

Shenzhen HTT Technology Co., Ltd.

Report No.: HTT202409140F01

TEST Report

Applicant: YEAHER INC.

Address of Applicant: 51 Steel Dr, Unit A, New Castle, Delaware, 19720

Manufacturer: Nimo Direct Inc.

Address of 51 Steel Dr. Unit A, New Castle, Delaware, 19720

Manufacturer:

Equipment Under Test (EUT)

Product Name: Portable Computer

Model No.: N171B

Series model: N171R, N171S, N171G

Trade Mark: N/A

FCC ID: 2BEMH-N171S

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: Sep. 06, 2024

Date of Test: Sep. 06, 2024 ~ Sep. 19, 2024

Date of report issued: Sep. 19, 2024

Test Result: PASS *

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



1. Version

Version No.	Date	Description
00	Sep. 19, 2024	Original

Tested/ Prepared By	Heber He	Date:	Sep. 19, 2024
	Project Engineer		
Check By:	Bruce Zhu	Date:	Sep. 19, 2024
	Reviewer		
Approved By :	Kerin Yang	Date:	Sep. 19, 2024
	Authorized Signature		



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3. Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)(iii)	Pass
Dwell Time	15.247 (a)(1)(iii)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

Remarks:

- 1. Pass: The EUT complies with the essential requirements in the standard.
- 2. Test according to ANSI C63.10:2013

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes				
Radiated Emission	30~1000MHz	4.37 dB	(1)				
Radiated Emission	1~18GHz	5.40 dB	(1)				
Radiated Emission	18-40GHz	5.45 dB	(1)				
Conducted Disturbance	0.15~30MHz	2.68 dB	(1)				
Note (1): The measurement unce	Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.						



4. General Information

4.1. General Description of EUT

Product Name:	Portable Computer
Model No.:	N171B
Series model:	N171R, N171S, N171G
Test sample(s) ID:	HTT202409140-1(Engineer sample) HTT202409140-2(Normal sample)
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, π/4-DQPSK, 8-DPSK
Antenna Type:	FPC Antenna
Antenna Gain:	4.3 dBi
Power Supply:	DC 20.0V From External Circuit
Adapter Information:	MODEL:A869-200325C-US1 INPUT:100-240V~ 50/60Hz 1.7A OUTPUT:5.0V=3A/ 9.0V=3A/ 12.0V=3A/ 15.0V=3A/ 20.0V=3.25A



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz



4.2. Test mode

Transmitting mode Keep the EUT in continuously transmitting mode.

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

4.3. Description of Support Units

None.

4.4. Deviation from Standards

None.

4.5. Abnormalities from Standard Conditions

None.

4.6. Test Facility

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

FCC-Registration No.: 779513 Designation Number: CN1319

Shenzhen HTT Technology Co.,Ltd. has been accredited on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6435.01

Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

4.7. Test Location

All tests were performed at:

Shenzhen HTT Technology Co.,Ltd.

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

Tel: 0755-23595200 Fax: 0755-23595201

4.8. Additional Instructions

Test Software	Special AT test command provided by manufacturer to Keep the EUT in continuously transmitting mode and hopping mode
Power level setup	Default



5. Test Instruments list

<u>J.</u>		113 1131					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)	
1	3m Semi- Anechoic Chamber	Shenzhen C.R.T technology co., LTD	9*6*6	HTT-E028	Aug. 10 2024	Aug. 09 2027	
2	Control Room	Shenzhen C.R.T technology co., LTD	4.8*3.5*3.0	HTT-E030	Aug. 10 2024	Aug. 09 2027	
3	EMI Test Receiver	Rohde&Schwar	ESCI7	HTT-E022	Apr. 26 2024	Apr. 25 2025	
4	Spectrum Analyzer	Rohde&Schwar	FSP	HTT-E037	Apr. 26 2024	Apr. 25 2025	
5	Coaxial Cable	ZDecl	ZT26-NJ-NJ-0.6M	HTT-E018	Apr. 26 2024	Apr. 25 2025	
6	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-2M	HTT-E019	Apr. 26 2024	Apr. 25 2025	
7	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-0.6M	HTT-E020	Apr. 26 2024	Apr. 25 2025	
8	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-8.5M	HTT-E021	Apr. 26 2024	Apr. 25 2025	
9	Composite logarithmic antenna	Schwarzbeck	VULB 9168	HTT-E017	May. 21 2024	May. 20 2025	
10	Horn Antenna	Schwarzbeck	BBHA9120D	HTT-E016	May. 20 2024	May. 19 2025	
11	Loop Antenna	Zhinan	ZN30900C	HTT-E039	Apr. 26 2024	Apr. 25 2025	
12	Horn Antenna	Beijing Hangwei Dayang	OBH100400	HTT-E040	Apr. 26 2024	Apr. 25 2025	
13	low frequency Amplifier	Sonoma Instrument	310	HTT-E015	Apr. 26 2024	Apr. 25 2025	
14	high-frequency Amplifier	HP	8449B	HTT-E014	Apr. 26 2024	Apr. 25 2025	
15	Variable frequency power supply	Shenzhen Anbiao Instrument Co., Ltd	ANB-10VA	HTT-082	Apr. 26 2024	Apr. 25 2025	
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	HTT-E004	Apr. 26 2024	Apr. 25 2025	
17	Artificial Mains	Rohde & Schwarz	ESH3-Z5	HTT-E006	May. 23 2024	May. 22 2025	
18	Artificial Mains	Rohde & Schwarz	ENV-216	HTT-E038	May. 23 2024	May. 22 2025	
19	Cable Line	Robinson	Z302S-NJ-BNCJ-1.5M	HTT-E001	Apr. 26 2024	Apr. 25 2025	
20	Attenuator	Robinson	6810.17A	HTT-E007	Apr. 26 2024	Apr. 25 2025	
21	Variable frequency power supply	Shenzhen Yanghong Electric Co., Ltd	YF-650 (5KVA)	HTT-E032	Apr. 26 2024	Apr. 25 2025	
22	Control Room	Shenzhen C.R.T technology co., LTD	8*4*3.5	HTT-E029	Aug. 10 2024	Aug. 09 2027	
23	DC power supply	Agilent	E3632A	HTT-E023	Apr. 26 2024	Apr. 25 2025	
24	EMI Test Receiver	Agilent	N9020A	HTT-E024	Apr. 26 2024	Apr. 25 2025	
25	Analog signal generator	Agilent	N5181A	HTT-E025	Apr. 26 2024	Apr. 25 2025	
26	Vector signal generator	Agilent	N5182A	HTT-E026	Apr. 26 2024	Apr. 25 2025	
27	Power sensor	Keysight	U2021XA	HTT-E027	Apr. 26 2024	Apr. 25 2025	
28	Temperature and humidity meter	Shenzhen Anbiao Instrument Co., Ltd	TH10R	HTT-074	Apr. 28 2024	Apr. 27 2025	
29	Radiated Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A	
30	Conducted Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A	
31	RF Test Software	panshanrf	TST	N/A	N/A	N/A	



6. Test results and Measurement Data

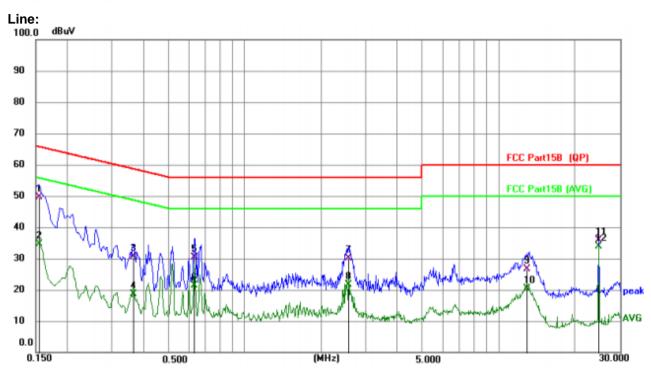
6.1. Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	150KHz to 30MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9KHz, VBW=30KHz, S	Sweep time=auto				
Limit:	Frequency range (MHz)	Limit	(dBuV)			
		Average				
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	m of the frequency	50			
Test setup:						
Test procedure:	* Decreases with the logarithm of the frequency. Reference Plane LISN 40cm 80cm Filter Ac power Equipment Under Test LISN Line Impedence Stabilization Network Test table height=0.8m 1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative					
-	according to ANSI C63.10		neasurement.			
Test Instruments:	Refer to section 6.0 for detail					
Test mode:	Refer to section 5.2 for detail	1	T T			
Test environment:	Temp.: 25 °C Hu	mid.: 52%	Press.: 1012mbar			
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

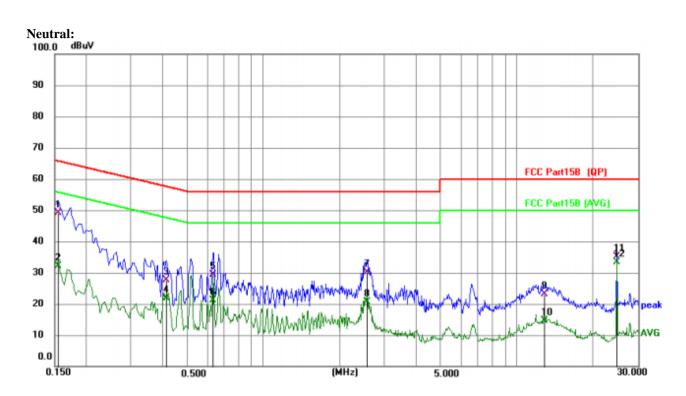


Measurement data:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1	*	0.1544	39.56	10.16	49.72	65.76	-16.04	QP
2		0.1544	24.47	10.16	34.63	55.76	-21.13	AVG
3		0.3614	20.39	10.25	30.64	58.70	-28.06	QP
4		0.3614	8.47	10.25	18.72	48.70	-29.98	AVG
5		0.6314	20.09	10.32	30.41	56.00	-25.59	QP
6		0.6314	10.96	10.32	21.28	46.00	-24.72	AVG
7		2.5620	19.69	10.46	30.15	56.00	-25.85	QP
8		2.5620	11.29	10.46	21.75	46.00	-24.25	AVG
9		12.8804	15.63	10.91	26.54	60.00	-33.46	QP
10		12.8804	9.52	10.91	20.43	50.00	-29.57	AVG
11		24.7064	24.46	11.35	35.81	60.00	-24.19	QP
12		24.7064	22.58	11.35	33.93	50.00	-16.07	AVG





No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz		dB	dBuV	dBuV	dB	Detector
1	0.1545	38.99	10.16	49.15	65.75	-16.60	QP
2	0.1545	22.03	10.16	32.19	55.75	-23.56	AVG
3	0.4115	17.34	10.26	27.60	57.62	-30.02	QP
4	0.4115	11.64	10.26	21.90	47.62	-25.72	AVG
5	0.6315	19.10	10.35	29.45	56.00	-26.55	QP
6	0.6315	10.80	10.35	21.15	46.00	-24.85	AVG
7	2.5620	19.62	10.43	30.05	56.00	-25.95	QP
8	2.5620	10.25	10.43	20.68	46.00	-25.32	AVG
9	12.8040	12.04	11.04	23.08	60.00	-36.92	QP
10	12.8040	3.60	11.04	14.64	50.00	-35.36	AVG
11	24.7065	23.66	11.37	35.03	60.00	-24.97	QP
12 *	24.7065	22.13	11.37	33.50	50.00	-16.50	AVG

Notes:

- 1. An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level = Receiver Read level + LISN Factor + Cable Los



6.2. Conducted Peak Output Power

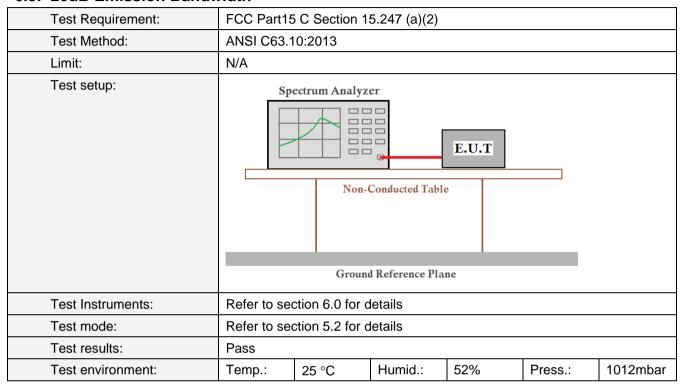
Test Requirement:	FCC Part15	FCC Part15 C Section 15.247 (b)(3)						
Test Method:	ANSI C63.	10:2013						
Limit:	30dBm(for	GFSK),20.97	dBm(for EDI	٦)				
Test setup:	Power sensor and Spectrum analyzer E.U.T Non-Conducted Table Ground Reference Plane							
Test Instruments:	Refer to section 6.0 for details							
Test mode:	Refer to section 5.2 for details							
Test results:	Pass							
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		

Measurement Data

Mode	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
	Lowest	1.92		
GFSK	Middle	2.16	30.00	Pass
	Highest	1.92		
	Lowest	2.87		
π/4-DQPSK	Middle	2.96	20.97	Pass
	Highest	2.69		
	Lowest	3.22		
8-DPSK	Middle	3.30	20.97	Pass
	Highest	3.12		



6.3. 20dB Emission Bandwidth



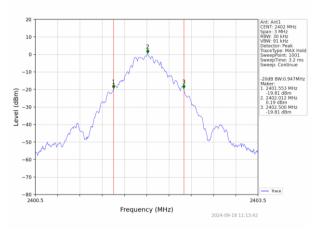
Measurement Data

Mode	Test channel	20dB Emission Bandwidth (MHz)	Result
	Lowest	0.947	
GFSK	Middle	0.947	Pass
	Highest	0.950	
	Lowest	1.272	
π/4-DQPSK	Middle	1.272	Pass
	Highest	1.279	
	Lowest	1.290	
8-DPSK	Middle	1.290	Pass
	Highest	1.288	

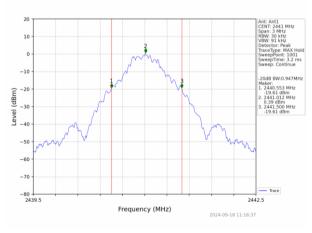


Test plot as follows:

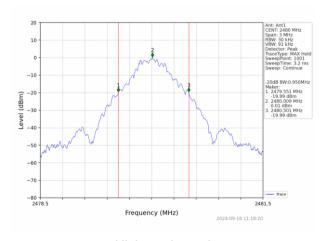
Test mode: GFSK mode



Lowest channel



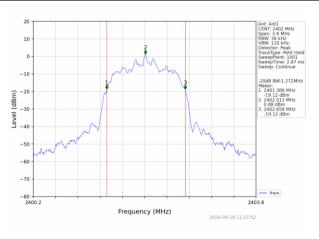
Middle channel



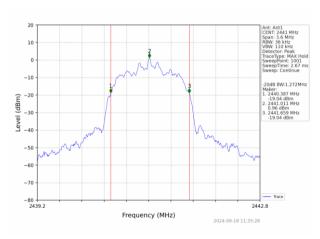
Highest channel



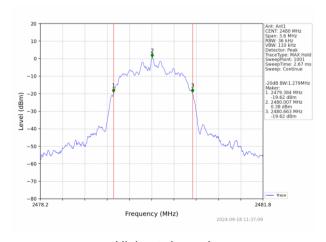
Test mode: $\pi/4$ -DQPSK mode



Lowest channel



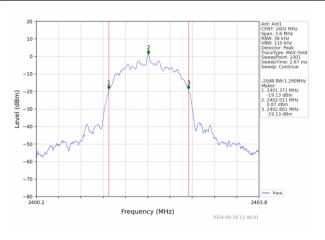
Middle channel



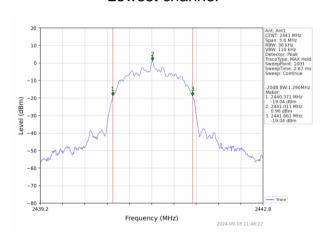
Highest channel



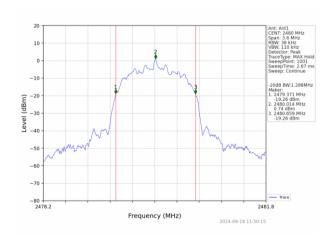
Test mode: 8-DPSK mode



Lowest channel



Middle channel



Highest channel



6.4. Frequencies Separation

Test Requirement:	FCC Part1	FCC Part15 C Section 15.247 (a)(1)							
Test Method:		ANSI C63.10:2013							
Receiver setup:	RBW=100k	KHz, VBW=30	00KHz, detec	ctor=Peak					
Limit:		B bandwidth 〈: 0.025MH	lz or 2/3 of	the 20dB b	oandwidth (v	vhichever is			
Test setup:	Sp								
Test Instruments:	Refer to se	ction 6.0 for o	details						
Test mode:	Refer to section 5.2 for details								
Test results:	Pass								
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar			

Measurement Data

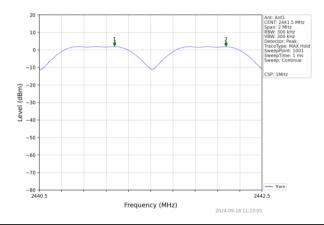
Measurement Data	1			
Mode	Test channel	Frequencies Separation (MHz)	Limit (kHz)	Result
			25KHz or	
GFSK	Middle	1.000	2/3*20dB	Pass
			bandwidth	
			25KHz or	
π/4-DQPSK	Middle	1.001	2/3*20dB	Pass
			bandwidth	
			25KHz or	
8-DPSK	Middle	0.996	2/3*20dB	Pass
			bandwidth	

Remark: We have tested all mode at high, middle and low channel, and recorded worst case at middle

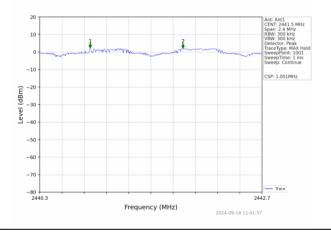


Test plot as follows:

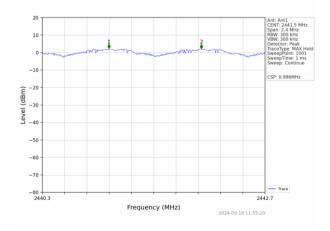
Modulation mode: GFSK



Test mode: π/4-DQPSK



Modulation mode: 8-DPSK





6.5. Hopping Channel Number

The state of the s								
Test Requirement:	FCC Part15	FCC Part15 C Section 15.247 (a)(1)(iii)						
Test Method:	ANSI C63.1	10:2013						
Receiver setup:	RBW=100k Detector=P	Hz, VBW=30 eak	0kHz, Freque	ency range=2	2400MHz-248	33.5MHz,		
Limit:	15 channels	S						
Test setup:	Spe			Z.U.T				
Test Instruments:	Refer to section 6.0 for details							
Test mode:	Refer to section 5.2 for details							
Test results:	Pass							
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		

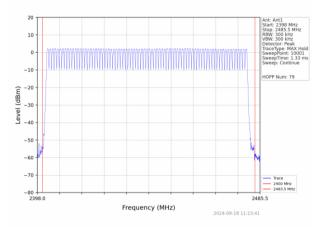
Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	79		Pass
π/4-DQPSK	79	≥15	Pass
8-DPSK	79		Pass

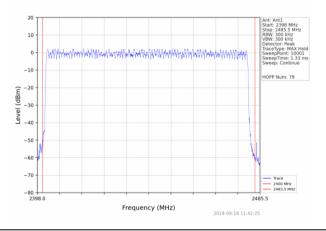


Test plot as follows:

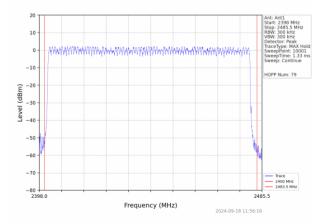
Test mode: GFSK



Test mode: $\pi/4$ -DQPSK



Test mode: 8-DPSK





6.6. Dwell Time

Test Requirement:	FCC Part1	FCC Part15 C Section 15.247 (a)(1)(iii)							
Test Method:	ANSI C63.	10:2013							
Receiver setup:	RBW=1MH	lz, VBW=1MH	lz, Span=0Hz	z, Detector=F	Peak				
Limit:	0.4 Second								
Test setup:	Sp			\perp					
Test Instruments:	Refer to section 6.0 for details								
Test mode:	Refer to section 5.2 for details								
Test results:	Pass								
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar			



Measurement Data

Modulation	Packet	Burst time (ms)	Dwell time (ms)	Limit (ms)	Result	
	DH1	0.412	131.840			
GFSK	DH3	1.668	273.552	400	Pass	
	DH5	2.916	341.172			
	2-DH1	0.422	135.040			
π/4DQPSK	2-DH3	1.670	268.870	400	Pass	
	2-DH5	2.924	286.552			
	3-DH1	0.422	135.040			
8DPSK	3-DH3	1.674	259.470	400	Pass	
	3-DH5	2.926	292.600			

Note:We have tested all mode at high, middle and low channel, and recoreded worst case at middle channel.

Dwell time=Pulse time (ms) \times (1600 \div 2 \div 79) \times 31.6 Second for DH1, 2-DH1, 3-DH1

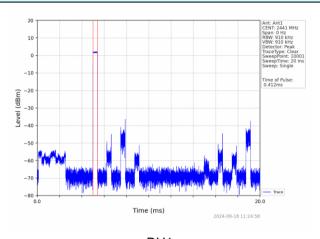
Dwell time=Pulse time (ms) \times (1600 \div 4 \div 79) \times 31.6 Second for DH3, 2-DH3, 3-DH3

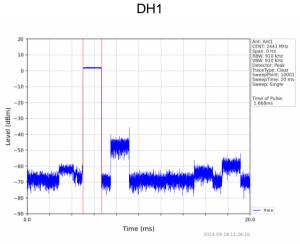
Dwell time=Pulse time (ms) \times (1600 \div 6 \div 79) \times 31.6 Second for DH5, 2-DH5, 3-DH5

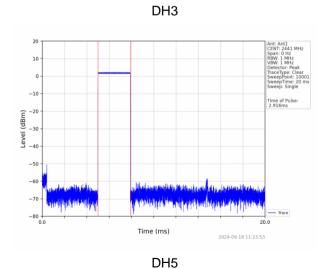


Test plot as follows:

GFSK mode

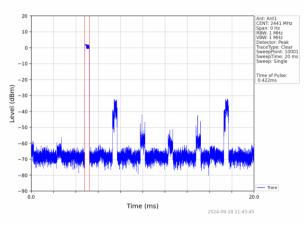




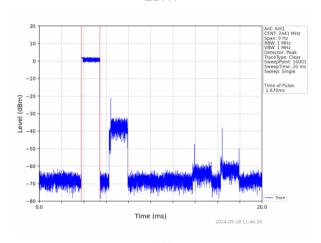




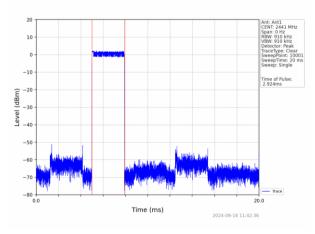
π/4-DQPSK mode



2DH1

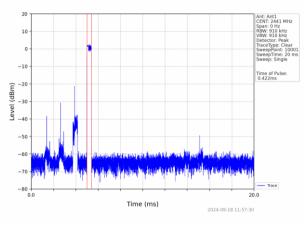


2DH3

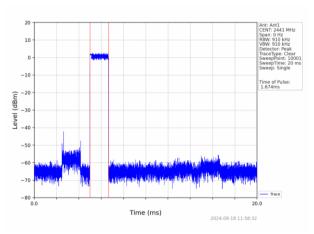




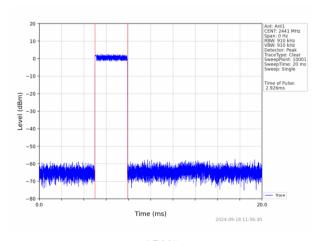
8-DPSK mode







3DH3





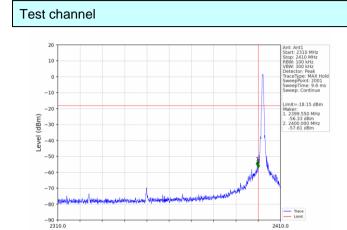
6.7. Band Edge

6.7.1. Conducted Emission Method

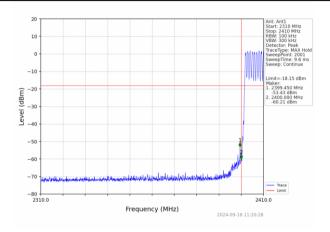
spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Test setup: Spectrum Analyzer Non-Conducted Table Test Instruments: Refer to section 6.0 for details Test mode: Refer to section 5.2 for details									
Receiver setup: Limit: 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 ir the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Test setup: Spectrum Analyzer Forum Analyzer Forum Analyzer Forum Analyzer Refer to section 6.0 for details Refer to section 5.2 for details	Test Requirement:	FCC Part15 C Section 15.247 (d)							
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Test setup: Spectrum Analyzer Feat Instruments: Refer to section 6.0 for details Test mode: Refer to section 5.2 for details	Test Method:	ANSI C63.1	0:2013						
spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Test setup: Spectrum Analyzer Non-Conducted Table Test Instruments: Refer to section 6.0 for details Test mode: Refer to section 5.2 for details	Receiver setup:	RBW=100kh	Hz, VBW=30	0kHz, Detect	or=Peak				
Test Instruments: Refer to section 6.0 for details Test mode: Refer to section 5.2 for details	Limit:	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							
Test mode: Refer to section 5.2 for details	Test setup:	Non-Conducted Table							
	Test Instruments:	Refer to section 6.0 for details							
Test results: Pass	Test mode:	Refer to section 5.2 for details							
. 551.5535	Test results:	Pass							
Test environment: Temp.: 25 °C Humid.: 52% Press.: 1012mba	Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		



Test plot as follows: GFSK Mode:



Lowest channel

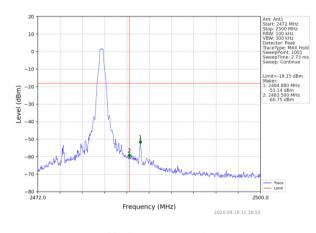


No-hopping mode

Hopping mode

Test channel:

Highest channel



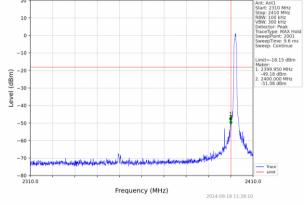
No-hopping mode

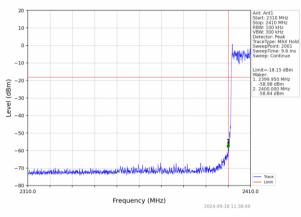
Hopping mode



π/4-DQPSK Mode:

Test channel Lowest channel





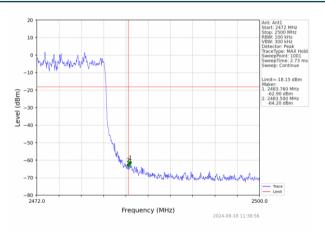
No-hopping mode

Hopping mode

Test channel:

2500.0 Frequency (MHz)

Highest channel



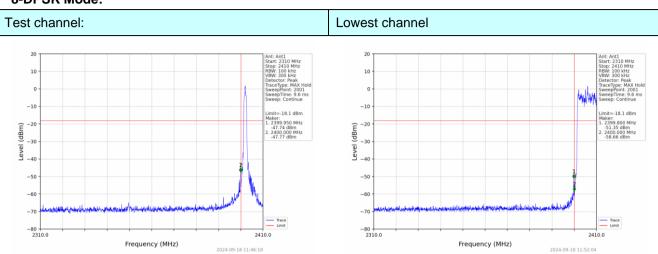
No-hopping mode

2024-09-18 11:37:27

Hopping mode



8-DPSK Mode:

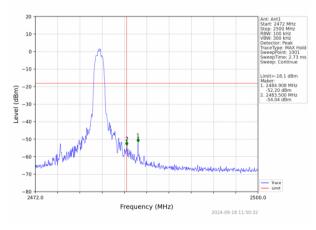


No-hopping mode

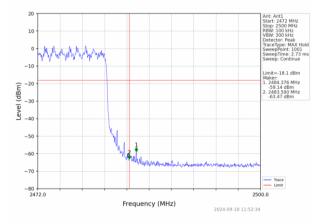
Hopping mode

Test channel:

Highest channel



No-hopping mode



Hopping mode



6.7.2. Radiated Emission Method

6.7.2. Radiated E	iiiissioii we	uioa					
Test Requirement:	FCC Part15	C Section 1	5.209 a	and 15.20	5		
Test Method:	ANSI C63.1	0:2013					
Test Frequency Range:		estrict bands lata was sho		tested, on	ly the wo	orst band's (2	2310MHz to
Test site:	Measureme	nt Distance:	3m				
Receiver setup:	Frequenc	y Detec	ctor	RBW	VBV	V Re	emark
·	Above 1GI	Hz Pea		1MHz 1MHz	3MH 10H		k Value ge Value
Limit:	Fre	equency	L	₋imit (dBu'	V/m @3n	n) Re	emark
	Abo	ve 1GHz		54. 74.			ge Value k Value
Test setup:	Test Antenna- Tum Table- <150cm >- Test Antenna- Tum Table- Tum Table-						
Test Procedure:	1. The EUT	was placed			Preamplifier- otating tak	ole 1.5 meter	s above the
	 ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 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. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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 						
Test Instruments:		tion 6.0 for c				in a data she	
Test mode:	Refer to section 5.2 for details						
Test results:	Pass						
Test environment:	Temp.: 25 °C Humid.: 52% Press.: 1012mbar						



Measurement Data

Remark: GFSK, Pi/4 DQPSK,8-DPSK all have been tested, only worse case GFSK is reported.

Operation Mode: GFSK

Freque	ncy(MHz)	:	24	02	Pola	arity:	Н	ORIZONTA	۱L
Frequency (MHz)	Emis Le [,] (dBu	vel	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)
2390.00	60.99	PK	74	13.01	62.38	27.2	4.31	32.9	-1.39
2390.00	45.24	AV	54	8.76	46.63	27.2	4.31	32.9	-1.39
Freque	ency(MHz):		24	02	Pola	arity:		VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)
2390.00	59.74	PK	74	14.26	61.13	27.2	4.31	32.9	-1.39
2390.00	45.55	AV	54	8.45	46.94	27.2	4.31	32.9	-1.39
Freque	ncy(MHz)	:	2480		P ola	arity:	н	ORIZONTA	۸L
Frequency (MHz)	Emis Le [,] (dBu	vel	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)
2483.50	56.81	PK	74	17.19	57.74	27.4	4.47	32.8	-0.93
2483.50	45.72	AV	54	8.28	46.65	27.4	4.47	32.8	-0.93
Freque	ncy(MHz)	:	24	80	Pola	arity:		VERTICAL	
Frequency (MHz)	Emis Le	vel	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)
2483.50	55.70	PK	74	18.30	56.63	27.4	4.47	32.8	-0.93
2483.50	44.53	AV	54	9.47	45.46	27.4	4.47	32.8	-0.93

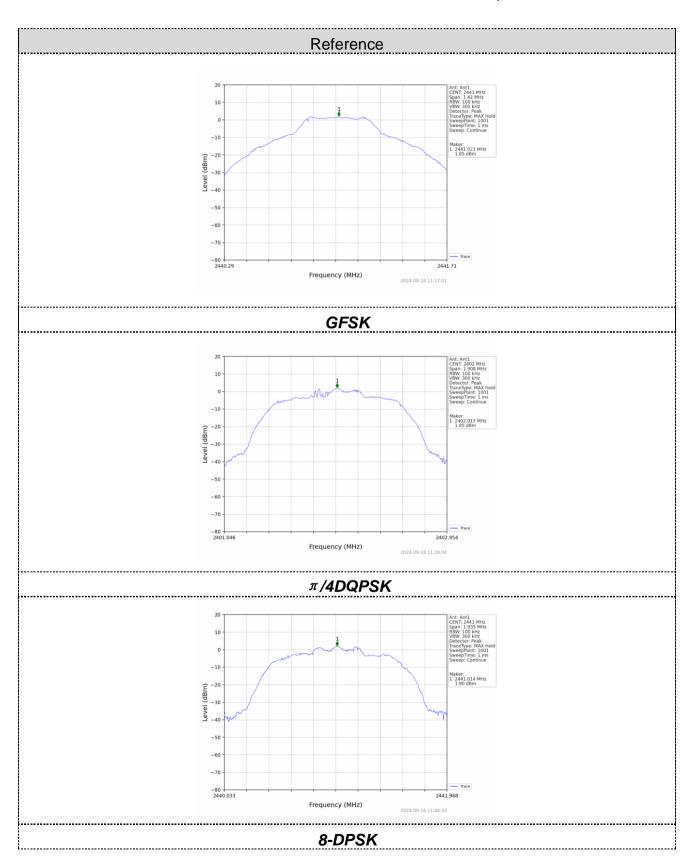


6.8. Spurious Emission

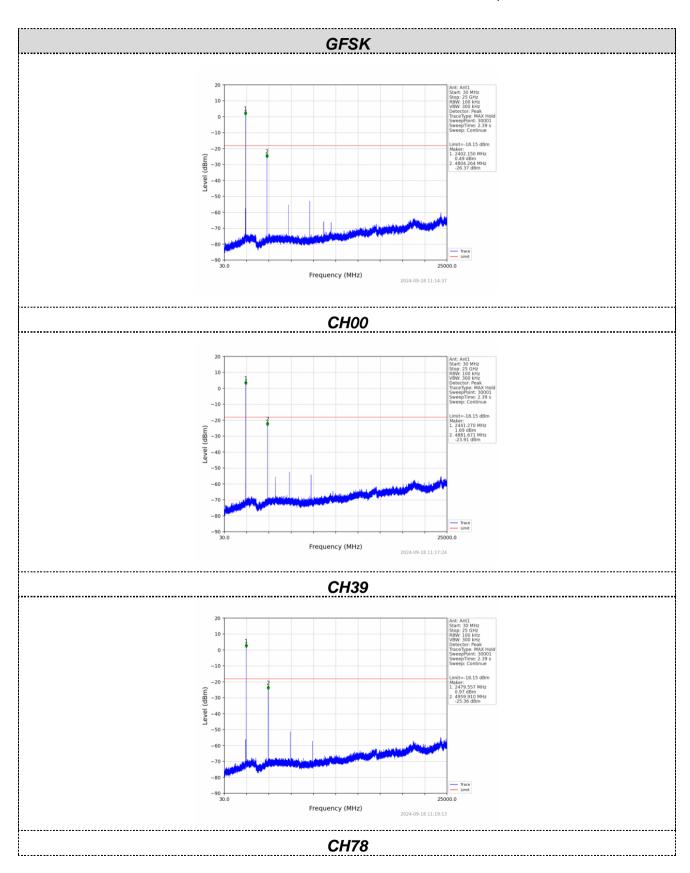
6.8.1. Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)									
Test Method:	ANSI C63.10:2013									
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.									
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane									
Test Instruments:	Refer to section 6.0 for details									
Test mode:	Refer to section 5.2 for details									
Test results:	Pass									
Test environment:	Temp.:25 °CHumid.:52%Press.:1012mbar									

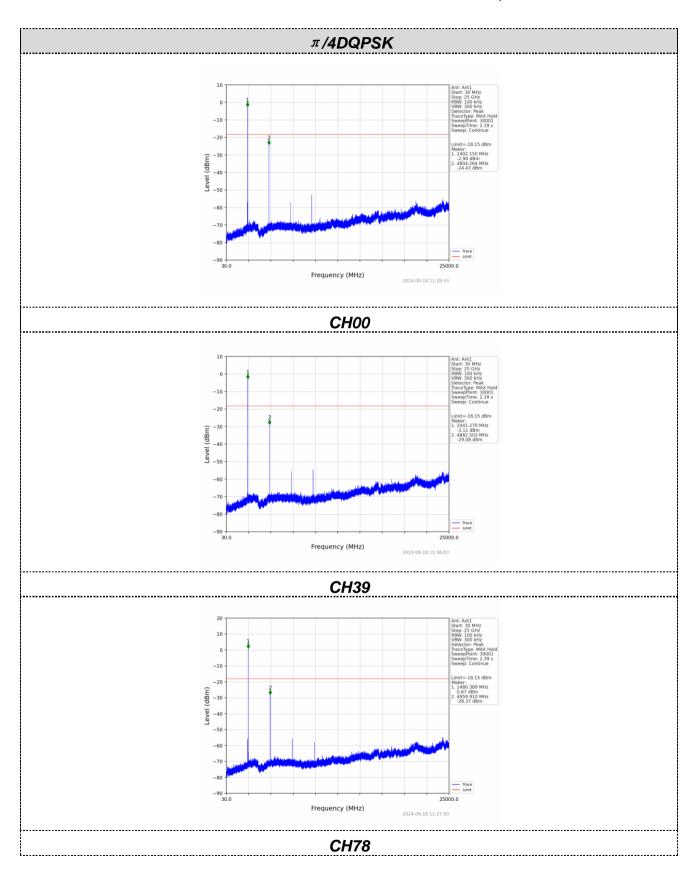




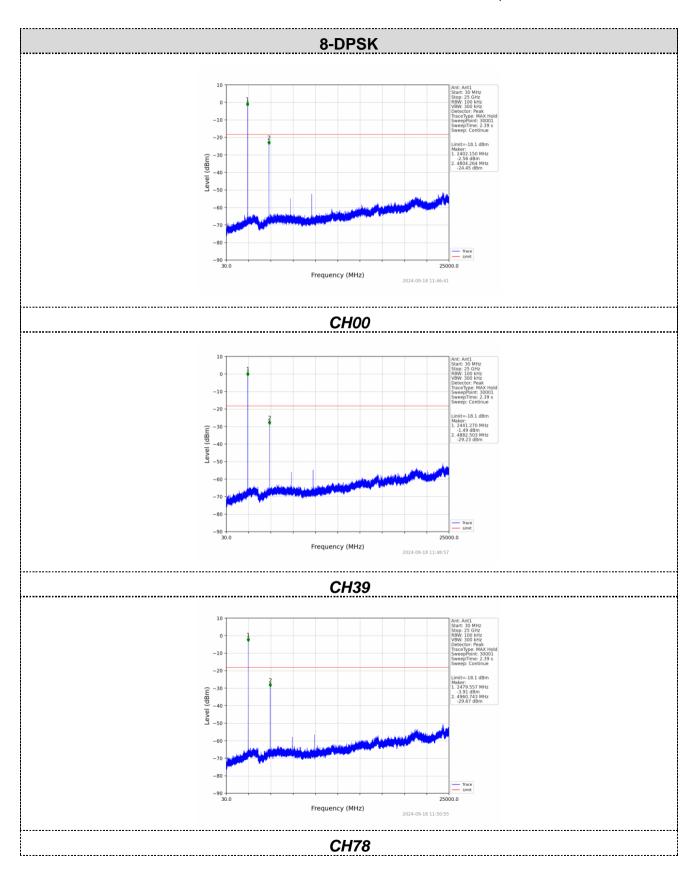










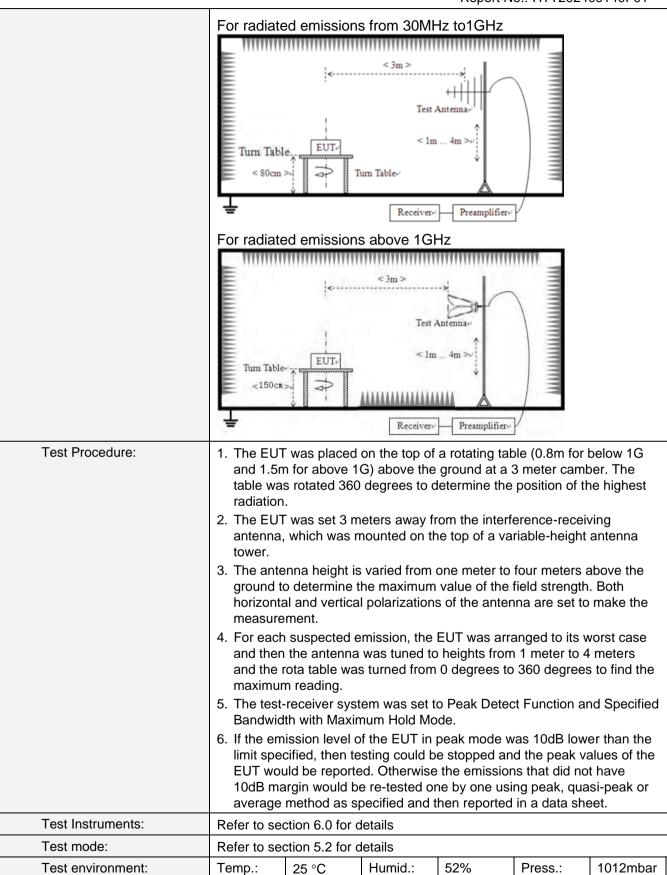




6.8.2. Radiated Emission Method

6.6.2. Radiated E	mission wethod										
Test Requirement:	FCC Part15 C Section	on 15	5.209								
Test Method:	ANSI C63.10:2013										
Test Frequency Range:	9kHz to 25GHz										
Test site:	Measurement Distar	Measurement Distance: 3m									
Receiver setup:	Frequency										
	9KHz-150KHz	Quasi-peak									
	150KHz-30MHz	Quasi-peak									
	30MHz-1GHz	Qι	uasi-peak	120K	Hz	300KH	łz	Quasi-peak			
	Above 1GHz		Peak	1MF	łz	3MHz	<u> </u>	Peak			
	Above IGIIZ		Peak	1MF	łz	10Hz		Average			
Limit:	Frequency		Limit (u\	//m)	٧	alue	N	Measurement Distance			
	0.009MHz-0.490M	lHz	2400/F(k	(Hz)		QP		300m			
	0.490MHz-1.705M	0.490MHz-1.705MHz 24000/F(KHz) QP 30m									
	1.705MHz-30MH	lz	30			QP		30m			
	30MHz-88MHz 100 QP										
	88MHz-216MHz										
	216MHz-960MH	Z	200			QP		3m			
	960MHz-1GHz		500			QP		5111			
	Above 1GHz		500		Av	erage					
	710070 10112		5000)	F	Peak					
Test setup:	For radiated emiss	sions	from 9kH	z to 30)MH:	Z					
	*********	11111	*****	********	//////	******					
	Tum Table EUT		< 3m > Test A	Im Receiver							







Test voltage:	AC 120V, 60Hz
Test results:	Pass

Measurement data:

Remarks:

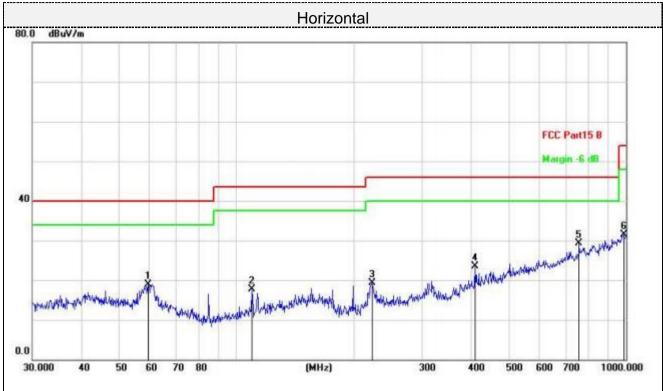
- 1. During the test, pre-scan the GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the GFSK modulation which it is worse case.
- 2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

■ 9kHz~30MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.



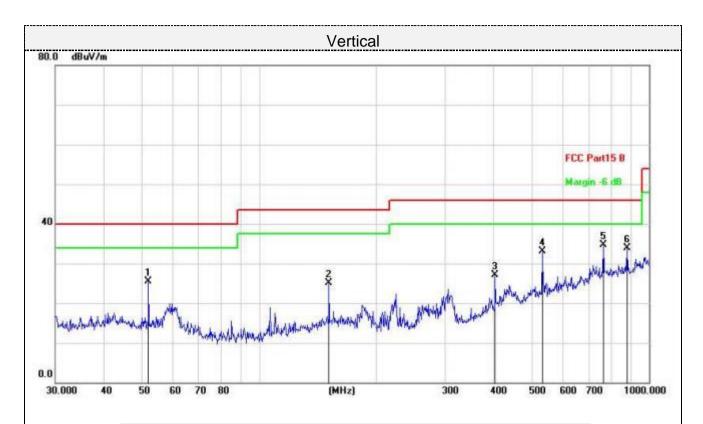
For 30MHz-1GHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dB/m	dB	Detector
1		59.4405	30.59	-11.61	18.98	40.00	-21.02	peak
2		109.7960	31.80	-14.09	17.71	43.50	-25.79	peak
3		222.9502	32.22	-13.01	19.21	46.00	-26.79	peak
4		410.3825	31.12	-7.66	23.46	46.00	-22.54	peak
5	*	758.0408	29.82	-0.49	29.33	46.00	-16.67	peak
6		986.0717	27.97	3.49	31.46	54.00	-22.54	peak

Final Level = Receiver Read level + Correct Factor





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dB/m	dB	Detector
1		52.0251	36.89	-11.45	25.44	40.00	-14.56	peak
2		151.0666	35.64	-10.56	25.08	43.50	-18.42	peak
3		403.2500	35.11	-7.93	27.18	46.00	-18.82	peak
4		531.9635	37.70	-4.63	33.07	46.00	-12.93	peak
5	*	763.3757	35.01	-0.40	34.61	46.00	-11.39	peak
6		878.3214	32.73	1.15	33.88	46.00	-12.12	peak

Final Level =Receiver Read level + Correct Factor



For 1GHz to 25GHz

Remark: For test above 1GHz GFSK,Pi/4 DQPSK and 8-DPSK were test at Low, Middle, and High channel; only the worst result of GFSK was reported as below:

Freque	Frequency(MHz):			2402		Polarity:		HORIZONTAL		
Frequency (MHz)		ssion vel V/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)	
4804.00	60.16	PK	74	13.84	54.46	31	6.5	31.8	5.7	
4804.00	43.23	AV	54	10.77	37.53	31	6.5	31.8	5.7	
7206.00	54.03	PK	74	19.97	41.38	36	8.15	31.5	12.65	
7206.00	43.61	AV	54	10.39	30.96	36	8.15	31.5	12.65	

Freque	Frequency(MHz):			2402		Polarity:		VERTICAL		
Frequency (MHz)	Emis Le		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)	
4804.00	59.05	PK	74	14.95	53.35	31	6.5	31.8	5.7	
4804.00	43.52	AV	54	10.48	37.82	31	6.5	31.8	5.7	
7206.00	53.91	PK	74	20.09	41.26	36	8.15	31.5	12.65	
7206.00	42.71	AV	54	11.29	30.06	36	8.15	31.5	12.65	

Freque	Frequency(MHz):			2441		Polarity:		HORIZONTAL		
Frequency (MHz)	Emis Le		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)	
4882.00	60.64	PK	74	13.36	54.48	31.2	6.61	31.65	6.16	
4882.00	43.10	AV	54	10.90	36.94	31.2	6.61	31.65	6.16	
7323.00	53.03	PK	74	20.97	40.08	36.2	8.23	31.48	12.95	
7323.00	42.93	AV	54	11.07	29.98	36.2	8.23	31.48	12.95	



Freque	ncy(MHz)):	2441		Polarity:		VERTICAL		
Frequency	Emis	ssion	Limit	Margin	Raw	Antenna	Cable	Pre-	Correction
(MHz)	Level			Value	Factor	Factor	amplifier	Factor	
(1011 12)	//Hz) (dBuV/m) (dBuV/m)		(dB)	(dBuV)	(dB/m)	(dB)	(dB)	(dB/m)	
4882.00	60.91	PK	74	13.09	54.75	31.2	6.61	31.65	6.16
4882.00	42.97	AV	54	11.03	36.81	31.2	6.61	31.65	6.16
7323.00	53.39	PK	74	20.61	40.44	36.2	8.23	31.48	12.95
7323.00	44.99	AV	54	9.01	32.04	36.2	8.23	31.48	12.95

Freque	ncy(MHz)):	2480		Polarity:		HORIZONTAL		
Frequency (MHz)	Le	ssion vel V/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)
4960.00	61.90	PK	74	12.10	55.24	31.4	6.76	31.5	6.66
4960.00	42.32	AV	54	11.68	35.66	31.4	6.76	31.5	6.66
7440.00	54.61	PK	74	19.39	41.31	36.4	8.35	31.45	13.3
7440.00	44.98	AV	54	9.02	31.68	36.4	8.35	31.45	13.3

Freque	Frequency(MHz):			2480		Polarity:		VERTICAL			
Emissi Frequency	sion	Limit	Margin	Raw	Antenna	Cable	Pre-	Correction			
	Level	(dBuV/m)	Ü	Value	Factor	Factor	amplifier	Factor			
(IVITIZ)	(MHz) (dBuV/m)		(dBuV/m) (dB)		(dBuV)	(dB/m)	(dB)	(dB)	(dB/m)		
4960.00	62.78	PK	74	11.22	56.12	31.4	6.76	31.5	6.66		
4960.00	43.56	AV	54	10.44	36.90	31.4	6.76	31.5	6.66		
7440.00	53.99	PK	74	20.01	40.69	36.4	8.35	31.45	13.3		
7440.00	44.01	AV	54	9.99	30.71	36.4	8.35	31.45	13.3		

Remark:

⁽¹⁾ Data of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

⁽²⁾ When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.



6.9. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

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

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

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

Antenna Connected Construction

The maximum gain of antenna was 4.3 dBi.

Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Shenzhen HTT Technology Co., Ltd. does not assume any responsibility.



7. Test Setup Photo

Reference to the appendix I for details.

8. EUT Constructional Details

Reference to the appendix II for details.

