



Product Service

FCC- TEST REPORT

Report Number : **68.920.12.002.01** Date of Issue: 22 March 2012

Model : **810-00012-00, 810-00012-01**

Product Type : Beats Wireless

Applicant : Beats Electronics, LLC

Address : 1601 Cloverfield Blvd. Suite 5000N Santa Monica,
CA 90404 United States

Production Facility : Charter Media (Dongguan) Co., Ltd.

Address : Daibandi Industrial Zone, Daning District, Humen Town,
Dongguan City, Guangdong Province 523930, P. R. China

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 65

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2 Details about the Test Laboratory

Details about the Test Laboratory

Location 1: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch
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Nantou, Shenzhen,
Guangdong,
China

Telephone: 86 755 2663 9496
Fax: 86 755 2663 2877

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Beats Wireless

Model no.: 810-00012-00

Brand Name: Beats

Options and accessories: NIL

Rating: 3.7VDC (supplied by Battery)
(or supplied by USB port of PC via USB cable)

RF Transmission
Frequency: 2402-2480MHz

Antenna Gain: 0dBi

Description of the EUT: NIL

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
NoteBook	Lenovo	XC200	---

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C, 10-1-2010 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition	Pages	Test Result			Test Location
		Pass	Fail	N/A	
15.207 Conducted Emission AC Power Port	8	☒	☐	☐	Location 2
15.247 (b) (1) Conducted peak output power	12	☒	☐	☐	Location 2
15.247(d) Band edge compliance of RF emissions	14	☒	☐	☐	Location 2
15.247(d) Spurious RF conducted emissions	28	☒	☐	☐	Location 2
15.247(d) 15.209 Spurious radiated emissions	36	☒	☐	☐	Location 2
15.247(a)(1) 20dB bandwidth	40	☒	☐	☐	Location 2
15.247(a)(1) Carrier frequency separation	48	☒	☐	☐	Location 2
15.247(a)(1)(iii) Number of hopping frequencies	51	☒	☐	☐	Location 2
15.247(a)(1)(iii) Dwell Time	54	☒	☐	☐	Location 2

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: COW81000012 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

The two models 810-00012-00 and 810-00012-01 are identical only except the enclosure color, 810-00012-00 is black color, 810-00012-01 is white color, so all the RF tests were applied on 810-00012-00, 810-00012-01 is deemed to fulfill relevant RF requirement without further testing.

All the configurations of the product were tested and only the worst test results are listed in the report.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: 13 December 2011

Testing Start Date: 14 December 2011

Testing End Date: 16 March 2012

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:



Ken Li
EMC Project Manager



Cookies Bu
EMC Project Engineer



Leo Li
EMC Test Engineer

7 Technical Requirement

7.1 Conducted Emission

Test Method

- 1 The EUT was placed on a table, which is 0.8m above ground plane
- 2 The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3 Maximum procedure was performed to ensure EUT compliance
- 4 A EMI test receiver is used to test the emissions from both sides of AC line

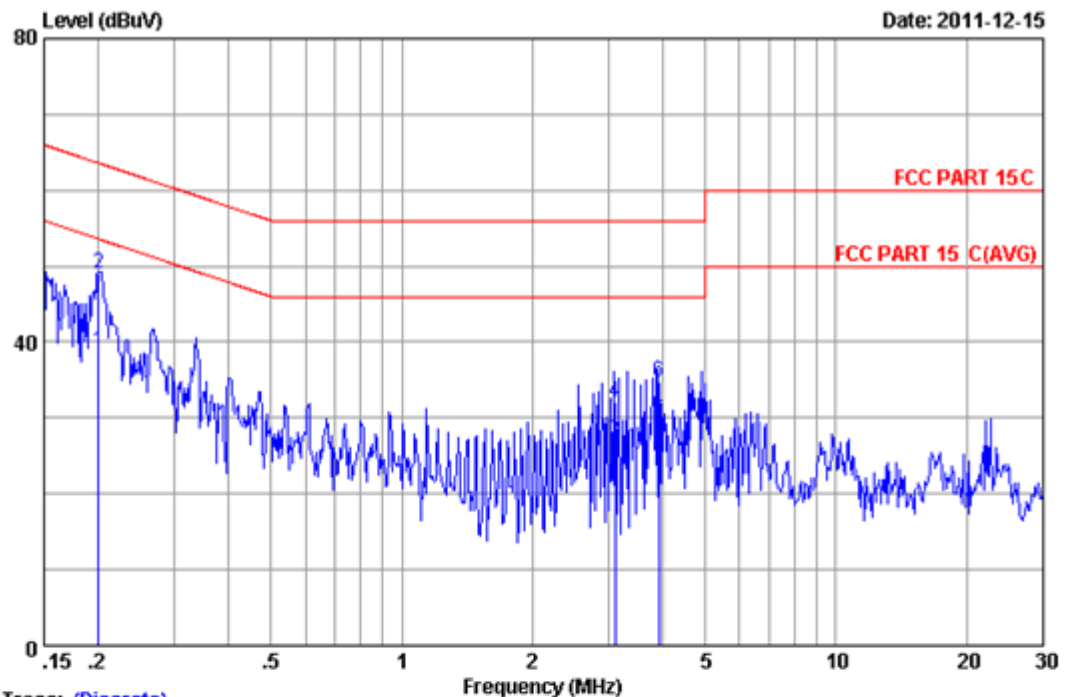
Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Remark: This test was carried out in all the test modes, here only the worst test result was shown.

Conducted Emission



Trace: (Discrete)

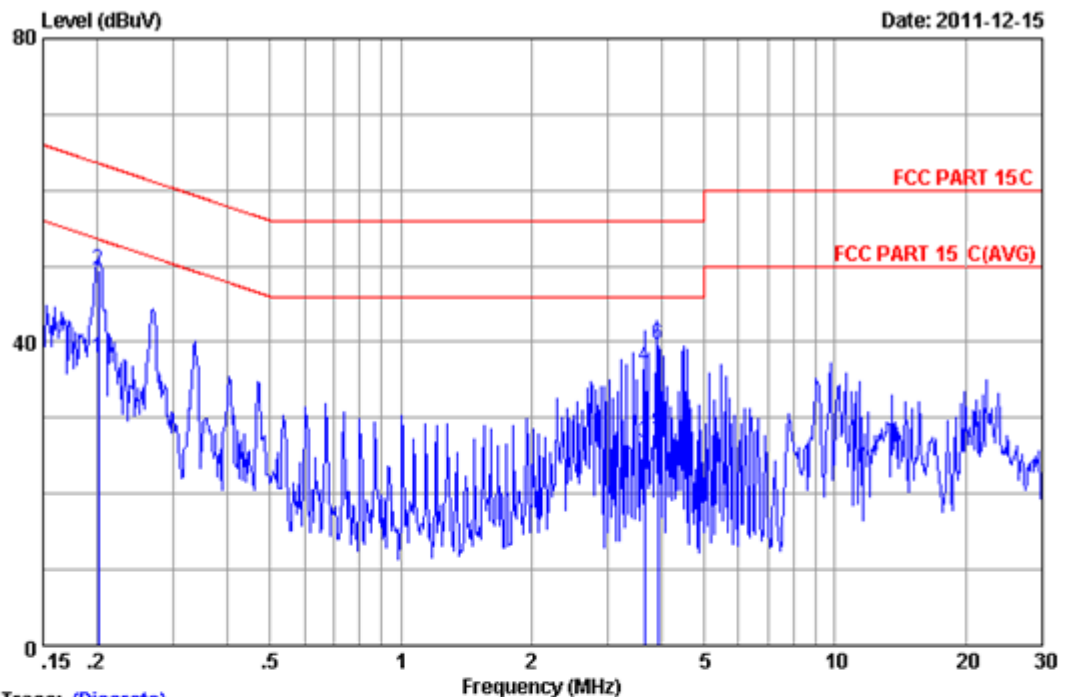
Site no :1#conduction Data No :2
Dis./Ant. :** 2011 ESH2-25 LINE
Limit :FCC PART 15 C
Env./Ins. :22.8°C/44% Engineer :Jolly_Xu
EUT :Beats Wireless
Power Rating :AC 120V/60Hz
Test Mode :Charging+Transmitting

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.20050	0.15	9.86	28.80	38.81	53.59	14.78	Average
2	0.20050	0.15	9.86	39.00	49.01	63.59	14.58	QP
3	3.102	0.22	9.96	16.79	26.97	46.00	19.03	Average
4	3.102	0.22	9.96	21.99	32.17	56.00	23.83	QP
5	3.909	0.23	9.98	19.51	29.72	46.00	16.28	Average
6	3.909	0.23	9.98	24.51	34.72	56.00	21.28	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss(Include 10dB pulse limit)+Reading.

2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Conducted Emission



Trace: (Discrete)

Site no : 1#conduction Data No : 1
 Dis./Ant. : ** 2011 ESH2-25 NEUTRAL
 Limit : FCC PART 15 C
 Env./Ins. : 22.8°C/44% Engineer : Jolly_Xu
 EUT : Beats Wireless
 Power Rating : AC 120V/60Hz
 Test Mode : Charging+Transmitting

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.20100	0.14	9.86	27.80	37.80	53.57	15.77	Average
2	0.20100	0.14	9.86	39.50	49.50	63.57	14.07	QP
3	3.635	0.23	9.97	16.60	26.80	46.00	19.20	Average
4	3.635	0.23	9.97	26.50	36.70	56.00	19.30	QP
5	3.907	0.23	9.98	18.01	28.22	46.00	17.78	Average
6	3.907	0.23	9.98	29.41	39.62	56.00	16.38	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss(Include 10dB pulse limit)+Reading.

2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Test Receiver	Rohde & Schwarz	ESCS30	100162	May 29, 2012
L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 29, 2012
50Ω Coaxial Switch	Anritsu	MP59B	6100214550	N/A
Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 29, 2012
I.S.N	Teseq GmbH	ISN T800	30327	May 29, 2012
LCL adaoter	Teseq GmbH	ADT800-Cat.5	30327.01	May 29, 2012
LCL adaoter	Teseq GmbH	ADT800-Cat.3	30327.02	May 29, 2012
LCL adaoter	Teseq GmbH	ADT800-R	30327.02	May 29, 2012

7.2 Conducted peak output power

Test Method

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an Power meter
3. Add a correction factor to the display.

Limits for conducted peak output power measurements

Frequency Range MHz	Limit W	Limit dBm
2400-2483	≤1	≤30

Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	4.48	Pass
Middle channel 2441MHz	4.40	Pass
High channel 2480MHz	3.88	Pass

Bluetooth Mode $\pi/4$ -DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.62	Pass
Middle channel 2441MHz	3.19	Pass
High channel 2480MHz	2.25	Pass

Bluetooth Mode 8-DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.07	Pass
Middle channel 2441MHz	3.82	Pass
High channel 2480MHz	3.88	Pass



Product Service

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2013

7.3 Band edge compliance of RF emissions

Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

Limits

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

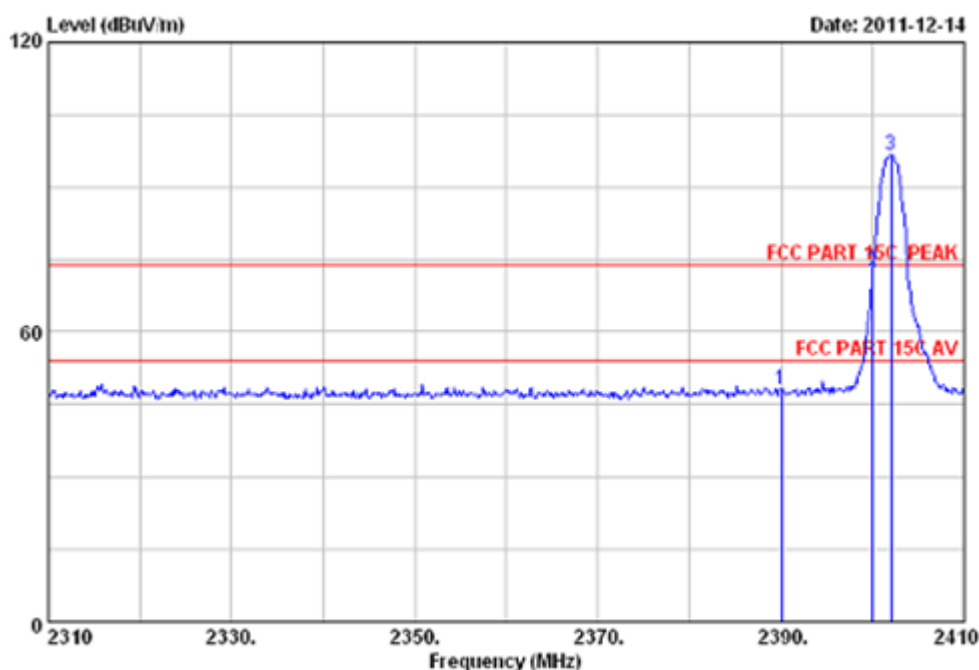
Band edge compliance of RF emissions

Remark: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in this test item.

Bluetooth Mode GFSK Modulation Test Result:

Lower edge peak Plot:

Vertical:



Site no. : 3m Chamber Data no. : 26
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode 2402MHz GFSK

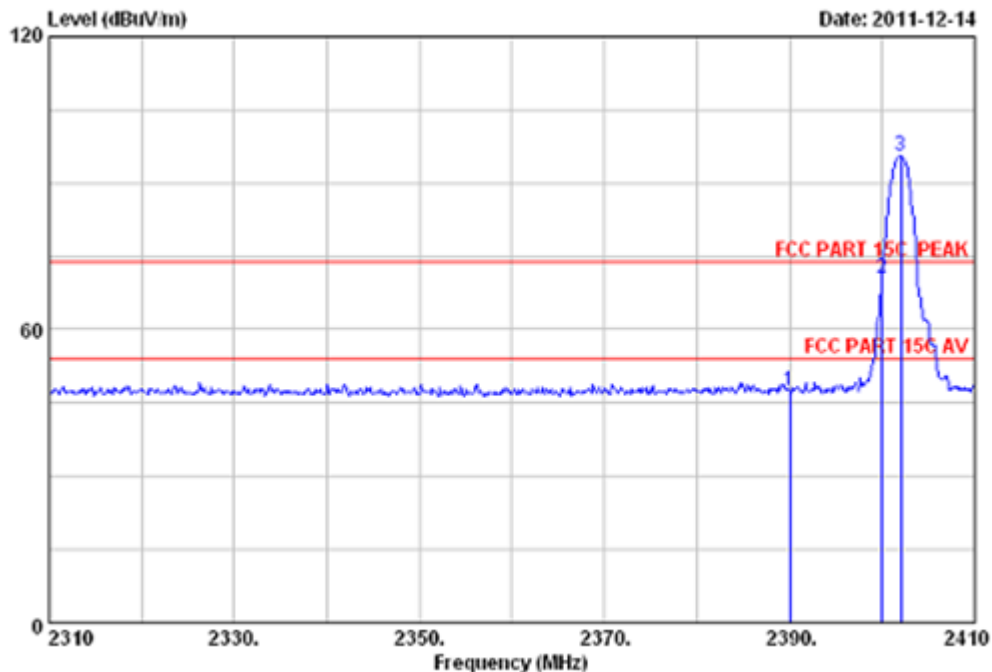
	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	48.76	48.29	74.00	25.71	Peak
2	2400.000	27.96	6.01	34.44	73.11	72.64	74.00	1.36	Peak
3	2402.000	27.96	6.01	34.44	97.22	96.75	74.00	-22.75	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Lower edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 27
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode 2402MHz GFSK

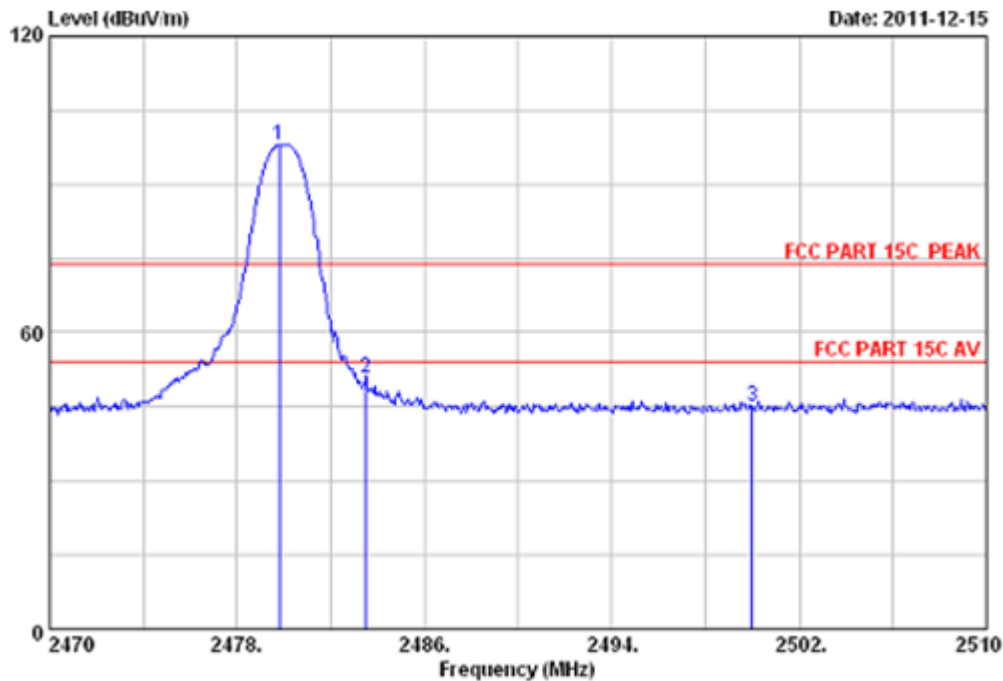
	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	48.10	47.63	74.00	26.37	Peak
2	2400.000	27.96	6.01	34.44	71.05	70.58	74.00	3.42	Peak
3	2402.000	27.96	6.01	34.44	96.17	95.70	74.00	-21.70	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Upper edge peak Plot:
Vertical:



Site no. : 3m Chamber Data no. : 79
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode 2480MHz GFSK

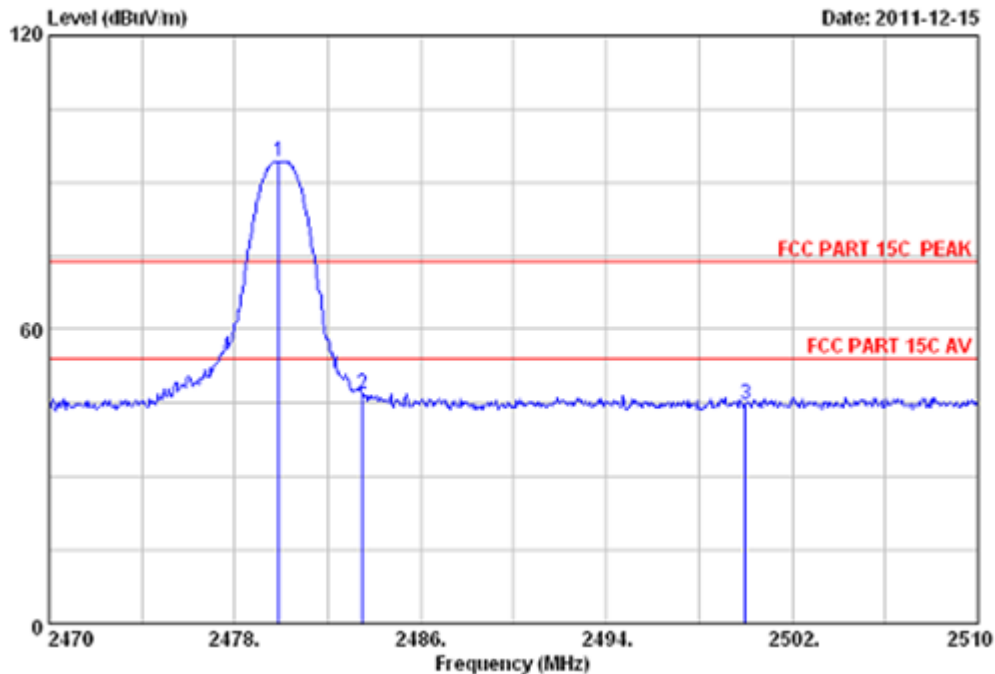
	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.800	28.08	6.15	34.45	98.14	97.92	74.00	-23.92	Peak
2	2483.500	28.08	6.15	34.45	51.01	50.79	74.00	23.21	Peak
3	2500.000	28.10	6.18	34.45	45.25	45.08	74.00	28.92	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Upper edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 78
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode 2480MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.880	28.08	6.15	34.45	94.61	94.39	74.00	-20.39	Peak
2	2483.500	28.08	6.15	34.45	46.88	46.66	74.00	27.34	Peak
3	2500.000	28.10	6.18	34.45	45.12	44.95	74.00	29.05	Peak

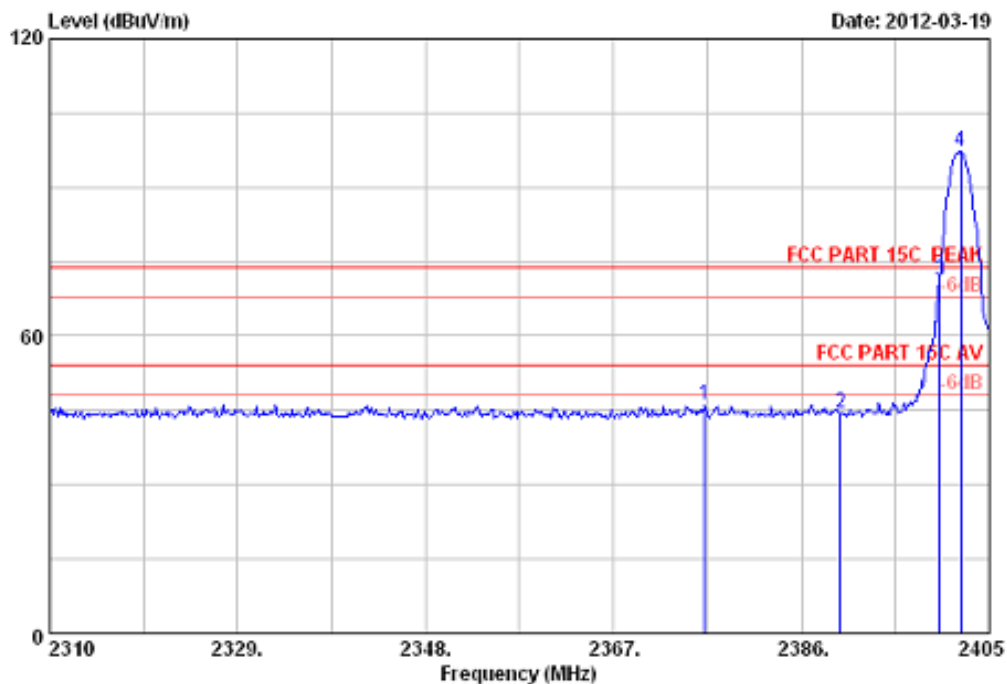
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Bluetooth Mode $\pi/4$ -DQPSK Modulation Test Result:

Lower edge peak Plot:
Vertical:



Site no. : RF Chamber Data no. : 1
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode $\pi/4$ -DQPSK 2402MHz
 M/N : 810-00012-00-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2376.215	27.93	5.98	34.44	46.75	46.22	74.00	27.78	Peak
2	2390.000	27.96	6.01	34.44	44.90	44.43	74.00	29.57	Peak
3	2400.000	27.96	6.01	34.44	71.67	71.20	74.00	2.80	Peak
4	2402.150	27.96	6.01	34.44	97.62	97.15	74.00	-23.15	Peak

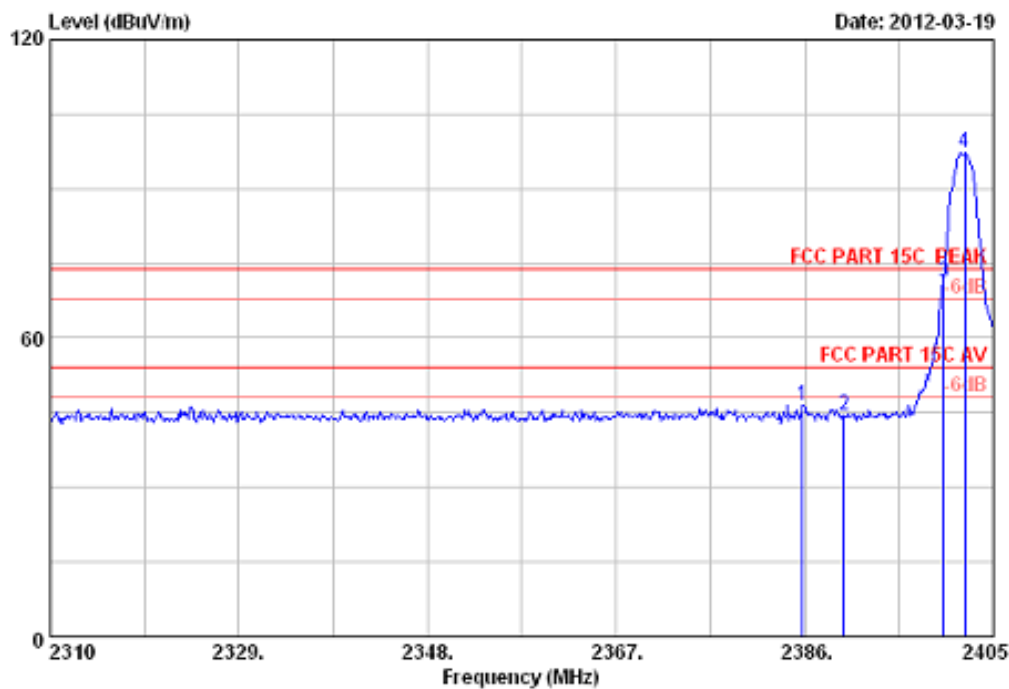
Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Bluetooth Mode $\pi/4$ -DQPSK Modulation Test Result:

Lower edge peak Plot:
Horizontal:



Site no. : RF Chamber Data no. : 2
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode $\pi/4$ -DQPSK 2402MHz
 M/N : 810-00012-00-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2385.810	27.96	6.01	34.44	46.98	46.51	74.00	27.49	Peak
2	2390.000	27.96	6.01	34.44	45.03	44.56	74.00	29.44	Peak
3	2400.000	27.96	6.01	34.44	71.66	71.19	74.00	2.81	Peak
4	2402.150	27.96	6.01	34.44	97.62	97.15	74.00	-23.15	Peak

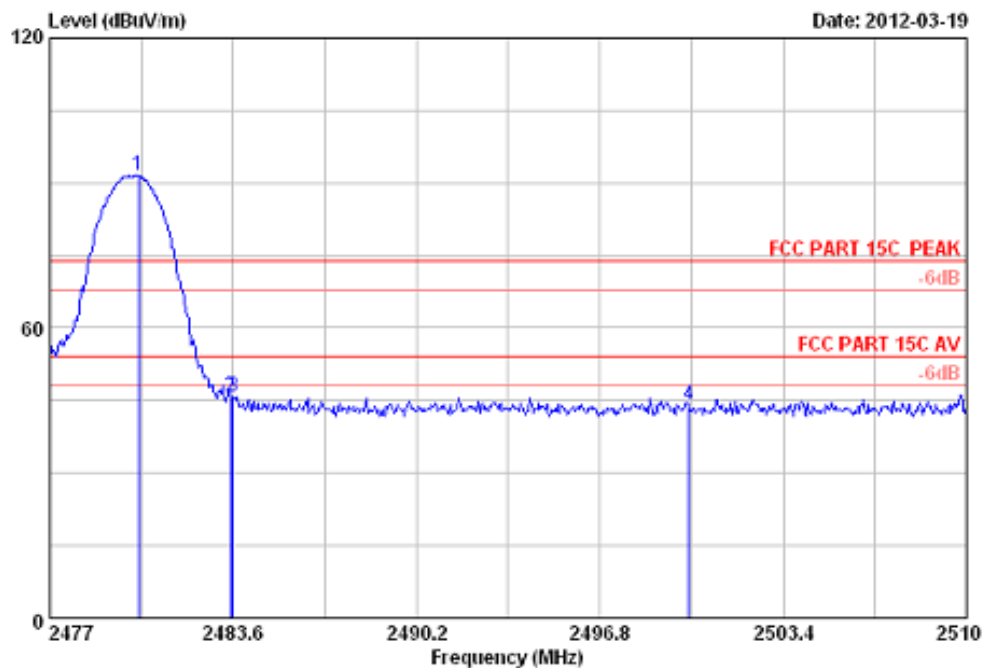
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Bluetooth Mode $\pi/4$ -DQPSK Modulation Test Result:

Upper edge peak Plot:
Vertical:



Site no. : RF Chamber Data no. : 8
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23°C/54% Engineer : Leo-Li
EUT : Beats Wireless
Power supply : DC 3.7V
Test mode : Tx Mode $\pi/4$ -DQPSK 2480MHz
M/N : 810-00012-00-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.201	28.08	6.15	34.45	91.72	91.50	74.00	-17.50	Peak
2	2483.500	28.08	6.15	34.45	45.99	45.77	74.00	28.23	Peak
3	2483.600	28.08	6.15	34.45	45.89	45.67	74.00	28.33	Peak
4	2500.000	28.10	6.18	34.45	44.33	44.16	74.00	29.84	Peak

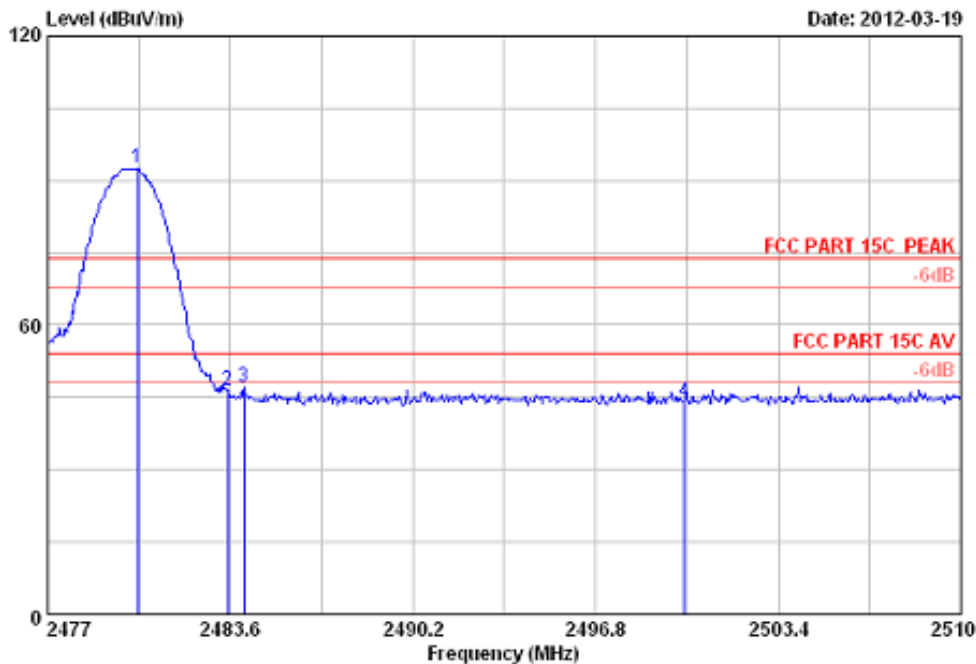
Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Bluetooth Mode $\pi/4$ -DQPSK Modulation Test Result:

Upper edge peak Plot:
Horizontal:



Site no. : RF Chamber Data no. : 7
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23°C/54% Engineer : Leo-Li
EUT : Beats Wireless
Power supply : DC 3.7V
Test mode : Tx Mode $\pi/4$ -DQPSK 2480MHz
M/N : 810-00012-00-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.234	28.08	6.15	34.45	92.65	92.43	74.00	-18.43	Peak
2	2483.500	28.08	6.15	34.45	46.73	46.51	74.00	27.49	Peak
3	2484.095	28.08	6.15	34.45	47.26	47.04	74.00	26.96	Peak
4	2500.000	28.10	6.18	34.45	44.17	44.00	74.00	30.00	Peak

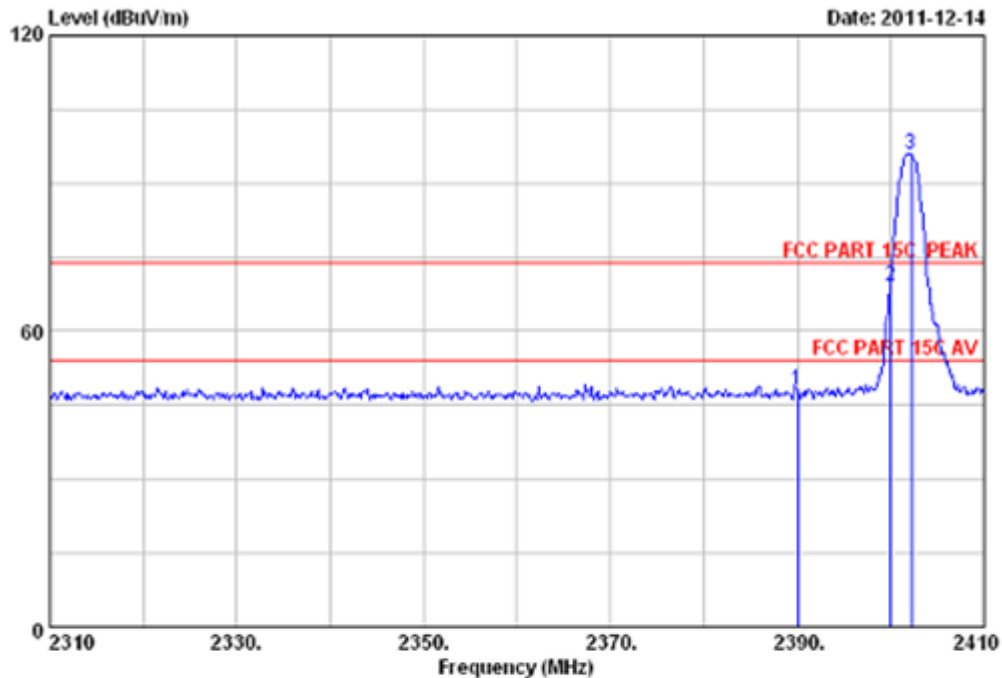
Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Bluetooth Mode 8-DPSK Modulation Test Result:

Lower edge peak Plot:
Vertical:



Site no. : 3m Chamber Data no. : 45
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23°C/54% Engineer : Leo-Li
EUT : Beats Wireless
Power supply : DC 3.7V
Test mode : Tx Mode 2402MHz 8-DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	48.47	48.00	74.00	26.00	Peak
2	2400.000	27.96	6.01	34.44	69.83	69.36	74.00	4.64	Peak
3	2402.200	27.96	6.01	34.44	96.51	96.04	74.00	-22.04	Peak

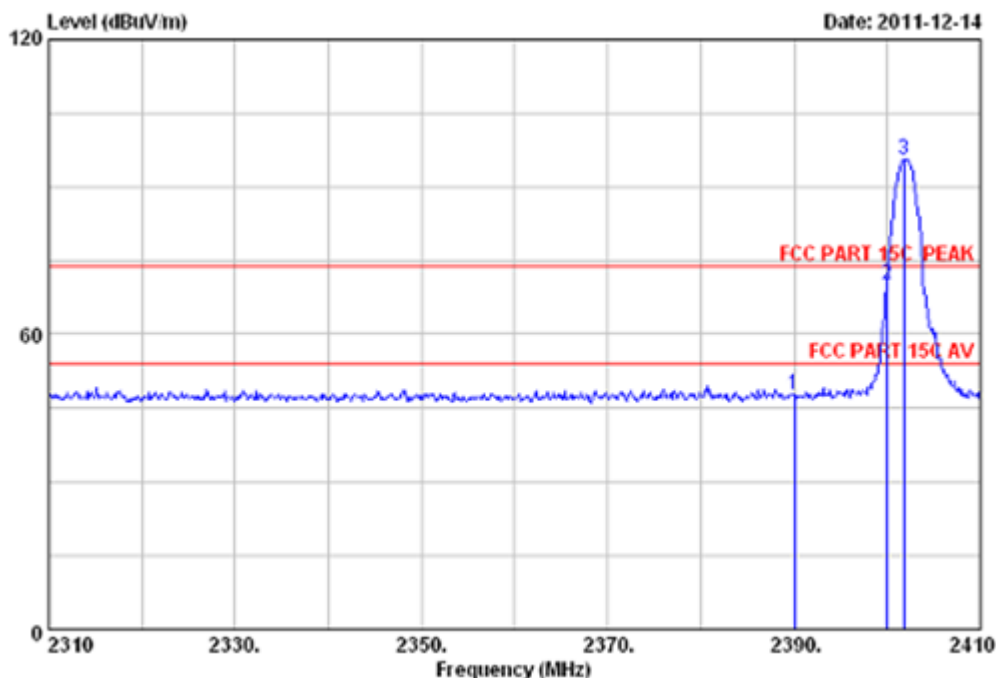
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Lower edge peak Plot:

Horizontal:



Site no. : 3m Chamber	Data no. : 44
Dis. / Ant. : 3m 2011 3115 4580	Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK	
Env. / Ins. : 23°C/54%	Engineer : Leo-Li
EUT : Beats Wireless	
Power supply : DC 3.7V	
Test mode : Tx Mode 2402MHz 8-DPSK	

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	48.43	47.96	74.00	26.04	Peak
2	2400.000	27.96	6.01	34.44	70.73	70.26	74.00	3.74	Peak
3	2401.800	27.96	6.01	34.44	96.23	95.76	74.00	-21.76	Peak

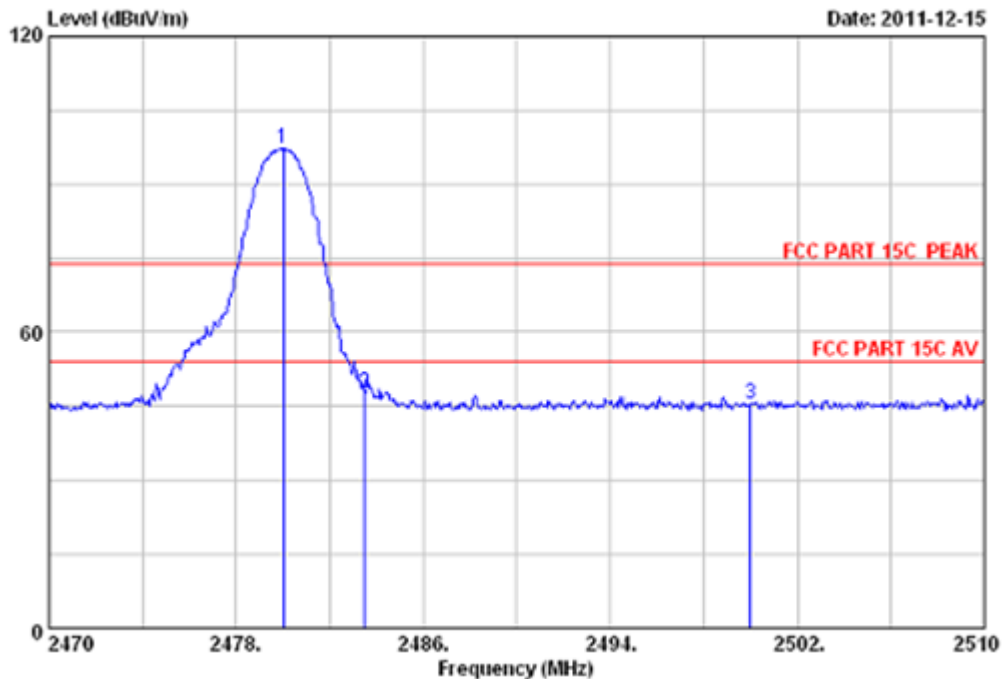
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Upper edge peak Plot:

Vertical:



Site no. : 3m Chamber Data no. : 80
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : Beats Wireless
 Power supply : DC 3.7V
 Test mode : Tx Mode 2480MHz 8DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	28.08	6.15	34.45	97.58	97.36	74.00	-23.36	Peak
2	2483.500	28.08	6.15	34.45	48.16	47.94	74.00	26.06	Peak
3	2500.000	28.10	6.18	34.45	45.55	45.38	74.00	28.62	Peak

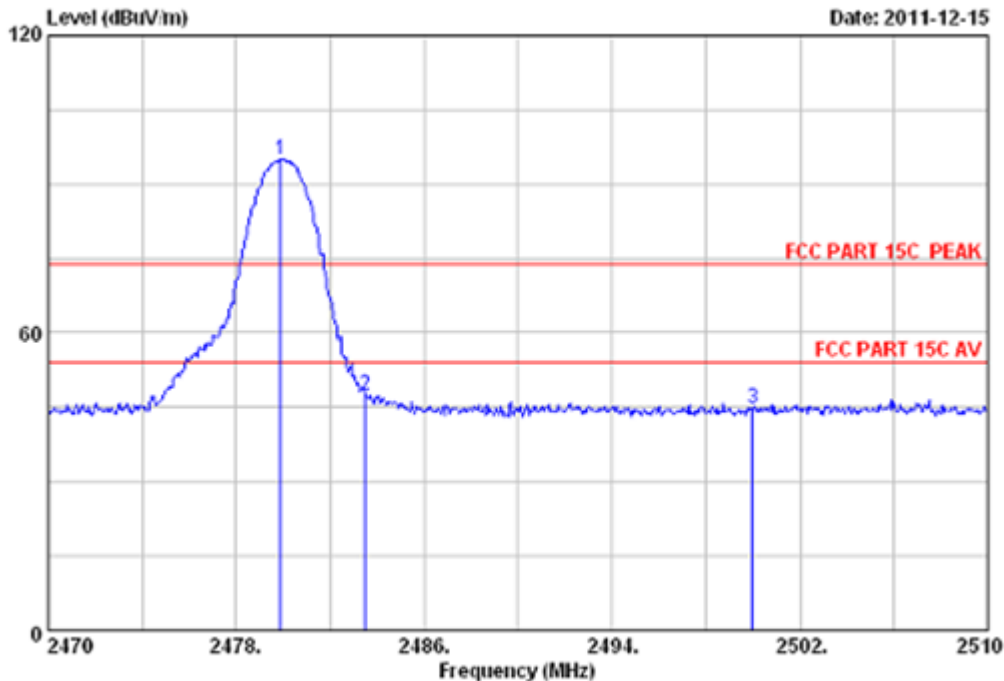
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

Upper edge peak Plot:

Horizontal:



Site no. : 3m Chamber	Data no. : 81
Dis. / Ant. : 3m 2011 3115 4580	Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK	
Env. / Ins. : 23°C/54%	Engineer : Leo-Li
EUT : Beats Wireless	
Power supply : DC 3.7V	
Test mode : Tx Mode 2460MHz 8DPSK	

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.880	28.08	6.15	34.45	95.15	94.93	74.00	-20.93	Peak
2	2483.500	28.08	6.15	34.45	47.72	47.50	74.00	26.50	Peak
3	2500.000	28.10	6.18	34.45	44.82	44.65	74.00	29.35	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2013
Amp	HP	8449B	3008A02495	May 08, 2013
Antenna	EMCO	3115	9607-4877	May 17, 2012
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

7.4 Spurious RF conducted emissions

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The resolution bandwidth(RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100kHz and 300kHz.

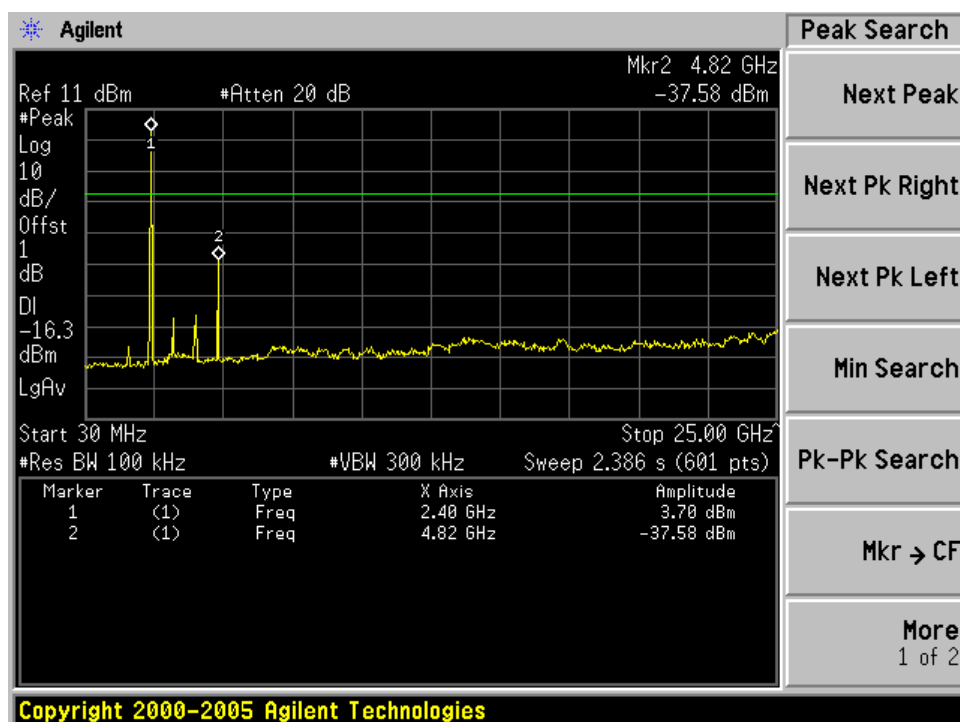
Limit

Frequency Range MHz	Limit (dBc)
1000-25000	-20

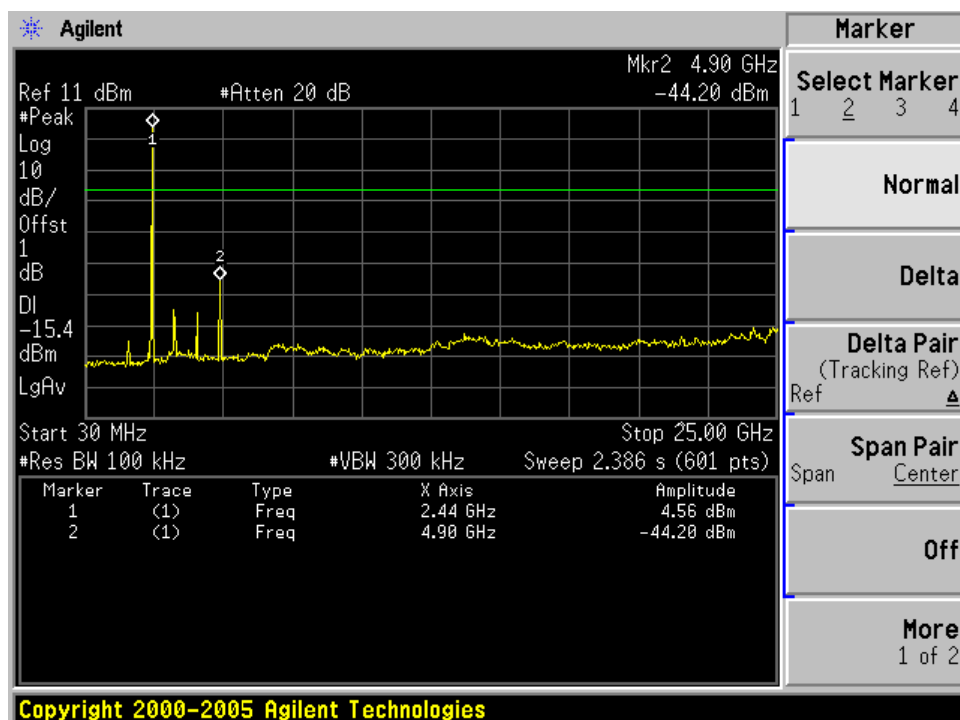
Spurious RF conducted emissions

Bluetooth Mode GFSK Modulation Test Result:

2402MHz

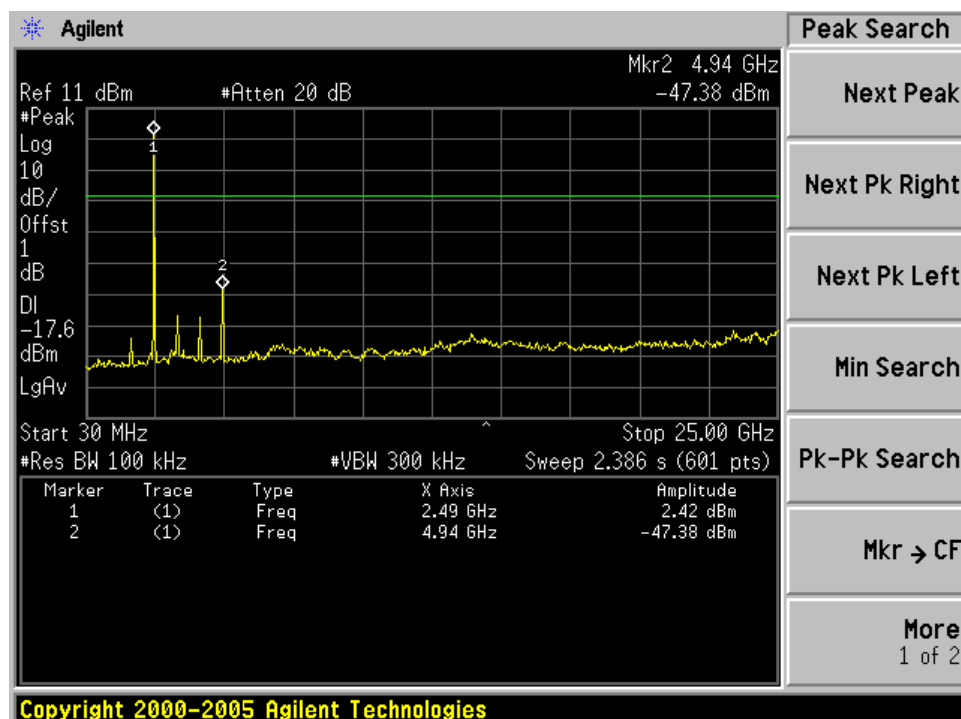


2441MHz

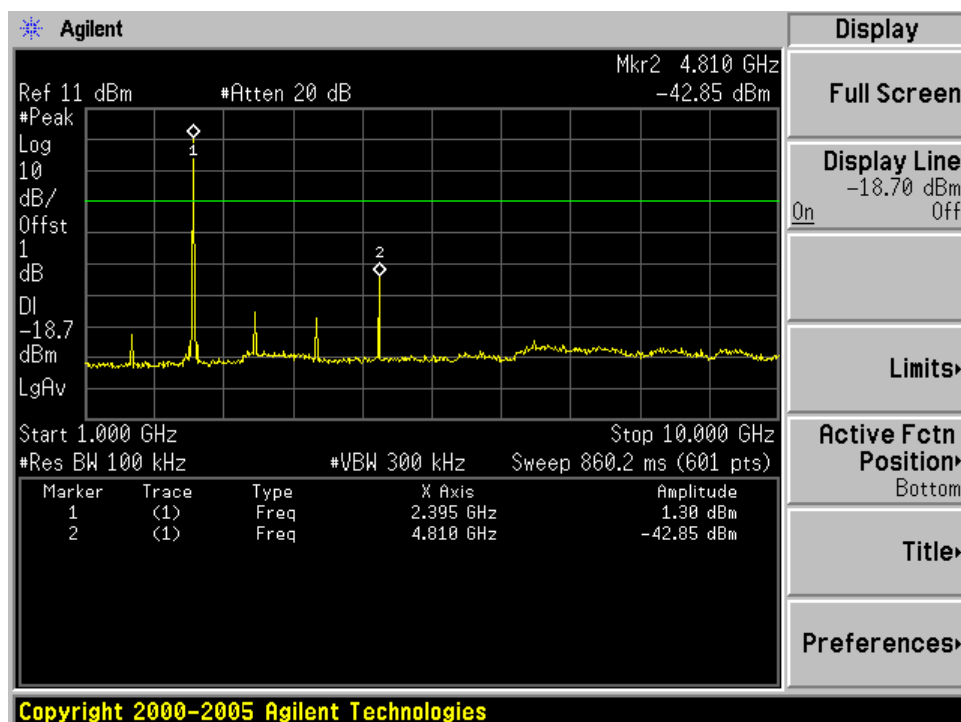


Spurious RF conducted emissions

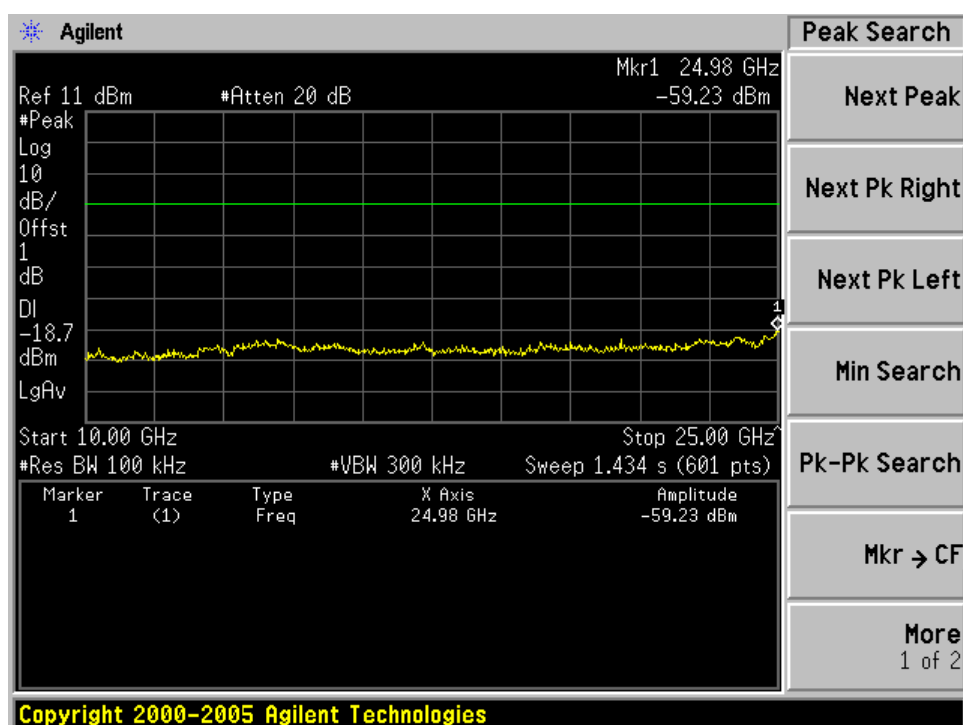
2480MHz


Bluetooth Mode $\pi/4$ -DQPSK Modulation Test Result:

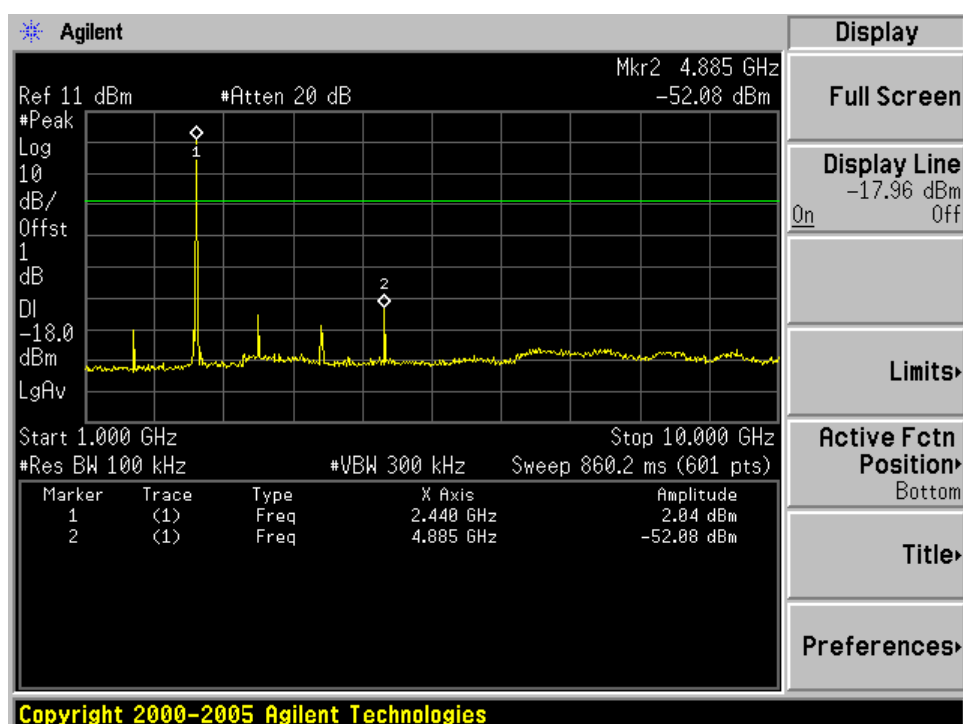
2402MHz



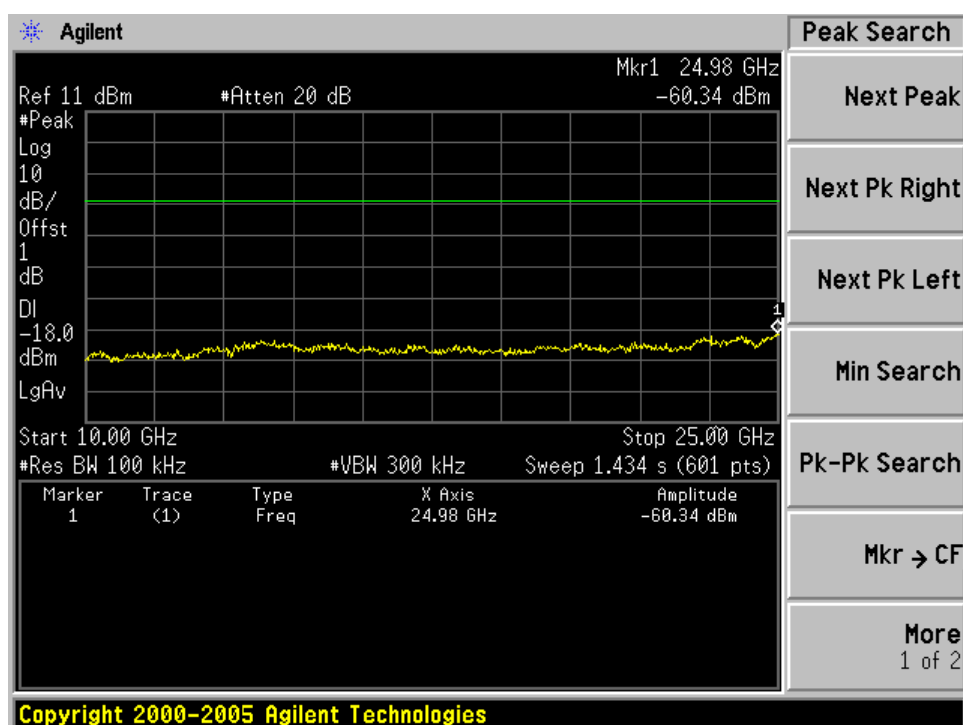
Spurious RF conducted emissions



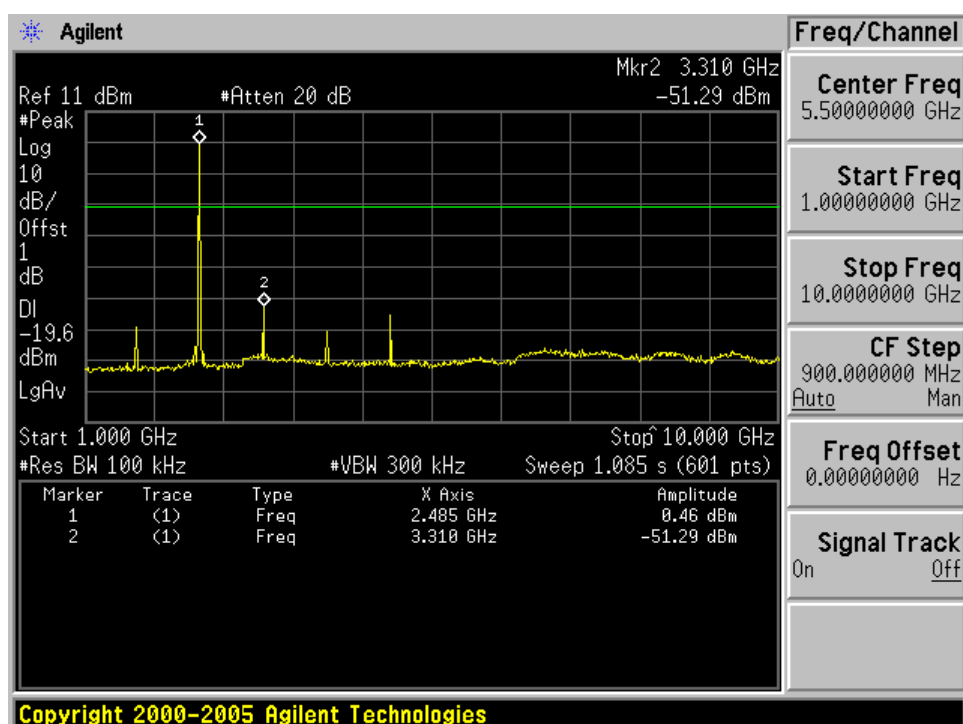
2441MHz



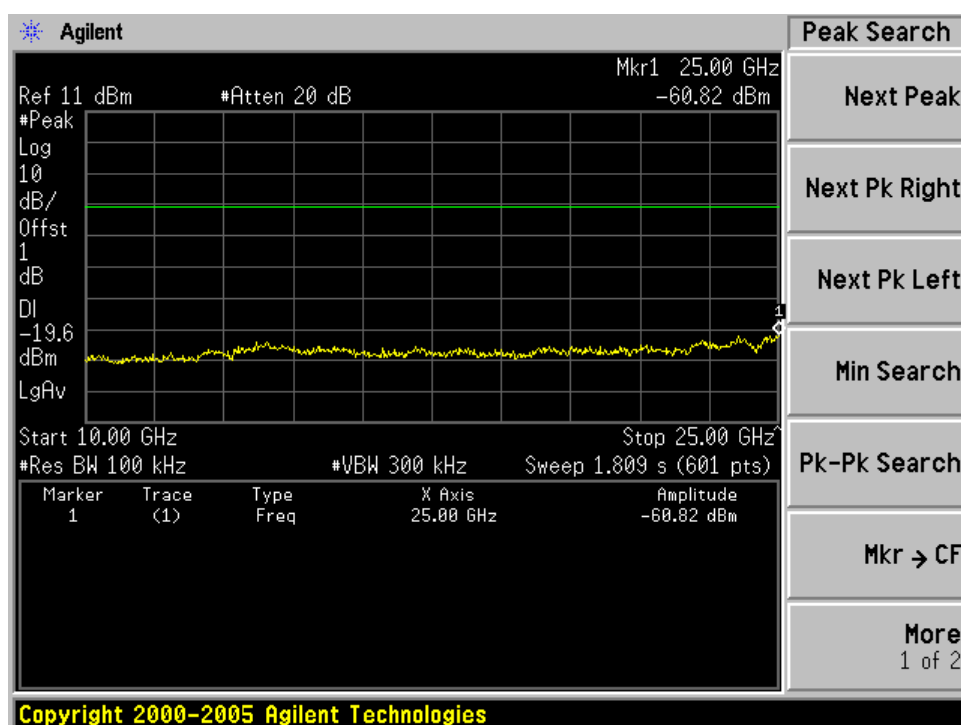
Spurious RF conducted emissions



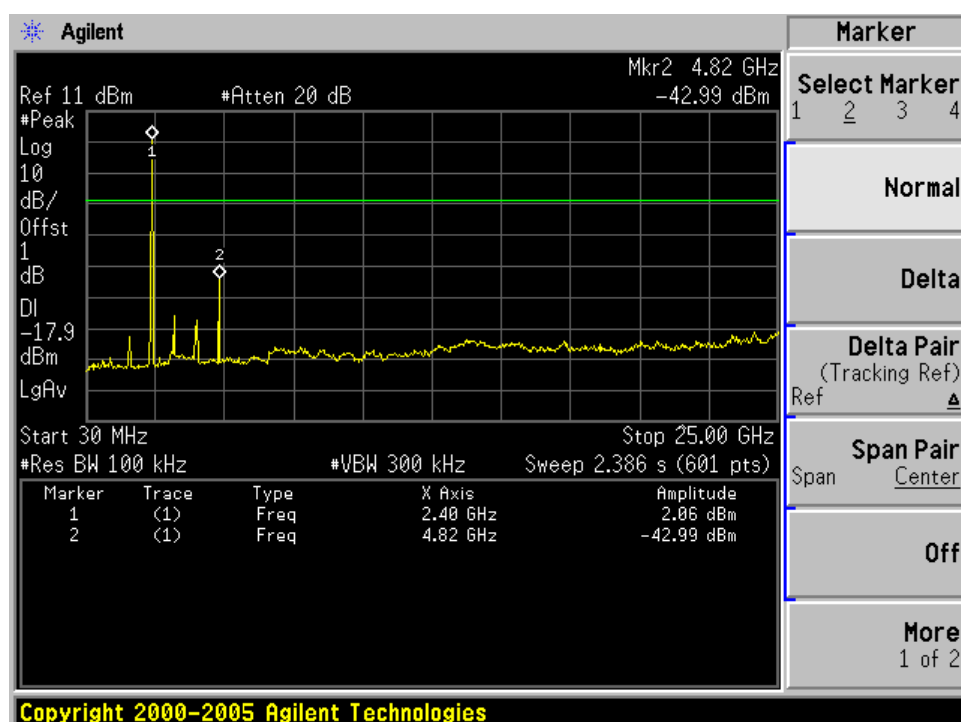
2480MHz



Spurious RF conducted emissions

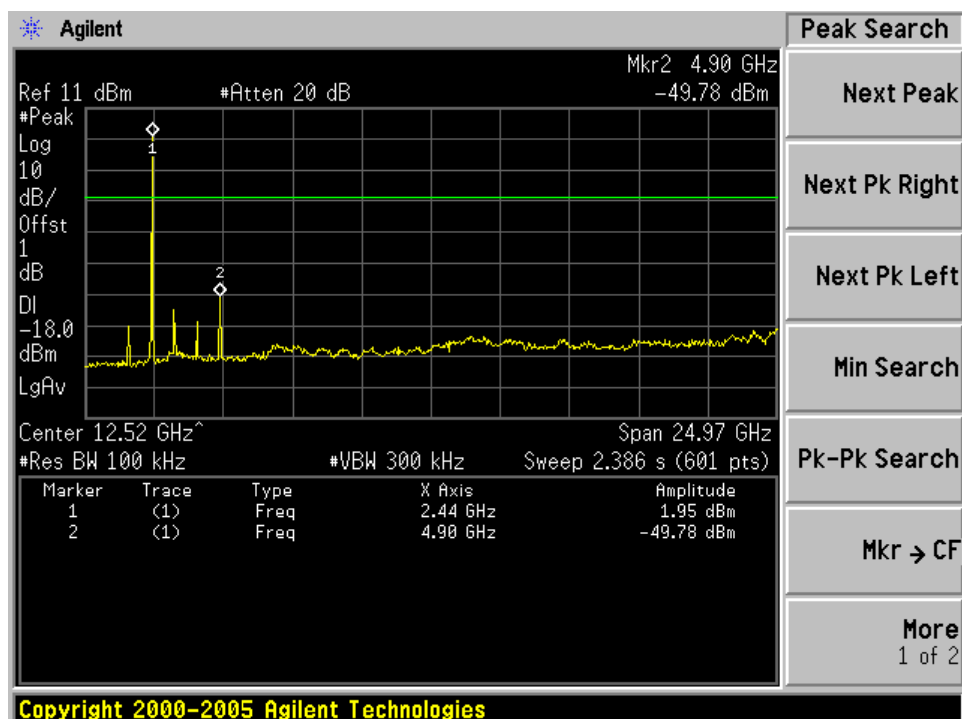


Bluetooth Mode 8-DPSK Modulation Test Result:
2402MHz

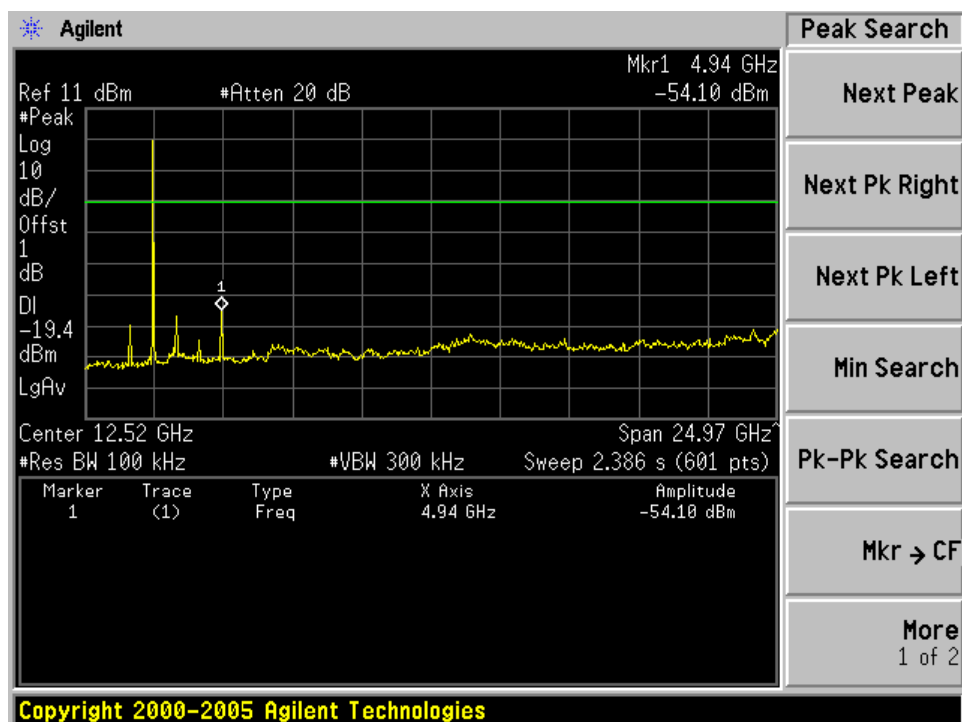


Spurious RF conducted emissions

2441MHz



2480MHz





Product Service

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2012

7.5 Spurious radiated emissions

Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Radiated Emission

Remark: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in this test item.

The testing was applied on all the modes, only the worst case data was shown in the report.

Bluetooth Mode GFSK Modulation 2402MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
340.4	13.90	1.40	-	13.29	28.59	Vertical	46.0	QP	Pass
344.38	14.22	1.42	-	23.40	39.04	Horizontal	46.0	QP	Pass
1595.0	25.72	4.76	34.60	51.17	47.05	Vertical	74.0	PK	Pass
1595.0	25.72	4.76	34.60	51.58	47.46	Horizontal	74.0	PK	Pass
4804.000	-	-	-	-	-	-	-	-	-
4804.000	-	-	-	-	-	-	-	-	-

Bluetooth Mode GFSK Modulation 2441MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
1629.0	25.86	4.78	34.59	50.73	46.78	Vertical	74	PK	Pass
1629.0	25.86	4.78	34.59	44.76	40.81	Horizontal	74	PK	Pass
4882.000	-	-	-	-	-	-	-	-	-
4882.000	-	-	-	-	-	-	-	-	-

Bluetooth Mode GFSK Modulation 2480MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
1646.0	25.93	4.81	34.58	54.95	51.11	Vertical	74	PK	Pass
1646.0	25.93	4.81	34.58	43.8	39.96	Horizontal	74	PK	Pass
4960.000	-	-	-	-	-	-	-	-	-
4960.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

Radiated Emission

Bluetooth Mode 8-DPSK Modulation 2402MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
340.4	13.90	1.40	-	13.30	28.60	Vertical	46.0	QP	Pass
344.38	14.22	1.42	-	23.42	39.06	Horizontal	46.0	QP	Pass
1595.0	25.72	4.76	34.60	49.28	45.16	Vertical	74.0	PK	Pass
1595.0	25.72	4.76	34.60	48.97	44.85	Horizontal	74.0	PK	Pass
4804.000	-	-	-	-	-	-	-	-	-
4804.000	-	-	-	-	-	-	-	-	-

Bluetooth Mode 8-DPSK Modulation 2441MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
1629.0	25.86	4.78	34.59	48.97	45.02	Vertical	74	PK	Pass
1629.0	25.86	4.78	34.59	47.58	43.63	Horizontal	74	PK	Pass
4882.000	-	-	-	-	-	-	-	-	-
4882.000	-	-	-	-	-	-	-	-	-

Bluetooth Mode 8-DPSK Modulation 2480MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
1646.0	25.93	4.81	34.58	53.19	49.35	Vertical	74	PK	Pass
1646.0	25.93	4.81	34.58	46.62	42.78	Horizontal	74	PK	Pass
4960.000	-	-	-	-	-	-	-	-	-
4960.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.



Product Service

Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2012
Amp	HP	8449B	3008A02495	May 08, 2012
Antenna	EMCO	3115	9607-4877	May 17, 2012
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2012

7.6 20 dB bandwidth

Test Method

- 1 Place the EUT on the table and set it in the transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Mark the peak frequency and –20dB (upper and lower) frequency.

Limit

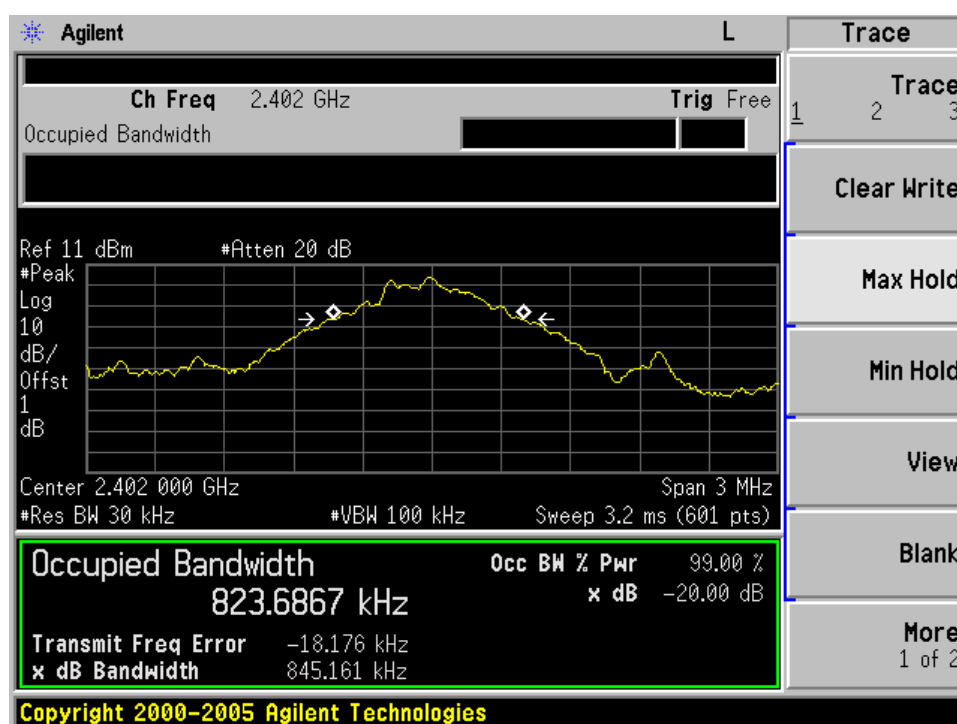
Limit [kHz]

N/A

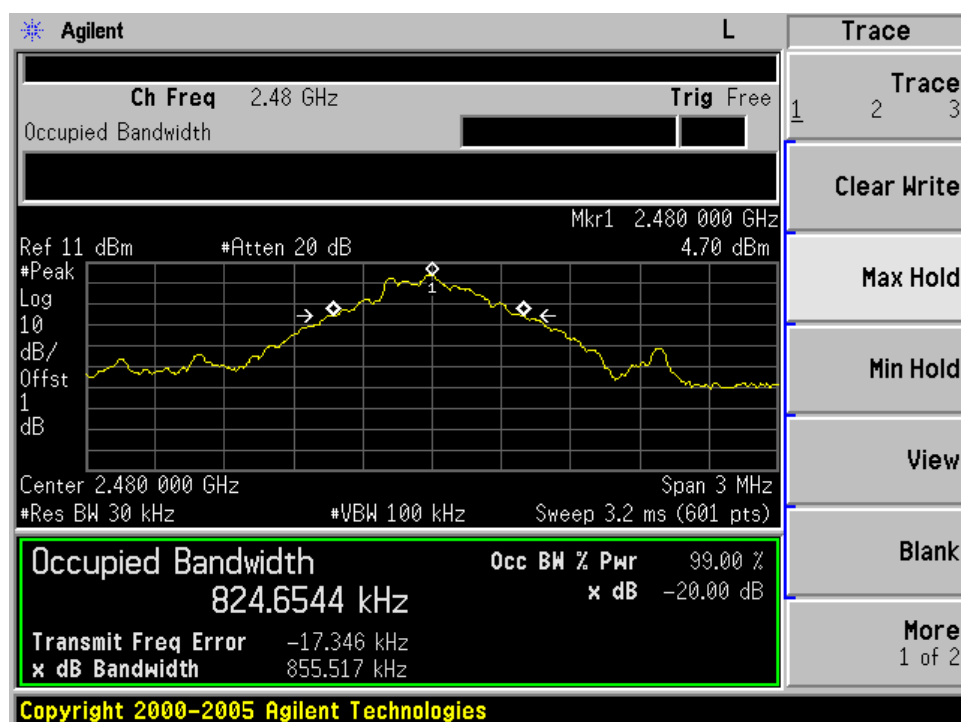
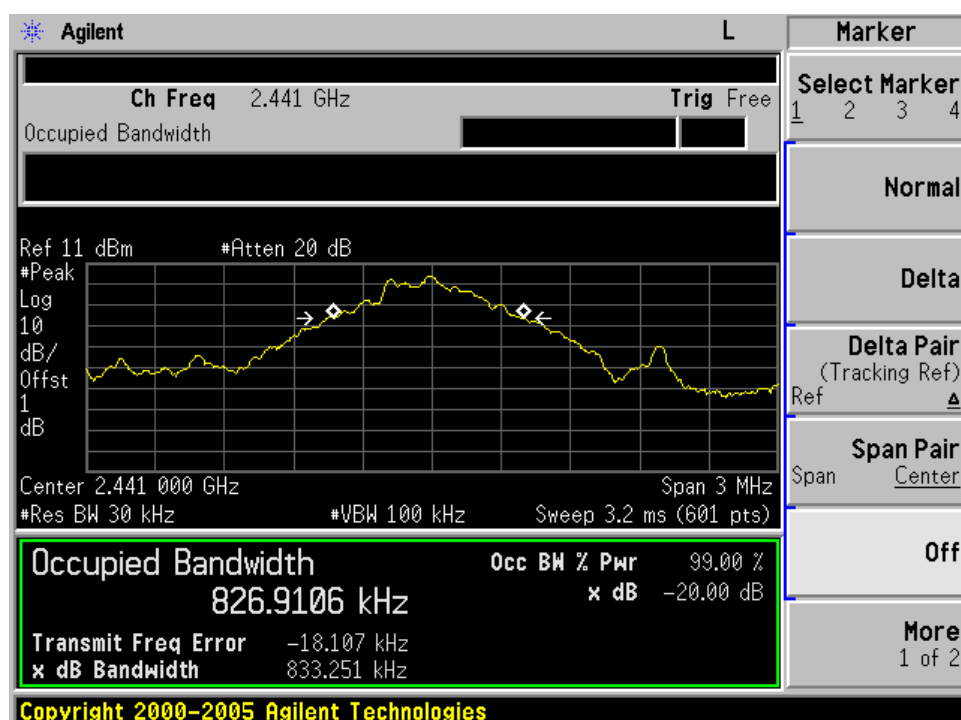
20 dB bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	845.161	Pass
2441	833.251	Pass
2480	855.517	Pass



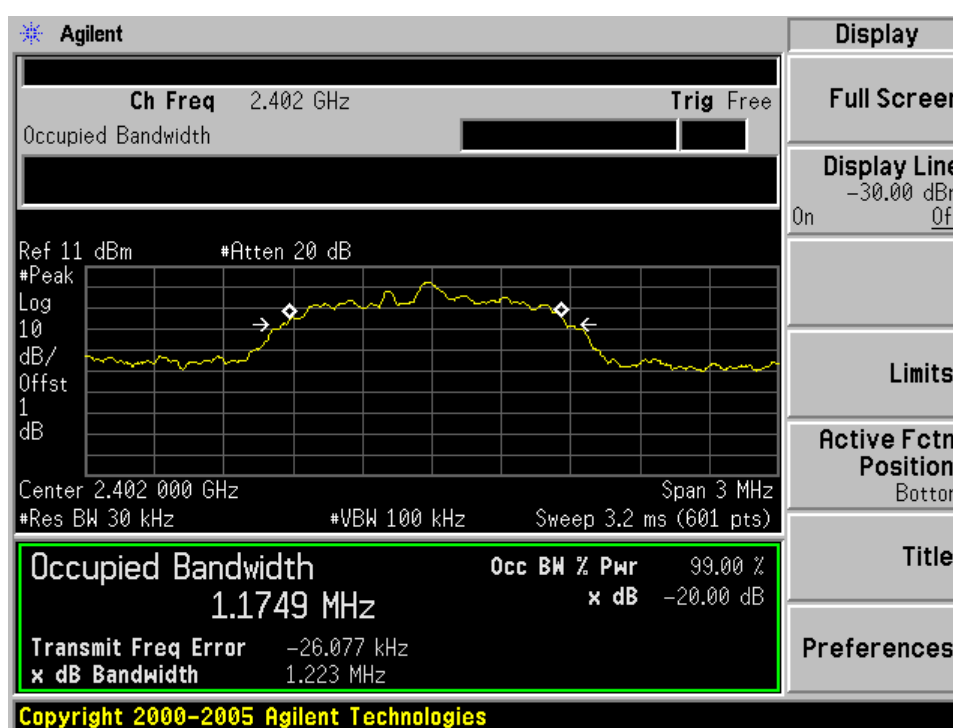
20 dB bandwidth



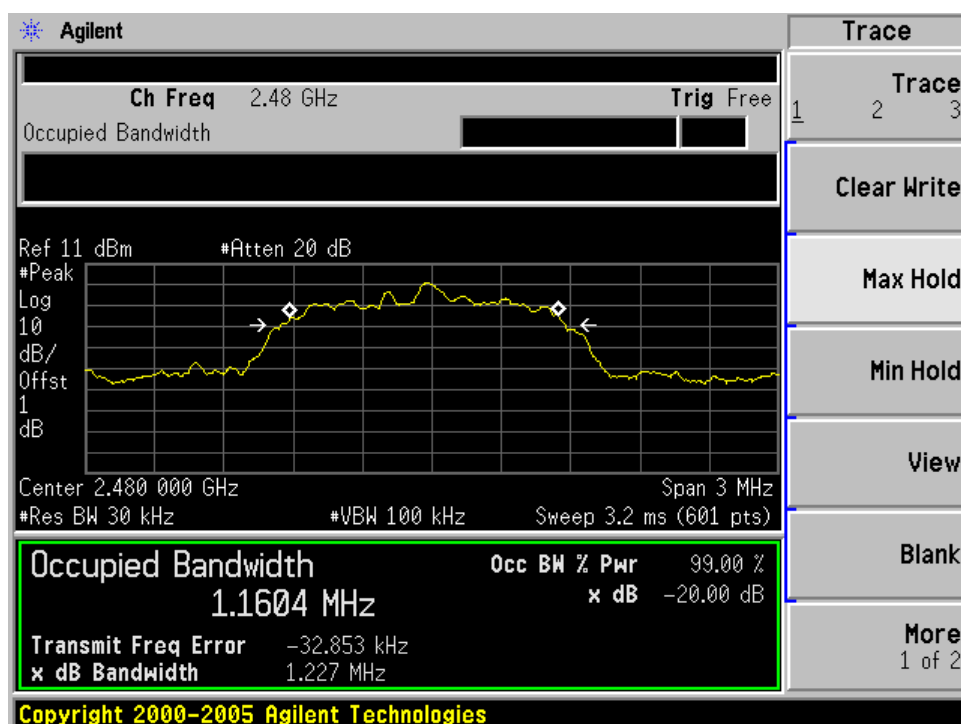
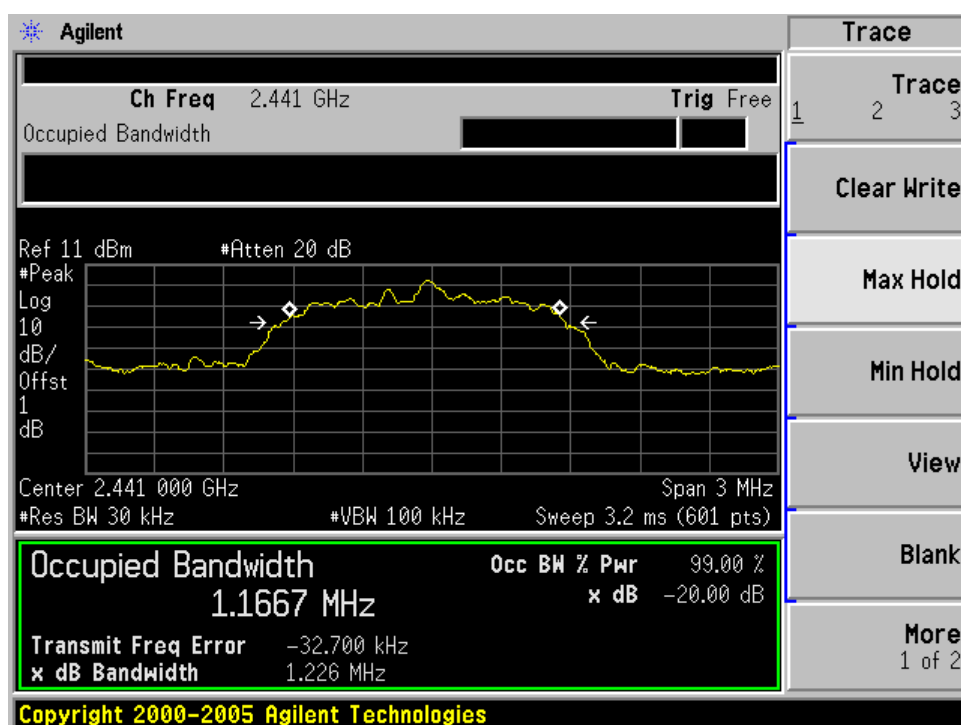
20 dB bandwidth

Bluetooth Mode $\pi/4$ -DQPSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	1223	Pass
2441	1226	Pass
2480	1227	Pass



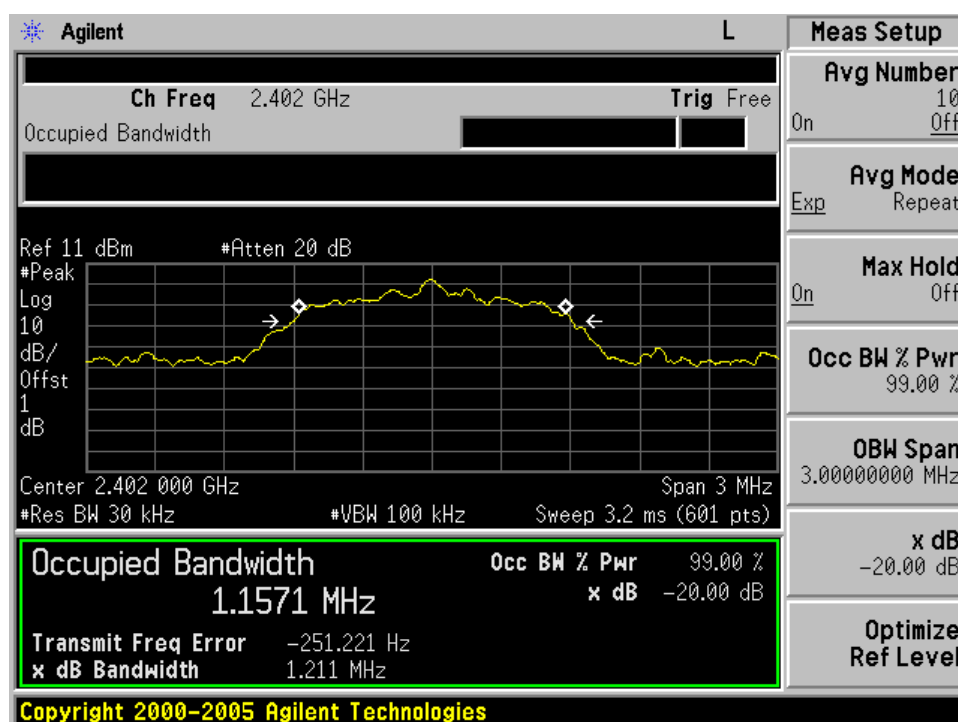
20 dB bandwidth



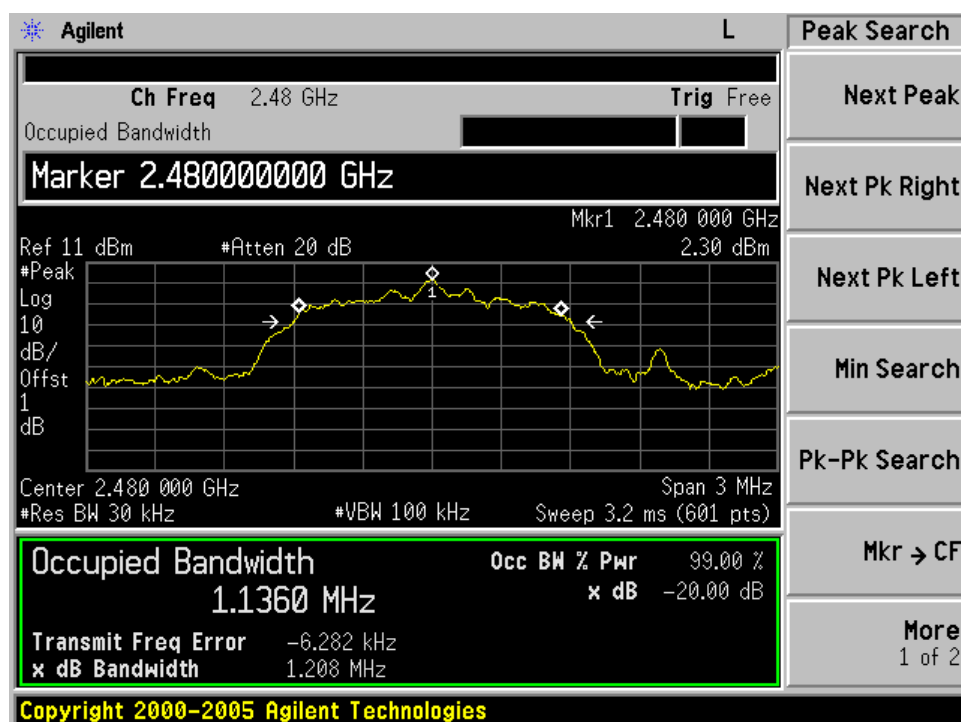
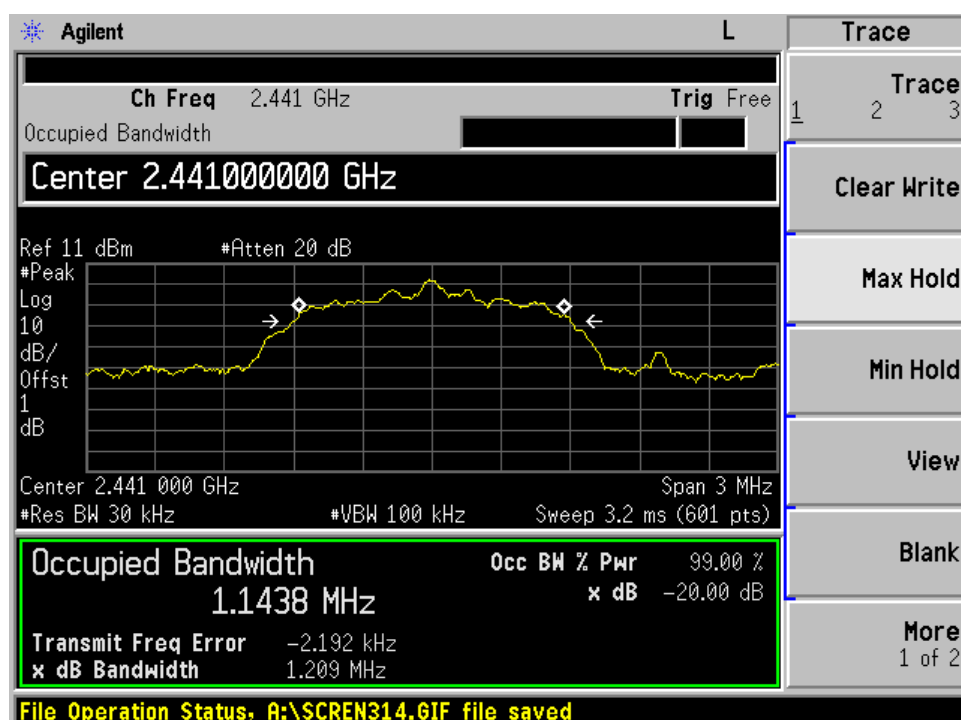
20 dB bandwidth

Bluetooth Mode 8-DPSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	1211	Pass
2441	1209	Pass
2480	1208	Pass



20 dB bandwidth



Test Equipment

20 dB bandwidth Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2012

7.7 Carrier Frequency Separation

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 30KHz; VBW: 100KHz; SPAN:5MHz
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
$\geq 25\text{KHz}$ or $2/3$ of the 20 dB bandwidth which is greater

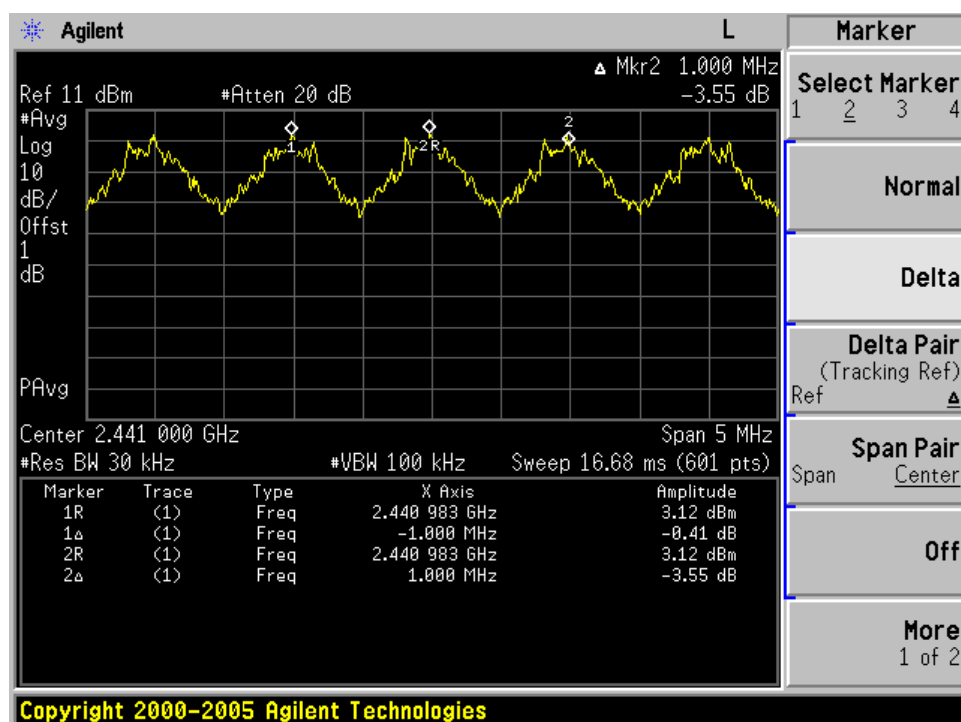
GFSK Modulation Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	563.4407
2441	555.5007
2480	570.3447

Carrier Frequency Separation

GFSK Modulation test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass





Product Service

Test Equipment

Carrier Frequency Separation Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2012

7.8 Number of hopping frequencies

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 30KHz; VBW: 100KHz
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
3. Repeat above procedures until all frequencies measured were complete.

Limit

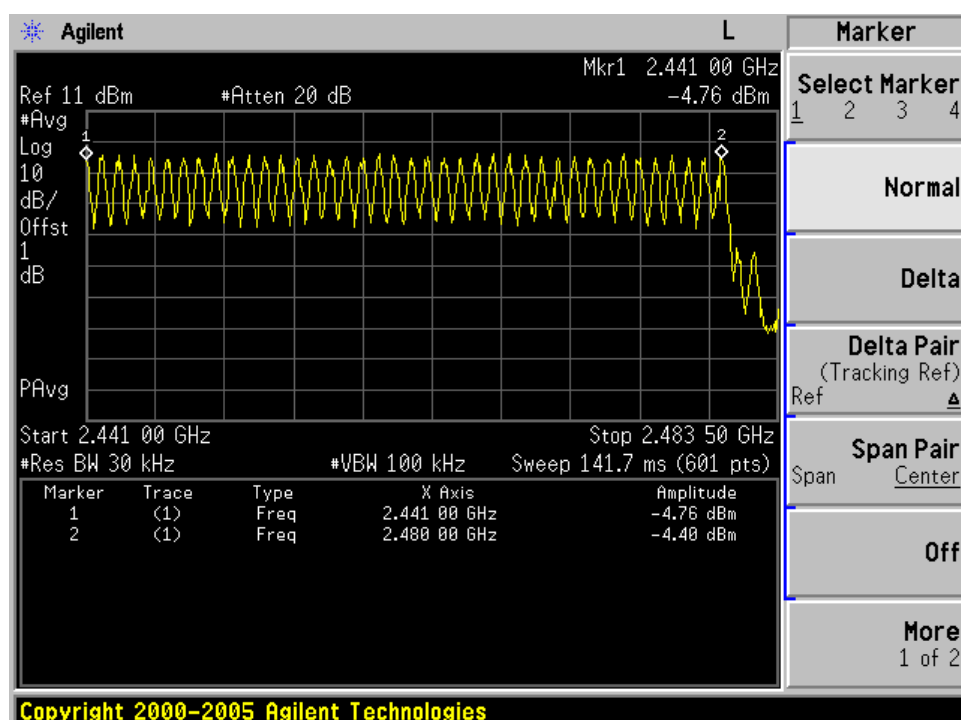
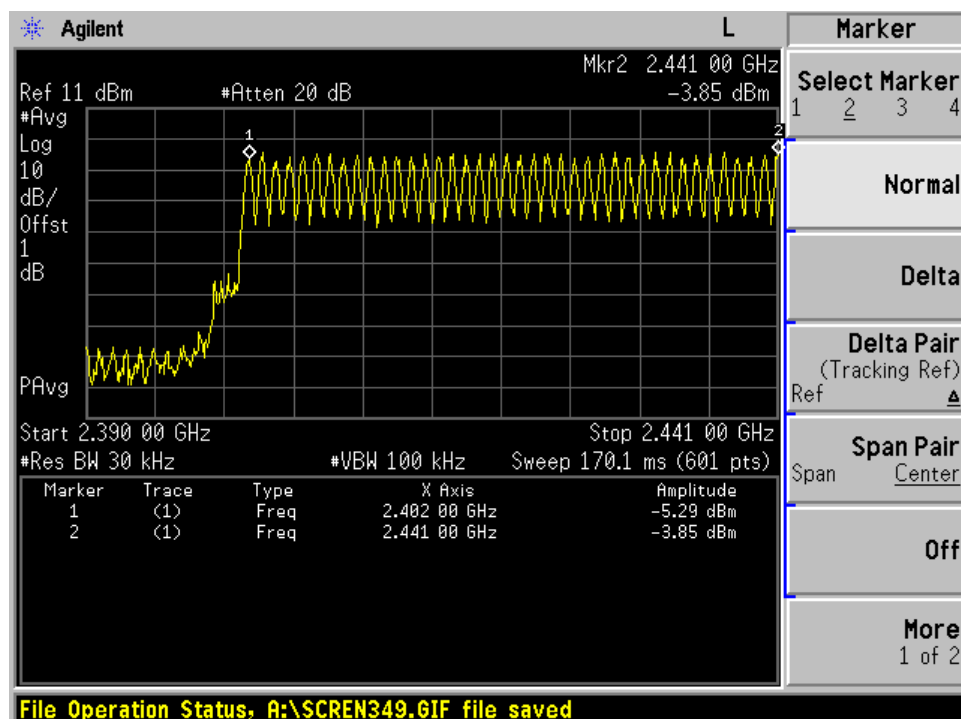
Limit
number

≥ 15

Number of hopping frequencies

Test result:

Number of hopping frequencies	Result
79	Pass



Test Equipment

Number of hopping frequencies Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2012

7.9 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
3. Measure the Dwell Time by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Dwell Time

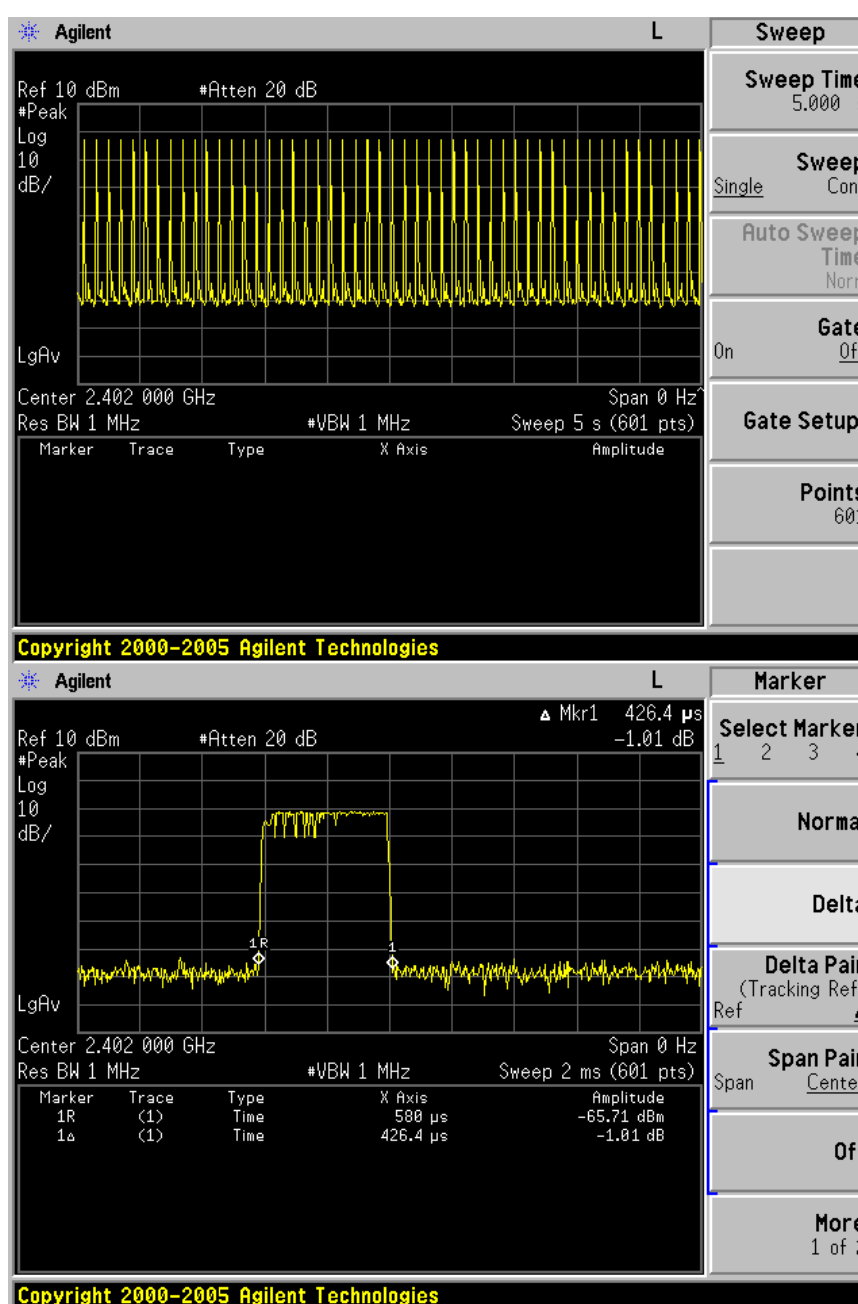
Dwell time

The maximum dwell time shall be 0,4 s.

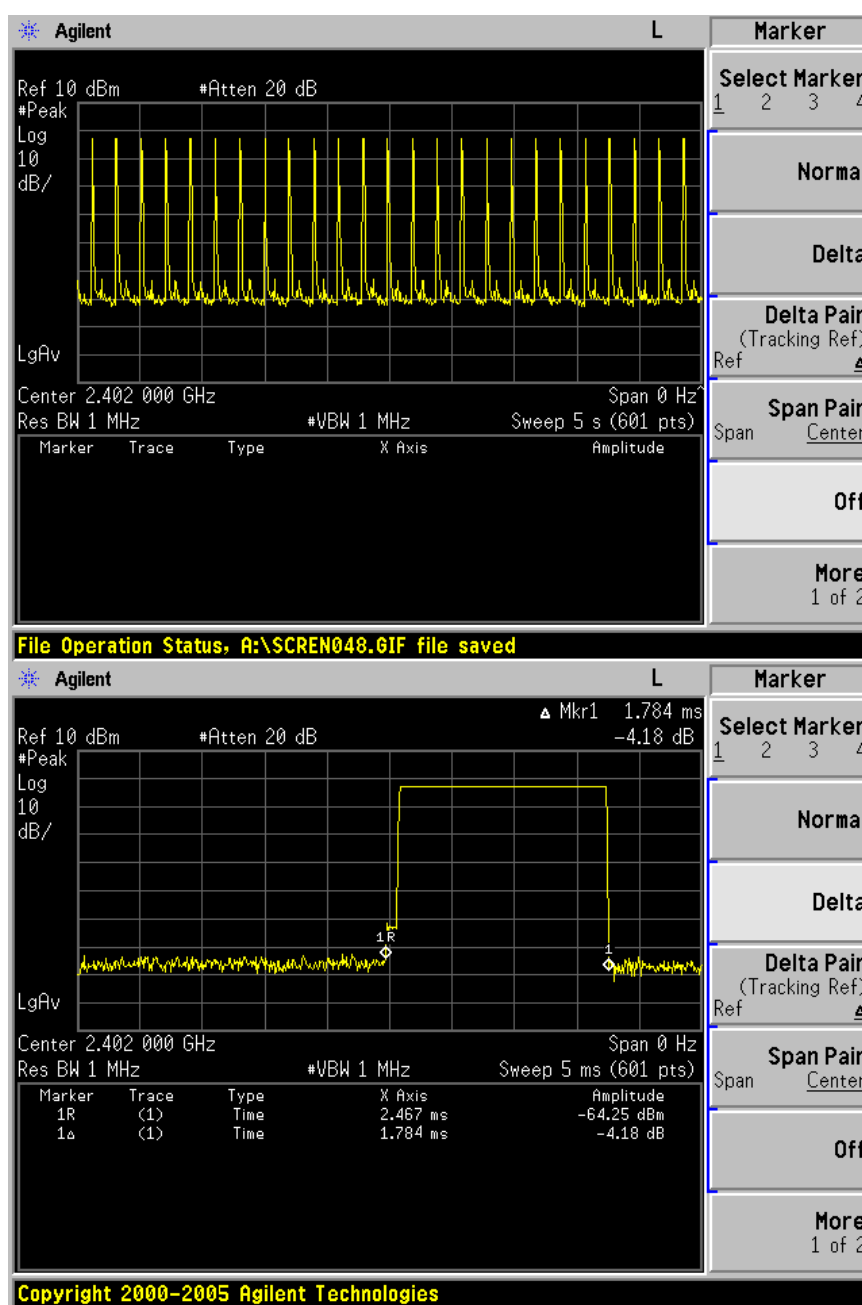
Bluetooth Mode GFSK Modulation:

Test Result

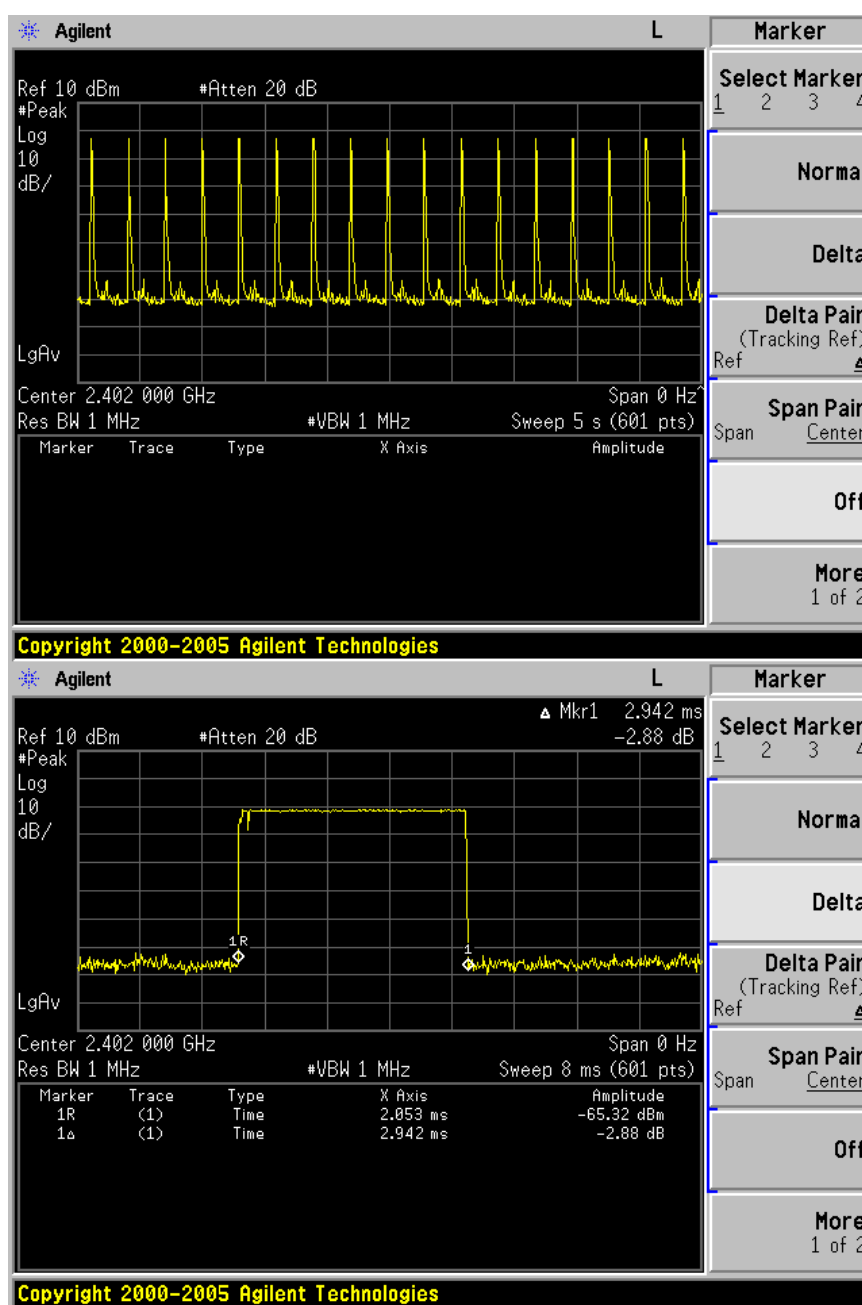
Mode	Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	426.4	137.44	< 400	Pass
DH3	1784	281.87	< 400	Pass
DH5	2942	316.62	< 400	Pass



DH1



DH3



DH5

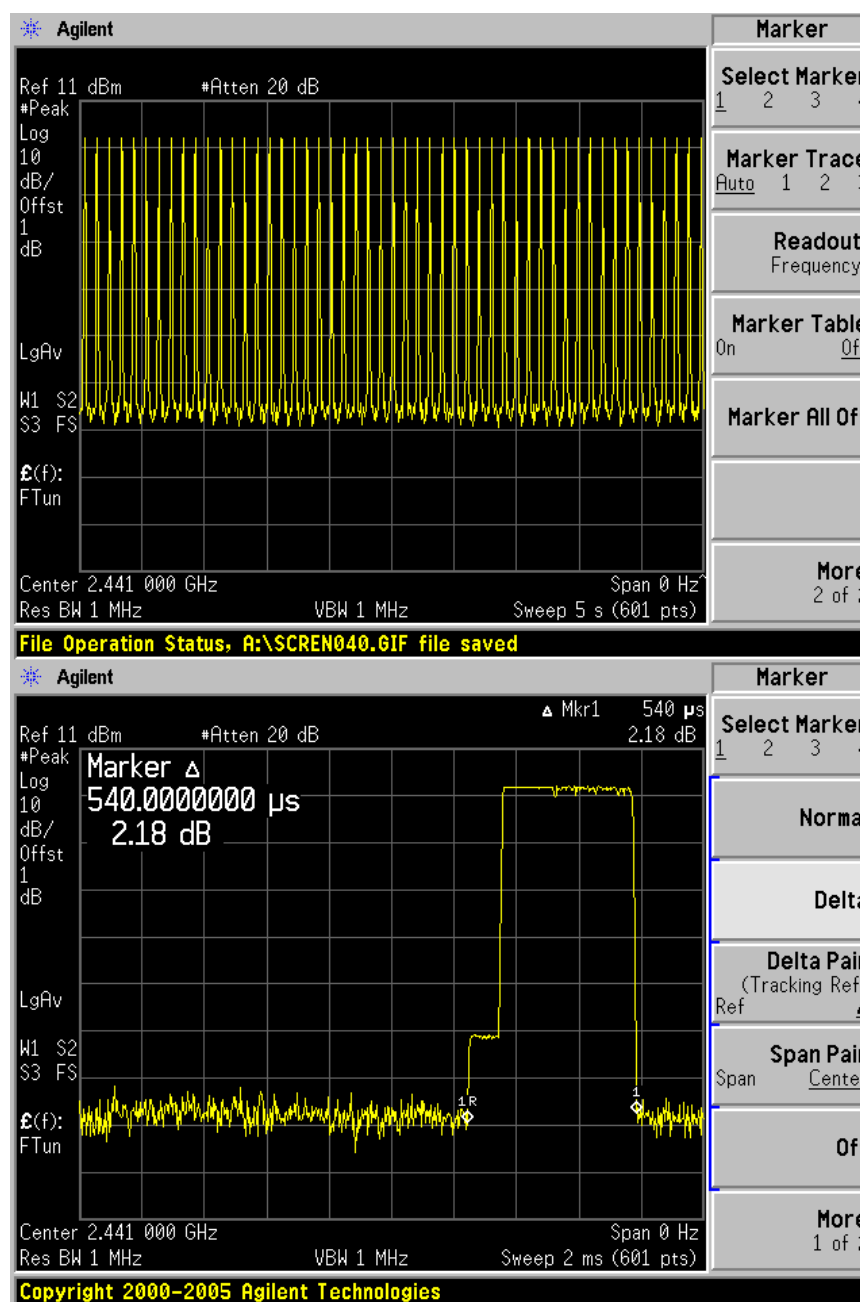
Note:

A period time=79x0.4(s)=31.6(s)

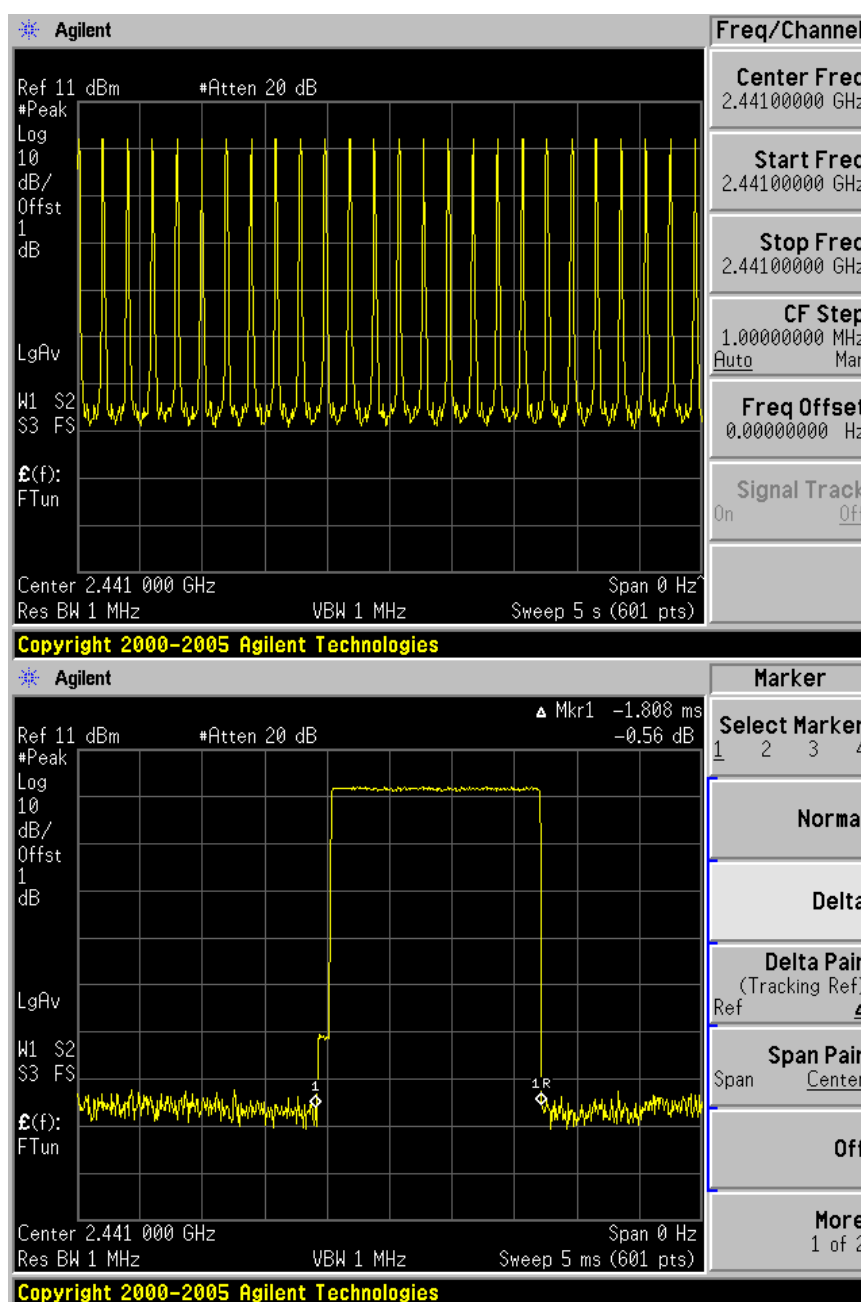
DH1	time slot= 51(times)/5(s) *426.4 (μs) *31.6(s)= 137.44 (ms)
DH3	time slot= 25(times)/5(s) *1784 (μs) *31.6(s)= 281.87 (ms)
DH5	time slot= 17(times)/5(s) *2942 (μs) *31.6(s)= 316.09 (ms)

Bluetooth Mode $\pi/4$ -DQPSK Modulation:

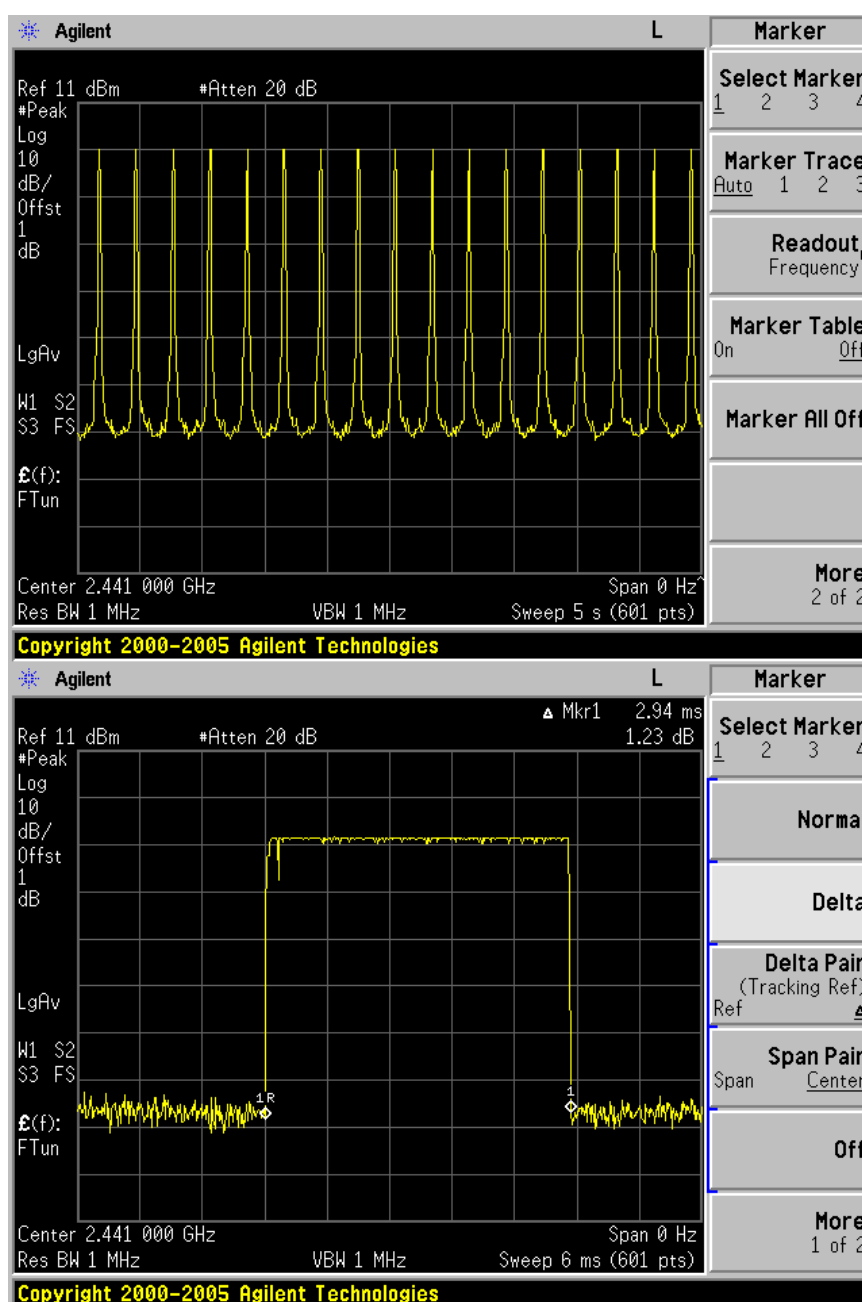
Mode	Reading (μ s)	Test Result (ms)	Limit (ms)	Result
DH1	540	174.05	< 400	Pass
DH3	1808	297.09	< 400	Pass
DH5	2940	315.87	< 400	Pass



DH1



DH3



DH5

Note:

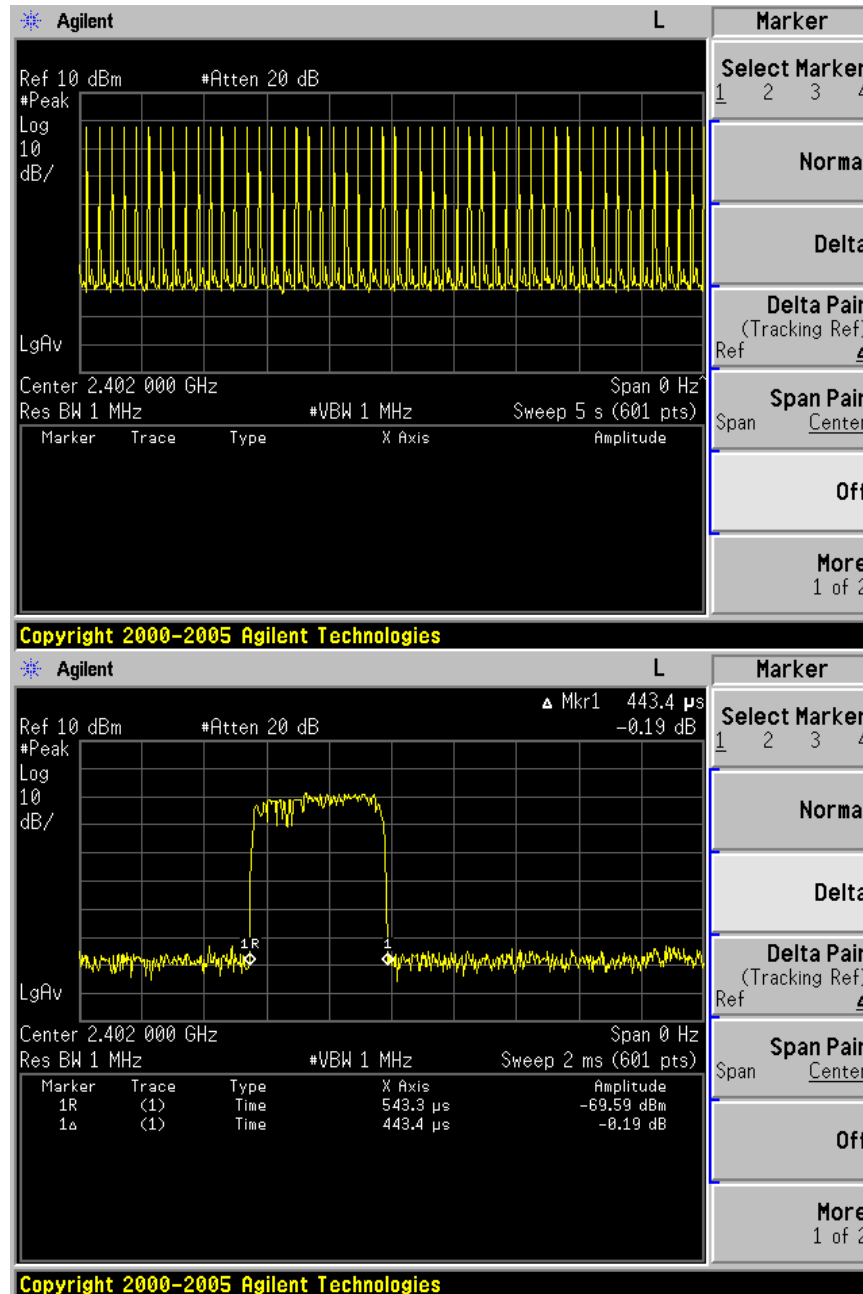
A period time=79x0.4(s)=31.6(s)

DH1 time slot= 51(times)/5(s) *540 (μs) *31.6(s)= 174.05(ms)
DH3 time slot= 26(times)/5(s) *1808 (μs) *31.6(s)= 297.09(ms)
DH5 time slot= 17(times)/5(s) *2940 (μs) *31.6(s)=315.87 (ms)

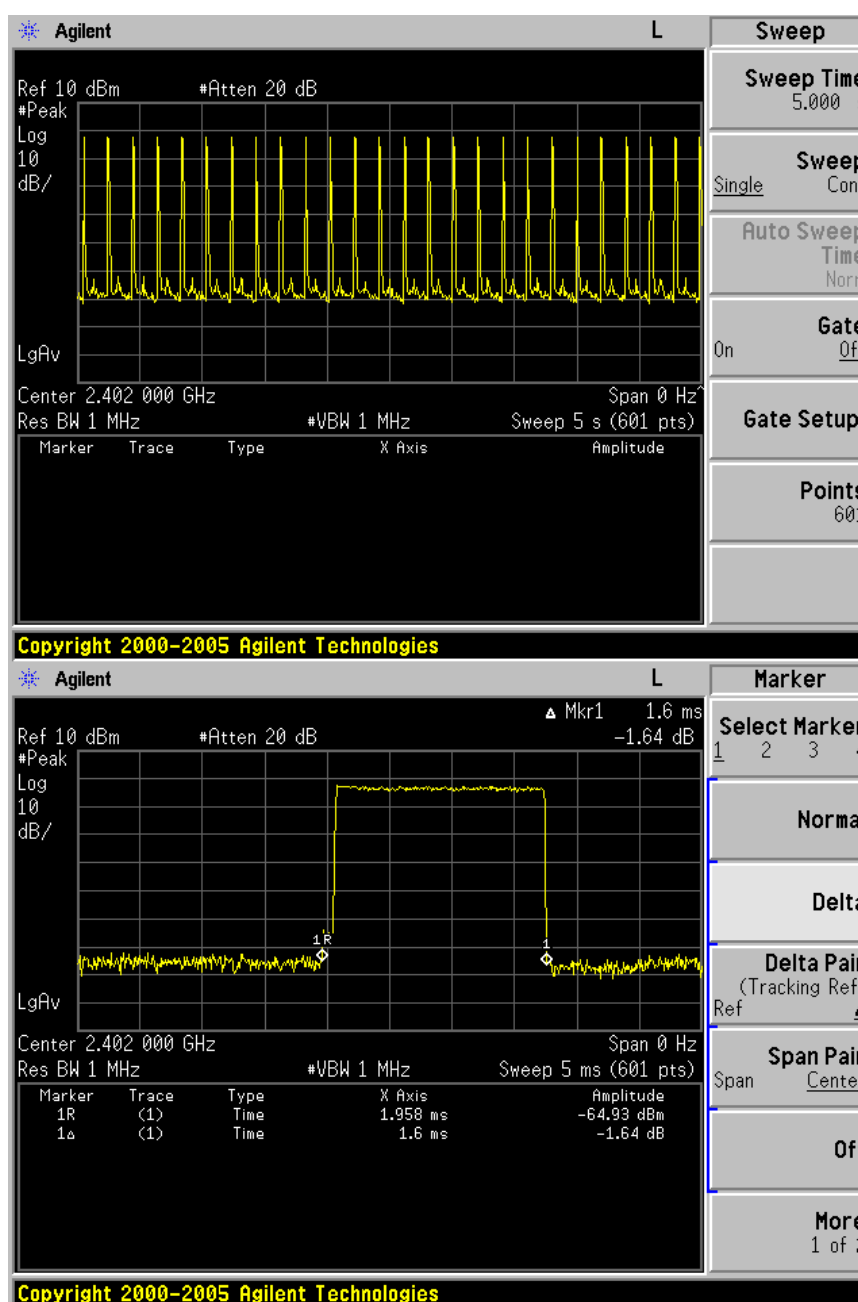
Bluetooth Mode 8-DPSK Modulation:

Test Result

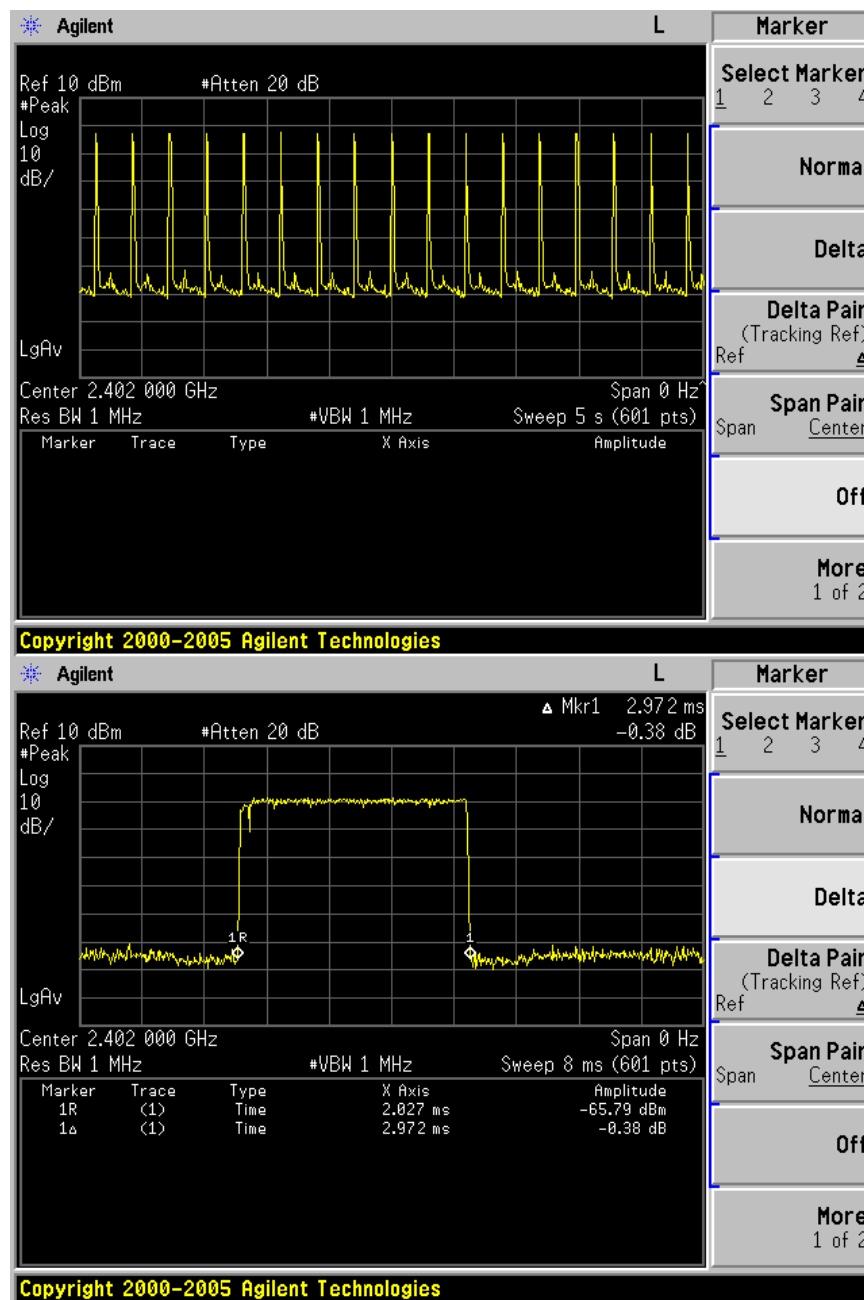
Mode	Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	443.4	142.92	< 400	Pass
DH3	1600	262.91	< 400	Pass
DH5	2972	319.31	< 400	Pass



DH1



DH3



DH5

Note:

A period time=79x0.4(s)=31.6(s)

DH1	time slot= 51(times)/5(s) *443.4 (μs) *31.6(s)= 142.92(ms)
DH3	time slot= 26(times)/5(s) *1600 (μs) *31.6(s)= 262.91(ms)
DH5	time slot= 17(times)/5(s) *2972 (μs) *31.6(s)=3 19.31 (ms)

Test Equipment

Dwell Time Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 08, 2012

8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.32dB (30MHz-25GHz)
CE	Disturbance Voltage (dB μ V)	U=2.4dB