

FCC 47 CFR PART 15 SUBPART C

Product Type : Dual Sim Smart phone
Applicant : QBEX Electronics Corporation
Address : 1606 NW 84th Ave, MIAMI, FL33126, USA
Trade Name : QBEX
Model Number : QBA757
Test Specification : FCC 47 CFR PART 15 SUBPART C: Oct., 2011
ANSI C63.4-2009
Application Purpose : Original
Receive Date : Aug. 29, 2012
Test Dates : Aug. 30 ~ Oct. 04, 2012
Issue Date : Oct. 05, 2012

Issue by

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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Oct. 05, 2012	Initial Issue	



Verification of Compliance

Issued Date: 10/05/2012

Product Type : Dual Sim Smart phone
Applicant : QBEX Electronics Corporation
Address : 1606 NW 84th Ave, MIAMI, FL33126, USA
Trade Name : QBEX
Model Number : QBA757
FCC ID : XFM-QBA757
EUT Rated Voltage : DC 5.0V, 1000mA
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2011
ANSI C63.4-2009

Test Result : Complied
Application Purpose : Original

Performing Lab. : A Test Lab Techno Corp.
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1330
<http://www.atl-lab.com.tw/e-index.htm>



The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample identified in this report.

Approved By

Reviewed By

(Manager)

(Murphy Wang)

(Testing Engineer)

(Fly Lu)

TABLE OF CONTENTS

1	General Information	6
2	EUT Description	7
3	Test Methodology	8
3.1.	Mode of Operation	8
3.2.	EUT Exercise Software	8
3.3.	Configuration of Test System Details	9
3.4.	Test Site Environment	9
4	Conducted Emission Measurement	10
4.1.	Limit	10
4.2.	Test Instruments	10
4.3.	Test Setup	10
4.4.	Test Procedure	11
4.5.	Test Result	12
5	Radiated Interference Measurement	16
5.1.	Limit	16
5.2.	Test Instruments	16
5.3.	Setup	17
5.4.	Test Procedure	18
5.5.	Test Result	20
6	Maximum Conducted Output Power Measurement	22
6.1.	Limit	22
6.2.	Test Setup	22
6.3.	Test Instruments	22
6.4.	Test Procedure	22
6.5.	Test Result	23
7	6dB RF Bandwidth Measurement	24
7.1.	Limit	24
7.2.	Test Setup	24
7.3.	Test Instruments	24
7.4.	Test Procedure	24
7.5.	Test Result	25
7.6.	Test Graphs	26
8	Maximum Power Density Measurement	27
8.1.	Limit	27
8.2.	Test Setup	27
8.3.	Test Instruments	27
8.4.	Test Procedure	27
8.5.	Test Result	28
8.6.	Test Graphs	29

9	Out of Band Conducted Emissions Measurement	30
9.1.	Limit.....	30
9.2.	Test Setup.....	30
9.3.	Test Instruments	30
9.4.	Test Procedure	30
9.5.	Test Graphs	31
10	Band Edges Measurement	32
10.1.	Limit.....	32
10.2.	Test Setup.....	32
10.3.	Test Instruments	32
10.4.	Test Procedure	33
10.5.	Test Result.....	34
11	99 % Occupied Bandwidth Measurement.....	38
11.1.	Limit.....	38
11.2.	Test Setup.....	38
11.3.	Test Instruments	38
11.4.	Test Procedure	38
11.5.	Test Result.....	39
11.6.	Test Graphs	40
12	Antenna Measurement.....	41
12.1.	Limit.....	41
12.2.	Antenna Connector Construction	41

1 General Information

1.1 Summary of Test Result

Standard		Item	Result	Remark
15.247	RSS-GEN			
15.207	7.2.2	AC Power Conducted Emission	PASS	-----
-----	6	Receiver Radiated Emissions	PASS	-----
Standard		Item	Result	Remark
15.247	RSS-210			
15.247(c)	A8.5	Transmitter Radiated Emissions	PASS	-----
15.247(b)(1)	A8.4 (2)	Max. Output Power	PASS	-----
15.247(a)(2)	A8.2 (a)	6dB RF Bandwidth	PASS	-----
15.247(e)	A8.2 (b)	Power Spectral Density	PASS	-----
15.247(c)	A8.5	Out of Band Conducted Spurious Emission	PASS	-----
15.247(c)	A8.5	Band Edge Measurement	PASS	-----
15.203	-	Antenna Requirement	PASS	-----

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2 Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.24 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.072 dB.



2 EUT Description

Product	:	Dual Sim Smart phone	
Trade Name	:	QBEX	
Model Number	:	QBA757	
Applicant	:	QBEX Electronics Corporation 1606 NW 84th Ave, MIAMI, FL33126, USA	
Manufacturer	:	TRANSAVA INC. (SZ) Unit 10c, Block 7, East Pacific Garden 2, Shen Zhen, Guangdong, China 518040	
IMEI Number	:	IMEI 1: 354515041110411 IMEI 2: 354515041110387	
FCC ID	:	XFM-QBA757	
Frequency Range	:	2402 ~ 2480 MHz	
Modulation Type	:	GFSK for 1Mbps π/4-DQPSK for 2Mbps 8DPSK for 3Mbps	
Antenna Type	:	Internal antenna	
Antenna Gain	:	1.2 dBi	
RF Output Power (Conducted)	:	Bluetooth v4.0 LE	1.39 dBm / 0.00138 W

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: IDLE Mode
Mode 2: Normal Operation Mode
Mode 3: Bluetooth v4.0 LE Link Mode
Mode 4: Receiver Mode

By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

Tested System Details

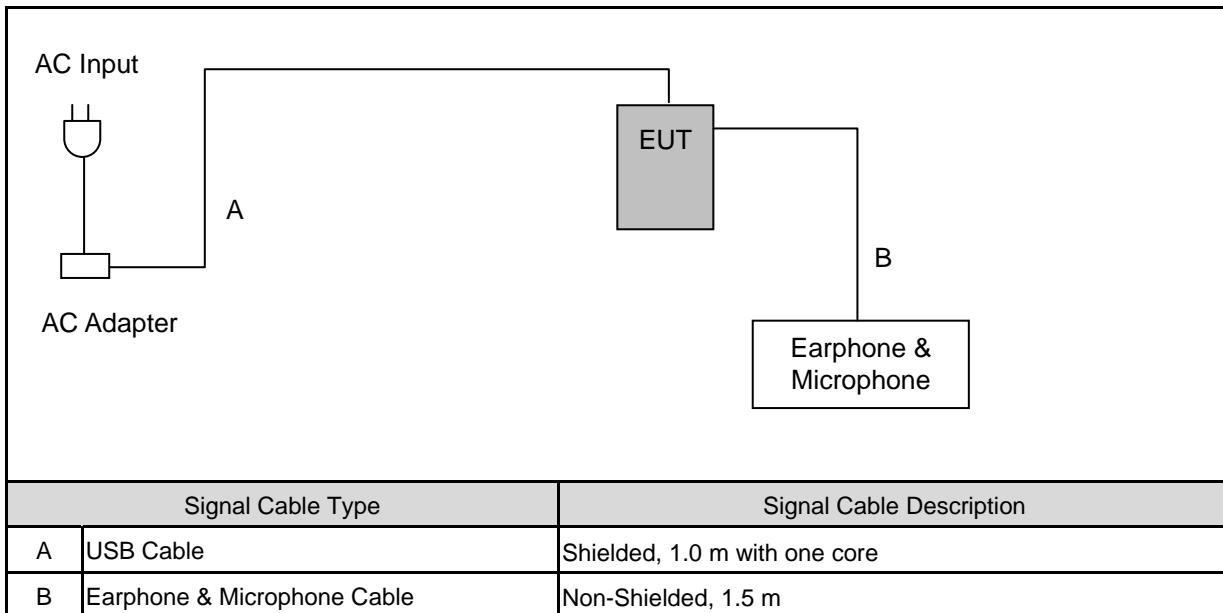
The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model Number	Serial Number	Power Cord
1.	Bluetooth Tester	R & S	CBT	100350	NA

3.2. EUT Exercise Software

1.	Setup the EUT and Bluetooth Tester (CBT) as shown on 3.3.
2.	Turn on the power of all equipment.
3.	EUT run test program.
4.	Open Bluetooth function link to CBT.

3.3. Configuration of Test System Details



3.4. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 Conducted Emission Measurement

4.1. Limit

Frequency (MHz)	Quasi-peak	Average
0.15 – 0.5	66 to 56	56 to 46
0.50 – 5.0	56	46
5.0 – 30.0	60	50

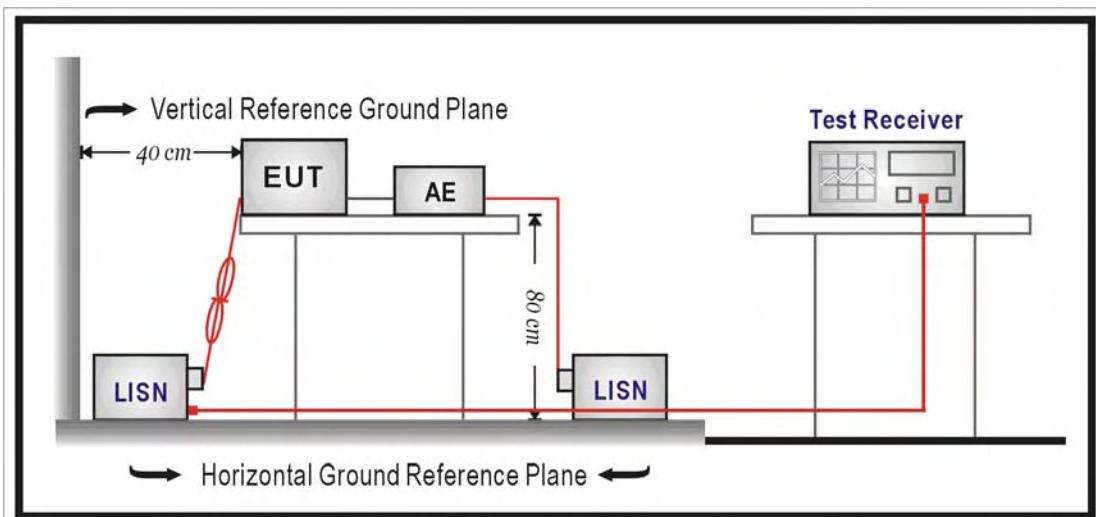
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/18/2012	(1)
LISN	R&S	ENV216	101040	03/07/2012	(1)
LISN	R&S	ENV216	101041	03/07/2012	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

4.3. Test Setup



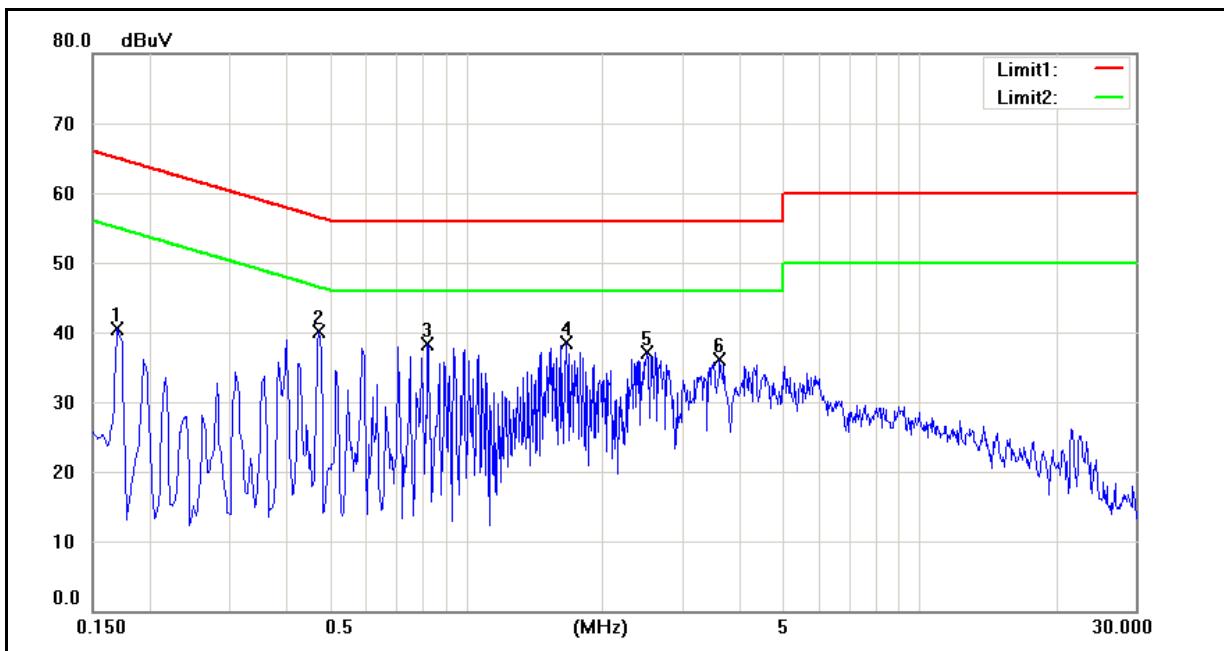
4.4. Test Procedure

The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3162/2 SH Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used. The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.1.

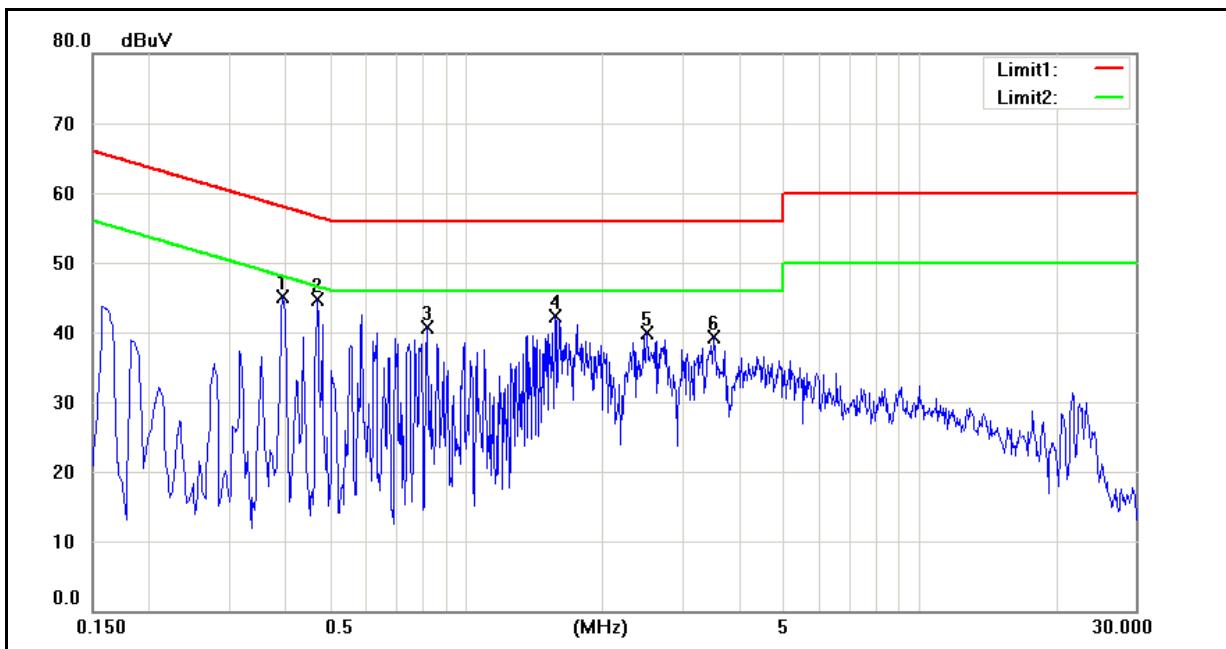
4.5. Test Result

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	09/03/2012
Test By:			Fly Lu
Description:			



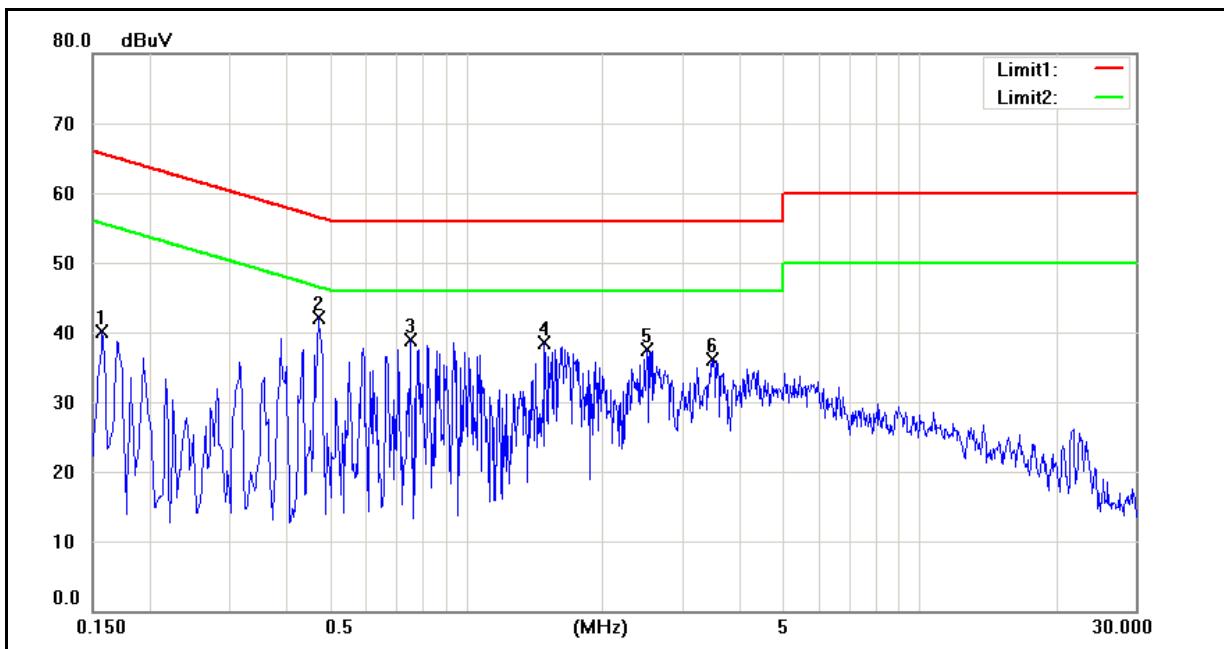
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1700	23.38	4.21	9.72	33.10	13.93	64.96	54.96	-31.86	-41.03	Pass
2	0.4740	29.59	21.64	9.72	39.31	31.36	56.44	46.44	-17.13	-15.08	Pass
3	0.8260	26.31	16.23	9.73	36.04	25.96	56.00	46.00	-19.96	-20.04	Pass
4	1.6700	23.06	8.82	9.78	32.84	18.60	56.00	46.00	-23.16	-27.40	Pass
5	2.5020	22.66	10.16	9.81	32.47	19.97	56.00	46.00	-23.53	-26.03	Pass
6	3.6340	20.75	9.42	9.81	30.56	19.23	56.00	46.00	-25.44	-26.77	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	09/03/2012
Test By:			Fly Lu
Description:			



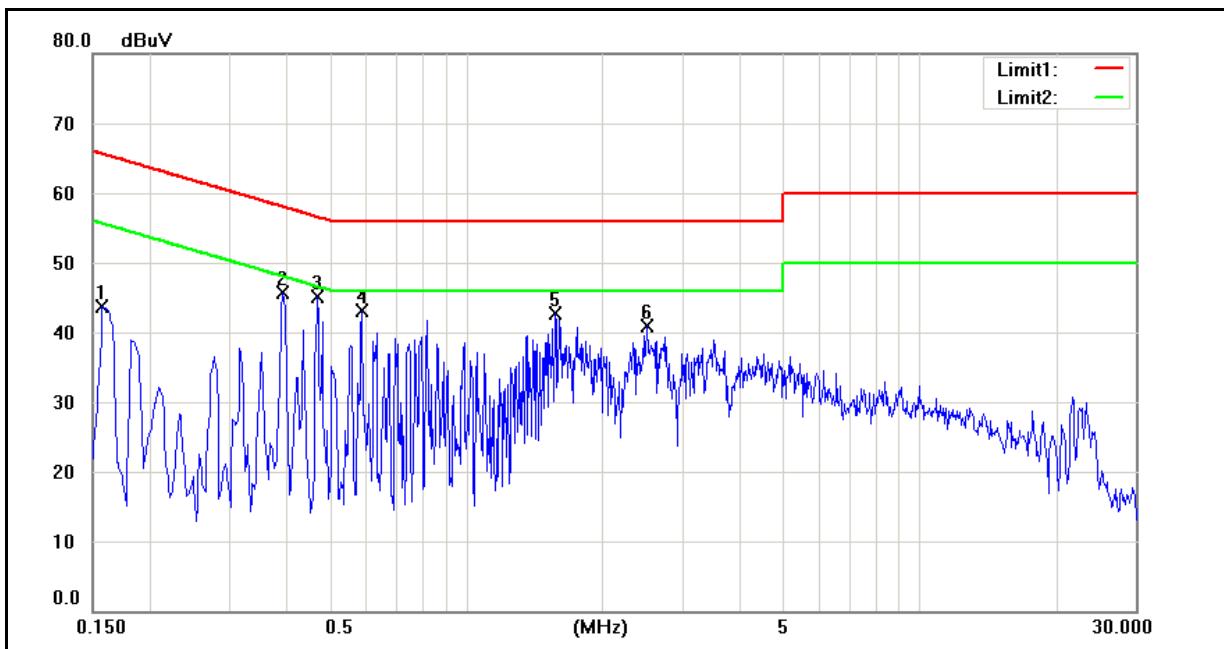
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.3940	30.07	18.88	9.64	39.71	28.52	57.98	47.98	-18.27	-19.46	Pass
2	0.4700	33.31	24.92	9.64	42.95	34.56	56.51	46.51	-13.56	-11.95	Pass
3	0.8220	29.38	20.71	9.67	39.05	30.38	56.00	46.00	-16.95	-15.62	Pass
4	1.5700	28.51	20.09	9.70	38.21	29.79	56.00	46.00	-17.79	-16.21	Pass
5	2.5100	27.01	13.94	9.74	36.75	23.68	56.00	46.00	-19.25	-22.32	Pass
6	3.5260	25.72	12.29	9.75	35.47	22.04	56.00	46.00	-20.53	-23.96	Pass

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	09/03/2012
Test By:			Fly Lu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1580	26.69	17.38	9.72	36.41	27.10	65.57	55.57	-29.16	-28.47	Pass
2	0.4740	29.43	21.39	9.72	39.15	31.11	56.44	46.44	-17.29	-15.33	Pass
3	0.7540	25.41	12.63	9.73	35.14	22.36	56.00	46.00	-20.86	-23.64	Pass
4	1.4900	24.04	10.63	9.76	33.80	20.39	56.00	46.00	-22.20	-25.61	Pass
5	2.5020	22.66	10.30	9.81	32.47	20.11	56.00	46.00	-23.53	-25.89	Pass
6	3.5020	21.52	10.08	9.82	31.34	19.90	56.00	46.00	-24.66	-26.10	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	09/03/2012
Test By:			Fly Lu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1580	29.73	18.51	9.65	39.38	28.16	65.57	55.57	-26.19	-27.41	Pass
2	0.3940	33.59	25.87	9.64	43.23	35.51	57.98	47.98	-14.75	-12.47	Pass
3	0.4700	32.77	21.74	9.64	42.41	31.38	56.51	46.51	-14.10	-15.13	Pass
4	0.5900	29.33	19.37	9.65	38.98	29.02	56.00	46.00	-17.02	-16.98	Pass
5	1.5700	27.04	13.66	9.70	36.74	23.36	56.00	46.00	-19.26	-22.64	Pass
6	2.5100	25.06	11.30	9.74	34.80	21.04	56.00	46.00	-21.20	-24.96	Pass

5 Radiated Interference Measurement

5.1. Limit

According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μ V/m at meter)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

5.2. Test Instruments

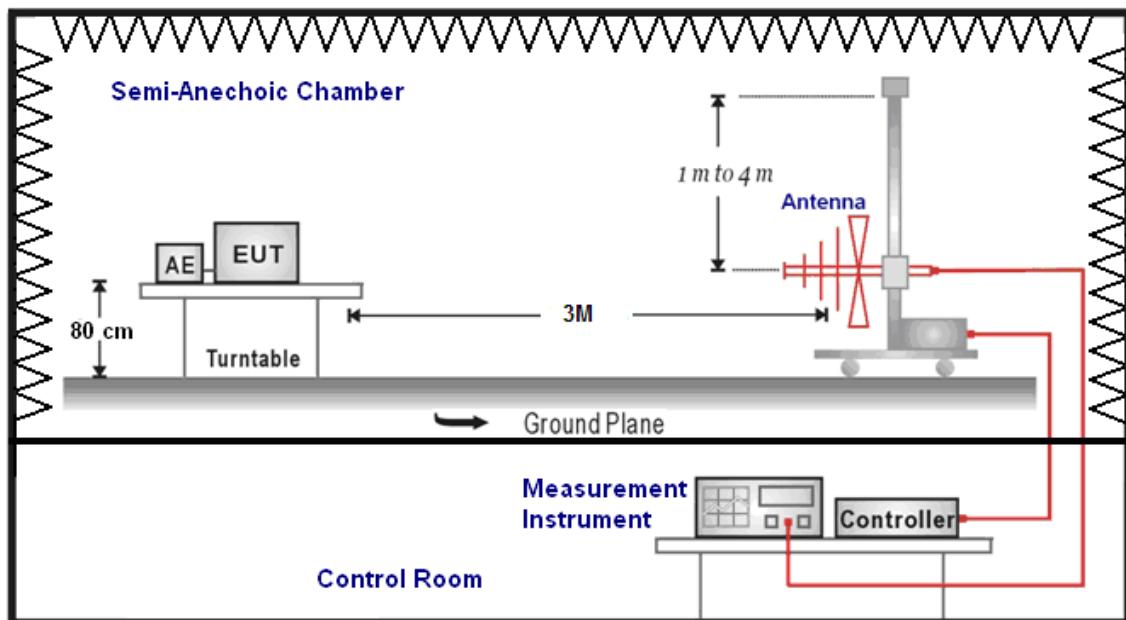
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/16/2012	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/16/2012	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/22/2012	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/22/2012	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	06/29/2012	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/15/2012	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/21/2012	(1)
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	08/14/2012	(3)
Test Site	ATL	TE01	888001	12/20/2011	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

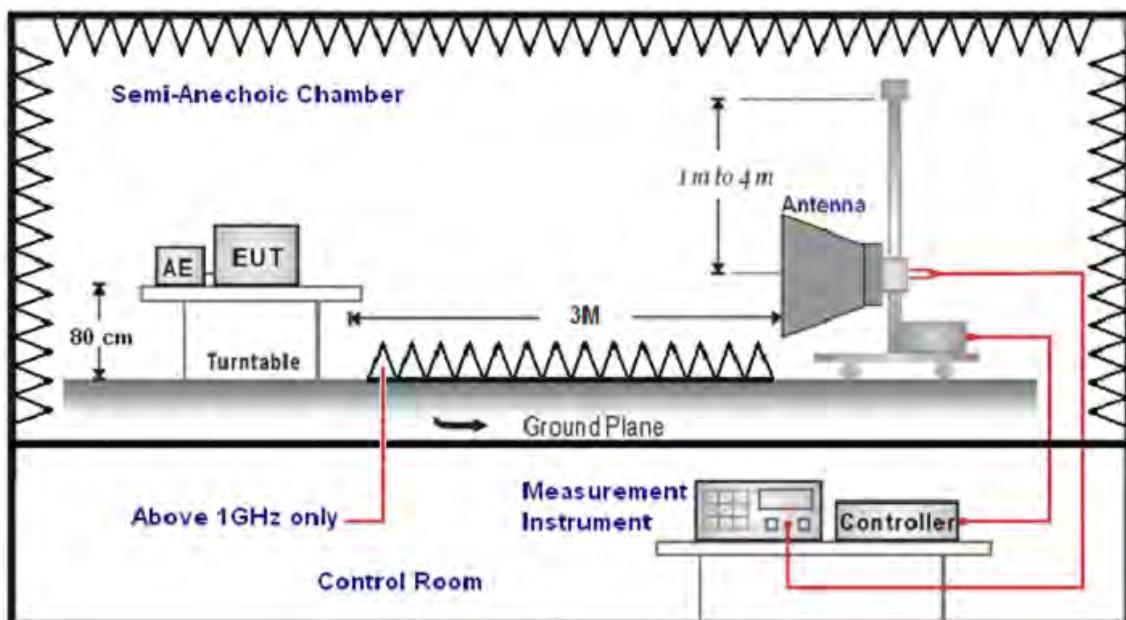
NOTE: N.C.R. = No Calibration Request.

5.3. Setup

Below 1GHz



Above 1GHz



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

A nonconductive material surrounded the EUT to supporting the EUT for standing on tree orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna (mode VULB9163) at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna (model BBHA9120D&9170) was used in frequencies 1 – 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts pre meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro colts per meter (dBuV/m).

The actual field intensity in dBuV/m is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

$$(1) \text{ Amplitude (dBuV/m)} = \text{FI (dBuV)} + \text{AF (dBuV)} + \text{CL (dBuV)} - \text{Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m)} = \text{Amplitude (dBuV)} - \text{Dis(dB)}$$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark 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.



5.5. Test Result

Below 1GHz

Standard:	FCC Part 15C		Test Distance:	3m			
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	QBA757			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	08/30/2012		
Frequency:	2402 MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3121.000	38.82	2.47	41.29	74.00	-32.71	peak	H
4626.000	33.54	7.34	40.88	74.00	-33.12	peak	H
6425.000	31.28	12.76	44.04	74.00	-29.96	peak	H
2995.000	37.17	2.18	39.35	74.00	-34.65	peak	V
4598.000	36.79	7.26	44.05	74.00	-29.95	peak	V
6278.000	33.28	12.10	45.38	74.00	-28.62	peak	V

Standard:	FCC Part 15C		Test Distance:	3m			
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	QBA757			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	08/30/2012		
Frequency:	2440 MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3149.000	37.16	2.53	39.69	74.00	-34.31	peak	H
4647.000	35.46	7.40	42.86	74.00	-31.14	peak	H
6194.000	33.27	11.72	44.99	74.00	-29.01	peak	H
3114.000	38.17	2.46	40.63	74.00	-33.37	peak	V
4598.000	36.06	7.26	43.32	74.00	-30.68	peak	V
6082.000	34.45	11.22	45.67	74.00	-28.33	peak	V



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	QBA757			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	08/30/2012		
Frequency:	2480 MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3170.000	37.23	2.58	39.81	74.00	-34.19	peak	H
4598.000	35.20	7.26	42.46	74.00	-31.54	peak	H
6222.000	34.64	11.85	46.49	74.00	-27.51	peak	H
3163.000	36.94	2.57	39.51	74.00	-34.49	peak	V
4577.000	36.05	7.19	43.24	74.00	-30.76	peak	V
6285.000	33.62	12.13	45.75	74.00	-28.25	peak	V

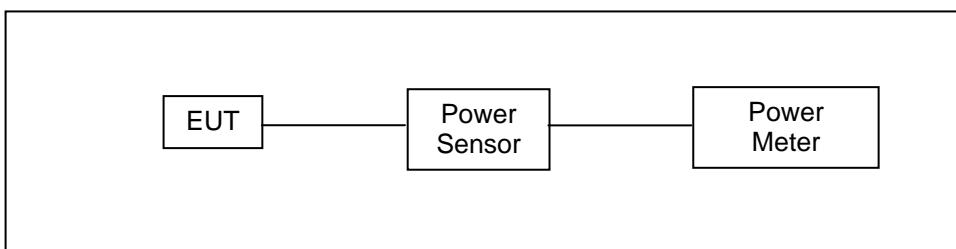
Standard:	FCC Part 15C			Test Distance:	3m			
Test item:	Radiated Emission			Power:	AC 120V/60Hz			
Model Number:	QBA757			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH			
Mode:	Mode 4			Date:	08/30/2012			
Modulation:	Bluetooth v4.0 LE, GFSK			Test By:	Fly Lu			
Frequency:	2440 MHz							
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Peak Limit (dBuV/m)	AVG. Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3170.000	35.98	2.58	38.56	74.00	54.00	-35.44	peak	H
4577.000	35.04	7.19	42.23	74.00	54.00	-31.77	peak	H
6082.000	32.22	11.22	43.44	74.00	54.00	-30.56	peak	H
3135.000	36.82	2.49	39.31	74.00	54.00	-34.69	peak	V
4647.000	33.13	7.40	40.53	74.00	54.00	-33.47	peak	V
6103.000	32.96	11.32	44.28	74.00	54.00	-29.72	peak	V

6 Maximum Conducted Output Power Measurement

6.1. Limit

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels < 1 watt.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Single Channel PK Power Sensor	Agilent	N1911A	MY45101619	12/15/2011	⁽²⁾
Wideband Power Meter	Agilent	N1921A	MY45241957	12/15/2011	⁽²⁾
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

6.4. Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor. The maximum peak output power shall not exceed 1 watt.

Use a direct connection between the antenna port of transmitter and the power sensor, for prevent the power sensor input attenuation 40-50 dB. Set the RBW Bandwidth of the emission or use a channel power meter mode.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm). For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6)/3 dBm.

The antenna port of the EUT was connected to the input of a power sensor. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.



6.5. Test Result

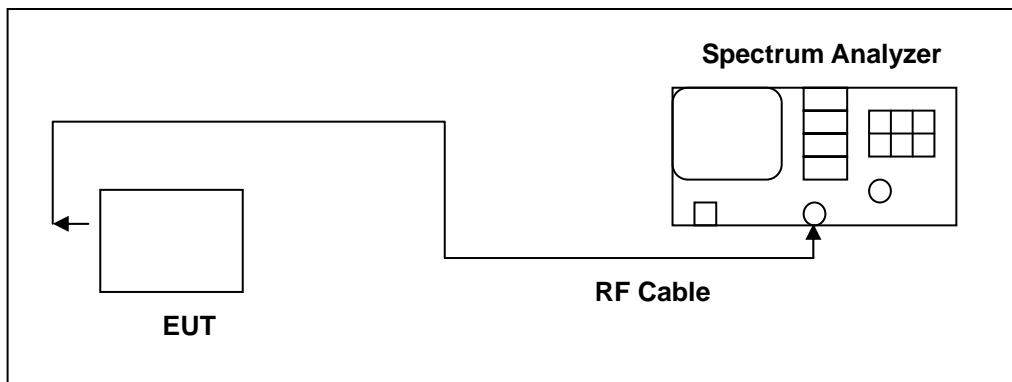
Model Number	QBA757					
Test Item	Maximum Conducted Output Power					
Test Mode	Mode 3: Bluetooth v4.0 LE Link Mode					
Date of Test	08/30/2012			Test Site	TE02	
Frequency (MHz)	Packet Type	Average Power		Peak Power		Limit (W)
		(dBm)	(W)	(dBm)	(W)	
2402	---	-1.94	0.00064	0.53	0.00113	< 0.125
2440	---	-1.61	0.00069	1.03	0.00127	< 0.125
2480	---	-1.29	0.00074	1.39	0.00138	< 0.125

7 6dB RF Bandwidth Measurement

7.1. Limit

Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/20/2011	(2)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

7.4. Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

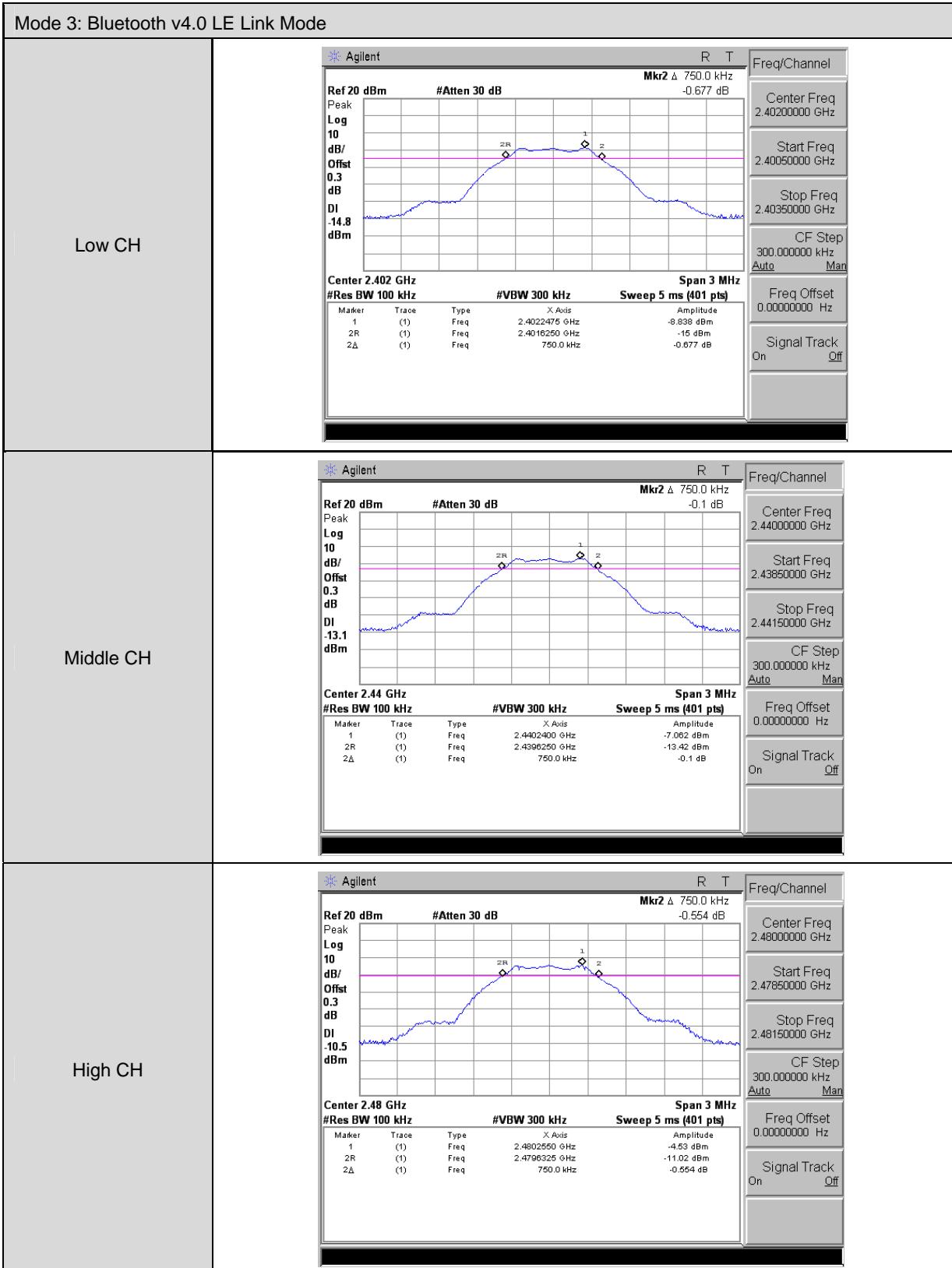
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel low, middle, high)

**7.5. Test Result**

Model Number	QBA757		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 3: Bluetooth v4.0 LE Link Mode		
Date of Test	09/03/2012	Test Site	TE02
Frequency (MHz)		Measurement (kHz)	Limit (kHz)
2402		750	> 500
2440		750	> 500
2480		750	> 500

7.6. Test Graphs

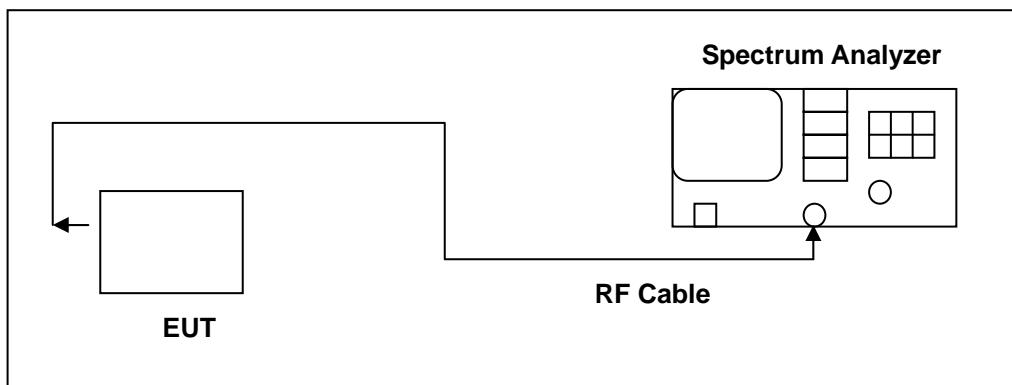


8 Maximum Power Density Measurement

8.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/20/2011	⁽²⁾
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

8.4. Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The spectrum analyzer RES BW was set to 3 kHz. The START and STOP frequencies were set to the band edges of the maximum output pass band. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs. The specification calls for a 1 second interval at each 3 kHz bandwidth; total SWEEP TIME is calculated as follows:

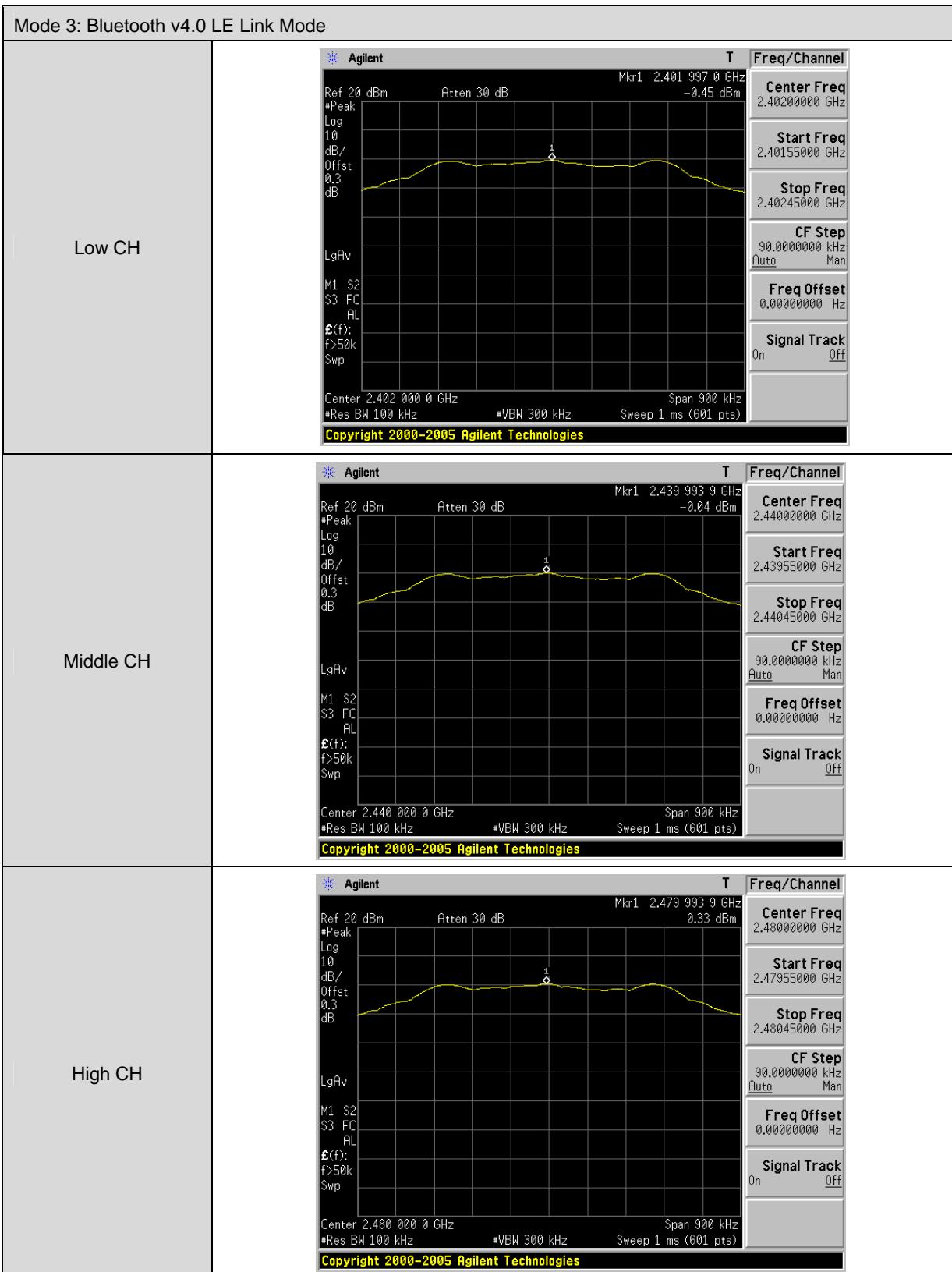
$$\text{SWEEP TIME (SEC)} = (\text{Fstop, kHz} - \text{Fstart, kHz})/3 \text{ kHz}$$

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

**8.5. Test Result**

Model Number	QBA757		
Test Item	Maximum Power Density		
Test Mode	Mode 3: Bluetooth v4.0 LE Link Mode		
Date of Test	09/03/2012	Test Site	TE02
Frequency (MHz)		Measurement (dBm)	Limit (dBm)
2402		-0.45	< 8
2440		-0.04	< 8
2480		0.33	< 8

8.6. Test Graphs

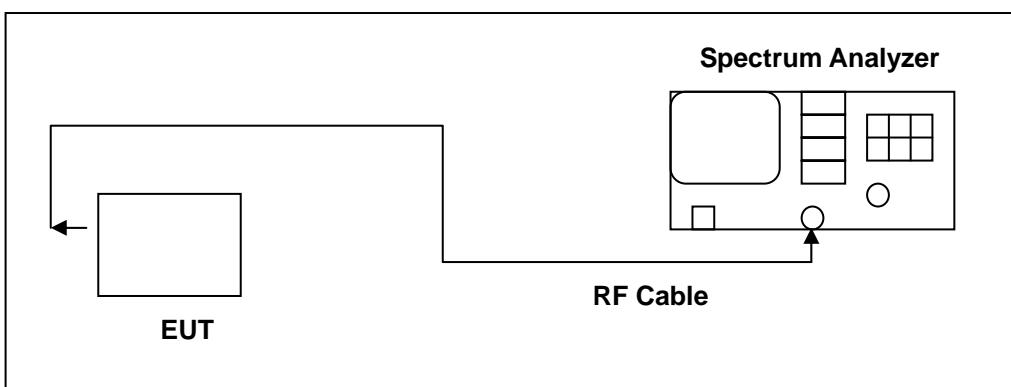


9 Out of Band Conducted Emissions Measurement

9.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/20/2011	(2)
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/09/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

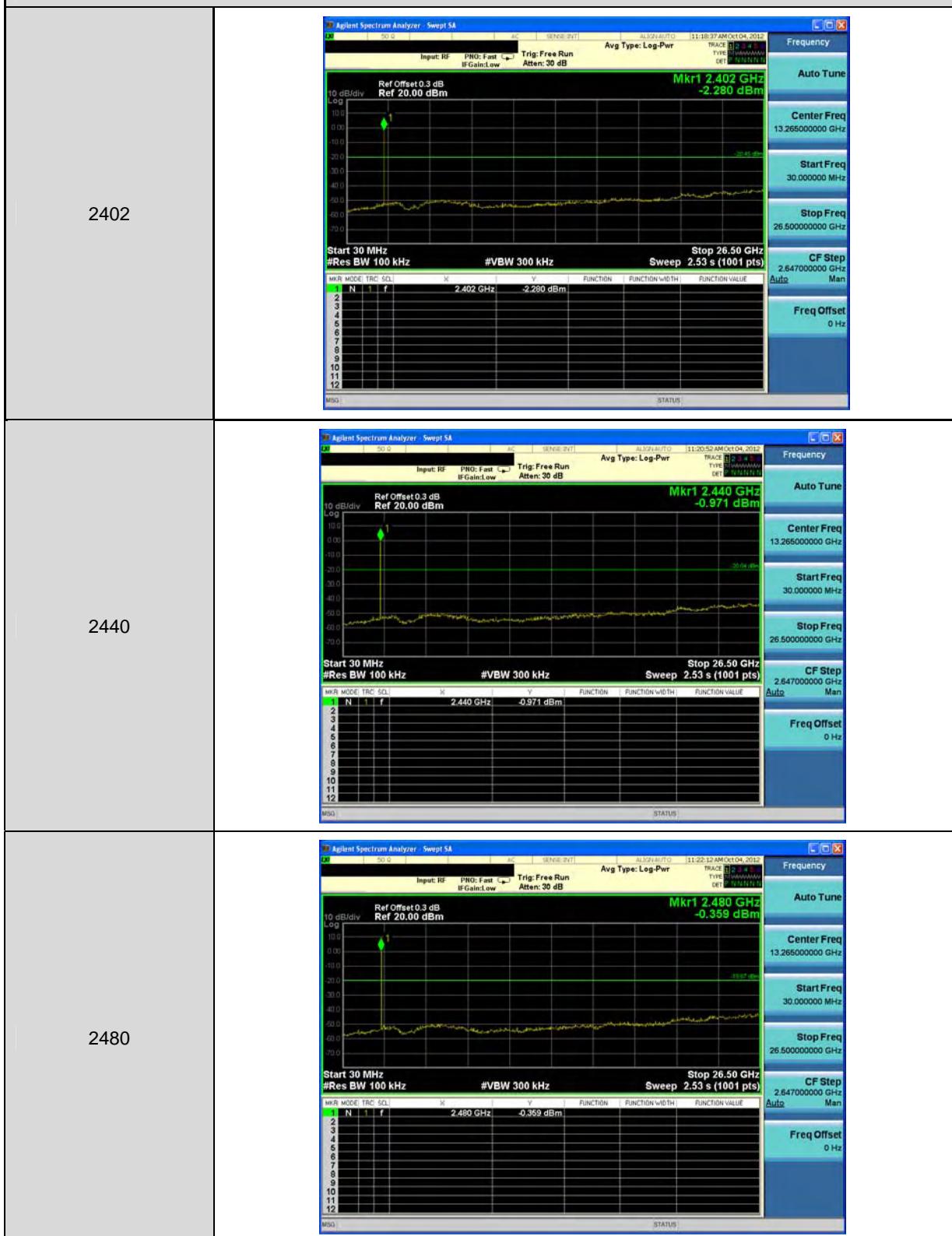
9.4. Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band. The test was performed at 3 channels (Channel 0, 39, 78)

9.5. Test Graphs

Mode 3: Bluetooth v4.0 LE Link Mode

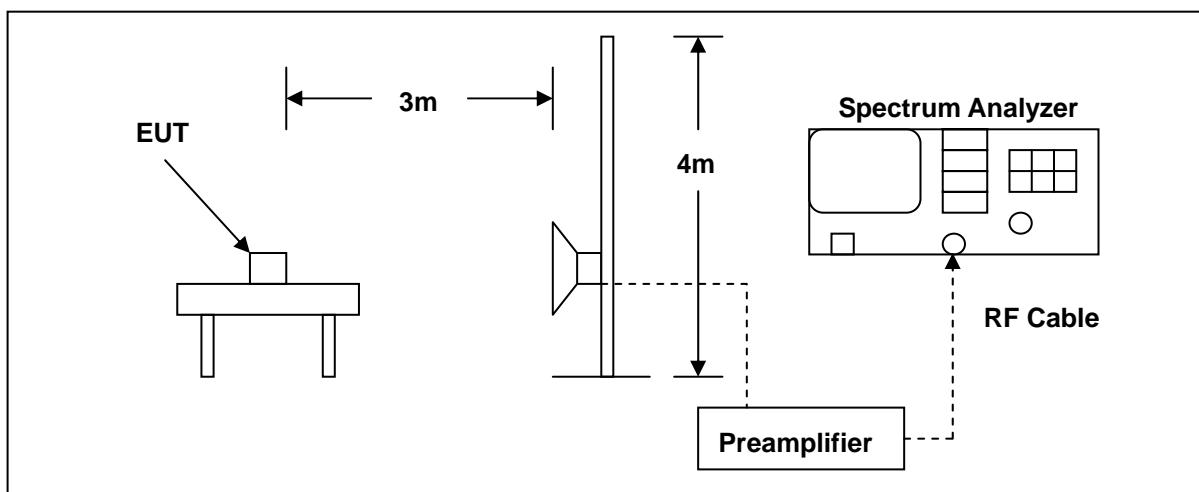


10 Band Edges Measurement

10.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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

10.2. Test Setup



10.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/09/2012	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/22/2012	(1)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	9120D	9120D-550	06/15/2012	(1)
Test Site	ATL	TE01	888001	12/20/2011	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

10.4. Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter was in full radiated power. The additional test was performed to show compliance with the requirement at the band-edge frequency 2483.5 MHz and up to 2500 MHz and at 2390.0 MHz.

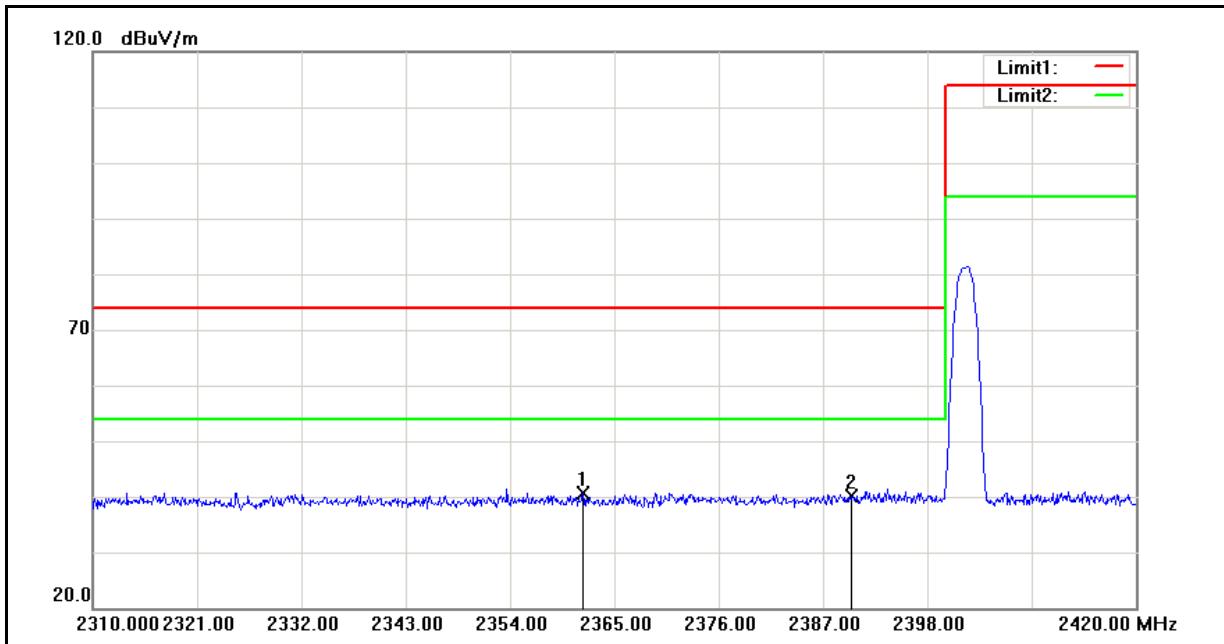
The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel. Then the field strength was measured at 2390.0 MHz. These tests were performed at 4 different bit rates.

For measurements the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

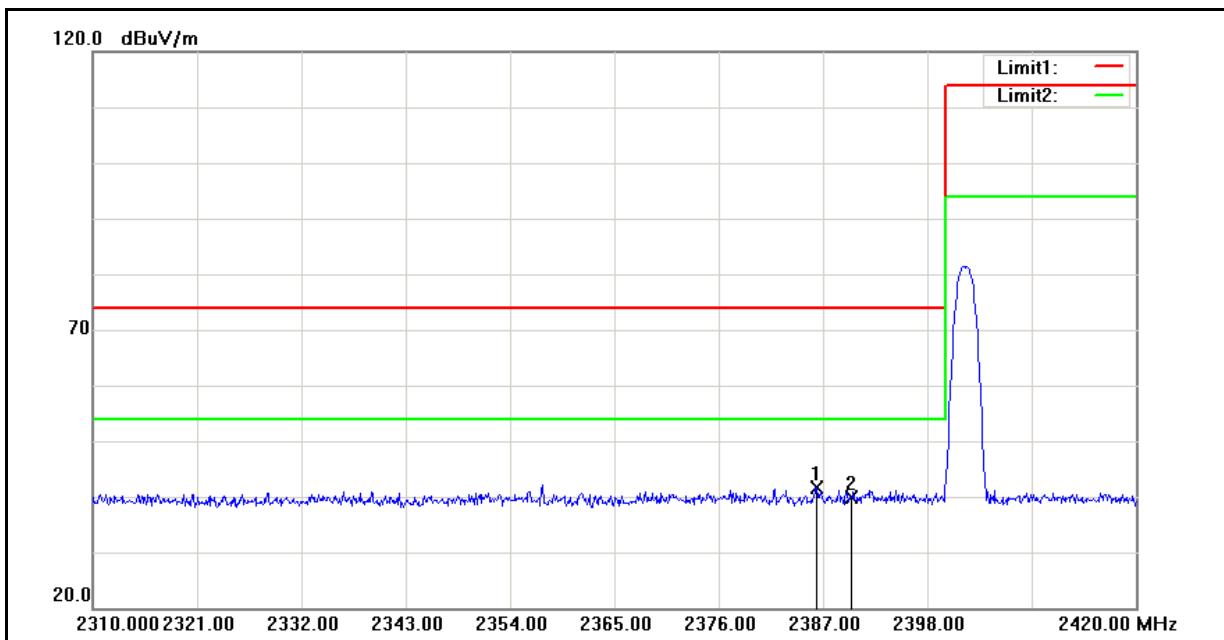
10.5. Test Result

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	08/30/2012
Frequency:	2402 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



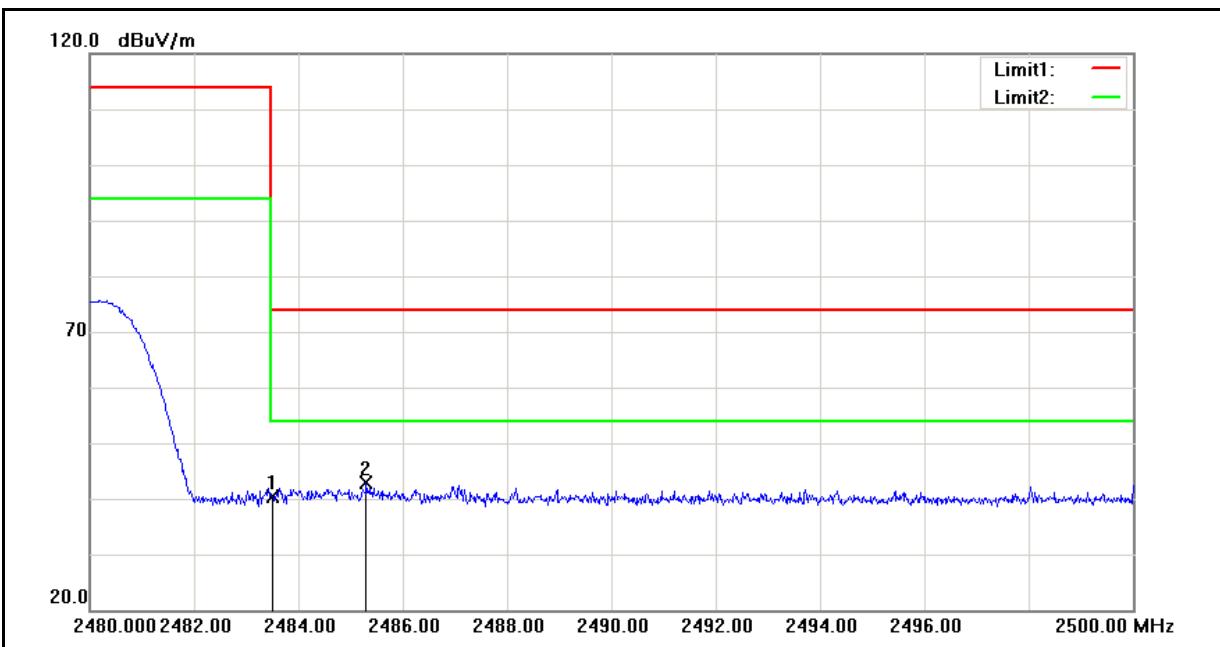
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2361.700	40.88	-0.18	40.70	74.00	-33.30	peak
2	2390.000	40.17	-0.06	40.11	74.00	-33.89	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	08/30/2012
Frequency:	2402 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



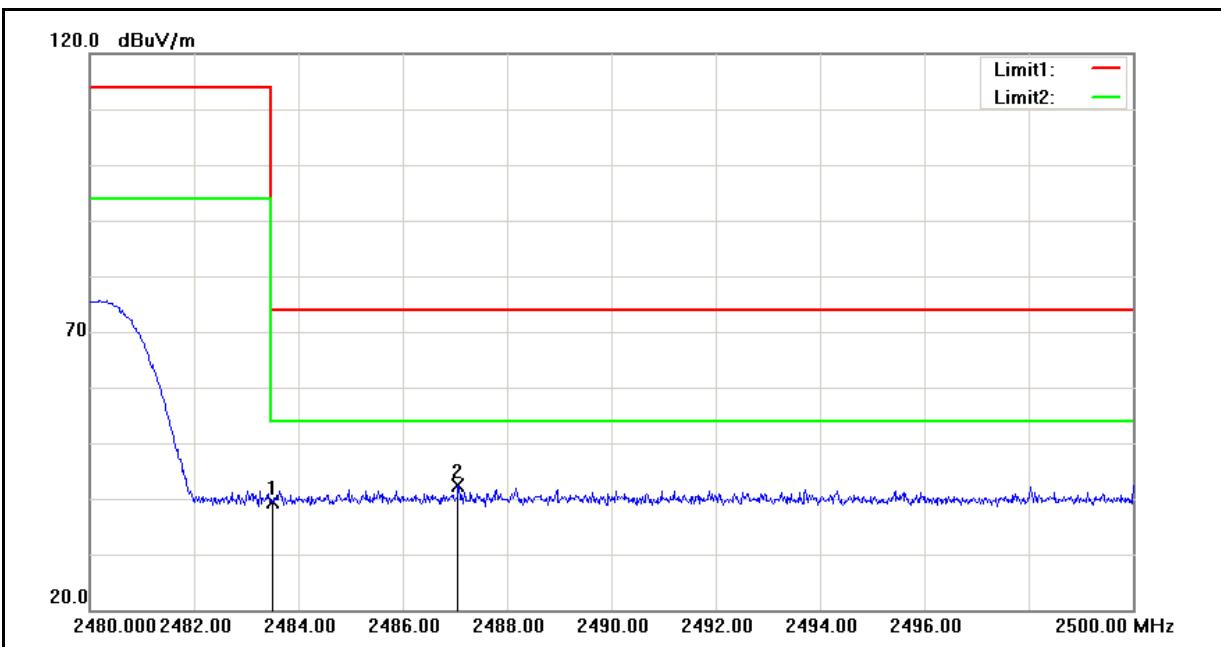
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.340	41.75	-0.08	41.67	74.00	-32.33	peak
2	2390.000	39.86	-0.06	39.80	74.00	-34.20	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	08/30/2012
Frequency:	2480 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	40.04	0.35	40.39	74.00	-33.61	peak
2	2485.300	42.64	0.36	43.00	74.00	-31.00	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	QBA757	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	08/30/2012
Frequency:	2480 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



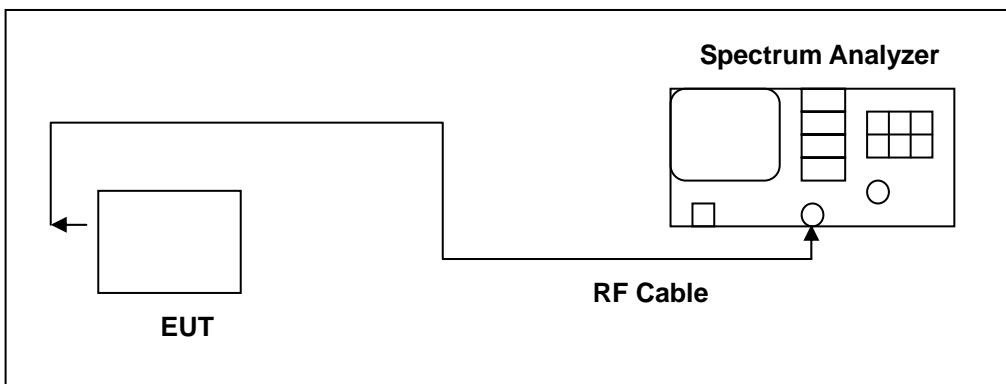
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	39.04	0.35	39.39	74.00	-34.61	peak
2	2487.060	41.92	0.37	42.29	74.00	-31.71	peak

11 99 % Occupied Bandwidth Measurement

11.1.Limit

N/A

11.2.Test Setup



11.3.Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/20/2011	⁽²⁾
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

11.4.Test Procedure

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

**11.5. Test Result**

Model Number	QBA757		
Test Item	99 % Occupied Bandwidth		
Test Mode	Mode 3: Bluetooth v4.0 LE Link Mode		
Date of Test	09/03/2012	Test Site	TE02
Frequency (MHz)		Measurement (MHz)	Limit (MHz)
2402		1.0248	-----
2440		1.0196	-----
2480		1.0226	-----

11.6. Test Graphs

Mode 3: Bluetooth v4.0 LE Link Mode	
2402	<p>Agilent</p> <p>Ch Freq 2.402 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm #Atten 30 dB</p> <p>#Samp Log</p> <p>10 dB/</p> <p>Offset 0.3 dB</p> <p>Center 2.402 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 5.425 ms (401 pts)</p> <p>Occupied Bandwidth</p> <p>1.0248 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 5.089 kHz x dB Bandwidth 1.129 MHz*</p>
2440	<p>Agilent</p> <p>Ch Freq 2.44 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm #Atten 30 dB</p> <p>#Samp Log</p> <p>10 dB/</p> <p>Offset 0.3 dB</p> <p>Center 2.44 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 5.425 ms (401 pts)</p> <p>Occupied Bandwidth</p> <p>1.0196 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 2.828 kHz x dB Bandwidth 1.131 MHz*</p>
2480	<p>Agilent</p> <p>Ch Freq 2.48 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm #Atten 30 dB</p> <p>#Samp Log</p> <p>10 dB/</p> <p>Offset 0.3 dB</p> <p>Center 2.48 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 5.425 ms (401 pts)</p> <p>Occupied Bandwidth</p> <p>1.0226 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error 4.455 kHz x dB Bandwidth 1.129 MHz*</p>



12 Antenna Measurement

12.1.Limit

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2.Antenna Connector Construction

The antenna used in this product is **Internal antenna**. And the maximum Gain of this antenna is only **1.2 dBi**.