



## STC Test Report

Date : 2008-03-27

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No. : MH182173

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

**Manufacturer:** N/A

**Description of Samples:** Product: Ipod TuneFM  
Brand Name: BELKIN  
Model Number: F8Z179  
FCC ID: K7SF8Z179

**Date Samples Received:** 2008-01-30

**Date Tested:** 2008-01-31 to 2008-03-11

**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:** ---

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

**The Hong Kong Standards and Testing Centre Ltd.**

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### **Appendix A**

List of Measurement Equipment

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### **Appendix B**

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### **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, CA 90220, U.S.A.

##### **Manufacturer**

N/A

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### **1.3 Equipment Under Test [EUT] Description of Sample**

Model Name: Ipod TuneFM  
Manufacturer: N/A  
Brand Name: BELKIN  
Model Number: F8Z179  
Input Voltage: 12Vd.c.

#### **1.3.1 Description of EUT Operation**

The Equipment Under Test (EUT) is a Belkin International INC., Ipod TuneFM. It is FM transmitter, Modulation by IC; and type is frequency modulation.

#### **1.4 Date of Order**

2008-01-30

#### **1.5 Submitted Sample(s):**

1 Sample

#### **1.6 Test Duration**

2008-01-31 to 2008-03-11

#### **1.7 Country of Origin**

China

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### **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	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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### **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: 2008-03-11  
Mode of Operation: Tx mode

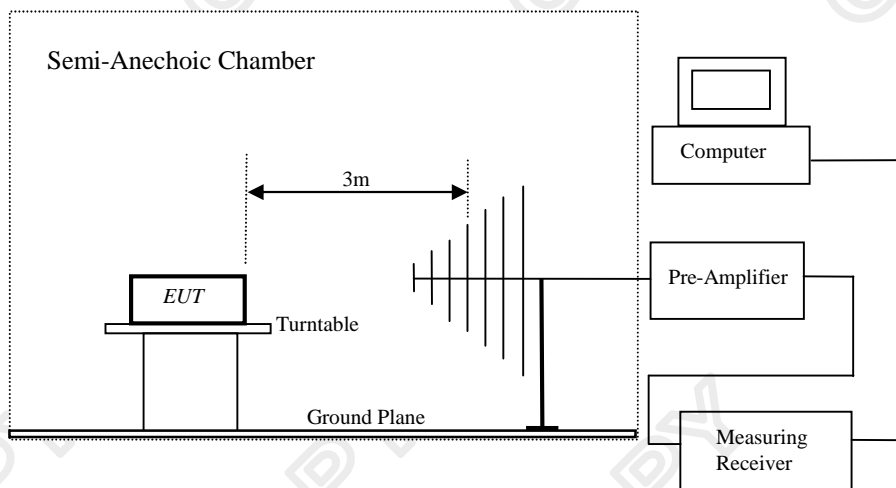
#### **Test Method:**

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 and the frequency spectrum should be measured from the lowest operating frequency of the EUT.

. 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.

#### **Test Setup:**



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

Frequency Range of Fundamental [MHz]	Peak Limits [ $\mu\text{V/m}$ ]	Average Limits [ $\mu\text{V/m}$ ]
88-108	2,500	250

### Results of Tx Mode (88.1MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
88.10	34.60	9.6	44.2	162.2	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
88.10	33.80	9.6	43.4	147.9	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.

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

Frequency Range [MHz]	Limits [ $\mu\text{V/m}$ ]
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 dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	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:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

No spurious emissions found between the EUT lowest operating frequency and 30MHz.

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

Frequency Range of Fundamental [MHz]	Peak Limits [ $\mu\text{V/m}$ ]	Average Limits [ $\mu\text{V/m}$ ]
88-108	2,500	250

### Results of Tx Mode (98.1MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
98.10	34.60	10.1	44.7	171.8	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
98.10	33.80	10.1	43.9	156.7	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.

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

Frequency Range [MHz]	Limits [ $\mu\text{V/m}$ ]
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 dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	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:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

No spurious emissions found between the EUT lowest operating frequency and 30MHz.

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

Frequency Range of Fundamental [MHz]	Peak Limits [ $\mu\text{V/m}$ ]	Average Limits [ $\mu\text{V/m}$ ]
88-108	2,500	250

### Results of Tx Mode (107.9MHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
107.90	32.80	9.7	42.5	133.4	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
107.90	32.10	9.7	41.8	123.0	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.

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

Frequency Range [MHz]	Limits [ $\mu\text{V/m}$ ]
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 $\text{dB}\mu\text{V}$	Correction Factor $\text{dB/m}$	Field Strength $\text{dB}\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	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:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: 30MHz to 1GHz 5.2dB

No spurious emissions found between the EUT lowest operating frequency and 30MHz.

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### **3.2 20B Bandwidth of Fundamental Emission**

Test Requirement: FCC 47 CFR 15.239  
Test Method: ANSI C63.4:2003 (Section 13.1.7)  
Test Date: 2008-03-11  
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. Verify the lowest and highest tunable frequency, insure the tunable frequency range is within the frequency band specified in this part. After the measurements, ensure the transmitter is still functional.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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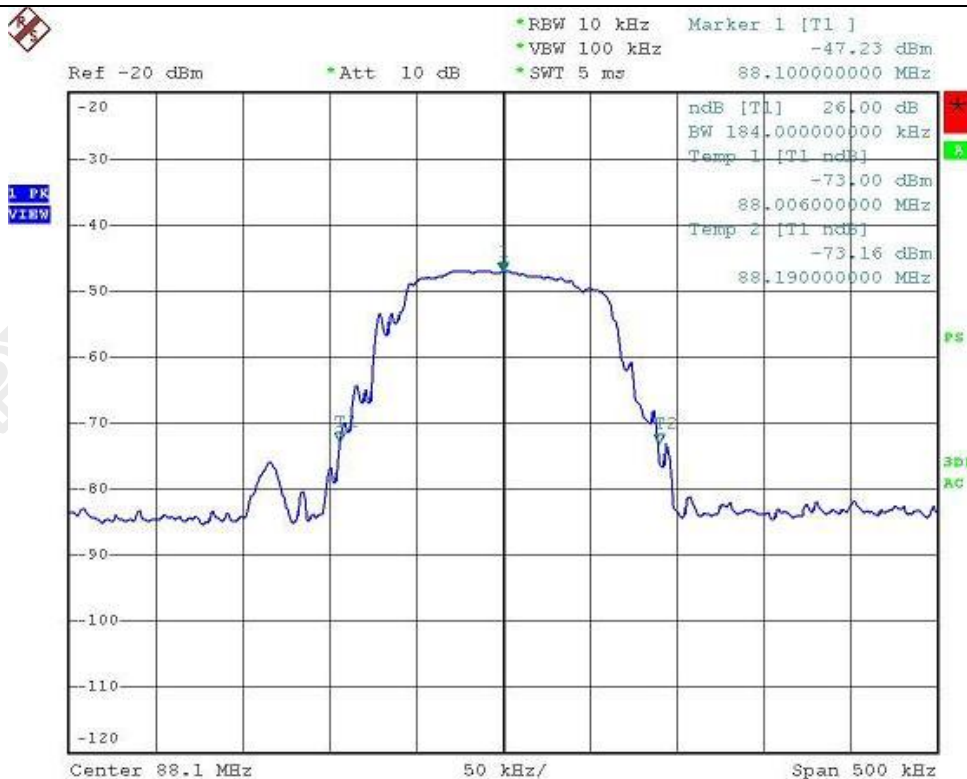
### Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
88.1	184	200

### Result:

The following figure is the measured bandwidth of Fundamental Emission.

### 20dB Bandwidth of Fundamental Emission



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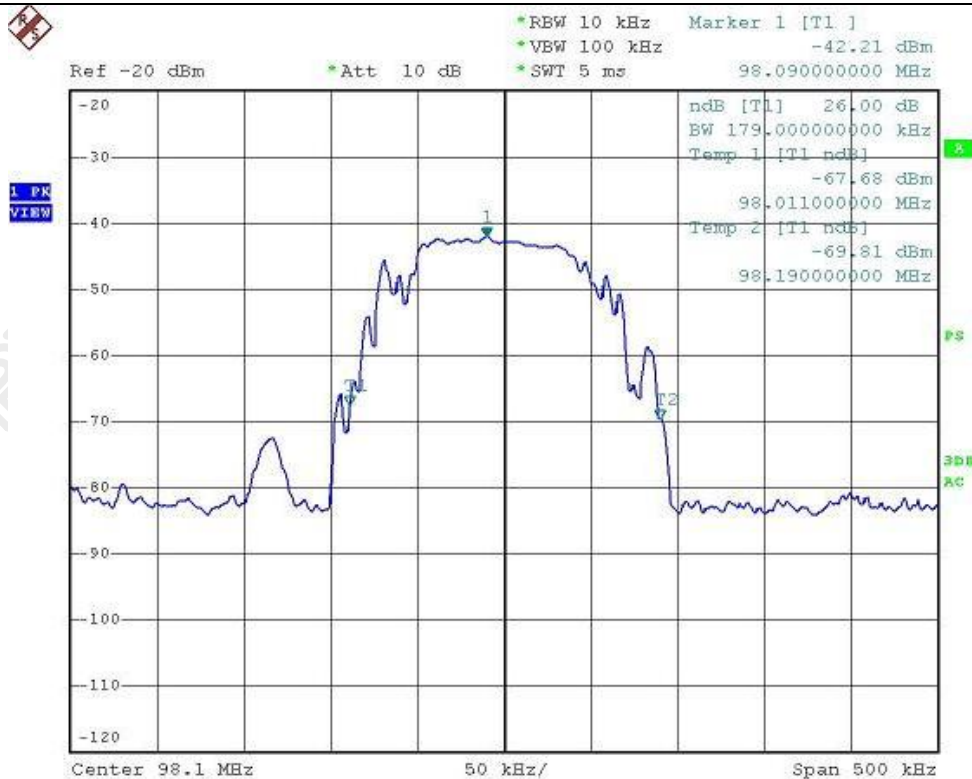
### Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
98.1	179	200

### Result:

The following figure is the measured bandwidth of Fundamental Emission.

### 20dB Bandwidth of Fundamental Emission



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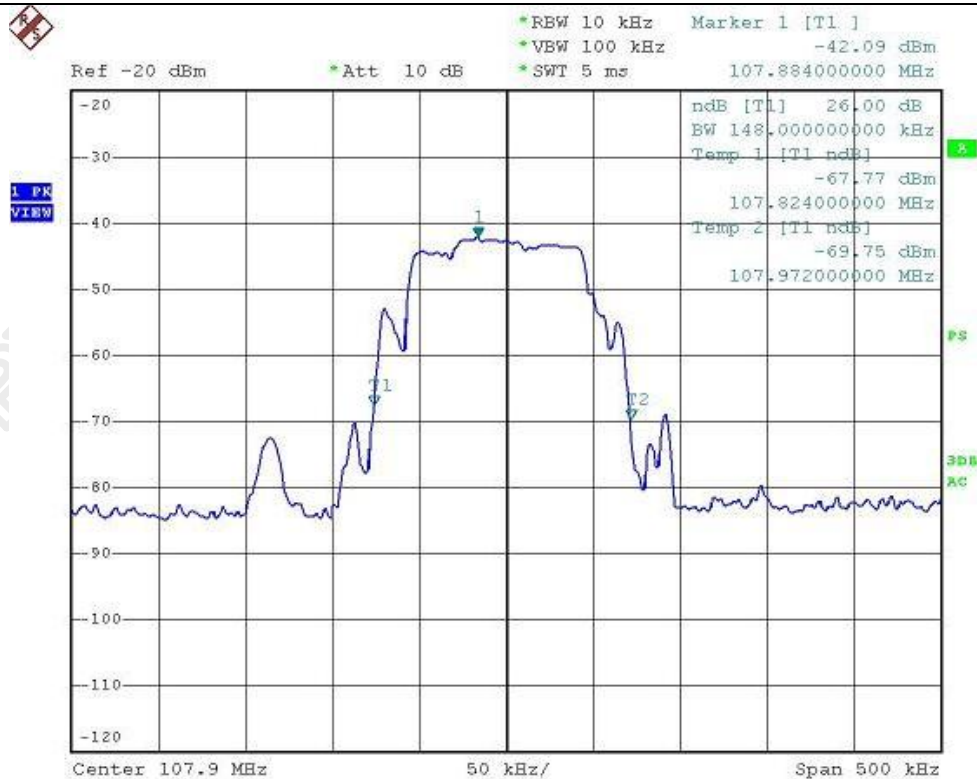
### Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
107.9	148	200

### Result:

The following figure is the measured bandwidth of Fundamental Emission.

### 20dB Bandwidth of Fundamental Emission



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### **3.3 Operation Description**

#### **3.3.1 Operating Frequency and Rating**

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 by different combinations of from frequency modulation signal on the 88.1-107.9MHz carrier frequency.

#### **3.3.2 EUT Antenna**

No external antenna, 11.6cm long internal antenna. There is no external ground connection. The ground is only that of the printed circuit board.

#### **3.3.3 Installation Method**

(Please refer to user manual)

#### **3.3.4 Test Procedure Used**

ANSI C36.4 test method is adopted.

#### **3.3.5 Test Method for car adapter equipment**

According to ANSI C36.4, EUT will be test on the turntable; there are no specific test requirements for EUT use inside a car.

#### **3.3.6 Tuning range of the EUT**

The EUT is able to tune from 88.1MHz to 107.9MHz only.

#### **3.3.7 Test signal**

A MP3 player (iPod nano) will be connected to the audio input of the EUT, the audio signal will consist of different sound, the volume will be also turn to maximum in order to obtain the worst case scenario.

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### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	ETS-LINGGREN	3115	4032	2006/07/11	2008/07/11
EM022	LOOP ANTENNA	ETS-LINGGREN	6502	1189-2424	2006/07/26	2008/07/26
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 7	100072	22007/06/08	2008/06/08
EM215	MULTIDEVICE CONTROLLER	ETS-LINGGREN	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	ETS-LINGGREN	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	ETS-LINGGREN	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINGGREN	FACT-3	--	2007/05/02	2008/05/02
EM219	BICONILOG ANTENNA	ETS-LINGGREN	3142C	00029071	2006/08/23	2008/08/23
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 40	100248	2007/07/11	2008/07/11

#### Remarks:-

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

**The Hong Kong Standards and Testing Centre Ltd.**

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

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### 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



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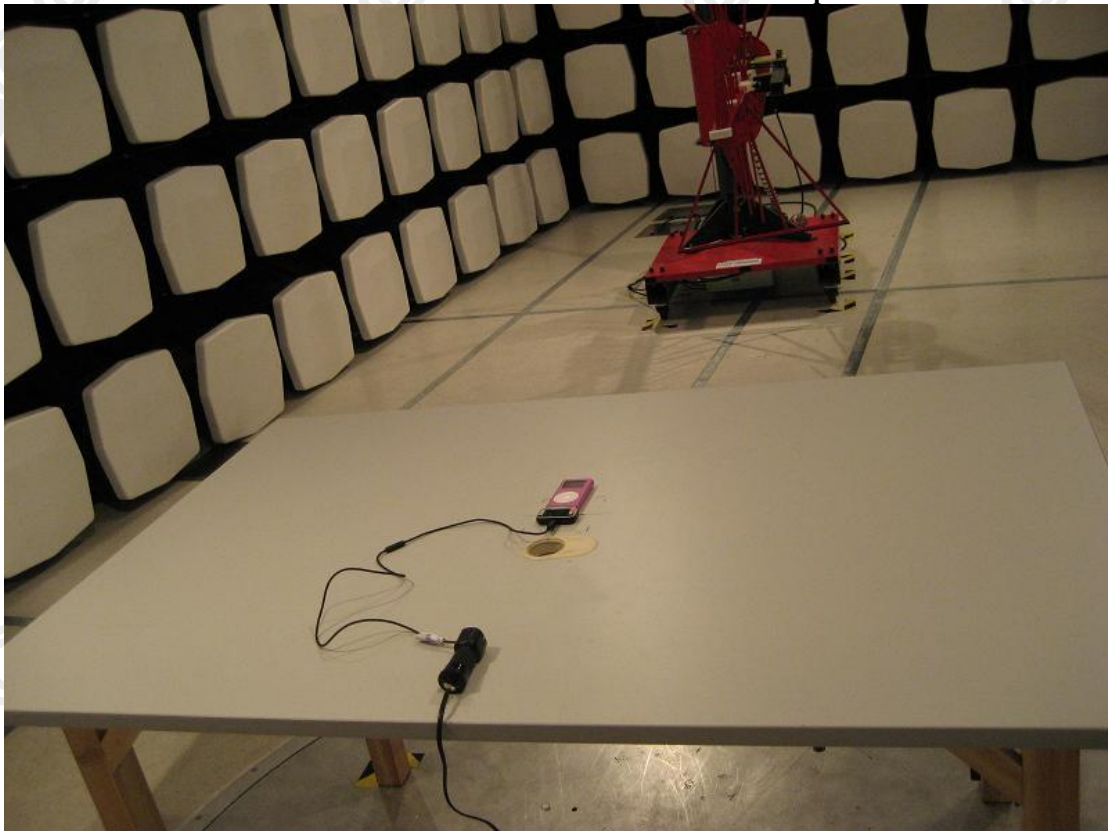
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### Photographs of EUT

#### Measurement of Radiated Emission Test Set Up



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

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