

EMC TEST REPORT For FCC



Test Report No. : CTK03-F124

Date of Issue : February 21, 2004

Model/Type No: : CAR MP3 AC-100

Kind of Product : MP3 Player

Applicant : AL Tech. Inc.

Applicant Address : Haesung Bldg. 1F, 747-2, Yoksam-Dong, Kangnam-Gu, Seoul,
Korea, 153-080

Manufacturer : AL Tech. Inc.

Manufacturer Address : Haesung Bldg. 1F, 747-2, Yoksam-Dong, Kangnam-Gu, Seoul,
Korea, 153-080

Contact Person : Mr. J. W. Kim

Telephone : +82-2-566-5093

Received Date : December 2, 2003

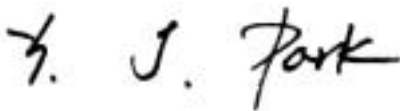
Test period : Start: February 20, 2004 End: February 20, 2004

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

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

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Tested by



Young-Joon, Park
EMC Test Engineer
Date: February 20, 2004

Reviewed by



James Hong
EMC Technical Manager
Date: February 20, 2004

REPORT REVISION HISTORY

Date	Revision	Page No
Feb. 21, 2004	(CTK03-F124) Issued	All

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1.0 General Product Description

1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model CAR MP3 AC-100.
- ☐ Tests performed on Model _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions: 112 by 59 by 25 ☒ mm ☐ in
Mobility: ☐ Hand-Held ☒ Table-top ☐ Floor-standing
☒ Used in a vehicle
Serial No.: Prototype

1.0.3 Electrical Ratings

Input: 12Vdc
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: 12Vdc
Frequency: Not applicable

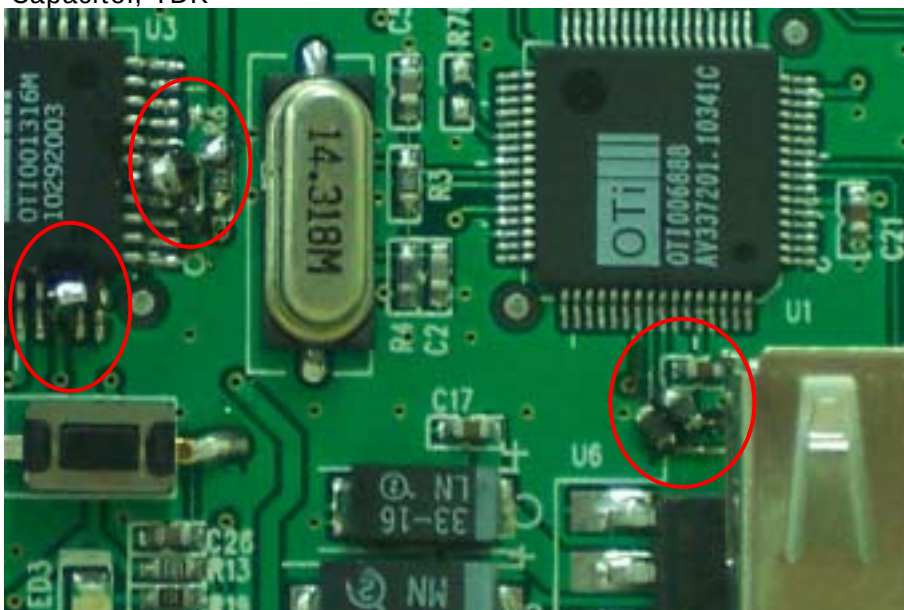
1.1 Model Differences

Not applicable

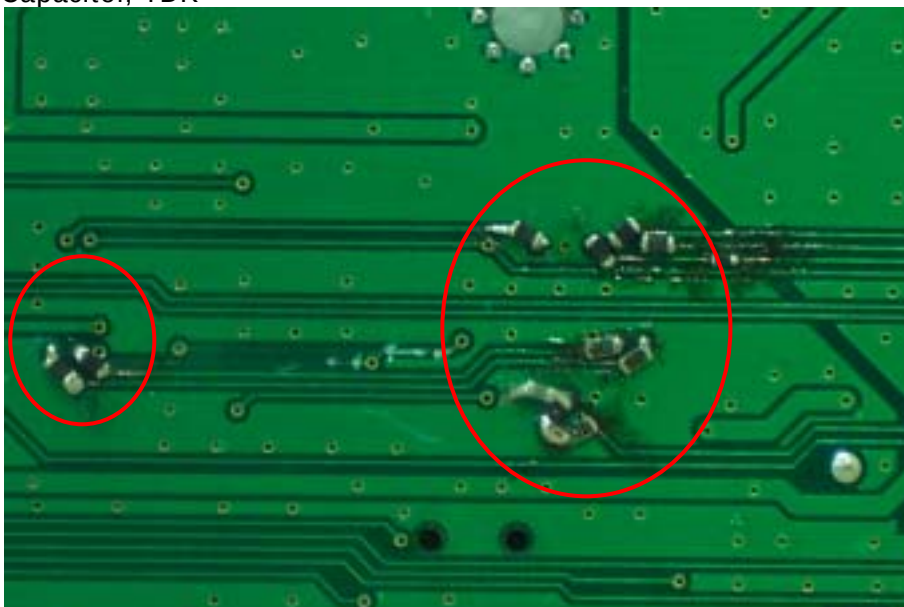
1.2 Device Modifications

The following modifications were necessary for compliance:

- 1 Kohm, Ferrite bead, TDK
- 85 ohm, Ferrite bead, TDK
- 0.1uF, Capacitor, TDK



- 1 Kohm, Ferrite bead, TDK
- 20pF, Capacitor, TDK



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
Adapter(2)	HP	F1454A	4038000001003301	-
Notebook PC	I & B COM	Slim 5360	MB0VAA111100094	DOC
Keyboard	SAMSUNG	SEM-DT35	33008107	DOC
USB Mouse	SAMSUNG	OMS3CB	0303009878	DOC
Adapter(1)	HON-KWANG	HKSD-03037	-	-
USB Memory	AL Tech. Inc	-	-	-

☒ Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	AC power cable, Unshielded	No	1.8	Connect to AC power
2	AC power cable, Unshielded	No	1.8	Connect to AC power
3	DC output cable, Unshielded	No	1.5	Between Adapter(1) and EUT
4	DC output cable, Unshielded	No	1.5	Between Adapter(2) and Notebook PC
5	OUT PUT Cable, Unshielded	No	1.5	Between EUT and Notebook PC
6	IN PUT Cable, Unshielded	No	1.5	Between EUT and Notebook PC
7	USB Mouse cable, Shielded	No	1.8	USB type
8	Keyboard cable, Shielded	No	1.2	PS/2 type

n/a = not available

1.4 Test Software

☐ Pinging

☒ Not applicable

1.5 EUT Operating Mode(s)

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

☐ Test program (H-Pattern)

☐ Standby

☒ Practice operation

☐ Test program (color bar)

☐ Test program (customer specific)

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 C63.4-2001 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
Europe	GLAS	EMC EN 55011, EN 55022, EN 55024, EN 61326, EN 50130-4, EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2, EN 61000-6-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11, EN 61000-3-2, EN 61000-3-3	 No.13000796-02

2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

☐ EN 50081-1:1992

☐ EN 55011:1998 +A1:1999

☐ Group 1

☐ Group 2

☐ Class A

☐ Class B

☐ EN 55013:1990 +A12:1994 +A13:1996 +A14:1999

☐ EN 55013:2001

☐ EN 55014-1:1993 +A1:1997 +A2:1999

☐ Household appliances and similar

☐ Portable tools

☐ Semiconductor devices

☐ EN 55014-1:2000

☐ EN 55014-2:1997

☐ EN 55015:1996 +A1:1997 +A2:1999

☐ EN 55015:2000

☐ EN 55020:1994 +A11:1996 +A13:1999 +A14:1999

☐ EN 55020:1994 +A11:1996 +A12:1999 +A13:1999 +A14:1999

☐ EN 55022:1994 +A1:1995 +A2:1997

☐ Class A

☐ Class B

☐ EN 55022:1998 +A1:2000

☐ Class A

☐ Class B

☐ EN 61000-3-2:1995 +A1:1998 +A2:1998

☐ EN 61000-3-2:1995 +A1:1998 +A2:1998 +A14:2000

☐ EN 61000-3-2:2000

☐ EN 61000-3-3:1995

☐ VCCI V-3/99.05 : 1999

☐ Class A

☐ Class B

☒ FCC Part 15 SUBPART B

☐ Class A

☒ Class B

☒ FCC Part 15 SUBPART C

☐ AS 3548 (1992)

☐ Class A

☐ Class B

☒ CISPR 22 (1998 + A1:2000)

☐ Class A

☒ Class B

The unit was tested to CISPR 22 and complied with the alternate methods allowed by FCC under paragraphs 15.107.

2.1 Conducted Voltage Emissions

Test Date

February 20, 2004

Test Location

EMI-CE: Shielded Room

Test Instruments

☒ Field Strength Meter	Rohde & Schwarz	ESHS30	828144/002
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Test Accessories

☐ LISN	EMCO	3825/2	9206-1971
☒ LISN	EMCO	3825/2	9409-2246
☒ LISN	EMCO	3825/2	9607-2574
☒ 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 16.3 dBuV(average) at 0.18 MHz
☐ NOT MET	limit exceeded by maximum of ____ dBuV at ____ MHz
☐ NOT APPLICABLE	

Remarks

See Appendix A for test data

2.2 Radiated Electric Field Emissions

Test Date

February 20, 2004

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	Rohde & Schwarz	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 4.8 dB (uV/m) at 769.24 MHz
☐ NOT MET limit exceeded by maximum of ____ dB(uV/m) at ____ MHz
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

2.3 Emissions from the intentional radiator #1

Test Date

February 20, 2004

Test Instruments

☒ Field Strength Meter	Rohde & Schwarz	ESVS30	826638/008
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TX Frequency Range

88.1 MHz to 107.9 MHz

Test Results

The requirements are:

- ☒ MET
- ☐ NOT MET
- ☐ NOT APPLICABLE

Remarks

Sec. 15.239 (a) 200KHz Bandwidth

See Appendix A for test data

2.4 Emissions from the intentional radiator #2

Test Date

February 20, 2004

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
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Test Accessories

☒ ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ Log-periodic Antenna	EMCO	3146	9607-4567

TX Frequency Range

88.1 MHz to 107.9 MHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- ☒ MET
☐ NOT MET
☐ NOT APPLICABLE

Remarks

Sec. 15.239 (b) Field Strength of Radiation

See Appendix A for test data

2.5 Emissions from the intentional radiator #3

Test Date

February 20, 2004

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
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Test Accessories

☒ ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ Log-periodic Antenna	EMCO	3146	9607-4567

TX Frequency Range

88.1 MHz to 107.9 MHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

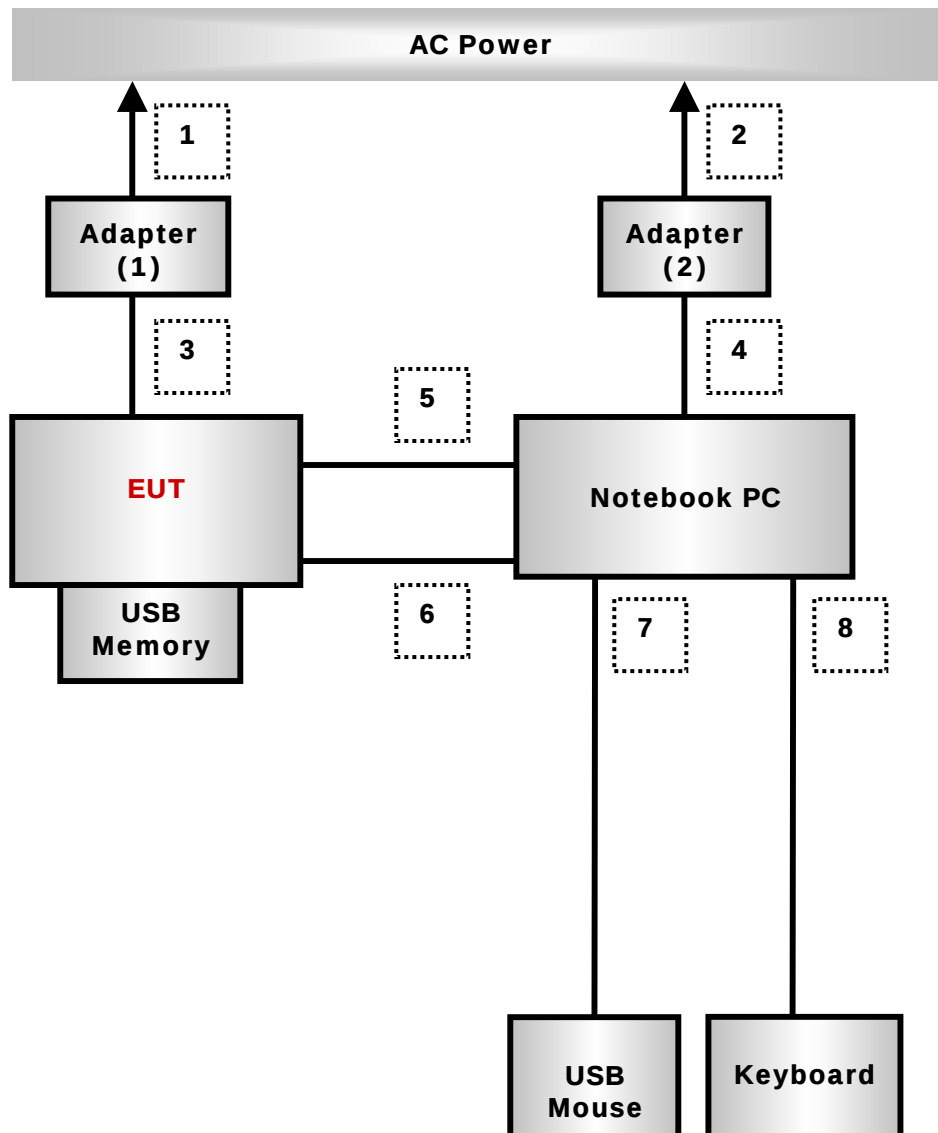
- ☒ MET
☐ NOT MET
☐ NOT APPLICABLE

Remarks

Sec. 15.239 (c) Field Strength of Spurious Radiation

See Appendix A for test data

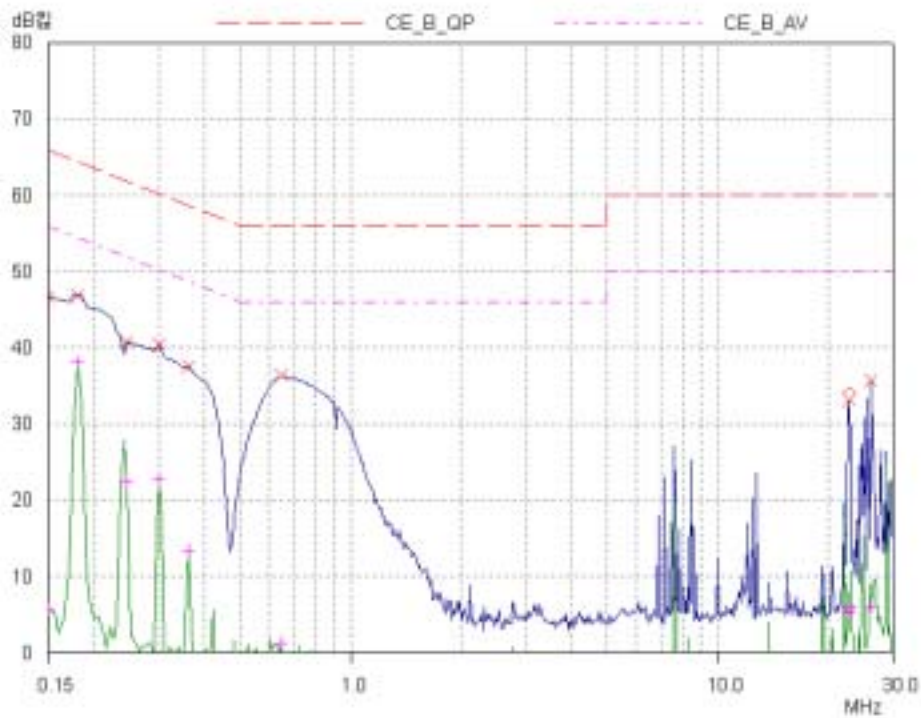
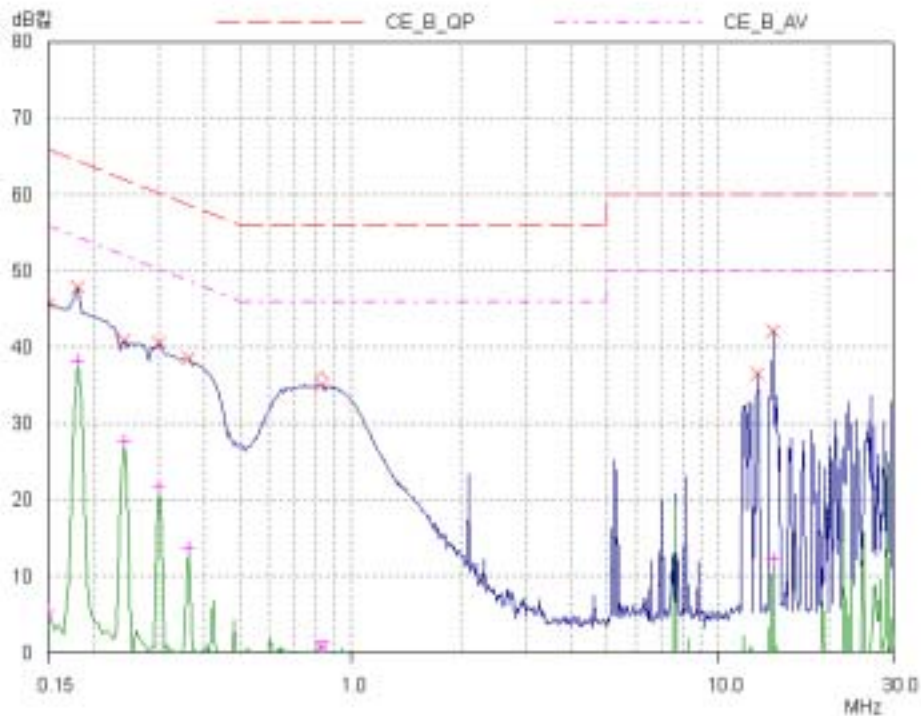
Configuration



APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading)

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.15	2.2	0.1	N	66.0	44.3	46.6	19.4	56.0	3.4	5.7	50.3
0.15	2.2	0.1	L	66.0	43.4	45.7	20.3	56.0	3.2	5.5	50.5
0.18	1.7	0.1	L	64.5	46.0	47.8	16.6	54.5	36.4	38.2	16.3
0.18	1.7	0.1	N	64.5	45.0	46.8	17.7	54.5	36.3	38.1	16.4
0.24	0.8	0.1	L	62.1	40.0	40.9	21.2	52.1	26.9	27.8	24.3
0.25	0.8	0.1	N	61.9	39.9	40.8	21.2	51.9	21.4	22.3	29.6
0.30	0.8	0.1	N	60.2	39.5	40.4	19.9	50.2	21.8	22.7	27.5
0.30	0.8	0.1	L	60.2	39.7	40.6	19.7	50.2	20.9	21.8	28.4
0.36	0.7	0.1	L	58.7	37.8	38.6	20.1	48.7	13.0	13.8	35.0
0.36	0.7	0.1	N	58.7	36.7	37.5	21.2	48.7	12.7	13.5	35.3
0.65	0.5	0.1	N	56.0	35.7	36.3	19.7	46.0	0.6	1.2	44.9
0.84	0.3	0.1	L	56.0	34.7	35.1	20.9	46.0	0.2	0.6	45.4
12.75	0.4	0.2	L	60.0	36.0	36.6	23.4	50.0	2.5	3.1	46.9
14.07	0.4	0.2	L	60.0	41.5	42.1	17.9	50.0	11.7	12.3	37.7
22.73	0.6	0.4	N	60.0	32.1	33.1	26.9	50.0	4.2	5.2	44.8
26.04	0.5	0.4	N	60.0	34.8	35.7	24.4	50.0	5.1	6.0	44.0

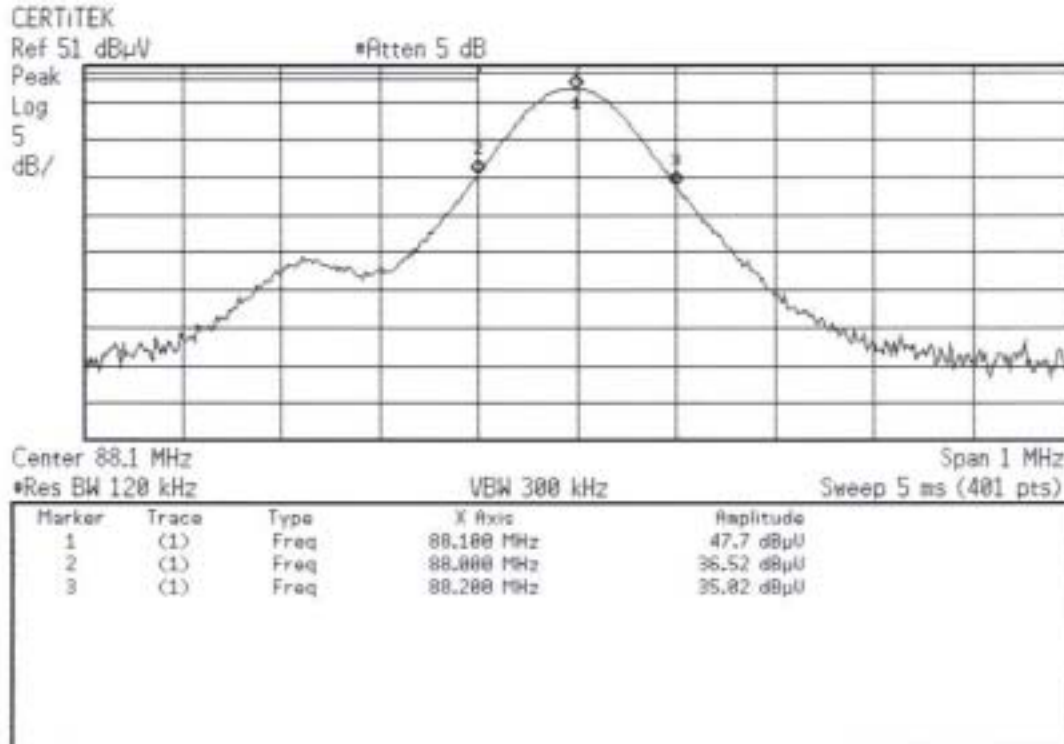


Radiated Electric Field Emissions (Quasi-Peak reading)

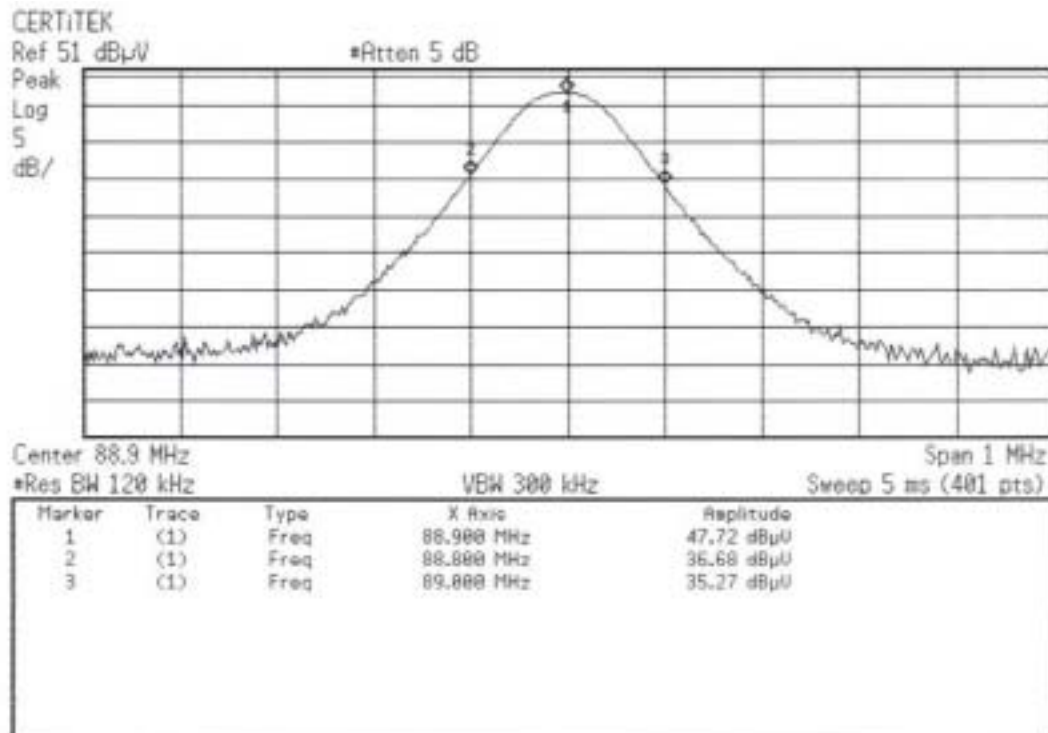
Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
175.78	22.2	H	4.0	9.7	1.1	43.5	33.0	10.5
219.64	17.2	H	4.0	17.2	0.5	40.0	34.9	5.1
229.08	22.1	V	1.0	14.4	3.0	46.0	39.5	6.5
600.49	21.6	H	1.8	14.6	3.1	46.0	39.3	6.7
613.27	21.6	V	3.5	15.0	3.3	46.0	39.9	6.1
672.88	21.5	V	2.3	15.3	3.3	46.0	40.1	5.9
769.24	22.0	H	2.1	15.7	3.5	46.0	41.2	4.8

Emissions from the intentional radiator #1 (Peak reading)

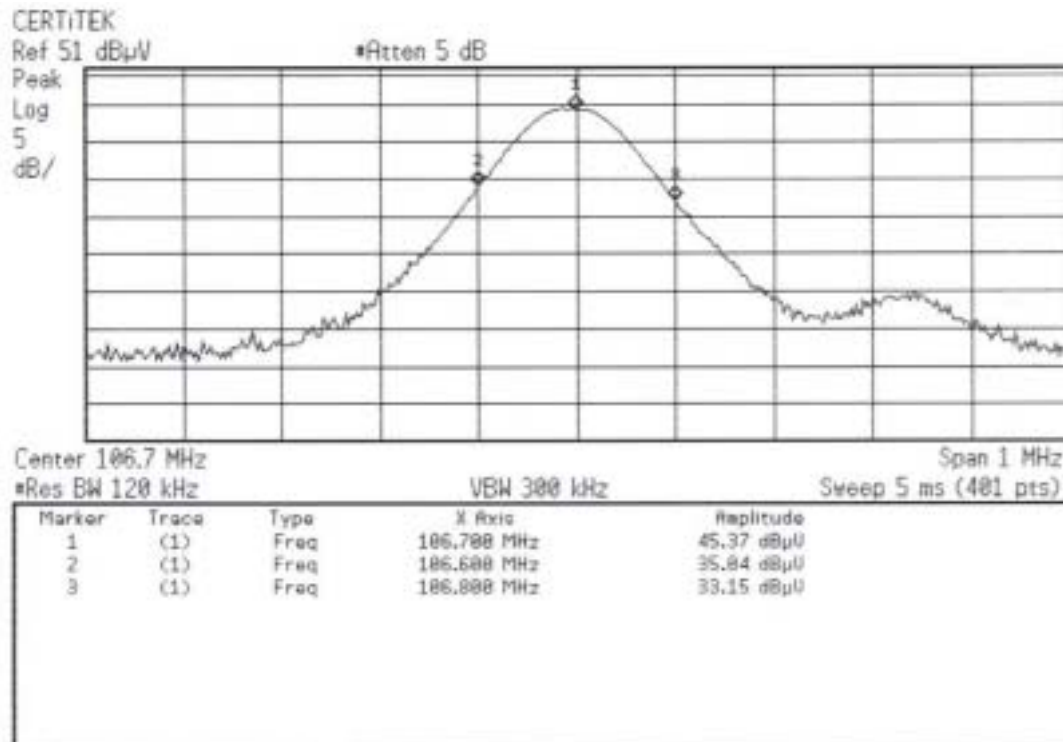
- 88.1MHz



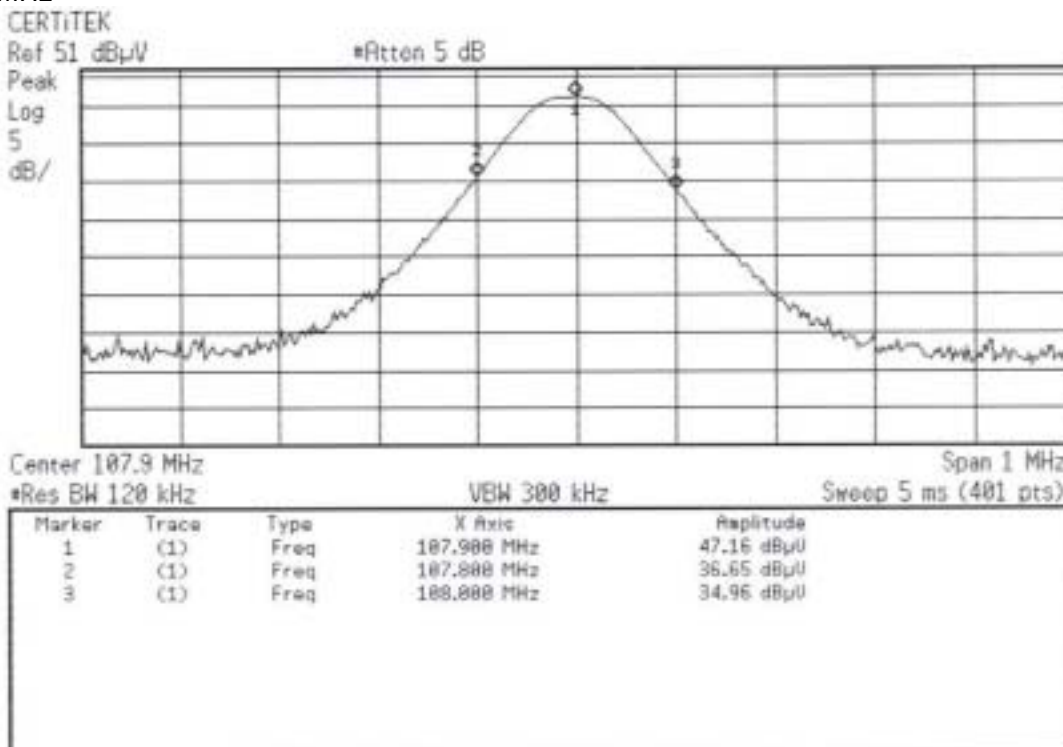
- 88.9Hz



- 106.7MHz



- 107.9MHz



Emissions from the intentional radiator #2 (Peak reading)

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
88.10	36.9	H	2.0	9.5	1.0	48.0	47.4	0.6
88.10	37.2	V	1.0	9.5	1.0	48.0	47.7	0.3
88.90	37.1	H	2.0	9.6	1.0	48.0	47.7	0.3
88.90	37.1	V	1.0	9.6	1.0	48.0	47.7	0.3
106.70	35.4	H	2.0	10.7	1.1	48.0	47.2	0.8
106.70	33.6	V	1.0	10.7	1.1	48.0	45.4	2.6
107.90	35.7	H	2.0	10.7	1.1	48.0	47.4	0.6
107.90	35.4	V	1.0	10.7	1.1	48.0	47.2	0.8

Emissions from the intentional radiator #3 (Quasi-Peak reading)

- 88.1MHz

Frequency [MHz]	Reading [dBuV / m]	Pol.	Height [m]	Correction Factor		Limits [dBuV / m]	Result [dBuV / m]	Margin [dB]
				Antenna	Cable			
176.20	9.9	H	2.0	13.1	1.6	43.5	24.6	18.9
176.20	9.1	V	1.0	13.1	1.6	43.5	23.8	19.7
264.30	11.0	H	2.0	19.1	2.2	46.0	32.3	13.7
264.30	6.1	V	1.0	19.1	2.2	46.0	27.4	18.6

- 88.9MHz

Frequency [MHz]	Reading [dBuV / m]	Pol.	Height [m]	Correction Factor		Limits [dBuV / m]	Result [dBuV / m]	Margin [dB]
				Antenna	Cable			
177.80	10.5	H	2.0	13.2	1.6	43.5	25.3	18.2
177.80	8.9	V	1.0	13.2	1.6	43.5	23.7	19.8
266.70	13.5	H	2.0	19.2	2.3	46.0	34.9	11.1
266.70	7.1	V	1.0	19.2	2.3	46.0	28.5	17.5

- 106.7MHz

Frequency [MHz]	Reading [dBuV / m]	Pol.	Height [m]	Correction Factor		Limits [dBuV / m]	Result [dBuV / m]	Margin [dB]
				Antenna	Cable			
213.40	8.5	H	2.0	16.1	1.8	43.5	26.4	17.1
213.40	6.5	V	1.0	16.1	1.8	43.5	24.4	19.1
320.10	10.4	H	2.0	15.2	2.5	46.0	28.2	17.8
320.10	5.7	V	1.0	15.2	2.5	46.0	23.4	22.6

- 107.9MHz

Frequency [MHz]	Reading [dBuV / m]	Pol.	Height [m]	Correction Factor		Limits [dBuV / m]	Result [dBuV / m]	Margin [dB]
				Antenna	Cable			
215.80	10.6	H	2.0	16.3	1.8	43.5	28.7	14.8
215.80	8.0	V	1.0	16.3	1.8	43.5	26.1	17.4
323.70	6.5	H	2.0	15.2	2.5	46.0	24.3	21.7
323.70	5.3	V	1.0	15.2	2.5	46.0	23.1	22.9