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

Report No.: 06-10-MAS-169

Client:	Caron Autosound Ltd
Product:	Bluetooth Car Kit
Model:	BT-1800
FCC ID:	T4PBT180020061010
Manufacturer/supplier:	Grand Union Electronics (Shenzhen) Company Ltd

Date test item received:	2006/10/25
Date test campaign completed:	2006/11/13
Date of issue:	2006/11/14

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Total number of pages of this test report: 59 pages

Total number of pages of photos: External photos 1 pages

Internal photos 3 pages

Setup photos 2 pages

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Client	: Caron Autosound Ltd
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Manufacturer	: Grand Union Electronics (Shenzhen) Company Ltd
Address	: Zheng Keng Industrial Area, Bantian, Buji Town, Shenzhen City, China
EUT	: Bluetooth Car Kit
Trade name	: CARON
Model No.	: BT-1800
Power Source	: DC 3.3V
Regulations applied	: FCC 47 CFR, Part 15 Subpart C (2006)

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Bluetooth Car Kit
b) Trade Name : CARON
c) Model No. : BT-1800

1.2 Characteristics of Device

The EUT is a Bluetooth Car Kit based on the Bluetooth technology. 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 2.84 dBm (1.92 mW).

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.

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..

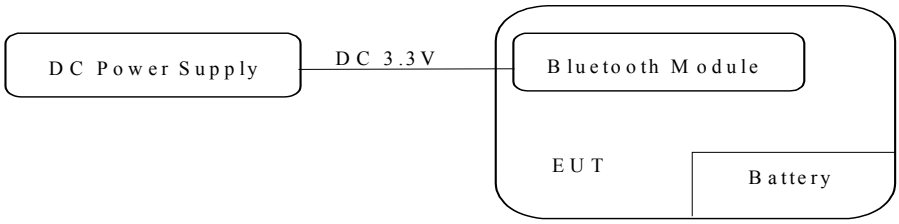
3.2 Devices for Tested System

Device	Manufacture	Model	Cable Description
*Bluetooth Car Kit	Grand Union Electronics (Shenzhen) Company Ltd	BT-1800	----
DC Power Supply	GW	GPC-3030D	1.2m*1, Unshielded Power Line

Remark

1. "*" means equipment under test.
2.

Test software:	Bluetest
Power setting (Ext, Int):	(0,58)



Note: An ASUS notebook performs the control test mode. The notebook removes away after the control command is ready.

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 movable devices, the following procedure was performed to determine the maximum emission axis of EUT (X,Y and Z 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 “Y axis”. (Please see the test setup photos)

B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission 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.

Figure 1 : Frequencies measured below 1 GHz configuration

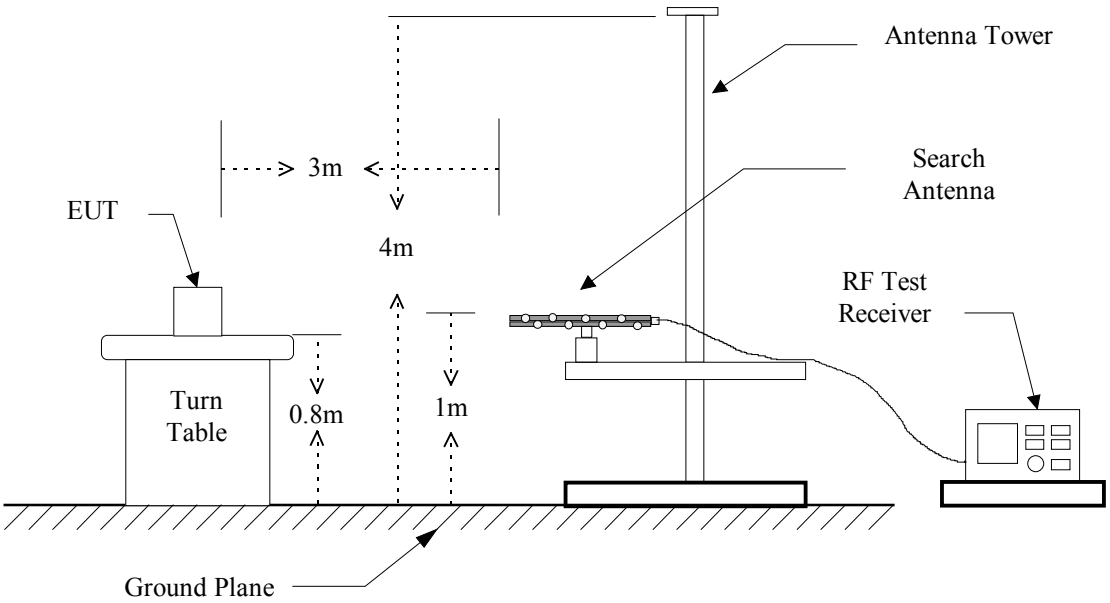
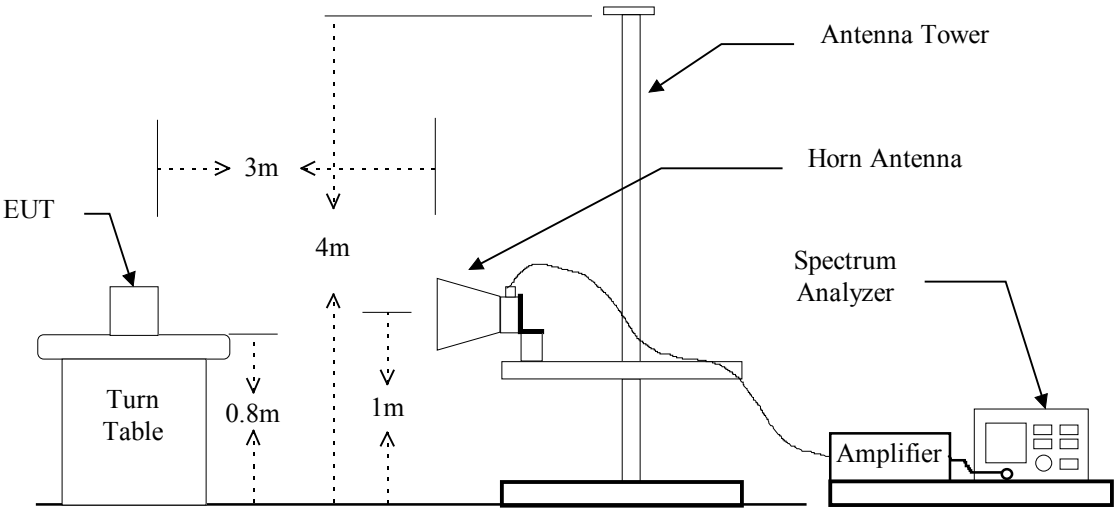


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
EMI Receiver	R&S	ESIB7	05/25/2007
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/31/2007
Horn Antenna	EMCO	3115	06/06/2007
BiLog Antenna	Schaffner	CBL 6112B	06/11/2007
Horn Antenna	EMCO	3116	07/23/2007
Preamplifier	Hewlett-Packard	8449B	09/17/2007

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 : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

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.
1201.000	---	---	---	---	-12.9	---	---	74.0	54.0
4804.000	---	---	---	---	0.5	---	---	74.0	54.0
12010.000	---	---	---	---	10.5	---	---	74.0	54.0
16216.000	---	---	---	---	13.3	---	---	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.
1220.500	---	---	---	---	-12.9	---	---	74.0	54.0
4882.000	---	---	---	---	0.5	---	---	74.0	54.0
7323.000	---	---	---	---	3.7	---	---	74.0	54.0
12205.000	---	---	---	---	5.8	---	---	74.0	54.0
19528.000	---	---	---	---	13.3	---	---	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.
1240.000	---	---	---	---	-12.9	---	---	74.0	54.0
4960.000	---	---	---	---	0.5	---	---	74.0	54.0
7440.000	---	---	---	---	3.7	---	---	74.0	54.0
12400.000	---	---	---	---	5.8	---	---	74.0	54.0
19840.000	---	---	---	---	13.3	---	---	74.0	54.0
22320.000	---	---	---	---	13.5	---	---	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

Operation Mode: 2402 MHz

A. below 1GHz

EUT : BT	Model : 1800	Status : ch00	
Condition : Horizontal	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	43.607	6.9	13.1	20.0	40.0	-20.0	108	56
2	105.812	4.9	12.0	16.9	43.5	-26.6	110	172
3	350.741	2.8	17.9	20.7	46.0	-25.3	105	183
4	364.349	2.4	18.4	20.8	46.0	-25.2	115	341
5	687.034	2.8	25.4	28.2	46.0	-17.8	108	108
6	887.255	2.8	28.6	31.4	46.0	-14.6	109	220

EUT : BT	Model : 1800	Status : ch00	
Condition : Vertical	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	103.868	4.1	11.7	15.8	43.5	-27.7	108	43
2	123.307	2.3	13.8	16.1	43.5	-27.4	117	334
3	397.395	2.6	19.1	21.7	46.0	-24.3	109	69
4	558.737	3.4	22.7	26.1	46.0	-19.9	110	79
5	790.060	1.6	27.2	28.8	46.0	-17.2	109	178
6	953.347	0.9	29.7	30.6	46.0	-15.4	108	99

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

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).

4.4.2.2

Operation Mode: 2441 MHz

A. below 1GHz

EUT : BT	Model : 1800	Status : ch39	
Condition : Horizontal	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	121.363	3.7	13.8	17.5	43.5	-26.0	115	241
2	199.118	2.8	13.0	15.8	43.5	-27.7	108	69
3	253.547	2.8	14.9	17.7	46.0	-28.3	109	270
4	692.866	1.7	25.5	27.2	46.0	-18.8	104	277
5	813.387	1.6	27.5	29.1	46.0	-16.9	108	169
6	928.076	1.8	29.3	31.1	46.0	-14.9	110	53

EUT : BT	Model : 1800	Status : ch39	
Condition : Vertical	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	101.924	5.3	11.5	16.8	43.5	-26.7	108	241
2	129.138	2.4	14.1	16.5	43.5	-27.0	110	218
3	197.174	2.0	13.1	15.1	43.5	-28.4	109	198
4	372.124	2.8	18.7	21.5	46.0	-24.5	113	202
5	506.253	2.1	21.9	24.0	46.0	-22.0	114	94
6	811.443	2.0	27.5	29.5	46.0	-16.5	113	318

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

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).

4.4.2.3

Operation Mode: 2480 MHz

A. below 1GHz

EUT : BT	Model : 1800	Status : ch78	
Condition : Horizontal	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	121.363	3.7	13.8	17.5	43.5	-26.0	113	309
2	199.118	2.8	13.0	15.8	43.5	-27.7	110	58
3	253.547	2.8	14.9	17.7	46.0	-28.3	111	192
4	692.866	1.7	25.5	27.2	46.0	-18.8	105	143
5	813.387	1.6	27.5	29.1	46.0	-16.9	119	319
6	928.076	1.8	29.3	31.1	46.0	-14.9	108	12

EUT : BT	Model : 1800	Status : ch78	
Condition : Vertical	Date : 2006/11/7	Temp. : 21℃	Humi. : 75%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height	Table Degree
1	103.868	5.5	11.7	17.2	43.5	-26.3	116	41
2	140.802	1.6	14.5	16.1	43.5	-27.4	108	35
3	197.174	1.2	13.1	14.3	43.5	-29.2	109	118
4	387.675	1.9	19.0	20.9	46.0	-25.1	110	176
5	517.916	2.1	22.2	24.3	46.0	-21.7	120	273
6	883.367	1.5	28.6	30.1	46.0	-15.9	108	309

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

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).

4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies

(A)

Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

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.
2375.550	29.5	14.5	29.5	14.8	30.3	59.8	45.1	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

Test Date : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

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.
2484.590	29.8	14.3	30.3	15.0	30.3	60.6	45.3	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

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

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 fix on the PCB. The peak gain of antenna used is –0.8 dBi.

7 20dB EMISSION BANDWIDTH MEASUREMENT

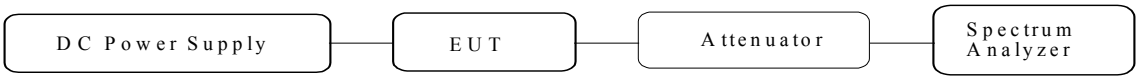
7.1 Standard Applicable

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

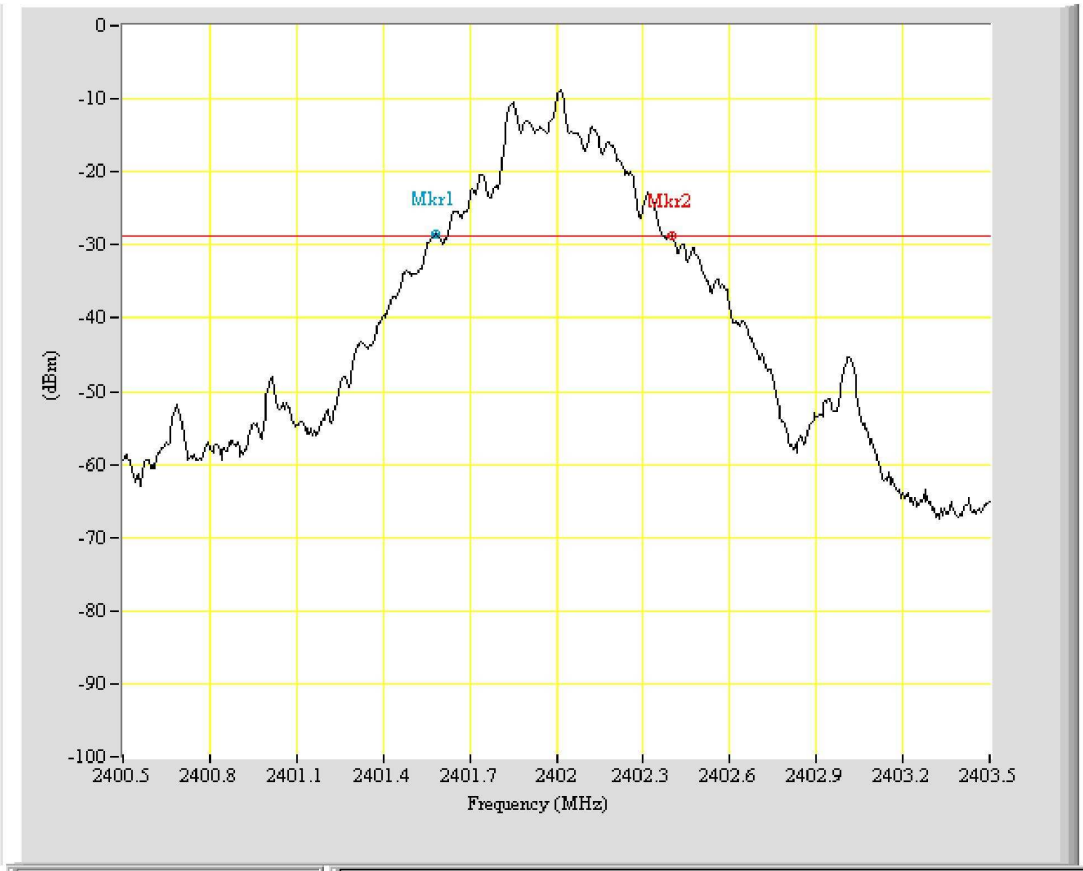
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Agilent	8564EC	09/22/2007

7.4 Measurement Data

Test Date : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

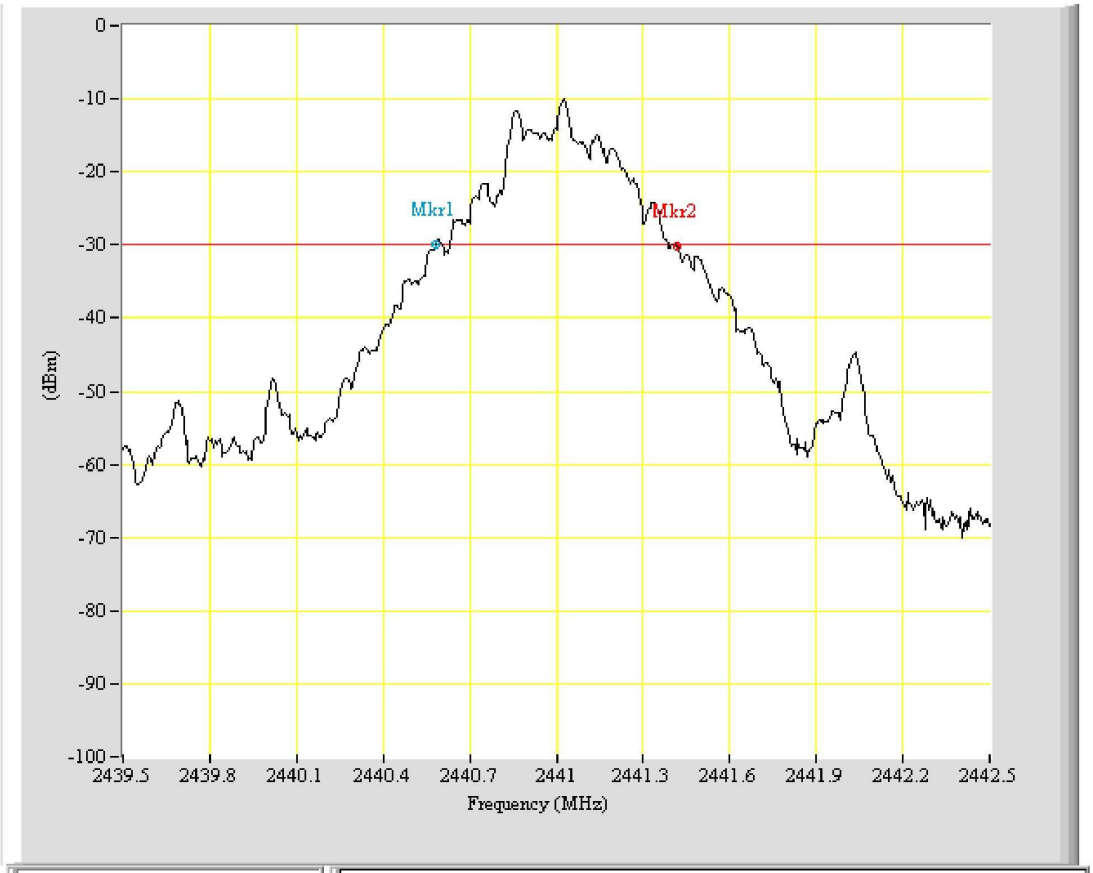
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Chart
0	2402	0.820	Page 27
39	2441	0.840	Page 28
78	2480	0.850	Page 29

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



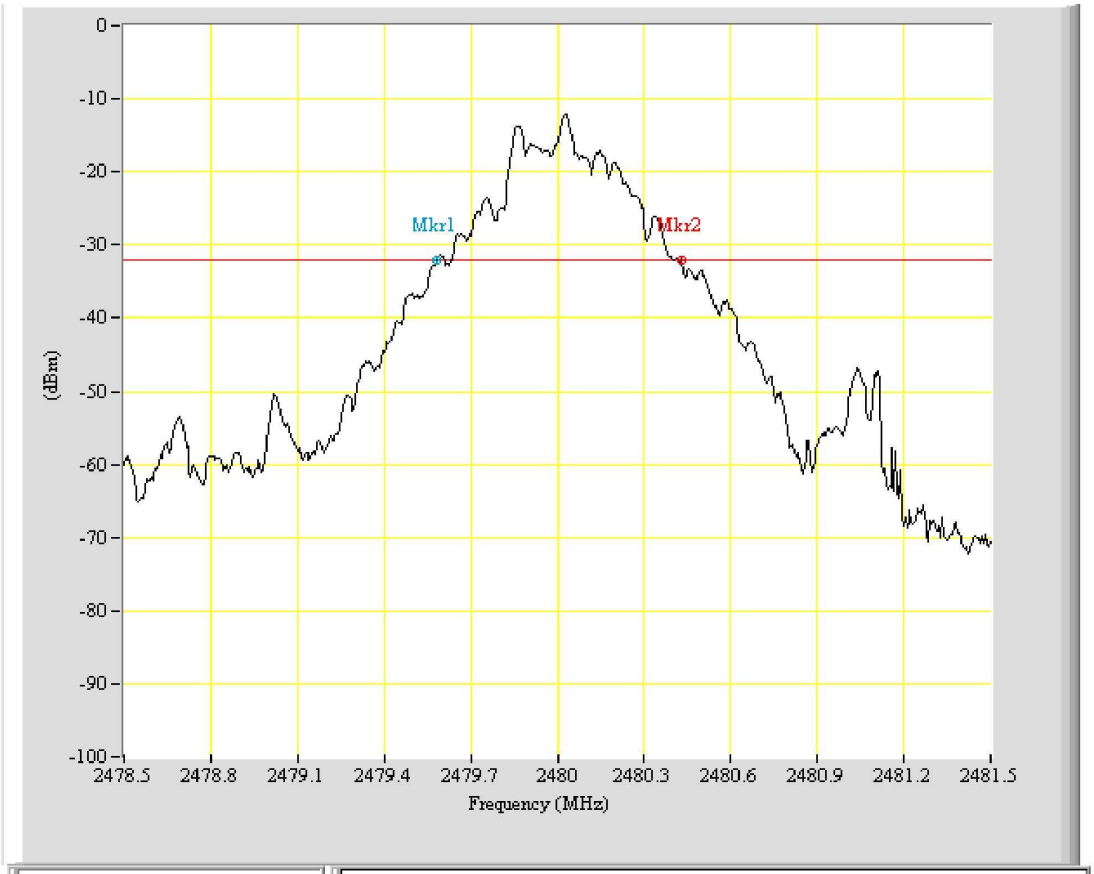
*Center 2402.0000MHz	Display Line -28.830dBm
*SPAN 3.0000MHz	Δ Marker -0.8200MHz -0.330dB
*RBW 30.00kHz	Mkr1 2401.580MHz -28.500dBm
*VBW 30.00kHz	Mkr2 2402.400MHz -28.830dBm
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: ch00
Note:



*Center 2441.0000MHz	Display Line -30.000dBm
*SPAN 3.0000MHz	Δ Marker -0.8400MHz -0.330dB
*RBW 30.00kHz	Mkr1 2440.580MHz -29.830dBm
*VBW 30.00kHz	Mkr2 2441.420MHz -30.160dBm
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: ch39
Note:



*Center 2480.0000MHz	Display Line -32.160dBm
*SPAN 3.0000MHz	Δ Marker -0.8500MHz 0.000dB
*RBW 30.00kHz	Mkr1 2479.580MHz -32.160dBm
*VBW 30.00kHz	Mkr2 2480.430MHz -32.160dBm
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: ch78
Note:

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

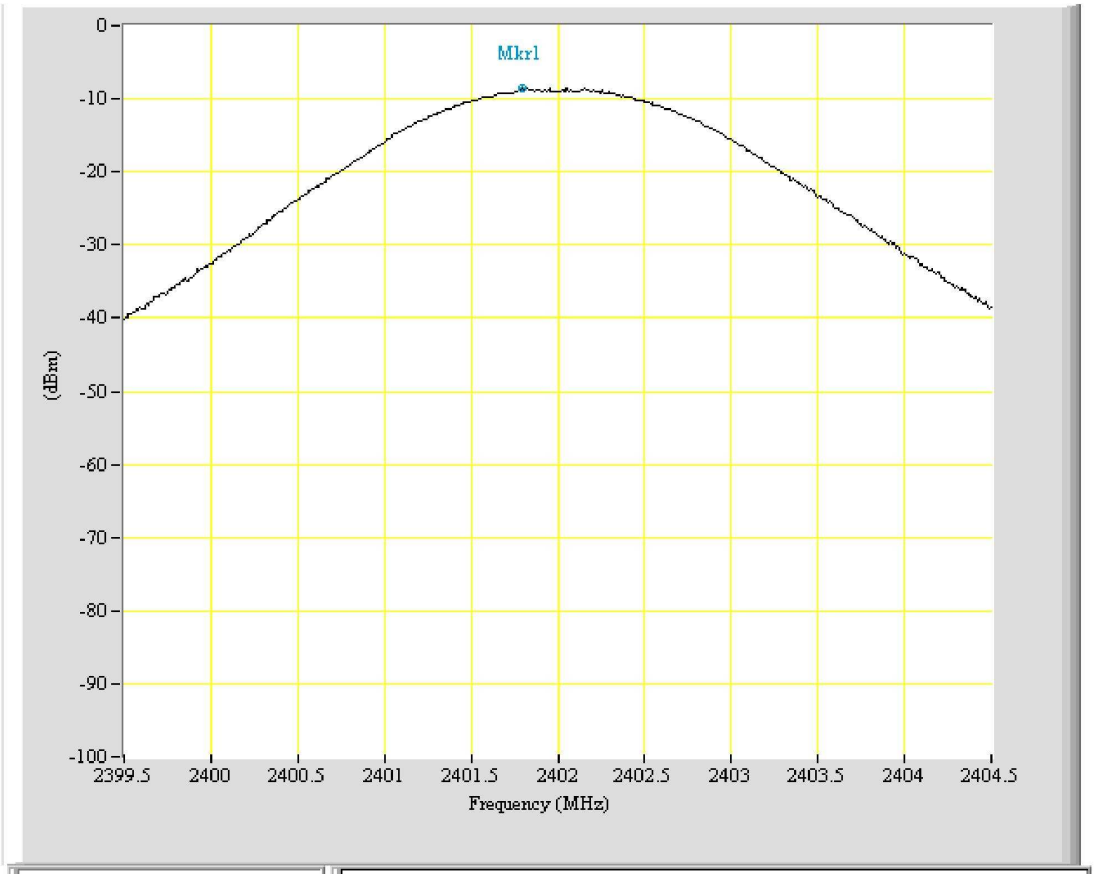
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Agilent	8564EC	09/22/2007

8.4 Measurement Data

Test Date : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

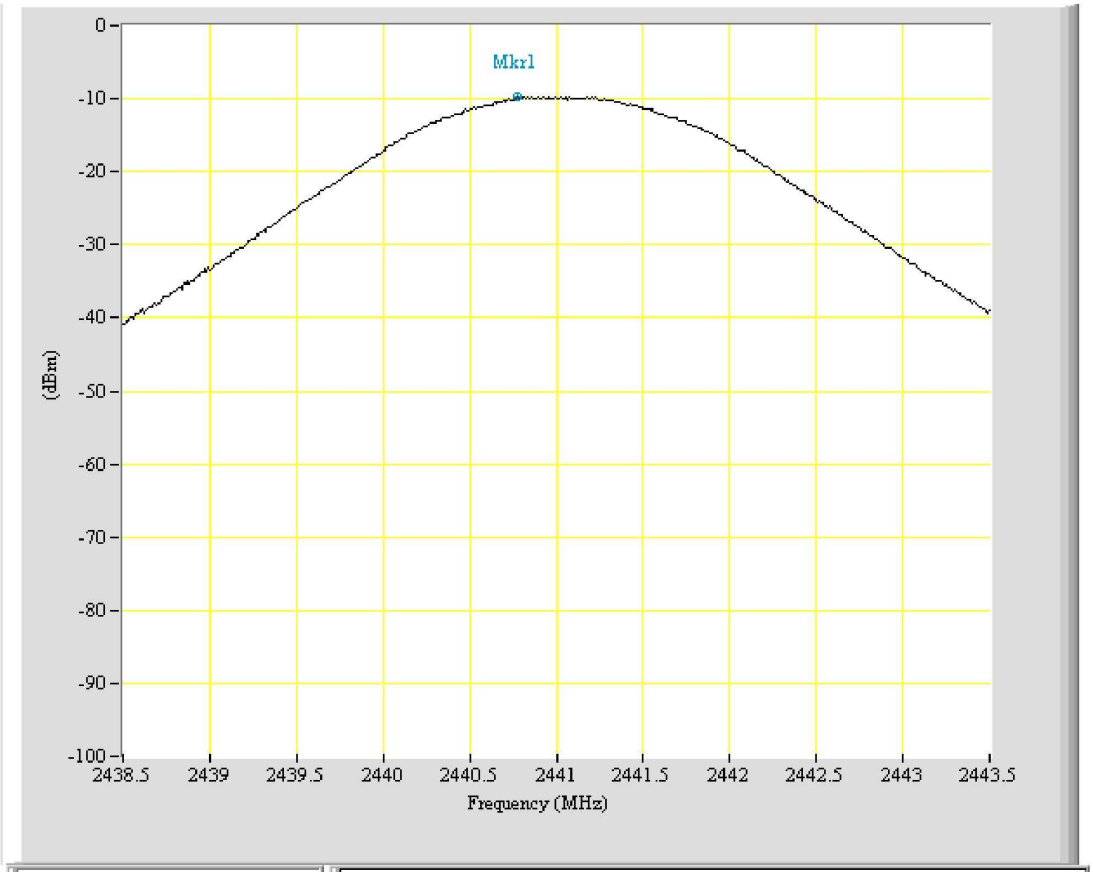
Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
0	2402	-8.66	11.5	2.84	1.92	1000	Page 32
39	2441	-9.83	11.5	1.67	1.46	1000	Page 33
78	2480	-11.83	11.5	-0.33	0.92	1000	Page 34

Note: Please refer to page 32 to page 34 for chart.



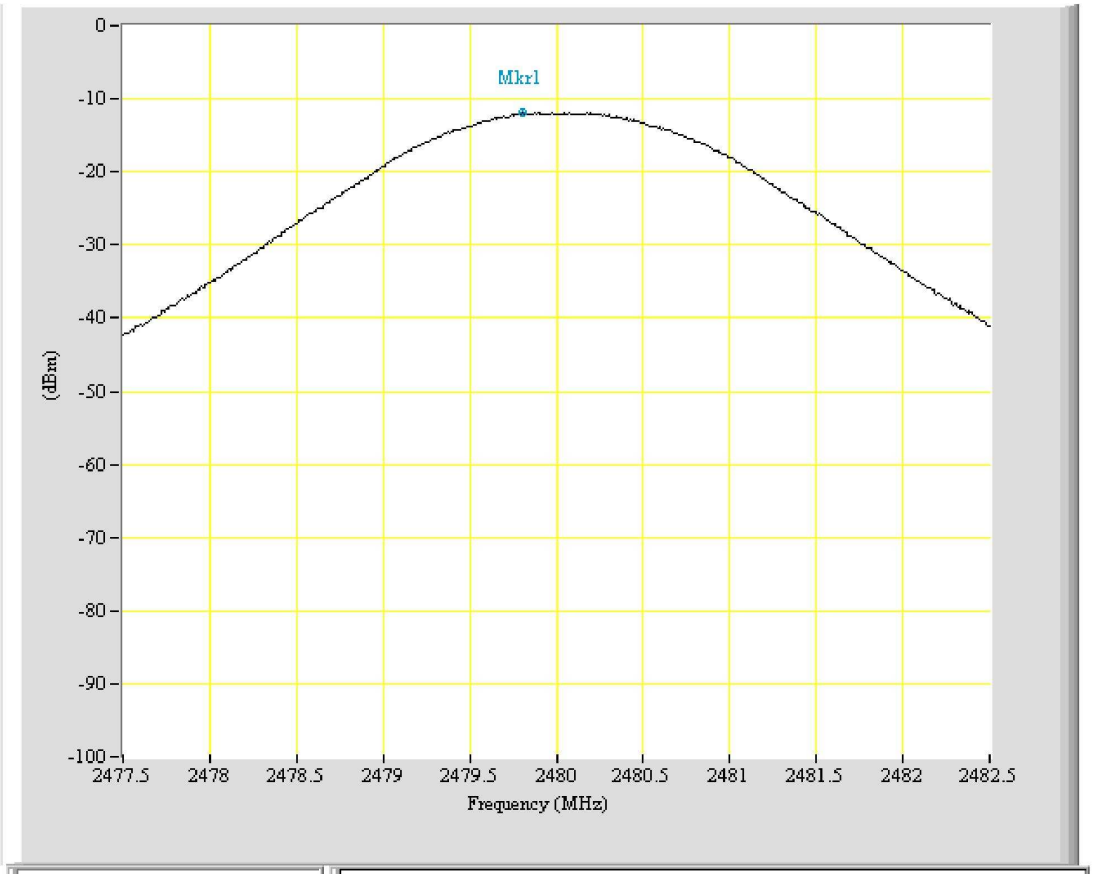
*Center 2402.0000MHz *SPAN 5.0000MHz *RBW 1000.00kHz *VBW 3000.00kHz *SWP 50.00msec *ATTEN 10.00dB *RL 0.00dBm	Marker 2401.792MHz -8.660dBm

EUT: BT
Purpose: Output_Pwr
Condition: ch00
Note:



*Center 2441.0000MHz	Marker 2440.775MHz -9.830dBm
*SPAN 5.0000MHz	
*RBW 1000.00kHz	
*VBW 3000.00kHz	
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Output_Pwr
Condition: ch39
Note:



*Center 2480.0000MHz *SPAN 5.0000MHz *RBW 1000.00kHz *VBW 3000.00kHz *SWP 50.00msec *ATTEN 10.00dB *RL 0.00dBm	Marker 2479.808MHz -11.830dBm

EUT: BT
Purpose: Output_Pwr
Condition: ch78
Note:

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

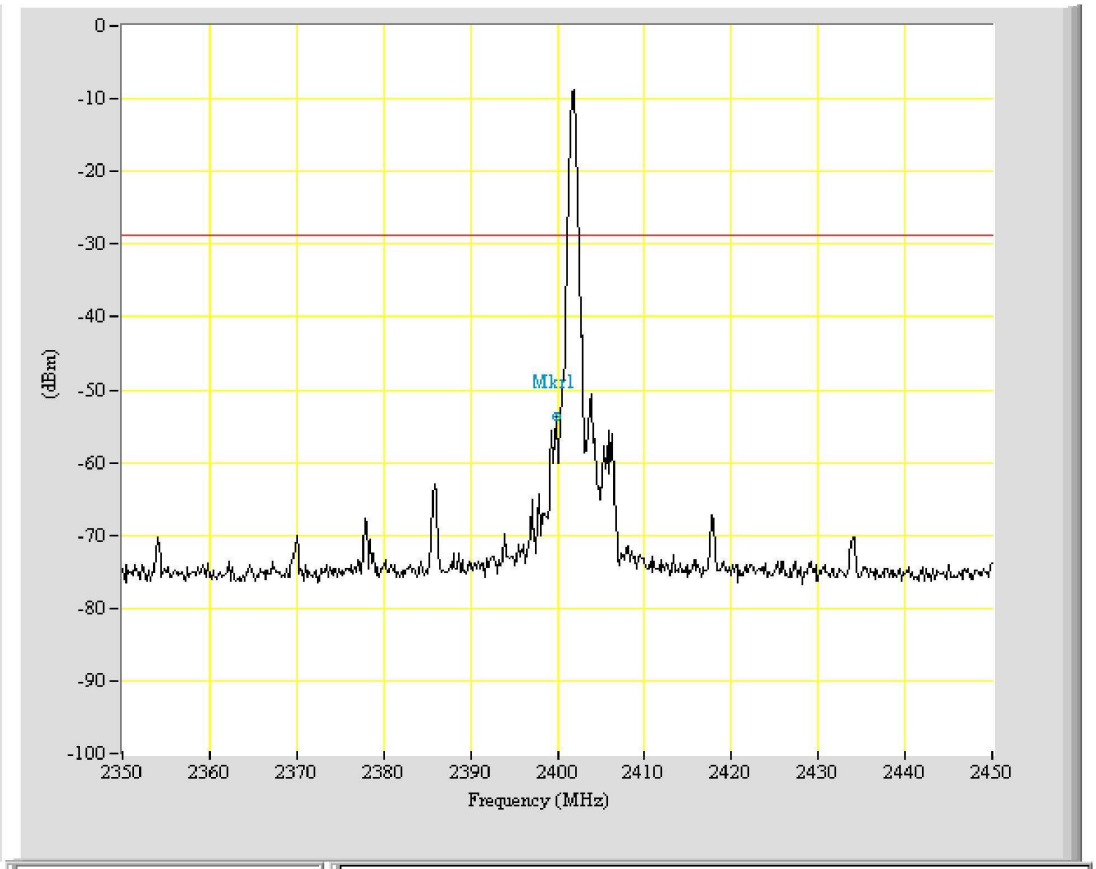
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Agilent	8564EC	09/22/2007

9.4 Measurement Data

Test Date : Nov. 13, 2006 Temperature : 23℃ Humidity : 72%

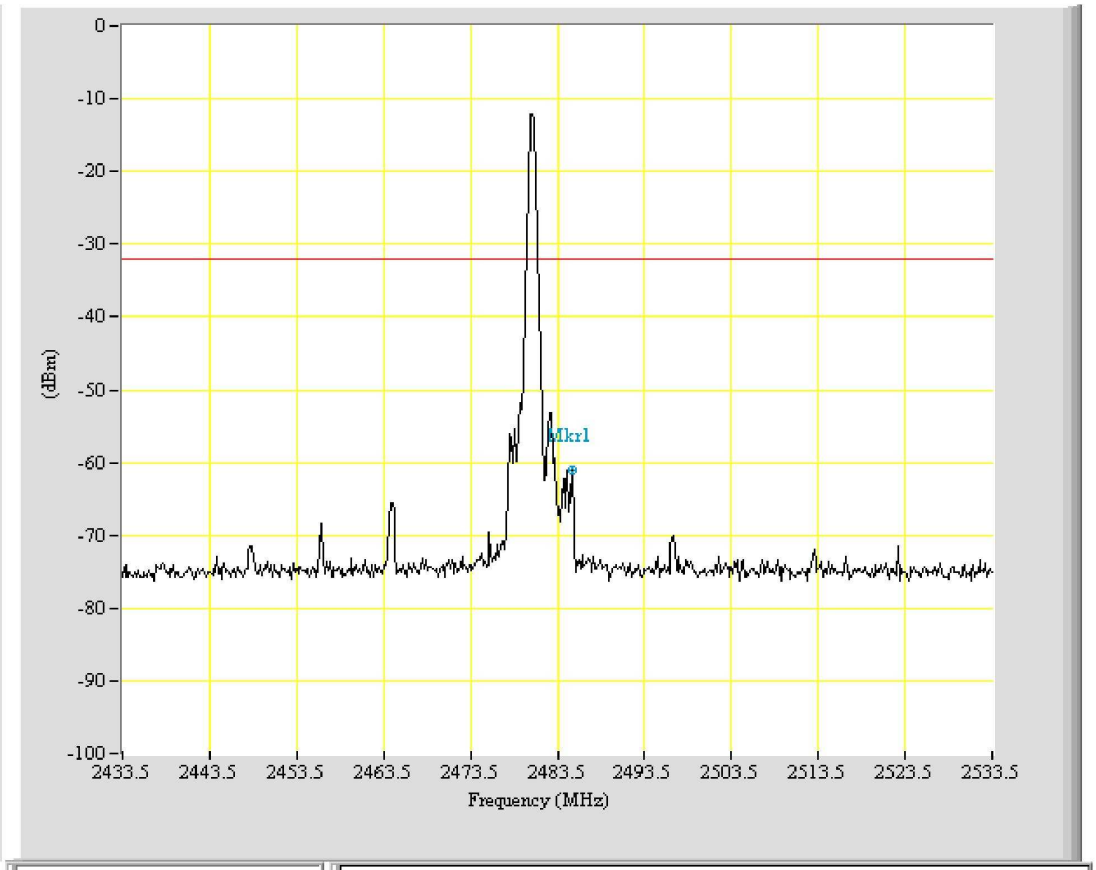
Channel	Test Frequency Range	Note	Chart
0	2350 MHz - 2450 MHz	Lower Band Edge	Page 37
78	2433.5 MHz - 2533.5 MHz	Upper Band Edge	Page 38
0	30 MHz - 25 GHz		Page 39
39	30 MHz - 25 GHz		Page 40
78	30 MHz - 25 GHz		Page 41

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



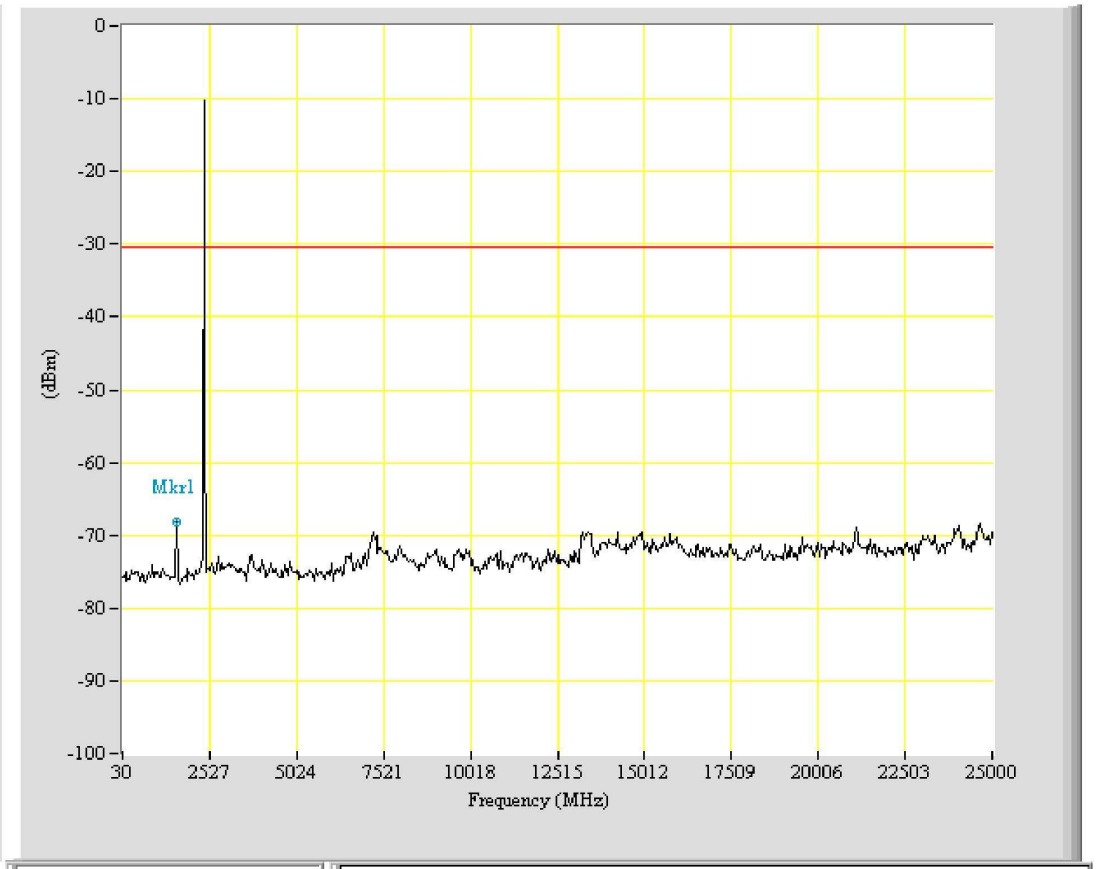
*Center 2400.0000MHz	Display Line -28.830dBm
*SPAN 100.0000MHz	Marker 2399.833MHz -53.660dBm
*RBW 100.00kHz	
*VBW 300.00kHz	
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Band_Edge
Condition: ch00
Note:



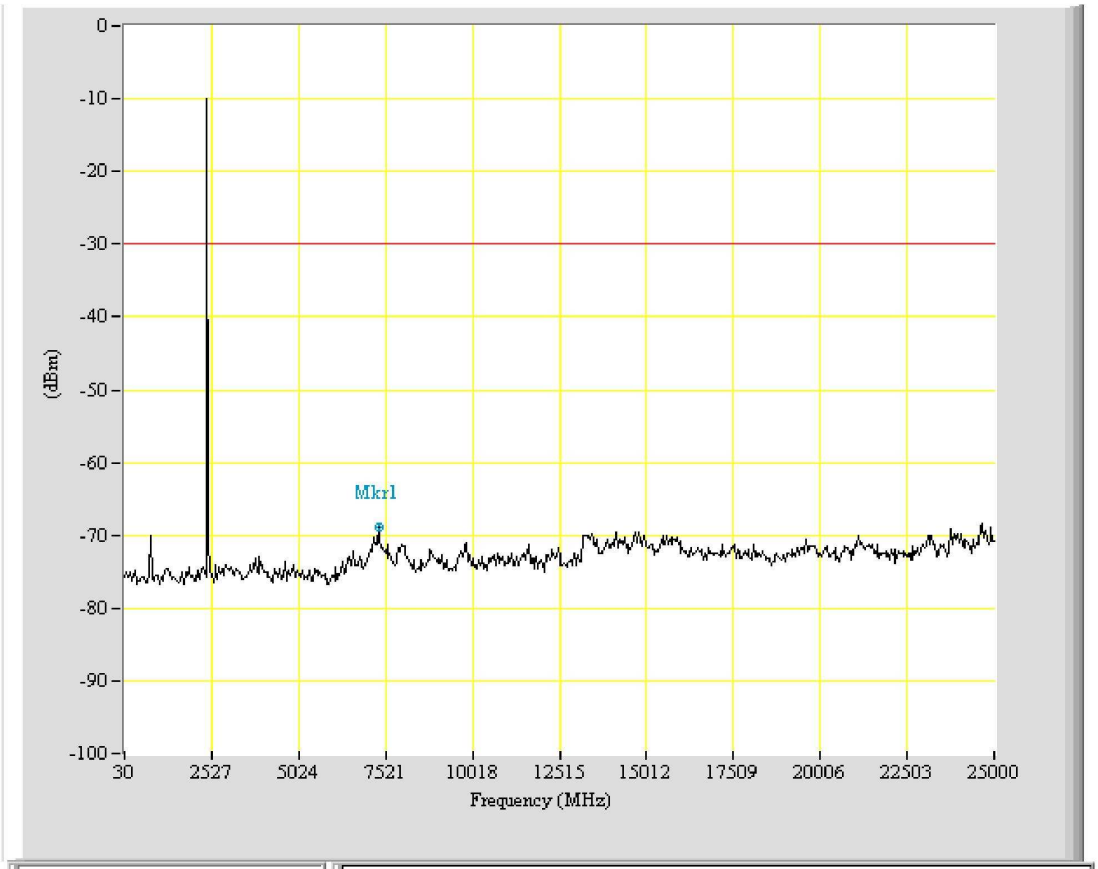
*Center 2483.5000MHz	Display Line -32.000dBm
*SPAN 100.0000MHz	Marker 2485.167MHz -61.000dBm
*RBW 100.00kHz	
*VBW 300.00kHz	
*SWP 50.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Band_Edge
Condition: ch78
Note:



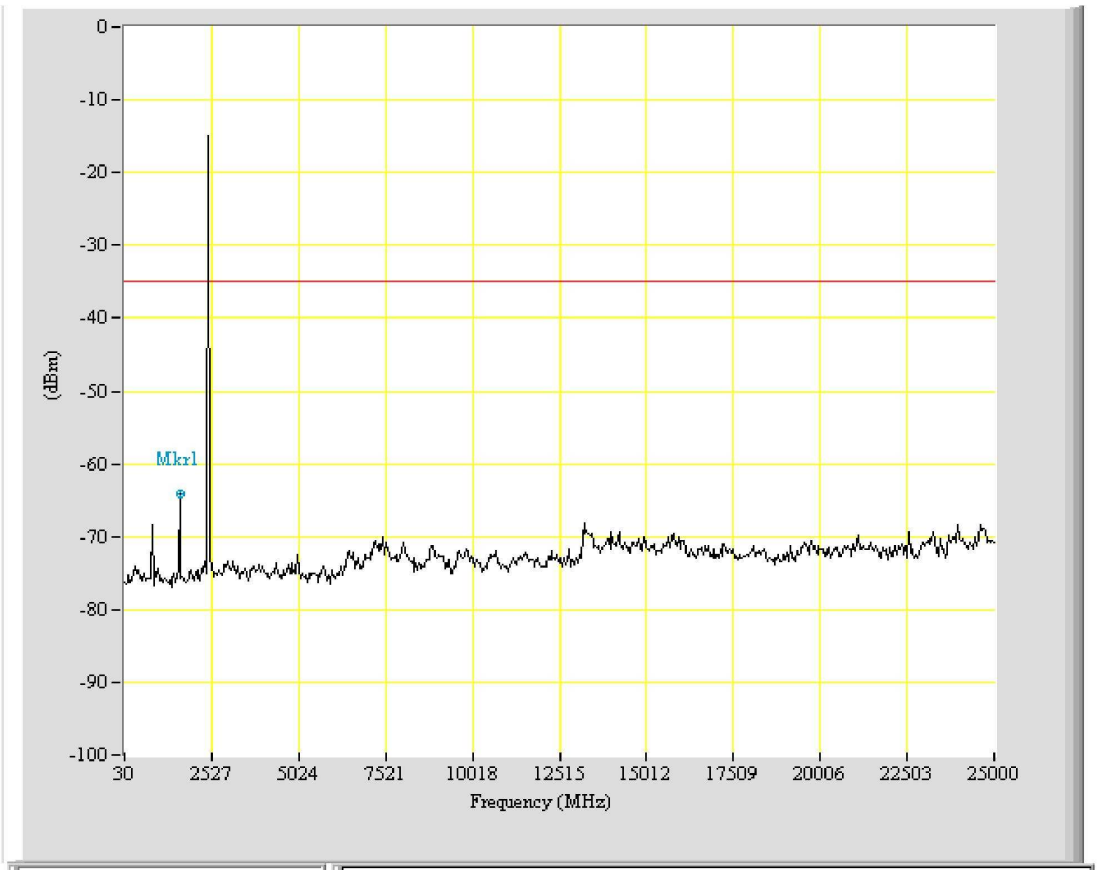
*Center 12515.0000MHz	Display Line -30.330dBm
*SPAN 24970.0000MHz	Marker 1569.817MHz -68.160dBm
*RBW 100.00kHz	
*VBW 300.00kHz	
*SWP 6300.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Band_Edge_All
Condition: ch00
Note:



*Center 12515.0000MHz	Display Line -30.000dBm
*SPAN 24970.0000MHz	Marker 7312.917MHz -69.000dBm
*RBW 100.00kHz	
*VBW 300.00kHz	
*SWP 6300.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Band_Edge_All
Condition: ch39
Note:



*Center 12515.0000MHz	Display Line -35.000dBm
*SPAN 24970.0000MHz	Marker 1611.433MHz -64.160dBm
*RBW 100.00kHz	
*VBW 300.00kHz	
*SWP 6300.00msec	
*ATTEN 10.00dB	
*RL 0.00dBm	

EUT: BT
Purpose: Band_Edge_All
Condition: ch78
Note: