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# TEST REPORT

Application No.:	SZEM1705004177CR
Applicant:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Applicant:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Manufacturer:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Factory:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Factory:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Equipment Under Test (EUT	):
EUT Name:	Bluetooth Smart Bracelet
Model No.:	ID115 Lite
FCC ID:	2AHFTID115LITE
Standards:	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2017-05-05
Date of Test:	2017-05-11 to 2017-05-18
Date of Issue:	2017-05-24
Test Result :	Pass*

\* In the configuration tested, the EUT complied with the standards specified above.



#### Jack Zhang EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2017-05-24		Original

Authorized for issue by:		
	Peter Gene	
	Peter Geng /Project Engineer	
	Eric Fu	
	Eric Fu /Reviewer	

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# 2 Test Summary

Radio Spectrum Technical Requirement					
Item	Standard	Method	Requirement	Result	
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass	

Radio Spectrum Matter Part					
ltem	Standard	Method	Requirement	Result	
Conducted Disturbance at AC Power Line (150kHz- 30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass	
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass	
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass	
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass	
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass	
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass	
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	

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# 4 General Information

## 4.1 Details of E.U.T.

Power supply:	DC 3.7V rechargeable battery which charged by USB port
Bluetooth version:	V4.0 BLE
Operation frequency:	2402-2480MHz
Modulation type:	GFSK
Channel number:	40
Channel separation:	2MHz
Antenna type:	Integral antenna
Antenna gain:	0dBi

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7		4.5dB (below 1GHz)
7	RF Radiated power	4.8dB (above 1GHz)
0	Dedicted Courieus emission test	4.5dB (30MHz-1GHz)
8	Radiated Spurious emission test	4.8dB (1GHz-18GHz)
9	Temperature test	1℃
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%



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### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

### 4.5 Test Facility

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

### • CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

### A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

### • VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

### FCC – Registration No.: 556682

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 No.: 556682.

### Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 4.6 Deviation from Standards

None

# 4.7 Abnormalities from Standard Conditions

None



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# 5 Equipment List

Conducted Disturbance at AC Power Line (150kHz-30MHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017-05-10	2018-05-10	
LISN	Rohde & Schwarz	ENV216	SEM007-01	2016-10-09	2017-10-09	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2017-04-14	2018-04-14	
8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN- T8-02	EMC0120	2016-09-28	2017-09-28	
4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN- T4-02	EMC0121	2016-09-28	2017-09-28	
2 Line ISN	Fischer Custom	FCC-TLISN- T2-02	EMC0122	2016-09-28	2017-09-28	

Minimum 6dB Bandwidth						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09	

Conducted Peak Output Power						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09	

Power Spectrum Density						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09	

Conducted Band Edges Measurement						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09	

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Conducted Spurious Emissions						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09	

General used equipment						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2016-10-12	2017-10-12	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12	
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12	
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-18	

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# 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

#### 6.1.2 Conclusion

Standard Requirment:

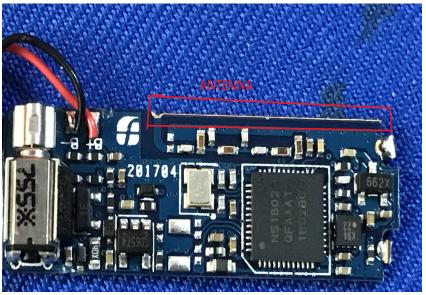
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### 15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.





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# 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Disturbance at AC Power Line (150kHz-30MHz)

Test Requirement Test Method: Limit: 47 CFR Part 15, Subpart C 15.207 ANSI C63.10 (2013) Section 6.2

	Conducted limit(dBµV)				
Frequency of emission(MHz)	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.					



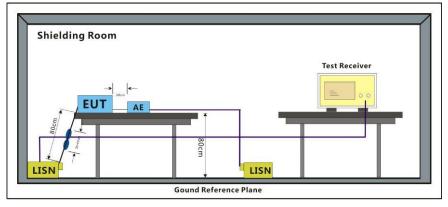
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### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature:25 °CHumidity:55 % RHAtmospheric Pressure:1015 mbarTest mode:b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.

### 7.1.2 Test Setup Diagram



### 7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 $\mu$ H + 50hm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

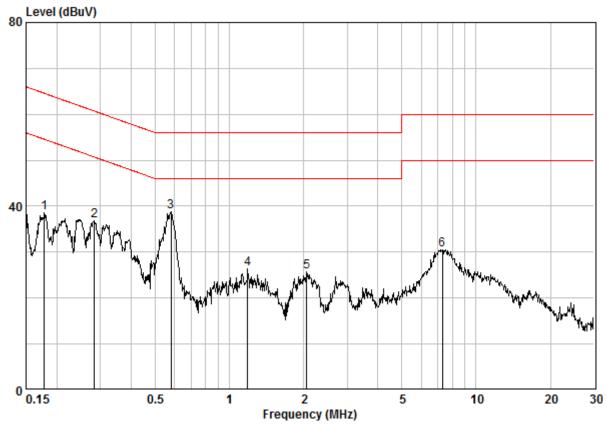
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.



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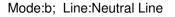


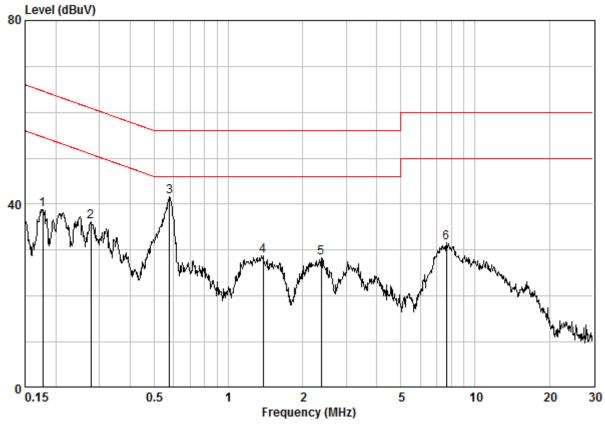
Site	: Shielding Room
Condition	: CE LINE
Job No.	: 04177CR
Test Mode	:b

	Freq	Cable Loss	LISN Factor	Read Level		Limit Line		Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17772	0.02	9.64	28.85	38.51	54.59	-16.08	Peak
2	0.28328	0.02	9.64	27.21	36.87	50.72	-13.85	Peak
3	0.57923	0.02	9.65	29.16	38.83	46.00	-7.17	Peak
4	1.184	0.03	9.66	16.59	26.27	46.00	-19.73	Peak
5	2.055	0.03	9.67	16.04	25.75	46.00	-20.25	Peak
6	7.290	0.09	9.80	20.69	30.57	50.00	-19.43	Peak



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Site	: Shielding Room
Condition	: CE NEUTRAL
Job No.	: 04177CR
Test Mode	:b

		Cable	LISN	Read		Limit	Over	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17678	0.02	9.63	29.22	38.87	54.64	-15.77	Peak
2	0.27734	0.02	9.63	26.57	36.22	50.90	-14.67	Peak
3 @	0.57617	0.02	9.63	31.91	41.56	46.00	-4.44	Peak
4	1.381	0.03	9.65	19.13	28.81	46.00	-17.19	Peak
5	2.384	0.03	9.66	18.65	28.34	46.00	-17.66	Peak
6	7.646	0.09	9.79	21.67	31.55	50.00	-18.45	Peak



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### 7.2 Minimum 6dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1
Limit:	≥500 kHz

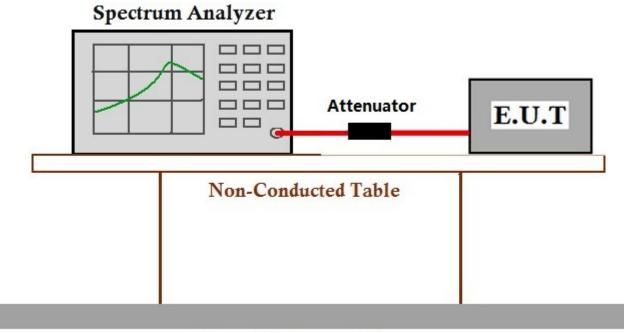
### 7.2.1 E.U.T. Operation

**Operating Environment:** 

Temperature:23 °CHumidity:56 % RHAtmospheric Pressure:1015 mbarPretest these<br/>mode to find the<br/>worst case:a:TX mode\_Keep the EUT in continuously transmitting mode with GFSK modulation<br/>b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.

The worst case b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

### 7.2.2 Test Setup Diagram



## **Ground Reference Plane**

### 7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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### 7.3 Conducted Peak Output Power

Test Requirement	47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method:	ANSI C63.10 (2013) Section 11.9.1.1
Limit:	

Frequency range(MHz)	Output power of the intentional radiator(watt)			
	1 for ≥50 hopping channels			
902-928	0.25 for 25≤ hopping channels <50			
	1 for digital modulation			
	1 for ≥75 non-overlapping hopping channels			
2400-2483.5	0.125 for all other frequency hopping systems			
	1 for digital modulation			
5725-5850	1 for frequency hopping systems and digital modulation			

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### 7.3.1 E.U.T. Operation

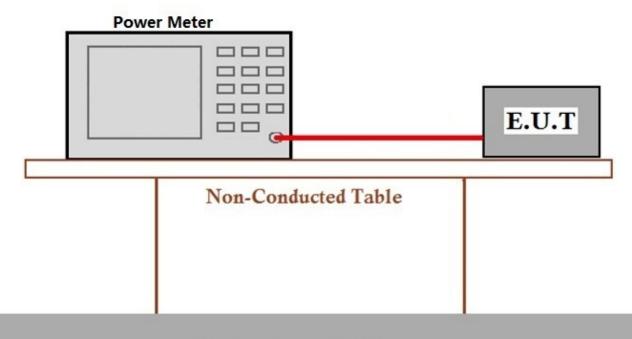
**Operating Environment:** 

Temperature:	23	°C	Humidity:	56	% RH	Atmospheric Pressure: 1015 mbar
Pretest these						Isly transmitting mode with GFSK modulation
mode to find the worst case:			TX mode_Keep modulation.	the	EUT in	charging and continuously transmitting mode
The worst case	b:Cl	harge +	TX mode_Keep	the	EUT in	charging and continuously transmitting mode

for final test:

with GFSK modulation.

### 7.3.2 Test Setup Diagram



# **Ground Reference Plane**

### 7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.4 Power Spectrum Density

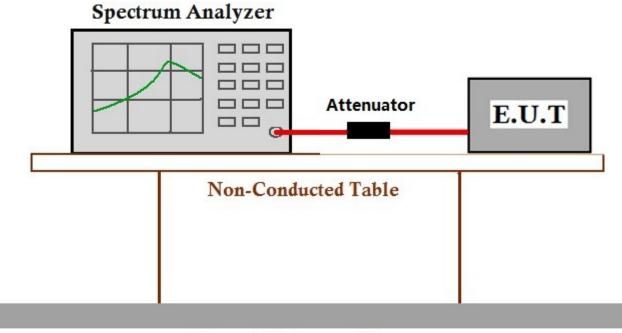
Test Requirement	47 CFR Part 15, Subpart C 15.247(e)
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Limit:	${\leq}8dBm$ in any 3 kHz band during any time interval of continuous transmission

### 7.4.1 E.U.T. Operation

**Operating Environment:** 

Temperature:	23	°C	Humidity:	56 % RH	Atmospheric Pressure:	1015 mbar
Pretest these	a:T>	K mode_Kee	ep the EUT i	n continuously	transmitting mode with GFSK	modulation
mode to find the worst case:		harge + TX GFSK mod		the EUT in ch	arging and continuously trans	mitting mode
The worst case for final test:		harge + TX GFSK mod		the EUT in ch	arging and continuously trans	mitting mode

### 7.4.2 Test Setup Diagram



## **Ground Reference Plane**

### 7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.5 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2

### 7.5.1 E.U.T. Operation

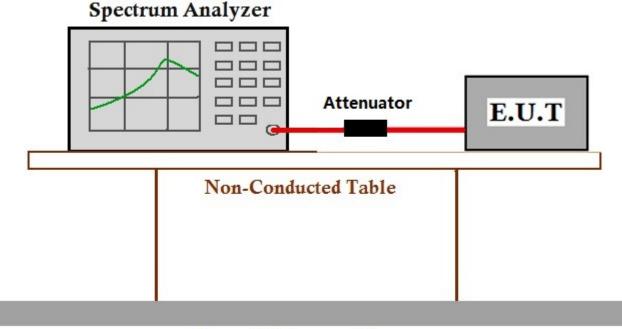
Operating Environment:

Temperature:23 °CHumidity:56 % RHAtmospheric Pressure:1015 mbarPretest these<br/>mode to find the<br/>worst case:a:TX mode\_Keep the EUT in continuously transmitting mode with GFSK modulation<br/>b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.

The worst case for final test:

b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

### 7.5.2 Test Setup Diagram



## **Ground Reference Plane**

### 7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.6 Conducted Spurious Emissions

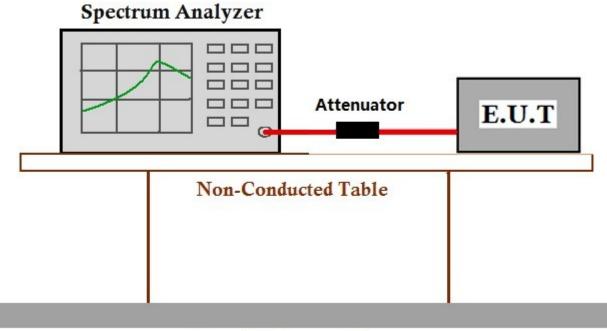
Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be 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.

### 7.6.1 E.U.T. Operation

**Operating Environment:** 

Temperature:	23 °C	Humidity:	56 % RH	Atmospheric Pressure:	1015 mbar
Pretest these	a:TX mode_K	Ceep the EUT	in continuousl	y transmitting mode with GFSK	modulation
mode to find the worst case:	b:Charge + T with GFSK me		o the EUT in c	harging and continuously trans	mitting mode
The worst case for final test:	b:Charge + T with GFSK me		o the EUT in c	harging and continuously trans	mitting mode

### 7.6.2 Test Setup Diagram



# **Ground Reference Plane**

### 7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.7 Radiated Emissions which fall in the restricted bands

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.10.5
Measurement Distance:	3m

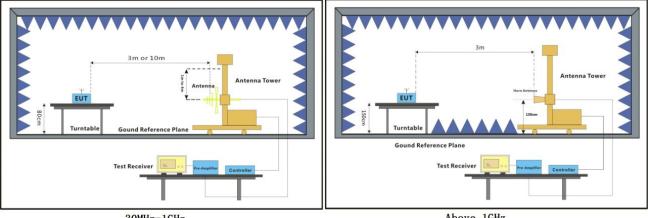
### 7.7.1 E.U.T. Operation

#### **Operating Environment:**

Temperature:23 °CHumidity:54 % RHAtmospheric Pressure:1015 mbarPretest these<br/>mode to find the<br/>worst case:a:TX mode\_Keep the EUT in continuously transmitting mode with GFSK modulation<br/>b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.

The worst case b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

### 7.7.2 Test Setup Diagram



30MHz-1GHz

Above 1GHz



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#### 7.7.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

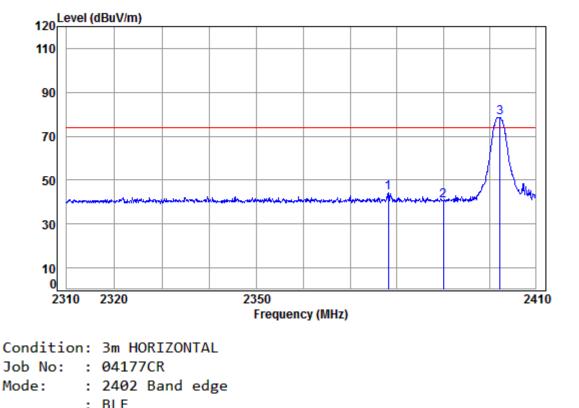
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.



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Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low

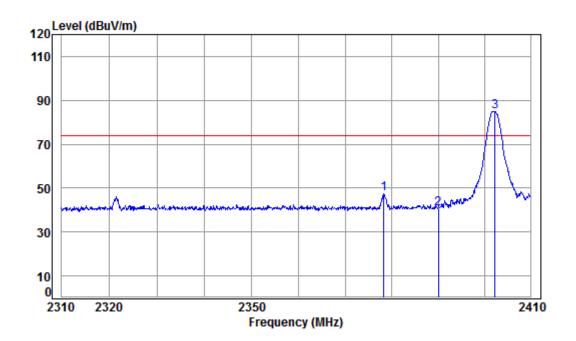


	. DLL								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2378.142	5.33	28.54	37,96	48,16	44.07	74.00	-29.93	peak
2	2390.000	5.34	28.57	37.96	44.59	40.54	/4.00	-33.46	peak
3 pp	2402.250	5.35	28.61	37.96	82.58	78.58	74.00	4.58	peak



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Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



# Condition: 3m VERTICAL

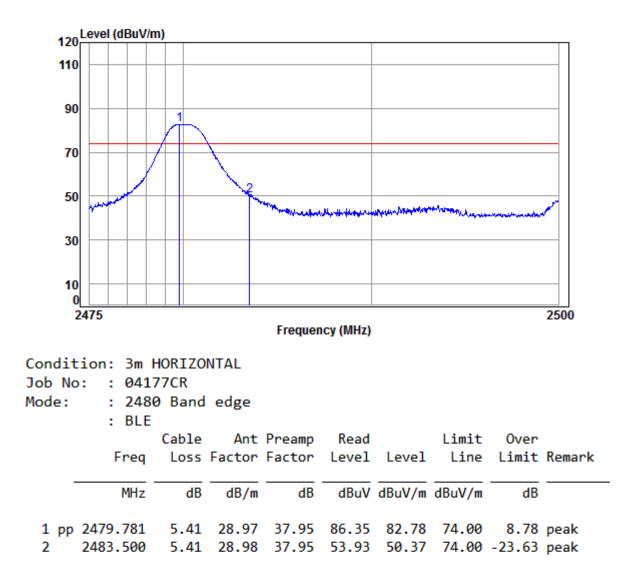
Job No: : 04177CR

Mode:	: 240	2 Band	edge							
	: BLE									
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
-										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2378.243	5.33	28.54	37.96	51.73	47.64	74.00	-26.36	peak	
2	2390.000	5.34	28.57	37.96	44.59	40.54	74.00	-33.46	peak	
3 pp	2402.250	5.35	28.61	37.96	88.83	84.83	74.00	10.83	peak	



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Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:High

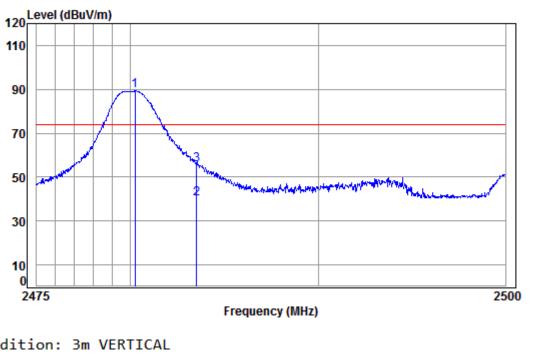


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Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition:	3m VERTICAL
Job No: :	04177CR
Mode: :	2480 Band edge

: BLE	Cable	Ant	Preamp	Read		Limit	0ver	
Freq			Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2480.229 2 av 2483.500 3 2483.500	5.41	28.98	37.95	43.69	40.13	54.00	-13.87	Average



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## 7.8 Radiated Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance:	3m
Limit:	

average limits specified above by more than 20 dB under any condition of modulation.

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)				
0.009-0.490	2400/F(kHz)	300				
0.490-1.705	24000/F(kHz)	30				
1.705-30.0	30	30				
30-88	100	3				
88-216	150	3				
216-960	200	3				
Above 960	500	3				
Remark: The emission limits sh	own in the above table are based	d on measurements employing a				
CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000						
MHz. Radiated emission limits	MHz. Radiated emission limits in these three bands are based on measurements employing an					
average detector, the peak field	strength of any emission shall not	t exceed the maximum permitted				



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#### 7.8.1 E.U.T. Operation

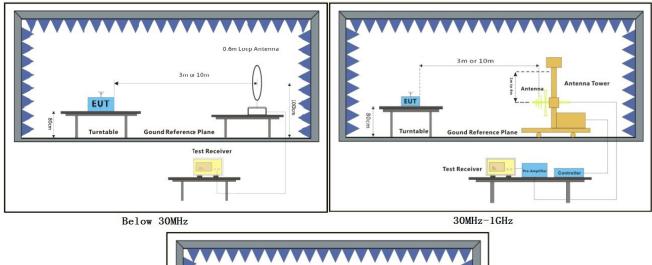
Operating Environment:

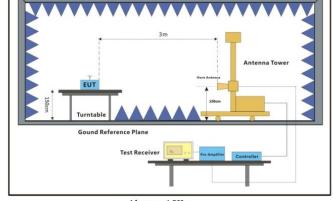
Temperature:23 °CHumidity:54 % RHAtmospheric Pressure:1015 mbarPretest these<br/>mode to find the<br/>worst case:a:TX mode\_Keep the EUT in continuously transmitting mode with GFSK modulation<br/>b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode<br/>with GFSK modulation.

For below 1GHz, tests were conducted in lowest/middle/highest channels and the worst case (middle channel) was reported only.

The worst case for final test: b:Charge + TX mode\_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

#### 7.8.2 Test Setup Diagram





Above 1GHz



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#### 7.8.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

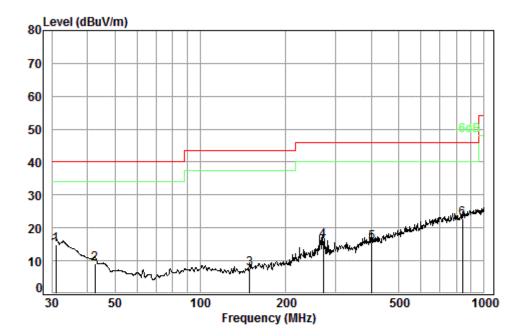
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.



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Below 1GHz



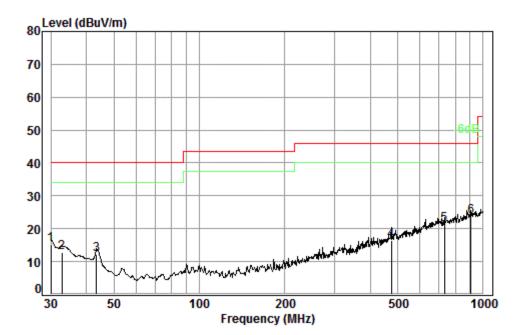
Condition: 3m HORIZONTAL Job No. : 04177CR Test mode: b

Cable Ant Preamp Read Limit 0ver Freq Loss Factor Factor Level Level Line Limit MHz dB/m dB dBuV dBuV/m dBuV/m dB dB 1 30.96 0.60 18.16 27.35 23.60 15.01 40.00 -24.99 2 42.60 0.66 11.96 27.31 23.95 9.26 40.00 - 30.74 3 149.49 8.95 7.46 43.50 -36.04 1.32 26.91 24.10 4 271.32 1.77 12.73 26.47 27.98 16.01 46.00 -29.99 5 401.84 2.21 16.31 27.15 24.04 15.41 46.00 - 30.59 6 pp 839.18 3.36 22.40 27.09 24.28 22.95 46.00 -23.05

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Condition: 3m VERTICAL Job No. : 04177CR

Test mode: b

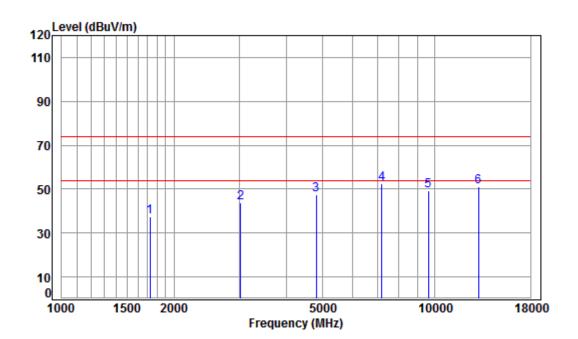
		Cable	Ant	Preamp	Read		Limit	0ver
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	23.21	15.15	40.00	-24.85
2	32.86	0.60	17.10	27.35	22.44	12.79	40.00	-27.21
3	43.51	0.68	11.56	27.31	27.10	12.03	40.00	-27.97
4	475.50	2.51	17.80	27.58	23.70	16.43	46.00	-29.57
5	729.36	2.99	21.62	27.38	24.11	21.34	46.00	-24.66
6 pp	906.48	3.61	23.23	26.75	23.53	23.62	46.00	-22.38



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Aove 1GHz

Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



# Condition: 3m HORIZONTAL

Job No:	з.	041//	'CR	
Mode:	:	2402	ТΧ	SE

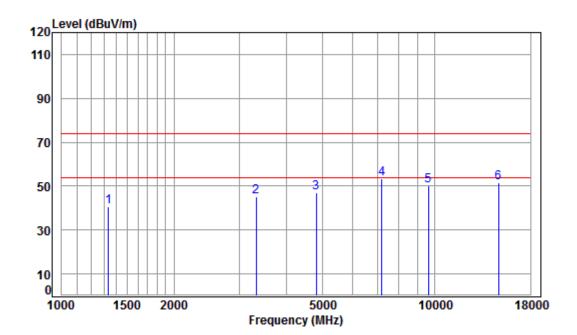
•	2402	
:	BLE	

				Preamp					
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1726.818	4.73	26.78	38.03	44.11	37.59	74.00	-36.41	peak
2	3016.575	5.94	31.33	37.90	44.33	43.70	74.00	-30.30	peak
3	4804.000	7.73	34.16	38.40	43.86	47.35	74.00	-26.65	peak
4	pp 7206.000	9.65	36.42	37.11	43.42	52.38	74.00	-21.62	peak
5	9608.000	11.06	37.52	35.10	35.61	49.09	74.00	-24.91	peak
6	13059.820	13.45	38.78	38.06	36.72	50.89	74.00	-23.11	peak



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Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



#### Condition: 3m VERTICAL Job No: : 04177CR

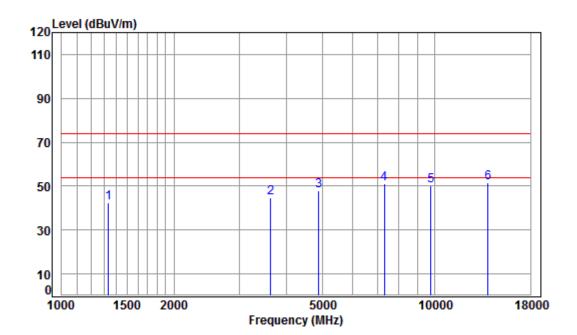
500 NO.		041//	City	
Mode:	:	2402	ТΧ	SE

: BLE								
	Cable	Ant	Preamp	Read		Limit	0ver	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 1335.141	4.27	25.11	38.07	49.50	40.81	74.00	-33.19	peak
2 3318.471	6.17	31.89	37.93	45.15	45.28	74.00	-28.72	peak
3 4804.000	7.73	34.16	38.40	43.37	46.86	74.00	-27.14	peak
4 pp 7206.000	9.65	36.42	37.11	44.33	53.29	74.00	-20.71	peak
5 9608.000	11.06	37.52	35.10	36.77	50.25	74.00	-23.75	peak
6 14788.150	14.80	40.92	38.92	34.78	51.58	74.00	-22.42	peak



Report No.: SZEM170500417701 Page: 34 of 59

Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:middle



## Condition: 3m HORIZONTAL

Job No:	:	04177	′CR
Mode:	:	2440	ТΧ

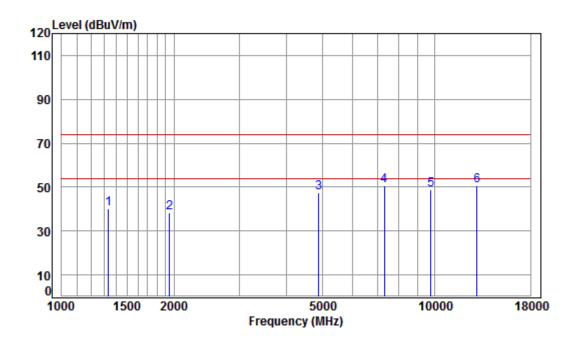
e:	:	2440	ТΧ	SE
		DIE		

: DLC								
	Cable	Ant	Preamp	Read		Limit	0ver	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
					10.1//	dD. M. Im		
MHZ	aB	ab/m	dВ	abuv	abuv/m	abuv/m	aв	
1335.141	4.27	25.11	38.07	51.10	42.41	74.00	-31.59	peak
3629.540	6.41	32.58	37.96	43.48	44.51	74.00	-29.49	peak
4880.000	7.83	34.29	38.44	44.03	47.71	74.00	-26.29	peak
7320.000	9.73	36.37	37.01	41.95	51.04	74.00	-22.96	peak
9760.000	11.21	37.55	35.02	36.49	50.23	74.00	-23.77	peak
pp13877.080	14.47	39.05	38.88	37.05	51.69	74.00	-22.31	peak
	Freq MHz 1335.141 3629.540 4880.000 7320.000 9760.000	Cable Freq Loss MHz dB 1335.141 4.27 3629.540 6.41 4880.000 7.83 7320.000 9.73 9760.000 11.21	Cable Ant   Freq Loss Factor   MHz dB dB/m   1335.141 4.27 25.11   3629.540 6.41 32.58   4880.000 7.83 34.29   7320.000 9.73 36.37   9760.000 11.21 37.55	CableAntPreamp LossFreqLossFactorFactorMHzdBdB/mdB1335.1414.2725.1138.073629.5406.4132.5837.964880.0007.8334.2938.447320.0009.7336.3737.019760.00011.2137.5535.02	CableAntPreampReadFreqLossFactorFactorLevelMHzdBdB/mdBdBuV1335.1414.2725.1138.0751.103629.5406.4132.5837.9643.484880.0007.8334.2938.4444.037320.0009.7336.3737.0141.959760.00011.2137.5535.0236.49	Cable Ant Preamp Read   Freq Loss Factor Factor Level Level   MHz dB dB/m dB dBuV dBuV/m   1335.141 4.27 25.11 38.07 51.10 42.41   3629.540 6.41 32.58 37.96 43.48 44.51   4880.000 7.83 34.29 38.44 44.03 47.71   7320.000 9.73 36.37 37.01 41.95 51.04   9760.000 11.21 37.55 35.02 36.49 50.23	Cable Ant Preamp Read Limit   Freq Loss Factor Factor Level Level Line   MHz dB dB/m dB dBuV dBuV/m dBuV/m   1335.141 4.27 25.11 38.07 51.10 42.41 74.00   3629.540 6.41 32.58 37.96 43.48 44.51 74.00   4880.000 7.83 34.29 38.44 44.03 47.71 74.00   7320.000 9.73 36.37 37.01 41.95 51.04 74.00   9760.000 11.21 37.55 35.02 36.49 50.23 74.00	Cable Ant Preamp Read Limit Over   Freq Loss Factor Factor Level Level Limit Over   MHz dB dB/m dB dBuV dBuV/m dBuV/m dB   1335.141 4.27 25.11 38.07 51.10 42.41 74.00 -31.59   3629.540 6.41 32.58 37.96 43.48 44.51 74.00 -29.49   4880.000 7.83 34.29 38.44 44.03 47.71 74.00 -26.29   7320.000 9.73 36.37 37.01 41.95 51.04 74.00 -22.96



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Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:middle



#### Condition: 3m VERTICAL . NI. 0447700

JOD NO:	- 1	041//CR	
Mode:	:	2440 TX	

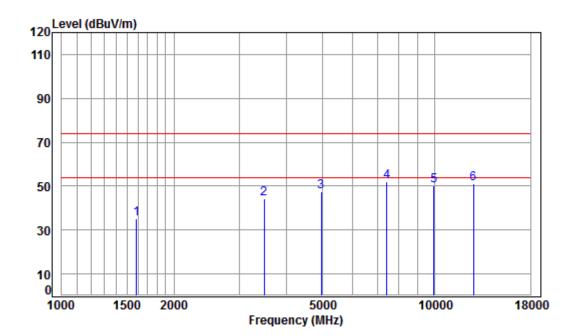
:	:	2440	ТΧ	SE
	:	BLE		

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	4.27	25.11	38.07	48.93	40.24	74.00	-33.76	peak
2	1944.073	4.96	27.60	38.01	43.69	38.24	74.00	-35.76	peak
3	4880.000	7.83	34.29	38.44	43.65	47.33	74.00	-26.67	peak
4	7320.000	9.73	36.37	37.01	41.36	50.45	74.00	-23.55	peak
5	9760.000	11.21	37.55	35.02	35.15	48.89	74.00	-25.11	peak
6	pp12947.070	13.34	38.81	37.87	36.40	50.68	74.00	-23.32	peak



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Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



### Condition: 3m HORIZONTAL Job Not : 04177CR

Job No:	- 2	04177
Mode:	:	2480

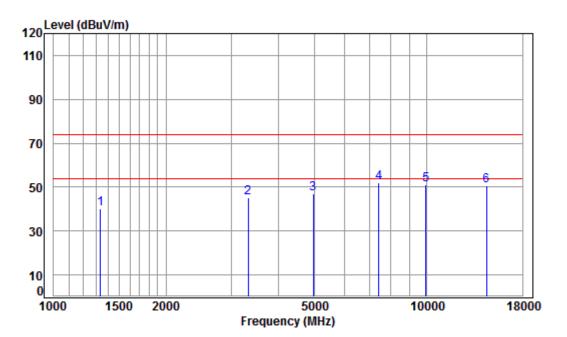
e:	:	2480	ТΧ	SE
		DIE		

	: BLE								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1587.975	4.58	26.20	38.04	42.54	35.28	74.00	-38.72	peak
2	3485.601	6.29	32.18	37.95	43.72	44.24	74.00	-29.76	peak
3	4960.000	7.95	34.43	38.48	43.44	47.34	74.00	-26.66	peak
4	pp 7440.000	9.81	36.32	36.90	42.73	51.96	74.00	-22.04	peak
5	9920.000	11.36	37.58	34.94	36.06	50.06	74.00	-23.94	peak
6	12687.750	13.22	38.86	37.25	36.22	51.05	74.00	-22.95	peak
6	12687.750	13.22	38.86	37.25	36.22	51.05	74.00	-22.95	peak



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Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition:	3m VERTICAL
Job No: :	04177CR
Mode: :	2480 TX SE

	DL	

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
3 4 pp 5	1335.141 3318.471 4960.000 7440.000 9920.000 14408.430	6.17 7.95 9.81 11.36	31.89 34.43 36.32 37.58	38.48 36.90 34.94	45.22 42.99 42.69 37.11	45.35 46.89 51.92 51.11	74.00 74.00 74.00 74.00	-28.65 -27.11 -22.08 -22.89	peak peak peak peak peak



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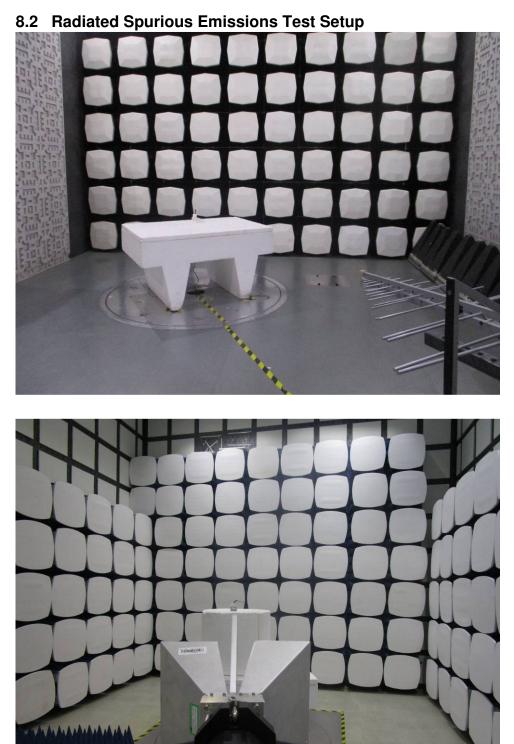
#### 8 Photographs

8.1 Conducted Disturbance at AC Power Line (150kHz-30MHz) Test Setup





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#### 8.3 EUT Constructional Details





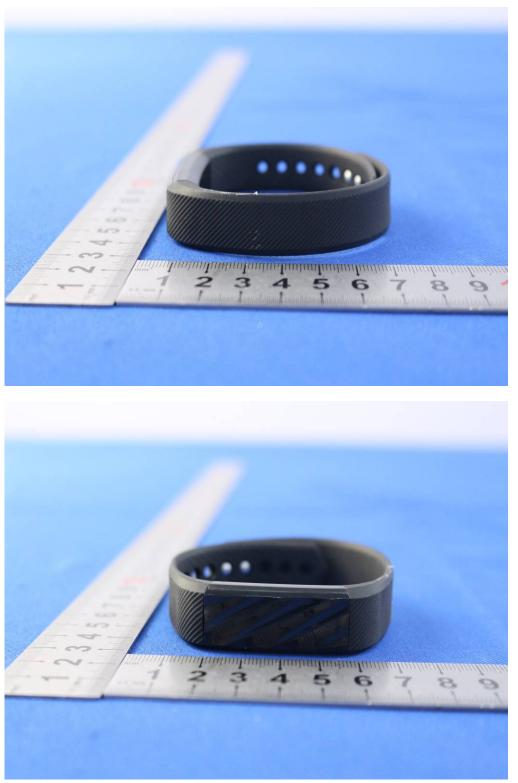


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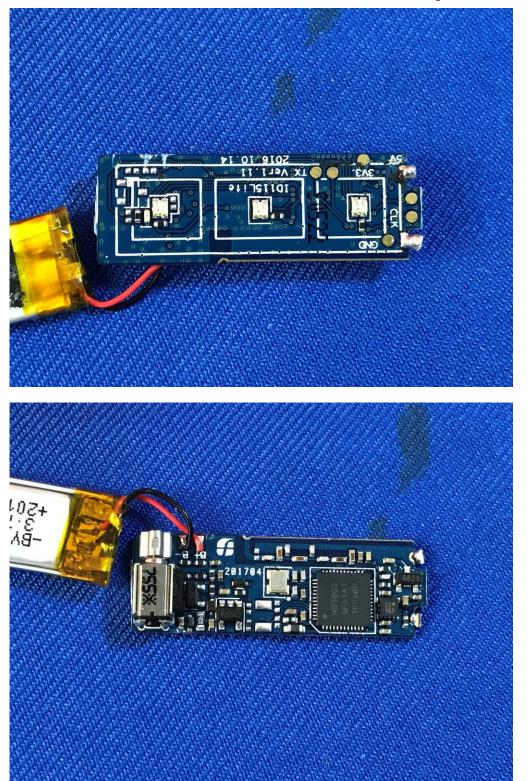


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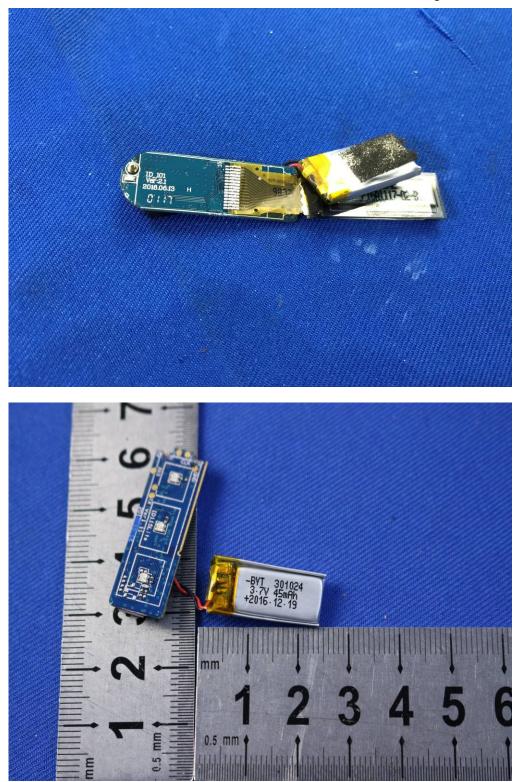
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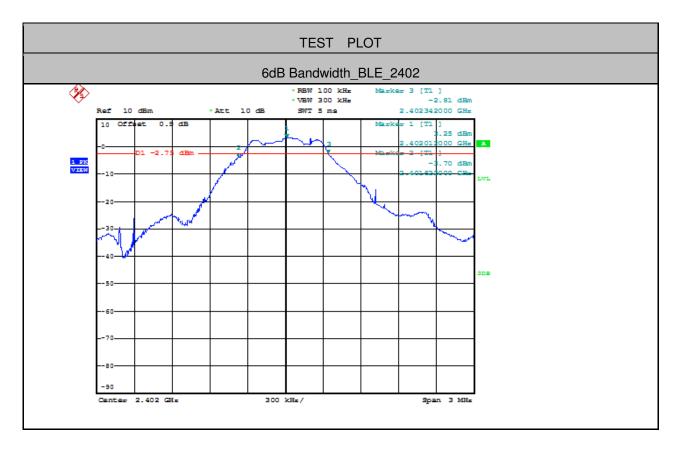
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#### 9 Appendix

#### 9.1 Appendix 15.247

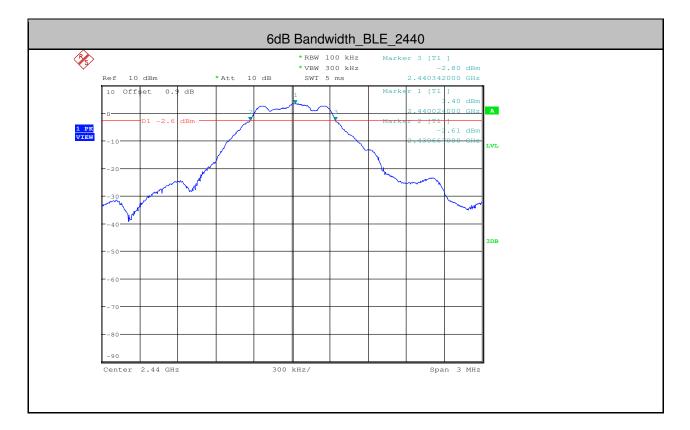
#### 1.6dB Bandwidth

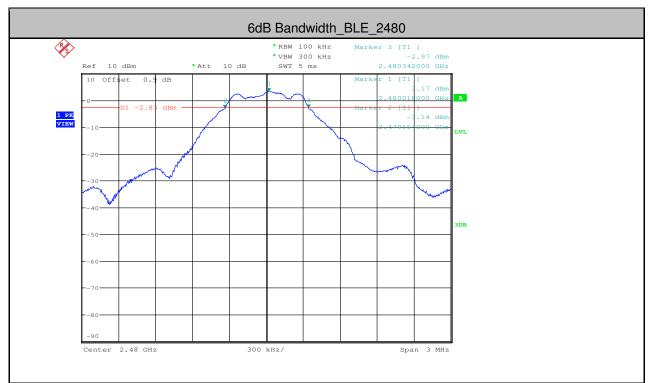
Test Mode	Test Channel	EBW[MHz]	Limit[MHz]	Verdict
BLE	2402	0.720	>=0.5	PASS
BLE	2440	0.675	>=0.5	PASS
BLE	2480	0.678	>=0.5	PASS





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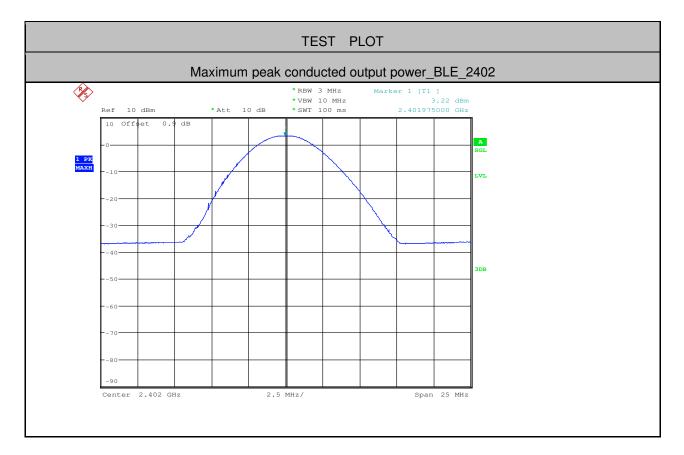




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#### 2. Maximum peak conducted output power

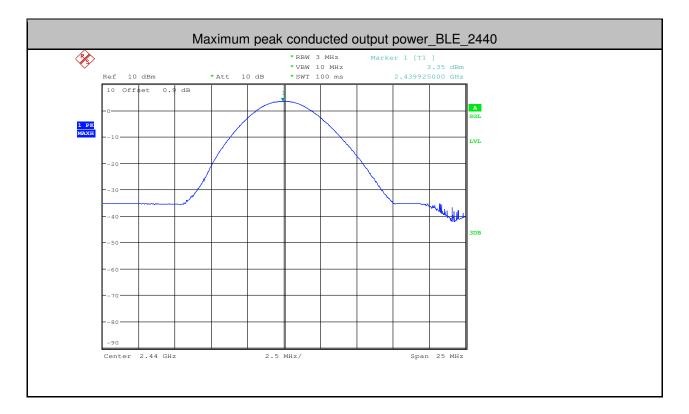
Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
BLE	2402	3.22	<30	PASS
BLE	2440	3.35	<30	PASS
BLE	2480	3.12	<30	PASS



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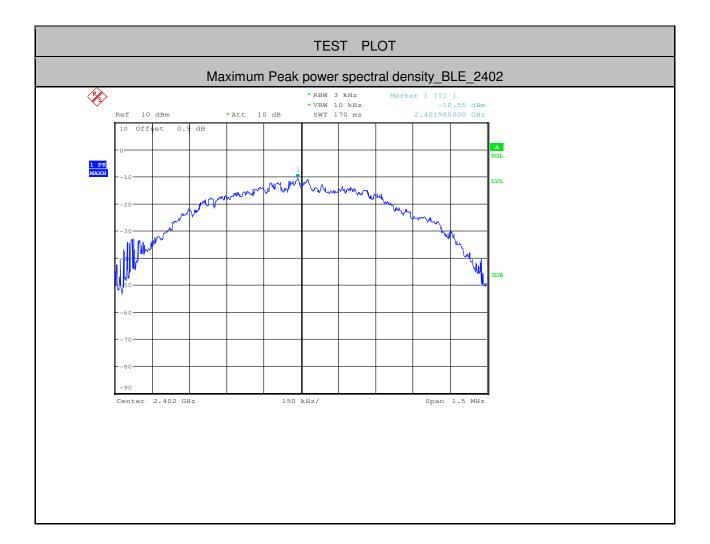




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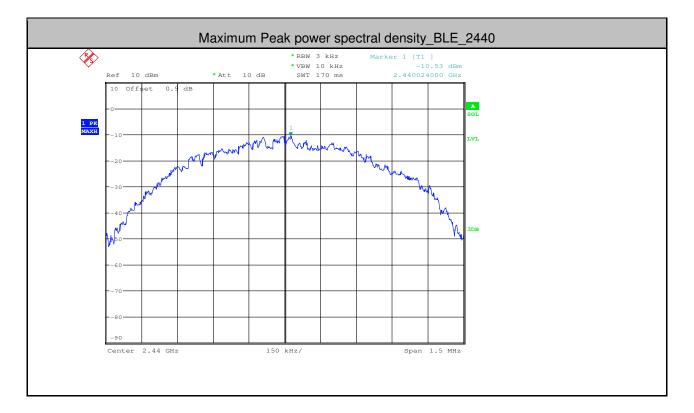
#### 3.Maximum Peak power spectral density

Test Mode	Test Channel	PSD[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE	2402	-10.55	<8.00	PASS
BLE	2440	-10.53	<8.00	PASS
BLE	2480	-10.41	<8.00	PASS





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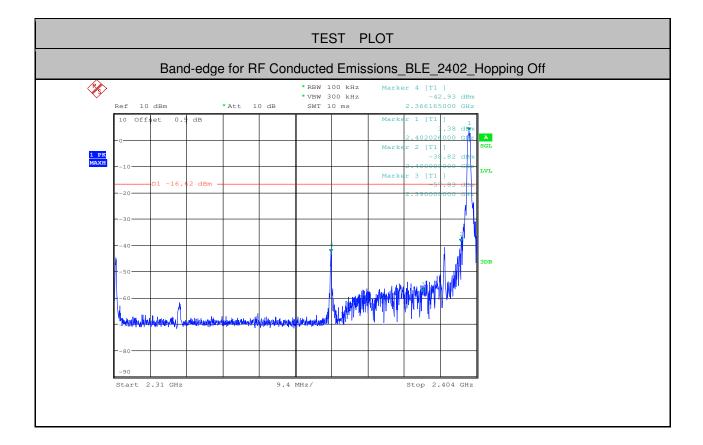




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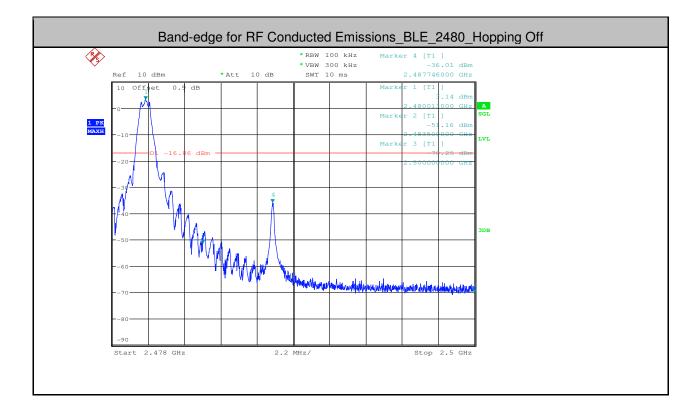
#### 4.Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	2402	3.380	-42.925	<-16.62	PASS
BLE	2480	3.140	-36.007	<-16.86	PASS





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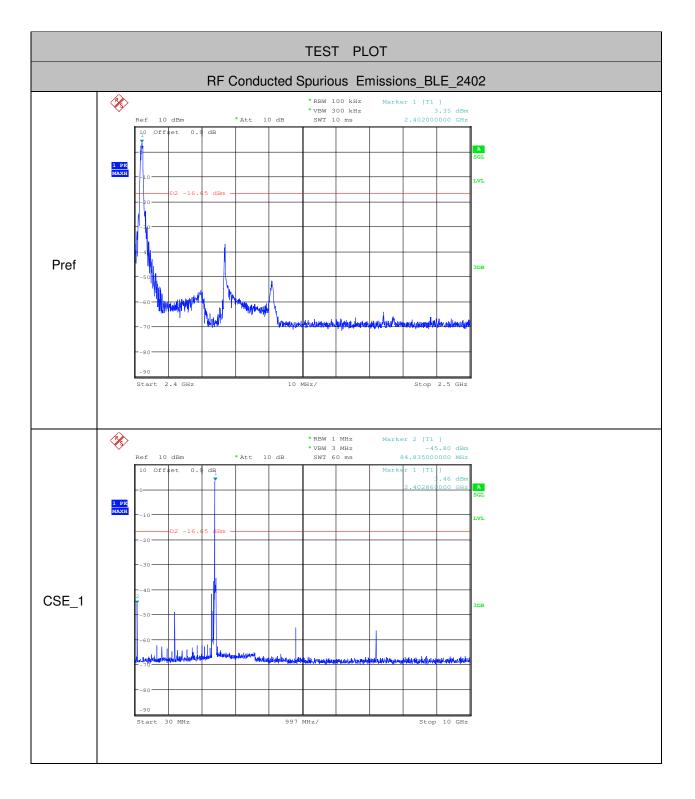
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
BLE	2402	30	10000	1000	3000	3.35	-45.800	<-16.65	PASS
BLE	2402	10000	25000	1000	3000	3.35	-65.260	<-16.65	PASS
BLE	2440	30	10000	1000	3000	3.52	-35.800	<-16.48	PASS
BLE	2440	10000	25000	1000	3000	3.52	-64.520	<-16.48	PASS
BLE	2480	30	10000	1000	3000	3.4	-45.910	<-16.6	PASS
BLE	2480	10000	25000	1000	3000	3.4	-64.170	<-16.6	PASS

#### **5.RF Conducted Spurious Emissions**

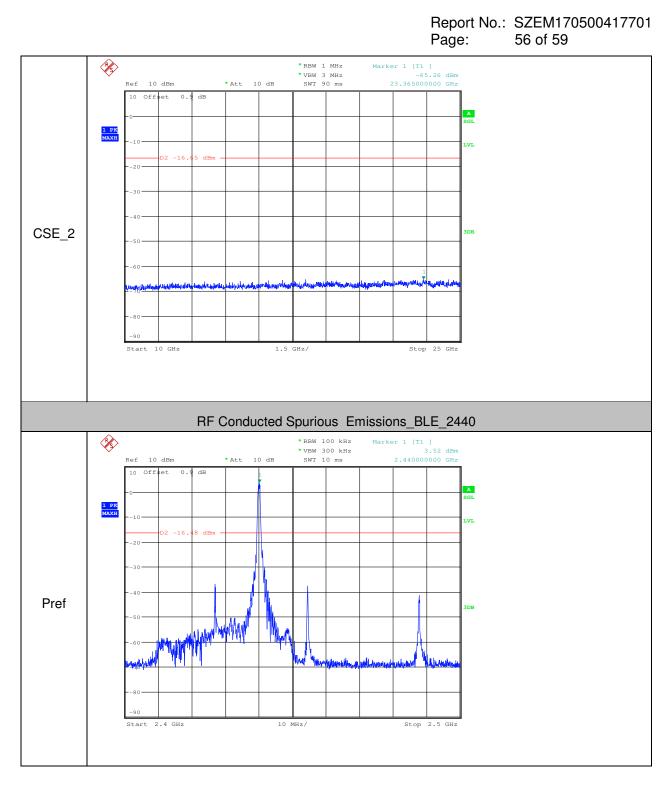
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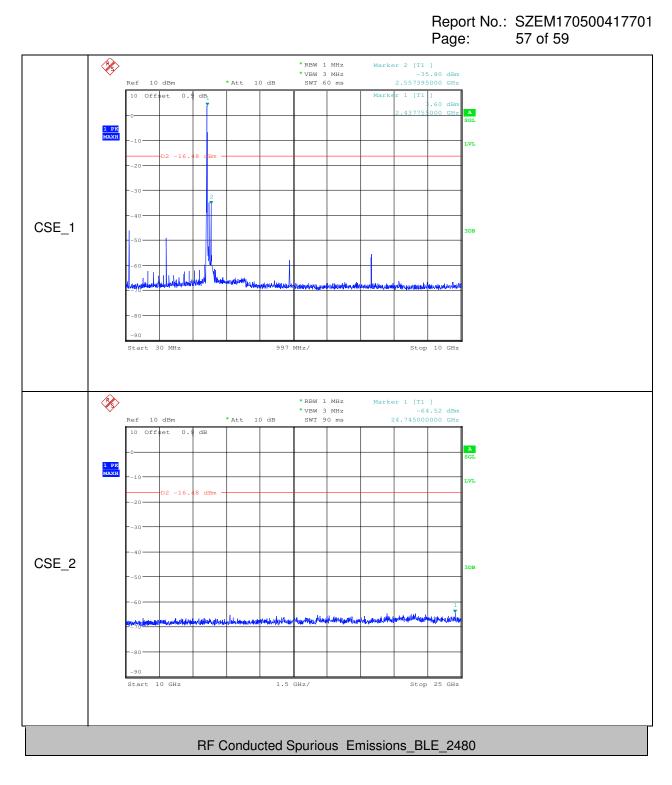






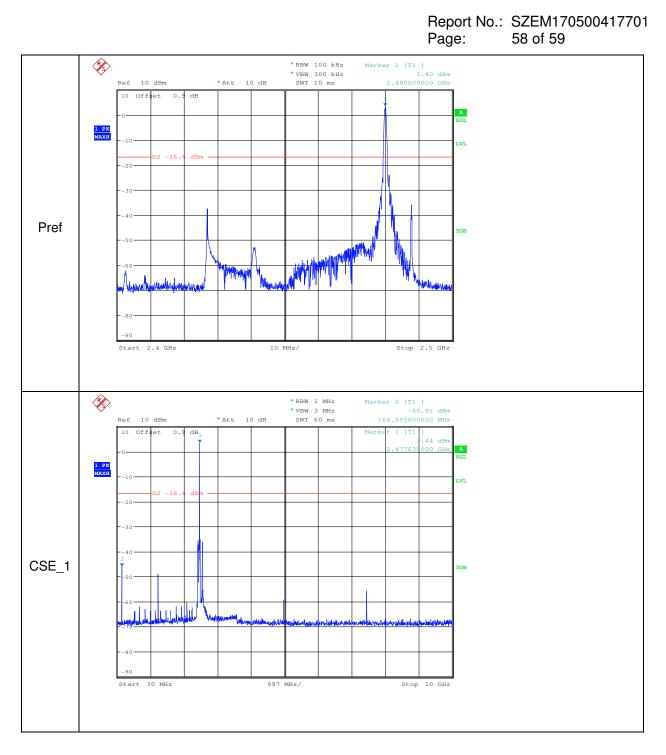
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Report No.: SZEM170500417701 Page: 59 of 59 × Marker 1 [T1 \*RBW 1 MHz ★VBW 3 MHz 64.17 dBm Ref 10 dBm \* Att 10 dB SWT 90 ms 10 Offset 0. dB A 1 PK MAXH LVI. -16 dBm -20-CSE 2 Ī. Start 10 GHz 1.5 GHz/ Stop 25 GHz

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