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Test report

341229-1TRFWL

Date of issue: January 29, 2018

Applicant:

Panasonic Corporation of North America

Product:

DECT Base Station with Bluetooth

Model:

KX-TGF670

FCC ID:

ACJ96NKX-TGF570

Specifications:

- FCC 47 CFR Part 15, Subpart D

  Isochronous UPCS Device, 1920–1930 MHz
- RSS-213, Issue 3, March 2015

  2 GHz Licence-Exempt Personal Communications Services (LE-PCS) Devices

Test location

Company name	Nemko Canada Inc.
Address	303 River Road
City	Ottawa
Province	Ontario
Postal code	K1V 1H2
Country	Canada
Telephone	+1 613 737 9680
Facsimile	+1 613 737 9691
Toll free	+1 800 563 6336
Website	www.nemko.com
Site number	FCC: CA2040; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by	Frode Sveinsen, Senior Wireless Engineer
Reviewed by	Andrey Adelberg, Senior Wireless/EMC Specialist
Date	January 29, 2018
Signature of reviewer	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

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1 INFORMATION

1.1 Applicant information

Name :	Panasonic Corporation of North America
Address:	Panasonic System Networks Co., Ltd. 1-62, 4-chome, Minoshima, Hakata-ku Fukuoka 812-8531, Japan

1.2 Tested Item

Name:	DECT Base Station
Additional information:	DECT 6.0, Bluetooth
Model name:	KX-TGF670
FCC ID:	ACJ96NKX-TGF670
Industry Canada Registration Number:	216A-KXTGF670
Serial number:	/
Trademark:	PANASONIC
Hardware identity and/or version:	PNLB2727xx
Software identity and/or version:	SW200
Tested to ISED Radio Standard (RSS):	RSS-213 Issue 3; RSS-Gen Issue 4
Frequency Band:	1920–1930 MHz
Frequency Range:	1921.536–1928.448 MHz
Number of Channels:	5 RF Channels, 5 × 12 = 60 TDMA Duplex Channels
Type of Modulation:	Digital (Gaussian Frequency Shift Keying)
Conducted Output Power:	68.5 mW
Antenna Connector:	None
Number of Antennas:	2
Antenna Diversity Supported:	Yes
Power Supply:	AC Adaptor: PNLV226 (ZZ)
Interface:	PSTN
Companion Device:	Wireless DECT Handset KX-TGFA61

1.3 Testing dates

Tested in period:	January 22, 2018 to January 25, 2018

1.4 Description of Tested Device

The EUT is a DECT Base Station with Bluetooth, and is a responding device as described in ANSI C63.17 and is designed to operate together with a DECT Headset, which is the initiating device.

1.5 Test Conditions

Temperature:	**15–30 °C**
Relative humidity	**20–75 %**
Air pressure	**860–1060 mbar**
Normal test voltage	**120 V_{AC}**

All tests were performed with the EUT powered from the mains.

The values are the limit registered during the test period.

1.6 Test Engineer(s)

Frode Sveinsen

1.7 Digital Modulation Techniques

The EUT uses Multi Carrier / Time Division Multiple Access / Time Division Duplex and Digital GFSK modulation. For further details see the operational description provided by the applicant.

Requirement, FCC 15.319(b):

All transmissions must use only digital modulation techniques.

1.8 Labeling Requirements

See separate documents showing the label design and the placement of the label on the EUT.

Requirements FCC 15.19

The FCC Identifier shall be displayed on the label, and the device(s) shall bear the following statement in a conspicuous location on the device or in the user manual if the device is too small:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label itself shall be of a permanent type, not a paper label, and shall last the lifetime of the equipment.

1.9 Antenna Requirement

Does the EUT have detachable antenna(s)?	**☐ YES**	**☒ NO**
If detachable, is the antenna connector(s) non-standard?	**☐ YES**	**☐ NO**
The tested equipment has only integral antennas. The conducted tests were performed on a sample with a temporary antenna connector.		

Requirement: FCC 15.203, 15.204, 15.317.

1.10 Channel Frequencies

UPCS CHANNEL	FREQUENCY (MHz)
Upper Band Edge	1930.000
0 (Highest)	1928.448
1	1926.720
2	1924.992
3	1923.264
4 (Lowest)	1921.536
Lower Band Edge	1920.000

Requirement: FCC 15.303

Within 1920–1930 MHz band for isochronous devices.

1.11 Other Comments

The Monitoring and Time and Spectrum Window Access tests were performed with Test Set-Up 6 (Ref. clause 5). A clock signal from the companion device was used to synchronize the Pulse Pattern Generator and the Spectrum Analyzer to the start of the DECT time window. The EUT was limited by administrative commands to operate on only two frequency carriers. For the tests where the EUT was required to operate on only one frequency carrier, one carrier was blocked by applying a CW interfering signal from RF Generator 3. The Pulse Pattern Generator was used to apply time synchronized interference to time windows where this was required.

Since the EUT was programmed to operate on only two RF carriers, it was only necessary with two RF generators for the monitoring tests, however a third generator was applied for the tests that required specific time slots to be blocked.

The tested EUT supports both normal DECT slot length and DECT Long slot. Long slot is an extended DECT slot that allows a higher data rate for bit rates higher than 32 kbps.

This EUT supports Least Interfered Channel procedure (LIC), the Monitoring and Time and Spectrum Window Access tests were conducted as specified for EUTs that support LIC procedure.

All tests except Power-Line Conducted Emissions were performed in conducted mode with a temporary antenna connector.

The Power-Line Conducted Emissions test was 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 on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR47 Part 15 Subpart D for Isochronous UPCS Devices and Industry Canada RSS-213 Issue 3 / RSS-Gen Issue 4 / RSP-100 Issue 11.

All tests were conducted is accordance with ANSI C63.4-2014 and ANSI C63.17-2013.

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
PUB 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 CFR 47 Paragraph #	IC RSS-213 Paragraph #	Verdict
Automatic discontinuation of transmission	15.319(f)	5.2 (4)	Complies
Emission Bandwidth	15.323(a)	5.5 RSS-GEN 6.6	Complies
In-band emissions	15.323(d)	5.8.2	Complies
Out-of-band emissions	15.323(d)	5.8.1	Complies
Peak Transmit Power and Antenna Gain	15.319(c)(e), 15.31(e)	5.6 RSS-GEN 8.3	Complies
Power Spectral Density	15.319(d)	5.7	Complies
Transmission duration	15.323(c)(3)	5.2 (3)	Complies

Note: This report is a Class II Permissive Change report, therefore only limited subset of testing was performed.

3 TEST RESULTS

3.1 Automatic Discontinuation of Transmission

Does the EUT transmit Control and Signaling Information?	**☒ YES**	**☐ NO**
TYPE OF EUT :	**☐ INITIATING DEVICE**	**☒ RESPONDING DEVICE**

The following tests simulate the reaction of the EUT in case of either absence of information to transmit or operational failure after a connection with the companion device is established.

Number	Test	EUT Reaction	Verdict
1	Power removed from EUT	A	Pass
2	Switch Off EUT	N/A	Pass
3	Hook-On by EUT	N/A	Pass
4	Power Removed from Companion Device	B	Pass
5	Switch Off Companion Device	B	Pass
6	Hook-On by Companion Device	B	Pass

A - Connection breakdown, Cease of all transmissions
B - Connection breakdown, EUT transmits control and signaling information
C - Connection breakdown, Companion Device transmits control and signaling information
N/A - Not Applicable (EUT does not have On/Off switch and cannot perform Hook-On)

Requirements, FCC 15.319(f)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

3.2 Peak Power Output

Test Method:

ANSI C63.17, clause 6.1.2.

Test Results: Complies

Measurement Data:

Maximum Conducted Output Power

Channel No.	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Maximum Antenna Gain (dBi)	Maximum Radiated Output Power (dBm)
4	1921.536	18.3	0.0*	18.3
2	1924.992	18.4	0.0*	18.4
0	1928.448	18.2	0.0*	18.2

Output Power value is RMS Power measured in the DECT Burst.

*Antenna Gain is value declared by manufacturer

For this test it was also checked that input voltage variation of 85 and 115% of nominal value did not have any effect on the measured output power.

Limit:

Conducted: 100 µW x SQRT(*B*) where *B* is the measured Emission Bandwidth in Hz

FCC 15.319(c)(e) and RSS-213, Issue 3: 20.76 dBm (119 mW)

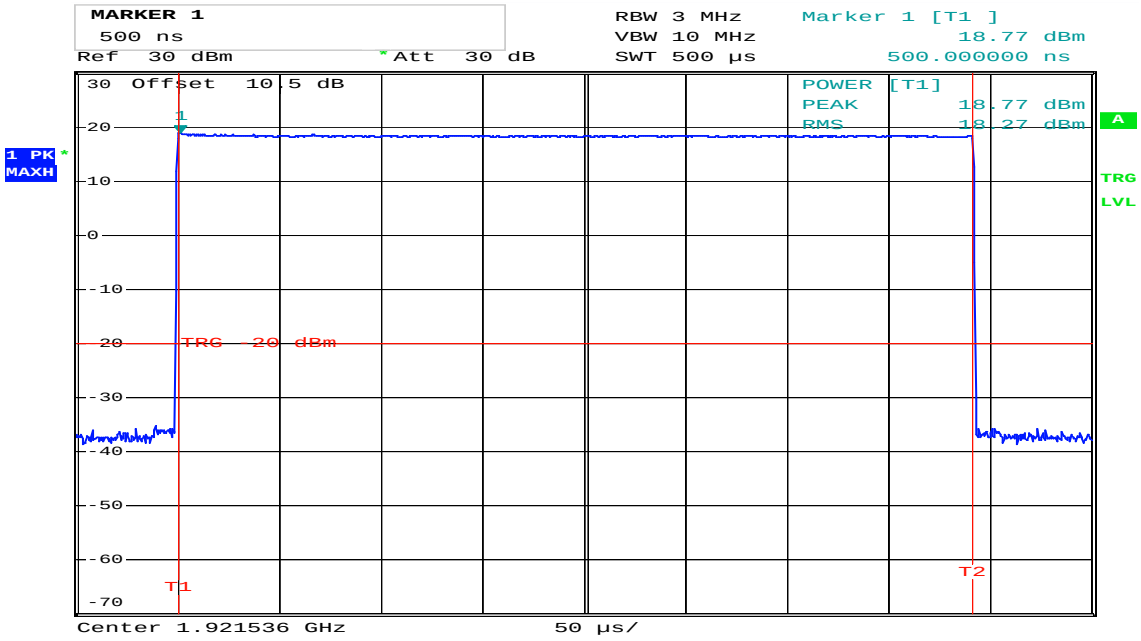
The antenna gain is below 3 dBi, no reduction in transmit power is necessary.

Requirements, FCC 15.319(c)(e); RSS-213, Issue 3; RSS-GEN, Issue 4

Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in Hertz.

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Conducted Peak Output Power



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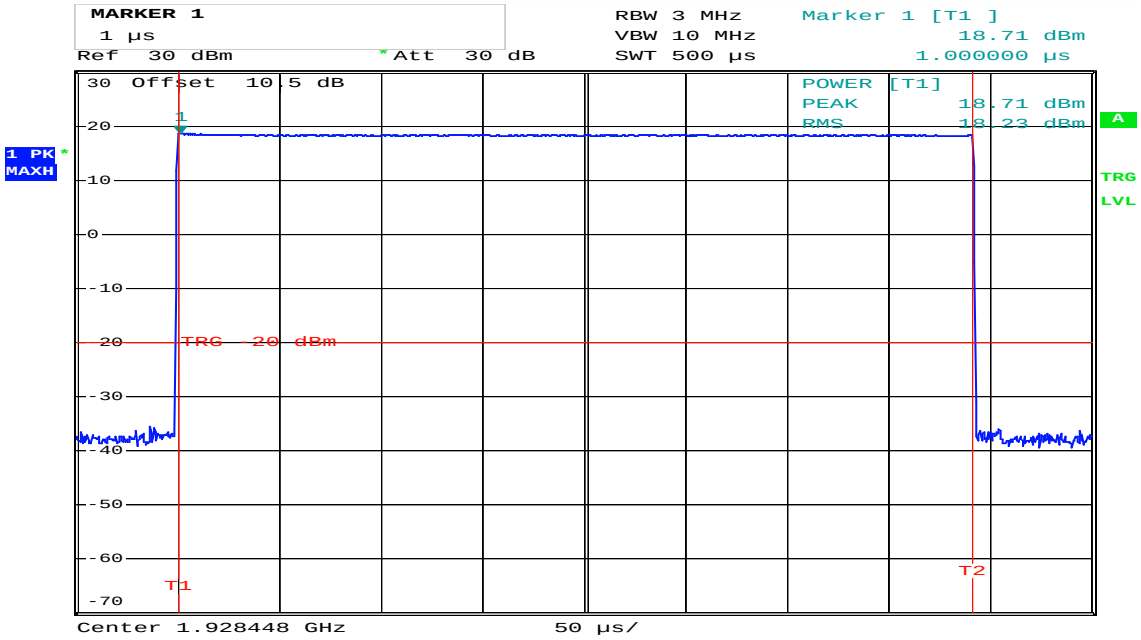
Lower Channel



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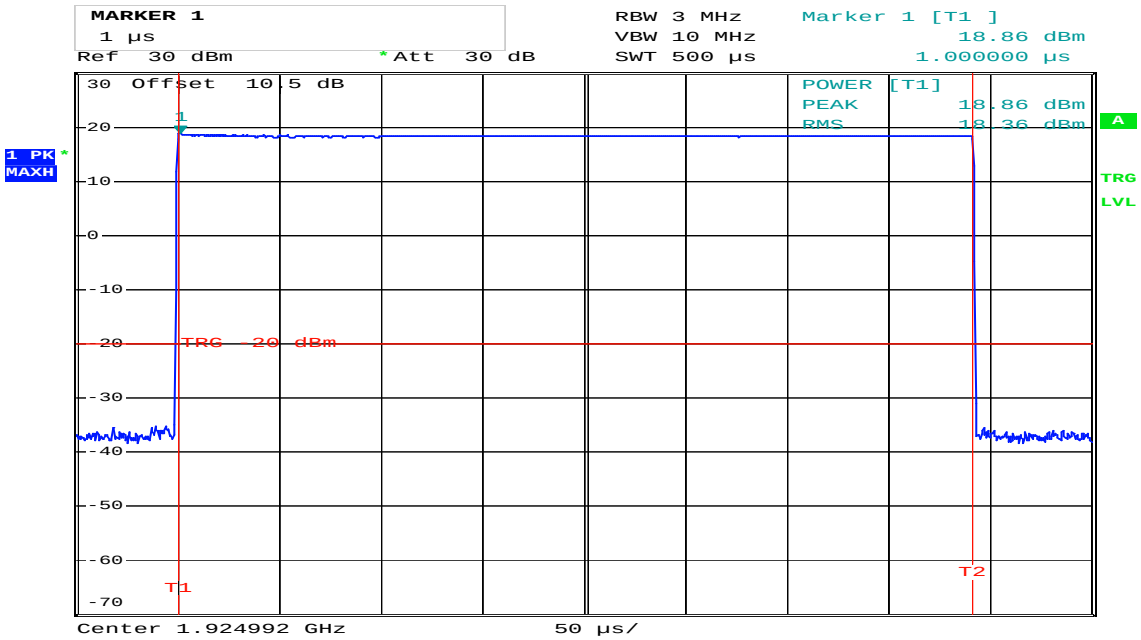
Upper Channel



Date: 23.JAN.2018 12:53:10

Middle Channel

3.3 Emission Bandwidth *B*

Test Method:

ANSI C63.17, clause 6.1.3.

Test Results: Complies

Measurement Data:

Channel No.	Frequency (MHz)	Emission Bandwidth *B* (MHz)
4	1921.536	1.40
0	1928.448	1.42

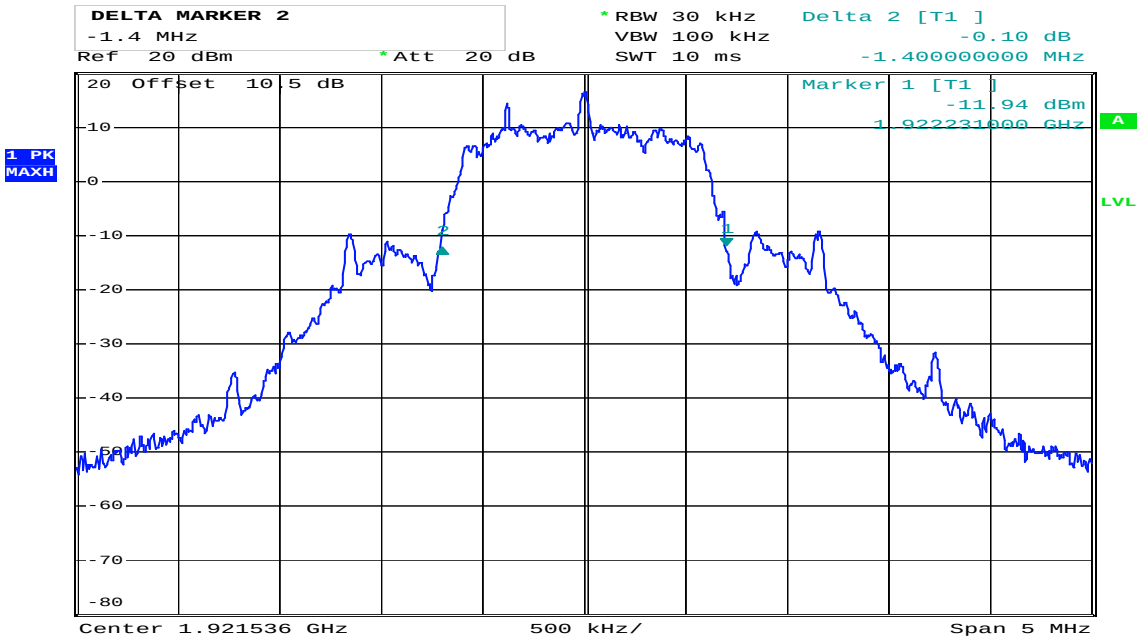
Channel No.	Frequency (MHz)	Occupied Bandwidth (MHz)
2	1924.992	1.24

Requirements, FCC 15.323(a), RSS-213 Issue 3, clause 5.5

The Emission Bandwidth *B* shall be larger than 50 kHz and less than 2.5 MHz.

No requirements for 6 and 12 dB Bandwidth, these values are only used for testing Monitoring Bandwidth if the Simple Compliance test fails (ANSI C63.17, clause 7.4).

Occupied Bandwidth (99%) is measured according to RSS-GEN Issue 4, clause 6.6. This value is reported for information only.



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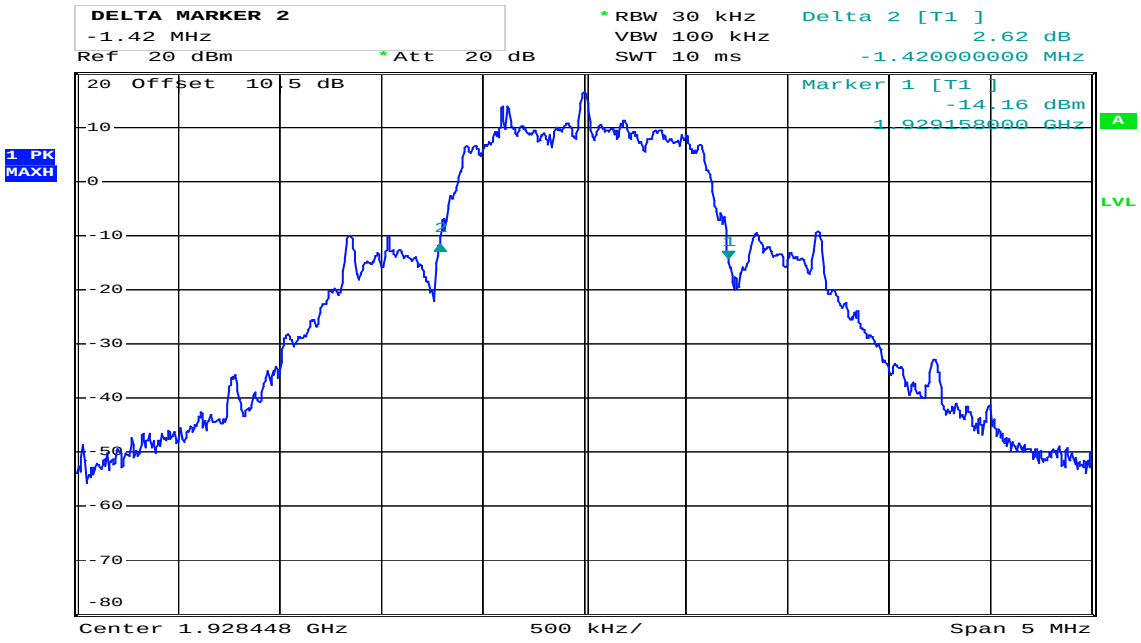
Emission Bandwidth *B*, Lower Channel



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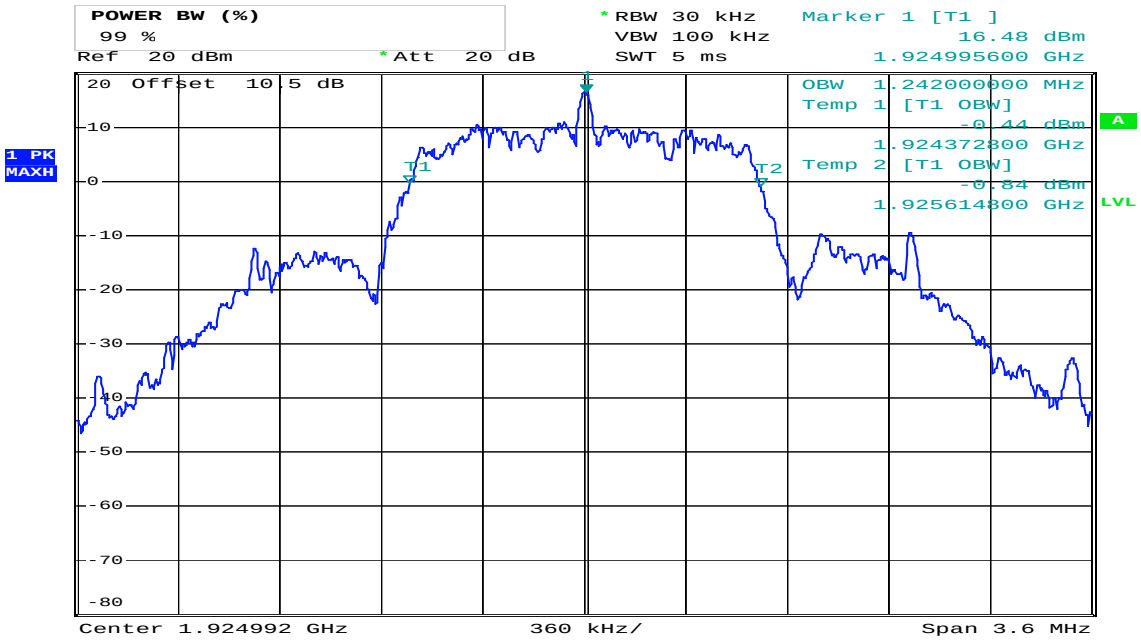
Emission Bandwidth *B*, Upper Channel



99% Bandwidth, Middle Channel

3.4 Out-of-band Emissions, Conducted

Test Method:

ANSI C63.17, clause 6.1.6.2.

Test Results: Complies

Measurement Data:

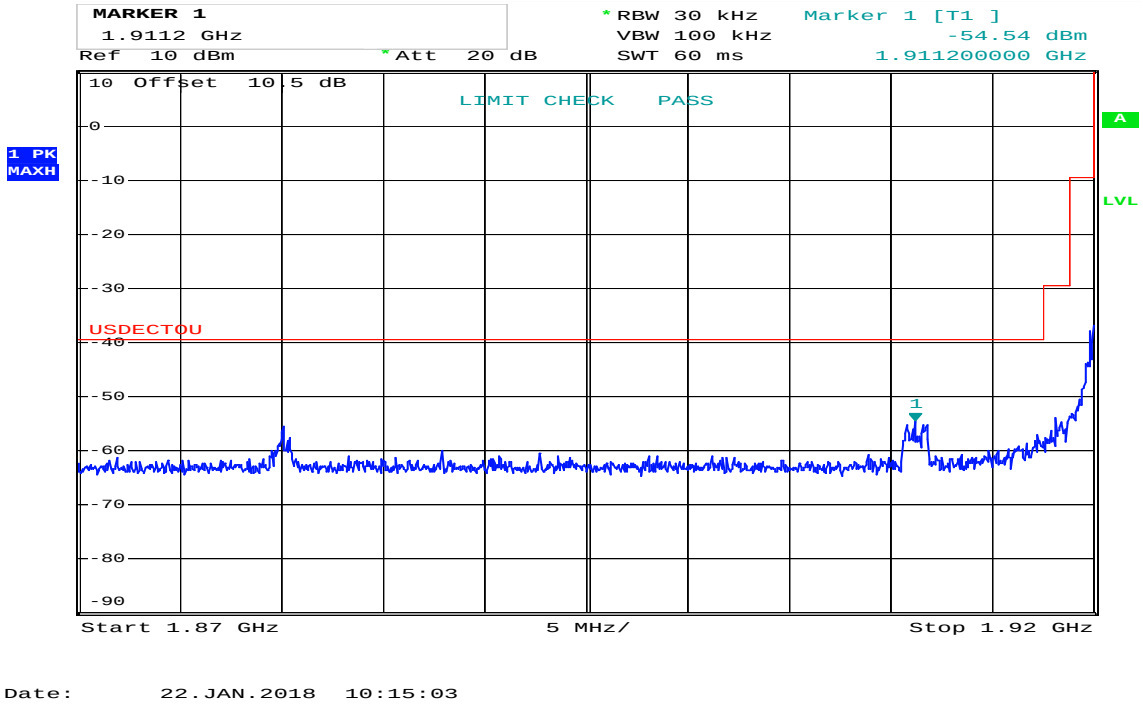
See plots.

Requirements, FCC 15.323(d):

$f \leq$ 1.25MHz outside UPCS band : ≤ -9.5dBm
1.25MHz ≤ $f \leq$ 2.5MHz outside UPCS band : ≤ -29.5 dBm
$f \geq$ 2.5MHz outside UPCS band : ≤ -39.5 dBm

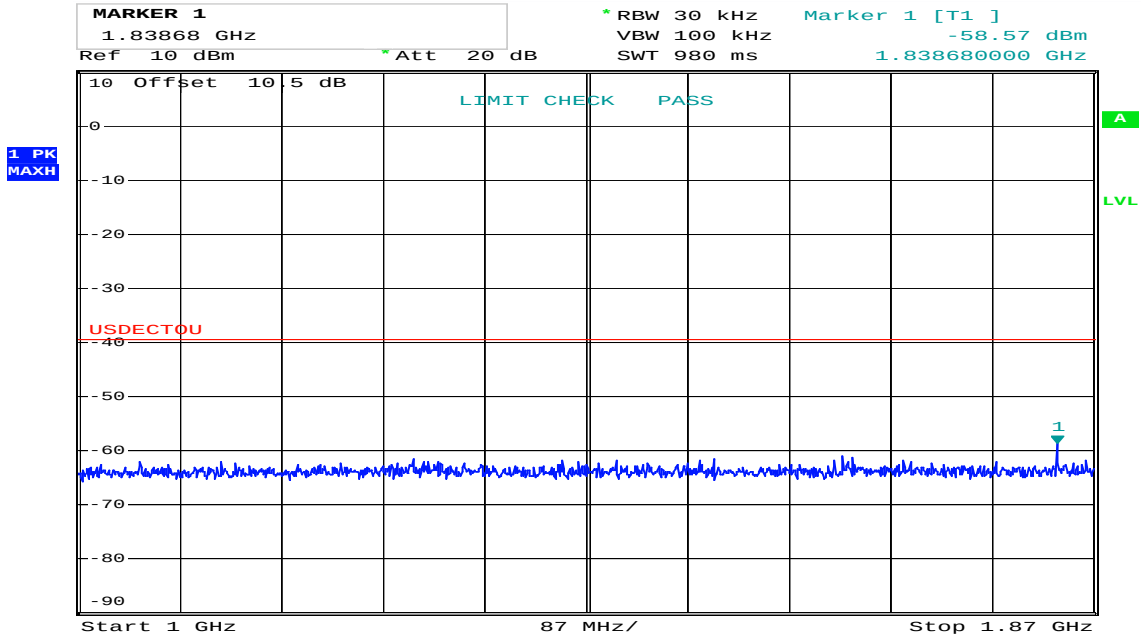
Out-of-Band Emissions, Conducted

Lower Channel:



Out-of-Band Emissions, Conducted

Lower Channel:



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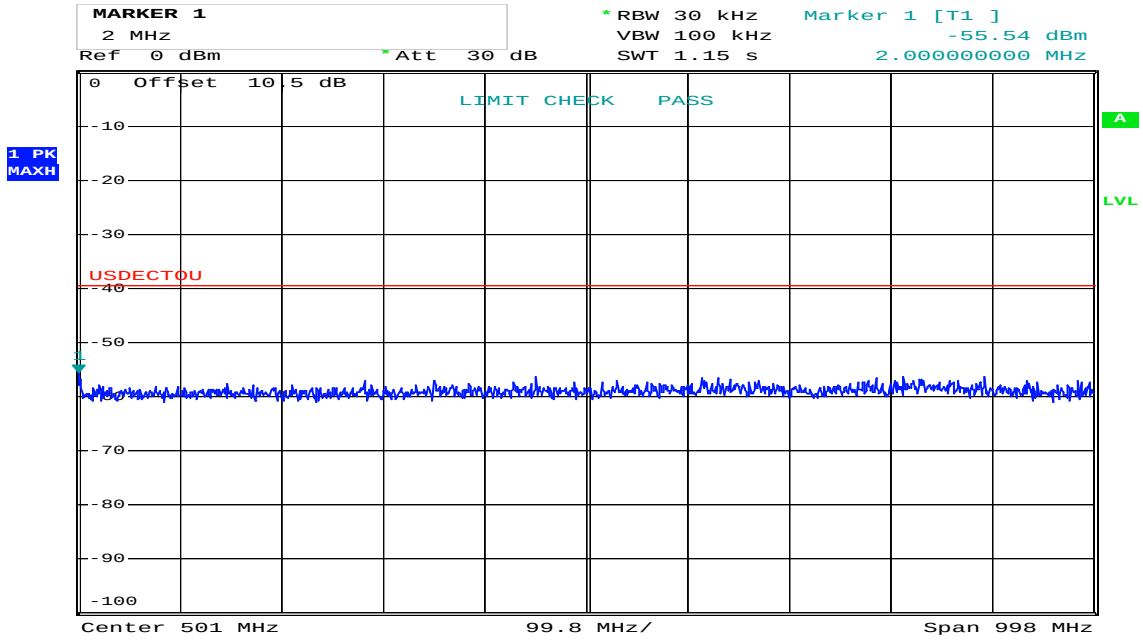

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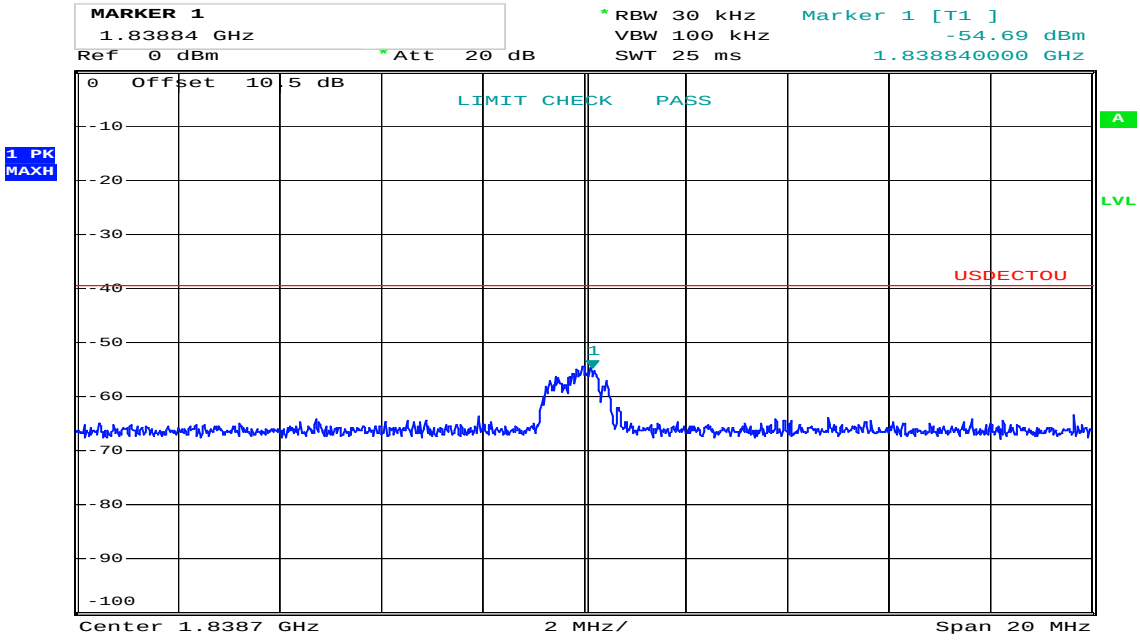
Out-of-Band Emissions, Conducted

Lower Channel:



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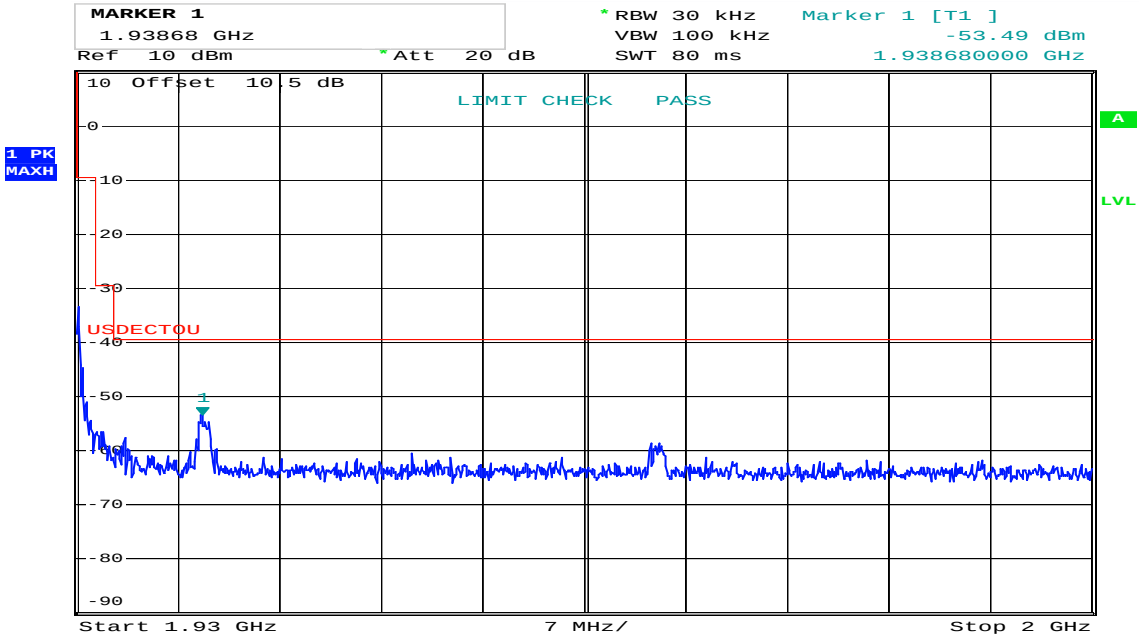
Out-of-Band Emissions, Conducted

Upper Channel:



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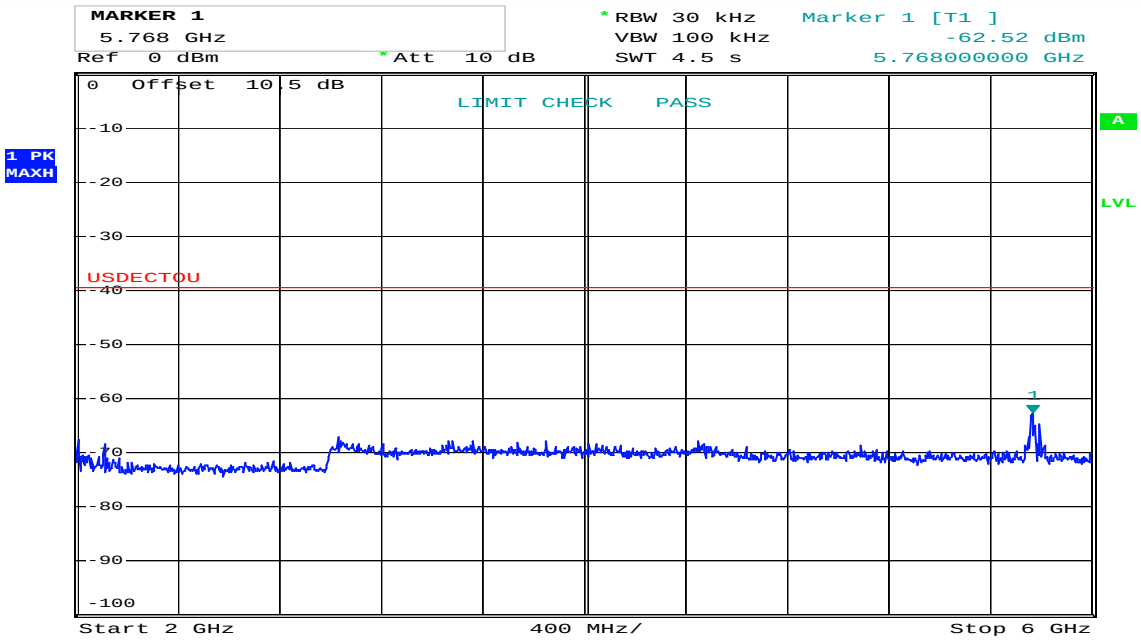
Mid Channel:



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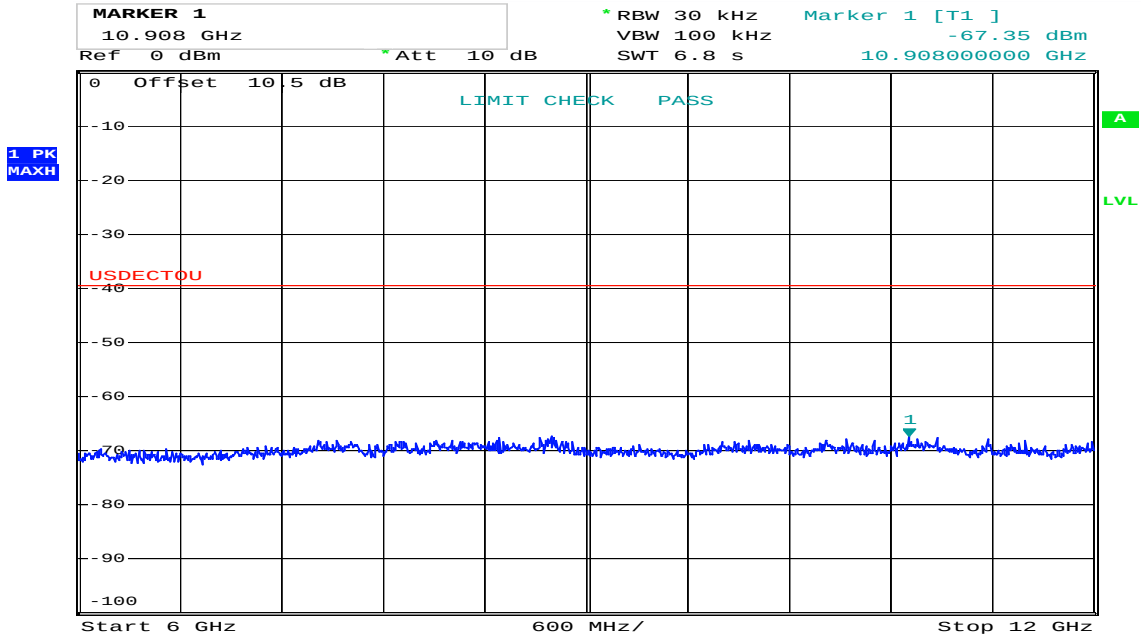
Out-of-Band Emissions, Conducted

Mid Channel:



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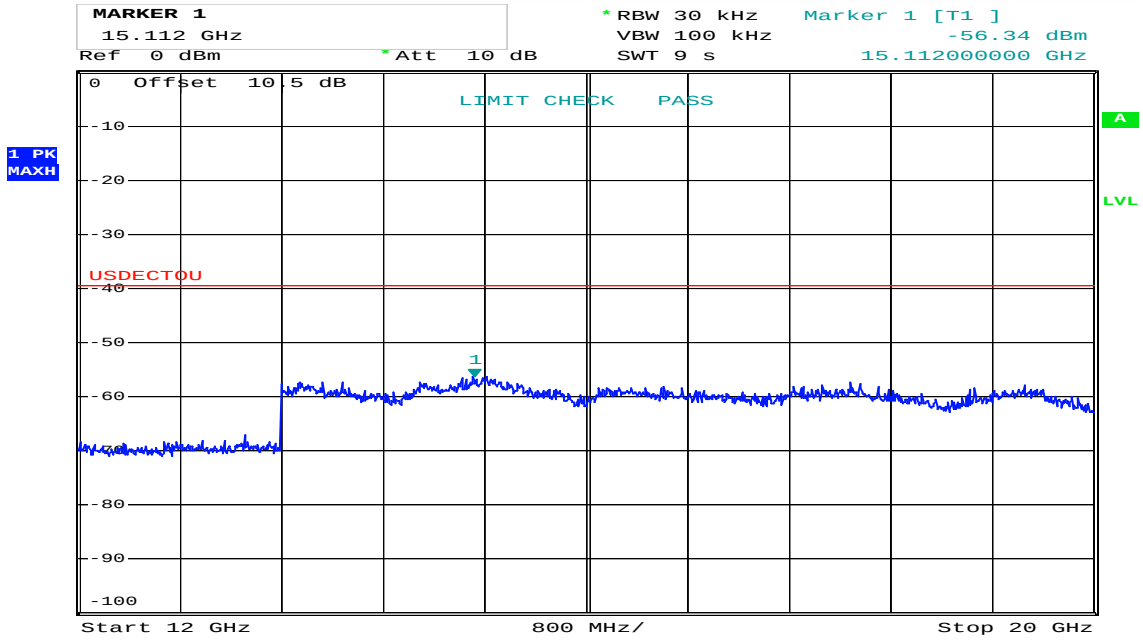

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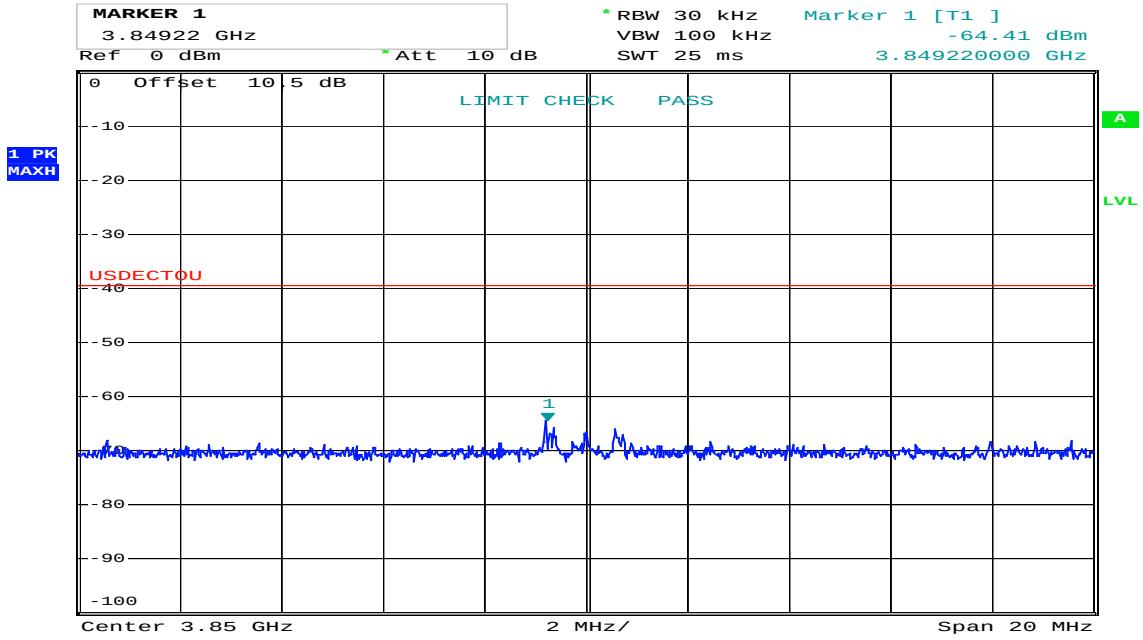
Out-of-Band Emissions, Conducted

Mid Channel:



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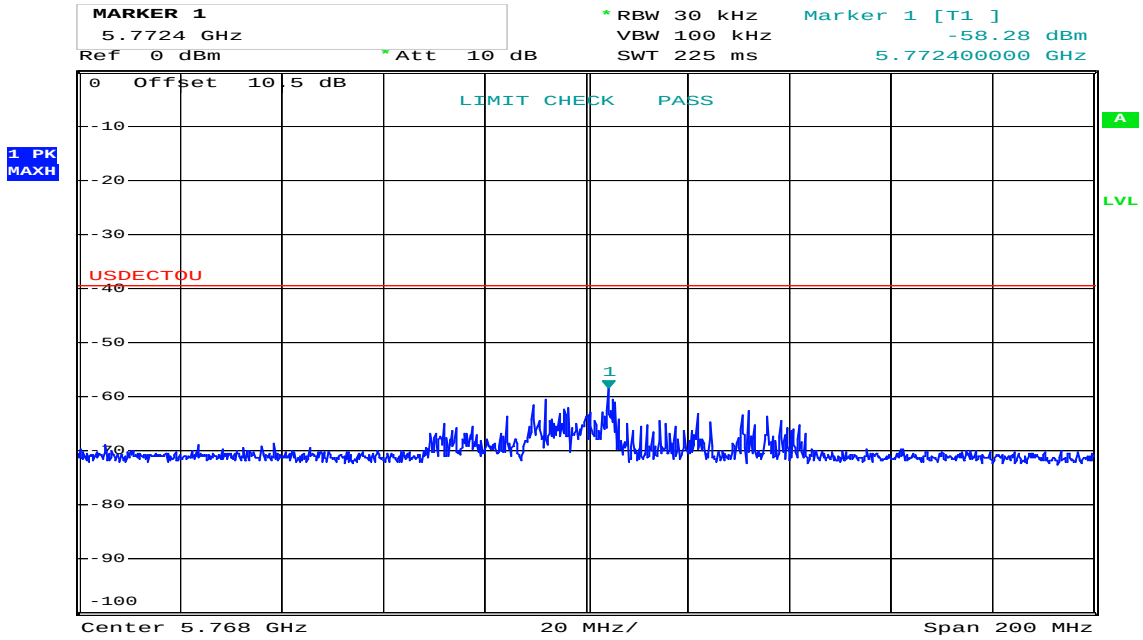


Date: 22.JAN.2018 10:23:25

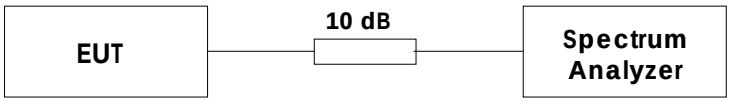
4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		**Uncertainty**
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted (RBW < 100 kHz)	**< 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
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

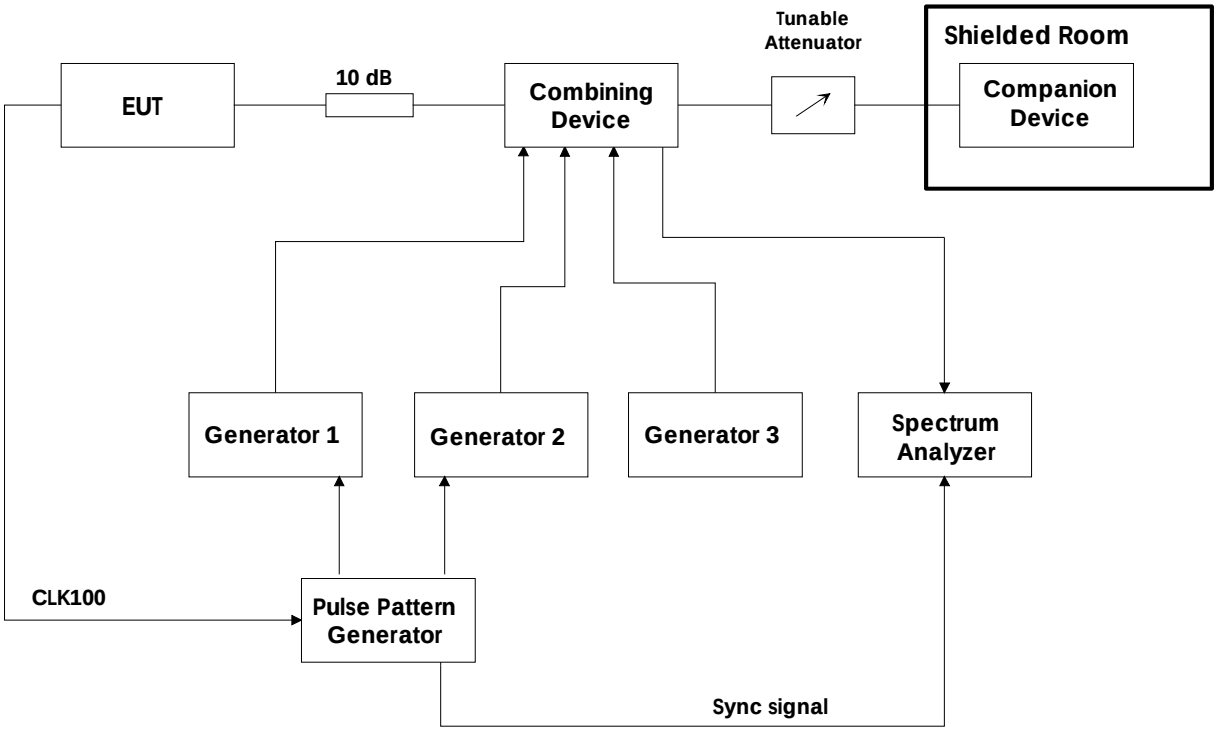
5.1 Conducted Emission Test



Test Set-up 3

This setup is used for all conducted emission tests.

5.2 Monitoring Tests



Test Set-Up 6

This test setup is used for all Monitoring and Time and Spectrum Access Procedure tests. The path loss from the signal generators to the EUT is measured with a power meter before the testing is started.

The CLK100 is used to synchronize the Pulse-/ Pattern generator to the start of the DECT frame, this signal always comes from the base station. If the EUT is a DECT Portable Part (i.e. a handset) the CLK100 signal will come from the Companion Device.

The sync signal to the Spectrum Analyzer is the CLK100 signal that is regenerated in the Pulse-/ Pattern Generator, this is used to synchronize the Spectrum Analyzer to the DECT frame when in zero span. The Pulse-/ Pattern Generator is used for tests that require time synchronized pulses or blocking of specific time slots.

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
1	FSP30	Spectrum Analyzer	Rohde & Schwarz	LR 1551	2017.06	2019.06
2	SMIQ06B	Signal generator	Rohde & Schwarz	SN: 100481	2017.08	2018.08
3	SMIQ03E	Signal generator	Rohde & Schwarz	FA001269	2016.04	2018.04
4	SMR40	Signal generator	Rohde & Schwarz	FA001879	COU	
5	53310A	Modulation Domain Analyzer	Hewlett Packard	LR 1483	2016.01	2018.01
6	81110A	Pulse-/ Pattern Generator	Agilent	LR 1725	COU	
7	8470B	Crystal Detector	Hewlett Packard	LR 1207	N/A	
8	6810.17B	Attenuator	Suhner	LR 1669	COU	
9	745-69	Step Attenuator	Narda	LR 1442	N/A	
10	WE 1506A	Power Splitter	Weinchel	LR 244	COU	
11	WE 1506A	Power Splitter	Weinchel	LR 245	COU	
12	H-9	Hybrid	Anzac	LR 86	COU	
13	H-9	Hybrid	Anzac	LR 257	COU	
14	S212DS	RF Switch	Narda	LR 1244	N/A	
15	87H35-1	Circulator	Racal-MESL	s.no.: 140	N/A	
16	87H35-1	Circulator	Racal-MESL	s.no.: 141	N/A	
17	87H35-1	Circulator	Racal-MESL	s.no.: 142	N/A	
18	ESU 26	Receiver/spectrum analyzer	Rohde & Schwarz	FA002043	2018.01	2019.01
19	ENV216	LISN	Rohde & Schwarz	FA002023	2017.05	2018.05
20	ST18/SMA/N/36	RF Cable	Suhner	LR 1627	COU	

Note: COU – calibrate on use; N/A – Not Applicable

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Agilent	Intuitlink Data Capture	2.1.0	Screenshots from HP 53310A
2	Rohde & Schwarz	EMC 32	9.26.01	Software for EMC Measurements of Power-Line Conducted Tests

Revision history

Version	Date	Comment	Sign
1.0	2018.01.29	First edition	FS