

**CTC** Laboratories, Inc.

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TEST REPORT					
Report No. ·····:	CTC20210213E06				
FCC ID:	2AYANSSD01				
Applicant:	SHENZHEN SMARTSAFE TECH CO., LTD.				
Address	3F, Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China				
Manufacturer:	SHENZHEN SMARTSAFE TECH CO	., LTD.			
Address:	3F, Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China				
Product Name·····:	SS DIAG				
Trade Mark:	SmartSafe				
Model/Type reference······:	SSD01				
Listed Model(s) ······	/				
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247				
Date of receipt of test sample:	Mar. 06, 2021				
Date of testing	Mar. 08, 2021 to Mar. 21, 2021				
Date of issue:	Mar. 22, 2021				
Result:	PASS				
Compiled by:		T: Jinna			
(Printed name+signature)	Jim Jiang	Jim ) iong			
Supervised by:		Miller Ma			
(Printed name+signature)	Miller Ma	//////////////////////////////////////			
Approved by:					
(Printed name+signature)	Walter Chen	Matter chis			
Testing Laboratory Name:	CTC Laboratories, Inc.				
Address	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China				
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# 1. TEST SUMMARY

## 1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

<u>RSS 247 Issue 2:</u> Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

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

# 1.2. Report Version

Revised No.	Date of issue	Description
01	Mar. 22, 2021	Original



# 1.3. Test Description

FCC Part 15 Subpart C (15.247) / RSS 247 Issue 2					
Test Item	Standard Se	Result	Test		
iest item	FCC	IC	Result	Engineer	
Antenna Requirement	15.203	/	Pass	Rod Luo	
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Rod Luo	
Radiated Band Edge and Spurious Emissions	15.205&15.209& 15.247(d)	RSS 247 5.5	Pass	Rod Luo	
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS 247 5.5	Pass	Rod Luo	
6dB Bandwidth	15.247(a)(2)	RSS 247 5.2 (a)	Pass	Rod Luo	
Conducted Max Output Power	15.247(b)(3)	RSS 247 5.4 (d)	Pass	Rod Luo	
Power Spectral Density	15.247(e)	RSS 247 5.2 (b)	Pass	Rod Luo	
Transmitter Radiated Spurious	15.205&15.209& 15.247(d)	RSS 247 5.5& RSS-Gen 8.9	Pass	Rod Luo	

Note: The measurement uncertainty is not included in the test result.



#### Address of the report laboratory

#### CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

#### Laboratory accreditation

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

#### CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

#### FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. 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 951311, Aug. 26, 2017.

### **1.5. 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 TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties radio equipment characteristics; Part 2" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. 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.

Below is the best measurement capability for CTC Laboratories, Inc.



Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth		(1)

**Note (1):** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

# 1.6. Environmental conditions

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

Temperature:	21°C~27°C
Relative Humidity:	40%~60%
Air Pressure:	101kPa

ΞN

# 2. GENERAL INFORMATION

# 2.1. Client Information

Applicant:	SHENZHEN SMARTSAFE TECH CO., LTD.
Address:	3F, Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China
Manufacturer:	SHENZHEN SMARTSAFE TECH CO., LTD.
Address:	3F, Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China

# 2.2. General Description of EUT

Product Name:	SS DIAG
Trade Mark:	SmartSafe
Model/Type reference:	SSD01
Listed Model(s):	/
Model Difference:	/
Power supply:	9-18Vdc
Adapter Model:	/
Hardware version:	V1.00.000
Software version:	V1.0
Bluetooth 4.2/ BLE	
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	PCB Antenna
Antenna gain:	1.28dBi



# 2.3. Accessory Equipment Information

Equipment Information						
Name	Model	S/N	Manufacturer			
Notebook	E470	/	Lenovo			
Cable Information						
Name	Shielded Type	Ferrite Core	Length			
USB Cable	Unshielded	NO	100cm			
Test Software Information	Test Software Information					
Name	Software version	1	/			
Bluetooth RF Test Tool	V2017.10.20	1	/			



# 2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT BLE, 40 channels are provided to the EUT. Channels 00/19/39 were selected for testing.

**Operation Frequency List:** 

Channel	Frequency (MHz)
00	2402
01	2404
:	÷
18	2438
19	2440
20	2442
:	:
38	2478
39	2480

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

#### Test mode

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.



#### **Measurement Instruments List** 2.5.

Tonscer	Tonscend JS0806-2 Test system						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until		
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021		
2	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 25, 2021		
3	Signal Generator	Agilent	E8257D	MY46521908	Dec. 25, 2021		
4	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 25, 2021		
5	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 25, 2021		
6	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 25, 2021		
7	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 25, 2021		
8	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 25, 2021		
9	Climate Chamber	ESPEC	MT3065	/	Dec. 25, 2021		
10	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 25, 2021		
11	300328 v2.2.2 test system	TONSCEND	v2.6	/	/		

Radiated Emission and Transmitter spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 25, 2021	
2	High pass filter	micro-tranics	HPM50111	142	Dec. 25, 2021	
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 25, 2021	
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 25, 2021	
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 25, 2021	
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021	
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 25, 2021	
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 25, 2021	
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 25, 2021	
10	Antenna Mast	UC	UC3000	N/A	N/A	
11	Turn Table	UC	UC3000	N/A	N/A	
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 25, 2021	
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX 102	DA1580	Dec. 25, 2021	
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 25, 2021	
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 25, 2021	

CTC Laboratories, Inc.





16	RF Connection Cable	Chengdu E-Microwave			Dec. 25, 2021
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 25, 2021
18	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3		Dec. 25, 2021
19	High and low temperature box	ESPEC	MT3065	12114019	Dec. 25, 2021

Conduc	ted Emission				
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 25, 2021
2	LISN	R&S	ENV216	101113	Dec. 25, 2021
3	EMI Test Receiver	R&S	ESCI	100658	Dec. 25, 2021

Note: 1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.



# 3. TEST ITEM AND RESULTS

# 3.1. Conducted Emission

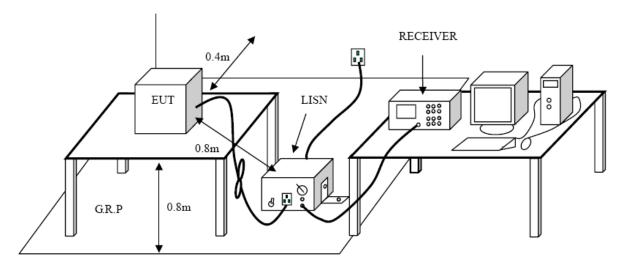
#### <u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.207/ RSS - Gen 8.8

	Limit (dBuV)					
Frequency range (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.

#### Test Configuration



#### Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.

2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.

3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

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

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

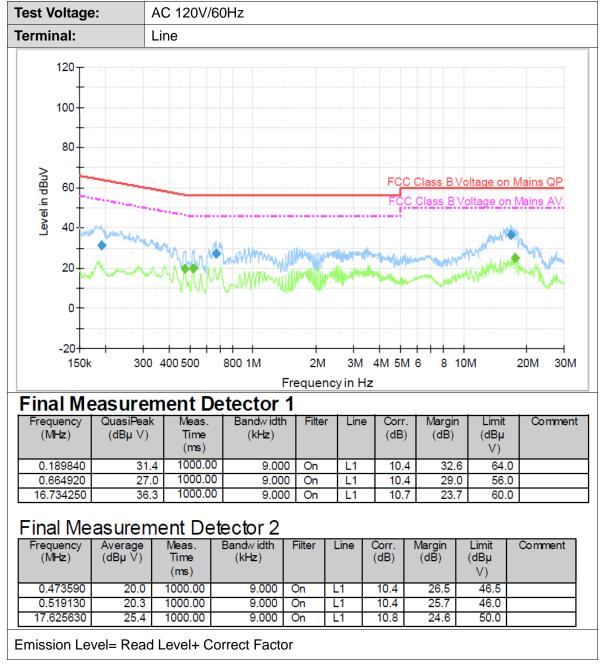
7. During the above scans, the emissions were maximized by cable manipulation.

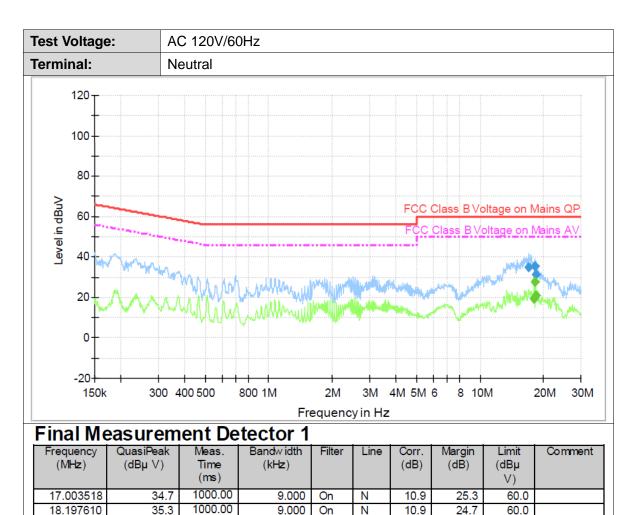


#### Test Mode

Please refer to the clause 2.4.

#### Test Results





Final	Measurer	nent Det	ector 2

31.1

18.343480

1000.00

Frequency (MHz)	Average (dBµ ∀)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ ∀)	Comment
18.052900	19.4	1000.00	9.000	On	Ν	10.9	30.6	50.0	
18.197610	27.5	1000.00	9.000	On	Ν	10.9	22.5	50.0	
18.343480	21.2	1000.00	9.000	On	Ν	10.9	28.8	50.0	

On

Ν

10.9

28.9

60.0

9.000

Emission Level= Read Level+ Correct Factor



# 3.2. Radiated Emission

<u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS - Gen 8.9

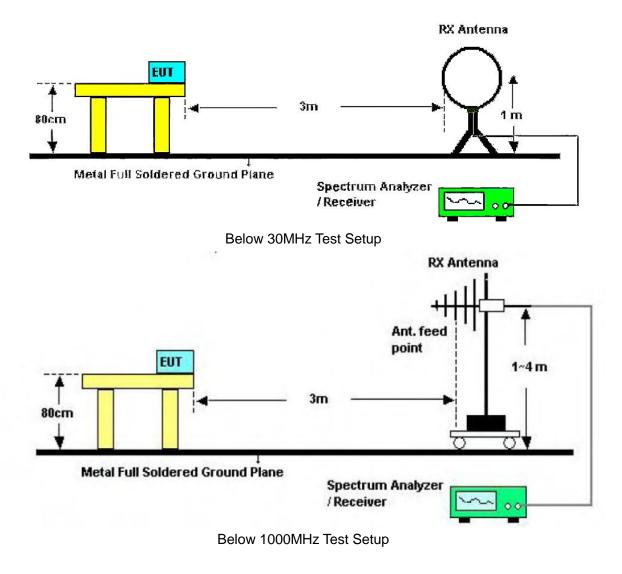
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 CH	54.00	Average
Above 1 GHz	74.00	Peak

#### Note:

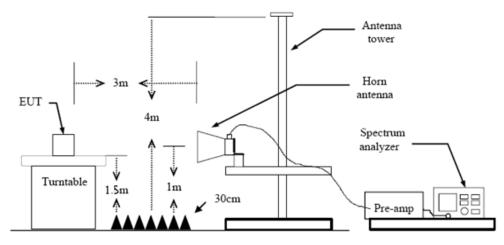
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

#### Test Configuration







Above 1GHz Test Setup

#### **Test Procedure**

1. The EUT was setup and tested according to ANSI C63.10:2013

2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable 3. height antenna tower.

For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna 4. tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

Set to the maximum power setting and enable the EUT transmit continuously. 5.

- 6. Use the following spectrum analyzer settings
- (1) Span shall wide enough to fully capture the emission being measured;
- (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

(3) From 1 GHz to 10<sup>th</sup> harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW=3MHz RMS detector for Average value.

### **Test Mode**

Please refer to the clause 2.4.

#### **Test Result**

#### 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

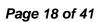


### 30MHz-1GHz

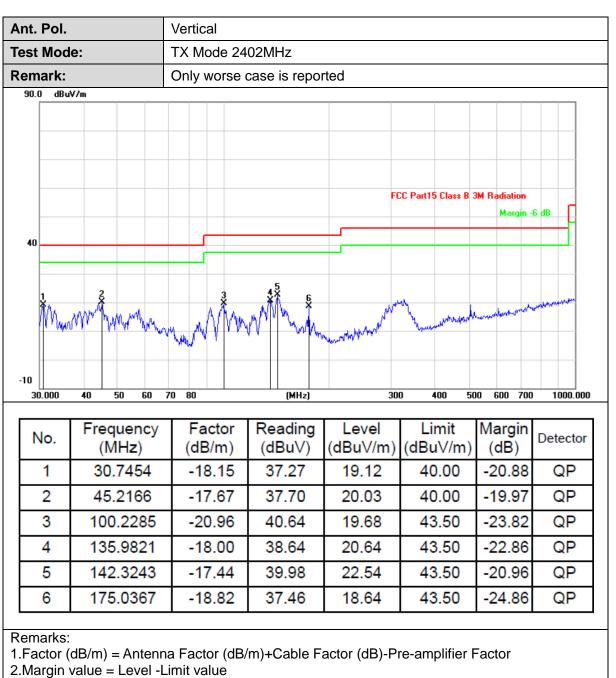
EN

Ant. Pol.		ŀ	Horizontal					
Test Mod	le:	٦	FX Mode 24	402MHz				
Remark:		(	Only worse	case is repo	rted			
90.0 dB	iV/m							
40					F	CC Part15 Class B 3	3M Radiation Margin	-6 dB
~~~~	Murran	m	million Andre		March March	5 A A A A A A A A A A A A A A A A A A A	work whether the	weather
-10 30.000	40 50	60 70			30			
			0 80	(MHz)	30	00 400 50	0 600 700	
	40 50 Frequen (MHz)	су			Level			
30.000	Frequen	су	Factor	(MHz) Reading	Level	00 400 50	00 600 700 Margin	0 1000.000
30.000 No.	Frequen (MHz)	icy 18	Factor (dB/m)	(MHz) Reading (dBuV)	Level (dBuV/m)	00 400 50 Limit (dBuV/m)	00 600 700 Margin (dB)	Detector
30.000 No.	Frequen (MHz) 135.03	18 60	Factor (dB/m) -18.08	(MHz) Reading (dBuV) 42.45	Level (dBuV/m) 24.37	00 400 50 Limit (dBu√/m) 43.50	Margin (dB) -19.13	Detector QP
30.000 No. 1 2	Frequen (MHz) 135.037 143.326	18 60 67	Factor (dB/m) -18.08 -17.36	(MHz) Reading (dBuV) 42.45 43.78	Level (dBuV/m) 24.37 26.42	00 400 50 Limit (dBuV/m) 43.50 43.50	Margin (dB) -19.13 -17.08	Detector QP QP
30.000 No. 1 2 3	Frequen (MHz) 135.037 143.326 175.036	18 60 67 81	Factor (dB/m) -18.08 -17.36 -18.82	(MHz) Reading (dBuV) 42.45 43.78 36.53	Level (dBuV/m) 24.37 26.42 17.71	Limit (dBuV/m) 43.50 43.50 43.50	Margin (dB) -19.13 -17.08 -25.79	Detector QP QP QP

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value









Above	1GHz

):	TX BLE											
		TX BLE Mode 2402MHz No report for the emission which more than 10 dB below the										
	No repor		on which mo	re than 10 c	dB below	the						
/m	11											
			FCC Pa	art15 Class B 3M /	Above-16 Pea	ık						
2			FCC	Part15 Class B 3	M Above-1G A	•						
×												
1												
3500.00 6000.0	0 8500.00	11000.00 13500.	DO 1600D.00	18500.00 210	00.00	26000.00 MH						
Frequence (MHz)	-			Limit (dBuV/m)	Margin (dB)	Detector						
4804.28	4 -2.8	2 41.44	38.62	54.00	-15.38	AVG						
4804.37	6 -2.8	2 55.45	52.63	74.00	-21.37	peak						
	2 × × 3500.00 6000.0 Frequence (MHz) 4804.28	2         2           2         2           3500.00         6000.00         8500.00           Frequency (MHz)         Fact (dB/n           4804.284         -2.8	2       2         2       2         3500.00       6000.00       6500.00       11000.00       13500.00         3500.00       6000.00       6500.00       11000.00       13500.00         Frequency (MHz)       Factor (dB/m)       Reading (dBuV)         4804.284       -2.82       41.44	Image: Constraint of the second sec	Image: Second	Image: Nm         FCC Part15 Class B 3M Above-16 Pea           2         FCC Part15 Class B 3M Above-16 Pea           2         FCC Part15 Class B 3M Above-16 Pea           3         X           3         Second Second Peace           3         Second Second Peace           1         Second Peace     <						

2.Margin value = Level -Limit value

ΕN



<b>\</b> III.	Pol.			Ve	ertical									
est	Mode:	:		(T)	X BLE	Mod	e 2402N	/Hz						
lem	ark:				o repor escribe			ssio	n whi	ch moi	re tha	n 10 (	dB below	the
90.0	) dBu∀/n	n												
										FCC Pa	rt15 Cla:	s B 3M /	Above-1G Pea	ak
			1							FCC	Part15 C	lass B 3	N Above-1G /	47
40			2											
-10	000.000 35		6000.0		8500.00		00.00 13	500.00		00.00 1	18500.00		0.00	26000.00 M
	No.		quen MHz)		Fact (dB/r		Readi (dBu\	~		vel V/m)		nit V/m)	Margin (dB)	Detector
	1	48	04.18	30	-2.8	2	55.1	0	52	.28	74	.00	-21.72	peak
-	2	48	04.31	14	-2.8	2	41.1	0	38	.28	54	.00	-15.72	AVG



	Pol.			Hor	izonta	d								
<b>Fest</b>	Mode	:		ТХ	BLE N	/lod	e 244	0MHz						
Ren	nark:				report scribe			missio	n whi	ch mo	re th	an 10 (	dB below	the
90.	0 dBu¥∕i	n												
										FCC Pa	rt15 Cla	iss B 3M /	Above-1G Pea	k
			_							FCC	Part15	Class B 31	N Above-1G A	v
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-10														
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			0000.00					10000.00			10005.1			
[	No		quenc	-	Facto			ding		vel		imit	Margin	Detector
	No.	()	ÚHz)	_ (	(dB/m	ı)	(dB	luV)	(dBu	IV/m)	(dB	uV/m)	(dB)	Detector
	No.	(I 48		4		1) D	(dB 54	-	(dBu		(dB 7			Detector peak AVG

2.Margin value = Level -Limit value



Ant. Pol.				V	ertica	al								
Test I	Mode:			Т	XBL	E Mod	le 244	10MHz						
Rema	ark:					oort for ribed lii		missic	on whi	ch moi	re tł	nan 10 (	dB belov	v the
90.0	dBu¥∕m	1												
										FCC Pa	rt15 C	lass B 3M /	Above-1G Pe	ak
_										FCC	Part1	5 Class B 3	M Above-1G	AV
		2	×											
40		Ś	*											
_														
-10														
100	0.000 35	00.00	6000	). 00	8500.0	10 110	00.00	13500.0	0 160	00.00 1	18500	.00 210	00.00	26000.00
	No.		ЙНz	)	(dl	actor B/m)	(dE	ading BuV)	(dBu		(dE	.imit BuV/m)		Detector
	1		79.5			2.60		8.98		.38	-	4.00	-22.62	· ·
	2	48	79.8	82	-2	2.60	39	).43	36	.83	5	54.00	-17.17	AVG



		lorizontal								
le:	Т	X BLE Mod	e 2480MHz							
		No report for the emission which more than 10 dB below the prescribed limit.								
V/m										
				FCC Pa	art15 Class B 3M A	Above-16 Pea	ık			
				FCC	Par(15 Class B 3)	N Above-16 A	w			
×										
*										
2520.00	000.00	0500.00 110	00.00 10500.0	0 1000.00	10500.00 0100	20.00	26000.00 MH			
	-	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector			
4959	.916	-2.38	53.50	51.12	74.00	-22.88	peak			
4960	.358	-2.38	39.03	36.65	54.00	-17.35	AVG			
	3500.00 6	V/m	Prescribed lin           V/m           V/m           Image: Second line           Image: Second line <td>Prescribed limit.           V/m           Image: Imag</td> <td>Prescribed limit.           V/m           Image: Second limit.           Image: Second limit.</td> <td>Prescribed limit.           V/m           FCC Part15 Class B 3M /           FCC Part1</td> <td>Prescribed limit.           V/m         FCC Part15 Class B 3M Above-16 Part           FCC Part15 Class B 3M Above-16 Part         FCC Part15 Class B 3M Above-16 Part           FCC Part15 Class B 3M Above-16 Part         FCC Part15 Class B 3M Above-16 Part           State         FCC Part15 Class B 3M Above-16 Part           State</td>	Prescribed limit.           V/m           Image: Imag	Prescribed limit.           V/m           Image: Second limit.           Image: Second limit.	Prescribed limit.           V/m           FCC Part15 Class B 3M /           FCC Part1	Prescribed limit.           V/m         FCC Part15 Class B 3M Above-16 Part           FCC Part15 Class B 3M Above-16 Part         FCC Part15 Class B 3M Above-16 Part           FCC Part15 Class B 3M Above-16 Part         FCC Part15 Class B 3M Above-16 Part           State         FCC Part15 Class B 3M Above-16 Part           State			



Ant. I	Pol.			V										
Test	Mode:			Т	TX BLE Mode 2480MHz									
Rema	ark:				No report for the emission which more than 10 dB below the prescribed limit.									
90.0	dBu¥/m													
										FCC Pa	nt15 Clas	8 3M A	vbove-16 Pea	ık
			2							FCC	Part15 C	ass B 31	4 Above-1G A	w.
40														
-10														
100	0.000 35	00.00	6000.	.00	8500.00	110	00.00	13500.00	) 160	00.00	18500.00	2100	0.00	26000.00 M
	No.		(Hz)	)	(dB		Rea (dB	uV)	(dBu		Lin (dBu	V/m)		Detector
	1		59.8			38	40.			.82		.00	-16.18	AVG
	2	496	60.3	90	-2.	38	53.	99	51	.61	74	.00	-22.39	peak



### 3.3. Band Edge Emissions

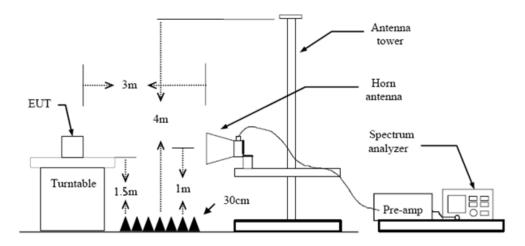
<u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)/ RSS 247 5.5:

Restricted Frequency Band	(dBuV/n	n)(at 3m)
(MHz)	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Conducted Band Edge and Conducted Spurious Emissions limit: The highest point of the operating frequency waveform down 20dB

#### **Test Configuration**



#### Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1MHz, VBW=3MHz PEAK detector for Peak value. RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value. The conducted spurious emissions set as follow:
- 1. Set RBW = 100 kHz.
- 2. Set the video bandwidth (VBW)  $\geq$  3 RBW.
- 3. Detector = Peak.
- 4. Trace mode = Max hold.
- 5. Sweep = Auto couple.

#### Test Mode

Please refer to the clause 2.4.

#### Test Results



#### (1) Radiation Test

	Pol.			Horizon	tal						
est	Mode:	:		BLE Mo	de 24	402MHz					
100.0 Г	dBuV/	m									
											$\Lambda$
								FCC P	art15 Class B 3	M Above-16 Pea	ak /
							2				$  \rangle$
50		1					л Х	FCC	CPart15 Class	B 3M Above-1G /	$\gamma +$
50		z					4			6	
		*					<u></u>				
0.0	08.000 2	318.00	2328.00	2338.00	234	8.00 2358.0	0 236	8.00	2378.00	2388.00	2408.00 M
L - K	08.000 2	318.00	2328.00	2338.00	234	8.00 2358.0	0 236	8.00	2378.00 2	2388.00	2408.00 M
1 - K		Free	quency			8.00 2358.0 Reading		8.00 vel	2378.00 2		
1 - K	No.	Fred (N	quency //Hz)	Fac (dB/	tor m)	Reading (dBuV)	Le (dBu	vel iV/m)	Limit (dBuV/r	Margin n) (dB)	Detector
L - K		Fred (N	quency	Fac	tor m)	Reading	Le (dBu	vel	Limit	Margin n) (dB)	Detector
1 - K	No.	Free (N 232	quency //Hz)	Fac (dB/	:tor (m) 79	Reading (dBuV)	Le (dBu 53	vel iV/m)	Limit (dBuV/r	Margin (dB) -20.42	Detector peak
1	No. 1	Free (N 232 232	quency //Hz) 21.800	Fac (dB/ 30.	tor (m) 79 79	Reading (dBuV) 22.79	Le (dBu 53 42	vel IV/m) .58	Limit (dBuV/r 74.00	Margin (dB) -20.42 -11.97	Detector peak AVG
1	No. 1 2	Free (N 232 232 232	quency //Hz) 21.800 21.800	Fac (dB/ 30. 30.	tor (m) 79 79 97	Reading (dBuV) 22.79 11.24	Le (dBu 53 42 55	vel IV/m) .58 .03	Limit (dBuV/r 74.00 54.00	Margin (dB) -20.42 -11.97 -18.01	Detector peak AVG
1 - k	No. 1 2 3	Free (N 232 232 236 236	quency /Hz) 21.800 21.800 62.100	Fac (dB/ 30. 30. 30.	tor (m) 79 79 97 97	Reading (dBuV) 22.79 11.24 25.02	Le (dBu 53 42 55 44	vel IV/m) .58 .03 .99	Limit (dBuV/r 74.00 54.00 74.00	Margin (dB) -20.42 -11.97 -18.01 -9.05	Detector peak AVG peak AVG
1 - k	No. 1 2 3 4	Free (N 232 232 232 236 236 236	quency MHz) 21.800 21.800 62.100 62.100	Fac (dB/ 30. 30. 30. 30.	tor (m) 79 79 97 97 10	Reading (dBuV) 22.79 11.24 25.02 13.98	Le (dBu 53 42 55 44 52	vel IV/m) .58 .03 .99 .95	Limit (dBuV/r 74.00 54.00 74.00 54.00	Margin (dB) -20.42 -11.97 -18.01 -9.05 -21.74	Detector peak AVG peak AVG peak

2.Margin value = Level -Limit value

ΕN



Ant. Pol.		Ve	rtical					
Fest Mode	:	BL	E Mode 2	402MHz				
100.0 dBuV/	'n							
					FCC Pa	nt15 Class B 3M A	Above-1G Pea	k A
					FCC	Part15 Class B 3	Above-16 A	
50							×	+
							2	
0.0								
2308.000 2	2318.00 2328	.00 23	338.00 234	18.00 2358.00	2368.00	2378.00 2388	3.00	2408.00 MH
No.	Frequer (MHz)	)	Factor (dB/m)	Reading (dBuV)		Limit (dBuV/m)		Detector
1	2390.0	00	31.10	21.01	52.11	74.00	-21.89	peak
2	2390.0	00	31.10	9.61	40.71	54.00	-13.29	AVG



2 2483.500 31.50 20.04 51.54 54.00 -2.46 AV	Ant.	Pol.		F	lorizo	ntal									
$\frac{1}{10000000000000000000000000000000000$	<b>Fest</b>	Mode:		E	BLE M	lode 2	480 M	Hz							
No.       Frequency       Factor       Reading       Level       Limit       Margin       Detection         1       2483.500       31.50       26.70       58.20       74.00       -15.80       peace         2       2483.500       31.50       20.04       51.54       54.00       -2.46       AV	100.0	dBu¥/n	1												-
50       7       7       7         0.0       2474.000 2484.00 2484.00 2504.00 2514.00 2524.00 2534.00 254.00 2554.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574.00 2574		Λ								FCC Pa	art15 Cla	\$\$ B 3M /	Above-16 Pea	k	
50       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3			1							FCC	D-0151	Cl D 2	U. 4 hours 10 /	W	
2474.000         2494.00         2494.00         2504.00         2514.00         2524.00         2534.00         2544.00         2554.00         2574.00           No.         Frequency (MHz)         Factor (dB/m)         Reading (dBuV)         Level (dBuV/m)         Limit (dBuV/m)         Margin (dB)         Detector           1         2483.500         31.50         26.70         58.20         74.00         -15.80         peatector           2         2483.500         31.50         20.04         51.54         54.00         -2.46         AV	50	Ţ	*							FLL	Partio	LIASS B 3	M ADOVE-IG A		
2474.000         2494.00         2494.00         2504.00         2514.00         2524.00         2534.00         2544.00         2554.00         2574.00           No.         Frequency (MHz)         Factor (dB/m)         Reading (dBuV)         Level (dBuV/m)         Limit (dBuV/m)         Margin (dB)         Detector           1         2483.500         31.50         26.70         58.20         74.00         -15.80         peatector           2         2483.500         31.50         20.04         51.54         54.00         -2.46         AV															
2474.000         2494.00         2494.00         2504.00         2514.00         2524.00         2534.00         2544.00         2554.00         2574.00           No.         Frequency (MHz)         Factor (dB/m)         Reading (dBuV)         Level (dBuV/m)         Limit (dBuV/m)         Margin (dB)         Detector           1         2483.500         31.50         26.70         58.20         74.00         -15.80         peatector           2         2483.500         31.50         20.04         51.54         54.00         -2.46         AV															
No.         Frequency (MHz)         Factor (dB/m)         Reading (dBuV)         Level (dBuV/m)         Limit (dBuV/m)         Margin (dB)         Detec           1         2483.500         31.50         26.70         58.20         74.00         -15.80         pea           2         2483.500         31.50         20.04         51.54         54.00         -2.46         AV	L - K														
No.         (MHz)         (dB/m)         (dBuV)         (dBuV/m)         (dBuV/m)         (dB)         Detection           1         2483.500         31.50         26.70         58.20         74.00         -15.80         pea           2         2483.500         31.50         20.04         51.54         54.00         -2.46         AV	Г		Freque	encv	Fa	ctor	Rea	dina	Lev	/el	Lii	mit	Margin		Т
2 2483.500 31.50 20.04 51.54 54.00 -2.46 AV		NO.	(MH	z)			(dB	uV)						Detector	
temarks:		-			L		l							peak	
		2	2483.	500	31	.50	20.	04	51.	54	54	.00	-2.46	AVG	
.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor			8/m) = An	itenna	Facto	or (dB/	m)+Ca	able F	actor	(dB)-F	Pre-an	nplifie	r Factor		



Ant.	Pol.			Ve	rtical											
est	Mode:			BL	E Mo	de 24	480 N	ЛНz								
100.0	) dBu∀/r	n														
	Λ															
	$-\Lambda$										T Dad	15 Claw	0.044	Above-16 Pea		
													10.007	40046-10166	×	
		i l														
		2 X									FCC P	art15 Cl	ase B 3	N Above-1G /	w	
50		1														
	J	<u> </u>						~								
0.0																
L	74.000 24	484.00	2494.0	0 2	504.00	251	4.00	2524.	0 2	2534.00	25	544.OD	2554	4.00	2574.00	MH:
	No.		quenc MHz)	y	Fact (dB/r			ading 3uV)		_eve BuV/		Lin		Margin (dB)	Detector	
	1	24	83.50	0	31.	50	16	6.10	4	7.60	)	54.	00	-6.40	AVG	
	2	24	83.50	0	31.	5 <b>0</b>	24	4.33	Ę	5.83	3	74.	00	-18.17	peak	1
																-



#### (2) Conducted Band Edge Test

2519.74

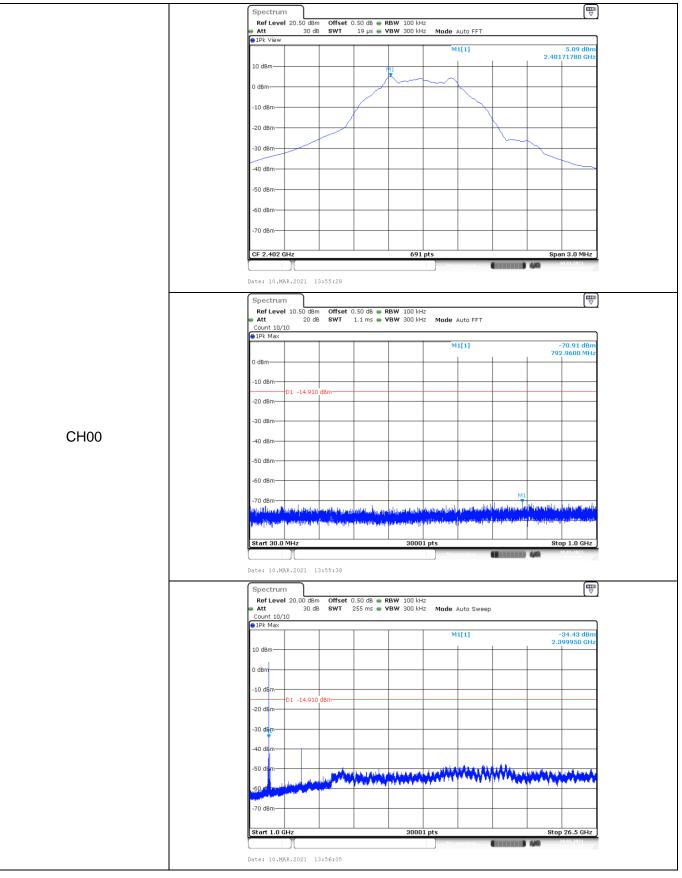
EN

(2) Conducted Band Et	<u> </u>		_
	Spectrum           Ref Level 20.00 dBm         Offset 0.50 dB • Ri           Att         30 dB         SWT         113.8 µs         V		
	Count 237/300 IPk View      10 dBm      -10 dBm      -20 dBm	M1[1] 5.20 2.401730 M2[1] -42.82 2.400000	GHz deBm
CH00	-30 dBm	Ma Ma Market Mar	
	Start 2.3 GHz           Marker           Type         Ref         Trc         X-value           M1         1         2.40173 GHz         1           M2         1         2.40173 GHz         1           M3         1         2.39 GHz         1           M4         1         2.361783 GHz         1	691 pts         Stop 2.405           K-value         Function         Function Result           5.20 dBm	GHZ
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2400.00	-42.82		
2390.00	-61.70	-14.80	Pass
2361.78	-44.22		
CH39	-70 dBm Start 2.47 GHz Marker		I GHZ GHZ
CH39 Mark frequency(MHz)	Ref Level 20.00 dBm       Offset 0.50 dB = RB         Att       30 dB       SWT 94.8 µs = VB         Count 284/300       IPk View         I0 dBm       H1       I         -10 dBm       H1       I         -20 dBm       H2       M3         -30 dBm       I       I         -30 dBm       I       I         -70 dBm       I       I         -70 dBm       I       I         INTER       I       I	W 300 kHz         Mode Auto FFT	dBm GHz dBm GHz
	Ref Level 20.00 dBm       Offset 0.50 dB eRB         Att       30 dB       SWT 94.8 µs         0 unt 284/300       1Pk View         10 dBm       0         -10 dBm       0         -20 dBm       0         -30 dBm       0         -30 dBm       0         -30 dBm       0         -70 dBm       0         -70 dBm       0         -70 dBm       0         Marker       1         Type       Ref         Type       Ref         Mai       1         2.5 GHz       Mai         Mai       1<	W 300 kHz         Mode Auto FFT           M1[1]         5.31           2.479670           M2[1]         -59.19           2.483500           9         2.483500           691 pts         Stop 2.55           C-value         Function Result           -59.19 dBm	dBm GHz GHz GHz GHz

-45.61

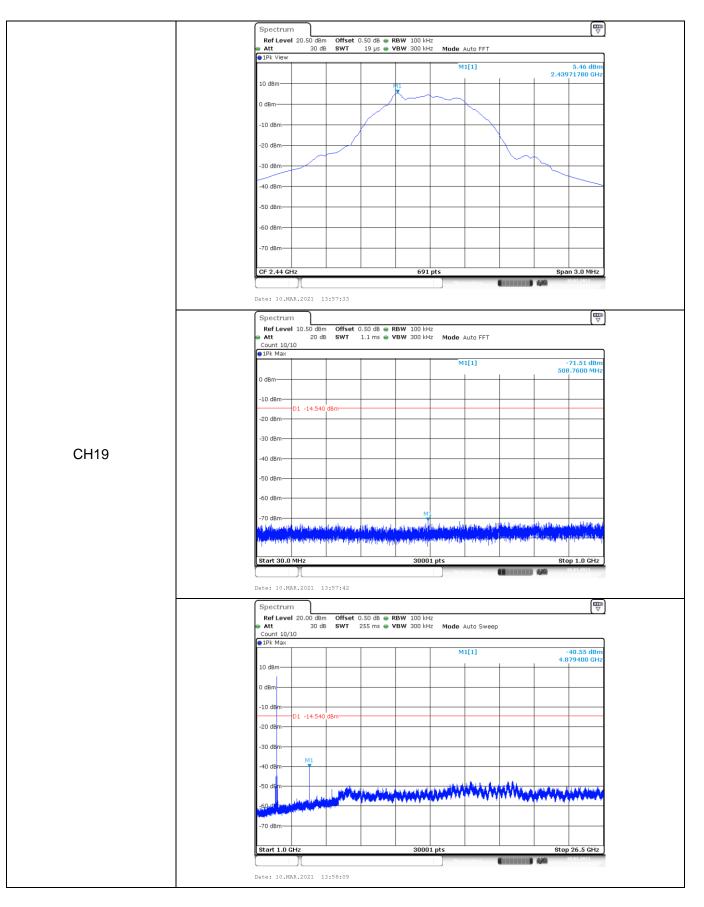


#### (3) Conducted Spurious Emissions Test

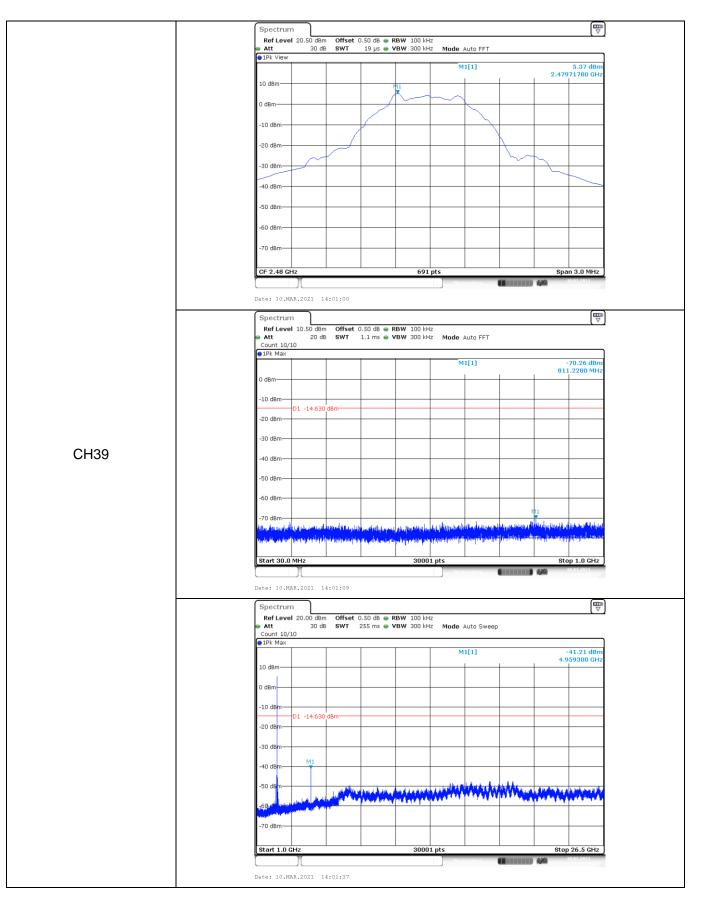


CTC Laboratories, Inc. 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China Tel.: (86)755-27521059 下a:: (86)755-27521011 Http://www.sz-ctc.org.cn For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : <u>vz.cnca.cn</u>











## 3.4. Bandwidth

<u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2)/ RSS-247 5.2 a:

Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

#### Test Configuration



#### Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW)  $\ge$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

#### Test Mode

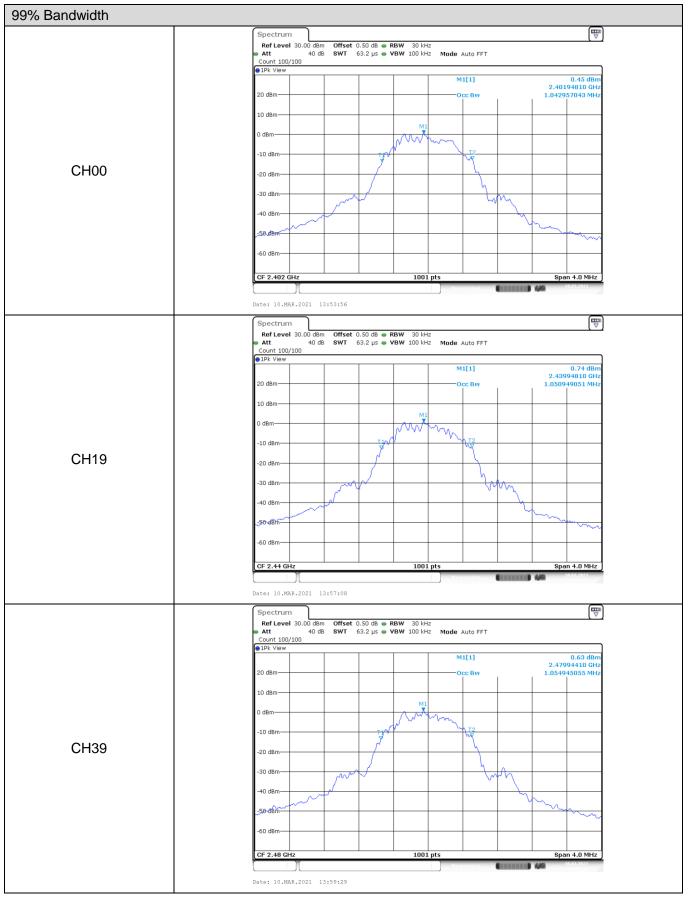
Please refer to the clause 2.4.

#### Test Results

Туре	Channel	99% Bandwidth (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
	00	1.043	0.728		
BT-BLE	19	1.051	0.716	≧500	Pass
	39	1.055	0.708		



#### Test plot as follows:





	Spectrum
	Ref Level         30.00 dBm         Offset         0.50 dB         RBW         100 kHz
	Count 100/100  IPk View
	20 dBm 240161200 GHz
	10 dBm M2 M2
	0 dBm 01 -0.848 dBm
	-10 dBm
	-20 dBm
CH00	-30 dBm-
	-40.dBm
	-50 dBm
	-60 dBm-
	CF 2.402 GHz 1001 pts Span 4.0 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.401612 GHz         -0.93 dBm         -0.93 dBm         -0.93 dBm
	M2         1         2.401716 GHz         5.15 dBm           D3         M1         1         728.0 kHz         0.01 dB
	Date: 10.MAR.2021 13:53:43
	Spectrum 🕎
	Ref Level         30.00 dBm         Offset         0.50 dB         ■ RBW         100 kHz           ■ Att         40 dB         SWT         18.9 μs         ■ VBW         300 kHz         Mode         Auto FFT
	Count 100/100  IPk View
	20 dBm M1[1]0.59 dBm
	10.4Pm 10.4Pm 2.43971600 GHz
	0 d8m 01 -0.584 d8m
	-10 dBm
	-20 dBm
CH19	-30 dBm
00	-10. d8m
	-50 dBm
	-60 dBm
	CF 2.44 GHz 1001 pts Span 4.0 MHz
	Marker Type Ref   Trc   X-value   Y-value   Function   Function Result
	M1         1         2.439616 GHz         -0.59 dBm           M2         1         2.439716 GHz         5.42 dBm
	D3 M1 1 716.0 kHz -0.05 dB
	Date: 10.MAR.2021 13:56:55
	Spectrum 🕎
	Ref Level 30.00 dBm Offset 0.50 dB  RBW 100 kHz
	Att 40 dB SWT 18.9 µs → VBW 300 kHz Mode Auto FFT     Count 100/100
	1Pk View     M1[1] -0.78 dBm
	20 dBm 2.47962000 GHz 2.47962000 GHz 5.28 dBm
	10 dBm M2 2.47971600 GHz
	0.d8m 01 -0.721 d8m
	-10 dBm
	-20 dBm
CH39	-30 dBm
	-90 dBm
	-50 dBm
	-60 dBm
	CF 2.48 GHz 1001 pts Span 4.0 MHz
	Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           MM         1         0.4766 CU         -0.70 dBe         Function         Function Result
	M1         1         2.47962 GHz         -0.78 dBm           M2         1         2.479716 GHz         5.28 dBm           D3         M1         1         708.0 kHz         -0.00 dB
	Date: 10.MAR.2021 13:59:16

CTC Laboratories, Inc.



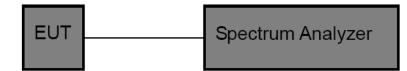
## 3.5. Peak Output Power

#### <u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3)/ RSS-247 5.4 d:

Section	Test Item	Limit	Frequency Range(MHz)
CFR 47 FCC 15.247(b)(3)	Maximum conducted output power	1 Watt or 30dBm	2400~2483.5
ISED RSS-247 5.4 d	EIRP	4 Watt or 36dBm	2400~2483.5

#### **Test Configuration**



#### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

2. Spectrum Setting:

Peak Detector: RBW≥DTS Bandwidth, VBW≥3\*RBW.

Sweep time=Auto.

Detector= Peak.

Trace mode= Maxhold.

Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

Туре	Channel	Output power (dBm)	Limit (dBm)	Result
	00	5.31		
BT-BLE	19	5.55	≤30.00	Pass
	39	5.41		



#### Test plot as follows:

I	
	Spectrum         (∇)           Ref Level 30.00 dBm         Offset 0.50 dB ● RBW 1 MHz
	Att 40 dB SWT 1.9 µs
	9 1Pk View
	M1[1] 5.31 dBm 2.401758530 GHz
CH00	20 dBm
	10 dBm
	0 dBm
	-10 dBm
	-20 dBm
	-30 dBm
	-40 dBm-
	-50 dBm
	-60 dBm
	CF 2.402 GHz 8001 pts Span 4.0 MHz
	Measuring (REPERT) (A) 10.052021
	Date: 10.MAR.2021 13:54:05
	Spectrum 🕎
	Ref Level         30.00 dBm         Offset         0.50 dB         RBW         1 MHz           ● Att         40 dB         SWT         1.9 µs         ● VBW         3 MHz         Mode         Auto FFT
	Count 100/100  1Pk View
	M1[1] 5.55 dBm 2.439726030 GHz
	20 dBm 22.439 /26030 GH2
	10 dBm-
	The second secon
	0 dBm
	-10 dBm
CH19	-20 dBp
	30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	CF 2.44 GHz         8001 pts         Span 4.0 MHz
	Cir 2:++ Cir 2         OUD2 pr/s         applit +: 0 min 2           Me asuring         10.32521
	Date: 10.MAR.2021 13:57:16
	Spectrum
	Spectrum         (\vec{\mathbf{\pi}}{\not\)           Ref Level 30.00 dBm         Offset 0.50 dB ● RBW 1 MHz
	Ref Level         30.00 dBm         Offset         0.50 dB         RBW         1 MHz           ➡ Att         40 dB         SWT         1.9 µs         ➡ VBW 3 MHz         Mode         Auto FFT
	RefLevel         30.00 dBm         Offset         0.50 dB         ■ RBW         1 MHz           ● Att         40 dB         SWT         1.9 μs         ● VBW 3 MHz         Mode Auto FFT           Count 100/100         ●         ●         PBW         3 MHz         Mode Auto FFT
	Ref Level         30.00 dBm         Offset         0.50 dB         ■ RBW         1 MHz           ● Att         40 dB         SWT         1.9 µs         ● VBW 3 MHz         Mode         Auto FFT           Count 100/100         ●         ●         Mode         M1[1]         5.41 dBm           ● IPk View         M1[1]         5.41 dBm         2.479740030 GHz
	Ref Level 30.00 dBm         Offset         0.50 dB         ■ RBW         1 MHz                 40 dB             SWT             1.9 μs             ● VBW 3 MHz             Mode Auto FFT               Count 100/100              • DFk View               M1[1]             5.41 dBm
	Ref Level         30.00 dBm         Offset         0.50 dB         RBW 1 MHz           Att         40 dB         SWT         1.9 µs         VBW 3 MHz         Mode Auto FFT           Count 100/100         0         0         0         0         0         0           @ 1Pk View         M1[1]         5.41 dBm         2.479740030 GHz         0         0
	Ref Level 30.00 dBm         Offset 0.50 dB         RBW 1 MHz           Att         40 dB         SWT         1.9 µs         • VBW 3 MHz         Mode Auto FFT           Count 100/100         ● IPk View         M1[1]         5.41 dBm           20 dBm         0 dBm         M1[1]         5.41 dBm           10 dBm         M1         M1         M1
	Ref Level 30.00 dBm         Offset 0.50 dB         RBW 1 MHz           • Att         40 dB         SWT         1.9 µs         • VBW 3 MHz           • Out 100/100         • Pk View         M1[1]         5.41 dBm           • 20 dBm         0 dBm         M1         0 dBm
	Ref Level 30.00 dBm         Offset 0.50 dB         RBW 1 MHz           Att         40 dB         SWT         1.9 µs         • VBW 3 MHz         Mode Auto FFT           Count 100/100         ● IPk View         M1[1]         5.41 dBm           20 dBm         0 dBm         M1[1]         5.41 dBm           10 dBm         M1         M1         M1
CH39	Ref Level 30.00 dBm         Offset 0.50 dB         RBW 1 MHz           • Att         40 dB         SWT         1.9 µs         • VBW 3 MHz         Mode Auto FFT           Count 100/100         • Pk View         M1[1]         5.41 dBm           20 dBm         0 dBm         0 dBm         0 dBm
СН39	Ref Level 30.00 dm       Offset 0.50 db       • RBW 1 MHz         • Att       40 db       SWT       1.9 µs       • VBW 3 MHz       Mode Auto FFT         Count 100/100       • PF: View
СН39	Ref Level 30.00 dm       Offset 0.50 dk          R BW 1 MHz             Att 40 dB       SWT 1.9 µs       VBW 3 MHz       Mode Auto FFT          Count 100/100           DIPL View           M1[1]           S.41 dBm          20 dBm           M1[1]           S.41 dBm           2.479740030 GHz          10 dBm           M1           M1           Auto FFT          -10 dBm           M1           Auto FFT           Auto FFT
CH39	Ref Level 30.00 dm       Offset 0.50 db       • RBW 1 MHz         • Att       40 db       SWT       1.9 µs       • VBW 3 MHz       Mode Auto FFT         Count 100/100       • IPi View
CH39	Ref Level 30.00 dm         Offset 0.50 dB         RBW 1 MHz           • Att         40 dB         SWT         1.9 µs         • VBW 3 MHz         Mode Auto FFT           Count 100/100         • PF: View           2.479740030 GHz           20 dBm             4.10 B           10 dBm                0 dBm                30 dBm                 -10 dBm                  -20 dBm
СНЗ9	Ref Level 30.00 dm       Offset 0.50 db       P RW 1 MHz         • Att       40 db       SWT       1.9 µs       • VBW 3 MHz       Mode Auto FFT         Count 100/100       • IPk View       M1[1]       5.41 dBm         20 dBm       0 dBm       91       2.479740030 GHz         10 dBm       91       91       91       91         0 dBm       91       91       91       91       91         10 dBm       91       91       91       91       91       91         10 dBm       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91       91
CH39	Ref Level 30.00 dm       Offset 0.50 db       • RBW 1 MHz         • Att       40 db       SWT       1.9 µs       • VBW 3 MHz       Mode Auto FFT         Count 100/100       • PF: View       M1[1]       5.41 dBm         20 dBm       M1[1]       5.41 dBm         0 dBm       M1       0       0       0         -10 dBm       -10 dBm       -10 dBm       -10 dBm       -10 dBm         -20 dBm       -20 dBm       -20 dBm       -20 dBm       -20 dBm       -20 dBm
CH39	Ref Level 30.00 dm       Offset 0.50 dB       RBW 1 MHz         • Att       40 dB       SWT       1.9 µs       • VBW 3 MHz       Mode Auto FFT         Count 100/100       • PF: View       M1[1]       5.41 dBm         20 dBm       0       m1       2.479740030 GHz         10 dBm       m1       0       dBm       0         0 dBm       m1       0       0       dBm       0         -10 dBm       -0       -0       0       -0       0         -287 dBm       -0       -0       -0       -0       -0         -50 dBm       -0       -0       -0       -0       -0         -50 dBm       -0       -0       -0       -0       -0
CH39	Ref Level 30.00 dbm         Offset 0.50 db         RBW 1 MHz           40 db         SWT         1.9 µs         VBW 3 MHz         Mode Auto FFT           Count 100/100         IPk View         M1[1]         5.41 dbm           20 dbm         0         Image: Superstand state



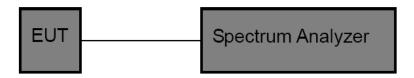
# 3.6. Power Spectral Density

#### <u>Limit</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e)/ RSS-247 5.2 b:

Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

#### Test Configuration



#### Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.

3. Spectrum Setting:

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to: 10 kHz Detector: peak

Sweep time: auto

Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

Туре	Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
	00	-10.33		
BT-BLE	19	-10.48	≤8.00	Pass
	39	-9.89		



#### Test plot as follows:

	Spectrum V
	Ref Level         20.50 dBm         Offset         0.50 dB         RBW         3 kHz           ■ Att         30 dB         SWT         631.9 µs         ● VBW         10 kHz         Mode         Auto FFT
	Count 100/100  Pt View
	M1[1] -10.33 dBm 2.4019426090 GHz
	10 dBm
	0 dBm
	M1
	-10 dBm
	-20 dBm
CH00	
01100	-30 dBm + 0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /
	-4946//
	A CONTRACTOR CONT
	-60 dBm
	-70 dBm
	CF 2.402 GHz 30000 pts Span 1.456 MHz
	Date: 10.MAR.2021 13:54:13
	Spectrum 🕎
	RefLevel 20.50 dBm Offset 0.50 dB ● RBW 3 kHz ● Att 30 dB SWT 632 µs ● VBW 10 kHz Mode Auto FFT
	Count 100/100
	M1[1] -10.48 dBm
	2.4399783530 GHz
	0 dBm
	-10 dBm
01110	-20 dBm
CH19	-30 dBm 74 04 1 1 1
	- plant / Y M M
	-50 dBm
	-60 dBm-
	70.40m
	-70 dBm
	CF 2.44 GHz 30000 pts Span 1.432 MHz
	Measurine (1043-2021
	Date: 10.MAR.2021 13:57:25
	Spectrum 🕎
	RefLevel 20.50 dBm Offset 0.50 dB  RBW 3 kHz
	<ul> <li>Att 30 dB SWT 632 μs</li> <li>VBW 10 kHz</li> <li>Mode Auto FFT</li> <li>Count 100/100</li> </ul>
	IPk View
	M1[1] -9.89 dBm 2.4799285160 GHz
	10 dBm
	0 dBm
	-10 dbm
	-10 dBm-
CH39	
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.48 GHz 30000 pts Span 1.416 MHz
	Date: 10.MAR.2021 13:59:46



## 3.7. Antenna Requirement

#### **Requirement**

#### FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of 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.

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### Test Result

Note: The test result is PASS, because the directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.