

CTC Laboratories, Inc.

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Tel: +86-755-27521059 Fax: +86-755-27521011 Http://www.sz-ctc.org.cn

т	EST REPORT				
Report No:	CTC20231666E12				
FCC ID:	2AR24-XBOX				
Applicant:	Shenzhen Absen Optoelectronic	Co.,Ltd			
Address:	18-20/F, Tower A, Building 3, Phase N0.2018, Xuegang Rd, Bantian, Lo Guangdong, P.R. China				
Manufacturer	Shenzhen Absen Optoelectronic Co	o.,Ltd			
Address:	18-20/F, Tower A, Building 3, Phase N0.2018, Xuegang Rd, Bantian, Lo Guangdong, P.R. China				
Product Name:	LED Multimedia Processor				
Trade Mark:	Absen				
Model/Type reference:	X-Box				
Listed Model(s):	/				
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247				
Date of receipt of test sample:	Aug. 18, 2023				
Date of testing	Aug. 19, 2023 ~ Dec. 3, 2023				
Date of issue	Aug. 09, 2024				
Result:	PASS				
Compiled by:		Lundan			
(Printed name+signature)	Lucy Lan	lucy lan			
Supervised by:		7: Thana			
(Printed name+signature)	Eric Zhang	Zric Zhang Jerras			
Approved by:		Lamas			
(Printed name+signature)	Totti Zhao	/*			
Testing Laboratory Name:	CTC Laboratories, Inc.				
Address:	ss Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China				
This test report may be duplicated co not be reproduced except in full, without it to claim product endorsement by C The test report shall be invalid without Any objections must be raised to CTC not be taken into consideration beyon	but the written approval of our labora TC. The Test Result in the report only t all the signatures of testing enginee C within 15 days since the date when	tory. The client should not use y apply to the tested sample. ers, reviewer and approver. the report is received. It will			



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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 902–928MHz, 2400–2483.5MHz, and 5725-5850MHz.

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC20231666E12	Aug. 09, 2024	Original

1.3. Test Description

FCC Part 15 Subpart C (15.247)					
Test Item	Standard Section	Result	Test Engineer		
Antenna Requirement	15.203	Pass	Lucy Lan		
Conducted Emission	15.207	Pass	Lucy Lan		
Restricted Bands	15.205	Pass	Lucy Lan		
Hopping Channel Separation	15.247(a)(1)	Pass	Lucy Lan		
Dwell Time	15.247(a)(iii)	Pass	Lucy Lan		
Peak Output Power	15.247(b)(1)	Pass	Lucy Lan		
Number of Hopping Frequency	15.247(a)(iii)	Pass	Lucy Lan		
Conducted Band Edge and Spurious Emissions	15.247(d)	Pass	Lucy Lan		
Radiated Band Edge and Spurious Emissions	15.205&15.209& 15.247(d)	Pass	Lucy Lan		
Radiated Spurious Emission	15.247(d) &15.209 Pass		Lucy Lan		
20dB Bandwidth 15.247(a) Pass			Lucy Lan		

Note:

EN

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.



1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: Room 101 of Building B, Room 107, 108, 207, 208 of Building A, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for 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 in our files. Registration 951311, Aug 26, 2017.



1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement 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.

Test Items	Measurement Uncertainty	Notes
20dB Emission Bandwidth	±0.0196%	(1)
Carrier Frequency Separation	±1.9%	(1)
Number of Hopping Channel	±1.9%	(1)
Time of Occupancy	±0.028%	(1)
Max Peak Conducted Output Power	±0.743 dB	(1)
Band-edge Spurious Emission	±1.328 dB	(1)
Conducted RF Spurious Emission	9kHz-1GHz: ±0.746dB 1GHz-26GHz: ±1.328dB	(1)
Conducted Emissions 9kHz~30MHz	±3.08 dB	(1)
Radiated Emissions 30~1000MHz	±4.51 dB	(1)
Radiated Emissions 1~18GHz	±5.84 dB	(1)
Radiated Emissions 18~40GHz	±6.12 dB	(1)

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

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:	15 °C to 35 °C
Relative Humidity:	20 % to 75 %
Air Pressure:	101 kPa





2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen Absen Optoelectronic Co.,Ltd	
Address:	18-20/F, Tower A, Building 3, Phase I, Tian An Cloud Park, N0.2018, Xuegang Rd, Bantian, Longgang District, Shenzhen, Guangdong, P.R. China	
Manufacturer:	Shenzhen Absen Optoelectronic Co.,Ltd	
Address:	18-20/F, Tower A, Building 3, Phase I, Tian An Cloud Park, N0.2018, Xuegang Rd, Bantian, Longgang District, Shenzhen, Guangdong, P.R. China	
Factory:	Huizhou Absen Optoelectronic Limited.	
Address:	No. 03, Donghua South road, Dongjiang Hi-tech Industry Park, Huizhou. Guangdong, China	

2.2. General Description of EUT

Product Name:	LED Multimedia Processor
Trade Mark:	Abyen
Model/Type reference:	X-Box
Listed Model(s):	/
Model Difference:	/
Power Supply:	AC 100-240V~2.6A 50/60Hz
RF Module Model:	AP6275S
Hardware Version:	/
Software Version:	/
Bluetooth 5.1 / BR+EDR	
Modulation:	GFSK, π/4-DQPSK, 8-DPSK
Operation Frequency:	2402MHz~2480MHz
Channel Number:	79
Channel Separation:	1MHz
Antenna Type:	PCB Antenna
Antenna Gain:	3.52dBi

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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	150cm		
Test Software Information					
Name	Version	/	/		
adb.exe	1	/	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.

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2.5. Measurement Instruments List

RF Tes	RF Test System					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	
1	MXA Signal Analyzer	Keysight	N9020A	MY46471737	Dec. 16, 2023	
2	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 24, 2024	
3	Test Software	WCS	WCS-WCN	2023.08.04	/	

Radiate	Radiated Emission (3m chamber 3)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 18, 2024	
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 01, 2024	
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 16, 2023	
4	Broadband Amplifier	SCHWARZBECK	BBV9743B	259	Dec. 16, 2023	
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 16, 2023	
6	3m chamber 3	YIHENG	EE106	/	Aug. 28, 2026	
7	Test Software	FARA	EZ-EMC	FA-03A2	/	

Conduc	Conducted Emission										
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until						
1	LISN	R&S	ENV216	101112	Dec. 16, 2023						
2	LISN	R&S	ENV216	101113	Dec. 16, 2023						
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 16, 2023						
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 16, 2023						
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 16, 2023						
6	Test Software	R&S	EMC32	6.10.10	/						

Note: 1. The Cal. Interval was one year.

2. The Cal. Interval was three years of the antenna.

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

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3. TEST ITEM AND RESULTS

3.1. Conducted Emission

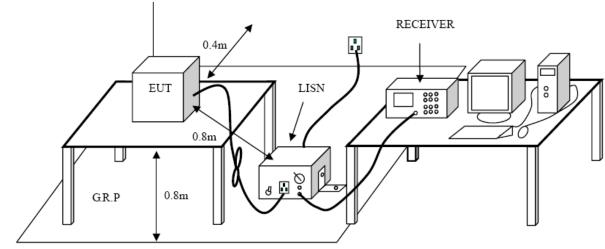
<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Conducte	d Limit (dBμV)
Frequency (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.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting 2. 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 impedance stabilization 3 network (LISN). The LISN provides a 50 ohm / 50 µH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the 4. block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was 5. individually connected through a LISN to the input power source.

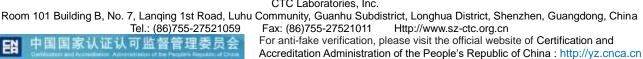
The excess length of the power cord between the EUT and the LISN receptacle were folded back and 6. forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a 7. receiver bandwidth of 9 kHz.

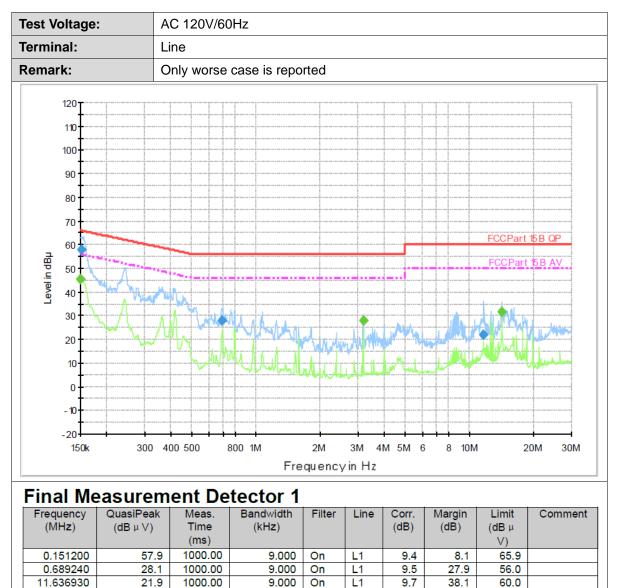
During the above scans, the emissions were maximized by cable manipulation. 8.

Test Mode

Please refer to the clause 2.4.







Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ ∀)	Comment
0.150600	45.2	1000.00	9.000	On	L1	9.4	10.8	56.0	
3.167000	28.0	1000.00	9.000	On	L1	9.5	18.0	46.0	
14.151110	31.4	1000.00	9.000	On	L1	9.8	18.6	50.0	

On

9.000

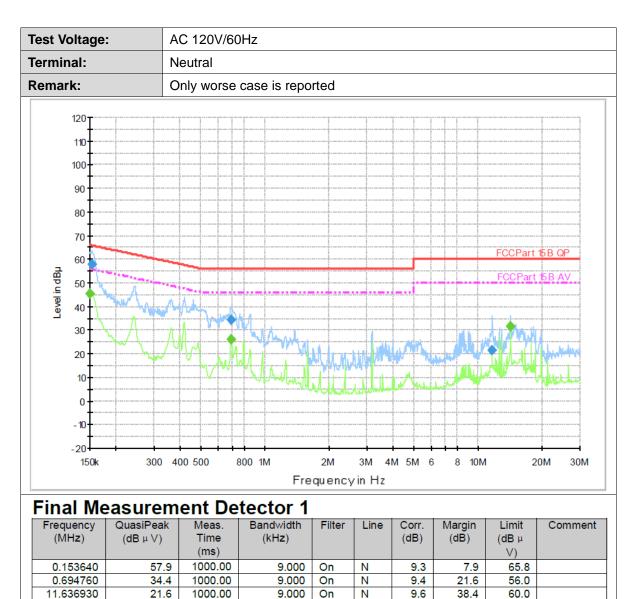
Emission Level = Read Level + Correct Factor

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Final Measurement Detector 2

Frequency (MHz)	Average (dB µ ∨)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ ∨)	Comment
0.150000	45.5	1000.00	9.000	On	Ν	9.3	10.5	56.0	
0.692000	25.8	1000.00	9.000	On	Ν	9.4	20.2	46.0	
14.151110	31.4	1000.00	9.000	On	Ν	9.6	18.6	50.0	

Emission Level = Read Level + Correct Factor

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3.2. Radiated Emission

<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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

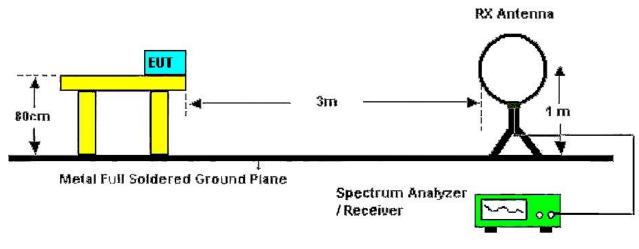
	dBµV/m (at 3 meters)				
Frequency Range (MHz)	Peak	Average			
Above 1000	74	54			

Note:

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

(2) Emission Level ($dB\mu V/m$)=20log Emission Level ($\mu V/m$).

Test Configuration



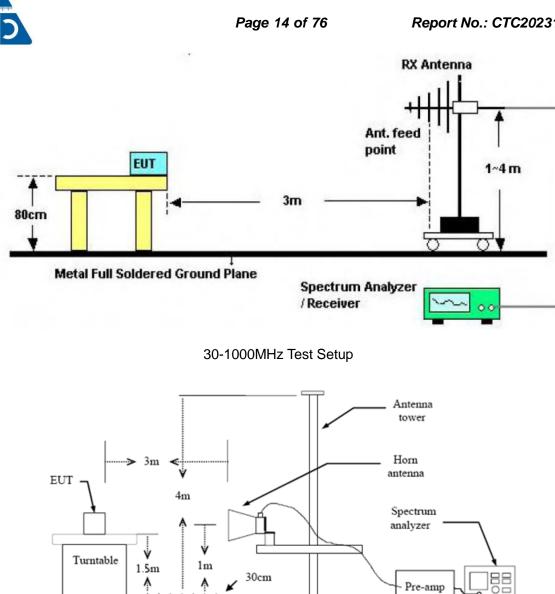
Below 30MHz Test Setup

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Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013.

The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for 2. 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.

For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna 4. tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

- Set to the maximum power setting and enable the EUT transmit continuously. 5.
- Use the following spectrum analyzer settings 6.
- Span shall wide enough to fully capture the emission being measured; (1)
- (2) 9k 150kHz:

RBW=300 Hz, VBW=1 kHz, Sweep=auto, Detector function=peak, Trace=max hold (3) 0.15M – 30MHz:

RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold (4) 30M - 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

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peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

(5) From 1 GHz to 10th harmonic:

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 3.10 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

Test Result

9 kHz~30 MHz

From 9 kHz to 30 MHz: The conclusion is PASS.

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



Ant.	Pol.	Horizontal						
Test	Mode:	TX GFSK	Mode 2402M	Hz				
Rema	ark:	Only worse	e case is repo	orted.				
90.0	dBu∀/m			1				
80								
70								
60 -					FCC Par	t15 RE-C	lass B 30-1	000M
50 -					Margin -	6 dB		
40 -				**	N AU	1 1		<u>6</u>
30				MALIN	Anton	1.MM	bowh Australian	Wandwaha
20	www.www.white	When were hard	Welling when	A A	· · · · ·	N N N		
10		"UMUAL MIN""	r wrodlywyydd r					
0 -								
-10 30.0	100 6	0.00		MHz)	300.00			1000.00
			_					
No	o. Frequen (MHz)	•	-		el Lir /m) (dBu		Margin (dB)	Detector
1	173.236	6 54.5	6 -18.3	36.2	5 43	.50	-7.25	QP
2	214.623	3 52.5	2 -15.8	36.9	8 43	.50	-6.52	QP
3	380.493	2 50.5	2 -11.4	0 39.1	2 46	.00	-6.88	QP

EN

6 *

4

5

496.8933

622.3467

812.4667

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

-9.36

-6.84

-4.15

38.41

37.68

40.26

46.00

46.00

46.00

-7.59

-8.32

-5.74

QP

QP

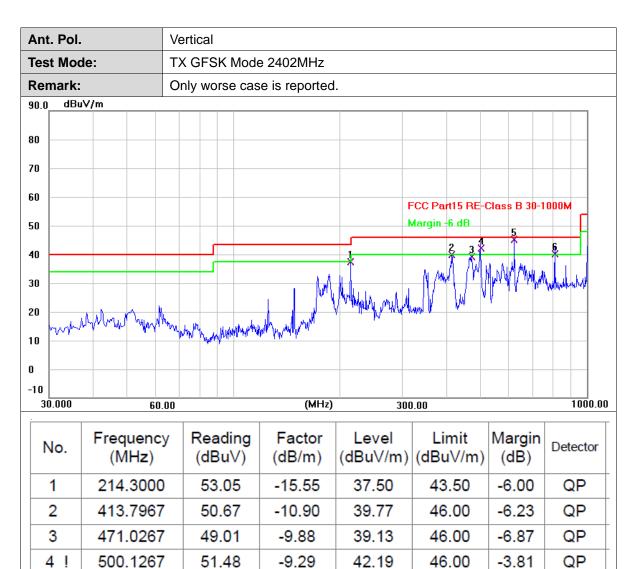
QP

47.77

44.52

44.41





ΕN

6 !

5 *

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

-6.80

-4.15

45.05

40.25

46.00

46.00

-0.95

-5.75

QP

QP

51.85

44.40

2.Margin value = Level -Limit value

624.9333

812.4667

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Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4803.160	25.58	2.07	27.65	54.00	-26.35	AVG
2	4803.814	39.29	2.08	41.37	74.00	-32.63	peak

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

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4803.071	40.60	2.07	42.67	74.00	-31.33	peak
2 *	4803.883	24.74	2.08	26.82	54.00	-27.18	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.		Horizontal	Horizontal					
Test Mode: TX GFSK Mode 2441MHz								
Remark:No report for the emission which more than 20 dB below the pres limit.					rescribed			
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
1 *	4881.450	23.98	2.18	26.16	54.00	-27.84	AVG	
2	4882.695	39.17	2.18	41.35	74.00	-32.65	peak	
-							. <u> </u>	

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

2.Margin value = Level -Limit value

Ant. Pol.		Vertical					
Test Mod	le:	TX GFSK Mo	de 2441MHz	<u></u>			
Remark:		No report for t limit.	the emission	which more t	han 20 dB be	low the p	rescribed
				1			
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4881.848	24.24	2.18	26.42	54.00	-27.58	AVG
2	4882.307	39.66	2.18	41.84	74.00	-32.16	peak
				1			
Remarks:	(dB/m) = Antenn	a Eactor (dB/m)+Cable Fac	tor (dB)-Pro-	amplifier Eact	or	
	value = Level -L	,					

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Ant. Pol. Horizo		Horizontal					
Test Mod	de:	TX GFSK Mo	de 2480MHz	2			
Remark: No report for the emission which more than 20 dB below the prescribe limit.						rescribed	
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4959.490	38.45	2.30	40.75	74.00	-33.25	peak
2 *	4960,129	23.57	2.30	25.87	54.00	-28.13	AVG

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

2.Margin value = Level -Limit value

nt. Pol		Vertical					
est Mo	de:	TX GFSK Mo	de 2480MHz				
emark		No report for t limit.	the emission	which more t	han 20 dB be	low the p	rescribed
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4959.209	39.22	2.30	41.52	74.00	-32.48	peak
2 *	4960.786	23.45	2.30	25.75	54.00	-28.25	AVG

2.Margin value = Level -Limit value

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Ant. Pol.		Horizontal					
Test Mo	de:	TX π/4-DQPSK Mode 2402MHz					
Remark:		No report for the emission which more than 20 dB below the prescribed limit.					
No.	Frequency	Reading	Factor		Limit	Margin	Detector

	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	20100101
1	4803.949	40.47	2.08	42.55	74.00	-31.45	peak
2 *	4803.999	24.99	2.08	27.07	54.00	-26.93	AVG

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

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1 *	4803.192	24.64	2.07	26.71	54.00	-27.29	AVG
2	4803.947	39.67	2.08	41.75	74.00	-32.25	peak

Remarks:

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

2.Margin value = Level -Limit value

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Ant. Pol.		Horizontal					
Test Mod	de:	TX π/4-DQPS	SK Mode 244	1MHz			
Remark:	Remark: No report for the emission which more than 20 dB below the prescribed limit.						rescribed
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4882.600	24.15	2.18	26.33	54.00	-27.67	AVG
2	4882.886	39.61	2.18	41.79	74.00	-32.21	peak
L	1	1		1	1	1	L

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

2.Margin value = Level -Limit value

ast Mode		Vertical					
Test Mode: TX π/4-DQPSK Mode 2441MHz							
emark:		No report for limit.	the emission	which more t	han 20 dB be	low the p	rescribed
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4882.033	24.35	2.18	26.53	54.00	-27.47	AVG
2	4882.245	39.75	2.18	41.93	74.00	-32.07	peak

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Ant. Pol.		Horizontal					
Test Mo	de:	TX π/4-DQPS	SK Mode 248	30MHz			
Remark: No report for the emission which more than 20 dB below the prescribed limit.					rescribed		
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit	Margin (dB)	Detector
	· · ·	()	(((aba v/iii)		
1	4959.996	40.01	2.30	42.31	74.00	-31.69	peak

Remarks:

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

2.Margin value = Level -Limit value

Ant. Pol.		Vertical					
est Mo	de:	TX π/4-DQPS	SK Mode 248	30MHz			
emark		No report for limit.	the emission	which more t	han 20 dB be	elow the p	rescribed
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4959.736	39.68	2.30	41.98	74.00	-32.02	peak
2 *	4959.911	23.41	2.30	25.71	54.00	-28.29	AVG

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Ant. Pol.	Horizontal
Test Mode:	TX 8-DPSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4804.235	40.89	2.08	42.97	74.00	-31.03	peak
2 *	4804.342	24.95	2.08	27.03	54.00	-26.97	AVG

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

Ant. Pol.	Vertical
Test Mode:	TX 8-DPSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	4803.513	39.82	2.08	41.90	74.00	-32.10	peak
2 *	4803.931	25.45	2.08	27.53	54.00	-26.47	AVG

Remarks:

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

2.Margin value = Level -Limit value

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Ant. Pol. Horizontal							
Test Mod	de:	TX 8-DPSK M	lode 2441MH	Ηz			
Remark:		No report for t limit.	the emission	which more t	han 20 dB be	low the p	rescribed
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4882.454	24.44	2.18	26.62	54.00	-27.38	AVG
2	4882.717	39.36	2.18	41.54	74.00	-32.46	peak
							<u> </u>

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

2.Margin value = Level -Limit value

nt. Pol	•	Vertical							
est Mo	de:	TX 8-DPSK N	lode 2441M	Hz					
Remark	:	No report for the emission which more than 20 dB below the prescribed limit.							
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
			2.18	40.20	74.00	-33.80	peak		
1	4882.009	38.02	2.10	40.20	74.00	-00.00	peak		

2.Margin value = Level -Limit value

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Ant. Pol. Horizontal							
Test Mod	de:	TX 8-DPSK N	lode 2480M	Hz			
Remark:		No report for limit.	the emission	which more t	han 20 dB be	elow the p	rescribed
	1			1		1	
No. Frequency (MHz)		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4960.148	38.89	2.30	41.19	74.00	-32.81	peak
2 * 4960.966		23.98	2.30	26.28	54.00	-27.72	AVG
L					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							
Fest Mo	de:	TX 8-DPSK N	/lode 2480MI	Ηz					
Remark	:	No report for the emission which more than 20 dB below the prescribed limit.							
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
1 *	4959.710	23.52	2.30	25.82	54.00	-28.18	AVG		
2	4960.058	38.84	2.30	41.14	74.00	-32.86	peak		

2.Margin value = Level -Limit value

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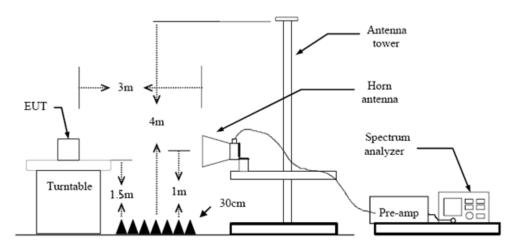
3.3. Band Edge Emissions (Radiated)

Limit

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

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

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 2. degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters. 3.

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: 5

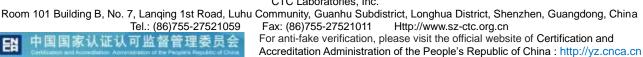
RBW=1MHz, VBW=3MHz Peak detector for Peak value.

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 3.10 Duty Cycle.

Test Mode

Please refer to the clause 2.4.





nt. Pol	-	Horizontal					
est Mo	de:	GFSK Mode	2402MHz				
20.0 dBu	₩/m						
10							
DO							Δ
)							$-\pi$
·					FCC Part15 C	- Above 1G P	ĸ
·							
					FCC Part15 C	- Above 16 A	
						_	
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)							
2305.000	2315.00 2325.	00 2335.00 2	345.00 (MHz)	2365.00	2375.00 2385.	.00 2395.0	00 2405.0
No.			Factor		Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
No. 1 2 *		(dBuV) 18.35					Detector peak

EN

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

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Ant. F	Pol.		Verti	cal									
Test I	Mode:		GFS	K Mode :	2402MF	łz							
120.0	dBu¥/m												
110													_
100													_
90												A	
80])	
70									FCC Pa	rt15 C	- Above 1G F	РК	
60													
50									FCC Pa	rt15 C	- Above 1G A	w	
											^		
40	and a second and a second	manut		ann agus a bann ar	hadaa aanaa karaa haara	uter botal	and a surger out	munimute	and an and the second		men Samuel	when	4
30													
20													_
10 0.0													
	i.000 2315.	00 2325.0	0 233	35.00 23	345.00	(MHz)	236	5.00	2375.00	2385.	00 2395	.00 2	2405.00
No	Fre	equency	Re	ading	Fac	tor	Le	vel	Lim	it	Margin	Det	ector
		(MHz)	(d	BuV)	(dB/	m)	(dBu	ıV/m)	(dBu∨	′/m)	(dB)	Dett	
1	23	390.000	1	9.27	31.3	31	50	.58	74.0	0	-23.42	pe	ak
2	* 23	390.000	Į	5.77	31.3	31	37	.08	54.0	0	-16.92	A١	/G
					-		-				-		<u>/</u>
Rema	arks:												

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

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Ant	Ant. Pol. Horizontal							
	t Moc		GFSK Mode	2480MHz				
120.0) dBu\	//m						
110								
100								
90	A							
80						FCC Part15 C	About 1C Pl	
70							- ADOVE TO FI	<u> </u>
60	+					FCC Part15 C	About 1C Al	
50		1 X					- ADOVE TO A	
40	H	2	and the mentioned	man makanda man	an a	the second the second	And the man	menut-menu
30								
20								
10								
0.0 24	77.000	2487.00 2497.00) 2507.00 25	i17.00 (MHz)	2537.00	2547.00 2557.	00 2567.0	10 2577.00
N	lo.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	2483.500	17.02	31.48	48.50	74.00	-25.50	peak
2	2 *	2483.500	5.33	31.48	36.81	54.00	-17.19	AVG

EN

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



	GFSK Mode	2480MHz				
				FCC Part15 C	About 16 Pk	
					- ADOVE TO FR	<u>. </u>
				FCC Part15 C	- Above 1G AV	
manna an tap to an	munhamata and an adams		any nagona you was na and a second	wandana wata waa	management and the states of the	hungangalan
87.00 2497.0	0 2507.00 2	517.00 (MHz)	2537.00	2547.00 2557.	00 2567.0	10 2577.0
- requency (MHz)		Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
2483.500	18.51	31.48	49.99	74.00	-24.01	peak
2483.500	5.79	31.48	37.27	54.00	-16.73	AVG
	Frequency (MHz) 2483.500	Frequency (MHz) Reading (dBuV) 2483.500 18.51	B7.00 2497.00 2507.00 2517.00 (MHz) Frequency (MHz) Reading (dBuV) Factor (dB/m) 2483.500 18.51 31.48	B7.00 2497.00 2507.00 2517.00 (MH₂) 2537.00 Frequency (MHz) Reading (dBu∨) Factor (dB/m) Level (dBu∨/m) 2483.500 18.51 31.48 49.99	B7.00 2497.00 2507.00 2517.00 (MHz) 2537.00 2547.00 2557. Frequency (MHz) Reading (dBuV) Factor (dB/m) Level (dBuV/m) Limit (dBuV/m) 2483.500 18.51 31.48 49.99 74.00	B7.00 2497.00 2507.00 2517.00 (MHz) 2537.00 2547.00 2557.00 2567.0 Frequency (MHz) Reading (dBuV) Factor (dB/m) Level (dBuV/m) Limit (dBuV/m) Margin (dB) 2483.500 18.51 31.48 49.99 74.00 -24.01

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

2.Margin value = Level -Limit value

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Ant. Pol.			Horizontal											
Test Mode:			π/4-DQPSK Mode 2402MHz											
20.0 dBu	//m		<u></u>											
0														
0								~						
·						FCC Part15 C	- Above 1G Pl							
·						FCC Part15 C	Above 1G A	++						
							1 X							
ı							2	+						
durate function of the	man	an a	Manana and an and a second second	egyinaneternetereveneteretereter	control and the second s	an han dar Angelan september diranga	ww.Fquark.Junk.HV41							
1.0														
2306.000	2316.00	2326.00	2336.00 23	46.00 (MHz)	2366.00	2376.00 2386.	00 2396.0	0 2406.						
No.	Frequ (Mł		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector						
1	2390	.000	16.93	31.31	48.24	74.00	-25.76	peak						
2 *	2390	.000	5.82	31.31	37.13	54.00	-16.87	AVG						

EN

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



Ant. P	ol.	Vertical					
Test M	ode:	π/4-DQPSK I	Mode 2402M	Hz			
120.0	lBu¥/m			1			
110							
100							
90							
80							-
70					FCC Part15 C	- Above 1G Pl	
60							
50					FCC Part15 C		<u> </u>
40						1 X 2	
30	and the second states a	an a	- war and	unin nantarenter tertenandete	quality and the second s	m.X.	north he
20							
10 0.0							
2305.0	00 2315.00 2325.0	0 2335.00 23	345.00 (MHz)	2365.00	2375.00 2385.	00 2395.0	00 2405.00
	Frequency	Reading	Factor	Level	Limit	Margin	
No.	(MHz)	(dBuV)	(dB/m)		(dBuV/m)	(dB)	Detector
1	2390.000	15.01	31.31	46.32	74.00	-27.68	peak
2 *	2390.000	5.82	31.31	37.13	54.00	-16.87	AVG
L	1		1	1	1	1	LL
Remar	ks:						

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

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Ant. Pol.		Horizontal												
Tes	Test Mode:			π/4-DQPSK Mode 2480MHz										
120.0) dBu ^v	//m												
110														
100														
90														
80	\square													
70										FCC Part15 C	- Above 1G P	ĸ		
60														
50		1 X								FCC Part15 C	- Above 16 A	v		
40														
30	w 1	2 Xanaanaanaa	normandan	an a	and a second	Ne har and the second second	warna	and a start of the		ndunuska karanda karanga	han an a	mould have		
20														
10 0.0														
L	76.500	2486.50	2496.50) 250	6.50 25	16.50	(MHz)	253	6.50	2546.50 2556	.50 2566.	50 2576.50		
N	l o.		uency Hz)		ading BuV)		ctor /m)		vel IV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
	1	2483	8.500	1	7.58	31.	.48	49	.06	74.00	-24.94	peak		
2	2 *	2483	8.500	6	6.64	31.	.48	38	.12	54.00	-15.88	AVG		

EN

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



nt.	Pol.				Vertical										
est	Mod	le:			π/4-DQPSK Mode 2480MHz										
20.0	dBu∖	//m													
10															
00															
	٨														
0 -	\uparrow														
											FCC Pa	art15 C	- Above 1G	РК	
•	T														
)	+										FCC Pa	ut15 C	- Above 1G	AV	
ו	11	1 X													
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24	76.500	2486.5	J 2	496.50	250	6.50 2	516.50	(MHz)	253	6.50	2546.50	2556.	.50 256	6.50 257	6.5
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		()	ИНz)	(a	BuV)	(ar	3/m)	(ави	iV/m)	(dBuV	/m)	(dB)		
1		248	33.5	00	1	7.15	31	.48	48	.63	74.0	0	-25.37	7 peal	k
2	*	24	33.5	00	5	6.69	31	.48	37	.17	54.0	0	-16.83	3 AVG	3

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

2.Margin value = Level -Limit value

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2315.00 2325.0	0 2335.00 23	345.00 (MHz)	2365.00	2375.00 2385.	.00 2395.0	0 2405.0								
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector								
2390.000	18.05	31.31	49.36	74.00	-24.64	peak								
2390.000	5.64	31.31	36.95	54.00	-17.05	AVG								
	2315.00 2325.0 Frequency (MHz) 2390.000	2315.00 2325.00 2335.00 23 Frequency (MHz) Reading (dBuV) 2390.000 18.05	Z315.00 Z325.00 Z335.00 Z345.00 (MHz) Frequency (MHz) Reading (dBuV) Factor (dB/m) 2390.000 18.05 31.31	Z315.00 Z325.00 Z335.00 Z345.00 (MHz) Z365.00 Frequency (MHz) Reading (dBuV) Factor (dB/m) Level (dBuV/m) 2390.000 18.05 31.31 49.36	Frequency (MHz) Reading (dBuV) Factor (dB/m) Level (dBuV/m) Limit (dBuV/m) 2390.000 18.05 31.31 49.36 74.00	Frequency (MHz) Reading (dBuV) Factor (dB/m) Level (dBuV/m) Limit (dBuV/m) Margin (dB) 2390.000 18.05 31.31 49.36 74.00 -24.64								

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



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0.0	2315.00	2325.00	2335.00	2345.00 (MHz)	2365.00	2375.00 2385.	00 2395.0	0 2405.0
	Freque	ency	Readin		Level	Limit	Margin	
No.	(MH	-	(dBuV)			(dBuV/m)		Detector
1	2390.	000	20.56	31.31	51.87	74.00	-22.13	peak
2 *	2390.	000	5.50	31.31	36.81	54.00	-17.19	AVG

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

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2476.500	2486.50	2496.50	2506.50	251	16.50	(MHz)	253	6.50 2	2546.50 2	556.50 256	6.50 2576.
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1	2483.	500	17.66	3	31.	.48	49	.14	74.00	-24.8	6 peak
2 *	2483.	500	5.22	!	31.	.48	36	.70	54.00	-17.3	0 AVG

Remarks:

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

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	le:	8	B-DPS	SK Mod	e 2480M	Hz							
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2477.000	2487.00	2497.00	2507	.00 25	17.00 (I	MHz)	253	7.00 2	2547.00	2557.	00 256	7.00 2	2577.
No.	Freque (MH	-		ading 8uV)	Fact (dB/n			vel V/m)	Lin (dBu\		Margir (dB)	n _{Dete}	ector
1	2483.	500	18	.84	31.4	8	50	.32	74.	00	-23.68	3 pe	ak
2 *	2483.	500	5	.80	31.4	8	37	.28	54.	00	-16.72	2 A\	/G
emarks													

2.Margin value = Level -Limit value

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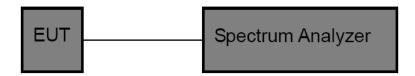
3.4. Band Edge and Spurious Emissions (Conducted)

<u>Limit</u>

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

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Configuration



Test Procedure

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

Test Mode

Please refer to the clause 2.4.

Test Result

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(1) Band Edge Conducted Test & Conducted Spurious Emissions Test

Non-Hopping

Modulation	Packet	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
		0	2400.00	-50.334	-13.25	-37.084	PASS
		0	3202.52	-46.971	-13.25	-33.721	PASS
GFSK	DH5	39	3254.96	-50.541	-13.59	-36.951	PASS
		78	2483.50	-57.660	-13.41	-44.250	PASS
		10	3306.77	-52.350	-13.41	-38.940	PASS
		0	2400.00	-53.439	-14.87	-38.569	PASS
		0	3202.52	-46.443	-14.87	-31.573	PASS
π/4DQPSK	2-DH5	39	3254.96	-48.498	-15.33	-33.168	PASS
		78	2483.50	-57.971	-14.84	-43.131	PASS
		70	3306.77	-49.304	-14.84	-34.464	PASS
		0	2400.00	-51.213	-14.92	-36.293	PASS
		0	3202.52	-46.042	-14.92	-31.122	PASS
8DPSK	3-DH5	39	3254.96	-47.888	-14.87	-33.018	PASS
		78	2483.50	-57.028	-14.78	-42.248	PASS
		10	3306.77	-50.089	-14.78	-35.309	PASS

Hopping

Modulation	Packet	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
GFSK	DH5	2400.00	-59.817	-13.33	-46.487	PASS
GFSK	DH5	2483.50	-61.895	-14.53	-47.365	PASS
π/4DQPSK	2-DH5	2400.00	-59.435	-16.02	-43.415	PASS
11/4DQF3N	2-0115	2483.50	-62.087	-15.93	-46.157	PASS
8DPSK	3-DH5	2400.00	-59.354	-15.62	-43.734	PASS
ODPSK	3-005	2483.50	-62.963	-14.57	-48.393	PASS

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Test plot as follows:

Aglient Spectrum Analyzer - Swept SA 28 R T RF SD Q: AC SENSE:MT Center Freq 2.402000000 GHz Televiser Burn	ALIGN AUTO 08:55:40 PM Sep 20, 2023 Avg Type: Log-Pwr 178-40 PL Part 110 Avg1Hald: 100(00 Type: Log	
PN0: Wide Ing. Free Kun IFGain:Low #Atten: 26 dB	DET PPPPP	
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm	Mkr3 2.402 016 5 GHz 6.746 dBm	
500	~~	
500		
150		
250		
45.0		
43.0 66.0		
66 D		
75.0		
Center 2.4020000 GHz #Res BW 100 kHz #VBW 300 kHz	Span 1.500 MHz Sweep 1.000 ms (1001 pts)	
In-Band Referen		
GFSK_DH5_Ch		
Agilent Spectrum Analyzer Swept SA U R T R ² SD AC Center Freq 2.352550000 GHz Xet and the set of t	ALIGNAUTO 08:56:01PM Sep 20, 2023 Avg Type: Log-Pwr TRACE Avg Hold: 100/100 Trace	
PN0: Fast Ing: Free Run IFGain:Low #Atten: 26 dB	Der	
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm	Mkr2 2.400 000 GHz -50.334 dBm	
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Start 2.30000 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.40500 GHz Sweep 10.07 ms (1001 pts)	
	FUNCTION WIDTH FUNCTION VALUE	
2 N 1 f 2.400 000 GHz -50.334 dBm		
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9 10		
11	×	
™ Out Of Band En	STATUS	
GFSK_DH5_Ch		
Agilent Spectrum Analyzer - Swopt SA	ALIGN AUTO 08:56:35 PM Sep 20, 2023	
Center Freq 12.515000000 GHz PN0: Fast Trig: Free Run IFGain:Low Atten: 24 dB	Avg Hold: 10/10	
Ref Offset 1.5 dB	Mkr1 3.202 5 GHz -46.971 dBm	
500		
-15.0	-13.25 dBn	
-25 0		
-45.0 -55.0		
Start 30 MHz #Res BW 100 kHz #VBW 300 kHz	Stop 25.00 GHz Sweep 2.387 s (40000 pts)	
MKB MODE TRC SCL X Y FUNCTION	Sweep 2.387 s (40000 pts) FUNCTION WIDTH FUNCTION VALUE	
1 N 1 f 3202 5 GHz -46.971 dBm 2 3		
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MSG	STATUS	
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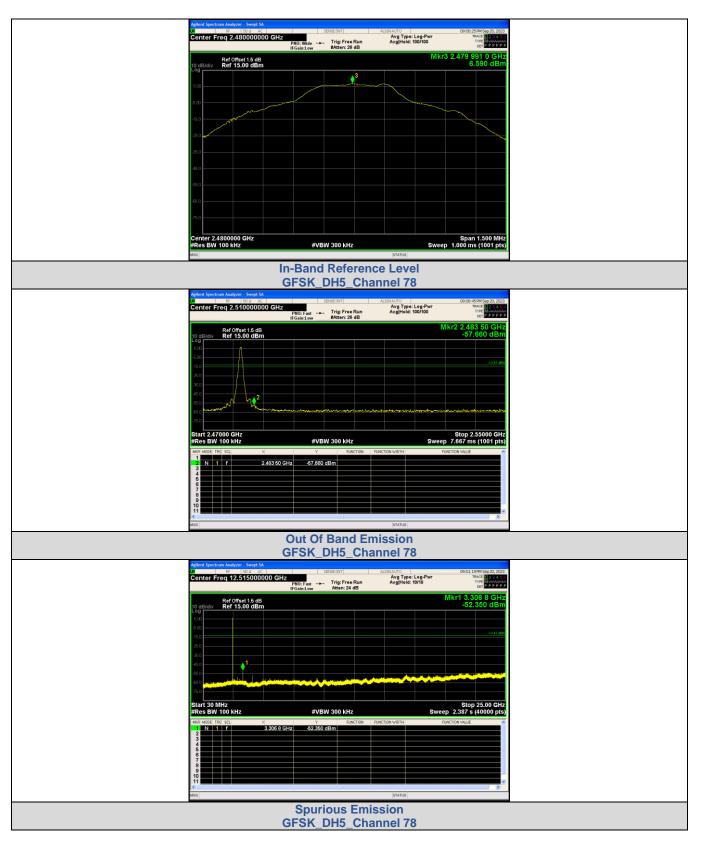
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	Bitent Spectrum Analyzer - Swept SA R T RF 50.2 AC center Freq 2.441000000 GHz	SENSE:INT	ALIGN AUTO	08:58:44 PM Sep 20, 2023
C	enter Freq 2.441000000 GHz	PNO: Wide Trig: Free Run IFGain:Low #Atten: 26 dB	Avg Type: Log-Pwr Avg Hold: 100/100	TRACE 23456 TYPE MUSEUM
		IFGain:Low #Atten: 26 dB	Mkr	
1	Ref Offset 1.5 dB 0 dB/div Ref 15.00 dBm			3 2.440 995 5 GHz 6.414 dBm
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c	enter 2.4410000 GHz			Span 1.500 MHz
7	enter 2.4410000 GHz Res BW 100 kHz	#VBW 300 kHz		Span 1.500 MHz p 1.000 ms (1001 pts)
8,85	5G		STATUS	
		-Band Referenc		
	G	FSK_DH5_Char	nel 39	
A	gilent Spectrum Analyzer - Swept SA			
C C	RF 50.9 AC	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10	08:59:32 PM Sep 20, 2023 TRACE 2 3 4 5 6 TYPE MWWWWWW DET P P P P P P
		PNO: Fast Trig: Free Run IFGain:Low Atten: 24 dB		
	Ref Offset 1.5 dB 0 dB/div Ref 15.00 dBm			Mkr1 3.255 0 GHz -50.541 dBm
1	0 dB/div Ref 15.00 dBm			-50.541 dBm
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	5.00			-13.59 dBn
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	Hout 20 Mila			Stop 25.00 CHz
5 #	tart 30 MHz Res BW 100 kHz	#VBW 300 kHz	Swee	Stop 25.00 GHz ep 2.387 s (40000 pts)
	KRIMODELTRCISCL X	Y FUNCTION FU		FUNCTION VALUE
	1 N 1 f 3.255 0 GH	z -50.541 dBm		
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		Spurious Emiss		
	G	FSK_DH5_Char	nel 39	





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Agent Spectram Andrews 21 Arr Spice Acc Spice Acc Spice Birt ALDONAUTO (99.02.00941 Spice), 2023 Center Freq 2.402000000 GHz Arrs Spice Acc Spice Birt Acc
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Ref offset 15.08 Mkr3 2.402 009 0 GHz to dBladv Ref 15.00 dBm 5.133 dBm
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-75.0
Center 2.4020000 GHz Span 1.500 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)
Isoa (status)
In-Band Reference Level π/4DQPSK_2-DH5_Channel 0
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Ref Offset 1.5 dB Mkr2 2.400 000 GHz
10 dB/div Ref 15.00 dBm
6.00
45.0 2+
Start 2.30000 GHz Stop 2.40500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 10.07 ms (1001 pts)
MRR MODE FRC SCI X Y FUNCTION FUNCTION </td
9 10 11
N SC STATUS
Out Of Band Emission
π/4DQPSK_2-DH5_Channel 0 Agiterit Spectrum Analyzer Swept SA N NO 09:02:54PM Sep 20, 2023
Center Freq 12.515000000 GHz Avg Type: Log-Pwr TKKT B23435 PW0: Fast Trig: Free Run Avg Hold: 10/10 tor D2255 IFGaint.tew Atten: 24 4B tor D2255
Ref offset 1.5 dB Mkr1 3.202 5 GHz 10 dBidly Ref 15.00 dBm -46.443 dBm
150
Start 30 MHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (40000 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE
1 N 1 f 3202 5 GHz 46.443 dBm
 Spurious Emission

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	ectrum Analyzer - Swept SA			
	RF 50.2 AC Freq 2.441000000 GHz	SENSE:INT AI	IGNAUTO Avg Type: Log-Pwr Avg]Hold: 100/100	09:03:35 PM Sep 20, 2023 TRACE 2 2 3 4 5 6 TYPE M WWWWWW DET P P P P P
	Ref Offset 1.5 dB	#Atten: 26 dB		kr3 2.440 976 0 GHz 4.674 dBm
10 dB/di Log	v Ref 15.00 dBm	∮ ³		4.674 dBm
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-500				
-150				
-36.0				
-45.0				
-55 0				
-es o				
-75.0				
Center	2.4410000 GHz W 100 kHz #V	DW 200 kHz		Span 1.500 MHz eep 1.000 ms (1001 pts)
#Res B	W 100 KHZ #V	BW 300 kHz	SWA	eep 1.000 ms (1001 pts)
		d Reference		
Asilant Se	π/4DQPS	< <u>2-DH5_CI</u>	nannel 39	
(1)	Freq 12.515000000 GHz	SENSE:INT AI	IGNAUTO Avg Type: Log-Pwr Avg Hold: 10/10	09:04:23 PM Sep 20, 2023 TRACE 2 3 4 5 5 TYPE PPPPP
	PN0: Fast IFGain:Low Ref.Offset 1.5 dB	Atten: 24 dB		Mkr1 3.255 0 GHz -48.498 dBm
10 dB/di Log	Ref Offset 1.5 dB v Ref 15.00 dBm			-48.498 dBm
-5.00				-15.33 dBn
-25.0				
-350 -450	1			
-65 0 -65 0		البالي الربان المحمد المراجع		
- ⁷⁵⁰ Start 3	0 MHz			Stop 25.00 GHz
MKB MODI	E TRC SCL X Y	BW 300 kHz	SW	Stop 25.00 GHz eep 2.387 s (40000 pts)
1 N 2 3	1 f 3.255 0 GHz -48.4	98 dBm		
4 5 6				
8 9 10				
			STATUS	2
MSG	Spur	ious Emiss		
		(_2-DH5_CI		





 Agilent Spectrum Analyzer - Swept SA D2 RF 50.9 AC SENSE:INT	ALIGNAUTO 09:04:51 PM Sep 20, 2023	
Center Freq 2.480000000 GHz PN0: Wide Trig: Free Run IFGaint.ow #Atten: 25 dB	Avg Type: Log-Pwr TRACE 12 34 5 6 Avg/Hold: 100/100 Det PPPPP	
	Mkr3 2.480 006 0 GHz 5.164 dBm	
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm	5.164 dBm	
5.00		
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-15.0		
-25.0		
-36.0		
-45.0		
55.0		
-65.0		
-75.0		
Center 2 4800000 GHz	Span 1.500 MHz	
Center 2.4800000 GHz #Res BW 100 kHz #VBW 300 kHz	Span 1.500 MHz Sweep 1.000 ms (1001 pts)	
In-Band Referenc	STATUS	
π/4DQPSK_2-DH5_C		
Agilent Spectrum Analyzer - Swept SA		
Center Freq 2.510000000 GHz	ALIGNAUTO 09:05:11 PM Sep 20, 2023 Avg Type: Log-Pwr Avg Hold: 100/100 DF P P P P P	
IFGain:Low #Atten: 26 dB		
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm	Mkr2 2.483 50 GHz -57.971 dBm	
500 A		
-5.00	-14.84 obs	
-250		
-350		
650		
-65 0 mental and a state of the	han and a second and a second a second beaution of the second from	
Start 2.47000 CHz	Stop 2 55000 GHz	
Start 2.47000 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.55000 GHz Sweep 7.667 ms (1001 pts)	
MRR MODE TRC SCL X Y FUNCTION FU 1 N 1 f 2.483 50 GHz -57.971 dBm FUNCTION FU	NCTION WIDTH FUNCTION VALUE	
2 4 1 1 2,465 50 GHz - 57,371 dbiii		
5 6 7		
9		
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Out Of Band Em	ission	
π/4DQPSK_2-DH5_C	hannel 78	
Agilent Spectrum Analyzer - Swept SA μ RF 50 Ω AC SENSE:BNT	ALIGN AUTO 09:05:45 FM Sep 20, 2023	
Center Freq 12.515000000 GHz PN0: Fast + Trig: Free Run Refaint.ow Atten: 24 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Det PPPPPP	
	Mkr1 3.306 8 GHz	
Ref Offset 1.5 dB 10 dB/dly Ref 15.00 dBm Log	-49.304 dBm	
500		
-15.0	-14.84 dBs	
-250		
450		
	and the second secon	
-75.0		
Start 30 MHz #Res BW 100 kHz #VBW 300 kHz	Stop 25.00 GHz Sweep 2.387 s (40000 pts)	
MIR MODE: TRC SCL X Y FUNCTION FU 1 N 1 f 33:05 8 GHz -49:304 dBm -49:304 dBm		
3 4 6		
6		
8 9 10		
	×	
 MSG	STATUS	
Spurious Emis	sion	
π/4DQPSK_2-DH5_C		
Spurious Emis	sion	

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Agilent Spectrum Analyzer Swept SA 2 For 19 59 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	
PHO: Wide ing free run Avginet. touriso ter 272225	
Ref Offset 1.5 dB Mkr3 2:402 001 5 GHz 10 dB/div Ref 15.00 dBm 5.080 dBm	
500	
500	
-15.0	
330	
45.0	
/30	
Center 2.4020000 GHz Span 1.500 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	
In-Band Reference Level	
8DPSK_3-DH5_Channel 0 Addref Spectrum Andyzer - Swept SA 0906-53PM Sep 20, 2022	
Center Freq 2.352500000 GHz PN0:Fast →→ Trig:Free Run Avg[Held:100/100 Treetworkshow #Atten:25 dB ter:25 dB ter:25 dB	
Ref Offset 15 dB Mkr2 2.400 000 GHz 10 dBdd/v Ref 15.00 dBm -51.213 dBm	
500	
150	
460	
J50	
Start 2.30000 GHz Stop 2.40500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 10.07 ms (1001 pts)	
MR R MODE THE SOL X Y Ranction Ranction value 1 f 2.400 000 GHz 51.213 dBm 6	
10 11 e	
8DPSK_3-DH5_Channel 0	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
RefOffset 15 dB Mkr1 3.202 5 GHz 10 dBidly Ref 15.00 dBm -46.042 dBm	
500	
Starf 30 MHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (40000 pts)	
MeR. Mode: TRC: Y Function Function Multi- Function Multi- Function Multi- Function Function Multi- Function Function <td></td>	
Spurious Emission 8DPSK 3-DH5 Channel 0	
8DPSK_3-DH5_Channel 0	

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Agilent Spectrum Analyzer - Swept SA			
Center Freg 2.441000000 GHz	ENSE:INT ALIGN A A Trig: Free Run Av	uto 09: vg Type: Log-Pwr vg Hold: 100/100	07:58 PM Sep 20, 2023 TRACE 1, 2 3 4 5 6 TYPE 1, 2 3 4 5 6
PNO: Wide ↔→ IFGain:Low	#Atten: 26 dB		
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm			0 998 5 GHz 5.133 dBm
5.00	3		
-500			
-15.0			
-25.0			
35.0			
-45.0			
550 560			
Center 2.4410000 GHz #Res BW 100 kHz #VB	W 300 kHz	Sp Sweep 1.000	pan 1.500 MHz) ms (1001 pts)
MSG		STATUS	
	Reference L		
Aglent Spectrum Analyzer - Swept SA	-DH5_Chan	nel 39	
24 RF 50.2 AC S	ENSE:INT ALIGN A Trig: Free Run Av	UTO 090 vg Type: Log-Pwr vg Hold: 10/10	08:46 FM Sep 20, 2023 TRACE 12 2 4 19 6 TYPE MANAGEMENT of (P P P P P P
IFGain:Low	Atten: 24 dB		
Ref Offset 1.5 dB 10 dB/div Ref 15.00 dBm			3.255 0 GHz 47.888 dBm
500 -500			
-15.0			-14.07 dbm
-350			
45.0			
-65 0			
Start 30 MHz #Res BW 100 kHz #VB		S	top 25.00 GHz 7 s (40000 pts)
#Res BW 100 kHz #VB	V 300 kHz FUNCTION FUNCTION V		
1 N 1 7 3.255 0 GHz 47.888			
4 5 6			
4 6 7 7 8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10			
		STATUS	>
to so so so so so so so so so so so so so	ous Emissio -DH5_Chan	ns	×





Addenis Spectramo Analyzer - Swerg SA 0 0 07 090 AC 1 990 AC 00000000 GHZ Conter Freq 2.480000000 GHZ Pho: Wide →→ Trig: Free Run Avg Type: Log-Pur Trock Party Conter Trock Party C
IFGainLow #Atten: 26 dB Det databate
Ref Orfset 1.5 dB Mkr3 2.479 997 0 GHz to dBidity Ref 15.00 dBm 5.225 dBm
5.00
500
150
35.0
45.0
75.0
Center 2.4800000 GHz Span 1.500 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)
NSG STATUS
In-Band Reference Level
8DPSK_3-DH5_Channel 78 Address Section Madgare - Swept SA
OF SP (S) = AC SP(E) P(I) AUXINO 0005 5004 (Sep 20, 2022) Conter Freq 2.510000000 GHz PR0: Fail
Ref Offset 15 dB Mkr2 2:483 50 GHz
10 dBidiv Ref 15.00 dBm -57.028 dBm
500
750 Storp 2,55000 GHz
Start 2.47000 CHz Stop 2.55000 CHz #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms (1001 pts) MM RUDE TRE SQL Y RUCTON RULE
1 N 1 Y 2.483 50 GHz -57.028 dBm
8DPSK_3-DH5_Channel 78
Agitent Spectrum Analyzer - Swept SA SEPGE INT ALIZYANTO DE10.26FM Sep.20, 2023 Canadrag Except 22, 55 (SEGDODOD CALE) Ava Twe'r Ion-Pwr Texto ID EXCEPTER
Center Freq 12.515000000 GHz Avg Type:Log-Pwr Tree Ing-Pwr Tree Ing-Pw
RefOffset 15 dB Mkr1 3.306 8 GHz
500
150
Start 30 MHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (40000 pts)
MRR MODE TRC SQL X Y RUNCTION RUNCTION WOTH RANCTION WALLE
11 × × × × × × × × × × × × × × × × × ×
Spurious Emission
8DPSK_3-DH5_Channel 78

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Out Of Band Emission(Right) 8DPSK_3-DH5_Channel Hopping

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8DPSK_3-DH5_Channel Hopping

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China Http://www.sz-ctc.org.cn Fax: (86)755-27521011 For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : http://yz.cnca.cn

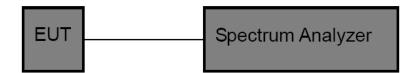


3.5. 20dB Bandwidth

<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 Result

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
GFSK	2402	0.87521	0.9543	0.636
	2441	0.86838	1.009	0.673
	2480	0.86868	1.016	0.677
π/4-DQPSK	2402	1.2045	1.346	0.897
	2441	1.2032	1.346	0.897
	2480	1.1968	1.347	0.898
8-DPSK	2402	1.1943	1.309	0.873
	2441	1.2086	1.308	0.872
	2480	1.2075	1.308	0.872

CTC Laboratories, Inc.

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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