

Issuing Laboratory:  
Intertek Testing Services Hong Kong Limited

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**TEST REPORT**

**Report Number: HK12120241-2**

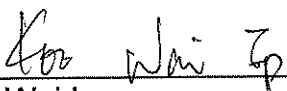
Application  
for  
Original Grant of 47 CFR Part 15 Certification


1.9GHz Digital Modulation Cordless Phone with Caller ID,  
Speakerphone, Digital Answering Machine and Bluetooth - Base Unit  
Bluetooth Portion

**FCC ID: EW780-9087-00**

Prepared and Checked by:

Approved by:

  
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Assistant Manager  
February 21, 2013

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**Intertek Testing Services Hong Kong Ltd.**

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## GENERAL INFORMATION

<b>Applicant Name:</b>	VTech Telecommunications Ltd.
<b>Applicant Address:</b>	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, N.T., Hong Kong.
<b>FCC Specification Standard:</b>	FCC Part 15, October 1, 2011 Edition
<b>FCC ID:</b>	EW780-9087-00
<b>FCC Model(s):</b>	TL96273, TL96373, TL96473, TL96323, TL96XY3
<b>Type of EUT:</b>	Transceiver
<b>Description of EUT:</b>	1.9GHz Digital Modulation Cordless Phone with Caller ID, Speakerphone, Digital Answering Machine and Bluetooth - Base Unit Bluetooth Portion
<b>Serial Number:</b>	N/A
<b>Sample Receipt Date:</b>	December 07, 2012
<b>Date of Test:</b>	December 20, 2012 to January 08, 2013
<b>Report Date:</b>	February 21, 2013
<b>Environmental Conditions:</b>	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	Results	Details see section
Antenna Requirement	15.203	Pass	2.1
Radiated Emission	15.249(a), 209, & 109	Pass	4.2
Radiated Emission on the Bandedge	15.249(d)	Pass	4.3
Radiated Emission in Restricted Bands	15.205	Pass	4.2
AC Power Line Conducted Emission	15.207 & 15.107	Pass	4.4

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 standard:

FCC Part 15, October 1, 2011 Edition

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**EXHIBIT 2**  
**GENERAL DESCRIPTION**

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## 2.0 General Description

### 2.1 Product Description

The TL96273 is a 1.9GHz Digital Modulation Cordless Phone with Caller ID, Speakerphone, Digital Answering Machine and Bluetooth - Base Unit Bluetooth Portion. Only Base Unit has Bluetooth feature, and it operates at frequency range of 2402MHz to 2480MHz. The Base Unit is powered by an adaptor 100-120VAC to 6VDC 600mA. With Bluetooth and 1.9GHz wireless communications enabled, the Base Unit allows users to use a cordless handset to dial out or receive Bluetooth-equipped cellular phone calls via the cellular network. Two Bluetooth devices can be connected at the same time.

The Bluetooth antenna used in base unit is integral, and the test sample is a prototype.

The Model(s): TL96373, TL96473, TL96323 and TL96XY3 are the same as the Model: TL96273 in electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are model number, color, package type (material) and number of Handset and Charger to be sold for marketing purpose. Suffix (X) indicates any alphanumeric character is presenting no. of Handset and Charger. Suffix (Y) indicates 0, 1, 2, 5, 7 or 8 which presents different package type (material) or color of enclosure, or suffix (Y) indicates 3, 4, 6 or 9 which presents different package type (material) or color of enclosure with Wireless Speaker.

The circuit description is saved with filename: descri.pdf.

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

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## 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.

## 2.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data and conducted data are at Roof Top and 2<sup>nd</sup> Floor respectively of Intertek Testing Services Hong Kong Ltd., which is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

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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 continuously / normal mode 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 Base Unit was powered by a 100-120VAC to 6VDC 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 to simulate typical use. The handset was remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base was wired to transmit full power without 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 was 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.

Radiated emission measurement was performed from the frequency 30MHz to 1GHz.

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 are subject to FCC Part 15 Section 15.109 Limits.

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### 3.1 Justification - Cont'd

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 4.2.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (Teff) was 625 $\mu$ s. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

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

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

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

The DECT module was put into transmission mode when taking radiated emission data for determining worst-case spurious emission.

### 3.2 EUT Exercising Software

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

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### 3.3 Details of EUT and Description of Accessories

Details of EUT:

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

- (1) Base Unit: An AC adaptor (100-120VAC to 6VDC 600mA, Model: S005IU0600060, Brand: Ten Pao and Model: SSA-5AP-09 US 060060L, Brand: Sunstrong) (Supplied by Client)

Description of Peripherals:

- (1) Telephone Line Simulator, Model: TLS-5D-01, S/N: 151101 (Supplied by Intertek)
- (2) Handset, Model: TL92273, FCC ID: EW780-9084-00 (Supplied by Client)
- (3) Nokia Mobile Phone, Model: 5300, FCC ID: PPIRM-146 (Supplied by Intertek)
- (4) Apple Iphone, Model: A1303, FCC ID: BCGA1303B (Supplied by Intertek)
- (5) 3m Telephone Line (Supplied by Intertek)
- (6) 1m Telephone Line with Termination (Supplied by Intertek)

### 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

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.

##### 4.1 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 dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- 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 reflect 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 dB $\mu$ V 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 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29 \text{ dB} \\ PD &= 0 \text{ dB} \\ AV &= -10 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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## 4.2 Radiated Emissions

### 4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at

Base Unit with Ten Pao and Sunstrong adaptors: 82.956 MHz

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

### 4.2.2 Radiated Emission Data

The data in tables 1-8 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Base Unit with Ten Pao and Sunstrong adaptors: Passed by 5.5 dB margin

Mode: TX-Channel 00 with Ten Pao adaptor

Table 1, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2402.000	99.0	33	29.4	24	71.4	94.0	-22.6
<b>V</b>	<b>4804.000</b>	<b>58.7</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>36.6</b>	<b>54.0</b>	<b>-17.4</b>
H	7206.000	46.3	33	37.9	24	27.2	54.0	-26.8
H	9608.000	43.4	33	40.4	24	26.8	54.0	-27.2
<b>H</b>	<b>12010.000</b>	<b>43.1</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.6</b>	<b>54.0</b>	<b>-27.4</b>
H	14412.000	43.2	33	40.0	24	26.2	54.0	-27.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2402.000	99.0	33	29.4	95.4	114.0	-18.6
<b>V</b>	<b>4804.000</b>	<b>58.7</b>	<b>33</b>	<b>34.9</b>	<b>60.6</b>	<b>74.0</b>	<b>-13.4</b>
H	7206.000	46.3	33	37.9	51.2	74.0	-22.8
H	9608.000	43.4	33	40.4	50.8	74.0	-23.2
<b>H</b>	<b>12010.000</b>	<b>43.1</b>	<b>33</b>	<b>40.5</b>	<b>50.6</b>	<b>74.0</b>	<b>-23.4</b>
H	14412.000	43.2	33	40.0	50.2	74.0	-23.8

- 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.

Mode: TX-Channel 39 with Ten Pao adaptor

Table 2, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2441.000	99.9	33	29.4	24	72.3	94.0	-21.7
<b>V</b>	<b>4882.000</b>	<b>57.4</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>35.3</b>	<b>54.0</b>	<b>-18.7</b>
<b>H</b>	<b>7323.000</b>	<b>46.5</b>	<b>33</b>	<b>37.9</b>	<b>24</b>	<b>27.4</b>	<b>54.0</b>	<b>-26.6</b>
H	9764.000	43.2	33	40.4	24	26.6	54.0	-27.4
<b>H</b>	<b>12205.000</b>	<b>42.8</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.3</b>	<b>54.0</b>	<b>-27.7</b>
H	14646.000	44.5	33	38.4	24	25.9	54.0	-28.1

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2441.000	99.9	33	29.4	96.3	114.0	-17.7
<b>V</b>	<b>4882.000</b>	<b>57.4</b>	<b>33</b>	<b>34.9</b>	<b>59.3</b>	<b>74.0</b>	<b>-14.7</b>
<b>H</b>	<b>7323.000</b>	<b>46.5</b>	<b>33</b>	<b>37.9</b>	<b>51.4</b>	<b>74.0</b>	<b>-22.6</b>
H	9764.000	43.2	33	40.4	50.6	74.0	-23.4
<b>H</b>	<b>12205.000</b>	<b>42.8</b>	<b>33</b>	<b>40.5</b>	<b>50.3</b>	<b>74.0</b>	<b>-23.7</b>
H	14646.000	44.5	33	38.4	49.9	74.0	-24.1

- 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.

Mode: TX-Channel 78 with Ten Pao adaptor

Table 3, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2480.000	99.4	33	29.4	24	71.8	94.0	-22.2
<b>V</b>	<b>4960.000</b>	<b>56.5</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>34.4</b>	<b>54.0</b>	<b>-19.6</b>
<b>H</b>	<b>7440.000</b>	<b>45.6</b>	<b>33</b>	<b>37.9</b>	<b>24</b>	<b>26.5</b>	<b>54.0</b>	<b>-27.5</b>
H	9920.000	43.2	33	40.4	24	26.6	54.0	-27.4
<b>H</b>	<b>12400.000</b>	<b>42.7</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.2</b>	<b>54.0</b>	<b>-27.8</b>
H	14880.000	44.5	33	38.4	24	25.9	54.0	-28.1

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2480.000	99.4	33	29.4	95.8	114.0	-18.2
<b>V</b>	<b>4960.000</b>	<b>56.5</b>	<b>33</b>	<b>34.9</b>	<b>58.4</b>	<b>74.0</b>	<b>-15.6</b>
<b>H</b>	<b>7440.000</b>	<b>45.6</b>	<b>33</b>	<b>37.9</b>	<b>50.5</b>	<b>74.0</b>	<b>-23.5</b>
H	9920.000	43.2	33	40.4	50.6	74.0	-23.4
<b>H</b>	<b>12400.000</b>	<b>42.7</b>	<b>33</b>	<b>40.5</b>	<b>50.2</b>	<b>74.0</b>	<b>-23.8</b>
H	14880.000	44.5	33	38.4	49.9	74.0	-24.1

- 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.

Mode: Talk with Ten Pao adaptor

Table 4, Base unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	41.475	39.6	16	10.0	33.6	40.0	-6.4
V	55.304	38.8	16	11.0	33.8	40.0	-6.2
H	82.956	43.5	16	7.0	34.5	40.0	-5.5
<b>H</b>	<b>110.608</b>	<b>36.6</b>	<b>16</b>	<b>14.0</b>	<b>34.6</b>	<b>43.5</b>	<b>-8.9</b>
H	138.260	36.2	16	14.0	34.2	43.5	-9.3
<b>H</b>	<b>165.912</b>	<b>32.4</b>	<b>16</b>	<b>17.0</b>	<b>33.4</b>	<b>43.5</b>	<b>-10.1</b>
H	221.216	32.2	16	17.0	33.2	46.0	-12.8

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

Mode: TX-Channel 00 with Sunstrong adaptor

Table 5, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2402.000	99.2	33	29.4	24	71.6	94.0	-22.4
<b>V</b>	<b>4804.000</b>	<b>58.9</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>36.8</b>	<b>54.0</b>	<b>-17.2</b>
H	7206.000	46.5	33	37.9	24	27.4	54.0	-26.6
H	9608.000	43.2	33	40.4	24	26.6	54.0	-27.4
<b>H</b>	<b>12010.000</b>	<b>43.3</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.8</b>	<b>54.0</b>	<b>-27.2</b>
H	14412.000	43.2	33	40.0	24	26.2	54.0	-27.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2402.000	99.2	33	29.4	95.6	114.0	-18.4
<b>V</b>	<b>4804.000</b>	<b>58.9</b>	<b>33</b>	<b>34.9</b>	<b>60.8</b>	<b>74.0</b>	<b>-13.2</b>
H	7206.000	46.5	33	37.9	51.4	74.0	-22.6
H	9608.000	43.2	33	40.4	50.6	74.0	-23.4
<b>H</b>	<b>12010.000</b>	<b>43.3</b>	<b>33</b>	<b>40.5</b>	<b>50.8</b>	<b>74.0</b>	<b>-23.2</b>
H	14412.000	43.2	33	40.0	50.2	74.0	-23.8

- 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.

Mode: TX-Channel 39 with Sunstrong adaptor

Table 6, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2441.000	99.8	33	29.4	24	72.2	94.0	-21.8
<b>V</b>	<b>4882.000</b>	<b>57.5</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>35.4</b>	<b>54.0</b>	<b>-18.6</b>
<b>H</b>	<b>7323.000</b>	<b>46.7</b>	<b>33</b>	<b>37.9</b>	<b>24</b>	<b>27.6</b>	<b>54.0</b>	<b>-26.4</b>
H	9764.000	43.0	33	40.4	24	26.4	54.0	-27.6
<b>H</b>	<b>12205.000</b>	<b>42.7</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.2</b>	<b>54.0</b>	<b>-27.8</b>
H	14646.000	44.7	33	38.4	24	26.1	54.0	-27.9

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2441.000	99.8	33	29.4	96.2	114.0	-17.8
<b>V</b>	<b>4882.000</b>	<b>57.5</b>	<b>33</b>	<b>34.9</b>	<b>59.4</b>	<b>74.0</b>	<b>-14.6</b>
<b>H</b>	<b>7323.000</b>	<b>46.7</b>	<b>33</b>	<b>37.9</b>	<b>51.6</b>	<b>74.0</b>	<b>-22.4</b>
H	9764.000	43.0	33	40.4	50.4	74.0	-23.6
<b>H</b>	<b>12205.000</b>	<b>42.7</b>	<b>33</b>	<b>40.5</b>	<b>50.2</b>	<b>74.0</b>	<b>-23.8</b>
H	14646.000	44.7	33	38.4	50.1	74.0	-23.9

- 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.

Mode: TX-Channel 78 with Sunstrong adaptor

Table 7, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2480.000	99.4	33	29.4	24	71.8	94.0	-22.2
<b>V</b>	<b>4960.000</b>	<b>56.7</b>	<b>33</b>	<b>34.9</b>	<b>24</b>	<b>34.6</b>	<b>54.0</b>	<b>-19.4</b>
<b>H</b>	<b>7440.000</b>	<b>45.7</b>	<b>33</b>	<b>37.9</b>	<b>24</b>	<b>26.6</b>	<b>54.0</b>	<b>-27.4</b>
H	9920.000	43.0	33	40.4	24	26.4	54.0	-27.6
<b>H</b>	<b>12400.000</b>	<b>43.4</b>	<b>33</b>	<b>40.5</b>	<b>24</b>	<b>26.9</b>	<b>54.0</b>	<b>-27.1</b>
H	14880.000	44.2	33	38.4	24	25.6	54.0	-28.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	2480.000	99.4	33	29.4	95.8	114.0	-18.2
<b>V</b>	<b>4960.000</b>	<b>56.7</b>	<b>33</b>	<b>34.9</b>	<b>58.6</b>	<b>74.0</b>	<b>-15.4</b>
<b>H</b>	<b>7440.000</b>	<b>45.7</b>	<b>33</b>	<b>37.9</b>	<b>50.6</b>	<b>74.0</b>	<b>-23.4</b>
H	9920.000	43.0	33	40.4	50.4	74.0	-23.6
<b>H</b>	<b>12400.000</b>	<b>43.4</b>	<b>33</b>	<b>40.5</b>	<b>50.9</b>	<b>74.0</b>	<b>-23.1</b>
H	14880.000	44.2	33	38.4	49.6	74.0	-24.4

- NOTES: 1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Mode: Talk with Sunstrong adaptor

Table 8, Base Unit

**Radiated Emission Data**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	41.475	39.8	16	10.0	33.8	40.0	-6.2
V	55.304	38.6	16	11.0	33.6	40.0	-6.4
H	82.956	43.5	16	7.0	34.5	40.0	-5.5
<b>H</b>	<b>110.608</b>	<b>36.5</b>	<b>16</b>	<b>14.0</b>	<b>34.5</b>	<b>43.5</b>	<b>-9.0</b>
H	138.260	36.4	16	14.0	34.4	43.5	-9.1
<b>H</b>	<b>165.912</b>	<b>33.0</b>	<b>16</b>	<b>17.0</b>	<b>34.0</b>	<b>43.5</b>	<b>-9.5</b>
H	221.216	32.8	16	17.0	33.8	46.0	-12.2

- 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. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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#### 4.2.3 Transmitter Duty Cycle Calculation

Based on the Bluetooth Specification Version 2.0 / 2.1 + EDR, the transmitter ON time for each timeslot of Bluetooth is  $625\mu\text{s}$ . DH5 has the maximum duty cycle, which consists of 5 continuous Tx slots and 1 Rx slot. Therefore one hopset take  $(5+1) \times 625\mu\text{s} = 3.75\text{ms}$ . For one period for a pseudo-random hopping through at least 20 RF channels in adaptive mode (worst case), it take:  $20 \times 3.75\text{ms} = 75\text{ms}$ .

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

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

Therefore,

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

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

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### 4.3 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz and 2483.5MHz). In case of emissions up to two standard bandwidths away 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 50 dB below the level of the fundamental or to the general radiated emission limits in FCC Part 15 Section 15.209, whichever is the lesser attenuation, which meet the requirement of FCC Part 15 Section 15.249(d).

The plots of radiated emission on the bandedge are saved as below.

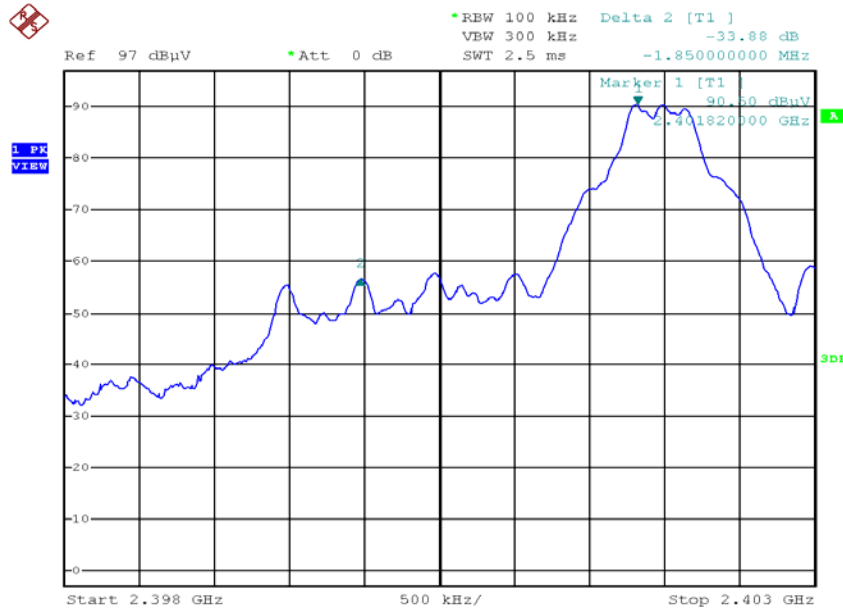
Issuing Laboratory:  
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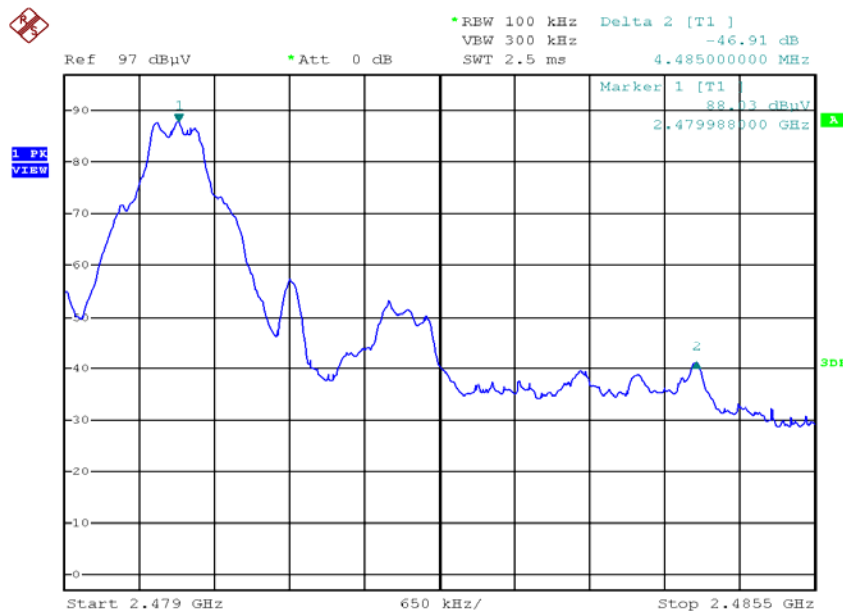


### Plots of radiated emission on the bandedge

#### Base unit, Lowest channel



#### Base unit, Highest channel



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

Resultant Field Strength = Fundamental Emissions - Delta from the plot

Resultant field strength for the lowest and/or highest channel(s), with corresponding average values are calculated as follows:

	Channel	Fundamental Emission (dBµV/m)	Delta from the Plot (dB)	Resultant Field Strength (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)
Ten Pao	Lowest	71.4	33.88	37.52	54	-16.48
	Highest	71.8	46.91	24.89	54	-29.11
Sunstrong	Lowest	71.6	33.88	37.72	54	-16.28
	Highest	71.8	46.91	24.89	54	-29.11

	Channel	Fundamental Emission (dBµV/m)	Delta from the Plot (dB)	Resultant Field Strength (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
Ten Pao	Lowest	95.4	33.88	61.52	74	-12.48
	Highest	95.8	46.91	48.89	74	-25.11
Sunstrong	Lowest	95.6	33.88	61.72	74	-12.28
	Highest	95.8	46.91	48.89	74	-25.11

The resultant field strength meets the general radiated emission limit in FCC Part 15 Section 15.209, which does not exceed 74dBµV/m for peak limit and also 54dBµV/m for average limit.

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#### 4.4 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.

##### 4.4.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration  
at

Base Unit with Ten Pao adaptor: 0.582 MHz

The worst case line conducted configuration photographs are saved with filename: config photos.pdf

##### 4.4.2 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

Base Unit with Ten Pao adaptor:  
Passed by 16.55 dB margin compare with quasi-peak limit

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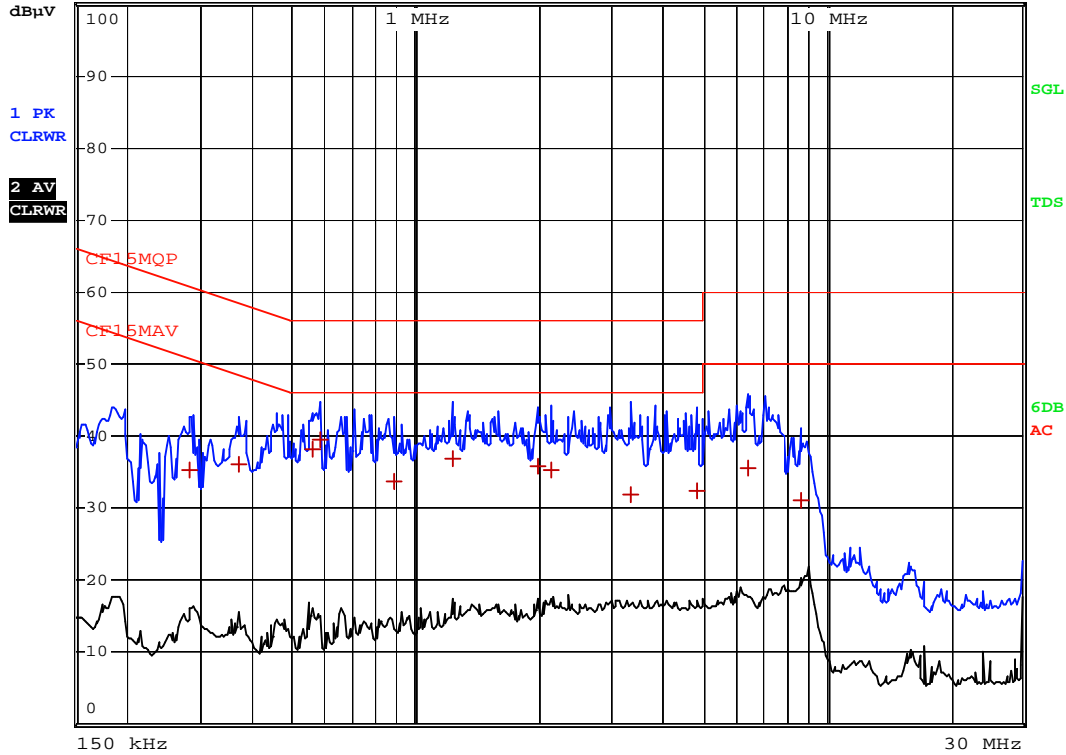


Worst Case: Conference Talk (Ten Pao adaptor)



RBW 9 kHz  
MT 1 s

Att 10 dB AUTO PREAMP OFF



Date: 15.JAN.2013 10:37:06

Issuing Laboratory:  
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Worst Case: Conference Talk (Ten Pao adaptor)

EDIT PEAK LIST (Final Measurement Results)					
Trace1:		CF15MQP			
Trace2:		CF15MAV			
Trace3:		---			
	TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1	Quasi Peak	285 kHz	35.22 L1		-25.44
1	Quasi Peak	370.5 kHz	36.19 N		-22.29
1	Quasi Peak	559.5 kHz	38.10 N		-17.89
1	Quasi Peak	582 kHz	39.44 N		-16.55
1	Quasi Peak	888 kHz	33.80 N		-22.19
1	Quasi Peak	1.23 MHz	36.77 N		-19.23
1	Quasi Peak	1.977 MHz	35.79 N		-20.20
1	Quasi Peak	2.13 MHz	35.39 N		-20.60
1	Quasi Peak	3.3315 MHz	31.98 N		-24.01
1	Quasi Peak	4.8525 MHz	32.38 N		-23.61
1	Quasi Peak	6.4545 MHz	35.66 N		-24.33
1	Quasi Peak	8.646 MHz	31.01 L1		-28.99

Date: 15.JAN.2013 10:36:52

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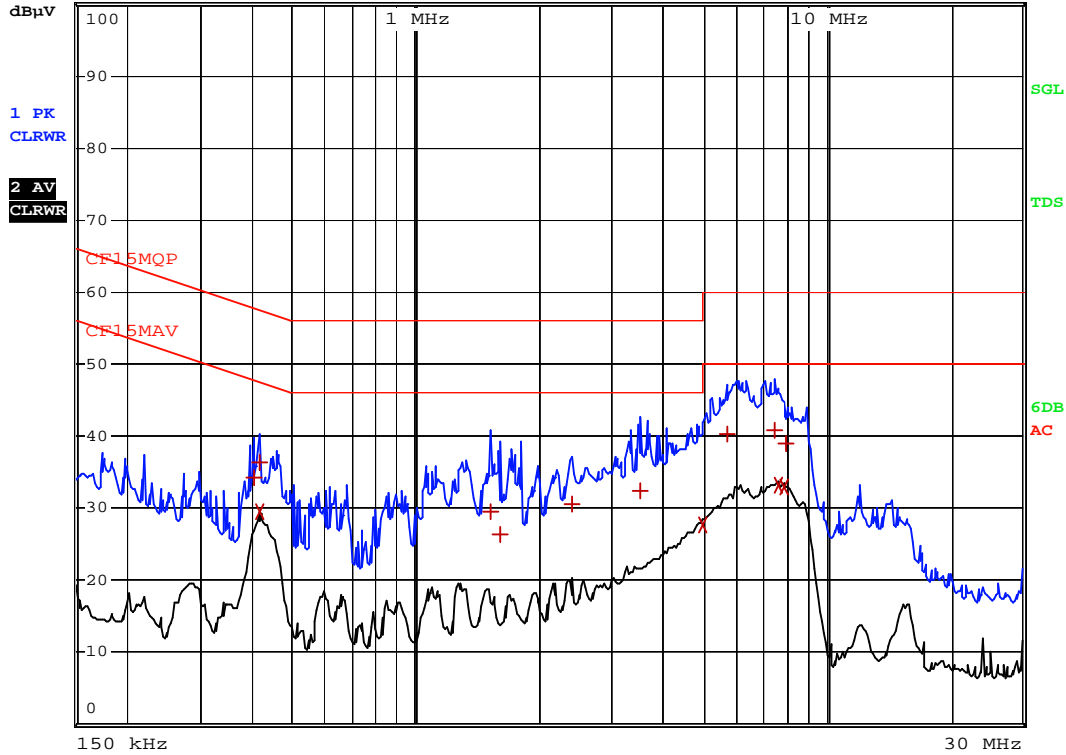


Worst Case: Conference Talk (Sunstrong adaptor)



RBW 9 kHz  
MT 1 s

Att 10 dB AUTO PREAMP OFF



Date: 15.JAN.2013 11:16:05

Issuing Laboratory:  
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Worst Case: Conference Talk (Sunstrong adaptor)

EDIT PEAK LIST (Final Measurement Results)					
Trace1:		CF15MQP			
Trace2:		CF15MAV			
Trace3:		---			
	TRACE	FREQUENCY	LEVEL dB $\mu$ V		DELTA LIMIT dB
1	Quasi Peak	402 kHz	34.12	N	-23.68
1	Quasi Peak	415.5 kHz	36.45	N	-21.08
2	CISPR Average	415.5 kHz	29.46	L1	-18.07
1	Quasi Peak	1.5225 MHz	29.43	N	-26.57
1	Quasi Peak	1.599 MHz	26.26	N	-29.73
1	Quasi Peak	2.4045 MHz	30.63	N	-25.36
1	Quasi Peak	3.507 MHz	32.32	N	-23.67
2	CISPR Average	4.983 MHz	27.66	L1	-18.33
1	Quasi Peak	5.721 MHz	40.32	N	-19.67
1	Quasi Peak	7.521 MHz	40.84	N	-19.15
2	CISPR Average	7.629 MHz	33.07	N	-16.92
1	Quasi Peak	7.9935 MHz	39.08	N	-20.91
2	CISPR Average	7.9935 MHz	33.06	L1	-16.94

Date: 15.JAN.2013 11:15:53

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**EXHIBIT 5  
EQUIPMENT LIST**

Issuing Laboratory:  
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## 5.0 Equipment List

### 1) Radiated Emissions Test

Equipment	Biconical Antenna	Log Periodic Antenna	Double Ridged Guide Antenna
Registration No.	EW-2512	EW-0446	EW-1015
Manufacturer	EMCO	EMCO	EMCO
Model No.	3104C	3146	3115
Calibration Date	Nov. 15, 2011	Oct. 31, 2011	Aug. 24, 2011
Calibration Due Date	May. 15, 2013	Apr. 30, 2013	Feb. 24, 2013

Equipment	EMI Test Receiver	Spectrum Analyzer 40GHz	Broad-Band Horn Antenna
Registration No.	EW-2500	EW-2253	EW-1679
Manufacturer	R&S	ROHDESCHWARZ	SCHWARZBECK
Model No.	ESCI	FSP40	BBHA9170
Calibration Date	Feb. 24, 2012	Jan. 12, 2012	Mar. 21, 2012
Calibration Due Date	Feb. 24, 2013	Apr. 12, 2013	Mar. 21, 2013

### 2) Conducted Emissions Test

Equipment	EMI Test Receiver	Artificial Mains Network
Registration No.	EW-2500	EW-2874
Manufacturer	R&S	ROHDESCHWARZ
Model No.	ESCI	ENV216
Calibration Date	Feb. 24, 2012	Aug. 15, 2012
Calibration Due Date	Feb. 24, 2013	Aug. 15, 2013

**END OF TEST REPORT**