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TEST REPORT

Report Number: 15120538HKG-004

Application
for
Original Grant of 47 CFR Part 15 Certification
RSS-247 Issue 1 Equipment Certification

Wireless Sound Bar

FCC ID: 2AA9N-GRBAR

IC: 11506A-GRBAR

Prepared and Checked by:

Signed on File
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Jan 28, 2016

GENERAL INFORMATION

Applicant Name:	Levven Electronics Ltd.
Applicant Address:	9741 54 Ave NW , Edmonton, Alberta T6E 5J4, Canada
Contact Person:	Jim Qualie
FCC Specification Standard:	FCC Part 15, 2014 Edition
IC Specification Standard:	RSS-247 Issue 1, May 2015 RSS-Gen Issue 4, November 2014
FCC ID:	2AA9N-GRBAR
IC:	11506A-GRBAR
FCC Model(s):	GoRave SOULWAY
IC HVIN:	GoRave SOULWAY
IC PMN:	GoRave SOULWAY
Type of EUT:	2.4GHz Frequency Hopping Spread Spectrum Transmitter
Description of EUT:	Wireless Sound Bar
Serial Number:	N/A
Sample Receipt Date:	Dec 29, 2015
Date of Test:	Dec 29, 2015 to Jan 26, 2016
Report Date:	Jan 28, 2016
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Table of Contents

EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 Test Results Summary & Statement of Compliance

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-247/ RSS-Gen# Section	Results	Details see section
Antenna Requirement	15.203	7.1.2#	Pass	2.1
Max. Conducted Output Power	15.247(b)(1)	5.1(2)	Pass	4.1
Max. 20dB RF Bandwidth	15.247(a)(1)(iii)	5.1(1)	Pass	4.2
Min. No. of Hopping Frequencies	15.247(a)(1)(iii)	5.1(3)	Pass	4.3
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	5.1	Pass	4.4
Average Time of Occupancy	15.247(a)(1)(iii)	5.1(3)	Pass	4.5
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.6
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d) & 15.109	5.4	Pass	4.8
AC Power Line Conducted Emission	15.207 & 15.107	7.2.4#	Pass	4.9

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, 2014 Edition
RSS-247 Issue 1, May 2015
RSS-Gen Issue 4, November 2014

EXHIBIT 2
GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a Wireless Sound Bar which equipped a 2.4GHz Frequency Hopping Spread Spectrum Transceiver. It operates at frequency range of 2403.585MHz to 2477.313MHz. There are total 15 channels. During normal operation, the EUT is paired with another 2.4GHz transceiver Model: PL5561-S (FCC ID: OP5PL5568 / IC:3534A-PL5568) that is connecting to PC or notebook computer. The EUT can accept audio signal via this 2.4GHz radio link. The audio signal is amplified and driving internal loudspeaker. The EUT is powered by 100-240VAC.

The antenna used in the EUT is integral, integrated.

The circuit description and frequency hopping algorithm are saved with filename: descri.pdf.

2.2 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in Open Area Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and FCC Public Notice DA 00-705 (30-Mar-2000). All other measurements were made in accordance with the procedures in RSS-Gen Issue 4 (2014).

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC and the Industry Canada.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver. In normal operation, this transceiver is working with another transceiver which had been already granted with FCC ID: OP5PL5568 / IC:3534A-PL5568

EXHIBIT 3
SYSTEM TEST CONFIGURATION

3.0 **System Test Configuration**

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 120VAC.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible). The parent unit was remotely located as far from the antenna and the base as possible to ensure full power transmission from the baby unit. Else, the base was wired to transmit full power with modulation.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 1 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209/ RSS-247 2.5. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109/ RSS-247 Section 5.5 Limits.

3.1 Justification - Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.8.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.8.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

3.3 Details of EUT and Description of Accessories

Details of EUT:

(1) The EUT is powered by 120VAC

Description of Accessories:

(1) 1 X power cable of 1.8m in length
(Supplied by Applicant)

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

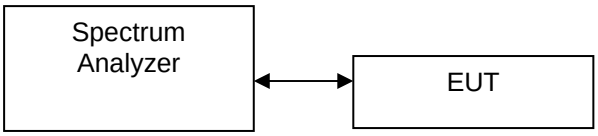
Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

EXHIBIT 4
TEST RESULTS

4.0 **Test Results**

RF Conduct measurement Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

☐ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

☒ The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW>20dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyser.

Antenna Gain = 2dBi			
Frequency (MHz)		Output in dBm	Output in mW
Low Channel:	2403.585	12.96	19.77
Middle Channel:	2438.913	12.60	18.20
High Channel:	2477.313	11.90	15.49

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

dBm max. output level = 12.96 dBm (19.77mW)

Limits:
☒ 0.125W (21dBm) for antennas with gains of 6dBi or less

☐ 0.25W (24dBm) for antennas with gains of 6dBi or less

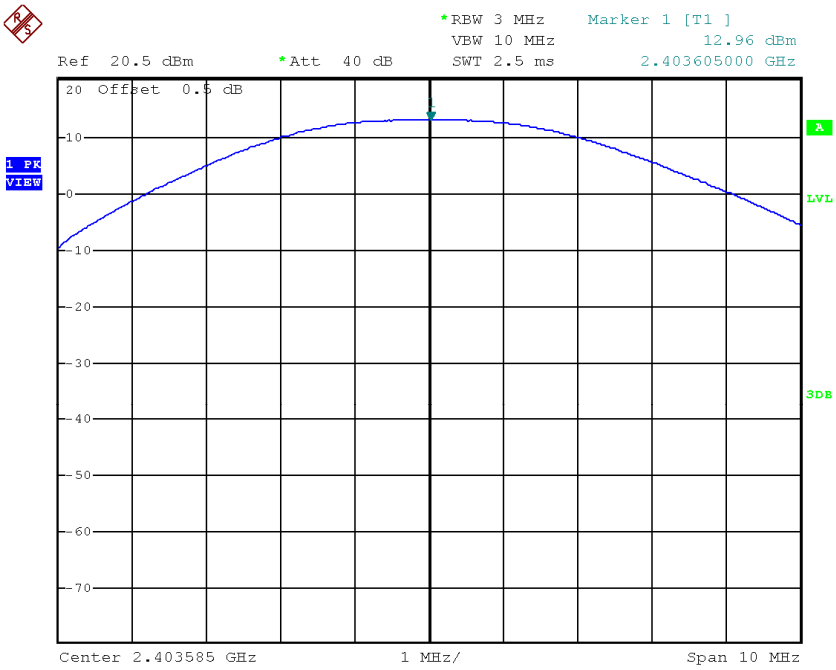
☐ 1W (30dBm) for antennas with gains of 6dBi or less

☐ ___W (___dBm) for antennas with gains more than 6dBi

The plots of conducted output power are saved as below.

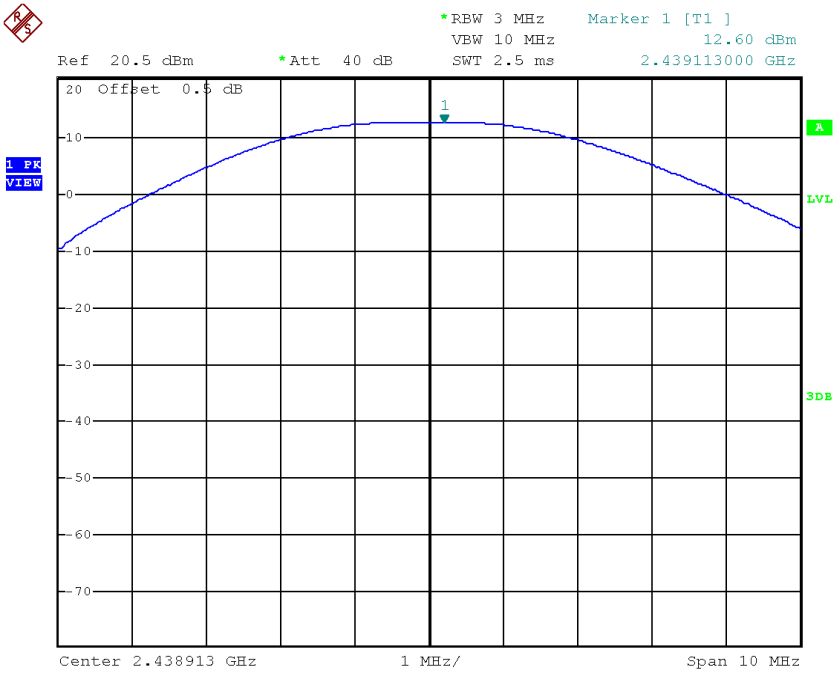
Plots of conducted output power

Lowest Channel



Date: 27.JAN.2016 14:31:05

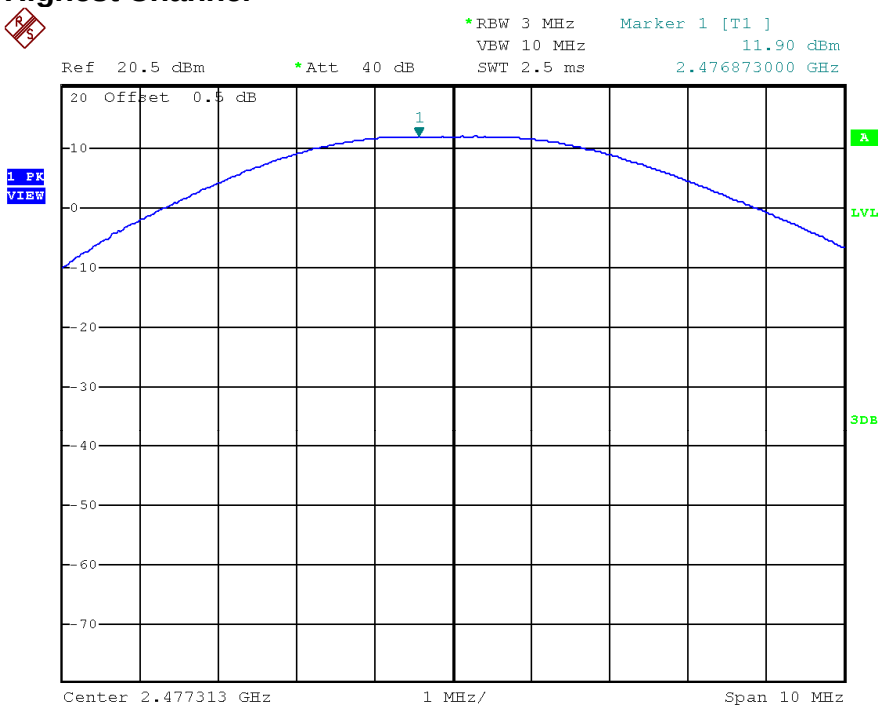
Middle Channel



Date: 27.JAN.2016 14:35:15

Plots of conducted output power

Highest Channel



Date: 27.JAN.2016 14:42:13

4.2 Maximum 20 dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Frequency (MHz)		20 dB Bandwidth (kHz)
Low Channel:	2403.585	2200
Middle Channel:	2438.913	2200
High Channel:	2477.313	2260

Limits

☐ ≤500kHz for 902-928MHz

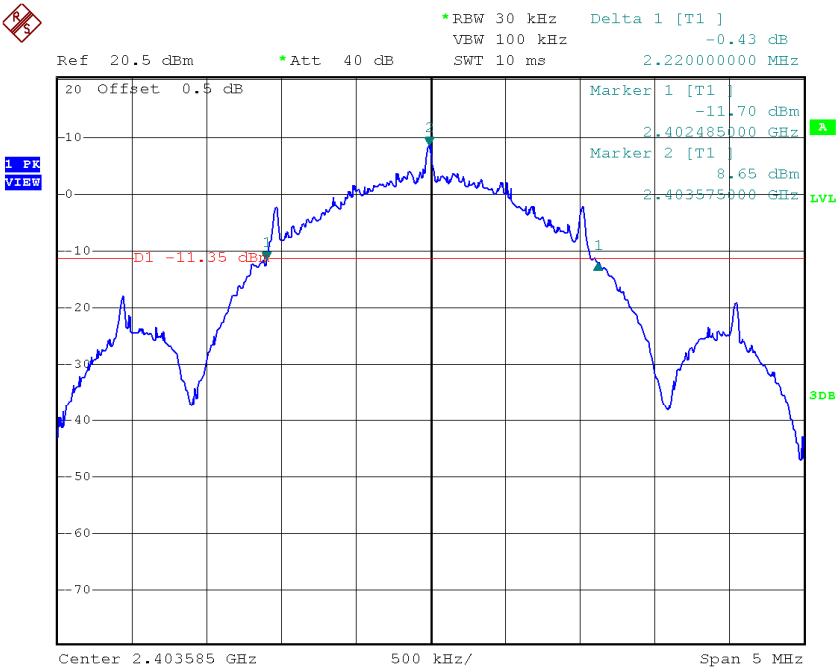
☒ N/A for 2400-2483.5MHz

☐ ≤1MHz for 5725-5850MHz

The plots of 20dB RF bandwidth and occupied bandwidth are saved as below.

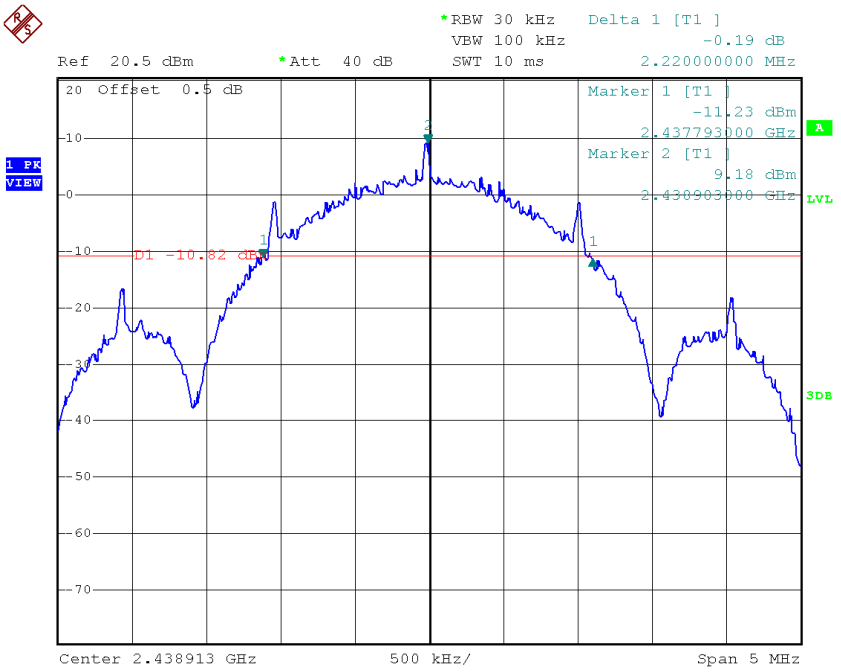
Plots of 20dB RF bandwidth

Lowest Channel



Date: 19.JAN.2016 18:45:45

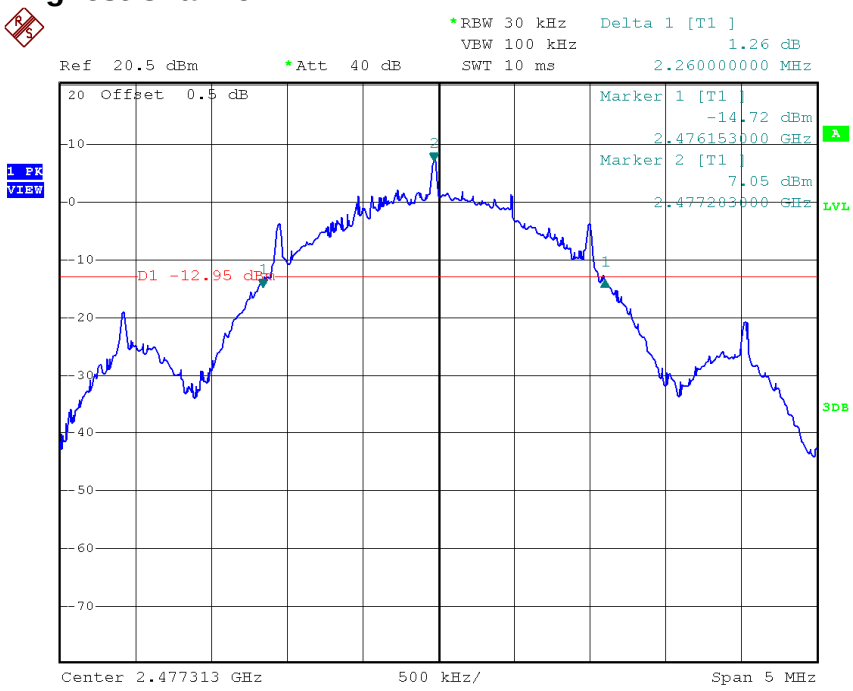
Middle Channel



Date: 19.JAN.2016 19:26:12

Plots of 20dB RF bandwidth

Highest Channel



Date: 19.JAN.2016 19:41:40

4.3 Minimum Number of Hopping Frequencies

With the analyzer set to MAX HOLD readings were taken for 2-3 minutes in each band. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

No. of hopping channels	15

Minimum Requirements:

☐ at least 50 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel < 250kHz)

☐ at least 25 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel ≥ 250kHz)

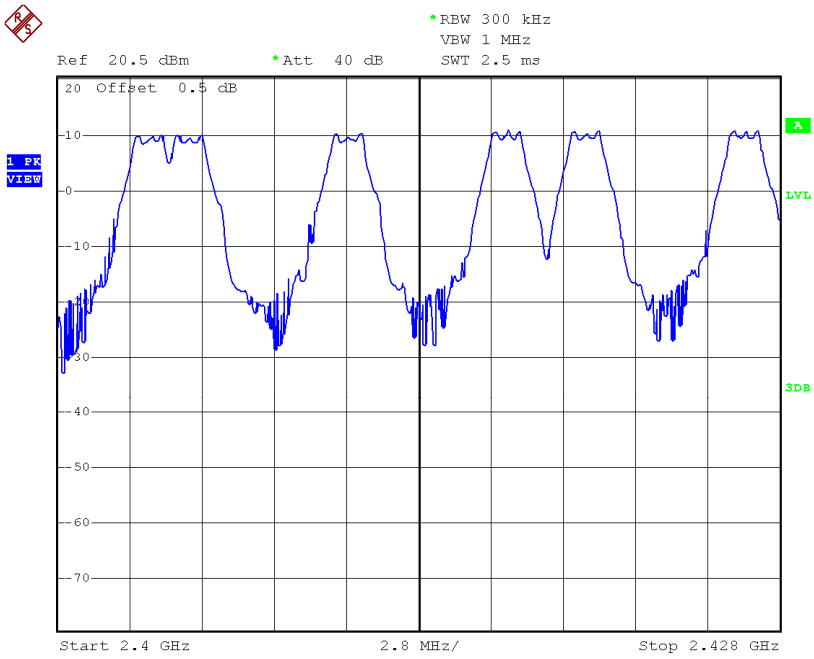
☒ at least 15 hopping channels for 2400MHz-2483.5MHz.

☐ at least 75 hopping channels for 5725MHz-5850MHz.

The plots of number of hopping frequencies are saved as below.

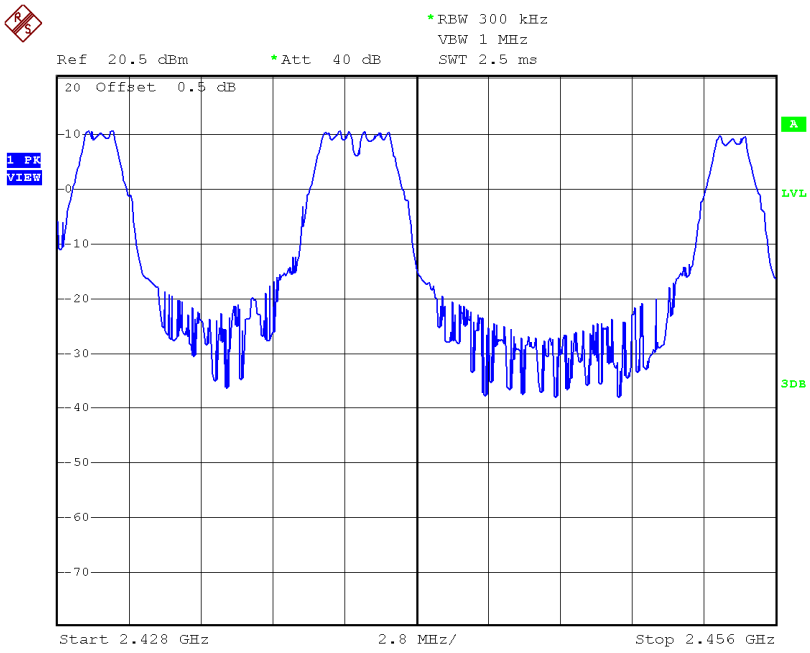
Plots of number of hopping frequencies

Lowest Channel



Date: 19.JAN.2016 20:24:50

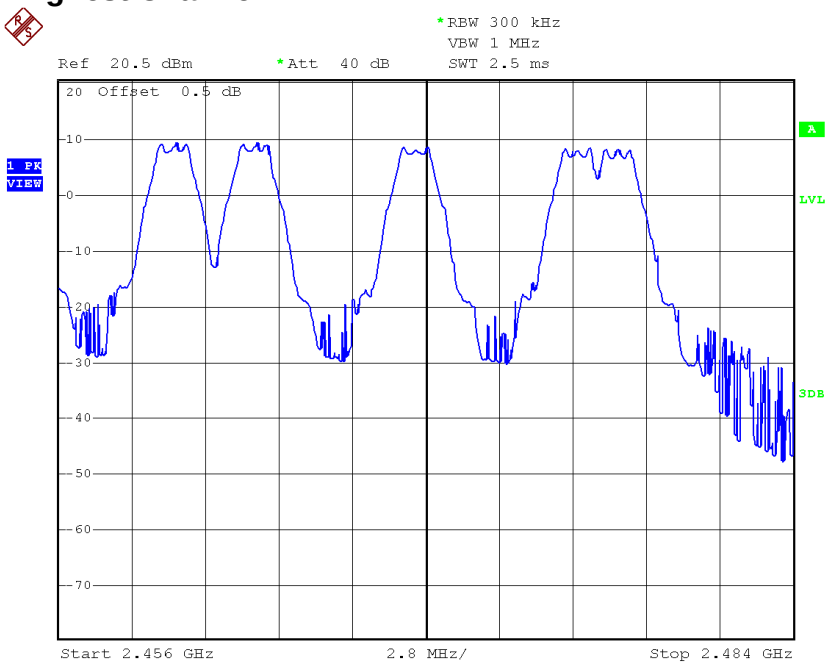
Middle Channel



Date: 19.JAN.2016 20:27:22

Plots of number of hopping frequencies

Highest Channel



4.4 Minimum Hopping Channel Carrier Frequency Separation

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and met the requirement.

Channel Separation (Channel 1 and Channel 2)	1538 kHz

Limits:
The channel separation must be larger than:

☐ 25 kHz

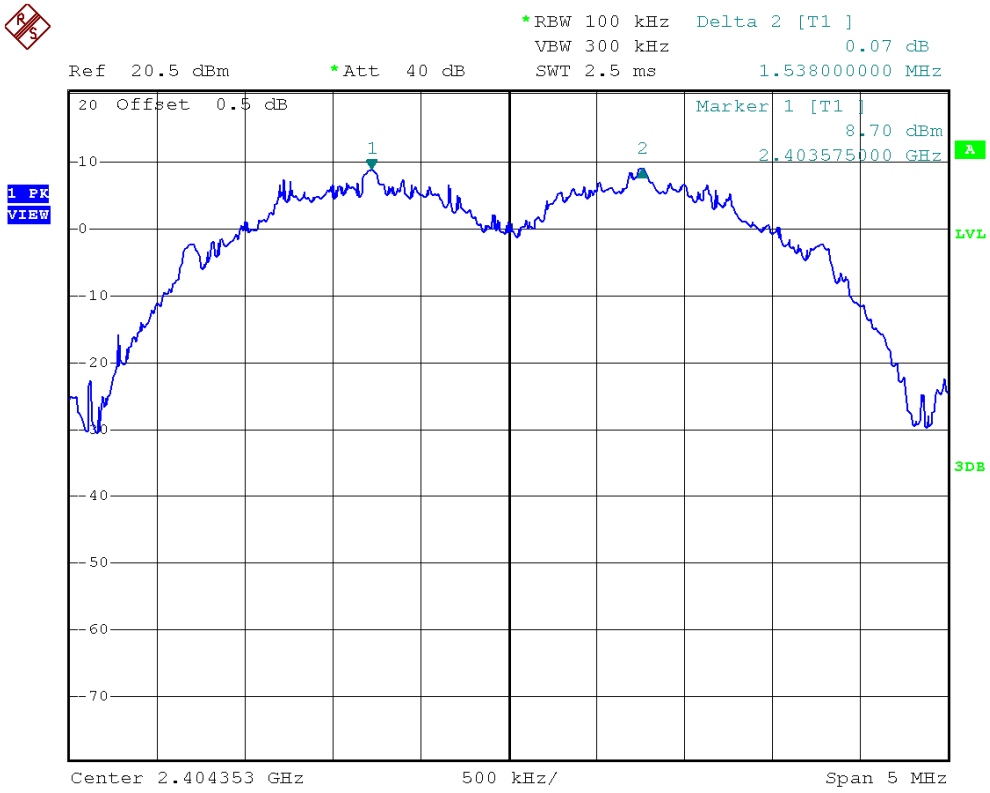
☐ 20 dB bandwidth of hopping channel: ___Hz

☒ 2/3 of 20dB bandwidth of hopping channel: 1506.667KHz

The plot(s) of hopping channel carrier frequency separation is saved as below.

Plots of hopping channel carrier frequency separation

Between channel 1 and channel 2



Date: 19.JAN.2016 20:43:54

4.5 Average Channel Occupancy Time

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 10ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

The SWEEP was then set to the time required by the regulation (20 seconds for 902-928 MHz devices, if the 20dB bandwidth is less than 250kHz, 10 seconds for 902-928 MHz if the 20dB bandwidth is or greater than 250kHz, "0.4 seconds x Number of hopping channels employed" seconds for 2400-2483.5 MHz, 30 seconds for 5725-5850 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4 seconds).

Average Occupancy Time	
Number of hops in 6s = 72 Single pulse width = 4.42ms Average Occupancy Time = 4.42ms X 72	Average Occupancy Time = 0.31824s

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 6 seconds (0.4 sec. x 15) for 2400MHz-2483.5MHz

☐ 20 seconds for 902MHz-928MHz ≥ 50 hopping channels

☐ 10 seconds for 902MHz-928MHz ≥ 25 hopping channels

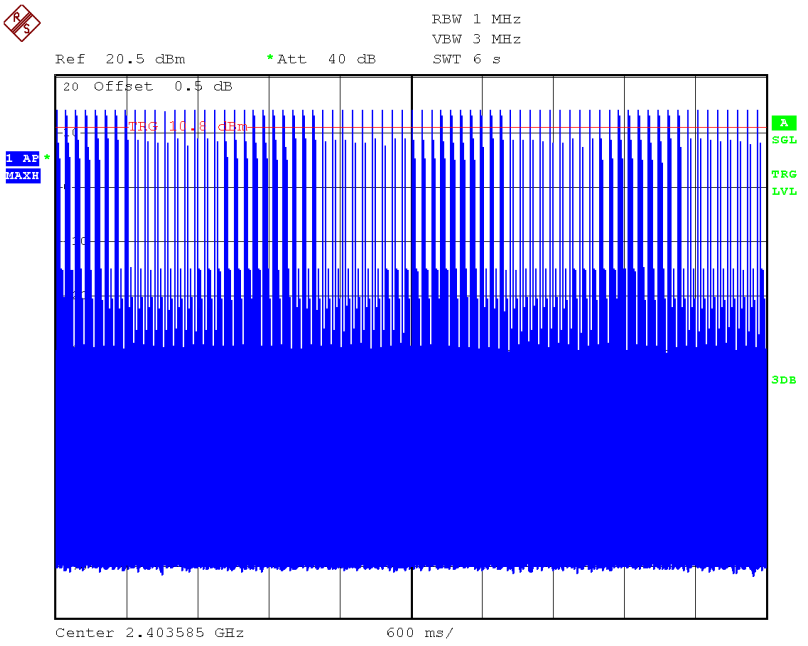
☐ 30 seconds for 5725-5850MHz

The plots of average channel occupancy time are saved as below.

Plots of average channel occupancy time

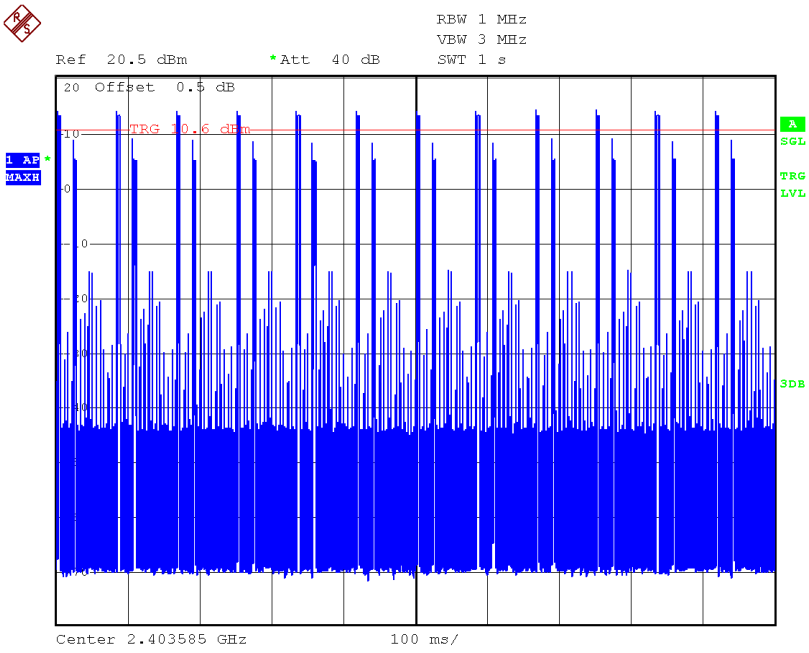
(hopping mode)

Plot A



Date: 28.JAN.2016 18:31:12

Plot B

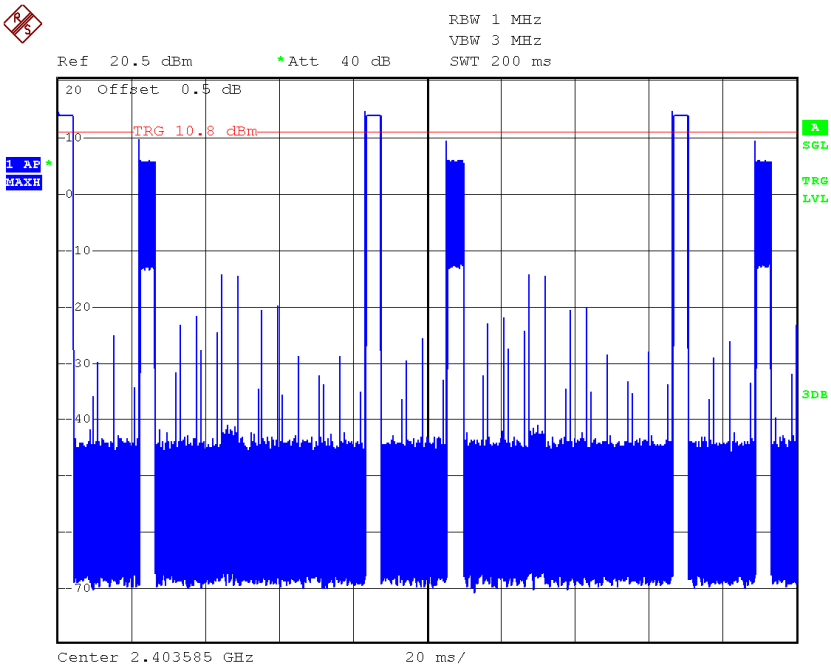


Date: 29.JAN.2016 13:09:23

Plots of average channel occupancy time

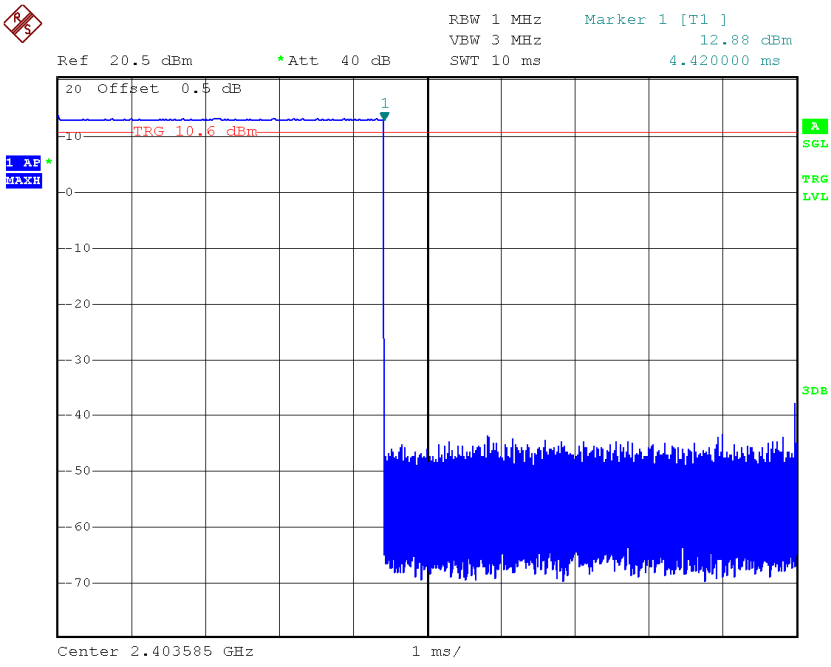
(hopping mode)

Plot C



Date: 29.JAN.2016 12:50:35

Plot D



Date: 29.JAN.2016 13:48:29

4.6 Out of Band Conducted Emissions

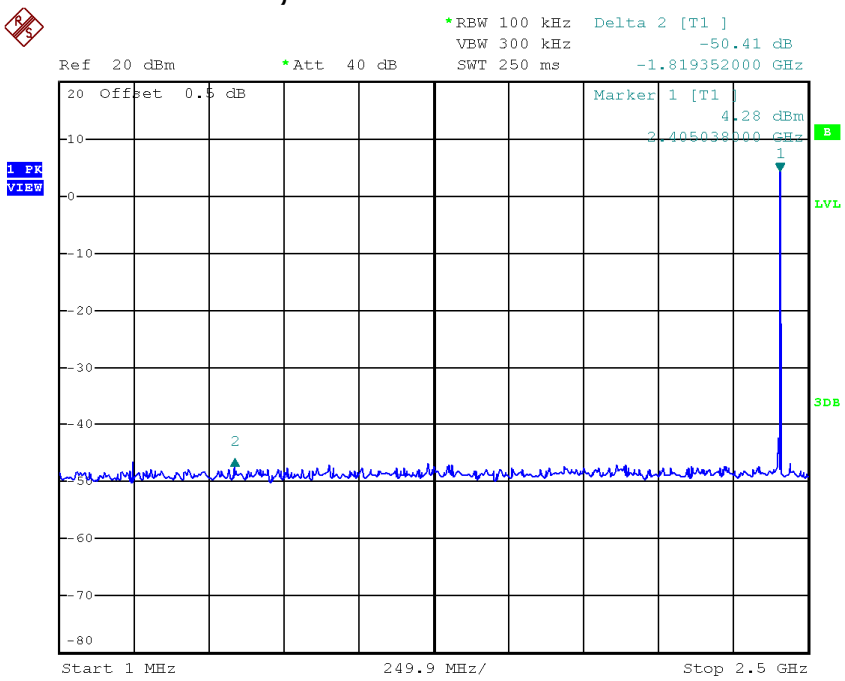
In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

The plot(s) of bandedge compliance is shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

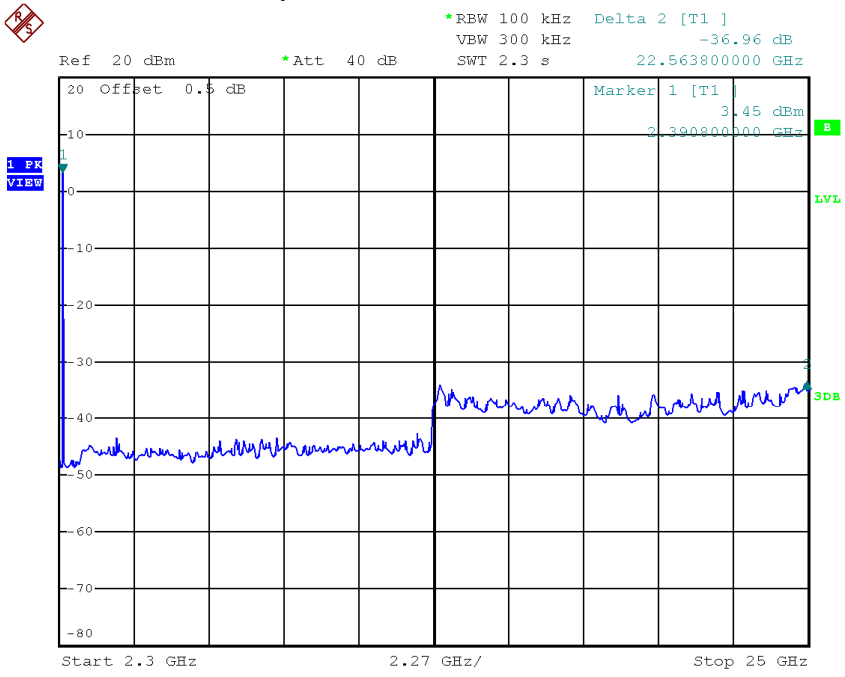
The plots of out of band conducted emissions and bandedge are saved as below.

Plots of out of band conducted emissions
Lowest channel, Plot 1



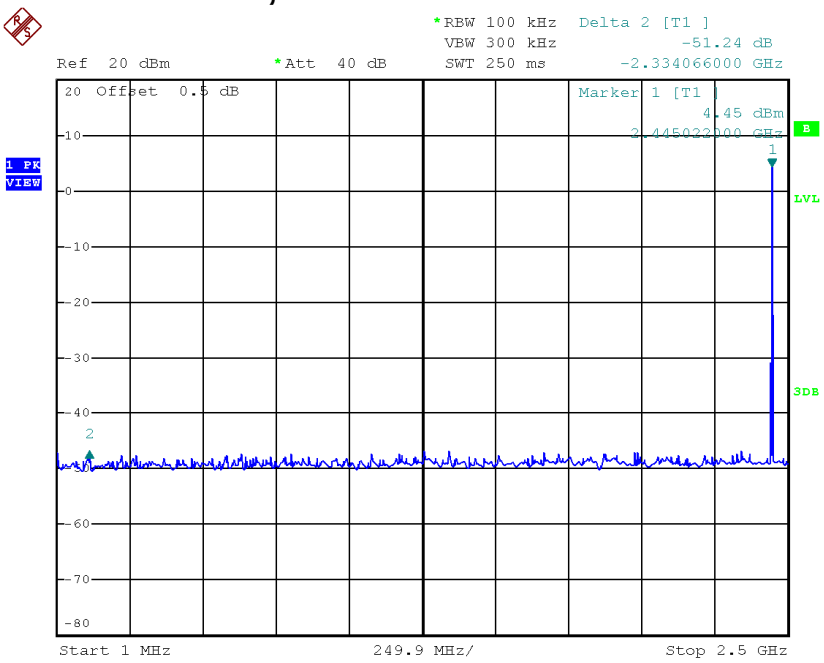
Date: 22.JUL.2015 17:34:55

Lowest channel, Plot 2



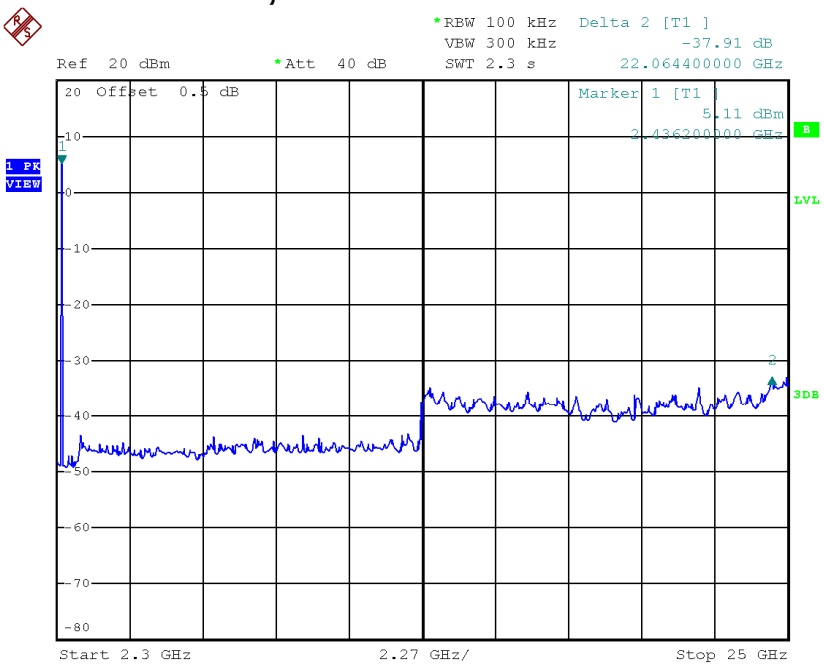
Date: 22.JUL.2015 17:37:15

Plots of out of band conducted emissions
Middle channel, Plot 1



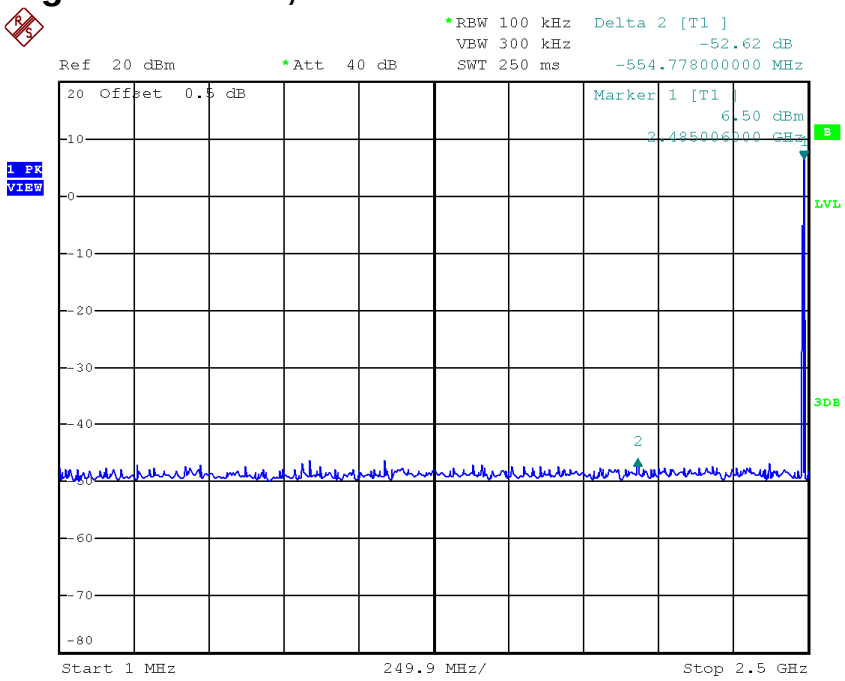
Date: 22.JUL.2015 17:40:42

Middle channel, Plot 2



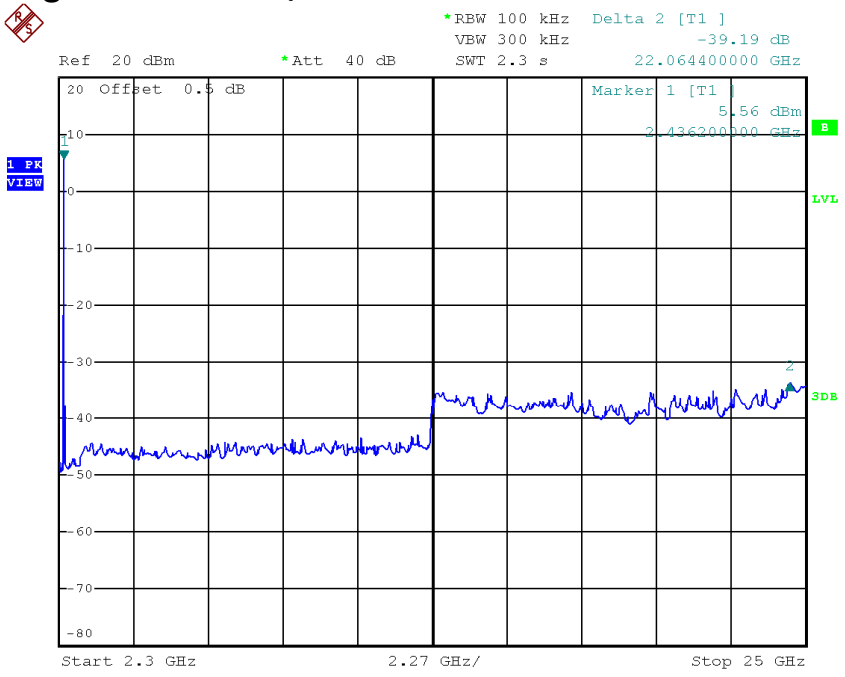
Date: 22.JUL.2015 17:38:19

Plots of out of band conducted emissions
Highest channel, Plot 1



Date: 22.JUL.2015 17:44:29

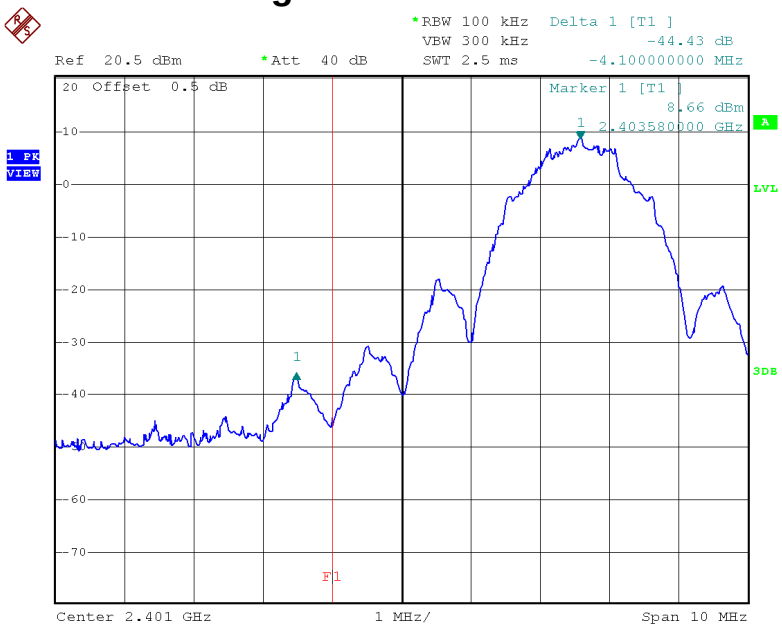
Highest channel, Plot 2



Date: 22.JUL.2015 17:46:37

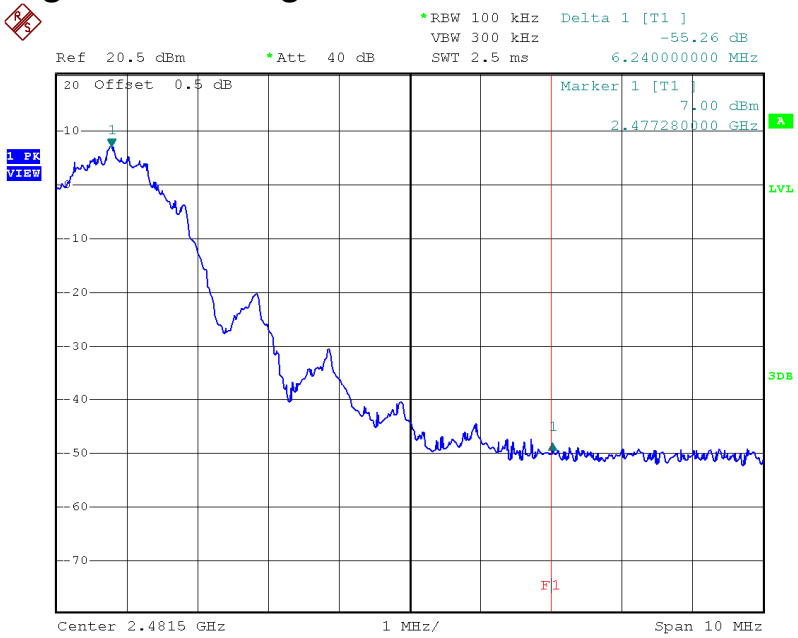
Plots of bandedge

Lowest bandedge



Date: 19.JAN.2016 18:55:50

Highest bandedge



Date: 19.JAN.2016 19:48:15

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

4.8 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.8.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

75.243 MHz

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.8.2 Radiated Emission Data

The data in tables 1-5 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 1.2 dB margin compare with peak limit

Mode: TX-Channel (Lowest)

Table 1

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	***2390.000***	***60.4***	***33***	***29.4***	***56.8***	***21***	***35.8***	***54.0***	***-18.2***
V	***4807.170***	***56.9***	***33***	***34.9***	***58.8***	***21***	***37.8***	***54.0***	***-16.2***
V	***12017.925***	***57.3***	***33***	***40.5***	***64.8***	***21***	***43.8***	***54.0***	***-10.2***

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	***2390.000***	***60.4***	***33***	***29.4***	***56.8***	***74.0***	***-17.2***
V	***4807.170***	***56.9***	***33***	***34.9***	***58.8***	***74.0***	***-15.2***
V	***12017.925***	***57.3***	***33***	***40.5***	***64.8***	***74.0***	***-9.2***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel (Middle)

Table 2

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	***4877.826***	***54.9***	***33***	***34.9***	***56.8***	***21***	***35.8***	***54.0***	***-18.2***
V	***7316.739***	***57.1***	***33***	***37.9***	***62.0***	***21***	***41.0***	***54.0***	***-13.0***
V	***12194.565***	***56.7***	***33***	***40.5***	***64.2***	***21***	***43.2***	***54.0***	***-10.8***

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	***4877.826***	***54.9***	***33***	***34.9***	***56.8***	***74.0***	***-17.2***
V	***7316.739***	***57.1***	***33***	***37.9***	***62.0***	***74.0***	***-12.0***
V	***12194.565***	***56.7***	***33***	***40.5***	***64.2***	***74.0***	***-9.8***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel (Highest)

Table 3

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	***2483.500***	***61.0***	***33***	***29.4***	***57.4***	***21***	***36.4***	***54.0***	***-17.6***
V	***4954.626***	***54.7***	***33***	***34.9***	***56.6***	***21***	***35.6***	***54.0***	***-18.4***
V	***7431.939***	***57.9***	***33***	***37.9***	***62.8***	***21***	***41.8***	***54.0***	***-12.2***
V	***12386.565***	***55.9***	***33***	***40.5***	***63.4***	***21***	***42.4***	***54.0***	***-11.6***

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	***2483.500***	***61.0***	***33***	***29.4***	***57.4***	***74.0***	***-16.6***
V	***4954.626***	***54.7***	***33***	***34.9***	***56.6***	***74.0***	***-17.4***
V	***7431.939***	***57.9***	***33***	***37.9***	***62.8***	***74.0***	***-11.2***
V	***12386.565***	***55.9***	***33***	***40.5***	***63.4***	***74.0***	***-10.6***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Worst Case: EUT Transmitting (Audio playing)

Table 4

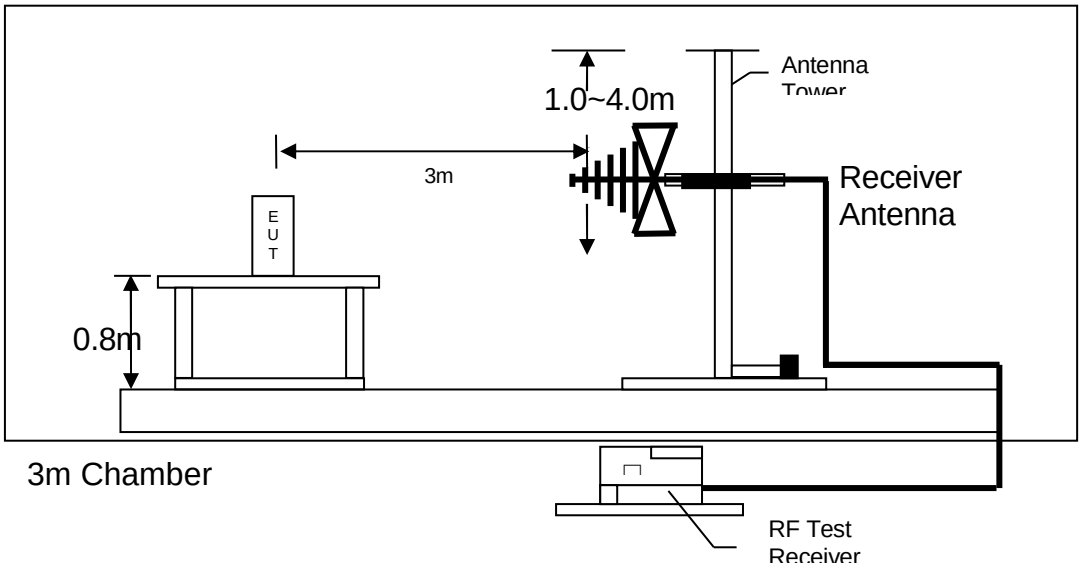
Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	43.942	42.0	16	10.0	36.0	40.0	-4.0
V	52.632	41.2	16	11.0	36.2	40.0	-3.8
V	75.243	48.8	16	6.0	38.8	40.0	-1.2
V	***113.456***	***39.4***	***16***	***14.0***	***37.4***	***43.5***	***-6.1***
V	***133.576***	***38.5***	***16***	***14.0***	***36.5***	***43.5***	***-7.0***
V	201.418	36.3	16	16.0	36.3	43.5	-7.2
V	***266.349***	***31.7***	***16***	***21.0***	***36.7***	***46.0***	***-9.3***
V	***332.971***	***27.6***	***16***	***24.0***	***35.6***	***46.0***	***-10.4***
V	602.905	22.2	16	29.0	35.2	46.0	-10.8

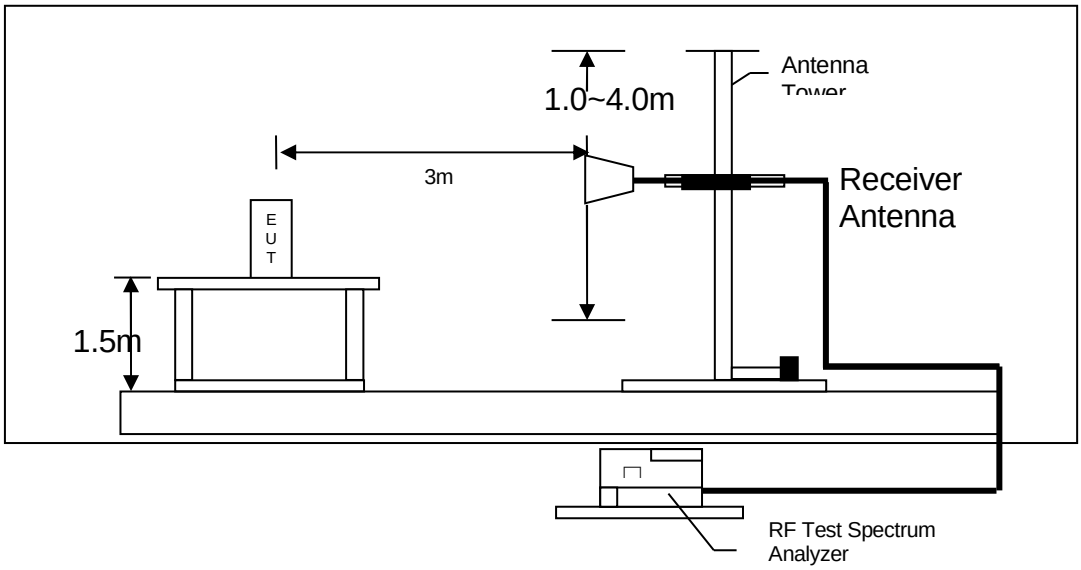
NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
5. Correction Factor is consitiuted Cable Loss, Antenna Factor and Amplifier Gain.

Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions upto 1GHz



Test setup of radiated emissions above 1GHz

4.8.3 Transmitter Duty Cycle Calculation

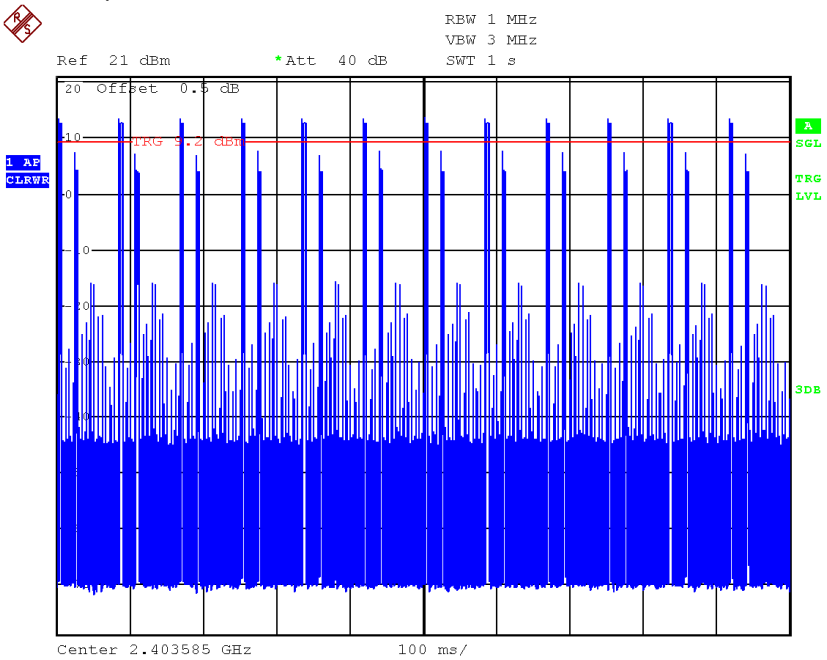
Duty Cycle (DC) = Maximum On time in 100ms/100ms
Duty Cycle (DC) = (2*4.42ms) / 100ms = 0.0884
Average Factor (AF) = 20 log(DC)
= 20* log (0.0884)
= -21dB

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SPAN function on the analyzer was set to ZERO. The transmitter ON time was determined from the resultant time-amplitude display.

Please refer to the attached plot(s) for more details.

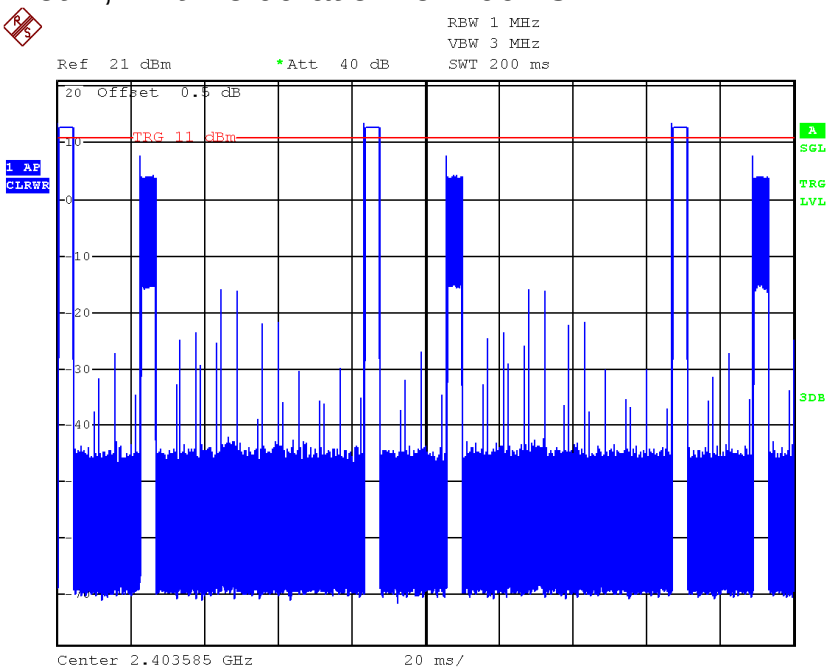
Plots of transmitter On time

Plot A, Tx time duration for one second



Date: 23.FEB.2016 10:12:24

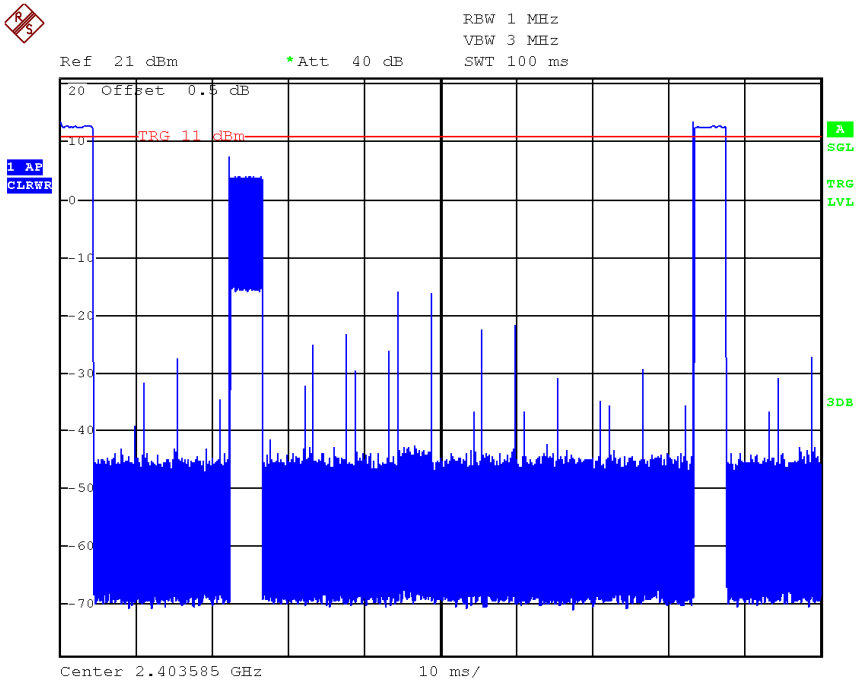
Plot B, Tx time duration for 200ms



Date: 23.FEB.2016 10:20:31

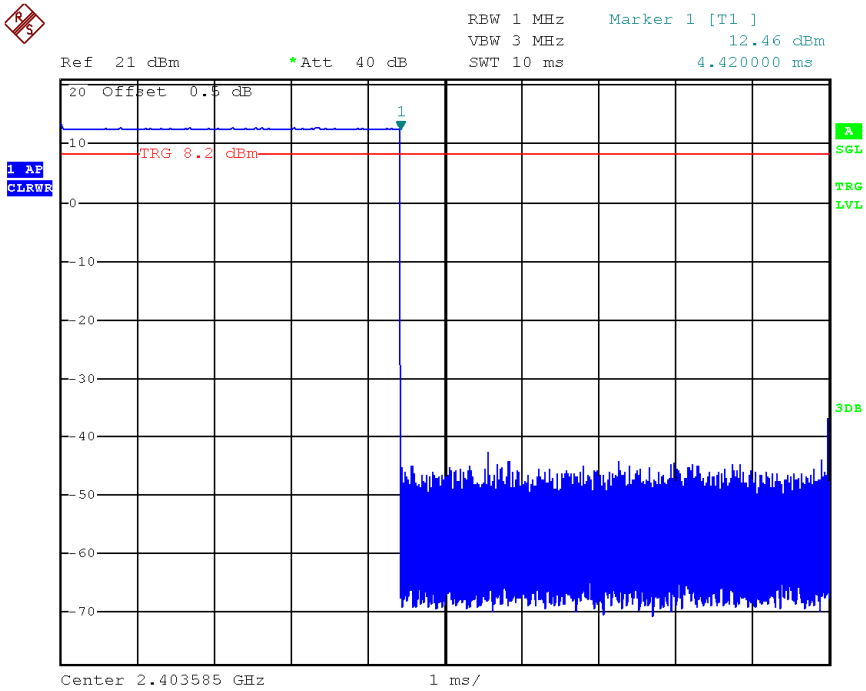
Plots of transmitter On time

Plot C, Tx time duration for 100ms



Date: 23.FEB.2016 10:28:45

Plot D, Tx time duration for 10ms



Date: 23.FEB.2016 10:32:07

4.9 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.9.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

0.398 MHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.9.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 2.9 dB margin compare with average limit

Worst Case: EUT Transmitting

EDIT PEAK LIST (Final Measurement Results)

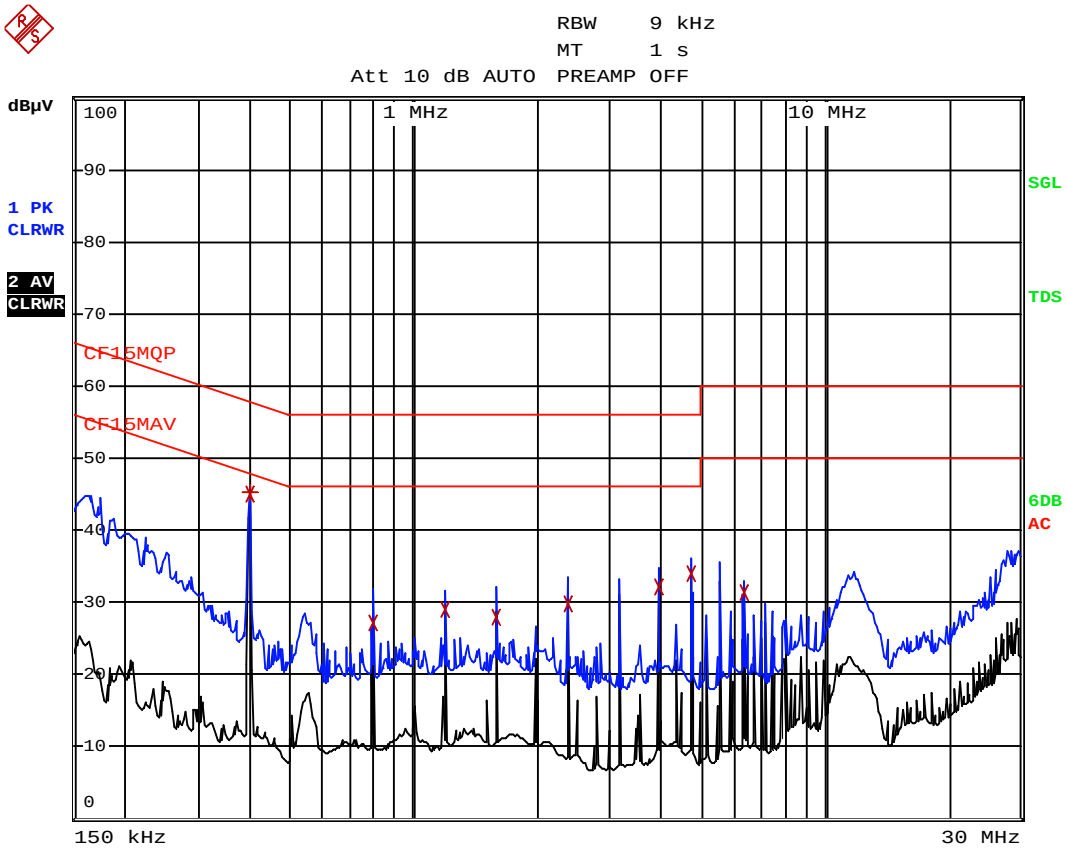
Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	397.5 kHz	45.17	N gnd	-12.73
2	CISPR Average	397.5 kHz	45.00	N gnd	-2.90
2	CISPR Average	793.5 kHz	27.15	N gnd	-18.84
2	CISPR Average	1.1895 MHz	29.04	N gnd	-16.95
2	CISPR Average	1.59 MHz	27.86	N gnd	-18.13
2	CISPR Average	2.382 MHz	29.79	N gnd	-16.20
2	CISPR Average	3.9705 MHz	32.23	L1 gnd	-13.77
2	CISPR Average	4.7625 MHz	34.02	N gnd	-11.97
2	CISPR Average	6.351 MHz	31.44	L1 gnd	-18.56

160121

Date: 21.JAN.2016 14:26:42

Worst Case: EUT Transmitting



160121

Date: 21.JAN.2016 14:26:56

Conducted Emission Test Setup

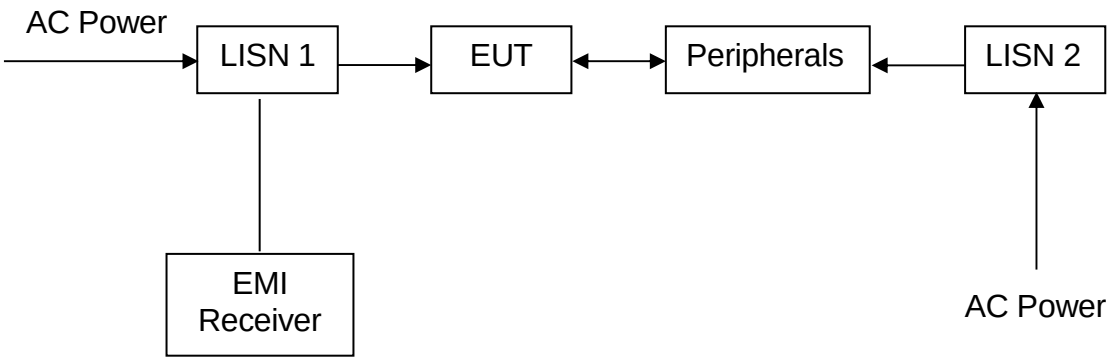


EXHIBIT 5
EQUIPMENT LIST

5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	BiConiLog Antenna
Registration No.	EW-3095	EW-3061
Manufacturer	R&S	EMCO
Model No.	ESCI	3412E
Calibration Date	Nov. 05, 2015	Jul. 22, 2015
Calibration Due Date	Nov. 05, 2016	Jul. 22, 2016

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0194
Manufacturer	R&S	EMCO
Model No.	FSP40	3115
Calibration Date	May 27, 2015	Jan. 29, 2015
Calibration Due Date	May 27, 2016	Jul. 29, 2016

2) Bandwidth/Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	Jun. 17, 2015
Calibration Due Date	Jun. 17, 2016

3) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN	Pulse Limiter
Registration No.	EW-2666	EW-0192	EW-0698
Manufacturer	R&S	R&S	R&S
Model No.	ESCI7	ESH3-Z5	ESH3-Z2
Calibration Date	May 13, 2015	Jun. 18, 2015	Jul. 14, 2015
Calibration Due Date	May 13, 2016	Jun. 18, 2016	Jul. 14, 2016

END OF TEST REPORT