




Test Report

Product	Scattered Xray dosimeter		
Name and address of the applicant	Uggledalsvägen 29 SE-42740 Billdal Sweden		
Name and address of the manufacturer	Uggledalsvägen 29 SE-42740 Billdal Sweden		
Model	Real-time Dosimeter Personal Dose Meter 2		
Rating	Internal one cell 3V Lithium battery, type CR2450		
Trademark	Raysafe™ Philips™ (OEM customer)		
Serial number	120000XX		
Additional information	SRD 918.3 MHz, Transceiver		
Tested according to	FCC Part 15.249 Frequency Hopping Transmitters / Digital Transmission Systems Industry Canada RSS-210, Issue 9 Licence-Exempt Radio Apparatus: Category I Equipment		
Order number	327574		
Tested in period	2017.06.12		
Issue date	2017.09.26		
Name and address of the testing laboratory	<div style="display: flex; align-items: center;">  <div> FCC No: 994405 IC OATS: 2040D-1 Instituttveien 6 Kjeller, Norway TEL: +47 22 96 03 30 FAX: +47 22 96 05 50 </div> </div>		
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">  Prepared by [Frode Sveisen] </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">  Approved by [G.Suwanthakumar] </div> </div>			
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1 INFORMATION

1.1 Test Item

Name :	Raysafe Philips
FCC ID :	XWK1601028
ISED ID :	9038A-1601028
Model/version :	Personal Dose Meter 2 Real-time Dosimeter
Serial number :	/
Hardware identity and/or version:	/
Software identity and/or version :	/
Frequency Range :	918.3 MHz
Number of Channels :	1
Operating Modes :	Transceiver
Type of Modulation :	Digital (2-GFSK)
Rated Output Power :	N/A
Type of Power Supply :	Primary Battery
Antenna Connector :	None (Internal Antenna)
Antenna Diversity Supported :	No
Desktop Charger :	N/A

Description of Test Item

The EUT is an X-Ray dose monitoring device. The EUT is continuously communicating with a Base Station when in use.

1.2 Normal test condition

Temperature:	22.8 – 23.6 °C
Relative humidity:	45 - 49 %
Normal test voltage:	3.0 V DC (Nominal Battery Voltage)

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen

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

All tests were performed with the EUT transmitting continuously with modulation.

1.8 Comments

All measurements were performed with the EUT powered by a new battery.

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 15.249 and Industry Canada RSS-210 Issue 9.

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

DXT 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-210 Issue 9, RSS-GEN Issue 4 reference	Result
Occupied Bandwidth	N/A	6.6 (RSS-GEN)	N/A
Peak Power Output	15.249 (a)(c)	B.10 (RSS-210)	Complies
Spurious Emissions (Radiated)	15.249 (a)(c)(d) 15.209	B.10 (RSS-210) 6.13 (RSS-GEN) 8.9 (RSS-GEN)	Complies

3 TEST RESULTS

3.1 Occupied Bandwidth

ISED RSS-GEN Issue 4, Clause 6.6

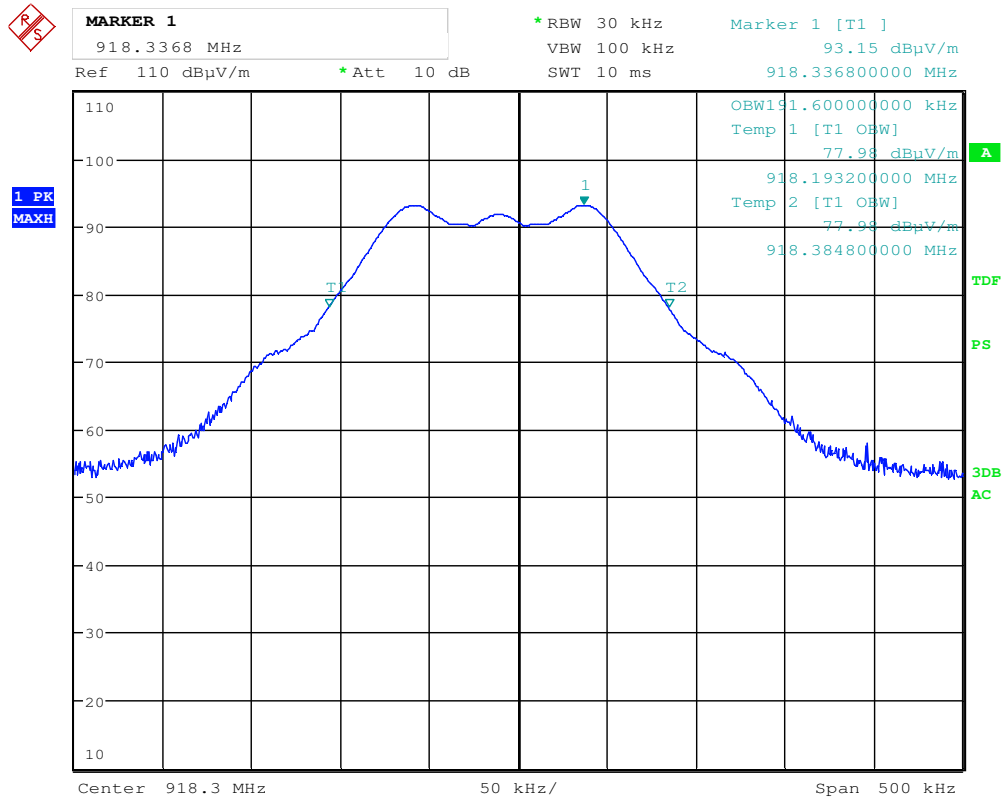
Measurement Data:

Number of RF Channels in use:	1
Channel Centre Frequency:	918.3 MHz
99% BW	191.6 kHz

See attached plots.

Requirements:

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



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99% Bandwidth

3.2 Peak Power Output

FCC part 15.249 (a)(c)

ISED RSS-210 Issue 9, Annex B.10 a)

Test Results: Complies

Measurement Data:

	Carrier Frequency 918.3 MHz
Field Strength (dB μ V/m)	93.4
Field Strength (mV/m)	46.8
EIRP, Calculated (mW)	0.656

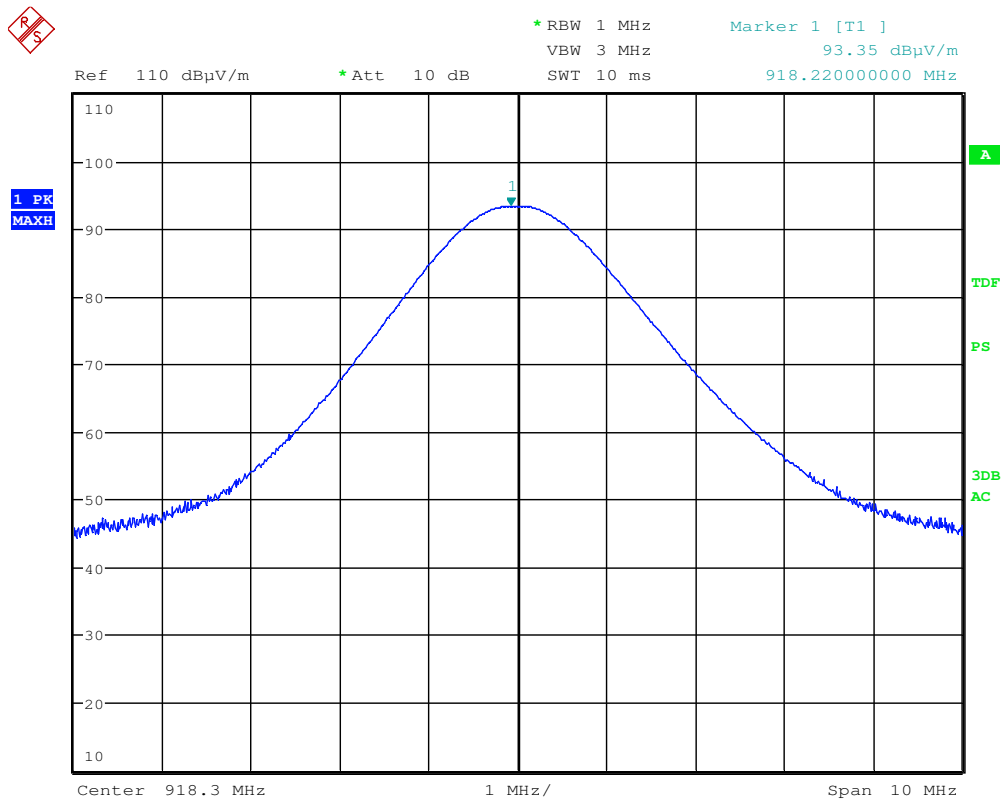
EIRP is calculated from measured field strength by the formulas in KDB 412172 D01.

See attached plots.

Requirements:

Field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (mV/m)	Field strength of harmonics (μ V/m)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500



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Field Strength, 918.3MHz (Max: EUT H1, HP)

3.3 Restricted Bands of operation

Restricted Bands of operation for FCC and ISSED are defined in FCC Part 15.205 and ISSED RSS-GEN, Issue 4 clause 8.10.

Generally, no fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN, Issue 4, clause 8.9.

FCC (MHz)	ISSED (MHz)	FCC (GHz)	ISSED (GHz)
0.090-0.110		0.96-1.24 1.3-1.427	0.96-1.427
0.495-0.505		1.435-1.6265	
2.1735-2.1905		1.6455-1.6465	
	3.020-3.026	1.660-1.710	
4.125-4.128		1.7188-1.7222	
4.17725-4.17775		2.2-2.3	
4.20725-4.20775		2.31-2.39	
	5.677-5.683	2.4835-2.5	
6.215-6.218		2.69-2.9	2.655-2.9
6.26775-6.26825		3.26-3.267	
6.31175-6.31225		3.332-3.339	
8.291-8.294		3.3458-3.358	
8.362-8.366		3.6-4.4	3.5-4.4
8.37625-8.38675		4.5-5.15	
8.41425-8.41475		5.35-5.46	
12.29-12.293		7.25-7.75	
12.51975-12.52025		8.025-8.5	
12.57675-12.57725		9.0-9.2	
13.36-13.41		9.3-9.5	
16.42-16.423		10.6-12.7	
16.69475-16.69525		13.25-13.4	
16.80425-16.80475		14.47-14.5	
25.5-25.67		15.35-16.2	
37.5-38.25		17.7-21.4	
73-74.6		22.01-23.12	
74.8-75.2		23.6-24.0	
108-121.94 123-138	108-138	31.2-31.8	
149.9-150.05		36.43-36.5	
156.52475-156.52525		Above 38.6	
156.7-156.9			
162.0125-167.17			
167.72-173.2			
240-285			
322-335.4			
399.9-410			
608-614			

Frequencies in **Bold** text are specific for FCC or ISSED, all other frequencies are common.

3.4 Spurious Emissions (Radiated)

FCC Part 15.249(a)(c)(d)

ISED RSS-210 Issue 9, Annex B.10

Test Results: Complies

Measurement Data:

Band-edge Attenuation

	Band Edge Attenuation to Carrier (dBc)		Limit	Margin	
	902 MHz	928 MHz	dBc	dB	
Measured Value	57.7	54.5	>50	7.7	4.5

Measured with Peak Detector and Max Hold.

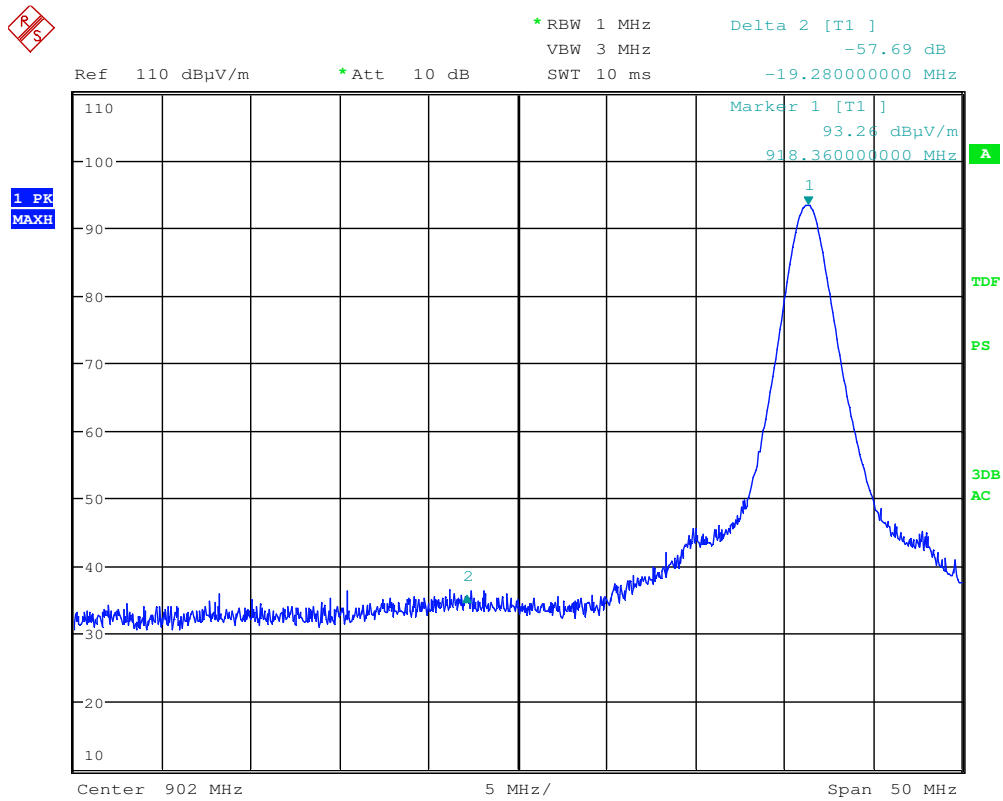
See attached plots.

Duty Cycle Correction Factor Calculation:

Duty Cycle = transmit time / 100ms

Duty Cycle Correction factor = $-20 \times \log(5 \text{ ms} / 100 \text{ ms}) = 26 \text{ dB}$

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



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Lower Band Edge, 902MHz (Max: EUT H1, HP)



DELTA MARKER 2

10.76 MHz

Ref 110 dBµV/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

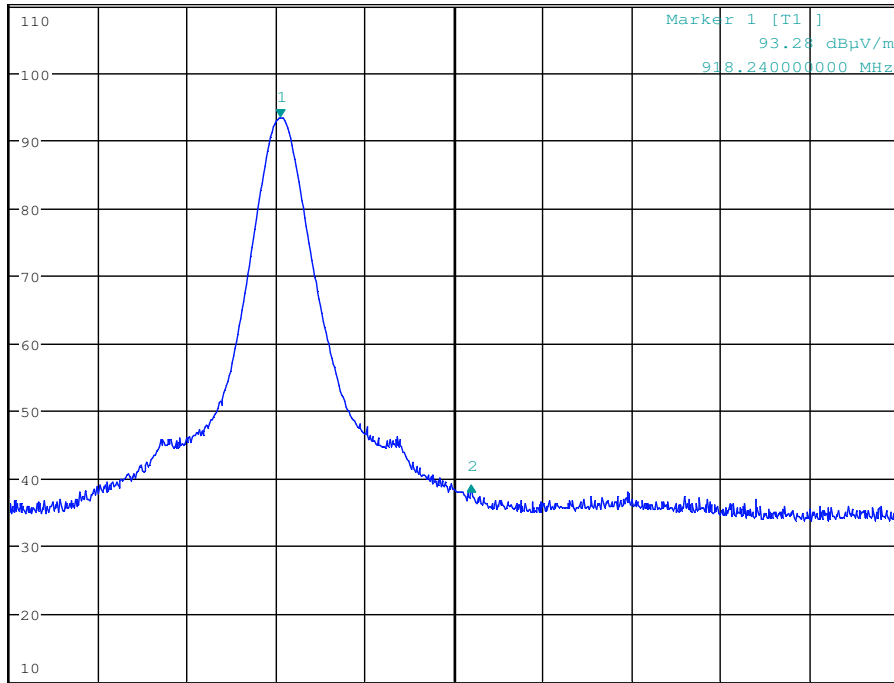
SWT 10 ms

Delta 2 [T1]

-54.45 dB

10.76000000 MHz

1 PK
MAXH



Center 928 MHz

5 MHz/

Span 50 MHz

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Upper Band Edge, 928MHz (Max: EUT H1, HP)

Radiated emission 30 – 1000 MHz.

Detector: Peak

Measuring distance 3 m according to ANSI C63.4-2014.

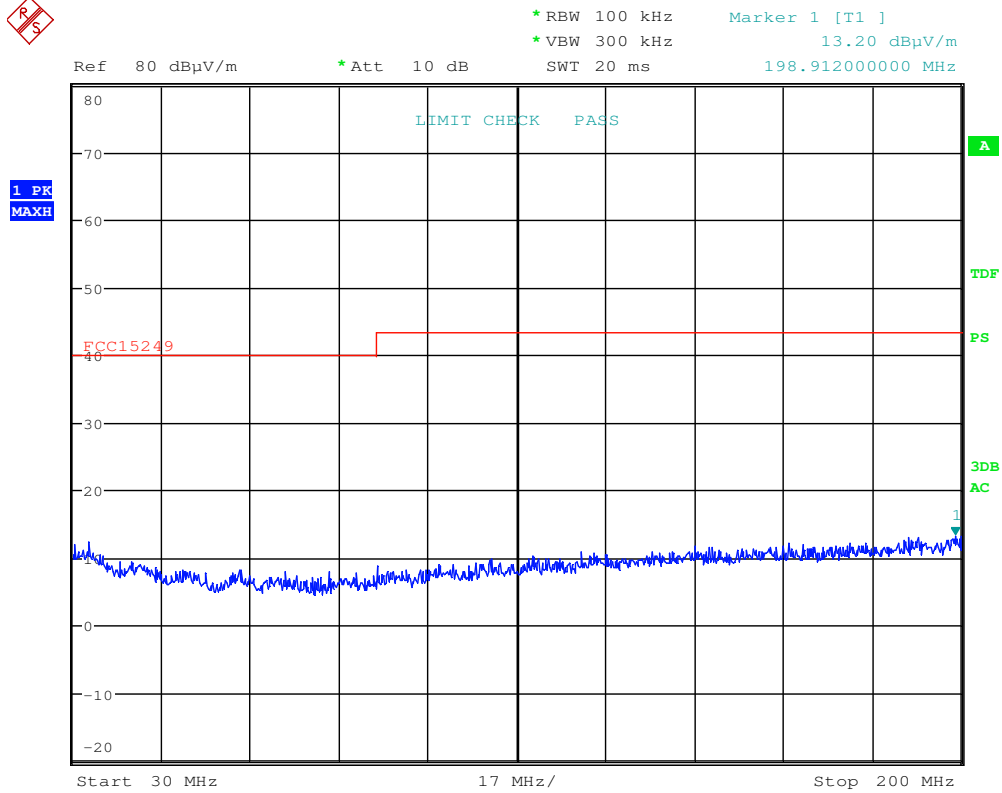
Tested in with EUT transmitting continuously.

No Spurious Emissions detected.

See attached plots.

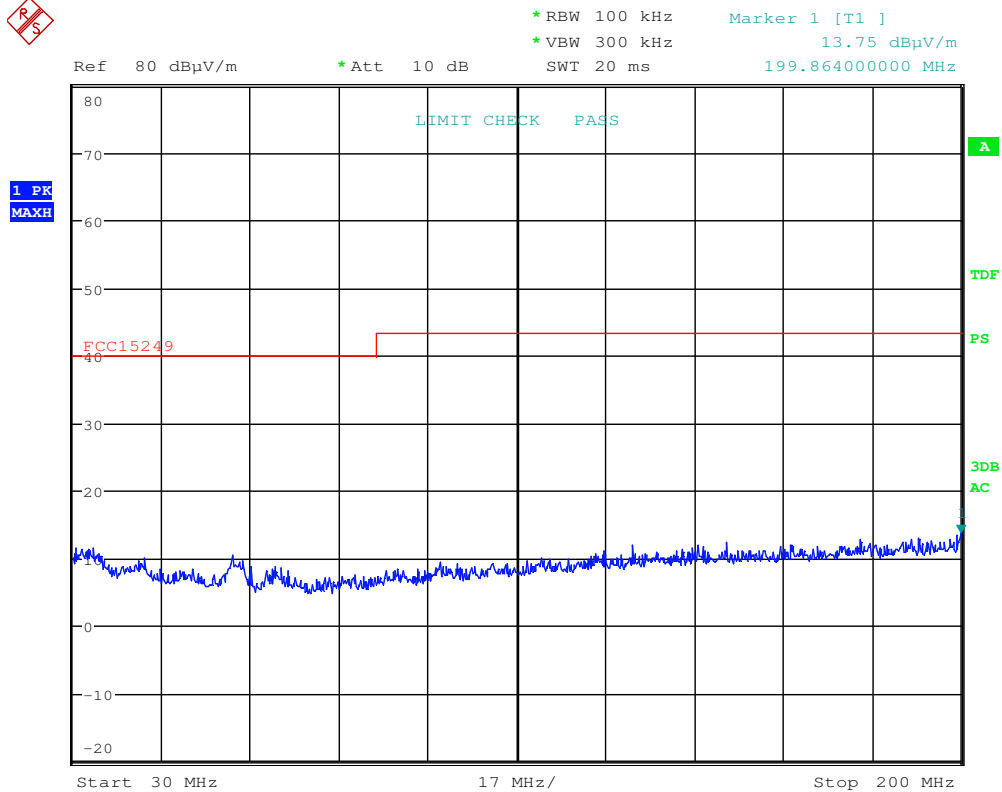
Requirements/Limit

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)	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



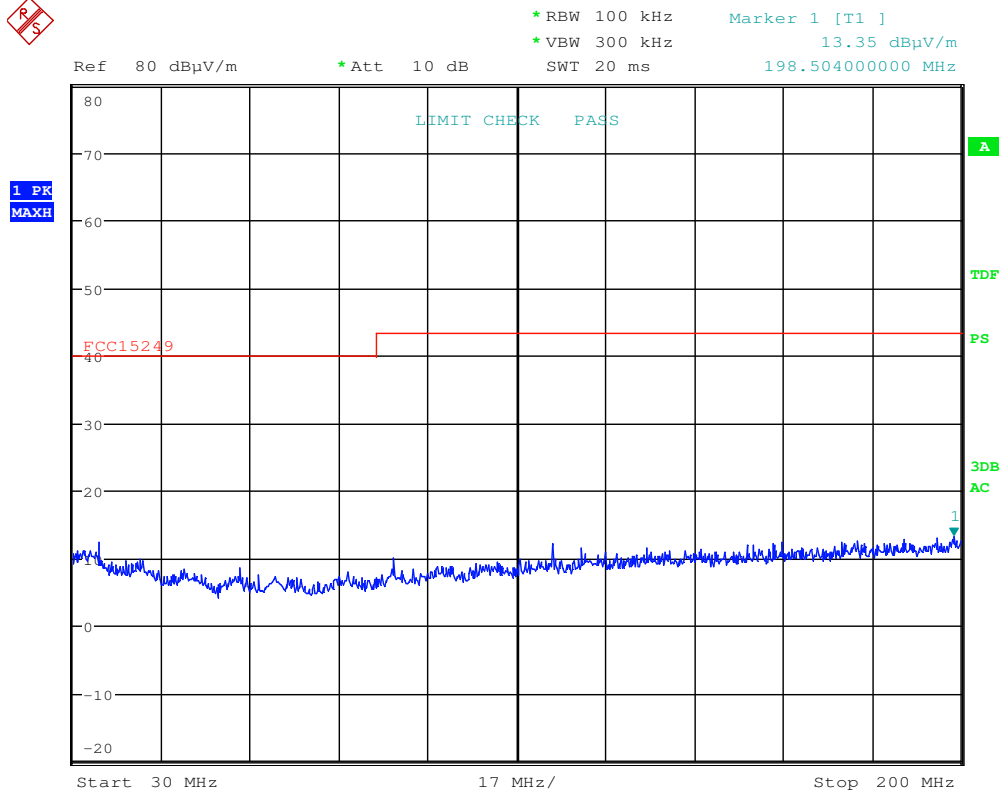
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Radiated Emissions, 30 -200MHz, EUT V, HP



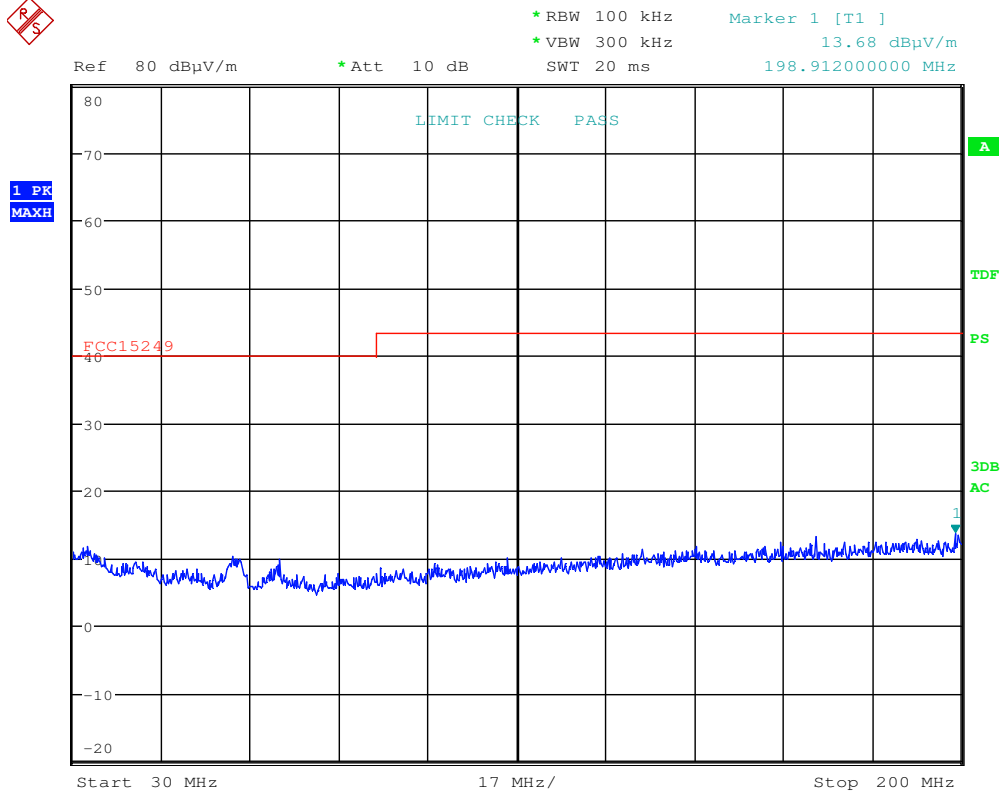
Date: 12.JUN.2017 14:22:56

Radiated Emissions, 30 -200MHz, EUT V, VP



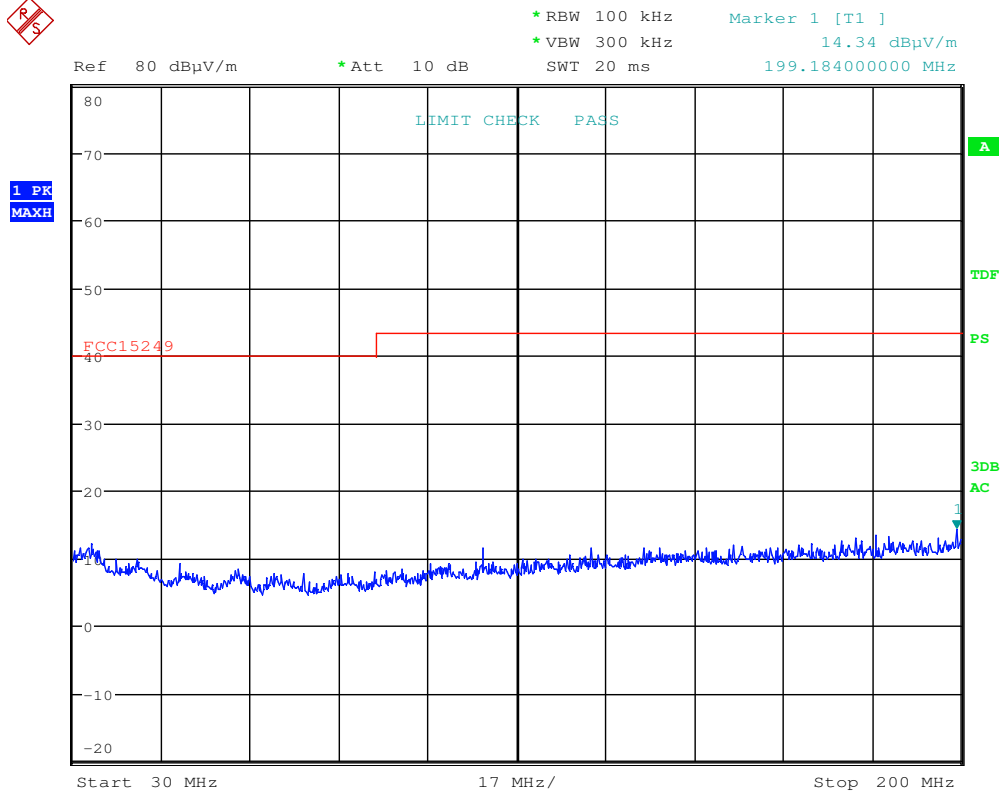
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Radiated Emissions, 30 -200MHz, EUT H1, HP



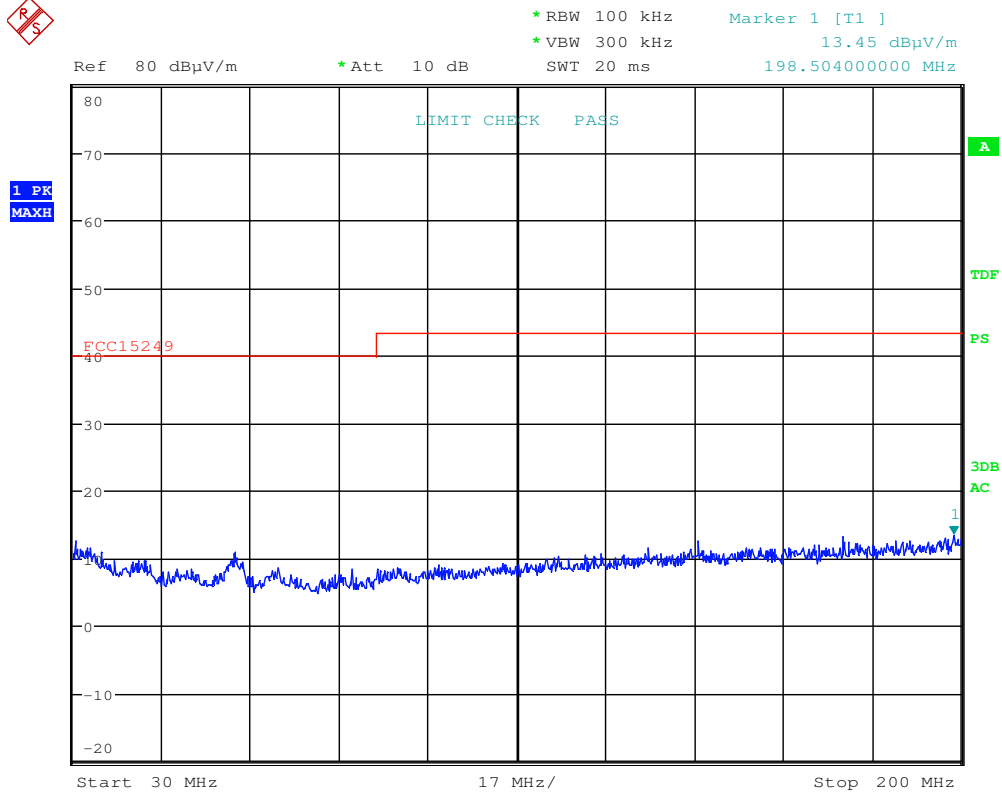
Date: 12.JUN.2017 14:28:08

Radiated Emissions, 30 -200MHz, EUT H1, VP



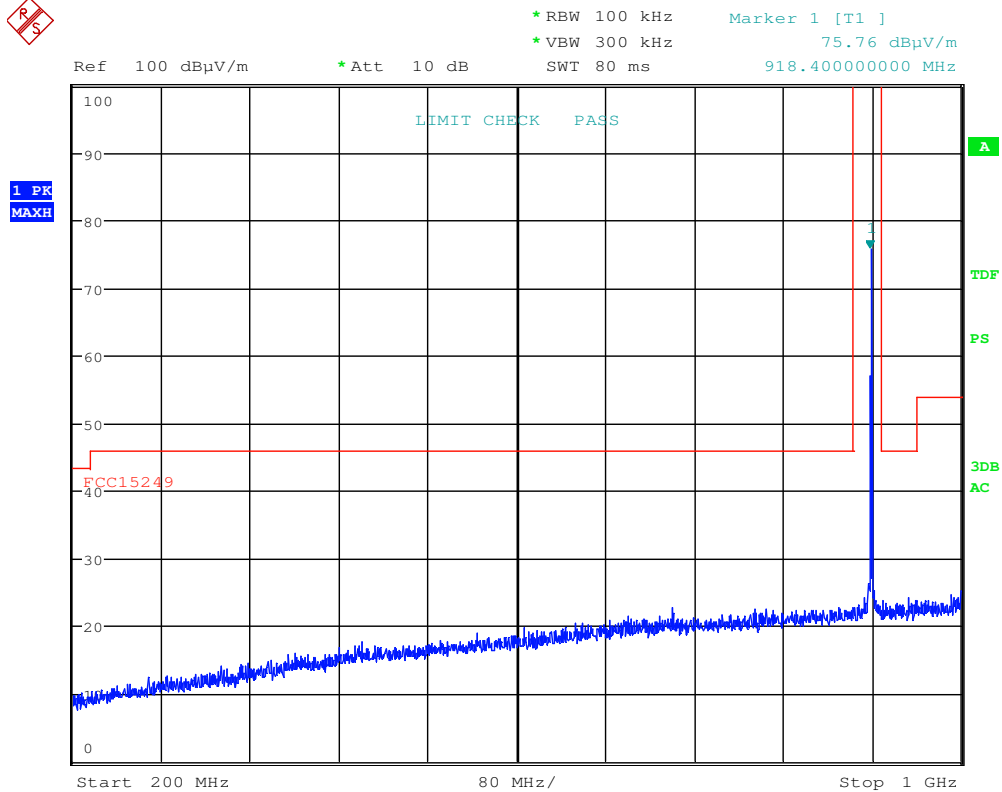
Date: 12.JUN.2017 14:36:38

Radiated Emissions, 30 -200MHz, EUT H2, HP



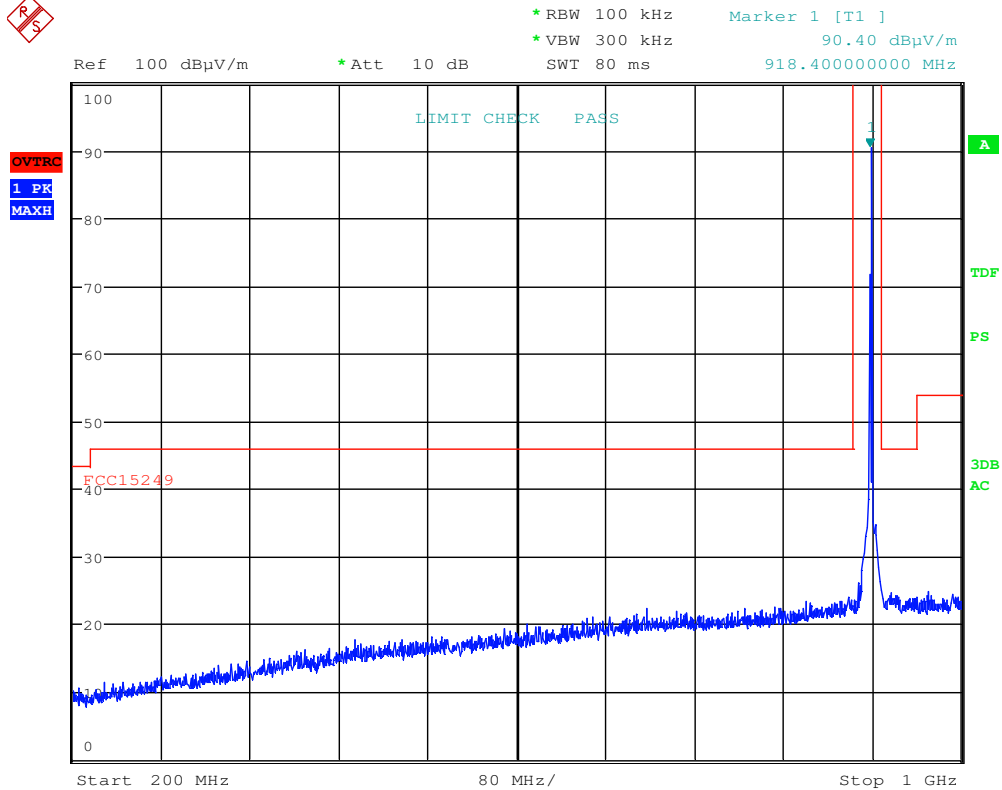
Date: 12.JUN.2017 14:34:39

Radiated Emissions, 30 -200MHz, EUT H2, VP



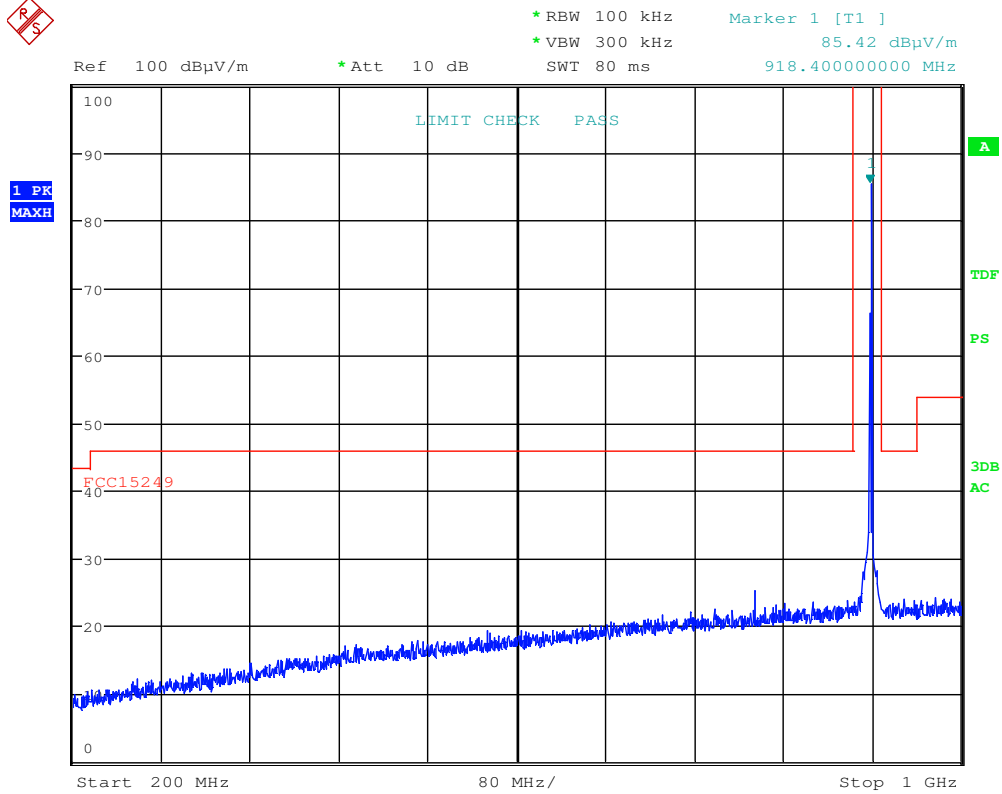
Date: 12.JUN.2017 14:14:33

Radiated Emissions, 200 -1000MHz, EUT V, HP



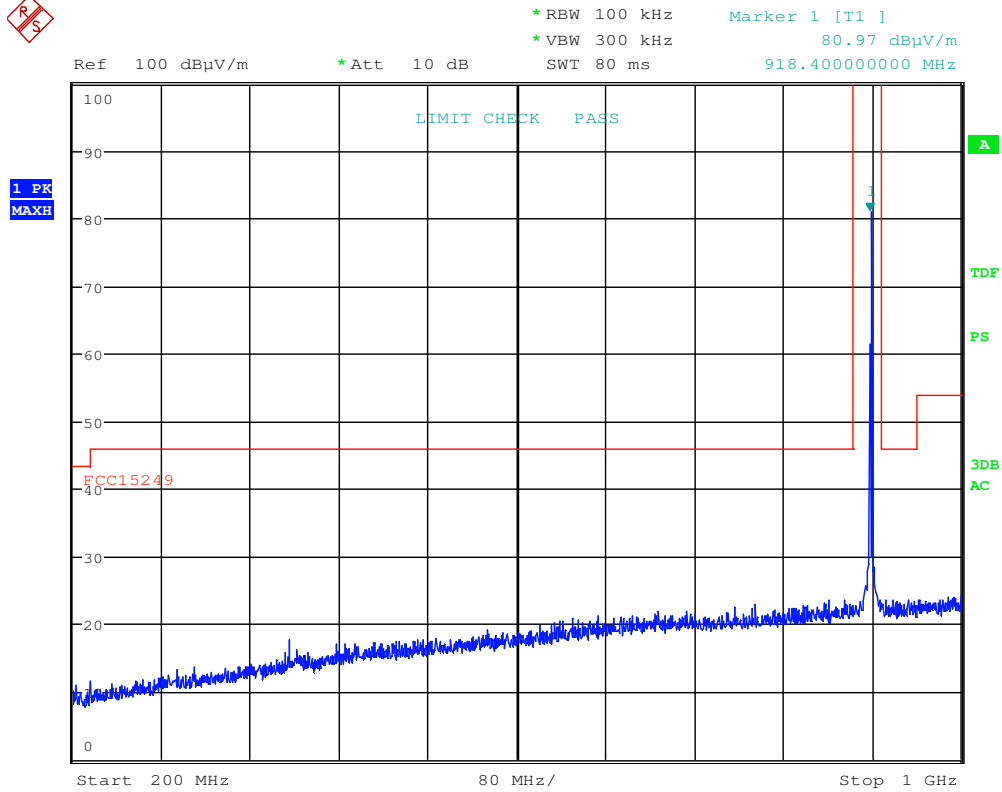
Date: 12.JUN.2017 14:12:34

Radiated Emissions, 200 -1000MHz, EUT V, VP



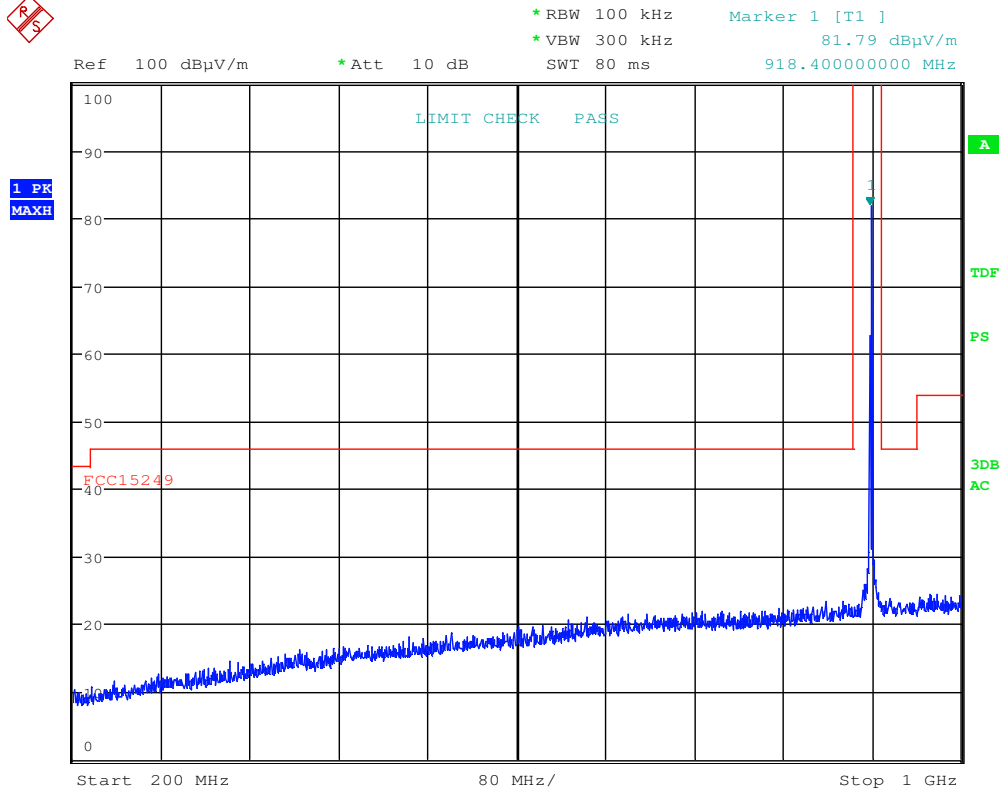
Date: 12.JUN.2017 14:01:25

Radiated Emissions, 200 -1000MHz, EUT H1, HP



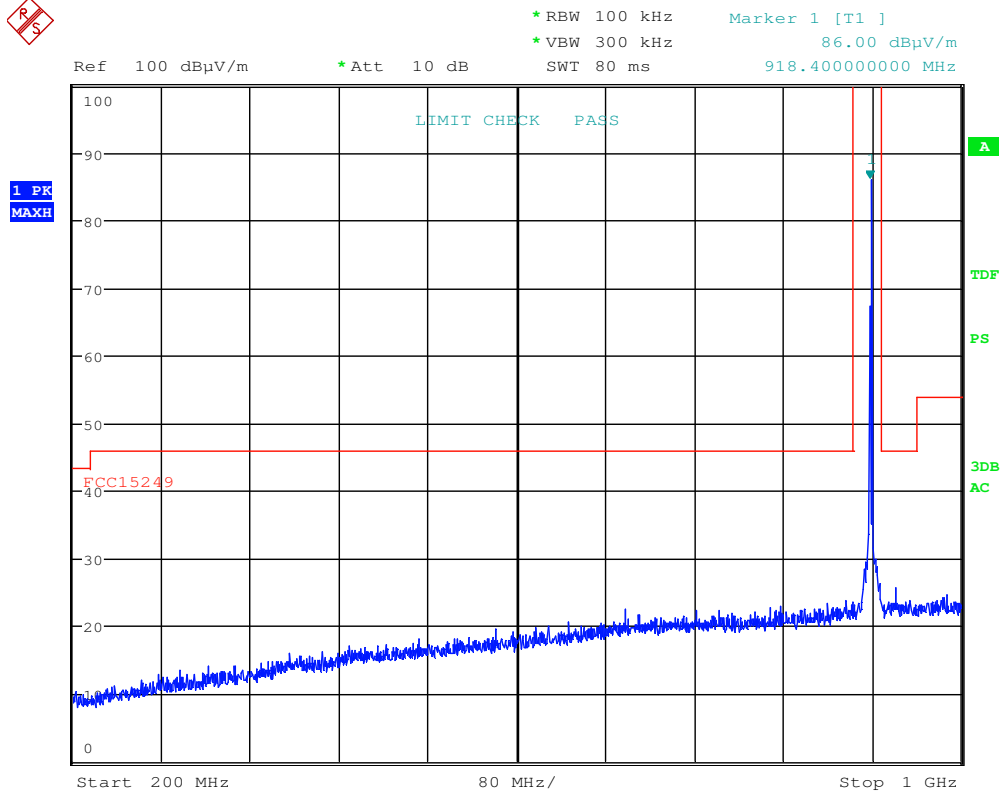
Date: 12.JUN.2017 13:59:27

Radiated Emissions, 200 -1000MHz, EUT H1, VP



Date: 12.JUN.2017 14:09:38

Radiated Emissions, 200 -1000MHz, EUT H2, HP



Date: 12.JUN.2017 14:07:39

Radiated Emissions, 200 -1000MHz, EUT H2, VP

Radiated Emissions, 1-10 GHz

Detector: Peak
Measuring distance: 3m (1 – 10 GHz)

Measured Values:

Frequency (MHz)	Measured Value Peak Det (dBμV/m)	Calc Value Average Det (dBμV/m)	Limit (dBμV/m)	Margin Peak Det (dB)	Margin Average Det (dB)
1836.6	55.9	35.9	74 / 54	18.1	18.1
2754.9	48.8	28.8	74 / 54	25.2	25.2

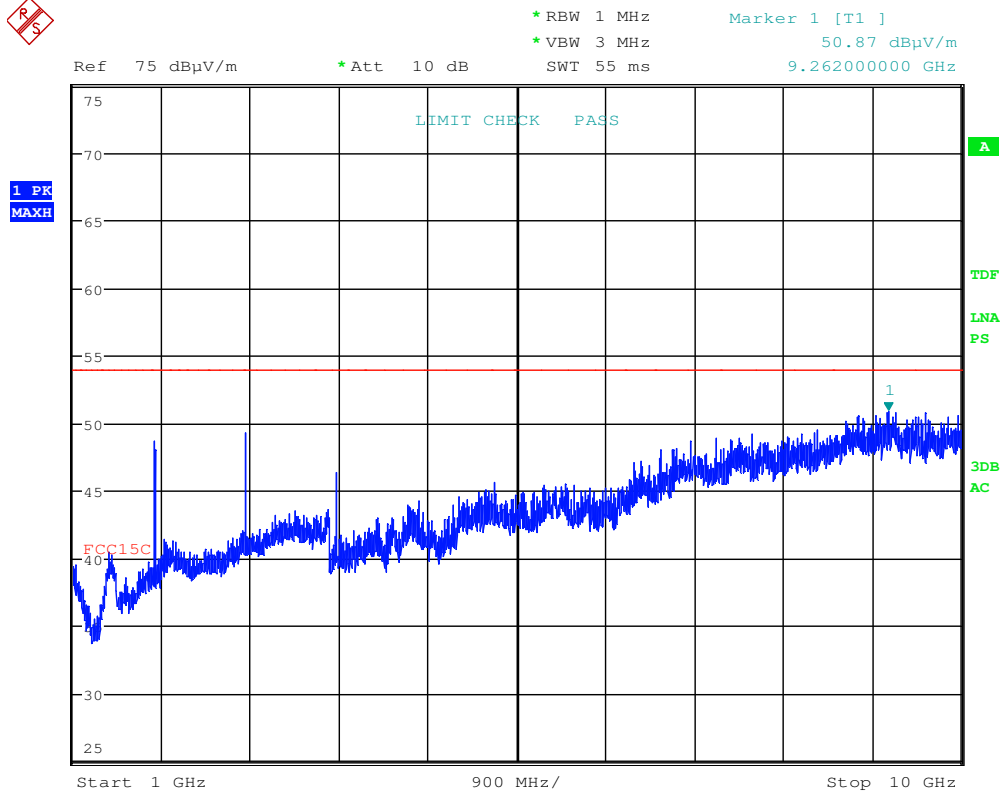
Pre-scan was performed with Peak Detector in XYZ-directions and with both Vertical and Horizontal Polarization.
Average Detector values are calculated from Peak values by Duty Cycle Correction Factor.
Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".
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



Radiated Emissions, 1000 -10000MHz, EUT V, HP

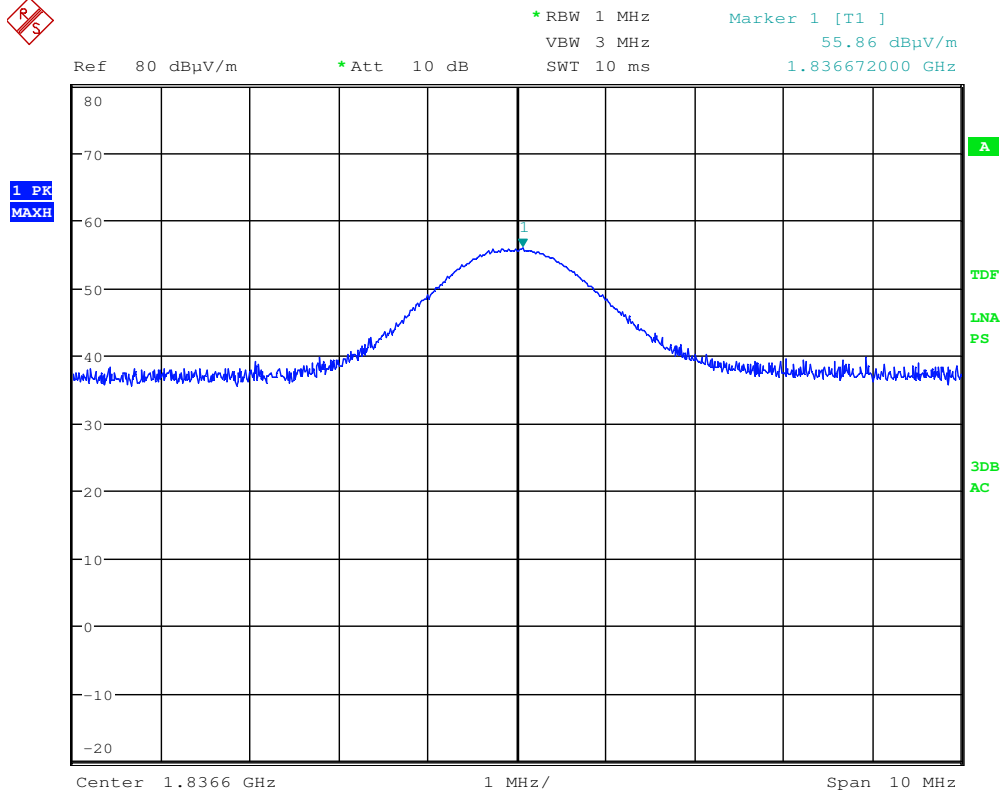


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Radiated Emissions, 1000 -10000MHz, EUT H1, VP

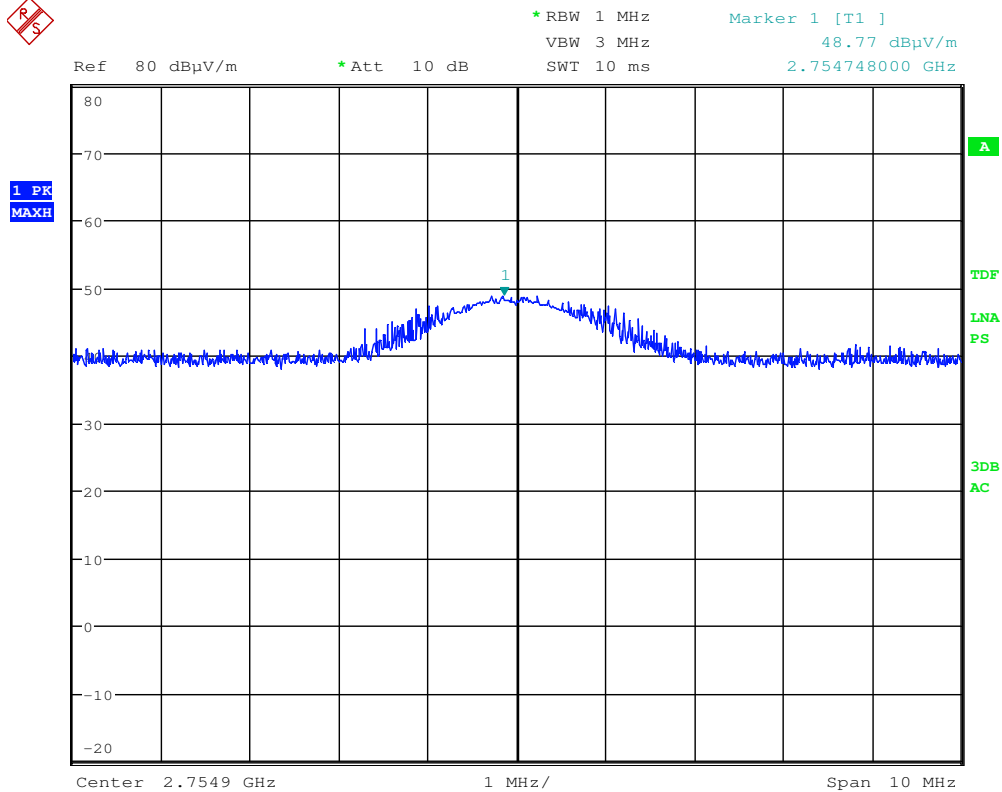


Radiated Emissions, 1000 -10000MHz, EUT H2, HP



Date: 12.JUN.2017 15:41:56

Radiated Emissions, 1836.6MHz (Max: EUT H1, HP)



Date: 12.JUN.2017 15:48:20

Radiated Emissions, 2754.9MHz (Max: EUT H1, VP)

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

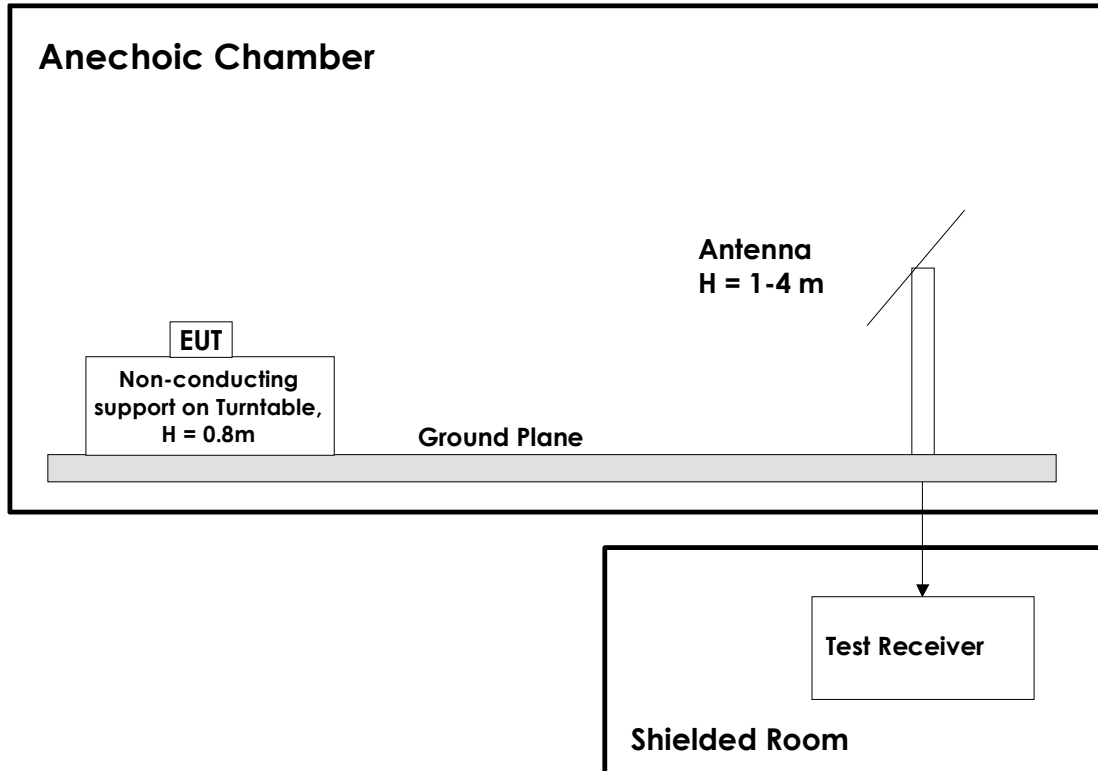
5 LIST OF TEST EQUIPMENT

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.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2016.12	2017.12
2	6HC1500/18000	Highpass Filter	Trilithic	LR 1612	Cal b4 use	
3	HL223	LogPeriod Antenna	Rohde & Schwarz	LR 1261	2013.12	2017.12
4	HK116	Biconical Antenna	Rohde & Schwarz	LR 1260	2013.12	2017.12
5	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2016.10	2017.10
6	3115	Horn Antenna	EMCO	LR 1226	2013.12	2018.12
7	317	Pre-amplifier	Sonoma Instrument	LR 1687	Cal b4 use	

6 BLOCK DIAGRAM

6.1 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
1.0	2017.07.06	First Edition	FS