

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC171172 Page: 1 of 44

FCC Radio Test Report FCC ID: 2AL8K-ONESCREEN-6

Original Grant

Report No.		TB-FCC171174
Applicant	5	NZS Inc. DBA Clary Icon
Equipment Under	Те	st (EUT)
EUT Name	÷	Interactive Touch Screen/ Interactive Flat Panel
Model No.	2	OneScreen 6
Serial Model No.	6	OneScreen * (* stands for 0-9,or A-Z,or a-z,or blank)
Brand Name		OneScreen
Receipt Date	1	2019-12-21
Test Date		2019-12- 21 to 2019-12-27
Issue Date		2019-12-28
Standards		FCC Part 15: 2019, Subpart C(15.247)
Test Method		ANSI C63.10: 2013
Conclusions		PASS
		In the configuration tected, the ELIT complied with the standards specified above

Test/Witness Engineer Engineer Supervisor

Engineer Manager



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0



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Revision History

Report No.	Version	Description	Issued Date
TB-RF171172	Rev.01	Initial issue of report	2019-12-28
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1. General Information about EUT

1.1 Client Information

Applicant	:	NZS Inc. DBA Clary Icon	
Address	:	8168 Miramar Road, San Diego CA 92126, United States	
Manufacturer	-	Shenzhen Konka E-display Co.,Ltd	
Address		22A,KONKA Building,South Technology Road No.12th,High-tech Industrial Park,Nanshan,Shenzhen China	

1.2 General Description of EUT (Equipment Under Test)

EUT Name		Interactive Touch Screen/ Interactive Flat Panel		
Models No.		OneScreen 6, OneScreen * (* stands for 0-9,or A-Z,or a-z,or blank)		
Model Different		All these models are the same PCB, layout and electrical circuit, the only different is model name.		
01113		Operation Frequency:	Bluetooth (BLE): 2402MHz~2480MHz	
		Number of Channel:	Bluetooth (BLE): 40 channels see note(3)	
Product Description		Antenna Gain:	5dBi Reverse SMA Antenna	
		Modulation Type:	GFSK	
DI TO		Bit Rate of 1Mbps(GFSK)		
Power Rating		Input: AC 100-240V, 50/60Hz		
Connecting I/O Port(S)	:	Please refer to the User's Manual		
Remark	:	The antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.		

Note:

This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB 558074 D01v05.

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) Antenna information provided by the applicant.



(3) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode

EUT Power Supply

1.4 Description of Support Units

	Equipment Information					
Name	Model	FCC ID/VOC	Manufacturer	Used "√"		
. M			WURT -	This area		
	Cable Information					
Number	Shielded Type	Ferrite Core	Length	Note		
		···· •	1000 mm			



1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test			
Final Test Mode Description			
Mode 1	TX Mode		

For Radiated Test				
Final Test Mode	Description			
Mode 2	TX Mode			
Mode 3	TX Mode (Channel 00/20/39)			

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

BLE Mode: GFSK Modulation Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	ISRT.exe		
Frequency	2402 MHz	2442MHz	2480 MHz
GFSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement y \pm U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U _{Lab})
	Level Accuracy:	
Conducted Emission	9kHz~150kHz	±3.42 dB
	150kHz to 30MHz	±3.42 dB
Radiated Emission	Level Accuracy:	±4.60 dB
Radiated Emission	9kHz to 30 MHz	±4.00 0B
Radiated Emission	Level Accuracy:	±4.40 dB
Radiated Emission	30MHz to 1000 MHz	±4.40 dB
Redicted Emission	Level Accuracy:	14.20 dP
Radiated Emission	Above 1000MHz	±4.20 dB



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1.8 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.

FCC Accredited Test Site Number: 854351.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

TOBY

2. Test Summary

Standard Section			MILLO P	
FCC	IC	Test Item	Judgment	Remark
15.203		Antenna Requirement	PASS	N/A
15.207(a)	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A
15.205&15.247(d)	RSS-GEN 7.2.2	Band-Edge & Unwanted Emissions into Restricted Frequency	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)(3)	RSS 247 5.4 (4)	Conducted Max Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.205, 15.209&15.247(d)	RSS 247 5.5	Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	PASS	N/A

Note: (1)"/" for no requirement for this test item.

(2)N/A is an abbreviation for Not Applicable.

(3)All tests were conducted using the adapter and antenna gain provided by the applicant, The laboratory tests only according to the information provided by the applicant.

Test Software

Test Item	Test Software	Manufacturer	Version No.
Conducted Emission	EZ-EMC	EZ	CDI-03A2
Radiation Emission	EZ-EMC	EZ	FA-03A2RE
RF Conducted Measurement	MTS-8310	MWRFtest	V2.0.0.0



3. Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 13, 2019	Jul. 12, 2020
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 13, 2019	Jul. 12, 2020
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 13, 2019	Jul. 12, 2020
LISN	Rohde & Schwarz	ENV216	101131	Jul. 13, 2019	Jul. 12, 2020
Radiation Emissio	n Test	-	-		-
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Dat
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 13, 2019	Jul. 12, 2020
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 13, 2019	Jul. 12, 2020
Spectrum Analyzer	Rohde & Schwarz	FSVR	1311.006K40-10094 5-DH	Feb. 10, 2019	Feb. 09, 2020
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Jan. 27, 2019	Jan. 26, 2020
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Jan. 27, 2019	Jan. 26, 2020
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.03, 2019	Mar. 02, 2020
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar.03, 2019	Mar. 02, 2020
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Mar.03, 2019	Mar. 02, 2020
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 13, 2019	Jul. 12, 2020
Pre-amplifier	Sonoma	310N	185903	Mar.04, 2019	Mar. 03, 2020
Pre-amplifier	HP	8449B	3008A00849	Mar.03, 2019	Mar. 02, 2020
Pre-amplifier	SKET	LNPA_1840G-50	SK201904032	Jul. 27, 2019	Jul. 26, 2020
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.03, 2019	Mar. 02, 2020
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

Antenna Conducted Emission

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 13, 2019	Jul. 12, 2020
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 13, 2019	Jul. 12, 2020
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 16, 2019	Sep. 15, 2020
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 16, 2019	Sep. 15, 2020
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 16, 2019	Sep. 15, 2020
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	Sep. 16, 2019	Sep. 15, 2020



5. Conducted Emission Test

- 4.1 Test Standard and Limit
 - 4.1.1Test Standard FCC Part 15.207
 - 4.1.2 Test Limit

Executency	Maximum RF Line Voltage (dBµV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

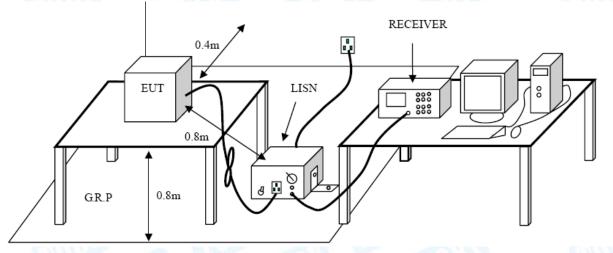
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Da5ta

Please refer to the Attachment A.



6. Radiated Emission Test

- 5.1 Test Standard and Limit
 - 5.1.1 Test Standard
 - FCC Part 15.247(d)
 - 5.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

Frequency	Distance Meters(at 3m)		
(MHz)	Peak (dBuV/m)	Average (dBuV/m)	
Above 1000	74	54	

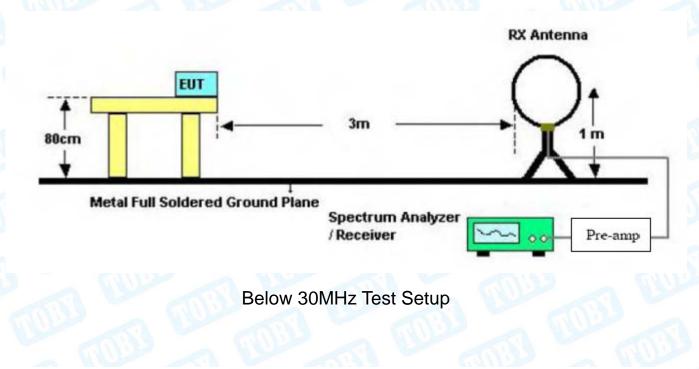
Note:

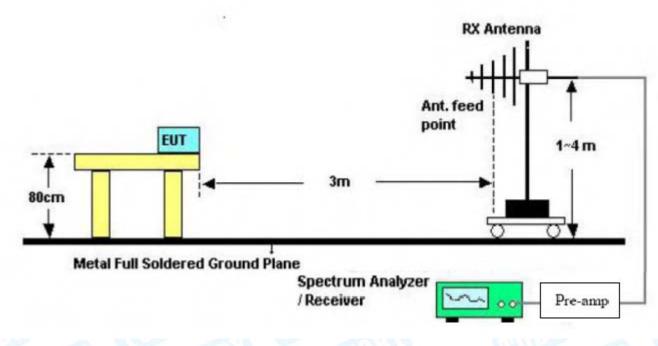
(1) The tighter limit applies at the band edges.

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



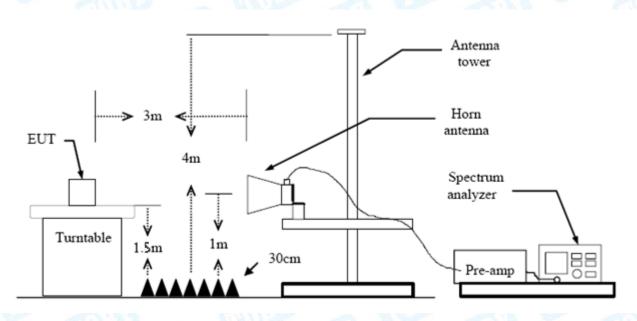
5.2 Test Setup





Below 1000MHz Test Setup





Above 1GHz Test Setup

5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



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5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Please refer to the Attachment B.

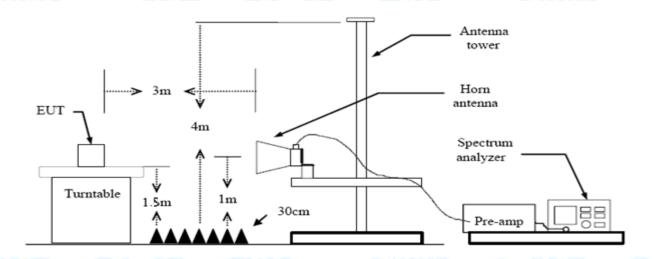


7. Restricted Bands Requirement

- 6.1 Test Standard and Limit
 - 6.1.1 Test Standard
 - FCC Part 15.247(d) FCC Part 15.205
 - 6.1.2 Test Limit

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

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector



mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values. Please refer to the Attachment C.

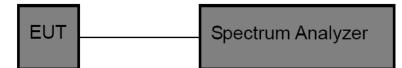


8. Bandwidth Test

- 7.1 Test Standard and Limit
 - 7.1.1 Test Standard
 - FCC Part 15.247 (a)(2)
 - 7.1.2 Test Limit

FCC	FCC Part 15 Subpart C(15.247)/RSS-247			
Test Item	Limit	Frequency Range(MHz)		
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5		

7.2 Test Setup



7.3 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 bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

7.4 EUT Operating Condition

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

7.5 Test Data

Please refer to the Attachment D.

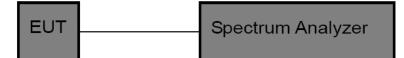


9. Peak Output Power Test

- 8.1 Test Standard and Limit
 - 8.1.1 Test Standard
 - FCC Part 15.247 (b)(3)
 - 8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-247			
Test Item Limit Frequency Range(MHz			
Peak Output Power	1 Watt or 30 dBm	2400~2483.5	

8.2 Test Setup



8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v04.

- (1) Set the RBW≥DTS Bandwidth
- (2) Set VBW≥3*RBW
- (3) Set Span≥3*RBW
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

8.5 Test Data

Please refer to the Attachment E.

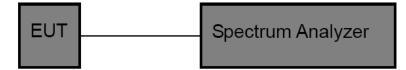


10. Power Spectral Density Test

- 9.1 Test Standard and Limit
 - 9.1.1 Test Standard
 - FCC Part 15.247 (e)
 - 9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)			
Test Item Limit Frequency Range(MH			
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5	

9.2 Test Setup



9.3 Test Procedure

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 v04.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequency.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

9.4 EUT Operating Condition

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

9.5 Test Data

Please refer to the Attachment F.



11. Antenna Requirement

10.1 Standard Requirement

10.1.1 Standard

FCC Part 15.203

10.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

10.2 Antenna Connected Construction

The gains of the antenna used for transmitting is 5dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

10.3 Result

The EUT antenna is Reverse SMA Antenna. It complies with the standard requirement.

Antenna Type							
	Permanent attached antenna						
3 5	Unique connector antenna	3					
	Professional installation antenna						

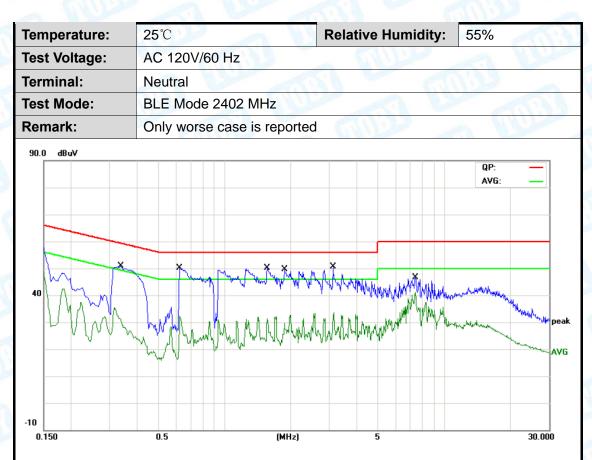


Attachment A-- Conducted Emission Test Data

Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		anis -
Terminal:	Line		
Test Mode:	BLE Mode 2402 MHz	4400	
Remark:	Only worse case is repo	rted	
90.0 dBu¥	1		
			QP: AVG:
40	Mar Mul Mill	MARTA A AMARTINA MANAGAMA	
0.150	0.5 (M	(Hz) 5	30.000

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.3140	39.63	9.84	49.47	59. 8 6	-10.39	QP
2		0.3140	25.13	9.84	34.97	49.86	-14.89	AVG
3	*	0.6260	38.77	9.92	48.69	56.00	-7.31	QP
4		0.6260	21.34	9.92	31.26	46.00	-14.74	AVG
5		1.5580	37.20	9.85	47.05	56.00	-8.95	QP
6		1.5580	20.28	9.85	30.13	46.00	-15.87	AVG
7		2.2820	32.33	9.83	42.16	56.00	-13.84	QP
8		2.2820	20.20	9.83	30.03	46.00	-15.97	AVG
9		3.1220	34.35	9.86	44.21	56.00	-11.79	QP
10		3.1220	20.52	9.86	30.38	46.00	-15.62	AVG
11		4.2900	32.69	9.85	42.54	56.00	-13.46	QP
12		4.2900	22.00	9.85	31.85	46.00	-14.15	AVG





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.3379	38.17	9.72	47.89	59.25	-11.36	QP
2		0.3379	19.55	9.72	29.27	49.25	-19.98	AVG
3	*	0.6260	38.97	9.78	48.75	56.00	-7.25	QP
4		0.6260	21.56	9.78	31.34	46.00	-14.66	AVG
5		1.5660	37.60	9.83	47.43	56.00	-8.57	QP
6		1.5660	20.94	9.83	30.77	46.00	-15.23	AVG
7		1.8740	36.65	9.85	46.50	56.00	-9.50	QP
8		1.8740	18.52	9.85	28.37	46.00	-17.63	AVG
9		3.1140	32.91	9.86	42.77	56.00	-13.23	QP
10		3.1140	22.20	9.86	32.06	46.00	-13.94	AVG
11		7.3860	34.19	9.86	44.05	60.00	-15.95	QP
12		7.3860	31.50	9.86	41.36	50.00	-8.64	AVG

Remark: All channels have been tested and only listed channels that is worst data



Attachment B-- Radiated Emission Test Data

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

Temperature:	25 ℃	Relative Humidity:	55%				
Fest Voltage:	AC 120V/60HZ		MUL				
Ant. Pol.	Horizontal						
Test Mode:	BLE TX 2402 Mode	E TX 2402 Mode					
Remark:	Only worse case is repor	rted	MULL				
80.0 dBuV/m							
			Limit: — Margin: —				
30		3 4 5					
	- may man and	manth timber markely and	In show man marine				
w Lynnin min							
20							
30.000 40 50	60 70 80 (MI	Hz) 300 400	500 600 700 1000.				

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	11	17.7725	47.46	-22.34	25.12	43.50	-18.38	QP
2	16	61.4742	46.44	-20.81	25.63	43.50	-17.87	QP
3	20	09.3130	47.17	-19.38	27.79	43.50	-15.71	QP
4	23	34.1684	45.69	-17.95	27.74	46.00	-18.26	QP
5	30	01.4224	46.80	-15.95	30.85	46.00	-15.15	QP
6	* 4(07.5145	44.77	-12.05	32.72	46.00	-13.28	QP

*:Maximum data x:Over limit !:over margin



Temperature:	25 ℃	22	R	elative Hum	idity:	55%	
Test Voltage:	AC 120)V/60HZ		1970	22	-	A DO
Ant. Pol.	Vertical		-	81		1125	
Test Mode:	BLE TX	< 2402 Mod	le				
Remark:	Only w	orse case i	s reported	900		2	A.A.
80.0 dBu∀/m							
						Lin Ma	nit: — argin: —
							F
30 1	munu	mill man	v.	1 M	while	\$~~~~~	mmytrank
Murum	www.ww	m A man		A.M.	william	\$~~~~	mmmmmm
Murum m	жуулар Э 60 70	und and	(MHz)	300	400	500 600	700 1000.000
-20	Freq.	Reading	Correct Factor	Measure- ment	Limit	Ove	er
-20		Reading	Correct	Measure-		Ove	er

2	90.8554	50.37	-22.02	28.35	43.50 -15.15	QP
3	112.9196	48.62	-22.43	26.19	43.50 -17.31	QP
4	209.3130	44.94	-19.38	25.56	43.50 -17.94	QP
5 *	301.4224	51.97	-15.95	36.02	46.00 -9.98	QP
6	510.0436	38.10	-10.06	28.04	46.00 -17.96	QP

*:Maximum data x:Over limit !:over margin

TOBY

Above 1GHz

emperatu	re:	25 ℃			Relativ	e Humidity:	55%		
est Voltag	e:	AC 120	V/60HZ						
Ant. Pol.		Horizor	ntal	1100	1932				
Fest Mode:		BLE M	ode TX 2	402 MHz	-		600		
Remark:			o report for the emission which more than 10 dB below the escribed limit.						
100.0 dBuV/m									
						(BF) FCC	PART 15C (PEAK)		
	2 X								
	^					(RF) FC	C PART 15C (AVG)		
50	1 X								
0.0									

	No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	4804.450	29.17	14.44	43.61	54.00	-10.39	AVG
2			4805.152	44.07	14.44	58.51	74.00	-15.49	peak



em	perature:	25 ℃		Relative Humid	ity: 55%
est	Voltage:	AC 120	V/60HZ	I THE THE	
۸nt.	Pol.	Vertica			Call Bar
est	Mode:	BLE M	ode TX 2402 M	ИНz	
Remark: No report for the emission which more than 10 dB below prescribed limit.					
100.0	dBuV∕m				
					(RF) FCC PART 15C (PEAK)
	1 X				(RF) FCC PART 15C (AVG)
50	2				
	×				
0.0	00.000 3550.00	6100.00 8	650.00 11200.00	13750.00 16300.00 18850.	00 21400.00 26500.0

No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4802.836	43.39	14.42	57.81	74.00	-16.19	peak
2	*	4803.928	29.97	14.43	44.40	54.00	-9.60	AVG



Гem	perature		25 ℃			Relative Humidity	y: 55%		
Fes t	Voltage:		AC 120	V/60HZ		MUDD		Y	
\nt	Pol.		Horizor	ntal	-				
est	Mode:		BLE Mo	ode TX 2442	MHz			5	
Ren	nark:		No report for the emission which more than 10 dB below the prescribed limit.						
100.0) dBuV/m								
						(BF)	FCC PART 15C (PE	AK)	
		1 X				(BF) FCC PART 15C (A	(VG)	
50		2							
		2 X							
0.0									

No	. Mk	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4884.582	43.14	14.93	58.07	74.00	-15.93	peak
2	*	4885.458	29.61	14.93	44.54	54.00	-9.46	AVG



Temperature:		25 ℃			Relative Hum	idity:	55%	
Test Voltage:		AC 120	V/60HZ	0	000	2		N
Ant. Pol.		Vertica		-	81	Ind	132	
Test Mode:		BLE Mode TX 2442 MHz						
Remark:		No report for the emission which more than 10 dB below the prescribed limit.						
100.0 dBuV/m								
						(RF) FCC	PART 15C (F	PEAK)
	2							
	×					(RF) FC	C PART 15C	(AVG)
50	1 X							
0.0		100.00 89	50.00 1120 0	.00 13750.	0 16300.00 18850.		00.00	26

No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4884.558	32.13	14.93	47.06	54.00	-6.94	AVG
2		4884.948	43.70	14.93	58.63	74.00	-15.37	peak



Temperature:		25 ℃			Relative	Humidity:	55%	
est Voltage:		AC 120	V/60HZ		10 -	JUL -		
nt. Pol.		Horizon	tal	-	81 -	100	182	
est Mode:		BLE Mo	de TX 248) MHz			-	
Remark:		No report for the emission which more than 10 dB below the prescribed limit.						
00.0 dBuV/m								
						(RF) FCC	Part 15C (Peak)	
	1 X					(BF) FC	PART 15C (AVG)	
50	2 X							
	×							
0.0								

No.	Mk.	Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4958.812	43.57	15.39	58.96	74.00	-15.04	peak
2	*	4960.090	30.40	15.39	45.79	54.00	-8.21	AVG



101							
AC 120V/60HZ							
Vertical							
BLE Mode TX 2480 MHz							
No report for the emission which more than 10 dB below the prescribed limit.							

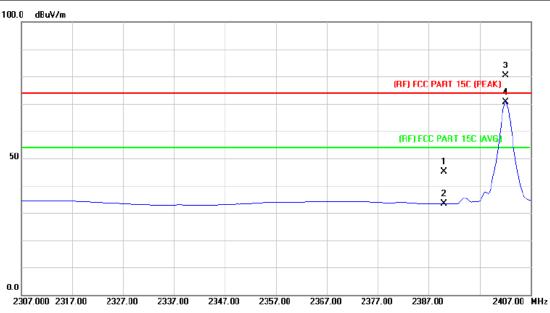
No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4960.972	32.37	15.40	47.77	54.00	-6.23	AVG
2		4961.314	44.04	15.40	59.44	74.00	-14.56	peak



Attachment C-- Restricted Bands Requirement Test Data

(1) Radiation Test

(2) Temperat ure:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V 60HZ		THUE D
Ant. Pol.	Horizontal	No and	
Test Mode:	BLE TX Mode 2402 MHz		
Remark:	Only worse case is reported		and
100.0 dBuV/m			



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure ment	- Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	42.40	2.82	45.22	74.00	-28.78	peak
2		2390.000	30.49	2.82	33.31	54.00	-20.69	AVG
3	Х	2402.200	77.44	2.87	80.31	Fundamental Frequency		peak
4	*	2402.200	67.81	2.87	70.68	Fundamental F	requency	AVG



Temperature:	25 ℃	Relative	Humidity:	55%
Test Voltage:	AC 120V 60HZ			
Ant. Pol.	Vertical	angs -	1970	2
Fest Mode:	BLE TX Mode 24	402 MHz		60033
Remark:	Only worse case	e is reported		
100.0 dBuV/m				
50			(RF) FCC P.	ART 15C (PEAK)

Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
	2390.000	42.22	2.82	45.04	74.00	-28.96	peak
	2390.000	30.82	2.82	33.64	54.00	-20.36	AVG
*	2402.000	77.34	2.87	80.21	Fundamental Frequency		AVG
Х	2402.200	80.00	2.87	82.87	Fundamental Frequency		peak
	*	MHz 2390.000 2390.000 * 2402.000	Mk. Freq. Level MHz dBu∨ 2390.000 42.22 2390.000 30.82 * 2402.000 77.34	Mk. Freq. Level Factor MHz dBuV dB/m 2390.000 42.22 2.82 2390.000 30.82 2.82 * 2402.000 77.34 2.87	Mk. Freq. Level Factor ment MHz dBuV dB/m dBuV/m 2390.000 42.22 2.82 45.04 2390.000 30.82 2.82 33.64 * 2402.000 77.34 2.87 80.21	Mk. Freq. Level Factor ment Limit MHz dBuV dB/m dBuV/m dBuV/m 2390.000 42.22 2.82 45.04 74.00 2390.000 30.82 2.82 33.64 54.00 * 2402.000 77.34 2.87 80.21 Fundamental F	Mk. Freq. Level Factor ment Limit Over MHz dBuV dB/m dBuV/m dBuV/m dBuV/m dB 2390.000 42.22 2.82 45.04 74.00 -28.96 2390.000 30.82 2.82 33.64 54.00 -20.36 * 2402.000 77.34 2.87 80.21 Fundamental Frequency



emperature:	25℃	Relative Humidity:	55%						
est Voltage:	AC 120V 60HZ	AC 120V 60HZ							
Ant. Pol.	Horizontal	1170 280	200						
Fest Mode:	BLE TX Mode 2480 MH	Hz	Can Ba						
Remark:	Only worse case is rep	orted							
100.0 dBuV/m									
2 X									
1		(RF) FCC P/	ART 15C (PEAK)						
Ă.									
50 3		(RF) FCC 1	PART 15C (AVG)						
0.0									
2473.500 2483.50	2493.50 2503.50 2513.50 2	2523.50 2533.50 2543.50 2553.5	0 2573.50 M						

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	69.88	3.38	73.26	Fundamental	Frequency	AVG
2	Х	2480.100	79.96	3.38	83.34	Fundamental	Frequency	peak
3		2483.500	49.05	3.41	52.46	74.00	-21.54	peak
4		2483.500	34.20	3.41	37.61	54.00	-16.39	AVG



Temperature:	25 ℃	DE		Relative	Humidity:	55%			
Test Voltage:	AC 1	AC 120V 60HZ							
Ant. Pol.	Verti	Vertical							
Test Mode:	BLE	BLE TX Mode 2480 MHz							
Remark:	Only	worse case	e is reported	1970	2				
100.0 dBuV/m									
2 X 1					(RF) FCC F	PART 15C (PEAK			
					(RF) FCC	PART 15C (AVG	3)		
50 X									
0.0									
2475.000 2485.00	2495.00	2505.00 25	15.00 2525.00	2535.00	2545.00 2555.	00 2	2575.00 MHz		
No. Mk. F	req.	Reading Level	Correct Factor	Measure ment	- Limit	Over			
N	ИНz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector		
1 X 248	0.000	72.94	3.38	76.32	Fundamental	Frequency	peak		
2 * 248	0.000	83.03	3.38	86.41	Fundamental	Frequency	AVG		
3 2483	3.500	35.30	3.41	38.71	74.00	-35.29	peak		
4 2483	3.500	46.64	3.41	50.05	54.00	-3.95	AVG		



(3) Conducted Test

nperature:	25 ℃	CI:S	Relative Humi	dity: 5	5%			
t Voltage:	AC 120V/60HZ							
t Mode:	BLE Mode T	X 2402MHz	/ BLE Mode TX 2	480MHz				
mark:	The EUT is p	The EUT is programed in continuously transmitting mode						
Keysight Spectrum		SENSE:INT	ALIGN AUTO	04:	D3:07 PM Dec 27, 2019			
	2.356000000 GHz	PNO: Fast C Trig: Fre Gain:Low Atten: 3	Avg Type: Log- ee Run Avg Hold:>100/1	°wr	TRACE 123456 TYPE MWWWWW DET P N N N N N			
Re and the Re	of Offset 3.89 dB of 23.89 dBm			Mkr1 2	.402 0 GHz -0.940 dBm			
10 dB/div Re Log								
3.89 -6.11								
-16.1					-20.97 dBm			
-36.1								
-46.1 -56.1	and a stand of the	we want the stand of the stand	anteritani anterina anterita da da da da da da da d	~~	eterment Par			
-66.1 Start 2.30600				Stor	2.40600 GHz			
#Res BW 100) kHz	#VBW 300 kH		Sweep 9.600	ms (1001 pts)			
0								
6 7 8 9 10 11		m			•			
		11	I STATUS		• •			
MSG MSG Keysight Spectrum M RL R	F 75 Ω AC CORREC	III SENSE:INT	ALIGN AUTO		58:29 PM Dec 27, 2019			
MSG MSG Keysight Spectrum M RL R	F 75 Ω AC CORREC 2.526000000 GHz P	SENSE:INT PNO: Fast Trig: Fre Gain:Low Atten: 3	ALIGN AUTO Avg Type: Log-1 se Run Avg Hold:>100/1	owr 00	08:29 PM Dec 27, 2019 TRACE 1 2 3 4 5 6 TYPE M DET P N N N N N			
11 Mso Image: Keysight Spectrum Image: Keysight Spectrum	F 75 0 AC CORFEC 2.526000000 GHz P IF of Offset 3.93 dB of 23.93 dB of 23.93 dB of 23.93 dB	PNO: Fast 😱 Trig: Fre	ALIGN AUTO Avg Type: Log-1 se Run Avg Hold:>100/1	^{Pwr} 00 Mkr1 2	18:29 PM Dec 27, 2019			
11 Msg Image: Keysight Spectrum Image: Keysight Spectrum	F 75.0 AC COREC 2.526000000 GHz P IF offset 3.93 dB of 23.93 dB of 0 Greet 3.93 dB	PNO: Fast 😱 Trig: Fre	ALIGN AUTO Avg Type: Log-1 se Run Avg Hold:>100/1	^{Pwr} 00 Mkr1 2	38:29 M Dec 27, 2019 TRACE 23 4 5 0 TYPE P NNNNN 2.480 0 GHz -1.080 dBm			
II MSG III Keysight Spectrum III R Center Freq III R III R III R III R III R IIII R IIIII R IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	F 75.0 AC CORFEC 2.526000000 GHz P IF Offset 3.93 dB of Offset 3.93 dB 2.3.93 dBm 2.3.93 dBm 0 GHz	PNO: Fast Trig: Fr Gain:Low Atten: 3	ALIGN AUTO Avg Type: Log-1 2e Run 4vg Hold:>100/1	Mkr1 2 Mkr1 2	98:29 M Dec 27, 2019 TRACE [] 2:3 4 5 6 TYPE M WWWWW DET P NNNN 			
11 MSG MSG	F 750 AC CORREC 2.526000000 GHz P F Offset 3.93 dB S 2.3.93 dB 2 2 4 4 3 1 6 1 6 1 1 1 1 1 1 1 1 1 1 1 1 1	PNO: Fast Atten: 3 Gain:Low Atten: 3 #VBW 300 kH	ALIGN AUTO Avg Type: Log-1 2e Run 4vg Hold:>100/1	Mkr1 2	9:23 PM Dec 27, 2019 TRACE [2 3 4 5 6 TYPE H WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW			
III Keysight Spectrum MSG RL R Center Freq IIII Reduction 13 9 IIII Reduction 13 9 IIII Reduction 13 9 IIIII Reduction 13 9 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	F 75.0 AC CORFEC 2.526000000 GHz P F Offset 3.93 dB of 07fset 3.93 dB of 07fset 3.93 dB 2 2 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 5 6 1 2 4 4 3 4 5 6 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1	WO: Fast Trig: Fr Gain:Low Trig: Fr Atten: 3 #VBW 300 kl 400 dBm -55.744 dBm -55.744 dBm	ALIGN AUTO Avg Type: Log-1 2e Run 4vg Hold:>100/1	Mkr1 2 Mkr1 2	9:23 PM Dec 27, 2019 TRACE [2 3 4 5 6 TYPE H WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW			
II MSG III Keysight Spectrum III Re IIII Re IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	F 75.0 AC CORFEC 2.526000000 GHz P F Offset 3.93 dB of 07fset 3.93 dB of 07fset 3.93 dB 2 2 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 5 6 1 2 4 4 3 4 5 6 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1	Trig: Frast Atten: 3	ALIGN AUTO Avg Type: Log-1 2e Run 4vg Hold:>100/1	Mkr1 2 Mkr1 2	9:23 PM Dec 27, 2019 TRACE [2 3 4 5 6 TYPE H WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW			



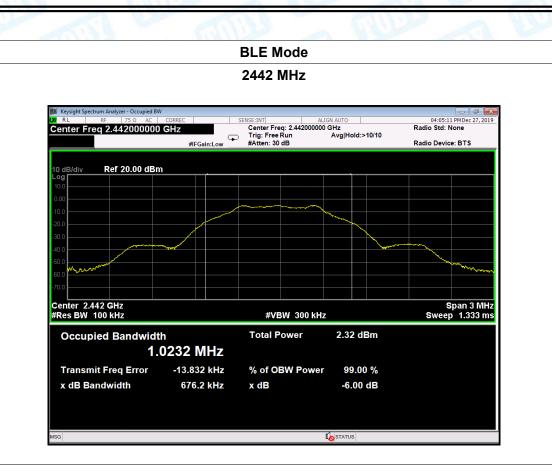
Attachment D-- Bandwidth Test Data

Temperature:	25 ℃		Relative Humidity:	55%			
Test Voltage:	AC 1	20V/60HZ		TIL I			
Test Mode:	BLE TX Mode						
Channel frequency		6dB Bandwidth	6dB Bandwidth 99% Bandwidth				
(MHz)		(kHz) (kHz)		(kHz)			
2402		678.9	1021.2				
2442		676.2	1023.2	>=500			
2480		671.1 1026.6					
BLE Mode							

2402 MHz

RL RF 75 Ω AC enter Freq 2.402000000	CORREC	Center Freq: 2.4020000		04:02:07 PM Dec 27, 201 Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 10 dB	Avg Hold:>10/10	Radio Device: BTS
5 dB/div Ref 20.00 dBr	n			
og				
0.0				
5.0				
0.0				
i5.0 mmmmm				
0.0				
15.0				
100				
115				
enter 2.402 GHz				Span 3 MH
Res BW 100 kHz		#VBW 300 kH	z	Sweep 1.333 m
Occupied Bandwid	th	Total Power	1.82 dBm	
1.	0212 MHz			
Transmit Freq Error	-13.224 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	678.9 kHz	x dB	-6.00 dB	





BLE Mode

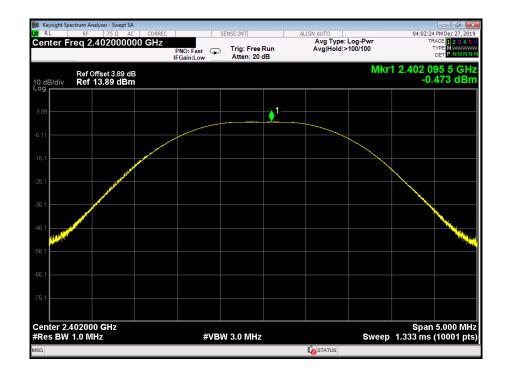
2480 MHz

RL RF 75 Ω AC CO	REC	SENSE:INT	ALIGN AUTO	04:07:36 PM Dec 27, 201
enter Freq 2.480000000 GH	z #IFGain:Low	Center Freq: 2.4800000 Trig: Free Run #Atten: 10 dB	00 GHz Avg Hold:>10/10	Radio Std: None Radio Device: BTS
dB/div Ref 20.00 dBm				
.0				
.0				
0			````	
.0				
0				
.0				
15				
enter 2.48 GHz				Span 3 MH
Res BW 100 kHz		#VBW 300 kH	lz	Sweep 1.333 m
Occupied Bandwidth		Total Power	1.50 dBm	
1.02	66 MHz			
Transmit Freq Error	-14.936 kHz	% of OBW Powe	er 99.00 %	
x dB Bandwidth	671.1 kHz	x dB	-6.00 dB	

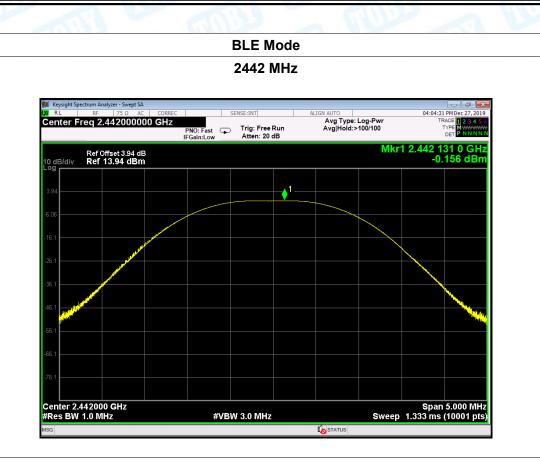


Attachment E-- Peak Output Power Test Data

Temperature:	25 ℃		Relative Humidity: 55%				
Test Voltage:	AC 120V/	20V/60HZ					
Test Mode:	BLE TX N	E TX Mode					
Channel freque	ncy (MHz)	Test Result (dBm)		Limit (dBm)			
2402	2402		73				
2442		-0.156		30			
2480		-0.472					
		BLE	Node				
		2402	MHz				

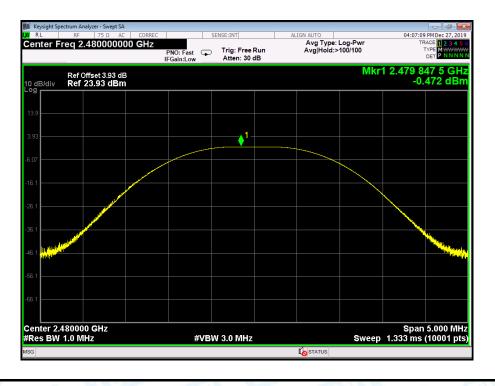






BLE Mode



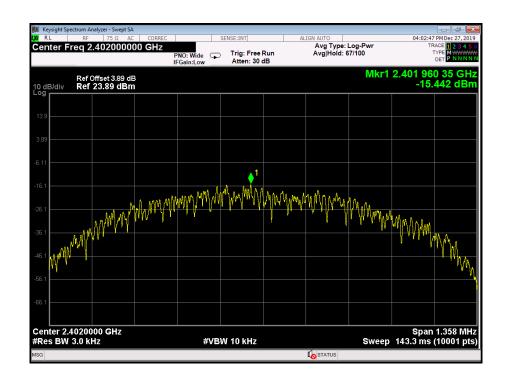


Attachment F-- Power Spectral Density Test Data

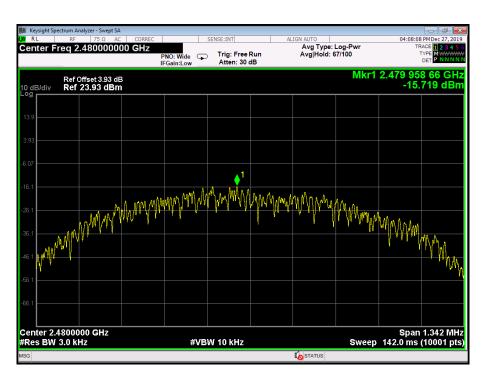
TOBY

Temperature:	25 ℃		Relative H	-lumidity:	55%		
Test Voltage:	AC 120V/	AC 120V/60HZ					
Test Mode:	BLE TX N	BLE TX Mode					
Channel Frequency		Power Density		Lim	Limit (dBm/3KHz)		
(MHz)	(MHz)		(dBm/3KHz)				
2402	2402 2442		142				
2442			15.186 8			PASS	
2480		-15.719					
		BLE N	lode				

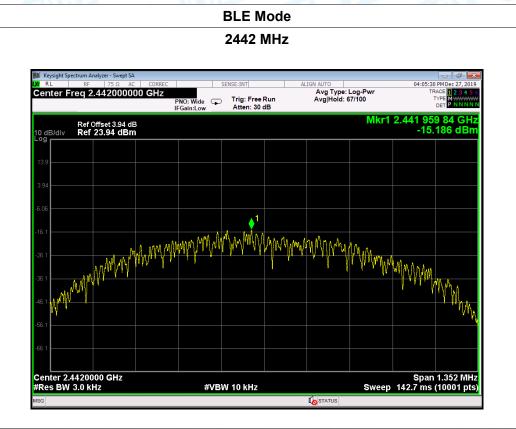
2402 MHz







BLE Mode 2480 MHz



TOBY