



STC Test Report

Date : 2006-11-03

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No. : HM157606

Applicant:

Belkin Corporation
501 West Walnut Street, Compton,
California 90220 United States

Description of Samples:

Model name: TuneBase for Nano 2G
Model no.: F8Z136
Brand name: Belkin
FCC ID: K7SF8Z136

Date Samples Received:

2006-10-16

Date Tested:

2006-10-16 to 2006-10-31

Investigation Requested:

FCC Part 15 Subpart C

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:

TSANG Chi Ho, Steven, EMD
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.

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

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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 Corporation
501 West Walnut Street, Compton,
California 90220 United States

Manufacturer

Sheenway Limited Mco
Flat A8, 6/F., Chong Fok Commercial Centre,
No 1287 Avenida Da Amizade, Macau

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
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1.3 Equipment Under Test [EUT]

Description of Sample

Model Name: TuneBase for Nano 2G
Manufacturer: Sheenway Limited Mco
Brand Name: Belkin
Model Number: F8Z136
Input Voltage: 12Vd.c.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Belkin Corporation., TuneBase for Nano 2G. It is trigger transmitter; The EUT continues to transmit while trigger is being pressed. It is voice transmitter, modulation by i-Pod and type is frequency modulation.

1.4 Date of Order

2006-10-16

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2006-10-16 to 2006-10-31

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: 2005 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	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.239	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions, 9kHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	Class B	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (9kHz – 1000MHz)

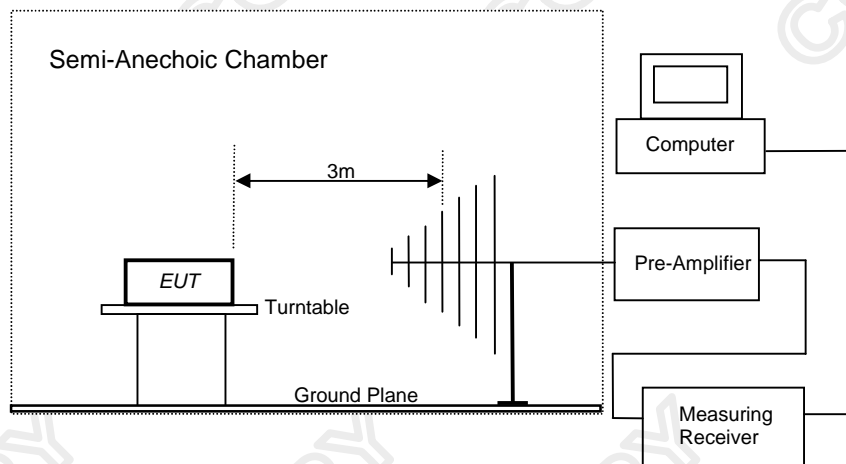
Test Requirement: FCC 47CFR 15.239
Test Method: ANSI C63.4:2003
Test Date: 2006-10-31
Mode of Operation: Tx mode

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.

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: PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μV	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	36.40	8.2	44.6	169.8	2,500	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μV	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	36.20	8.2	44.4	166.0	250	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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 [$\mu\text{V/m}$]
0.009 – 0.490	2400/F(kHz)
0.490 – 1.705	24000/F(kHz)
1.705 – 30.0	30
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.

Result of 9KHz to 30MHz

Radiated Emissions Quasi-Peak						
Frequency kHz	Measured Level @3m dB μV	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
EMISSIONS DETECTED ARE MORE THAN 20dB BELOW THE FCC LIMITS						

Results of Tx mode: PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB μV	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
121.2	20.4	7.7	28.1	25.4	150	Vertical
176.20	< 1.0	10.9	< 11.9	< 3.9	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 included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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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: PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μV	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
98.00	32.50	8.5	41.0	112.2	2,500	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μV	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
98.00	32.40	8.5	40.9	110.9	250	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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 [$\mu\text{V/m}$]
0.009 – 0.490	2400/F(kHz)
0.490 – 1.705	24000/F(kHz)
1.705 – 30.0	30
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.

Result of 9KHz to 30MHz

Radiated Emissions Quasi-Peak						
Frequency kHz	Measured Level @3m dB μV	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
EMISSIONS DETECTED ARE MORE THAN 20dB BELOW THE FCC LIMITS						

Results of Tx mode: PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB μV	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
121.2	20.5	7.7	28.2	25.7	150	Vertical
196.00	< 1.0	10.9	< 11.9	< 3.9	150	Vertical
294.00	< 1.0	14.0	< 15.0	< 5.6	200	Vertical
392.00	< 1.0	17.5	< 18.5	< 8.4	200	Vertical
490.00	< 1.0	10.2	< 11.2	< 3.6	200	Vertical
588.00	< 1.0	11.9	< 12.9	< 4.4	200	Vertical
686.00	< 1.0	12.4	< 13.4	< 4.7	200	Vertical
784.00	< 1.0	13.2	< 14.2	< 5.1	200	Vertical
882.00	< 1.0	15.0	< 16.0	< 6.3	200	Vertical
980.00	< 1.0	16.1	< 17.1	< 7.2	200	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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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: **PASS**

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μV	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	35.30	8.7	44.0	158.5	2,500	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μV	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	35.10	8.7	43.8	154.9	250	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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 [$\mu\text{V/m}$]
0.009 – 0.490	2400/F(kHz)
0.490 – 1.705	24000/F(kHz)
1.705 – 30.0	30
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.

Result of 9KHz to 30MHz

Radiated Emissions Quasi-Peak						
Frequency kHz	Measured Level @3m dB μV	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
EMISSIONS DETECTED ARE MORE THAN 20dB BELOW THE FCC LIMITS						

Results of Tx mode: PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB μV	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
121.2	20.3	7.7	28	25.1	149	Vertical
215.80	< 1.0	10.9	< 11.9	< 3.9	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 included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$

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3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2003
Test Date:	N/A
Mode of Operation:	N/A

Results: N/A

The EUT is operated by a single source of car battery power, therefore power line conducted emission was deemed unnecessary.

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3.2 20B Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.227
Test Method: ANSI C63.4:2003 (Section 13.1.7)
Test Date: 2006-10-31
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.

During the test, the EUT was connected to I-Pod nano. The transmitter is powered by I-Pod nano. The EUT continues to transmit while trigger is being I-Pod nano output signal. Modulation by music of MP3 file and the volume was set to the maximum setting. It would try different type and very loud music in order to get worst result.

The EUT is 88.1-107.9MHz FM transmitter. Transmission frequency is fixed 88.1-107MHz within 200kHz width. There have two buttons to control of frequency up or down between 88.1MHz and 107.9MHz. It was impossible. Set the device to a frequency outside the band of 88.1-107.9MHz. It is fixed program by IC. Therefore, user unable to set the frequency outside the band of 88.1-107.9MHz.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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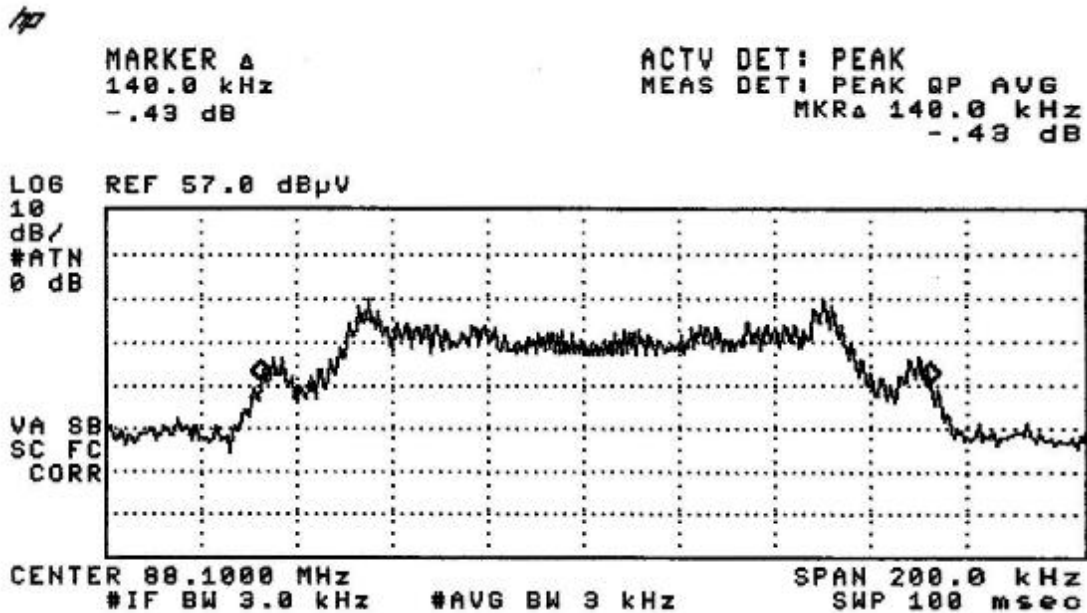
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
88.1	140	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



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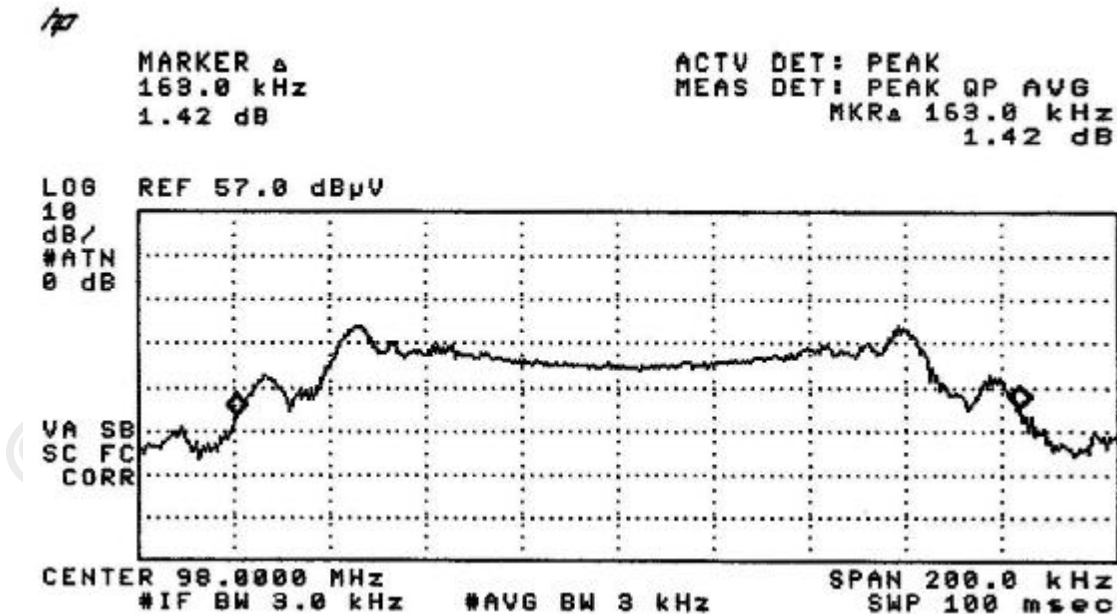
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
98	163	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



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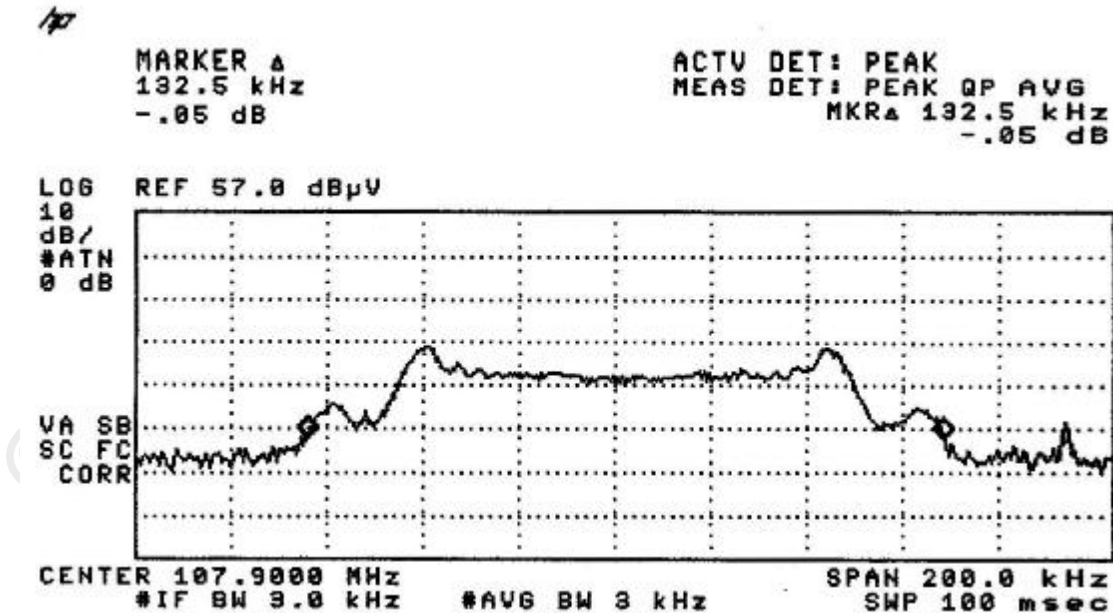
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits [kHz]
107.9	132.5	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



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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

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3.3 Operation Description

Circuit Description

The 88.1-107.9MHz crystal oscillator driver the base of IC the final / buffer amplifier. The modulation provide by audio input. The output of IC has the matching network consisting C20, C23, C24, R39, R40, R44 and L2 that limit the harmonic content and effect the proper coupling of the antenna to the output stage.

Antenna, ground and power source

The antenna is single wire as an internal antenna. The antenna a 33mm long. There is no external ground connection. The ground is only that of the printed circuit board. Electronic current is supplied by I-Pod nano for primary battery.

Operation Description

The transmitter is a FM transmitter operating at 88-108MHz band. The transmitter is power by I-Pod nano and the transmitting frequency is crystal with IC controlled. The operation is achieved by different combinations of form frequency modulating signal on the 88.1-107.9MHz carrier frequency.

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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262
EM020	HORN ANTENNA	ETS-Linggren	3115	4032
EM022	LOOP ANTENNA	ETS-Linggren	6502	1189-2424
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892
EM083	OPEN AREA TEST SITE	HKSTC	N/A	N/A
EM131	EMC ANALYZER	HEWLETT PACKARD	8595EM	3710A00155
EM145	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS 30	830245/021
EM195	ANTENNA POSITIONING MAST	ETS-Linggren	2075	2368
EM196	MULTI-DEVICE CONTROLLER	ETS-Linggren	2090	1662
EM215	MULTIDEVICE CONTROLLER	ETS-Linggren	2090	00024676
EM216	MINI MAST SYSTEM	ETS-Linggren	2075	00026842
EM217	ELECTRIC POWERED TURNTABLE	ETS-Linggren	2088	00029144
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--
EM219	BICONILOG ANTENNA	ETS-Linggren	3142C	00029071
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB40	100248

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A
EM119	LISN	ROHDE & SCHWARZ	ESH3-Z5	0831.5518.52
EM127	ISOLATION TRANSFORMER 220 TO 300V	WING SUN	N/A	N/A
EM233	PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100314
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057-99A
M197	LISN	ETS-Linggren	4825/2	1193

Remarks:-

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

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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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Photographs of EUT

View of the Car Adaptor



View of the Car Adaptor



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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

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