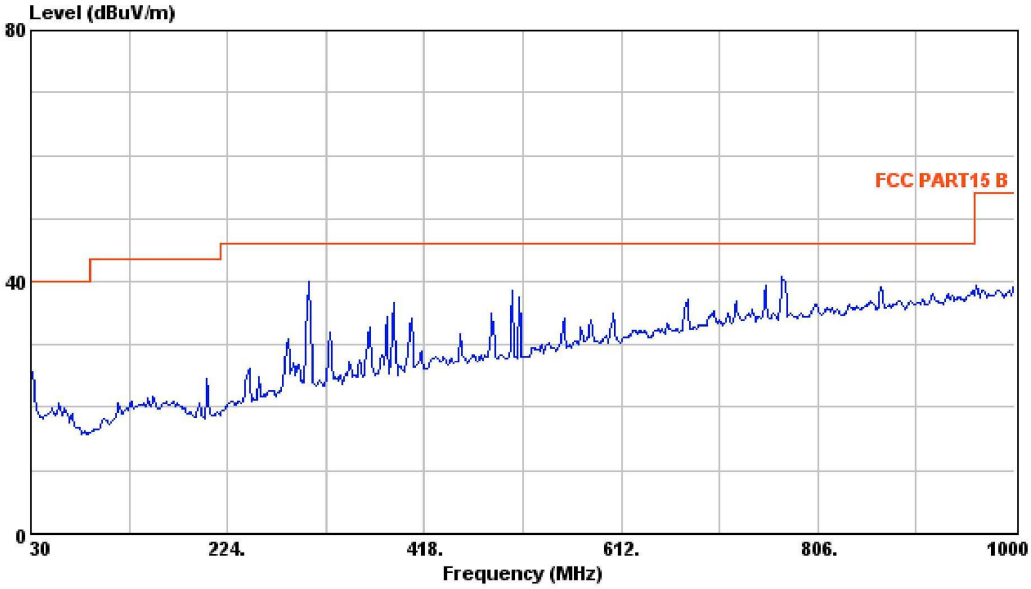
Horizontal

ETC TEST LABORTARY

Data#: 4068 File#: C:\Program Files\E3\MARK.emi

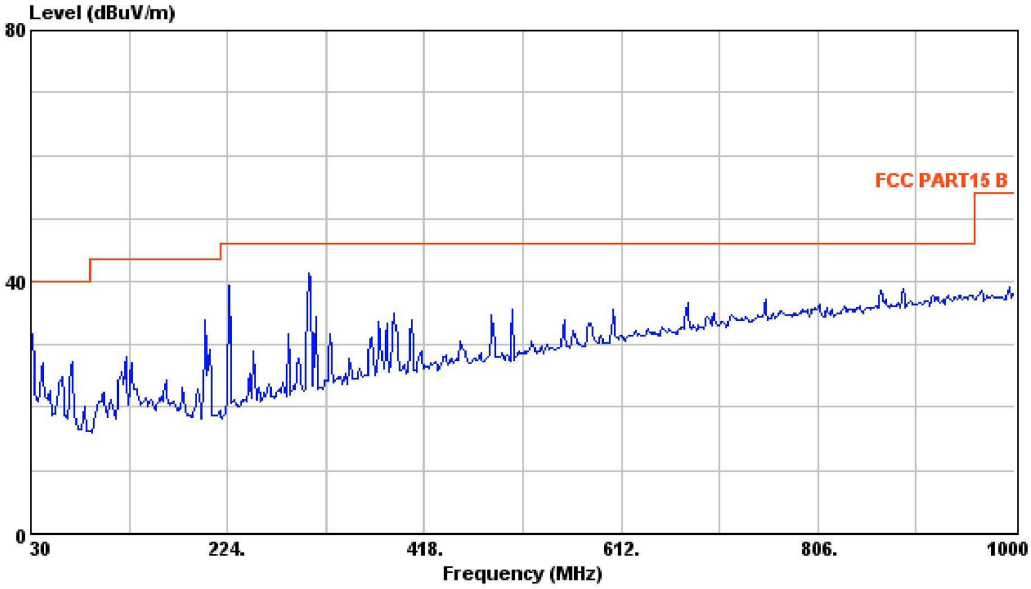


Site : MOO SITE
Condition : FCC PART15 B 3m HORIZONTAL
EUT :
MODEL : BAP-100
memo :

Vertical

ETC TEST LABORTARY

Data#: 4069 File#: C:\Program Files\E3\MARK.emi



Site : MOO SITE
Condition : FCC PART15 B 3m VERTICAL
EUT :
MODEL : BAP-100
memo :

4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies

(A)

Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Dec. 27, 2004 Temperature : 23℃ Humidity : 71%

Frequency (MHz)	Reading (dBuV) H Peak	Reading (dBuV) H Ave	Reading (dBuV) V Peak	Reading (dBuV) 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.	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
2390.000	30.2	21.1	30.0	21.0	28.3	58.5	49.4	74.0	54.0	-4.6	312	1.0

(B)

Channel 78

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Dec. 27, 2004 Temperature : 23℃ Humidity : 71%

Frequency (MHz)	Reading (dBuV) H Peak	Reading (dBuV) H Ave	Reading (dBuV) V Peak	Reading (dBuV) 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.	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
2483.500	30.9	21.9	31.0	22.0	28.3	59.3	50.3	74.0	54.0	-3.7	128	1.0

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

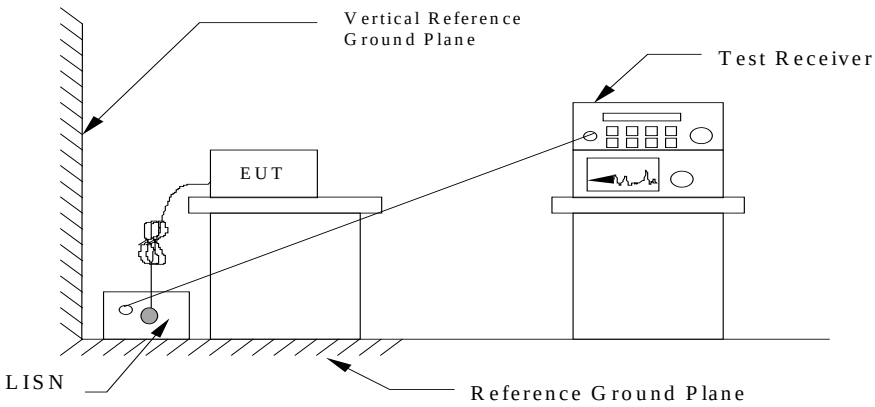
5.1 Standard Applicable

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

Operation Mode: 2402MHz

Test Date : Dec. 27, 2004 Temperature : 23℃ Humidity : 70%

Freq. (MHz)	**Meter Reading** (dBuV)				**Factor** (dB)	**Result** (dBuV)				**Limit** (dBuV)		**Margins** (dB)
	Q.P Value		AVG. Value			Q.P Value		AVG. Value		Q.P Value	AVG. Value	Q.P. or AVG.
	L1	L2	L1	L2		L1	L2	L1	L2			
0.232	46.7	45.9	----	----	0.2	46.9	46.1	----	----	62.4	52.4	-15.5
0.466	***	37.7	----	----	0.2	***	37.9	----	----	56.6	46.6	-18.7
0.470	39.1	***	----	----	0.2	39.3	***	----	----	56.5	46.5	-17.2
0.697	35.2	***	----	----	0.2	35.4	***	----	----	56.0	46.0	-20.6
0.700	***	34.8	----	----	0.2	***	35.0	----	----	56.0	46.0	-21.0
0.927	36.5	***	----	----	0.2	36.7	***	----	----	56.0	46.0	-19.3
0.935	***	37.2	----	----	0.2	***	37.4	----	----	56.0	46.0	-18.6
1.181	***	37.1	----	----	0.2	***	37.3	----	----	56.0	46.0	-18.7
1.185	37.3	***	----	----	0.2	37.5	***	----	----	56.0	46.0	-18.5
1.638	***	32.4	----	----	0.2	***	32.6	----	----	56.0	46.0	-23.4
1.650	32.2	***	----	----	0.2	32.4	***	----	----	56.0	46.0	-23.6

Note:

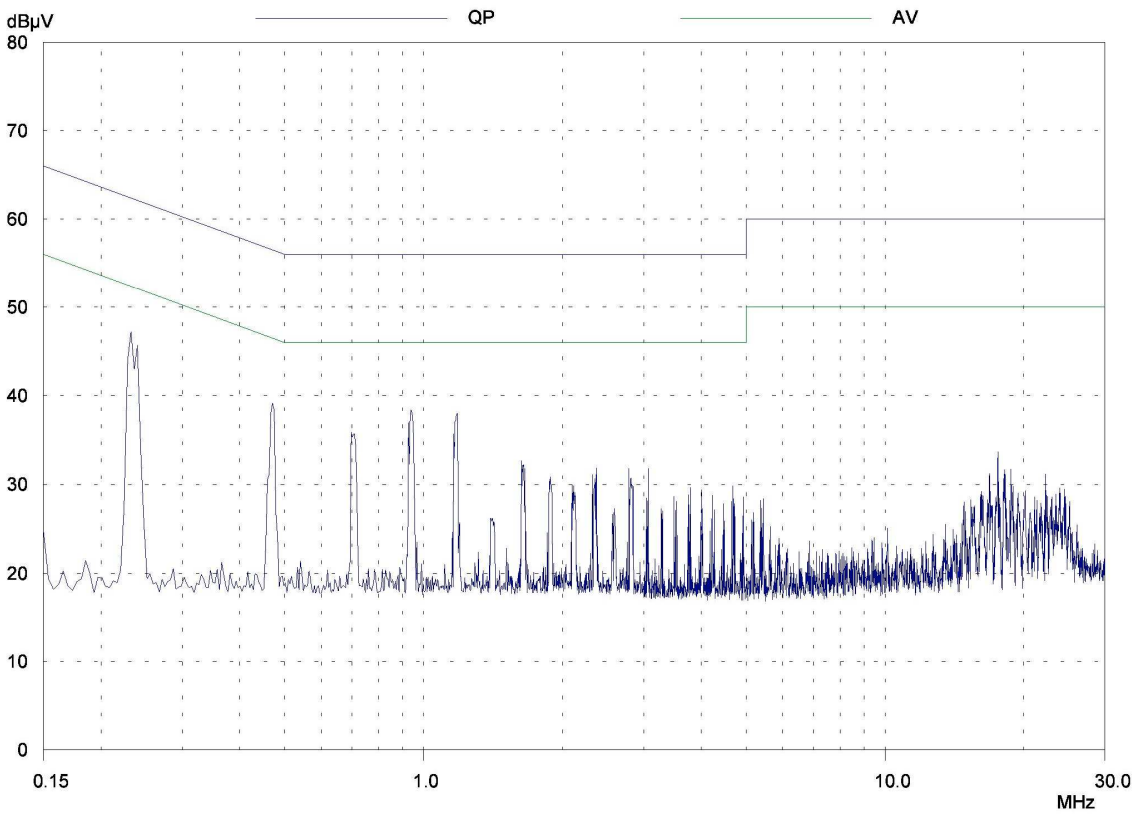
1. Place of measurement: EMC LAB. of the ETC.
2. “***” means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. “#” means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.
6. Please refer to page 51 to page 56 for chart

Conducted Emission

Peak Value

EUT:	
Manuf:	
Op Cond:	BLUETOOTH TX_CH0
Operator:	MARK
Test Spec:	FCC
Comment:	L1

Prescan Measurement:	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB

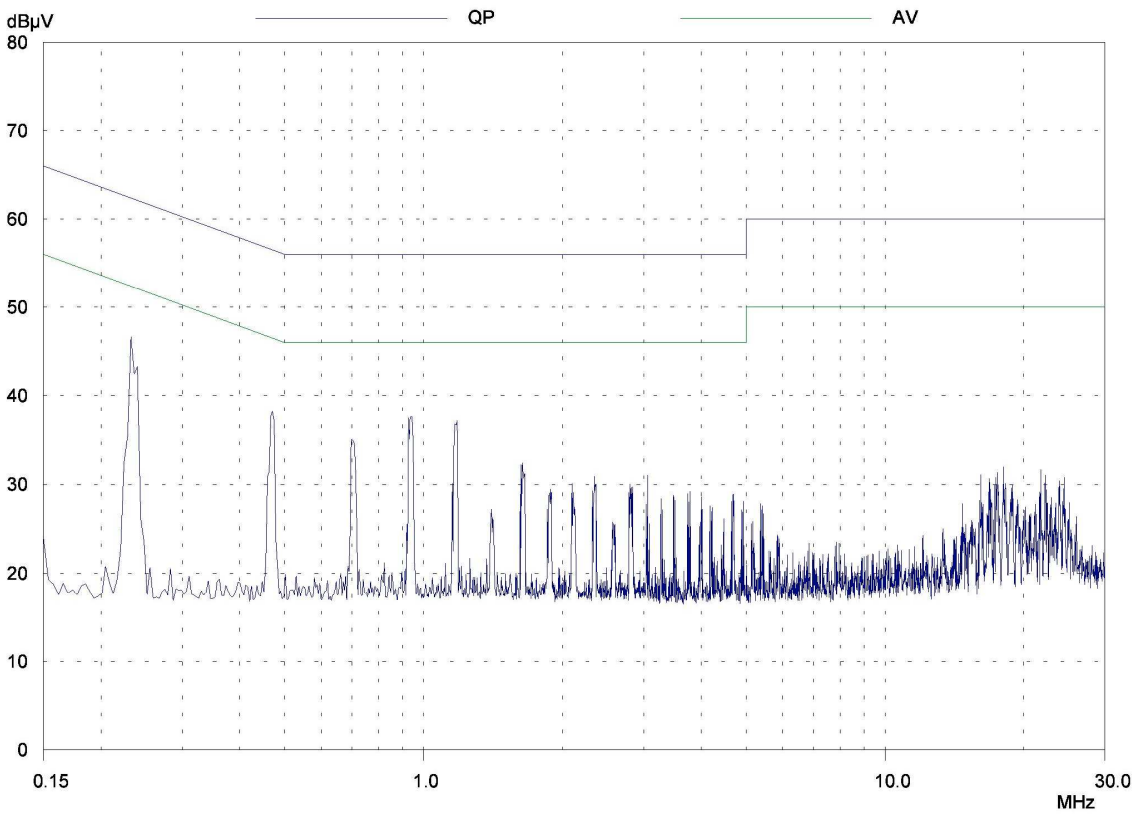


Conducted Emission

Peak Value

EUT:	
Manuf:	
Op Cond:	BLUETOOTH TX_CH0
Operator:	MARK
Test Spec:	FCC
Comment:	L2

Prescan Measurement:	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB

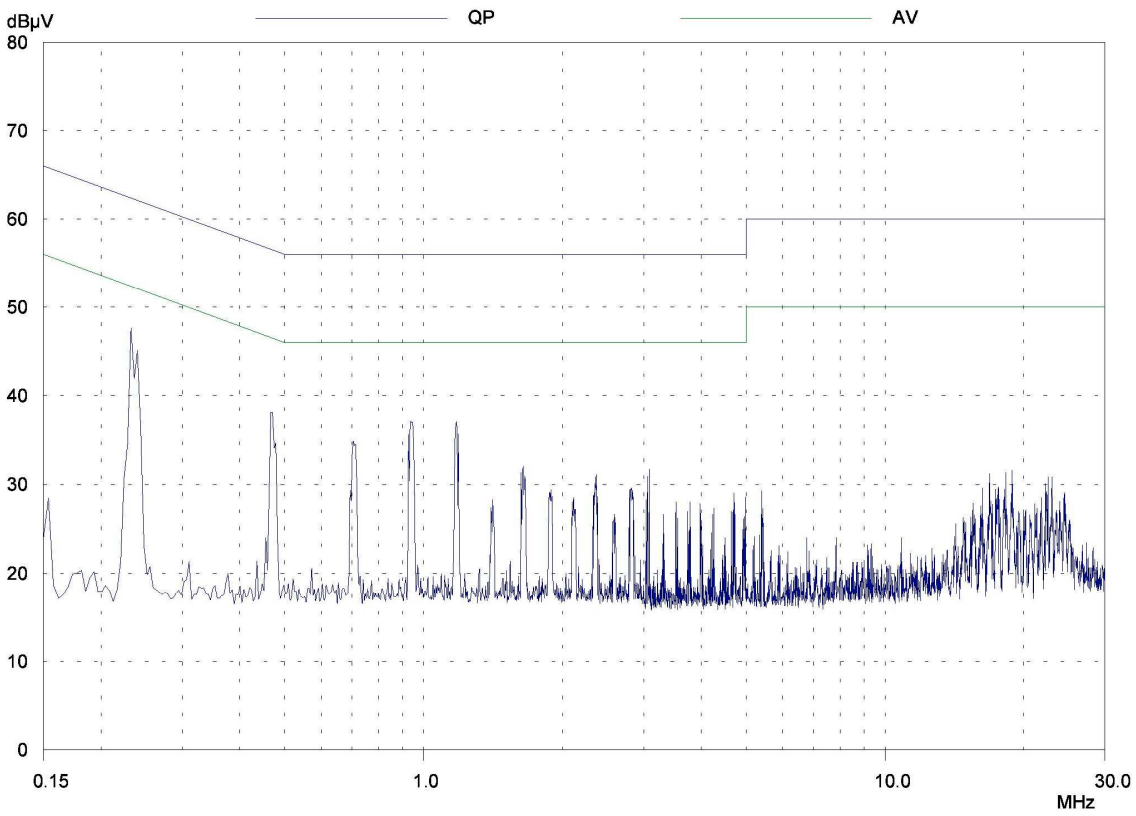


Conducted Emission

Peak Value

EUT:	
Manuf:	
Op Cond:	BLUETOOTH TX_CH39
Operator:	MARK
Test Spec:	FCC
Comment:	L1

Prescan Measurement:	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB

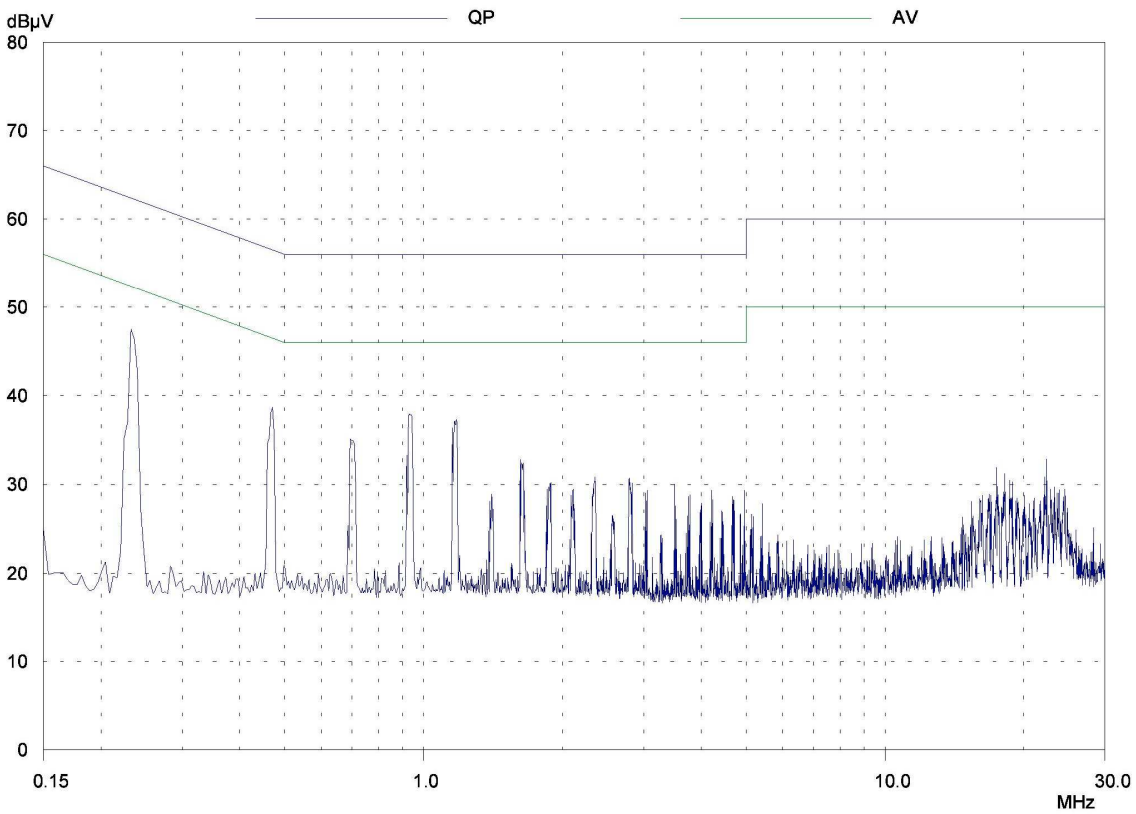


Conducted Emission

Peak Value

EUT:	
Manuf:	
Op Cond:	BLUETOOTH TX_CH39
Operator:	MARK
Test Spec:	FCC
Comment:	L2

Prescan Measurement:	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB

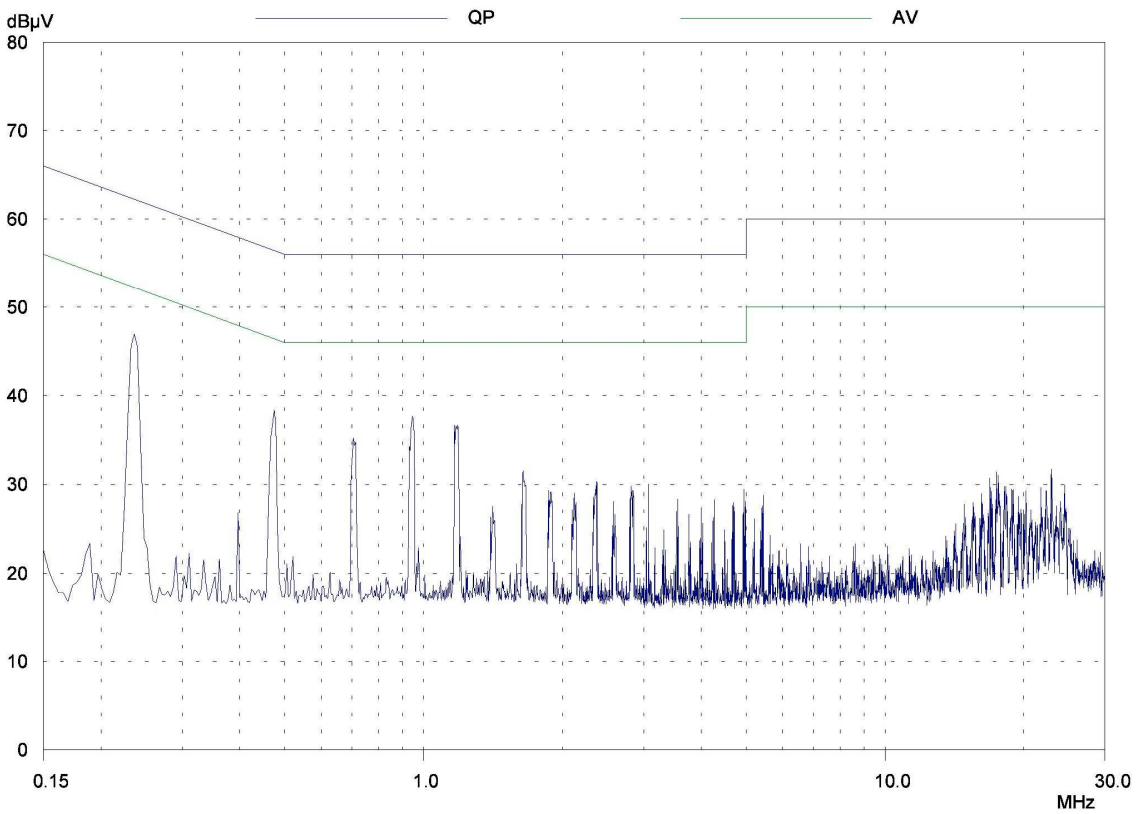


Conducted Emission

Peak Value

EUT:
Manuf:
Op Cond: BLUETOOTH TX_CH78
Operator: MARK
Test Spec: FCC
Comment: L1

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

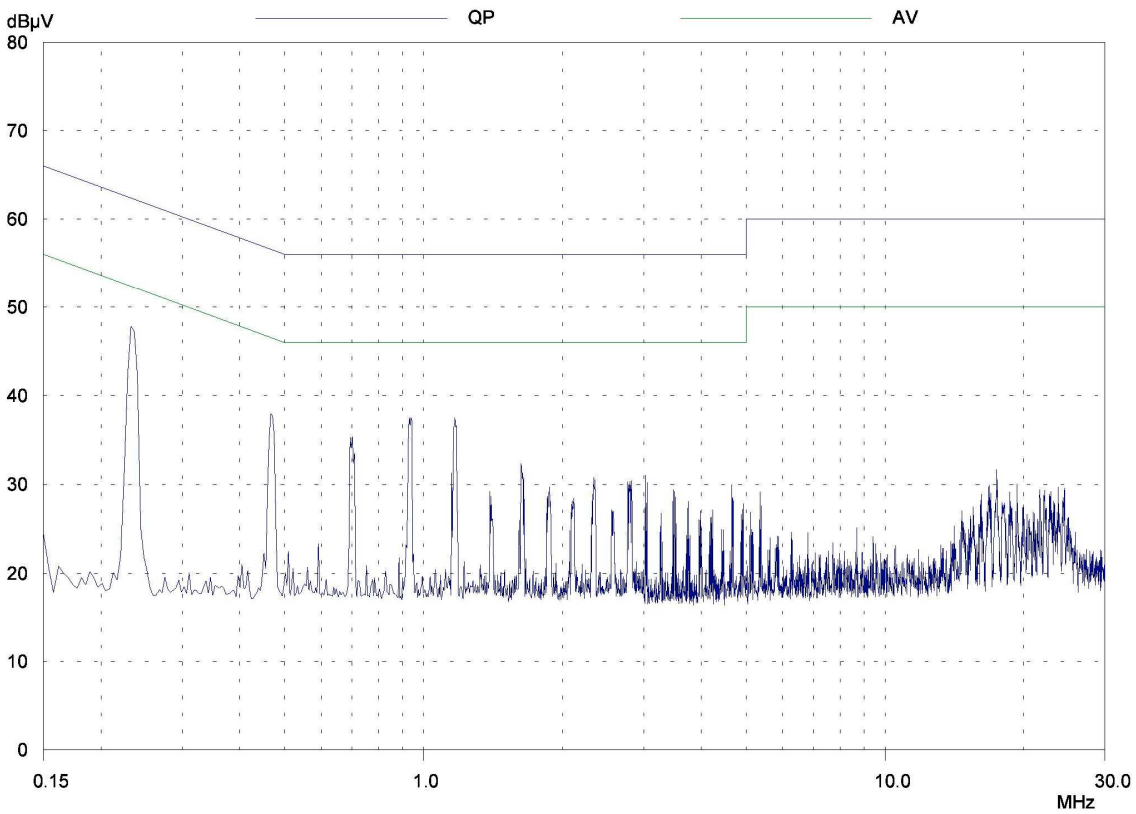


Conducted Emission

Peak Value

EUT:	
Manuf:	
Op Cond:	BLUETOOTH TX_CH78
Operator:	MARK
Test Spec:	FCC
Comment:	L2

Prescan Measurement:	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB



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)

Assume a receiver reading of 22.5 dB μV is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μV.

RESULT = 22.5 + 0.1 = 22.6 dB μV

Level in μV = Common Antilogarithm[(22.6 dB μV)/20]

= 13.48 μV

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	04/01/2005
Line Impedance Stabilization network	EMCO	3825	11/09/2005

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 monopole antenna is fixed at casing of EUT and with 2dBi antenna gain. The power need not to be reduced by the amount in dB.

7 20dB EMISSION BANDWIDTH MEASUREMENT

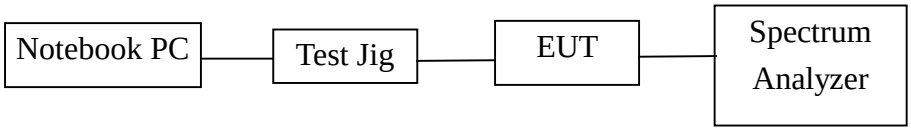
7.1 Standard Applicable

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

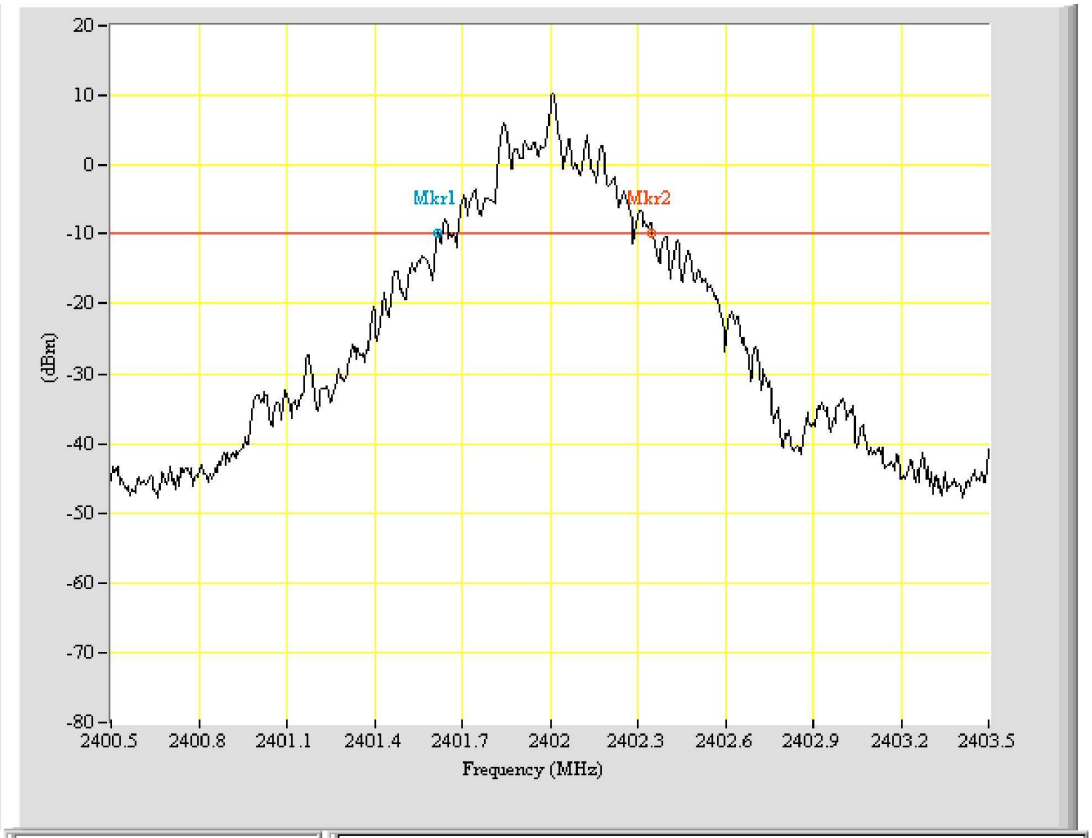
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564EC	09/16/2005

7.4 Measurement Data

Test Date : Dec. 27, 2004 Temperature : 23 ℃ Humidity: 71%

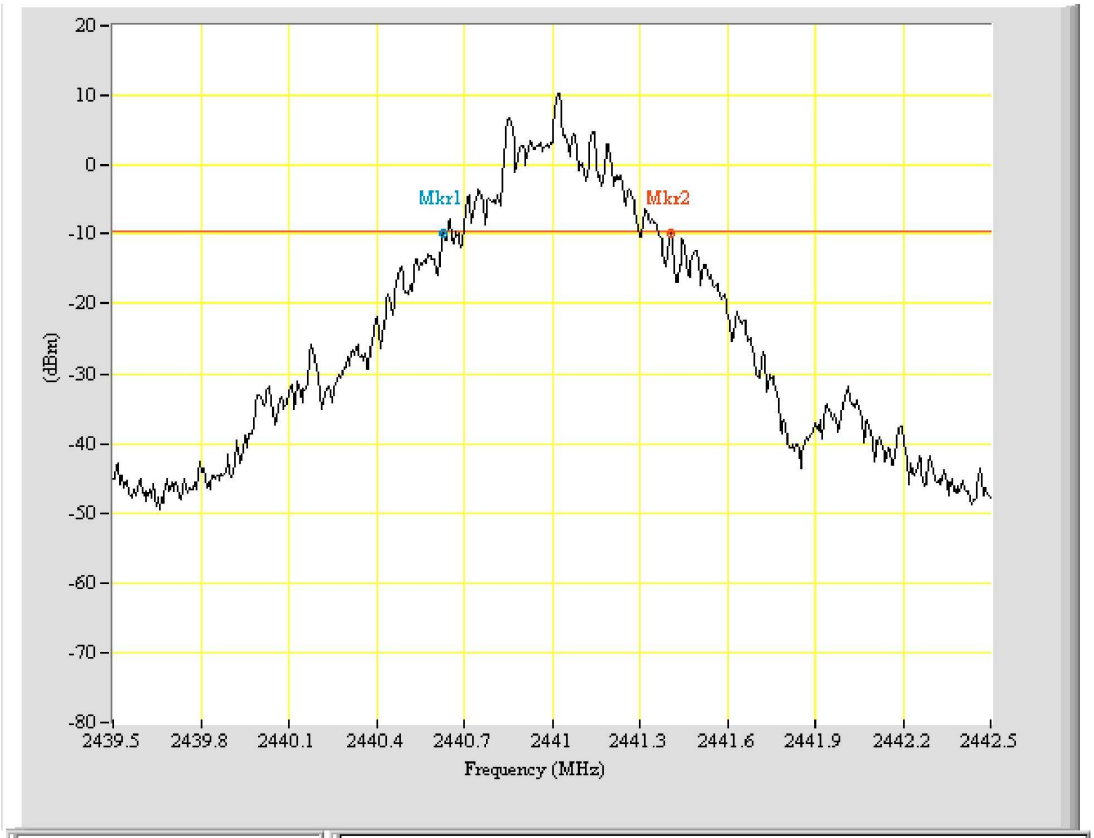
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Chart
0	2402	0.735	Page 61
39	2441	0.775	Page 62
78	2480	0.765	Page 63

Note: Please refer to page 61 to page 63 for chart



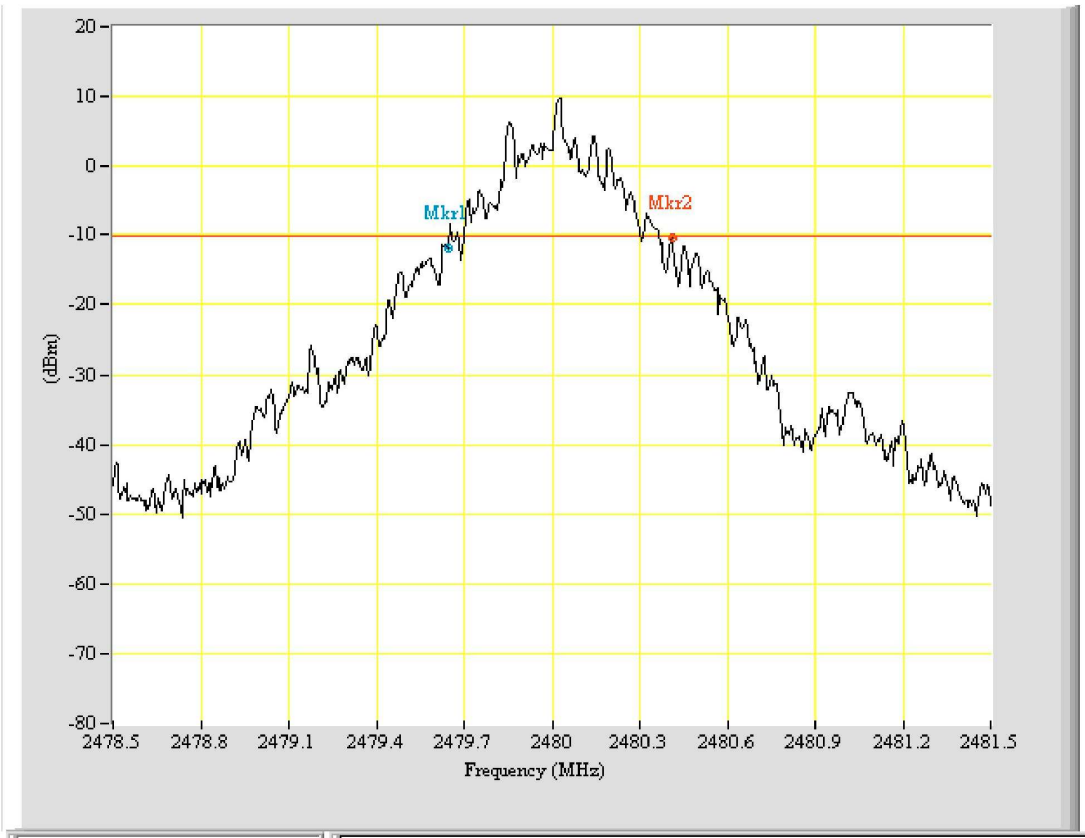
*Center 2402.0000MHz	Display Line -9.830dBm
*SPAN 3.0000MHz	Δ Marker -0.7350MHz 0.000dB
*RBW 10.00kHz	Mkr1 2401.615MHz -10.000dBm
*VBW 30.00kHz	Mkr2 2402.350MHz -10.000dBm
*SWP 75.00msec	
*ATTEN 30.00dB	
*RL 20.00dBm	

EUT:
Purpose: 20dB_BW
Condition: CH0
Note:



*Center 2441.0000MHz	Display Line -9.660dBm
*SPAN 3.0000MHz	Δ Marker -0.7750MHz 0.170dB
*RBW 10.00kHz	Mkr1 2440.630MHz -10.000dBm
*VBW 30.00kHz	Mkr2 2441.405MHz -9.830dBm
*SWP 75.00msec	
*ATTEN 30.00dB	
*RL 20.00dBm	

EUT
Purpose: 20dB_BW
Condition: CH39
Note:



*Center 2480.0000MHz	Display Line -10.160dBm
*SPAN 3.0000MHz	Δ Marker -0.7650MHz 1.500dB
*RBW 10.00kHz	Mkr1 2479.645MHz -11.830dBm
*VBW 30.00kHz	Mkr2 2480.410MHz -10.330dBm
*SWP 75.00msec	
*ATTEN 30.00dB	
*RL 20.00dBm	

EUT: BAP-100
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

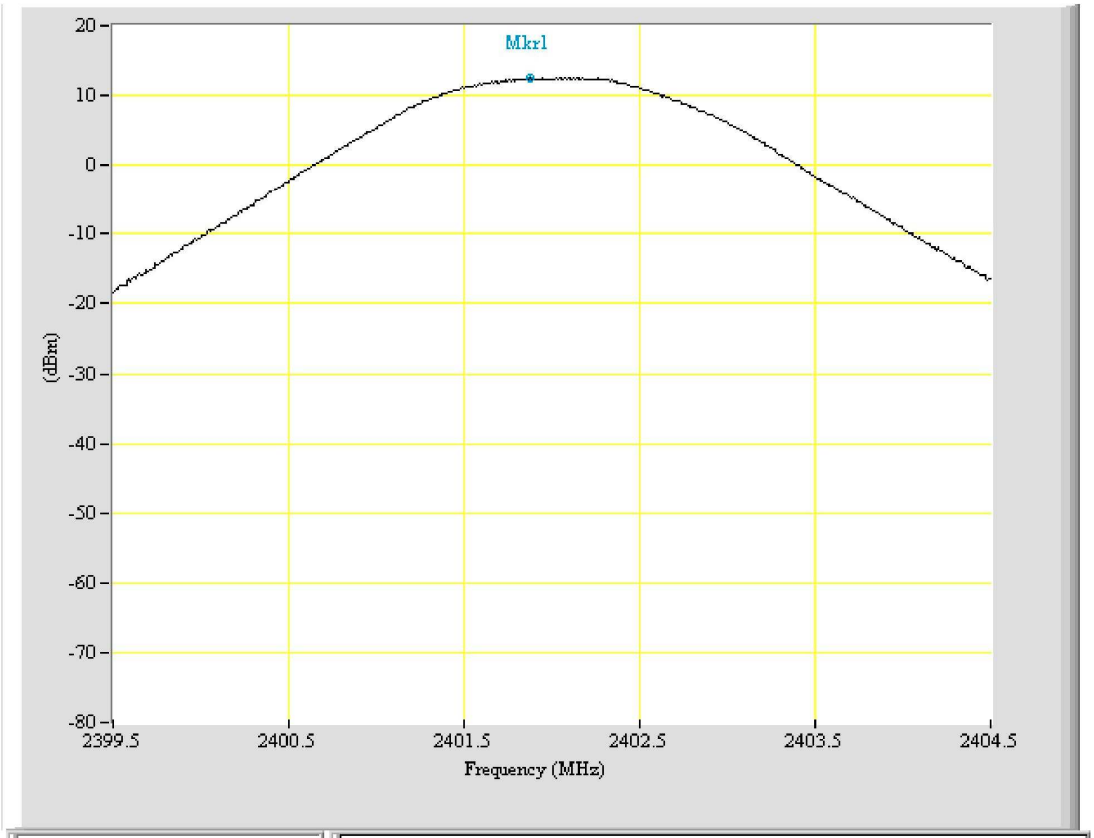
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564EC	09/16/2005

8.4 Measurement Data

Test Date : Dec. 27, 2004 Temperature : 23 ℃ Humidity: 71%

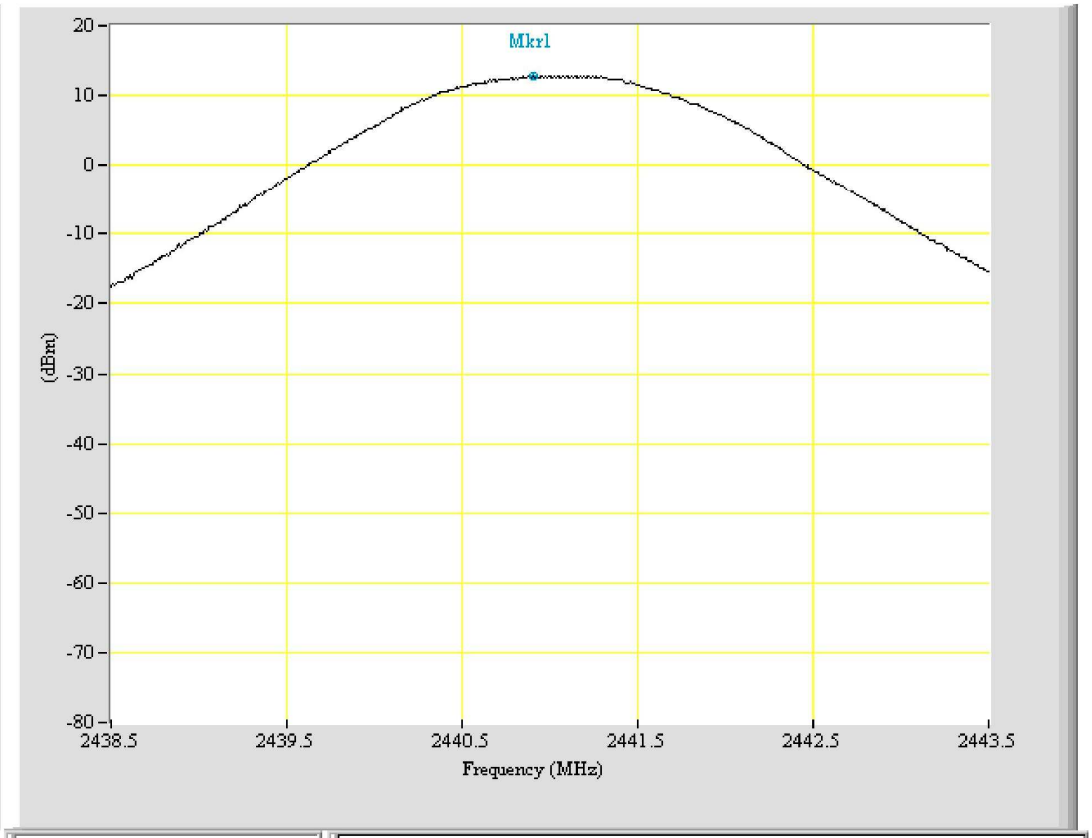
Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
0	2402	12.50	0.5	13.0	19.95	1000	Page 66
39	2441	12.84	0.5	13.34	21.58	1000	Page 67
78	2480	12.34	0.5	12.84	19.23	1000	Page 68

Note: Please refer to page 66 to page 68 for chart



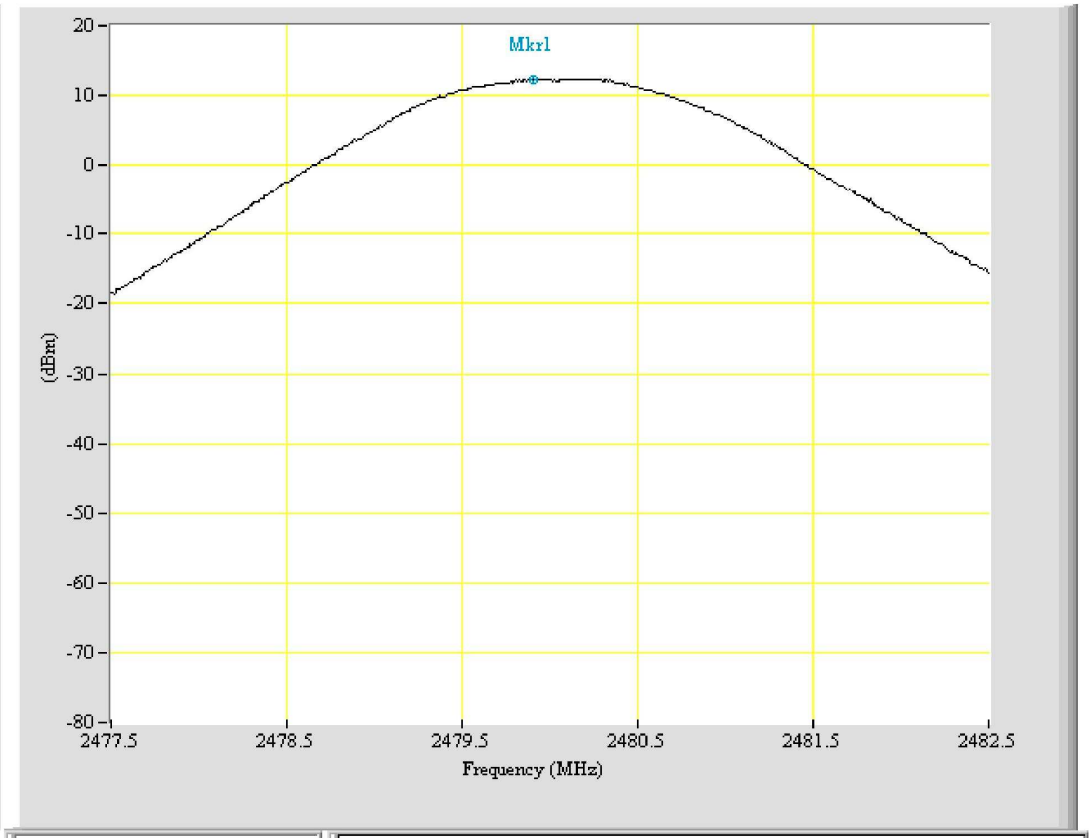
*Center 2402.0000MHz *SPAN 5.0000MHz *RBW 1000.00kHz *VBW 3000.00kHz *SWP 50.00msec *ATTEN 30.00dB *RL 20.00dBm	Marker 2401.875MHz 12.500dBm

EUT:
Purpose: Output_Pwr
Condition: CH0
Note:



*Center 2441.0000MHz *SPAN 5.0000MHz *RBW 1000.00kHz *VBW 3000.00kHz *SWP 50.00msec *ATTEN 30.00dB *RL 20.00dBm	Marker 2440.908MHz 12.840dBm

EUT:
Purpose: Output_Pwr
Condition: CH39
Note:



*Center 2480.0000MHz *SPAN 5.0000MHz *RBW 1000.00kHz *VBW 3000.00kHz *SWP 50.00msec *ATTEN 30.00dB *RL 20.00dBm	Marker 2479.908MHz 12.340dBm

EUT:
Purpose: Output_Pwr
Condition: CH78
Note: