

Page 1 of 66

FCC Test Report

Report No.: AGC09881200801FE03

FCC ID	: XPYNINAW106
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: NINA-W1
BRAND NAME	: u-blox
MODEL NAME	: NINA-W106, NINA-W136, NINA-W156, NINA-B226
APPLICANT	: u-blox AG
DATE OF ISSUE	: Sep. 09, 2020
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	© /	Sep. 09, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	u-blox AG
Address	Zuercherstrasse 68, Ch-8800 Thalwil, Switzerland
Manufacturer	u-blox AG
Address	Zuercherstrasse 68, Ch-8800 Thalwil, Switzerland
Product Designation	NINA-W1
Brand Name	u-blox
Test Model	NINA-W106
Series Model	NINA-W136, NINA-W156, NINA-B226
Difference description	All the series model is same as the test model except for Software support of radion technology. The model NINA-W106 and NINA-W156 support Wi-Fi, Bluetooth and BLE;The model NINA-W136 support Wi-Fi;The model NINA-B226 support Bluetooth and BLE
Date of test	Aug. 27, 2020 to Sep. 07, 2020
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) 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 PART 15.247.

sky dong Prepared By Sky Dong Sep. 07, 2020 (Project Engineer) Max Zhang **Reviewed By** Max Zhang Sep. 09, 2020 (Reviewer) fore Approved By Forrest Lei Sep. 09, 2020 (Authorized Officer)

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "NINA-W1". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480 GHz
RF Output Power	15.279dBm (Max)
Bluetooth Version	V 4.2
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	4.0
Software Version	3.0
Antenna Designation	Integral Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	3dBi
Power Supply	DC 3.3V

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2403 MHz
0		
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
	77	2479 MHz
	78	2480 MHz

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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 multi slot 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 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 behavior action with other units only offset is 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 bits 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 the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

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

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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: XPYNINAW106** filing to comply with the FCC PART 15.247 requirements.

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.

2.10. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard

uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: $Uc = \pm 2\%$
- Uncertainty of Frequency: $Uc = \pm 2\%$

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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	Hopping mode GFSK
11	Hopping mode π/4-DQPSK
12	Hopping mode 8DPSK

Note:

1. 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.

3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

4. The test software is the SecureCRTPortable V7.0.4.537 which can set the EUT into the individual test modes.

The test command are as follows:

fcc_bt_tx 7 [Hopping: 0=off, 1=on] [Channel: 0-78] [Bitrate: 1-

3][Packet size: DH1=1, DH3=3, DH5=5] 2 0

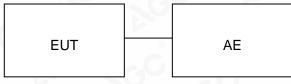
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:

	EUT		AE
--	-----	--	----

5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	NINA-W1	NINA-W106	XPYNINAW106	EUT
2	Adapter	TY0500100E1MN	N/A	AE
3	Charger line	G258	N/A	AE
4	control board	EPS-35-3.3	DC 3.3V	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(1)	Peak Output Power	Compliant
15.247 (a)(1)	20 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.209	Radiated Emission	Compliant
15.247 (a)(1)(iii)	Number of Hopping Frequency	Compliant
15.247 (a)(1)(iii)	Time of Occupancy	Compliant
15.247 (a)(1)	Frequency Separation	Compliant
15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd	
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China	
Designation Number	CN1259	
FCC Test Firm Registration Number	975832	
A2LA Cert. No.	5054.02	
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA	

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	Cal. Date	Cal. Due	
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2022
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due		
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021		
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020		
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022		
Attenuator	ZHINAN	E-002	N/A	Sep. 09, 2019	Sep. 08, 2021		
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021		
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022		
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021		
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020		
ANTENNA	SCHWARZBECK	VULB9168 494		Jan. 09, 2019	Jan. 08, 2021		
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A		

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7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

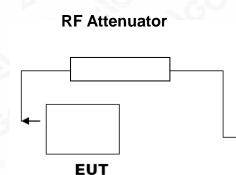
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW \geq RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

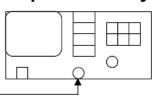
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION										
2.402	8.317	21	Pass							
2.441	10.995	21	Pass							
2.480	13.106	21	Pass							

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π/4-DQPSK MODULATION										
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail							
2.402	10.418	21	Pass							
2.441	12.966	21	Pass							
2.480	15.279	21	Pass							

Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Cent 402000000 GHz Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Low Auto Tune Mkr1 2.402 170 GHz 10.418 dBm 10 dB/div Ref 20.00 dBm 1 **Center Freq** 2.402000000 GHz Start Freq 2.399500000 GHz Stop Freq 2.404500000 GHz CF Step 500.000 kHz Man <u>Auto</u> Freq Offset 0 Hz Scale Type Center 2.402000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) Log Lin #VBW 5.0 MHz

CH0

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CH39 ALIGN AUTO Avg Type: Log-Pwr Avg|Hold: 100/100 02,2020 Frequency Center Freq 2.441000000 GHz Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Low Auto Tune Mkr1 2.441 125 GHz 12.966 dBm Ref 20.00 dBm 0 dB/div ▲1 **Center Freq** 2.441000000 GHz Start Freq 2.438500000 GHz Stop Freq 2.443500000 GHz CF Step 500.000 kHz <u>Auto</u> Man Freq Offset 0 Hz Scale Type Span 5.000 MHz Sweep 1.000 ms (1001 pts) Center 2.441000 GHz #Res BW 1.5 MHz Lin #VBW 5.0 MHz STATUS

CH78

Keysight Spectrum Analyzer - Swept SA					- F
RL RF 50 Ω AC Center Freq 2.480000000	CORREC GHz	SENSE:INT	ALIGN AUTO	02:49:56 PM Sep 02, 2020 TRACE 1 2 3 4 5 6	Frequency
0 dB/div Ref 20.00 dBm	PNO: Fast ↔ IFGain:Low	→ Trig: Free Run Atten: 30 dB	Avg Hold: 100/100	2.480 180 GHz 15.279 dBm	Auto Tui
og 10.0		↓↓ 1			Center Fr 2.480000000 G
0.0					Start Fr 2.477500000 G
D.0					Stop Fr 2.482500000 G
					CF Si 500.000
					Freq Off 0
enter 2.480000 GHz Res BW 1.5 MHz	#\/B\	↓ 5.0 MHz	Swoon 1	Span 5.000 MHz	Scale Ty
	#VBW		Sweep 1	.000 ms (1001 pts)	

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION									
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail						
2.402	10.798	21	Pass						
2.441	13.392	21	Pass						
2.480	13.075	21	Pass						



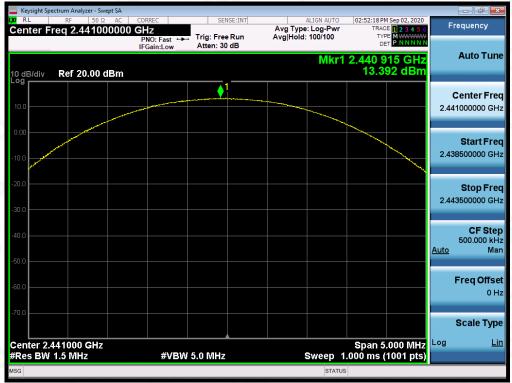
CH0

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CH39



CH78

🧧 Keysight Spectrum Analyzer - Swept SA					
XIRL RF 50Ω AC Center Freq 2.48000000		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:24:44 PM Sep 02, 2020 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dB m	PNO: Fast	Trig: Free Run Atten: 30 dB	AvgiHold: 100/100 Mkr1	2.480 095 GHz 13.075 dBm	Auto Tune
10.0					Center Freq 2.480000000 GHz
-10.0					Start Freq 2.477500000 GHz
-20.0					Stop Fred 2.482500000 GHz
-40.0					CF Step 500.000 kH <u>Auto</u> Mar
-60.0					Freq Offset 0 Hz
-70.0 Center 2.480000 GHz				Shop 5 000 MHz	Scale Type
#Res BW 1.5 MHz	#VBW :	5.0 MHz		.000 ms (1001 pts)	
MSG			STATUS		

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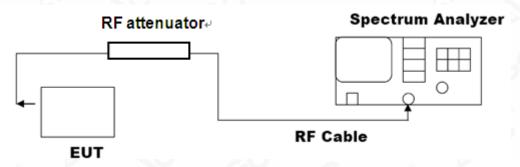


8. 20DB BANDWIDTH

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 5 times the 20 dB bandwidth, centered on a hoping channel The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

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



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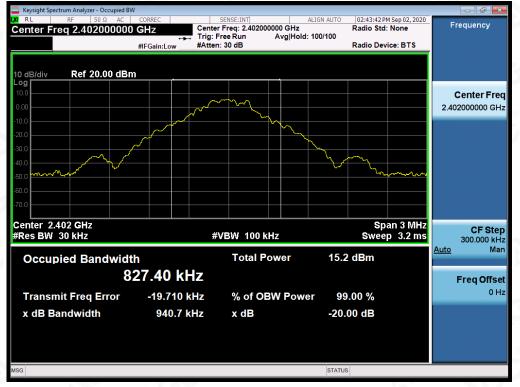
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8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION										
Appliachte Limite		Measurement Resu	lt							
Applicable Limits	Test Da	Criteria								
	Low Channel	0.941	PASS							
N/A	Middle Channel	0.942	PASS							
	High Channel	0.937	PASS							



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

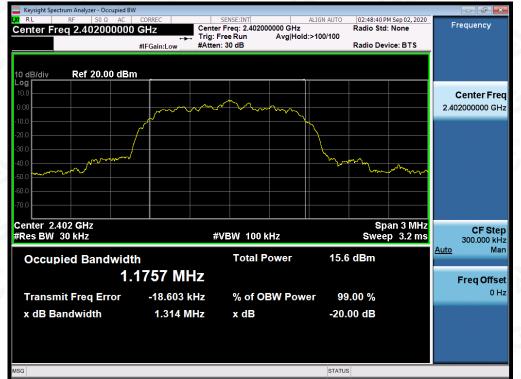


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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION										
Applicable Limits		Measurement Result								
	Test Data	Test Data (MHz)								
	Low Channel	1.314	PASS							
N/A	Middle Channel	1.293	PASS							
	High Channel	1.312	PASS							

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR 8-DPSK MODULATION										
Applicable Limita		Measurement Result								
Applicable Limits	Test Data	Test Data (MHz) Crit								
	Low Channel	1.311	PASS							
N/A	Middle Channel	1.309	PASS							
	High Channel	1.311	PASS							

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

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

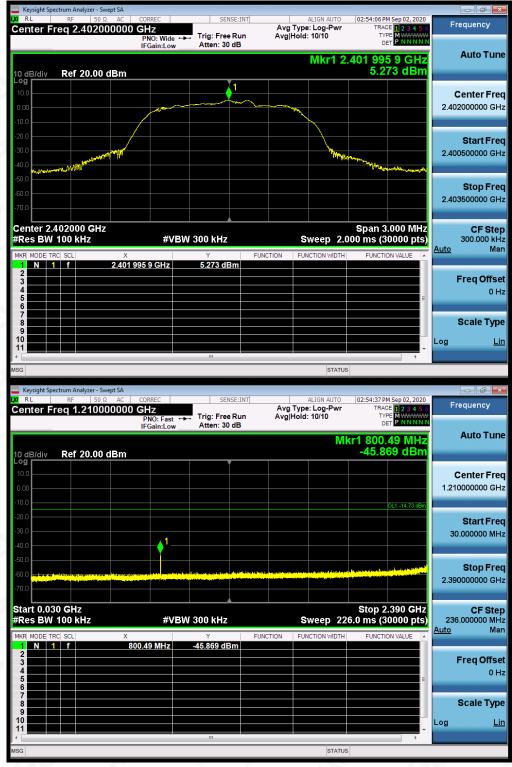
9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEA	SUREMENT RESULT					
Annlinghta Limita	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS				
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				

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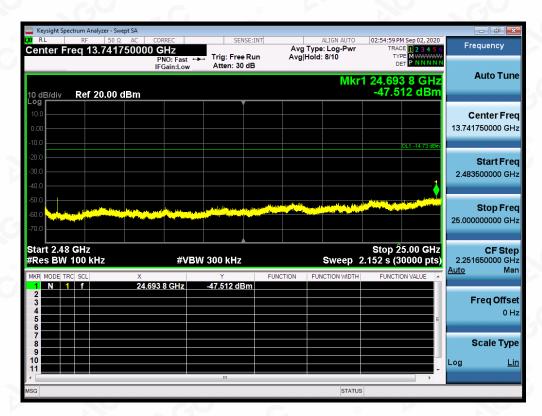
TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL



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Report No.: AGC09881200801FE03 Page 29 of 66





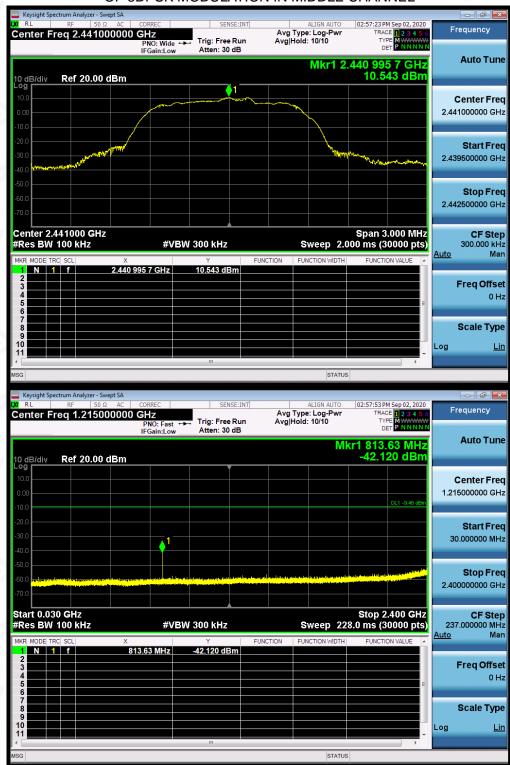
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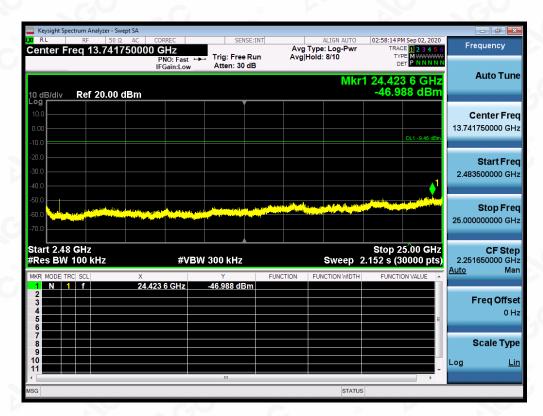


TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL

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Report No.: AGC09881200801FE03 Page 31 of 66





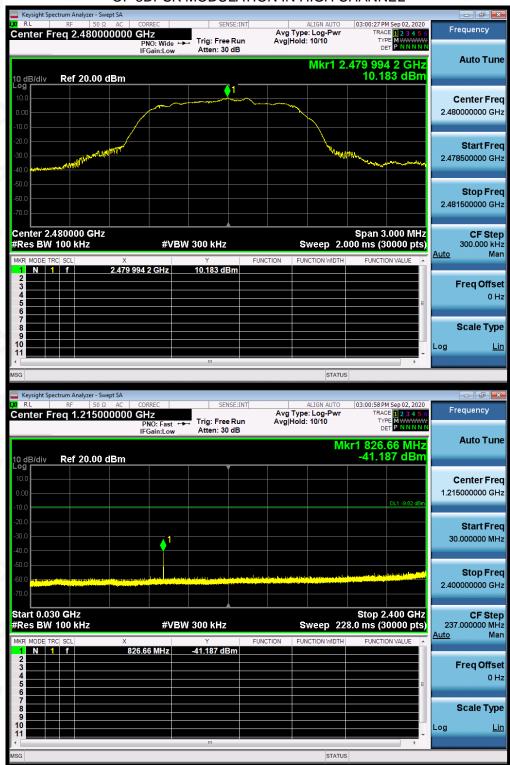
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Pesting/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuer of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc~cert.com.

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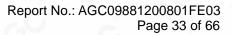
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN HIGH CHANNEL

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— К	eysight Sp	ectrum	Analy	zer - Sw	ept SA																5 ×
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						PN	IO: Fas Sain:Lo	st 🔸	Trig: Fre Atten: 3			Avg l	Hold:		-4.0	D		NN		Auto	Tune
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Note: The 8DPSK modulation is the worst case and only those data recorded in the report.

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02:43:59 PM Sep 02, 2020 ALIGN AUTO Frequency 00 GHz PNO: Fast IFGain:Low Avg Type: Log-Pw Avg|Hold: 100/100 RACE Center Frea Trig: Free Run Atten: 30 dB Auto Tune Ref 20.00 dBm Center Freq 2.398500000 GHz Start Freq 2.39000000 GHz Stop Freq 2.407000000 GHz Start 2.390000 GHz #Res BW 100 kHz Stop 2.407000 GHz Sweep 1.667 ms (1001 pts) CF Step #VBW 300 kHz 1.700000 MHz Man Auto FUNCTION FUN 2.402 002 GHz 2.400 000 GHz 8.213 dBm -39.736 dBm Freq Offset 0 Hz Scale Type Log Lin

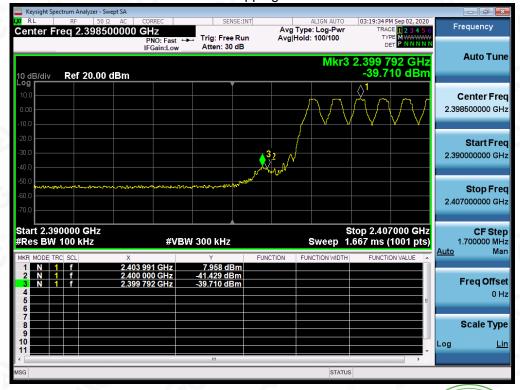
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

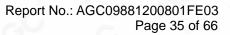
Hopping off

Hopping on

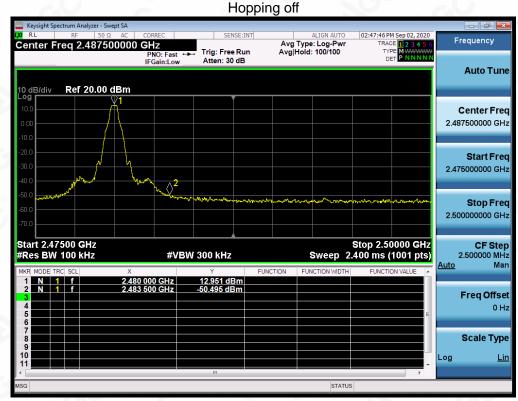
STATUS



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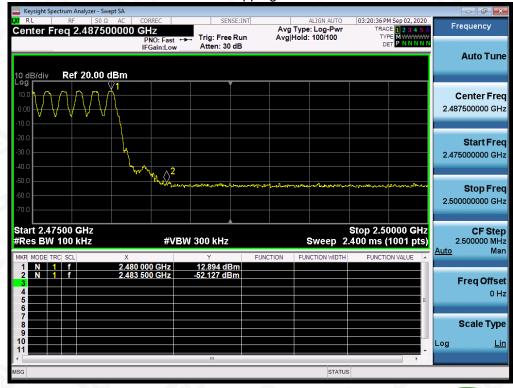






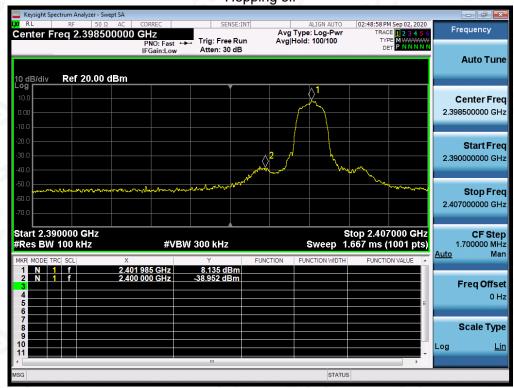
GFSK MODULATION IN HIGH CHANNEL

Hopping on



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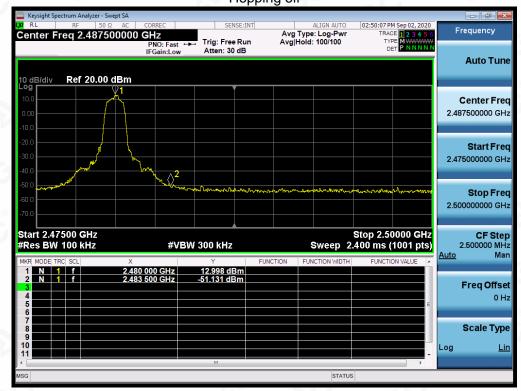
π /4-DQPSK MODULATION IN LOW CHANNEL Hopping off

Hopping on



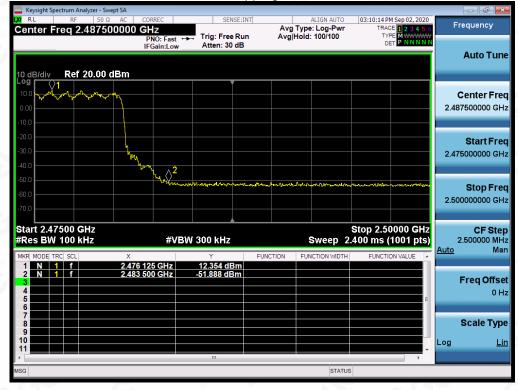
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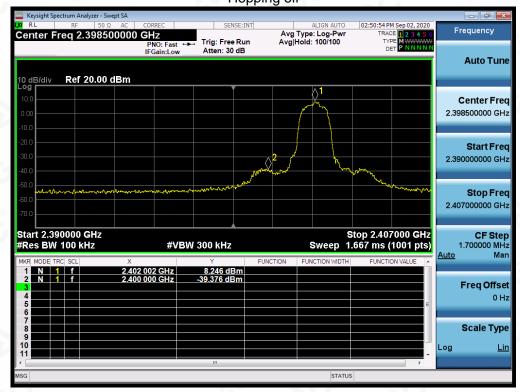
π /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



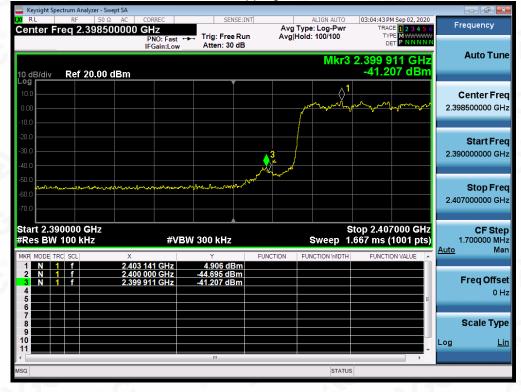
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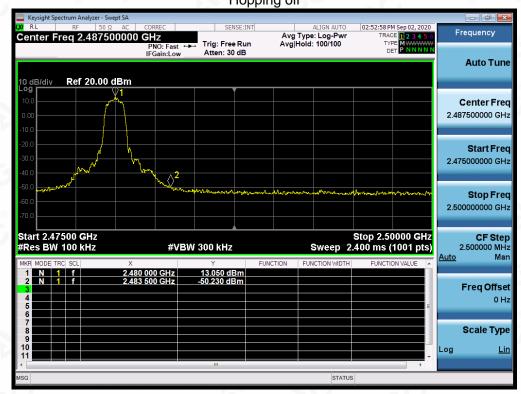
8-DPSK MODULATION IN LOW CHANNEL Hopping off

Hopping on



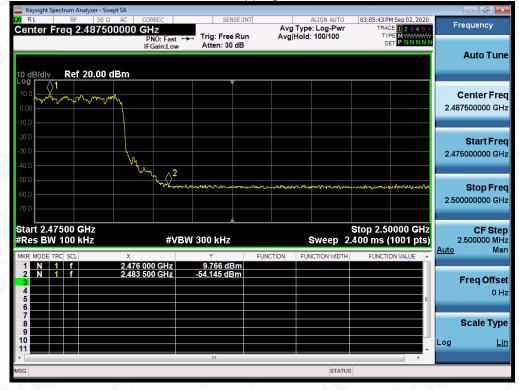
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8-DPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



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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 emission, 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 RBW and 3MHz VBW for peak reading. 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.

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