

FCC Test Report

Report No.: AGC09477231004FR01

FCC ID	:	2AMZY-CHRG4
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Harmony3
BRAND NAME	:	Origaudio
MODEL NAME	:	Z01-S
APPLICANT	:	HandStandsPromo LLC
DATE OF ISSUE	:	Dec. 08, 2023
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0
DATE OF ISSUE STANDARD(S)	:	Dec. 08, 2023 FCC Part 15 Subpart C §15.247







Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes	
V1.0	/	Dec. 08, 2023	Valid	Initial Release	



Table of Contents

1. General Information	5
2. Product Information	6
2.1 Product Technical Description	6
2.2 Test Frequency List	6
2.3 Related Submittal(S) / Grant (S)	7
2.4 Test Methodology	7
2.5 Receiver Input Bandwidth	7
2.6 Equally Average Use of Frequencies And Behaviour	7
2.7 Pseudorandom Frequency Hopping Sequence	
2.8 Special Accessories	9
2.9 Equipment Modifications	9
2.10 Antenna Requirement	9
3. Test Environment	
3.1 Address of The Test Laboratory	
3.2 Test Facility	
3.3 Environmental Conditions	11
3.4 Measurement Uncertainty	11
3.5 List of Equipment Used	
4.System Test Configuration	
4.1 EUT Configuration	14
4.2 EUT Exercise	
4.3 Configuration of Tested System	14
4.4 Equipment Used in Tested System	14
4.5 Summary of Test Results	
5. Description of Test Modes	
6. RF Output Power Measurement	
6.1 Provisions Applicable	
6.2 Measurement Procedure	
6.3 Measurement Setup (Block Diagram of Configuration)	
6.4 Measurement Result	
7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement	
7.1 Provisions Applicable	
7.2 Measurement Procedure	
7.3 Measurement Setup (Block Diagram of Configuration)	
7.4 Measurement Results	
8. Conducted Band Edge and Out-of-Band Emissions	
8.1 Provisions Applicable	
8.2 Measurement Procedure	
8.3 Measurement Setup (Block Diagram of Configuration)	



9. Radiated Spurious Emission	
9.1 Measurement Limit	
9.2 Measurement Procedure	
9.3 Measurement Setup (Block Diagram of Configuration)	
9.4 Measurement Result	
10. Number of Hopping Frequency Measurement	65
10.1 Provisions Applicable	
10.2 Measurement Procedure	65
10.3 Measurement Setup (Block Diagram of Configuration)	
10.4 Measurement Result	
11. Time of Occupancy (Dwell Time) Measurement	67
11.1 Provisions Applicable	
11.2 Measurement Procedure	67
11.3 Measurement Setup (Block Diagram of Configuration)	67
11.4 Measurement Result	67
12. Frequency Separation Measurement	71
12.1 Provisions Applicable	71
12.2 Measurement Procedure	71
12.3 Measurement Setup (Block Diagram of Configuration)	71
12.4 Measurement Result	71
13. AC Power Line Conducted Emission Test	73
13.1 Measurement Limit	73
13.2 Measurement Setup (Block Diagram of Configuration)	73
13.3 Preliminary Procedure of Line Conducted Emission Test	
13.4 Final Procedure of Line Conducted Emission Test	74
13.5 Measurement Results	74
Appendix I: Photographs of Test Setup	77
Appendix II: Photographs of Test EUT	77



1. General Information

Applicant	HandStandsPromo LLC
Address	1770 South 5350 West Suite 100, Salt Lake City, Utah 84104, United States
Manufacturer	Xinvo
Address	Room 408, Building A, Getailong Industrial Park, BanTian Street, LongGang Dist, Shenzhen, China
Factory	N/A
Address	N/A
Product Designation	Harmony3
Brand Name	Origaudio
Test Model	Z01-S
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Oct. 16, 2023
Date of Test	Oct.16, 2023 to Dec. 08, 2023
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-BR_EDR-V1

Note: The test results of this report relate only to the tested sample identified in this report.

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2. Product Information

2.1 Product Technical Description

Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2402MHz-2480MHz
Bluetooth Version	V5.1
Modulation Type	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK
Number of channels	79 Channels
Channel Separation	1 MHz
Maximum Transmitter Power	-0.622dBm
Hardware Version	1.0
Software Version	1.0
Antenna Designation	PCB Antenna
Antenna Gain	-0.68dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter or DC 5V by charging base
Adapter Information	N/A

2.2 Test Frequency List

Frequency Band	Channel Number	Frequency		
	0	2402 MHz		
	1	2403 MHz		
	:	:		
2400~2483.5MHz	39	2441MHz		
	:	:		
	77	2479 MHz		
	78	2480 MHz		
Note: f = 2402 + 1k MHz, k = 0,, 78 ; "f "is the operating frequency (MHz); "k" is the operating channel.				



2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2AMZY-CHRG4**, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.4 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title	
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations	
2	2 FCC 47 CFR Part 15 Radio Frequency Devices		
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices	
4	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules	

2.5 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.

2.6 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:

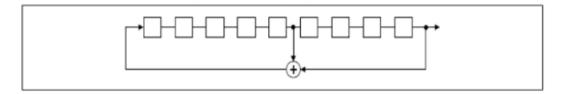
The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth 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.



2.7 Pseudorandom Frequency Hopping Sequence

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

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



Linear Feedback Shift Register for Generation of The PRBS Sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

44	35	78	03	20	76	02	19		21	64	75
						1]			\square
			i						1		
			1			1			i		
			. !	<u>`</u>		<u>'i</u>		1			

Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



2.8 Special Accessories

Not available for this EUT intended for grant.

2.9 Equipment Modifications

Not available for this EUT intended for grant.

2.10 Antenna Requirement

Standard Requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

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

EUT Antenna:

The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is -0.68dBi.



3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

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

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.



3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 3.7V

3.4 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%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$



3.5 List of Equipment Used

RF Conducted Test System								
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
\boxtimes	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-06-01	2024-05-31	
\boxtimes	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2023-03-03	2024-03-02	
\boxtimes	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2023-03-03	2024-03-02	
\boxtimes	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08	
\boxtimes	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A	
	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A	

Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2023-02-18	2024-02-17
\boxtimes	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2023-06-03	2024-06-02
\boxtimes	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31
\boxtimes	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11
\boxtimes	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
\boxtimes	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22
\boxtimes	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
\boxtimes	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
\boxtimes	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2023-06-01	2024-05-31
\square	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08

• A	AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
\boxtimes	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2023-06-03	2024-06-02	
\boxtimes	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2023-06-03	2024-06-02	
\square	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2024-06-08	



• Te	Test Software							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information			
	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71			
\boxtimes	AGC-EM-S003	RE-Test System	FARA	EZ-EMC	VRA-03A			
	AGC-ER-S012	BT/WIFI-Test System	Tonscend	JS1120-2	2.6			
\square	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0			



4.System Test Configuration

4.1 EUT Configuration

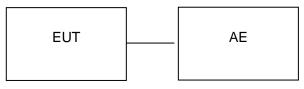
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System

Radiated Emission Configure:



Conducted Emission Configure:

EUT	AE
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4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement: Test Accessories Come From The Laboratory

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	Phone	Xiaomi	MI 10		
2	Notebook Adapter	HUAWEI	HW-200325CP0		
3	Control Box		USB-TTL		

Test Accessories Come From The Manufacturer

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1					



4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(1)	RF Output Power	Pass
3	§15.247 (a)(1)	20 dB Bandwidth	Pass
4	§15.247 (d)	Conducted Band Edge and Out-of-Band Emissions	Pass
5	§15.209	Radiated Spurious Emission	Pass
6	§15.247 (a)(1)(iii)	Number of Hopping Frequency	Pass
7	§15.247 (a)(1)(iii)	Time of Occupancy	Pass
8	§15.247 (a)(1)	Frequency Separation	Pass
9	§15.207	AC Power Line Conducted Emission	Pass



5. Description of Test Modes

	Summary table of Test Cases				
	Data Rate / Modulation				
Test Item	Bluetooth – BR_EDR (GFSK/π /4-DQPSK/8DPSK)				
Radiated & Conducted Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps (Battery powered or AC/DC adapter or charging base) Mode 2: Bluetooth Tx CH39_2441 MHz_1Mbps (Battery powered or AC/DC adapter or charging base) Mode 3: Bluetooth Tx CH78_2480 MHz_1Mbps (Battery powered or AC/DC adapter or charging base) Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps (Battery powered or AC/DC adapter or charging base) Mode 5: Bluetooth Tx CH39_2441 MHz_2Mbps (Battery powered or AC/DC adapter or charging base) Mode 6: Bluetooth Tx CH78_2480 MHz_2Mbps (Battery powered or AC/DC adapter or charging base) Mode 6: Bluetooth Tx CH78_2480 MHz_2Mbps (Battery powered or AC/DC adapter or charging base) Mode 7: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered or AC/DC adapter or charging base) Mode 8: Bluetooth Tx CH39_2441 MHz_3Mbps (Battery powered or AC/DC adapter or charging base) Mode 9: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered or AC/DC adapter or charging base) Mode 9: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered or AC/DC adapter or charging base) Mode 10: Bluetooth Tx Hopping-1Mbps (Battery powered or AC/DC adapter or charging base) Mode11: Bluetooth Tx Hopping-2Mbps (Battery powered or AC/DC adapter or charging base)				
	Mode12: Bluetooth Tx Hopping-3Mbps (Battery powered or AC/DC adapter or charging base)				
AC Conducted Emission	Mode 13: Bluetooth Link + Battery + USB Cable (Charging from AC Adapter) Mode 14: Bluetooth Link + Battery + USB Cable (Charging from charging base)				
Note: 1. Only the result of the worst case was recorded in the report, if no other cases. 2. The battery is full-charged during the test. 3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.					

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

Software Setting Diagram

Report No.: AGC09477231004FR01 Page 17 of 77





6. RF Output Power Measurement

6.1 Provisions Applicable

The maximum out power permissible output power is 1 Watt for all frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels.

The maximum out power permissible output power is 0.125 watts for all other frequency hopping systems in the 2400-2483.5 MHz band.

6.2 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.

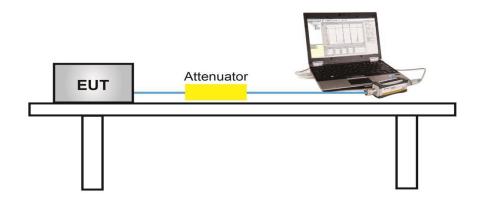
8.Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

\boxtimes For Average power test:

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required

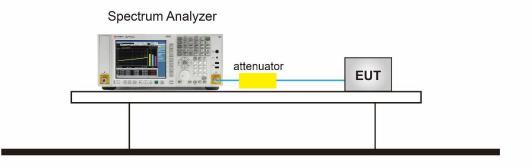
6.3 Measurement Setup (Block Diagram of Configuration)

 \boxtimes For Average power test setup





\boxtimes For peak power test setup



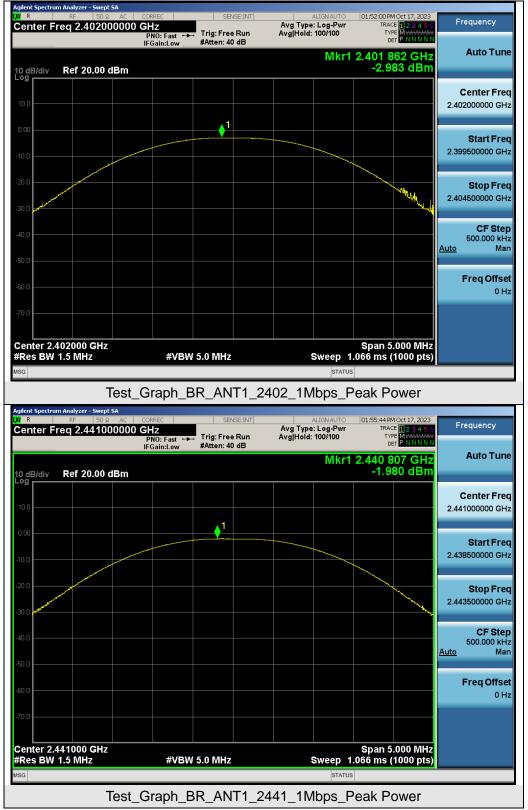
6.4 Measurement Result

Test Data of Conducted Output Power						
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail		
	2402	-2.983	≤21	Pass		
GFSK	2441	-1.980	≤21	Pass		
	2480	-1.890	≤21	Pass		
	2402	-2.086	≤21	Pass		
π /4-DQPSK	2441	-1.091	≤21	Pass		
	2480	-0.955	≤21	Pass		
	2402	-1.729	≤21	Pass		
8DPSK	2441	-0.762	≤21	Pass		
	2480	-0.622	≤21	Pass		

Test Result of Average Output Power (Reporting Only)

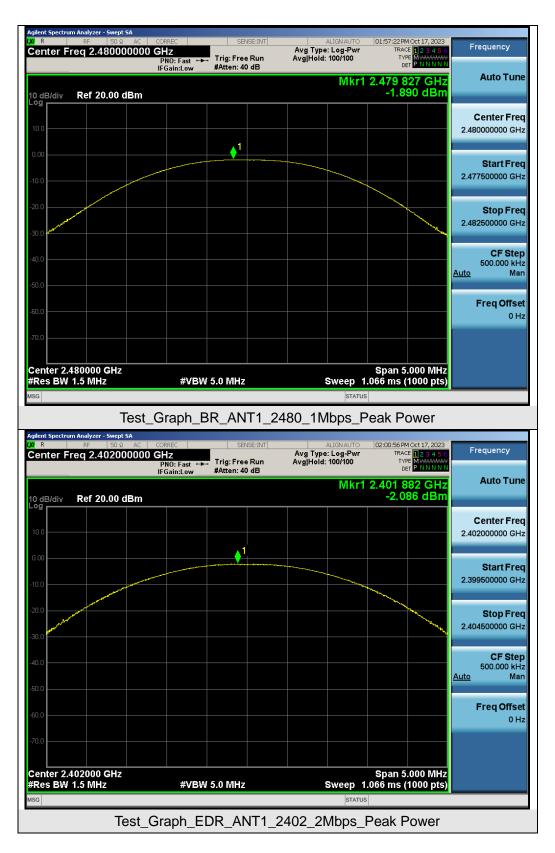
Test Data of Conducted Output Power						
Test Mode	Test Frequency (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail		
	2402	-4.412	≤21	Pass		
GFSK	2441	-3.758	≤21	Pass		
	2480	-3.326	≤21	Pass		
	2402	-4.519	≤21	Pass		
π /4-DQPSK	2441	-3.415	≤21	Pass		
	2480	-2.684	≤21	Pass		
	2402	-3.231	≤21	Pass		
8DPSK	2441	-2.764	≤21	Pass		
	2480	-2.180	≤21	Pass		



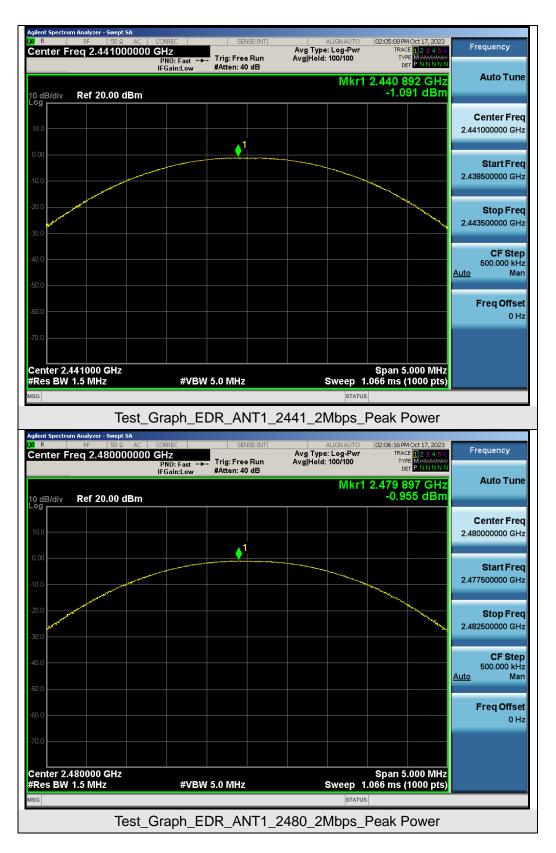


Test Graphs of Conducted Output Power

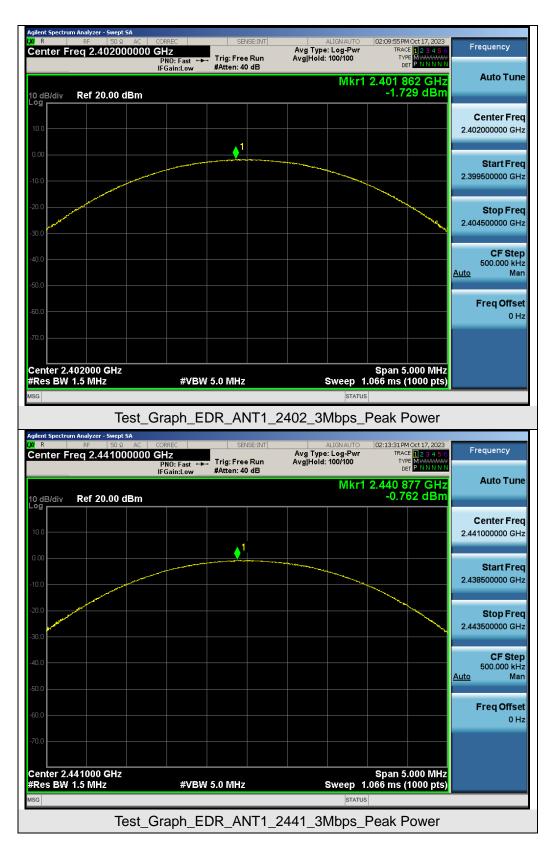




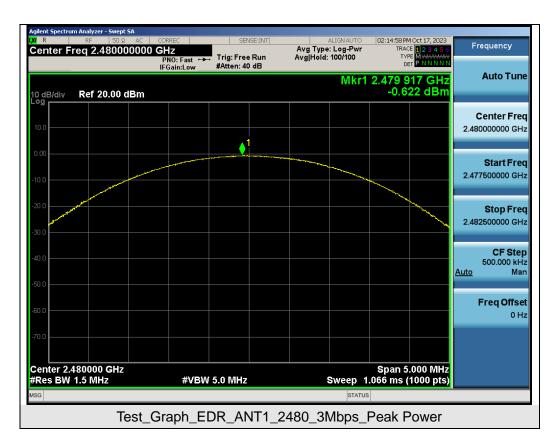














7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement

7.1 Provisions Applicable

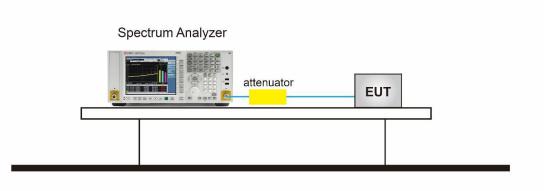
There is no corresponding limit requirement for this test item.

7.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 6.9.2 (20dB BW).

- The 20dB bandwidth spectrum analyzer setting reference is as follows:
- 1. Set RBW ≥ 1% to 5% of the 20dB bandwidth
- 2. VBW = Approximately three times RBW
- 3. Span = Approximately 2 to 5 times the 20dB bandwidth, centered on a hopping channel
- 4. Detector = Peak
- 5. Trace mode = Max hold
- 6. Sweep = Auto couple
- 7. Allow the trace to stabilize
- 8. Measure the maximum width of the emission that is constrained by the frequencies associated
- 9. with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20
- 10. dB relative to the maximum level in the fundamental emission.
- The 99% bandwidth spectrum analyzer setting reference is as follows:
- 1. Span = 1.5 times to 5 times the OBW
- 2. Set RBW = 1% to 5% the OBW
- 3. VBW \geq 3 × RBW
- 4. Detector = Peak
- 5. Trace mode = Max hold
- 6. Sweep = Auto couple
- 7. Allow the trace was allowed to stabilize

7.3 Measurement Setup (Block Diagram of Configuration)

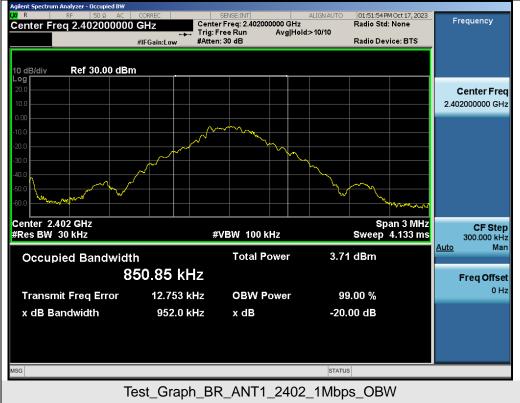




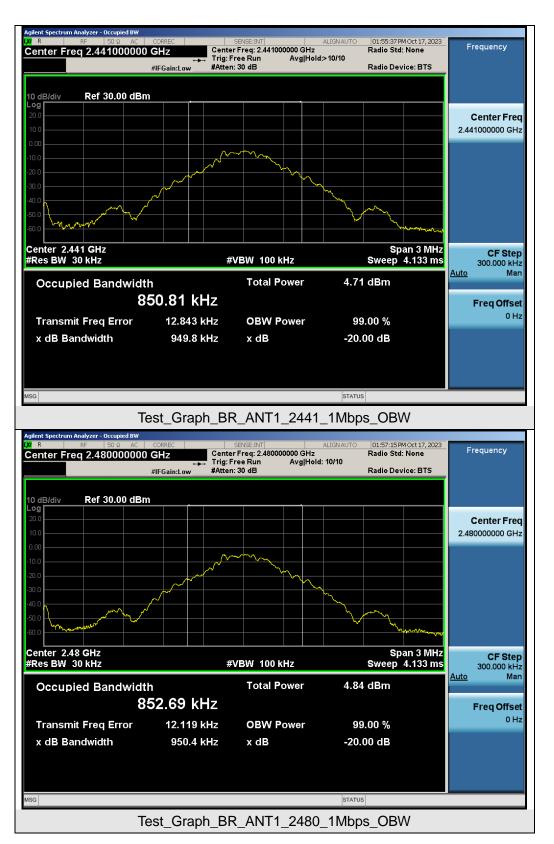
7.4 Measurement Results

Test Data of Occupied Bandwidth and -20dB Bandwidth						
Test Mode	Test Frequency (MHz)	99% Occupied Bandwidth (MHz)	-20dB Bandwidth (MHz)	Limits	Pass or Fail	
	2402	0.851	0.952	N/A	Pass	
GFSK	2441	0.851	0.950	N/A	Pass	
	2480	0.853	0.950	N/A	Pass	
	2402	1.169	1.279	N/A	Pass	
π /4-DQPSK	2441	1.170	1.280	N/A	Pass	
	2480	1.168	1.281	N/A	Pass	
	2402	1.177	1.294	N/A	Pass	
8DPSK	2441	1.176	1.294	N/A	Pass	
	2480	1.180	1.294	N/A	Pass	

Test Graphs of Occupied Bandwidth and -20 Bandwidth





















8. Conducted Band Edge and Out-of-Band Emissions

8.1 Provisions Applicable

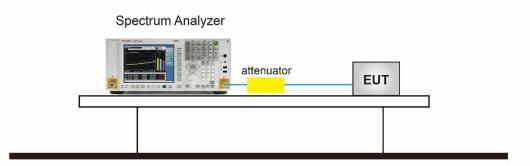
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

8.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 6.10.4 and 7.8.8:

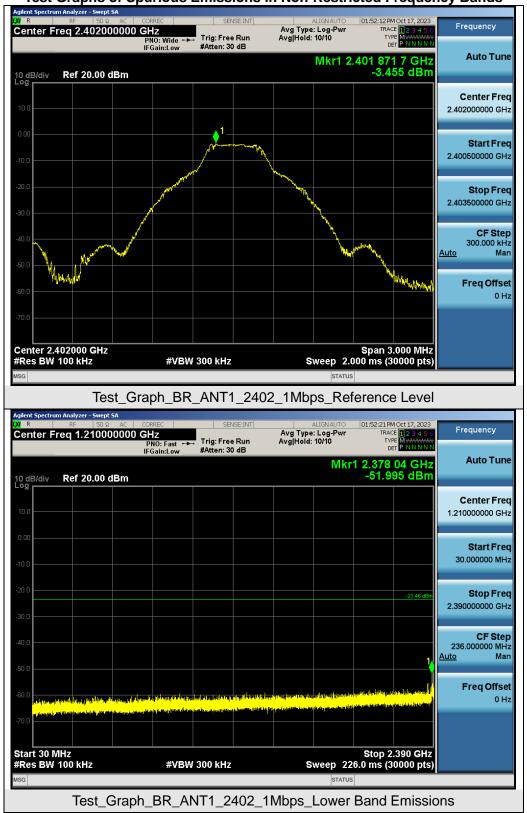
- Reference level measurement
- 1. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
- 2. RBW = 100kHz
- 3. VBW = 300kHz
- 4. Detector = Peak
- 5. Sweep time = Auto couple
- 6. Trace mode = Max hold
- 7. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.
- Emission level measurement
- 1. Span = Wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
- 2. RBW = 100kHz
- 3. VBW = 300kHz
- 4. Detector = Peak
- 5. Sweep time = Auto couple
- 6. Trace mode = Max hold
- 7. Trace was allowed to stabilize
- 8. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

8.3 Measurement Setup (Block Diagram of Configuration)



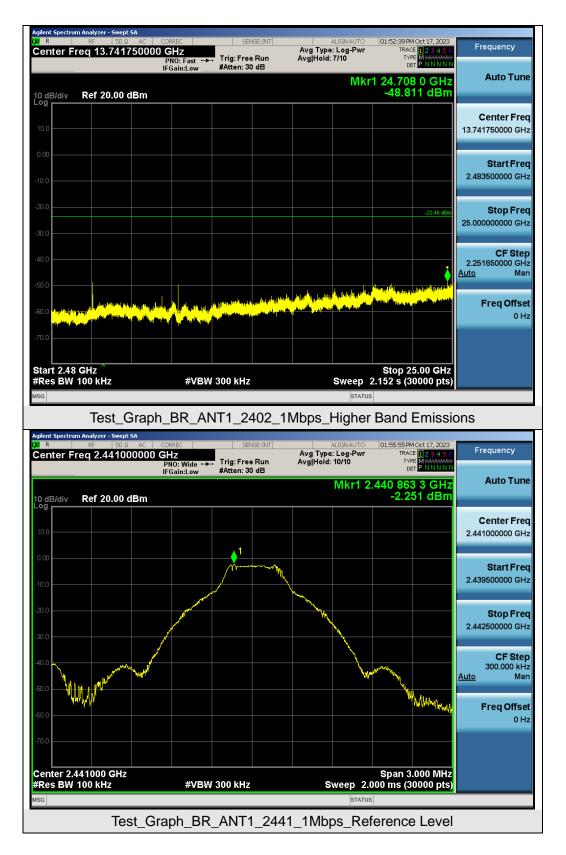


8.4 Measurement Results

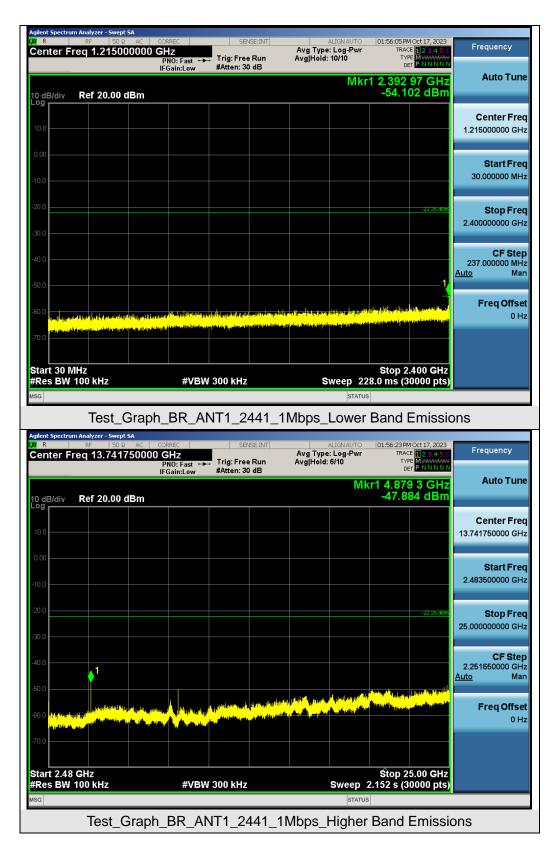


Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

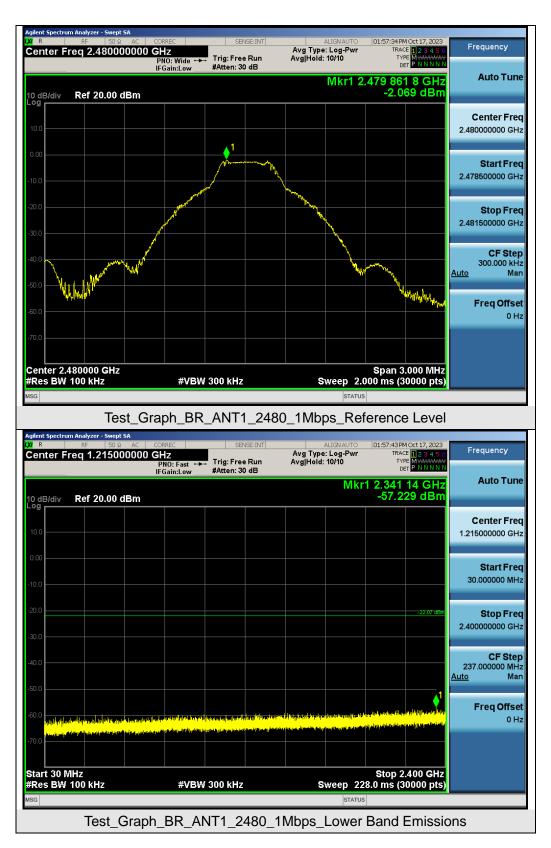




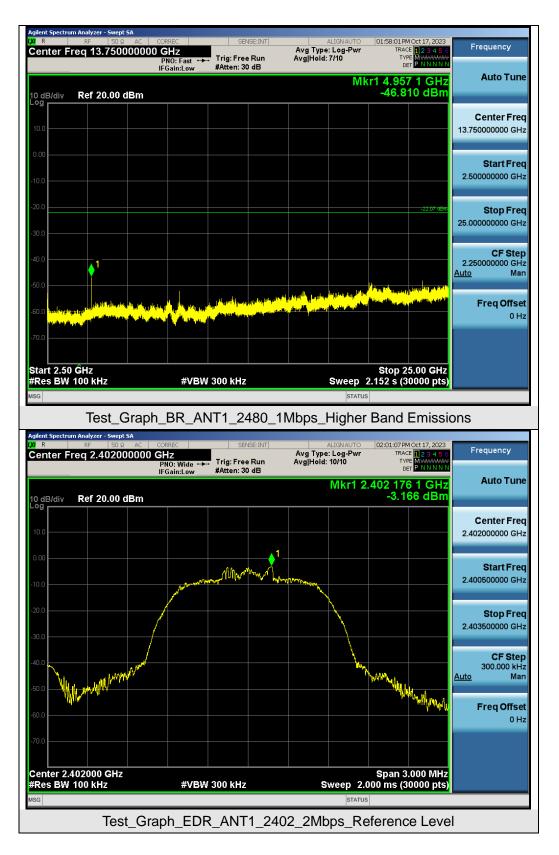




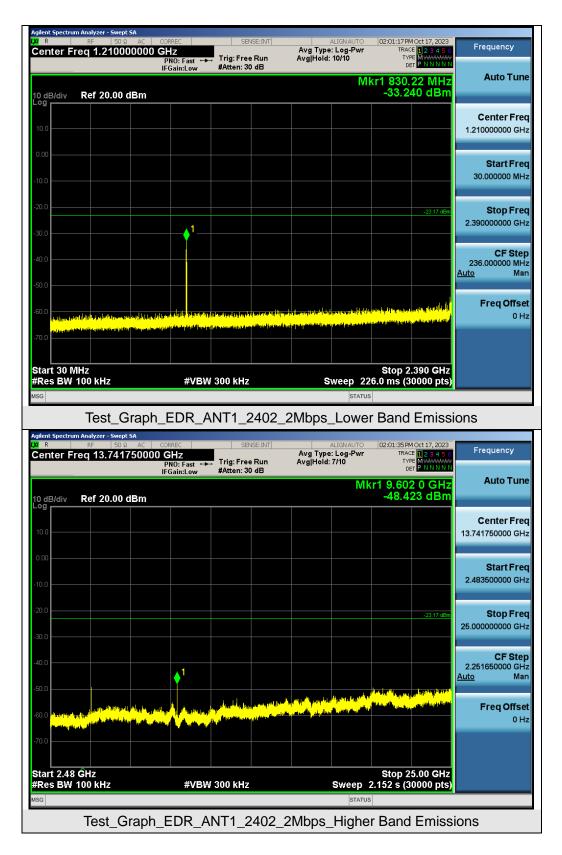








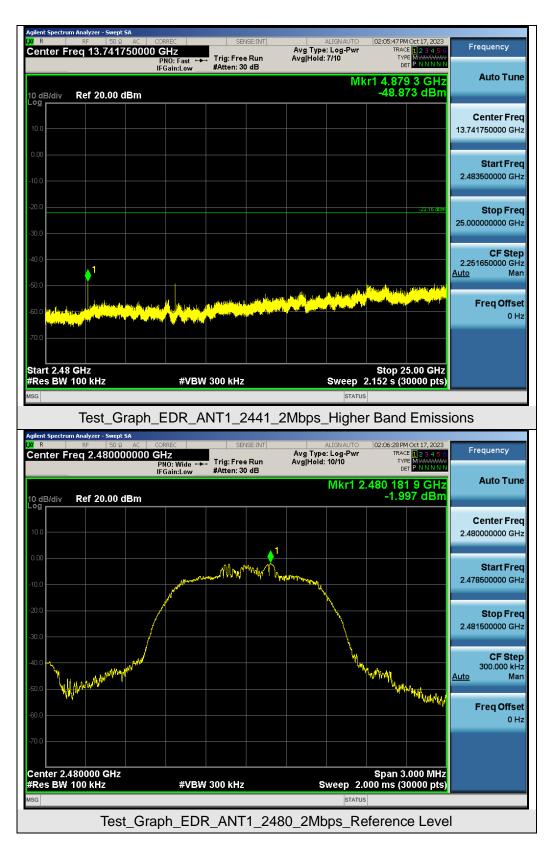




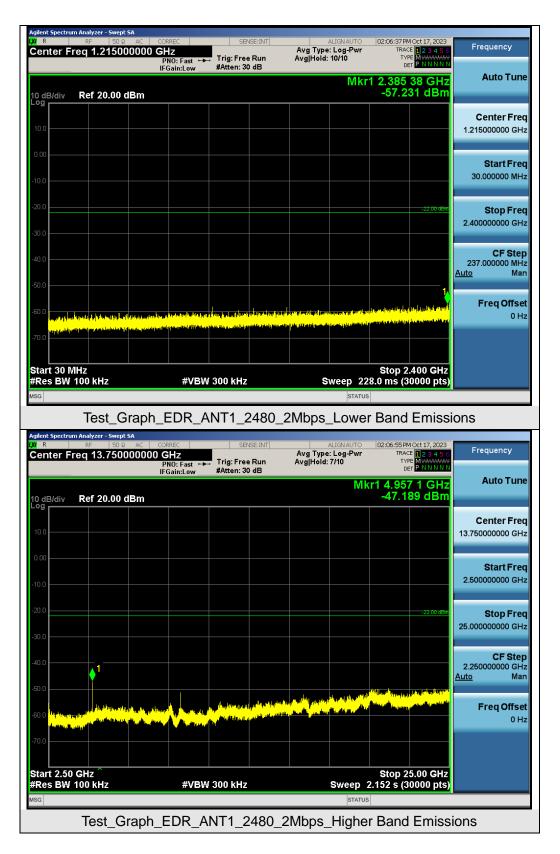








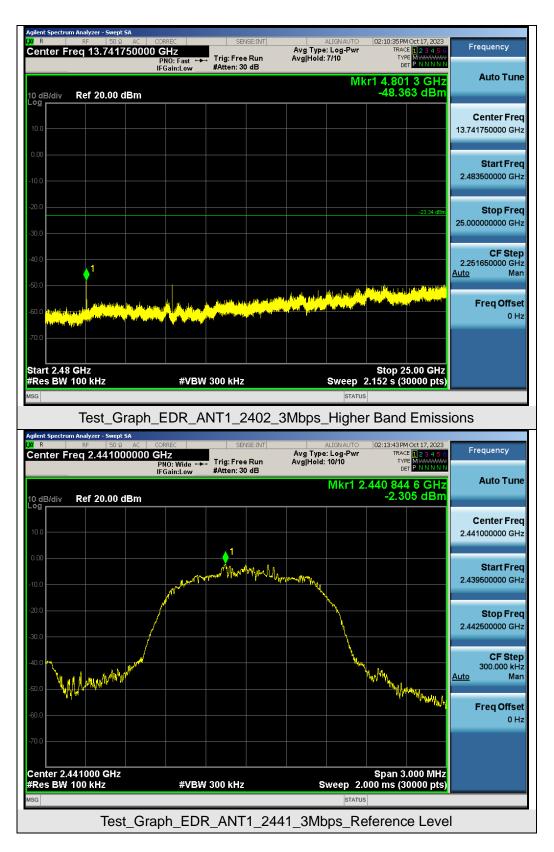




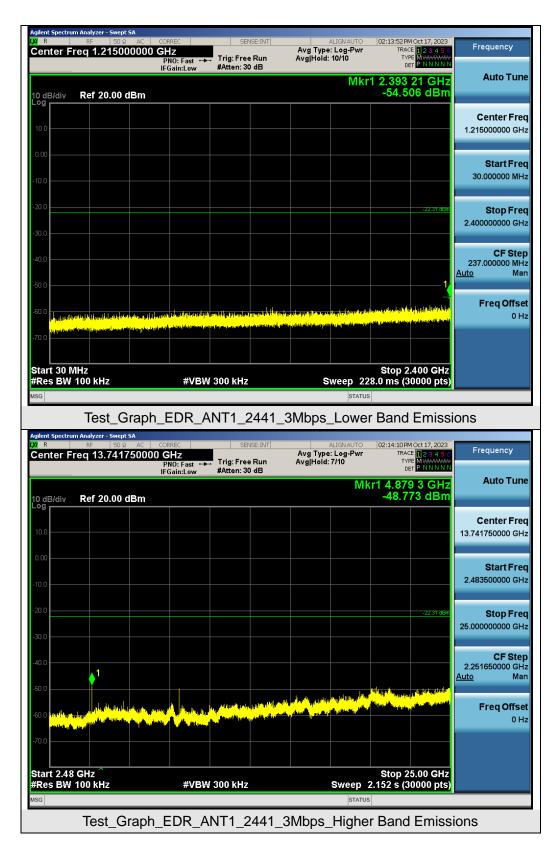




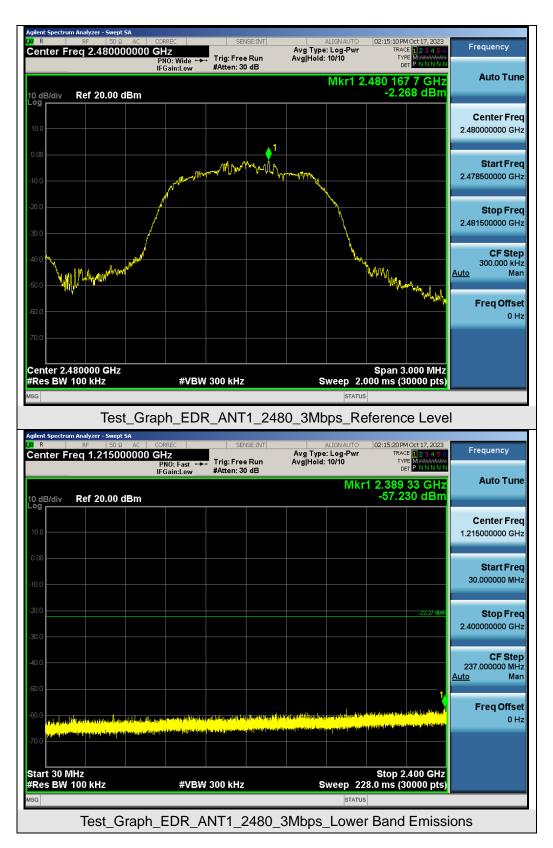




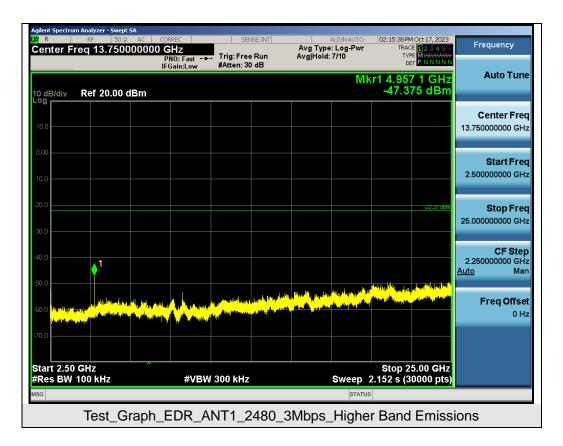


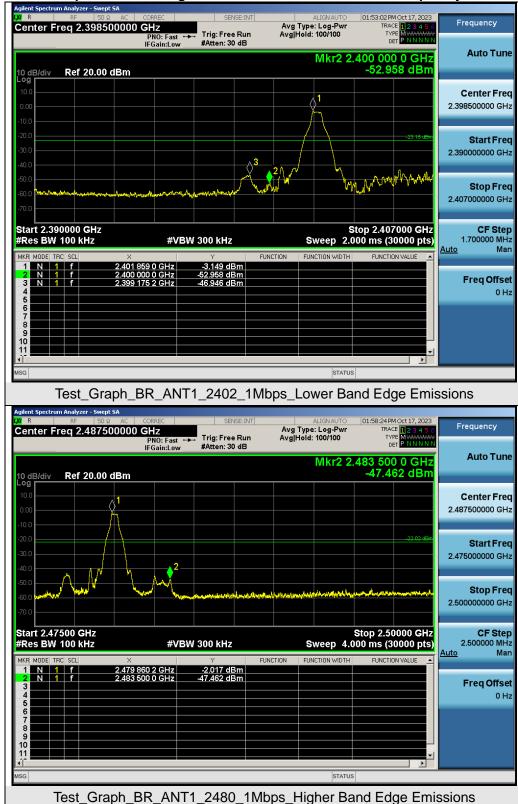






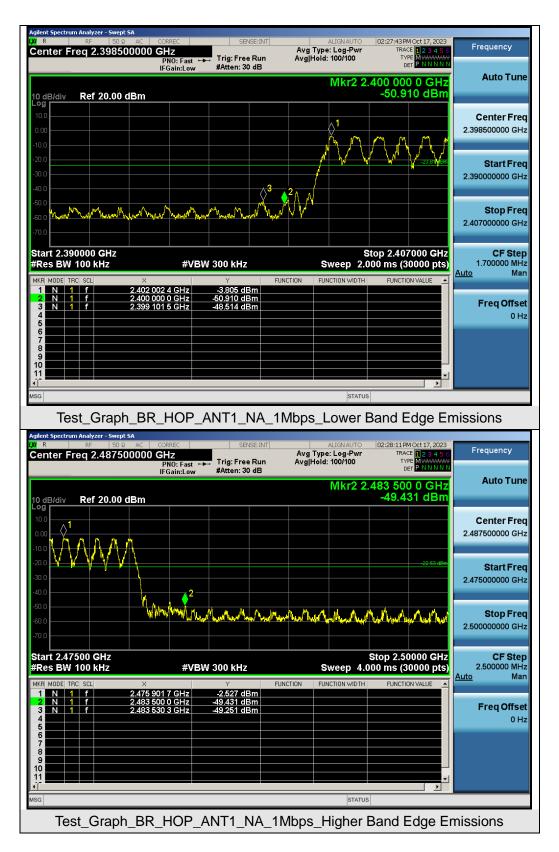




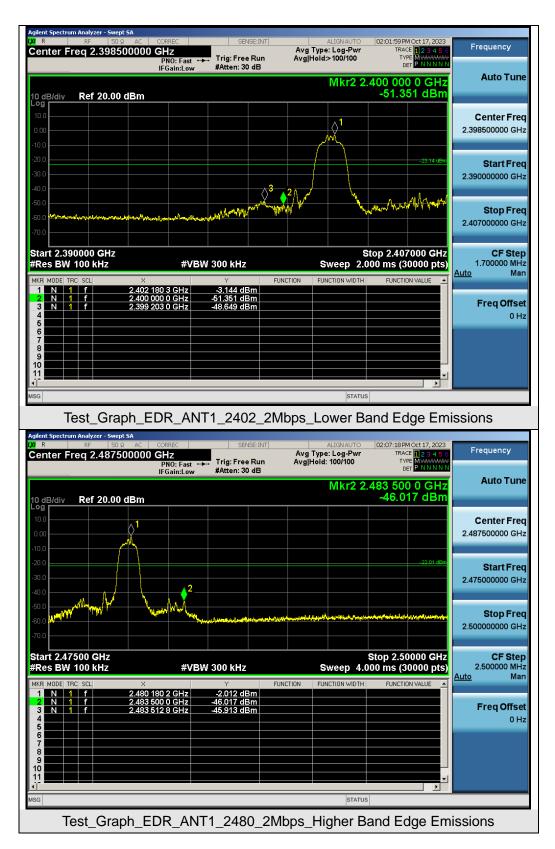


Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

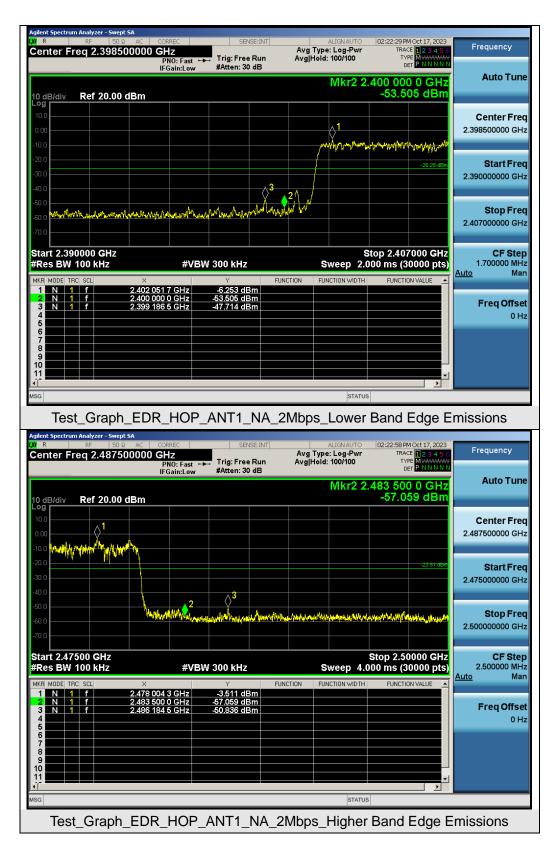




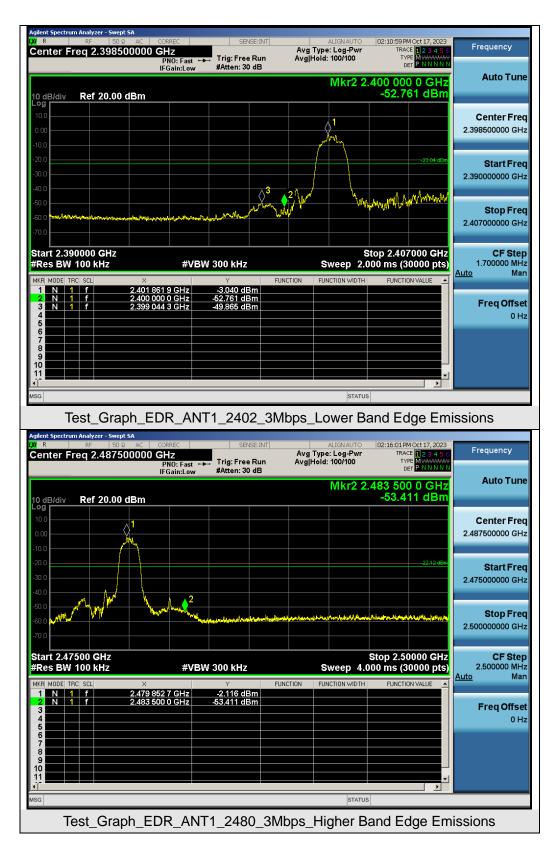




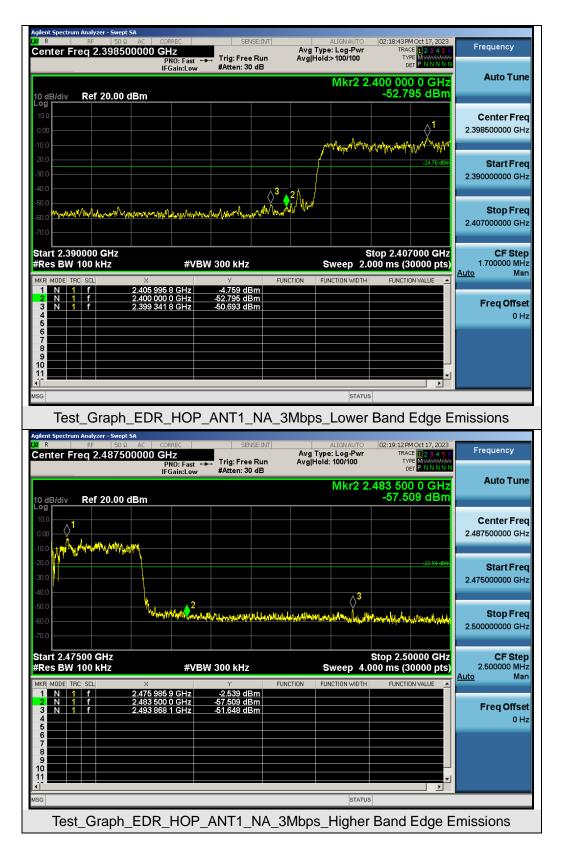














9. Radiated Spurious Emission

9.1 Measurement Limit

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

9.2 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 Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection"

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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.

Spectrum Parameter	Setting				
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP				
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP				
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP				
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average				

The following table is the setting of spectrum analyzer and receiver.

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP



• Quasi-Peak Measurements below 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. Span was set greater than 1MHz
- 3. RBW = as shown in the table above
- 4. Detector = CISPR quasi-peak
- 5. Sweep time = auto couple
- 6. Trace was allowed to stabilize

Peak Measurements above 1GHz

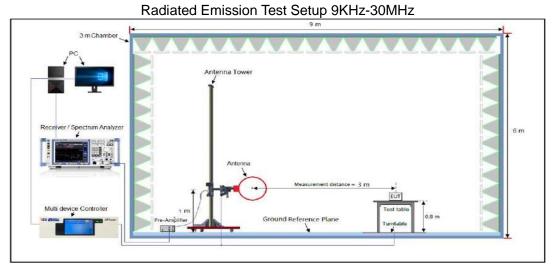
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

• Average Measurements above 1GHz (Method VB)

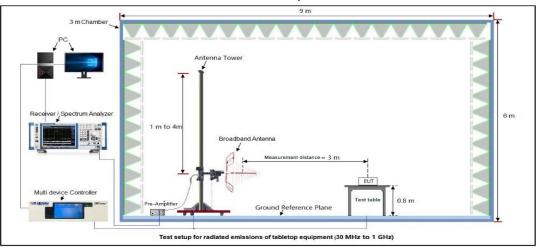
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW setting requirements are as follows:
- 4. If the EUT is configured to transmit with duty cycle \ge 98%, set VBW = 10 Hz.
- 5. If the EUT duty cycle is < 98%, set VBW \ge 1/T. T is the minimum transmission duration.
- 6. Detector = Peak
- 7. Sweep time = auto
- 8. Trace mode = max hold
- 8. Trace was allowed to stabilize



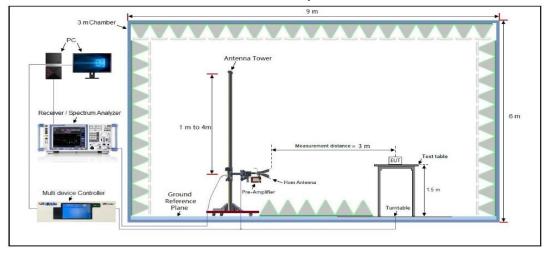
9.3 Measurement Setup (Block Diagram of Configuration)



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz



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 Attestation of Global Compliance(Shenzhen)Co., Ltd

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 E-mail: agc@agccert.com



9.4 Measurement Result

Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

			Ra	uia	ted Emi	551011	1 1631 163	sults at	30111	HZ-1GH	٦Z				
EUT Name	Harmony3					Мс	Model Name			ZO	Z01-S				
Temperature	23.8℃					Re	Relative Humidity 67			61	.5%	, D			
Pressure	960hl	Pa						Те	st Vol	tage		DC	C 5	5V	
Test Mode	Mode	9						An	ntenna	a Polar	ity	Ho	orizo	ontal	
72.0 d	lBuV/m														
												Limit Marg		_	
32									2XX	a start		multi and	- Jungh		 *
-8 30.000) 4 0	50	60	70 ×		historial di docas	(MHz)	nut thing A	300	400	500	600 7	00	1000	
-8) 40	50	60	70	Read	ing	(MHz) Correct		sure-			0ver	00	1000	
-8		50		70 :	80	ing el	(MHz)	Mea: me dBu	sure- ent		it			1000	
-8 30.000) 40	50 k.	60 Free	70 2q.	® Read Leve	ing el	(MHz) Correct Factor	me	sure- ent V/m	Lim	it n	Over	D		tor
-8 30.000) 40 No. M	50 k. 96	60 Fre MH	70 eq. lz 62	BO Read Leve	ing el v	(MHz) Correct Factor dB	me dBu\	sure- ent V/m 27	Limi dB/r	it n D ·	Over dB	D	etect	tor k
-8 30.000	0 40 No. M	50 k. 90 300	60 Fre MH 6.43	70 eq. lz 62 72	Read Leve dBu	ing el v 2 7	(MHz) Correct Factor dB 15.65	me dBu\ 27.2	sure- ent V/m 27 17	Limi dB/r 43.50	it n D ·	Over dB -16.23	D	etect peal	tor k k
-8 30.000	0 40 No. M 1 2	50 k. 90 300 435	б0 Fre MH 6.43 0.36	70 eq. lz 62 72 98	Bead Leve dBu 11.6	ing el 2 7	(MHz) Correct Factor dB 15.65 16.50	me dBu\ 27.1 33.	sure- ent 27 17 06	Limi dB/r 43.50 46.00	it n D · D ·	Over dB -16.23 -12.83		etect peal peal	tor k k
-8 30.000	No. M	50 k. 30(43(524	60 Fre MH 6.43 0.36 5.58	⁷⁰ eq. lz 62 72 98 41	BO Read Leve dBu 11.6 16.6 8.9	ing 2 2 7 1 0	(MHz) Correct Factor dB 15.65 16.50 24.15	me dBu\ 27.2 33. 33.	sure- ent 27 17 06 30	Limi dB/r 43.50 46.00 46.00	it D	Over dB -16.23 -12.83 -12.94		etect peal peal peal	tor k k k



				Radia	tea Em	115510	in restine	suits	at SUIVI	Hz-1GH	2		
EUT Name	Hai	rmor	ny3					ſ	Nodel I	Name		Z01	-S
Temperature	23.	23.8℃						F	Relativ	e Humid	lity	61.5	5%
Pressure	960	960hPa						-	Fest Vo	ltage		DC 5V	
Test Mode	Мо	de 9)					1	Antenn	a Polari	ty	Vert	tical
72.0) dBuV/	m											
32		2							×	- Anti Anti Anti		Limit: Margin:	
	"Nyroom"	////\	madnind	Lornophum	www.wells	haywoodale	contraction of the	When we will be	Marth	www.dayaht			
-8 30 —	.000	40	50	60 70	90 Read	ling	(MHz) Correct	Me	300 asure-	400	500 E	600 700	
	•	40	50 F		80	ling	(MHz)	Me	300		500 0	500 700 Ver	
		40	50 F	60 70 req. 1Hz	B0 Read Leve	ling el	(MHz) Correct Factor	Me m dB	300 asure- ient	400 Limit	500 G	600 700 Ver) 1000.0
	No.	40 Mk.	50 F M	60 70 req. 1Hz 053	BO Read Leve	ling el ∨ 79	(MH₂) Correct Factor dB	Me m dB 33	300 asure- ient uV/m	400 Limit dB/m	500 C O d -6.	600 700 Ver B	Detector
	No.	40 Mk.	50 F M 30.1	60 70 req. 1Hz 053 7129	BO Read Leve dBu 19.7	ling el V 79	(MH₂) Correct Factor dB 13.63	Me m dB 33	300 asure- nent uV/m 3.42	400 Limit dB/m 40.00	500 G O d -6. -8.	500 700 ver 58 .67	Detector peak
	No.	40 Mk.	50 F 30.1 41.7	60 70 req. 1Hz 053 7129 8672	BO Read Leve dBu 19.7 14.4 14.8	ling el V 79	(MH₂) Correct Factor dB 13.63 16.92	Me m dB 33 31 33	300 asure- nent uV/m 3.42 1.33	400 Limit dB/m 40.00 40.00	500 G OV d -6. -8. -12	500 700 ver 58 .67	Detector peak peak
	No.	40 Mk.	50 F 30.1 41.7 300.3	60 70 req. 1Hz 053 (129 6672 1650	BO Read Leve dBu 19.7 14.4 14.8	ling el 79 11 32 34	(мн₂) Correct Factor dB 13.63 16.92 18.93	Me m dB 33 31 33 33	300 asure- nent uV/m 3.42 1.33 3.75	400 Limit dB/m 40.00 40.00 46.00	500 G Ov d -6. -8. -12 -12	500 700 ver 58 .67 2.25	Detector peak peak peak

RESULT: Pass

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

2. All test modes had been pre-tested. The mode 9 is the worst case and recorded in the report.



Radiated Emissions Test Results Above 1 GHz

EUT Name	Ha	Harmony3			Mode	l Name	Z01-S	
Temperature23.8°C					Relati	ve Humidity	61.5%	
Pressure	ssure 960hPa		?a			/oltage	DC 5V	
Test Mode	Мо	de 7			Anten	na Polarity	Horizonta	
Frequency	Meter Re	ading	Factor	Emissior	n Level	Limits	Margin	Value Type
(MHz)	(dBµ	V)	(dB)	(dBµV	″m)	(dBµV/m)	(dB)	value Type
4804.000	45.8	3	0.08	45.9)1	74	-28.09	peak
4804.000	36.3	9	0.08	36.4	7	54	-17.53	AVG
7206.000	41.6	7	2.21	43.8	8	74	-30.12	peak
7206.000	32.	7	2.21	34.9)1	54	-19.09	AVG
Remark:								
Factor = Ante	nna Factor	+ Cable	e Loss – Pre-	amplifier.				
		+ Cable	e Loss – Pre-	amplifier.	Mode	l Name	Z01-S	
Factor = Anter		rmony3	e Loss – Pre-	amplifier.		l Name ve Humidity	Z01-S 61.5%	
Factor = Anter EUT Name	Hai 23.	rmony3	e Loss – Pre-	amplifier.	Relati			
Factor = Anter EUT Name Femperature	Hai 23. 960	rmony3 8℃	e Loss – Pre-	amplifier.	Relati Test V	ve Humidity	61.5%	
Factor = Anter EUT Name Femperature Pressure Fest Mode	Hai 23. 960 Mo	rmony3 8℃ 0hPa de 7			Relati Test V Anter	ve Humidity /oltage ina Polarity	61.5% DC 5V Vertical	
Factor = Anter EUT Name Femperature Pressure Fest Mode	Hai 23. 960 Mo Meter Re	rmony3 8℃ 0hPa de 7 ading	Factor	Emissior	Relati Test V Anten	Ve Humidity /oltage ma Polarity Limits	61.5% DC 5V Vertical Margin	- Value Type
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz)	Hai 23. 960 Mo Meter Re (dBµ	rmony3 8℃)hPa de 7 ading V)	Factor (dB)	Emissior (dBµV	Relati Test V Anten	ve Humidity /oltage ma Polarity Limits (dBµV/m)	61.5% DC 5V Vertical Margin (dB)	
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4804.000	Hai 23. 960 Mo Meter Re (dBµ 45.3	rmony3 8℃ 0hPa de 7 ading V)	Factor (dB) 0.08	Emissior (dBµV 45.4	Relati Test V Anten h Level (/m)	Ve Humidity /oltage ana Polarity Limits (dBµV/m) 74	61.5% DC 5V Vertical Margin (dB) -28.57	peak
Factor = Anter	Нан 23. 960 Мо Меter Re (dBµ 45.3 36.5	rmony3 8℃ DhPa de 7 ading V) 5 8	Factor (dB) 0.08 0.08	Emissior (dBµV 45.4 36.6	Relati Test V Anten h Level //m) 13 66	Ve Humidity /oltage Ina Polarity Limits (dBµV/m) 74 54	61.5% DC 5V Vertical Margin (dB) -28.57 -17.34	peak AVG
Factor = Anter	Hai 23. 960 Mo Meter Re (dBµ 45.3 36.5 41.8	rmony3 8℃ 0hPa de 7 ading V) 5 8 3	Factor (dB) 0.08 0.08 2.21	Emission (dBµV 45.4 36.6 44.0	Relati Test V Anten Level (/m) 3 66	ve Humidity /oltage ma Polarity Limits (dBµV/m) 74 54 74	61.5% DC 5V Vertical Margin (dB) -28.57 -17.34 -29.96	peak AVG peak
Factor = Anter	Нан 23. 960 Мо Меter Re (dBµ 45.3 36.5	rmony3 8℃ 0hPa de 7 ading V) 5 8 3	Factor (dB) 0.08 0.08	Emissior (dBµV 45.4 36.6	Relati Test V Anten Level (/m) 3 66	Ve Humidity /oltage Ina Polarity Limits (dBµV/m) 74 54	61.5% DC 5V Vertical Margin (dB) -28.57 -17.34	peak AVG
Factor = Anter	Hai 23. 960 Mo Meter Re (dBµ 45.3 36.5 41.8	rmony3 8℃ 0hPa de 7 ading V) 5 8 3	Factor (dB) 0.08 0.08 2.21	Emission (dBµV 45.4 36.6 44.0	Relati Test V Anten Level (/m) 3 66	ve Humidity /oltage ma Polarity Limits (dBµV/m) 74 54 74	61.5% DC 5V Vertical Margin (dB) -28.57 -17.34 -29.96	peak AVG peak

RESULT: Pass



EUT Name	Harmony	3	Mode	el Name	Z01-S	
F emperature	23.8 ℃		Rela	tive Humidity	61.5%	
Pressure	ure 960hPa		Test	Voltage	DC 5V	
Fest Mode	Mode 8		Ante	nna Polarity	Horizonta	I
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	44.73	0.14	44.87	74	-29.13	peak
4882.000	36.21	0.14	36.35	54	-17.65	AVG
7323.000	40.47	2.36	42.83	74	-31.17	peak
7323.000	32.48	2.36	34.84	54	-19.16	AVG
	-					
Remark:				1		
	na Factor + Cal	le Loss – Pre	amplifier			
	nna Factor + Cal Harmony			el Name	Z01-S	
Factor = Anter			Mode	el Name	Z01-S 61.5%	
Factor = Anter EUT Name	Harmony		Mode			
Factor = Anter EUT Name Femperature	Harmony 23.8℃		Mode Rela Test	tive Humidity	61.5%	
Factor = Anter EUT Name Femperature Pressure Fest Mode	Harmony 23.8℃ 960hPa Mode 8	3	Mode Rela Test Ante	tive Humidity Voltage nna Polarity	61.5% DC 5V Vertical	
Factor = Anter EUT Name Femperature Pressure Frest Mode	Harmony 23.8℃ 960hPa Mode 8 Meter Reading	3 Factor	Mode Rela Test Ante Emission Level	tive Humidity Voltage nna Polarity	61.5% DC 5V Vertical Margin	Value Type
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz)	Harmony 23.8℃ 960hPa Mode 8 Meter Reading (dBµV)	3 Factor (dB)	Mode Rela Test Ante Emission Level (dBµV/m)	tive Humidity Voltage nna Polarity Limits (dBµV/m)	61.5% DC 5V Vertical Margin (dB)	
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4882.000	Harmony 23.8℃ 960hPa Mode 8 Meter Reading (dBµV) 44.55	3 Factor (dB) 0.14	Mode Rela Test Ante Emission Level (dBµV/m) 44.69	tive Humidity Voltage nna Polarity Limits (dBµV/m) 74	61.5% DC 5V Vertical Margin (dB) -29.31	peak
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4882.000 4882.000	Harmony 23.8°C 960hPa Mode 8 Meter Reading (dBμV) 44.55 36.6	3 Factor (dB) 0.14 0.14	Mode Rela Test Ante Emission Level (dBµV/m) 44.69 36.74	tive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54	61.5% DC 5V Vertical Margin (dB) -29.31 -17.26	peak AVG
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4882.000 4882.000 7323.000	Harmony 23.8℃ 960hPa Mode 8 Meter Reading (dBµV) 44.55 36.6 40.45	3 Factor (dB) 0.14 0.14 2.36	Моde Rela Test Ante Emission Level (dBµV/m) 44.69 36.74 42.81	tive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54 74	61.5% DC 5V Vertical Margin (dB) -29.31 -17.26 -31.19	peak AVG peak
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4882.000 4882.000	Harmony 23.8°C 960hPa Mode 8 Meter Reading (dBμV) 44.55 36.6	3 Factor (dB) 0.14 0.14	Mode Rela Test Ante Emission Level (dBµV/m) 44.69 36.74	tive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54	61.5% DC 5V Vertical Margin (dB) -29.31 -17.26	peak AVG
Factor = Anter EUT Name Femperature Pressure Fest Mode Frequency (MHz) 4882.000 4882.000 7323.000	Harmony 23.8℃ 960hPa Mode 8 Meter Reading (dBµV) 44.55 36.6 40.45	3 Factor (dB) 0.14 0.14 2.36	Моde Rela Test Ante Emission Level (dBµV/m) 44.69 36.74 42.81	tive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54 74	61.5% DC 5V Vertical Margin (dB) -29.31 -17.26 -31.19	peak AVG peak

RESULT: Pass



Radiated Emissions Test Results for Above 1 GHz

UT Name		Harmony3			Model	Name	Z01-S		
Temperature23.8°C					Relativ	e Humidity	61.5%		
Pressure	sure 960hPa				Test Ve	oltage	DC 5V		
Fest Mode		Mode 9			Anteni	na Polarity	Horizontal		
		I							
Frequency	Met	ter Reading	Factor	Emissio	on Level	Limits	Margin	Value Type	
(MHz)		(dBµV)	(dB)	(dBµ	ıV/m)	(dBµV/m)	(dB)	value Type	
4960.000		47.82	0.22	48	.04	74	-25.96	peak	
4960.000		35.87	0.22	36	.09	54	-17.91	AVG	
7440.000		41.47	2.64	44	.11	74	-29.89	peak	
7440.000		30.82	2.64	33	.46	54	-20.54	AVG	
Remark:									
Factor = Anter	ina Fa	actor + Cable	e Loss – Pre-	amplifier.			-	-	
EUT Name		Harmony3			Model	Name	Z01-S		
Femperature		23.8 ℃	3°C			e Humidity	61.5%		
Pressure		960hPa	960hPa		Test Voltage		oltage	DC 5V	
Test Mode		Mode 9			Anteni	na Polarity	Vertical		
		tan Danadinan	Factor	F acia ai	on Level	Limits	Manaia		
Frequency	ivie	ter Reading	(dB)		IV/m)	(dBµV/m)	Margin (dB)	Value Type	
		(dBµV) 47.76	(ub) 0.22	· · ·	,	(ασμν/m) 74	-26.02	peak	
(MHz)		4/./0		47.98 35.86		54	-26.02	· ·	
4960.000			0.00	9E			1 -10.14		
4960.000 4960.000		35.64	0.22					AVG	
4960.000 4960.000 7440.000		35.64 41.43	2.64	44	.07	74	-29.93	peak	
4960.000 4960.000		35.64		44				-	
4960.000 4960.000 7440.000		35.64 41.43	2.64	44	.07	74	-29.93	peak	

RESULT: Pass

Note:

- 1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
- 2. Factor = Antenna Factor + Cable loss Pre-amplifier gain, Margin = Emission Level-Limit.
- 3. The "Factor" value can be calculated automatically by software of measurement system.
- 4. All test modes had been tested. The 8DPSK modulation is the worst case and recorded in the report.



EUT Name	Harmony3	Model Name	Z01-S
Temperature	23.8 ℃	Relative Humidity	61.5%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 7	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



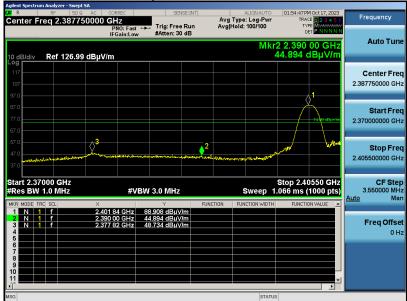
RESULT: Pass



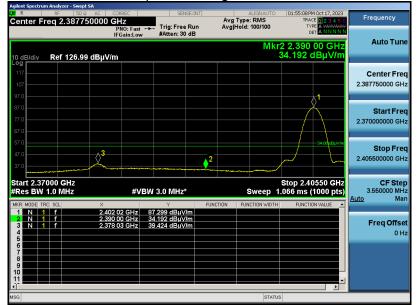
Band Edge Emission Test Results for Restricted Bands

EUT Name	Harmony3	Model Name	Z01-S
Temperature	23.8 ℃	Relative Humidity	61.5%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 7	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



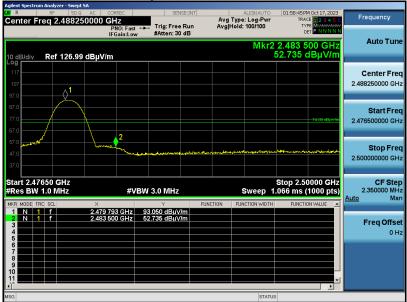
RESULT: Pass



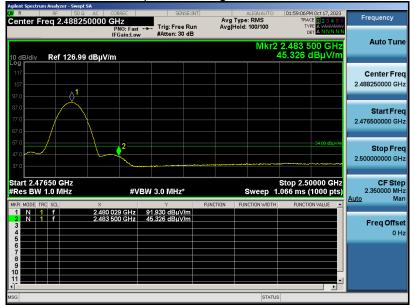
Band Edge Emission Test Results for Restricted Bands

EUT Name	Harmony3	Model Name	Z01-S
Temperature	23.8 ℃	Relative Humidity	61.5%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 9	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



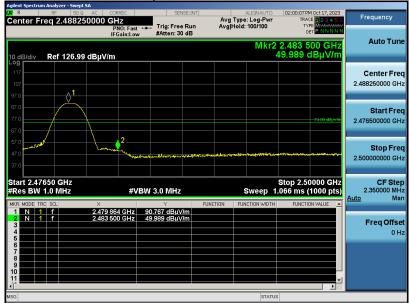
RESULT: Pass



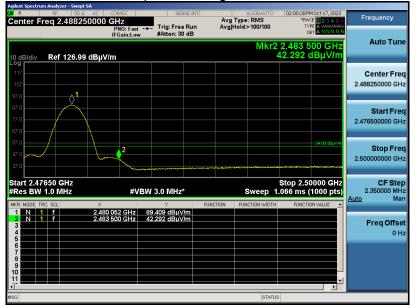
Band Edge Emission Test Results for Restricted Bands

EUT Name	Harmony3	Model Name	Z01-S
Temperature	23.8 ℃	Relative Humidity	61.5%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 9	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: Pass

Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. The 8DPSK modulation is the worst case and recorded in the report.



10. Number of Hopping Frequency Measurement

10.1 Provisions Applicable

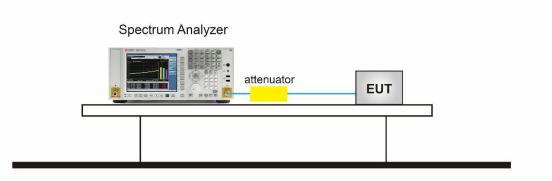
This frequency hopping system must employ a minimum of 15 hopping channels.

10.2 Measurement Procedure

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

- 1. Span = The frequency band of operation. Depending on the number of channels the device
- 2. supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- 3. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- 4. VBW \geq RBW
- 5. Sweep time = Auto couple
- 6. Detector = Peak
- 7. Trace mode = Max hold
- 8. Allow the trace to stabilize

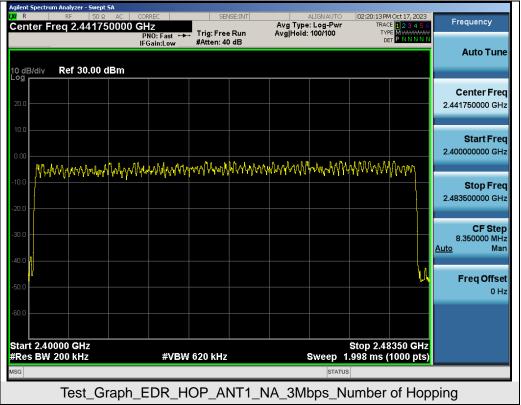
10.3 Measurement Setup (Block Diagram of Configuration)



10.4 Measurement Result

Test Data of Number of Hopping Frequency						
Test Mode Number of Hopping Frequency Limits Pass or Fa						
8DPSK Hopping	79	>=15	Pass			





Test Graphs of Number of Hopping Frequency

Note: The 8DPSK modulation is the worst case and recorded in the report.



11. Time of Occupancy (Dwell Time) Measurement

11.1 Provisions Applicable

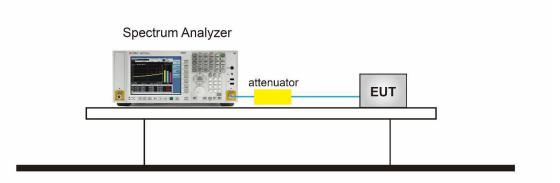
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

11.2 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. VBW \geq RBW
- 4. Sweep time = As necessary to capture the entire dwell time per hopping channel
- 5. Detector = Peak
- 6. Trace mode = Free Run
- 7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

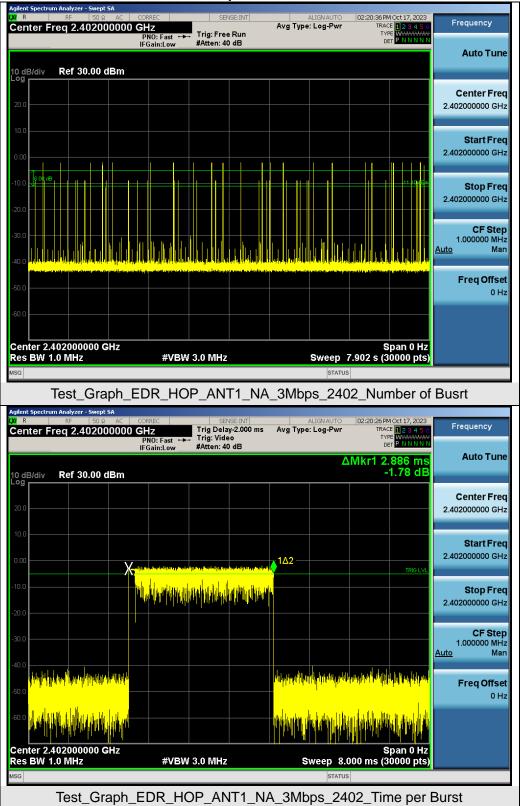
11.3 Measurement Setup (Block Diagram of Configuration)



11.4 Measurement Result

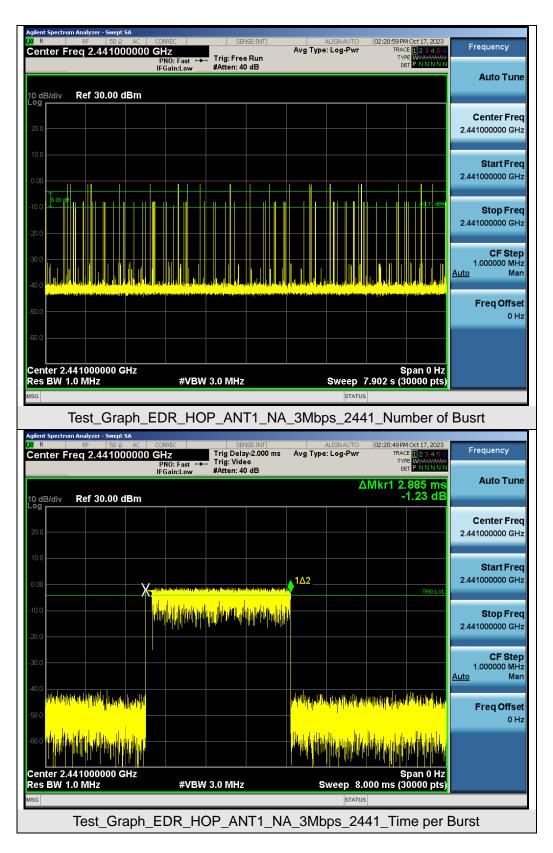
Test Data of Dwell Time						
Channel	Channel Time of Pulse for 3DH5 (ms) Number of hops in the period specified in the requirements			Limit (ms)	Pass or Fail	
2402	2.886	24.0*4	277.056	400	Pass	
2441	2.885	21.0*4	242.340	400	Pass	
2480	2.886	25.0*4	288.600	400	Pass	



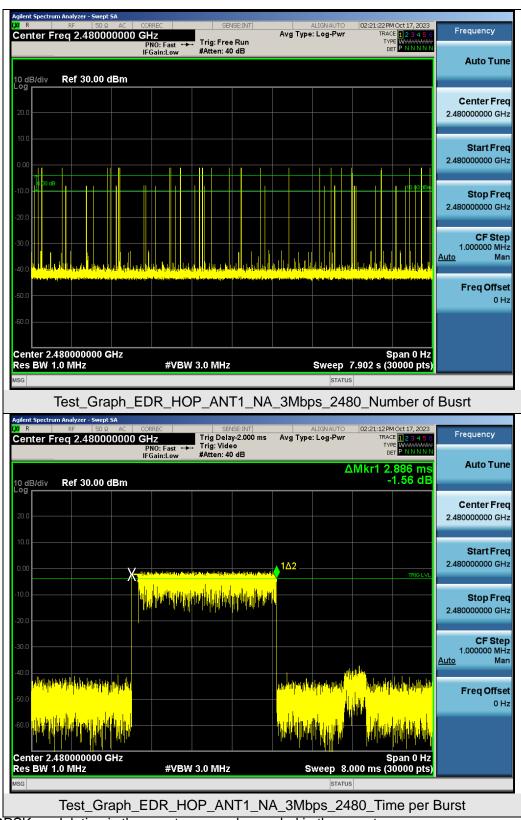


Test Graphs of Dwell Time









Note: The 8DPSK modulation is the worst case and recorded in the report.

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12. Frequency Separation Measurement

12.1 Provisions Applicable

When the power is less than 0.125W: The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.

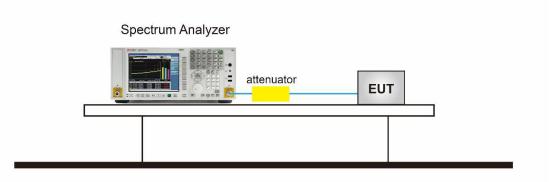
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

12.2 Measurement Procedure

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

- 1. Span: Wide enough to capture the peaks of two adjacent channels.
- 2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- 3. Video (or average) bandwidth (VBW) \geq RBW.
- 4. Sweep: Auto.
- 5. Detector function: Peak.
- 6. Trace: Max hold. g) Allow the trace to stabilize.
- 7. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

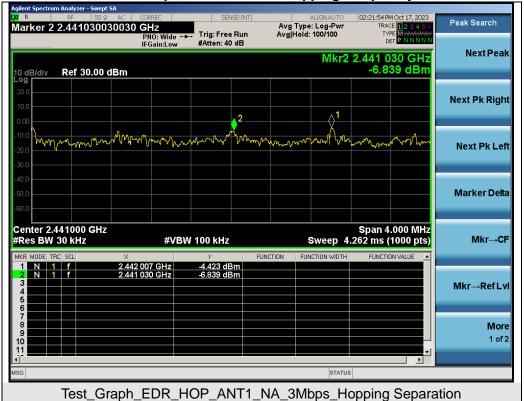
12.3 Measurement Setup (Block Diagram of Configuration)



12.4 Measurement Result

Test Data of Frequency Separation						
Test Mode Channel Separation (MHz) Limits Pass or Fail						
8DPSK Hopping	0.977	>= 2/3 -20dB BW	Pass			





Test Graphs of Number of Hopping Frequency

Note: The 8DPSK modulation is the worst case and recorded in the report.



13. AC Power Line Conducted Emission Test

13.1 Measurement Limit

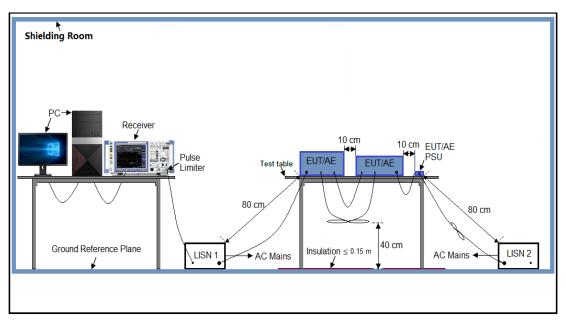
Francisco	Maximum RF Line Voltage			
Frequency	Q.P. (dBµV)	Average (dBµV)		
150kHz~500kHz	66-56	56-46		
500kHz~5MHz	56	46		
5MHz~30MHz	60	50		

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.

13.2 Measurement Setup (Block Diagram of Configuration)





13.3 Preliminary Procedure of Line Conducted Emission Test

- 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 equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from 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.

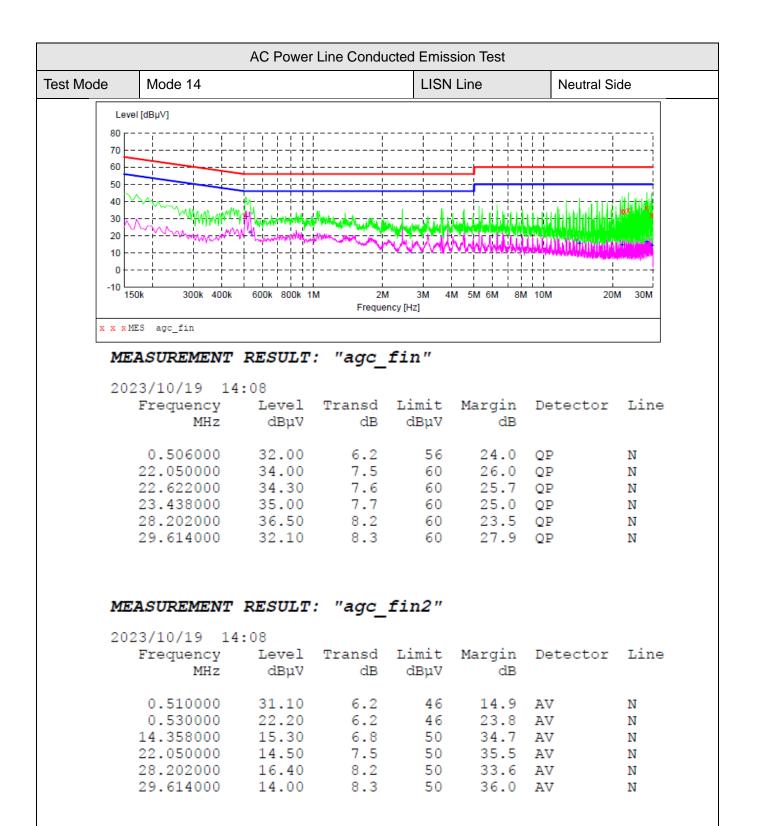
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4 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.
- 2. 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.

13.5 Measurement Results



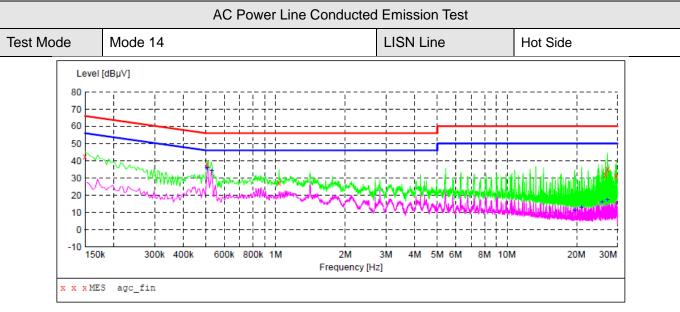


RESULT: Pass

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MEASUREMENT RESULT: "agc fin"

2023/10/19 14:05							
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	
0.150000 0.506000 1.034000 26.646000 27.174000 29.698000	42.40 38.20 27.10 32.00 35.00 31.10	6.1 6.2 6.2 8.1 8.1 8.3	66 56 60 60	23.6 17.8 28.9 28.0 25.0 28.9	QP QP QP QP QP QP	L1 L1 L1 L1 L1 L1	

MEASUREMENT RESULT: "agc fin2"

2023/10/19 14:05							
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	
0.506000	35.70	6.2	46	10.3	AV	L1	
0.530000	34.30	6.2	46	11.7	AV	L1	
19.610000	11.10	7.1	50	38.9	AV	L1	
21.022000	12.70	7.3	50	37.3	AV	L1	
25.766000	15.90	8.0	50	34.1	AV	L1	
27.174000	17.40	8.1	50	32.6	AV	L1	

RESULT: Pass

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Report No.: AGC09477231004FR01 Page 77 of 77

Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC09477231004AP01

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC09477231004AP02

-----End of Report-----



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3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

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7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.