Issuing Laboratory:
Intertek Testing Services Hong Kong Limited

HKAS has accredited this laboratory (HOKLAS 005 – TEST) under HOKLAS for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories.

HOKLAS 005
TEST

TEST REPORT

Report Number: 14120647HKG-001

Application
for
Original Grant of 47 CFR Part 15 Certification
New Family of RSS-210 Issue 8 Equipment Certification

2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Baby Unit

FCC ID: EW780-9602-00

IC: 1135B-80960200

Prepared and Checked by:

Chak Chun Yin, Ray
Assistant Engineer

Approved by:

Nip Ming Fung, Melvin
Assistant Manager
January 20, 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, 2012 Edition
FCC ID:	EW780-9602-00
FCC Model(s):	VM312 BU, VM312-2 BU, VM312-3 BU, VM312-4 BU, VM3x2-ab BU, VM302, VM302-ab
IC Specification Standard:	RSS-210 Issue 8, December 2010 RSS-Gen Issue 3, December 2010
IC:	1135B-80960200
IC Model(s):	VM312 BU, VM312-2 BU, VM312-3 BU, VM312-4 BU, VM302
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Baby Unit
Serial Number:	N/A
Sample Receipt Date:	December 17, 2014
Date of Test:	December 29,2014-January 17, 2015
Report Date:	January 20, 2015
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

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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	7.1.2#	Pass	2.1
Max. Conducted Output Power	15.247(b)(1)	A8.4(2)	Pass	4.1
Max. 20dB RF Bandwidth	15.247(a)(1)(iii)	A8.1(d)	Pass	4.2
Min. No. of Hopping Frequencies	15.247(a)(1)(iii)	A8.1(d)	Pass	4.3
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	A8.1(b)	Pass	4.4
Average Time of Occupancy	15.247(a)(1)(iii)	A8.1(d)	Pass	4.5
Out of Band Antenna Conducted Emission	15.247(d)	A8.5	Pass	4.6
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d) & 15.109	2.2	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, 2012 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 3, December 2010

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EXHIBIT 2
GENERAL DESCRIPTION

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2.0 General Description

2.1 Product Description

The VM312-2 BU is a 2.4GHz Frequency Hopping Spread Spectrum Baby Monitor - Baby Unit. It operates at frequency range of 2407.5MHz to 2475MHz. There are total 21 channels. The Baby Unit is powered by an adaptor 100-240VAC 50/60Hz 150mA to 6.0VDC 600mA.

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

For FCC, The Model(s): VM312 BU, VM312-3 BU, VM312-4 BU, VM3x2-ab BU, VM302 and VM302-ab are the same as the Model: VM312-2 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. Suffix (x) indicates different type packaging. Suffix (a) indicates different number of baby unit. Suffix (b) indicates different color of enclosure.

For IC, The Model(s): VM312 BU, VM312-3 BU, VM312-4 BU, VM302 are the same as the Model: VM312-2 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..

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 (2009). 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 (2009). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The open area test 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, Shatin, New Territories, Hong Kong. This test facility and site measurement data have been fully placed on file with FCC and Industry Canada.

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EXHIBIT 3
SYSTEM TEST CONFIGURATION

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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 Baby Unit was powered by a 100-240VAC to 6.0VDC 600mA adaptor.

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. Digital circuitry used to control additional functions other than the operation of the transmitter is subject to FCC Part Section 15.109 Limits.

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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.

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.

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3.3 Details of EUT and Description of Accessories

Details of EUT:

An AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) An AC adaptor (100-240VAC 50/60Hz 150mA to 6.0VDC 600mA, Model: S003IU0600060, Brand: Ten Pao) (Supplied by Client)

Description of Accessories:

(1) Parent Unit, Model: VM312-2 PU, FCC ID: EW780-9602-01 (Provided by Client)

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

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EXHIBIT 4
TEST RESULTS

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4.0 **Test Results**

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 = 0dBi			
Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2407.500	15.61	36.39
Middle Channel:	2441.250	15.24	33.42
High Channel:	2475.000	15.36	34.36

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 = 15.61 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.

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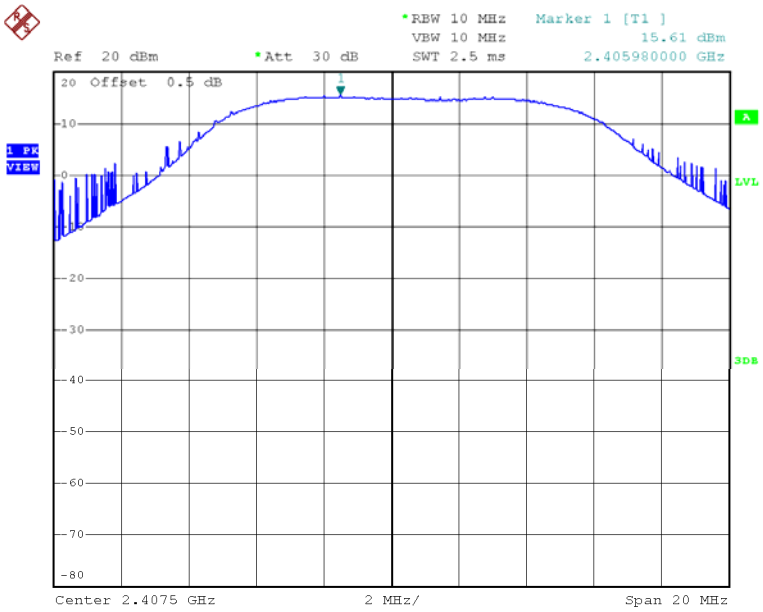
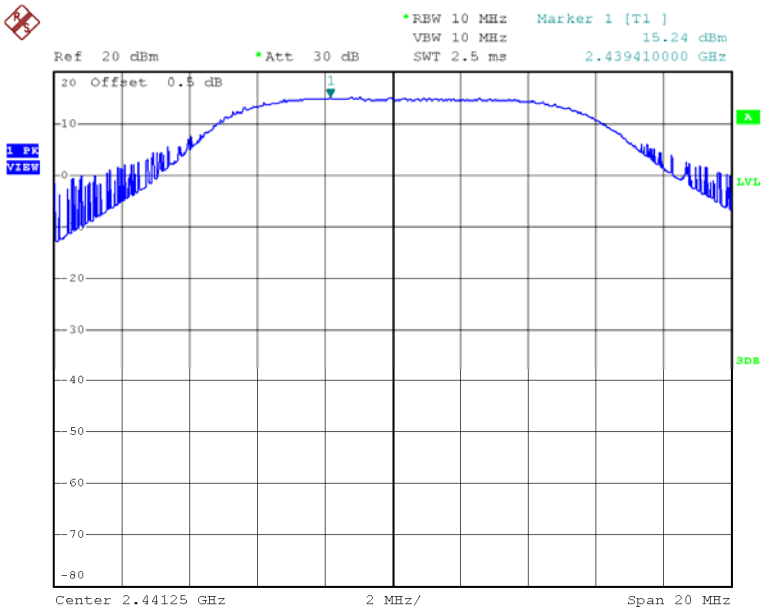
Plots of conducted output power

Lowest Channel



Date: 10.JAN.2015 11:46:30

Middle Channel



Date: 10.JAN.2015 14:52:54

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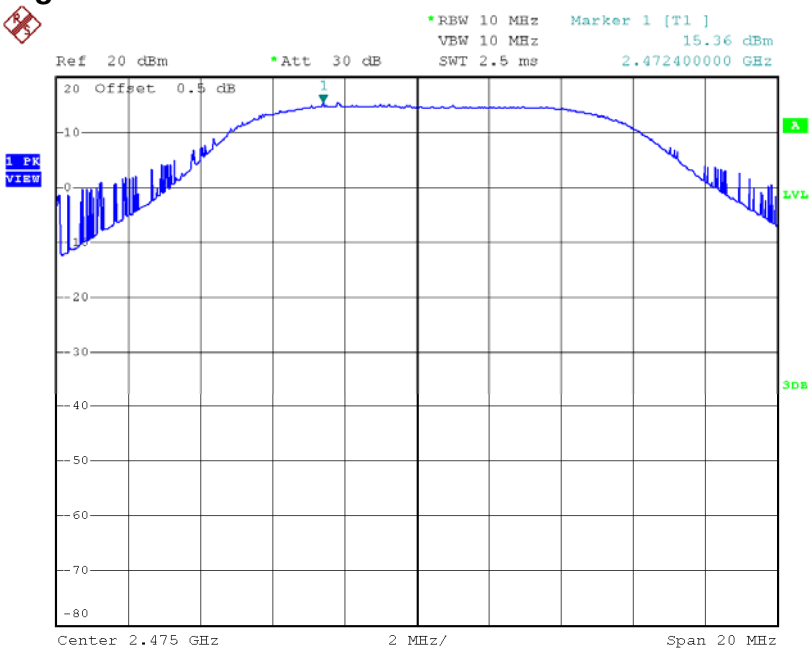
Plots of conducted output power

Highest Channel



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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:	2407.500	3620
Middle Channel:	2441.250	3640
High Channel:	2475.000	3640

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.

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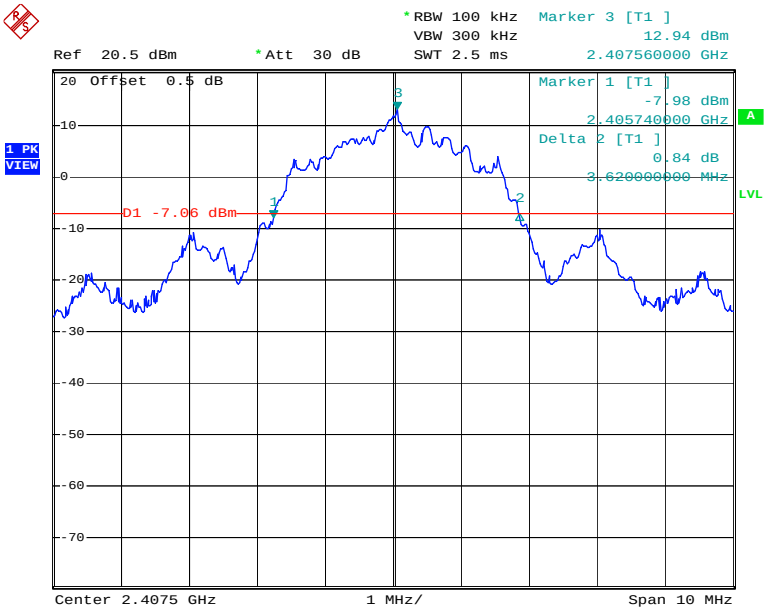
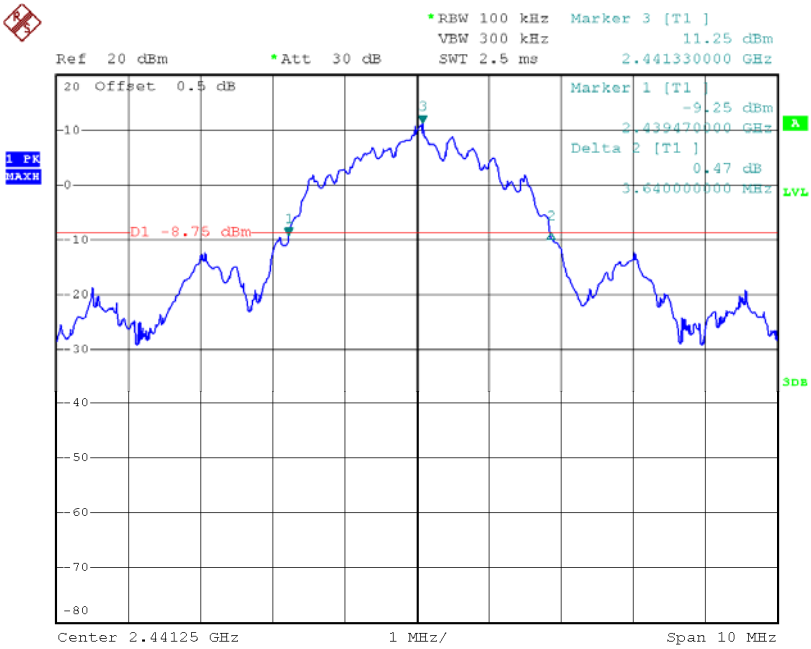
Plots of 20dB RF bandwidth

Lowest Channel



Date: 16.JAN.2015 14:13:37

Middle Channel



Date: 10.JAN.2015 14:51:11

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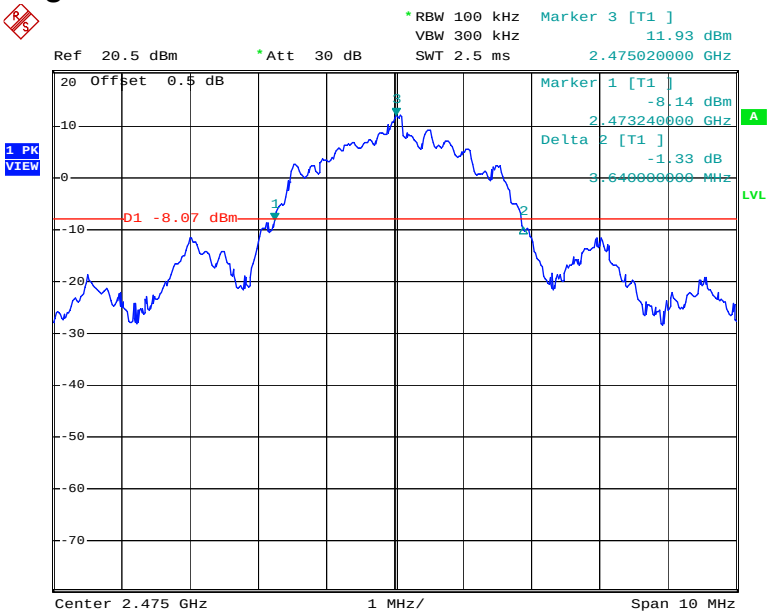
Highest Channel



Date: 16.JAN.2015 14:18:30

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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 (traffic) (theoretical)	16
No. of hopping channels (traffic)	21

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.

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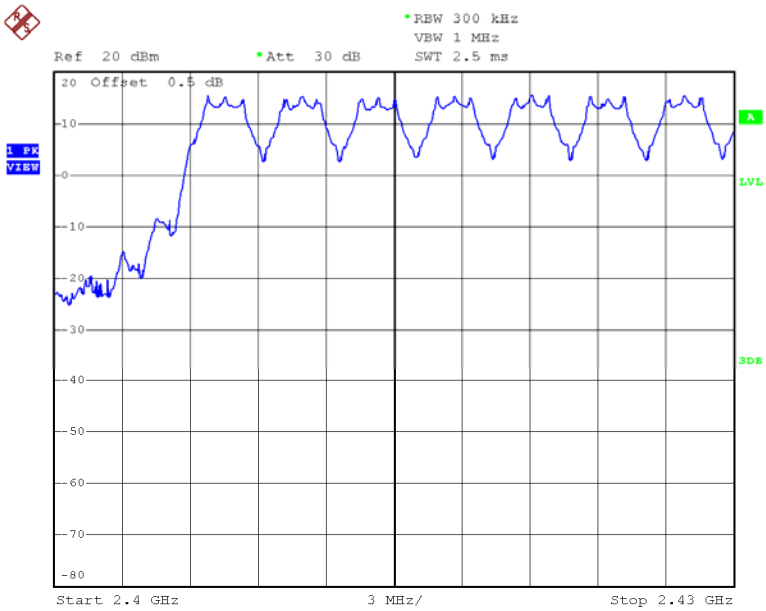
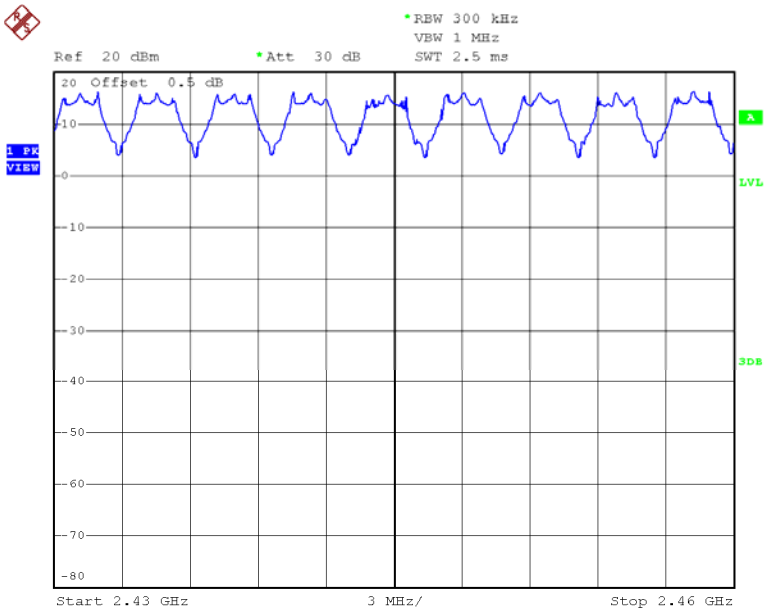
Plots of number of hopping frequencies

Plot A



Date: 10.JAN.2015 12:02:54

Plot B



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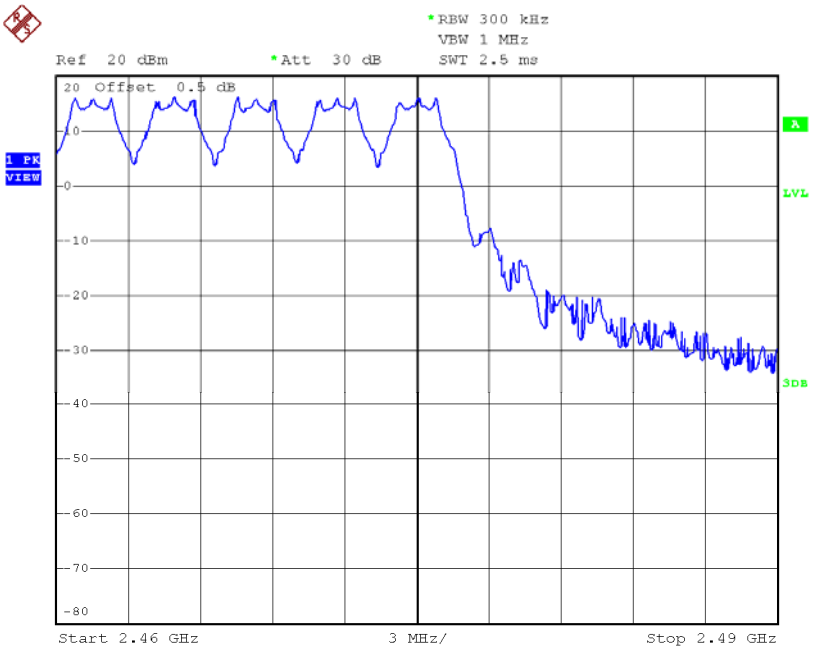
Plots of number of hopping frequencies

Plot C



Date: 10.JAN.2015 12:13:29

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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 10 and Channel 11)	3390 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: 2427KHz

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

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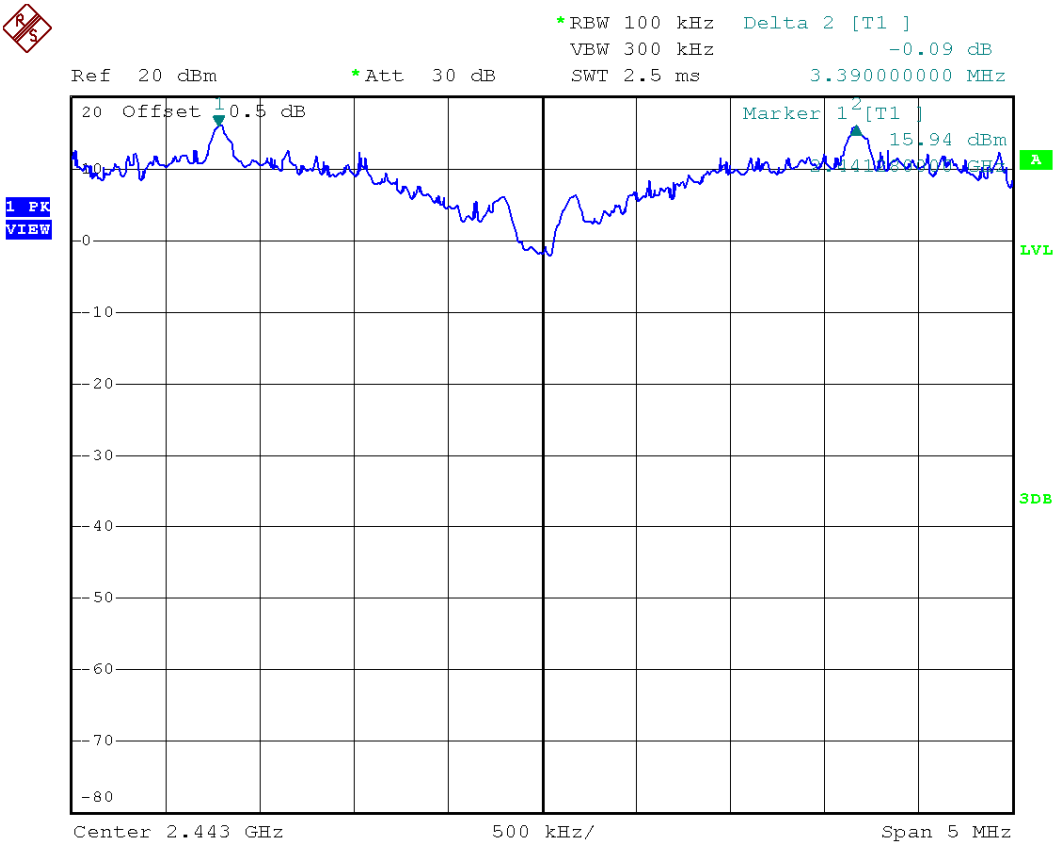
Plots of hopping channel carrier frequency separation

Between channel 10 and channel 11



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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).

Baby Unit (worst-case:)	
Average Occupancy Time = 0.809ms x 1 x 300	242.7 ms

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 8.4 seconds (0.4 sec. x 21) 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.

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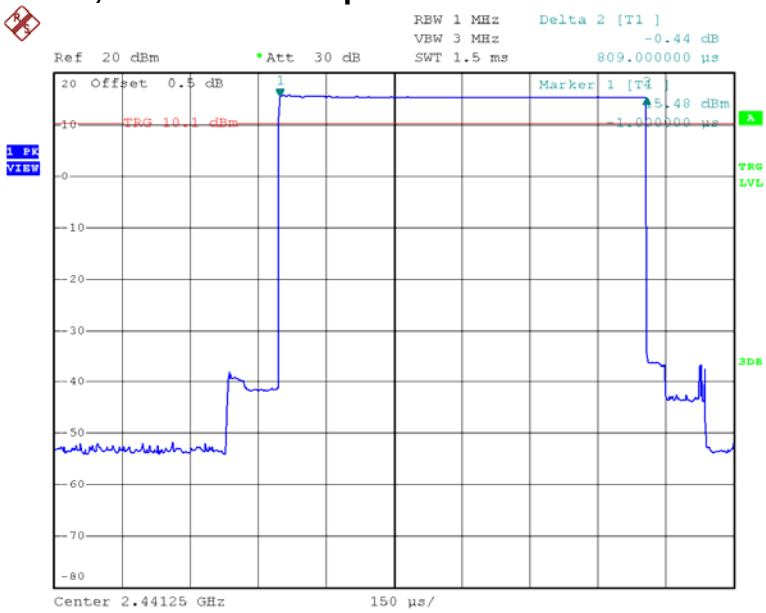
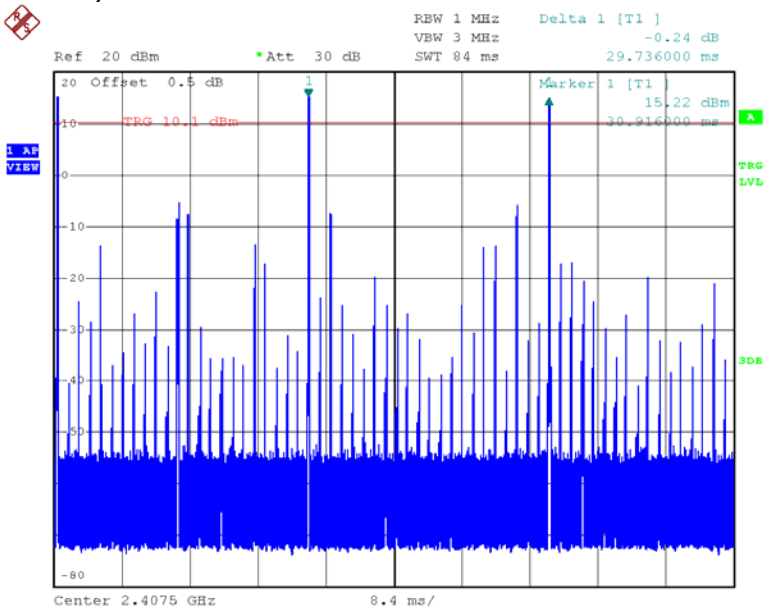
Plots of average channel occupancy time

Plot A, Tx time for one pluse



Date: 10.JAN.2015 14:01:13

Plot B, No. of Tx in 84ms



Date: 10.JAN.2015 14:14:13

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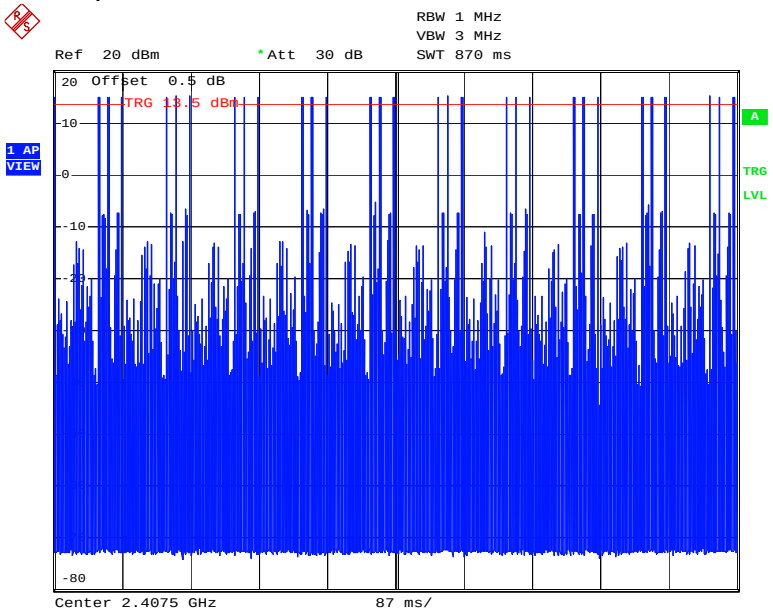
Plots of average channel occupancy time

Plot C, No. of Tx in 870ms



Date: 16.JAN.2015 14:27:23

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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.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

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.

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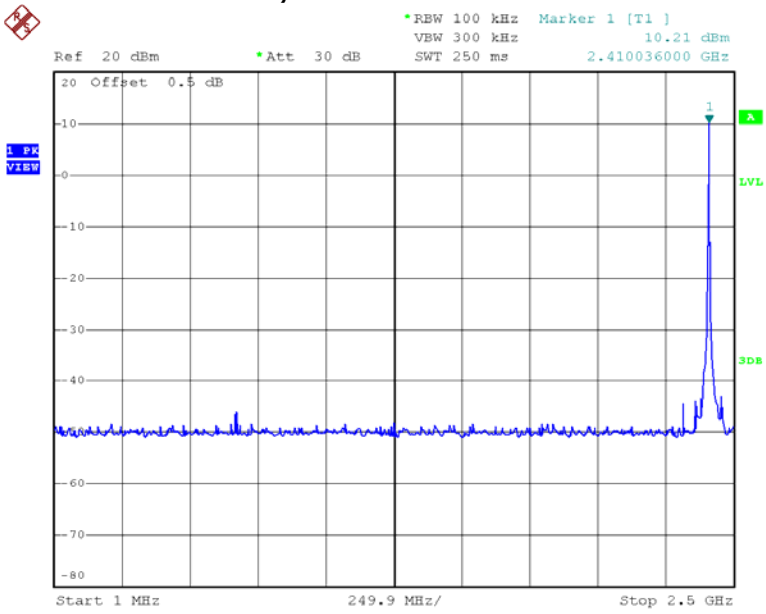
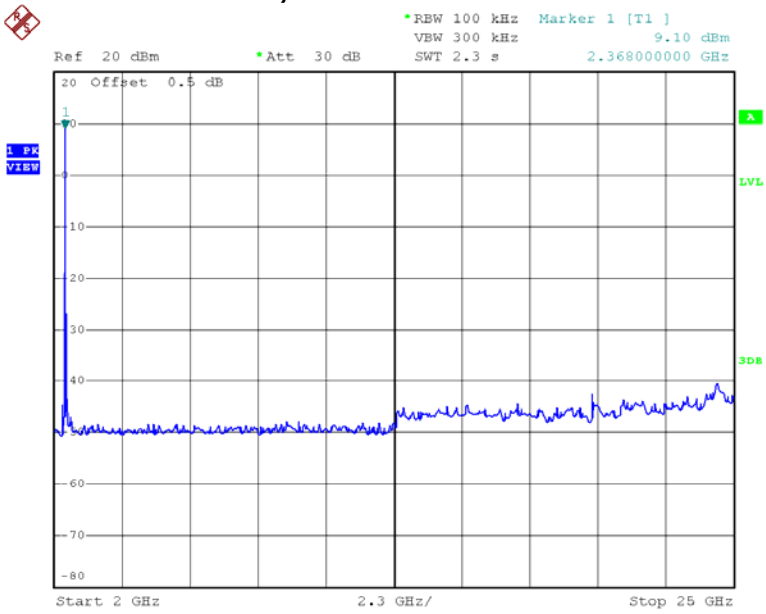
Plots of out of band conducted emissions

Lowest channel, Plot 1



Date: 10.JAN.2015 14:31:08

Lowest channel, Plot 2



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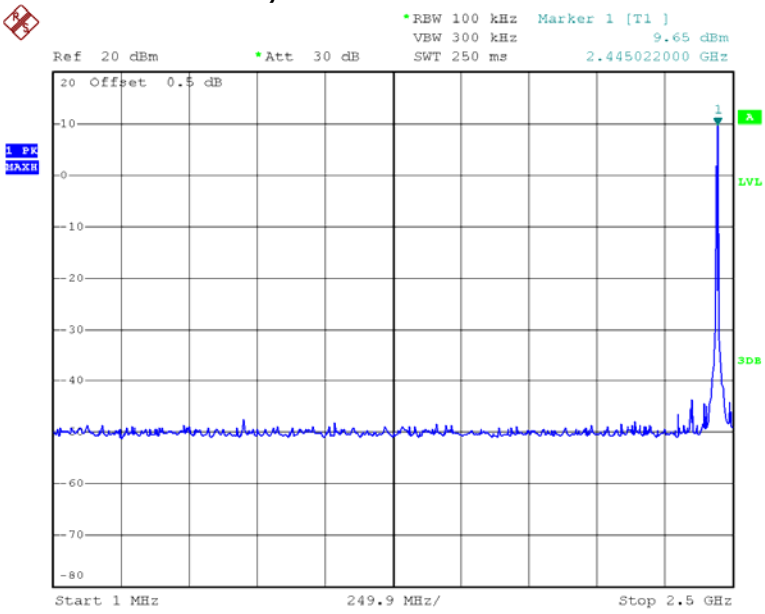
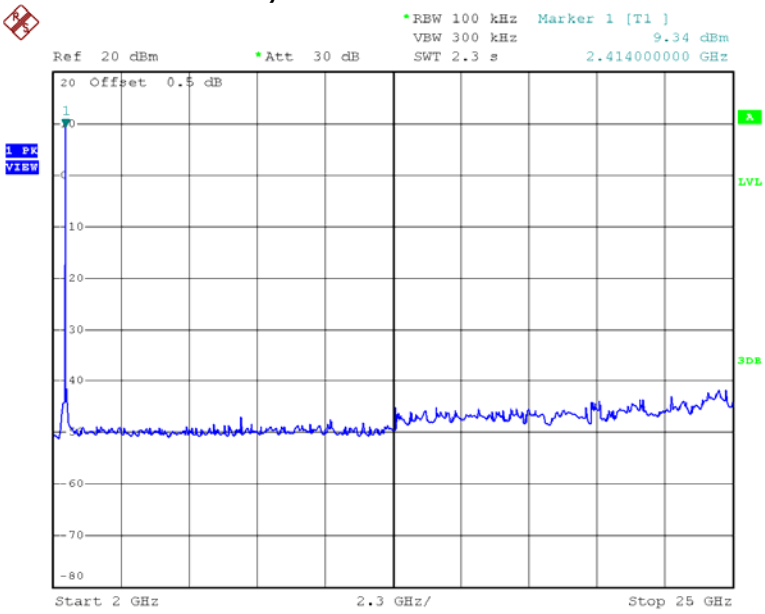
Plots of out of band conducted emissions

Middle channel, Plot 1



Date: 10.JAN.2015 14:33:24

Middle channel, Plot 2



Date: 10.JAN.2015 14:34:06

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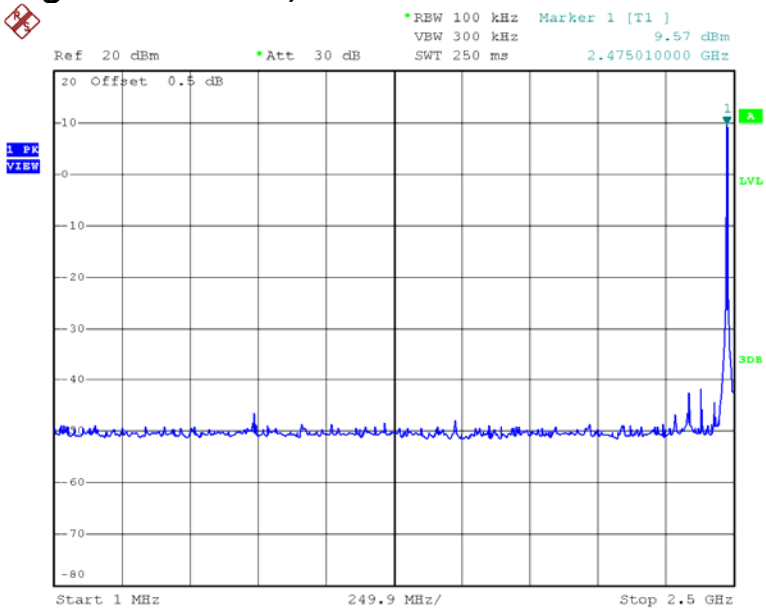
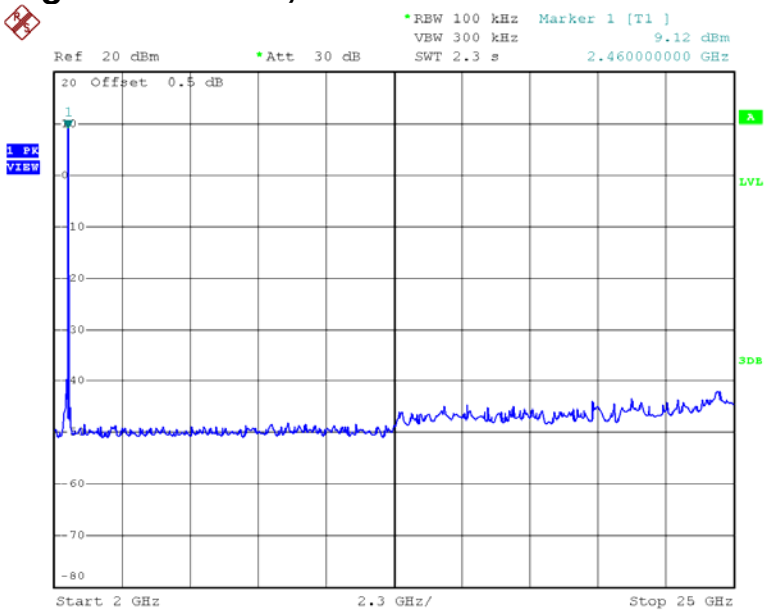
Plots of out of band conducted emissions

Highest channel, Plot 1



Date: 10.JAN.2015 14:35:47

Highest channel, Plot 2



Date: 10.JAN.2015 14:36:25

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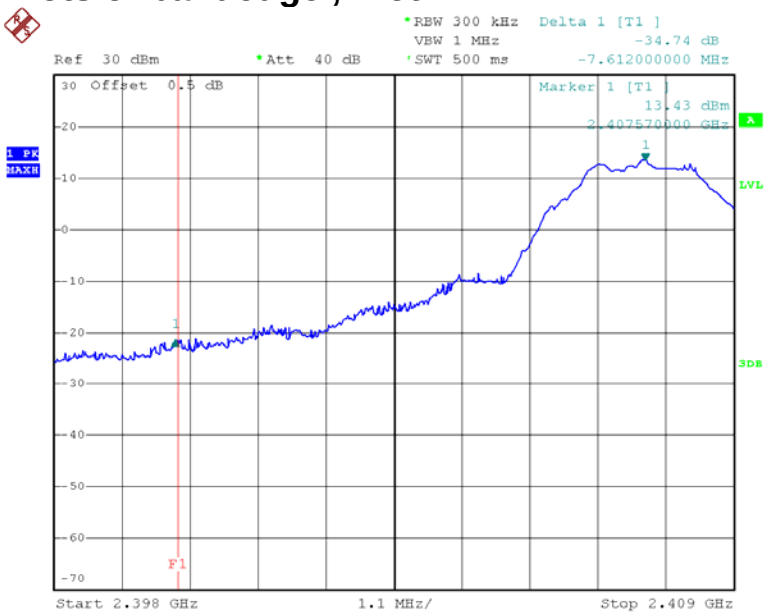
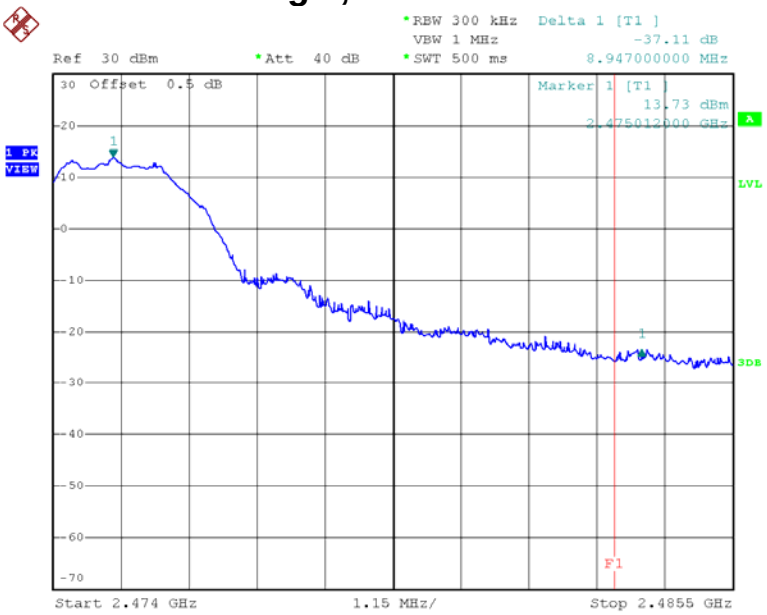
Plots of bandedge , Plot 1



Date: 10.JAN.2015 14:40:05

Plots of bandedge , Plot 2



Date: 10.JAN.2015 14:42:33

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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

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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.

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4.8.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

720.11 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 2.7 dB margin

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Mode: TX-Channel 00

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)
H	***2390.000***	***59.8***	***33***	***29.4***	***56.2***	***32.3***	***23.9***	***54.0***	***-30.1***
V	***4815.000***	***54.2***	***33***	***34.9***	***56.1***	***32.3***	***23.8***	***54.0***	***-30.2***
H	***12037.500***	***43.5***	***33***	***40.5***	***51.0***	***32.3***	***18.7***	***54.0***	***-35.3***

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)
H	***2390.000***	***59.8***	***33***	***29.4***	***56.2***	***74.0***	***-17.8***
V	***4815.000***	***54.2***	***33***	***34.9***	***56.1***	***74.0***	***-17.9***
H	***12037.500***	***43.5***	***33***	***40.5***	***51.0***	***74.0***	***-23.0***

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.

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Mode: TX-Channel 10

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)
H	***4882.500***	***55.1***	***33***	***34.9***	***57.0***	***32.3***	***24.7***	***54.0***	***-29.3***
V	***7323.750***	***60.6***	***33***	***37.9***	***65.5***	***32.3***	***33.2***	***54.0***	***-20.9***
H	***12206.250***	***44.3***	***33***	***40.5***	***51.8***	***32.3***	***19.5***	***54.0***	***-34.5***

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	***4882.500***	***55.1***	***33***	***34.9***	***57.0***	***74.0***	***-17.0***
V	***7323.750***	***60.6***	***33***	***37.9***	***65.5***	***74.0***	***-8.6***
H	***12206.250***	***44.3***	***33***	***40.5***	***51.8***	***74.0***	***-22.2***

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-210 Section 2.2.

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Mode: TX-Channel 21

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)
H	***2483.500***	***61.0***	***33***	***29.4***	***57.4***	***32.3***	***25.1***	***54.0***	***-28.9***
V	***4950.000***	***52.4***	***33***	***34.9***	***54.3***	***32.3***	***22.0***	***54.0***	***-32.0***
V	***7425.000***	***59.3***	***33***	***37.9***	***64.2***	***32.3***	***31.9***	***54.0***	***-22.1***
H	***12375.000***	***43.7***	***33***	***40.5***	***51.2***	***32.3***	***18.9***	***54.0***	***-35.1***

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Calculated at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	***2483.500***	***61.0***	***33***	***29.4***	***57.4***	***57.4***	***74.0***	***-16.6***
V	***4950.000***	***52.4***	***33***	***34.9***	***54.3***	***54.3***	***74.0***	***-19.7***
V	***7425.000***	***59.3***	***33***	***37.9***	***64.2***	***64.2***	***74.0***	***-9.8***
H	***12375.000***	***43.7***	***33***	***40.5***	***51.2***	***51.2***	***74.0***	***-22.8***

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-210 Section 2.2.

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Mode: Talk with Camera On

Table 4

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	56.370	32.4	16	11.0	27.4	40.0	-12.6
V	76.170	37.9	16	6.0	27.9	40.0	-12.1
H	105.001	25.7	16	13.0	22.7	43.5	-20.8
H	576.008	21.5	16	28.0	33.5	46.0	-12.5
V	576.010	29.7	16	28.0	41.7	46.0	-4.3
V	624.010	29.4	16	29.0	42.4	46.0	-3.6
V	720.011	29.3	16	30.0	43.3	46.0	-2.7

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.

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4.8.3 Transmitter Duty Cycle Calculation

Duty Cycle (DC) = Maximum On time in 100ms/100ms
Duty Cycle (DC) = duration of one cycle/ effective period of the cycle
Average Factor (AF) = 20 log (DC)
= 20* log (0.02427)
= -32.3dB

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.

The plot(s) shows the bit timing is attached in the Appendix and saved with filename: timing.pdf.

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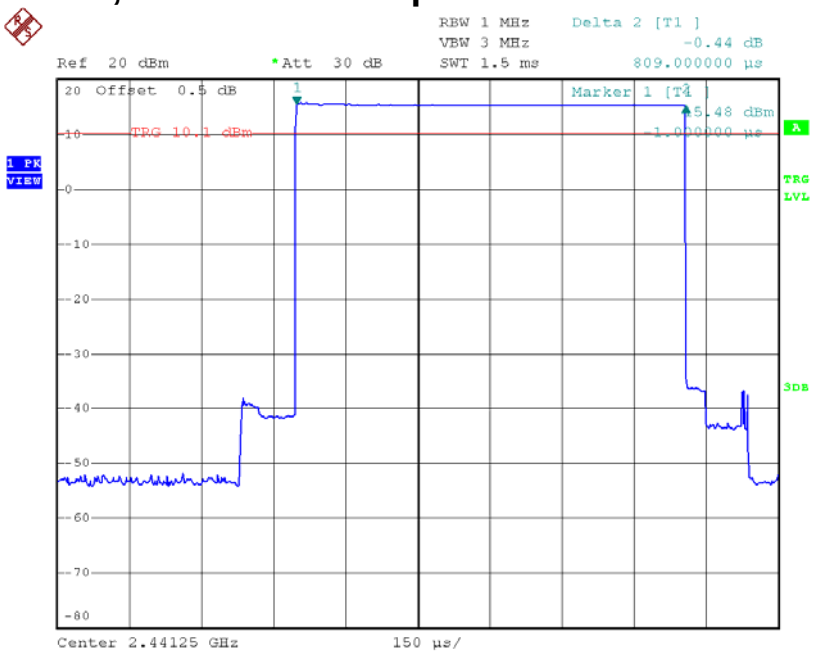
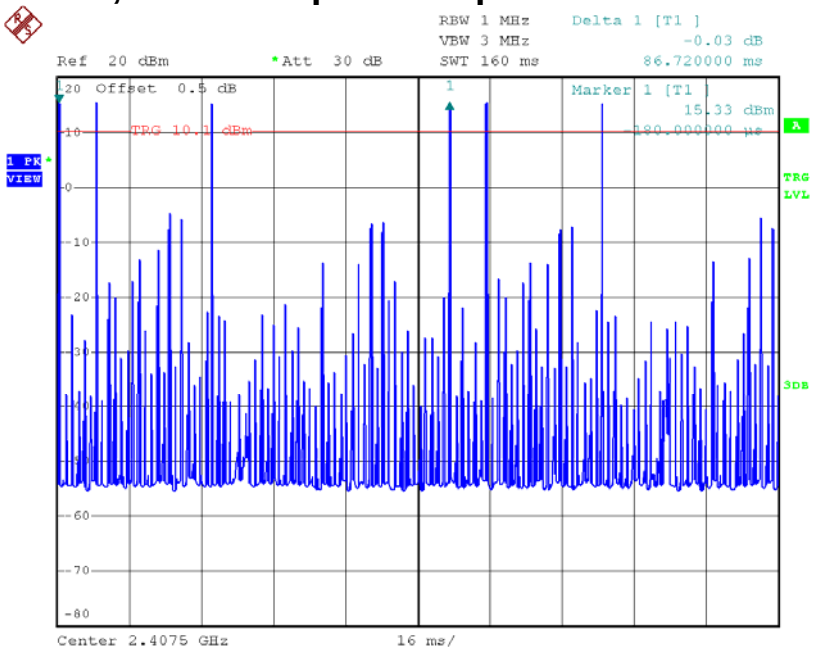
Plots of transmitter On time

Plot A, Tx time for one pulse



Date: 10.JAN.2015 14:01:13

Plot B, Time to repeat one period



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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

321 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 16.53 dB margin compare with average limit

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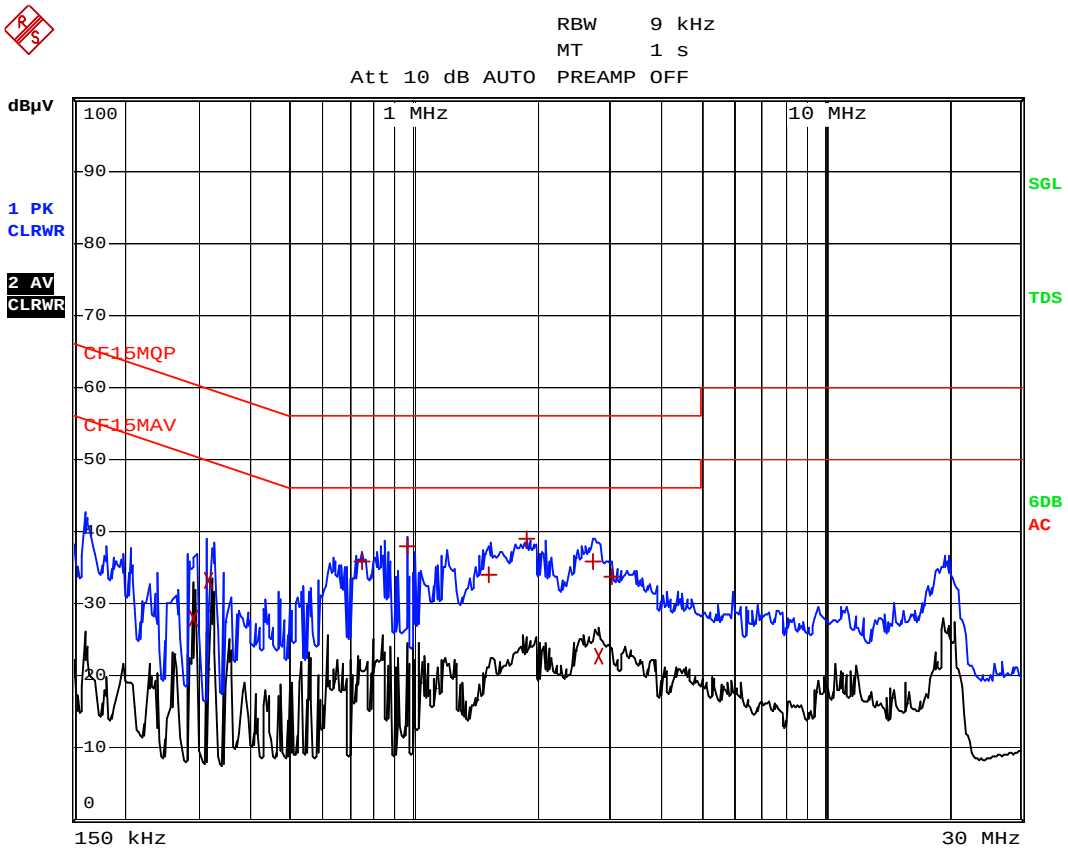
Worst Case: Sound Receiving



Date: 11.JAN.2015 11:29:27

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Worst Case: Sound Receiving

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	289.5 kHz	27.87	L1 gnd	-22.66
2	CISPR Average	321 kHz	33.15	L1 gnd	-16.53
1	Quasi Peak	748.5 kHz	35.95	N gnd	-20.04
1	Quasi Peak	964.5 kHz	37.92	N gnd	-18.07
1	Quasi Peak	1.518 MHz	33.87	N gnd	-22.12
1	Quasi Peak	1.8735 MHz	38.90	N gnd	-17.09
1	Quasi Peak	2.724 MHz	35.87	N gnd	-20.13
2	CISPR Average	2.8185 MHz	22.57	N gnd	-23.42
1	Quasi Peak	3.0525 MHz	33.73	N gnd	-22.26

Date: 11.JAN.2015 11:29:57

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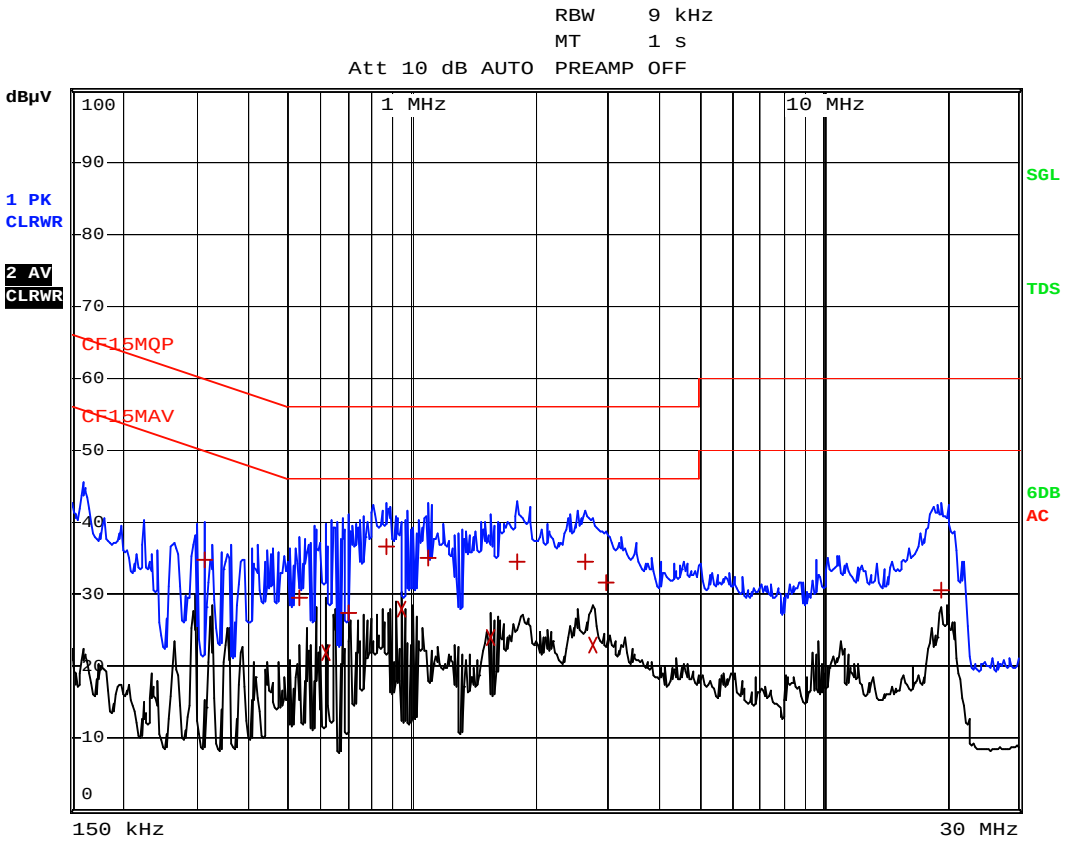
Worst Case: Talk with Camera On



Date: 11.JAN.2015 11:22:35

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Worst Case: Talk with Camera On

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	312 kHz	34.69	L1 gnd	-25.22
1	Quasi Peak	532.5 kHz	29.52	N gnd	-26.47
2	CISPR Average	618 kHz	21.88	N gnd	-24.11
1	Quasi Peak	699 kHz	27.36	N gnd	-28.63
1	Quasi Peak	870 kHz	36.55	N gnd	-19.44
2	CISPR Average	942 kHz	27.87	N gnd	-18.12
1	Quasi Peak	1.0995 MHz	34.95	N gnd	-21.04
2	CISPR Average	1.5585 MHz	24.11	N gnd	-21.88
1	Quasi Peak	1.806 MHz	34.48	N gnd	-21.51
1	Quasi Peak	2.634 MHz	34.54	N gnd	-21.45
2	CISPR Average	2.7645 MHz	23.04	N gnd	-22.95
1	Quasi Peak	2.9805 MHz	31.51	N gnd	-24.48
1	Quasi Peak	19.4145 MHz	30.69	N gnd	-29.30

Date: 11.JAN.2015 11:23:06

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EXHIBIT 5
EQUIPMENT LIST

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5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	Double Ridged Guide Antenna	EMI Test Receiver	Spectrum Analyzer
Registration No.	EW-0194	EW-2500	EW-2188
Manufacturer	EMCO	R&S	AGILENTTECH
Model No.	3115	ESCI	E4407B
Calibration Date	Jul. 24, 2013	Nov. 06, 2014	Apr. 16, 2014
Calibration Due Date	Jan. 25, 2015	Nov. 06, 2015	Apr. 16, 2015

Equipment	Broad-Band Horn Antenna	BiConiLog Antenna
Registration No.	EW-1679	EW-3061
Manufacturer	SCHWARZBECK	EMCO
Model No.	BBHA9170	3412E
Calibration Date	Jun. 05, 2014	Jul. 17, 2014
Calibration Due Date	Jun. 05, 2015	Jul. 17, 2015

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-3095	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Oct. 16, 2014	Oct. 17, 2014
Calibration Due Date	Oct. 16, 2015	Aug. 17, 2015

3) Conductive Measurement Test

Equipment	Spectrum Analyzer
Registration No.	EW-3016
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Jul. 14, 2014
Calibration Due Date	Jul. 14, 2015

END OF TEST REPORT

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