

FCC ID TEST REPORT

for

FM Transmitter

Model: LH-101

FCC ID: 2AANQLH-101

Prepared for: Shenzhen United electronic Technology Co., Ltd.
Floor 7, Bldg. 1, Fumin Industrial Zone, Qiaotou, Fuyong Town,
Baoan Dist., Shenzhen, Guangdong, China (Mainland)

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Report Number: TCT130716003F2-1
Date of Test: July 22~26, 2013
Date of Report: July 26, 2013

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.

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1.0 General Details**1.1 Test Lab Details**

Name :	Shenzhen TCT Testing Technology Co.,Ltd
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Site Listed with Federal Communication Commission

Registration Number: 572331

For 3m chamber

Site Listed with Industry Canada of Ottawa, Canada

Registration Number IC: 10668A-1

For 3m chamber

1.2 Applicant Details

Applicant:	Shenzhen United electronic Technology Co., Ltd.
Address:	Floor 7, Bldg. 1, Fumin Industrial Zone, Qiaotou, Fuyong Town, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Telephone:	0755-61557182
Fax:	0755-61557183

Manufacturer:	Shenzhen United electronic Technology Co., Ltd.
Address:	Floor 7, Bldg. 1, Fumin Industrial Zone, Qiaotou, Fuyong Town, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Telephone:	0755-61557182
Fax:	0755-61557183

1.3 Description of EUT

Product:	FM Transmitter
Model No.:	LH-101
Additional Model No.:	LH-100, LH-102, LH-105, LH-106
Brand Name:	L.HOME
Rating:	DC 4.2 V battery or; DC 5V via USB line
Operation Frequency:	88.10 to 107.90MHz (step 0.1MHz)
Antenna Designation:	An integral antenna and the maximum gain is 0 dBi.

1.4 Statement: These models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

1.5 Test Engineer

The sample tested by



Printed name: Jack Kang

2.0 Test equipments and Associated Equipment used during the test.

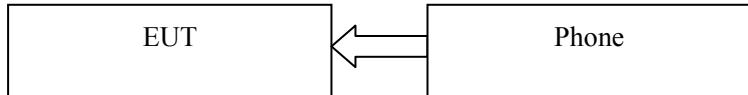
2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 7, 2013	July 6, 2014
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 7, 2013	July 6, 2014
Pre-amplifier	Teseq	LAN6900	--	July 8, 2013	July 7, 2014
Pre-amplifier	Agilent	8447D	83153007374	July 8, 2013	July 7, 2014
Pre-amplifier	Agilent	8449B	3008A01738	July 8, 2013	July 7, 2014
Triple-loop antenna	ROHDE&SCHWARZ	HM020	843885/002	July 8, 2013	July 7, 2014
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 8, 2013	July 7, 2014
Horn Antenna	ETS LINDGREN	3117	--	July 8, 2013	July 7, 2014
EMI Test Receiver	R&S	ESCS30	100139	July 7, 2013	July 6, 2014
LISN	AFJ	LS16C	16010222119	July 7, 2013	July 6, 2014

2.2 AE used during the test

Equipment type	Manufacturer	Model
Phone	SAMSUNG	GT-S5570
N/A		
N/A		

2.3. Block Diagram of EUT Configuration



Note: 1) This EUT is powered from the DC 4.2V by Lithium Battery or DC 5V by USB line

2) The EUT can transmit an audio signal which input via the audio port from a mobile phone.

The EUT operate from 88.1MHz to 107.9MHz. Three channels were selected to conduct the tests.

Lowest channel (88.1 MHz); Middle channel (98 MHz); Highest channel (107.9 MHz),

3) During testing, the EUT was actively playing music set to its maximum audio volume in order to generate the worst case emissions (e.g. to generate the maximum bandwidth during bandwidth test). No test tones were used for testing. The tuning range of the EUT was manually verified and the conclusion is that it only works at selected channels within 88.1-107.9MHz, not below and not above this range.

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result	Notes
Conduction Emission, 0.15MHz to 30MHz	15.207	PASS	Complies
Fundamental Radiation Emission	15.239(b), 15.35	PASS	Complies
Spurious Radiation Emission	15.239(c), 15.209	PASS	Complies
Occupied Bandwidth	15.239(a)	PASS	Complies
Antenna Requirement	15.203	PASS	Complies

Note: N/A=Not applicable

3.2 Test Standards

FCC Part 15:2012 Subpart C, Paragraph 15.239

4.0 EUT Modification

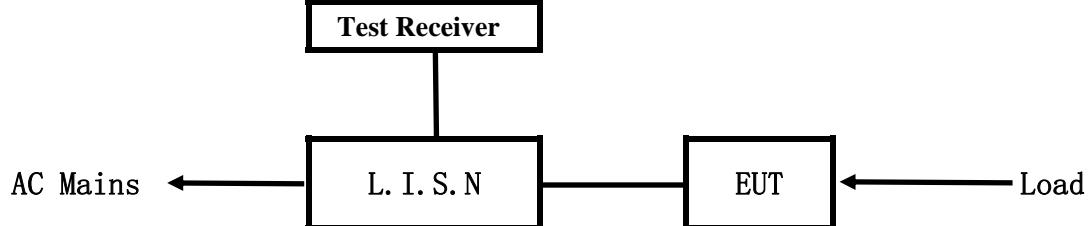
No modification by Shenzhen TCT Testing Technology Co., Ltd

5.0 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	MU
1.	Radio Frequency	$\pm 1 \times 10^{-9}$
2.	Temperature	$\pm 0.1^\circ\text{C}$
3.	Humidity	$\pm 1.0\%$
4.	RF power, conducted	$\pm 0.34\text{dB}$
5.	RF power density, conducted	$\pm 1.45\text{dB}$
6.	Spurious emissions, conducted	$\pm 3.70\text{dB}$
7.	All emissions, radiated	$\pm 4.50\text{dB}$

6.0 Power Line Conducted Emission Test

6.1 Schematics of the test



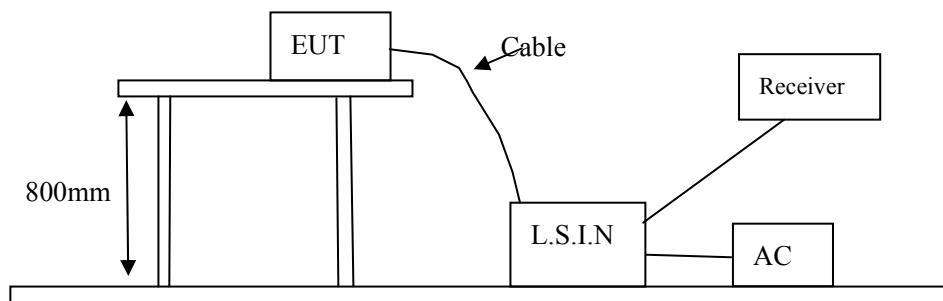
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009. The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009

- 1) Setup the EUT and simulators as shown on the following
- 2) Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Please refer to the Section 2

6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

Notes: 1) *Decreasing linearly with logarithm of frequency.
2) The tighter limit shall apply at the transition frequencies

6.6 Photo documentation of the test set-up

Please refer to the Section 17

6.7 Test specification:

Environmental conditions: Temperature: 22° C Humidity: 52% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- Tx mode

6.8 Test result

Min. limit margin 8.35 dBm at 0.4914 MHz

The requirements are FULFILLED

Remarks: _____

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

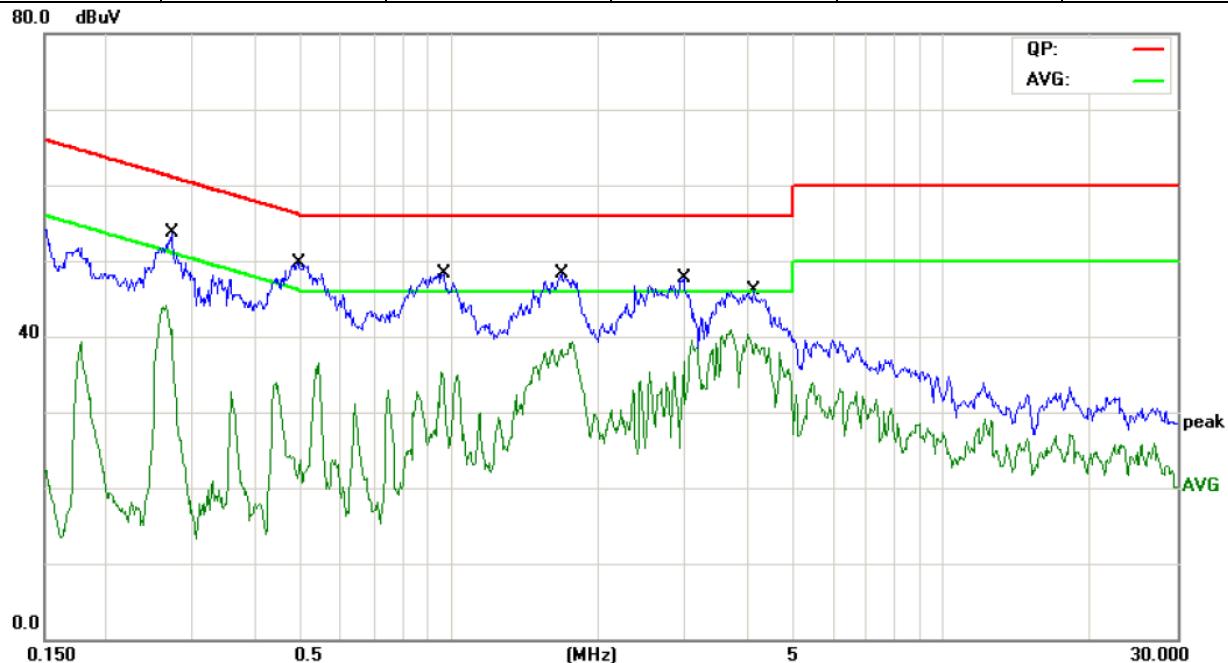
EUT Description: FM Transmitter

Operation Mode: Tx Mode

Tested By: Beryl Zhao

Test date: July 25, 2013

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.2714	51.65	36.93	--	--	61.07	51.07
0.4914	47.79	31.12	--	--	56.14	46.14
0.9684	45.38	31.12	--	--	56.00	46.00
1.6794	45.25	29.54	--	--	56.00	46.00
2.9780	44.74	30.32	--	--	56.00	46.00
4.1444	42.10	30.45	--	--	56.00	46.00

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

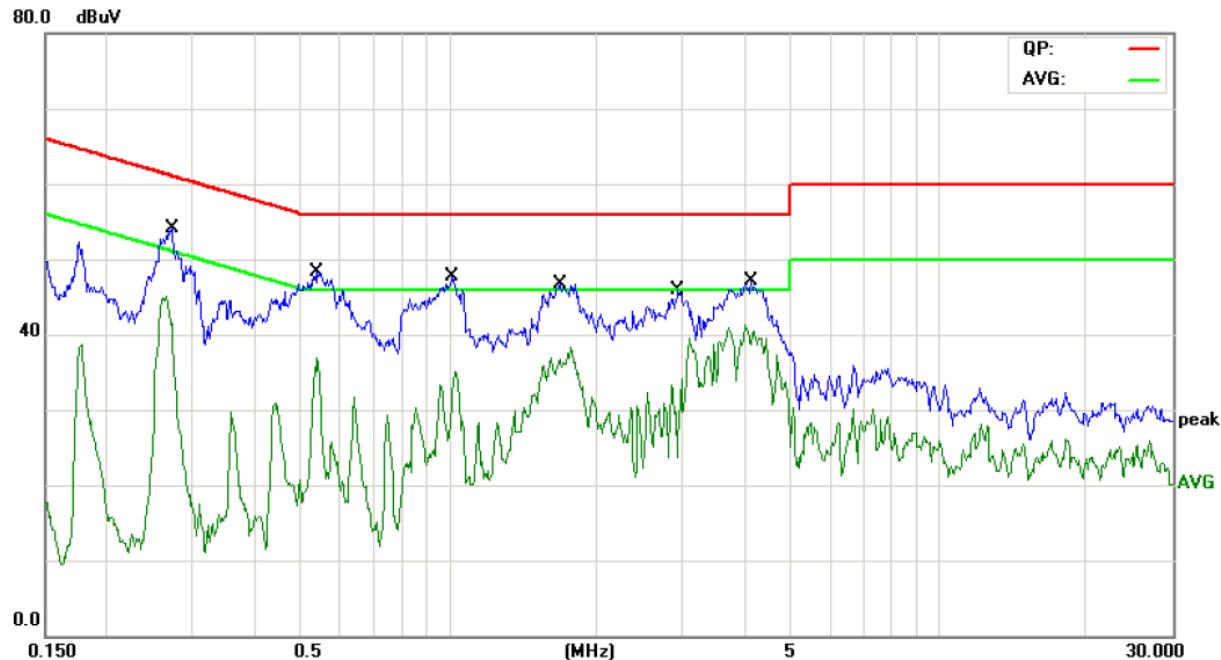
EUT Description: FM Transmitter

Operation Mode: Tx Mode

Tested By: Beryl Zhao

Test Data: July 25, 2013

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



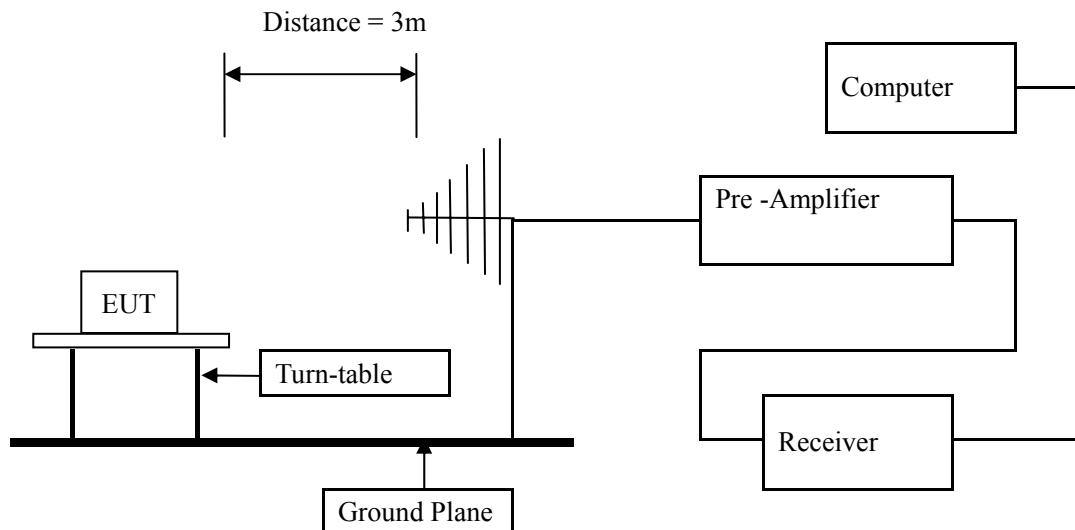
Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.2714	--	--	50.15	34.45	61.07	51.07
0.5403	--	--	44.22	29.99	56.00	46.00
1.0156	--	--	43.62	31.35	56.00	46.00
1.6794	--	--	43.75	32.12	56.00	46.00
2.9305	--	--	43.97	30.54	56.00	46.00
4.1444	--	--	44.10	31.43	56.00	46.00

7.0 Fundamental Radiation Emission

7.1 Test Method and test Procedure:

- 1) The EUT was tested according to ANSI C63.10 –2009.
- 2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009.
- 3) The EUT works in 88.10MHz, 98.00MHz and 107.9MHz respectively with the average detector and peak detector. Measurements were made at 3 meters.
- 4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- 5) The antenna polarization: Vertical polarization and Horizontal polarization.

7.2 Block diagram of Test setup



7.3 Limit

According to 15.239(b), the field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolt/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

Frequency Range (MHz)	Limits(dB μ V)	
	Peak	Average
88.1-107.9	68	48

Note:

- 1) RF Voltage (dB μ V) = $20 \log_{10}$ RF Voltage (uV)
- 2) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 3) The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
- 4) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula $Ld1 = Ld2 * (d2/d1)$

7.4 Photo documentation of the test set-up

Please refer to the Section 12

7.5 Test Equipment:

Please refer to the Section 2

7.6 Test specification:

Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

7.7 Test result

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor
2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Result: Pass

Data (Test Mode: TX 88.10MHz):

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction(H/V)
88.10	42.51	48	Average	H
88.10	54.43	68	Peak	H
88.10	44.46	48	Average	V
88.10	57.62	68	Peak	V

Data (Test Mode: TX 98.00MHz):

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction(H/V)
98.00	40.62	48	Average	H
98.00	52.22	68	Peak	H
98.00	43.24	48	Average	V
98.00	54.87	68	Peak	V

Data (Test Mode: TX 107.90MHz):

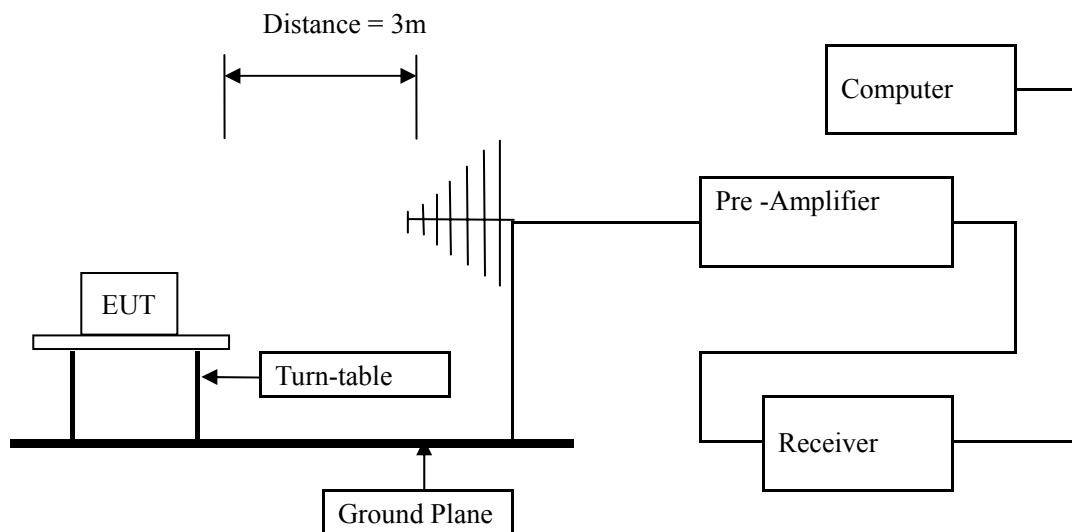
Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction(H/V)
107.90	40.74	48	Average	H
107.90	52.78	68	Peak	H
107.90	43.11	48	Average	V
107.90	55.38	68	Peak	V

8.0 Spurious Emission Test

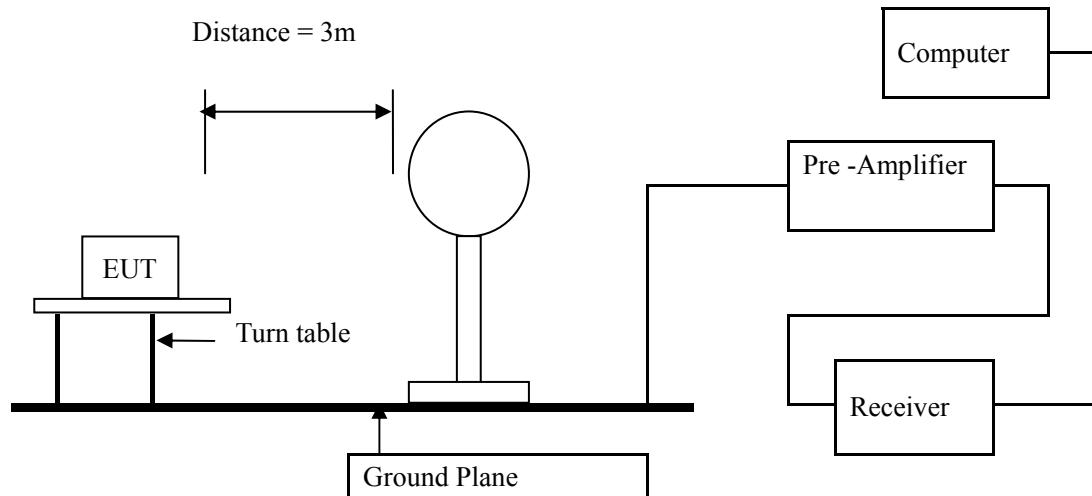
8.1 Test Method and test Procedure:

- 1) The EUT was tested according to ANSI C63.10 –2009.
- 2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009.
- 3) The frequency spectrum from 9kHz to 2GHz was investigated. All readings from 9kHz to 30MHz are quasi-peak values with a resolution bandwidth of 10 kHz. All readings from 30MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
- 4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- 5) The antenna polarization: Vertical polarization and Horizontal polarization.

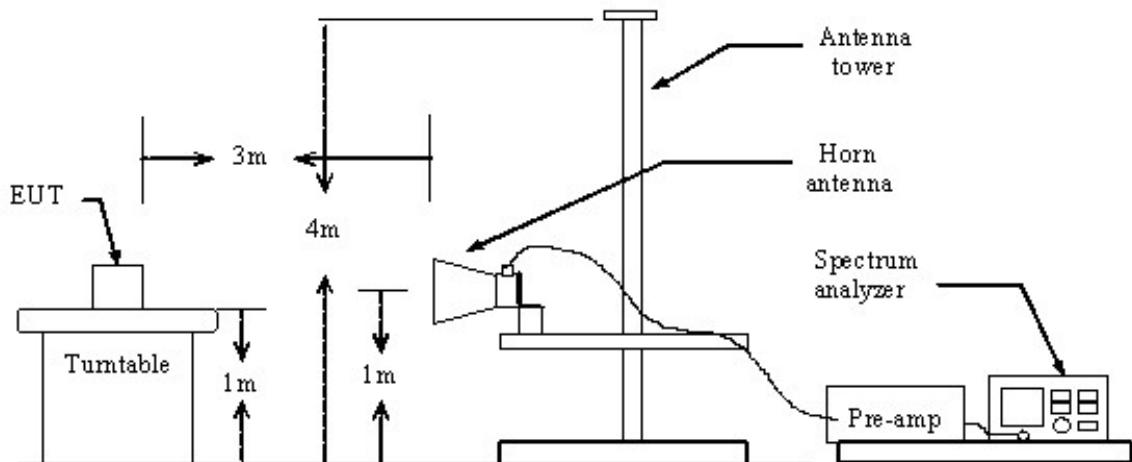
8.2 Block diagram of Test setup



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



8.3 Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	$20\log 2400/F$ (kHz) + 80
0.490-1.705	3	$20\log 24000/F$ (kHz) + 40
1.705-30	3	$20\log 30 + 40$
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1) RF Voltage (dBuV) = $20 \log$ RF Voltage (uV)
- 2) In the Above Table, the tighter limit applies at the band edges.
- 3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4) The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand). After pre-test. It was found that the worse radiated emission was get at the lying position.
- 5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 9kHz-1000MHz. As to 1G-2G, the final emission level got using PK and AV detector.
- 6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula $Ld1 = Ld2 * (d2/d1)$

8.4 Photo documentation of the test set-up

Please refer to the Section 12

8.5 Test Equipment:

Please refer to the Section 2

8.6 Test specification:

Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

8.7 Test result

Result: Pass

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor
2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

A Radiated Emission (9 kHz---30 MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)	Remark
12.5419	39.76	--	69.5	QP
24.0034	40.35	--	69.5	QP
28.8723	43.22	--	69.5	QP

Note: Measurements were conducted in all three channels (high, middle, low), and the worst case (high channel) was submitted only.

B Radiated Emission (30MHz----1000MHz)

Low channel: 88.10 MHz

Frequency (MHz)	Level@3m(d μ V/m)	Antenna Polarity	Limit@3m (d μ V/m)	Remark
66.2478	32.26	H	40.00	QP
180.3765	37.38	H	43.50	QP
350.1826	39.27	H	46.00	QP
68.3176	31.85	V	40.00	QP
175.8859	36.38	V	43.50	QP
264.1538	38.26	V	46.00	QP

Middle channel: 98.00 MHz

Frequency (MHz)	Level@3m(d μ V/m)	Antenna Polarity	Limit@3m (d μ V/m)	Remark
65.3454	33.79	H	40.00	QP
201.9673	35.27	H	43.50	QP
572.7876	38.34	H	46.00	QP
60.2087	32.74	V	40.00	QP
197.1522	34.22	V	43.50	QP
587.2075	36.97	V	46.00	QP

High channel: 107.90 MHz

Frequency (MHz)	Level@3m(d μ V/m)	Antenna Polarity	Limit@3m (d μ V/m)	Remark
72.7295	31.28	H	40.00	QP
214.8965	33.96	H	43.50	QP
572.9784	37.32	H	46.00	QP
69.2974	30.26	V	40.00	QP
205.6925	32.67	V	43.50	QP
647.3451	35.39	V	46.00	QP

C Radiated Emission (1000MHz----2000MHz)

Freq. (MHz)	Ant. Pol. H/V	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin(dB)
		Peak (dBuV/m)	AV (dBuV/m)			
---	H	---	---	74.00	54.00	---
---	H	---	---	74.00	54.00	---
---	H	---	---	74.00	54.00	---

Notes: 1) Measurements were conducted in all (Low channel, Middle channel, High channel) modes;

2) Measurements were conducted the 10th harmonic of highest fundamental frequency.

3) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

9.0 Occupied Bandwidth

9.1 Test Equipment

Please refer to the Section 2

9.2 Test Specification:

Environmental conditions: Temperature 24° C Humidity: 50% Atmospheric pressure: 103kPa

9.3 Limit

According to 15.239(a), Emissions from intentional radiator shall be confined within a band 200 kHz wide centered on the operating on the frequency. The 200 kHz band shall be lie wholly within the frequency range of 88-108 MHz

9.4 Test status:

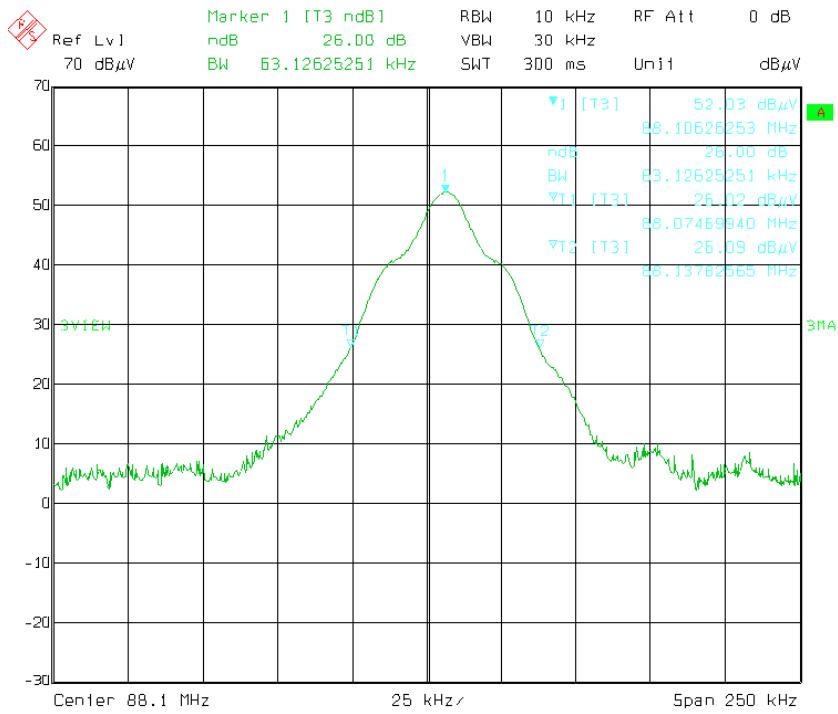
Pre-tests were made in continuous transmitting mode at lowest (88.10MHz), middle (98.00 MHz) and highest (107.90MHz) channel.

9.5 Test Result:

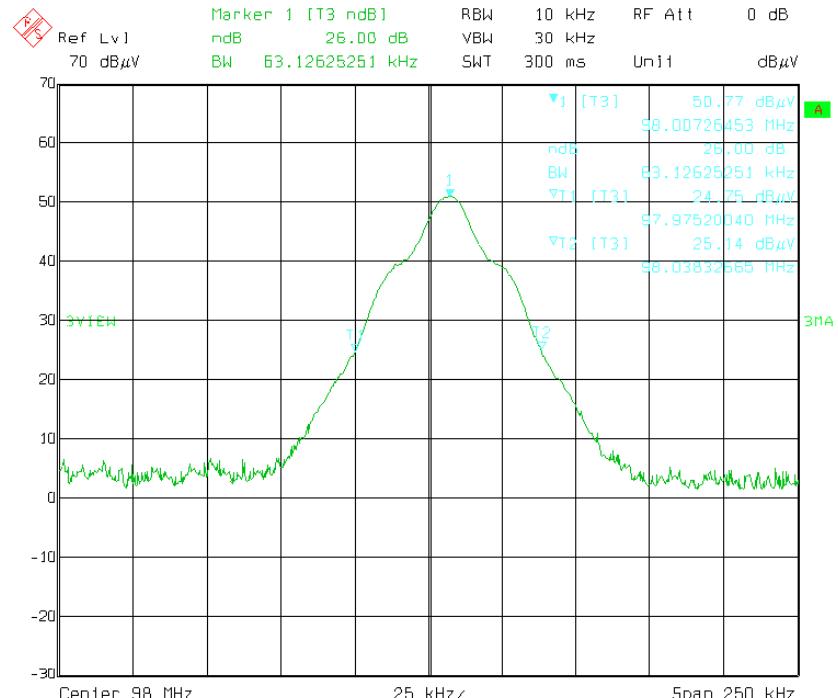
According to test figures, the 26dB Bandwidth lied wholly within the frequency range of 88-108 MHz. The lowest channel is 88.106MHz, EUT LCD display 88.1MHz. The highest channel is 107.908MHz, the EUT LCD display 107.9MHz.

Channel	26dB Bandwidth (kHz)	Limit (kHz)	Conclusion
(Low)	63.13	200	PASS
(Middle)	63.13	200	PASS
(High)	62.63	200	PASS

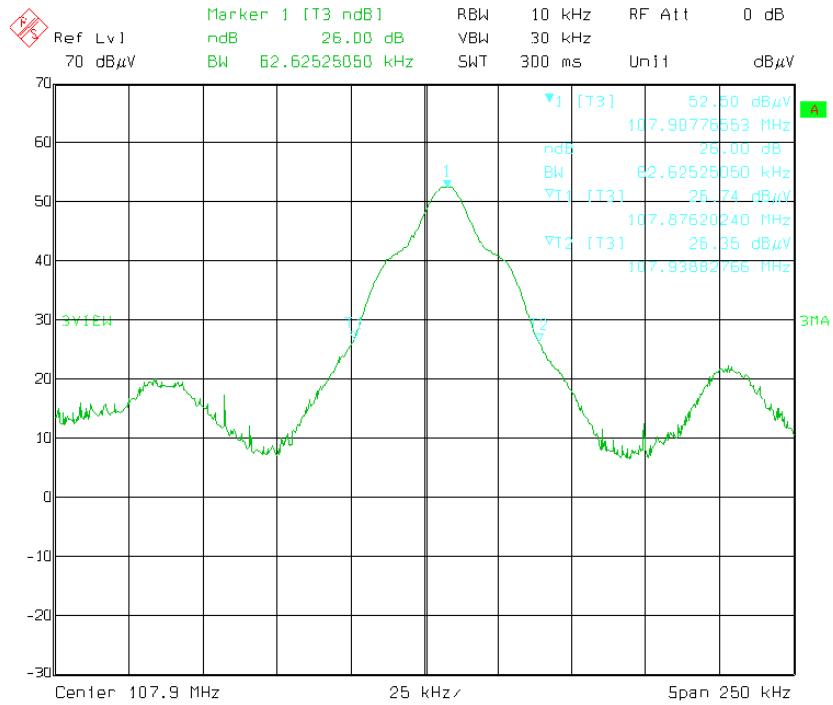
Low channel 88.10MHz



Middle channel 98.00MHz



High channel 107.90MHz



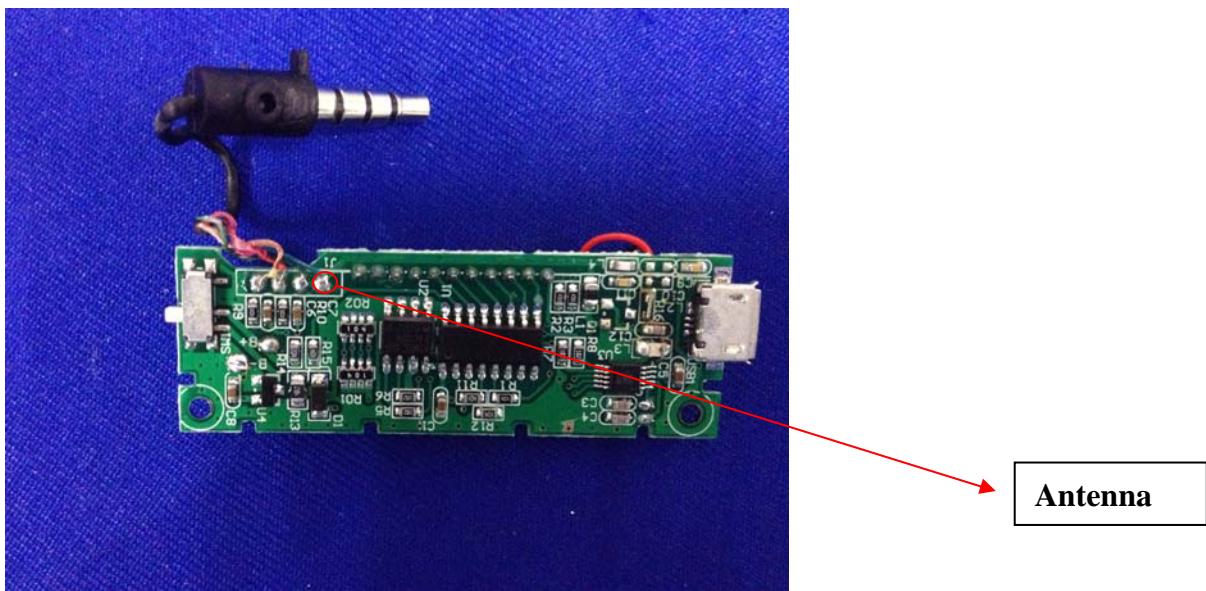
10.0 Antenna Requirement

10.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 Antenna Specification

According to the manufacturer declared, the EUT has a Built-in antenna; and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

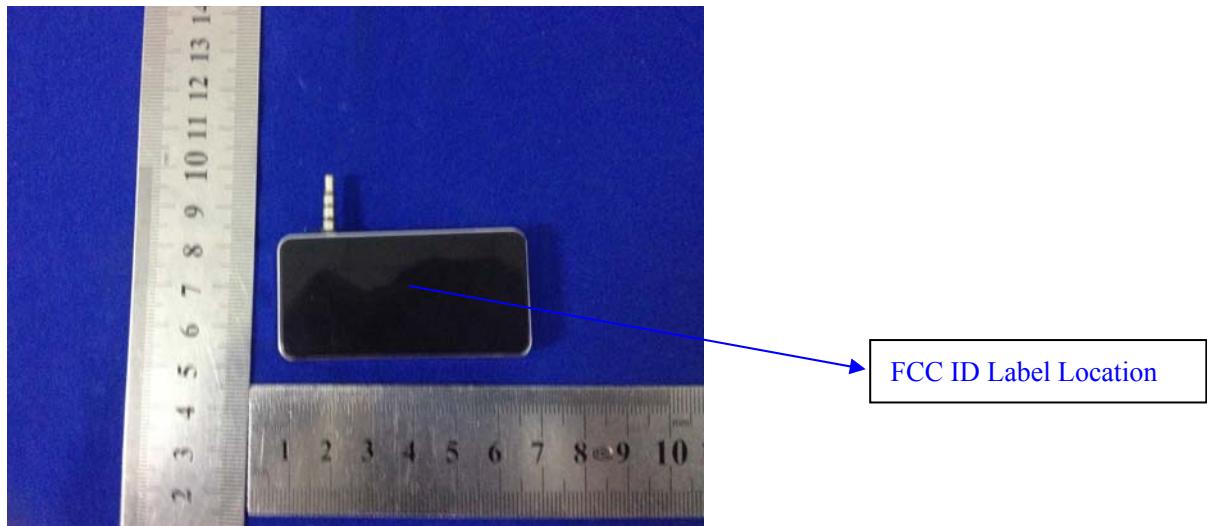


11.0 FCC ID Label

FCC ID: 2AANQLH-101

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



--End of the report--