STC Test Report

Date : 2008-11-05
No. : MH182206

Applicant (SHL012): Belkin International INC.
501 West Walnut Street, Compton, California 90220, U.S.A.

Manufacturer: N/A

Description of Samples:

Product:	TuneCast III FM Transmitter 3.5mm Universal
Brand Name:	BELKIN
Model Number:	F8M010
FCC ID:	K7SF8M010A

Date Samples Received: 2008-02-26, 2008-03-03

Date Tested: 2008-02-28 to 2008-03-04

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2007 and ANSI C63.4:2003 for FCC Certification.

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: ---

Dr. LEE Kam Chuen,
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

CONTENT:

Appendix A

Appendix B

The Hong Kong Standards and Testing Centre Ltd.
10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details

Applicant

Belkin International INC.
501 West Walnut Street, Compton, California 90220, U.S.A.

Manufacturer

N/A

1.3 Equipment Under Test [EUT]

Description of Sample

Model Name:	TuneCast III FM Transmitter 3.5mm Universal
Manufacturer:	N/A
Brand Name:	BELKIN
Model Number:	F8M010
Input Voltage:	12Vd.c.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Belkin International INC., TuneCast III FM Transmitter 3.5mm Universal. It is FM transmitter, Modulation by IC. and type is frequency modulation. The EUT can not turning outside 88.1-107.9MHz band.

1.4 Date of Order

2008-02-26, 2008-03-03

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2008-02-28 to 2008-03-04

1.7 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2007 and ANSI C63.4: 2003 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary					
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result	
				Pass	Failed
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.239	ANSI C63.4:2003	N/A	☒	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

Test Requirement:	FCC 47CFR 15.239
Test Method:	ANSI C63.4:2003
Test Date:	2008-03-04
Mode of Operation:	Tx mode

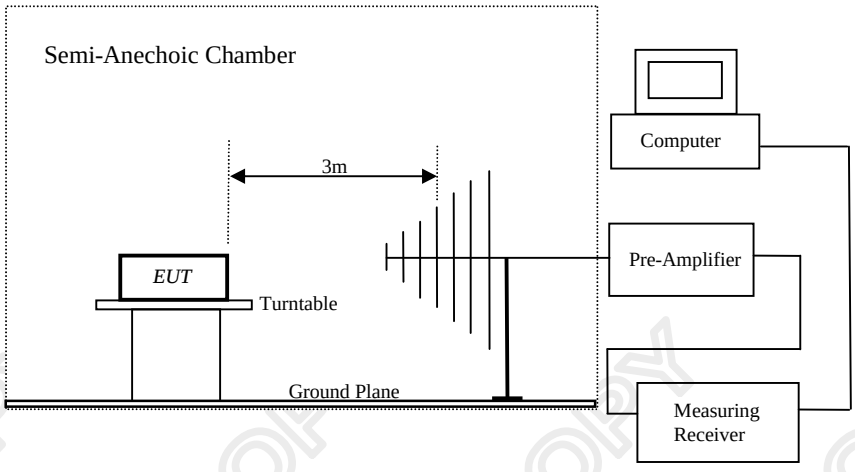
Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-anechoic chamber located on the G/F of HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

** During the test, we would use MP3 or CD player input audio signal to EUT and turn max. volume with different sound (e.g.: very loud song) in order to get worst result.

Test Setup:



Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.239]:

Frequency Range of Fundamental [MHz]	Peak Limits [μV/m]	Average Limits [μV/m]
88-108	2,500	250

Results of Tx Mode (88.1MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
88.10	32.20	9.8	42.0	125.9	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
88.10	31.80	9.8	41.6	120.2	250	Horizontal

Remarks:
Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Limits [μV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx Mode (88.1MHz): PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
176.20	< 1.0	11.0	< 12.0	< 4.0	150	Vertical
264.30	< 1.0	14.0	< 15.0	< 5.6	200	Vertical
352.40	< 1.0	17.5	< 18.5	< 8.4	200	Vertical
440.50	< 1.0	10.2	< 11.2	< 3.6	200	Vertical
528.60	< 1.0	11.9	< 12.9	< 4.4	200	Vertical
616.70	< 1.0	12.4	< 13.4	< 4.7	200	Vertical
704.80	< 1.0	13.2	< 14.2	< 5.1	200	Vertical
792.90	< 1.0	15.0	< 16.0	< 6.3	200	Vertical
881.00	< 1.0	16.1	< 17.1	< 7.2	200	Vertical

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.239]:

Frequency Range of Fundamental [MHz]	Peak Limits [μV/m]	Average Limits [μV/m]
88-108	2,500	250

Results of Tx Mode (98.1MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
98.10	26.20	10.2	36.4	66.1	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
98.10	25.00	10.2	35.2	57.5	250	Horizontal

Remarks:
Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Limits [μV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx Mode (98.1MHz): PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
196.20	< 1.0	11.0	< 12.0	< 4.0	150	Vertical
294.30	< 1.0	14.0	< 15.0	< 5.6	200	Vertical
392.40	< 1.0	17.5	< 18.5	< 8.4	200	Vertical
490.50	< 1.0	10.2	< 11.2	< 3.6	200	Vertical
588.60	< 1.0	11.9	< 12.9	< 4.4	200	Vertical
686.70	< 1.0	12.4	< 13.4	< 4.7	200	Vertical
784.80	< 1.0	13.2	< 14.2	< 5.1	200	Vertical
882.90	< 1.0	15.0	< 16.0	< 6.3	200	Vertical
981.00	< 1.0	16.1	< 17.1	< 7.2	200	Vertical

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.239]:

Frequency Range of Fundamental [MHz]	Peak Limits [μV/m]	Average Limits [μV/m]
88-108	2,500	250

Results of Tx Mode (107.9MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
107.90	33.80	9.6	43.4	147.9	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
107.90	32.60	9.6	42.2	128.8	250	Horizontal

Remarks:
Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Limits [μV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx Mode (107.9MHz): PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
215.80	< 1.0	11.0	< 12.0	< 4.0	150	Vertical
323.70	< 1.0	14.0	< 15.0	< 5.6	200	Vertical
431.60	< 1.0	17.5	< 18.5	< 8.4	200	Vertical
539.50	< 1.0	10.2	< 11.2	< 3.6	200	Vertical
647.40	< 1.0	11.9	< 12.9	< 4.4	200	Vertical
755.30	< 1.0	12.4	< 13.4	< 4.7	200	Vertical
863.20	< 1.0	13.2	< 14.2	< 5.1	200	Vertical
971.10	< 1.0	15.0	< 16.0	< 6.3	200	Vertical
1079.00	< 1.0	16.1	< 17.1	< 7.2	200	Vertical

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx on mode:

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
287.99	26.8	15.1	41.9	124.5	200	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30MHz

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.227
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2008-02-29
Mode of Operation:	Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

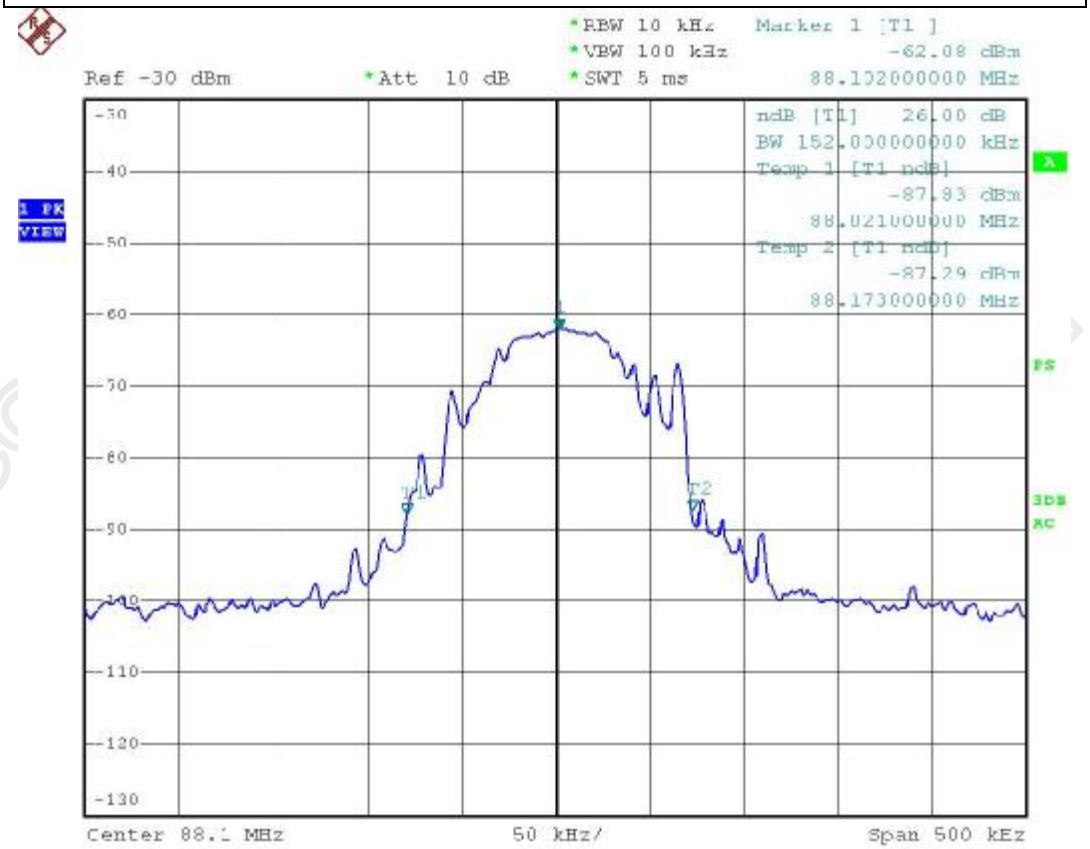
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
88.1	152	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



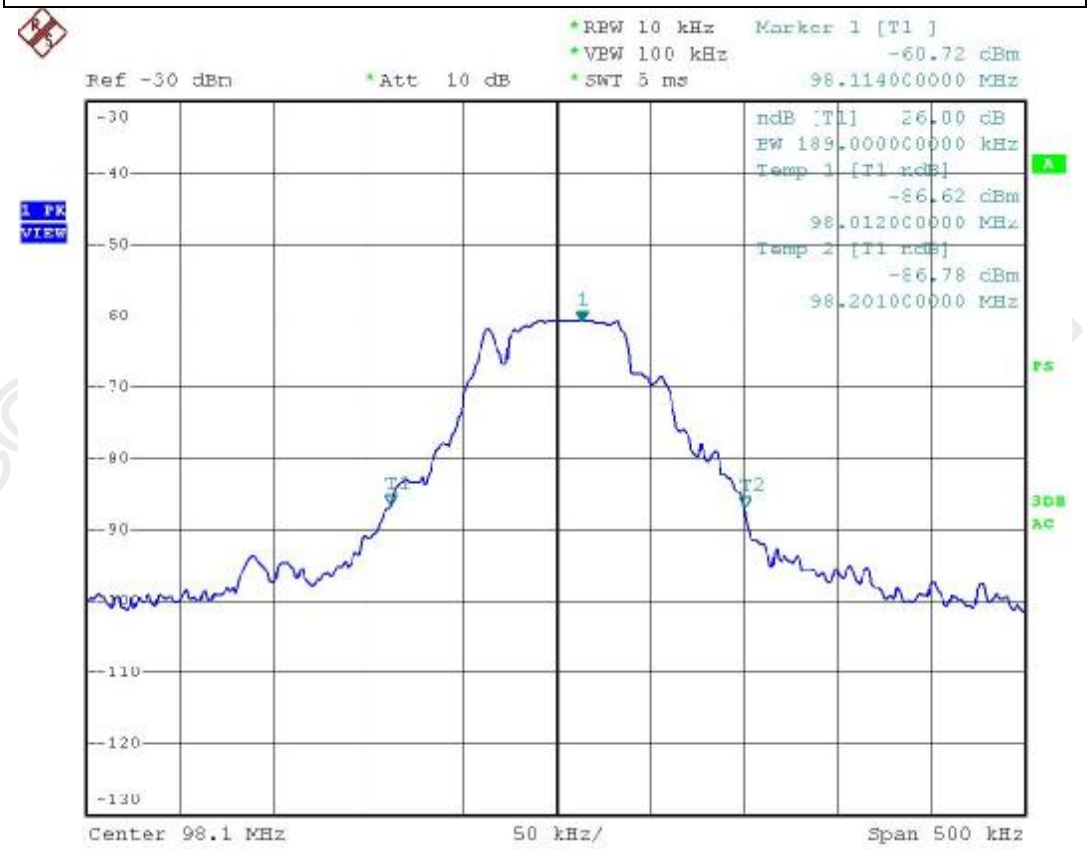
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
98.2	189	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



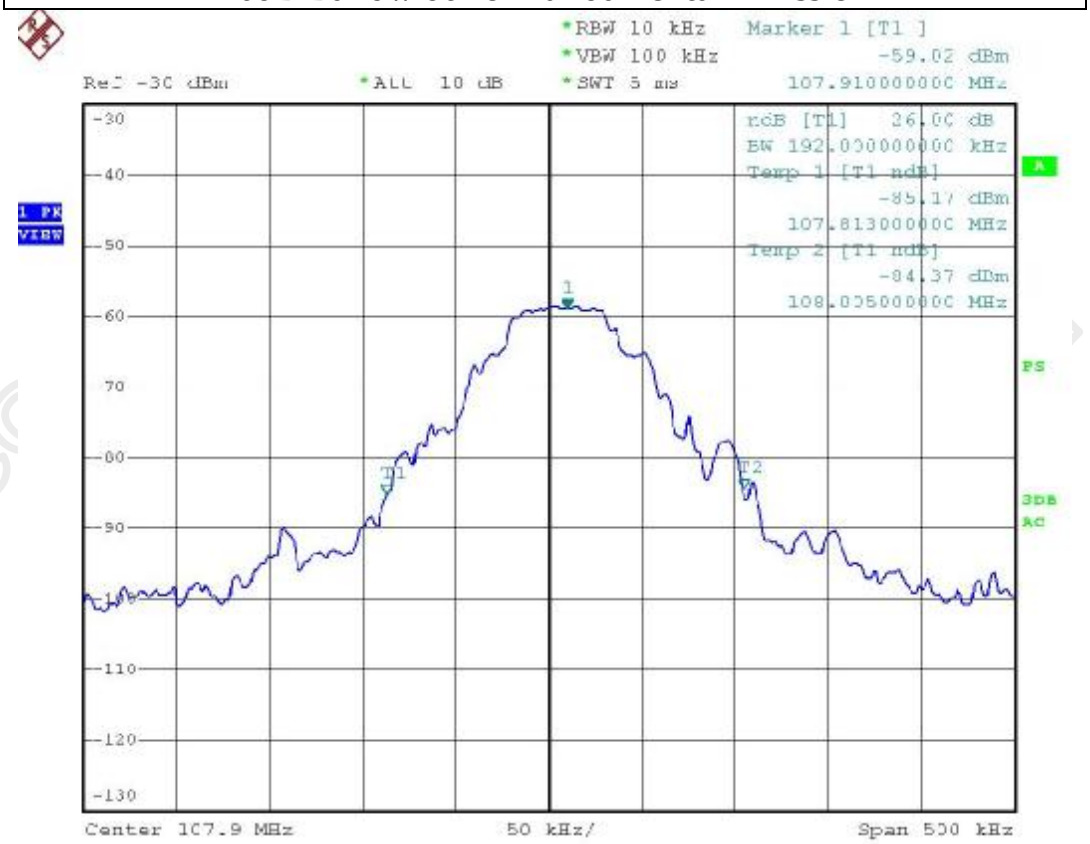
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
107.9	192	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



3.3 Operation Description

The transmitter is a FM transmitter operating at 88-108MHz band. The transmitter is powered by 12Vd.c. and the transmitting frequency is crystal controlled. The operation is achieved b y different combinations of from frequency modulation signal on the 88.1-107.9MHz carrier frequency.

Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2006/07/11	2009/07/11
EM215	MULTIDEVICE CONTROLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Lindgren	FACT-3	--	2006/05/02	2009/05/02
EM174	BICONILOG ANTENNA	EMCO	3142C	00029071	2008/01/24	2010/01/24
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2008/06/16	2009/06/16
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2006/07/26	2009/07/26

Remarks:-
CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

Appendix B

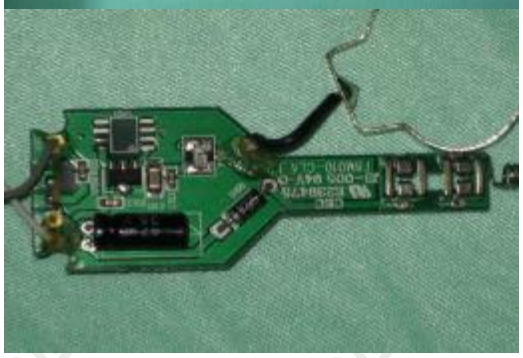
Photographs of EUT

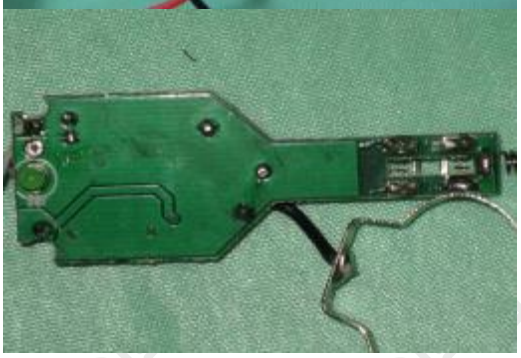
Front View of the product

Rear View of the product

Front View of the product

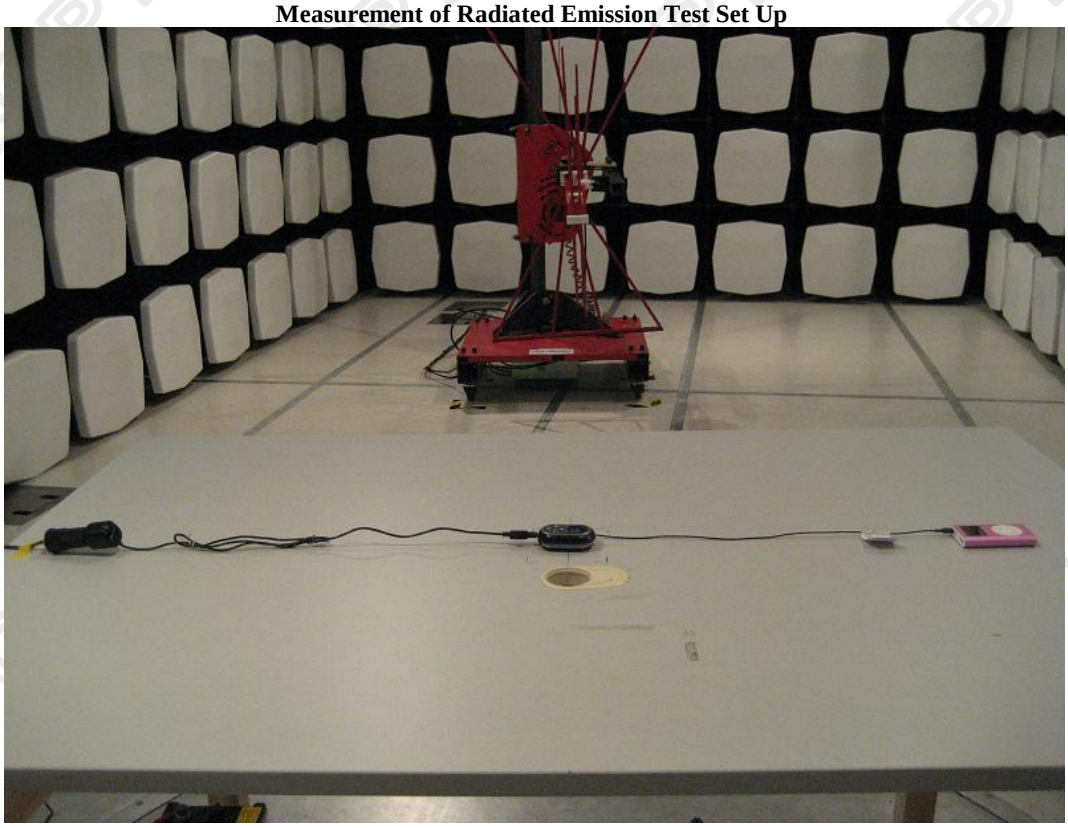
Rear View of the product





Photographs of EUT

Measurement of Radiated Emission Test Set Up



******* End of Test Report *******