

## 4.5 HOPPING CHANNEL SEPARATION

### 4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or 20dB bandwidth (whichever is greater).

### 4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 17, 2002

#### NOTES:

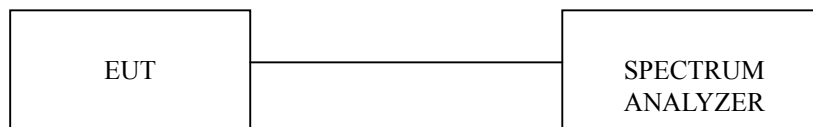
- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.



### 4.5.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

### 4.5.4 TEST SETUP



### 4.5.5 TEST RESULTS

**Data Mode:**

Channel	Frequency (MHz)	Adjacent Channel Separation	Minimum Limit (kHz)	Pass / Fail
0	2402	1MHz	838.677	PASS
39	2441	1MHz	817.635	PASS
78	2480	1MHz	838.677	PASS

**Acquisition Mode:**

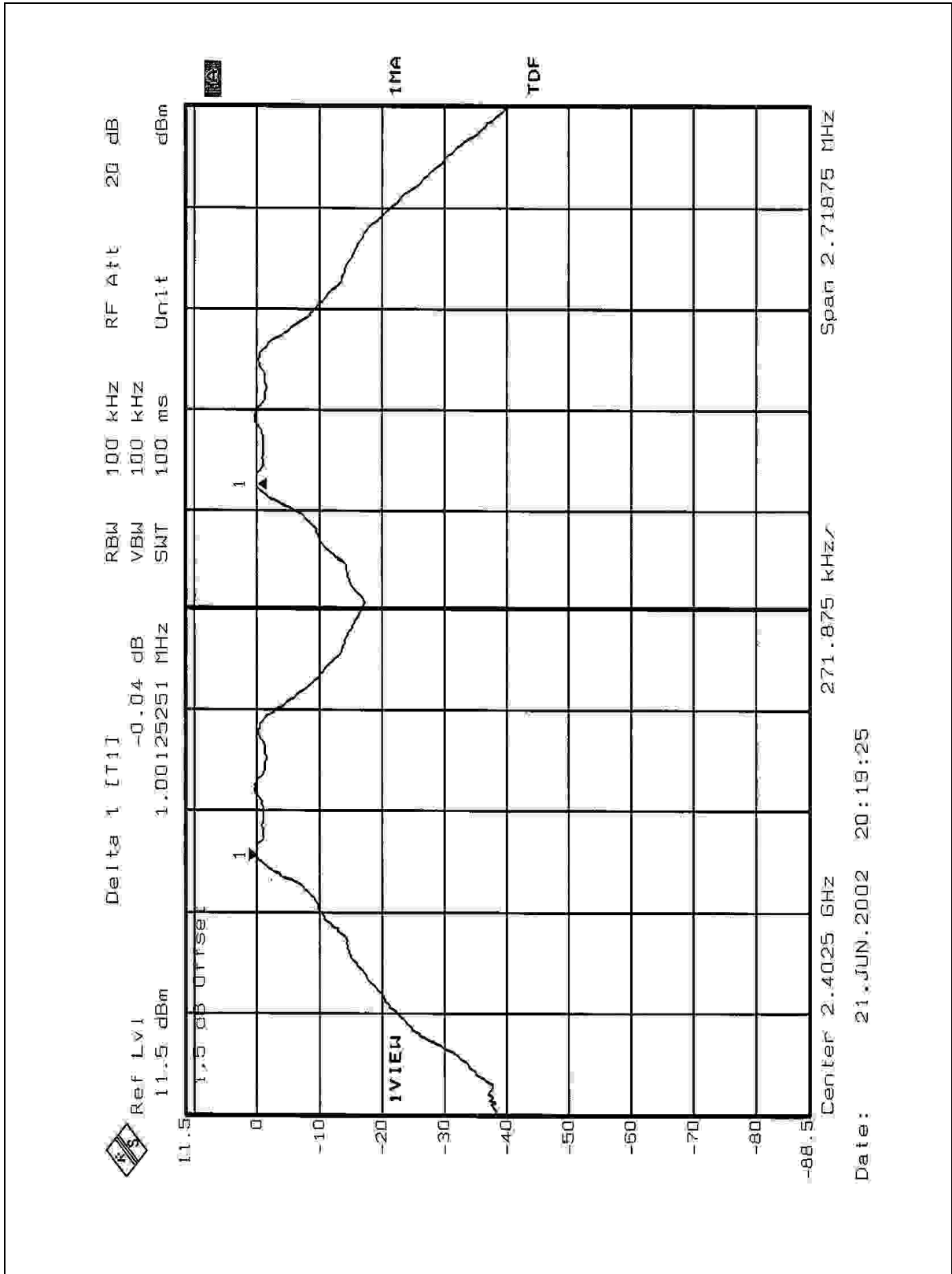
Channel	Frequency (MHz)	Adjacent Channel Separation	Minimum Limit (kHz)	Pass / Fail
39	2441	1.987MHz	817.635	PASS

The minimum limit is 20dB bandwidth. Test results please refer to next three pages.



**Data Mode:**

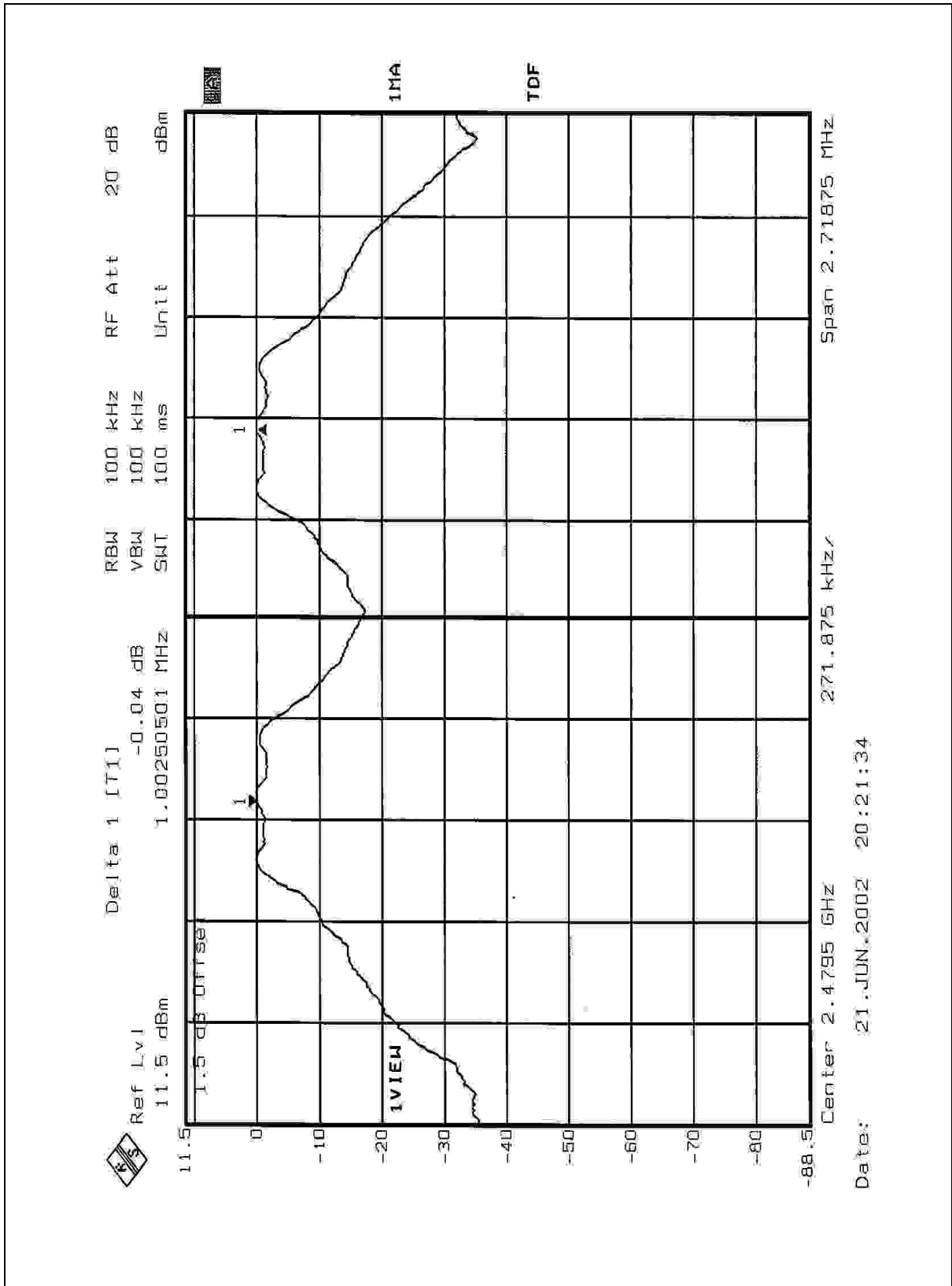
Channel 0







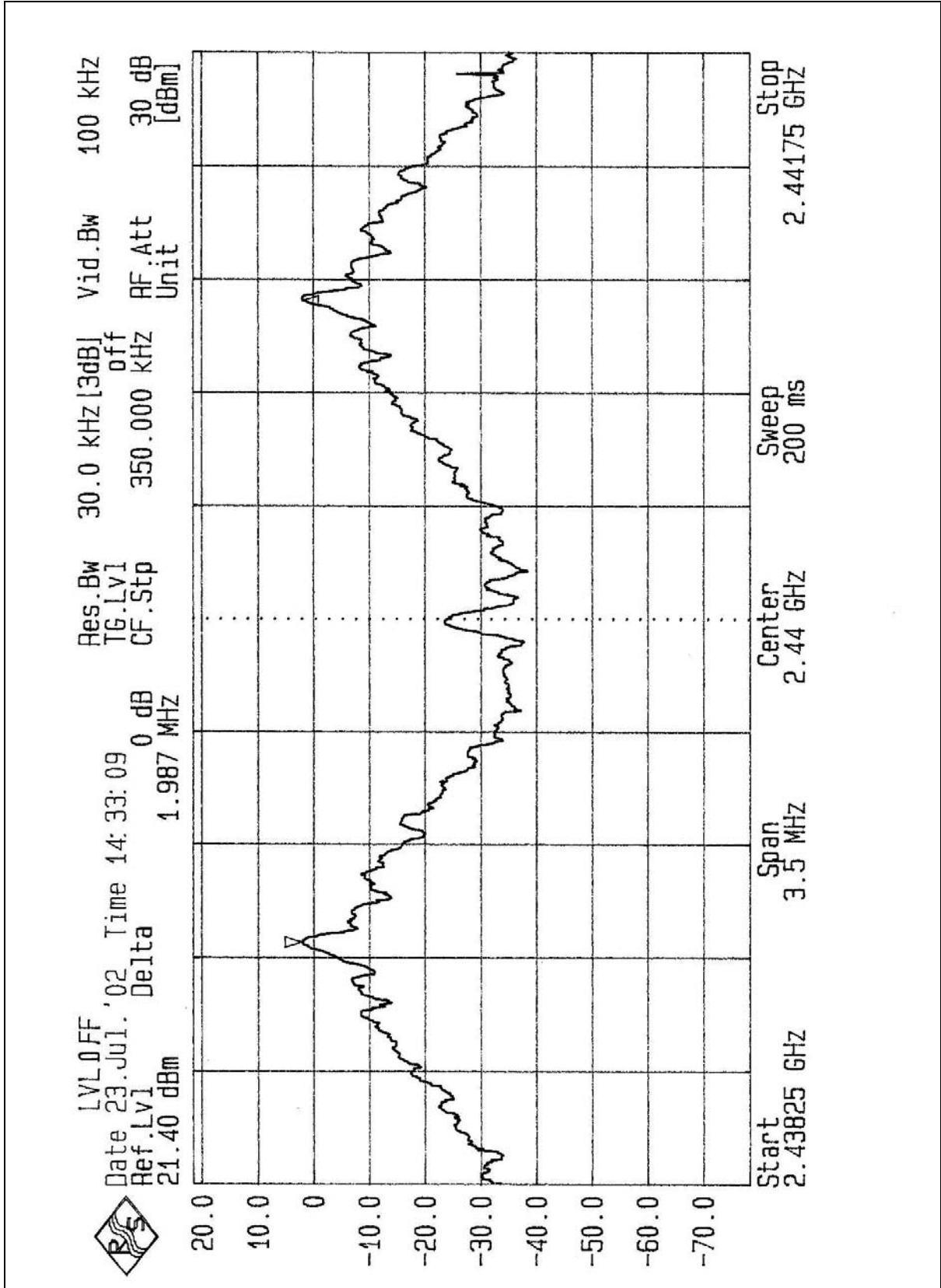
Channel 78





**Acquisition Mode:**

Channel 39





## 4.6 MAXIMUM PEAK OUTPUT POWER

### 4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Limit of Maximum Peak Output Power Measurement is 30dBm.

### 4.6.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 17, 2002

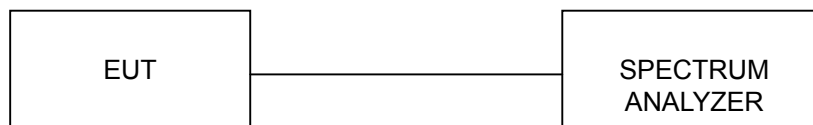
#### NOTES:

- 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.

#### 4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 2 MHz RBW and 3 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.6.4 TEST SETUP



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

#### 4.6.5 EUT OPERATING CONDITION

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



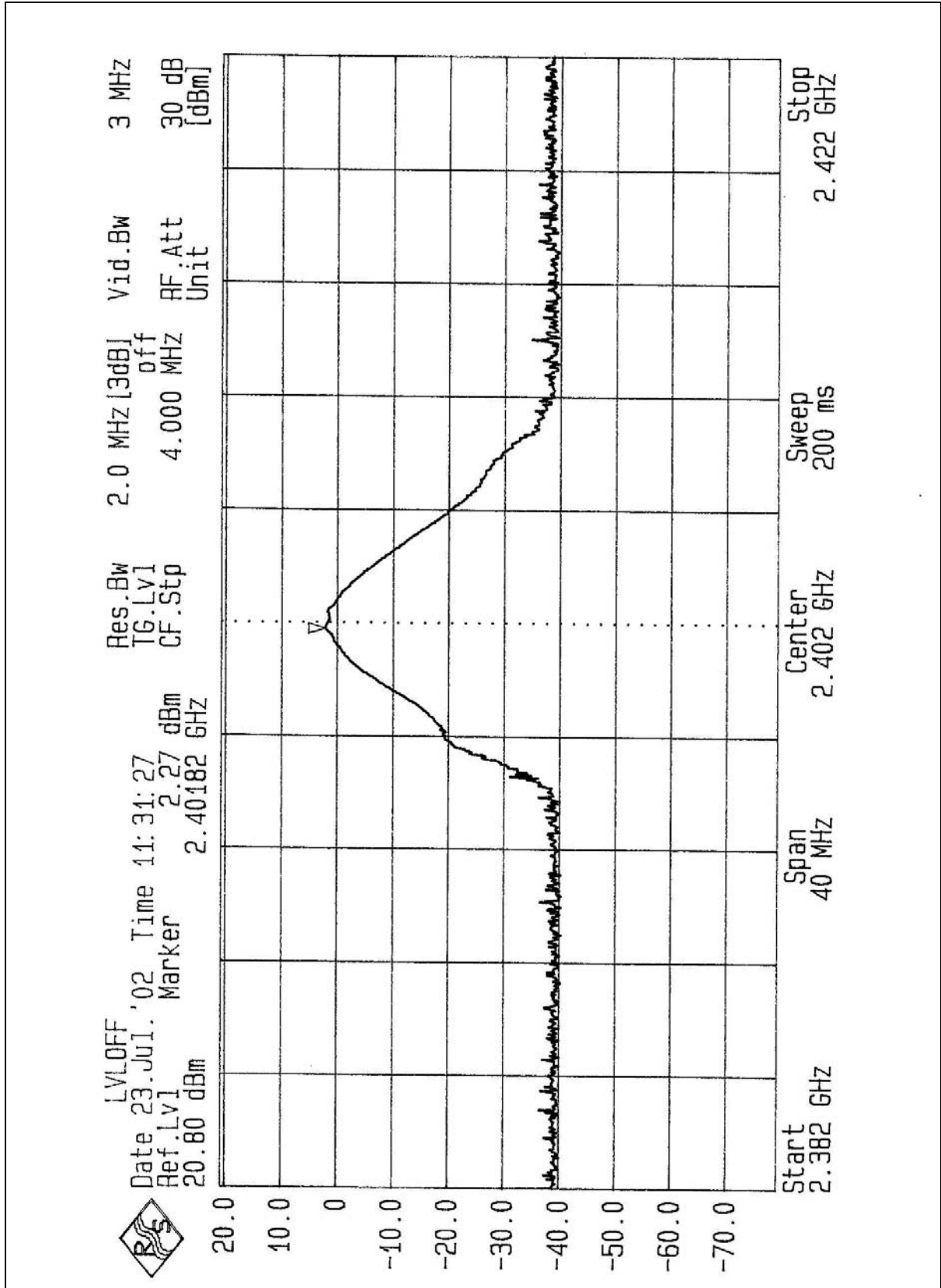
## 4.6.6 TEST RESULTS

Output Power Into Antenna:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	2.27	30	PASS
39	2441	2.98	30	PASS
78	2480	3.23	30	PASS

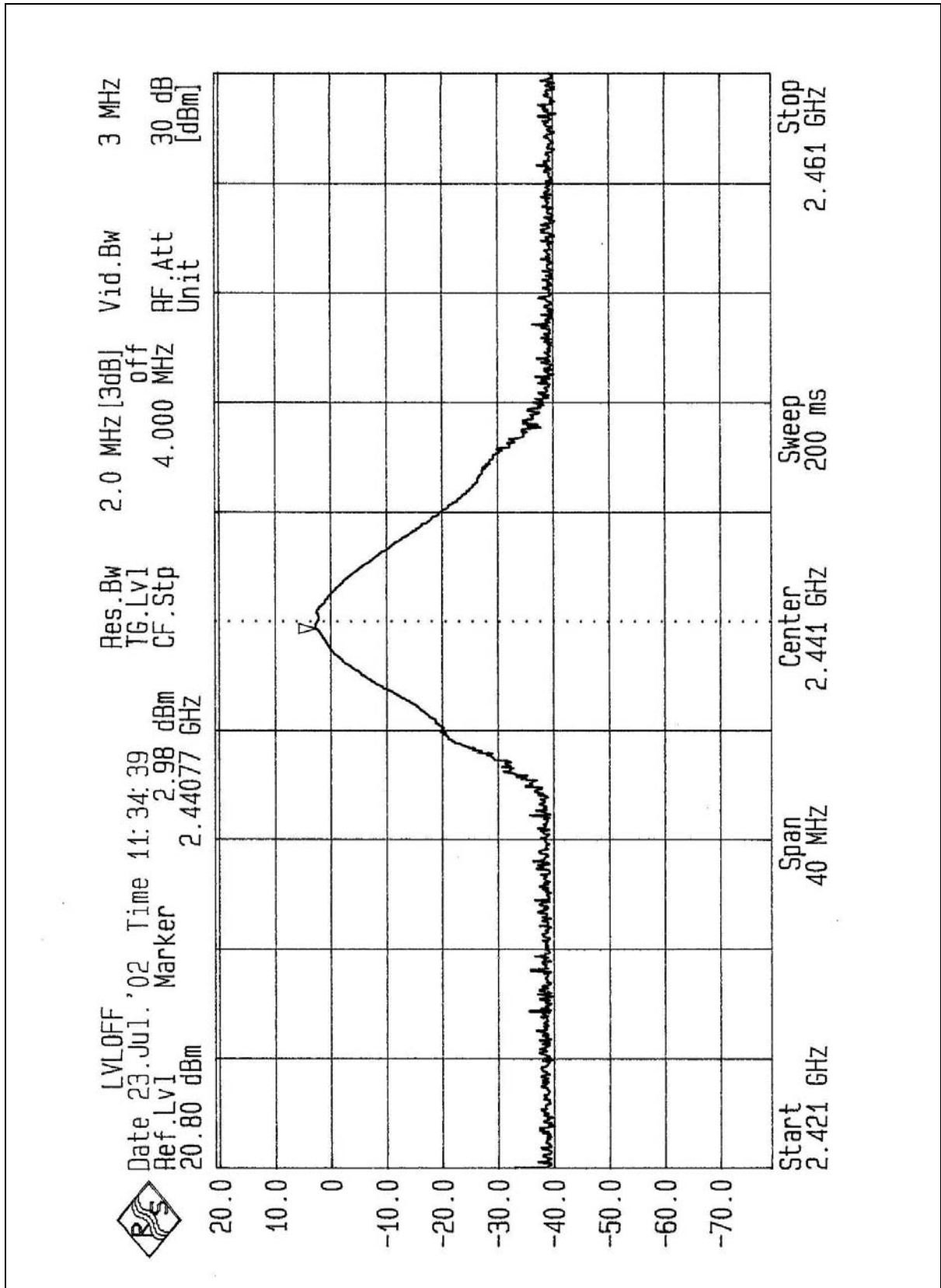


Channel 0



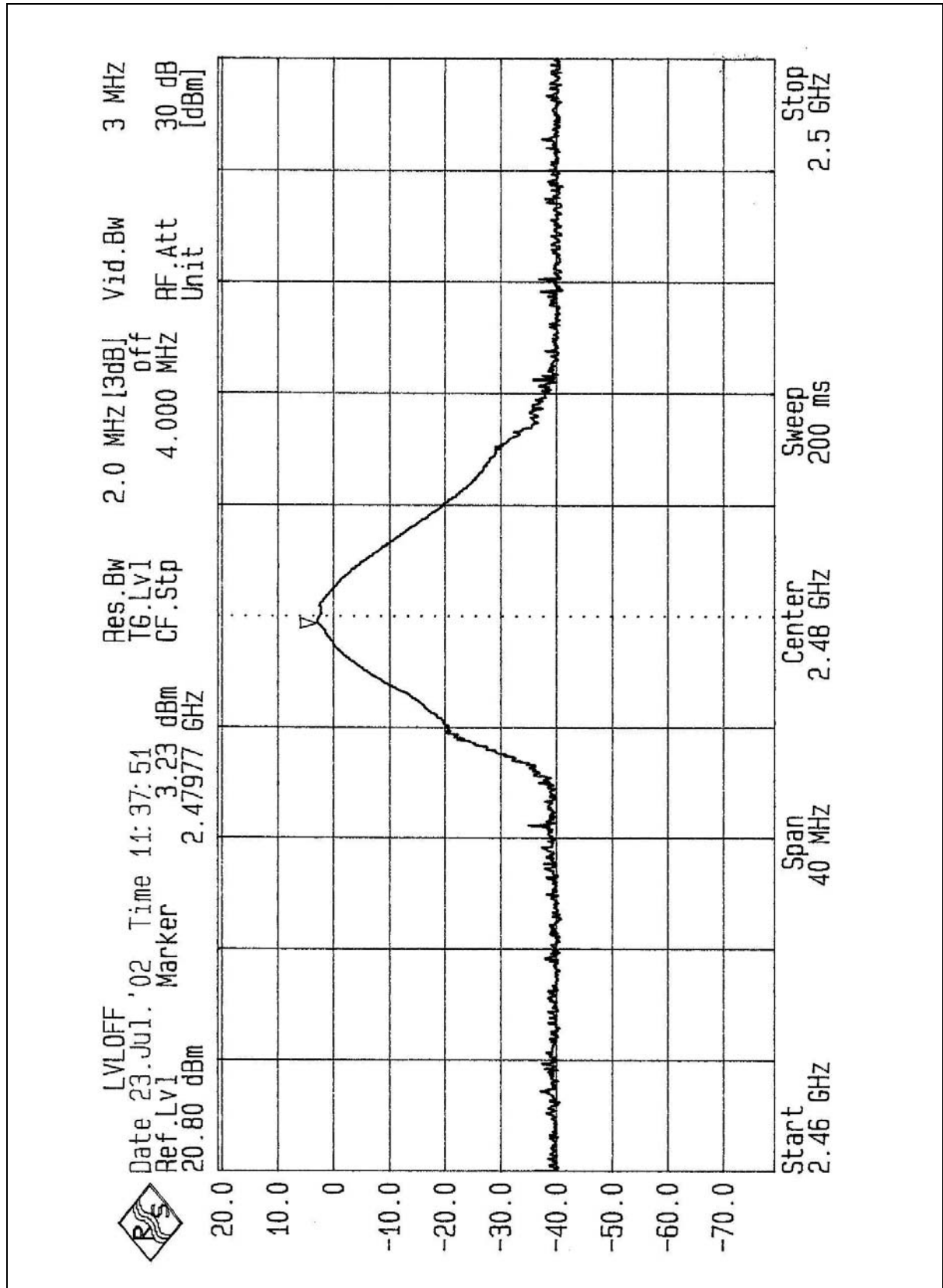


Channel 39





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	3544A01176	May 13, 2003
* HP Preamplifier	8447D	2944A08485	Oct. 30, 2002
* HP Preamplifier	8449B	3008A01201	Dec. 06, 2002
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2002
* 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	CBL6112A	2221	Aug. 2, 2002
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 9, 2003
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 2, 2002
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 2, 2002
Open Field Test Site	Site 5	ADT-R05	July 28, 2002
VCCI Site Registration No.	Site 5	R-1039	NA

**NOTE:** 1. The measurement uncertainty is less than +/- 3.0dB, 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.

3. "\*" = These equipment are used for the final measurement.

4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.



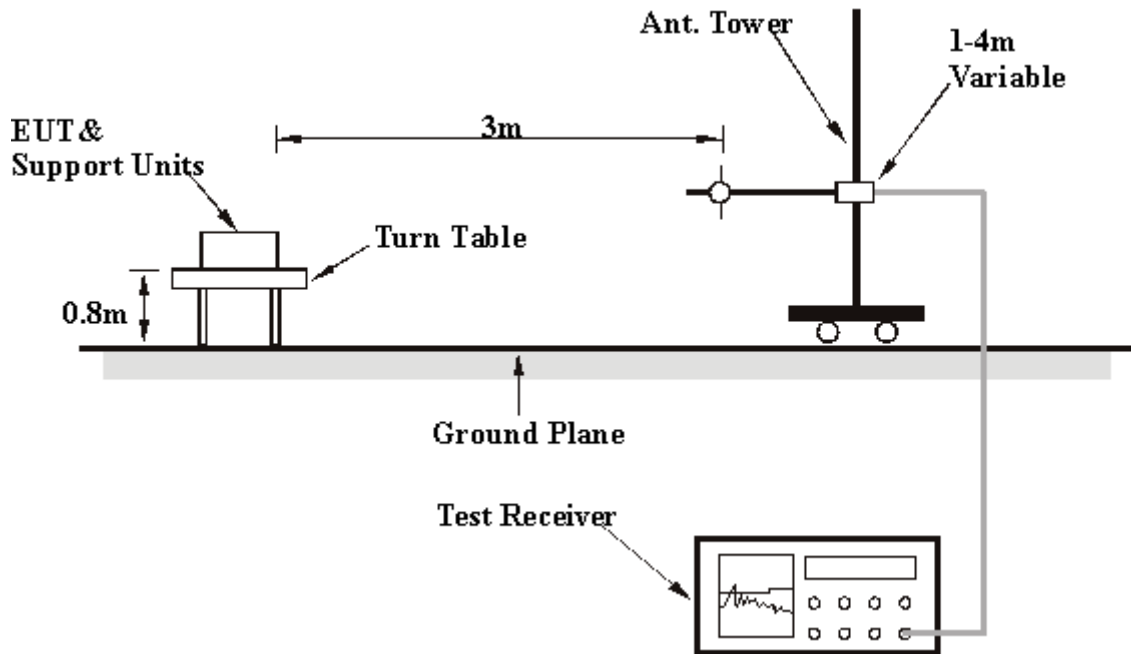
#### 4.7.3 TEST PROCEDURES

- 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 TEST SETUP



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



## 4.7.5 TEST RESULTS (A)

**Digital Portion:**

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	80.00	18.2 QP	40.00	-21.80	1.05H	3	9.75	7.33	1.12	0.00	-8.45
2	128.00	12.8 QP	43.50	-30.70	1.21H	17	0.20	11.37	1.23	0.00	-12.60
3	144.00	16.5 QP	43.50	-27.00	1.15H	292	4.64	10.58	1.28	0.00	-11.86
4	160.00	18.0 QP	43.50	-25.50	1.32H	39	7.00	9.62	1.38	0.00	-11.01
5	208.00	25.3 QP	43.50	-18.20	1.38H	83	14.46	9.40	1.45	0.00	-10.85
6	224.00	22.7 QP	46.00	-23.30	1.44H	169	10.74	10.41	1.56	0.00	-11.96
7	240.00	19.9 QP	46.00	-26.10	1.57H	273	6.82	11.41	1.67	0.00	-13.09
8	300.00	24.3 QP	46.00	-21.70	2.79H	80	9.24	13.18	1.88	0.00	-15.07
9	320.00	24.0 QP	46.00	-22.00	1.74H	315	8.40	13.62	1.98	0.00	-15.61
10	336.00	21.0 QP	46.00	-25.00	1.63H	235	5.03	13.92	2.05	0.00	-15.98
11	600.00	25.7 QP	46.00	-20.30	1.49H	12	4.24	18.61	2.85	0.00	-21.47
12	915.00	26.3 QP	46.00	-19.70	2.59H	72	1.68	20.92	3.69	0.00	-24.63

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	80.00	27.8 QP	40.00	-12.20	1.07V	2	48.06	7.33	1.12	28.71	20.26
2	160.00	20.9 QP	43.50	-22.60	1.12V	252	38.61	9.62	1.38	28.71	17.71
3	216.00	17.9 QP	43.50	-25.60	1.31V	99	35.16	9.97	1.51	28.71	17.23
4	240.00	25.9 QP	46.00	-20.10	1.72V	103	41.53	11.41	1.67	28.71	15.63
5	320.00	20.8 QP	46.00	-25.20	1.18V	85	33.90	13.62	1.98	28.71	13.10
6	336.00	22.9 QP	46.00	-23.10	1.60V	223	35.64	13.92	2.05	28.71	12.74
7	360.00	21.4 QP	46.00	-24.60	1.76V	95	33.40	14.58	2.13	28.71	12.00
8	384.00	18.6 QP	46.00	-27.40	1.56V	194	29.66	15.50	2.15	28.71	11.06
9	432.00	22.9 QP	46.00	-23.10	1.26V	52	33.05	16.28	2.28	28.71	10.16
10	460.00	29.0 QP	46.00	-17.00	1.48V	155	38.80	16.53	2.37	28.71	9.82
11	528.00	22.0 QP	46.00	-24.00	1.26V	131	30.47	17.62	2.62	28.71	8.48
12	720.00	23.5 QP	46.00	-22.50	1.37V	124	29.25	19.68	3.28	28.71	5.76

**RF Portion :**

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2402.00	89.3 PK	-	-	1.20V	157	57.05	27.11	5.10	0.00	-32.21
2	*2402.00	72.7 AV	-	-	1.20V	157	40.47	27.11	5.10	0.00	-32.21
3	4804.00	35.7 AV	54.00	-18.30	1.02H	358	31.64	31.43	7.23	34.63	-4.02
4	4804.00	46.8 PK	74.00	-27.20	1.02H	358	42.78	31.43	7.23	34.63	-4.02

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2402.00	89.3 PK	-	-	1.20V	157	57.05	27.11	5.10	0.00	-32.21
2	*2402.00	72.7 AV	-	-	1.20V	157	40.47	27.11	5.10	0.00	-32.21
3	4804.00	35.7 AV	54.00	-18.30	1.02H	358	31.64	31.43	7.23	34.63	-4.02
4	4804.00	46.8 PK	74.00	-27.20	1.02H	358	42.78	31.43	7.23	34.63	-4.02

**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 Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2441.00	78.4 AV	-	-	1.05H	37	46.00	27.33	5.08	0.00	-32.40
2	*2441.00	95.3 PK	-	-	1.05H	37	62.87	27.33	5.08	0.00	-32.40
3	4882.00	46.6 PK	74.00	-27.40	1.17H	114	42.56	31.47	7.21	34.63	-4.05
4	4882.00	36.0 AV	54.00	-18.00	1.17H	114	31.90	31.47	7.21	34.63	-4.05

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2441.00	92.9 PK	-	-	1.24V	58	60.48	27.33	5.08	0.00	-32.40
2	*2441.00	76.3 AV	-	-	1.24V	58	43.87	27.33	5.08	0.00	-32.40
3	4882.00	35.6 AV	54.00	-18.40	1.31V	51	31.50	31.47	7.21	34.63	-4.05
4	4882.00	47.0 PK	74.00	-27.00	1.31V	51	42.90	31.47	7.21	34.63	-4.05

#### 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 Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.00	95.7 PK	-	-	1.00H	64	63.14	27.54	5.06	0.00	-32.59
2	*2480.00	79.6 AV	-	-	1.00H	64	47.00	27.54	5.06	0.00	-32.59
3	4960.00	35.9 AV	54.00	-18.1	1.24H	209	31.73	31.55	7.26	34.61	-4.21
4	4960.00	46.4 PK	74.00	-27.6	1.24H	209	42.19	31.55	7.26	34.61	-4.21

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (DbuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.00	77.5 AV	-	-	1.23V	58	44.92	27.54	5.06	0.00	-32.59
2	*2480.00	94.0 PK	-	-	1.23V	58	61.40	27.54	5.06	0.00	-32.59
3	4960.00	47.2 PK	74.00	-26.80	1.38V	54	43.00	31.55	7.26	34.61	-4.21
4	4960.00	36.3 AV	54.00	-17.70	1.38V	54	32.10	31.55	7.26	34.61	-4.21

#### 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.

## 4.7.6 TEST RESULTS (B)

**Digital Portion:**

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	80.00	18.3 QP	40.00	-21.70	1.54H	337	9.85	7.33	1.12	0.00	-8.45
2	128.00	14.0 QP	43.50	-29.50	1.66H	262	1.40	11.37	1.23	0.00	-12.60
3	144.00	16.0 QP	43.50	-27.50	1.39H	185	4.14	10.58	1.28	0.00	-11.86
4	208.00	25.7 QP	43.50	-17.80	1.34H	114	14.86	9.40	1.45	0.00	-10.84
5	224.00	24.3 QP	46.00	-21.70	1.56H	70	12.34	10.41	1.56	0.00	-11.96
6	240.00	17.0 QP	46.00	-29.00	1.16H	144	3.92	11.41	1.67	0.00	-13.08
7	300.00	25.8 QP	46.00	-20.20	1.11H	224	10.74	13.18	1.88	0.00	-15.06
8	320.00	23.3 QP	46.00	-22.70	1.06H	316	7.70	13.62	1.98	0.00	-15.61
9	336.00	17.5 QP	46.00	-28.50	1.12H	3	1.53	13.92	2.05	0.00	-15.98
10	460.00	20.7 QP	46.00	-25.30	1.55H	138	1.80	16.53	2.37	0.00	-18.91
11	600.00	20.7 QP	46.00	-25.30	1.06H	193	-0.76	18.61	2.85	0.00	-21.46
12	915.00	24.4 QP	46.00	-21.60	1.86H	110	-0.22	20.92	3.69	0.00	-24.62

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	80.00	28.8 QP	40.00	-11.20	1.43V	100	20.35	7.33	1.12	0.00	-8.45
2	160.00	23.4 QP	43.50	-20.10	1.30V	36	12.40	9.62	1.38	0.00	-11.00
3	216.00	25.9 QP	43.50	-17.60	1.37V	35	14.42	9.97	1.51	0.00	-11.48
4	240.00	24.4 QP	46.00	-21.60	1.65V	143	11.32	11.41	1.67	0.00	-13.08
5	320.00	15.9 QP	46.00	-30.10	1.23V	36	0.30	13.62	1.98	0.00	-15.60
6	336.00	20.4 QP	46.00	-25.60	1.60V	291	4.43	13.92	2.05	0.00	-15.98
7	360.00	21.5 QP	46.00	-24.50	1.54V	321	4.79	14.58	2.13	0.00	-16.72
8	384.00	17.7 QP	46.00	-28.30	1.39V	161	0.05	15.50	2.15	0.00	-17.66
9	432.00	24.5 QP	46.00	-21.50	1.83V	105	5.94	16.28	2.28	0.00	-18.57
10	460.00	33.8 QP	46.00	-12.20	1.18V	218	14.90	16.53	2.37	0.00	-18.90
11	528.00	21.3 QP	46.00	-24.70	1.08V	306	1.06	17.62	2.62	0.00	-20.24
12	720.00	21.9 QP	46.00	-24.10	1.48V	177	-1.06	19.68	3.28	0.00	-22.96

**RF Portion :**

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2402.00	93.9 PK	-	-	1.13H	59	61.68	27.11	5.10	0.00	-32.21
2	*2402.00	76.6 AV	-	-	1.13H	59	44.37	27.11	5.10	0.00	-32.21
3	4802.00	34.5 AV	54.00	-19.50	1.23H	70	30.48	31.38	7.27	34.64	-4.01
4	4802.00	45.9 PK	74.00	-28.10	1.23H	70	41.89	31.38	7.27	34.64	-4.01

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2402.00	91.6 PK	-	-	1.01V	18	59.40	27.11	5.10	0.00	-32.21
2	*2402.00	75.5 AV	-	-	1.01V	18	43.30	27.11	5.10	0.00	-32.21
3	4802.00	45.8 PK	74.00	-28.20	1.05V	69	41.82	31.38	7.27	34.64	-4.01
4	4802.00	34.4 AV	54.00	-19.60	1.05V	69	30.37	31.38	7.27	34.64	-4.01

**NOTE:**

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



<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2441.00	76.8 AV	-	-	1.09H	89	44.37	27.33	5.08	0.00	-32.40
2	*2441.00	94.8 PK	-	-	1.09H	89	62.42	27.33	5.08	0.00	-32.40
3	4882.00	45.6 PK	74.00	-28.40	1.18H	63	41.50	31.47	7.21	34.63	-4.05
4	4882.00	34.8 AV	54.00	-19.20	1.18H	63	30.79	31.47	7.21	34.63	-4.05

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2441.00	93.6 PK	-	-	1.11H	60	61.17	27.33	5.08	0.00	-32.40
2	*2441.00	76.9 AV	-	-	1.11H	60	44.45	27.33	5.08	0.00	-32.40
3	4882.00	35.7 AV	54.00	-18.30	1.02H	73	31.63	31.47	7.21	34.63	-4.05
4	4882.00	46.5 PK	74.00	-27.50	1.02H	73	42.40	31.47	7.21	34.63	-4.05

#### NOTE:

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

<b>EUT</b>	Bluetooth Module	<b>MODEL</b>	BT-0002M
<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>	30 deg. C, 70%RH, 1050 hPa	<b>TESTED BY:</b> Bunny Yao	

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.00	96.1 PK	-	-	1.19H	109	63.54	27.54	5.06	0.00	-32.59
2	*2480.00	80.3 AV	-	-	1.19H	109	47.75	27.54	5.06	0.00	-32.59
3	4960.00	35.1 AV	54.00	-18.90	1.30H	79	30.89	31.55	7.26	34.61	-4.21
4	4960.00	46.0 PK	74.00	-28.00	1.30H	79	41.75	31.55	7.26	34.61	-4.21

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

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (DbuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	*2480.00	94.7 PK	-	-	1.10V	48	62.14	27.54	5.06	0.00	-32.59
2	*2480.00	79.0 AV	-	-	1.10V	48	46.38	27.54	5.06	0.00	-32.59
3	4960.00	46.5 PK	74.00	-27.50	1.18V	147	42.26	31.55	7.26	34.61	-4.21
4	4960.00	35.3 AV	54.00	-18.70	1.18V	147	31.10	31.55	7.26	34.61	-4.21

#### NOTE:

6. Emission level = Raw value - Correction Factor
7. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
8. Margin value = Emission level - Limit value
9. " \* " : Fundamental frequency
10. 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 17, 2002

#### 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

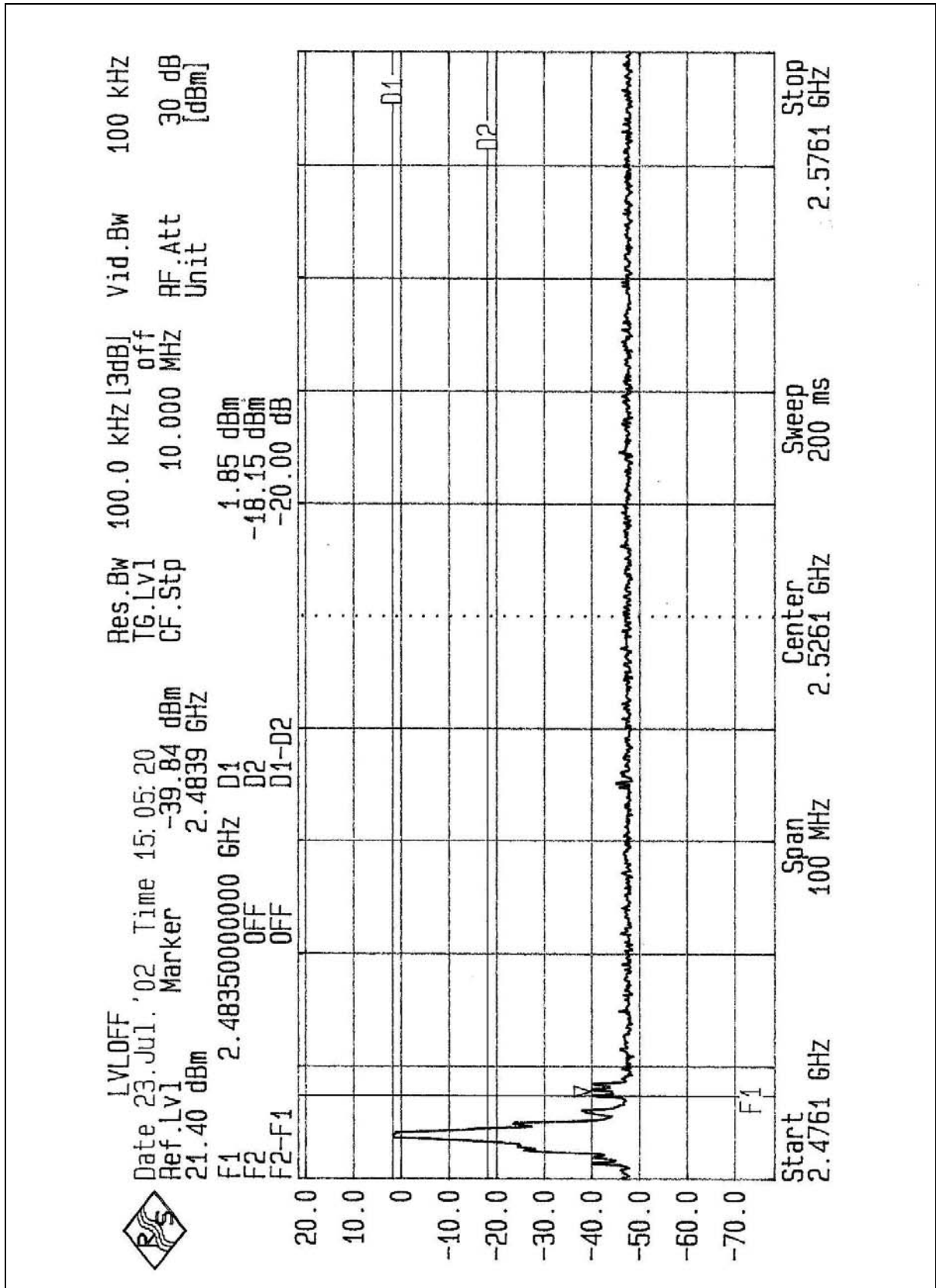
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

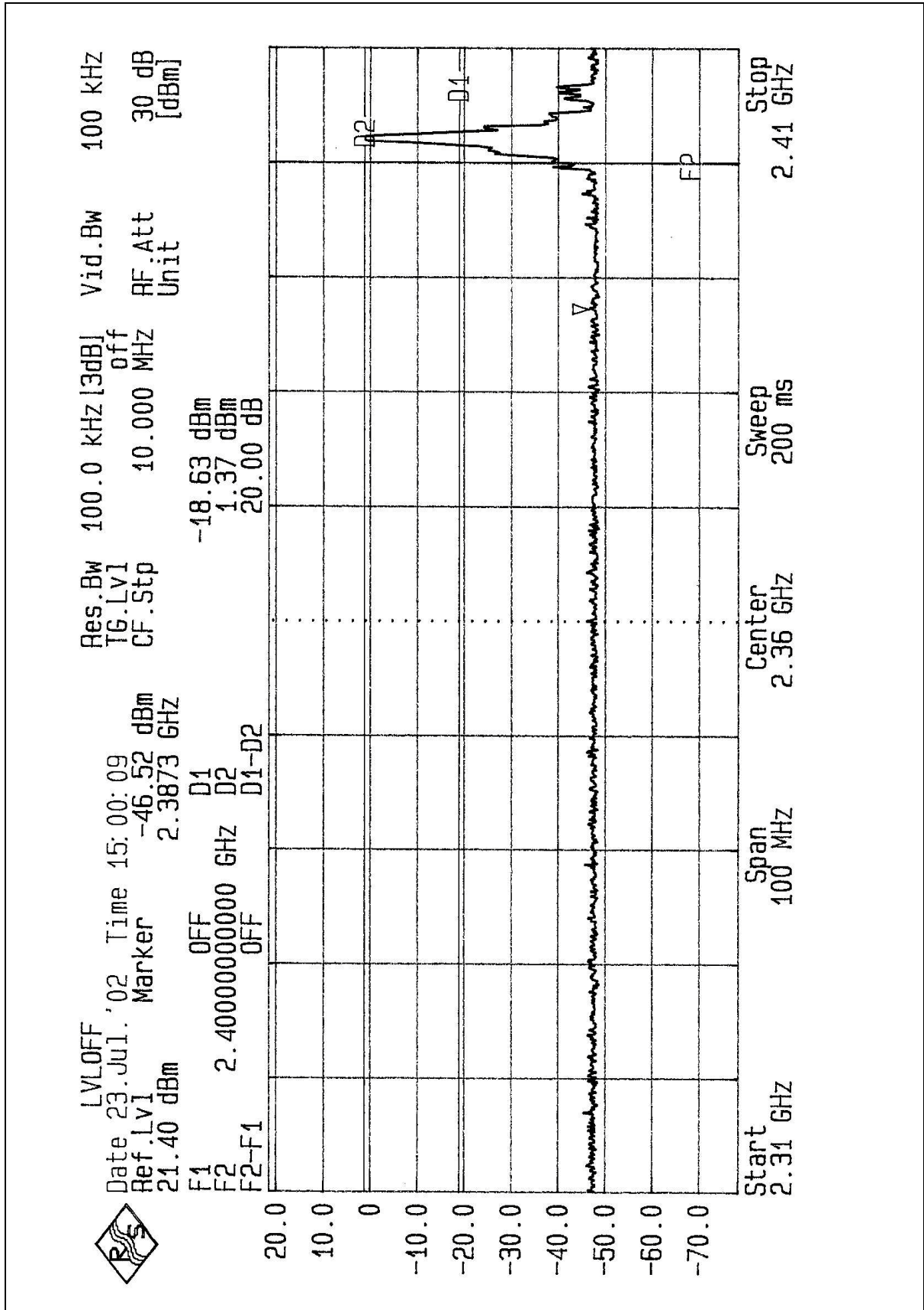
#### 4.8.5 TEST RESULTS

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).

**NOTE1:** The band edge emission plot on the following first page shows 41.69dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.7.6 is 80.3dBuV/m, so the maximum field strength in restrict band is  $80.3 - 41.69 = 38.61$  dBuV/m which is under 54 dBuV/m limit.

**NOTE2:** The band edge emission plot on the following second page shows 47.89dB delta between carrier maximum power and local maximum emission in restrict band (2.3873GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.7.6 is 76.6dBuV/m, so the maximum field strength in restrict band is  $76.6 - 47.89 = 28.71$  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 Inverted F Antenna and Printed dipole Antenna. The antenna connector is UFL. The maximum Gain of this antenna is only -2dBi.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

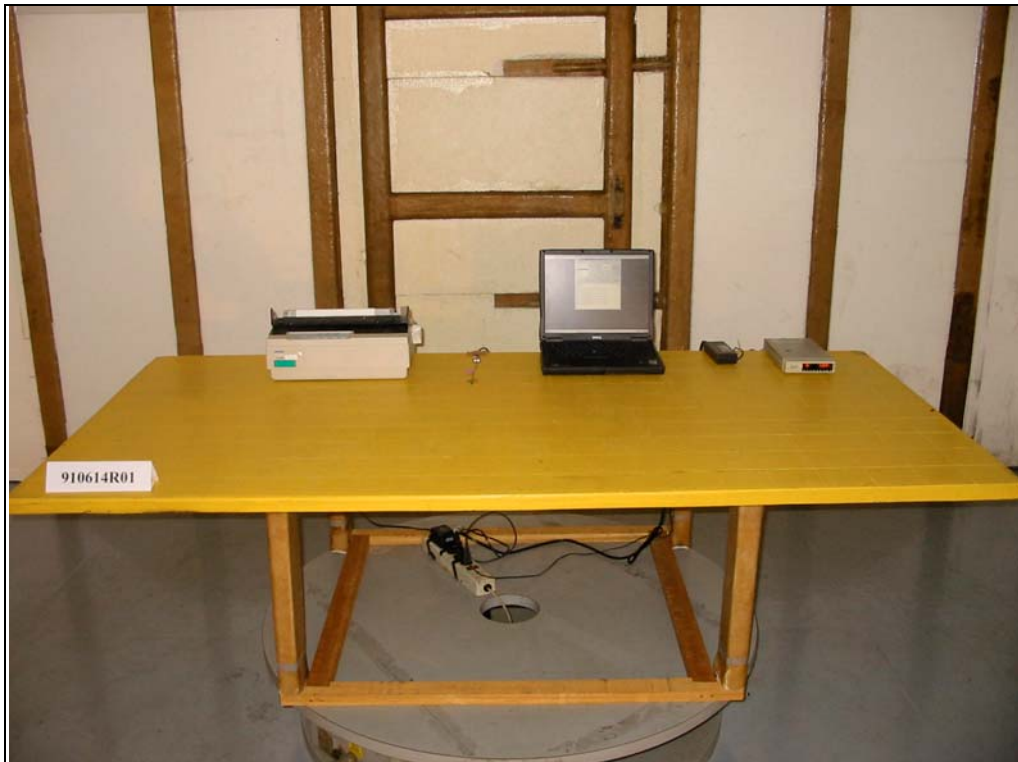
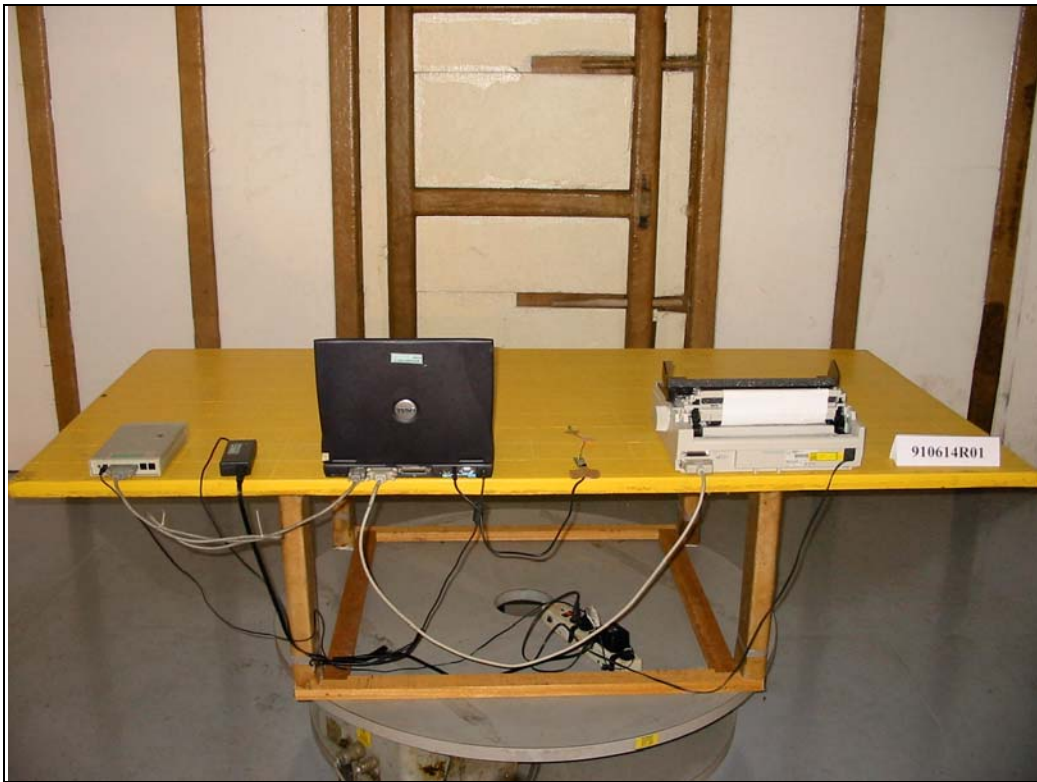
### CONDUCTED EMISSION TEST







### 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).

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