

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC166206 Page: 1 of 48

# FCC Radio Test Report FCC ID: XMF-MID7015

#### **Original Grant**

Report No.	-	TB-FCC166206
Applicant	1	Lightcomm Technology Co., Ltd.
Equipment Under	Те	st (EUT)
EUT Name	÷	7"Tablet
Model No.		100005206
Serial Model No.	6	MID7015
Brand Name		onn
Receipt Date	1	2019-05-21
Test Date		2019-05-21 to 2019-05-27
Issue Date		2019-06-10
Standards	:	FCC Part 15: 2017, Subpart C(15.247)
Test Method	÷	ANSI C63.10: 2013
Conclusions		PASS
		In the configuration tested, the EUT complied with the standards specified above,
Test/Witness Engineer		: Jason Xu TECHNOLOG
		2

Supervisor

Engineer

**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.



# Contents

CON	NTENTS	2
1.	GENERAL INFORMATION ABOUT EUT	5
	1.1 Client Information	5
	1.2 General Description of EUT (Equipment Under Test)	
	1.3 Block Diagram Showing the Configuration of System Tested	6
	1.4 Description of Support Units	7
	1.6 Description of Test Software Setting	
	1.7 Measurement Uncertainty	
	1.8 Test Facility	
2.	TEST SUMMARY	10
3.	TEST EQUIPMENT	11
4.	CONDUCTED EMISSION TEST	12
	4.1 Test Standard and Limit	12
	4.2 Test Setup	12
	4.3 Test Procedure	12
	4.4 EUT Operating Mode	13
	4.5 Test Da5ta	13
5.	RADIATED EMISSION TEST	14
	5.1 Test Standard and Limit	14
	5.2 Test Setup	15
	5.3 Test Procedure	16
	5.4 EUT Operating Condition	
	5.5 Test Data	17
6.	RESTRICTED BANDS REQUIREMENT	18
	6.1 Test Standard and Limit	
	6.2 Test Setup	18
	6.3 Test Procedure	
	6.4 EUT Operating Condition	
	6.5 Test Data	
7.	BANDWIDTH TEST	
	7.1 Test Standard and Limit	20
	7.2 Test Setup	
	7.3 Test Procedure	
	7.4 EUT Operating Condition	
	7.5 Test Data	
8.	PEAK OUTPUT POWER TEST	
	8.1 Test Standard and Limit	21
	8.2 Test Setup	
	8.3 Test Procedure	21



	8.4 EUT Operating Condition	21
	8.5 Test Data	
9.	POWER SPECTRAL DENSITY TEST	
	9.1 Test Standard and Limit	
	9.2 Test Setup	22
	9.3 Test Procedure	22
	9.4 EUT Operating Condition	22
	9.5 Test Data	22
10.	ANTENNA REQUIREMENT	
	10.1 Standard Requirement	23
	10.2 Antenna Connected Construction	
	10.3 Result	23
ATTA	ACHMENT A CONDUCTED EMISSION TEST DATA	24
ATTA	ACHMENT B RADIATED EMISSION TEST DATA	28
ATTA	ACHMENT C RESTRICTED BANDS REQUIREMENT TEST DATA	
ATTA	ACHMENT D BANDWIDTH TEST DATA	43
ATTA	ACHMENT E PEAK OUTPUT POWER TEST DATA	45
	ACHMENT F POWER SPECTRAL DENSITY TEST DATA	



Report No.: TB-FCC166206 Page: 4 of 48

# **Revision History**

Report No.	Version	Description	Issued Date
TB-FCC166206	Rev.01	Initial issue of report	2019-06-10
and!		TOPS TO THE TOP TOPS	mobil
TEL S	LORD	A COMPANY REAL	
1000		LED LED	RUDD
TO BE		THE FUEL	
alles and			
and how		TOBI TODI	A DU
L'and			0
al luc		MOBI MODI	
and a			
			3



### 1. General Information about EUT

#### **1.1 Client Information**

Applicant	-	ightcomm Technology Co., Ltd.	
Address	:	NIT 1306 13/F ARION COMMERCIAL CENTRE, 2-12 QUEEN'S OAD WEST, SHEUNG WAN HK	
Manufacturer		luizhou HengDu Electronics Co., Ltd	
Address	•	No.8 Huitai Road, Huinan High-tech Industrial Park, Huiao Avenue, Huizhou, Guangdong, China	

#### 1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	7"Tablet	The states		
Models No.	-	100005206, MID7015			
Model Difference	:	All models are in the same PCB layout interior structure and electrica circuits, The only difference is model.			
		Operation Frequency:	Bluetooth 4.0(BLE): 2402MHz~2480MHz		
		Number of Channel:	Bluetooth 4.0(BLE): 40 channels see note(3)		
Product		RF Output Power:	5.628dBm Conducted Power		
Description		Antenna Gain:	3.02dBi FPC Antenna		
		Modulation Type:	GFSK		
		Bit Rate of Transmitter:	1Mbps(GFSK)		
Power Supply	:	DC Voltage Supply from Adapter(TEKA006-0501000UK). DC Voltage supplied by Li-ion battery.			
Power Rating		TEKA006-0501000UK: Input: AC 100-240V 50/60Hz 0.3A(MAX) Output: DC 5.0V 1A by adapter DC 3.7V by 2100mAh Li-ion battery			
Software Version	:	PPR1.180610.011 relea	PPR1.180610.011 release-keys		
Hardware Version	•	LC-MT8167-REV 0.1			
Connecting I/O Port(S)	Ś	Please refer to the User	's Manual		

Remark: One electronic material suppliers are different, such as display screen.

#### Note:

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

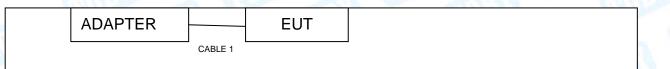


558074 D01 DTS Means Guidance v05.

- (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	1	
13	2428	27	2456		

1.3 Block Diagram Showing the Configuration of System Tested





#### 1.4 Description of Support Units

Cable Information						
Number	Number   Shielded Type   Ferrite Core   Length   Note					
Cable 1	Yes	NO	1.0M	Accessory		

#### 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	Charging+TX Mode (Channel 20)			
	For Radiated Test			
Final Test Mode	Description			
Mode 2	TX Mode (Channel 20)			
Mode 3	TX Mode (Channel 00/20/39)			
Remark: One electronic mater	ial suppliers are different, such as display screen.			

#### 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	MTK Engineer Mode.exe			
Frequency	2402 MHz	2442MHz	2480 MHz	6
BLE GFSK	DEF	DEF	DEF	6

#### 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 <sub>Lab</sub> )
Conducted Emission	Level Accuracy: 9kHz~150kHz	±3.42 dB
AUDO A	150kHz to 30MHz	±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



Report No.: TB-FCC166206 Page: 9 of 48

#### 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.

#### 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

Report No.: TB-FCC166206 10 of 48 Page:

## 2. Test Summary

Standard Section		- 19	M102	
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



# 3. Test Equipment

					Cal. Due
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 18, 2018	Jul. 17, 2019
RF Switching Unit	Switching Unit Compliance Direction Systems RSU-A4 34403 Inc		34403	Jul. 18, 2018	Jul. 17, 2019
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 18, 2018	Jul. 17, 2019
LISN	Rohde & Schwarz	ENV216	101131	Jul. 18, 2018	Jul. 17, 2019
Radiation Emissic	on Test				-
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 18, 2018	Jul. 17, 2019
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 18, 2018	Jul. 17, 2019
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
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 14, 2018	Jul.13, 2019
Pre-amplifier	Sonoma	310N	185903	Mar.04, 2019	Mar. 03, 2020
Pre-amplifier	HP	8449B	3008A00849	Mar.03, 2019	Mar. 02, 2020
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.03, 2019	Mar. 02, 2020
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducte	ed Emission			_	
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 18, 2018	Jul. 17, 2019
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 18, 2018	Jul. 17, 2019
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 15, 2018	Sep. 14, 2019
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 15, 2018	Sep. 14, 2019
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Sep. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 15, 2018	Sep. 14, 2019
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Sep. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	Sep. 15, 2018	Sep. 14, 2019



### 4. Conducted Emission Test

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

Eroguopov	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			

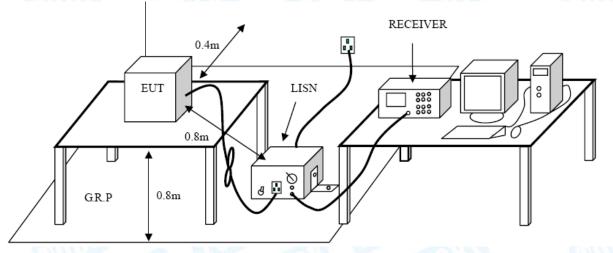
Notes:

(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.



### 5. 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 Met	ers(at 3m)	
(MHz)	Peak (dBuV/m)	Average (dBuV/m)	
Above 1000	74	54	

#### Note:

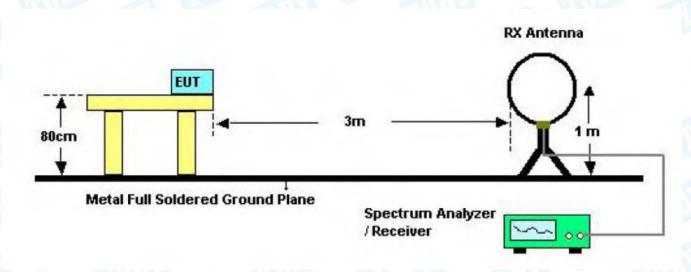
(1) The tighter limit applies at the band edges.

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

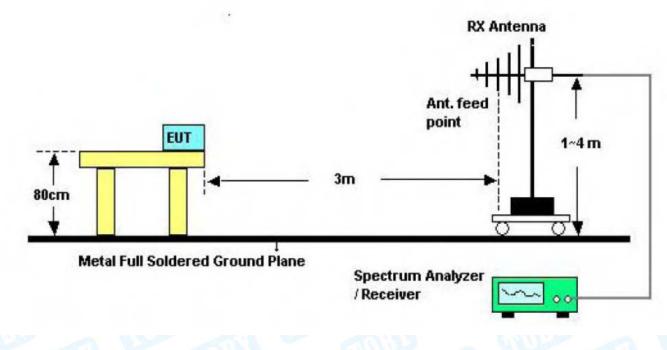


Report No.: TB-FCC166206 Page: 15 of 48

5.2 Test Setup

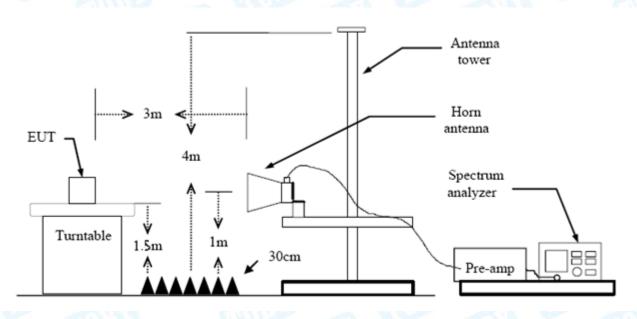


Below 30MHz Test Setup



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.



Report No.: TB-FCC166206 Page: 17 of 48

#### 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.

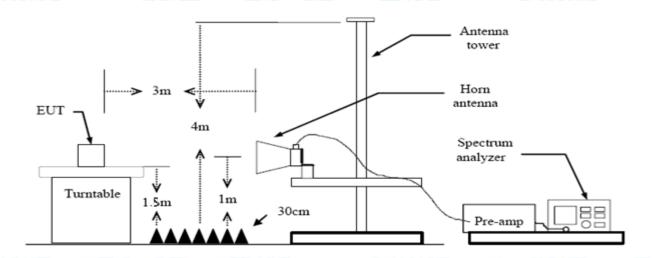


### 6. Restricted Bands Requirement

- 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.

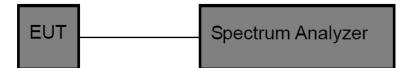


### 7. Bandwidth Test

- 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.

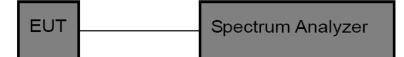


### 8. Peak Output Power Test

- 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 v05.

- (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.

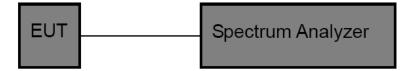


### 9. Power Spectral Density Test

- 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(MHz)						
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 v05.

- (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.



### 10. 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 3.02dBi, 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 a FPC Antenna. It complies with the standard requirement.

Antenna Type			
	Permanent attached antenna		
a US	Unique connector antenna		
	Professional installation antenna		

### **Attachment A-- Conducted Emission Test Data**

TOBY

Tempera	ture:	<b>24</b> ℃			Relative Hu	midity:	55%	- MA
Test Volt	age:	AC 1	20V 60Hz		21 6	6	and	
Terminal	:	Line	2	010		<u>a</u> 1		A DAY
Test Mod	le:	Mode	ə 1				~	BAR
Remark:		Only	worse case	e is reported		-	643	
90.0 dBuV				Enter and the second				
-10		0.9	5 Reading	(MHz)	5 Measure-			30.000
No. Mk	. Fr	eq.	Level	Factor	ment	Limit	Over	
	M	Ηz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.17	00	24.13	9.58	33.71	64.96	-31.25	QP
2	0.17	00	11.34	9.58	20.92	54.96	-34.04	AVG
3	0.27	40	23.24	9.59	32.83	60.99	-28.16	QP
4	0.27	40	11.97	9.59	21.56	50.99	-29.43	AVG
5	0.41	40	32.07	9.60	41.67	57.57	-15.90	QP
6 *	0.41	40	22.89	9.60	32.49	47.57	-15.08	AVG
7	0.83	340	27.88	9.61	37.49	56.00	-18.51	QP
8	0.83	340	15.01	9.61	24.62	46.00	-21.38	AVG
9	1.08	320	20.07	9.60	29.67	56.00	-26.33	QP
10	1.08	320	12.28	9.60	21.88	46.00	-24.12	AVG
11	13.89	940	19.11	10.38	29.49	60.00	-30.51	QP



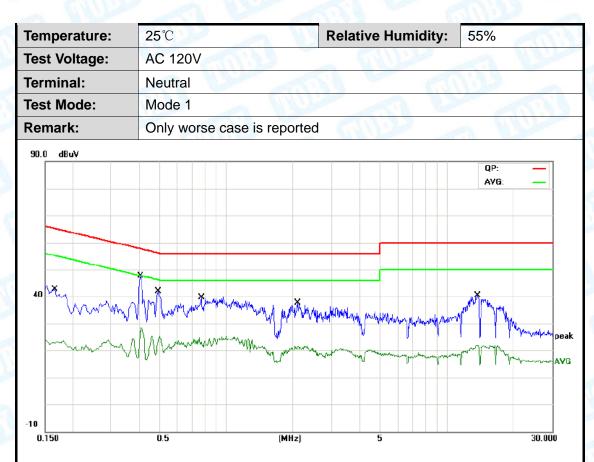
Temperatu	Jre: 2	2 <b>5</b> ℃		Relative H	lumidity:	55%	ant's		
Fest Volta	oltage: AC 120V								
Terminal:	N	Neutral							
Fest Mode	≱: N	Mode 1							
Remark:	C	Only worse cas	e is reported	(()) t	2		10		
90.0 dBuV		· · · · · · · · · · · · · · · · · · ·			· · · · · ·				
						QP: AVG:	_		
X X	Mu								
40 WWWW	month	monoral mander	X.			A well for			
	M	h. m. Mymman	Philipping the month of the second	where and have the way the way	Any work works served	Wanter and P	Waytowaw pe		
	V V V		James and the		maria	mun magain	marmal AV		
0 0.150		0.5	(MHz)	5			30.000		
0.100		Reading	Correct	Measure-					
No. Mk.	Freq.		Factor	ment	Limit	Over			
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector		
1	0.1582	2 29.99	9.64	39.63	65.55	-25.92	QP		
2	0.1582	2 14.62	9.64	24.26	55.55	-31.29	AVG		
3	0.2340	) 25.31	9.62	34.93	62.30	-27.37	QP		
4	0.2340	) 12.90	9.62	22.52	52.30	-29.78	AVG		
5 *	0.4260		9.58	42.42		-14.91	QP		
6	0.4260		9.58	29.60		-17.73	AVG		
7	0.8220		9.59	34.70		-21.30	QP		
						-18.15			
8	0.8220		9.59	27.85			AVG		
9	1.1980		9.59	29.52		-26.48	QP		
10	1.1980	) 14.73	9.59	24.32	46.00	-21.68	AVG		
10	14.0180	) 16.89	10.54	27.43	60.00	-32.57	QP		
10	14.0100								



### Material difference sample

Temperature	: 24°C		288	Relative Hum	idity:	55%	ALC:
Test Voltage:		20V 60Hz					
Terminal:	Line	3	110				130
Test Mode:	Mode	e 1		600	0	~	TUP
Remark:	Only	worse case	is reported	ł	-	AL.	
90.0 dBuV	· · · ·			1 1 1			
40 MmM	mm	My Mining	hunn Man M	Emphantin and a second se	an mana		i:
-10	0.5	j	(MHz)	5			30.000
	_	Reading	Correct		1.1	0	
No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
	MHz	Level dBuV	Factor dB	ment dBuV	dBuV	dB	Detector
		Level	Factor	ment	dBuV		Detector QP
1 * (	MHz	Level dBuV	Factor dB	ment dBuV	dBuV 57.65	dB	
1 * (	MHz 0.4100	Level dBuV 33.42	Factor dB 9.77	ment dBuV 43.19	dBuV 57.65 47.65	dB -14.46	QP
1 * ( 2 ( 3 (	MHz 0.4100 0.4100	Level dBuV 33.42 18.01	Factor dB 9.77 9.77	ment dBuV 43.19 27.78	dBuV 57.65 47.65 56.03	dB -14.46 -19.87	QP AVG
1 * ( 2 ( 3 ( 4 (	MHz 0.4100 0.4100 0.4980	Level dBuV 33.42 18.01 26.79	Factor dB 9.77 9.77 9.79	ment dBuV 43.19 27.78 36.58	dBuV 57.65 47.65 56.03 46.03	dB -14.46 -19.87 -19.45	QP AVG QP
1 * ( 2 ( 3 ( 4 ( 5 (	MHz 0.4100 0.4100 0.4980 0.4980	Level dBuV 33.42 18.01 26.79 15.13	Factor dB 9.77 9.77 9.79 9.79 9.79	ment dBuV 43.19 27.78 36.58 24.92	dBuV 57.65 47.65 56.03 46.03 56.00	dB -14.46 -19.87 -19.45 -21.11	QP AVG QP AVG QP
1 * ( 2 ( 3 ( 4 ( 5 ( 6 (	MHz 0.4100 0.4100 0.4980 0.4980 0.4980 0.8980	Level dBuV 33.42 18.01 26.79 15.13 22.63	Factor dB 9.77 9.77 9.79 9.79 9.79 9.84	ment dBuV 43.19 27.78 36.58 24.92 32.47	dBuV 57.65 47.65 56.03 46.03 56.00 46.00	dB -14.46 -19.87 -19.45 -21.11 -23.53	QP AVG QP AVG
1 * ( 2 ( 3 ( 4 ( 5 ( 6 ( 7 )	MHz 0.4100 0.4100 0.4980 0.4980 0.4980 0.8980 0.8980 1.1300	Level dBuV 33.42 18.01 26.79 15.13 22.63 12.03 24.33	Factor dB 9.77 9.77 9.79 9.79 9.84 9.84 9.88	ment dBuV 43.19 27.78 36.58 24.92 32.47 21.87 34.21	dBuV 57.65 47.65 56.03 46.03 56.00 46.00 56.00	dB -14.46 -19.87 -19.45 -21.11 -23.53 -24.13	QP AVG QP AVG QP AVG QP
1 * ( 2 ( 3 ( 4 ( 5 ( 6 ( 7 ) 8 )	MHz 0.4100 0.4100 0.4980 0.4980 0.8980 0.8980 0.8980 1.1300 1.1300	Level dBuV 33.42 18.01 26.79 15.13 22.63 12.03 24.33 14.56	Factor dB 9.77 9.77 9.79 9.79 9.84 9.84 9.88 9.88	ment dBuV 43.19 27.78 36.58 24.92 32.47 21.87 34.21 24.44	dBuV 57.65 47.65 56.03 46.03 56.00 46.00 56.00 46.00	dB -14.46 -19.87 -19.45 -21.11 -23.53 -24.13 -21.79 -21.56	QP AVG QP AVG QP AVG QP AVG
1 * 0   2 0   3 0   4 0   5 0   6 0   7 *   8 *   9 2	MHz 0.4100 0.4100 0.4980 0.4980 0.8980 0.8980 0.8980 1.1300 1.1300 2.3179	Level dBuV 33.42 18.01 26.79 15.13 22.63 12.03 24.33 14.56 18.58	Factor dB 9.77 9.77 9.79 9.79 9.84 9.84 9.88 9.88 9.88	ment dBuV 43.19 27.78 36.58 24.92 32.47 21.87 34.21 24.44 28.44	dBuV 57.65 47.65 56.03 46.03 56.00 46.00 56.00 46.00	dB -14.46 -19.87 -19.45 -21.11 -23.53 -24.13 -21.79 -21.56 -27.56	QP AVG QP AVG QP AVG QP AVG QP
1 * 0   2 0   3 0   4 0   5 0   6 0   7 *   8 *   9 2   10 2	MHz 0.4100 0.4100 0.4980 0.4980 0.8980 0.8980 0.8980 1.1300 1.1300	Level dBuV 33.42 18.01 26.79 15.13 22.63 12.03 24.33 14.56	Factor dB 9.77 9.77 9.79 9.79 9.84 9.84 9.88 9.88	ment dBuV 43.19 27.78 36.58 24.92 32.47 21.87 34.21 24.44	dBuV 57.65 47.65 56.03 46.03 56.00 46.00 56.00 46.00 56.00	dB -14.46 -19.87 -19.45 -21.11 -23.53 -24.13 -21.79 -21.56	QP AVG QP AVG QP AVG QP AVG





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1660	25.45	9.68	35.13	65.15	-30.02	QP
2		0.1660	11.84	9.68	21.52	55.15	-33.63	AVG
3	*	0.4100	33.52	9.72	43.24	57.65	-14.41	QP
4		0.4100	15.22	9.72	24.94	47.65	-22.71	AVG
5		0.4900	25.27	9.72	34.99	56.17	-21.18	QP
6		0.4900	13.55	9.72	23.27	46.17	-22.90	AVG
7		0.7700	24.20	9.73	33.93	56.00	-22.07	QP
8		0.7700	12.68	9.73	22.41	46.00	-23.59	AVG
9		2.1060	21.08	9.80	30.88	56.00	-25.12	QP
10		2.1060	11.39	9.80	21.19	46.00	-24.81	AVG
11		13.8060	22.59	9.94	32.53	60.00	-27.47	QP
12		13.8060	10.81	9.94	20.75	50.00	-29.25	AVG



### **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:	<b>25℃</b>	arup	<b>Relative Humi</b>	dity:	55%	,	
Fest Voltage:	DC 3.7V	21	6032		19	(U)	
Ant. Pol.	Horizontal			<u> </u>			5
fest Mode:	Mode 2	GUD2			1		
Remark:	Only worse	e case is reported		-	U III	1	
80.0 dBuV/m		· · · ·					
				(RF)FCC	15C 3M R	adiation	
					M	argin -6 o	ab F
30	ſ						c
30	3		4	5 X		1	, ž
	2		MMM	malin	rund	M.M.	
1		1 I.	3.4 p/				
MM 1	Ť	Jan man mark mark	mann				
		monorman	Managara				
		- man man					
		hummonoume					

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		46.9948	36.00	-22.24	13.76	40.00	-26.24	QP
2		67.2022	37.11	-23.74	13.37	40.00	-26.63	QP
3		87.7248	41.64	-22.10	19.54	40.00	-20.46	QP
4		289.0021	40.67	-16.42	24.25	46.00	-21.75	QP
5		410.3825	37.21	-12.21	25.00	46.00	-21.00	QP
6	*	887.6099	30.34	-4.08	26.26	46.00	-19.74	QP

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



Temperature:	<b>25℃</b>		Relative Humic	lity: 58	5%
Test Voltage:	DC 3.7V		E TU		
Ant. Pol.	Vertical	1		(Ind)	30
Test Mode:	Mode 2				
Remark:	Only wors	e case is report	ed		1 Due
80.0 dBuV/m					
				(RF)FCC 150	C 3M Radiation
					Margin -6 dB
30					6
		2	3 X 4	. the head had	5 Martin Martin
mm /	hand and the second		many mark me	mound	
	Column 1	markarkarkark			
-20 30.000 40 50	0 60 70 80	(MI	Iz) 300	400 500	600 700 1000.00
		(***	-, 300	405 500	000 100 1000.00
		ading Corre	ect Measure-		
No. Mk. F	req. L	evel Fact	or ment	Limit	Over
N	MHz (	dBuV dB/m	dBuV/m	dBuV/m	dB Detecto
		dD/m			

		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	47.9940	45.92	-22.57	23.35	40.00	-16.65	QP
2		85.8984	40.05	-22.21	17.84	40.00	-22.16	QP
3		181.9202	36.70	-20.10	16.60	43.50	-26.90	QP
4		284.9767	30.85	-16.49	14.36	46.00	-31.64	QP
5		539.4775	28.66	-9.43	19.23	46.00	-26.77	QP
6		724.2611	29.68	-6.70	22.98	46.00	-23.02	QP

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



#### Material difference sample

#### 30MHz~1GHz

Ten	nperatu	re:	26	<b>6°</b> ℃			2	60	Relative H	lumidi	ty:	5	5%		_	
Tes	t Voltag	je:	D	C 3.	.7V								1	1	199	
Ant	t. Pol.		Н	oriz	onta	al					2					2
Tes	t Mode:		М	lode	2			199		5			2		2	
Rer	mark:		0	nly	wor	se	case i	is reported					a		3	
80.0	0 dBuV/m	-		-						-	-	_		_	- -	
30	1				2	3		mmm	4		6 6			liation gin -6	L   d	
-20 30	0.000 40	<u> </u>	06	60 7	70 8	0		(MHz)		300	400	500	600	700	1000.0	
JU	1.000 40	י ( 	J 0	, U,							400	000	600	700	1000.0	.00
N	lo. Mk.	. F	Freq	<b>]</b> .		lea Lev	ding vel	Correct Factor			imit		Ove	e		
			MHz			dB	uV	dB/m	dBuV/m	ı di	BuV/r	m	dB		Detec	tor
							77	44.04	40.40		0.00	)	-20.	87	QF	)
1		32	.179	)4		33.	. ( (	-14.64	19.13	4	0.00					
1 2			.179 .321			33. 37.		-14.64 -22.79	19.13		10.00	)	-25.	37	QF	)
		77		12	1		.42			4			-25. -20.		QF QF	
2		77 87	.321	12 18		37. 41.	.42	-22.79	14.63	4	10.00	0		46		þ
2		77. 87. 188	.321 .724	12 18 24		37. 41. 41.	.42 .64	-22.79 -22.10	14.63 19.54	4	10.00 10.00	D D	-20.	46 32	QF	) )

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



Temperatu	re: 26℃		Re	lative Humi	idity:	55%	
Test Voltag	e: DC 3	.7V	10	10	200		199
Ant. Pol.	Vertio	cal	-		(mal)	162	-
Test Mode:	Mode	2	A RUE			A	
Remark:	Only	worse case i	s reported	(U)	2		
80.0 dBuV/m							
30	2	3 3 M	4 × ×	6 6 	(RFJFCC	15C 3M Radiatio Margin -t	
30.000 40	50 60	70 80	(MHz)	300	400	500 600 700	1000.00
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detecto
1	35.2511	36.98	-16.87	20.11	40.00	-19.89	QP
2 *	47.9939	44.92	-22.57	22.35	40.00	-17.65	QP
3	85.2980	42.79	-22.24	20.55	40.00	-19.45	QP
4	130.8369	39.08	-22.44	16.64	43.50	-26.86	QP
	100 5000	44.04	20.54	24.40	43.50	-22.40	
5	169.5989	41.64	-20.54	21.10	45.50	-22.40	QP

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

# TOBY

#### Above 1GHz

em	perature:	<b>25</b> ℃			Relative Hu	imidity:	55%
<b>Fest</b>	Voltage:	DC 3.7	V		2 19		
Ant.	Pol.	Horizor	ntal	(III)		199	
<b>Fest</b>	Mode:	BLE M	ode TX 240	2 MHz	2003	5	6115
Rem	ark:	No rep	ort for the e	mission w	hich more th	an 10 dB	below the
prescribed limit.						20	
100.0	dBuV/m						
-						(RF) FCC	PART 15C (PEAK)
	2 X						
	X					(RF) FCC	PART 15C (AVG)
50 _	1 X						
-	^						
-							
0.0	0.000 3550.00	6100.00 8	650.00 11200	.00 13750.00	16300.00 18	350.00 2140	0.00 26500.00

No.	Mk	. Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.312	28.40	14.43	42.83	54.00	-11.17	AVG
2		4804.864	42.78	14.44	57.22	74.00	-16.78	peak



ſen	perature:		<b>25</b> ℃			Relative	Humidity:	55%	
<b>Tes</b>	t Voltage:		DC 3.	7V	132	5	RUPP -		
۱nt	. Pol.		Vertica	al	-	118	61	132	
es	t Mode:		BLE N	lode TX 2	2402 MHz	2			
Ren	nark:		No report for the emission which more than 10 dB below the						
			presci	ibed limit		a v		13	
00.0	dBu¥/m								
							(RF) FC	C PART 15C (PEAK)	
		1 X					(00) 0		
50		^					(RF) F	CC PART 15C (AVG)	
50		2 X							
0.0									

No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4804.006	42.65	14.43	57.08	74.00	-16.92	peak
2	*	4804.330	28.40	14.43	42.83	54.00	-11.17	AVG



emperat	ure:	<b>25</b> ℃		Rela	Relative Humidity: 55%				
est Volta	ige:	DC 3.7	V		all market				
nt. Pol.		Horizor	ntal	1200		152			
est Mod	10								
Remark:		No report for the emission which more than 10 dB below the prescribed limit.							
100.0 dBuV/	m								
					(RF) FCC	PART 15C (PEAK)			
	1 X				(BE) EC	C PART 15C (AVG)			
50									
	2 X								
0.0									

No.	Mk. Freq.		Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4884.198	43.43	14.92	58.35	74.00	-15.65	peak
2	*	4884.924	28.68	14.93	43.61	54.00	-10.39	AVG



Гem	perature	:	<b>25</b> ℃			Relative H	umidity:	55%		
Test	Voltage		DC 3.7V							
Ant.	Pol.		Vertical	1000	-	20	Gall	152		
Test	Mode:		BLE Mo	de TX 24	42 MHz	/				
Rem	nark:		No report for the emission which more than 10 dB below the prescribed limit.							
100.0	dBuV/m									
							(RF) FCC	PART 15C (PEAK)		
-										
		1 X					(RF) FC	PART 15C (AVG)		
50		2								
-		x								
0.0	0.000 3550.0	0 6	100.00 865	50.00 1120	0.00 13750.		3850.00 2140	0.00 26		

No	. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4884.258	43.27	14.93	58.20	74.00	-15.80	peak
2	*	4885.158	28.66	14.93	43.59	54.00	-10.41	AVG



Tempera	ture:	<b>25</b> ℃		Relative Hu	midity:	55%			
Test Volt	age:	DC 3.7V							
Ant. Pol.		Horizonta	al		Gal	133			
Test Mod	le:	BLE Mod	le TX 2480 MI	Hz					
Remark:		No report for the emission which more than 10 dB below the prescribed limit.							
100.0 dBu¥	/m								
					(RF) FCC	PART 15C (PEAK)			
	1 X				(RF) FCC	PART 15C (AVG)			
50	2								
	×								
0.0									

No	o. Mk. Freq.		Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.690	42.80	15.40	58.20	74.00	-15.80	peak
2	*	4961.002	28.66	15.40	44.06	54.00	-9.94	AVG



Temperature:	<b>25℃</b>	Relative Humidity:55%							
Test Voltage:	DC 3.7V								
Ant. Pol.	Vertical	603							
fest Mode:	BLE Mode TX 2480	BLE Mode TX 2480 MHz							
Remark:	No report for the er prescribed limit.	mission which more than 10 dB below the							
00.0 dBu∀/m									
		(RF) FCC PART 15C (PEAK)							
1									
×		(RF) FCC PART 15C (AVG)							
50 2									
×									

No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.268	43.54	15.39	58.93	74.00	-15.07	peak
2	*	4961.224	28.65	15.40	44.05	54.00	-9.95	AVG



# **Attachment C-- Restricted Bands Requirement Test Data**

Temperature:	: <b>25</b> ℃	R	elative Humidity:	: 55%
Test Voltage:	DC 3.7V			
Ant. Pol.	Horizontal	51	6000	
Test Mode:	BLE Mode TX 24	402 MHz		
Remark:	N/A	MIDS		9
110.0 dBuV/m				
				4 ×
			H)	RF) FCC PART 15C (PEAK)
60				(RF) FCC PART 15C (AVG)
				1
				×
				2 X
10.0				
2309.000 2319.00	0 2329.00 2339.00	2349.00 2359.00	2369.00 2379.00	2389.00 240
l				
	Readin	g Correct	Measure-	
No. Mk.	Freq. Level	Factor	ment Lir	mit Over
	MHz dBuV	dB/m	dBuV/m dB	BuV/m dB D
1 23	390.000 43.02	2.82	45.84 74	4.00 -28.16
2 23	390.000 31.31	2.82	34.13 54	4.00 -19.87
3 X 24	402.000 72.07	2.87	74.94 Fundan	mental Frequency



Tem	peratu	re:	<b>25°</b> ℃				Rel	ative	Hun	nidity:	55%		
Test	Voltag	ge:	DC 3	.7V	10	30			40	100		160	
Ant.	Pol.		Vertic	al			2		100	Ind	132		-
Test	Mode	:	BLE	Mode T	<sup>-</sup> X 24	02 MHz	1		~			3	
Rem	ark:		N/A	-		$\sim$		1		2			
100.0	dBuV/m												_
												4 X	
										(RF) FCC	PART 15C (P	EAK	
												Ň	
										(RF) FC	C PART 15C (	4461	
50											1 X	$/ \langle$	
												/ \	$\downarrow$
											2 *		1
0.0													
23	08.000 23	18.00	2328.00	2338.00	) 23	48.00 235	8.00	2368.0	)0 2	378.00 2388	.00	2408.0	о мн
		-		Rea		Corre		Meas		Limit	Over		
N	o. Mk.		req.	Lev		Facto	or	me					
		N	1Hz	dBi	uV	dB/m		dBu	V/m	dBuV/m	dB	Det	tecto
1		2390	0.000	43.	52	2.82		46.	34	74.00	-27.6	6 p	eak
2		2390	0.000	31.	16	2.82		33.	98	54.00	-20.0	2 A	VG
3	Х	2402	2.000	67.	55	2.87		70.	42	– Fundamenta	I Frequenc	y A	VG
4	*	2400	2.200	90.	03	2.87		93.	80	– Fundamenta	l Frequenc	v n	eak



Гетр	eratu	re:	<b>25℃</b>	:02				Rela	tive l	Humidit	y:	55%		
Test \	Voltag	ge:	DC :	3.7V	n'i			~	24	Job C			AT A	
Ant. F	Pol.		Hori	zontal			6		100	6	77	132		~
Test I	Node	:	BLE	Mode T	X 24	80 MHz			-			-	2	8
Rema	ark:		N/A	-				5		P	1	2	NAR.	
110.0	dBuV/n	1												_
	×													
														1
	2									(RF)	FCC	PART 15C (PI	EAK]	
		4												
60													wei	
		3 X									·jru	: PART 15C (	4903	-
F	)								_					-
10.0 2472	2.000 24	82.00	2492.00	2502.00	251	2.00 252	2.00	2532	2.00	2542.00	2552	.00	2572.00	_  
				Readi	na	Correc	•t	Mea	curo					
No.	Mk.	Fr	eq.	Leve	-	Facto			ent	Lim	it	Over		
		M	Ηz	dBu\	/	dB/m		dBu	JV/m	dBu\	//m	dB	Dete	ecto
1	*	2479	600	102.5	56	3.38		10	5.94	Fundame	ntal	Frequency	pe	ak
2	Х	2480		74.8		3.38			3.23	_		Frequency		
3		2483		48.0		3.41			.43	54.	00	-2.57		
4														
4		2483	000	62.4		3.41		65	5.82	74.	UU	-8.18	3 pe	aĸ



							_							-
ſemp	peratu	re:	<b>25°</b> ℃	1010		a	Re	ative	e Hun	nidity	:	55%	-	2
lest \	Voltag	ge:	DC 3	.7V		30			211		2	~	A.R.	
Ant. I	Pol.		Vertic	al	100				V		1	152		R.
lest l	Mode	:	BLE I	Mode	TX 248	30 MHz				5	C)	-	3	
Rema	ark:		N/A		697	5		5	00	9	1			
100.0	dBu¥/m													_
		x												
		2								(F	RF) FCC	PART 15C (PI	EAK)	
		Ň												
		/ \ 3												
50		×									(RF) FC	C PART 15C	AVG)	-
	/	X												
M	$\sim$									_				
0.0														
2469	9.000 24	79.00	2489.00	2499	.00 25	09.00 251	9.00	2529	).00	2539.00	2549	.00	2569.00	M
				Re	ading	~	- 4							
				T\C	auing	Corre		viea	sure-			-		
No.	. Mk.	F	eq.		evel	Facto			sure- ent		nit	Over		
No.	. Mk.		req. Hz	Le				me		Lir	nit u∨/m	Over dB	Dete	ecto
	. Mk.	М		Le	evel	Facto	or	dBu	ent uV/m	Lir dB	uV/m			
1		М	Hz .600	Le di 92	evel <sup>BuV</sup>	Facto dB/m	or	dBu 95	ent iV/m i.59	Lir dB Fundan	uV/m nental	dB	pe	al
No. 1 2 3	*	м 2479	Hz .600 .800	Le di 92 68	evel <sup>BuV</sup> 2.21	Factor dB/m 3.38	or	me dBu 95 71	ent iV/m i.59	Lir dB Fundan Fundan	uV/m nental	dB Frequency	pe A	ecto eal



### (2) Conducted Test

perature:	<b>25</b> ℃	1.2.2	Relative Humidity:	55%
t Voltage:	DC 3.7V			an BL
t Mode:	BLE Mode TX	2402MHz / B	LE Mode TX 2480M	1Hz
nark:	The EUT is pro	gramed in co	ntinuously transmit	ting mode
Keysight Spectrum		SENSE:INT	ALIGN AUTO	01:34:46 AM May 22, 2019
	2.356000000 GHz	ast 😱 Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNN
Ret	IFGain: f Offset 3.61 dB ef 23.61 dBm	Low Atten: 30 dB		/kr1 2.402 2 GHz
10 dB/div Re	ef 23.61 dBm			3.079 dBm
3.61				<b>\</b>
-6.39 -16.4				-17.01 dBm
-26.4 -36.4				
-46.4			<b>↓</b>	3
-56.4		anderdige and a single of the second free of the second second second second second second second second second		abilites (not equal to the second
Start 2.30600 #Res BW 100		#VBW 300 kHz	Sween	Stop 2.40600 GHz 9.600 ms (1001 pts)
	L X	Y FUNCTION	-	NCTION VALUE
2 N 1 f 3 N 1 f	2.400 0 GHz 2.390 0 GHz	3.079 dBm -52.360 dBm -56.010 dBm		
4 N 1 f 5 6	2.379 7 GHz	-53.206 dBm		E
8				
9				
9 10 11				
10		m	STATUS	*
		m SENSE:INT		01:40:30 AM May 22, 2019
10 11 MSG MSG Keysight Spectrum VX R R	F 75 Ω AC CORREC 2.526000000 GHz PNO: 1	sense:inti at	ALIGN AUTO	01-40:30 AM May 22, 2019 01-40:30 AM May 22, 2019 TYPE M 444 DEP PINNINN
10 11 MSG Keysight Spectrum (XI R RF Center Freq	F 75 Ω AC CORREC 2.526000000 GHz PNO: I IFGain:	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET P NNNN Akr1 2,480 0 GHz
10 11 MSG Keysight Spectrum (XI R RF Center Freq	F 75 Ω AC CORREC 2.526000000 GHz PNO: 1	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75 Ω AC CORREC 2.526000000 GHz PNO: I IFGain:	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET P NNNN Akr1 2,480 0 GHz
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75 Ω AC CORREC 2.526000000 GHz PNO: I IFGain:	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET P NNNN Akr1 2,480 0 GHz
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75 Ω AC CORREC 2.526000000 GHz PNO: I IFGain:	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 2 3 4 5 6 TYPE M WWWWW DET P NNNNN Akr1 2.480 0 GHz 3.542 dBm
10 11 MSG MSG Center Freq 10 dB/div Re 10 dB/div Re 13 6 13 6 1 - 6.39 -16.4 -26.4 -46.4	F 75.9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB f 23.61 dBm	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 2 3 4 5 6 TYPE M WWWWW DET P NNNNN Akr1 2.480 0 GHz 3.542 dBm
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75.9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB f 23.61 dBm	ast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 2 2 3 4 5 6 TYPE M WWWWW DET P NNNNN Akr1 2.480 0 GHz 3.542 dBm
10 11 MSG	F 75 9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB f 23.61 dB f 33.61 d	ast Low Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May 22, 2019 TRACE 12 3 4 5 6 TYPE M WWWWW DET P N N N N Akr1 2:480 0 GHz 3.542 dBm -16 55 dbm -16 55 dbm Stop 2:57600 GHz
10 11 MSG MSG Center Freq 10 dB/div Re 10 dB/div Re 13 6 13 6 13 6 13 6 14 -56 4 -56 4 -56 4 -56 4 Start 2.47600 #Res MU 100 MRR MDD TRC SCI	F 75 9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB 2.3.61 dBm 2.3.61 dBm 4.4 4.4 4.4 4.4 4.4 4.4 4.4 4.	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May22, 2019 TRACE 12 3 4 5 G TYPE MANNAN DET P NN NN NN Akr1 2.480 0 GHz 3.542 dBm
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75 9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB of 23.61 dBm 2.44 2.44 4.45 CHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May22, 2019 TRACE 12 3 4 15 6 Type 14 23 4 15 6 Type 14 24 4 10 6 Akr1 2.480 0 GHz 3.542 dBm 
10 11 MSG	F 75 9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB of 23.61 dBm 2.44 2.44 4.45 CHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May22, 2019 TRACE 12 3 4 15 6 Type 14 23 4 15 6 Type 14 24 4 10 6 Akr1 2.480 0 GHz 3.542 dBm 
10 11 MSG MSG MSG MSG MSG MSG MSG MSG	F 75 9. AC CORREC 2.526000000 GHz PNO: IFGain: f Offset 3.61 dB of 23.61 dBm 2.44 2.44 4.45 CHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:40:30 AM May22, 2019 TRACE 12 3 4 15 6 Type 14 23 4 15 6 Type 14 24 4 10 6 Akr1 2.480 0 GHz 3.542 dBm 



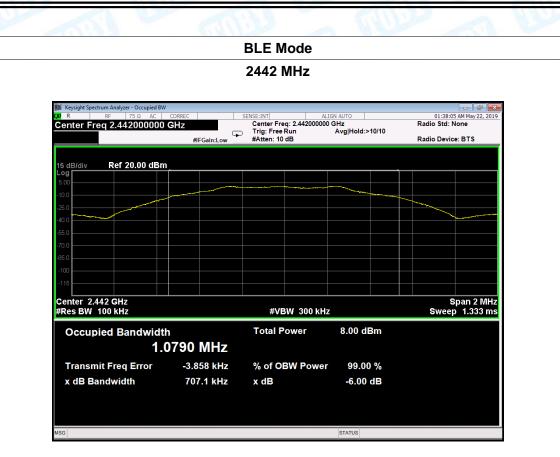
# Attachment D-- Bandwidth Test Data

Temperature:	<b>25</b> ℃		Relative Humidity:	55%	
Test Voltage:	DC 3	8.7V		mill -	
Test Mode:	BLE	TX Mode			
Channel frequency		6dB Bandwidth	99% Bandwidth	Limit	
(MHz)		(kHz)	(kHz)	(kHz)	
2402		707.4	1079.8		
2442		707.1	1079.0	>=500	
2480		705.7	1079.9	-	

### BLE Mode

Keysight Spectrum Analyzer - Occupied BW R RF 75 Ω AC	CORREC	SENSE:INT ALIG	IN AUTO	01:34:00 AM May 22, 2019 Radio Std: None
Center Freq 2.402000000	#IFGain:Low	T 1	Avg Hold:>10/10	Radio Device: BTS
5 dB/div Ref 20.00 dBm				
5.00				
0.0				
25.0				
70.0				
35.0				
100				
115				
enter 2.402 GHz				Span 2 MHz
Res BW 100 kHz		#VBW 300 kHz		Sweep 1.333 m
Occupied Bandwidt	า	Total Power	6.10 dBm	
1.0	0798 MHz			
Transmit Freq Error	-3.229 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	707.4 kHz	x dB	-6.00 dB	





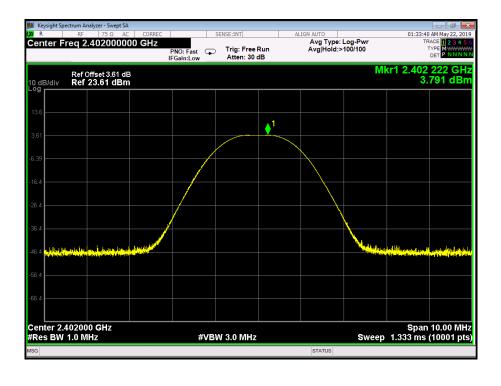
#### BLE Mode

Keysight Spectrum Analyzer - Occupied BW     R   RF   75 Ω   AC	CORREC		GN AUTO	01:39:49 AM May 22, 20
enter Freq 2.480000000		Center Freq: 2.480000000 Trig: Free Run	GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
0 dB/div Ref 20.00 dBm	r			
10.0				
0.00				
10.0				
20.0				
80.0				
40.0				
50.0				
60.0				
70.0				
Center 2.48 GHz				Span 2 MF
Res BW 100 kHz		#VBW 300 kHz		Sweep 1.333 m
Occupied Bandwidth	า	Total Power	7.29 dBm	
1.0	)799 MHz			
	-5.512 kHz	% of OBW Power	99.00 %	
Transmit Freq Error				
Transmit Freq Error x dB Bandwidth	705.7 kHz	x dB	-6.00 dB	
	705.7 kHz	x dB	-6.00 dB	
	705.7 kHz	x dB	-6.00 dB	
	705.7 kHz	x dB	-6.00 dB	

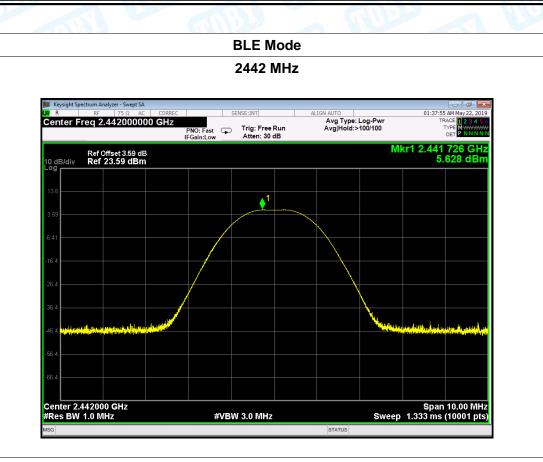


## **Attachment E-- Peak Output Power Test Data**

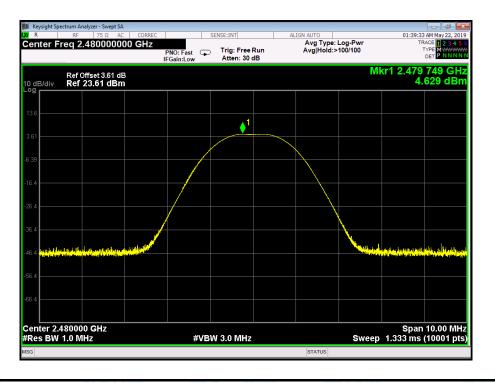
Temperature:	<b>25</b> ℃	Rel	ative Humidity:	55%	
Test Voltage:	DC 3.7V	L'AL		mill -	
Test Mode:	BLE TX M	lode			
Channel frequen	icy (MHz)	Test Result (d	Limit (dBm)		
2402		3.791			
2442		5.628		30	
2480		4.629			
		BLE Mod	9		
		2402 MH	2		





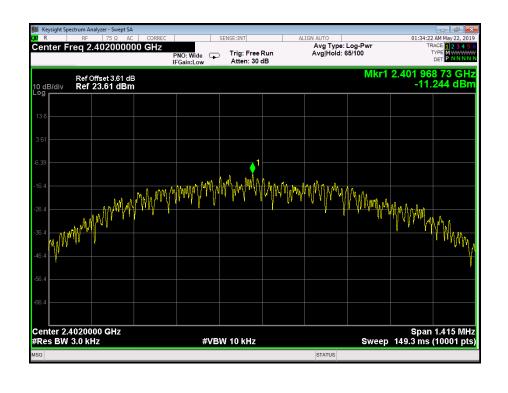


BLE Mode

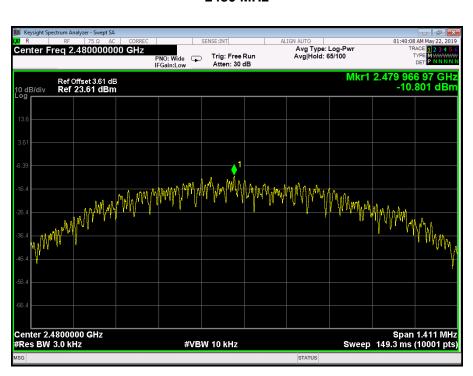


### **Attachment F-- Power Spectral Density Test Data**

Temperature:	<b>25</b> ℃	Relative H	Relative Humidity: 55%			
Test Voltage:	DC 3.7V		61	R		
Test Mode:	BLE TX N	lode	aU			
Channel Frequency		Power Density	Lim	it	Result	
(MHz)		(dBm)	(dBn	n)	Result	
2402		-11.244	-11.244 -9.853 <b>8</b>			
2442		-9.853			PASS	
2480		-10.801				
		BLE Mode				







#### BLE Mode 2480 MHz

