

FCC ID TEST REPORT

for

FM Transmitter

Model: FM-04

FCC ID: Z37FM-B

Prepared for: Besstec Electronics (Zhongshan) Co., Ltd.
Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road,
Zhongshan, China

Prepared by: Shenzhen TCT Testing Technology Co., Ltd
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Report Number: TCT130507013F2-1

Date of Test: May 10~16, 2013

Date of Report: May 16, 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
Address: 1F, Building 1, Yibaolai Industrial Park, Qiaotou Village, Fuyong Town, Baoan District, Shenzhen, Guangdong, China
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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: Besstec Electronics (Zhongshan) Co., Ltd.
Address: Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road, Zhongshan, China
Telephone: 86-760-88331776
Fax: 86-760-88331706

Manufacturer: Besstec Electronics (Zhongshan) Co., Ltd.
Address: Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road, Zhongshan, China
Telephone: 86-760-88331776
Fax: 86-760-88331706

1.3 Description of EUT

Product: FM Transmitter
Model No.: FM-04
Additional Model No.: FM-02, FM-03, FM-05,, FM-06
Brand Name: N/A
Additional Trade Name: N/A
Rating: DC 12V by car charger or DC 3V by 2 AAA battery
Operation Frequency: 88.10~107.90MHz (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, shape and colour are different for the marketing requirement.

1.5 Test Duration

2013-05-10 to 2013-05-16

1.6 Test Engineer

The sample tested by



Printed name: Jack Kang

2.0 Test equipments and Associated Equipment used during the test.

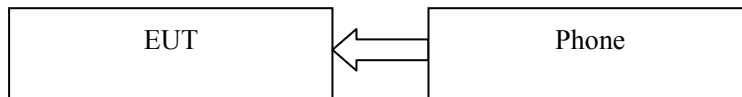
2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2012-07-25	2013-07-24
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	2012-07-25	2013-07-24
Pre-amplifier	Teseq	LAN6900	--	2012-07-25	2013-07-24
Pre-amplifier	Agilent	8447D	83153007374	2012-07-25	2013-07-24
Pre-amplifier	Agilent	8449B	3008A01738	2012-07-25	2013-07-24
Triple-loop antenna	ROHDE&SCHWARZ	HM020	843885/002	2012-07-25	2013-07-24
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2012-07-25	2013-07-24
Horn Antenna	ETS LINDGREN	3117	--	2012-07-25	2013-07-24

2.2 AE used during the test

Equipment type	Manufacturer	Model
Phone	Sony Ericsson	LT18i
N/A		
N/A		
N/A		

2.3. Block Diagram of EUT Configuration



Note: 1. This EUT is powered from the DC 3V by 2 AAA battery or DC 12V by car charger, new batteries were used during the test for all test items.

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),

3.0 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	N/A	N/A
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 15:2011 Subpart C, Paragraph 15.239

4.0 EUT Modification

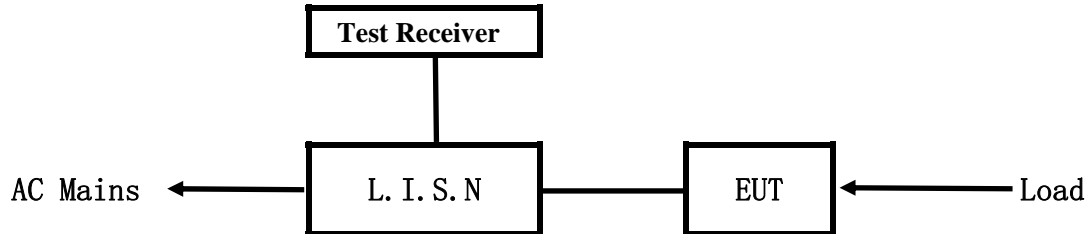
No modification by Shenzhen TCT Testing Technology Co., Ltd

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



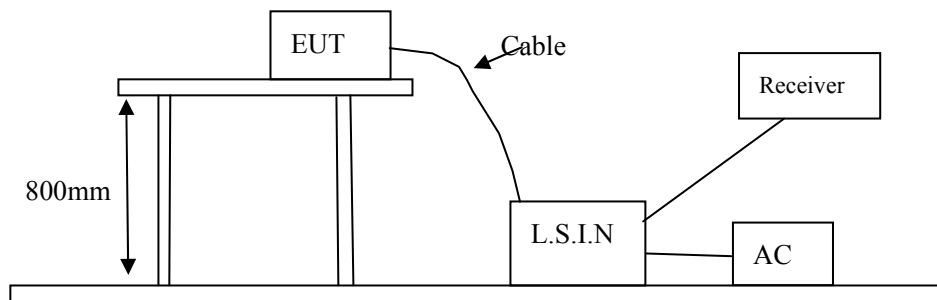
EUT: Equipment Under Test

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):

--

6.8 Test result

Min. limit margin --

The requirements are FULFILLED

Remarks: This EUT is powered from the DC 3V by 2 AAA battery or DC 12V by car charger, therefore this test
is not applicable

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

EUT Description: --

Operation Mode: --

Tested By: --

Test date: --

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
--	--	--	--	--	--	--
--	--	--	--	--	--	--

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

EUT Description: --

Operation Mode: --

Tested By: --

Test Data: --

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

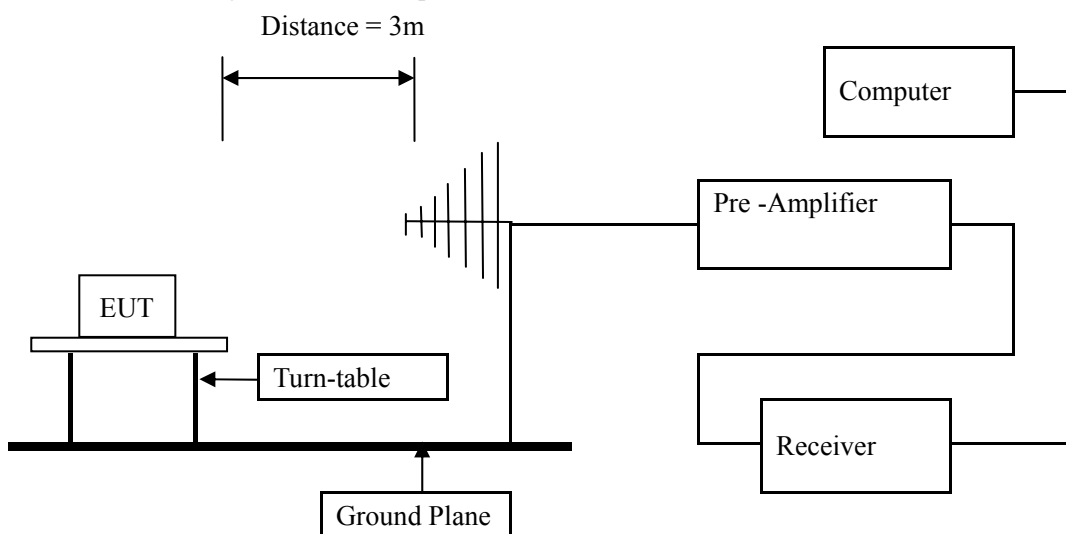
Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--	--	--
--	--	--	--	--	--	--

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(dBμV)	
	Peak	Average
88.1-107.9	68	48

- Note:
- 1) RF Voltage (dBuV) = 20 log 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	41.67	48	Average	H
88.10	51.54	68	Peak	H
88.10	40.24	48	Average	V
88.10	50.34	68	Peak	V

Data (Test Mode: TX 98.00MHz):

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction(H/V)
98.00	38.96	48	Average	H
98.00	51.22	68	Peak	H
98.00	39.17	48	Average	V
98.00	49.75	68	Peak	V

Data (Test Mode: TX 107.90MHz):

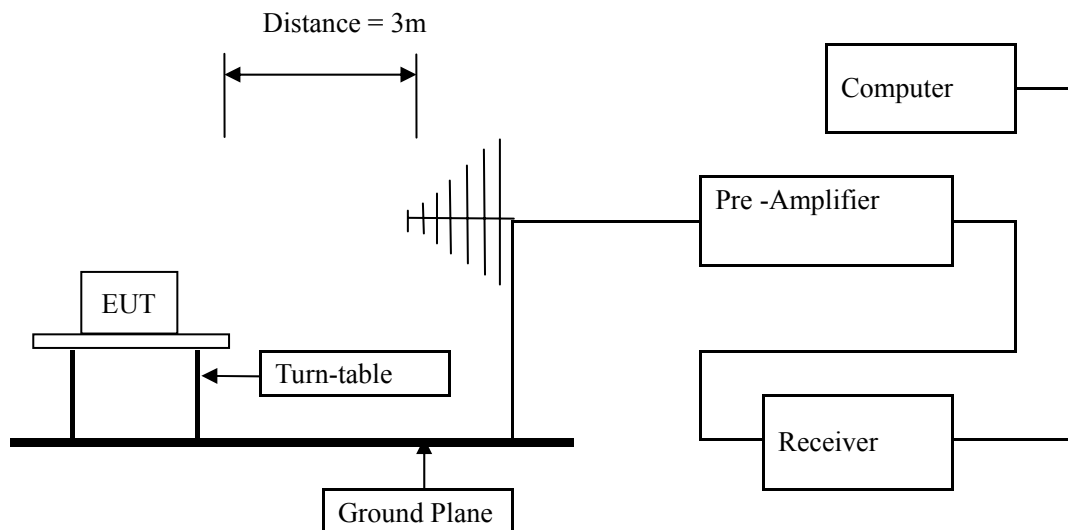
Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Remark	Direction(H/V)
107.90	35.17	48	Average	H
107.90	37.07	68	Peak	H
107.90	40.44	48	Average	V
107.90	42.34	68	Peak	V

8.0 Spurious Emission Test

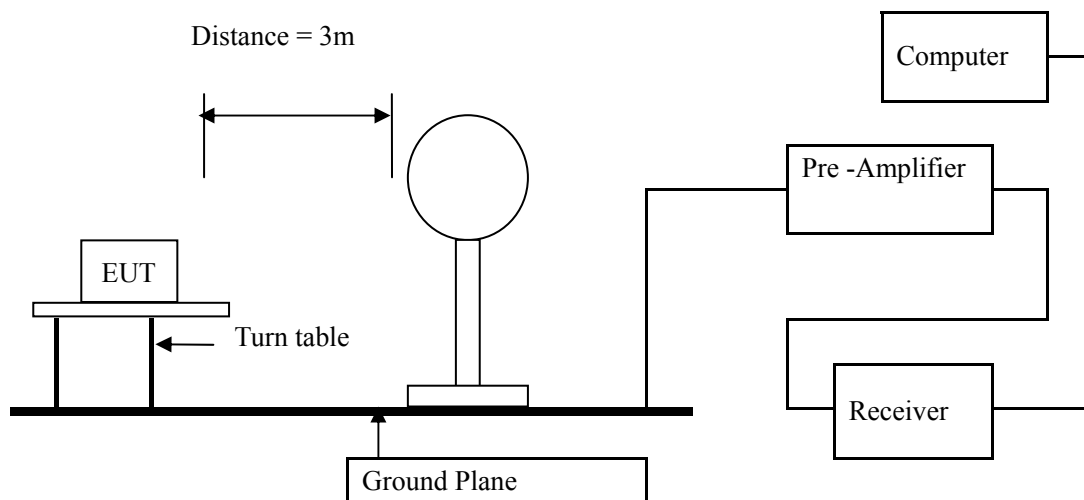
8.1 Test Method and test Procedure:

- 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.

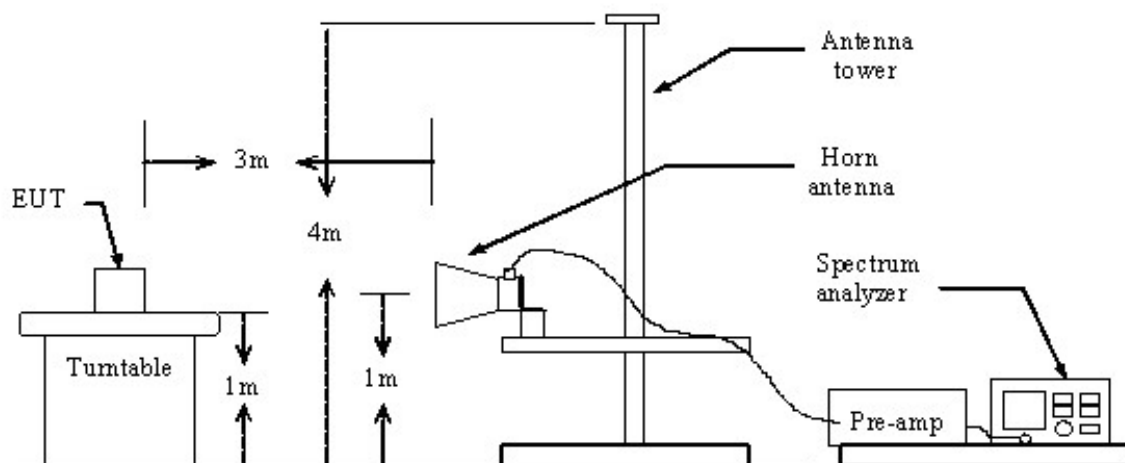
8.2 Block diagram of Test setup



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	$20\log 2400/F \text{ (kHz)} + 80$
0.490-1.705	3	$20\log 24000/F \text{ (kHz)} + 40$
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) = $20 \log \text{RF Voltage (uV)}$
 - 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	39.56	--	69.5	QP
24.0034	40.77	--	69.5	QP
28.8723	43.13	--	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 (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)	Remark
71.7834	32.56	H	40.00	QP
176.2457	34.78	H	43.50	QP
352.4751	36.67	H	46.00	QP
68.3176	31.69	V	40.00	QP
175.8859	34.11	V	43.50	QP
264.1538	35.42	V	46.00	QP

Middle channel: 98.00 MHz

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)	Remark
65.3417	30.67	H	40.00	QP
196.3729	32.81	H	43.50	QP
588.5231	35.43	H	46.00	QP
70.1154	32.74	V	40.00	QP
294.4572	35.56	V	43.50	QP
587.9834	34.83	V	46.00	QP

High channel: 107.90 MHz

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)	Remark
72.5641	31.78	H	40.00	QP
192.8945	32.38	H	43.50	QP
577.5632	36.47	H	46.00	QP
59.8932	30.03	V	40.00	QP
323.4571	34.62	V	43.50	QP
647.3451	35.91	V	46.00	QP

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

High channel: 107.90 MHz						
Freq. (MHz)	Ant. Pol. H/V	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin(dB)
		Peak (dBuV/m)	AV (dBuV/m)			
1079.784	H	42.43	---	74.00	54.00	-11.57
1186.043	H	41.69	---	74.00	54.00	-12.31
1294.895	H	39.78	---	74.00	54.00	-14.22
1079.784	V	43.66	---	74.00	54.00	-10.34
1186.043	V	40.40	---	74.00	54.00	-13.60
1294.895	V	41.71	---	74.00	54.00	-12.29

Notes: 1) Measurements were conducted the 10th harmonic of highest fundamental frequency.

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

3) Average test would be performed if the peak readings were greater than the average limit.

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.

5) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

9.0 Occupied Bandwidth

9.1 Test Equipment

Please refer to the Section 2

9.2 Test Specification:

Environmental conditions: Temperature 22° 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:

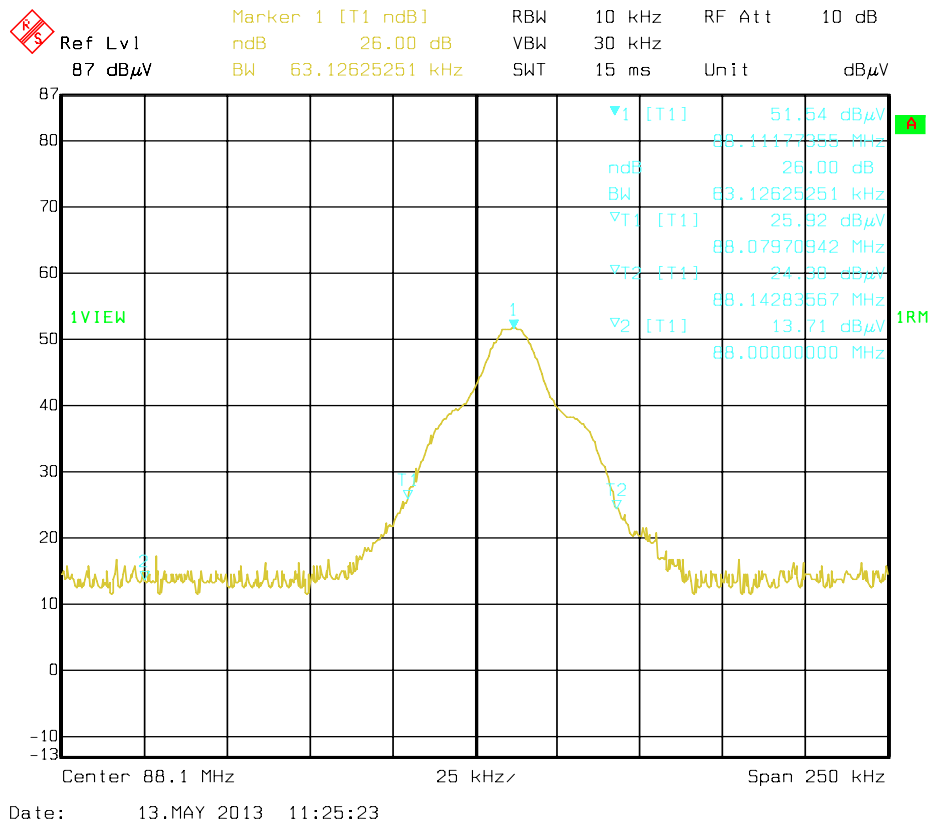
Pre-tests were made in continuous transmitting mode at lowest (88.10MHz), middle (98.00 MHz) and highest (107.90MHz) channel.

9.5 Test Result:

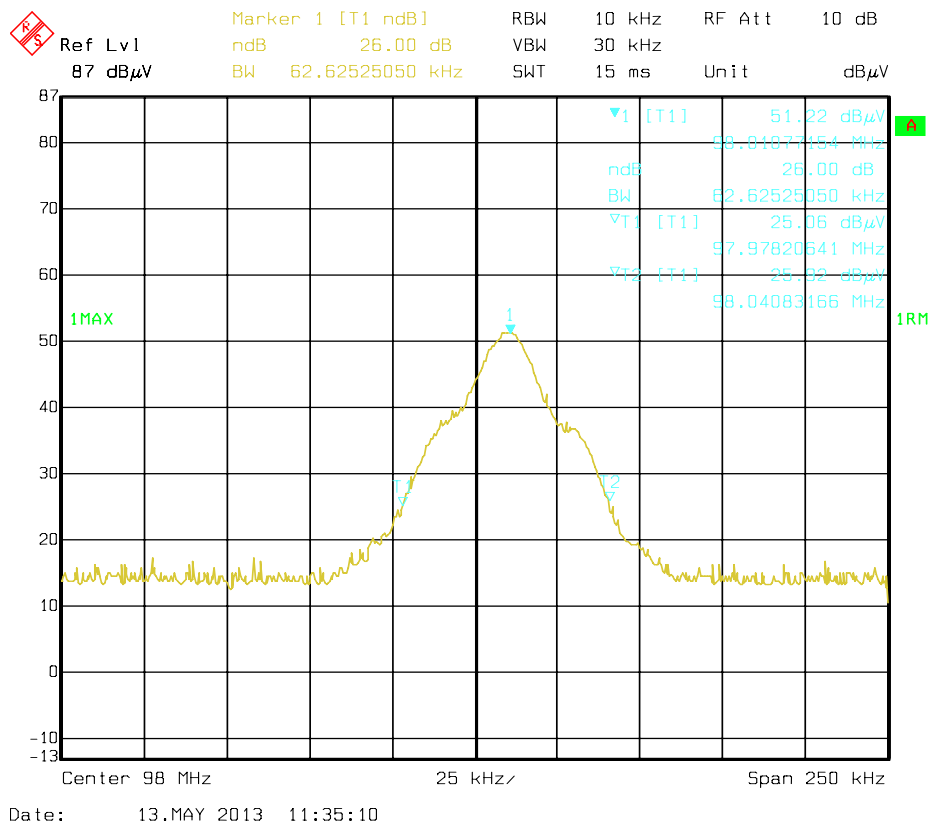
According to test figures, the 26dB Bandwidth lied wholly within the frequency range of 88-108 MHz. The lowest channel is 88.117MHz, EUT LCD display 88.1MHz. The highest channel is 107.911MHz, the EUT LCD display 107.9MHz.

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

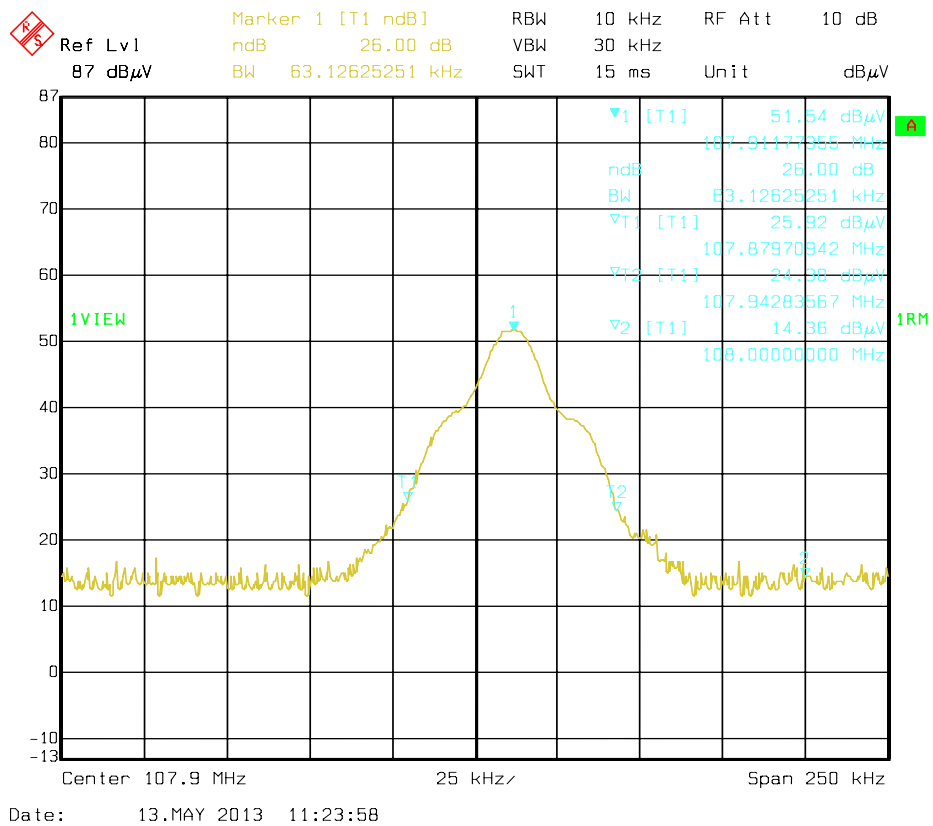
Low channel 88.10MHz



Middle channel 98.00MHz



High channel 107.90MHz



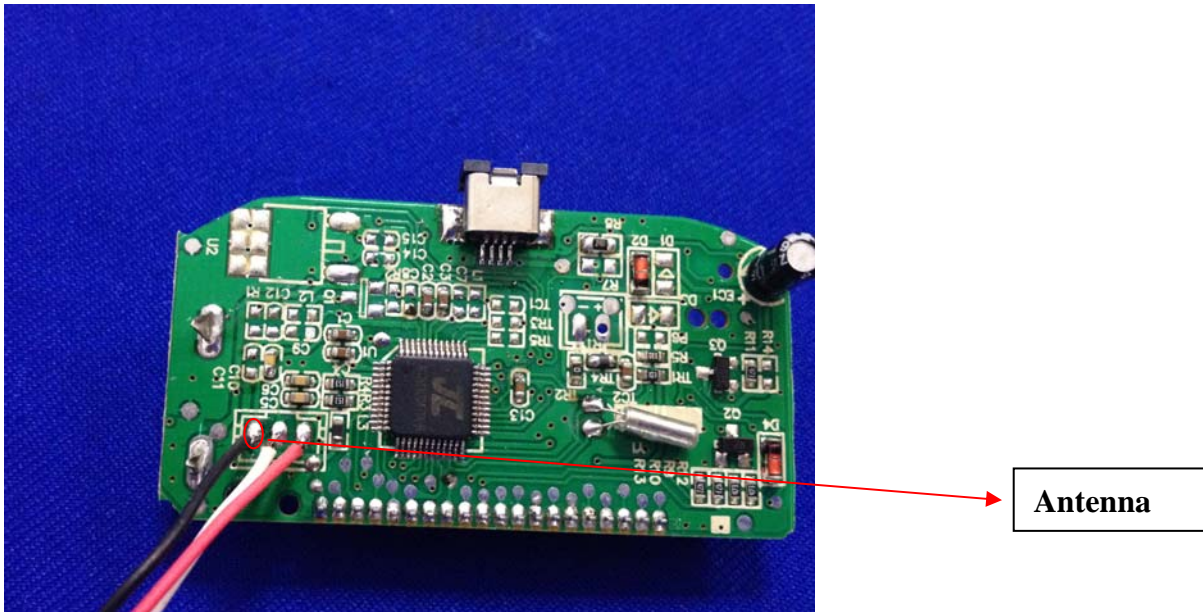
10.0 Antenna Requirement

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 antenna; the directional gain of antenna is 0 dBi, and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



11.0 FCC ID Label

FCC ID: Z37FM-B

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:



FCC ID Label Location

--End of the report--