

## EMC TEST REPORT For FCC



Test Report No. : CTK01-F190  
Date of Issue : January 07, 2002  
Model/Type No: : SFM-1, FMM-1, 102997 and MTV-FMKR  
Kind of Product : FM MODULATOR (FM TRANSMITTER)  
FCC ID : P48000001  
TX Frequency Range : 88.1 MHz – 88.9 MHz  
Applicant : SAMYANG ELECTRONICS CO., LTD.  
Applicant Address : 437-9, Mogok-Dong, Pyongtaek-City, Kyungki-Do, Korea  
Manufacturer : SAMYANG ELECTRONICS CO., LTD.  
Manufacturer Address : 437-9, Mogok-Dong, Pyongtaek-City, Kyungki-Do, Korea  
Contact Person : BONG-GEUN HONG  
Telephone : +82-31-665-4141  
Received Date : December 27, 2001  
Test period : Start: December 27, 2001 End: January 7, 2002  
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

CERTiTEK Standards Laboratory Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by



Michael Jang  
EMC Test Engineer  
Date: January 7, 2002

Reviewed by



James Hong  
EMC Technical Manager  
Date: January 7, 2002

## REPORT REVISION HISTORY

Date	Revision	Page No
January 7, 2002	(CTK01-F190) Issued	All

*This report shall not be reproduced except in full, without the written approval of CERTiTEK Standards Laboratory Co., Ltd. This document may be altered or revised by CERTiTEK Standards Laboratory Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CERTiTEK Standards Laboratory Co., Ltd. will constitute fraud and shall nullify the document.*

## TABLE OF CONTENTS

1.0 General Product Description .....	4
1.1 Model Differences .....	4
1.2 Device Modifications .....	4
1.3 EUT Configuration(s) .....	5
1.4 Test Software .....	5
1.5 EUT Operating Mode(s) .....	5
1.6 Calibration Details of Equipment Used for Measurement.....	6
1.7 Test Facility .....	6
1.8 Measurement Procedure .....	6
1.9 Laboratory Accreditations and Listings .....	7
2.0 Emissions Test Regulations.....	8
2.1 Conducted Voltage Emissions .....	9
2.2 Radiated Electric Field Emissions.....	10
2.3 Intentional radiator (a) 200 kHz Bandwidth.....	11
2.4 Intentional radiator (b) Field Strength of Radiation.....	12
2.5 Intentional radiator (c) Field Strength of SPURIOUS .....	13
Configurations.....	14
APPENDIX A - TEST DATA.....	15
Conducted Voltage Emissions (Quasi-Peak reading).....	15
Radiated Electric Field Emissions (Quasi-Peak reading) .....	17
Intentional radiator (a) 200 kHz Bandwidth.....	18
Intentional radiator (b) Field Strength of Radiation.....	19
Intentional radiator (c) Field Strength of SPURIOUS .....	20

## 1.0 General Product Description

The product is FM MODULATOR (FM TRANSMITTER).

### 1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model SFM-1.
- ☒ Tests performed on Model SFM-1 were considered to be representative of Model(s) FMM-1, 102997 and MTV-FMKR.

### 1.0.2 Equipment Size, Mobility and Identification

Dimensions: 102 by 54 by 25 ☒ mm ☐ in  
 Mobility: ☐ Hand-Held ☐ Table-top ☐ Floor-standing  
☒ Used in a vehicle  
 Serial No.: Not applicable

### 1.0.3 Electrical Ratings

Input: 12 V dc  
 Output: Not applicable

### 1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage: 12 V dc  
 Frequency: Not applicable

### 1.0.5 Clock & Other Frequencies Utilized

7.6MHz

## 1.1 Model Differences

Model	Buyer	Difference			
		Case Color	Input Level Control	Frequency Setting	Power SW
SFM-1	SAMYANG	Black	VR	DIP SW	No
FMM-1	ETI	Black	VR	DIP SW	No
102997	AUTOCINEMA	Steel	3-State SW	DIP SW	No
MTV-FMKR	Micro Alarm	Black	VR	DIP SW	Yes

## 1.2 Device Modifications

The following modifications were necessary for compliance:  
 Not applicable

### 1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
Head Unit	Hyundai	H-910YD	96150-38000	Verification
DC Power Supply	HP	E3620A	N/a	N/a
DVD Player	Samsung	DVD-709	61KN400749	DoC

☒ Cable Description

#	Description	Ferrited	Length (m)	Other Details
1	DC Power Cable, Unshielded	No	1.0	Connect to DC Power Supply
2	RCA Cable, Unshielded	No	2.0	Between EUT and DVD Player
3	Antenna Cable (Male), Unshielded	No	0.6	Between EUT and Head Unit
4	Antenna Cable (Female), Unshielded	No	1.0	Between EUT and Car Antenna
5	DC Power Supply Power Cable, Unshielded	No	1.0	Connect to AC Power
6	DVD Player Power Cable, Unshielded	No	1.0	Connect to AC Power
7	Head Unit Power Cable, Unshielded	No	1.0	Connect to AC Power

N/a = Not available

### 1.4 Test Software

- ☐ Pinging  
☒ Audio CD

### 1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

- ☐ Test program (H-Pattern)      ☐ Test program (color bar)  
☐ Standby      ☒ Practice operation

## 1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.7 Test Facility

The measurement facility is located at 386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.8 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)





Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

\* Measurement procedures was In accordance with ANSI C63.4-1992 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

## 1.9 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 and 10 meter Open Area Test Sites to perform FCC Part 15/18 measurements.	 93250
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986
KOREA	MIC	10 meter Open Area Test Site and EMS (ESD, RS, EFT/Burst, Surge)	 No. 51, KR0025
International	KOLAS	EMC	 NO. 119

## 2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

☐ EN 50081-1 /1992

☐ EN 55011 /1998

☐ Group 1

☐ Group 2

☐ Class A

☐ Class B

☐ EN 55013 /A12:1994

☐ EN 55014 /1987

☐ Household appliances and similar

☐ Portable tools

☐ Semiconductor devices

☐ EN 55014 /A2:1990

☐ EN 55014 /1993

☐ Household appliances and similar

☐ Portable tools

☐ Semiconductor devices

☐ EN 55015 /1987

☐ EN 55015 /A1:1990

☐ EN 55015 /1993

☐ EN 55022 /A1:1995

☐ Class A

☐ Class B

☐ EN 55022 /1998

☐ Class A

☐ Class B

☐ EN 61000-3-2 /1995 (EN 60555 Part 2 /4.87)

☐ EN 61000-3-3 /1995 (EN 60555 Part 3 /4.87)

☐ BS

☐ VCCI V-3/99.05 : 1999

☐ Class A

☐ Class B

☒ FCC Part 15 SUBPART B

☐ Class A

☒ Class B

☒ FCC Part 15 SUBPART C

☐ Class A

☒ Class B

☐ AS 3548 (1992)

☐ Class A

☐ Class B

☐ CISPR 11 (1990)

☐ Group 1

☐ Group 2

☐ Class A

☐ Class B

☐ CISPR 22 (1993)

☐ Class A

☐ Class B



## 2.1 Conducted Voltage Emissions

### Test Date

Not Applicable

### Test Location

EMI-CE: Shielded Room

### Test Instruments

<input type="checkbox"/> Field Strength Meter	Rohde Schwarz	ESHS30	828144/002
---	---------------	--------	------------

### Test Accessories

<input type="checkbox"/> LISN	EMCO	3825/2	9409-2246
<input type="checkbox"/> LISN	EMCO	3825/2	9607-2574
<input type="checkbox"/> LISN	EMCO	3825/2	9206-1971
<input type="checkbox"/> Control PC	HP	Vectra 500	SG72000192

### Frequency Range of Measurement

☐ 150 kHz to 30 MHz  
☐ 450 kHz to 30 MHz  
☐ \_\_\_\_\_

### Instrument Settings

IF Band Width: 9 kHz

### Test Results

The requirements are:

<input type="checkbox"/> MET	minimum margin is ____ dB $\mu$ V at ____ MHz
<input type="checkbox"/> NOT MET	limit exceeded by maximum of ____ dB $\mu$ V at ____ MHz
<input type="checkbox"/> NOT APPLICABLE	

### Remarks

See Appendix A for test data.

## 2.2 Radiated Electric Field Emissions

### Test Date

January 2, 2002

### Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m  
☒ EMI-OATS: Testing was performed at a test distance of 3 m

### Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

### Test Accessories

<input checked="" type="checkbox"/> ULTRA Broadband Antenna	R & S	HL562	361324/014
<input type="checkbox"/> Biconical Antenna	Schwarzbeck	BBA9106	41-00201
<input type="checkbox"/> Biconical Antenna	EMCO	3110B	9607-2564
<input type="checkbox"/> Log-periodic Antenna	EMCO	3146	9607-4567

### Frequency Range of Measurement

30 MHz to 1 GHz

### Instrument Settings

IF Band Width: 120 kHz

### Test Results

The requirements are:

- ☒ MET minimum margin is 6.2 dB $\mu$ V/m at 200.1 MHz  
☐ NOT MET limit exceeded by maximum of \_\_\_\_ dB $\mu$ V/m at \_\_\_\_ MHz  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data

## 2.3 Intentional radiator (a) 200kHz Bandwidth

### Test Date

January 2, 2002

### Test Location

Shielded Room

### Test Instruments

<input checked="" type="checkbox"/> Spectrum Analyzer	HP	8590A	2839A03633
---	----	-------	------------

### Test Accessories

<input type="checkbox"/> ULTRA Broadband Antenna	R & S	HL562	361324/014
<input type="checkbox"/> Biconical Antenna	Schwarzbeck	BBA9106	41-00201
<input type="checkbox"/> Biconical Antenna	EMCO	3110B	9607-2564
<input type="checkbox"/> Log-periodic Antenna	EMCO	3146	9607-4567

### Frequency Range of Measurement

88.1 MHz – 88.9 MHz

### Instrument Settings

RES BW : 10 kHz  
VBW : 100 kHz

### Test Results

The requirements are:

☒ MET  
☐ NOT MET  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data

## 2.4 Intentional radiator (b) Field Strength of Radiation

### Test Date

January 2, 2002

### Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m  
☒ EMI-OATS: Testing was performed at a test distance of 3 m

### Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

### Test Accessories

<input checked="" type="checkbox"/> ULTRA Broadband Antenna	R & S	HL562	361324/014
<input type="checkbox"/> Biconical Antenna	Schwarzbeck	BBA9106	41-00201
<input type="checkbox"/> Biconical Antenna	EMCO	3110B	9607-2564
<input type="checkbox"/> Log-periodic Antenna	EMCO	3146	9607-4567

### Frequency Range of Measurement

88.1 MHz – 88.9 MHz

### Instrument Settings

IF Band Width: 120 kHz

### Test Results

The requirements are:

- ☒ MET minimum margin is 2.4 dB $\mu$ V/m at 88.9 MHz  
☐ NOT MET limit exceeded by maximum of \_\_\_\_ dB $\mu$ V/m at \_\_\_\_ MHz  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data

## 2.5 Intentional radiator (c) Field Strength of SPURIOUS

### Test Date

January 2, 2002

### Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m  
☒ EMI-OATS: Testing was performed at a test distance of 3 m

### Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

### Test Accessories

<input checked="" type="checkbox"/> ULTRA Broadband Antenna	R & S	HL562	361324/014
<input type="checkbox"/> Biconical Antenna	Schwarzbeck	BBA9106	41-00201
<input type="checkbox"/> Biconical Antenna	EMCO	3110B	9607-2564
<input type="checkbox"/> Log-periodic Antenna	EMCO	3146	9607-4567

### Frequency Range of Measurement

88.1 MHz – 88.9 MHz

### Instrument Settings

IF Band Width: 120 kHz

### Test Results

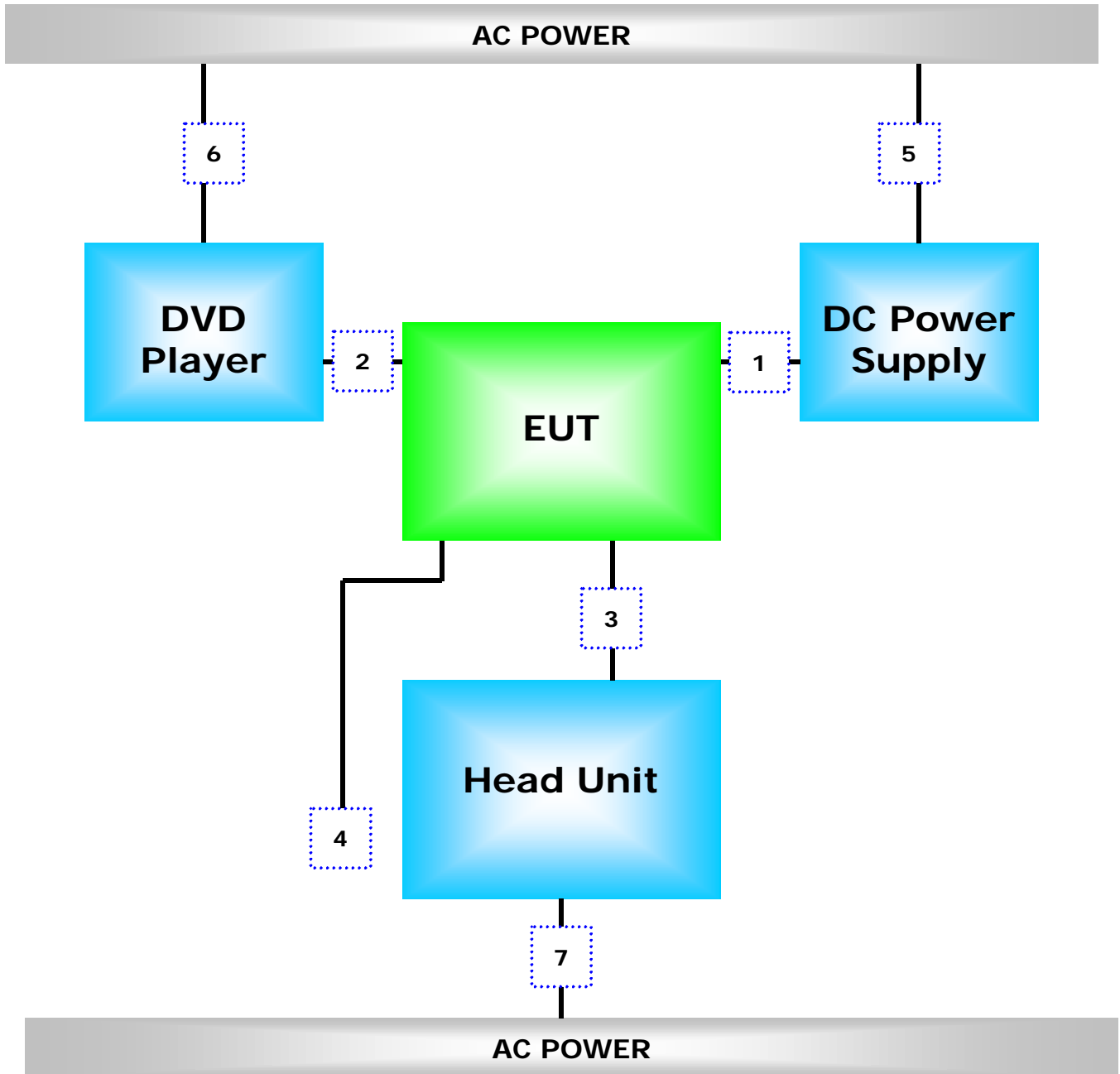
The requirements are:

- ☒ MET minimum margin is 28.5 dB $\mu$ V/m at 177.80 MHz  
☐ NOT MET limit exceeded by maximum of \_\_\_\_ dB $\mu$ V/m at \_\_\_\_ MHz  
☐ NOT APPLICABLE

### Remarks

See Appendix A for test data

## Configuration



## APPENDIX A – TEST DATA

## Conducted Voltage Emissions (Quasi-Peak reading)

[illegible]

*Not Applicable*

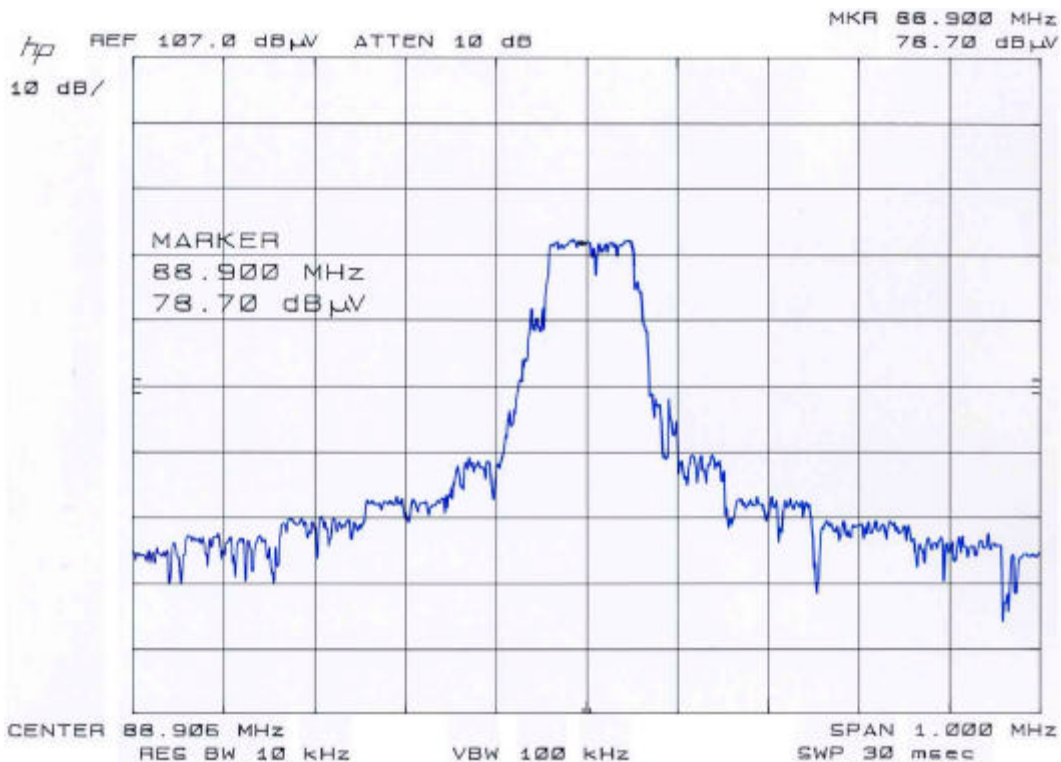
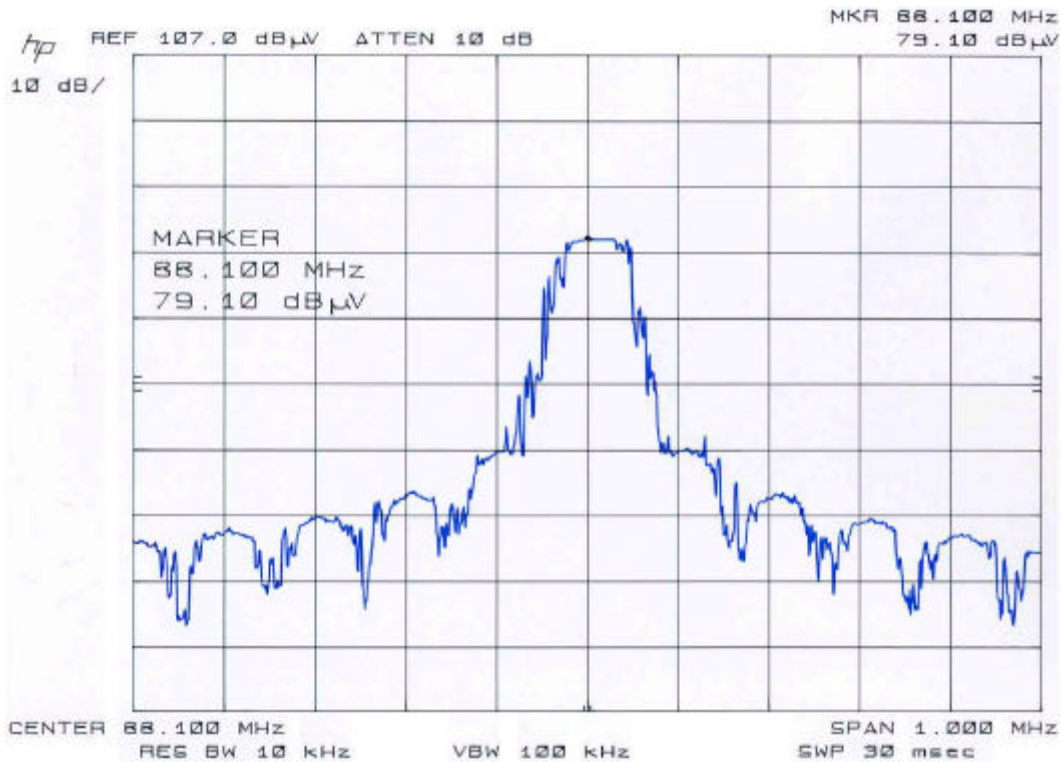
*Not Applicable*



## Radiated Electric Field Emissions (Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
54.30	27.0	H	4.0	4.7	0.6	40.0	32.3	7.7
121.80	26.6	H	4.0	9.6	1.1	43.5	37.2	6.3
135.30	24.6	V	1.0	8.4	1.3	43.5	34.3	9.2
200.10	28.5	V	1.0	7.2	1.6	43.5	37.3	6.2
216.30	20.4	V	1.0	8.0	1.8	46.0	30.1	15.9
270.30	27.4	H	4.0	10.1	2.3	46.0	39.8	6.2
297.30	23.7	H	4.0	10.9	2.4	46.0	37.0	9.0
356.00	10.9	H	1.0	12.6	2.6	46.0	26.1	19.9
545.00	12.6	H	1.2	16.3	3.5	46.0	32.4	13.6
762.20	14.3	H	2.6	19.0	4.4	46.0	37.7	8.3

## Intentional radiator (a) 200kHz Bandwidth





<http://www.certitek.com/>



(Quasi-Peak reading)

[illegible]



<http://www.certitek.com/>

## **APPENDIX B - Test Setup Photos and Configuration**

### **Conducted Voltage Emissions**

*Not Applicable*

*Not Applicable*



## Radiated Electric Field Emissions

