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## FCC PART 15 SUBPART C TEST REPORT

### FCC PART 15.249

Report Reference No.: CTL1506241728-WF

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*Tracy Qi*

Product Name.....: Bluetooth Speaker

Model/Type reference.....: QSPR-415BT-BL

List Model(s).....: QSPR-415BT-OR

Trade Mark.....: QUO

FCC ID.....: 2AAPW-QSPR-415BT

Applicant's name.....: KBX GROUP

Address of applicant.....: AVENIDA 1ERA. CALLE B Y C MANZANA 58 FRANCE FIELD,  
PANAMA, Florida, United States, 32412

Test Firm.....: Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm.....: Floor 1-A, Baisha Technology Park, No.3011, Shaheixi Road,  
Nanshan District, Shenzhen, China 518055

Test specification.....:

Standard.....: FCC Part 15.249: Operation within the bands 920-928 MHz,  
2400-2483.5 MHz, 5725-5850 MHz and 24.0 - 24.25 GHz.

TRF Originator.....: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF.....: Dated 2011-01

Date of Receipt.....: Jun., 25, 2015

Date of Test Date.....: Jun., 26, 2015 – July, 01, 2015

Data of Issue.....: July, 02, 2015

Result.....: Positive

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# TEST REPORT

<b>Test Report No. :</b>	<b>CTL1506241728-WF</b>	July, 02, 2015 Date of issue
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Equipment under Test : Bluetooth Speaker

Model /Type : QSPR-415BT-BL

Listed Models : QSPR-415BT-OR

**Applicant** : **KBX GROUP**

Address : AVENIDA 1ERA. CALLE B Y C MANZANA 58  
FRANCE FIELD, PANAMA, Florida, United States,  
32412

**Manufacturer** : **KBX GROUP**

Address : AVENIDA 1ERA. CALLE B Y C MANZANA 58  
FRANCE FIELD, PANAMA, Florida, United States,  
32412

<b>Test result</b>	<b>Pass *</b>
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\* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**\*\* Modified History \*\***

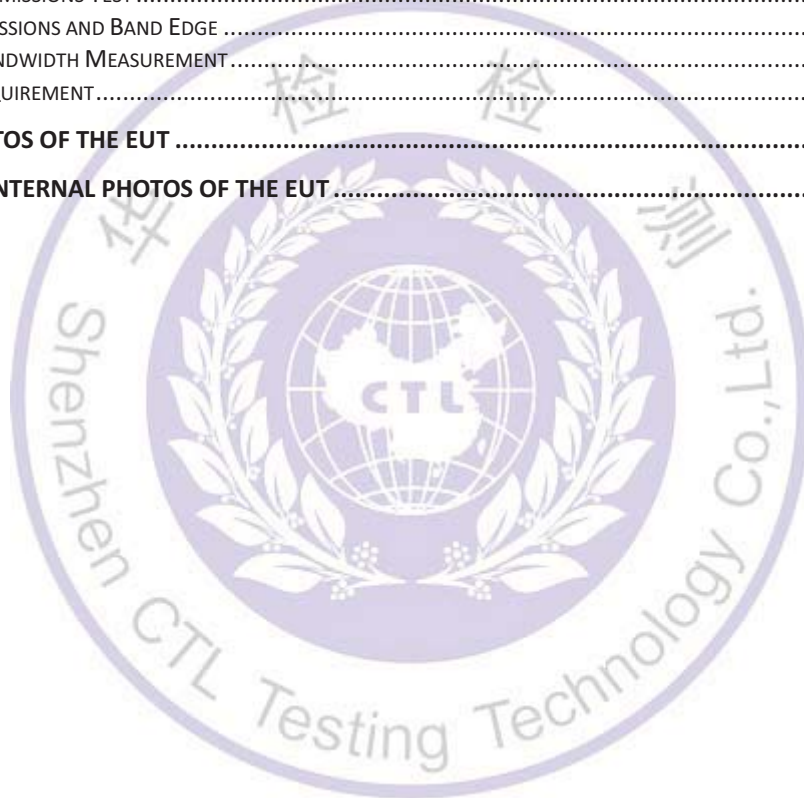
Revision	Description	Issued Data	Report No.	Remark
Revision 1.0	Initial Test Report Release	2015-07-02	CTL1506241728-WF	Tracy Qi



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# 1. SUMMARY

## 1.1. TEST STANDARDS

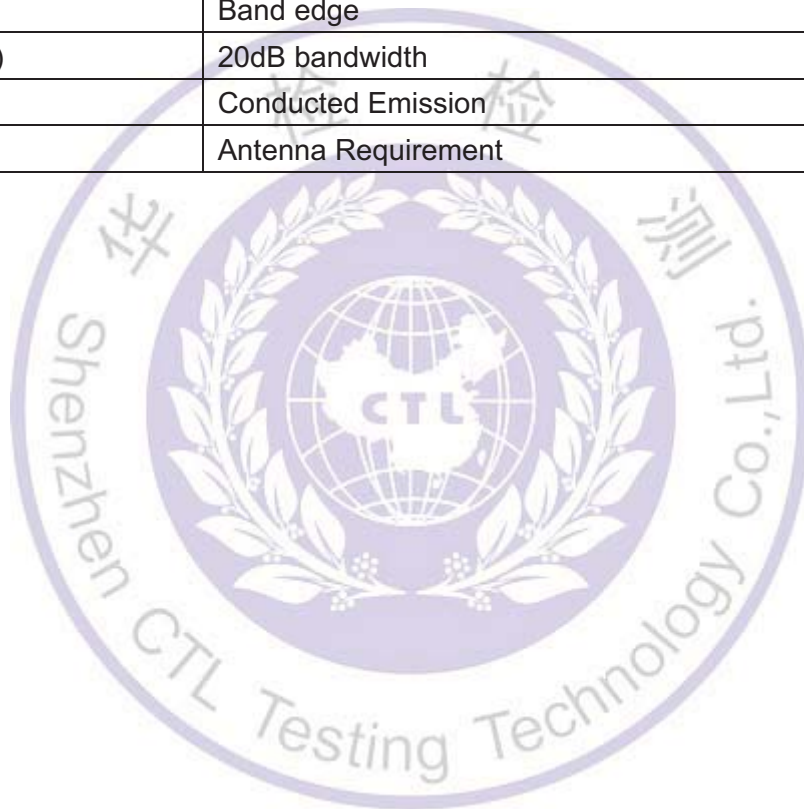
The tests were performed according to following standards:

**FCC Rules Part 15.249:** Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

**ANSI C63.4: 2014** American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

## 1.2. Test Description

FCC PART 15.249		
FCC Part 15.249(a)	Field Strength of Fundamental	PASS
FCC Part 15.209	Spurious Emission	PASS
FCC Part 15.209	Band edge	PASS
FCC Part 15.215(c)	20dB bandwidth	PASS
FCC Part 15.207	Conducted Emission	PASS
FCC Part 15.203	Antenna Requirement	PASS





### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

#### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

##### IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

##### FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

### 1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 2. GENERAL INFORMATION

### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

### 2.2. General Description of EUT

Product Name:	Bluetooth Speaker
Model/Type reference:	QSPR-415BT-BL
Power supply:	DC 3.7V from battery

Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	1.0dBi

Note: For more details, please refer to the user's manual of the EUT.

### 2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing. There are 79 channels provided to the EUT and Channel 00/39/78 were selected to test.

#### Operation Frequency :

Channel	Frequency (MHz)
<b>00</b>	<b>2402</b>
2	2403
:	:
38	2440
<b>39</b>	<b>2441</b>
40	2442
:	:
77	2479
<b>78</b>	<b>2480</b>

The field strength of radiation emission was measured in the following position: EUT stand-up position (Yaxis), lie-down position (X, Z axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of Y axis was reported.

All test performed at GFSK,  $\pi/4$  DQPSK and 8DPSK mode of each test frequency and recorded worst case at GFSK DH5 mode.

## 2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2015/05/21	2016/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2015/05/21	2016/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2015/05/19	2016/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2015/05/19	2016/05/18
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
Amplifier	Agilent	8349B	3008A02306	2015/05/19	2016/05/18
Amplifier	Agilent	8447D	2944A10176	2015/05/19	2016/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2015/06/02	2016/06/01
Temperature/Humidity Meter	Gangxing	CTH-608	02	2015/05/20	2016/05/19

The calibration interval was one year

## 2.5. Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: 2AAPW-QSPR-415BT filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

## 2.6. Modifications

No modifications were implemented to meet testing criteria.



### 3. TEST CONDITIONS AND RESULTS

#### 3.1. Conducted Emissions Test

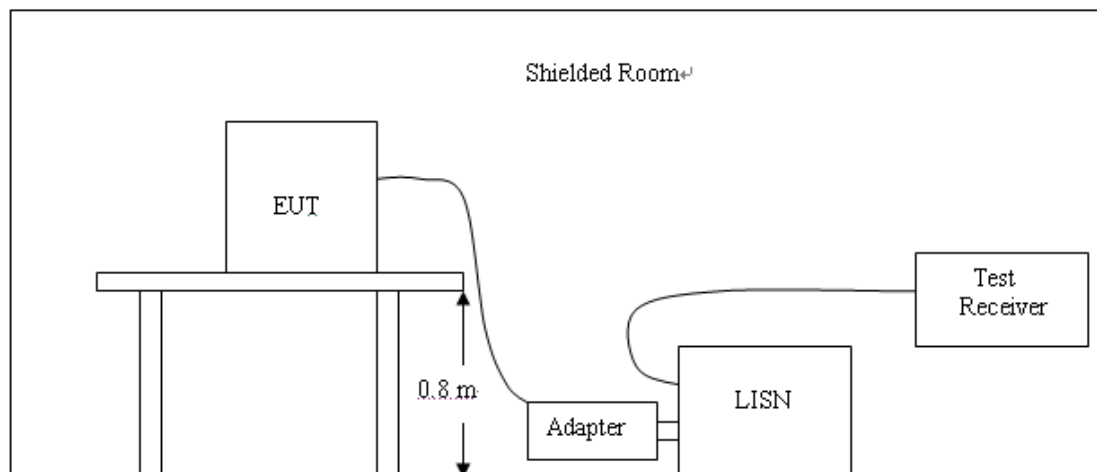
##### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

##### TEST CONFIGURATION

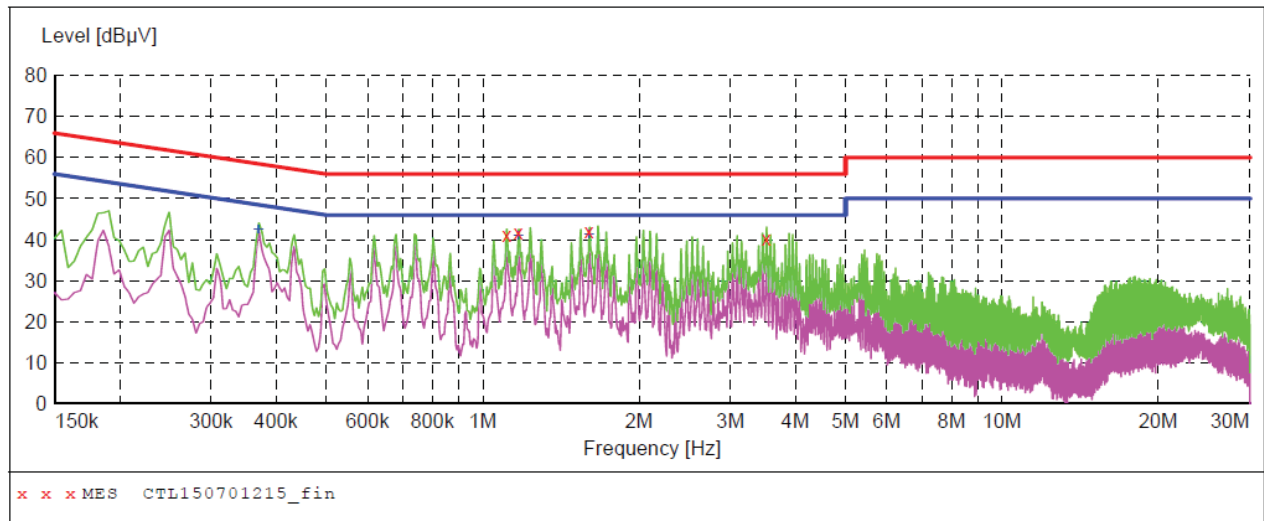


##### TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

**TEST RESULTS****SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL150701215\_fin"**

7/1/2015 4:27PM

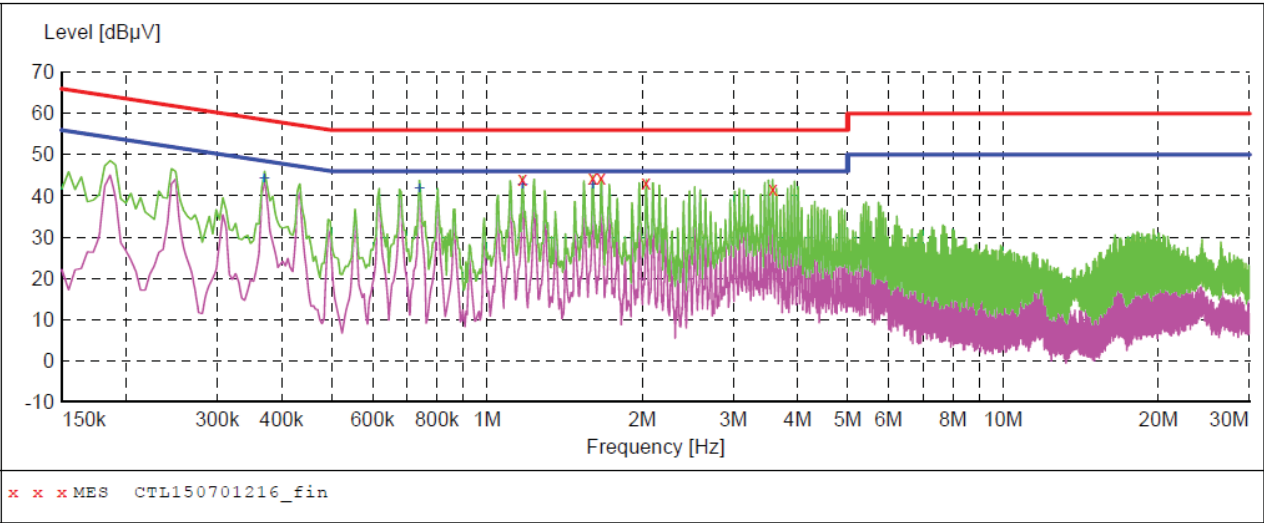
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
1.112000	41.10	10.2	56	14.9	QP	L1	GND
1.172000	41.60	10.2	56	14.4	QP	L1	GND
1.604000	42.00	10.3	56	14.0	QP	L1	GND
3.518000	40.30	10.5	56	15.7	QP	L1	GND

**MEASUREMENT RESULT: "CTL150701215\_fin2"**

7/1/2015 4:27PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370000	42.60	9.9	49	5.9	AV	L1	GND
1.172000	41.00	10.2	46	5.0	AV	L1	GND
1.604000	41.30	10.3	46	4.7	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M)FIN"  
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150701216\_fin"

7/1/2015 4:41PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
1.172000	44.00	10.2	56	12.0	QP	N	GND
1.604000	44.40	10.3	56	11.6	QP	N	GND
1.664000	44.40	10.3	56	11.6	QP	N	GND
2.036000	43.20	10.4	56	12.8	QP	N	GND
3.578000	41.80	10.5	56	14.2	QP	N	GND

MEASUREMENT RESULT: "CTL150701216\_fin2"

7/1/2015 4:41PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370000	44.30	9.9	49	4.2	AV	N	GND
0.740000	41.90	10.0	46	4.1	AV	N	GND
1.172000	42.80	10.2	46	3.2	AV	N	GND
1.604000	43.00	10.3	46	3.0	AV	N	GND

### 3.2. Radiated Emissions and Band Edge

#### Limit

According 15.249, the field strength of emissions from intentional radiators operated within 2400MHz-2483.5Mhz shall not exceed 94dB $\mu$ V/m(50mV/m):

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

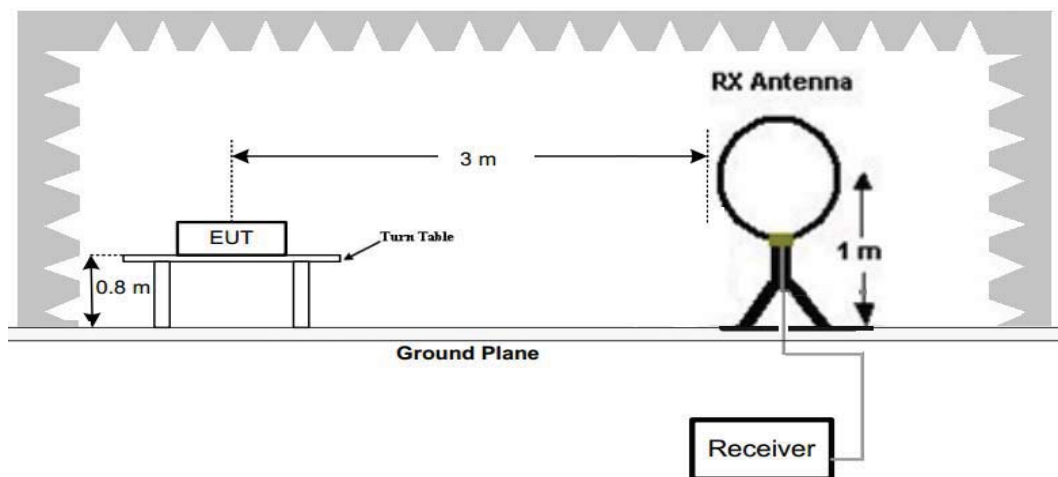
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

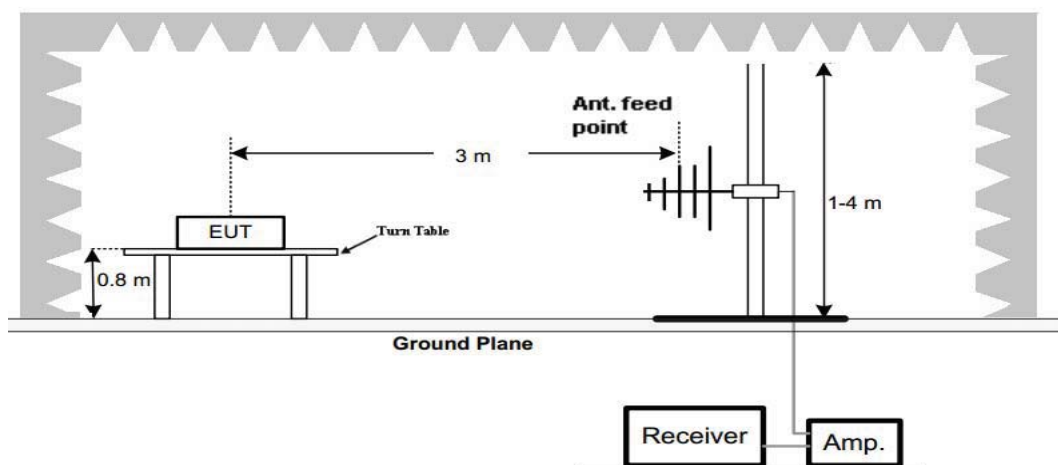
Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

#### TEST CONFIGURATION

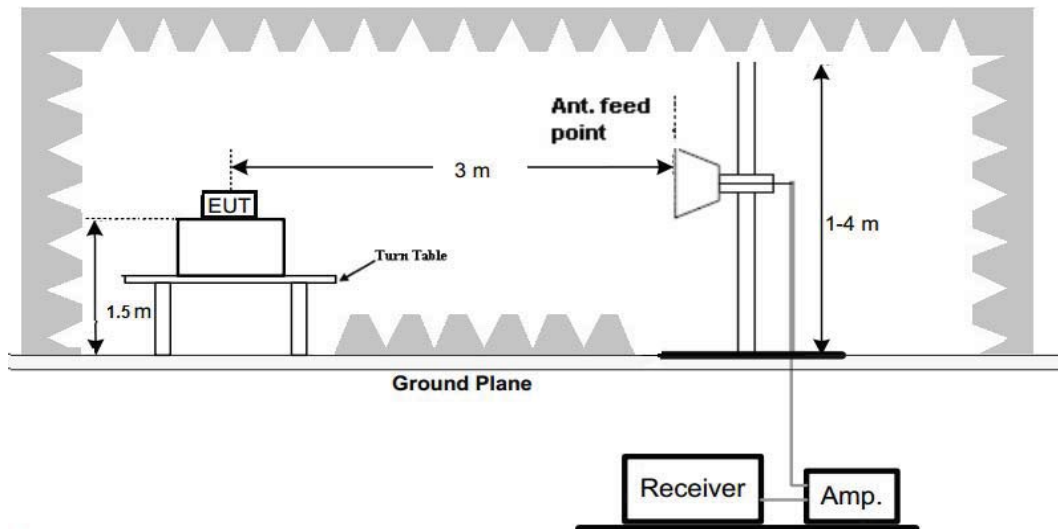
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



## (C) Radiated Emission Test Set-Up, Frequency above 1000MHz

**Test Procedure**

1. The EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

**TEST RESULTS**

Remark:

1. We measured Radiated Emission at GFSK,  $\pi/4$  DQPSK and 8DPSK mode from 9 KHz to 25GHz and recorded worst case at GFSK DH5 mode.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.

**For 9 KHz-30MHz**

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.20	49.58	101.58	52.00	PK	PASS
1.18	56.74	66.17	9.43	QP	PASS
20.25	55.41	69.54	14.13	QP	PASS
25.30	48.98	69.54	20.56	QP	PASS

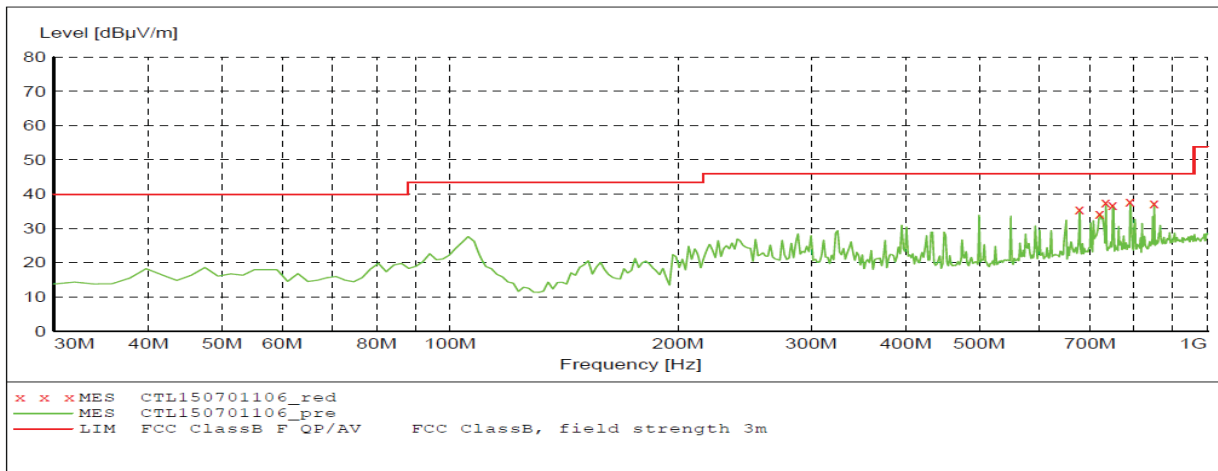


## For 30MHz-1GHz

## Horizontal

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	JB1

**MEASUREMENT RESULT: "CTL150701106\_red"**

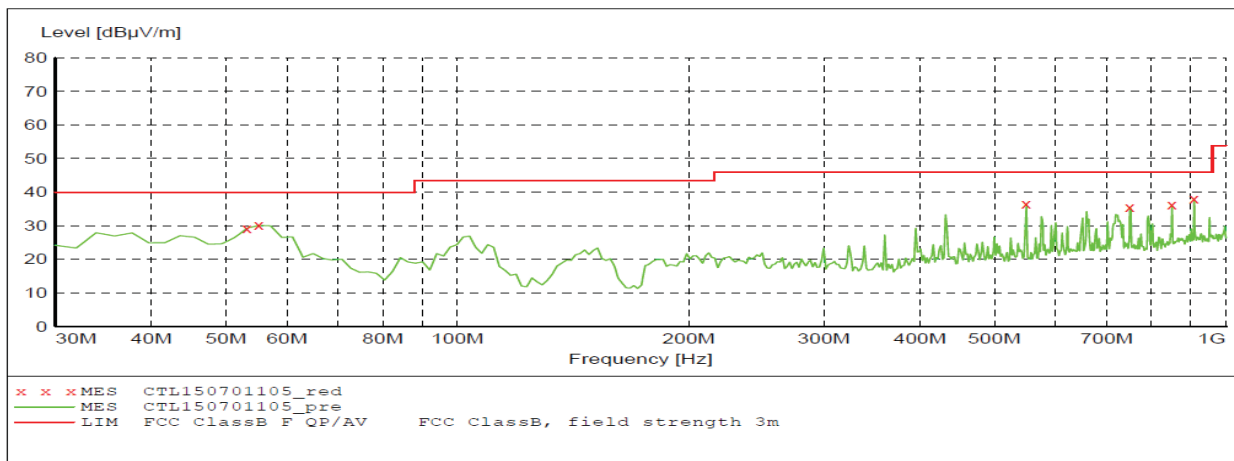
7/1/2015 1:45PM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
677.960000	35.60	-7.4	46.0	10.4	---	100.0	157.00	HORIZONTAL
720.640000	34.30	-6.8	46.0	11.7	---	100.0	274.00	HORIZONTAL
734.220000	37.50	-6.3	46.0	8.5	---	100.0	170.00	HORIZONTAL
749.740000	36.70	-6.1	46.0	9.3	---	100.0	144.00	HORIZONTAL
790.480000	37.80	-5.8	46.0	8.2	---	100.0	157.00	HORIZONTAL
850.620000	37.30	-5.1	46.0	8.7	---	100.0	0.00	HORIZONTAL

## Vertical

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	JB1

**MEASUREMENT RESULT: "CTL150701105\_red"**

7/1/2015 1:42PM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	29.20	-16.5	40.0	10.8	---	100.0	145.00	VERTICAL
55.220000	30.10	-16.6	40.0	9.9	---	100.0	228.00	VERTICAL
549.920000	36.50	-9.5	46.0	9.5	---	100.0	53.00	VERTICAL
749.740000	35.50	-6.1	46.0	10.5	---	100.0	260.00	VERTICAL
850.620000	36.20	-5.1	46.0	9.8	---	100.0	38.00	VERTICAL
908.820000	38.00	-4.3	46.0	8.0	---	100.0	300.00	VERTICAL

**For 1GHz to 25GHz****GFSK Mode (above 1GHz)**

Frequency(MHz):				2402		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	98.10	PK	114	15.9	100.06	28.78	4.61	35.36	-1.96
1	2402.00	89.66	AV	94	4.34	91.62	28.78	4.61	35.36	-1.96
2	2390.00	38.64	PK	74	35.36	40.68	28.72	4.60	35.36	-2.04
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	45.33	PK	74	28.67	47.30	28.78	4.61	35.36	-1.97
3	2400.00	--	AV	54	--	--	--	--	--	--
4	4010.50	57.25	PK	74	16.75	53.48	33.09	6.40	35.71	3.77
4	4010.50	43.45	AV	54	10.55	39.68	33.09	6.40	35.71	3.77
5	4804.00	63.57	PK	74	10.43	57.51	33.49	6.91	34.34	6.06
5	4804.00	47.74	AV	54	6.26	41.68	33.49	6.91	34.34	6.06
6	5152.75	56.89	PK	74	17.11	49.62	34.44	7.12	34.28	7.27
6	5152.75	43.74	AV	54	10.26	36.47	34.44	7.12	34.28	7.27
7	7206.00	48.74	PK	74	25.26	37.63	36.95	9.18	35.03	11.11
7	7206.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2402		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	99.51	PK	114	14.49	101.47	28.78	4.61	35.36	-1.96
1	2402.00	89.58	AV	94	4.42	91.54	28.78	4.61	35.36	-1.96
2	2390.00	37.74	PK	74	36.26	39.78	28.72	4.60	35.36	-2.04
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	45.36	PK	74	28.64	47.33	28.78	4.61	35.36	-1.97
3	2400.00	--	AV	54	--	--	--	--	--	--
4	4505.20	55.47	PK	74	18.53	51.70	32.87	6.72	35.82	3.77
4	4505.20	43.65	AV	54	10.35	39.88	32.87	6.72	35.82	3.77
5	4804.00	66.47	PK	74	7.53	60.41	33.49	6.91	34.34	6.06
5	4804.00	49.41	AV	54	4.59	43.35	33.49	6.91	34.34	6.06
6	5211.50	55.74	PK	74	18.26	48.35	34.55	7.15	34.31	7.39
6	5211.50	44.87	AV	54	9.13	37.48	34.55	7.15	34.31	7.39
7	7206.00	48.50	PK	74	25.5	37.39	36.95	9.18	35.03	11.11
7	7206.00	--	AV	54	--	--	--	--	--	--

**REMARKS:**

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector for PK value , RMS detector for AV value

Frequency(MHz):				2441		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2441.00	99.58	PK	114	14.42	101.44	28.85	4.66	35.37	-1.86
1	2441.00	90.14	AV	94	3.86	92.00	28.85	4.66	35.37	-1.86
2	4255.20	55.45	PK	74	18.55	50.72	32.83	6.56	34.65	4.73
2	4255.20	43.45	AV	54	10.55	38.72	32.83	6.56	34.65	4.73
3	4882.00	64.56	PK	74	9.44	58.30	33.60	6.95	34.30	6.26
3	4882.00	45.74	AV	54	8.26	39.48	33.60	6.95	34.30	6.26
4	5335.35	57.45	PK	74	16.55	49.59	34.68	7.22	34.04	7.86
4	5335.35	46.45	AV	54	7.55	38.59	34.68	7.22	34.04	7.86
5	7323.00	50.55	PK	74	23.45	38.85	37.46	9.23	35.00	11.70
5	7323.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2441		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2441.00	100.45	PK	114	13.55	102.31	28.85	4.66	35.37	-1.86
1	2441.00	91.85	AV	94	2.15	93.71	28.85	4.66	35.37	-1.86
2	4205.25	55.74	PK	74	18.26	51.08	32.82	6.52	34.68	4.66
2	4205.25	43.54	AV	54	10.46	38.88	32.82	6.52	34.68	4.66
3	4882.00	63.7	PK	74	10.3	57.44	33.60	6.95	34.30	6.26
3	4882.00	48.74	AV	54	5.26	42.48	33.60	6.95	34.30	6.26
4	5515.20	58.26	PK	74	15.74	50.12	34.75	7.32	33.94	8.14
4	5515.20	44.25	AV	54	9.75	36.11	34.75	7.32	33.94	8.14
5	7323.00	49.44	PK	74	24.56	37.74	37.46	9.23	35.00	11.70
5	7323.00	--	AV	54	--	--	--	--	--	--

## REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector for PK value , RMS detector for AV value
7. For fundamental frequency , RBW 2MHz VBW 6MHz

Frequency(MHz):				2480		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	98.78	PK	114	15.22	100.53	28.92	4.70	35.38	-1.75
1	2480.00	89.15	AV	94	4.85	90.90	28.92	4.70	35.38	-1.75
2	2483.50	57.41	PK	74	16.59	59.15	28.93	4.70	35.38	-1.74
2	2483.50	40.72	AV	54	13.28	42.46	28.93	4.70	35.38	-1.74
3	2500.00	37.54	PK	74	36.46	39.24	28.96	4.72	35.38	-1.70
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4550.20	57.25	PK	74	16.75	53.40	32.94	6.75	35.83	3.85
4	4550.20	42.28	AV	54	11.72	38.43	32.94	6.75	35.83	3.85
5	4960.00	59.89	PK	74	14.11	53.30	33.84	7.00	34.25	6.59
5	4960.00	47.71	AV	54	6.29	41.12	33.84	7.00	34.25	6.59
6	5335.35	56.65	PK	74	17.35	49.10	34.68	7.22	34.35	7.55
6	5335.35	45.48	AV	54	8.52	37.93	34.68	7.22	34.35	7.55
7	7440.00	50.22	PK	74	23.78	38.27	37.64	9.28	34.97	11.95
7	7440.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2480		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	98.95	PK	114	15.05	100.70	28.92	4.70	35.38	-1.75
1	2480.00	89.65	AV	94	4.35	91.40	28.92	4.70	35.38	-1.75
2	2483.50	59.54	PK	74	14.46	61.28	28.93	4.70	35.38	-1.74
2	2483.50	43.35	AV	54	10.65	45.09	28.93	4.70	35.38	-1.74
3	2500.00	38.25	PK	74	35.75	39.95	28.96	4.72	35.38	-1.70
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4650.25	56.47	PK	74	17.53	52.38	33.13	6.82	35.85	4.09
4	4650.25	44.88	AV	54	9.12	40.79	33.13	6.82	35.85	4.09
5	4960.00	61.54	PK	74	12.46	54.95	33.84	7.00	34.25	6.59
5	4960.00	48.48	AV	54	5.52	41.89	33.84	7.00	34.25	6.59
6	6225.75	57.50	PK	74	16.5	49.07	35.19	7.94	34.70	8.43
6	6225.75	43.36	AV	54	10.64	34.93	35.19	7.94	34.70	8.43
7	7440.00	48.74	PK	74	25.26	36.79	37.64	9.28	34.97	11.95
7	7440.00	--	AV	54	--	--	--	--	--	--

## REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector for PK value , RMS detector for AV value
7. For fundamental frequency , RBW 2MHz VBW 6MHz

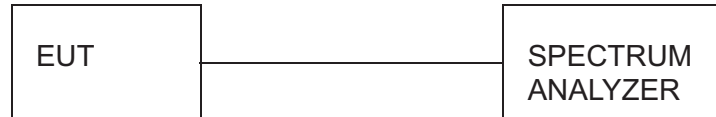


### 3.3. Occupied Bandwidth Measurement

#### Limit

N/A

#### Test Configuration



#### Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100 KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

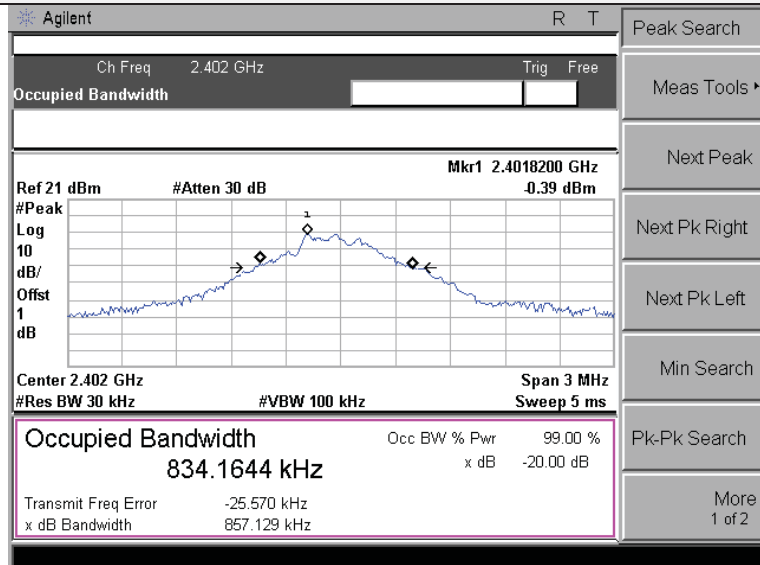
#### Test Results

Modulation	Channel	99% OBW (MHz)	20dB bandwidth (MHz)	Result
GFSK	CH00	0.834	0.857	Pass
	CH39	0.836	0.923	
	CH78	0.837	0.919	
$\pi/4$ DQPSK	CH00	1.133	1.204	
	CH39	1.139	1.198	
	CH78	1.140	1.215	
8DPSK	CH00	1.115	1.213	
	CH39	1.126	1.208	
	CH78	1.125	1.212	

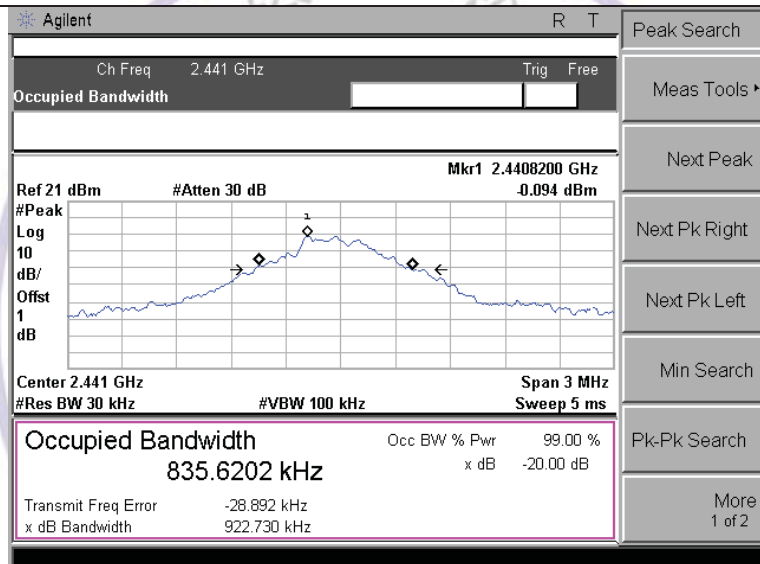
Test plot as follows:



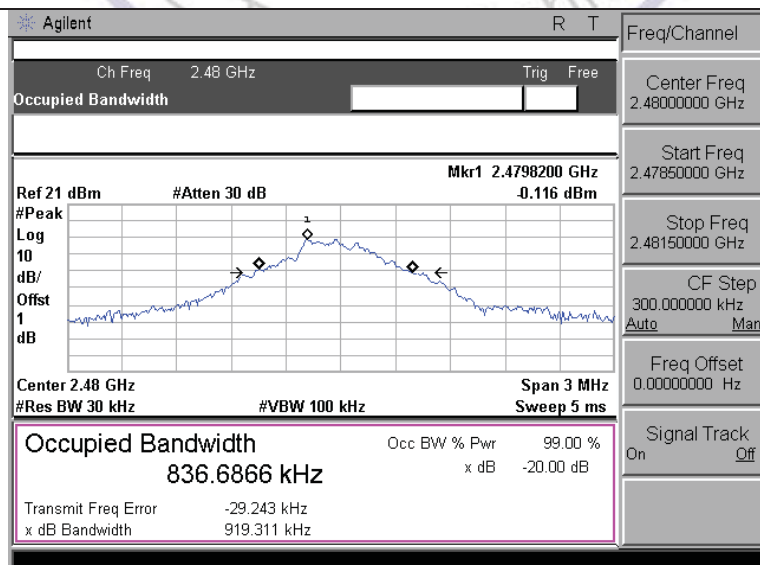
## GFSK Modulation



## CH00



## CH39



## CH78

The spectrum analyzer display shows a signal with a peak at 2.4018200 GHz. The peak is marked with a diamond and labeled '1'. The display includes a grid, a blue trace, and various measurement parameters.

**Parameters:**

- Ch Freq: 2.402 GHz
- Trig: Free
- Occupied Bandwidth: [ ]
- Ref 21 dBm
- #Atten 30 dB
- Mkr1 2.4018200 GHz
- 2 dBm
- #Peak
- Log
- 10 dB/div
- Offset 1 dB
- Center 2.402 GHz
- #Res BW 30 kHz
- #VBW 100 kHz
- Span 3 MHz
- Sweep 5 ms

**Occupied Bandwidth:** 1.1326 MHz

**Occupied Bandwidth % Pwr:** 99.00 %

**Occupied Bandwidth x dB:** -20.00 dB

**Transmit Freq Error:** -30.776 kHz

**x dB Bandwidth:** 1.204 MHz

The screen displays the 'Occupied Bandwidth' measurement results. At the top, the 'Ch Freq' is 2.441 GHz. The 'Mkr 1' is at 2.4408200 GHz with a level of -1.869 dBm. The graph shows a noisy signal with a peak marked '1'. The 'Ref' is 21 dBm and '#Atten' is 30 dB. The 'Center' frequency is 2.441 GHz, 'Span' is 3 MHz, '#Res BW' is 30 kHz, and '#VBW' is 100 kHz. The 'Sweep' time is 5 ms. The 'Occupied Bandwidth' is 1.1391 MHz. Other parameters include 'Transmit Freq Error' of -33.160 kHz, 'x dB Bandwidth' of 1.198 MHz, 'Occ BW % Pwr' of 99.00%, and 'x dB' of -20.00 dB. The right sidebar contains navigation buttons: 'Peak Search', 'Meas Tools', 'Next Peak', 'Next Pk Right', 'Next Pk Left', 'Min Search', 'Pk-Pk Search', and 'More' (1 of 2).

Agilent R T

Ch Freq 2.48 GHz Trig Free

Occupied Bandwidth

Ref 21 dBm #Atten 30 dB Mkr1 2.4799700 GHz -2.067 dBm

#Peak Log 10 dB/Ofst 1 dB

Center 2.48 GHz Span 3 MHz

#Res BW 30 kHz #VBW 100 kHz Sweep 5 ms

Occupied Bandwidth 1.1403 MHz

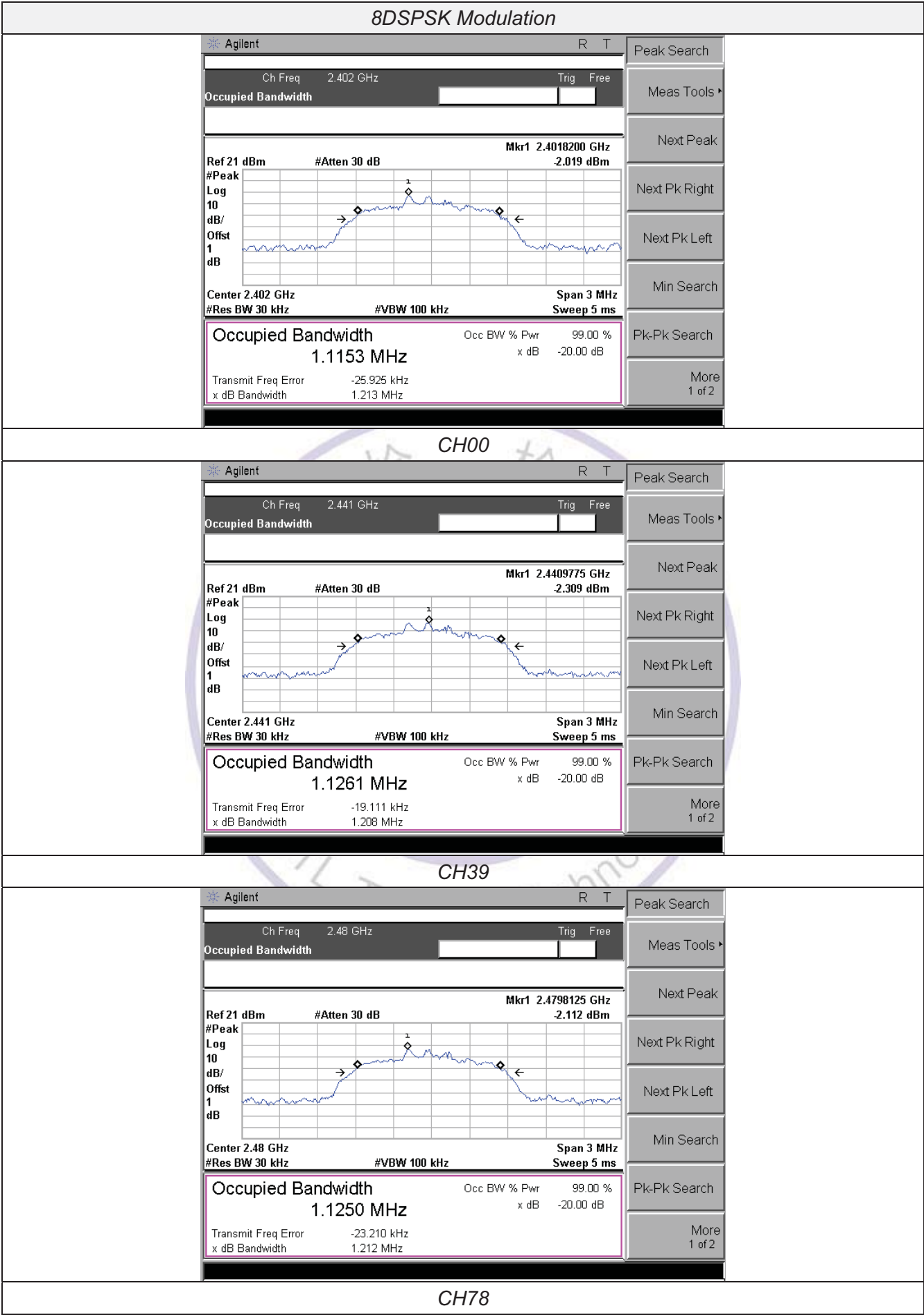
Occ BW % Pwr 99.00 %

x dB -20.00 dB

Transmit Freq Error -33.562 kHz

x dB Bandwidth 1.215 MHz

## CH78



### 3.4. Antenna Requirement

#### Standard Applicable

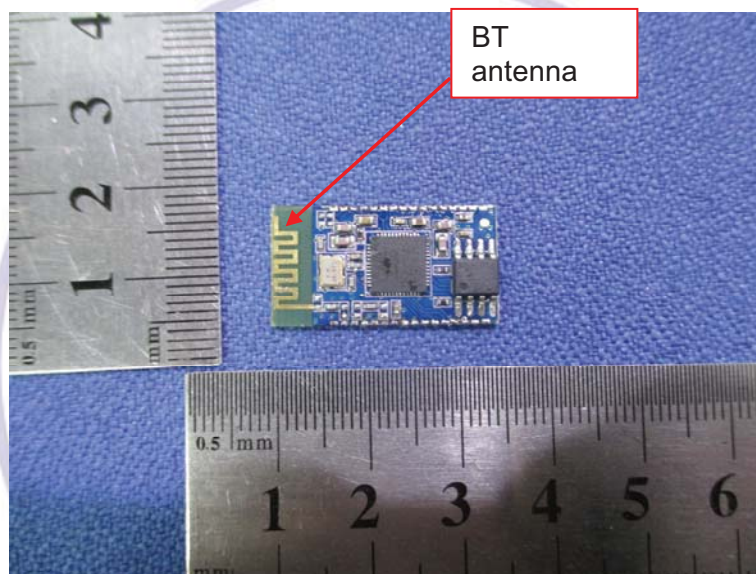
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### **Refer to statement below for compliance.**

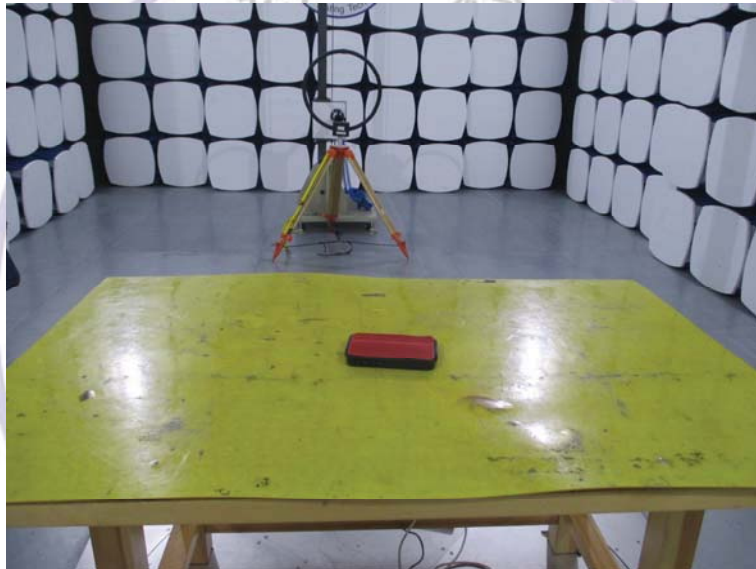
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### Antenna Connected Construction

The antenna used in this product is an internal Antenna, The directional gains of antenna used for transmitting is 1 dBi.



## 4. Test Setup Photos of the EUT





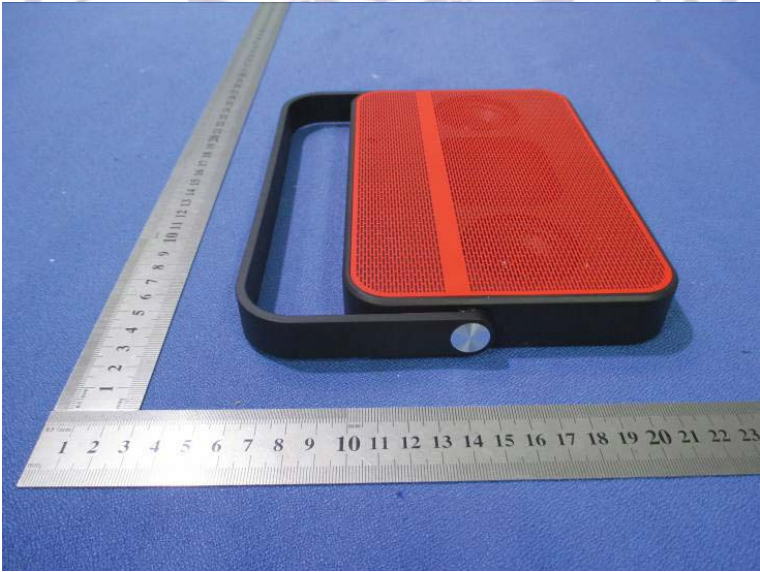
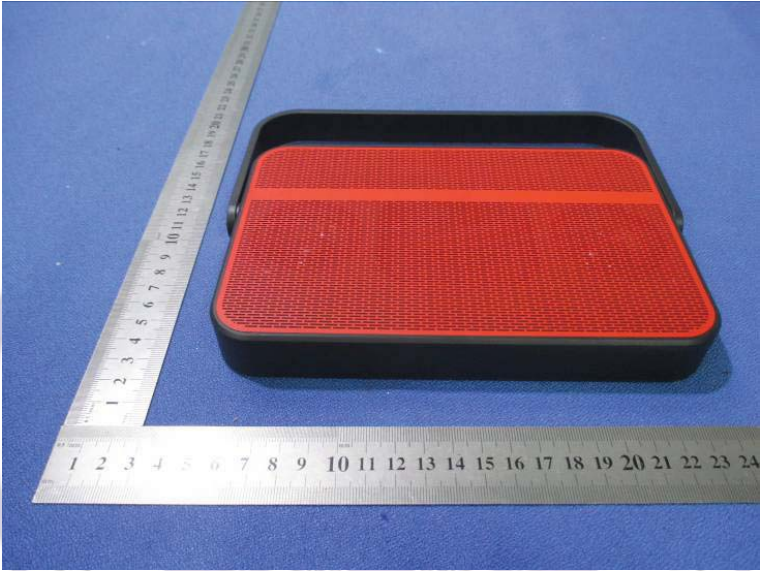


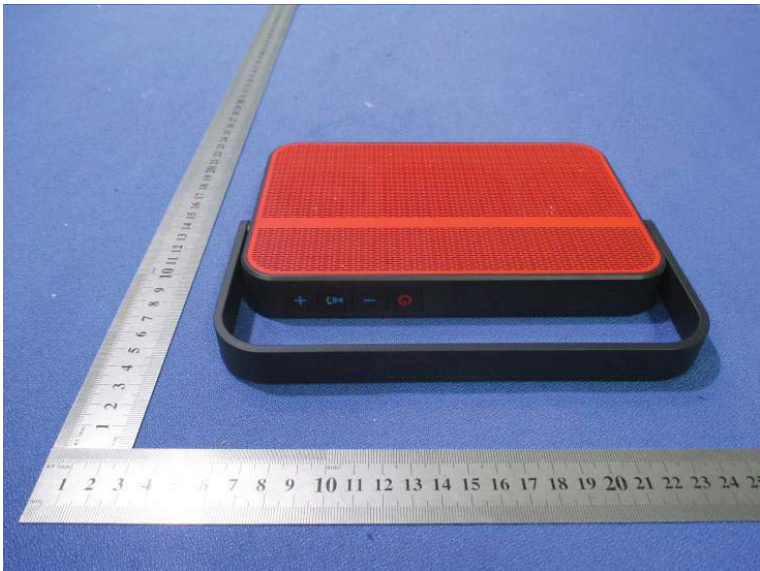
## 5. External and Internal Photos of the EUT

### External Photos of EUT



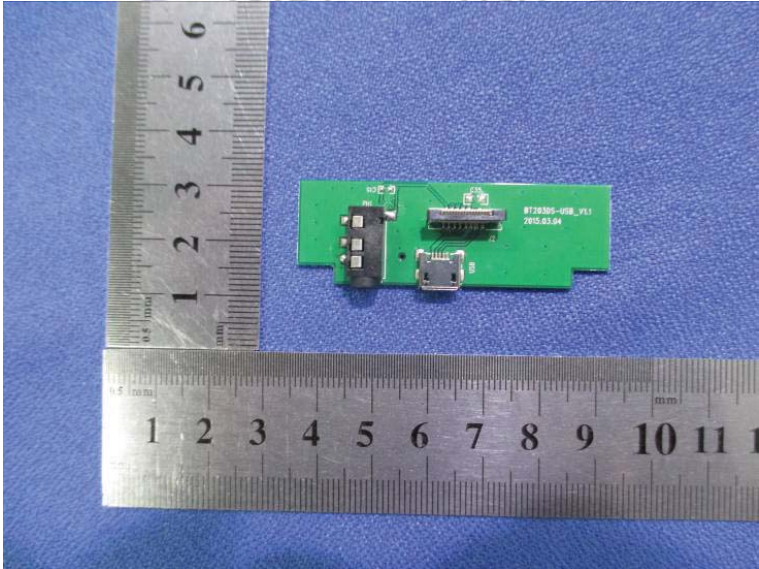




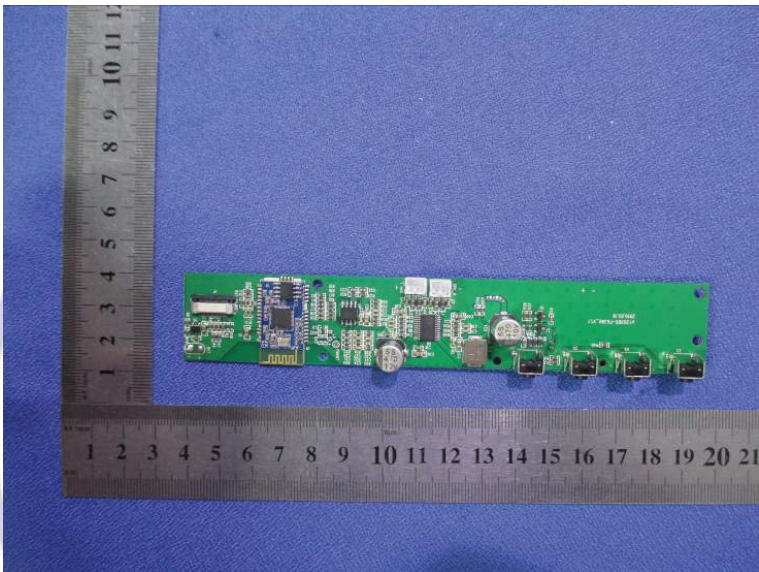
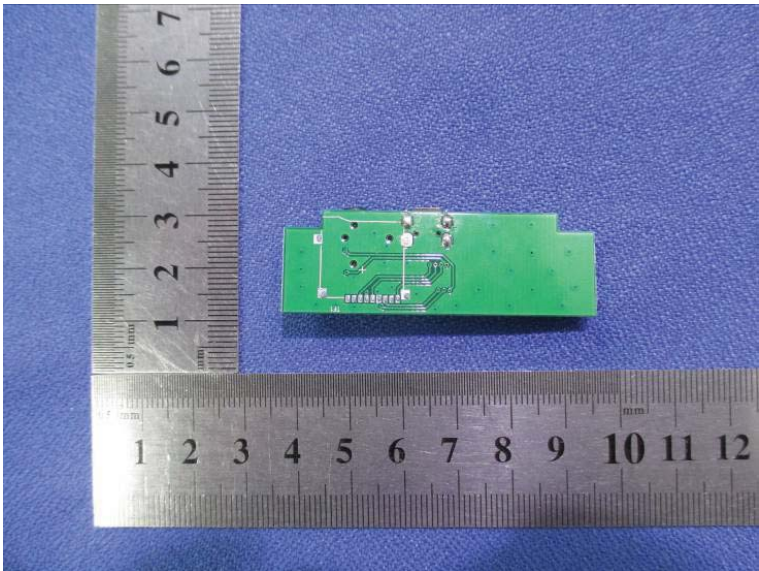


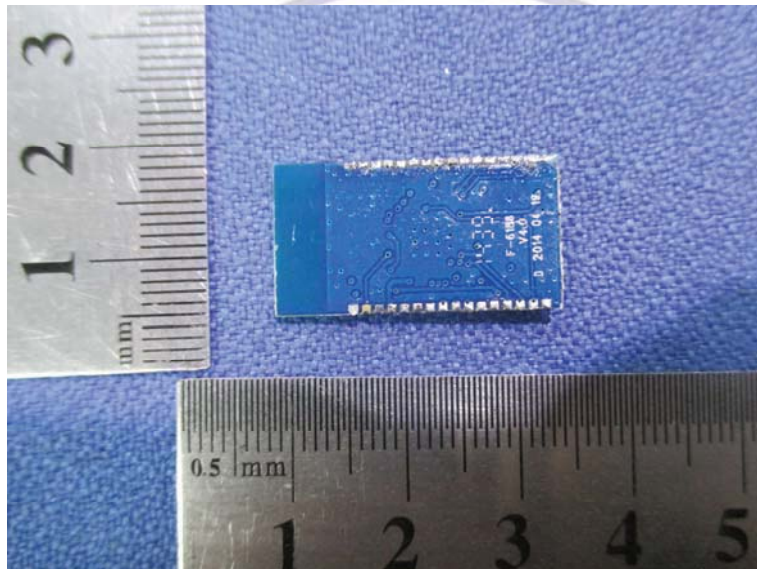
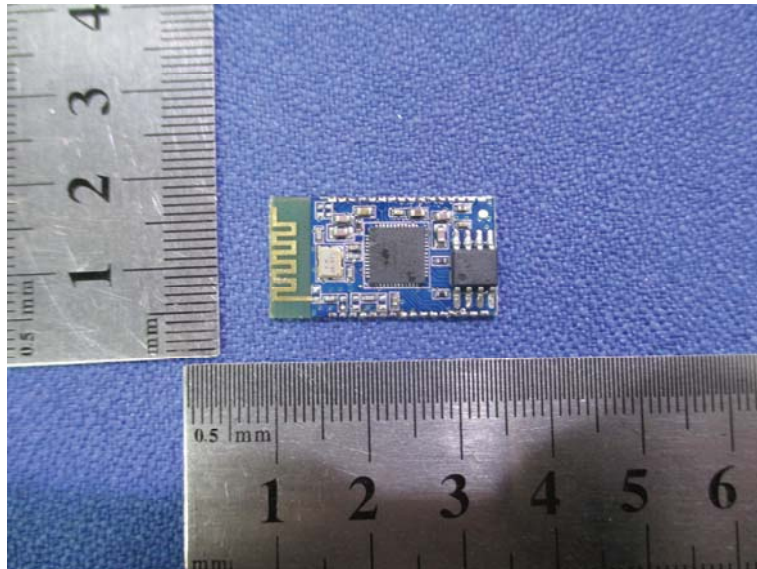


Internal Photos of EUT









\*\*\*\*\* End of Report \*\*\*\*\*