

FCC - TEST REPORT

Report Number : **68.920.15.020.01** Date of Issue: Apr 22, 2015

FCC Model : SHB4000, SHB4000/XX, SHB4000YY/XX,
SHB4100, SHB4100/XX, SHB4100YY/XX
SHK4000, SHK4000/XX, SHK4000YY/XX (XX=00 to 99 for
marketing purpose representing different countries, YY=AA to ZZ
for different color)

Product Type : Bluetooth Headset

Applicant : Gibson Innovations Limited

Address : 5/F Philips Electronics Building, 5 Science Park East Ave, HK
Science Park, Shatin, NT, Hong Kong

Production Facility : Concord Electronics Factory

Address : 21, PingAn Road, ShuiKou HuiCheng District, HuiZhou
GuangDing, China

Test Result : Positive Negative

Total pages including
Appendices : 56

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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China

Telephone: 86 755 2663 9496

Fax: 86 755 2663 2877

3 Description of the Equipment Under Test

Product:	Bluetooth Headset
FCC Model No.:	SHB4000, SHB4000/XX, SHB4000YY/XX, SHB4100, SHB4100/XX, SHB4100YY/XX SHK4000, SHK4000/XX, SHK4000YY/XX(XX=00 to 99 for marketing purpose representing different countries, YY=AA to ZZ for different color)
FCC ID:	2AANUSHB4000
IC ID:	11260A-SHB4000
Brand Name:	Philips
Options and accessories:	NIL
Rating:	DC3.7V (supplied by Li-ion rechargeable battery) DC5V (charged by USB port)
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Duty Cycle:	33.9%
Antenna Type:	Dip type antenna
Antenna Gain:	-0.8dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Bluetooth Headset with Bluetooth function operating at 2.4GHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements for the Certification of Radio Apparatus
RSS-210 Issue 8 December 2010	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to Public Notice DA 00-705 -Frequency Hopping Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2013).

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C, RSS-Gen, RSS-210					
Test Condition			Pages	Test Site	Test Result
§15.207	RSS-Gen A8.8	Conducted emission AC power port	10	Site 1	Pass
§15.247(b)(1)	RSS-210 A8.4	Conducted peak output power	13	Site 1	Pass
§15.247(a)(2)	RSS-210 A8.2(a)	6dB bandwidth	---	---	N/A
§15.247(a)(1)	RSS-210 A8.1(a) & RSS-Gen 6.6	20dB bandwidth and 99% Occupied Bandwidth	15	Site 1	Pass
§15.247(a)(1)	RSS-210 A8.1(b)	Carrier frequency separation	22	Site 1	Pass
§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Number of hopping frequencies	24	Site 1	Pass
§15.247(a)(1)(iii)	RSS-210 A8.1(c)	Dwell Time	26	Site 1	Pass
§15.247(e)	RSS-210 A8.2(b)	Power spectral density*	---	---	N/A
§15.247(d)	RSS-210 A8.5	Spurious RF conducted emissions	29	Site 1	Pass
§15.247(d)	RSS-210 A8.5	Band edge	35	Site 1	Pass
§15.247(d) & §15.209 &	RSS-210 2.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter and receiver	52	Site 1	Pass
§15.203	RSS-Gen 8.3	Antenna requirement	See note 1		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a Dip Type antenna, which gain is -0.8dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AANUSHB4000 and IC ID: 11260A-SHB4000, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C and RSS-210.

SHB4000, SHB4000/XX, SHB4000YY/XX, SHB4100, SHB4100/XX, SHB4100YY/XX, SHK4000, SHK4000/XX, SHK4000YY/XX (XX=00 to 99 for marketing purpose representing different countries, YY=AA to ZZ for different color) have the same technical construction including software design, RF module, circuit design and PCB layout.

The only difference is the size of SHB4000, SHB4000/XX, SHB4000YY/XX, SHB4100, SHB4100/XX, SHB4100YY/XX is larger than SHK4000, SHK4000/XX, SHK4000YY/XX (XX=00 to 99 for marketing purpose representing different countries, YY=AA to ZZ for different color), SHK4000, SHK4000/XX, SHK4000YY are designed for kids version, which will not affect its electromagnetic emissions, radio-frequency output signal characteristics and output power level. Therefore full test was applied on SHB4000, the other model is deemed to fulfill relevant EMC requirement without further testing.

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: Jan 22, 2013

Testing Start Date: Jan 22, 2013

Testing End Date: Jan 25, 2013

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

Prepared by:

Tested by:



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EMC Project Manager



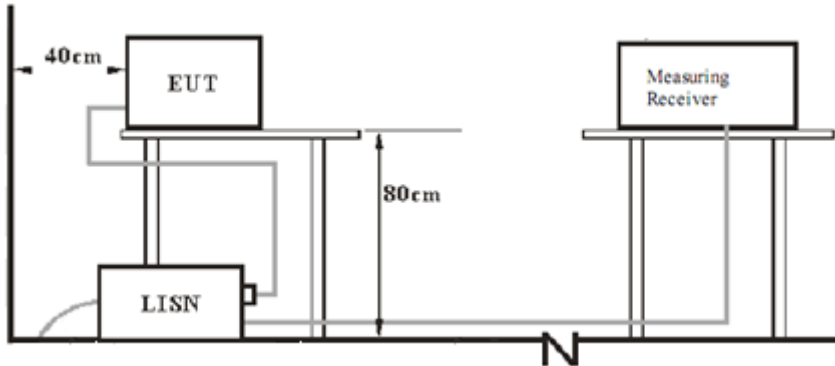
Calvin Weng
EMC Project Engineer



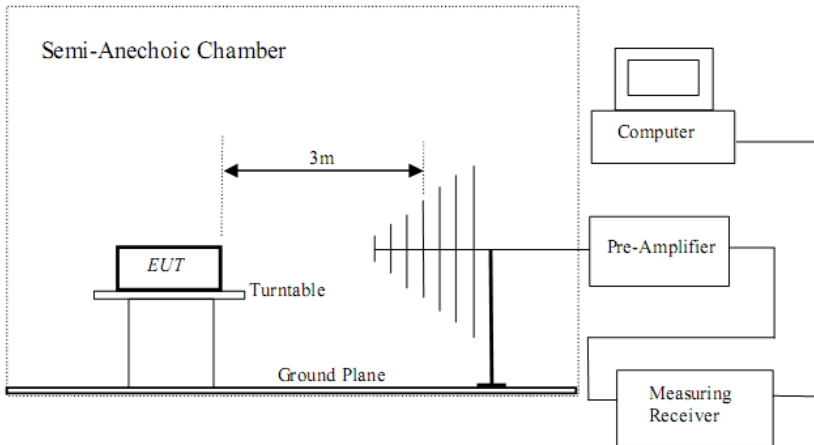
Leo Li
EMC Test Engineer

7 Test Setups

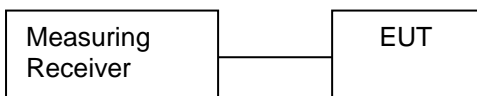
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
MP4 Player	Apple	iPod touch	---

Test software: RF Control Kit v1.0.exe, which used to control the EUT in continues transmitting mode

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

9 Technical Requirement

9.1 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

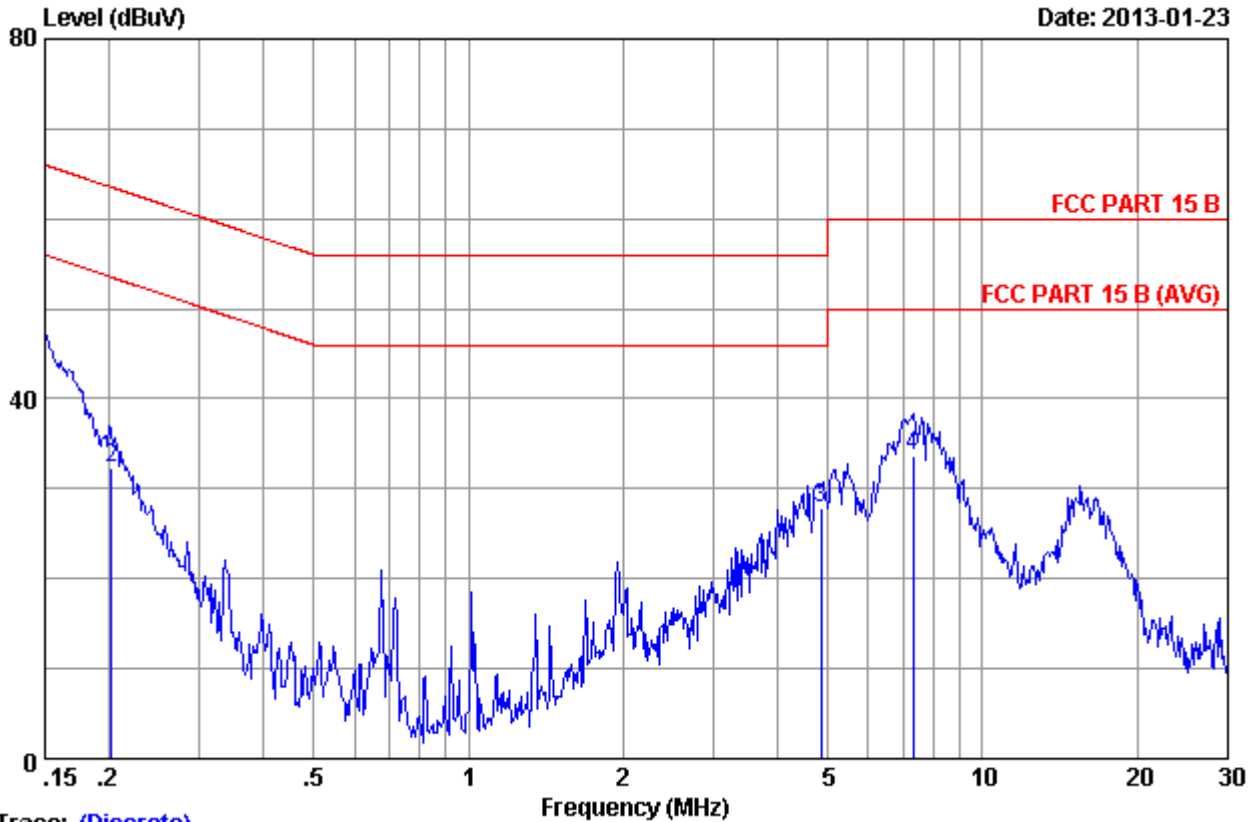
Limit

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

Conducted Emission

Product Type : Bluetooth Headset
 M/N : SHB4000
 Operating Condition : Charging and transmitting
 Test Specification : Power Line, Live
 Comment : AC 120V/60Hz



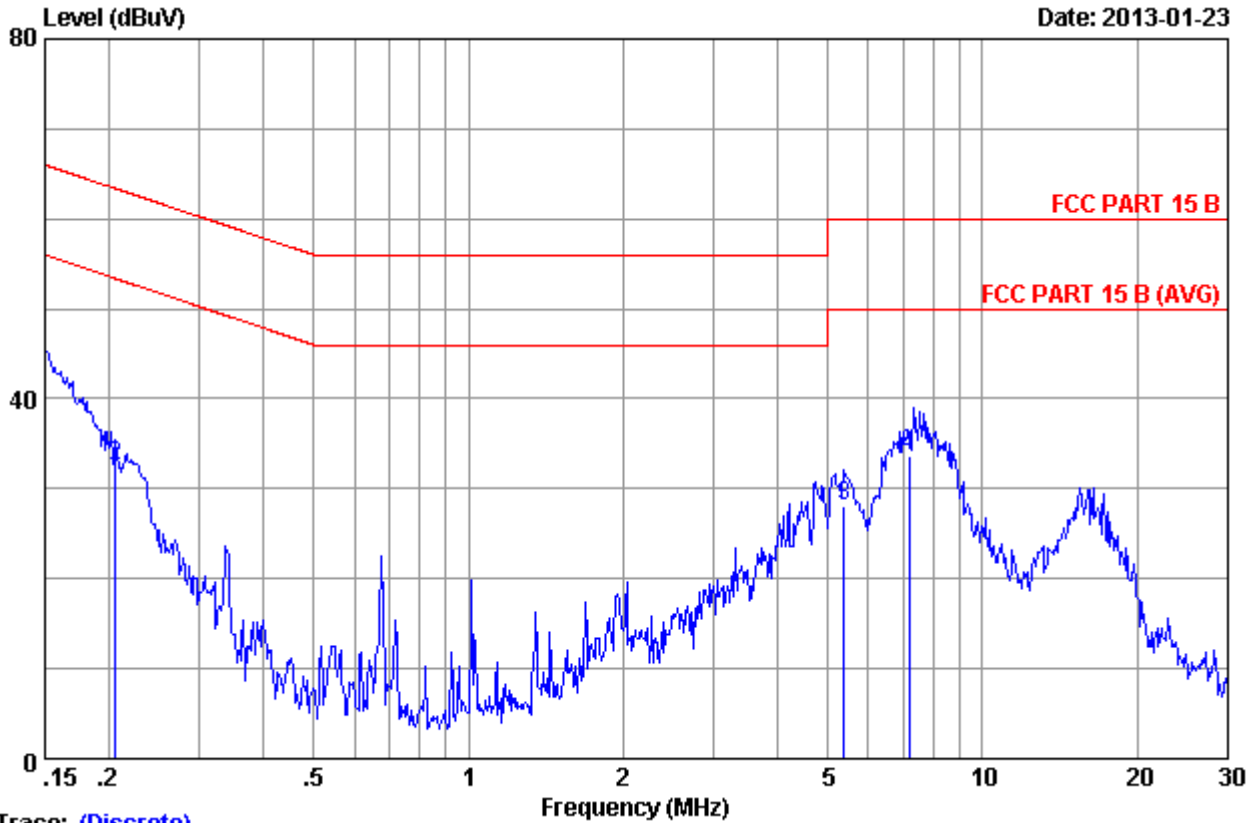
Trace: (Discrete)

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15000	0.19	0.14	38.61	38.94	66.00	27.06	QP
2	0.20200	0.19	0.14	32.00	32.33	63.53	31.20	QP
3	4.844	0.31	0.15	27.40	27.86	56.00	28.14	QP
4	7.321	0.39	0.16	32.99	33.54	60.00	26.46	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+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

Product Type : Bluetooth Headset
 M/N : SHB4000
 Operating Condition : Charging and transmitting
 Test Specification : Power Line, Neutral
 Comment : AC 120V/60Hz



Trace: (Discrete)

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15000	0.21	0.14	39.80	40.15	66.00	25.85	QP
2	0.20600	0.21	0.15	32.20	32.56	63.37	30.81	QP
3	5.369	0.35	0.15	27.60	28.10	60.00	31.90	QP
4	7.203	0.40	0.16	33.00	33.56	60.00	26.44	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+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.

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW,
Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

According to §15.247 (b) (1) , conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.44	Pass
Middle channel 2441MHz	3.45	Pass
High channel 2480MHz	3.84	Pass

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

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	0.17	Pass
Middle channel 2441MHz	0.23	Pass
High channel 2480MHz	0.56	Pass

Bluetooth Mode 8DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	0.43	Pass
Middle channel 2441MHz	0.48	Pass
High channel 2480MHz	0.94	Pass



9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one 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.

Limit

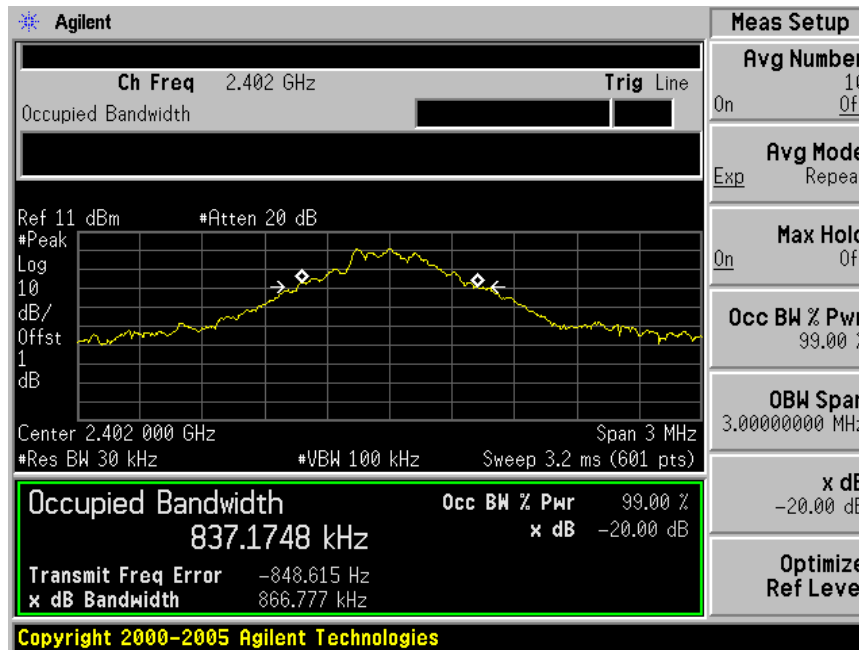
Limit [kHz]

N/A

20 dB bandwidth and 99% Occupied Bandwidth

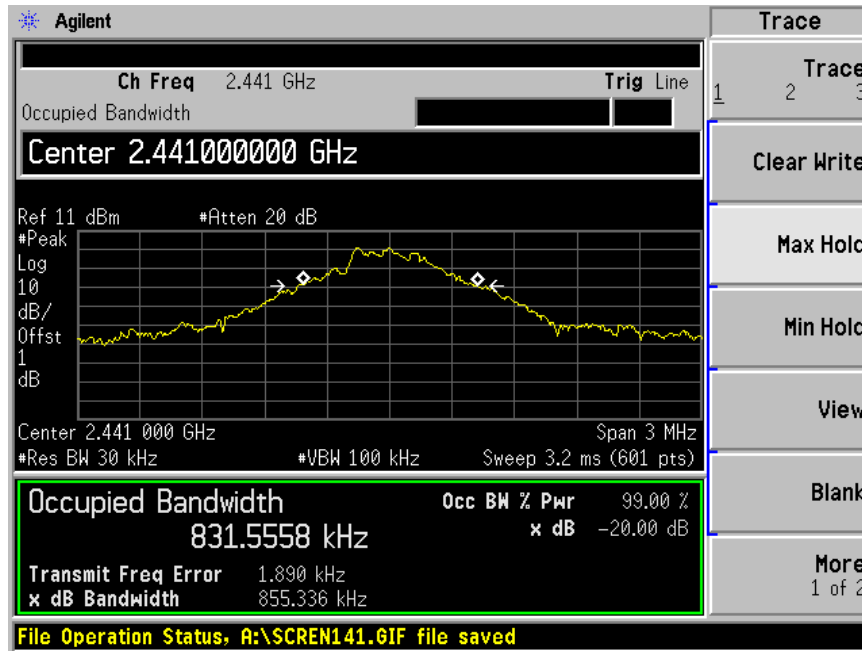
Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	866.777	837.1748	--	Pass
2441	855.336	831.5558	--	Pass
2480	852.940	827.9023	--	Pass

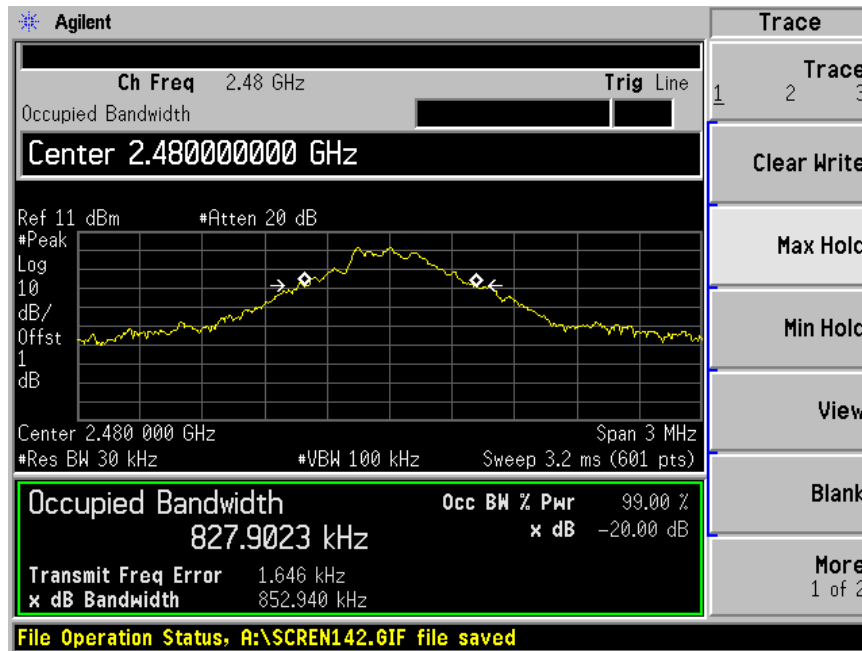


2402MHz

20 dB bandwidth and 99% Occupied Bandwidth



2441MHz

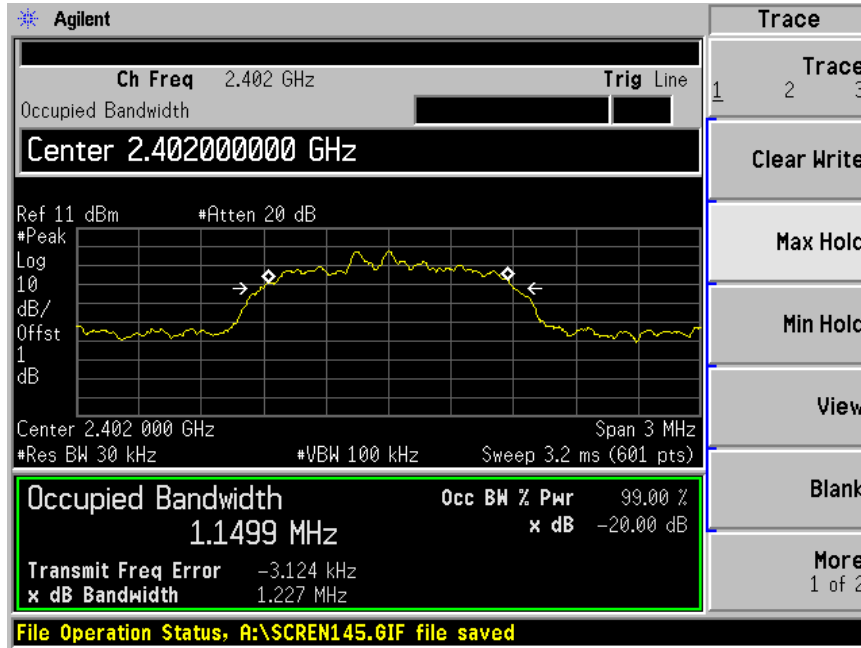


2480MHz

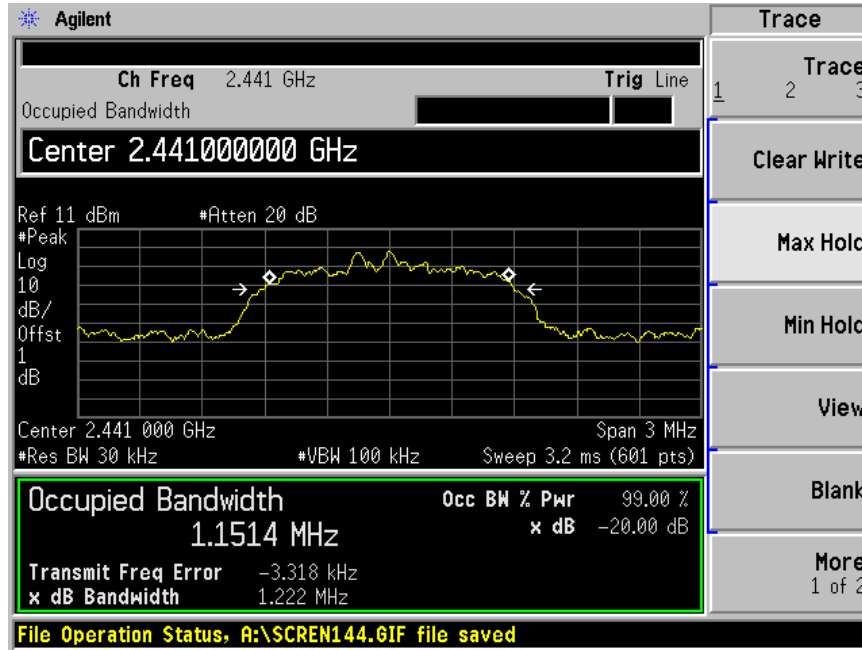
20 dB bandwidth and 99% Occupied Bandwidth

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

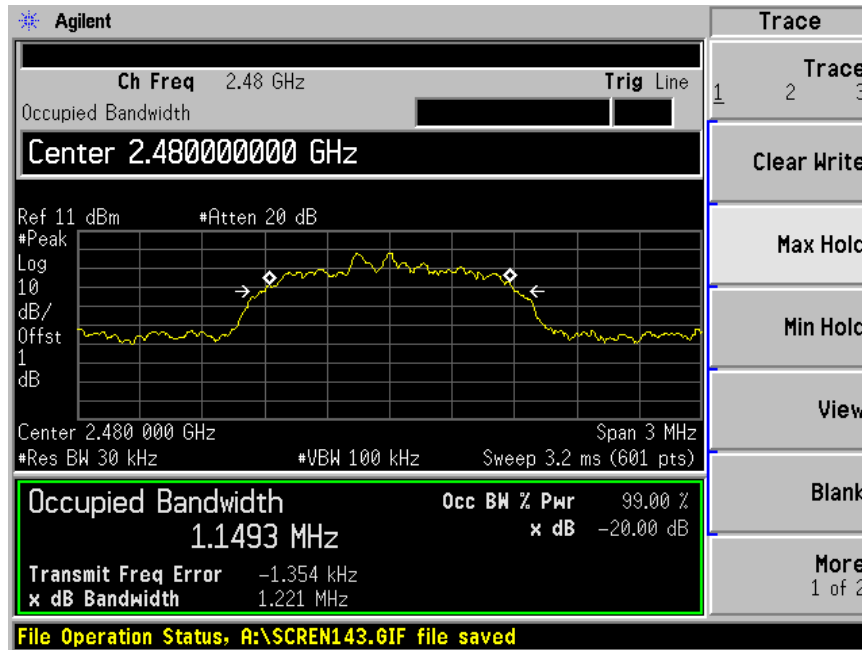
Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1227.0	1149.9	--	Pass
2441	1222.0	1151.4	--	Pass
2480	1221.0	1149.3	--	Pass



2402MHz



2441MHz

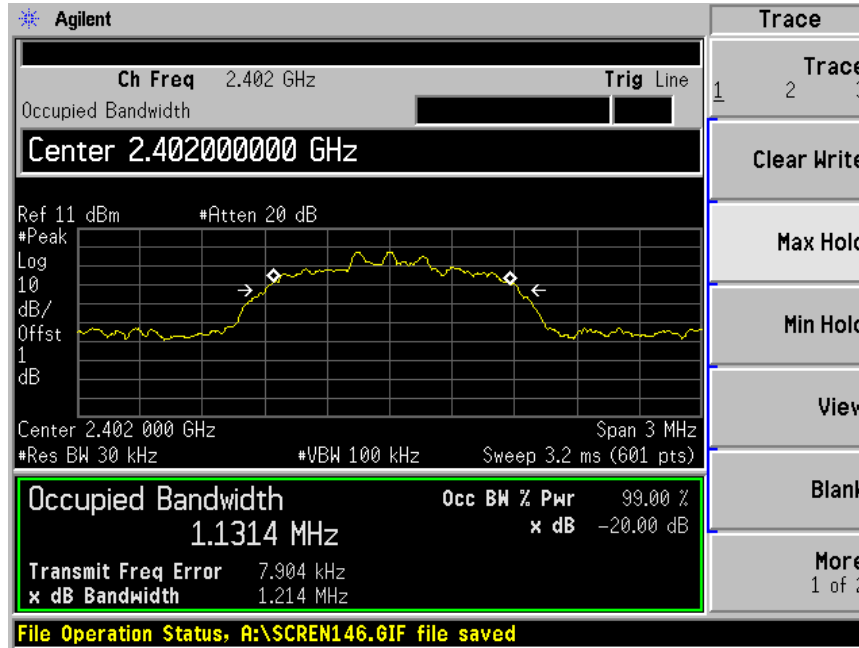


2480MHz

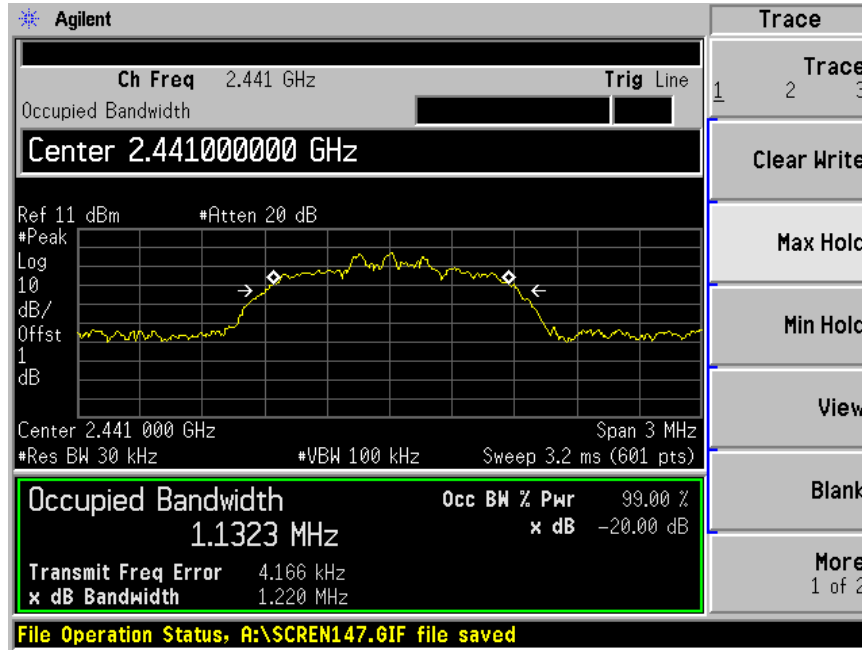
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode 8DPSK Modulation test result

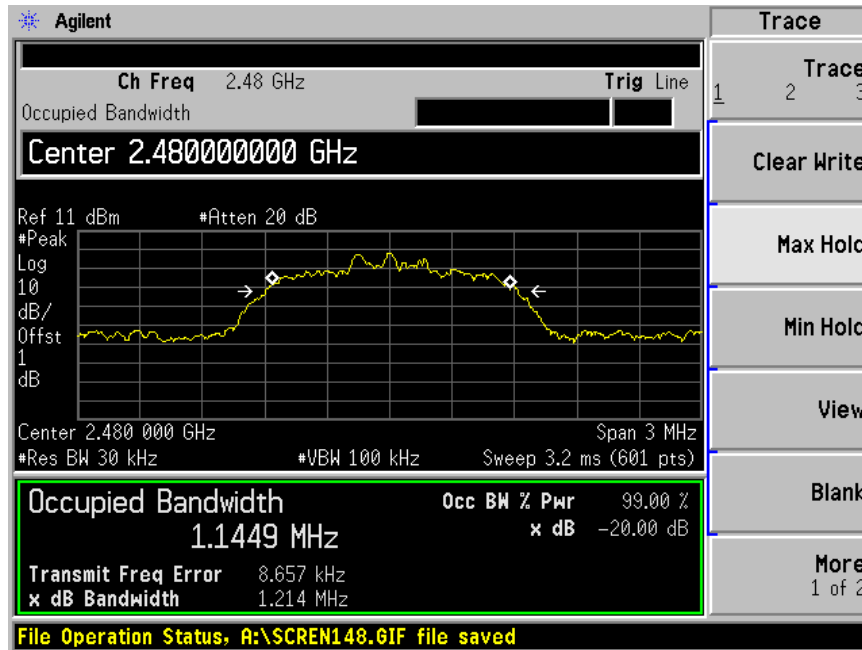
Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1214.0	1131.4	--	Pass
2441	1220.0	1132.3	--	Pass
2480	1214.0	1144.9	--	Pass



2402MHz



2441MHz



2480MHz

9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, RBW \geq 1% of the span, VBW \geq RBW, Sweep = auto, Detector function = peak
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

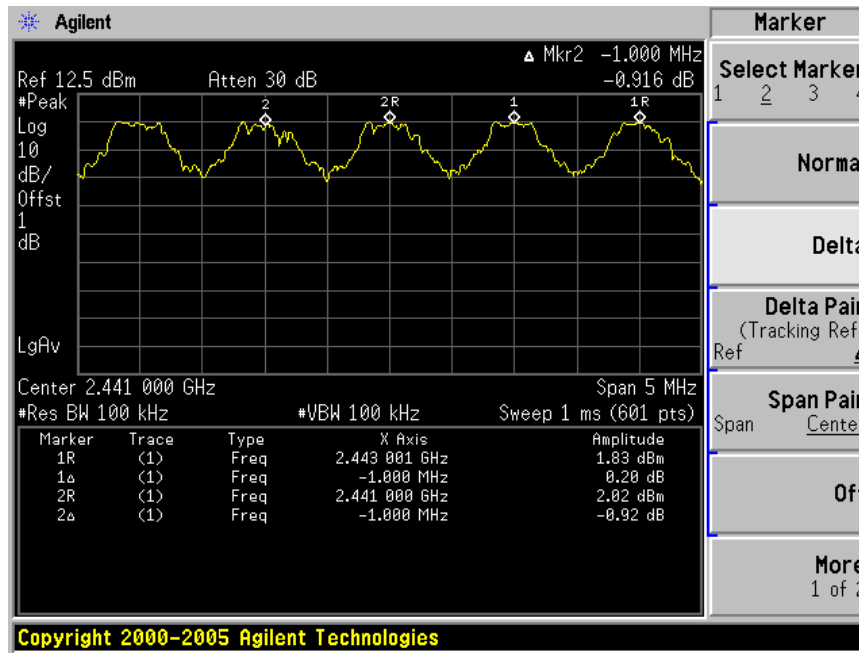
Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	549.3147
2441	543.1322
2480	552.7683

Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here GFSK modulation mode was used to show compliance.

GFSK Modulation test result

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



9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, $RBW \geq 1\%$ of the span, $VBW \geq RBW$, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

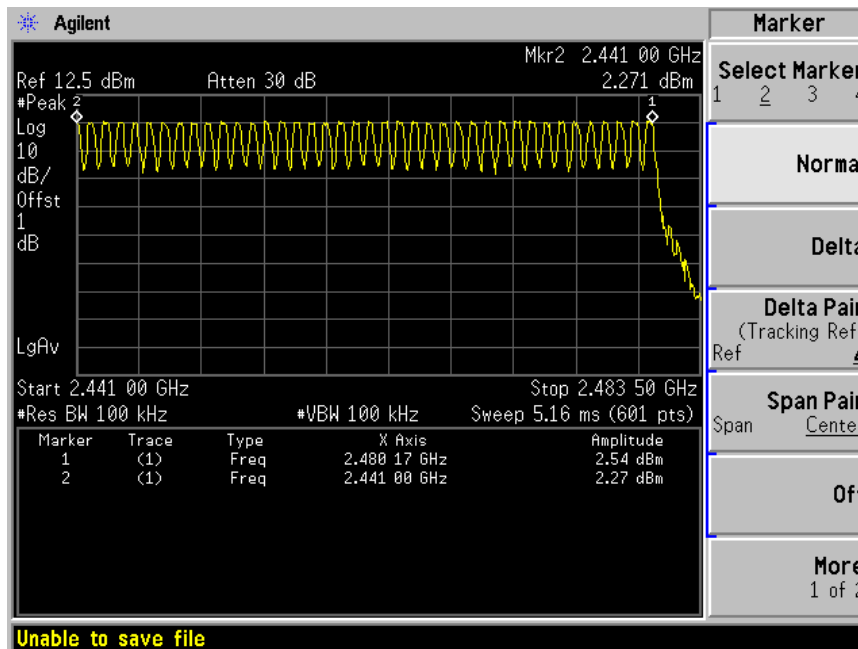
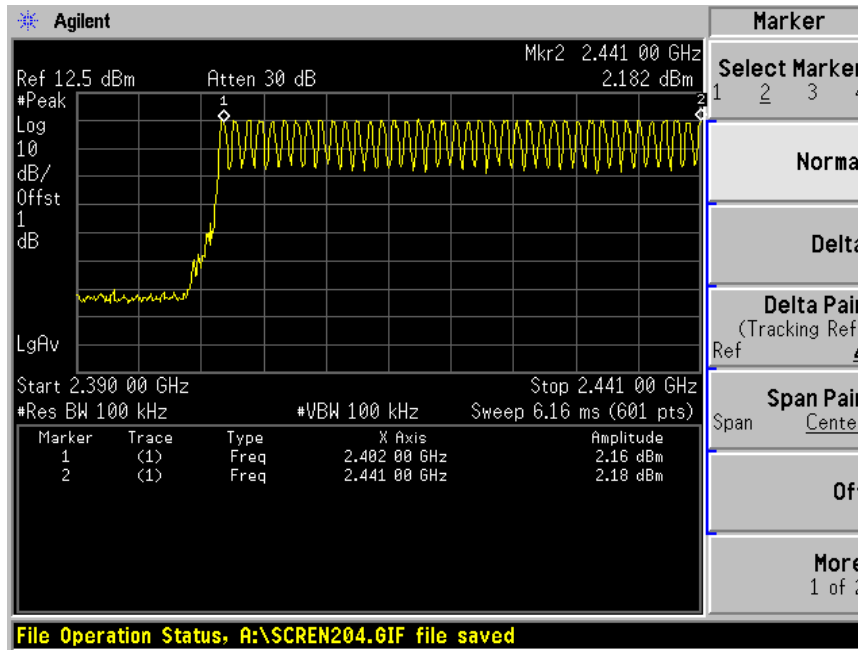
**Limit
number**

≥ 15

Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass



9.6 Dwell Time

Test Method

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

Limit

According to §15.247(a)(1)(iii) . 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.

According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:

The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

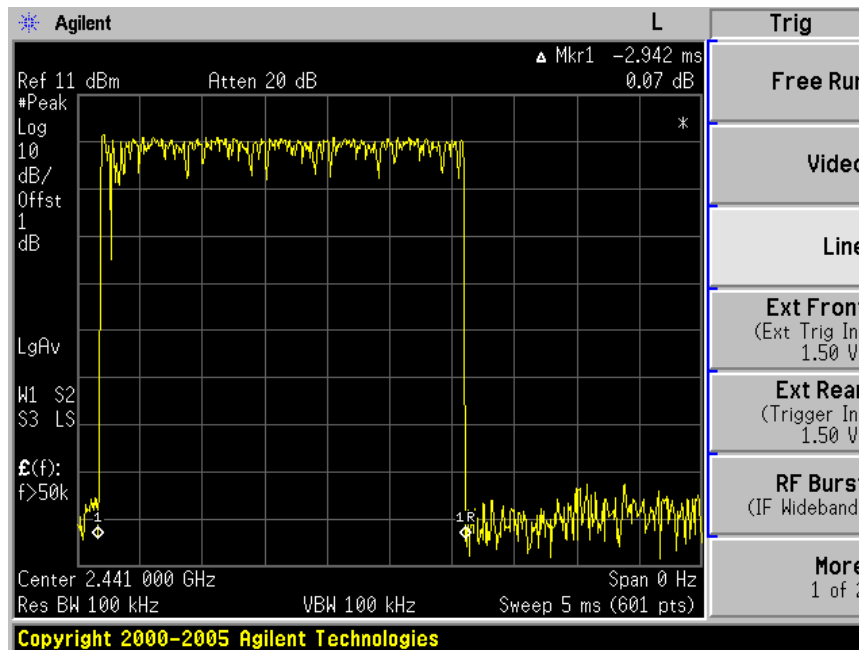
The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 31.6s for DH5=1600 / 6 / 79 *31.6=106.67

Test Result

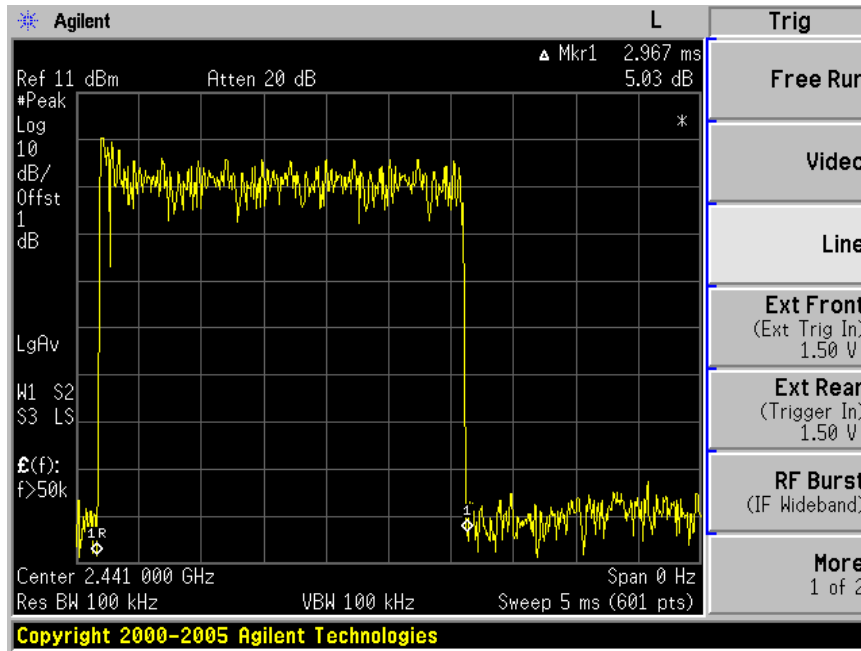
Modulation	Mode	Reading (µs)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	2942	106.67	297.495	< 400	Pass
π/4-DQPSK	2DH5	2967	106.67	262.520	< 400	Pass
8-DPSK	3DH5	2942	106.67	297.495	< 400	Pass

GFSK Modulation



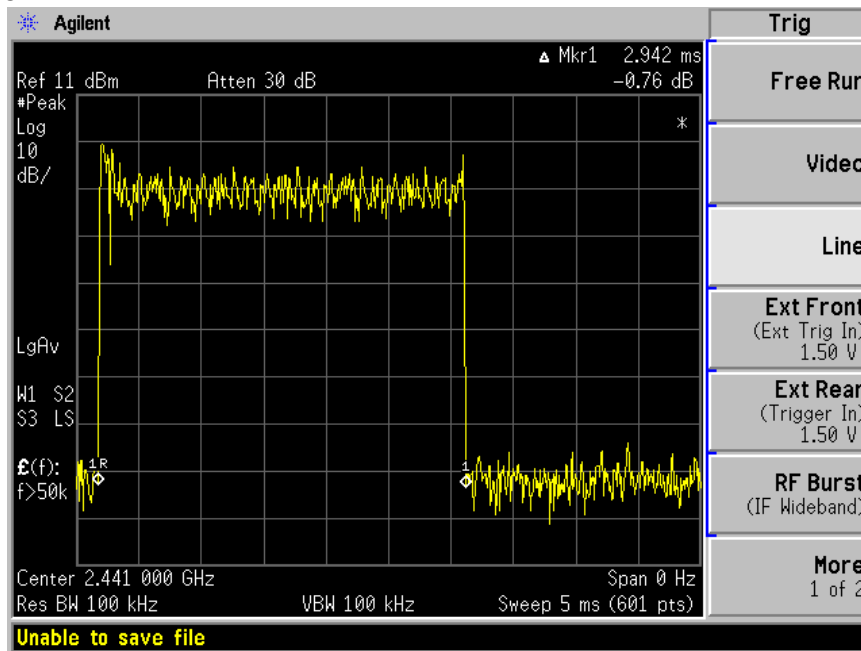
DH5

$\pi/4$ -DQPSK Modulation



2DH5

8-DPSK Modulation



3DH5

9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

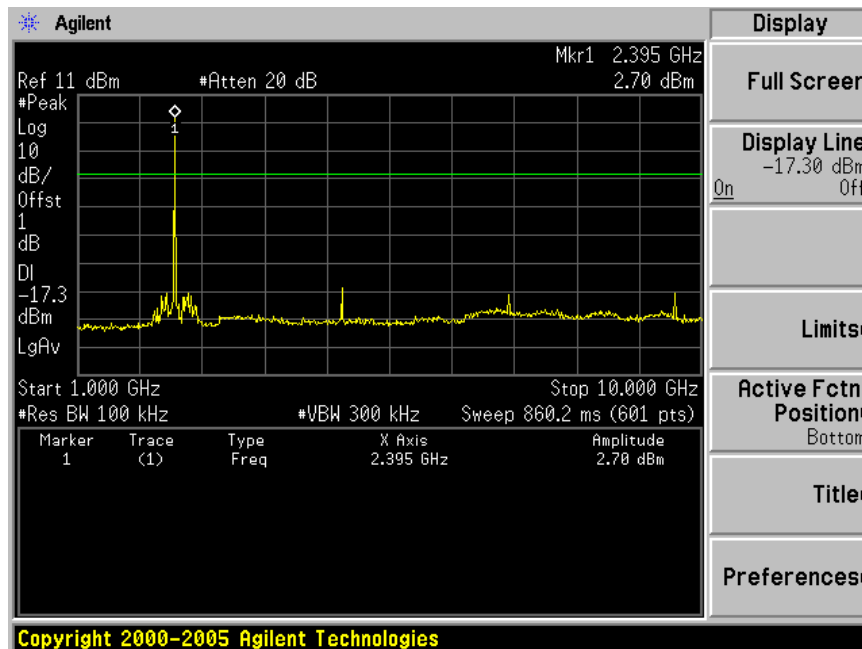
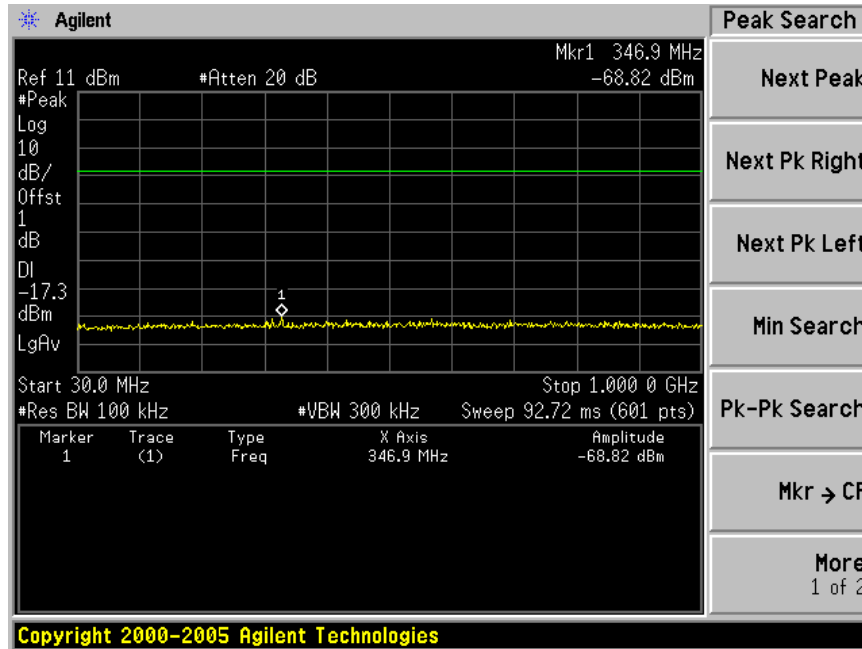
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

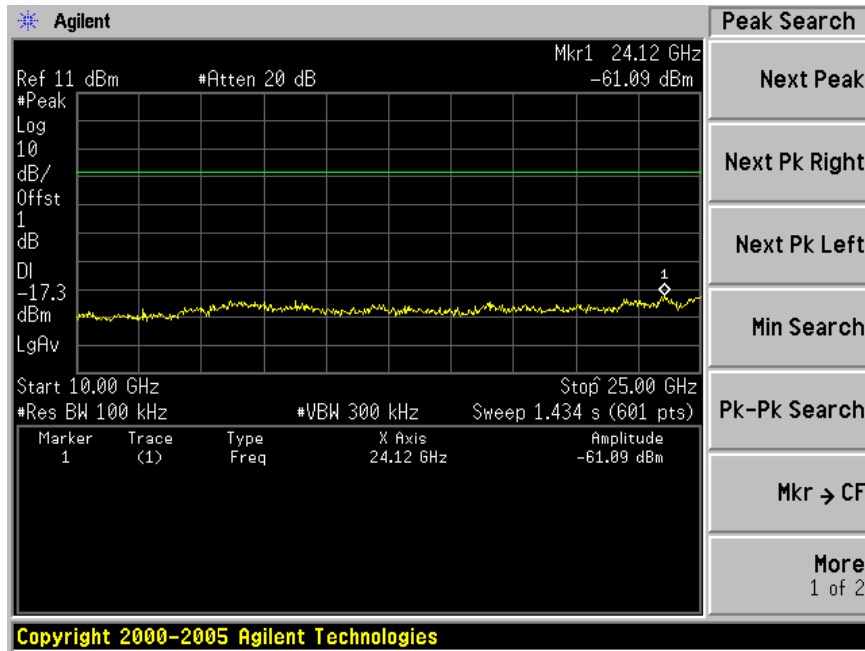
Spurious RF conducted emissions

Only the worse case (which is subject to the maximum EIRP, GFSK mode) test result is listed in the report.

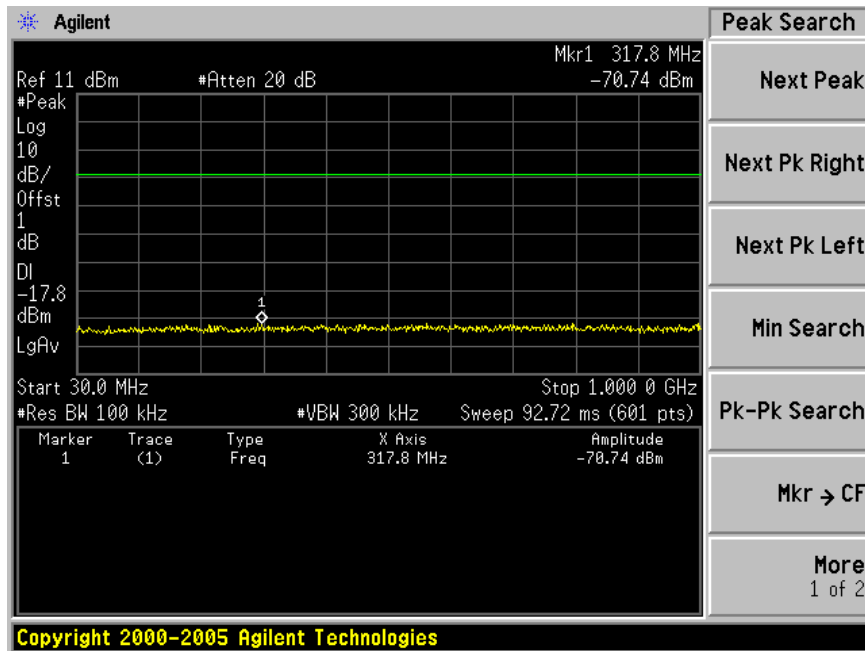
2402MHz



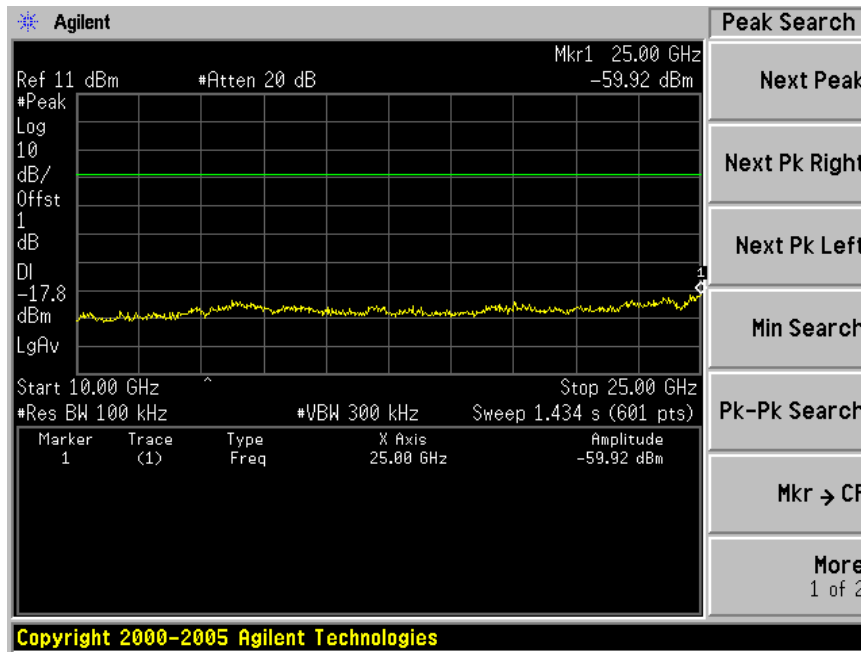
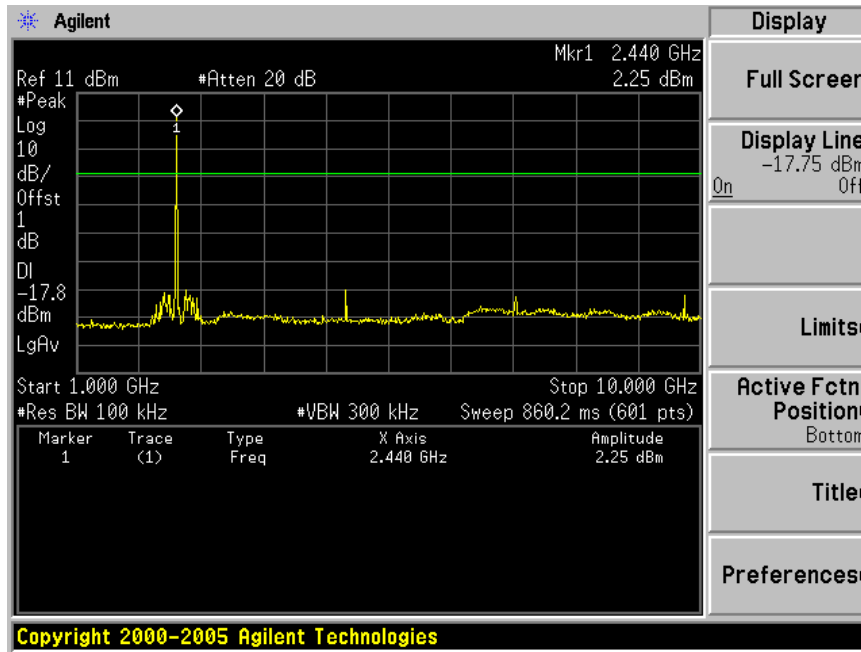
Spurious RF conducted emissions



2441MHz

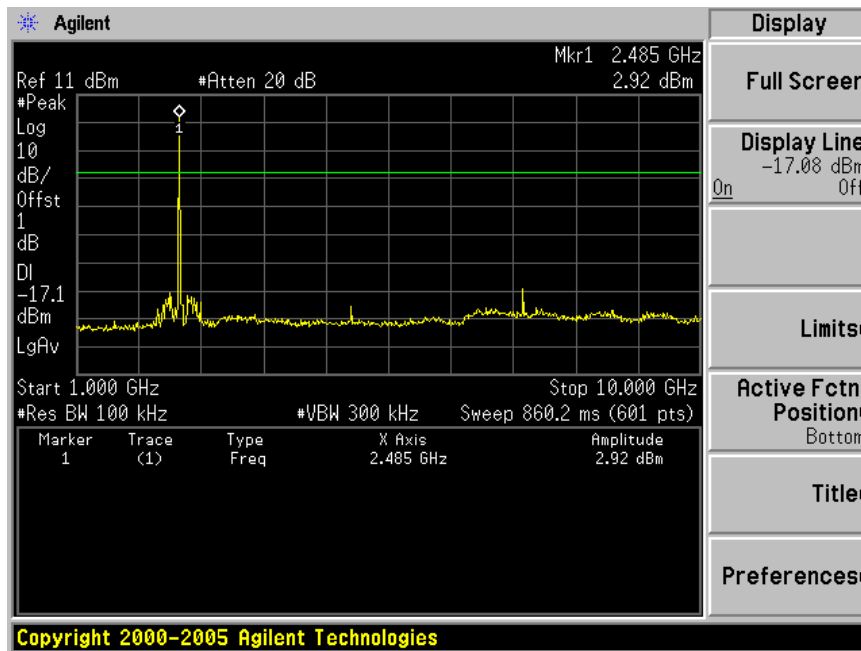
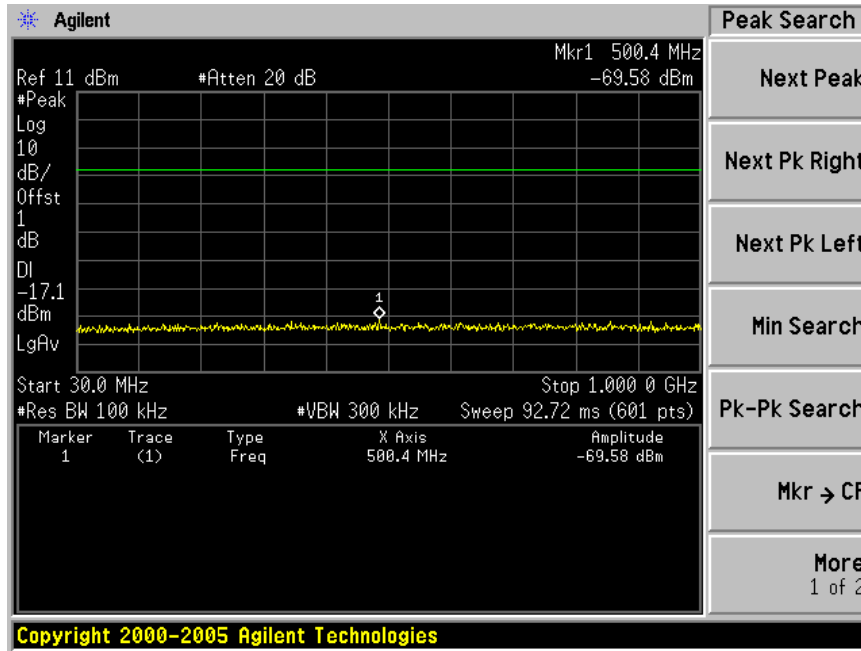


Spurious RF conducted emissions



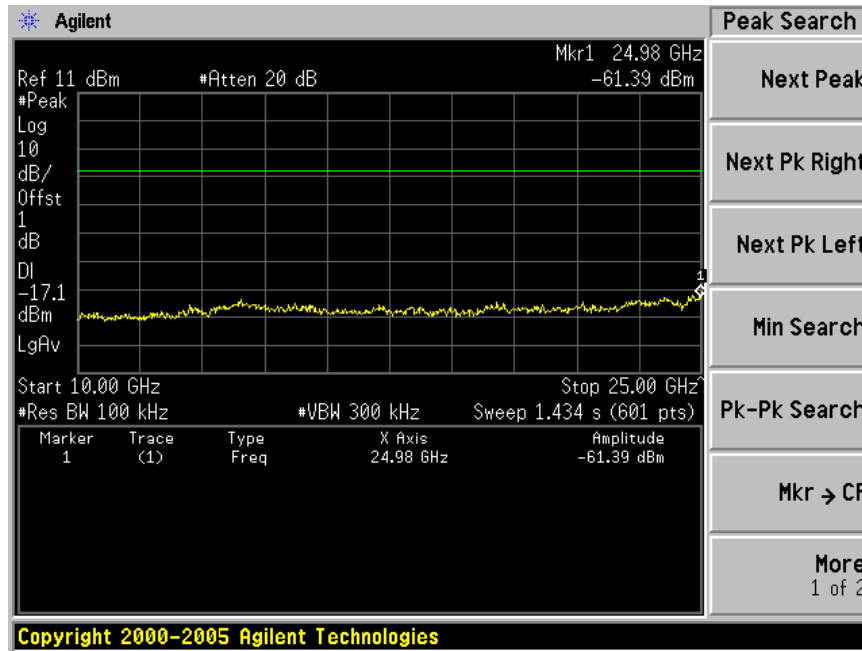
Spurious RF conducted emissions

2480MHz





Spurious RF conducted emissions



9.8 Band edge testing

Test Method

- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

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)).

Band edge testing

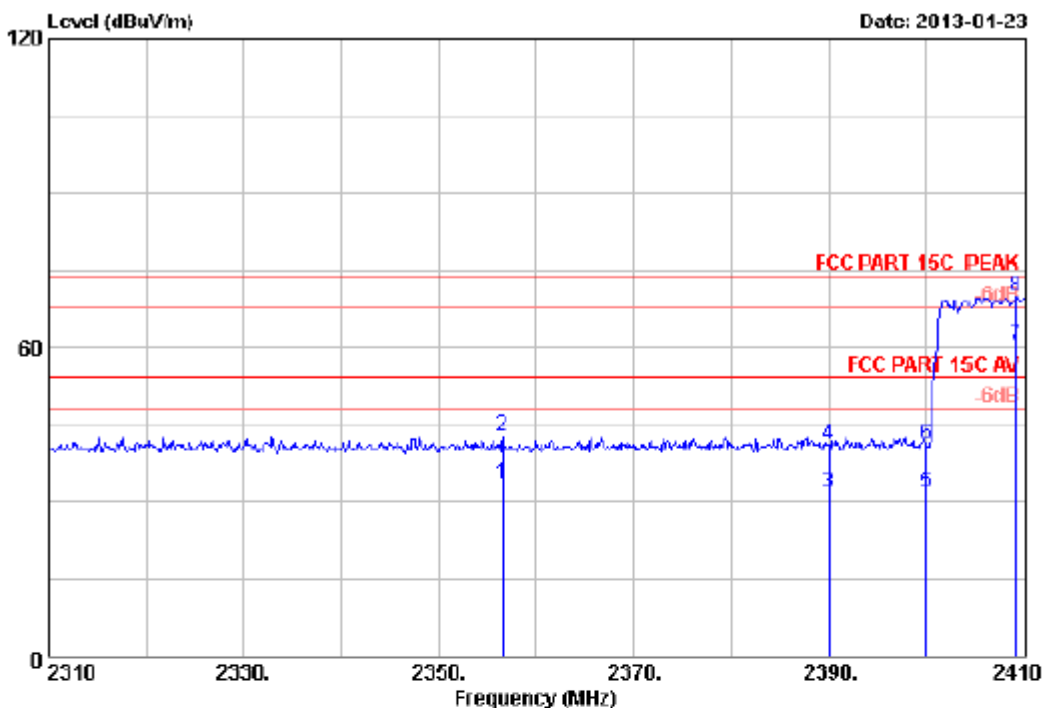
The EUTs have been tested under all modulation modes, only the worse case GFSK and 8-DPSK modulation with Radiated measurement test result are listed in the report.

Bluetooth Mode GFSK Modulation Test Result:

Lower edge peak Plot:

Hopping on mode:

Horizontal:



```

Site no.       : 3m Chamber          Data no.      : 4
Dis. / Ant.   : 3m 2012 3115 (4580) Ant. pol.     : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23°C/54%           Engineer      : Leo-Li
EUT           : SHB4000
Power supply  : DC 3.7V
Test mode     : Hopping (GFSK)
H/N           :
    
```

	Freq. [MHz]	Ant. Factor [dB/m]	Cable loss [dB]	Amp. Factor [dB]	Emission Reading [dBuV]	Emission Level [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Remark
1	2356.500	26.48	5.94	35.92	36.89	33.39	54.00	20.61	Average
2	2356.500	26.48	5.94	35.92	46.28	42.78	74.00	31.22	Peak
3	2390.000	26.70	6.00	35.92	34.98	31.76	54.00	22.24	Average
4	2390.000	26.70	6.00	35.92	44.38	41.16	74.00	32.84	Peak
5	2400.000	26.76	6.02	35.92	34.78	31.64	54.00	22.36	Average
6	2400.000	26.76	6.02	35.92	44.18	41.04	74.00	32.96	Peak
7	2409.000	26.82	6.03	35.92	63.51	60.44	54.00	-6.44	Average
8	2409.000	26.82	6.03	35.92	72.91	69.84	74.00	4.16	Peak

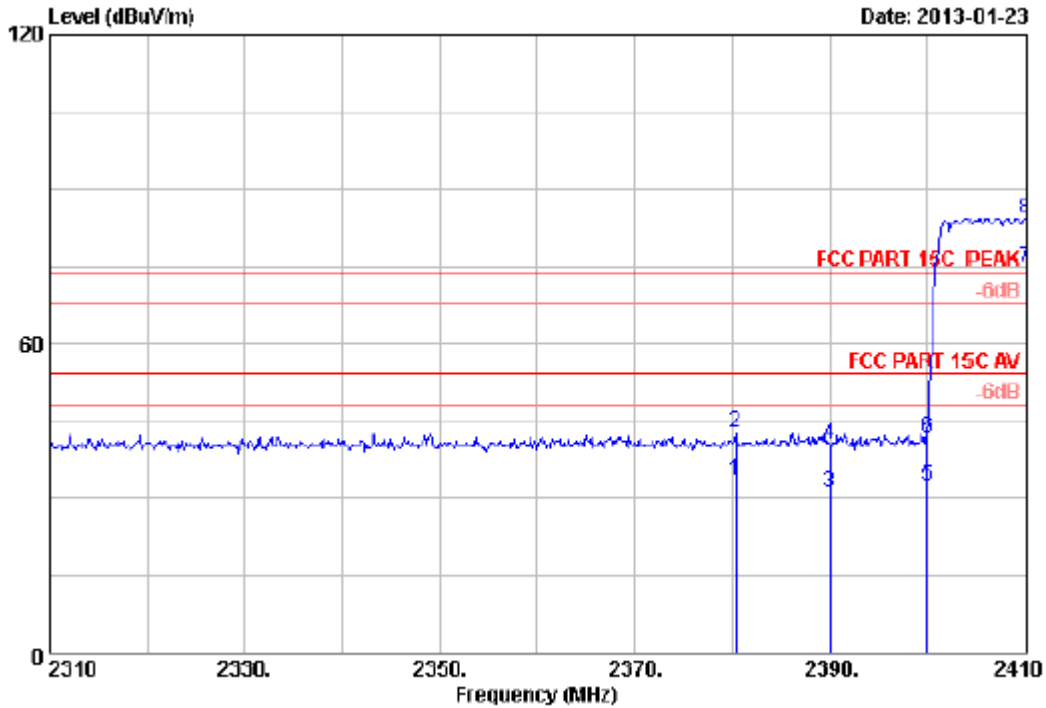
Remarks:

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



Band edge testing

Lower edge peak Plot:
Vertical:



```

Site no.      : 3m Chamber                Data no.   : 3
Dis. / Ant.  : 3m  2012 3115 (4580)      Ant. pol.  : VERTICAL
Limit        : FCC PART 15C PEAK
Env. / Ins.  : 23 °C/54%                  Engineer   : Leo-Li
EUT          : SHB4000
Power supply : DC 3.7V
Test mode    : Hopping (GFSK)
M/N          :
    
```

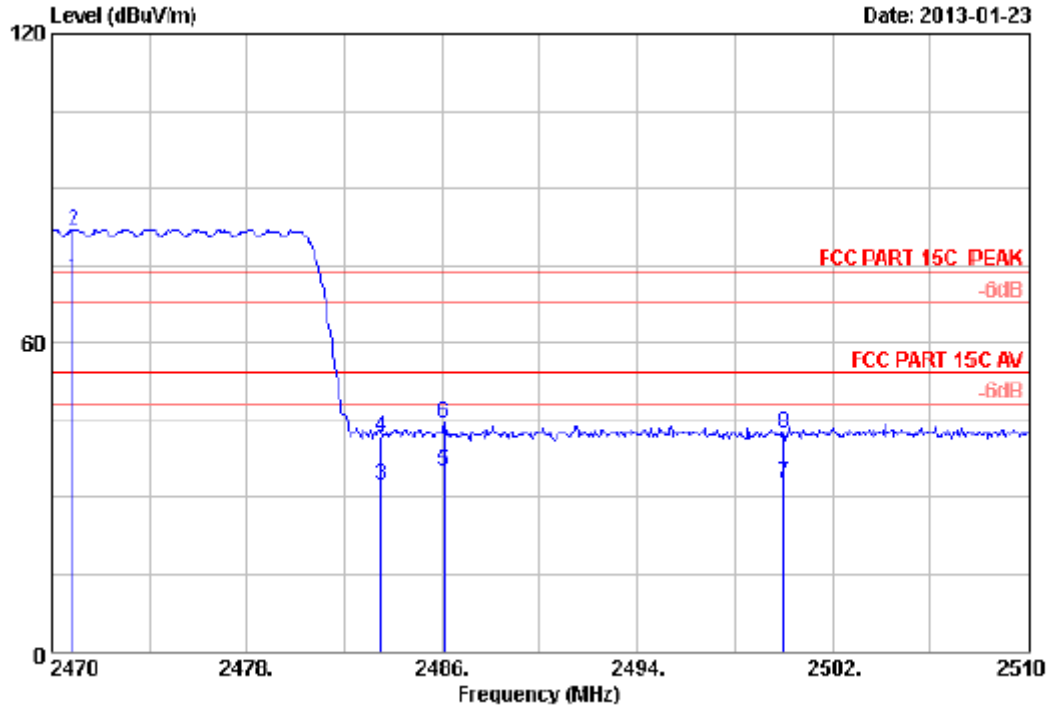
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission		Margin (dB)	Remark
						Level (dBuV/m)	Limits (dBuV/m)		
1	2380.300	26.63	5.98	35.92	36.69	33.38	54.00	20.62	Average
2	2380.300	26.63	5.98	35.92	46.08	42.77	74.00	31.23	Peak
3	2390.000	26.70	6.00	35.92	34.17	30.95	54.00	23.05	Average
4	2390.000	26.70	6.00	35.92	43.57	40.35	74.00	33.65	Peak
5	2400.000	26.76	6.02	35.92	35.65	32.51	54.00	21.49	Average
6	2400.000	26.76	6.02	35.92	45.05	41.91	74.00	32.09	Peak
7	2410.000	26.82	6.03	35.92	78.04	74.97	54.00	-20.97	Average
8	2410.000	26.82	6.03	35.92	87.43	84.36	74.00	-10.36	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 testing

Upper edge peak Plot:
Horizontal:



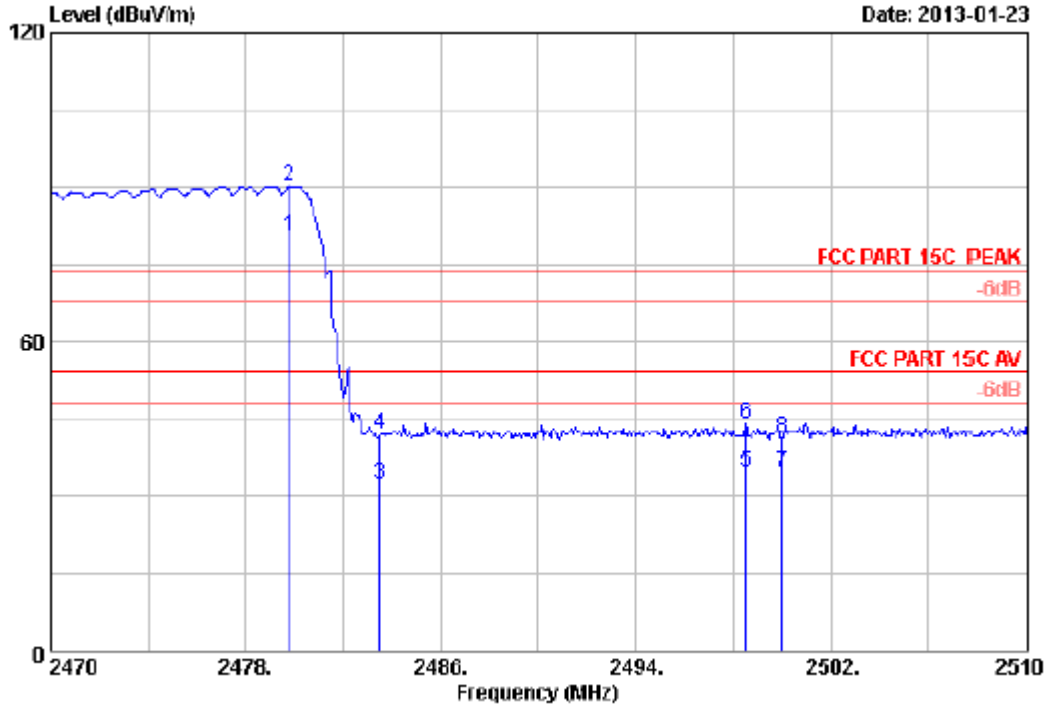
Site no. : 3m Chamber Data no. : 1
 Dis. / Int. : 3m 2012 3115 |4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : Hopping |GFSK
 N/N :
 :

	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	2470.880	27.21	6.14	35.92	75.15	72.58	54.00	-18.58	Average
2	2470.880	27.21	6.14	35.92	84.55	81.98	74.00	-7.98	Peak
3	2483.500	27.29	6.16	35.92	34.82	32.35	54.00	21.65	Average
4	2483.500	27.29	6.16	35.92	44.22	41.75	74.00	32.25	Peak
5	2486.080	27.31	6.16	35.92	37.52	35.07	54.00	18.93	Average
6	2486.080	27.31	6.16	35.92	46.92	44.47	74.00	29.53	Peak
7	2500.000	27.40	6.19	35.93	35.25	32.91	54.00	21.09	Average
8	2500.000	27.40	6.19	35.93	44.65	42.31	74.00	31.69	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.

Band edge testing

Upper edge peak Plot:
Vertical:



Site no. : 3m Chamber
 Dis. / Ant. : 3m 2012 3115 (4580)
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54%
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : Hopping (GFSK)
 M/N :
 Date no. : 2
 Ant. pol. : VERTICAL
 Engineer : Leo-Li

	Freq. [MHz]	Ant. Factor [dB/m]	Cable Loss [dB]	Imp. Factor [dB]	Reading [dBUV]	Emission Level [dBUV/m]	Limits [dBUV/m]	Margin [dB]	Remark
1	2479.800	27.27	6.15	35.92	83.20	80.70	54.00	-26.70	Average
2	2479.800	27.27	6.15	35.92	92.60	90.10	74.00	-16.10	Peak
3	2483.500	27.29	6.16	35.92	35.06	32.59	54.00	21.41	Average
4	2483.500	27.29	6.16	35.92	44.46	41.99	74.00	32.01	Peak
5	2498.520	27.39	6.18	35.92	37.20	34.85	54.00	19.15	Average
6	2498.520	27.39	6.18	35.92	46.60	44.25	74.00	29.75	Peak
7	2500.000	27.40	6.19	35.93	37.23	34.89	54.00	19.11	Average
8	2500.000	27.40	6.19	35.93	43.63	41.29	74.00	32.71	Peak

Remarks:

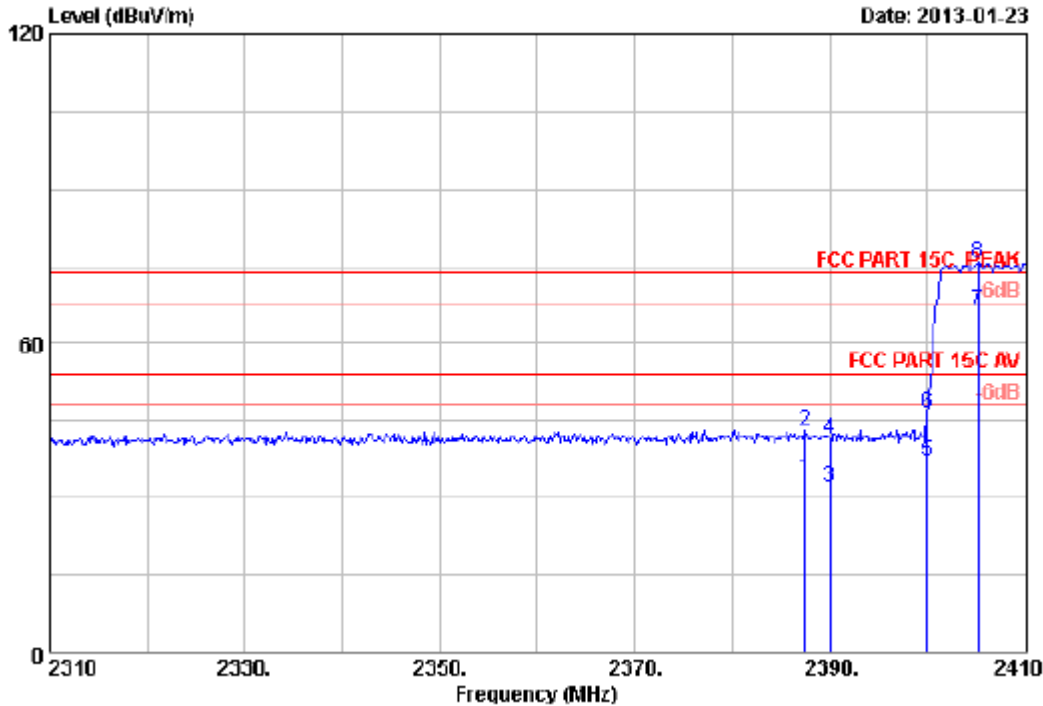
- Emission Level= Antenna Factor + Cable Loss -imp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.



Band edge testing

Bluetooth Mode 8-DPSK Modulation Test Result:

Lower edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 5
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-L1
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : Hopping (8-DPSK)
 N/N :
 :

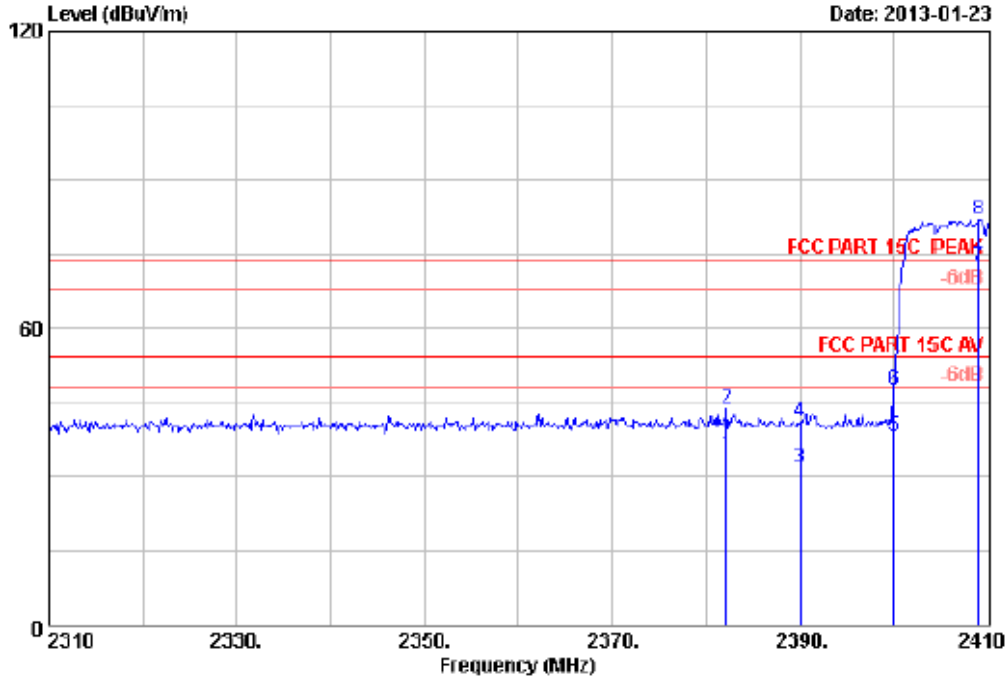
	Ant.	Cable	Imp.	Emission					
Freq. [MHz]	Factor (dB/m)	loss (dB)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark	
1	26.68	6.00	35.92	37.10	33.86	54.00	20.14	Average	
2	26.68	6.00	35.92	45.50	43.26	74.00	30.74	Peak	
3	26.70	6.00	35.92	35.28	32.06	54.00	21.94	Average	
4	26.70	6.00	35.92	44.68	41.46	74.00	32.54	Peak	
5	26.76	6.02	35.92	40.36	37.22	54.00	16.78	Average	
6	26.76	6.02	35.92	49.76	46.62	74.00	27.38	Peak	
7	26.79	6.03	35.92	69.57	66.47	54.00	-12.47	Average	
8	26.79	6.03	35.92	78.97	75.87	74.00	-1.87	Peak	

Remarks:

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

Band edge testing

Lower edge peak Plot:
Vertical:



```

Site no.       : 3m Chamber           Data no.   : 6
Dis. / Ant.   : 3m 2012 3115 (4580)  Ant. pol.  : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23°C/54%             Engineer   : Leo-Li
EUT           : SHB4000
Power supply  : DC 3.7V
Test mode     : Hopping (8-DPSK)
M/N          :
    
```

	Freq. [MHz]	Ant. Factor (dB/m)	Cable loss (dB)	Imp. Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2382.200	26.65	5.99	35.92	37.62	34.34	54.00	19.66	Average
2	2382.200	26.65	5.99	35.92	47.03	43.75	74.00	30.25	Peak
3	2390.000	26.70	6.00	35.92	34.95	31.73	54.00	22.27	Average
4	2390.000	26.70	6.00	35.92	44.35	41.13	74.00	32.87	Peak
5	2400.000	26.76	6.02	35.92	41.18	38.04	54.00	15.96	Average
6	2400.000	26.76	6.02	35.92	50.58	47.44	74.00	26.56	Peak
7	2408.800	26.82	6.03	35.92	75.68	72.61	54.00	-18.61	Average
8	2408.800	26.82	6.03	35.92	85.08	82.01	74.00	-8.01	Peak

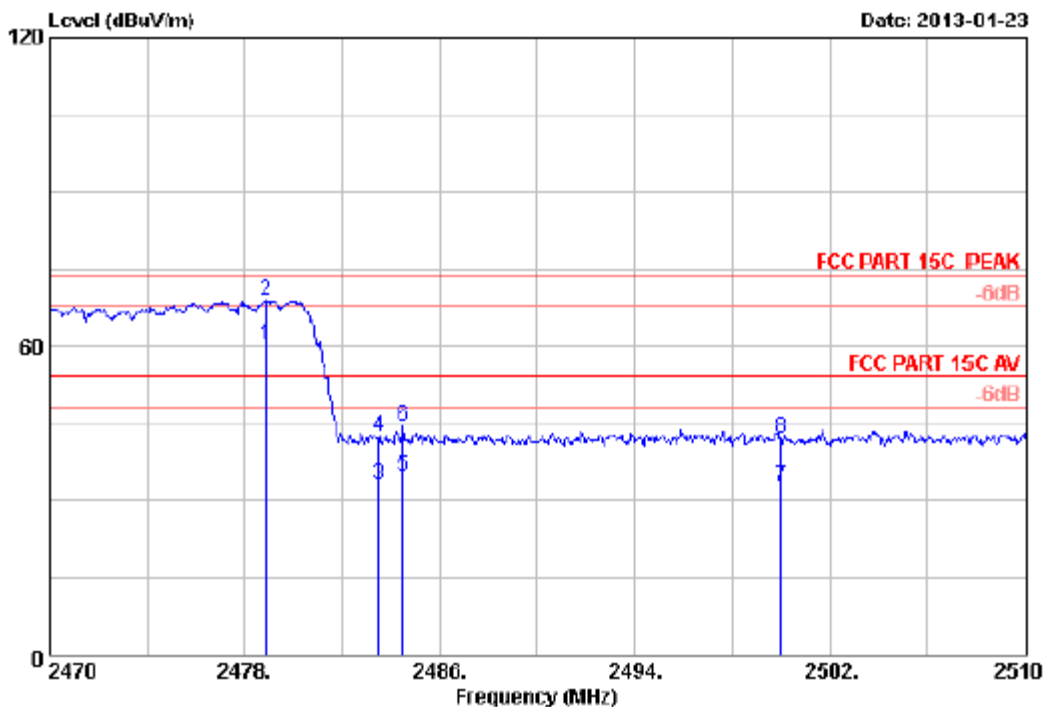
Remarks:

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



Band edge testing

Upper edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 8
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : Hopping (8-DPSK)
 N/N :

	int.	Cable	amp.	Emission					
Freq. (MHz)	Factor (dB/m)	loss (dB)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
1	2478.880	27.26	6.15	35.92	62.81	60.30	54.00	-6.30	Average
2	2478.880	27.26	6.15	35.92	71.21	68.70	74.00	5.30	Peak
3	2483.500	27.29	6.16	35.92	35.45	32.98	54.00	21.02	Average
4	2483.500	27.29	6.16	35.92	44.85	42.38	74.00	31.62	Peak
5	2484.480	27.30	6.16	35.92	37.37	34.91	54.00	19.09	Average
6	2484.480	27.30	6.16	35.92	46.77	44.31	74.00	29.69	Peak
7	2500.000	27.40	6.19	35.93	34.94	32.60	54.00	21.40	Average
8	2500.000	27.40	6.19	35.93	44.34	42.00	74.00	32.00	Peak

Remarks:

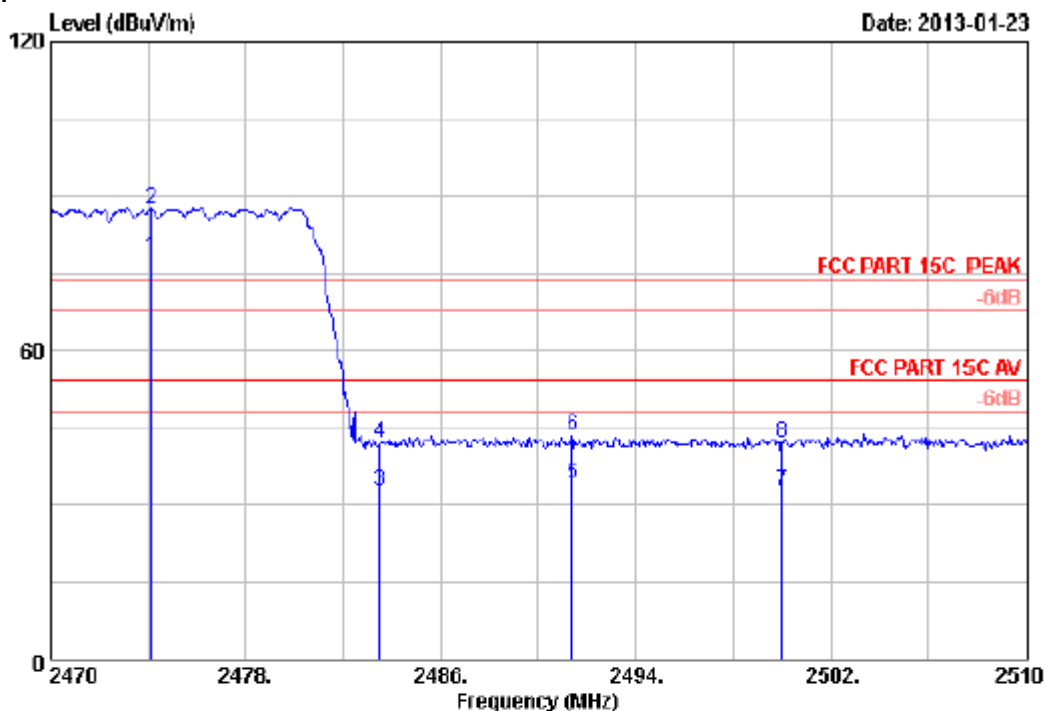
1. Emission Level= Antenna Factor + Cable Loss -amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Band edge testing

Upper edge peak Plot:

Vertical:



Site no. : 3m Chamber Data no. : 7
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : Hopping (B-DPSK)
 N/N :
 :

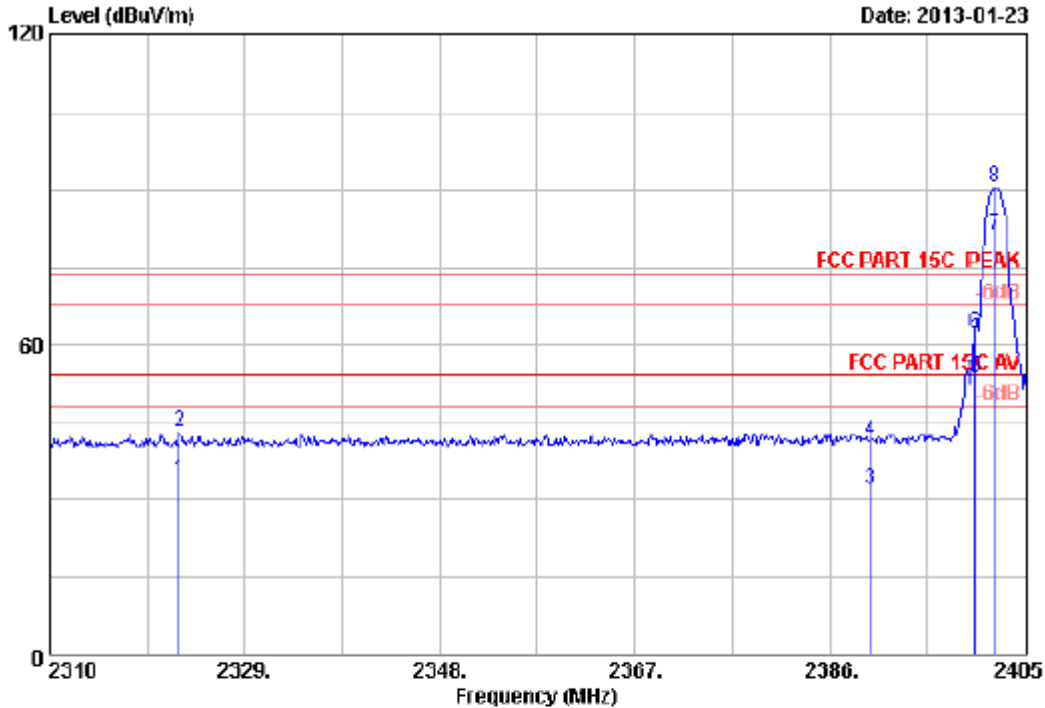
	Int.	Cable	Imp.	Emission					
Freq. [MHz]	Factor (dB/m)	Loss (dB)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark	
1 2474.120	27.23	6.14	35.92	80.70	78.15	54.00	-24.15	Average	
2 2474.120	27.23	6.14	35.92	90.10	87.55	74.00	-13.55	Peak	
3 2483.500	27.29	6.16	35.92	35.19	32.72	54.00	21.28	Average	
4 2483.500	27.29	6.16	35.92	44.59	42.12	74.00	31.88	Peak	
5 2491.400	27.34	6.17	35.92	36.46	34.05	54.00	19.95	Average	
6 2491.400	27.34	6.17	35.92	45.86	43.45	74.00	30.55	Peak	
7 2500.000	27.40	6.19	35.93	35.16	32.82	54.00	21.18	Average	
8 2500.000	27.40	6.19	35.93	44.56	42.22	74.00	31.78	Peak	

Remarks:

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

Band edge testing

Bluetooth Mode GFSK Modulation Test Result:
 Lower edge peak Plot:
 Hopping off mode:
 Horizontal:



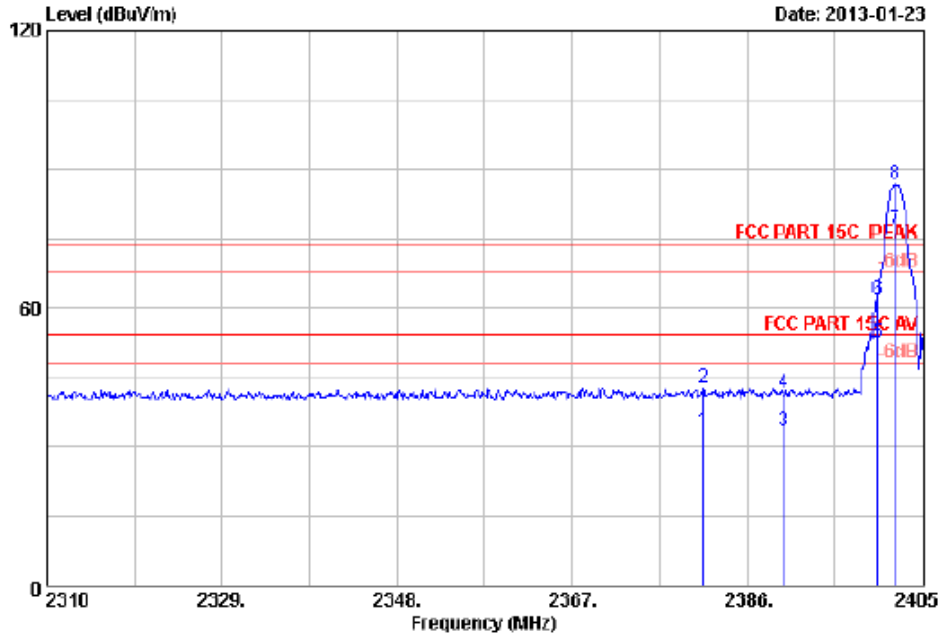
Site no. : 3m Chamber Data no. : 12
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : GFSK 2402MHz Tx
 M/N :
 :

	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	2322.635	26.26	5.89	35.92	37.48	33.71	54.00	20.29	Average
2	2322.635	26.26	5.89	35.92	46.89	43.12	74.00	30.88	Peak
3	2390.000	26.70	6.00	35.92	35.31	32.09	54.00	21.91	Average
4	2390.000	26.70	6.00	35.92	44.71	41.49	74.00	32.51	Peak
5	2400.000	26.76	6.02	35.92	57.00	53.86	54.00	0.14	Average
6	2400.000	26.76	6.02	35.92	65.39	62.25	74.00	11.75	Peak
7	2401.960	26.77	6.02	35.92	81.22	81.09	54.00	-27.09	Average
8	2401.960	26.77	6.02	35.92	93.62	90.49	74.00	-16.49	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 testing

Lower edge peak Plot:
Vertical:



Site no. : 3m Chamber Date no. : 11
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : GFSK 2402MHz Tx
 M/N :
 :

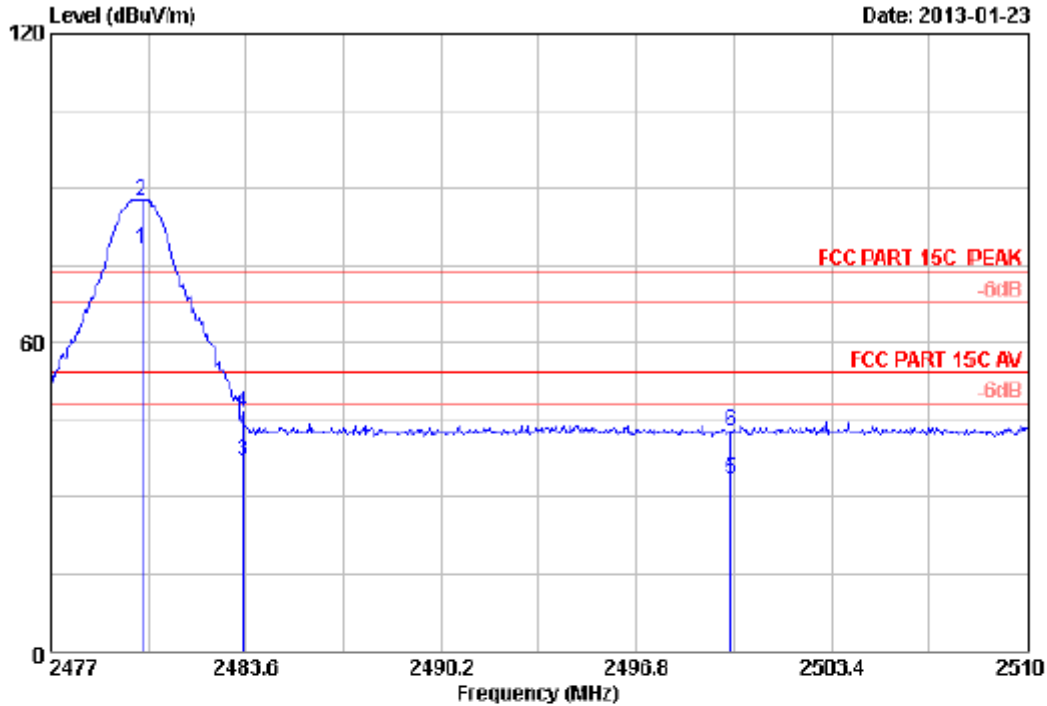
	Freq. [MHz]	Ant. Factor [dB/m]	Cable Loss [dB]	Imp. Factor [dB]	Reading [dBuV]	Emission Level [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Remark
1	2381.250	26.64	5.99	35.92	36.62	33.33	54.00	20.67	Average
2	2381.250	26.64	5.99	35.92	46.02	42.73	74.00	31.27	Peak
3	2390.000	26.70	6.00	35.92	36.63	33.41	54.00	20.59	Average
4	2390.000	26.70	6.00	35.92	45.03	41.81	74.00	32.19	Peak
5	2400.000	26.76	6.02	35.92	55.67	52.53	54.00	1.47	Average
6	2400.000	26.76	6.02	35.92	65.07	61.93	74.00	12.07	Peak
7	2401.960	26.77	6.02	35.92	80.49	77.36	54.00	-23.36	Average
8	2401.960	26.77	6.02	35.92	89.59	86.76	74.00	-12.76	Peak

Remarks:
 1. Emission Level= Antenna Factor + Cable Loss -Imp 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:



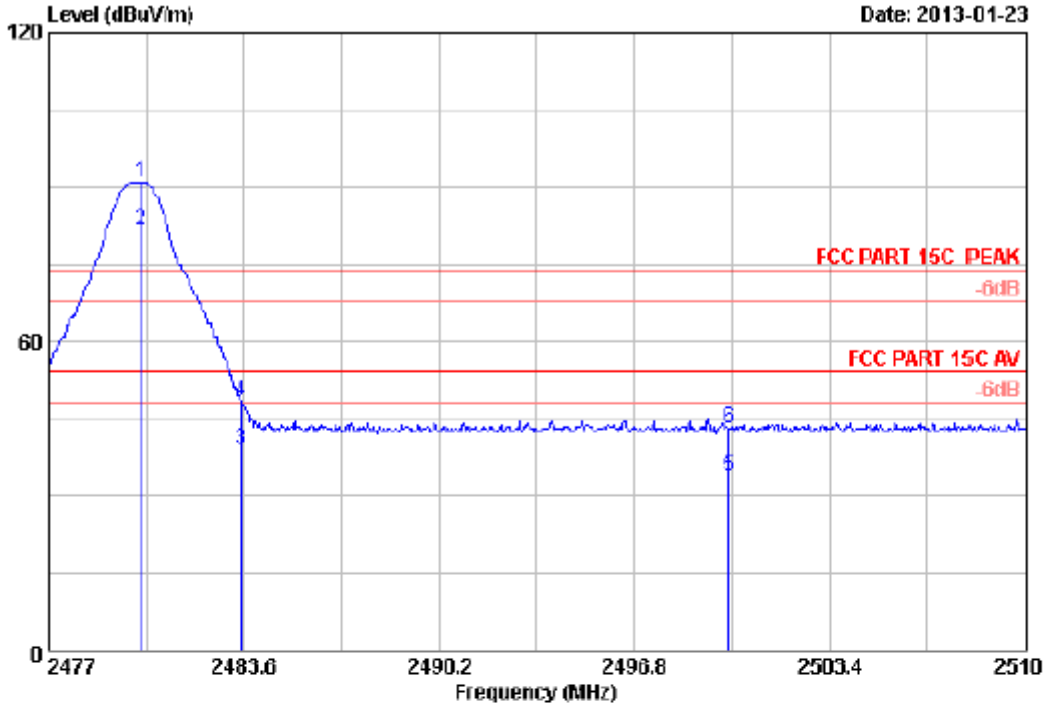
Site no. : 3m Chamber Date no. : 17
 Dis. / Ant. : 3m 2012 3115 (45B0) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : GFSK 2400MHz Tx
 N/N :
 :

	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	27.27	6.15	35.92	80.81	78.31	54.00	-24.31	Average
2	2480.069	27.27	6.15	35.92	90.21	87.71	74.00	-13.71	Peak
3	2483.500	27.29	6.16	35.92	39.45	36.98	54.00	17.02	Average
4	2483.500	27.29	6.16	35.92	48.85	46.38	74.00	27.62	Peak
5	2500.000	27.40	6.19	35.93	35.66	33.32	54.00	20.68	Average
6	2500.000	27.40	6.19	35.93	45.07	42.73	74.00	31.27	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
 Dis. / Ant. : 3m 2012 3115 (4580)
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54%
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : GFSK 2480MHz Tx
 N/N :
 Date no. : 18
 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	2480.135	27.27	6.15	35.92	93.55	91.05	74.00	-17.05	Peak
2	2480.135	27.27	6.15	35.92	84.15	81.65	74.00	-7.65	Peak
3	2483.500	27.29	6.16	35.92	41.42	38.95	54.00	15.05	Average
4	2483.500	27.29	6.16	35.92	50.83	48.36	74.00	25.64	Peak
5	2500.000	27.40	6.19	35.93	36.03	33.69	54.00	20.31	Average
6	2500.000	27.40	6.19	35.93	45.44	43.10	74.00	30.90	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.

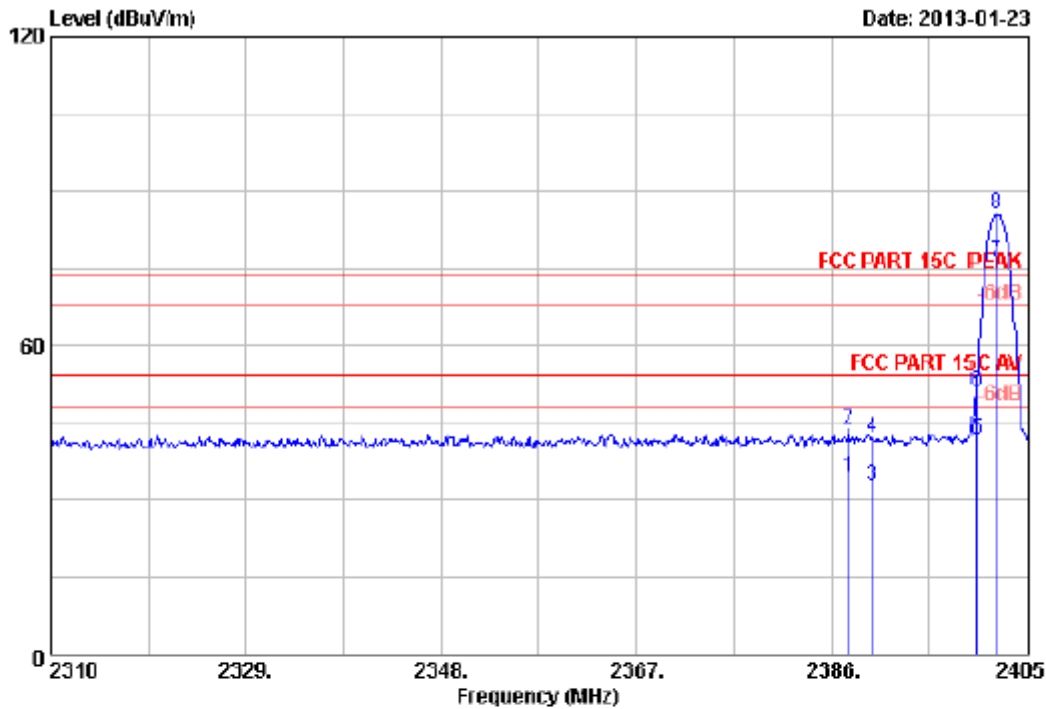
Band edge testing

Bluetooth Mode 8-DPSK Modulation Test Result:

Lower edge peak Plot:

Hopping off mode:

Horizontal:



Site no. : 3m Chamber
 Dis. / Ant. : 3m 2013 3115 (4580)
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54%
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : 8-DPSK 2402MHz Tx
 H/N :
 :
 :
 Date no. : 28
 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	2387.710	26.68	6.00	35.92	37.53	34.29	54.00	19.71	Average
2	2387.710	26.68	6.00	35.92	46.93	43.69	74.00	30.31	Peak
3	2390.000	26.70	6.00	35.92	36.09	32.87	54.00	21.13	Average
4	2390.000	26.70	6.00	35.92	45.49	42.27	74.00	31.73	Peak
5	2400.000	26.76	6.02	35.92	44.92	41.78	54.00	12.22	Average
6	2400.000	26.76	6.02	35.92	54.32	51.18	74.00	22.82	Peak
7	2401.865	26.77	6.02	35.92	79.33	76.20	54.00	-22.20	Average
8	2401.865	26.77	6.02	35.92	88.73	85.60	74.00	-11.60	Peak

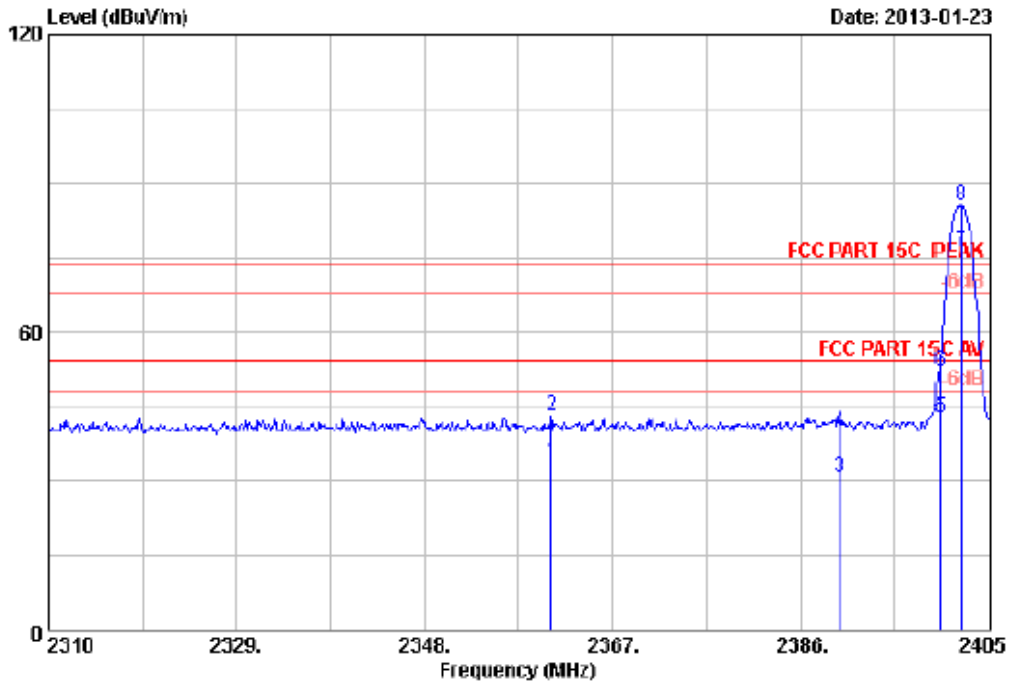
Remarks:

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



Band edge testing

Lower edge peak Plot:
Vertical:



```

Site no.       : 3m Chamber
Dis. / Ant.   : 3m 2012 3115 (4580)
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23°C/54%
EUT           : SHB4000
Power supply  : DC 3.7V
Test mode     : 0-DP3K 2402MHz Tx
M/N           :
    
```

```

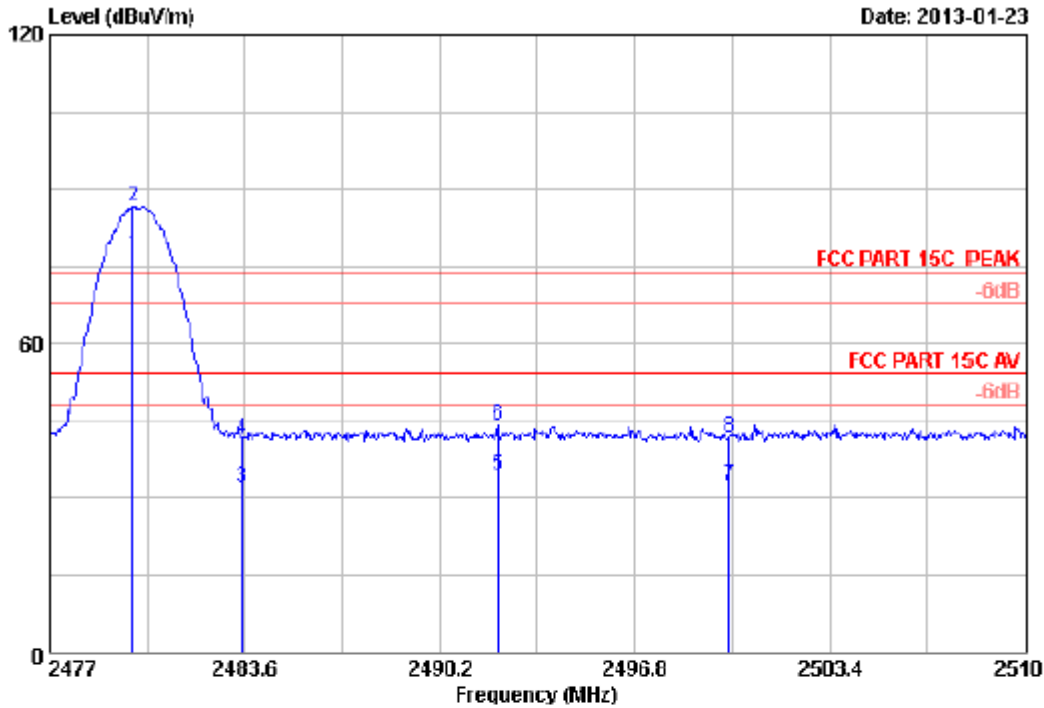
Data no.      : 27
Ant. pol.    : VERTICAL
Engineer     : Leo-Li
    
```

	Freq.	ant.	Cable	Imp.	Emission				
	[MHz]	[dB/m]	[dB]	[dB]	Reading	Level	Limits	Margin	Remark
					[dBUV]	(dBUV/m)	(dBUV/m)	(dB)	
1	2360.825	26.51	5.95	35.92	37.27	33.81	54.00	20.19	Average
2	2360.825	26.51	5.95	35.92	46.67	43.21	74.00	30.79	Peak
3	2390.000	26.70	6.00	35.92	34.04	30.82	54.00	23.18	Average
4	2390.000	26.70	6.00	35.92	43.44	40.22	74.00	33.78	Peak
5	2400.000	26.76	6.02	35.92	45.93	42.79	54.00	11.21	Average
6	2400.000	26.76	6.02	35.92	55.33	52.19	74.00	21.81	Peak
7	2402.150	26.77	6.02	35.92	79.22	76.09	54.00	-22.09	Average
8	2402.150	26.77	6.02	35.92	88.62	85.49	74.00	-11.49	Peak

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

Band edge testing

Upper edge peak Plot:
Horizontal:



Site no. : 3m Chamber Data no. : 20
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : 8-DPSK 2480MHz Tx
 I/N :
 :

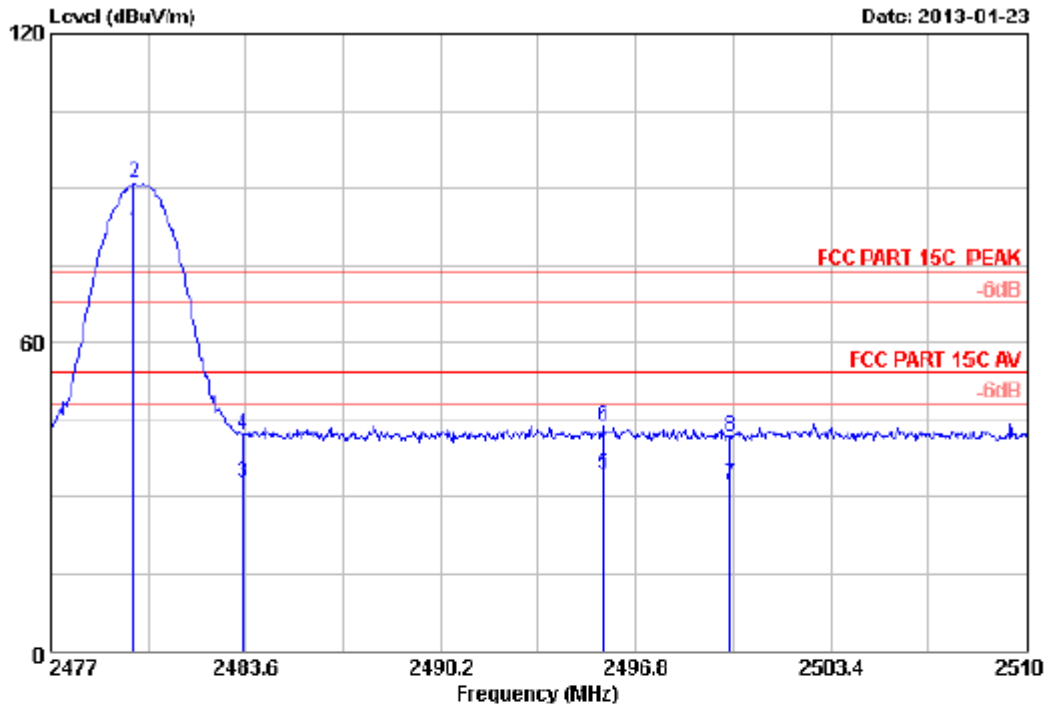
	Freq. [MHz]	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.805	27.27	6.15	35.92	79.67	77.17	54.00	-23.17	Average
2	2479.805	27.27	6.15	35.92	89.07	86.57	74.00	-12.57	Peak
3	2483.500	27.29	6.16	35.92	34.62	32.15	54.00	21.85	Average
4	2483.500	27.29	6.16	35.92	44.02	41.55	74.00	32.45	Peak
5	2492.180	27.35	6.17	35.92	36.98	34.58	54.00	19.42	Average
6	2492.180	27.35	6.17	35.92	46.38	43.98	74.00	30.02	Peak
7	2500.000	27.40	6.19	35.93	34.62	32.28	54.00	21.72	Average
8	2500.000	27.40	6.19	35.93	44.02	41.66	74.00	32.32	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 testing

Upper edge peak Plot:
Vertical:



Site no. : 3m Chamber Date no. : 19
 Dis. / Int. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : SHB4000
 Power supply : DC 3.7V
 Test mode : 8-DPSK 2480MHz Tx
 N/N :
 :

	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	2479.805	27.27	6.15	35.92	84.12	81.62	54.00	-27.62	Average
2	2479.805	27.27	6.15	35.92	93.52	91.02	74.00	-17.02	Peak
3	2483.500	27.29	6.16	35.92	35.11	32.64	54.00	21.36	Average
4	2483.500	27.29	6.16	35.92	44.51	42.04	74.00	31.96	Peak
5	2495.711	27.37	6.18	35.92	36.78	34.41	54.00	19.59	Average
6	2495.711	27.37	6.18	35.92	46.18	43.81	74.00	30.19	Peak
7	2500.000	27.40	6.19	35.93	34.60	32.26	54.00	21.74	Average
8	2500.000	27.40	6.19	35.93	44.00	41.66	74.00	32.34	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.

9.9 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/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

Spurious radiated emissions for transmitter

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 below table if the peak value complies with average limit.

The only worse case GFSK and 8-DPSK mode test result are listed in the report.

Transmitting spurious emission test result as below:

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 dB μ V/m	Detector	Result
80.440	9.3	0.76	-	4.7	14.76	Vertical	40	QP	Pass
190.050	10.47	1.12	-	14.14	25.65	Horizontal	43.5	QP	Pass
4804.000	32.47	8.67	35.72	44.32	49.74	Vertical	74.0	PK	Pass
4804.000	32.47	8.67	35.72	45.78	51.20	Horizontal	74.0	PK	Pass

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 dB μ V/m	Detector	Result
4882.000	32.64	8.74	35.69	46.51	52.20	Vertical	74.0	PK	Pass
4882.000	32.64	8.74	35.69	45.31	51.00	Horizontal	74.0	PK	Pass

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 dB μ V/m	Detector	Result
4960.000	32.81	8.81	35.66	45.33	51.29	Vertical	74.0	PK	Pass
4960.000	32.81	8.81	35.66	44.87	50.33	Horizontal	74.0	PK	Pass

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 dBμV/m	Detector	Result
131.850	12.92	0.91	-	3.36	17.19	Vertical	43.5	QP	Pass
190.050	10.47	1.04	-	13.22	24.73	Horizontal	43.5	QP	Pass
4804.000	32.47	8.67	35.72	44.95	50.37	Vertical	74.0	PK	Pass
4804.000	32.47	8.67	35.72	44.23	49.65	Horizontal	74.0	PK	Pass

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 dBμV/m	Detector	Result
4882.000	32.64	8.74	35.69	45.20	50.89	Vertical	74	PK	Pass
4882.000	32.64	8.74	35.69	44.32	50.01	Horizontal	74	PK	Pass

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 dBμV/m	Detector	Result
4960.000	32.81	8.81	35.66	44.78	50.74	Vertical	74.0	PK	Pass
4960.000	32.81	8.81	35.66	45.36	51.32	Horizontal	74.0	PK	Pass

Remark:

- (1) AV Emission Level= PK Emission Level+20log(dutycycle)
- (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.
- (3) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Spectrum	Agilent	E4446A	US44300459	May.08, 16
Amp	HP	8449B	3008A08495	May.08, 16
Antenna	EMCO	3115	9510-4580	May.17, 16
HF Cable	Hubersuhne	Sucoflex104	-	May.08, 16
Power Meter	Anritsu	ML2487A	6K00002472	May.08, 16
Power Sensor	Anritsu	MA2491A	033005	May.08, 16
Power meter	Agilent	436A	MY45100928	May.08, 16
Power Sensor	Agilent	8482B	MY41090514	May.08, 16
Power meter	Anritsu	ML2487A	6K00002472	May.08, 16
Power Sensor	Anritsu	ML2491A	032516	May.08, 16
Noise Figure	HP	8970B	3247U02193	May.08, 16
Noise Source	HP	346B	3318A13134	May.08, 16
Loop Antenna	Chase	HLA6120	1062	May.08, 16
Test Receiver	Rohde & Schwarz	ESHS10	838693/001	Oct.30, 16
L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	Oct.30, 16
L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	May.08, 16
Terminator	Hubersuhner	50Ω	No. 1	May.08, 16
Terminator	Hubersuhner	50Ω	No. 2	May.08, 16
RF Cable	Fujikura	3D-2W	No.1	May.08, 16
Coaxial Switch	Anritsu	MP59B	M50564	May.08, 16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100341	May.08, 16
Oscilloscope	Tektronix	TDS3052B	B026036	May.20, 16



11 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