Test Report

FCC Part15 Subpart C

Product Name	:	EZ-BLE PRoC Module
Model No.	:	CYBLE-222005-00
FCC ID	:	WAP2005
IC	:	7922A-2005

Applicant	:	Cypress Semiconductor Corporation
Address	:	198 Champion Ct, San Jose, California 95134 United States

Date of Receipt	:	Sept. 09, 2015
Test Date	:	Sept. 09, 2015~ Sept. 30, 2015
Issued Date	:	Oct. 12, 2015
Report No.	:	1590279R-RF-US-P06V02
Report Version	:	V1.0

Test Report Certification

Issued Date : Oct.12, 2015
Report No. : 1590279R-RF-US-P06V02

QuieTek a DEKRA company

Product Name	:	EZ-BLE PRoC Module
Applicant	:	Cypress Semiconductor Corporation
Address	:	198 Champion Ct, San Jose, California 95134 United States
Manufacturer	:	Wujiang Sigmatron Electronics Co., Ltd
Address	:	386 Huahong Rd, Wujiang, Suzhou, Jiangsu, China
Model No.	:	CYBLE-222005-00
FCC ID	:	WAP2005
IC	:	7922A-2005
EUT Voltage	:	DC 3.3V
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014; ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r03 Industry Canada RSS-Gen Issue 4 / RSS-247 Issue 1
Test Result	:	Complied
Performed Location	:	Suzhou EMC Laboratory No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098

Documented By : Zlene Wang

Reviewed By :

Approved By :

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
USA	**:**	**FCC**
Japan	**:**	**VCCI**
China	**:**	**CNAS**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site :http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :
No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

LinKou Testing Laboratory :
No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

Suzhou Testing Laboratory :
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : service@quietek.com

TABLE OF CONTENTS

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1590279R-RF-US-P06V02	V1.0	Initial Issued Report	Oct. 12, 2015

1. General Information

1.1. EUT Description

Product Name	EZ-BLE PRoC Module
Model No.	CYBLE-222005-00
Working Voltage	DC 3.3V
Bluetooth Specification	V4.1
Frequency Range	2402- 2480 MHz
Channel Number	V4.1: 40
Channel Separation	V4.1: 2MHz
Type of Modulation	V4.1: GFSK
Data Rate	V4.1: 1Mbps(GFSK)
Antenna Type	Reference to Antenna List
Peak Antenna Gain	Reference to Antenna List

Note: The Bluetooth version is 4.1 but only supports low energy mode.

Bluetooth Working Frequency of Each Channel: (For V4.0)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz	03	2408 MHz
04	2410 MHz	05	2412 MHz	06	2414 MHz	07	2416 MHz
08	2418 MHz	09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz	15	2432 MHz
16	2434 MHz	17	2436 MHz	18	2438 MHz	19	2440 MHz
20	2442 MHz	21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz	27	2456 MHz
28	2458 MHz	29	2460 MHz	30	2462 MHz	31	2464 MHz
32	2466 MHz	33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz	39	2480 MHz

Bluetooth Antenna List

Antenna	Manufacturer	Model No.	Peak Gain
Ceramic Antenna	N/A	N/A	0.5dBi

1.2. Mode of Operation

QuieTek 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: Transmit-1Mbps(GFSK_BLE)

Note:

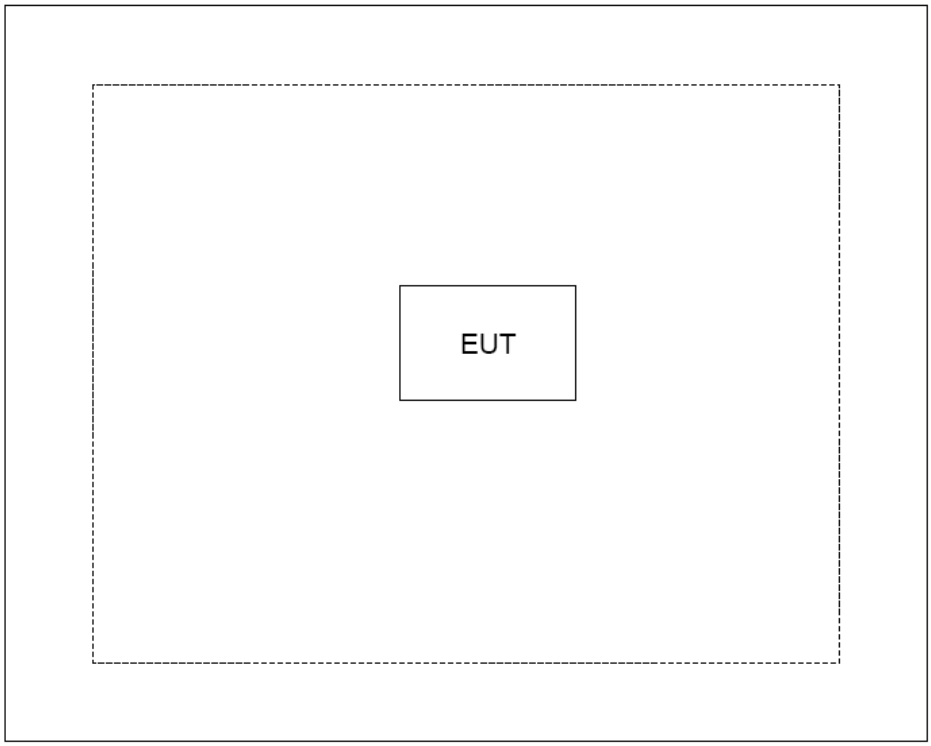
1. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.
3. The reading values of all the test items contain cable loss. (Cable loss=0.5dBm)

1.3. 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 No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

1.4. Configuration of Tested System

Connection Diagram		
		
Signal Cable Type		Signal cable Description
N/A	N/A	N/A

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Run the RF test software, and set the test mode and channel, then press OK to start continue Transmit.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.209	Yes	No
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d)	Yes	No
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 15.215(c)	Yes	No
6dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(2)	Yes	No
Power Output	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(3)	Yes	No
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(e)	Yes	No

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	RSS-Gen Issue 4 Section 8.8	Yes	No
Radiated Emission	RSS-Gen Issue 4 Section 8.9	Yes	No
RF Antenna Conducted Spurious	RSS-247 Issue 1 Section A5.5	Yes	No
Radiated Emission Band Edge	RSS-247 Issue 1 Section A5.5	Yes	No
Occupied Bandwidth	RSS-Gen Issue 4 Section 6.6 RSS-247 Issue 1 Section A5.2(1)	Yes	No
Power Output	RSS-247 Issue 1 Section A5.4(4)	Yes	No
Power Spectral Density	RSS-247 Issue 1 Section A5.2(2)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

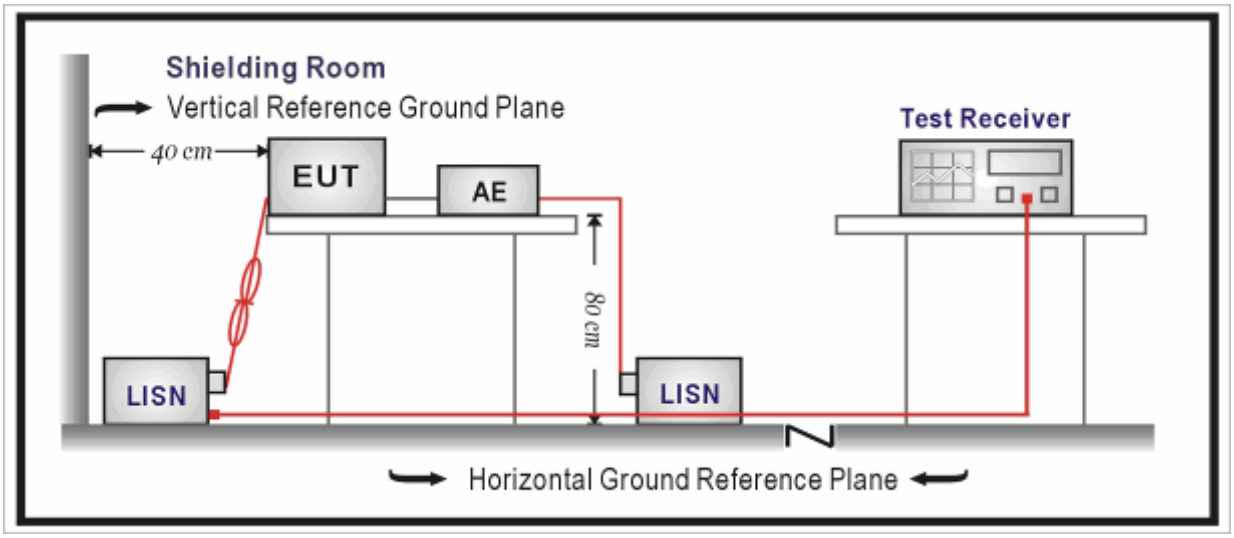
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2016/03/30
Two-Line V-Network	R&S	ENV216	100043	2016/03/30
Two-Line V-Network	R&S	ENV216	100044	2016/09/16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2016/03/01
50ohm Termination	SHX	TF2	07081401	2016/09/16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2016/01/08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

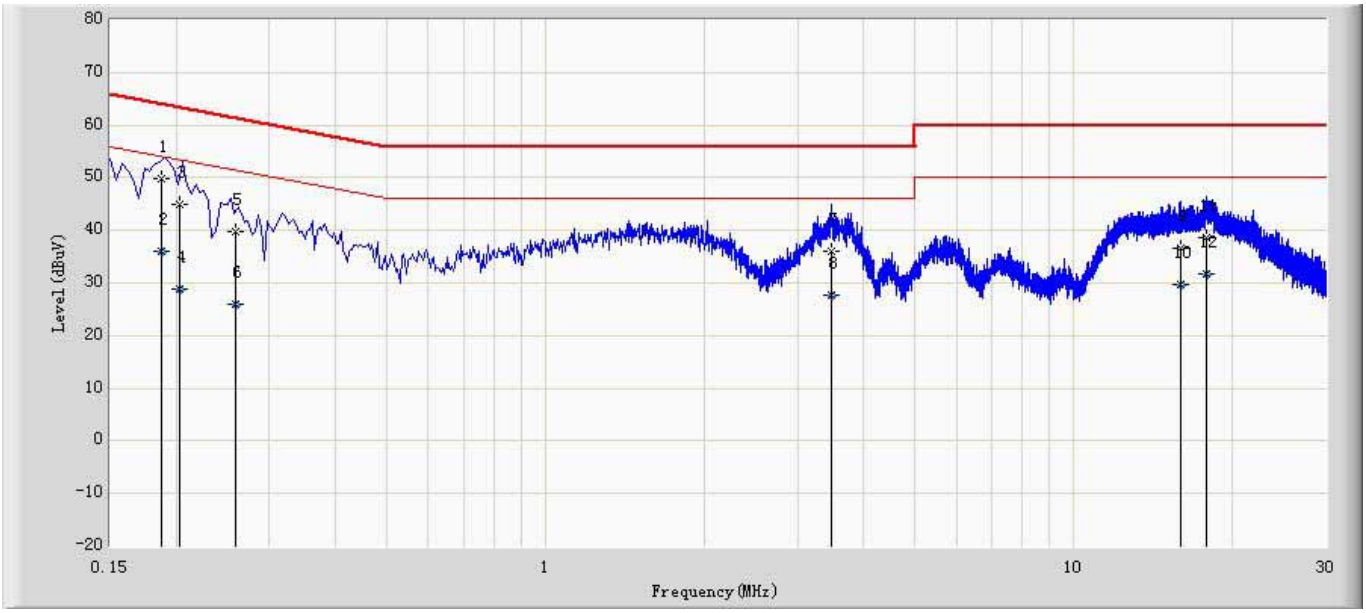
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

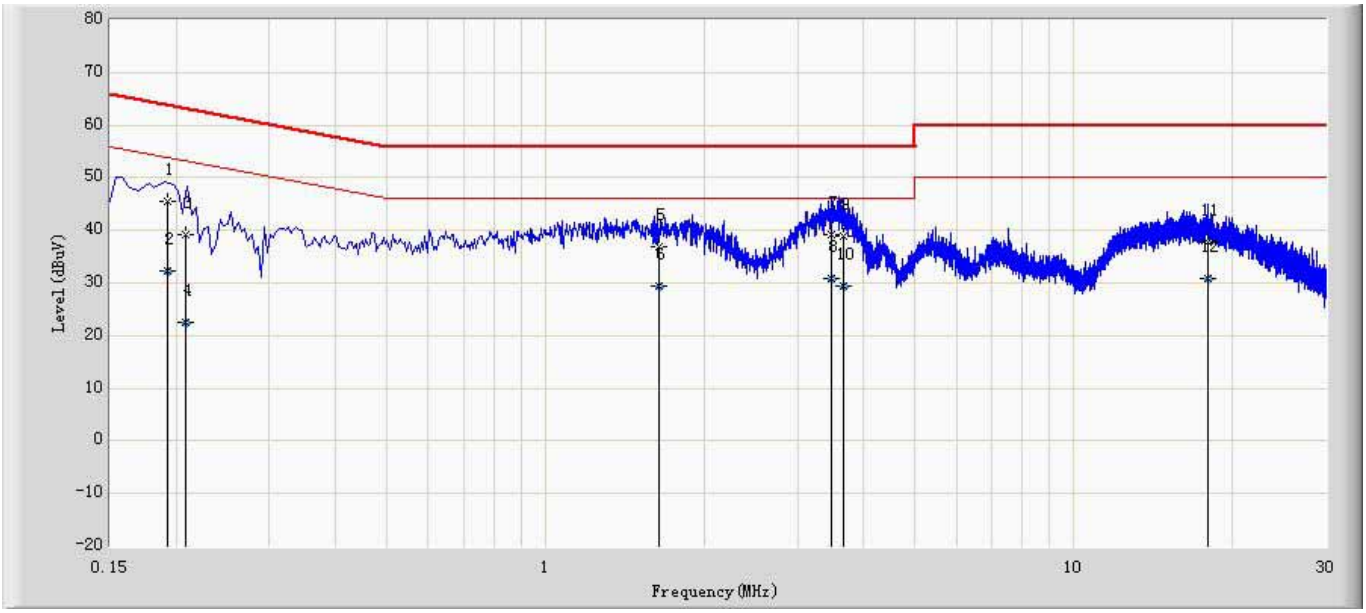
3.6. Test Result

Site: TR1	Time: 2015/09/17
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-L1	Polarity: Line
EUT: EZ-BLE PRoC Module	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1	*	0.188	49.947	40.236	-14.177	64.124	9.711	QP
2		0.188	35.930	26.219	-18.194	54.124	9.711	AV
3		0.203	44.968	35.258	-18.519	63.487	9.710	QP
4		0.203	28.766	19.056	-24.721	53.487	9.710	AV
5		0.259	39.861	30.154	-21.602	61.463	9.707	QP
6		0.259	25.870	16.163	-25.593	51.463	9.707	AV
7		3.476	36.178	26.398	-19.822	56.000	9.780	QP
8		3.476	27.796	18.016	-18.204	46.000	9.780	AV
9		15.941	36.578	26.348	-23.422	60.000	10.230	QP
10		15.941	29.606	19.376	-20.394	50.000	10.230	AV
11		17.782	38.569	28.339	-21.431	60.000	10.230	QP
12		17.782	31.744	21.514	-18.256	50.000	10.230	AV

Site: TR1	Time: 2015/09/17
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-N	Polarity: Neutral
EUT: EZ-BLE PRoC Module	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.193	45.547	35.827	-18.359	63.906	9.720	QP
2		0.193	32.186	22.466	-21.720	53.906	9.720	AV
3		0.208	39.247	29.527	-24.038	63.285	9.720	QP
4		0.208	22.603	12.883	-30.682	53.285	9.720	AV
5		1.638	36.868	27.138	-19.132	56.000	9.730	QP
6		1.638	29.367	19.637	-16.633	46.000	9.730	AV
7		3.480	39.237	29.457	-16.763	56.000	9.780	QP
8	*	3.480	30.930	21.150	-15.070	46.000	9.780	AV
9		3.674	38.887	29.097	-17.113	56.000	9.790	QP
10		3.674	29.517	19.727	-16.483	46.000	9.790	AV
11		17.923	37.694	27.424	-22.306	60.000	10.270	QP
12		17.923	30.753	20.483	-19.247	50.000	10.270	AV

Note: All the low ,middle and high channels of all different modes are investigated, and only report the worst case.

4. Radiated Emission

4.1. Test Equipment

Radiated Emission / AC-2

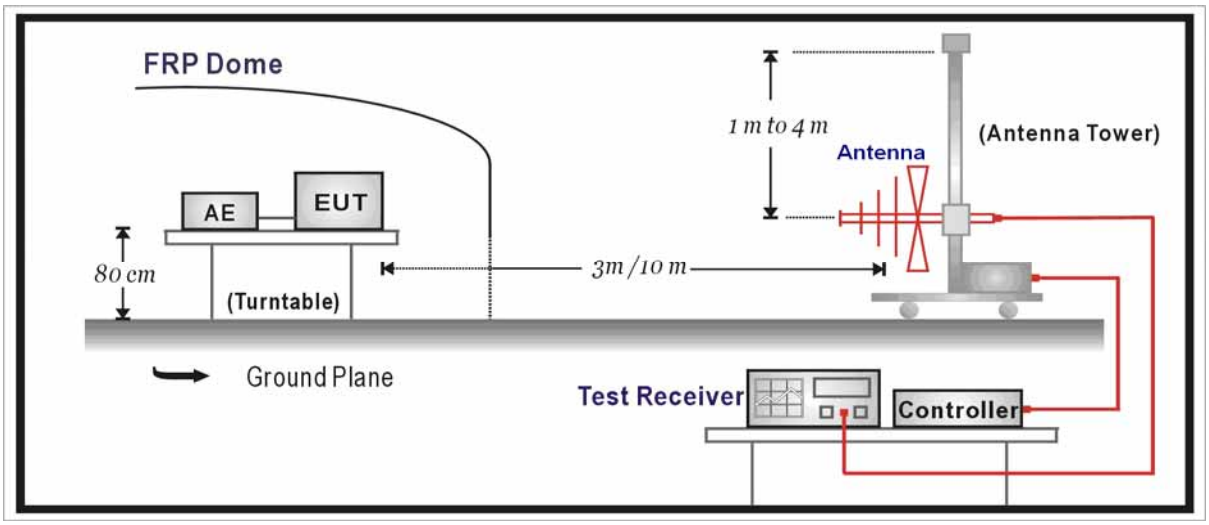
Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016/03/28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015/11/25
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2016/10/10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016/03/01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2016/01/08

Radiated Emission / AC-5

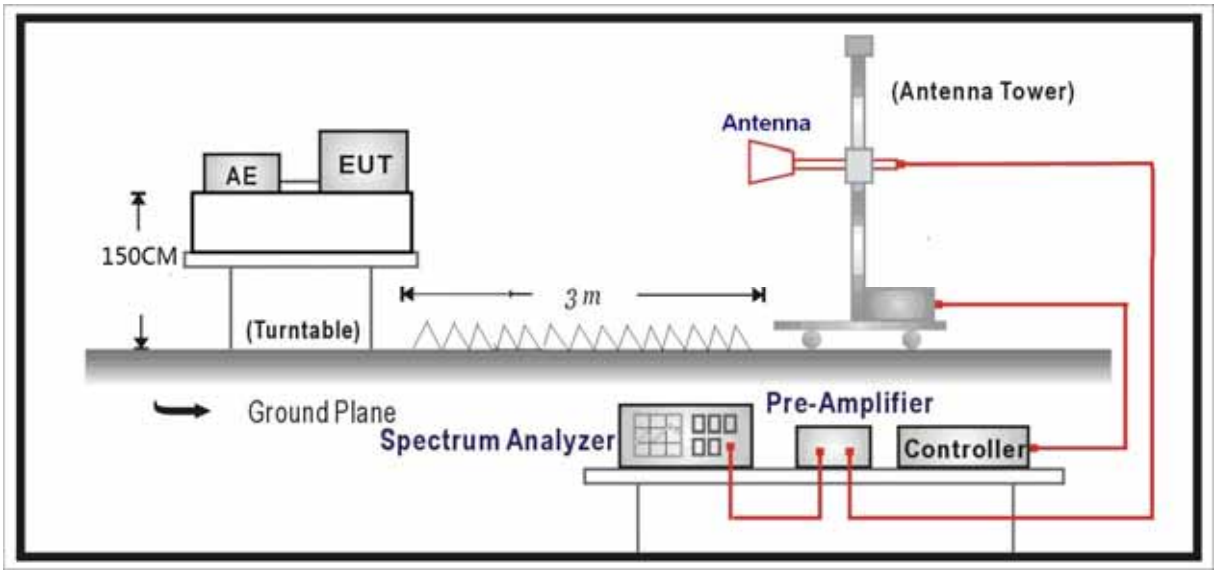
Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016/05/12
Preamplifier	Miteq	NSP1800-25	1364185	2016/05/03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016/05/03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2015/10/15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2016/06/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2016/04/10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016/03/01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2016/01/08

4.2. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.
Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

4.5. Uncertainty

The measurement uncertainty above 1GHz is defined as ± 3.9 dB
below 1GHz is defined as ± 3.8 dB

4.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

Mode 1: Transmitter-1Mbps(GFSK_BLE)

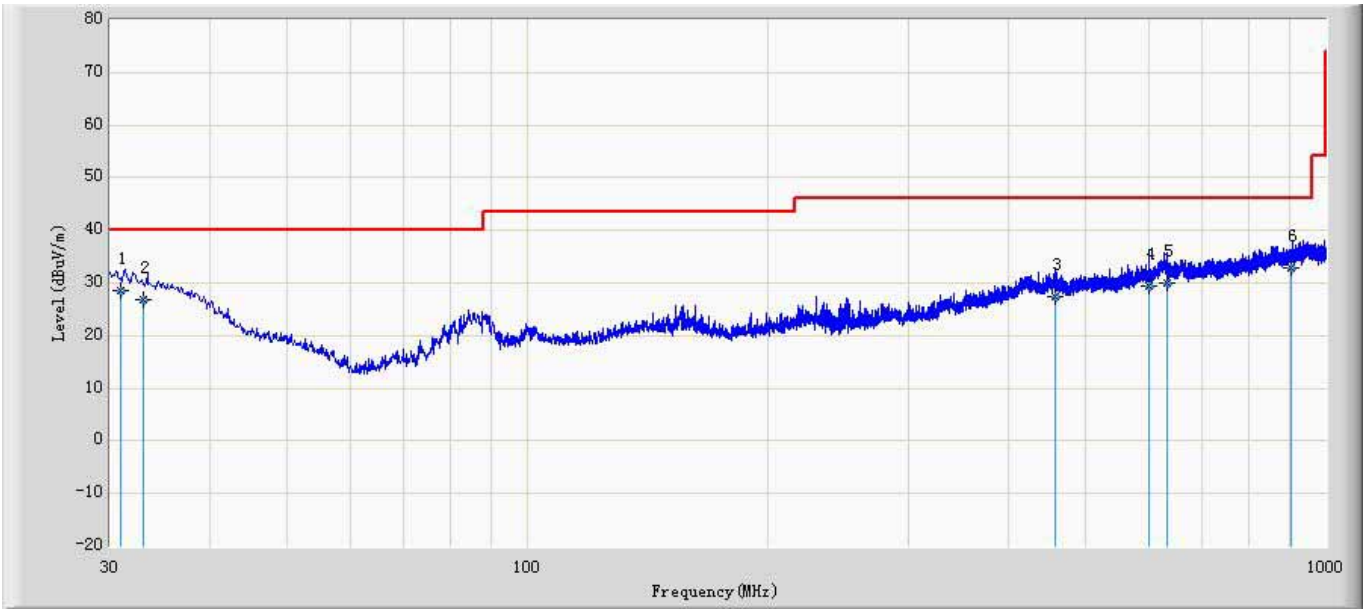
CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	48.2	-6.6	41.6	54(Note2)	-12.4	PK
	V	4804.0	48.9	-6.6	42.3	54(Note2)	-11.7	PK
	H	7206.0	46.2	-2.9	43.3	54(Note2)	-10.7	PK
	V	7206.0	46.0	-2.9	43.1	54(Note2)	-10.9	PK
	H	9608.0	44.0	0.9	45.0	54(Note2)	-9.0	PK
	V	9608.0	43.7	0.9	44.7	54(Note2)	-9.3	PK
19	H	4880.0	48.0	-6.6	41.4	54(Note2)	-12.6	PK
	V	4880.0	48.9	-6.6	42.3	54(Note2)	-11.7	PK
	H	7320.0	46.8	-2.8	44.0	54(Note2)	-10.0	PK
	V	7320.0	46.8	-2.8	44.1	54(Note2)	-9.9	PK
	H	9760.0	44.6	1.2	45.9	54(Note2)	-8.1	PK
	V	9760.0	44.7	1.2	45.9	54(Note2)	-8.1	PK
39	H	4960.0	48.7	-6.3	42.4	54(Note2)	-11.6	PK
	V	4960.0	50.0	-6.3	43.7	54(Note2)	-10.3	PK
	H	7440.0	46.6	-2.6	44.0	54(Note2)	-10.0	PK
	V	7440.0	47.0	-2.6	44.4	54(Note2)	-9.6	PK
	H	9920.0	44.3	0.8	45.2	54(Note2)	-8.8	PK
	V	9920.0	43.9	0.8	44.7	54(Note2)	-9.3	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

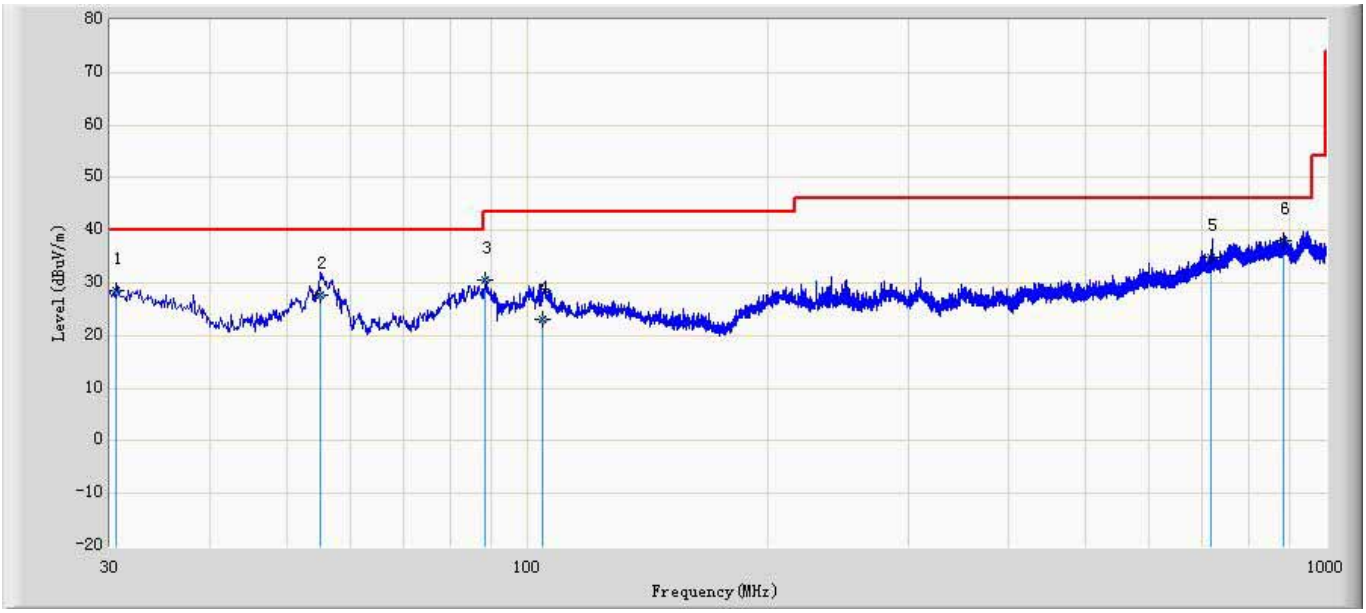
The worst case of Radiated Emission below 1GHz:

Site: AC3	Time: 2015/09/17 - 10:38
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: AC3_10m (30-1000MHz)	Polarity: Horizontal
EUT: EZ-BLE PRoC Module	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	30.980	28.535	32.794	-11.465	40.000	-4.259	QP
2		32.998	26.945	32.386	-13.055	40.000	-5.441	QP
3		457.489	27.306	30.626	-18.694	46.000	-3.320	QP
4		599.897	29.360	30.475	-16.640	46.000	-1.115	QP
5		631.456	29.907	30.616	-16.093	46.000	-0.709	QP
6		906.336	32.830	31.711	-13.170	46.000	1.119	QP

Site: AC3	Time: 2015/09/17 - 10:42
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: AC3_10m (30-1000MHz)	Polarity: Vertical
EUT: EZ-BLE PRoC Module	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		30.500	28.592	32.567	-11.408	40.000	-3.975	QP
2		55.114	27.708	42.588	-12.292	40.000	-14.880	QP
3		88.371	30.596	43.956	-12.904	43.500	-13.360	QP
4		104.417	23.094	33.605	-20.406	43.500	-10.511	QP
5		718.892	34.808	35.178	-11.192	46.000	-0.370	QP
6	*	885.420	38.179	37.148	-7.821	46.000	1.031	QP

5. RF Antenna Conducted Spurious

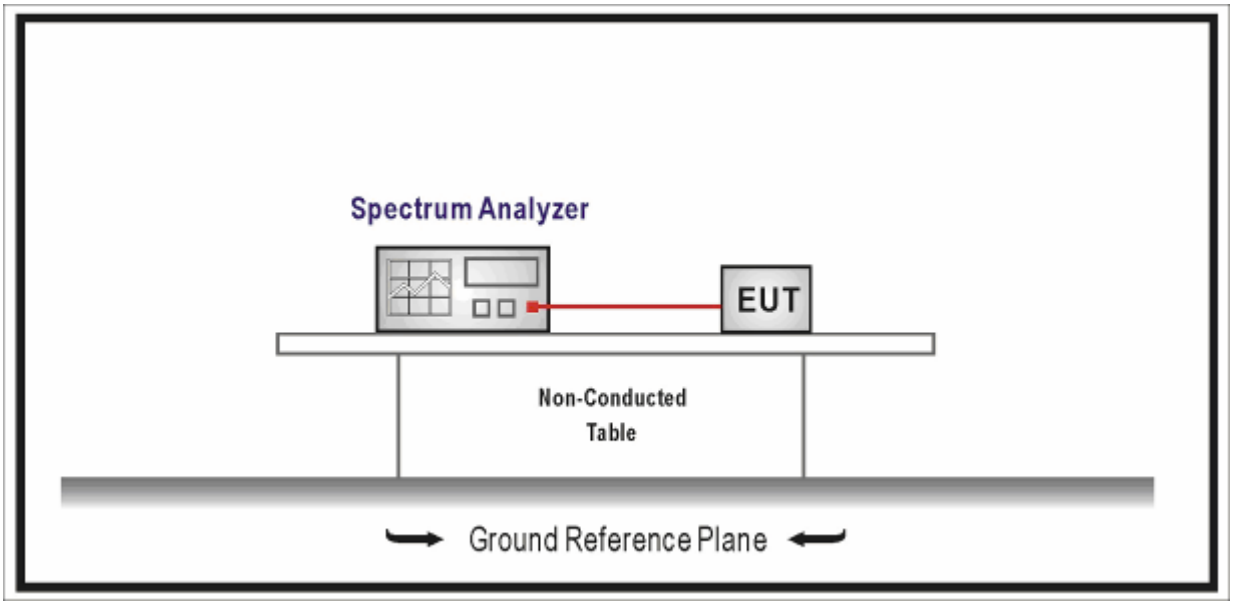
5.1. Test Equipment

RF Antenna Conducted Spurious / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016/01/05
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/04/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup



5.3. Limit

In any 100 kHz bandwidth outside the frequency band 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.

5.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
RBW ≧ 1% of the 20dB bandwidth
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.
Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

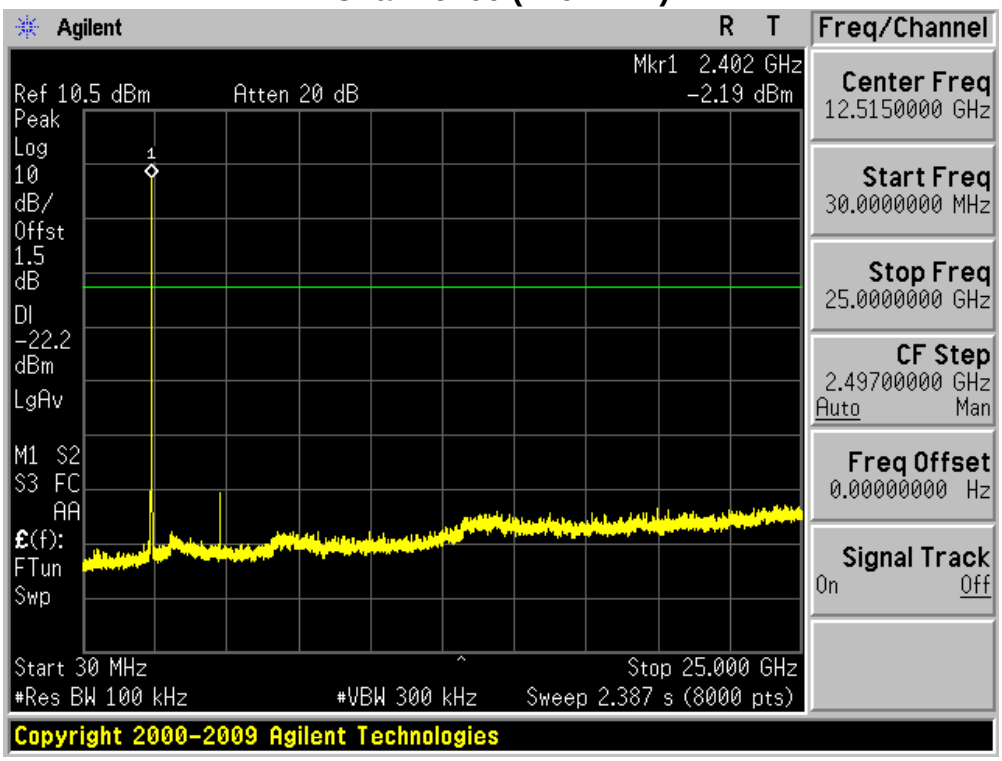
5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

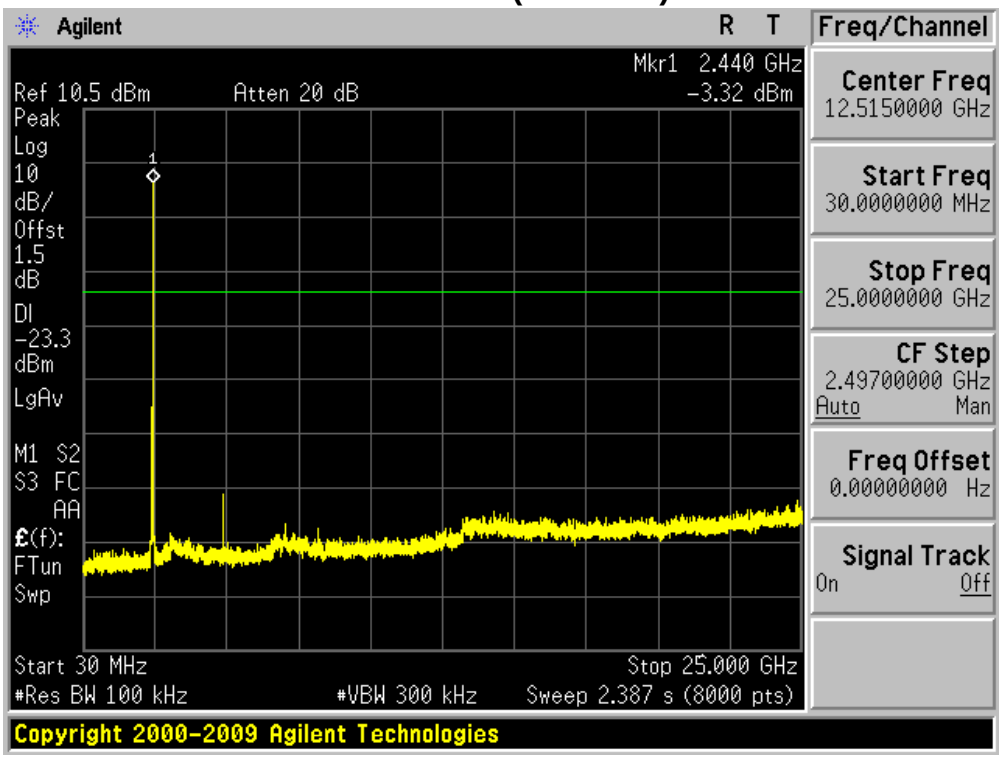
5.6. Test Result

Product	:	EZ-BLE PROC MODULE
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit-1Mbps(GFSK_BLE)

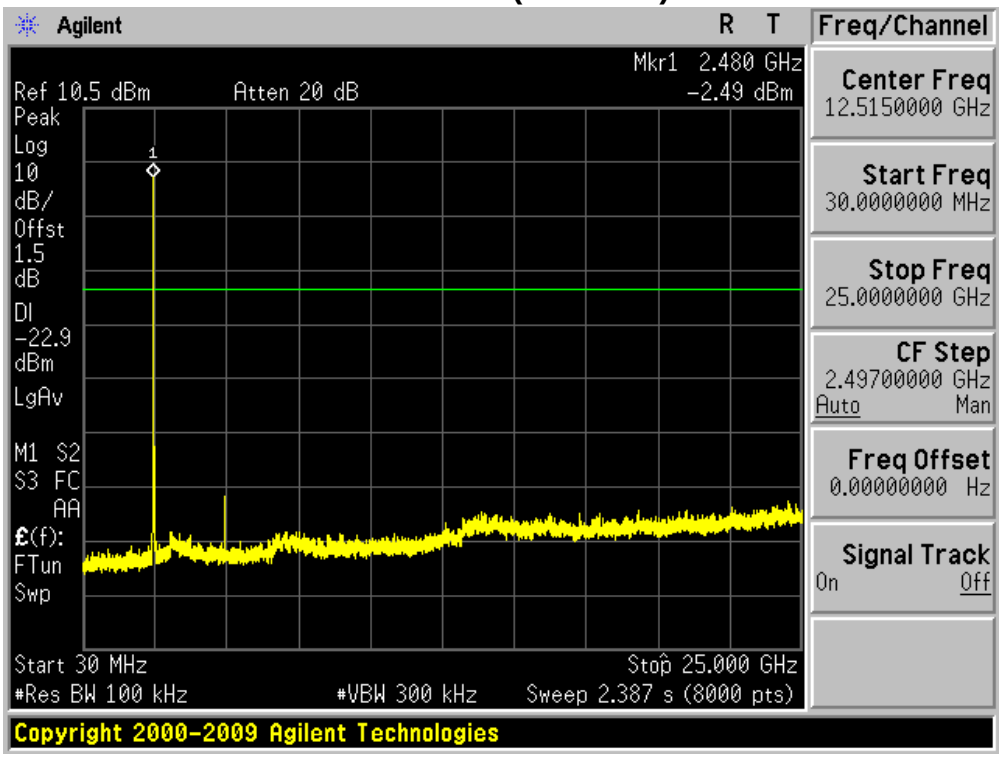
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



6. Radiated Emission Band Edge

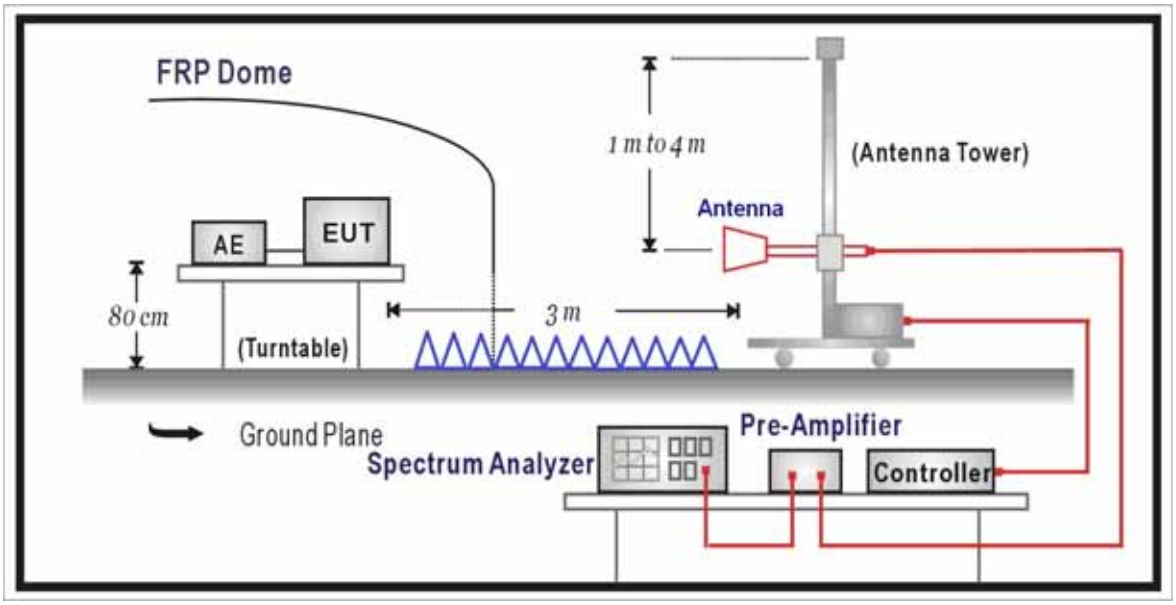
6.1. Test Equipment

☒Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2016/03/30
Preamplifier	Miteq	NSP1800-25	1364185	2016/05/03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016/05/03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2015/10/15
DRG Horn	ETS-Lindgren	3117	00123988	2016/01/05
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016/03/01
EMI Receiver	Agilent	N9038A	MY51210196	2016/08/07
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2016/01/08

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

According to ANSI C63.10: 2013.
This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≧ 1 GHz, 100 kHz for f < 1GHz
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines 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. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with

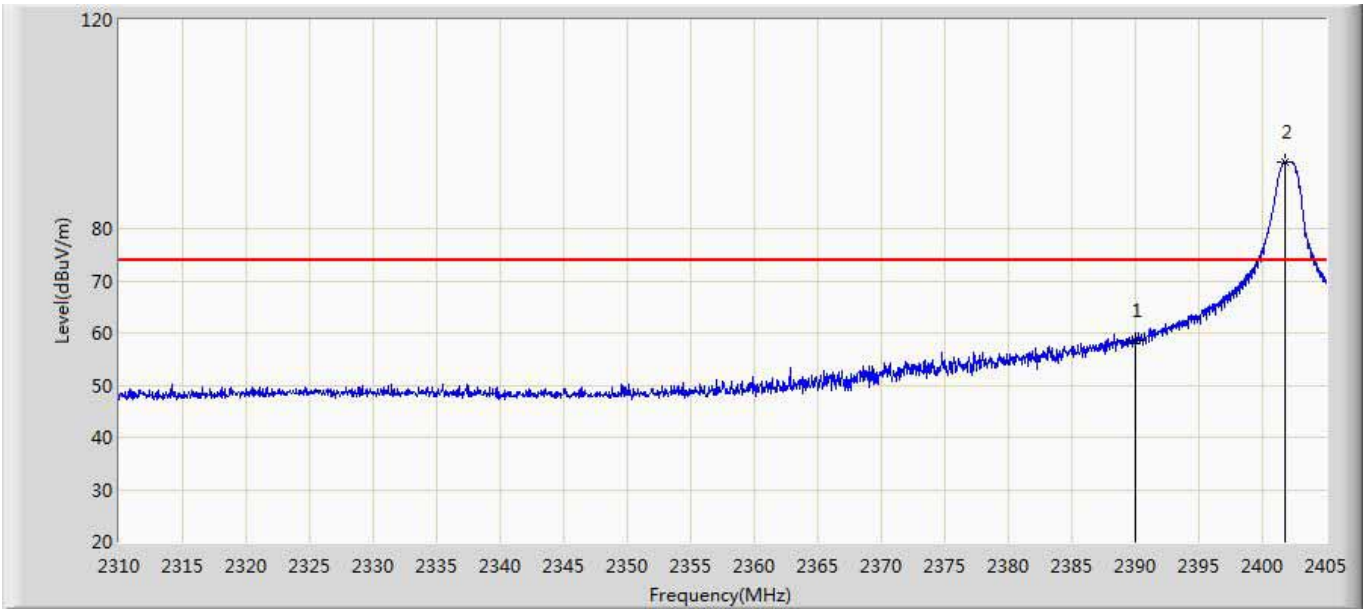
sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.
Now set the VBW ≥ 1 / T (the minimum transmission duration), while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15.
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

6.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

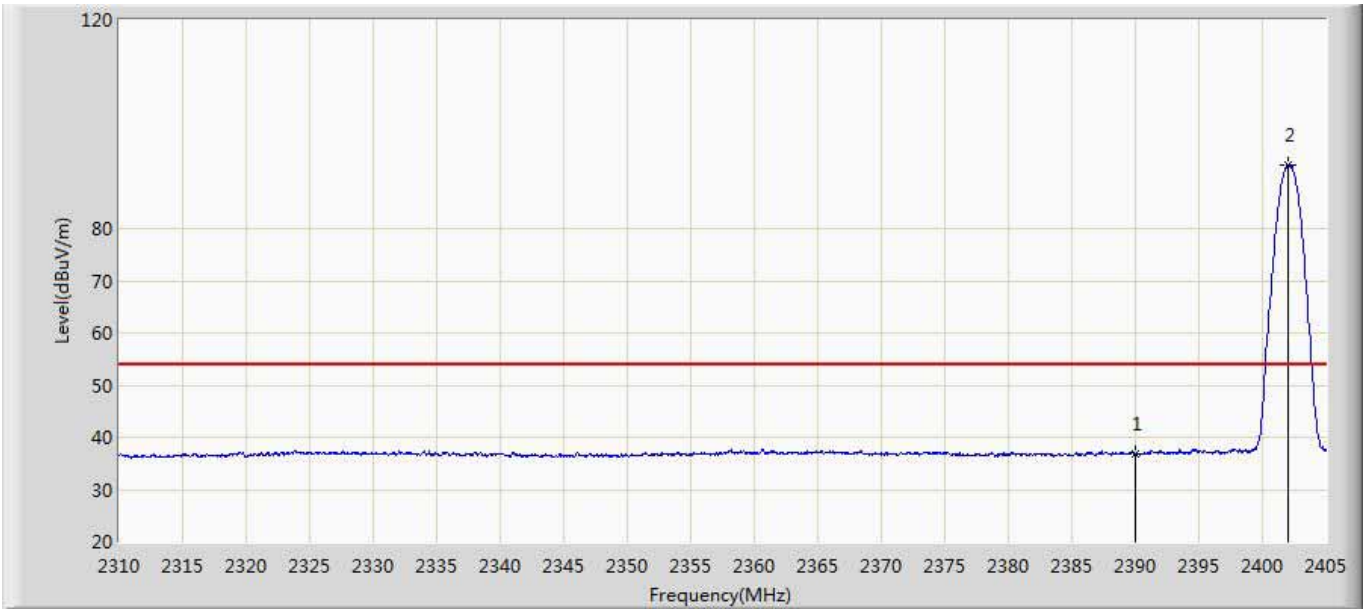
6.6. Test Result

Site: AC5	Time: 2015/09/09 - 10:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2402 by BLE	



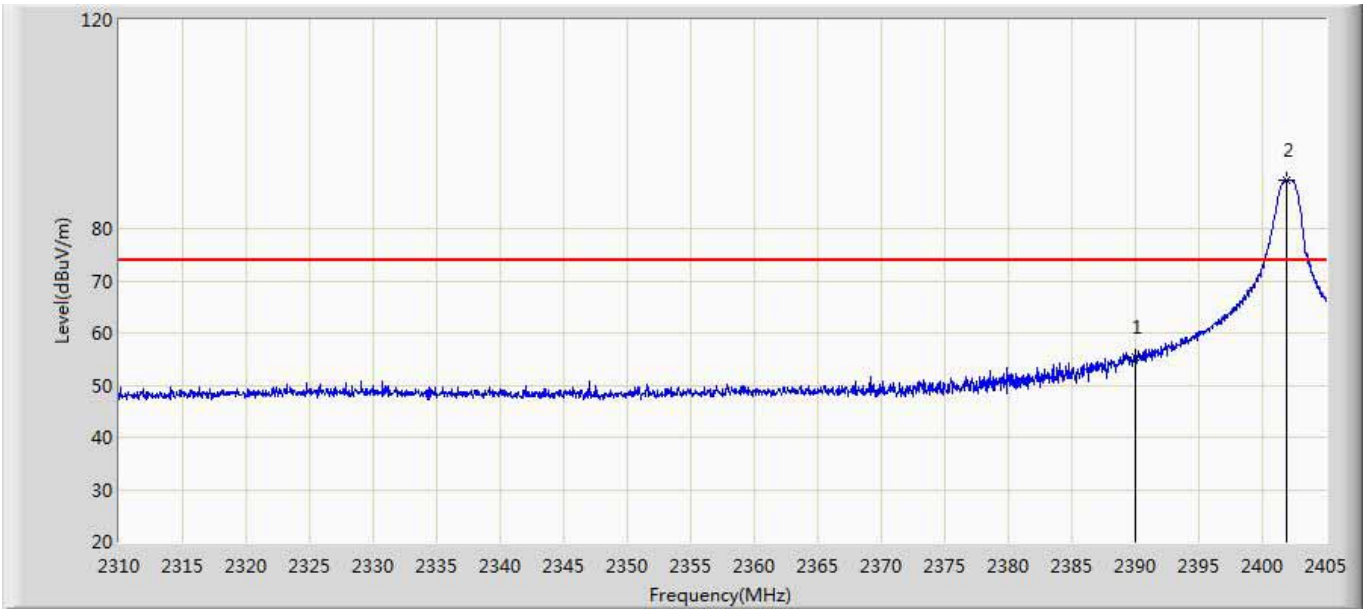
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	58.497	21.142	-15.503	74.000	37.355	PK
2	*	2401.817	92.797	55.455	18.797	74.000	37.342	PK

Site: AC5	Time: 2015/09/09 - 10:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2402 by BLE	



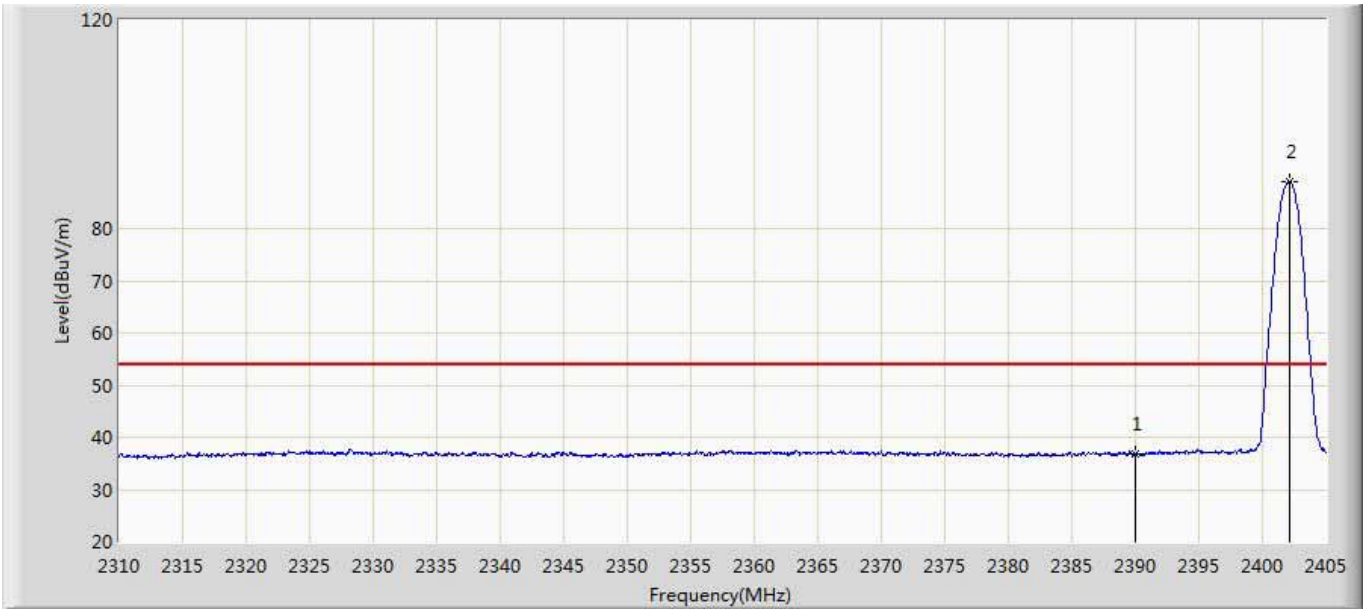
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	36.734	-0.621	-17.266	54.000	37.355	AV
2	*	2402.008	92.209	54.867	38.209	54.000	37.341	AV

Site: AC5	Time: 2015/09/09 - 10:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2402 by BLE	



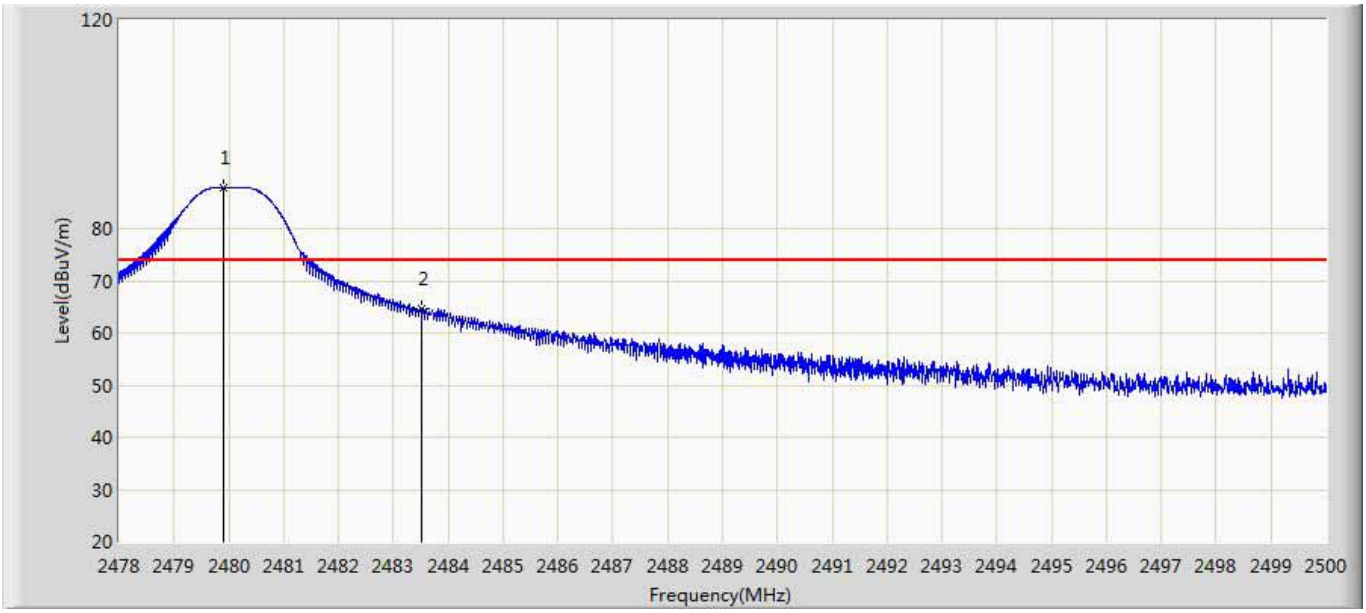
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	55.467	18.112	-18.533	74.000	37.355	PK
2	*	2401.960	89.229	51.887	15.229	74.000	37.341	PK

Site: AC5	Time: 2015/09/09 - 10:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2402 by BLE	



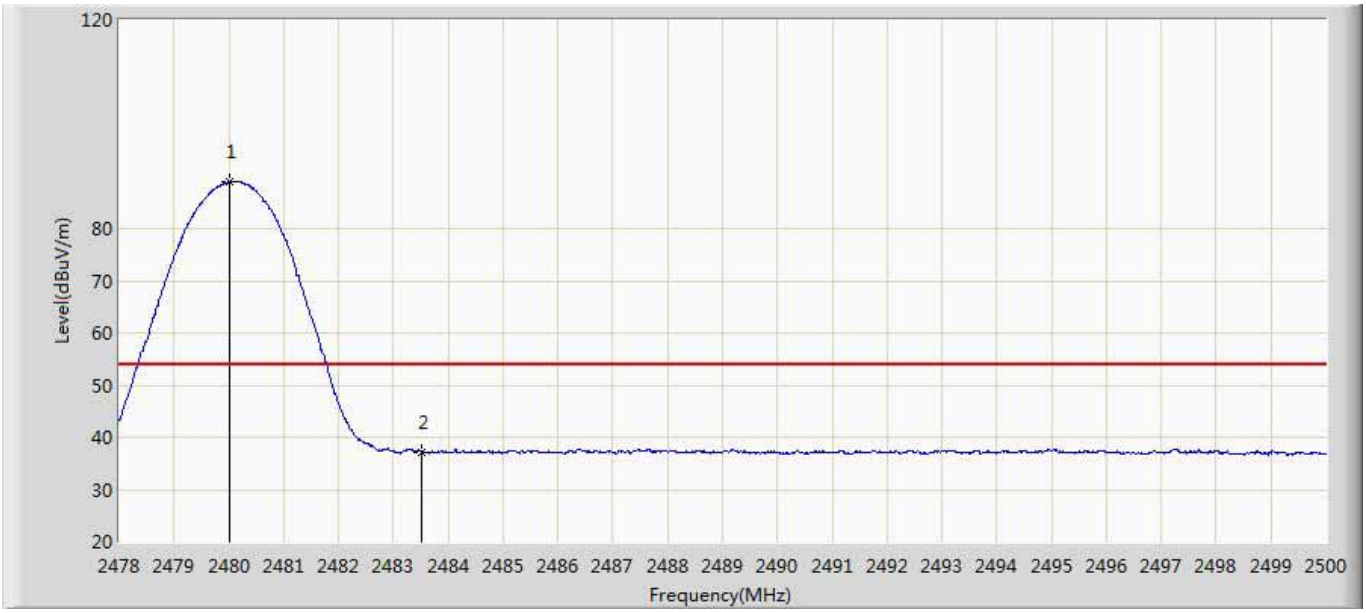
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	36.777	-0.578	-17.223	54.000	37.355	AV
2	*	2402.103	89.043	51.701	35.043	54.000	37.342	AV

Site: AC5	Time: 2015/09/09 - 10:18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2480 by BLE	



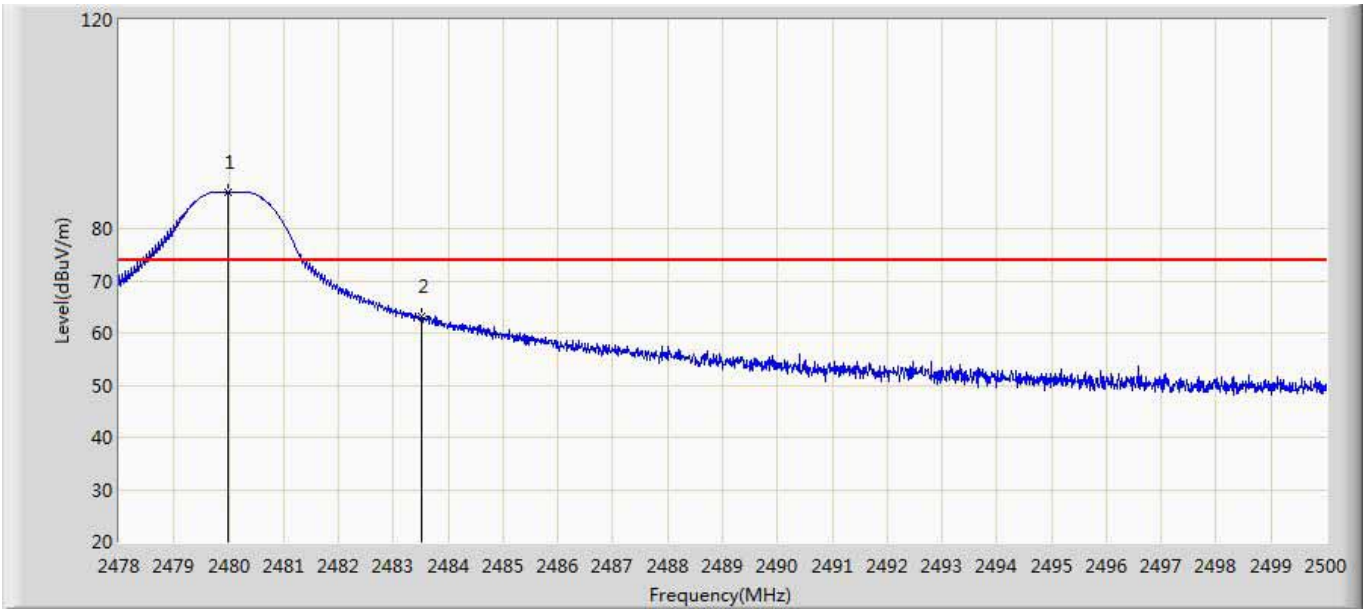
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.914	87.870	50.385	13.870	74.000	37.485	PK
2		2483.500	64.651	27.140	-9.349	74.000	37.511	PK

Site: AC5	Time: 2015/09/09 - 10:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2480 by BLE	



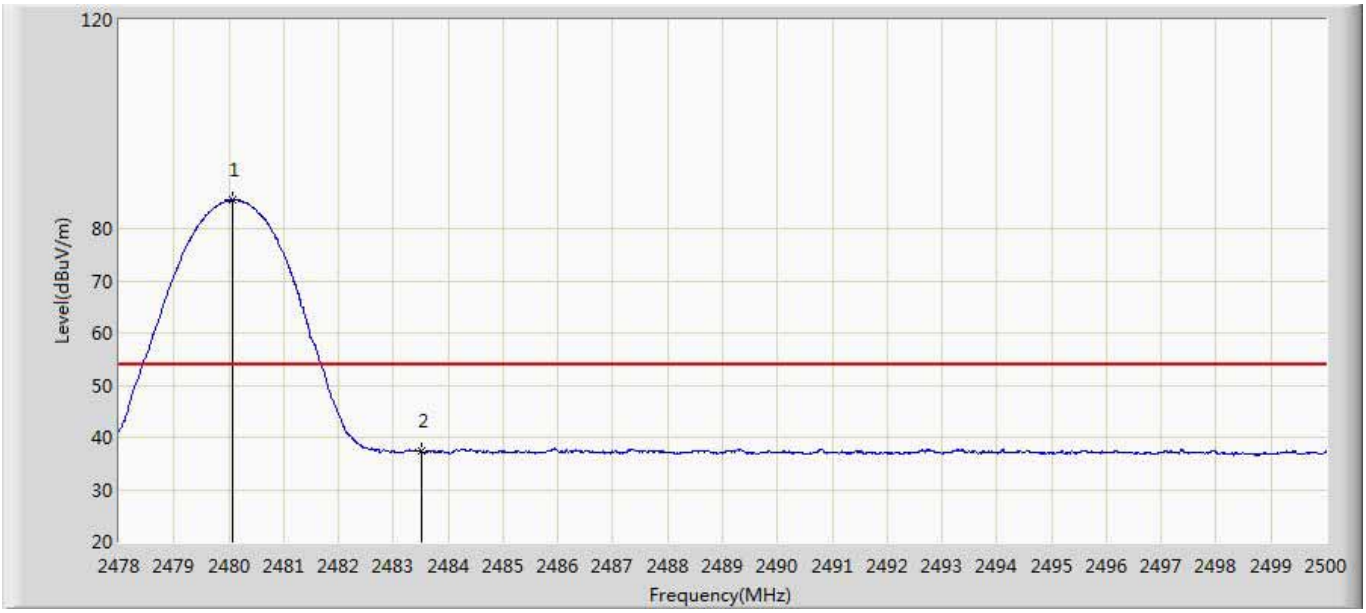
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.024	88.978	51.492	34.978	54.000	37.486	AV
2		2483.500	37.207	-0.304	-16.793	54.000	37.511	AV

Site: AC5	Time: 2015/09/09 - 10:22
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2480 by BLE	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.980	86.978	49.492	12.978	74.000	37.486	PK
2		2483.500	63.065	25.554	-10.935	74.000	37.511	PK

Site: AC5	Time: 2015/09/09 - 10:22
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: CYBLE-22005-00	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2480 by BLE	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.057	85.402	47.916	31.402	54.000	37.486	AV
2		2483.500	37.285	-0.226	-16.715	54.000	37.511	AV

7. Operation Frequency Range of 20dB Bandwidth

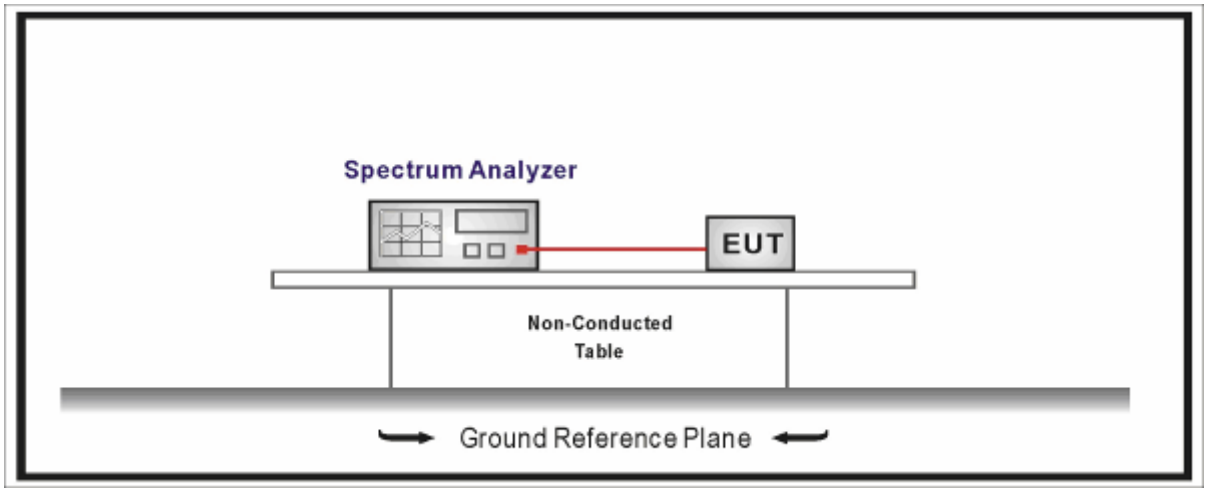
7.1. Test Equipment

Operation Frequency Range of 20dB Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016/01/05
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/04/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

20 dB bandwidth of the emission is contained within the operation frequency band.

7.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

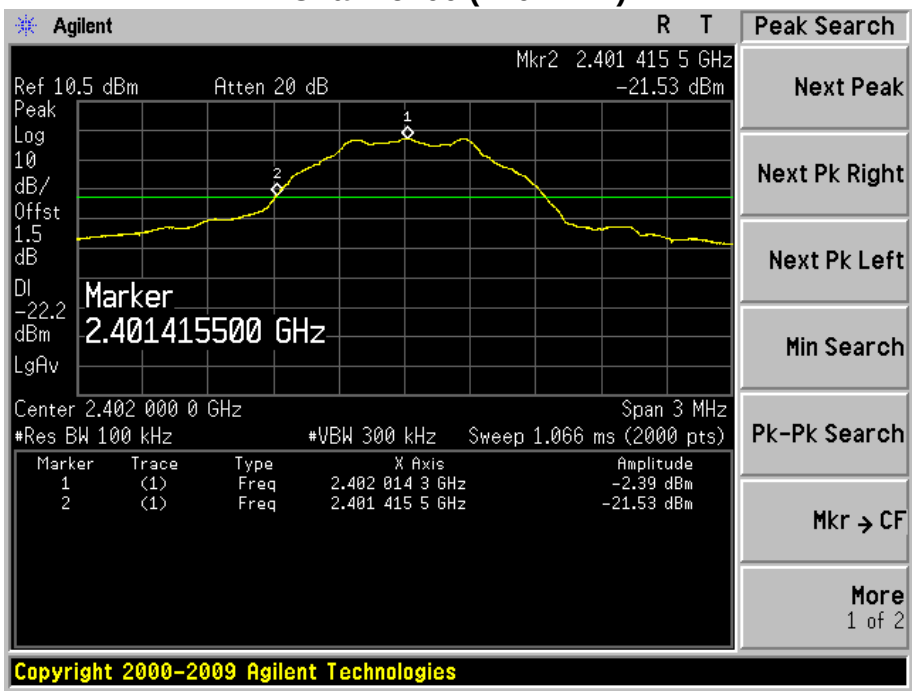
7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

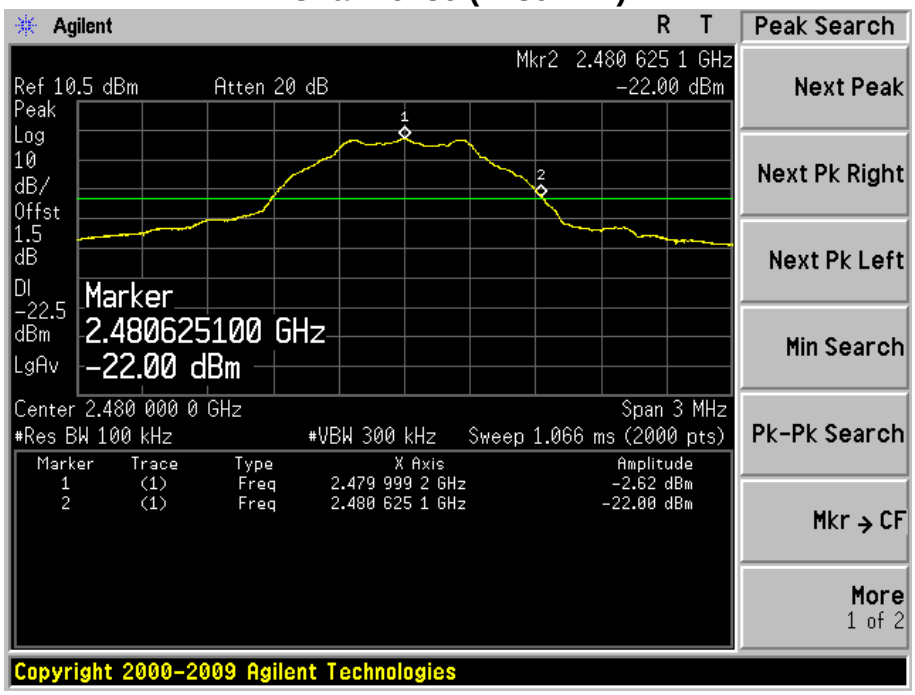
7.6. Test Result

Product	:	EZ-BLE PROC MODULE
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit-1Mbps(GFSK_BLE)

Channel 00 (2402MHz)



Channel 39 (2480MHz)



8. 6dB Bandwidth and Occupied Bandwidth

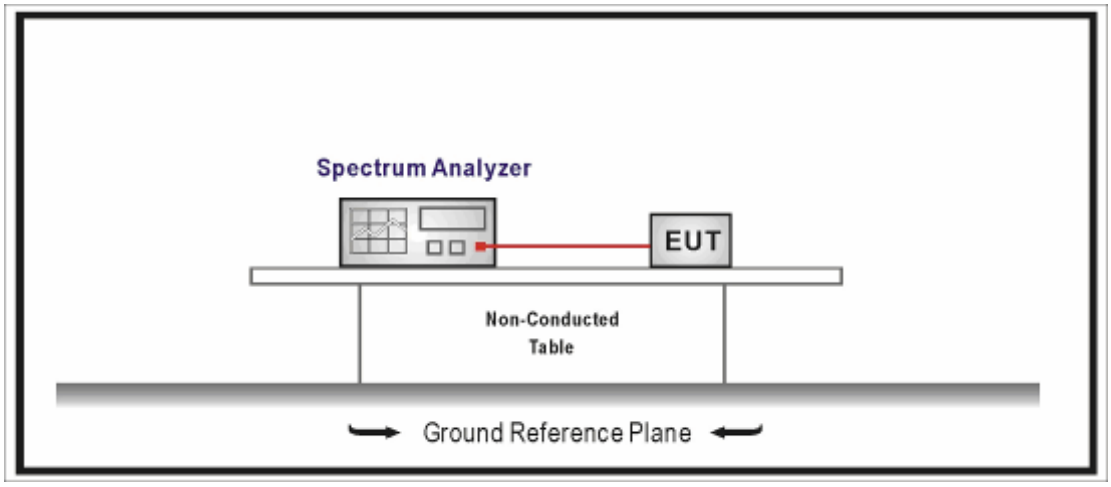
8.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016/01/05
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/04/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

8.2. Test Setup



8.3. Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

8.4. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of ANSI C63.10 requirements.

When the average power is exercised, the measured power is to be referenced to the OBW (99% occupied bandwidth) rather than to the DTS bandwidth according to Clause 11.9.2.1 of ANSI C63.10.

The 99% bandwidth test is using ANSI C63.10 Section 6.9.3 method.

a) Set RBW = in the range of 1% to 5% of the OBW.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

8.5. Uncertainty

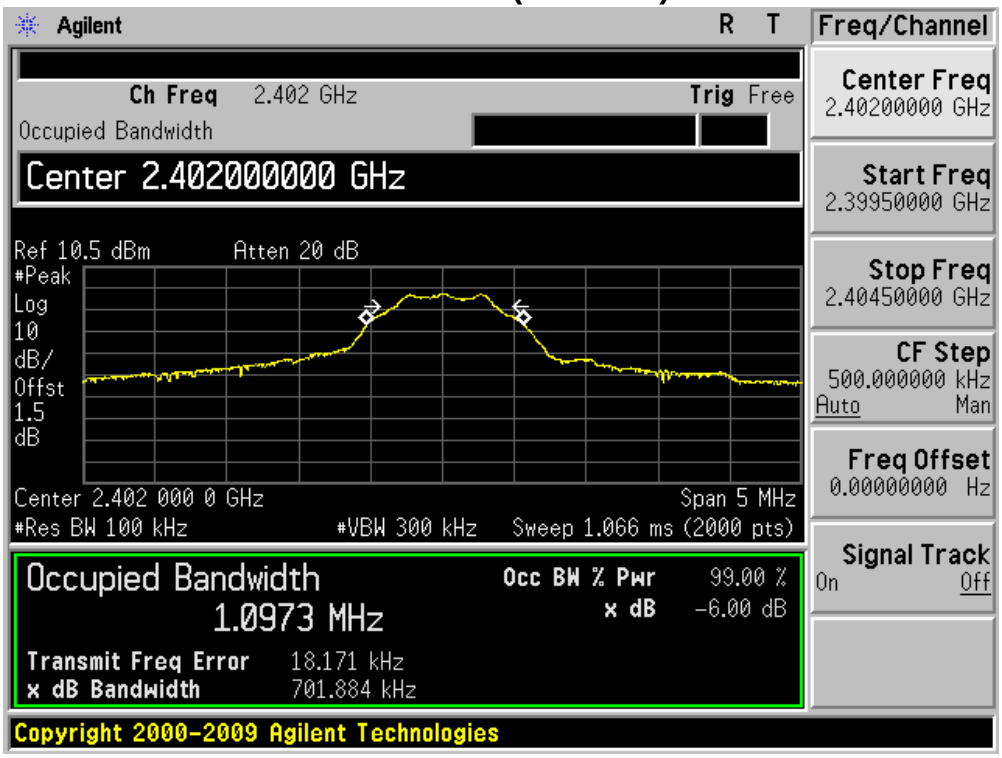
The measurement uncertainty is defined as ± 1 kHz

8.6. Test Result

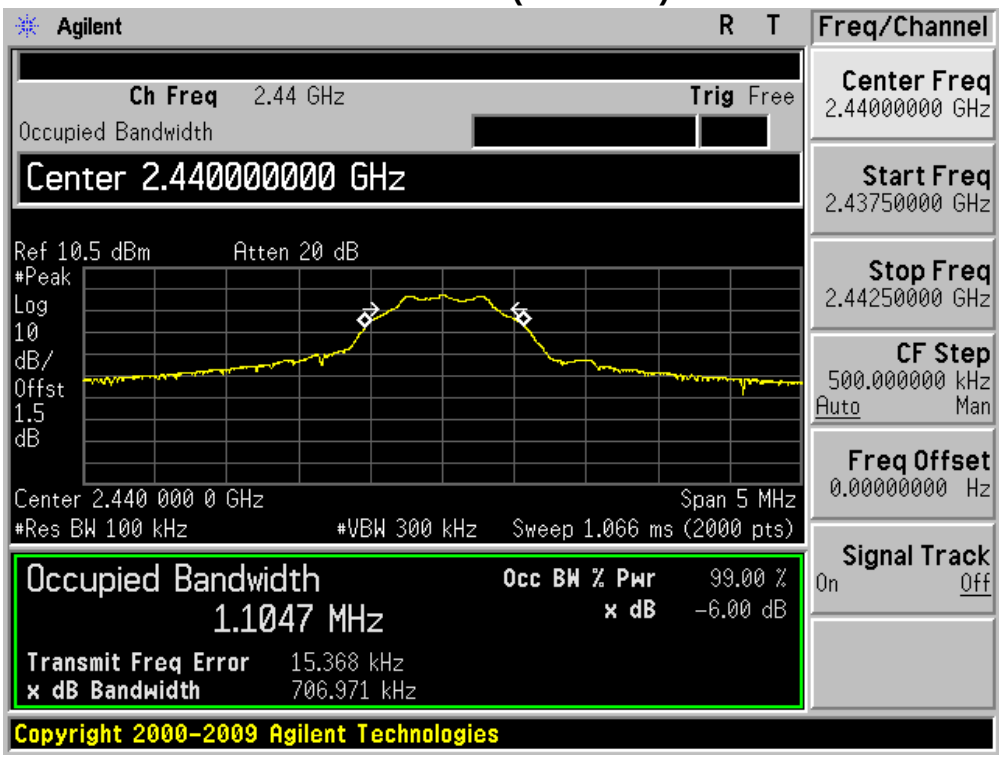
Product	:	EZ-BLE PROC MODULE
Test Item	:	6dB Bandwidth & 99% Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit-1Mbps(GFSK_BLE)

Channel No.	Frequency (MHz)	6dB Bandwidth (kHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
00	2402	701.884	1097.3	>500	Pass
19	2440	706.971	1104.7	>500	Pass
39	2480	696.785	1104.1	>500	Pass

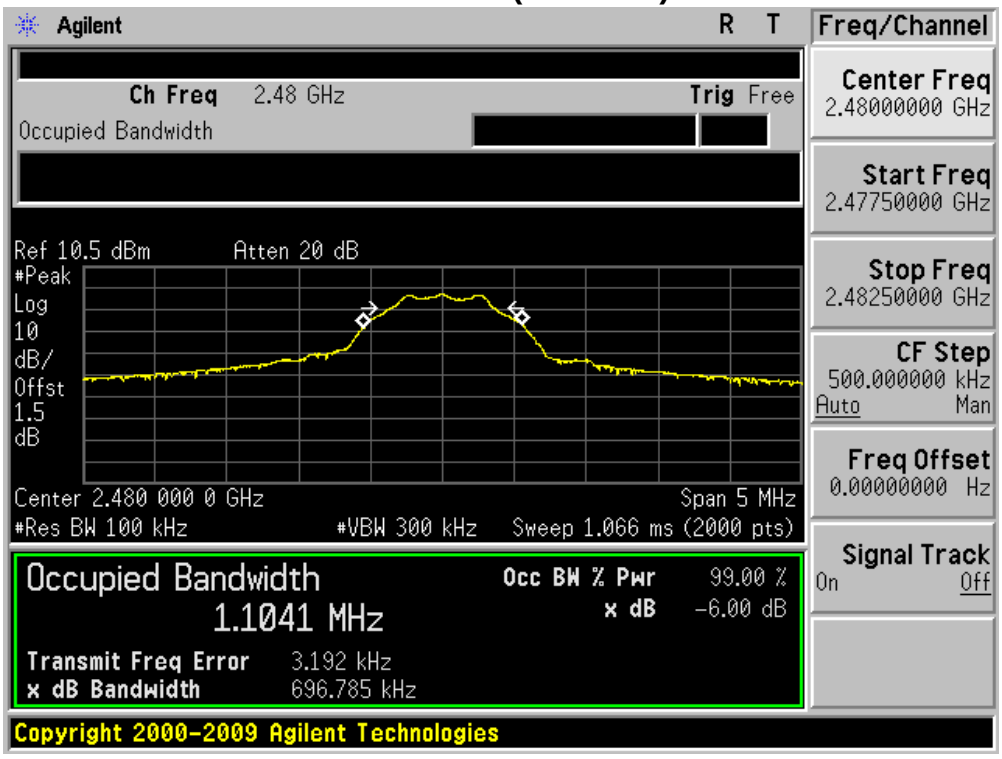
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



9. Power Output

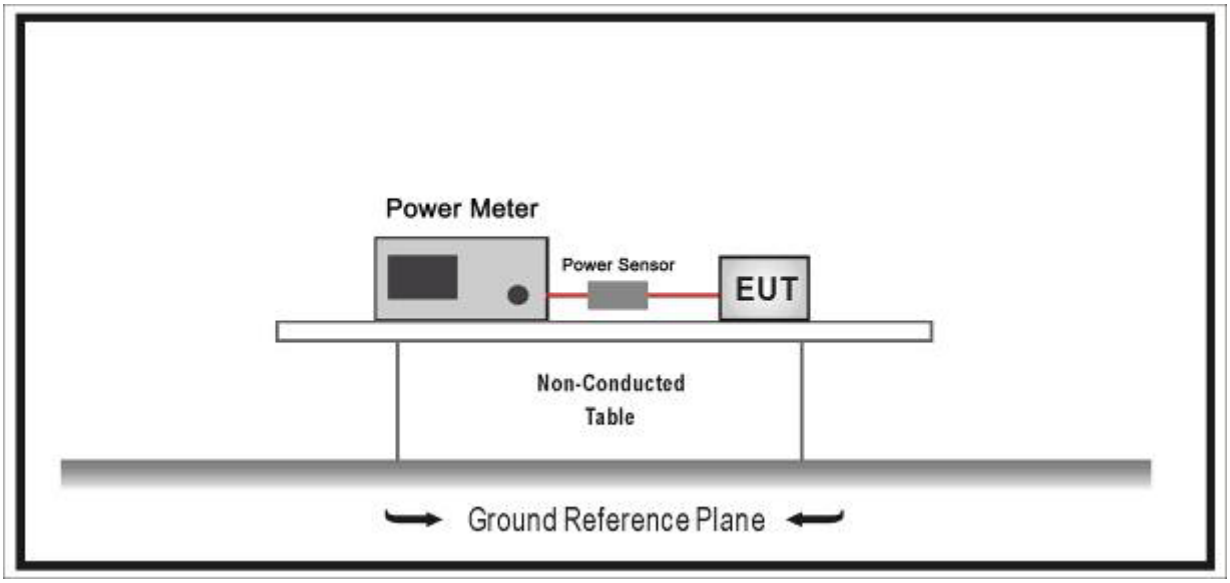
9.1. Test Equipment

Power Output / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2015/11/10
Power Sensor	Anritsu	MA2411B	0846014	2015/11/10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/04/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

9.2. Test Setup



9.3. Limit

The maximum peak power shall be less 1 Watt (30dBm).
Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.
For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

9.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements. The maximum conducted output power using ANSI C63.10 section 11.9.1.1 peak power meter method.

1. Power meter and sensor's minimum video bandwidth is 50MHz, larger than occupied bandwidth;
2. Fast responding diode sensors respond immediately to changes in power level to reduce total test time.
3. Use peak detector to test.

9.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

9.6. Test Result

Product	:	EZ-BLE PROC MODULE
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 1: Transmit-1Mbps(GFSK_BLE)

Channel No.	Frequency (MHz)	Power Output (dBm)	Output Power Limit (dBm)	Result
00	2402	-1.09	30.00	Pass
19	2440	-1.14	30.00	Pass
39	2480	-1.27	30.00	Pass

10. Power Spectral Density

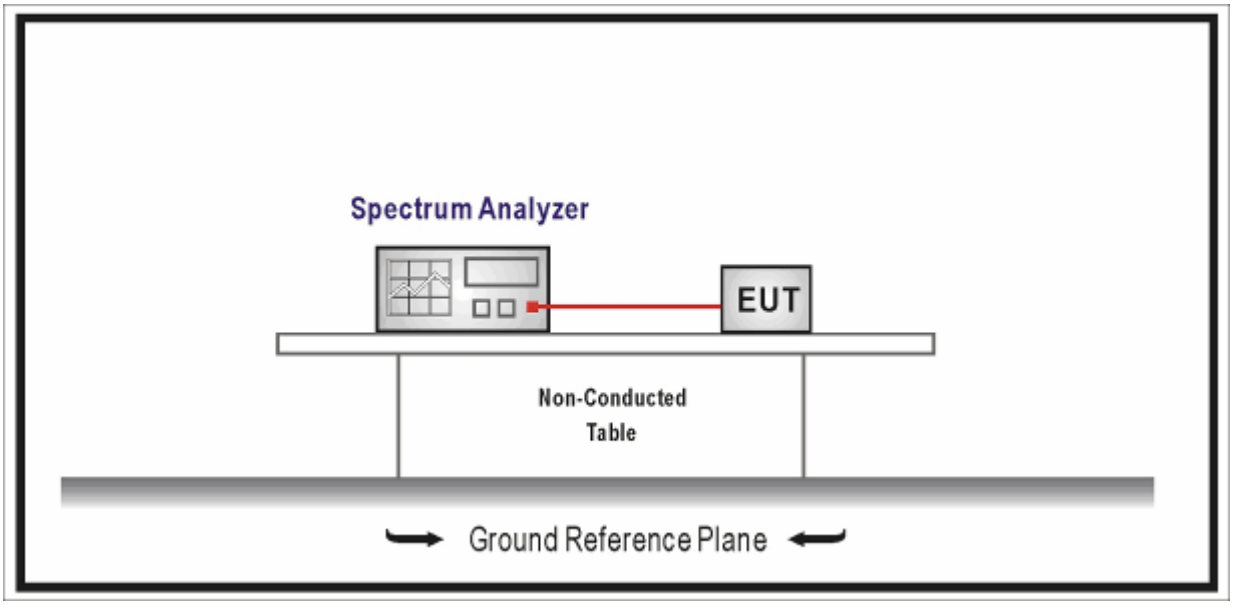
10.1.Test Equipment

Power Spectral Density / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016/01/05
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/04/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2.Test Setup



10.3. Limit

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

10.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.
The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. (Actually we use 3kHz RBW)

d) Set the VBW ≥ 3 × RBW.

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the band.

j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.5. Uncertainty

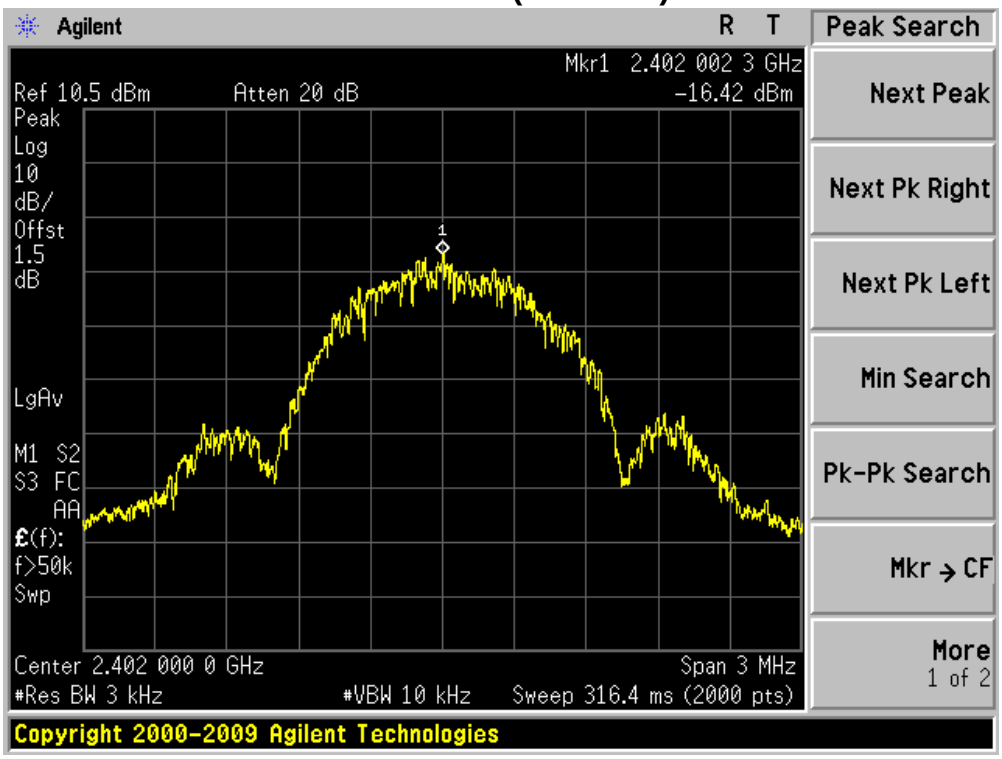
The measurement uncertainty is defined as ± 1.27 dB

10.6. Test Result

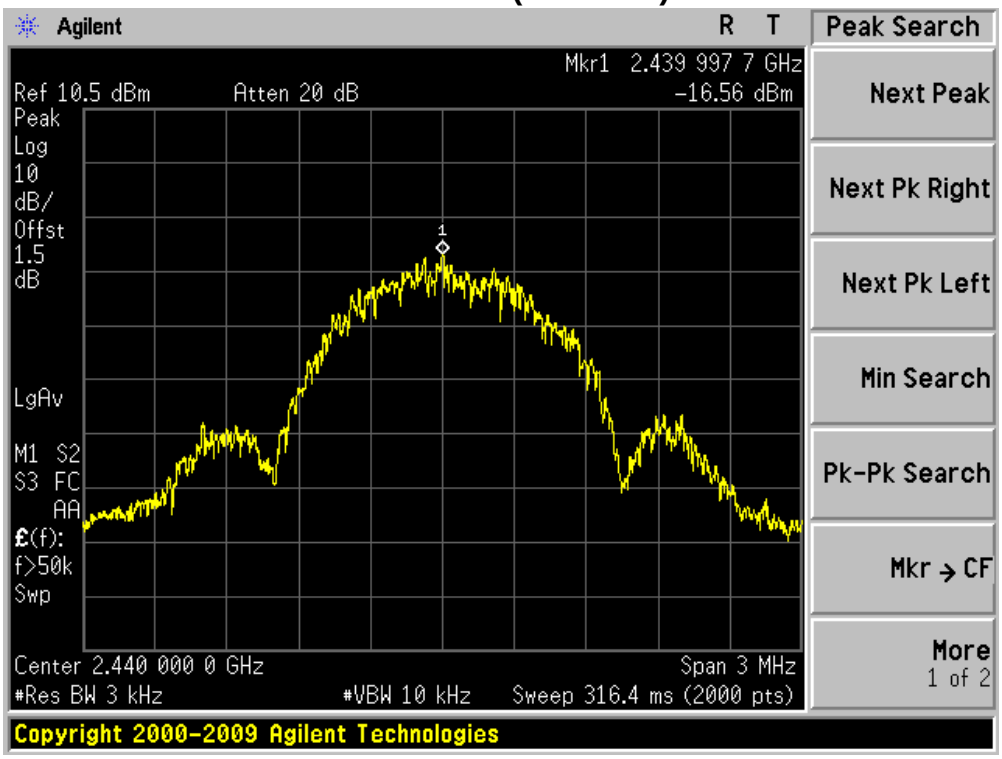
Product	:	EZ-BLE PROC MODULE
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit-1Mbps(GFSK_BLE)

Channel No.	Frequency (MHz)	Measurement PPSD (dBm)	Limit (dBm)	Result
00	2402	-16.42	8	Pass
19	2440	-16.56	8	Pass
39	2480	-16.51	8	Pass

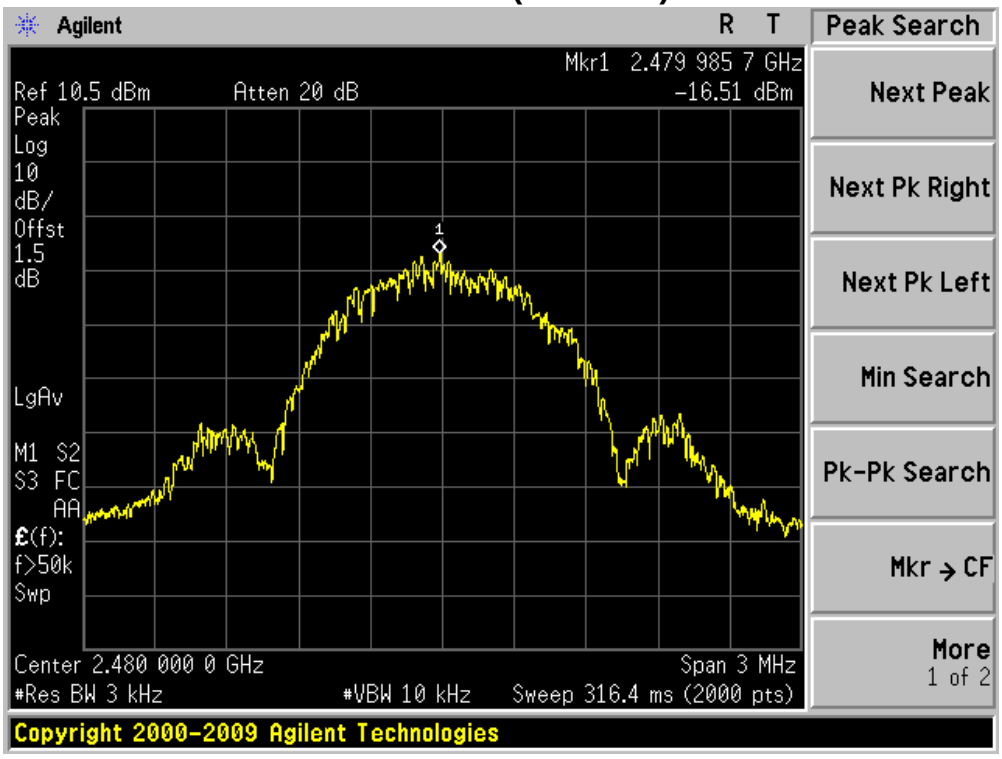
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



The End