Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15 SUBPART C 15.247 & RSS 247

Report Reference No. .....: **CTL1704068021-WF02**

Compiled by: (position+printed name+signature)	Allen Wang (File administrators)	Allen Wang
Tested by: (position+printed name+signature)	Nice Nong (Test Engineer)	Nice Nong
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name.....:	Bluetooth Gramophone
FCC Model .....:	VSG-140
HVIN.....:	ITSG-140 (IC model only)
Trade Mark.....:	VICTROLA / INNOVATIVE TECHNOLOGY
FCC ID: 2AFHW-VSG140 ; IC: 9577A-SG140	

Applicant's name .....:	**Innovative Technology Electronics LLC**
Address of applicant .....:	1 Channel Drive, Port Washington, NY 11050, USA

Test Firm .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm .....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Test specification.....:	
Standard.....:	**47 CFR FCC Part 15 Subpart C 15.247 & RSS 247 Issue 2, February 2017**
TRF Originator .....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF .....:	Dated 2011-01

Date of Receipt.....:	Apr. 12, 2017
Date of Test Date.....:	Apr. 13, 2017–Apr. 17, 2017
Data of Issue.....:	Apr. 18, 2017
Result.....:	Pass

TEST REPORT

Test Report No. :	CTL1704068021-WF02	Apr. 18, 2017 Date of issue

Equipment under Test	:	Bluetooth Gramophone
FCC Model	:	VSG-140
HVIN	:	ITSG-140 (IC model only)
Applicant	:	**Innovative Technology Electronics LLC**
Address	:	1 Channel Drive, Port Washington, NY 11050, USA
Manufacturer	:	**Shenzhen Trendwoo Tech. Co.,Ltd**
Address	:	12th Floor, Block B, Building 6, BaoNeng Tech Park, No.1 Qingxiang Road, Longhua District, Shenzhen, China

Test result	Pass *

* 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 **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2017-04-18	CTL1704068021-WF02	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

RSS-247-Issue 2: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 4: — General Requirements for Compliance of Radio Apparatus

ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

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 and IC Requirements		
FCC Part 15.207 RSS-Gen 8.8	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2) RSS 247 5.2(a) RSS GEN 6.6	6dB Bandwidth & 99% Bandwidth	PASS
FCC Part 15.247(d) RSS 247 5.5	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b) RSS 247 5.4 (d)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e) RSS 247 5.2(b)	Power Spectral Density	PASS
FCC Part 15.205/ 15.209 RSS-Gen 8.9 8.10	Radiated Emissions	PASS
FCC Part 15.247(d) RSS-Gen 5.5	Band Edge	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	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±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 Gramophone
Power supply:	DC 7.4V from battery
Adapter information:	Model:SK03T1-1800166Z Input: AC100-240VAC, 50/60Hz 0.6A Output:18V⎓1.66A
Bluetooth BLE	
Supported type:	Version 4.0 for low Energy
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Antenna type:	PCB Antenna
Antenna gain:	0 dBi

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 39 channels provided to the EUT and Channel 00/19/39 were selected for BT4.0 test.

Operation Frequency List BT4.0：

Channel	Frequency (MHz)
00	**2402**
02	2404
03	2406
⋮	⋮
19	**2440**
⋮	⋮
37	2476
38	2478
39	**2480**

Note: The line display in grey were the channel selected for testing

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.12	2016/06/02	2017/06/01
LISN	R&S	ESH2-Z5	860014/010	2016/06/02	2017/06/01
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2016/05/21	2017/05/20
Spectrum Analyzer	Agilent	N9020	US46220290	2016/01/17	2017/01/16
Power Meter	Anritsu	ML2487B	110553	2016/06/02	2017/06/01
Power Sensor	Anritsu	MA2411B	100345	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
RF Cable	Megalon	RF-A303	N/A	2016/06/02	2017/06/01

The calibration interval was one year

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

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules, RSS Gen and RSS 247 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

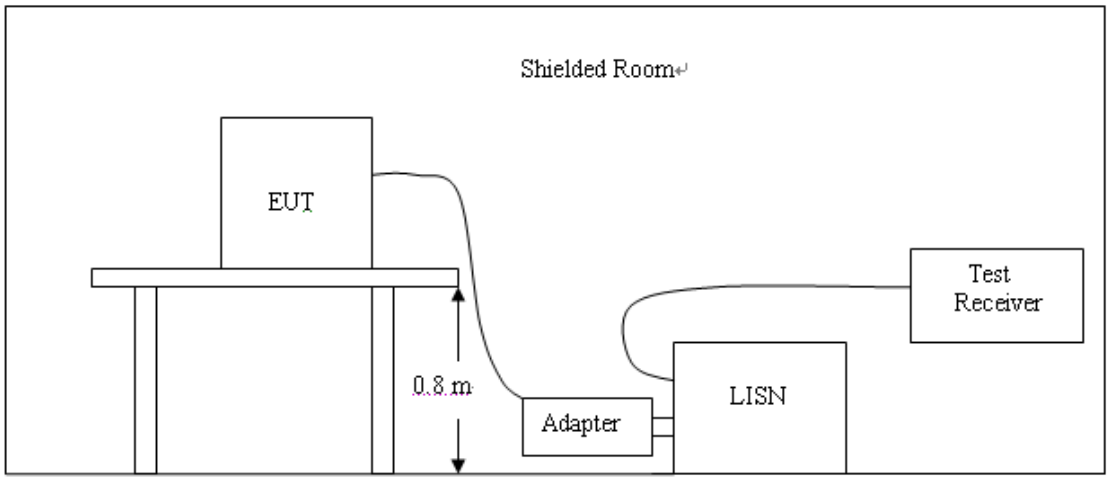
LIMIT

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207 and RSS Gen 8.8, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

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

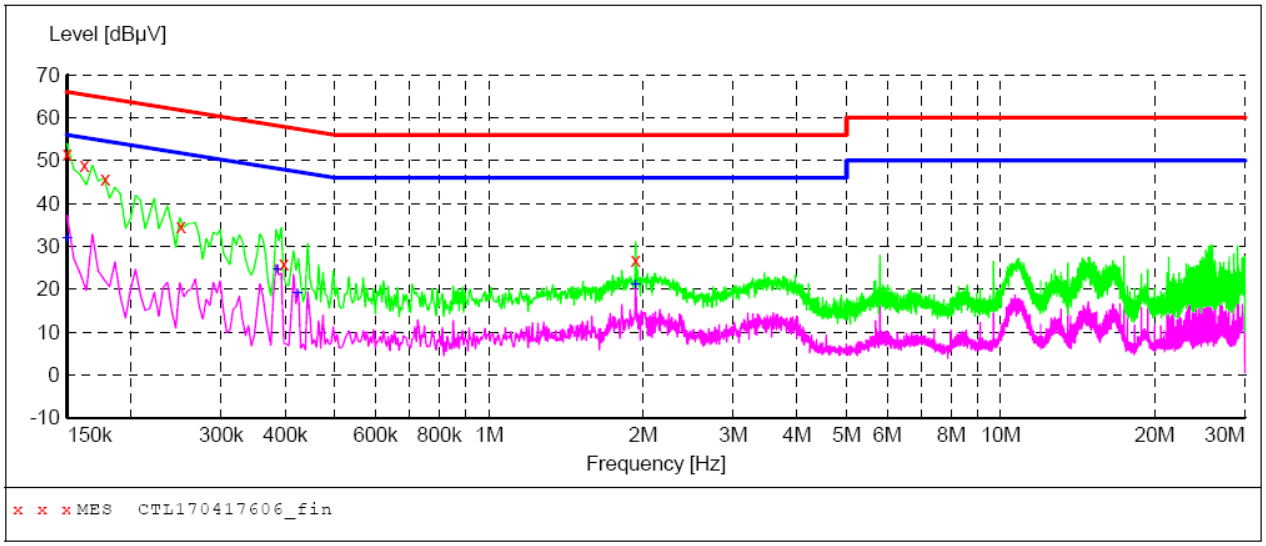


TEST PROCEDURE

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 C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The 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: "CTL170417606_fin"

4/17/2017 5:11PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	51.50	10.2	66	14.5	QP	L1	GND
0.162000	49.00	10.2	65	16.4	QP	L1	GND
0.178000	45.60	10.2	65	19.0	QP	L1	GND
0.250000	34.60	10.2	62	27.2	QP	L1	GND
0.398000	25.80	10.2	58	32.1	QP	L1	GND
1.934000	26.70	10.3	56	29.3	QP	L1	GND

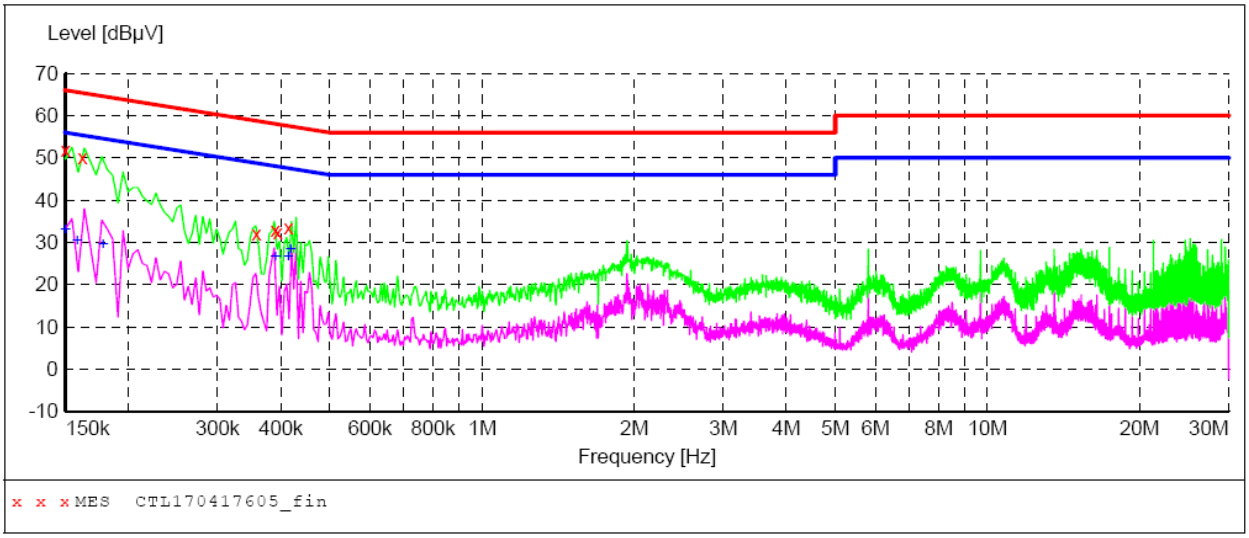
MEASUREMENT RESULT: "CTL170417606_fin2"

4/17/2017 5:11PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	31.70	10.2	56	24.3	AV	L1	GND
0.386000	24.40	10.2	48	23.7	AV	L1	GND
0.422000	18.90	10.2	47	28.5	AV	L1	GND
1.934000	21.10	10.3	46	24.9	AV	L1	GND

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL170417605_fin"

4/17/2017 5:08PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	51.80	10.2	66	14.2	QP	N	GND
0.162000	50.00	10.2	65	15.4	QP	N	GND
0.358000	32.10	10.2	59	26.7	QP	N	GND
0.390000	32.80	10.2	58	25.3	QP	N	GND
0.394000	32.40	10.2	58	25.6	QP	N	GND
0.414000	33.40	10.2	58	24.2	QP	N	GND

MEASUREMENT RESULT: "CTL170417605_fin2"

4/17/2017 5:08PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	32.90	10.2	56	23.1	AV	N	GND
0.158000	30.40	10.2	56	25.2	AV	N	GND
0.178000	29.30	10.2	55	25.3	AV	N	GND
0.390000	26.50	10.2	48	21.6	AV	N	GND
0.414000	26.40	10.2	48	21.2	AV	N	GND
0.418000	28.40	10.2	48	19.1	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

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)

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

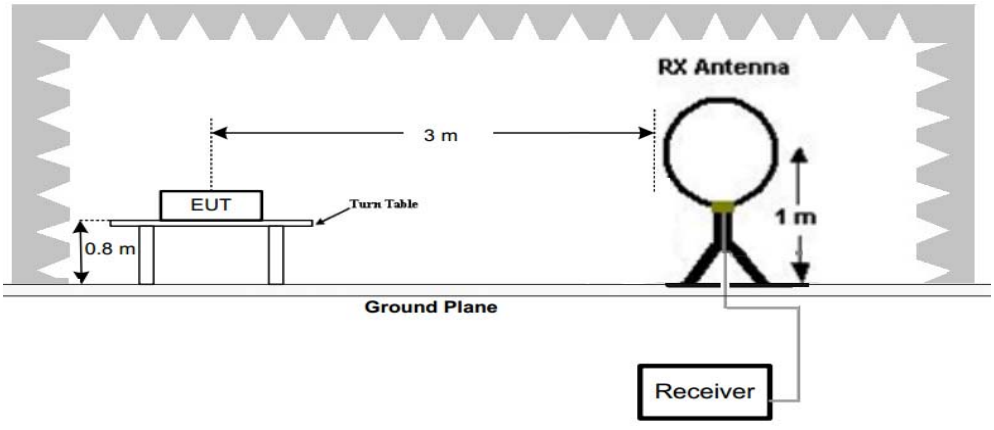
Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Radiated emission limits

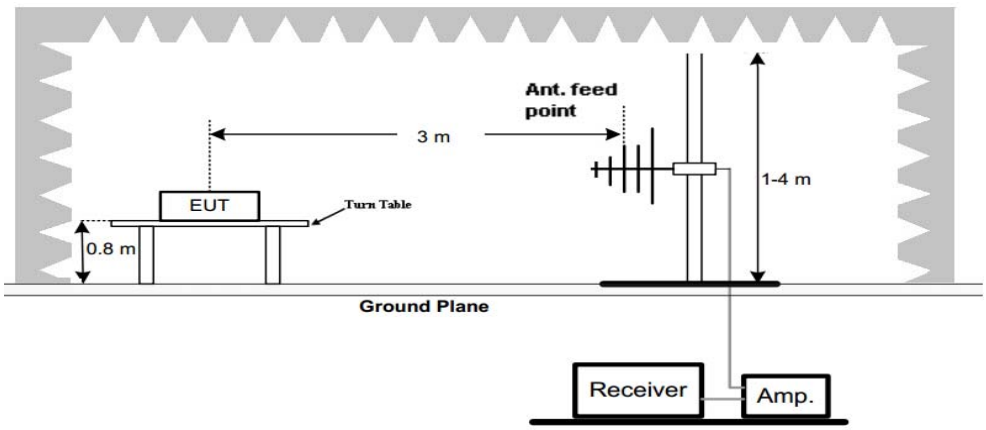
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

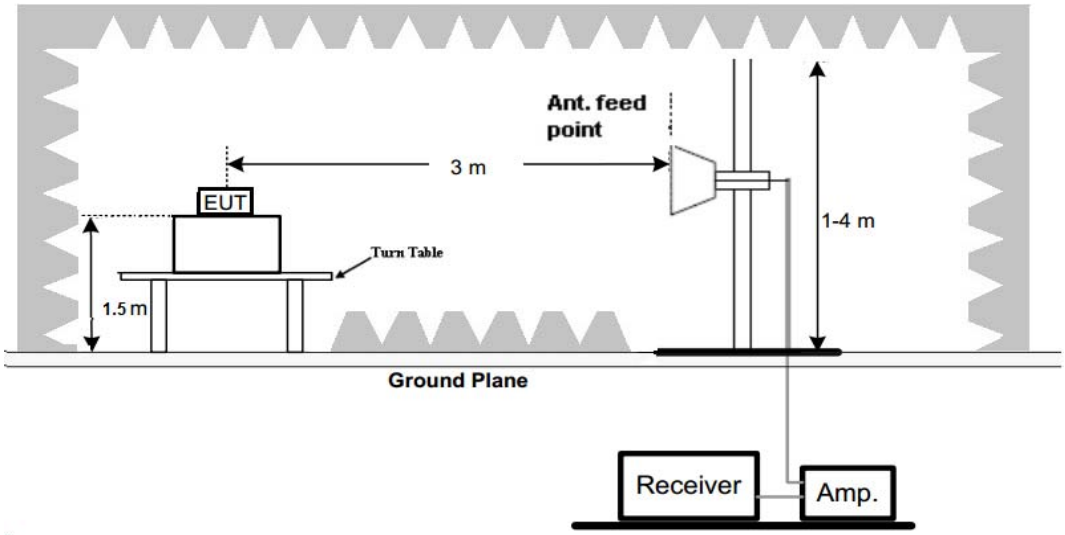
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
4. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.
5. 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
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

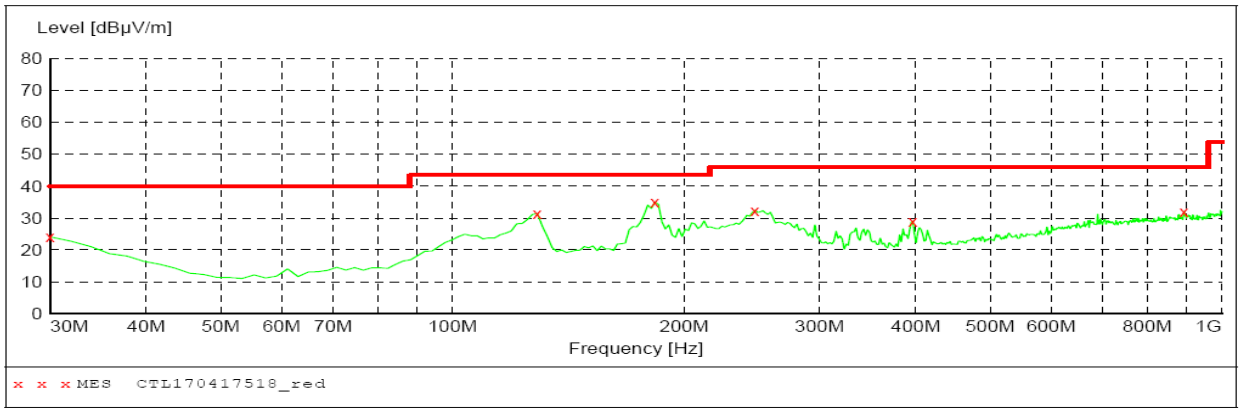
Remark:
1. For below 1GHz testing recorded worst at BLE low channel.
2. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Horizontal

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

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



MEASUREMENT RESULT: "CTL170417518_red"

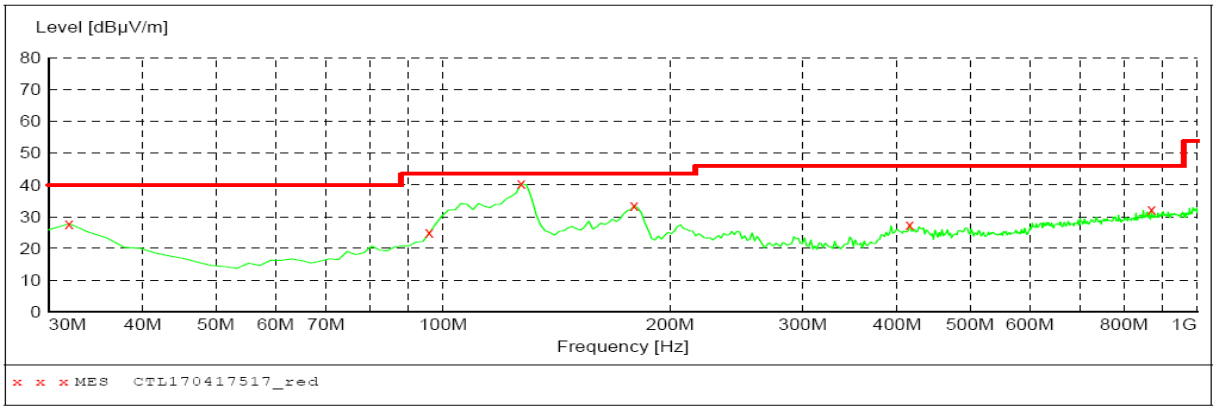
4/17/2017 4:37PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.10	20.8	40.0	15.9	---	0.0	0.00	HORIZONTAL
128.940000	31.40	14.5	43.5	12.1	---	0.0	0.00	HORIZONTAL
183.260000	35.00	13.1	43.5	8.5	---	0.0	0.00	HORIZONTAL
247.280000	32.40	13.8	46.0	13.6	---	0.0	0.00	HORIZONTAL
396.660000	29.00	17.9	46.0	17.0	---	0.0	0.00	HORIZONTAL
893.300000	32.10	25.8	46.0	13.9	---	0.0	0.00	HORIZONTAL

Vertical

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

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



MEASUREMENT RESULT: "CTL170417517_red"

4/17/2017 4:36PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	27.80	19.2	40.0	12.2	---	0.0	0.00	VERTICAL
95.960000	24.90	10.2	43.5	18.6	---	0.0	0.00	VERTICAL
127.000000	40.40	14.6	43.5	3.1	---	0.0	0.00	VERTICAL
179.380000	33.40	13.0	43.5	10.1	---	0.0	0.00	VERTICAL
416.060000	27.50	18.5	46.0	18.5	---	0.0	0.00	VERTICAL
870.020000	32.20	25.4	46.0	13.8	---	0.0	0.00	VERTICAL

For 1GHz to 25GHz

BT4.0 Mode (above 1GHz)

Frequency(MHz):			2402		Polarity:			HORIZONTAL	
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)
4804.00	56.74	PK	74	17.26	52.23	33.49	6.91	35.89	4.51
4804.00	48.21	AV	54	5.79	43.70	33.49	6.91	35.89	4.51
5580.75	49.62	PK	74	24.38	41.93	34.77	7.36	34.44	7.69
5580.75	--	AV	54	--	--	--	--	--	--
7206.00	43.50	PK	74	30.5	32.39	36.95	9.18	35.03	11.11
7206.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2402		Polarity:			VERTICAL	
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)
4804.00	56.89	PK	74	17.11	52.38	33.49	6.91	35.89	4.51
4804.00	48.36	AV	54	5.64	43.85	33.49	6.91	35.89	4.51
5580.75	50.22	PK	74	23.78	42.53	34.77	7.36	34.44	7.69
5580.75	--	AV	54	--	--	--	--	--	--
7206.00	44.75	PK	74	29.25	33.64	36.95	9.18	35.03	11.11
7206.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2440		Polarity:			HORIZONTAL	
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)
4880.00	55.25	PK	74	18.75	50.60	33.60	6.95	35.90	4.65
4880.00	48.12	AV	54	5.88	43.47	33.60	6.95	35.90	4.65
5438.50	48.26	PK	74	25.74	40.62	34.74	7.28	34.39	7.64
5438.50	--	AV	54	--	--	--	--	--	--
7320.00	43.42	PK	74	30.58	31.73	37.46	9.23	35.00	11.69
7320.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2440		Polarity:			VERTICAL	
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)
4880.00	55.75	PK	74	18.25	51.10	33.60	6.95	35.90	4.65
4880.00	48.50	AV	54	5.50	43.85	33.60	6.95	35.90	4.65
5438.50	49.11	PK	74	24.89	41.47	34.74	7.28	34.39	7.64
5438.50	--	AV	54	--	--	--	--	--	--
7320.00	43.45	PK	74	30.55	31.76	37.46	9.23	35.00	11.69
7320.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			HORIZONTAL	
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)
4960.00	55.26	PK	74	18.74	50.34	33.84	7.00	35.92	4.92
4960.00	47.85	AV	54	6.15	42.93	33.84	7.00	35.92	4.92
5839.00	50.22	PK	74	23.78	42.44	34.81	7.50	34.53	7.78
5839.00	--	AV	54	--	--	--	--	--	--
7440.00	44.15	PK	74	29.85	32.20	37.64	9.28	34.97	11.95
7440.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			VERTICAL	
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)
4960.00	55.52	PK	74	18.48	50.60	33.84	7.00	35.92	4.92
4960.00	47.71	AV	54	6.29	42.79	33.84	7.00	35.92	4.92
5839.00	50.32	PK	74	23.68	42.54	34.81	7.50	34.53	7.78
5839.00	--	AV	54	--	--	--	--	--	--
7440.00	45.21	PK	74	28.79	33.26	37.64	9.28	34.97	11.95
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. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Results of Band Edges Test (Radiated)

Frequency(MHz):			2402		Polarity:			HORIZONTAL	
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)
2402.00	93.55	PK	--	--	60.15	28.78	4.61	0.00	33.40
2402.00	87.58	AV	--	--	54.18	28.78	4.61	0.00	33.40
2350.25	45.23	PK	74	28.77	12.20	28.47	4.56	0.00	33.03
2350.25	--	AV	54	--	--	--	--	--	--
2390.00	49.26	PK	74	24.74	15.94	28.72	4.60	0.00	33.32
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	52.05	PK	74	21.95	18.66	28.78	4.61	0.00	33.39
2400.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2402		Polarity:			VERTICAL	
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)
2402.00	93.65	PK	--	--	60.25	28.78	4.61	0.00	33.40
2402.00	87.25	AV	--	--	53.85	28.78	4.61	0.00	33.40
2350.25	45.14	PK	74	28.86	12.11	28.47	4.56	0.00	33.03
2350.25	--	AV	54	--	--	--	--	--	--
2390.00	50.11	PK	74	23.89	16.79	28.72	4.60	0.00	33.32
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	52.18	PK	74	21.82	18.79	28.78	4.61	0.00	33.39
2400.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			HORIZONTAL	
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)
2480.00	93.69	PK	--	--	60.07	28.92	4.70	0.00	33.62
2480.00	88.01	AV	--	--	54.39	28.92	4.70	0.00	33.62
2483.50	51.35	PK	74	22.65	17.72	28.93	4.70	0.00	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2484.50	49.50	PK	74	24.5	15.86	28.93	4.70	0.00	33.64
2484.50	--	AV	54	--	--	--	--	--	--
2500.00	43.75	PK	74	30.25	10.07	28.96	4.72	0.00	33.68
2500.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			VERTICAL	
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)
2480.00	93.78	PK	--	--	60.16	28.92	4.70	0.00	33.62
2480.00	88.22	AV	--	--	54.60	28.92	4.70	0.00	33.62
2483.50	51.53	PK	74	22.47	17.90	28.93	4.70	0.00	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2484.50	50.12	PK	74	23.88	16.48	28.93	4.70	0.00	33.64
2484.50	--	AV	54	--	--	--	--	--	--
2500.00	44.12	PK	74	29.88	10.44	28.96	4.72	0.00	33.68
2500.00	--	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. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

3.3. Maximum Conducted Output Power

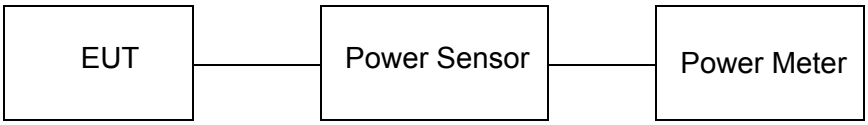
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

BT4.0

Type	Channel	Output power (dBm)	Limit (dBm)	Result
GFSK	00	5.359	30.00	Pass
	19	6.177		
	39	6.996		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

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.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration

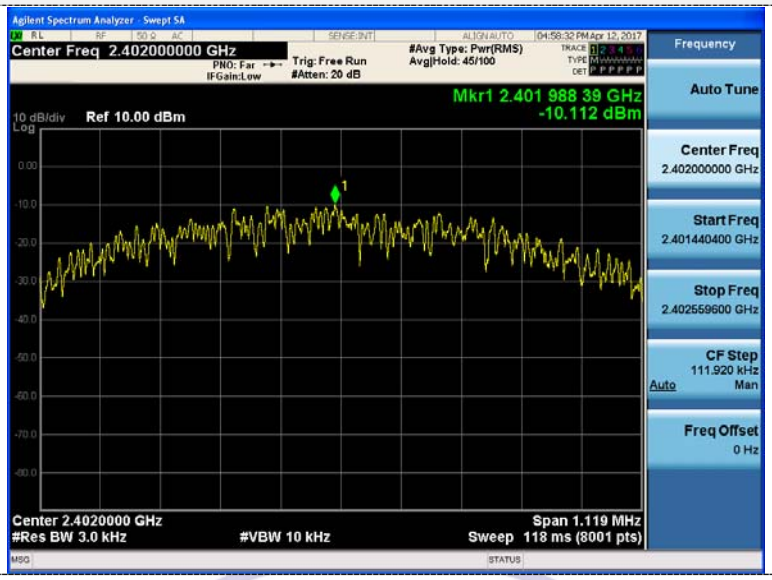
Test Results

BT4.0

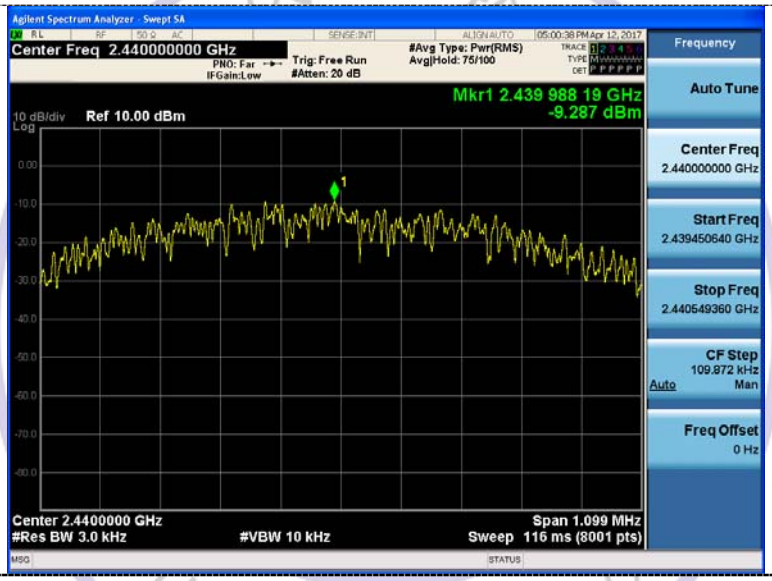
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	00	-10.112	8.00	Pass
	19	-9.287		
	39	-8.426		

Test plot as follows:

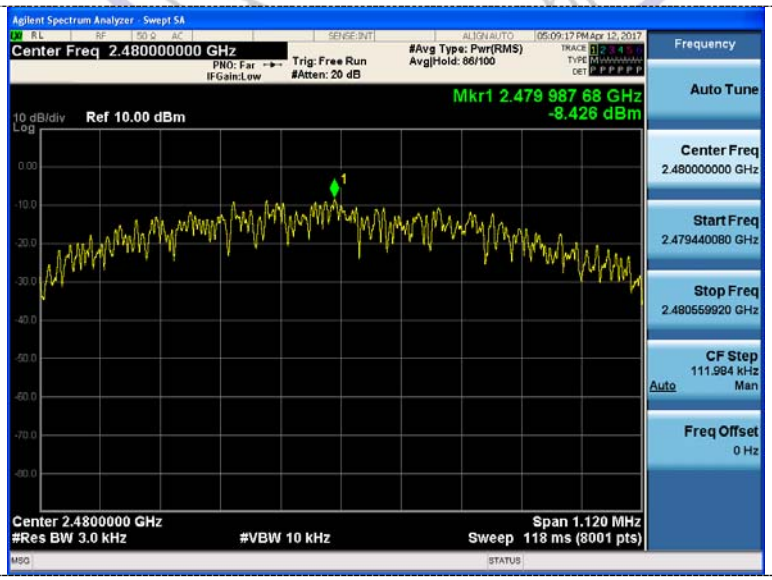
BT4.0



CH00



CH19



CH39

3.5. 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

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 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

Test Results

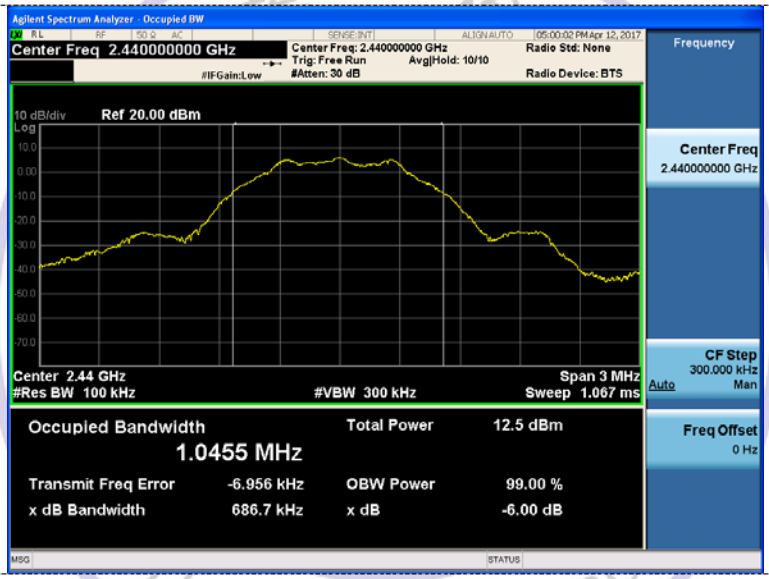
BT4.0

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
GFSK	00	0.6995	≥500	Pass
	19	0.6867		
	39	0.6999		

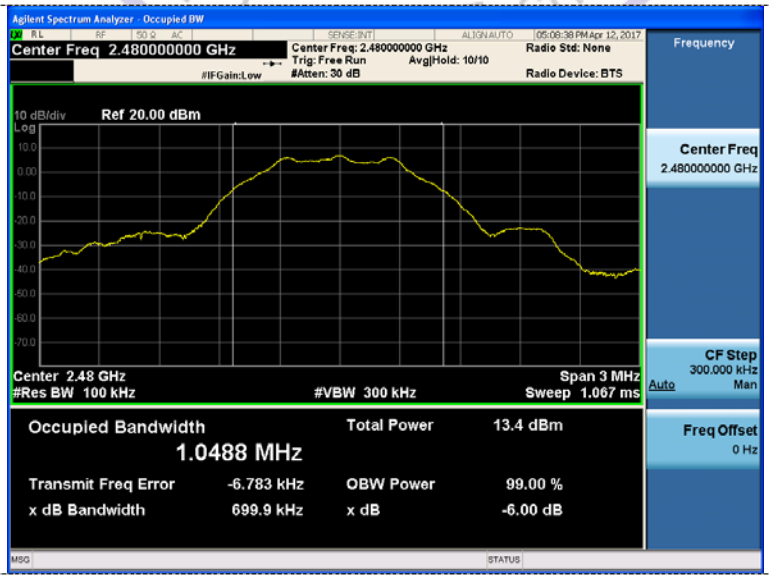
Test plot as follows:

BT4.0

CH00



CH19



CH39

3.6. Occupied Bandwidth

Limit

N/A

Test Procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

RBW=1% to 5% of the OBW
VBW=approximately 3 X RBW
Detector=Peak
Trace Mode: Max Hold

Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recoded.

Test Configuration

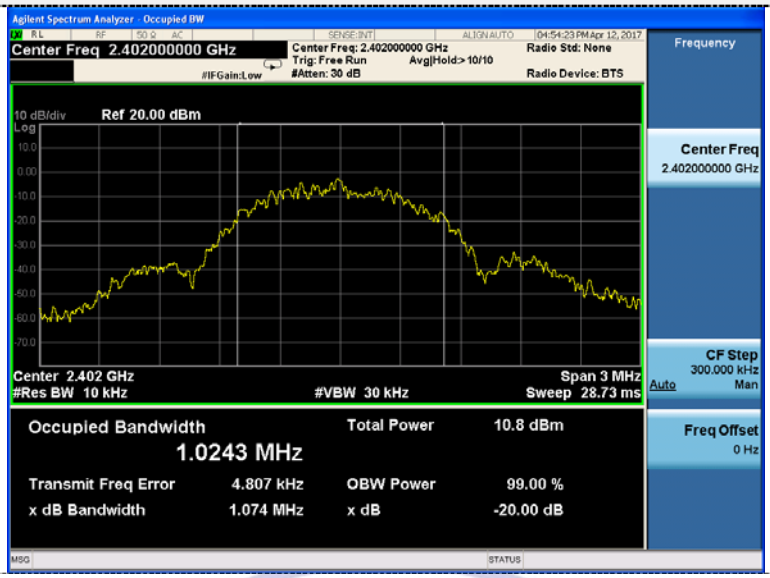
Test Results

BLE

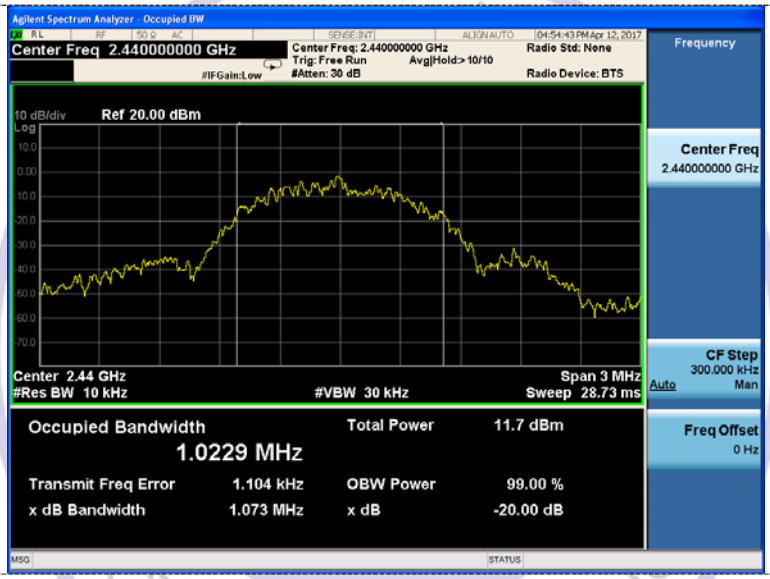
Type	Channel	Occupied Bandwidth (MHz)	Limit (KHz)	Result
GFSK	00	1.0243	≥500	Pass
	19	1.0229		
	39	1.0229		

Test plot as follows:

BLE GFSK



CH00



CH19

CH39

3.7. Out-of-band Emissions

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, based on either an RF con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required

Test Procedure

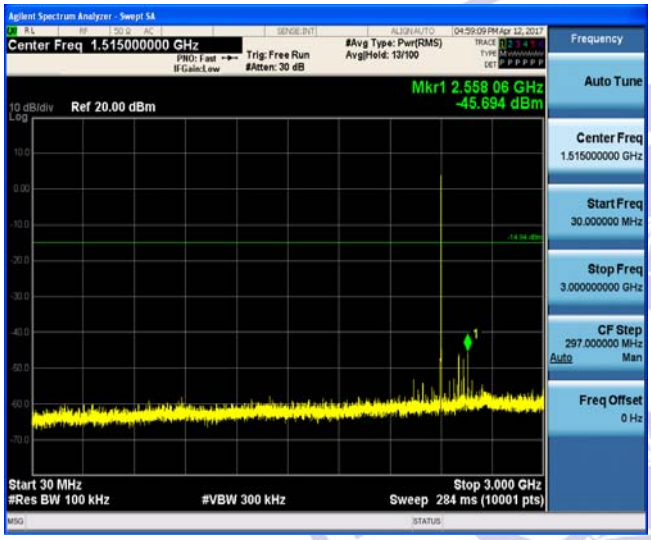
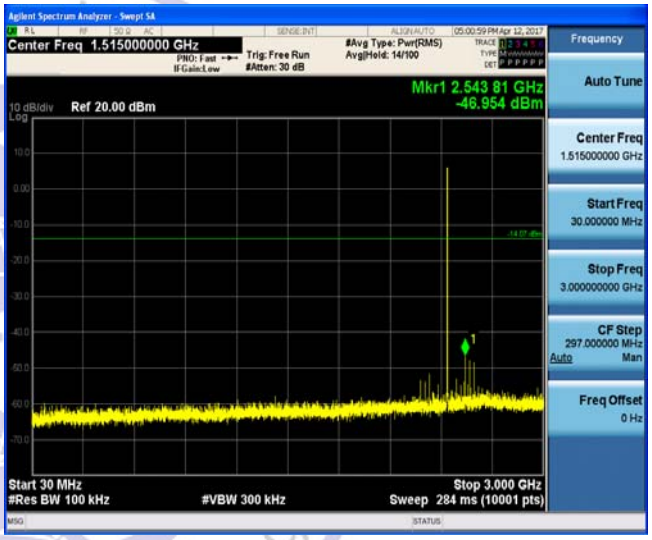
Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration

Test Results

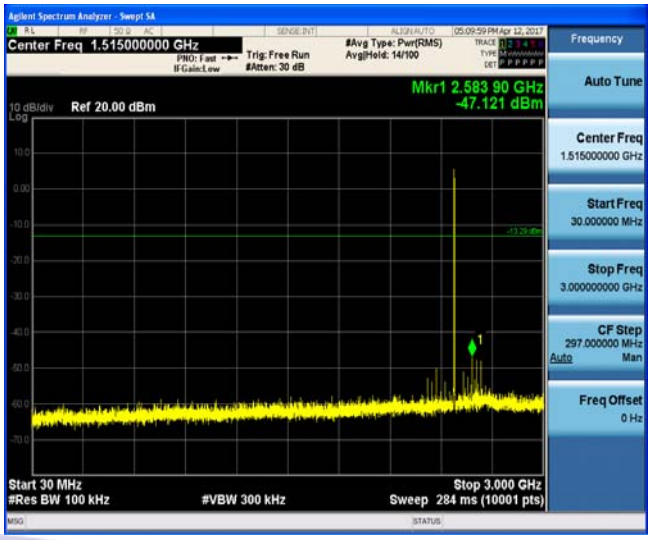
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

Test plot as follows:

BT4.0 CH00	*BT4.0 CH19*
	
Reference	Reference
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

BT4.0 CH39

Reference

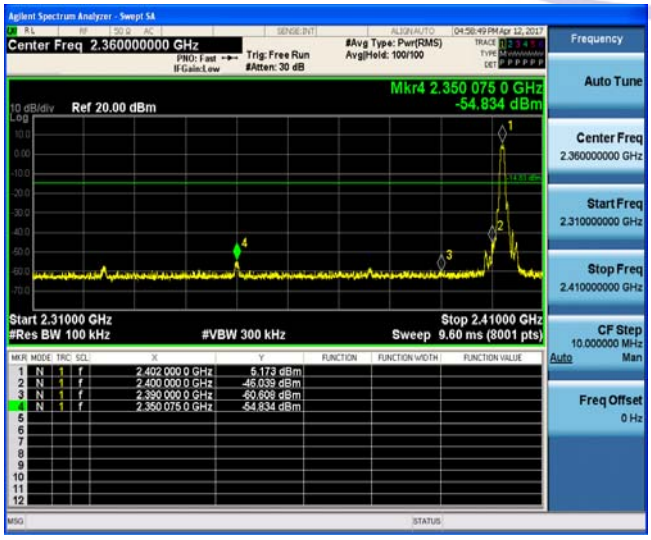


30MHz-3GHz

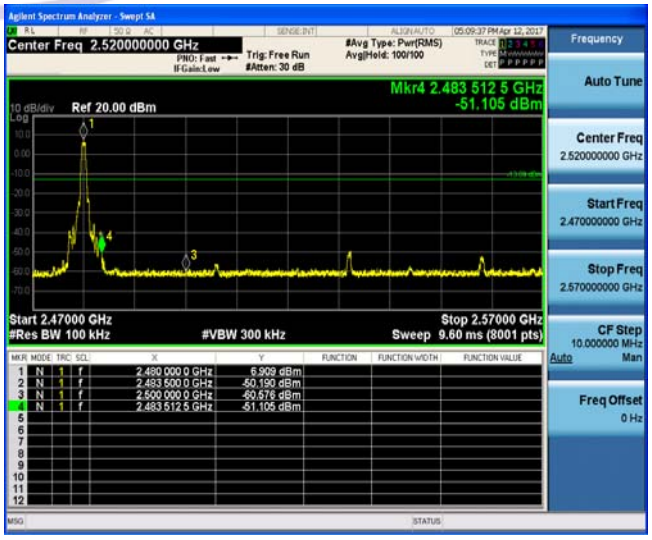
3GHz-25GHz

Band-edge Measurements for RF Conducted Emissions:

BT4.0

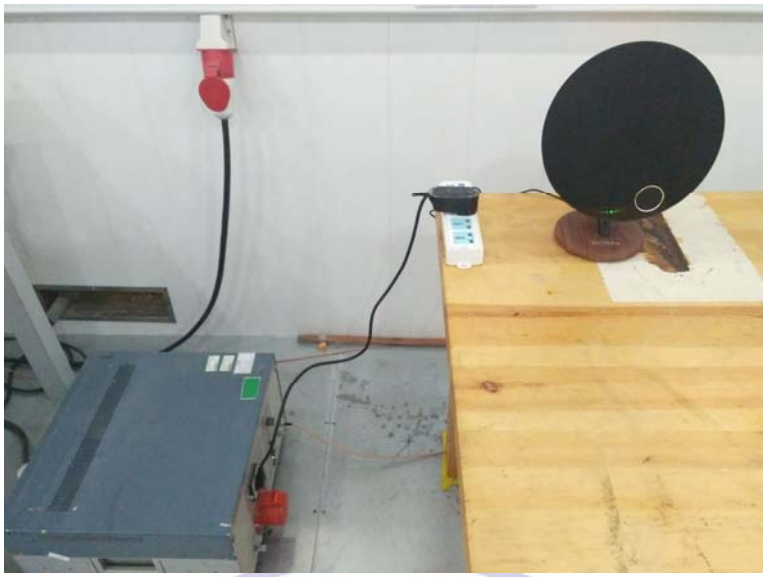


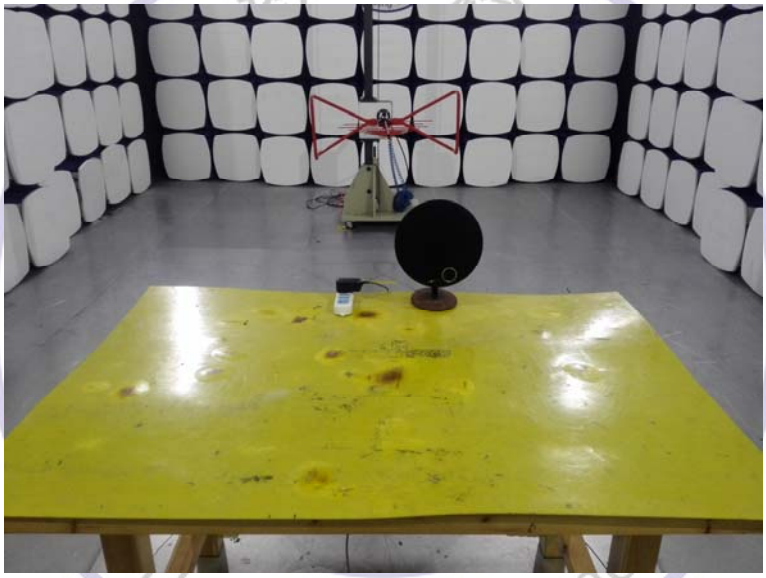
Left bandedge

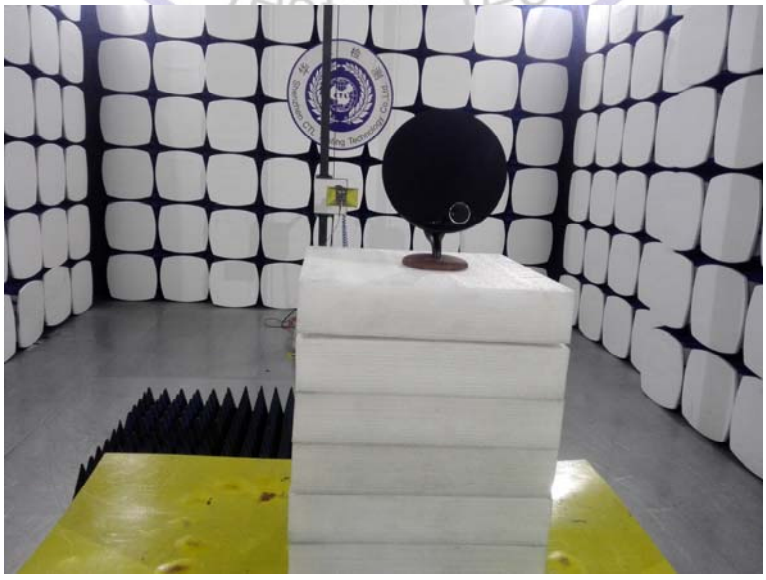


Right bandedge

4. Test Setup Photos of the EUT







5. External and Internal Photos of the EUT

Please reference to the test report No.: CTL1704068021-WF01

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