TEST REPORT

Report Number: 15100943HKG-003

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

2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Parent Unit

FCC ID: EW780-0148-01

IC: 1135B-80014801

Prepared and Checked by:

Signed On File
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November 30, 2015

GENERAL INFORMATION

Applicant Name:	VTech Telecommunications Ltd.
Applicant Address:	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong.
FCC Specification Standard:	FCC Part 15, October 1, 2014 Edition
FCC ID:	EW780-0148-01
FCC Model(s):	VM344 PU, VM344-2 PU, VM344-3 PU, VM344-4 PU, VM3x4-ab PU
IC Specification Standard:	RSS-247 Issue 1, May 2015 RSS-Gen Issue 4, November 2014
IC:	1135B-80014801
IC Model(s):	VM344 PU, VM344-2 PU
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Parent Unit
Serial Number:	N/A
Sample Receipt Date:	October 27, 2015
Date of Test:	October 31 to November 04, 2015
Report Date:	November 30, 2015]
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-210/ RSS-Gen# Section	Results	Details see section
Antenna Requirement	15.203	8.3#	Pass	2.1
Max. Conducted Output Power	15.247(b)(1)	5.4(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(4)	Pass	4.3
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	5.1(2)	Pass	4.4
Average Time of Occupancy	15.247(a)(1)(iii)	5.1(4)	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) & 15.209	8.10#	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, October 1, 2014 Edition
RSS-247 Issue 1, May 2015
RSS-Gen Issue 4, December 2014

EXHIBIT 2
GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The VM344-2 PU is a 2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Parent Unit. It operates at frequency range of 2406MHz to 2475MHz. There are total 24 physical channels. The Parent Unit is powered by an adaptor 100-240VAC to 5VDC 1000mA and/or powered by a "Li-polymer" type rechargeable battery pack (3.7V 950mAh).

The antenna used in the EUT is integral, and the test sample is a prototype.

For FCC, The Model(s): VM344 PU, VM344-3 PU, VM344-4 PU, VM3x4-ab PU are the same as the Model: VM344-2 BU in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are color, and model number to be sold for marketing purpose. Suffix (X) indicates any alphanumeric character, presenting different type of packaging. Suffix (a) indicates any alphanumeric character or blank, presenting number of baby unit. Suffix (b) indicates any alphanumeric character or blank, presenting color of enclosure

For IC, The Model(s): VM344 PU is the same as the Model: VM344-2 PU in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are color and model number to be sold for marketing purpose.

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

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). 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). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission t0est site, AC Power Line conducted measurement facility, and antenna port conducted measurement facility used to collect the radiated data, AC Power Line conducted data, and conductive data are at Fo Tan office of Intertek Testing Services Hong Kong Ltd., which is located 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.

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 Parent Unit was powered by an adaptor 100-240VAC to 5VDC 1000mA and/or powered by a "Li-polymer" type rechargeable battery pack (3.7V 950mAh

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable at 0.8m heights from the ground plane for emission testing at or below 1GHz and 1.5m for emission measurements above 1 GHz. If the parent unit attached to peripherals, they were connected and operational (as typical as possible). The baby unit was remotely located as far from the antenna and the parent as possible to ensure full power transmission from the baby unit. Else, the parent 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. Digital circuitry used to control additional functions other than the operation of the transmitter is subject to FCC Part Section 15.109 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 4.8.4.

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.

All relevant operation modes have been tested, and the worst case data is included in this report.

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:

An AC adaptor and/or a battery (provided with the unit) were used to power the device. Their description are listed below.

(1) An AC adaptor (100-240VAC to 5VDC 1000mA, Model: S006AKU0500100, Brand: Ten Pao) (Supplied by Client)
(2) A "Li-polymer" type rechargeable battery pack (3.7V 950mAh, Model: BT198555/ BT298555, Brand: BYD) (Supplied by Client).

Description of Accessories:

(1) Vtech Baby Unit, Model: VM344-2 BU, FCC ID: EW780-0148-00 (Supplied by client)

3.4 Measurement Uncertainty

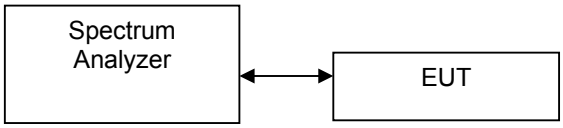
When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test, AC line conducted emission test and RF conducted test are $\pm$ 5.3dB, $\pm$ 4.2dB, $\pm$ 0.99dB respectively.

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 Conducted measurement Test Setup by a Spectrum Analyzer.
The figure below shows the test setup, which is utilized to make these measurements.



4.1 Maximum Conducted 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 = 2 dBi			
Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2406	15.93	39.17
Middle Channel:	2442	15.66	36.81
High Channel:	2475	15.05	31.99

Cable loss : 0.5 dB External Attenuation : 10 dB

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

dBm max. output level = 15.93 dBm

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

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

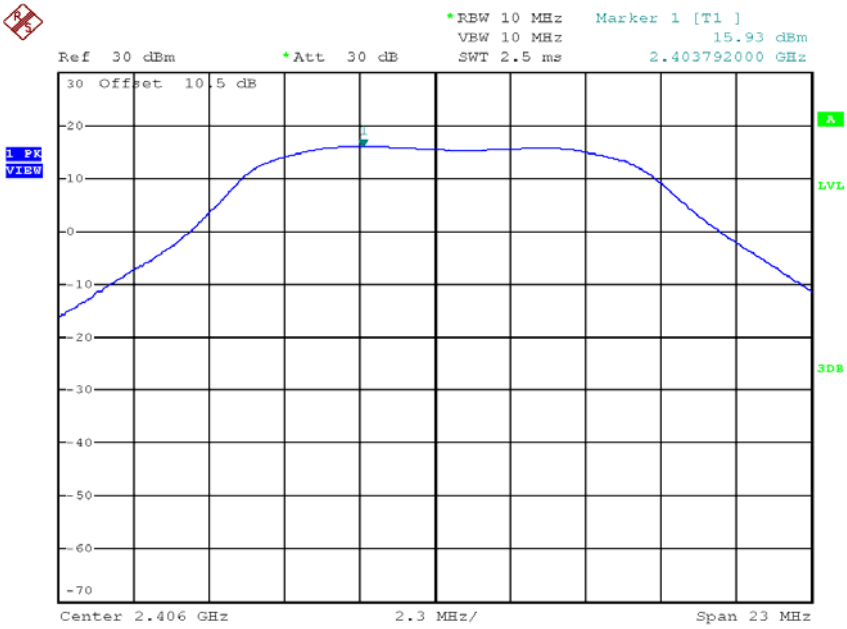
☐ 1W (30dBm) for antennas with gains of 6dBi or less

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

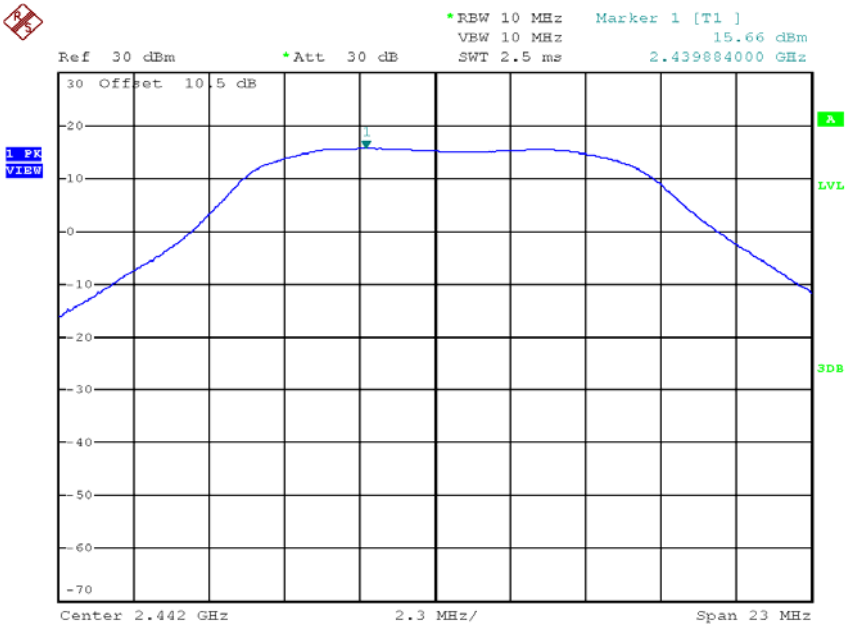
The plots of conducted output power are saved as below.

Plots of conducted output power

Lowest Channel

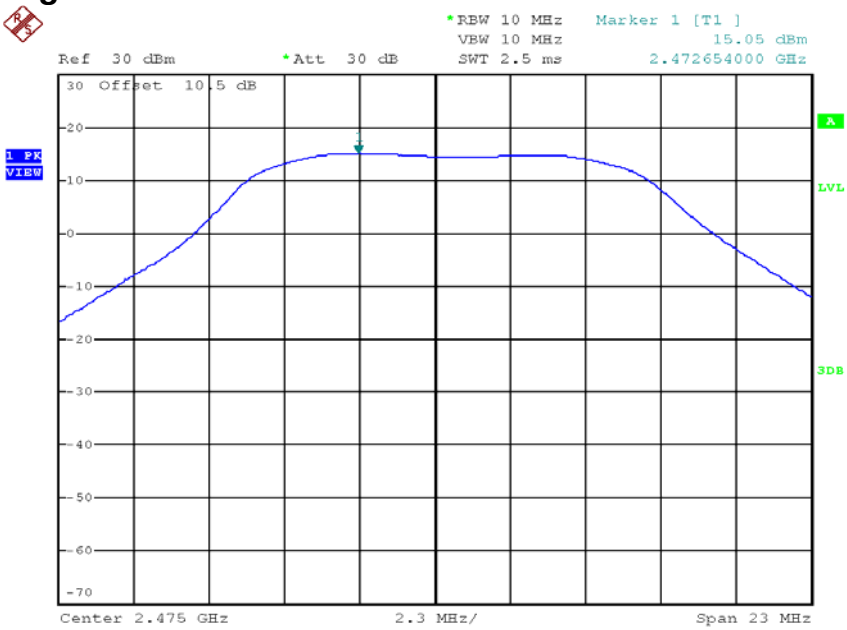


Middle Channel



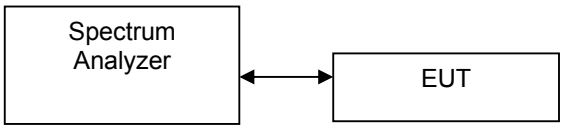
Plots of conducted output power

Highest Channel



RF Conduct measurement Test Setup

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



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:	2406	4380
Middle Channel:	2442	4380
High Channel:	2475	4480

Limits

☐ ≤500kHz for 902-928MHz

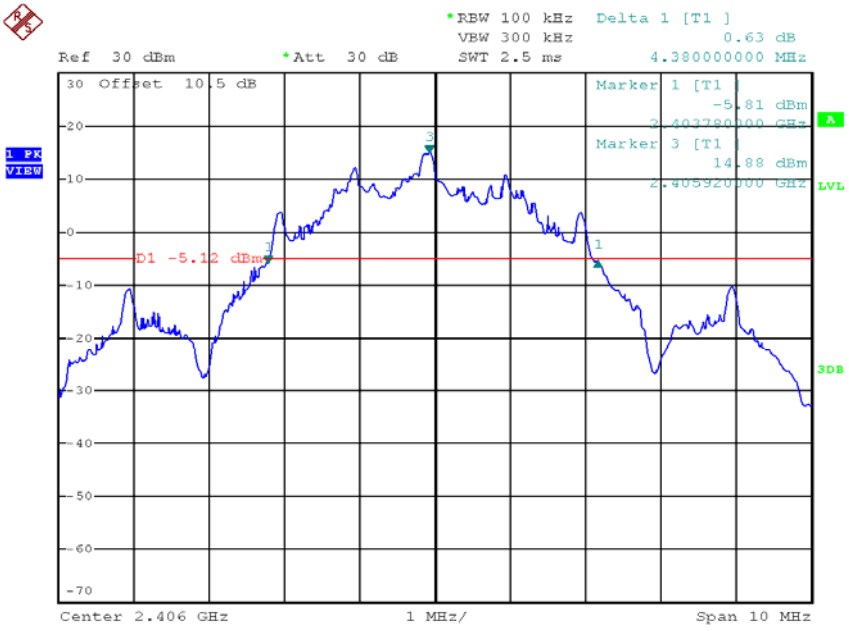
☒ N/A for 2400-2483.5MHz

☐ ≤1MHz for 5725-5850MHz

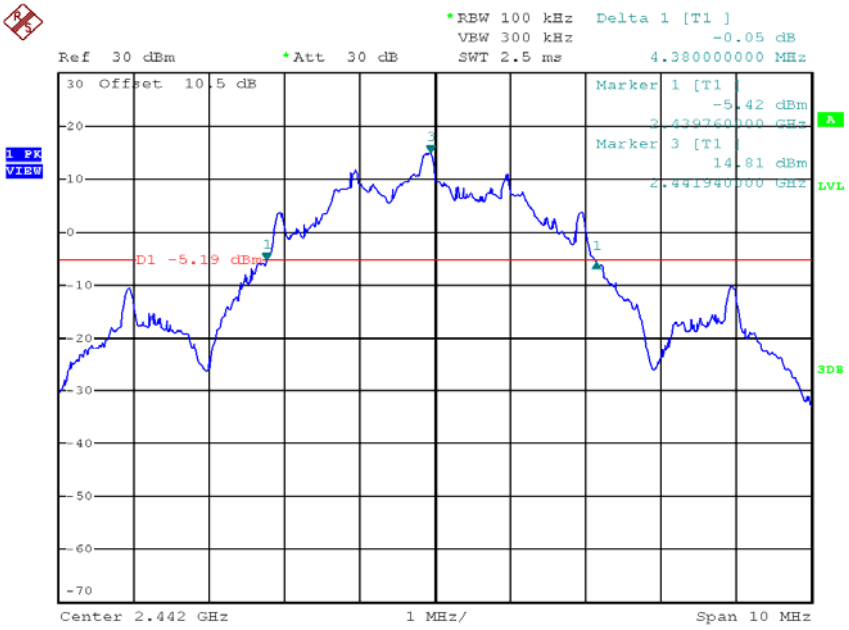
The plots of 20dB RF bandwidth and occupied bandwidth are saved as below.

Plots of 20dB RF bandwidth

Lowest Channel

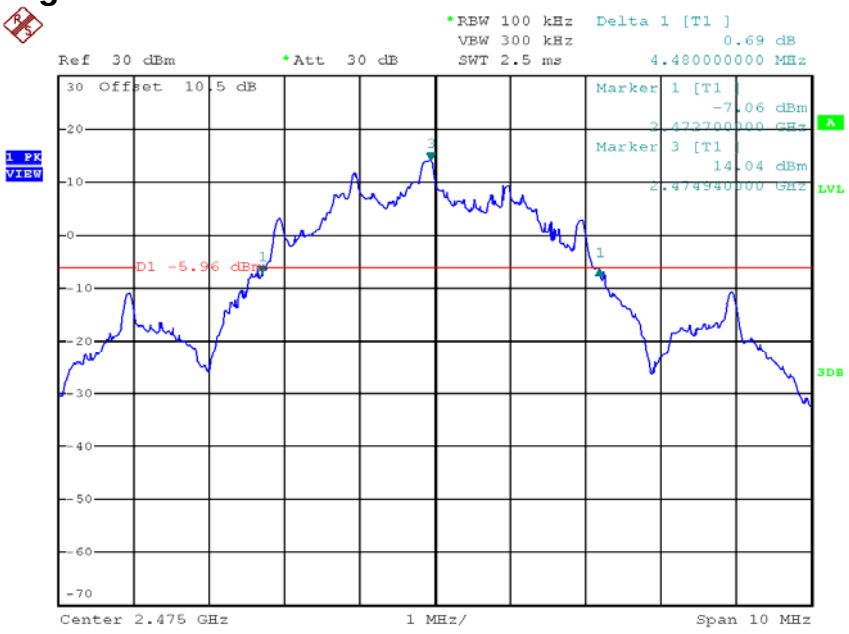


Middle Channel



Plots of 20dB RF bandwidth

Highest Channel



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 (Talk)	16
No. of hopping channels (Traffic)	16

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)

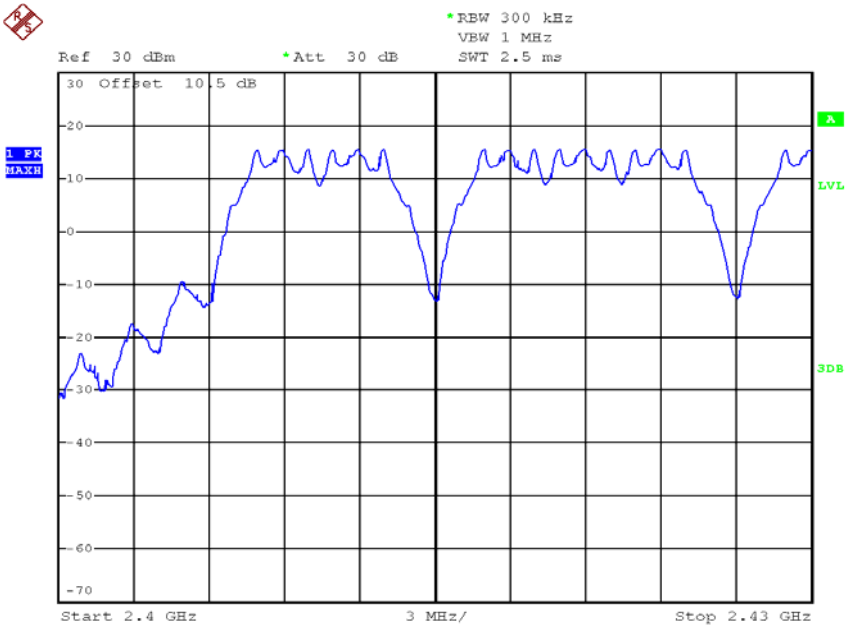
☒ at least 15 hopping channels for 2400MHz-2483.5MHz.

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

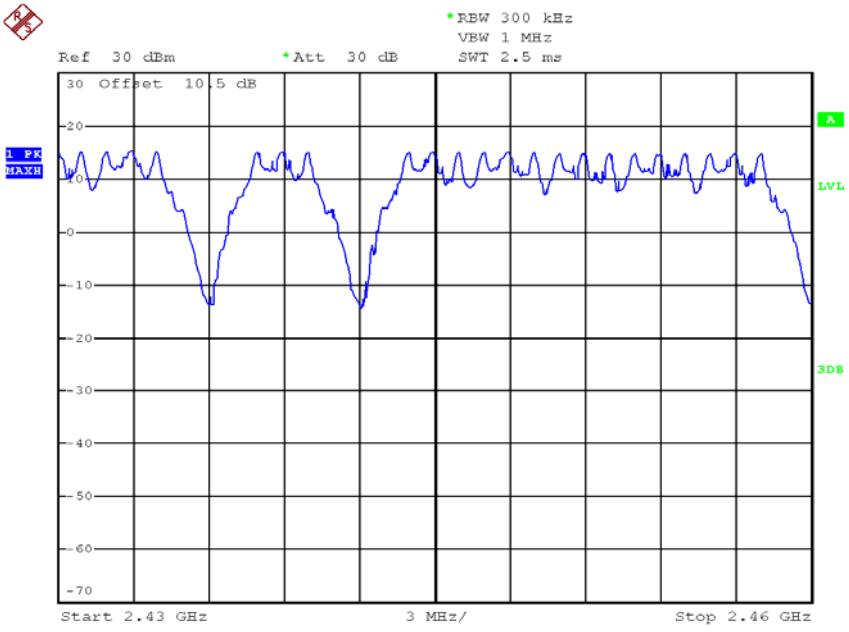
The plots of number of hopping frequencies are saved as below.

Plots of number of hopping frequencies

Plot A

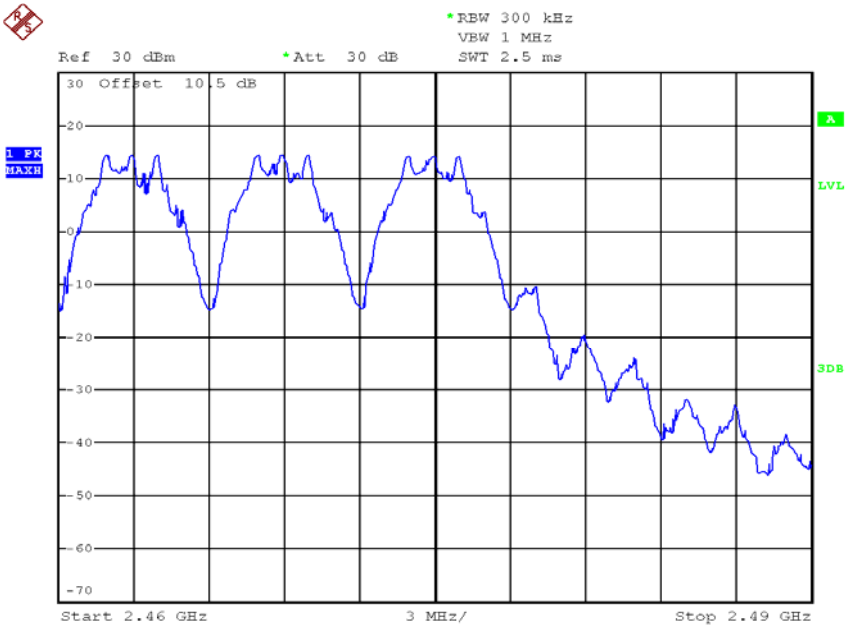


Plot B



Plots of number of hopping frequencies

Plot C



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 11 and Channel 12)	3000 kHz

Limits:
The channel separation must be larger than:

☐ 25 kHz

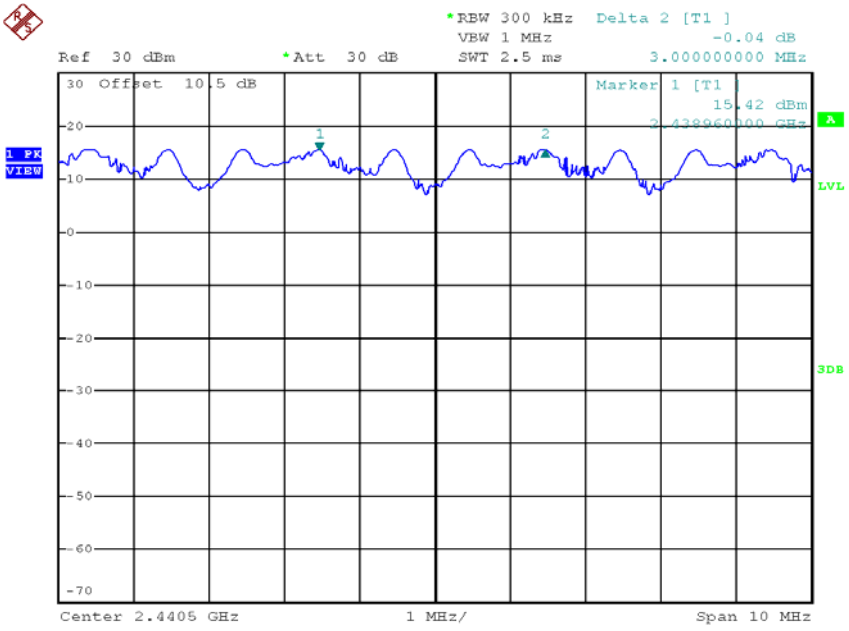
☐ 20 dB bandwidth of hopping channel: ___Hz

☒ 2/3 of 20dB bandwidth of hopping channel: 2986.7Hz

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

Plots of hopping channel carrier frequency separation

Between channel 12 and channel 13



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).

Parent Unit (worst-case:)	
Average Occupancy Time = 0.46ms x 1 x 2 x 37	34.04ms

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 6.4 seconds (0.4 sec. x 16) for 2400MHz-2483.5MHz

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

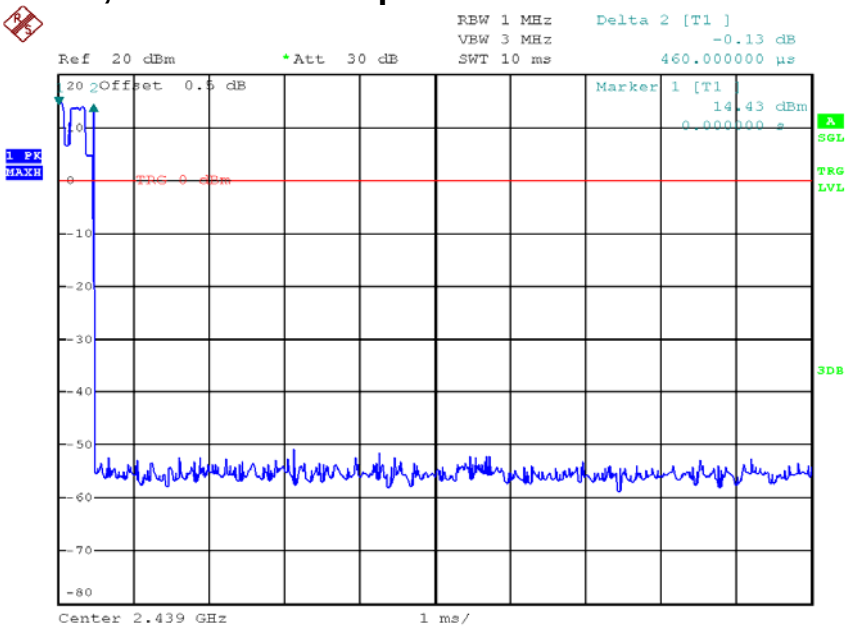
☐ 10 seconds for 902MHz-928MHz ≥ 25 hopping channels

☐ 30 seconds for 5725-5850MHz

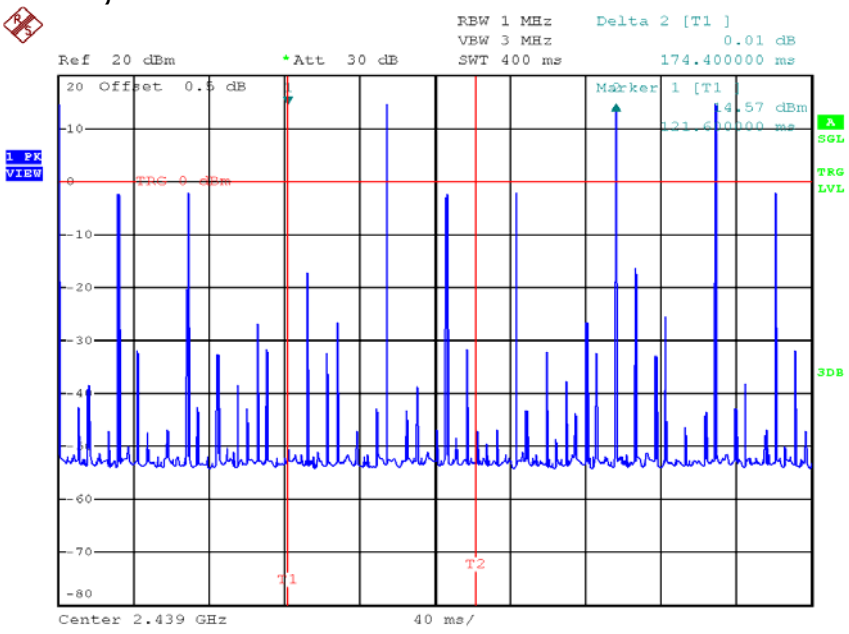
The plots of average channel occupancy time are saved as below.

Plots of average channel occupancy time

Plot A, Tx time for one pulse

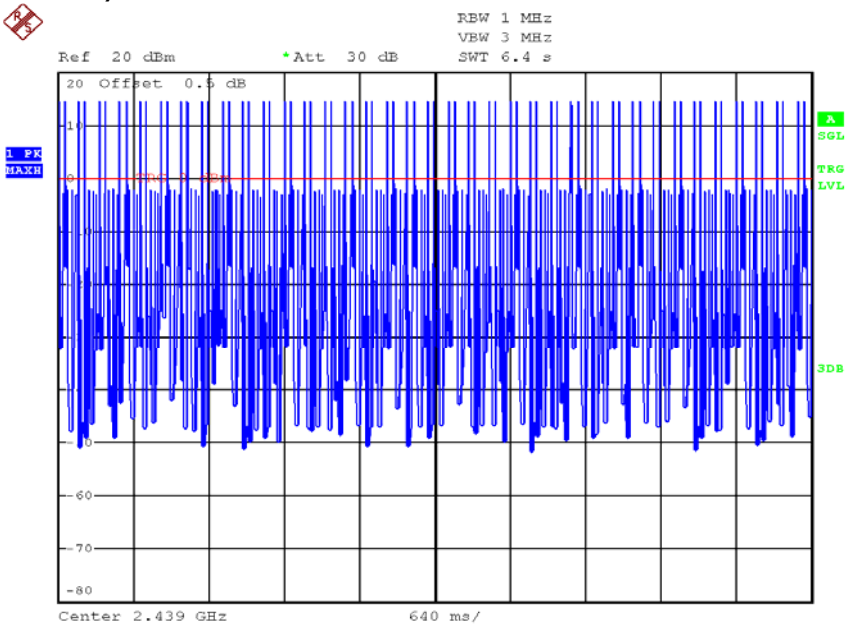


Plot B, No. of Tx in 400ms



Plots of average channel occupancy time

Plot A, No. of Tx in 6.4s



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.

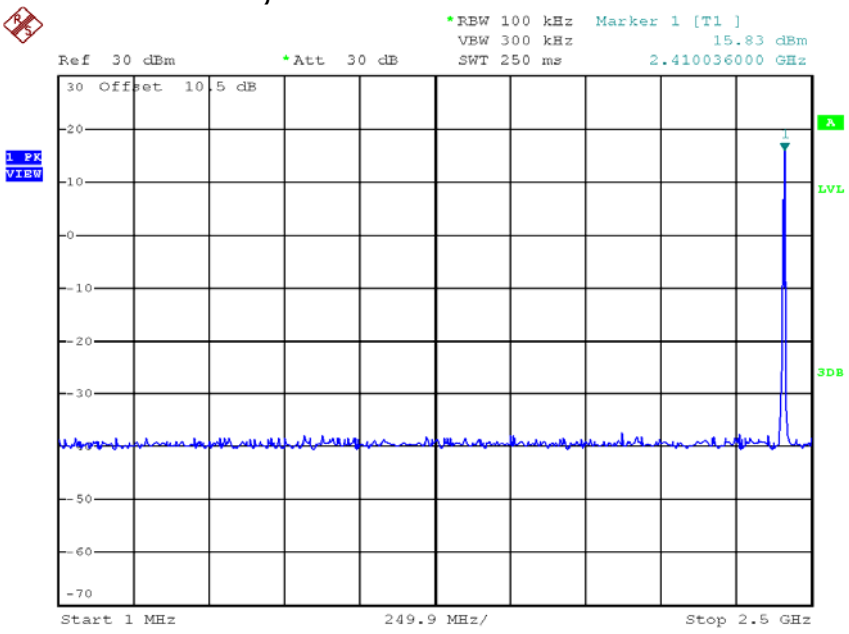
The plot(s) of bandedge compliance is shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

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.

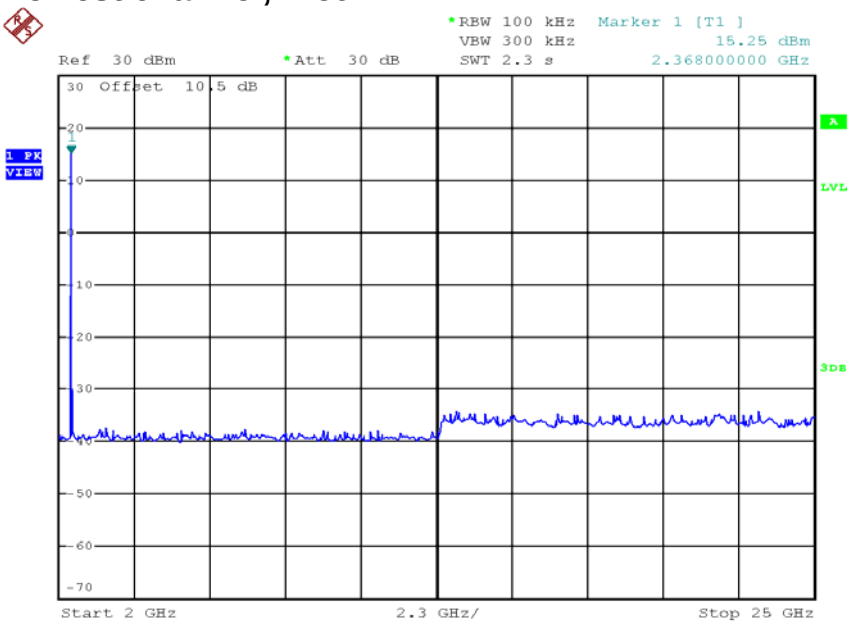
The plots of out of band conducted emissions is saved as below.

Plots of out of band conducted emissions

Lowest channel, Plot 1

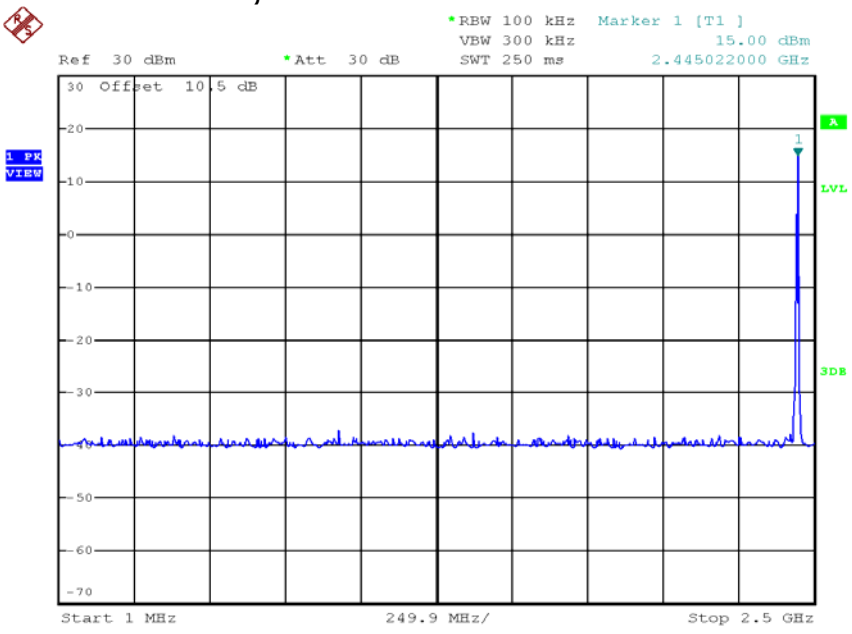


Lowest channel, Plot 2

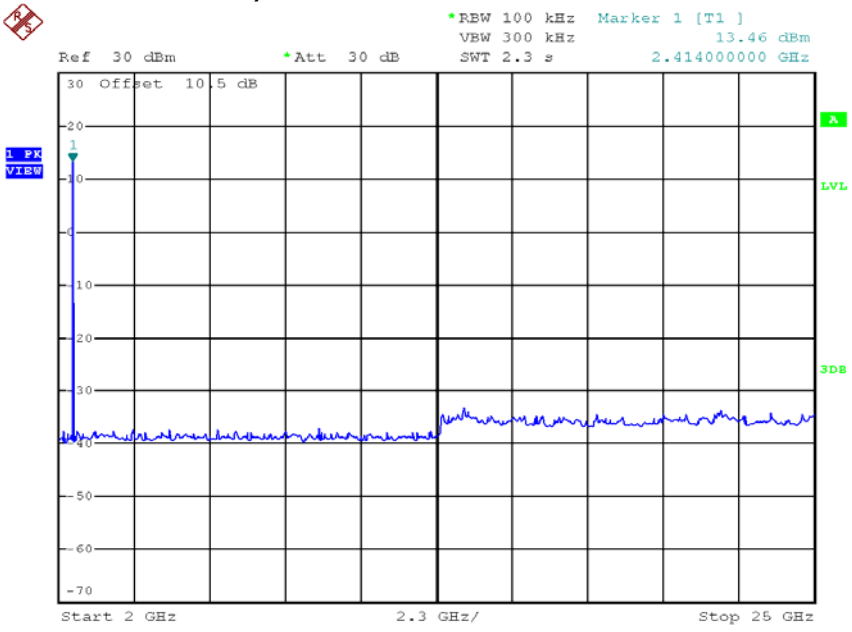


Plots of out of band conducted emissions

Middle channel, Plot 1

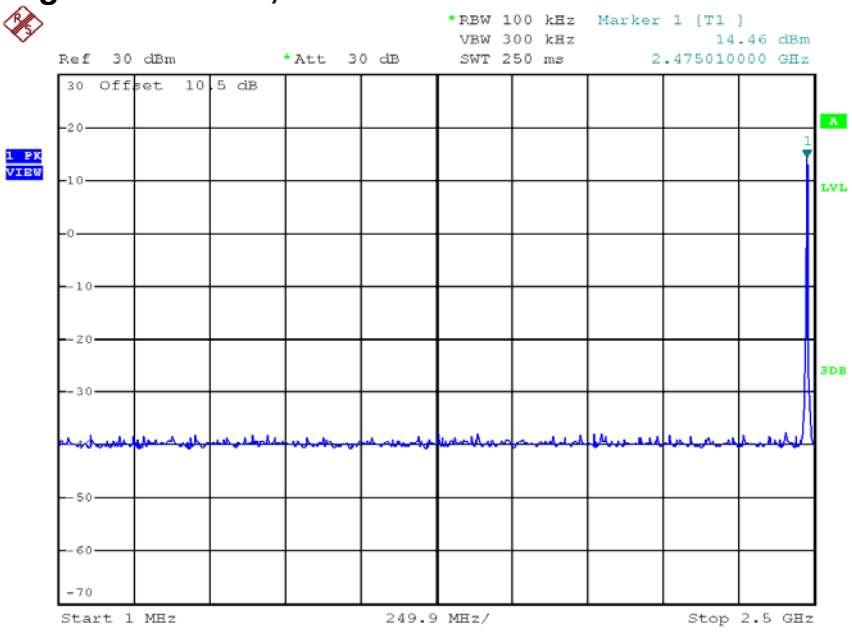


Middle channel, Plot 2

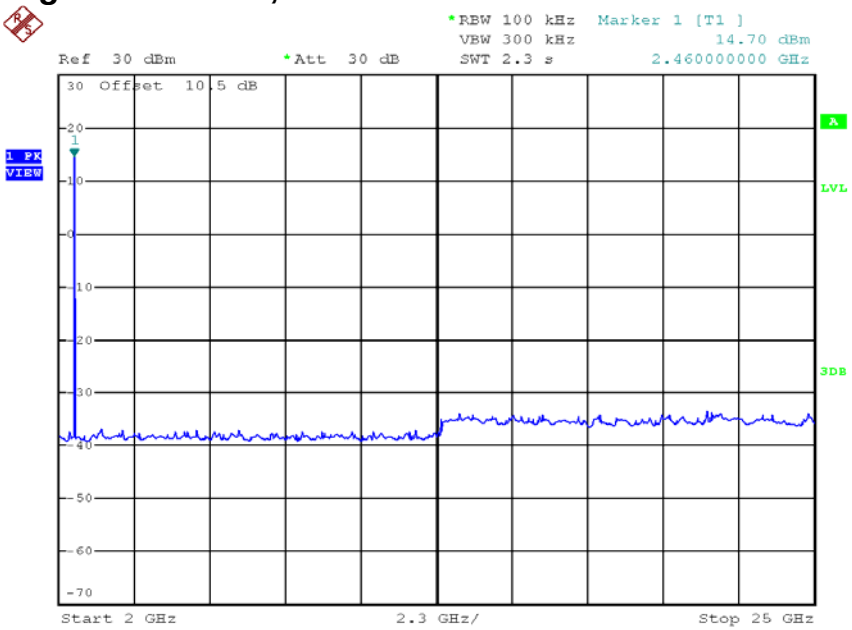


Plots of out of band conducted emissions

Highest channel, Plot 1

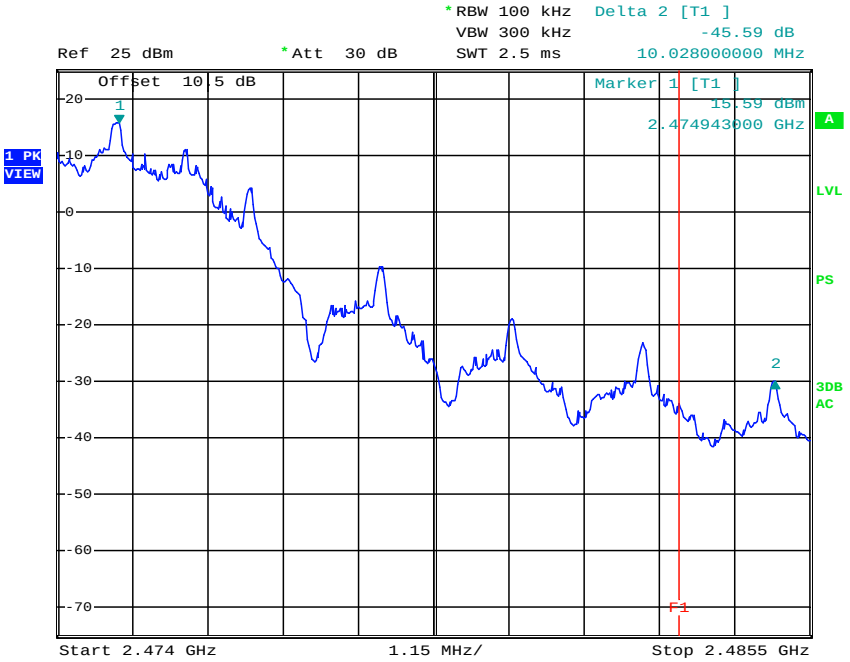


Highest channel, Plot 2



Plots of bandedge, Plot 1

Plots of bandedge, Plot 2



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

2483.500 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

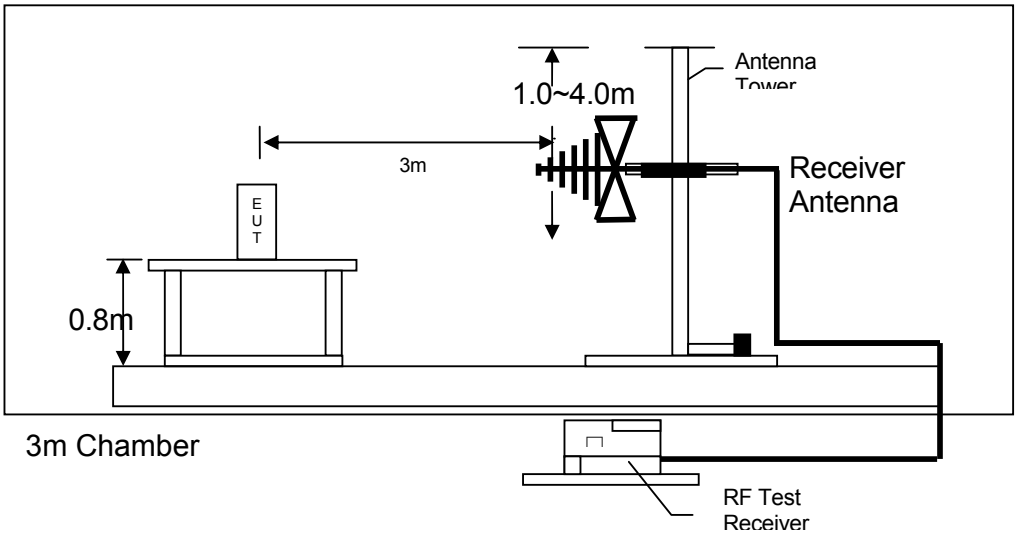
The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

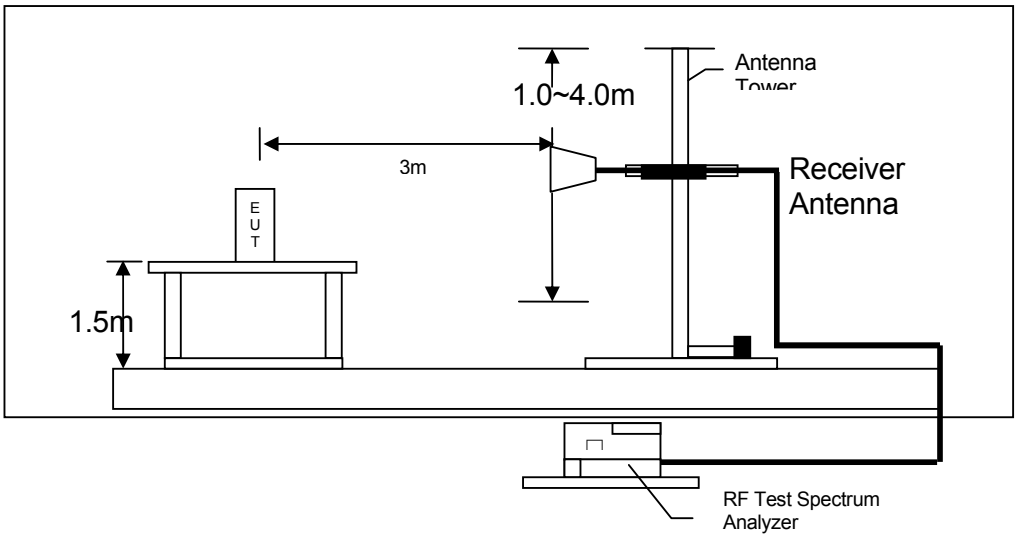
Passed by 2.0 dB margin compare with peak limit

4.8.3 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

Mode: TX-Channel 00

Table 1

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2390.000***	***68.6***	***33***	***29.4***	***40.7***	***24.3***	***54.0***	***-29.7***
V	***4812.000***	***58.2***	***33***	***34.9***	***40.7***	***19.4***	***54.0***	***-34.6***
V	***12030.000***	***50.1***	***33***	***40.5***	***40.7***	***16.9***	***54.0***	***-37.1***

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)
H	***2390.000***	***68.6***	***33***	***29.4***	***65.0***	***74.0***	***-9.0***
V	***4812.000***	***58.2***	***33***	***34.9***	***60.1***	***74.0***	***-13.9***
V	***12030.000***	***50.1***	***33***	***40.5***	***57.6***	***74.0***	***-16.4***

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-210 Section 2.2.

Mode: TX-Channel 12

Table 2

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	***4884.000***	***57.9***	***33***	***34.9***	***40.7***	***19.1***	***54.0***	***-34.9***
V	***7326.000***	***48.2***	***33***	***37.9***	***40.7***	***12.4***	***54.0***	***-41.6***
V	***12210.000***	***49.9***	***33***	***40.5***	***40.7***	***16.7***	***54.0***	***-37.3***

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	***4884.000***	***57.9***	***33***	***34.9***	***59.8***	***74.0***	***-14.2***
V	***7326.000***	***48.2***	***33***	***37.9***	***53.1***	***74.0***	***-20.9***
V	***12210.000***	***49.9***	***33***	***40.5***	***57.4***	***74.0***	***-16.6***

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-210 Section 2.2.

Mode: TX-Channel 23

Table 3

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2483.500***	***75.6***	***33***	***29.4***	***40.7***	***31.3***	***54.0***	***-22.7***
V	***4950.000***	***56.4***	***33***	***34.9***	***40.7***	***17.6***	***54.0***	***-36.4***
V	***7425.000***	***48.7***	***33***	***37.9***	***40.7***	***12.9***	***54.0***	***-41.1***
V	***12375.000***	***50.2***	***33***	***40.5***	***40.7***	***17.0***	***54.0***	***-37.0***

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)
H	***2483.500***	***75.6***	***33***	***29.4***	***72.0***	***74.0***	***-2.0***
V	***4950.000***	***56.4***	***33***	***34.9***	***58.3***	***74.0***	***-15.7***
V	***7425.000***	***48.7***	***33***	***37.9***	***53.6***	***74.0***	***-20.4***
V	***12375.000***	***50.2***	***33***	***40.5***	***57.7***	***74.0***	***-16.3***

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-210 Section 2.2.

Mode: Speaker On and Charging

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	***119.504***	***29.6***	***16***	***14.0***	***27.6***	***43.5***	***-15.9***
H	***130.300***	***28.3***	***16***	***14.0***	***26.3***	***43.5***	***-17.2***
V	192.008	38.4	16	16.0	38.4	43.5	-5.1
H	287.032	33.3	16	22.0	39.3	46.0	-6.7
V	479.884	25.5	16	26.0	35.5	46.0	-10.5
V	575.336	24.7	16	28.0	36.7	46.0	-9.3
H	588.550	22.9	16	29.0	35.9	46.0	-10.1
H	672.736	28.7	16	29.0	41.7	46.0	-4.3

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-210 Section 2.2.

4.8.4 Transmitter Duty Cycle Calculation

Duty Cycle (DC) = Maximum On time in 100ms/100ms
= (0.46ms x 1 x 2) / 100ms

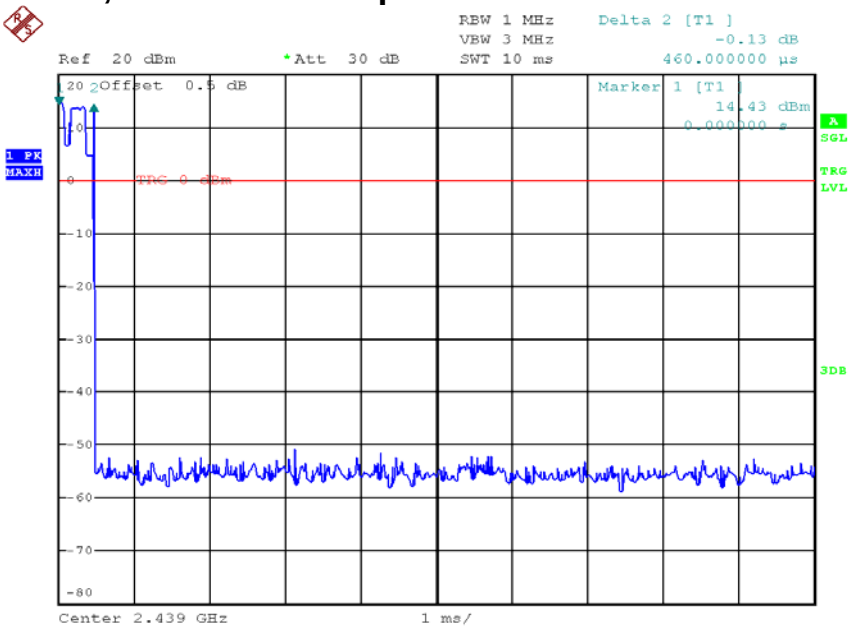
Duty Cycle (DC) = duration of one cycle/ effective period of the cycle
Average Factor (AF) = 20 log(DC)
= 20* log (0.0092)
= -40.72 dB

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.

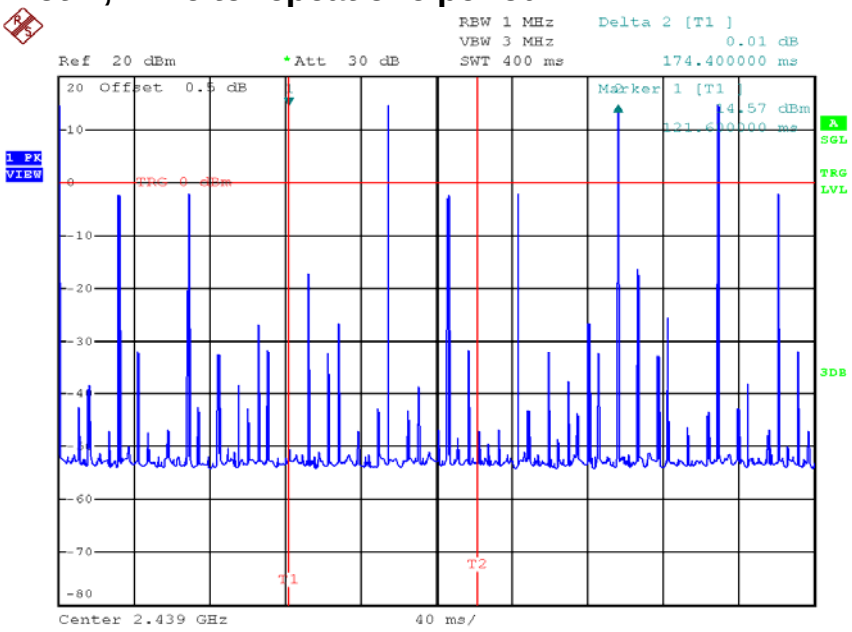
Please refer to the attached plot(s) for more details.

Plots of transmitter On time

Plot A, Tx time for one pulse



Plot B, Time to repeat one period



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

379.5 kHz

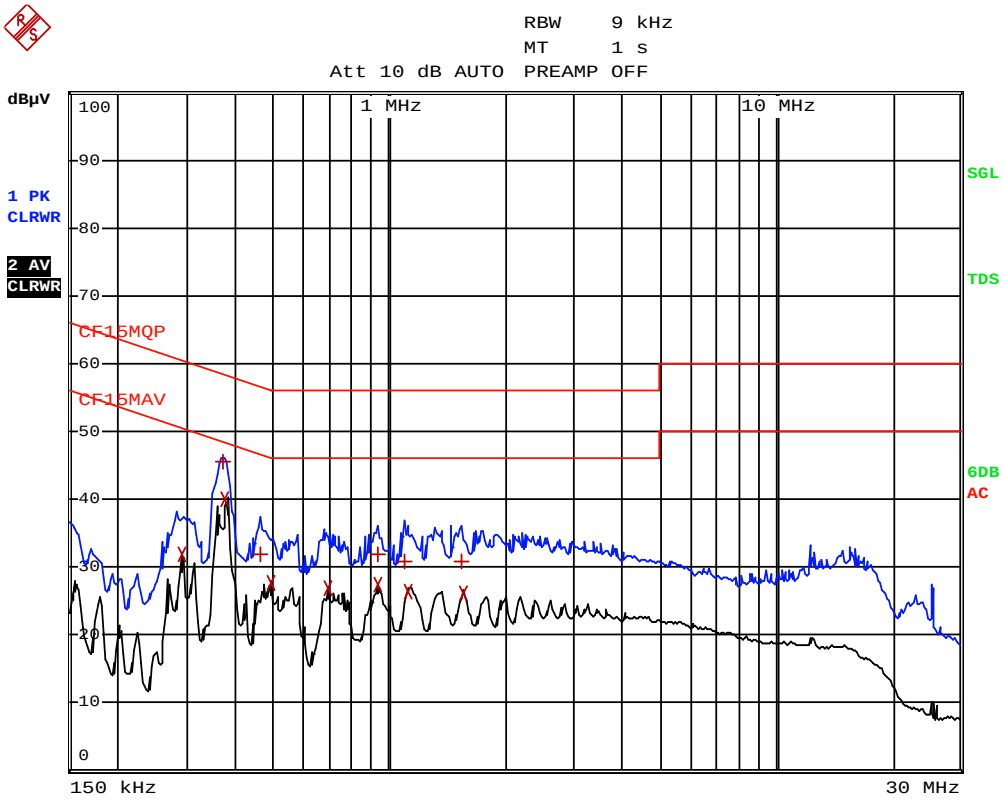
The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

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 8.34 dB margin compare with average limit

Worst Case: Talk and Charging



Worst Case: Talk and Charging

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	289.5 kHz	31.83	L1	-18.70
1	Quasi Peak	370.5 kHz	45.48	L1	-13.00
2	CISPR Average	379.5 kHz	39.94	L1	-8.34
1	Quasi Peak	460.5 kHz	31.81	L1	-24.86
2	CISPR Average	492 kHz	27.55	L1	-18.57
2	CISPR Average	694.5 kHz	26.85	L1	-19.14
1	Quasi Peak	933 kHz	31.84	L1	-24.15
2	CISPR Average	937.5 kHz	27.49	L1	-18.50
1	Quasi Peak	1.095 MHz	30.91	L1	-25.08
2	CISPR Average	1.1175 MHz	26.38	L1	-19.61
1	Quasi Peak	1.5405 MHz	30.83	L1	-25.16
2	CISPR Average	1.5585 MHz	26.05	L1	-19.94

EXHIBIT 5
EQUIPMENT LIST

5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	BiConiLog Antenna
Registration No.	EW-2251	EW-2249	EW-3061
Manufacturer	R&S	R&S	EMCO
Model No.	ESCI	FSP30	3412E
Calibration Date	Dec. 4, 2014	Nov. 19, 2014	Jul. 22, 2015
Calibration Due Date	Dec. 4, 2015	Nov. 19, 2015	Jul. 22, 2016

Equipment	Double Ridged Guide Antenna	Broad-Band Horn Antenna
Registration No.	EW-0194	EW-1679
Manufacturer	EMCO	SCHWARZBECK
Model No.	3115	BBHA9170
Calibration Date	Jan. 29, 2015	Jun. 10, 2015
Calibration Due Date	Jul. 29, 2016	Jun. 10, 2016

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2251	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Dec. 4, 2014	Jan. 15, 2015
Calibration Due Date	Dec. 4, 2015	Jan. 15, 2016

3) Conductive Measurement Test

Equipment	Spectrum Analyzer
Registration No.	EW-2466
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Sep. 16, 2015
Calibration Due Date	Aug. 20, 2016

END OF TEST REPORT