

1 of 92 Page:

FCC Radio Test Report FCC ID: 2ABHA0048

Original Grant

TB-FCC162598 Report No.

NINGBO CSTAR IMP&EXP CO., LTD **Applicant**

Equipment Under Test (EUT)

Clock Wireless Charger Speaker **EUT Name**

SL203 Model No.

2967, 32328 Series Model No.

Brand Name Cstar

2018-10-31 **Receipt Date**

Test Date 2018-11-01 to 2018-11-08

2018-11-09 **Issue Date**

FCC Part 15: 2018, Subpart C(15.247) **Standards**

ANSI C63.10: 2013 **Test Method**

Conclusions PASS

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

Test/Witness Engineer

Engineer Supervisor

: NAN SV : fayta. **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.

Page: 2 of 92

Contents

COL	NIENIS	
1.	GENERAL INFORMATION ABOUT EUT	5
	1.1 Client Information	
	1.2 General Description of EUT (Equipment Under Test)	5
	1.3 Block Diagram Showing the Configuration of System Tested	<i>.</i>
	1.4 Description of Support Units	
	1.5 Description of Test Mode	
	1.6 Description of Test Software Setting	8
	1.7 Measurement Uncertainty	
	1.8 Test Facility	
2.	TEST SUMMARY	11
3.	TEST EQUIPMENT	12
4.	CONDUCTED EMISSION TEST	13
	4.1 Test Standard and Limit	13
	4.2 Test Setup	
	4.3 Test Procedure	
	4.4 EUT Operating Mode	14
	4.5 Test Data	14
5.	RADIATED EMISSION TEST	15
	5.1 Test Standard and Limit	15
	5.2 Test Setup	
	5.3 Test Procedure	17
	5.4 EUT Operating Condition	17
	5.5 Test Data	17
6.	RESTRICTED BANDS REQUIREMENT	18
	6.1 Test Standard and Limit	18
	6.2 Test Setup	18
	6.3 Test Procedure	18
	6.4 EUT Operating Condition	
	6.5 Test Data	19
7.	NUMBER OF HOPPING CHANNEL	20
	7.1 Test Standard and Limit	20
	7.2 Test Setup	
	7.3 Test Procedure	
	7.4 EUT Operating Condition	
	7.5 Test Data	20
8.	AVERAGE TIME OF OCCUPANCY	21
	8.1 Test Standard and Limit	21
	8.2 Test Setup	



Report No.: TB-FCC162598
Page: 3 of 92

Page:

	8.3 Test Procedure	21
	8.4 EUT Operating Condition	21
	8.5 Test Data	21
9.	CHANNEL SEPARATION AND BANDWIDTH TEST	22
	9.1 Test Standard and Limit	22
	9.2 Test Setup	
	9.3 Test Procedure	
	9.4 EUT Operating Condition	
	9.5 Test Data	
10.	PEAK OUTPUT POWER TEST	23
	10.1 Test Standard and Limit	23
	10.2 Test Setup	
	10.3 Test Procedure	
	10.4 EUT Operating Condition	23
	10.5 Test Data	
11.	ANTENNA REQUIREMENT	24
	11.1 Standard Requirement	24
	11.2 Antenna Connected Construction	
	11.3 Result	24
ATT	ACHMENT A CONDUCTED EMISSION TEST DATA	25
	ACHMENT B RADIATED EMISSION TEST DATA	
	ACHMENT C RESTRICTED BANDS REQUIREMENT TEST DATA	
	ACHMENT D NUMBER OF HOPPING CHANNEL TEST DATA	
ATT	ACHMENT E AVERAGE TIME OF OCCUPANCY TEST DATA	69
ATT	ACHMENT F CHANNEL SEPARATION AND BANDWIDTH TEST DATA	75
ATT	ACHMENT G PEAK OUTPUT POWER TEST DATA	87



Page: 4 of 92

Revision History

Report No.	Version	Description	Issued Date
TB-FCC162598	Rev.01	Initial issue of report	2018-11-08
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Page: 5 of 92

1. General Information about EUT

1.1 Client Information

Applicant	Applicant : NINGBO CSTAR IMP&EXP CO., LTD	
Address	:	Floor 4, Building E, No. 65590, Qiming Road, Yinzhou Investment & Innovation Center, Ningbo, China
Manufacturer : NINGBO CSTAR IMP&EXP CO., LTD		NINGBO CSTAR IMP&EXP CO., LTD
Address		Floor 4, Building E, No. 65590, Qiming Road, Yinzhou Investment & Innovation Center, Ningbo, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name		Clock Wireless Charger Sp	Clock Wireless Charger Speaker		
Models No.	:	SL203, 2967, 32328			
Model Difference : All models are in the same PCB layout interior structure and circuits, The only difference is model name.					
		Operation Frequency:	Bluetooth V4.2(BT): 2402~2480 MHz		
		Number of Channel:	Bluetooth: 79 Channels See Note 2		
Product		Max Peak Output Power:	Bluetooth: 0.265dBm(GFSK)		
Description		Antenna Gain:	-0.5dBi PCB Antenna		
		Modulation Type:	GFSK (1 Mbps) π /4-DQPSK (2 Mbps) 8-DPSK (3 Mbps)		
Power Supply		DC Voltage Supply from Add DC Voltage supplied by Li-			
Power Rating	Ŀ	lutput: DC 5.0V 2A by ada DC 3.7V by 4000mAh Li-ic			
Software Version	:	1.0			
Hardware Version	:	1.2			
Connecting I/O Port(S)	35	Please refer to the User's Manual			

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



Page: 6 of 92

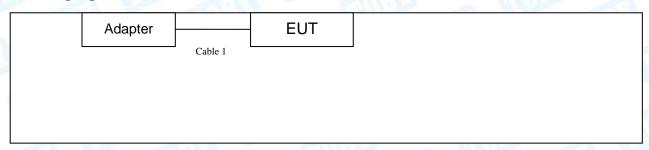
(2) Channel List:

Bluetooth Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)		
00	2402	27	2429	54	2456		
01	2403	28	2430	55	2457		
02	2404	29	2431	56	2458		
03	2405	30	2432	57	2459		
04	2406	31	2433	58	2460		
05	2407	32	2434	59	2461		
06	2408	33	2435	60	2462		
07	2409	34	2436	61	2463		
08	2410	35	2437	62	2464		
09	2411	36	2438	63	2465		
10	2412	37	2439	64	2466		
11	2413	38	2440	65	2467		
12	2414	39	2441	66	2468		
13	2415	40	2442	67	2469		
14	2416	41	2443	68	2470		
15	2417	42	2444	69	2471		
16	2418	43	2445	70	2472		
17	2419	44	2446	71	2473		
18	2420	45	2447	72	2474		
19	2421	46	2448	73	2475		
20	2422	47	2449	74	2476		
21	2423	48	2450	75	2477		
22	2424	49	2451	76	2478		
23	2425	50	2452	77	2479		
24	2426	51	2453	78	2480		
25	2427	52	2454				
26	2428	53	2455				

⁽³⁾ The Antenna information about the equipment is provided by the applicant.

1.3 Block Diagram Showing the Configuration of System Tested

Charging + TX Mode





Page: 7 of 92

TX Mode				
	EUT			

1.4 Description of Support Units

Equipment Information						
Name	Model	FCC ID/VOC	Manufacturer	Used "√"		
ADAPTER	JK050200-S04USA		m(II)	V		
	Cable Information					
Number	Shielded Type	Ferrite Core	Length	Note		
Cable 1	NO	NO	0.8M			

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		

For Radiated Test				
Final Test Mode Description				
Mode 1	TX GFSK Mode			
Mode 2	TX Mode(GFSK) Channel 00/39/78			
Mode 3	TX Mode(π /4-DQPSK) Channel 00/39/78			
Mode 4	TX Mode(8-DPSK) Channel 00/39/78			
Mode 5	Hopping Mode(GFSK)			
Mode 6	Hopping Mode(π /4-DQPSK)			
Mode 7	Hopping Mode(8-DPSK)			



Page: 8 of 92

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. We have pretested all the test modes above.

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:

TX Mode: GFSK (1 Mbps)
TX Mode: # /4-DQPSK (2 Mbps)
TX Mode: 8-DPSK (3Mbps)

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. 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 Bluetooth mode.

Test Software Version		AppoTech RF Control Kit.	exe
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF
π/4-DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF



Page: 9 of 92

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})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.42 dB ±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



Page: 10 of 92

1.8 Test Facility

The testing report were 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. 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.



Page: 11 of 92

2. Test Summary

	F	CC Part 15 Subpart C(15.247)/ RSS	247 Issue 2		
Standard S	ection	Tarak Manus	ld		
FCC	IC	Test Item	Judgment	Remark	
15.203		Antenna Requirement	PASS	N/A	
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	N/A	
15.205	RSS-Gen 7.2.3	Restricted Bands	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (2)	Hopping Channel Separation	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (4)	Dwell Time	PASS	N/A	
15.247(b)(1)	RSS 247 5.4 (2)	Peak Output Power	PASS	N/A	
15.247(b)(1)	RSS 247 5.1 (4)	Number of Hopping Frequency	PASS	N/A	
15.247(d)	RSS 247 5.5	Band Edge	PASS	N/A	
15.247(c)& RSS 247 15.209		Radiated Spurious Emission	PASS	N/A 99%OBW: GFSK: 823.43kHz π/4-DQPSK: 1144.5kHz 8-DPSK: 1125.7KHz	
		99% Occupied Bandwidth & 20dB Bandwidth	PASS		



Page: 12 of 92

3. Test Equipment

Conducted Emiss	ion Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 18, 2018	Jul. 17, 2019
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	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 Emissio	n 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	Mar.16, 2018	Mar.15, 2019
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar.16, 2018	Mar.15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.16, 2018	Mar.15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar.16, 2018	Mar.15, 2019
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 14, 2018	Jul. 13, 2019
Pre-amplifier	Sonoma	310N	185903	Mar.16, 2018	Mar.15, 2019
Pre-amplifier	HP	8449B	3008A00849	Mar.16, 2018	Mar.15, 2019
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.16, 2018	Mar.15, 2019
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
33	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Sep.15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Sep.15, 2018	Sep. 14, 2019
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Sep.15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Sep.15, 2018	Sep. 14, 2019



Page: 13 of 92

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1Test Standard FCC Part 15.207

4.1.2 Test Limit

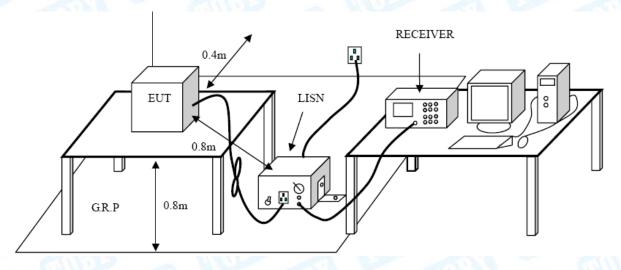
Conducted Emission Test Limit

Eroguenov	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.



Page: 14 of 92

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 9kHz, 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 Data

Please refer to the Attachment A.



Page: 15 of 92

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limit (9 kHz~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 of 3m	(dBuV/m)
(MHz)	Peak	Average
Above 1000	74	54

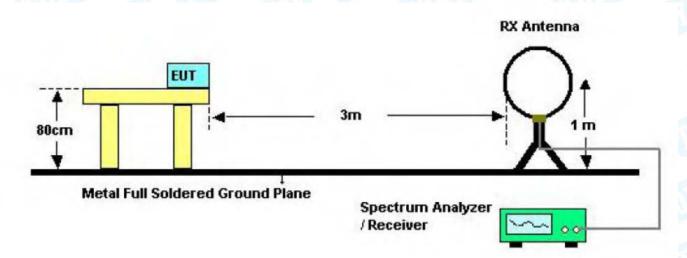
Note:

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

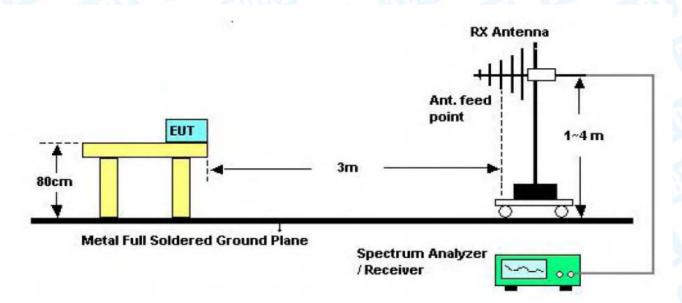


Page: 16 of 92

5.2 Test Setup



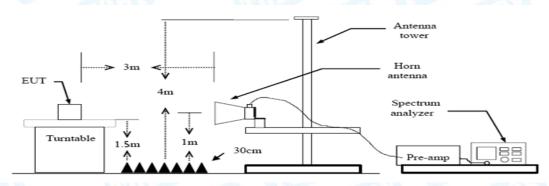
Below 30MHz Test Setup



Below 1000MHz Test Setup



Page: 17 of 92



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.

5.4 EUT Operating Condition

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

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.



Page: 18 of 92

6. Restricted Bands Requirement

6.1 Test Standard and Limit

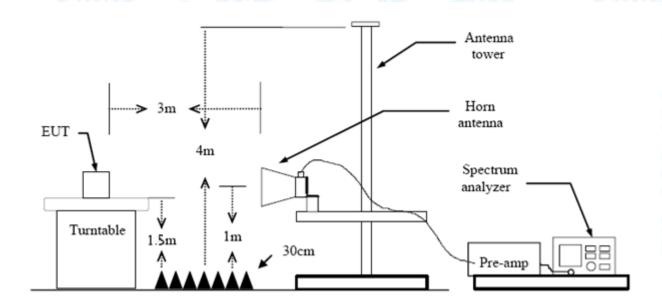
6.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

6.1.2 Test Limit

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

Note: All restriction bands have been tested, only the worst case is reported.

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.



Report No.: TB-FCC162598 Page: 19 of 92

(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 AVG 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.

All restriction bands have been tested, only the worst case is reported.

Please refer to the Attachment C.



Page: 20 of 92

7. Number of Hopping Channel

7.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.247 (a)(1)

6.1.2 Test Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

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) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.

7.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

7.5 Test Data

Please refer to the Attachment D.



Page: 21 of 92

8. Average Time of Occupancy

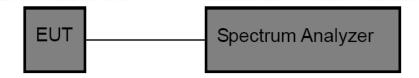
8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (a)(1)

8.1.2 Test Limit

Section	Test Item	Limit
15.247(a)(1)	Average Time of Occupancy	0.4 sec

8.2 Test Setup



8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=1MHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

8.4 EUT Operating Condition

The average time of occupancy on any channel within the Period can be calculated with formulas:

 $\{Total \ of \ Dwell\} = \{Pulse \ Time\} * (1600 / X) / \{Number \ of \ Hopping \ Frequency\} * \{Period\} = 0.4s * \{Number \ of \ Hopping \ Frequency\}$

Note: X=2 or 4 or 6 (1DH1=2, 1DH3=4, 1DH5=6. 2DH1=2, 2DH3=4, 2DH5=6. 3DH1=2, 3DH3=4, 3DH5=6)

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

The EUT was set to the Hopping Mode by the Customer.

8.5 Test Data

Please refer to the Attachment E.



Page: 22 of 92

9. Channel Separation and Bandwidth Test

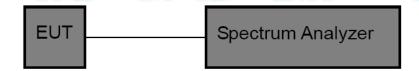
9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247

9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)	
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5	
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5	

9.2 Test Setup



9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Channel Separation: RBW=100 kHz, VBW=100 kHz.

Bandwidth: RBW=30 kHz, VBW=100 kHz.

- (3) The bandwidth is measured at an amplitude level reduced 20dB 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.
 - (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

9.4 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.

9.5 Test Data

Please refer to the Attachment F.



Page: 23 of 92

10. Peak Output Power Test

10.1 Test Standard and Limit

10.1.1 Test Standard FCC Part 15.247 (b) (1)

10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm)	2400~2483.5
THE OWNER OF THE OWNER OWNER OWNER OF THE OWNER OWN	Other <125 mW(21dBm)	

10.2 Test Setup



10.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz. RBW=3 MHz, VBW ≥ RBW for bandwidth more than 1MHz.

10.4 EUT Operating Condition

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

10.5 Test Data

Please refer to the Attachment G.



Page: 24 of 92

11. Antenna Requirement

11.1 Standard Requirement

11.1.1 Standard FCC Part 15.203

11.1.2 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.

11.2 Antenna Connected Construction

The gains of the antenna used for transmitting is -0.5dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

11.3 Result

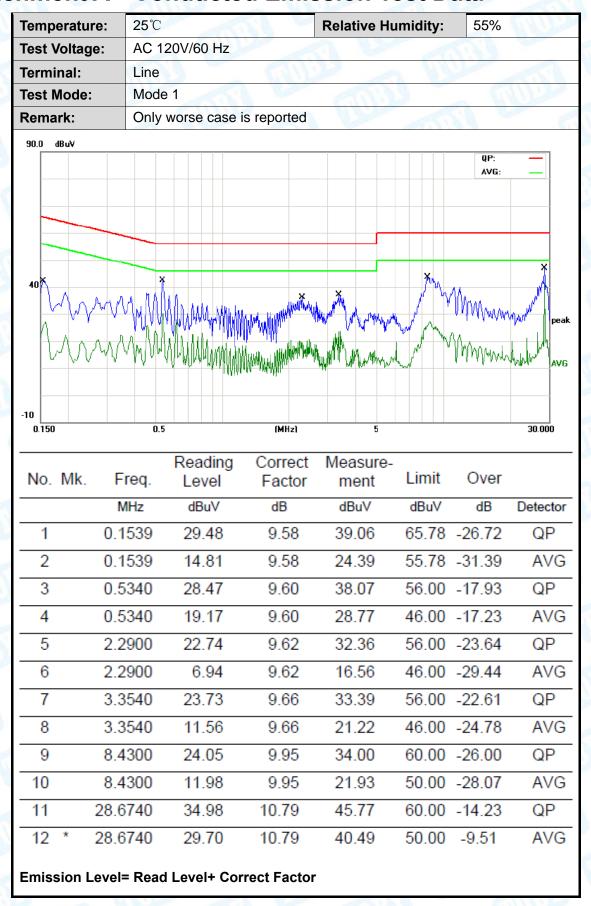
The EUT antenna is a PCB Antenna. It complies with the standard requirement.

	Antenna Type Permanent attached antenna Unique connector antenna Professional installation antenna	
The same of the sa	⊠Permanent attached antenna	EM
a Turn	Unique connector antenna	
	Professional installation antenna	O DE



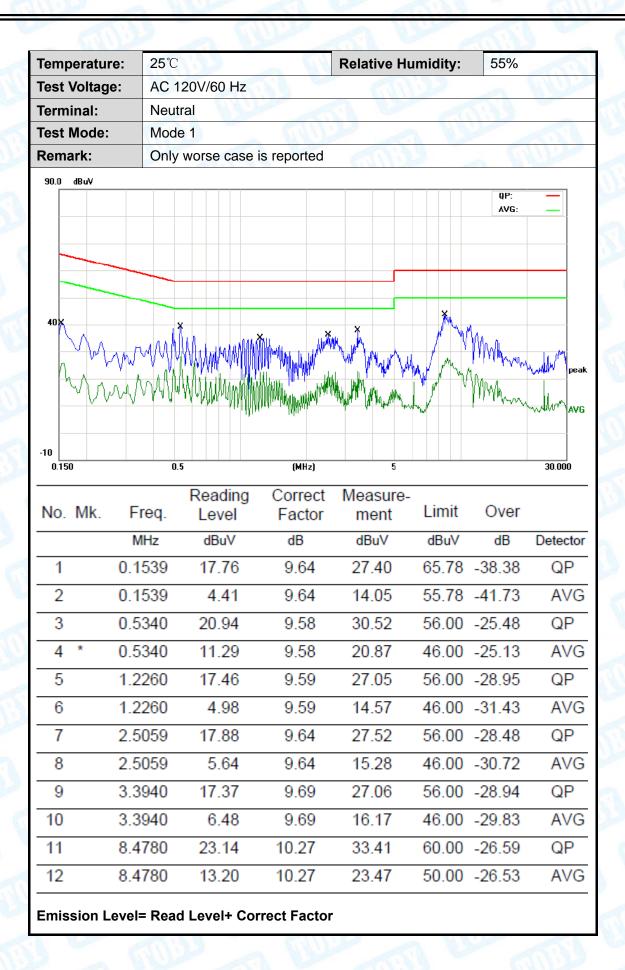


Attachment A-- Conducted Emission Test Data





Page: 26 of 92

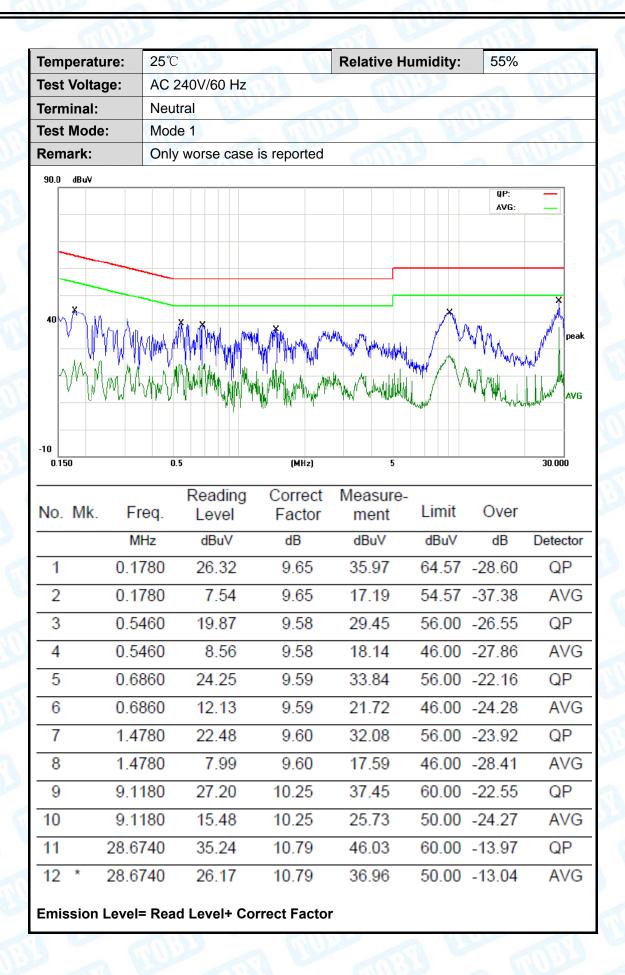




25℃ 55% Temperature: **Relative Humidity: Test Voltage:** AC 240V/60 Hz Terminal: Line Test Mode: Mode 1 Remark: Only worse case is reported 90.0 dBuV QP: AVG: -10 0.5 (MHz) 30 000 0.150 Reading Correct Measure-No. Mk. Freq. Limit Over Level Factor ment dBuV MHz dΒ dBuV dBuV dB Detector 0.1806 26.38 9.58 35.96 64.45 -28.49QΡ 2 6.80 16.38 54.45 -38.07 0.1806 9.58 AVG 3 0.5460 27.26 9.60 36.86 56.00 -19.14 QΡ 46.00 -27.09 4 0.5460 9.31 9.60 18.91 AVG 5 1.0900 22.18 9.60 31.78 56.00 -24.22 QΡ 46.00 -29.47 6 1.0900 6.939.60 16.53 AVG 2.3820 31.52 7 21.90 9.62 56.00 -24.48 QΡ 46.00 -28.54 2.3820 7.84 9.62 17.46 AVG 8 27.00 60.00 -23.02 9 8.9580 9.98 36.98 QΡ 8.9580 15.28 25.26 50.00 -24.74 AVG 10 9.98 28.6740 31.15 10.79 60.00 -18.06 QΡ 11 41.94 12 28.6740 27.11 10.79 37.90 50.00 -12.10 AVG **Emission Level= Read Level+ Correct Factor**



28 of 92 Page:





29 of 92 Page:

Attachment B-- Radiated Emission Test Data

9KHz~30MHz

From 9KHz to 30MHz: 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 ℃	1		Relative I	Humidity:	55%	a 1
Test Voltage:	AC 1	20V/60 Hz	ARTIC		C. Daniel		13
Ant. Pol.	Horiz	zontal				Harr	
Test Mode:	Mode	e 1					
Remark:	Only	worse case	is reported			THE STATE OF	900
80.0 dBuV/m							
					(RF)FCC 15	iC 3M Radiation	
				3		Margin -6	gB
				2 *	1 -		++-
30		<u> </u>		1 // 4	7 5 6 7 7	1	11 1.1
				1,100		Manual	ULAMAA
. ,			N	Mary A	Mouthran		
Mayney	٨, ٨,	morning	manara				
· wy	· Amundada A.						
30.000 40	50 60 70	0 80	(MHz)	300	400 50	0 600 700	1000.000
		Reading	Correct	Measure-			
No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
	MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detecto
1 24	4.2321	45.16	-17.50	27.66	46.00	-18.34	QP
2 27	7.0935	54.69	-16.65	38.04	46.00	-7.96	QP
3 * 30	1.4224	58.66	-16.16	42.50	46.00	-3.50	QP
4 32	5.5958	47.12	-15.37	31.75	46.00	-14.25	QP
5 34	9.2500	44.79	-14.61	30.18	46.00	-15.82	QP
6 37	2.0045	42.33	-13.56	28.77	46.00	-17.23	QP
*:Maximum data	x:Over limit	!:over margin	-				
Emission Leve	el= Read	Level+ Cor	rect Factor	•			



Report No.: TB-FCC162598
Page: 30 of 92

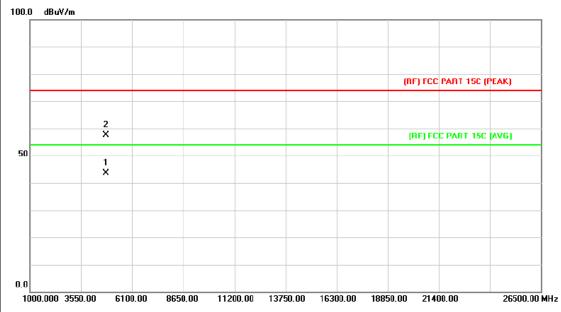
		A WY	Itelative	Humidity:	55%	400
AC 12	0V/60 Hz	33	TIME TO THE	(1)	> 1	MAL
Vertica	al			-0	139	
Test Mode: Mode 1						
Only v	vorse case i	s reported		23	a 61	M. Care
				(RF)FCC	15C 3M Radiatio	n
					Margin -	6 dB
			4		6	
	1		2 3 X	5 ¥	X	mum
	X.,		My show wally	Manuell	MADE STORES	
4~1	I more	Manne	,	-44		
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
50 60 7	0 80	(MHz)	30	D 400 5	500 600 700	1000.00
	Reading	Correct	Measure-			
req.	Level	Factor	ment	Limit	Over	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detecto
7808	39.76	-22.84	16.92	40.00	-23.08	QP
.9551	43.00	-19.68	23.32	43.50	-20.18	QP
.0935	41.18	-16.65	24.53	46.00	-21.47	QP
						QP
						QP
.3718	34.01	-8.39	25.62	46.00	-20.38	QP
x:Over limit	!:over margin					
	Vertical Mode Only volume of the North Control of t	Only worse case i  Reading Level MHz dBuV 7808 39.76 .9551 43.00 .0935 41.18 .4224 43.84 .5958 37.52 .3718 34.01	Vertical  Mode 1  Only worse case is reported  Reading Correct Level Factor  WHz dBuV dB/m  7808 39.76 -22.84  .9551 43.00 -19.68  .0935 41.18 -16.65  .4224 43.84 -16.16  .5958 37.52 -15.37  .3718 34.01 -8.39	Vertical   Mode 1   Only worse case is reported	Vertical  Mode 1  Only worse case is reported  Reading Correct Measure—ment Limit  MHz dBuV dB/m dBuV/m dBuV/m  7808 39.76 -22.84 16.92 40.00  .9551 43.00 -19.68 23.32 43.50  .0935 41.18 -16.65 24.53 46.00  .4224 43.84 -16.16 27.68 46.00  .5958 37.52 -15.37 22.15 46.00  .3718 34.01 -8.39 25.62 46.00	Vertical Mode 1  Only worse case is reported  (REFIECC 15C 3M Radiation Margin 1  Reading Correct Measure- Freq. Level Factor ment Limit Over MHZ dBuV dB/m dBuV/m dBuV/m dB  7808 39.76 -22.84 16.92 40.00 -23.08  .9551 43.00 -19.68 23.32 43.50 -20.18  .0935 41.18 -16.65 24.53 46.00 -21.47  .4224 43.84 -16.16 27.68 46.00 -18.32  .5958 37.52 -15.37 22.15 46.00 -23.85  .3718 34.01 -8.39 25.62 46.00 -20.38



Page: 31 of 92

## Above 1GHz(Only worse case is reported)

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V		NAME OF THE PARTY			
Ant. Pol. Horizontal						
Test Mode:	TX GFSK Mode 2402MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

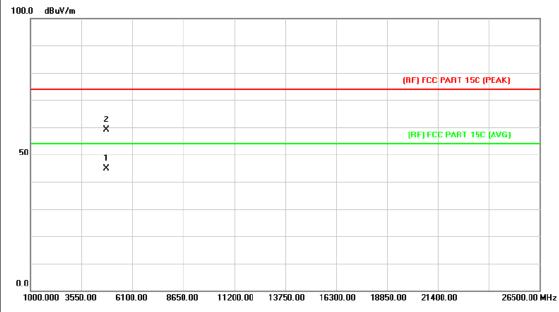


No.	Mk.	Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.942	29.27	14.44	43.71	54.00	-10.29	AVG
2		4805.332	43.13	14.44	57.57	74.00	-16.43	peak



Page: 32 of 92

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	COUNTY OF THE PARTY OF THE PART	NIU.			
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2402	MHz				
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					
1						

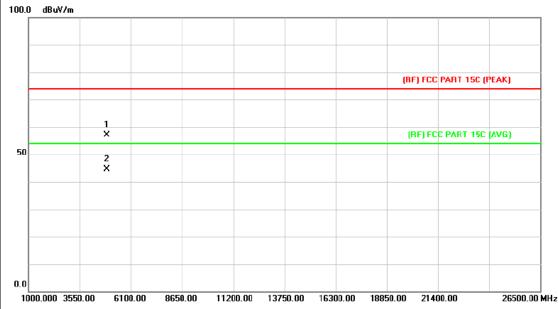


No.	Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.228	30.38	14.43	44.81	54.00	-9.19	AVG
2		4804.672	44.73	14.44	59.17	74.00	-14.83	peak



Page: 33 of 92

Temperature:	<b>25</b> ℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal		77.30			
Test Mode:	TX GFSK Mode 2441MHz	W W				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

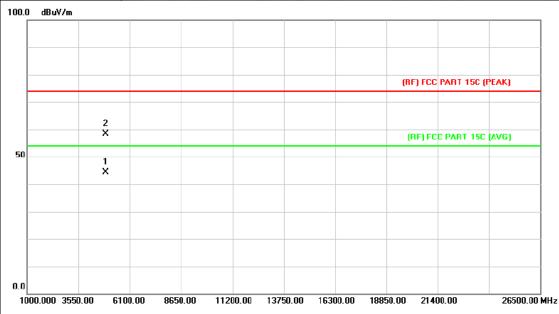


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4880.824	42.23	14.90	57.13	74.00	-16.87	peak
2	*	4883.098	29.63	14.91	44.54	54.00	-9.46	AVG



Page: 34 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	W. O. P. F.	NIU.				
Ant. Pol.	Vertical	Vertical					
Test Mode:	TX GFSK Mode 2441MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

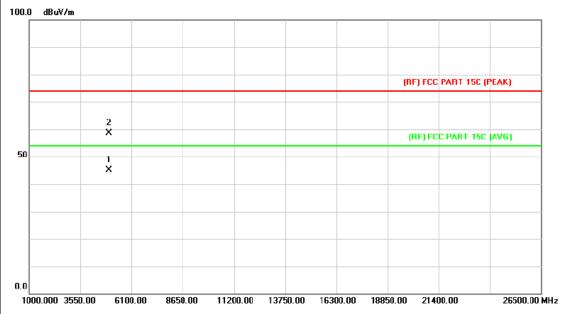


No	). M	k. Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.330	29.54	14.91	44.45	54.00	-9.55	AVG
2		4882.720	43.51	14.91	58.42	74.00	-15.58	peak



Page: 35 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	COLUMN TO SERVICE OF THE PERSON OF THE PERSO	MAIN				
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX GFSK Mode 2480MHz						
Remark: No report for the emission which more than 10 dB below the prescribed limit.							

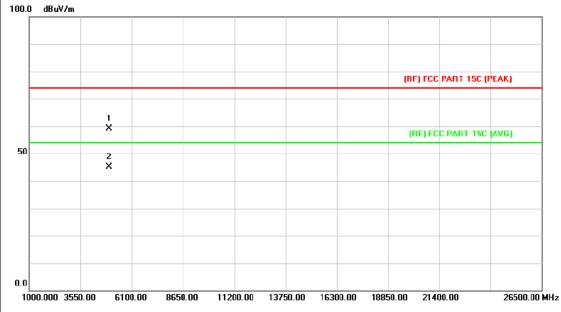


No.	Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4960.684	29.71	15.40	45.11	54.00	-8.89	AVG
2		4961.236	43.35	15.40	58.75	74.00	-15.25	peak



Page: 36 of 92

Temperature:	25℃ Relative Humidity: 55%					
Test Voltage:	DC 3.7V	COLUMN TO SERVICE STATE OF THE PERSON OF THE	MAN			
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2480MHz	D ON W				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

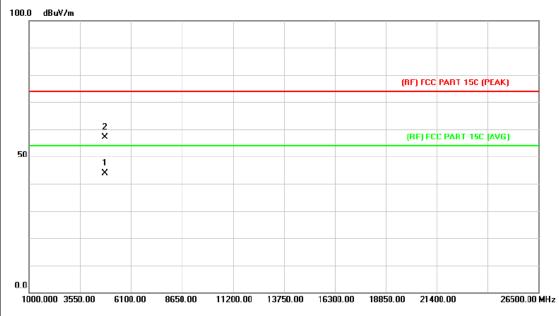


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.294	43.68	15.39	59.07	74.00	-14.93	peak
2	*	4960.984	29.74	15.40	45.14	54.00	-8.86	AVG



Page: 37 of 92

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX π /4-DQPSK Mode 2402	MHz				
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.	The state of the s				

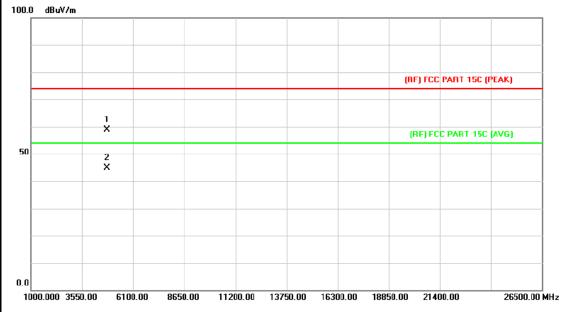


No.	. Mk	. Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.168	29.41	14.43	43.84	54.00	-10.16	AVG
2		4804.396	42.71	14.43	57.14	74.00	-16.86	peak



Page: 38 of 92

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	TX π /4-DQPSK Mode 240	2MHz				
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

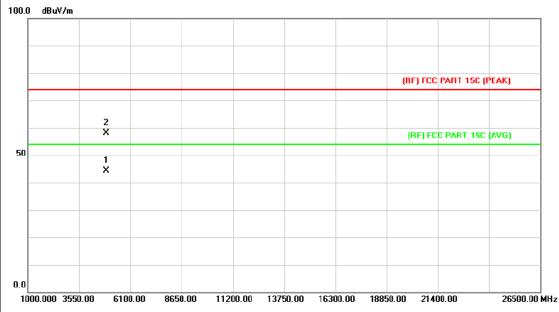


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4804.132	44.39	14.43	58.82	74.00	-15.18	peak
2	*	4804.150	30.42	14.43	44.85	54.00	-9.15	AVG



Page: 39 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	CAUDIN S	NAME OF THE PARTY				
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX π /4-DQPSK Mode 244	IMHz					
Remark: No report for the emission which more than 10 dB below the prescribed limit.							

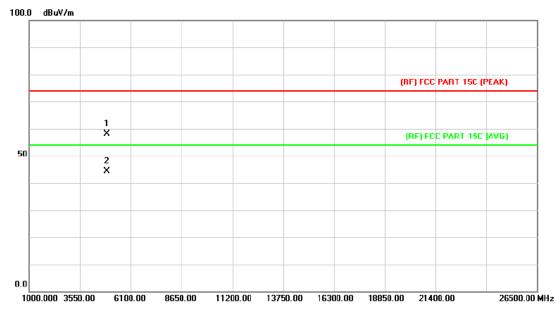


No	. Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.094	29.57	14.91	44.48	54.00	-9.52	AVG
2		4881.910	43.30	14.91	58.21	74.00	-15.79	peak



Page: 40 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Vertical						
Test Mode:	TX π /4-DQPSK Mode 2441	MHz					
Remark: No report for the emission which more than 10 dB below the prescribed limit.							

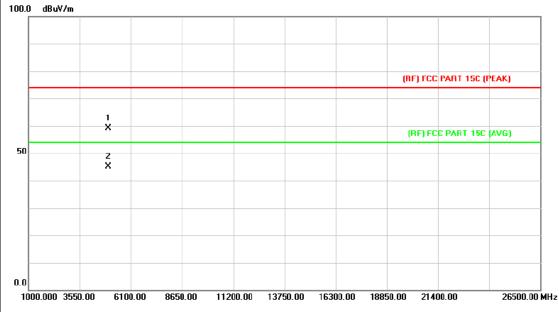


No.	Mk.	Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.016	43.21	14.91	58.12	74.00	-15.88	peak
2	*	4883.242	29.59	14.91	44.50	54.00	-9.50	AVG



Page: 41 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	(UUD)	MAN				
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX π /4-DQPSK Mode 24	30MHz					
Remark:	No report for the emission prescribed limit.	which more than 10 dB be	elow the				

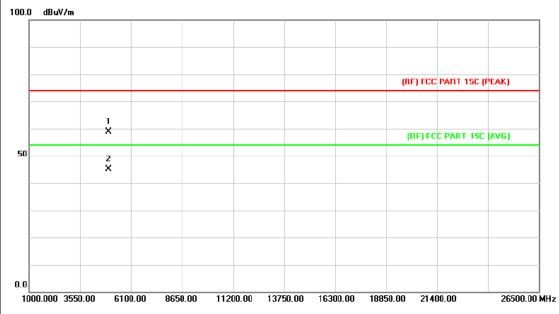


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.202	43.62	15.39	59.01	74.00	-14.99	peak
2	*	4960.702	29.72	15.40	45.12	54.00	-8.88	AVG



Page: 42 of 92

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	111111	NAME OF THE PARTY			
Ant. Pol.	Vertical					
Test Mode:	TX π /4-DQPSK Mode 2480M	Hz				
Remark:	No report for the emission wh prescribed limit.	ich more than 10 dB be	elow the			

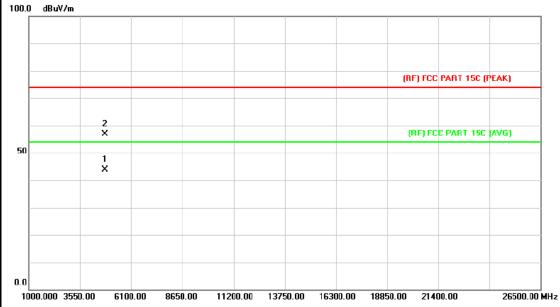


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.622	43.44	15.39	58.83	74.00	-15.17	peak
2	*	4960.270	29.71	15.39	45.10	54.00	-8.90	AVG



Page: 43 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	COUNTY S	NAME OF THE PARTY				
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX 8-DPSK Mode 2402MHz	PAW					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

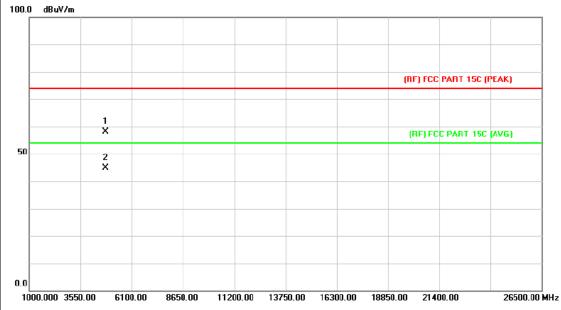


No.	Mk	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.510	29.39	14.44	43.83	54.00	-10.17	AVG
2		4805.296	42.45	14.44	56.89	74.00	-17.11	peak



Page: 44 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V						
Ant. Pol.	Vertical	Vertical					
Test Mode:	TX 8-DPSK Mode 2402M	Hz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

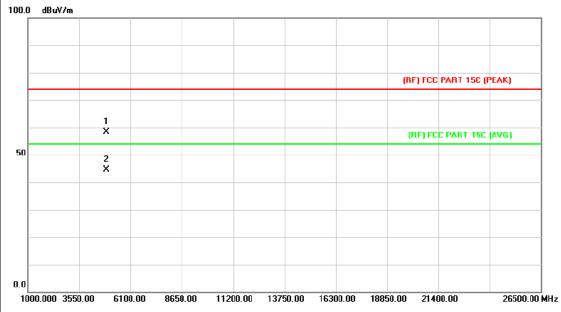


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.844	43.78	14.43	58.21	74.00	-15.79	peak
2	*	4804.186	30.42	14.43	44.85	54.00	-9.15	AVG



Page: 45 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	(11)	NAME OF THE PARTY				
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX 8-DPSK Mode 2441MHz	P A W					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

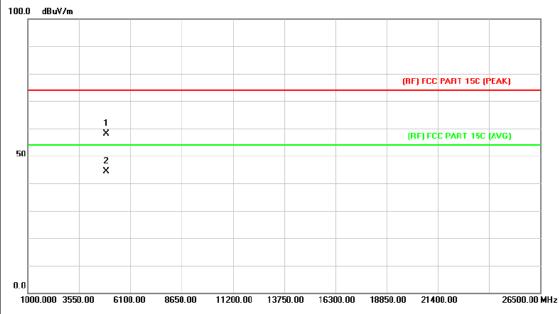


No.	Mk.	Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4882.204	43.51	14.91	58.42	74.00	-15.58	peak
2	*	4883.362	29.62	14.91	44.53	54.00	-9.47	AVG



Page: 46 of 92

Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V		NAME OF THE PARTY				
Ant. Pol.	Vertical	Vertical					
Test Mode:	TX 8-DPSK Mode 2441MHz	P A W					
Remark: No report for the emission which more than 10 dB below the prescribed limit.							

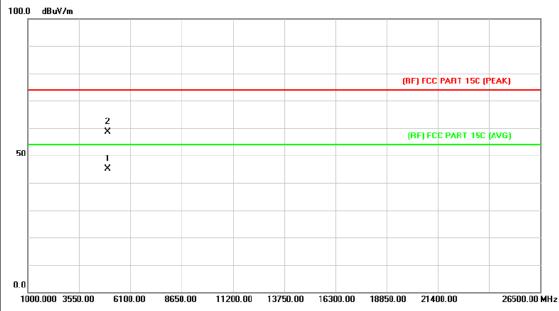


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4882.180	43.33	14.91	58.24	74.00	-15.76	peak
2	*	4882.192	29.53	14.91	44.44	54.00	-9.56	AVG



Page: 47 of 92

Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		NAME OF THE PARTY
Ant. Pol.	Horizontal		189
Test Mode:	TX 8-DPSK Mode 2480MHz		
Remark:	No report for the emission wh prescribed limit.	ich more than 10 dB bo	elow the

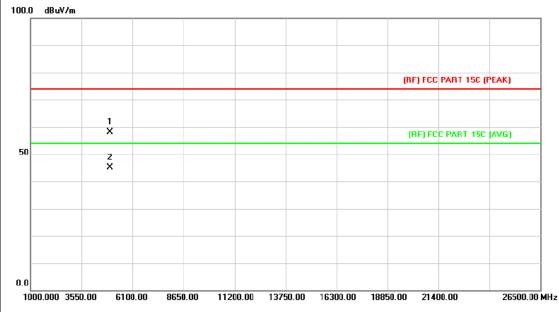


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4958.698	29.65	15.39	45.04	54.00	-8.96	AVG
2		4960.384	43.32	15.40	58.72	74.00	-15.28	peak

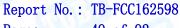


Page: 48 of 92

Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	WW.	A VIVI			
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2480MHz					
Remark:	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		4960.102	42.84	15.39	58.23	74.00	-15.77	peak
2	*	4961.224	29.72	15.40	45.12	54.00	-8.88	AVG

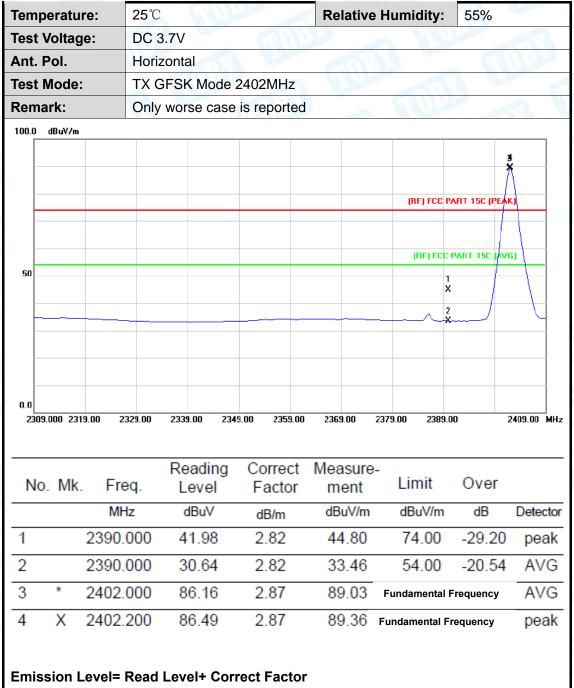




Page: 49 of 92

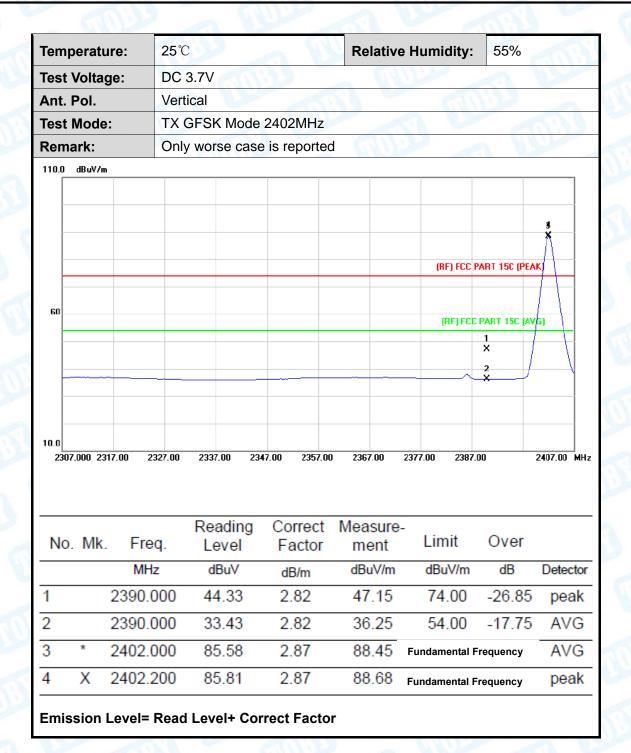
## **Attachment C-- Restricted Bands Requirement Test Data**

## (1) Radiation Test



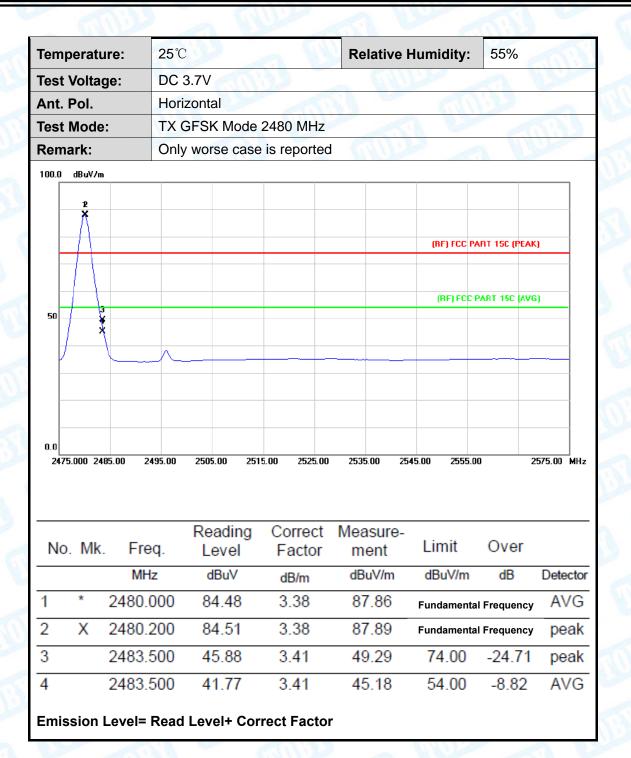


Page: 50 of 92



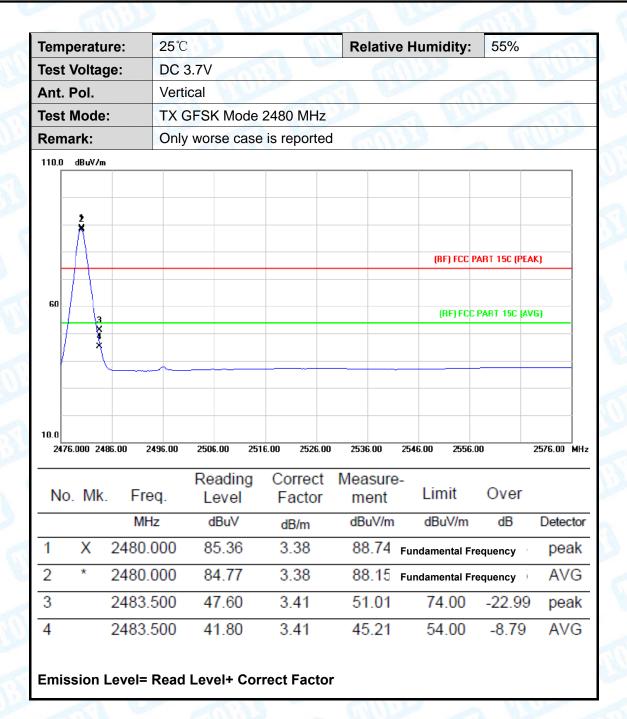


Page: 51 of 92





Page: 52 of 92





Page: 53 of 92

ıem	perati	ıre:	25℃		CI V	Relative	Humidity:	55%	
Test	Volta	ge:	DC :	3.7V	130	THE STATE OF THE S	Miles		ARTIN .
٩nt.	Pol.		Hori	zontal			170	1730	
Test	Mode	):	ТХл	4-DQPSK	Mode 2402	MHz			ATT I
Rem	nark:		Only	worse case	e is reported			a W	N. Contraction
100.0 T	dBuV/r	1							
									3 X
									$\triangle$
-							(RF) FCC	PART 15C (PE	AKJ
							(RF) FC	PART 15C (A	vg)
50								1 X	
								2 X	$\dashv$
-								*	
-									
0.0	09.000 2:	10.00	2329.00	2339.00 23	849.00 2359.00	2369.00	2379.00 2389		2409.00 MI
				Reading		Measure			
				Reading	Correct	ivieasure.		0	
No	. Mk	Fre	q.	Level	Factor	ment	Limit	Over	
No	o. Mk	Fre MH		_	Factor dB/m		Limit dBuV/m	dB	Detecto
No I	o. Mk		z	Level		ment			
l	o. Mk	MH	z 000	Level	dB/m	ment dBuV/m	dBuV/m	dB	
	*	MH 2390.0	z 000 000	dBuV 41.30	dB/m 2.82	ment dBuV/m 44.12	dBuV/m 74.00	dB -29.88 -20.51	peak



Page: 54 of 92

Temperature:	25℃		Relative Humi	dity: 5	55%
Test Voltage:	DC 3.7V	1130	CHILL'S		3 13
Ant. Pol.	Vertical			MIL	
Test Mode:	TX π /4-DQPSI	K Mode 2402N	lHz	6	
Remark:	Only worse car	se is reported	WILL ST		Marie
110.0 dBuV/m					
					3
					Λ
			(R	F) FCC PART 1	ISC (PEAK)
60				RF) FCC PART	15C (AVG)
				1 X	
				2	/\
				×	
10.0					
2307.000 2317.00 2	2327.00 2337.00 2	2347.00 2357.00	2367.00 2377.00	2387.00	2407.00 MHz
No Mic E-	Reading		Measure- ment Lir	nit O	ver
	eq. Level	Factor	mont		
MI		dB/m			dB Detector
1 2390.	.000 44.69	2.82	47.51 74	1.00 -2	26.49 peak
2 2390.	.000 32.33	2.82	35.15 54	1.00 -1	8.85 AVG

85.02

85.27

2.87

2.87

87.89

88.14

2402.000

2402.200

3

Χ

AVG

peak

Fundamental Frequency

**Fundamental Frequency** 



Page: 55 of 92

Temperature:	<b>25</b> ℃			Relative	<b>Humidity:</b>	55%	
Test Voltage:	DC 3.7	V	13	" EII	المناسل		A COLUMN TO SERVICE SE
Ant. Pol.	Horizon	ıtal			177	13.0	
Test Mode:	TX π /4-	DQPSK I	Mode 2480N	lHz		-	
Remark:	Only wo	orse case	is reported	am		9 F.	Labor.
100.0 dBuV/m							
<b>2</b> X					(RF) FCC PA	ART 15C (PEA	K)
50 3					(RF) FCC F	PART 15C (AV	G)
*	^_						
0.0 2475.000 2485.00	2495.00 25	05.00 2515	i.00 2525.00	2535.00 2	2555.00 2555.00	0	2575.00 MH
No. Mk. Fr		eading _evel	Correct Factor	Measure- ment	Limit	Over	
	Hz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detecto
M							AVG
1 * 2480	.000.	34.02	3.38	87.40	Fundamental	Frequency	
1 * 2480		84.02 84.05	3.38	87.40 87.43	Fundamental Fundamental F		
1 * 2480	.200						peak



Page: 56 of 92

Temperatu	re: 2	25℃			Rela	ative F	lumidity:	55%	
Test Voltag	e: [	OC 3.7V	MA	10		1177	The same		
Ant. Pol.	١	/ertical			TY.		TI	U.D.	
Test Mode:	1	X π /4-E	OQPSK	Mode 248	30MHz				
Remark:		Only wor	se case	is report	ed	111/2		a W	No.
110.0 dBuV/m									
2							(RF) FCC	PART 15C (PEA	K)
60							(RF) FC	C PART 15C (AV	<b>G)</b>
10.0	5.00 2496	.00 2506	6.00 2 <b>5</b> 1	6.00 2526	.00 2536	6.00 2	546.00 2556	5.00	2576.00 MH
No. Mk.	Freq.		ading evel	Correc Facto		asure- ent	Limit	Over	
No. Mk.	Freq.	. L	_		r m				Detecto
		. Lo	evel	Facto	r m	ent	Limit	dB	Detecto
1 X	MHz	. Lo	evel IBuV	Factor dB/m	r m dB 88	ent uV/m	Limit dBuV/m	dB I Frequency	
1 X 2 *	MHz 2480.00	00 8:	evel IBuV 5.33	dB/m 3.38	r m dB 88	ent uV/m 3.71	Limit dBuV/m Fundamenta	dB I Frequency I Frequency	peak AVG

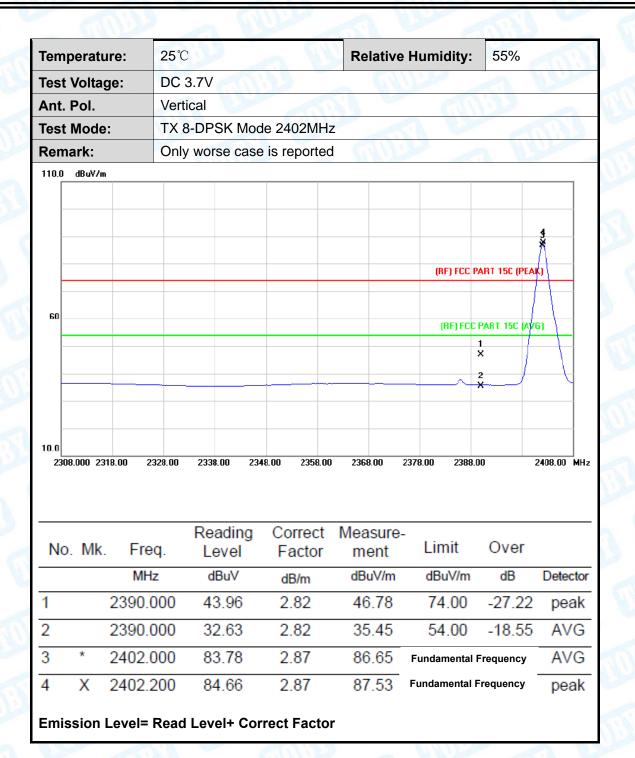


Page: 57 of 92

Temp	erature:	25℃			Relative H	lumidity:	55%	TITE
Test \	Voltage:	DC 3.	7V		- EHI	الملايل		الزول
Ant. F	ol.	Horizo	ontal	TOTAL		177	133	
Test N	Mode:	TX 8-I	OPSK Mod	de 2402MHz	<u>z</u>			
Rema	ırk:	Only v	vorse case	is reported			2 W	A CONTRACTOR OF THE PARTY OF TH
100.0	dBuV/m							
50							PART 15C (PEAK PART 15C IAVS 1 X 2	
0.0 2307.0	000 2317.00	2327.00	2337.00 234	7.00 2357.00	2367.00 23	377.00 2387.0	00 2	407.00 MI
No.	Mk. Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
No.						Limit dBuV/m	Over	Detect
No.		eq. Hz	Level	Factor	ment			Detect
	М	eq. Hz .000	Level	Factor dB/m	ment dBuV/m	dBuV/m	dB	
1	M 2390	eq. Hz .000	dBuV 41.01	Factor dB/m 2.82	ment dBuV/m 43.83	dBuV/m 74.00	dB -30.17 -20.56	pea

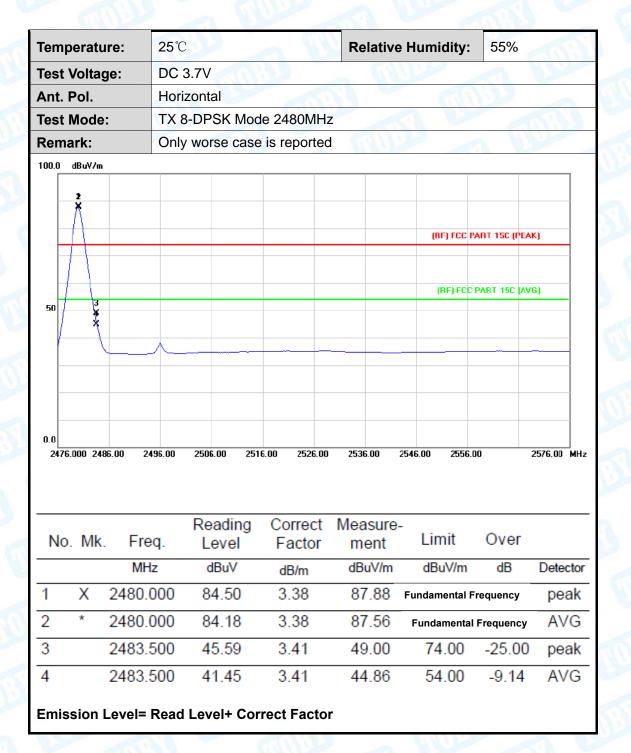


Page: 58 of 92





Page: 59 of 92





Page: 60 of 92

Tem	perature:	25℃	3 84	Relative Humidity:	55%
Test	Voltage:	DC 3.7V	10	CHILL	A VIII
Ant.	Pol.	Vertical			
Test	Mode:	TX 8-DPSK Mode	2480MHz		
Rem	nark:	Only worse case i	s reported	WILL STATE OF THE	3 13
110.0	dBuV/m				
	1				
	Z				

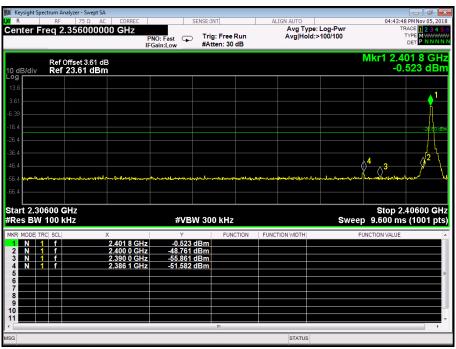
	<u> </u>								
	Å								
	+						(RF) FC	C PART 15C (	PEAK)
60	$I \setminus$								
L		3					(RF) F	CC PART 15C	(AVG)
		*							
.0									

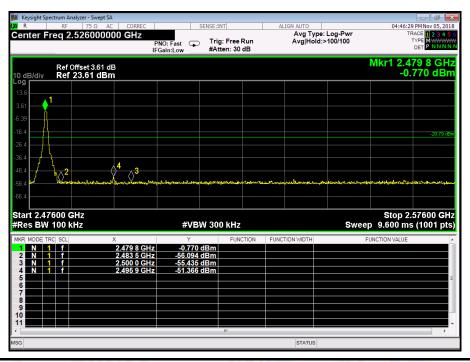
No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2480.000	85.15	3.38	88.53	Fundamental F	requency	peak
2	*	2480.000	84.29	3.38	87.67	Fundamental F	requency	AVG
3		2483.500	47.07	3.41	50.48	74.00	-23.52	peak
4		2483.500	42.34	3.41	45.75	54.00	-8.25	AVG



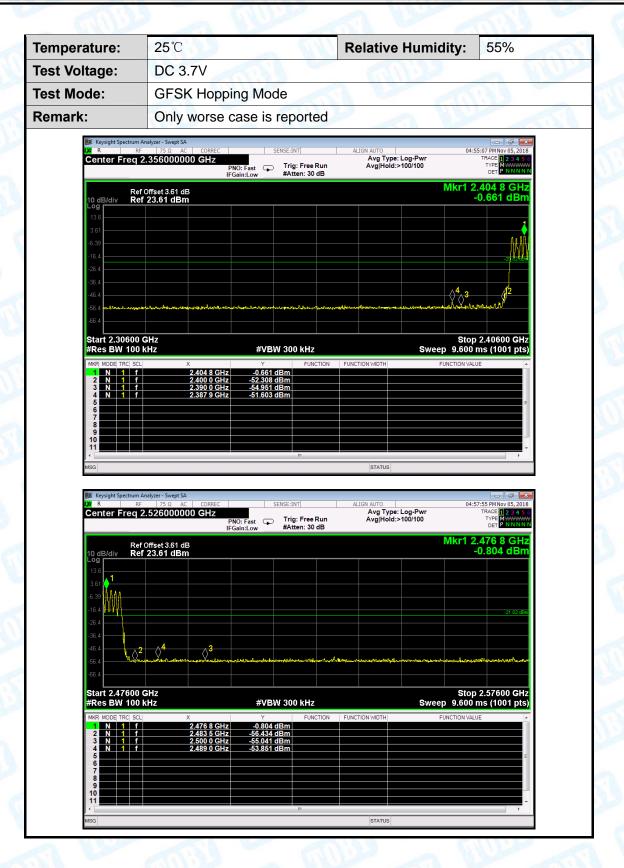
(2) Conducted Test



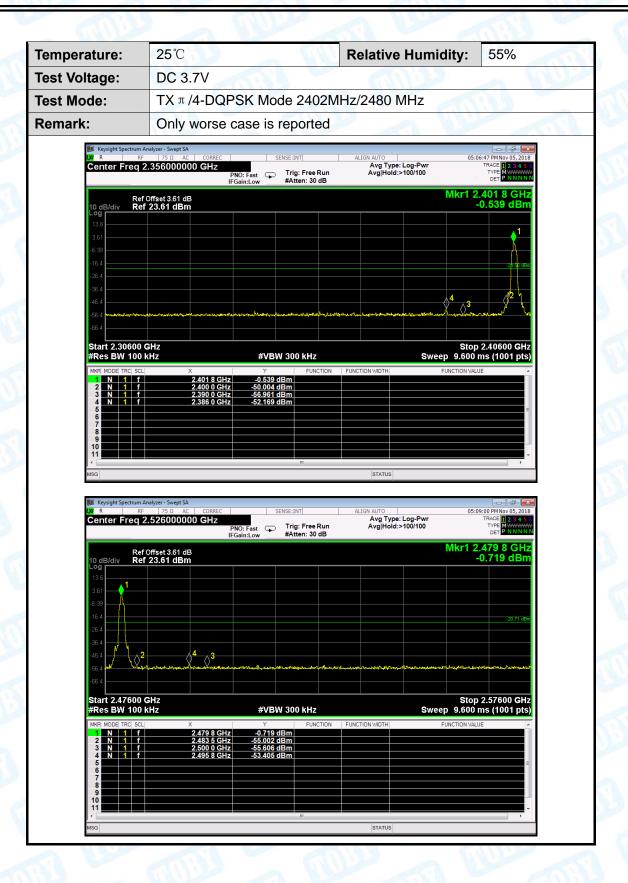




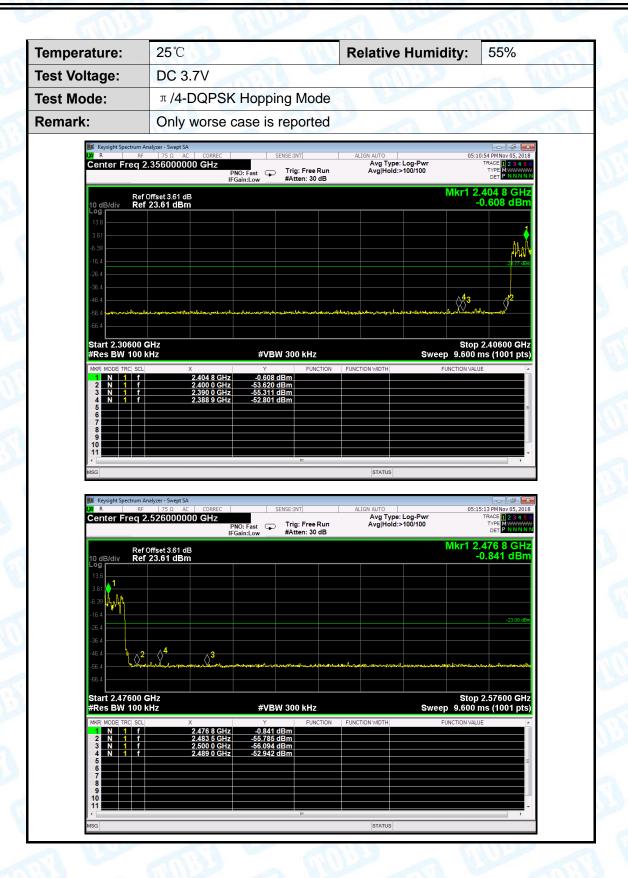




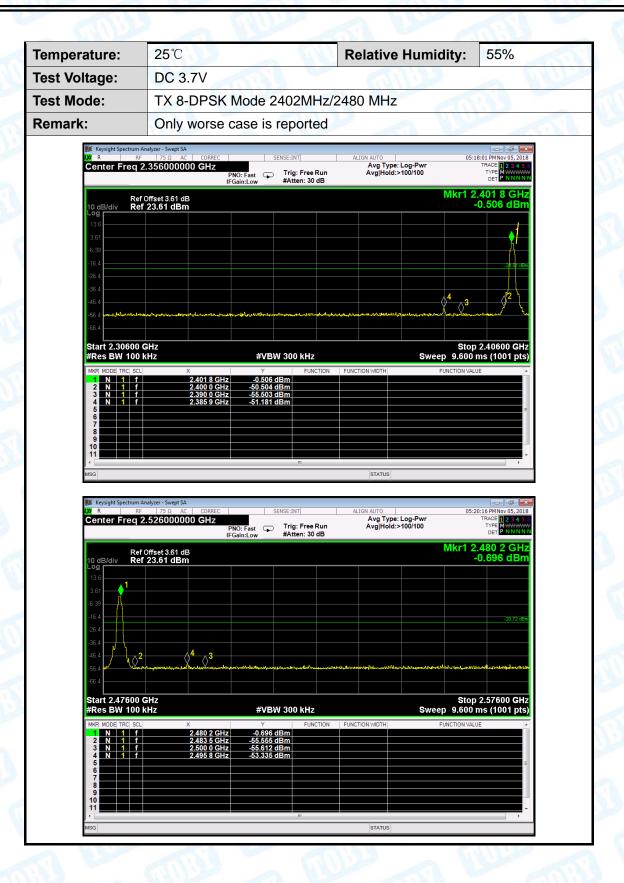




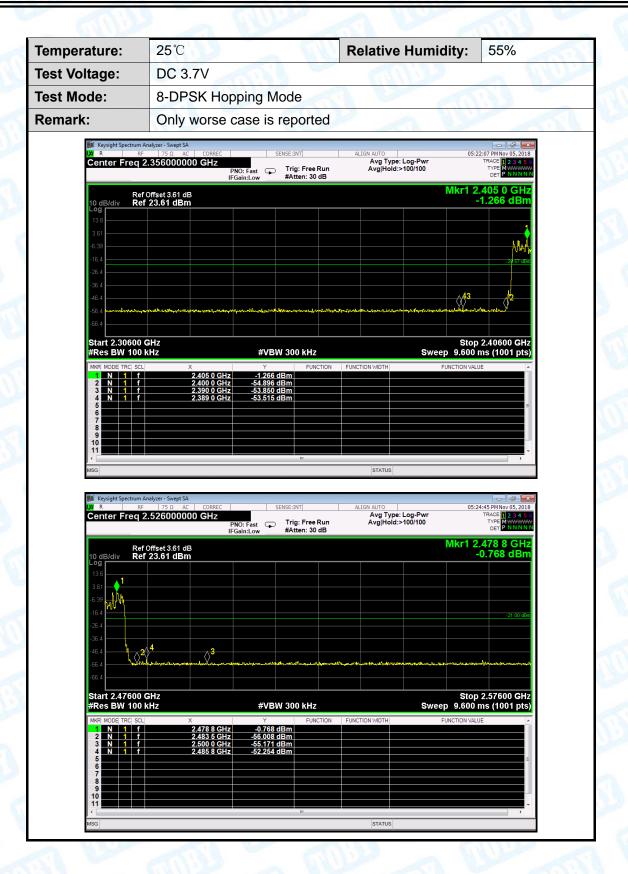












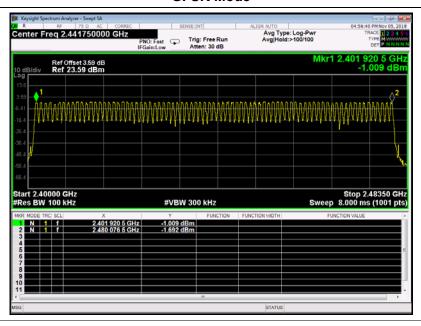




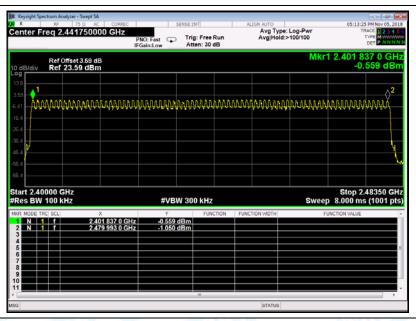
**Attachment D-- Number of Hopping Channel Test Data** 

Temperature:	25°	C		Relative Humidity:	55%			
Test Voltage:	DC	OC 3.7V						
Test Mode:	Hop	oping Mode	BAD					
Frequency Rang	ge	Test Mode	Q	antity of Hopping Channel	Limit			
		GFSK		79				
2402MHz~2480M	lHz	π /4-DQPSK	79		>15			
		8-DPSK		79				
			2501/14					



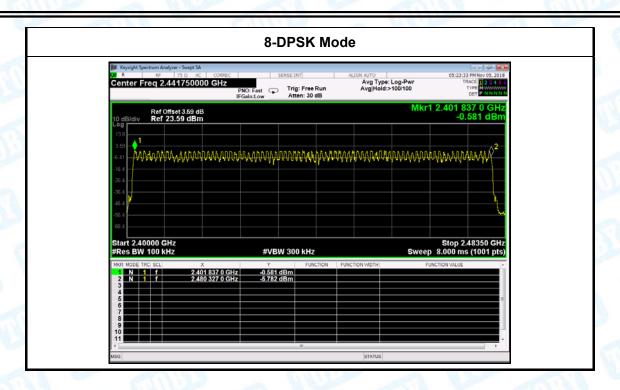


#### π/4-DQPSK Mode





Page: 68 of 92







Page: 69 of 92

# **Attachment E-- Average Time of Occupancy Test Data**

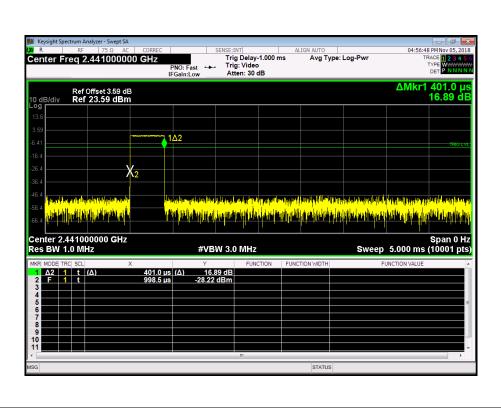
ture:	25°	C	WI -	Relative Humidity:	55%	MAIN	
Test Voltage: DC 3.7V							
le:	Hop	ping Mode (G	SFSK)				
Chanr	nel	Pulse	Total of Dwe	II Period Time	Limit	Result	
(MHz	<u>z</u> )	Time (ms)	(ms)	(s)	(ms)	Result	
2441	1	0.401	128.32	31.60	400	PASS	
2441	1	1.657	265.12	31.60	400	PASS	
2441	1	2.905	309.87	31.60	400	PASS	
	age: le: Chanr (MHz 244	age: DC	Age:         DC 3.7V           le:         Hopping Mode (Control of the control of the co	age:         DC 3.7V           le:         Hopping Mode (GFSK)           Channel (MHz)         Pulse (ms) (ms)           2441         0.401         128.32           2441         1.657         265.12	Channel   Pulse   Total of Dwell   Period Time   (MHz)   Time (ms)   (ms)   (s)   2441   0.401   128.32   31.60   2441   0.657   265.12   31.60	Age:         DC 3.7V           Ie:         Hopping Mode (GFSK)           Channel (MHz)         Pulse (ms)         Total of Dwell (ms)         Period Time (ms)         Limit (ms)           2441         0.401         128.32         31.60         400           2441         1.657         265.12         31.60         400	

1DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79

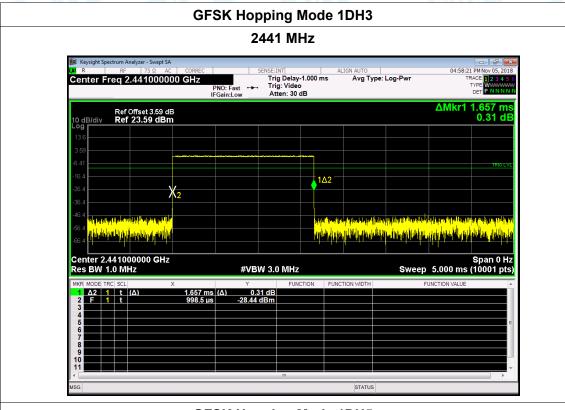
1DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79

1DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79

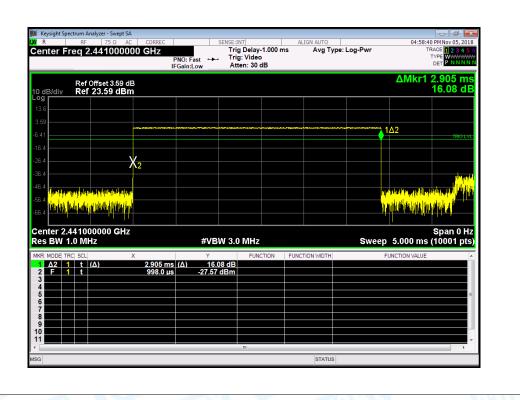
## **GFSK Hopping Mode 1DH1**







## **GFSK Hopping Mode 1DH5**





Page: 71 of 92

Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	400	

**Test Mode:** Hopping Mode ( π /4-DQPSK)

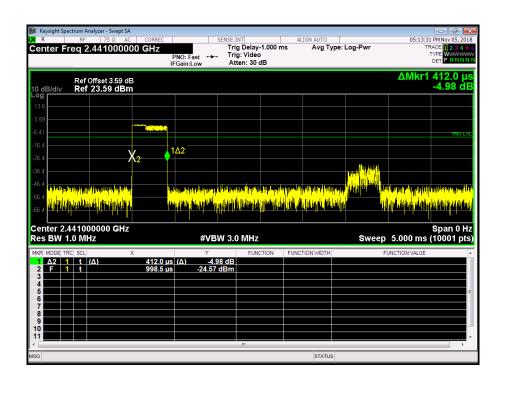
Test	Channel	Pulse	Total of Dwell	Period Time	Limit	Dogult
Mode	(MHz)	Time (ms)	(ms)	(s)	(ms)	Result
2DH1	2441	0.412	131.84	31.60	400	PASS
2DH3	2441	1.664	266.24	31.60	400	PASS
2DH5	2441	2.913	310.72	31.60	400	PASS

2DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79

2DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79

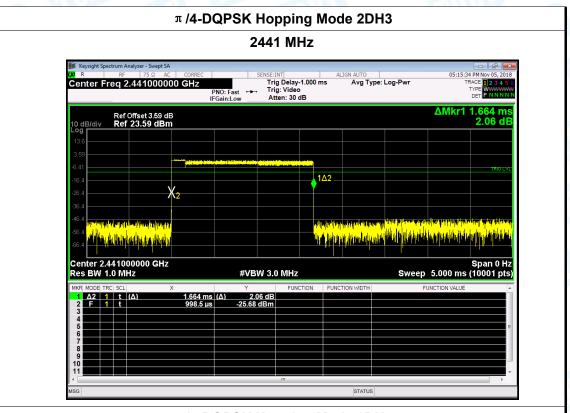
2DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79

## $\pi$ /4-DQPSK Hopping Mode 2DH1

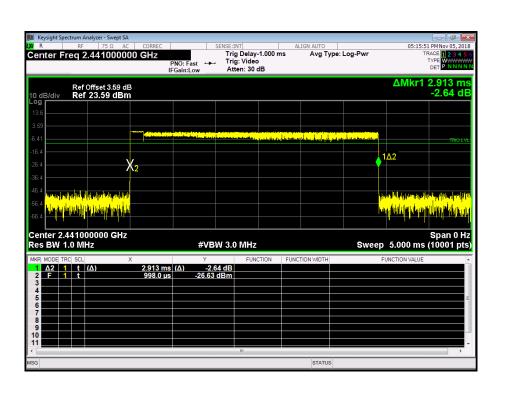




Report No.: TB-FCC162598 Page: 72 of 92



### π /4-DQPSK Hopping Mode 2DH5





Page: 73 of 92

Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		MU
Tost Mode:	Honning Mode (8-DPSK)		7.1

**Test Mode:** Hopping Mode (8-DPSK)

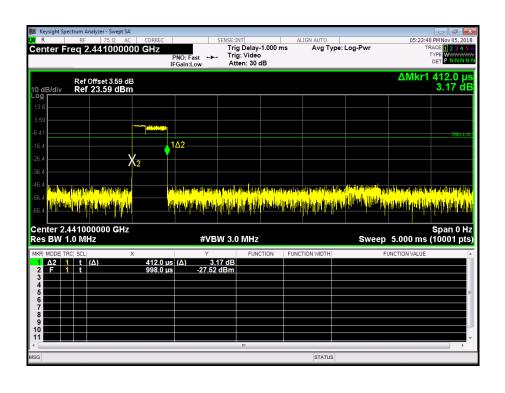
Test	Channel	Pulse	Total of Dwell	Period Time	Limit	Result
Mode	(MHz)	Time (ms)	(ms)	(s)	(ms)	Result
3DH1	2441	0.412	131.84	31.60	400	PASS
3DH3	2441	1.663	266.08	31.60	400	PASS
3DH5	2441	2.914	310.83	31.60	400	PASS

1DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79

1DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79

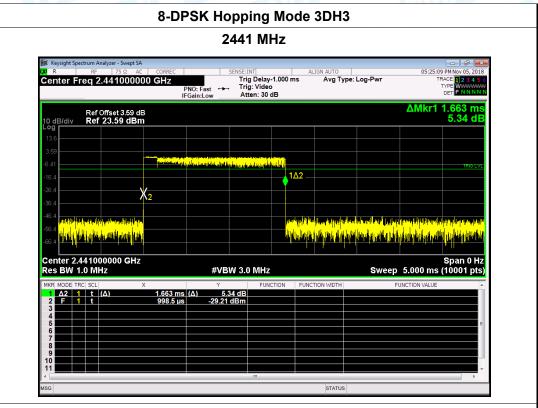
1DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79

### 8-DPSK Hopping Mode 3DH1

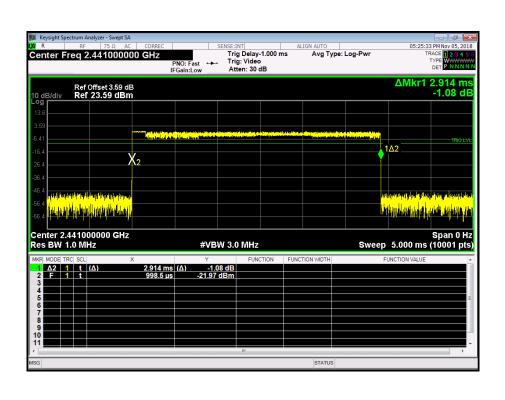




74 of 92 Page:



### 8-DPSK Hopping Mode 3DH5





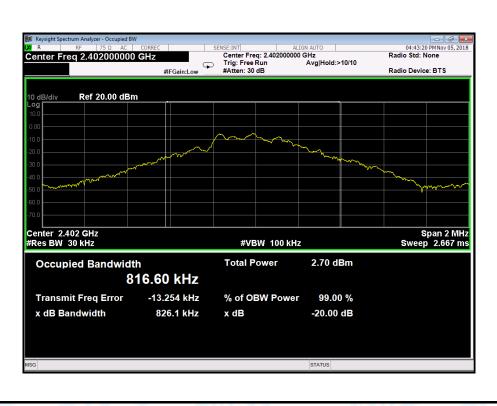


Page: 75 of 92

# Attachment F-- Channel Separation and Bandwidth Test Data

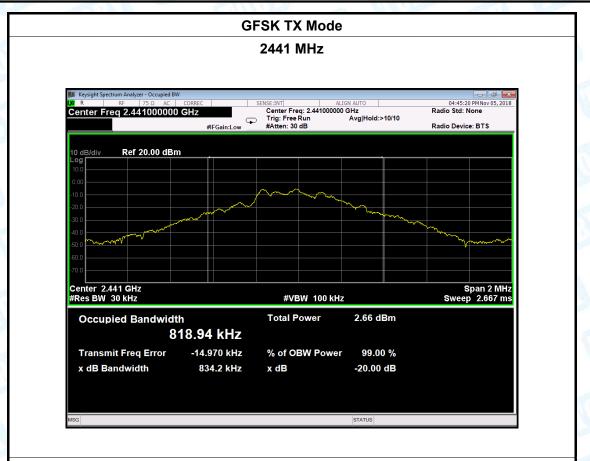
Temperature:	<b>25</b> ℃		Relative Humidity:	55%
Test Voltage:	DC	3.7V		
Test Mode:	TX	Mode (GFSK)		
Channel frequency (MHz)		99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402		816.60	826.1	
2441		818.94	834.2	
2480		823.43	841.9	







76 of 92 Page:



#### **GFSK TX Mode**





2480

Report No.: TB-FCC162598

804.00

Page: 77 of 92

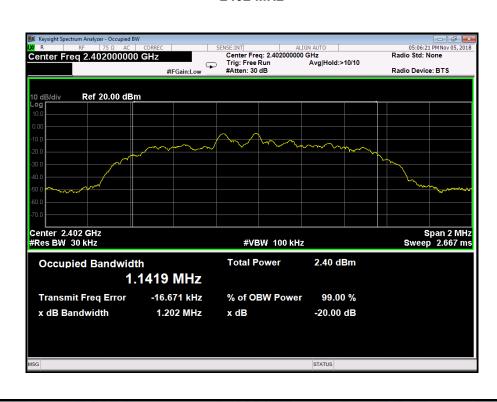
Temperature:	25°	C	Relative Humidity:	55%
Test Voltage:	DC	3.7V		LINE S
Test Mode:	TX	Mode (π/4-DQPSK)	1	133
Channel frequer (MHz)	тсу	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402		1141.9	1202	801.33
2441		1144.5	1207	804.67

### $\pi$ /4-DQPSK TX Mode

1206

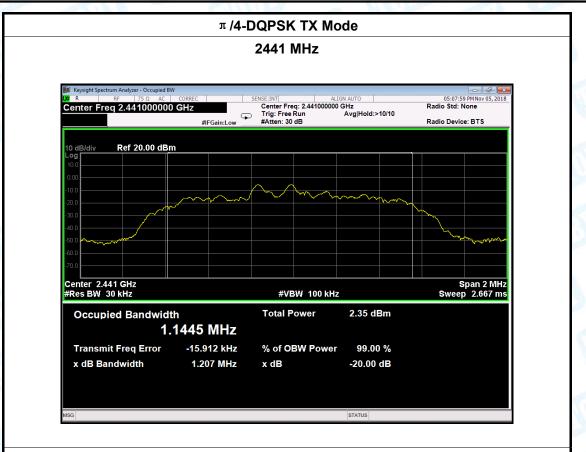
#### 2402 MHz

1144.0

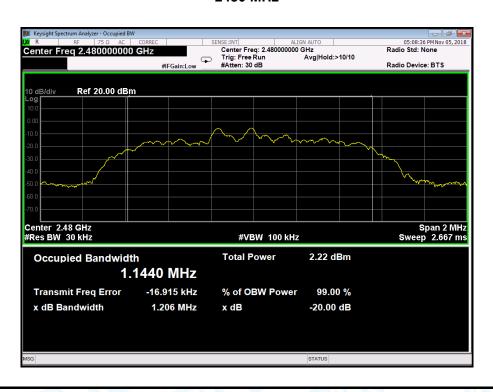




Page: 78 of 92



#### π/4-DQPSK TX Mode

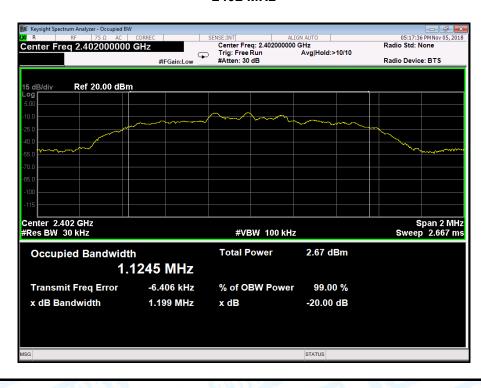




Page: 79 of 92

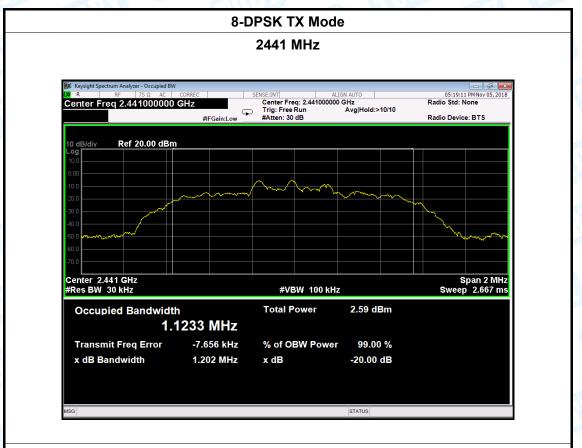
Temperature:	25°	C	Relative Humidity:	55%
Test Voltage:	DC	3.7V		(3.1
Test Mode:	TX	Mode (8-DPSK)		
Channel frequency (MHz)		99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402		1124.5	1199	799.33
2441		1123.3	1202	801.33
2480		1125.7	1199	799.33

#### 8-DPSK TX Mode

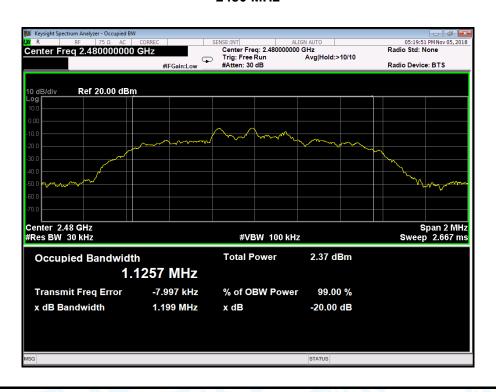




Page: 80 of 92









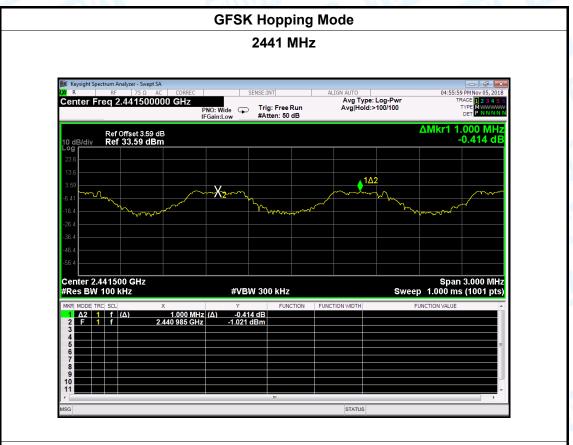
Page: 81 of 92

Temperature:	25℃		Relative Hun	nidity:	55%	
Test Voltage:	DC 3.7V	DC 3.7V				
Test Mode:	Hopping I	Hopping Mode (GFSK)				
Channel frequency Separation Read Value Separation				aration Limit		
(MHz)		(kHz)		(kHz)		
2402		1000		826.1		
2441		1000		834.2		
2480		1000			841.9	
		GFSK Hoppir	g Mode			
2402 MHz						





Report No.: TB-FCC162598 Page: 82 of 92









Page: 83 of 92

Temperature:	25℃		Relative Hur	nidity:	55%	
Test Voltage:	DC 3.7V	DC 3.7V				
Test Mode:	Hopping I	Hopping Mode ( π /4-DQPSK)				
Channel frequency Separation Read Value Sepa			aration Limit			
(MHz)		(kHz)		(kHz)		
2402		980			801.33	
2441		1000		804.67		
2480		1000			804.00	
		π/4-DQPSK Hop	ping Mode			
		2402 MI	Hz			





Report No.: TB-FCC162598 Page: 84 of 92





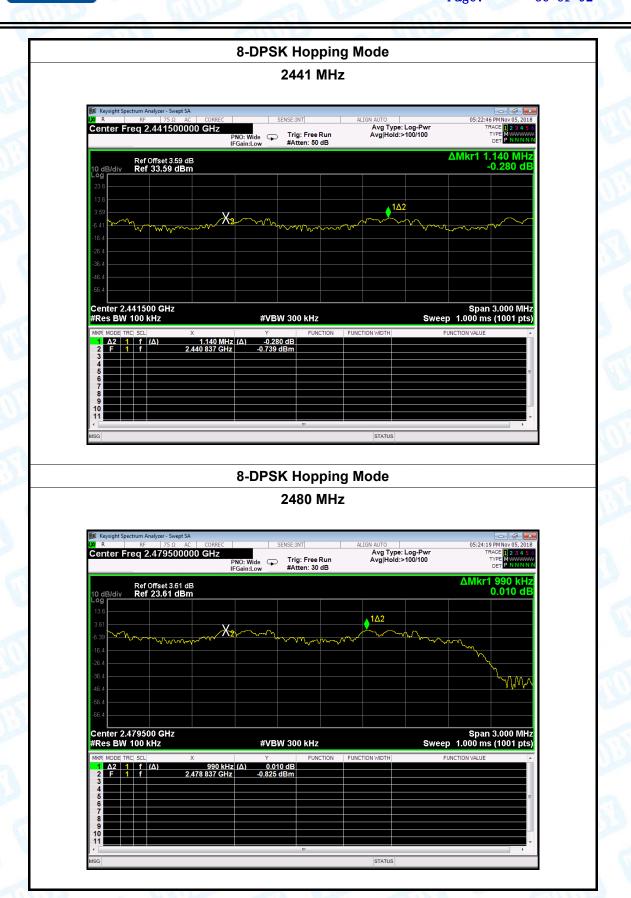
Page: 85 of 92

Temperature:	25℃		Relative Humid	ity:	55%	
Test Voltage:	DC 3.7V	DC 3.7V				
Test Mode:	Hopping Mode (8-DPSK)					
Channel frequency Separation			ad Value	aration Limit		
(MHz)	(MHz)			(kHz)		
2402	2402			799.33		
2441	2441			801.33		
2480		990			799.33	
8-DPSK Hopping Mode						





Report No.: TB-FCC162598 Page: 86 of 92







Page: 87 of 92

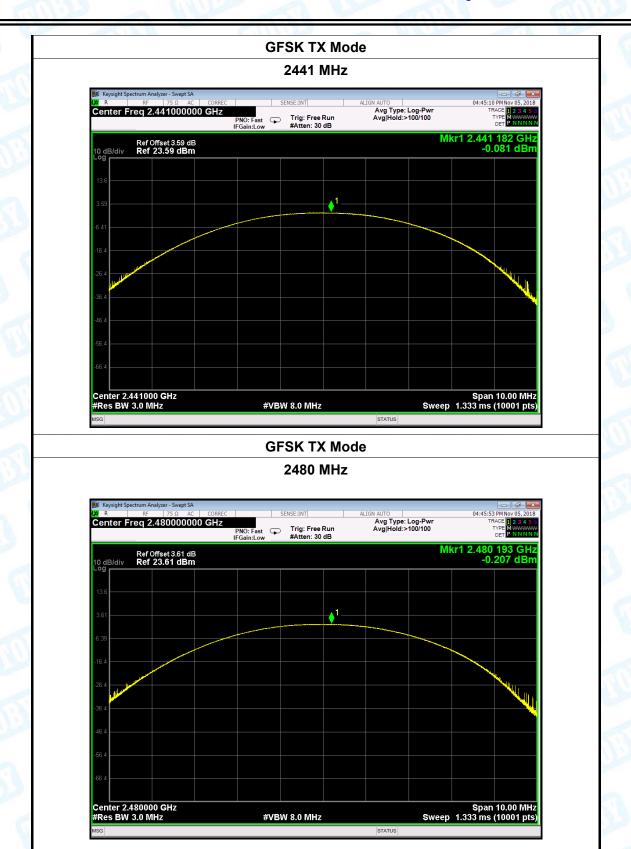
## **Attachment G-- Peak Output Power Test Data**

mperature:	25℃	Relative Humid		dity:	55%	
st Voltage:	DC 3.7V	MA		1		
st Mode:	TX Mode	(GFSK)	MADE		All	
thannel frequency (MHz) Test Result (dBm) Limit (dBm)						mit (dBm)
2402			0.265			
2441			-0.081			30
2480			-0.207			
		GFS	K TX Mod	e		
		24	102 MHz			
	n Analyzer - Swept SA					
	RF 75 Ω AC CORRE 2.402000000 GHz			ALIGN AUTO Avg Type: Log-Pwr	04	:41:13 PM Nov 05, 2018 TRACE 1 2 3 4 5 6
			rig: Free Run Atten: 30 dB	Avg Hold:>100/100		DET P NNNN
Real Real Real Real Real Real Real Real	ef Offset 3.61 dB ef 23.61 dBm				Mkr1 2.4	401 956 GHz 0.265 dBm
10 dB/div Ro	23.01 4511					
13.6						
3.61			1			
-6.39						
-16.4						
-26.4						
-36.4						
-46.4						
-56.4						
-66.4						
Center 2.402	000 CH-					pan 10.00 MHz

#VBW 8.0 MHz



Page: 88 of 92

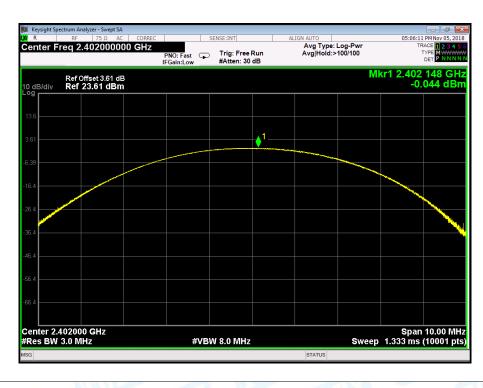




Page: 89 of 92

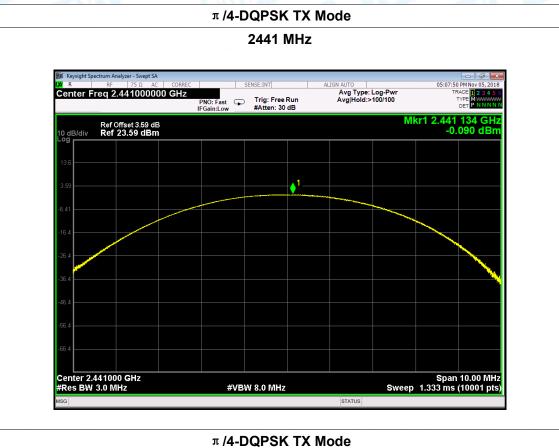
Temperature:	25℃		Relative Humidity:	55%		
Test Voltage:	DC 3.7V					
Test Mode:	TX Mode	TX Mode ( π /4-DQPSK)				
Channel frequency (MHz) Test Result			(dBm) Li	mit (dBm)		
2402		-0.044				
2441		-0.090		21		
2480		-0.185				
	// DODOK TV M. J.					

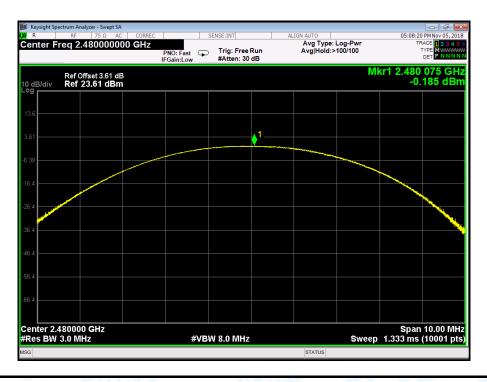
#### π /4-DQPSK TX Mode





90 of 92 Page:



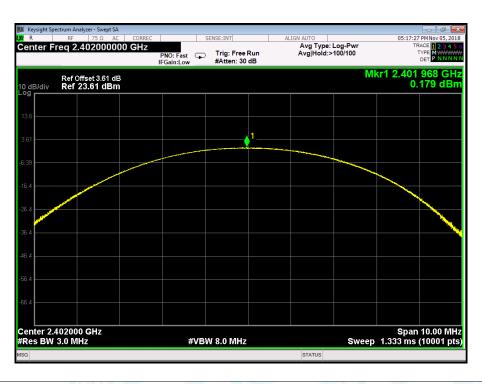




Page: 91 of 92

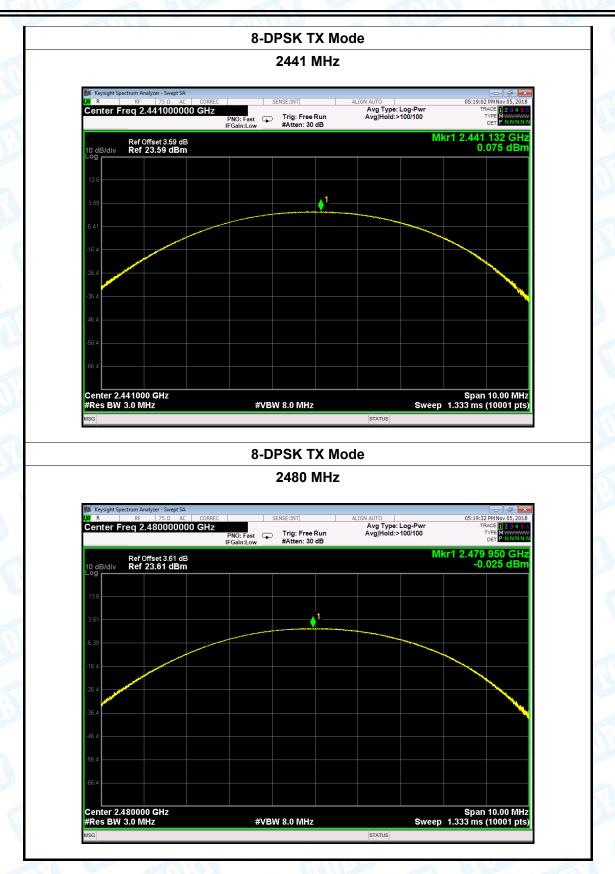
Temperature:	<b>25</b> ℃		Relative Humidity:	55%		
Test Voltage:	DC 3.7V		THE STATE OF THE S	NIO.		
Test Mode:	TX Mode	(8-DPSK)		633		
Channel frequency (MHz) Test Result (dBm			IBm) Li	Limit (dBm)		
2402		0.179				
2441		0.075		21		
2480		-0.025				
		8 DDSK TY M	lodo			

#### 8-DPSK TX Mode





Report No.: TB-FCC162598 Page: 92 of 92



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