CERTiTEK

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EMC TEST REPORT For FCC

Test Report No.	:	CTK02-FE033
Date of Issue	:	April 22, 2002
Model/Type No:	:	TX-101
Kind of Product	:	FM-TRANSMITTER
TX Frequency Range	:	88.0 ㎒, 88.4 ㎒ and 89.2 ㎒.
Applicant	:	D&A Corporation
Applicant Address	:	#305 Kyungki Venture Bldg., 1017, Inkye-Dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea
Manufacturer	:	D&A Corporation
Manufacturer Address	:	#305 Kyungki Venture Bldg., 1017, Inkye-Dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea
Contact Person	:	Chul-Hee Lee
Telephone	:	+82-31-234-4812
Received Date	:	March 4, 2002
Test period	:	Start: March 4, 2002 End: March 27, 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: April 22, 2002

Reviewed by

James Hong
EMC Technical Manager
Date: April 22, 2002

REPORT REVISION HISTORY

Date	Revision	Page No
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1.0 General Product Description

The product is FM TRANSMITTER.

1.0.1 Tested Equipment

☒ Unless otherwise indicated, all tests were conducted on Model SFM-1.

☐ Tests performed on _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions:	Approx. 76 by 16 ☒ mm ☐ in
Mobility:	☐ Hand-Held ☒ Table-top ☐ Floor-standing
	☒ Used in a vehicle
Serial No.:	Not applicable

1.0.3 Electrical Ratings

Input:	6 V dc – 24 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 (with DC Power Supply) and
Frequency:	Not applicable

1.0.5 Clock & Other Frequencies Utilized

7.6MHz

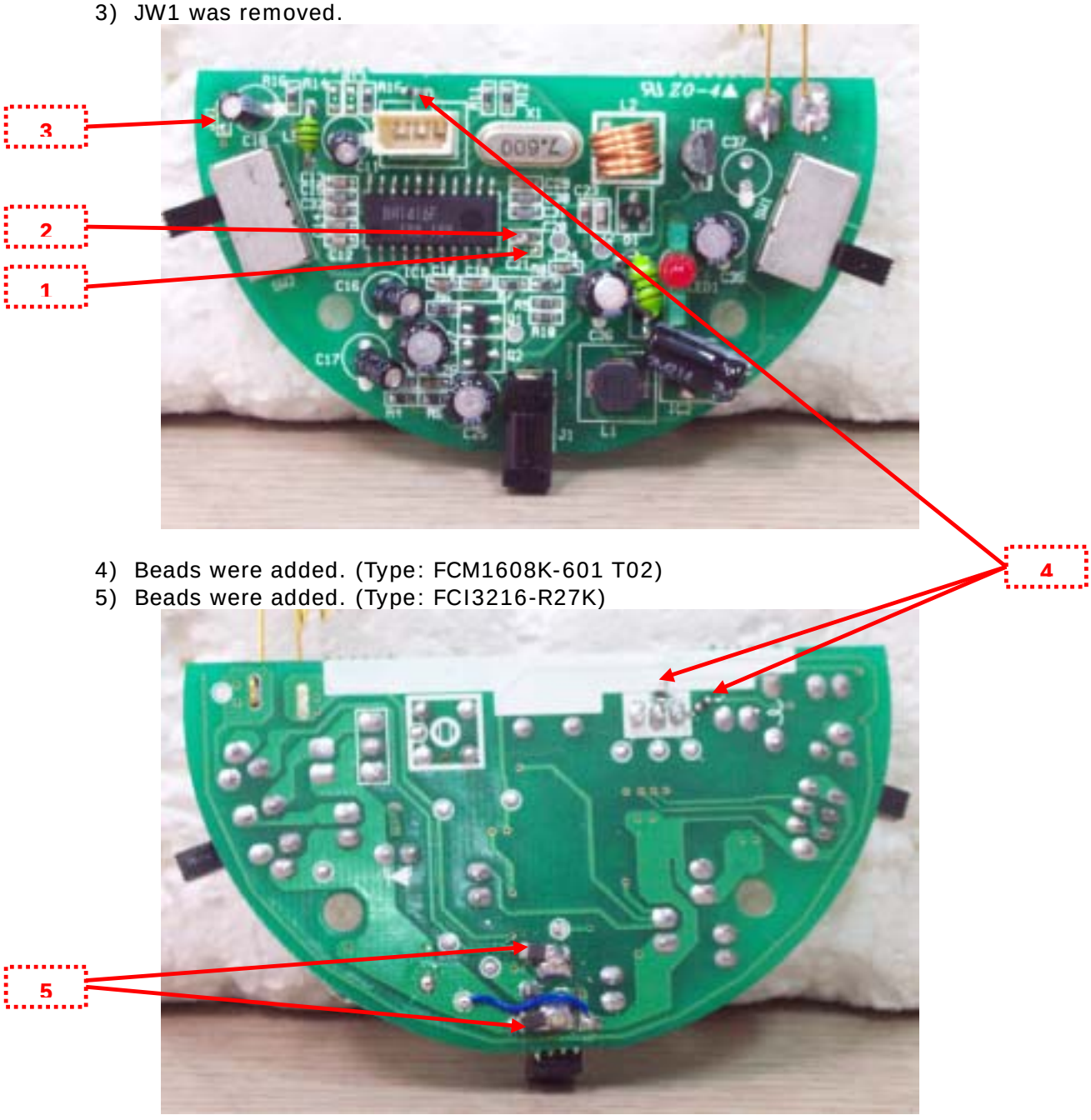
1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

1) Capacitor (C21) was removed.
2) Resistor (68 Ω) was added to reduce the radiated emission.
3) JW1 was removed.



4) Beads were added. (Type: FCM1608K-601 T02)
5) Beads were added. (Type: FCI3216-R27K)

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
DC Power Supply	HP	E3620	KR40300004	-
Cassette	Ace-Ohayo Co., Ltd.	LL-2330	-	-

☒ Cable Description

#	Description	Ferrited	Length (m)	Other Details
1	DC Power Supply Power Cord, Unshielded	No	1.8	Connect to AC Power
2	DC Power Supply Output Cable, Unshielded	No	0.9	Connect to EUT Power Cable
3	EUT Power Cable, Unshielded	No	0.45	Connect to DC Power Supply Output
4	Cable, Unshielded	No	0.3	Between EUT and Cassette

N/a = Not available

1.4 Test Software

☐ Pinging
☐ Windows Media Player

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**	EMI (CE, RE) EMS (ESD, Burst, RS, Surge, CS, Power-Frequency Susceptibility, Voltage Dips and Short Interruptions)	No. 51, KR0025
International	**KOLAS**	EMC	

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

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.

2.2 Radiated Electric Field Emissions

Test Date
March 27, 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

With DC Power Supply;
At 88.0 ㎒: Minimum margin is 11.5 dBμV/m at 92.80 ㎒.
At 88.4 ㎒: Minimum margin is 13.7 dBμV/m at 83.30 ㎒.
At 89.2 ㎒: Minimum margin is 10.7 dBμV/m at 91.40 ㎒.

☐ NOT MET limit exceeded by maximum of ___ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

2.3 Intentional radiator 200kHz Bandwidth

Test Date
March 27, 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
88.0 ㎒, 88.4 ㎒ and 89.2 ㎒.

Instrument Settings
RES BW : 10 kHz
VBW : 10 kHz

Test Results
The requirements are:

☒ MET
☐ NOT MET
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

2.4 Intentional radiator Field Strength of Radiation

Test Date
March 27, 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
88.0 ㎒, 88.4 ㎒ and 89.2 ㎒.

Instrument Settings
IF Band Width: 120 kHz

Test Results
The requirements are:

☒ MET

With DC Power Supply;
At 88.0 ㎒: Minimum margin is 1.4 dBμV/m at 88.00 ㎒.
At 88.4 ㎒: Minimum margin is 1.4 dBμV/m at 88.40 ㎒.
At 89.2 ㎒: Minimum margin is 1.4 dBμV/m at 89.20 ㎒.

☐ NOT MET limit exceeded by maximum of ___ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

2.5 Intentional radiator Field Strength of Spurious

Test Date
March 27, 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:

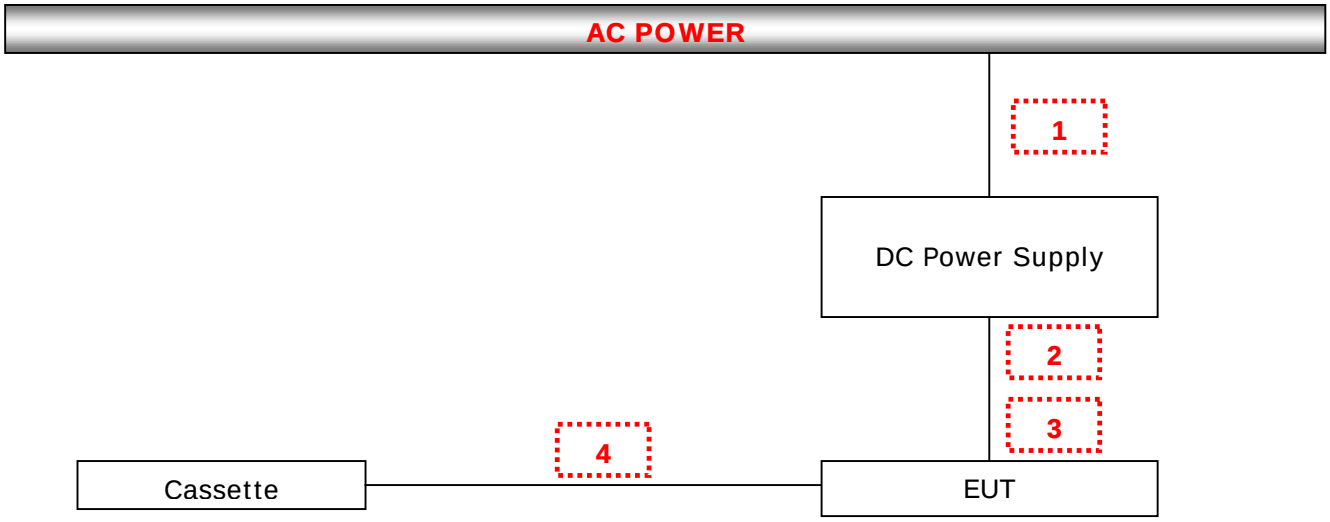
☒ MET

With DC Power Supply;
At 88.0 ㎒: Minimum margin is 13.3 dBμV/m at 175.80 ㎒.
At 88.4 ㎒: Minimum margin is 14.0 dBμV/m at 177.20 ㎒.
At 89.2 ㎒: Minimum margin is 14.0 dBμV/m at 178.50 ㎒.

☐ NOT MET limit exceeded by maximum of ___ dBμV/m at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

Configuration



APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading)

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

Not Applicable

Not Applicable

Radiated Electric Field Emissions (Quasi-Peak reading) at 88.0 ㎒ with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
56.30	17.8	V	1.0	3.6	0.6	40.0	22.0	18.0
84.00	13.7	V	1.0	8.7	0.9	40.0	23.3	16.7
92.80	22.1	V	1.0	9.0	0.9	43.5	32.0	11.5
101.60	15.5	V	1.0	9.4	1.0	43.5	25.9	17.6
119.80	13.7	V	1.0	9.7	1.1	43.5	24.5	19.0
123.20	18.7	V	1.0	9.6	1.1	43.5	29.3	14.2
124.50	18.9	V	1.0	9.4	1.1	43.5	29.4	14.1

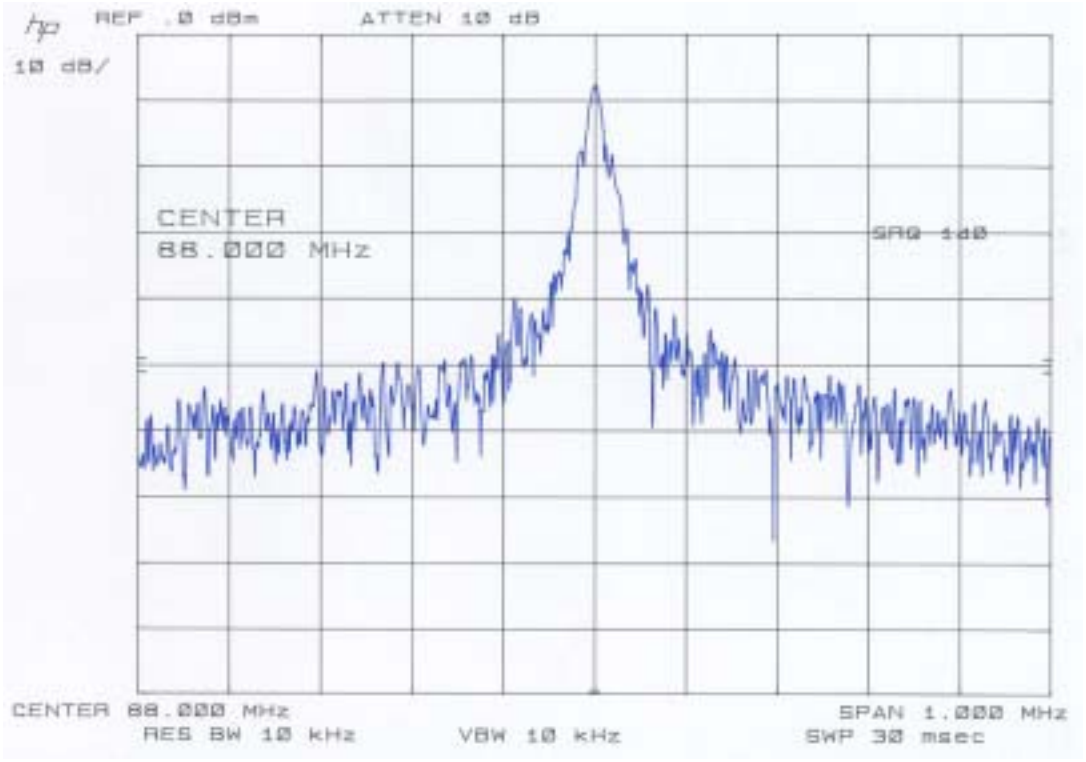
Radiated Electric Field Emissions (Quasi-Peak reading) at 88.4 ㎒ with DC Power Supply

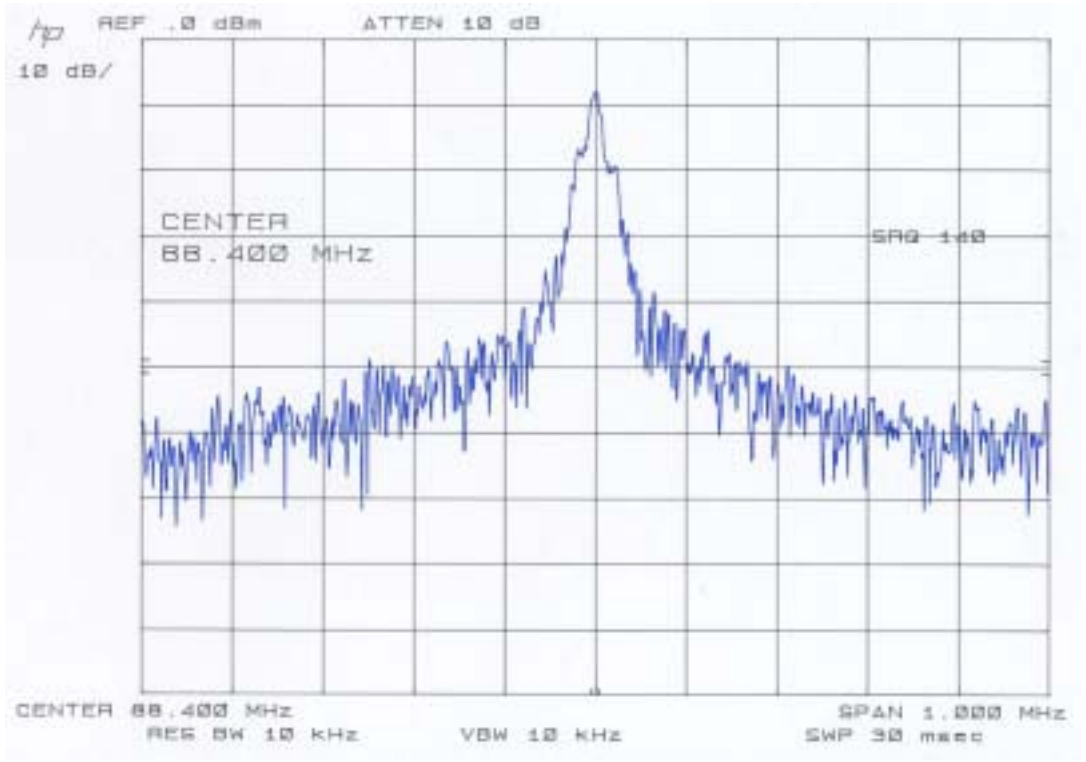
Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
53.00	18.5	V	1.0	6.2	0.6	40.0	25.3	14.7
56.30	18.6	V	1.0	3.6	0.6	40.0	22.8	17.2
83.30	16.8	H	4.0	8.6	0.9	40.0	26.3	13.7
92.80	13.5	V	1.0	9.0	0.9	43.5	23.4	20.1
122.50	18.4	V	1.0	9.6	1.1	43.5	29.0	14.5
144.80	14.8	V	1.0	7.8	1.4	43.5	24.0	19.5
229.80	16.0	H	4.0	8.4	2.0	46.0	26.4	19.7

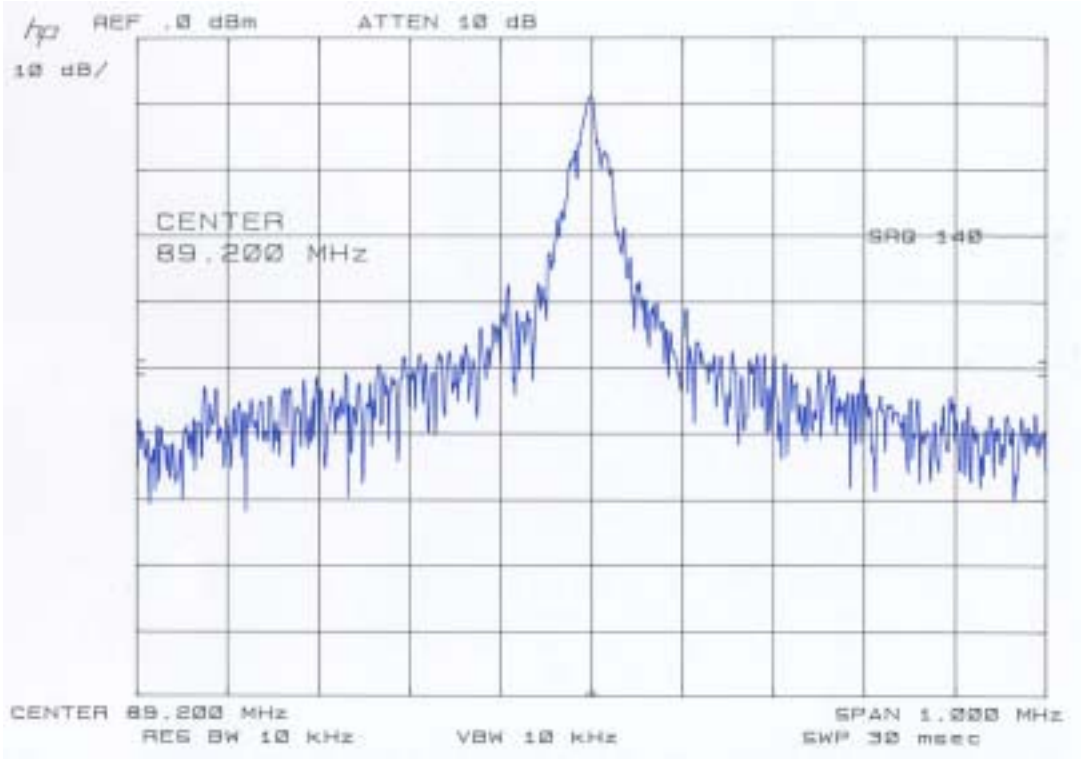
Radiated Electric Field Emissions (Quasi-Peak reading) at 89.2 ㎒ with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
84.70	14.7	V	1.0	8.7	0.9	40.0	24.3	15.8
87.40	17.5	V	1.0	8.8	1.0	40.0	27.3	12.7
91.40	22.9	V	1.0	9.0	0.9	43.5	32.8	10.7
95.50	15.0	V	1.0	8.9	0.9	43.5	24.8	18.7
117.80	14.1	V	1.0	9.6	1.1	43.5	24.8	18.7
121.10	19.0	V	1.0	9.7	1.1	43.5	29.8	13.7
125.20	15.0	V	1.0	9.4	1.1	43.5	25.5	18.0
169.10	17.3	V	1.0	7.1	1.6	43.5	26.0	17.6

Intentional radiator 200kHz Bandwidth







Intentional radiator Field Strength of Radiation (Quasi-Peak reading) with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
88.00	36.8	V	1.0	8.8	1.0	48.0	46.6	1.4
88.40	36.8	V	1.0	8.8	1.0	48.0	46.6	1.4
89.20	36.7	V	1.0	8.9	1.0	48.0	46.6	1.4

Intentional radiator Field Strength of Spurious (Quasi-Peak reading) at 88.0 ㎒ with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
175.80	21.6	H	4.0	7.0	1.6	43.5	30.2	13.3
265.60	14.0	H	4.0	9.9	2.2	46.0	26.1	19.9

Intentional radiator Field Strength of Spurious (Quasi-Peak reading) at 88.4 ㎒ with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
177.20	21.0	H	4.0	7.0	1.6	43.5	29.5	14.0
265.60	14.0	H	4.0	9.9	2.2	46.0	26.1	20.0

Intentional radiator Field Strength of Spurious (Quasi-Peak reading) at 89.2 ㎒ with DC Power Supply

Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
178.50	20.9	H	4.0	7.0	1.6	43.5	29.5	14.0
267.60	12.4	H	4.0	10.0	2.3	46.0	24.7	21.4