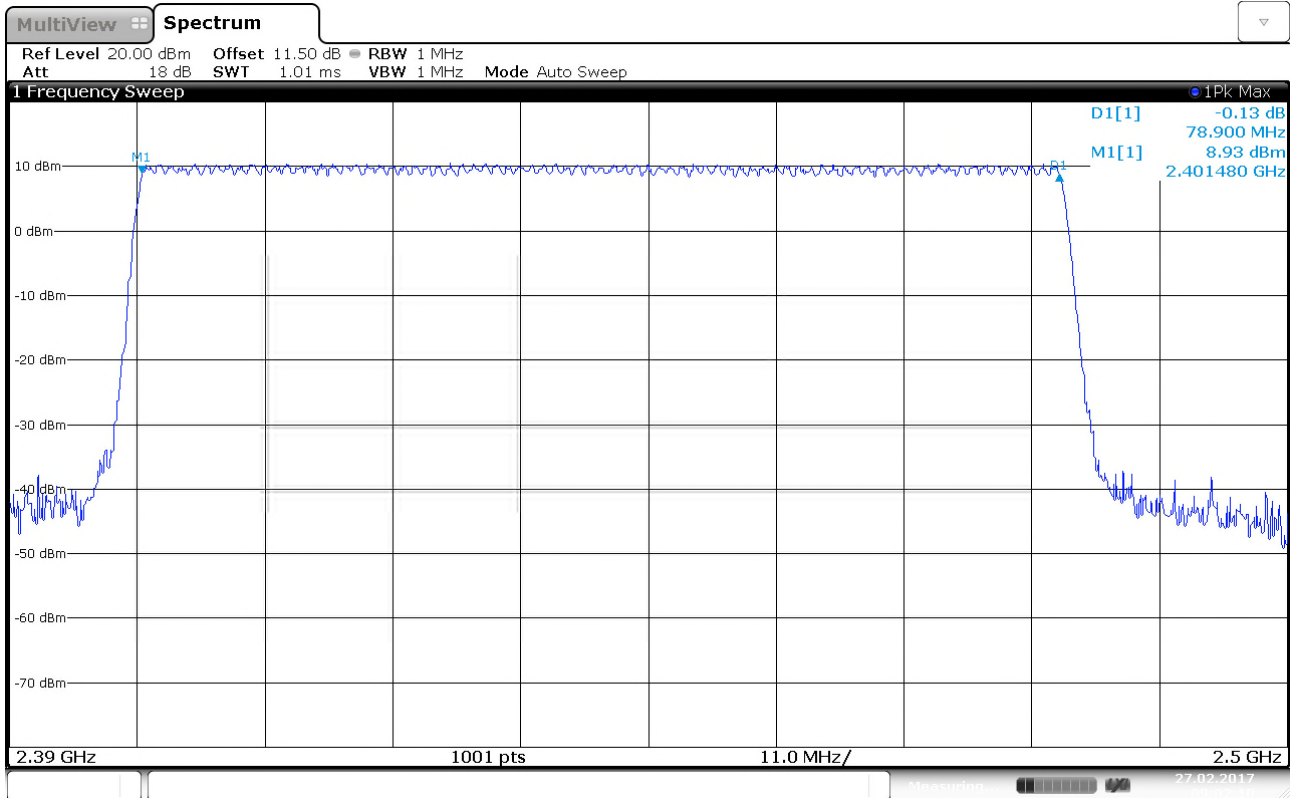
No requirement for 99% BW, reported for information only.



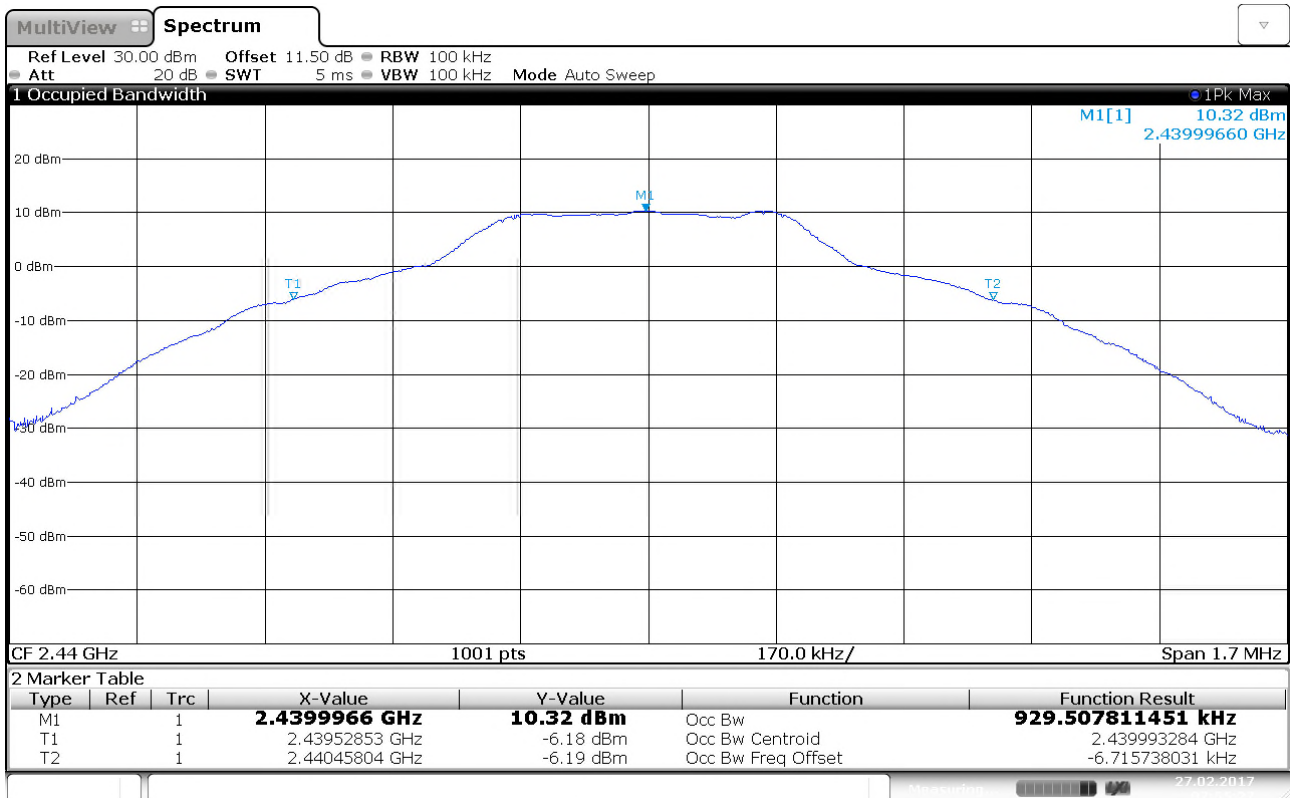
RF Channels in Use – BR-DH5



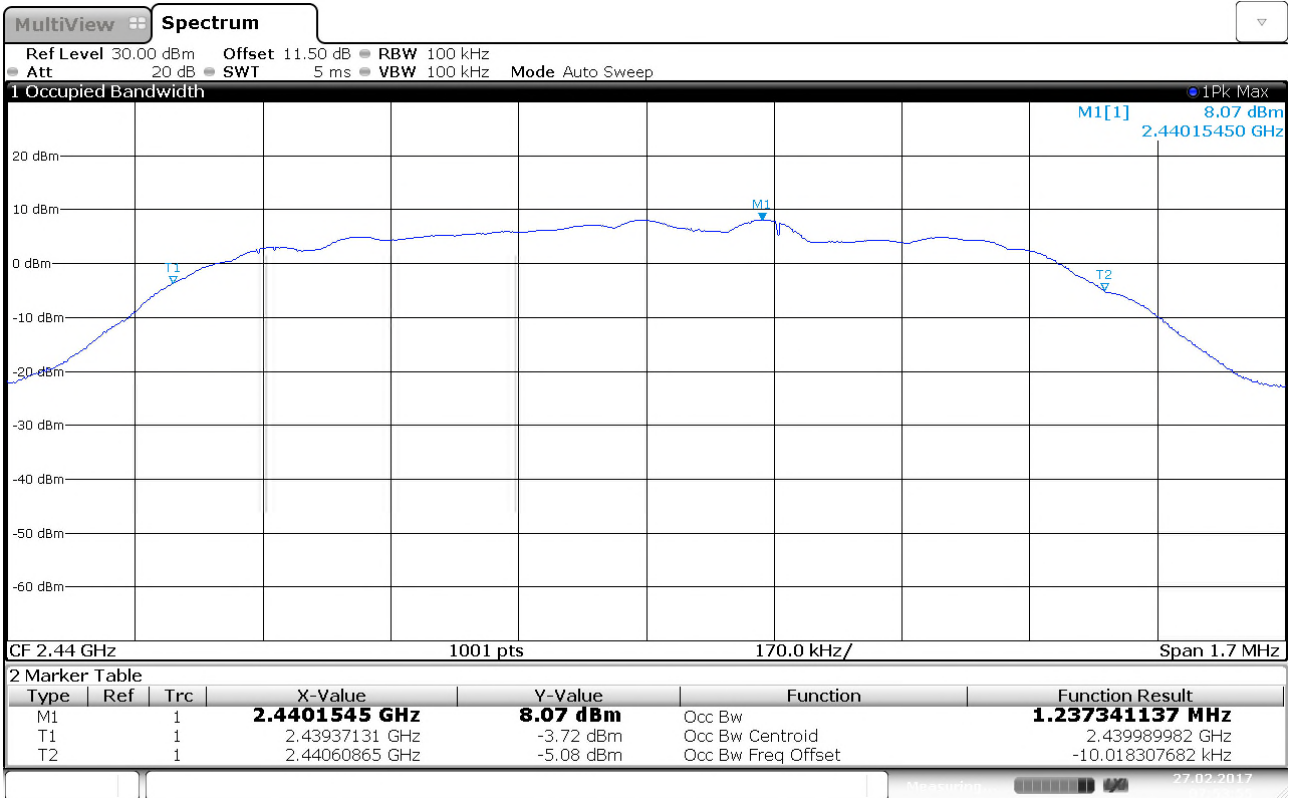
RF Channels in Use – EDR-3DH3



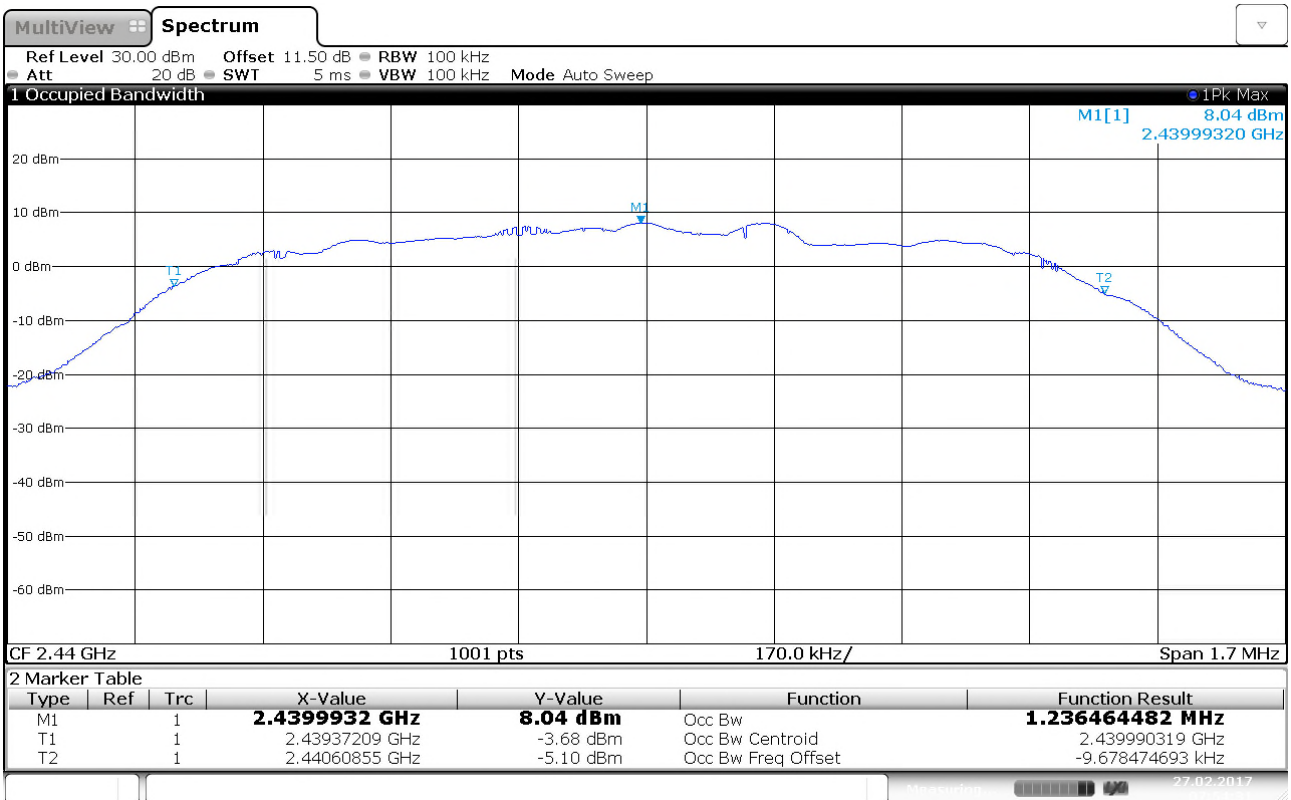
RF Channels in Use – EDR-3DH5



99% Bandwidth – BR-DH5



99% Bandwidth – EDR-3DH3



99% Bandwidth – EDR-3DH5

3.6 Peak Power Output

FCC part 15.247 (b)

Test Performed By: G.Suhanthakumar

Date of Test: 2017.02.23

Test Results: Complies

Measurement Data:

Mode		2402 MHz	2440 MHz	2480 MHz
BR-DH5	Conducted Power (dBm)	10.48	10.42	10.33
	Conducted Power (mW)	11.17	11.02	10.79
	Field Strength (dB μ V/m)	107.06	108.82	106.41
	EIRP, Calculated (mW)	15.24	22.86	13.13
	Antenna gain (dBi)	1.4	3.2	0.9
EDR-3DH3	Conducted Power (dBm)	10.63	10.48	10.46
	Conducted Power (mW)	11.56	11.17	11.12
	Field Strength (dB μ V/m)	108.46	108.39	105.54
	EIRP, Calculated (mW)	21.04	20.71	10.74
	Antenna gain (dBi)	2.6	2.7	-0.1
EDR-3DH5	Conducted Power (dBm)	10.64	10.48	10.31
	Conducted Power (mW)	11.59	11.17	10.74
	Field Strength (dB μ V/m)	106.37	107.33	104.95
	EIRP, Calculated (mW)	13.01	16.22	9.38
	Antenna gain (dBi)	0.5	1.6	-0.6

Maximum field strength is obtained in HP

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

EIRP is calculated from measured field strength by the formulas in KDB 412172 D01 Determining ERP and EIRP v01.

See attached plots.

Requirements:

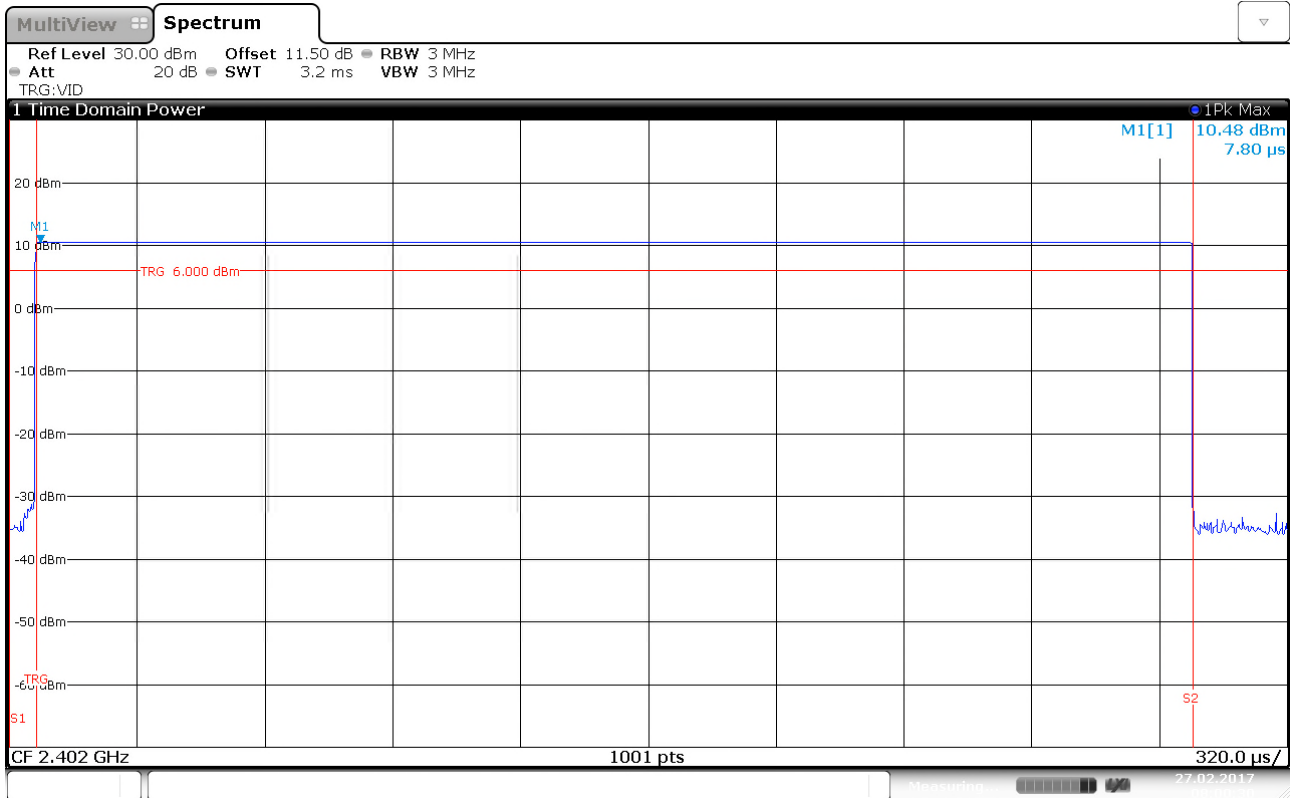
The maximum peak output power shall not exceed the following limits:

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.

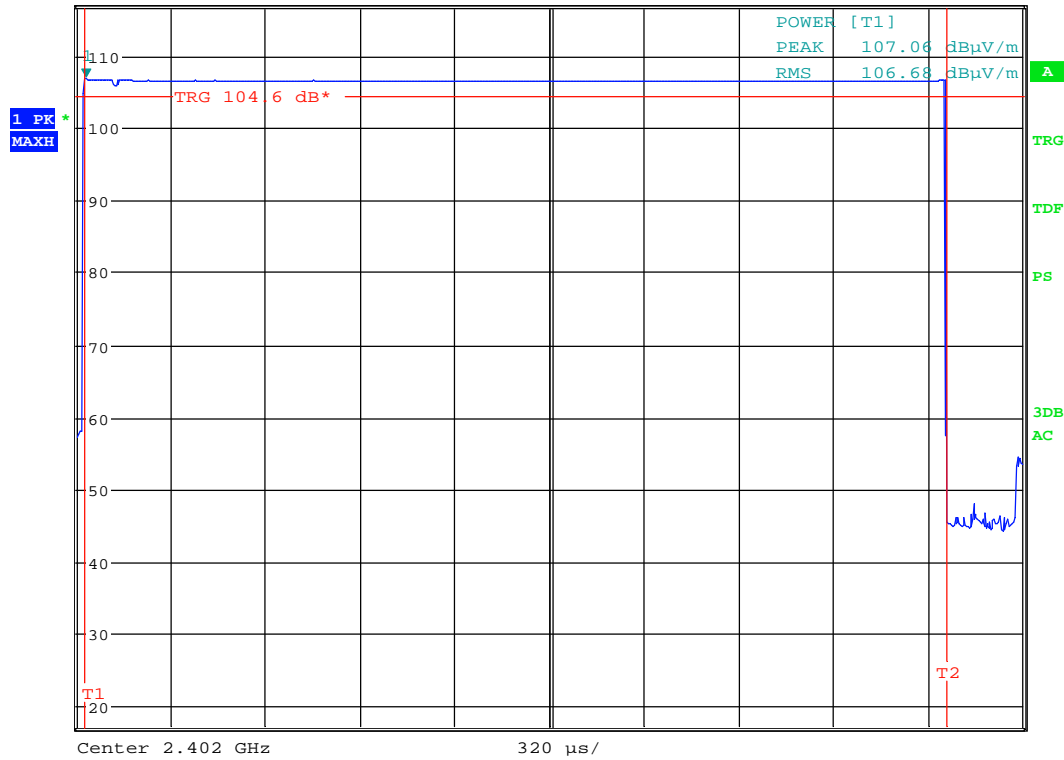


Conducted output Power, ch2402MHz , BR-DH5



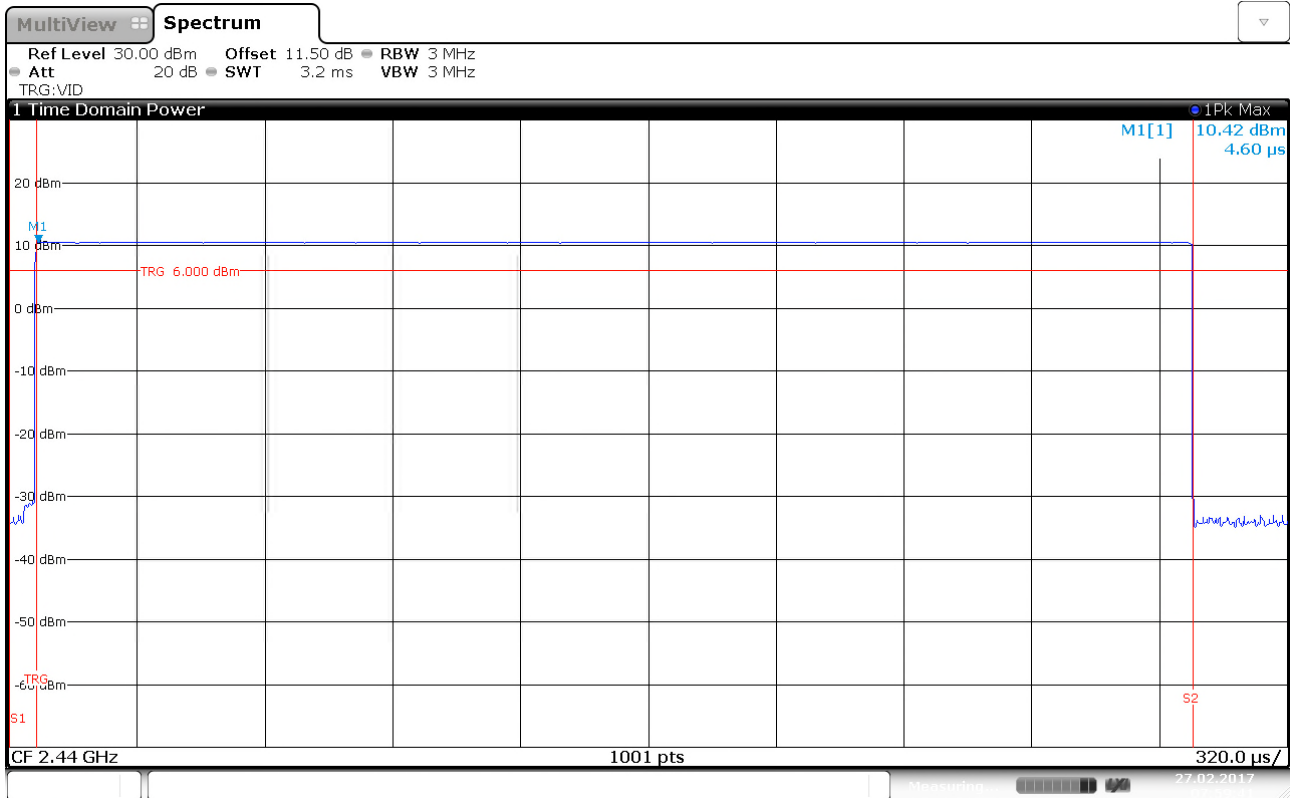
MARKER 1
 3.019230769 μ s
 Ref 117 dB μ V/m * Att 10 dB

RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 107.06 dB μ V/m
 SWT 3.2 ms 3.019231 μ s



Date: 23.FEB.2017 09:51:51

Radiated field strength-HP, ch2402MHz , BR-DH5



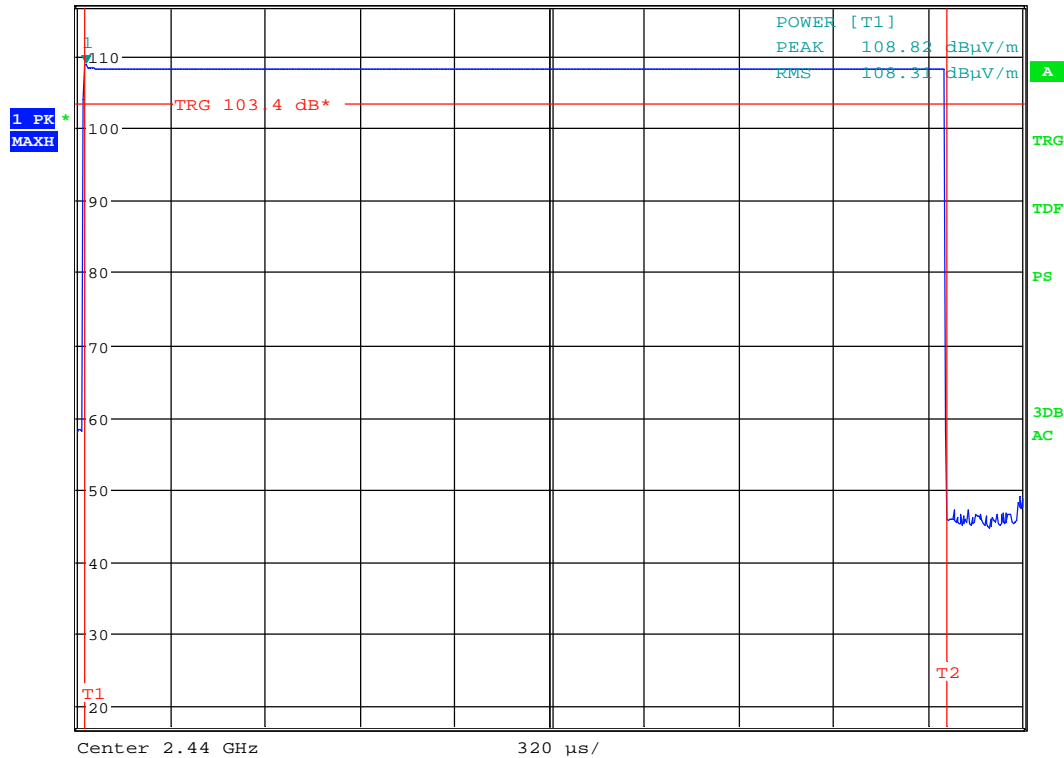
Conducted output Power, ch2440MHz , BR-DH5



MARKER 1
 3.019230769 μ s

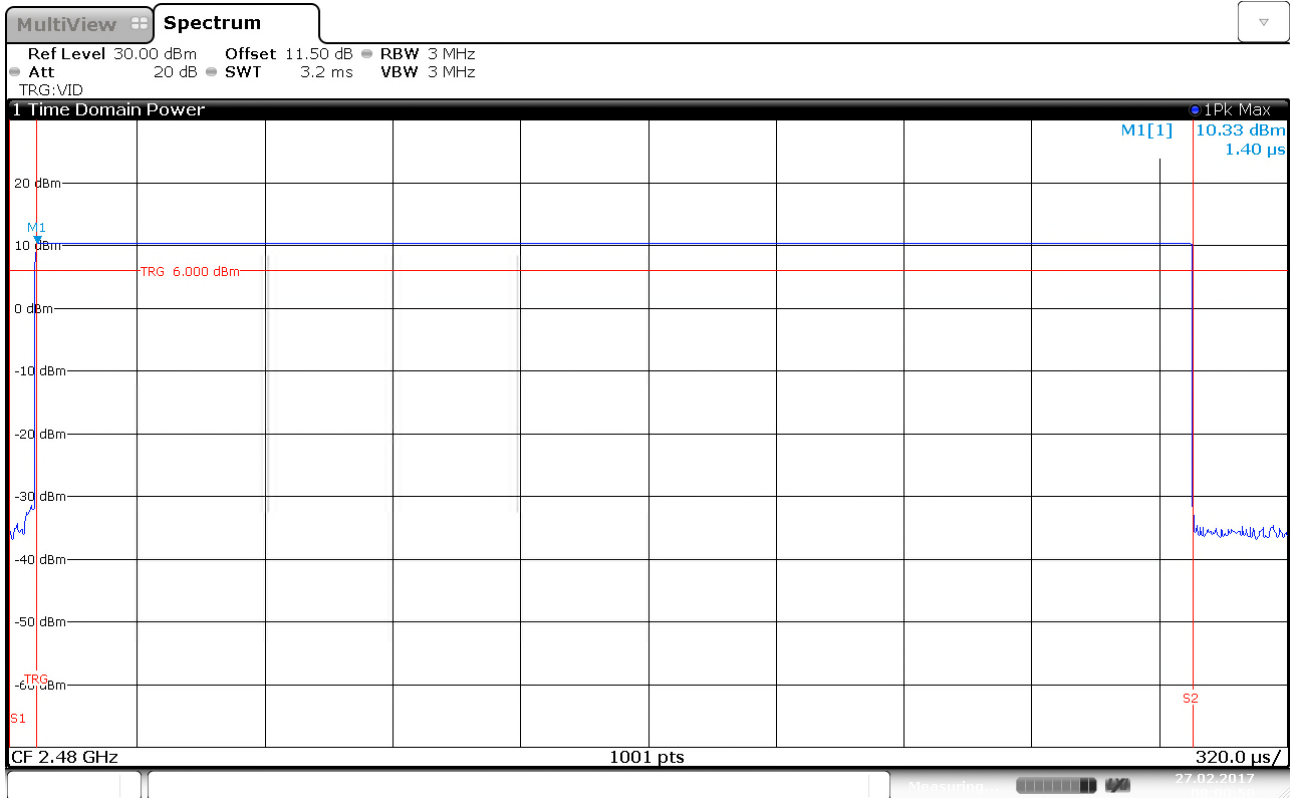
RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 108.82 dB μ V/m
 SWT 3.2 ms 3.019231 μ s

Ref 117 dB μ V/m *Att 10 dB



Date: 23.FEB.2017 10:13:49

Radiated field strength-HP, ch2440MHz , BR-DH5

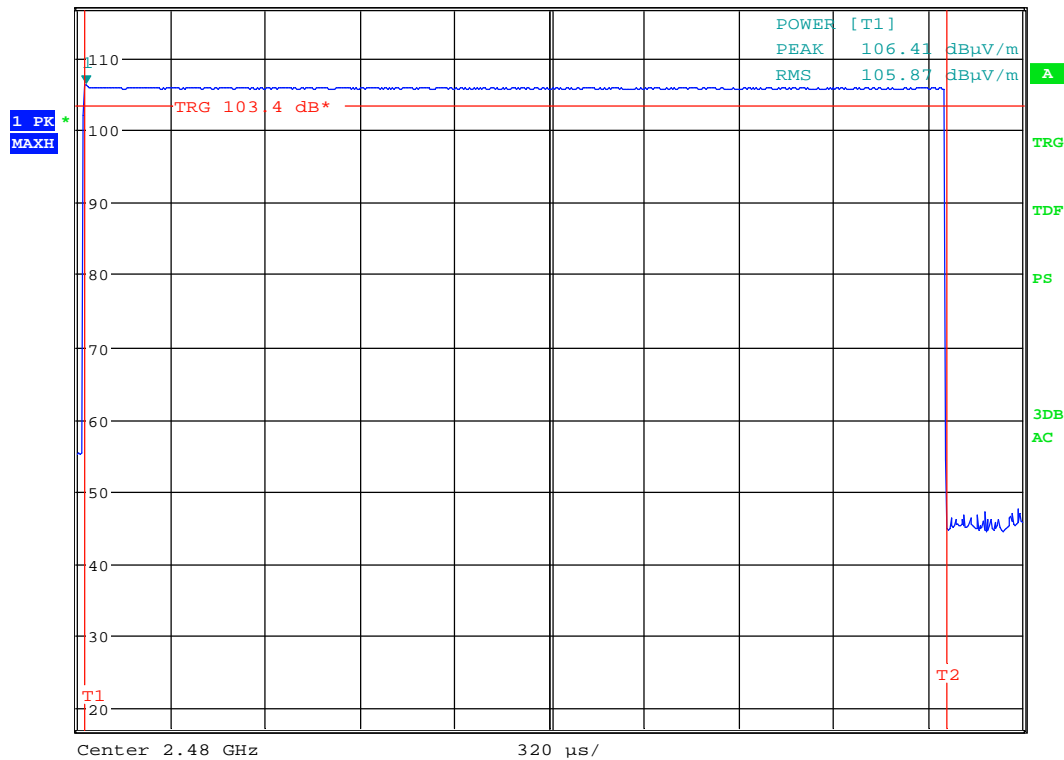


Conducted output Power, ch2480MHz , BR-DH5



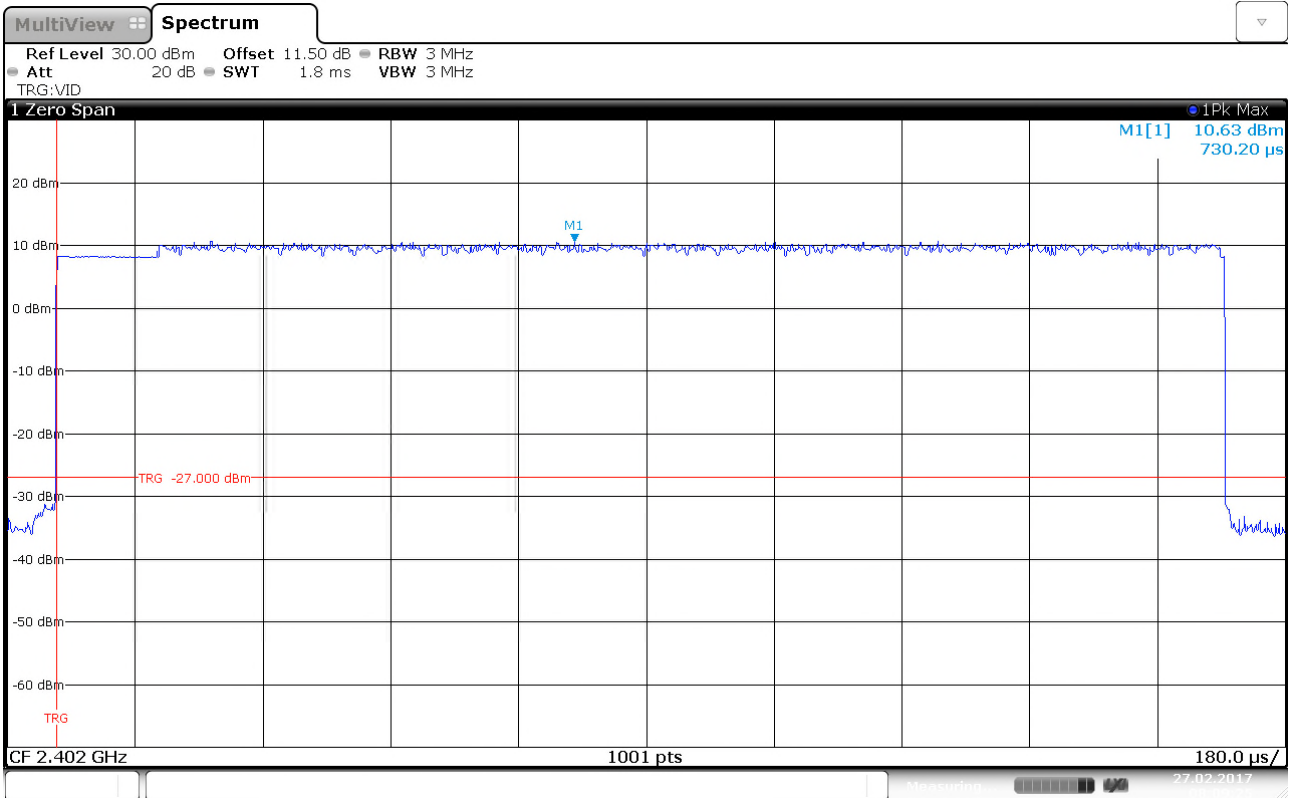
MARKER 1
 3.019230769 μ s
 Ref 117 dB μ V/m * Att 10 dB

RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 106.41 dB μ V/m
 SWT 3.2 ms 3.019231 μ s



Date: 23.FEB.2017 10:14:16

Radiated field strength-HP, ch2480MHz , BR-DH5



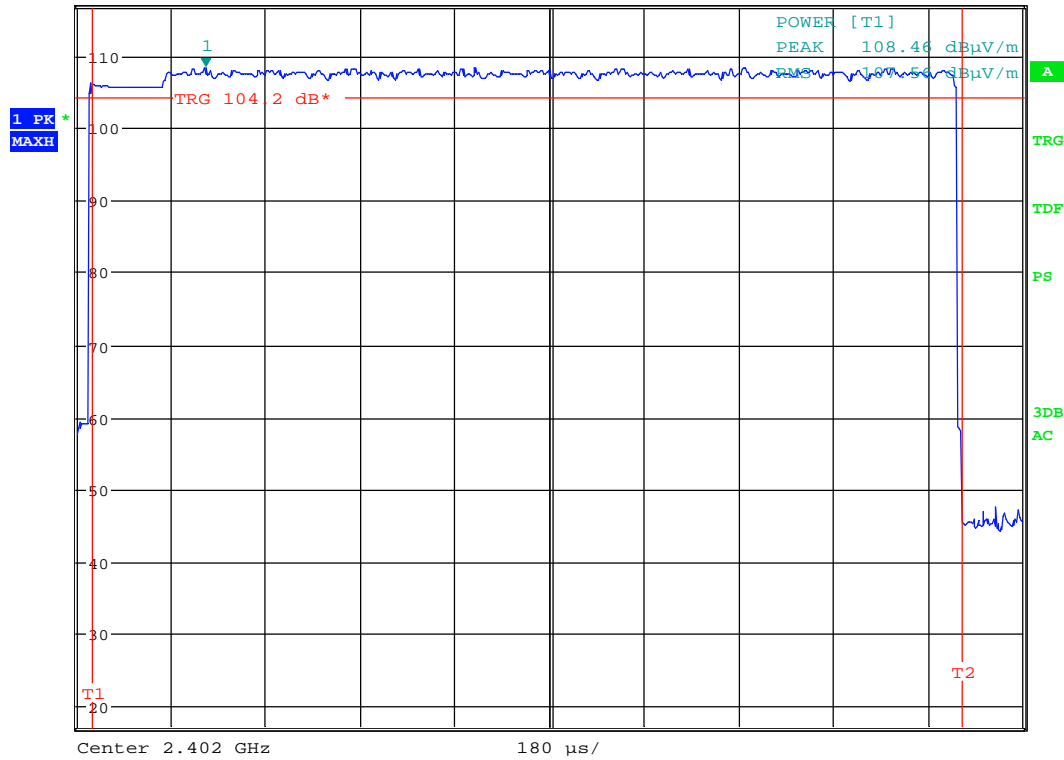
Conducted output Power, ch2402MHz , EDR-3DH3



MARKER 1
 217.4423077 μ s

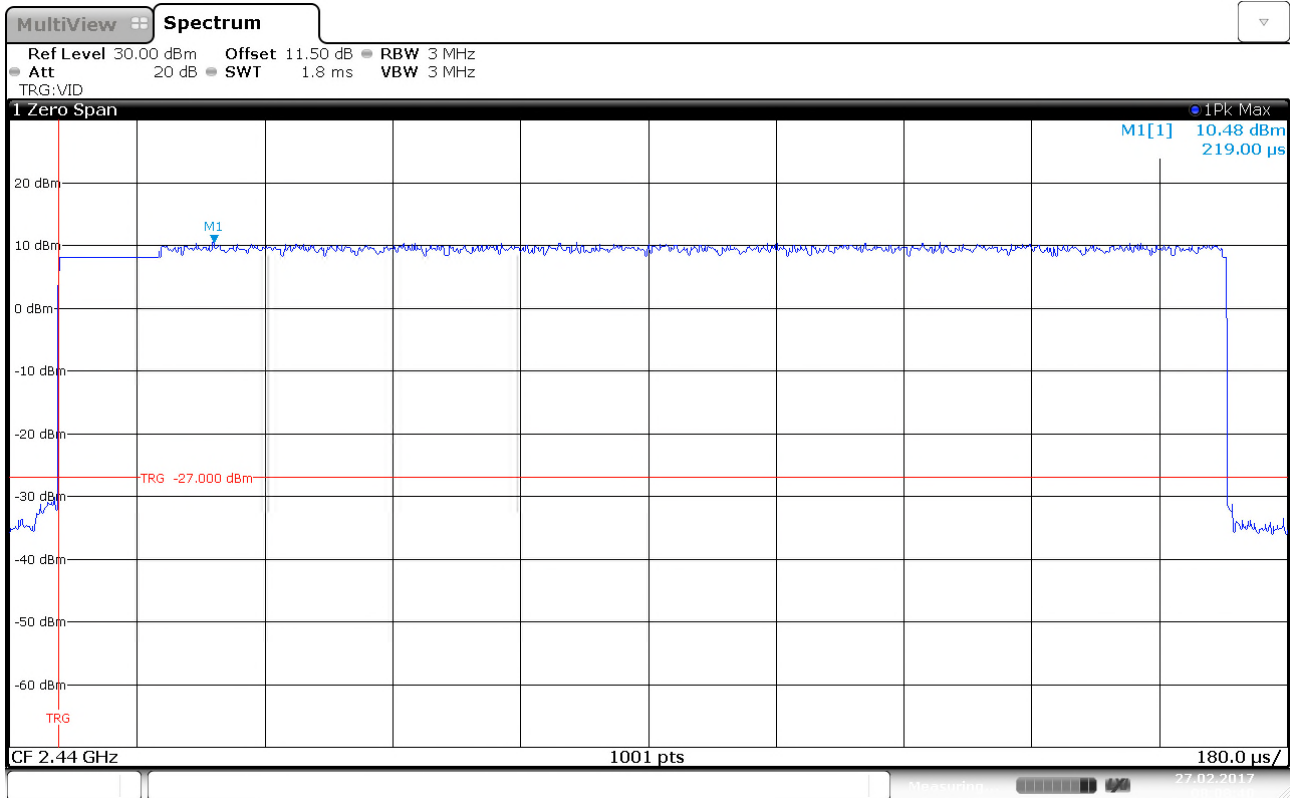
RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 108.46 dB μ V/m
 SWT 1.8 ms 217.442308 μ s

Ref 117 dB μ V/m *Att 10 dB



Date: 23.FEB.2017 10:35:28

Radiated field strength-HP, ch2402MHz , EDR-3DH3



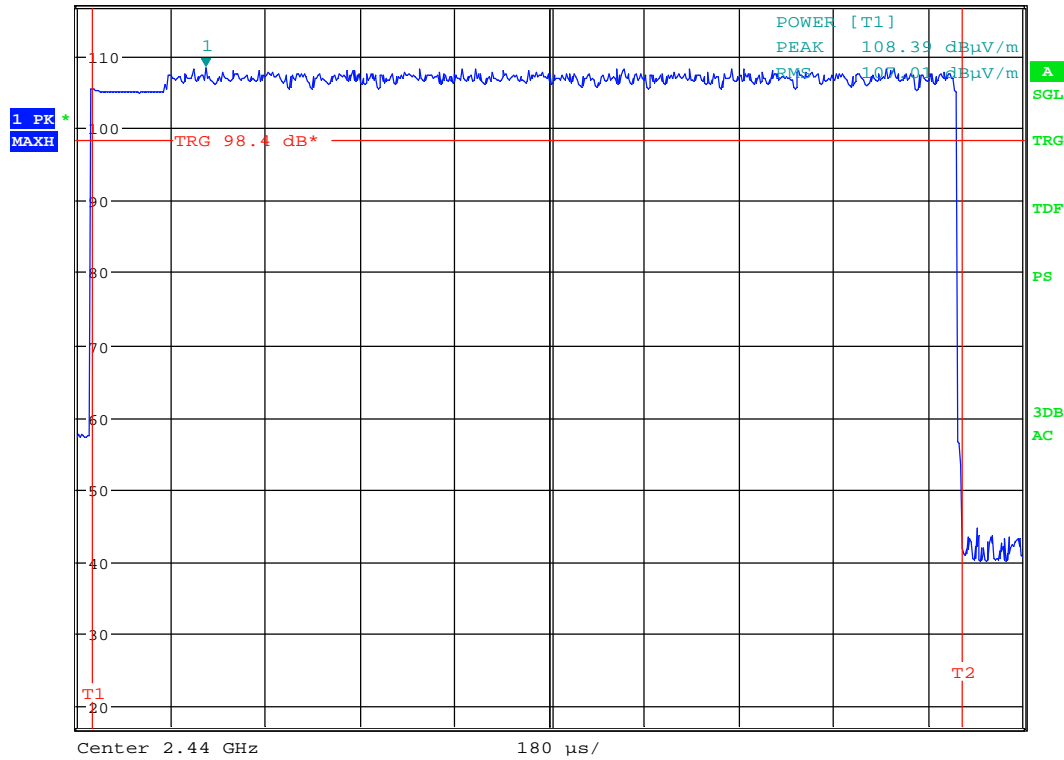
Conducted output Power, ch2440MHz , EDR-3DH3



MARKER 1
 217.4423077 μ s

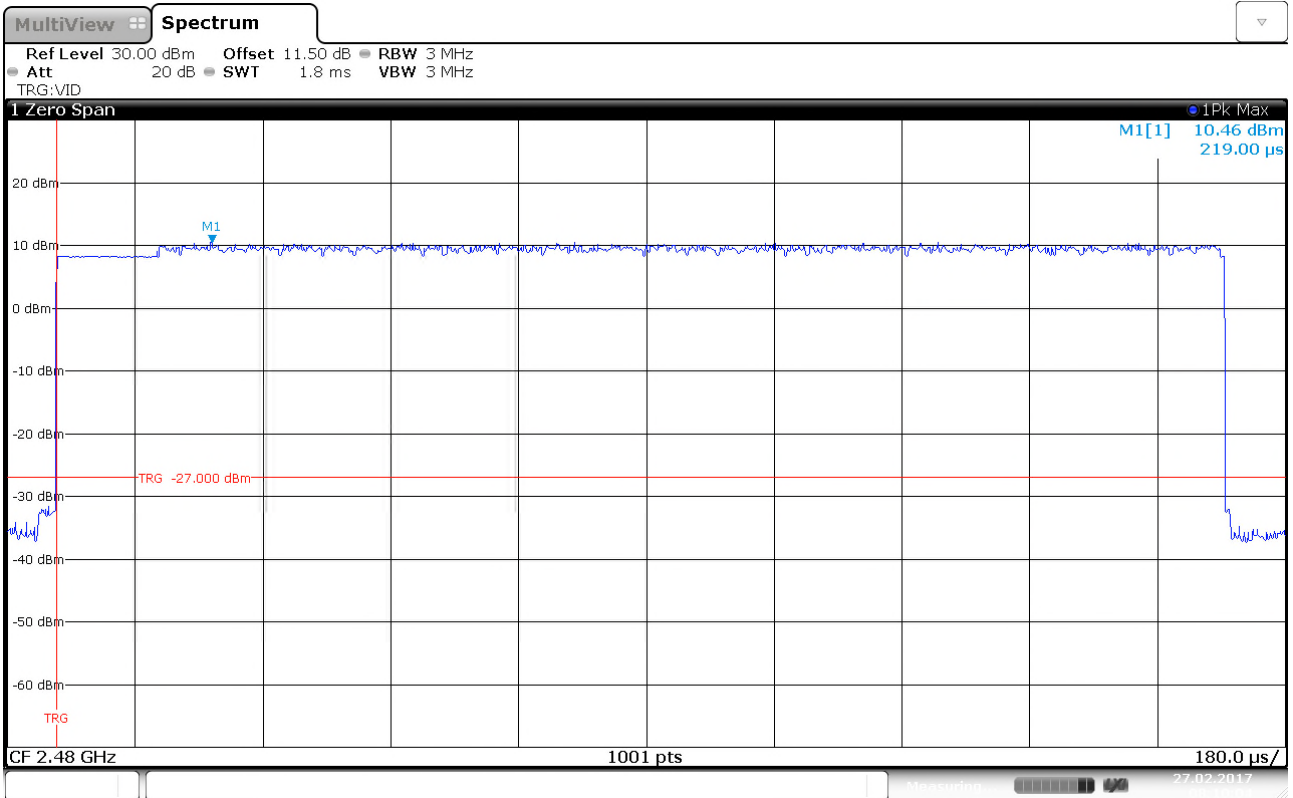
RBW 3 MHz
 VBW 10 MHz
 SWT 1.8 ms

Marker 1 [T1]
 108.39 dB μ V/m
 217.442308 μ s



Date: 23.FEB.2017 10:37:02

Radiated field strength-HP, ch2440MHz , EDR-3DH3

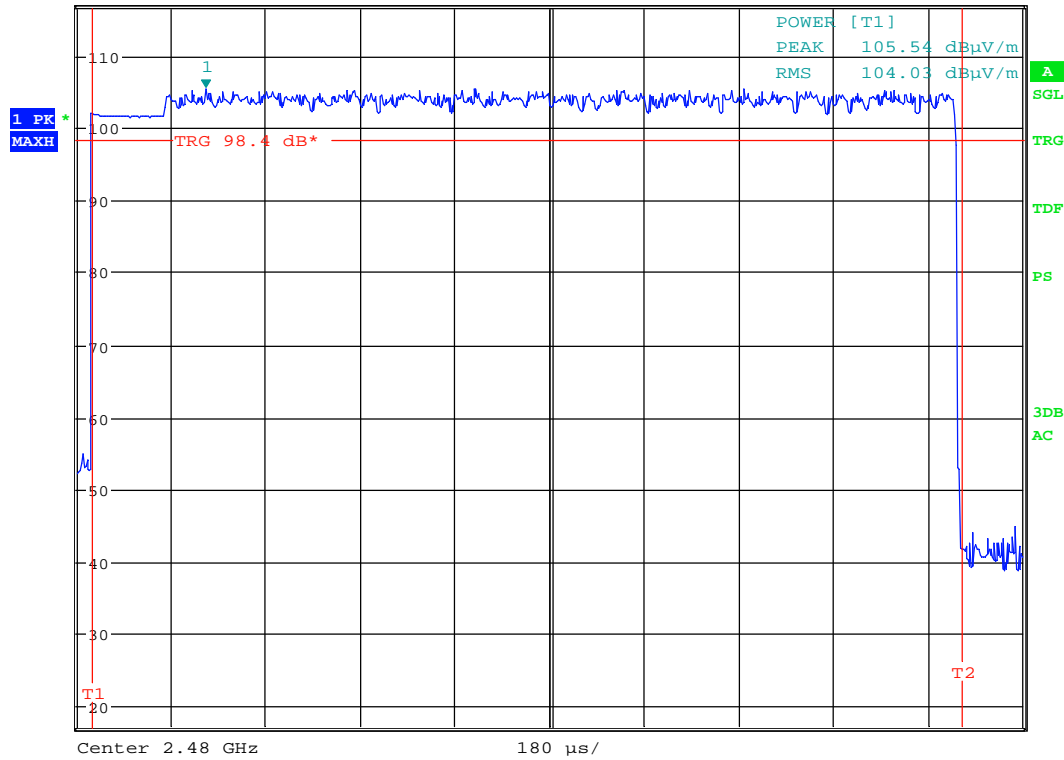


Conducted output Power, ch2480MHz , EDR-3DH3



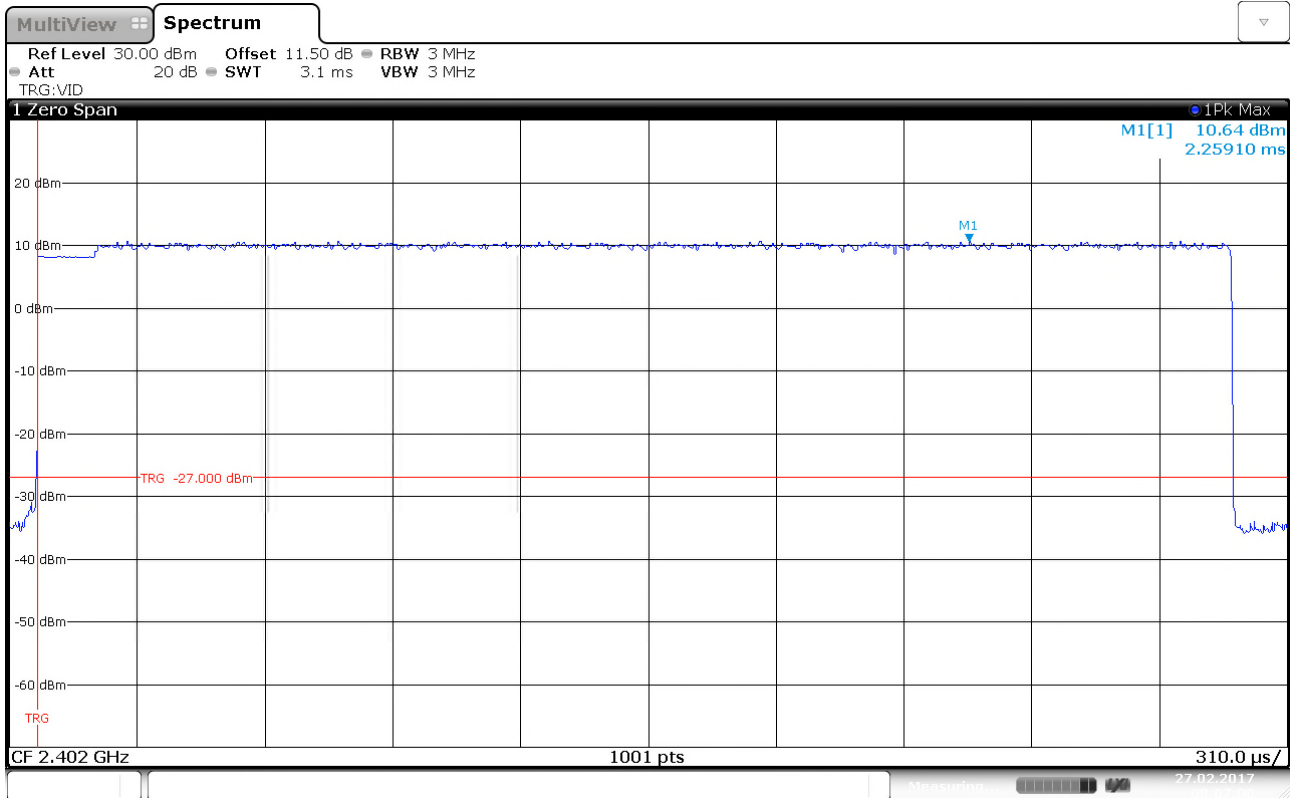
MARKER 1
 217.4423077 μ s
 Ref 117 dB μ V/m *Att 10 dB

RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 105.54 dB μ V/m
 SWT 1.8 ms 217.442308 μ s



Date: 23.FEB.2017 10:38:41

Radiated field strength-HP, ch2480MHz , EDR-3DH3

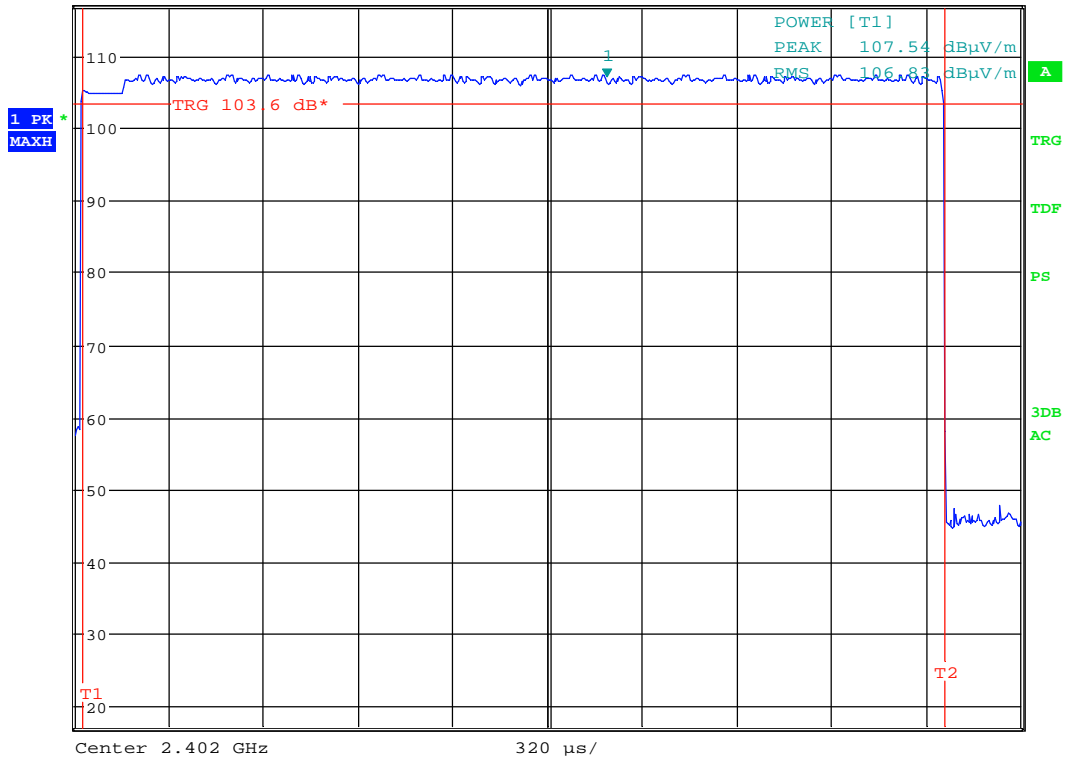


Conducted output Power, ch2402MHz , EDR-3DH5



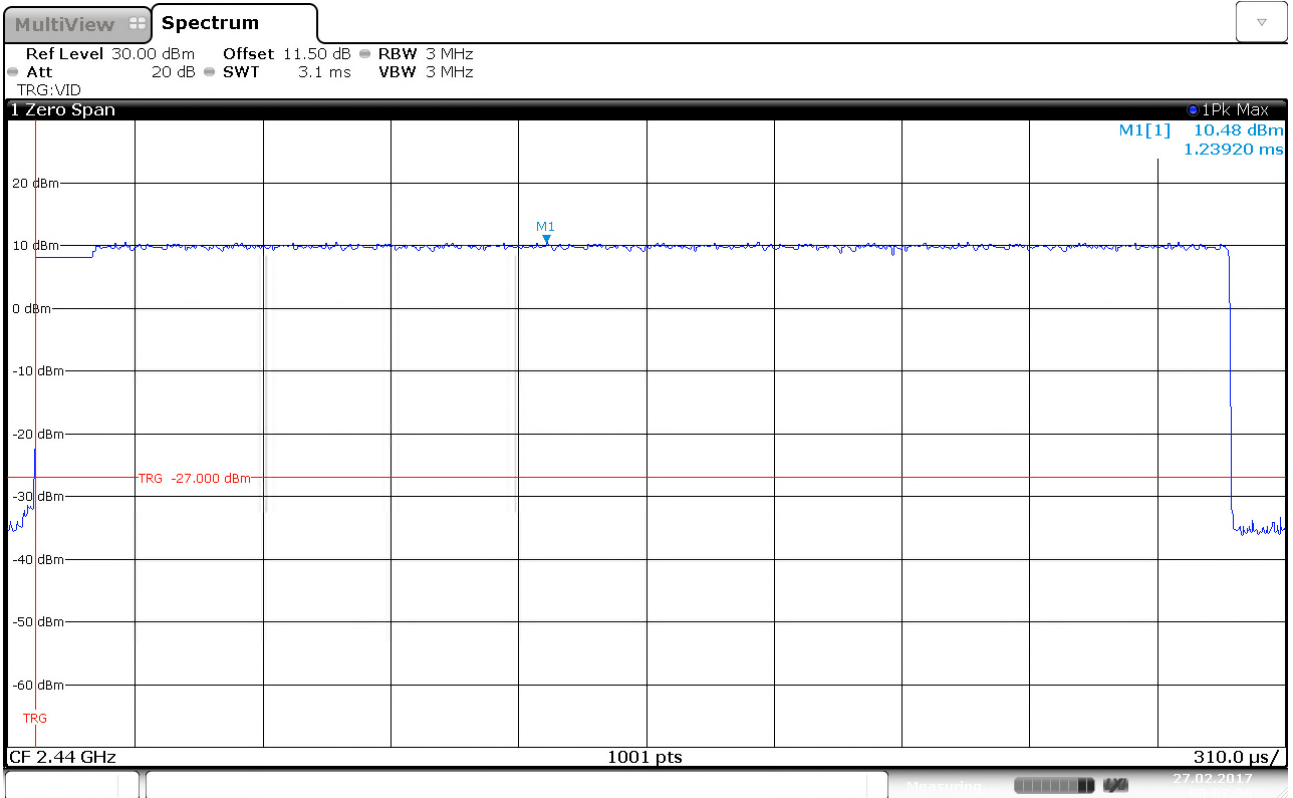
RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 106.97 dBμV/m
 SWT 3.2 ms 1.772250 ms

Ref 117 dBμV/m *Att 10 dB



Date: 23.FEB.2017 11:07:34

Radiated field strength-HP, ch2402MHz , EDR-3DH5

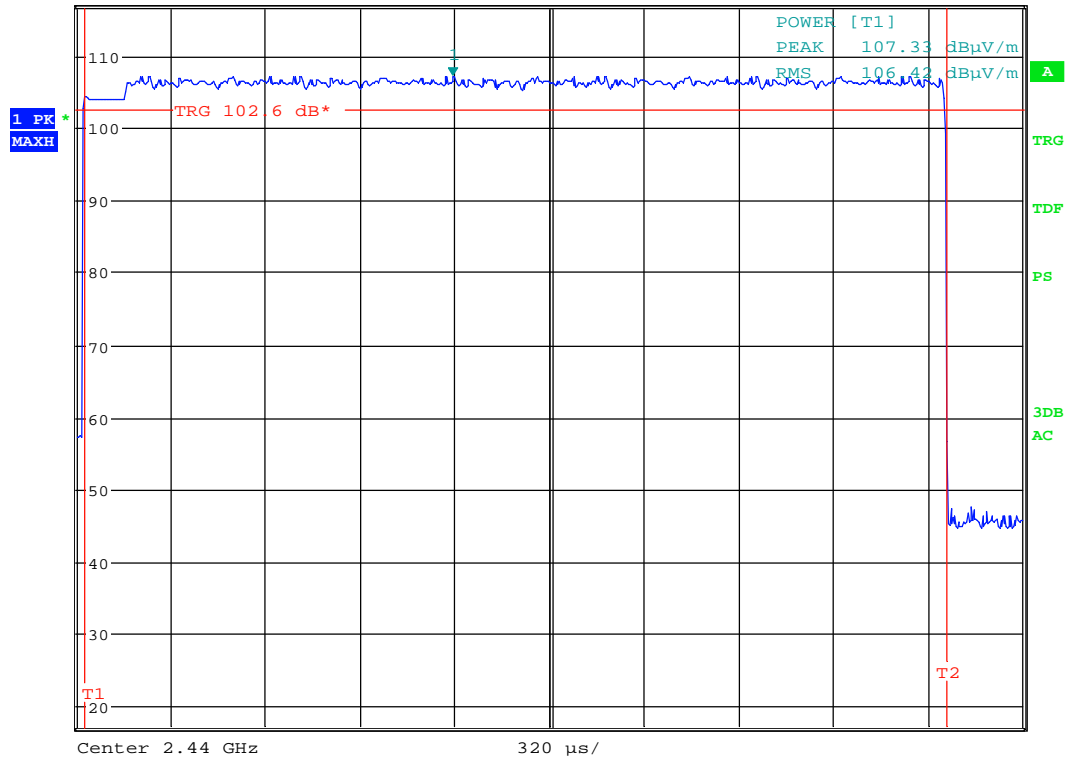


Conducted output Power, ch2440MHz , EDR-3DH5



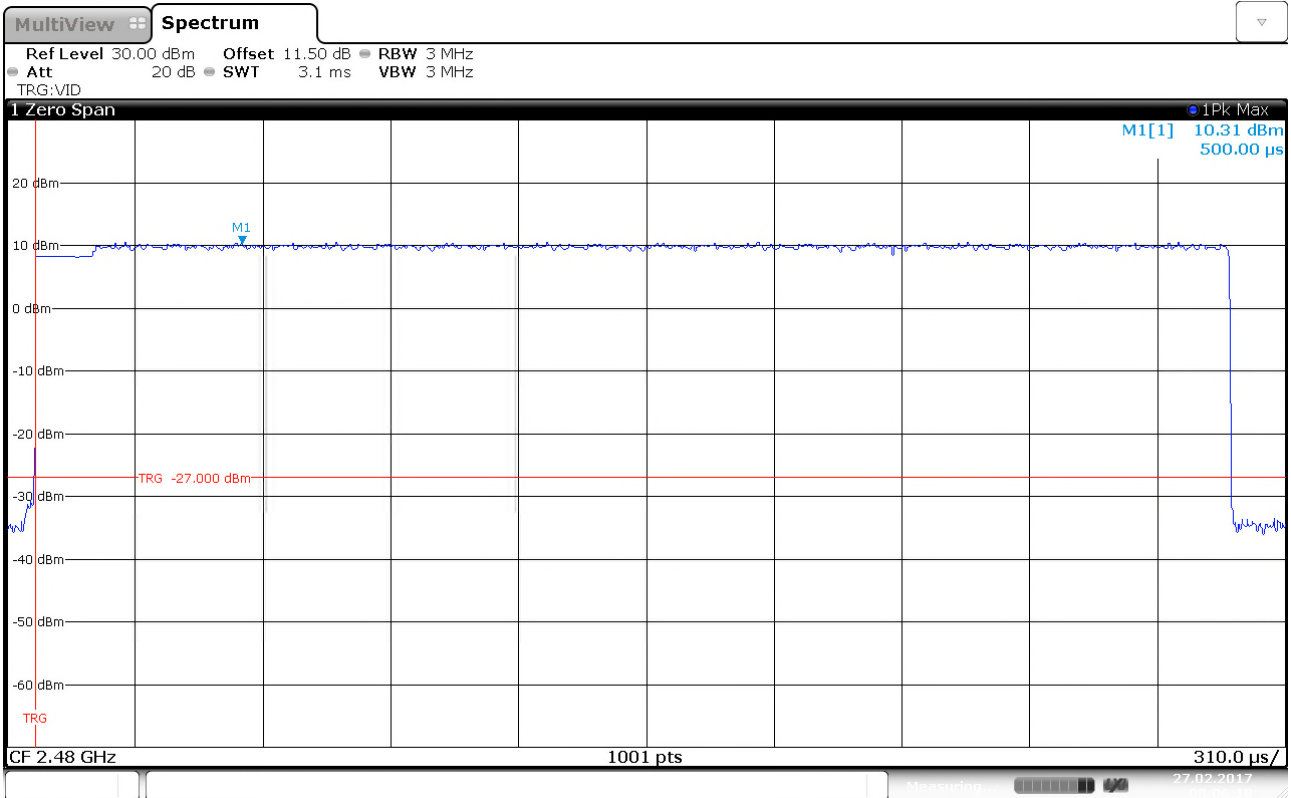
MARKER 1
 1.244044872 ms
 Ref 117 dBμV/m *Att 10 dB

RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 107.33 dBμV/m
 SWT 3.2 ms 1.244045 ms



Date: 23.FEB.2017 11:08:15

Radiated field strength-HP, ch2440MHz , EDR-3DH5

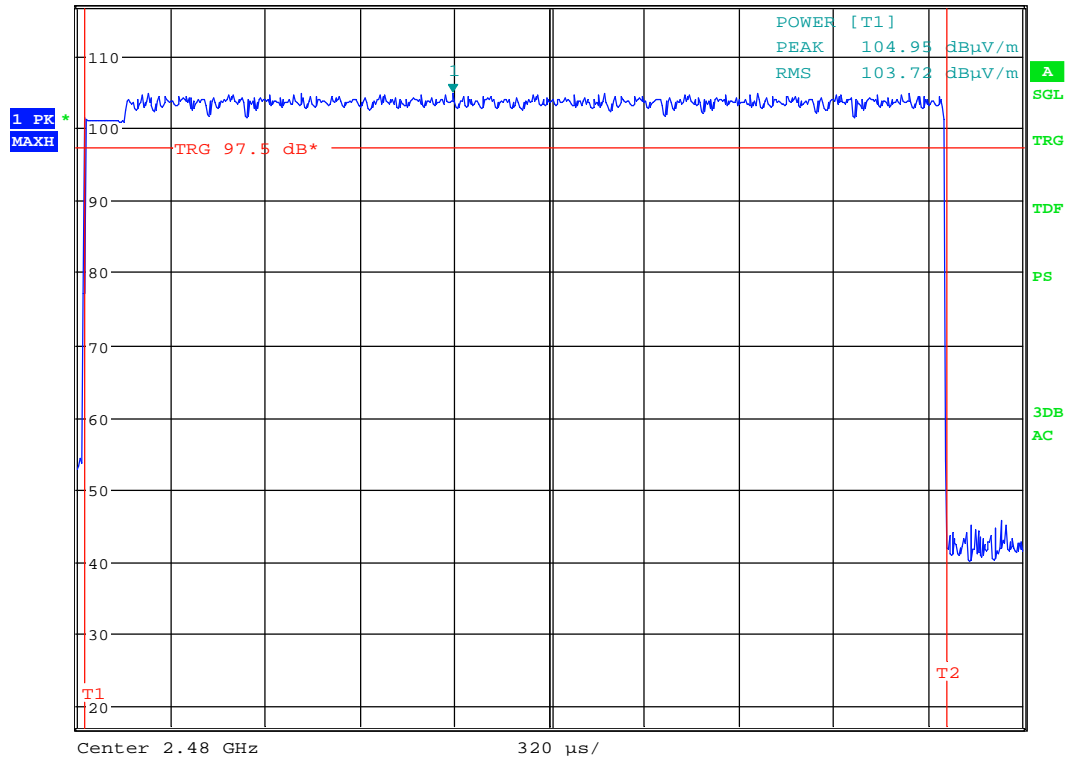


Conducted output Power, ch2480MHz , EDR-3DH5



MARKER 1
 1.244044872 ms
 Ref 117 dBμV/m * Att 10 dB

RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 104.95 dBμV/m
 SWT 3.2 ms 1.244045 ms



Date: 23.FEB.2017 11:09:35

Radiated field strength-HP, ch2480MHz , EDR-3DH5

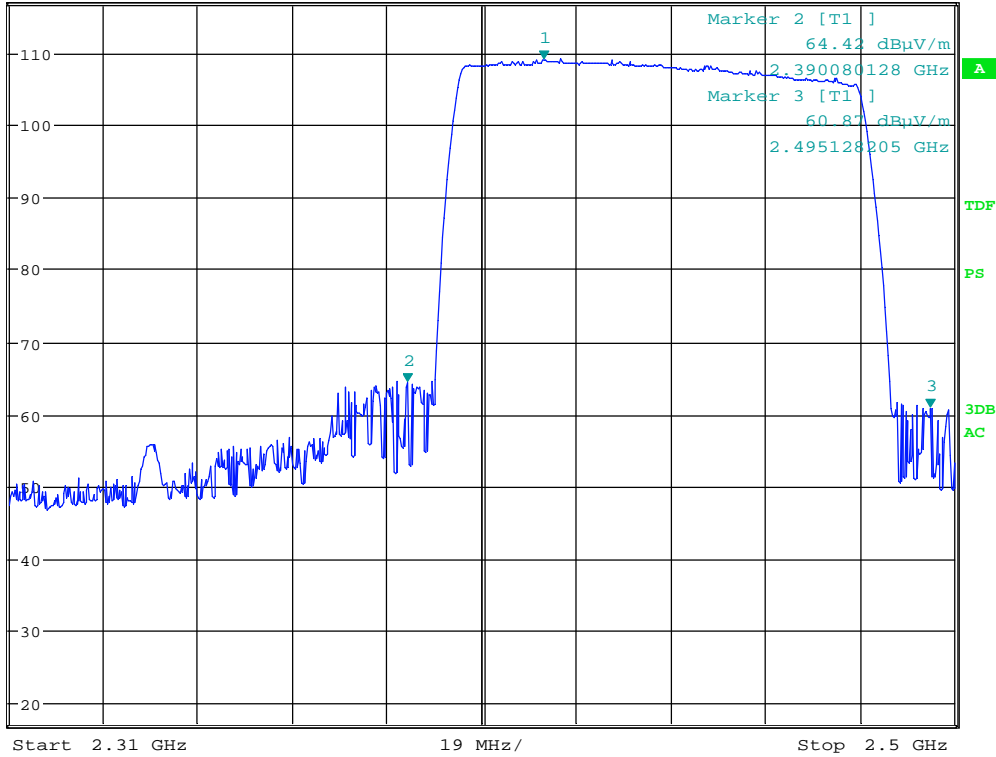


MARKER 1
 2.417483974 GHz

*RBW 3 MHz Marker 1 [T1]
 VBW 10 MHz 109.19 dBμV/m
 SWT 2.5 ms 2.417483974 GHz

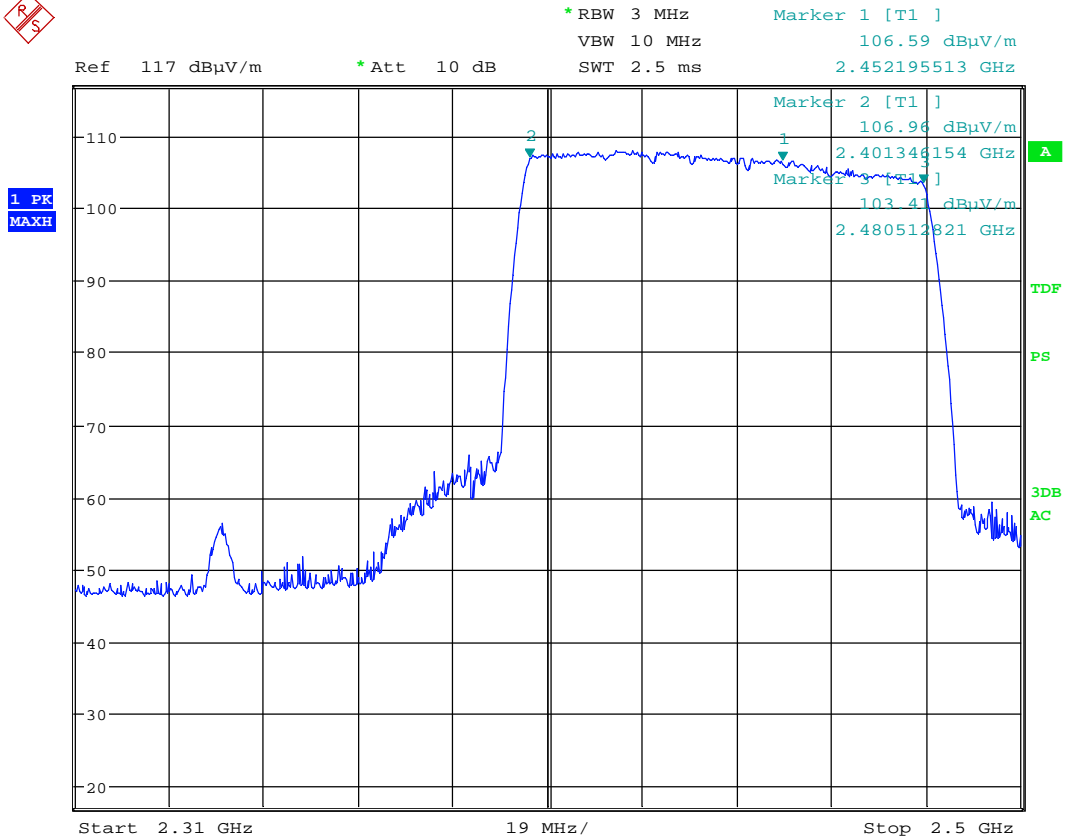
Ref 117 dBμV/m *Att 10 dB

1 PK
 MAXH



Date: 23.FEB.2017 10:19:07

Radiated field strength-HP, In hopping mode , BR-DH5



Date: 23.FEB.2017 11:00:47

Radiated field strength-HP, In hopping mode , EDR-3DH3



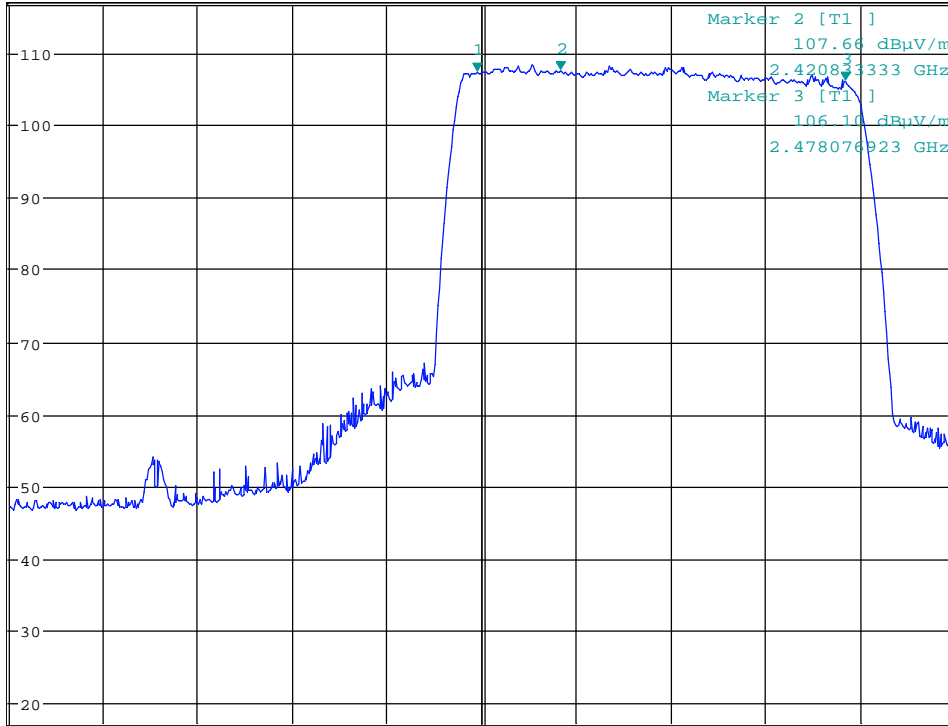
MARKER 1
 2.404166667 GHz

*RBW 3 MHz
 VBW 10 MHz
 SWT 2.5 ms

Marker 1 [T1]
 107.49 dBμV/m
 2.404166667 GHz

Ref 117 dBμV/m *Att 10 dB

1 PK
 MAXH



Start 2.31 GHz 19 MHz/ Stop 2.5 GHz

Date: 23.FEB.2017 12:39:53

Radiated field strength-HP, In hopping mode , EDR-3DH5

3.7 Conducted Emissions at Antenna Connector

Para. No.: 15.247 (d)

Test Performed By: G.Suhanthakumar	Date of Test: 2017.02.27
---	---------------------------------

RF conducted power to 25 GHz see attached plots.

Maximum RF level outside operating band:

RF in hpping mode , BR-DH5: 51 dB/C, margin >20 dB

RF in hpping mode , EDR-3DH3: 52 dB/C, margin >20 dB

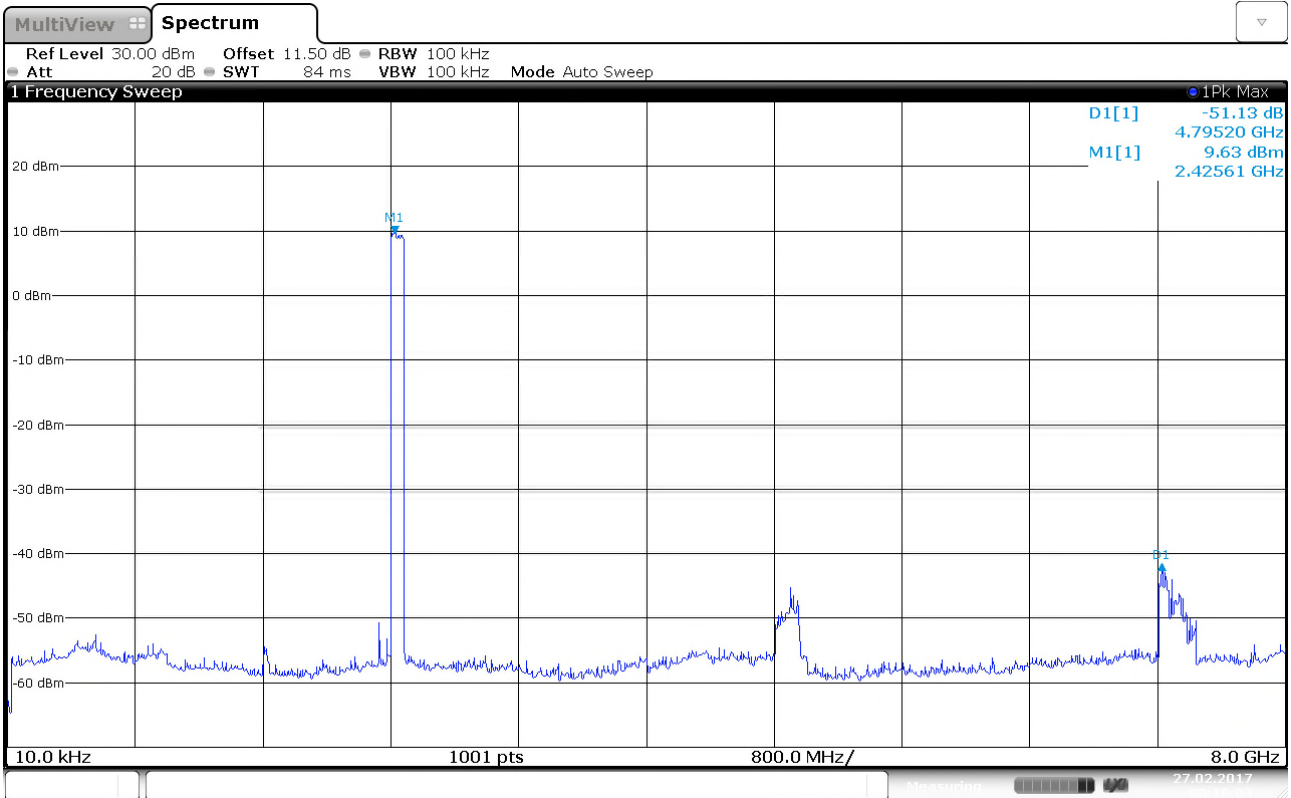
RF in hpping mode , EDR-3DH5: 49 dB/C, margin >20 dB

Limit

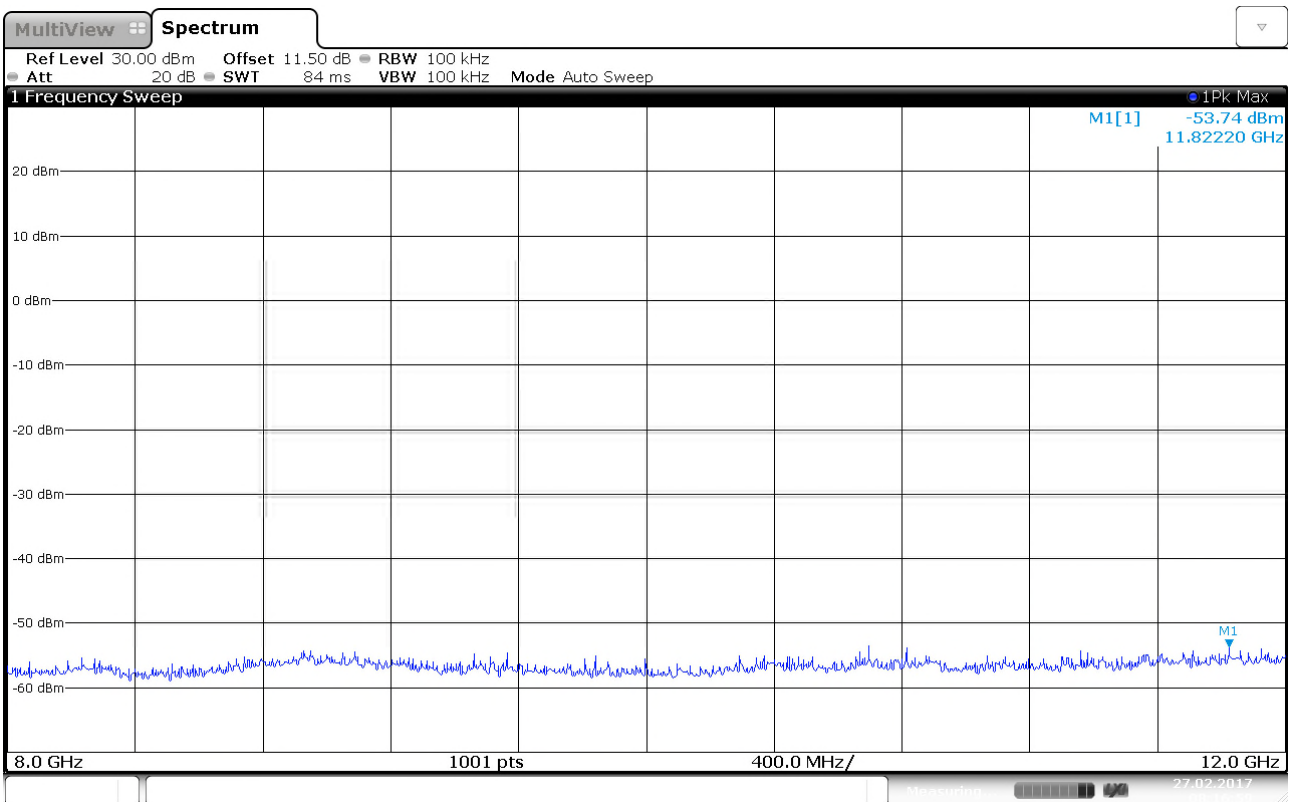
Peak measurement	RMS averaging
20 dBc or more in 100 kHz bandwidth	30 dBc or more in 100 kHz bandwidth

Detector type shall be the same as used for measuring Output Power.

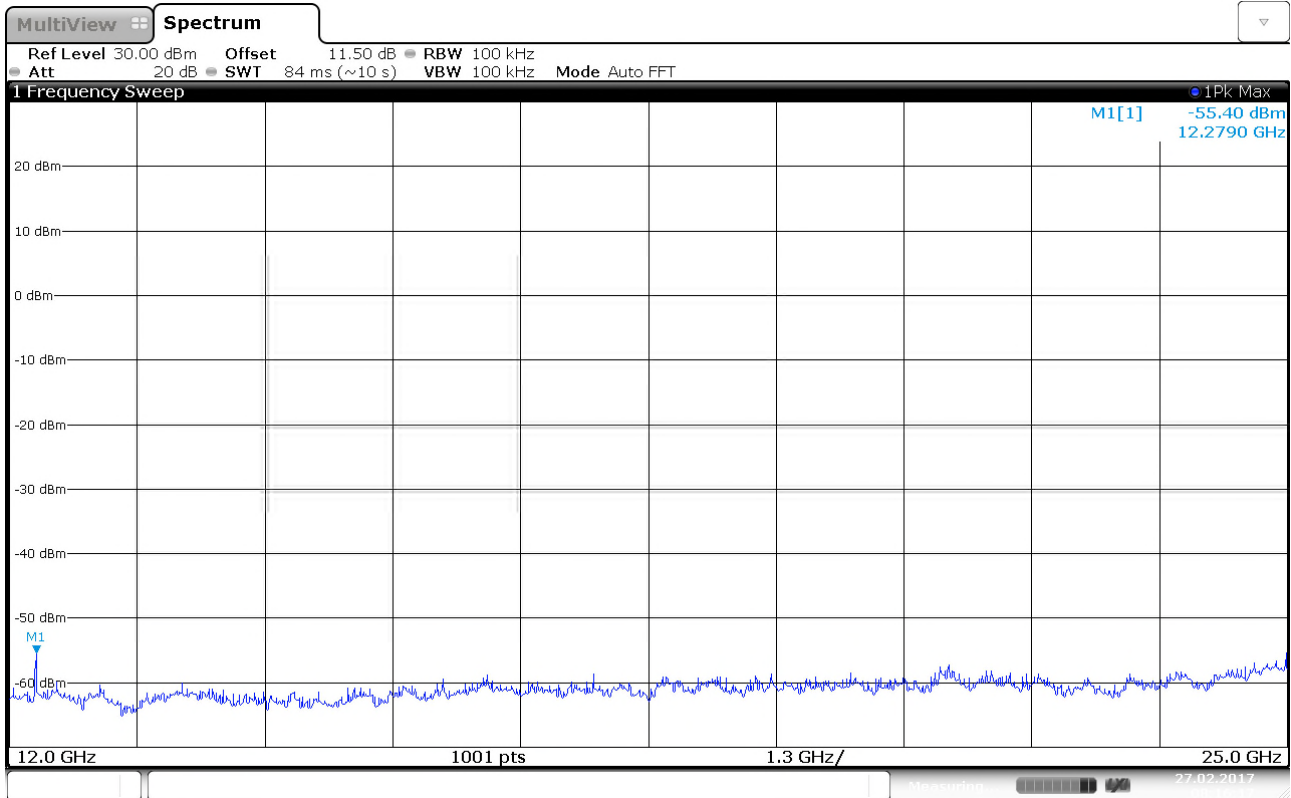
Attenuation below the general limits specified in part 15.209(a) is not required.



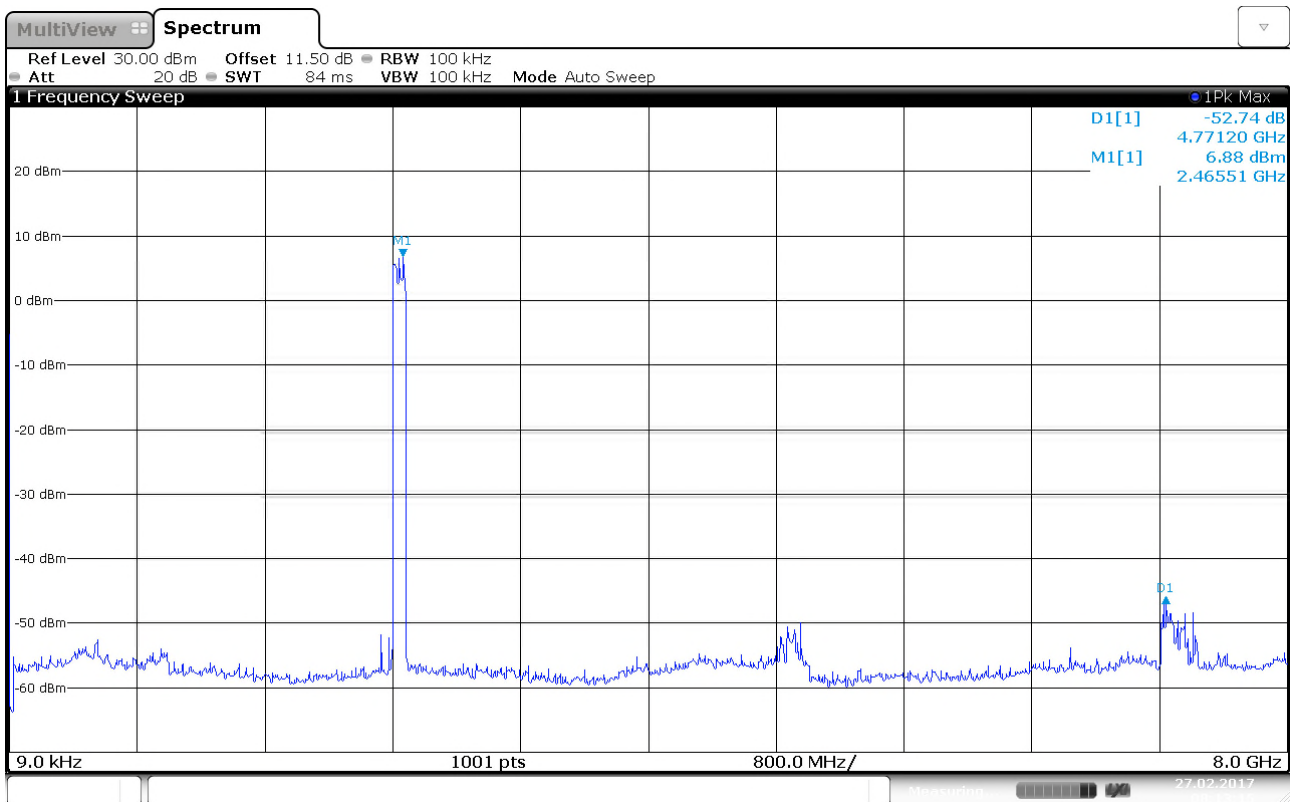
Conducted spurious emissions 10kHz – 8GHz , BR-DH5



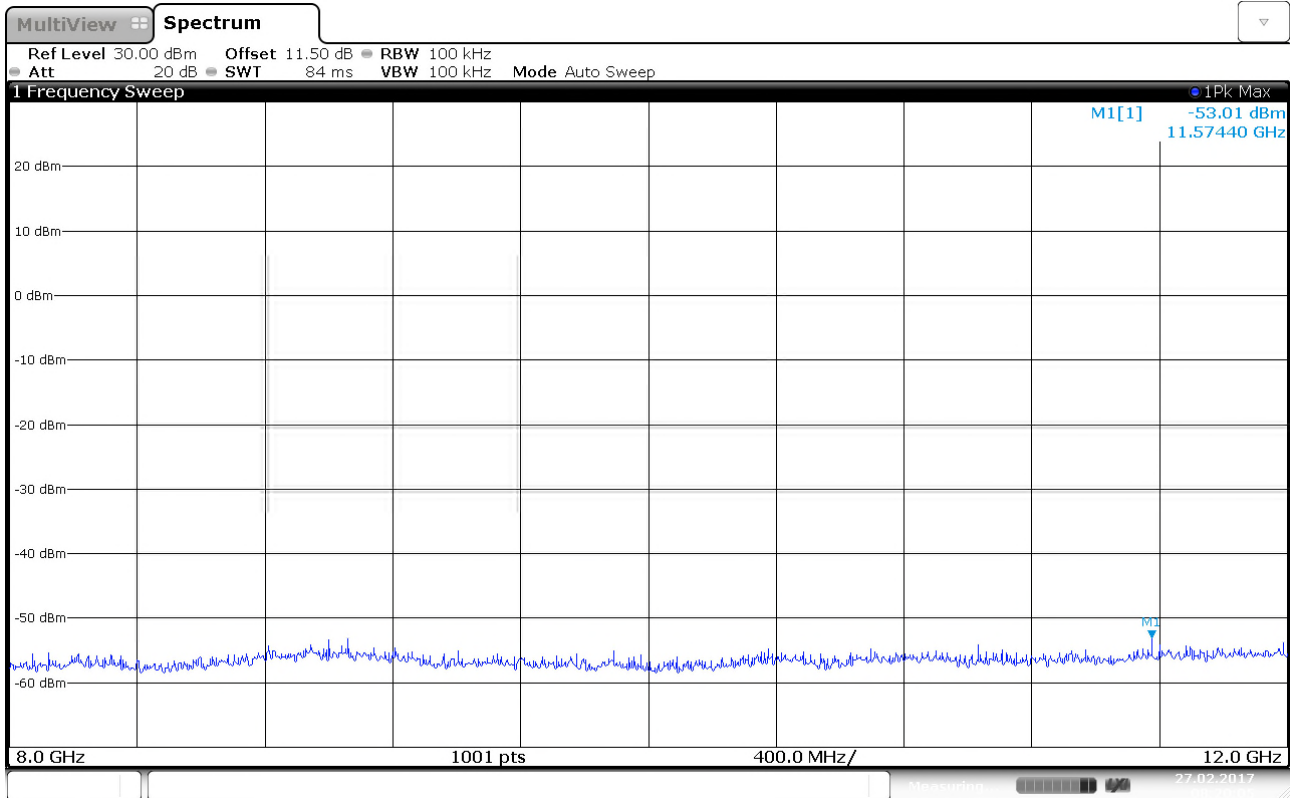
Conducted spurious emissions 8GHz – 12GHz , BR-DH5



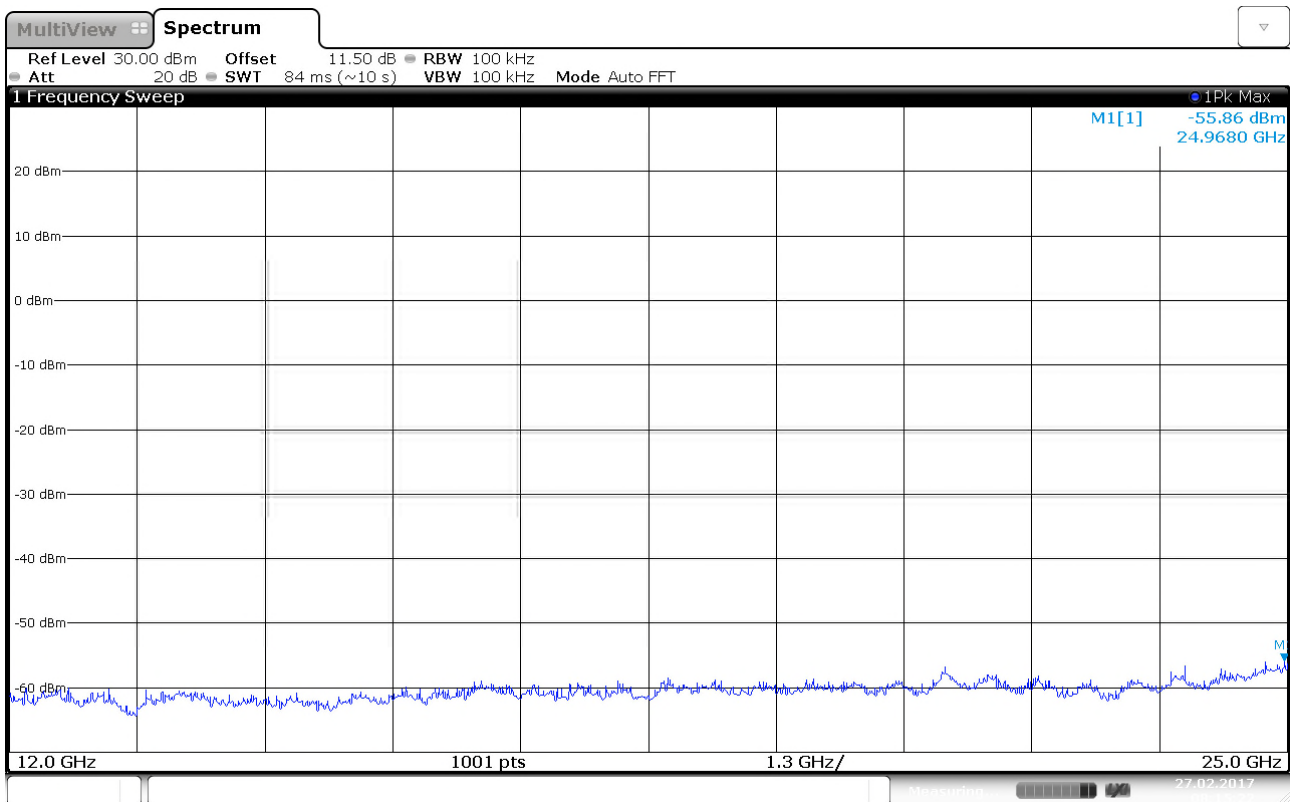
Conducted spurious emissions 12GHz – 25GHz , BR-DH5



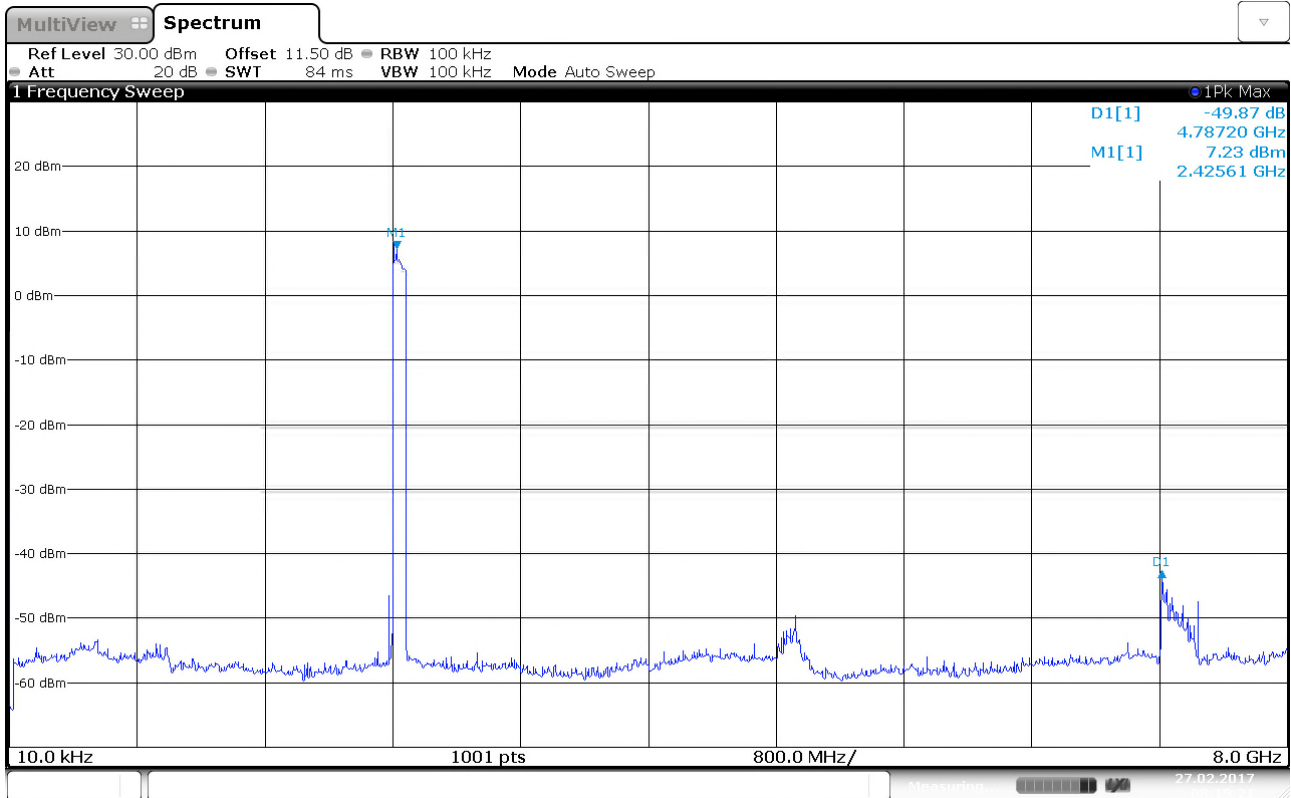
Conducted spurious emissions 10kHz – 8GHz , EDR-3DH3



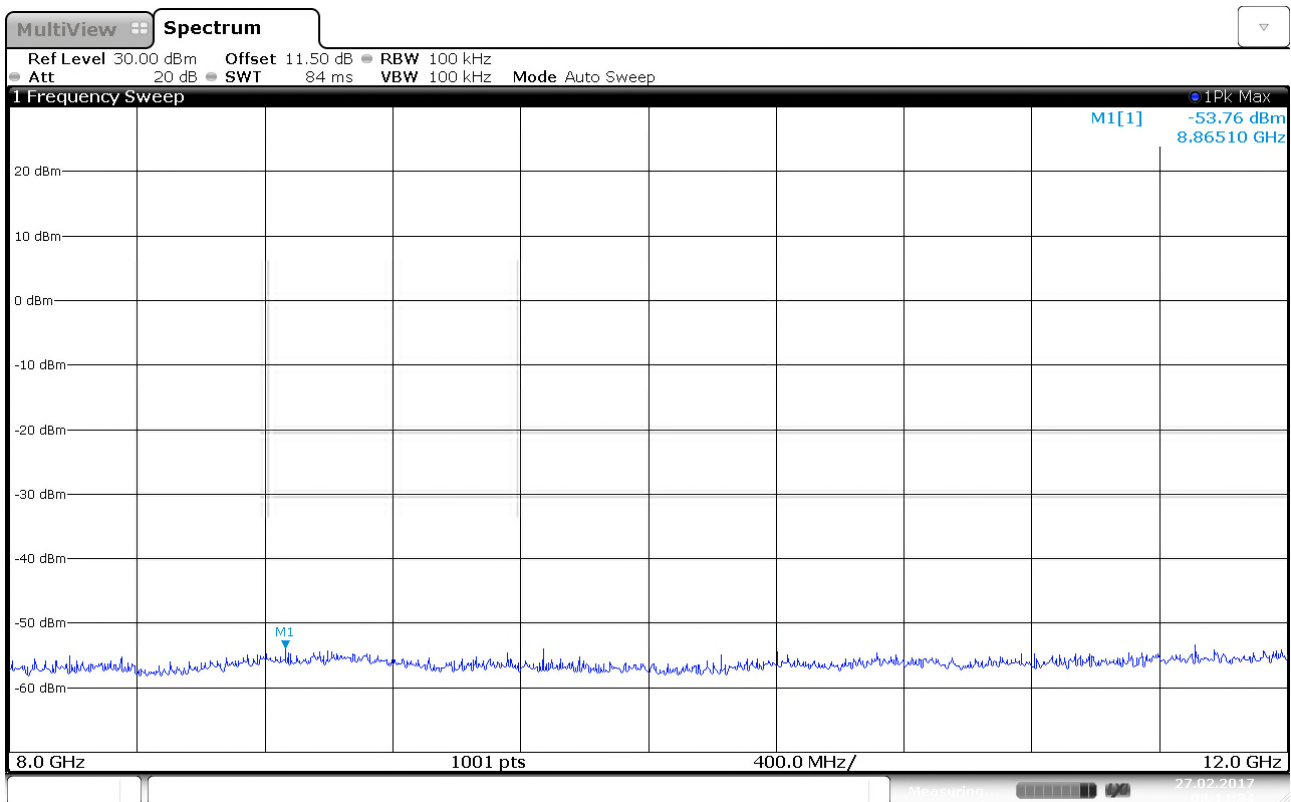
Conducted spurious emissions 8GHz – 12GHz , EDR-3DH3



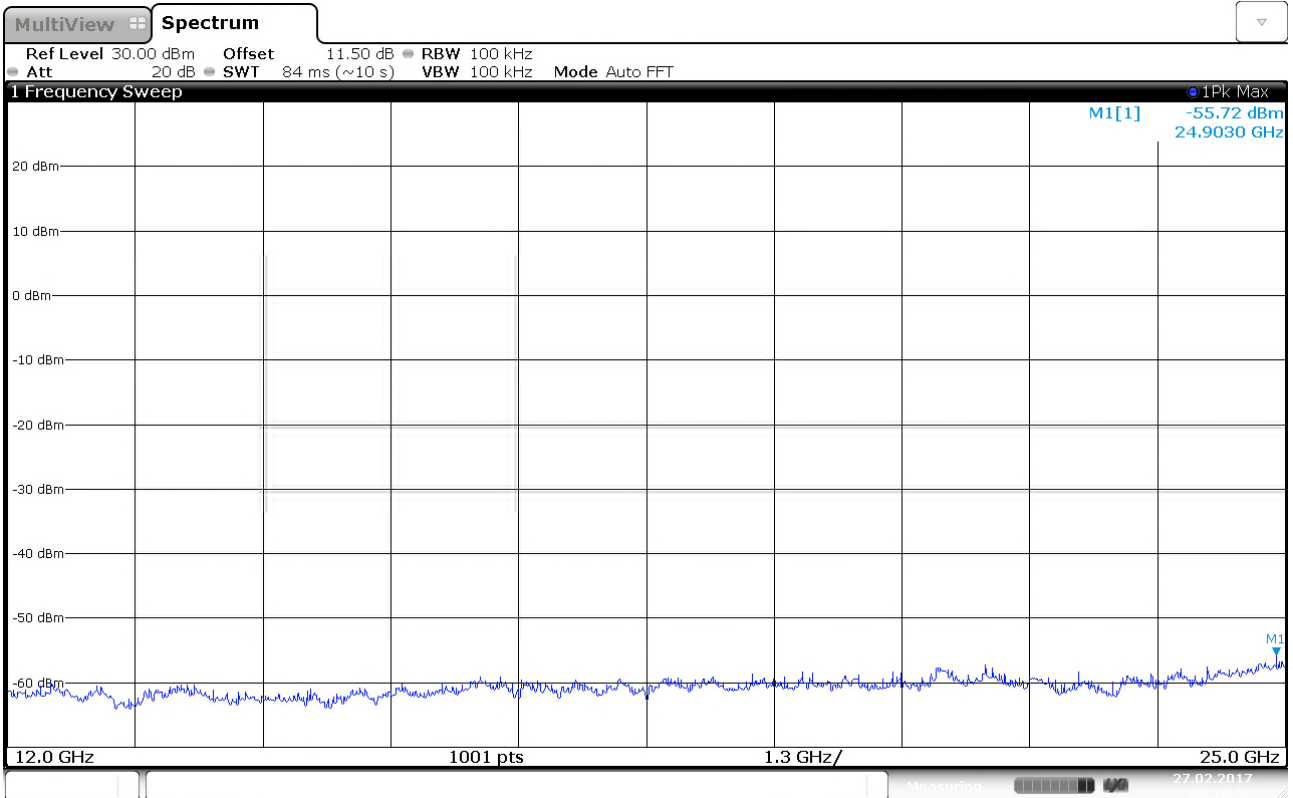
Conducted spurious emissions 12GHz – 25GHz , EDR-3DH3



Conducted spurious emissions 10kHz – 8GHz , EDR-3DH5



Conducted spurious emissions 8GHz – 12GHz , EDR-3DH5



Conducted spurious emissions 12GHz – 25GHz , EDR-3DH5

3.8 Spurious Emissions (Radiated)

FCC Part 15.247

Test Performed By: G.Suhandhakumar

Date of Test: 2017.02.23

Test Results: Complies

Measurement Data:

Band-edge radiated, In hopping mode

Modulation Scheme	Detector	Measured field strength (dB μ V/m)		Limit dB μ V/m	Margin	
		2377/2390 MHz	2483.5 MHz		dB	
BR-DH5	Peak Detector	62.03	62.14	74	11.97	11.86
	Average Detector	42.03	42.14	54	11.97	11.86
EDR-3DH3	Peak Detector	55.89	62.72	74	18.11	11.28
	Average Detector	35.89	42.72	54	18.11	11.28
EDR-3DH5	Peak Detector	58.16	63.60	74	15.84	10.40
	Average Detector	38.16	43.60	54	15.84	10.40

Average Detector values are measured with Peak Detector and corrected for Duty Cycle.

See attached plots.

Duty Cycle Correction Factor Calculation:

Duty Cycle = slot length / (frame length x hopping channels) = 0.626ms / (216ms x 79) = 2.9

Duty Cycle Correction factor = -20 x log (Duty Cycle) = -30.7 dB

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

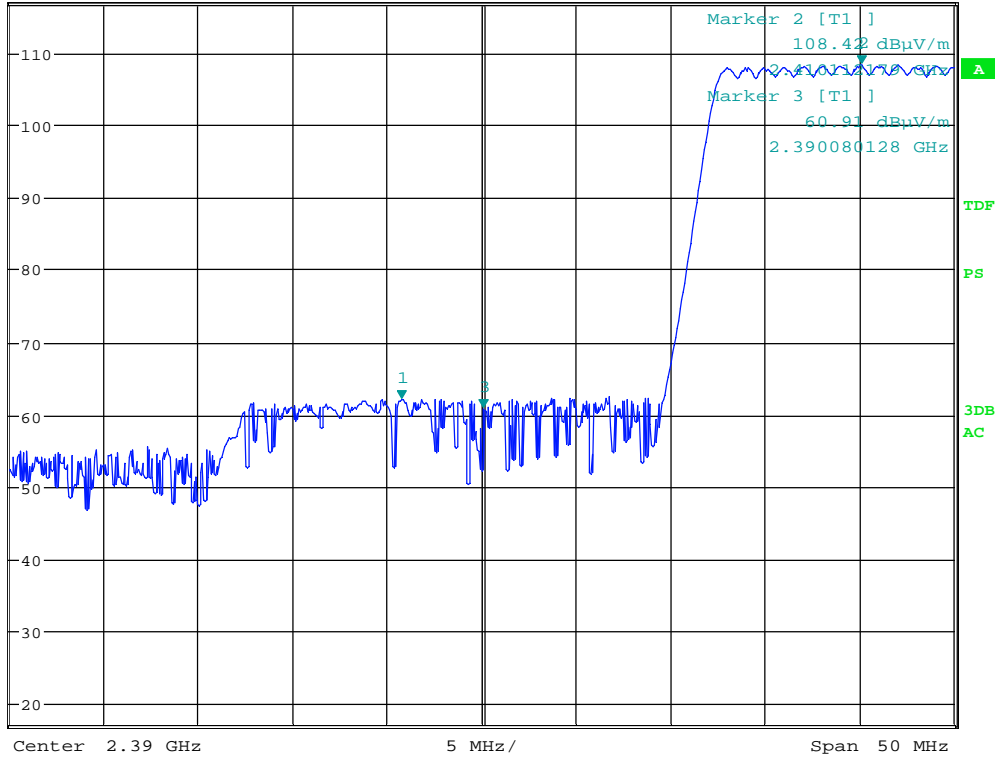


MARKER 1
 2.385753205 GHz
 Ref 117 dBμV/m * Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 62.03 dBμV/m
 2.385753205 GHz

1 PK
 MAXH



Date: 23.FEB.2017 09:58:10

Lower Band Edge, Hopping mode , BR-DH5, Peak Det



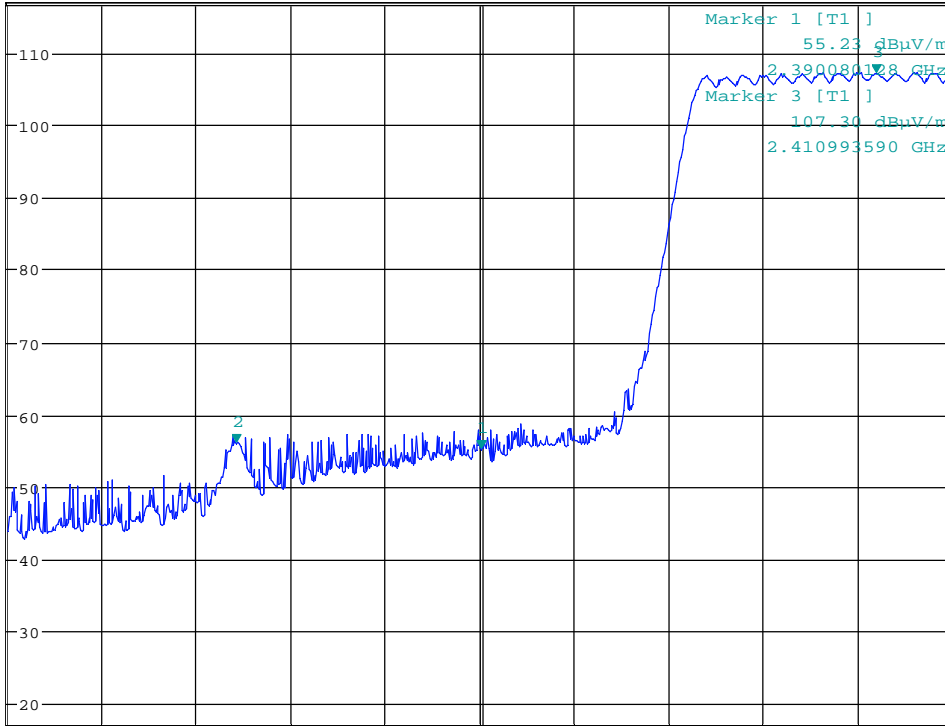
MARKER 2
 2.377099359 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 2 [T1]
 55.89 dBμV/m
 2.377099359 GHz

Ref 117 dBμV/m *Att 10 dB

1 PK
 MAXH



Center 2.39 GHz 5 MHz/ Span 50 MHz

Date: 23.FEB.2017 10:41:07

Lower Band Edge, Hopping mode , EDR-3DH3, Peak Det

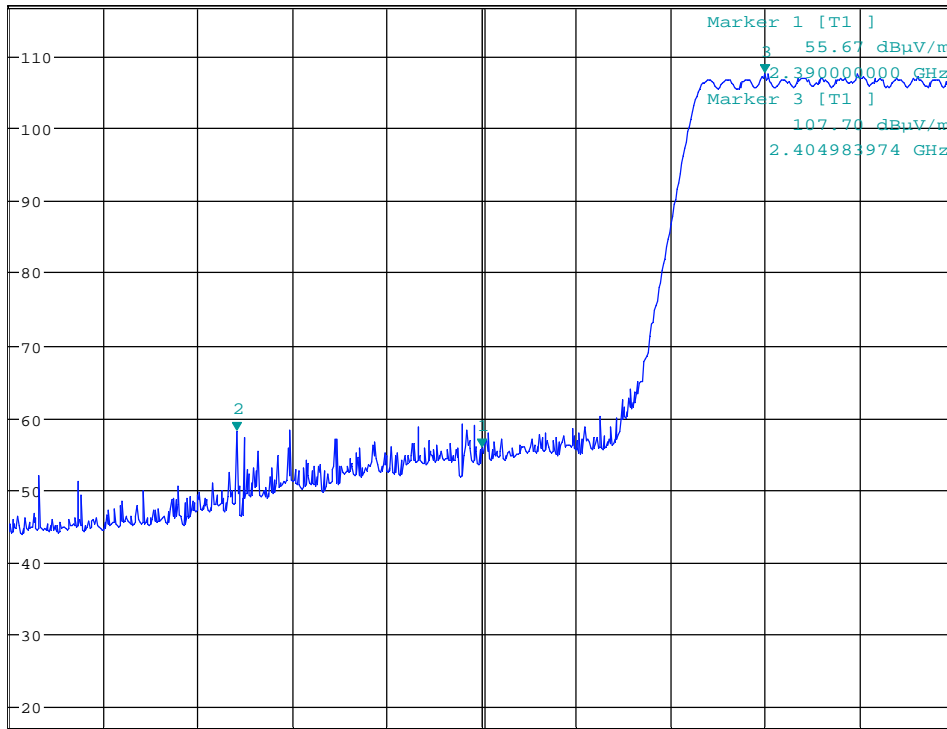


MARKER 2
 2.377019231 GHz
 Ref 117 dBμV/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 2 [T1]
 58.16 dBμV/m
 2.377019231 GHz

1 PK
 MAXH



Center 2.39 GHz 5 MHz/ Span 50 MHz

Date: 23.FEB.2017 12:28:33

Lower Band Edge, Hopping mode , EDR-3DH5, Peak Det

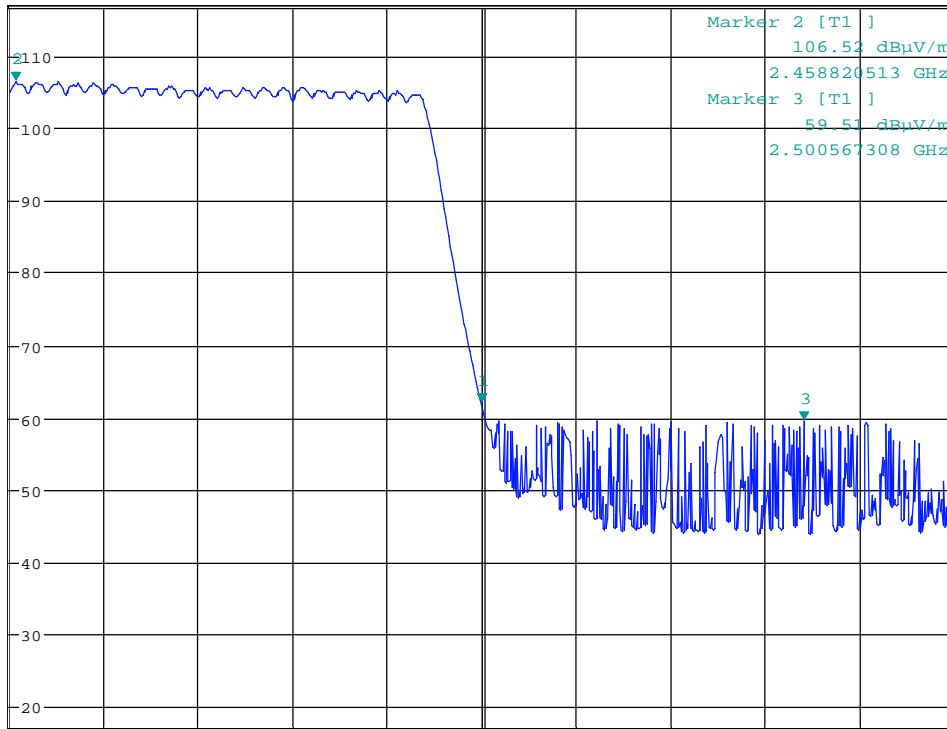


MARKER 1
 2.4835 GHz
 Ref 117 dB μ V/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 62.14 dB μ V/m
 2.483500000 GHz

1 PK
 MAXH



Center 2.4835 GHz 5 MHz/ Span 50 MHz

Date: 23.FEB.2017 09:59:49

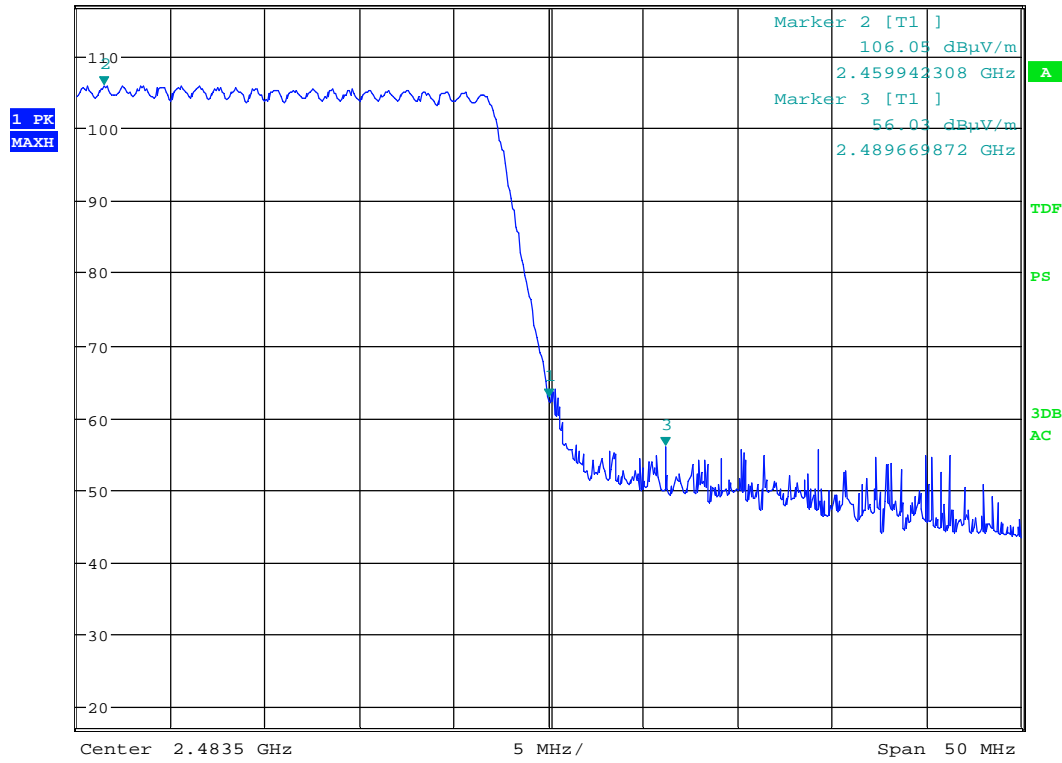
Upper Band Edge, Hopping mode , BR-DH5, Peak Det



MARKER 1
 2.4835 GHz
 Ref 117 dBμV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 62.72 dBμV/m
 2.483500000 GHz



Date: 23.FEB.2017 10:42:17

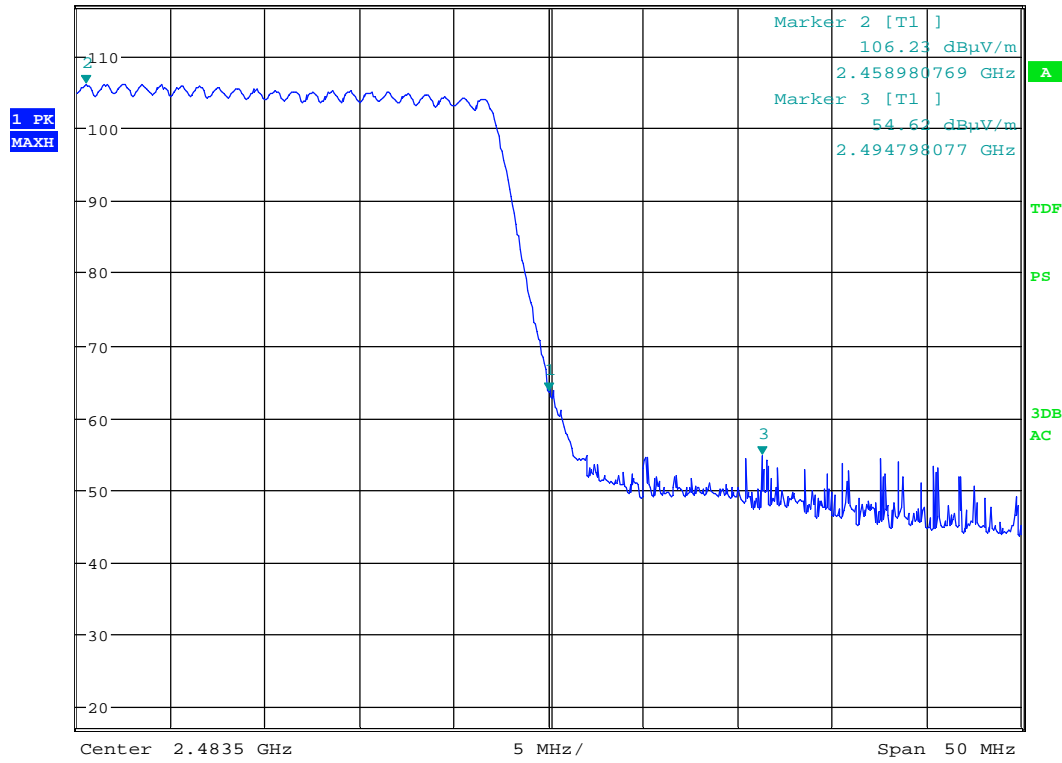
Upper Band Edge, Hopping mode , EDR-3DH3, Peak Det



MARKER 1
 2.4835 GHz
 Ref 117 dB μ V/m * Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 2.5 ms

Marker 1 [T1]
 63.60 dB μ V/m
 2.483500000 GHz



Date: 23.FEB.2017 12:30:04

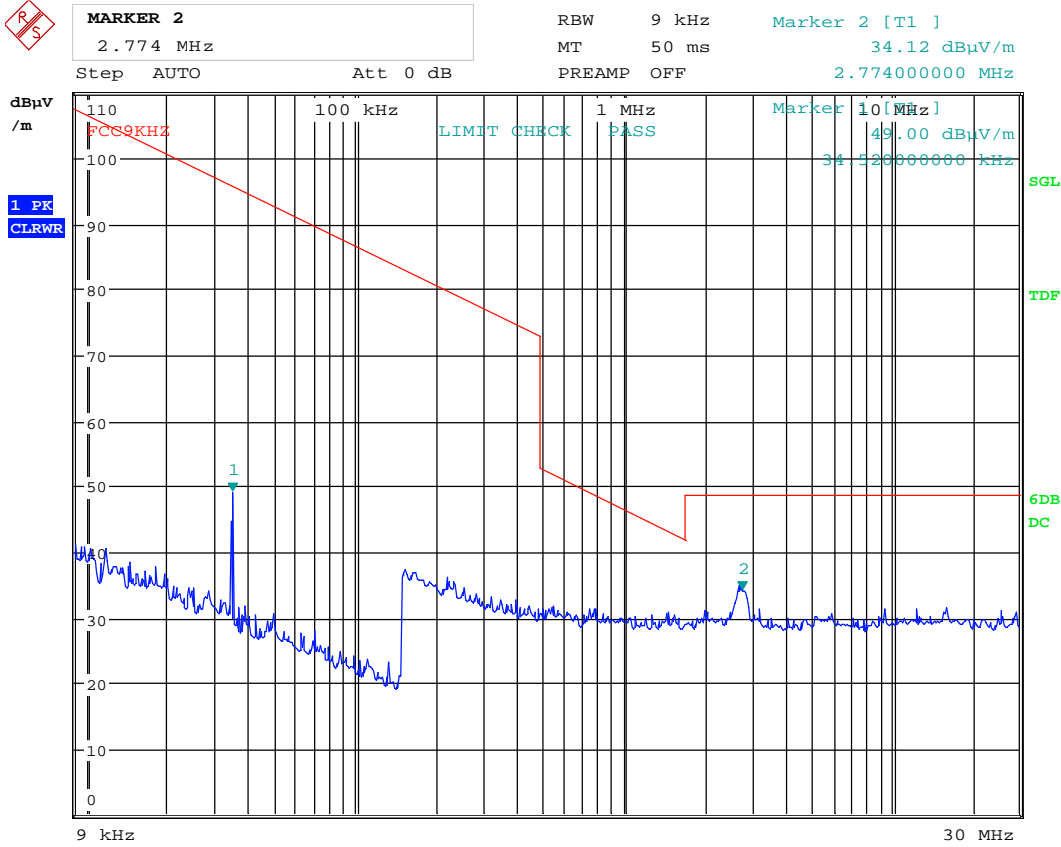
Upper Band Edge, Hopping mode , EDR-3DH5, Peak Det

Radiated emissions 9 kHz-30 MHz.

Measuring distance 10 m, measured with Peak detector.

No component detected above the limit with peak detector, see attached graph.

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



Date: 23.FEB.2017 07:21:29

9kHz - 30MHz

Radiated emission 30 – 1000 MHz.

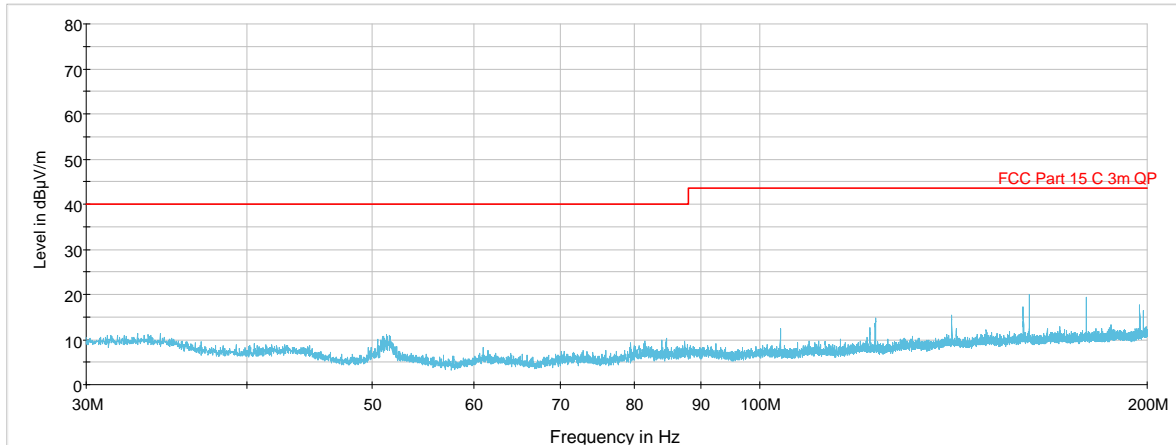
Measuring distance 3 m according to ANSI.

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
518.931	37.95	46.00	8.05	1000.0	120.000	111.0	V	305	-16.8
537.012	38.82	46.00	7.18	1000.0	120.000	119.0	V	302	-16.4
556.151	38.98	46.00	7.02	1000.0	120.000	113.0	V	1	-16.0
575.358	38.38	46.00	7.62	1000.0	120.000	100.0	V	239	-15.8
593.428	35.15	46.00	10.85	1000.0	120.000	110.0	V	306	-15.6
594.539	34.03	46.00	11.97	1000.0	120.000	123.0	V	316	-15.6
612.587	36.04	46.00	9.96	1000.0	120.000	121.0	V	303	-14.9
631.767	36.33	46.00	9.67	1000.0	120.000	112.0	V	1	-14.4
669.034	32.84	46.00	13.16	1000.0	120.000	100.0	V	297	-13.7
791.966	36.51	46.00	9.49	1000.0	120.000	171.0	V	61	-12.5
932.984	34.35	46.00	11.65	1000.0	120.000	110.0	H	260	-10.9

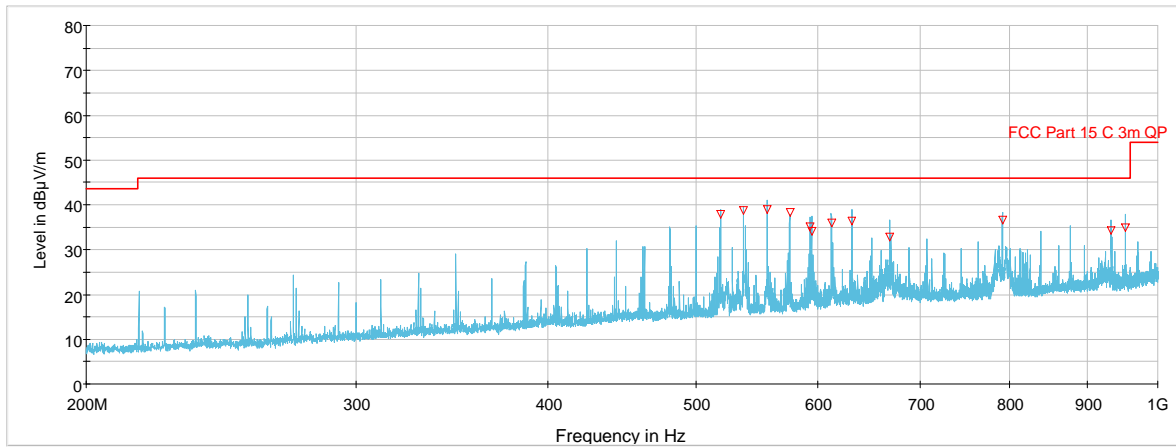
See attached graphs.

Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 4, Clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	Quasi Peak (µV/m)	Quasi Peak (dBµV/m)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0



30MHz - 200MHz - In hopping mode



200 - 1000MHz – In hopping mode

Radiated Emissions, 1-25 GHz; Measuring distance:3m (1 – 8 GHz), 1m (8 – 18 GHz); A pre-scan was performed above 18 GHz and no spurious emissions were detected.

Peak Detector:

Modulation scheme	Frequency	Polarization	Dist. corr. factor	Field strength, Peak Detector, 3m	Duty cycle corr. factor	Limit	Margin
	MHz		dB	dB μ V/m	dB	dB μ V/m	dB
BR-DH5	4803.77	VP	0	56.48	/	74	17.52
	4880.00	VP	0	55.29	/	74	18.71
	4959.88	VP	0	58.15	/	74	15.85
EDR-3DH3	4803.81	VP	0	55.94	/	74	18.06
	4880.00	VP	0	54.59	/	74	19.41
	4960.00	VP	0	57.80	/	74	16.20
EDR-3DH5	4803.89	VP	0	55.93	/	74	18.07
	4879.99	VP	0	55.03	/	74	18.97
	4960.00	VP	0	57.40	/	74	16.60
BR-DH5	7205.90	VP	0	58.91	/	74	15.09
	7319.93	VP	0	60.92	/	74	13.08
	7440.38	VP	0	57.04	/	74	16.96
EDR-3DH3	7205.39	VP	0	59.68	/	74	14.32
	7320.00	VP	0	59.84	/	74	14.16
	7440.00	VP	0	58.66	/	74	15.34
EDR-3DH5	7205.61	VP	0	62.87	/	74	11.13
	7319.45	VP	0	61.92	/	74	12.08
	7440.21	VP	0	59.28	/	74	14.72
BR-DH5	9608.67	VP	-9.5	56.64	/	74	17.36
	9760.57	VP	-9.5	52.09	/	74	21.91
	9920.08	VP	-9.5	57.56	/	74	16.44
EDR-3DH3	9607.46	VP	-9.5	56.53	/	74	17.47
	9761.15	VP	-9.5	53.18	/	74	20.82
	9920.64	VP	-9.5	57.06	/	74	16.94
EDR-3DH5	9607.61	VP	-9.5	56.18	/	74	17.82
	9760.80	VP	-9.5	53.41	/	74	20.59
	9919.29	VP	-9.5	56.87	/	74	17.13
BR-DH5	12009.81	HP	-9.5	59.10	/	74	14.90
	12200.87	HP	-9.5	63.18	/	74	10.82
	12399.19	HP	-9.5	61.05	/	74	12.95
EDR-3DH3	12009.19	HP	-9.5	58.96	/	74	15.04
	12199.93	HP	-9.5	62.87	/	74	11.13
	12399.26	HP	-9.5	60.64	/	74	13.36
EDR-3DH5	12009.97	HP	-9.5	58.99	/	74	15.01
	12199.19	HP	-9.5	62.81	/	74	11.19
	12399.26	HP	-9.5	60.59	/	74	13.41
Other freqs	L,M,H	VP/HP	/	None detected	/	74	>20

Average:

Modulation scheme	Frequency	Polarization	Dist. corr. factor	Field strength, Average, 3m	Duty cycle corr. factor	Limit	Margin
	MHz		dB	dB μ V/m	dB	dB μ V/m	dB
BR-DH5	4803.77	VP	0	56.48	20	54	17.52
	4880.00	VP	0	55.29	20	54	18.71
	4959.88	VP	0	58.15	20	54	15.85
EDR-3DH3	4803.81	VP	0	55.94	20	54	18.06
	4880.00	VP	0	54.59	20	54	19.41
	4960.00	VP	0	57.80	20	54	16.20
EDR-3DH5	4803.89	VP	0	55.93	20	54	18.07
	4879.99	VP	0	55.03	20	54	18.97
	4960.00	VP	0	57.40	20	54	16.60
BR-DH5	7205.90	VP	0	58.91	20	54	15.09
	7319.93	VP	0	60.92	20	54	13.08
	7440.38	VP	0	57.04	20	54	16.96
EDR-3DH3	7205.39	VP	0	59.68	20	54	14.32
	7320.00	VP	0	59.84	20	54	14.16
	7440.00	VP	0	58.66	20	54	15.34
EDR-3DH5	7205.61	VP	0	62.87	20	54	11.13
	7319.45	VP	0	61.92	20	54	12.08
	7440.21	VP	0	59.28	20	54	14.72
BR-DH5	9608.67	VP	-9.5	56.64	20	54	17.36
	9760.57	VP	-9.5	/	20	54	/
	9920.08	VP	-9.5	57.56	20	54	16.44
EDR-3DH3	9607.46	VP	-9.5	56.53	20	54	17.47
	9761.15	VP	-9.5	/	20	54	/
	9920.64	VP	-9.5	57.06	20	54	16.94
EDR-3DH5	9607.61	VP	-9.5	56.18	20	54	17.82
	9760.80	VP	-9.5	/	20	54	/
	9919.29	VP	-9.5	56.87	20	54	17.13
BR-DH5	12009.81	HP	-9.5	59.10	20	54	14.90
	12200.87	HP	-9.5	63.18	20	54	10.82
	12399.19	HP	-9.5	61.05	20	54	12.95
EDR-3DH3	12009.19	HP	-9.5	58.96	20	54	15.04
	12199.93	HP	-9.5	62.87	20	54	11.13
	12399.26	HP	-9.5	60.64	20	54	13.36
EDR-3DH5	12009.97	HP	-9.5	58.99	20	54	15.01
	12199.19	HP	-9.5	62.81	20	54	11.19
	12399.26	HP	-9.5	60.59	20	54	13.41
Other freqs	L,M,H	VP/HP	/	None detected	20	54	>20

Distance correction for 1m is included in the spectrum analyser.

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".

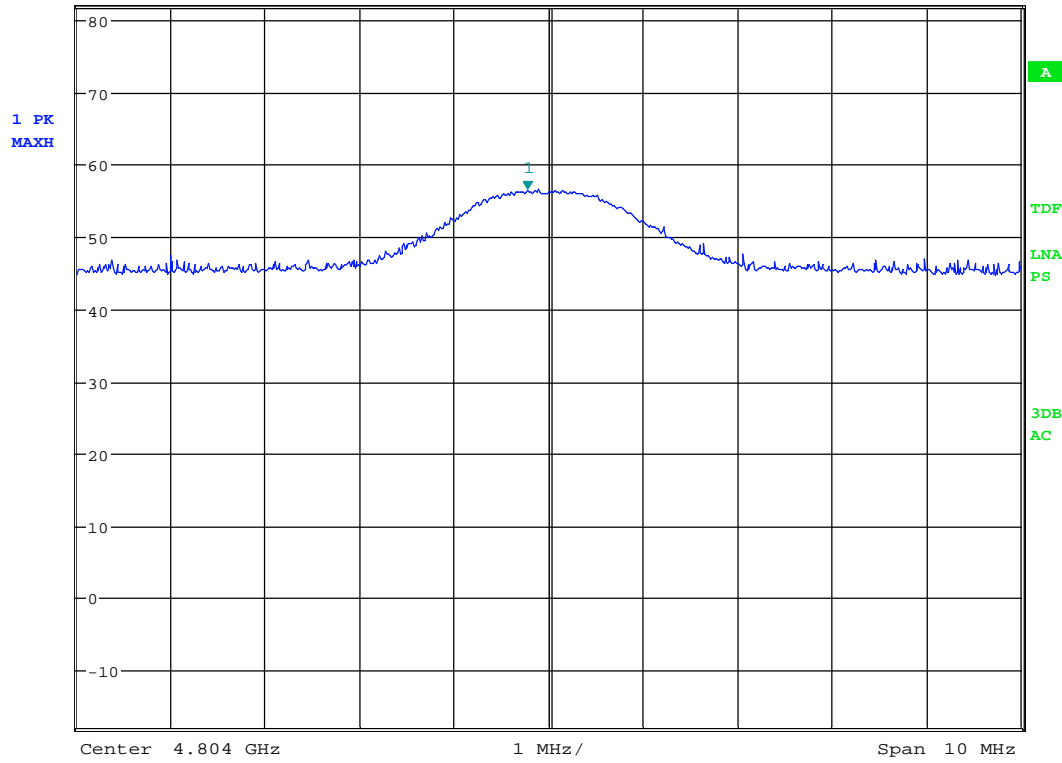
See plots.

Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 4, Clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	AV (dBµV/m)	Peak (dBµV/m)
Above 1 GHz	54.0	74.0



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
4.803775641 GHz	VBW 3 MHz	56.48 dBμV/m
Ref 82 dBμV/m	*Att 10 dB	SWT 20 ms
		4.803775641 GHz

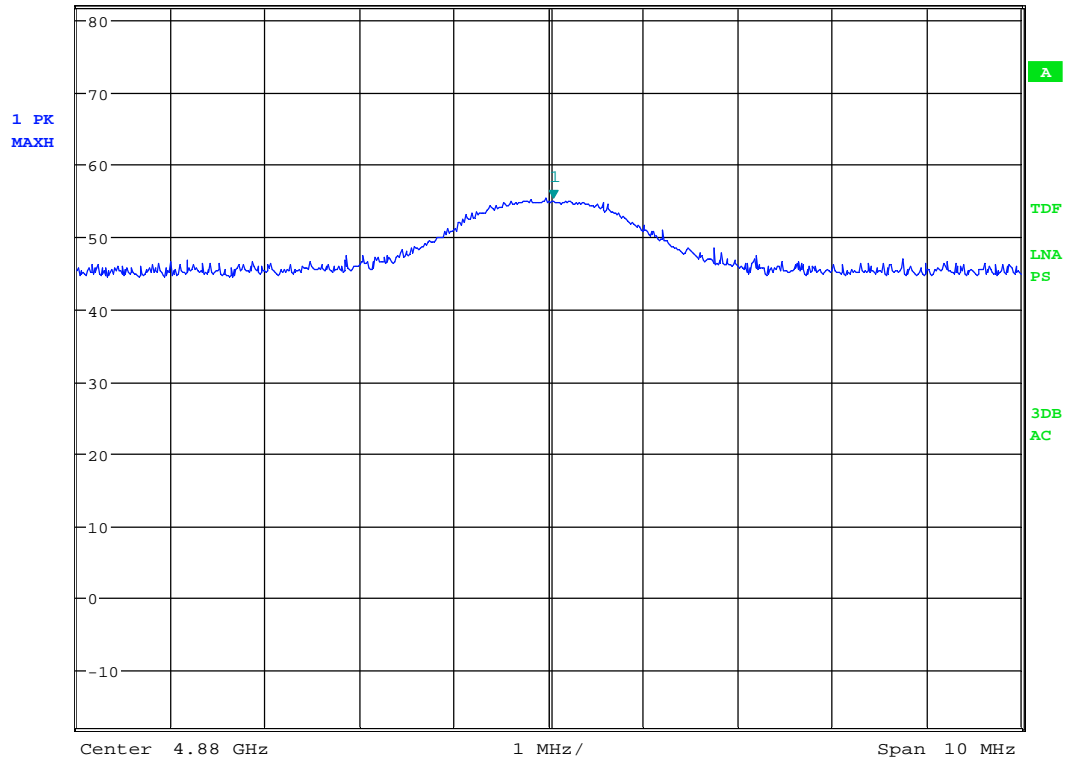


Date: 23.FEB.2017 13:30:22

2nd har, PK, ch2402MHz, BR-DH5 – VP



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
4.880048077 GHz	VBW 3 MHz	55.29 dBμV/m
Ref 82 dBμV/m	*Att 10 dB	SWT 20 ms
		4.880048077 GHz



Date: 23.FEB.2017 13:31:34

2nd har, PK, ch2440MHz, BR-DH5 – VP



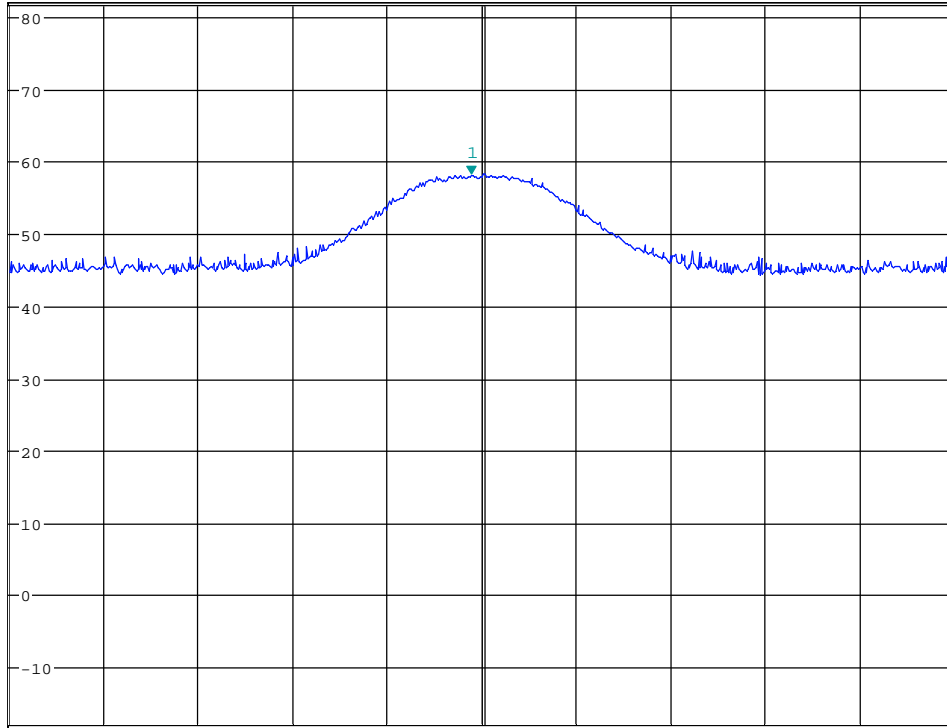
MARKER 1
 4.959887821 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 58.15 dBμV/m
 4.959887821 GHz

Ref 82 dBμV/m *Att 10 dB

1 PK
 MAXH



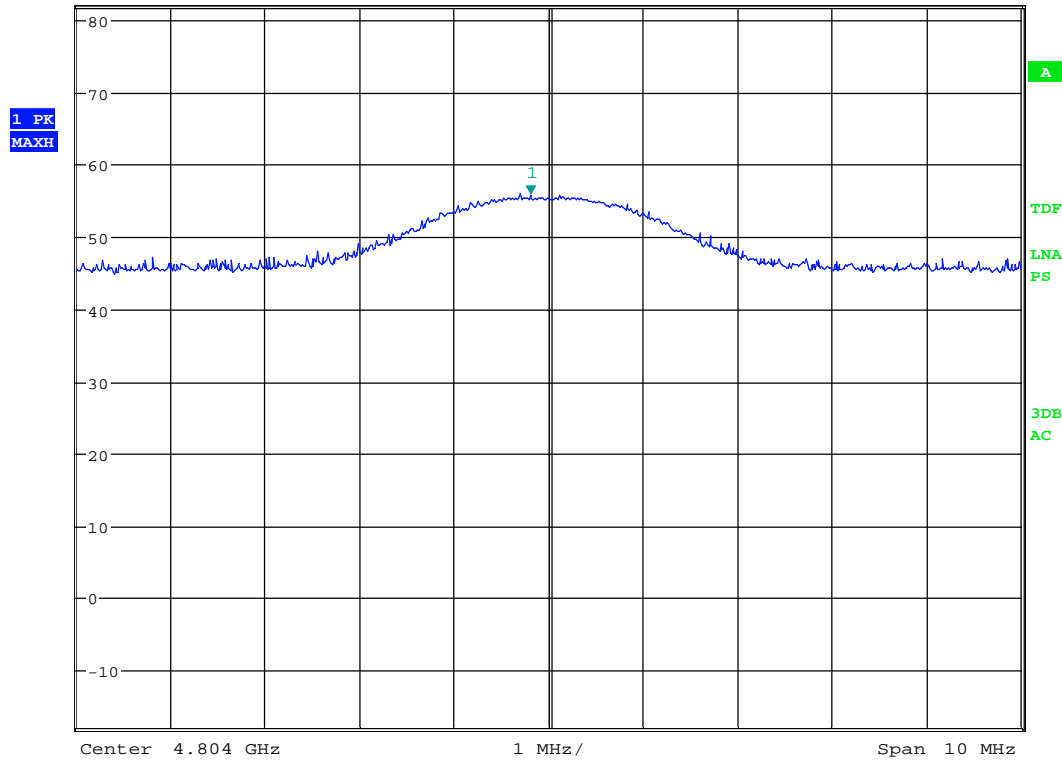
Center 4.96 GHz 1 MHz / Span 10 MHz

Date: 23.FEB.2017 13:32:35

2nd har, PK, ch2480MHz, BR-DH5 – VP



MARKER 1
 4.803807692 GHz
 Ref 82 dB μ V/m * Att 10 dB *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 55.94 dB μ V/m
 SWT 20 ms 4.803807692 GHz



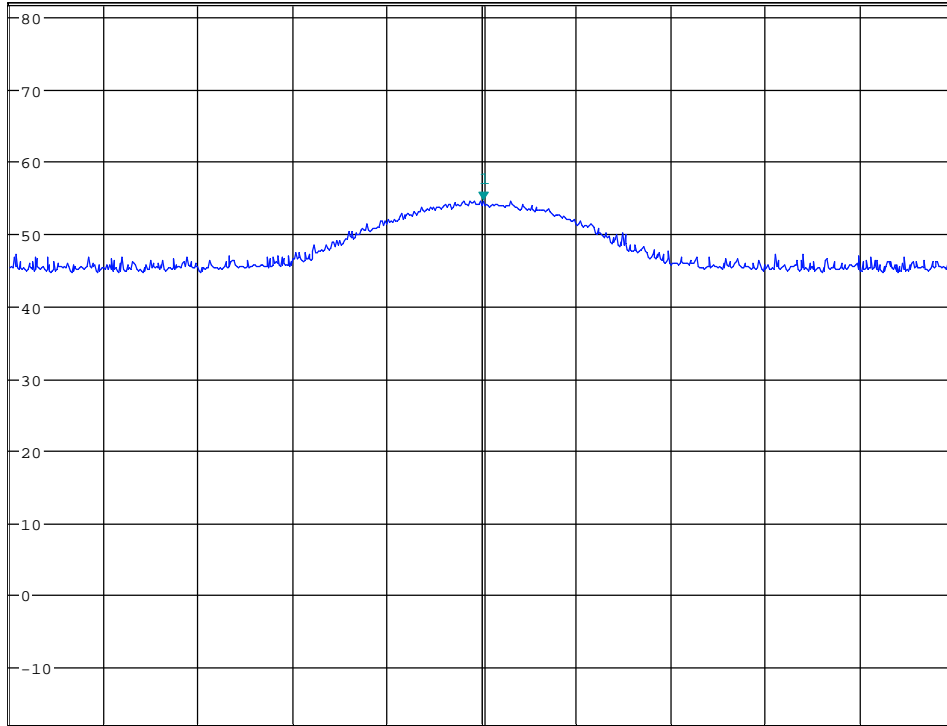
Date: 23.FEB.2017 13:24:04

2nd har, PK, ch2402MHz, EDR-3DH3 – VP



MARKER 1
 4.880016026 GHz
 Ref 82 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 20 ms
 Marker 1 [T1] 54.59 dB μ V/m 4.880016026 GHz

1 PK
MAXH



Center 4.88 GHz 1 MHz/ Span 10 MHz

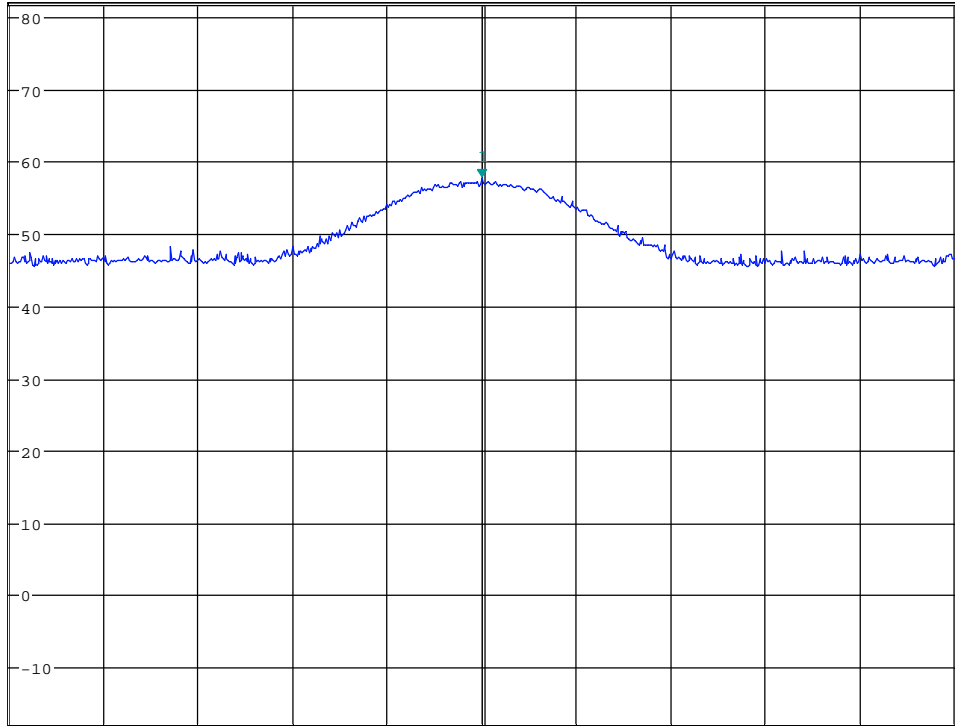
Date: 23.FEB.2017 13:21:49

2nd har, PK, ch2440MHz, EDR-3DH3 – VP



MARKER 1
4.96 GHz
Ref 82 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 20 ms Marker 1 [T1] 57.80 dB μ V/m 4.960000000 GHz

1 PK
MAXH



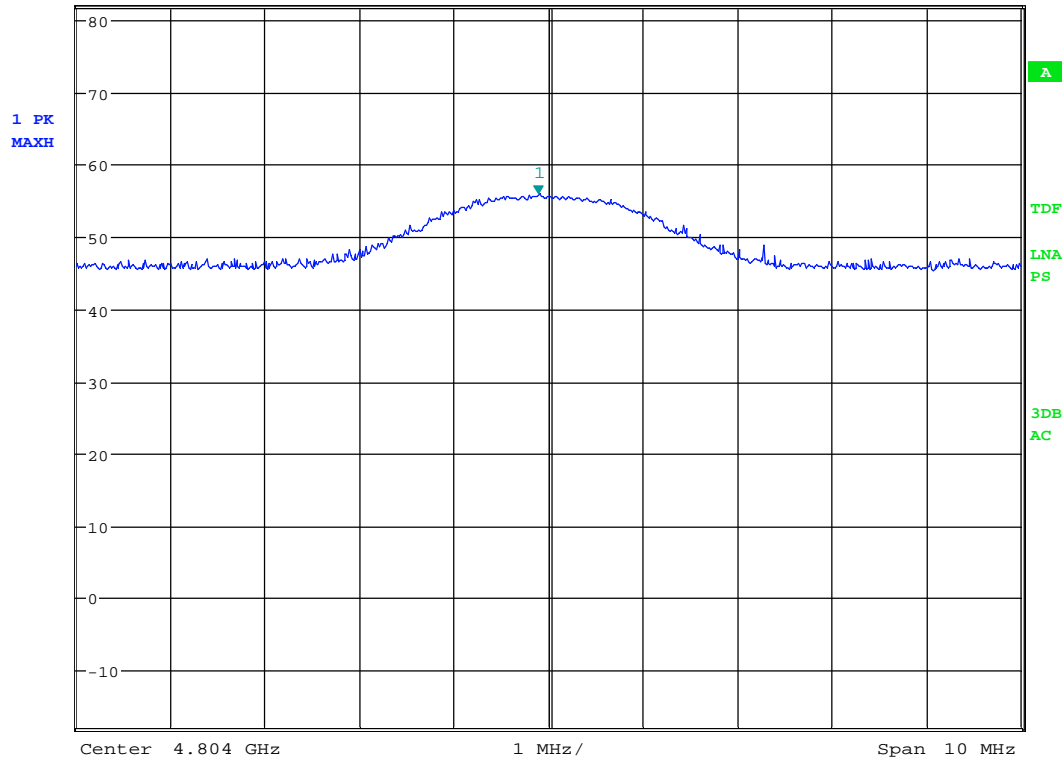
Center 4.96 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:16:55

2nd har, PK, ch2480MHz, EDR-3DH3 – VP



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
4.803887821 GHz	VBW 3 MHz	55.93 dBμV/m
Ref 82 dBμV/m	*Att 10 dB	4.803887821 GHz
	SWT 20 ms	

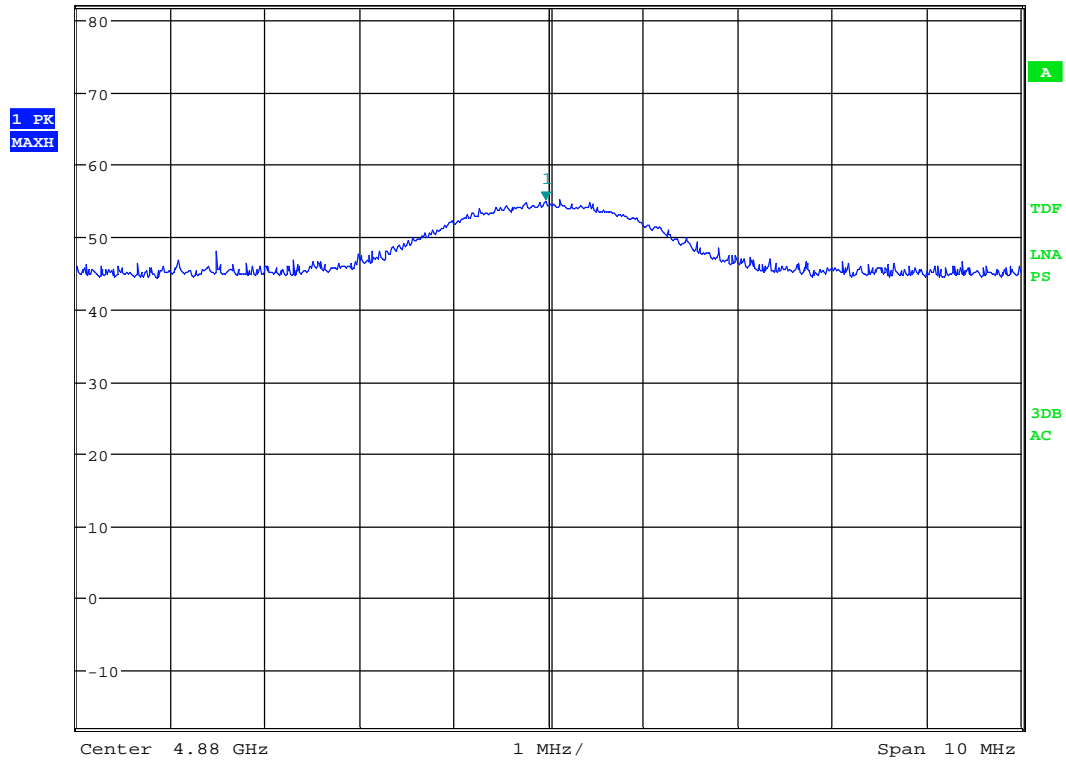


Date: 23.FEB.2017 12:54:49

2nd har, PK, ch2402MHz, EDR-3DH5 – VP



MARKER 1
 4.879967949 GHz
 Ref 82 dB μ V/m * Att 10 dB *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 55.03 dB μ V/m
 SWT 20 ms 4.879967949 GHz



Date: 23.FEB.2017 13:05:44

2nd har, PK, ch2440MHz, EDR-3DH5 – VP

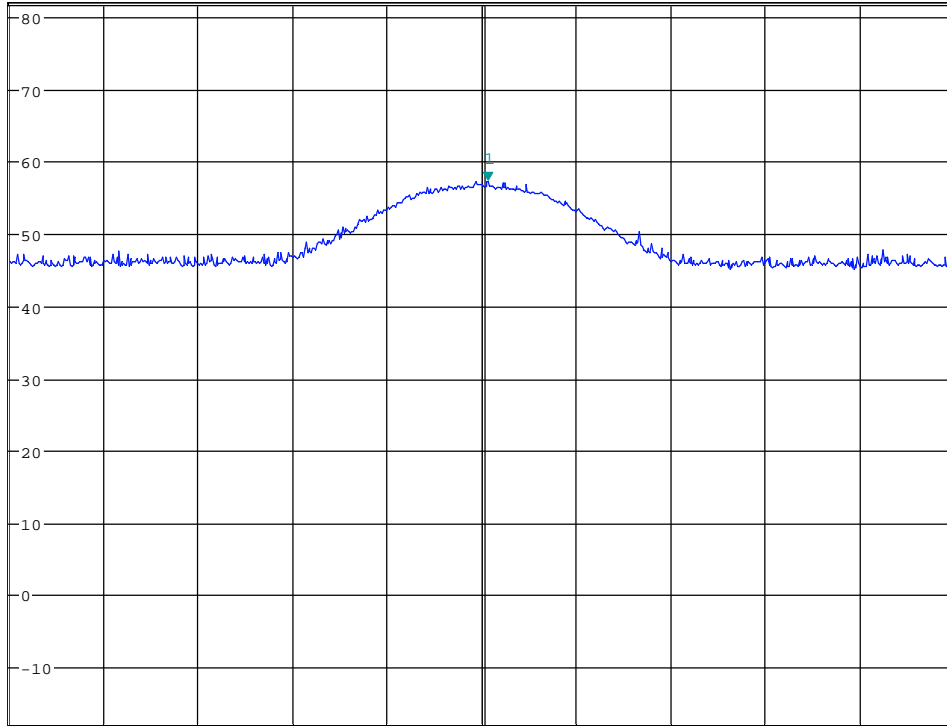


MARKER 1
 4.960064103 GHz
 Ref 82 dB μ V/m * Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 57.40 dB μ V/m
 4.960064103 GHz

1 PK
 MAXH



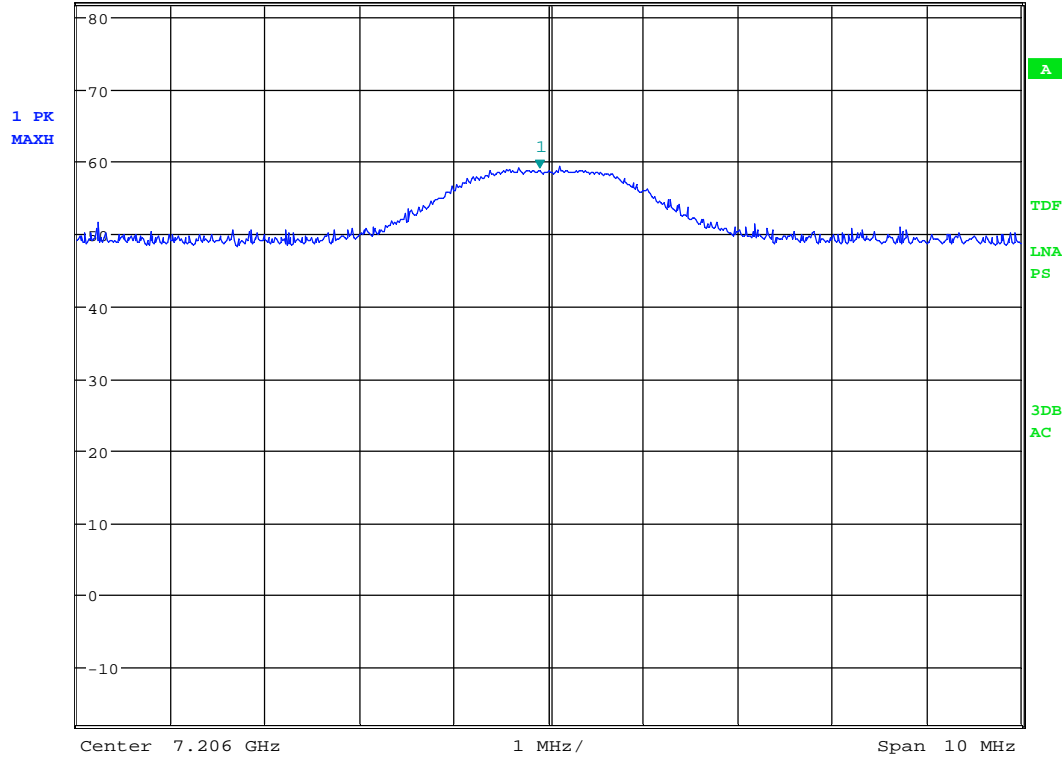
Center 4.96 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:07:59

2nd har, PK, ch2480MHz, EDR-3DH5 – VP



MARKER 1	*RBW 1 MHz	Marker 1 [T1]
7.205903846 GHz	VBW 3 MHz	58.91 dBμV/m
Ref 82 dBμV/m	*Att 10 dB	SWT 20 ms
		7.205903846 GHz



Date: 23.FEB.2017 13:30:56

3rd har, PK, ch2402MHz, BR-DH5 – VP



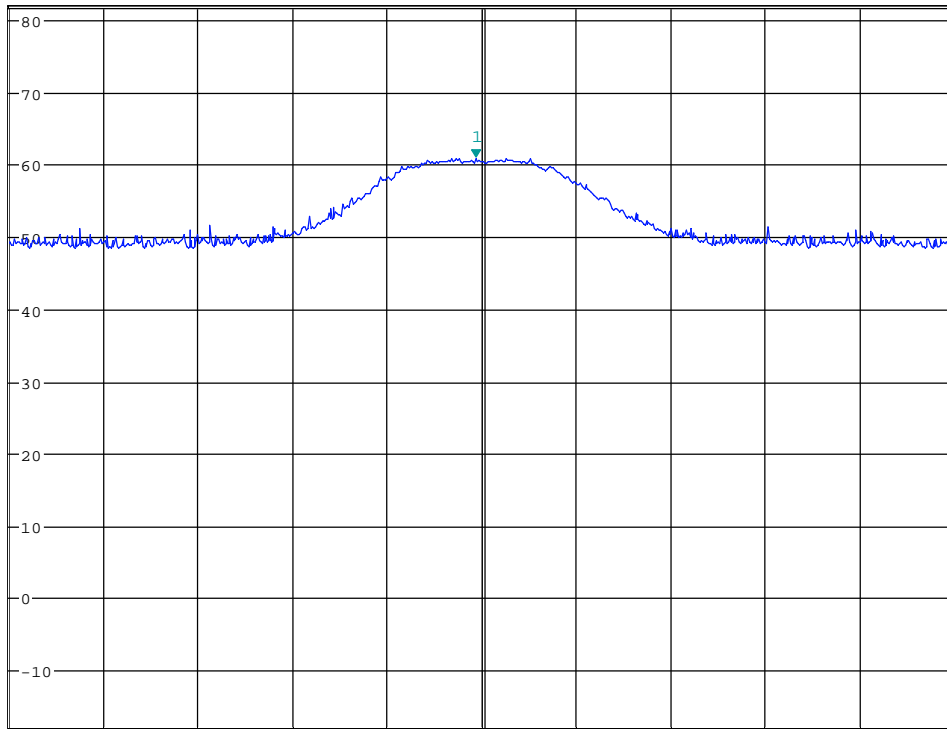
MARKER 1
 7.319935897 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 60.92 dB μ V/m
 7.319935897 GHz

Ref 82 dB μ V/m *Att 10 dB

1 PK
 MAXH



Center 7.32 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:32:01

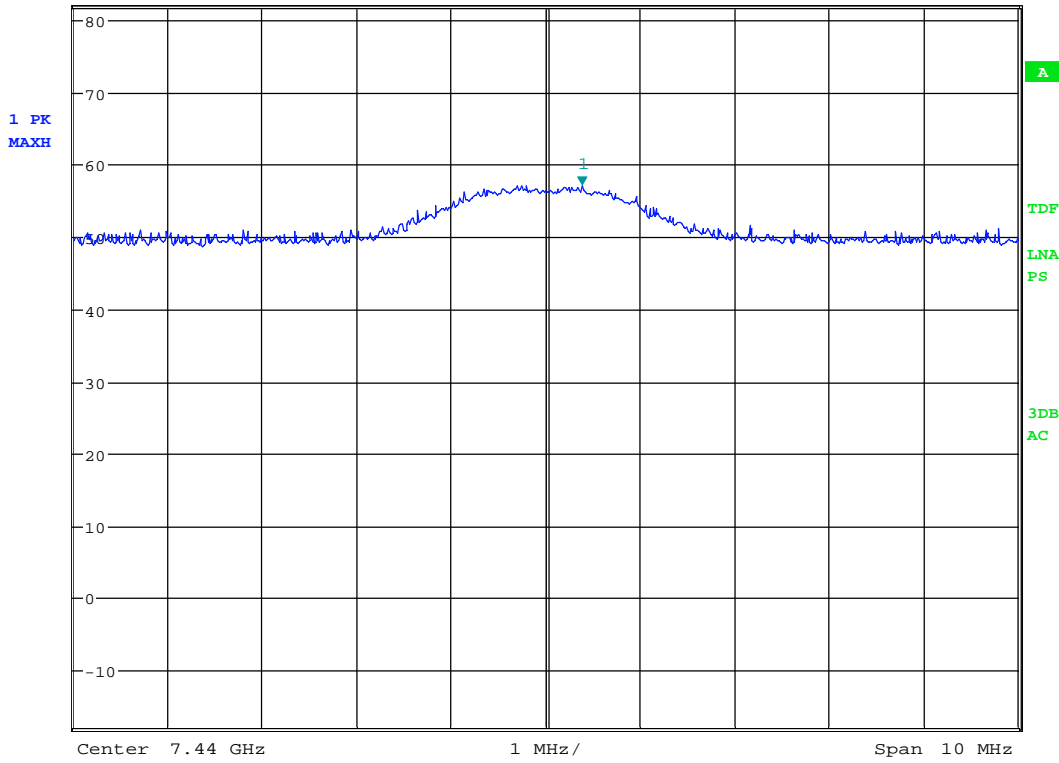
3rd har, PK, ch2440MHz, BR-DH5 – VP



MARKER 1
 7.440384615 GHz
 Ref 82 dB μ V/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 57.04 dB μ V/m
 7.440384615 GHz



Date: 23.FEB.2017 13:33:04

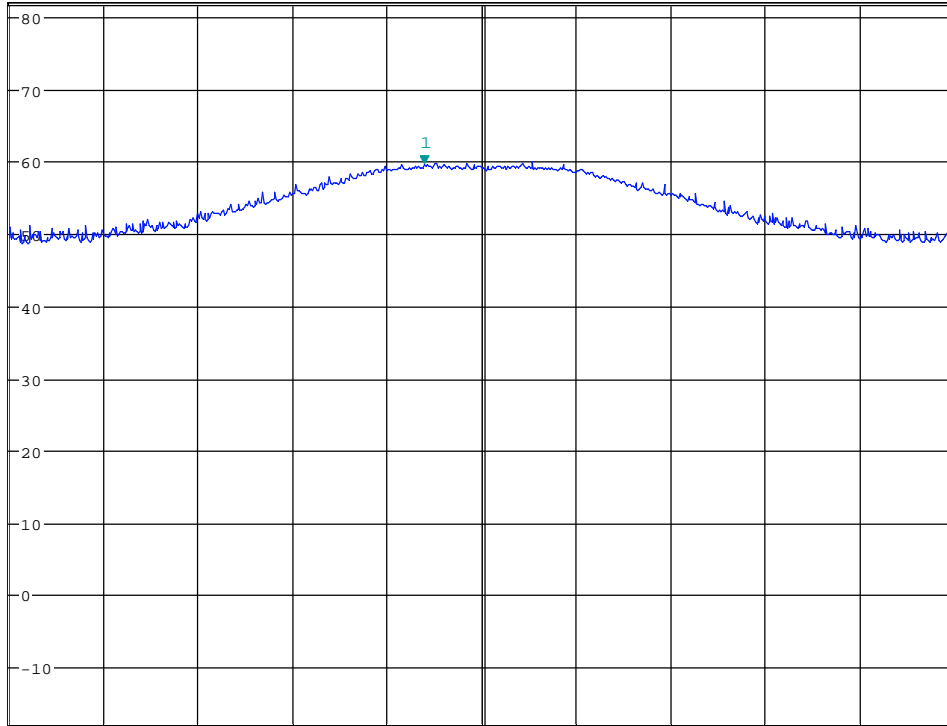
3rd har, PK, ch2480MHz, BR-DH5 – VP



MARKER 1
 7.205391026 GHz

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 59.68 dBμV/m
 Ref 82 dBμV/m *Att 10 dB 7.205391026 GHz
 SWT 20 ms

1 PK
 MAXH



Center 7.206 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:24:32

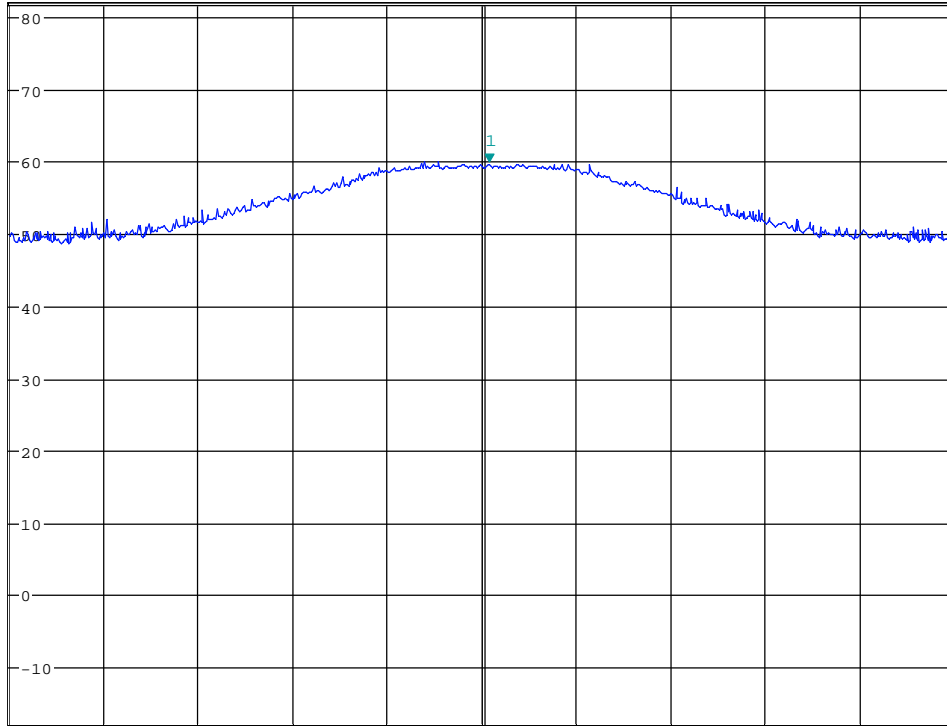
3rd har, PK, ch2402MHz, EDR-3DH3 – VP



MARKER 1
 7.320080128 GHz

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 59.84 dBμV/m
 Ref 82 dBμV/m *Att 10 dB 7.320080128 GHz
 SWT 20 ms

1 PK
 MAXH



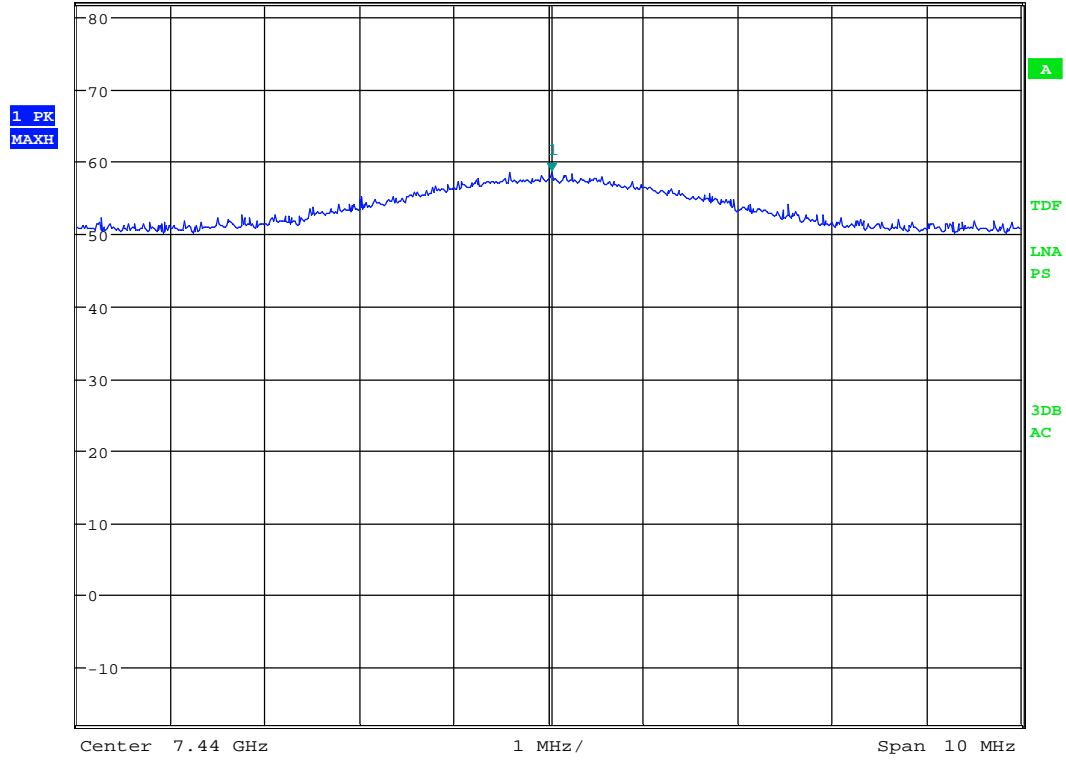
Center 7.32 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:22:17

3rd har, PK, ch2440MHz, EDR-3DH3 – VP



MARKER 1
 7.440032051 GHz
 Ref 82 dB μ V/m * Att 10 dB *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 58.66 dB μ V/m
 SWT 20 ms 7.440032051 GHz



Date: 23.FEB.2017 13:21:04

3rd har, PK, ch2480MHz, EDR-3DH3 – VP



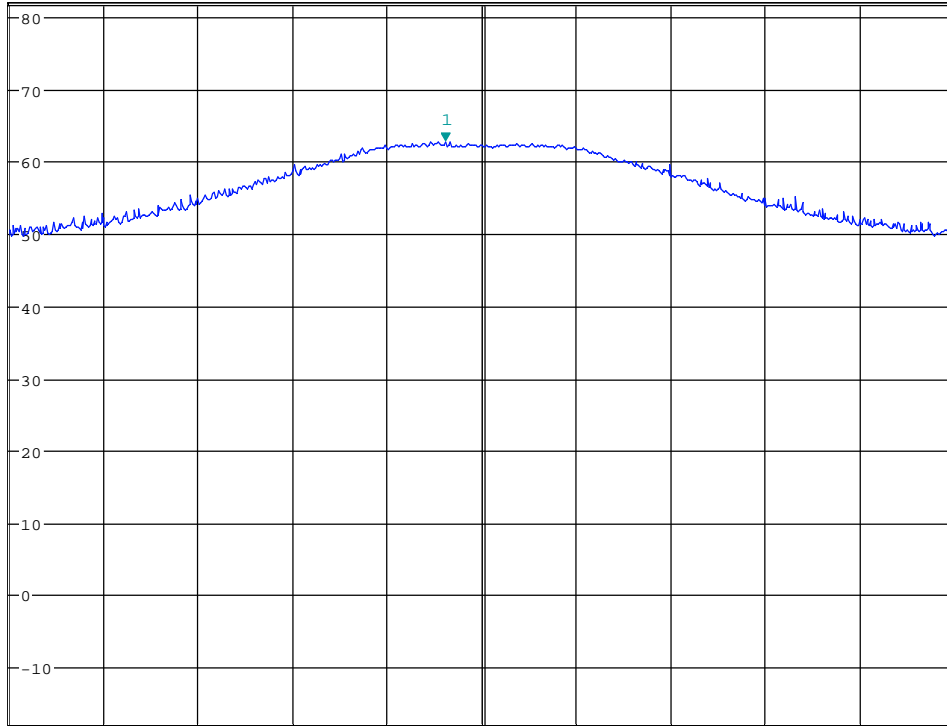
MARKER 1
 7.205615385 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 62.87 dB μ V/m
 7.205615385 GHz

Ref 82 dB μ V/m *Att 10 dB

1 PK
 MAXH



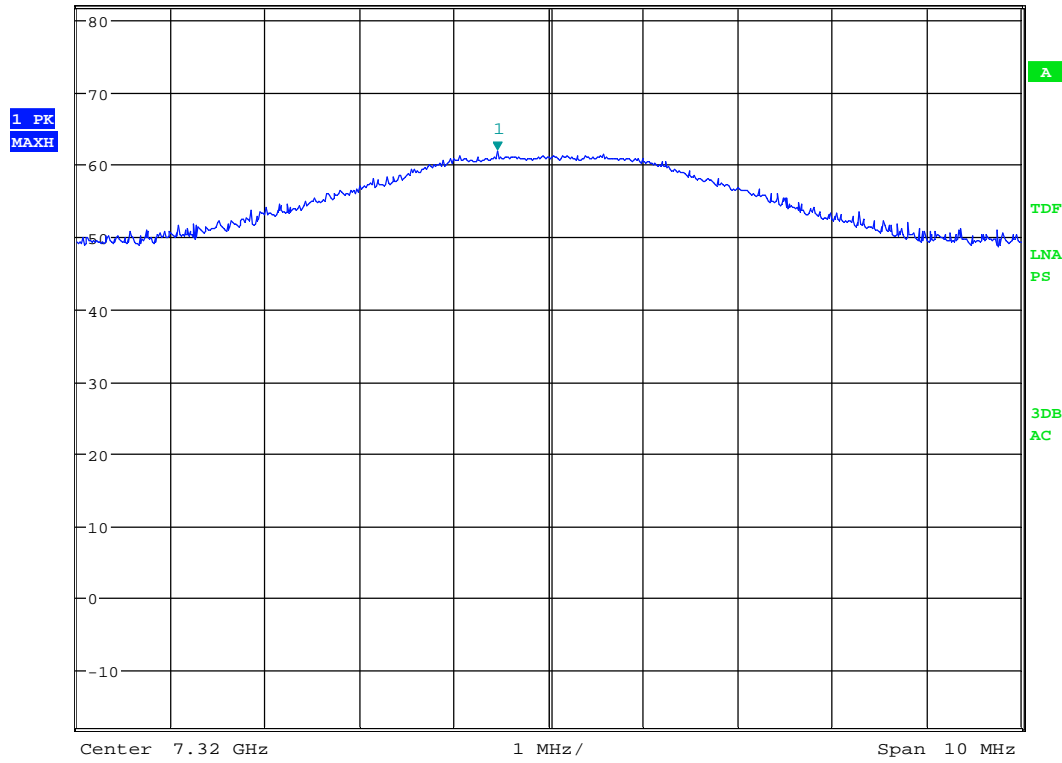
Date: 23.FEB.2017 12:56:36

3rd har, PK, ch2402MHz, EDR-3DH5 – VP



MARKER 1
 7.319455128 GHz
 Ref 82 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 61.92 dB μ V/m
 SWT 20 ms 7.319455128 GHz



Date: 23.FEB.2017 13:06:19

3rd har, PK, ch2440MHz, EDR-3DH5 – VP



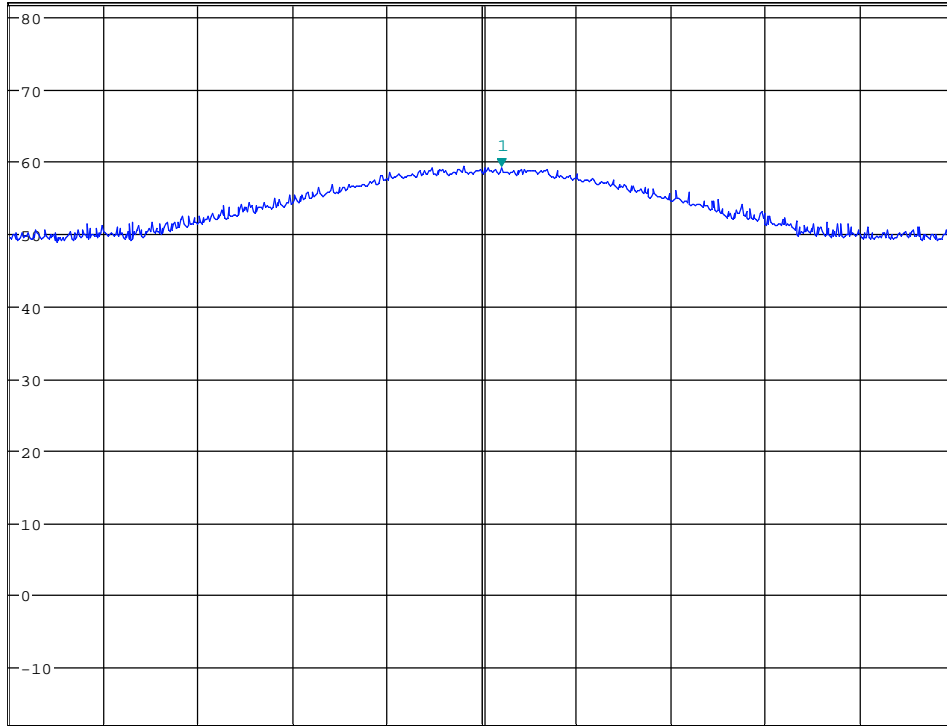
MARKER 1
 7.440208333 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 59.28 dBμV/m
 7.440208333 GHz

Ref 82 dBμV/m *Att 10 dB

1 PK
 MAXH



Center 7.44 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:09:08

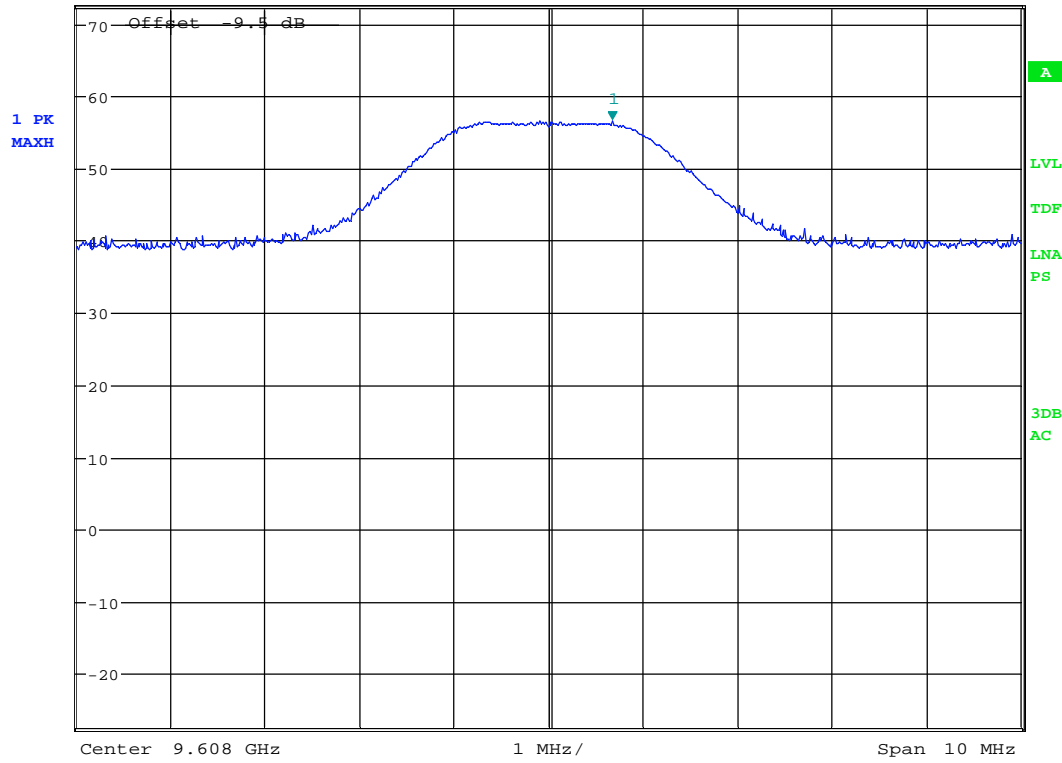
3rd har, PK, ch2480MHz, EDR-3DH5 – VP



MARKER 1
 9.608673077 GHz
 Ref 72.5 dBμV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 56.64 dBμV/m
 9.608673077 GHz

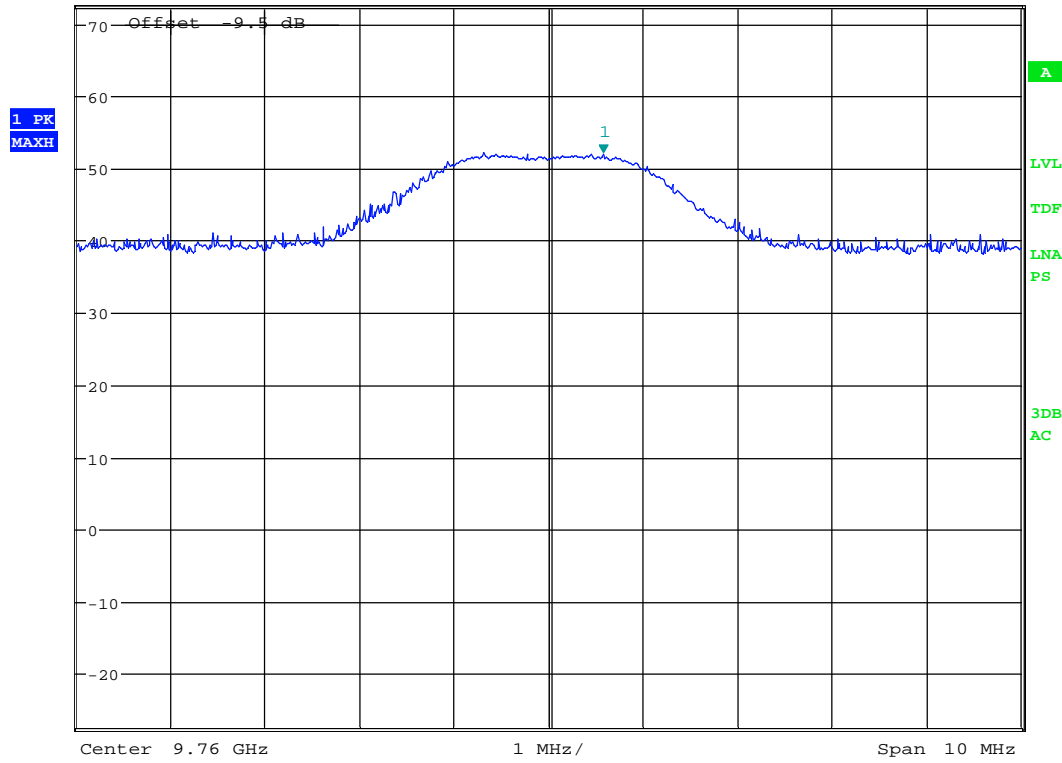


Date: 23.FEB.2017 13:46:37

4th har, PK, ch2402MHz, BR-DH5 – HP



MARKER 1
 9.760576923 GHz
 Ref 72.5 dBμV/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 20 ms
 Marker 1 [T1] 52.09 dBμV/m
 9.760576923 GHz



Date: 23.FEB.2017 13:47:42

4th har, PK, ch2440MHz, BR-DH5 – HP

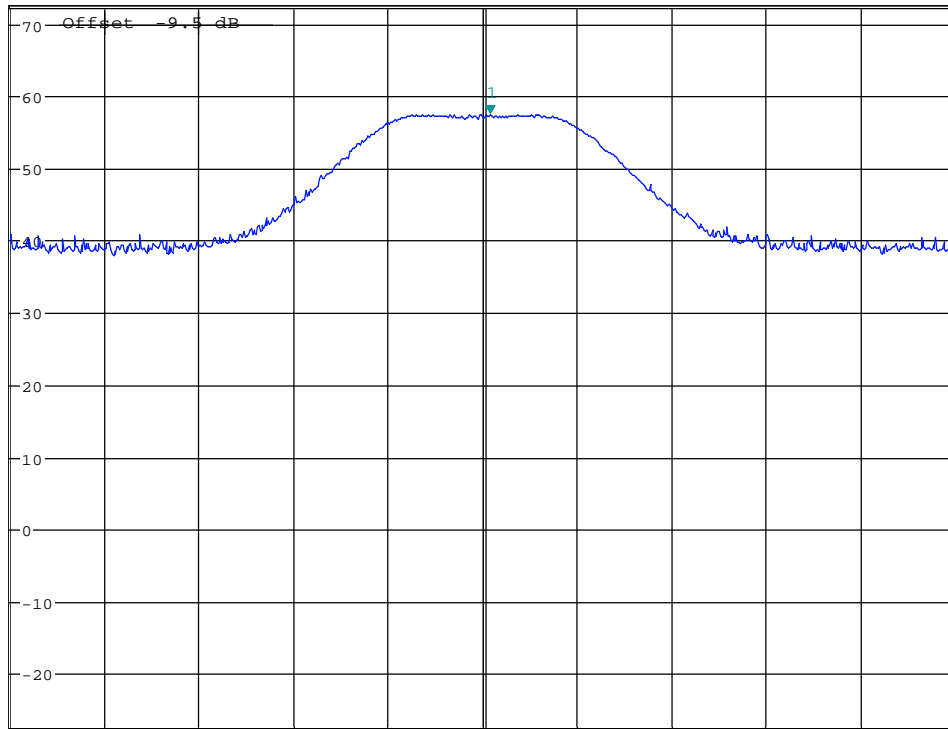


MARKER 1
 9.920080128 GHz
 Ref 72.5 dBμV/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 57.56 dBμV/m
 9.920080128 GHz

1 PK
 MAXH



Center 9.92 GHz 1 MHz/ Span 10 MHz

Date: 23.FEB.2017 13:48:10

4th har, PK, ch2480MHz, BR-DH5 – HP



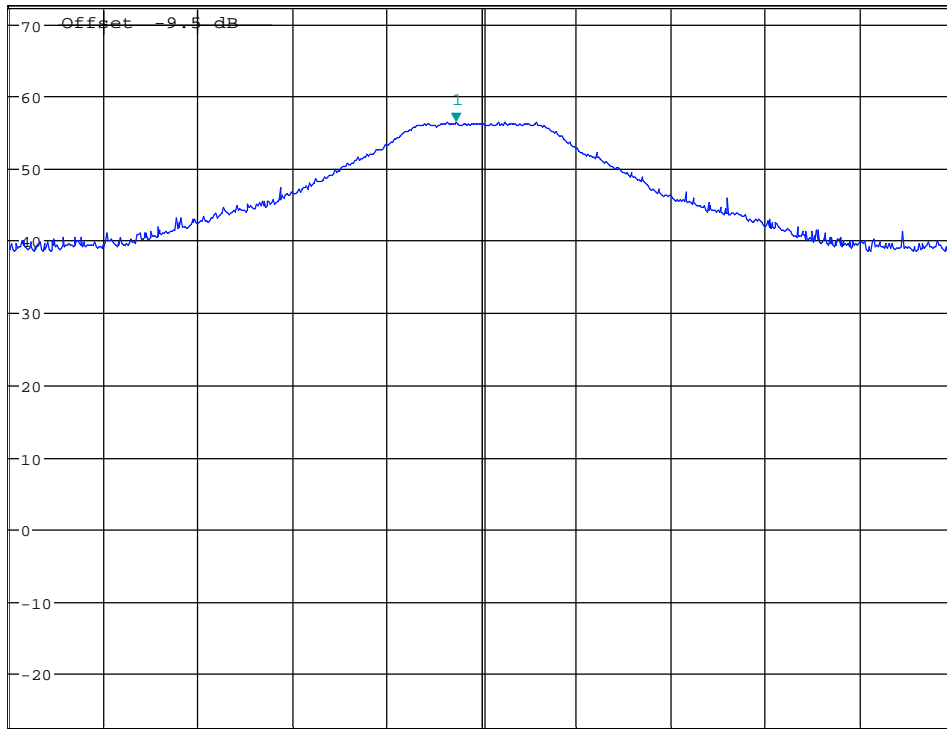
MARKER 1
 9.607455128 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 56.53 dBμV/m
 9.607455128 GHz

Ref 72.5 dBμV/m *Att 10 dB

1 PK
 MAXH



Center 9.608 GHz 2 MHz/ Span 20 MHz

Date: 23.FEB.2017 13:52:20

4th har, PK, ch2402MHz, EDR-3DH3 – VP

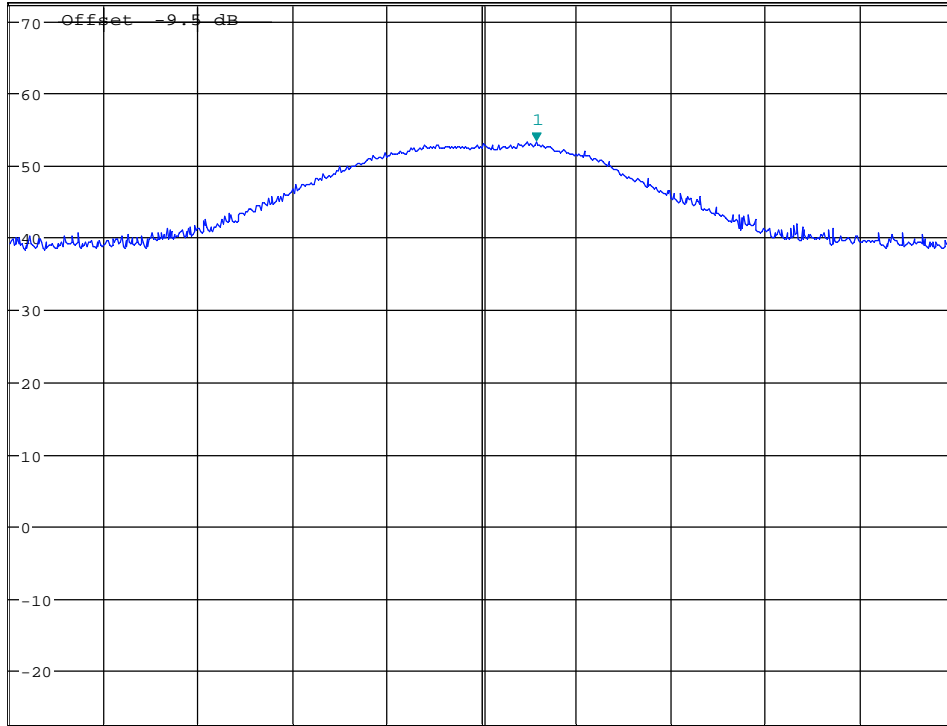


MARKER 1
 9.761153846 GHz
 Ref 72.5 dBμV/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 53.18 dBμV/m
 9.761153846 GHz

1 PK
 MAXH



Center 9.76 GHz 2 MHz/ Span 20 MHz

Date: 23.FEB.2017 13:53:14

4th har, PK, ch2440MHz, EDR-3DH3 – VP



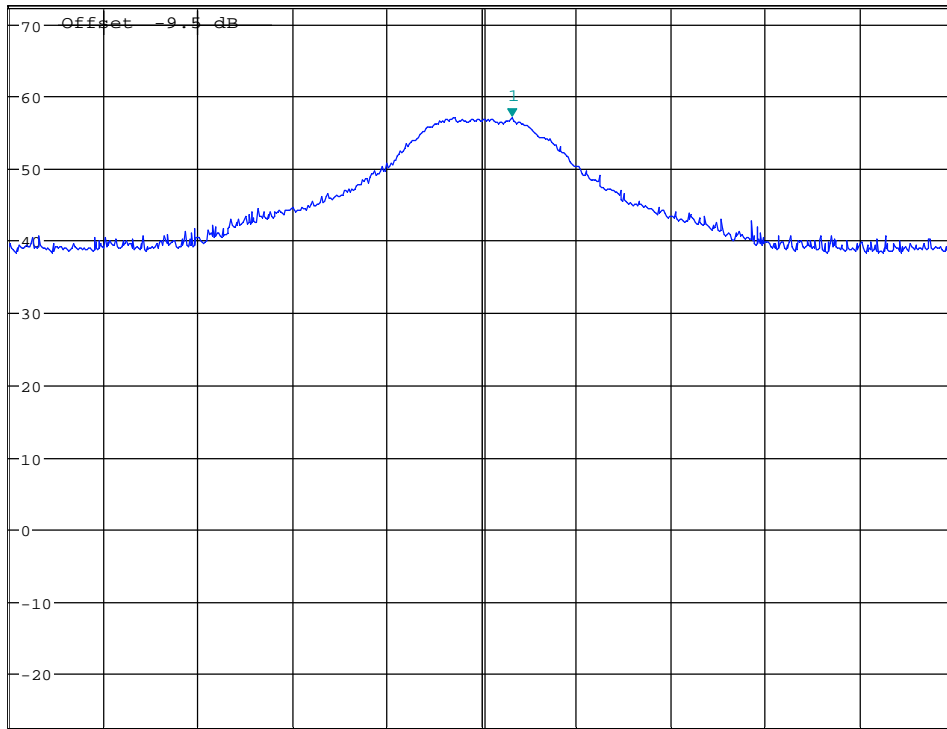
MARKER 1
 9.920641026 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 57.06 dBμV/m
 9.920641026 GHz

Ref 72.5 dBμV/m *Att 10 dB

1 PK
 MAXH



Center 9.92 GHz 2 MHz/ Span 20 MHz

Date: 23.FEB.2017 13:53:43

4th har, PK, ch2480MHz, EDR-3DH3 – VP

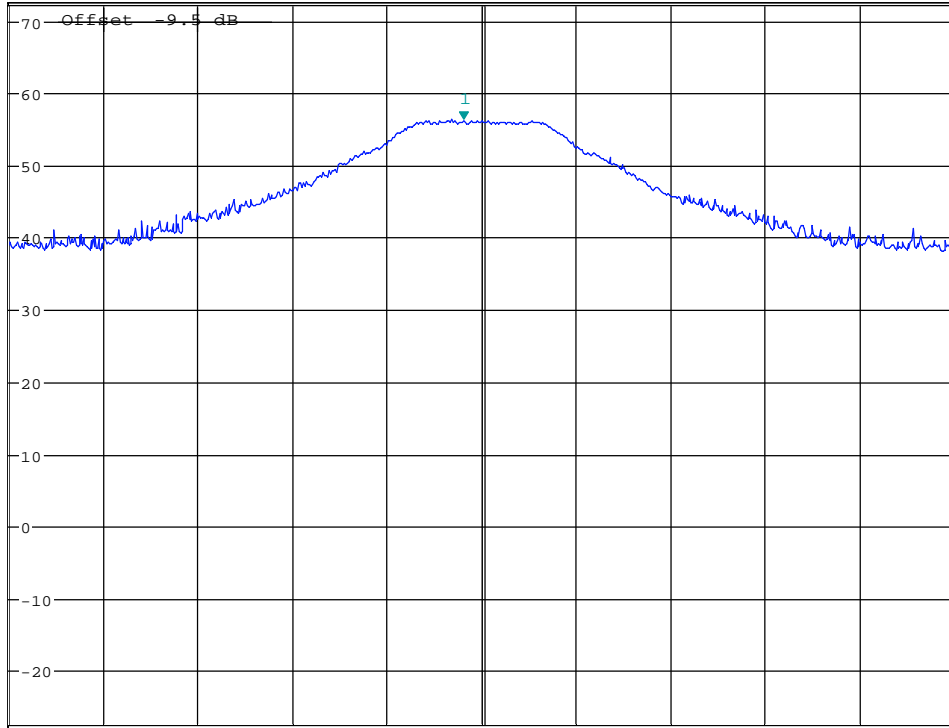


MARKER 1
 9.607615385 GHz
 Ref 72.5 dBµV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 56.18 dBµV/m
 9.607615385 GHz

1 PK
 MAXH



Center 9.608 GHz 2 MHz/ Span 20 MHz

Date: 23.FEB.2017 13:56:01

4th har, PK, ch2402MHz, EDR-3DH5 – VP

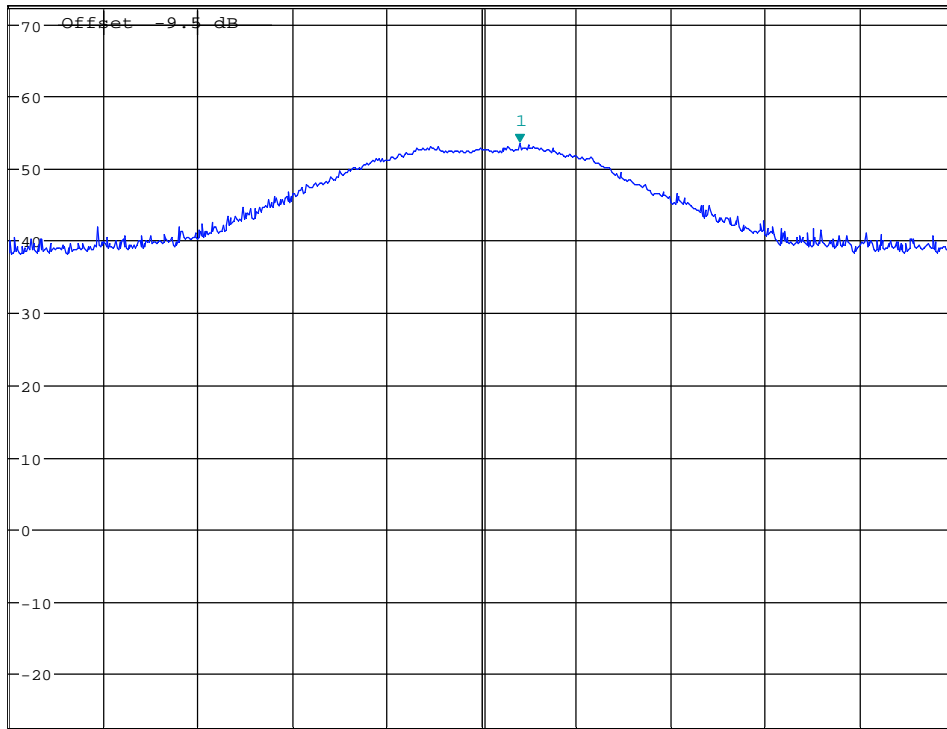


MARKER 1
 9.760801282 GHz
 Ref 72.5 dBμV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 53.41 dBμV/m
 9.760801282 GHz

1 PK
 MAXH



Center 9.76 GHz 2 MHz/ Span 20 MHz

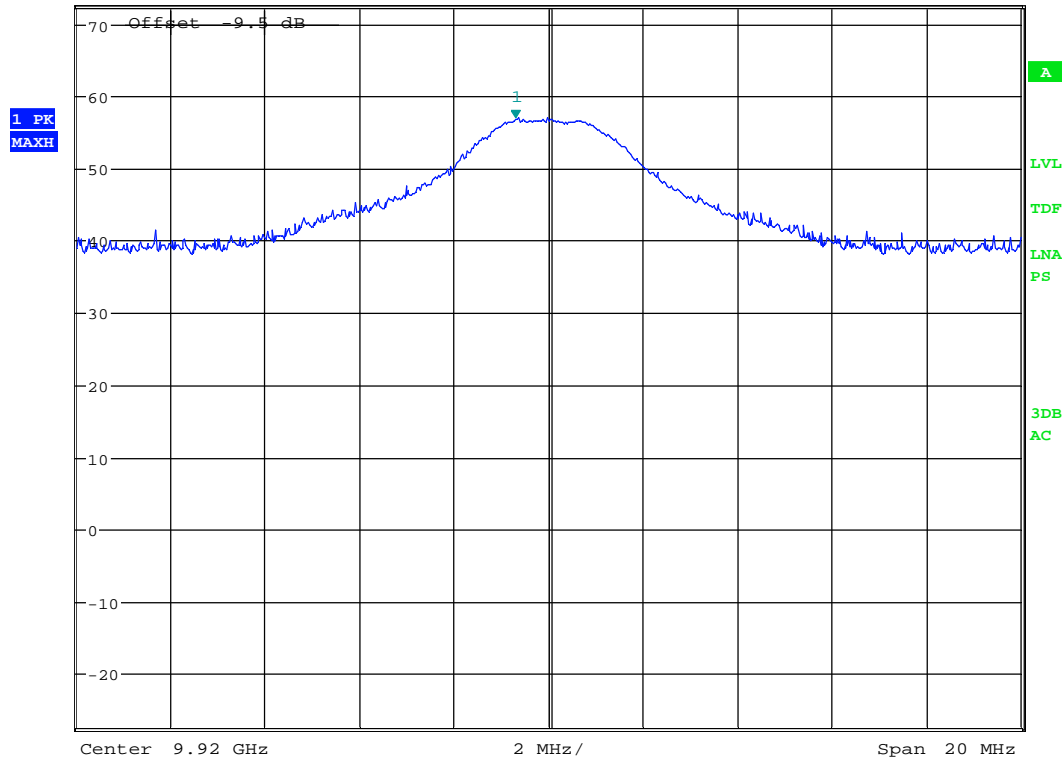
Date: 23.FEB.2017 13:56:47

4th har, PK, ch2440MHz, EDR-3DH5 – VP



MARKER 1
 9.919294872 GHz
 Ref 72.5 dBµV/m *Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 56.87 dBµV/m
 SWT 20 ms 9.919294872 GHz



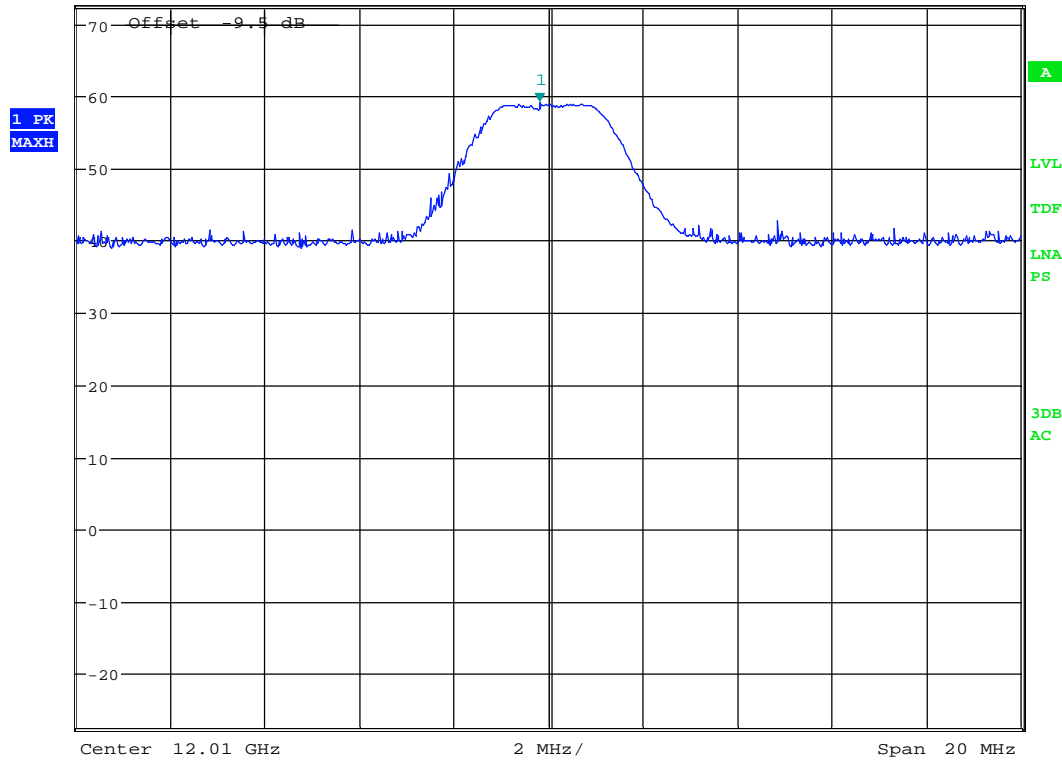
Date: 23.FEB.2017 13:57:12

4th har, PK, ch2480MHz, EDR-3DH5 – VP



MARKER 1
 12.00980769 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 59.10 dB μ V/m
 SWT 20 ms 12.009807692 GHz

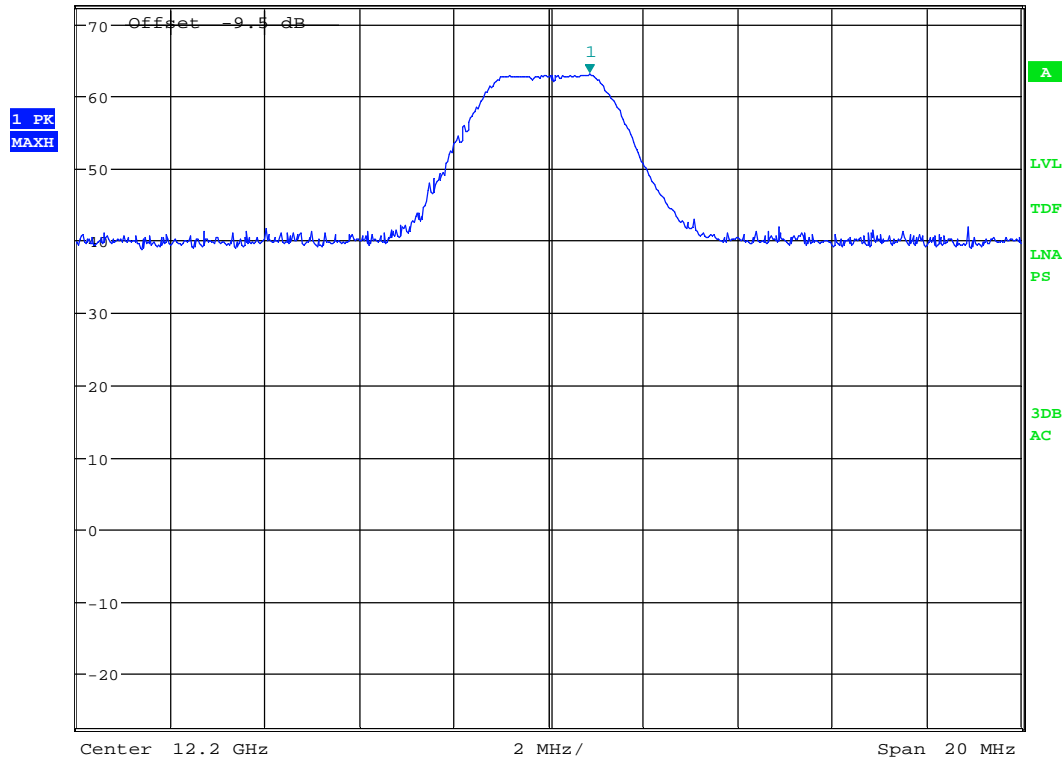


Date: 23.FEB.2017 14:11:19

5th har, PK, ch2402MHz, BR-DH5 – HP



MARKER 1
 12.20086538 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 20 ms
 Marker 1 [T1] 63.18 dB μ V/m
 12.200865385 GHz

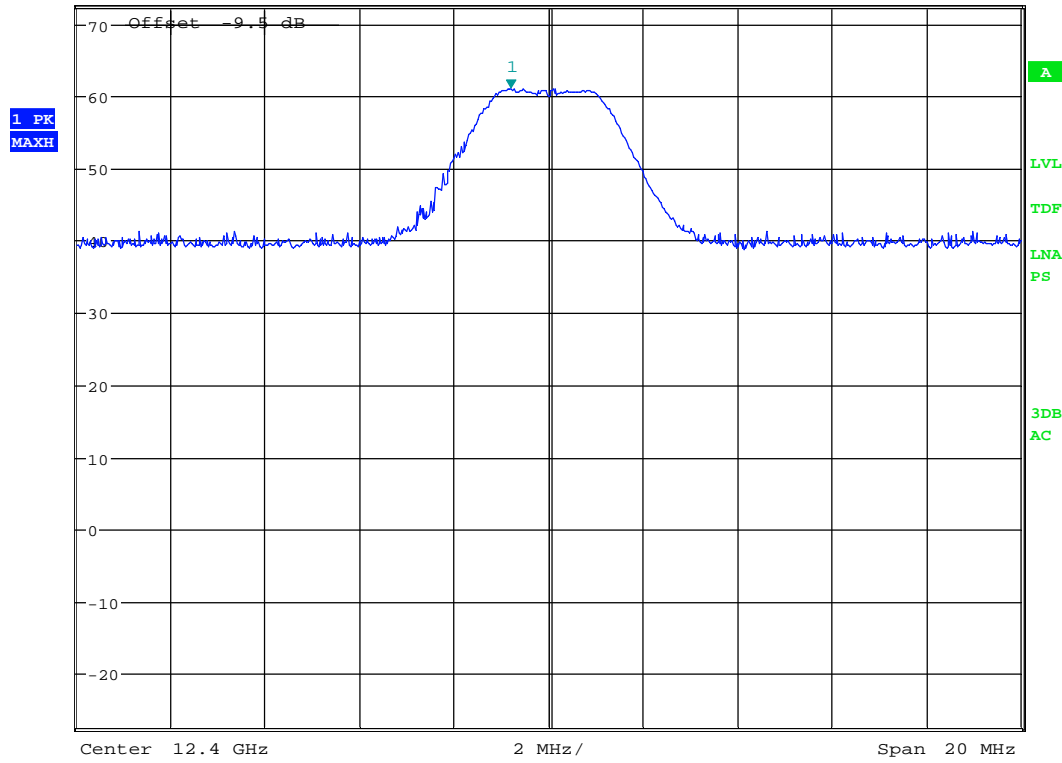


Date: 23.FEB.2017 14:12:04

5th har, PK, ch2440MHz, BR-DH5 – HP



MARKER 1
 12.39919872 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 20 ms
 Marker 1 [T1] 61.05 dB μ V/m
 12.399198718 GHz



Date: 23.FEB.2017 14:12:33

5th har, PK, ch2480MHz, BR-DH5 – HP

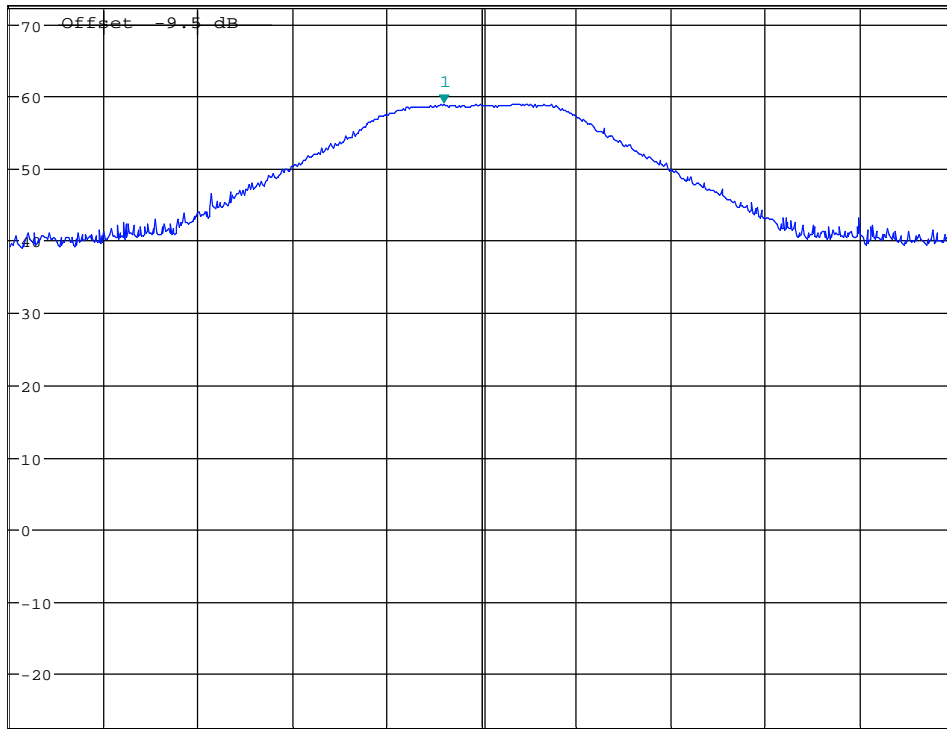


MARKER 1
 12.00919872 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 20 ms

Marker 1 [T1]
 58.96 dB μ V/m
 12.009198718 GHz

1 PK
 MAXH



Center 12.01 GHz 2 MHz/ Span 20 MHz

A
 LVL
 TDF
 LNA
 PS
 3DB
 AC

Date: 23.FEB.2017 14:06:40

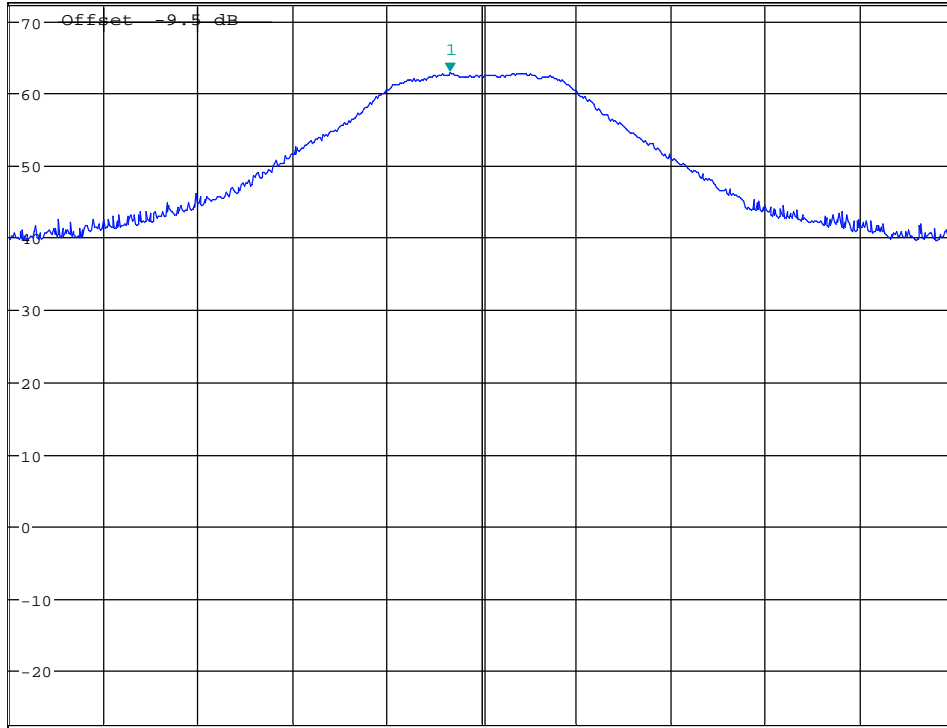
5th har, PK, ch2402MHz, EDR-3DH3 – HP



MARKER 1
 12.19932692 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 62.87 dB μ V/m
 SWT 20 ms 12.199326923 GHz

1 PK
 MAXH



Center 12.2 GHz 2 MHz/ Span 20 MHz

Date: 23.FEB.2017 14:07:22

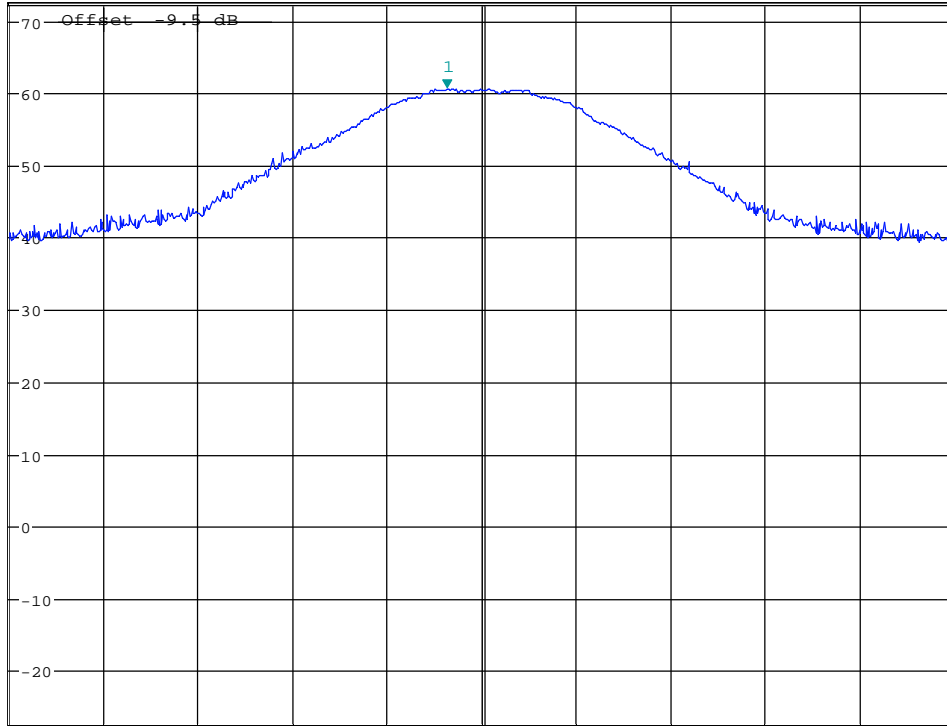
5th har, PK, ch2440MHz, EDR-3DH3 – HP



MARKER 1
 12.39926282 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 60.64 dB μ V/m
 SWT 20 ms 12.399262821 GHz

1 PK
 MAXH



Center 12.4 GHz 2 MHz/ Span 20 MHz

A
 LVL
 TDF
 LNA
 PS
 3DB
 AC

Date: 23.FEB.2017 14:07:56

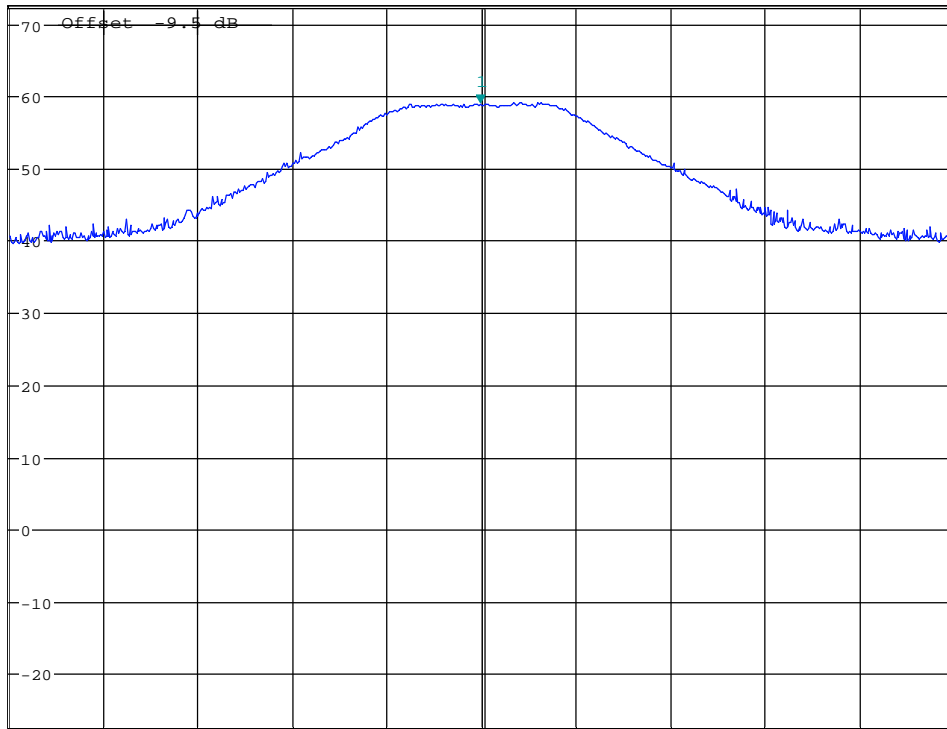
5th har, PK, ch2480MHz, EDR-3DH3 – HP



MARKER 1
 12.00996795 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 58.99 dB μ V/m
 SWT 20 ms 12.009967949 GHz

1 PK
 MAXH



Center 12.01 GHz 2 MHz/ Span 20 MHz

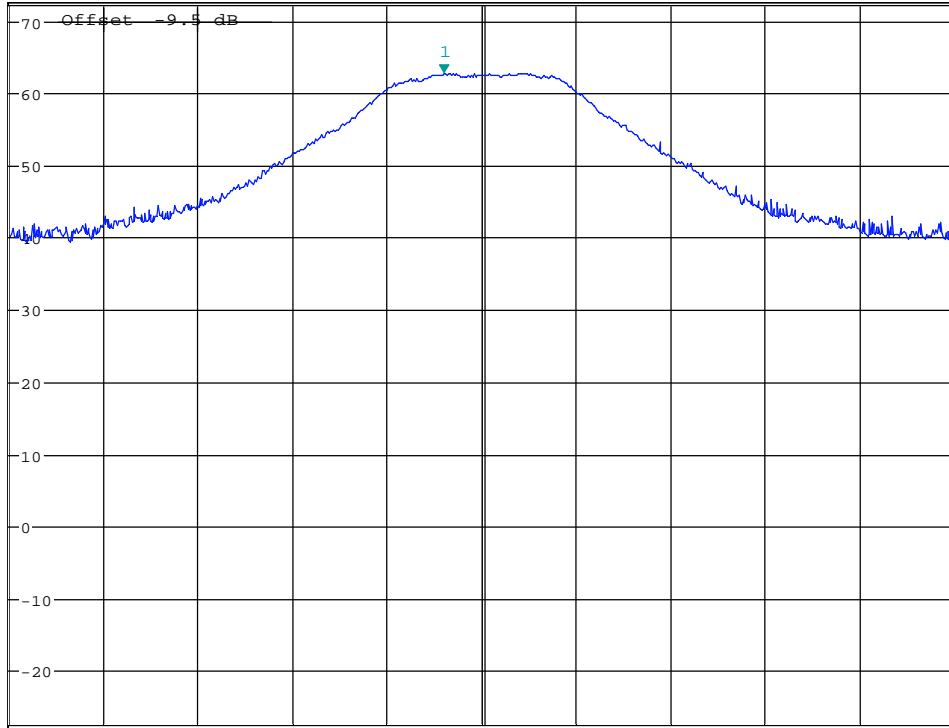
Date: 23.FEB.2017 14:03:26

5th har, PK, ch2402MHz, EDR-3DH5 – HP



MARKER 1
12.19919872 GHz
Ref 87 dB μ V/m * Att 10 dB *RBW 1 MHz VBW 3 MHz SWT 20 ms Marker 1 [T1] 62.81 dB μ V/m 12.199198718 GHz

1 PK
MAXH



Center 12.2 GHz 2 MHz/ Span 20 MHz

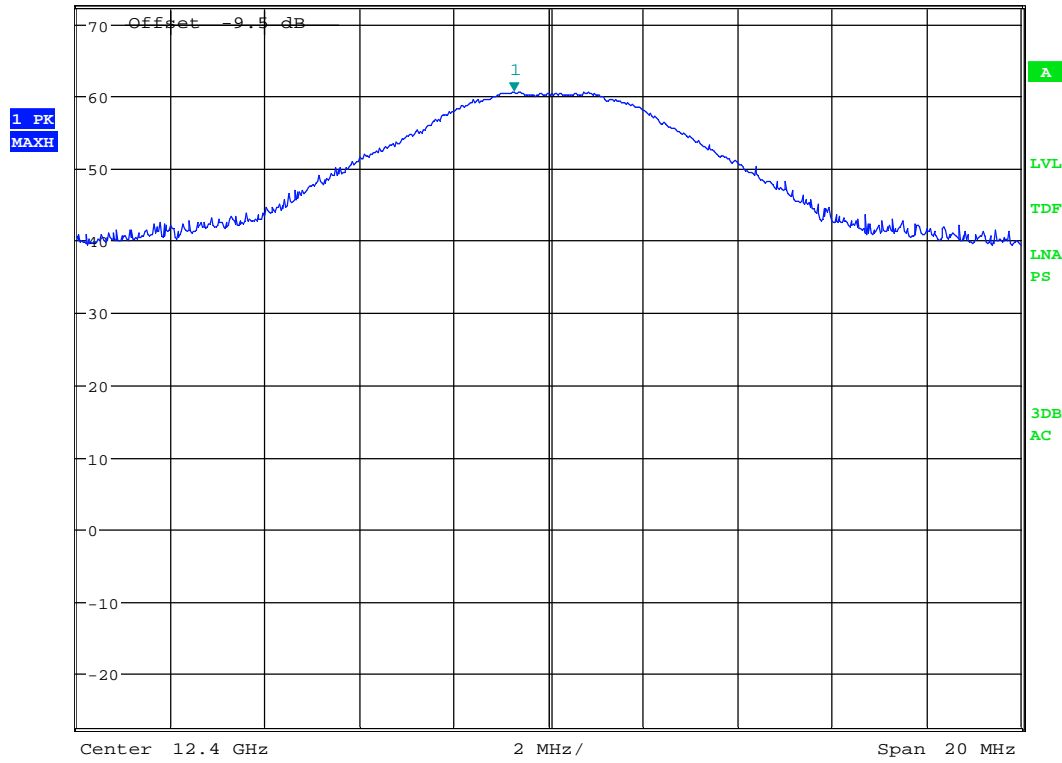
Date: 23.FEB.2017 14:04:08

5th har, PK, ch2440MHz, EDR-3DH5 – HP



MARKER 1
 12.39926282 GHz
 Ref 87 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 60.59 dB μ V/m
 SWT 20 ms 12.399262821 GHz



Date: 23.FEB.2017 14:04:32

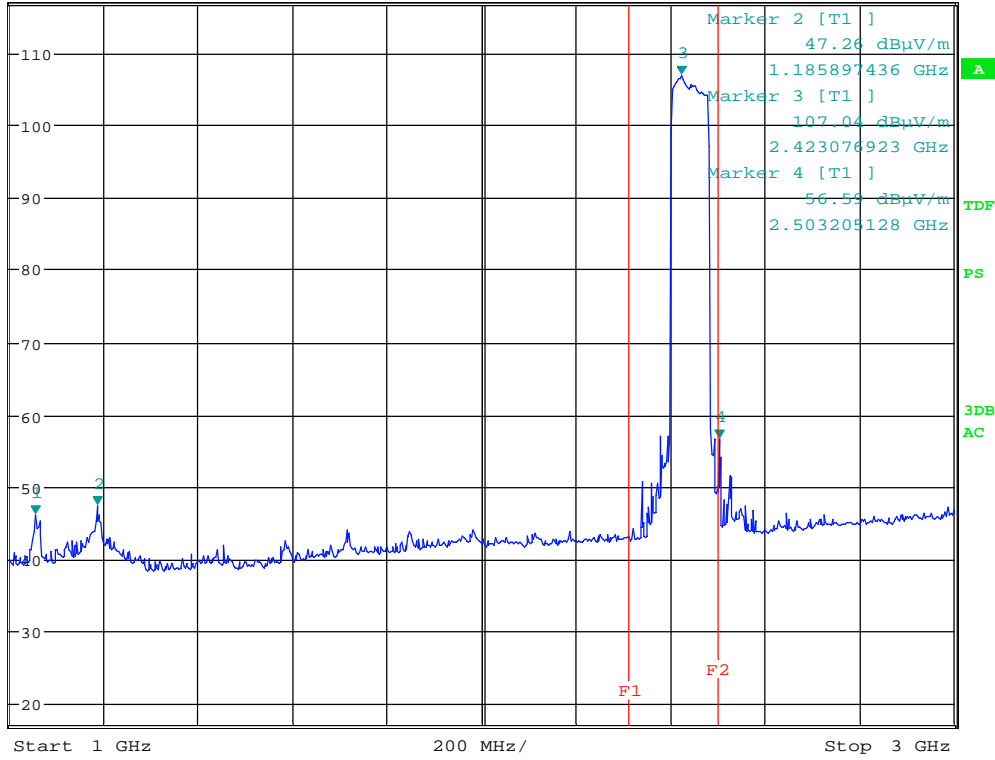
5th har, PK, ch2480MHz, EDR-3DH5 – HP



MARKER 1
 1.054487179 GHz
 Ref 117 dBuV/m *Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 46.19 dBuV/m
 SWT 5 ms 1.054487179 GHz

1 PK
 MAXH



Date: 23.FEB.2017 10:06:30

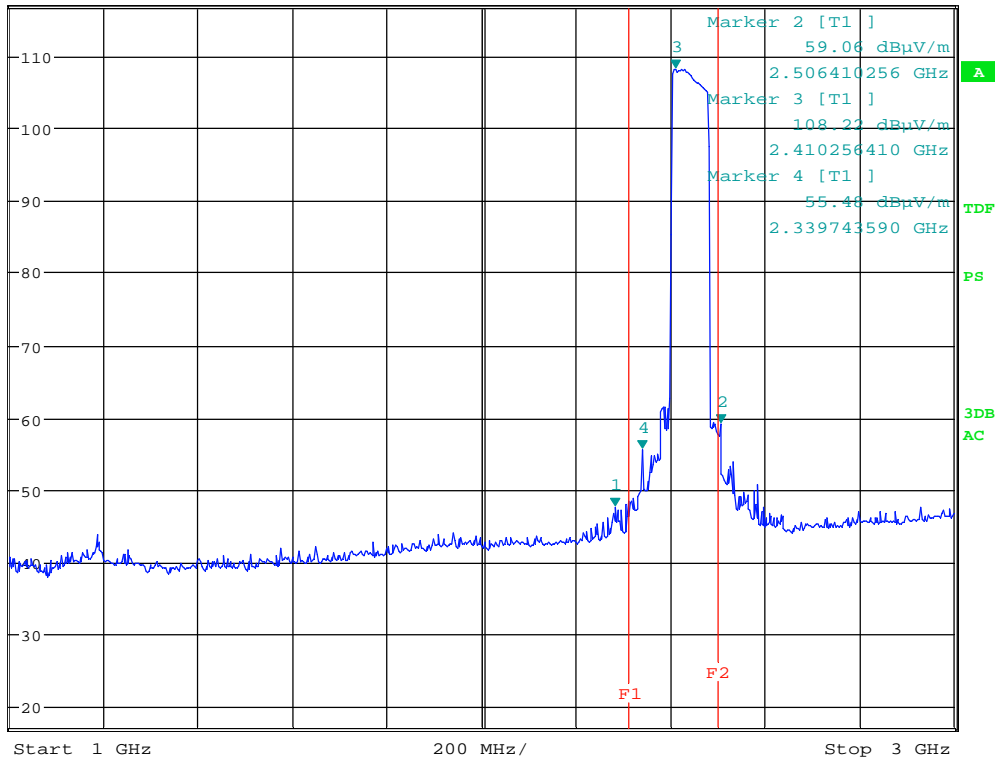
VP, 1 - 3GHz , hopping mode BR-DH5, PK scan



MARKER 1
 2.282051282 GHz
 Ref 117 dBμV/m *Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 47.60 dBμV/m
 SWT 5 ms 2.282051282 GHz

1 PK
 MAXH



Date: 23.FEB.2017 10:03:55

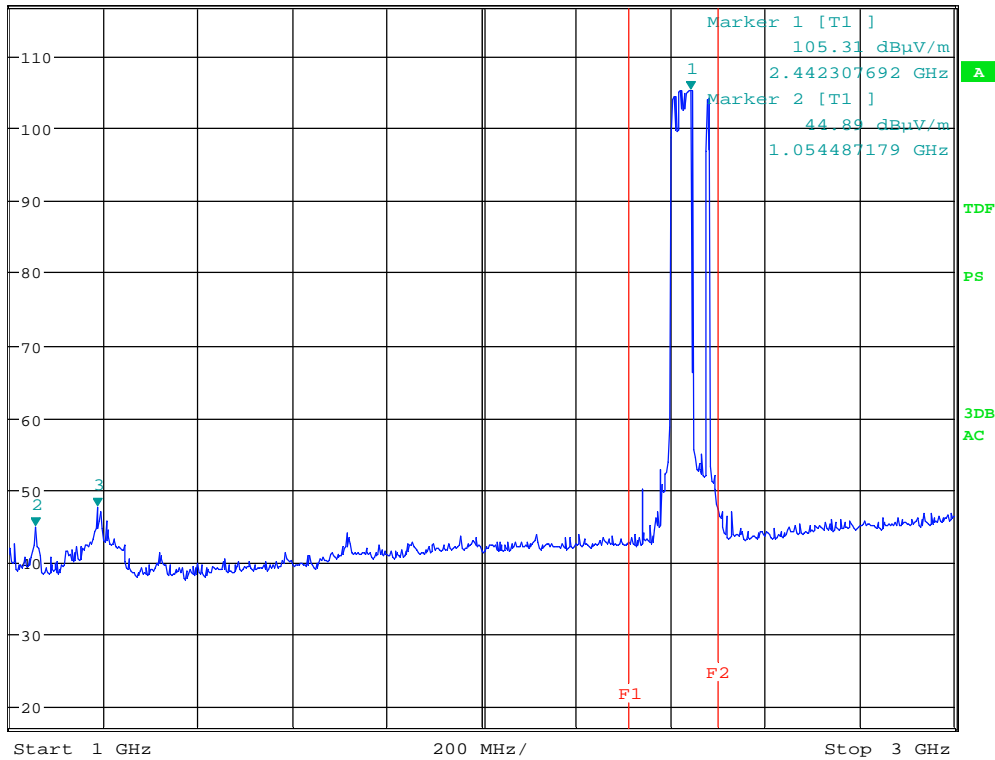
HP, 1 - 3GHz , hopping mode BR-DH5, PK scan



MARKER 3
 1.185897436 GHz
 Ref 117 dBµV/m *Att 10 dB

*RBW 1 MHz Marker 3 [T1]
 VBW 3 MHz 47.60 dBµV/m
 SWT 5 ms 1.185897436 GHz

1 PK
 MAXH



Date: 23.FEB.2017 10:49:23

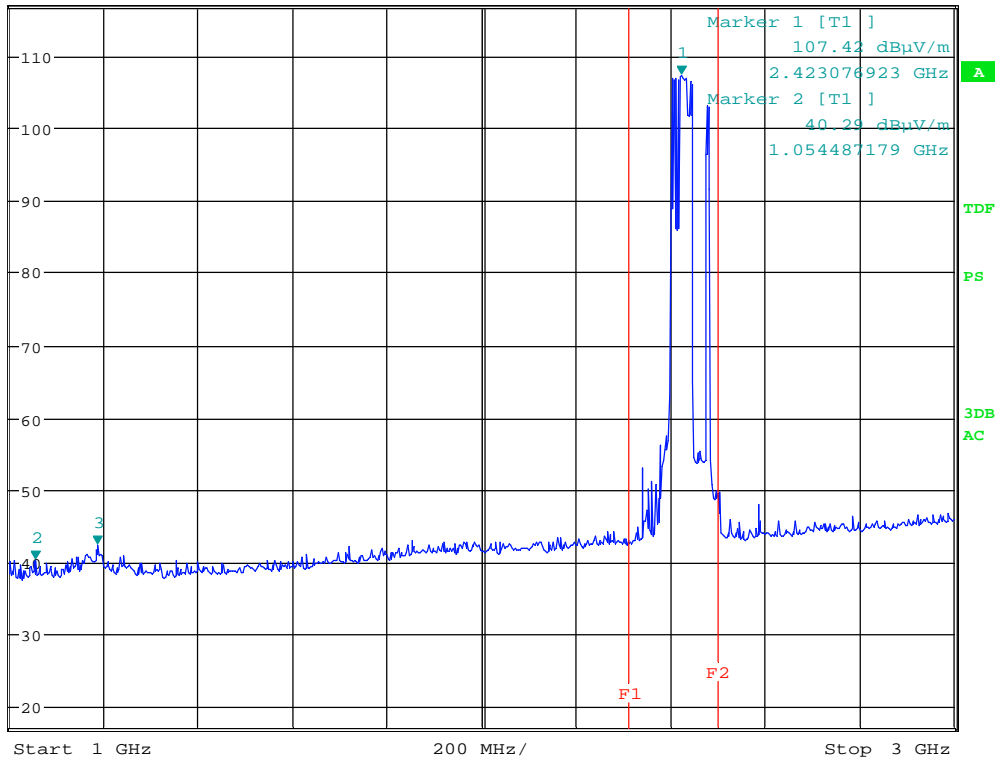
VP, 1 - 3GHz , hopping mode EDR-3DH3, PK scan



MARKER 3
 1.185897436 GHz
 Ref 117 dBμV/m *Att 10 dB

*RBW 1 MHz Marker 3 [T1]
 VBW 3 MHz 42.33 dBμV/m
 SWT 5 ms 1.185897436 GHz

1 PK
 MAXH



Date: 23.FEB.2017 10:50:32

HP, 1 - 3GHz , hopping mode EDR-3DH3, PK scan

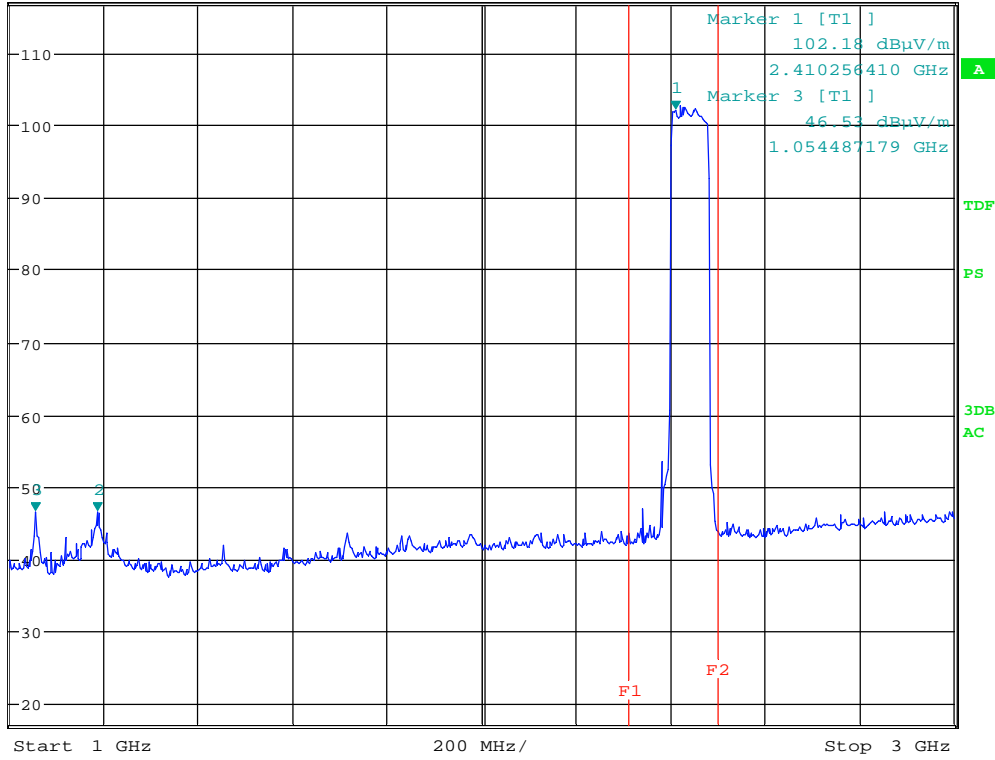


MARKER 2
 1.185897436 GHz
 Ref 117 dBµV/m *Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 5 ms

Marker 2 [T1]
 46.55 dBµV/m
 1.185897436 GHz

1 PK
 MAXH



Date: 23.FEB.2017 12:31:58

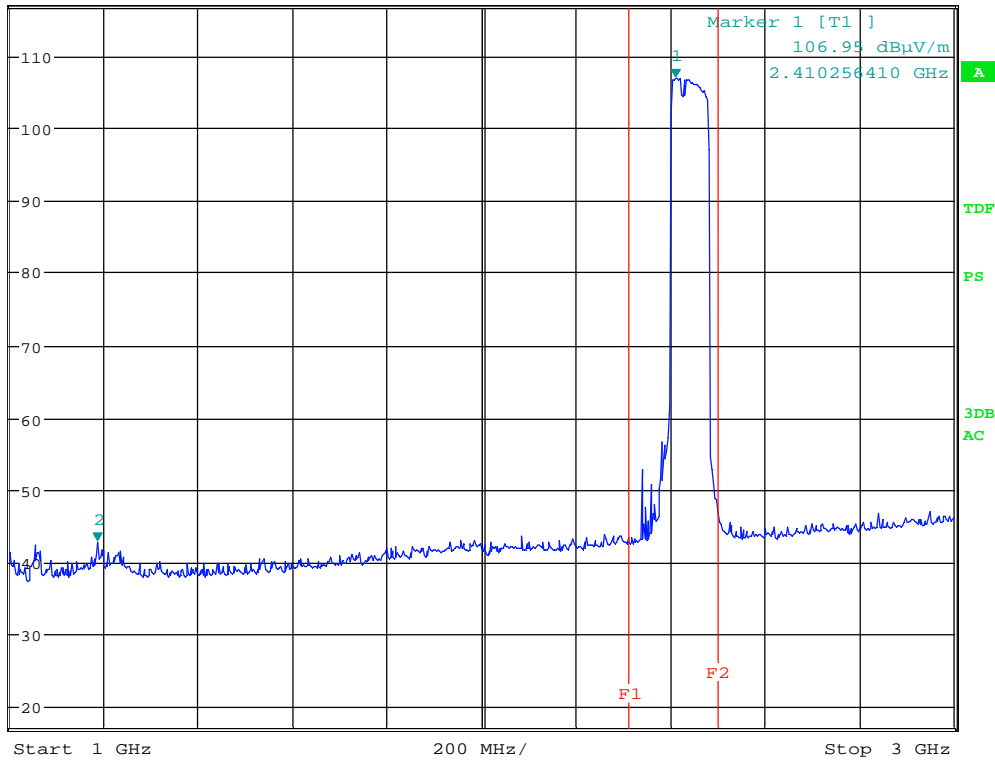
VP, 1 - 3GHz , hopping mode EDR-3DH5, PK scan



MARKER 2
 1.185897436 GHz
 Ref 117 dBμV/m *Att 10 dB

*RBW 1 MHz Marker 2 [T1]
 VBW 3 MHz 42.76 dBμV/m
 SWT 5 ms 1.185897436 GHz

1 PK
 MAXH



Date: 23.FEB.2017 12:31:03

HP, 1 - 3GHz , hopping mode EDR-3DH5, PK scan



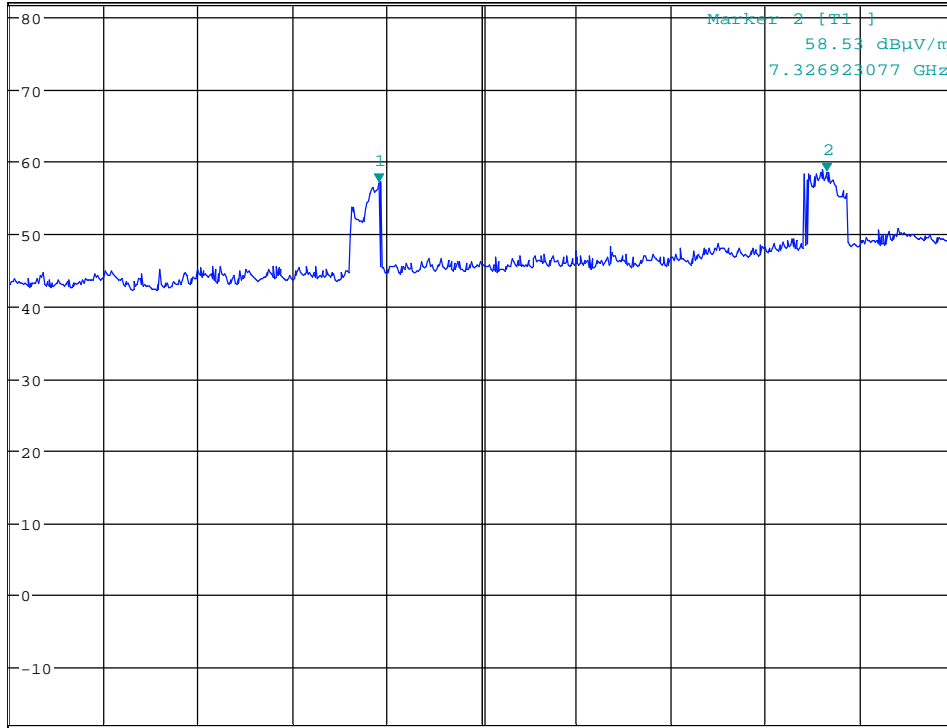
MARKER 1
 4.953788462 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 30 ms

Marker 1 [T1]
 57.05 dBμV/m
 4.953788462 GHz

Ref 82 dBμV/m *Att 10 dB

1 PK
 MAXH



Date: 23.FEB.2017 13:28:20

VP, 3 - 8GHz , hopping mode BR-DH5, PK scan



MARKER 1
 4.937762821 GHz

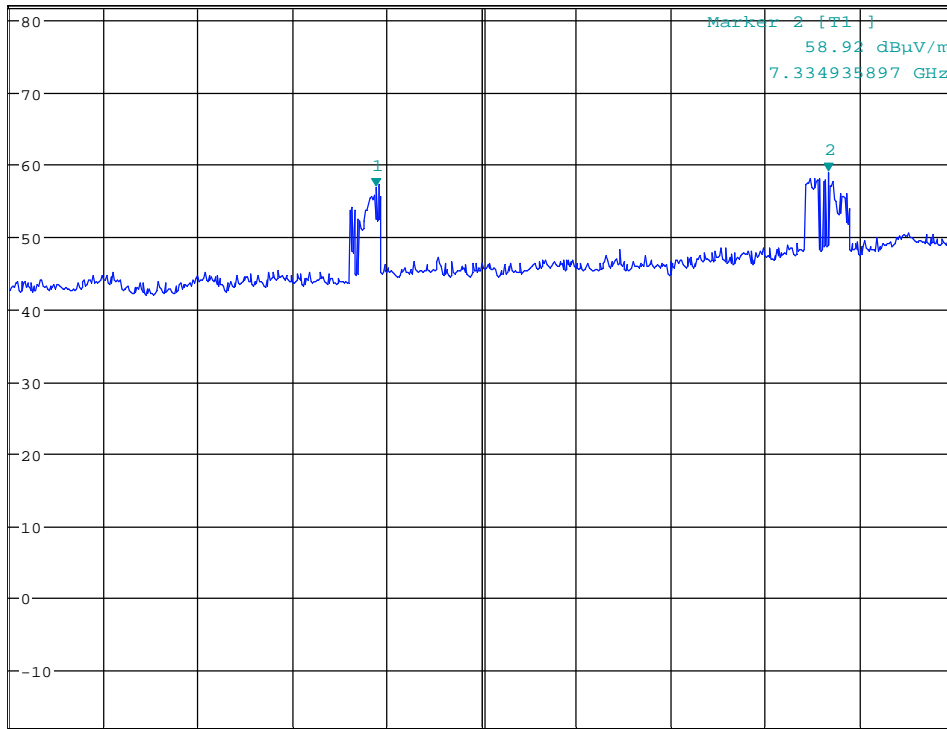
*RBW 1 MHz
 VBW 3 MHz
 SWT 30 ms

Marker 1 [T1]
 56.80 dBμV/m
 4.937762821 GHz

Ref 82 dBμV/m

*Att 10 dB

1 PK
 MAXH



Start 3 GHz

500 MHz/

Stop 8 GHz

Date: 23.FEB.2017 13:25:42

HP, 3 - 8GHz , hopping mode BR-DH5, PK scan



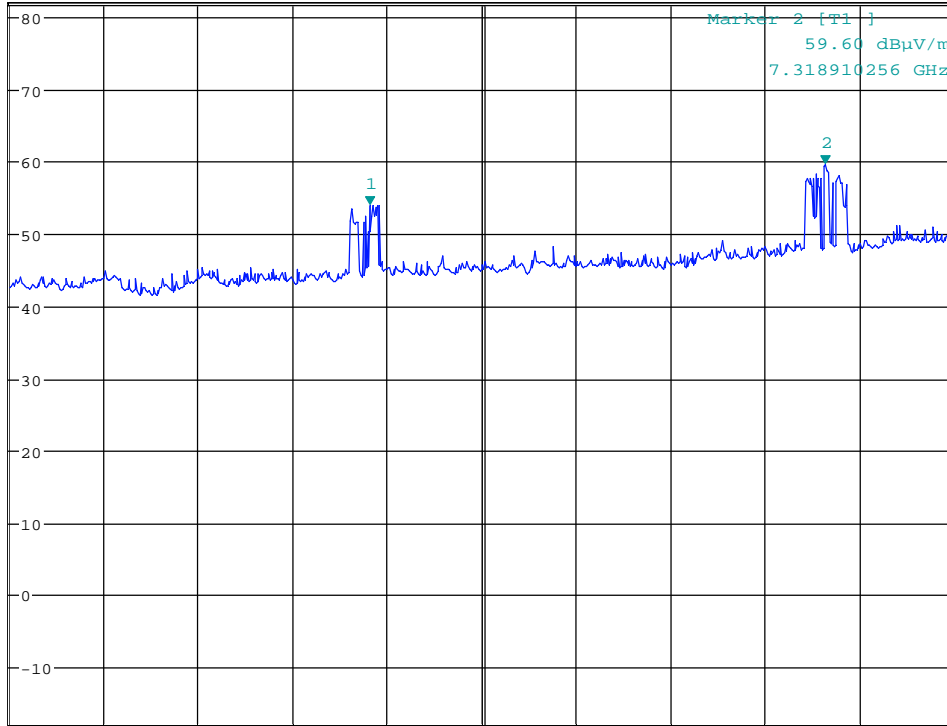
MARKER 1
 4.908157051 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 30 ms

Marker 1 [T1]
 54.03 dBμV/m
 4.908157051 GHz

Ref 82 dBμV/m *Att 10 dB

1 PK
 MAXH



Start 3 GHz 500 MHz/ Stop 8 GHz

Date: 23.FEB.2017 13:12:27

VP, 3 - 8GHz , hopping mode EDR-3DH3, PK scan



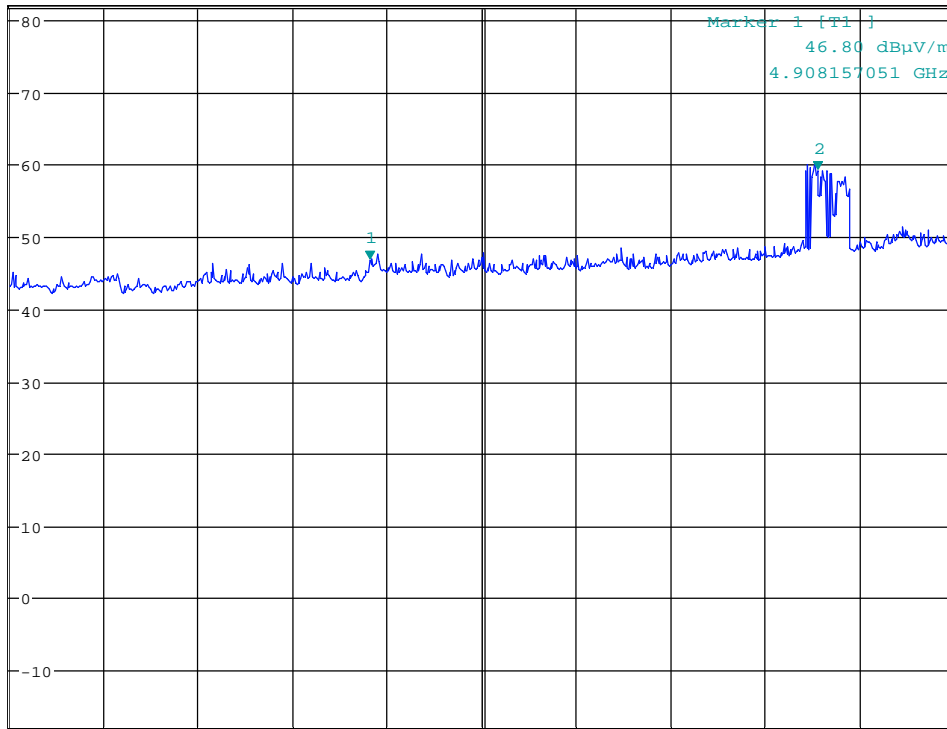
MARKER 2
 7.278846154 GHz

*RBW 1 MHz
 VBW 3 MHz
 SWT 30 ms

Marker 2 [T1]
 59.17 dBμV/m
 7.278846154 GHz

Ref 82 dBμV/m *Att 10 dB

1 PK
 MAXH



Start 3 GHz 500 MHz/ Stop 8 GHz

Date: 23.FEB.2017 13:14:00

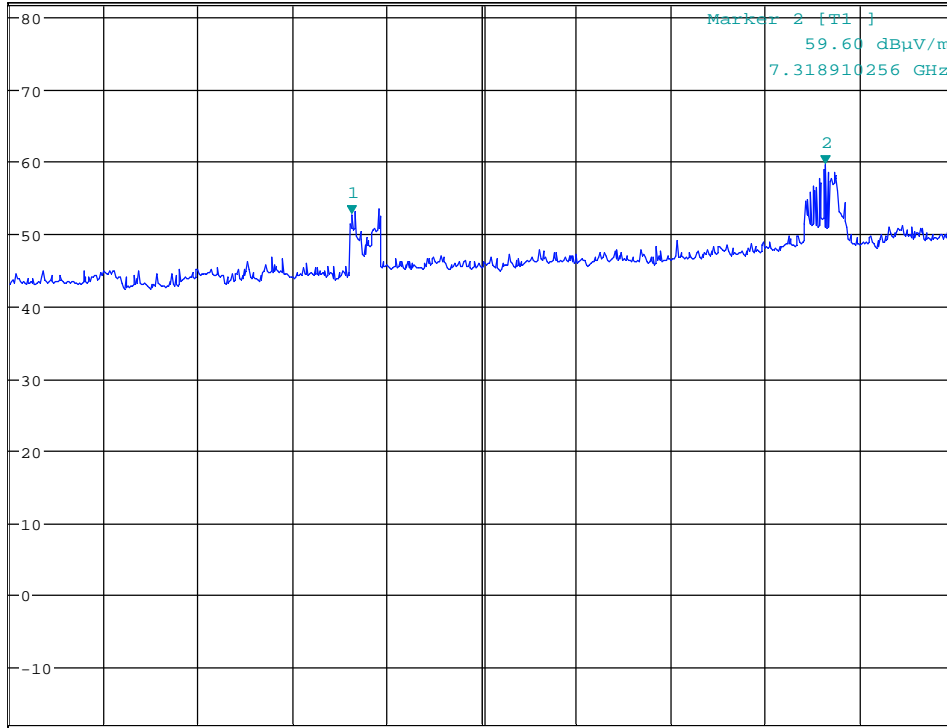
HP, 3 - 8GHz , hopping mode EDR-3DH3, PK scan



MARKER 1
 4.810897436 GHz
 Ref 82 dB μ V/m * Att 10 dB

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 52.64 dB μ V/m
 SWT 30 ms 4.810897436 GHz

1 PK
 MAXH



Start 3 GHz 500 MHz/ Stop 8 GHz

A
 TDF
 LNA
 PS
 3DB
 AC

Date: 23.FEB.2017 12:44:45

VP, 3 - 8GHz , hopping mode EDR-3DH5, PK scan

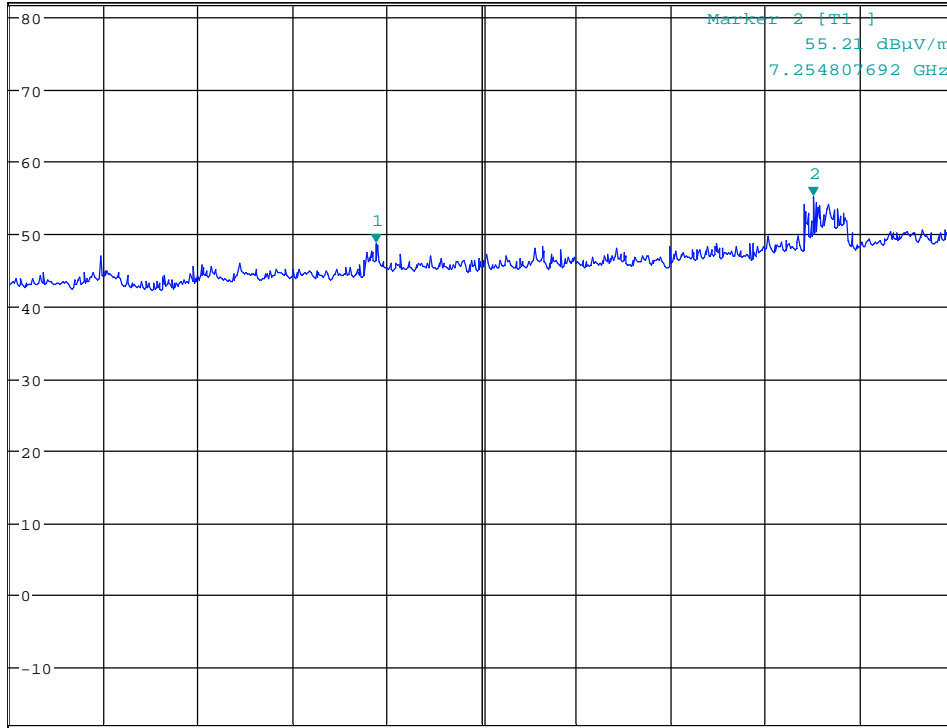


MARKER 1
 4.939102564 GHz
 Ref 82 dB μ V/m * Att 10 dB

*RBW 1 MHz
 VBW 3 MHz
 SWT 30 ms

Marker 1 [T1]
 48.75 dB μ V/m
 4.939102564 GHz

1 PK
 MAXH



Start 3 GHz 500 MHz/ Stop 8 GHz

Date: 23.FEB.2017 12:47:33

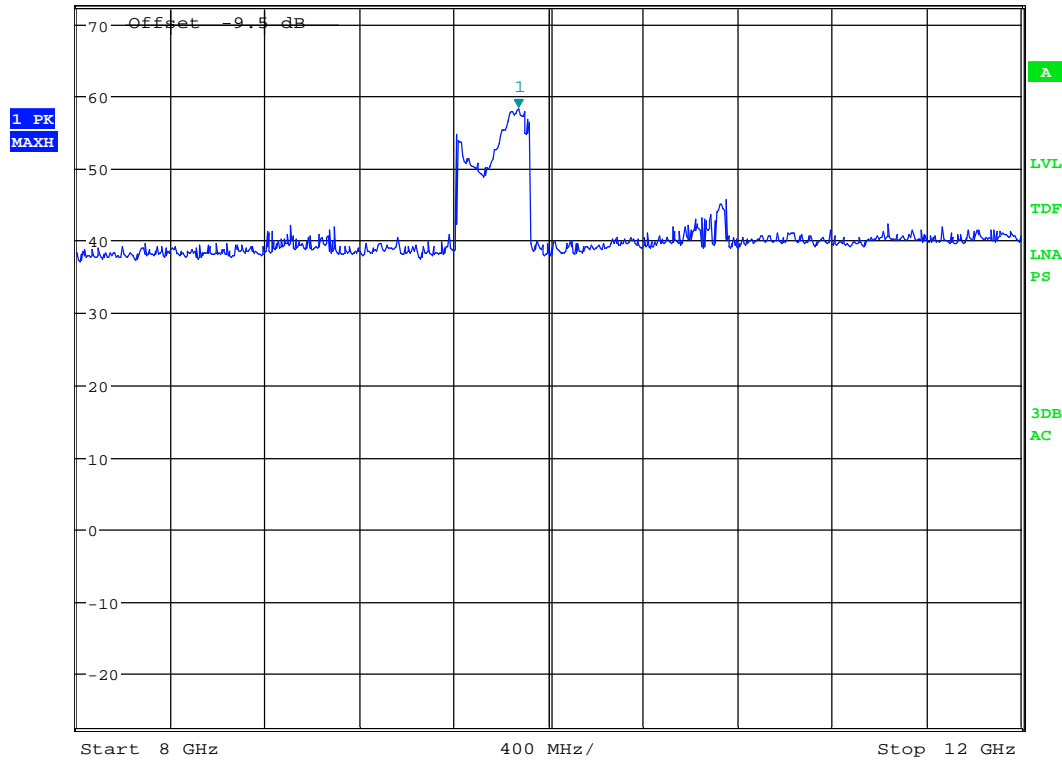
HP, 3 - 8GHz , hopping mode EDR-3DH5, PK scan



MARKER 1
 9.871794872 GHz
 Ref 72.5 dBµV/m * Att 10 dB

* RBW 1 MHz
 VBW 3 MHz
 SWT 25 ms

Marker 1 [T1]
 58.22 dBµV/m
 9.871794872 GHz

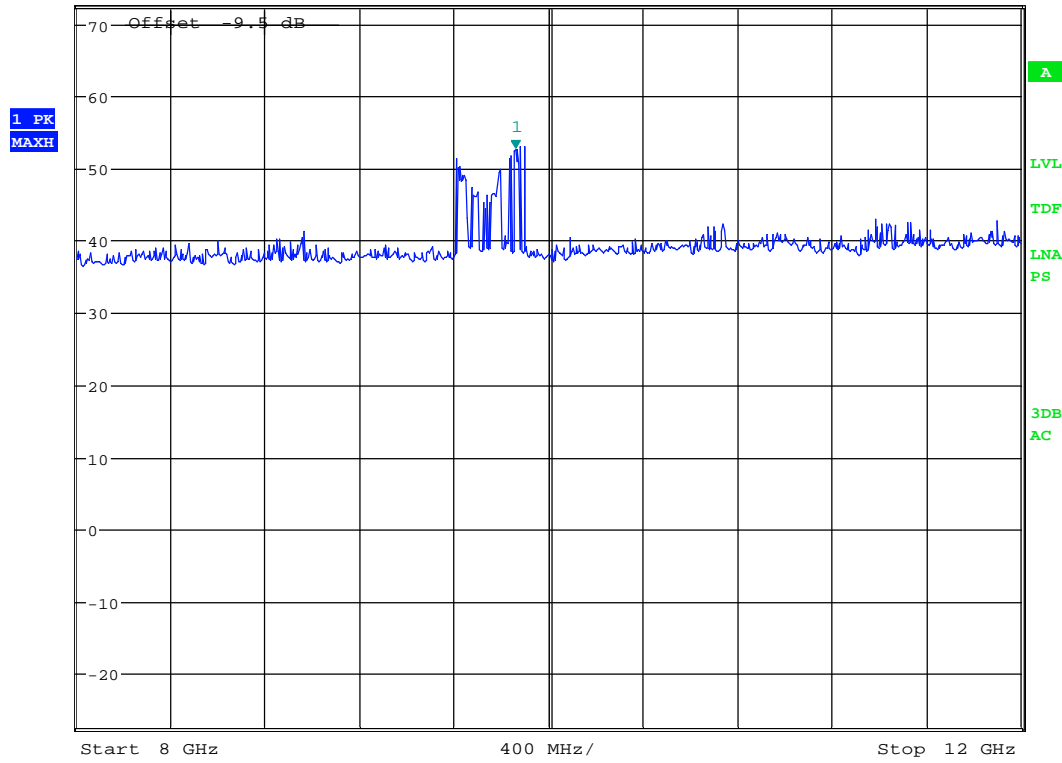


Date: 23.FEB.2017 13:44:21

VP, 8 - 12GHz , hopping mode BR-DH5, PK scan



MARKER 1
 9.858974359 GHz
 Ref 72.5 dBµV/m * Att 10 dB
 *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 52.73 dBµV/m
 SWT 25 ms 9.858974359 GHz

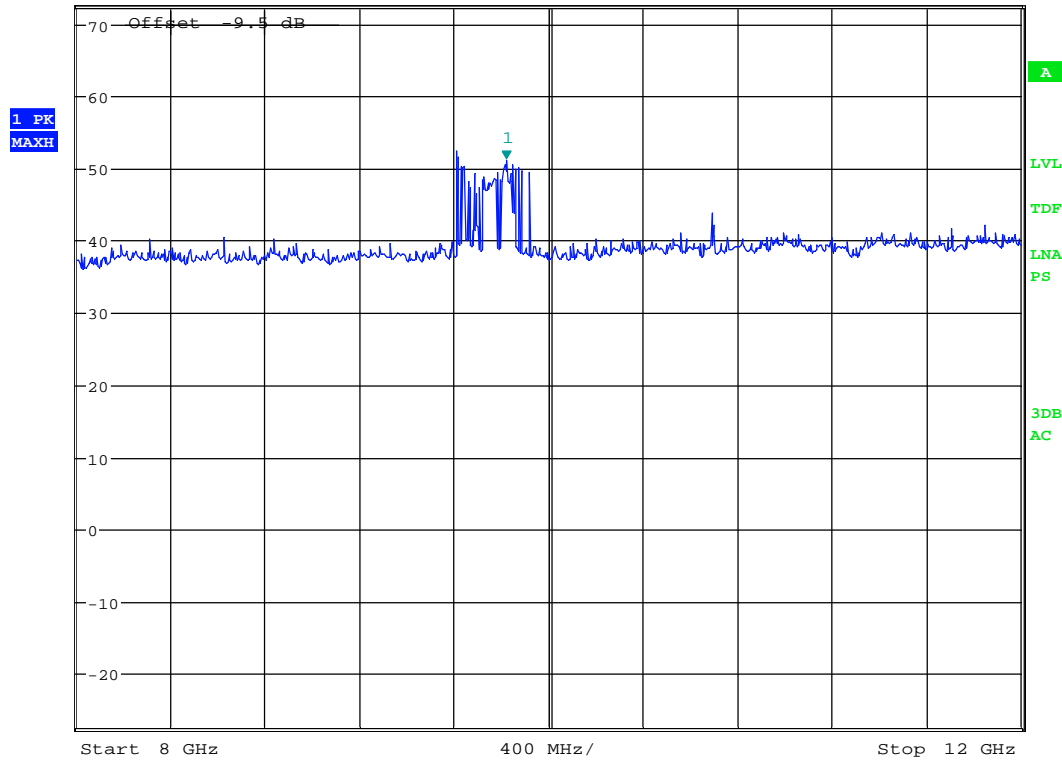


Date: 23.FEB.2017 13:45:04

HP, 8 - 12GHz , hopping mode BR-DH5, PK scan



MARKER 1
 9.820512821 GHz
 Ref 72.5 dBµV/m *Att 10 dB *RBW 1 MHz VBW 3 MHz SWT 25 ms
 Marker 1 [T1] 51.20 dBµV/m
 9.820512821 GHz

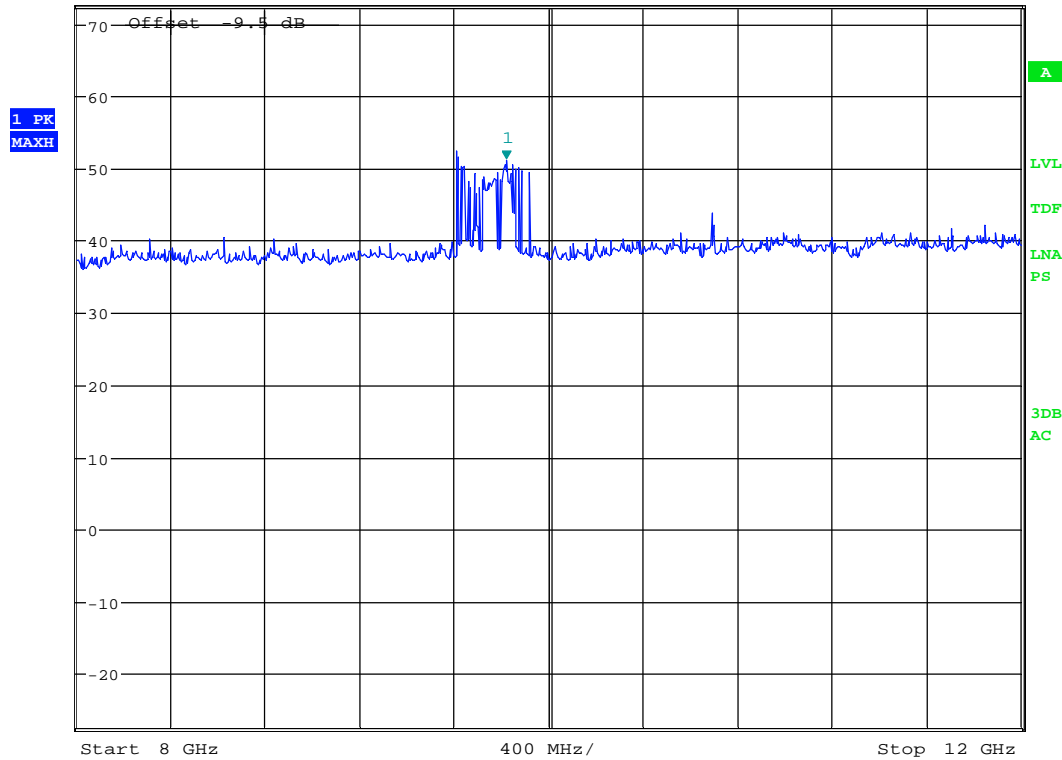


Date: 23.FEB.2017 13:51:02

VP, 8 - 12GHz , hopping mode EDR-3DH3, PK scan



MARKER 1
 9.820512821 GHz
 Ref 72.5 dBµV/m *Att 10 dB *RBW 1 MHz VBW 3 MHz SWT 25 ms
 Marker 1 [T1] 51.20 dBµV/m
 9.820512821 GHz

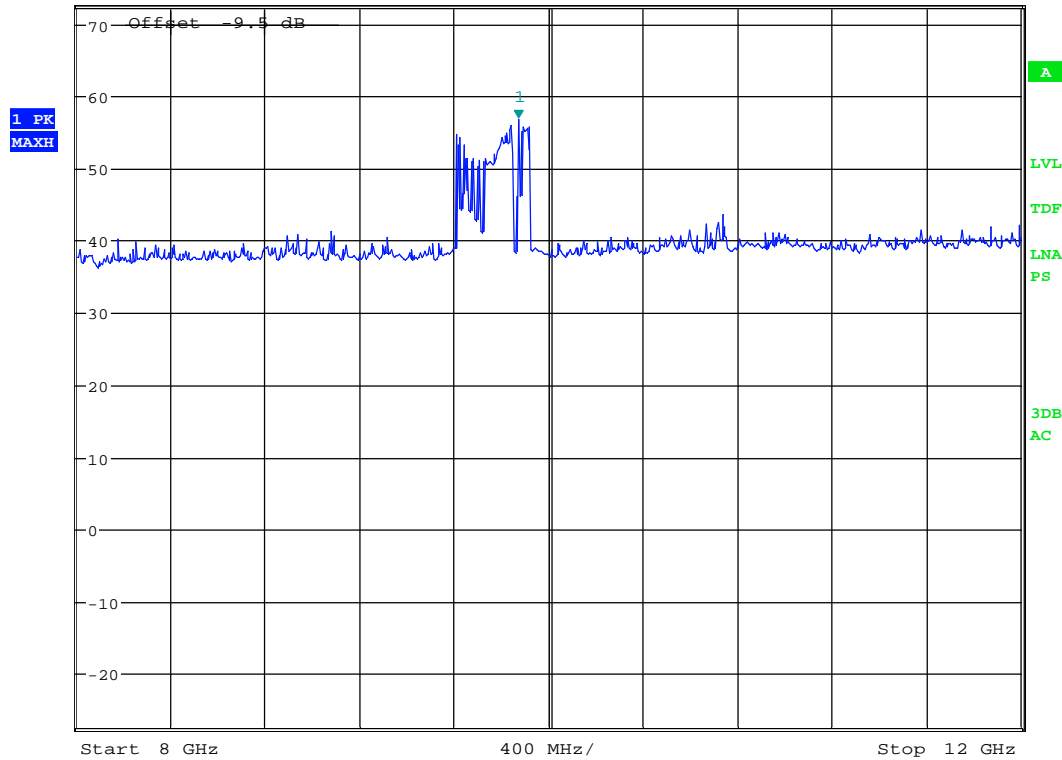


Date: 23.FEB.2017 13:51:02

HP, 8 - 12GHz , hopping mode EDR-3DH3, PK scan



MARKER 1
 9.871794872 GHz
 Ref 72.5 dBµV/m * Att 10 dB
 *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 56.81 dBµV/m
 SWT 25 ms 9.871794872 GHz



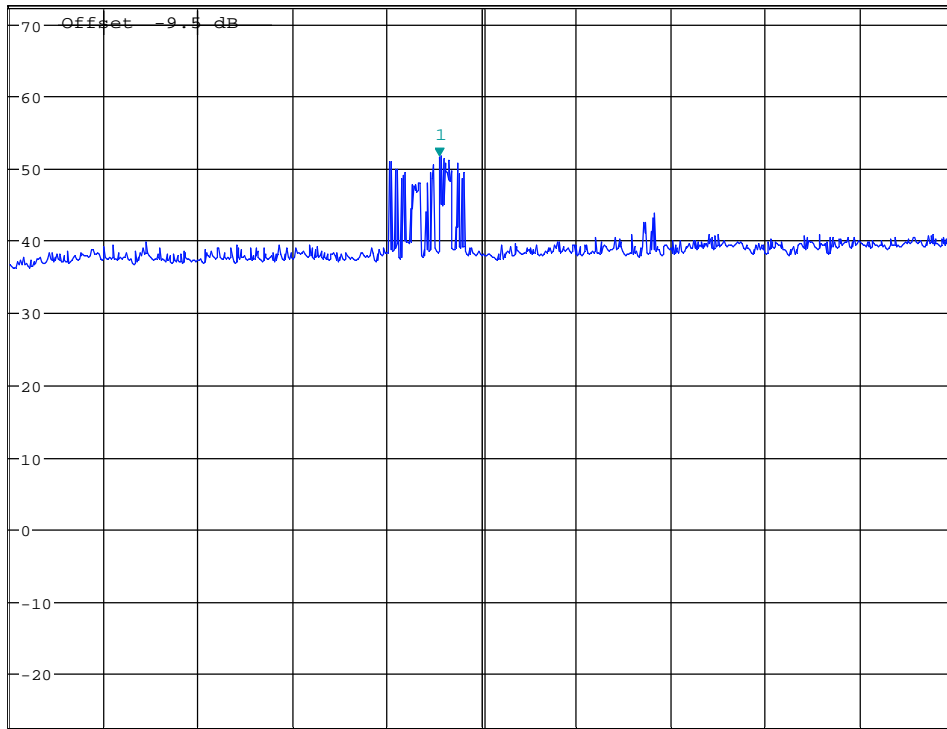
Date: 23.FEB.2017 13:54:27

VP, 8 - 12GHz , hopping mode EDR-3DH5, PK scan



MARKER 1
 9.820512821 GHz

*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 51.58 dBμV/m
 Ref 72.5 dBμV/m *Att 10 dB 9.820512821 GHz
 SWT 25 ms



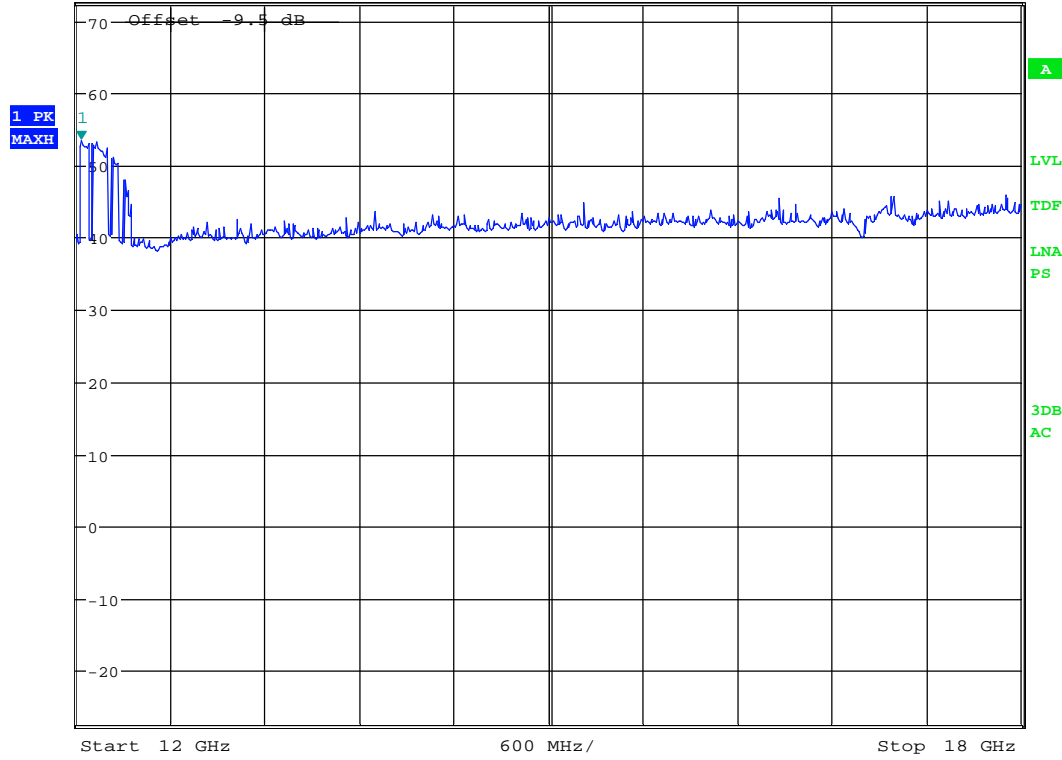
Start 8 GHz 400 MHz/ Stop 12 GHz

Date: 23.FEB.2017 13:55:06

HP, 8 - 12GHz , hopping mode EDR-3DH5, PK scan



MARKER 1
 12.02884615 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 1 [T1] 53.52 dB μ V/m
 12.028846154 GHz

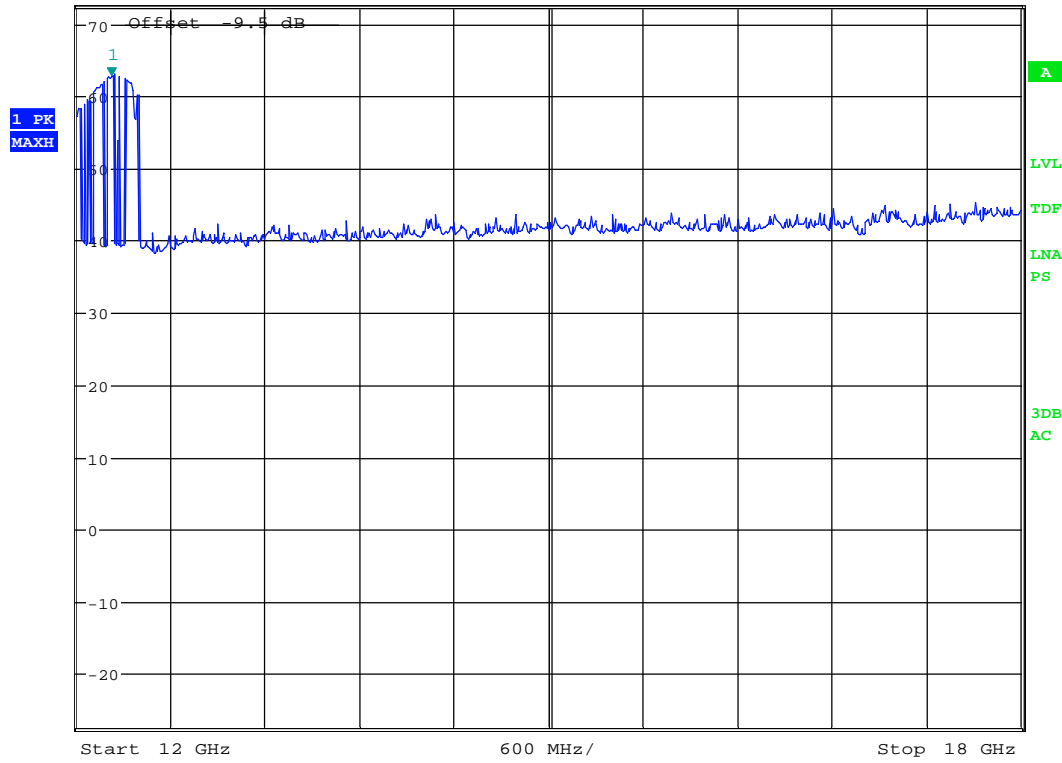


Date: 23.FEB.2017 14:10:11

VP, 12 - 18GHz , hopping mode BR-DH5, PK scan



MARKER 1
 12.22115385 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 1 [T1] 62.68 dB μ V/m
 12.221153846 GHz

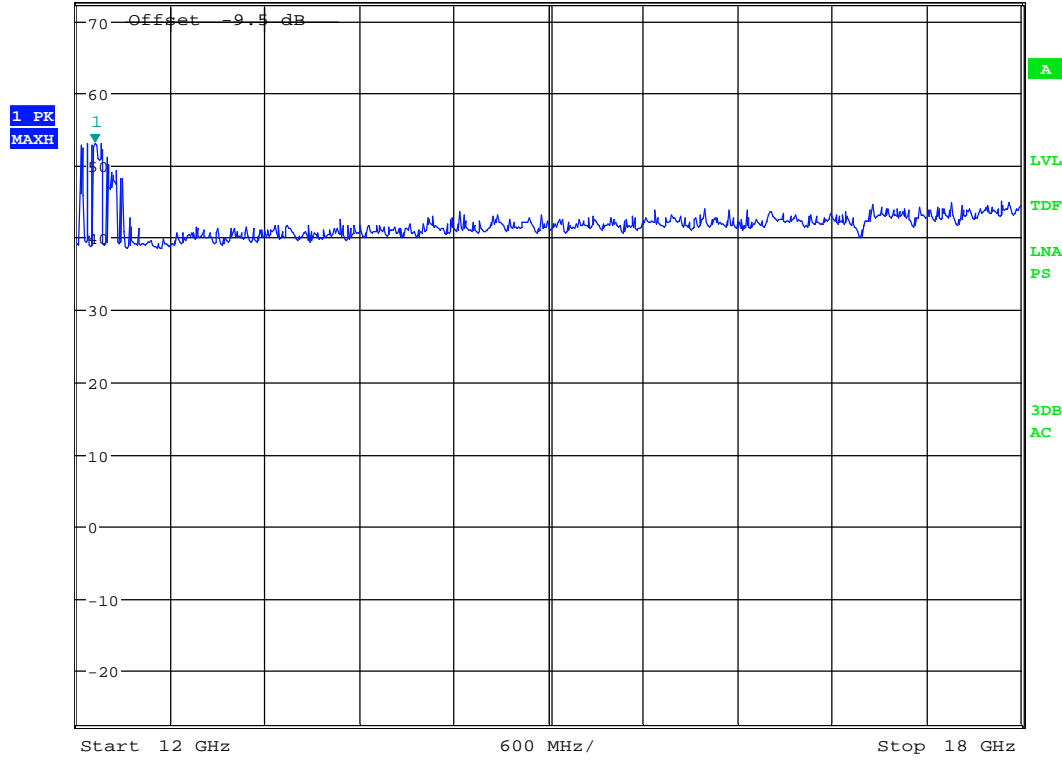


Date: 23.FEB.2017 14:08:29

HP, 12 - 18GHz , hopping mode BR-DH5, PK scan



MARKER 1
 12.11538462 GHz
 Ref 87 dBμV/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 1 [T1] 53.06 dBμV/m
 12.115384615 GHz

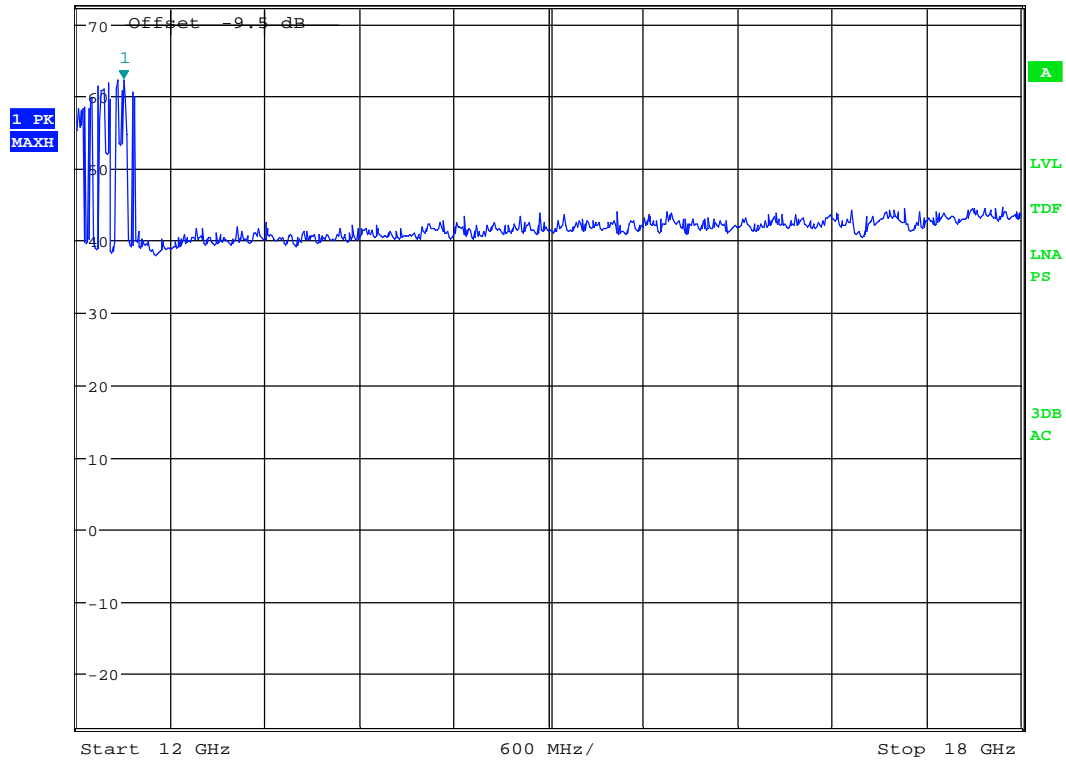


Date: 23.FEB.2017 14:06:03

VP, 12 - 18GHz , hopping mode EDR-3DH3, PK scan



MARKER 1
 12.29807692 GHz
 Ref 87 dB μ V/m * Att 10 dB *RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 62.32 dB μ V/m
 SWT 35 ms 12.298076923 GHz

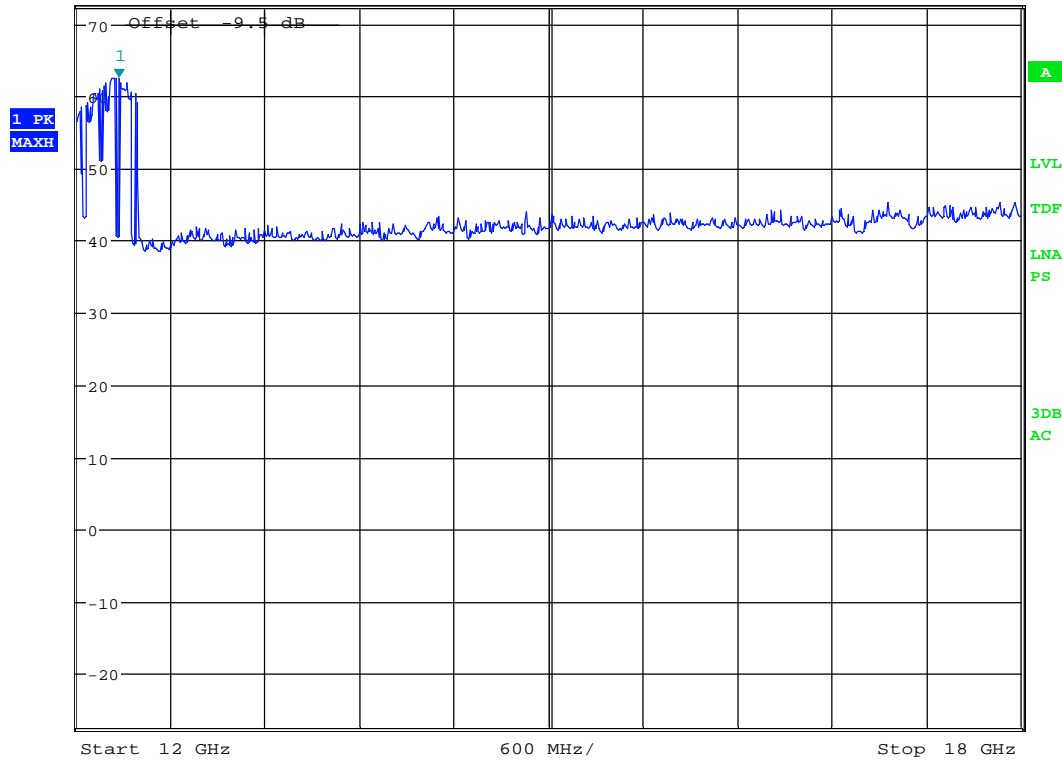


Date: 23.FEB.2017 14:05:21

HP, 12 - 18GHz , hopping mode EDR-3DH3, PK scan



MARKER 1
 12.26923077 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 1 [T1] 62.54 dB μ V/m
 12.269230769 GHz

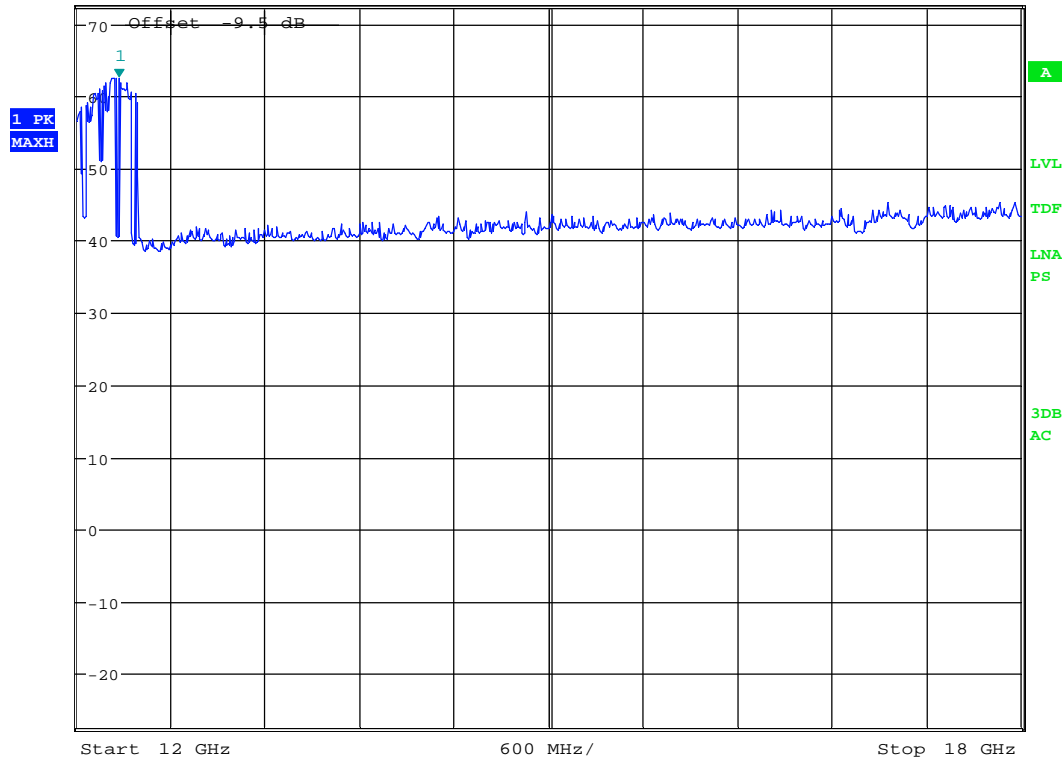


Date: 23.FEB.2017 14:01:42

VP, 12 - 18GHz , hopping mode EDR-3DH5, PK scan



MARKER 1
 12.26923077 GHz
 Ref 87 dB μ V/m * Att 10 dB * RBW 1 MHz VBW 3 MHz SWT 35 ms
 Marker 1 [T1] 62.54 dB μ V/m
 12.269230769 GHz

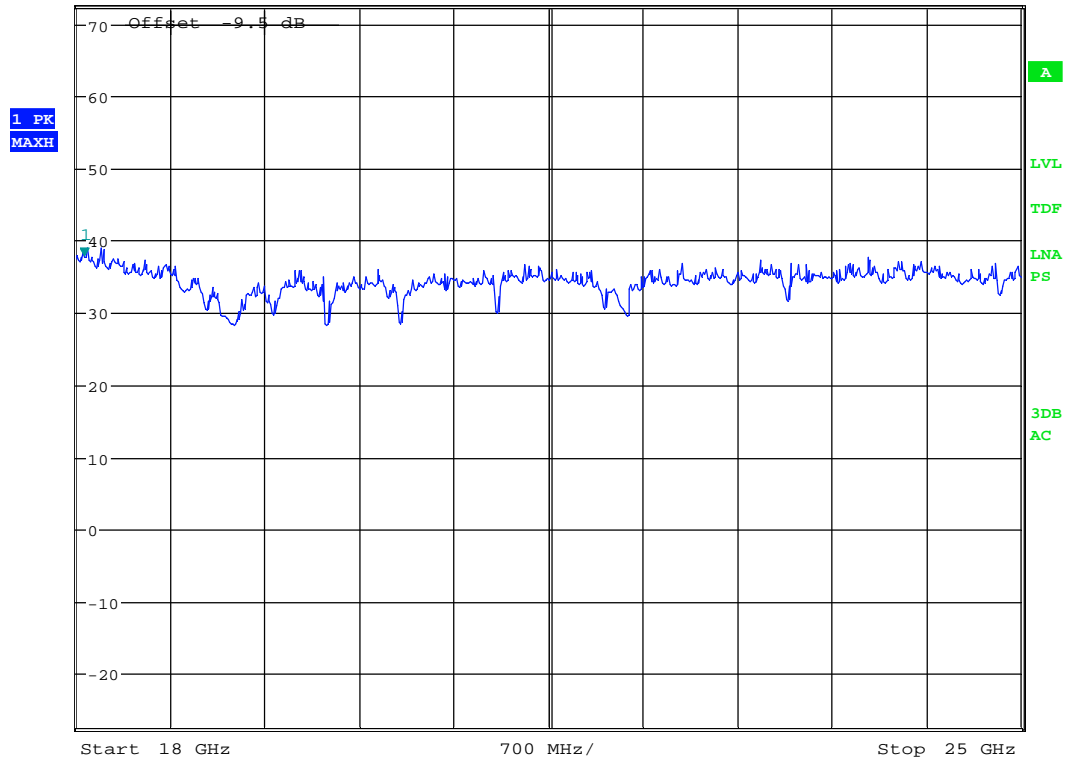


Date: 23.FEB.2017 14:01:42

HP, 12 - 18GHz , hopping mode EDR-3DH5, PK scan



MARKER 1
 18.05608974 GHz
 Ref 72.5 dBµV/m * Att 10 dB *RBW 1 MHz VBW 3 MHz SWT 45 ms
 Marker 1 [T1]
 37.81 dBµV/m
 18.05608974 GHz



Date: 23.FEB.2017 14:15:03

VP/HP, 12 - 18GHz , hopping mode , PK scan

4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	< 3.6 GHz	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	Frequency	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

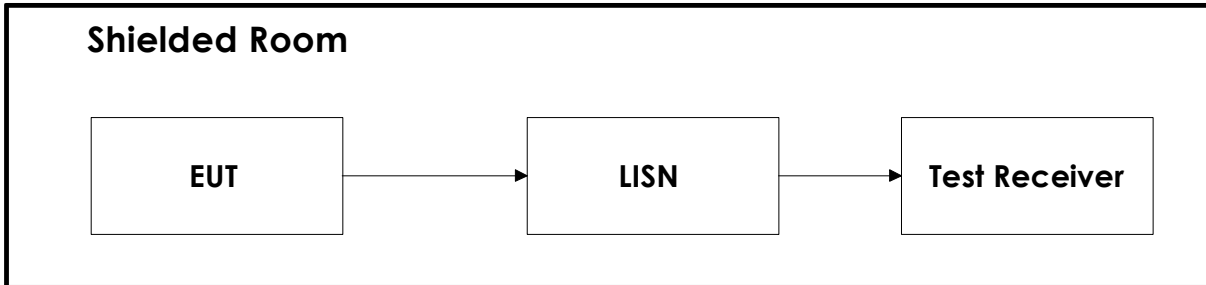
5 LIST OF TEST EQUIPMENT

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.

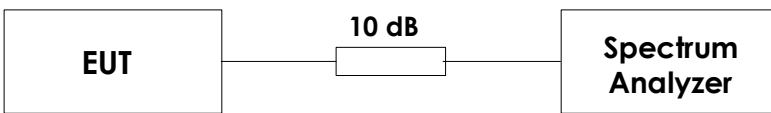
No.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal. Date	Cal. Due
1.	ESU40	EMI Receiver	Rohde & Schwarz	LR 1639	2016.11	2017.11
2.	FSW43	Spectrum analyser	Rohde & Schwarz	LR 1690	2016.07	2018.07
3.	3115	Antenna horn	EMCO	LR 1330	2010.08	2018.08
4.	HFH2-Z2	Loop antenna	Rohde & Schwarz	LR1660	2016.08	2018.08
5.	HK116	Biconical Antenna	Rohde & Schwarz	LR 1260	2013.12	2017.12
6.	HL223	Log Periodic antenna	Rohde & Schwarz	LR 1261	2013.12	2017.12
7.	PM7320X	Antenna horn	Siverts lab	LR 103	2009.01	2018.01
8.	DBF-520-20	Antenna horn	Systron Donner	LR 101	2009.01	2018.01
9.	638	Antenna horn	Narda	LR 098	2010.06	2018.06.
10.	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2016.11	2017.11
11.	310N	Pre-amplifier	Sonoma	LR 1686	2016.05	2017.05
12.	B603D	DC power supply	Øltronix	LT 666	Cal b4 use	
13.	6032A	DC power supply	Hewlett Packard	LT 1062	Cal b4 use	
14.	Model 87 V	Multimeter	Fluke	LR 1599	2016.10	2018.10
15.	74-10-12	10 attenuator	Aeroflex	LR 1579	Cal b4 use	
16.	FA210A1010003030	Microwave cable	Rosenberger	LR1566	Cal b4 use	
17.	6HC 3000-18000	HP Filter	Trithlic	LR1614	Cal b4 use	

6 BLOCK DIAGRAM

6.1 Power Line Conducted Emission

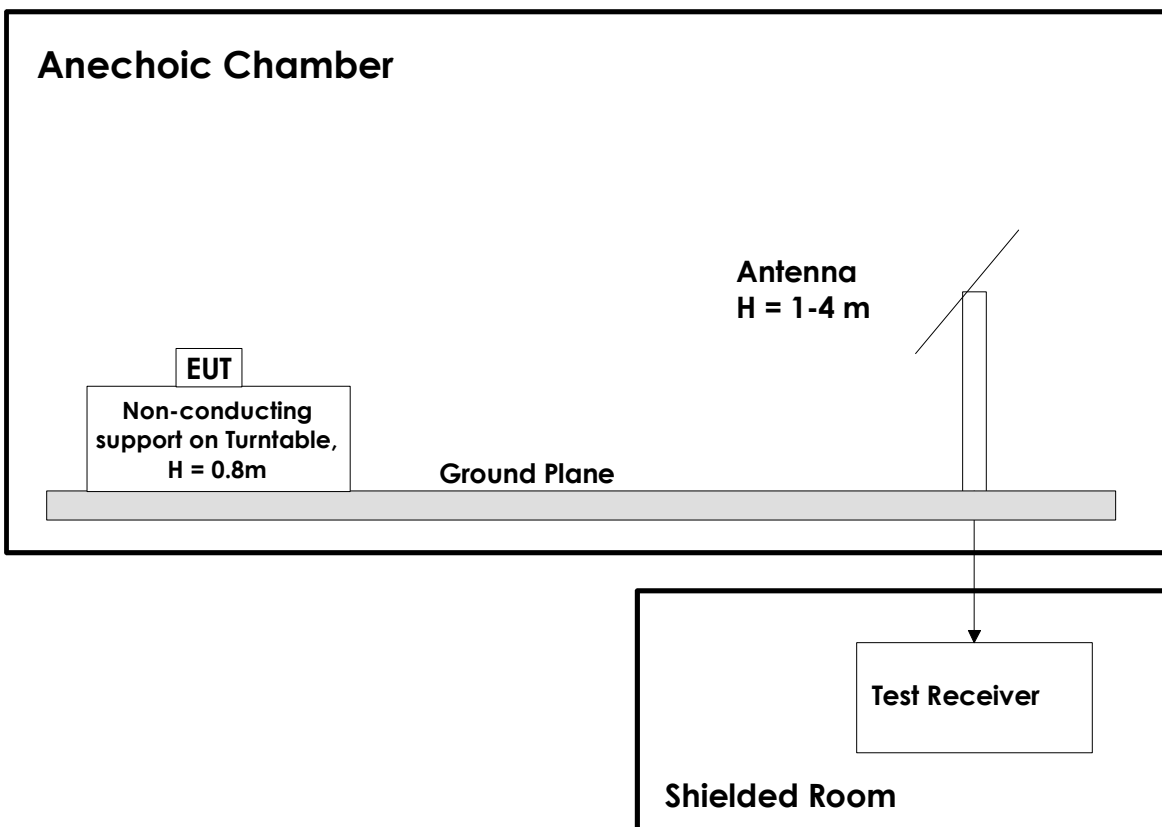


6.2 Conducted Tests



This test set-up is used for all Conducted tests. For the Frequency Stability test the EUT was placed in a climatic chamber.

6.3 Test Site Radiated Emission



Measurements at 1GHz and above were performed with turntable height 1.5m and with the ground plane covered by absorbers.

Revision history

Version	Date	Comment	Sign
00	2017.03.02	First version	gns
01	2017.09.25	First revision	gns