FCC- TEST REPORT

Report Number	:	**68.920.12.012.01**	Date of Issue:	24 April 2012

Model	:	harman/kardon BT
Product Type	:	Bluetooth headset
Applicant	:	Fujikon Industrial Co., Ltd.
Address	:	16/F., Tower 1, Grand Central Plaza,
		138 Shatin Rural Committee Rd. Shatin, N.T. Hong Kong
Production Facility	:	Charter Media (Dongguan) Co., Ltd.
Address	:	Daibandi Industrial Zone, Daning District, Humen Town,
		523930 Dongguan City, Guangdong Province, P. R. China

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	69

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test site1:

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch
6th Floor, H Hall,
Century Craftwork Culture Square,
No. 4001, Fuqiang Road,
Futian District 518048,
Shenzhen,P.R.C.

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

Test site2:

Company name: Audix Technology (shenzhen) Co.,Ltd
Block Shenzhen, Science & Industry Park,
Nantou, Shenzhen,
Guangdong,
China

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

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3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Bluetooth headset
Model no.:	harman/kardon BT
Brand Name:	AKG
Options and accessories:	NIL
Rating:	3.7VDC (supplied by 3.7V/580mAh Li-ion Polymer 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)
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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

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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	☒	☐	☐	Test Site2
15.247 (b) (1) Conducted peak output power	12	☒	☐	☐	Test Site2
15.247(d) Band edge compliance of RF emissions	14	☒	☐	☐	Test Site2
15.247(d) Spurious RF conducted emissions	28	☒	☐	☐	Test Site2
15.247(d) 15.209 Spurious radiated emissions	39	☒	☐	☐	Test Site2
15.247(a)(1) 20dB bandwidth	43	☒	☐	☐	Test Site2
15.247(a)(1) Carrier frequency separation	51	☒	☐	☐	Test Site2
15.247(a)(1)(iii) Number of hopping frequencies	55	☒	☐	☐	Test Site2
15.247(a)(1)(iii) Dwell Time	58	☒	☐	☐	Test Site2

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6 General Remarks

Remarks
This submittal(s) (test report) is intended for FCC ID: TTC-BT-HARMANBT complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.
harman/kardon BT can power by two types of batteries, the detailed information of each type as below form, because the voltage of two types are the same, so all the tests were applied on harman/kardon BT was powered by 3.7V/580mAh Li-ion Polymer Battery only.

Type	Description
Type 1	3.7V/580mAh Li-ion Polymer Battery
Type 2	3.7V/430mAh Li-ion Polymer Battery

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: 26 March 2012

Testing Start Date: 30 March 2012

Testing End Date: 12 April 2012

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Reviewed by:	Prepared by:	Tested by:
Ken Li	Cookies Bu	Leo Li
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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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 dBµV	AV Limit dBµV
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.

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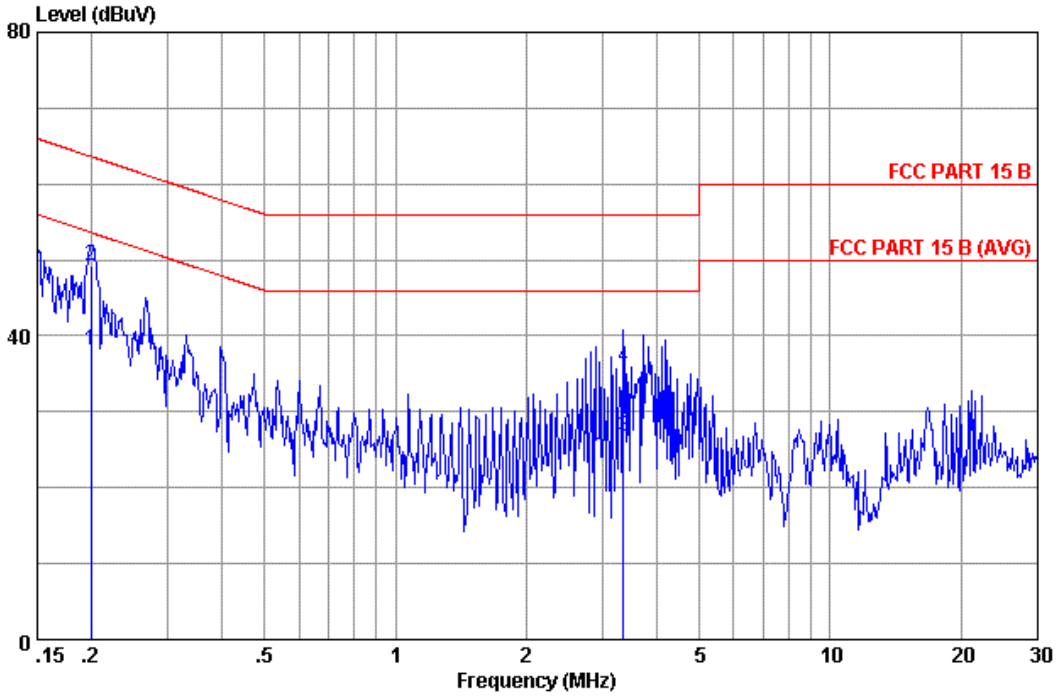
Conducted Emission



Site no :1#conduction Data No :1
Dis./Ant. :** 2011 ESH2-Z5 LINE
Limit :FCC PART 15 B
Env./Ins. :Temp:22.9' Humi:52% Engineer :Jerry
EUT :BLUETOOTH HEADSET M/N:harman/kardon BT
Power Rating :AC 120V/50Hz
Test Mode :Charging+Transmitting

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.19900	0.15	9.98	28.00	38.13	53.65	15.52	Average
2	0.19900	0.15	9.98	39.20	49.33	63.65	14.32	QP
3	3.340	0.22	9.95	16.51	26.68	46.00	19.32	Average
4	3.340	0.22	9.95	25.81	35.98	56.00	20.02	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss(Include 10dB pulse limit)
+Reading.
2.If the average limit is met when useing a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

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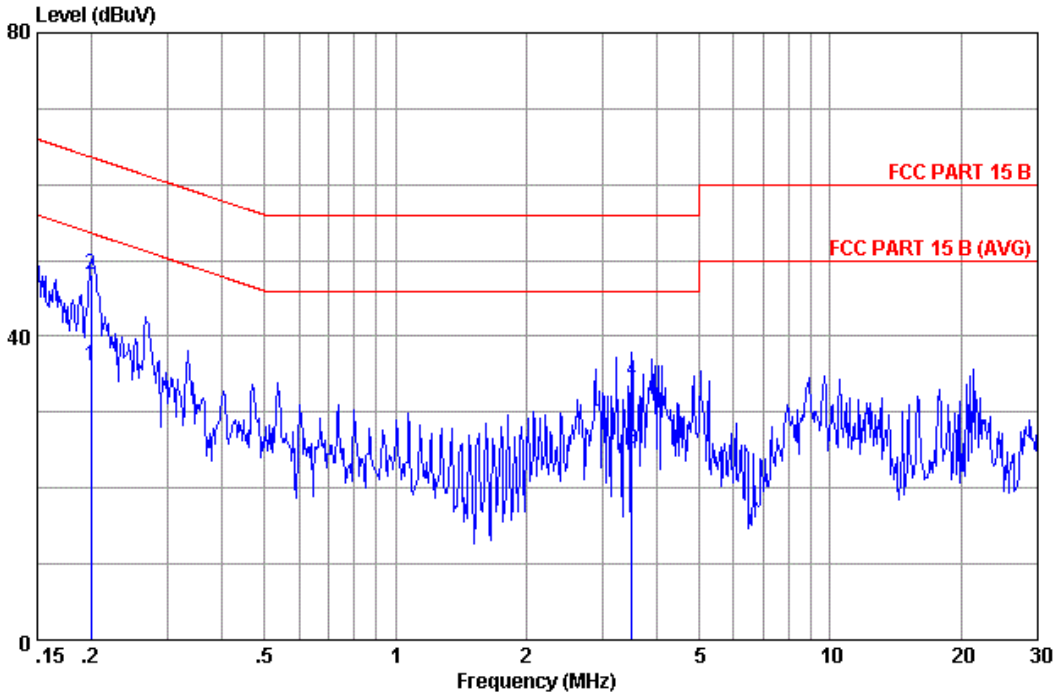
Conducted Emission



Site no :1#conduction Data No :2
Dis./Ant. :** 2011 ESH2-Z5 NEUTRAL
Limit :FCC PART 15 B
Env./Ins. :Temp:22.9' Humi:52% Engineer :Jerry
EUT :BLUETOOTH HEADSET M/N:harman/kardon BT
Power Rating :AC 120V/50Hz
Test Mode :Charging+Transmitting

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.19900	0.14	9.98	26.00	36.12	53.65	17.53	Average
2	0.19900	0.14	9.98	38.00	48.12	63.65	15.53	QP
3	3.490	0.22	9.95	15.01	25.18	46.00	20.82	Average
4	3.490	0.22	9.95	24.01	34.18	56.00	21.82	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss(Include 10dB pulse limit)
+Reading.
2.If the average limit is met when useing a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

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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

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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	4.50	Pass
Middle channel 2441MHz	4.13	Pass
High channel 2480MHz	3.28	Pass

Bluetooth Mode π/4-DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.69	Pass
Middle channel 2441MHz	2.95	Pass
High channel 2480MHz	2.82	Pass

Bluetooth Mode 8-DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.96	Pass
Middle channel 2441MHz	3.35	Pass
High channel 2480MHz	2.29	Pass

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Test Equipment

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

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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 in 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

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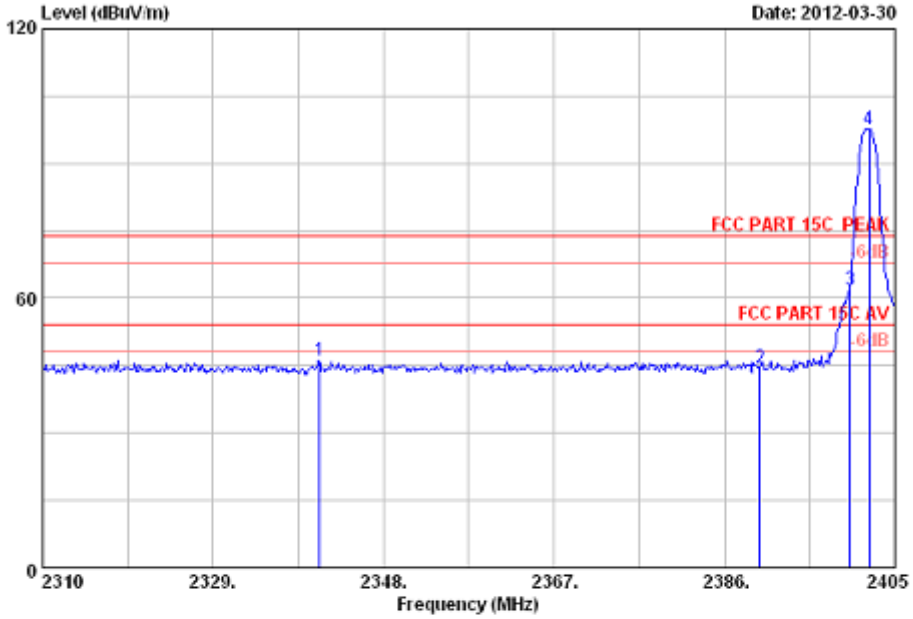
Band edge compliance of RF emissions

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
Dis. / Ant. : 3m 2011 3115 4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54%
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode GFSK 2402MHz
M/N : harman/kardon BT

Data no. : 9
Ant. pol. : VERTICAL
Engineer : Leo-Li

	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	2340.875	27.88	5.92	34.44	46.93	46.29	74.00	27.71	Peak
2	2390.000	27.96	6.01	34.44	44.85	44.38	74.00	29.62	Peak
3	2400.000	27.96	6.01	34.44	62.22	61.75	74.00	12.25	Peak
4	2402.150	27.96	6.01	34.44	98.16	97.69	74.00	-23.69	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.

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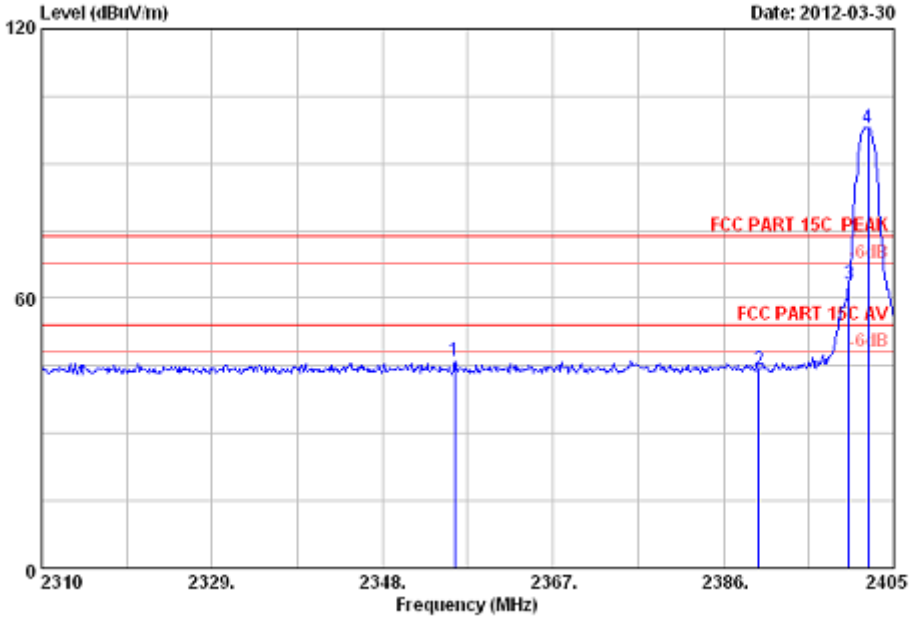
Band edge compliance of RF emissions

Lower edge peak Plot:
Horizontal:



Site no. : 3m Chamber
Dis. / Ant. : 3m 2011 3115 4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54%
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode GFSK 2402MHz
M/N : harman/kardon BT

Data no. : 10
Ant. pol. : HORIZONTAL
Engineer : Leo-Li

	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	2356.075	27.91	5.95	34.44	46.84	46.26	74.00	27.74	Peak
2	2390.000	27.96	6.01	34.44	44.67	44.20	74.00	29.80	Peak
3	2400.000	27.96	6.01	34.44	63.77	63.30	74.00	10.70	Peak
4	2402.150	27.96	6.01	34.44	98.53	98.06	74.00	-24.06	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.

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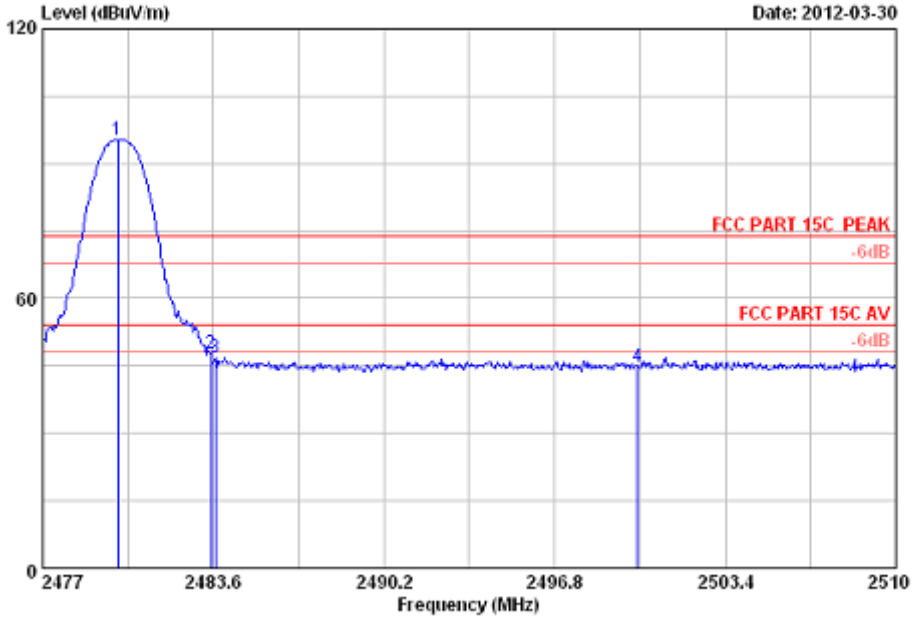
Band edge compliance of RF emissions

Upper edge peak Plot:
Vertical:



Site no. : 3m Chamber
Dis. / Ant. : 3m 2011 3115 4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54%
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode GFSK 2480MHz
M/N : harman/kardon BT

Data no. : 11
Ant. pol. : VERTICAL
Engineer : Leo-Li

	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	2479.904	28.08	6.15	34.45	95.40	95.18	74.00	-21.18	Peak
2	2483.500	28.08	6.15	34.45	48.02	47.80	74.00	26.20	Peak
3	2483.666	28.08	6.15	34.45	47.11	46.89	74.00	27.11	Peak
4	2500.000	28.10	6.18	34.45	44.92	44.75	74.00	29.25	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

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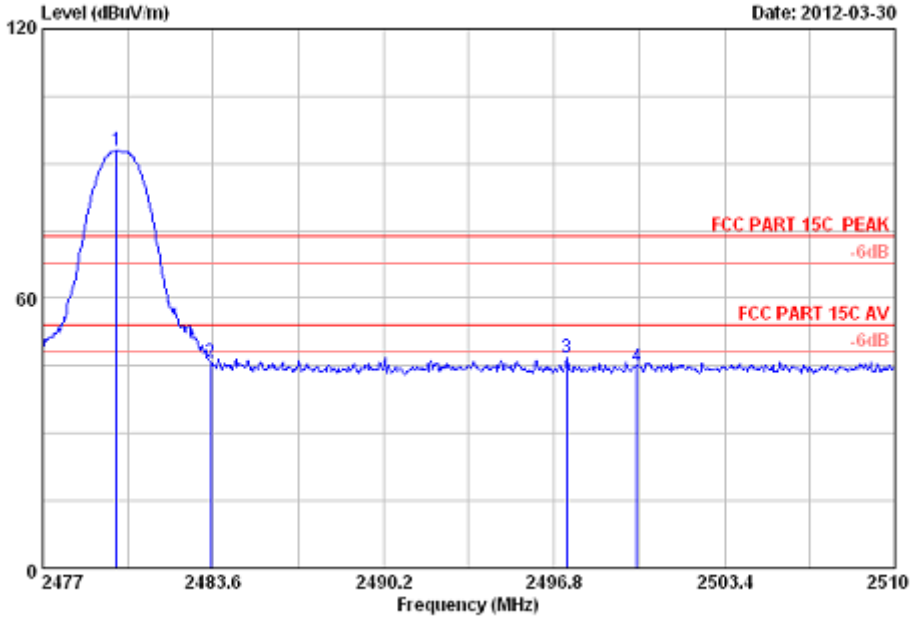
Band edge compliance of RF emissions

Upper edge peak Plot:
Horizontal:



Site no.	: 3m Chamber		Data no.	: 12
Dis. / Ant.	: 3m 2011 3115 4580		Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK			
Env. / Ins.	: 23*C/54%		Engineer	: Leo-Li
EUT	: Bluetooth headset			
Power supply	: DC 3.7V			
Test mode	: Tx Mode GFSK 2480MHz			
M/N	: harman/kardon BT			

	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	2479.871	28.08	6.15	34.45	93.02	92.80	74.00	-18.80	Peak
2	2483.500	28.08	6.15	34.45	46.14	45.92	74.00	28.08	Peak
3	2497.295	28.10	6.18	34.45	47.05	46.88	74.00	27.12	Peak
4	2500.000	28.10	6.18	34.45	45.03	44.86	74.00	29.14	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.

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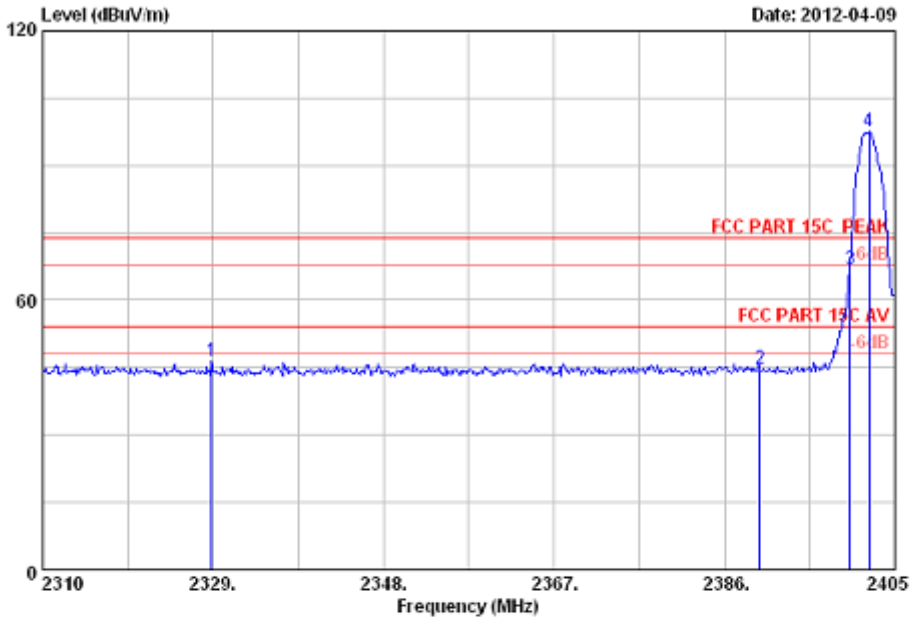
Band edge compliance of RF emissions

Bluetooth Mode π/4-DQPSK Modulation Test Result:

Lower edge peak Plot:
Vertical:



Site no. : 3m Chamber Data no. : 73
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54% Engineer : Leo-Li
EUT : Bluetooth Headset
Power supply : DC 3.7V
Test mode : Tx Mode Pi/4-DQPSK 2402MHz
harman/kardon BT

	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	2328.810	27.86	5.89	34.43	47.24	46.56	74.00	27.44	Peak
2	2390.000	27.96	6.01	34.44	45.22	44.75	74.00	29.25	Peak
3	2400.000	27.96	6.01	34.44	67.26	66.79	74.00	7.21	Peak
4	2402.150	27.96	6.01	34.44	98.04	97.57	74.00	-23.57	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.

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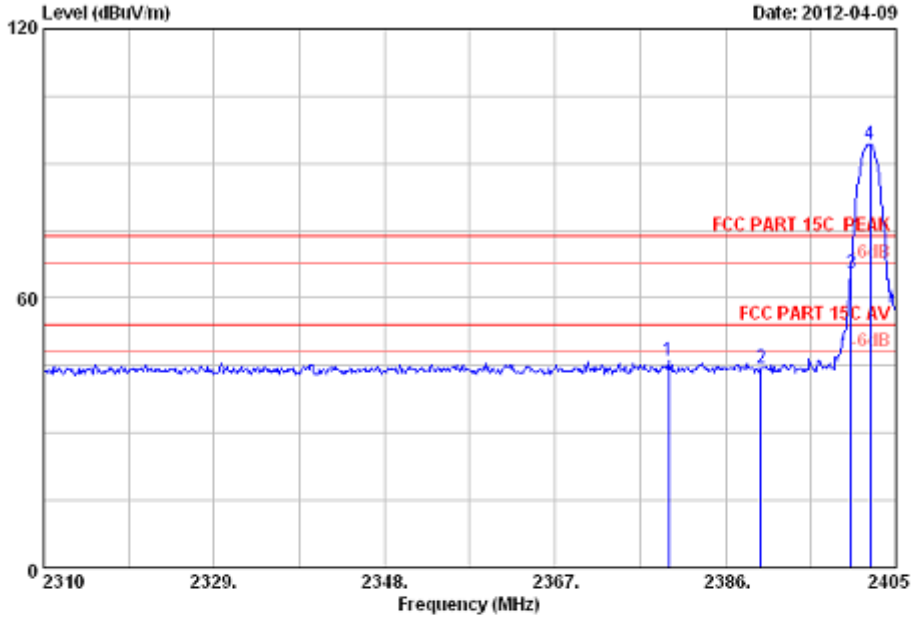
Band edge compliance of RF emissions

Bluetooth Mode π/4-DQPSK Modulation Test Result:

Lower edge peak Plot:
Horizontal:

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Site no.      : 3m Chamber              Data no.   : 72
Dis. / Ant.   : 3m   2011 3115 4580     Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C  PEAK
Env. / Ins.   : 23*C/54%                Engineer   : Leo-Li
EUT           : Bluetooth Headset
Power supply  : DC 3.7V
Test mode     : Tx Mode   Pi/4-DQPSK 2402MHz
                harman/kardon BT
```

	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	2379.635	27.93	5.98	34.44	46.61	46.08	74.00	27.92	Peak
2	2390.000	27.96	6.01	34.44	44.89	44.42	74.00	29.58	Peak
3	2400.000	27.96	6.01	34.44	66.12	65.65	74.00	8.35	Peak
4	2402.150	27.96	6.01	34.44	94.82	94.35	74.00	-20.35	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.

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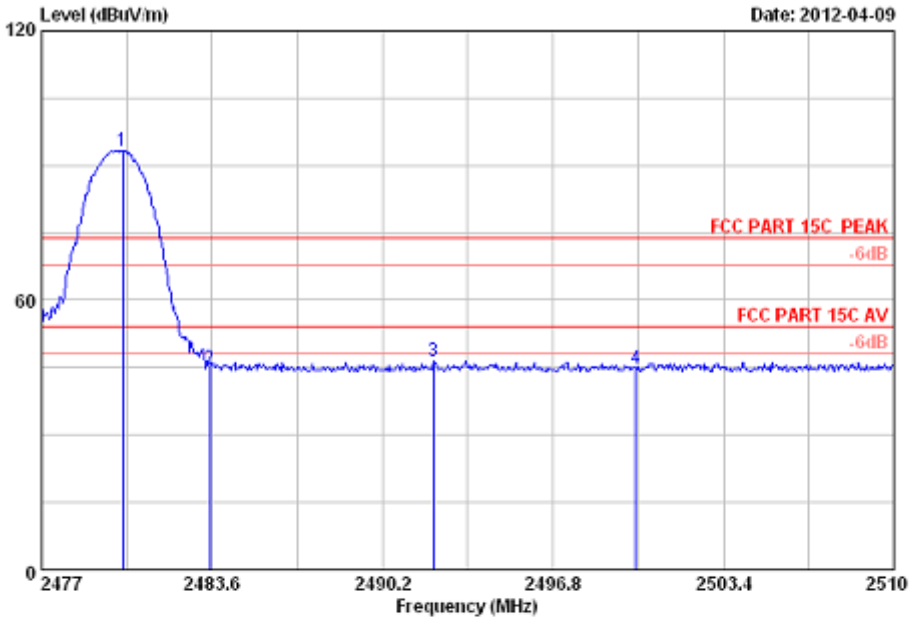
Band edge compliance of RF emissions

Bluetooth Mode π/4-DQPSK Modulation Test Result:

Upper edge peak Plot:
Vertical:




```
Site no.      : 3m Chamber              Data no.   : 74
Dis. / Ant.   : 3m   2011 3115 4580     Ant. pol.  : VERTICAL
Limit         : FCC PART 15C  PEAK
Env. / Ins.   : 23*C/54%                Engineer   : Leo-Li
EUT           : Bluetooth Headset
Power supply  : DC 3.7V
Test mode     : Tx Mode   Pi/4-DQPSK 2480MHz
                harman/kardon BT
```

	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	2480.135	28.08	6.15	34.45	93.64	93.42	74.00	-19.42	Peak
2	2483.500	28.08	6.15	34.45	44.99	44.77	74.00	29.23	Peak
3	2492.180	28.10	6.15	34.45	46.72	46.52	74.00	27.48	Peak
4	2500.000	28.10	6.18	34.45	44.98	44.81	74.00	29.19	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.

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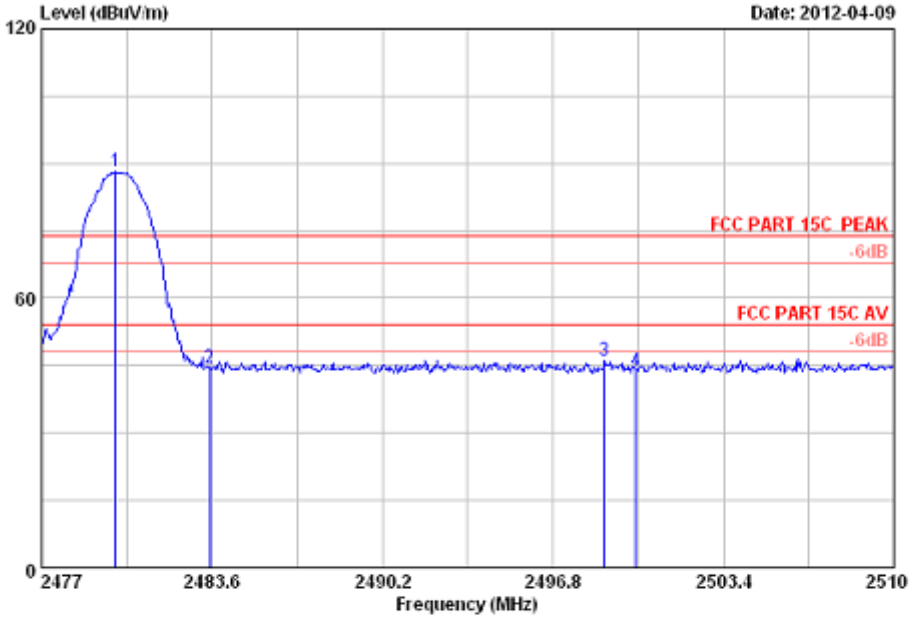
Band edge compliance of RF emissions

Bluetooth Mode π/4-DQPSK Modulation Test Result:

Upper edge peak Plot:
Horizontal:




```
Site no.      : 3m Chamber                Data no.  : 75
Dis. / Ant.   : 3m   2011 3115 4580       Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C  PEAK
Env. / Ins.   : 23*C/54%                  Engineer  : Leo-Li
EUT           : Bluetooth Headset
Power supply  : DC 3.7V
Test mode     : Tx Mode   Pi/4-DQPSK 2480MHz
                harman/kardon BT
```

	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	2479.871	28.08	6.15	34.45	88.36	88.14	74.00	-14.14	Peak
2	2483.500	28.08	6.15	34.45	44.62	44.40	74.00	29.60	Peak
3	2498.780	28.10	6.18	34.45	46.37	46.20	74.00	27.80	Peak
4	2500.000	28.10	6.18	34.45	43.95	43.78	74.00	30.22	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.

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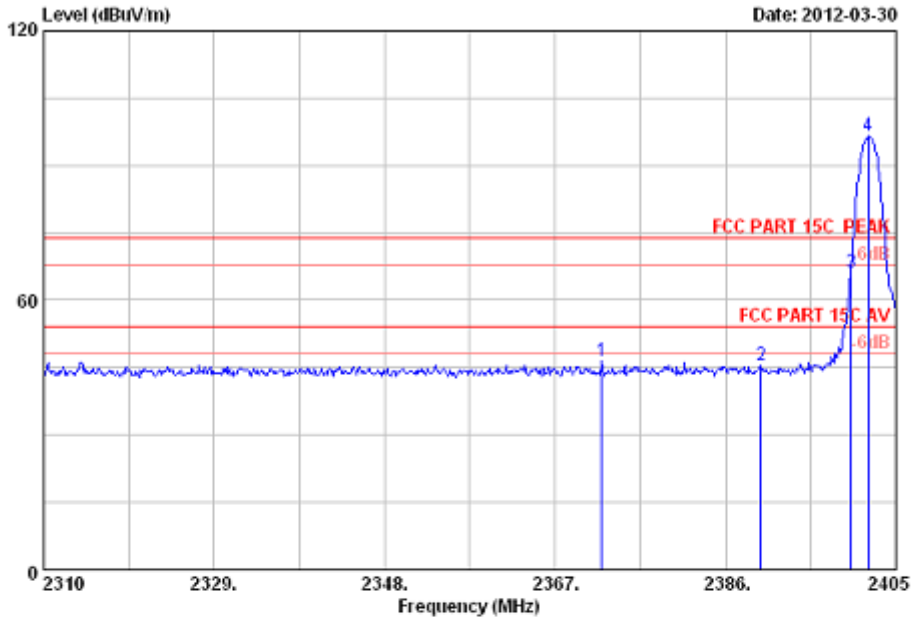
Band edge compliance of RF emissions

Bluetooth Mode 8-DPSK Modulation Test Result:

Lower edge peak Plot:
Vertical:



Site no. : 3m Chamber Data no. : 21
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54% Engineer : Leo-Li
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode 8-DPSK 2402MHz
M/N : harman/kardon BT

	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	2372.225	27.93	5.98	34.44	46.88	46.35	74.00	27.65	Peak
2	2390.000	27.96	6.01	34.44	45.78	45.31	74.00	28.69	Peak
3	2400.000	27.96	6.01	34.44	66.82	66.35	74.00	7.65	Peak
4	2401.960	27.96	6.01	34.44	97.07	96.60	74.00	-22.60	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.

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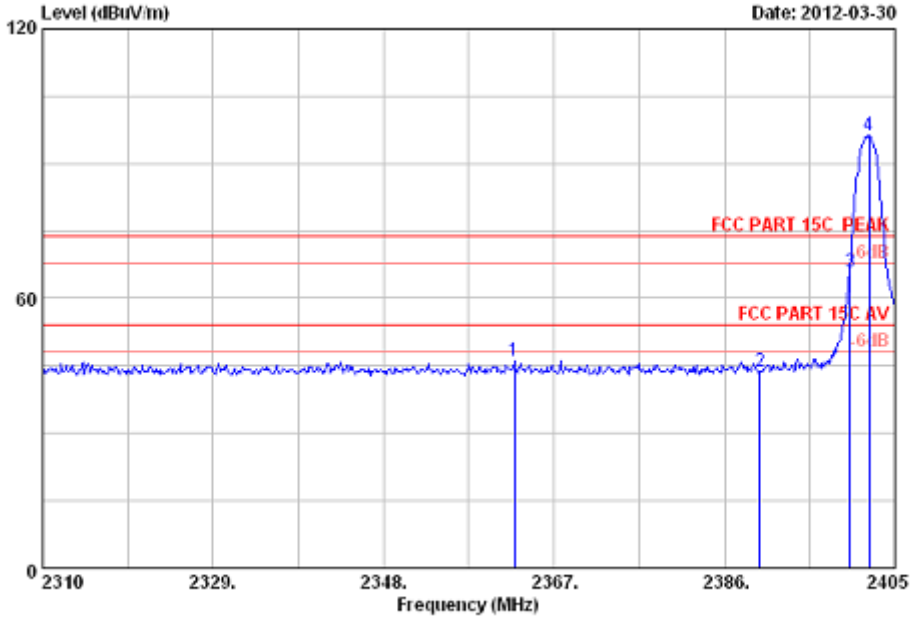
Band edge compliance of RF emissions

Lower edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 22
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54% Engineer : Leo-Li
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode 8-DPSK 2402MHz
M/N : harman/kardon BT

	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	2362.535	27.91	5.95	34.44	46.78	46.20	74.00	27.80	Peak
2	2390.000	27.96	6.01	34.44	44.40	43.93	74.00	30.07	Peak
3	2400.000	27.96	6.01	34.44	66.40	65.93	74.00	8.07	Peak
4	2402.150	27.96	6.01	34.44	96.77	96.30	74.00	-22.30	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.

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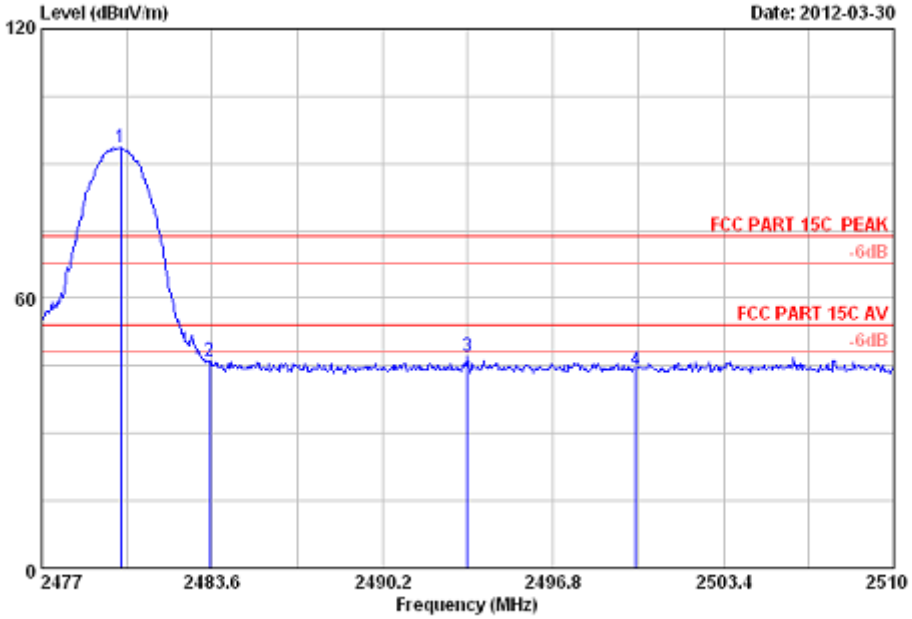
Band edge compliance of RF emissions

Upper edge peak Plot:
Vertical:




```
Site no.      : 3m Chamber              Data no.   : 32
Dis. / Ant.   : 3m   2011 3115 4580     Ant. pol.  : VERTICAL
Limit         : FCC PART 15C  PEAK
Env. / Ins.   : 23*C/54%                Engineer   : Leo-Li
EUT           : Bluetooth headset
Power supply  : DC 3.7V
Test mode     : Tx Mode   8-DPSK  2480MHz
M/N           : harman/kardon BT
```

	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	2480.069	28.08	6.15	34.45	93.76	93.54	74.00	-19.54	Peak
2	2483.500	28.08	6.15	34.45	46.44	46.22	74.00	27.78	Peak
3	2493.500	28.10	6.18	34.45	47.41	47.24	74.00	26.76	Peak
4	2500.000	28.10	6.18	34.45	44.40	44.23	74.00	29.77	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.

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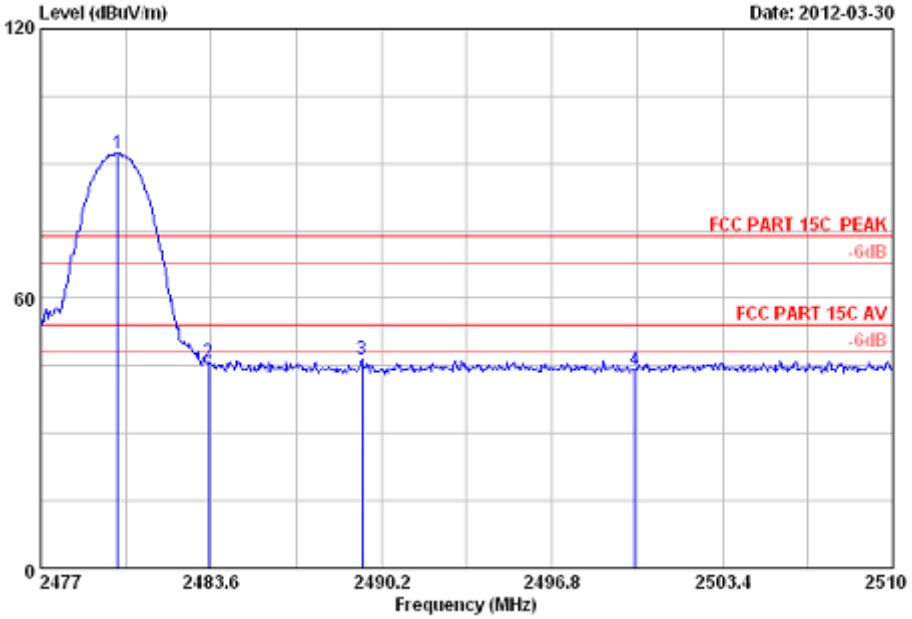
Band edge compliance of RF emissions

Upper edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 31
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23*C/54% Engineer : Leo-Li
EUT : Bluetooth headset
Power supply : DC 3.7V
Test mode : Tx Mode 8-DPSK 2480MHz
M/N : harman/kardon BT

	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	2479.970	28.08	6.15	34.45	92.43	92.21	74.00	-18.21	Peak
2	2483.500	28.08	6.15	34.45	45.97	45.75	74.00	28.25	Peak
3	2489.441	28.10	6.15	34.45	46.60	46.40	74.00	27.60	Peak
4	2500.000	28.10	6.18	34.45	44.39	44.22	74.00	29.78	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.

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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, 2013
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

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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

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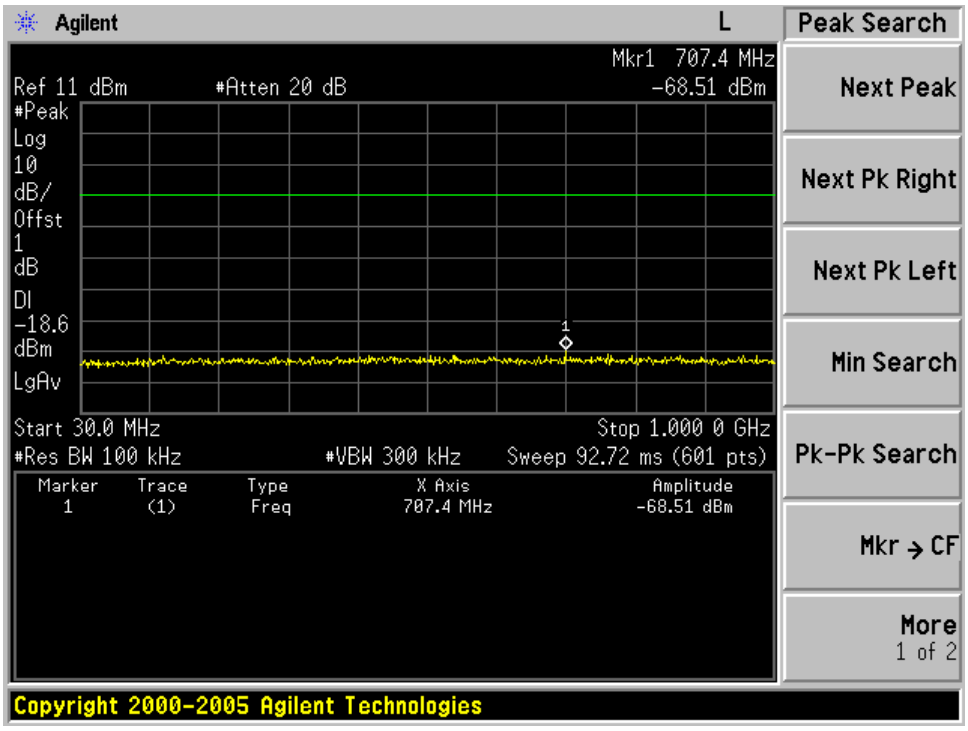
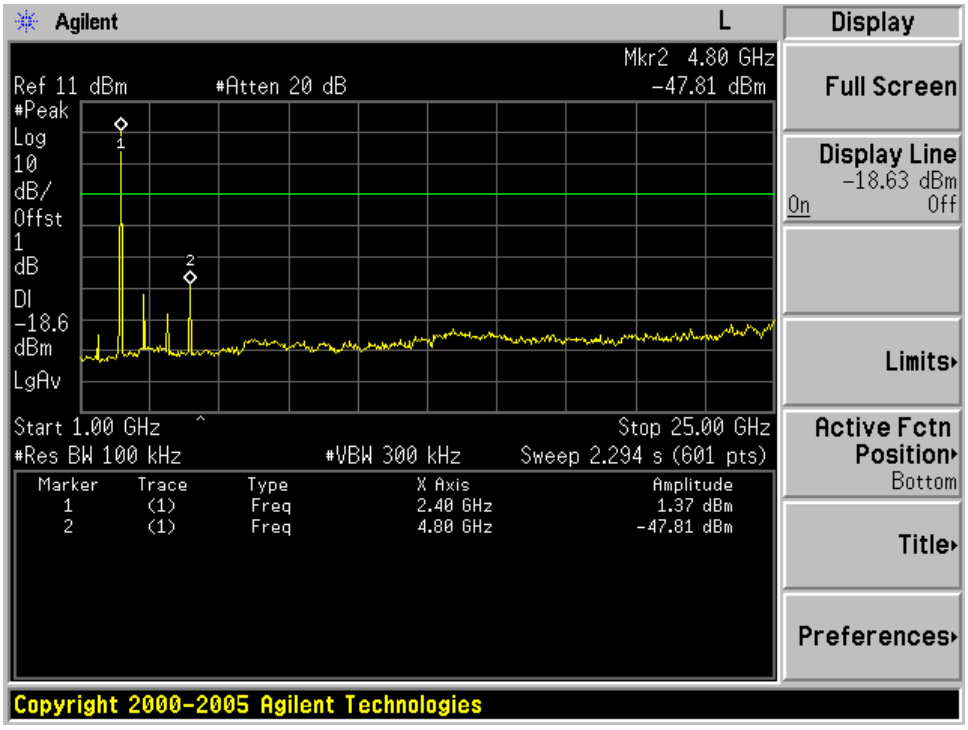
Spurious RF conducted emissions

Bluetooth Mode GFSK Modulation Test Result:

2402MHz





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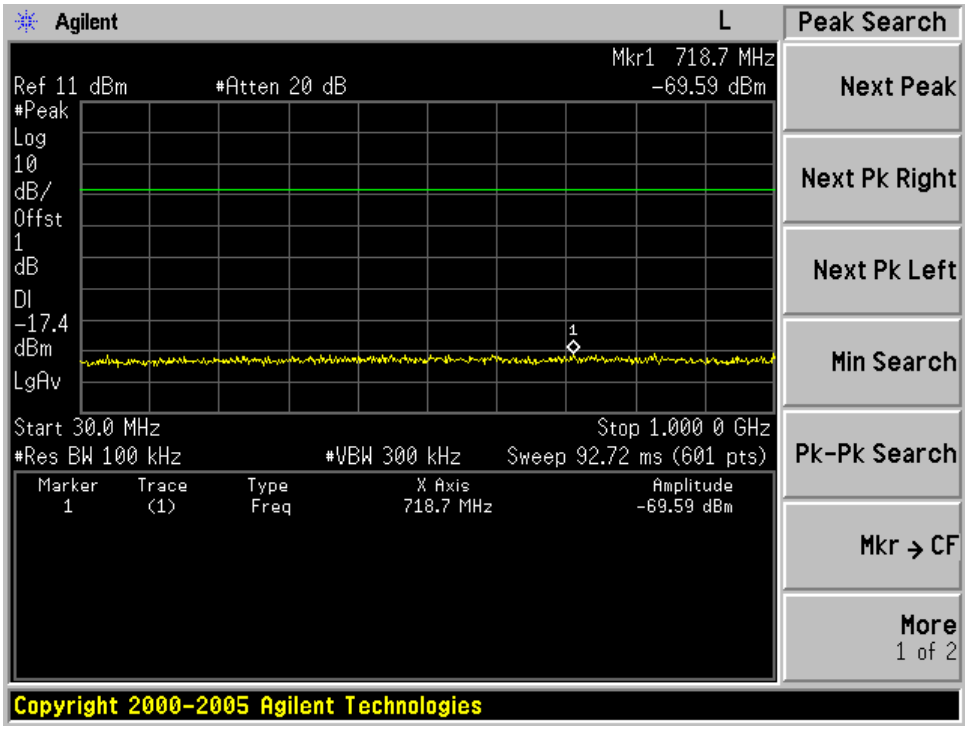
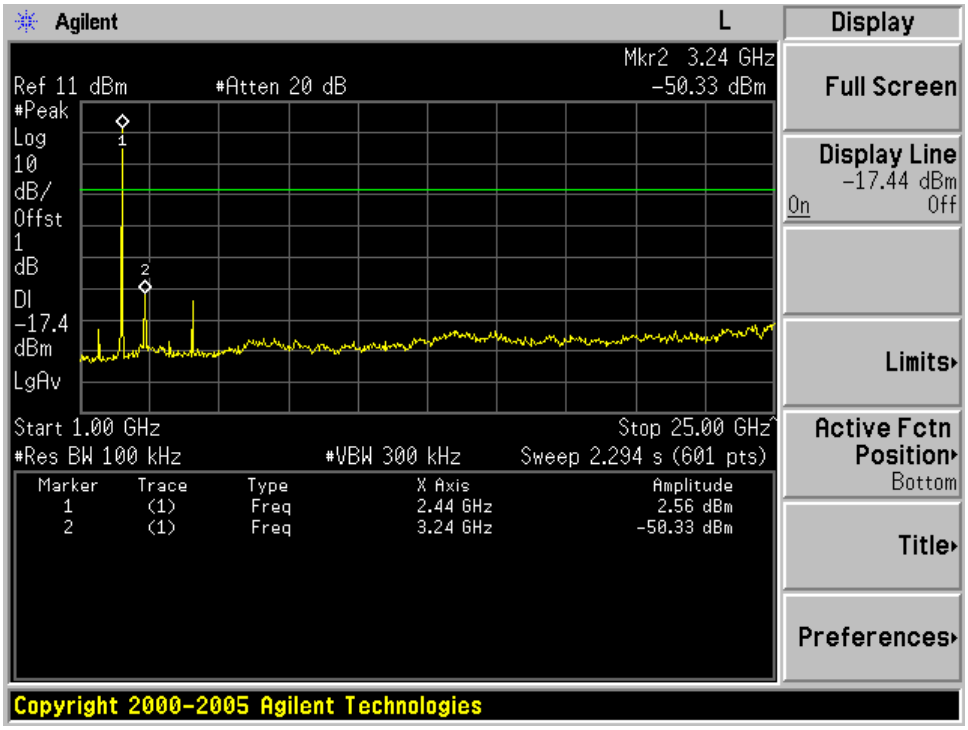
Spurious RF conducted emissions

2441MHz





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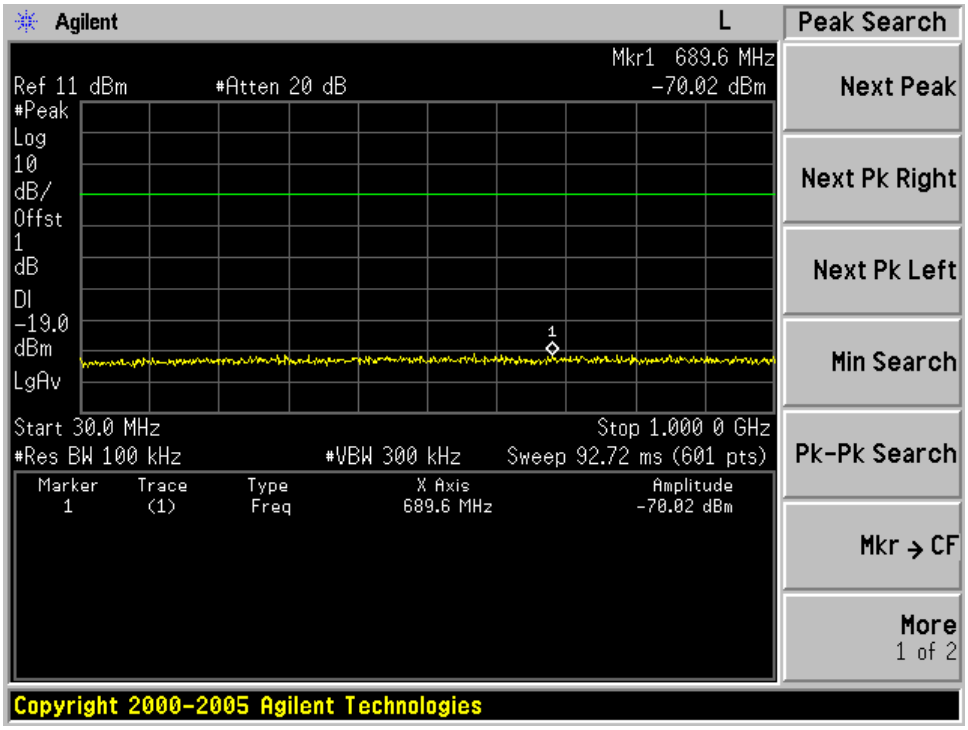
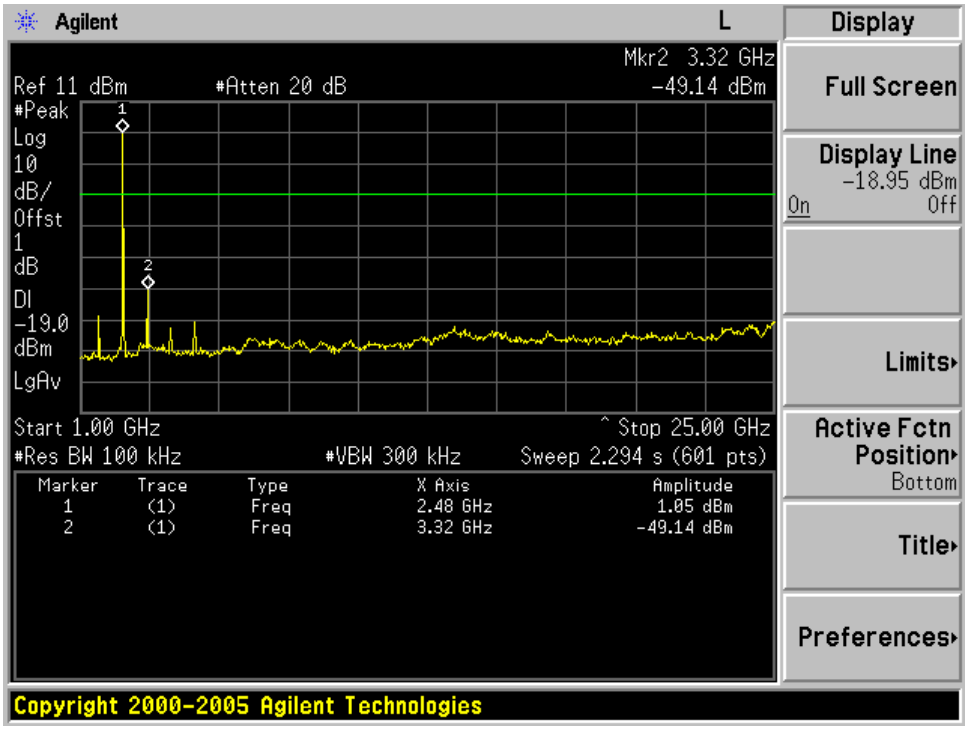
Spurious RF conducted emissions

2480MHz





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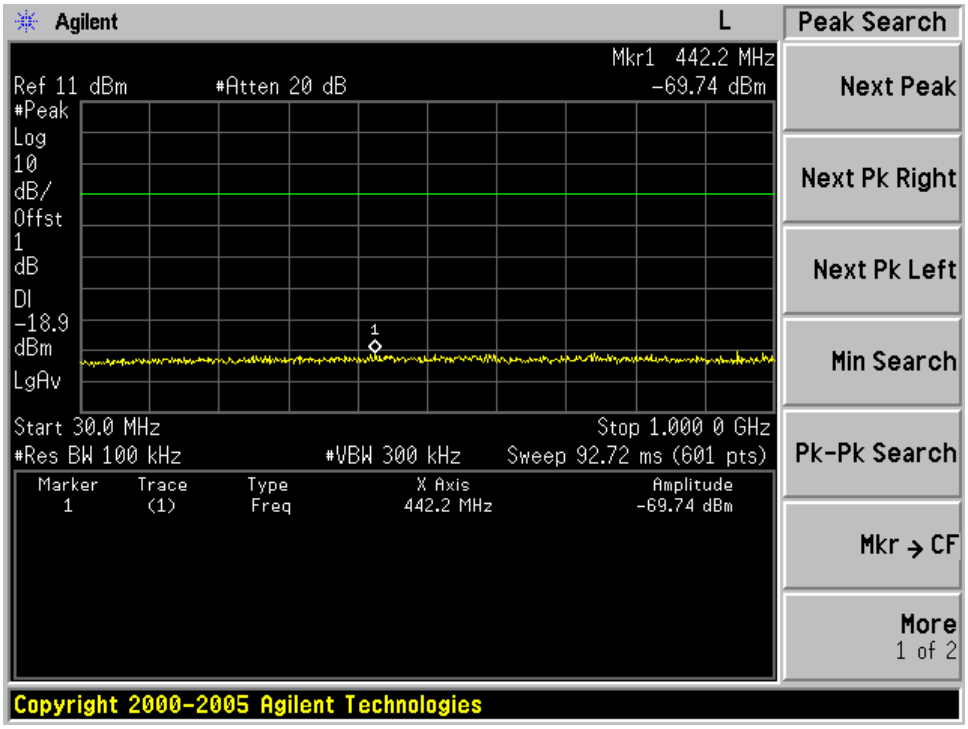
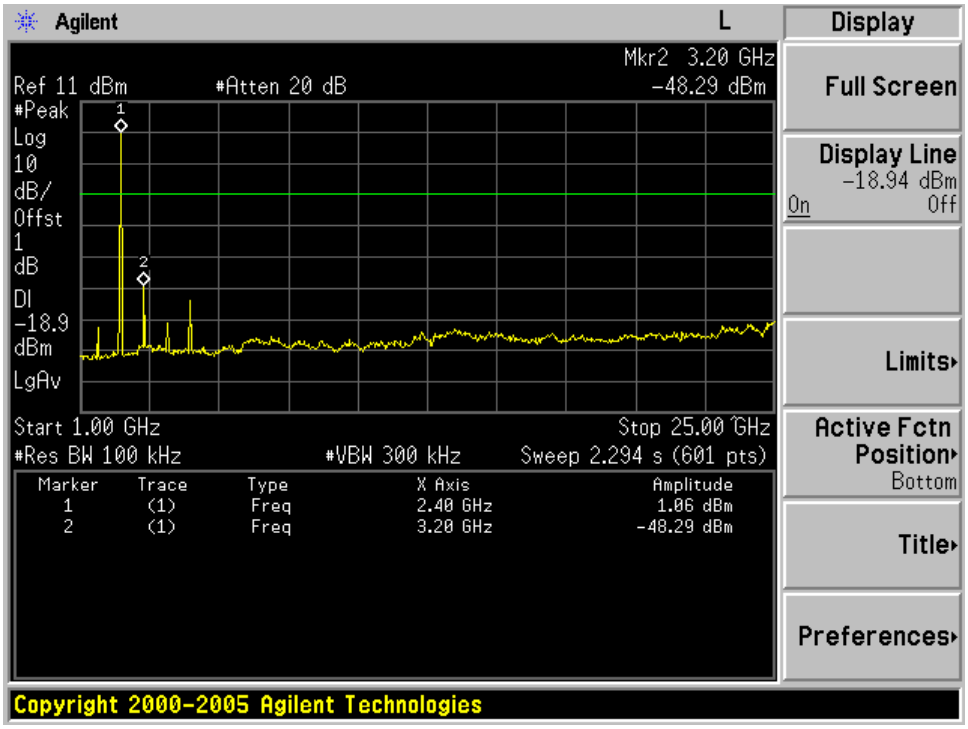
Spurious RF conducted emissions

Bluetooth Mode π/4-DQPSK Modulation Test Result:

2402MHz





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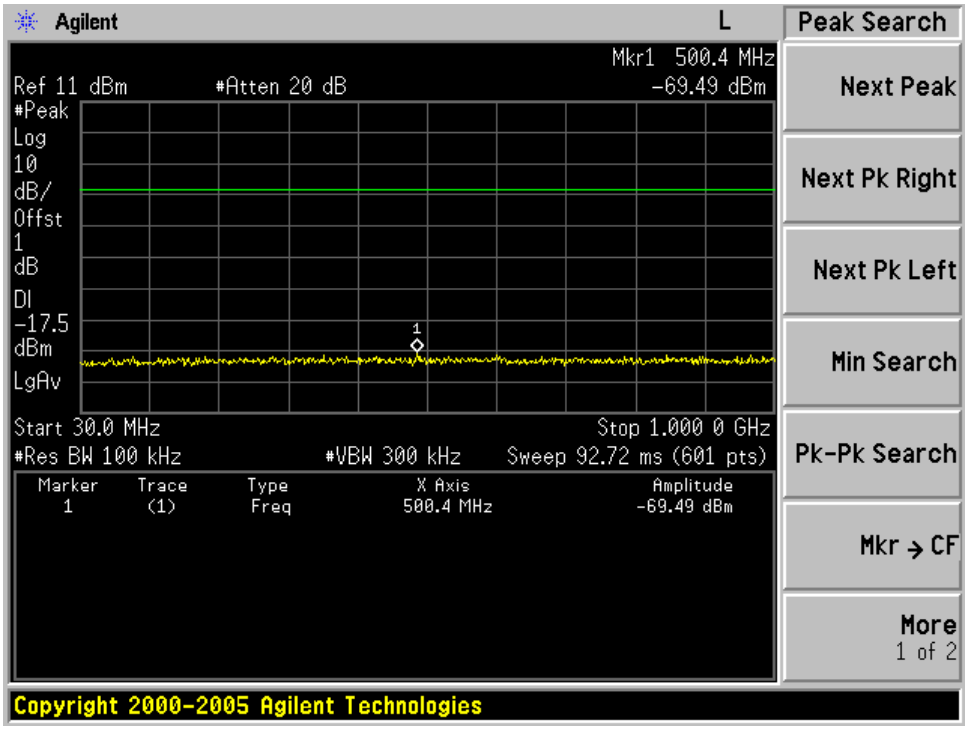
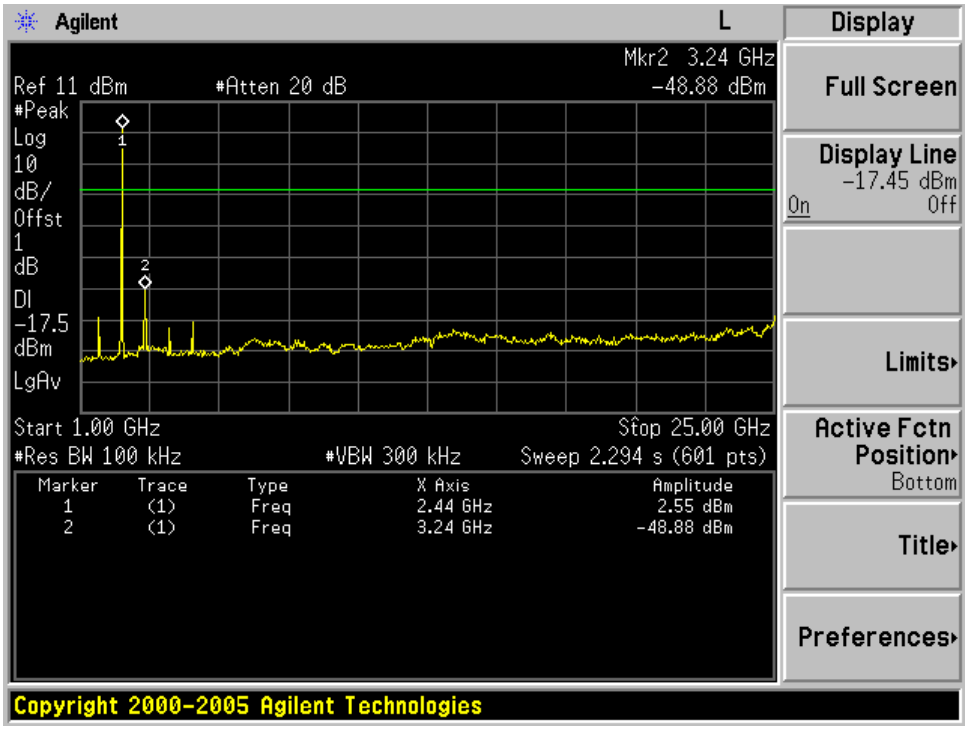
Spurious RF conducted emissions

2441MHz





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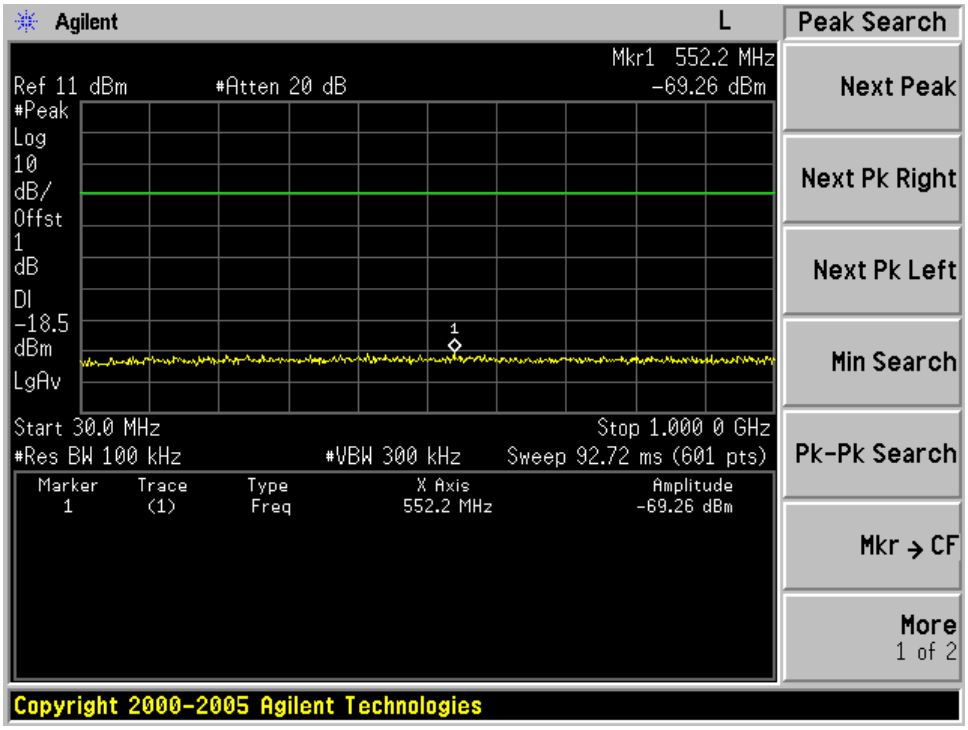
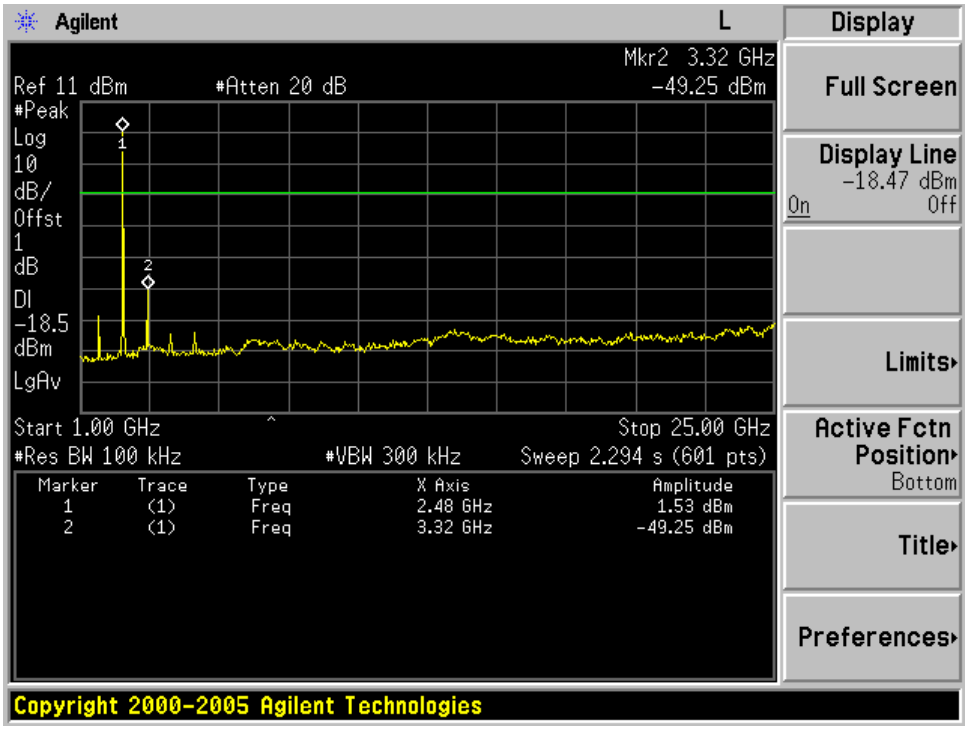
Spurious RF conducted emissions

2480MHz





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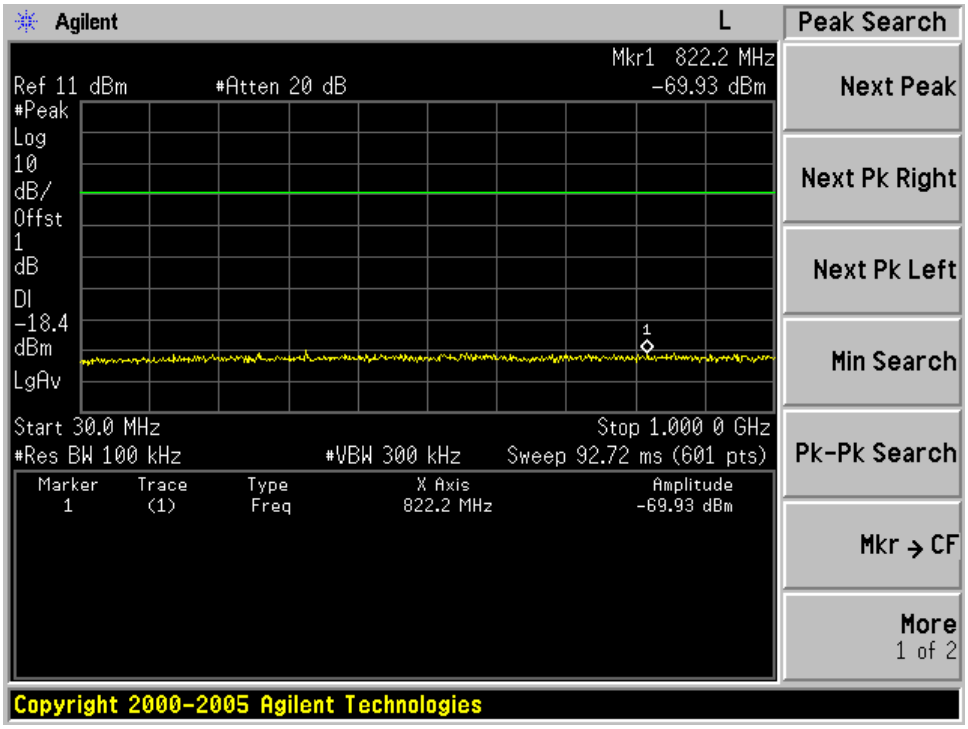
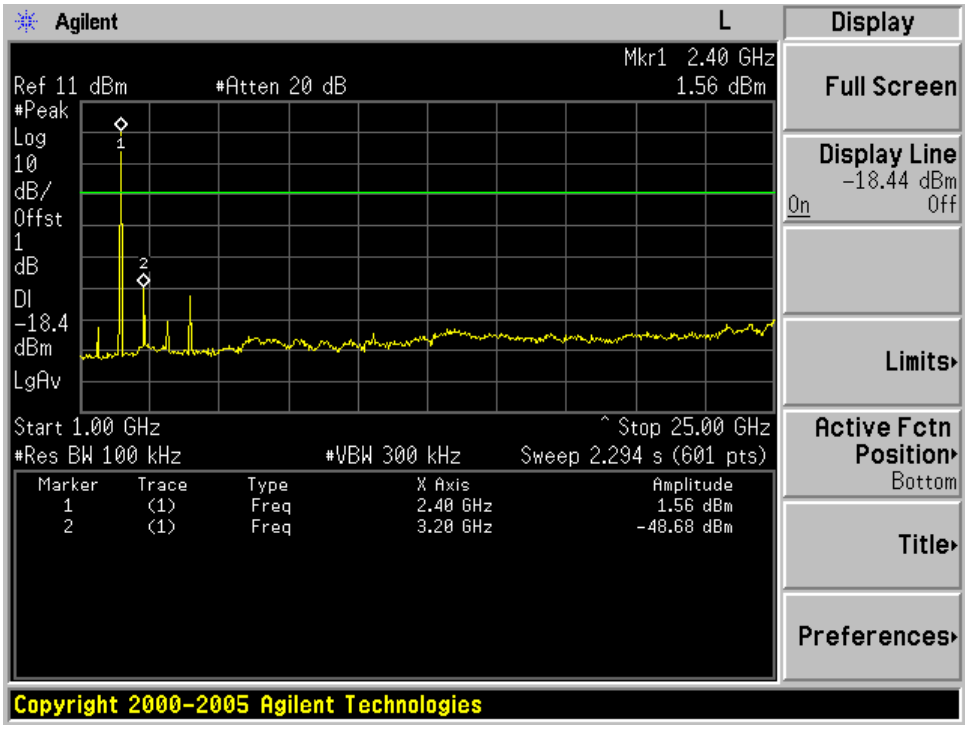
Spurious RF conducted emissions

Bluetooth Mode 8-DPSK Modulation Test Result:

2402MHz





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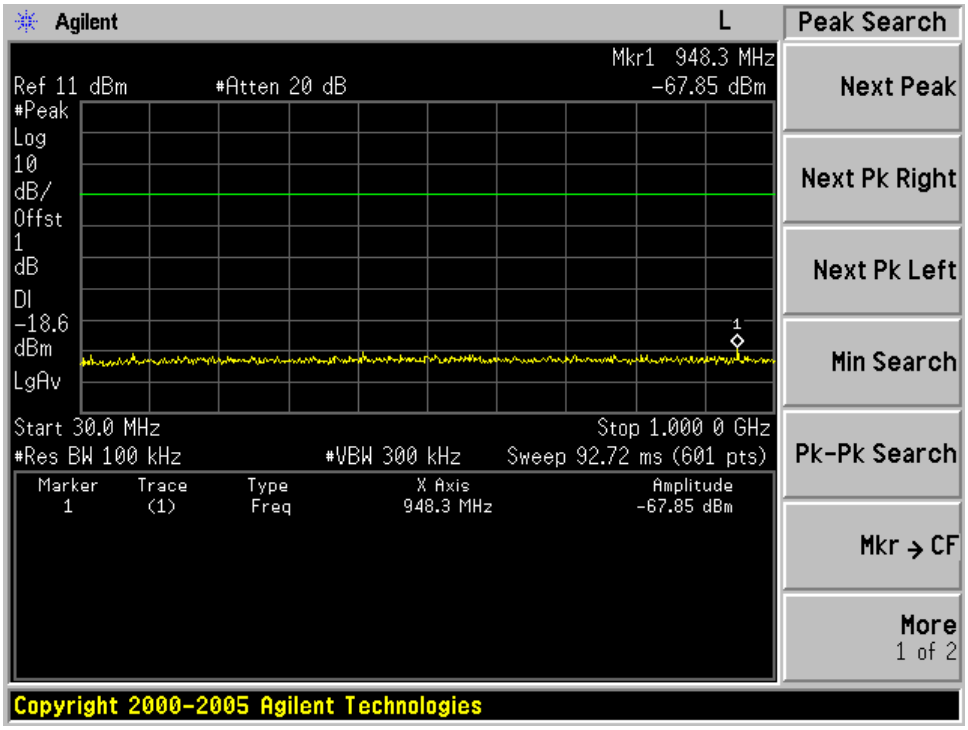
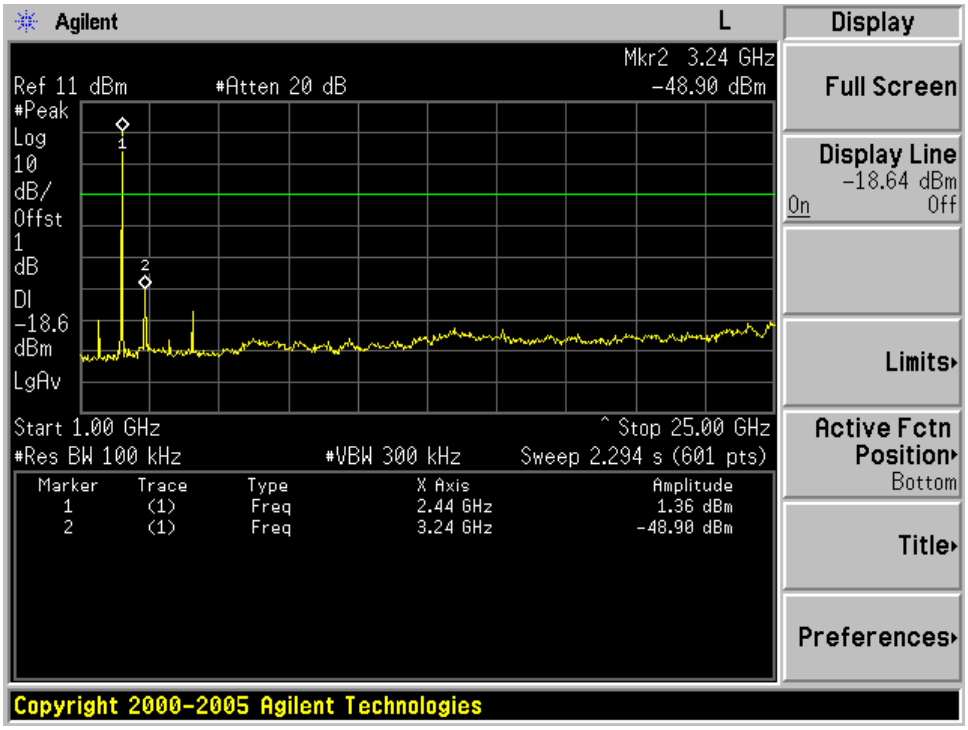
Spurious RF conducted emissions

2441MHz





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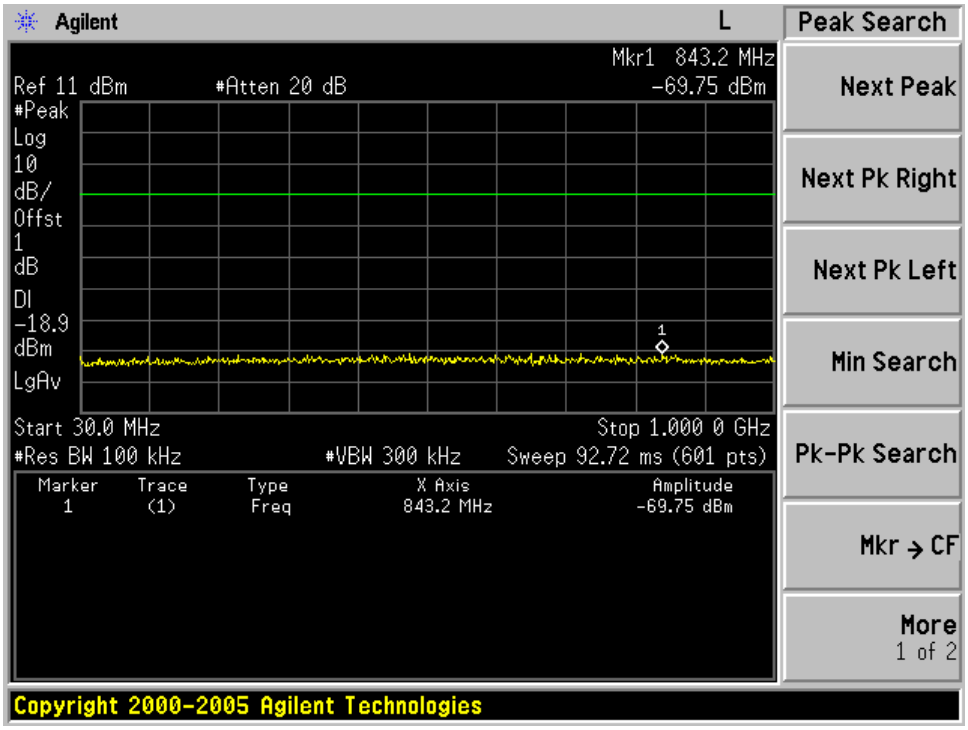
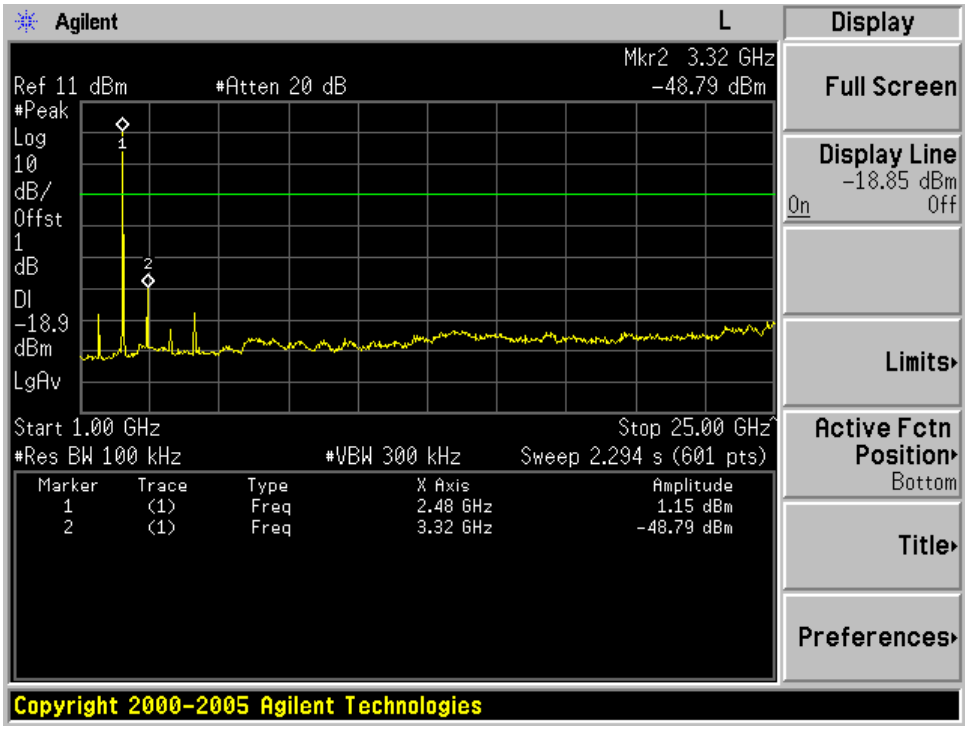
Spurious RF conducted emissions

2480MHz





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Test Equipment List

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

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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

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Radiated Emission

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	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
225.94	10.68	1.10	-	9.85	21.63	Vertical	46.0	QP	Pass
225.94	10.68	1.10	-	9.88	21.66	Horizontal	46.0	QP	Pass
1602.00	25.72	4.76	34.60	48.20	44.08	Vertical	74.0	PK	Pass
1602.00	25.72	4.76	34.60	44.11	39.99	Vertical	54.0	AV	Pass
1602.00	25.72	4.76	34.60	50.52	46.40	Horizontal	74.0	PK	Pass
1602.00	25.72	4.76	34.60	44.42	40.30	Horizontal	54.0	AV	Pass
4804.00	32.86	8.52	34.60	47.42	54.20	Vertical	74.0	PK	Pass
4804.00	32.86	8.52	34.60	34.55	41.33	Vertical	54.0	AV	Pass
4804.00	32.86	8.52	34.60	48.42	55.20	Horizontal	74.0	PK	Pass
4804.00	32.86	8.52	34.60	35.07	41.85	Horizontal	54.0	AV	Pass

Bluetooth Mode GFSK Modulation 2441MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
1626.00	25.86	4.78	34.59	56.18	52.23	Vertical	74.0	PK	Pass
1626.00	25.86	4.78	34.59	49.76	45.81	Vertical	54.0	AV	Pass
1626.00	25.86	4.78	34.59	50.91	46.96	Horizontal	74.0	PK	Pass
1626.00	25.86	4.78	34.59	47.92	43.97	Horizontal	54.0	AV	Pass
4882.00	32.98	8.58	34.60	47.37	54.33	Vertical	74.0	PK	Pass
4882.00	32.98	8.58	34.60	36.36	43.32	Vertical	54.0	AV	Pass
4882.00	32.98	8.58	34.60	56.04	63.00	Horizontal	74.0	PK	Pass
4882.000	32.98	8.58	34.60	42.49	49.45	Horizontal	54.0	AV	Pass

Bluetooth Mode GFSK Modulation 2480MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
1646.00	25.93	4.84	34.58	55.71	51.90	Vertical	74.0	PK	Pass
1646.00	25.93	4.84	34.58	53.46	49.65	Vertical	54.0	AV	Pass
1646.00	25.93	4.84	34.58	53.89	50.08	Horizontal	74.0	PK	Pass
1646.00	25.93	4.84	34.58	50.46	46.65	Horizontal	54.0	AV	Pass
4960.00	33.14	8.65	34.60	47.31	54.50	Vertical	74.0	PK	Pass
4960.00	33.14	8.65	34.60	34.90	42.09	Vertical	54.0	AV	Pass
4960.00	33.14	8.65	34.60	49.34	56.53	Horizontal	74.0	PK	Pass
4960.00	33.14	8.65	34.60	35.66	42.85	Horizontal	54.0	AV	Pass

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Radiated Emission

Bluetooth Mode 8-DPSK Modulation 2402MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
225.94	10.68	1.10	-	9.83	21.61	Vertical	46.0	QP	Pass
225.94	10.68	1.10	-	9.85	21.63	Horizontal	46.0	QP	Pass
1602.0	25.72	4.76	34.6	56.66	52.54	Vertical	74.0	PK	Pass
1602.0	25.72	4.76	34.6	54.36	50.24	Vertical	54.0	AV	Pass
1602.0	25.72	4.76	34.6	54.44	50.32	Horizontal	74.0	PK	Pass
1602.0	25.72	4.76	34.6	51.62	47.50	Horizontal	54.0	AV	Pass
4804.0	32.86	8.52	34.6	45.43	52.21	Vertical	74.0	PK	Pass
4804.0	32.86	8.52	34.6	33.30	40.08	Vertical	54.0	AV	Pass
4804.0	32.86	8.52	34.6	45.35	52.13	Horizontal	74.0	PK	Pass
4804.0	32.86	8.52	34.6	32.88	39.66	Horizontal	54.0	AV	Pass

Bluetooth Mode 8-DPSK Modulation 2441MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
1626.00	25.86	4.78	34.59	54.88	50.93	Vertical	74.0	PK	Pass
1626.00	25.86	4.78	34.59	51.66	47.71	Vertical	54.0	AV	Pass
1626.00	25.86	4.78	34.59	47.25	43.30	Horizontal	74.0	PK	Pass
1626.00	25.86	4.78	34.59	42.60	38.65	Horizontal	54.0	AV	Pass
4882.00	32.98	8.58	34.60	44.69	51.65	Vertical	74.0	PK	Pass
4882.00	32.98	8.58	34.60	32.26	39.22	Vertical	54.0	AV	Pass
4882.00	32.98	8.58	34.60	45.13	52.09	Horizontal	74.0	PK	Pass
4882.000	32.98	8.58	34.60	33.07	40.03	Horizontal	54.0	AV	Pass

Bluetooth Mode 8-DPSK Modulation 2480MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBuV	dBuV/m		dBµV/m		
1646.00	25.93	4.84	34.58	55.08	51.27	Vertical	74.0	PK	Pass
1646.00	25.93	4.84	34.58	52.16	48.35	Vertical	54.0	AV	Pass
1646.00	25.93	4.84	34.58	54.89	51.08	Horizontal	74.0	PK	Pass
1646.00	25.93	4.84	34.58	51.93	48.12	Horizontal	54.0	AV	Pass
4960.00	33.14	8.65	34.60	38.22	45.41	Vertical	74.0	PK	Pass
4960.00	33.14	8.65	34.60	25.88	33.07	Vertical	54.0	AV	Pass
4960.00	33.14	8.65	34.60	45.55	52.74	Horizontal	74.0	PK	Pass
4960.00	33.14	8.65	34.60	33.16	40.35	Horizontal	54.0	AV	Pass

Remark:

(1) QP Emission Level= Antenna Factor + Cable Loss(include amplifier factor) + 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.

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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, 2013
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

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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

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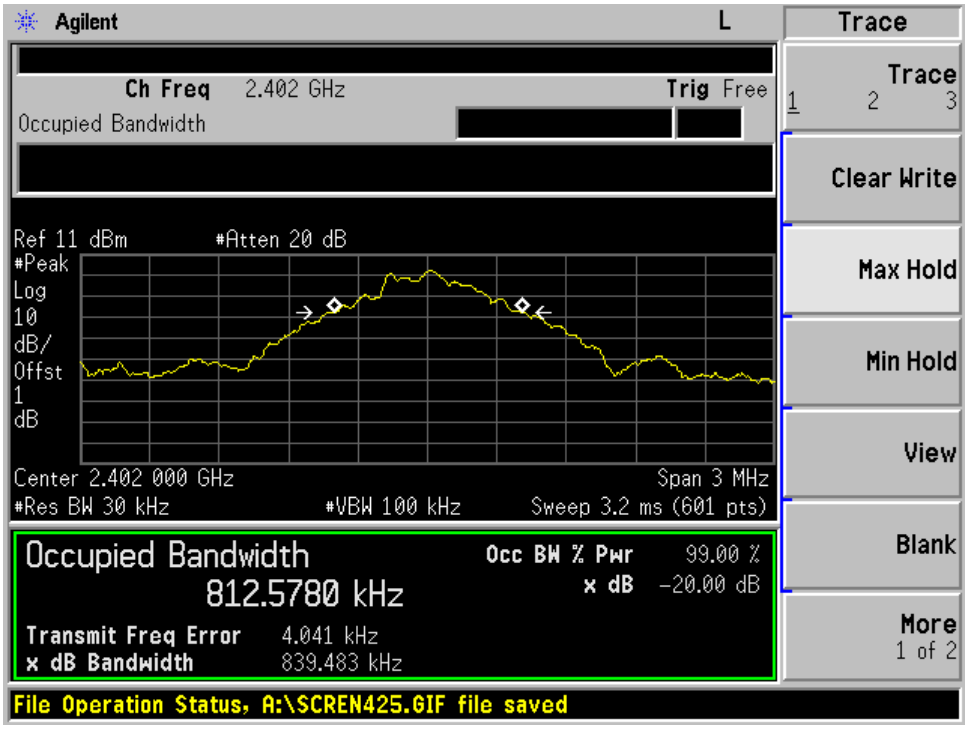
20 dB bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	839.483	Pass
2441	840.786	Pass
2480	846.322	Pass



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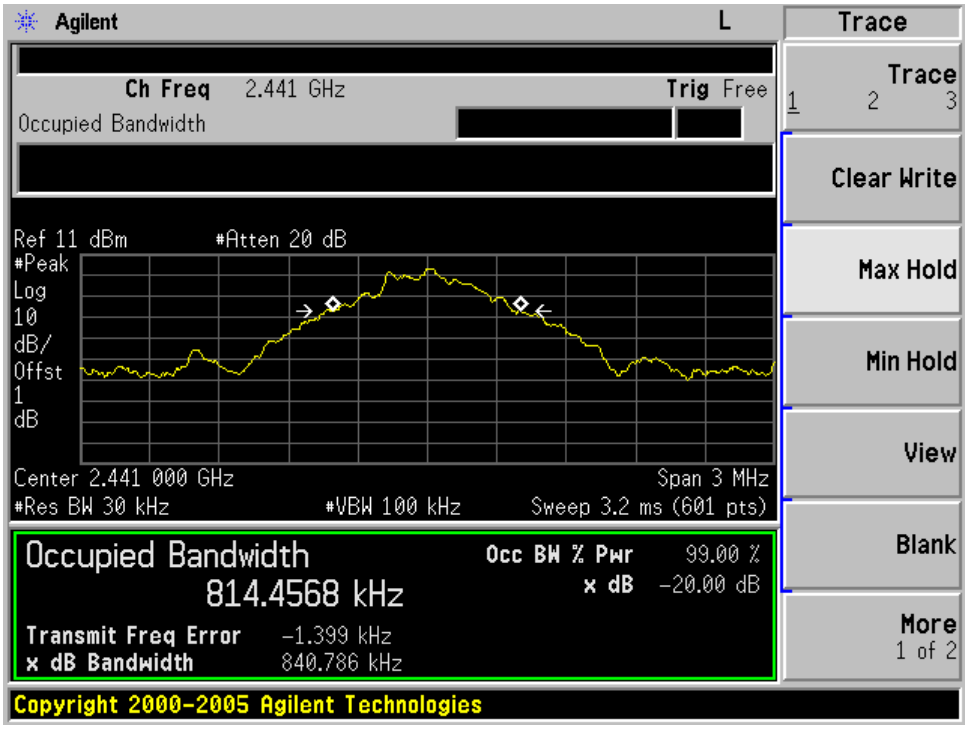
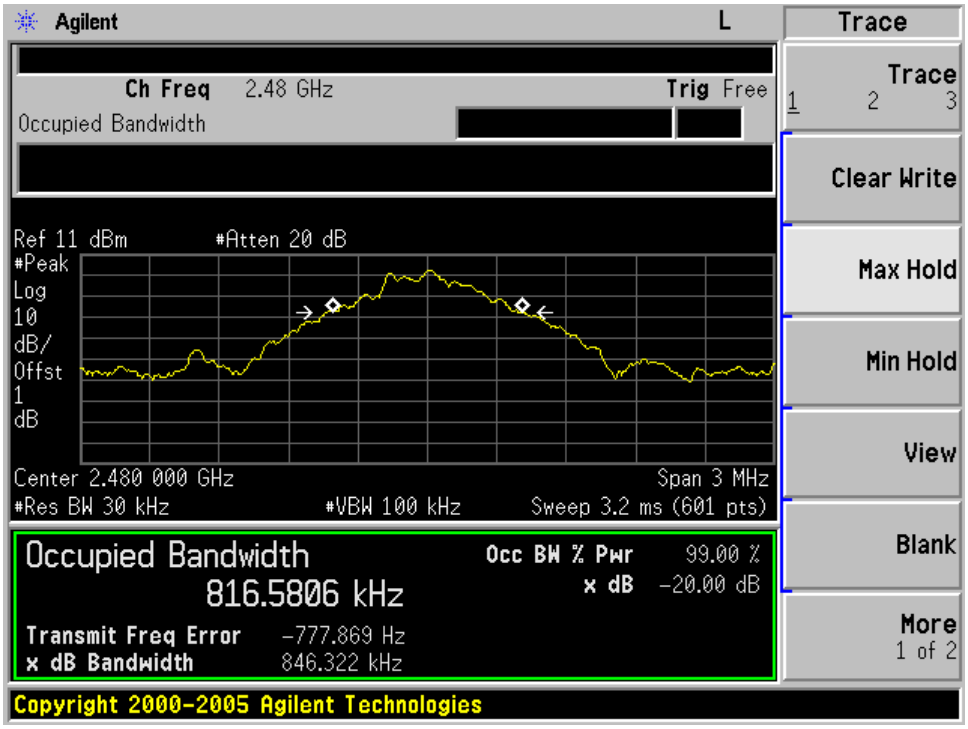
20 dB bandwidth





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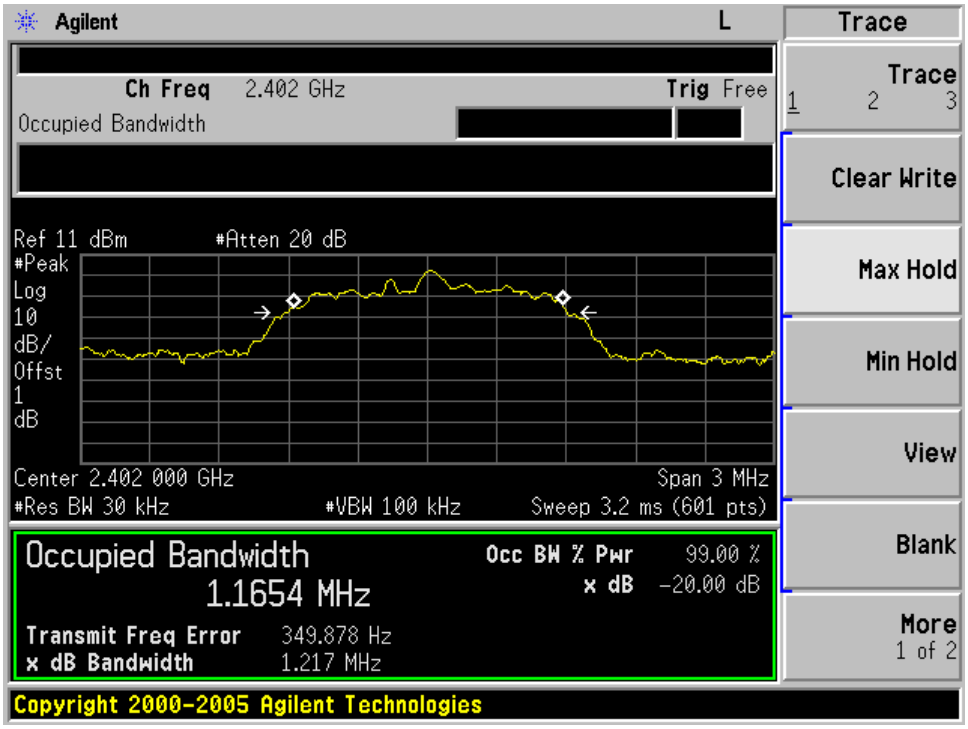
20 dB bandwidth

Bluetooth Mode π/4-DQPSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	1217	Pass
2441	1224	Pass
2480	1226	Pass



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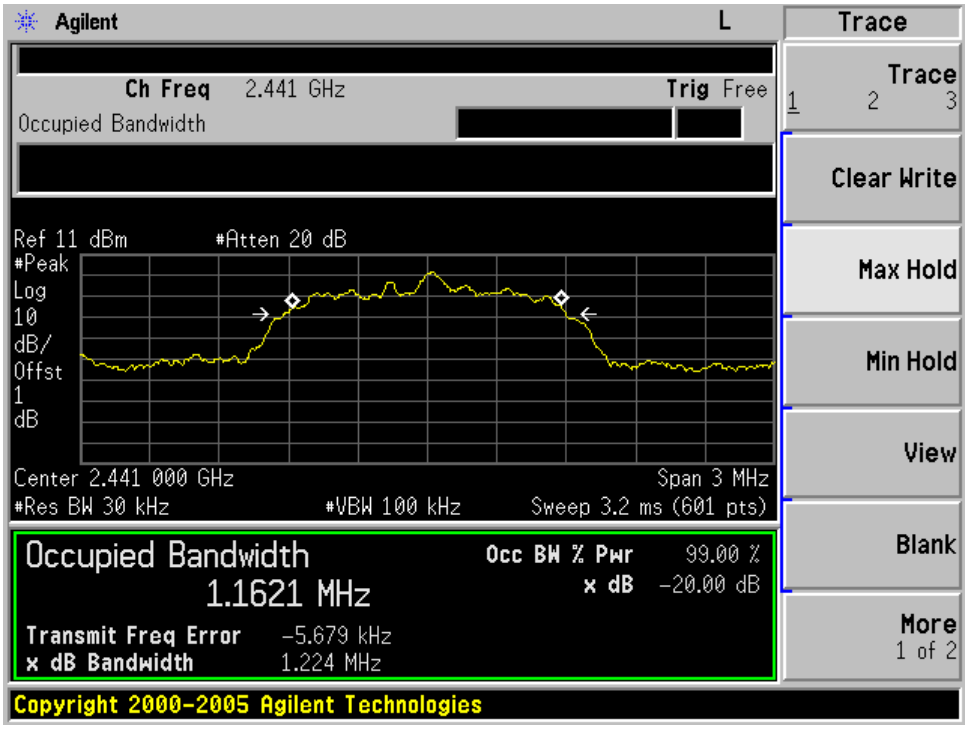
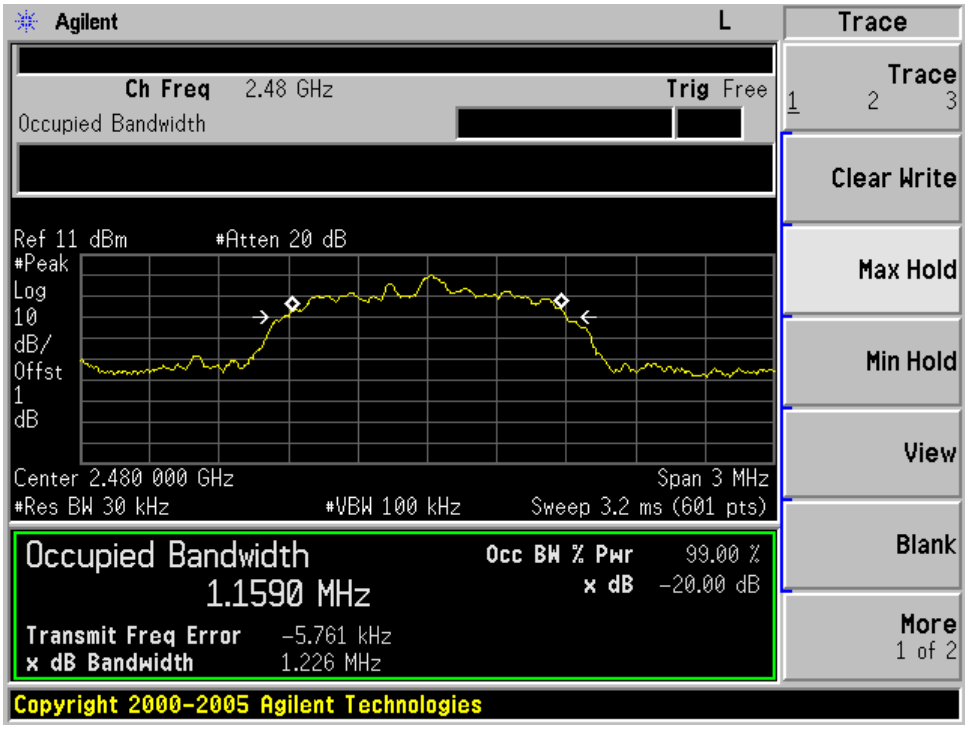
20 dB bandwidth





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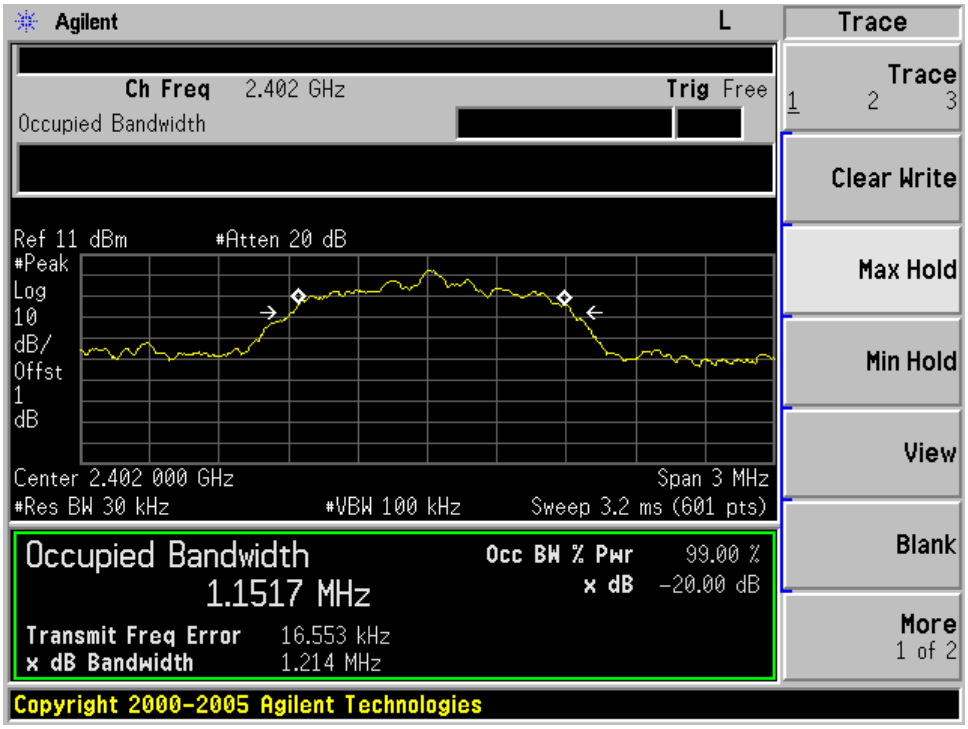
20 dB bandwidth

Bluetooth Mode 8-DPSK Modulation test result

Frequency MHz	Bandwidth kHz	Result
2402	1214	Pass
2441	1217	Pass
2480	1210	Pass



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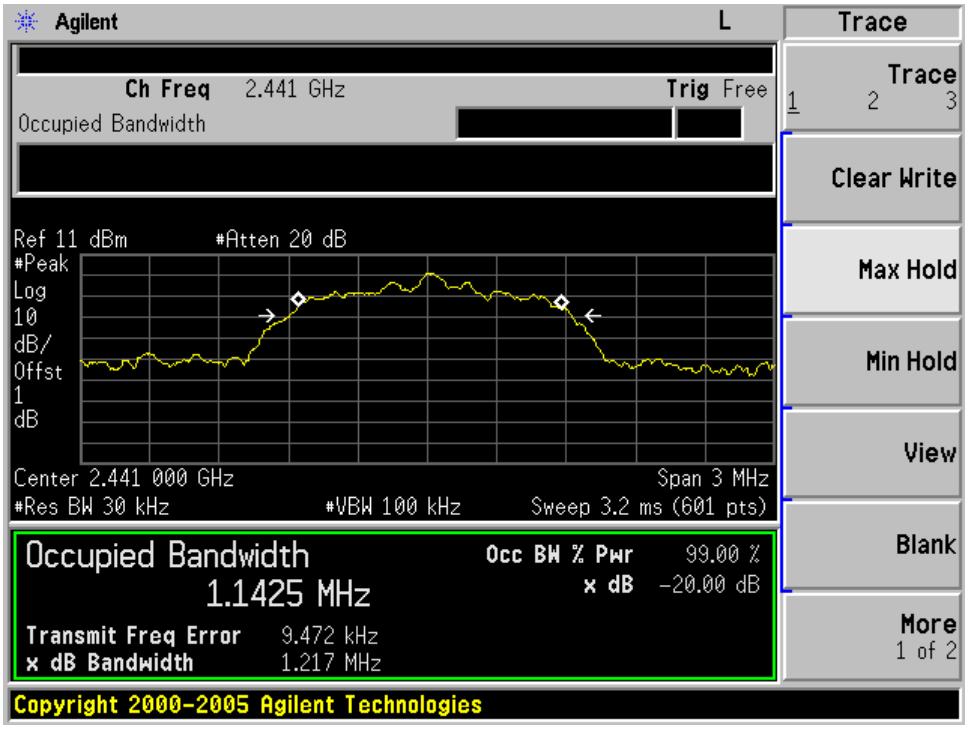
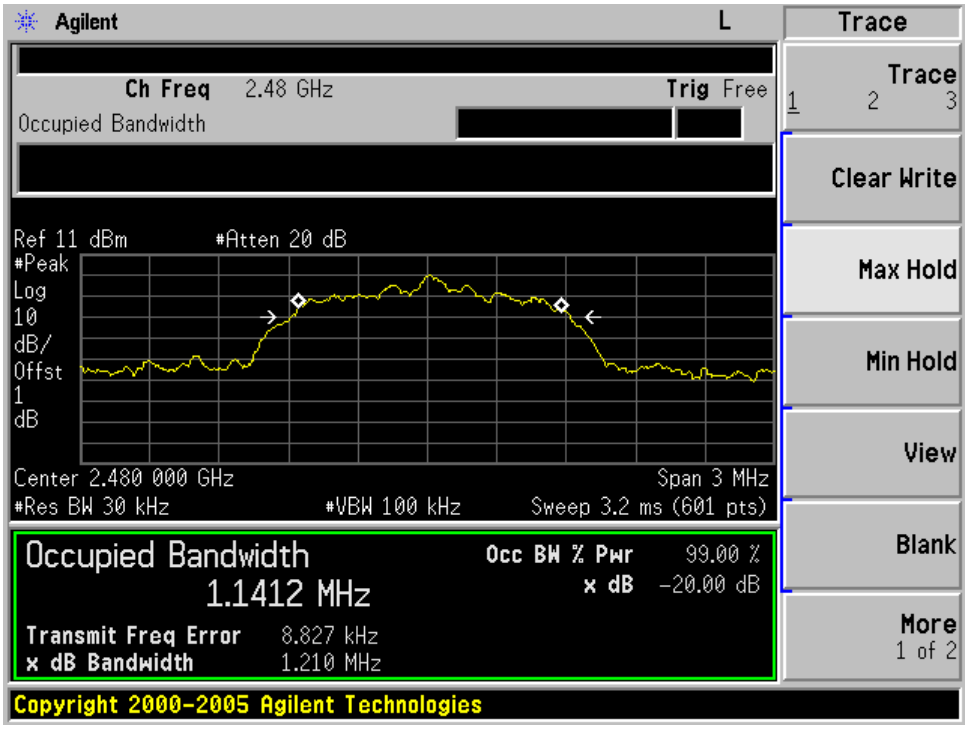
20 dB bandwidth





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Test Equipment

20 dB bandwidth Test

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

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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
⩾25KHz or 2/3 of the 20 dB bandwidth which is greater

GFSK Modulation Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	559.6553
2441	560.5240
2480	564.2147

8-DPSK Modulation Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	809.3333
2441	811.3333
2480	806.6667

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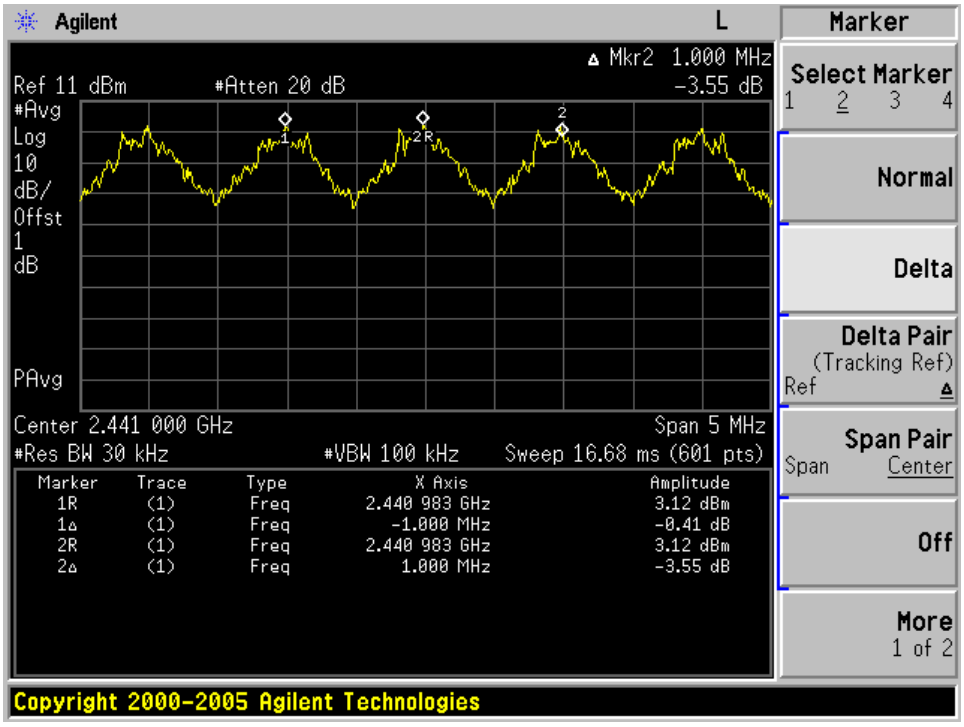
Carrier Frequency Separation

GFSK Modulation test result

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



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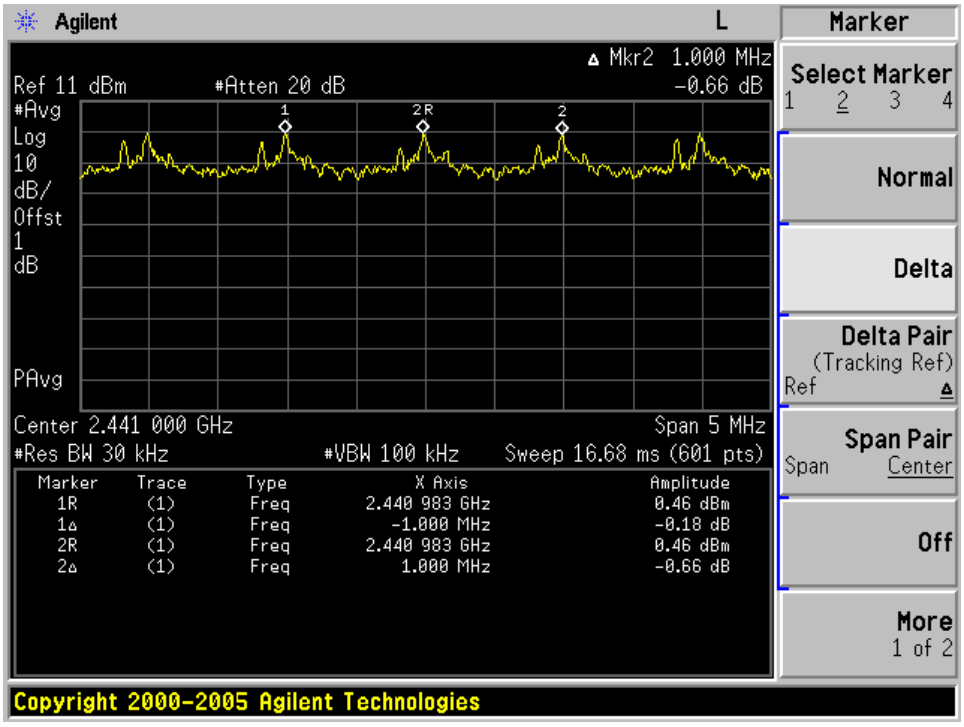
Carrier Frequency Separation

8-DPSK Modulation test result

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



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Test Equipment

Carrier Frequency Separation Test

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

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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

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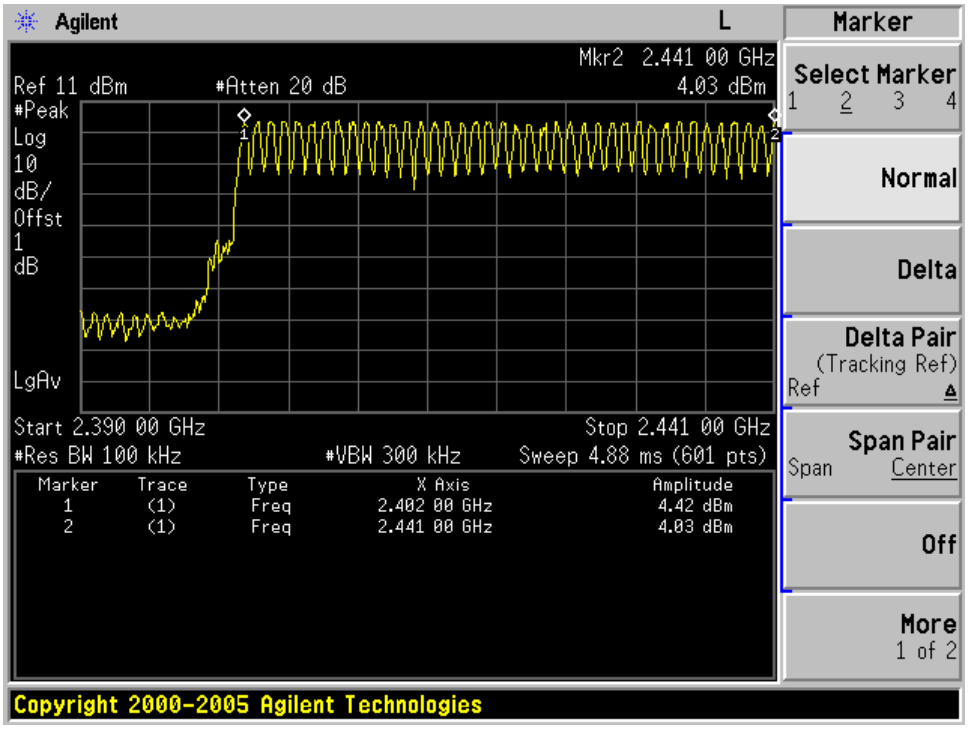
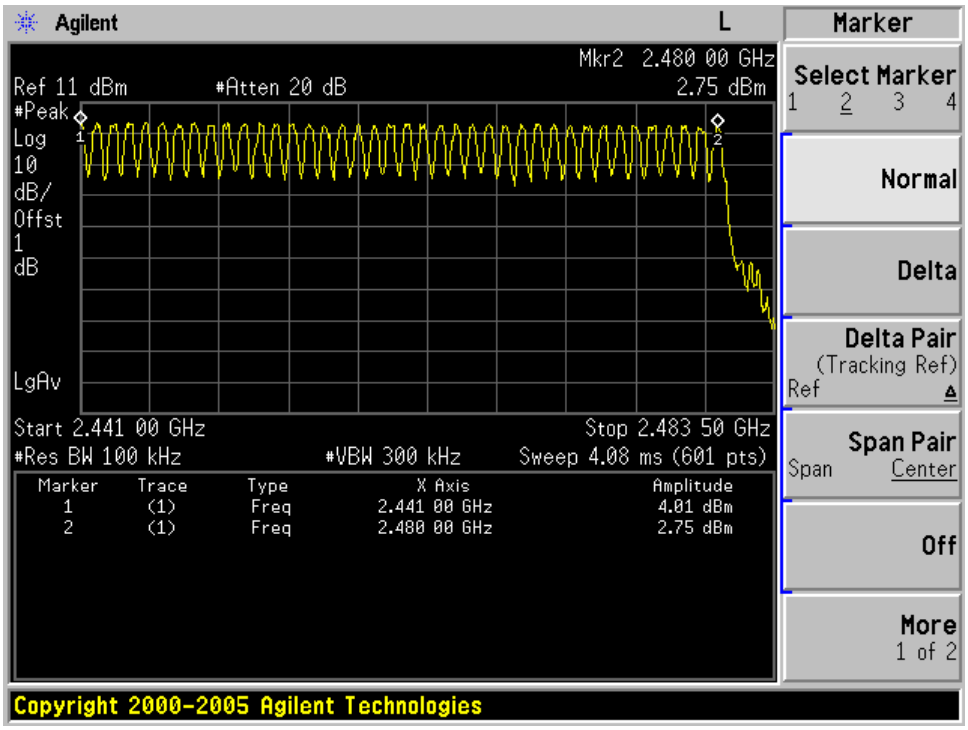
Number of hopping frequencies

Test result:

Number of hopping frequencies	Result
79	Pass





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Test Equipment

Number of hopping frequencies Test

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

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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.

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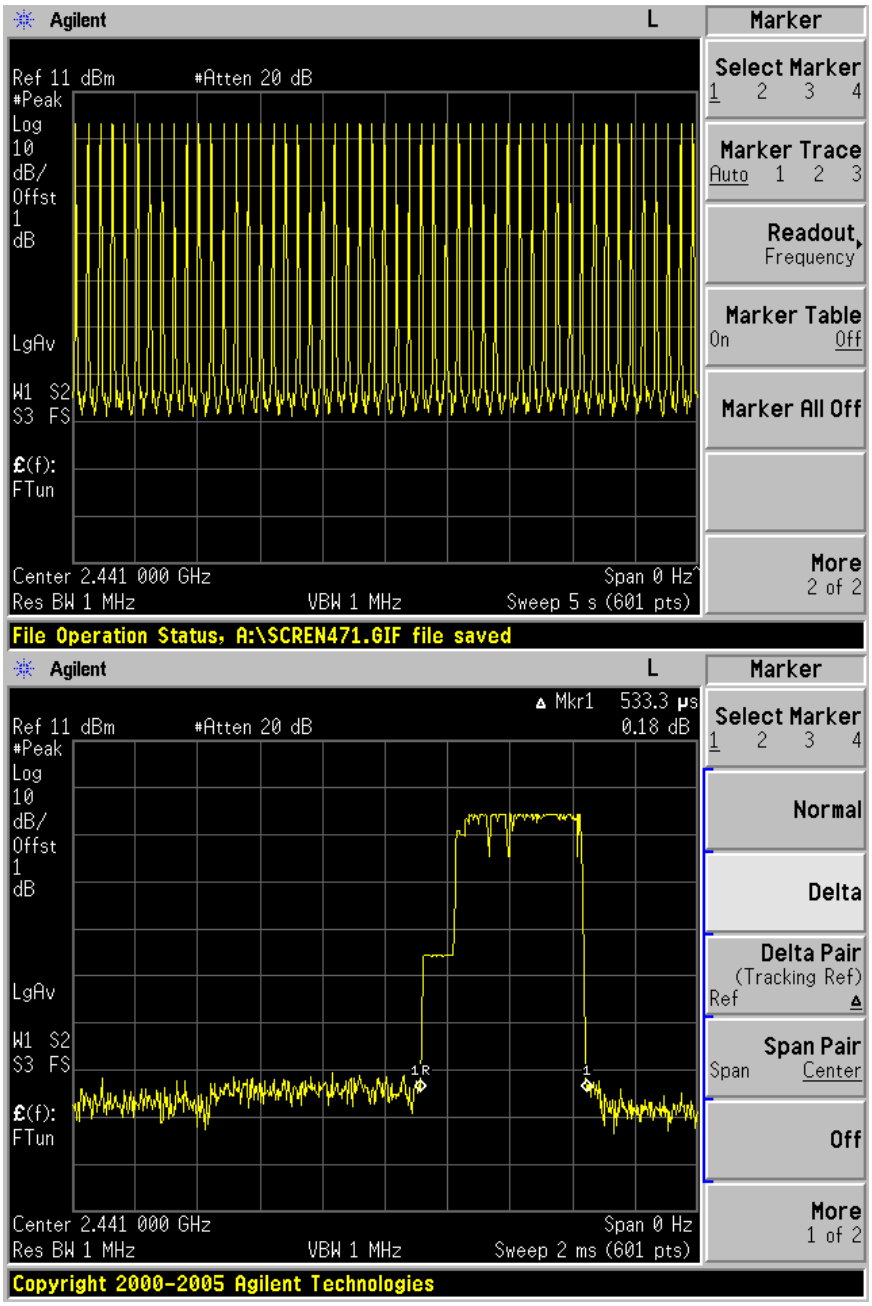
Dwell Time

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	533.3	171.89	< 400	Pass
DH3	1808	285.66	< 400	Pass
DH5	2960	318.02	< 400	Pass



DH1

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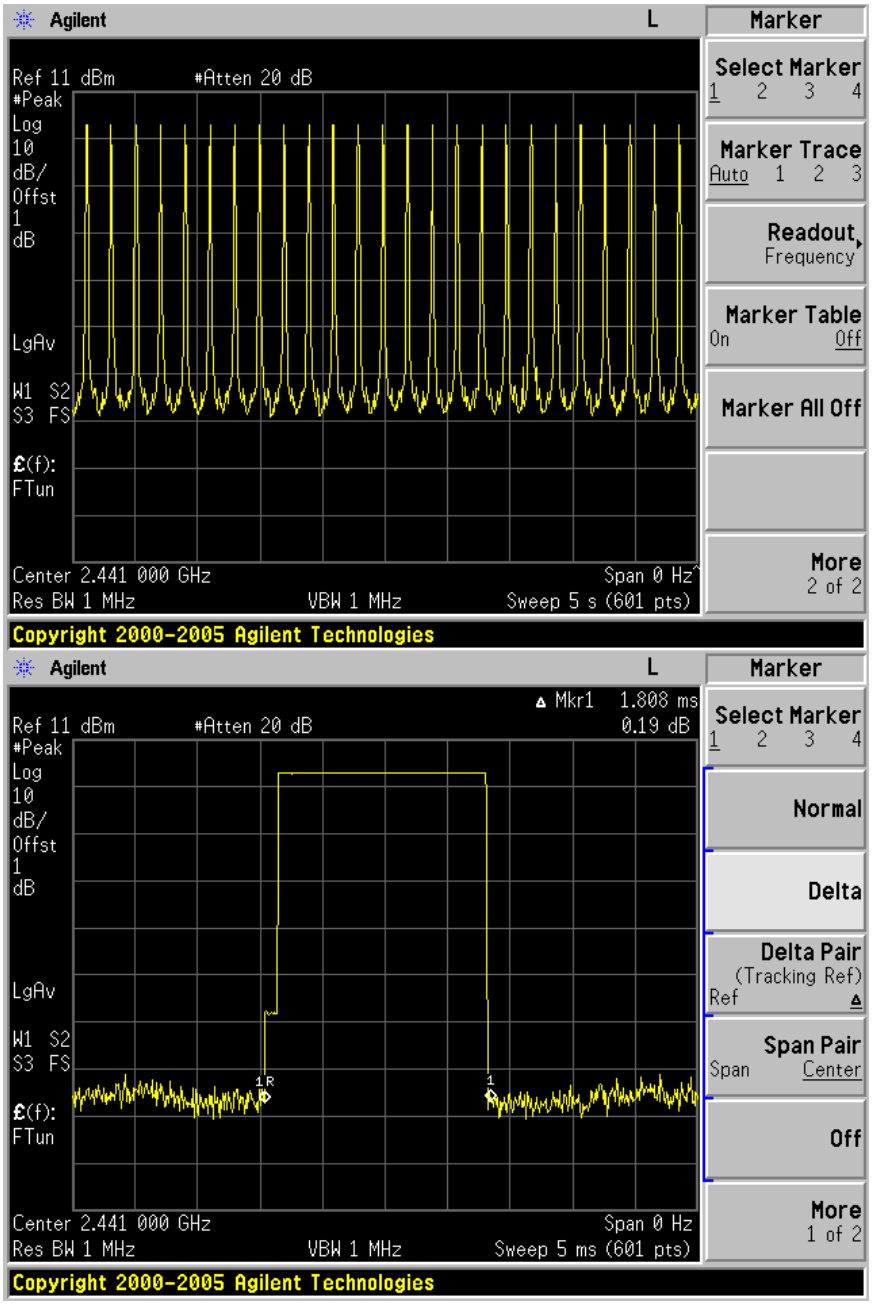
Dwell Time



DH3

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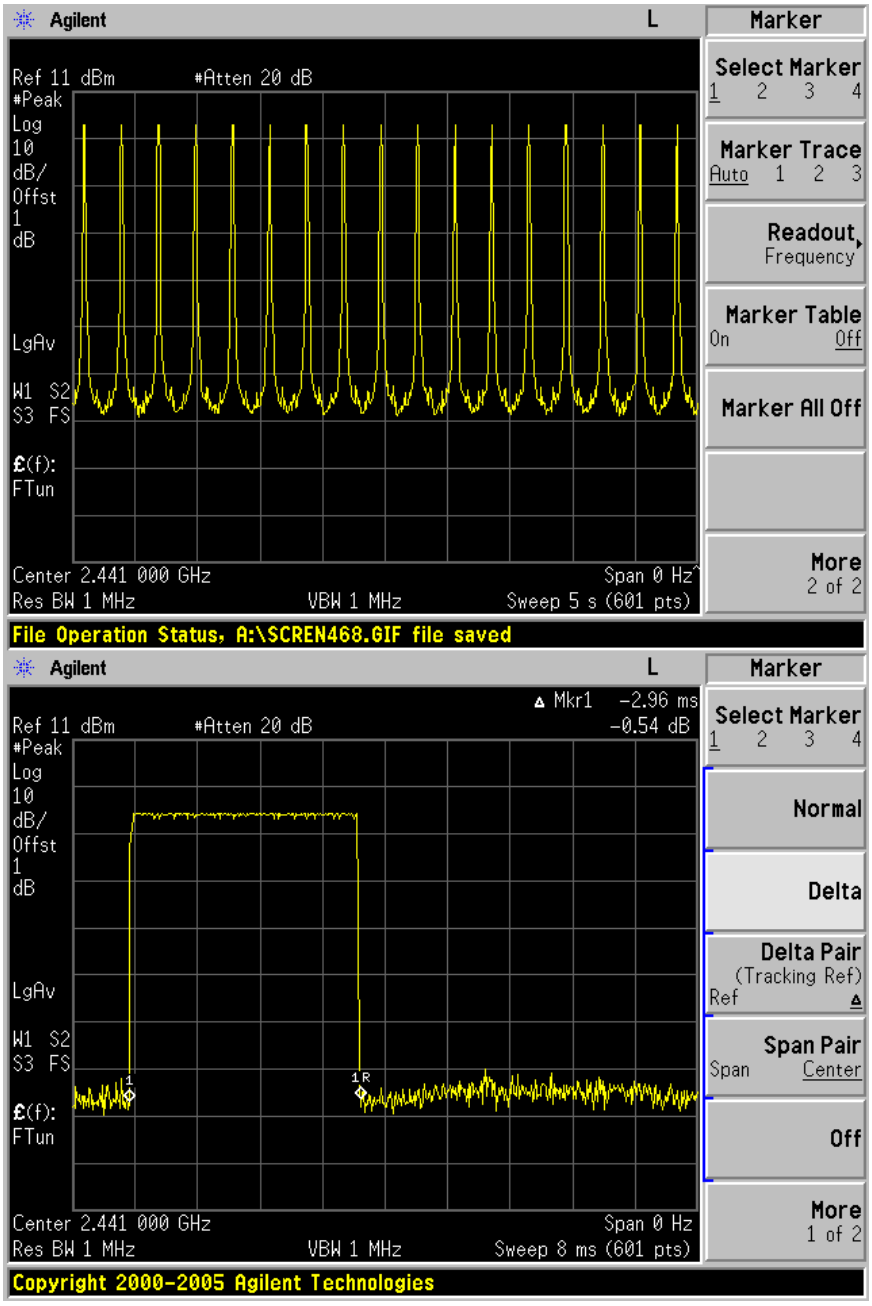
Dwell Time



DH5

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

DH1 time slot= 51(times)/5(s) *533.3 (μs) *31.6(s)= 171.89 (ms)
DH3 time slot= 25(times)/5(s) *1808 (μs) *31.6(s)= 285.66 (ms)
DH5 time slot= 17(times)/5(s) *2960 (μs) *31.6(s)= 318.02 (ms)

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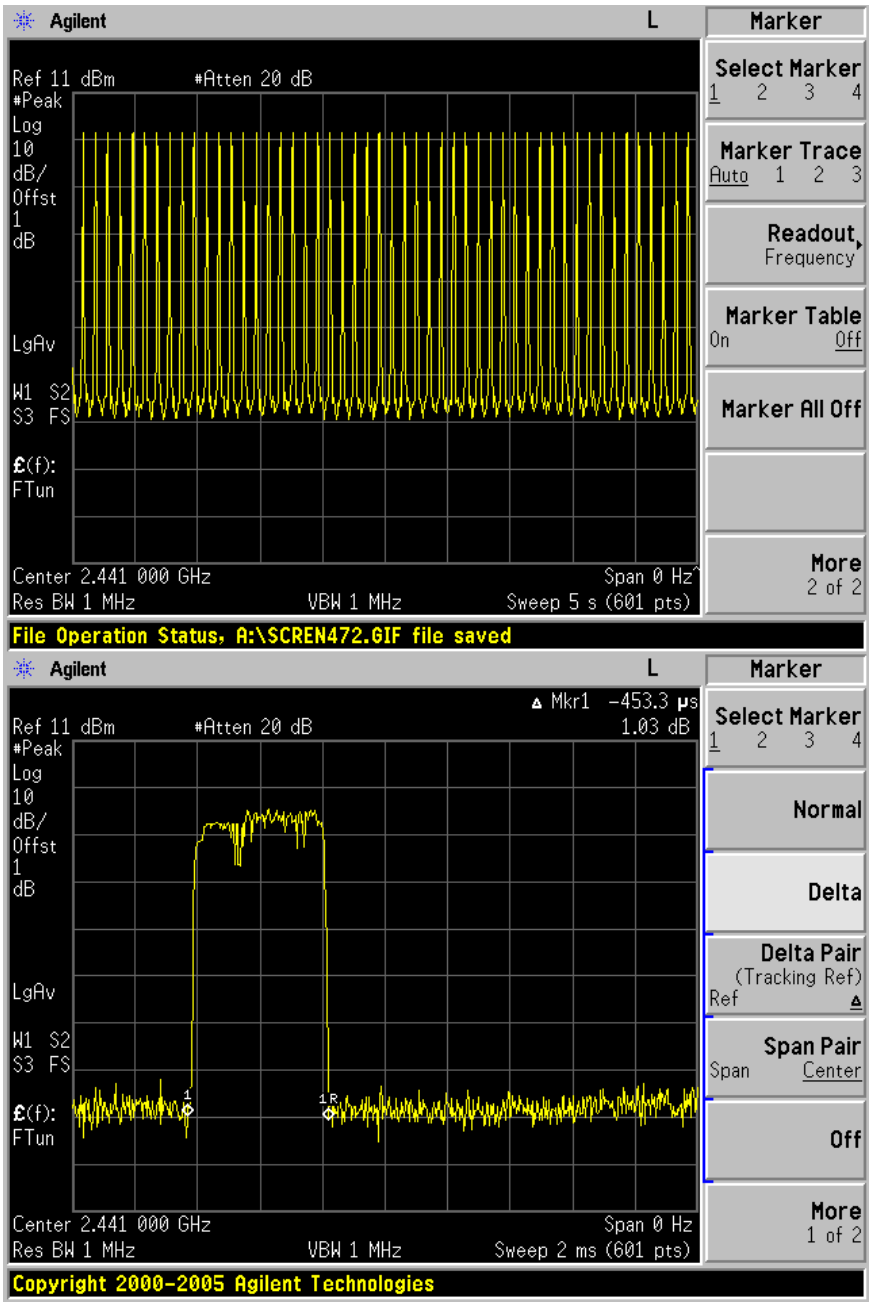
Dwell Time

Bluetooth Mode π/4-DQPSK Modulation:

Mode	Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	453.3	143.24	< 400	Pass
DH3	1808	285.66	< 400	Pass
DH5	2940	315.87	< 400	Pass



DH1

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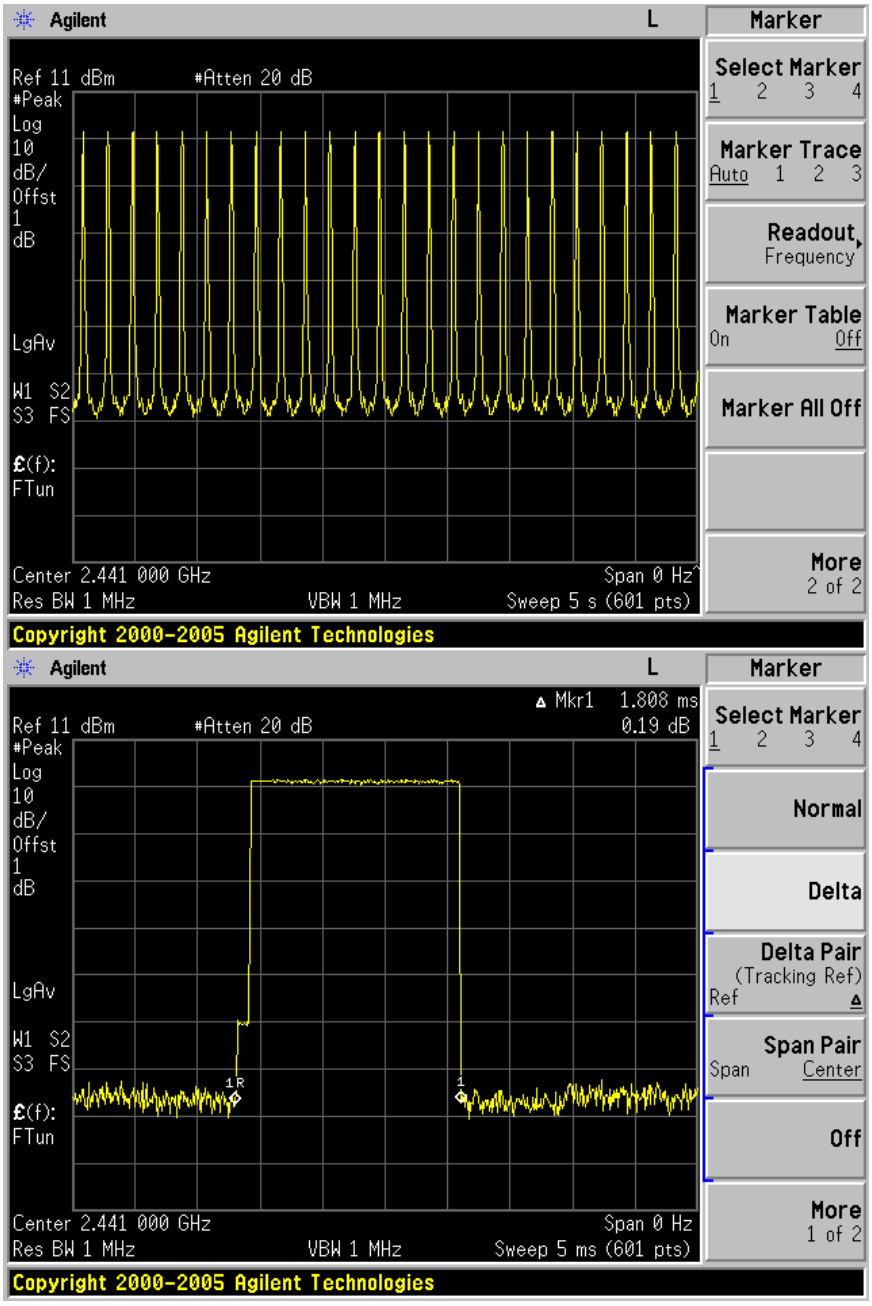
Dwell Time



DH3

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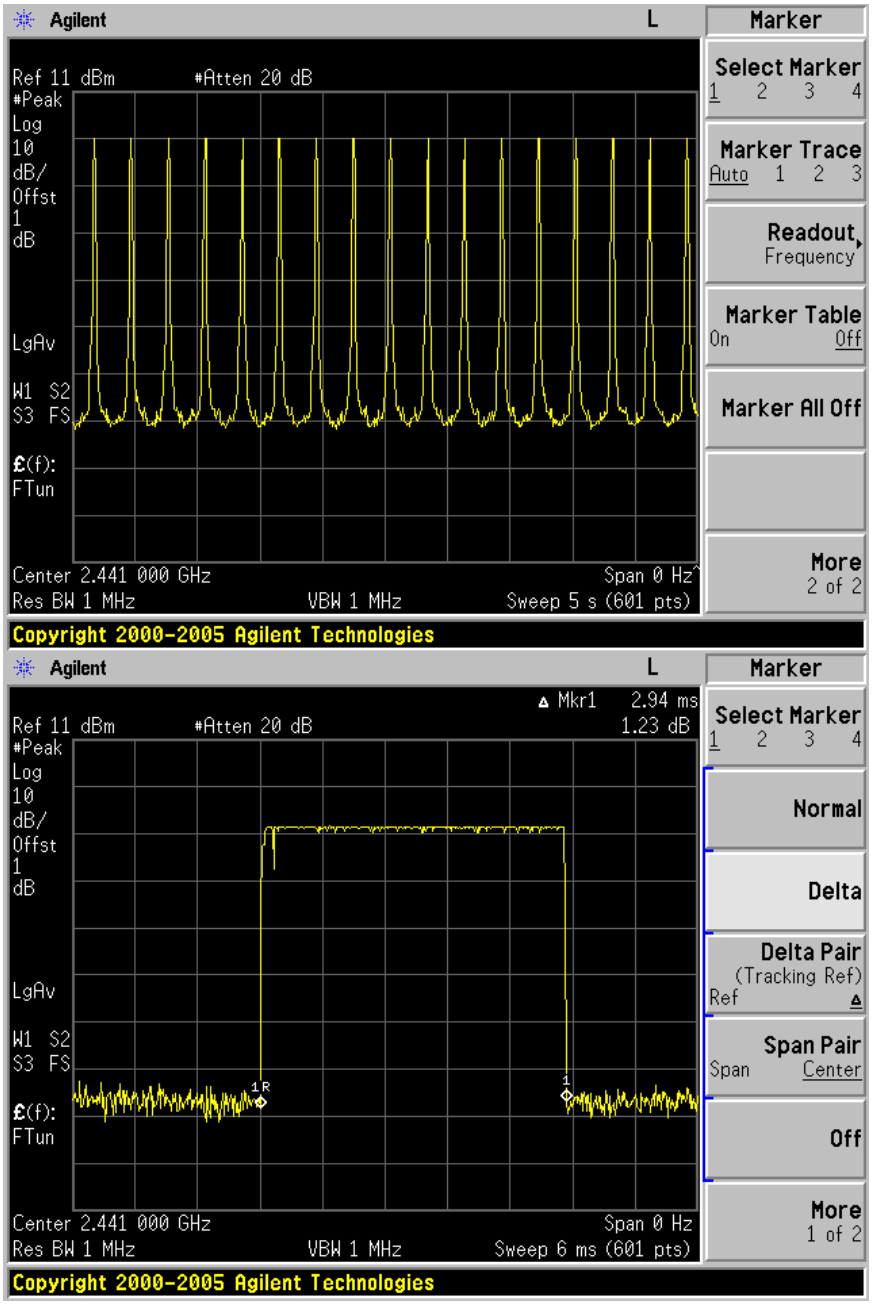
Dwell Time



DH5

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

DH1 time slot= 50(times)/5(s) *453.3 (μs) *31.6(s)= 143.24(ms)
DH3 time slot= 25(times)/5(s) *1808 (μs) *31.6(s)= 285.66(ms)
DH5 time slot= 17(times)/5(s) *2940(μs) *31.6(s)=315.87 (ms)

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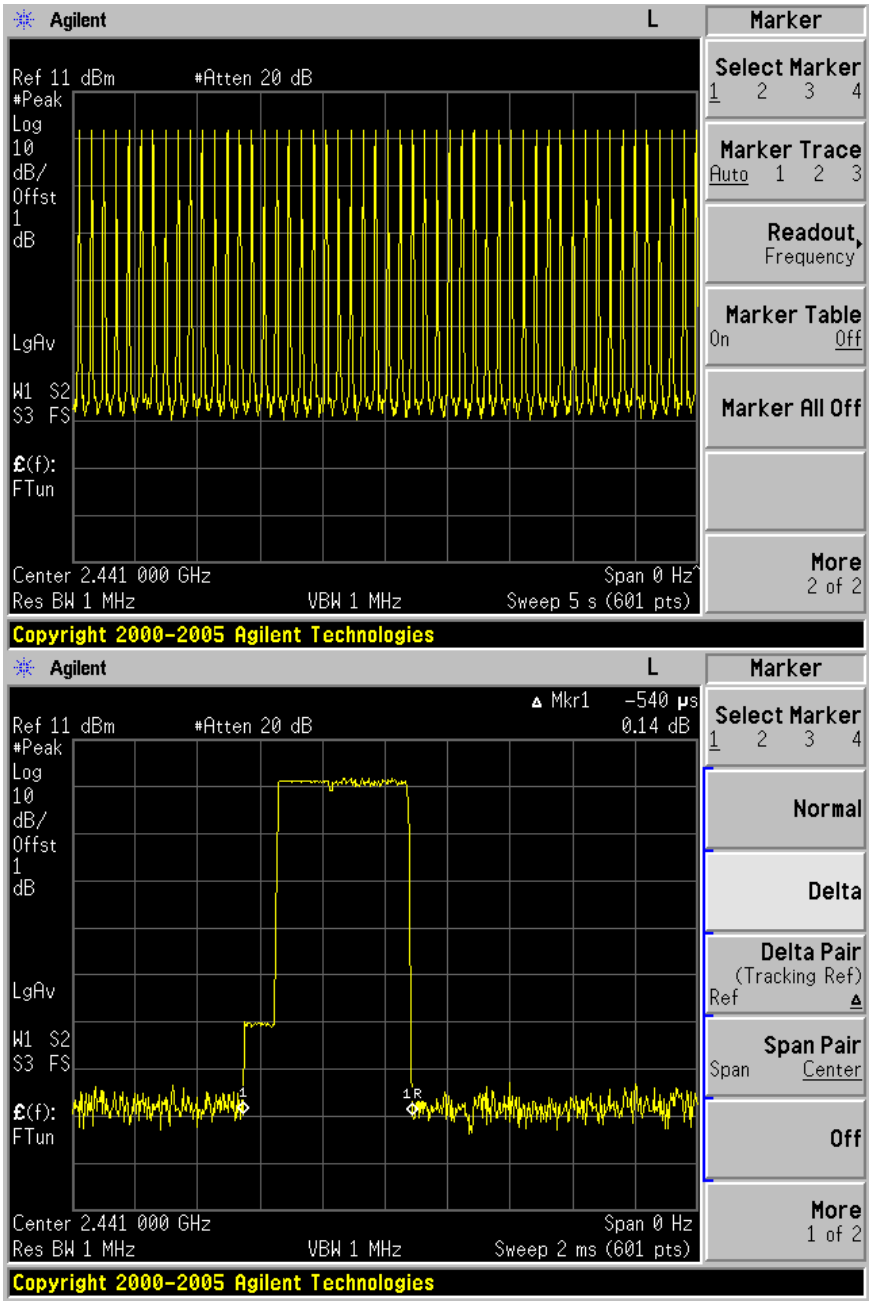
Dwell Time

Bluetooth Mode 8-DPSK Modulation:

Test Result

Mode	Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	540	174.05	< 400	Pass
DH3	1800	284.40	< 400	Pass
DH5	3060	328.77	< 400	Pass



DH1

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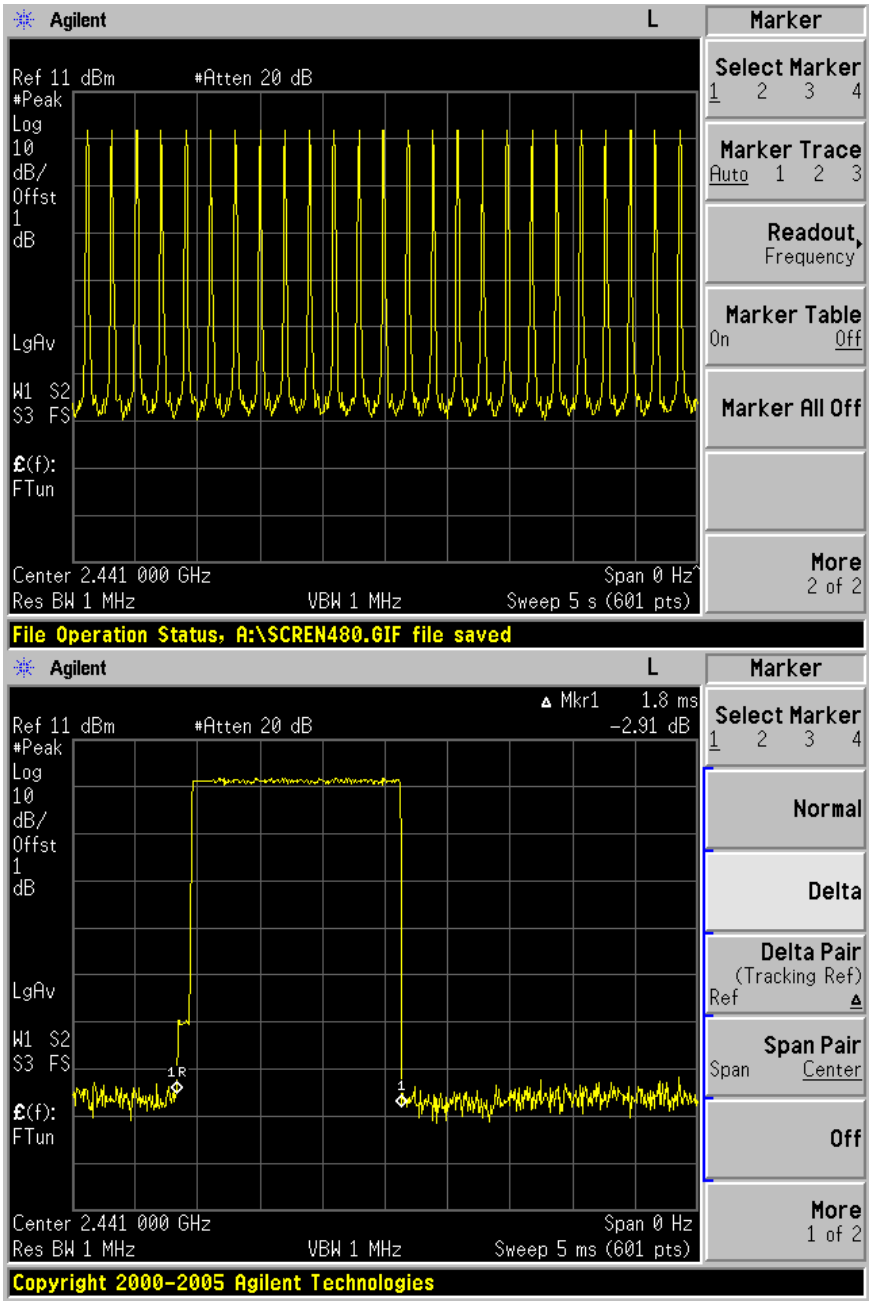
Dwell Time



DH3

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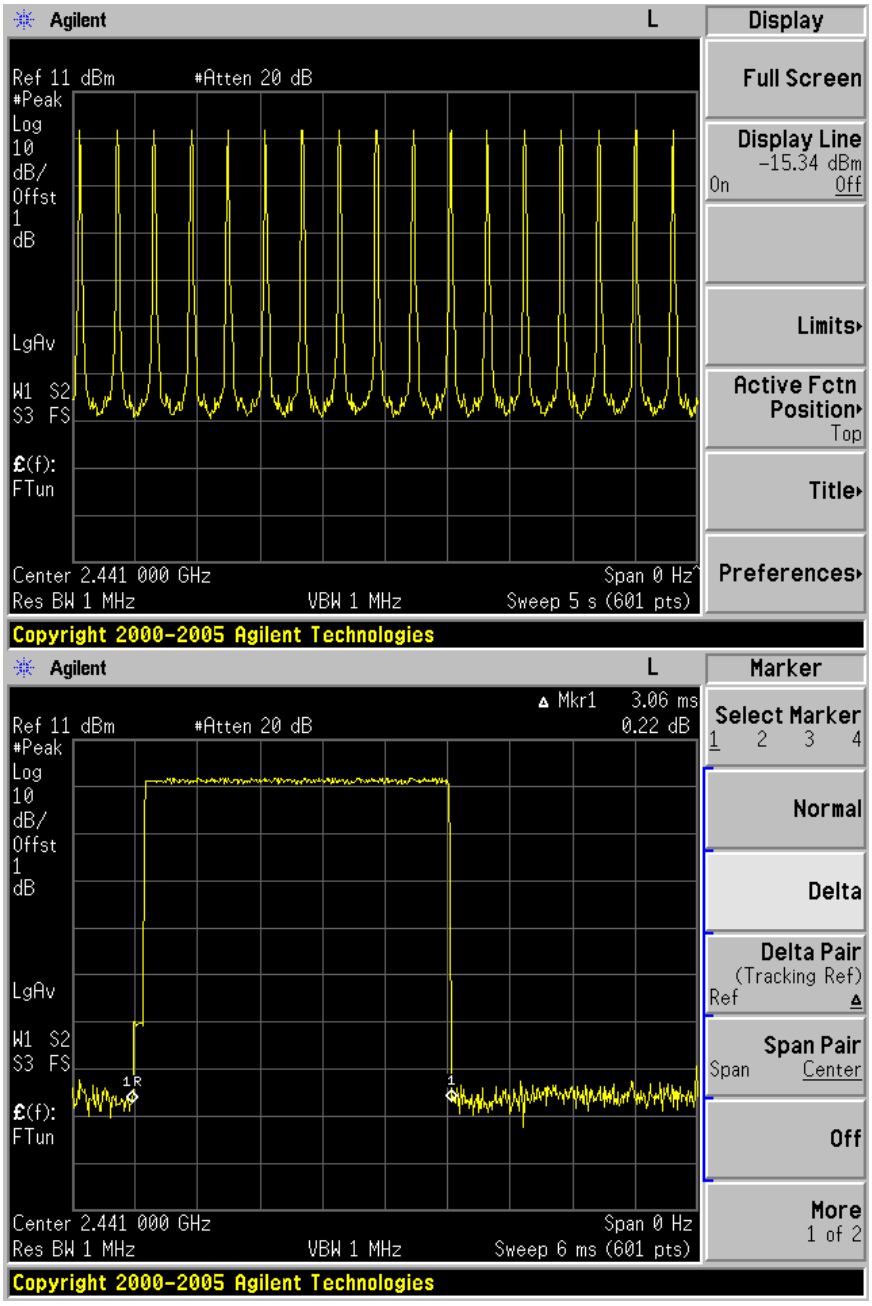
Dwell Time



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= 25(times)/5(s) *1800 (μs) *31.6(s)= 284.40(ms)
DH5 time slot= 17(times)/5(s) *3060 (μs) *31.6(s)=328.77 (ms)

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Test Equipment

Dwell Time Test

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

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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 (dBμV/m)	U=4.32dB (30MHz-25GHz)
CE	Disturbance Voltage (dBμV)	U=2.4dB

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