FCC TEST REPORT

REPORT NO.: RF921112R02
MODEL NO.: BT-0310
RECEIVED: November 12, 2003
TESTED: November 19 ~ November 20, 2003

APPLICANT: CC&C TECHNOLOGIES INC.

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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
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Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT :	Bluetooth Wireless/USB Keyboard
BRAND NAME :	CC&C
MODEL NO. :	BT-0310
TEST ITEM :	ENGINEERING SAMPLE
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 November 19, 2003 to November 20, 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.

PREPARED BY: Stacy Hsueh. , **DATE:** November 21, 2003

Stacy Hsueh

APPROVED BY: Ellis Wu , **DATE:** November 21, 2003

Ellis Wu /
Technical 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**
15.107	AC Power Conducted Emission Limit: 48dBuV	NA	NA
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 –2.00 dB at 79.99MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

Note: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth Wireless/USB Keyboard
MODEL NO.	BT-0310
POWER SUPPLY	6Vdc from battery
MODULATION TYPE	FHSS (GFSK)
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	3.46dBm
ANTENNA TYPE	Printed Antenna
ANTENNA GAIN	2dBi
DATA CABLE	USB (1.8m shielded cable)
I/O PORTS	USB Port
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is the Bluetooth Wireless keyboard, the test report includes the Bluetooth Wireless function. But the Keyboard used the USB interface function in the 15B report.
2. For a more detailed features description, please refer to the manufacturer's specifications or User's Manual

3.2 DESCRIPTION OF TEST MODES

Seventy-nine channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2431	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

The EUT (Bluetooth Wireless/USB Keyboard) has been tested under operating and standby condition. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel 0, 39 and 78 are chosen for testing to fulfill the requirement of frequency spectrum usage in each country.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth Wireless/USB Keyboard. 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 test items 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.

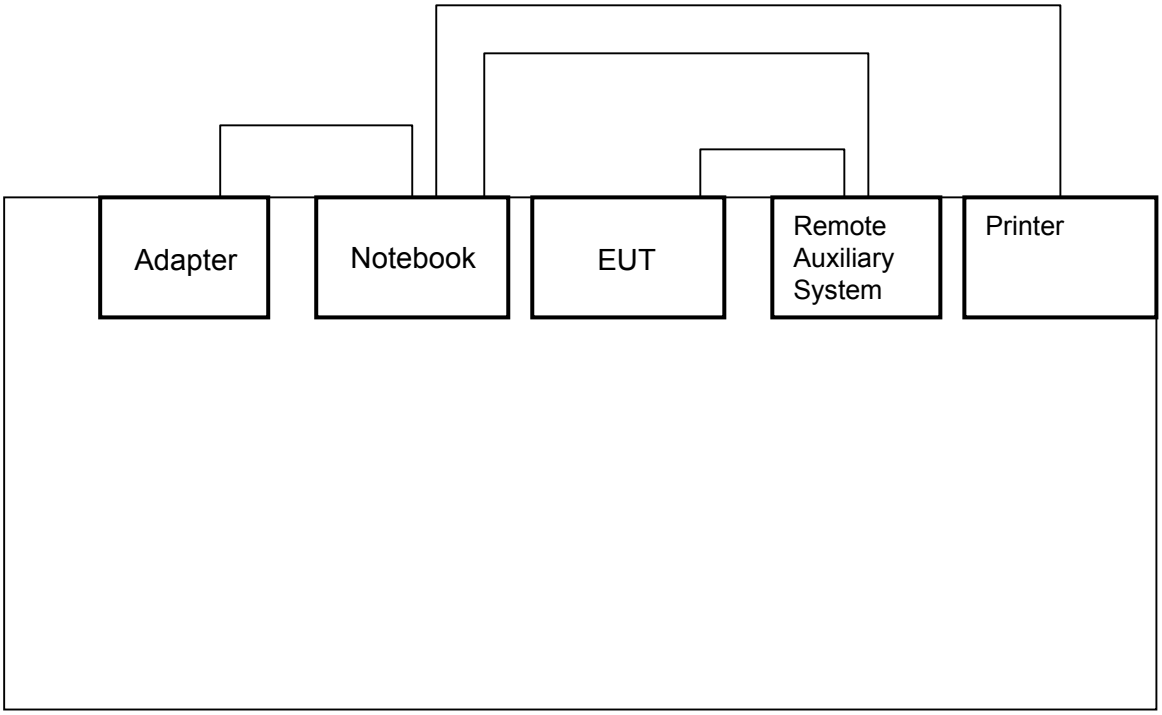
3.4 DESCRIPTION OF SUPPORT UNITS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	DELL	PP01L	TW-0791UH-12800-123-5423	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017058	FCC DoC Approved

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

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

NA

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	Aug. 12, 2004

NOTE:

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

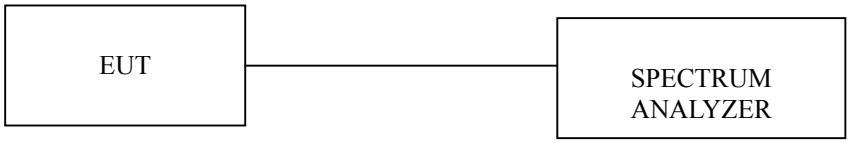
4.2.3 TEST PROCEDURES

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

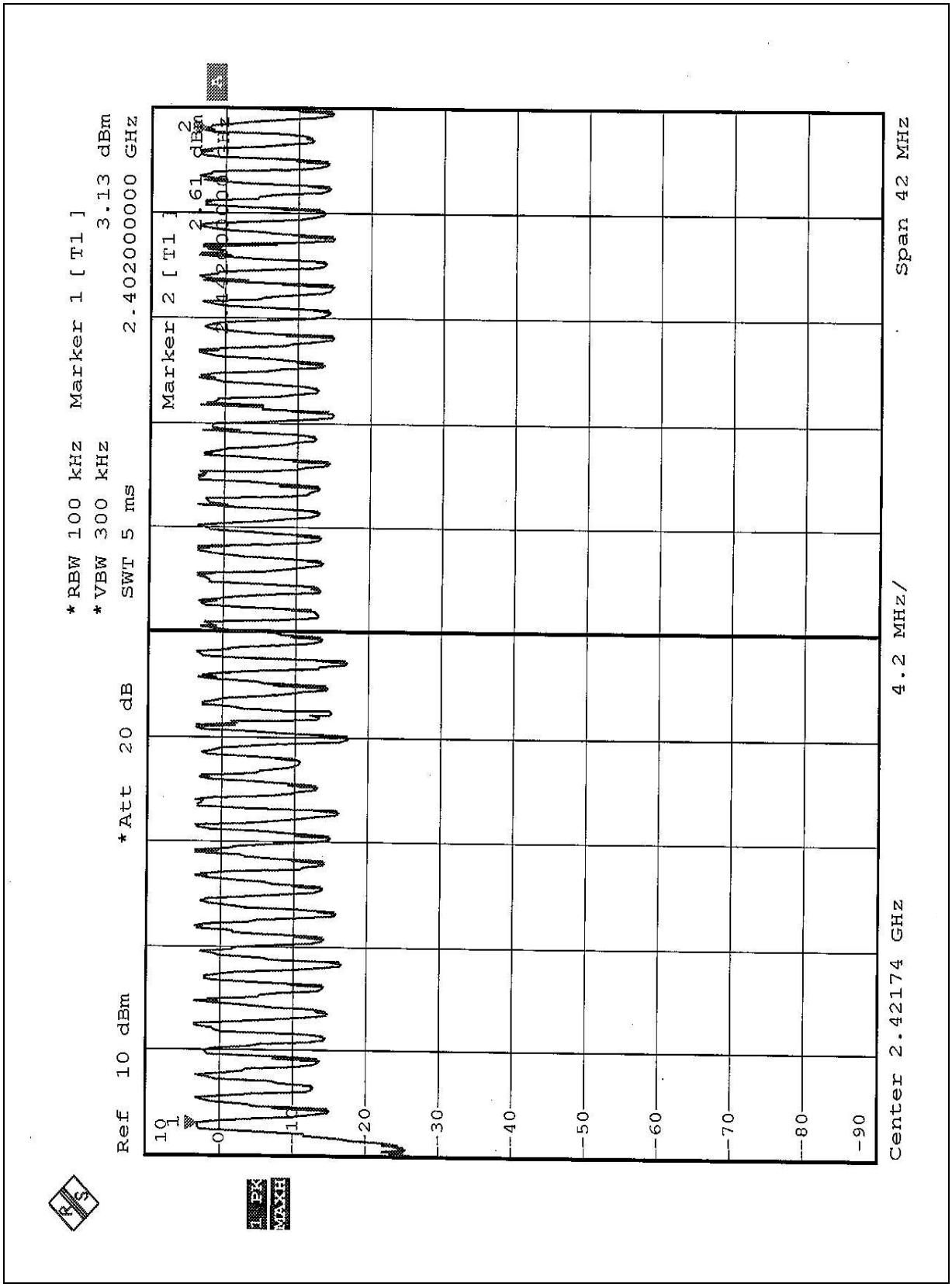
No deviation

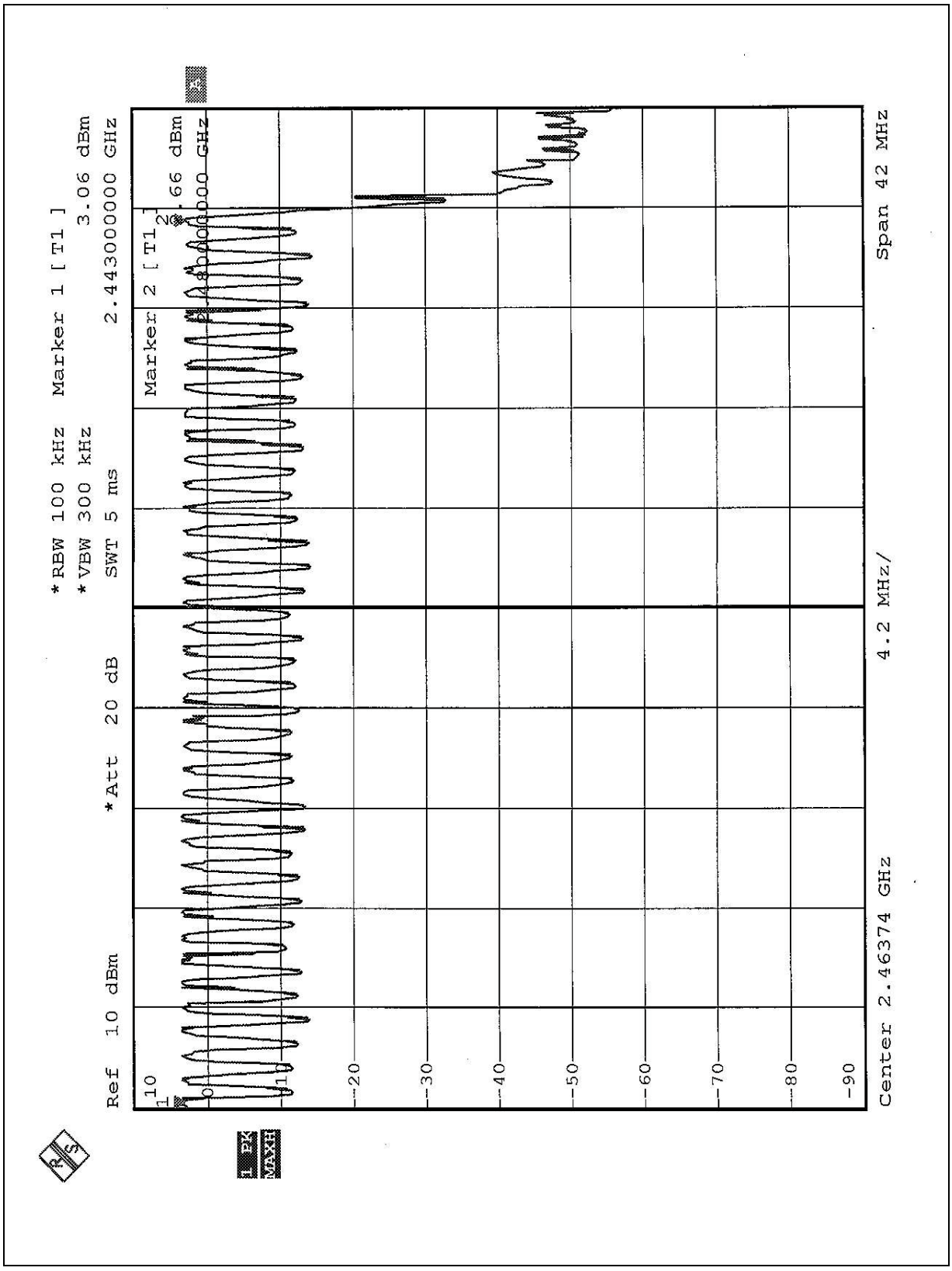
4.2.5 TEST SETUP



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.


Ref 10 dBm
*Att 20 dB
*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
3.13 dBm
2.402000000 GHz
Marker 2 [T1]
2.61 dBm
2.442000000 GHz
Center 2.42174 GHz
4.2 MHz/
Span 42 MHz
1 PK
MAXH


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
3.06 dBm
2.443000000 GHz
Marker 2 [T1]
Ref 10 dBm
*Att 20 dB
Center 2.46374 GHz
4.2 MHz/
Span 42 MHz
1 PK
MAXH

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	Aug. 12, 2004

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

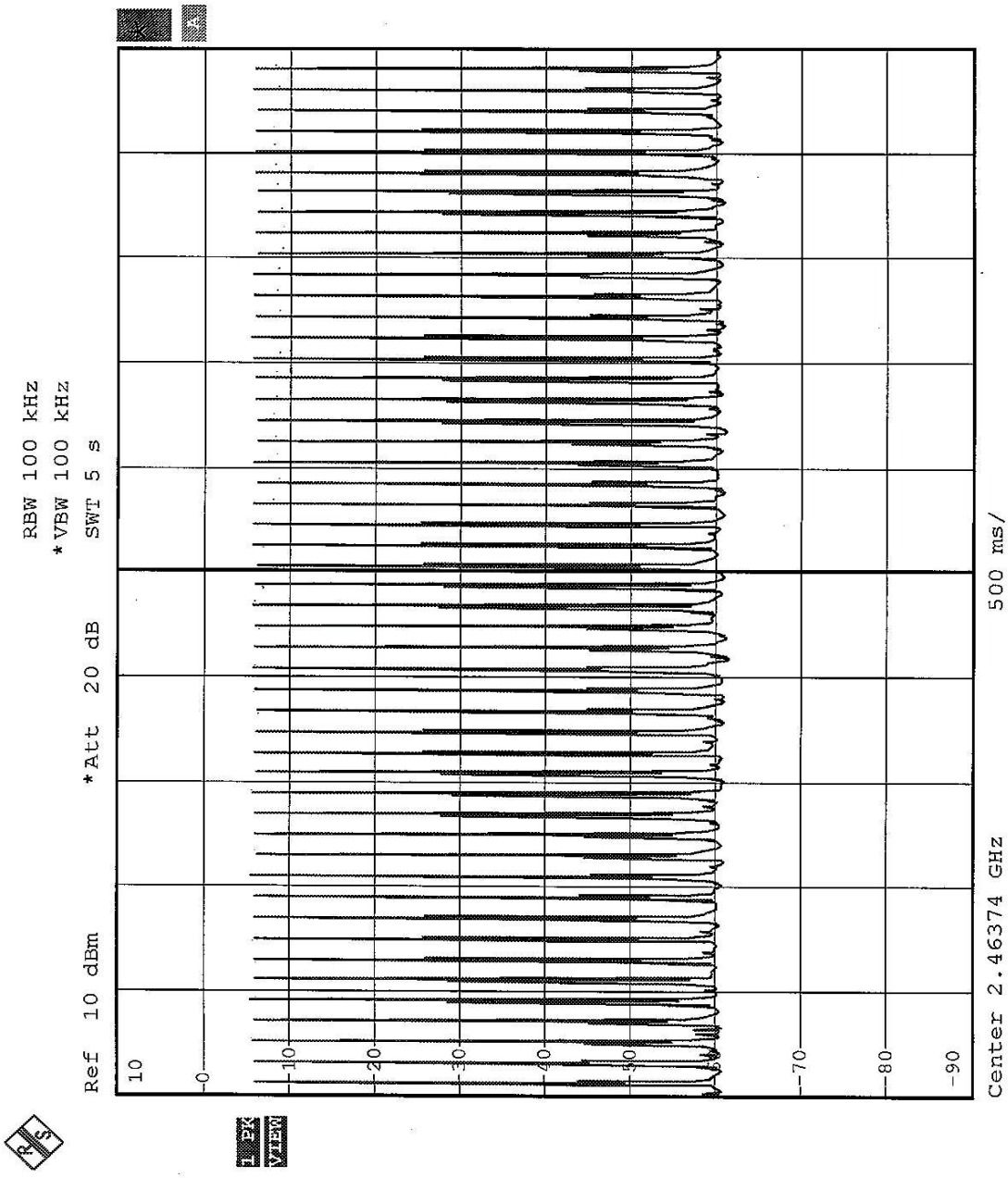
4.3.5 TEST SETUP

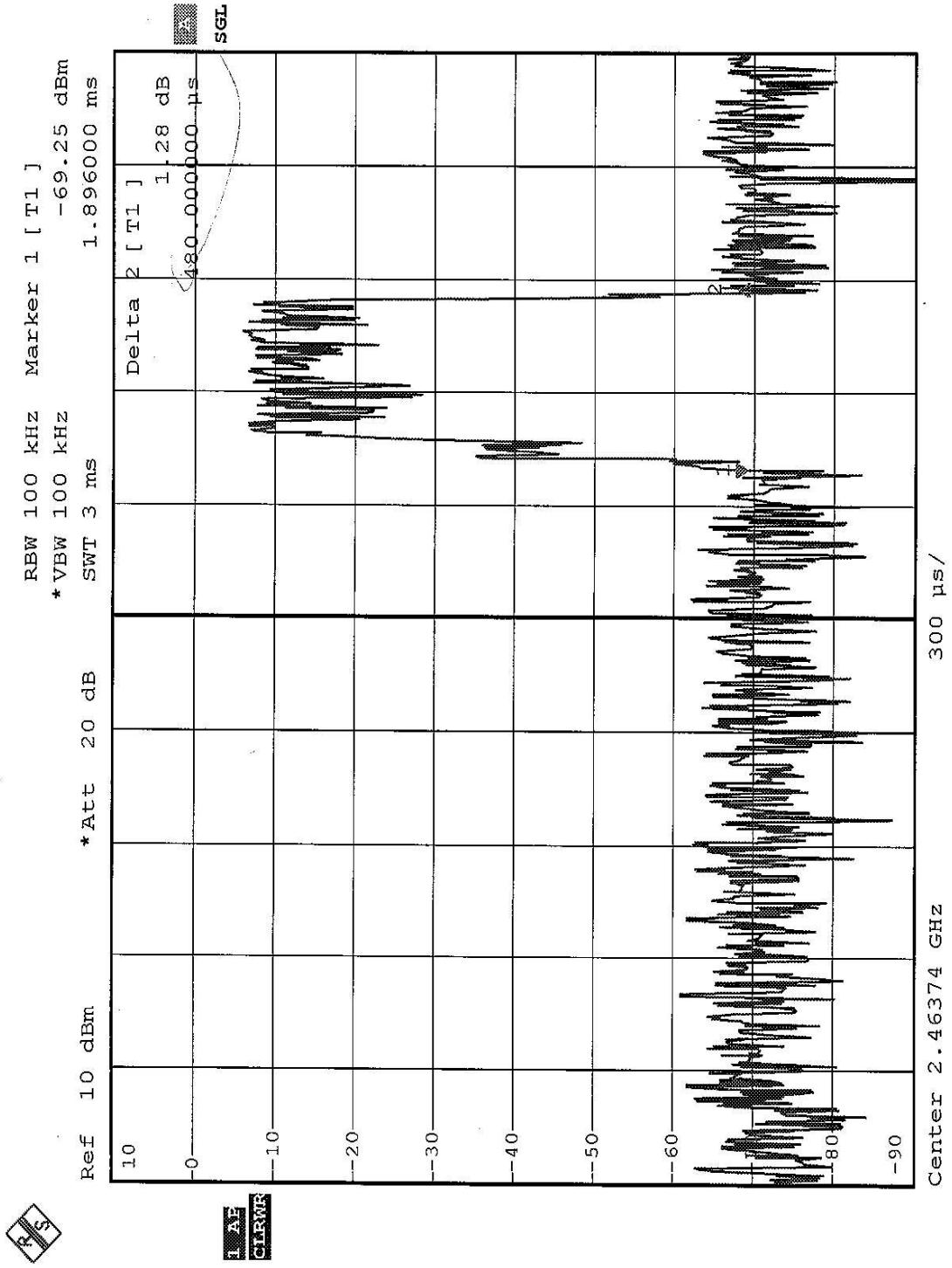
4.3.6 TEST RESULTS

DH1-Packet

The system makes worst case 50 hops per 5 second each hop length of 0.48ms with 1 channel. So you have each channel 316 times per 31.6 second .

So we have 316*0.48ms=151.68 ms per 31.6 seconds.

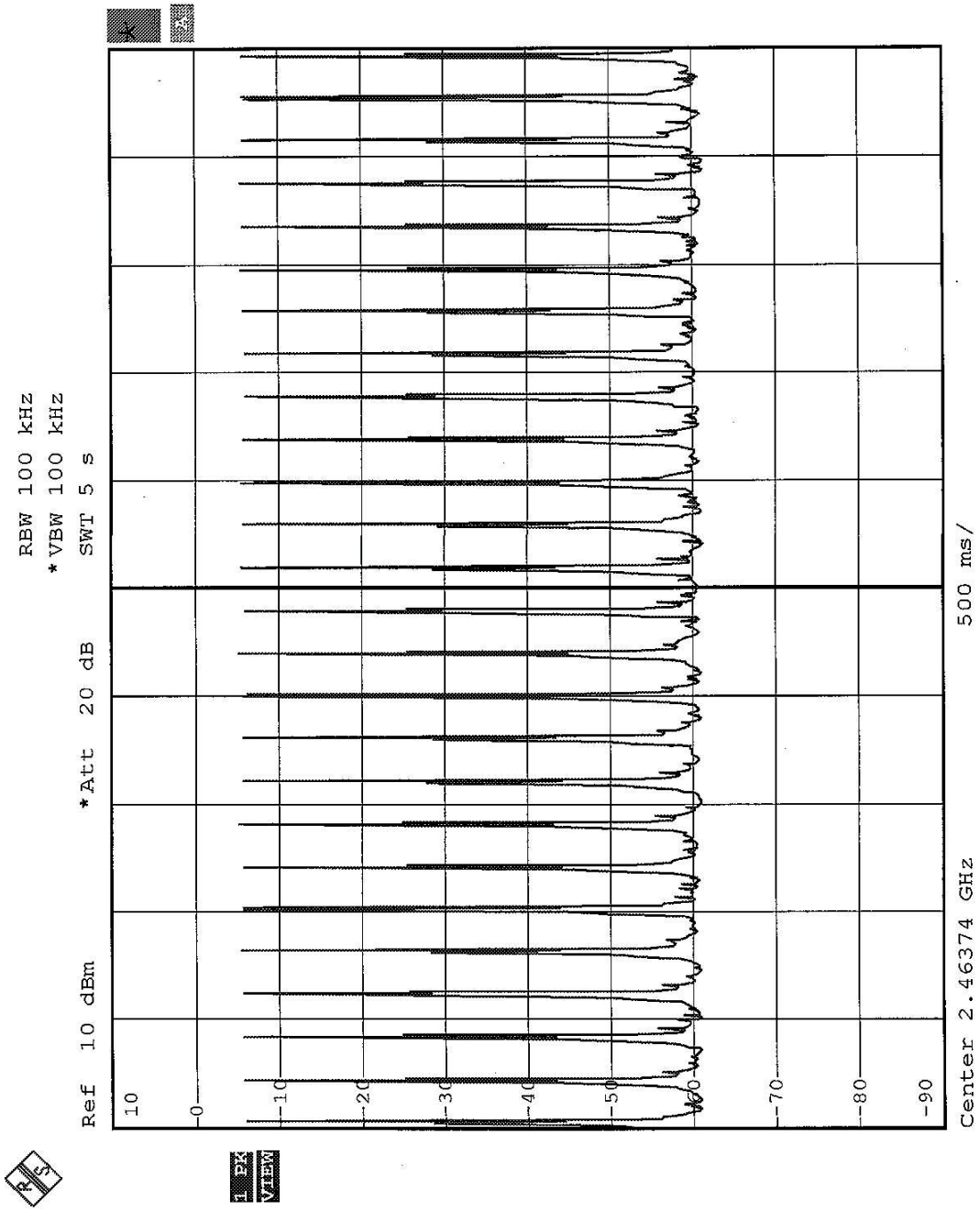


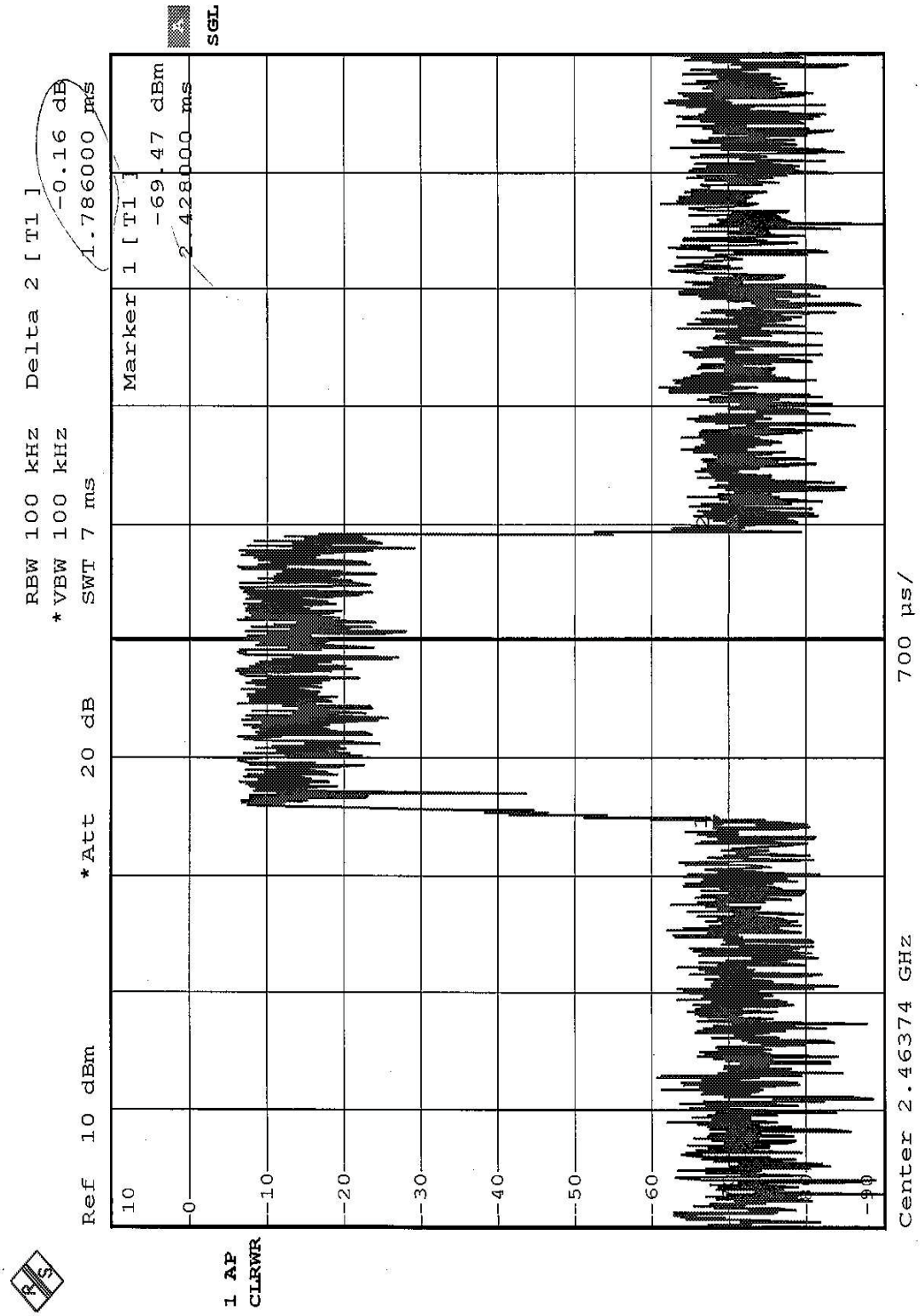

Ref 10 dBm
*Att 20 dB
RBW 100 kHz
*VBW 100 kHz
SWT 3 ms
Marker 1 [T1]
-69.25 dBm
1.896000 ms
Delta 2 [T1]
1.28 dB
480.000000 µs
SGL
1 AP
CLRWR
Center 2.46374 GHz
300 µs/

DH3-Packet

The system makes worst case 26 hops per 5 second each hop length of 1.78ms with 1 channel. So you have each channel 164.32 times per 31.6 second .

So we have 164.32*1.78ms=292.48 ms per 31.6 seconds..

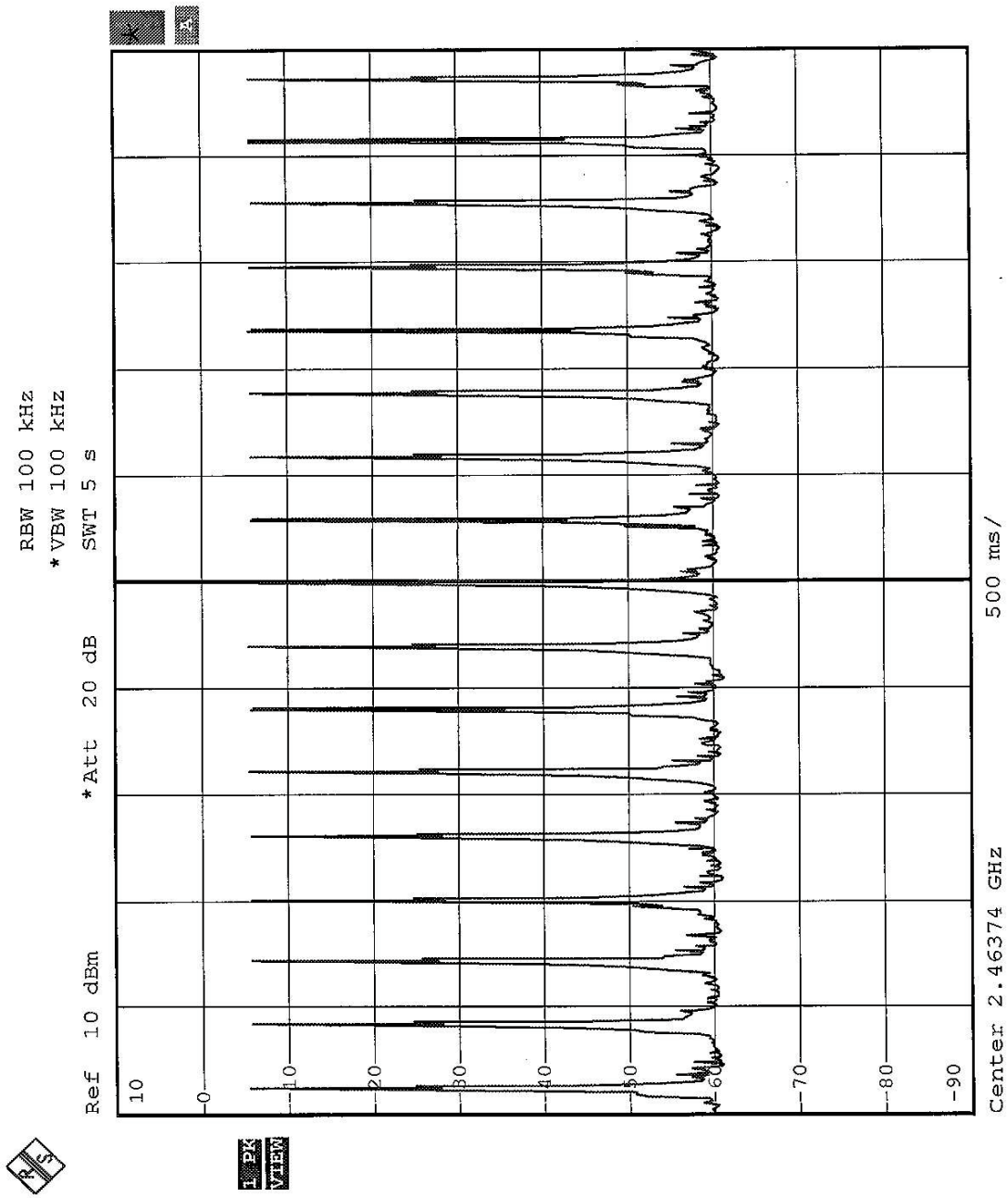


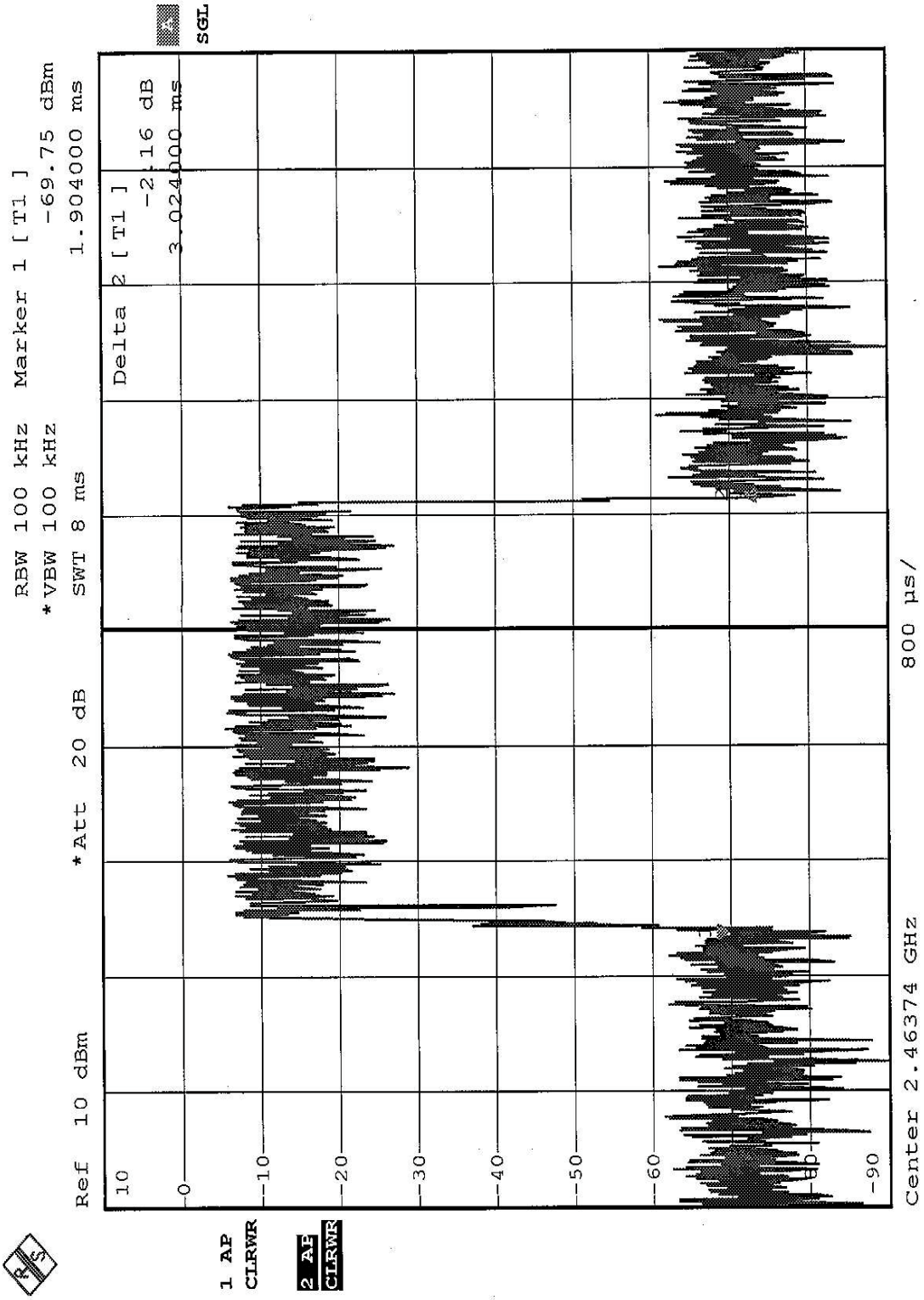

Ref 10 dBm
*Att 20 dB
RBW 100 kHz
*VBW 100 kHz
SWT 7 ms
Delta 2 [T1]
-0.16 dB
1.786000 ms
Marker 1 [T1]
-69.47 dBm
2.428000 ms
1 AP
CLRWR
SGL
Center 2.46374 GHz
700 µs/

DH5-Packet

The system makes worst case 17 hops per 5 second each hop length of 3.024ms with 1 channel. So you have each channel 107.44 times per 31.6 second .

So we have 107.44*3.024ms=324.89 ms per 31.6 seconds.




Ref 10 dBm
*Att 20 dB
RBW 100 kHz
*VBW 100 kHz
SWT 8 ms
Marker 1 [T1]
-69.75 dBm
1.904000 ms
Delta 2 [T1]
-2.16 dB
3.024000 ms
SGL
1 AP
CLRWR
2 AP
CLRWR
Center 2.46374 GHz
800 µs/

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	Aug. 12, 2004

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

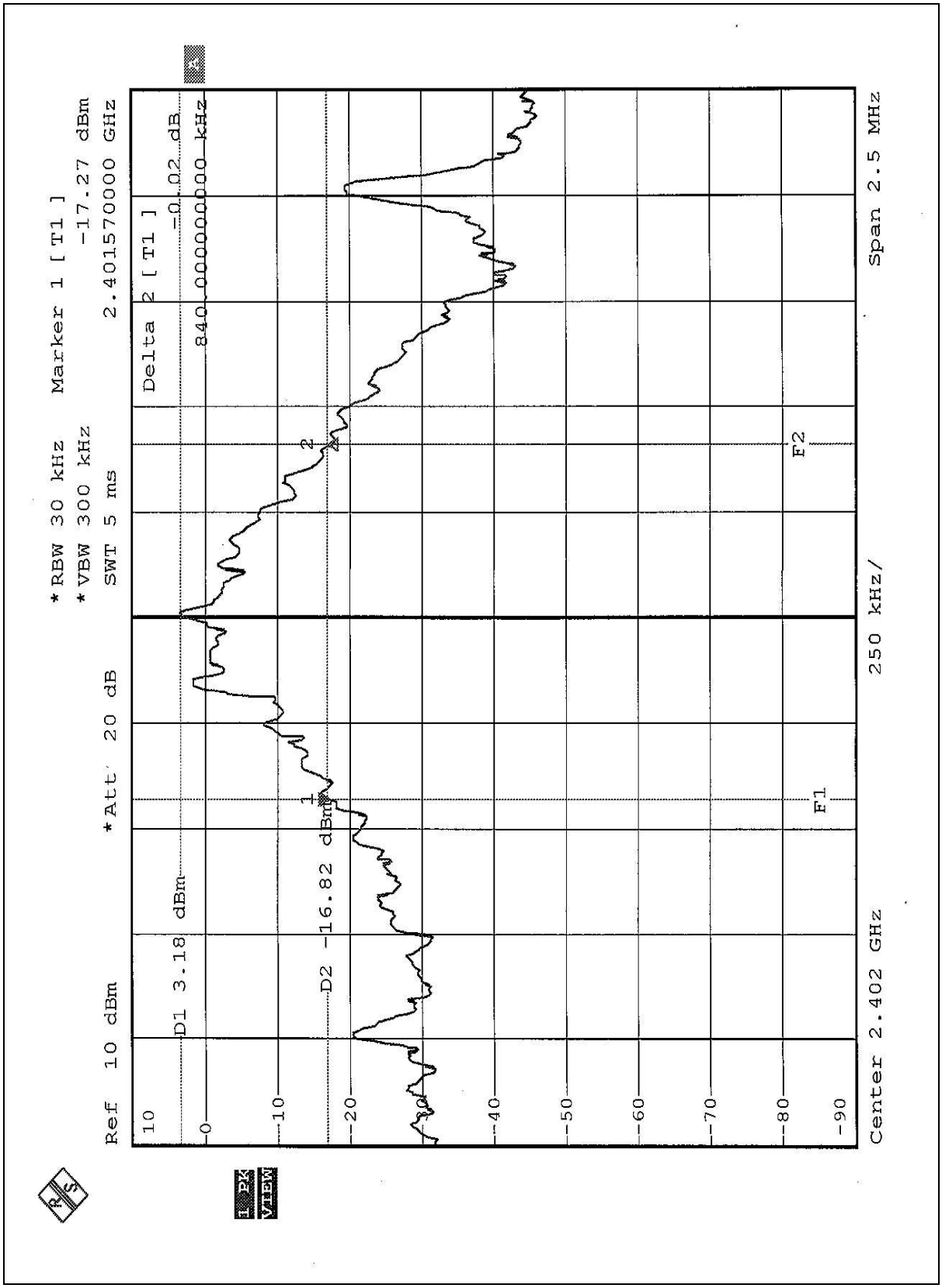
4.4.6 EUT OPERATING CONDITION

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

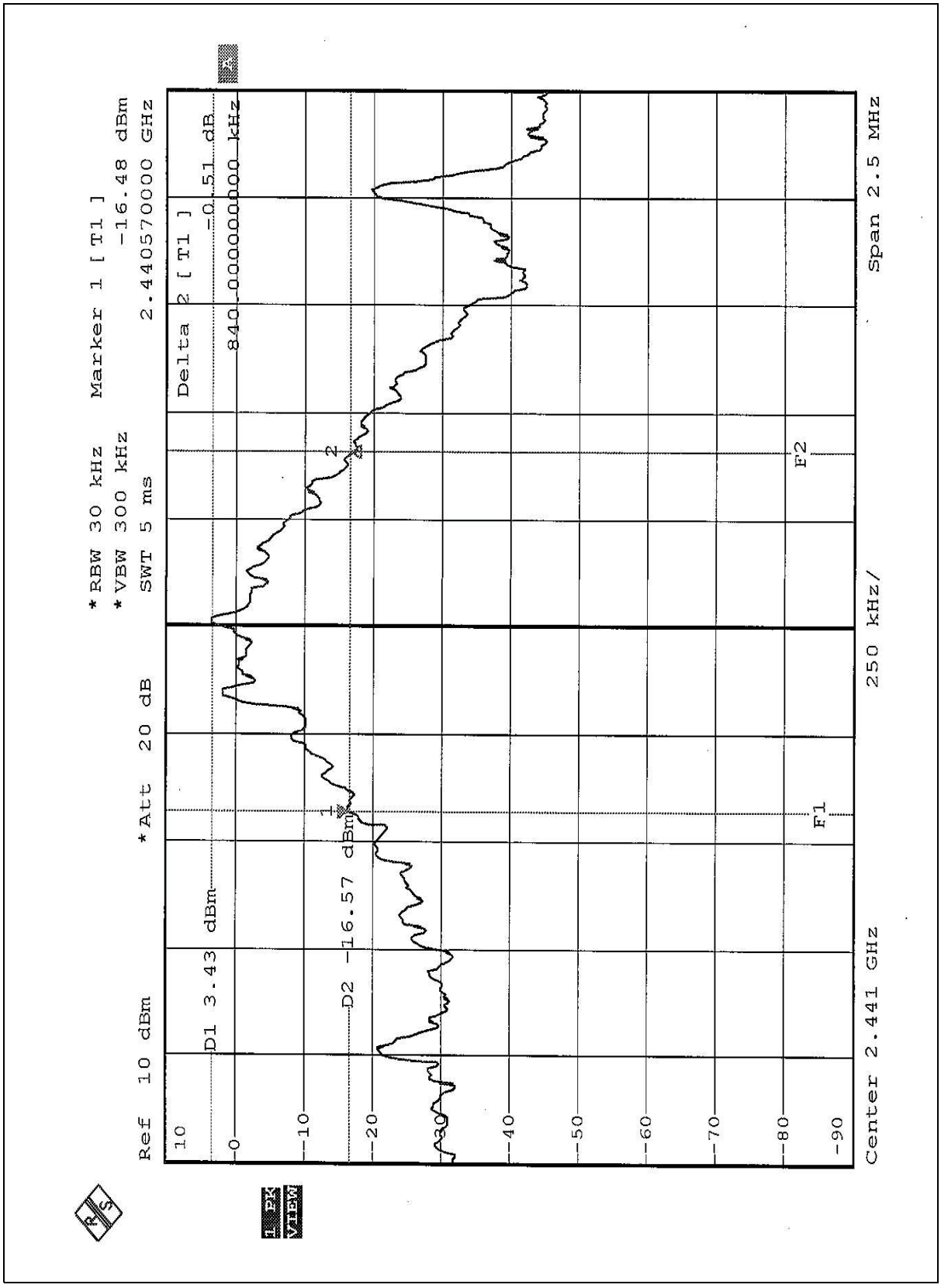
4.4.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (MHz)	PASS/FAIL
0	2402	830	1	PASS
39	2441	840	1	PASS
78	2480	840	1	PASS

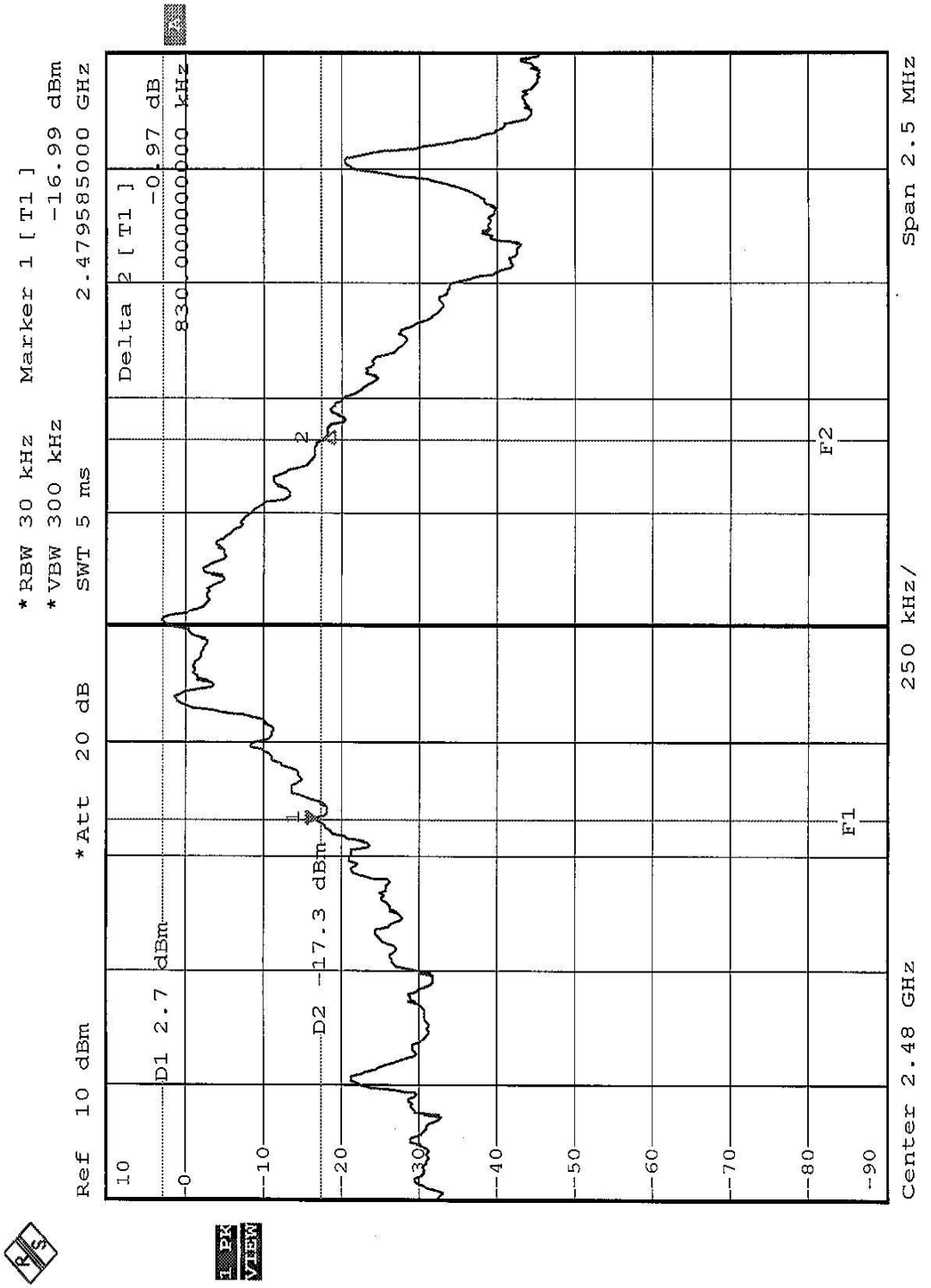
Channel 0


Ref 10 dBm
*Att 20 dB
*RBW 30 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
-17.27 dBm
2.401570000 GHz
Delta 2 [T1]
-0.02 dB
840.000000000 kHz
D1 3.18 dBm
D2 -16.82 dBm
F1
F2
Center 2.402 GHz
250 kHz/
Span 2.5 MHz

Channel 39


Ref 10 dBm
*Att 20 dB
*RBW 30 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
-16.48 dBm
2.440570000 GHz
D1 3.43 dBm
D2 -16.57 dBm
Delta 2 [T1]
-0.51 dB
840.000000000 kHz
Center 2.441 GHz
250 kHz/
Span 2.5 MHz
F1
F2
PK VIEW

Channel 78


Ref 10 dBm
*Att 20 dB
*RBW 30 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
-16.99 dBm
2.479585000 GHz
Delta 2 [T1]
-0.97 dB
830.000000000 kHz
D1 2.7 dBm
D2 -17.3 dBm
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

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	Aug. 12, 2004

NOTES:

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

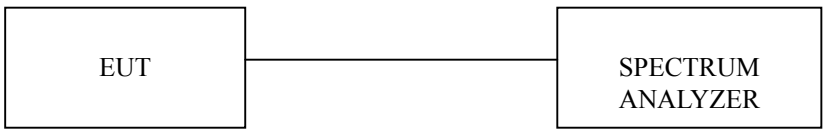
4.5.3 TEST PROCEDURES

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	1.005 MHz	1000	PASS
39	2441	1.005 MHz	1000	PASS
78	2480	1.005 MHz	1000	PASS

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