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T	EST REPORT				
Report No. ······:	CTC20211677E07				
FCC ID:	2AY37-S-13				
Applicant:	Shenzhen Times Innovation Technology Co., Ltd.				
Address	5th Floor, Building B, Baseus Intelligence Park, No.2008, Xue- gang Rd, Gangtou Community, Bantian Street, Longgang Dis- trict, Shenzhen China				
Manufacturer	Shenzhen Times Innovation Technolog	y Co., Ltd.			
Address	5th Floor, Building B, Baseus Intelligence Park, No.2008, Xue- gang Rd, Gangtou Community, Bantian Street, Longgang Dis- trict, Shenzhen China				
Product Name·····:	Car Bluetooth Player				
Trade Mark·····:	Baseus				
Model/Type reference······:	S-13				
Listed Model(s) ······:	S-09, S-09A, S-13, S-13A, S-16, S-16A	N .			
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247				
Date of receipt of test sample:	Oct. 15, 2021				
Date of testing	Oct. 15, 2021 to Nov. 09, 2021				
Date of issue:	Nov. 11, 2021				
Result:	PASS				
Compiled by:		Tim Jiang			
(Printed name+signature)	Jim Jiang	Jim Jiang			
Supervised by:		Miller Ma			
(Printed name+signature)	Miller Ma	NUMBY NUX			
		1 0 00			
Approved by:		Johnas			
(Printed name+signature)	Totti Zhao	/			
Testing Laboratory Name:	CTC Laboratories, Inc.				
Address	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China				
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the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CTC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit. The test report merely correspond to the test sample.



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# 1. TEST SUMMARY

## 1.1. Test Standards

The tests were performed according to following standards:

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

RSS 247 Issue 2: Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

## **1.2. Report Version**

Revised No.	Date of issue	Description
01	Nov. 11, 2021	Original

## **1.3. Test Description**

FCC Part 15 Subpart C (15.247)/ RSS 247 Issue 2					
Test Item	Standard	Decult	Test Engi-		
Test nem	FCC	IC	Result	neer	
Antenna Requirement	15.203	/	Pass	Jim Jiang	
Conducted Emission	15.207	RSS-Gen 8.8	N/A	N/A	
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Jim Jiang	
Hopping Channel Separation	15.247(a)(1)	RSS 247 5.1 (b)	Pass	Jim Jiang	
Dwell Time	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Jim Jiang	
Peak Output Power	15.247(b)(1)	RSS 247 5.4 (b)	Pass	Jim Jiang	
Number of Hopping Frequency	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Jim Jiang	
Band Edge Emissions	15.247(d)	RSS 247 5.5	Pass	Jim Jiang	
Radiated Spurious Emission	15.247(d)&15.209	RSS 247 5.5& RSS-Gen 8.9	Pass	Jim Jiang	
20dB Bandwidth	15.247(a)	RSS 247 5.1 (b)	Pass	Jim Jiang	

Note:

1. The measurement uncertainty is not included in the test result.

2. N/A: means this test item is not applicable for this device according to the technology characteristic of device.





### **CTC** Laboratories, Inc.

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

## Laboratory accreditation

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

## CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

## A2LA-Lab Cert. No.: 4340.01

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

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

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

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

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained inour files. Registration 951311, Aug 26, 2017.

## 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

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



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

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

# **1.6. Environmental Conditions**

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

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



# 2. GENERAL INFORMATION

## 2.1. Client Information

Applicant:	Shenzhen Times Innovation Technology Co., Ltd.
Address:5th Floor, Building B, Baseus Intelligence Park, No.2008, Xuegang Rd, Gangtou Community, Bantian Street, Longgang District, Shenzhen China	
Manufacturer:	Shenzhen Times Innovation Technology Co., Ltd.
Address:5th Floor, Building B, Baseus Intelligence Park, No.2008, Xuegang Ro Gangtou Community, Bantian Street, Longgang District, Shenzhen Ch	
Factory:	Shenzhen Lohee Technology Co., Ltd.
Address:	6F, Building B1, Anle Industrial Zone, No. 172, Hangcheng Avenue, Xixiang Street, Baoan District, Shenzhen China

# 2.2. General Description of EUT

Product Name:	Car Bluetooth Player
Trade Mark:	Baseus
Model/Type reference:	S-13
Listed Model(s):	S-09, S-09A, S-13, S-13A, S-16, S-16A
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit. The difference is the model. Model S-13 was selected as the EUT in this report.
Power supply:	Input: DC12-24V 3A Total Output: 36W USB1 Output: DC5V 3A, DC9V 3A, DC12V 2.4A Type-C Output: DC5V 3A, DC9V 3A, DC12V 2.4A USB2 Output: DC5V 1.5A
Hardware version:	S-13-MAIN_V2.0
Software version:	V2.3
Bluetooth 5.0/ EDR	
Modulation:	GFSK, π/4-DQPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	-0.58dBi



# 2.3. Accessory Equipment Information

Equipment Information					
Name	Model	S/N	Manufacturer		
Notebook	ThinkPad T460s	/	Lenovo		
Cable Information					
Name	Shielded Type	Ferrite Core	Length		
USB Cable	Unshielded	NO	100cm		
Test Software Information					
Name	Version	/	/		
FCCAssist	2.4	1	/		

## 2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

**Operation Frequency List:** 

Channel	Frequency (MHz)
00	2402
01	2403
:	:
38	2440
39	2441
40	2442
:	:
77	2479
78	2480

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

### Test mode

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated spurious emissions test item:

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



## 2.5. Measurement Instruments List

Tonscei	Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021	
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2022	
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 25, 2021	
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 25, 2021	
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 25, 2021	
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 25, 2021	
7	Simultaneous Sam- pling DAQ	Agilent	U2531A	TW54493510	Dec. 25, 2021	
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 25, 2021	
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 25, 2021	
10	Climate Chamber	ESPEC	MT3065	/	Dec. 25, 2021	
11	300328 v2.2.2 test system	TONSCEND	v2.6	/	/	

Radiated Emission and Transmitter spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 25, 2021
2	High pass filter	micro-tranics	HPM50111	142	Dec. 25, 2021
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 25, 2021
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 25, 2021
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 25, 2021
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 25, 2021
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 25, 2021
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 25, 2021
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 25, 2021
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 25, 2021
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 25, 2021
15	RF Connection Ca- ble	HUBER+SUHNER	RE-7-FL	N/A	Dec. 25, 2021
16	RF Connection Ca- ble	Chengdu E-Microwave			Dec. 25, 2021

CTC Laboratories, Inc.



17	High pass filter	Compliance Direc- tion systems	BSU-6	34202	Dec. 25, 2021
18	Attenuator	Chengdu E-Microwave	EMCAXX-10RNZ-3		Dec. 25, 2021
19	High and low tem- perature box	ESPEC	MT3065	12114019	Dec. 25, 2021

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

Note:

1. The Cal. Interval was one year.

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



# 3.1. Conducted Emission

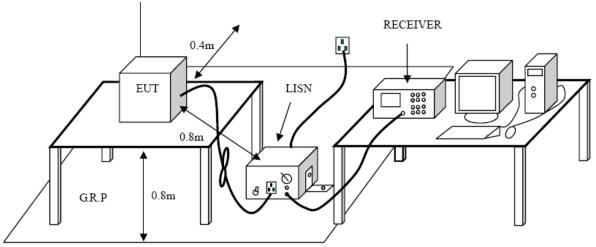
## <u>Limit</u>

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

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

\* Decreases with the logarithm of the frequency.

## Test Configuration



## Test Procedure

- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 7. During the above scans, the emissions were maximized by cable manipulation.



<u>Test Mode</u> Please refer to the clause 2.4.

### Test Results

Not applicable.



## 3.2. Radiated Emission

<u>Limit</u>

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

Frequency (MHz)	Field Strength (microvolts/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
960~1000	500	3

	dB(uV/m)	) (at 3 meters)
Frequency (MHz)	Peak	Average
Above 1000	74	54

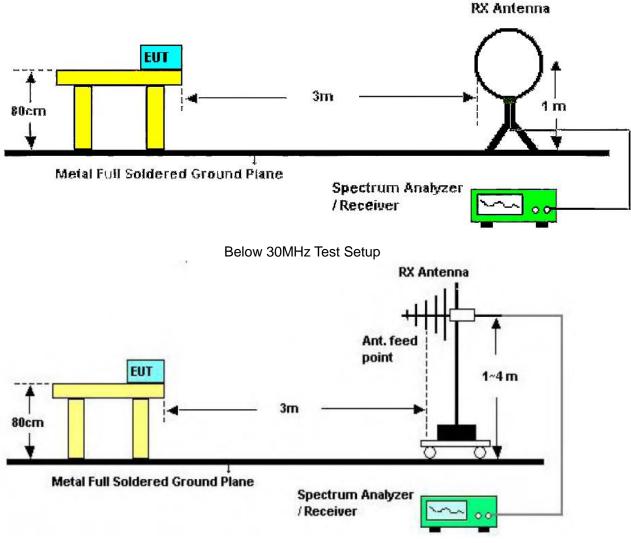
### Note:

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

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

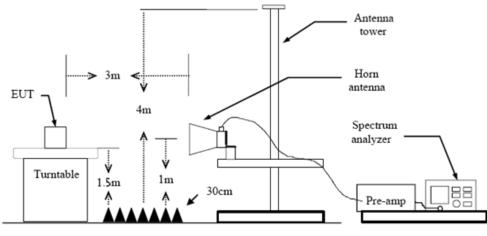
## **Test Configuration**





30-1000MHz Test Setup





Above 1GHz Test Setup

## Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:

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

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

(3) From 1 GHz to  $10^{th}$  harmonic:

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

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

## Test Mode

Please refer to the clause 2.4.

### Test Result

### 9 KHz~30 MHz

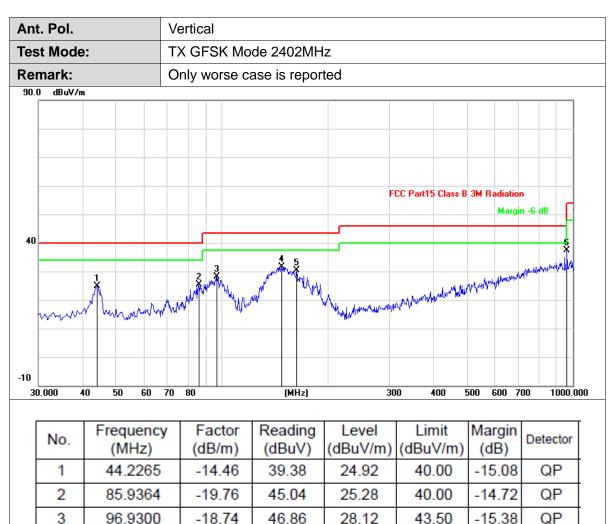
From 9 KHz to 30 MHz: Conclusion: PASS

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



	. Pol.		H	Horizontal									
Гes	t Mode	):	T	X GFSł	< Mo	de 2402MH	Z						
	nark:		0	nly wor	se c	ase is repor	ted						
90.0	) dBuV/m	1					1						
40	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				22			FCC Part15				n -6 dB	
30	1.000 4	10 50 1	60 70	80		(MHz)	3	00 40	10 !	500	600 7	00	1000.0
30	0.000 4	0 50 0	60 70	80		(MHz)	3	00 40	0 !	500	600 7	00	1000.0
30	.000 4 No.	Freque	ency	80 Fac (dB/		(MHz) Reading (dBuV)	3 Level (dBuV/m)	Lim	it	Ma	600 7 argin dB)		
30		Freque	ency z)	Fac	m)	Reading	Level	Lim	it //m)	Ma (0	argin		ctor
30	No.	Freque (MHz	ency z) 658	Fac (dB/	m) 44	Reading (dBuV)	Level (dBuV/m)	Lim (dBuV	it //m) 00	Ма ((	argin dB)	Dete	ctor P
30	No. 1	Freque (MHz 43.96	ency z) 558 598	Fac (dB/r -14.	m) 44 84	Reading (dBuV) 38.51	Level (dBuV/m) 24.07	Lim (dBuV 40.0	it //m) 00 50	Ma (( -1 -1	argin dB) 5.93	Dete Q	ctor P P
30	No. 1 2	Freque (MHz 43.96 105.65	ency z) 558 598 696	Fac (dB/r -14. -17.	m) 44 84 56	Reading (dBuV) 38.51 49.72	Level (dBuV/m) 24.07 31.88	Lim (dBuV 40.0 43.9	it //m) 00 50	Ma (( -1 -1	argin dB) 5.93 1.62	Dete Q Q	ctor P P P
30	No. 1 2 3	Freque (MHz 43.96 105.65 176.46	ency z) 558 598 696 366	Fac (dB/r -14. -17. -15.	m) 44 84 56 80	Reading (dBuV) 38.51 49.72 49.53	Level (dBuV/m) 24.07 31.88 33.97	Lim (dBu\ 40.0 43.0 43.0	it //m) 50 50 50	Ma (( -1 -1 -9 -1	argin dB) 5.93 1.62 9.53	Dete Q Q Q	ctor P P P





43.50

43.50

46.00

QP

QP

QP

-11.83

-13.13

-8.72

Remarks:	

4

5

6

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

46.18

44.81

37.81

31.67

30.37

37.28

-14.51

-14.44

-0.53

2.Margin value = Level -Limit value

148.0166

163.2133

960.0000



An	t. Pol.			Hor	izontal							
Tes	st Mode	:		TX	GFSK Mo	de 2402N	ЛH	z				
Re	mark:				report for bed limit.	the emiss	sior	n whic	h mor	e than 20 d	B below t	he pre-
100.	0 dBuV/m	1	1									
		_							FCC Pa	rt15 Class C 3M A	bove-1G Pea	k
			<b>n</b>						FCC	Part15 Class C 3	A Above-1G A	v
50			2									
			1									
		;	*									
		_										
0.0						00.00 1050		1000	0.00			
1	000.000 35	00.00	6000.0	U 8:	500.00 110	00.00 1350	IU. UU	1600	0.00	18500.00 2100	10.00	26000.00 MHz
	No.		quen	cy	Factor	Readin	-	Le		Limit	Margin	Detector
			MHz)		(dB/m)	(dBuV	*			(dBuV/m)	(dB)	
	1		03.65		-2.82	37.91		35.		54.00	-18.91	AVG
	2	48	04.24	4	-2.82	52.02		49.	20	74.00	-24.80	peak
Re	marks:											

Remarks:

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



AIII	t. Pol.			Ve	Vertical									
es	st Mode	:		T	X GFS	K Mo	de 24	I02MH	Z					
Rer	mark:				o repo cribed l		the e	missio	n whic	ch moi	e thar	ם 20 d	B below	the pre-
00.0	) dBuV/m	l												
										FCC Pa	art15 Clas	s C 3M A	bove-1G Pea	k
										FCC	Part15 C	lass C 3I	4 Above-1G A	N .
50			<											
		Ś	k											
0.0														
10	00.000 35	00.00	6000.	.00	8500.00	110	00.00	13500.0	D 160	00.00	18500.00	) 2100	0.00	26000.00 MI
[	No.		quen		Fac			ading		vel	1	nit V/m)	Margin	Detector
		(	MHz)	)	(dB/	/m)	(dE	BuV)	(dBu	V/m)	(dBu	V/m)	(dB)	
	No.	(1 48		) 59	1	/m) 82	(dE 51		(dBu 48		(dBu 74		-	Detector peak AVG



No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AVC	Ant	. Pol.			H	orizont	al								
Scribed limit.     00.0   dBwV/m     FCC Part15 Class C 3M Above-16 Peak     50   FCC Part15 Class C 3M Above-16 AV     50   FCC Part16 Clas			:		(T)	< GFS	K Mo	de 24	41MH	z					
Image: No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV	Rei	nark:						the er	nissior	n whic	h mor	e than	20 d	B below t	the pre-
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect (dBuV/m)	100.0	) dBu∀/m	1					1							
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect (dBuV/m)															
S0   FCC Part15 Class C 3M Above-1G AV     50   \$     0.0   \$     0.0   \$     1000.000 3500.00   \$     0.0   \$     1000.000 3500.00   \$     1000.000 3500.00   \$     1000.000 3500.00   \$     1   4881.812     -2.60   38.17     35.57   54.00     -18.43   AV(2)															
50   2   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3											FCC Pa	rt15 Class	C 3M A	bove-1G Pea	k l
50   2   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3															
50   2   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3															
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect (dBuV/m)     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(d				2							FCC	Part15 Cl	ass C 3I	Above-1G A	v
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)   Detect Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(	50			Ę											
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)   Detect Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(															
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(dB)				*											
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(dB)															i
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(dB)															
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AV(dB)															
No.   Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dB)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AVC	0.0														
No.   (MHz)   (dB/m)   (dBuV)   (dBuV/m)   (dBuV/m)   (dB)   Detect     1   4881.812   -2.60   38.17   35.57   54.00   -18.43   AVC	10	00.000 35	00.00	6000.	.00	8500.00	110	00.00	13500.00	) 160	00.00	18500.00	2100	0.00	26000.00 M
1 4881.812 -2.60 38.17 35.57 54.00 -18.43 AV	[	No.			-				_			1		-	Detector
	ł	1			,			38	.17			•			AVG
	ŀ	2				l								-24.46	peak
		-				2.				.0				21.10	pour



-\nu	. Pol.			Verti	cal									
	t Mode	:		TX C	3FSK	Мо	de 244	11MHz	z					
Rer	nark:				eport bed lir		he em	issior	n whic	h mor	e than 2	20 d	B below t	he pre-
00.0	) dBu¥/m													
										FCC Pa	rt15 Class (	C 3M A	bove-1G Peal	k
										FCC	Part15 Cla	ss C 31	Above-1G A	v
50		Ś	2											
		3	k											
0.0														
10	00.000 35	00.00	6000.00	850	)0.00	1100	0.00	13500.00	1600	0.00 1	8500.00	2100	0.00	26000.00 MI
[	No.		quenc	· ·	Fact		Rea	-		vel V/m)	Lim (dBuV		Margin (dB)	Detector
		(	ИНz)	_	(dB/n	n)	(dB	uV)	(dBu	V/m)	(dBuV	/m)	(dB)	
	No.	(I 48		5		n) 0		uV) .94	(dBu 35			/m) 00		Detector AVG peak



An	t. Pol.			Ho	orizonta	al				Horizontal TX GFSK Mode 2480MHz									
	st Mode	:		ТХ	GFSK	(Mo	de 24	80MF	z										
Rei	mark:				report ribed li		the er	nissio	n whic	ch mor	e than	20 d	B below	the pre-					
100.0	0 dBuV/m	1					1			1									
										FCC Pa	ırt15 Class	C 3M A	bove-1G Pea	<u>k</u>					
										FCC	Part15 Cla	ss C 3	A Above-1G A	v					
50			2 1																
			*																
0.0																			
10	00.000 35	00.00	6000.0	00 8	8500.00	110	00.00	13500.0	0 160	00.00	18500.00	2100	)0.00	26000.00 M					
[	No.		quen MHz)	-	Fact (dB/r			ading BuV)		vel V/m)	Lim (dBu\		Margin (dB)	Detector					
	No.	()	MHz)	-	(dB/r	m)	(dE	3uV)	(dBu	V/m)	(dBu∖	//m)	(dB)						
		(N 49		47		m) 38	(dE 37		(dBu 35		1	//m) 00		Detector AVG peak					



Ant	. Pol.			V	ertical									
ſes	est Mode emark: <sup>10.0</sup> dBuV/m	:			X GFS	-								
Rer	nark:				o repo cribed		the e	missio	n whic	ch mor	e than 2	0 dl	B below t	he pre-
00.0	dBuV/m	ī					1							
										FCC Pa	rt15 Class C	ЗМ А	bove-1G Peal	k
										FCC	Part15 Class	C 3	l Above-1G A	v
50			2 1											
		:	* I											
0.0														
10	00.000 350	00.00	6000	.00	8500.00	110	00.00	13500.0	D 160	DO.OO ·	18500.00	2100	0.00	26000.00 N
[	No.		quei MHz		Fac (dB	ctor /m)		ading BuV)		vel	Limi (dBuV/		Margin (dB)	Detector
ł	1		59.9	·		38		7.70		.32	54.0		-18.68	AVG
ŀ	2		60.0			38		1.63		.25	74.0		-24.75	peak
L	_											-		P



nt. Pol.		H	Horizontal												
est Mode: emark:	le:	Т	X π/4-DQP	SK Mode 24	02MHz										
emark:			o report for cribed limit.	the emission	n which mor	e than 20 d	B below t	he pre-							
0.0 dBuV	/m	1			1										
					FCC Pa	rt15 Class C 3M A	hove-16 Pea	<b>k</b>							
								<u>`</u>							
					FCC	Part15 Class C 3	Above-1G A	v							
50	2 X														
	1	۲													
.0															
1000.000	3500.00	6000.00	8500.00 110	00.00 13500.00	) 16000.00 <sup>-</sup>	18500.00 2100	0.00	26000.00 M							
			Factor	Deading	Lovel	Limit	Margin								
No.		quency MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)		Margin (dB)	Detector							
1	48	03.994	-2.82	37.87	35.05	54.00	-18.95	AVG							
2	48	04.142	-2.82	51.50	48.68	74.00	-25.32	peak							
			1			1									

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



	Vertical											
			Ηz	240	SK Mode	/4-DQPS	TX π/4	Т				
he pre-	3 below t	e than 20 dl	ch mor	sion	he emis	port for 1 ed limit.				Remark:		
										dBu¥/m	00.0	
<u>.</u>	hove-16 Peak	t15 Class C 3M A	FCC Pa									
v	Above-1G A	Part15 Class C 3M	FCC									
									2 X		50	
									1 *			
											0.0	
26000.00 MI	0.00	8500.00 2100	100.00 ·	00.00	0.00 135	.00 1100	8500.00	6000.00	0.00	0.000 350	L	
											-	
Detector	Margin (dB)	Limit (dBuV/m)		-	Readir (dBuV	Factor dB/m)		uency Hz)	-	No.		
AVG	-19.33	54.00	.67	)	37.49	-2.82	-2	3.776	480	1	ſ	
peak	-25.44	74.00	8.56	3	51.38	-2.82	-2	4.029	480	2	ľ	
A	(dB) -19.33	54.00	.67	() )	37.49	-2.82	(dE -2	3.776	(M 480	1		

Remarks:

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



	Pol.			Horizon	tai						
st	Mode			TX π/4-	DQPSK	Mode 2	441M⊦	lz			
emark:				No repo scribed	rt for the limit.	e emissi	on whic	h mor	e than 20 o	B below	the pre-
D. O	dBu¥/m										
								FCC Pa	nt15 Class C 3M	Above-1G Pea	k
								FCC	Part15 Class C 3	M Above-1G A	v
:0		Ş	2								
		>	ł								
									10500.00.010		
1000	.000 350	JU.UU	6000.00	8500.00	11000.0	0 13500.	00 1600	0.00	18500.00 210	00.00	26000.00 M
1	No.		quency MHz)	y Fac (dB		Reading (dBuV)			Limit (dBuV/m)	Margin (dB)	Detector
	1	48	81.754	-2.	60	38.19	35.	59	54.00	-18.41	AVG
	2	48	82.258	3 -2.	60	51.91	49.	31	74.00	-24.69	peak
	2	40	52.200	, -Z.	00	51.81	49	.51	14.00	-24.09	реак

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



	Ver	tical					
):							
			the emissio	n which mor	e than 20 d	B below t	the pre-
n							
				ECC Pa	w15 Class C 3M A	hove-16 Pea	L I
				TCCT			<u>`</u>
				FCC	Part15 Class C 3	Above-1G A	v
1 X							
2							
00.00 00.00	00 0	500.00 1100	10.00 12500.0	0 16000.00	19500.00 2100	0.00	26000 00 M
							26000.00 N
Frequer	icy	Factor	Reading (dBuV)	Level	Limit (dBuV/m)	Margin (dB)	Detector
Frequer (MHz)	)	(dB/m)	(ubuv)	(ubu v/m)	(ubu v/iii)	(40)	
	, 	-2.60	51.10	48.50	74.00	-25.50	peak
	500.00 6000.	Image: State of the second	No report for the scribed limit.	TX π/4-DQPSK Mode 24   No report for the emission scribed limit.   Image: transmit in t	TX π/4-DQPSK Mode 2441MHz   No report for the emission which morscribed limit.   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P  P  P  P  P  P  P P P   P P P   P P P   P P P   P P P   P P P   P P P P   P P P P   P P P P   P P P P P   P P P P P	TX π/4-DQPSK Mode 2441MHz   No report for the emission which more than 20 discribed limit.   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P   P  P P   P P   P P   P P   P P   P P   P P   P P   P P   P P   P P P   P P P   P P P   P P P    P	TX π/4-DQPSK Mode 2441MHz   No report for the emission which more than 20 dB below to scribed limit.   n   FCC Part15 Class C 3M Above-16 Pea   FCC Part15 Class C 3M Above-16 Pea   No FCC Part15 Class C 3M Above-16 Pea   State FCC Part15 Class C 3M Above-16 A   State FCC Part15 Class C 3M Above-16 A

Remarks:

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



AIII	. Pol.			Horizontal TX π/4-DQPSK Mode 2480MHz											
	t Mode	:													
Ren	nark:				report ribed lir		he em	nissior	n whic	h mor	e than 20 (	B below	the pre-		
00.0	) dBu¥/m										i	1 1			
ł										FCC Pa	rt15 Class C 3M	Above-1G Pea	k		
										FCC	Part15 Class C	M Above-1G A	V		
50			2												
		:	*												
0.0															
10	00.000 35	00.00	6000.0	00 8	8500.00	1100	)0.00 ·	13500.00	1600	)0.00	18500.00 210	00.00	26000.00 M		
Г	No.		quen	-	Fact		Rea	-		vel	Limit	Margin	Detector		
	No.	(	MHz)		(dB/r	n)	(dBi	uV)	(dBu	V/m)	(dBuV/m	(dB)			
	No.	(				n)		uV)		V/m)			Detector AVG		



nt.	Pol.			Ve	rtical							
	t Mode	:		TX	π/4-DQ	PSK Mod	e 24	1M08	lz			
en	nark:				report for report for ribed limit		ssio	n whic	h mor	e than 20 d	B below	the pre-
)0.0	dBu¥/m					1						
							_					
									FCC Pa	rt15 Class C 3M A	hove-16 Pea	k
ŀ									10010			<b>N</b>
									FCC	Part15 Class C 3	Above-1G A	N
50			1 X									
			2 X									
		_										
).0 101	0.000 35	00 00	6000.0	10 8	3500.00 1	1000.00 13	500.00	1600	0.00	18500.00 2100	0.00	26000.00 M
_												
	No.		quen MHz)	-	Factor (dB/m)			Le (dBu	vel V/m)	Limit (dBuV/m)	Margin (dB)	Detector
Γ	1	49	59.90	00	-2.38	50.8	5	48.	47	74.00	-25.53	peak
	2	49	60.00	)7	-2.38	37.7	8	35.	40	54.00	-18.60	AVG

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



## 3.3. Band Edge Emissions (Radiated)

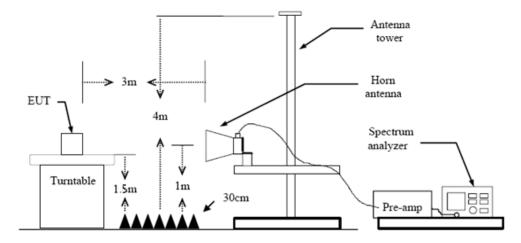
<u>Limit</u>

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

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

Conducted band edge limit: The highest point of the operating frequency waveform down 20dB

## Test Configuration



## Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1MHz, VBW=3MHz Peak detector for Peak value. RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.9 Duty Cycle.

### Test Mode

Please refer to the clause 2.4.



### (1) Radiation Test

Ant	. Pol.		H	lorizonta	al										
<b>Tes</b>	t Mode:		G	FSK M	ode 2	402MH	z								
90.0	dBu∀/m														_
									FCC	Part15 R	E-Class	B Above 1	IG PK	(	
ļ															
									FCC	Part15 R	E-Class	B Above 1	16 AV	, H	
												1	,		
40												ſ	•		
40								a	a carde a cardo	the ward				m	~
- [															
10	85.600 229	7 60 22	09.60	2321.60	2333	60 224	5.60	2357	. 60	2369.60	2381	60		2405.60	
_															
	No.	Frequ		Fac		Readi	-		vel	1	nit	Marg		Detect	or
╞		(MH		(dB/		(dBu\	*			(dBu			-		
	1	2390	.000	30.	84	17.2	3	48	.07	74	.00	-25.9	93	pea	k
	2	2390	.000	30.	84	3.75		34	.59	54	.00	-19.4	41	AVG	3
L	I						1			1		1	I		



	Vertical													
G	FSK Mode 2	2402MHz												
			FCC	Part15 BE-Class F	Above 16 P	ĸ								
						Λ								
			FCC	Part15 RE-Class E	Above 1G A	v H								
					1									
					Î									
					3									
	hand have a second s	an manakati na anakata kata kata kata kata kata kat	(halishe), laaneeraala sookka of Saadhaa	a)-alan										
37.60 2309.60	2321.60 2333	3.60 2345.60	2357.60	2369.60 2381	.60	2405.60 M								
Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector								
2390.000	30.84	18.33	49.17	74.00	-24.83	peak								
2390.000	30.84	4.38	35.22	54.00	-18.78	AVG								
	Frequency (MHz)	Frequency Factor (MHz) (dB/m)	Frequency (MHz)   Factor (dB/m)   Reading (dBuV)	Frequency (MHz) FCC FCC FCC FCC FCC FCC FCC FCC FCC FC	Frequency   Factor   Reading   Level   Limit     MHz)   Factor   Reading   Level   Limit	Frequency (MHz)   Factor (dB/m)   Reading (dBuV)   Level (dBuV/m)   Limit (dBuV/m)   Margin (dBuV/m)								

Remarks:

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



Horizontal GFSK Mode 2480 MHz											
ss B Above 1G PK											
ss B Above 1G AV											
and the second											
572.40 2596.4											
772.40 2006.4											
Margin n) (dB) Detec											
-26.74 pea											
-18.74 AV											
t /m 0											

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



\nt	. Po	ol.			V	ertica											
ſes	t M	ode			G	FSK	Mode	2480	) MH	z							
90.0	) di	3uV/m			_												
												FCC	Part15	RE-Class	B Above 1G I	PK	
	Λ																
	- 11																
												FCC	Part15	RE-Class	B Above 1G /	v	
		×															
40		2								Mana				dealers dassed	and a second	and so we	
		_															
			-														
0																	
24	76.40	00 248	38.40	250	D.40	2512.4	0 25	24.40	2538	6.40	2548	3.40	2560.4	0 2572	2.40	2596.40 N	ЯΗ
ſ	N	0.		que MHz		1	actor 3/m)		eadin IBuV			vel V/m)	1	imit uV/m)	Margin (dB)	Detector	T
ł		1		83.5			1.24		4.52	*		.76		4.00	-28.24	peak	t
╞		2		83.5			1.24	_	4.57		35			4.00	-18.19	•	$\frac{1}{2}$
L		_															Τ
٥n	nar																
								- / \	-						er Factor		



Ant. Pol. Test Mode:			Hori	Horizontal π/4-DQPSK Mode 2402MHz											
			π/4-												
90.0	dBu¥/m														
							FCC	Part15 RE-C	lass B .	Above 1G F	ĸ				
											$-\Lambda$ $-1$				
							FCC	Part15 RE-C	lass B .	Above 1G A	iove 1G AV				
										IJ					
40										Ň					
			Martin and Martin	ang na sa ang magalan kasaranga	war Mangarana hu	Markellerseekye		-	-	·····	and him				
10															
22	86.800 229	98.80 2310.8	30 232	22.80 2334	4.80 2346.8	0 2358	8.80 2	370.80	2382.8	30	2406.80 N				
ſ	No.	Frequen	-	Factor	Reading		vel	Limit		Margin	Detector				
		(MHz)		(dB/m)	(dBuV)	(dBu	V/m)	(dBuV/	m)	(dB)					
	No.		00				V/m)		m) D	_	Detector peak				

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EN

Ant. Pol. Test Mode:			Ve	Vertical π/4-DQPSK Mode 2402MHz											
			π/												
90.0	dBuV/m														
															]
										FCC	Part15 RE	-Class	B Above 1G	РК	
														Α	
														1 - N	
										FCC	Part15 RE	-Class	B Above 1G	AV	1
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22	85.600 22	97.60	2309.	.60	2321.60	233	3.60 2	2345.60	2357	7.60	2369.60	2381	.60	2405.60	л МН
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ſ			30.84		4.53		35.37		54.00		-18.63	3 AVG	1		
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Ant. Pol. Horizontal						orizont	al								
est Mode:				π	π/4-DQPSK Mode 2480MHz										
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	N	0.		eque MHz		Fac (dB/		Readi (dBu\			vel V/m)	I	imit uV/m)	Margin (dB)	Detector
ſ		1	24	83.	500	31.	24	15.5	1	46	.75	7	4.00	-27.25	peak
ľ		2	24	83.	500	31.	24	4.45	5	35	.69	5	4.00	-18.31	AVG
L								1						1	L

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



Ant. Pol. Vertical									
est Mode	:	π/4-D0		Node 2480	OMHz				
90.0 dBuV/m		I							
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No.	Frequenc	-	actor	Reading		vel	Limit	Margin	Detector
	(MHz)	(d	B/m)	(dBuV)	(dBu	V/m)	(dBuV/m)	(dB)	
1	(MHz) 2483.50	(d 0 3	B/m) 1.24	(dBuV) 14.69	(dBu 45.	V/m) .93	(dBuV/m) 74.00	(dB) -28.07	peak
	(MHz)	(d 0 3	B/m)	(dBuV)	(dBu 45.	V/m)	(dBuV/m)	(dB)	
1	(MHz) 2483.50	(d 0 3	B/m) 1.24	(dBuV) 14.69	(dBu 45.	V/m) .93	(dBuV/m) 74.00	(dB) -28.07	peak
1	(MHz) 2483.50	(d 0 3	B/m) 1.24	(dBuV) 14.69	(dBu 45.	V/m) .93	(dBuV/m) 74.00	(dB) -28.07	peak
1	(MHz) 2483.50	(d 0 3	B/m) 1.24	(dBuV) 14.69	(dBu 45.	V/m) .93	(dBuV/m) 74.00	(dB) -28.07	peak
1	(MHz) 2483.50	(d 0 3	B/m) 1.24	(dBuV) 14.69	(dBu 45.	V/m) .93	(dBuV/m) 74.00	(dB) -28.07	peak

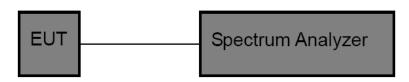


# 3.4. Band edge and Spurious Emissions (Conducted)

## Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

## **Test Configuration**



#### **Test Procedure**

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

#### **Test Mode**

Please refer to the clause 2.4.

#### **Test Results**

#### (1) Band edge Conducted Test

Test Mode	Antenna	ChName	Frequency (MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
		Low	2402	3.64	-28.54	<=-16.36	PASS
DH5	Ant1	High	2480	3.85	-42.43	<=-16.15	PASS
DHS		Low	Hop_2402	3.05	-53.78	<=-16.95	PASS
		High	Hop_2480	3.64	-54.04	<=-16.36	PASS
		Low	2402	3.69	-28.67	<=-16.31	PASS
2DH5	Ant1	High	2480	3.83	-42.54	<=-16.18	PASS
2005	Anti	Low	Hop_2402	0.48	-57.07	<=-19.52	PASS
		High	Hop_2480	3.71	-54.46	<=-16.29	PASS











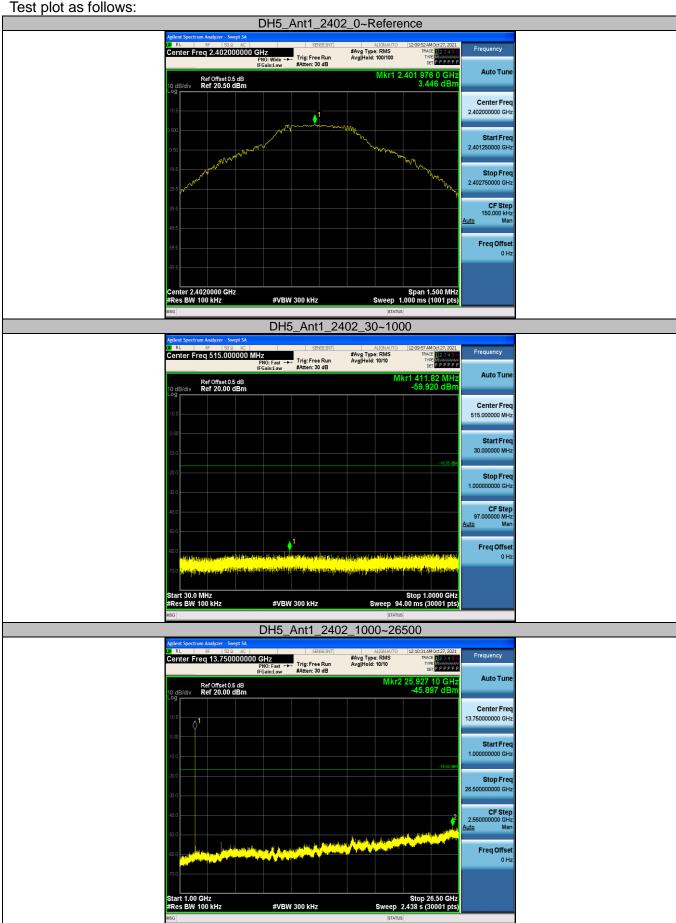




## (2) Conducted Spurious Emissions Test

Test Mode	Antenna	Frequency (MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
			Reference	3.45	3.45		PASS
		2402	30~1000	3.45	-59.92	<=-16.55	PASS
			1000~26500	3.45	-45.90	<=-16.55	PASS
			Reference	3.53	3.53		PASS
DH5	Ant1	2441	30~1000	3.53	-60.01	<=-16.48	PASS
			1000~26500	3.53	-46.29	<=-16.48	PASS
		2480	Reference	3.07	3.07		PASS
			30~1000	3.07	-59.79	<=-16.93	PASS
			1000~26500	3.07	-46.23	<=-16.93	PASS
			Reference	0.86	0.86		PASS
		2402	30~1000	0.86	-59.88	<=-19.14	PASS
			1000~26500	0.86	-46.33	<=-19.14	PASS
			Reference	0.79	0.79		PASS
2DH5	Ant1	2441	30~1000	0.79	-59.53	<=-19.21	PASS
			1000~26500	0.79	-46.22	<=-19.21	PASS
		2480	Reference	3.68	3.68		PASS
			30~1000	3.68	-60.06	<=-16.32	PASS
			1000~26500	3.68	-46.44	<=-16.32	PASS



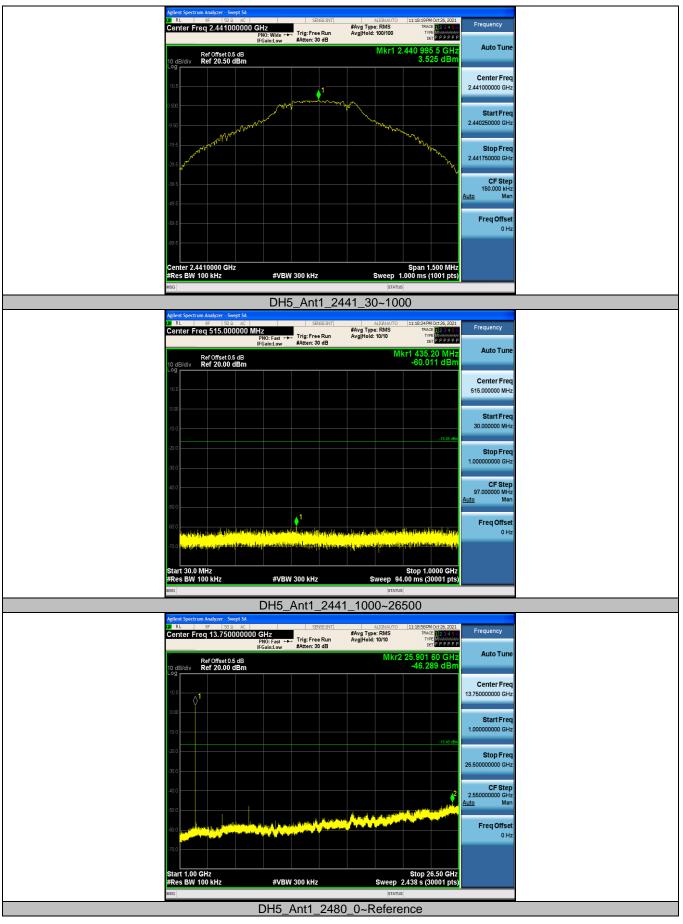


DH5\_Ant1\_2441\_0~Reference



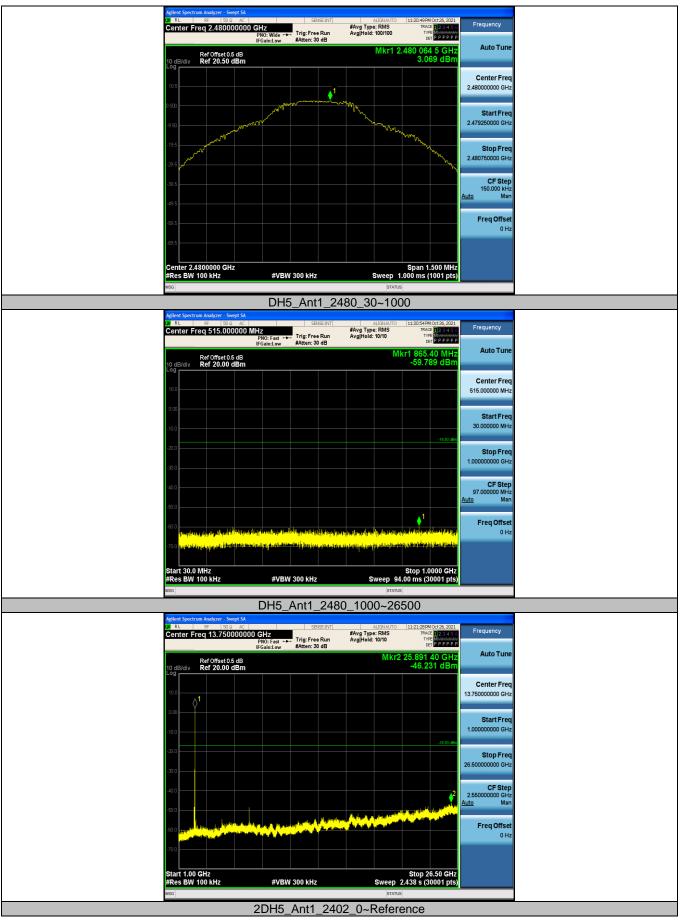


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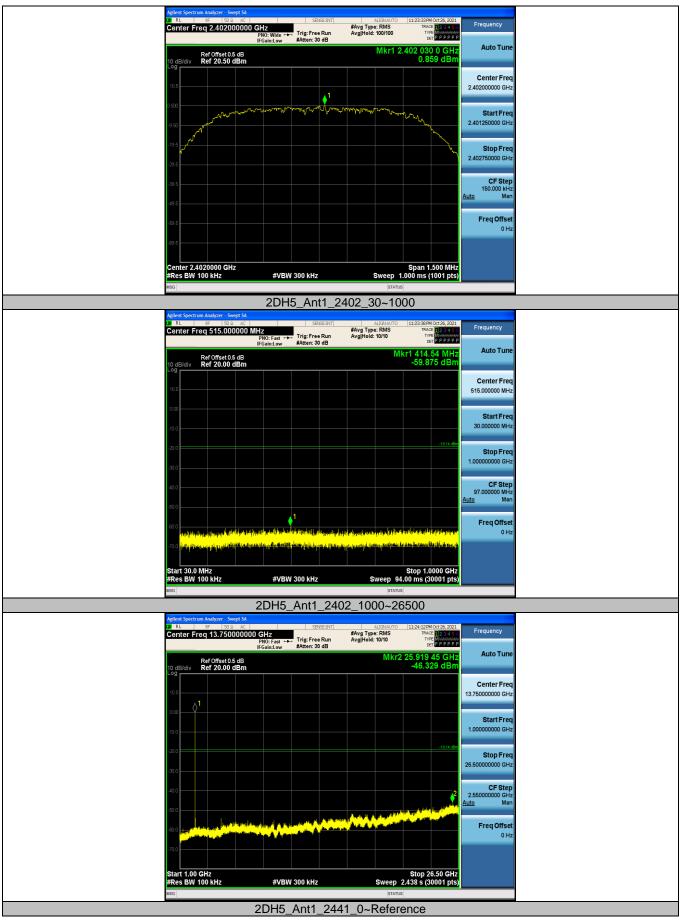


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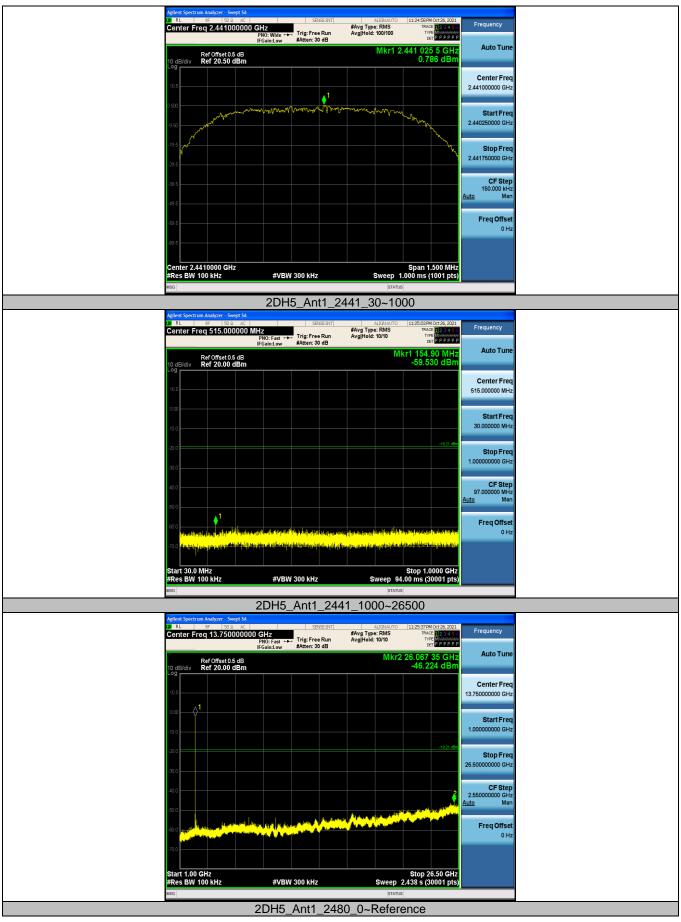




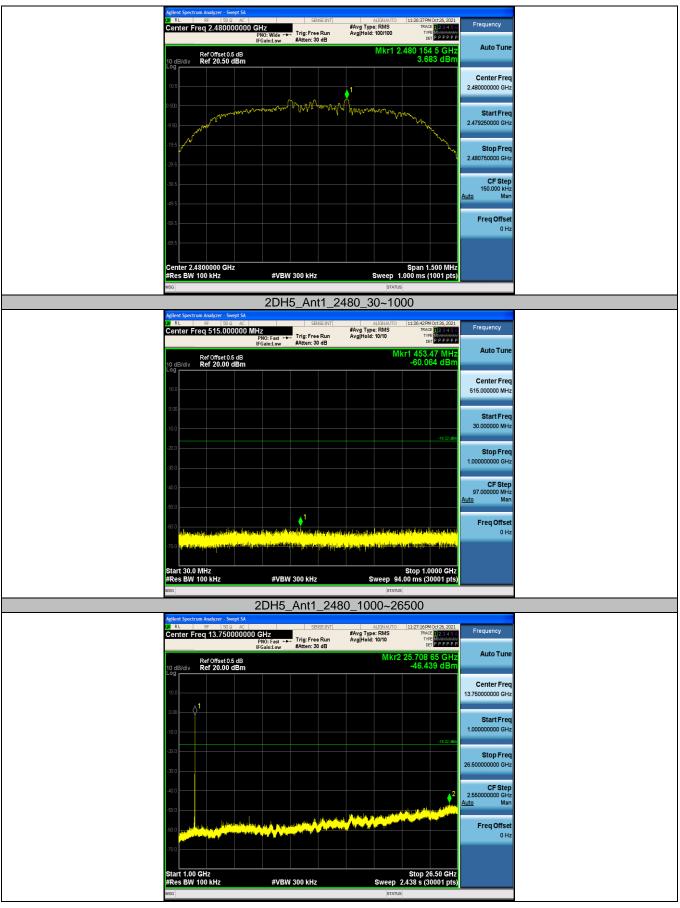












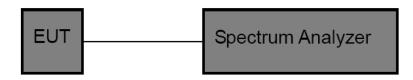


# 3.5. Bandwidth

## <u>Limit</u>

N/A

## Test Configuration



## Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. OCB and 20dB Spectrum Setting:
  - (1) Set RBW =  $1\% \sim 5\%$  occupied bandwidth.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

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

## Test Mode

Please refer to the clause 2.4.

#### Test Results

Modulation type	Channel	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
	00	0.825	0.888	592.000
GFSK	39	0.838	0.894	596.000
	78	0.842	0.867	578.000
	00	1.190	1.323	882.000
π/4-DQPSK	39	1.198	1.317	878.000
	78	1.215	1.299	866.000









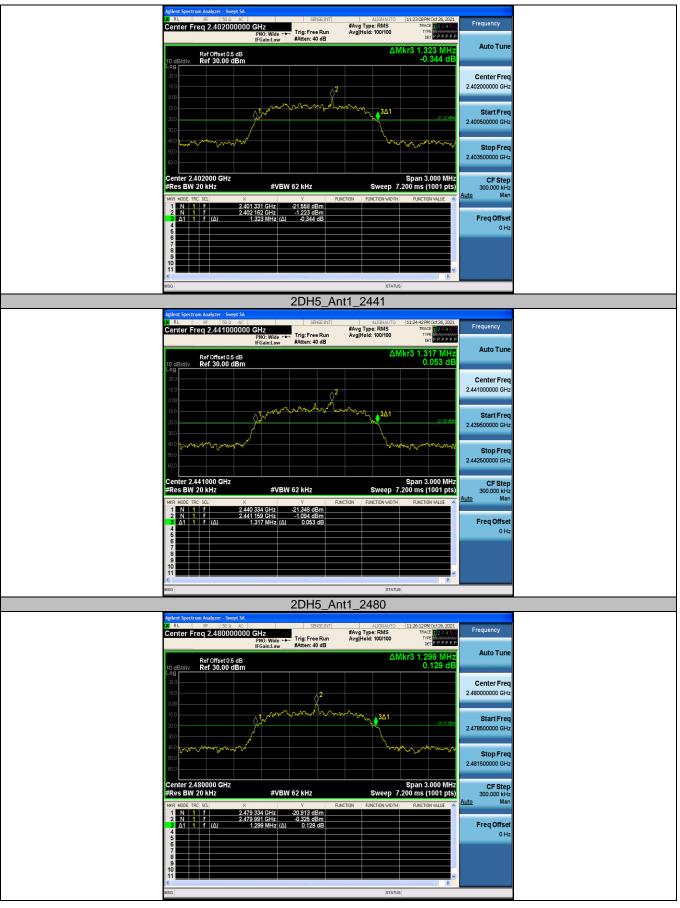












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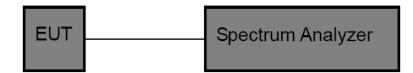
## 3.6. Channel Separation

<u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :

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

## **Test Configuration**



## Test Procedure

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

- 2. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

## Test Mode

Please refer to the clause 2.4.

#### Test Results

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
GFSK	39	0.992	596.000	Pass
π/4-DQPSK	39	0.998	878.000	Pass







# 3.7. Number of Hopping Channel

## <u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:

Section	Test Item	Limit
15.247 (a)(iii)/ RSS-247 5.1 d:	Number of Hopping Channel	>15

## **Test Configuration**



#### Test Procedure

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

- 2. Spectrum Setting:
  - (1) Peak Detector: RBW=100 kHz, VBW ≥RBW, Sweep time= Auto.

## Test Mode

Please refer to the clause 2.4.

#### Test Result

Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4-DQPSK	79	215.00	Fass



lest plot as follows:			
	DH5_Ant	1_Hop	
	PNO: East +++ Trig: Free Run	ALIGNAUTO   11:51:42 PM Oct 26, 2021     #Avg Type: RMS   TRACE     P2:4 5 G     Avg Hold: 3000/3000   TYPE     Det [P P P P P	Frequency
	IF GainsLow #Atten: 40 dB Ref Offset 0.5 dB 10 dB/div Ref 30.00 dBm Log		Auto Tune
	20.0	2	Center Freq 441750000 GHz
		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Start Freq 400000000 GHz
			Stop Freq 483500000 GHz
	400	Aut	CF Step 8.350000 MHz <u>o</u> Man
	-50.0	<u></u>	Freq Offset 0 Hz
	Start 2.40000 GHz #Res BW 100 KHz #VBW 300 kHz	Stop 2.48350 GHz Sweep 8.000 ms (1001 pts)	
	MISG	STATUS	
	2DH5_Ant	1_Hop	
	Aglient Spectrum Analyzer - Swept SA	ALIGNAUTO 11:50:16PM Oct 26, 2021 #Avg Type: RMS TRACE 123455 AvgHold: 3000/2000 TVPE	Frequency
	PNO: Fast →→ Trig: Free Run IFGain:Low #Atten: 40 dB	Avg[Hold: 3000/3000 TYPE MANAGAMAN DET P P P P P	Auto Tune
	Ref Offset 0.5 dB Log Ref 30.00 dBm		Center Freq
	10.0		441750000 GHz Start Free
			40000000 GHz
	-20.0	2	Stop Freq 483500000 GHz
	-300	Aut	CF Step 8.350000 MHz <u>o</u> Man
	-500		Freq Offset 0 Hz
	Start 2.40000 GHz	Stop 2.48350 GHz Sweep 8.000 ms (1001 pts)	
	#Res BW 100 kHz #VBW 300 kHz	Sween 2 000 mc (1001 ptc)	
	MSG	status	

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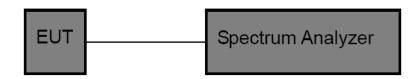


## 3.8. Dwell Time

<u>Limit</u>

Section	Test Item	Limit	
15.247(a)(iii)/ RSS-247 5.1 d	Average Time of Occupancy	0.4 sec	

## Test Configuration



#### Test Procedure

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

#### Test Mode

Please refer to the clause 2.4.

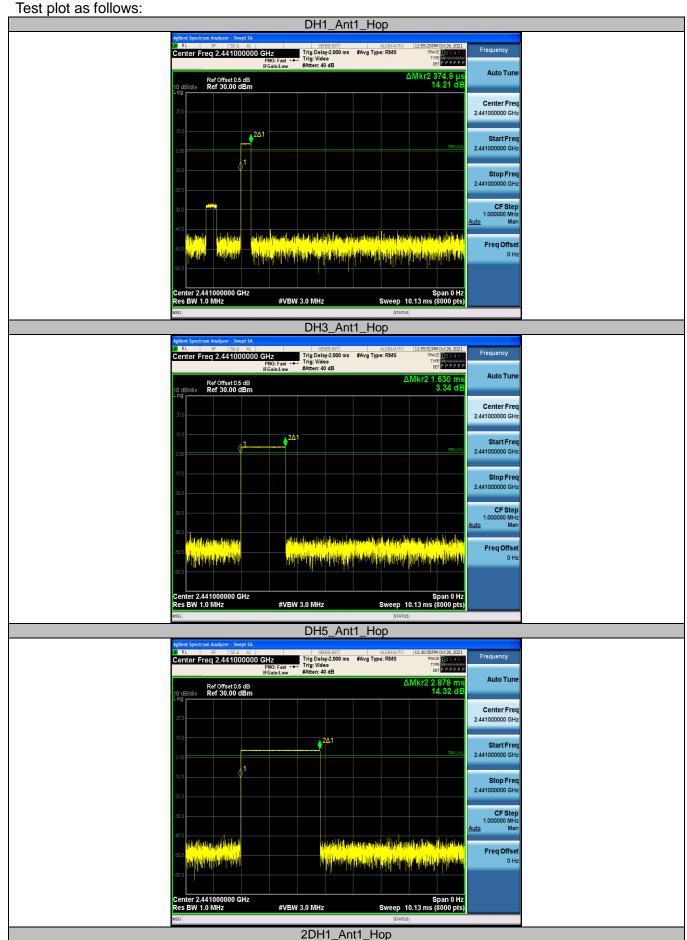


## Test Result

Modulation type	Channel	Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
	DH1	2441	0.37	118.40	31.60		
GFSK	DH3	2441	1.63	260.80	31.60	≤ 0.40	Pass
	DH5	2441	2.88	307.20	31.60		
	2DH1	2441	0.39	124.80	31.60		
π/4-DQPSK	2DH3	2441	1.64	262.40	31.60	≤ 0.40	Pass
	2DH5	2441	2.88	307.20	31.60		

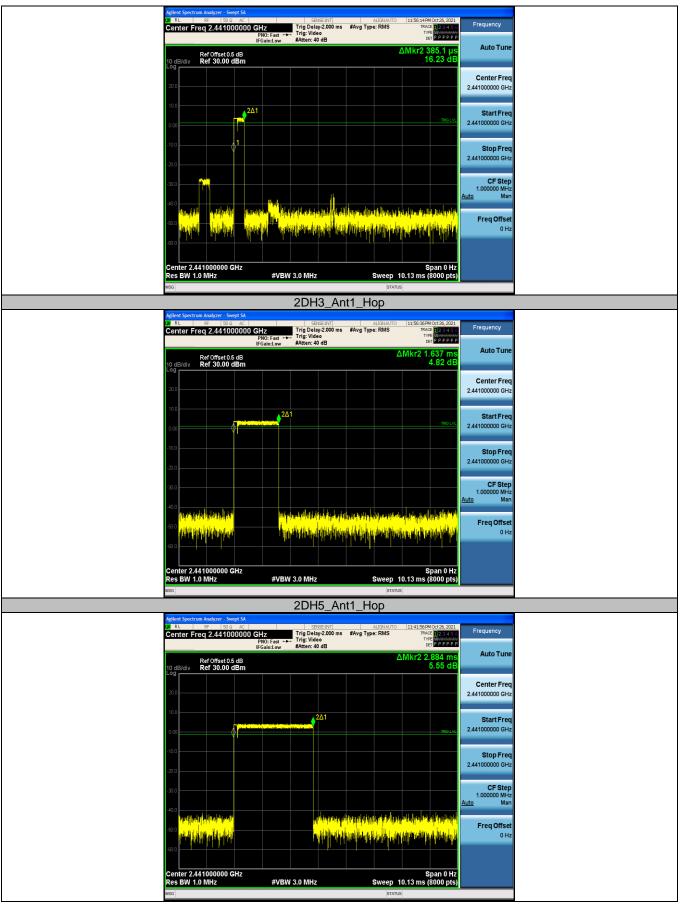
Note: 1DH1/2DH1/3DH1Total of Dwell= Pulse Time\*(1600/2)\*31.6/79 1DH3/2DH3/3DH3 Total of Dwell= Pulse Time\*(1600/4)\*31.6/79 1DH5/2DH5/3DH5 Total of Dwell= Pulse Time\*(1600/6)\*31.6/79

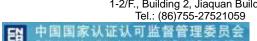














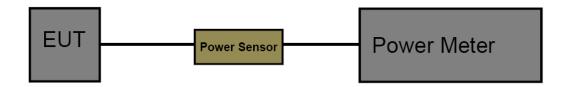
## 3.9. Peak Output Power

## <u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:

Test Item	Limit	Frequency Range(MHz)	
Peak Output Power	Hopping Channels>75 Pow- er<1W(30dBm) Other <125mW(21dBm)	2400~2483.5	

### **Test Configuration**



## Test Procedure

- 1. The maximum conducted output power may be measured using a broadband Peak RF power meter.
- 2. Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor.
- 3. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.
- 4. Record the measurement data.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
GFSK	00	4.04		
	39	4.00	< 21.00	Pass
	78	3.88		
π/4-DQPSK	00	4.75		
	39	4.70	< 21.00	Pass
	78	4.56		



# 3.10. Antenna Requirement

## **Requirement**

## FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

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

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

#### Test Result

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