

Date: 2003-12-30

TEST REPORT

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No.: HM112393

FCC PART 15 SUBPART C CERTIFICATION REPORT

FOR LOW POWER TRANSMITTER

TEST REPORT No.: HM112393

Equipment Under Test [EUT]:

FM Audio Transmitter (TuneCast II)

Model Number:

F8V3080

Applicant:

Belkin Corporation

FCC ID :

K7SF8V3080

Date: 2003-12-30

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CONCLUSION

The submitted product was deemed to have 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.

Verified by
Ivan Toa

K C Lee
for Chief Executive

Date: 2003-12-30

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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 CA 90220-5221 U.S.

HKSTC Code Number for Applicant

SHT019

Manufacturer

N/A

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1.3 Equipment Under Test [EUT]

Description of Sample

Product: FM Audio Transmitter (TuneCast II)
Manufacturer: N/A
Brand Name: BELKIN
Model Number: F8V3080
Input Voltage: 3Vd.c ("AAA" size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Belkin Corporation., FM Audio Transmitter (TuneCast II). The transmitter is a 2 button transmitter. The EUT continues to transmit while button is being pressed., Modulation by IC. and tape is pulse modulation.

1.4 Date of Order

2003-12-17

1.5 Submitted Sample(s):

2 Samples per model

1.6 Test Duration

2003-12-27

1.7 Country of Origin

China

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1.8 Additional Information of EUT

	Submitted	Not Available
User Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part List	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Circuit Diagram	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Printed Circuit Board [PCB] Layout	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Block diagram	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC ID Label	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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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 and ANSI C63.4: 2000 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 C63.4:2000	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2000	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 C63.4:2000	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

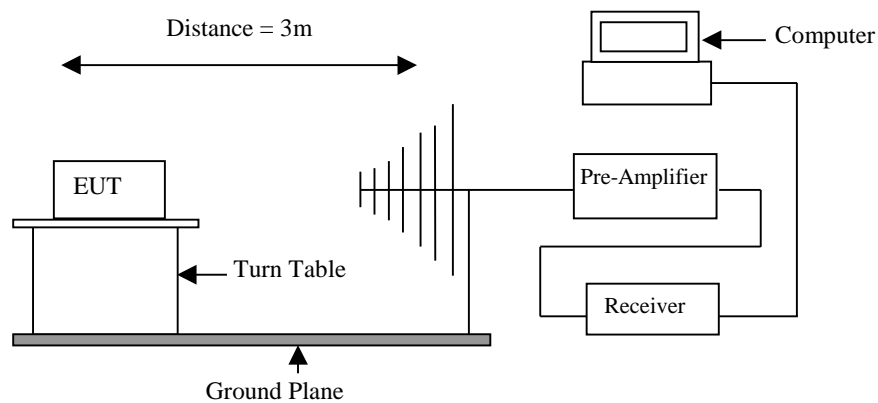
Test Requirement:	FCC 47CFR 15.109 Class A
Test Method:	ANSI C63.4:2000
Test Date:	2003-12-27
Mode of Operation:	On mode

Test Method:

The sample was placed 0.8m above the ground plane on the OATS *. 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.

*: OATS [Open Area Test Site] located at HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90657.

Test Setup:



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

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

Results:

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}/\text{m}$	Correction Factor dB $\mu\text{V}/\text{m}$	Field Strength dB $\mu\text{V}/\text{m}$	Field Strength $\mu\text{V}/\text{m}$	Limit @3m $\mu\text{V}/\text{m}$	E-Field Polarity
88.10	32.4	10.4	42.8	138.0	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}/\text{m}$	Correction Factor dB $\mu\text{V}/\text{m}$	Field Strength dB $\mu\text{V}/\text{m}$	Field Strength $\mu\text{V}/\text{m}$	Limit @3m $\mu\text{V}/\text{m}$	E-Field Polarity
88.10	31.9	10.4	42.3	130.3	250	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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.

For effective averaging, the bandwidth of the video filter must be smaller than the resolution bandwidth. The higher the ratio of resolution bandwidth to video bandwidth, the greater the averaging will be. Below setting for HP8572A EMI Receiver.

Resolution Bandwidth : 3MHz

Video Bandwidth 1Hz

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

Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V}/\text{m}$]
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:

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB $\mu\text{V}/\text{m}$	Correction Factor dB $\mu\text{V}/\text{m}$	Field Strength dB $\mu\text{V}/\text{m}$	Field Strength $\mu\text{V}/\text{m}$	Limit @3m $\mu\text{V}/\text{m}$	E-Field Polarity
176.20	< 1.0	13.2	< 14.2	< 5.1	150	Vertical
264.30	< 1.0	9.8	< 10.8	< 3.5	150	Vertical
352.40	< 1.0	11.5	< 12.5	< 4.2	150	Vertical
440.50	< 1.0	15.9	< 16.9	< 7.0	200	Vertical
528.60	< 1.0	17.4	< 18.4	< 8.3	200	Vertical
616.70	< 1.0	17.2	< 18.2	< 8.1	200	Vertical
704.80	< 1.0	18.8	< 19.8	< 9.8	200	Vertical
792.90	< 1.0	19.7	< 20.7	< 10.8	200	Vertical
881.00	< 1.0	20.6	< 21.6	< 12.0	200	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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

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

Results:

Field Strength of Fundamental Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}/\text{m}$	Correction Factor dB $\mu\text{V}/\text{m}$	Field Strength dB $\mu\text{V}/\text{m}$	Field Strength $\mu\text{V}/\text{m}$	Limit @3m $\mu\text{V}/\text{m}$	E-Field Polarity
98.00	31.5	10.4	41.9	124.5	2,500	Horizontal

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}/\text{m}$	Correction Factor dB $\mu\text{V}/\text{m}$	Field Strength dB $\mu\text{V}/\text{m}$	Field Strength $\mu\text{V}/\text{m}$	Limit @3m $\mu\text{V}/\text{m}$	E-Field Polarity
98.00	31.3	10.4	41.7	121.6	250	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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.

For effective averaging, the bandwidth of the video filter must be smaller than the resolution bandwidth. The higher the ratio of resolution bandwidth to video bandwidth, the greater the averaging will be. Below setting for HP8572A EMI Receiver.

Resolution Bandwidth : 3MHz
Video Bandwidth 1Hz

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

Frequency Range [MHz]	Quasi-Peak 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:

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
196.00	< 1.0	13.2	< 14.2	< 5.1	150	Vertical
294.00	< 1.0	9.8	< 10.8	< 3.5	150	Vertical
392.00	< 1.0	11.5	< 12.5	< 4.2	150	Vertical
490.00	< 1.0	15.9	< 16.9	< 7.0	200	Vertical
588.00	< 1.0	17.4	< 18.4	< 8.3	200	Vertical
686.00	< 1.0	17.2	< 18.2	< 8.1	200	Vertical
784.00	< 1.0	18.8	< 19.8	< 9.8	200	Vertical
882.00	< 1.0	19.7	< 20.7	< 10.8	200	Vertical
980.00	< 1.0	20.6	< 21.6	< 12.0	200	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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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:

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
107.90	30.8	10.4	41.2	114.8	2,500	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	Field Polarity
107.90	30.2	10.4	40.6	107.2	250	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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.

For effective averaging, the bandwidth of the video filter must be smaller than the resolution bandwidth. The higher the ratio of resolution bandwidth to video bandwidth, the greater the averaging will be. Below setting for HP8572A EMI Receiver.

Resolution Bandwidth : 3MHz
Video Bandwidth 1Hz

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

Frequency Range [MHz]	Quasi-Peak 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:

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
215.80	< 1.0	13.2	< 14.2	< 5.1	150	Vertical
323.70	< 1.0	9.8	< 10.8	< 3.5	150	Vertical
431.60	< 1.0	11.5	< 12.5	< 4.2	150	Vertical
539.50	< 1.0	15.9	< 16.9	< 7.0	200	Vertical
647.40	< 1.0	17.4	< 18.4	< 8.3	200	Vertical
755.30	< 1.0	17.2	< 18.2	< 8.1	200	Vertical
863.20	< 1.0	18.8	< 19.8	< 9.8	200	Vertical
971.10	< 1.0	19.7	< 20.7	< 10.8	200	Vertical
1079.00	< 1.0	20.6	< 21.6	< 12.0	200	Vertical

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 5.7\text{dB}$

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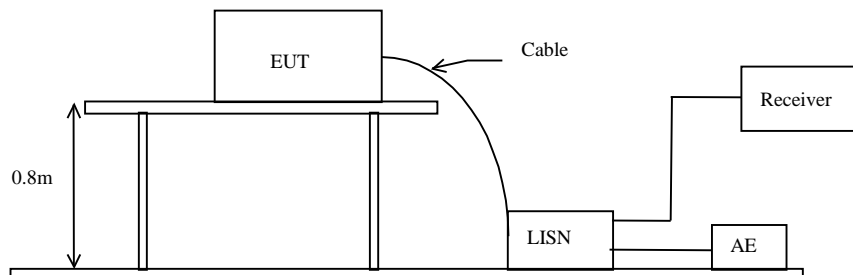
3.1.1 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4: 2000
Test Date:	2003-12-27
Mode of Operation:	On mode

Test Method:

The test was performed in accordance with ANSI C63.4:2000, with the following: an initial measurement was performed in peak and average detection mode on the live line. Any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



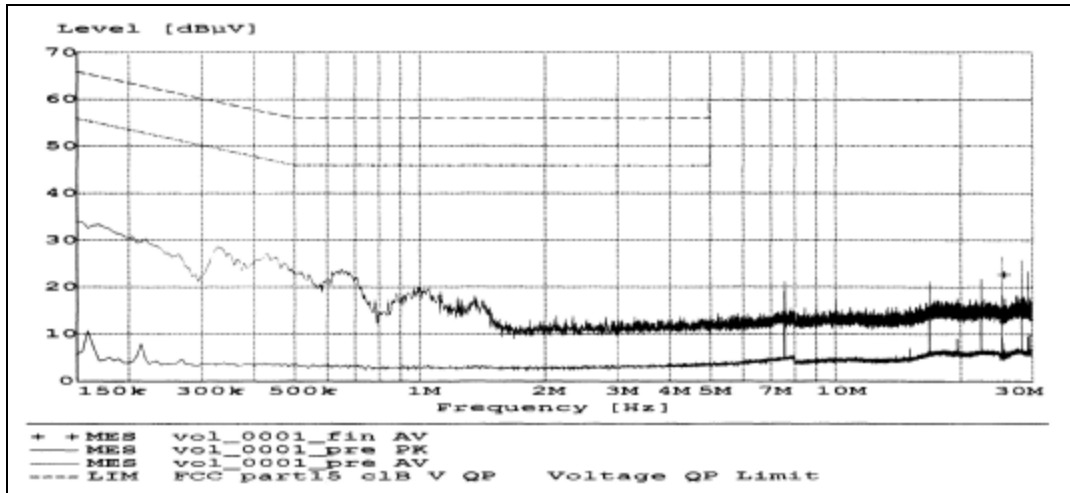
Limits for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram labelled as (QP and AV).

Results:



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dBμV	Limit dBμV	Level dBμV	Limit dBμV
Live	25.405	-*	-*	22.6	50.0

Remarks:

Calculated measurement uncertainty : ±3.9dB
 -* Emission greater than 30dB below limit line.

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3.2 20B Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.227
Test Method:	ANSI C63.4:2000 (Section 13.1.7)
Test Date:	2003-12-27
Mode of Operation:	On 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.

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Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	26dB Bandwidth [KHz]	FCC Limits [MHz]
88.1	110	200

Result:

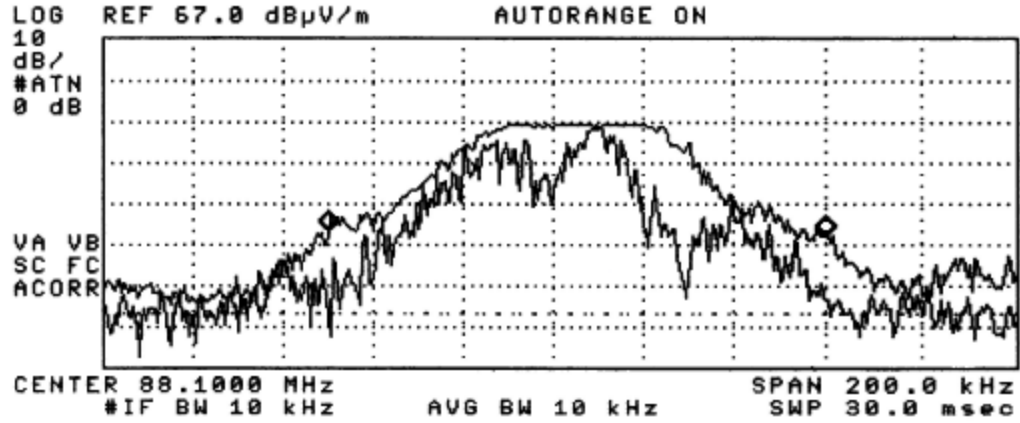
The following figure is the measured bandwidth of Fundamental Emission.

20 Bandwidth of Fundamental Emission

```

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997
MARKER Δ ACTV DET: PEAK
110.0 kHz MEAS DET: PEAK QP AVG
-.76 dB MKRΔ 110.0 kHz
-.76 dB

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Limits for 20dB Bandwidth of Fundamental Emission:

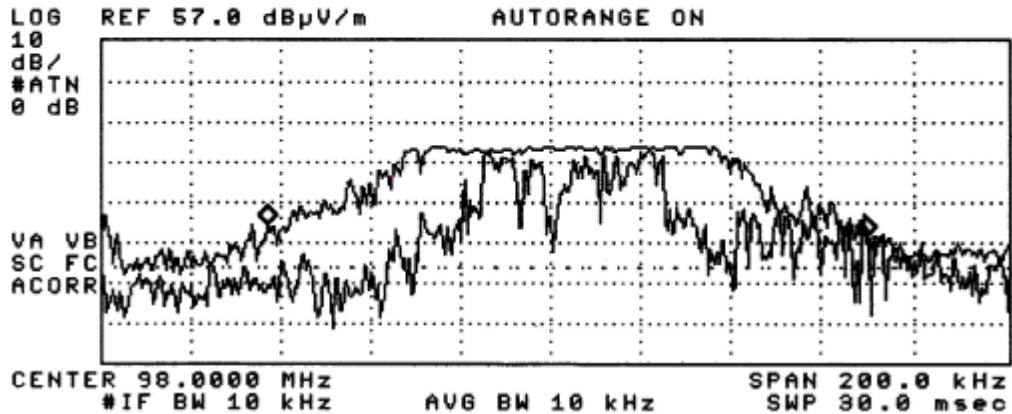
Frequency Range [MHz]	26dB Bandwidth [KHz]	FCC Limits [KHz]
98.0	133	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20B Bandwidth of Fundamental Emission

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997
MARKER Δ ACTV DET: PEAK
133.0 kHz MEAS DET: PEAK QP AVG
-2.82 dB MKR Δ 133.0 kHz
-2.82 dB



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Limits for 20dB Bandwidth of Fundamental Emission:

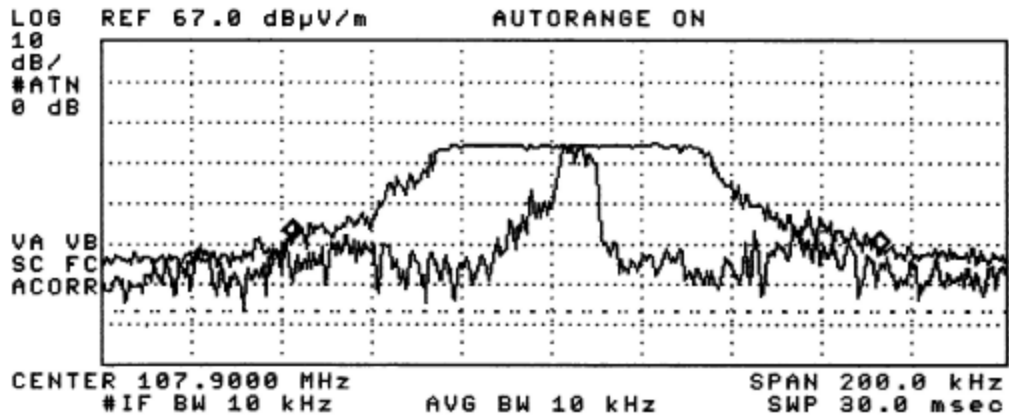
Frequency Range [MHz]	20B Bandwidth [KHz]	FCC Limits [KHz]
107.9	130.5	200

Result:

The following figure is the measured bandwidth of Fundamental Emission.

20B Bandwidth of Fundamental Emission

09:11:24 JAN 16, 1995 23:49:37 NOV 12, 1997
MARKER Δ 130.5 kHz -2.83 dB
ACTV DET: PEAK MEAS DET: PEAK QP AVG
MKR Δ 130.5 kHz -2.83 dB



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Appendix A**Test Equipment Audit****Radiated Emission**

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	14/03/03
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	14/03/03
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	14/03/03
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	14/03/03
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	14/03/03
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	14/03/03
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	CM
EM020	HORN ANTENNA	EMCO	3115	4032	19/07/00
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	04/08/00
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	08/11/02
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	18/12/01
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	02/08/03
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	14/05/02
EM195	ANTENNA POSITIONING MAST	EMCO	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	EMCO	2090	1662	N/A

Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A	CM
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A	18/10/02
EM119	LISN	R & S	ESH3-Z5	0831.5518.5 2	01/10/02
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULSES LIMITER	R & S	ESH3Z2	357.8810.52	03/07/02
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	28/11/01
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	18/10/02
EM197	LISN	EMCO	4825/2	1193	08/04/03

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



Inner Circuit Top View



Inner Circuit Bottom View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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Measurement of Conducted Emission Test Set Up



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