CONFORMANCE TEST REPORT
FOR
FCC 47 CFR, Part 15 Subpart C

Report No.: 08-12-MAS-226-03

Client:	CHUNG-HSIN ELECTRIC& MACHINERY MFG.. CORP
Product:	Portable Data Terminal
Model:	PPT-180
FCC ID:	QWTPPT-180
Manufacturer/supplier:	CHUNG-HSIN ELECTRIC& MACHINERY MFG.. CORP
Date test item received:	2008/12/23
Date test campaign completed:	2009/01/07
Date of issue:	2009/01/08

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Total number of pages of this test report: 57 pages

Total number of pages of photos: External photos 3 pages
Internal photos 6 pages
Setup photos 3 pages

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Client	: CHUNG-HSIN ELECTRIC& MACHINERY MFG.. CORP
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Manufacturer	: CHUNG-HSIN ELECTRIC& MACHINERY MFG.. CORP
Address	: NO.25,Wen-Te Rd.,Lo-Shan Village, Kwei Shan Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
EUT	: Portable Data Terminal
Trade name	: Mobia
Model No.	: PPT-180
Power Source	: Adaptor (SL-0106-6V1.5A-U) Input 100-240VAC，50-60Hz，0.3A Output 6.0V dc，1.5A
Regulations applied	: FCC 47 CFR, Part 15 Subpart C (2007)

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

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⑤ FCC Registration Number: 90588, 91094, 91095

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Portable Data Terminal
b) Trade Name : Mobia
c) Model No. : PPT-180
d) FCC ID : QWTPPT-180

1.2 Characteristics of Device

The EUT is a Portable Data Terminal includes the Bluetooth technology function. Bluetooth is a short-range radio link intended to be a cable replacement between portable or fixed electronic devices. Bluetooth operates in the unlicensed ISM Band at 2.4GHz. In this band, 79 RF channels spaced 1MHz apart are defined. The rated output power is –0.91 dBm (0.811 mW).
The other function of the EUT: Data collection (1D laser scan), Data storage, Display with touch panel, 24 key input etc.

1.3 Test Methodology

All testing were performed according to the procedures in ANSI C63.4 (2003) an FCC CFR 47 Part 2 and Part 15.

1.4 Modifiction List of EUT

N/A

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

1.6 Test Summary

Requirement	FCC Paragraph #	Test Pass
Antenna Requirement	15.203	☒
Conducted Emission	15.207	☒
Emission Bandwidth	15.247 (a)(2)	☒
Output Power Requirement	15.247 (b)	☒
Power Density Requirement	15.247 (e)	☒
Spurious Emissions	15.247 (d)	☒
Radiated Emission	15.247 (d)	☒

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to §15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Quasi Peak dB μV	Average dB μV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

*Decreases with the logarithm of the frequency.

For intentional device, according to §15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dB μV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(3) Antenna Requirement

For intentional device, according to §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.

(4) 20dB Bandwidth Requirement

For frequency hopping systems, according to 15.247(a)(1), hopping channel carrier frequencies seperated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

(5) Output Power Requirement

For frequency hopping systems, according to 15.247(1), operating in the 2400-2483.5MHz band employing at least 75 hopping channels. The maximum peak output power of the transmitter shall not exceed 1 Watt. 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.

(6) 100 kHz Bandwidth of Frequency Band Edges Requirement

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

(7) Number of Hopping Channels

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels.

(8) Channel Carrier Frequencies Seperation

According to 15.247(a)(1)(iii), the frequency hopping systems shall have hopping channel carrier frequencies seperated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

(9) Dwell Time

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

(10) Power Spectral Density

According to 15.247(d), for bluetooth device, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater them 8dBm in any 3kHz band during any time interral of continuous transmission.

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

To comply with the FCC RF exposure compliance requirement, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

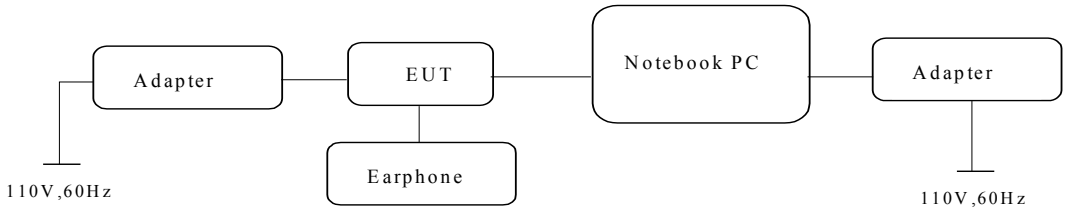
For the purposes of this test report ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT during the test. Notebook PC was used to control the RF channel under the hightest, middle and lowest frequency and transmit the maximun RF power. Customer would not use it. But never the less ancillary equipment can influence the test results..

3.2 Devices for Tested System

Device	Manufacture	Model	Cable Description
* Portable Data Terminal	CHUNG-HSIN ELECTRIC& MACHINERY MFG.. CORP	PPT-180	1.5m*1, Unshielded Power Line / Adaptor
Notebook PC	HP	nx6320	1.8m*1, Unshielded Power Line / Adaptor 1.8m Unshielded Signal Line
Earphone	N/A	N/A	0.5m Unshielded Signal Line

Remark

1. "*" means equipment under test.



Note: A HP notebook performs the control test mode. The notebook removes away to check the emission test after the control command is ready.

2. Software setting: Bluetest.exe
   Power setting (Ext, Int): (255, 50)

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with §15.109(a).

For intentional radiators, according to §15.247 (a), operation under this provision is limited to frequency hopping and digitally modulated, and the out band emission shall be comply with § 15.247 (c)

4.2 Measurement Procedure

A.Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT (X and Y axis):

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antennna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. The axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.
4. The position in which the maximum noise occurred was “X axis”. (Please see the test setup photos)

B. Final Measurement

1. Setup the configuration per figure 3 and 4 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, it is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions. For emission frequencies measured above 1 GHz, a pre-scan be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
   Note : A filter was used to avoid pre-amplifier saturated when measure TX operation mode.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the datarate, placement of ANT. cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

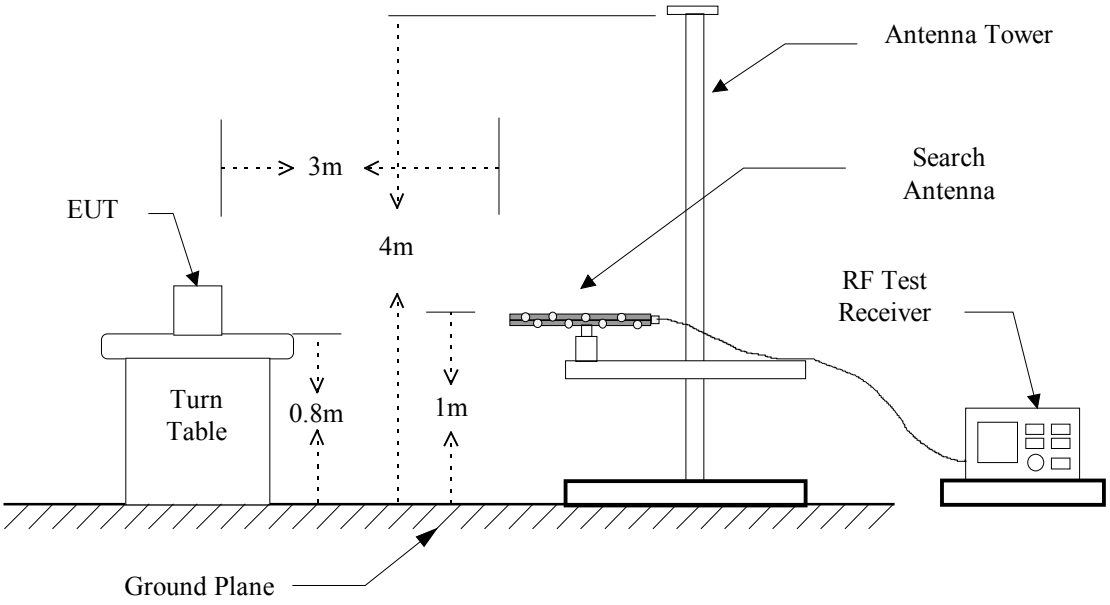
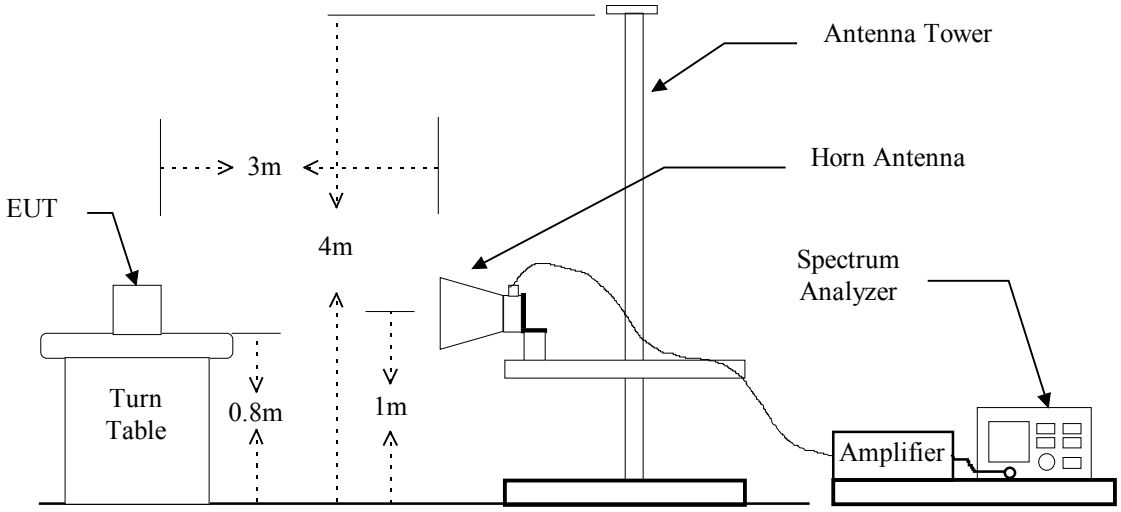


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
EMI Test Receiver	R&S	ESIB7	07/17/2009
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009
Horn Antenna	EMCO	3115	06/12/2009
BiLog Antenna	Schaffner	CBL 6112B	07/03/2009
Horn Antenna	EMCO	3116	07/15/2009
Preamplifier	Hewlett-Packard	8449B	09/21/2009

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	300 kHz
	RF Test Receiver	Peak	120 kHz	300 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz

4.4 Radiated Emission Data

4.4.1 RF Portion

a) Channel 0

Operation Mode : Transmitting
Fundamental Frequency : 2402 MHz
Test Date : Jan. 07, 2009 Temperature : 20℃ Humidity : 60%

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
4804.000	---	---	---	---	0.6	---	---	74.0	54.0
7206.000	---	---	---	---	2.2	---	---	74.0	54.0
9608.000	---	---	---	---	2.6	---	---	74.0	54.0

b) Channel 39

Fundamental Frequency : 2441 MHz

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
4882.000	---	---	---	---	0.5	---	---	74.0	54.0
7323.000	---	---	---	---	2.9	---	---	74.0	54.0
9764.000	---	---	---	---	4.2	---	---	74.0	54.0

c) Channel 78

Fundamental Frequency : 2480 MHz

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
4960.000	---	---	---	---	0.5	---	---	74.0	54.0
7440.000	---	---	---	---	2.9	---	---	74.0	54.0
9920.000	---	---	---	---	4.2	---	---	74.0	54.0
14880.000	---	---	---	---	3.1	---	---	74.0	54.0
17360.000	---	---	---	---	6.3	---	---	74.0	54.0

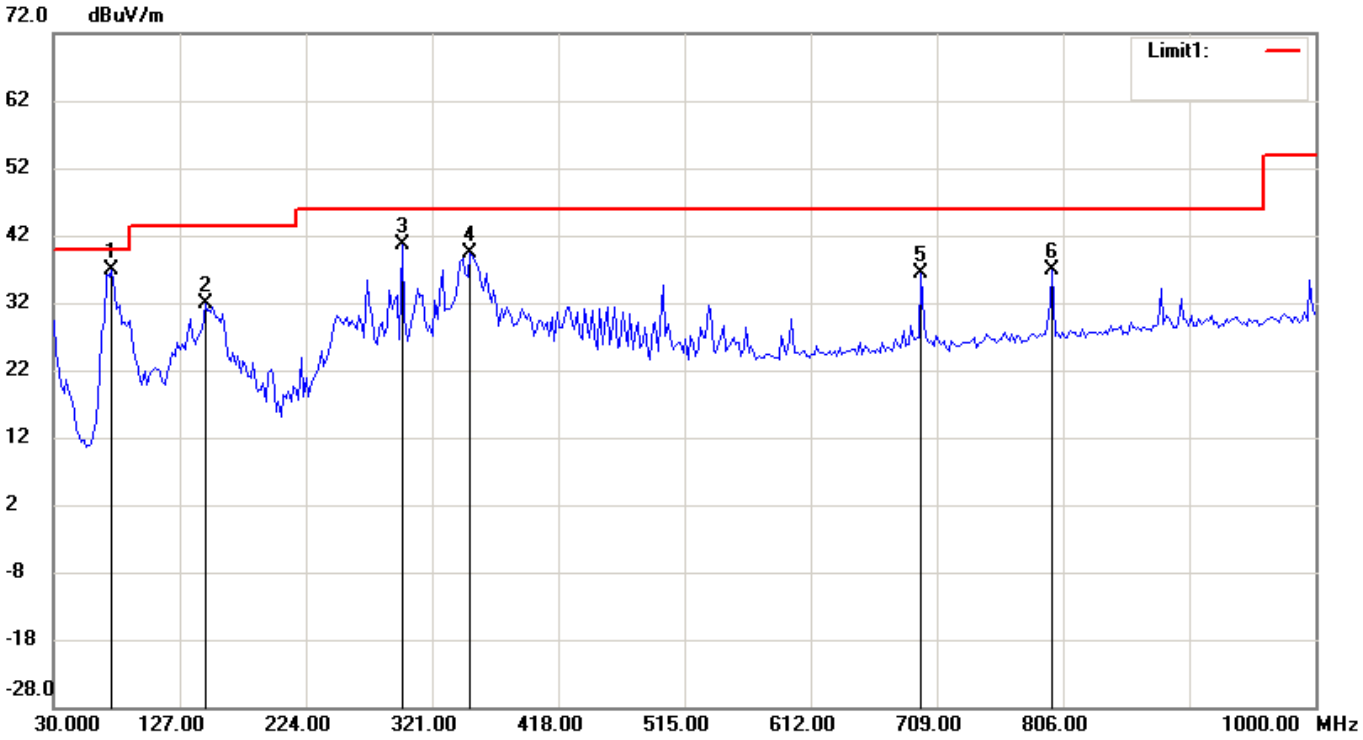
Note :

1. Item of margin shown in above table refer to average limit.
2. Remark "---" means that the emissions level is too low to be measured.
3. Item "Margin" referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

4.4.2 Other Emission

4.4.2.1 below 1GHz

File: **Data: #58** **Date: 2009/1/7** **Temperature: 20 ℃**
Time: AM 11:57:59 **Humidity: 60 %**

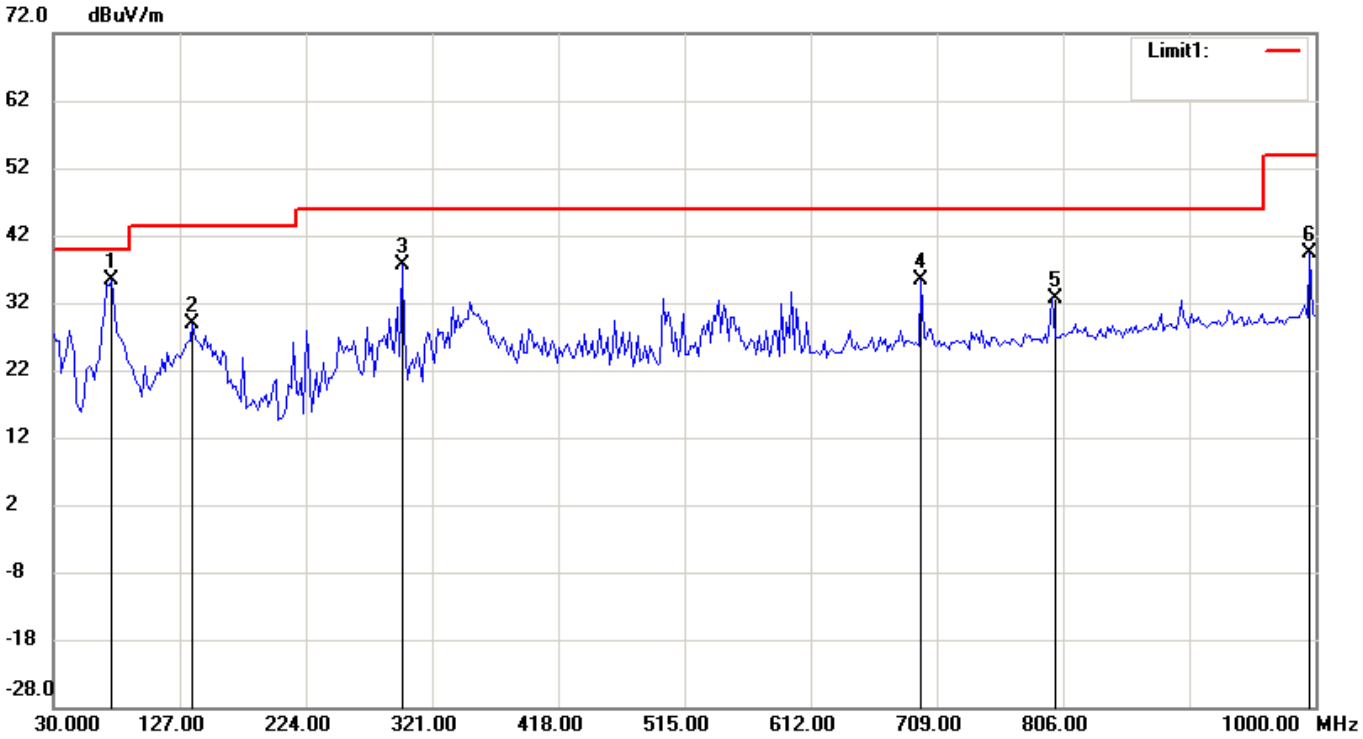


Condition: FCC_30-1000MHz **Polarization:** Horizontal
EUT: Port1ble Data Therminal **Distance:** 3m
Model: PPT-180
Test Mode:
Note: WORSE CASE

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	74.7094	28.90	peak	8.01	36.91	40.00	-3.09
2	146.6332	18.71	peak	13.27	31.98	43.50	-11.52
3	298.2565	23.82	peak	16.86	40.68	46.00	-5.32
4	350.7414	20.68	peak	18.72	39.40	46.00	-6.60
5	696.7535	11.56	peak	24.79	36.35	46.00	-9.65
6	797.8356	10.60	peak	26.17	36.77	46.00	-9.23

File: **Data: #59** **Date: 2009/1/7** **Temperature: 20 ℃**

Time: PM 12:00:14 **Humidity: 60 %**



Condition: **FCC_30-1000MHz** **Polarization:** **Vertical**

EUT: **Portable Data Therminal** **Distance:** **3m**

Model: **PPT-180**

Test Mode:

Note: **WORSE CASE**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	74.7094	27.43	peak	8.01	35.44	40.00	-4.56
2	136.9138	14.89	peak	13.95	28.84	43.50	-14.66
3	298.2565	20.86	peak	16.86	37.72	46.00	-8.28
4	696.7535	10.65	peak	24.79	35.44	46.00	-10.56
5	797.8357	6.42	peak	26.17	32.59	46.00	-13.41
6	996.1122	10.72	peak	28.65	39.37	54.00	-14.63

4.4.2.2 above 1GHz

4.4.2.2.1 Operation Mode : CH 0, 2402 MHz

Frequency (MHz)	Reading (dBuV)				Correct Factor (dB/m)	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V						
	Peak	AVG	Peak	AVG		Peak	AVG	Peak	AVG
1240.000	52.3	---	52.8	---	-15.0	37.8	---	74.0	54.0

4.4.2.2.2 Operation Mode : CH 39, 2441 MHz

Frequency (MHz)	Reading (dBuV)				Correct Factor (dB/m)	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V						
	Peak	AVG	Peak	AVG		Peak	AVG	Peak	AVG
1240.000	53.2	---	54.2	---	-15.0	39.2	---	74.0	54.0

4.4.2.2.3 Operation Mode : CH 78, 2480 MHz

Frequency (MHz)	Reading (dBuV)				Correct Factor (dB/m)	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V						
	Peak	AVG	Peak	AVG		Peak	AVG	Peak	AVG
1240.000	52.2	---	53.6	---	-15.0	38.6	---	74.0	54.0

Note:
1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "***" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz).
   ±4.1dB (1GHz≦f≦18GHz).
   ±4.4dB (18GHz<f≦40GHz).

4 Remark “---” means that the emissions level is too low to be measured.

4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies

(A)
Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Jan. 07, 2009 Temperature : 20℃ Humidity : 60%

Frequency	Reading (dBuV)				Factor	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V		(dB)	Peak	Ave	Peak	Ave.
(MHz)	Peak	Ave	Peak	Ave	Corr.	(H/V Max.)			
2390.000	28.36	18.73	27.12	18.60	30.3	58.66	49.03	74.0	54.0

Note:
The result is the highest value of radiated emission from restrict band of 2310 ~2390 MHz.

(B)
Channel 78

Operation Mode : Transmitting

Fundamental Frequency : 2480 MHz

Frequency	Reading (dBuV)				Factor	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V		(dB)	Peak	Ave	Peak	Ave.
(MHz)	Peak	Ave	Peak	Ave	Corr.	(H/V Max.)			
2483.500	26.4	16.21	25.61	17.30	30.3	56.70	47.60	74.0	54.0

Note:
The result is the highest value of radiated emission from restrict band of 2483.5 ~2500 MHz.

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

where

Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

5 CONDUCTED EMISSION MEASUREMENT

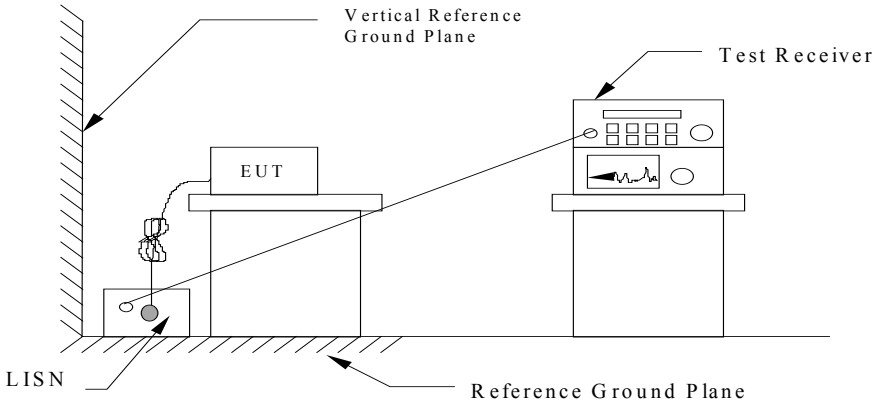
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

5.2 Measurement Procedure

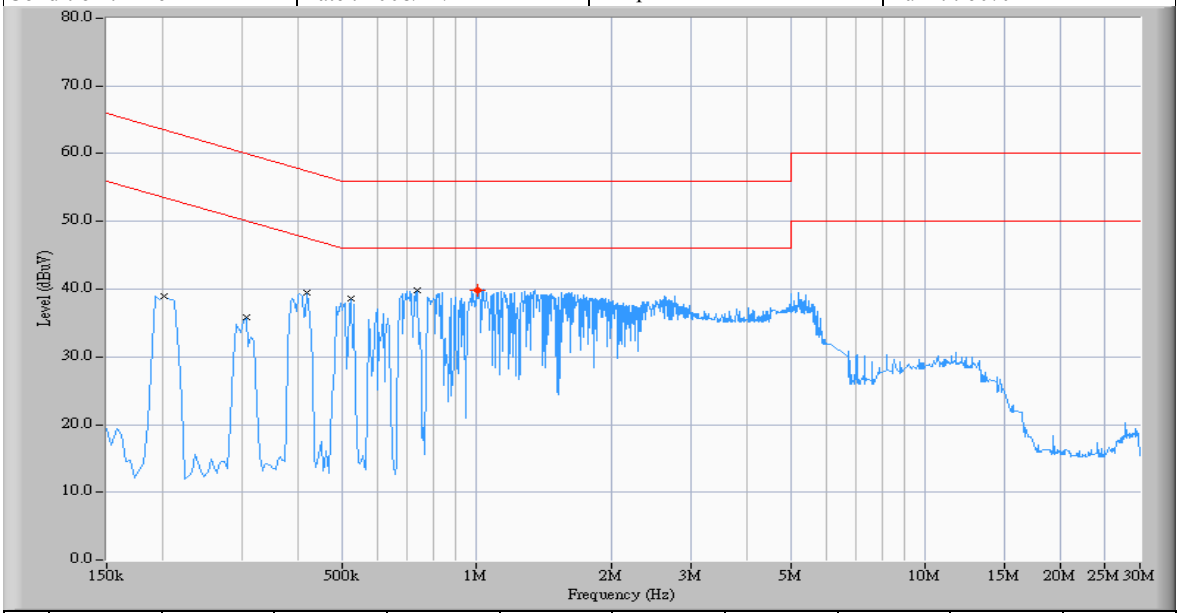
1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

EUT : BT	Model :	Status :	
Condition : Line 1	Date : 2008/12/14	Temp. : 15℃	Humi. : 60%

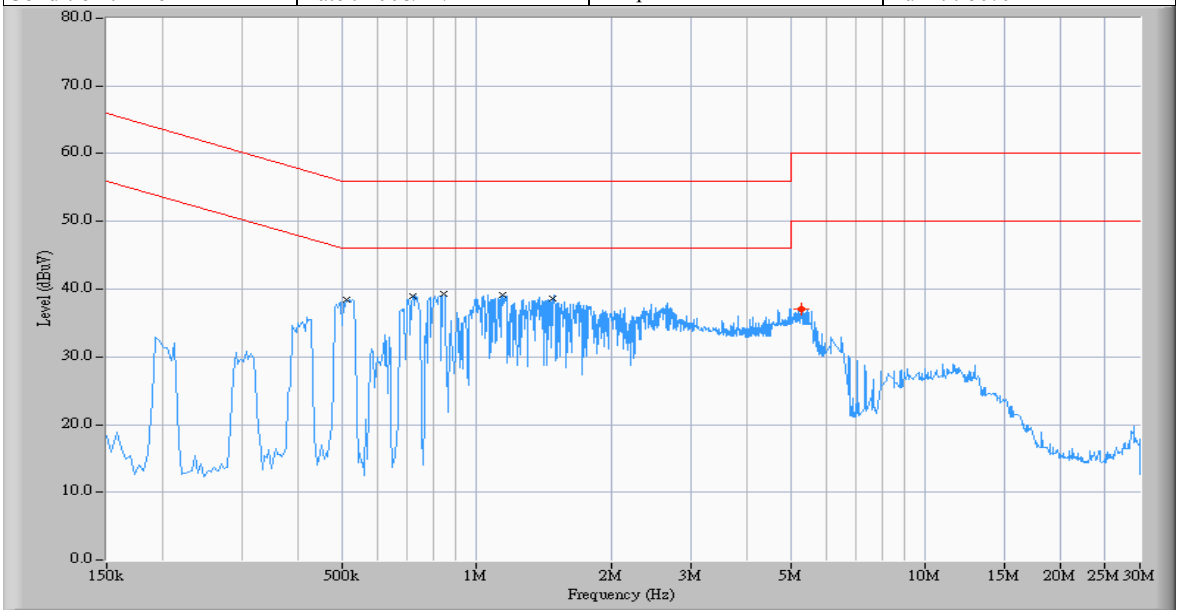


	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.201	39.0	----	0.1	39.1	----	63.6	53.6	-24.5	----
2	0.306	35.8	----	0.1	35.9	----	60.1	50.1	-24.2	----
3	0.420	39.5	----	0.2	39.7	----	57.5	47.5	-17.8	----
4	0.525	38.6	----	0.2	38.8	----	56.0	46.0	-17.2	----
5	0.736	39.8	----	0.3	40.1	----	56.0	46.0	-15.9	----
6	1.005	39.8	----	0.3	40.1	----	56.0	46.0	-15.9	----

Note:

1. Place of measurement: EMC LAB. of the ETC.
2. "***" means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. "#" means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.

EUT : BT	Model :	Status :	
Condition : Line 2	Date : 2008/12/14	Temp. : 20℃	Humi. : 60%



	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.513	38.4	----	0.1	38.5	----	56.0	46.0	-17.5	----
2	0.720	39.0	----	0.1	39.1	----	56.0	46.0	-16.9	----
3	0.845	39.3	----	0.2	39.5	----	56.0	46.0	-16.5	----
4	1.142	39.1	----	0.3	39.4	----	56.0	46.0	-16.6	----
5	1.478	38.7	----	0.3	39.0	----	56.0	46.0	-17.0	----
6	5.287	37.1	----	0.3	37.4	----	60.0	50.0	-22.6	----

Note:

1. Place of measurement: EMC LAB. of the ETC.
2. "***" means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. "#" means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR (Included Cable Loss)

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test.

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESCS30	08/13/2009
LISN	EMCO	37100/2M	02/12/2009
LISN	TELEMETER	NNB-2/16Z	03/30/2009

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

For intentional device, according to §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 §15.247 (b), if Receving 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.

6.2 Antenna Construction and Directional Gain

The antennas is a Bluetooth chip antenna. The peak gain of antenna used is 1.5 dBi.

Antenna Type	Chip Antenna
Model Number	AN9520
Brand Name	Rainsun
Peak Antenna Gain	1.5 dBi
Antenna Size	9.5mm(L)*2.0mm(W)*1.0mm(H)

7 20dB EMISSION BANDWIDTH MEASUREMENT

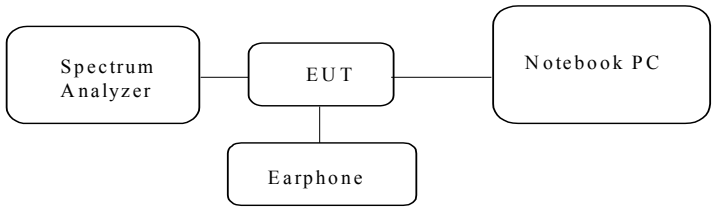
7.1 Standard Applicable

According to 15.247(a)(1), for frequency hopping systems, hopping channel carrier frequencies seperated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect it to measurement instrument. Then set it to any 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 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Figure 4: Emission bandwidth measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

7.4 Measurement Data

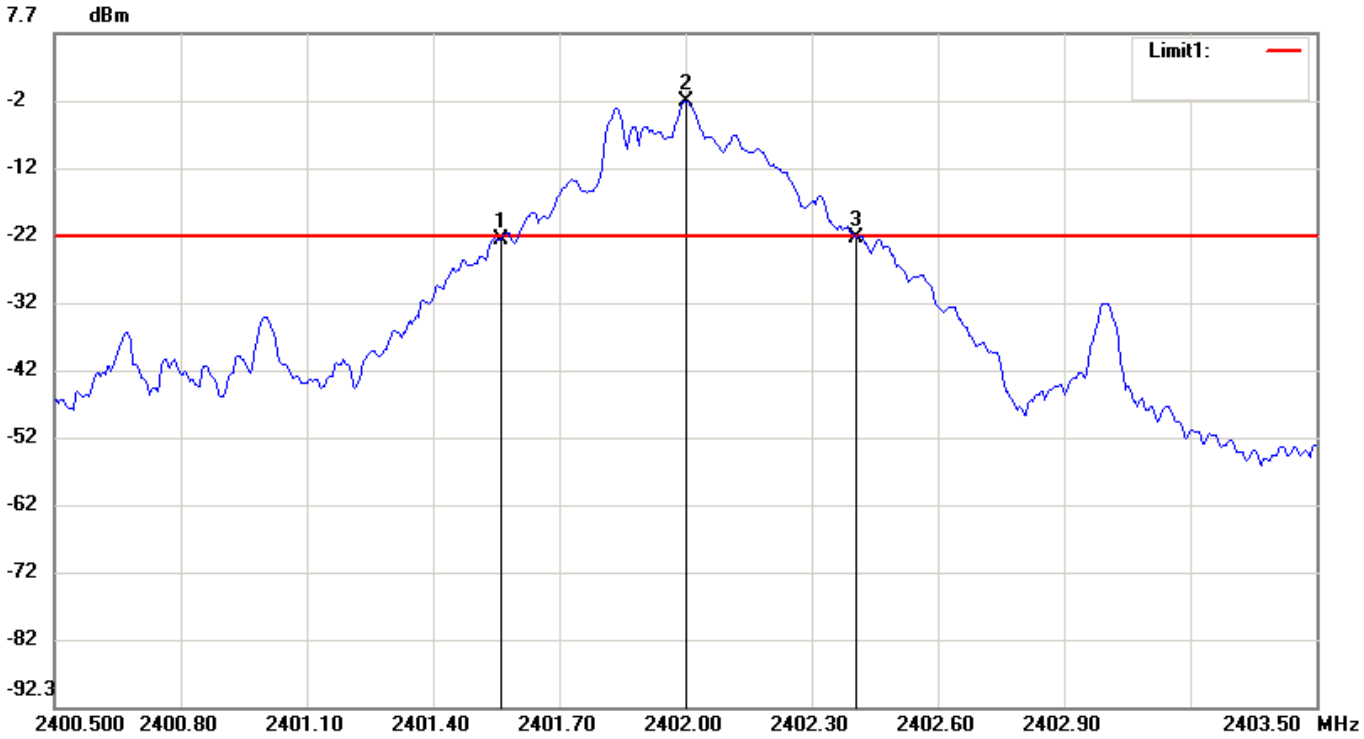
Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Chart
0	2402	0.845	Page 27
39	2441	0.940	Page 28
78	2480	0.935	Page 29

Note: Please refer to page 27 to page 29 for chart.

File: 08-12-MAS-226 Data: #3 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:09:18 **Humidity: 59 %**



Condition: **-22.35dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3.2ms Att.: 10dB**

Model: **PPT-180** **RBW: 30 KHz VBW: 100 KHz**

Test Mode:

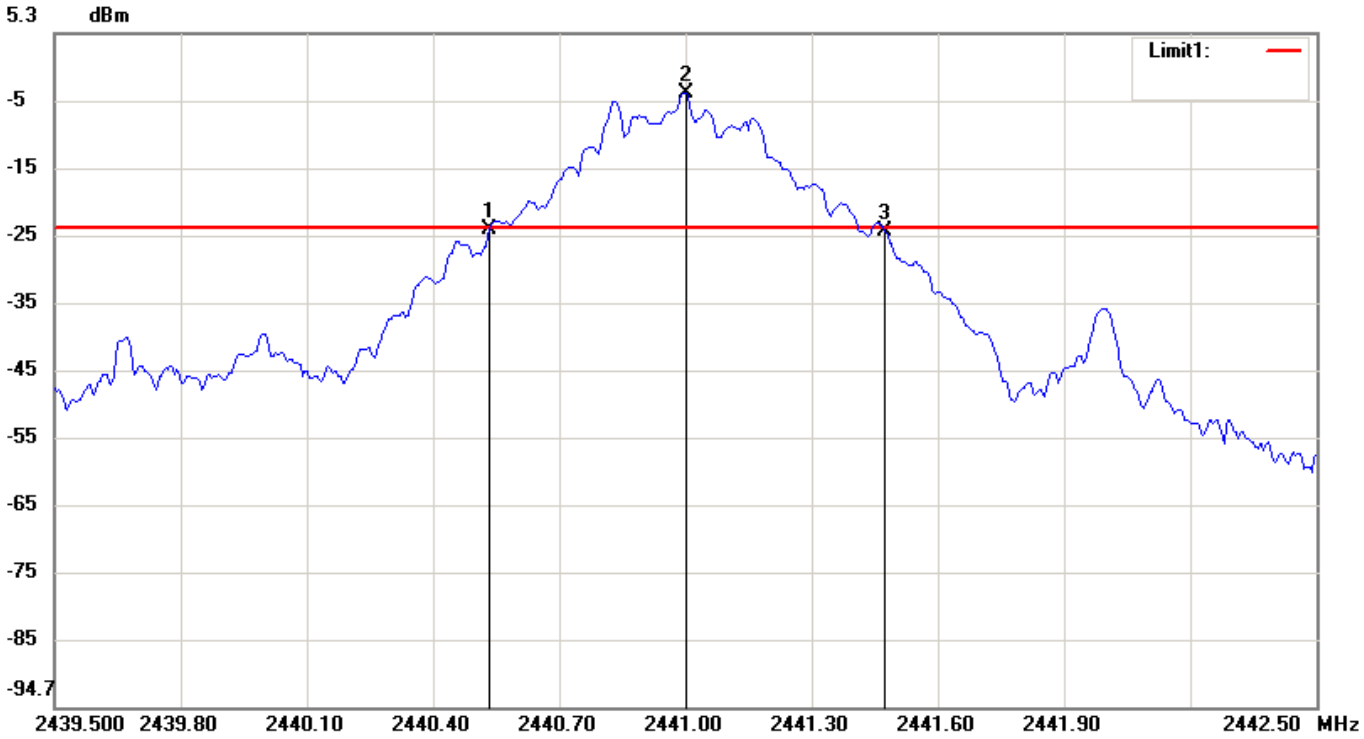
Note: **FCC-Bluetooth Channel 00-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2401.560	-22.95
2	2402.000	-2.35
3	2402.405	-22.61

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.845	0.34

File: 08-12-MAS-226 Data: #17 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:57:15 **Humidity: 59 %**



Condition: **-23.53dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3.2ms Att.: 10dB**

Model: **PPT-180** **RBW: 30 KHz VBW: 100 KHz**

Test Mode:

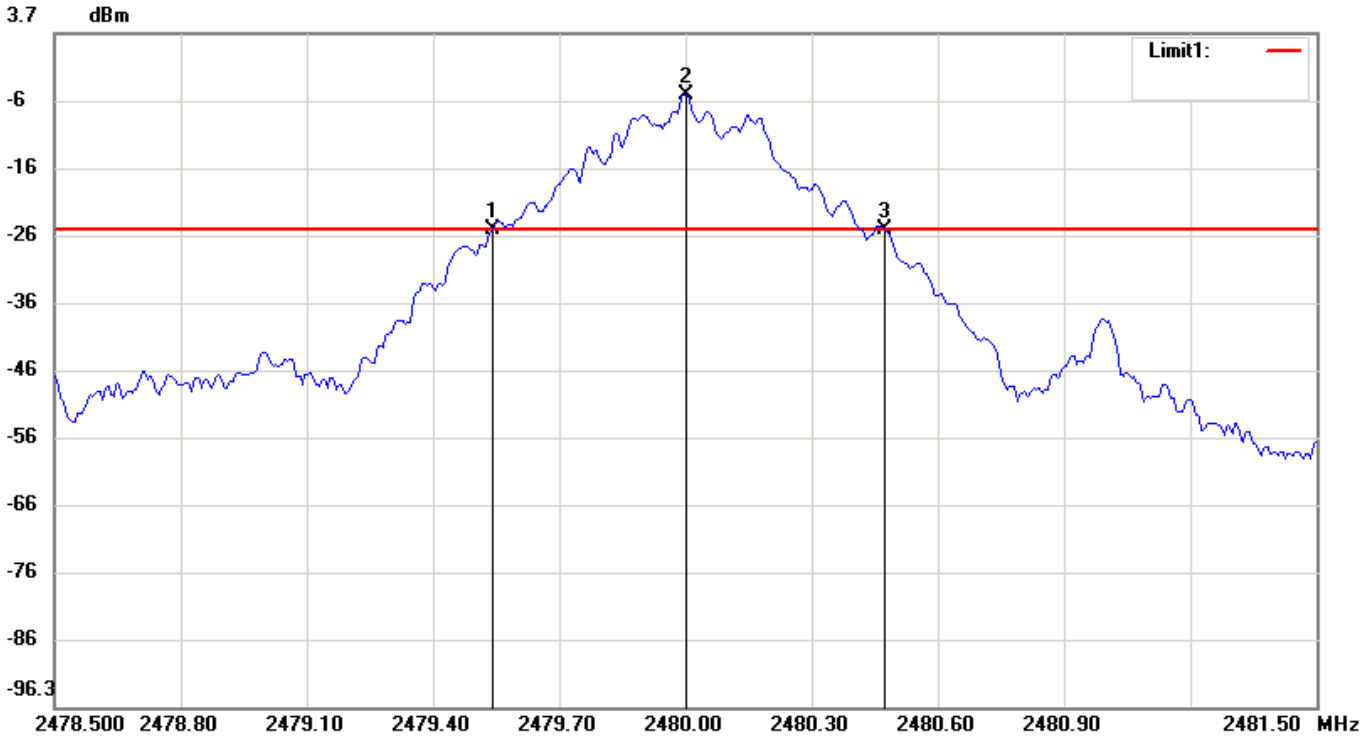
Note: **FCC-Bluetooth Channel 39-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2440.535	-23.89
2	2441.000	-3.53
3	2441.475	-24.05

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.94	-0.16

File: 08-12-MAS-226 Data: #10 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:16:02 **Humidity: 59 %**



Condition: **-25.41dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3.2ms Att.: 10dB**

Model: **PPT-180** **RBW: 30 KHz VBW: 100 KHz**

Test Mode:

Note: **FCC-Bluetooth Channel 78-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2479.540	-25.45
2	2480.000	-5.41
3	2480.475	-25.53

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.935	-0.08

8 OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

For frequency hopping system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If Receving 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.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

8.4 Measurement Data

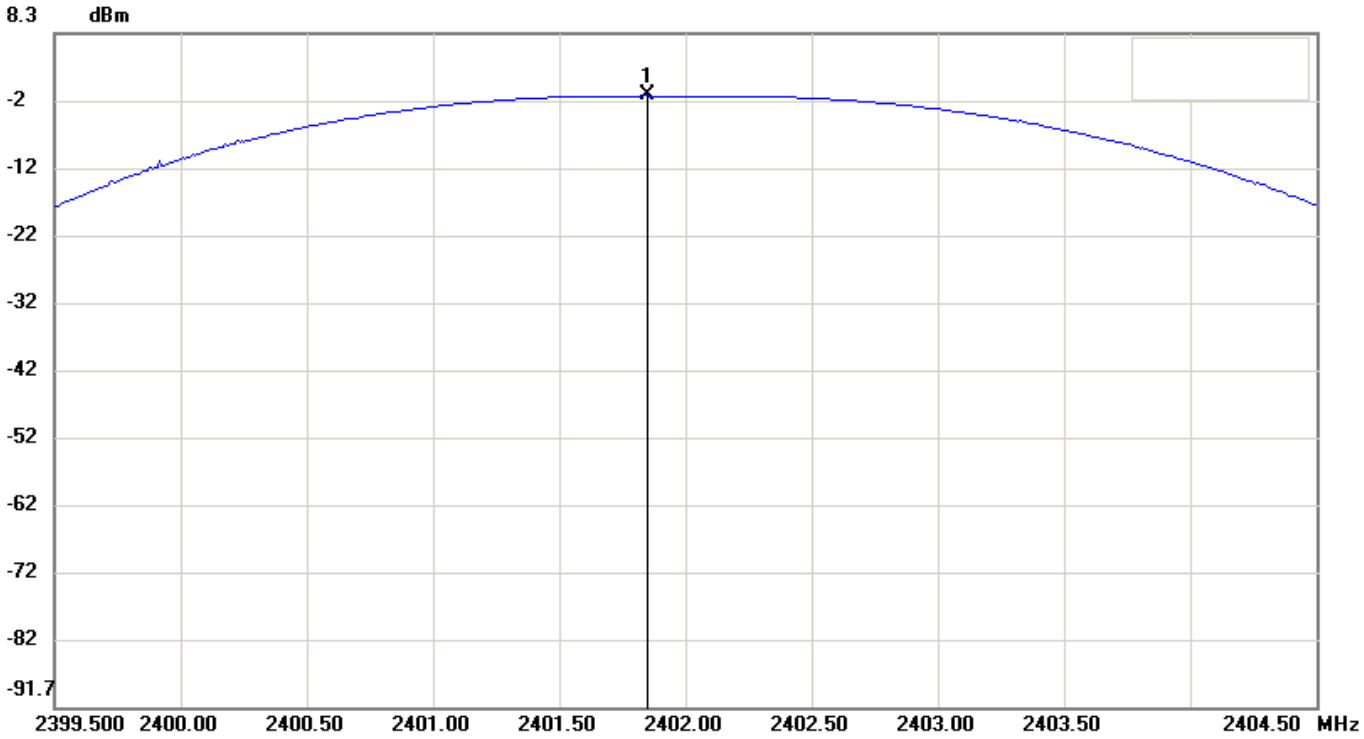
Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
0	2402	-0.91	0.811	1000	Page 32
39	2441	-3.42	0.455	1000	Page 33
78	2480	-5.32	0.294	1000	Page 34

Note : 1. Please refer to page 32 to page 34 for chart.
2. Instrument have compensation for factor of result.

File: 08-12-MAS-226 Data: #1 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:08:28 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 2000 KHz VBW: 2000 KHz**

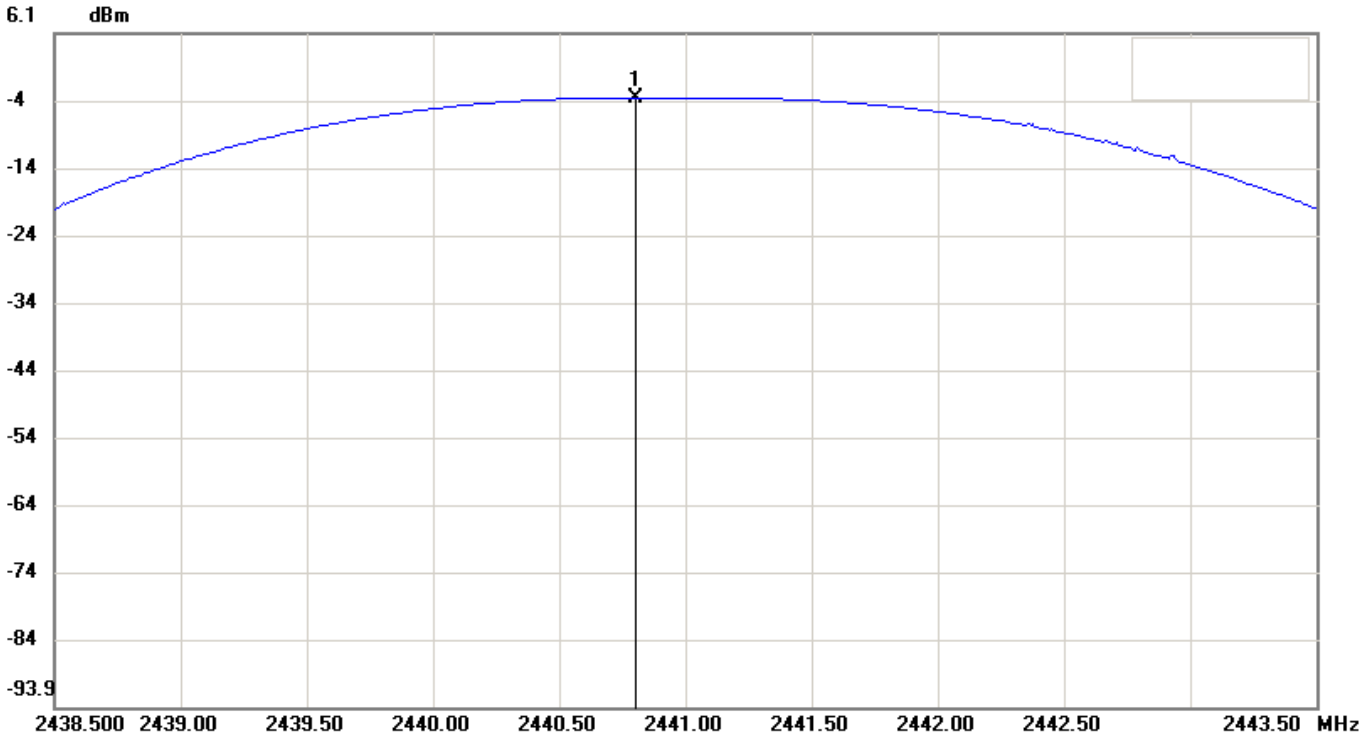
Test Mode:

Note: **FCC Bluetooth CH00 Output Power**

No.	Frequency(MHz)	Level(dBm)
1	2401.842	-0.91

File: 08-12-MAS-226 Data: #15 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:56:28 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 2000 KHz VBW: 2000 KHz**

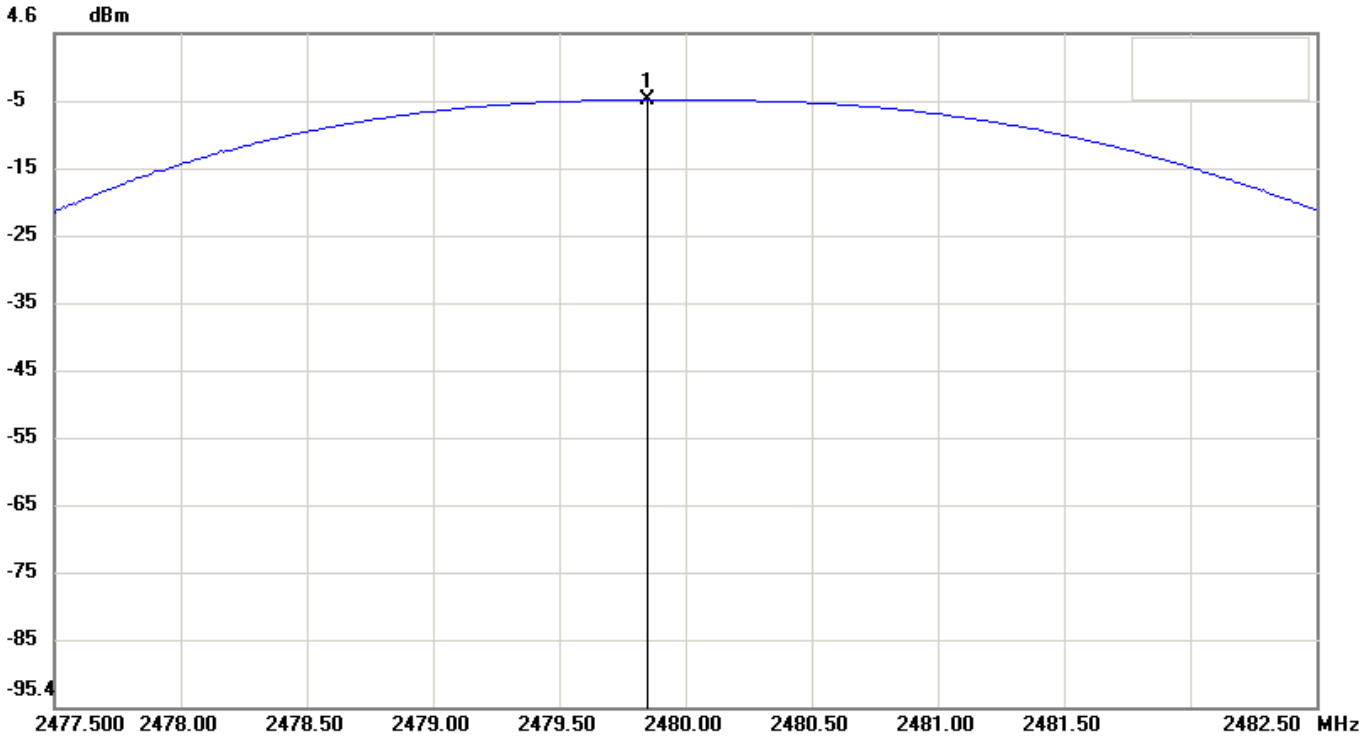
Test Mode:

Note: **FCC Bluetooth CH39 Output Power**

No.	Frequency(MHz)	Level(dBm)
1	2440.792	-3.42

File: 08-12-MAS-226 Data: #8 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:15:15 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 2000 KHz VBW: 2000 KHz**

Test Mode:

Note: **FCC Bluetooth CH78 Output Power**

No.	Frequency(MHz)	Level(dBm)
1	2479.850	-5.32

9 OUT-OF-BAND RF CONDUCTED SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

9.4 Measurement Data

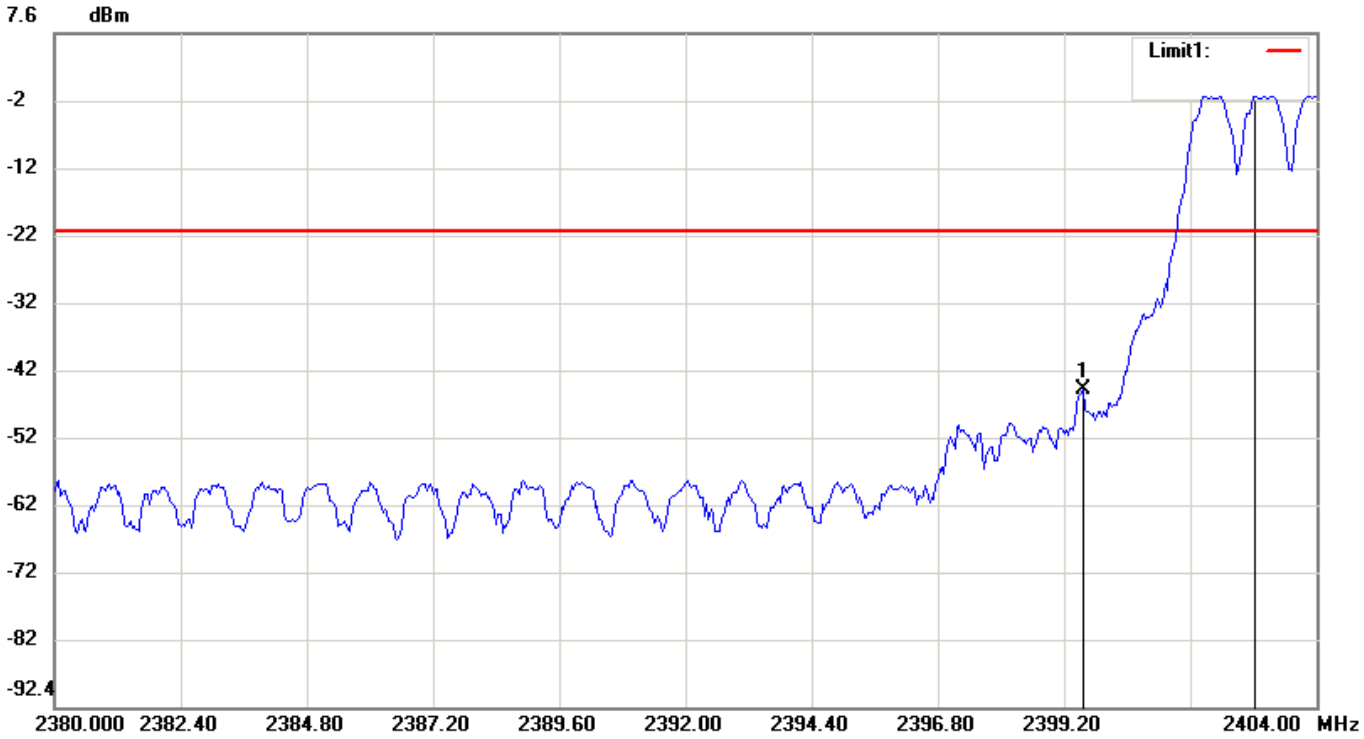
Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

Channel	Test Frequency Range	Note	Chart
0	2350 MHz - 2450 MHz	Lower Band Edge	Page 37
78	2433.5 MHz - 2533.5 MHz	Upper Band Edge	Page 38
0	30 MHz - 25 GHz		Page 39
39	30 MHz - 25 GHz		Page 40
78	30 MHz - 25 GHz		Page 41

Note: Please refer to page 37 to page 41 for chart.

File: 08-12-MAS-226 Data: #27 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:07:57 **Humidity: 59 %**



Condition: **-21.67dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 100 KHz VBW: 300 KHz**

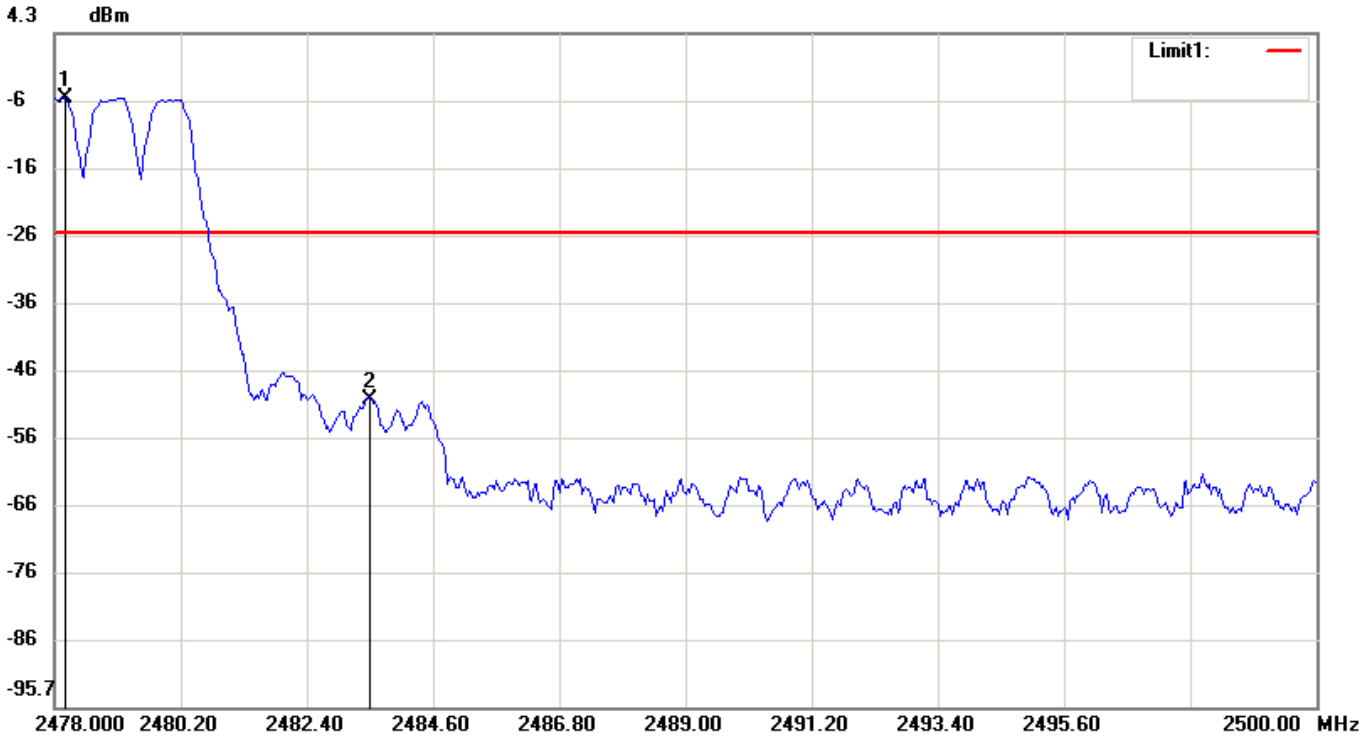
Test Mode:

Note: **FCC-Bluetooth Channel 00-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2399.560	-45.28
2	2402.840	-1.67

File: 08-12-MAS-226 Data: #28 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:08:56 **Humidity: 59 %**



Condition: **-25.18dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 100 KHz VBW: 300 KHz**

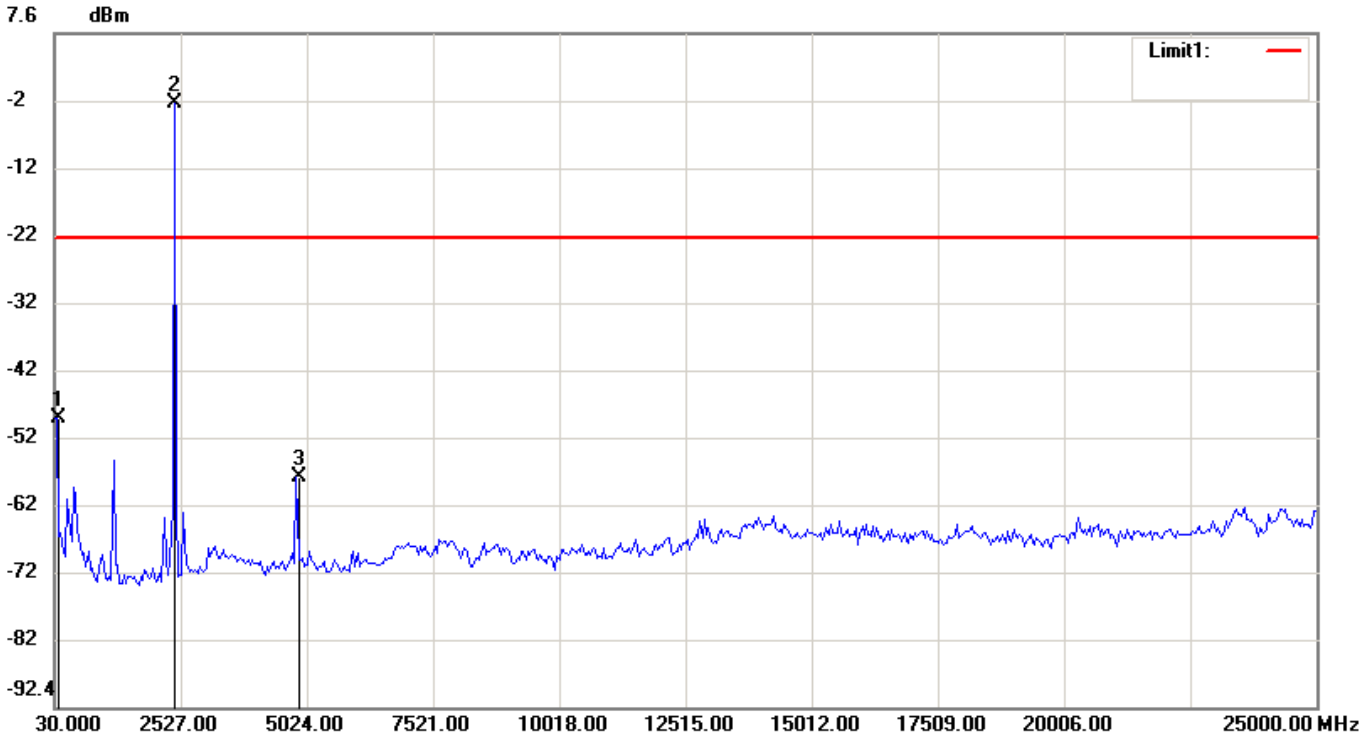
Test Mode:

Note: **FCC-Bluetooth Channel 78-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2478.147	-5.18
2	2483.500	-50.11

File: 08-12-MAS-226 Data: #5 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:10:17 **Humidity: 59 %**



Condition: **-22.63dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 2386.4ms Att.: 10dB**

Model: **PPT-180** **RBW: 100 KHz VBW: 300 KHz**

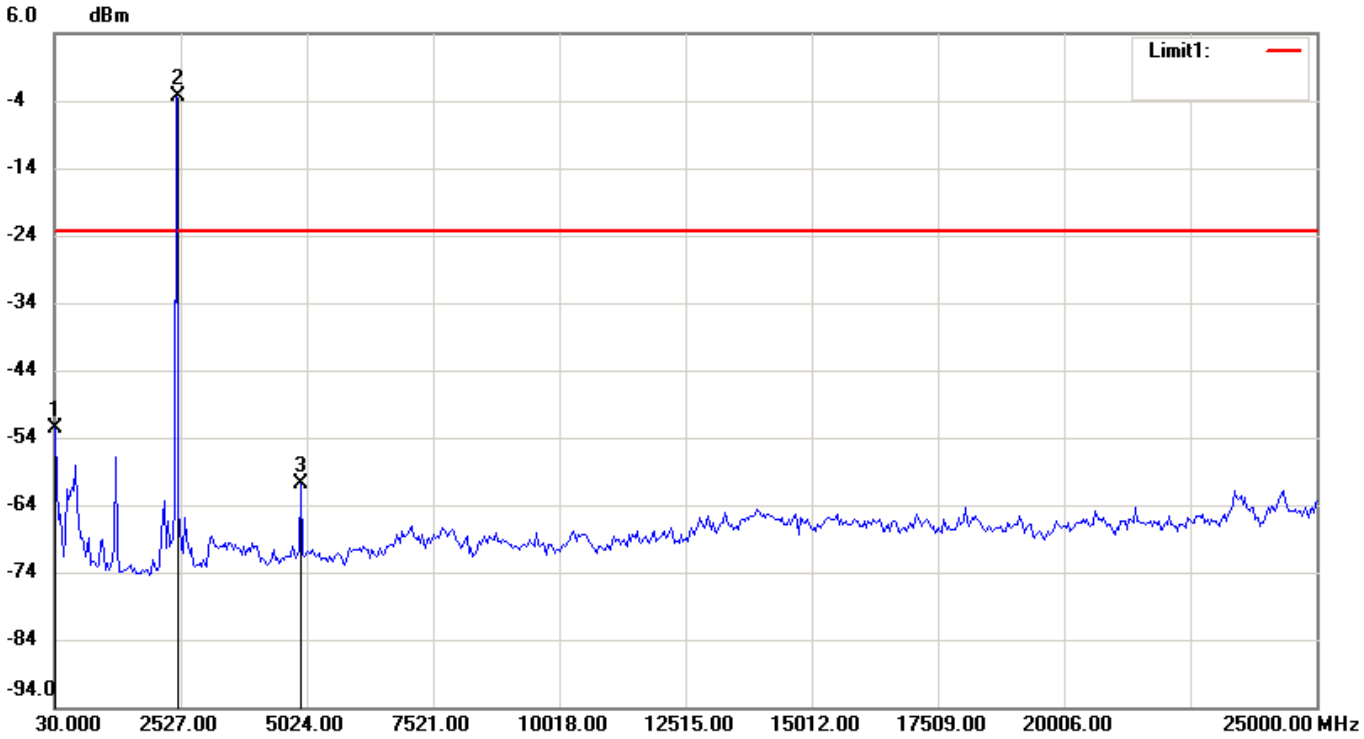
Test Mode:

Note: **FCC-BT Channel 00-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	71.6167	-49.37
2	2402.150	-2.63
3	4815.917	-58.25

File: 08-12-MAS-226 Data: #19 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:58:14 **Humidity: 59 %**



Condition: **-23.27dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 2386.4ms Att.: 10dB**

Model: **PPT-180** **RBW: 100 KHz VBW: 300 KHz**

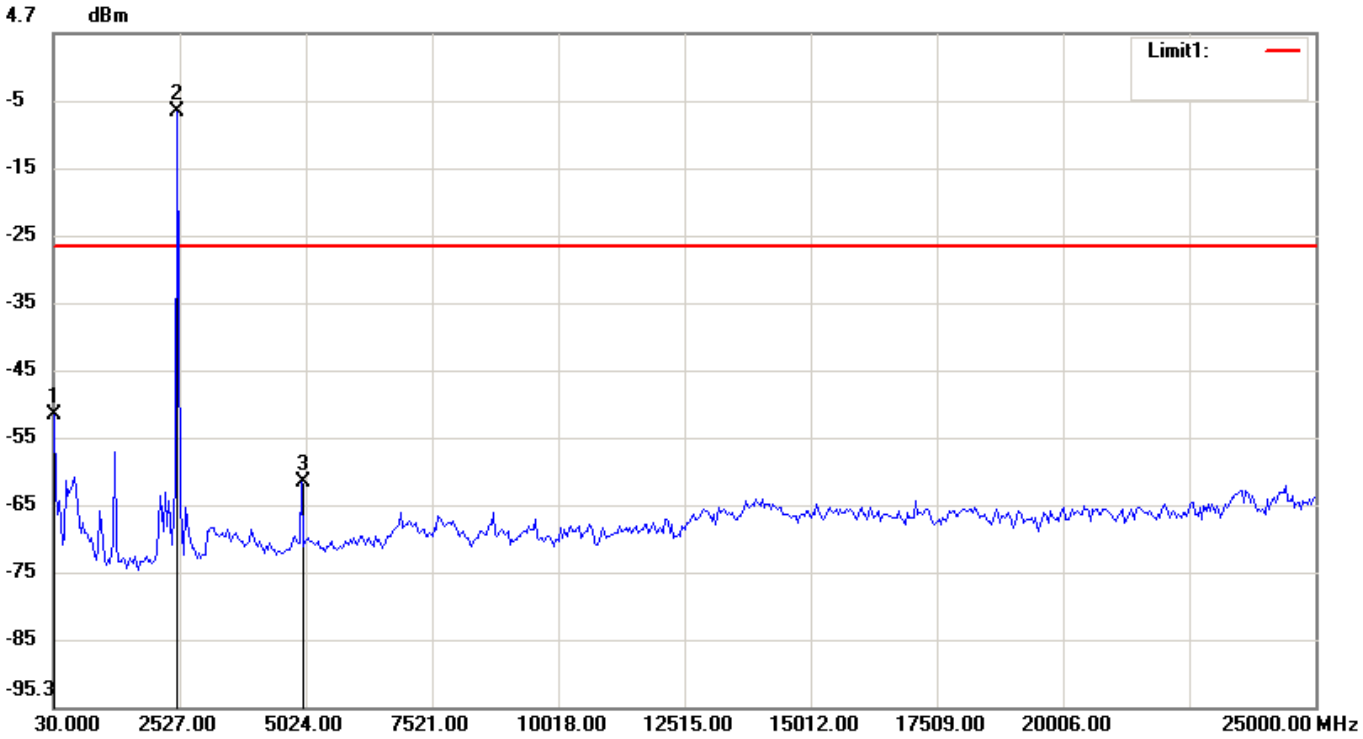
Test Mode:

Note: **FCC-BT Channel 39-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	30.0000	-52.67
2	2443.767	-3.27
3	4899.150	-60.93

File: 08-12-MAS-226 Data: #12 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: AM 11:17:01 **Humidity: 59 %**



Condition: **-27.03dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 2386.4ms Att.: 10dB**

Model: **PPT-180** **RBW: 100 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-BT Channel 78-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	30.0000	-51.89
2	2485.383	-7.03
3	4940.767	-61.88

10 NUMBER of HOPPING CHANNELS

10.1 Standard Applicable

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set EUT to hopping operating mode and set spectrum analyzer mixiumum to measure the number of hopping channels.

10.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

10.4 Measurement Data

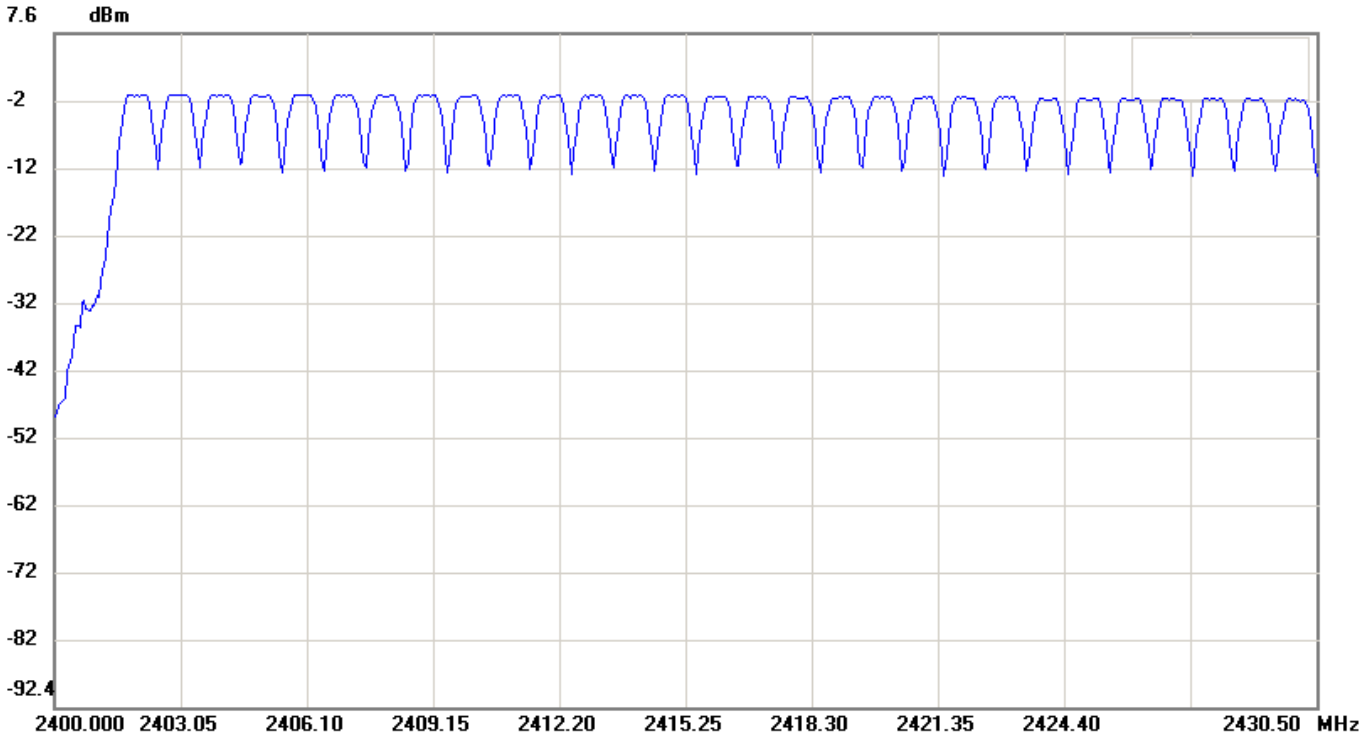
Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

Number of hopping channels = 79 channels

Note: Please refer to page 43 to page 45 for chart.

File: 08-12-MAS-226 Data: #29 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:10:46 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

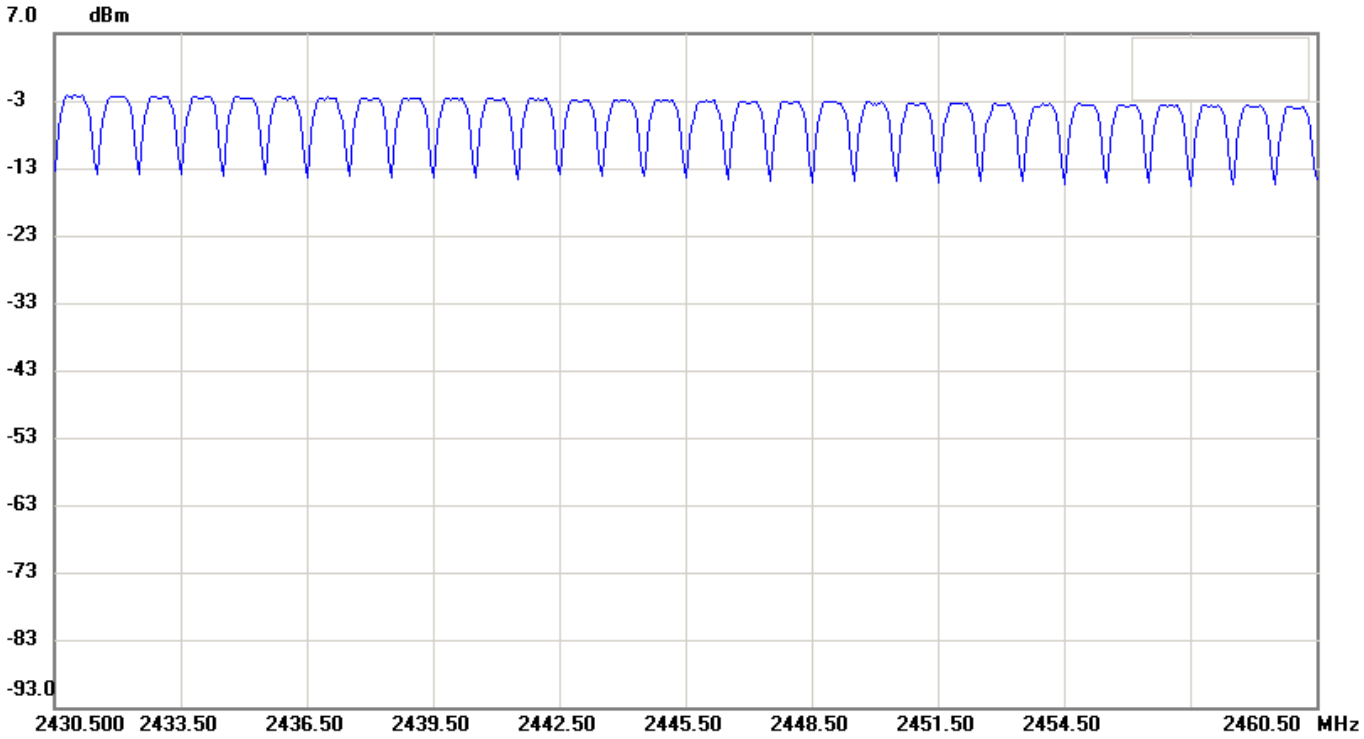
Model: **PPT-180** **RBW: 300 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part1**

File: 08-12-MAS-226 Data: #30 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:12:39 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

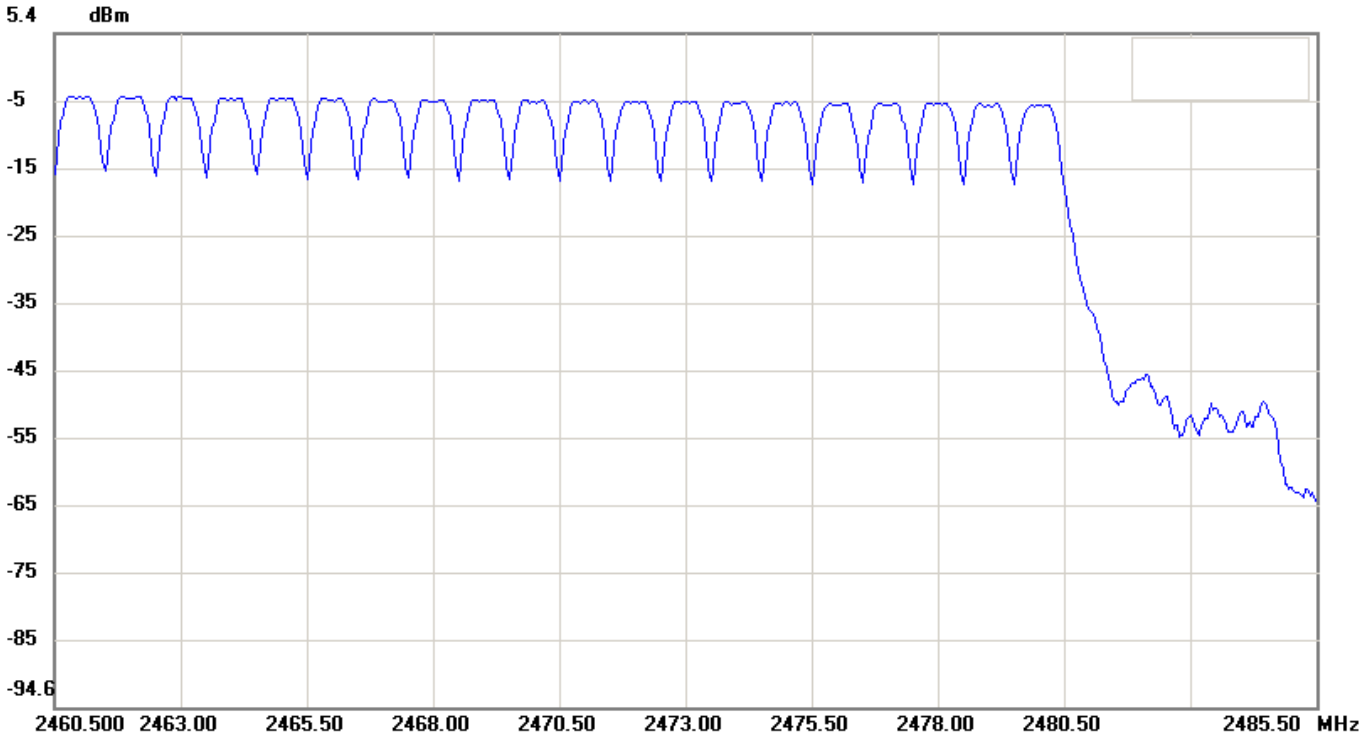
Model: **PPT-180** **RBW: 300 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part2**

File: 08-12-MAS-226 Data: #31 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:14:32 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 300 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part3**

11 HOPPING CHANNEL CARRIER FREQUENCY SEPARATED

11.1 Standard Applicable

According to 15.247(a)(1), the frequency hopping system shall have hopping channel carrier frequencies seperated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measurement frequency within its operating ragne and make sure the instrument is operated in its linear range.
3. Set spectrum analyzer maximum hold to measure channel carrier frequency , then adjust channel carrier frequency to adjacent channel.
4. Repeat above procedure until all measured frequencies were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

11.4 Measurement Data

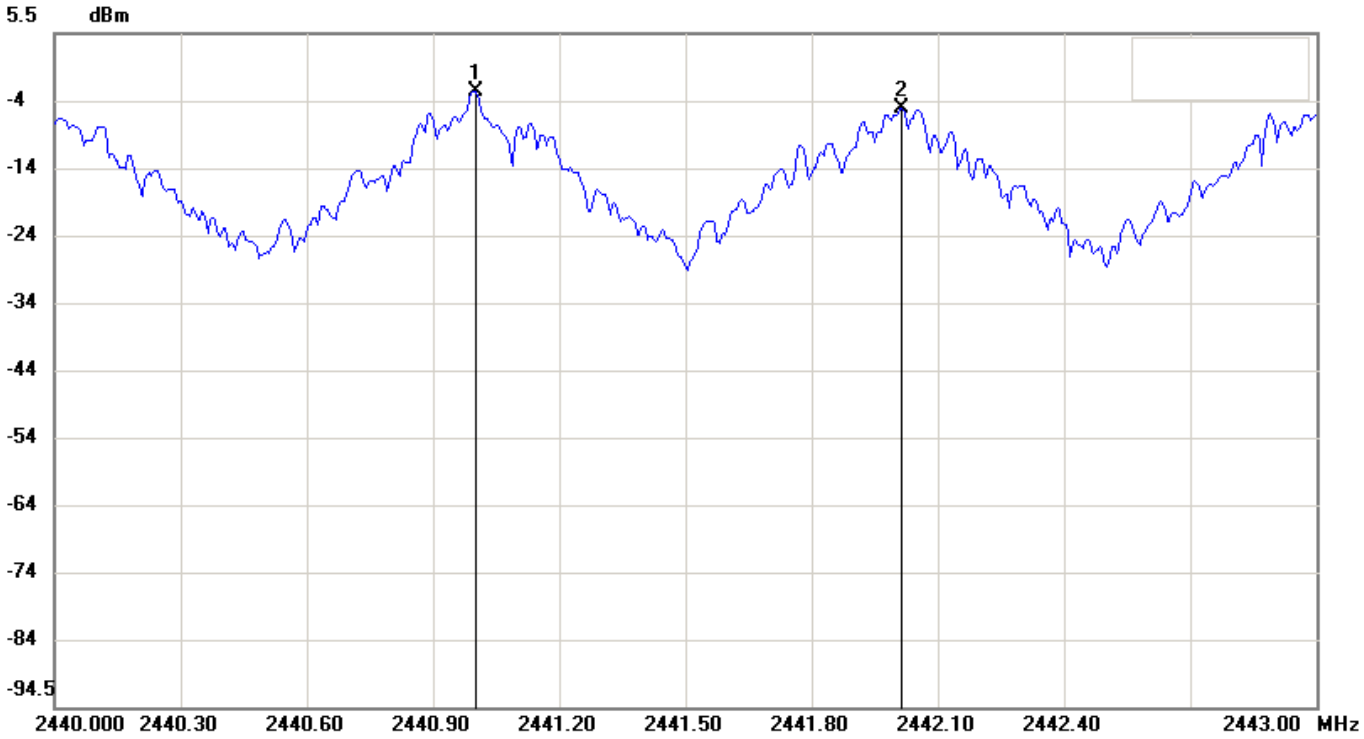
Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

Channel	Frequency (MHz)	Hopping Channel Carrier Frequency Separated (MHz)	Chart
39	2441	1.015	Page 48

Note: Please refer to page 48 for chart.

File: 08-12-MAS-226 Data: #26 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:06:49 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3.2ms Att.: 10dB**

Model: **PPT-180** **RBW: 30 KHz VBW: 100 KHz**

Test Mode:

Note: **FCC-Bluetooth Carrier Frequency Separation**

No.	Frequency(MHz)	Level(dBm)
1	2441.000	-3.18
2	2442.015	-5.60

No.		△Frequency(MHz)	△Level(dB)
1	mk2-mk1	1.015	-2.42

12 Dwell Time

12.1 Standard Applicable

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4.

12.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/24/2009

12.4 Measurement Data

Test Date : Jan. 06, 2009 Temperature : 21℃ Humidity : 59%

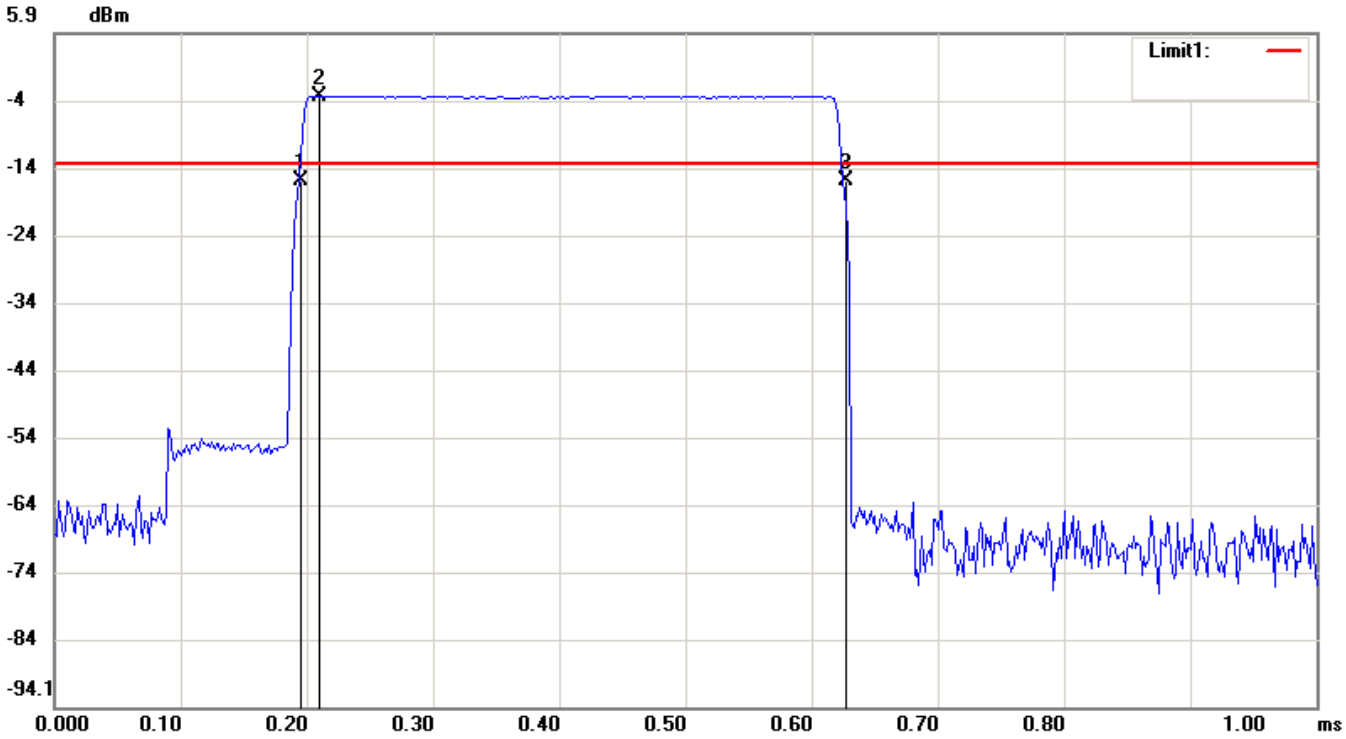
12.4.1 DH1

Test period=0.4(second/channel)× 79 channel=31.6sec
2402MHz dwell time= 431.7 us× 340 = 146.8 ms

Note: Please refer to page 50 to page 51 for chart.

File: 08-12-MAS-226 Data: #21 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:03:23 **Humidity: 59 %**



Condition: **-13.4dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 1ms Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz VBW: 1000 KHz**

Test Mode:

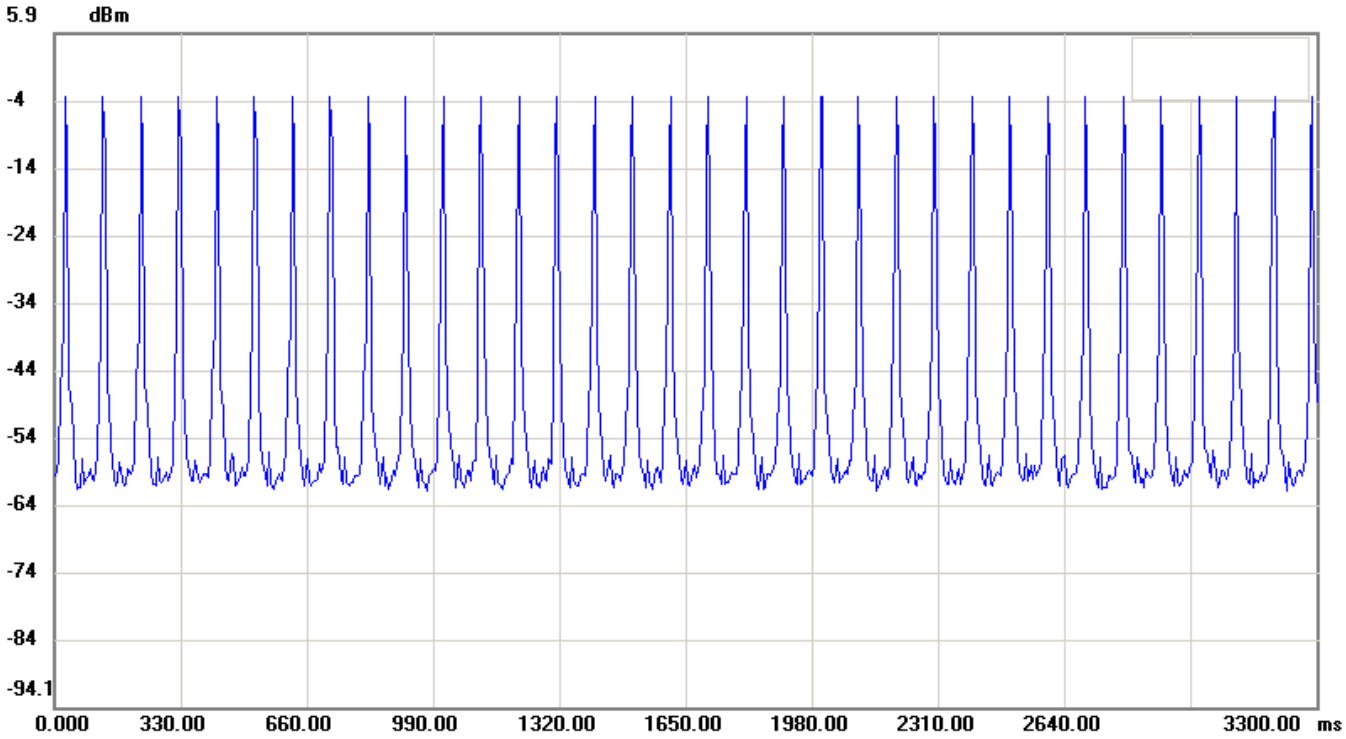
Note: **DH1 pulse width**

No.	Sweep time(ms)	Level(dBm)
1	0.1933	-16.04
2	0.2083	-3.40
3	0.6250	-16.05

No.		△Time(ms)	△Level(dB)
1	mk3-mk1	0.4317	-0.01

File: 08-12-MAS-226 Data: #20 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:03:03 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3300ms** **Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH1 Hops per 3.16 seconds**

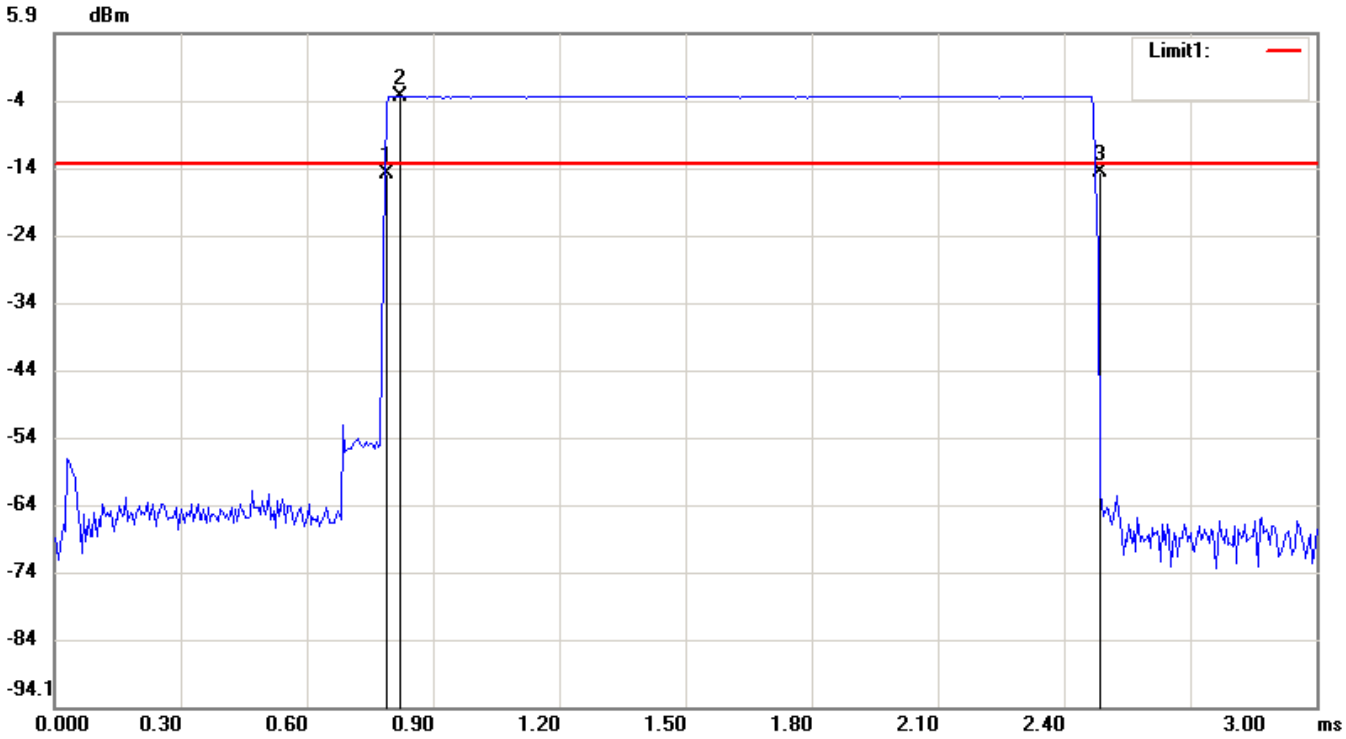
12.4.2 DH3

Test period=0.4(second/channel)$\times$79 channel=31.6sec
2441MHz dwell time= 1.69 ms$\times$170 = 287.3 ms

Note: Please refer to page 53 to page 54 for chart.

File: 08-12-MAS-226 Data: #23 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:04:28 **Humidity: 59 %**



Condition: **-13.44dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3ms Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz VBW: 1000 KHz**

Test Mode:

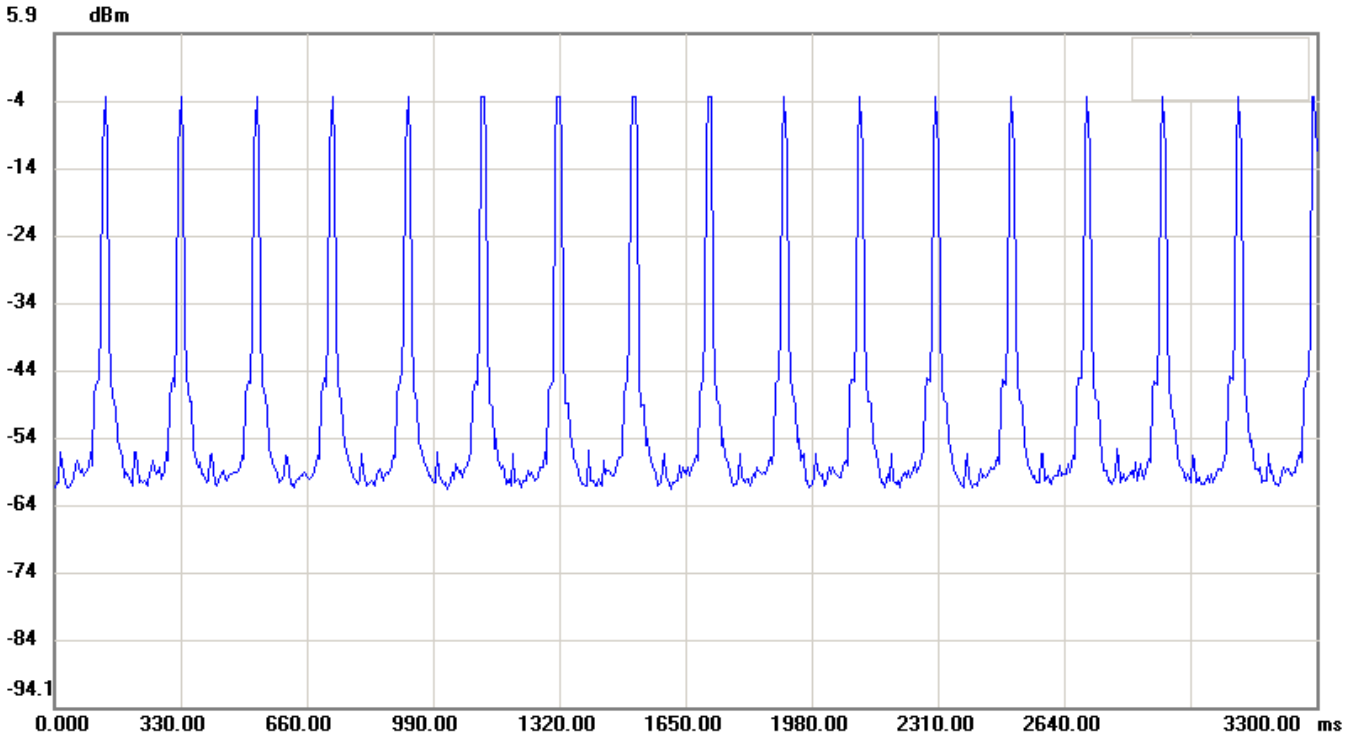
Note: **DH3 pusle width**

No.	Sweep time(ms)	Level(dBm)
1	0.7850	-15.07
2	0.8150	-3.44
3	2.4750	-14.87

No.		△Time(ms)	△Level(dB)
1	mk3-mk1	1.69	0.2

File: 08-12-MAS-226 Data: #22 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:04:09 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3300ms** **Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH3 Hops per 3.16 seconds**

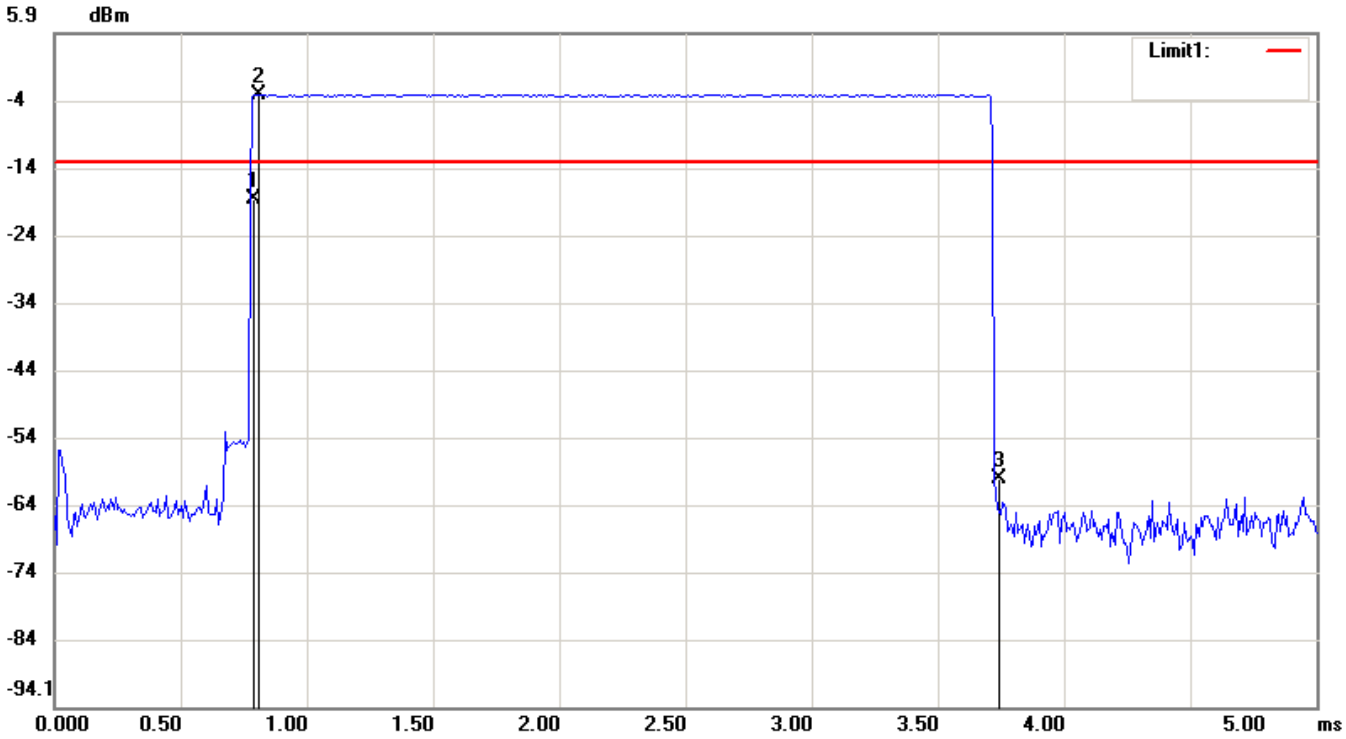
12.4.3 DH5

Test period=0.4(second/channel)$\times$79 channel=31.6sec
2480MHz dwell time= 2.95 ms$\times$110 = 324.5 ms

Note: Please refer to page 56 to page 57 for chart.

File: 08-12-MAS-226 Data: #25 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:05:26 **Humidity: 59 %**



Condition: **-13.32dBm** **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 5ms Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz VBW: 1000 KHz**

Test Mode:

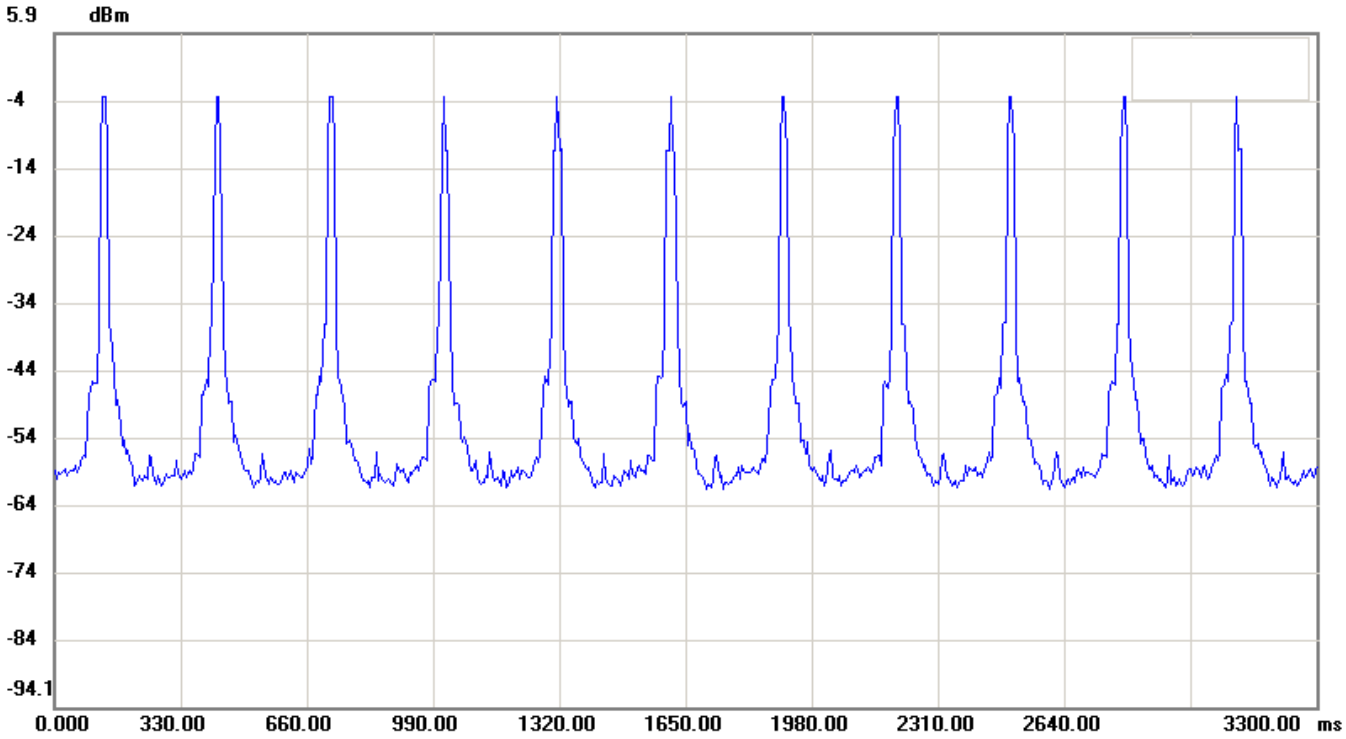
Note: **DH5 pulse width**

No.	Sweep time(ms)	Level(dBm)
1	0.7750	-18.72
2	0.7917	-3.32
3	3.7250	-60.17

No.		△Time(ms)	△Level(dB)
1	mk3-mk1	2.95	-41.45

File: 08-12-MAS-226 Data: #24 **Date: 2009/1/6** **Temperature: 21 ℃**

Time: PM 12:05:05 **Humidity: 59 %**



Condition: **RF Conducted**

EUT: **Portable Data Therminal** **Sweep Time: 3300ms** **Att.: 10dB**

Model: **PPT-180** **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH5 Hops per 3.16 seconds**