

FCC TEST REPORT

REPORT NO.: RF930726L02

MODEL NO.: FTP-628WSL110

RECEIVED: Jul. 26, 2004

TESTED: Sep. 20 ~ Sep. 30, 2004

APPLICANT: Fujitsu Component Limited

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ISSUED BY: Advance Data Technology Corporation

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No. 2177-01



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1 CERTIFICATION

PRODUCT : Bluetooth Printer
BRAND NAME : FUJITSU
MODEL NO. : FTP-628WSL110
APPLICANT : Fujitsu Component Limited
TESTED DATE : Sep. 20 ~ Sep. 30, 2004
TEST SAMPLE : R&D SAMPLE
STANDARDS : FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Windy Chou , **DATE:** Oct. 05, 2004
(Windy Chou)

TECHNICAL
ACCEPTANCE : Gary Chang , **DATE:** Oct. 05, 2004
Responsible for RF (Gary Chang)

APPROVED BY : Cody Chang , **DATE:** Oct. 05, 2004
(Cody Chang,
Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC 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 -20.08dB at 0.482 MHz
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 75 channels	PASS	Meet the requirement of limit
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 30 second	PASS	Meet the requirement of limit
15.247(a)(1)	Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth	PASS	Meet the requirement of limit
15.247(a)(1)	Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	NA	NA
15.247(b)	Maximum Peak Output Power Spec.: max. 30dBm	PASS	Meet the requirement of limit
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -1.96dB at 206.89MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit

2.0 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9k~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.55 dB
	200MHz ~1000MHz	3.58 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth Printer
MODEL NO.	FTP-628WSL110
POWER SUPPLY	5Vdc from AC adapter
MODULATION TYPE	GFSK
MODULATION TECHNOLOGY	FHSS
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	1.233mW
ANTENNA TYPE	PIFA antenna with 0.5dBi gain
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is powered by the following adapter:

BRAND:	KAMI ELECTRONICS INDUSTRY CO., L
MODEL:	KSW523U
INPUT:	100Vac, 29VA, 50/60Hz
OUTPUT:	5Vdc, 2.3A

2. Bluetooth technology is used for the EUT.
3. The above EUT information was declared by manufacturer and for 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		

NOTE:

1. Below 1 GHz, the channel 0, 39, and 78 were pre-tested in chamber. The channel 78, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 39, and 78 were tested individually.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

**FCC Part 15, Subpart C. (15.247)
ANSI C63.4 : 2003**

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.



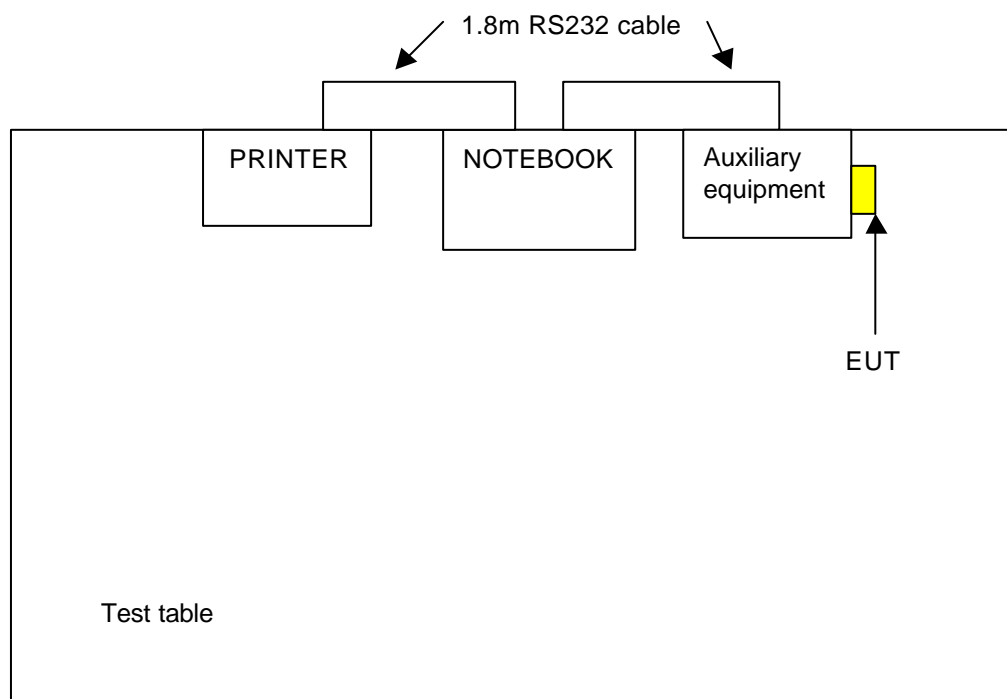
3.4 DESCRIPTION OF SUPPORT UNITS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	Panasonic	CF-LIEA	A990994JP	NA
2	PRINTER	EPSON	LQ-300+	DCGY054147	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m shielded cable without 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

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

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
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Dec. 12, 2004
RF signal cable Woken	5D-FB	Cable-HYC01-01	Mar. 02, 2005
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Mar. 03, 2005
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Mar. 02, 2005
Software ADT	ADT_Cond_V3	NA	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. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.



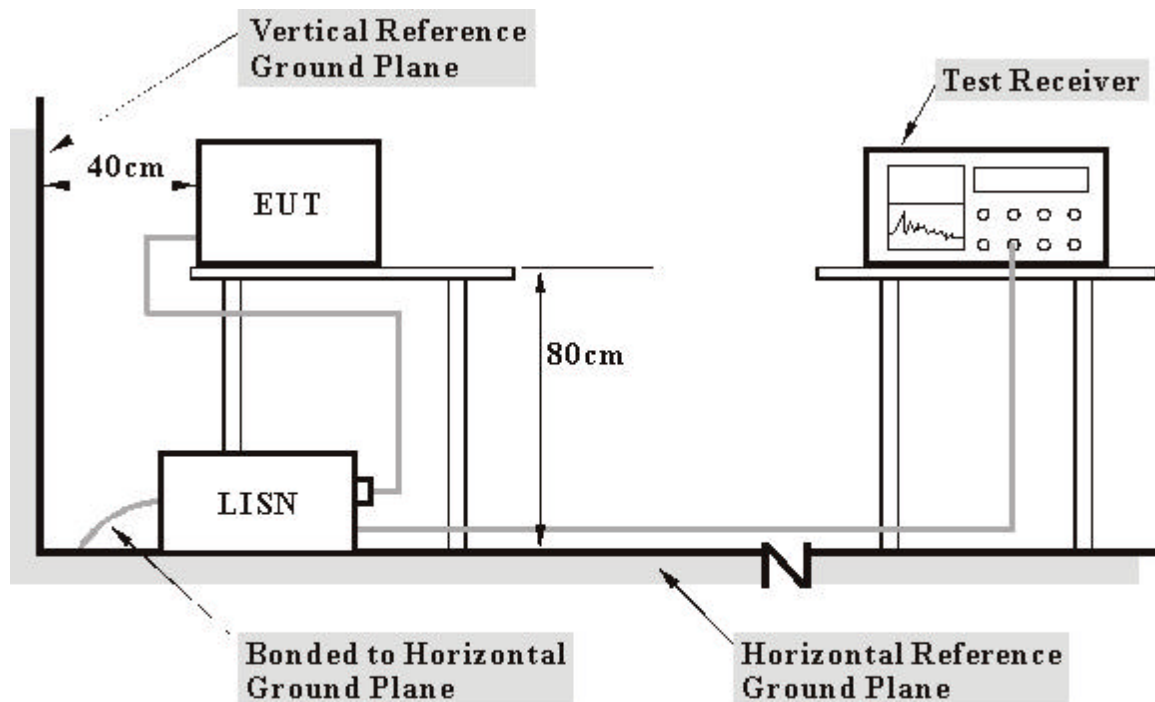
4.1.3 TEST PROCEDURES

- 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 150kHz to 30MHz was searched. Emission levels under Limit - 20dB was not recorded.

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 (AMIN) 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. Connected the EUT into the Notebook system and placed on a testing table.
- b. The Notebook system ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. The notebook system sent "H" messages to printer, and the printer prints them on paper.

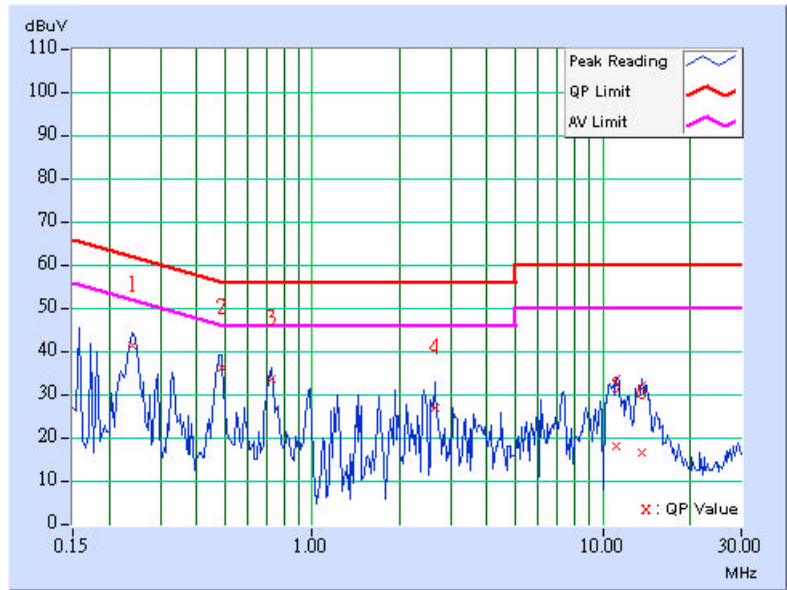


4.1.7 TEST RESULTS

EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	0	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.240	0.12	40.70	-	40.82	-	62.10	52.10	-21.28	-
2	0.486	0.13	35.78	-	35.91	-	56.24	46.24	-20.33	-
3	0.724	0.14	33.11	-	33.25	-	56.00	46.00	-22.75	-
4	2.656	0.18	26.34	-	26.52	-	56.00	46.00	-29.48	-
5	11.164	0.41	17.50	-	17.91	-	60.00	50.00	-42.09	-
6	13.684	0.65	16.05	-	16.70	-	60.00	50.00	-43.30	-

- REMARKS:**
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.

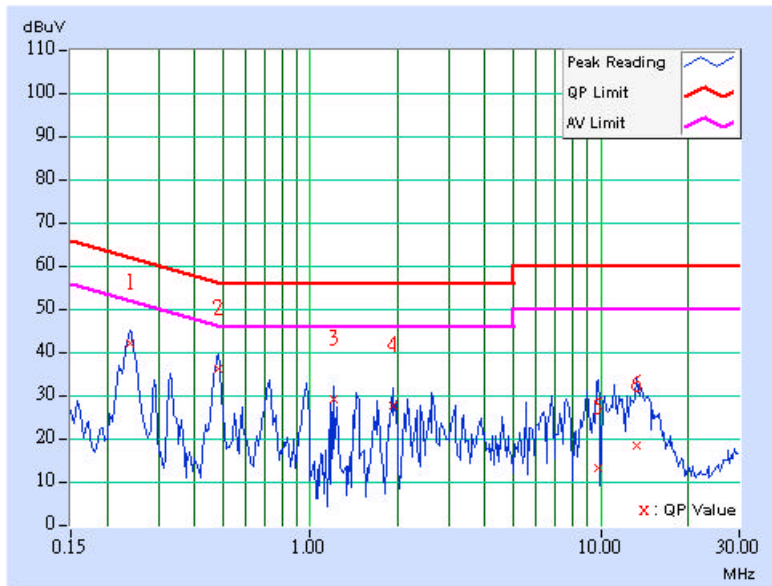




EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	0	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.240	0.11	41.84	-	41.95	-	62.10	52.10	-20.15	-
2	0.482	0.12	35.88	-	36.00	-	56.30	46.30	-20.31	-
3	1.199	0.15	28.64	-	28.79	-	56.00	46.00	-27.21	-
4	1.926	0.16	27.32	-	27.48	-	56.00	46.00	-28.52	-
5	9.832	0.28	12.67	-	12.95	-	60.00	50.00	-47.05	-
6	13.223	0.51	17.85	-	18.36	-	60.00	50.00	-41.64	-

- REMARKS:**
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.

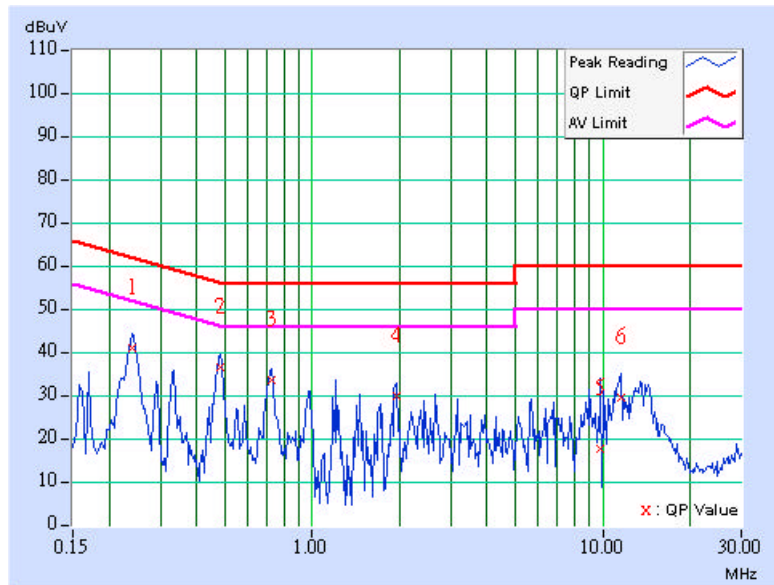




EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	39	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.240	0.12	40.82	-	40.94	-	62.10	52.10	-21.16	-
2	0.482	0.13	36.10	-	36.23	-	56.30	46.30	-20.08	-
3	0.724	0.14	33.31	-	33.45	-	56.00	46.00	-22.55	-
4	1.941	0.16	29.55	-	29.71	-	56.00	46.00	-26.29	-
5	9.863	0.30	17.22	-	17.52	-	60.00	50.00	-42.48	-
6	11.512	0.45	29.24	-	29.69	-	60.00	50.00	-30.31	-

- REMARKS:**
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.

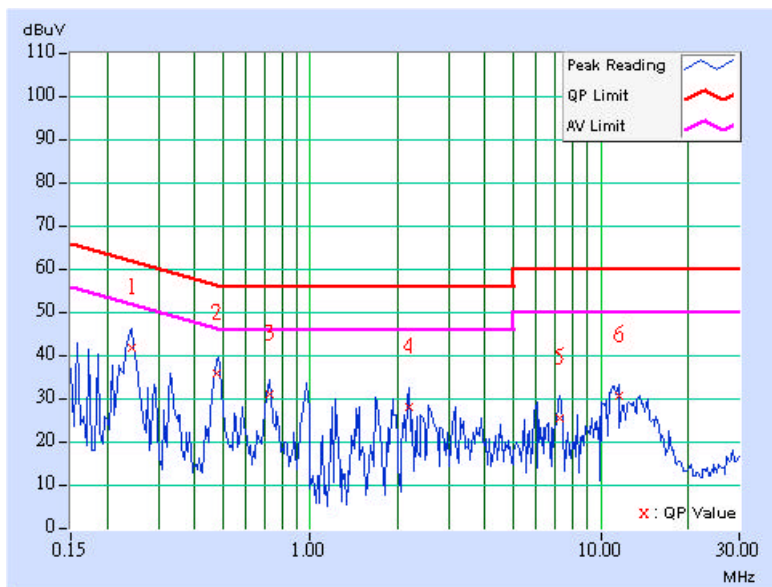




EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	39	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.244	0.11	41.40	-	41.51	-	61.97	51.97	-20.46	-
2	0.478	0.12	35.72	-	35.84	-	56.37	46.37	-20.53	-
3	0.724	0.13	30.56	-	30.69	-	56.00	46.00	-25.31	-
4	2.191	0.16	27.87	-	28.03	-	56.00	46.00	-27.97	-
5	7.242	0.28	25.07	-	25.35	-	60.00	50.00	-34.65	-
6	11.523	0.39	30.31	-	30.70	-	60.00	50.00	-29.30	-

- REMARKS:**
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.

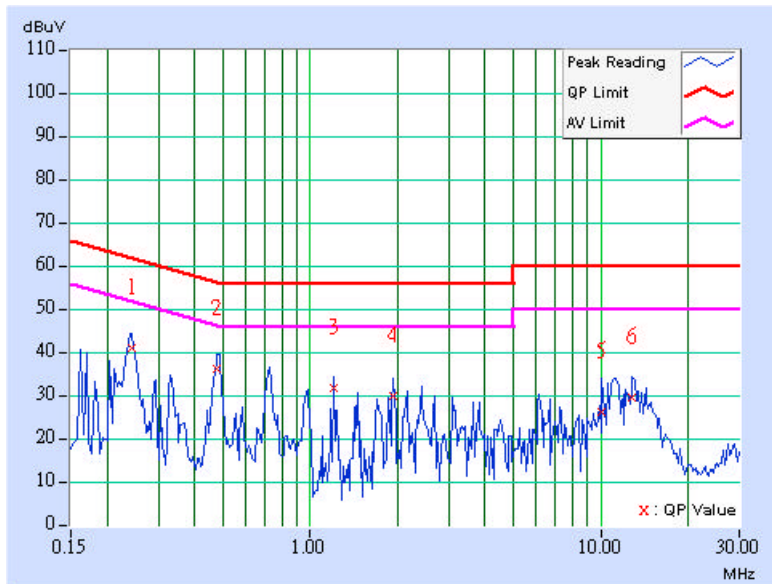




EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.244	0.12	40.47	-	40.59	-	61.97	51.97	-21.38	-
2	0.478	0.13	35.90	-	36.03	-	56.37	46.37	-20.34	-
3	1.207	0.15	31.13	-	31.28	-	56.00	46.00	-24.72	-
4	1.938	0.16	29.51	-	29.67	-	56.00	46.00	-26.33	-
5	10.000	0.30	25.82	-	26.12	-	60.00	50.00	-33.88	-
6	12.859	0.57	28.88	-	29.45	-	60.00	50.00	-30.55	-

- REMARKS:**
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.

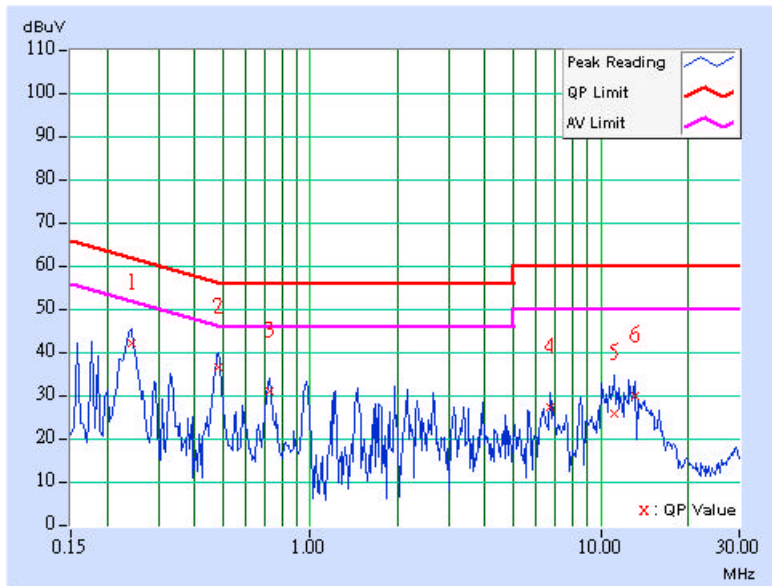




EUT	Bluetooth Printer	MODEL	FTP-628WSL110
CHANNEL	78	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neurral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 65%RH, 991 hPa	TESTED BY: Rush Kao	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.244	0.11	41.56	-	41.67	-	61.97	51.97	-20.30	-
2	0.482	0.12	36.10	-	36.22	-	56.30	46.30	-20.09	-
3	0.724	0.13	30.66	-	30.79	-	56.00	46.00	-25.21	-
4	6.699	0.27	26.92	-	27.19	-	60.00	50.00	-32.81	-
5	11.199	0.37	25.40	-	25.77	-	60.00	50.00	-34.23	-
6	13.180	0.51	29.34	-	29.85	-	60.00	50.00	-30.15	-

- REMARKS:**
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	Aug. 12, 2005

NOTE:

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



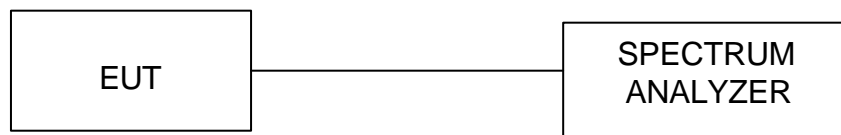
4.2.3 TEST PROCEDURES

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

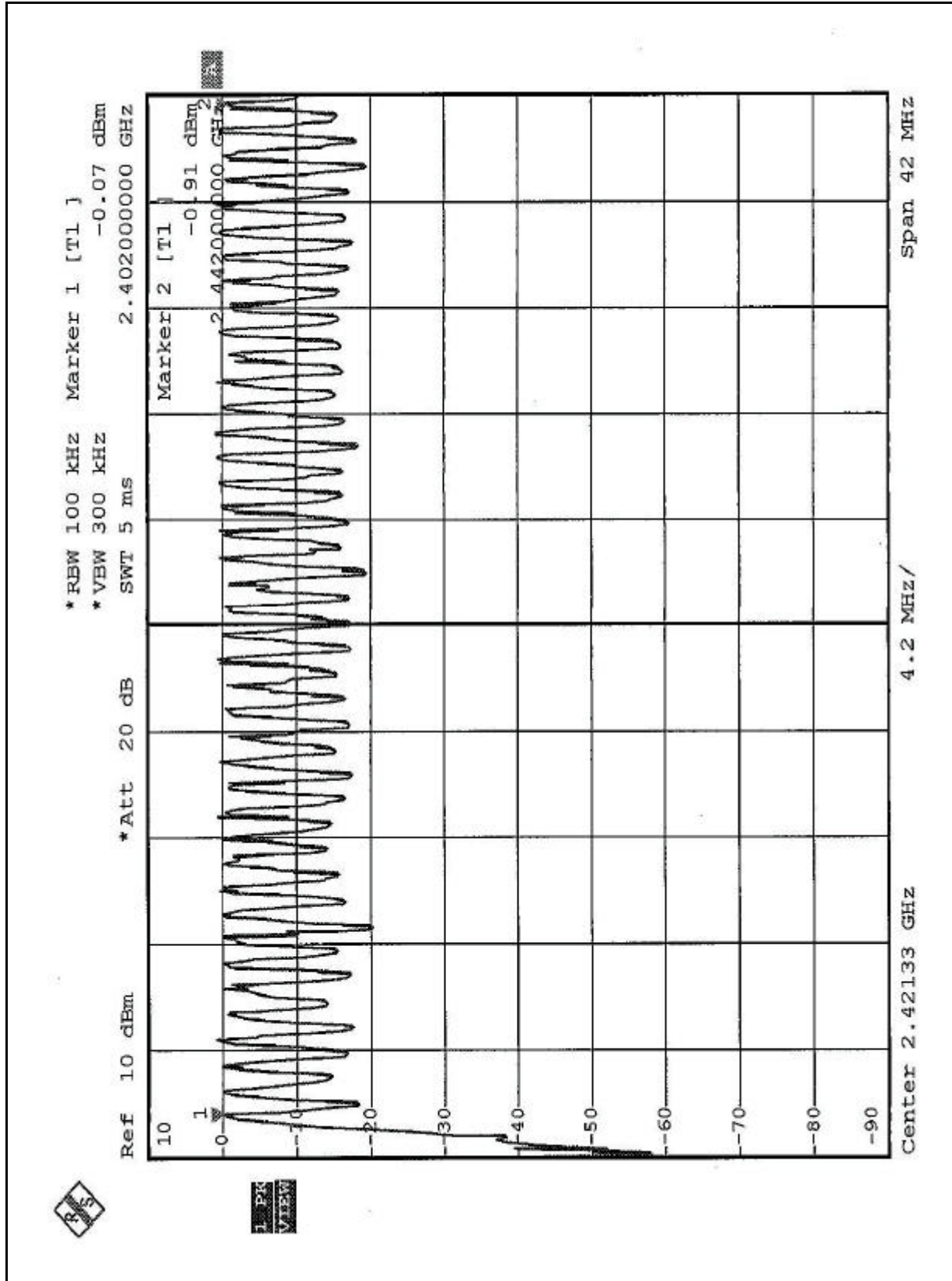
No deviation

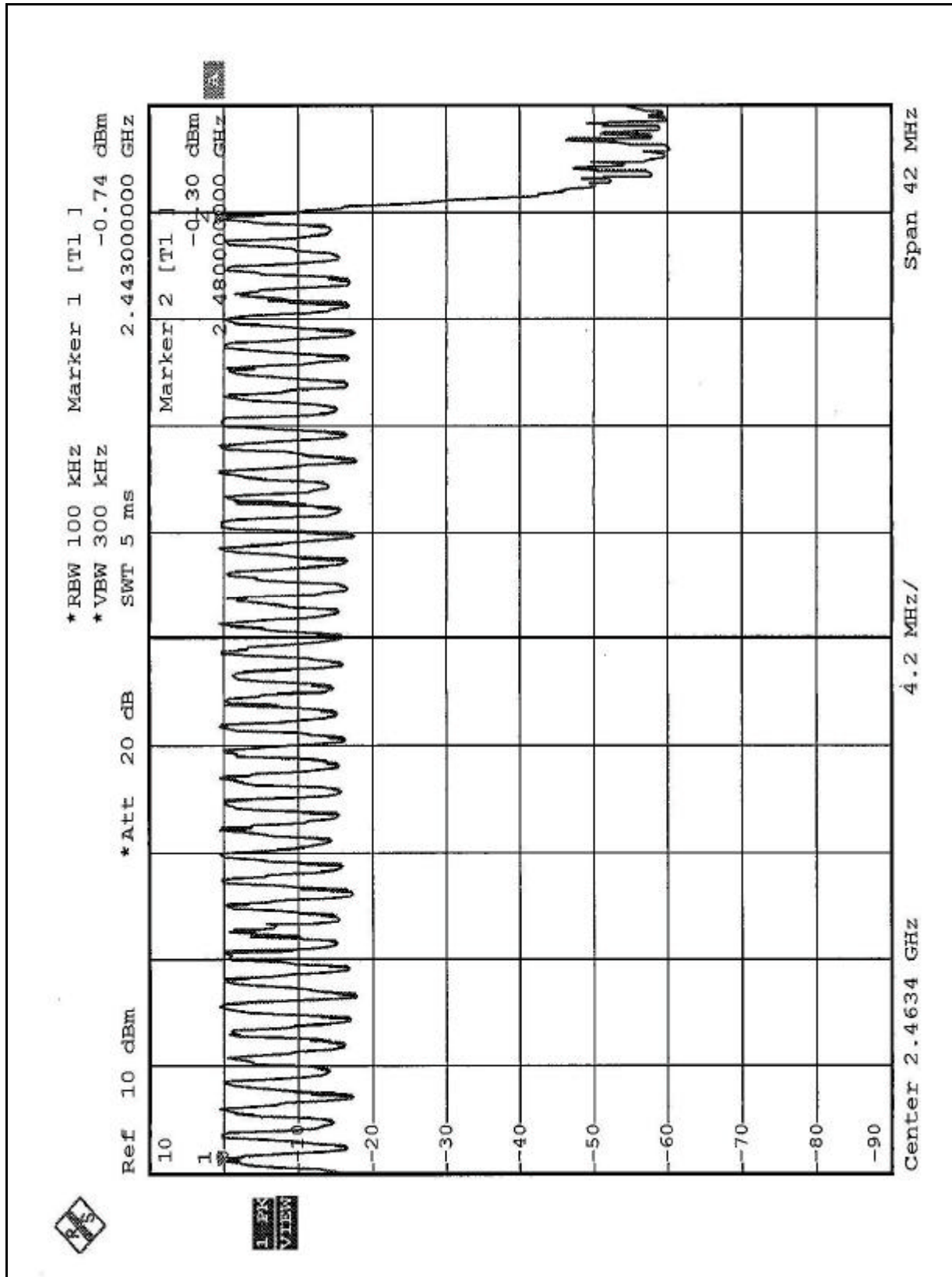
4.2.5 TEST SETUP



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.





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, 2005

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



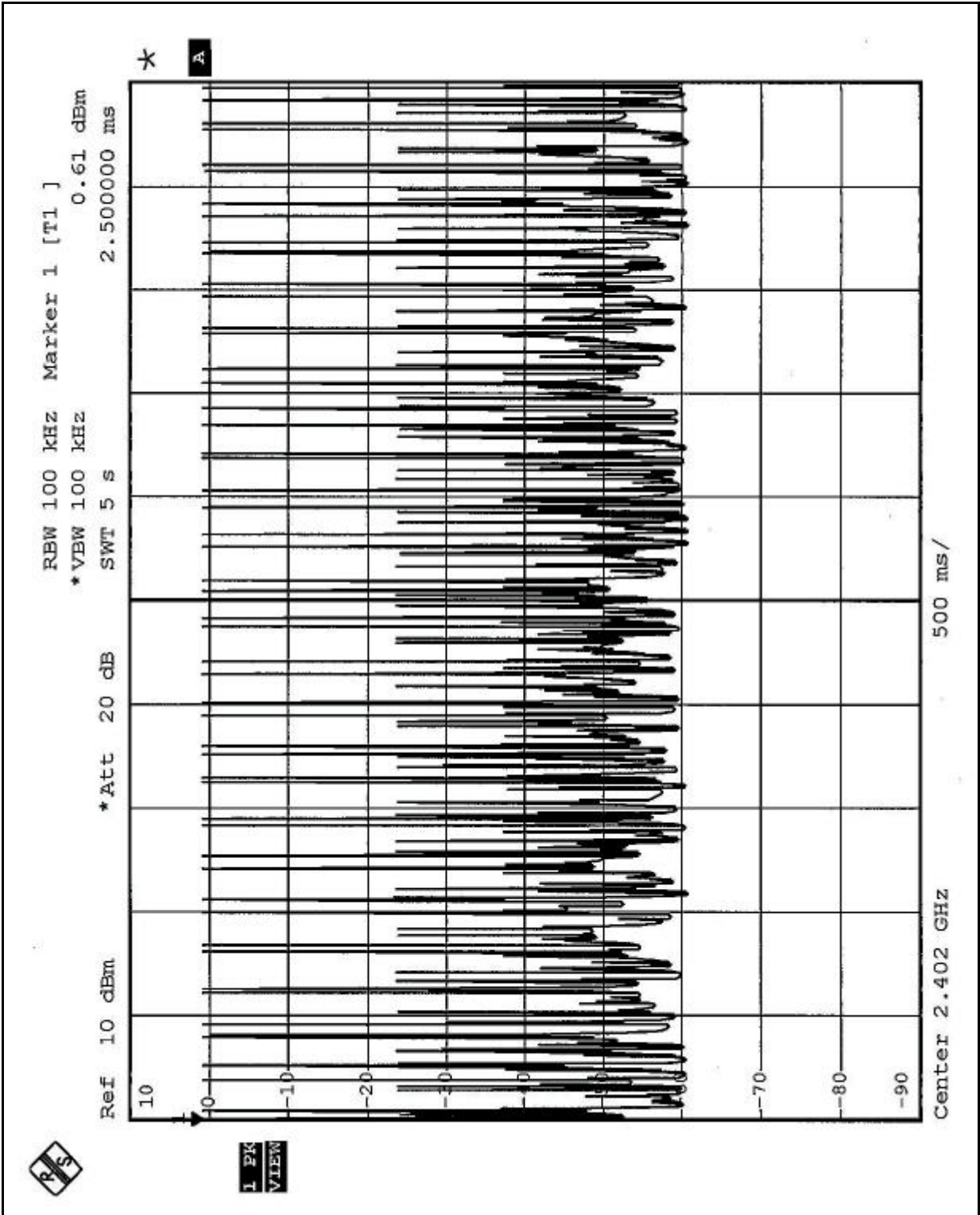
4.3.6 TEST RESULTS

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=316.00 times	0.490	154.840	400
DH3	26 (times / 5 sec) *6.32=164.32 times	1.780	292.490	400
DH5	17 (times / 5 sec) *6.32=107.44 times	3.020	324.469	400

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

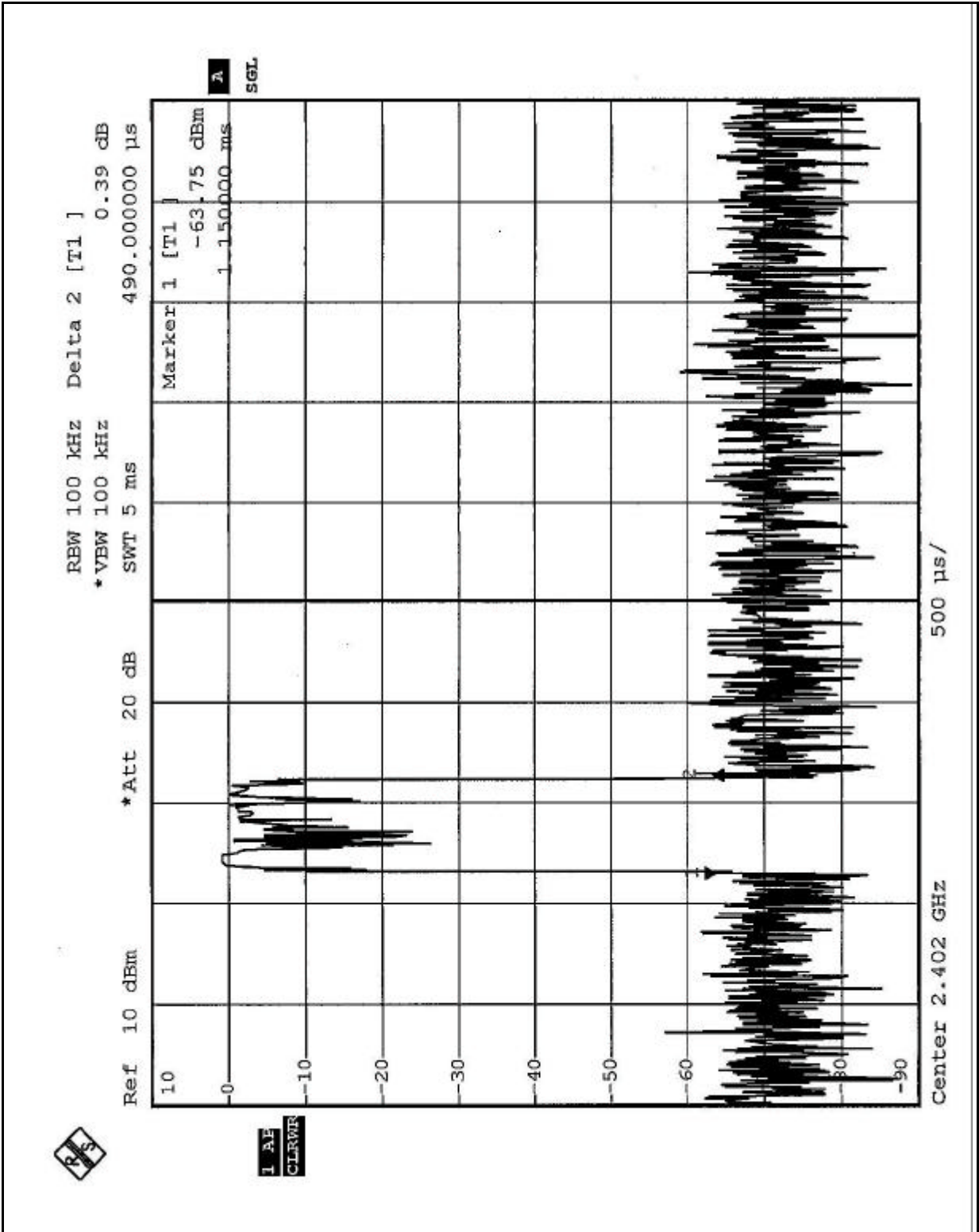


DH1



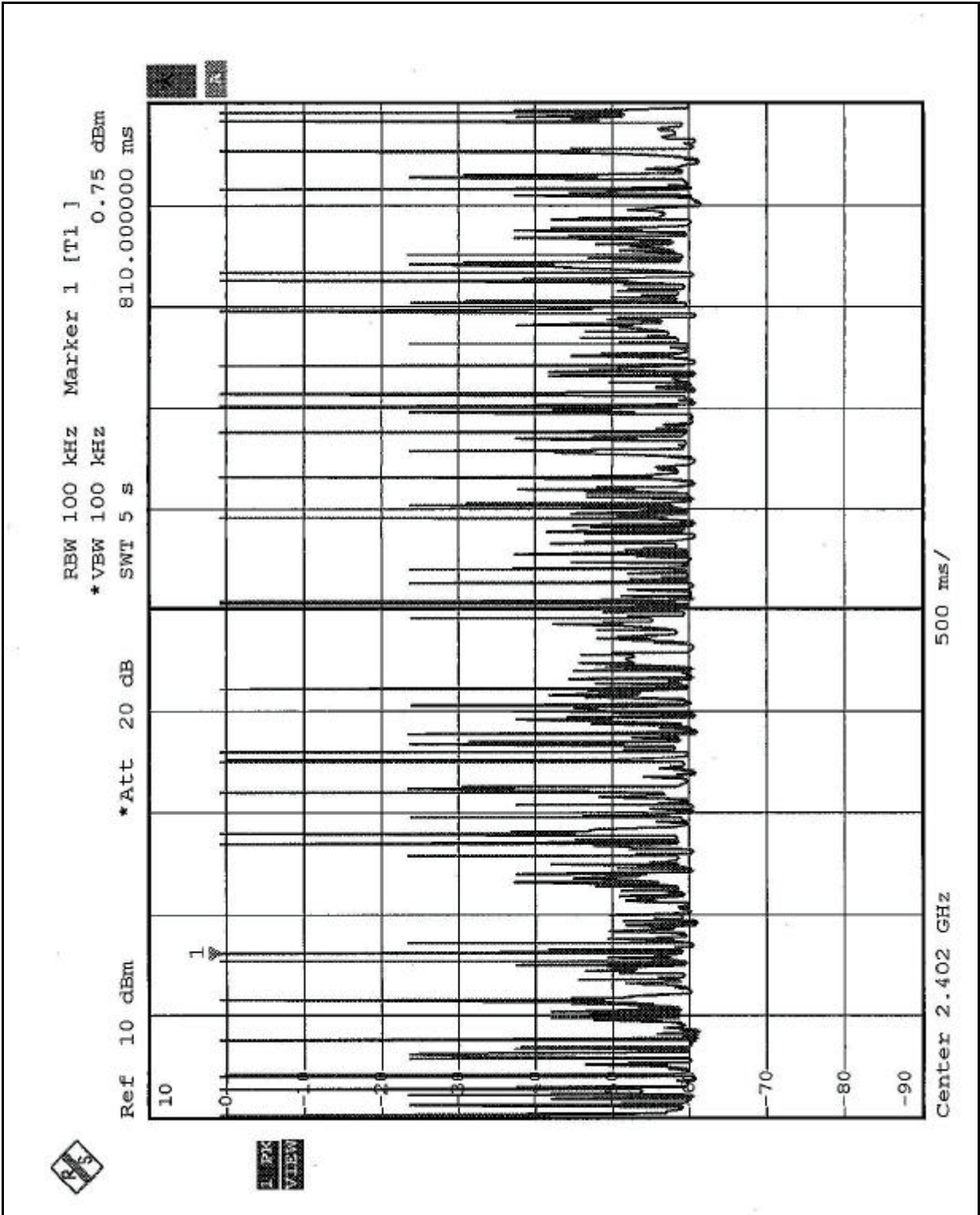


DH1



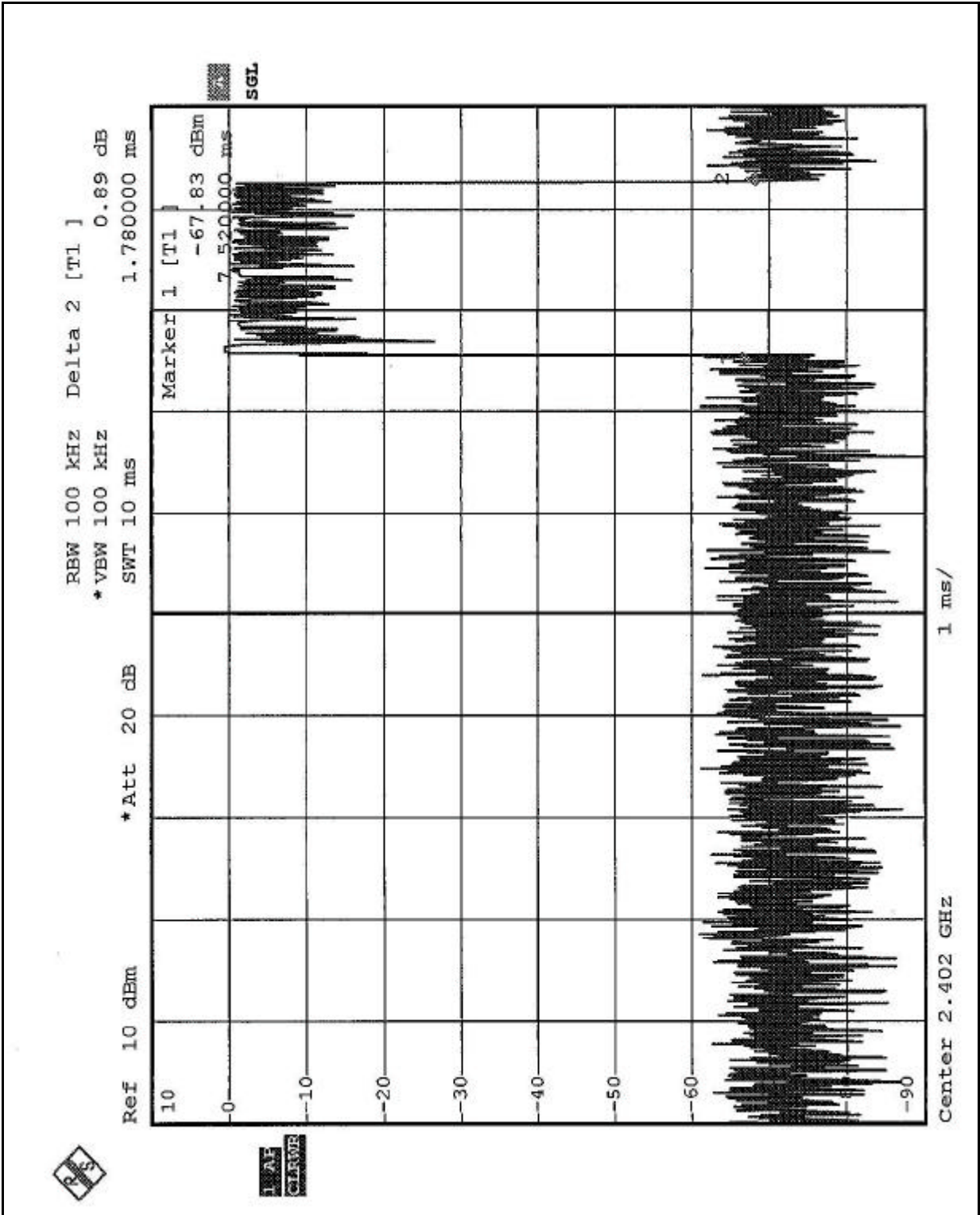


DH3



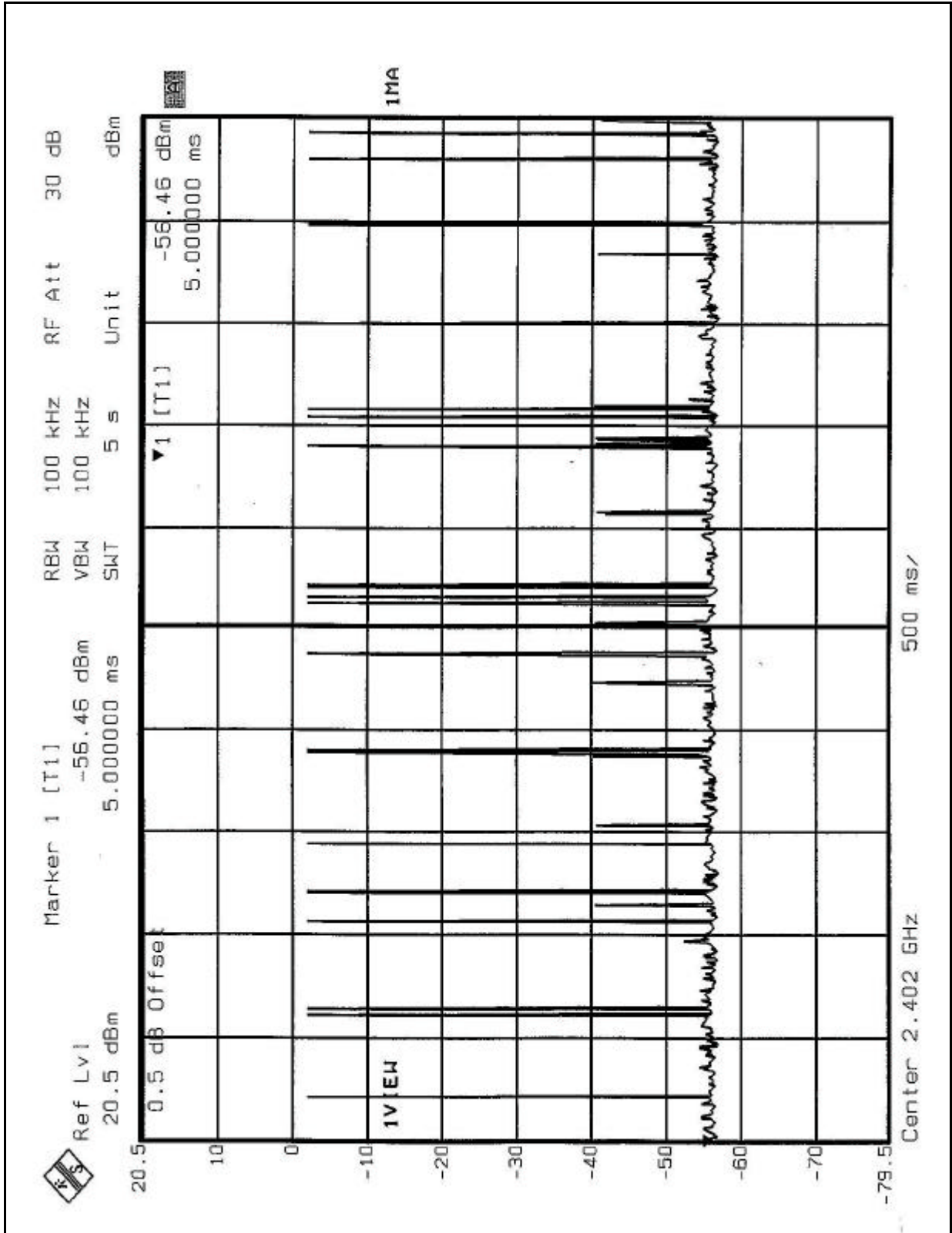


DH3





DH5





DH5

