

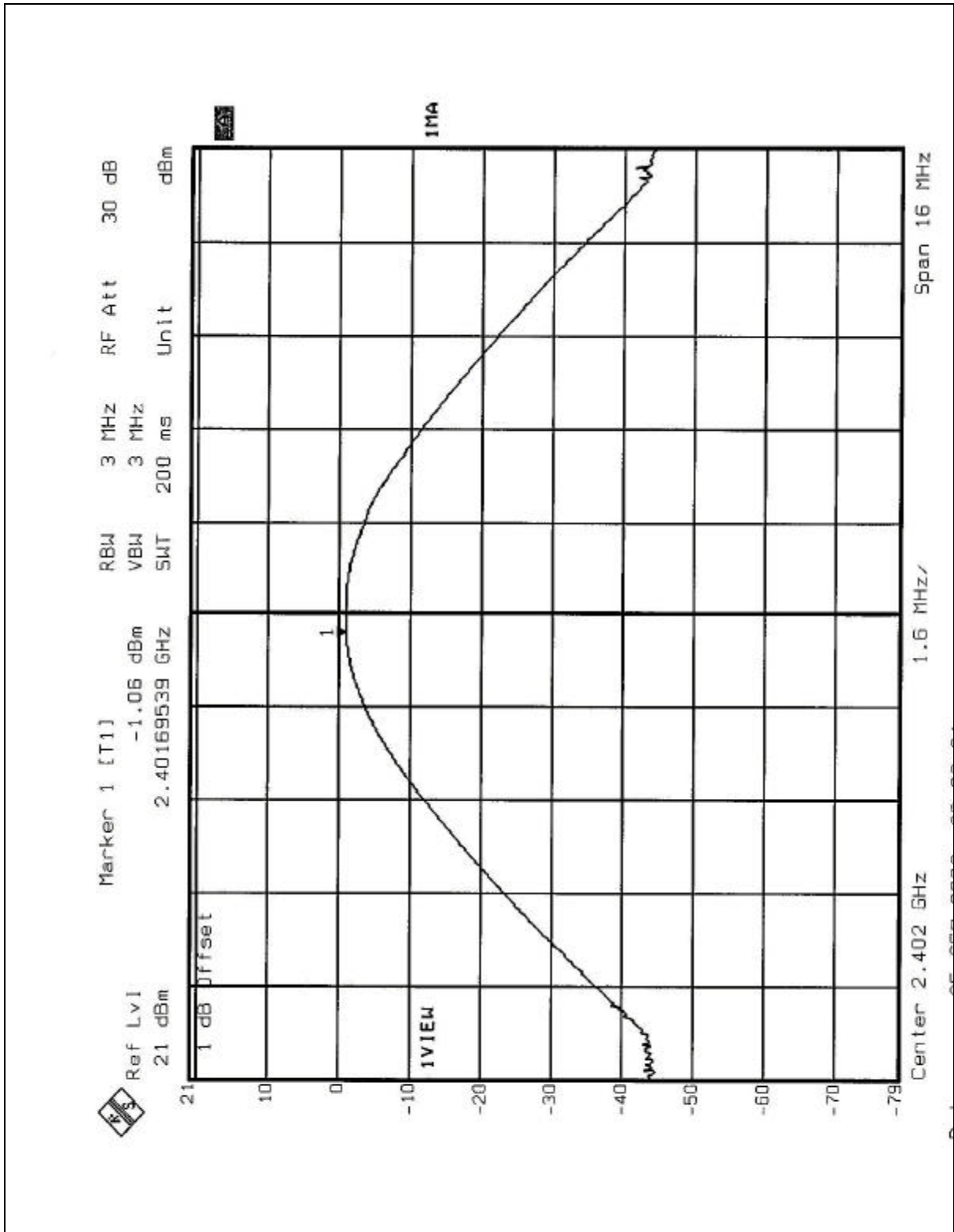
## 4.6.7 TEST RESULTS

Output Power Into Antenna:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	-1.06	30	PASS
39	2441	-1.06	30	PASS
78	2480	-0.90	30	PASS

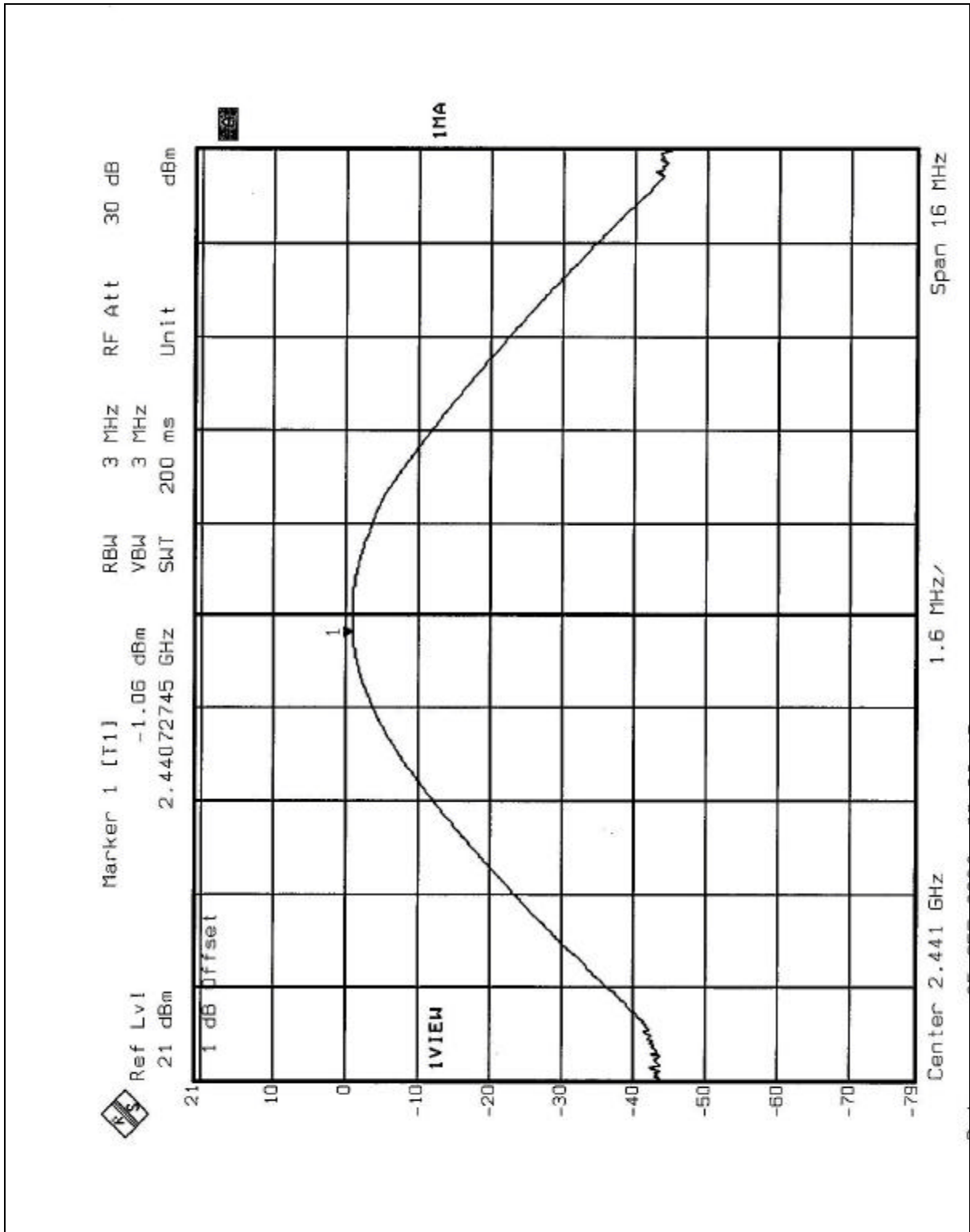


Channel 0



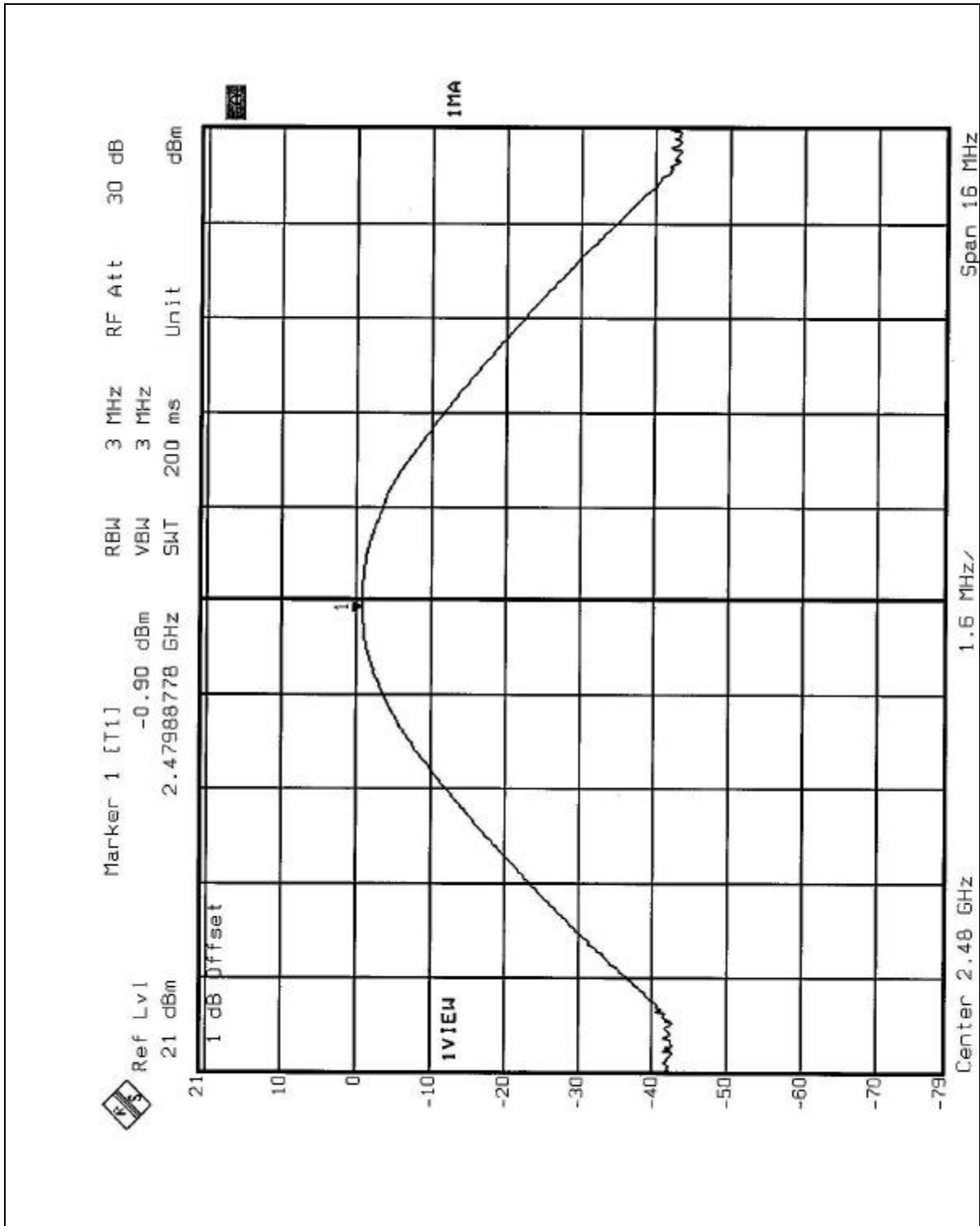


Channel 39





Channel 78





## 4.7 RADIATED EMISSION MEASUREMENT

### 4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field Strength of Fundamental	
	uV/m	dBuV/m
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. 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.



## 4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*HP Spectrum Analyzer	8590L	3520A00667	Aug. 26, 2003
*CHASE Preamplifier	CPA9231A/4	3215	Nov. 08, 2002
* HP Preamplifier	8449B	3008A01201	Dec. 06, 2002
* HP Preamplifier	8449B	3008A01292	Aug. 07, 2003
* ROHDE & SCHWARZ TEST RECEIVER	ESVS10	846285/012	Sept. 16, 2003
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 27, 2003
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2002
* CHASE BILOG Antenna	CBL6112B	2751	March 30, 2003
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 03, 2003
* EMCO Horn Antenna	3115	9312-4192	April 09, 2003
* CHANCE Turn Table & Tower Controller	ACS-I	NA	NA
* Software	ADT_Radiated_V5.06	NA	NA
* ANRITSU RF Switches	MP59B	M51167	Aug. 21, 2003
* TIMES RF cable	LMR-600	CABLE-ST6-01	Aug. 21, 2003

- 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. "\*" = These equipment are used for the final measurement.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The test was performed in ADT Open Site No. 6.
  5. The VCCI Site Registration No. is R-728.



### 4.7.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB 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 peak, quasi-peak or average method as specified and then reported in a data sheet.

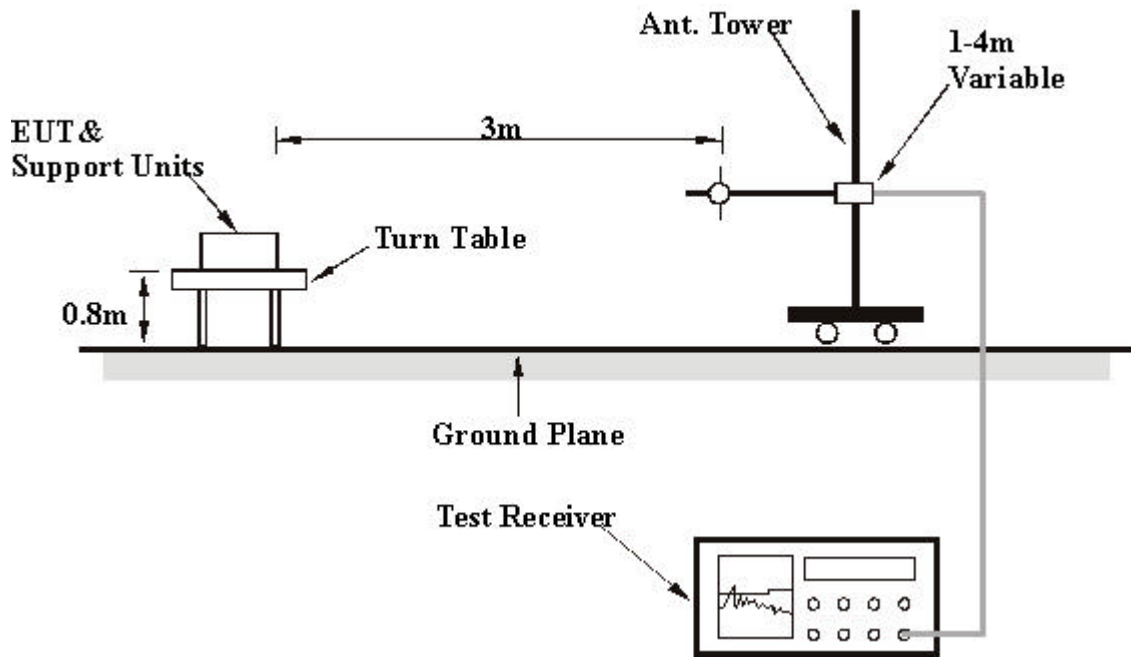
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.7.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.7.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



## 4.7.7 TEST RESULTS

**Digital Portion:**

<b>EUT</b>	Bluetooth USB module	<b>MODEL</b>	UB2-2111-S
<b>MODE</b>	Channel 78	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Gary Chang	

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	32.45	17.0	10.8	27.8	40.0	-12.2	174	4
2	144.03	11.8	16.4	28.2	43.5	-15.3	151	310
3	240.04	12.6	16.0	28.6	46.0	-17.4	196	162
4	272.01	13.9	15.6	29.4	46.0	-16.6	138	125
5	336.04	15.3	16.6	32.0	46.0	-14.0	112	299
6	480.08	19.0	8.3	27.3	46.0	-18.7	106	308

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	32.15	17.1	19.6	36.7	40.0	-3.3	108	144
2	39.83	13.4	22.6	36.0	40.0	-4.0	100	152
3	57.00	7.2	24.1	31.2	40.0	-8.8	106	213
4	131.99	12.3	14.2	26.5	43.5	-17.0	102	302
5	144.03	11.8	16.7	28.5	43.5	-15.0	142	56
6	443.88	18.3	10.0	28.3	46.0	-17.7	162	320
7	480.10	19.0	6.2	25.1	46.0	-20.9	188	200
8	516.10	19.8	12.1	31.9	46.0	-14.1	110	84
9	624.10	21.4	4.7	26.0	46.0	-20.0	167	255

**NOTE:**

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.

**RF Portion :**

<b>EUT</b>	Bluetooth USB module	<b>MODEL</b>	UB2-2111-S
<b>MODE</b>	Channel 0	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Gary Chang	

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2402.00	29.9	55.9	40.8	85.9	70.7	-	-	-	-	125	141
2	4804.00	35.7	4.5	-5.3	40.2	30.4	74.0	54.0	-33.8	-23.6	114	104

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2402.00	29.9	49.0	36.6	78.9	66.5	-	-	-	-	118	135
2	4804.00	35.7	4.0	-5.7	39.7	30.0	74.0	54.0	-34.3	-24.0	125	114

**NOTE:**

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. “ \* “ : Fundamental frequency
5. The other emission levels were very low against the limit.

<b>EUT</b>	Bluetooth USB module	<b>MODEL</b>	UB2-2111-S
<b>MODE</b>	Channel 39	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Gary Chang	

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2441.00	29.9	57.0	41.2	86.9	71.1	-	-	-	-	132	152
2	4882.00	35.9	4.2	-5.7	40.1	30.2	74.0	54.0	-33.9	-23.8	141	135

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2441.00	29.9	48.6	37.2	78.5	67.1	-	-	-	-	153	117
2	4882.00	35.9	1.7	-6.3	37.6	29.6	74.0	54.0	-36.4	-24.4	121	132

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.

<b>EUT</b>	Bluetooth USB module	<b>MODEL</b>	UB2-2111-S
<b>MODE</b>	Channel 78	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Gary Chang	

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2480.00	29.8	60.4	43.0	90.3	72.9	-	-	-	-	125	147
2	4960.00	36.0	0.7	-5.9	36.7	30.2	74.0	54.0	-37.3	-23.8	125	147

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB)	Reading		Emission		Limit		Margin		Antenna Height (m)	Table Angle (deg.)
			PK	AV	PK	AV	PK	AV	PK	AV		
1	*2480.00	29.8	49.6	36.6	79.4	66.4	-	-	-	-	152	114
2	4960.00	36.0	2.9	-4.9	38.9	31.1	74.0	54.0	-35.1	-22.9	111	184

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.

## 4.8 BAND EDGES MEASUREMENT

### 4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz RB).

### 4.8.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 24, 2003

#### Notes:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

### 4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.



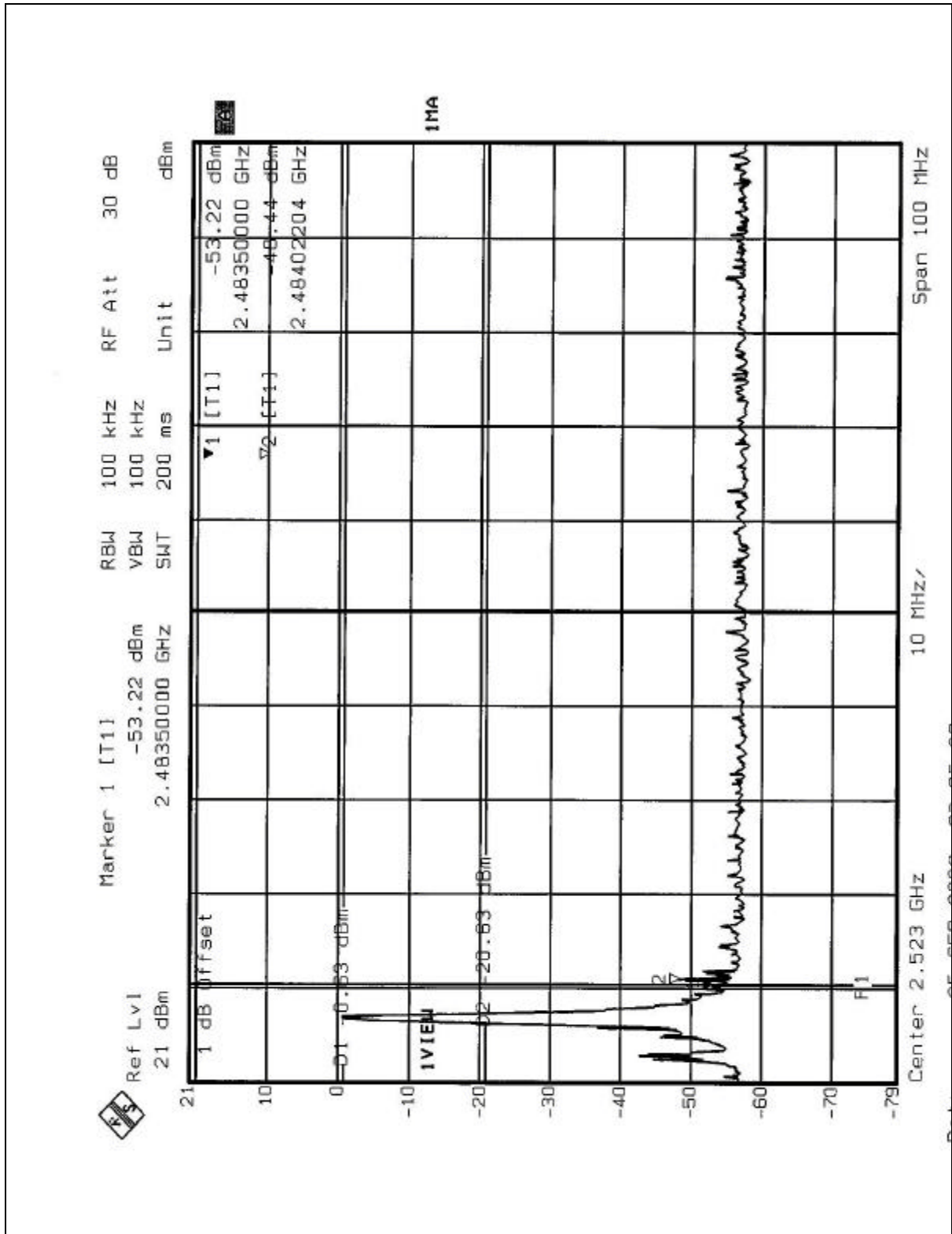
#### 4.8.4 EUT OPERATING CONDITION

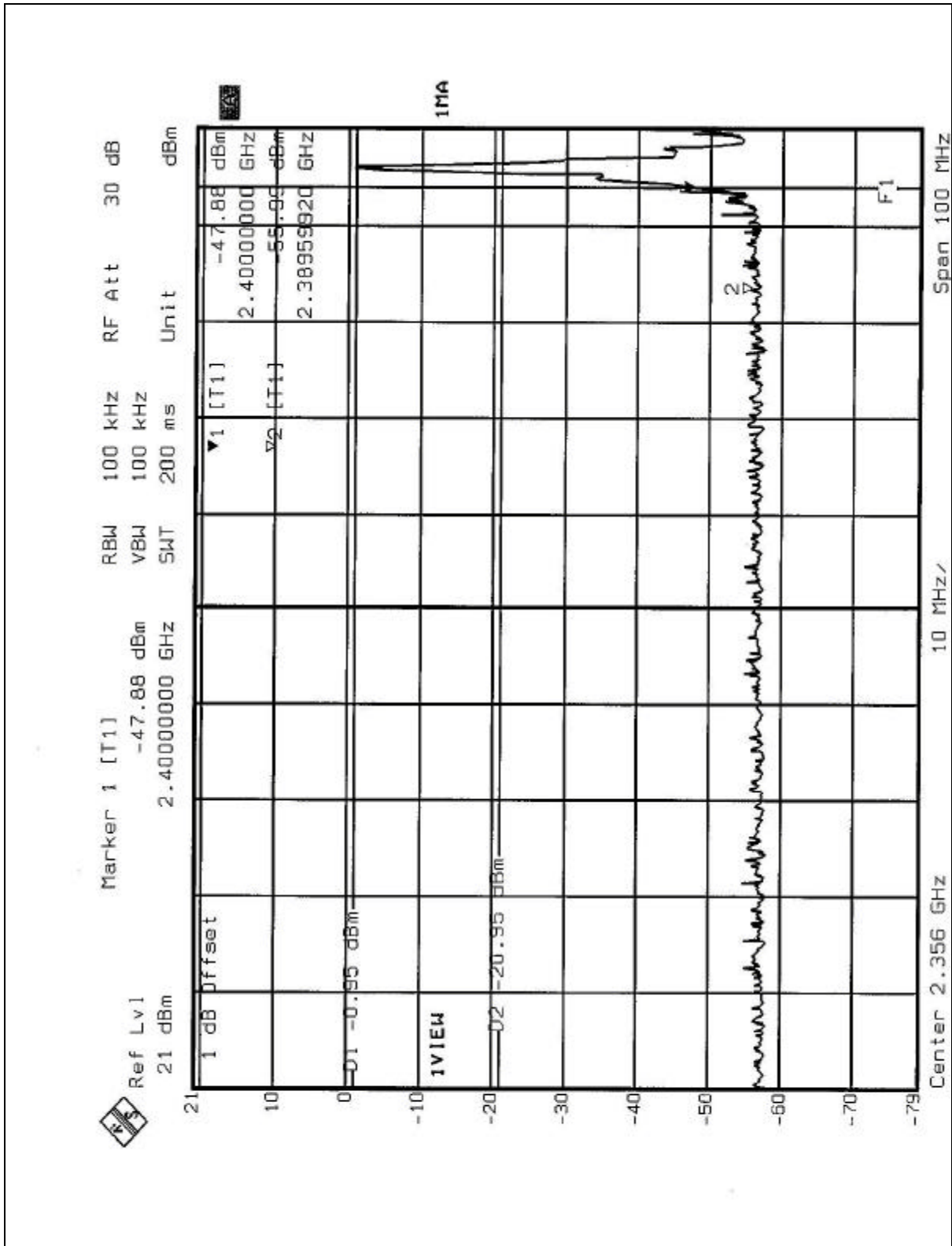
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.8.5 TEST RESULTS

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

**NOTE:** The band edge emission plot on the following 2 pages shows 49.07dB / 55.04dB delta between carrier maximum power and local maximum emission in restrict band (2.4840GHz / 2.3896GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.7.7 (Page 52) is 72.9dBuV/m, so the maximum field strength in restrict band is  $72.9 - 49.07 = 23.83$ dBuV/m which is under 54 dBuV/m limit.









## **4.9 ANTENNA REQUIREMENT**

### **4.9.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

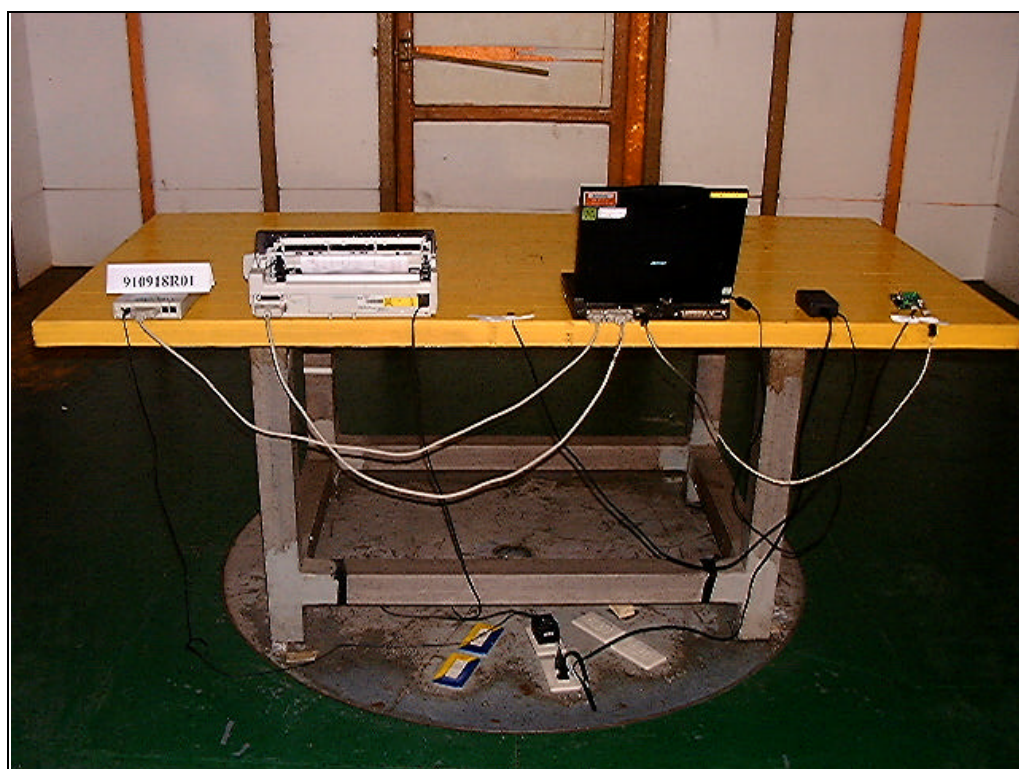
### **4.9.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is printed antenna. There is no antenna connector. The maximum gain of this antenna is only 0dBi.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



### RADIATED EMISSION TEST





## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.