Shenzhen CTL Electromagnetic Technology Co., Ltd.
Tel: +86-755-89486194 Fax: +86-755-89486187

FCC PART 15 SUBPART C TEST REPORT

FCC Part 15.239

Report Reference No.....:	**CTL11058307-S-WF**
Compiled by (position+printed name+signature)..:	File administrators Andy Zhang
Name of the organization performing the tests (position+printed name+signature)..:	Test Engineer Kendy Wang
Approved by (position+printed name+signature)..:	Manager Tracy Qi
Date of issue.....:	June 3, 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.....:	**SHENZHEN SUKCONN ELECTRONICS CO., LTD.**
Address .....:	F Seat Shifong Technology Garden, Huanin Road, Dalang Street, Shenzhen City China
Test specification:	
Standard.....:	FCC Part 15.239: Operation in the band 88–108 MHz.
TRF Originator.....:	Shenzhen CTL Electromagnetic Technology Co., Ltd.
Master TRF.....:	Dated 2011-01

Test item description .....:	**GPS**
FCC ID……..:	**ZMTSY-4319**
Trade Mark .....:	/
Model/Type reference.....:	SY-4319
Listed Models .....:	SY-4312, SY-4317, SY-5088, SY-5009, SY-5008, SY-5061
Modulation .....:	FM
Work Frequency Range……..:	88.1~107.9MHz
Antenna Type……:	PCB Antenna
Result.....:	**Positive**

TEST REPORT

Test Report No. :	CTL11058307-S-WF	June 3, 2011 Date of issue

Equipment under Test	:	GPS
Model /Type	:	SY-4319
Listed Models	:	SY-4312, SY-4317, SY-5088, SY-5009, SY-5008, SY-5061
Applicant	:	SHENZHEN SUKCONN ELECTRONICS CO., LTD.
Address	:	F Seat Shifong Technology Garden, Huanin Road, Dalang Street, Shenzhen City China
Manufacturer	:	SHENZHEN SUKCONN ELECTRONICS CO., LTD.
Address	:	F Seat Shifong Technology Garden, Huanin Road, Dalang Street, Shenzhen City China

Test Result according to the standards on page 4:	**Positive**

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 15.239: Operation in the band 88–108 MHz.

ANSI C63.4-2003

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample : May 08, 2011

Testing commenced on : May 09, 2011

Testing concluded on : May 12, 2011

2.2. Equipment Under Test

Power supply system utilised

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

DC 3.7V from Battery

Support Equipment

Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.

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

GPS with FM Transmitter function

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. And the tuning controls were manually adjusted to verify maximum tuning range.

2.5. EUT configuration

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

o - supplied by the manufacturer

● - supplied by the lab

● Mouse Manufacturer : DELL
Model No. : MOC5UO

● Keyboard Manufacturer : DELL
Model No. : L100

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

This submittal(s) (test report) is intended for FCC ID: **ZMTSY-4319** filing to comply with Section 15.239 of the FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. Test Result Summary

Test Item	Test Standards and Procedure	Result
Radiated Emission	FCC Subpart 15C§15.239(b),(c) ANSI C63.4-2003 section 13. 4	Complied
Conducted Emission	FCC Subpart 15C§15.207 ANSI C63.4-2003 section 13. 3	Complied
Occupied Bandwidth	FCC Subpart 15C§15.239(a) ANSI C63.4-2003 section 13.7	Complied

NOTE:
1),The detailed test rusult please see section 4.
2),The test report merely corresponds to the test sample.
3),It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements

3.2. Test Facility

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

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.

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, 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

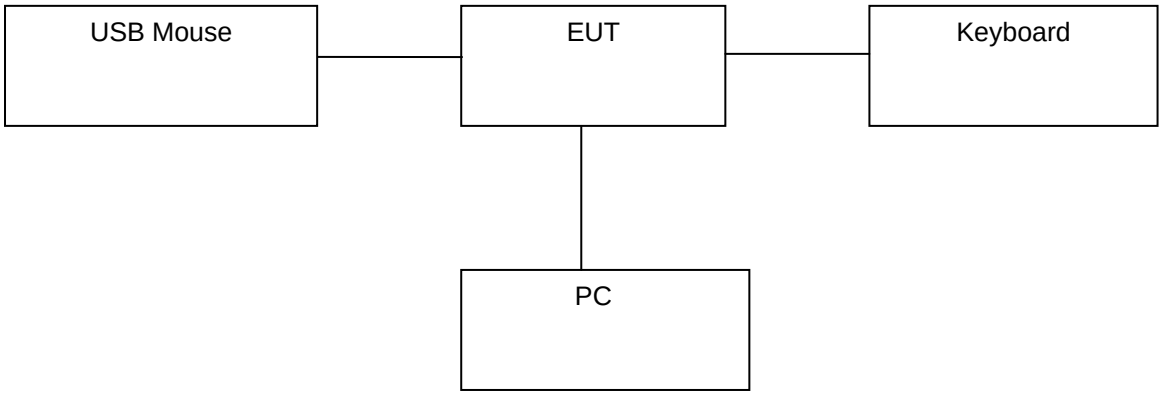


Table 2-1 Equipment Used in Tested System

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)

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

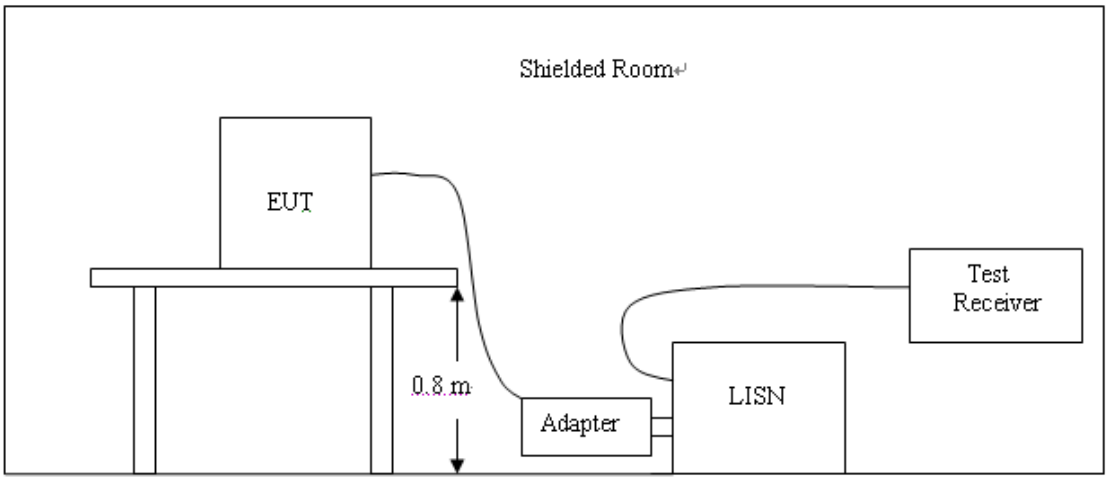
3.6. Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Last Cal.	Due. Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	2011/04/14	2012/04/13
2	Spectrum Analyzer	Agilent	E4402B	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
20	Spectrum Analyzer	Agilent	E7405A	2011/04/14	2012/04/13
21	Spectrum Analyzer	HP	8593E	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 adapter, the 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：

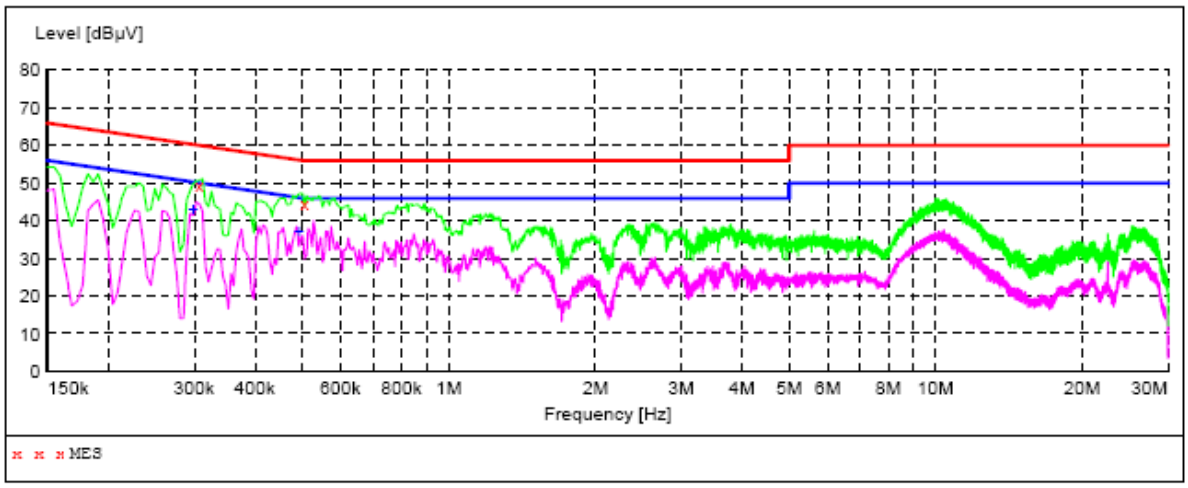
Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* 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



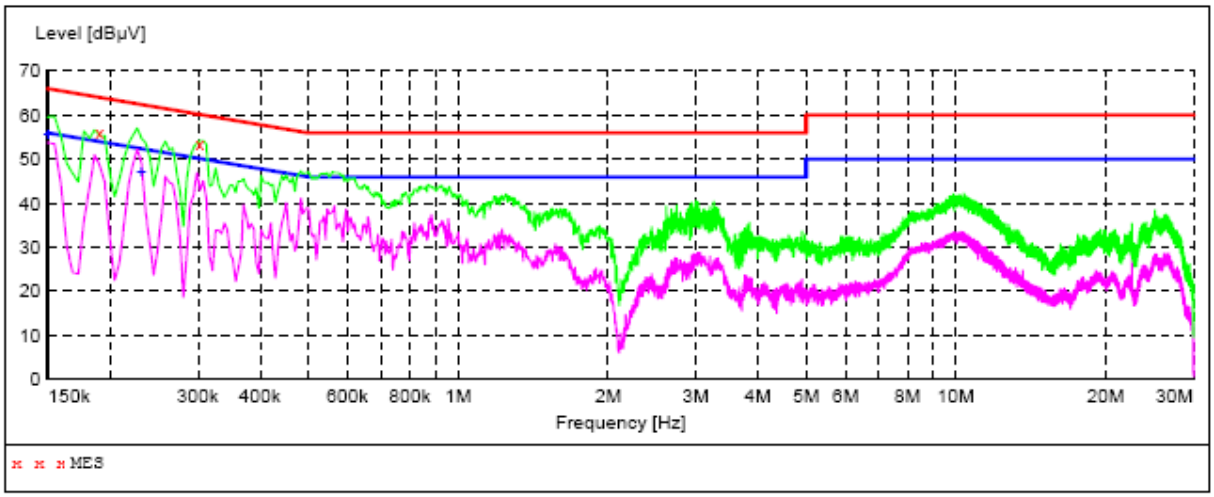
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.307500	49.60	10.0	60	10.4	QP	N	GND
0.505500	44.70	9.9	56	11.3	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.298500	42.80	10.0	50	7.5	AV	N	GND
0.492000	37.20	9.9	46	8.9	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
0.190500	55.90	9.9	64	8.1	QP	L1	GND
0.303000	53.40	10.0	60	6.8	QP	L1	GND

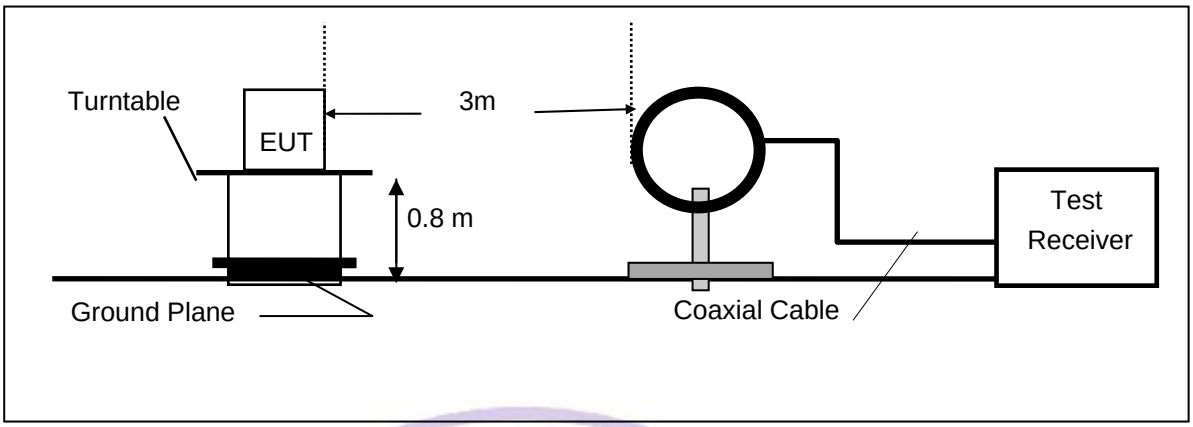
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	55.60	9.9	56	0.4	AV	L1	GND
0.231000	47.20	9.9	52	5.2	AV	L1	GND

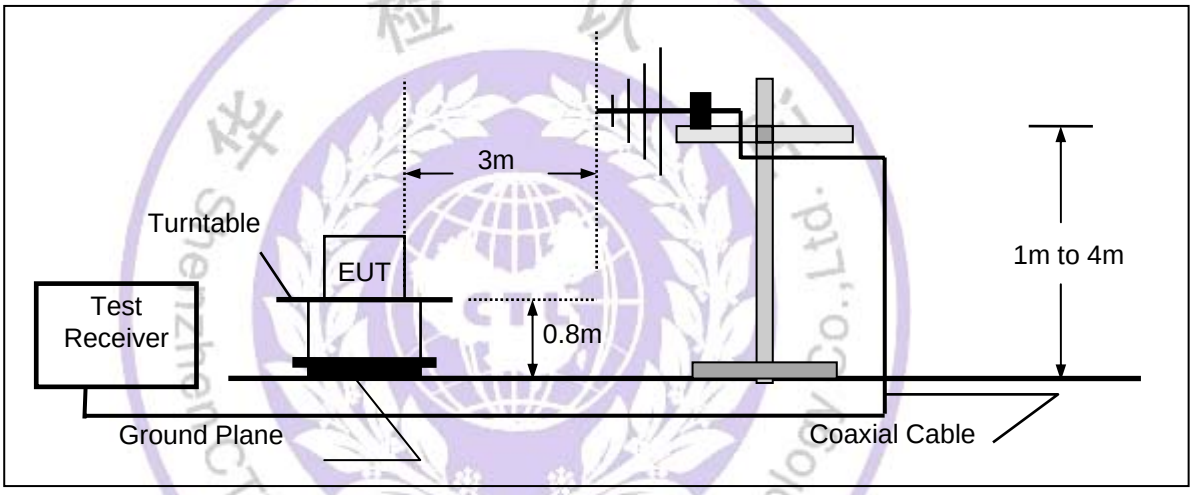
4.2. Radiated Emission Test

TEST CONFIGURATION

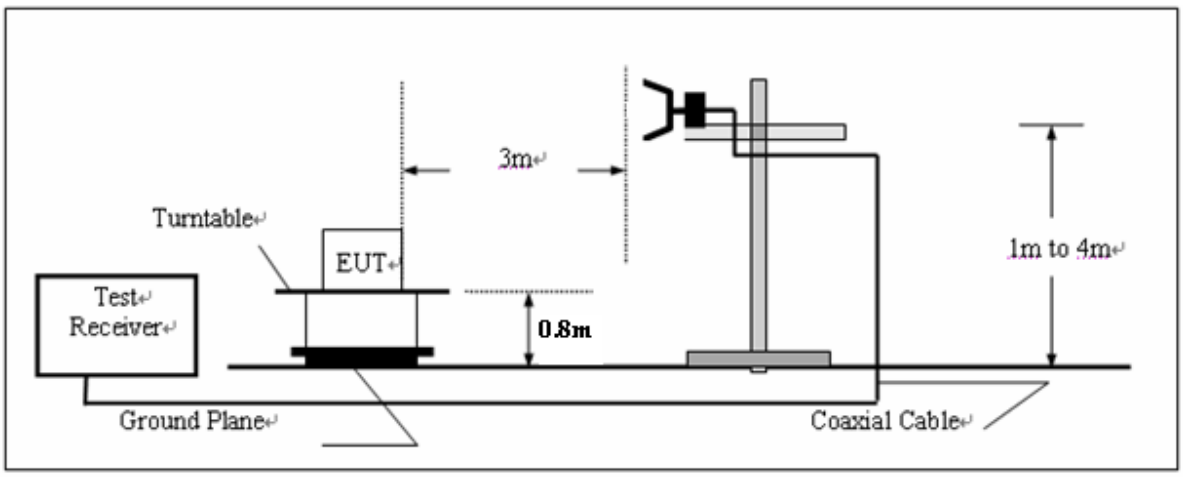
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.
2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

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)	Field Strength (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 high, middle and low frequencies are complete.

7. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were eported. The UUT was tested in 3 orthogonal planes.

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

Carrier frequency:

Frequency (MHz)	Read dBuV PK	Read dBuV AV	Polar	Ant Height m	Ant./CL Amp.CF(dB)	Result dBuv/m PK	Result dBuv/m AV	Limit dBuv/m PK	Limit dBuv/m AV	Margin dBuv/m PK	Margin dBuv/m AV
88.1	39.9	32.5	H	1.1	11.7	**51.6**	**44.2**	68	48	-16.4	-3.8
88.1	33.4	23.8	V	1.0	11.7	**45.1**	**35.5**	68	48	-22.9	-12.5

Frequency (MHz)	Read dBuV PK	Read dBuV AV	Polar	Ant Height m	Ant./CL Amp.CF(dB)	Result dBuv/m PK	Result dBuv/m AV	Limit dBuv/m PK	Limit dBuv/m AV	Margin dBuv/m PK	Margin dBuv/m AV
98.1	47.8	31.6	H	1.1	14.2	**62.0**	**45.8**	68	48	-6.0	-2.2
98.1	41.1	27.3	V	1.0	14.2	**55.3**	**41.5**	68	48	-12.7	-6.5

Frequency (MHz)	Read dBuv PK	Read dBuV AV	Polar	Ant Height m	Ant./CL Amp.CF(dB)	Result dBuv/m PK	Result dBuv/m AV	Limit dBuv/m PK	Limit dBuv/m AV	Margin dBuv/m PK	Margin dBuv/m AV
107.9	51.5	32.8	H	1.2	14.1	**65.6**	**46.9**	68	48	-2.4	-1.1
107.9	45.6	28.7	V	1.0	14.1	**59.7**	**42.8**	68	48	-8.3	-5.2

OUT-OF-BAND EMISSIONS:

Mode: 88.1 MHz

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
30	V	Peak	1.80	21.20	23.00	40.00	-17.00	
30	H	Peak	2.70	21.20	23.90	40.00	-16.10	
105.6	V	Peak	24.10	13.90	38.00	43.50	-5.50	
105.6	H	Peak	6.10	13.90	20.00	43.50	-23.50	
176.2	V	Peak	13.10	11.30	24.40	43.50	-19.10	
176.2	H	Peak	7.50	11.30	18.80	43.50	-24.70	
616.7	V	Peak	8.00	22.90	30.90	46.00	-15.10	
616.7	H	Peak	4.90	22.90	27.80	46.00	-18.20	
733.6	V	Peak	9.20	23.50	32.70	46.00	-13.30	
733.6	H	Peak	6.90	23.50	30.40	46.00	-15.60	
Others			---					

Mode: 98.1 MHz

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
30	V	Peak	1.90	21.20	23.10	40.00	-16.90	
30	H	Peak	2.90	21.20	24.10	40.00	-15.90	
109.7	V	Peak	23.90	13.90	37.80	43.50	-5.70	
109.7	H	Peak	5.80	13.90	19.70	43.50	-23.80	
196.2	V	Peak	14.50	11.30	25.80	43.50	-17.70	
196.2	H	Peak	3.50	11.30	14.80	43.50	-28.70	
294.3	V	Peak	8.80	23.50	32.30	46.00	-13.70	
294.3	H	Peak	4.10	23.50	27.60	46.00	-18.40	
Others			---					

Mode: 107.9 MHz

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
30	V	Peak	2.50	21.20	23.70	40.00	-16.30	
30	H	Peak	2.90	21.20	24.10	40.00	-15.90	
96.1	V	Peak	12.90	13.90	26.80	43.50	-16.70	
96.1	H	Peak	4.00	13.90	17.90	43.50	-25.60	
215.8	V	Peak	15.80	11.30	27.10	43.50	-16.40	
215.8	H	Peak	5.20	11.30	16.50	43.50	-27.00	
647.4	V	Peak	8.20	23.50	31.70	46.00	-14.30	
647.4	H	Peak	4.80	23.50	28.30	46.00	-17.70	
Others			---					

Remark：

(1) Measuring frequencies from 30 MHz to the 1 GHz。

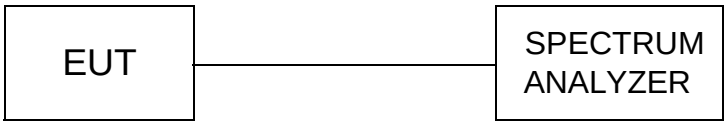
*(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.*

(3) 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.

(4) 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. 20dB Bandwidth Measurement

TEST CONFIGURATION



TEST PROCEDURE

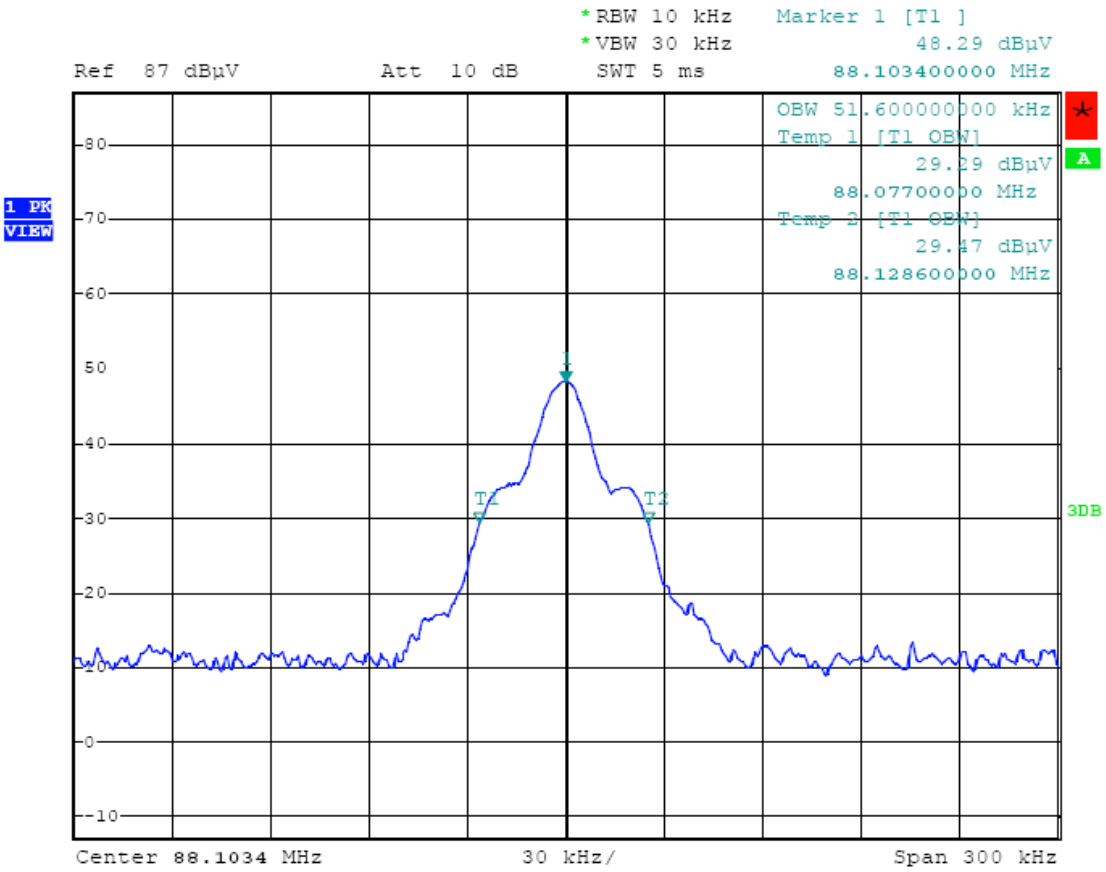
The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 10 KHz and VBW is set 30 KHz.

LIMIT

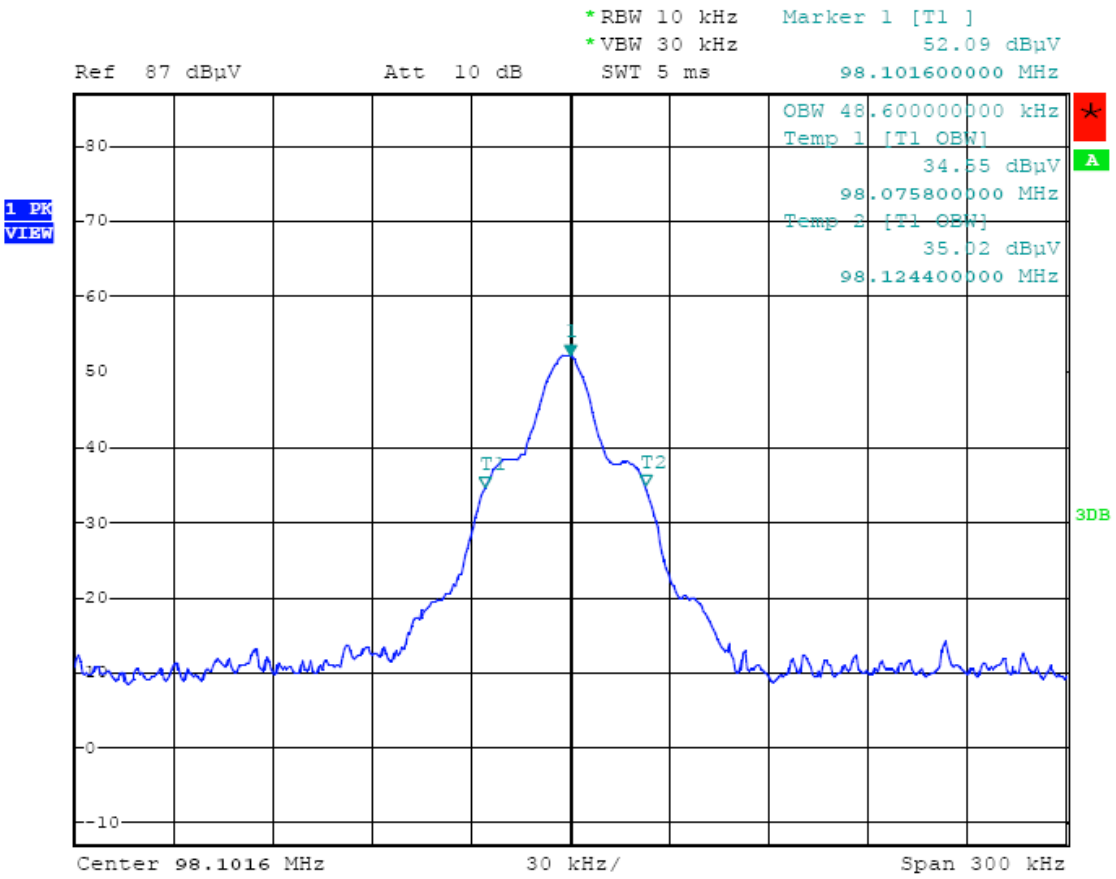
the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

TEST RESULTS

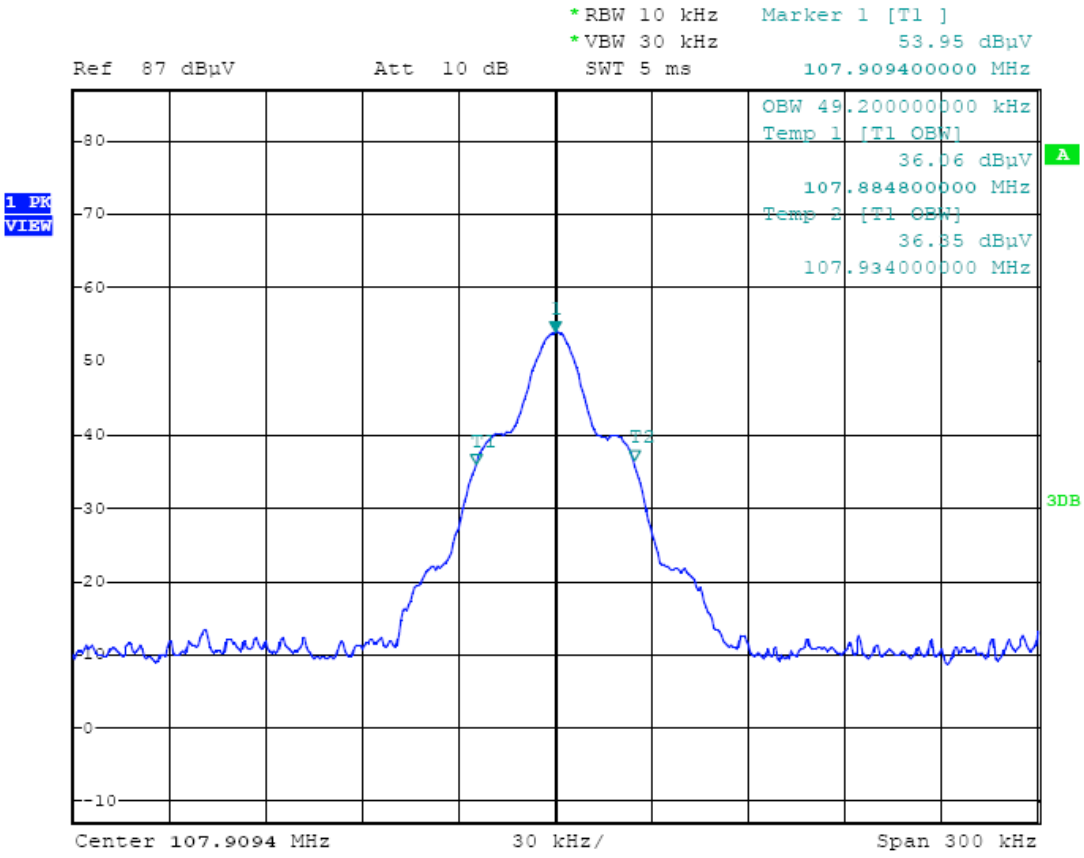
Bottom Channel:



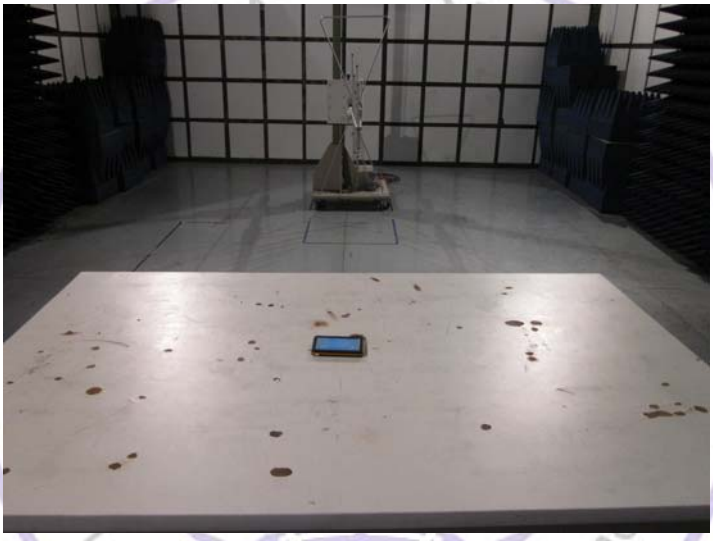
Mid Channel:



Top Channel:



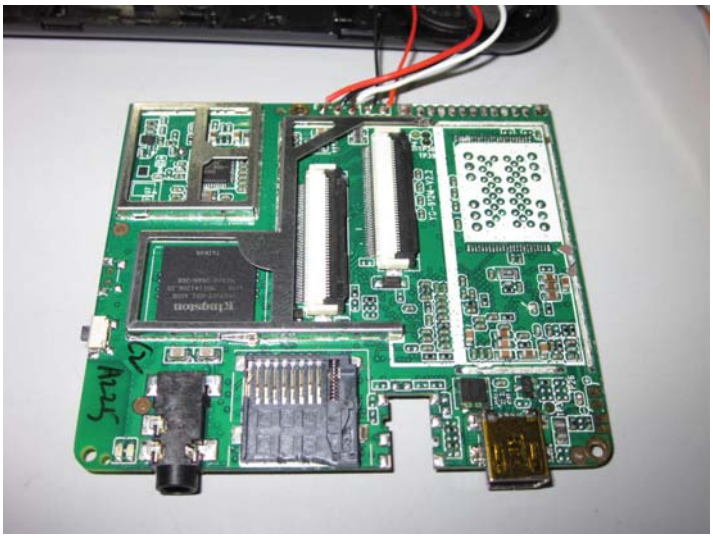
5. Test Setup Photos of the EUT

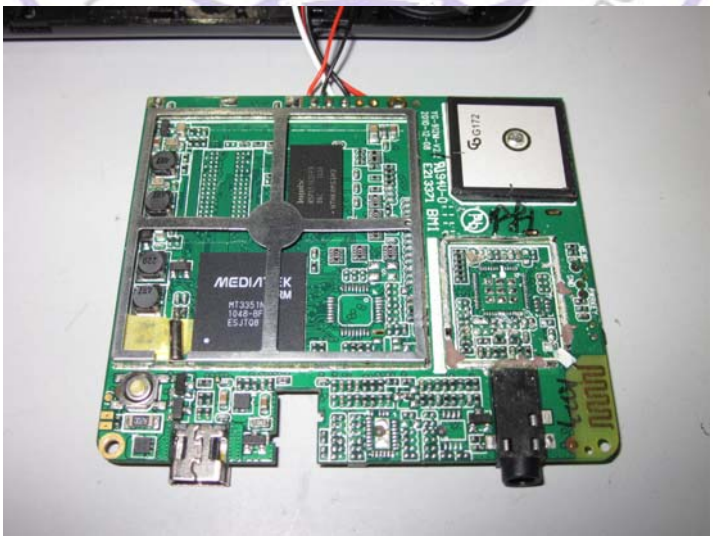


6. External and Internal Photos of the EUT

External Photos

Internal Photos





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