漢翔航空工業股份有限公司
電磁效應實驗室

Aerospace Industrial Development Corporation
Electromagnetic Effect Laboratory

Test Report For :

Grand Mate Co., Ltd.

Model :

650+RFA

AIDC
EME LAB.

Testing Laboratory
0367

地址：台中縣沙鹿鎮公明里中清路 38 之 3 號　電話：886-4-26244053　傳真：886-4-26244023
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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Restricted to periodic operation within the band 315MHz

PRODUCT	**:**	**REMOTE CONTROL TRANSMITTER**
MODEL NO	**:**	**650+RFA(Receiver：650，Transmitter：RFA)**
TRADE NAME	**:**	**GRAND MATE ; DEXEN**
FCC ID	**:**	**UMP650**
REPORT NO	**:**	**EME-95-0332**
RECEIVED	**:**	**Aug. 23, 2006**
TESTED	**:**	**Aug. 28 ～ Jan. 31 , 2007**
ISSUED	**:**	**Jan. 31 , 2007**

APPLICANT:	**GRAND MATE CO., LTD**
ADDRESS:	**NO.30 LUGONG S 2nd RD,LUGANG TOWN,CHANGHUA HSIEN 505 TAIWAN**
ISSUED BY:	**AEROSPACE INDUSTRIAL DEVELOPMENT CORPORATION / AIDC EME LAB.**
LAB LOCATION:	**(J128) NO.38-3 JONG-CHING ROAD SHA-LU TOWN TAICHUNG HSIN TAIWAN R.O.C**

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DESCRIPTION PAGE

1. CERTIFICATION

Product Name	Remote Control Transmitter
Brand Name	GRAND MATE ; DEXEN
Model No.	650+RFA (Receiver：650，Transmitter：RFA)
Serial Number	Preproduction
Power Supply	AC 120V; DC 12V
Type of Equipment	Restricted to periodic operation within the band 315MHz
Applicant	GRAND MATE CO., LTD. NO.30 LUGONG S 2nd RD,LUGANG TOWN,CHANGHUA HSIEN 505 TAIWAN
Applicable Standards	47 CFR Part 15: 2005 Subpart C (Section 15.209 and Section 15.231) ANSI C63.4:2003
Date of Receipt	Aug. 23 , 2006
Finished date of Test	Feb. 06 , 2007
Date of Issue	Feb. 06 , 2007
Report No.	EME-95-0332
Note: The results in this test report apply only to the sample(s) tested	

We, **Aerospace Industrial Development Corporation.,** hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By: Jacky Lin , **Date:** 02 / 06 / 2007
(Jacky Lin)

Tested review By: Marlon Huang , **Date:** 02 / 06 / 2007
(Marlon Huang)

Approved BY: Alex Song , **Date:** Feb / 07 / 2007
(Alex Song)

2. TEST STATEMENT

1. The test results in the report apply only to the unit tested by AIDC Lab.
2. There was no deviation from the requirements of test standards during the test.
3. AC power source, 120VAC/60Hz and DC 12V Battery, was used during the test.

3. SUMMARY OF TEST RESULTS

The EUT is Remote control Transmitter. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.231)-2005
ANSI C63.4-2003

All test items have been performed and recorded as per the above standards.

The EUT has been tested according to the following specifications:

APPLIED 47 CFR Part 15 , Subpart C STANDARD: ANSI C63.4:2003			
Standard Section	**Test Type and Limit**	**Result**	**Remark**
FCC Rules – Radio frequency devices (intentional radiators) Section 15.231			
§15.207	Conducted Emissions Test	Pass	
§15.231(b) §15.209 §15.205	Radiated Emissions Test	Pass	
§15.231(c)	20dB Occupied Bandwidth Measurements	Pass	
§15.231	Transmitter Duty Cycle Measurements	Pass	
The above equipment was tested by AIDC EME Laboratory for compliance with the requirements set forth in CFR 47 PART 15 SUBPART C. This said equipment in the configuration described in this report show that maximum emission levels emanating from equipment are within the compliance requirements.			

4 MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

AIDC had modified the resistance to reduce the output power , spark off peak data is more difference from previous reports.

5 GENERAL DESCRIPTION OF EUT

5.1 GENERAL DESCRIPTION OF EUT

Product Name	Remote Control Transmitter
Trade Name	GRAND MATE ; DEXEN
Model No.	650+RFA(Receiver：650，Transmitter：RFA)
Modulation Type	FSK
Carrier Frequency of Each Channel	315MHz
Number of Channel	1
Antenna Type	Soldered on PCB
Data Cable Supplied	N/A
I/O Ports	N/A

Remark:

1. The EUT is a Remote Control Transmitter (Including the receiver and transmitter).
2. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:
   Mode 1: Normal Operation
3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

5.2 DESCRIPTION OF SUPPORT EQUIPMENT

The EUT itself forms a system. No support equipment is required for its normal operation.

5.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETSI TR 100 028-1 & ETSI TR 100 028-2:

Measurement	Value	
Conducted emissions	±1.823dB	
Radiated emission	Horizontal (300~1000MHz)	±3.0dB
	Vertical (300~1000MHz)	±2.69dB
Bandwidth Measurements	±72.34Hz	

Note: Measuring uncertainty for a level of confidence of 95%.

TECHNICAL CHARACTERISTICS TEST (TEST TYPES AND RESULTS)

6.1 CONDUCTED EMISSION TEST

6.1.1 LIMIT

FCC Part 15:2005, Subpart C (Section 15.207)

Limits of conducted emission measurement

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

6.1.2 TEST EQUIPMENTS

The following test equipment was used during the conducted emission test:

Manufacturer	Test Equipment	Model No.	Serial No.	Next Cal. Date
MEB	EMI RECEIVER	SMV41	147	03/10/2007
EMCO	LISN	3825/2	9703-2640	12/21/2006

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

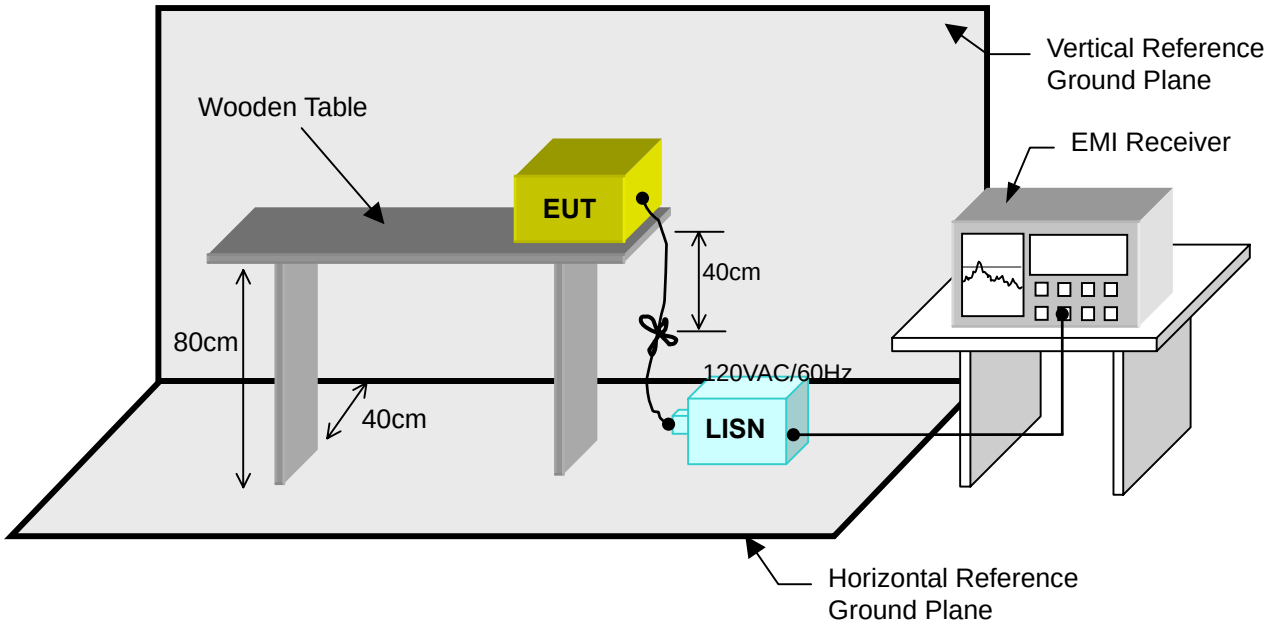
6.1.3 TEST PROCEDURES

1. The EUT was placed 0.4 meters from the conducting wall with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 μ H of coupling impedance for the measuring instrument.
2. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
3. The frequency range from150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

6.1.4 DEVIATION FROM TEST STANDARD

No deviation

6.1.5 TEST SET-UP



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80cm from EUT and at the least 80cm from other units and other metal planes support units.

6.1.6 TEST RESULT

EUT:	Remote Control Transmitter	**Model No.**	650
Test mode:	Power on	**6dB Bandwidth:**	9kHz
Input Power:	120Vac, 60Hz	**Phase:**	Line(L)
Environmental Conditions:	25deg.C, 65%RH	**Tested By:**	Jacky Lin

Freq. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Margin (dB)		Result
	QP	AV	QP	AV	QP	AV	
0.198	23.83	12.67	64.06	54.06	-40.23	-41.39	**Pass**
0.240	30.64	7.74	63.29	53.29	-32.65	-45.55	**Pass**
0.264	31.82	9.84	63.03	53.03	-31.21	-43.19	**Pass**
0.328	25.24	8.27	61.63	51.63	-36.39	-43.36	**Pass**
2.200	23.72	-1.03	56.00	46.00	-32.28	-47.03	**Pass**
6.180	8.02	-3.63	60.00	50.00	-51.98	-53.63	**Pass**
18.280	11.95	-2.83	60.00	50.00	-48.05	-52.83	**Pass**
28.140	4.97	-2.77	60.00	50.00	-55.03	-52.77	**Pass**

REMARKS：

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. Margin value = Emission level-Limit value.
3. Emission Level = Cable loss + Reading Value.

EUT:	Remote Control Transmitter	**Model No.**	650
Test mode:	Power on	**6dB Bandwidth:**	9kHz
Input Power:	120Vac, 60Hz	**Phase:**	Line(N)
Environmental Conditions:	25deg.C, 65%RH	**Tested By:**	Jacky Lin

Freq. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Margin (dB)		Result
	QP	AV	QP	AV	QP	AV	
0.200	24.79	12.69	64.00	54.00	-39.21	-41.31	**Pass**
0.248	32.03	12.60	63.06	53.06	-31.03	-40.46	**Pass**
0.440	28.62	15.06	57.86	47.86	-29.24	-32.80	**Pass**
0.840	20.84	7.79	56.00	46.00	-35.16	-38.21	**Pass**
2.240	20.01	-1.67	56.00	46.00	-35.99	-47.67	**Pass**
8.240	8.02	-2.39	60.00	50.00	-51.98	-52.39	**Pass**
18.080	13.82	-2.48	60.00	50.00	-46.18	-52.48	**Pass**
29.500	8.85	-0.90	60.00	50.00	-51.15	-50.90	**Pass**

REMARKS：

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. Margin value = Emission level-Limit value.
3. Emission Level = Cable loss + Reading Value.

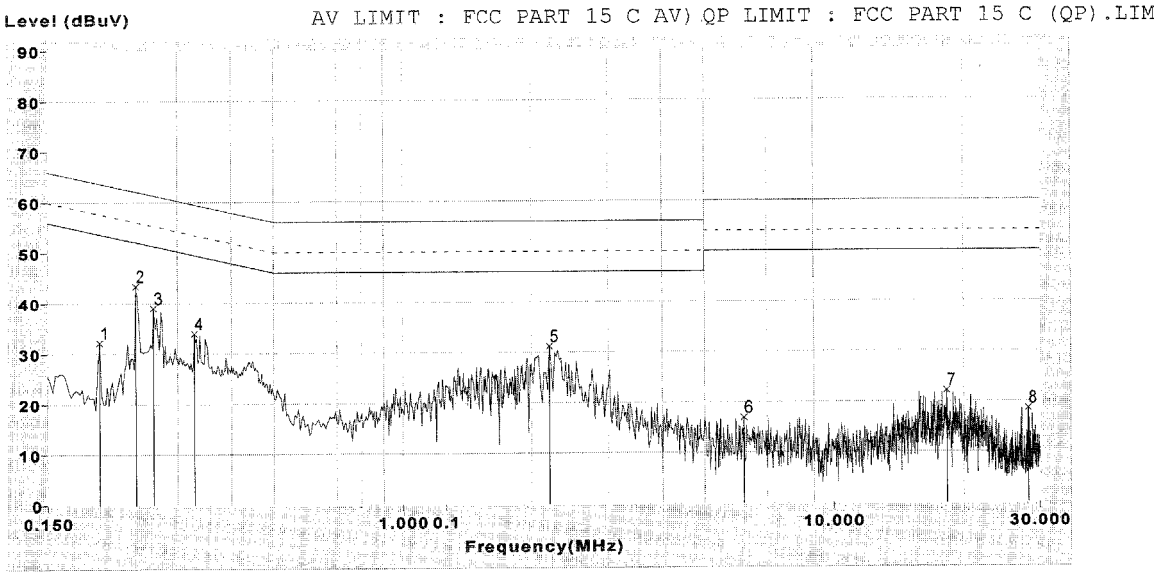
AIDC EMC LAB.

DATE: 09-28-2006
TIME: 09:25:35

CONDUCTION TESTING DATA

EUT : remote controller (receive)
CLIENT:
MODEL: 650+RFA
RATING: 120V/60Hz
Ser#:

REPORT#: FCC PART15 C CE (L1)
FILE/DATA#: 650+RFA.emi/4
OPERATOR: Jacky Lin
TEST SITE: Chamber CE/RE test site



COMMENT: power on

1:	0.150MHZ	--	25.58 dBuV	6:	0.550MHZ	--	16.08 dBuV	11:	6.000MHZ	--	11.16 dBuV
2:	0.150MHZ	--	25.58 dBuV	7:	1.000MHZ	--	18.49 dBuV	12:	10.000MHZ	--	10.29 dBuV
3:	0.150MHZ	--	25.58 dBuV	8:	1.400MHZ	--	21.91 dBuV	13:	22.000MHZ	--	10.84 dBuV
4:	0.160MHZ	--	26.00 dBuV	9:	2.000MHZ	--	27.77 dBuV	14:	30.000MHZ	--	10.68 dBuV
5:	0.240MHZ	--	43.34 dBuV	10:	3.500MHZ	--	16.74 dBuV				

	Freq	Peak	QP	AV	Limit QP	Limit AV	Under QP	Under AV
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV
1	0.198	38.28	23.83	12.67	64.06	54.06	-40.23	-41.39
2	0.240	42.87	30.64	7.74	63.29	53.29	-32.65	-45.55
3	0.264	42.80	31.82	9.84	63.03	53.03	-31.21	-43.19
4	0.328	36.75	25.24	8.27	61.63	51.63	-36.39	-43.36
5	2.200	31.30	23.72	-1.03	56.00	46.00	-32.28	-47.03
6	6.180	16.68	8.02	-3.63	60.00	50.00	-51.98	-53.63
7	18.280	22.04	11.95	-2.83	60.00	50.00	-48.05	-52.83
8	28.140	17.03	4.97	-2.77	60.00	50.00	-55.03	-52.77

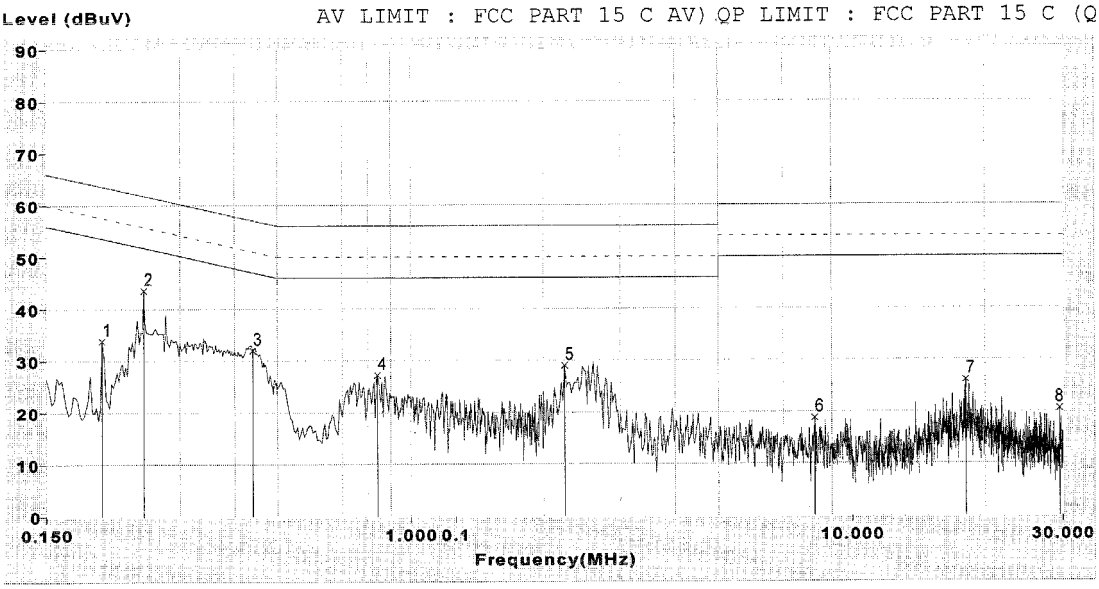
AIDC EMC LAB.

DATE: 09-28-2006
TIME: 09:35:40

CONDUCTION TESTING DATA

EUT : remote controller (receive)
CLIENT:
MODEL: 650+RFA
RATING: 120V/60Hz
Ser#:

REPORT#: FCC PART15 C CE (L2)
FILE/DATA#: 650+RFA.emi/5
OPERATOR: Jacky Lin
TEST SITE: Chamber CE/RE test site



COMMENT: power on

1:	0.150MHZ	--	26.50	dBuV	6:	0.550MHZ	--	16.13	dBuV	11:	6.000MHZ -- 12.10 dBuV
2:	0.150MHZ	--	26.50	dBuV	7:	1.000MHZ	--	21.03	dBuV	12:	10.000MHZ -- 11.32 dBuV
3:	0.150MHZ	--	26.50	dBuV	8:	1.400MHZ	--	16.76	dBuV	13:	22.000MHZ -- 14.27 dBuV
4:	0.160MHZ	--	25.59	dBuV	9:	2.000MHZ	--	20.37	dBuV	14:	30.000MHZ -- 9.75 dBuV
5:	0.240MHZ	--	37.94	dBuV	10:	3.500MHZ	--	18.34	dBuV		

	Freq	Peak	QP	AV	Limit QP	Limit AV	Under QP	Under AV
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV	dBuV
1	0.200	38.88	24.79	12.69	64.00	54.00	-39.21	-41.31
2	0.248	43.60	32.03	12.60	63.06	53.06	-31.03	-40.46
3	0.440	33.36	28.62	15.06	57.86	47.86	-29.24	-32.80
4	0.840	27.44	20.84	7.79	56.00	46.00	-35.16	-38.21
5	2.240	29.01	20.01	-1.67	56.00	46.00	-35.99	-47.67
6	8.240	17.56	8.02	-2.39	60.00	50.00	-51.98	-52.39
7	18.080	24.27	13.82	-2.48	60.00	50.00	-46.18	-52.48
8	29.500	21.14	8.85	-0.90	60.00	50.00	-51.15	-50.90

6.2 RADIATED EMISSION

6.2.1 LIMIT

FCC Part15, Subpart C Section 15.231(b)

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)	Limit (dBμV/m)	Field Strength of Spurious Emissions (microvolts/meter)	Limit (dBμV/m)
40.66-40.70	2250	67.04	225	47.04
70-130	1250	61.94	125	41.94
130-174	[1]1250 to 3750	61.94 to 71.48	[1]125 to 375	41.94 to 51.48
174-260	3750	71.48	375	51.48
260-470	[1]3750 to12500	71.48 to 81.9	[1]375-1250	51.4 to 61.9
Above 470	12500	81.94	1250	61.94

[1]Linear interpolations

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

FCC Part15, Subpart C Section 15.209

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Limit (dB μ V/m)	Distance (m)
0.009 - 0.490	2,400/F(kHz)	67.6/F(kHz)	300
0.490– 1.705	24,000//F(kHz)	87.6/F(kHz)	30
1.705 – 30	30	29.5	30
30 – 88	100	40.0	3
88- 216	150	43.5	3
216- 960	200	46	3
Above 960	500	54	3

Note:

1. Emission level(dBμV/m) = 20 log Emission level (μV/m) .
2. As shown in 15.35(b),for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

6.2.2 TEST EQUIPMENTS

The following test equipment was used during the radiated emission test:

Manufacturer	Test Equipment	Model No.	Serial No.	Next Cal. Date
Sidt	3m Chamber	CEM966	N.C.R	N.C.R
HP	EMI RECEIVER	HP8542E	3737A0029	03/16/2007
R&S	Spectrum	ESIB 26	100097	03/02/2007
EATON	Double Ridged Guide Horn Antenna	96001	2197	07/25/2007
Frankonia	BILOG ANT.	BTA-L	980008L	03/06/2007
HP	Pre-amplifier	HP8449B	3008A00371	10/27/2007

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP pre-amplifier(model:HP8449B) are used only for the measurement of emission frequency above 1GHz if tested.

6.2.3 TEST PROCEDURES

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotary table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to peak detect function and specified trace with maximum hold mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in data sheet peak mode and QP mode.

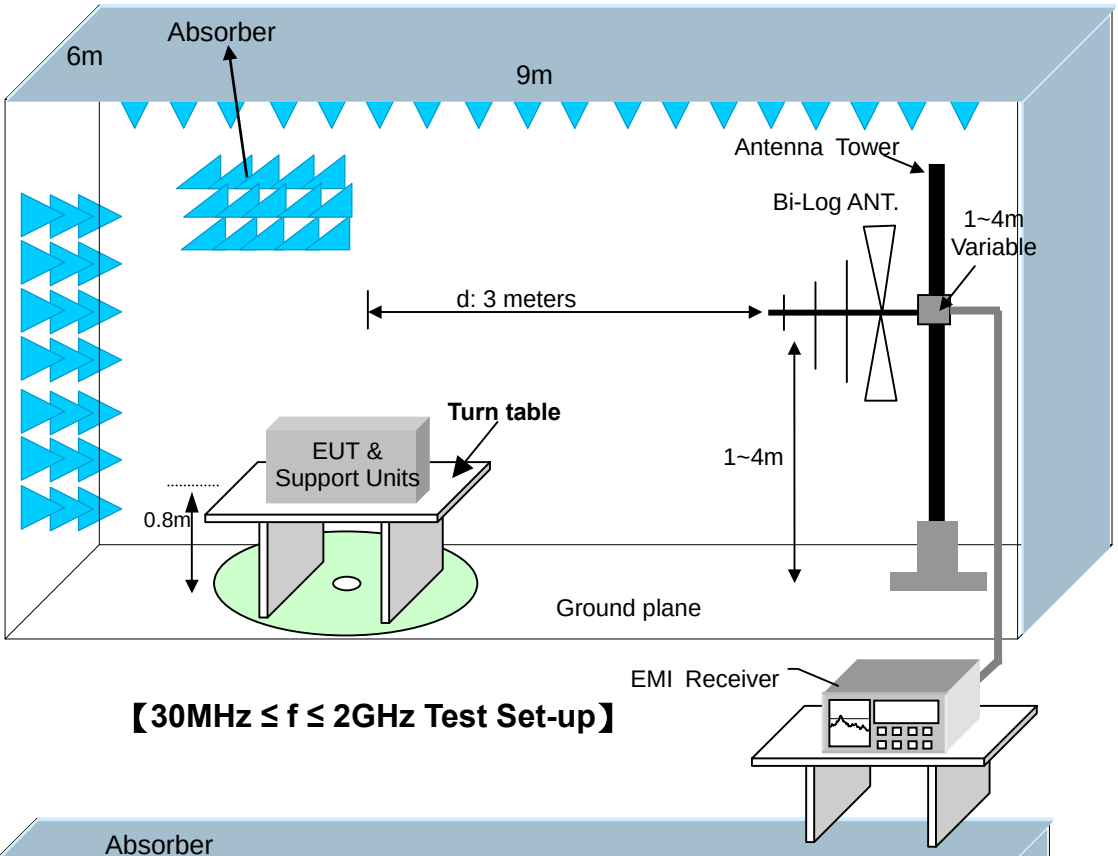
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz at frequency above 1GHz.

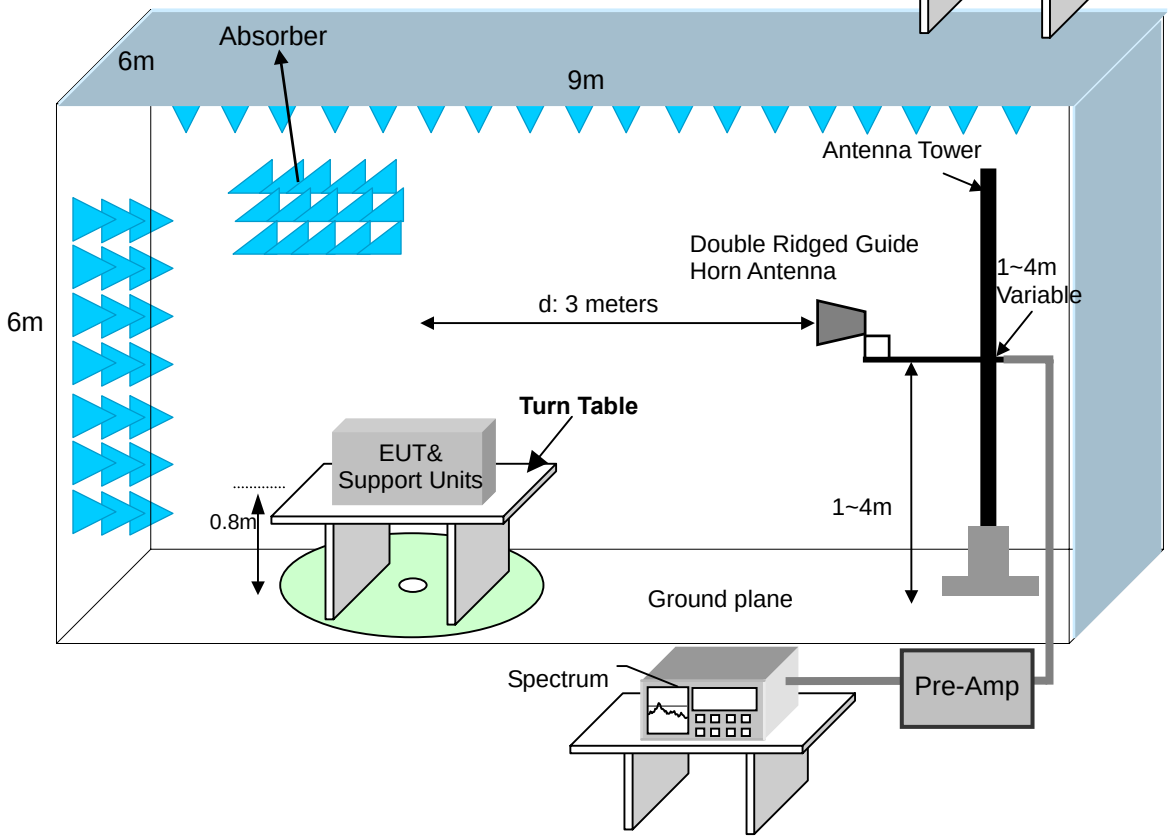
6.2.4 DEVIATION FROM TEST STANDARD

No deviation

6.2.5 TEST SET-UP



【30MHz ≤ f ≤ 2GHz Test Set-up】



【2GHz ≤ f ≤ 18GHz Test Set-up】

6.2.6 TEST RESULT

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Horizontal (X AXIS)												
No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.045	76.18	71.88	60.51	-	13.58	2.09	95.6	75.6	-19.42	-3.72	Pass
2	630.105	47.19	42.89	23.79	-	20.36	3.04	75.6	55.6	-28.41	-12.71	Pass
3	945.150	51.19	46.89	24.00	-	23.51	3.68	75.6	55.6	-24.41	-8.71	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

Duty Cycle Correction Factor (dB)=$20 \times \text{Log}_{10}$(Duty Cycle(%))

20log (Duty cycle)=20log0.6092 = -4.3dB

Please see page 50 to 52 for plotted duty.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Vertical (X AXIS)												
No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.052	58.09	53.79	42.42	-	13.58	2.09	95.6	75.6	-37.51	-21.81	Pass
2	630.090	43.94	39.64	20.54	-	20.36	3.04	75.6	55.6	-31.66	-15.96	Pass
3	945.157	40.86	36.56	13.67	-	23.51	3.68	75.6	55.6	-34.74	-19.04	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

Duty Cycle Correction Factor (dB)=$20 \times \text{Log}_{10}$(Duty Cycle(%))

20log (Duty cycle)=20log0.6092 = -4.3dB

Please see page 50 to 52 for plotted duty.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Horizontal (Y AXIS)												
No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.052	73.11	68.81	57.44	-	13.58	2.09	95.6	75.6	-22.49	-6.79	Pass
2	630.097	49.09	44.79	25.69	-	20.36	3.04	75.6	55.6	-26.51	-10.81	Pass
3	945.150	44.50	40.20	17.31	-	23.51	3.68	75.6	55.6	-31.10	-15.40	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

$$\text{Duty Cycle Correction Factor (dB)} = 20 \times \text{Log}_{10}(\text{Duty Cycle}(\%))$$

$$20\log(\text{Duty cycle}) = 20\log 0.6092 = -4.3\text{dB}$$

Please see page 50 to 52 for plotted duty.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Vertical (Y AXIS)

No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.038	65.75	61.45	50.08	-	13.58	2.09	95.6	75.6	-29.85	-14.15	Pass
2	630.097	42.15	37.85	18.75	-	20.36	3.04	75.6	55.6	-33.45	-17.75	Pass
3	945.157	49.58	45.28	22.39	-	23.51	3.68	75.6	55.6	-26.02	-10.32	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

$$\text{Duty Cycle Correction Factor (dB)} = 20 \times \text{Log}_{10}(\text{Duty Cycle}(\%))$$

20log (Duty cycle)=20log0.6092 = -4.3dB

Please see page 50 to 52 for plotted duty.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Horizontal (Z AXIS)												
No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.052	58.76	54.46	43.09	-	13.58	2.09	95.6	75.6	-36.84	-21.14	Pass
2	630.097	44.69	40.39	21.29	-	20.36	3.04	75.6	55.6	-30.91	-15.21	Pass
3	945.165	42.11	37.81	14.92	-	23.51	3.68	75.6	55.6	-33.49	-17.79	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

Duty Cycle Correction Factor (dB)=$20 \times \text{Log}_{10}$(Duty Cycle(%))

20log (Duty cycle)=20log0.6092 = -4.3dB

Please see page 50 to 52 for plotted duty.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Frequency Range	30MHz～3.3GHz	Tested Date:	02.06,2007
Measured Distance	3m	Test Result:	PASS

Antenna Polarization: Vertical (Z AXIS)												
No.	Frequency (MHz)	Emission (dBμV/m)		Reading (dBμV)		Ant. Fact. (dB/m)	Cable Loss (dB)	Limit (dBμV/m)		Margin (dB)		Result
		PK	AV	PK	AV			PK	AV	PK	AV	
1	∗315.052	71.82	67.52	56.15	-	13.58	2.09	95.6	75.6	-23.78	-8.08	Pass
2	630.105	48.24	43.94	24.84	-	20.36	3.04	75.6	55.6	-27.36	-11.66	Pass
3	945.150	49.47	45.17	22.28	-	23.51	3.68	75.6	55.6	-26.13	-10.43	Pass

Note:

1. "∗": Fundamental frequency.
2. Emission Level(dBμV/m)=Reading Value+ Ant. Factor(dB/m)+Cable Loss(dB).
3. Margin value=Emission level-Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is:
   Average=Peak value+20log (Duty cycle),where the Duty factor is calculated from following formula:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

$$\text{Duty Cycle}(\%) = \frac{(25.05+25.05+10.82)\text{ms}}{100\text{ms}} \times 100\% = 60.92\%$$

Duty Cycle Correction Factor (dB)=$20 \times \text{Log}_{10}$(Duty Cycle(%))

20log (Duty cycle)=20log0.6092 = -4.3dB

Please see page 50 to 52 for plotted duty.

Horizontal (X AXIS)---30MHz～1000MHz

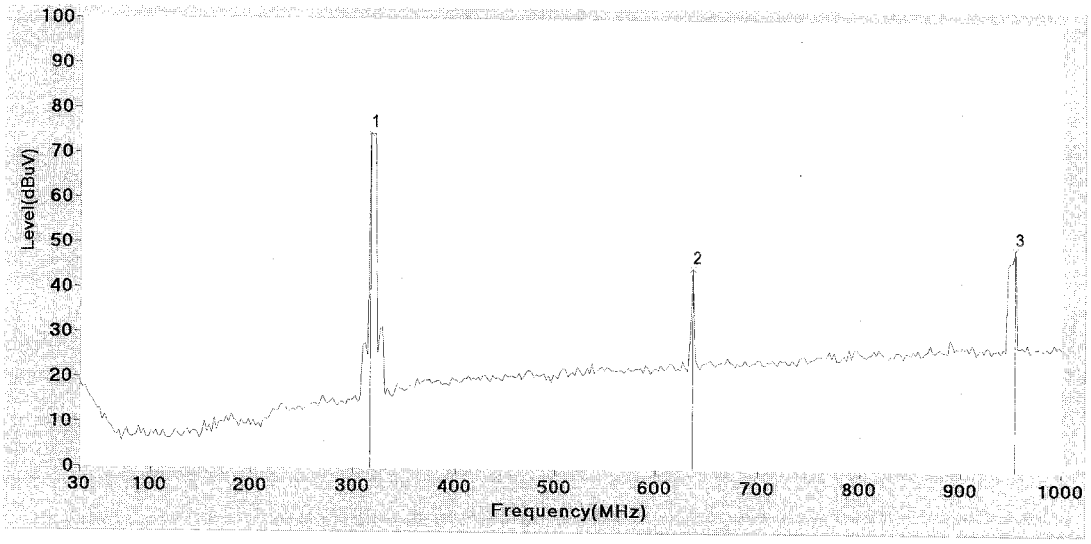
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 14:49:26

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/5
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: X AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.045	76.18	76.18	0.00	60.51	13.58	2.09	0.00	PK
*	2	630.105	47.19	47.19	0.00	23.79	20.36	3.04	0.00	PK
*	3	945.150	51.19	51.19	0.00	24.00	23.51	3.68	0.00	PK

650+RFA.emi/5 1/1

Horizontal (X AXIS)---1000MHz～2000MHz

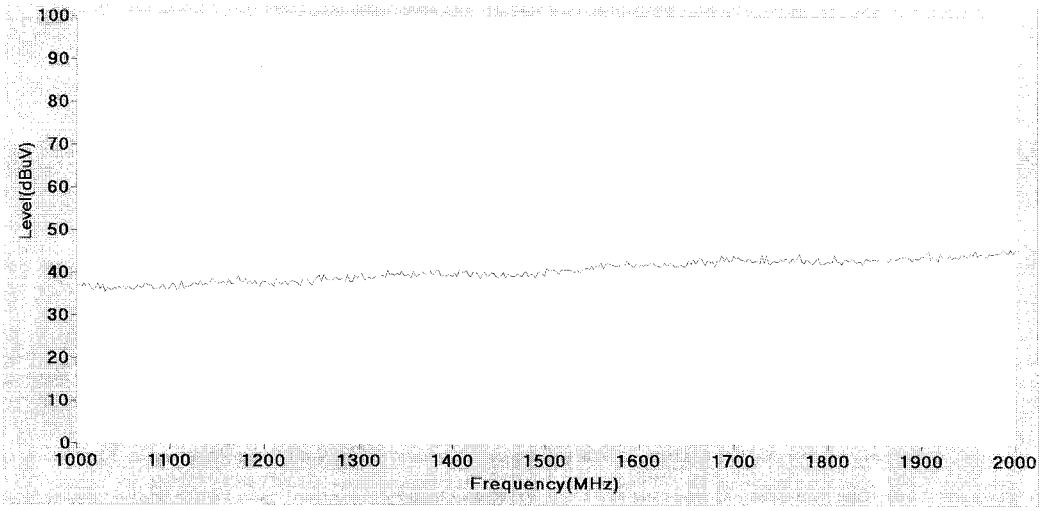
AIDC EMC LAB.

DATE: 02-06-2007
TIME: 14:50:59

EMI TESTING DATA

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

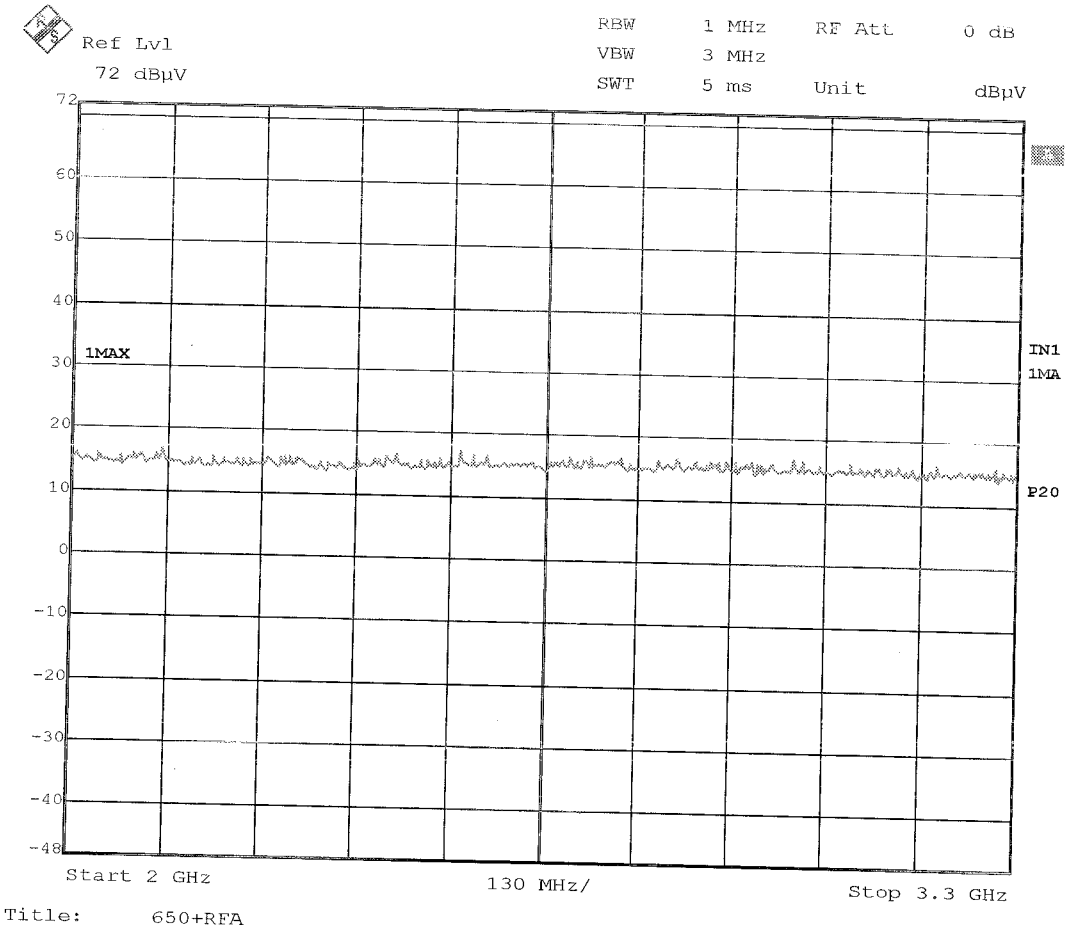
POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/6
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: X AXIS

650+RFA.emi/6 1/1

Horizontal (X AXIS)---2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(horizontal)(x axis)
Date: 6.FEB.2007 14:46:27

Vertical (X AXIS)--- 30MHz～1000MHz

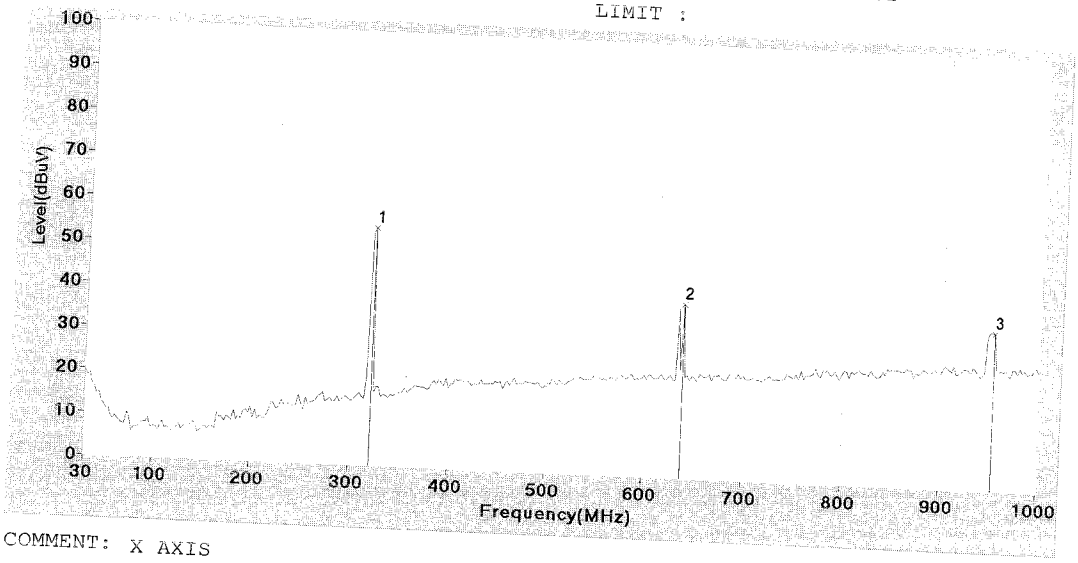
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 14:54:43

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/8
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: X AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.052	58.09	58.09	0.00	42.42	13.58	2.09	0.00	PK
*	2	630.090	43.94	43.94	0.00	20.54	20.36	3.04	0.00	PK
*	3	945.157	40.86	40.86	0.00	13.67	23.51	3.68	0.00	PK

650+RFA.emi/8

1/1

Vertical (X AXIS)--- 1000MHz～2000MHz

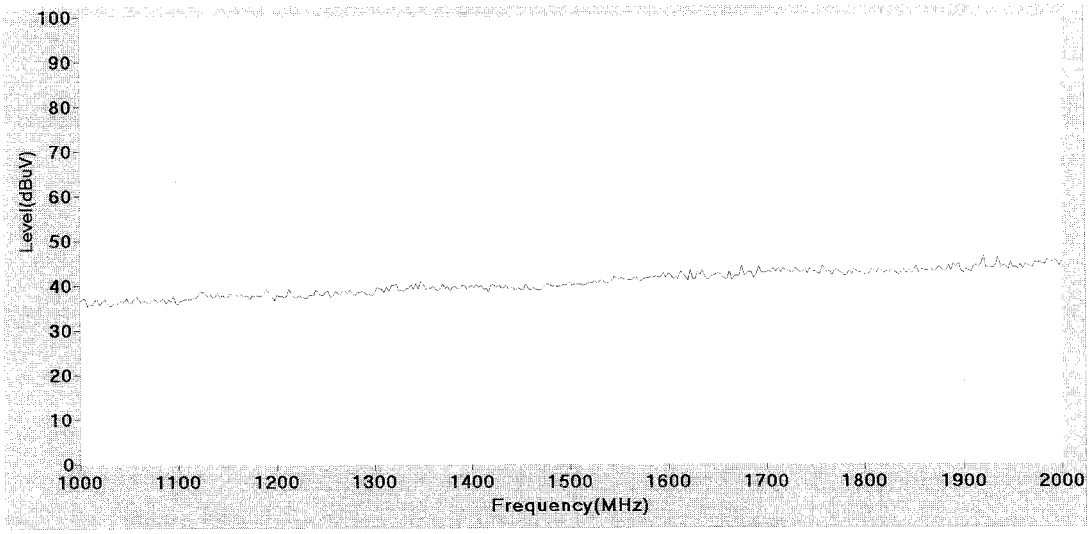
AIDC EMC LAB.

DATE: 02-06-2007
TIME: 14:51:30

EMI TESTING DATA

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

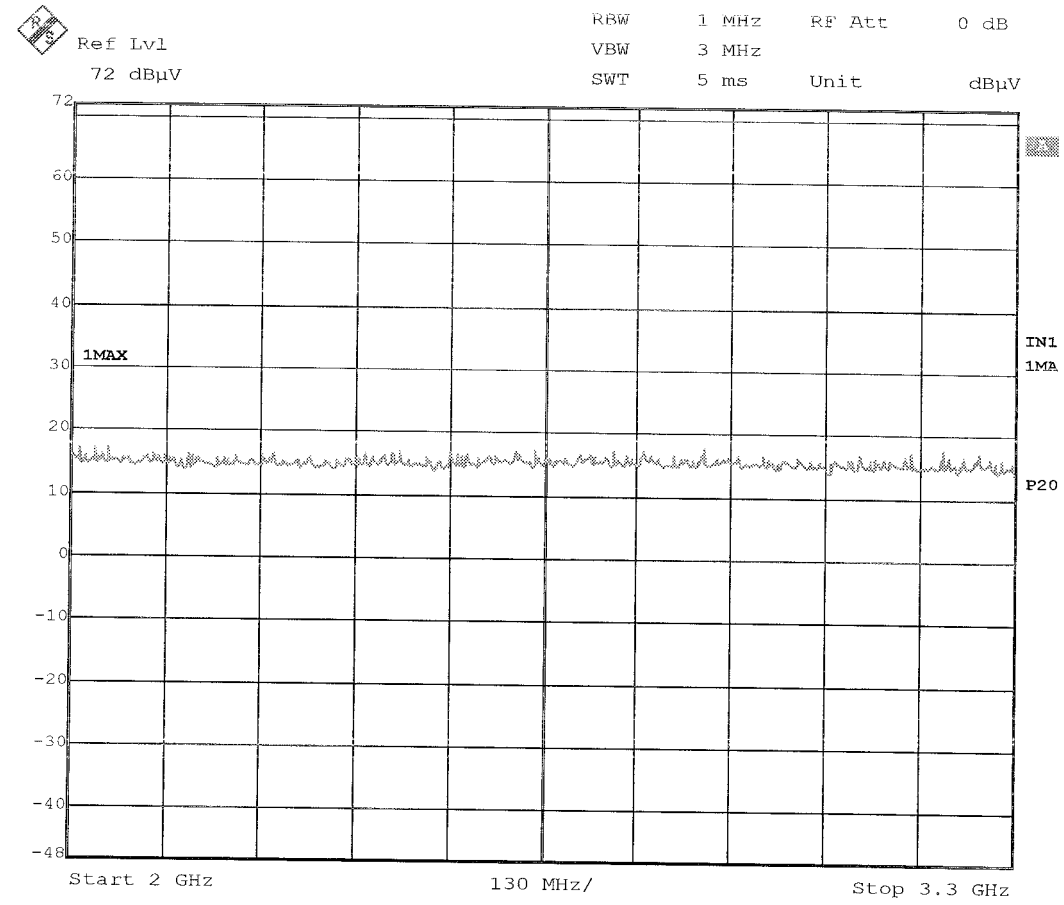
POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/7
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: X AXIS

650+RFA.emi/7 1/1

Vertical (X AXIS)--- 2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(vertical)(x axis)
Date: 6.FEB.2007 14:44:01

Horizontal (Y AXIS)--- 30MHz～1000MHz

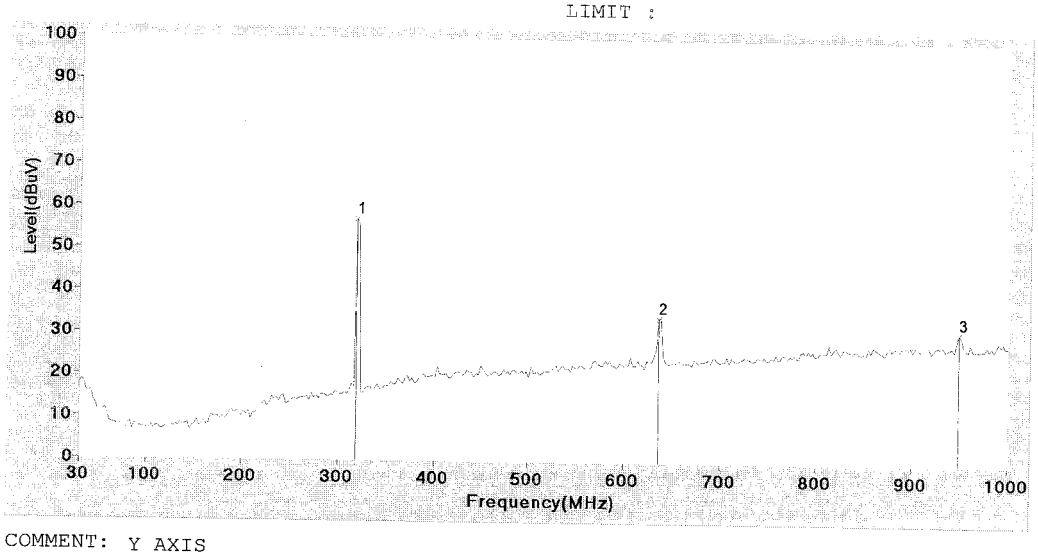
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 14:59:34

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/9
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Y AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.052	73.11	73.11	0.00	57.44	13.58	2.09	0.00	PK
*	2	630.097	49.09	49.09	0.00	25.69	20.36	3.04	0.00	PK
*	3	945.150	44.50	44.50	0.00	17.31	23.51	3.68	0.00	PK

650+RFA.emi/9 1/1

Horizontal (Y AXIS)--- 1000MHz～2000MHz

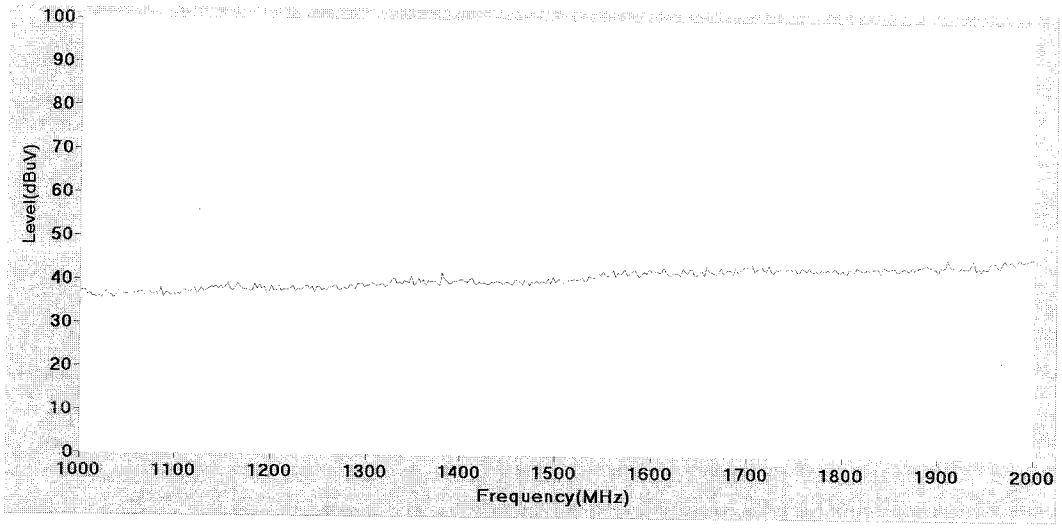
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:00:08

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

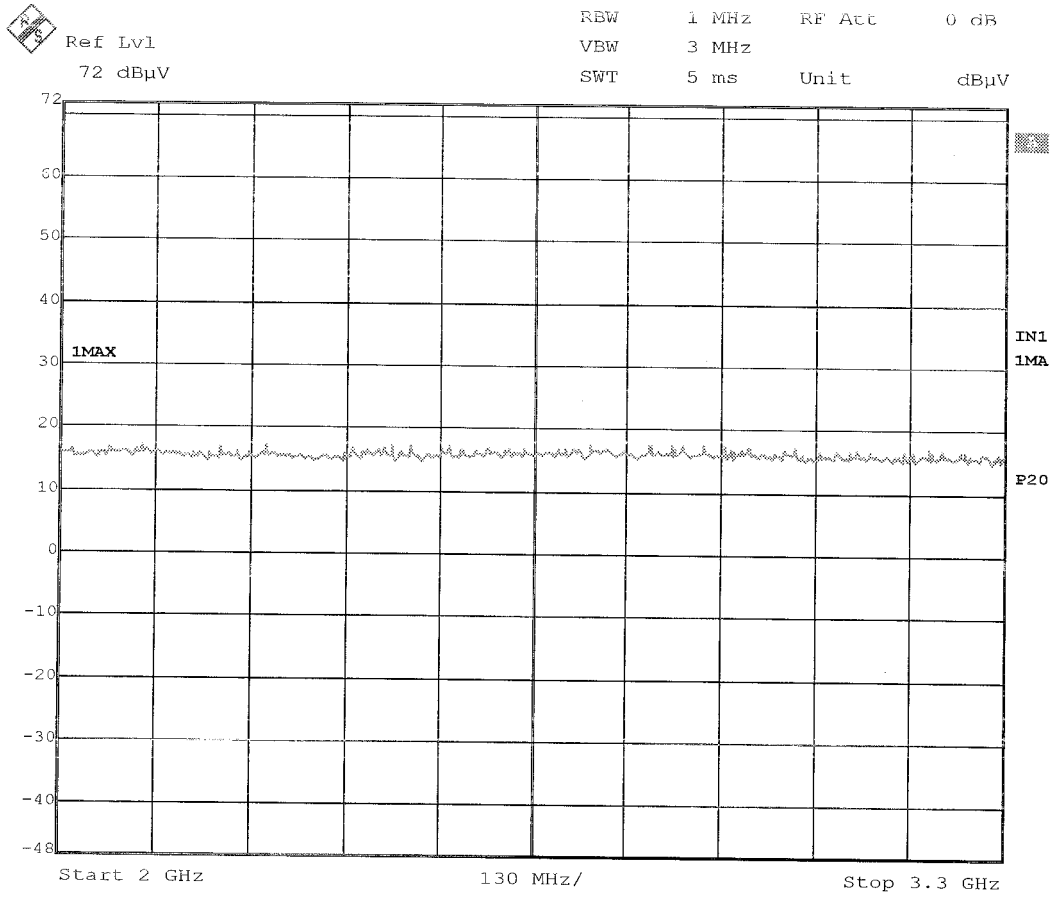
POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/10
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Y AXIS

650+RFA.emi/10 1/1

Horizontal (Y AXIS)--- 2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(horizontal)(y axis)
Date: 6.FEB.2007 14:46:53

Vertical (Y AXIS)--- 30MHz～1000MHz

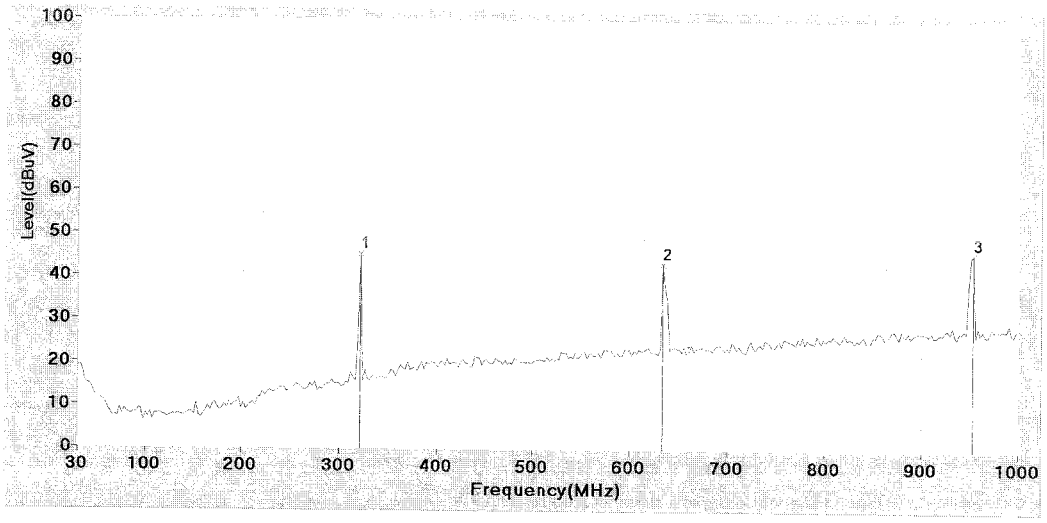
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:05:26

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/12
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Y AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.038	65.75	65.75	0.00	50.08	13.58	2.09	0.00	PK
*	2	630.097	42.15	42.15	0.00	18.75	20.36	3.04	0.00	PK
*	3	945.157	49.58	49.58	0.00	22.39	23.51	3.68	0.00	PK

650+RFA.emi/12 1/1

Vertical (Y AXIS)--- 1000MHz～2000MHz

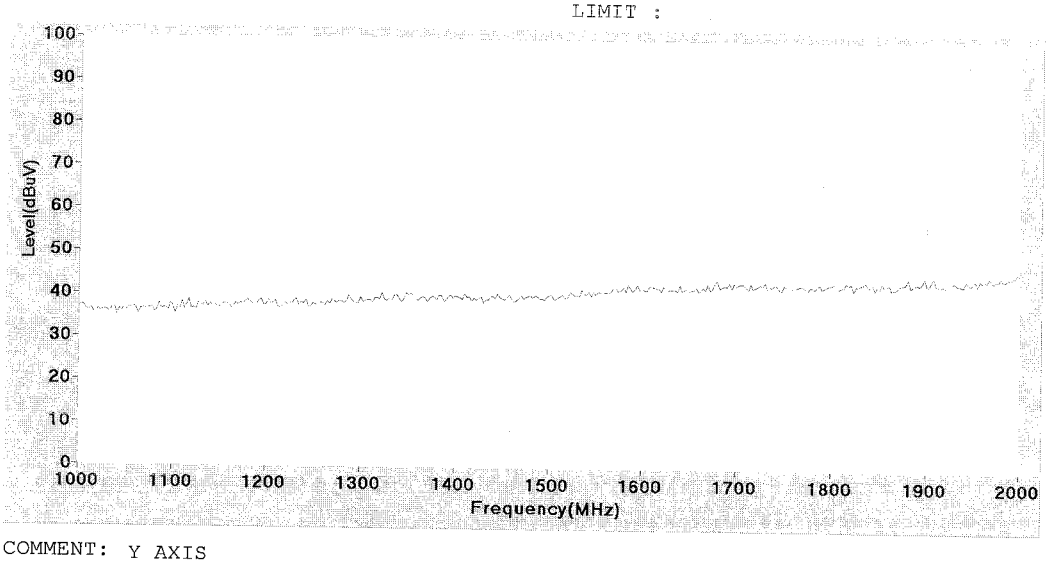
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:00:53

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V DC Battery
Ser#:
TRACE:

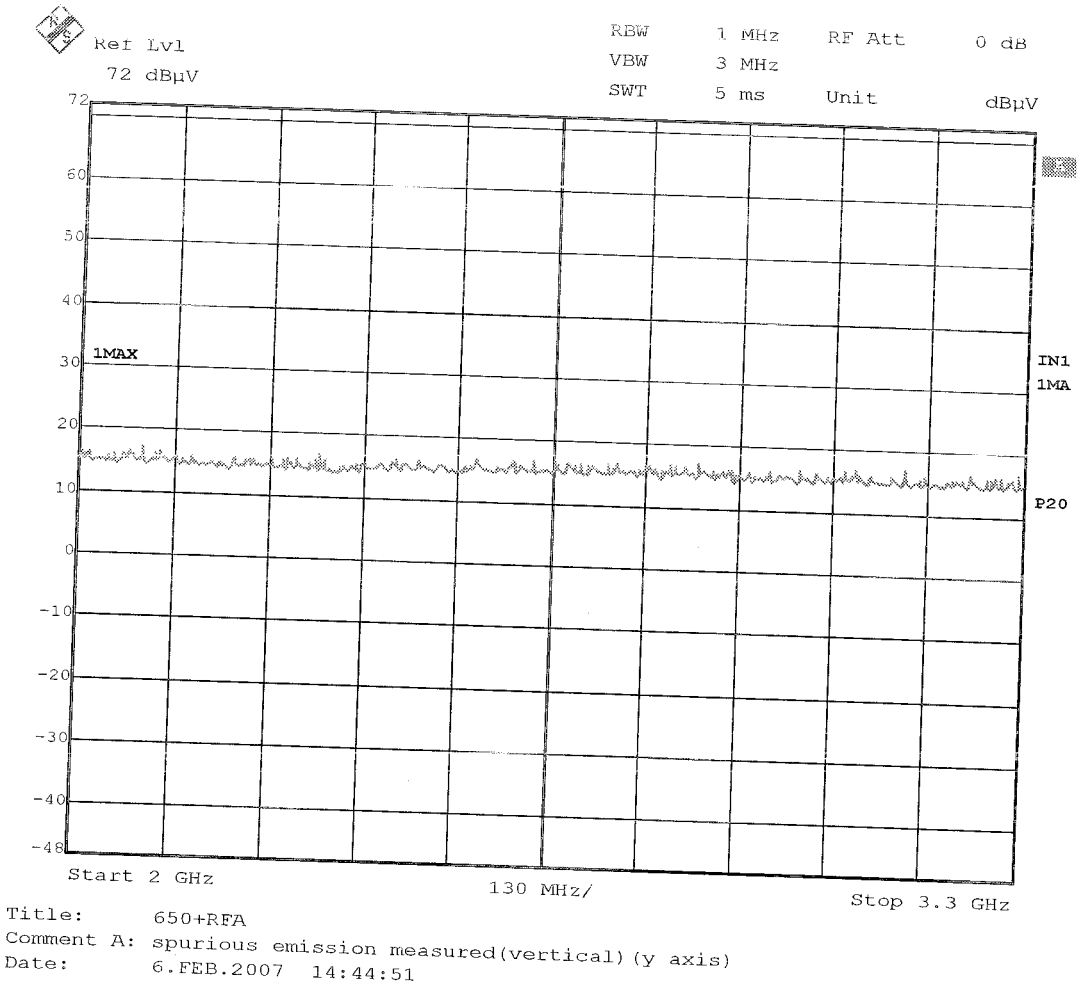
POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/11
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Y AXIS

650+RFA.emi/11 1/1

Vertical (Y AXIS)--- 2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(vertical)(y axis)
Date: 6.FEB.2007 14:44:51

Horizontal (Z AXIS)---30MHz～1000MHz

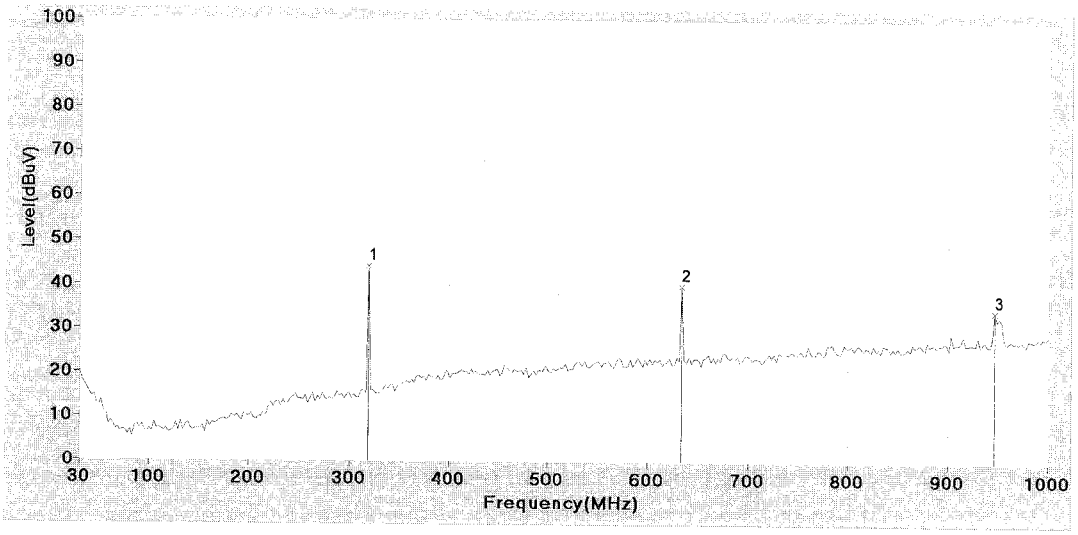
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:11:54

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/13
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Z AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.052	58.76	58.76	0.00	43.09	13.58	2.09	0.00	PK
*	2	630.097	44.69	44.69	0.00	21.29	20.36	3.04	0.00	PK
*	3	945.165	42.11	42.11	0.00	14.92	23.51	3.68	0.00	PK

650+RFA.emi/13 1/1

Horizontal (Z AXIS)---1000MHz～2000MHz

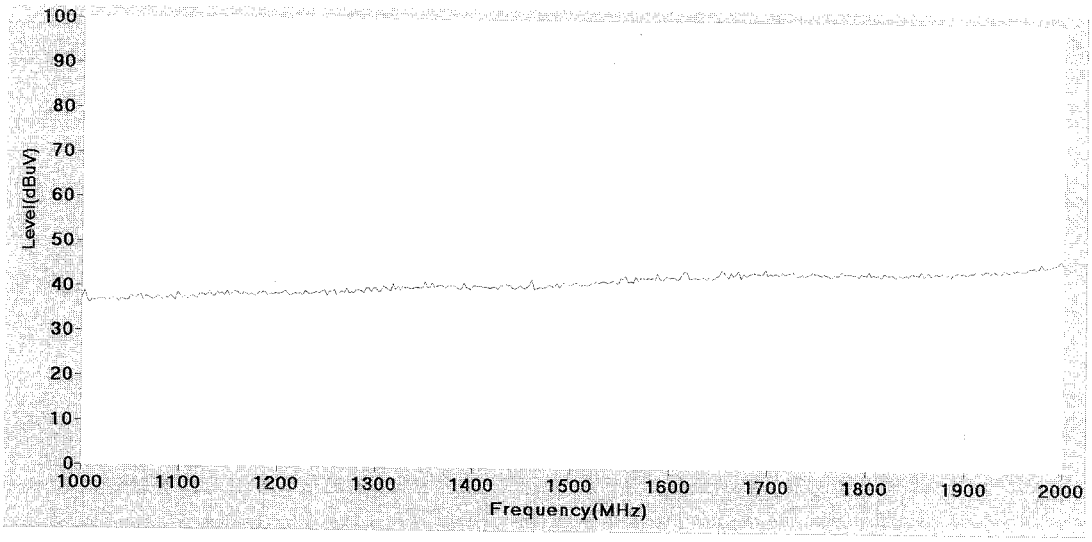
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:12:36

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

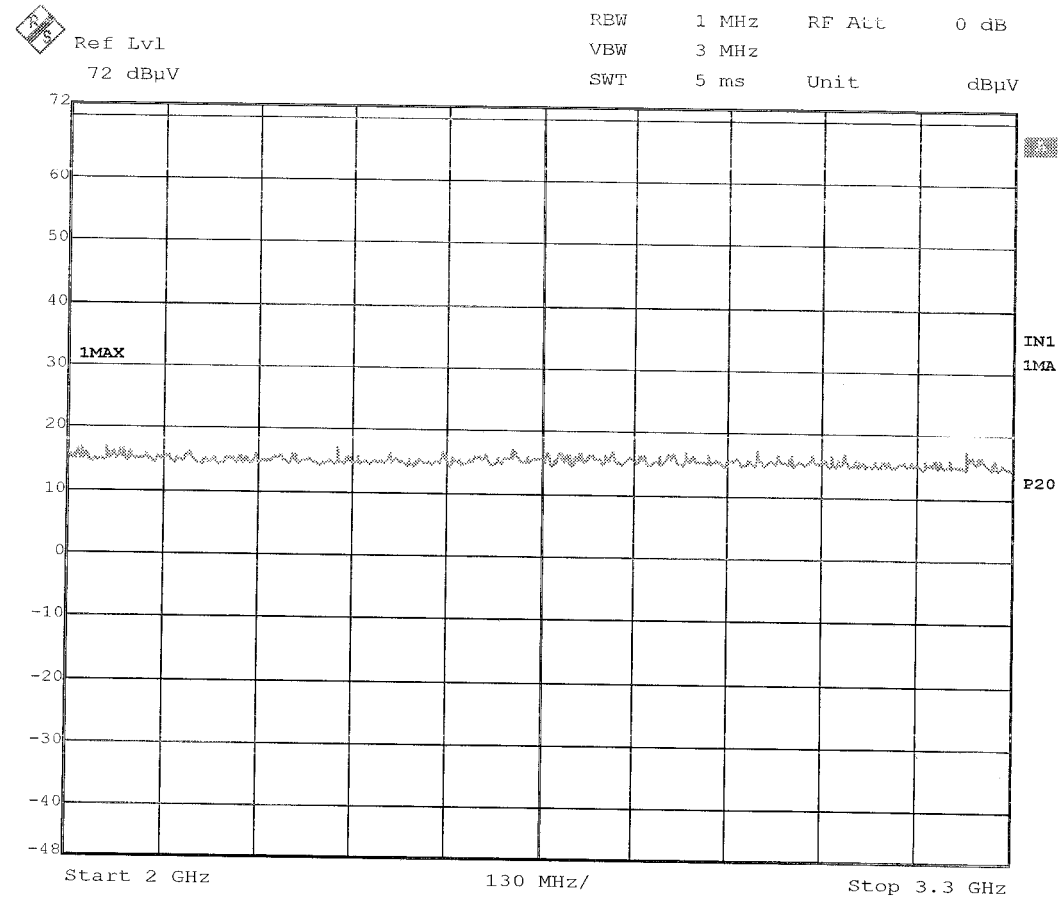
POLARIZATION: Horizontal
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/14
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Z AXIS

650+RFA.emi/14 1/1

Horizontal (Z AXIS)---2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(horizontal)(z axis)
Date: 6.FEB.2007 14:47:30

Vertical (Z AXIS)---30MHz～1000MHz

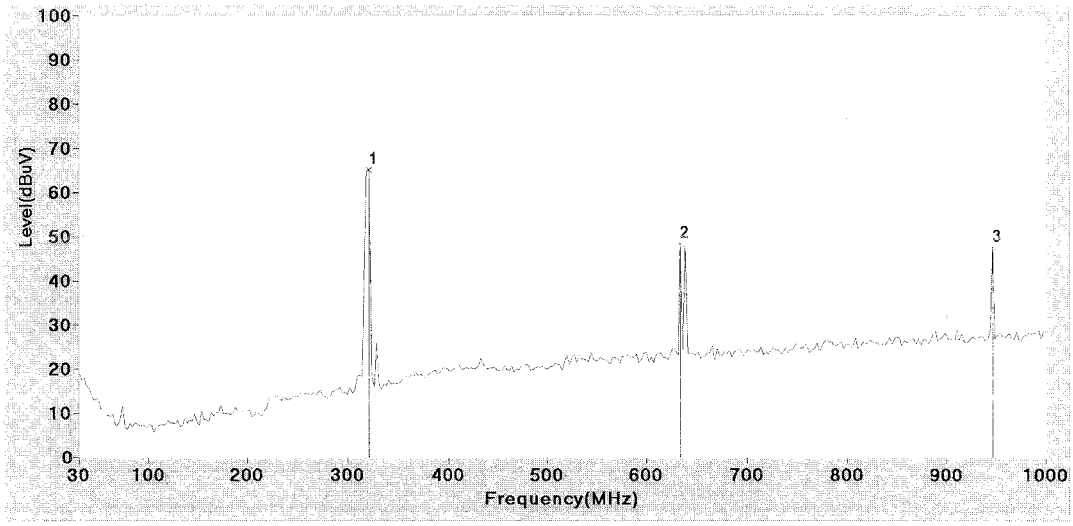
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:19:57

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/16
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Z AXIS

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor	Remark
		MHz	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
*	1	315.052	71.82	71.82	0.00	56.15	13.58	2.09	0.00	PK
*	2	630.105	48.24	48.24	0.00	24.84	20.36	3.04	0.00	PK
*	3	945.150	49.47	49.47	0.00	22.28	23.51	3.68	0.00	PK

650+RFA.emi/16 1/1

Vertical (Z AXIS)---1000MHz～2000MHz

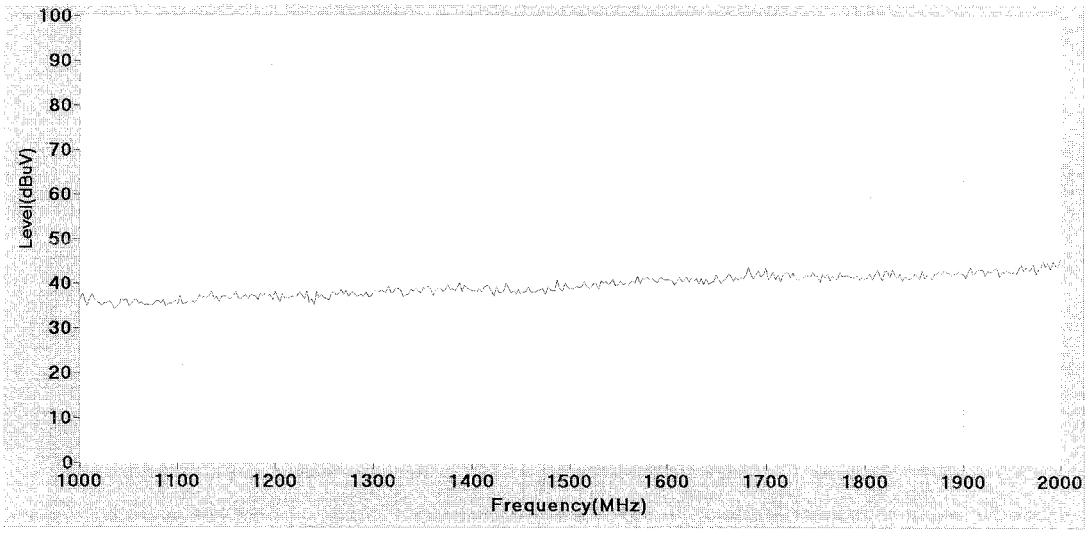
AIDC EMC LAB.

EMI TESTING DATA

DATE: 02-06-2007
TIME: 15:13:03

EUT : remote controller
CLIENT:
MODEL: 650+RFA
RATING: 12V-DC Battery
Ser#:
TRACE:

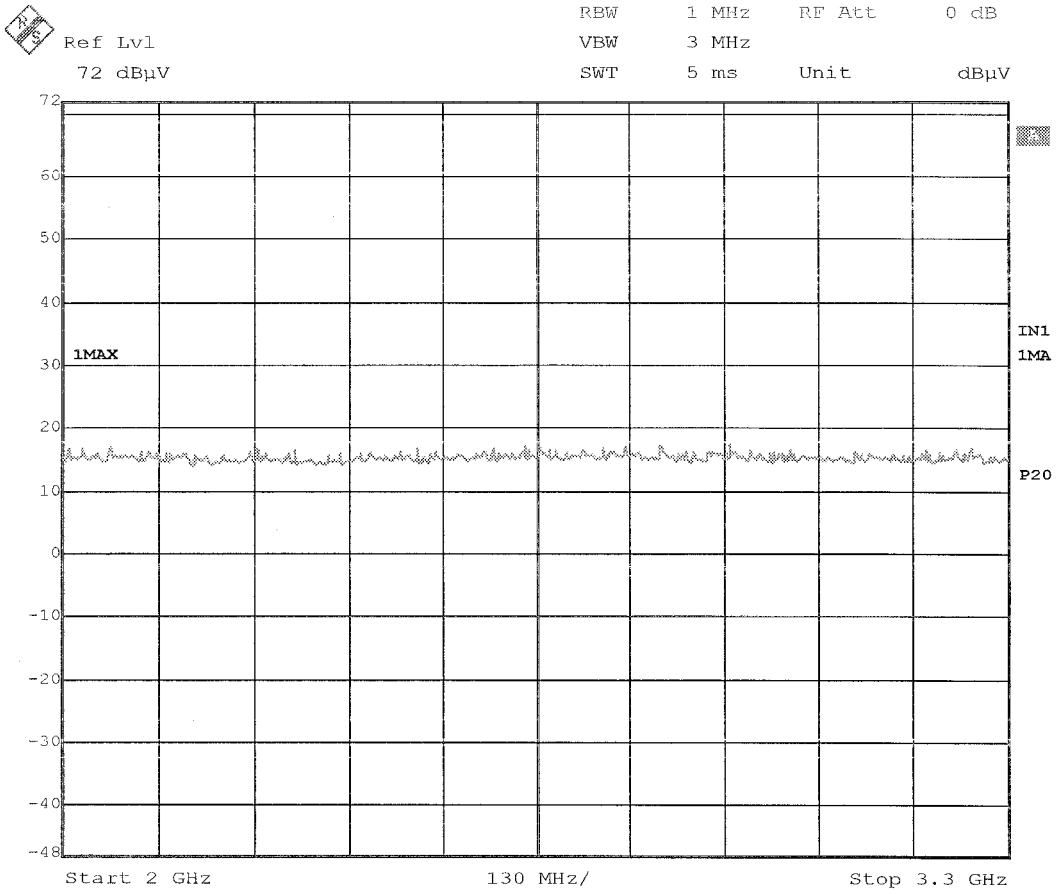
POLARIZATION: Vertical
TEST DISTANCE: 3 M
PROJECT ID:
FILE/DATA#: 650+RFA.emi/15
OPERATOR: Jacky Lin
TEST SITE: Chamber
LIMIT :



COMMENT: Z AXIS

650+RFA.emi/15 1/1

Vertical (Z AXIS)---2GHz～3.3GHz



Title: 650+RFA
Comment A: spurious emission measured(vertical)(z axis)
Date: 6.FEB.2007 14:42:57

6.3 TRANSMITTER BANDWIDTH MEASUREMENTS

6.3.1 LIMIT

FCC Part15, Subpart C Section 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

6.3.2 TEST EQUIPMENTS

The following test equipment was used during the test:

Manufacturer	Test Equipment	Model No.	Serial No.	Next Cal. Date
R&S	Spectrum	ESIB 26	100097	03/02/2007

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.3.3 TEST PROCEDURES

The EUT was placed on a table and a dipole antenna was used at a distance about 15 cm for receiving. While testing, EUT was set to transmit continuously.

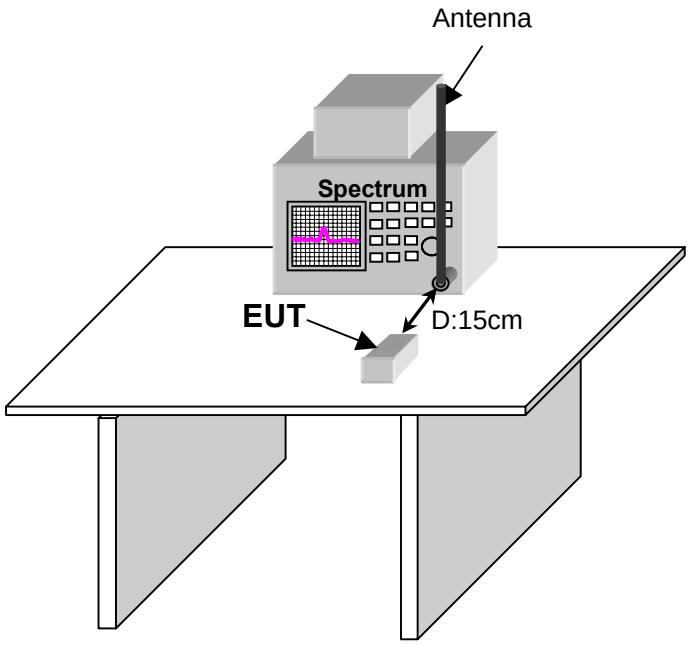
The resolution bandwidth of the spectrum analyzer was set to 100KHz.

The detector function was set to peak and hold mode to clearly observe the components. The maximum permitted bandwidth at -20dB with respect to the reference level specified by the rule was 0.25% of the center frequency of the EUT..

6.3.4 DEVIATION FROM TEST STANDARD

No deviation

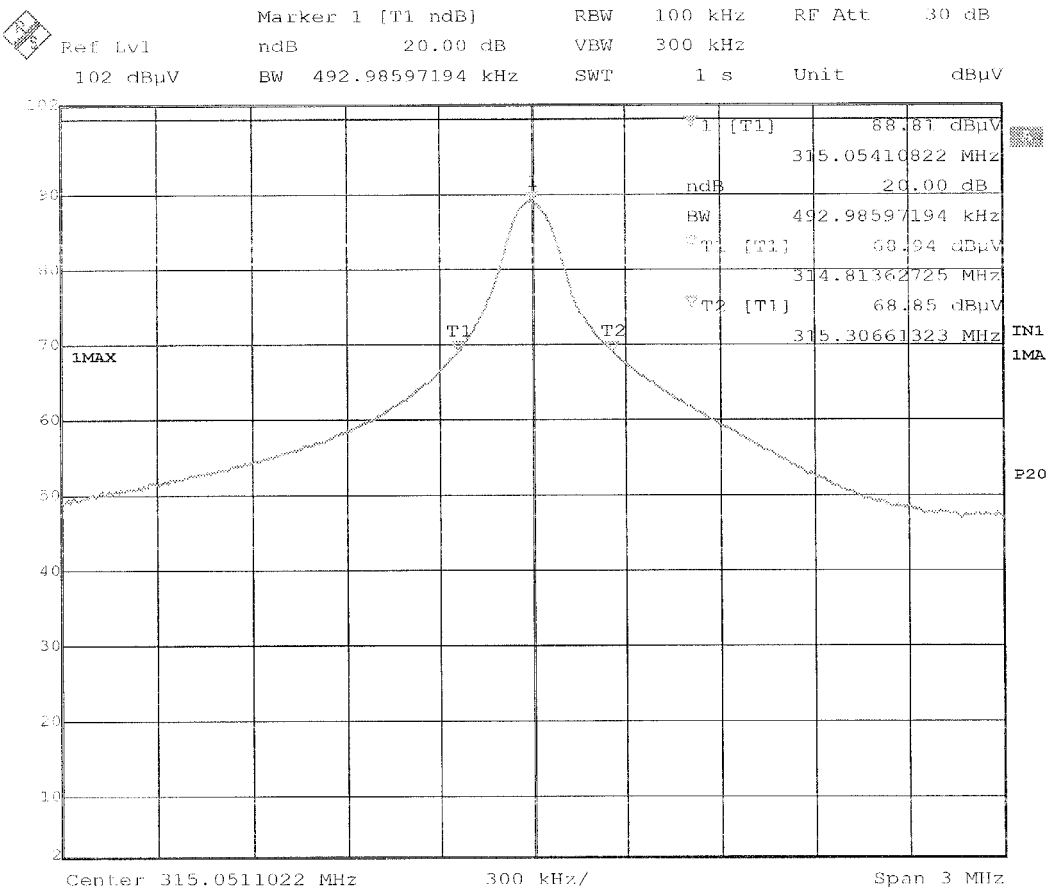
6.3.5 TEST SET-UP



6.3.6 TEST RESULT

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Test Result:	PASS	Tested Date:	08.28,2006

Frequency (MHz)	Bandwidth Measurement (kHz)	Permitted Maximum Bandwidth (kHz)	Result
315	492.98	≤787.5	Pass



Title: 650+RFA
Comment A: bandwidth measured
Date: 28.AUG.2006 10:54:33

6.4 TRANSMITTER DUTY CYCLE MEASUREMENT

6.4.1 LIMIT

FCC Part15, Subpart C Section 15.231.

The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition

6.4.2 TEST REQUIPMENTS

The following test equipment was used during the test:

Manufacturer	Test Equipment	Model No.	Serial No.	Next Cal. Date
R&S	Spectrum	ESIB 26	100097	03/02/2007

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.4.3 TEST PROCEDURES

The EUT was placed on a table and a dipole antenna was used at a distance about 15 cm for receiving. While testing, press the switch then release.

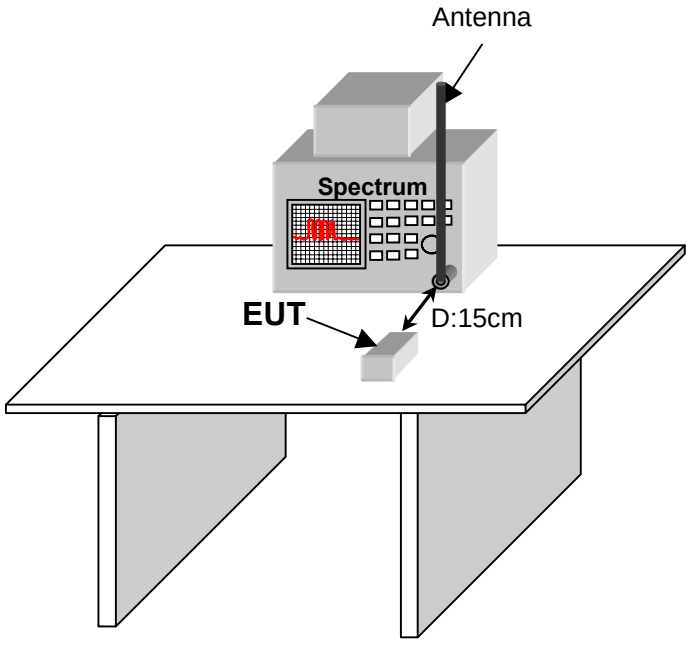
The RBW of the SA was set to 1MHz; the SWT set to 1 second, span set to 0Hz, the detect function use peak mode, and trace with maximum hold mode. Lastly use Delta function to reed data.

When test transmission time, the SWT of the SA was set to 1 second, span set to 0Hz; test duty cycle, the SWT of the SA was set to100ms, span set to 0Hz the detect function use peak mode, and trace with maximum hold mode. Lastly use delta function to read data.

6.4.4 DEVIATION FROM TEST STANDARD

No deviation

6.4.5 TEST SET-UP



6.4.6 TEST RESULT

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Test Result:	PASS	Tested Date:	08.28,2006

Automatically deactivate

Frequency (MHz)	Time of Transmitting ms(sec)	Limit (sec)	Margin (sec)	Result
315	174.348697ms (0.17sec)	＜5sec	4.83	Pass

Remark: Please see page 48 for plotted.

Model No.	650+RFA	Humidity:	55%RH
Temperature:	25℃	Tested by:	Jacky Lin
Test Result:	PASS	Tested Date:	02.06,2006

Duty Cycle

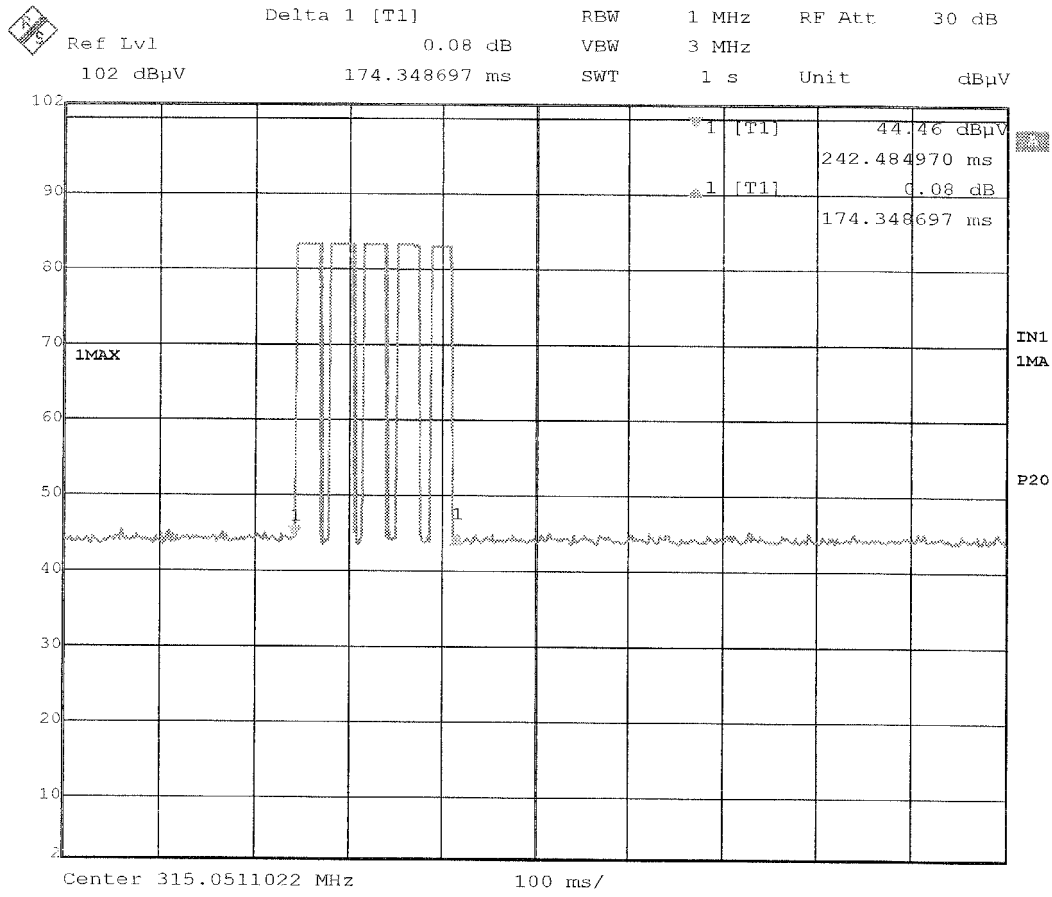
Total on interval in a complete pulse train (msec)	Length of a complete pulse train (msec)	Duty cycle (%)	Duty Cycle Correction Factor (dB)
60.92	100	60.92	-4.30

Remark:

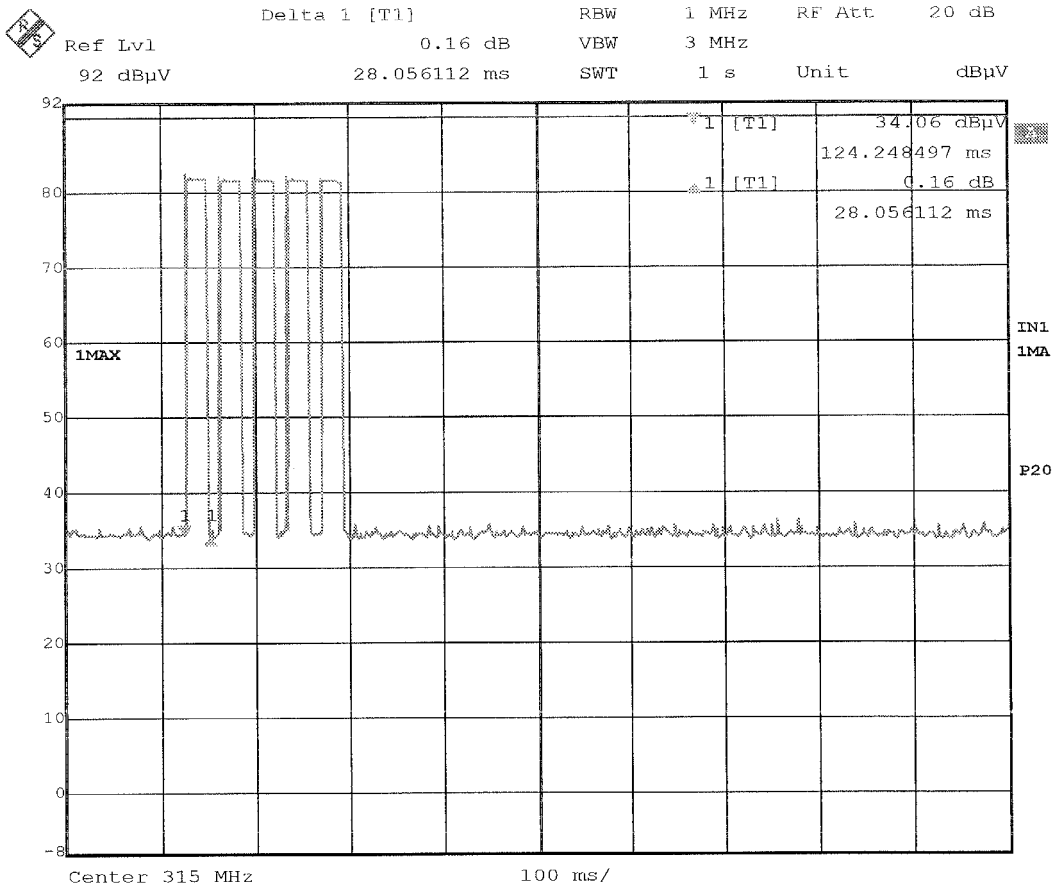
1. Please see page 50 to 52 for plotted duty.
2. The duty cycle was determined by the following equation:
   To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion:

$$\text{Duty Cycle}(\%) = \frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}} \times 100\%$$

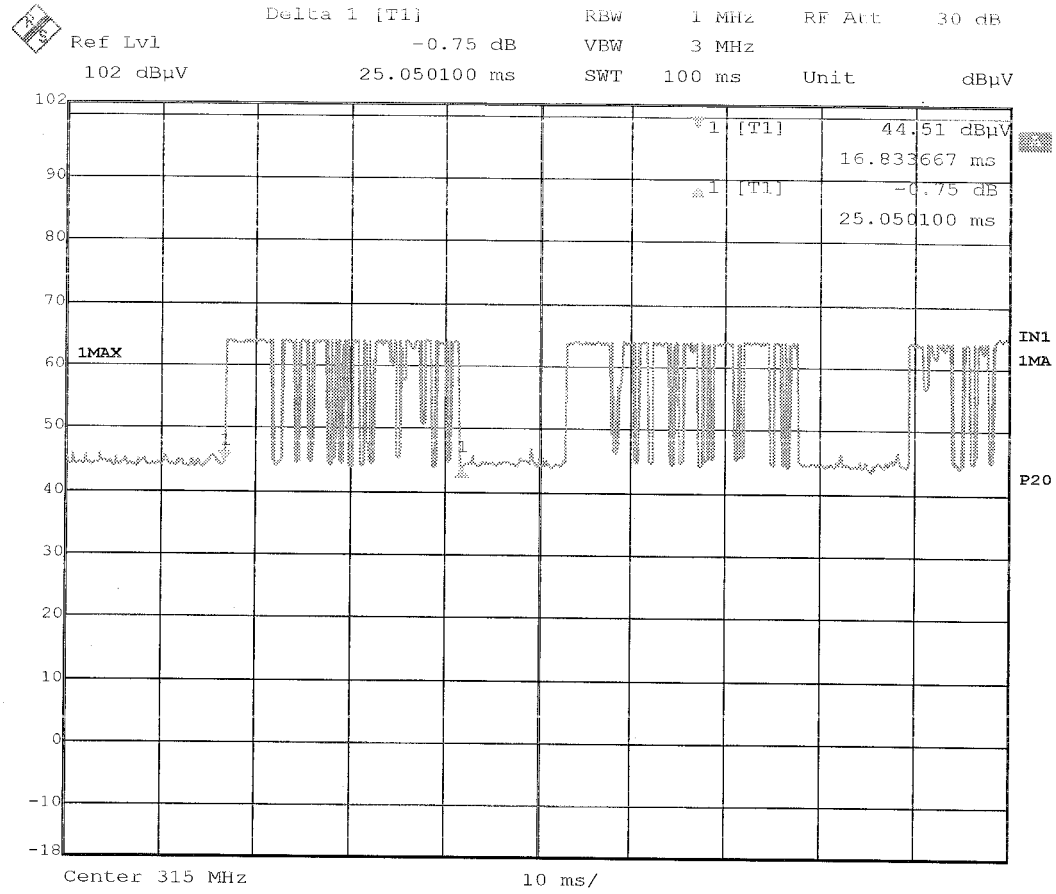
$$\text{Duty Cycle Correction Factor (dB)} = 20 \times \text{Log}_{10}(\text{Duty Cycle}(\%))$$



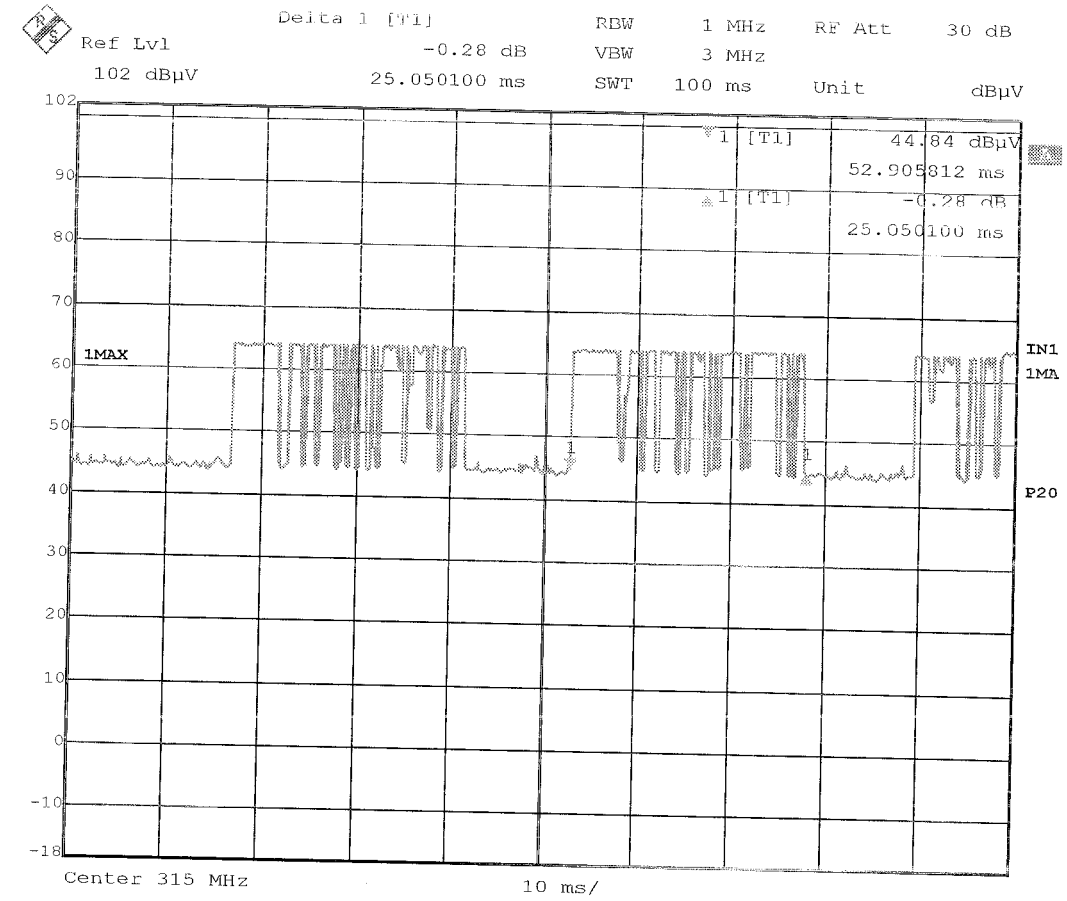
Title: 650+RFA
Comment A: dwell time measured
Date: 28.AUG.2006 10:52:27



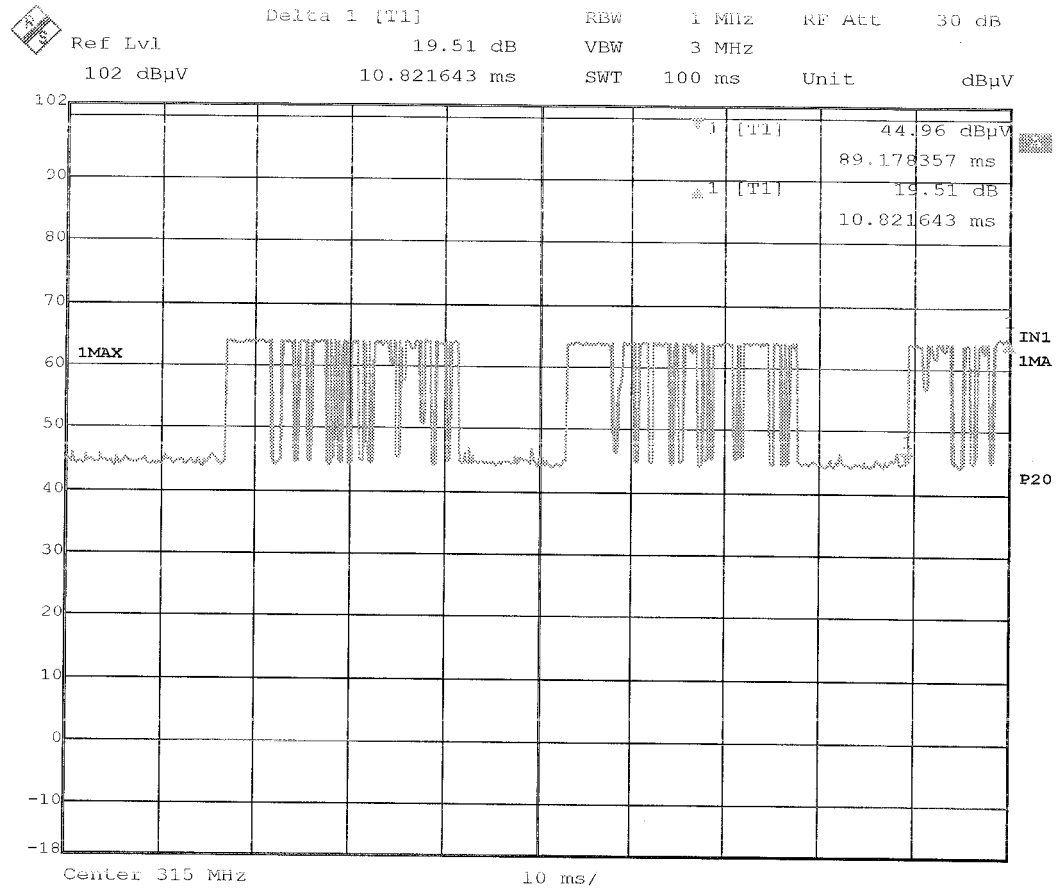
Title: 650+RFA
Comment A: pulse measured
Date: 31.JAN.2007 09:35:12



Title: 650+RFA
Comment A: duty cycle measured
Date: 6.FEB.2007 12:52:00



Title: 650+RFA
Comment A: duty cycle measured
Date: 6.FEB.2007 12:52:32



Title: 650+RFA
Comment A: duty cycle measured
Date: 6.FEB.2007 12:52:59