CERTiTEK

CERTiTEK Standards Laboratory Co., Ltd.
386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100
Tel: +82-31-339-9970 Fax: +82-31-339-9855
http://www.certitek.com/

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

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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

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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

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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

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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	

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2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

☐ EN 50081-1 /1992		
☐ EN 55011 /1998	☐ Group 1 ☐ Class A	☐ Group 2 ☐ 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 ☐ Class A	☐ Group 2 ☐ Class B
☐ CISPR 22 (1993)	☐ Class A	☐ Class B

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2.1 Conducted Voltage Emissions

Test Date
Not Applicable

Test Location
EMI-CE: Shielded Room

Test Instruments

☐ Field Strength Meter	Rohde Schwarz	ESHS30	828144/002

Test Accessories

☐ LISN	EMCO	3825/2	9409-2246
☐ LISN	EMCO	3825/2	9607-2574
☐ LISN	EMCO	3825/2	9206-1971
☐ 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:

☐ MET minimum margin is ___ dBµV at _____ MHz
☐ NOT MET limit exceeded by maximum of ___ dBµV at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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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

☒ ULTRA Broadband Antenna	R & S	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ 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 dBμV/m at 200.1 MHz
☐ NOT MET limit exceeded by maximum of ___ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

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2.3 Intentional radiator (a) 200kHz Bandwidth

Test Date
January 2, 2002

Test Location
Shielded Room

Test Instruments

☒ Spectrum Analyzer	HP	8590A	2839A03633

Test Accessories

☐ ULTRA Broadband Antenna	R & S	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ 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

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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

☒ ULTRA Broadband Antenna	R & S	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ 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 dBμV/m at 88.9 MHz
☐ NOT MET limit exceeded by maximum of ____ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

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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

☒ ULTRA Broadband Antenna	R & S	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ 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 dBμV/m at 177.80 MHz
☐ NOT MET limit exceeded by maximum of ____ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

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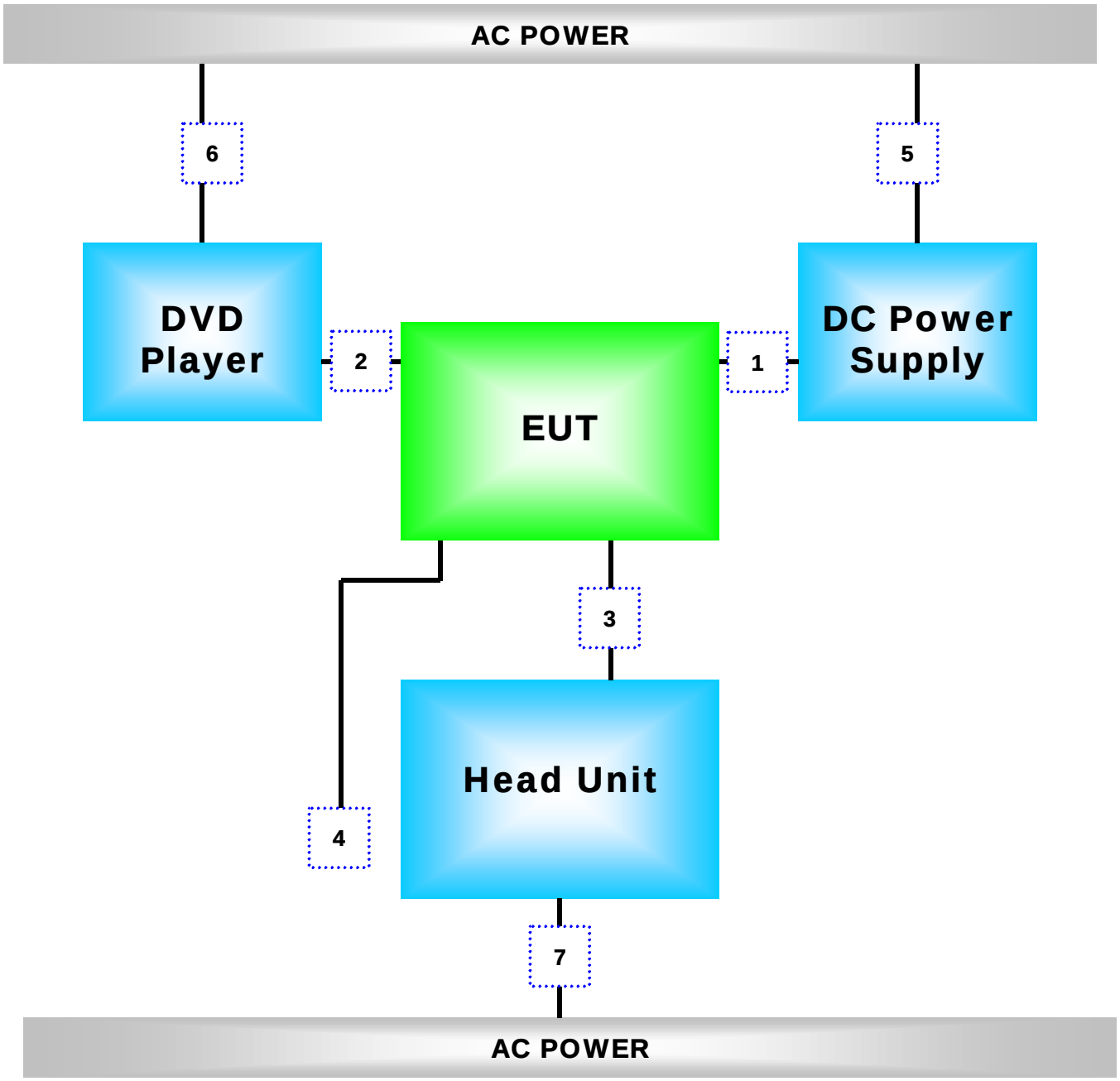
Configuration



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APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading)

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]
Not Applicable											

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Not Applicable

Not Applicable

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Radiated Electric Field Emissions (Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor Antenna	Correction Factor Cable	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
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

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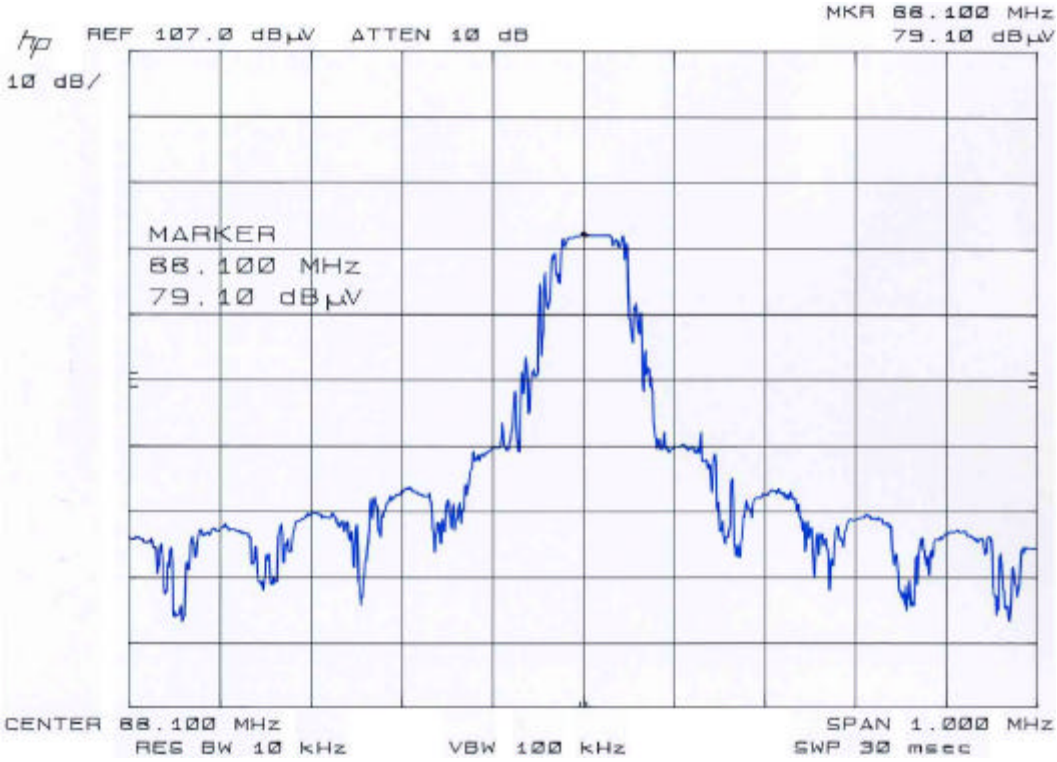
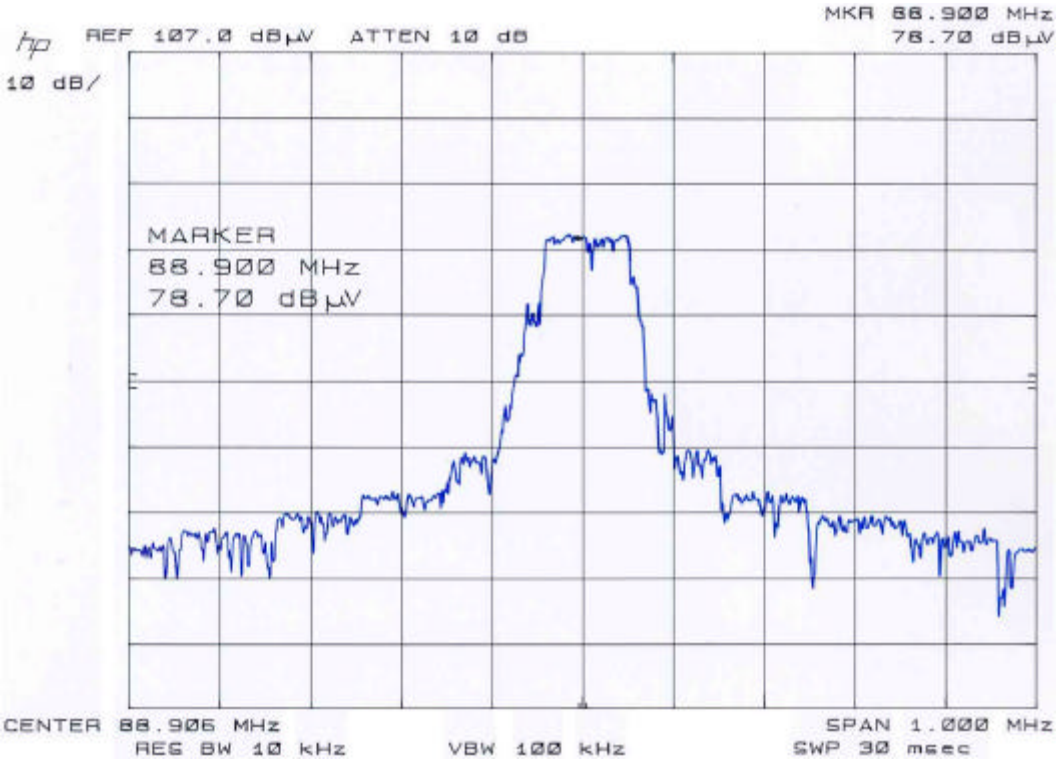
Intentional radiator (a) 200kHz Bandwidth





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Intentional radiator (b) Field Strength of Radiation

(Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor Antenna	Correction Factor Cable	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
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

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Intentional radiator (c) Field Strength of SPURIOUS

(Quasi-Peak reading)

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor Antenna	Correction Factor Cable	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
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

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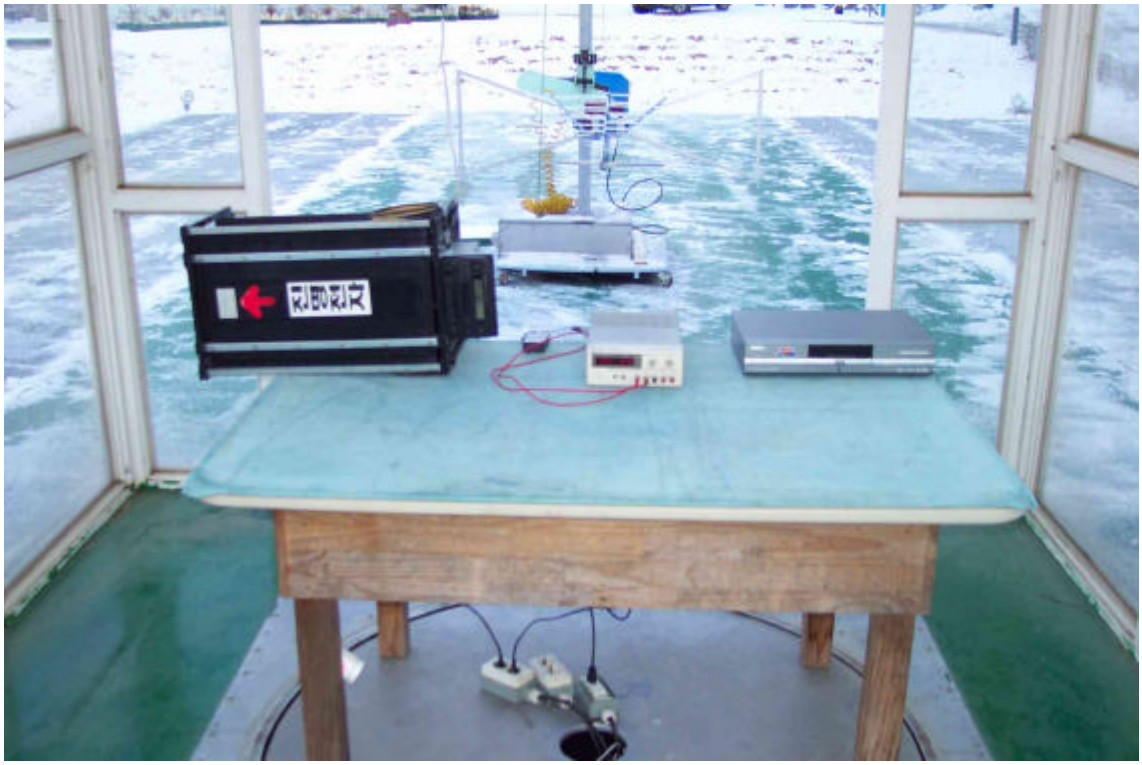
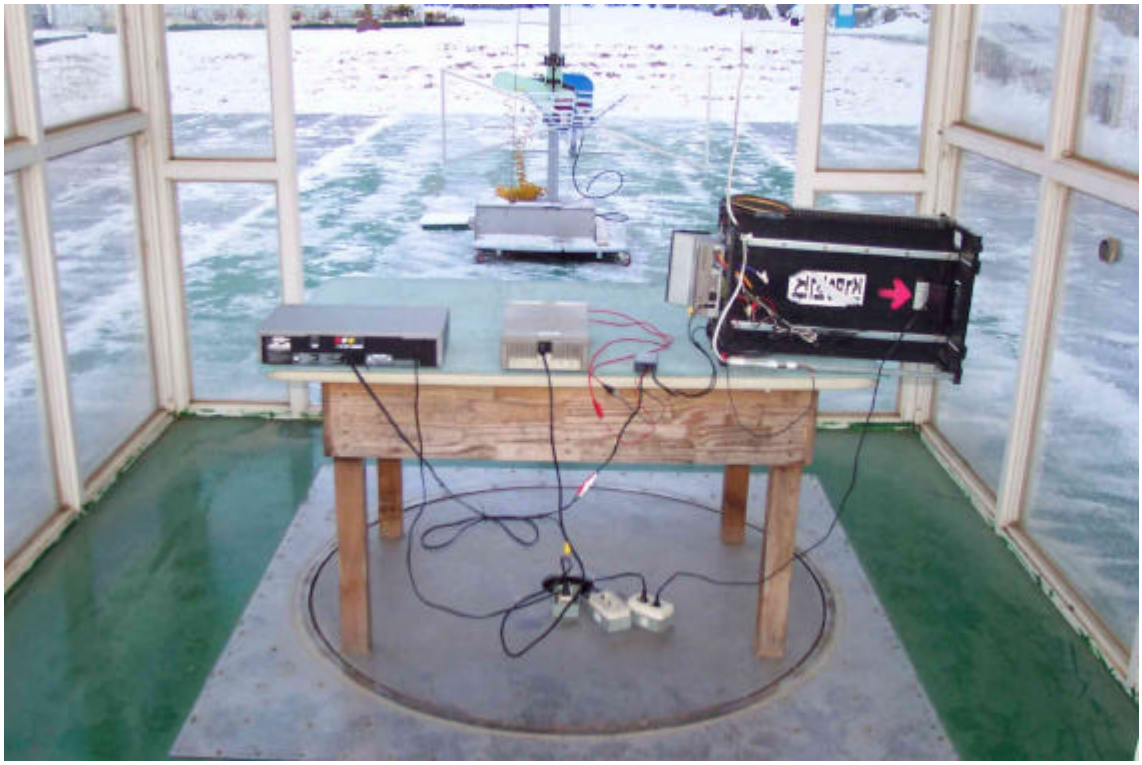
Radiated Electric Field Emissions





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