Report No. 290009-2

Test Report

Product	Remote Control for 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 Remote Control
Rating	3.0V DC (Primary Battery)
Trademark	Phonak
Serial number	/
Additional information	434.050MHz
Tested according to	**FCC Part 15.231** Low Power device **Industry Canada RSS-210, Issue 8** Low Power Licence-Exempt Radiocommunications Devices
Order number	290009
Tested in period	2015.09.11 to 2015.09.11 and 2016.01.13
Issue date	2016.02.17
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.Suhanthakumar]

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ENTERPRISE NUMBER NO974404532

CONTENTS

1 INFORMATION

1.1 Test Item

Name :	Phonak
FCC ID :	KWC-TX23RCV1
Industry Canada ID :	2262A-TX23RCV1
Model/version :	Roger Table Mic Remote control
Serial number :	/
Hardware identity and/or version:	V3
Software identity and/or version :	W1509
Frequency Range :	434.050 MHz
Number of Channels :	1
Operating Modes :	PTT device
Type of Modulation :	Digital (GFSK)
User Frequency Adjustment :	None
Output Power :	0.0244 mW (Peak, Radiated)
Type of Power Supply :	Primary Battery
Antenna Connector :	None
Antenna Diversity Supported :	No
Desktop Charger :	N/A

Description of Test Item

The EUT is a 434MHz Remote Control for a Wireless Microphone.

Exposure Evaluation

The EUT is designed for handheld use and for purposes of exposure evaluation this EUT is a portable device, however it is exempted from SAR evaluation since the output power is below the exemption level.

The EUT is exempted from RF Exposure Evaluation to Industry Canada requirements since the output power complies with the power levels of section 2.5.1 of RSS-102 Issue 5.

1.2 Test Environment

1.2.1 Normal test condition

Temperature:	20.8 – 22.1 °C
Relative humidity:	40 - 54 %
Normal test voltage:	3.7 V DC

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen

1.4 Test Equipment

See list of test equipment in clause 5.

2 TEST REPORT SUMMARY

2.1 General

All measurements are tracable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.231 and Industry Canada RSS-210 Issue 8.

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
DSR 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”.

2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 8, RSS-GEN Issue 4 reference	Result
Antenna Requirement	15.203	8.3 (RSS-GEN)	Complies
Operating Mode and Frequency	15.231(a)	A1.1.1	Complies
Field Strength of Fundamental	15.231(b)	A1.1.2	Complies
Field Strength of Spurious Emissions	15.231(b) 15.209 15.205	A1.1.2 8.9 (RSS-GEN) 8.10 (RSS-GEN)	Complies
Bandwidth of Emissions	15.231(c)	A1.1.3	Complies
Reduced Field Strengths	15.231(e)	A1.1.5	N/A[1]
Limitation of Transmissions	15.231(e)	A1.1.5	N/A[1]
Frequency Stability	15.231(d)	A1.1.4	N/A[2]

[1] Not applicable for EUTs operating under the conditions specified in FCC 15.231(a)

[2] Only applicable for EUTs operating in the 40.66 – 40.70 MHz band

2.3 Description of modification for Modification Filing

Not applicable.

2.4 Comments

All measurements were done with the EUT powered by fully charged batteries, 2xAA batteries were used for all tests.

2.5 Family List Rational

Not Applicable.

3 TEST RESULTS

3.1 Antenna Requirement

Ref: FCC 15.203

Detachable antenna? ☐ Yes ☒ No

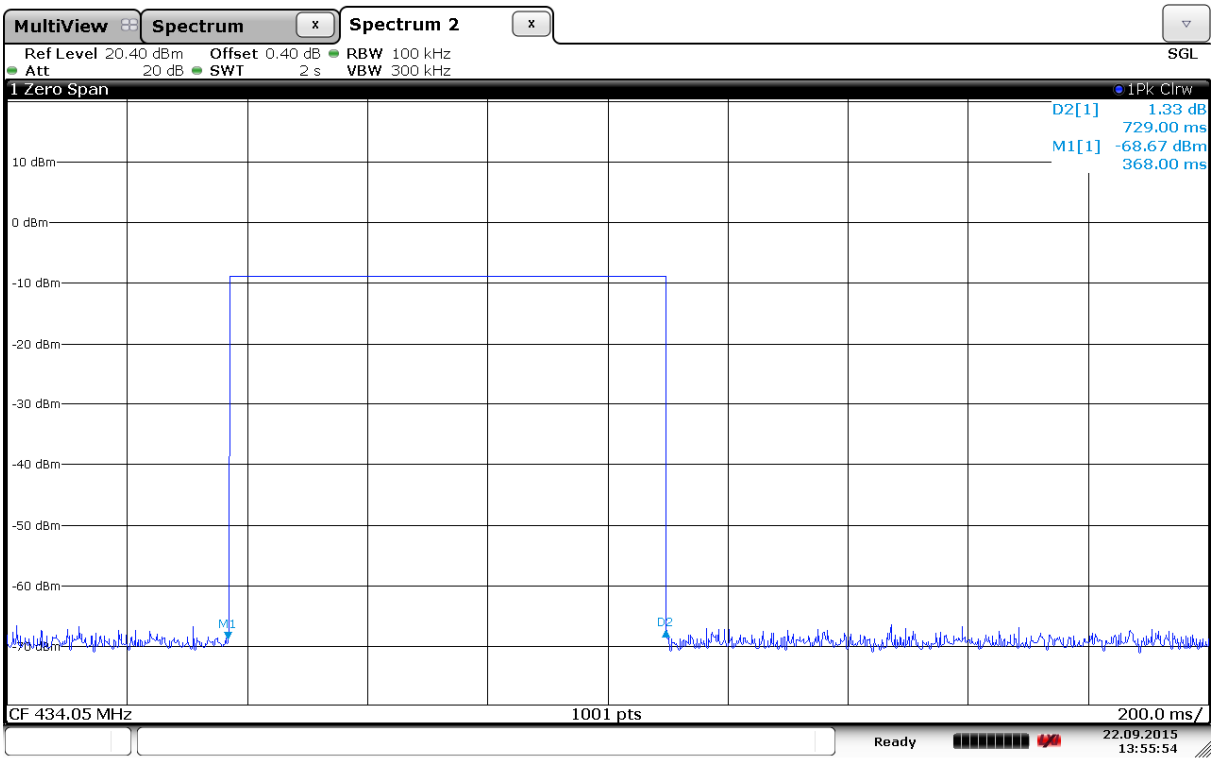
If detachable, is the antenna connector non-standard? ☐ Yes ☐ No

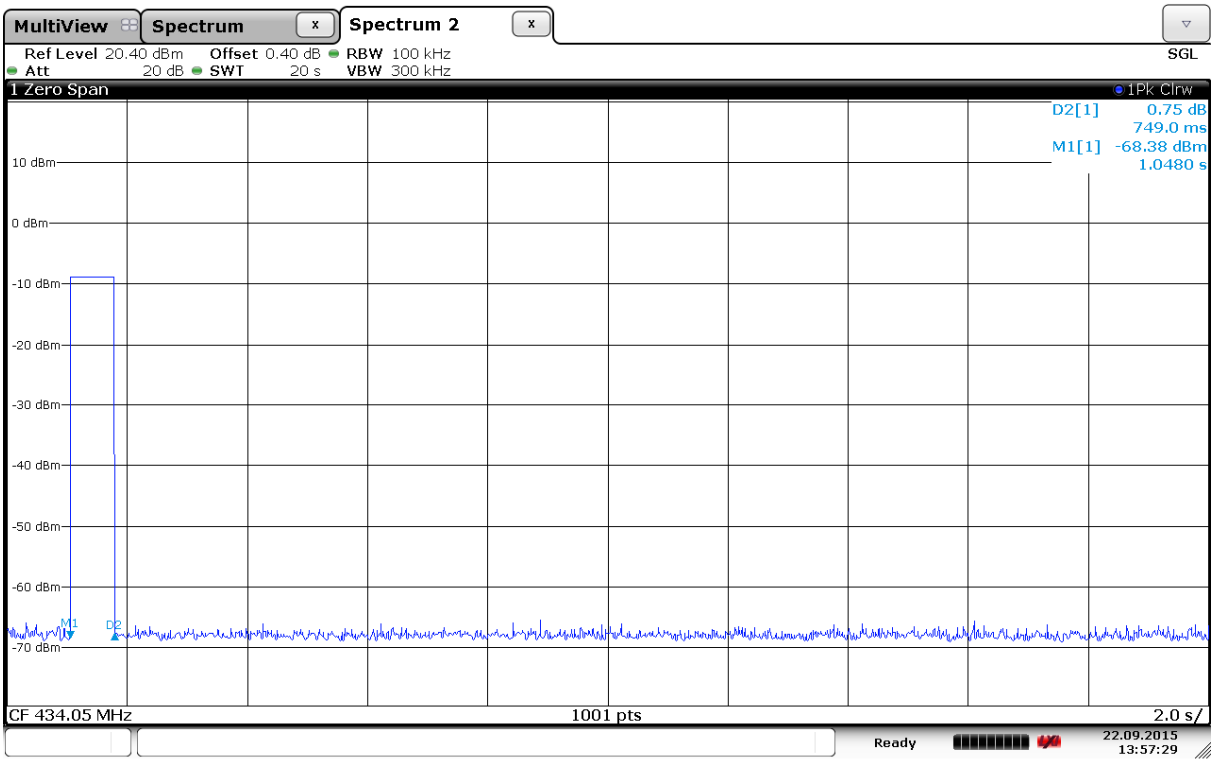
Type of antenna connector: N/A

3.2 Operating Mode and Frequency

The EUT is a remote control that is used to control a wireless tabletop microphone. The EUT transmits only when a button is pushed.

Requirement FCC 15.231(a)	Comment	Verdict
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released	The EUT transmits for 750 ms each time a button is pressed, EUT is then deactivated until next time a button is presses.	Complies
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation	Not applicable, the EUT is a remote control and only transmits when a button is pushed	N/A
(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.	Not applicable, the EUT only transmits when a button is pushed	N/A
(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition	Not applicable, the EUT is not used for alarm or emergeny purposes	N/A
(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.	Not applicable	N/A





Transmission time

3.3 Field Strength of Fundamental

Para. No.: 15.231 (b)

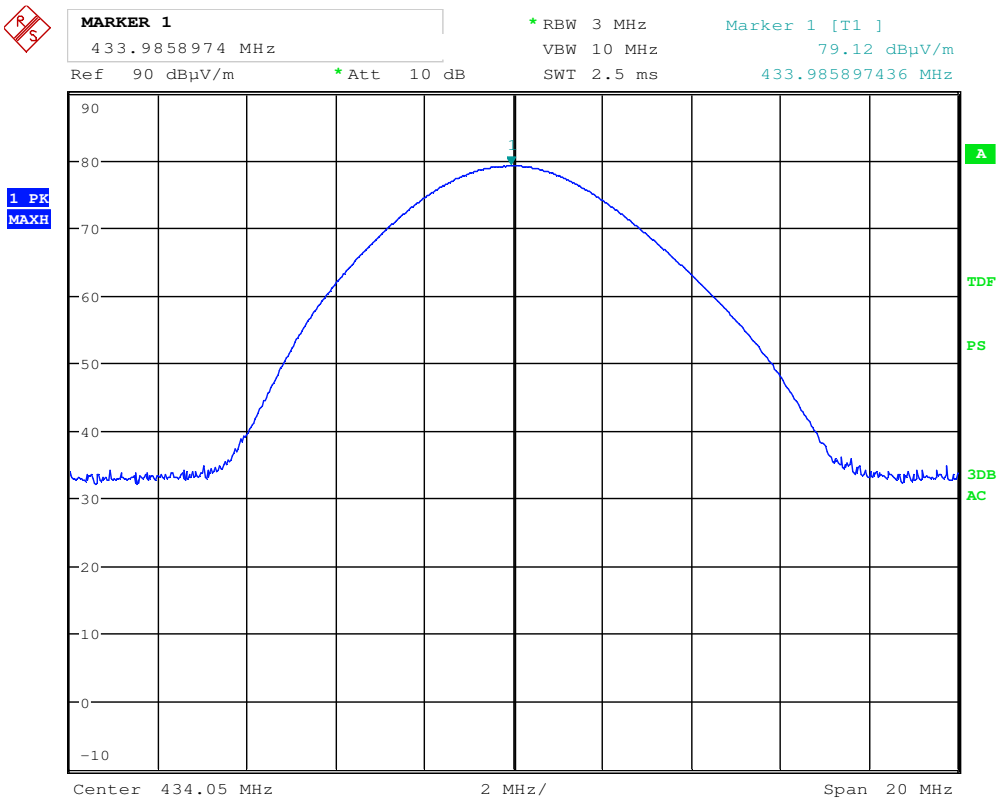
Test Results: **Complies**

Measurement Data:

	434.050 MHz
Measured Field Strength	79.1 dBµV/m
Requirement	81 dBµV/m
Calculated Radiated Output Power	0.0244 mW

Radiated Output Power is calculated with Free Field Formula.

Measured at 3m with Peak detector



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Field Strength of Fundamental (HP, Peak Det)

3.4 Field Strength of Spurious Emissions

Para. No.: 15.209

Test Results: Complies

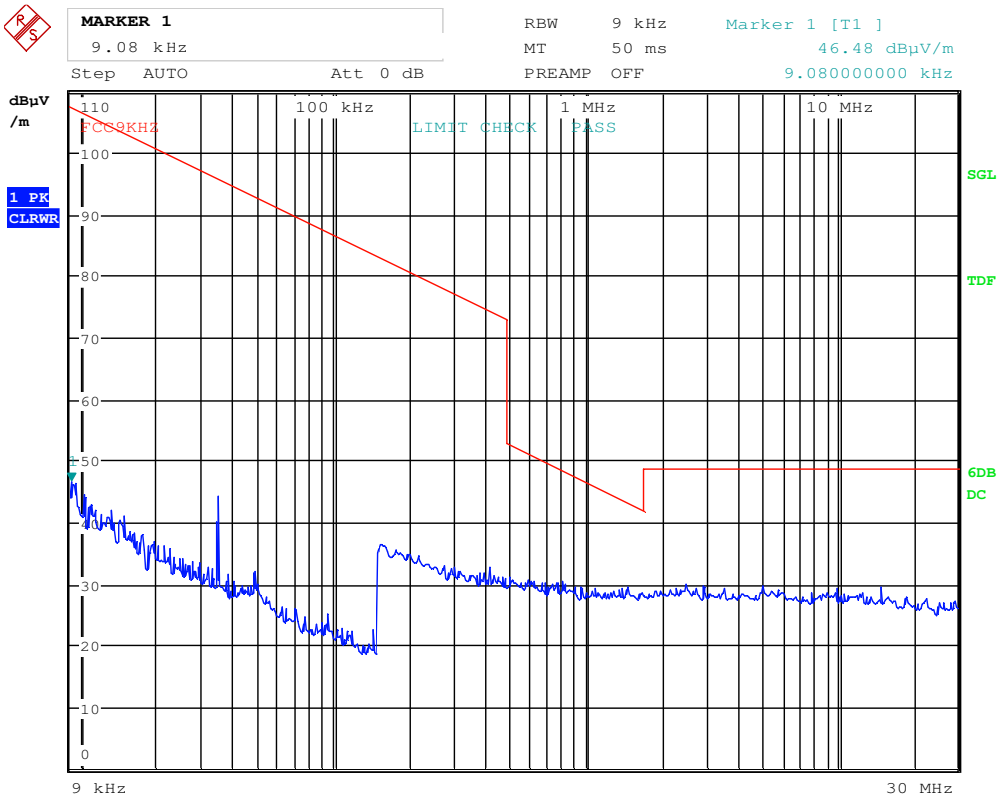
Measurement Data:

Radiated emissions 9 kHz-30 MHz.

Measuring distance 10 m, measured with Peak detector.

No component detected, see attached plot.

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



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Radiated emission 30 – 1000 MHz.

Detector: Quasi-Peak

Measuring distance 3m according to FCC 15.209 and 15.231.

Tested with the EUT transmitting continuously.

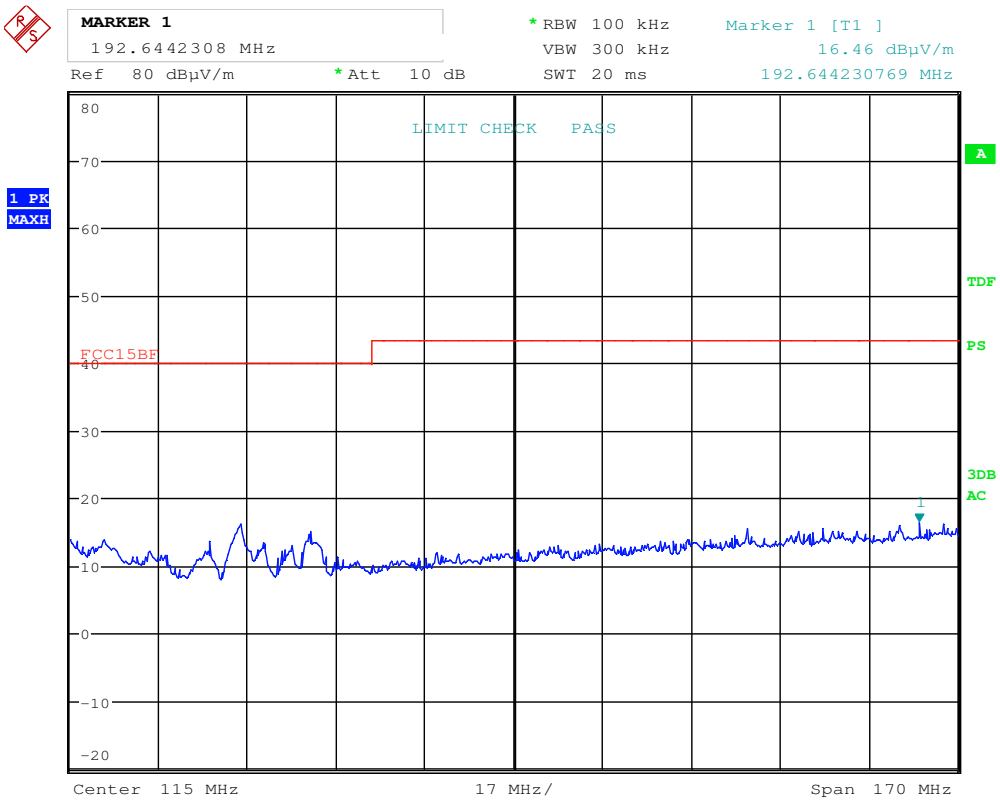
Frequency	Detector	Polarization	Field strength	Measuring distance	Limit 15.231[1] 15.209[2]	Margin
MHz			dBµV/m	metres	dBµV/m	dB
868	AV	HP	30.5	3	61.9[1]	31.4
868	QP	HP	27.6	3	46[2]	18.4
893.59	QP	HP	23.2	3	46[2]	22.8
902.56	QP	VP	19.3	3	46[2]	26.7

See attached plots.

Spurious Emissions Limits, FCC 15.231:

Frequency (MHz)	**Field Strength of Spurious Emission (dBµV/m)**
40.66 – 40.70	47.0
70 – 130	41.9
130 – 174	41.9 to 51.5
174 – 260	51.5
260 – 470	51.5 to 61.9
Above 470	61.9

Above limits are valid for measurements with Average Detector at 3m measuring distance



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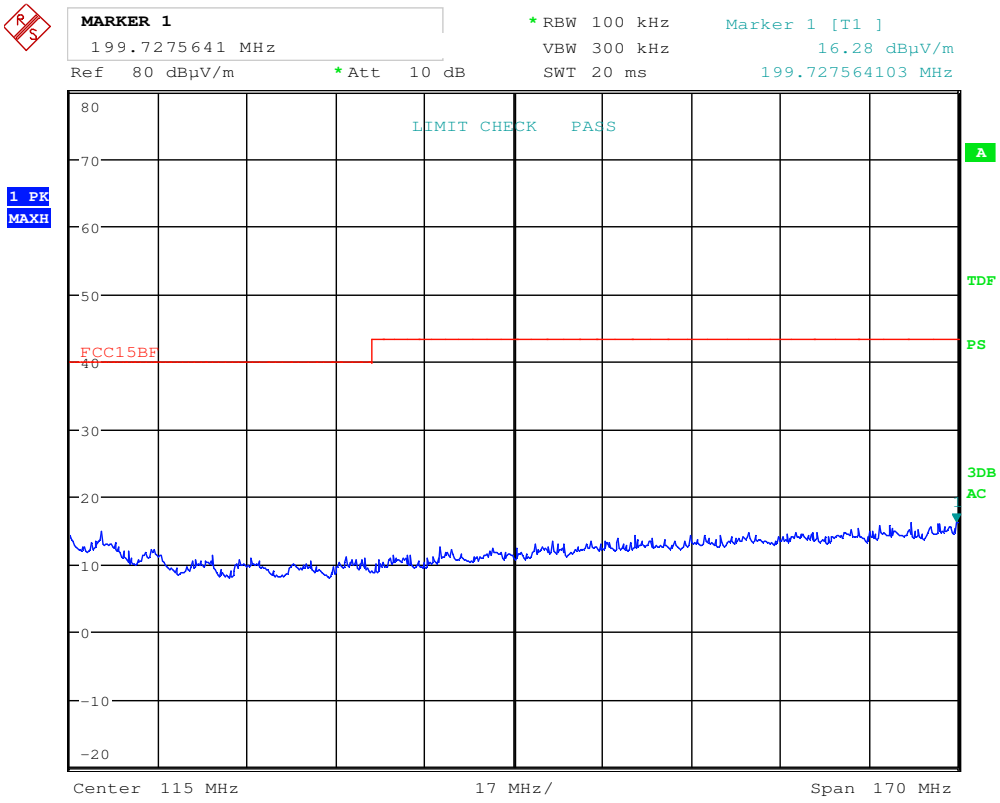
Radiated Emissions, 30 -200MHz, VP



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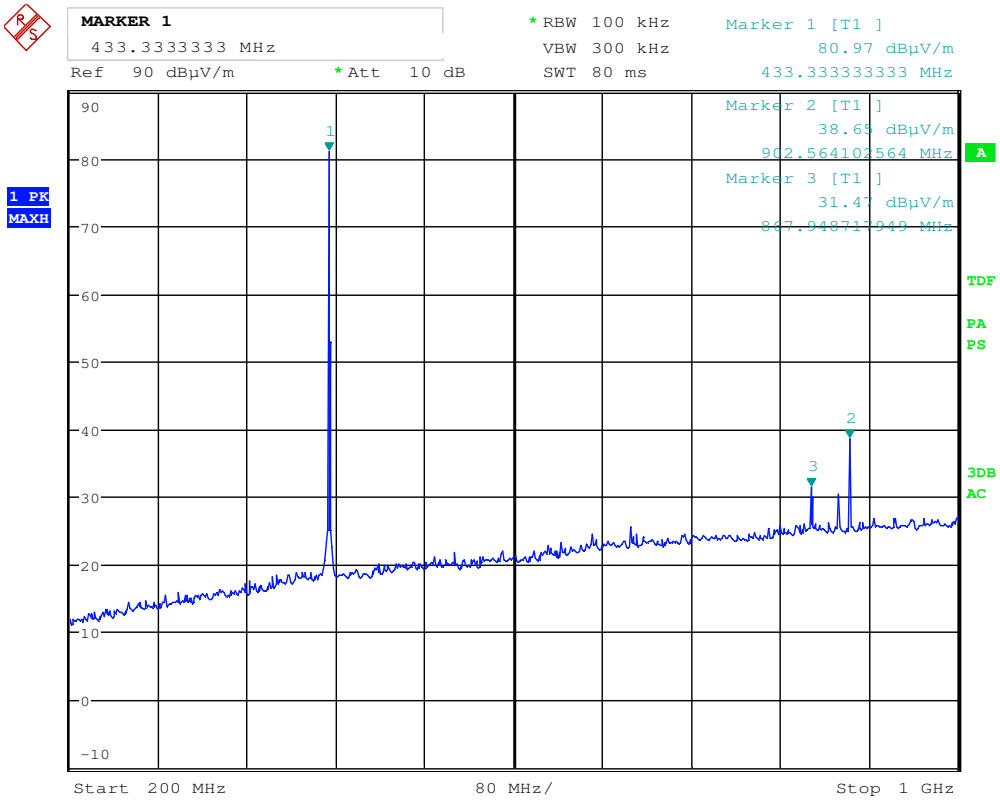
Radiated Emissions, 30 -200MHz, HP



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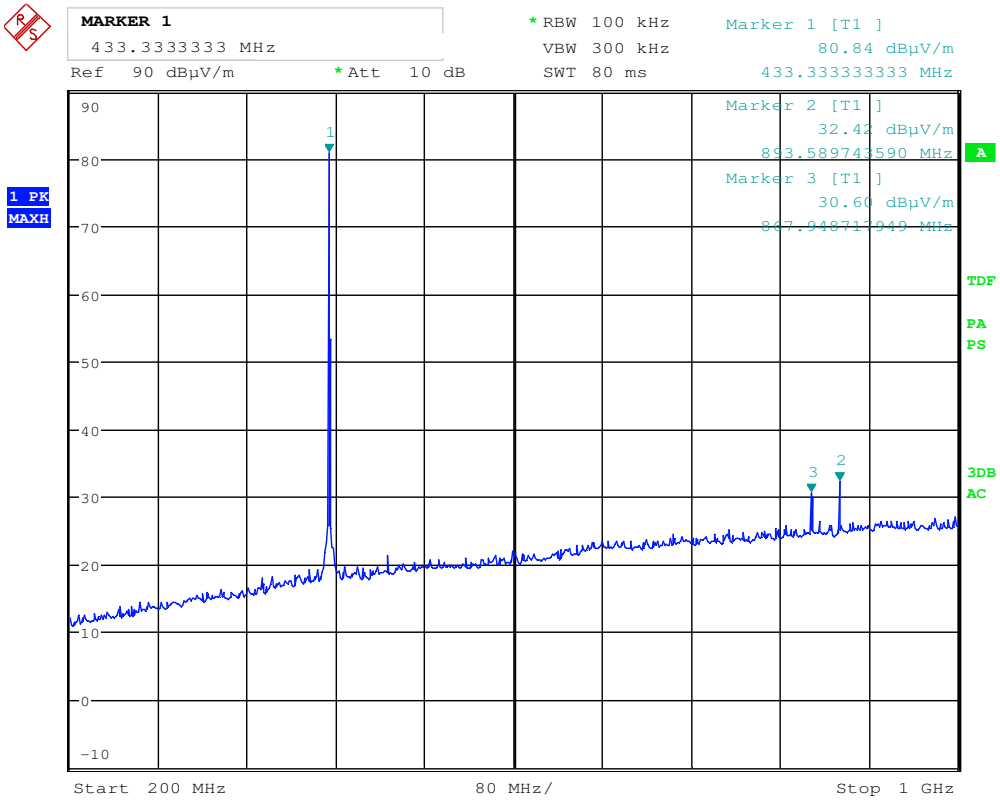
Radiated Emissions. 200 -1000MHz, VP



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Radiated Emissions. 200 -1000MHz, HP

Radiated Emissions, 1 -5 GHz

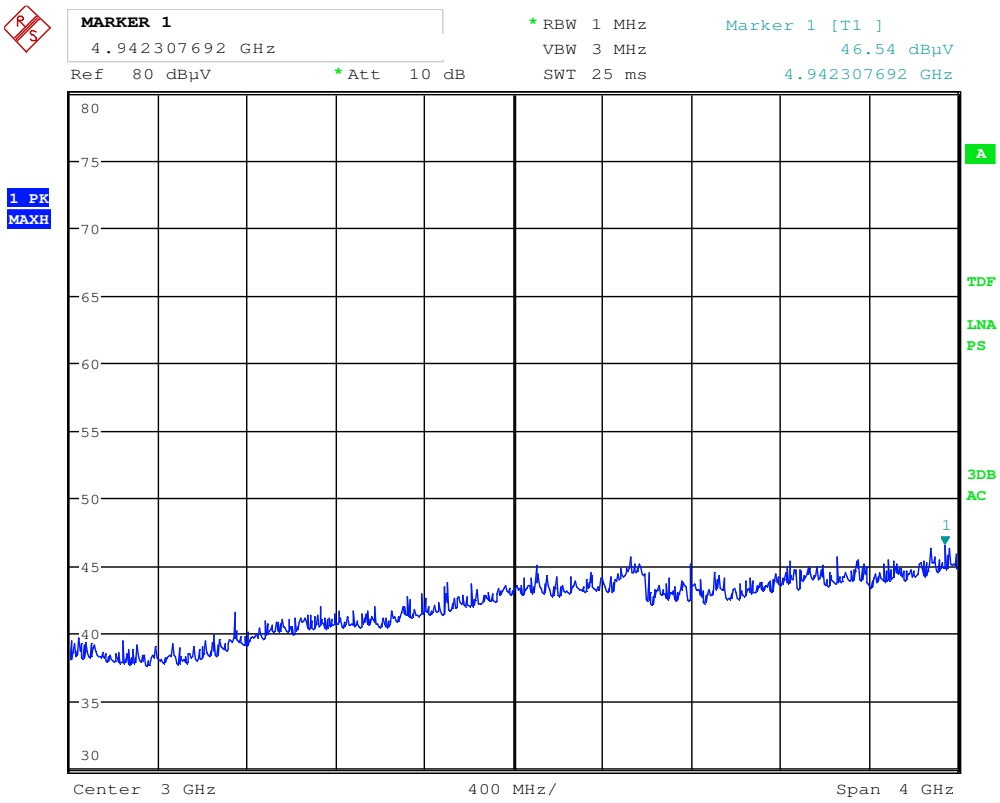
Measuring distance: 3m (1 – 5 GHz)

Peak Detector:

Frequency	RF channel	Dist. corr. factor	Field strength, Peak Detector	Peak Limit 15.209	Average Limit 15.231(b)
GHz	L,M,H	dB	dBµV/m	dBµV/m	dBµV/m
All freqs	L,M,H	N/A	None detected	74	61.9

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

See plots.



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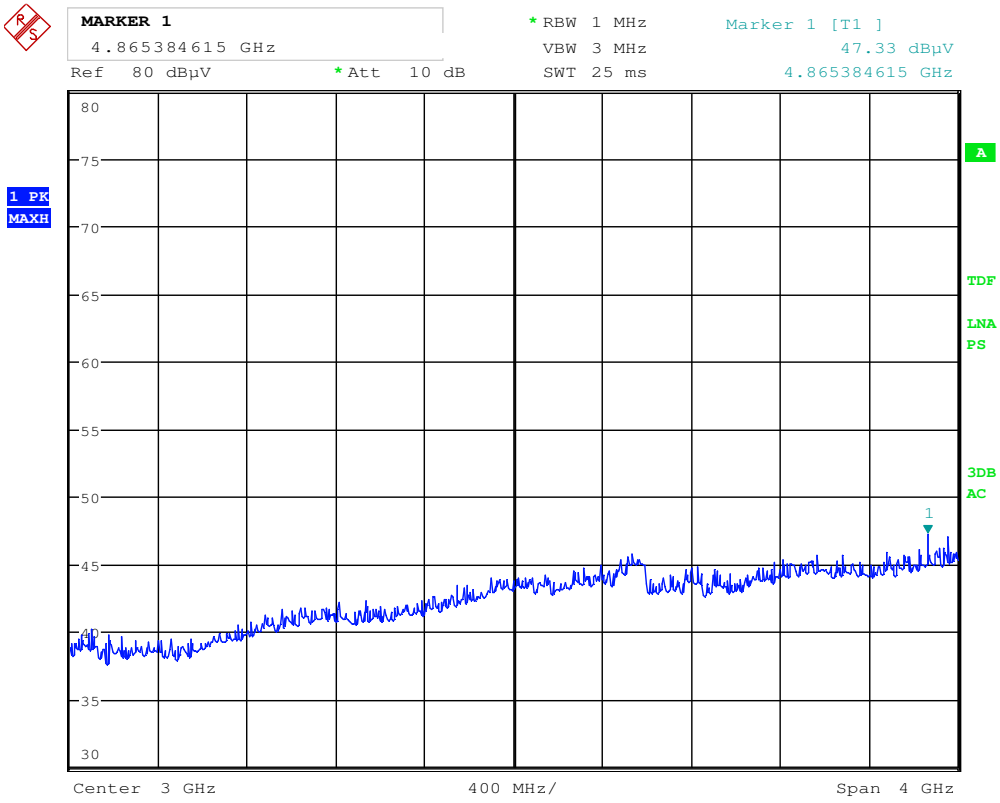
Radiated Emissions, 1000 -5000 MHz, VP



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Radiated Emissions, 1000 -5000 MHz, HP

3.5 Bandwidth of Emissions

Para. No.: 15.231 (c)

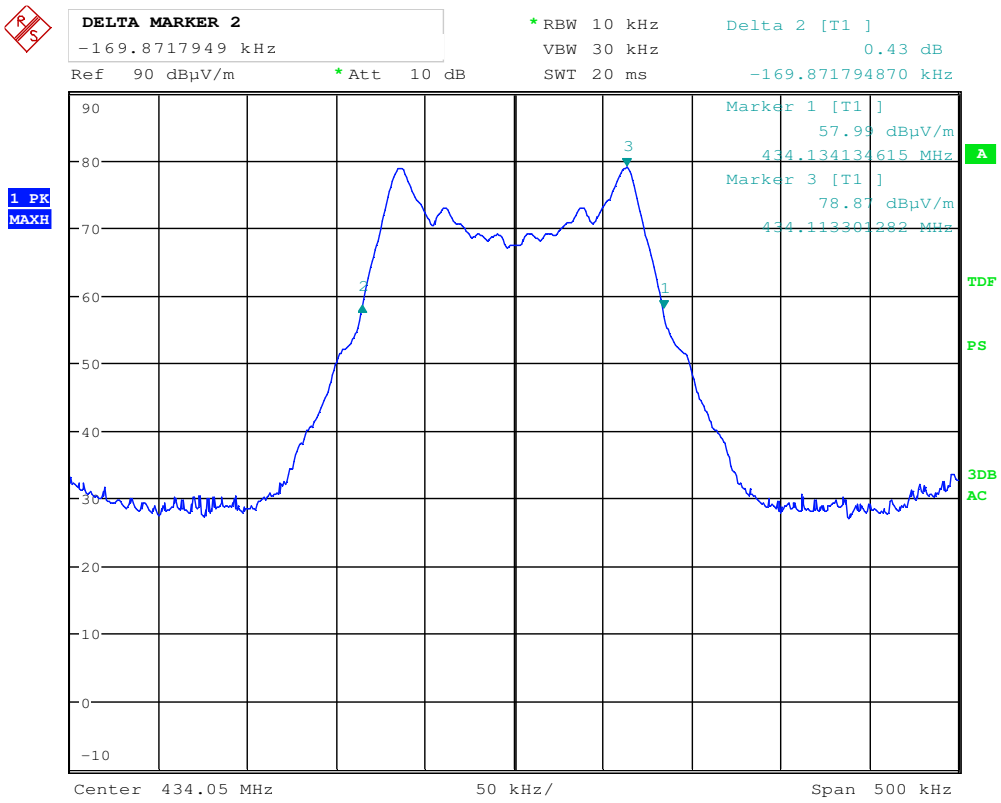
Test Results: Complies

Centre Frequency of transmitter	434.050 MHz
Measured 20 dB BW	170 kHz
Limit	1085 kHz
Verdict	Passed

See attached plots.

Requirements:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.



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20dB Bandwidth

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

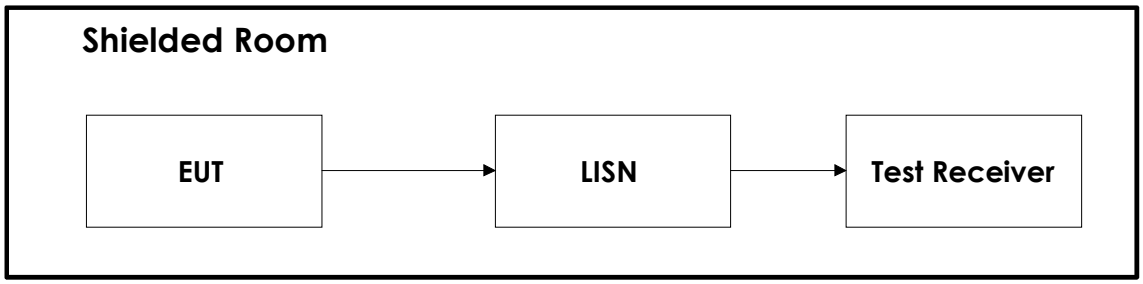
5 LIST OF TEST EQUIPMENT

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.

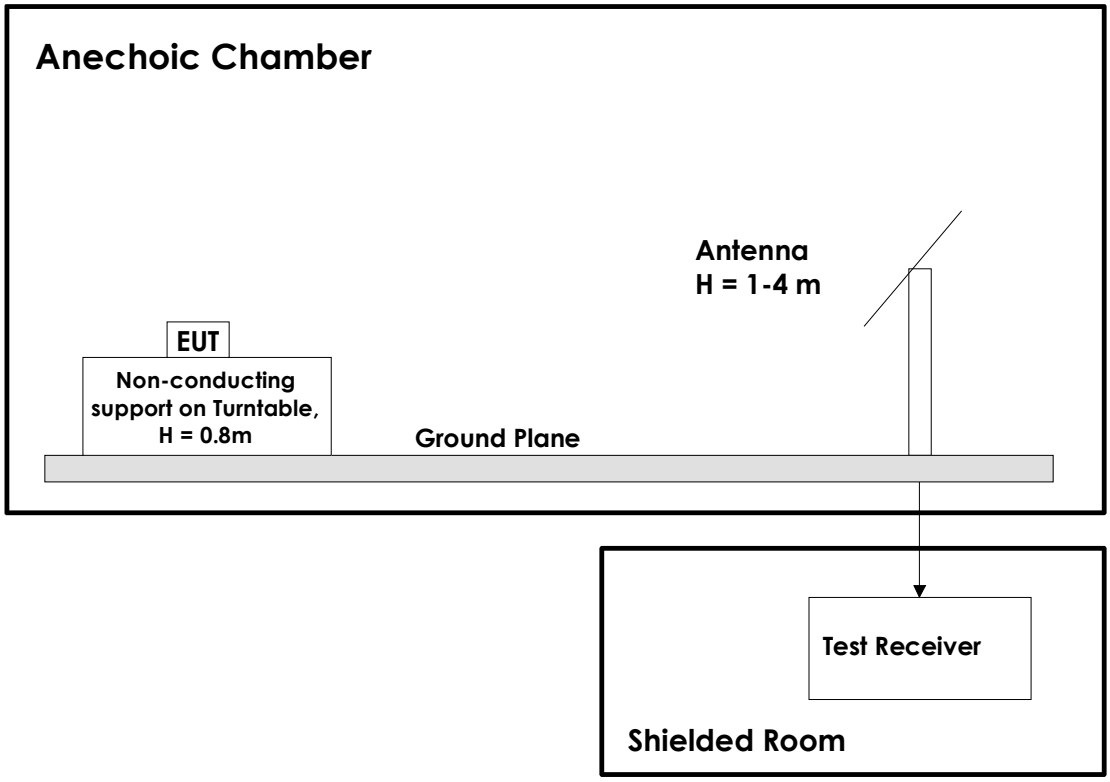
No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSW26	Spectrum Analyzer	Rohde & Schwarz	LR 1640	2015.10	2016.10
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2014.11	2015.11
4	6HC3000/18000	Highpass Filter	Trilithic	LR 1614	Cal b4 use	
5	HK116	Biconical Antenna	Rohde & Schwarz	LR 1260	2013.12	2017.12
6	HL223	LPDA antenna	Rohde & Schwarz	LR 1261	2013.12	2017.12
7	3115	Horn Antenna	EMCO	LR 1226	2013.12	2018.12
8	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2014.11	2015.11
9	642	Antenna Horn	Narda	LR 220	2009.01.26	2017.01.26
10	PM7320X	Antenna horn	Siverts lab	LR 103	2009.01.26	2017.01.26
11	DBF-520-20	Antenna horn	Systron Donner	LR 101	2009.01.26	2017.01.26
12	638	Antenna Horn	Narda	LR 1480	2010.06	2020.06
14	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 1660	2014.10	2016.10
15	Model 87V	Multimeter	Fluke	LR 1599	2015.10	2016.10
16	ESHS10	EMI	Rohde & Schwarz	N-3528	2015.08	2016.08
17	ESH3-Z5	Two-line V-Network	Rohde & Schwarz	LR 1076	2014.04.23	2016.04.23
18	ESH3-Z2	Pulse limiter	Rohde & Schwarz	LR 1074	2015.03.05	2017.03.05
19	6812B	AC power Source	Agilent	LR 1515	Cal b4 use	
20	HP 10855A	Pre-amplifier	Hewlett Packard	LR 1445	2015.10	2016.10

6 BLOCK DIAGRAM

6.1 Power Line Conducted Emission



6.2 Test Site Radiated Emission



Revision history

Version	Date	Comment	Sign
1.0	2016.01.26	First Edition	FS
2.0	2016.02.17	Added calculated power value	FS