

FCC TEST REPORT

REPORT NO.: RF910312R05

MODEL NO.: PA3203U-1BTM

RECEIVED: Mar. 12, 2002

TESTED: Mar. 14, 2002

APPLICANT: COMPAL ELECTRONICS INC.

ADDRESS: No. 581, Juikuang Rd., Neihu 114, Taipei,
Taiwan, R.O.C.

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

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1 CERTIFICATION

PRODUCT : Bluetooth
BRAND NAME : Toshiba
MODEL NO. : PA3203U-1BTM
APPLICANT : COMPAL ELECTRONICS INC.
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247),
ANSI C63.4-1992, Canada RSS 210,
New Zealand RFS 29

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on Mar. 14, 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.

TESTED BY: Gary Chang, DATE: Mar. 20, 2002
Gary Chang

CHECKED BY: Demi Chen, DATE: Mar. 20, 2002
Demi Chen

APPROVED BY: Alan Lane, DATE: Mar. 20, 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 -4.88dBuV at 27.476 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 -5.5dBuV at 156.00MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth
MODEL NO.	PA3203U-1BTM
POWER SUPPLY	5.0VDC from host equipment
MODULATION TYPE	FHSS (GFSK)
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	-1.61dBm
ANTENNA TYPE	PIFA Antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE: 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.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth. 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, Canada RSS 210, New Zealand RFS 29

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	DELL	PP01L	TW-09C748-12800-190-B220	FCC DoC APPROVED
2	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
3	MODEM	ACEEX	1414	980020510	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 (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.45 – 30	48	-	48	-

Notes:

1. The lower limit shall apply at the transition frequencies.
1. 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	ESHS30	828109/007	July 4, 2002
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 3, 2002
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Dec. 2, 2002
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 2, 2002
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 3, 2002
Software	Cond-V2L	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C02.01	July 5, 2002
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 measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

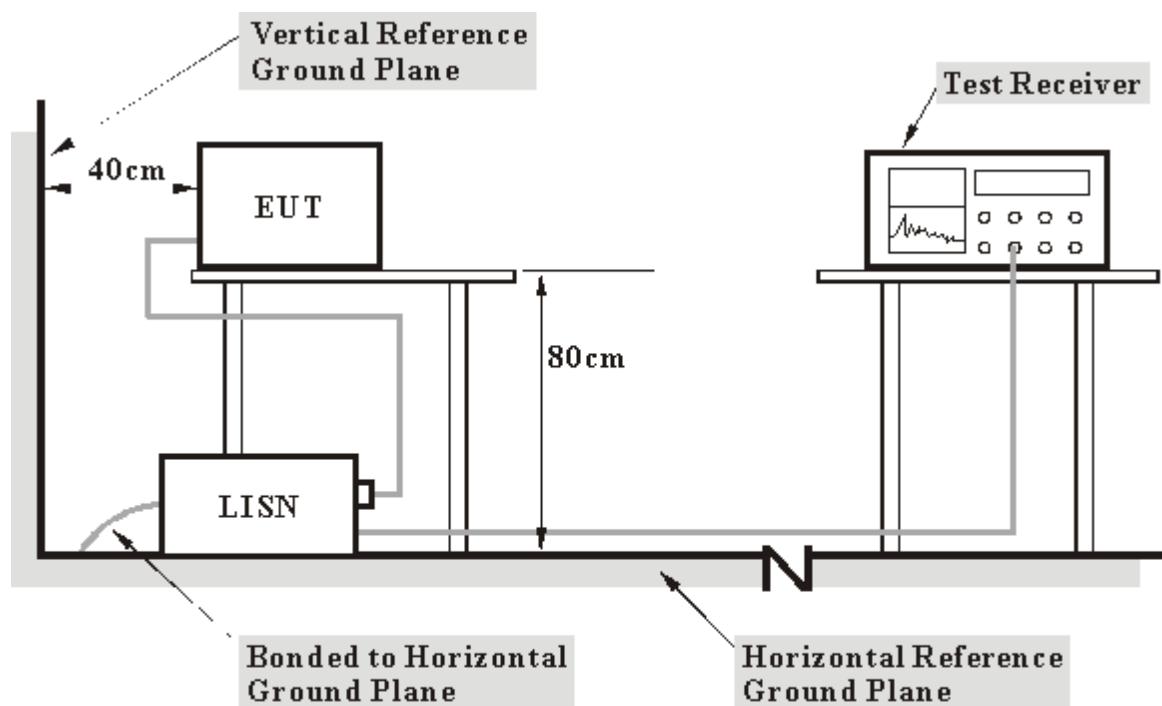
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. “*”: These equipment are used for conducted telecom port test only (if tested).

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 450 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.

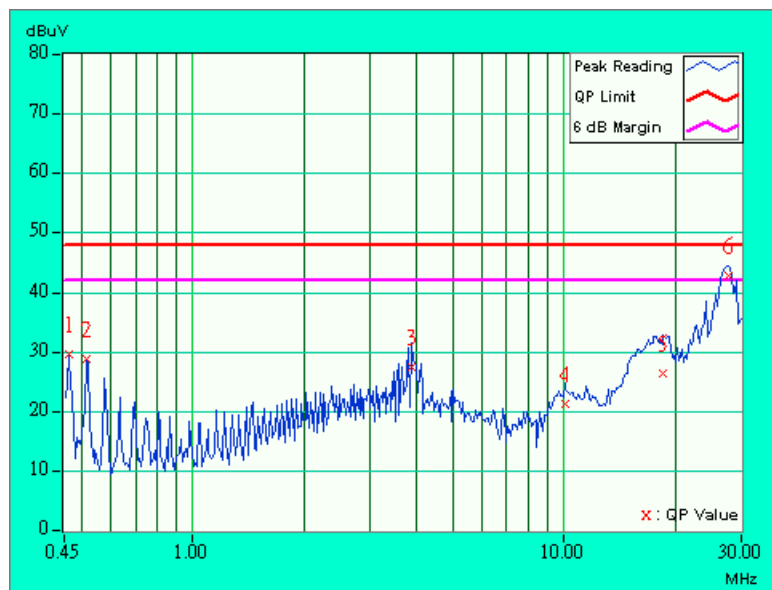
4.1.5 TEST RESULTS

EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 0	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiau	

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	0.462	0.10	28.46	-	28.56	-	48.00	-	-19.44	-
2	0.519	0.10	27.55	-	27.65	-	48.00	-	-20.35	-
3	3.873	0.29	26.29	-	26.58	-	48.00	-	-21.42	-
4	10.067	0.50	20.05	-	20.55	-	48.00	-	-27.45	-
5	18.509	0.94	25.22	-	26.16	-	48.00	-	-21.84	-
6	27.581	1.15	41.80	-	42.95	-	48.00	-	-5.05	-

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.

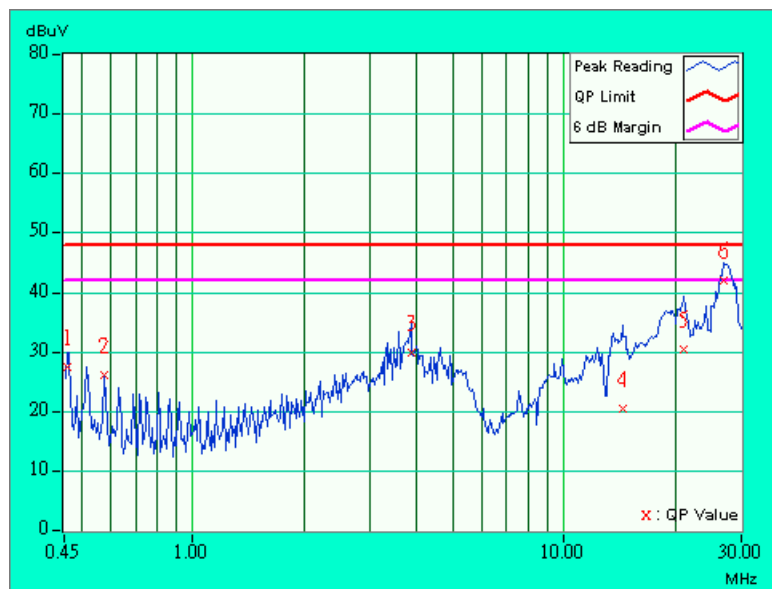


EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 0	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiao	

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	0.459	0.10	26.56	-	26.66	-	48.00	-	-21.34	-
2	0.576	0.10	25.24	-	25.34	-	48.00	-	-22.66	-
3	3.867	0.29	29.08	-	29.37	-	48.00	-	-18.63	-
4	14.321	0.57	19.51	-	20.08	-	48.00	-	-27.92	-
5	21.020	0.82	29.48	-	30.30	-	48.00	-	-17.70	-
6	26.948	0.94	41.10	-	42.04	-	48.00	-	-5.96	-

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.

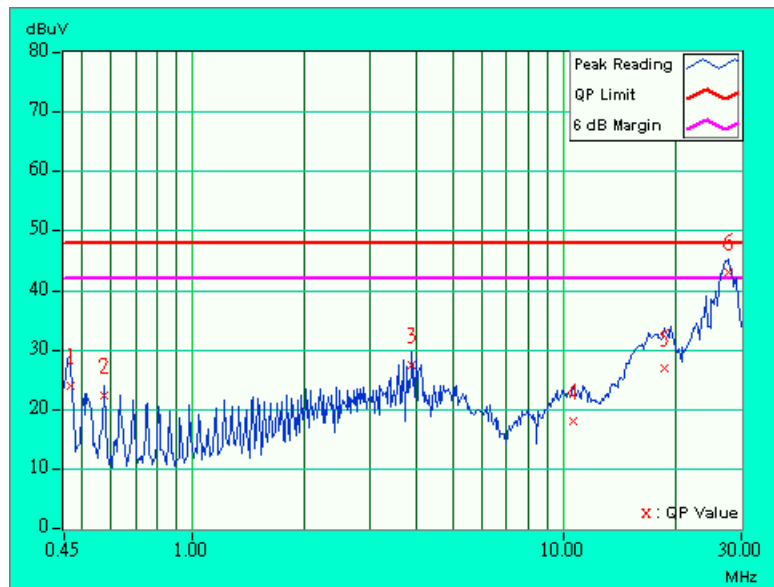


EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 39	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiau	

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	0.468	0.10	22.93	-	23.03	-	48.00	-	-24.97	-
2	0.576	0.10	21.12	-	21.22	-	48.00	-	-26.78	-
3	3.873	0.29	26.39	-	26.68	-	48.00	-	-21.32	-
4	10.526	0.53	16.81	-	17.34	-	48.00	-	-30.66	-
5	18.608	0.94	25.73	-	26.67	-	48.00	-	-21.33	-
6	27.686	1.15	41.82	-	42.97	-	48.00	-	-5.03	-

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.

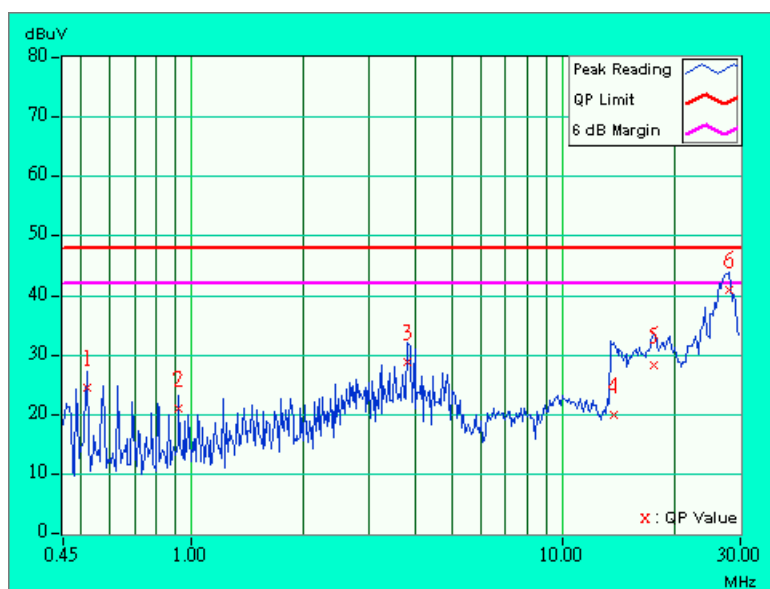


EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 39	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiau	

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	0.522	0.10	23.53	-	23.63	-	48.00	-	-24.37	-
2	0.924	0.10	19.98	-	20.08	-	48.00	-	-27.92	-
3	3.810	0.28	27.97	-	28.25	-	48.00	-	-19.75	-
4	13.703	0.55	18.93	-	19.48	-	48.00	-	-28.52	-
5	17.525	0.70	27.39	-	28.09	-	48.00	-	-19.91	-
6	28.106	0.96	40.08	-	41.04	-	48.00	-	-6.96	-

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.

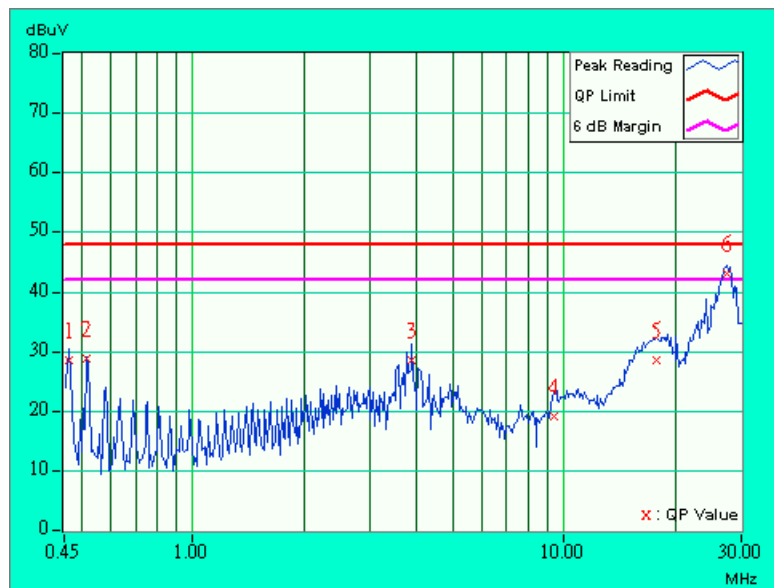


EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 78	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiau	

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	0.465	0.10	27.31	-	27.41	-	48.00	-	-20.59	-
2	0.519	0.10	27.63	-	27.73	-	48.00	-	-20.27	-
3	3.873	0.29	27.29	-	27.58	-	48.00	-	-20.42	-
4	9.371	0.48	18.06	-	18.54	-	48.00	-	-29.46	-
5	17.750	0.91	27.32	-	28.23	-	48.00	-	-19.77	-
6	27.476	1.15	41.97	-	43.12	-	48.00	-	-4.88	-

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.

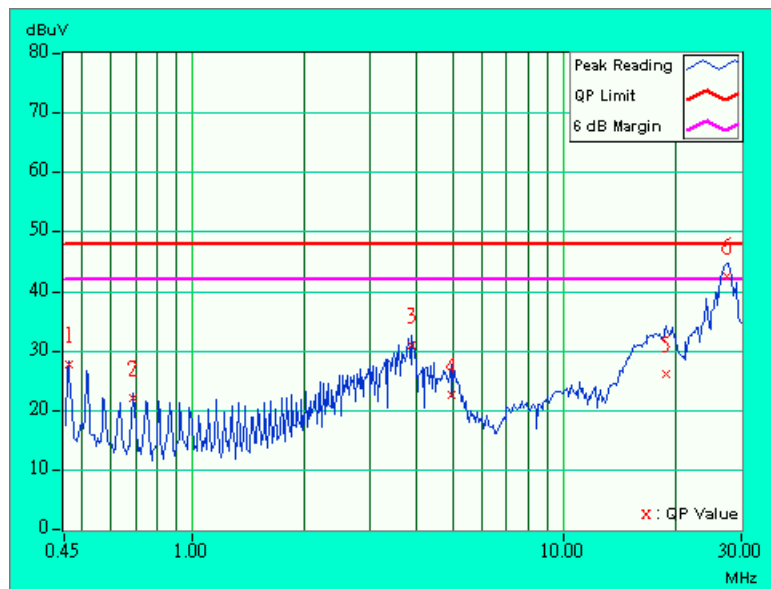


EUT	Bluetooth	MODEL	PA3203U-1BTM
MODE	Channel 78	6dB BANDWIDTH	10 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Netural (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 1005 hPa	TESTED BY: Bruce Shiau	

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	0.462	0.10	26.90	-	27.00	-	48.00	-	-21.00	-
2	0.693	0.10	21.27	-	21.37	-	48.00	-	-26.63	-
3	3.873	0.29	30.02	-	30.31	-	48.00	-	-17.69	-
4	4.968	0.32	21.75	-	22.07	-	48.00	-	-25.93	-
5	18.725	0.75	25.13	-	25.88	-	48.00	-	-22.12	-
6	27.476	0.95	41.63	-	42.58	-	48.00	-	-5.42	-

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 17, 2002

NOTE:

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

4.2.3 TEST PROCEDURES

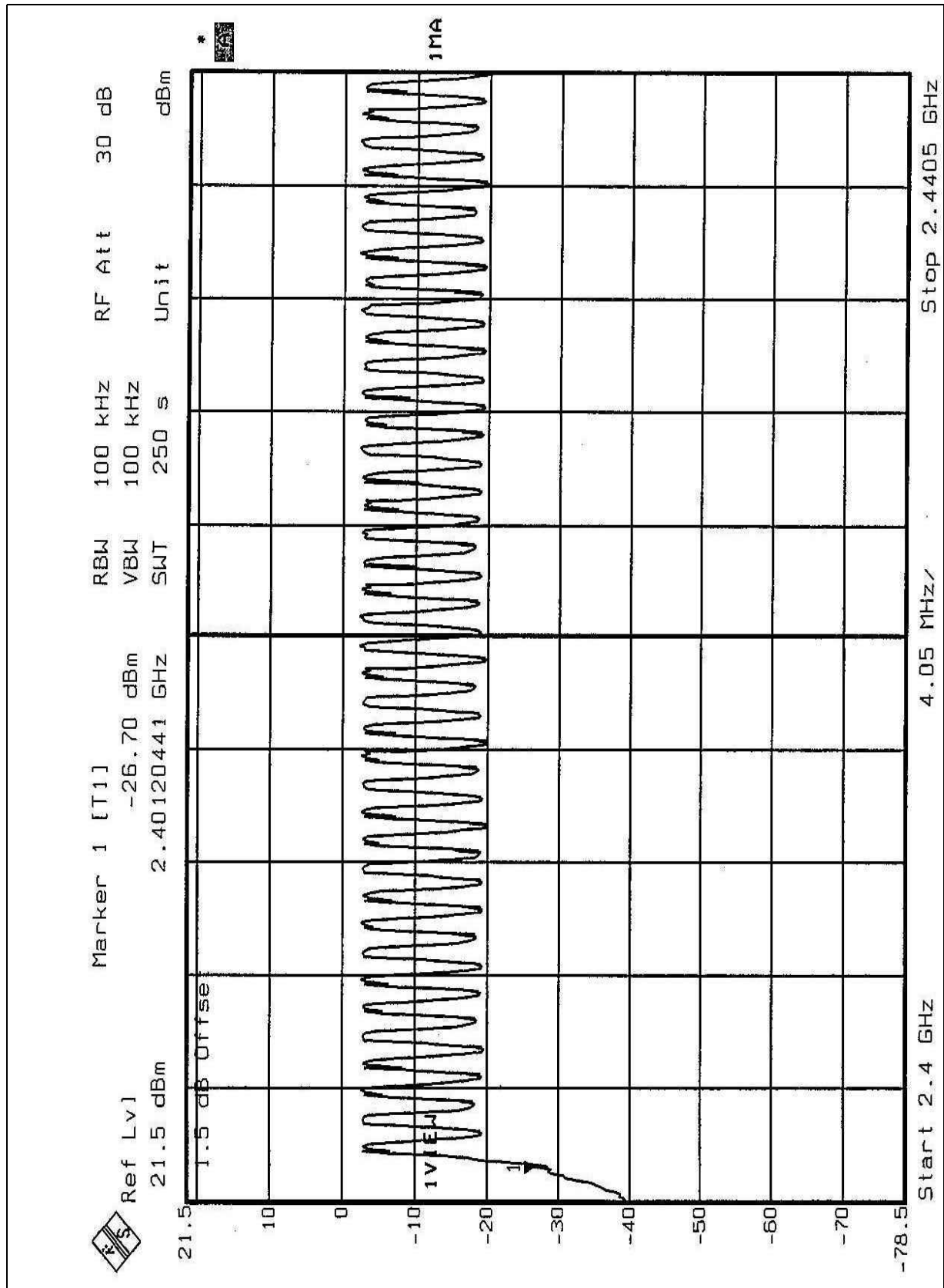
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and 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.

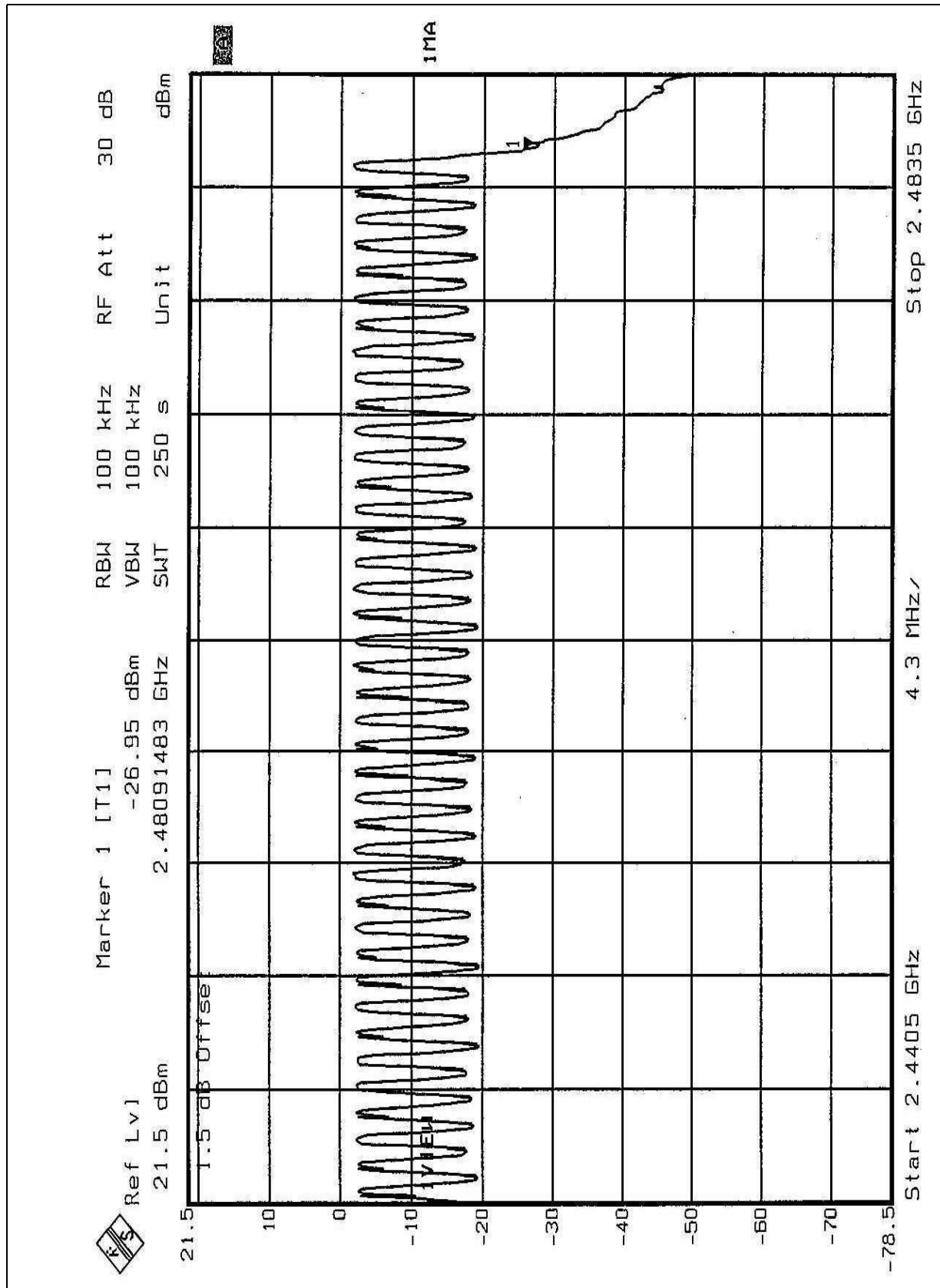
4.2.4 TEST SETUP



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 17, 2002

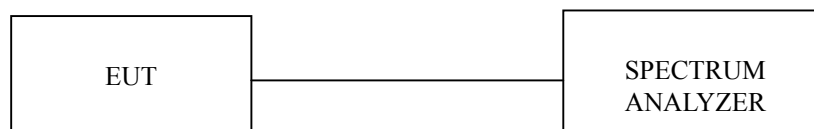
NOTES:

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

4.3.3 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

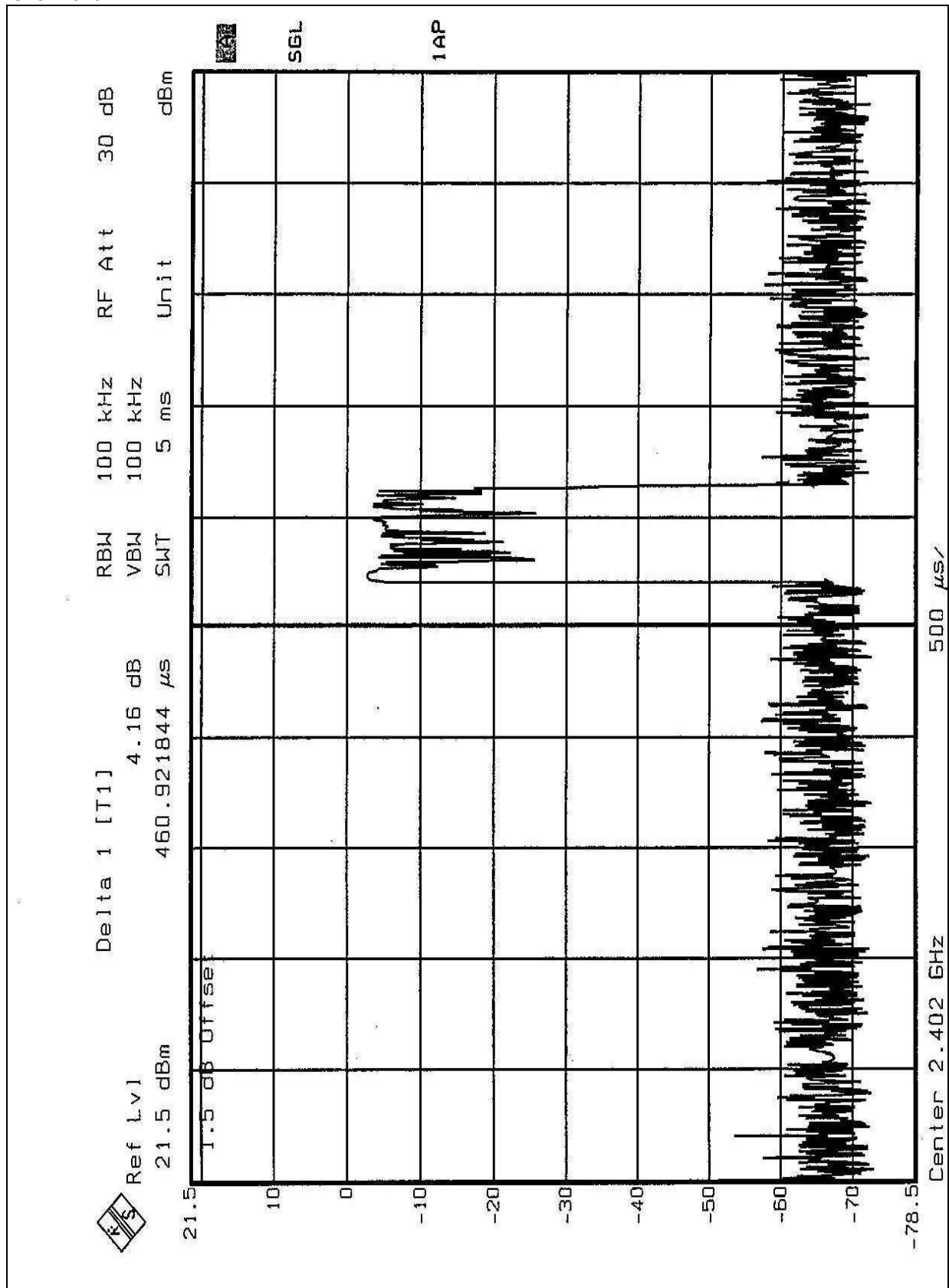
CHANNEL	DWELL TIME
0	280.05ms
39	280.05ms
78	280.05ms

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.

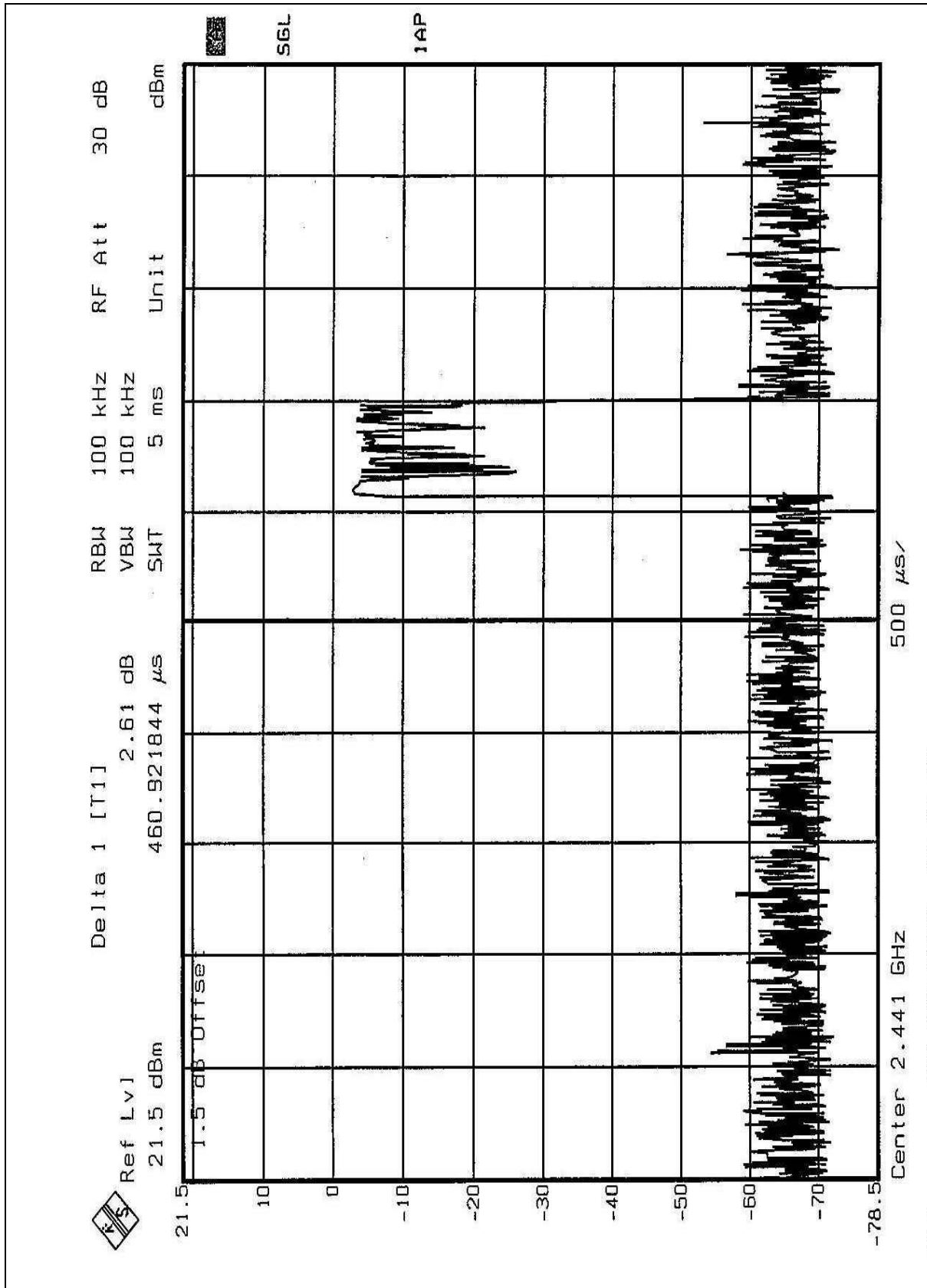
So, the longest Dwell Time = $460.92 \mu \text{ sec} \times 1600 \div 79 \times 30 = 280.05 \text{ msec}$. which is smaller than 0.4sec.

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

Channel 0



Channel 39



Channel 78

