FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Wireless remote controller for motorcycle stereo audio

Model: MSM-2050

Brand: ACTIWAY,BOSS,SSL

Test Report Number:

C130620Z14-RP

Issued for

Shenzhen Actiway Electronics Co.,Ltd.

Building 2, Longwu Industrial Zone, Bulong Road, Longhua New District, Shenzhen 518131, China

Issued By

Compliance Certification Services (Shenzhen) Inc.

No.10-1 Mingkeda Logistics park, No.18 Huanguan South Rd.,
Guan Lan Town, Baoan District, Shenzhen, China

TEL: 86-755-28055000

FAX: 86-755-28055221

Issued Date: July 3, 2013

A2LA ACCREDITED
TESTING CERT #2861.01

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1. TEST RESULT CERTIFICATION

Product	Wireless remote controller for motorcycle stereo audio
Model	MSM-2050
Brand	ACTIWAY,BOSS,SSL
Tested	June 20~July 3, 2013
Applicant	**Shenzhen Actiway Electronics Co.,Ltd.** Building 2, Longwu Industrial Zone, Bulong Road, Longhua New District, Shenzhen 518131, China
Manufacturer	**Shenzhen Actiway Electronics Co.,Ltd.** Building 2, Longwu Industrial Zone, Bulong Road, Longhua New District, Shenzhen 518131, China

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
DEVIATION FROM APPLICABLE STANDARD	
None	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.209 and Part 15.231.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Tom Gan.

Tom Gan
Supervisor of EMC Dept.
Compliance Certification Service Inc.

Reviewed by:

Ruby zhang

Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Service Inc.

2. EUT DESCRIPTION

Product	Wireless remote controller for motorcycle stereo audio
Model	MSM-2050
Brand	ACTIWAY,BOSS,SSL
Model Difference	N/A
Power Supply	DC3.0V supplied by the battery
Frequency Range	433.92 MHz
Transmit Power	Peak: 79.45dBuV/m (Max.) Average: 69.65dBuV/m (Max.)
Modulation Technique	OOK
Number of Channels	1 Channel
Antenna Designation	PCB printed antenna
Temperature Range	-20°C ~ +70°C

Remark: *This submittal(s) (test report) is intended for FCC ID: YBM-MSM2050V2 filing to comply with Section 15.209 and 15.231 of the FCC Part 15, Subpart C Rules.*

3. TEST METHODOLOGY

3.1 DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.
The following test mode(s) were scanned during the preliminary test below 1G:

Test Item	Test mode	Worse mode
Conducted Emission	Not applicable since the EUT supplied by the battery.	☐
Radiated Emission	Mode 1: TX	☒

Above 1G, TX mode with the highest data rate (worst case) are chosen for full testing.

The field strength of spurious radiation emission was measured in the following position: EUT stand-up position (Y mode) and lie-down position (X, Z mode) The following data show only the worst case setup.

The worst case (X axis) was reported.

4. FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at **No.10-1, Mingkeda Logistics Park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI The sites are constructed in conformance with the requirements of ANSI C63.4:2003, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

4.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	**A2LA**
China	**CNAS**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI(C-3478, R-3135, T-652, G-624)**
Canada	**INDUSTRY CANADA**
Taiwan	**BSMI**
Norway	**Nemko**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsrf.com

4.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	*Uncertainty*
Radiated Emission, 30 to 200 MHz Test Site : 966(2)	+/-3.6880dB
Radiated Emission, 200 to 1000 MHz Test Site : 966(2)	+/-3.6695dB
Radiated Emission, 1 to 8 GHz	+/-5.1782dB
Radiated Emission, 8 to 18 GHz	+/-5.2173dB
Conducted Emissions	+/-3.6836dB
Band Width	178kHz
Peak Output Power MU	+/-1.906dB
Band Edge MU	+/-0.182dB
Channel Separation MU	416.178Hz
Duty Cycle MU	0.054ms
Frequency Stability MU	226Hz

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

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.

5. SETUP OF EQUIPMENT UNDER TEST

5.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

5.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
N/A						

Remark:

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6. FCC PART 15.231 REQUIREMENTS

6.1 20 DB BANDWIDTH

LIMIT

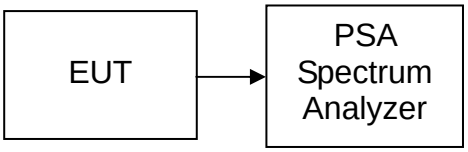
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated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

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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 30kHz.

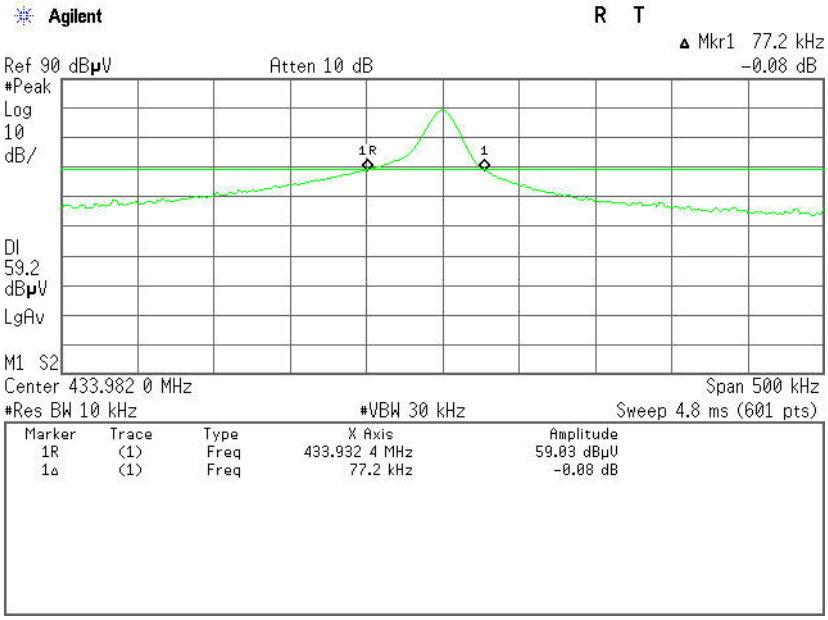
TEST RESULTS

No non-compliance noted.

Test Data

Frequency (MHz)	20 dB Bandwidth (MHz)	Limit (MHz)	Result
433.98	0.0772	1.0850	PASS

Test Plot



6.2 LIMIT OF TRANSMISSION TIME

LIMIT

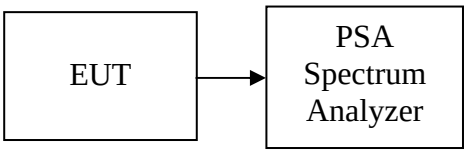
According to 15.231 (a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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 and VBW are set to 1MHz.

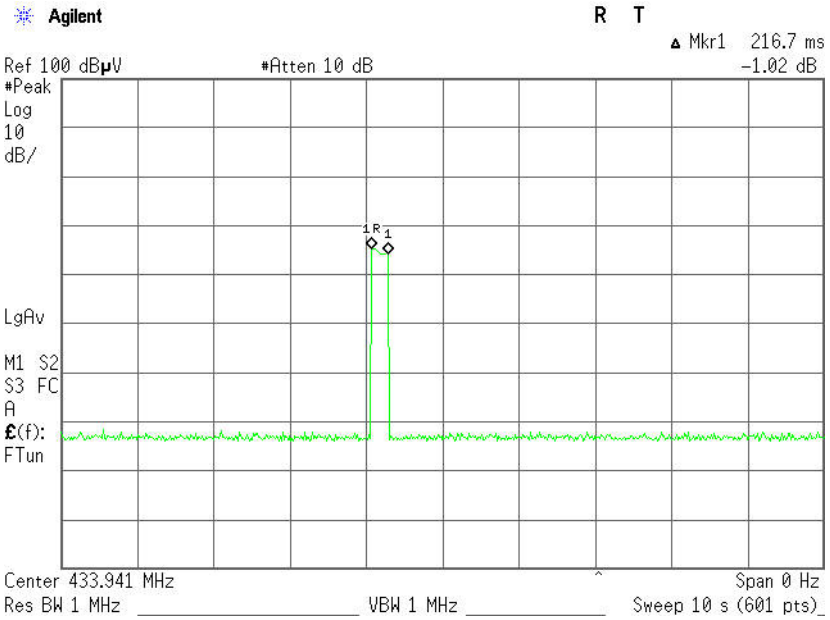
TEST RESULTS

No non-compliance noted

Test Data

Frequency (MHz)	Transmission time (ms)	Limit (Second)	Result
433.94	216.70	5.00	PASS

Test Plot



6.3 DUTY CYCLE

LIMIT

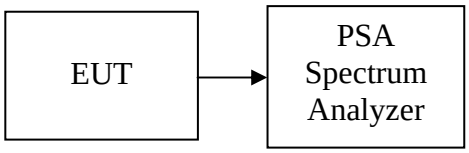
Nil (No dedicated limit specified in the Rules)

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Adjust Sweep = 20ms
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted

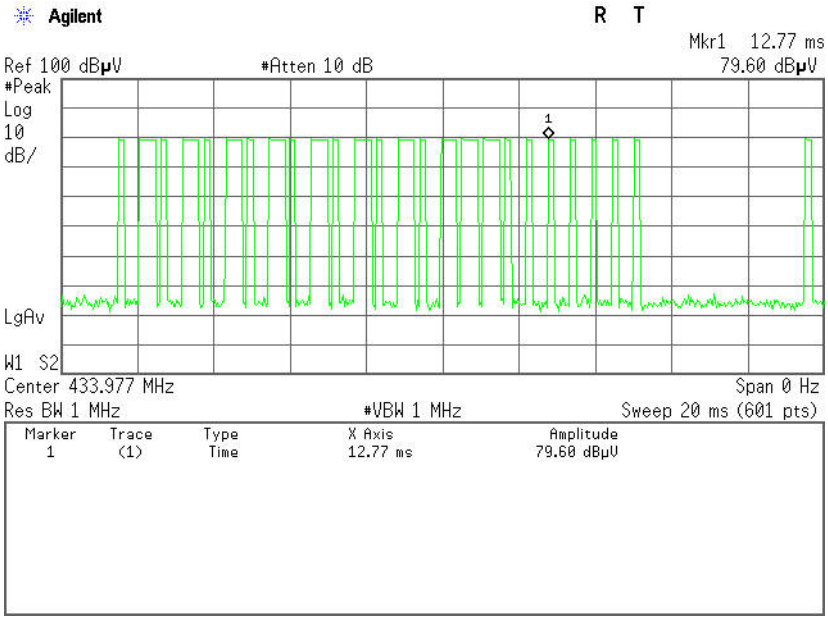
Test Data

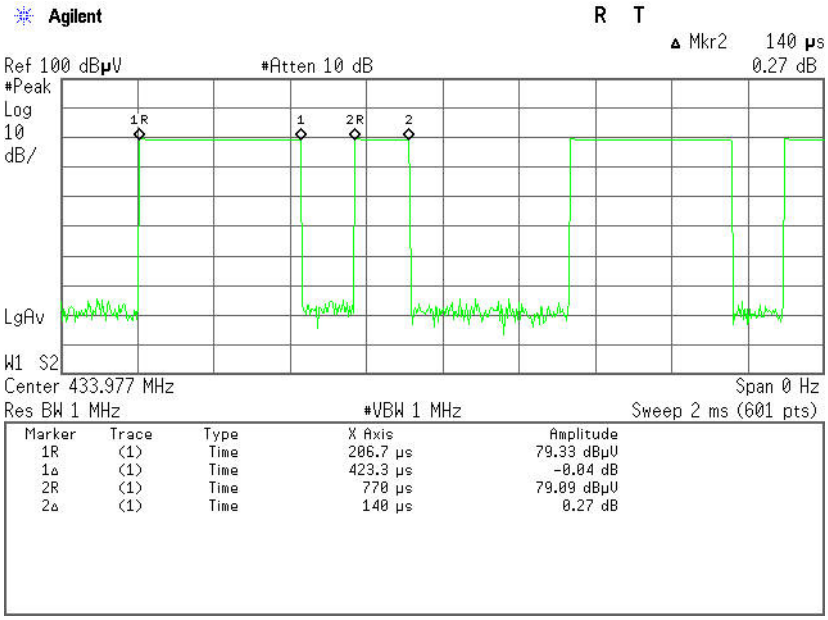
Ton + off = 20ms

Ton =0.423*10+0.14*16=6.47ms

Duty Cycle Correction Factor = 20 log (Ton / Ton+ off) = 20* log (6.47/20) =-9.8dB*

Test Plot





6.4 RADIATED EMISSIONS

LIMIT

1. According to §15.231(b), In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following: Fundamental Field Strength of Field Strength of Frequency Fundamental Spurious Emissions (MHz) (microvolts/meter) (microvolts/meter)

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 – 40.70	2,250	225
70 – 130	1,250	125
130 – 174	1,250 to 3,750 **	125 to 375 **
174 – 260	3,750	375
260 – 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

2. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

3. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

MEASUREMENT EQUIPMENT USED

Radiated Emission Test Site 966（2）					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1411843	03/18/2013	03/18/2014
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A、R、A	PLA-1030/B	1029	03/19/2013	03/18/2014
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

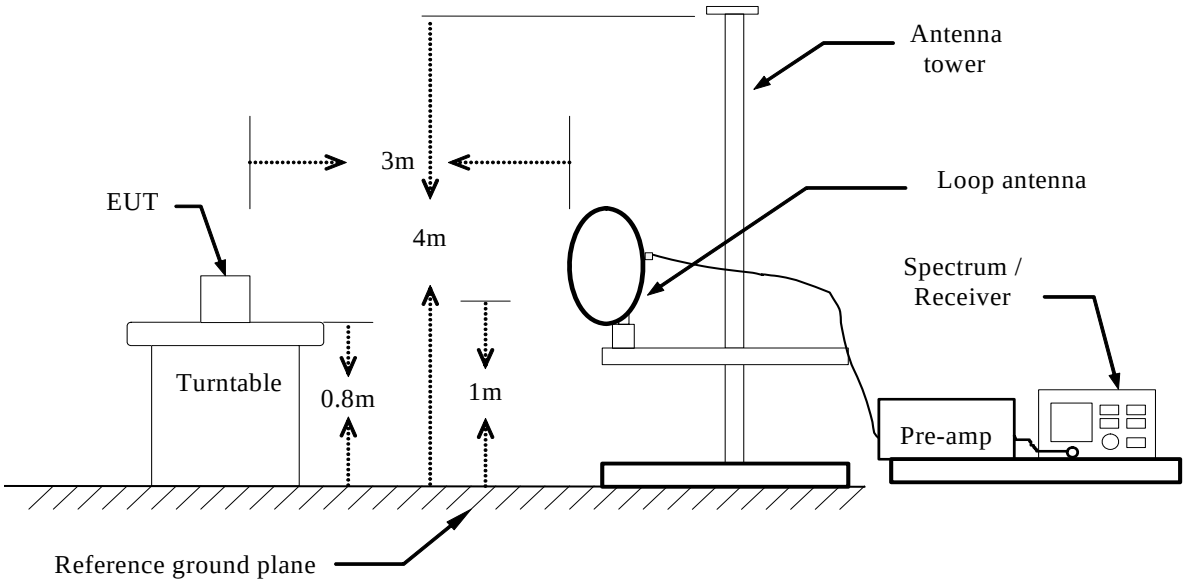
   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

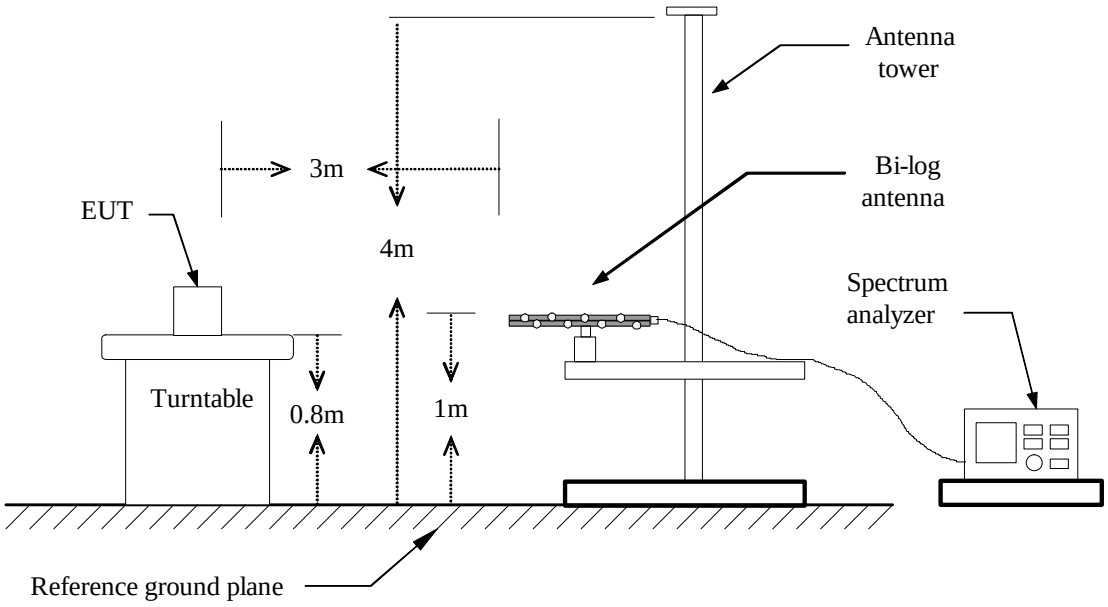
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

TEST CONFIGURATION

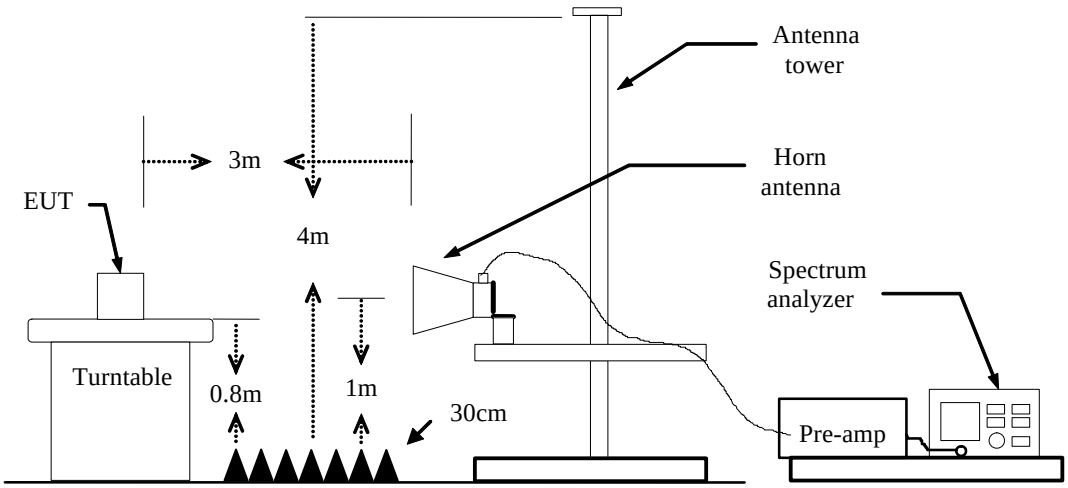
Below 30MHz



Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

DATA SAMPLE

Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	37.47	-16.41	21.06	40.00	-18.94	V	QP

Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	55.54	4.56	60.10	74.00	-13.90	V	Peak
XXXX.XXXX	29.66	4.56	34.22	54.00	-19.78	V	AVG

Frequency (MHz) = Emission frequency in MHz
Reading (dBuV) = Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
Q.P. = Quasi-peak Reading
Peak = Peak Reading
AVG = Average Reading

TEST RESULTS

Operation Mode: TX **Test Date:** June 27,2013

Temperature: 24°C **Tested by:** Mack LiC

Humidity: 52 % RH **Polarity:** Ver. / Hor.

Fundamental:

Freq. (MHz)	Reading (Peak) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Duty Cycle Correction Factor (dB)	Result (Average/ Quasi-peak) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pol (H/V)	Remark
434.1666	94.31	-14.86	79.45	---	---	100.83	-21.38	V	Peak
434.1666	94.31	-14.86	79.45	-9.8	69.65	80.83	-11.18	V	Average
434.1666	82.10	-14.86	67.24	---	---	100.83	-33.59	H	Peak
434.1666	82.10	-14.86	67.24	-9.8	57.44	80.83	-23.39	H	Average

Remark: Average =Peak result+ Duty cycle correction factor

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
89.8167	46.87	-23.32	23.55	43.50	-19.95	V	QP
327.4667	42.61	-17.49	25.12	46.00	-20.88	V	QP
464.8833	43.57	-14.92	28.65	46.00	-17.35	V	QP
497.2167	40.04	-14.27	25.77	46.00	-20.23	V	QP
592.6000	43.61	-12.70	30.91	46.00	-15.09	V	QP
613.6167	42.09	-12.40	29.69	46.00	-16.31	V	QP
225.6167	44.45	-17.90	26.55	46.00	-19.45	H	QP
290.2832	42.28	-18.26	24.02	46.00	-21.98	H	QP
350.1000	48.07	-16.67	31.40	46.00	-14.60	H	QP
464.8833	47.92	-14.92	33.00	46.00	-13.00	H	QP
773.6666	42.11	-11.09	31.02	46.00	-14.98	H	QP
867.4333	43.20	-9.52	33.68	46.00	-12.32	H	QP

Remark: *No emission found between lowest internal used/generated frequency to 30MHz.*

Remark:

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
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 SPA between 30MHz to 1GHz was 100kHz.*

Above 1 GHz

Operation Mode:	TX	**Test Date:**	June 27,2013
Temperature:	24°C	**Humidity:**	52 % RH
Tested by:	Mack Li		

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1300.0000	61.70	-8.28	53.42	74.00	-20.58	V	peak
1300.0000	44.45	-8.28	36.17	54.00	-17.83	V	AVG
1733.3333	63.38	-9.19	54.19	74.00	-19.81	V	peak
1733.3333	46.24	-9.19	37.05	54.00	-16.95	V	AVG
2166.6667	64.79	-8.52	56.27	74.00	-17.73	V	peak
2166.6667	46.46	-8.52	37.94	54.00	-16.06	V	AVG
2606.6667	63.96	-5.81	58.15	74.00	-15.85	V	peak
2606.6667	45.36	-5.81	39.55	54.00	-14.45	V	AVG
3040.0000	51.95	-4.21	47.74	74.00	-26.26	V	peak
3473.3333	51.52	-3.64	47.88	74.00	-26.12	V	peak
1300.0000	62.73	-8.28	54.45	74.00	-19.55	H	peak
1300.0000	45.03	-8.28	36.75	54.00	-17.25	H	AVG
1733.3333	55.68	-9.19	46.49	74.00	-27.51	H	peak
2173.3333	49.26	-8.41	40.85	74.00	-33.15	H	peak
2606.6667	59.46	-5.81	53.65	74.00	-20.35	H	peak
2606.6667	42.23	-5.81	36.42	54.00	-17.58	H	AVG
2906.6667	47.64	-4.61	43.03	74.00	-30.97	H	peak
3360.0000	46.83	-4.02	42.81	74.00	-31.19	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *Spectrum AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

6.5 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
LISN	SCHAFFNER	NNB42	2001/001	05/26/2013	05/26/2014
LISN	EMCO	3825/2	8901-1459	03/09/2013	03/08/2014
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/04/2013	03/03/2014
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

Not applicable (Since the EUT is powered by battery)