

FCC PART 15 CLASS B  
EMI MEASUREMENT AND TEST REPORT  
For

ENJOY TECHNOLOGY CO., LIMITED  
UNIT 04&#65292;7/F BRIGHT WAY TOWER NO.33 MONG KOK RD KL Hong Kong China

**FCC ID: RJM-ENGAGE**

January 29, 2013

This Report Concerns: Original Report	Equipment Type: Audience response system
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Test Engineer of performing the tests:	Hans Hu <i>Hans.Hu</i>
Report No.:	BST120015721Y-1ER-3
Receive EUT Date/Test Date:	January 02, 2013 / January 02, 2013- January 29, 2013
Reviewed By:	Mike Moo <i>Mike Moo</i>
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## **1. GENERAL INFORMATION**

### **1.1. Report information**

- 1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BST in any way guarantees the later performance of the product/equipment.
- 1.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 1.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BST, unless the applicant has authorized BST in writing to do so.

#### Test Facility -

The test site used to collect the data is located on the address of

Global United Technology Service Co., Ltd

(FCC Registered Test Site Number: 600491) on

2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District,  
Shenzhen, China 518102

The Test Site is constructed and calibrated to meet the FCC requirements.

## 2. PRODUCT DESCRIPTION

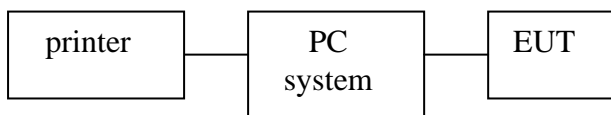
### 2.1. EUT Description

Applicant : ENJOY TECHNOLOGY CO., LIMITED  
 Address : UNIT 04&#65292;7/F BRIGHT WAY TOWER NO.33 MONG  
 KOK RD KL Hong Kong China  
 Manufacturer : GUANGZHOU QILE TECHNOLOGY CO.,LTD  
 Address : 3/F and 4/F, 29-1#, Dayuan Nan Road, Baiyun District,  
 Guangzhou, Guangdong Province, China  
 EUT Description : Audience response system  
  
 Trade Name : ENJOY® VoteWorks®  
 Model Number : ENJOY VoteWorks® Engage Receiver  
 Receiver frequency : 2402-2480MHz  
 modulation type : GFSK(1Mbps)  
 Antenna gain : 0dBi  
  
 Power Supply : DC 5V (Powered by PC)  
 Use RJ45 port to USB port cable, connect to the USB port of PC  
 Channel : 79

#### Note:

- 1,The Audience response system only one working mode is 4 modules simultaneously transmit and receive.
- 2,these 4 RF modules and 4 antennas own the exactly same specification and RF parameters.

### 2.2. Block Diagram of EUT Configuration



### 2.3. Support Equipment List

Name	Model No	S/N	Manufacturer	Used (Y/N)
PC system	AM1830	N/A	Acer	Y
Printer	HP1020	N/A	HP	Y

## **2.4. Test Conditions**

Temperature: 23~27°C

Relative Humidity: 50~63 %

### 3. TEST RESULTS SUMMARY

**Table 1 Test Results Summary**

Test Items	Test Results
Conducted disturbance	Pass
Radiated disturbance	Pass

#### 4. TEST EQUIPMENT USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 30 2012	1 Year
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 04 2012	1 Year
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRO NIK	VULB9163	GTS214	Feb. 25 2012	1 Year
Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRO NIK	9120D-829	GTS208	June 30 2012	1 Year
Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2012	1 Year
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Cable	Resenberger	N/A	NO.1	Apr. 6, 2012	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Apr. 6, 2012	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Apr. 6, 2012	1 Year
Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 04 2012	1 Year
Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 04 2012	1 Year
Amplifier (18-26GHz)	R&S	AFS33-1800 2 650-30-8P-4 4	GTS218	June 30 2012	1 Year
Band filter	Amindeon	82346	GTS219	Mar. 31 2012	1 Year
Active Loop Antenna	Beijing Daze	ZN30900A	GTS215	Mar. 31 2012	1 Year
Power Meter	R&S	NRVS	GTS216	Apr. 6, 2012	1 Year
Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Sep. 08 2012	1 Year
EMI Test Receiver	R&S	ESCS30	GTS223	Jul. 04 2012	1 Year
10dB Pulse Limita	R&S	N/A	GTS224	Jul. 04 2012	1 Year
Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 04 2012	1 Year
LISN	SCHWARZBECK MESS-ELEKTRO NIK	NSLK 8127	GTS226	Jul. 04 2012	1 Year
Coaxial Cable	SCHWARZBECK	N/A	NO.4	Apr. 6, 2012	1 Year
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Spectrum analyzer	agilent	E4440A	GTS251	Jul. 04 2012	N/A

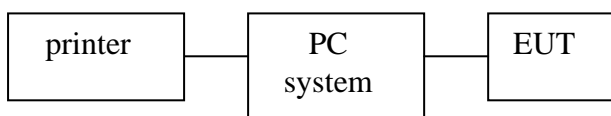
## 5. CONDUCTED EMISSION TEST

### 5.1. Measurement Uncertainty

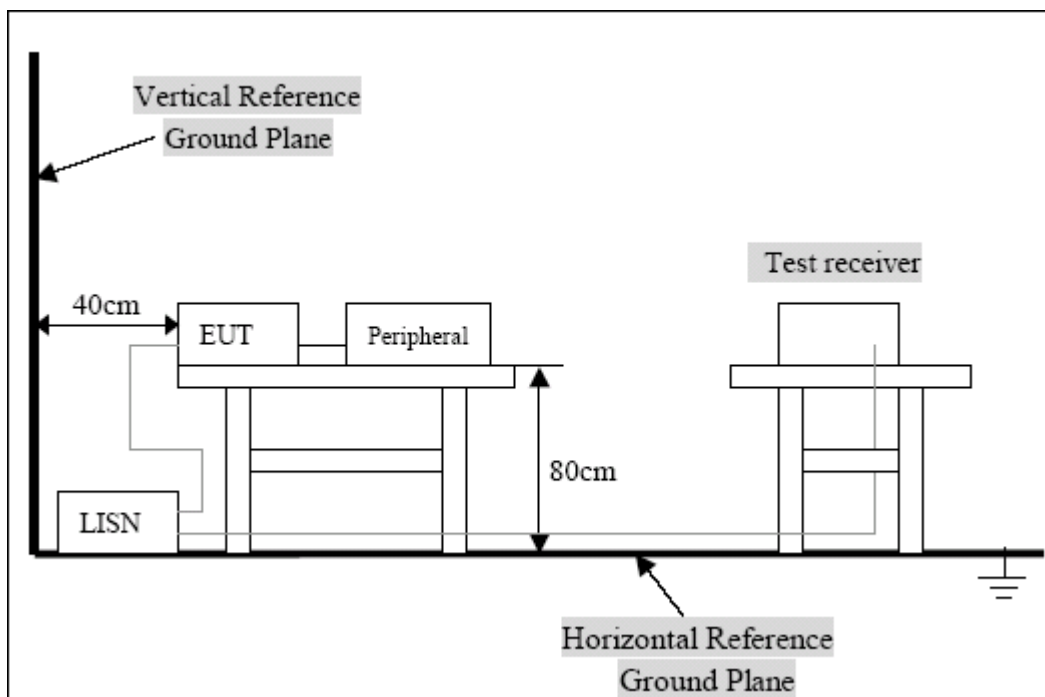
The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is +/-1.38 dB.

### 5.2. Block Diagram of Test Setup

#### 5.2.1. Block Diagram of connection between the EUT and the simulators



#### 5.2.2. Test Setup Diagram



### 5.3. Test Standard

FCC Part 15 CLASS B

ANSI C63.4 2003



#### 5.4. Conducted Emission Limit(Class B)

Frequency MHz	Limits dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.

#### 5.5. EUT Configuration on Test

The following equipments are installed on conducted emission test to meet FCC Part 15 requirement and operating in a manner, which tends to maximize its emission characteristics in a normal application.

#### 5.6. Operating Condition of EUT

5.6.1. Setup the EUT and simulators as shown in Section 6.1.

5.6.2. Turn on the power of all equipments.

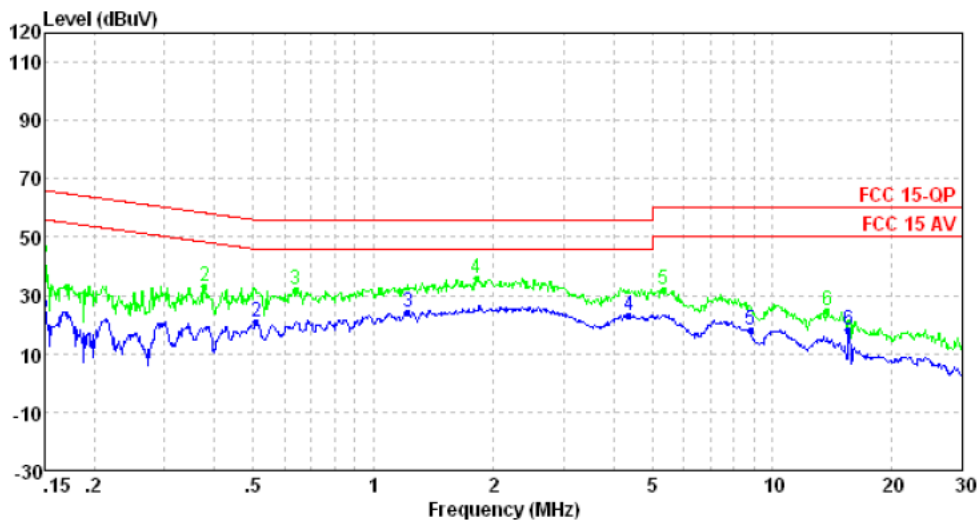
5.6.3. Let the EUT work in test mode and test it.

#### 5.7. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line. The bandwidth of EMI test receiver is set at 9kHz.

#### 5.8. Test Result

Test mode:running with PC

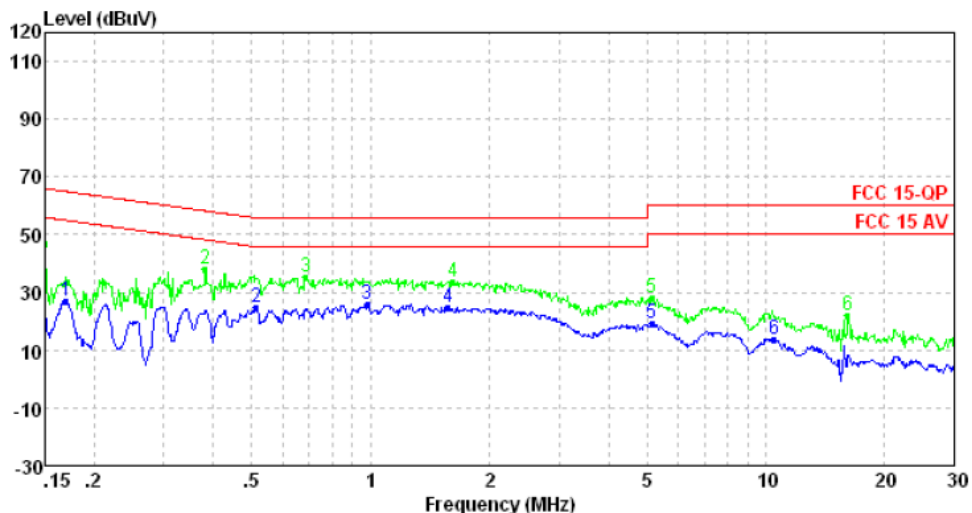


Condition:  
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.15	27.46	56.00	-28.54	Average	LINE
2	0.51	20.75	46.00	-25.25	Average	LINE
3	1.22	24.21	46.00	-21.79	Average	LINE
4	4.38	23.40	46.00	-22.60	Average	LINE
5	8.82	18.07	50.00	-31.93	Average	LINE
6	15.55	18.02	50.00	-31.98	Average	LINE

Condition:  
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.15	46.48	66.00	-19.52	Peak	LINE
2	0.38	33.24	58.34	-25.10	Peak	LINE
3	0.64	31.90	56.00	-24.10	Peak	LINE
4	1.82	36.11	56.00	-19.89	Peak	LINE
5	5.33	32.27	60.00	-27.73	Peak	LINE
6	13.77	24.66	60.00	-35.34	Peak	LINE



Condition:

: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.17	27.04	54.99	-27.95	Average	NEUTRAL
2	0.51	25.05	46.00	-20.95	Average	NEUTRAL
3	0.98	25.75	46.00	-20.25	Average	NEUTRAL
4	1.57	25.07	46.00	-20.93	Average	NEUTRAL
5	5.14	19.02	50.00	-30.98	Average	NEUTRAL
6	10.51	13.68	50.00	-36.32	Average	NEUTRAL

Condition:

: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.15	46.83	66.00	-19.17	Peak	NEUTRAL
2	0.38	37.82	58.25	-20.43	Peak	NEUTRAL
3	0.69	35.36	56.00	-20.64	Peak	NEUTRAL
4	1.62	33.92	56.00	-22.08	Peak	NEUTRAL
5	5.14	28.15	60.00	-31.85	Peak	NEUTRAL
6	16.14	22.07	60.00	-37.93	Peak	NEUTRAL

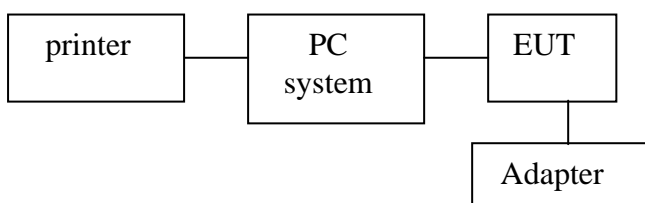
## 6. RADIATED EMISSION MEASUREMENT

### 6.1. Measurement Uncertainty

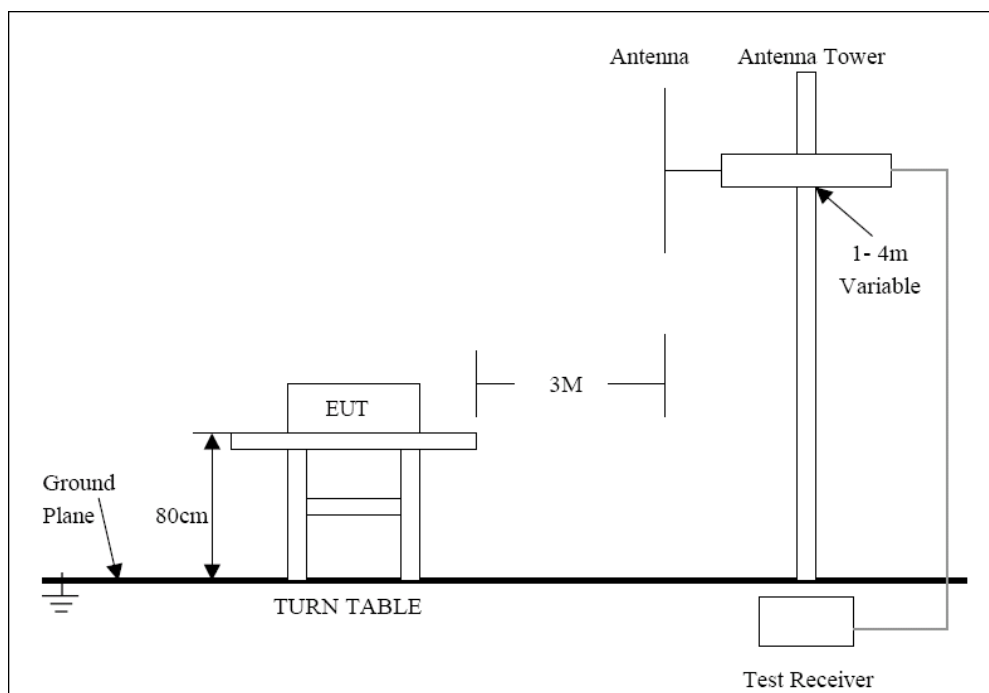
The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is  $<1G : +/-4.68 Db, >1G : +/-4.89 Db$ .

### 6.2. Block Diagram of EUT Configuration

6.2.1. Block Diagram of connection between the EUT and the simulators



6.2.2. Semi-anechoic Chamber Test Setup Diagram



### 6.3. Test Standard

FCC Part 15 CLASS B  
ANSI C63.4 2003

**6.4. Radiated Emission Limit(Class B)**

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB $\mu$ V/m)
30 ~ 88	3	40.0
88 ~ 216	3	43.5
216 ~ 960	3	46.0
Above 1000	3	54.0

Note:(1) The smaller limit shall apply at the edge between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT or system.

**6.5. EUT Configuration on Test**

The following equipment are installed on Radiated Emission Measurement to meet the Commission requirements and operating regulations in a manner which tends to maximize Its emission characteristics in normal application.

**6.6. Operating Condition of EUT**

6.6.1.Let the EUT work in test mode and test it.

## **6.7. Test Procedure**

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Calibrated Loop antenna is used as receiving antenna for frequencies below 30MHz, Calibrated Bilog antenna is used as receiving antenna for frequencies between 30 MHz and 1 GHz, Calibrated Horn antenna is used as receiving antenna for frequencies above 1000MHz. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver is set at 100kHz in 30-1000MHz. and set at 1000kHz above 1000MHz.

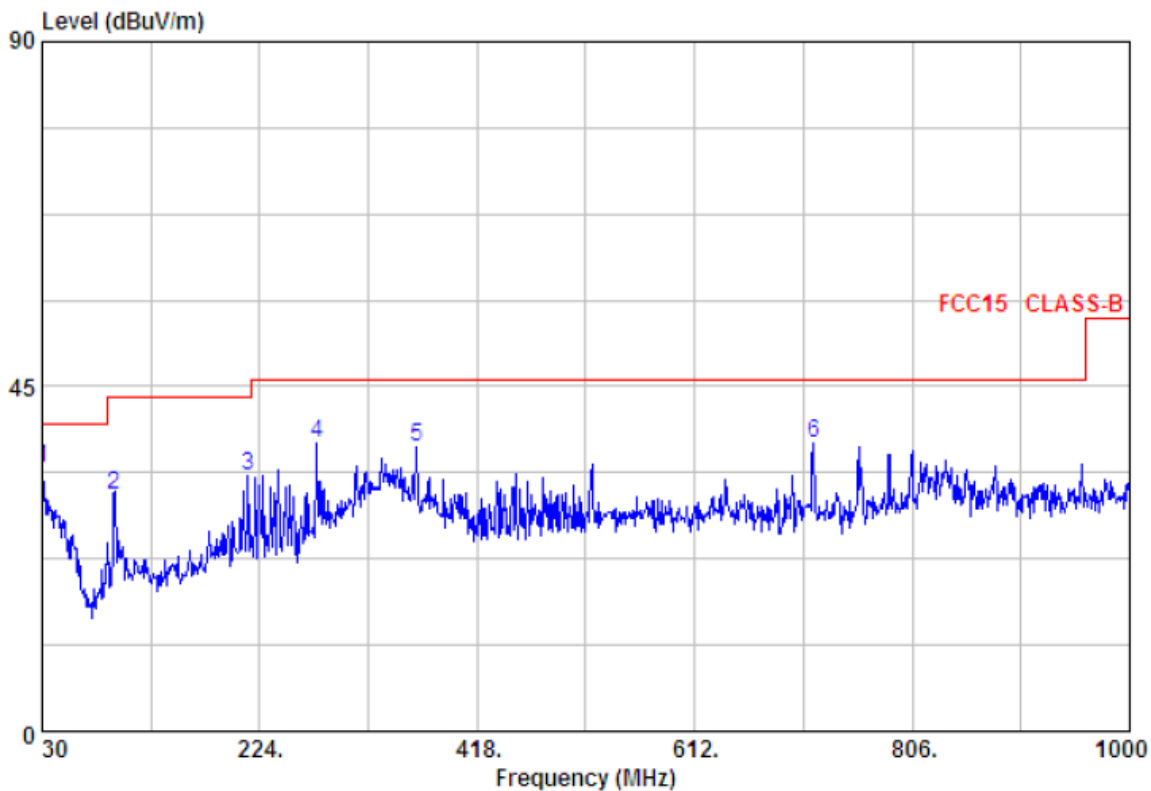
The final measurement in band above 1000MHz is performed with Peak detector and Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

## **6.8. Test Result**

**PASS**

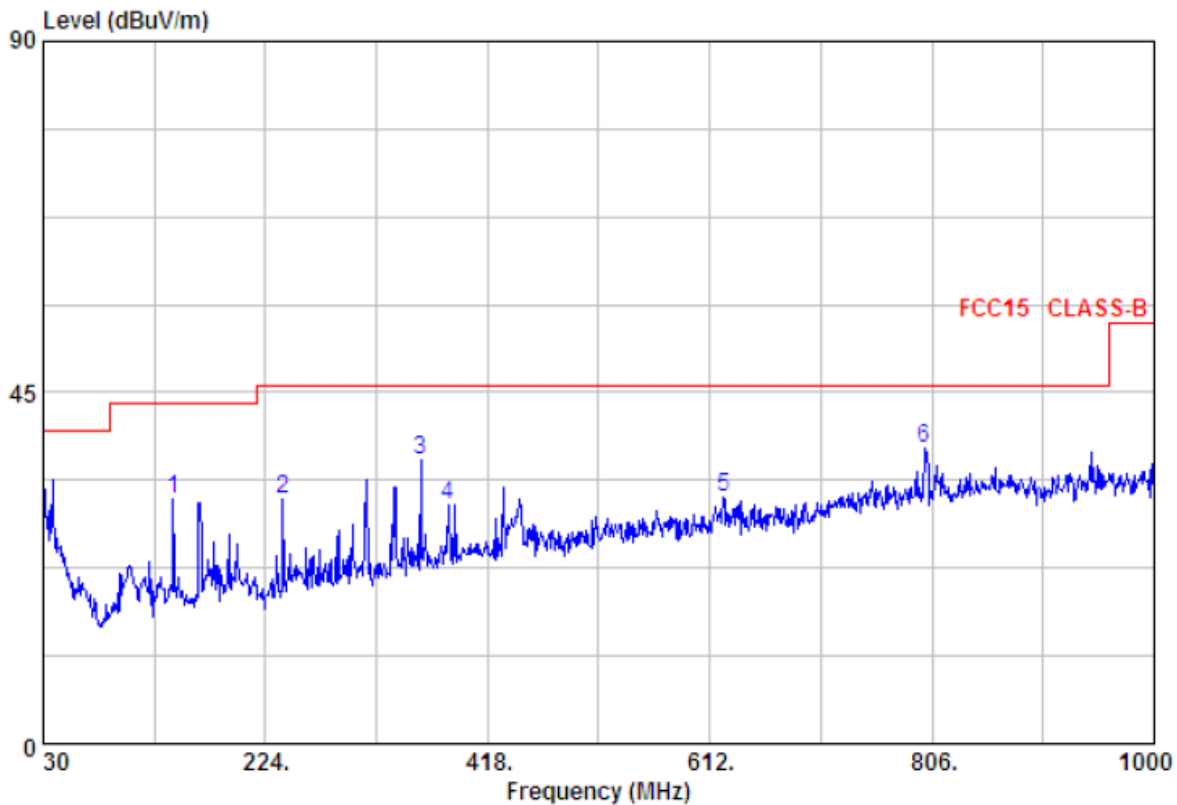
Test mode:running with PC

**For 30MHz-1000MHz Spurious**



Condition : FCC15 CLASS-B 3m VERTICAL  
 : RBW:100.000KHz VBW:300.000KHz SWT:Auto

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1 max	30.00	34.30	40.00	-5.70	QP	VERTICAL
2	94.02	30.91	43.50	-12.59	QP	VERTICAL
3	213.33	33.39	43.50	-10.11	QP	VERTICAL
4	275.41	37.59	46.00	-8.41	QP	VERTICAL
5	363.68	37.21	46.00	-8.79	QP	VERTICAL
6	717.73	37.55	46.00	-8.45	QP	VERTICAL



Condition : FCC15 CLASS-B 3m HORIZONTAL  
 : RBW:100.000KHz VBW:300.000KHz SWT:Auto

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	143.49	31.37	43.50	-12.13	QP	HORIZONTAL
2	239.52	31.38	46.00	-14.62	QP	HORIZONTAL
3	359.80	36.34	46.00	-9.66	QP	HORIZONTAL
4	384.05	30.70	46.00	-15.30	QP	HORIZONTAL
5	623.64	31.63	46.00	-14.37	QP	HORIZONTAL
6 max	799.21	37.76	46.00	-8.24	QP	HORIZONTAL



**For 1000MHz-25000MHz Spurious**

**Horizontal**

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
1059.616	36.82	10.31	47.13	74.00	-26.87	PK
1059.616	23.83	10.31	34.14	54.00	-19.86	AV
2304.647	38.75	11.32	50.07	74.00	-23.93	PK
2304.647	24.11	11.32	35.43	54.00	-18.57	AV
3738.698	39.04	12.25	51.29	74.00	-22.71	PK
3738.698	21.62	12.25	33.87	54.00	-20.13	AV

Remark:  
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**Vertical**

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
1059.616	36.68	10.31	46.99	74.00	-27.01	PK
1059.616	22.61	10.31	32.92	54.00	-21.08	AV
2304.647	37.99	11.32	49.31	74.00	-24.69	PK
2304.647	21.98	11.32	33.3	54.00	-20.7	AV
3738.698	39.65	12.25	51.9	74.00	-22.1	PK
3738.698	22.9	12.25	35.15	54.00	-18.85	AV

Remark:  
Factor = Antenna Factor + Cable Loss – Pre-amplifier.