FCC TEST REPORT

REPORT NO.: RF920417R02A
MODEL NO.: SU-2
RECEIVED: Apr. 17, 2003
TESTED: Apr. 17 ~ Apr. 30, 2003

APPLICANT: NOKIA CORPORATION

ADDRESS: Joensuunkatu 7G, FIN-241000, FINLAND

ISSUED BY: Advance Data Technology Corporation

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

This test report consists of 68 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, NVLAP or any government agencies. The test results in the report only apply to the tested sample.

0528
ILAC MRA

Lab Code: 200102-0

TABLE OF CONTENTS

1 CERTIFICATION

PRODUCT :	IMAGE VIEWER
BRAND NAME :	Nokia
MODEL NO. :	SU-2
APPLICANT :	NOKIA CORPORATION
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 Apr. 17 ~ Apr. 30, 2003. 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: Demi Chen **DATE:** May 20, 2003

Demi Chen

APPROVED BY: for , **DATE:** May 20, 2003

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	PASS	Meet the requirement of limit Minimum passing margin is –23.80dBuV at 0.416 MHz
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 –3.70dBuV at 384.01MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	IMAGE VIEWER
MODEL NO.	SU-2
POWER SUPPLY	5.7 VDC from AC Adapter or 6.0VDC from Batteries (Battery*4)
MODULATION TYPE	FHSS (GFSK)
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	-4.74dBm
ANTENNA TYPE	Chip Antenna
ANTENNA GAIN	1dBi
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. There have two functions provide the power to EUT. One is by following power adapter, and another by batteries.

BRAND :	FWHK
MODEL :	ACP-12U
INPUT :	100-240V, 50-60Hz, 125mA
OUTPUT :	+5.7V—800mA

2. For a 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 Spurious Radiation test (below 1GHz), there are two test results for the test.

(A) Only adapter powered the EUT.

(B) Both adapter and batteries powered the EUT.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR 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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	TV MONITOR	HACE	CC14A	23719011000400	VERIFICATION
2	Cellular phone	Nokia	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

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 (dBμV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

Notes:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class A/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	ESCS30	847793/022	Mar. 10, 2004
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	828075/003	July 23, 2003
ROHDE & SCHWARZ 200-A Four-line V-Network	ENV4200	830326/018	Oct. 30, 2003
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Nov. 29, 2003
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/018	Nov. 29, 2003
EMCO-L.I.S.N. (for peripheral)	3825/2	90031627	July 23, 2003
Software	Cond-V2M1	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C05.01	July 19, 2003
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-305	Feb. 23, 2004
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-306	Feb. 23, 2004

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 Shielded Room No. 5.
4. The VCCI Site Registration No. is C-1093.

4.1.3 TEST PROCEDURES

a. 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.

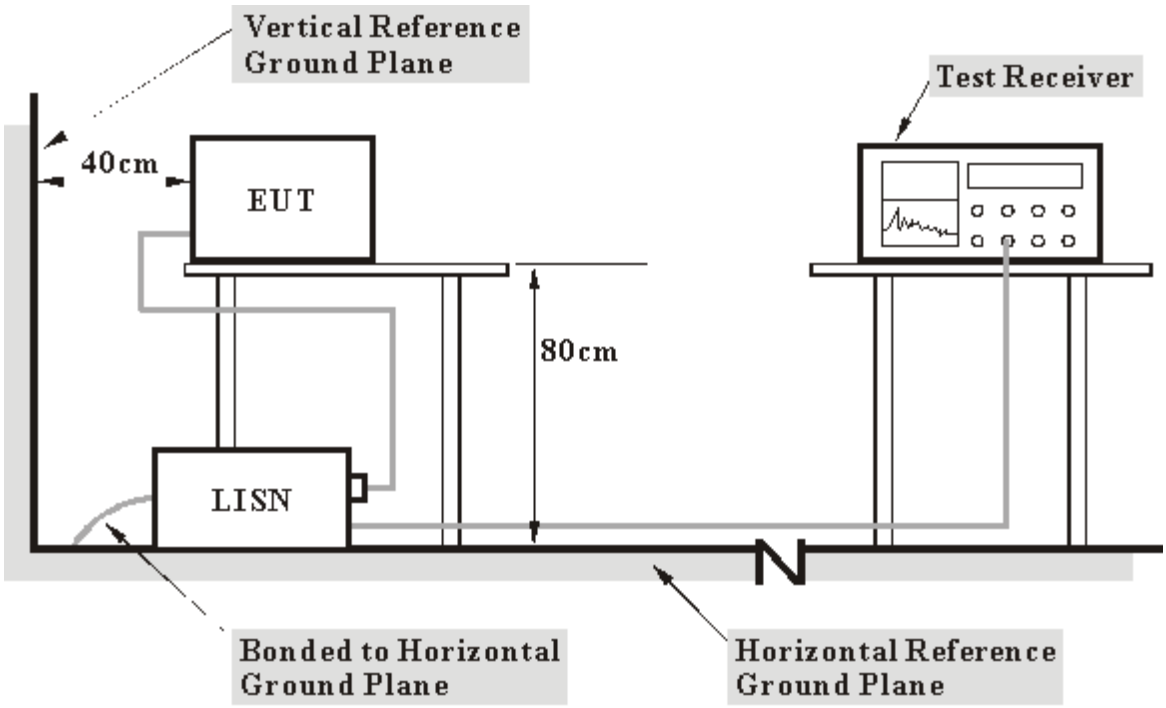
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. 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 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. 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.

4.1.6 EUT OPERATING CONDITIONS

a. Placed the EUT with Monitor on a testing table.
b. The computer system ran a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.
c. The Video messages from Nokia cellular phone was received by EUT, and then video messages were shown on TV monitor via cable.

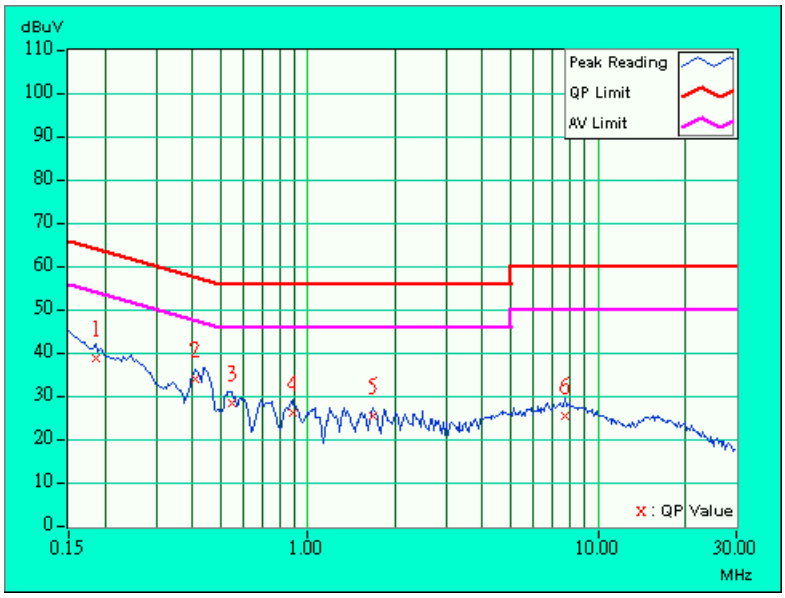
4.1.7 TEST RESULTS

EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 0	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.185	0.10	38.26	-	38.36	-	64.25	54.25	-25.89	-
2	0.408	0.10	33.58	-	33.68	-	57.69	47.69	-24.01	-
3	0.548	0.12	27.92	-	28.04	-	56.00	46.00	-27.96	-
4	0.884	0.18	25.84	-	26.02	-	56.00	46.00	-29.98	-
5	1.688	0.20	25.05	-	25.25	-	56.00	46.00	-30.75	-
6	7.742	0.52	25.18	-	25.70	-	60.00	50.00	-34.30	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

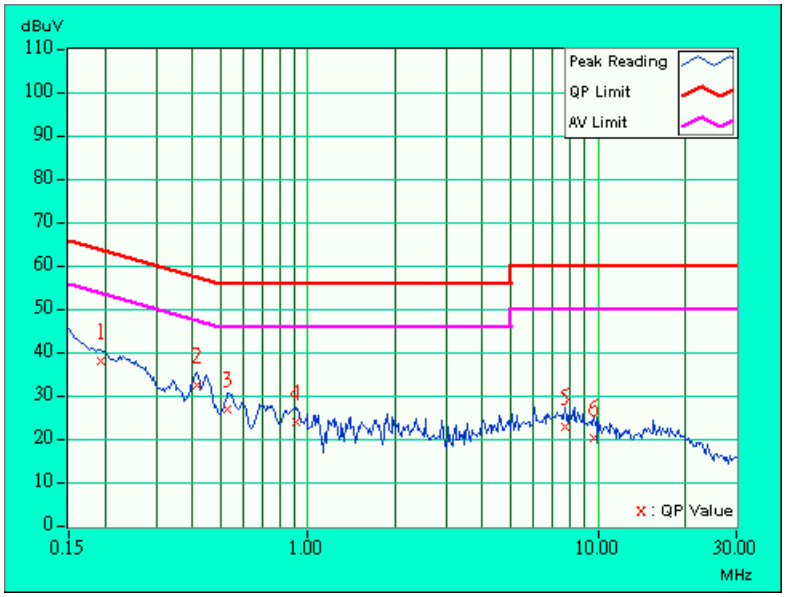


EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 0	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.193	0.10	37.67	-	37.77	-	63.91	53.91	-26.14	-
2	0.416	0.10	32.36	-	32.46	-	57.54	47.54	-25.07	-
3	0.529	0.12	26.73	-	26.85	-	56.00	46.00	-29.15	-
4	0.908	0.18	23.83	-	24.01	-	56.00	46.00	-31.99	-
5	7.680	0.36	22.73	-	23.09	-	60.00	50.00	-36.91	-
6	9.699	0.39	19.85	-	20.24	-	60.00	50.00	-39.76	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

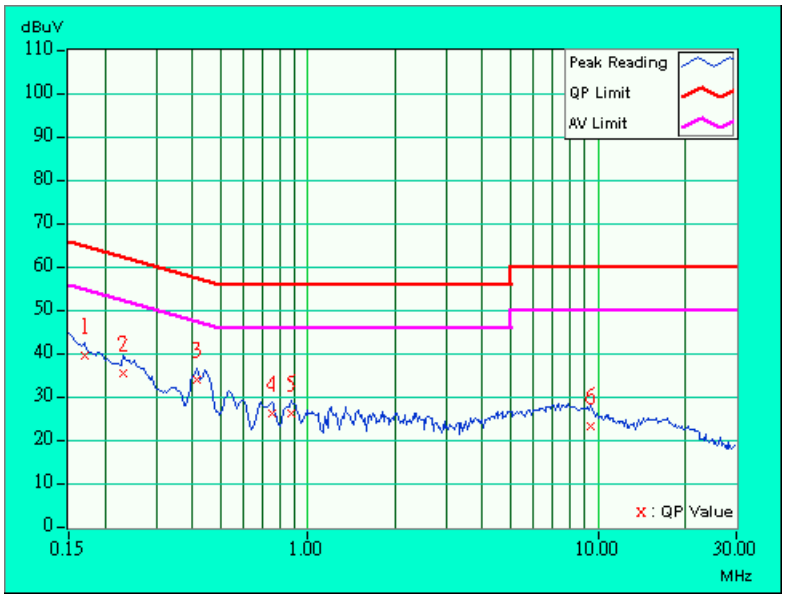


EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 39	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	39.18	-	39.28	-	64.98	54.98	-25.70	-
2	0.232	0.10	34.97	-	35.07	-	62.38	52.38	-27.31	-
3	0.416	0.10	33.62	-	33.72	-	57.54	47.54	-23.81	-
4	0.752	0.16	25.58	-	25.74	-	56.00	46.00	-30.26	-
5	0.880	0.18	25.74	-	25.92	-	56.00	46.00	-30.08	-
6	9.422	0.58	22.78	-	23.36	-	60.00	50.00	-36.64	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

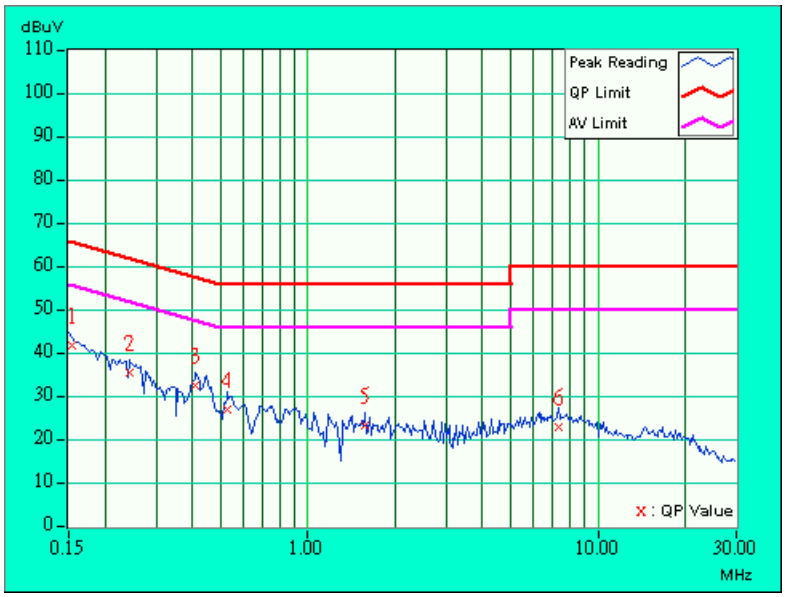


EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 39	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (Uv)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.10	41.63	-	41.73	-	65.79	55.79	-24.06	-
2	0.244	0.10	35.13	-	35.23	-	61.97	51.97	-26.74	-
3	0.412	0.10	32.40	-	32.50	-	57.61	47.61	-25.11	-
4	0.529	0.12	26.69	-	26.81	-	56.00	46.00	-29.19	-
5	1.578	0.20	23.07	-	23.27	-	56.00	46.00	-32.73	-
6	7.355	0.36	22.48	-	22.84	-	60.00	50.00	-37.16	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

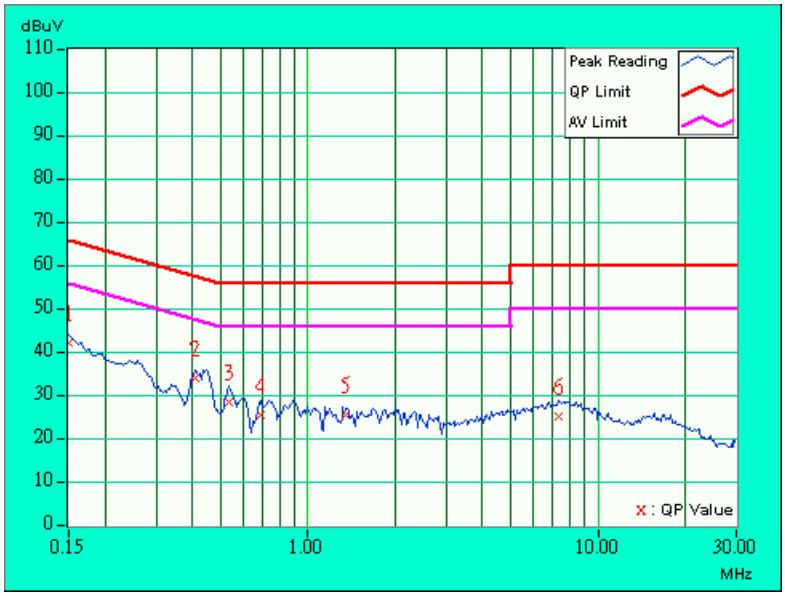


EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	41.62	-	41.72	-	66.00	56.00	-24.28	-
2	0.412	0.10	33.64	-	33.74	-	57.61	47.61	-23.87	-
3	0.537	0.12	27.91	-	28.03	-	56.00	46.00	-27.97	-
4	0.685	0.15	25.18	-	25.33	-	56.00	46.00	-30.67	-
5	1.359	0.20	25.13	-	25.33	-	56.00	46.00	-30.67	-
6	7.344	0.51	24.71	-	25.22	-	60.00	50.00	-34.78	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value

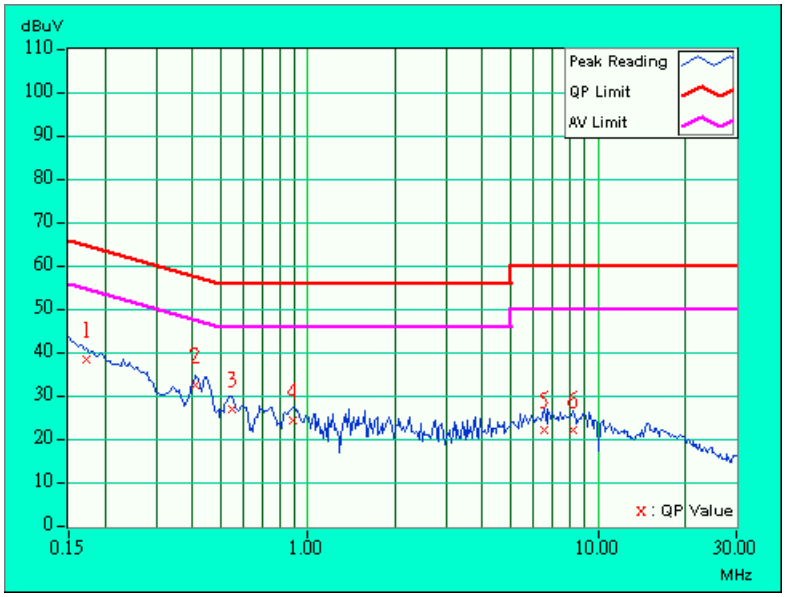


EUT	IMAGE VIEWER	MODEL	SU-2
MODE	Channel 78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neurral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60%RH, 1005 hPa	TESTED BY: Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.10	38.12	-	38.22	-	64.79	54.79	-26.57	-
2	0.412	0.10	32.32	-	32.42	-	57.61	47.61	-25.19	-
3	0.548	0.12	26.72	-	26.84	-	56.00	46.00	-29.16	-
4	0.892	0.18	23.99	-	24.17	-	56.00	46.00	-31.83	-
5	6.539	0.34	21.74	-	22.08	-	60.00	50.00	-37.92	-
6	8.219	0.37	21.99	-	22.36	-	60.00	50.00	-37.64	-

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value



4.2 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 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:

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

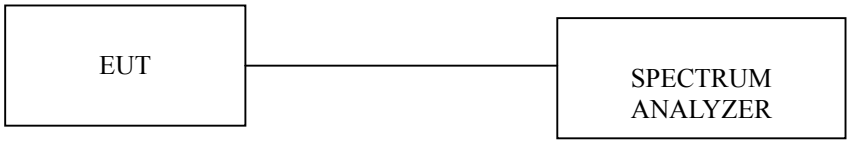
4.2.3 TEST PROCEDURES

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 DEVIATION FROM TEST STANDARD

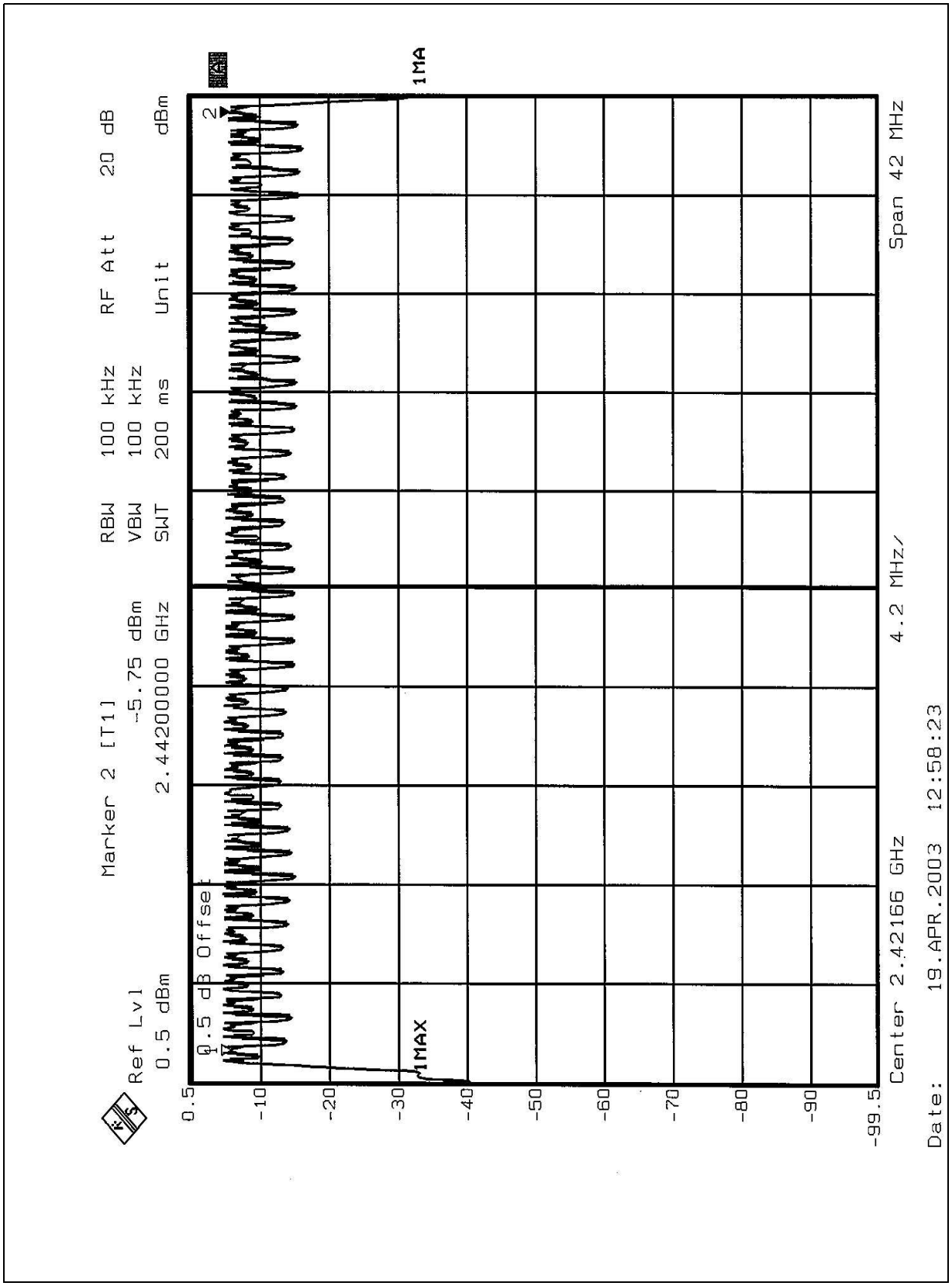
No deviation

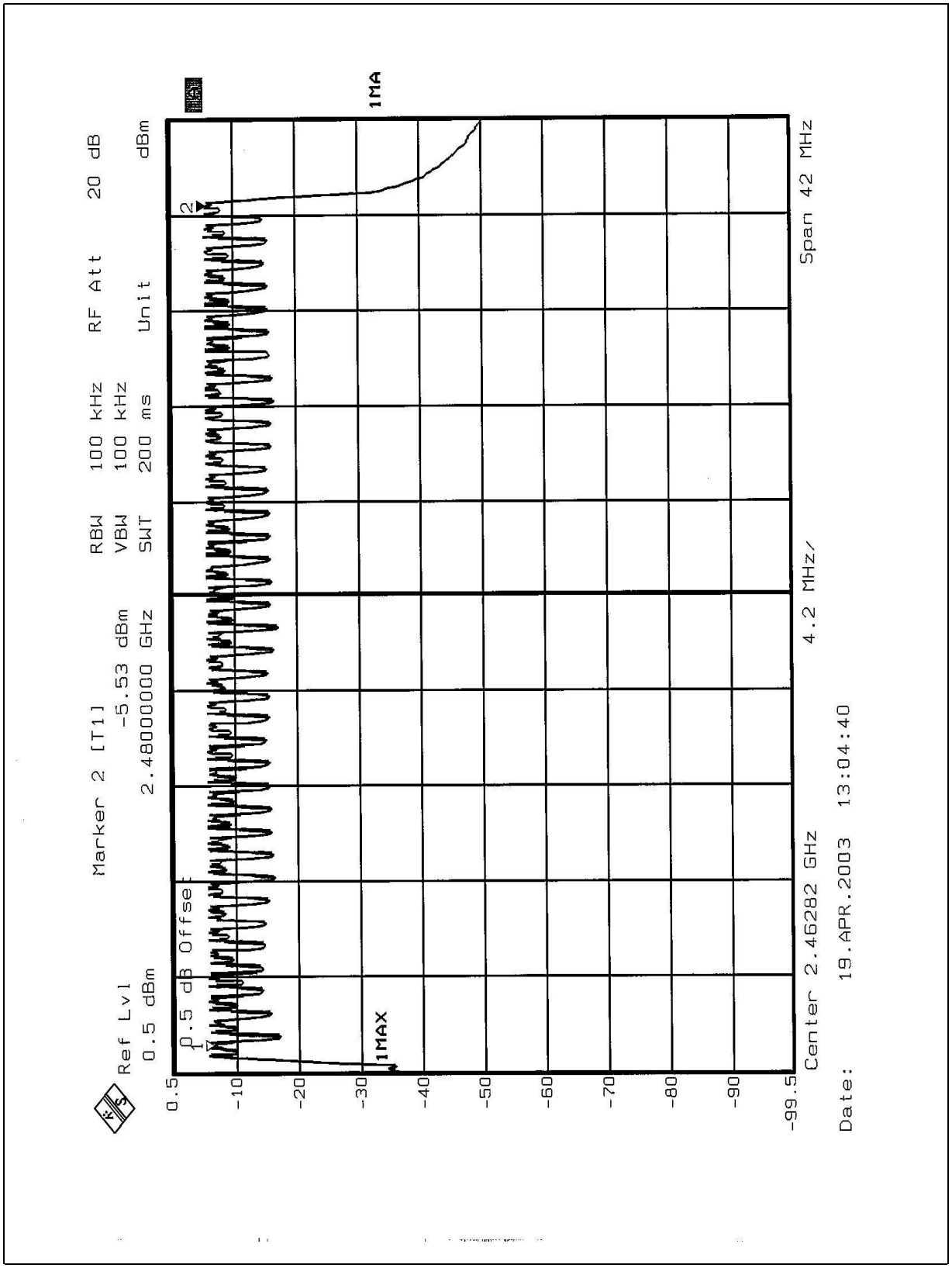
4.2.5 TEST SETUP



4.2.6 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.


Marker 2 [T1]
-5.75 dBm
2.44200000 GHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Unit dBm
Ref Lvl
0.5 dBm
0.5 dB Offset
1MA
1MAX
Center 2.42166 GHz
4.2 MHz/
Span 42 MHz
Date: 19.APR.2003 12:58:23


Marker 2 [T1]
-5.53 dBm
2.48000000 GHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Unit dBm
Ref Lvl
0.5 dBm
0.5 dB Offset
1MA
1MAX
Span 42 MHz
4.2 MHz/
Center 2.46282 GHz
Date: 19.APR.2003 13:04:40

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 31.6 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:

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 DEVIATION FROM TEST STANDARD

No deviation

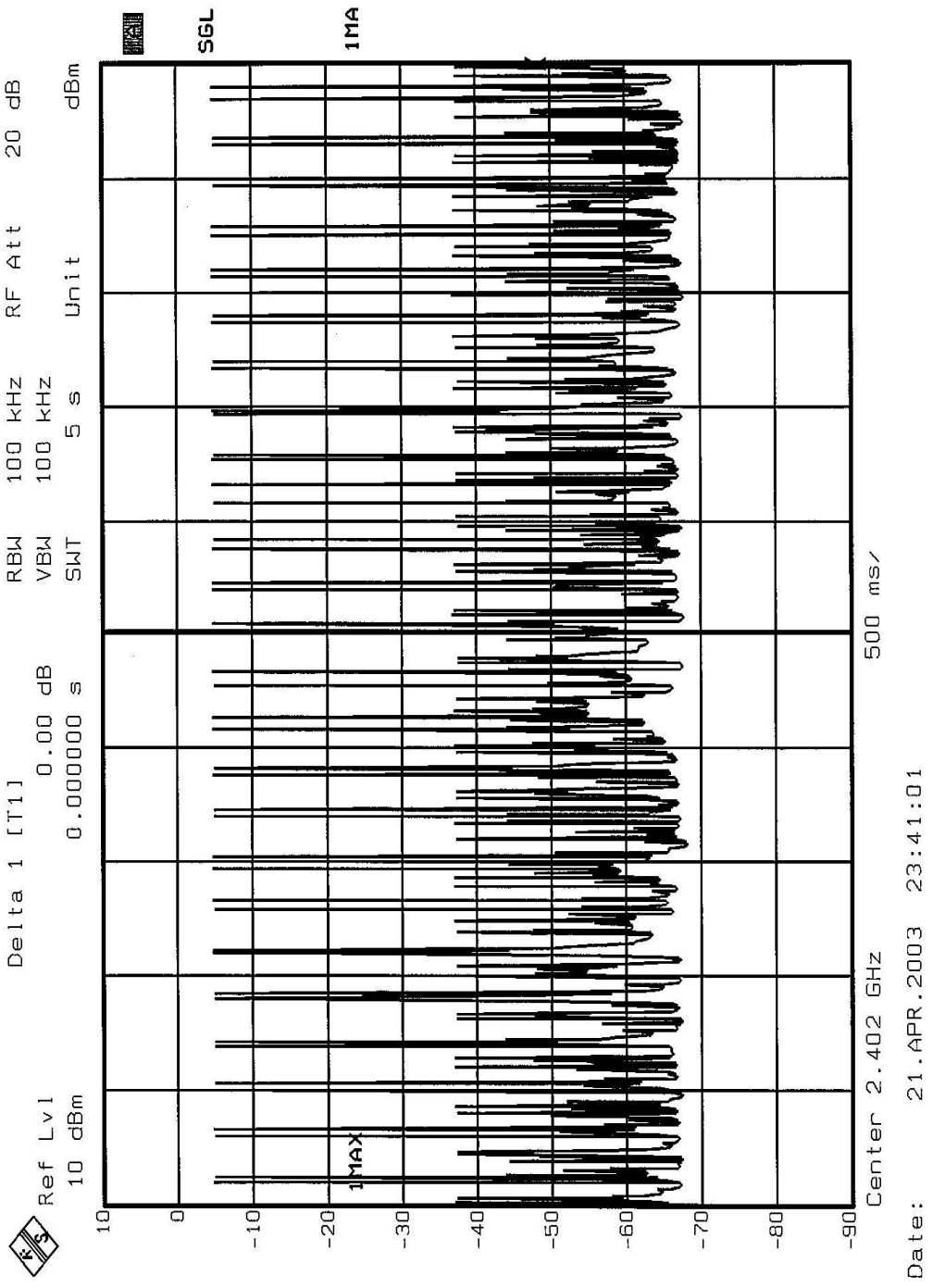
4.3.5 TEST SETUP

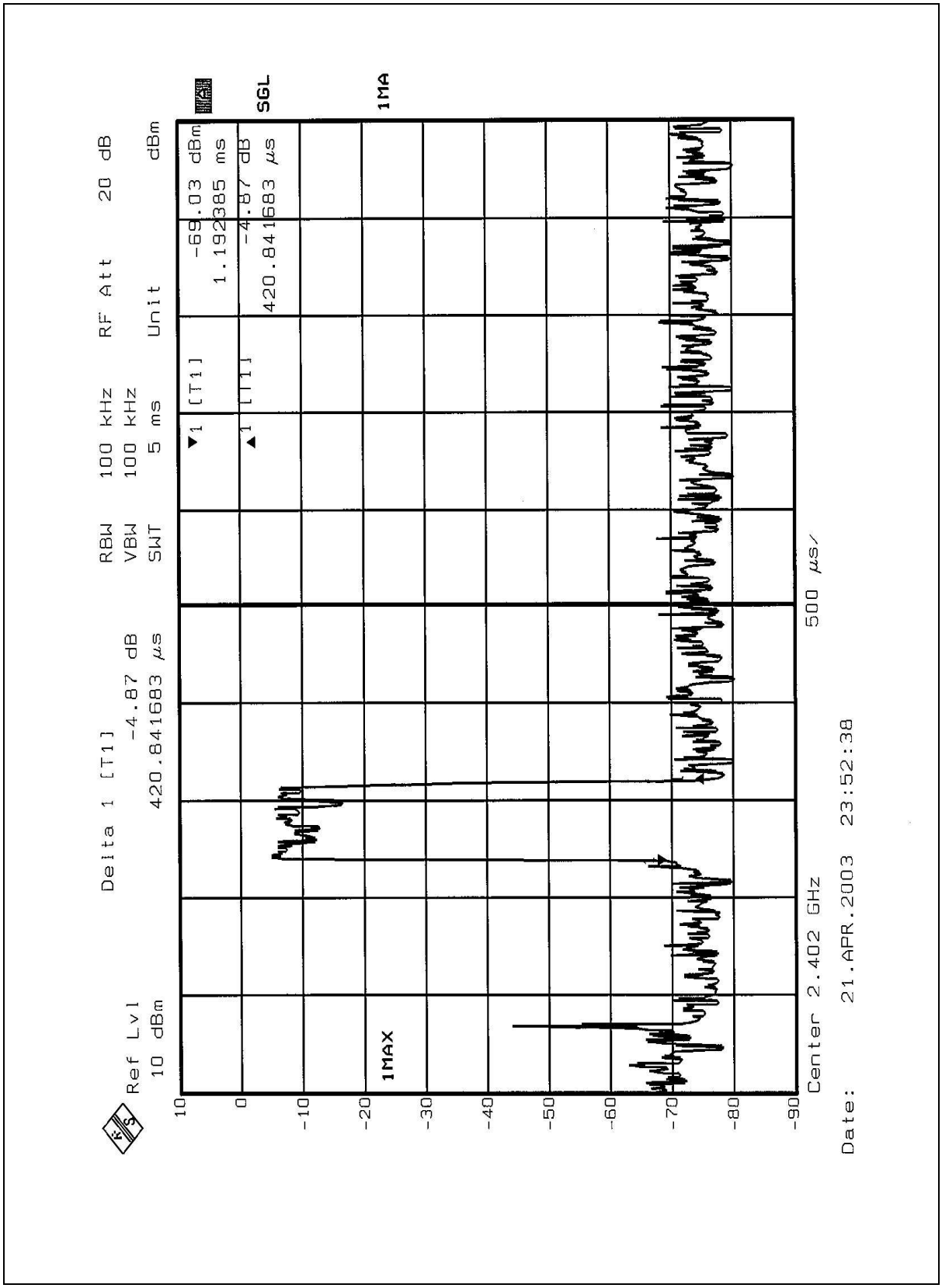
4.3.6 TEST RESULTS

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 times / 5 sec *6.32=316 times	0.420	132.72	400
DH2	25 times / 5 sec *6.32=158 times	1.763	278.55	400
DH5	17 times / 5 sec *6.32=108 times	2.965	320.22	400

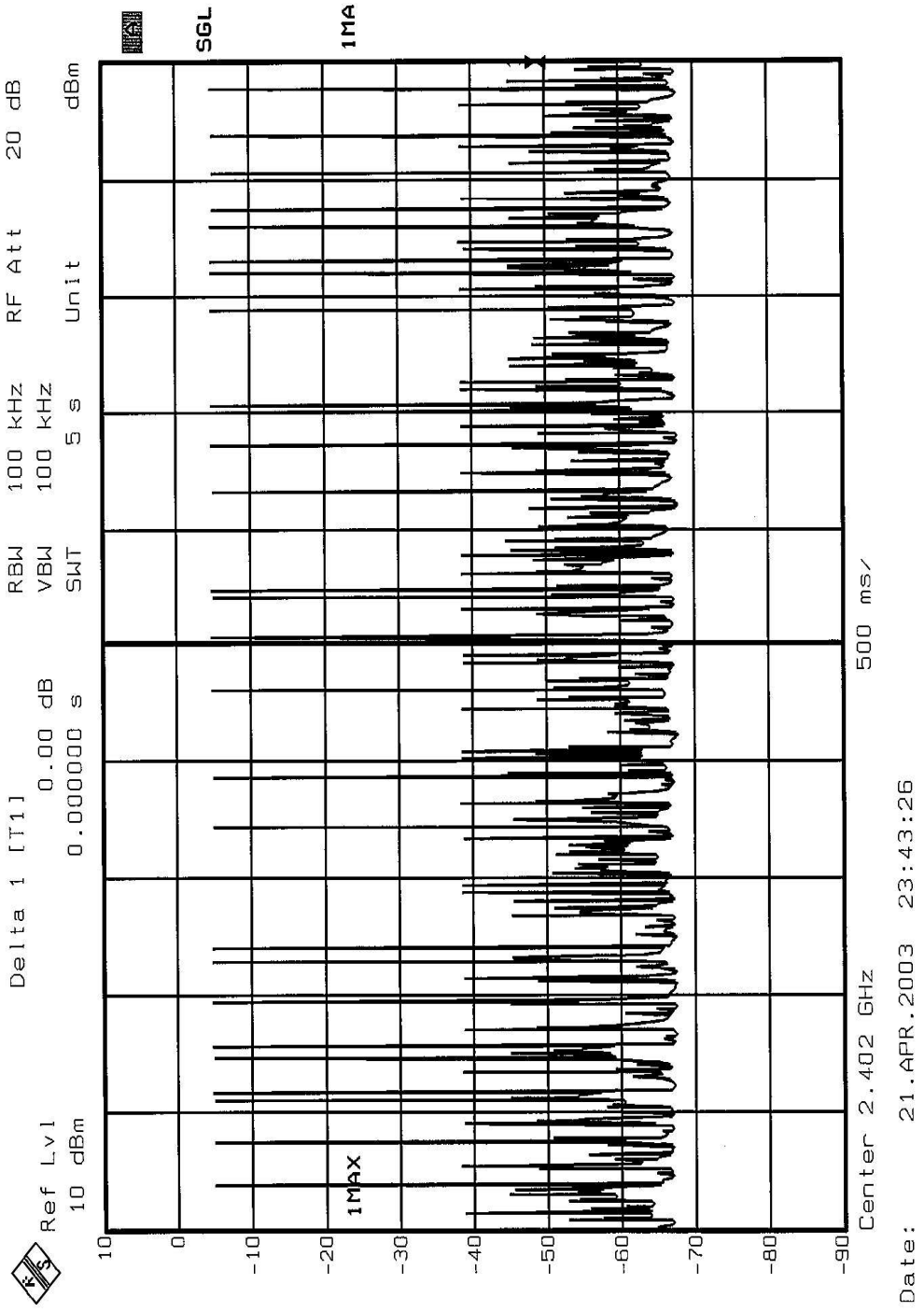
Test plots of the transmitting time slot are shown on next six pages.

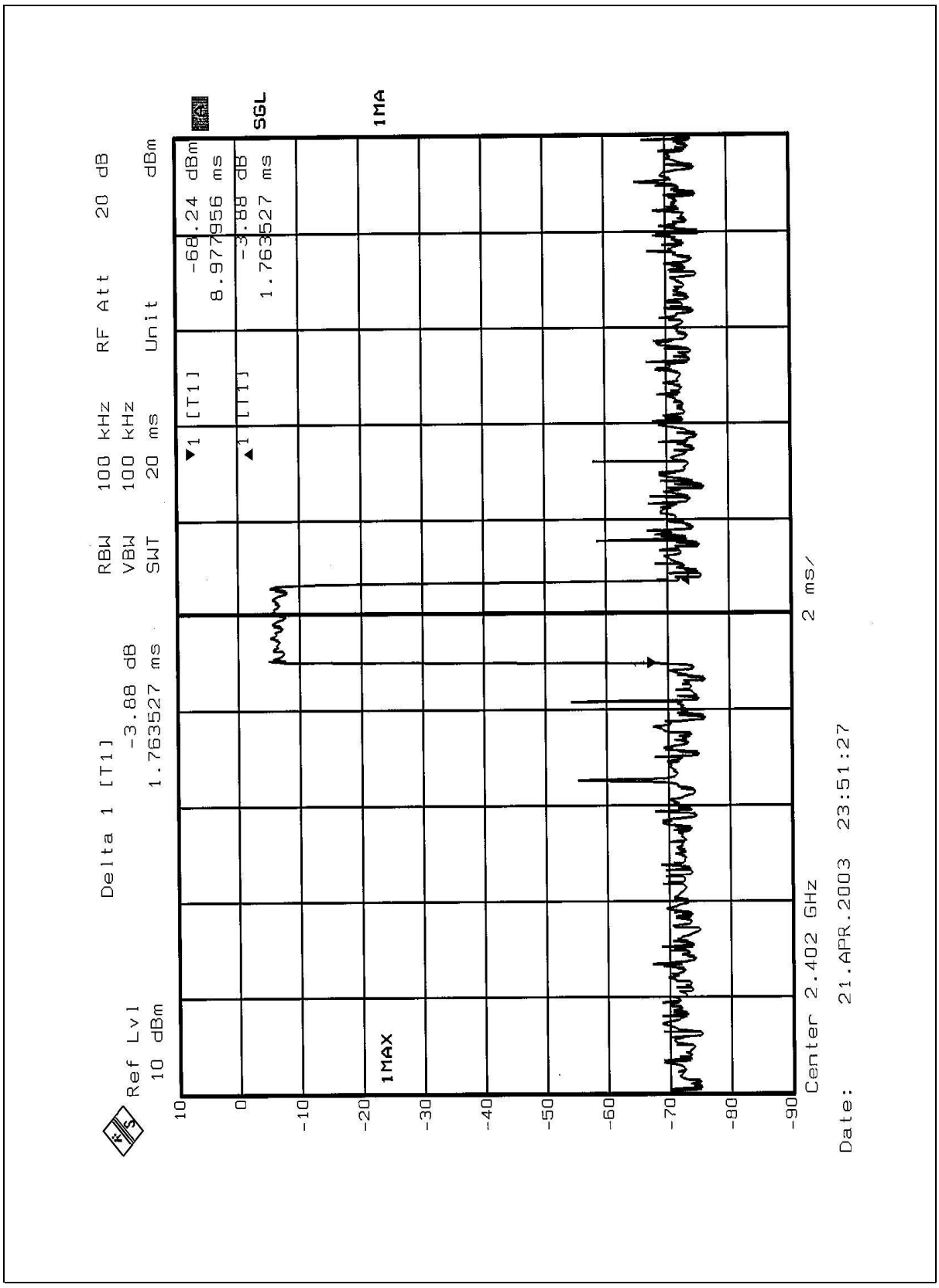
DH1


SGL
1MA
Ref Lvl
10 dBm
Delta 1 [T1]
0.00 dB
0.000000 s
RBW 100 kHz
VBW 100 kHz
SWT 5 s
RF Att 20 dB
Unit dBm
1MAX
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.402 GHz
500 ms/
Date: 21.APR.2003 23:41:01

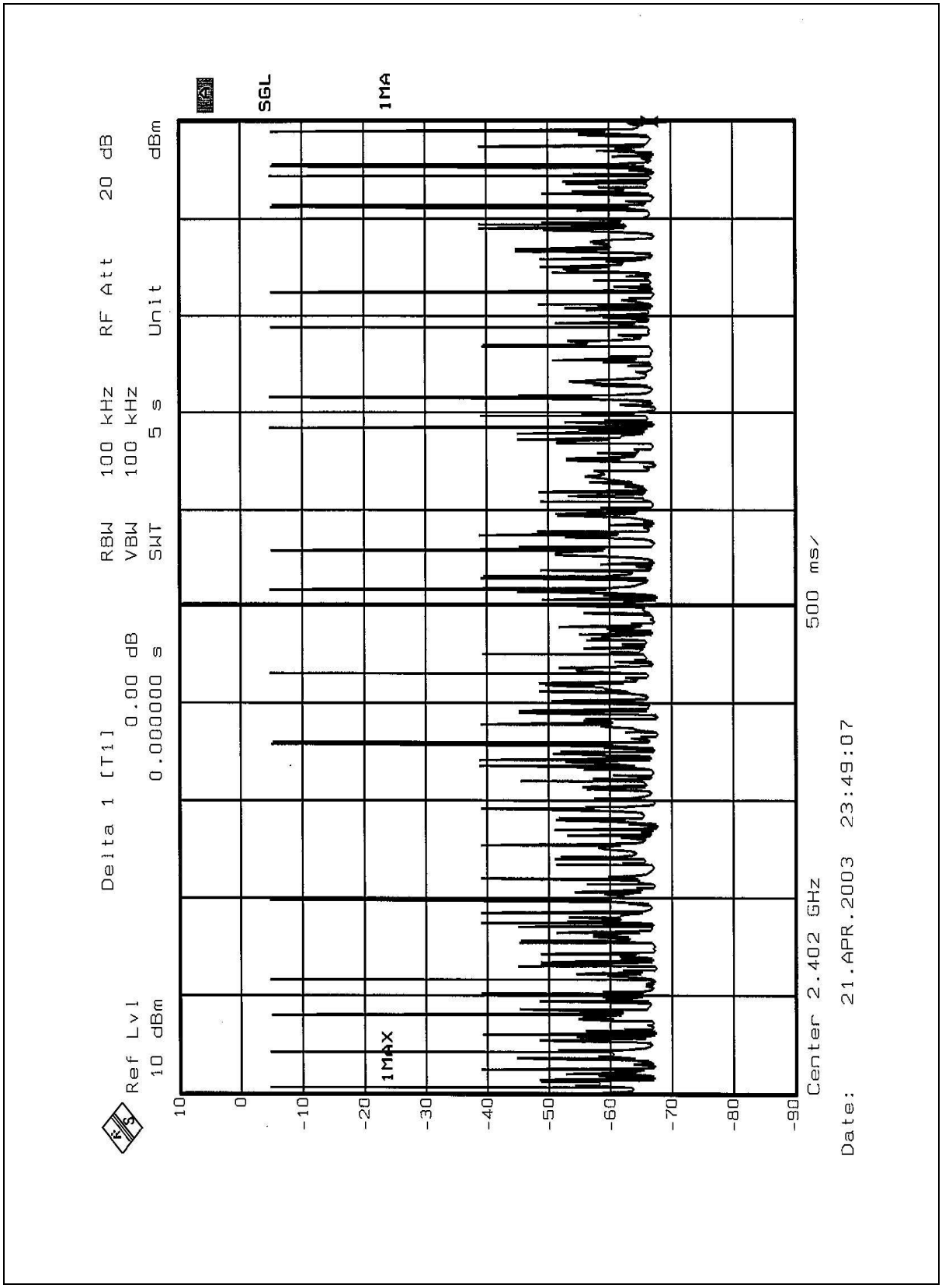

Ref Lvl
10 dBm
Delta 1 [T1]
-4.87 dB
420.841683 µs
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
RF Att 20 dB
Unit dBm
[T1]
-69.03 dBm
1.192385 ms
[T1]
-4.87 dB
420.841683 µs
SGL
1MA
1MAX
Center 2.402 GHz
500 µs/
Date: 21.APR.2003 23:52:38

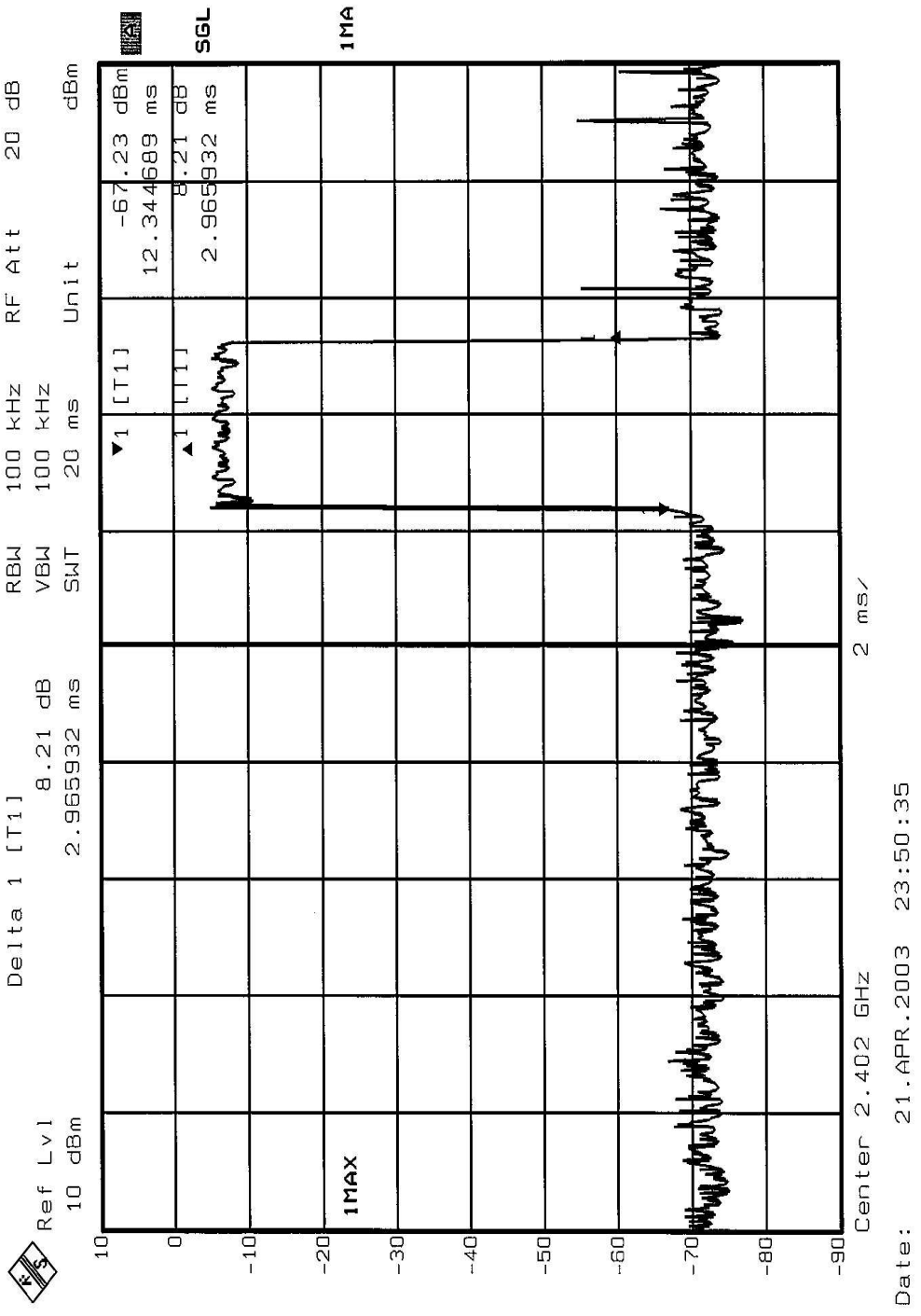
DH3


SGL
1MA
Delta 1 [T1]
0.00 dB
0.000000 s
RBW 100 kHz
VBW 100 kHz
SWT 5 s
RF Att 20 dB
Unit dBm
Ref Lvl
10 dBm
1MAX
500 ms/
Center 2.402 GHz
Date: 21.APR.2003 23:43:26


Delta 1 [T1]
-3.88 dB
1.763527 ms
RBW 100 kHz
VBW 100 kHz
SWT 20 ms
RF Att 20 dB
Unit dBm
1 [T1] -68.24 dBm
8.977956 ms
1 [T1] -3.88 dB
1.763527 ms
SGL
1MA
1MAX
Ref Lvl
10 dBm
Center 2.402 GHz
2 ms/
Date: 21.APR.2003 23:51:27

DH5


SGL
1MA
Delta 1 [T1]
0.00 dB
0.000000 s
RBW 100 kHz
VBW 100 kHz
SWT 5 s
RF Att 20 dB
Unit dBm
Ref Lvl
10 dBm
1MAX
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.402 GHz
500 ms/
Date: 21.APR.2003 23:49:07


Ref Lvl
10 dBm
Delta 1 [T1]
8.21 dB
2.965932 ms
RBW 100 kHz
VBW 100 kHz
SWT 20 ms
RF Att 20 dB
Unit dBm
1 [T1]
-67.23 dBm
12.344689 ms
1 [T1]
8.21 dB
2.965932 ms
SGL
1MA
1MAX
Center 2.402 GHz
2 ms/
Date: 21.APR.2003 23:50:35

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	8564EC	4208A00662	Sept. 10, 2003

NOTES:

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 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP

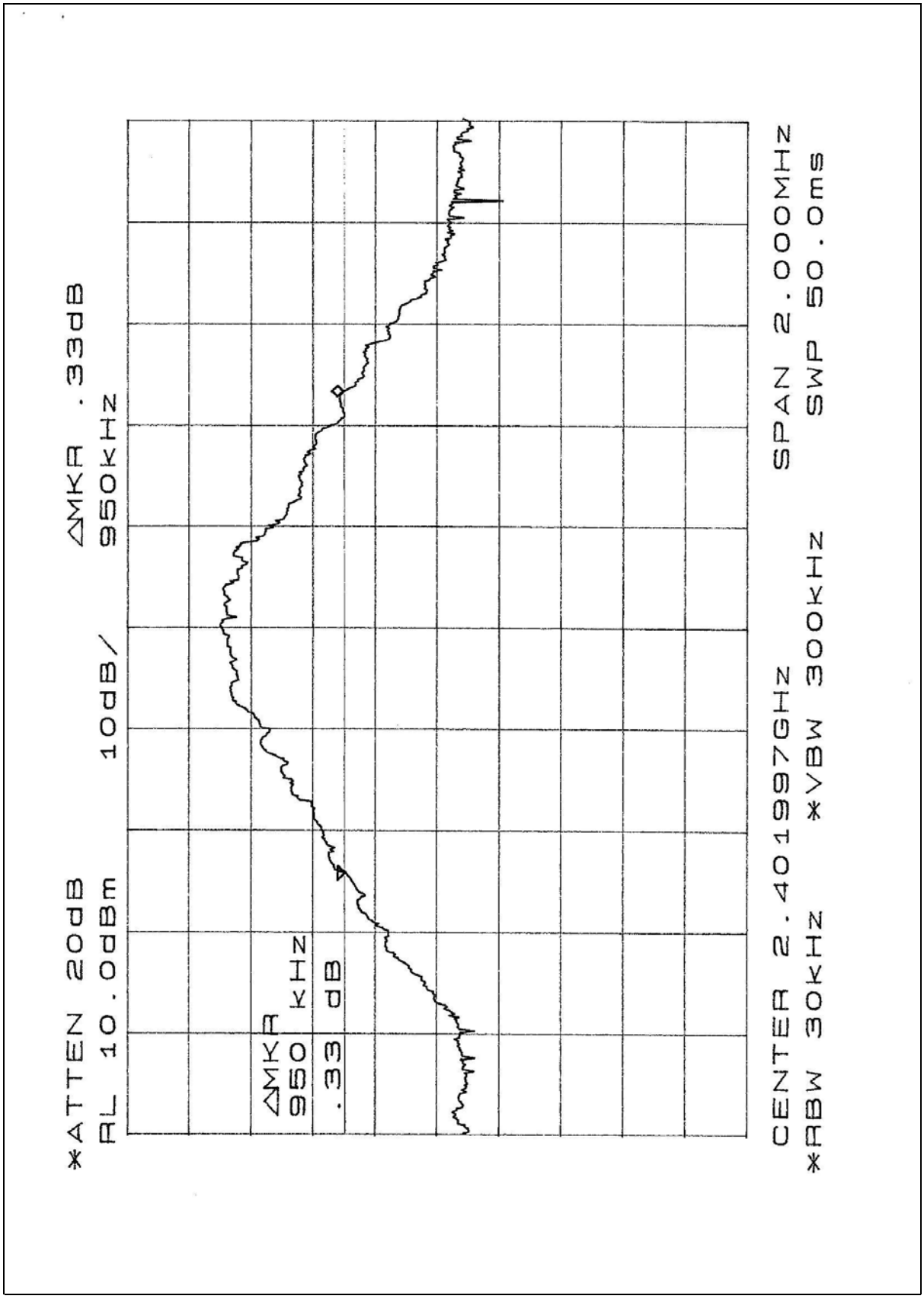
4.4.6 EUT OPERATING CONDITION

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

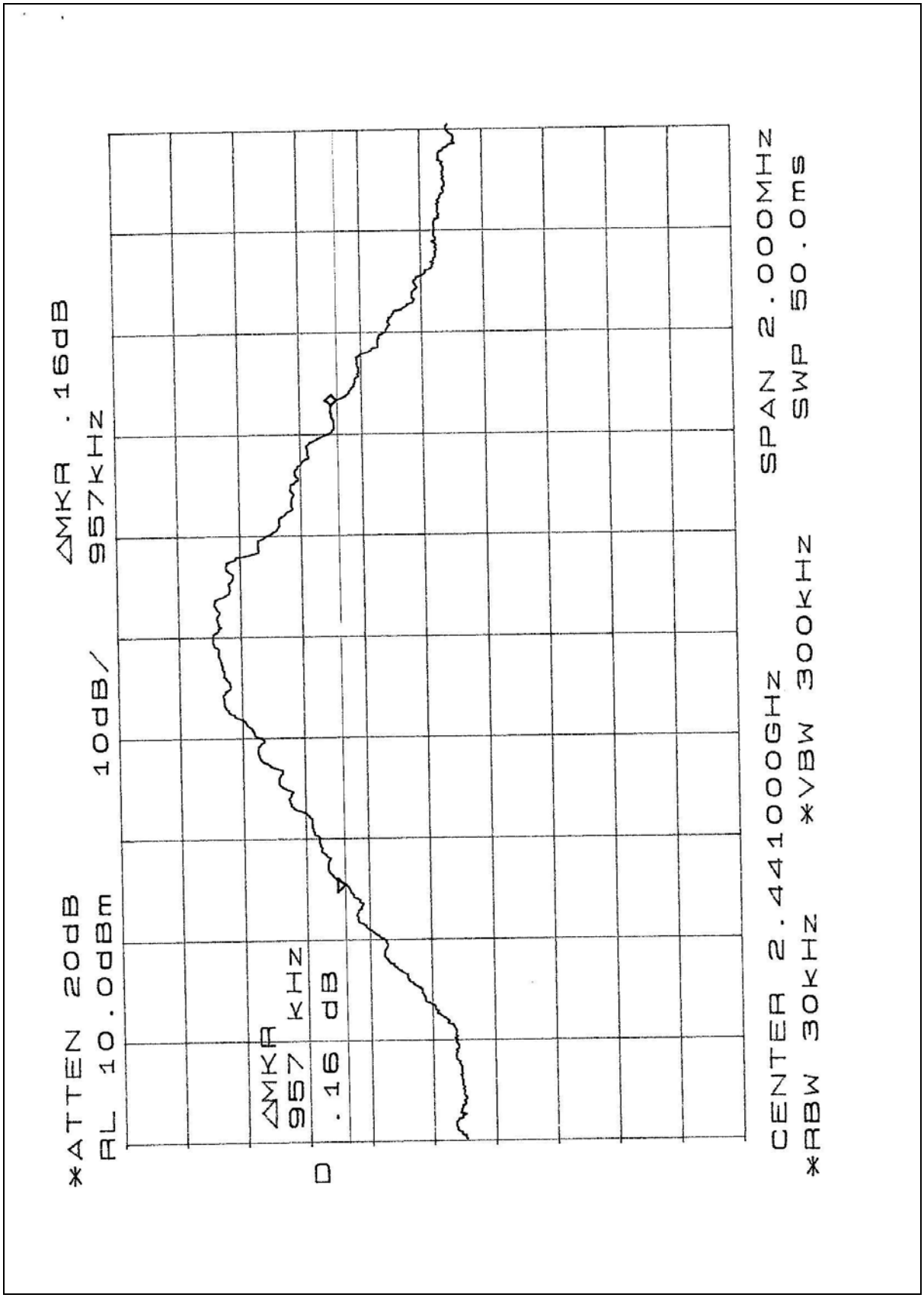
4.4.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (MHz)	PASS/FAIL
0	2402	950	1	PASS
39	2441	957	1	PASS
78	2480	927	1	PASS

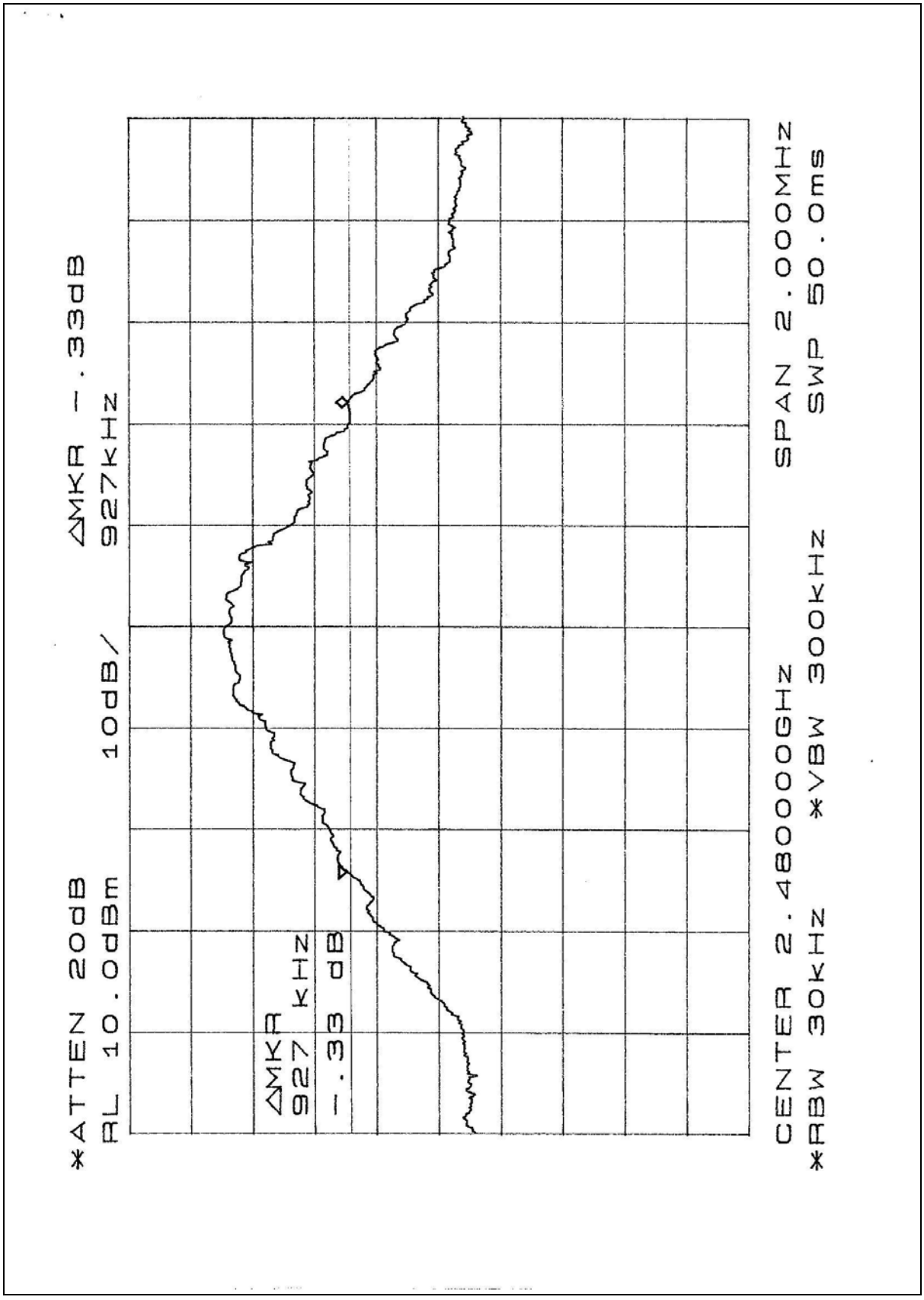
Channel 0


*ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR .33dB
950kHz
ΔMKR
950 kHz
.33 dB
CENTER 2.401997GHz
*RBW 30kHz
*VBW 300kHz
SPAN 2.000MHz
SWP 50.0ms

Channel 39


*ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR .16dB
957kHz
ΔMKR
957 kHz
.16 dB
D
CENTER 2.441000GHz
*RBW 30kHz
*VBW 300kHz
SPAN 2.000MHz
SWP 50.0ms

Channel 78


*ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.33dB
927kHz
ΔMKR
927 kHz
-.33 dB
CENTER 2.480000GHz
*RBW 30kHz
*VBW 300kHz
SPAN 2.000MHz
SWP 50.0ms

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:

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

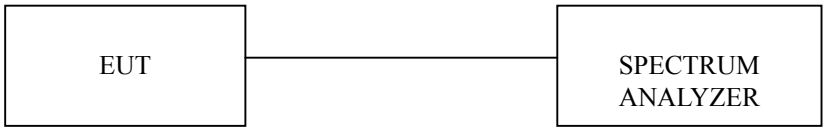
4.5.3 TEST PROCEDURES

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 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP

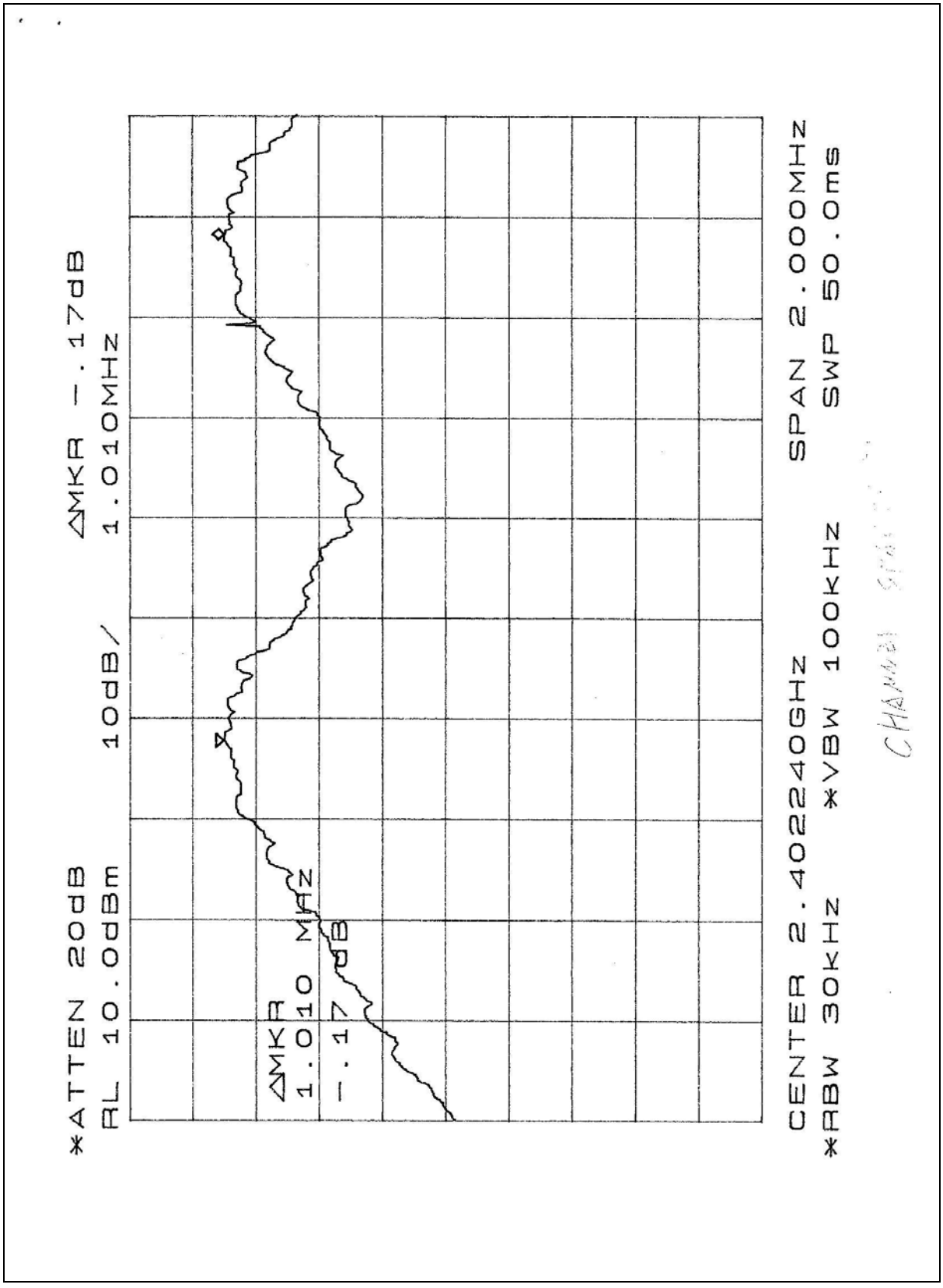


4.5.6 TEST RESULTS

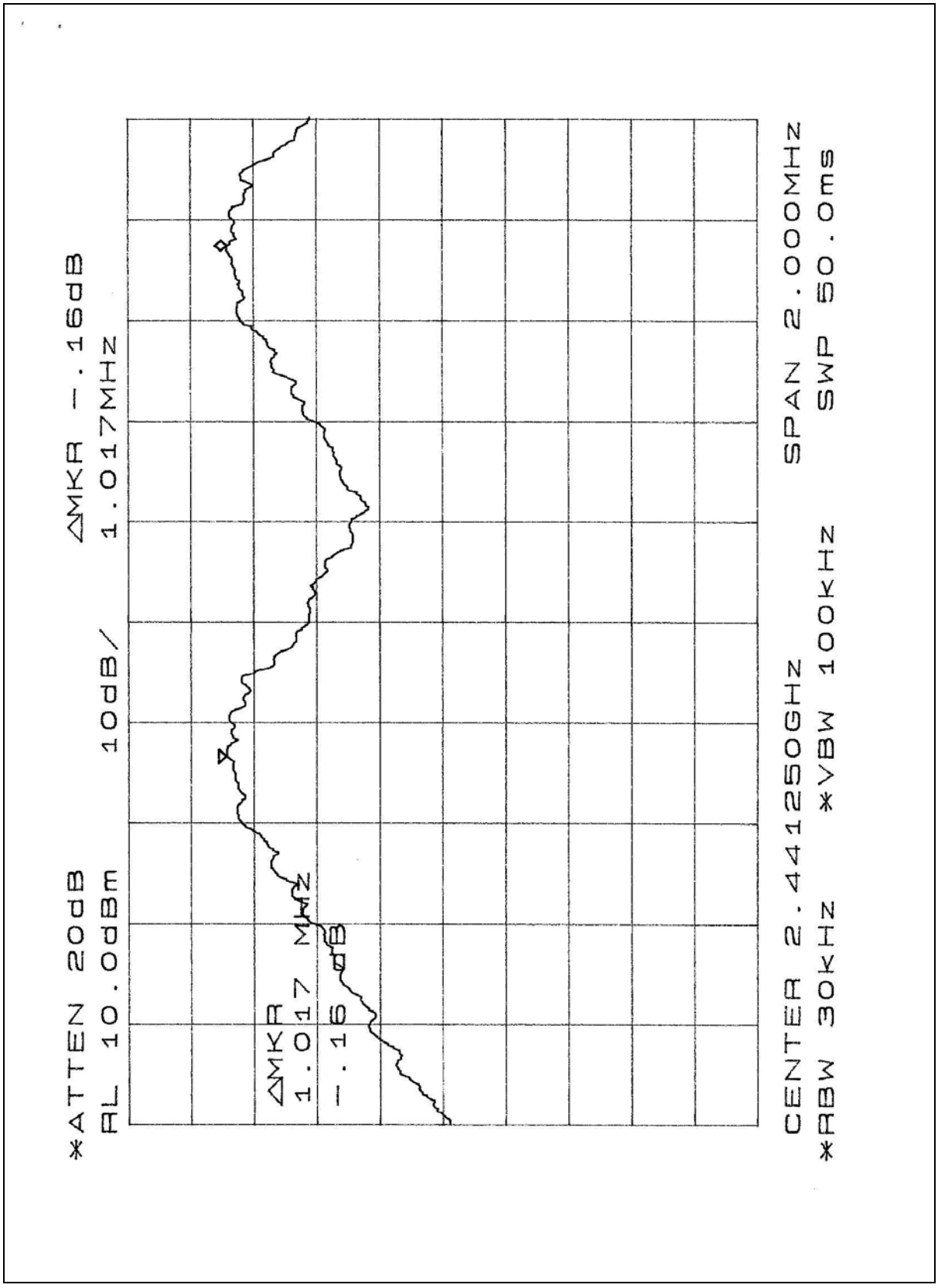
Channel	Frequency (MHz)	Adjacent Channel Separation	Minimum Limit (kHz)	Pass / Fail
0	2402	1MHz	950	PASS
39	2441	1MHz	957	PASS
78	2480	1MHz	927	PASS

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

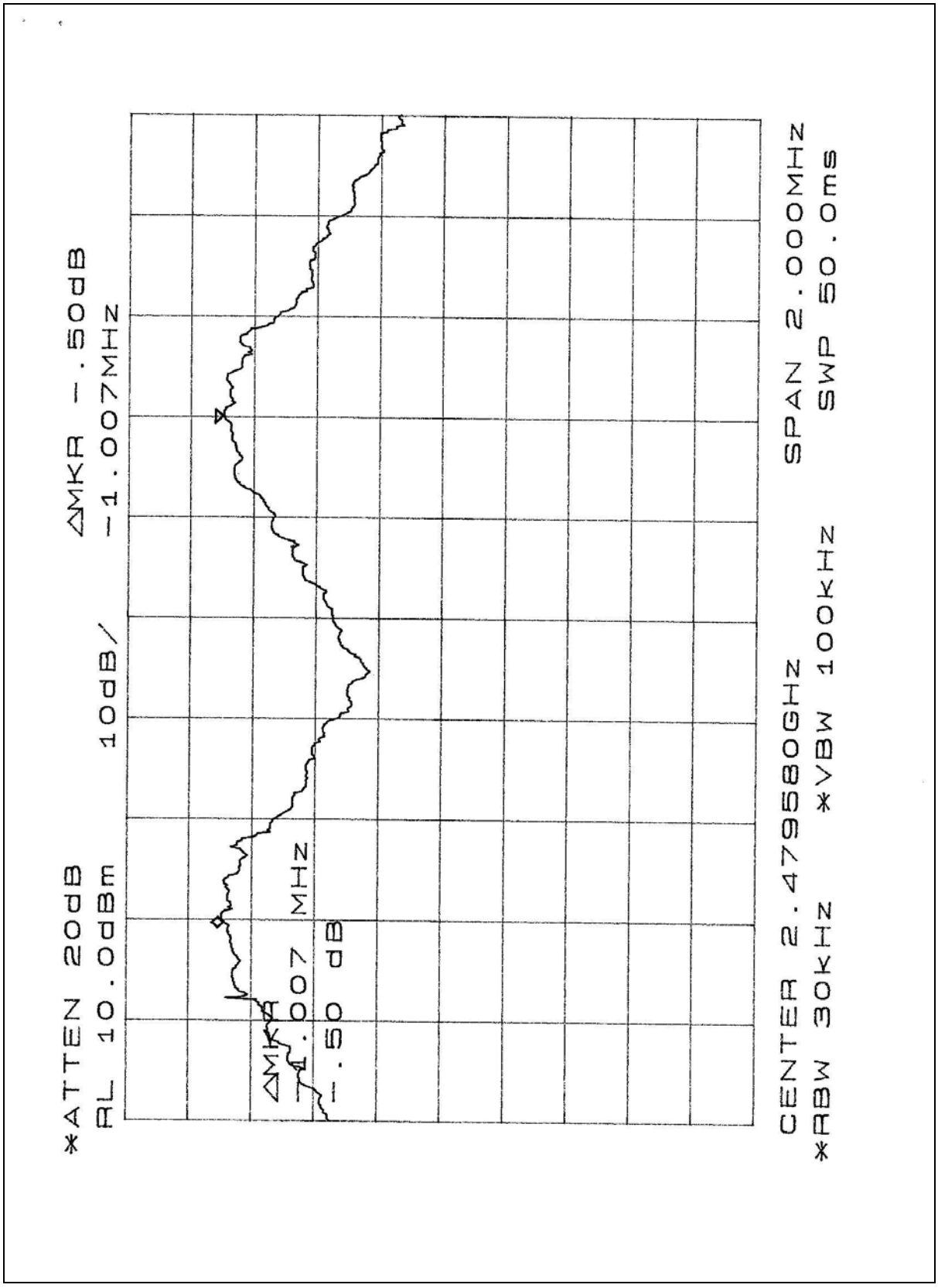
Channel 0


*ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.17dB
1.010MHz
ΔMKR
1.010 MHz
-.17 dB
CENTER 2.402240GHz
*RBW 30KHz
*VBW 100KHz
SPAN 2.000MHz
SWP 50.0ms

Channel 39


*ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.16dB
1.017MHz
ΔMKR
1.017 MHz
-.16 dB
CENTER 2.441250GHz
*RBW 30KHz
*VBW 100KHz
SPAN 2.000MHz
SWP 50.0ms

Channel 78


*ATTEN 20dB
RL 10.00dBm
10dB/
ΔMKR -.50dB
-1.007MHz
ΔMKR -1.007 MHz
-.50 dB
CENTER 2.479580GHz
SPAN 2.000MHz
*RBW 30KHz
*VBW 100KHz
SWP 50.0ms

4.6 MAXIMUM PEAK OUTPUT POWER –USING POWER METTER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.6.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYEER	FSEK30	100049	Jul. 24, 2003

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

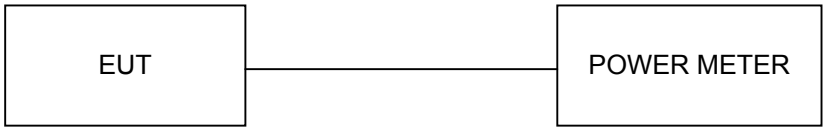
4.6.3 TEST PROCEDURES

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 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



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

4.6.6 EUT OPERATING CONDITION

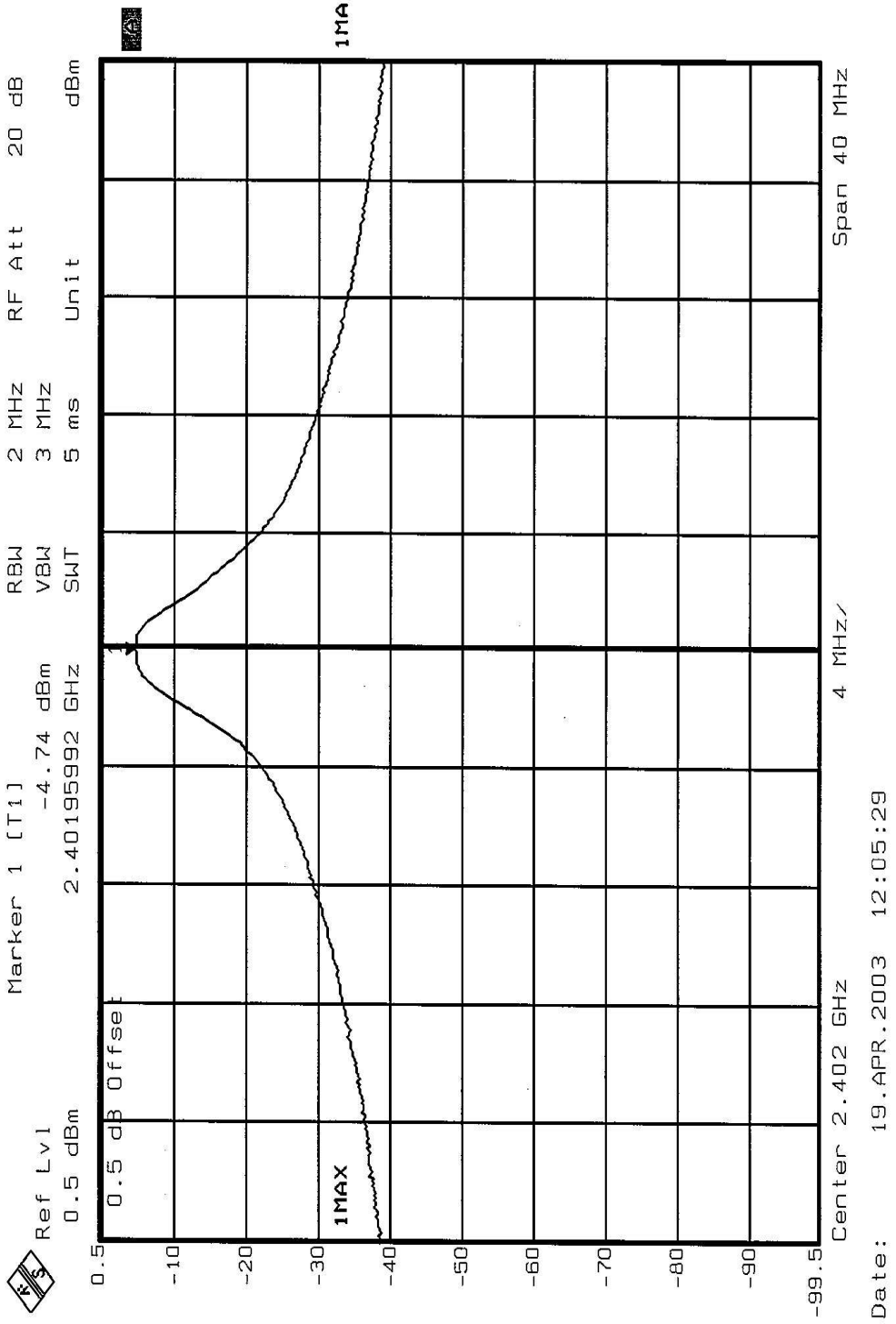
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 TEST RESULTS

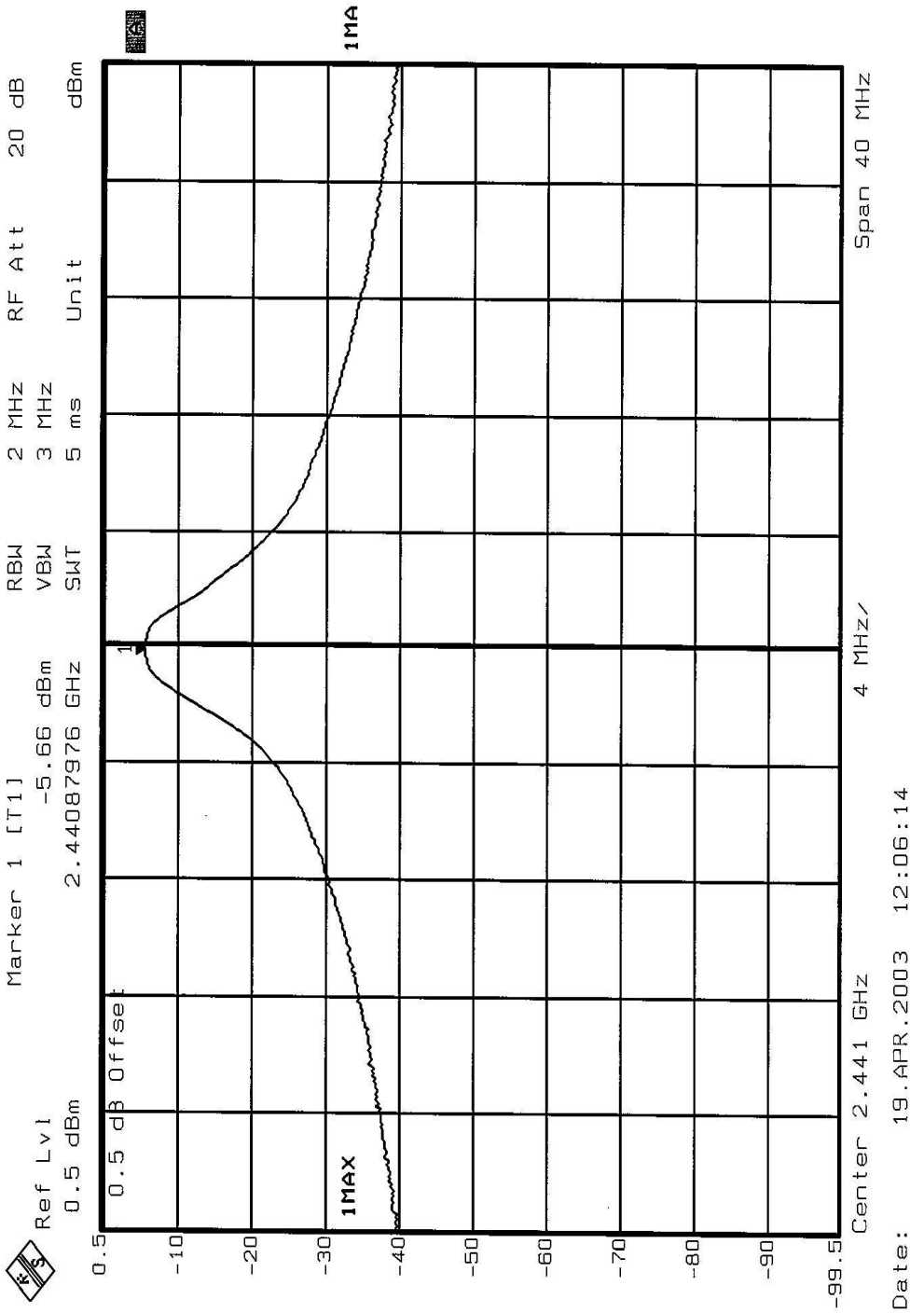
Output Power to Antenna:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	-4.74	30	PASS
39	2441	-5.66	30	PASS
78	2480	-5.53	30	PASS

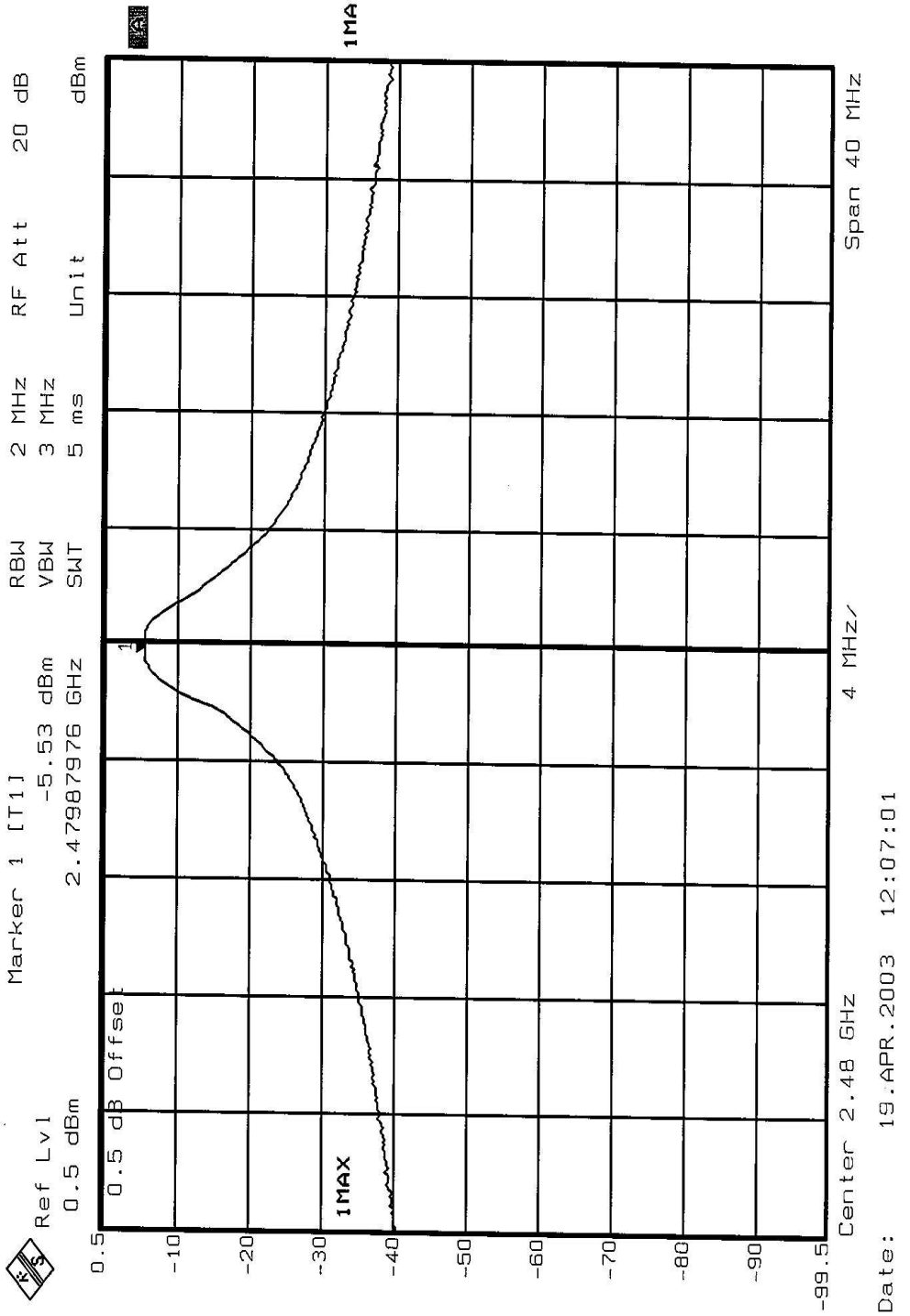
Channel 0


Ref Lvl
0.5 dBm
0.5 dB Offset
Marker 1 [T1]
-4.74 dBm
2.40195992 GHz
RBW 2 MHz
VBW 3 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm
1MA
1MAX
Span 40 MHz
4 MHz/
Center 2.402 GHz
Date: 19.APR.2003 12:05:29
0.5
-10
-20
-30
-40
-50
-60
-70
-80
-90
-99.5

Channel 39


Marker 1 [T1]
-5.66 dBm
2.44087976 GHz
Ref Lvl
0.5 dBm
0.5 dB Offset
RBW 2 MHz
VBW 3 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm
1MA
1MAX
Span 40 MHz
4 MHz/
Center 2.441 GHz
Date: 19.APR.2003 12:06:14

Channel 78


Marker 1 [T1]
-5.53 dBm
2.47987976 GHz
RBW 2 MHz
VBW 3 MHz
SWT 5 ms
RF Att 20 dB
Unit dBm
Ref Lvl
0.5 dBm
0.5 dB Offset
1MA
1MAX
Span 40 MHz
4 MHz/
Center 2.48 GHz
Date: 19.APR.2003 12:07:01

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

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	May 1, 2004
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01292	Aug. 07, 2003
*Spectrum Analyzer	8593E	3926A04191	Mar. 24, 2004
*Test Receiver	ESI7	838496/016	Feb. 23, 2004
SCHAFFNER Tunable Dipole Antenna SCHWARZBECK Tunable Dipole Antenna	VHBA 9123 UHA 9105	459 977	Nov. 22, 2003
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 02, 2003
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 03, 2003
* EMCO Horn Antenna	3115	9312-4192	Mar. 23, 2004
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	ADT_Radiated _V5.09	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Jul. 11. 2003
* TIMES RF cable	LMR-600	CABLE-ST5-01	Jul. 11. 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. 5.
5. The VCCI Site Registration No. is R-1039.

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.

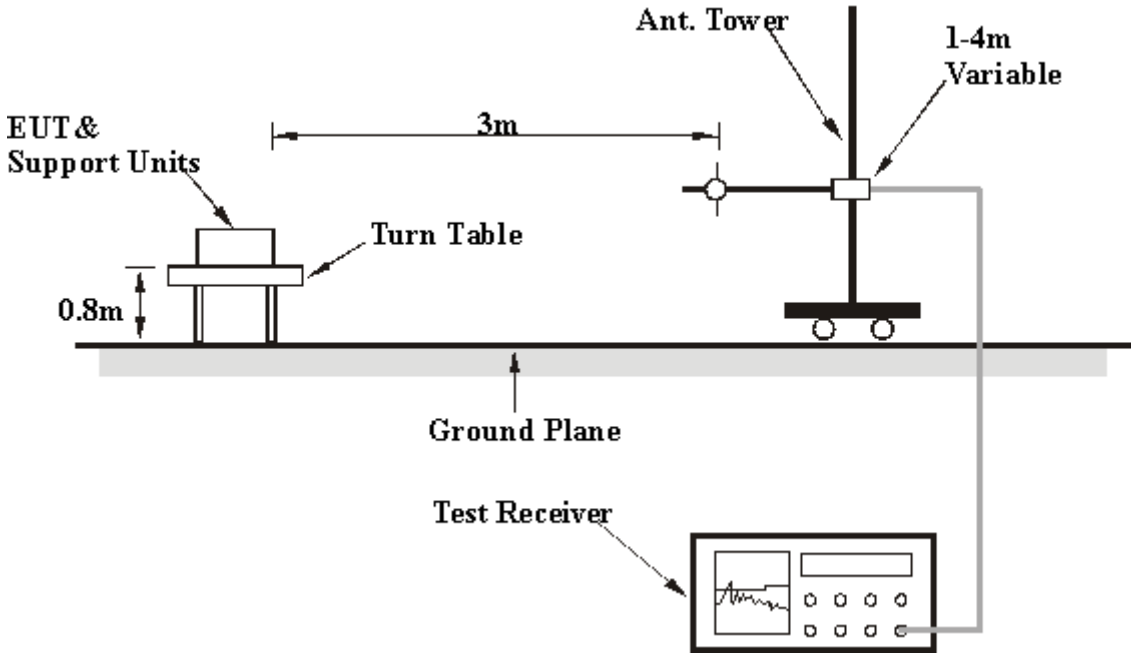
NOTE:

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 TEST RESULTS(A)

Digital Portion:

EUT	IMAGE VIEWER	**MODEL**	SU-2
MODE	Channel 78	**FREQUENCY RANGE**	Below 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27 deg. C, 70%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)	Correction Factor (dB/m)
1	189.01	24.0 QP	43.50	-19.50	1.49 H	207	13.20	10.80
2	192.00	28.8 QP	43.50	-14.70	1.49 H	310	18.00	10.80
3	216.00	31.2 QP	43.50	-12.30	1.75 H	183	18.80	12.40
4	239.99	35.0 QP	46.00	-11.00	1.38 H	180	20.30	14.70
5	288.00	33.8 QP	46.00	-12.20	1.09 H	345	17.20	16.60
6	336.00	39.8 QP	46.00	-6.20	1.14 H	132	22.30	17.40
7	384.01	42.3 QP	46.00	-3.70	1.00 H	143	23.70	18.70

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)	Correction Factor (dB/m)
1	192.01	26.6 QP	43.50	-16.90	1.44 V	205	15.80	10.80
2	192.03	26.0 QP	43.50	-17.50	1.20 V	164	15.20	10.80
3	216.00	28.6 QP	46.00	-17.40	1.53 V	204	16.20	12.40
4	240.01	32.7 QP	46.00	-13.30	1.11 V	236	18.00	14.70
5	249.28	25.7 QP	46.00	-20.30	1.36 V	67	10.20	15.50
6	288.01	29.8 QP	46.00	-16.20	1.48 V	110	13.20	16.60
7	311.66	32.9 QP	46.00	-13.10	1.14 V	146	15.90	17.00

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.

4.7.7 TEST RESULTS(B)

EUT	IMAGE VIEWER	**MODEL**	SU-2
MODE	Channel 78	**FREQUENCY RANGE**	Below 1000 MHz
INPUT POWER (SYSTEM)	6.0V from Battery	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	30 deg. C, 62%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)	Correction Factor (dB/m)
1	160.01	24.7 QP	43.50	-18.80	2.00 H	52	13.80	10.80
2	189.01	28.4 QP	43.50	-15.10	1.59 H	208	17.70	10.80
3	192.01	28.0 QP	43.50	-15.50	1.59 H	198	17.10	10.80
4	216.00	35.5 QP	43.50	-8.00	2.07 H	30	23.10	12.40
5	240.00	40.4 QP	46.00	-5.60	1.12 H	170	25.70	14.70
6	252.01	35.8 QP	46.00	-10.20	1.93 H	44	20.00	15.80
7	288.01	33.6 QP	46.00	-12.40	1.13 H	80	17.00	16.60

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)	Correction Factor (dB/m)
1	160.03	25.2 QP	43.50	-18.30	1.99 V	144	14.40	10.80
2	216.01	25.6 QP	46.00	-20.40	1.25 V	223	13.10	12.40
3	240.01	36.6 QP	46.00	-9.40	2.67 V	110	22.00	14.70
4	252.23	30.7 QP	46.00	-15.30	2.28 V	50	14.80	15.90
5	264.13	30.9 QP	46.00	-15.10	2.64 V	102	14.20	16.70
6	288.02	28.4 QP	46.00	-17.60	1.04 V	82	11.80	16.60

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
5. The other emission levels were very low against the limit.

4.7.8 TEST RESULTS

RF Portion :

EUT	IMAGE VIEWER	**MODEL**	SU-2
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)	Correction Factor (dB/m)
1	*2402.00	90.9 PK			1.26 H	133	61.30	29.60
1	*2402.00	60.9 AV			1.26 H	133	29.80	31.30
2	4804.00	44.9 PK	74.00	-29.10	1.84 H	204	9.70	35.20

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)	Correction Factor (dB/m)
1	*2402.00	94.1 PK			1.27 V	327	58.90	35.20
1	*2402.00	64.1 AV			1.27 V	327	28.90	35.20
2	4804.00	45.1 PK	74.00	-28.90	1.44 V	119	9.90	35.20

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.
6. 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: 20log(3.125/100)= -30dB
7. Average value = peak reading –20log(duty cycle)

EUT	IMAGE VIEWER	MODEL	SU-2
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)	Correction Factor (dB/m)
1	*2441.00	93.5 PK			1.51 H	276	63.80	29.80
1	*2441.00	63.5 AV			1.51 H	276	33.80	29.80
2	4882.00	45.2 PK	74.00	-28.80	1.44 H	67	9.70	35.50

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)	Correction Factor (dB/m)
1	*2441.00	87.0 PK			1.24 V	134	57.20	29.80
1	*2441.00	57.0 AV			1.24 V	134	27.20	29.80
2	4882.00	47.2 PK	74.00	-26.80	1.72 V	6	11.70	35.50

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.
6. 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: 20log(3.125/100)= -30Db
7. Average value = peak reading –20log(duty cycle)

EUT	IMAGE VIEWER	MODEL	SU-2
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)	Correction Factor (dB/m)
1	*2480.00	93.3 PK			1.10 H	176	63.40	29.90
1	*2480.00	63.3 AV			1.10 H	176	33.40	29.90
2	4960.00	46.2 PK	74.00	-27.80	1.25 H	51	10.40	35.80

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)	Correction Factor (dB/m)
1	*2480.00	88.2 PK			1.10 V	186	58.30	29.90
1	*2480.00	58.2 AV			1.10 V	186	28.30	29.90
2	4960.00	48.5 PK	74.00	-25.50	1.37 V	211	12.70	35.80

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.
6. 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: 20log(3.125/100)= -30dB
7. Average value = peak reading –20log(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:

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 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 EUT OPERATING CONDITION

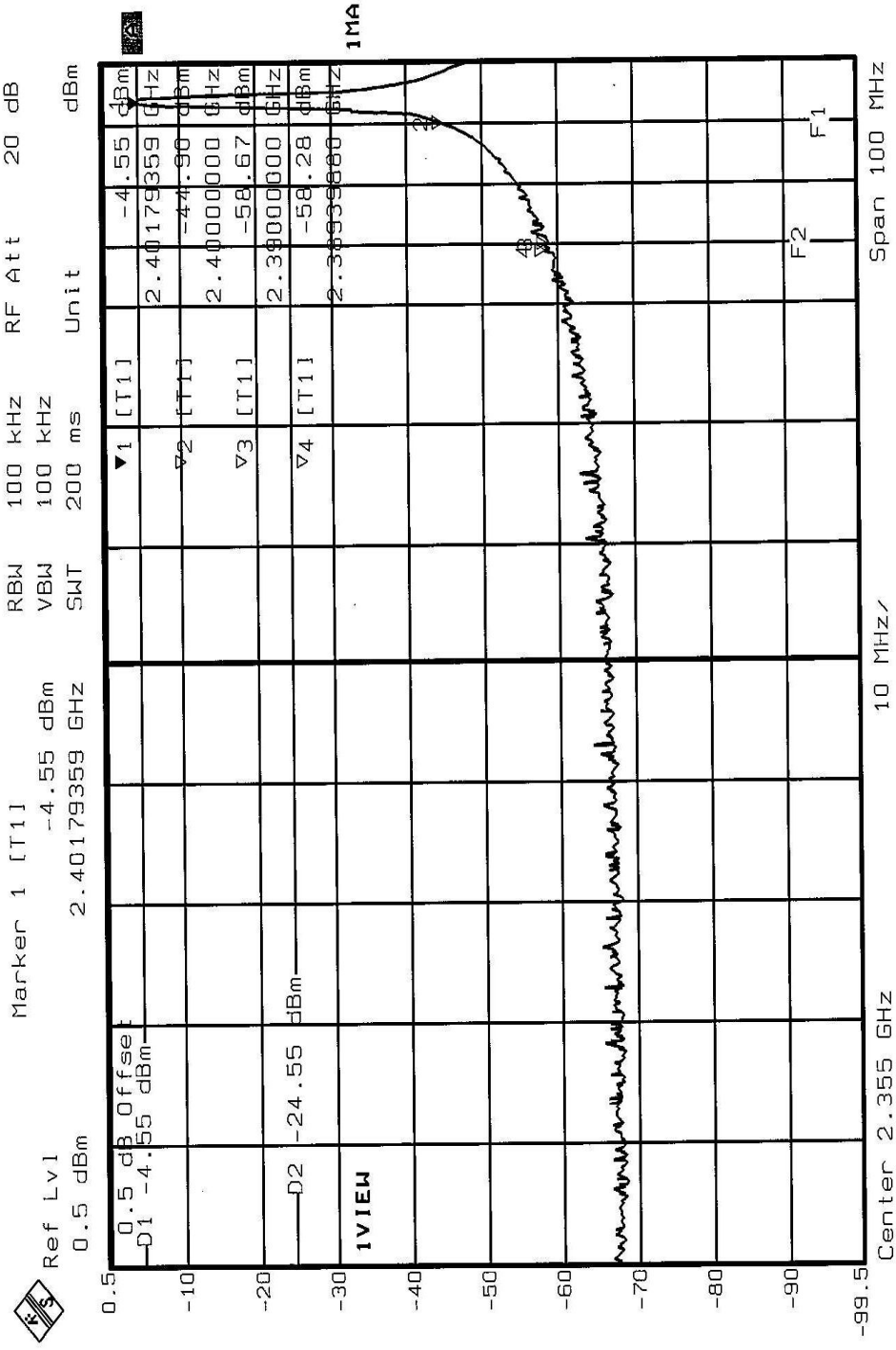
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

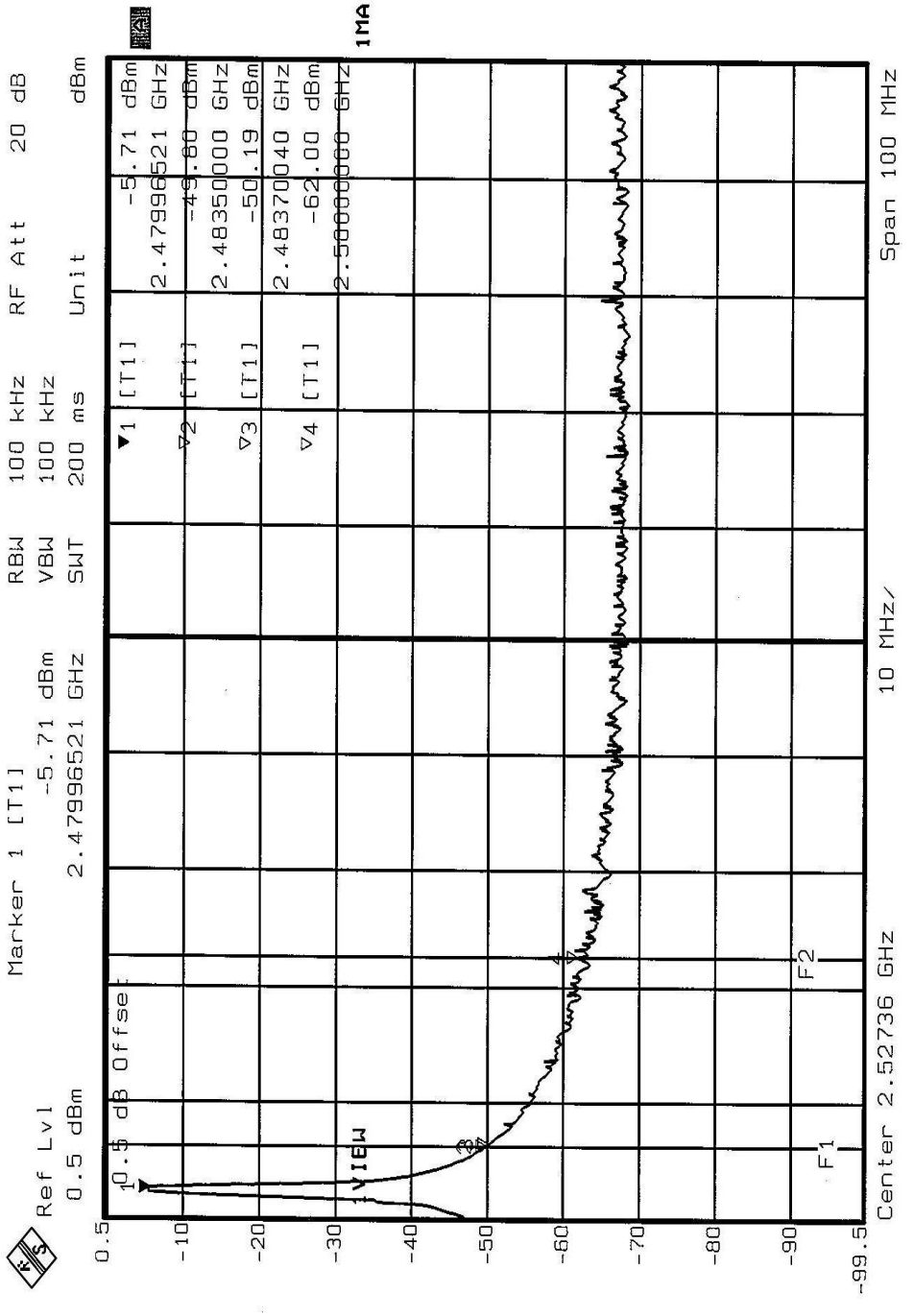
4.8.6 TEST RESULTS

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 first page shows 53.73dB delta between carrier maximum power and local maximum emission in restrict band (2.389GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.7.8 is 64.1dBuV/m, so the maximum field strength in restrict band is 64.1-53.73=11.37dBuV/m which is under 54 dBuV/m limit.

NOTE: The band edge emission plot on the following second page shows 44.09dB 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 4.7.8 is 63.3dBuV/m, so the maximum field strength in restrict band is 63.3-44.09=19.21dBuV/m which is under 54 dBuV/m limit.


Marker 1 [T1]
-4.55 dBm
2.40179359 GHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Unit dBm
Ref Lvl
0.5 dBm
0.5 dB Offset
D1 -4.55 dBm
D2 -24.55 dBm
1VIEW
1MA
Center 2.355 GHz
10 MHz/
Span 100 MHz
F1
F2
Date: 19.APR.2003 12:27:03


Marker 1 [T1]
-5.71 dBm
2.47996521 GHz
RBW 100 kHz
VBW 100 kHz
SWT 200 ms
RF Att 20 dB
Unit dBm
Ref Lvl
0.5 dBm
0.5 dB Offset
VIEW
1MA
Center 2.52736 GHz
10 MHz/
Span 100 MHz
Date: 19.APR.2003 12:20:58
F1
F2
1 [T1] -5.71 dBm 2.47996521 GHz
2 [T1] -49.80 dBm 2.48350000 GHz
3 [T1] -50.19 dBm 2.48370040 GHz
4 [T1] -62.00 dBm 2.50000000 GHz

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 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

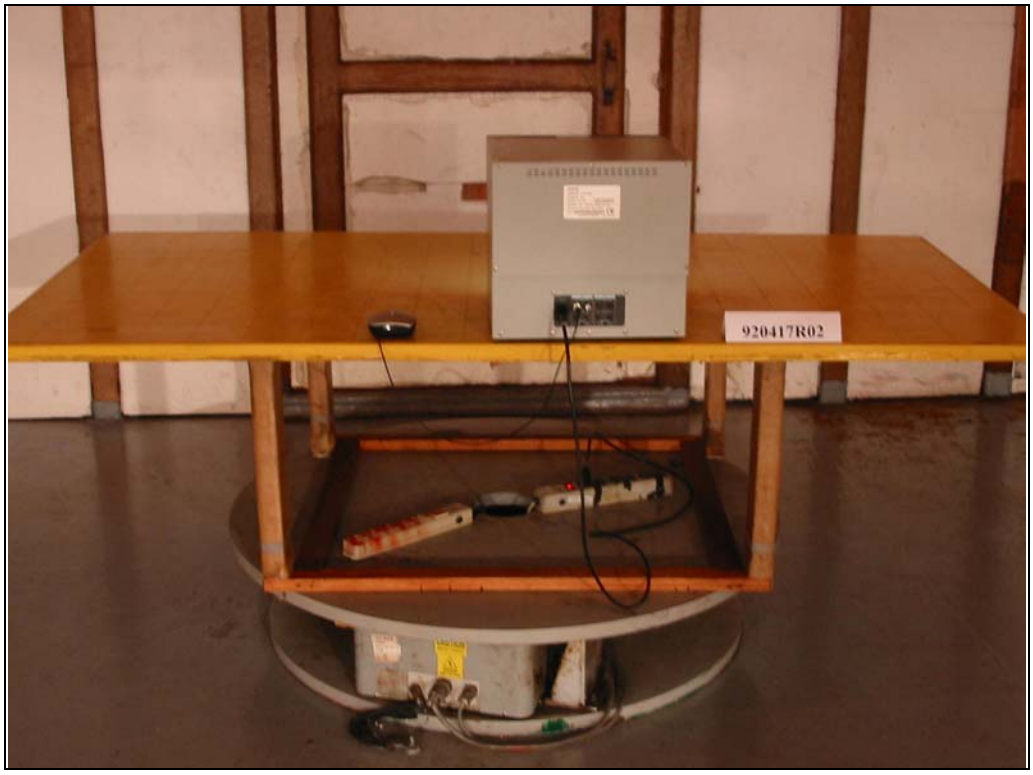
4.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Chip Antenna without antenna connector. The maximum Gain of this antenna is only 1dBi.

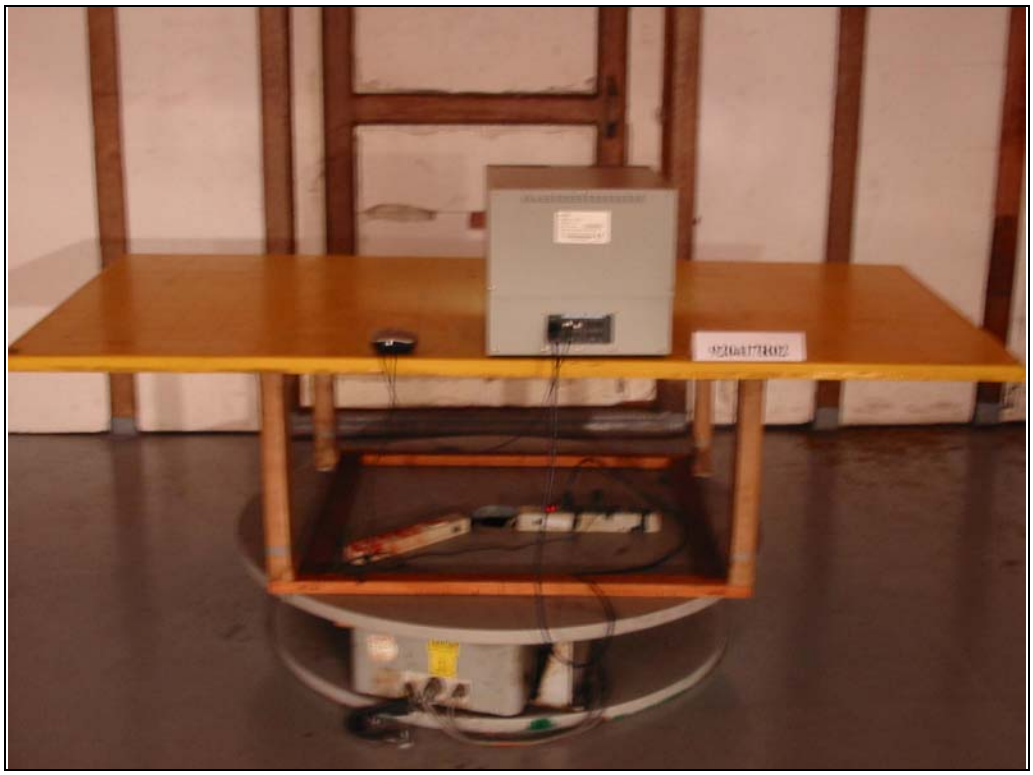
5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST




920417R02



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: www.adt.com.tw/index.5/phtml.

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

Lin Kou EMC Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC Lab:
Tel: 886-35-935343
Fax: 886-35-935342

Lin Kou Safety Lab:
Tel: 886-2-26093195
Fax: 886-2-26093184

Lin Kou RF&Telecom Lab
Tel: 886-3-3270910
Fax: 886-3-3270892

Email: service@mail.adt.com.tw
Web Site: www.adt.com.tw

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