

Test Report

Product	433MHz Receiver in Wireless Microphone
Name and address of the applicant	Phonak Communications AG Laenggasse 17, CH-3280 Murten Switzerland
Name and address of the manufacturer	Same as above
Model	Roger Table Mic
Rating	3.7V DC (Secondary Battery) and 5.0V DC (Power Adaptor)
Trademark	Phonak
Serial number	/
Additional information	USB charging, Frequency Hopping
Tested according to	FCC Part 15, subpart B Other Class B Digital Device Industry Canada RSS-310, Issue 4 Licence-Exempt Radio Apparatus: Category II Equipment
Order number	290009
Tested in period	2015.09.10 to 2015.09.11 and 2016.01.13
Issue date	2016.01.26
Name and address of the testing laboratory	 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 [Frode Sveinsen]  Approved by [G. Suhantakumar]	
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1 INFORMATION

1.1 Tested Item

Name :	Phonak
FCC ID :	KWC-TX23V1
Industry Canada ID :	2262A-TX23V1
Model/version :	Roger Table Mic
Serial number :	-
Hardware identity and/or version:	V3
Software identity and/or version :	W1509
Frequency Range :	2402 – 2480 MHz
Number of Channels :	Minimum 20 and Maximum 38 (Adaptive Frequency Hopping)
Operating Modes :	Adaptive Frequency Hopping
Type of Modulation :	Digital (GFSK)
Antenna Connector :	None (Integral Antenna)
Number of Antennas :	1
Type of Power Supply :	Internal Battery and External Power Adaptor for charging and operation. 3.7V (Secondary Battery, Li-Ion) and 5.0V DC (AC Adaptor)
Tested to IC Radio Standard (RSS) :	RSS-310, Issue 4; RSS-GEN, Issue 4
Test Site IC Reg. Number :	2040D-1
Power Adaptors :	GPE125-050200-Z (5.0V, 2000mA) GPE053A-075065-Z (7.5V, 650mA) GPE053B-050100-Z (5.0V, 1000mA, USB Interface)

Description of Tested Device(s)

The tested equipment is a 433 MHz Receiver for the wireless remote control of a 2.4 GHz Table Mic. This test report covers only the 433 MHz Receiver, the 2.4 GHz Transceiver is covered by Nemko test report no. 290009-1.

Exposure Evaluation

Not applicable for receiver.

1.2 Test Environment

Temperature:	20.0 – 22.1 °C
Relative humidity:	39 - 54 %
Normal test voltage:	3.7 V DC (Nominal battery voltage)

For radiated emissions tests the EUT was also powered from a USB charger supplied by the manufacturer. Power Line Conducted emissions Tests were performed with the two supplied power adaptors. The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen / Thomas Dangle

1.4 Test Equipment

See list of test equipment in clause 6.

1.5 Other Comments

All tests were performed with all ports populated and operating.

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 15B and Industry Canada RSS-310 Issue 4.

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 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

CYY 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 CFR 47 Paragraph #	Industry Canada RSS-310, RSS-GEN Paragraph #	Verdict
Power Line Conducted Emission	15.107(a) 15.207(a)	3.1 8.8 (RSS-GEN)	Complies
Spurious Emissions (Radiated)	15.109(a)	3.1 7.1 (RSS-GEN)	Complies

3 TEST RESULTS

3.1 Power Line Conducted Emissions

Para. No.: 15.107 (a)

Test Performed By: Thomas Danglé	Date of Test: 1-Oct-2015
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Measurement procedure: ANSI C63.4-2014 using 50 μ H/50 ohms LISN.

Test Results: Complies.

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

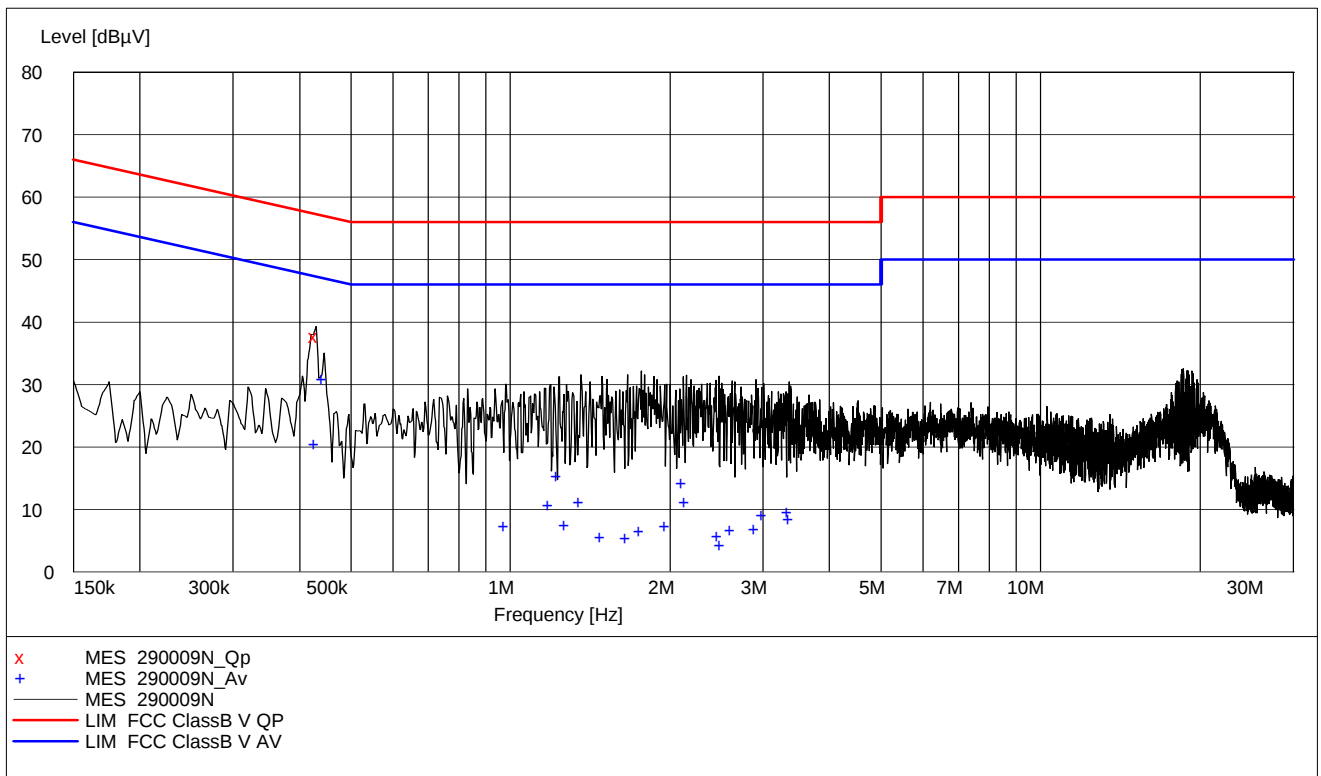
Highest measured value (L1 and N):

Single Adaptor (120V 60Hz):

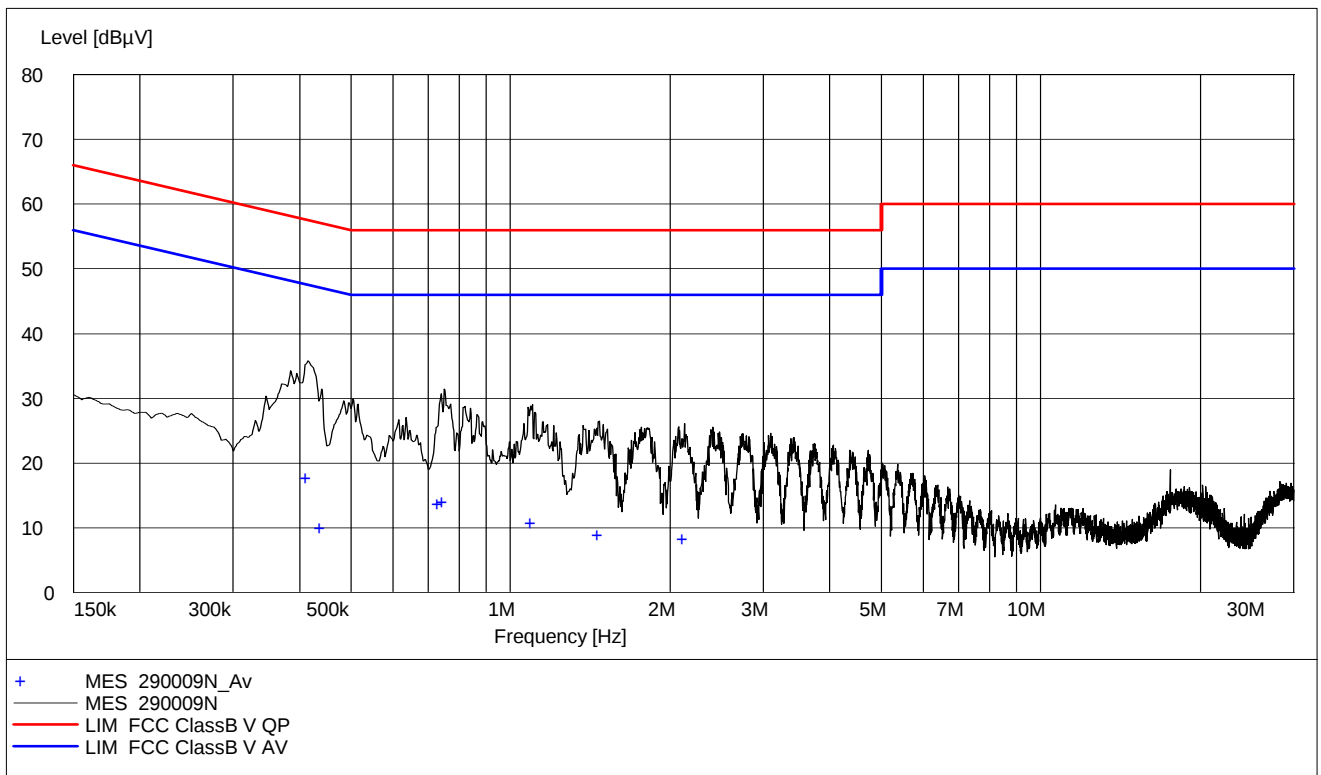
Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.430000	37.70	10.30	57.30	19.60	QP	L1	Pass
0.430000	20.50	10.30	47.30	26.80	AV	L1	Pass
0.445000	30.90	10.30	47.00	16.10	AV	L1	Pass
0.980000	7.40	10.40	46.00	38.60	AV	N	Pass
1.190000	10.70	10.40	46.00	35.30	AV	N	Pass
1.235000	15.40	10.40	46.00	30.60	AV	N	Pass
1.275000	7.50	10.40	46.00	38.50	AV	L1	Pass
1.360000	11.10	10.40	46.00	34.90	AV	N	Pass
1.490000	5.60	10.40	46.00	40.40	AV	N	Pass
1.665000	5.50	10.40	46.00	40.50	AV	N	Pass
1.765000	6.60	10.40	46.00	39.40	AV	N	Pass
1.970000	7.40	10.40	46.00	38.60	AV	N	Pass
2.120000	14.30	10.40	46.00	31.70	AV	N	Pass
2.150000	11.10	10.40	46.00	34.90	AV	N	Pass
2.475000	5.70	10.40	46.00	40.30	AV	N	Pass
2.505000	4.20	10.40	46.00	41.80	AV	N	Pass
2.620000	6.80	10.40	46.00	39.20	AV	N	Pass
2.905000	6.90	10.40	46.00	39.10	AV	N	Pass
3.010000	9.20	10.40	46.00	36.80	AV	N	Pass
3.355000	9.60	10.40	46.00	36.40	AV	N	Pass
3.380000	8.40	10.40	46.00	37.60	AV	N	Pass

Dual Adaptor (120V 60Hz):

Frequency [MHz]	Level [dBuV]	Af [dB]	Limit [dBuV]	Margin [dB]	Det	Position	Verdict [Pass/Fail]
0.415000	17.80	10.30	47.50	29.70	AV	N	Pass
0.440000	10.00	10.30	47.10	37.10	AV	N	Pass
0.735000	13.70	10.20	46.00	32.30	AV	N	Pass
0.750000	14.00	10.20	46.00	32.00	AV	N	Pass
1.100000	10.70	10.40	46.00	35.30	AV	N	Pass
1.470000	8.90	10.40	46.00	37.10	AV	N	Pass
2.130000	8.30	10.40	46.00	37.70	AV	N	Pass



Single Adaptor (120V 60Hz)



Dual Adaptor (120V 60Hz)

3.2 Spurious Emissions (Radiated)

Measurement Procedure:

FCC 15.109

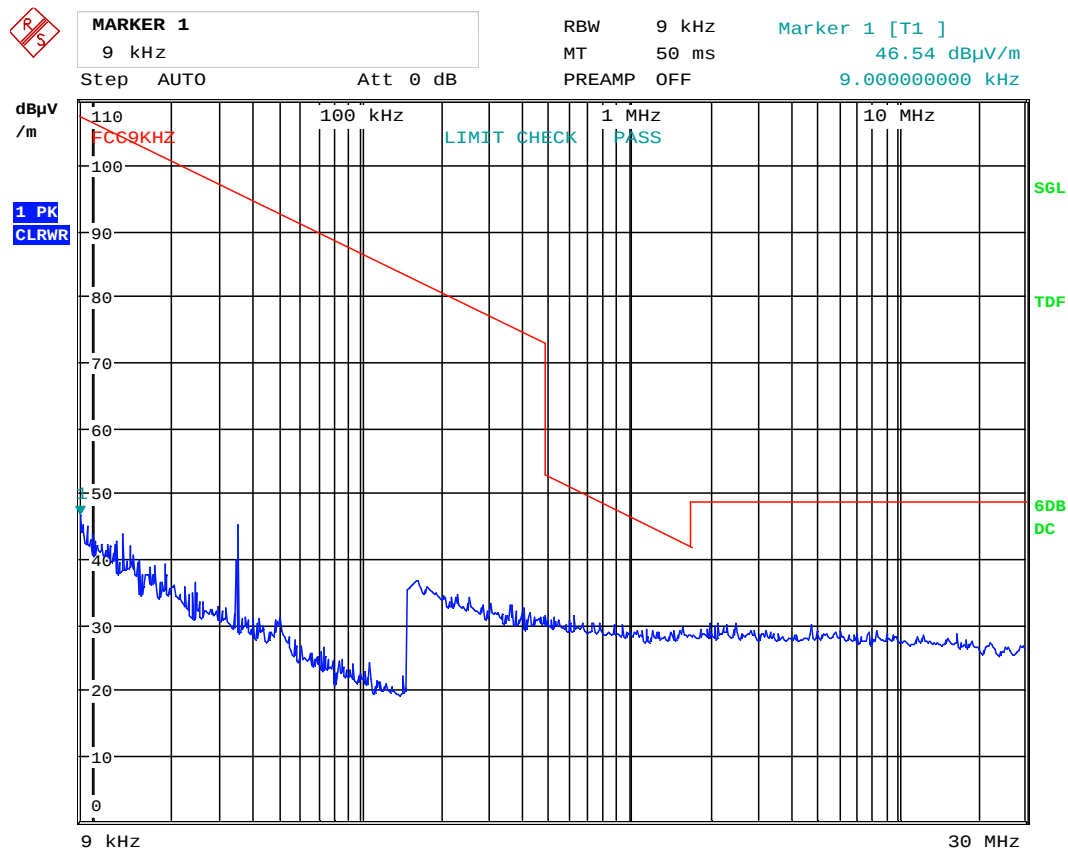
Test Results:

Radiated emission 9 kHz-30 MHz.

Measuring distance 10 m, measured with Peak detector.

No component detected, see attached graph.

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



Date: 11.SEP.2015 16:56:32

Radiated Emissions 30 - 1000 MHz.

Detector: Quasi-Peak

Measuring distance 3 m

The EUT were rotated 360 degrees and the antenna height varied between 1 and 4 m on all found frequencies.

Frequency	Operational condition	Polarization	Field strength	Measuring distance	Limit FCC15.209	Margin
MHz			dB μ V/m	metres	dB μ V/m	dB
37.36	TX on	VP	36.3	3	40	3.7
Other freqs	TX on	VP / HP	/	3	/	>10

Value above is measured with Peak detector.

See attached plots.

Limits:

Spurious Frequency MHz	Field Strength dB μ V/m @3m
30-88	40
88-216	43.5
216-960	46
Above 960	54 ¹

¹ The limit above 1000 MHz is specified for Average Detector, when the measurement is performed with a Peak Detector a Duty-Cycle Correction Factor has to be calculated to find the corresponding Average Detector value.



MARKER 1

37.35576923 MHz

Ref 80 dB μ V/m

* Att 10 dB

* RBW 100 kHz

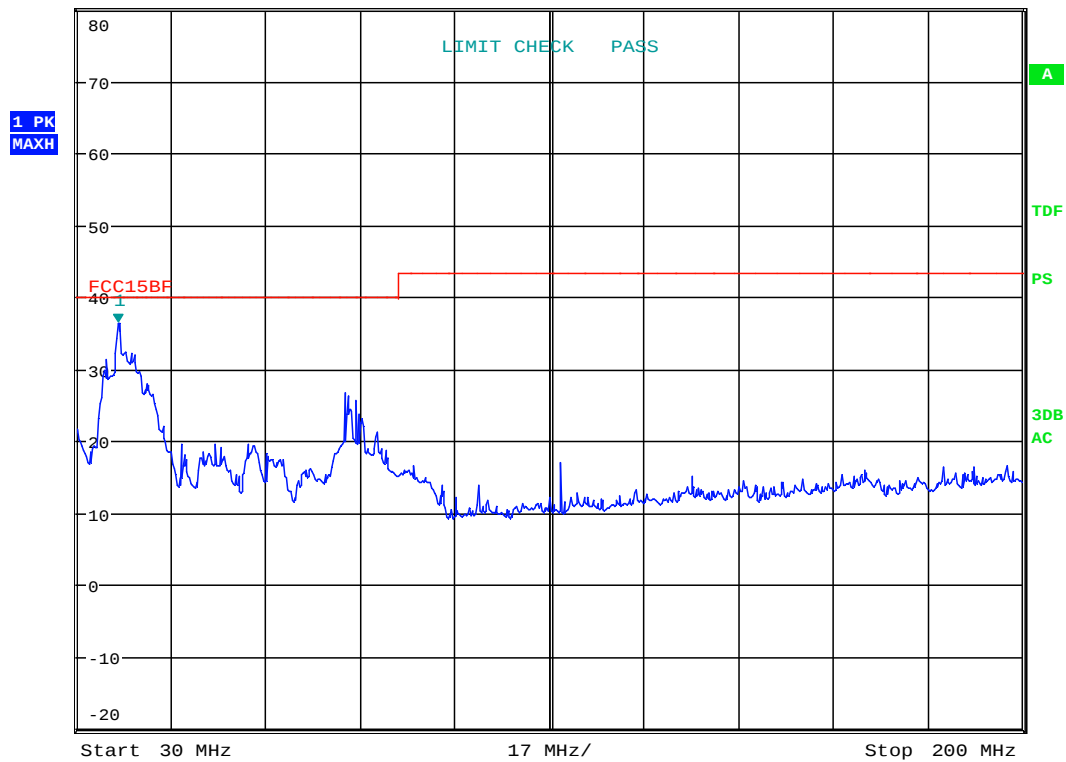
VBW 300 kHz

SWT 20 ms

Marker 1 [T1]

36.34 dB μ V/m

37.355769231 MHz



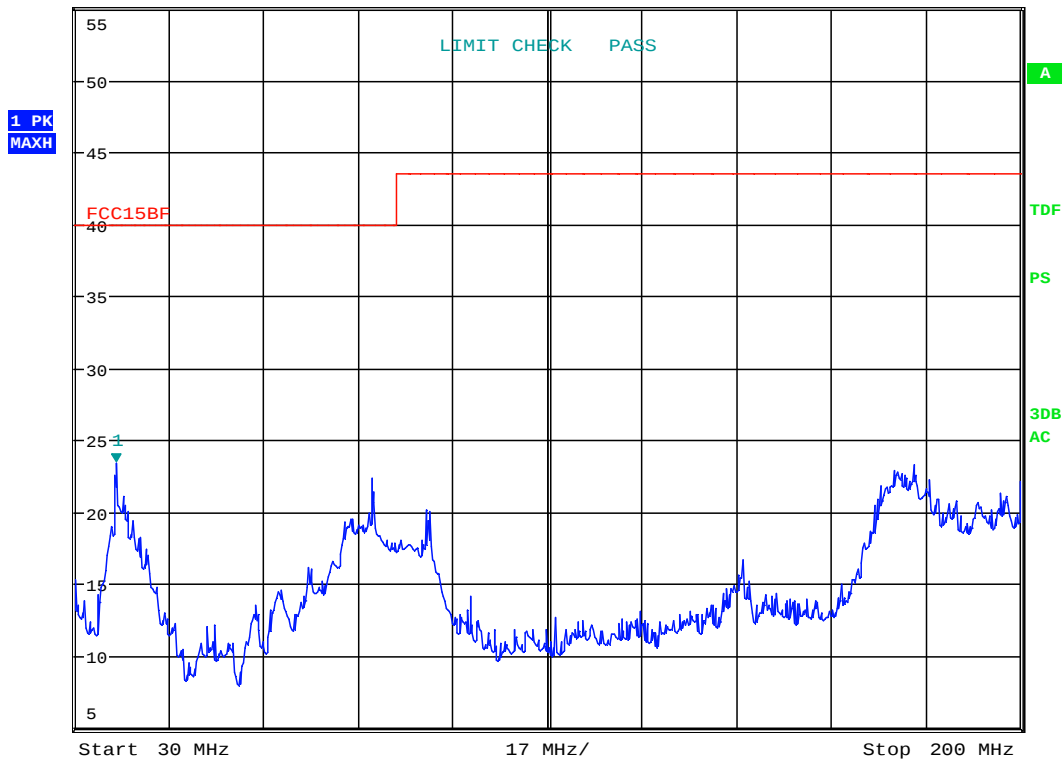
Date: 13.JAN.2016 14:58:12

Radiated Emissions, 30 -200MHz, Single Power Supply, VP



MARKER 1
37.35576923 MHz
Ref 55 dBμV/m * Att 10 dB

* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 23.48 dBμV/m
SWT 20 ms 37.355769231 MHz



Date: 13.JAN.2016 14:52:40

Radiated Emissions, 30 -200MHz, Single Power Supply, HP



MARKER 1

975.6410256 MHz

Ref 60 dB μ V/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

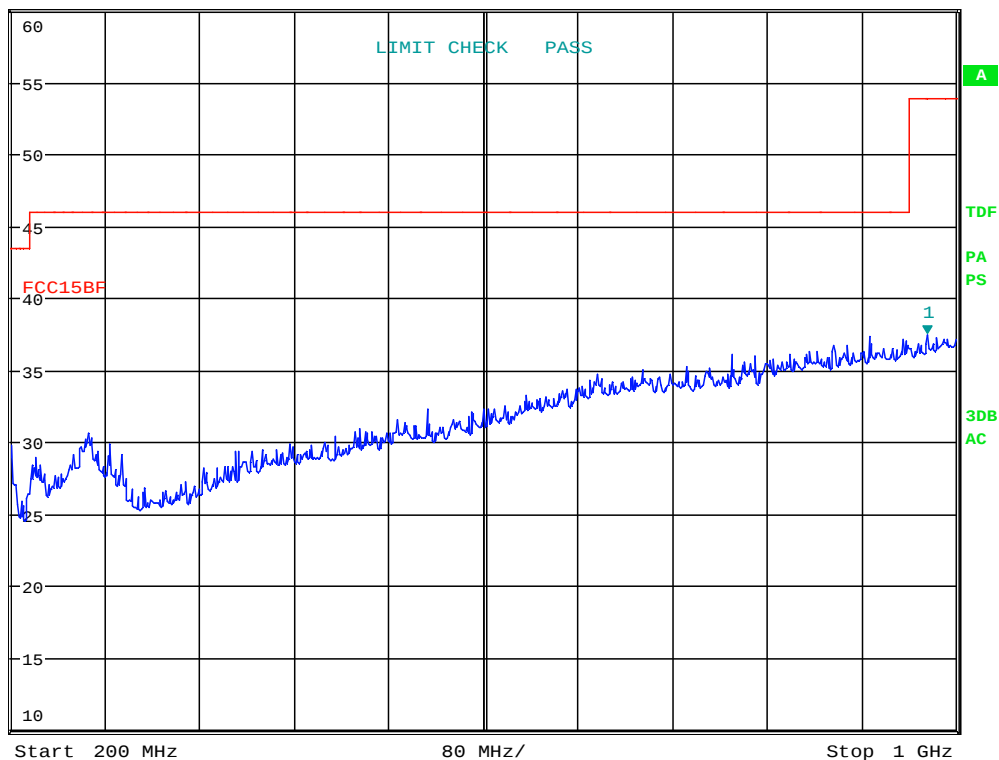
SWT 2.5 ms

Marker 1 [T1]

37.47 dB μ V/m

975.641025641 MHz

1 PK
MAXH



Date: 13.JAN.2016 14:25:45

Radiated Emissions. 200 -1000MHz, Single Power Supply, VP



MARKER 1

989.7435897 MHz

Ref 60 dB μ V/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

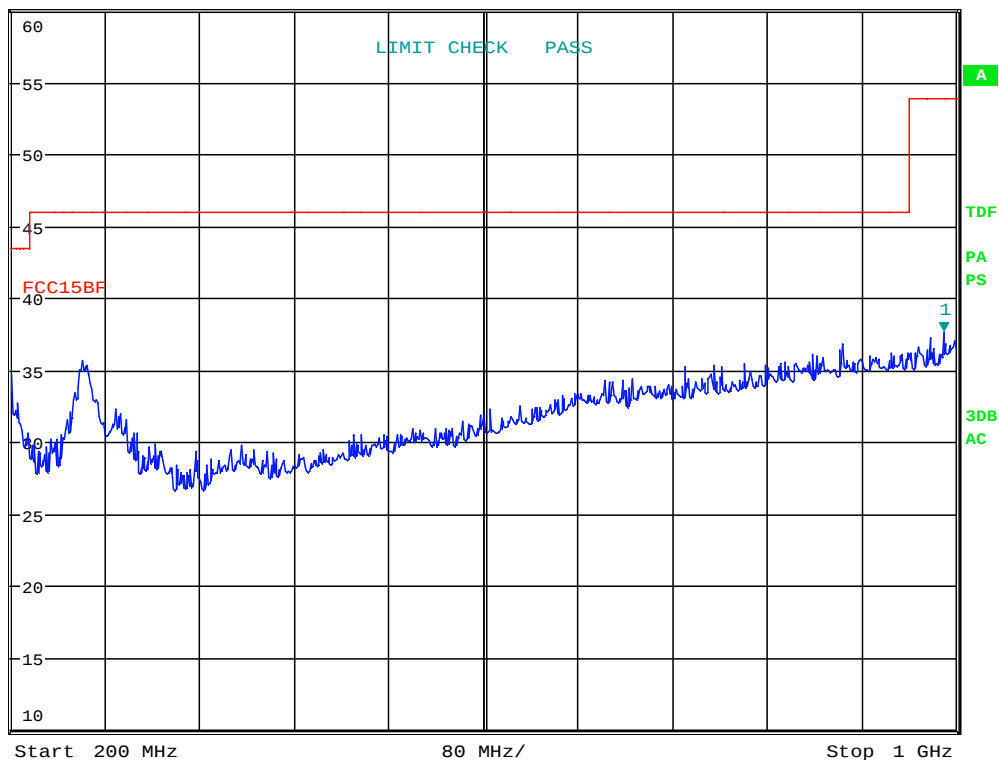
SWT 2.5 ms

Marker 1 [T1]

37.65 dB μ V/m

989.743589744 MHz

1 PK
MAXH

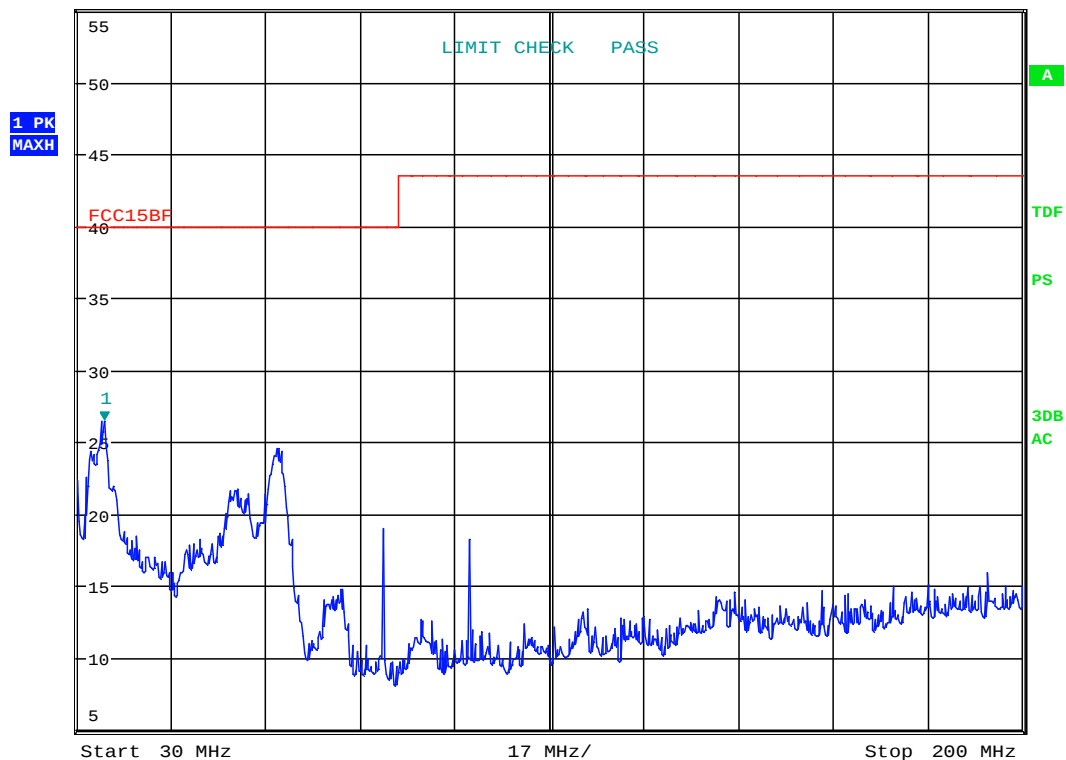


Date: 13.JAN.2016 14:28:53

Radiated Emissions. 200 -1000MHz, Single Power Supply, HP



MARKER 1
34.90384615 MHz
Ref 55 dB μ V/m * Att 10 dB * RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 26.53 dB μ V/m
SWT 20 ms 34.903846154 MHz

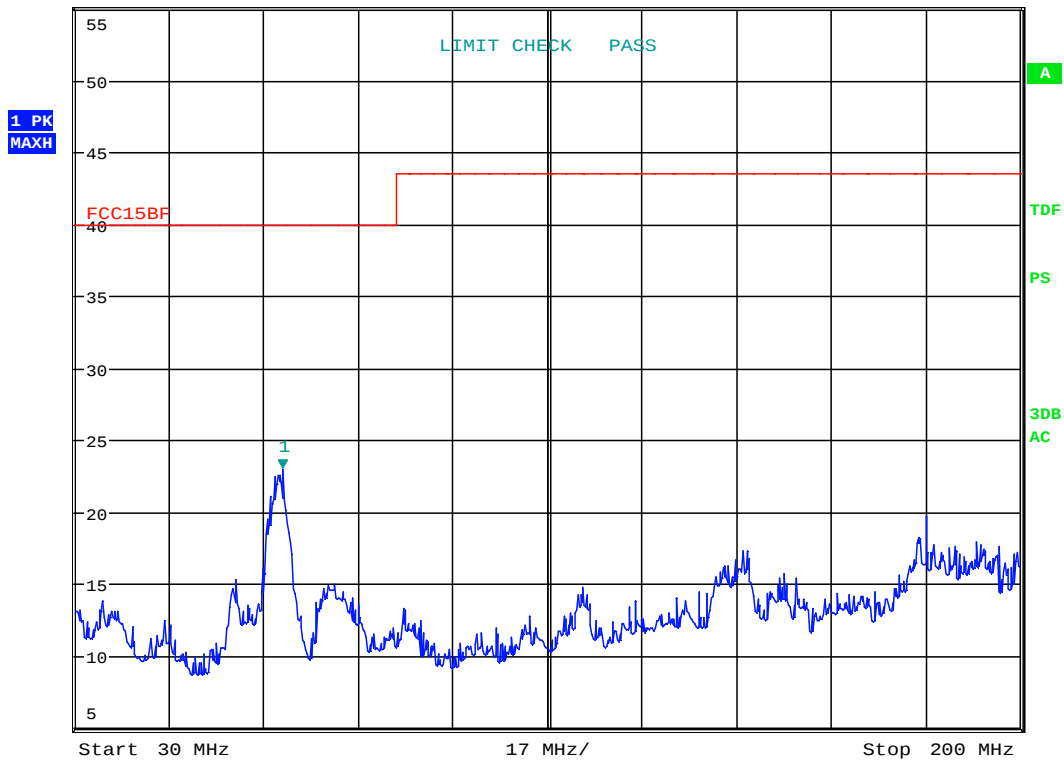


Date: 13.JAN.2016 14:47:46

Radiated Emissions, 30 -200MHz, Dual Power Supply, VP



MARKER 1
67.32371795 MHz
Ref 55 dBμV/m * Att 10 dB * RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 22.97 dBμV/m
SWT 20 ms 67.323717949 MHz



Date: 13.JAN.2016 14:50:31

Radiated Emissions, 30 -200MHz, Dual Power Supply, HP



MARKER 1

975.6410256 MHz

Ref 60 dB μ V/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

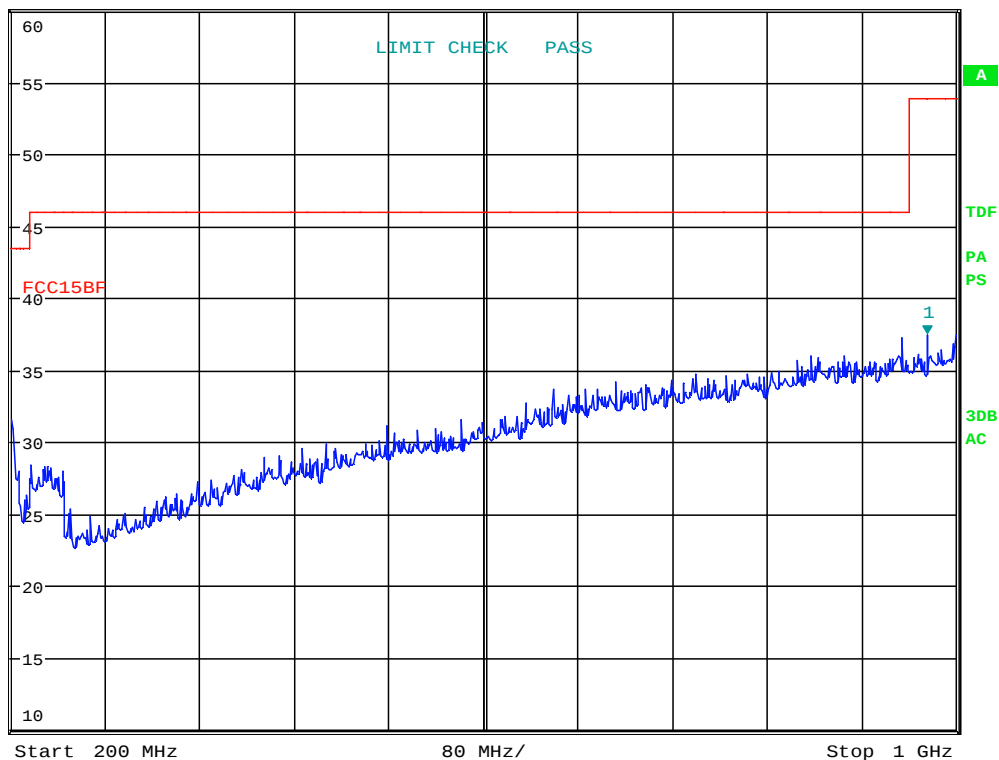
SWT 2.5 ms

Marker 1 [T1]

37.43 dB μ V/m

975.641025641 MHz

1 PK
MAXH



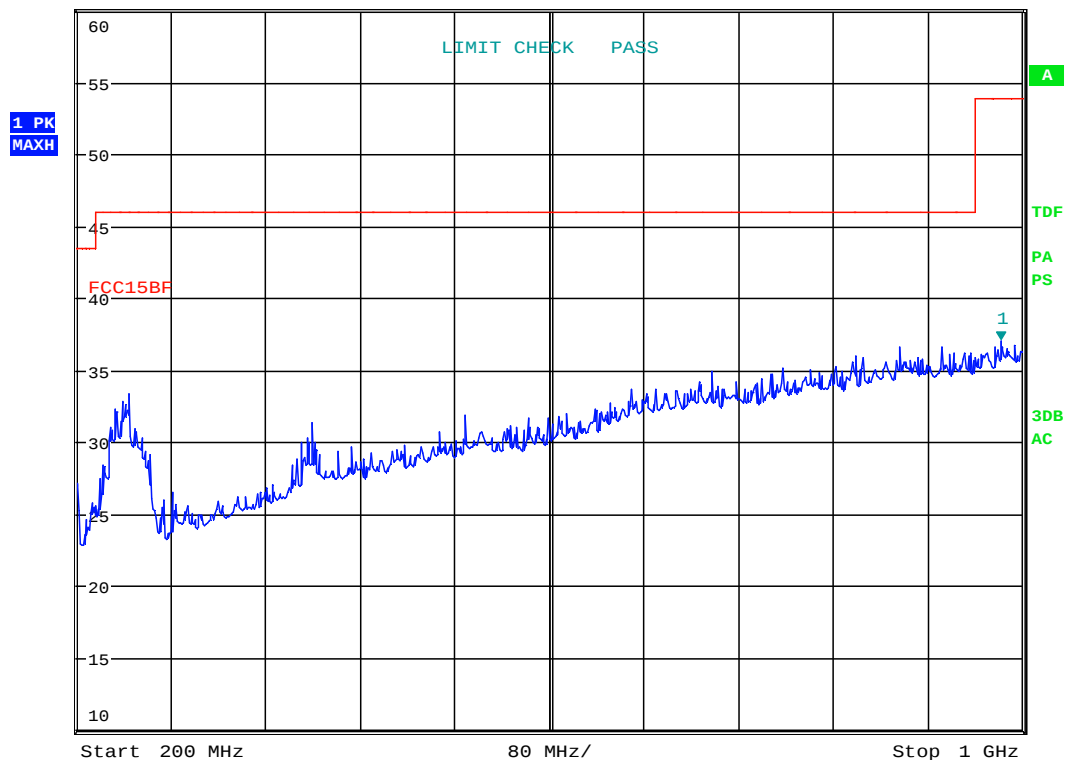
Date: 13.JAN.2016 14:35:18

Radiated Emissions. 200 -1000MHz, Dual Power Supply, VP



MARKER 1
982.0512821 MHz
Ref 60 dBμV/m * Att 10 dB

* RBW 1 MHz Marker 1 [T1]
VBW 3 MHz 37.08 dBμV/m
SWT 2.5 ms 982.051282051 MHz



Date: 13.JAN.2016 14:33:10

Radiated Emissions. 200 -1000MHz, Dual Power Supply, HP

Radiated Emissions, 1 -2.2 GHz

Measuring distance: 3m (1 – 2.2 GHz)

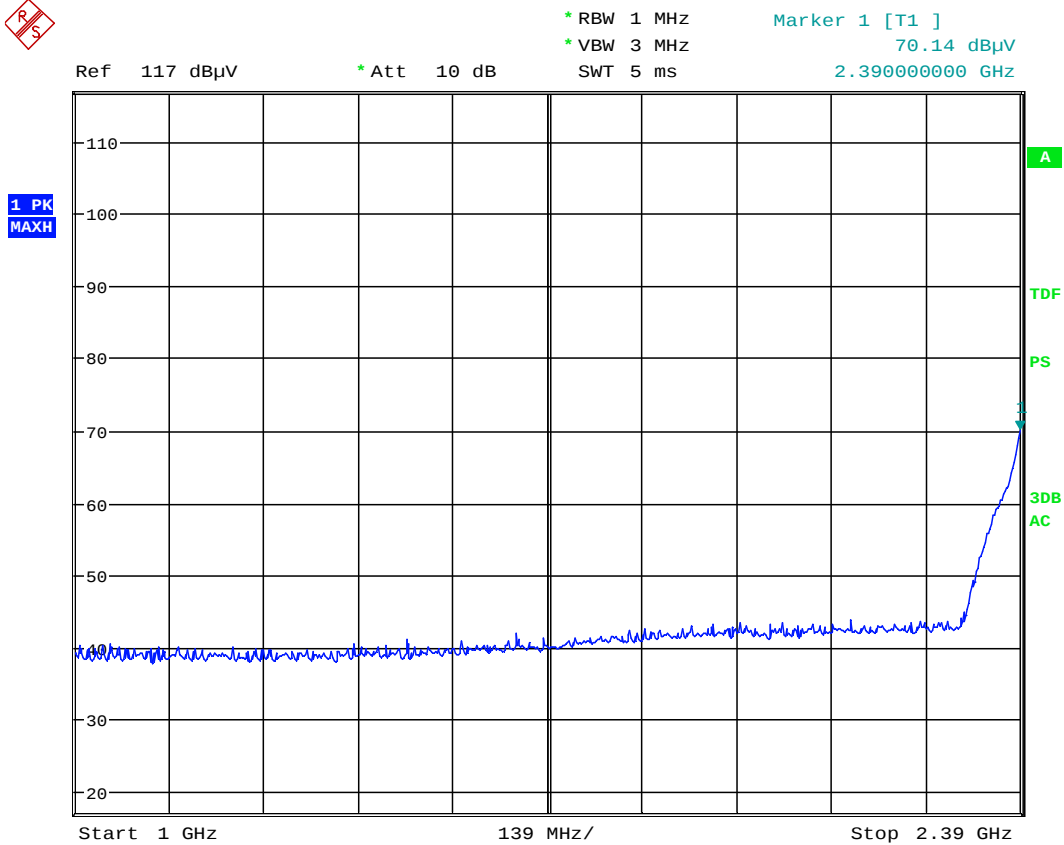
Peak Detector:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector	Duty cycle corr. factor	Limit	Margin
GHz	L,M,H	dB	dB μ V/m	dB	dB μ V/m	dB
All freqs	L,M,H	N/A	None detected	20	74	>20

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

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

See plots.



Date: 10.SEP.2015 15:04:19

Radiated Emissions, 1000 -2390MHz, VP



* RBW 1 MHz
* VBW 3 MHz
SWT 5 ms

Marker 1 [T1]
64.56 dBμV
2.390000000 GHz

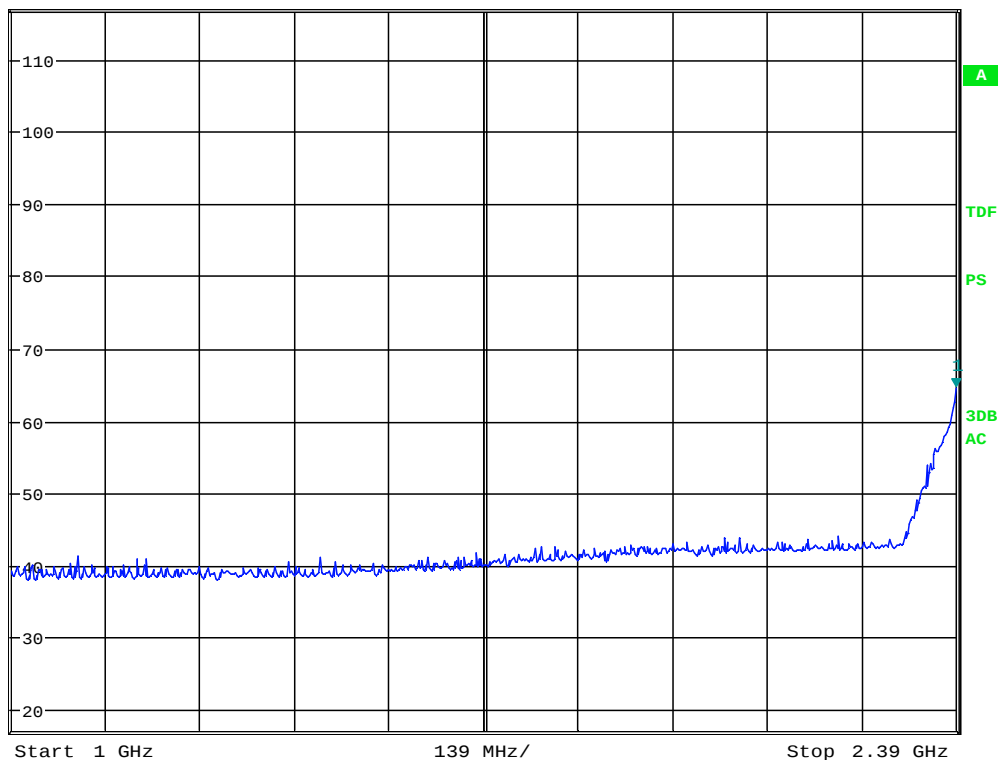
Ref 117 dBμV

* Att 10 dB

SWT 5 ms

2.390000000 GHz

1 PK
MAXH



Date: 10.SEP.2015 15:06:10

Radiated Emissions, 1000 -2390MHz, HP

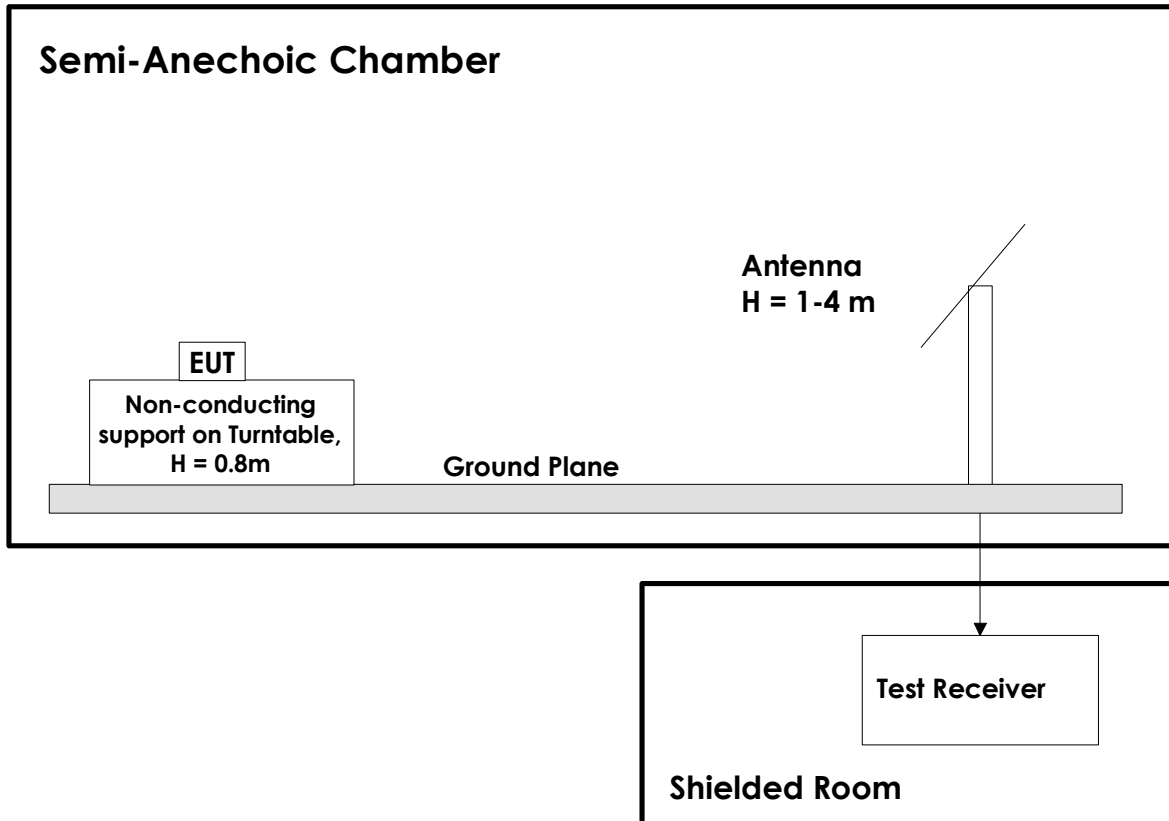
4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Power Line Conducted Emissions		+2.9 / -4.1 dB
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 Test Setups

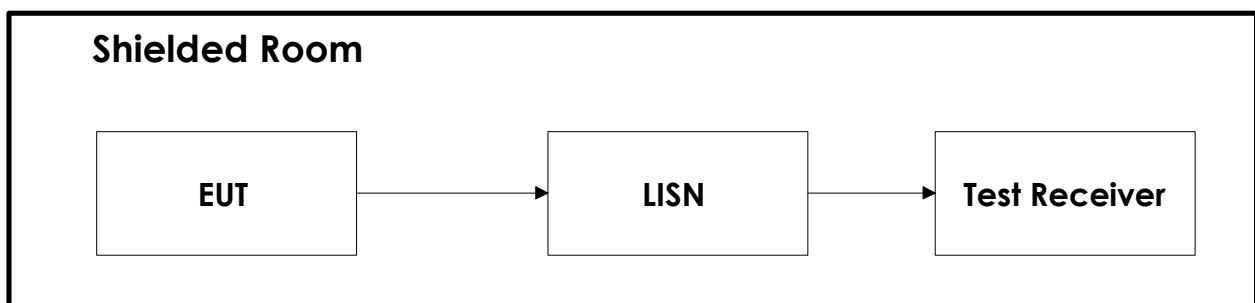
5.1 Radiated Emissions Test



Test Set-Up 1

This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz are 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.

5.2 Power Line Conducted Emissions Test



Test Set-Up 2

6 Test Equipment Used

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 Testhouse.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2014.11 2015.11	2015.11 2016.11
4	HK116	Biconical Antenna	Rohde & Schwarz	LR 1260	2013.12	2017.12
5	HL223	LPDA antenna	Rohde & Schwarz	LR 1261	2013.12	2017.12
6	3115	Horn Antenna	EMCO	LR 1226	2013.12	2018.12
7	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2014.11 2015.10	2015.11 2016.10
12	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 1660	2014.10	2016.10
13	Model 87V	Multimeter	Fluke	N-4669	2015.10	2016.10
14	ESHS10	EMI	Rohde & Schwarz	N 3528	2015.08	2016.08
15	ESH3-Z5	Two-line V-Network	Rohde & Schwarz	LR 1076	2014.04.23	2016.04.23
16	ESH3-Z2	Pulse limiter	Rohde & Schwarz	LR 1074	2015.03.05	2017.03.05
17	6812B	AC power Source	Agilent	LR 1515	2015.12	2016.12
18	HP 10855A	Pre-amplifier	Hewlett Packard	LR 1445	2015.10	2016.10

Revision history

Version	Date	Comment	Sign
1.0	2016.01.26		