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TEST REPORT

Report No.: 15041543HKG-001

Alco Electronics Ltd

Application
For
Certification
(Original Grant)
(FCC ID: A2HW101)
(IC: 9903A-W101)

Transceiver

Prepared and Checked by:

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Date: May 28, 2015

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GENERAL INFORMATION

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Manufacturer:	Alco Electronics (Dongguan) Limited
Manufacturer Address:	Gong Ye Xi Road, Houjie Technology Industrial Park, Houjie, Dongguan, Guangdong P.R.C. 523960 China
Brand Name:	VENTURER / RCA
Model:	WT19303W87 / W101
Type of EUT:	Transceiver
Description of EUT:	10.1" Windows Tablet
Serial Number:	N/A
FCC ID / IC:	A2HW101 / 9903A-W101
Date of Sample Submitted:	April 27, 2015
Date of Test:	April 27, 2015 to May 14, 2015
Report No.:	15041543HKG-001
Report Date:	May 28, 2015
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 8.8	Pass
Radiated Emission Radiated Emission on the Bandedge	15.249, 15.209 / RSS-210 A2.9, RSS-210 2.5	Pass
Radiated Emission in Restricted Bands	15.205 / RSS-210 2.2	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2013 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 4, December 2014

- Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB 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 excepted variations in temperature and supply voltage were considered.

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1.0 **General Description**

1.1 Product Description

The Equipment Under Test (EUT) is a 10.1" Windows Tablet, equipped with keyboard, headphone, WiFi, Bluetooth, SD, HDMI and USB Interface. For WiFi, the EUT operates in a frequency range from 2412MHz to 2462MHz at 802.11b,g,n HT20 (11 channels with 5MHz spacing) while from 2422MHz to 2452MHz at 802.11n HT40 (7 channels with 5MHz channel spacing). For Bluetooth 3.0, the EUT occupies a frequency range from 2402MHz to 2480MHz (79 channels with channel spacing of 1MHz). For Bluetooth 4.0 BLE, the EUT occupies a frequency range from 2402MHz to 2480MHz (40 channels with channel spacing of 2MHz). The EUT is powered by an external AC/DC adaptor (5VDC output) or/and internal 3.7VDC (2x 3.7V rechargeable battery). The adaptor accepts 100-240VAC.

The Model: W101 is the same as the Model: WT19303W87 in hardware aspect. The difference in model number and brand name serves as marketing strategy.

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

The Declaration of the Conformity procedure of PC Connectivity for this transceiver (with FCC ID: A2HW101) is being processed at the same time of this application.

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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application. Average measurements were performed according to ANSI C63.10 (2009).

1.4 Test Facility

The 3m Chamber and conducted measurement facility used to collect the radiated data 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 placed on file with the FCC and IC.

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2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by 120VAC.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

All configuration (with and without PC connectivity during transceiver test) and setting of data rate for 802.11b/g/n(HT20)/n(HT40) of WiFi mode had been considered, and worst case test data are shown on this test report.

For simultaneous transmission, both WiFi and Bluetooth portions are also switched on when taking radiated emission for determining worst-case spurious emission.

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2.2 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.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

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

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.

2.5 Support Equipment List and Description

1. Headphone of 1.2m long cable
2. 4GB Micro SD Card
3. 4GB USB Flash Drive
4. HDMI Monitor
5. HDMI cable of 2m long
6. LAN cable of 2m long (with termination)
(Provided by Intertek)
7. Test Mode Software: MPTool
8. Notebook Computer (MIS1492)
9. USB cable of 1m long
10. Keyboard
11. AC/DC Adaptor (Input: 100-240VAC 50/60Hz; Output: 5VDC 2.0A)
Model: STC-A0502000-Z, Brand: DOKOCOM
(Provided by Applicant)

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3.0 Emission Results

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.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

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

where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where

- FS = Field Strength in dB μ V/m
- RR = RA - AG - AV in dB μ V
- LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V/m}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V/m}$$

$$RR = 18.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 240.006 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 3.0 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.537 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

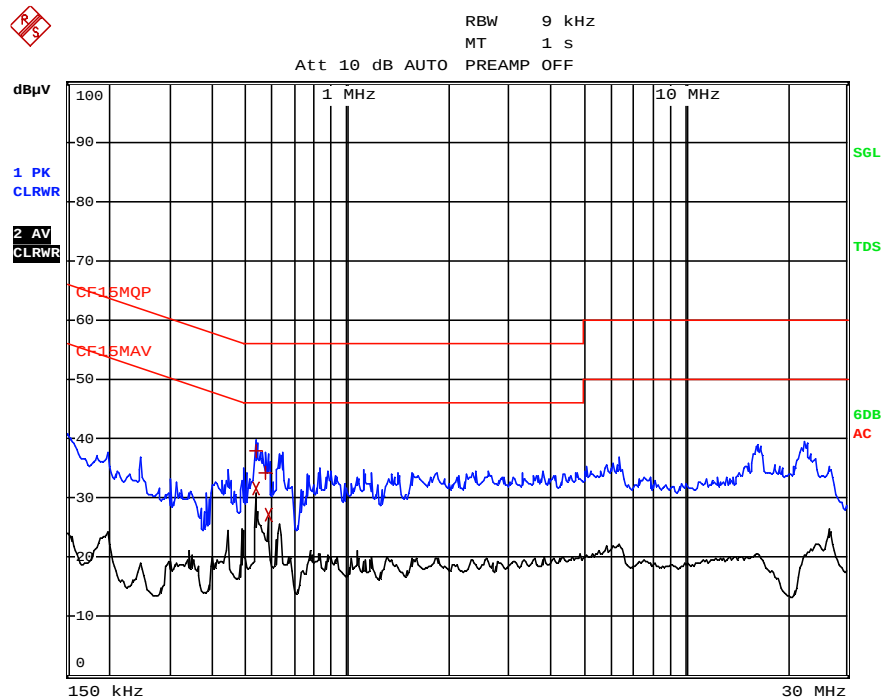
3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 14.4 dB

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Worst-Case Operating Mode: Transmitting (WiFi and Bluetooth)



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	537 kHz	37.97 N		-18.02
2 CISPR Average	537 kHz	31.60 N		-14.39
1 Quasi Peak	573 kHz	34.37 L1		-21.62
2 CISPR Average	586.5 kHz	27.13 N		-18.86

Note: Measurement Uncertainty is ± 4.2 dB at a level of confidence of 95%.

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Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11b DSSS 11Mbps)

Table 1
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2412.000	89.2	33	29.4	85.6	94.0	-8.4
V	4824.000	38.1	33	34.9	40.0	54.0	-14.0
V	7236.000	40.3	33	37.9	45.2	54.0	-8.8
V	9648.000	40.7	33	40.4	48.1	54.0	-5.9
V	12060.000	40.7	33	40.5	48.2	54.0	-5.8
V	14472.000	41.0	33	40.0	48.0	54.0	-6.0

Channel 06

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	91.0	33	29.4	87.4	94.0	-6.6
V	4874.000	38.2	33	34.9	40.1	54.0	-13.9
V	7311.000	39.4	33	37.9	44.3	54.0	-9.7
V	9748.000	40.9	33	40.4	48.3	54.0	-5.7
V	12185.000	40.6	33	40.5	48.1	54.0	-5.9
V	14622.000	42.8	33	38.4	48.2	54.0	-5.8

Channel 11

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2462.000	92.6	33	29.4	89.0	94.0	-5.0
V	4924.000	38.4	33	34.9	40.3	54.0	-13.7
V	7386.000	40.2	33	37.9	45.1	54.0	-8.9
V	9848.000	40.7	33	40.4	48.1	54.0	-5.9
V	12310.000	40.7	33	40.5	48.2	54.0	-5.8
V	14772.000	43.0	33	38.4	48.4	54.0	-5.6

- NOTES:
1. Average measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11b DSSS 11Mbps)

Table 2

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	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	2412.000	101.0	33	29.4	97.4	114.0	-16.6
V	4824.000	47.2	33	34.9	49.1	74.0	-24.9
V	7236.000	51.3	33	37.9	56.2	74.0	-17.8
V	9648.000	53.7	33	40.4	61.1	74.0	-12.9
V	12060.000	56.6	33	40.5	64.1	74.0	-9.9
V	14472.000	61.1	33	40.0	68.1	74.0	-5.9

Channel 06

Polarization	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	2437.000	101.8	33	29.4	98.2	114.0	-15.8
V	4874.000	47.5	33	34.9	49.4	74.0	-24.6
V	7311.000	51.4	33	37.9	56.3	74.0	-17.7
V	9748.000	53.8	33	40.4	61.2	74.0	-12.8
V	12185.000	57.9	33	40.5	65.4	74.0	-8.6
V	14622.000	62.8	33	38.4	68.2	74.0	-5.8

Channel 11

Polarization	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	2462.000	102.2	33	29.4	98.6	114.0	-15.4
V	4924.000	47.3	33	34.9	49.2	74.0	-24.8
V	7386.000	50.3	33	37.9	55.2	74.0	-18.8
V	9848.000	52.8	33	40.4	60.2	74.0	-13.8
V	12310.000	57.6	33	40.5	65.1	74.0	-8.9
V	14772.000	63.2	33	38.4	68.6	74.0	-5.4

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11g OFDM 54Mbps)

Table 3
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2412.000	82.7	33	29.4	79.1	94.0	-14.9
V	4824.000	38.2	33	34.9	40.1	54.0	-13.9
V	7236.000	39.9	33	37.9	44.8	54.0	-9.2
V	9648.000	40.6	33	40.4	48.0	54.0	-6.0
V	12060.000	40.5	33	40.5	48.0	54.0	-6.0
V	14472.000	41.0	33	40.0	48.0	54.0	-6.0

Channel 06

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	84.8	33	29.4	81.2	94.0	-12.8
V	4874.000	38.4	33	34.9	40.3	54.0	-13.7
V	7311.000	40.2	33	37.9	45.1	54.0	-8.9
V	9748.000	40.7	33	40.4	48.1	54.0	-5.9
V	12185.000	40.5	33	40.5	48.0	54.0	-6.0
V	14622.000	42.6	33	38.4	48.0	54.0	-6.0

Channel 11

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2462.000	86.0	33	29.4	82.4	94.0	-11.6
V	4924.000	38.2	33	34.9	40.1	54.0	-13.9
V	7386.000	40.2	33	37.9	45.1	54.0	-8.9
V	9848.000	40.7	33	40.4	48.1	54.0	-5.9
V	12310.000	40.5	33	40.5	48.0	54.0	-6.0
V	14772.000	42.6	33	38.4	48.0	54.0	-6.0

- NOTES:
1. Average measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11g OFDM 54Mbps)

Table 4

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	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	2412.000	99.2	33	29.4	95.6	114.0	-18.4
V	4824.000	47.4	33	34.9	49.3	74.0	-24.7
V	7236.000	50.5	33	37.9	55.4	74.0	-18.6
V	9648.000	53.8	33	40.4	61.2	74.0	-12.8
V	12060.000	57.6	33	40.5	65.1	74.0	-8.9
V	14472.000	61.0	33	40.0	68.0	74.0	-6.0

Channel 06

Polarization	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	2437.000	100.4	33	29.4	96.8	114.0	-17.2
V	4874.000	47.3	33	34.9	49.2	74.0	-24.8
V	7311.000	50.8	33	37.9	55.7	74.0	-18.3
V	9748.000	53.7	33	40.4	61.1	74.0	-12.9
V	12185.000	57.6	33	40.5	65.1	74.0	-8.9
V	14622.000	62.4	33	38.4	67.8	74.0	-6.2

Channel 11

Polarization	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	2462.000	102.0	33	29.4	98.4	114.0	-15.6
V	4924.000	47.4	33	34.9	49.3	74.0	-24.7
V	7386.000	50.4	33	37.9	55.3	74.0	-18.7
V	9848.000	54.0	33	40.4	61.4	74.0	-12.6
V	12310.000	57.9	33	40.5	65.4	74.0	-8.6
V	14772.000	62.7	33	38.4	68.1	74.0	-5.9

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11n HT20 mcs7 65Mbps)

Table 5

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2412.000	80.3	33	29.4	76.7	94.0	-17.3
V	4824.000	38.3	33	34.9	40.2	54.0	-13.8
V	7236.000	39.4	33	37.9	44.3	54.0	-9.7
V	9648.000	36.8	33	40.4	44.2	54.0	-9.8
V	12060.000	37.9	33	40.5	45.4	54.0	-8.6
V	14472.000	39.4	33	40.0	46.4	54.0	-7.6

Channel 06

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	82.0	33	29.4	78.4	94.0	-15.6
V	4874.000	38.2	33	34.9	40.1	54.0	-13.9
V	7311.000	39.5	33	37.9	44.4	54.0	-9.6
V	9748.000	36.9	33	40.4	44.3	54.0	-9.7
V	12185.000	38.0	33	40.5	45.5	54.0	-8.5
V	14622.000	41.0	33	38.4	46.4	54.0	-7.6

Channel 11

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2462.000	83.4	33	29.4	79.8	94.0	-14.2
V	4924.000	38.2	33	34.9	40.1	54.0	-13.9
V	7386.000	39.5	33	37.9	44.4	54.0	-9.6
V	9848.000	36.8	33	40.4	44.2	54.0	-9.8
V	12310.000	37.9	33	40.5	45.4	54.0	-8.6
V	14772.000	41.0	33	38.4	46.4	54.0	-7.6

- NOTES:
1. Average measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11n HT20 mcs7 65Mbps)

Table 6

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 01

Polarization	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	2412.000	98.8	33	29.4	95.2	114.0	-18.8
V	4824.000	47.4	33	34.9	49.3	74.0	-24.7
V	7236.000	49.9	33	37.9	54.8	74.0	-19.2
V	9648.000	52.8	33	40.4	60.2	74.0	-13.8
V	12060.000	56.9	33	40.5	64.4	74.0	-9.6
V	14472.000	57.2	33	40.0	64.2	74.0	-9.8

Channel 06

Polarization	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	2437.000	100.0	33	29.4	96.4	114.0	-17.6
V	4874.000	47.6	33	34.9	49.5	74.0	-24.5
V	7311.000	50.4	33	37.9	55.3	74.0	-18.7
V	9748.000	52.7	33	40.4	60.1	74.0	-13.9
V	12185.000	56.9	33	40.5	64.4	74.0	-9.6
V	14622.000	58.8	33	38.4	64.2	74.0	-9.8

Channel 11

Polarization	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	2462.000	101.4	33	29.4	97.8	114.0	-16.2
V	4924.000	47.4	33	34.9	49.3	74.0	-24.7
V	7386.000	50.9	33	37.9	55.8	74.0	-18.2
V	9848.000	52.8	33	40.4	60.2	74.0	-13.8
V	12310.000	56.8	33	40.5	64.3	74.0	-9.7
V	14772.000	58.7	33	38.4	64.1	74.0	-9.9

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11n HT40 mcs7 130Mbps)

Table 7

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 03

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2422.000	79.8	33	29.4	76.2	94.0	-17.8
V	4844.000	38.5	33	34.9	40.4	54.0	-13.6
V	7266.000	40.4	33	37.9	45.3	54.0	-8.7
V	9688.000	39.9	33	40.4	47.3	54.0	-6.7
V	12110.000	34.8	33	40.5	42.3	54.0	-11.7
V	14532.000	37.1	33	38.4	42.5	54.0	-11.5

Channel 06

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2437.000	81.4	33	29.4	77.8	94.0	-16.2
V	4874.000	38.5	33	34.9	40.4	54.0	-13.6
V	7311.000	40.6	33	37.9	45.5	54.0	-8.5
V	9748.000	40.0	33	40.4	47.4	54.0	-6.6
V	12185.000	34.7	33	40.5	42.2	54.0	-11.8
V	14622.000	36.7	33	38.4	42.1	54.0	-11.9

Channel 09

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2452.000	83.2	33	29.4	79.6	94.0	-14.4
V	4904.000	38.3	33	34.9	40.2	54.0	-13.8
V	7356.000	40.5	33	37.9	45.4	54.0	-8.6
V	9808.000	40.0	33	40.4	47.4	54.0	-6.6
V	12260.000	35.1	33	40.5	42.6	54.0	-11.4
V	14712.000	36.7	33	38.4	42.1	54.0	-11.9

- NOTES:
1. Average measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (802.11n HT40 mcs7 130Mbps)

Table 8

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Channel 03

Polarization	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	2422.000	98.7	33	29.4	95.1	114.0	-18.9
V	4844.000	48.7	33	34.9	50.6	74.0	-23.4
V	7266.000	51.4	33	37.9	56.3	74.0	-17.7
V	9688.000	54.0	33	40.4	61.4	74.0	-12.6
V	12110.000	54.6	33	40.5	62.1	74.0	-11.9
V	14532.000	56.7	33	38.4	62.1	74.0	-11.9

Channel 06

Polarization	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	2437.000	99.8	33	29.4	96.2	114.0	-17.8
V	4874.000	48.5	33	34.9	50.4	74.0	-23.6
V	7311.000	51.5	33	37.9	56.4	74.0	-17.6
V	9748.000	54.0	33	40.4	61.4	74.0	-12.6
V	12185.000	54.7	33	40.5	62.2	74.0	-11.8
V	14622.000	56.6	33	38.4	62.0	74.0	-12.0

Channel 09

Polarization	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	2452.000	101.0	33	29.4	97.4	114.0	-16.6
V	4904.000	48.3	33	34.9	50.2	74.0	-23.8
V	7356.000	51.3	33	37.9	56.2	74.0	-17.8
V	9808.000	54.0	33	40.4	61.4	74.0	-12.6
V	12260.000	55.1	33	40.5	62.6	74.0	-11.4
V	14712.000	56.7	33	38.4	62.1	74.0	-11.9

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (Bluetooth 3.0)

Table 9

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Lowest Channel

Polarization	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	2402.000	92.4	33	29.4	88.8	24	64.8	94.0	-29.2
V	4804.000	46.1	33	34.9	48.0	24	24.0	54.0	-30.0
V	7206.000	43.1	33	37.9	48.0	24	24.0	54.0	-30.0
V	9608.000	40.7	33	40.4	48.1	24	24.1	54.0	-29.9
V	12010.000	39.6	33	40.5	47.1	24	23.1	54.0	-30.9
V	14412.000	40.1	33	40.0	47.1	24	23.1	54.0	-30.9

Middle Channel

Polarization	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	2442.000	92.8	33	29.4	89.2	24	65.2	94.0	-28.8
V	4884.000	46.2	33	34.9	48.1	24	24.1	54.0	-29.9
V	7326.000	43.2	33	37.9	48.1	24	24.1	54.0	-29.9
V	9768.000	40.2	33	40.4	47.6	24	23.6	54.0	-30.4
V	12210.000	40.1	33	40.5	47.6	24	23.6	54.0	-30.4
V	14652.000	42.6	33	38.4	48.0	24	24.0	54.0	-30.0

Highest Channel

Polarization	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	2480.000	93.4	33	29.4	89.8	24	65.8	94.0	-28.2
V	4960.000	46.2	33	34.9	48.1	24	24.1	54.0	-29.9
V	7440.000	42.2	33	37.9	47.1	24	23.1	54.0	-30.9
V	9920.000	40.8	33	40.4	48.2	24	24.2	54.0	-29.8
V	12400.000	40.5	33	40.5	48.0	24	24.0	54.0	-30.0
V	14880.000	42.6	33	38.4	48.0	24	24.0	54.0	-30.0

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value 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.
 6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (Bluetooth 3.0)

Table 10

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Lowest Channel

Polarization	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	2402.000	92.4	33	29.4	88.8	114.0	-25.2
V	4804.000	46.1	33	34.9	48.0	74.0	-26.0
V	7206.000	43.1	33	37.9	48.0	74.0	-26.0
V	9608.000	40.7	33	40.4	48.1	74.0	-25.9
V	12010.000	39.6	33	40.5	47.1	74.0	-26.9
V	14412.000	40.1	33	40.0	47.1	74.0	-26.9

Middle Channel

Polarization	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	2442.000	92.8	33	29.4	89.2	114.0	-24.8
V	4884.000	46.2	33	34.9	48.1	74.0	-25.9
V	7326.000	43.2	33	37.9	48.1	74.0	-25.9
V	9768.000	40.2	33	40.4	47.6	74.0	-26.4
V	12210.000	40.1	33	40.5	47.6	74.0	-26.4
V	14652.000	42.6	33	38.4	48.0	74.0	-26.0

Highest Channel

Polarization	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	2480.000	93.4	33	29.4	89.8	114.0	-24.2
V	4960.000	46.2	33	34.9	48.1	74.0	-25.9
V	7440.000	42.2	33	37.9	47.1	74.0	-26.9
V	9920.000	40.8	33	40.4	48.2	74.0	-25.8
V	12400.000	40.5	33	40.5	48.0	74.0	-26.0
V	14880.000	42.6	33	38.4	48.0	74.0	-26.0

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value 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.
 6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 11

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Lowest Channel

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2402.000	92.8	33	29.4	89.2	94.0	-4.8
V	4804.000	44.3	33	34.9	46.2	54.0	-7.8
V	7206.000	40.2	33	37.9	45.1	54.0	-8.9
V	9608.000	40.7	33	40.4	48.1	54.0	-5.9
V	12010.000	39.5	33	40.5	47.0	54.0	-7.0
V	14412.000	40.0	33	40.0	47.0	54.0	-7.0

Middle Channel

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2442.000	93.2	33	29.4	89.6	94.0	-4.4
V	4884.000	44.3	33	34.9	46.2	54.0	-7.8
V	7326.000	40.3	33	37.9	45.2	54.0	-8.8
V	9768.000	39.8	33	40.4	47.2	54.0	-6.8
V	12210.000	39.7	33	40.5	47.2	54.0	-6.8
V	14652.000	42.6	33	38.4	48.0	54.0	-6.0

Highest Channel

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2480.000	94.4	33	29.4	90.8	94.0	-3.2
V	4960.000	44.3	33	34.9	46.2	54.0	-7.8
V	7440.000	40.4	33	37.9	45.3	54.0	-8.7
V	9920.000	39.6	33	40.4	47.0	54.0	-7.0
V	12400.000	39.6	33	40.5	47.1	54.0	-6.9
V	14880.000	42.6	33	38.4	48.0	54.0	-6.0

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 12

Radiated Emissions

Pursuant to FCC Part 15 Section 15.249 / RSS-210 A2.9 Requirement

Lowest Channel

Polarization	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	2402.000	92.8	33	29.4	89.2	114.0	-24.8
V	4804.000	44.3	33	34.9	46.2	74.0	-27.8
V	7206.000	40.2	33	37.9	45.1	74.0	-28.9
V	9608.000	40.7	33	40.4	48.1	74.0	-25.9
V	12010.000	39.5	33	40.5	47.0	74.0	-27.0
V	14412.000	40.0	33	40.0	47.0	74.0	-27.0

Middle Channel

Polarization	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	2442.000	93.2	33	29.4	89.6	114.0	-24.4
V	4884.000	44.3	33	34.9	46.2	74.0	-27.8
V	7326.000	40.3	33	37.9	45.2	74.0	-28.8
V	9768.000	39.8	33	40.4	47.2	74.0	-26.8
V	12210.000	39.7	33	40.5	47.2	74.0	-26.8
V	14652.000	42.6	33	38.4	48.0	74.0	-26.0

Highest Channel

Polarization	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	2480.000	94.4	33	29.4	90.8	114.0	-23.2
V	4960.000	44.3	33	34.9	46.2	74.0	-27.8
V	7440.000	40.4	33	37.9	45.3	74.0	-28.7
V	9920.000	39.6	33	40.4	47.0	74.0	-27.0
V	12400.000	39.6	33	40.5	47.1	74.0	-26.9
V	14880.000	42.6	33	38.4	48.0	74.0	-26.0

- NOTES:
1. Peak measurement method is used for emission measurement.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 6. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.
 7. 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.
 8. Measurement Uncertainty is $\pm 5.3\text{dB}$ at a level of confidence of 95%.

INTERTEK TESTING SERVICES

Applicant: Alco Electronics Ltd

Date of Test: May 14, 2015

Model: WT19303W87

Worst-Case Operating Mode: WiFi and Bluetooth

Table 13

Radiated Emissions Pursuant to FCC Part 15 Section 15.209 / RSS-210 2.5 Requirement

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	72.002	42.6	16	7.0	33.6	40.0	-6.4
V	120.003	39.4	16	14.0	37.4	43.5	-6.1
V	192.005	34.4	16	16.0	34.4	43.5	-9.1
V	240.006	40.0	16	19.0	43.0	46.0	-3.0
V	256.250	37.4	16	21.0	42.4	46.0	-3.6
V	264.576	35.5	16	21.0	40.5	46.0	-5.5
V	288.012	30.5	16	22.0	36.5	46.0	-9.5
V	360.013	28.2	16	24.0	36.2	46.0	-9.8
V	384.024	27.8	16	24.0	35.8	46.0	-10.2
V	408.010	27.9	16	24.0	35.9	46.0	-10.1
V	432.034	27.0	16	25.0	36.0	46.0	-10.0
V	480.126	25.6	16	26.0	35.6	46.0	-10.4
V	512.500	31.8	16	27.0	42.8	46.0	-3.2
V	720.135	22.8	16	30.0	36.8	46.0	-9.2
V	768.735	27.6	16	31.0	42.6	46.0	-3.4
V	960.358	20.5	16	33.0	37.5	54.0	-16.5

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value 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.
6. Measurement Uncertainty is ± 5.3 dB at a level of confidence of 95%.

INTERTEK TESTING SERVICES

4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 **Technical Specifications**

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States and Canada.

8.0 **Miscellaneous Information**

The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor.

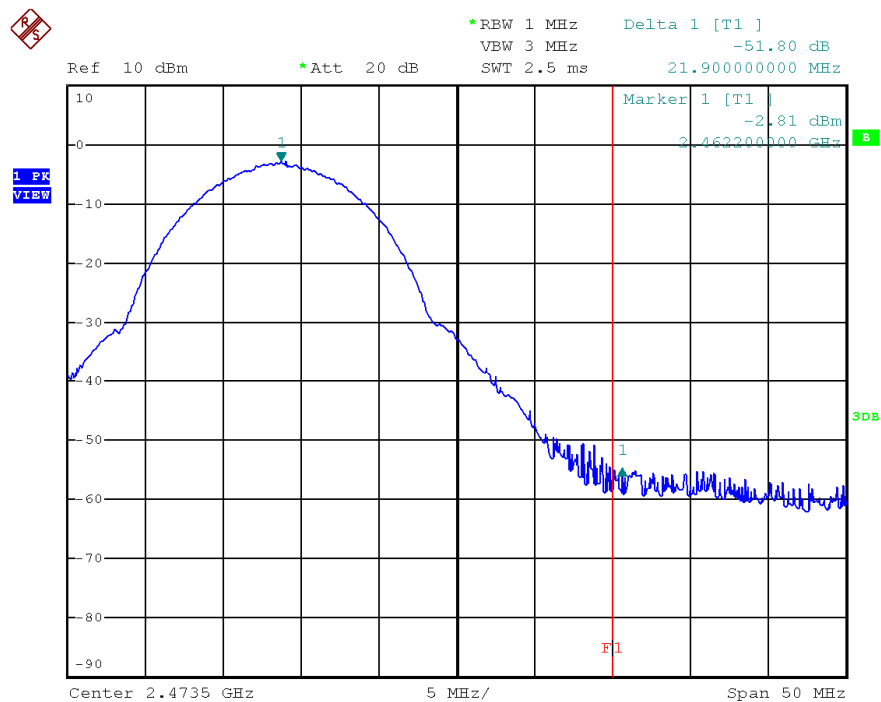
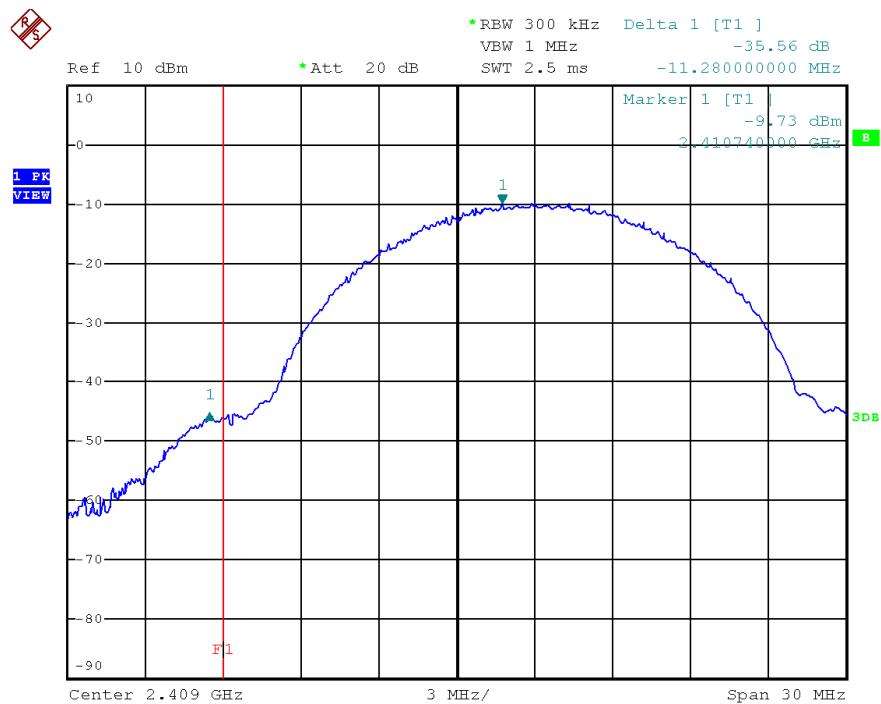
8.1 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209 / RSS-210 2.5, whichever is the lesser attenuation, which meet the requirement of part 15.249(d) / RSS-210 A2.9.

INTERTEK TESTING SERVICES

Peak Measurement (802.11b DSSS 11Mbps)



INTERTEK TESTING SERVICES

Peak Measurement (802.11b DSSS 11Mbps)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=97.4 dB μ V/m - 35.6 dB

=61.8 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=85.6 dB μ V/m - 35.6 dB

=50.0 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=98.6 dB μ V/m - 51.8 dB

=46.8 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

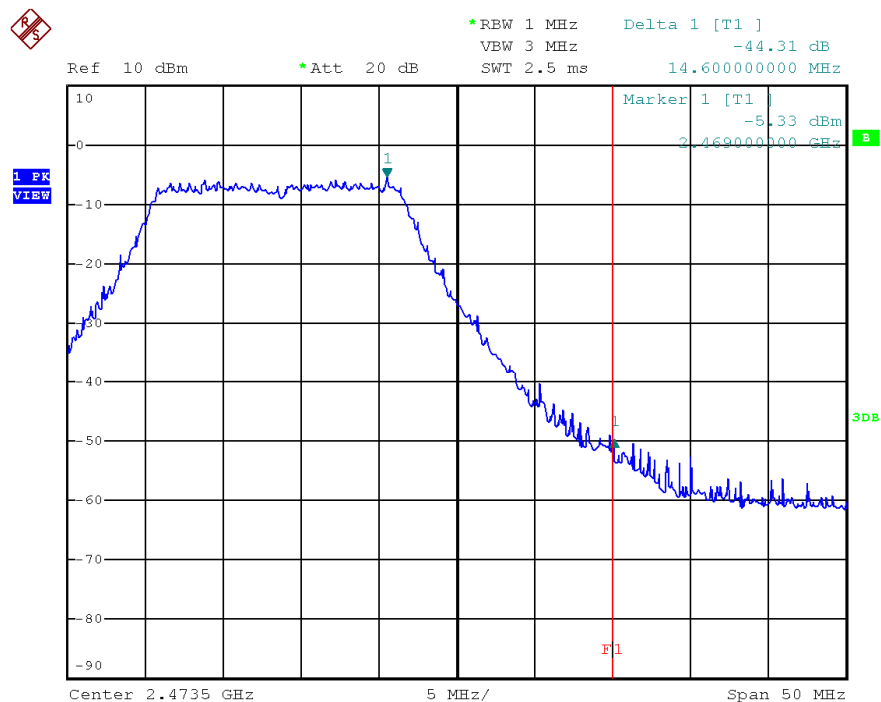
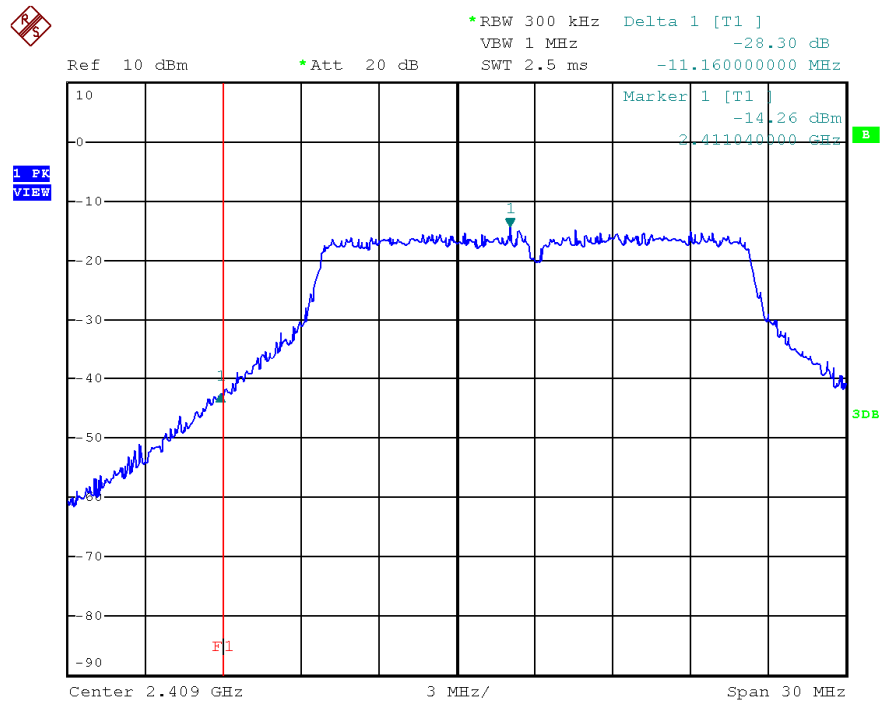
=89.0 dB μ V/m - 51.8 dB

=37.2 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

Peak Measurement (802.11g OFDM 54Mbps)



INTERTEK TESTING SERVICES

Peak Measurement (802.11g OFDM 54Mbps)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=95.6 dB μ V/m - 28.3 dB

=67.3 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=79.1 dB μ V/m - 28.3 dB

=50.8 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=98.4 dB μ V/m - 44.3 dB

=54.1 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

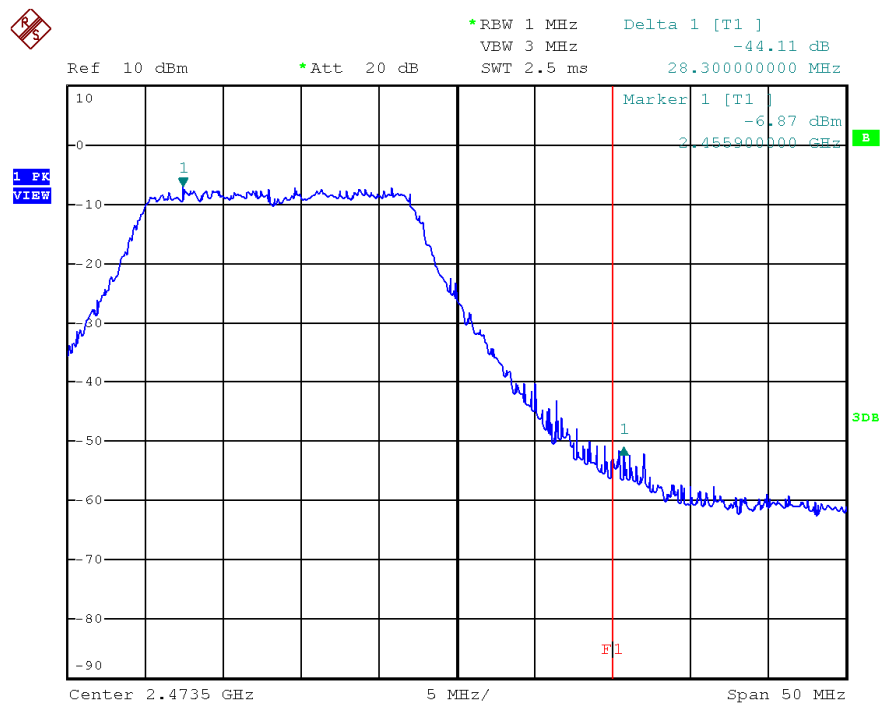
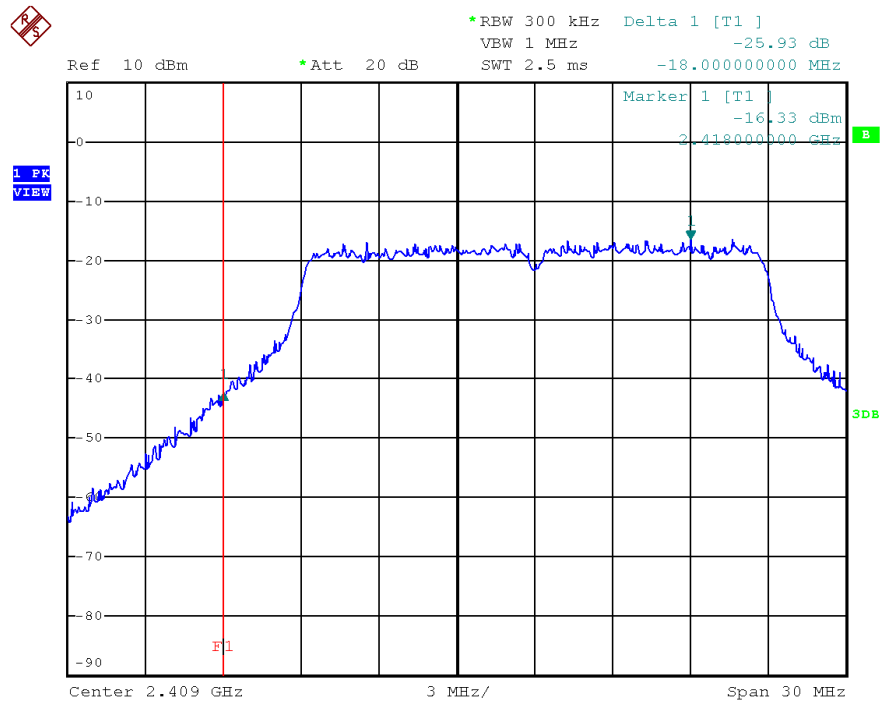
=82.4 dB μ V/m - 44.3 dB

=38.1 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

Peak Measurement (802.11n HT20 mcs7 65Mbps)



INTERTEK TESTING SERVICES

Peak Measurement (802.11n HT20 mcs7 65Mbps)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=95.2 dB μ V/m - 25.9 dB

=69.3 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=76.7 dB μ V/m - 25.9 dB

=50.8 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=97.8 dB μ V/m - 44.1 dB

=53.7 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

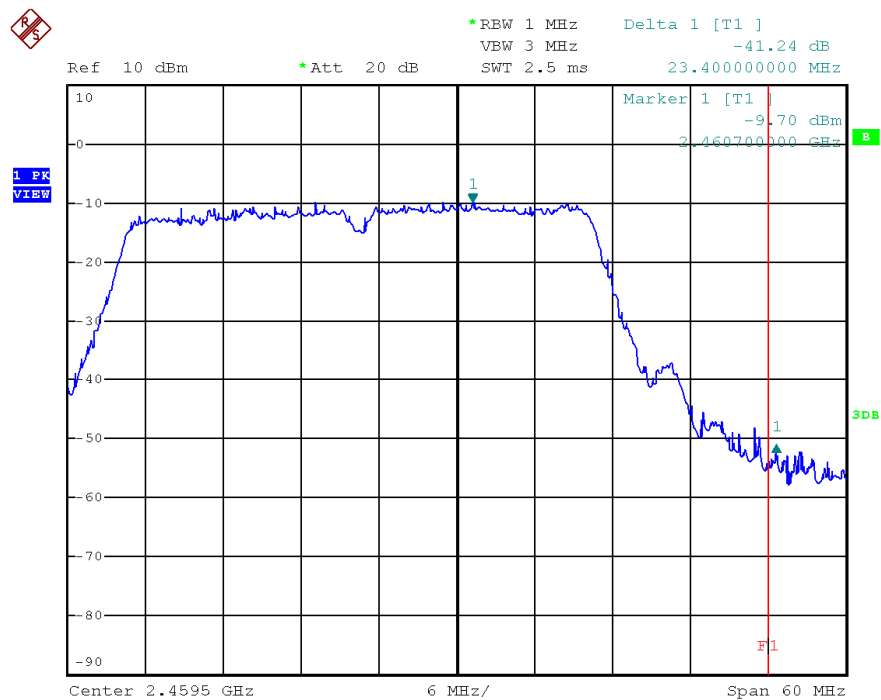
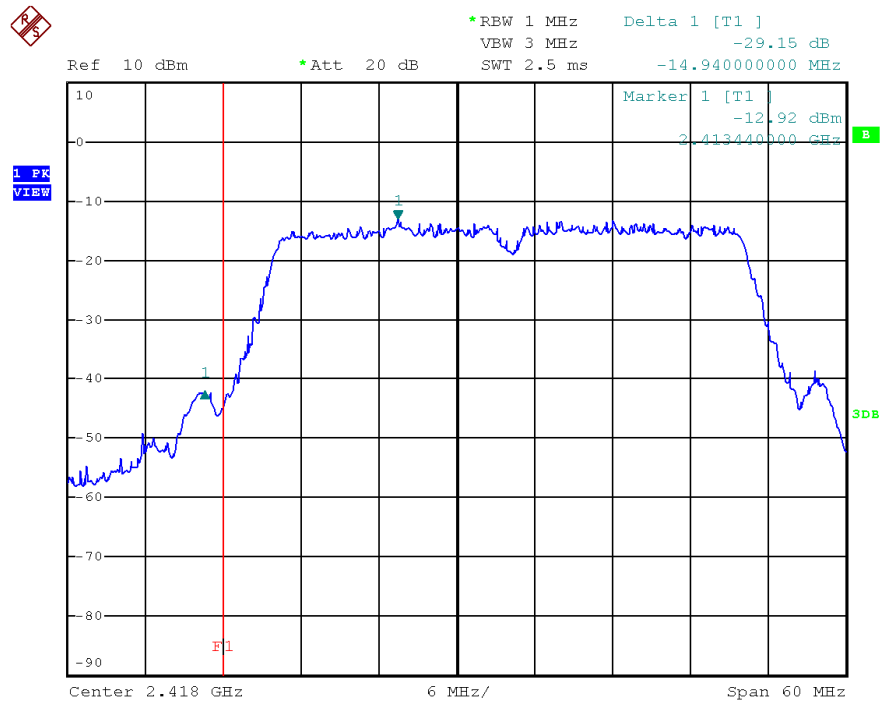
=79.8 dB μ V/m - 44.1 dB

=35.7 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

Peak Measurement (802.11n HT40 mcs7 130Mbps)



INTERTEK TESTING SERVICES

Peak Measurement (802.11n HT40 mcs7 130Mbps)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=95.1 dB μ V/m - 29.2 dB

=65.9 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=76.2 dB μ V/m - 29.2 dB

=47.0 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=97.4 dB μ V/m - 41.2 dB

=56.2 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

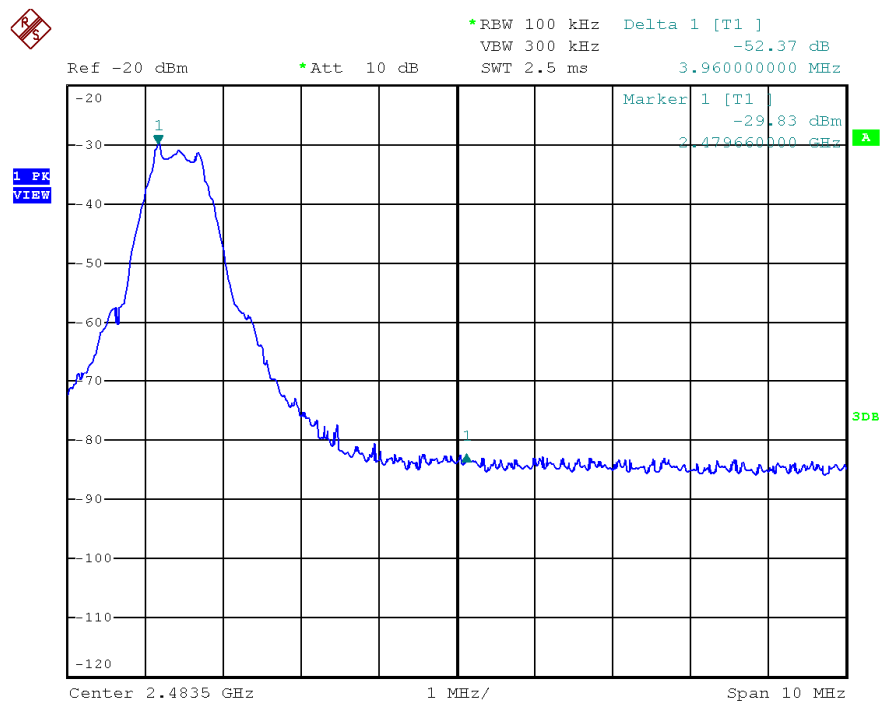
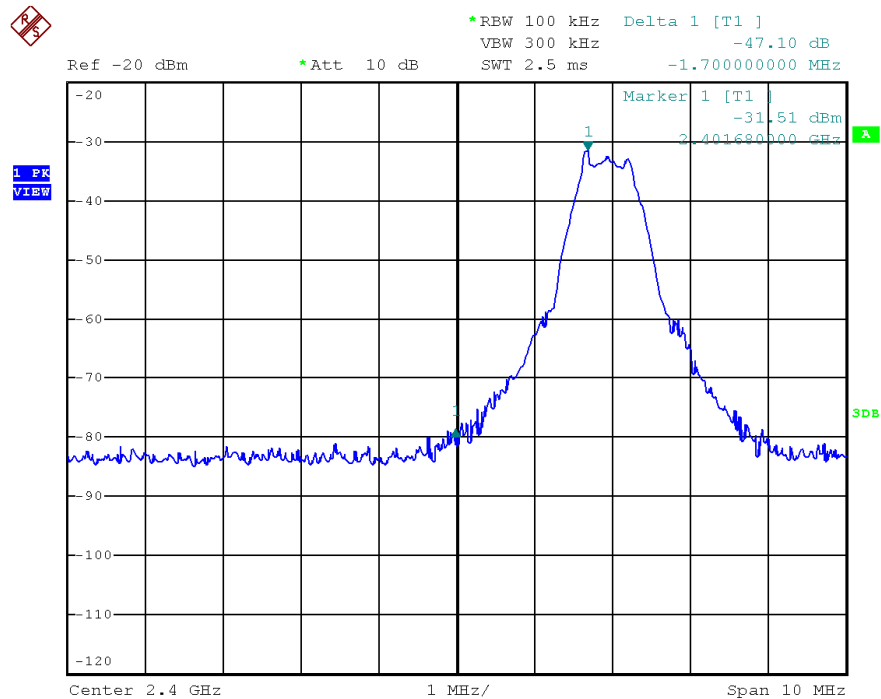
=79.6 dB μ V/m - 41.2 dB

=38.4 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

Peak Measurement (Bluetooth 3.0)



INTERTEK TESTING SERVICES

Peak Measurement (Bluetooth 3.0)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=88.8 dB μ V/m - 47.1 dB

=41.7 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=64.8 dB μ V/m - 47.1 dB

=17.7 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=89.8 dB μ V/m - 52.4 dB

=37.4 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

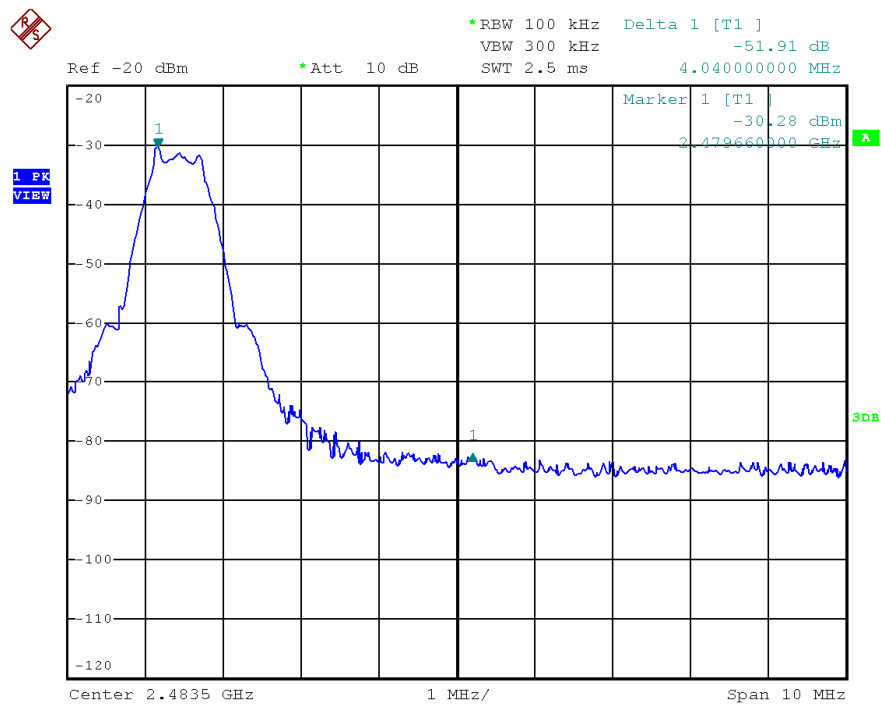
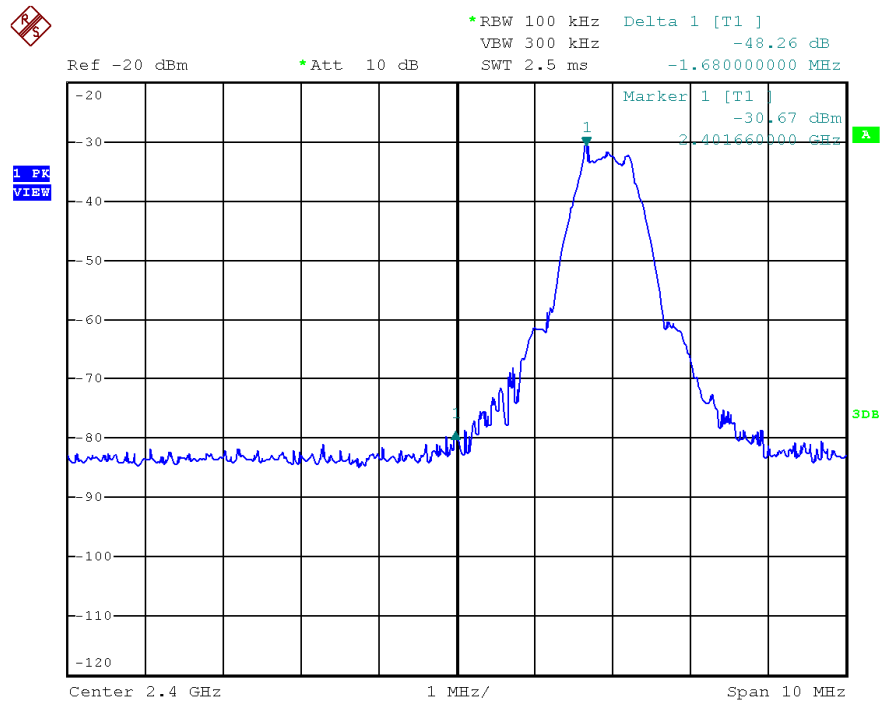
=65.8 dB μ V/m - 52.4 dB

=13.4 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

Peak Measurement (Bluetooth 4.0 BLE)



INTERTEK TESTING SERVICES

Peak Measurement (Bluetooth 4.0 BLE)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=89.2 dB μ V/m - 48.3 dB

=40.9 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=89.2 dB μ V/m - 48.3 dB

=40.9 dB μ V/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=90.8 dB μ V/m - 51.9 dB

=38.9 dB μ V/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=90.8 dB μ V/m - 51.9 dB

=38.9 dB μ V/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.2 Discussion of Pulse Desensitization

(Bluetooth 3.0)

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 6.25ms for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

(WiFi and Bluetooth 4.0 BLE)

Pulse desensitivity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

8.3 Calculation of Average Factor

(Bluetooth 3.0)

Based on the Bluetooth Specification Version 3.0 + EDR, the transmitter ON time for each timeslot of Bluetooth is 625μs. DH5 has the maximum duty cycle, which consists of 5 continuous Tx slots and 1 Rx slot. Therefore one hopset take $(5+1) \times 625\mu s = 3.75ms$. For one period for a pseudo-random hopping through at least 20 RF channels in adaptive mode (worse case), it take: $20 \times 3.75ms = 75ms$.

The dwell time for DH5 is $5 \times 625\mu s = 3.125ms$.

For the worst case calculation, there are two transmissions might occur in 100ms. Therefore,

$$\begin{aligned}\text{Duty Cycle (DC)} &= \text{Maximum On time in } 100ms / 100ms \\ &= 3.125ms \times 2 / 100ms \\ &= 0.0625\end{aligned}$$

$$\begin{aligned}\text{Average Factor (AF) of Bluetooth in dB} &= 20 \log_{10} (0.0625) \\ &= -24 \text{ dB}\end{aligned}$$

(WiFi and Bluetooth 4.0 BLE)

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are 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 Exhibit 8.3.

The frequency range scanned is 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 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

INTERTEK TESTING SERVICES

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

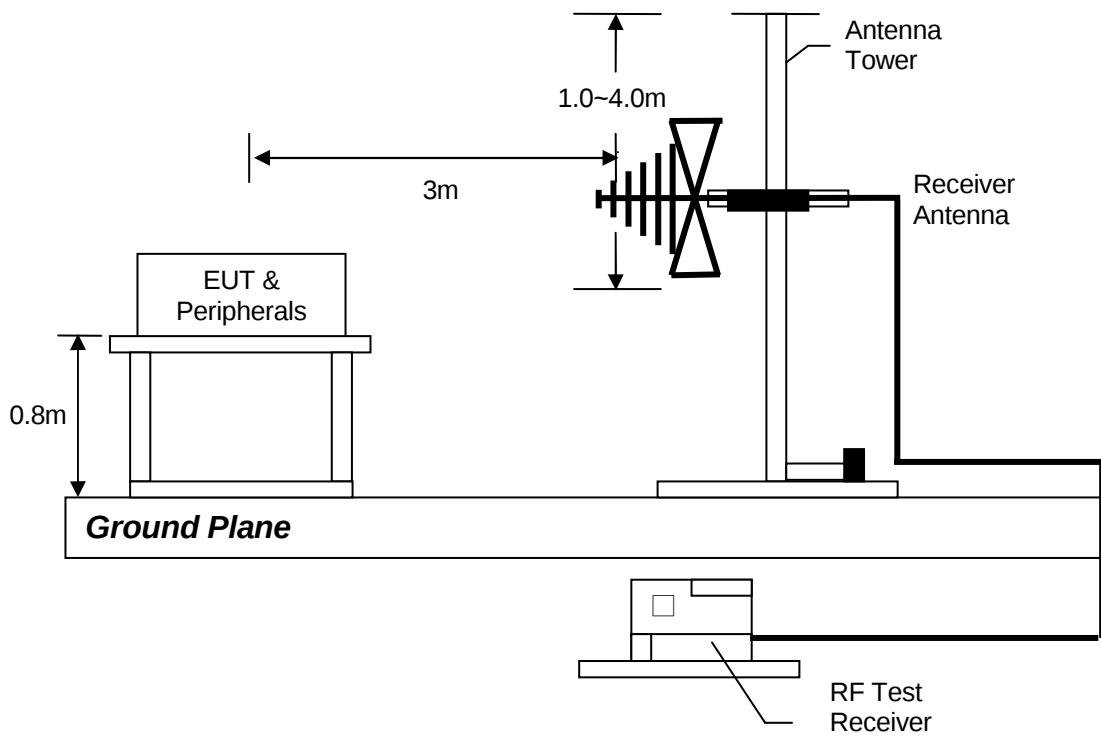
Conducted measurements were made as described in ANSI C63.4 (2009).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

8.4.1 Radiated Emission Test Setup

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



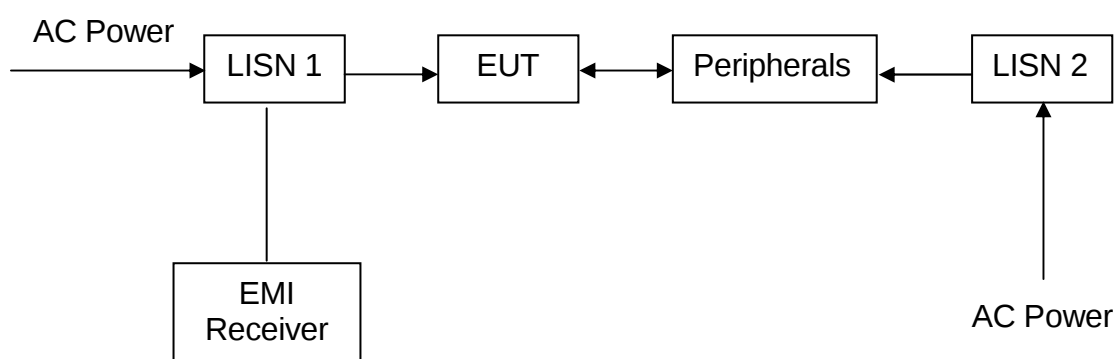
INTERTEK TESTING SERVICES

8.4.2 Conducted Emission Test Procedures

For tabletop equipment, the EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table. For floor-standing equipment, the EUT and all cables were insulated, if required, from the ground plane by up to 12 mm of insulating material. 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 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

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

8.4.3 Conducted Emission Test Setup



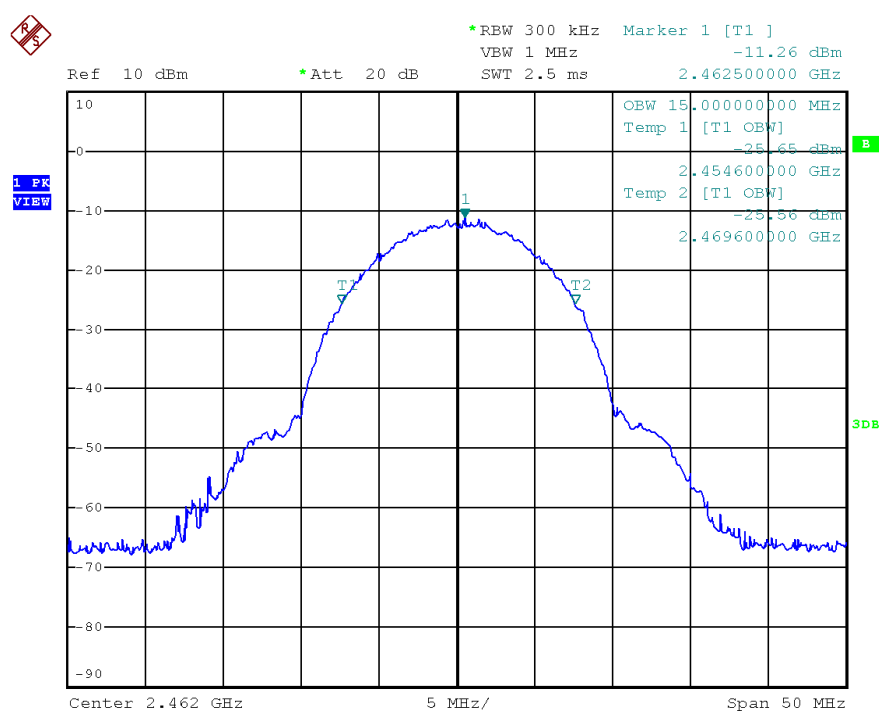
INTERTEK TESTING SERVICES

8.5 Occupied Bandwidth

Occupied Bandwidth Results: (802.11b DSSS 11Mbps)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2412	15.00
Middle Channel: 2437	15.00
High Channel: 2462	15.00

The worst case is shown as below

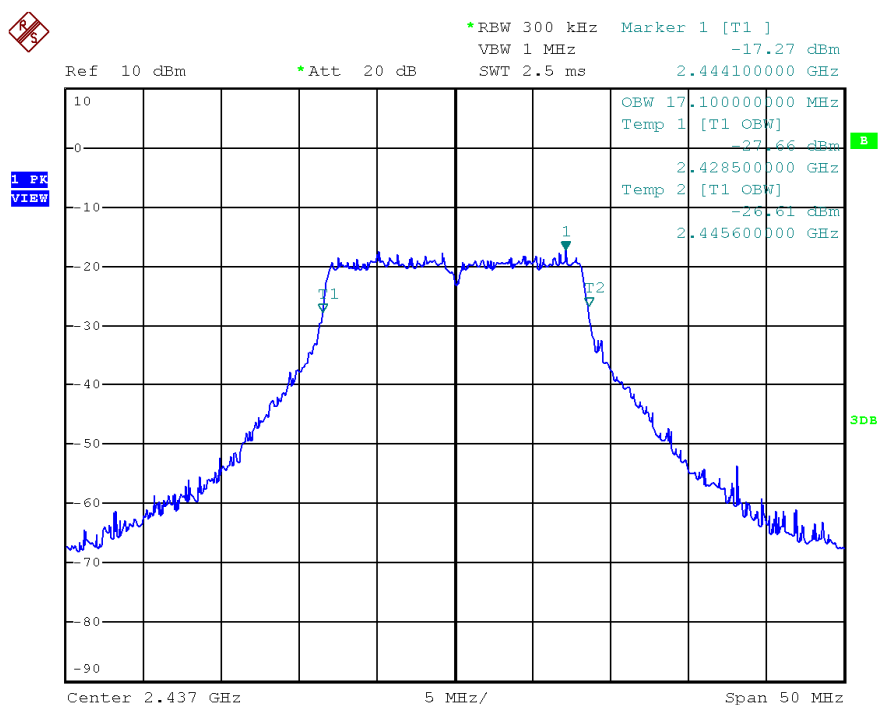


INTERTEK TESTING SERVICES

Occupied Bandwidth Results: (802.11g OFDM 54Mbps)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2412	17.00
Middle Channel: 2437	17.10
High Channel: 2462	17.00

The worst case is shown as below

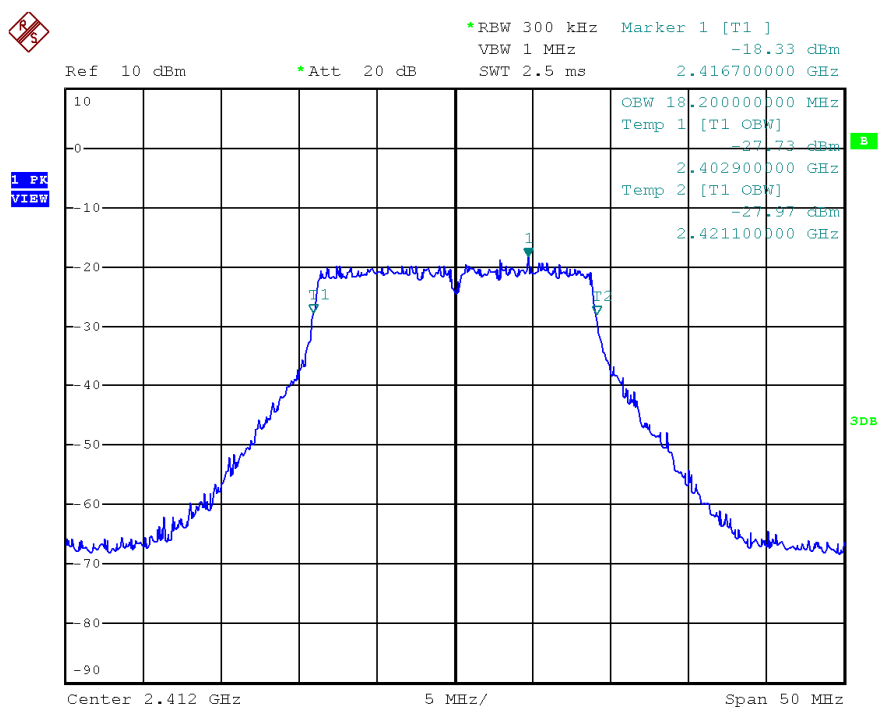


INTERTEK TESTING SERVICES

Occupied Bandwidth Results: (802.11n HT20 mcs7 65Mbps)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2412	18.20
Middle Channel: 2437	18.20
High Channel: 2462	18.10

The worst case is shown as below

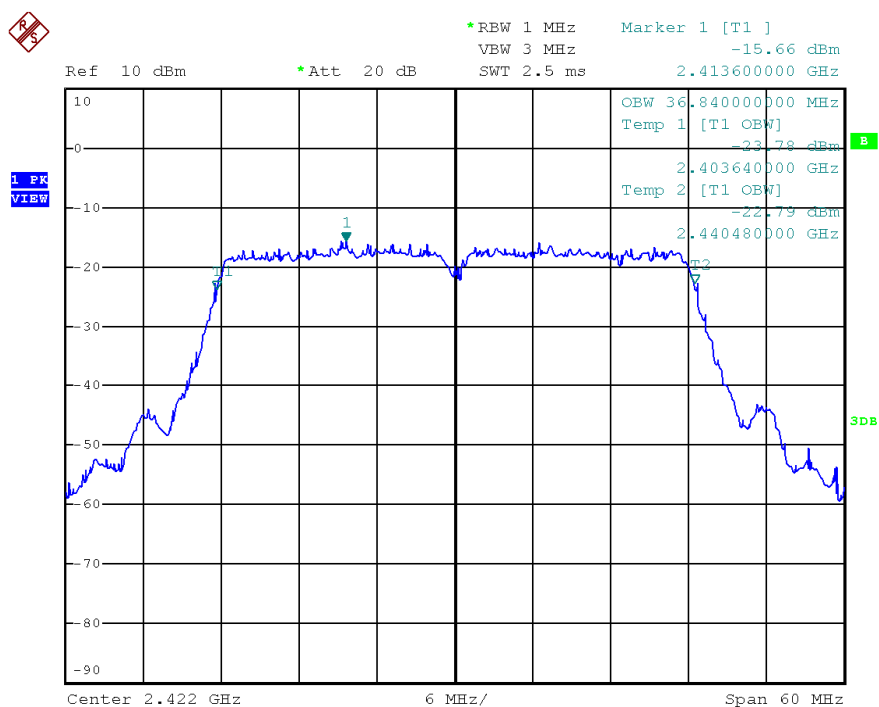


INTERTEK TESTING SERVICES

Occupied Bandwidth Results: (802.11n HT40 mcs7 130Mbps)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2422	36.84
Middle Channel: 2437	36.84
High Channel: 2452	36.72

The worst case is shown as below

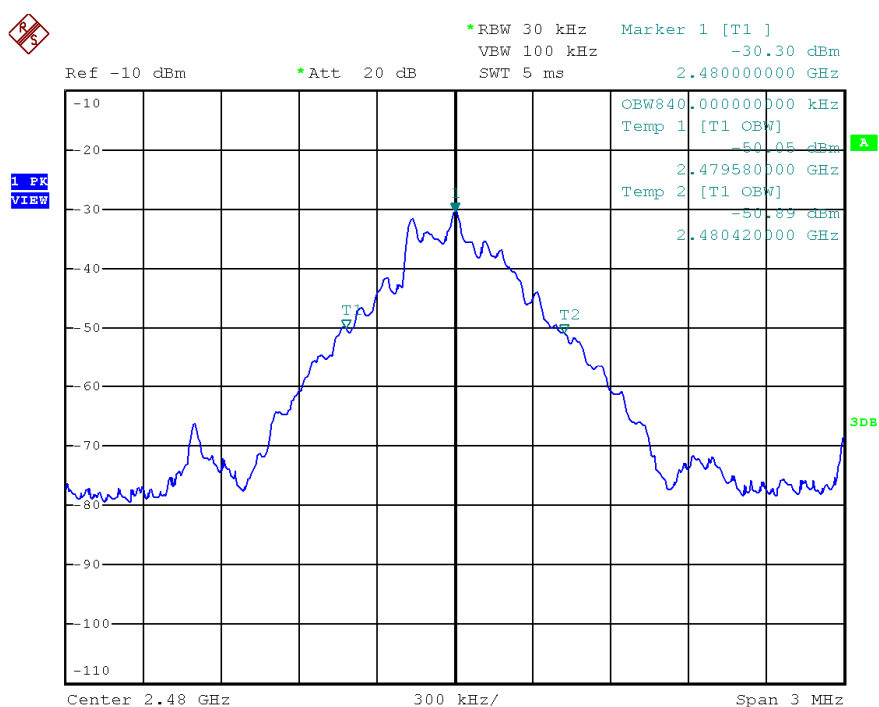


INTERTEK TESTING SERVICES

Occupied Bandwidth Results: (Bluetooth 3.0)

Bluetooth	Occupied Bandwidth (kHz)
Low Channel: 2402	840
Middle Channel: 2442	840
High Channel: 2480	840

The worst case is shown as below

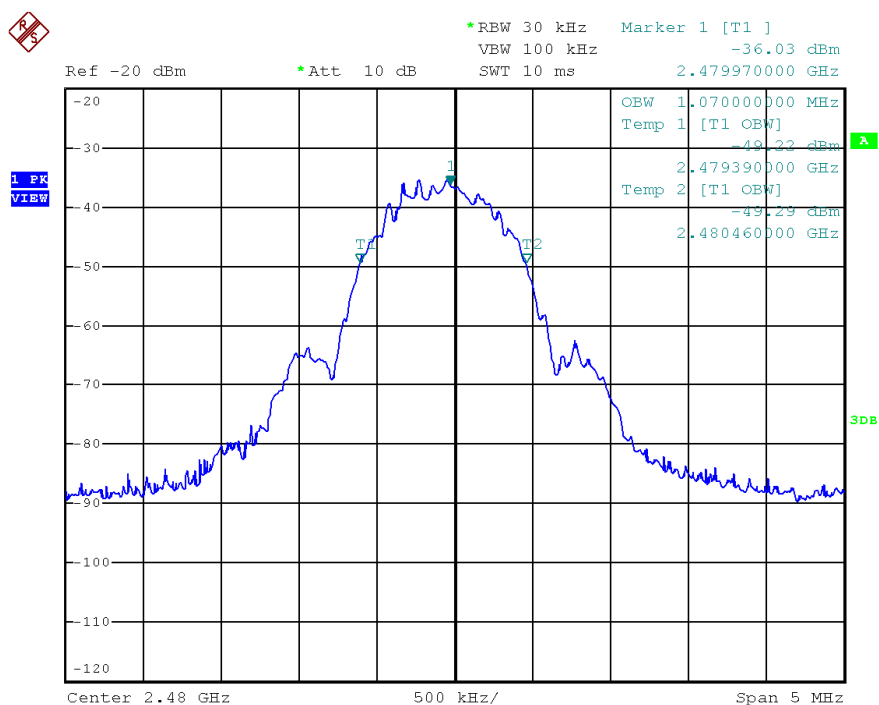


INTERTEK TESTING SERVICES

Occupied Bandwidth Results: (Bluetooth 4.0 BLE)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2402	1.060
Middle Channel: 2442	1.060
High Channel: 2480	1.070

The worst case is shown as below



INTERTEK TESTING SERVICES

9.0 Confidentiality Request

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

10.0 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer
Registration No.	EW-3095	EW-2249
Manufacturer	R&S	R&S
Model No.	ESCI	FSP30
Calibration Date	Oct. 16, 2014	Nov. 19, 2014
Calibration Due Date	Oct. 16, 2015	Nov. 19, 2015

Equipment	BiConiLog Antenna	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-3061	EW-0905	EW-1133
Manufacturer	EMCO	EMCO	EMCO
Model No.	3412E	3160-09	3115
Calibration Date	Jul. 17, 2014	Jan. 28, 2014	Apr. 30, 2014
Calibration Due Date	Jul. 17, 2015	Jul. 28, 2015	Oct. 30, 2015

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Nov. 06, 2014	Dec. 08, 2014
Calibration Due Date	Nov. 06, 2015	Dec. 08, 2015

3) Bandedge/Bandwidth Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Nov. 19, 2014
Calibration Due Date	Nov. 19, 2015

END OF TEST REPORT