

CTC Laboratories, Inc.

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TEST REPORT				
Report No. ·····:	CTC20221783E02			
FCC ID:	WNA-HP46E-R			
Applicant:	Shenzhen Skyworth Digital Techr	nology Co.,LTD		
Address:	14/F,Block A,Skyworth Building,Gao District,Shenzhen,China	oxin Ave.1.S.,Nanshan		
Manufacturer:	Shenzhen Skyworth Digital Techr	nology Co.,LTD		
Address	14/F,Block A,Skyworth Building,Gao District,Shenzhen,China	oxin Ave.1.S.,Nanshan		
Product Name·····:	4K UHD Streaming TV Box			
Trade Mark······:	STRONG, SKYWORTH, MECOOL, 1	HOMSON		
Model/Type reference······:	Leap-S3			
Listed Model(s) ······	LEAP-S3, HP46E, HP4618, KM7 PL	JS, THA 200, THA200		
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	Oct. 11, 2022			
Date of testing	Oct. 11, 2022 ~ Oct. 28, 2022			
Date of issue:	Nov. 30, 2022			
Result:	PASS			
Compiled by: (Printed name+signature)	Lucy Lan	Incry Iom		
Supervised by: (Printed name+signature)	Eric Zhang	Incry Iam Zic zhang Jemas		
Approved by:		1 anas		
(Printed name+signature)	Totti Zhao	10-		
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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not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CTC. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CTC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit. The test report merely correspond to the test sample.



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1.1. Test Standards

The tests were performed according to following standards:

<u>FCC Rules Part 15.247</u>: 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. <u>ANSI C63.10-2013</u>: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Nov. 30, 2022	Original



FN

1.3. Test Description

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

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





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:

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 r 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 inour 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 in the measurement 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	3.08 dB	(1)
Radiated Emissions 30~1000MHz	4.51 dB	(1)
Radiated Emissions 1~18GHz	5.84 dB	(1)
Radiated Emissions 18~40GHz	6.12 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



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen Skyworth Digital Technology Co.,LTD	
Address:	14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China	
Manufacturer:	Shenzhen Skyworth Digital Technology Co.,LTD	
Address:	14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China	

2.2. General Description of EUT

Product Name:	4K UHD Streaming TV Box
Trade Mark:	STRONG, SKYWORTH, MECOOL, THOMSON
Model/Type reference:	Leap-S3
Listed Model(s):	LEAP-S3, HP46E, HP4618, KM7 PLUS, THA 200, THA200
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit, Different is trade mark and model number.
Power supply:	DC12V 1A from AC/DC Adapter
Adapter model 1:	RJ-SKY120100U60S ^{Note1} Input: 100-240V~ 50/60Hz 0.5A Output: 12Vdc/1A
Adapter model 2:	YS-SKY120100U00P ^{Note2} Input: 100-240V~ 50/60Hz 05A Output: 12Vdc/1A
Hardware version:	54024
Software version:	P2.0.3_20220929
BT 5.0/ BLE	
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Data rate:	1Mbps
Antenna type:	Onboard Antenna
Antenna gain:	1.2dBi
Matai	

Note:

1. RJ-SKY120100AXXS,(A = E or B, stands for different plug, E means for Europe plug, B means for UK plug, M or U means for US plug.XX = 00-99. stands for customer code)

2. YS-SKY120100N0XP (N = E, B, 1character indicate difference plug type: E denote EU plug, B denote UK plug, X = 0.9, 1 digit, only for marketing purpose, no impact on safety)





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2.3. Accessory Equipment information

Equipment Information						
Name	Model	S/N	Manufacturer			
Displayer	EW3270-T	EW3270U	BenQ			
Notebook	ThinkBook 14G3 ACL		Lenovo			
Cable Information	Cable Information					
Name Shielded Type Ferrite Core Length						
Lan Cable	Without	Without	1.5M			
HDMI	Without	Without	1.5M			
Test Software Information						
Name	/	/	/			
adb.exe	/	/	/			



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.



2.5. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	KEYSIGHT	N9020A	100231	Dec. 23, 2022
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2022
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 23, 2022
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 23, 2022
5	Power Sensor	Agilent	U2021XA	MY5365004	Mar. 15, 2022
6	Power Sensor	Agilent	U2021XA	MY5365006	Mar. 15, 2022
7	High and low temperature box	ESPEC	MT3035	N/A	Mar. 24, 2022
8	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	102414	Dec. 23, 2022
9	300328 v2.2.2 test system	TONSCEND	v2.6	/	/

Radiated emission(3m chamber 2)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-1013	Jan. 12, 2023
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 23, 2022
3	Loop Antenna	LAPLAC	RF300	9138	Dec. 23, 2022
4	Spectrum Analyzer	R&S	FSU26	100105	Dec. 23, 2022
5	Spectrum Analyzer	R&S	FSV40-N	101331	Mar. 15, 2023
6	Pre-Amplifier	SONOMA	310	186194	Dec. 23, 2022
7	Low Noise Pre-Amplifier	EMCI	EMC051835	980075	Dec. 23, 2022
8	Test Receiver	R&S	ESCI7	100967	Dec. 23, 2022
9	3m chamber 2	Frankonia	EE025	/	Oct. 23, 2024

Radiate	d emission(3m chamber 3)					
Item	Test Equipment	Manufacturer Model No.		Serial No.	Calibrated Until	
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-759	Mar. 30, 2023	
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 23, 2022	
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 23, 2022	
4	Broadband Premplifier	SCHWARZBECK	BBV9743B	259	Dec. 23, 2022	
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 23, 2022	
6	3m chamber 3	YIHENG	EE106	/	Sep. 09, 2023	

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Condu	Conducted Emission										
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until						
1	LISN	R&S	ENV216	101112	Dec. 23, 2022						
2	LISN	R&S	ENV216	101113	Dec. 23, 2022						
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 23, 2022						

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

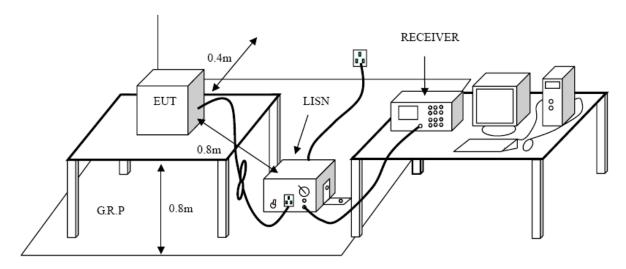
<u>Limit</u>

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

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

* Decreases with the logarithm of the frequency.

Test Configuration



Test Procedure

1. The 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.

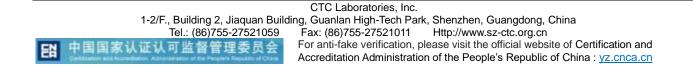
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram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

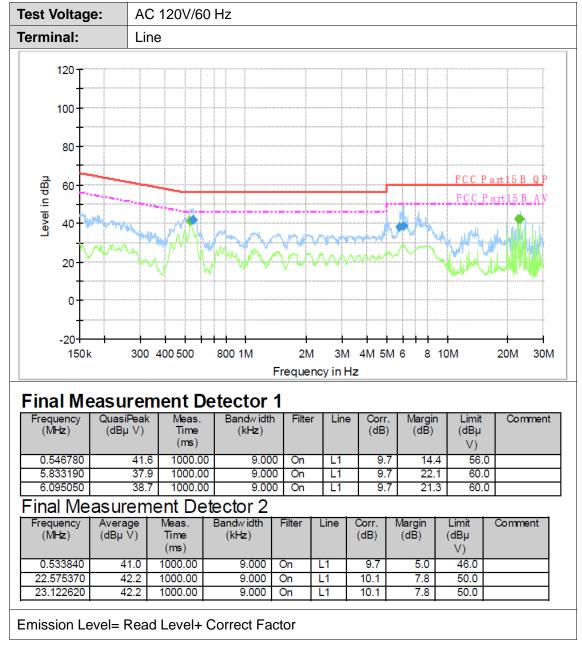


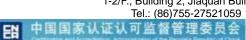


Test Mode:

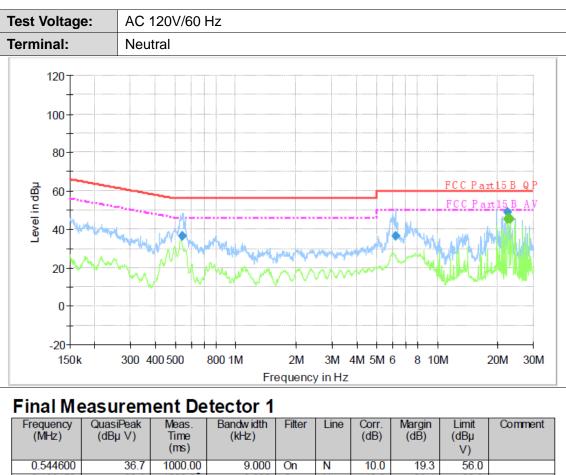
Please refer to the clause 2.4.

Test Results









22.395840	49.1	1000.00	9.000	On	N	10.0	10.9	60.0	
6.193150	36.6	1000.00	9.000	On	N	10.0	23.4	60.0	
0.544600	36.7	1000.00	9.000	On	N	10.0	19.3	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
22.395840	45.3	1000.00	9.000	On	Ν	10.0	4.7	50.0	
22.575370	45.6	1000.00	9.000	On	Ν	10.0	4.4	50.0	
23.122620	45.2	1000.00	9.000	On	Ν	10.0	4.8	50.0	

Emission Level= Read Level+ Correct Factor



3.2. Radiated Emission

<u>Limit</u>

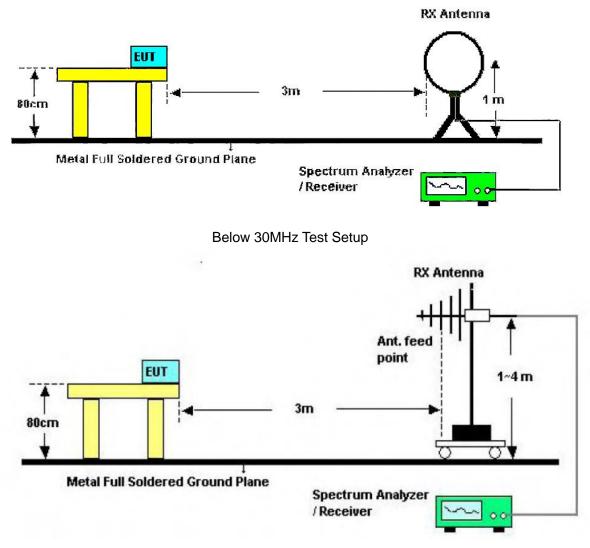
FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS - Gen 8.9

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 GHz	54.00	Average	
	74.00	Peak	

Note:

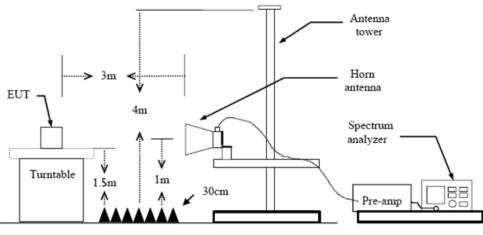
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

Test Configuration



Below 1000MHz Test Setup





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.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna 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

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 10th harmonic:

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

RBW=1MHz, VBW \geq 1/T Peak detector for Average value.

Note 1: For the 1/T& Duty Cycle please refer to clause 3.8 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

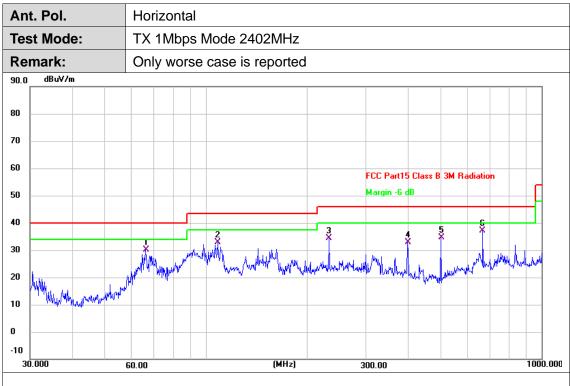
Test Result

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.





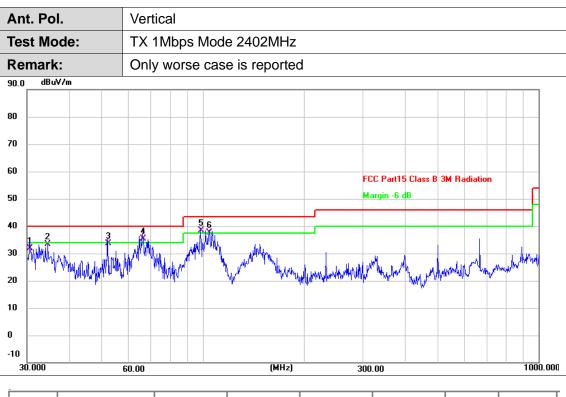
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	66.2661	50.03	-19.78	30.25	40.00	-9.75	QP
2	108.6470	53.15	-20.26	32.89	43.50	-10.61	QP
3	233.3486	53.63	-19.21	34.42	46.00	-11.58	QP
4	399.0302	47.77	-14.87	32.90	46.00	-13.10	QP
5	501.1790	47.36	-12.64	34.72	46.00	-11.28	QP
6 *	668.1422	46.54	-9.51	37.03	46.00	-8.97	QP

Remarks:

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

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.5306	50.07	-18.22	31.85	40.00	-8.15	QP
2	34.6385	51.33	-18.07	33.26	40.00	-6.74	QP
3	52.2079	51.50	-17.86	33.64	40.00	-6.36	QP
4 *	66.2662	55.22	-19.78	35.44	40.00	-4.56	QP
5 !	98.4866	59.38	-20.98	38.40	43.50	-5.10	QP
6 !	104.5361	58.05	-20.54	37.51	43.50	-5.99	QP

Remarks:

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



Ant. Po	l.	Hori	zontal					
Test Mo	de:	TX I	BLE 1Mbps	Mode 2402	MHz			
Remark: No report for the emission which more than 10 dB below the prescribed limit.								;
No.	Frequer (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4803.7	11	31.27	2.16	33.43	54.00	-20.57	AVG
2	4803.9	50	42.69	2.16	44.85	74.00	-29.15	peak
Remark								

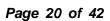
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX BLE 1Mbps Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4803.617	41.85	2.16	44.01	74.00	-29.99	peak
2 *	4803.979	27.92	2.16	30.08	54.00	-23.92	AVG

Remarks:

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





Ant. Pol. Horizontal								
Test Mode: TX BLE 1Mbps Mode 2440MHz								
Remark:No report for the emission which more than 10 dB below the prescribed limit.)	
·					1			
No.	Frequency (MHz)		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4879.6	53	33.37	2.31	35.68	54.00	-18.32	AVG
2	4880.5	15	43.52	2.31	45.83	74.00	-28.17	peak
Remark	-	Anton	no Footor (o Footor (dF) Dro omoli	fior Foot	
	· · ·		Limit value	uo/m)+∪abi	e Factor (dE	y-rie-ampli		ור

Ant. Po	I.	Vert	Vertical							
Test Mo	de:	TX E	BLE 1Mbps	Mode 2440	MHz					
Remark	:		eport for the cribed limit.	emission v	which more t	than 10 dB l	below the	9		
No.	Frequer (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
1 *	4879.5	05	26.00	2.31	28.31	54.00	-25.69	AVG		
2	4879.8	77	40.63	2.31	42.94	74.00	-31.06	peak		
Remark	s:									
1.Factor	(dB/m) = /		na Factor (Limit value	dB/m)+Cabl	e Factor (dE	3)-Pre-ampli	fier Facto	or		





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ant Mar	-	Hori	lorizontal						
est Mod	de:	TX E	BLE 1Mbps	Mode 2480	MHz				
Remark:			report for the scribed limit.		which more t	han 10 dB t	below the	9	
No.	Frequen (MHz)	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
1	4959.58	36	43.58	2.48	46.06	74.00	-27.94	peak	
2 *	4959.77	75	32.29	2.48	34.77	54.00	-19.23	AVG	

Ant. Po	Ι.	Vertical							
Test Mo	de:	TX E	BLE 1Mbps	Mode 2480	MHz				
Remark	:		eport for the cribed limit.	emission v	vhich more t	han 10 dB t	pelow the)	
No.	Frequer (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
1 *	4959.6	26	25.17	2.48	27.65	54.00	-26.35	AVG	
2	4960.24	43	40.81	2.48	43.29	74.00	-30.71	peak	
Remark	e.								
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value									
2.Margir	n value = L	evel -	Limit value						



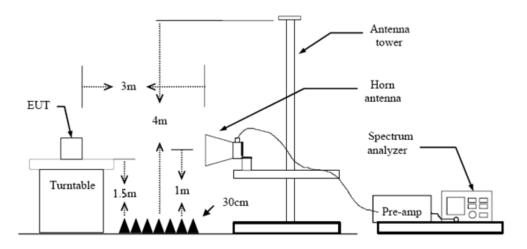
3.3. Band Edge Emissions (Radiated)

Limit

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

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

Test Configuration



Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
- The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 2. degrees to determine the position of the maximum emission level.
- The EUT was positioned such that the distance from antenna to the EUT was 3 meters. 3.
- The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is 4. 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.
- 5. The receiver set as follow:

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

RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

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Test Results

nt. Po	Ι.	Hori	Horizontal										
est Mo	de:	BLE	BLE 1Mbps Mode 2402MHz										
20.0 dBu	JV/m												7
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00													
												٨	
,									FCC	Part15	C - Above	e TG PK	
												[]	
									FCC	Part15	<u>C - Above</u>	e 1G AV	t
, ,											1 X		
) motoward			man man	*****	a) waa ali da waxaa ayaa da waxaa wa	Landrag Tra	~~~~	manada ya adalada	avi-eve-v=saggebb		<u> </u>	mont	
D D.O													1
2304.000	0 2314.00	2324.00	2334	00 23	144.00 (I	/Hz)	238	64.00	2374.00	2384	.00 239	14.00 24	04.0
No.	Freque (MHz			ding uV)	Facto (dB/n			vel IV/m)	Lim (dBu\		Margi (dB)		tor
1	2390.0	000	14	.10	30.84	4	44	.94	74.	00	-29.0	6 pea	k
2 *	2390.0	00	4.	68	30.84	4	35	.52	54.	00	-18.4	8 AVC	G
Remark													

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



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nt. Po	ol.	Vertical						
est M	ode:	BLE	1Mbps Mod	de 2402MH	z			
20.0 dB	uV/m							
10								
00								
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o						FCC Part15	C - Above 1	GPK
o ⊨								
o						FCC Part15	0.411	
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o							× 2	-
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0.0 2304 50	0 2314.50	2324.50	2334.50 23	44.50 (MHz)	2364.50	2374.50 2384	.50 2394.	50 2404.
	Frogu		Pooding	Factor	Level	Limit	Margin	
No.	Freque (MF	-	Reading (dBuV)	(dB/m)		(dBuV/m)	Margin (dB)	Detector
1	2390.	000	15.12	30.84	45.96	74.00	-28.04	peak
2 *	2390.	000	4.43	30.84	35.27	54.00	-18.73	AVG
Remark	<i>.</i>							



nt. Po	Ι.	Hori	zontal					
est Mo	est Mode: BLE 1Mbps Mode 2480 MHz							
20.0 dBi	ıV/m		ĺ					
10								
111								
) <u> </u>						FCC Part15	C - Above 1	G PK
)								
)						FCC Part15	C - Above 1	G AV
	ł.							
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)								
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).0	0 2487.50	2497.50	2507.50 25	17.50 (MHz)	2537.50	2547.50 2557	.50 2567.	50 2577.5
	_							
No.	Freque (MH	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.	500	14.35	31.24	45.59	74.00	-28.41	peak
2 *	2483.	500	6.05	31.24	37.29	54.00	-16.71	AVG

2.Margin value = Level -Limit value

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Ant. P	ol.	Vert	Vertical							
Test M	st Mode: BLE 1Mbps Mode 2480 MHz									
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110										
100										
30 A										
- <u> </u>						FCC Part15	C - Above 1	G PK		
'0 - -										
						FCC Part15	C - Above 1	G AV		
i0	1×									
	K Singar marine and	waxananananana	an and a second and the second se	harman and a second	and a second	and statement and a state		man		
20										
10										
0.0 2478.0	00 2488.00	2498.00	2508.00 25	518.00 (MHz)	2538.00	2548.00 2558	.00 2568.	00 2578.0		
No.	Frequ (MH	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
	· ·	·	· · ·	. ,	· · ·	. ,				
1	2483		14.60	31.24	45.84	74.00	-28.16	peak		
2 *	2483	.500	4.53	31.24	35.77	54.00	-18.23	AVG		
Remar		= Anter	na Factor (dB/m)+Cabl	e Factor (dE	3)-Pre-ampli	fier Facto	or		

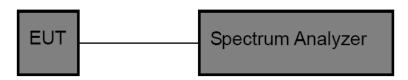


3.4. Band edge and Spurious Emissions (Conducted)

<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):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.

Test Configuration



Test Procedure

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:
 - RBW = 100 kHz, VBW ≥ RBW, scan up through 10th harmonic.
- Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

Test Mode

Please refer to the clause 2.4.

Test Results

(1) Band edge Conducted Test

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE 1M	Ant1	Low	2402	6.71	-49.28	≤-13.29	PASS
DLC_1W	Anti	High	2480	5.93	-53.96	≤-14.07	PASS



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	BLE_1M_Ant	1_Low_2402		
Agilent Spectrum Analyzer – Swept	AC SENSE:INT	ALIGN OFF 05:36:34 PM Oct 11, 2022	Frequency	
Center Freq 2.3525000	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	#Avg Type: RMS TRACE 1234 50 TYPE TYPE DET PPPPP		
Ref Offset 0.5 d 10 dB/div Ref 20.00 dB		Mkr5 2.399 960 GHz -49.28 dBm	Auto Tune	
			Center Freq	
0.00			2.352500000 GHz	
-000		-1323 (8)	Start Freq	
-30.0			2.30000000 GHz	
-50.0 4		3 Aland	Stop Freg	
-20.0 Bachyreylwiang, dynte san gwei yw fernan yw Fernan yw fernan yw fernan yw fernan wy ferna wy ferna wy fernan wy fernan wy fernan w	utarungunga katarug kuranak progeta katarang Abyuka katan dipersek	Ay Seleptine and a start and a selection of the selection	2.405000000 GHz	
Start 2.30000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.40500 GHz Sweep 10.07 ms (1001 pts)	CF Step	
MKE MODE THE SEL	X Y FIN	CTION FUNCTION WIDTH FUNCTION VALUE	10.500000 MHz <u>Auto</u> Man	
1 N 1 F 2 N 1 F 3 N 1 F	2.402.060 GHz 6.71 dBm 2.400.000 GHz -49.28 dBm 2.390.000 GHz -58.82 dBm 2.310.000 GHz -60.11 dBm 2.399.960 GHz -49.28 dBm		FreqOffset	
4 N 1 7 6 N 1 7 6 N 1 7	2.310 000 GHz -60.11 dBm 2.399 960 GHz -49.28 dBm		0 Hz	
7				
		×		
MSG		STATUS		
Agilent Spectrum Analyzer - Swept	BLE_1M_Ant1	_High_2480		
2017 RL RF 50 Ω / Center Freq 2.5100000	C SENSE:INT	ALIGN OFF 05:44:59 PM Oct 11, 2022 #Avg Type: RMS TRACE 2 2 3 4 5 0 Type Management	Frequency	
	PNO: Fast G Trig: Free Run IFGain:Low #Atten: 30 dB	DETPPPP	Auto Tune	
Ref Offset 0.5 d 10 dB/div Ref 20.00 dB	B M	Mkr4 2.486 24 GHz -53.96 dBm		
			Center Freq	
-10.0		-14.U/ dbH	2.51000000 GHz	
-20.0			Start Freq	
-40.0			2.470000000 GHz	
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-70.0			2.550000000 GHz	
Start 2.47000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.55000 GHz Sweep 7.667 ms (1001 pts)	CF Step 8.000000 MHz	
NKR MODE TRC SCL	X Y FUN 2.480 00 GHz 5.93 dBm	ICTION FUNCTION WIDTH FUNCTION VALUE	Auto Man	
2 N 1 F 3 N 1 F 4 N 1 F	2.480 00 GHz 5.93 dBm 2.483 50 GHz -58.59 dBm 2.500 00 GHz -61.38 dBm 2.486 24 GHz -53.96 dBm		Freq Offset 0 Hz	
			UTIZ	
8				
	Ш	×		
MSG		STATUS		

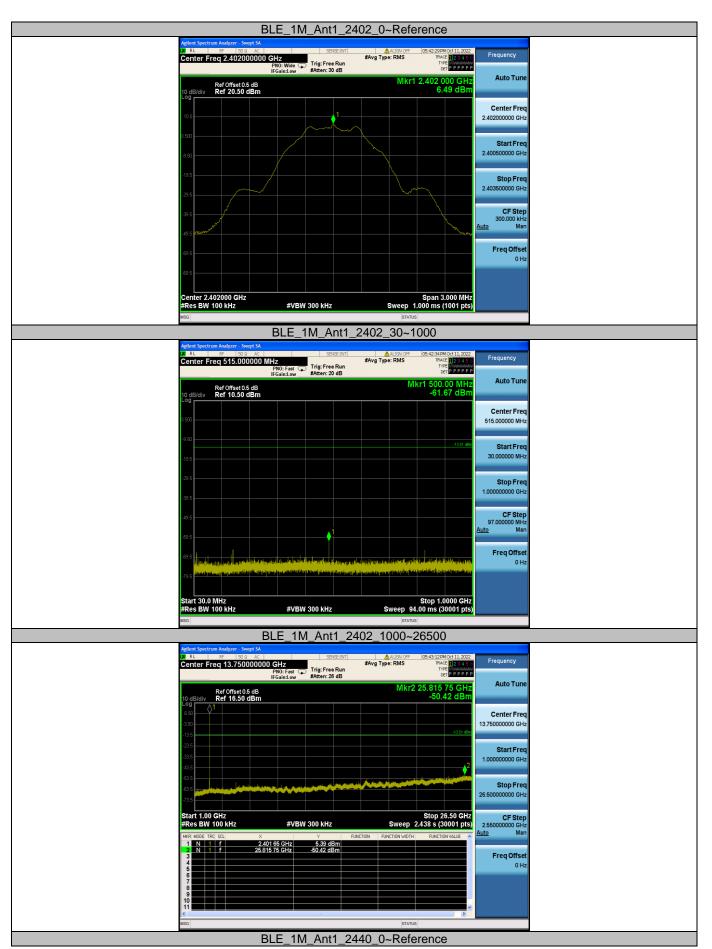


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(2) Conducted Spurious Emissions Test

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
			Reference	6.49	6.49		PASS
		2402	30~1000	6.49	-61.67	≤-13.51	PASS
			1000~26500	6.49	-50.42	≤-13.51	PASS
			Reference	6.61	6.61		PASS
BLE_1M	Ant1	2440	30~1000	6.61	-61.38	≤-13.39	PASS
			1000~26500	6.61	-44.38	≤-13.39	PASS
			Reference	5.75	5.75		PASS
		2480	30~1000	5.75	-61.27	≤-14.25	PASS
			1000~26500	5.75	-50.68	≤-14.25	PASS

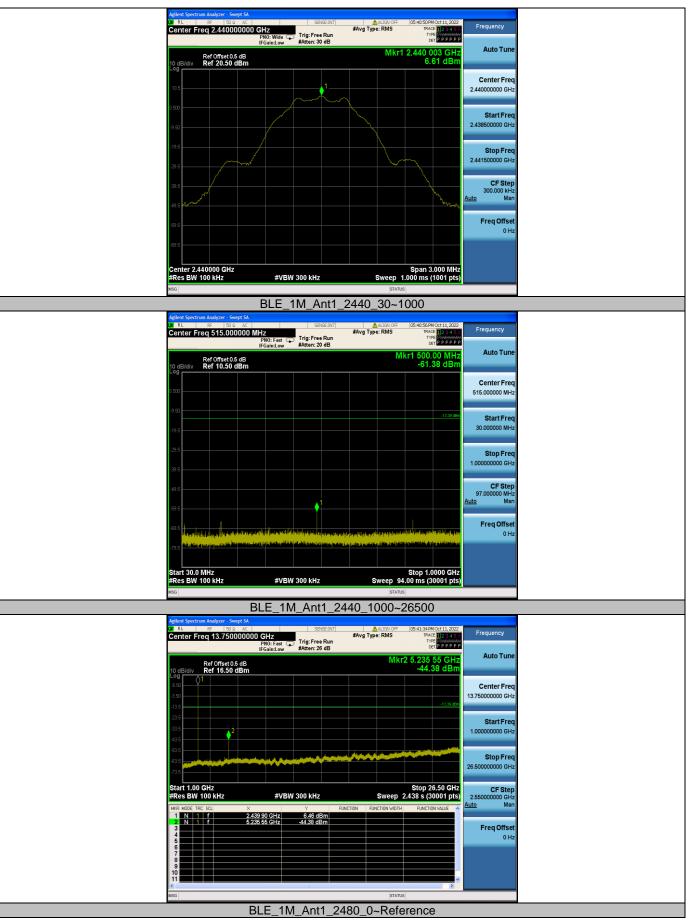




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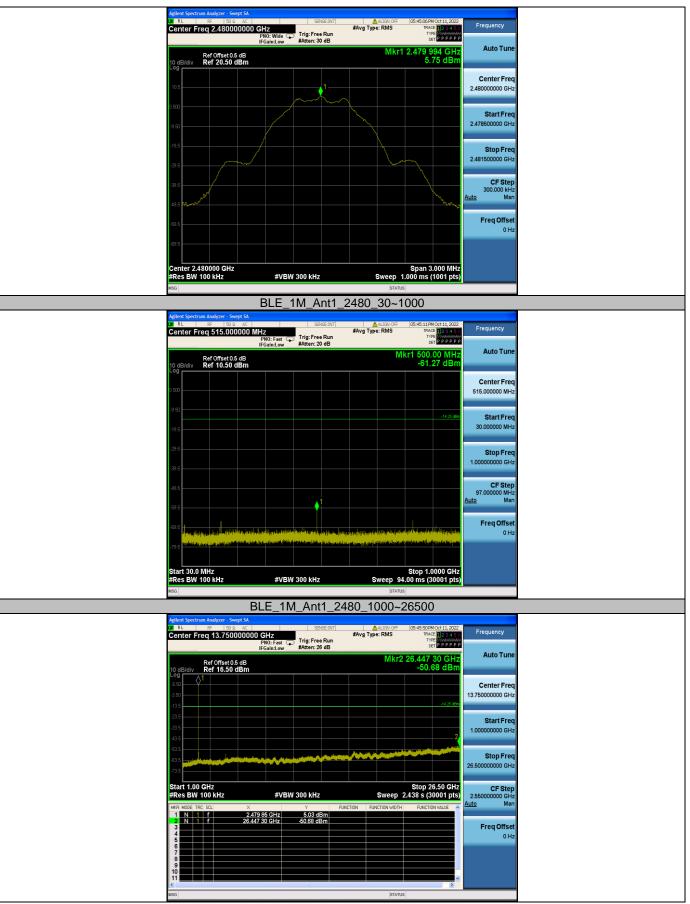








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3.5. DTS Bandwidth

Limit

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

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

Test Configuration

EUT	Spectrum Analyzer

Test Procedure

- 5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- DTS Spectrum Setting: 6.
 - (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.
 - OCB Spectrum Setting:
 - (1) Set RBW = $1\% \sim 5\%$ occupied bandwidth.
 - (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

DTS Bandwidth Test Results

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.660	2401.664	2402.324	0.5	PASS
BLE_1M	Ant1	2440	0.656	2439.668	2440.324	0.5	PASS
		2480	0.664	2479.664	2480.328	0.5	PASS

Occupied Channel Bandwidth Test Results

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	1.0226	2401.497	2402.520		PASS
BLE_1M	Ant1	2440	1.0188	2439.498	2440.517		PASS
		2480	1.0215	2479.498	2480.519		PASS

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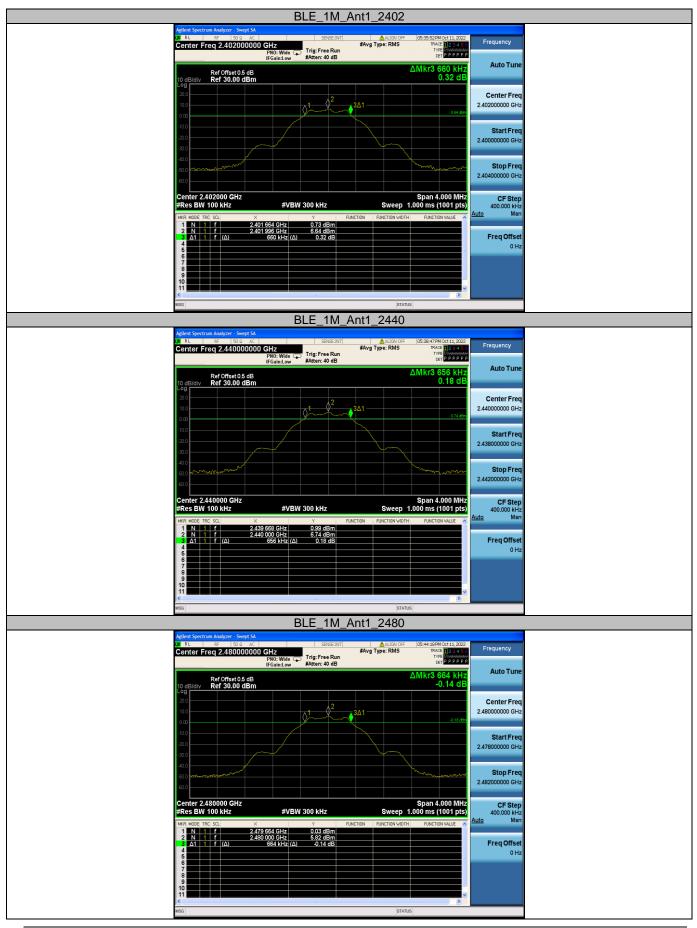
Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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DTS Bandwidth Test Graphs



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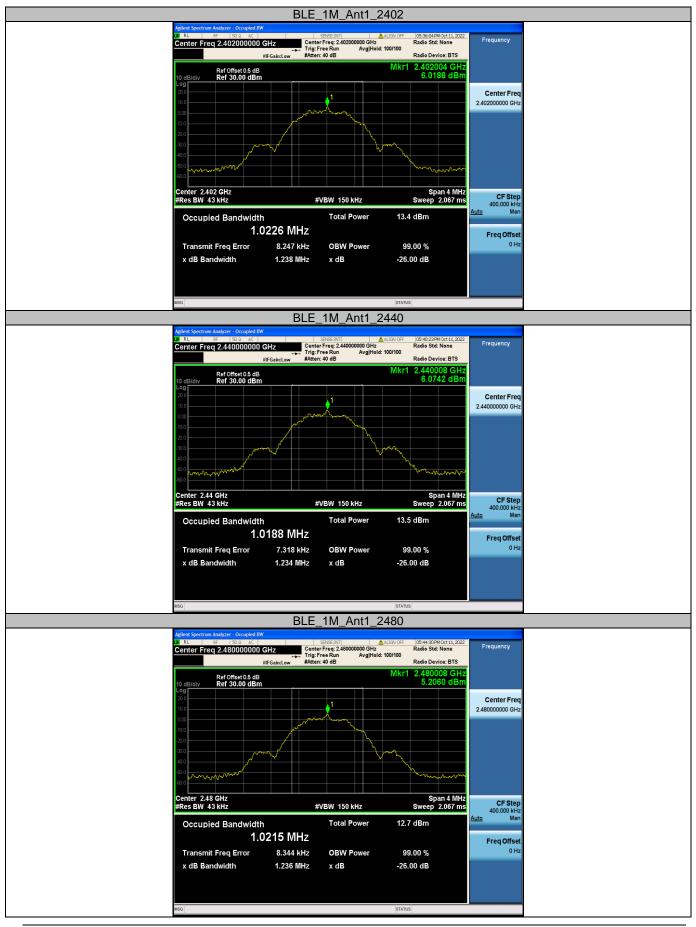


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Occupied Channel Bandwidth Test Graphs



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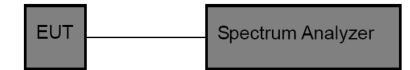
3.6. Peak Output Power

<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

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
		2402	6.63	≤30	PASS
BLE_1M	Ant1	2440	6.65	≤30	PASS
		2480	5.82	≤30	PASS



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Freq offset Center 24/20000 CH2: FYUB 0.0 MH2: Saves 1.000 MH5 BEE_1M_Ant1_2440 BLE_1M_Ant1_2440 BEE_1M_Ant1_2440 BES 25 CH1 Freq offset Center Freq 24/20000 CH2 Example Center Freq 24/20000 CH2 Example BEE_1M_Ant2409 BES 26 CH1 Freq offset Storp Freq Storp Fre	
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Stop Freq 2.43700000 GHz #Res BW 2.0 MHz BLE_1M_Ant1_2480 BLE_1M_Ant1_2480 BLE_1M_Ant1_2480 BLE_1M_Ant1_2479 844 50 GHZ BLE_1M_STOP Freq Adv Stop Freq 0 Hz BLE_1M_Ant1_2479 844 50 GHZ Auto Ture	
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Stop Freq 2.44300000 GHz 400 600 600 600 600 600 600 600 600 600	
CF Step 600,000 KHz Auto Man Freq Offset 0 Hz Center 2.440000 GHz #Res BW 2.0 MHz WHz BLE_1M_Ant1_2480 Freq Store 1.067 ms (8001 pts) 1053 Freq Offset 0.67 ms (8001 pts) 1053 Freq Units Auto Ture Ref Offset 0.5 dB Mkr1 2.479 944 50 GHz Auto Ture	
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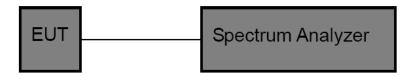
3.7. Power Spectral Density

<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

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
		2402	-9.06	≤8	PASS
BLE_1M	Ant1	2440	-8.96	≤8	PASS
		2480	-9.57	≤8	PASS





BLE_1M_Ant1_2402 Center Freq 2.402000000 GHz PNO: Wide IFGain:Low Frequency #Avg Type: RMS TYPE MWWWWW Auto Tune Mkr1 2 78 42 Gi -9.06 dB Ref Offset 0.5 dB Ref 20.50 dBm Center Free 2.402000000 GHz Start Free ٠ 2.401340000 GH www.www.www WM Stop Free W 2.402660000 GH .M CF Step 132.000 kH Mar Freq Offse 0 H; Span 1.320 MHz Sweep 140.0 ms (30000 pts) enter 2.4020000 GHz Res BW 3.0 kHz #VBW 10 kHz BLE_1M_Ant1_2440 Frequency #Avg Type: RMS Center Freq 2.440000000 GHz PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB PPPPP Auto Tun Mkr1 2.439 978 11 GI -8.96 dB Ref Offset 0.5 dB Ref 20.50 dBm Center Free 2.440000000 GH; Start Fred 2.439344000 GH: ٠ and man with my man with the second Stop Freq IT WWWWAAA WWW 2.440656000 GH M. CF Step 131.200 kH Ma Freq Offse 0 Н Span 1.312 MHz Sweep 140.0 ms (30000 pts Center 2.4400000 GHz Res BW 3.0 kHz #VBW 10 kHz BLE_1M_Ant1_2480 #Avg Type: RMS enter Freq 2.480000000 GHz PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB Frequency Auto Tun 977 71 G -9.57 dE Ref Offset 0.5 dB Ref 20.50 dBm Center Fred 2.48000000 GHz Start Fred י זיוויועע אין 2.479336000 GH h/W/W/W MANA MMMMM IT IT WANNAMANA Stop Free 2.480664000 GH CF Step 132.800 kH Mar uto Freq Offse οн Span 1.328 MHz Sweep 142.0 ms (30000 pts) Center 2.4800000 GHz #Res BW 3.0 kHz #VBW 10 kHz

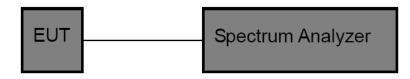


3.8. Duty Cycle

<u>Limit</u>

None, for report purposes only.

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 test channel center frequency. Set the span to 0Hz Set the RBW to 10MHz Set the VBW to 10MHz Detector: Peak Sweep time: Auto

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

Test Mode

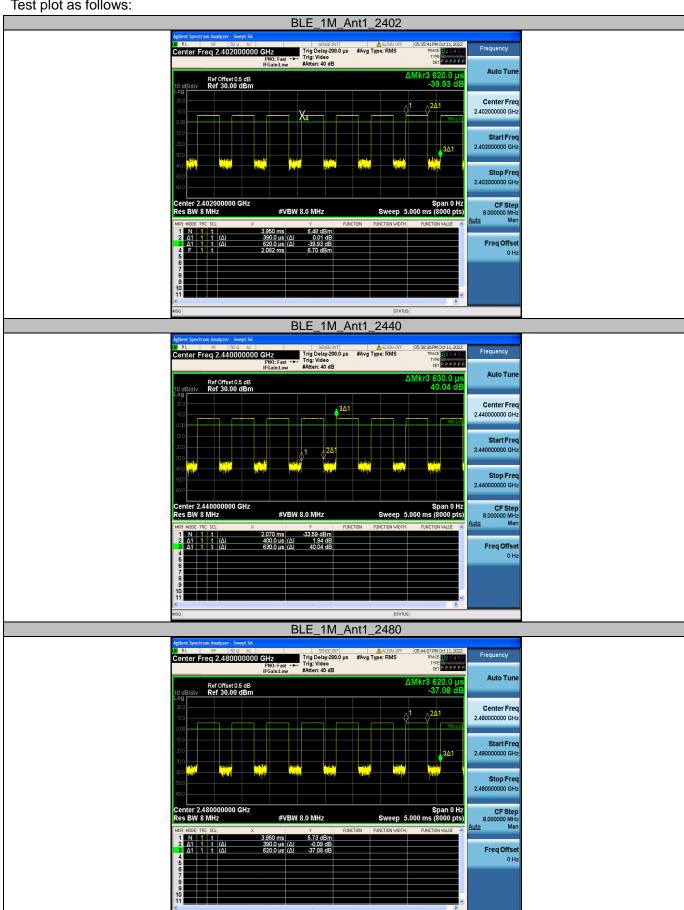
Please refer to the clause 2.4.

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<u>Test Result</u>

Test Mode	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
	2402	0.39	0.62	62.90	1.61	2
BLE 1Mbps	2440	0.40	0.63	63.49	1.59	2
Timps	2480	0.39	0.62	62.90	1.61	2





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3.9. 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

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.