

**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

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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)
 Standby Test program (color bar)
 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.

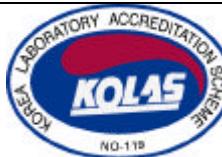
Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

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	



2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

<input type="checkbox"/> EN 50081-1 /1992		
<input type="checkbox"/> EN 55011 /1998	<input type="checkbox"/> Group 1 <input type="checkbox"/> Class A	<input type="checkbox"/> Group 2 <input type="checkbox"/> Class B
<input type="checkbox"/> EN 55013 /A12:1994		
<input type="checkbox"/> EN 55014 /1987	<input type="checkbox"/> Household appliances and similar <input type="checkbox"/> Portable tools <input type="checkbox"/> Semiconductor devices	
<input type="checkbox"/> EN 55014 /A2:1990		
<input type="checkbox"/> EN 55014 /1993	<input type="checkbox"/> Household appliances and similar <input type="checkbox"/> Portable tools <input type="checkbox"/> Semiconductor devices	
<input type="checkbox"/> EN 55015 /1987		
<input type="checkbox"/> EN 55015 /A1:1990		
<input type="checkbox"/> EN 55015 /1993		
<input type="checkbox"/> EN 55022 /A1:1995	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> EN 55022 /1998	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> EN 61000-3-2 /1995 (EN 60555 Part 2 /4.87)		
<input type="checkbox"/> EN 61000-3-3 /1995 (EN 60555 Part 3 /4.87)		
<input type="checkbox"/> BS		
<input type="checkbox"/> VCCI V-3/99.05 : 1999	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input checked="" type="checkbox"/> FCC Part 15 SUBPART B	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> Class B
<input checked="" type="checkbox"/> FCC Part 15 SUBPART C	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> Class B
<input type="checkbox"/> AS 3548 (1992)	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> CISPR 11 (1990)	<input type="checkbox"/> Group 1 <input type="checkbox"/> Class A	<input type="checkbox"/> Group 2 <input type="checkbox"/> Class B
<input type="checkbox"/> CISPR 22 (1993)	<input type="checkbox"/> Class A	<input type="checkbox"/> 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
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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

<input type="checkbox"/> 150 KHz to 30 MHz
<input type="checkbox"/> 450 KHz to 30 MHz
<input type="checkbox"/> _____

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

<input type="checkbox"/> MET	minimum margin is _____ dB μ V at _____ MHz
<input type="checkbox"/> NOT MET	limit exceeded by maximum of _____ dB μ V at _____ MHz
<input type="checkbox"/> NOT APPLICABLE	

RemarksSee 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 μ V/m at 200.1 MHz
 NOT MET limit exceeded by maximum of _____ dB μ V/m at _____ MHz
 NOT APPLICABLE

RemarksSee 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
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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

RemarksSee 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 μ V/m at 88.9 MHz
 NOT MET limit exceeded by maximum of _____ dB μ V/m at _____ MHz
 NOT APPLICABLE

RemarksSee 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 EVS30 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

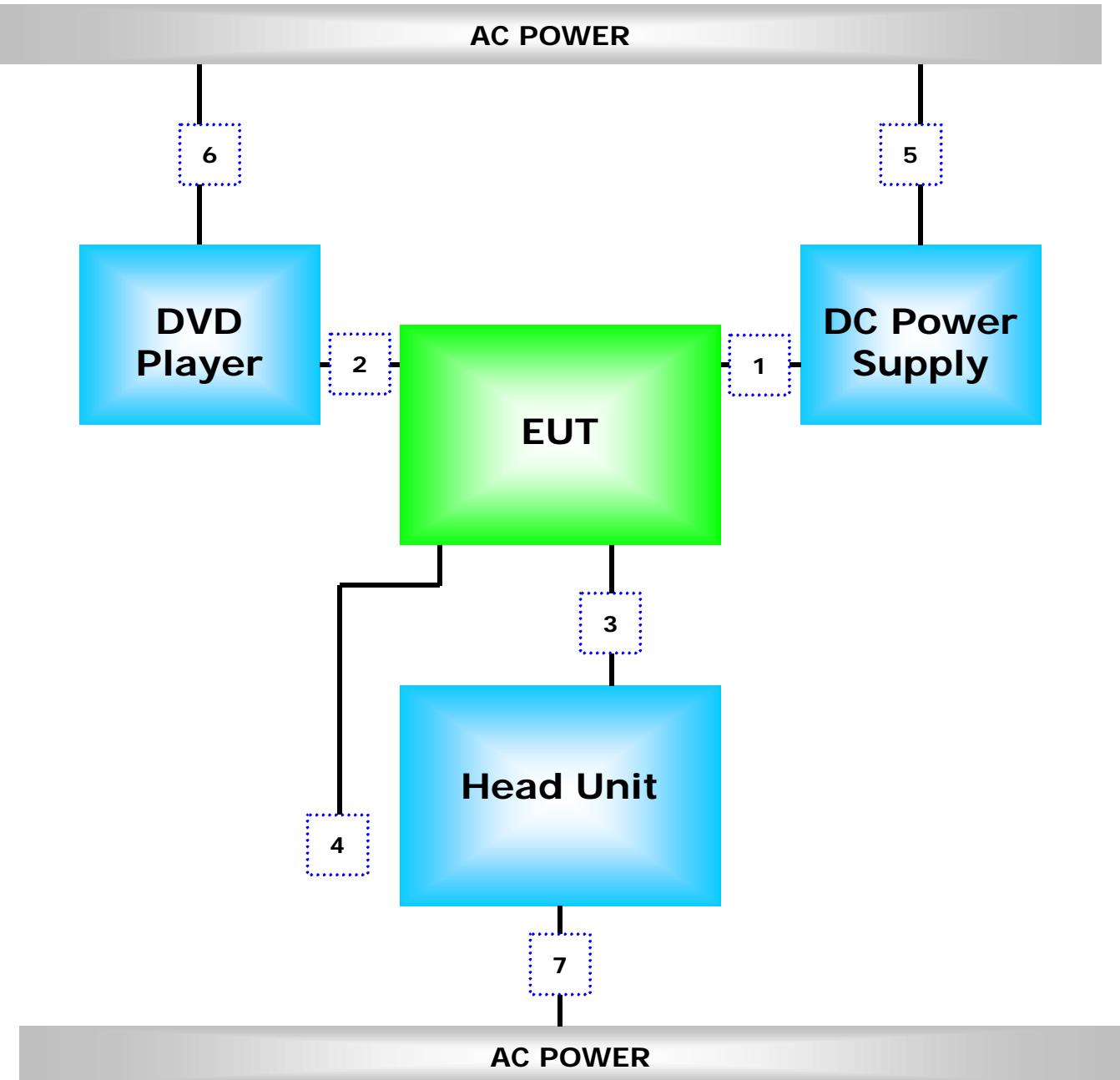
Test Results

The requirements are:

MET minimum margin is 28.5 dB μ V/m at 177.80 MHz
 NOT MET limit exceeded by maximum of _____ dB μ V/m at _____ MHz
 NOT APPLICABLE

RemarksSee Appendix A for test data

Configuration





APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading)

Not Applicable



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Not Applicable

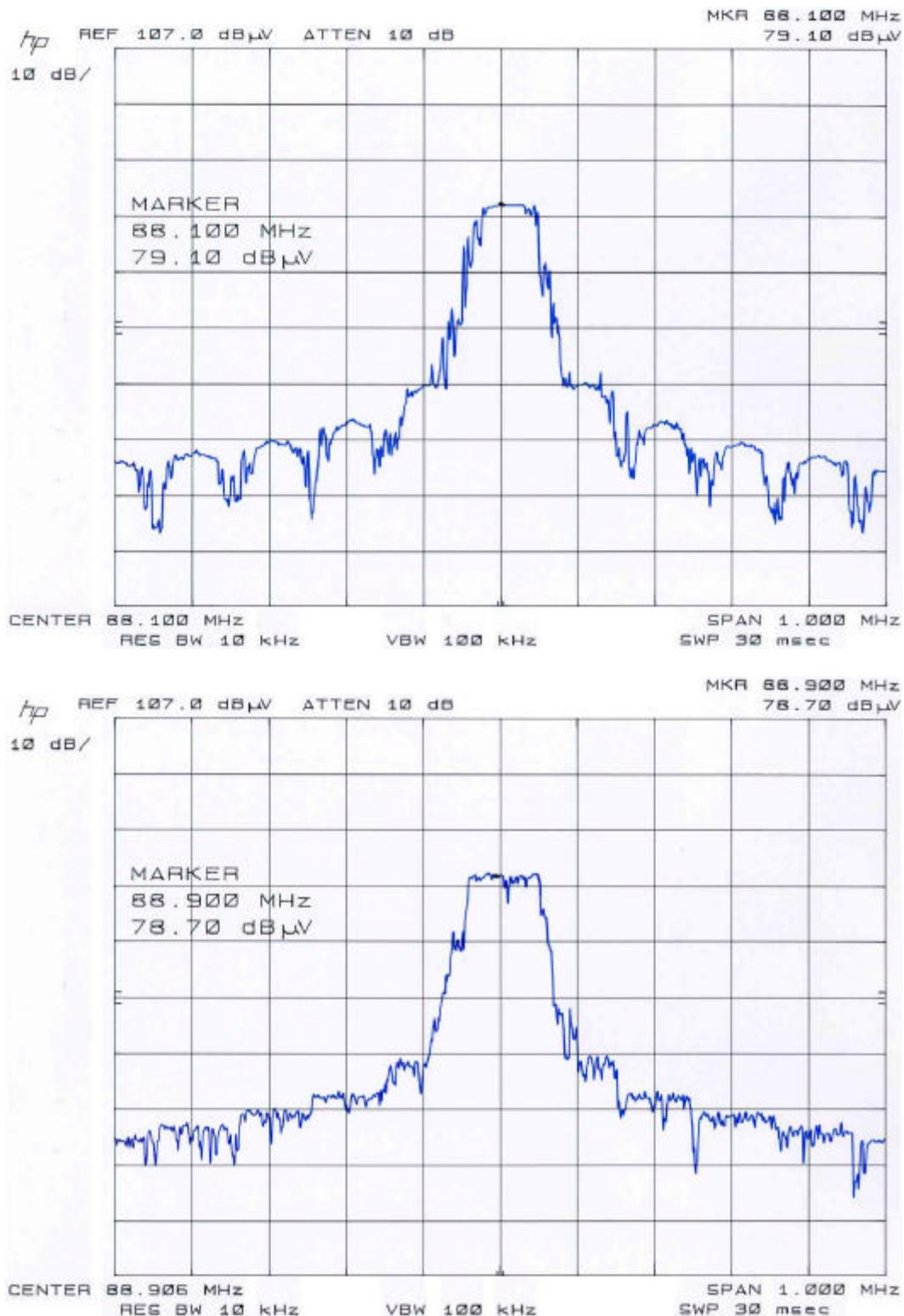
Not Applicable

**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



**Intentional radiator (b) Field Strength of Radiation**

(Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
88.10	35.5	V	1.0	8.8	1.0	48.0	45.3	2.7
88.90	35.7	V	1.0	8.9	1.0	48.0	45.6	2.4

**Intentional radiator (c) Field Strength of SPURIOUS**

(Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
176.20	4.4	V	1.0	7.0	1.6	43.5	13.0	30.5
177.80	6.5	V	1.0	7.0	1.6	43.5	15.0	28.5
264.30	0.4	V	1.0	9.9	2.2	46.0	12.5	33.5
266.70	0.6	V	1.0	10.0	2.3	46.0	12.9	33.1



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APPENDIX B - Test Setup Photos and Configuration

Conducted Voltage Emissions

Not Applicable

Not Applicable



Radiated Electric Field Emissions

