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## FCC PART 15 SUBPART C TEST REPORT

### FCC Part 15.249

Report Reference No.....: CTL11108693-S-WF

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Date of issue.....: November 1, 2011

Representative Laboratory Name : Shenzhen CTL Electromagnetic Technology Co., Ltd.

Address.....: Zone B, 4/F, Block 20, Guangqian Industrial Park, Longzhu Road, Nanshan, Shenzhen 518055 China.

Test Firm.....: Bontek Compliance Testing Laboratory Ltd

Address.....: 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

Applicant's name.....: HongKong AtoB Co. Ltd.

Address.....: The 1st floor, Shisheng Building, Shangkeng Industrial District Changping Town, DongGuan City, GuangDong, China

#### Test specification:

Standard .....: FCC Part 15.249: Operation within the bands 920-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0 - 24.25 GHz.

TRF Originator.....: Shenzhen CTL Electromagnetic Technology Co., Ltd.

Master TRF.....: Dated 2011-01

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Test item description .....: Bluetooth headset

Trade Mark .....: /

Models/Type reference.....: TK2, PP-300, TK1, TK3, TK4, TK5

Modulation .....: GFSK

Work Frequency.....: 2402 MHz~2480 MHz

Antenna Type.....: PCB Antenna

FCC ID .....: Z79-TK2

Result.....: Positive

**TEST REPORT**

<b>Test Report No. :</b>	<b>CTL11108693-S-WF</b>	November 1, 2011 Date of issue
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**Equipment under Test** : Bluetooth headset

**Model /Type** : TK2

**Listed Models** : PP-300, TK1, TK3, TK4, TK5

**Applicant** : HongKong AtoB Co. Ltd.

**Address** : The 1st floor, Shisheng Building, Shangkeng Industrial District Changping Town, DongGuan City, GuangDong, China

**Manufacturer** HongKong AtoB Co. Ltd.

**Address** The 1st floor, Shisheng Building, Shangkeng Industrial District Changping Town, DongGuan City, GuangDong, China

<b>Test Result</b> according to the standards on page 4:	<b>Positive</b>
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The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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## **1. TEST STANDARDS**

The tests were performed according to following standards:

**FCC Rules Part 15.249:** Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

**ANSI C63.4-2003**



## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample : October 28, 2011

Testing commenced on : October 29, 2011

Testing concluded on : October 31, 2011

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage : ☒ 120V / 60 Hz ☐ 115V / 60Hz  
☐ 12 V DC ☐ 24 V DC  
☒ Other (specified in blank below)

DC 3.7V from battery

### 2.3. Short description of the Equipment under Test (EUT)

Wireless Bluetooth headset work at 2400~2483.5 MHz.

For more details, refer to the user's manual of the EUT.

Serial number: Prototype

### 2.4. EUT operation mode

The EUT has been tested under typical operating condition.

### 2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

☐ - supplied by the manufacturer

☒ - supplied by the lab

☒ Mouse

Manufacturer : DELL

Model No. : MOC5UO

☒ Notebook Computer

Manufacturer : DELL

Model No. : PP26L

☒ Keyboard

Manufacturer : DELL

Model No. : L100



## 2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **Z79-TK2** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

## 2.7. Modifications

No modifications were implemented to meet testing criteria.



### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Bontek Compliance Testing Laboratory Ltd  
1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

#### **3.2. Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **IC Registration No.: 7631A**

The 3m alternate test site of Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on March, 2011.

##### **FCC-Registration No.: 338263**

Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

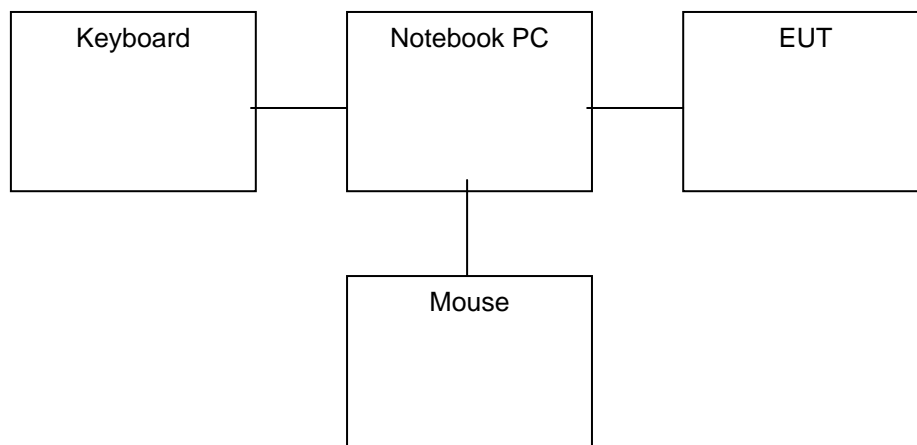
Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

#### **3.4. Configuration of Tested System**

**Fig. 2-1 Configuration of Tested System**





### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Bontek laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~12.75GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

(2)

### 3.6. Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Last Cal.	Due. Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	2011/04/14	2012/04/13
2	Radio Communication Tester	ROHDE & SCHWARZ	CMU200	2011/04/14	2012/04/13
3	Dual Directional Coupler	Agilent	778D	2011/04/14	2012/04/13
4	10dB attenuator	SCHWARZBECK	MTAIMP-136	2011/04/14	2012/04/13
5	Tunable Bandreject filter	K&L	3TNF-800	2011/04/14	2012/04/13
6	Tunable Bandreject filter	K&L	5TNF-1700	2011/04/14	2012/04/13
7	High-Pass Filter	K&L	9SH10-2700/X12750-O/O	2011/04/14	2012/04/13
8	High-Pass Filter	K&L	41H10-1375/U12750-O/O	2011/04/14	2012/04/13
9	Coaxial Cable	Huber+Suhner	AC4-RF-H	2011/04/14	2012/04/13
10	AC Power Supply	IDRC	CF-500TP	2011/04/14	2012/04/13
11	DC Power Supply	IDRC	CD-035-020PR	2011/04/14	2012/04/13
12	RF Current Probe	FCC	F-33-4	2011/04/14	2012/04/13
13	Temperature /Humidity Meter	zhicheng	ZC1-2	2011/04/14	2012/04/13
14	MICROWAVE AMPLIFIER	HP	8349B	2011/04/14	2012/04/13
15	Amplifier	HP	8447D	2011/04/14	2012/04/13
16	SIGNAL GENERATOR	HP	8647A	2011/04/14	2012/04/13
17	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2011/04/14	2012/04/13
18	Horn Antenna	Schwarzbeck	BBHA9120A	2011/04/14	2012/04/13
19	EMI Test Receiver	R&S	ESPI	2011/04/14	2012/04/13

## **4. TEST CONDITIONS AND RESULTS**

### **4.1. Conducted Emissions Test**

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
- 2 Support equipment, if needed, was placed as per ANSI C63.4.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4 If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

**Conducted Power Line Emission Limit**

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

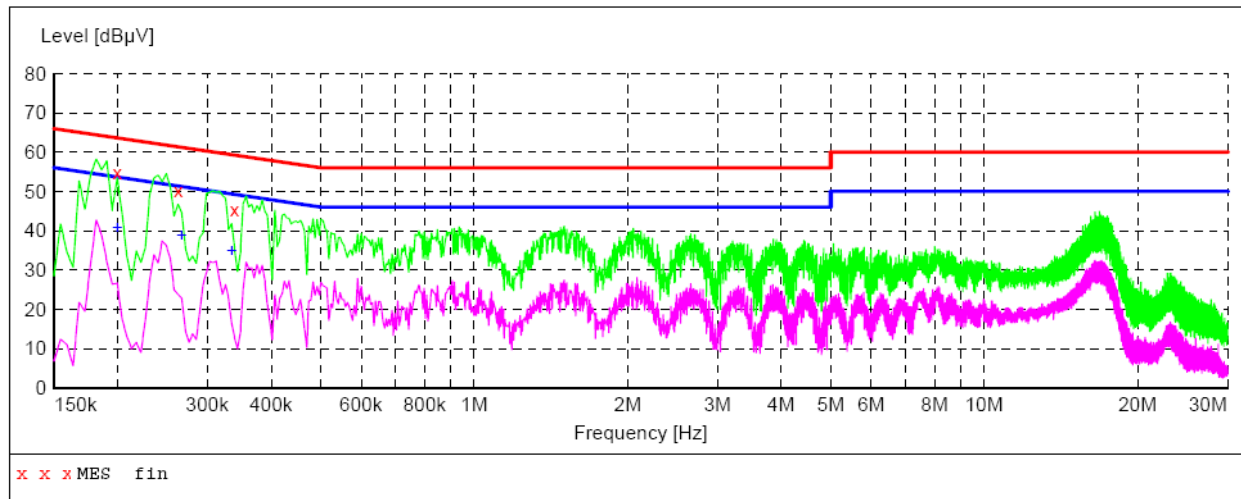
Frequency (MHz)	Maximum RF Line Voltage (dBµV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

**TEST RESULTS*****SCAN TABLE: "Voltage (9K-30M) FIN"***

Short Description: 150K-30M Voltage

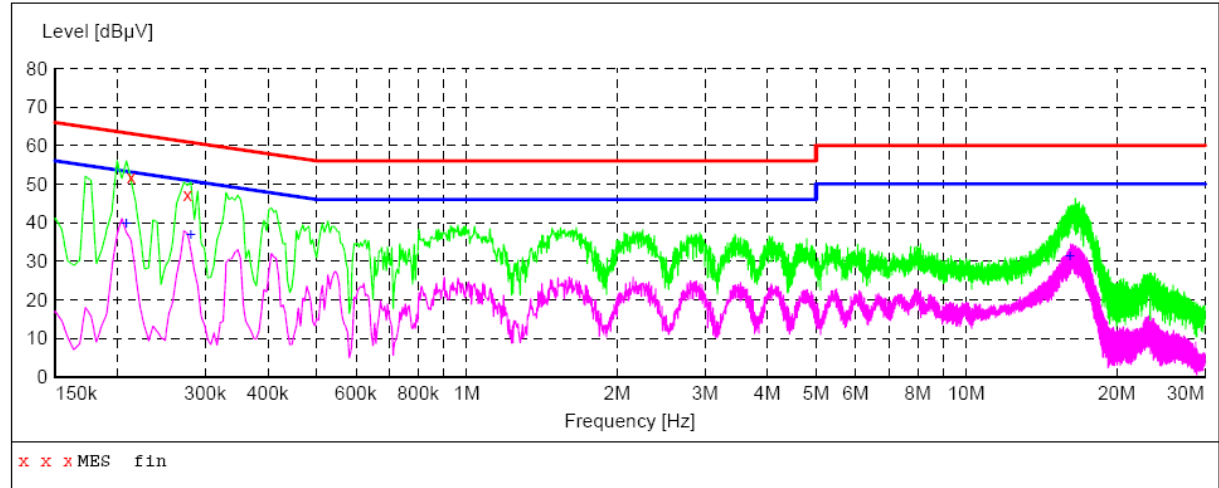
***MEASUREMENT RESULT:***

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	54.90	10.1	64	8.7	QP	N	GND
0.262500	50.20	10.1	61	11.2	QP	N	GND
0.339000	45.40	10.2	59	13.8	QP	N	GND

***MEASUREMENT RESULT:***

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	40.80	10.1	54	12.8	AV	N	GND
0.267000	38.90	10.1	51	12.3	AV	N	GND
0.334500	35.00	10.2	49	14.3	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"  
Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.213000	52.00	10.1	63	11.1	QP	L1	GND
0.276000	47.20	10.1	61	13.7	QP	L1	GND

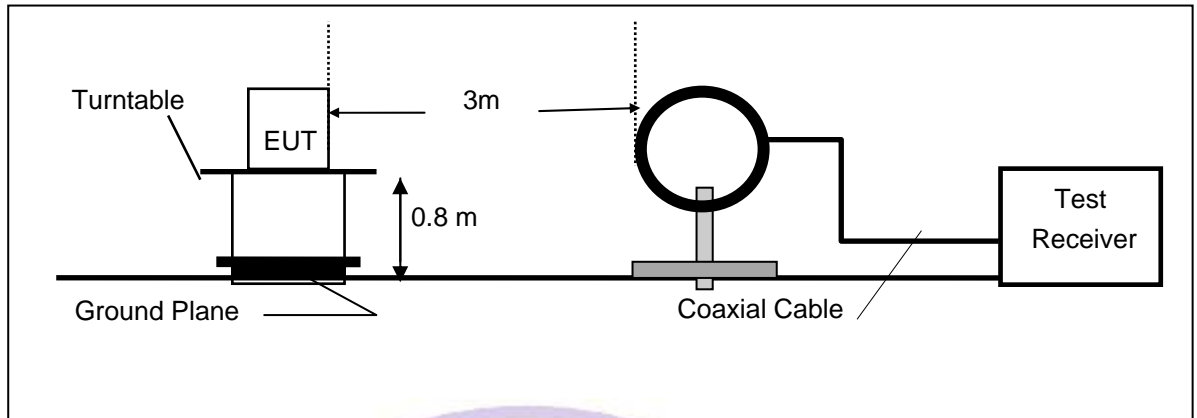
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.208500	39.70	10.1	53	13.6	AV	L1	GND
0.280500	36.90	10.1	51	13.9	AV	L1	GND
16.156500	31.20	10.5	50	18.8	AV	L1	GND

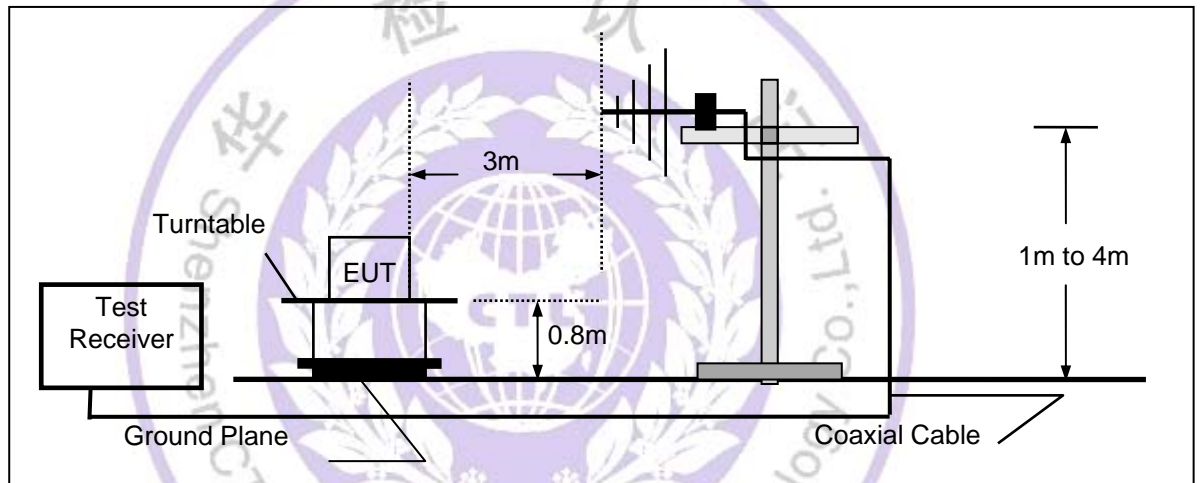
## 4.2. Radiated Emission Test

### TEST CONFIGURATION

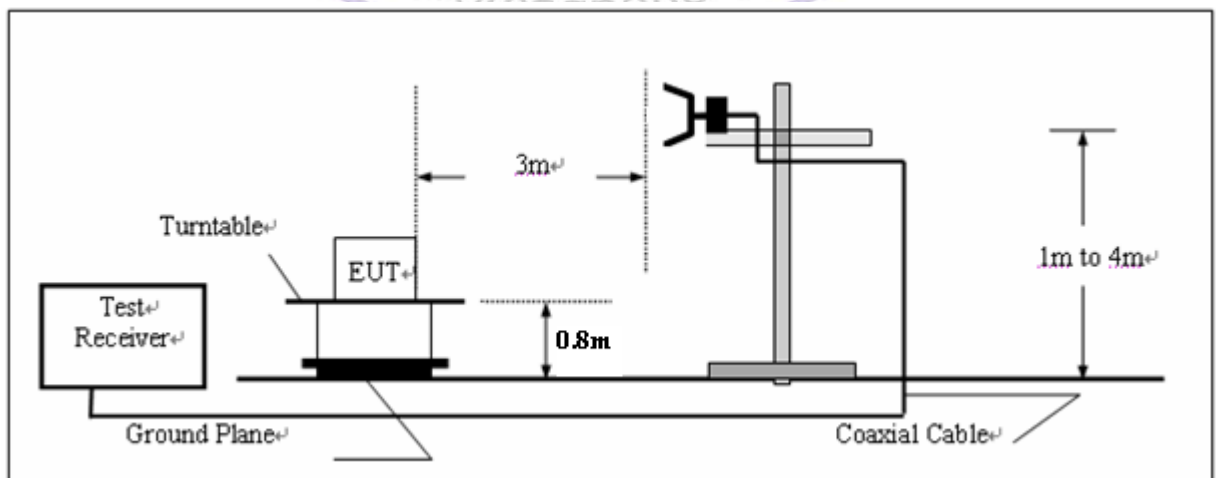
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



### **Field Strength Calculation**

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

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

### **Radiation Limit**

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

### **Test Procedure**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Note:

Three axes are chosen for pretest, the Z axis is the worst mode for final test.

For battery operated equipment, the equipment tests shall be performed using a new battery.

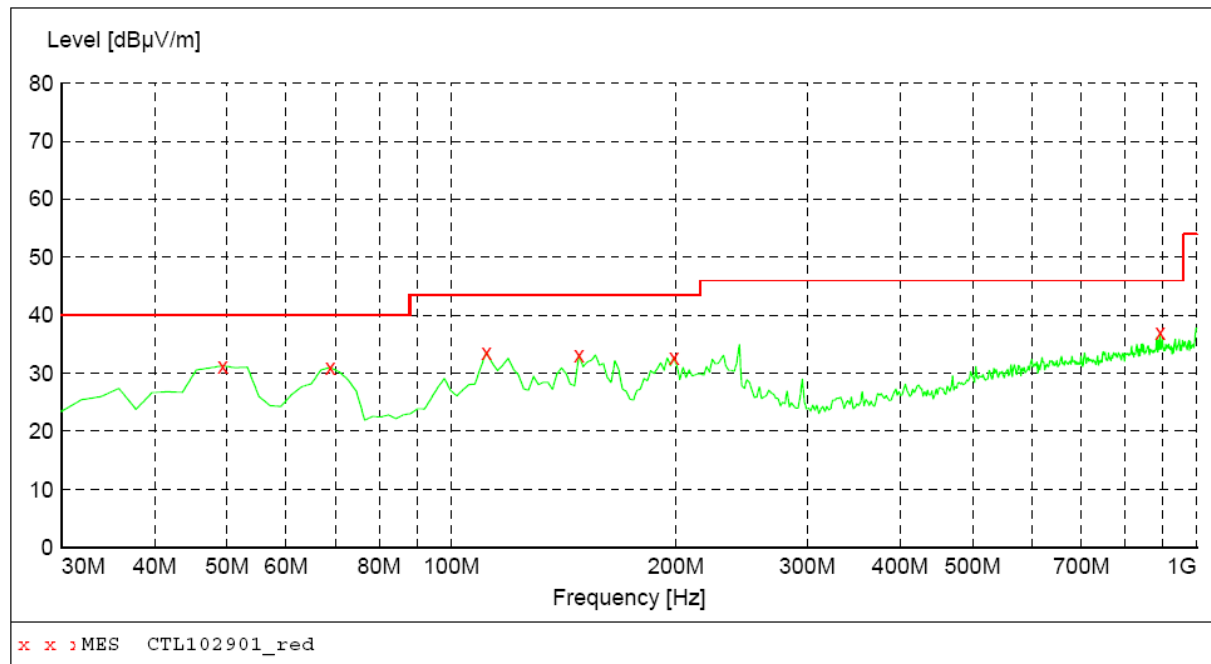
### **TEST RESULTS**

Below 1GHz Test Results:



***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency	Time	Bandw.		
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW

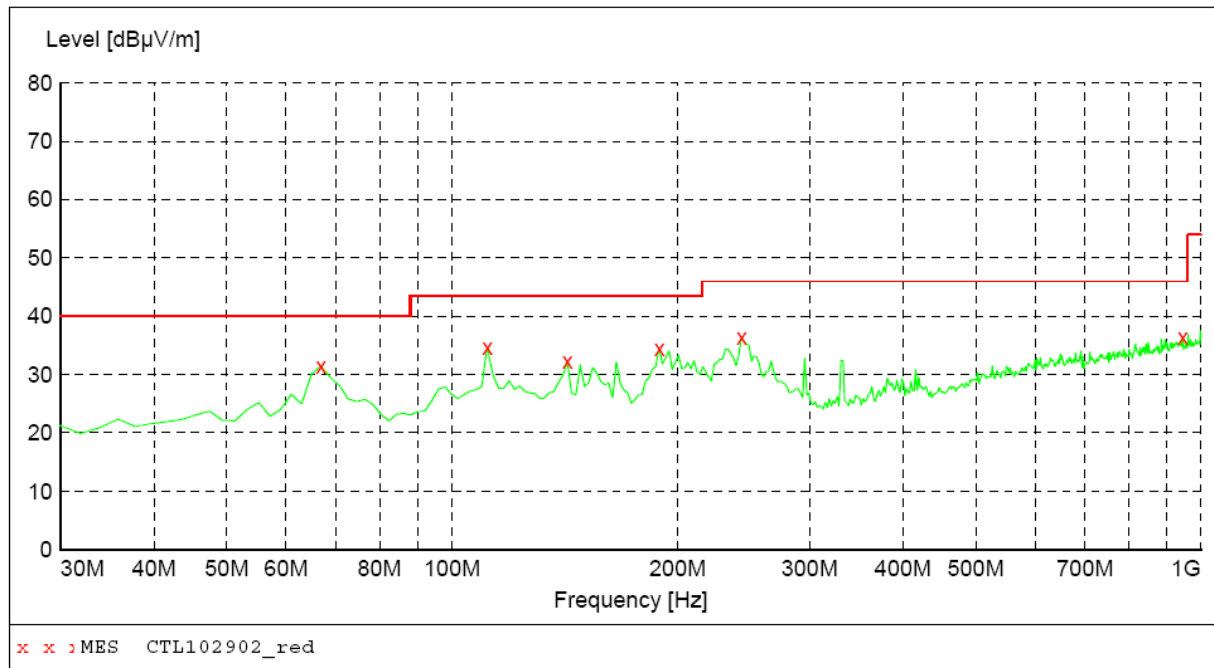
***MEASUREMENT RESULT: "CTL102901\_red"***

10/29/2011 11:37

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000	31.30	15.8	40.0	8.7	---	100.0	0.00	VERTICAL
68.800000	31.00	12.7	40.0	9.0	---	100.0	0.00	VERTICAL
111.480000	33.70	16.2	43.5	9.8	---	100.0	0.00	VERTICAL
148.340000	33.20	12.3	43.5	10.3	---	100.0	0.00	VERTICAL
198.780000	32.80	14.9	43.5	10.7	---	100.0	0.00	VERTICAL
893.300000	37.00	29.1	46.0	9.0	---	100.0	0.00	VERTICAL

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW

**MEASUREMENT RESULT: "CTL102902\_red"**

10/29/2011 11:41

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
66.860000	31.50	13.1	40.0	8.5	---	300.0	0.00	HORIZONTAL
111.480000	34.70	16.2	43.5	8.8	---	300.0	0.00	HORIZONTAL
142.520000	32.20	12.3	43.5	11.3	---	100.0	0.00	HORIZONTAL
189.080000	34.50	14.7	43.5	9.0	---	100.0	0.00	HORIZONTAL
243.400000	36.40	17.0	46.0	9.6	---	100.0	0.00	HORIZONTAL
945.680000	36.40	29.5	46.0	9.6	---	300.0	0.00	HORIZONTAL

**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

**Above 1 GHz Test Results:**

Top Channel

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2480	V	Peak	76.85	-3.30	73.55	93.98	-20.43	F
2480	H	Peak	69.56	-3.30	66.26	93.98	-27.72	F
4960	V	Peak	49.21	3.90	53.11	73.98	-20.87	H
4960	H	Peak	45.27	3.90	49.17	73.98	-24.81	H
7440	V		---					H
7440	H		---					H
Others			---					

Middle Channel:

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2441	V	Peak	76.62	-3.40	73.22	93.98	-20.76	F
2441	H	Peak	69.51	-3.40	66.11	93.98	-27.87	F
4882	V	Peak	48.46	3.70	52.16	73.98	-21.82	H
4882	H	Peak	42.58	3.70	46.28	73.98	-27.70	H
7323	V		---					H
7323	H		---					H
Others			---					

Bottom Channel:

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2402	V	Peak	76.37	-3.50	72.87	93.98	-21.11	F
2402	H	Peak	69.25	-3.50	65.75	93.98	-28.23	F
4804	V	Peak	48.41	3.80	52.21	73.98	-21.77	H
4804	H	Peak	41.93	3.80	45.73	73.98	-28.25	H
7206	V		---					H
7206	H		---					H
Others			---					

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

### 4.3. Band Edge Measurement

#### TEST CONFIGURATION

Same as Section 4.2

#### TEST PROCEDURE

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

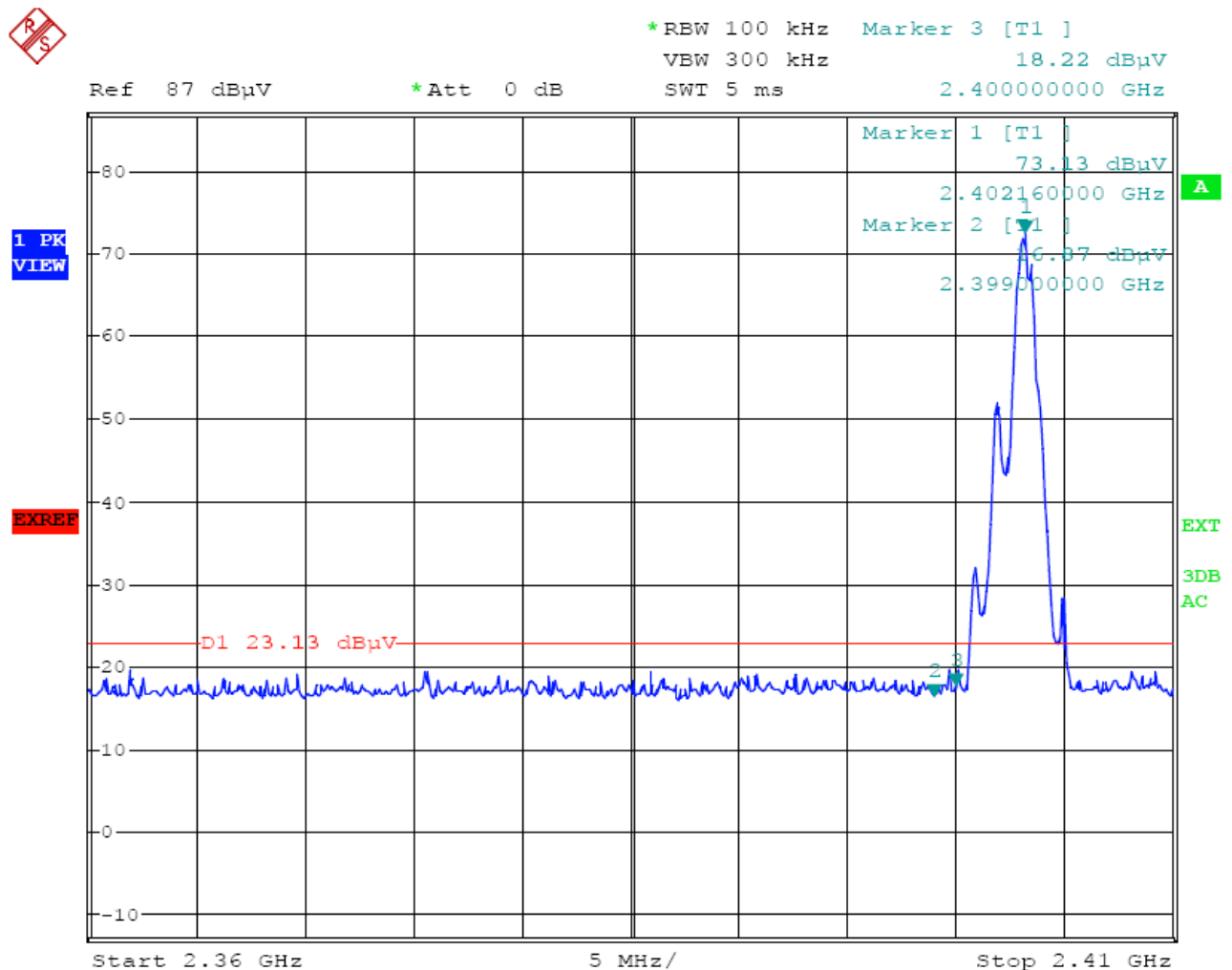
The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

#### LIMIT

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

#### TEST RESULTS

Band-Edge Compliance: 2310MHz – 2390MHz Restricted Band, Low Channel,



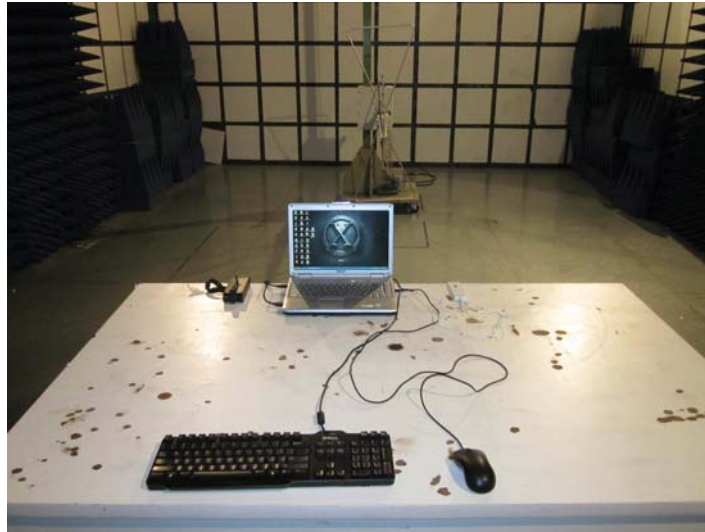
Band-Edge: 2483.5MHz – 2500MHz Restricted Band, High Channel



Note:

1. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.
2. The average measurement was not performed when the peak measured data under the limit of average detection.

## **5. Test Setup Photos of the EUT**

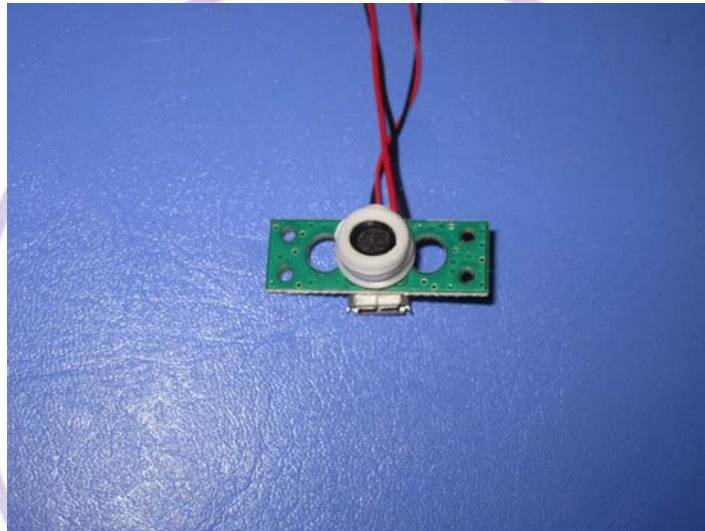


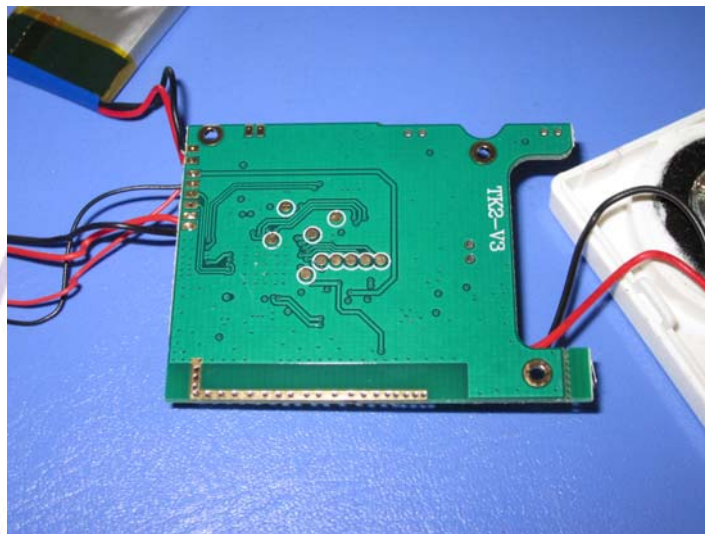
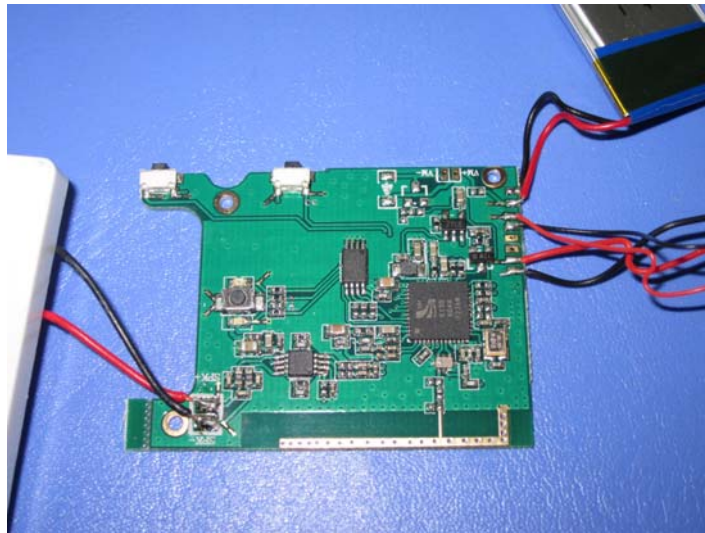


## 6. External and Internal Photos of the EUT

### External Photos



Internal Photos



.....End of Report.....