



EMI TEST REPORT

Test Report No. : 27LE0377-HO

Applicant : Japan Radio Co., Ltd.
Type of Equipment : Weather Radar System
Model No. : JMA-500
Test standard : FCC Part 87: 2006
FCC ID : VK5-JMA500
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the client product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

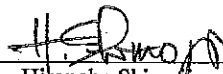
Date of test:

August 23 and 24, 2007

Tested by:


Kenichi Adachi
EMC Services

Approved by :


Hironobu Shimoda
Assistant Manager of EMC Services

UL Japan, Inc.

Head Office EMC Lab.

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MF060b (18.06.07)

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SECTION 1: Client information

Company name : Japan Radio Co., Ltd.
Address : 1-1 Shimorenjaku 5-chome, Mitaka-shi, Tokyo, 181-8510 Japan
Telephone Number : +81-422-45-9821
Facsimile Number : +81-422-45-9958
Contact Person : Hideki Tamura

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Weather Radar System
Model No. : JMA-500
Serial No. : WA50176
Rating : DC 28V, 5A
Country of Manufacture : Japan
Receipt Date of Sample : August 23, 2007
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

2.2 Product Description

Model: JMA-500 (referred to as the EUT in this report) is Weather Radar System.

Equipment identification : Transmitter
Frequency of Operation : 9375MHz +/- 30MHz
Clock Frequency (ies) in the system: Clock 10MHz
Intermediate Frequency : 60MHz
Antenna type : Flat slot array antenna
Antenna gain : More than 25.4 dBi

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SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 87: 2006
Title : AVIATION SERVICES

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	RF Output Power	Section 2.1046	Section 87.131	-	N/A	-	Complied
2	Modulation Characteristics	Section 2.1047	-	-	N/A	-	N/A *1)
3	Emission Bandwidth	Section 2.1049	Section 87.135	-	N/A	-	Complied
4	Spurious Emission at Antenna Terminals	Section 2.1051	Section 87.139	-	N/A	0.6dB 18731.25MHz	Complied
5	Field Strength of Spurious Emission	Section 2.1053	Section 87.139	-	N/A	5.1dB 37467.07MHz Vertical	Complied
6	Frequency Stability Measurement	Section 2.1055	Section 87.133	-	N/A	-	Complied

Note: UL Japan, Inc.'s EMI Work Test Procedure QPM05.

*1) Since EUT transmits no message and uses no modulation.

3.3 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Radiated Emission

The measurement uncertainty for this test using Biconical antenna is ± 4.59 dB.

The measurement uncertainty for this test using Logperiodic antenna is ± 4.62 dB.

The measurement uncertainty for this test using Horn antenna is ± 5.27 dB.

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Other tests except Radiated Emission

The measurement uncertainty for this test is ± 3.0 dB.

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3.4 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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Telephone number : +81 596 24 8116
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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.5 Test setup and test instruments

Refer to APPENDIX 1 and 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

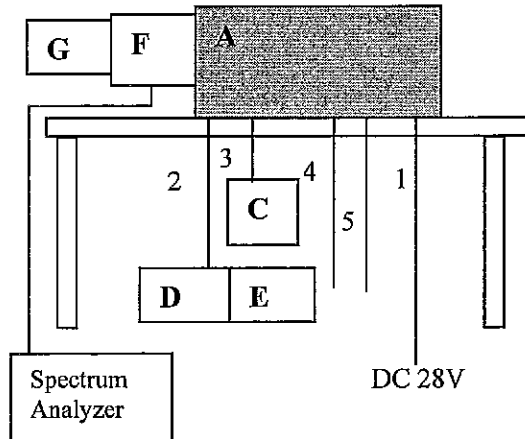
The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The mode is used : Transmitting 9375MHz

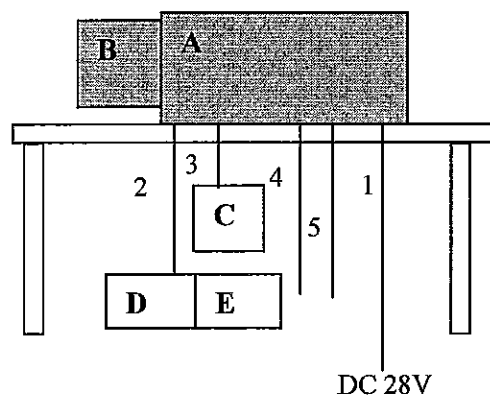
Justification : The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2. Configuration and peripherals

4.2.1 Antenna Terminal Measurement Tests



4.2.2 Radiated Emission



* Cabling and setup were taken into consideration and test data was taken under worst case conditions.

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Weather Radar System	JMA-500	WA50176	Japan Radio Co., Ltd.	EUT
B	Antenna	7ACKP0019B	000025	Japan Radio Co., Ltd.	EUT
C	Jig	453INTF	-	Japan Radio Co., Ltd.	-
D	Serial Port Adaptor	ARINC429	60776	-	-
E	Serial USB Adaptor	USB-RSAQ2	-	IO Data	-
F	Directional Coupler	WDC-100-215A	R3942002	Shimada Rika Industrial Co., Ltd.	-
G	Dummy Load	90-710B-6	F174103-02	-	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	DC Cable	2.0	Unshielded	Unshielded
2	Signal Cable	7.0	Unshielded	Unshielded
3	Signal Cable	7.0	Unshielded	Unshielded
4	Signal Cable	7.0	Unshielded	Unshielded
5	Signal Cable	7.0	Unshielded	Unshielded

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SECTION 5: RF Output power

5.1 Test Procedure : FCC Part 2.1046, Part 87.131

[Conducted]

The RF Output power was measured with a spectrum analyzer connected to the antenna port.

[Radiated]

EUT(Equipment Under Tests) was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The Radiated Electric Field Strength intensity has been measured in semi anechoic chamber with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

The Result is converted from electric field strength in dBuV/m to EIRP in Watts using the following formula

$$F [V/m] = 10 ^ { (E [dBuV/m] - 120) / 20 }$$

$$P = ((F \times d[m]) ^ 2) / (30 \times g)$$

E = measurement electric field strength, in dBuV/m

F = measurement electric field strength, in V/m

P = EIRP, in dBm

d = measurement distance, in meters. = 3 [m]

g = numeric antenna gain (Example: $10 ^ { (25.4[dBi] / 10) } = 346.737$)

- | | | | |
|------------|-------------------------|----------|---|
| 5.2 | Test data | : | APPENDIX 2 |
| 5.3 | Test result | : | Pass |
| 5.4 | Test instruments | : | [Conducted] MTR-01, MAT-39, MCC-15
[Radiated] MTR-01, MAT-39, MCC-10, MCC-48, MCC-18, MHA-05 |

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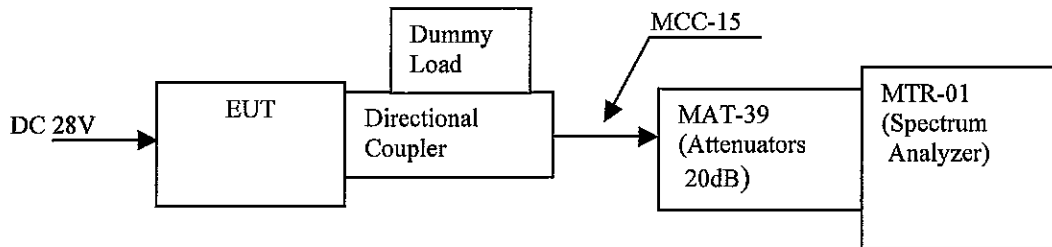
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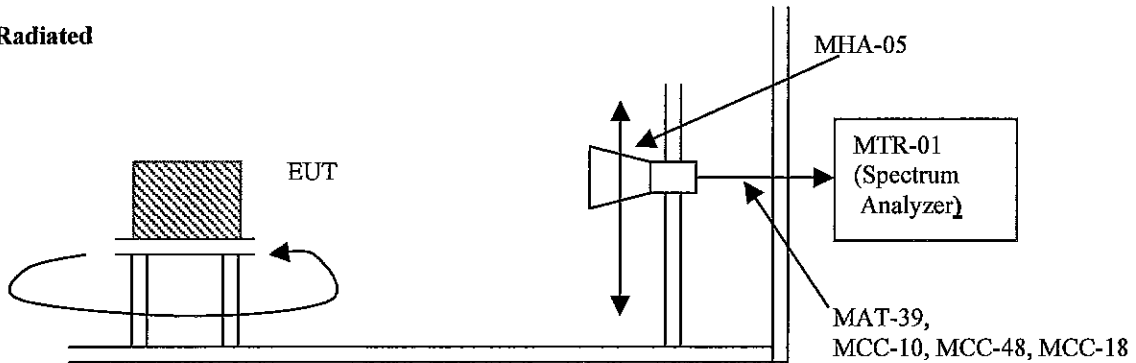
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5.5 Measurement Block Diagram of RF power output

5.5.1 Conducted



5.5.2 Radiated



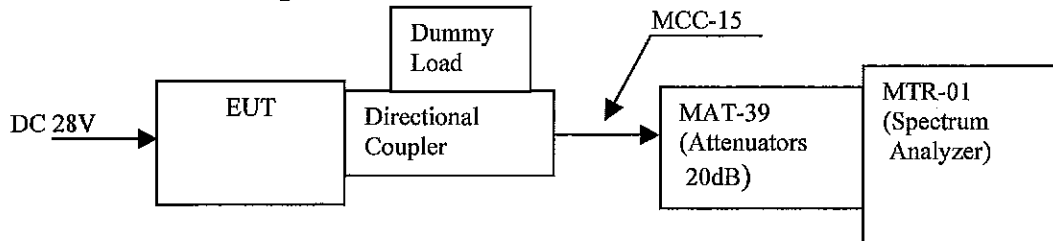
SECTION 6: Modulation Characteristics

6.1 Test Procedure : FCC Part 2.1049 , Part 87.141 (Reference data)

The Modulation Characteristics was measured with a spectrum analyzer connected to the antenna port.
The EUT transmits no message and uses no modulation.

- 6.1.2 Test Data : APPENDIX 2
6.1.3 Test Result : N/A (Since EUT transmits no message and uses no modulation)
6.1.4 Test Instrument : MTR-01, MAT-39, MCC-15

6.1.5 Measurement Block Diagram



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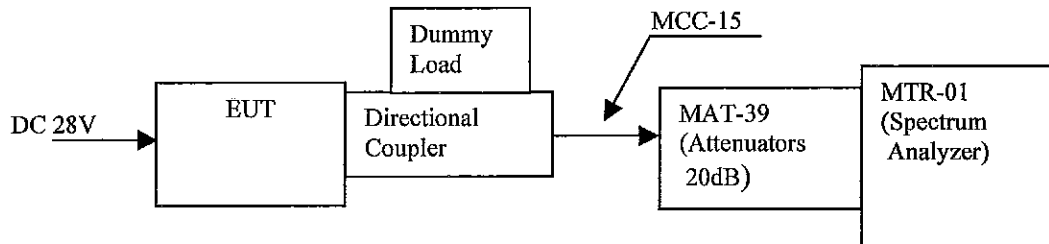
SECTION 7: Emission Bandwidth

7.1 Test Procedure : FCC Part 2.1049 , Part 87.135

The Emission Bandwidth was measured with a spectrum analyzer connected to the antenna port.

7.2 Test Data : APPENDIX 2
7.3 Test Result : Pass
7.4 Test Instrument : MTR-01, MAT-39, MCC-15

7.5 Measurement Block Diagram



SECTION 8: Spurious emission at Antenna Terminals

8.1 Test Procedure : FCC Part 2.1051 , Part 87.139

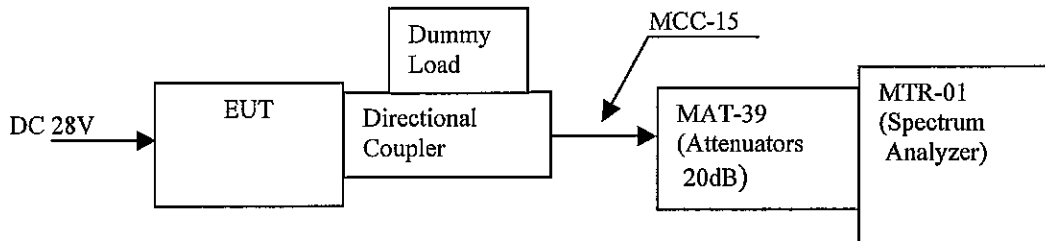
The Spurious emission at Antenna Terminals was measured with a spectrum analyzer connected to the antenna port.

Instrument used	Spectrum Analyzer
IF Bandwidth	PK: RBW: 1MHz/VBW:1MHz

Transmitter Spurious Limit : Carrier Level – (43 + 10 x log (Average power [W] = Peak power x Duty))

8.2 Test Data : APPENDIX 2
8.3 Test result : Pass
8.4 Test Instrument : MTR-01, MAT-39, MCC-15

8.5 Measurement Block Diagram



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SECTION 9: Field Strength of Spurious Emission

9.1 Test Procedure FCC Part 2.1053 , Part 87.139

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in semi anechoic chamber with a ground plane and at a distance of 3m (30MHz-18GHz) or 1m(18GHz-40GHz). The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW: 120kHz	PK: RBW: 1MHz/VBW: 1MHz

Transmitter Spurious Limit (General emissions) :
Refer to FCC part15 subpart C section 15.209

Transmitter Spurious Limit (Harmonics emissions) :
Carrier Level – (43 + 10 x log (Average power [W] = Peak power x Duty))

The Result is converted from electric field strength in dBuV/m to EIRP in Watts using the following formula

$$F [V/m] = 10^{(E [dBuV/m] - 120) / 20}$$

$$P = ((F \times d[m])^2) / (30 \times g)$$

E = measurement electric field strength, in dBuV/m
F = measurement electric field strength, in V/m
P = EIRP, in dBm
d = measurement distance, in meters. = 3 [m]
g = numeric antenna gain (Example: $10^{(25.4[dBi] / 10)} = 346.737$)

9.2 Test Data : APPENDIX 2
9.3 Test Result : Pass
9.4 Test Instrument : [Common] MAEC-01, MTR-01,
[30MHz – 1GHz] MCC-01, MPA-04, MAT-06 , MBA-01, MLA-09,
[1GHz-18GHz] MAT-39, MCC-10, MCC-48, MCC-18, MHA-05,
[18GHz – 26.5GHz] MCC-10, MCC-48, MCC-18, MCC-15, MHA-01,
[26.5GHz – 40GHz] MCC-10, MCC-05, MCC-55, MCC-65, MCC-66, MHA-03

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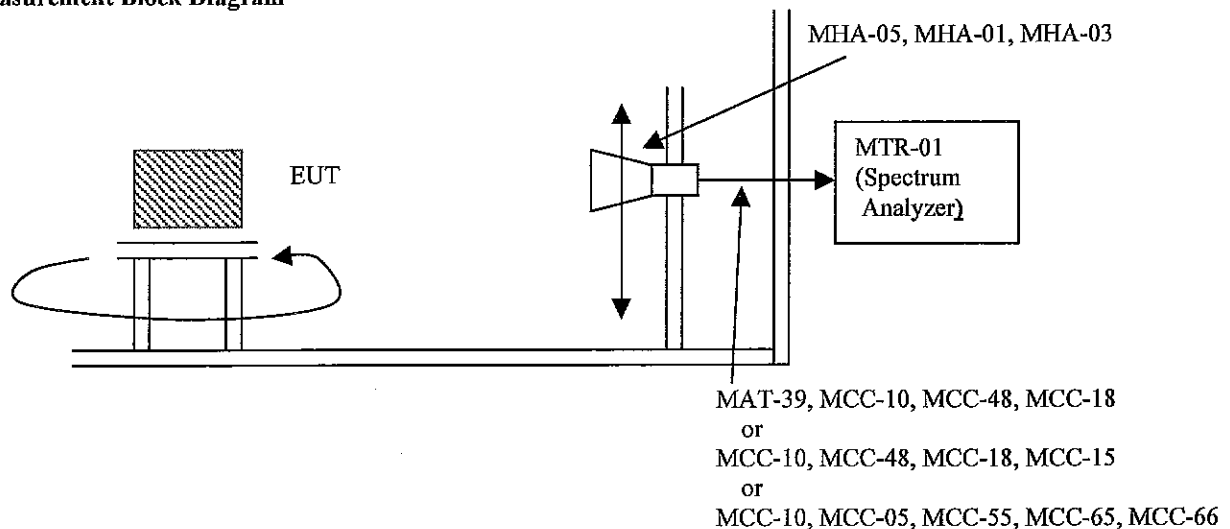
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9.5 Measurement Block Diagram



SECTION 10: Frequency Stability

10.1 Test Procedure : FCC Part 2.1055, FCC Part 87.133

The Spurious emission at Antenna Terminals was measured with a spectrum analyzer connected to the antenna port.

Refer to FCC part 2, Section 2.1055.

Input Voltage: 85% to 115% at 20 deg.C.

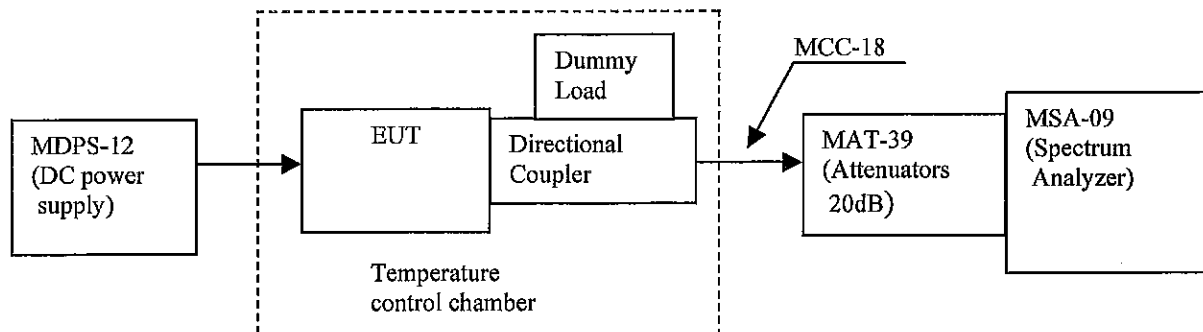
Temperature: -30deg.C. to +50deg.C. at Normal Voltage. (step 10deg.C.)

10.2 Test Data : APPENDIX 2

10.3 Test Result : Pass

10.4 Test Instrument : MCH-04 , MSA-09 , MAT-39 , MCC-18 , MDPS-12

10.5 Measurement Block Diagram



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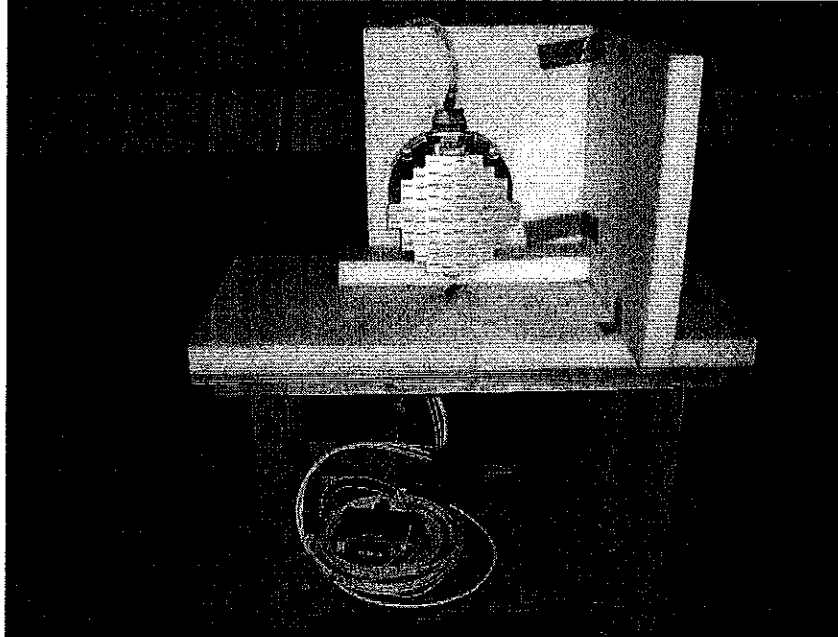
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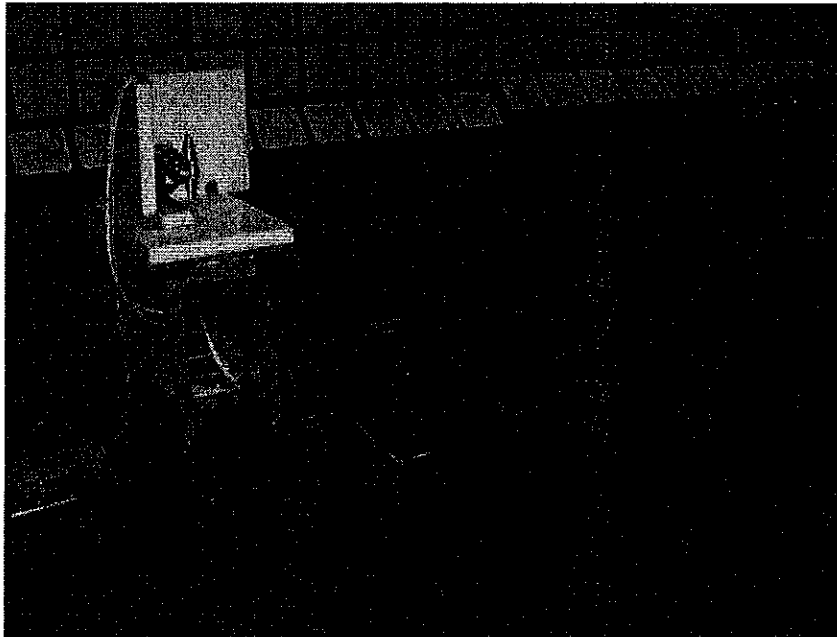
APPENDIX 1: Photographs of test setup

Radiated Emission

Front



Rear



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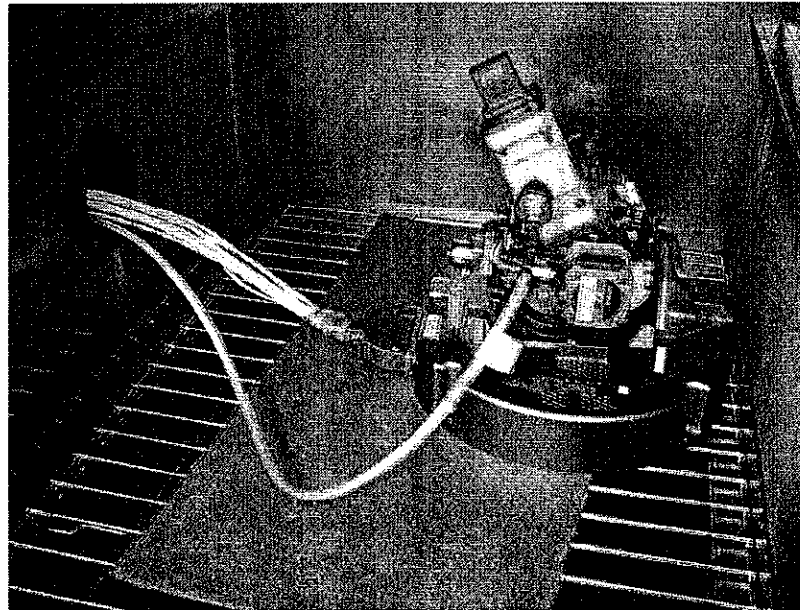
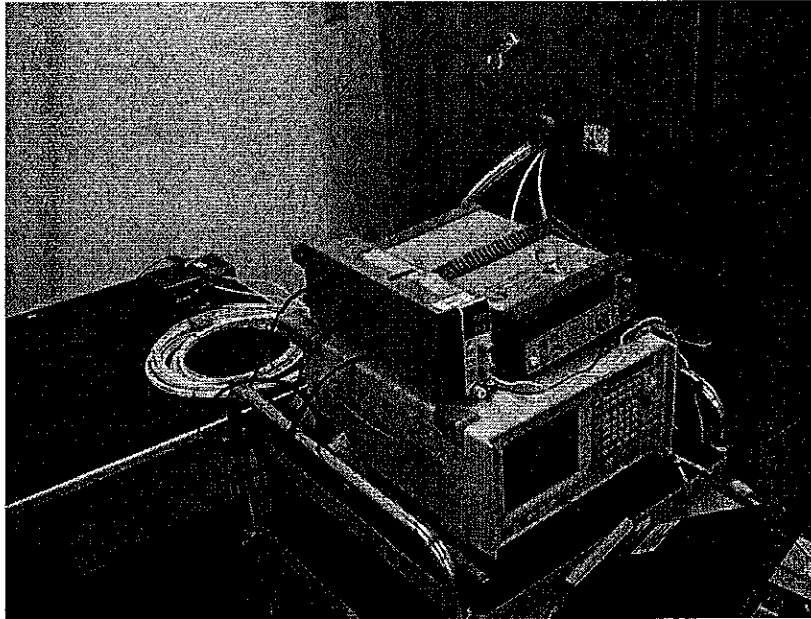
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Antenna Terminal Tests



APPENDIX 2: Data of EMI test

RF Output Power (Conducted)

Company	Japan Radio Co., Ltd.	Regulation	FCC Part87 Section 87.131 / Part 2, Section 2.1046
Equipment	Weather Radar System	Test Distance	-
Model	JMA-500	Date	08/23/2007
S/N	WA50176	Temperature	24 deg.C.
Power	DC 28V	Humidity	59 %
Mode	Transmitting 9375MHz	Engineer	Kenichi Adachi

(RBW 1MHz, VBW 1MHz)

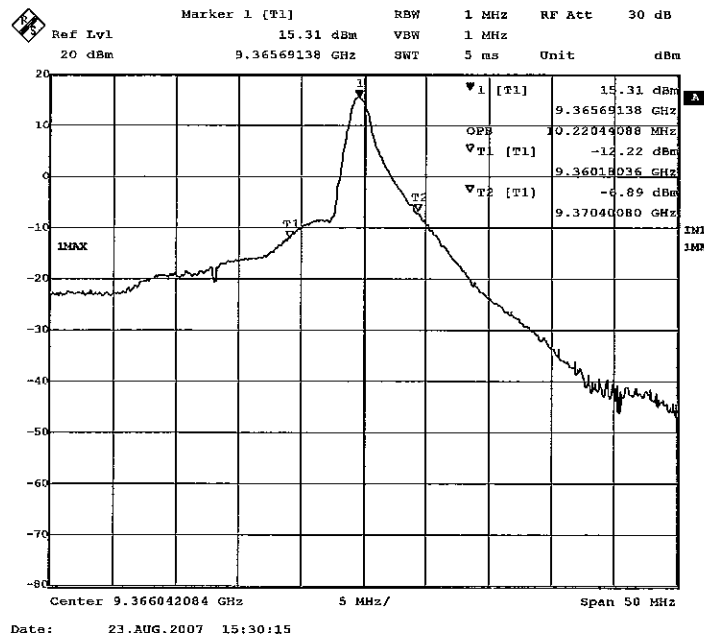
Detect	FREQ [MHz]	S/A Reading [dBm]	Cable Loss [dB]	ATT Loss [dB]	Directional Coupler Loss [dB]	Result [dBm]	Result (PK) [W]	Duty	Result (AV) [W]
PK	9366.767	15.31	0.70	19.90	30.00	65.91	3899.42	0.00049	1.91

Result (PK) [dBm] = S/A Reading + Cable Loss + ATT Loss + Directional Coupler Loss

Result (PK) [W] = $10^{(\text{Result (PK) [dBm]} / 10)} / 10^3$

Result (AV) [W] = (Result (PK) [W]) x Duty

* Duty refer to "Modulation Characteristics(Conducted)(Reference data)".



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RF Output Power (Radiated)

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Head Office EMC Lab. No.1 Semi Anechoic Chamber

Company Japan Radio Co., Ltd.
Equipment Weather Radar System
Model JMA-500
S/N WA50176
Power DC 28V
Mode Transmitting 9375MHz

Regulation FCC Part87 Section 87.131 / Part 2, Section 2.1046
Test Distance 3m
Date 08/23/2007
Temperature 24 deg.C.
Humidity 59 %
Engineer Kenichi Adachi

(RBW 1MHz, VBW 1MHz)

Measurement distance 3 [m]

PoL	Detect	FREQ [MHz]	S/A Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	ATT Loss [dB]	Result (PK) [dBuV/m]	Result (PK) [V/m]	Result (PK) [W]	Duty	Result (AV) [W]	EUT Angle [deg.]	Antenna Height [cm]
H	PK	9366.76	70.80	38.20	19.70	19.90	148.60	26.92	0.63	0.00049	0.0003	0	100
V	PK	9366.76	108.50	38.20	19.70	19.90	186.30	2065.38	3690.81	0.00049	1.8085	0	100

Result (PK) [dBuV/m] = S/A Reading + Antenna Factor + Cable Loss + ATT Loss

Result (PK) [V/m] = $10^{((\text{Result (PK) [dBuV/m]} - 120) / 20)}$

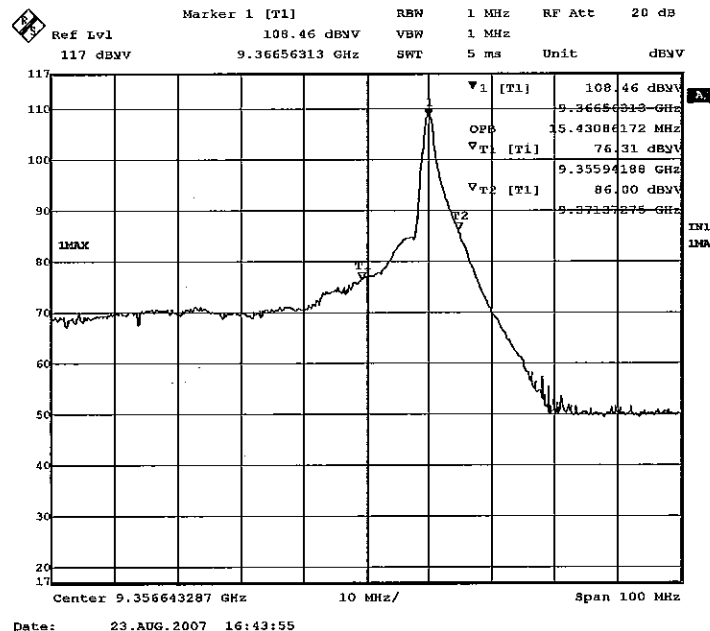
Result (PK) [W] = $((\text{Result (PK) [V/m]} \times d = 3[m]))^2 / (30 \times (g = 10^{(25.4[\text{dBi}] / 10)}))$

Result (AV) [W] = (Result (PK) [W]) x Duty

* d: measurement distance, g: numeric antenna gain.

* Duty refer to "Modulation Characteristics(Conducted)(Reference data)".

Antenna gain	
[dBi]	(numeric gain)
25.4	346.737



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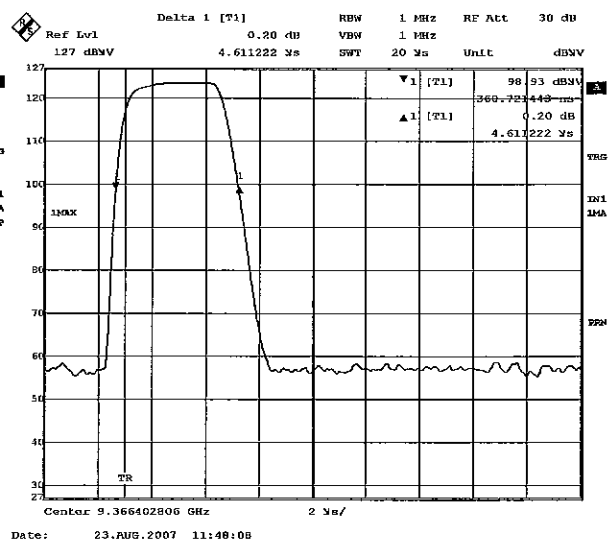
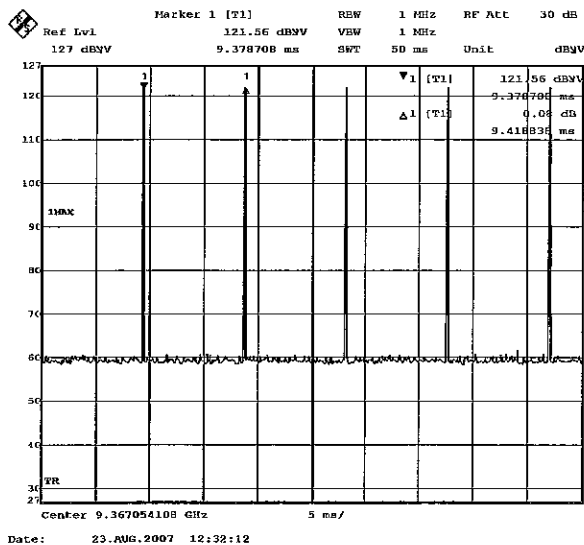
Modulation Characteristics (Conducted)(Reference data)

Company Japan Radio Co., Ltd.
Equipment Weather Radar System
Model JMA-500
S/N WA50176
Power DC 28V
Mode Transmitting 9375MHz

UL Japan, Inc
Head Office EMC Lab. No.1 Measurement room
Regulation (Reference)
Test Distance -
Date 08/23/2007
Temperature 24 deg.C.
Humidity 59 %
Engineer Kenichi Adachi

Duty

on time [ms]	1 cycle times [ms]	Duty
0.00461122	9.418838	0.0004896



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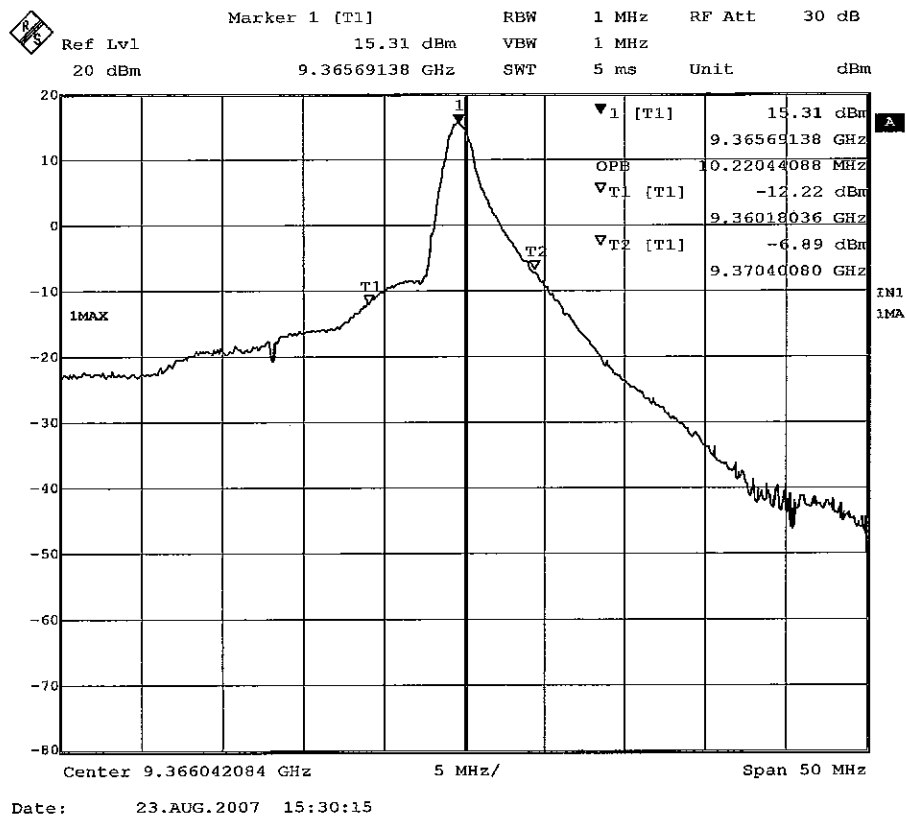
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Occupied Bandwidth (Conducted)

Company	Japan Radio Co., Ltd.	UL Japan, Inc
Equipment	Weather Radar System	Head Office EMC Lab. No.1 Measurement room
Model	JMA-500	Regulation
S/N	WA50176	FCC Part87 Section 87.135 / Part 2, Section 2.1049
Power	DC 28V	Test Distance
Mode	Transmitting 9375MHz	Date
		08/23/2007
		Temperature
		24 deg.C.
		Humidity
		59 %
		Engineer
		Kenichi Adachi

99% Occupied Bandwidth [MHz]
10.22044088



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Spurious Emissions at Antenna Terminals(Conducted)

Company	Japan Radio Co., Ltd.	Regulation	FCC Part87 Section 87.139 / Part 2, Section 2.1051
Equipment	Weather Radar System	Test Distance	-
Model	JMA-500	Date	08/23/2007
S/N	WA50176	Temperature	24 deg.C.
Power	DC 28V	Humidity	59 %
Mode	Transmitting 9375MHz	Engineer	Kenichi Adachi

UL Japan, Inc

Head Office EMC Lab. No.1 Measurement room

(RBW 1MHz, VBW 1MHz)

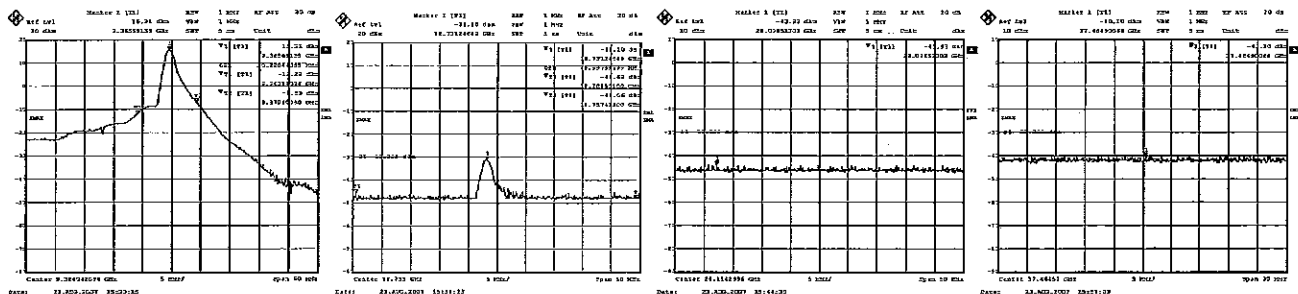
Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	ATT Loss [dB]	Directional Coupler Loss [dB]	Result [dBm]	S/A Limit [dBm]	Margin [dB]	Remarks
9366.767	15.31	0.70	19.90	30.00	65.91	-	-	Carrier
18731.246	-31.10	1.50	20.50	30.00	20.90	-30.50	0.60	
28100.301	-43.93	3.20	20.70	30.00	9.97	-30.50	13.43	
37467.068	-40.10	4.00	20.40	30.00	14.30	-30.50	9.60	

Result [dBm] = S/A Reading + Cable Loss + ATT Loss + Directional Coupler Loss

Limit: Carrier Level - 43 + Log (P(AV)[W]) = 15.31 - (43 + log (1.91)) = 15.31 - 45.81 = -30.50 [dB]

43+log(P) [dBc]	Power (AV) [W]
45.81	1.91

* Power(AV) refer to "RF Output Power(Conducted)".



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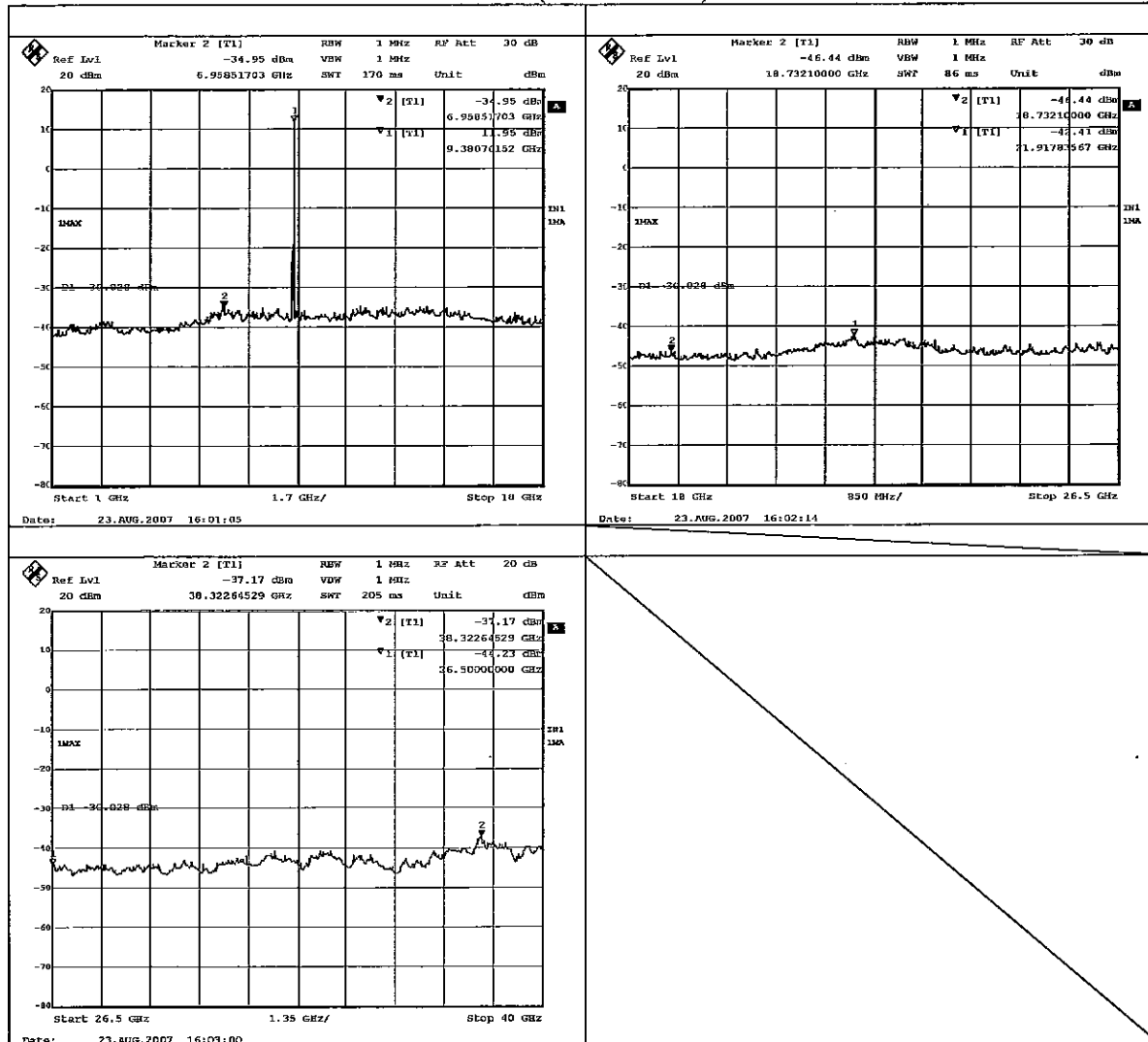
Head Office EMC Lab.

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Spurious Emissions at Antenna Terminals (Conducted)
(Reference chart)



Spurious Emissions (Radiated)(Below 1GHz)
(General Emissions)

DATA OF RADIATED EMISSION TEST

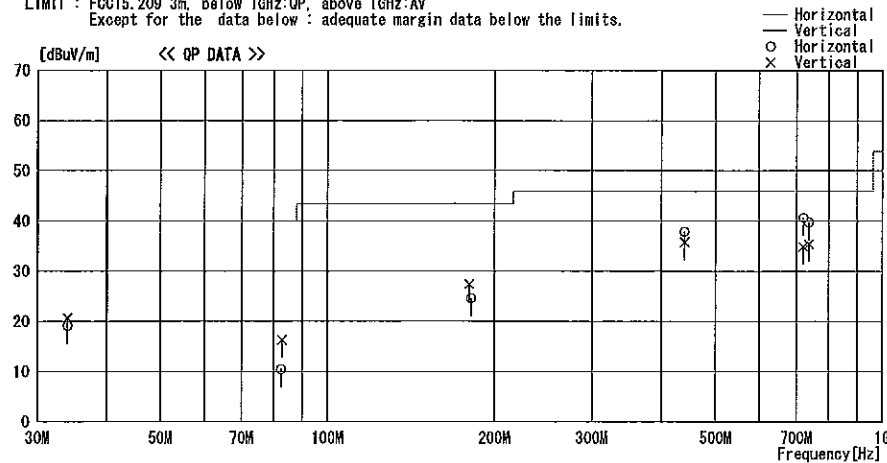
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2007/08/24

Company : Japan Radio Co.,Ltd.
Kind of EUT : Weather Radar System
Model No. : JMA-500
Serial No. : WA50176

Report No. : 27LE0377-HO
Power : DC 28V
Temp./Humi. : 24deg.C. / 50%
Operator : Kenichi Adachi

Mode / Remarks : Transmitting 9375MHz

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:AV
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Loss Gain [dB]						
34.005	23.0	QP	17.2	-21.1	19.1	180	300	Hori.	40.0	20.9
34.005	24.6	QP	17.2	-21.1	20.7	317	100	Vert.	40.0	19.3
82.567	23.4	QP	6.9	-19.8	10.5	271	270	Hori.	40.0	29.5
82.880	20.2	QP	6.9	-19.8	16.3	147	110	Vert.	40.0	23.7
181.503	26.2	QP	16.7	-18.3	24.6	7	182	Hori.	43.5	18.9
180.019	29.1	QP	18.6	-18.3	27.4	158	100	Vert.	43.5	16.1
439.993	36.0	QP	18.3	-16.4	37.9	43	116	Hori.	46.0	8.1
440.002	33.9	QP	18.3	-16.4	35.8	274	100	Vert.	46.0	10.2
721.049	34.4	QP	21.1	-14.9	40.6	130	100	Hori.	46.0	5.4
719.999	28.7	QP	21.1	-14.9	34.9	330	223	Vert.	46.0	11.1
737.630	33.1	QP	21.3	-14.7	39.7	138	157	Hori.	46.0	6.3
737.657	28.8	QP	21.3	-14.7	35.4	149	113	Vert.	46.0	10.6

CHART: WITH FACTOR ANT TYPE: 30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

Spurious Emissions (Radiated) (Above 1GHz)

(Harmonics Emissions)

UL Japan, Inc

Head Office EMC Lab. No.1 Semi Anechoic Chamber

Company Japan Radio Co., Ltd.
Equipment Weather Radar System
Model JMA-500
S/N WA50176
Power DC 28V
Mode Transmitting 9375MHz

Regulation FCC Part87 Section 87.139 / Part 2, Section 2.1053
Test Distance 3m
Date 08/23/2007
Temperature 24 deg.C.
Humidity 59 %
Engineer Kenichi Adachi

(RBW 1MHz, VBW 1MHz)

Freq. [MHz]	S/A (PK) Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	ATT Loss [dB]	3m Result (PK) [dBuV/m]	Pol.	Limit [dBuV/m]	Margin [dB]	EUT Angle [deg.]	Antenna Height [cm]	Remarks
Test distance 3meters RESULT=S/A Reading + Antenna Factor + Cable Loss + ATT Loss											
9366.64	70.8	38.2	19.7	19.9	148.6	Hor.	-	-	0	100	Carrier
9366.64	108.5	38.2	19.7	19.9	186.3	Ver.	-	-	0	100	Carrier(Worst)
Test distance 1meters RESULT=S/A Reading + Antenna Factor + Cable Loss + ATT Loss + Distance Factor											
18731.25	39.5	39.6	30.6	0.0	100.2	Hor.	140.7	40.5	0	100	residual noise
18731.25	39.6	39.6	30.6	0.0	100.3	Ver.	140.7	40.4	0	100	residual noise
28100.30	43.5	42.9	45.7	0.0	122.6	Hor.	140.7	18.1	0	100	residual noise
28100.30	43.4	42.9	45.7	0.0	122.5	Ver.	140.7	18.2	0	100	residual noise
37467.07	47.5	44.0	53.5	0.0	135.5	Hor.	140.7	5.2	0	100	residual noise
37467.07	47.6	44.0	53.5	0.0	135.6	Ver.	140.7	5.1	0	100	residual noise

Result = S/A Reading + Antenna Factor + Cable Loss + ATT Loss

Distance factor = $20 \times \log(1/3) = -9.54$ dB

*In the frequency over the second harmonic, the noise from the EUT was not seen. The data above is its base noise.

Limit: Carrier Level - 43 + Log (P(AV)[W]) = $186.3 - (43 + \log(1.81)) = 186.3 - 45.577 = 140.723$ [dBuV/m]

43+log(P) [dBc]	Power (AV) [W]	EUT Antenna Gain [dBi]	(numeric gain)
45.577	1.81	25.4	346.737

* Power(AV) refer to "RF Output Power(Radiated)".

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Frequency Stability(Conducted)

Company Japan Radio Co., Ltd.
Equipment Weather Radar System
Model JMA-500
S/N WA50176
Power DC 28V
Mode Transmitting 9375MHz

UL Japan, Inc
Head Office EMC Lab. No.6 Measurement room
Regulation FCC Part87 Section 87.133 / Part 2, Section 2.1055
Test Distance -
Date 08/24/2007
Temperature 26 deg.C.
Humidity 56 %
Engineer Kenichi Adachi

Limits : No Limit (Product specification : +/-30MHz)

Operating freq	9375 MHz	±	30 MHz
			MHz
Lower Limit			9345.000000
Upper Limit			9405.000000

Frequency stability vs. temperature

Ambient temperature [deg.C]		Result
-30	Measured Frequency [MHz]	9375.5916810
	Tolerance [MHz]	0.5916810
	Tolerance [ppm]	63.1126400
-20	Measured Frequency [MHz]	9373.6587700
	Tolerance [MHz]	-1.3412300
	Tolerance [ppm]	-143.0645333
-10	Measured Frequency [MHz]	9371.9682220
	Tolerance [MHz]	-3.0317780
	Tolerance [ppm]	-323.3896533
0	Measured Frequency [MHz]	9370.1748740
	Tolerance [MHz]	-4.8251260
	Tolerance [ppm]	-514.6801067
+10	Measured Frequency [MHz]	9368.6624190
	Tolerance [MHz]	-6.3375810
	Tolerance [ppm]	-676.0086400
+20	Measured Frequency [MHz]	9367.2512780
	Tolerance [MHz]	-7.7487220
	Tolerance [ppm]	-826.5303467
+30	Measured Frequency [MHz]	9365.8345270
	Tolerance [MHz]	-9.1654730
	Tolerance [ppm]	-977.6504533
+40	Measured Frequency [MHz]	9364.5754700
	Tolerance [MHz]	-10.4245300
	Tolerance [ppm]	-1111.9498667
+50	Measured Frequency [MHz]	9363.0655380
	Tolerance [MHz]	-11.9344620
	Tolerance [ppm]	-1273.0092800

Note: Test Procedure FCC 2.1055

Frequency stability vs. input voltage

% of Rated Supply	Supply Voltage [V]		Result
Normal DC	28.0	Measured Frequency [MHz]	9367.2512780
		Tolerance [MHz]	-7.7487220
		Tolerance [ppm]	-826.5303467
85% DC	23.8	Measured Frequency [MHz]	9367.2314650
		Tolerance [MHz]	-7.7685350
		Tolerance [ppm]	-828.6437333
115% DC	32.2	Measured Frequency [MHz]	9367.2673460
		Tolerance [MHz]	-7.7326540
		Tolerance [ppm]	-824.8164267

Note: Test Procedure FCC 2.1055

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APPENDIX 3: Test Instruments

Control No.	Instrument	Manufacturer	Model No.	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE / AT	2006/11/01 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ES140	RE / AT	2007/08/16 * 12
MCC-10	Coaxial cable	Storm	90-195-394	RE	2007/03/14 * 12
MCC-48	Microwave Cable 1G-26.5GHz 7m	Suhner	SUCOFLEX102	RE	2006/08/29 * 12
MCC-18	Microwave Cable 1G-26.5GHz 5m	Suhner	SUCOFLEX 104	RE / FT	2007/02/22 * 12
MAT-39	Attenuator(20dB)1-40GHz	Weinschel	54A-20	RE / AT / FT	2006/12/12 * 12
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	RE	2007/01/30 * 12
MCC-15	Microwave Cable 1G-26.5GHz 1m	Suhner	SUCOFLEX 104	RE / AT	2007/02/22 * 12
MHA-01	Horn Antenna 18-26.5G	EMCO	3160-09	RE	2007/01/30 * 12
MCC-05	Microwave Cable 1G-40GHz 2m	Storm	421-011 (90-1394-079)	RE	2007/01/12 * 12
MCC-55	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX101	RE	2007/03/09 * 12
MCC-65	Microwave Cable 1G-40GHz	Schmer	SUCOFLEX102	RE	2007/04/03 * 12
MCC-66	Microwave Cable 1G-40GHz	Schmer	SUCOFLEX102	RE	2007/04/03 * 12
MHA-03	Horn Antenna 26.5-40GHz	EMCO	3160-10	RE	2007/01/30 * 12
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE	-
MOS-01	Digital Humidity Indicator	N.T	NT-1800	RE / AT	2006/11/27 * 12
MJM-01	Measure	KDS	ES19-55	RE / AT	-
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/TSJ	-	RE	2007/02/27 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2007/07/11 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2006/12/27 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2006/10/07 * 12
MLA-09	Logperiodic Antenna	Schwarzbeck	USLP9143B	RE	2007/01/19 * 12
MCH-04	Temperature and Humidity Chamber	Espec	PL-2KP	FT	2006/09/06 * 12
MSA-09	Spectrum Analyzer	Advantest	R3273	FT	2006/12/08 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-180	FT	2006/01/19 * 24
MDPS-12	DC power supply	Kikusui	PAK35-10A	FT	-

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

RE: Radiated emission

AT: Antenna Terminal measurement tests (except Frequency Tolerance)

FT: Frequency Tolerance

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APPENDIX 4: ENGINEER QUALIFICATIONS

Engineer: Kenichi Adachi

Mr. Adachi has approximately 16 years experience in the field of electronics.
12 years working in NEC Robot Engineering Co.,Ltd.
12 years working in the electrical design and 4 years in the testing of radio communications and electronic equipments.

Position Held:

Electrical Engineer: NEC Robot Engineering Co.,Ltd.
12 years

Electrical Engineer: UL Japan, Inc.(Include Apex international and UL Apex Co.,Ltd.)
Current

Educational Background:

Several specialized training courses and seminars pertaining to Electronic, Mechanical and Information technology in vocational college.



Kenichi Adachi
September 6, 2007

Engineer: Hironobu Shimoji

Mr. Shimoji has approximately 19 years experience in the field of electronics.
10 years working in the Sankyo Seiki Mfg.
10 years working in the electrical design and 9 years in the testing of radio communications and electronic equipments.

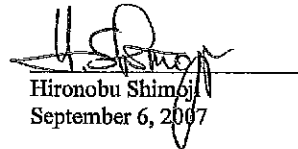
Position Held:

Electrical Engineer: Sankyo Seiki Mfg.
10 years

Electrical Engineer: UL Japan, Inc.(Include Apex international and UL Apex Co.,Ltd.)
Current

Educational Background:

Bachelor of Physics department of Toyama University.



Hironobu Shimoji
September 6, 2007

UL Japan, Inc.

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