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TEST REPORT

Application No.:	KSCR2204000422AT
FCC ID:	2AAGE-TAB10RK66
Applicant:	Chengdu Vantron Technology Co., Ltd.
Address of Applicant:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China
Manufacturer:	Chengdu Vantron Technology Co., Ltd.
Address of Manufacturer:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China
Factory:	Chengdu Vantron Technology Co., Ltd.
Address of Factory:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China
Equipment Under Test (EUT):
EUT Name:	Tablet
Model No.:	M10 Lite
Trade Mark:	Vantron
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2022-04-02
Date of Test:	2022-04-15 to 2022-07-15
Date of Issue:	2022-08-10
Test Result:	Pass*

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

Enin fri

Eric Lin Laboratory Manager



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	Revision Record			
Version	Chapter	Date	Modifier	Remark
01		2022-08-10		Original

Authorized for issue by:		
	Paun. Liu	
	Pawn.Liu/Project Engineer	
	Eric fri	
	Eric Lin /Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
ltem	Standard	Method	Requirement	Result
Antenna Requirement		N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
ltem	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation		ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number		ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15,	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

Remark: This report use the reference data documented in the test report no KSCR220400042002.So the data of worse case have test in this report.



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Test Report Form Version: Rev01

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4 General Information

4.1 Details of E.U.T.

DC 3.8V by Battery
Battery Model:GSP27103107
Battery:8000mAh,3.8V,30.4Wh
2402MHz to 2480MHz
V5.0 Dual mode
GFSK, pi/4DQPSK, 8DPSK
79
1MHz
Frequency Hopping Spread Spectrum(FHSS)
PIFA Antenna
4.0 dBi (Provided by manufacturer)
AC 120V/60Hz

4.2 Power level setting using in test:

Channel	DH5	2DH5	3DH5
0	Default	Default	Default
39	Default	Default	Default
78	Default	Default	Default

4.3 Environment Parameter

Environment Parameter		Selected \	/alues During Tes	sts
Relative Humidity		Ambient		
Value		Temperatu	ure(°C)	Voltage(V)
NTNV		25		AC 120
Note:				
NV:Normal Voltage	LV:Low Extreme Test Vo	Itage	HV:High Extrem	ne Test Voltage
NT:Normal Temperature	ature LT:Low Extreme Test Te		HT:High Extrem	ne Test Temperature

4.4 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Mingxin	MX15U-050300UU	/



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No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 ⁻⁸
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
0	Kr Kaulaleu Powel	5.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
9	Padiated Spurious Emission Test	4.5dB (30MHz-1GHz)
9	Radiated Spurious Emission Test	5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

4.5 Measurement Uncertainty

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.6 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China. Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1.SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).

2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

4.7 Test Facility

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

A2LA (Certificate No. 2541.01)

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

FCC (Designation Number: CN1172)

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

ISED (CAB identifier: CN0072)

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

• VCCI (Member No.: 1938)

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.8 Deviation from Standards None

Abnormalities from Standard Conditions 4.9 None





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5 Equipment List

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Condu	Icted Emission at Mains Ter	minals (150kHz-30N	1Hz)			
1	EMI Test Receive	R&S	ESCI	KS301101	01/22/2022	01/21/2023
2	LISN	R&S	ENV216	KS301197	01/22/2022	01/21/2023
3	LISN	Schwarzbeck	NNLK 8129	KS301091	01/22/2022	01/21/2023
4	Pulse Limiter	R&S	ESH3-Z2	KUS1902E001	01/22/2022	01/21/2023
5	CE test Cable	Thermax	/	CZ301102	11/14/2021	11/13/2022
6	Test Software	Farad	EZ-EMC	/	N.C.R	N.C.R
RF Co	nducted Test					
1	Spectrum Analyzer	Keysight	N9020A	KUS1911E004-2	10/11/2021	10/10/2022
2	Spectrum Analyzer	Keysight	N9020A	KUS2001M001-2	09/17/2021	09/16/2022
3	Spectrum Analyzer	Keysight	N9030B	KSEM021-1	01/22/2022	01/21/2023
4	Signal Generator	R&S	SMW200A	KSEM020-1	10/12/2021	10/11/2022
5	Signal Generator	Agilent	N5182A	KUS2001M001- 1	08/27/2021	08/26/2022
6	Radio Communication Test Station	Anritsu	MT8000A	KSEM001-1	09/23/2021	09/22/2022
7	Radio Communication Analyzer	Anritsu	MT8821C	KSEM002-1	04/01/2022	03/31/2023
8	Universal Radio Communication Tester	R&S	CMW500	KUS1911E004-1	10/12/2021	10/11/2022
9	Switcher	CCSRF	FY562	KUS2001M001-3	10/12/2021	10/11/2022
10	AC Power Source	EXTECH	6605	KS301178	N.C.R	N.C.R
11	DC Power Supply	Aglient	E3632A	KS301180	N.C.R	N.C.R
12	Conducted Test Cable	Thermax	RF01-RF04	CZ301111- CZ301120	01/16/2022	01/15/2023
13	Temp. / Humidity Chamber	TERCHY	MHK-120AK	KS301190	04/01/2021	03/31/2023
14	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-5	04/01/2021	03/31/2023
15	Software	BST	TST-PASS	/	N/A	N/A
RF Ra	diated Test	ſ				1
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	10/11/2021	10/10/2022
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	04/01/2022	03/31/2023
3	Signal Generator	Agilent	E8257C	KS301066	10/18/2021	10/17/2022
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	04/13/2021	04/12/2023
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2021	06/28/2023
6	Bilog Antenna	SCHWARZBECK	VULB9160	CZ301016	04/13/2021	04/12/2024
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	10/26/2020	10/25/2022
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	02/22/2021	02/21/2023
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	03/22/2022	03/21/2023
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/22/2022	01/21/2023
11	Amplifier(18~40GHz)	COM-POWER	PAM-840A	KUS1710E001	01/22/2022	01/21/2023
12	RE Test Cable	REBES MICROWAVE	/	CZ301097	11/14/2021	11/13/2022
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	01/04/2022	31/03/2023
14	Software	Faratronic	EZ_EMC-v 3A1	/	N/A	N/A



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

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

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is PIFA Antenna and no consideration of replacement. The best case gain of the antenna is 4.0dBi.

Antenna location: Refer to internal photo.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- > Number of shift register stages: 9
- > Length of pseudo-random sequence: 29 -1 = 511 bits
- > Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping



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frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement Test Method: 47 CFR Part 15, Subpart C 15.207 ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of	Conducted limit(dBµV)				
emission(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.					
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz					

7.1.1 E.U.T. Operation

Operating Environ	ment	t:						
Temperature:	24	°C	Humidity:	48	% RH	Atmospheric Pressure:	1010	mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



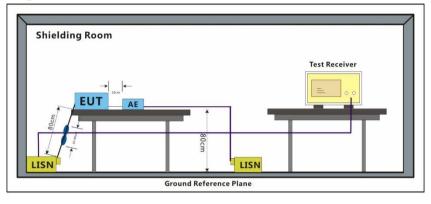
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7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor

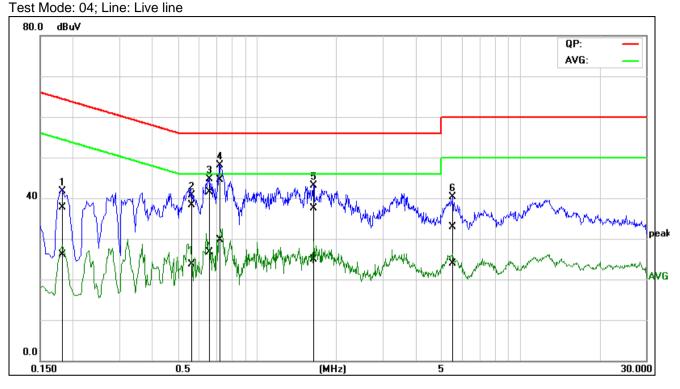


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No.	Frequency	QuasiPeak	Average	Correction	QuasiPeak	Average	QuasiPeak	Average	QuasiPeak	Average	Remark
		reading	reading	factor	result	result	limit	limit	margin	margin	
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1837	18.22	6.62	19.50	37.72	26.12	64.32	54.32	-26.60	-28.20	Pass
2	0.5664	18.80	4.21	19.56	38.36	23.77	56.00	46.00	-17.64	-22.23	Pass
3	0.6584	21.84	7.20	19.57	41.41	26.77	56.00	46.00	-14.59	-19.23	Pass
4*	0.7261	25.02	10.20	19.57	44.59	29.77	56.00	46.00	-11.41	-16.23	Pass
5	1.6349	17.79	5.28	19.63	37.42	24.91	56.00	46.00	-18.58	-21.09	Pass
6	5.5701	12.99	4.10	19.85	32.84	23.95	60.00	50.00	-27.16	-26.05	Pass



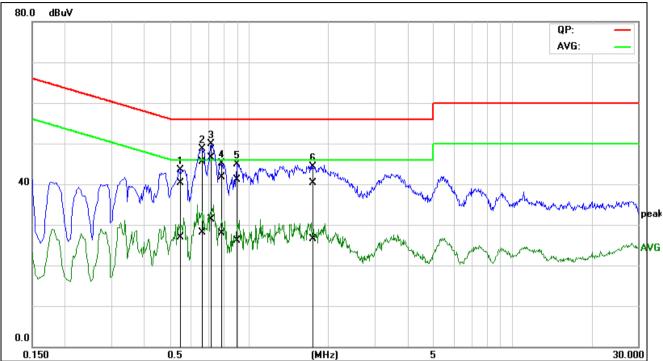
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Test	Mode:	04·	Line:	Neutral	l ine
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No.	Frequency	QuasiPeak	Average	Correction	QuasiPeak	Average	QuasiPeak	Average	QuasiPeak	Average	Remark
		reading	reading	factor	result	result	limit	limit	margin	margin	
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.5499	20.75	7.34	19.56	40.31	26.90	56.00	46.00	-15.69	-19.10	Pass
2	0.6653	26.00	8.57	19.56	45.56	28.13	56.00	46.00	-10.44	-17.87	Pass
3*	0.7223	26.98	11.68	19.56	46.54	31.24	56.00	46.00	-9.46	-14.76	Pass
4	0.7860	22.07	8.43	19.57	41.64	28.00	56.00	46.00	-14.36	-18.00	Pass
5	0.9068	21.57	6.58	19.59	41.16	26.17	56.00	46.00	-14.84	-19.83	Pass
6	1.7371	20.60	6.78	19.63	40.23	26.41	56.00	46.00	-15.77	-19.59	Pass



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7.2 Conducted Peak Output Power

Test Requirement	47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
	1 for ≥50 hopping channels
902-928	0.25 for 25≤ hopping channels <50
	1 for digital modulation
	1 for ≥75 non-overlapping hopping channels
2400-2483.5	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:

Temperature:	24 °C	Humidity: 48 % RH	Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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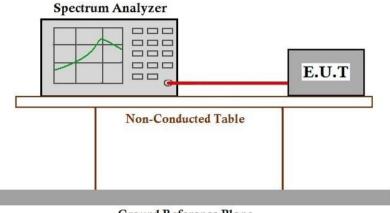
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7.2.3 Test Setup Diagram



Ground Reference Plane

7.2.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix B for KSCR220400042202



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7.3 20dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247(a)(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.7

7.3.1 E.U.T. Operation

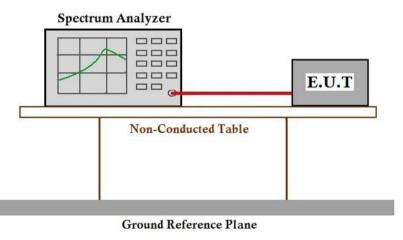
Operating Environment:

Temperature: 24 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix B for KSCR220400042202



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7.4 Carrier Frequencies Separation

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.2

Limit:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

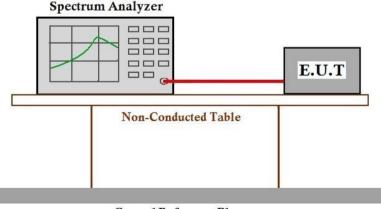
7.4.1 E.U.T. Operation

Operating Enviro	nmen	t:				
Temperature:	24	°C	Humidity:	48	% RH	Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description		
Final test	05	Charge+TX_Hop mode_Keep the EUT in charging and frequency hopping mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.		

7.4.3 Test Setup Diagram



Ground Reference Plane

7.4.4 Measurement Procedure and Data

Please Refer to Appendix B for KSCR220400042202



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7.5 Hopping Channel Number

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method:	ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
902-928	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

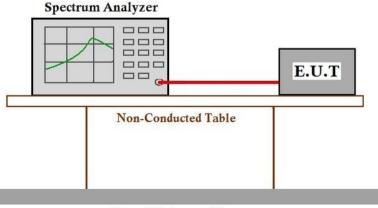
7.5.1 E.U.T. Operation

Operating Environment: Temperature: 24 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	05	Charge+TX_Hop mode_Keep the EUT in charging and frequency hopping mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.5.3 Test Setup Diagram



Ground Reference Plane



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7.5.4 Measurement Procedure and Data

Please Refer to Appendix B for KSCR220400042202



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7.6 Dwell Time

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method:	ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
902-928	0.4S within a 10S period(20dB bandwidth≥250kHz)
0400 0400 5	0.4S within a period of 0.4S multiplied by the number
2400-2483.5	of hopping channels
5725-5850	0.4S within a 30S period

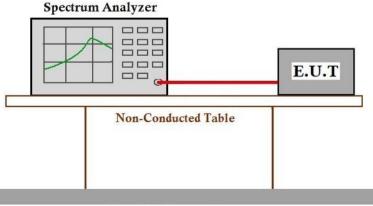
7.6.1 E.U.T. Operation

Operating Enviro	nment	t:				
Temperature:	24	°C	Humidity:	48	% RH	Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	05	Charge+TX_Hop mode_Keep the EUT in charging and frequency hopping mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.6.3 Test Setup Diagram



Ground Reference Plane



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7.6.4 Measurement Procedure and Data

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7.7 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.6

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.7.1 E.U.T. Operation

Operating Environment: Temperature: 24 °C

Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.7.2 Test Mode Description



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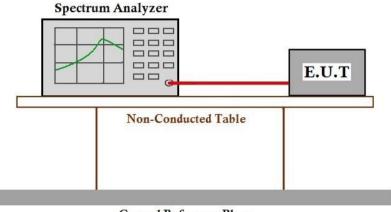
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7.7.3 Test Setup Diagram



Ground Reference Plane

7.7.4 Measurement Procedure and Data

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7.8 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.8.1 E.U.T. Operation

Operating Environment: Temperature: 24 °C

Humidity: 48 % RH

Atmospheric Pressure: 1010 mbar

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.8.2 Test Mode Description



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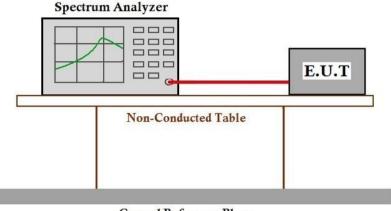
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7.8.3 Test Setup Diagram



Ground Reference Plane

7.8.4 Measurement Procedure and Data

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7.9 Radiated Emissions which fall in the restricted bands

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.10.5

Limit:

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		
Above 960	500	3		

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.9.1 E.U.T. Operation

Operating Environment:							
Temperature:	24	°C	Humidity:	48	% RH	Atmospheric Pressure: 1010	mbar

7.9.2 Test Mode Description

Pre-scan Final test	/ Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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7.9.3 Test Setup Diagram

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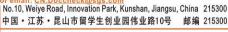
3m or 10r Antenna Towe Antenna To Antonn EUT EUT Ground Reference Plan Ground Reference Plan **Test Receiver Test Receiver** 30MHz-1GHz Above 1GHz

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7.9.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

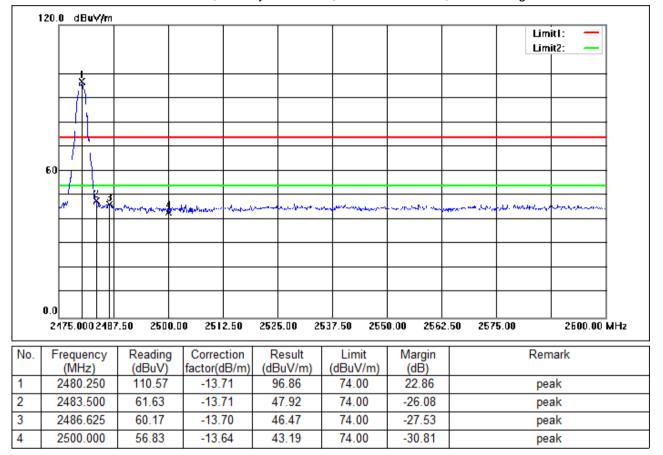


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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High

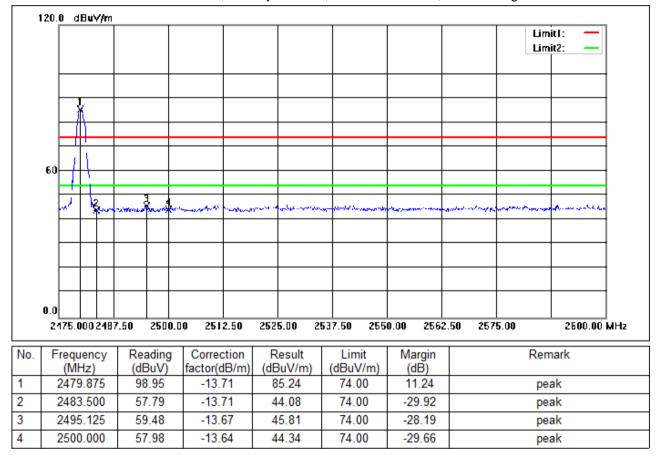


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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:High

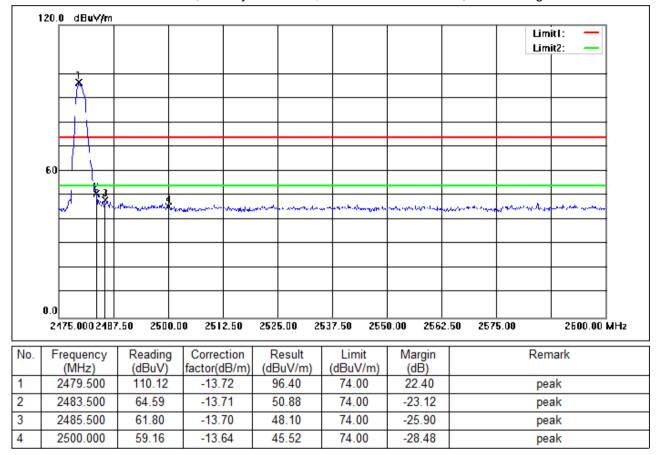


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Test Mode: 04; Polarity: Horizontal; Modulation:π/4 DQPSK; Channel:High



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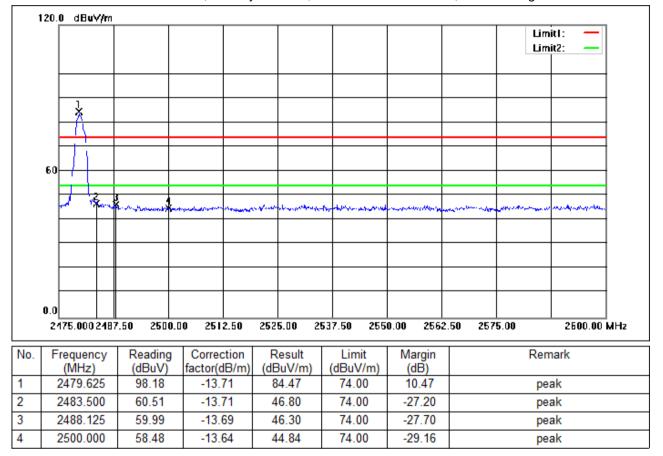
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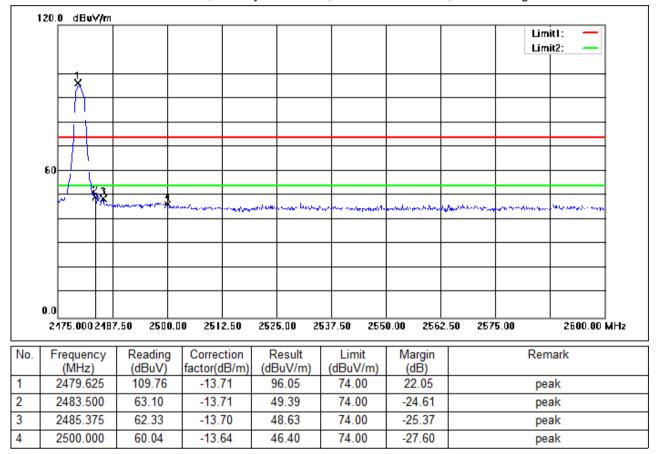
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Test Mode: 04; Polarity: Horizontal; Modulation:8DPSK; Channel:High



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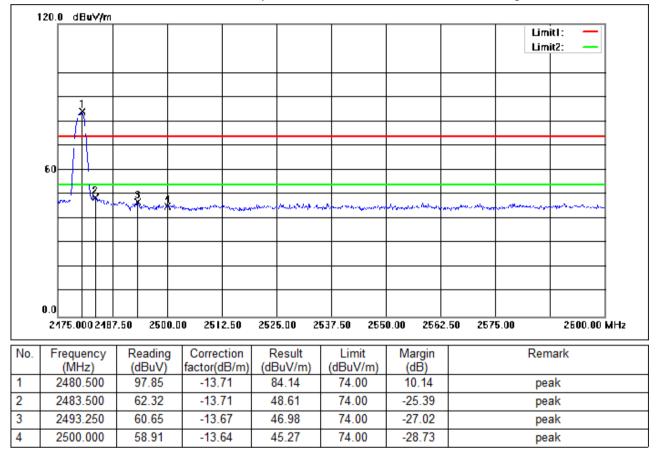
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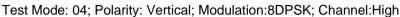
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7.10 Radiated Spurious Emissions Below 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5

Limit:

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

7.10.1 E.U.T. Operation

Operating Environment:

Temperature:	24 °C	Humidity: 48 % RH	Atmospheric Pressure: 1010 mbar
	-		

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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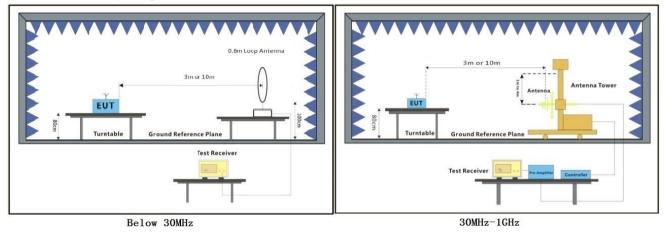
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7.10.3 Test Setup Diagram





Test Report Form Version: Rev01

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7.10.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

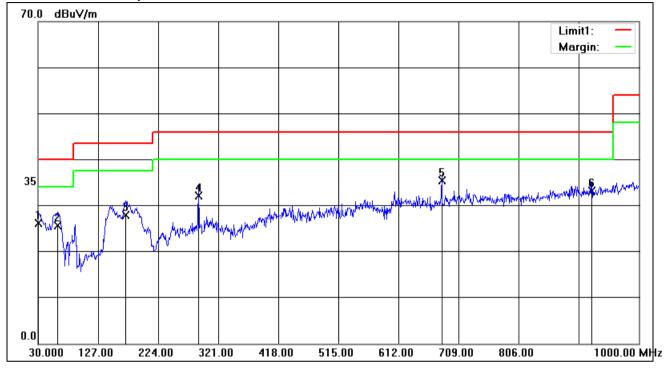


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Test Mode: 04; Polarity: Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.9700	1.06	25.12	26.18	40.00	-13.82	QP
2	62.0100	11.00	14.69	25.69	40.00	-14.31	QP
3	171.6200	10.94	16.90	27.84	43.50	-15.66	QP
4	288.9900	11.65	20.46	32.11	46.00	-13.89	QP
5	681.8400	32.94	2.44	35.38	46.00	-10.62	QP
6	924.3400	30.63	2.54	33.17	46.00	-12.83	QP



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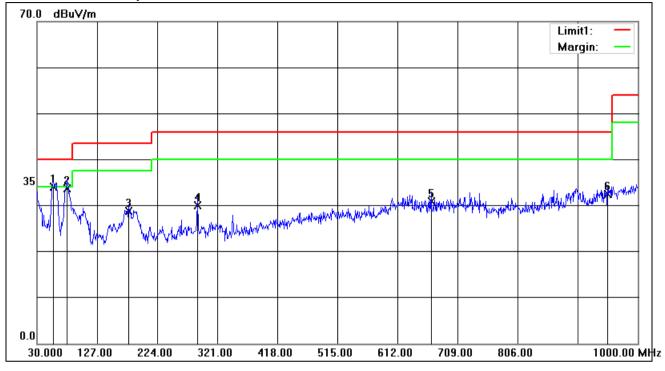
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Test Mode: 04; Polarity: Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	56.1900	18.37	15.74	34.11	40.00	-5.89	QP
2	78.5000	19.39	14.32	33.71	40.00	-6.29	QP
3	177.4400	12.09	16.70	28.79	43.50	-14.71	QP
4	288.9900	9.52	20.46	29.98	46.00	-16.02	QP
5	666.3200	3.65	27.29	30.94	46.00	-15.06	QP
6	951.5000	29.78	2.62	32.40	46.00	-13.60	QP



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7.11 Radiated Spurious Emissions Above 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.6

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

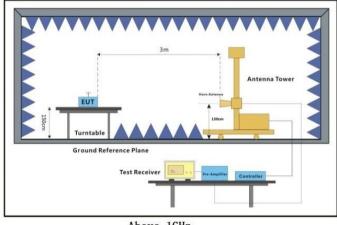
7.11.1 E.U.T. Operation

Operating Environment:							
Temperature:	24	°C	Humidity:	48	% RH	Atmospheric Pressure: 1010 mbar	

7.11.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.11.3 Test Setup Diagram



Above 1GHz



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7.11.4 Measurement Procedure and Data

a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

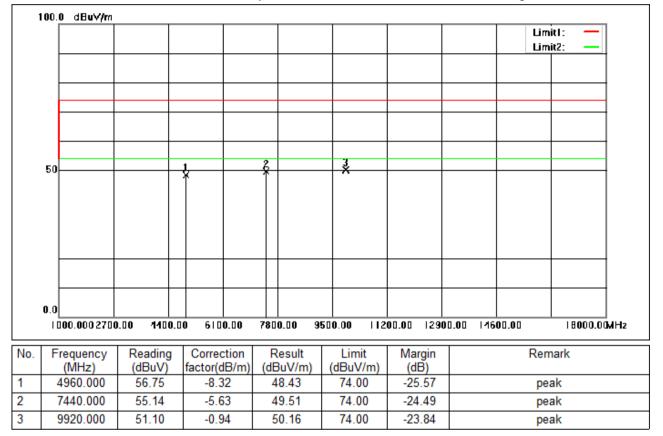


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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High



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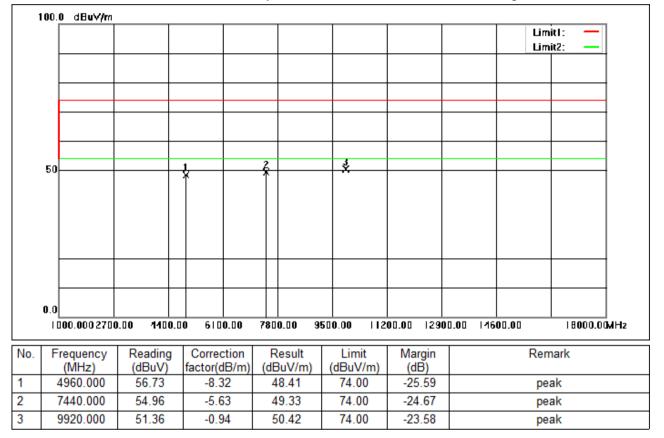
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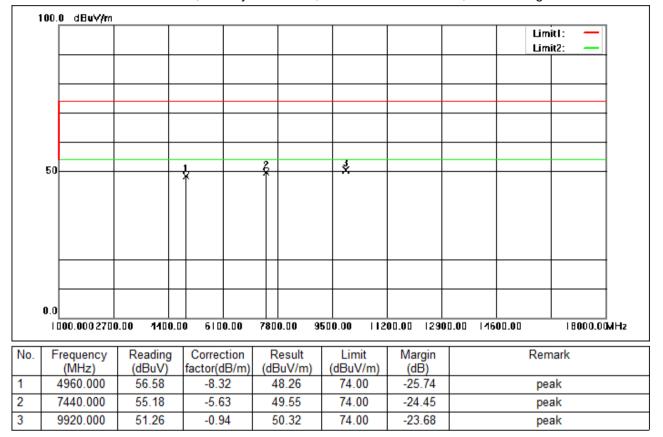
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Test Mode: 04; Polarity: Horizontal; Modulation:π/4 DQPSK; Channel:High

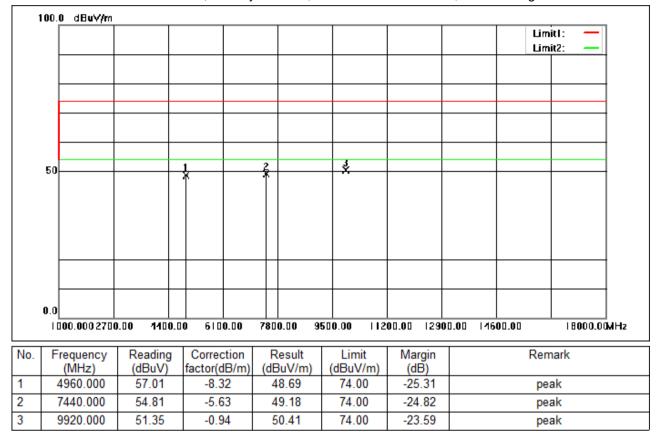


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Test Mode: 04; Polarity: Vertical; Modulation:π/4 DQPSK; Channel:High



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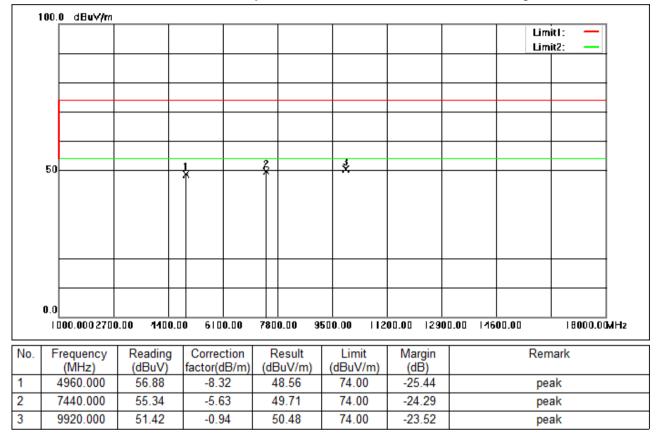
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Test Mode: 04; Polarity: Horizontal; Modulation:8DPSK; Channel:High



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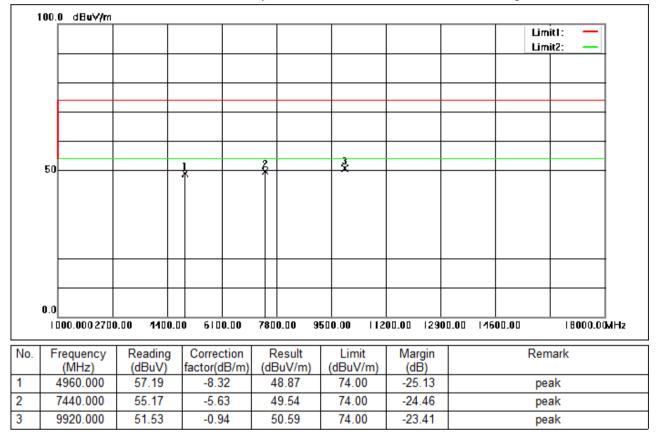
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Test Mode: 04; Polarity: Vertical; Modulation:8DPSK; Channel:High



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2204000422AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2204000422AT



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10 Appendix

Appendix B for KSCR220400042202

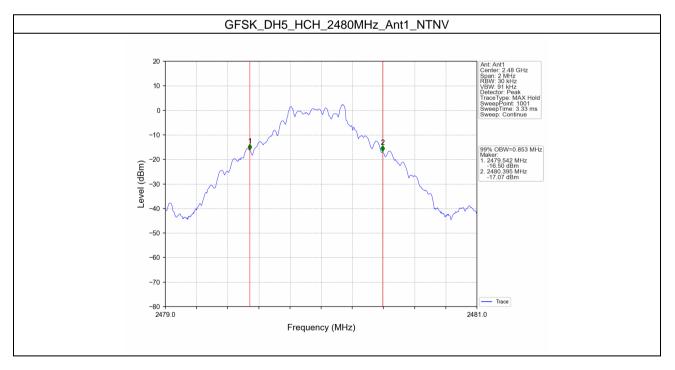
1. Bandwidth

1.1 OBW

1.1.1 Test Result

Mada	ΤХ	Frequency	Packet		99% Occupied Bandwidth (MHz)	Vardiat
Mode	Туре	(MHz)	Туре	ANT	Result	Verdict
GFSK	SISO	2480	DH5	1	0.853	Pass
Pi/4DQPSK	SISO	2480	2DH5	1	1.215	Pass
8DPSK	SISO	2480	3DH5	1	1.207	Pass

1.1.2 Test Graph





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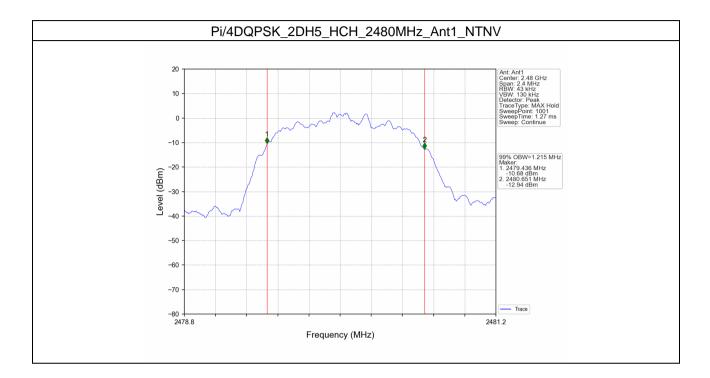
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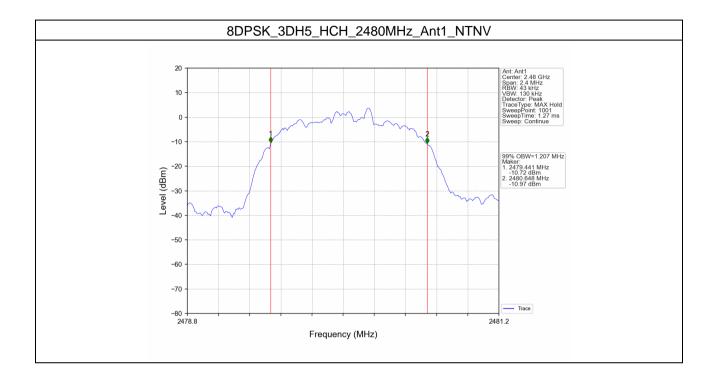
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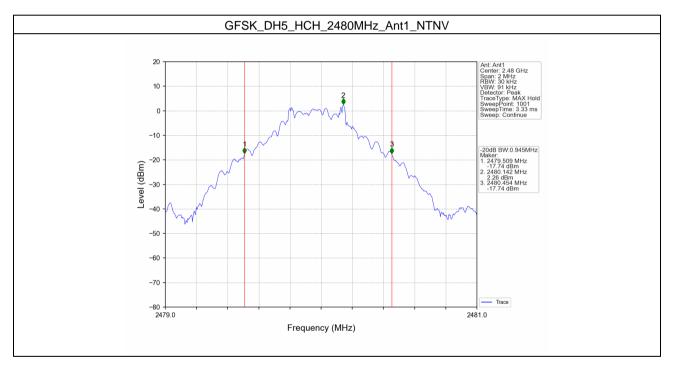
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1.2 20dB BW

1.2.1 Test Result

Mada	ΤХ	Frequency	Packet		20dB Bandwidth (MHz)	Vordiot
Mode	Туре	(MHz)	Туре	ANT	Result	Verdict
GFSK	SISO	2480	DH5	1	0.945	Pass
Pi/4DQPSK	SISO	2480	2DH5	1	1.376	Pass
8DPSK	SISO	2480	3DH5	1	1.324	Pass

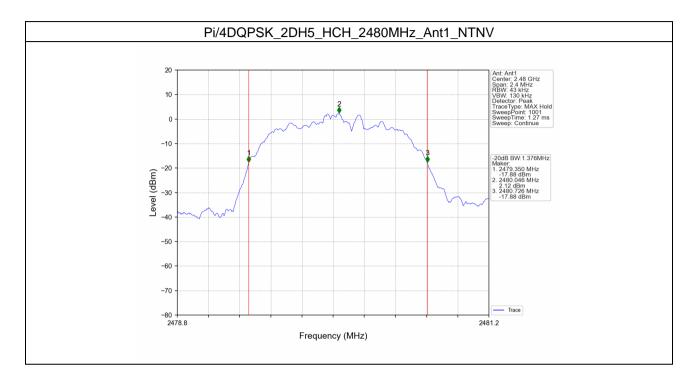
1.2.2 Test Graph

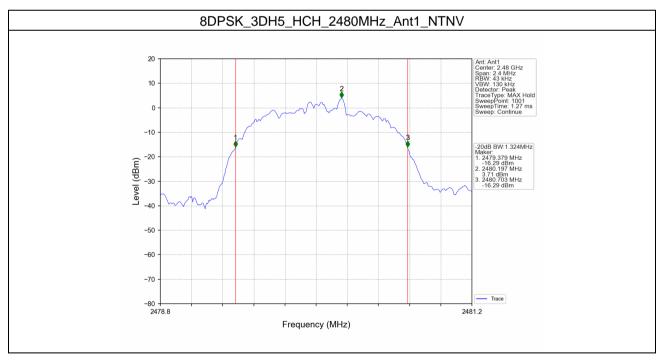






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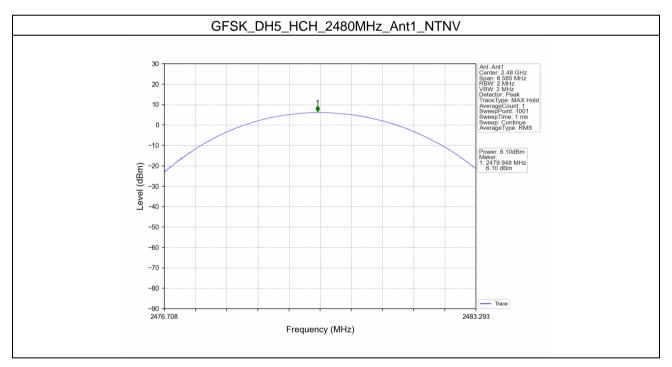
2. Maximum Conducted Output Power

2.1 Power

2.1.1 Test Result

Mode	ΤХ	Frequency	Packet Type	Maximum Peak Conduc	Verdict			
	Туре	(MHz)		ANT1	Limit	verdict		
GFSK	SISO	2480	DH5	6.10	<=20.97	Pass		
Pi/4DQPSK	SISO	2480	2DH5	5.86	<=20.97	Pass		
8DPSK	SISO	2480	3DH5	6.15	<=20.97	Pass		
Note1: Antenna Gain: Ant1: 4.0dBi;								

2.1.2 Test Graph

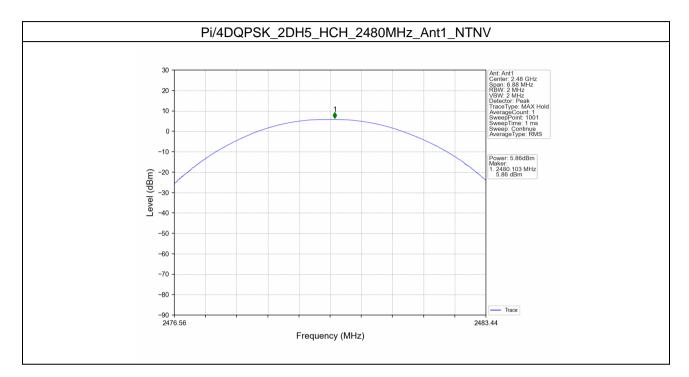


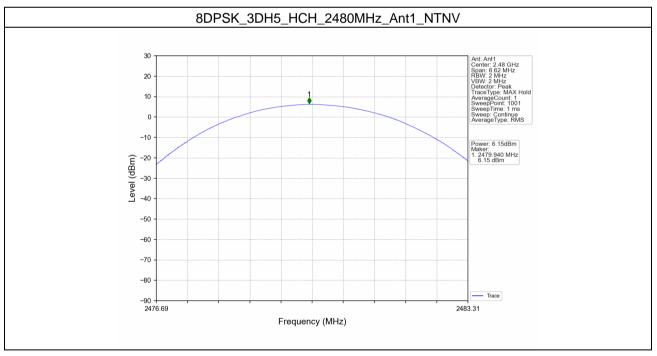


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3. Unwanted Emissions InStandard Non-restricted Frequency Bands

3.1 Ref

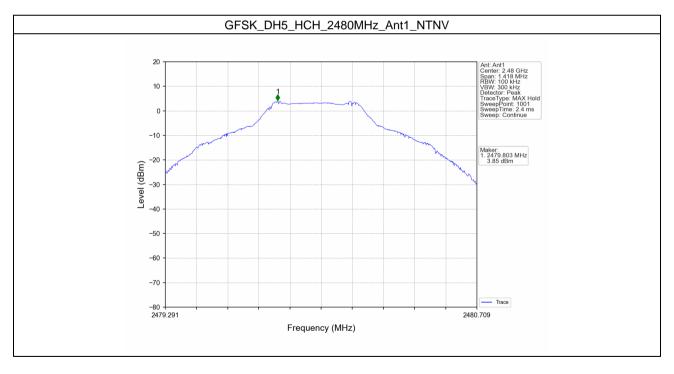
3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	
GFSK	SISO	2480	DH5	1	3.85	
Pi/4DQPSK	SISO	2480	2DH5	1	3.62	
8DPSK	SISO	2480	3DH5	1	3.57	
Nete 4. Defende EQO Dest 45.047 (d) and ANOLOGO 40.0040, the shared contains the menimum DOD level						

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.

6.1.2 Test Graph





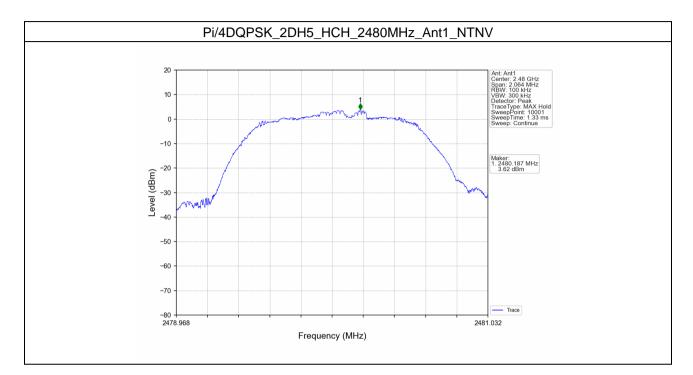
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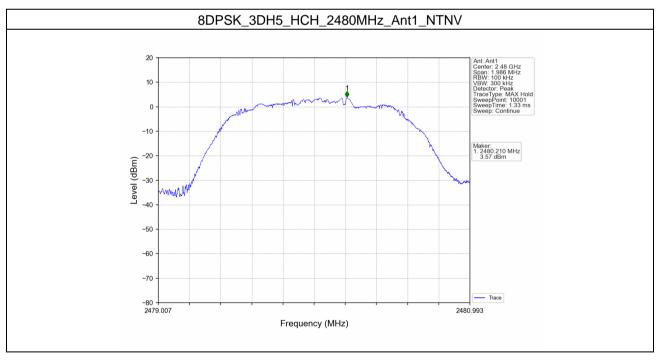
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6.2 CSE

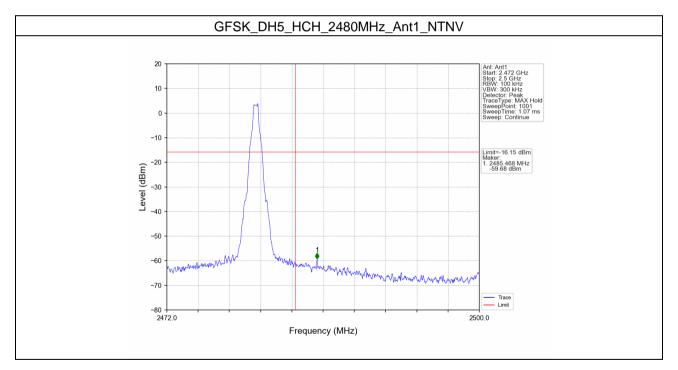
6.2.1 Test Result

Mode	ТХ Туре	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2480	DH5	1	3.85	-16.15	Pass
Pi/4DQPSK	SISO	2480	2DH5	1	3.62	-16.38	Pass
8DPSK	SISO	2480	3DH5	1	3.57	-16.43	Pass

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.

6.2.2 Test Graph

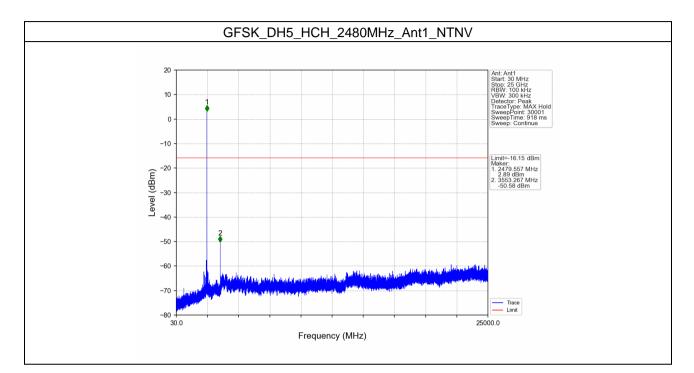


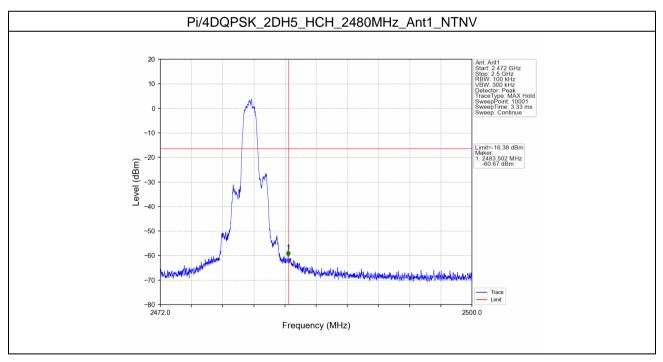


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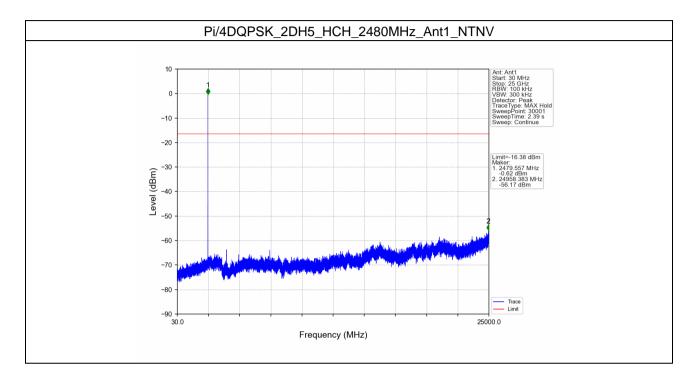
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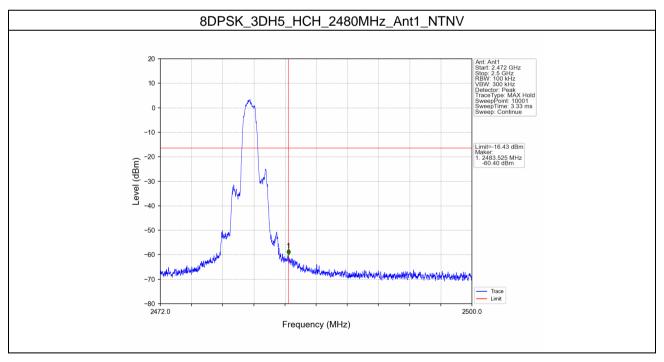
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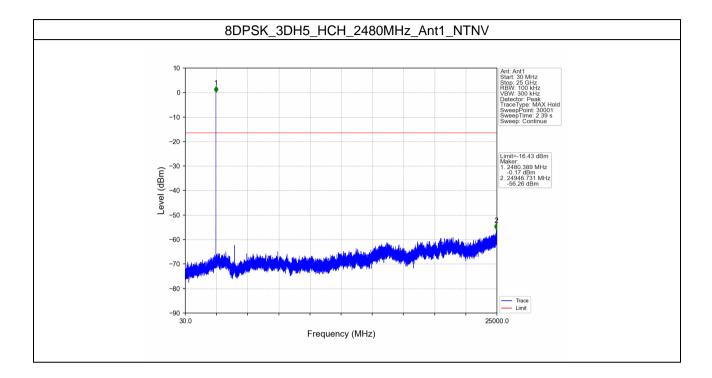
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