

FCC TEST REPORT

REPORT NO.: RF911115R03

MODEL NO.: BT-0002M-1

RECEIVED: Nov. 15, 2002

TESTED: Nov. 20 ~ Nov. 28, 2002

APPLICANT: CC&C TECHNOLOGIES INC.

ADDRESS: 8F, 150, Jian Yi Road, Chung Ho City, Taipei,
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ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei,
Taiwan, R.O.C.

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0528
ILAC MRA



Lab Code: 200102-0



TABLE OF CONTENTS

1	CERTIFICATION	4
2	SUMMARY OF TEST RESULTS.....	5
3	GENERAL INFORMATION	6
3.1	GENERAL DESCRIPTION OF EUT.....	6
3.2	DESCRIPTION OF TEST MODES.....	7
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	7
3.4	DESCRIPTION OF SUPPORT UNITS.....	8
4	TEST PROCEDURES AND RESULTS	9
4.1	CONDUCTED EMISSION MEASUREMENT.....	9
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	9
4.1.2	TEST INSTRUMENTS.....	9
4.1.3	TEST PROCEDURES	10
4.1.4	TEST SETUP	10
4.1.5	TEST RESULTS.....	11
4.2	NUMBER OF HOPPING FREQUENCY USED.....	17
4.2.1	LIMIT OF HOPPING FREQUENCY USED.....	17
4.2.2	TEST INSTRUMENTS.....	17
4.2.3	TEST PROCEDURES	18
4.2.4	TEST SETUP	18
4.2.5	TEST RESULTS	18
4.3	DWELL TIME ON EACH CHANNEL.....	21
4.3.1	LIMIT OF DWELL TIME USED.....	21
4.3.2	TEST INSTRUMENTS.....	21
4.3.3	TEST PROCEDURES	22
4.3.4	TEST SETUP	22
4.3.5	TEST RESULTS.....	23
4.4	CHANNEL BANDWIDTH.....	27
4.4.1	LIMITS OF CHANNEL BANDWIDTH	27
4.4.2	TEST INSTRUMENTS.....	27
4.4.3	TEST PROCEDURE.....	28
4.4.4	TEST SETUP	28
4.4.5	EUT OPERATING CONDITION.....	28
4.4.6	TEST RESULTS.....	29
4.5	HOPPING CHANNEL SEPARATION	33
4.5.1	LIMIT OF HOPPING CHANNEL SEPARATION	33
4.5.2	TEST INSTRUMENTS.....	33
4.5.3	TEST PROCEDURES	34



4.5.4	TEST SETUP	34
4.5.5	TEST RESULTS.....	34
4.6	MAXIMUM PEAK OUTPUT POWER	38
4.6.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	38
4.6.2	INSTRUMENTS	38
4.6.3	TEST PROCEDURES	39
4.6.4	TEST SETUP	39
4.6.5	EUT OPERATING CONDITION.....	39
4.6.6	TEST RESULTS.....	40
4.7	RADIATED EMISSION MEASUREMENT	44
4.7.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	44
4.7.2	TEST INSTRUMENTS	45
4.7.3	TEST PROCEDURES	46
4.7.4	TEST SETUP	47
4.7.5	TEST RESULTS (A).....	48
4.7.6	TEST RESULTS (B).....	53
4.7.7	TEST RESULTS (C).....	58
4.8	BAND EDGES MEASUREMENT	63
4.8.1	LIMITS OF BAND EDGES MEASUREMENT.....	63
4.8.2	TEST INSTRUMENTS	63
4.8.3	TEST PROCEDURE	63
4.8.4	EUT OPERATING CONDITION.....	64
4.8.5	TEST RESULTS.....	64
4.9	ANTENNA REQUIREMENT	67
4.9.1	STANDARD APPLICABLE.....	67
4.9.2	ANTENNA CONNECTED CONSTRUCTION	67
5	PHOTOGRAPHS OF THE TEST CONFIGURATION	68
6	INFORMATION ON THE TESTING LABORATORIES.....	72



1 CERTIFICATION

PRODUCT : Bluetooth Module
BRAND NAME : CC&C
MODEL NO. : BT-0002M-1
APPLICANT : CC&C TECHNOLOGIES INC.
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247),
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Nov. 20 ~ Nov. 28, 2002. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY: Rennie Wang, **DATE:** November 29, 2002
Rennie Wang

APPROVED BY: Alan Lane, **DATE:** November 29, 2002
Dr. Alan Lane
Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission Limit: 48dBuV	PASS	Meet the requirement of limit Minimum passing margin is -16.70dBuV at 0.17MHz
15.247(a)(1)(I)-(ii)	Number of Hopping Frequency Used Spec.: At least 75 channels	PASS	Meet the requirement of limit
15.247(a)(1)(ii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 30 second	PASS	Meet the requirement of limit
15.247(a)(1)(I)-(ii)	Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth	PASS	Meet the requirement of limit
15.247(a)(2)	Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System Spec.: Max. 1 MHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Spec.: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -5.60dBuV at 9920.00MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth Module
MODEL NO.	BT-0002M-1
POWER SUPPLY	5.0VDC from host equipment
MODULATION TYPE	FHSS (GFSK)
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	2.65dBm
ANTENNA TYPE	Patch, Printed and Printed Monopole
DATA CABLE	NA
I/O PORTS	USB port
ASSOCIATED DEVICES	NA

NOTE:

1. There are three antenna types provided to this EUT.
2. The details about three antennas:

	ANTENNA TYPE	ANTENNA GAIN
1	Patch	3dBi
2	Printed	2dBi
3	Printed Monopole	2dBi

3. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.



3.2 DESCRIPTION OF TEST MODES

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

For “Radiated Emission Measurement” test, there are three test results for the test: The test result A is for Patch antenna, the test result B is for Printed antenna and the test result C is for Printed Monopole antenna.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth Module. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR 47 Part 15, Subpart C. (15.247)
ANSI C63.4 : 1992

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	IBM	TYPE 1161-41T	AA-G0R37 00/10	FCC DoC APPROVED
2	PRINTER	EPSON	LQ-300+	DCGY017096	FCC DoC APPROVED
3	MODEM	ACEEX	1414	980020569	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.

NOTE: All power cords of the above support units are non shielded (1.8m).

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	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. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

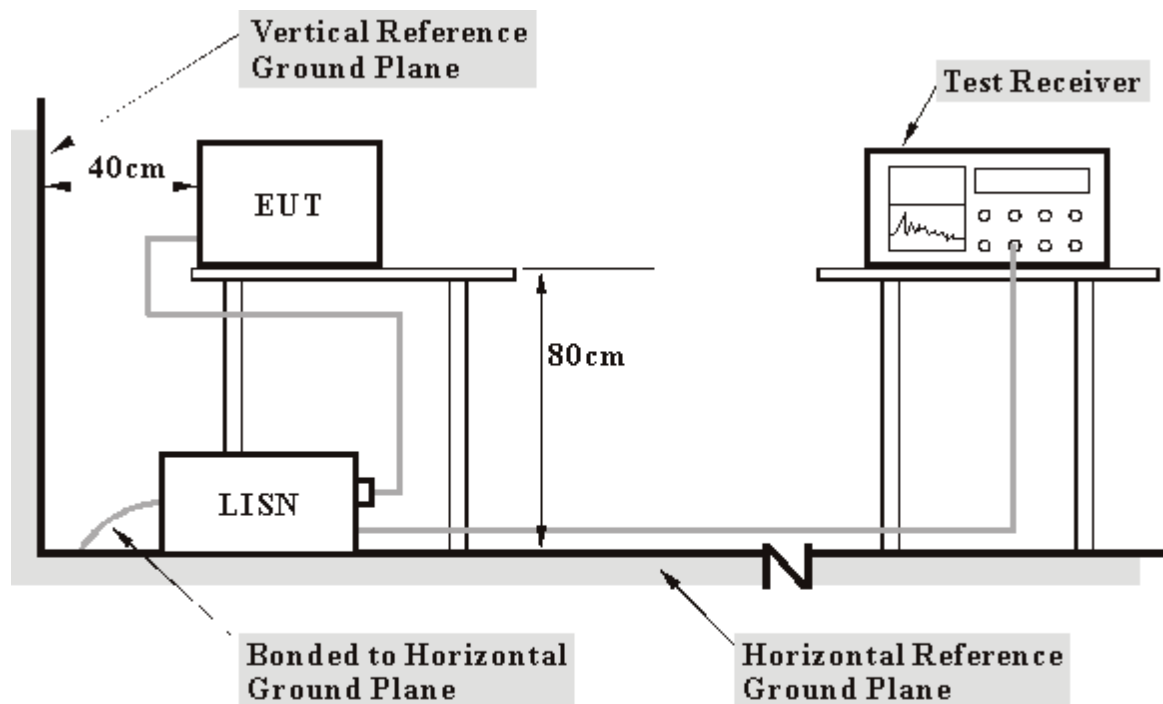
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 3, 2003
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 2, 2003
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Dec. 10, 2002
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 2, 2002
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 2, 2003
Software	Cond-V2L	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C02.01	July 5, 2003
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2003
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2003
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	NA

- 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 conducted telecom port test only (if tested).
3. The test was performed in ADT Open Site No. 2.

4.1.3 TEST PROCEDURES

- The EUT was placed 0.4 meters from the conducting wall of the shielded room 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/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



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

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

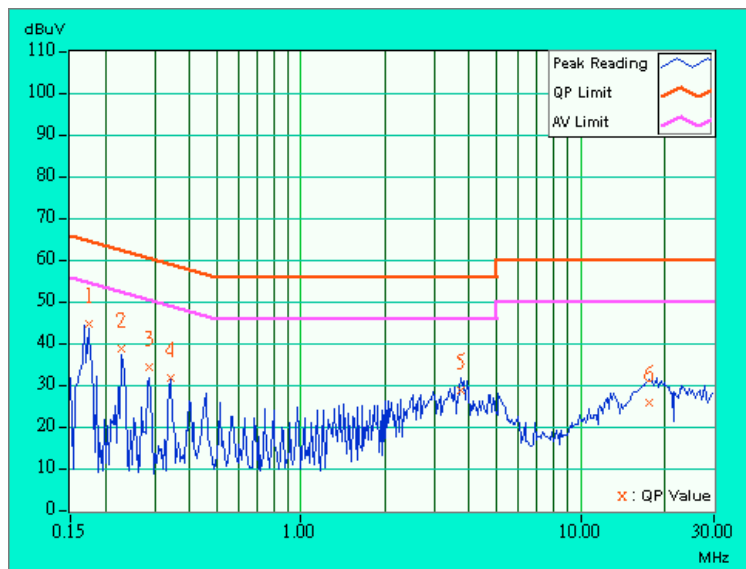
4.1.5 TEST RESULTS

EUT	Bluetooth Module	MODEL	BT-0002M-1
CHANNEL	0	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.174	0.10	43.85	-	43.95	-	64.77	54.77	-20.82	-
2	0.228	0.10	37.85	-	37.95	-	62.52	52.52	-24.57	-
3	0.285	0.10	33.21	-	33.31	-	60.67	50.67	-27.36	-
4	0.342	0.10	30.86	-	30.96	-	59.15	49.15	-28.19	-
5	3.717	0.27	27.67	-	27.94	-	56.00	46.00	-28.06	-
6	17.546	1.10	24.87	-	25.97	-	60.00	50.00	-34.03	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



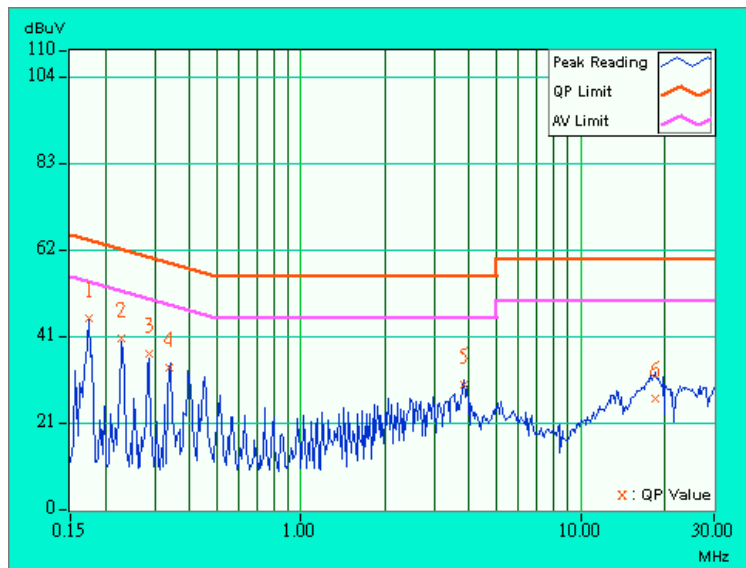


EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 0	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.174	0.10	45.05	-	45.15	-	64.77	54.77	-19.62	-
2	0.228	0.10	40.08	-	40.18	-	62.52	52.52	-22.34	-
3	0.285	0.10	36.48	-	36.58	-	60.67	50.67	-24.09	-
4	0.339	0.10	32.99	-	33.09	-	59.23	49.23	-26.14	-
5	3.821	0.28	29.12	-	29.40	-	56.00	46.00	-26.60	-
6	18.599	0.94	25.73	-	26.67	-	60.00	50.00	-33.33	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



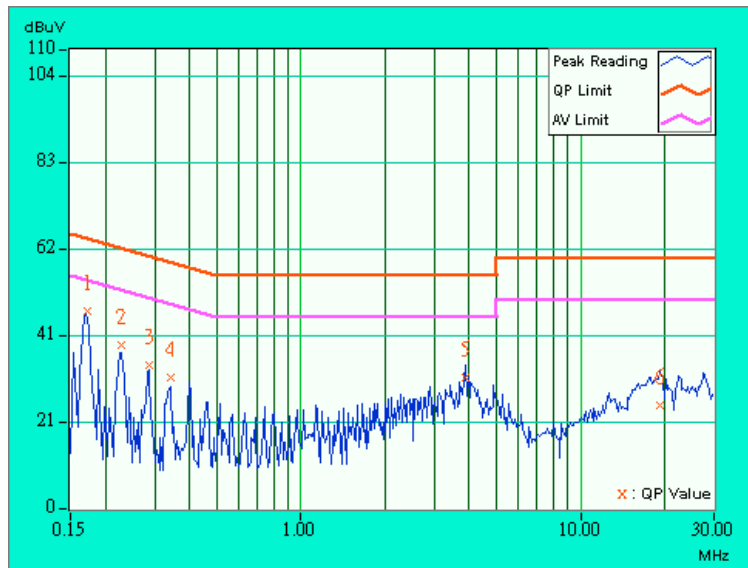


EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 39	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.172	0.10	46.28	-	46.38	-	64.87	54.87	-18.49	-
2	0.228	0.10	38.19	-	38.29	-	62.52	52.52	-24.23	-
3	0.286	0.10	33.13	-	33.23	-	60.65	50.65	-27.42	-
4	0.343	0.10	30.34	-	30.44	-	59.13	49.13	-28.69	-
5	3.876	0.29	30.48	-	30.77	-	56.00	46.00	-25.23	-
6	19.172	1.17	23.60	-	24.77	-	60.00	50.00	-35.23	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



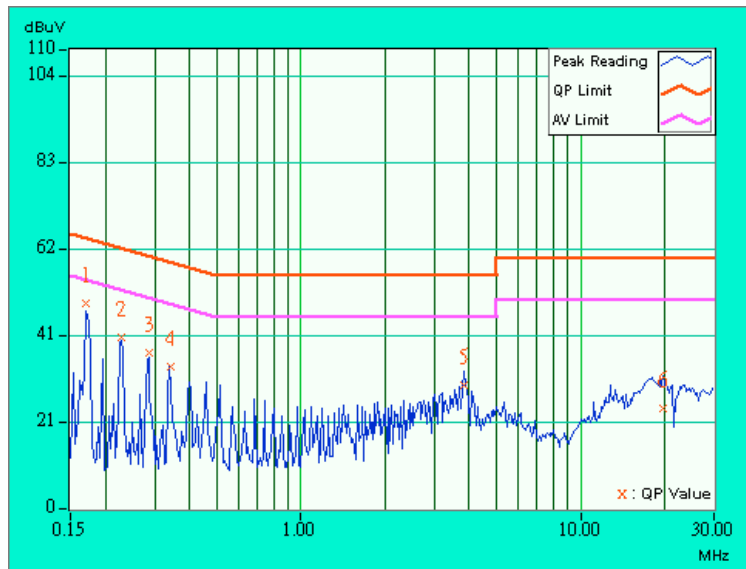


EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 39	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (Uv)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.171	0.10	48.11	-	48.21	-	64.91	54.91	-16.70	-
2	0.228	0.10	40.28	-	40.38	-	62.52	52.52	-22.14	-
3	0.286	0.10	36.40	-	36.50	-	60.65	50.65	-24.15	-
4	0.344	0.10	33.13	-	33.23	-	59.10	49.10	-25.87	-
5	3.822	0.28	28.49	-	28.77	-	56.00	46.00	-27.23	-
6	19.787	0.99	23.13	-	24.12	-	60.00	50.00	-35.88	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



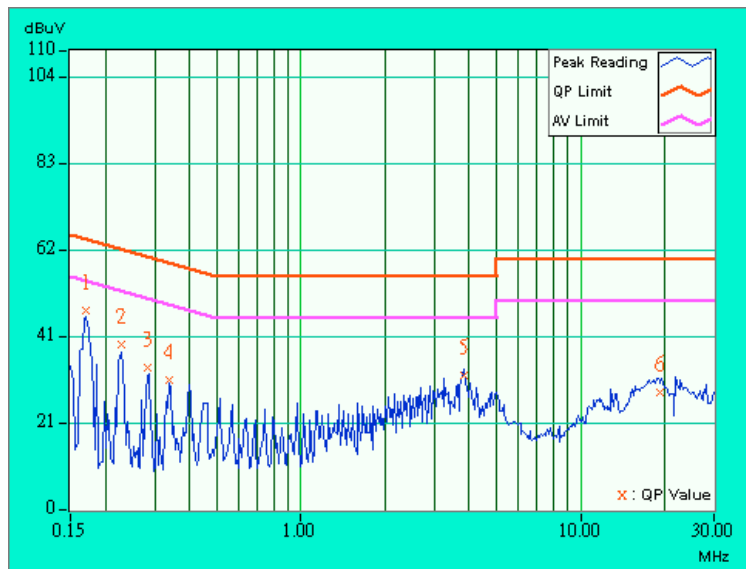


EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.171	0.10	46.58	-	46.68	-	64.91	54.91	-18.23	-
2	0.228	0.10	38.35	-	38.45	-	62.52	52.52	-24.07	-
3	0.282	0.10	32.73	-	32.83	-	60.76	50.76	-27.93	-
4	0.339	0.10	29.88	-	29.98	-	59.23	49.23	-29.25	-
5	3.816	0.28	31.04	-	31.32	-	56.00	46.00	-24.68	-
6	19.121	1.16	27.06	-	28.22	-	60.00	50.00	-31.78	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



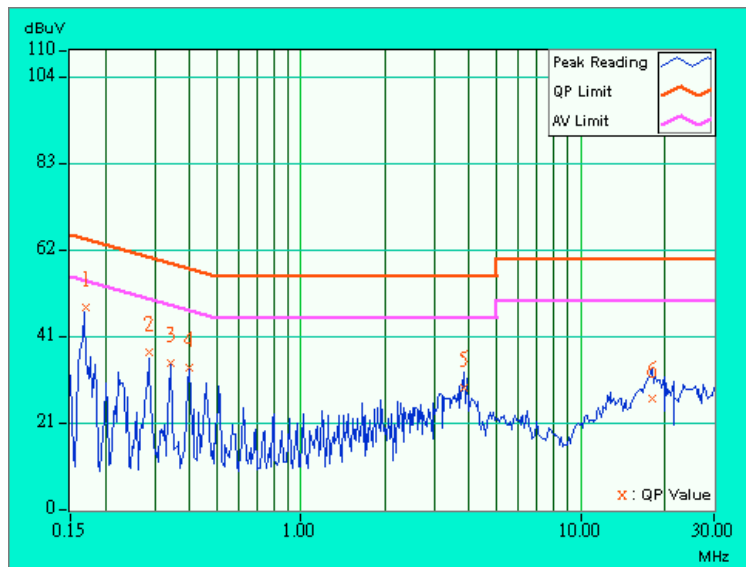


EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Netural (N)
ENVIRONMENTAL CONDITIONS	22 deg. C, 52%RH, 1005 hPa	TESTED BY: Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.171	0.10	47.77	-	47.87	-	64.93	54.93	-17.06	-
2	0.285	0.10	37.04	-	37.14	-	60.67	50.67	-23.53	-
3	0.342	0.10	34.37	-	34.47	-	59.15	49.15	-24.68	-
4	0.399	0.10	32.99	-	33.09	-	57.87	47.87	-24.78	-
5	3.816	0.28	28.16	-	28.44	-	56.00	46.00	-27.56	-
6	17.960	0.92	25.86	-	26.78	-	60.00	50.00	-33.22	-

NOTE:

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.





4.2 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 75 hopping frequencies, and should be equally spaced.

4.2.2 TEST INSTRUMENTS

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

4.2.3 TEST PROCEDURES

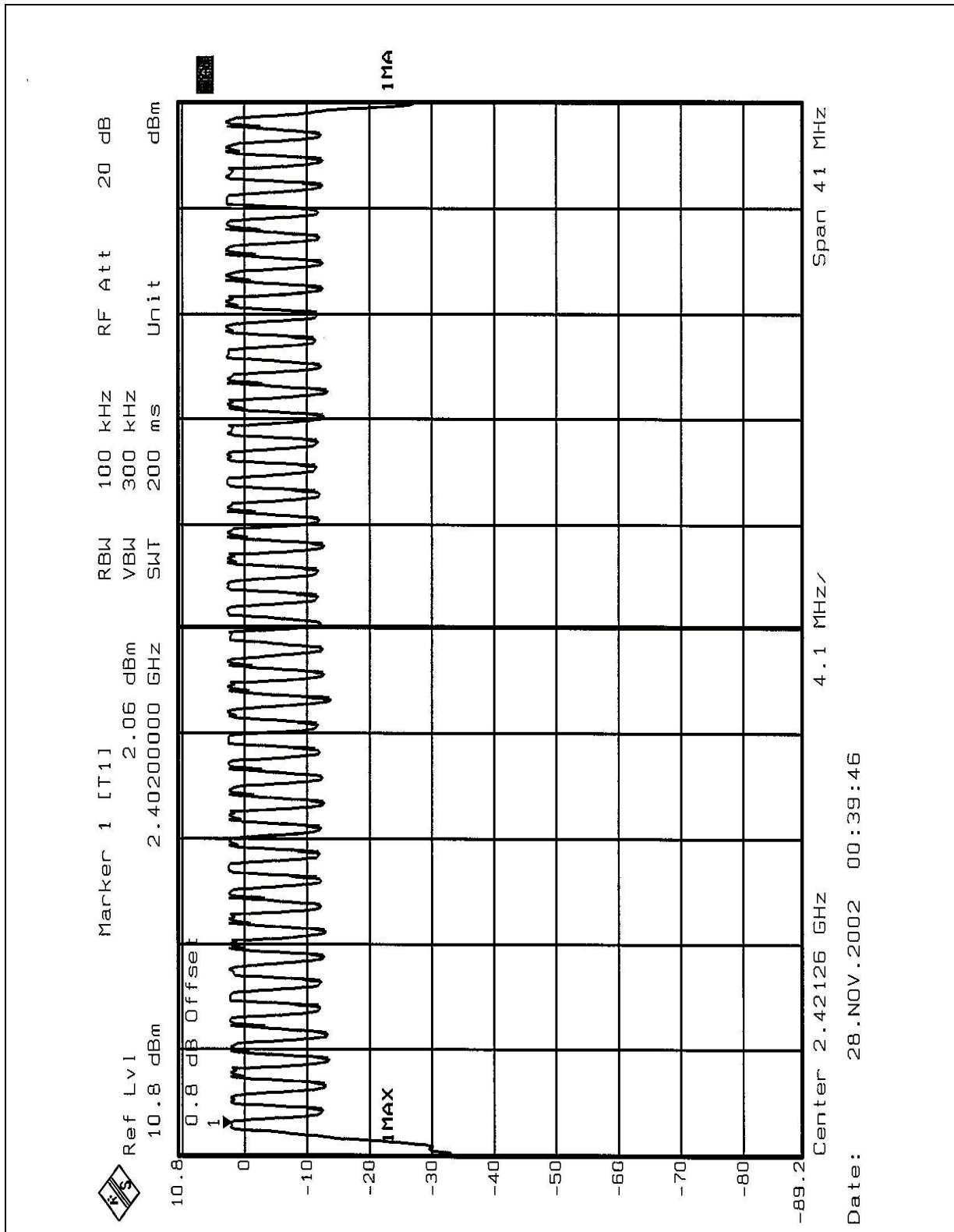
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

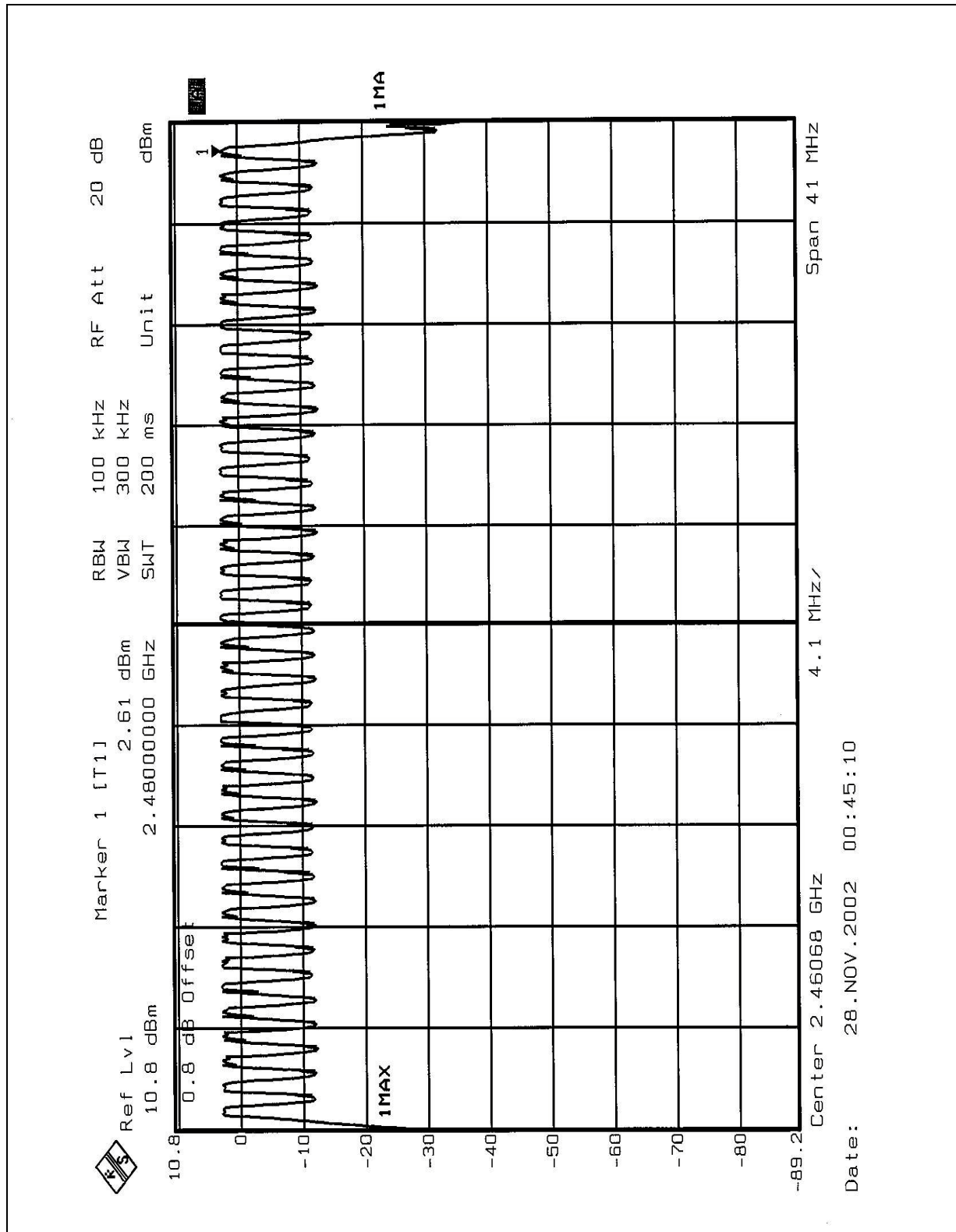
4.2.4 TEST SETUP



4.2.5 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.







4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

4.3.2 TEST INSTRUMENTS

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

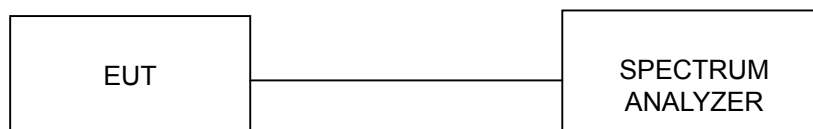
NOTES:

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

4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4 TEST SETUP





4.3.5 TEST RESULTS

CHANNEL	DWELL TIME
0	289.79ms
39	287.36ms
78	289.79ms

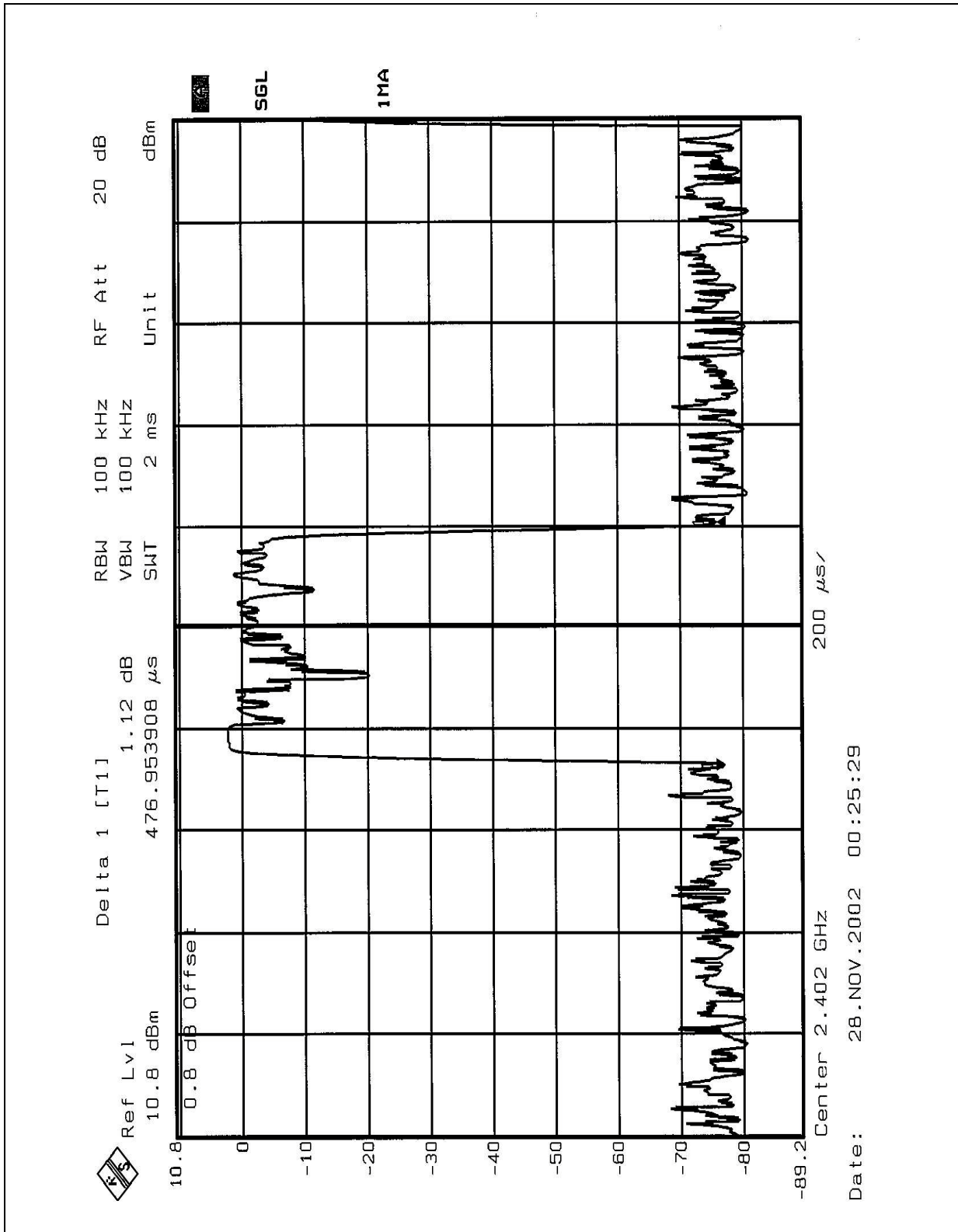
Note : This product is averagely hopped on 79 frequencies. The maximum hopping rate is 1600 hops/sec. The longest pulse duration is 460.92 μ sec.

So, the longest Dwell Time = $476.95 \mu \text{ sec} \times 1600 \div 79 \times 30 = 289.79 \text{ msec}$. which is smaller than 0.4sec.

Test plots of the transmitting time slot are shown on next three pages.

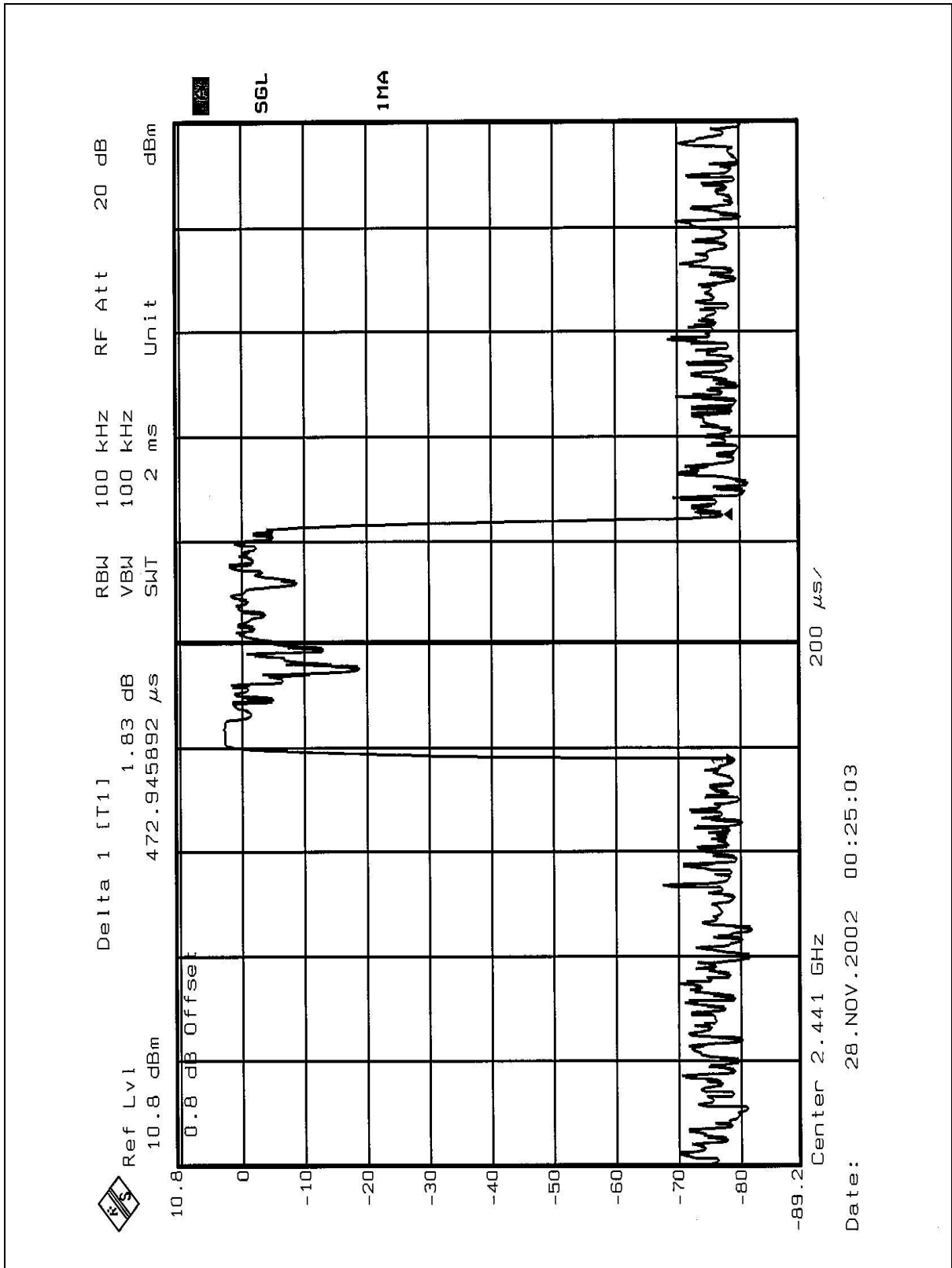


Channel 0



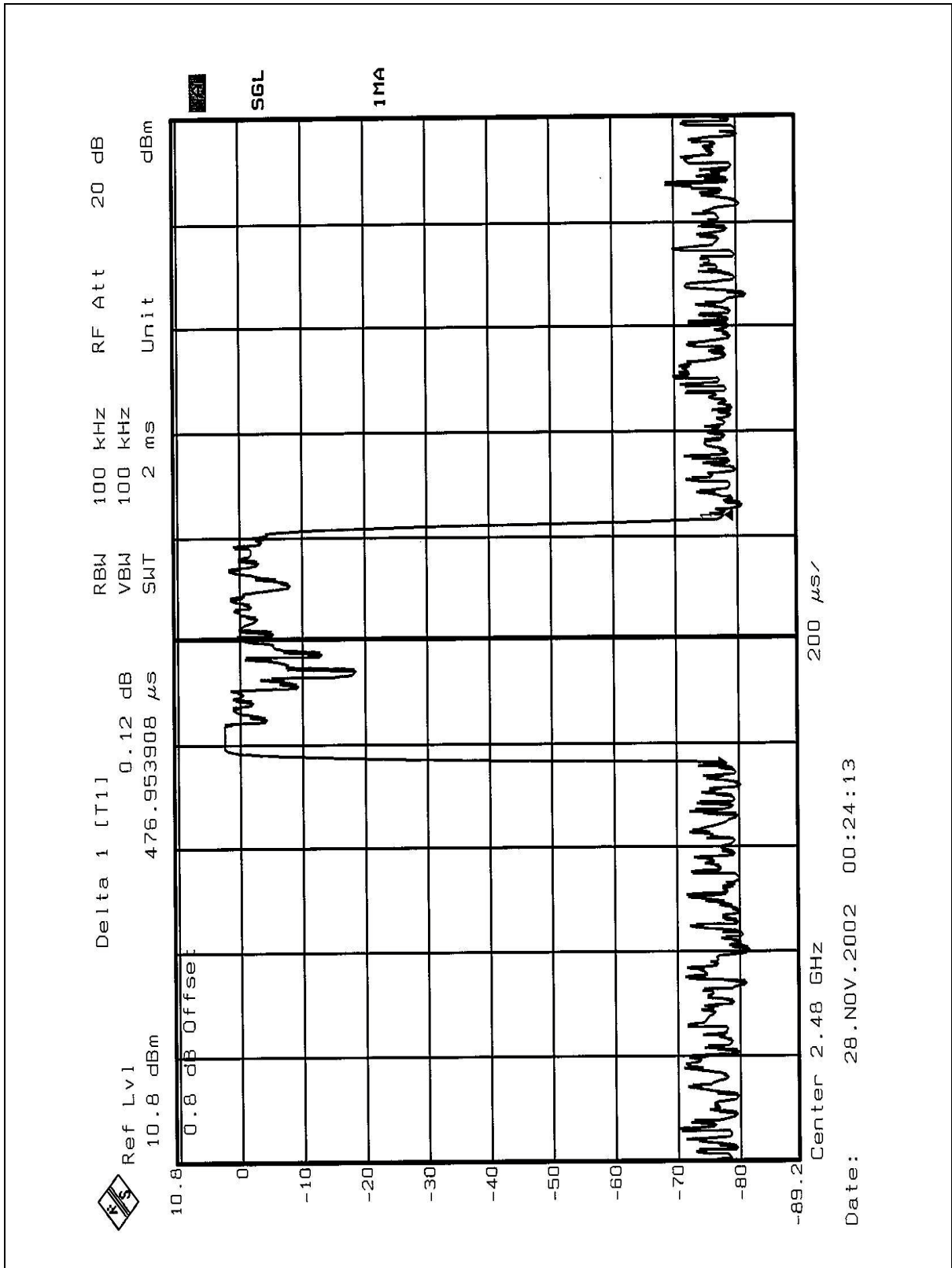


Channel 39





Channel 78





4.4 CHANNEL BANDWIDTH

4.4.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.4.2 TEST INSTRUMENTS

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

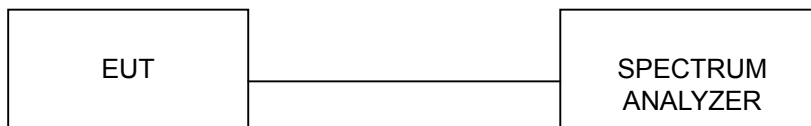
NOTES:

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

4.4.3 TEST PROCEDURE

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. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITION

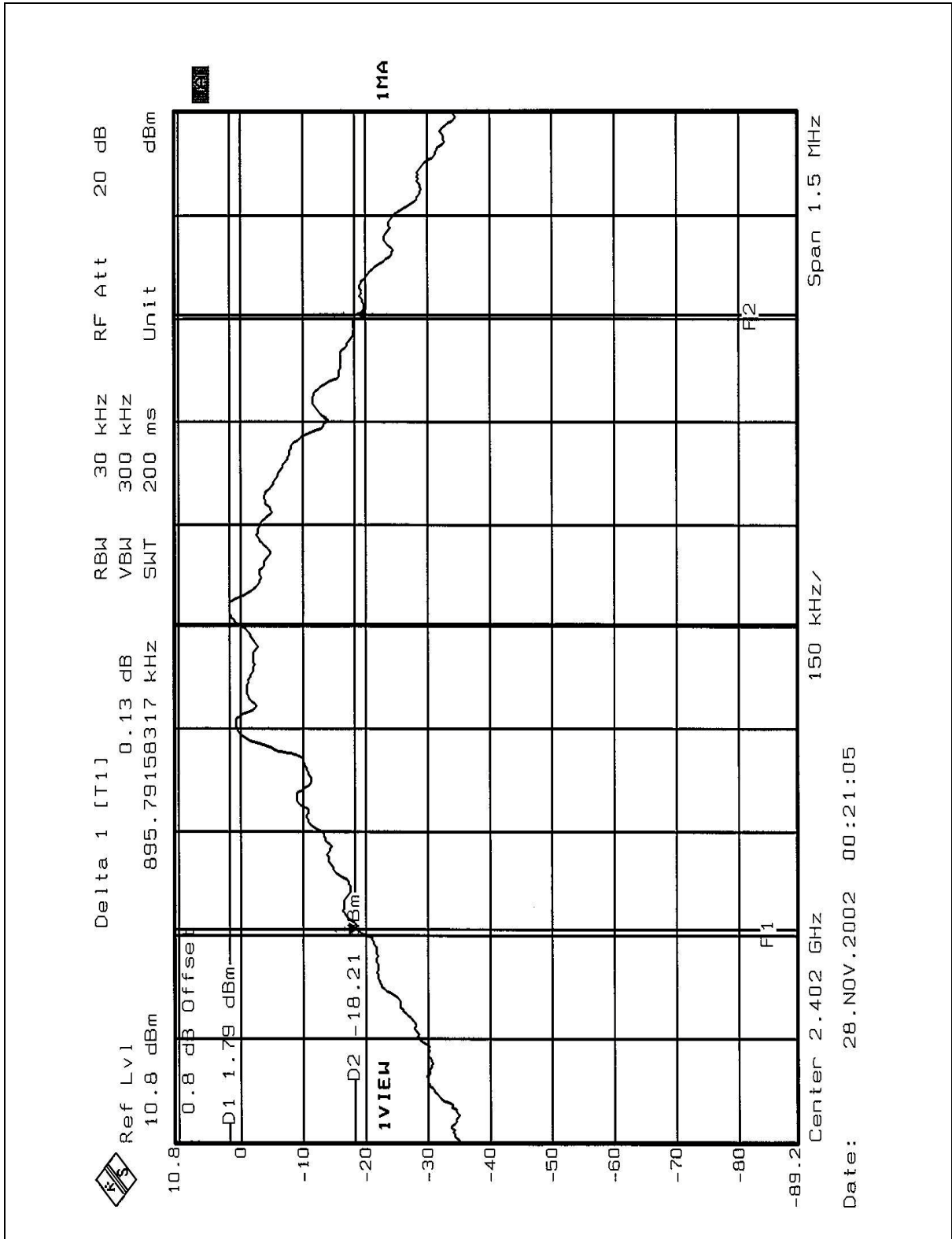
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.4.6 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20 dB BANDWIDTH (kHz)	MAXIMUM LIMIT (MHz)	PASS/FAIL
0	2402	895.791	1	PASS
39	2441	886.773	1	PASS
78	2480	892.785	1	PASS

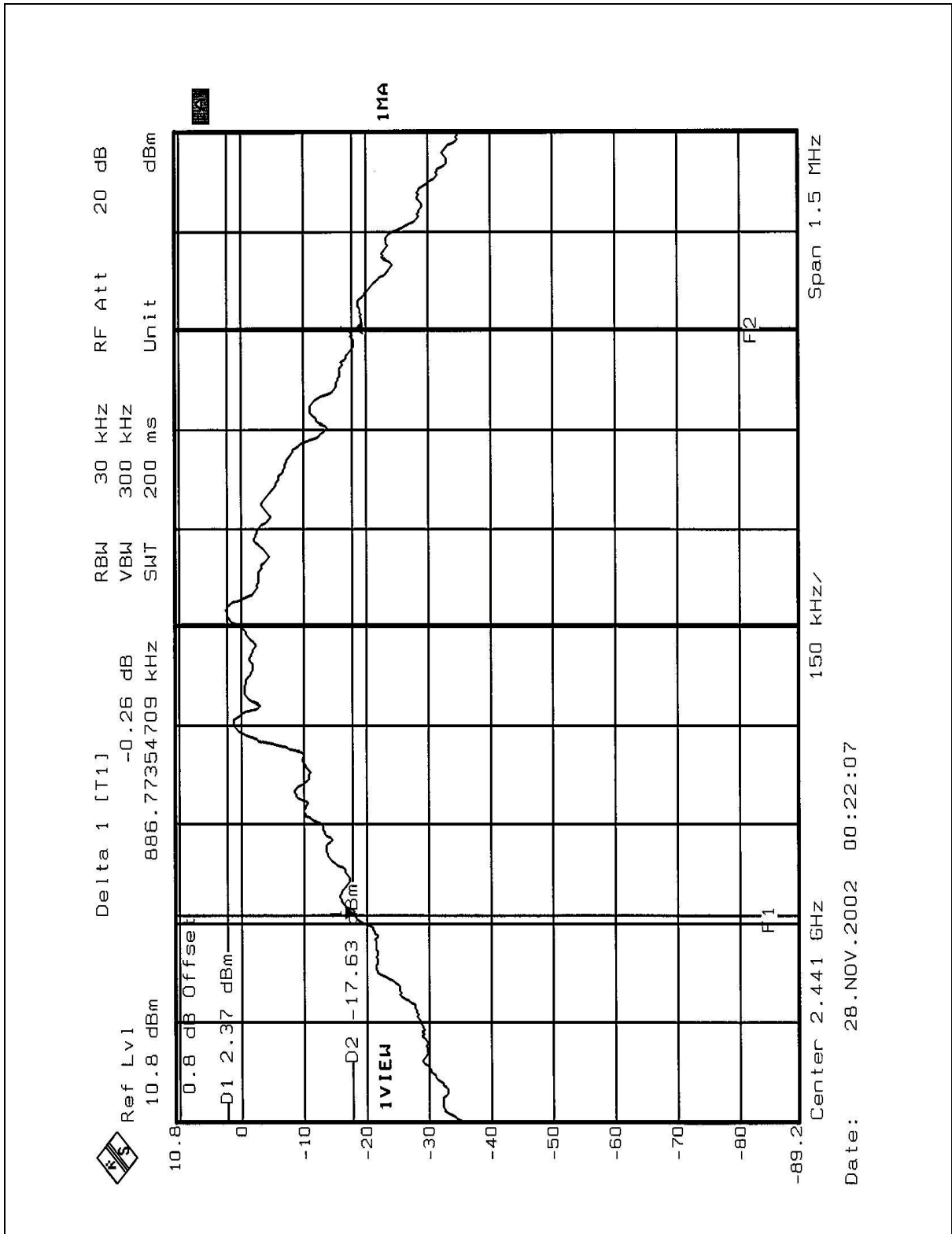


Channel 0



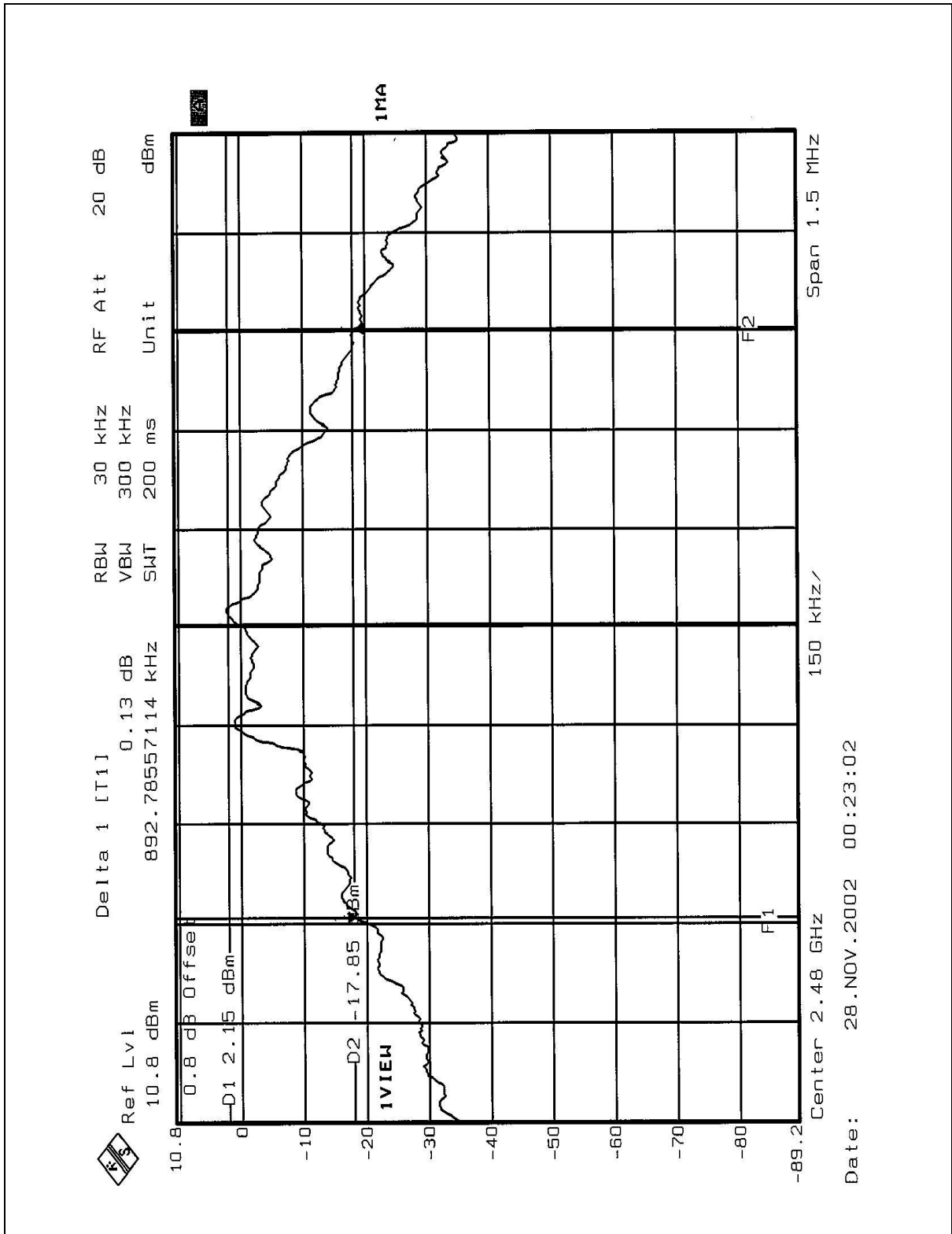


Channel 39





Channel 78



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 24, 2003

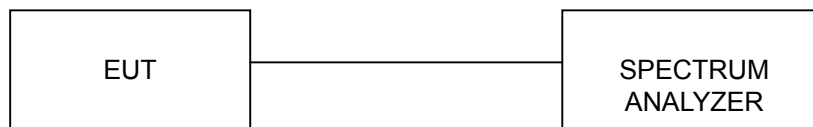
NOTES:

1. 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

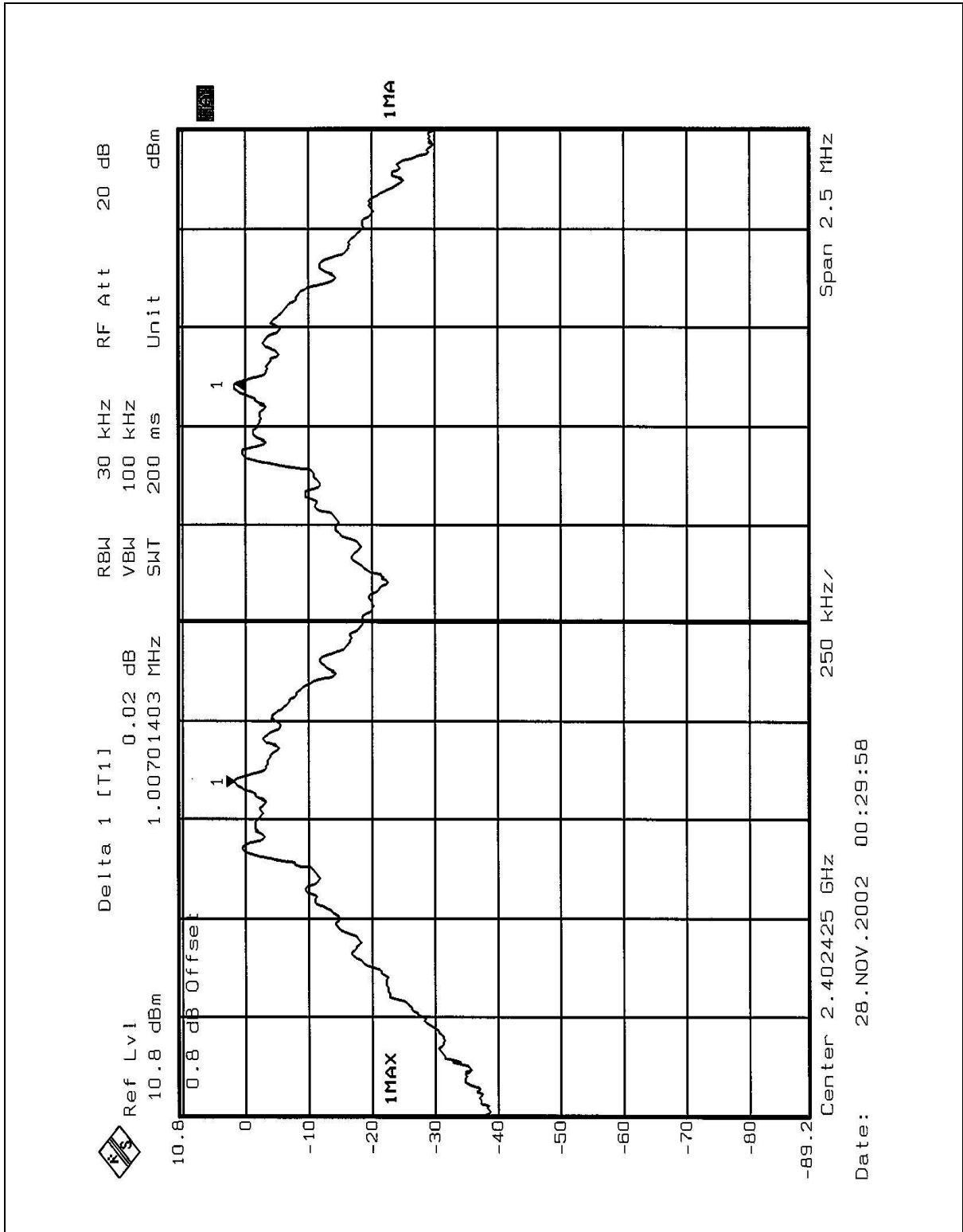
Data Mode:

Channel	Frequency (MHz)	Adjacent Channel Separation	Minimum Limit (kHz)	Pass / Fail
0	2402	1MHz	895.792	PASS
39	2441	1MHz	886.774	PASS
78	2480	1MHz	892.786	PASS

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

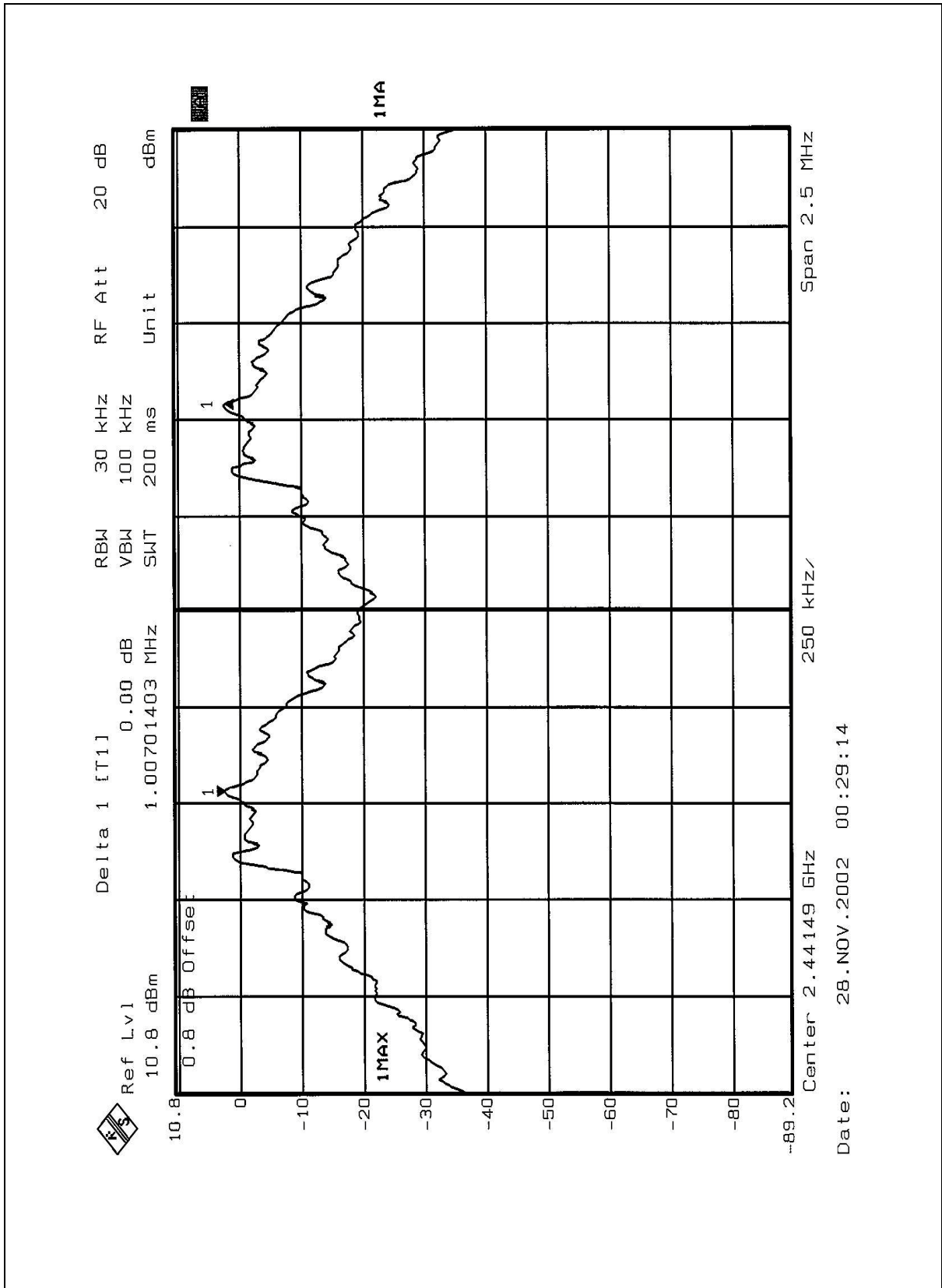


Channel 0



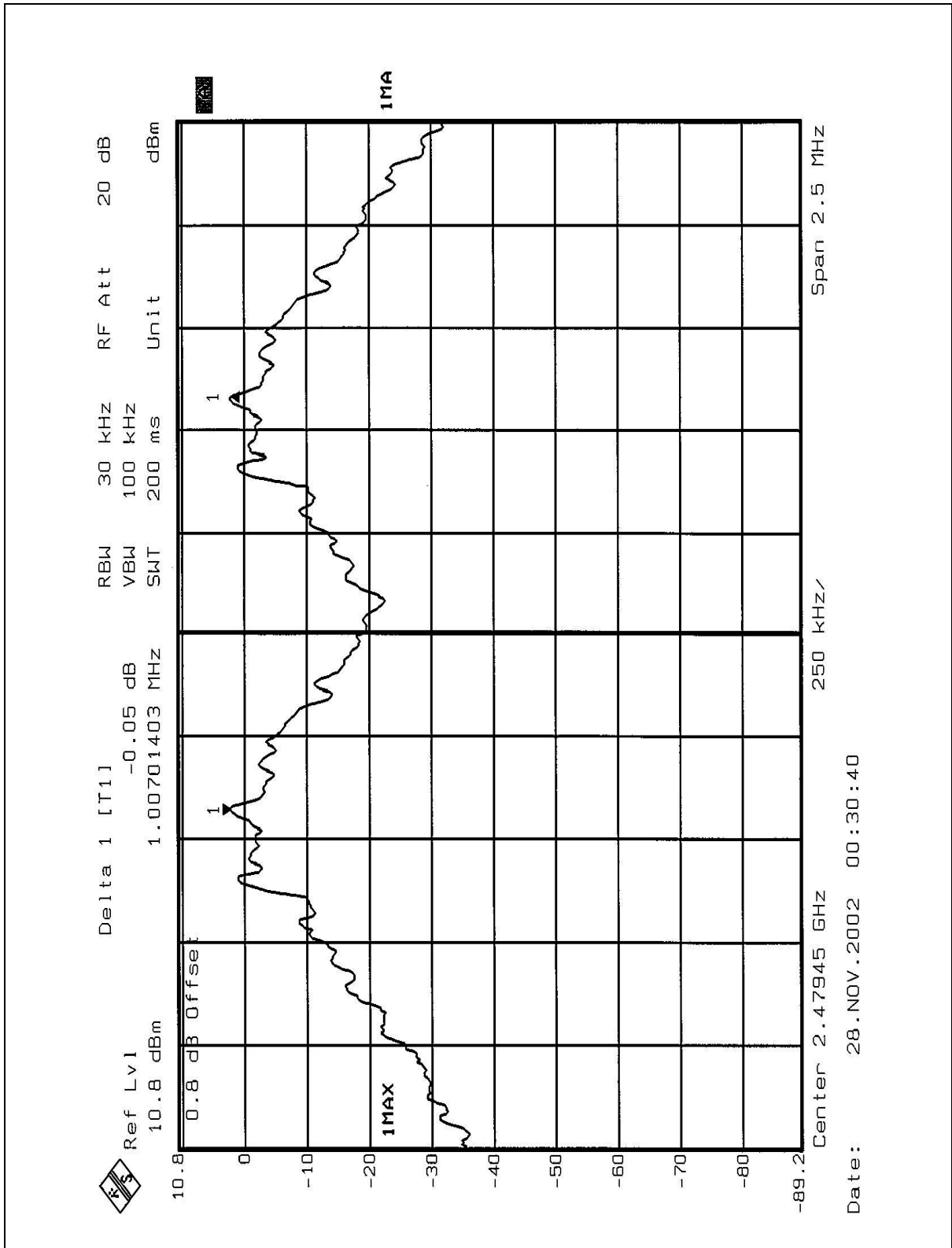


Channel 39





Channel 78



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 24, 2003

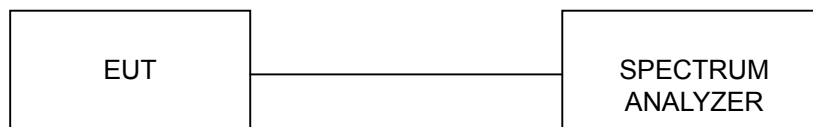
NOTES:

- 1.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.

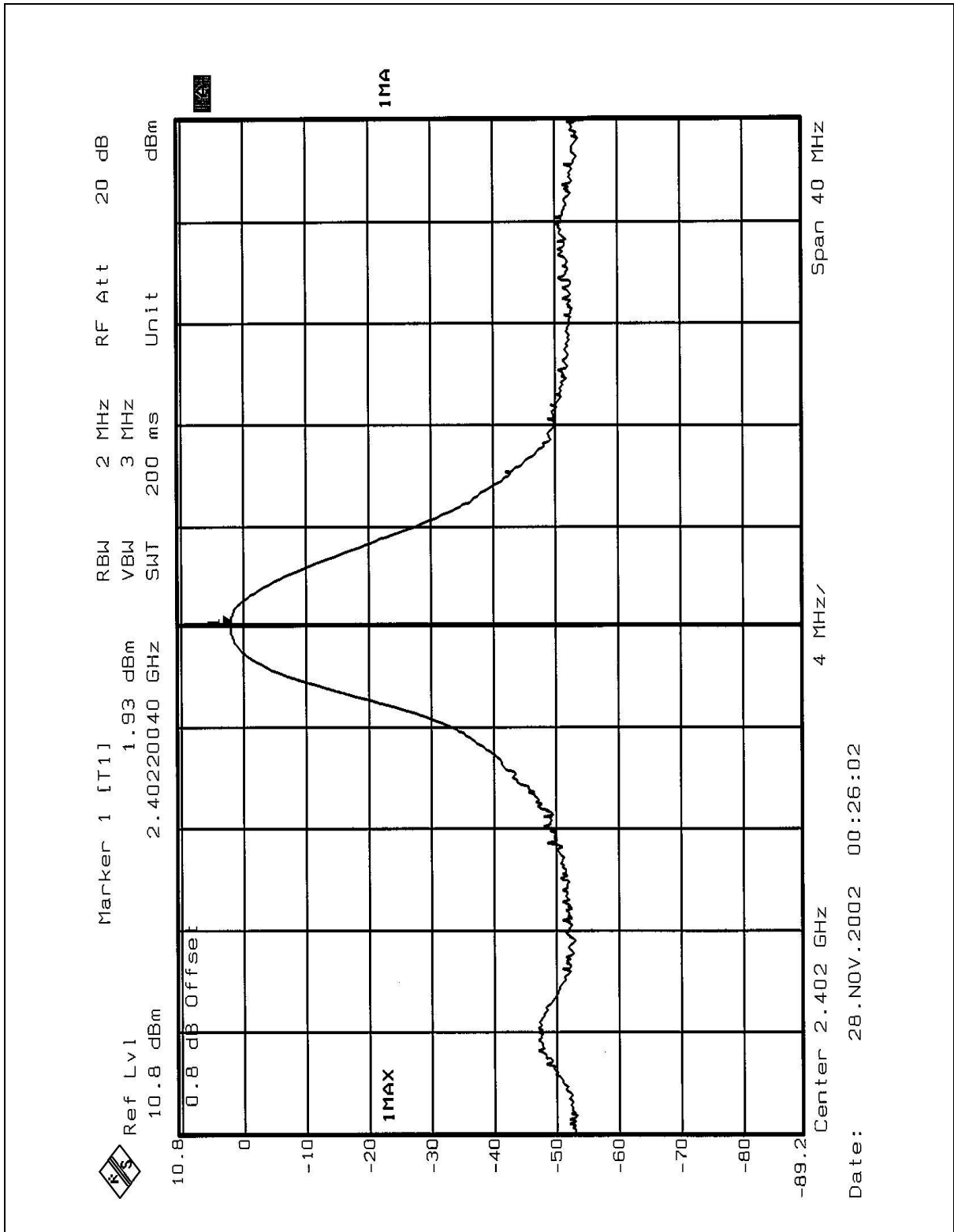
4.6.6 TEST RESULTS

Output Power Into Antenna:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	1.93	30	PASS
39	2441	2.65	30	PASS
78	2480	2.43	30	PASS

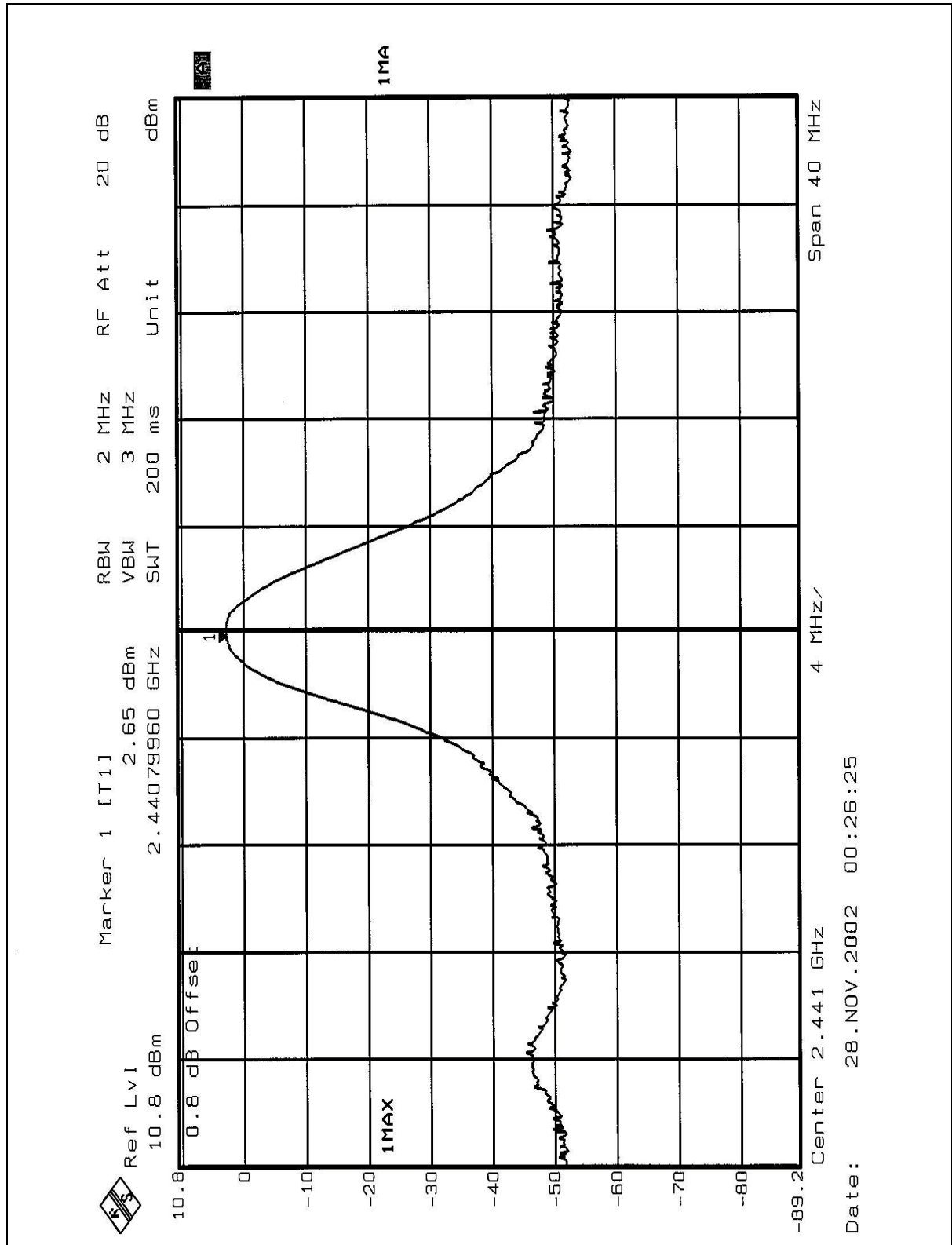


Channel 0



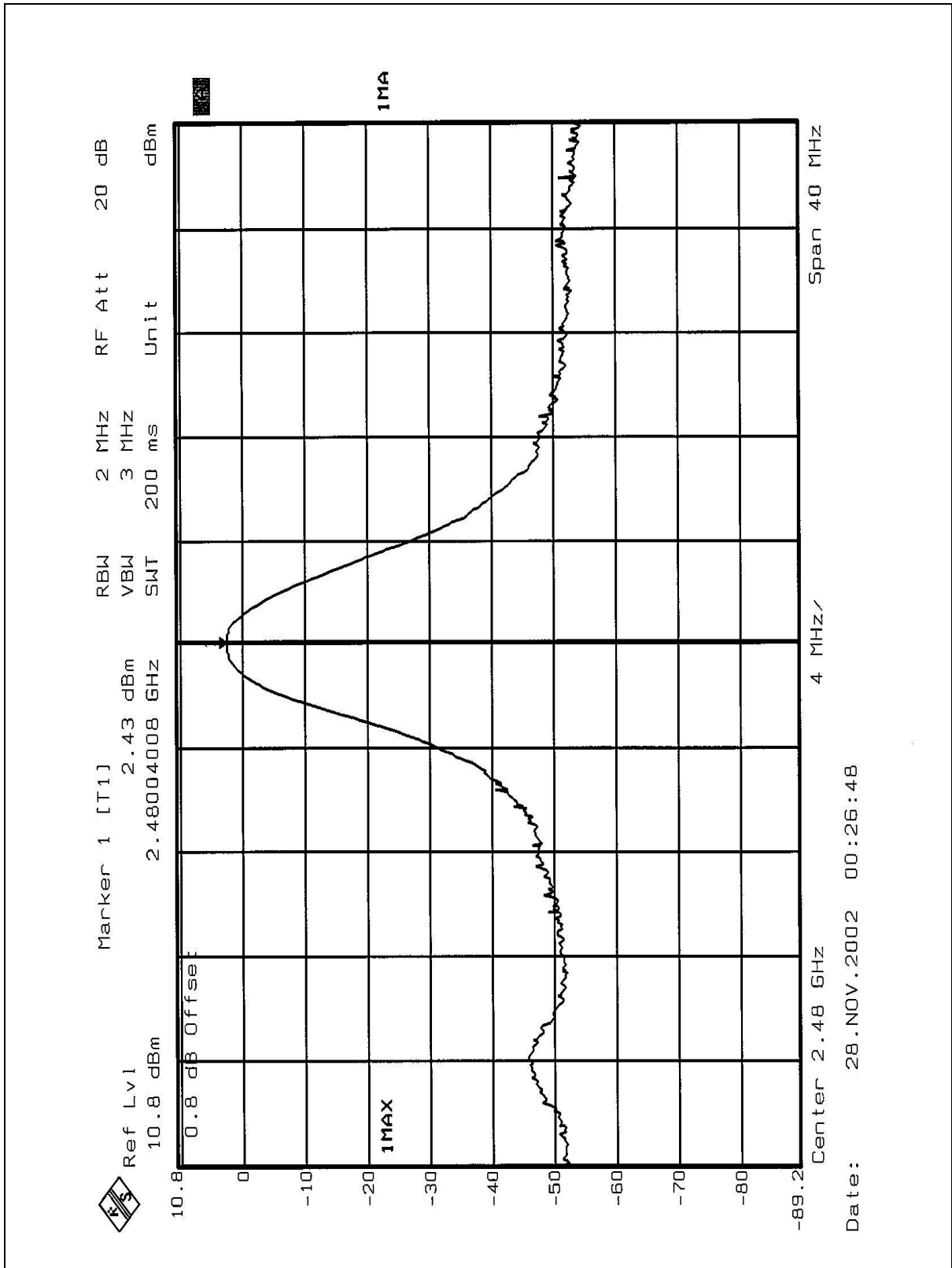


Channel 39





Channel 78



4.7 RADIATED EMISSION MEASUREMENT

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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	Apr. 29, 2003
* HP Preamplifier	8449B	3008A01201	Dec. 06, 2002
* HP Preamplifier	8449B	3008A01292	Aug. 07, 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, 2003
ANTENNA (Large Biconical)	VHBA9123	449	Dec. 10, 2002
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 02, 2003
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	Jul. 03, 2003
* EMCO Horn Antenna	3115	9312-4192	Apr. 09, 2003
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Jan. 25, 2003
* TIMES RF cable	LMR-600	CABLE-ST5-01	Jul. 12, 2003
Open Field Test Site	Site 5	ADT-R05	Jul. 19, 2003
VCCI Site Registration No.	Site 5	R-1039	NA

- 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. 5.



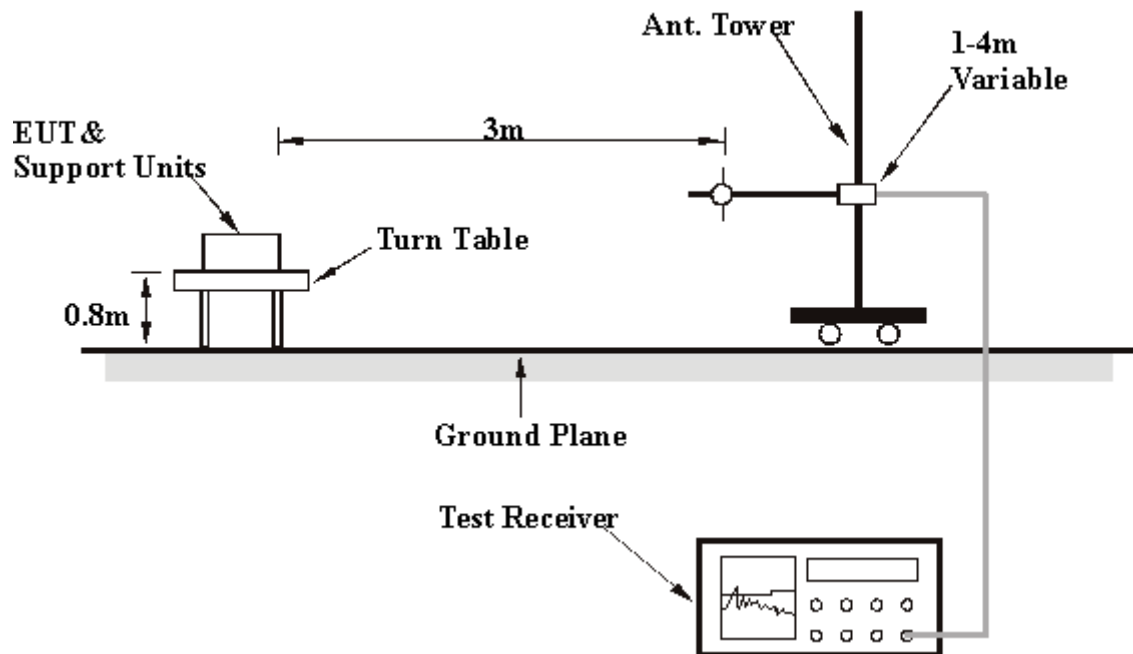
4.7.3 TEST PROCEDURES

- 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:

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	144.00	25.0 QP	43.50	-18.50	1.37H	26	10.94	10.58	3.48	0.00	-14.06
2	240.00	26.8 QP	46.00	-19.20	1.53H	333	10.84	11.41	4.55	0.00	-15.96
3	256.00	25.5 QP	46.00	-20.50	1.37H	10	8.15	12.56	4.79	0.00	-17.36
4	336.00	26.2 QP	46.00	-19.80	1.37H	200	6.75	13.92	5.53	0.00	-19.46
5	342.00	30.0 QP	46.00	-16.00	1.34H	242	10.32	14.07	5.62	0.00	-19.68
6	480.00	25.4 QP	46.00	-20.60	1.33H	7	1.97	16.92	6.51	0.00	-23.44

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	120.00	27.0 QP	43.50	-16.50	1.13V	2	12.10	11.65	3.25	0.00	-14.90
2	144.00	25.5 QP	43.50	-18.00	1.75V	225	11.44	10.58	3.48	0.00	-14.06
3	288.00	26.8 QP	46.00	-19.20	1.34V	24	8.90	12.88	5.01	0.00	-17.90
4	314.20	26.8 QP	46.00	-19.20	1.63V	251	8.07	13.48	5.25	0.00	-18.74
5	358.00	35.5 QP	46.00	-10.50	1.71V	261	15.23	14.49	5.78	0.00	-20.27
6	432.00	25.1 QP	46.00	-20.90	1.19V	344	2.39	16.28	6.43	0.00	-22.72

RF Portion :

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 0	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	68.2AV	-	-	1.03H	230	38.00	27.67	2.53	0.00	-30.20
2	*2402.00	98.2 PK	-	-	1.03H	230	68.00	27.67	2.53	0.00	-30.20
3	4804.00	43.6 PK	74.00	-30.40	1.61H	113	44.80	31.52	4.01	36.70	1.18
4	7205.00	48.2 PK	74.00	-25.80	1.46H	351	43.50	36.13	5.51	36.98	-4.66
5	9606.00	51.8 PK	74.00	-22.20	1.38H	108	45.20	38.43	5.79	37.62	-6.61

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	94.3 PK	-	-	1.01V	263	64.10	27.67	2.53	0.00	-30.20
2	*2402.00	64.3 AV	-	-	1.01V	263	34.10	27.67	2.53	0.00	-30.20
3	4804.00	44.1 PK	74.00	-29.90	1.59V	265	45.23	31.52	4.01	36.70	1.18
4	7205.00	51.5 PK	74.00	-22.50	1.54V	30	46.80	36.13	5.51	36.98	-4.66

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 39	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	99.2 PK	-	-	1.01H	243	68.70	27.81	2.66	0.00	-30.47
2	*2441.00	69.2 AV	-	-	1.01H	243	38.70	27.81	2.66	0.00	-30.47
3	4882.00	43.2 PK	74.00	-30.80	1.45H	310	44.29	31.59	4.03	36.70	1.08
4	7323.00	54.1 PK	74.00	-19.90	1.20H	48	49.05	36.33	5.72	37.03	-5.02
5	7323.00	45.5 AV	54.00	-28.50	1.20H	48	40.50	36.33	5.72	37.03	-5.03
6	9764.00	51.5 PK	74.00	-22.50	1.29H	193	45.00	38.50	5.66	37.65	-6.51

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	63.7AV	-	-	1.00V	332	33.20	27.81	2.66	0.00	-30.47
2	*2441.00	93.7 PK	-	-	1.00V	332	63.20	27.81	2.66	0.00	-30.47
3	4882.00	43.3 PK	74.00	-30.70	1.70V	44	44.35	31.59	4.03	36.70	1.08
4	7326.00	53.5 PK	74.00	-20.50	1.70V	357	48.50	36.33	5.72	37.03	-5.02
5	7326.00	43.0 AV	54.00	-31.00	1.70V	357	38.00	36.33	5.72	37.03	-5.02
6	9764.00	52.0 PK	74.00	-22.00	1.14V	105	45.50	38.50	5.66	37.65	-6.51

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	67.9 AV	-	-	1.17H	212	37.20	27.96	2.78	0.00	-30.74
2	*2480.00	97.9 PK	-	-	1.17H	212	67.20	27.96	2.78	0.00	-30.74
3	4960.00	43.6 PK	74.00	-30.40	1.13H	75	44.50	31.72	4.08	36.70	0.89

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	93.0 PK	-	-	1.89V	0	62.30	27.96	2.78	0.00	-30.74
2	*2480.00	63.0 AV	-	-	1.89V	0	32.30	27.96	2.78	0.00	-30.74
3	4960.00	44.9 PK	74.00	-29.10	1.52V	204	45.80	31.72	4.08	36.70	0.89
4	7440.00	52.1 PK	74.00	-21.90	1.23V	37	46.70	36.54	5.93	37.08	-5.39

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

4.7.6 TEST RESULTS (B)

Digital Portion:

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	144.00	25.0 QP	43.50	-18.50	1.15H	200	10.94	10.58	3.48	0.00	-14.06
2	220.00	24.8 QP	46.00	-21.20	1.09H	81	10.38	10.12	4.30	0.00	-14.43
3	314.20	30.0 QP	46.00	-16.00	1.15H	106	11.27	13.48	5.25	0.00	-18.73
4	342.00	27.5 QP	46.00	-18.50	1.31H	128	7.82	14.07	5.62	0.00	-19.68
5	399.20	25.5 QP	46.00	-20.50	1.03H	65	3.30	16.05	6.16	0.00	-22.21
6	524.50	31.2 QP	46.00	-14.80	1.69H	234	6.65	17.59	6.95	0.00	-24.55

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	120.00	26.8 QP	43.50	-16.70	1.03V	296	11.90	11.65	3.25	0.00	-14.90
2	144.00	27.0 QP	43.50	-16.50	1.16V	245	12.94	10.58	3.48	0.00	-14.06
3	288.20	26.2 QP	46.00	-19.80	1.11V	196	8.30	12.88	5.01	0.00	-17.91
4	359.80	25.4 QP	46.00	-20.60	1.23V	1	5.02	14.58	5.80	0.00	-20.39
5	425.00	25.0 QP	46.00	-21.00	1.50V	208	2.39	16.24	6.37	0.00	-22.62
6	524.40	24.5 QP	46.00	-21.50	1.05V	3	-0.05	17.59	6.95	0.00	-24.55

RF Portion :

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 0	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	91.2 PK	-	-	1.20H	290	61.00	27.67	2.53	0.00	-30.20
2	*2402.00	61.2 AV	-	-	1.20H	290	31.00	27.67	2.53	0.00	-30.20
3	4804.00	46.0 PK	74.00	-28.00	1.05H	3	47.20	31.52	4.01	36.70	1.18
4	7206.00	49.9 PK	74.00	-24.10	1.15H	41	45.25	36.13	5.51	36.98	-4.66

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	58.2 AV	-	-	1.16V	90	28.0	27.67	2.53	0.00	-30.20
2	*2402.00	88.2 PK	-	-	1.16V	90	58.00	27.67	2.53	0.00	-30.20
3	4804.00	44.1 PK	74.00	-29.90	1.34V	3	45.30	31.52	4.01	36.70	1.18
4	7206.00	48.9 PK	74.00	-25.10	1.30V	357	44.20	36.13	5.51	36.98	-4.66

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 39	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	90.0 PK	-	-	1.00H	79	59.50	27.81	2.66	0.00	-30.47
2	*2441.00	50.0 AV	-	-	1.00H	79	29.50	27.81	2.66	0.00	-30.47
3	4882.00	45.4 PK	74.00	-28.60	1.40H	2	46.50	31.59	4.03	36.70	1.08
4	7323.00	48.5 PK	74.00	-25.50	1.37H	352	43.50	36.33	5.72	37.03	-5.02

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	*2441.00	58.5 AV	-	-	1.65V	347	28.00	27.81	2.66	0.00	-30.47
2	*2441.00	88.5 PK	-	-	1.65V	347	58.00	27.81	2.66	0.00	-30.47
3	4882.00	46.1 PK	74.00	-27.90	1.10V	2	47.20	31.59	4.03	36.70	1.09
4	7323.00	49.0 PK	74.00	-25.00	1.10V	3	44.00	36.33	5.72	37.03	-5.02

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	58.1 AV	-	-	1.32H	149	27.40	27.96	2.78	0.00	-30.74
2	*2480.00	88.1 PK	-	-	1.32H	149	57.40	27.96	2.78	0.00	-30.74
3	4960.00	46.3 PK	74.00	-27.70	1.00H	3	47.19	31.72	4.08	36.70	0.89
4	7440.00	52.4 PK	74.00	-21.60	1.53H	15	47.00	36.54	5.93	37.08	-5.39
5	7440.00	43.9 AV	54.00	-10.10	1.53H	15	38.50	36.54	5.93	37.08	-5.39
6	9920.00	53.4 PK	74.00	-20.60	1.17H	285	47.00	38.57	5.52	37.69	-6.40
7	9920.00	46.4 AV	54.00	-7.60	1.17H	285	40.00	38.57	5.52	37.69	-6.40

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	88.3 PK	-	-	1.00V	149	57.60	27.96	2.78	0.00	-30.74
2	*2480.00	58.3 AV	-	-	1.00V	149	27.60	27.96	2.78	0.00	-30.74
3	4960.00	49.1 PK	74.00	-24.90	1.02V	124	49.96	31.72	4.08	36.70	0.89
4	7440.00	53.2 PK	74.00	-20.80	1.37V	358	47.80	36.54	5.93	37.08	-5.39
5	7440.00	44.4 AV	54.00	-9.60	1.36V	358	39.00	36.54	5.93	37.08	-5.39
6	9920.00	48.4 AV	54.00	-5.60	1.34V	6	42.00	38.57	5.52	37.69	-6.40
7	9920.00	55.9 PK	74.00	-18.10	1.34V	6	49.50	38.57	5.52	37.69	-6.40.

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

4.7.7 TEST RESULTS (C)

Digital Portion:

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	144.00	26.2 QP	43.50	-17.30	1.11H	127	12.14	10.58	3.48	0.00	-14.06
2	240.00	26.0 QP	46.00	-20.00	1.31H	200	10.04	11.41	4.55	0.00	-15.96
3	256.80	27.0 QP	46.00	-19.00	1.27H	157	9.33	12.82	4.85	0.00	-17.68
4	356.00	25.8 QP	46.00	-20.20	1.39H	266	5.65	14.40	5.76	0.00	-20.16
5	457.00	34.0 QP	46.00	-12.00	2.04H	37	10.95	16.49	6.56	0.00	-23.06
6	480.00	26.2 QP	46.00	-19.80	1.22H	111	2.77	16.92	6.51	0.00	-23.44

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	120.40	26.0 QP	43.50	-17.50	1.17V	65	11.10	11.65	3.25	0.00	-14.90
2	144.00	27.5 QP	43.50	-16.00	1.14V	125	13.44	10.58	3.48	0.00	-14.06
3	371.00	31.0 QP	46.00	-15.00	1.23V	300	10.05	15.04	5.91	0.00	-20.95
4	392.00	26.8 QP	46.00	-19.20	1.09V	250	4.94	15.77	6.09	0.00	-21.86
5	461.00	32.0 QP	46.00	-14.00	1.02V	204	8.88	16.58	6.55	0.00	-23.13
6	525.00	27.0 QP	46.00	-19.00	1.06V	351	2.45	17.59	6.95	0.00	-24.56

RF Portion :

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 0	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	93.5 PK	-	-	1.27H	214	63.30	27.67	2.53	0.00	-30.20
2	*2402.00	63.5 AV	-	-	1.27H	214	33.30	27.67	2.53	0.00	-30.20
3	4804.00	43.3 PK	74.00	-30.70	1.26H	8	44.50	31.52	4.01	36.70	1.18
4	7205.00	50.2 PK	74.00	-23.80	1.50H	3	45.50	36.13	5.51	36.98	-4.66

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	61.9 AV	-	-	1.62V	181	31.70	27.67	2.53	0.00	-30.20
2	*2402.00	91.9 PK	-	-	1.62V	181	61.70	27.67	2.53	0.00	-30.20
3	4804.00	43.7 PK	74.00	-30.30	1.11V	6	44.85	31.52	4.01	36.70	1.18

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 39	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	65.2 AV	-	-	1.00H	165	34.90	27.81	2.66	0.00	-30.47
2	*2441.00	95.2 PK	-	-	1.00H	165	64.70	27.81	2.66	0.00	-30.47
3	4882.00	44.0 PK	74.00	-30.00	1.49H	38	45.10	31.59	4.03	36.70	1.08

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	90.5 PK	-	-	1.36V	221	60.00	27.81	2.66	0.00	-30.47
2	*2441.00	60.5 AV	-	-	1.36V	221	30.00	27.81	2.66	0.00	-30.47
3	4882.00	44.2 PK	74.00	-29.80	1.14V	251	45.30	31.59	4.03	36.70	1.08

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

EUT	Bluetooth Module	MODEL	BT-0002M-1
MODE	Channel 78	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1050 hPa	TESTED BY: Gary Chang	

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	95.4 PK	-	-	1.00H	219	64.70	27.96	2.78	0.00	-30.74
2	*2480.00	65.4 AV	-	-	1.00H	219	34.70	27.96	2.78	0.00	-30.74
3	4960.00	46.9 PK	74.00	-27.10	1.37H	3	47.80	31.72	4.08	36.70	0.89

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	94.0 PK	-	-	1.21V	166	63.30	27.96	2.78	0.00	-30.74
2	*2480.00	64.0 AV	-	-	1.21V	166	33.30	27.96	2.78	0.00	-30.74
3	4960.00	45.6 PK	74.00	-28.40	1.32V	335	46.50	31.72	4.08	36.70	0.89

NOTE:

- Emission level = Raw value - Correction Factor
- Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
- Margin value = Emission level - Limit value
- " * " : Fundamental frequency
- The other emission levels were very low against the limit.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel.
Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30\text{dB}$
- Average value = peak reading $-20\log(\text{duty cycle})$

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 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

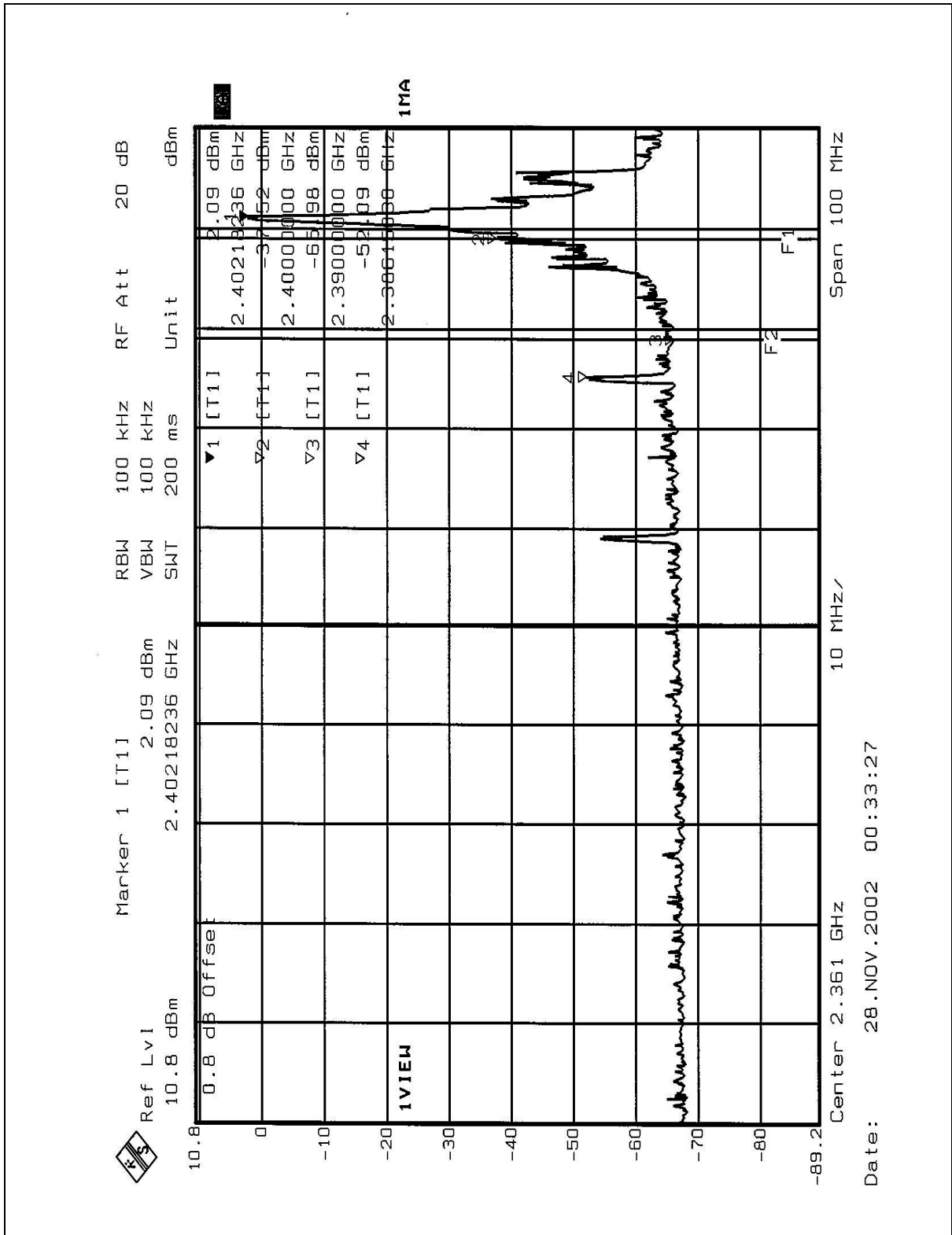
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

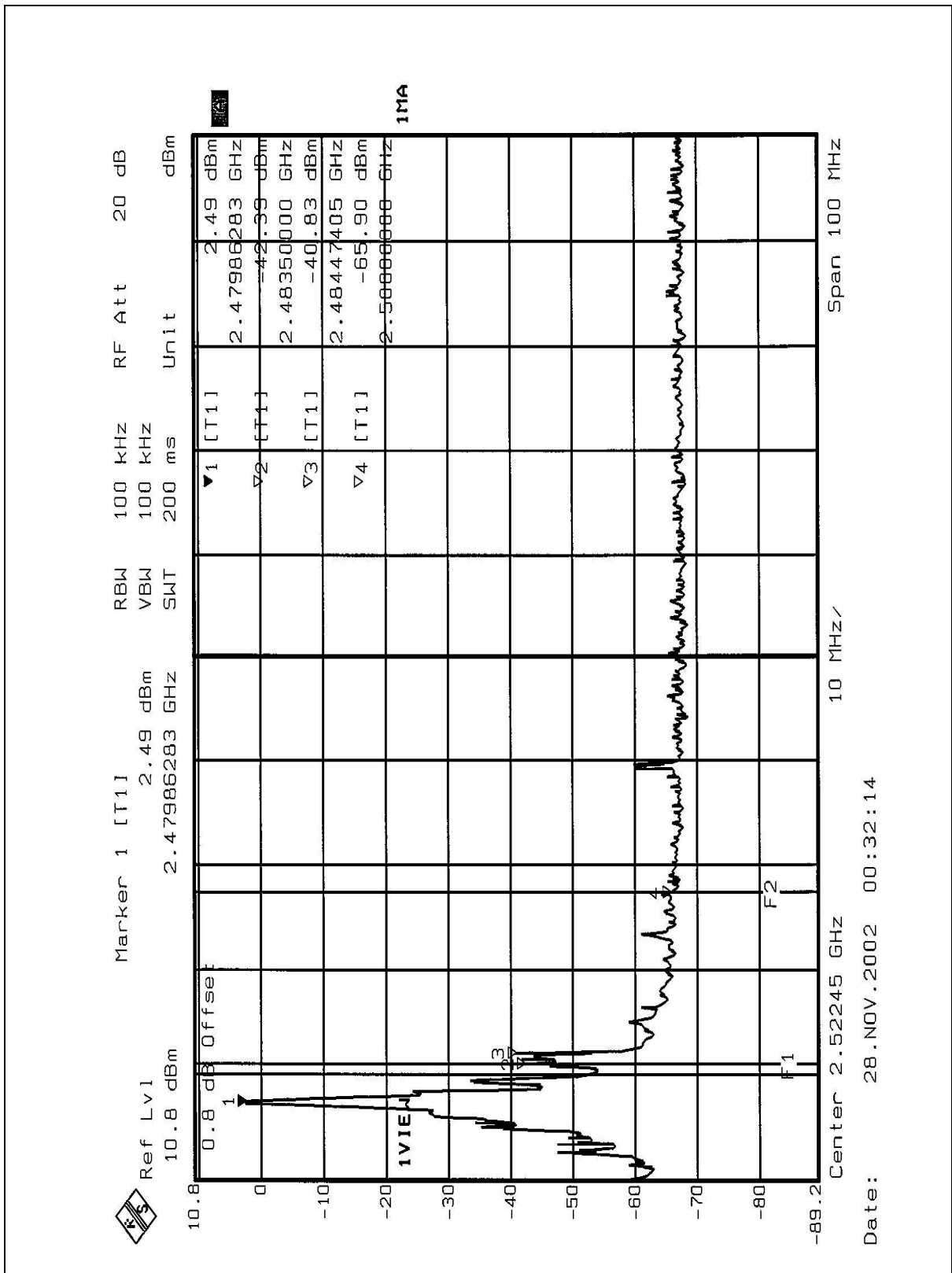
4.8.5 TEST RESULTS

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 54.18dB delta between carrier maximum power and local maximum emission in restrict band (2.4021GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.7.5 (page 50) is 68.2dBuV/m, so the maximum field strength in restrict band is $68.2-54.18=14.02$ dBuV/m which is under 54dBuV/m limit.

NOTE2: The band edge emission plot on the following second page shows 43.32dB delta between carrier maximum power and local maximum emission in restrict band (2.4798GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.7.5 (page 52) is 67.9dBuV/m, so the maximum field strength in restrict band is $67.9-43.32=24.58$ dBuV/m which is under 54dBuV/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 types of antenna used in this product are Patch antenna, Printed antenna, and Printed Monopole antenna. There is no antenna connector. The maximum Gain of the antenna is only 3dBi.

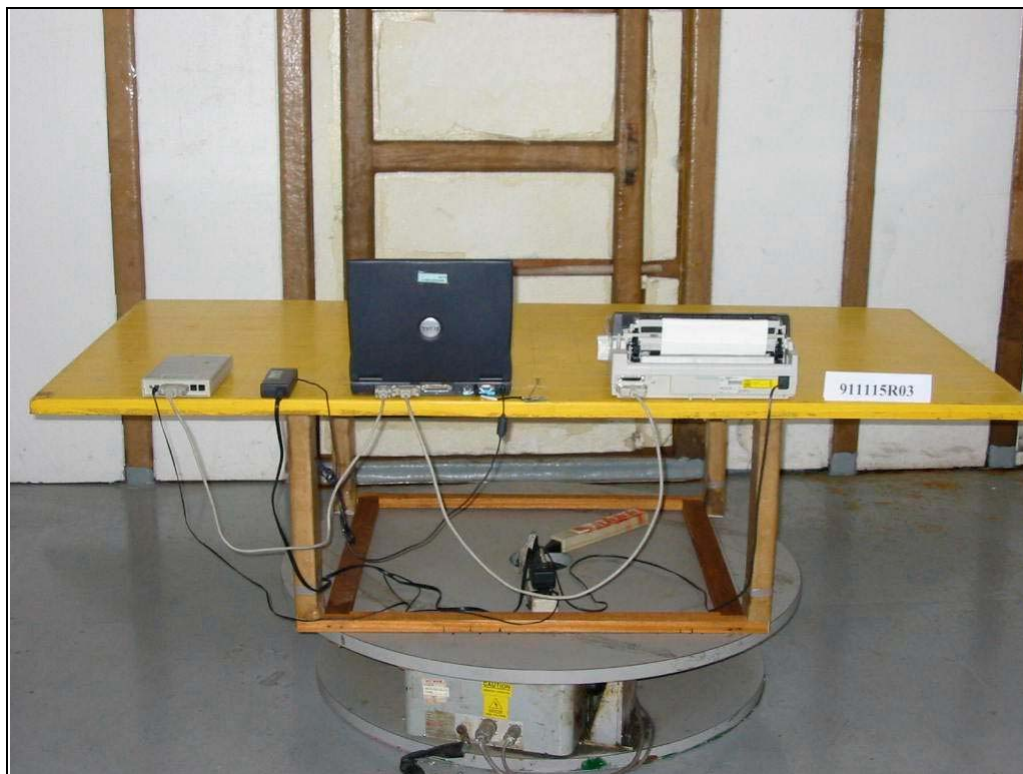
5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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:

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

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

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