FCC Test Report

Report No.: AGC04845170601FE03

FCC ID	:	2ADLJHOTSPOTII
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Mobile Phone
BRAND NAME	:	VORTEX
MODEL NAME	:	HotSpot II, UW2408K
CLIENT	:	Xwireless LLC
DATE OF ISSUE	:	July 08, 2017
STANDARD(S) TEST PROCEDURE(S)	:	FCC Part 15 Rules ANSI C63.10 (2013)
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 08, 2017	Valid	Original Report

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	6
2.3. RECEIVER INPUT BANDWIDTH	
2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE	7
2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR	7
2.6. RELATED SUBMITTAL(S) / GRANT (S)	8
2.7. TEST METHODOLOGY	8
2.8. SPECIAL ACCESSORIES	8
2.9. EQUIPMENT MODIFICATIONS	8
3. MEASUREMENT UNCERTAINTY	9
4. DESCRIPTION OF TEST MODES	9
5. SYSTEM TEST CONFIGURATION	9
5.1. CONFIGURATION OF EUT SYSTEM	9
5.2. EQUIPMENT USED IN EUT SYSTEM	
5.3. SUMMARY OF TEST RESULTS	10
6. TEST FACILITY	
7. PEAK OUTPUT POWER	
7.1. MEASUREMENT PROCEDURE	
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	13
7.3. LIMITS AND MEASUREMENT RESULT	
8. 20DB BANDWIDTH	16
8.1. MEASUREMENT PROCEDURE	
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	16
8.3. LIMITS AND MEASUREMENT RESULTS	16
9. CONDUCTED SPURIOUS EMISSION	19
9.1. MEASUREMENT PROCEDURE	19
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	19
9.3. MEASUREMENT EQUIPMENT USED	19
9.4. LIMITS AND MEASUREMENT RESULT	
10. RADIATED EMISSION	25
10.1. MEASUREMENT PROCEDURE	25
10.2. TEST SETUP	
10.3. LIMITS AND MEASUREMENT RESULT	27

Report No.: AGC04845170601FE03 Page 4 of 46

10.4. TEST RESULT	
11. BAND EDGE EMISSION	31
11.1. MEASUREMENT PROCEDURE	31
11.2. TEST SET-UP	31
11.3. Radiated TEST RESULT	32
11.4 Conducted TEST RESULT	33
12. NUMBER OF HOPPING FREQUENCY	37
12.1. MEASUREMENT PROCEDURE	37
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	37
12.3. MEASUREMENT EQUIPMENT USED	37
12.4. LIMITS AND MEASUREMENT RESULT	37
13.1. MEASUREMENT PROCEDURE	38
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	38
13.3. MEASUREMENT EQUIPMENT USED	38
13.4. LIMITS AND MEASUREMENT RESULT	38
Test Graph	39
14. FREQUENCY SEPARATION	40
14.1. MEASUREMENT PROCEDURE	40
14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	40
14.3. MEASUREMENT EQUIPMENT USED	40
14.4. LIMITS AND MEASUREMENT RESULT	40
15. FCC LINE CONDUCTED EMISSION TEST	41
15.1. LIMITS OF LINE CONDUCTED EMISSION TEST	
15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	41
15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	42
15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	42
15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	43
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	45

Applicant	Xwireless LLC		
Address	11426 Rockville pike, Rockville, MD 20852United States		
Manufacturer	Xwireless LLC		
Address	11426 Rockville pike,Rockville, MD 20852United States		
Product Designation	Mobile Phone		
Brand Name	VORTEX		
Test Model	HotSpot II		
Series Model	UW2408K		
Difference Description	All the same except the mode name.		
Date of test	June 25, 2017~July 08, 2017		
Deviation	None		
Condition of Test Sample	Normal		
Report Template	AGCRT-US-BR/RF		

1. VERIFICATION OF CONFORMITY

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Tested By	donjon strong	
	Donjon Huang(Huang Dongyang)	July 08, 2017
Reviewed By	Bon? xie	
	Bart Xie(Xie Xiaobin)	July 08, 2017
Approved By	Solya shary	
	Solger Zhang(Zhang Hongyi) Authorized Officer	July 08, 2017

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is "Mobile Phone" designed as a "Communication Device". It is designed by way of utilizing the FHSS technology to achieve the system operation.

Operation Frequency	2.402 GHz to 2.480GHz
Bluetooth Version	V2.1+EDR
Modulation	GFSK, π /4-DQPSK, 8DPSK
Number of channels	79(For BR/EDR)
Hardware Version	V1.0
Software Version	HK500_HWV1.0_SWV0.3
Antenna Designation	Integrated Antenna
Antenna Gain	0.6dBi
Power Supply	DC3.7V by Battery

A major technical description of EUT is described as following

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402MHZ
	1	2403MHZ
	•••	:
	38	2440 MHZ
2400~2483.5MHZ	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ, In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values: 1. LAP/UAP of the master of the connection.

2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For ehavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us.The clock has a cycle of about one day(23h30).In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures(permutations, additions, XOR-operations)are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following ehavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always Differ from the first one.

2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ADLJHOTSPOTII** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION	
1	Low channel GFSK	
2	Middle channel GFSK	
3	High channel GFSK	
4	Low channel π /4-DQPSK	
5	Middle channel π /4-DQPSK	
6	High channel π /4-DQPSK	
7	Low channel 8DPSK	
8	Middle channel 8DPSK	
9	High channel 8DPSK	
10	Normal Hopping	
Mater		

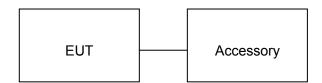
Note:

1. All the test modes can be supply by Built-in Li-ion battery, only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM Configuration:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Mobile Phone	HotSpot II	FCC ID: 2ADLJHOTSPOTII	EUT
2	Adapter	HotSpot II	DC 5.0V/500mA	Accessory

3	Battery	KB-W65	DC3.7V/ 3600mAh	Accessory
4	USB Cable	N/A	N/A	Accessory
5	Earphone	N/A	N/A	Accessory

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Spurious Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant
§15.247	Frequency Separation	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.		
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,		
FCC Registration No.	ion No. 371540		
Description The test site is constructed and calibrated to meet the FCC requirements documents ANSI C63.10:2013.			

ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 2, 2017	July 1, 2018
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 2, 2017	July 1, 2018
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 2, 2017	July 1, 2018
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 2, 2017	June 1, 2018
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 2, 2017	June 1, 2018
Spectrum analyzer	Agilent	E4407B	MY46185649	June 2, 2017	June 1, 2018
Power Probe	R&S	NRP-Z23	100323	July 24,2016	July 23,2017
RF attenuator	N/A	RFA20db	68	N/A	N/A

Radiated Emission Test Site						
Name of Equipment	Manufacturer	Manufacturer Model Number Seria		Last Calibration	Due Calibration	
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017	
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018	
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 10, 2016	July 9, 2018	
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 3, 2016	July 2, 2017	
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 2, 2017	July 1, 2018	
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 6, 2016	July 5, 2017	
RF Cable	SCHWARZBECK	AK9515H	96220	July 7, 2016	July 6, 2017	
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 2, 2017	June 1, 2018	
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A	
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 2, 2017	June 1, 2018	
Power Probe	R&S	NRP-Z23	100323	July 24,2016	July 23,2017	
RF attenuator	N/A	RFA20db	68	N/A	N/A	

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Artificial Mains Network	Narda	L2-16B	000WX31025	July 7, 2016	July 6, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 7, 2016	July 6, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 2, 2017	July 1, 2018
Shielded Room	CHENGYU	843	PTS-002	June 2, 2017	June 1, 2018

7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
- 3. RBW > the 20 dB bandwidth of the emission being measured, VBW \ge RBW.
- 4. Record the maximum power from the Spectrum Analyzer.

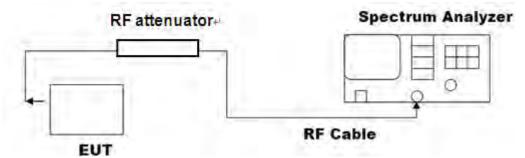
For average power test:

- 1. Connect EUT RF output port to power probe through an RF attenuator.
- 2. Connect the power probe to the PC.
- 3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4. Record the maximum power from the software.

Note: The EUT was tested according for compliance ANSI C63.10 (2013) requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP



7.3. LIMITS AND MEASUREMENT RESULT

Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
	2.402	2.173	30	Pass
GFSK	2.441	3.948	30	Pass
	2.480	3.948	30	Pass

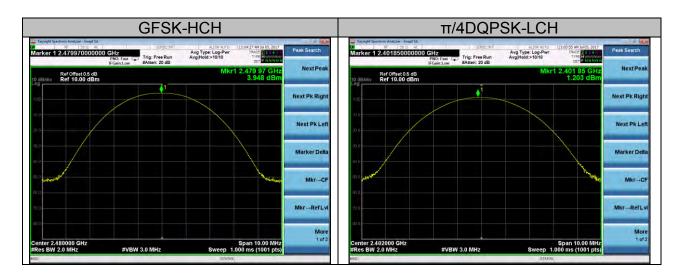
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
	2.402	1.203	30	Pass
π/4-DQPSK	2.441	2.972	30	Pass
	2.480	2.856	30	Pass

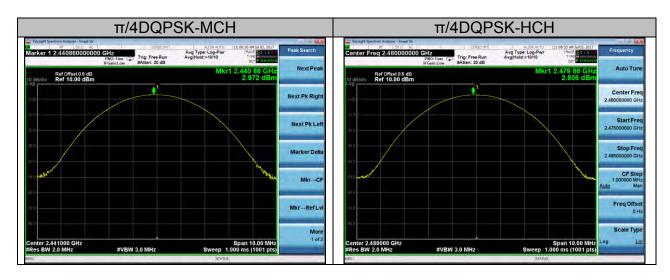
Report No.: AGC04845170601FE03 Page 14 of 46

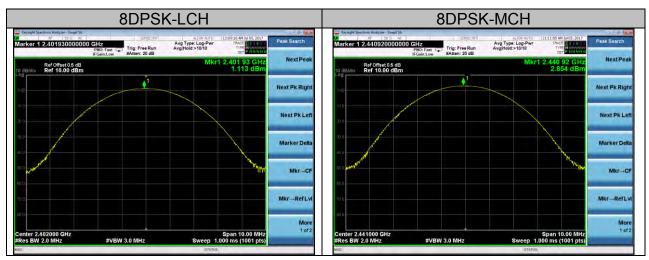
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
	2.402	1.113	30	Pass
8DPSK	2.441	2.854	30	Pass
	2.480	2.804	30	Pass

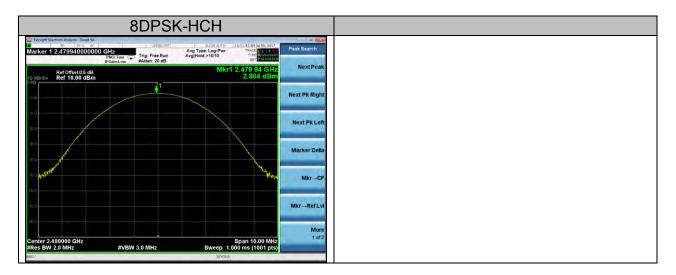
Test Graph

GF	SK-LCH	GF	SK-MCH
Ref Orsett 0.00 dBm	Aug Type: Log-Pwr TARCE 12 103 Run Avg Hold:>10/10 dB Det	Arch Marker 1 2.44080000000 GHzen Trig: F Ref Offset 0.5 dB 10 dB/dW Ref 10.00 dBm	Avg Type: Log-69 Avg Type: Log-69 Avg Type: Log-69 Avg Peak Search 20 dB Avg/Hold:>10:10 Type: Log-60 Avg Peak Search Peak Search 20 dB Mrt1 2:440 B0 GHz Say 8 dBn Next Peak
aug	Next P	k Right	Next Pk Right
-0.0 20 G	Next	Pk Left 200	Next Pk Left
400	Mark	er Delta 470	Marker Detta
20.0 AND	M	100	MkrCP
-90.0	Mkr-	RefLvi	Mkr→RefLvi
Center 2.402000 GHz #Res BW 2.0 MHz #VBW 3.0 MHz	Span 10.00 MHz Sweep 1.000 ms (1001 pts)	More 1 of2 Center 2.441000 GHz #Res BW 2.0 MHz #VBW 3.0 MH	tz Sweep 1.000 ms (1001 pts)







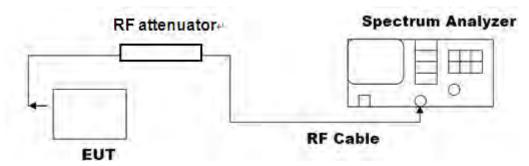


8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

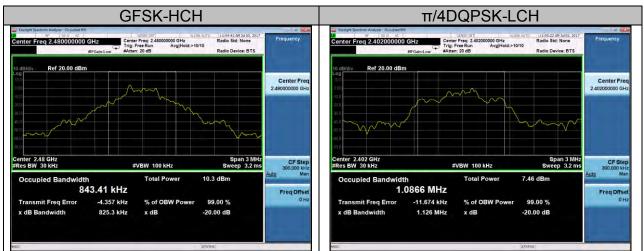


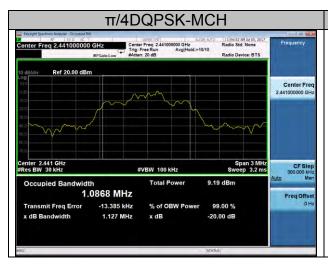
8.3. LIMITS AND MEASUREMENT RESULTS

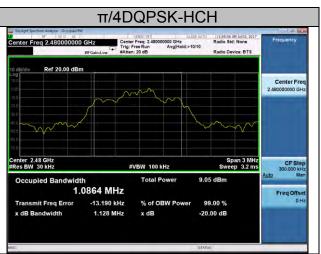
Mode	Channel.	20dB Bandwidth [KHz]	Verdict
GFSK	LCH	829.1	PASS
GFSK	MCH	827.5	PASS
GFSK	НСН	825.3	PASS
π/4DQPSK	LCH	1126	PASS
π/4DQPSK	MCH	1127	PASS
π/4DQPSK	HCH	1128	PASS
8DPSK	LCH	1118	PASS
8DPSK	MCH	1120	PASS
8DPSK	HCH	1141	PASS

Test Graph

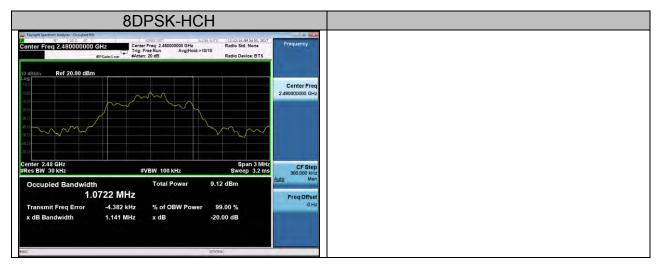












9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. RBW = 100 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according for compliance ANSI C63.10 (2013) requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW > RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW > RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

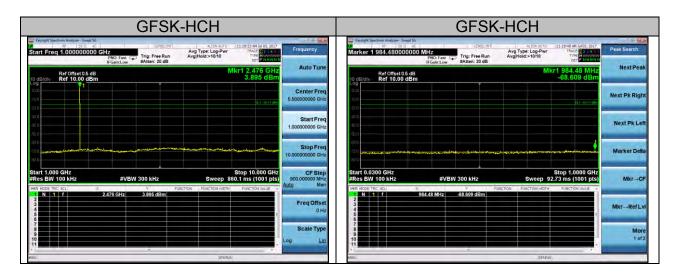
LIMITS AND MEASUREMENT RESULT				
Angliaghta Limita	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit			
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS		
intentional radiator is operating, the radio frequency	Channel			
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation 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))	At least -20dBc than the limit Specified on the TOP Channel	PASS		

Test Graph

GFSK-LCH		GFSK-LCH	
Knylett Stection Andyce- Bingt SA Klibs arrow Fill SE W 900 40 Steart Frog 1.0000000000 GHz Fill SE FR0: Fill SE Fill SE Avg Typer Loop-Pwr Avg Typer Loop-Pwr Fill Steart Co dB Trig: Free Run Avg Typer Loop-Pwr Typer Loop-P	Frequency	Marker 1 945.6800000000 MHz. Stitls: 3/11 Aut Type 1.00-PWr Aut Type 1.00-PWr Part Stitle: 3/11 Part Stitle: 3/11	s Search
Ref Offset 0.5 dB Mkr1 2.404 GHz 10 dB/div Ref 10.00 dBm 1.989 dBm	Auto Tune	Ref Offset 0.5 dB Mkr1 945,68 MHz 10 dB/div Ref 10.00 dBm -68,576 dBm	NextPeak
	Center Freq 5.500000000 GHz		t Pk Right
50	Start Freq 1.000000000 GHz		ext Pk Left
	Stop Freq 10.000000000 GHz	010	irker Delta
Start 1.000 GHz Stop 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 860.1 ms (1001 pts) mm weet not 2 2 Control and Control and Control and Control to the Control of the Control and Control of the Cont	CF Step 900.000000 MHz Auto Man	Start 0.0300 GHz Stop 1.0000 GHz #Res BW 100 kHz \$VEW 300 kHz Sweep 92.73 ms (1001 pts) #Mm Noor First July > >	Mkr→CF
NM MODE TRD: SQL X Y Fallection Fa	Freq Offset 0 Hz	1 N 1 F 945.68 MHz -68.576 dBm	r→RefLvi
	Scale Type		More 1 of 2
HSG STATUS		HSG STATUS	

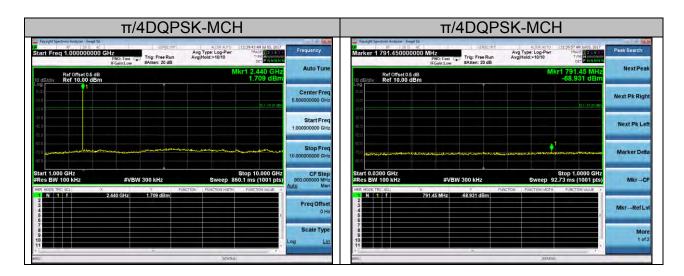
GFSK-LCH		GFSK-MCH
Forgigit Spectrum Analyse - Swept SA CP (SS 2) ALDIN M/TO (11)4-99 4M Jul (5, 2017) Marker 1 24.955000000000 GHz PND: Fast France: 20 8B Trig: Free Run Argitridic=1010 Arg Type: Log-Pur Trig: Free Run Argitridic=1010 Trik: C 11 24-99 4M Jul (5, 2017)	Peak Search	Triger Free Run Argeleide 1610
Ref Offset 0.5 dB Mkr1 24.955 GHz 10 dBJdiv Ref 10.00 dBm -57,495 dBm	NextPeak	Ref Offset 05 dB Mkr1 2,440 GHz Auto Tune 10 dB/div Ref 10,00 dBm 3,869 dBm
002 027 026 020	Next Pk Right	Conter Freq 5.00 300
301 	Next Pk Left	271 Start Preq 1,0000000 GHz
	Marker Delta	(1) 0 (2) 0 (3) 0 (4) 0 (4
Start 10.000 GHz Stop 25.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.434 s (1001 pts)	Mkr→CF	Start 1.000 GHz Stop 10.000 GHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 860.1 ms (1001 pts) Auto Man
MIC MODE TRC SEL V X Y FINICITON FUNCTION MOTH FUNCTION VALUE *	Mkr→RefLvl	Implementation X Y Function Fun
	More 1 of 2	Scale Type
4 " *		4 n r r r r r r r r r r r r r r r r r r

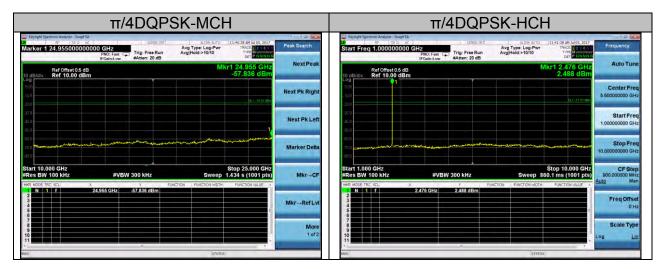
GFSK-MCH		GFSK-MCH
Tright Statement Anapare January 5.4 Statement Anapare January 5.4 Statement Anapare January 5.4 Markor 1 869.0500000000 MHz Fright Free Run Fright Statement 20 dB Avg Tright Log-Perr Avg Tright Statement 20 dB Tright Free Run Avg Tright Statement 20 dB Tright Statement 20 dB	Peak Search	Knowled Sector Made Sector Secto
Ref Offset0.5 dB Mkr1 869,05 MHz 10 dEldiv Ref 10.00 dBm -68.235 dBm -68.235 dBm	Next Peak	Ref Offset 0.5 dB Mkr1 24.970 GHz 10 dB/dw Ref 10.00 dBm -57.376 dBm
100 100 200	Next Pk Right	lan kidagan
50	Next Pk Left	100 100
	Marker Delta	(0) (1) Marker Della (1)
Start 0.0300 GHz #Res BW 100 kHz #WBW 300 kHz Sweep 92,73 ms (1001 pts) http://www.ncs.ms.su/	Mkr→CF	Start 10.000 GHz Stop 25.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.434 s (1001 pts) Mm Hoot Field x Y Pactor
N 1 F 859.05 MHz -69.235 dBm F	Mkr→RefLvi	N 1 F 24 970 GHz 47,876 dBm Function mode
	More 1 of 2	More tor2
MSG STATUS		HSQ STATUS

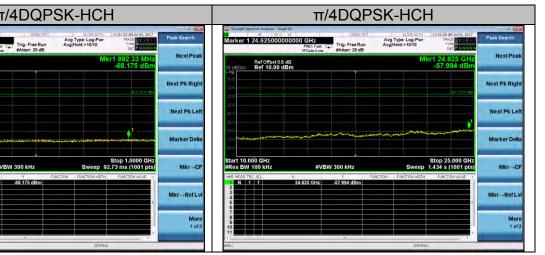


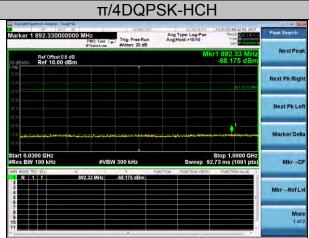
GFSK-HCH		π/4DQPSK-LCH		
Forping Section Autors - Section 34 FOR Figure - Section 34 Fo	Peak Search	Tryingt Spearson Analysis Sing 54 Sing		
Ref Offset 0.5 dB Mkr1 25.000 GHz 10 dB/div / Ref 10.00 dBm -57.243 dBm	Next Peak	Ref Offset 05 dB Mkr1 2.404 GHz Auto Tune 10 dB/div Ref 10.00 dBm 0.206 dBm		
-50 000 000 000 000 000 000 000 000 000	Next Pk Right	Conter Freq 1007 100 100 100 100 100 100 10		
	Next Pk Left			
	Marker Delta	0.0 70 0 10.00000000 GHz 00		
Start 10.000 GHz Stop 25.000 GHz Stop 25.000 GHz Stop 25.000 GHz #VBW 300 kHz Sweep 1.334 {1001 pts} Res Rost Rot Cut x Participating Participation Particip	Mkr-+CF	Start 1.000 GHz Stop 10.000 GHz Stop 10.000 GHz CF Step 9000000 HHz Stop 10.000 GHz Stop 00000 HHz Stop 00000 Hz Stop 0000 Hz Stop 0000 Hz Stop 00000 Hz Stop 0000 Hz Stop 00000 Hz Stop 00000 Hz </td		
N 1 f 25.000 GHz -57.243 dBm 2	Mkr→RefLvl	N 1 1 7 2.404 GHz 0.205 dBm 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		
	More 1 of 2	Scale Type		
11 	2	11 		

π/4DQPSK-LC	Н	π/4DQPSK-LCH		
Consistent Section Address - Ball Section - Ball Se	DET P ALN NOT	Registration Avg/hold Sec Statistics Sec Statistics Sec Statistics Sec	DET P NN NN N	
Ref Offset 0.5 dB 10 dB/div Ref 10.00 dBm	Mkr1 897.18 MHz -68,152 dBm	Ref Offset0.5 dB 10 dBidiv Ref 10.00 dBm	Mkr1 24.535 GHz -56.786 dBm	
9.00	Next Pk Right		Next Pk Right	
80	Next Pk Left	450 	Next Pk Left	
99.6 1791 <mark>- Janes - Anne Hannes, and an ann an ann an ann an ann an ann an</mark>	Marker Delta	1800 - 1700 - 1800	Marker Delta	
	Stop 1.0000 GHz 92.73 ms (1001 pts) MkrCF		Stôp 25.000 GHz Sweep 1.434 s (1001 pts) Mkr→CF	
MR HOCK THE SKU X. Y FUNCTION HO N 1 f 897/18 MHz 48.5152 dBm 2 1 1 1 1 897/18 MHz 48.5152 dBm		MM RODE TRC: SKL -X Y FallerTox Faller	E MKr-+RefLvi	
7 9 9 10 11	More 1 of 2		More 1 of 2	
ia sty	nis	MSG	STATUS	

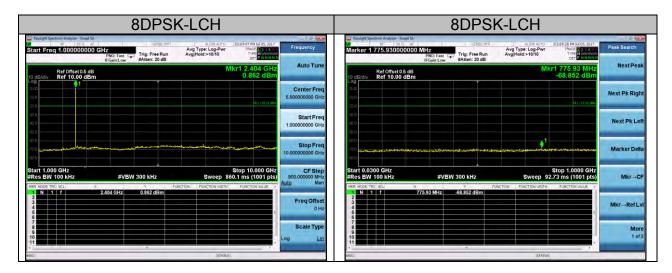








Report No.: AGC04845170601FE03 Page 23 of 46



8DPSK-LCH		8DPSK-MCH
Rovjet Section Adaptive Tangl 5A EDSC/01 EUDE Linfo E02 eX55 PPI M 05 2017 Rovjet Section 24.4 150000000000 GHz Trig: Free Run Avg Type Log-Pwr Trig: Section 4 wgHoid: 1010 Trig: Section 4 wgHoid: 1010	Peak Search	tryingt Spectrum Malphan Sung Sa. try: Start Freq 1.00000000 GHz Fraid Chart
Ref Offset 0.5 dB Mkr1 24.415 GHz 57.546 dBm -57.546 dBm	Next Peak	RefOrmerto 5 dB Mkr1 2.440 GHz Auto Tune 10 dBidiv Ref 10.00 dBm 1.677 dBm
	Next Pk Right	Cop Center Preq 100 100 100 100 100 100 100 10
	Next Pk Left	C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Marker Delta	0.5 Stop Freq 0.0 Stop Freq 0.0 Stop Freq
Start 10.000 GHz Stop 25.000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 1.434 s (1001 pts)	Mkr→CF	Start 1.000 GHz Stop 10.000 GHz #Res BW 100 kHz \$WBW 300 kHz \$weep 580.1 ms (1001 pts) Auto Man
N 1 I Z4415 GHz - Function	Mkr→RefLvl	Image Tec, ScL X Y Function Fun
7 8 9 9	More 1 of 2	Scale Type
11	0	





8DPSK-HCH		
Register Sections Available Bingt SA EDISCIPIT ALLION NUTO (62.4-20 PH SA (5.2017) Marker 1 25.000000000000 GHz PROC Fast Fights were stated and the section of the	Peak Bearch	
Ref Offiset 05 dB Mkr1 25.000 GHz 30 dB/dlv Ref 10.00 dBm -57.698 dBm	NextPeak	
27	Next Pk Right	
	Next Pk Left	
	Marker Delta	
tart 10.000 GHz Res BW 100 kHz Stop 25.000 GHz Res BW 100 kHz #VBW 300 kHz Sweep 1.434 s (1001 pts) s mode Tin ≤ 20 x v suschos susch	MkrCF	
N N 1 F 25.009 GHz -57.698 dBm	Mkr→RefLvI	
	More 1 of 2	
6 aratus		

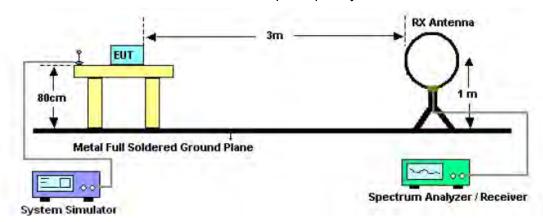
10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

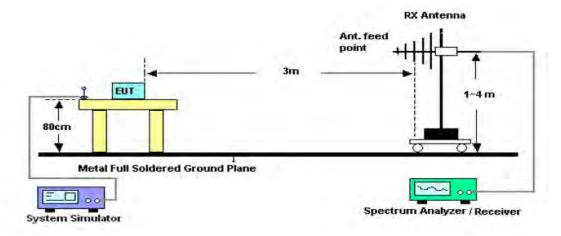
- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

10.2. TEST SETUP

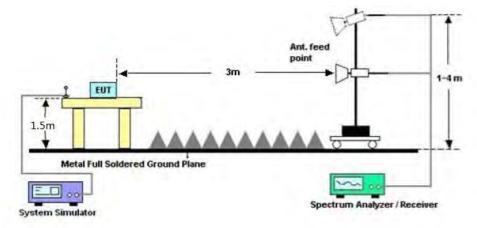
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



10.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

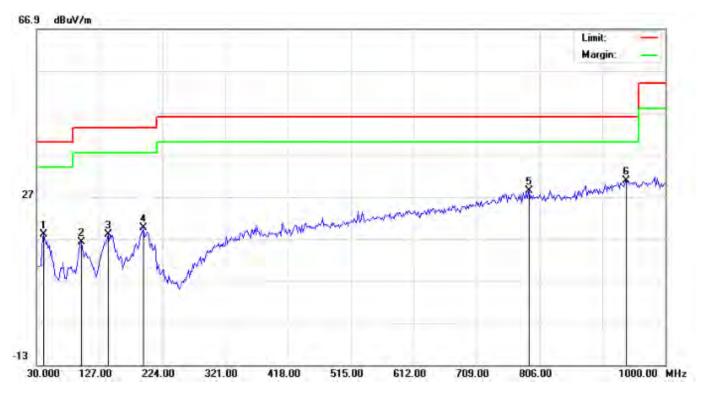
10.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

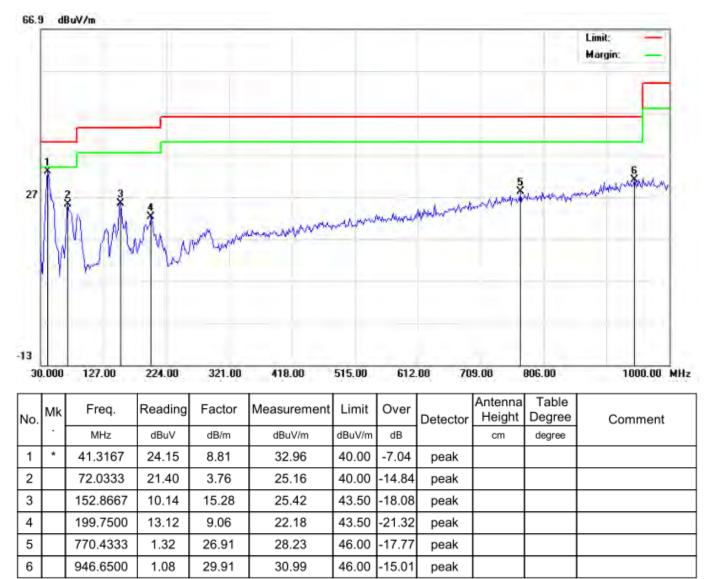
RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	·	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		41.3167	6.21	11.81	18.02	40.00	-21.98	peak			
2		99.5167	6.15	10.00	16.15	43.50	-27.35	peak			
3		139.9333	2.89	15.17	18.06	43.50	-25.44	peak			
4		194.9000	7.77	11.76	19.53	43.50	-23.97	peak			
5		789.8333	1.31	27.18	28.49	46.00	-17.51	peak			
6	*	940.1833	1.10	29.73	30.83	46.00	-15.17	peak			

RESULT: PASS



RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

3. All test modes for different EUT are pre-tested. The worst mode (GFSK Low channel) for the worst EUT recorded in the report.

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
			Low Channel (2402	2 MHz)			
4804	64.12	-3.62	60.50	74	-13.50	Pk	Vertical
4804	44.36	-3.62	40.74	54	-13.26	AV	Vertical
4804	62.55	-3.64	58.91	74	-15.09	Pk	Horizontal
4804	45.14	-3.64	41.50	54	-12.50	AV	Horizontal
			Mid Channel (2441	MHz)			
4882	63.85	-3.65	60.20	74	-13.80	Pk	Vertical
4882	43.68	-3.65	40.03	54	-13.97	AV	Vertical
4882	63.12	-3.68	59.44	74	-14.56	Pk	Horizontal
4882	42.41	-3.68	38.73	54	-15.27	AV	Horizontal
		ł	High Channel (248	0 MHz)			
4960	63.79	-3.59	60.20	74	-13.80	pk	Vertical
4960	43.81	-3.59	40.22	54	-13.78	AV	Vertical
4960	63.59	-3.59	60.00	74	-14.00	pk	Horizontal
4960	41.97	-3.59	38.38	54	-15.62	AV	Horizontal

RADIATED EMISSION TEST- (ABOVE 1GHZ)

Note:

1) 30MHz~25GHz:(Scan with GFSK, π/4-DQPSK,8DPSK, the worst casw is GFSK Mode)

2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor Margin = Emission Leve - Limit

RESULT: PASS

11. BAND EDGE EMISSION

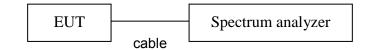
11.1. MEASUREMENT PROCEDURE

- 1. The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100kHz. The video bandwidth is set to 300kHz.
- 2. Transmitter set to the normal hopping mode at 2.4 and 2.4835 GHz.

11.2. TEST SET-UP

Radiated same as 10.2

Conducted set up



Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
			GF	SK		•	
2399.9	62.81	-12.99	49.82	74	-24.18	peak	Vertical
2399.9	53.62	-12.99	40.63	54	-13.37	AVG	Vertical
2399.9	66.34	-12.99	53.35	74	-20.65	peak	Horizontal
2399.9	47.07	-12.99	34.08	54	-19.92	AVG	Horizontal
2483.6	61.75	-12.78	48.97	74	-25.03	peak	Vertical
2483.6	52.18	-12.78	39.40	54	-14.60	AVG	Vertical
2483.6	63.60	-12.78	50.82	74	-23.18	peak	Horizontal
2483.6	53.42	-12.78	40.64	54	-13.36	AVG	Horizontal
			π/4-D	QPSK			
2399.9	60.96	-12.99	47.97	74	-26.03	peak	Vertical
2399.9	55.14	-12.99	42.15	54	-11.85	AVG	Vertical
2399.9	62.93	-12.99	49.94	74	-24.06	peak	Horizontal
2399.9	53.41	-12.99	40.42	54	-13.58	AVG	Horizontal
2483.6	62.85	-12.78	50.07	74	-23.93	peak	Vertical
2483.6	52.34	-12.78	39.56	54	-14.44	AVG	Vertical
2483.6	62.14	-12.78	49.36	74	-24.64	peak	Horizontal
2483.6	50.08	-12.78	37.30	54	-16.70	AVG	Horizontal
			8DF	PSK			
2399.9	63.93	-12.99	50.94	74	-23.06	peak	Vertical
2399.9	56.31	-12.99	43.32	54	-10.68	AVG	Vertical
2399.9	64.43	-12.99	51.44	74	-22.56	peak	Horizontal
2399.9	50.97	-12.99	37.98	54	-16.02	AVG	Horizontal
2483.6	60.65	-12.78	47.87	74	-26.13	peak	Vertical
2483.6	54.08	-12.78	41.30	54	-12.70	AVG	Vertical
2483.6	62.69	-12.78	49.91	74	-24.09	peak	Horizontal
2483.6	56.43	-12.78	43.65	54	-10.35	AVG	Horizontal

11.3. Radiated TEST RESULT

RESULT: PASS

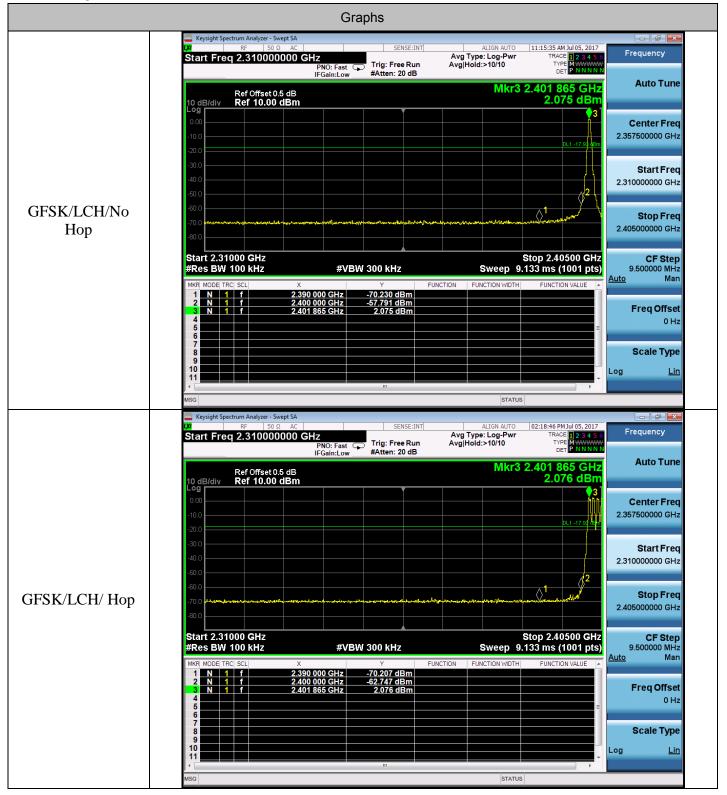
Note: The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

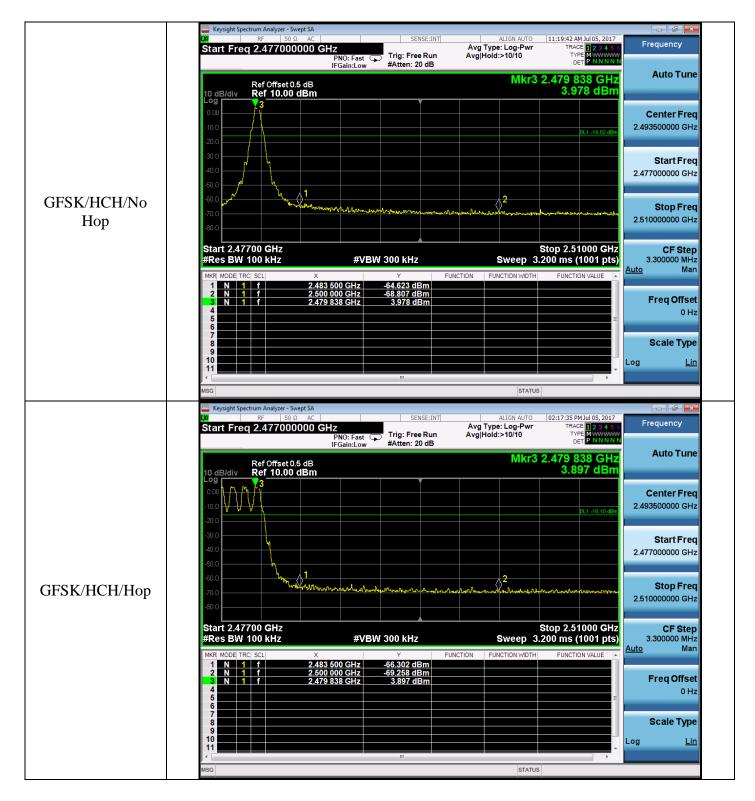
The "Factor" value can be calculated automatically by software of measurement system.

11.4 Conducted TEST RESULT

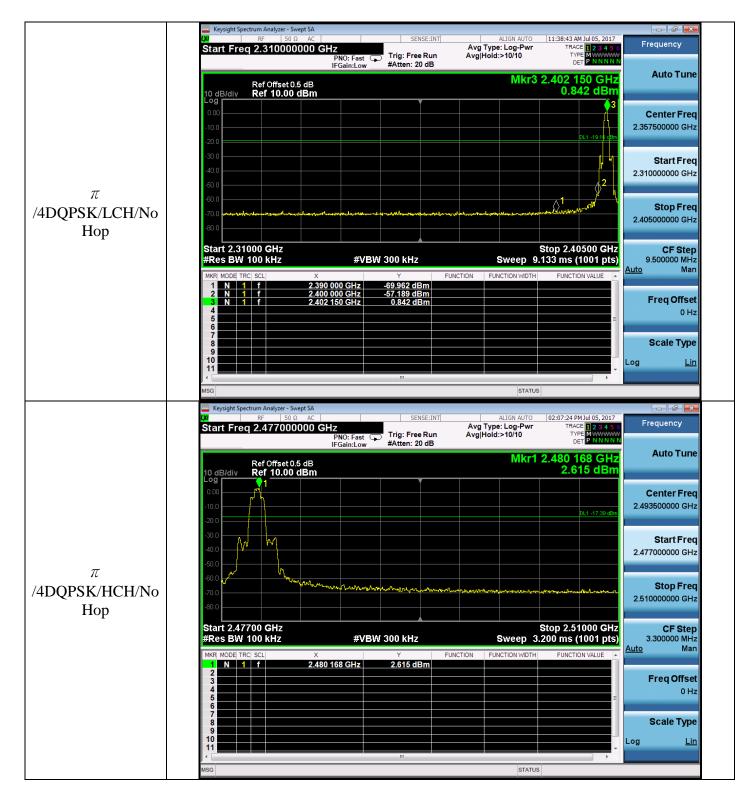
Test Graph



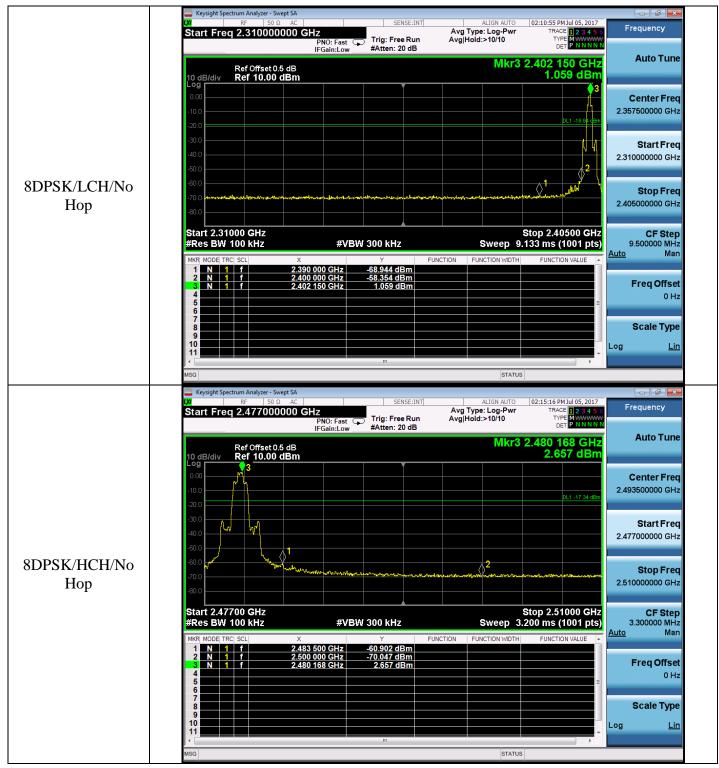
Report No.: AGC04845170601FE03 Page 34 of 46



Report No.: AGC04845170601FE03 Page 35 of 46



Report No.: AGC04845170601FE03 Page 36 of 46



Note: All modes were tested, only the worst case record in the report.

12. NUMBER OF HOPPING FREQUENCY

12.1. MEASUREMENT PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz
- 4. Set the Spectrum Analyzer as RBW>=1%span, VBW>=RBW.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

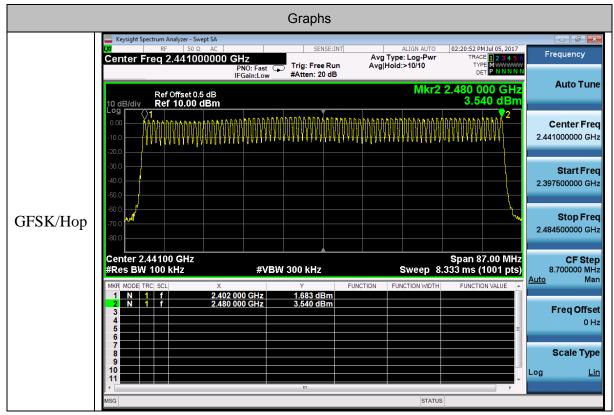
The same as described in section 6

12.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Нор	79	PASS

Note: All modes were tested, only the worst case record in the report.

Test Graph



13. TIME OF OCCUPANCY (DWELL TIME)

13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.

2. RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

4. Detector function: Peak. Trace: Max hold.

5. Use the marker-delta function to determine the transmit time per hop.

6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

13.4. LIMITS AND MEASUREMENT RESULT

Channel.	Burst Width [ms/hop/ch]	Dwell Time[ms]	Verdict	Limit (ms)
LCH	3.085	329.067078	PASS	400
MCH	3.085	329.067078	PASS	400
HCH	3.085	329.067078	PASS	400

Note: The DH5 for GFSK modulation is the worst case and recorded in the report.

The dwell time is calculated with the following formula:

Dwell time = t_{pulse} x n_{hops} / number of channels x 31.6 s

Where:

t_{pulse} is the measured pulse time (pls. refer the plots of the spectrum analyser above) [s], n_{hops} is the number of hops per second in the actual operating mode of the transmitter [1/s].

The hopping rate of the system is 1600 hops per second and the system uses 79 channels. For this reason one time slot has a length of 625 $\mu s.$

With the used hopping mode (DH5) a packet need 5 timeslots for transmitting and the next timeslot for receiving. So the system makes in worst case 266,67 hops per second in transmit mode (n_{hops} = 266.667 1/s)

GFSK-LCH GFSK-MCH enter Freq 2.402000000 GH Marker 1 & 3.08500 m Frequency rig: Free Run 20 dB Trig: Free Ru Auto Tu Free R Ref Offset 0.5 dB Ref 10.00 dBm Ref Offset 0.5 dB Ref 10.00 dBm Center Fre Vid X X2 240 NF En Lin Stop Fre External 1 2.40 CF Ste External 2 Ma - ANG Freq Offs RF Burs Scale Typ Mor LH Span 0 Hz 5.000 ms (1001 pts) 2.44100 1.0 M 000 GH2 Span 0 H ep 5.000 ms (1001 pt #VBW 30 #VBW 3.0 MH

GFS	SK-HCH	
English Spectrum Analyser- Direct SA English Spectrum Analyser- Direct SA English Spectrum Analyser- Direct SA Proci-Fasa	Aug Type: Log-Pwr TRACE D2101 Fro	Frequency
Ref Offset 0.5 dB dB/div Ref 10.00 dBm	ΔMkr1 3.085 ms -0.57 dB	Auto Tune
d X2		Center Freq 248000000 GHz
л		Start Freq 2.48000000 GHz
n 		Stop Freq 2.48000000 GHz
0	Auto 1.	CF Step 1.00000 MHz 120 Mmm
wardymicity wards	dalater the deliving with	Freq Offset 0Hz
D.		Scale Type
enter 2.480000000 GHz es BW 1.0 MHz #VBW 3.0 MHz	Span 0 Hz Sweep 5.000 ms (1001 pts)	g Lin
	STATUS	

Test Graph

14. FREQUENCY SEPARATION

14.1. MEASUREMENT PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode
- 2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
- Set Span = wide enough to capture the peaks of two adjacent channels Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span Video (or Average) Bandwidth (VBW) ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold

14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

14.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

14.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
GFSK	Нор	1.002	PASS

Note: All modes were tested, only the worst case record in the report.

Test Graph



15. FCC LINE CONDUCTED EMISSION TEST

15.1. LIMITS OF LINE CONDUCTED EMISSION TEST

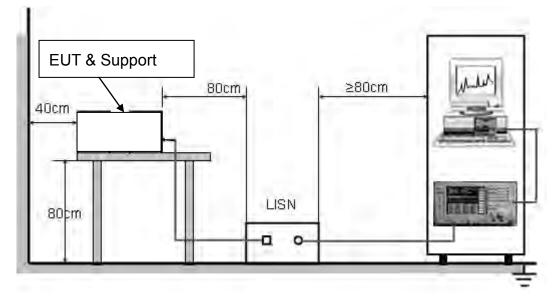
Frequency	Maximum RF Line Voltage							
Frequency	Q.P.(dBuV)	Average(dBuV)						
150kHz~500kHz	66-56	56-46						
500kHz~5MHz	56	46						
5MHz~30MHz	60	50						

Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

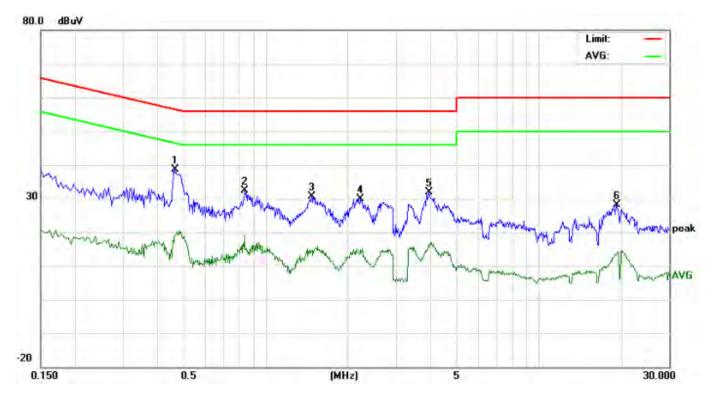
- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC charging voltage by adapter which received 120V/60Hzpower by a LISN..
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

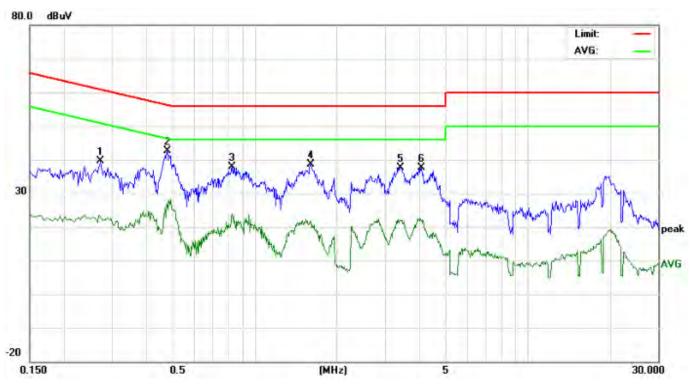
- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST



Line Conducted Emission Test Line 1-L

No. Freq. (MHz)	Reading_Level (dBuV)			Correct Factor				Limit (dBuV)		Margin (dB)		P/F	Comment	
	(MHZ)	Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4661	28.36		8.62	10.38	38.74		19.00	56.58	46.58	-17.84	-27.58	Р	
2	0.8419	22.14		6.03	10.33	32.47		16.36	56.00	46.00	-23.53	-29.64	Р	
3	1.4738	20.17		4.21	10.38	30.55		14.59	56.00	46.00	-25.45	-31.41	Р	
4	2.2299	19.63		4.68	10.32	29.95		15.00	56.00	46.00	-26.05	-31.00	Р	
5	3.9780	21.48		4.95	10.43	31.91		15.38	56.00	46.00	-24.09	-30.62	Р	
6	19.2299	18.07		3.51	10.12	28.19		13.63	60.00	50.00	-31.81	-36.37	Р	



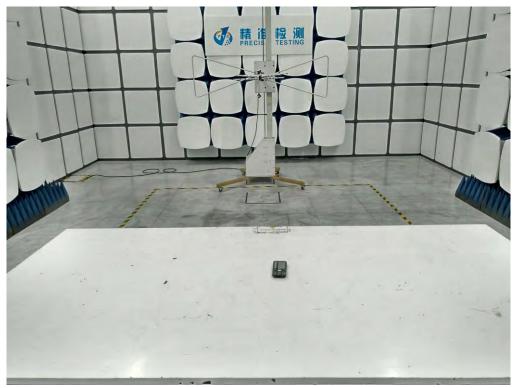
Line Conducted Emission Test Line 2-N

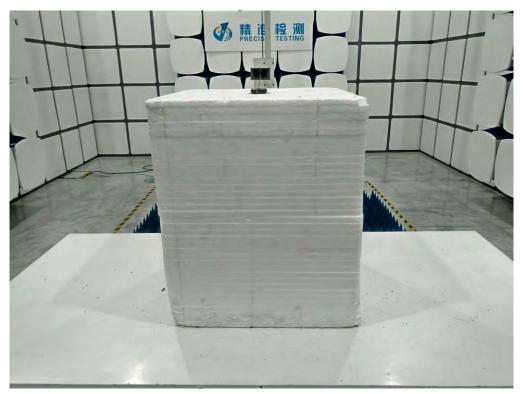
No. Freq. (MHz)	Reading_Level (dBuV)			Correct Factor				Limit (dBuV)		Margin (dB)		P/F	Comment	
	Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG			
1	0.2740	29.27		12.52	10.28	39.55		22.80	60.99	50.99	-21.44	-28.19	Р	
2	0.4786	32.30		16.27	10.39	42.69		26.66	56.36	46.36	-13.67	-19.70	Р	
3	0.8298	27.66		13.50	10.32	37.98		23.82	56.00	46.00	-18.02	-22.18	Р	
4	1.6060	28.20		11.45	10.35	38.55		21.80	56.00	46.00	-17.45	-24.20	Р	
5	3.4300	27.21		11.25	10.52	37.73		21.77	56.00	46.00	-18.27	-24.23	Р	
6	4.0899	27.12		11.50	10.39	37.51		21.89	56.00	46.00	-18.49	-24.11	Р	

APPENDIX A: PHOTOGRAPHS OF TEST SETUP FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP





----END OF REPORT----