

FCC Test Report

Report No.: AGC12375241101FR01

FCC ID : 2A2JM-RTS2

APPLICATION PURPOSE: Original Equipment

PRODUCT DESIGNATION: Wireless Audio Receiver & Transmitter

BRAND NAME : N/A

MODEL NAME : RTS2

APPLICANT: Shenzhen JiaJianShiTing Technology co., Ltd.

DATE OF ISSUE : Dec. 16, 2024

STANDARD(S) : FCC Part 15 Subpart C §15.247

REPORT VERSION: V1.0

Attestation of Global Conclude (Shenzhen) Co., Ltd



Page 2 of 76

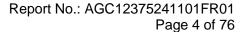
Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 16, 2024	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	8
2.8 Special Accessories	g
2.9 Equipment Modifications	9
2.10 Antenna Requirement	g
3. Test Environment	10
3.1 Address of The Test Laboratory	10
3.2 Test Facility	10
3.3 Environmental Conditions	11
3.4 Measurement Uncertainty	11
3.5 List of Equipment Used	12
4.System Test Configuration	14
4.1 EUT Configuration	14
4.2 EUT Exercise	14
4.3 Configuration of Tested System	14
4.4 Equipment Used in Tested System	14
4.5 Summary of Test Results	15
5. Description of Test Modes	16
6. RF Output Power Measurement	17
6.1 Provisions Applicable	17
6.2 Measurement Procedure	17
6.3 Measurement Setup (Block Diagram of Configuration)	17
6.4 Measurement Result	18
7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement	24
7.1 Provisions Applicable	24
7.2 Measurement Procedure	24
7.3 Measurement Setup (Block Diagram of Configuration)	24
7.4 Measurement Results	25
8. Conducted Band Edge and Out-of-Band Emissions	30
8.1 Provisions Applicable	30
8.2 Measurement Procedure	30
8.3 Measurement Setup (Block Diagram of Configuration)	30
8.4 Measurement Results	31





9. Radiated Spurious Emission	51
9.1 Measurement Limit	51
9.2 Measurement Procedure	51
9.3 Measurement Setup (Block Diagram of Configuration)	54
9.4 Measurement Result	55
10. Number of Hopping Frequency Measurement	64
10.1 Provisions Applicable	64
10.2 Measurement Procedure	64
10.3 Measurement Setup (Block Diagram of Configuration)	64
10.4 Measurement Result	64
11. Time of Occupancy (Dwell Time) Measurement	66
11.1 Provisions Applicable	66
11.2 Measurement Procedure	66
11.3 Measurement Setup (Block Diagram of Configuration)	66
11.4 Measurement Result	66
12. Frequency Separation Measurement	70
12.1 Provisions Applicable	70
12.2 Measurement Procedure	70
12.3 Measurement Setup (Block Diagram of Configuration)	70
12.4 Measurement Result	70
13. AC Power Line Conducted Emission Test	72
13.1 Measurement Limit	72
13.2 Measurement Setup (Block Diagram of Configuration)	72
13.3 Preliminary Procedure of Line Conducted Emission Test	73
13.4 Final Procedure of Line Conducted Emission Test	73
13.5 Measurement Results	73
Appendix I: Photographs of Test Setup	76
Appendix II: Photographs of Test EUT	76



Page 5 of 76

1. General Information

Applicant	Shenzhen JiaJianShiTing Technology co., Ltd.			
	301, Building 2, 728 ChuangYiBanGong , Xinfeng 1st Road, YangGuang			
Address	Community, Xili Subdistrict, Nanshan District, ShenZhen, GuangDong Province,			
	China			
Manufacturer	Shenzhen JiaJianShiTing Technology co., Ltd.			
	301, Building 2, 728 ChuangYiBanGong , Xinfeng 1st Road, YangGuang			
Address	Community, Xili Subdistrict, Nanshan District, ShenZhen, GuangDong Province,			
	China			
Factory	Shenzhen JiaJianShiTing Technology co., Ltd.			
	301, Building 2, 728 ChuangYiBanGong , Xinfeng 1st Road, YangGuang			
Address	Community, Xili Subdistrict, Nanshan District, ShenZhen, GuangDong Province,			
	China			
Product Designation	Wireless Audio Receiver & Transmitter			
Brand Name	N/A			
Test Model	RTS2			
Series Model(s)	N/A			
Difference Description	N/A			
Date of receipt of test item	Nov. 15, 2024			
Date of Test	Nov. 15, 2024 to Dec. 16, 2024			
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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_	Thea Huang (Project Engineer)	Dec. 16, 2024
Reviewed By	Colin Lin	
	Calvin Liu (Reviewer)	Dec. 16, 2024
Approved By	Angole Li	
	Angela Li (Authorized Officer)	Dec. 16, 2024



Page 6 of 76

2. Product Information

2.1 Product Technical Description

Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2402MHz-2480MHz
Bluetooth Version	V5.2
Modulation Type	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK
Number of channels	79 Channels
Channel Separation	1 MHz
Maximum Transmitter Power	3.579dBm
Hardware Version	V1.2
Software Version	C04
Antenna Designation	Ceramic Antenna
Antenna Gain	5.62dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

2.2 Test Frequency List

Frequency Band	Channel Number	Test 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.



Page 7 of 76

2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2A2JM-RTS2, 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	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.

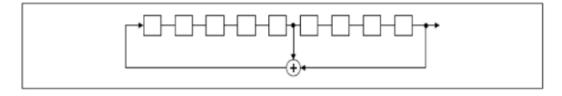


Report No.: AGC12375241101FR01 Page 8 of 76

2.7 Pseudorandom Frequency Hopping Sequence

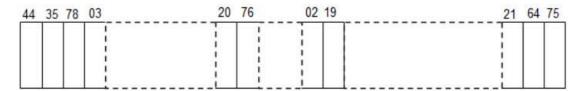
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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



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.



Page 9 of 76

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 5.62dBi.



Page 10 of 76

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.



Page 11 of 76

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 by battery or DC 5V by adapter		

3.4 Measurement Uncertainty

The reported uncertainty of measurement y ±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 = ±2 %		
Uncertainty of Dwell Time	U _c = ±2 %		



Report No.: AGC12375241101FR01 Page 12 of 76

3.5 List of Equipment Used

• R	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	2024-05-24	2025-05-23
\boxtimes	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2024-02-01	2025-01-31
\boxtimes	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2024-02-01	2025-01-31
\boxtimes	AGC-ER-A001	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-09-21	2025-09-20
	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2024-05-23	2025-05-22
\boxtimes	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
\boxtimes	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

• F	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	2024-02-01	2025-01-31
	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
\boxtimes	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
\boxtimes	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
\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	2024-03-31	2025-03-30
\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	2024-07-24	2026-07-23
\boxtimes	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
\boxtimes	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08

• A	AC Power Line Conducted Emission								
Illsed Fauinment No. Test Fauinment Manutacturer Model No. Serial No.							Next Cal. Date (YY-MM-DD)		
	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2024-05-28	2025-05-27		
	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2025-06-08		
	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2024-05-28	2025-05-27		



Page 13 of 76

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



Report No.: AGC12375241101FR01 Page 14 of 76

4. System Test Configuration

4.1 EUT Configuration

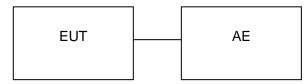
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

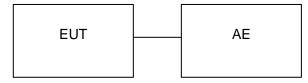
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System

Radiated Emission Configure:



Conducted Emission Configure:



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

1	No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
	1	Adapter	Huawei	HW-200440C00		
	2	RF Cable	Harbour	RF001		

☐ Test Accessories Come From The Manufacturer

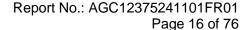
No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	-	-		-	



Page 15 of 76

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



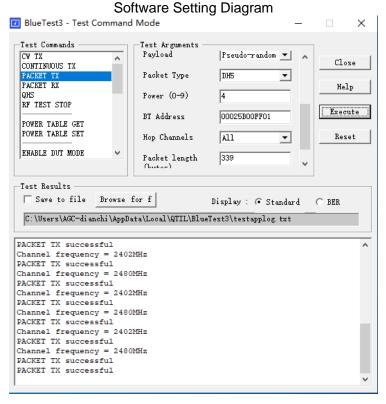


5. Description of Test Modes

Summary table of Test Cases				
Test Item	Data Rate / Modulation			
iest itelli	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) Mode 2: Bluetooth Tx CH39_2441 MHz_1Mbps (Battery powered or AC/DC adapter) Mode 3: Bluetooth Tx CH78_2480 MHz_1Mbps (Battery powered or AC/DC adapter) Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps (Battery powered or AC/DC adapter) Mode 5: Bluetooth Tx CH39_2441 MHz_2Mbps (Battery powered or AC/DC adapter) Mode 6: Bluetooth Tx CH78_2480 MHz_2Mbps (Battery powered or AC/DC adapter) Mode 7: Bluetooth Tx CH00_2402 MHz_3Mbps (Battery powered or AC/DC adapter) Mode 8: Bluetooth Tx CH39_2441 MHz_3Mbps (Battery powered or AC/DC adapter) Mode 9: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered or AC/DC adapter) Mode10: Bluetooth Tx Hopping-1Mbps (Battery powered or AC/DC adapter) Mode11: Bluetooth Tx Hopping-2Mbps (Battery powered or AC/DC adapter) Mode12: Bluetooth Tx Hopping-3Mbps (Battery powered or AC/DC adapter)			
AC Conducted Emission	Mode 1: Bluetooth Link + Battery + USB Cable (Charging from AC Adapter)			

Note:

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





Page 17 of 76

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:

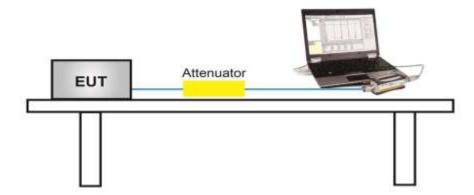
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW ≥RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: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

☐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

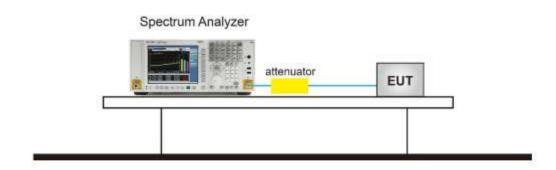
6.3 Measurement Setup (Block Diagram of Configuration)

For Average power test setup



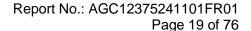


Page 18 of 76



6.4 Measurement Result

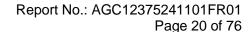
	Test Data of Conducted Output Power					
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail		
	2402	2.488	≤21	Pass		
GFSK	2441	3.098	≤21	Pass		
	2480	3.579	≤21	Pass		
	2402	0.470	≤21	Pass		
π /4-DQPSK	2441	1.092	≤21	Pass		
	2480	1.583	≤21	Pass		
	2402	0.976	€21	Pass		
8DPSK	2441	1.608	≤21	Pass		
	2480	2.115	€21	Pass		





Test Graphs of Conducted Output Power Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Center Freq 2.402000000 GHz Trig: Free Run #Atten: 40 dB **Auto Tune** Mkr1 2.402 148 GHz 2.488 dBm Ref 30.00 dBm Center Freq 2.402000000 GHz Start Freq 2.399500000 GHz Stop Freq 2.404500000 GHz **CF Step** 500.000 kHz Man Freq Offset Center 2.402000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.066 ms (1000 pts) **#VBW 5.0 MHz** Test_Graph_BR_ANT1_2402_1Mbps_Peak Power

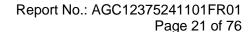










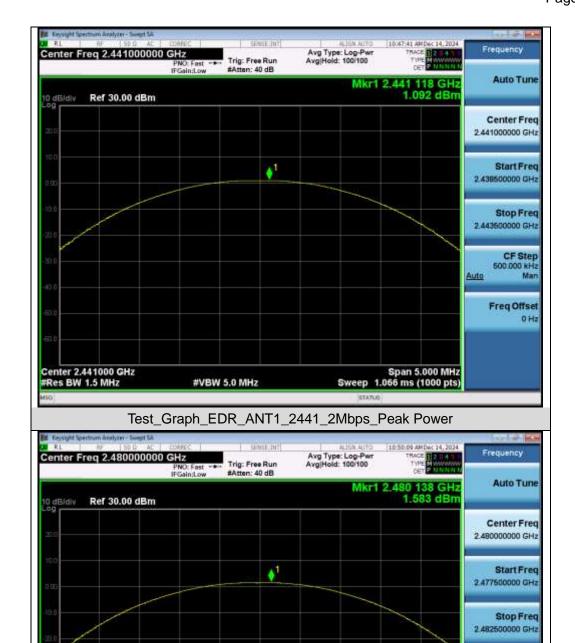


CF Step 500.000 kHz Man

Freq Offset

Span 5.000 MHz Sweep 1.066 ms (1000 pts)



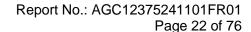


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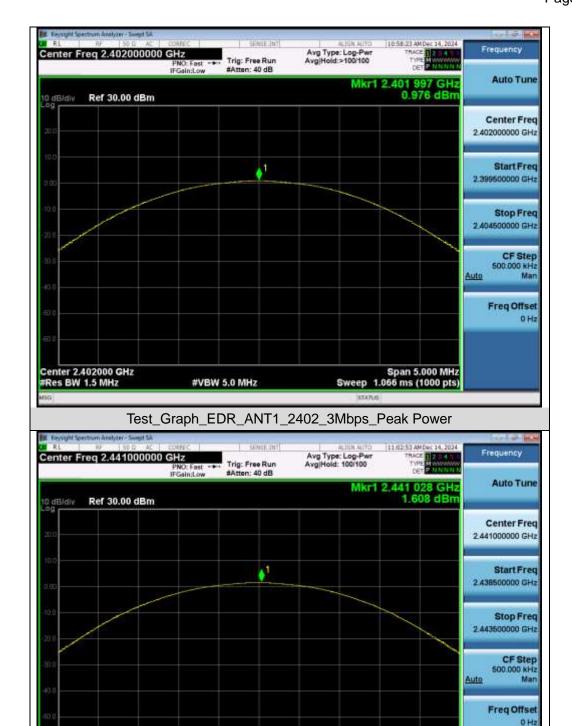
Test_Graph_EDR_ANT1_2480_2Mbps_Peak Power

#VBW 5.0 MHz

Center 2.480000 GHz #Res BW 1.5 MHz





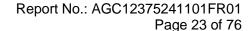


Test_Graph_EDR_ANT1_2441_3Mbps_Peak Power

#VBW 5.0 MHz

Span 5.000 MHz Sweep 1.066 ms (1000 pts)

Center 2.441000 GHz #Res BW 1.5 MHz









Page 24 of 76

7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement

7.1 Provisions Applicable

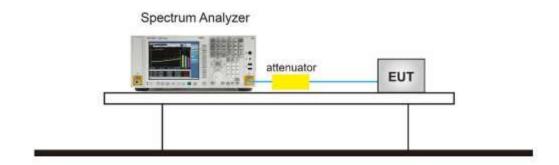
There is no corresponding limit requirement for this test item.

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 ≥ 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)



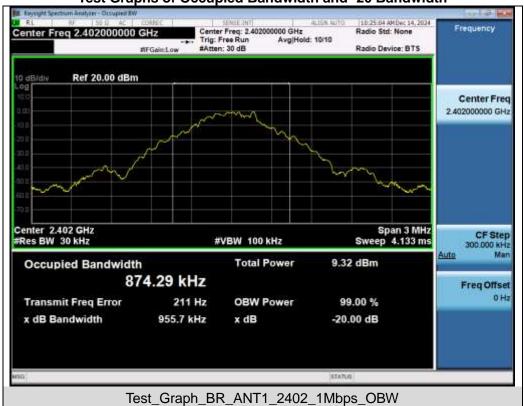


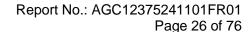
Report No.: AGC12375241101FR01 Page 25 of 76

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	0.874	0.956	N/A	Pass	
GFSK	2441	0.870	0.955	N/A	Pass	
	2480	0.866	0.955	N/A	Pass	
	2402	1.188	1.331	N/A	Pass	
π /4-DQPSK	2441	1.187	1.331	N/A	Pass	
	2480	1.188	1.333	N/A	Pass	
	2402	1.187	1.306	N/A	Pass	
8DPSK	2441	1.188	1.307	N/A	Pass	
	2480	1.188	1.307	N/A	Pass	

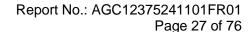
Test Graphs of Occupied Bandwidth and -20 Bandwidth













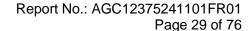


Test_Graph_EDR_ANT1_2441_2Mbps_OBW

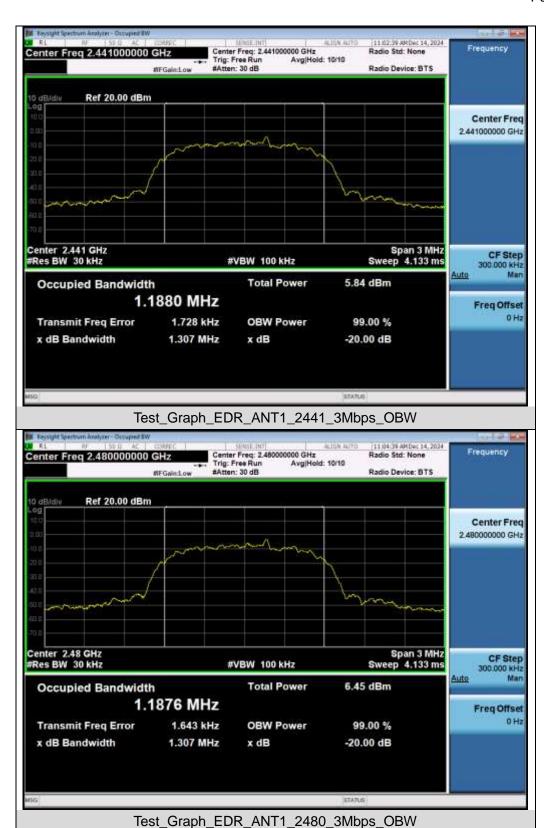














Page 30 of 76

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

8.1 Provisions Applicable

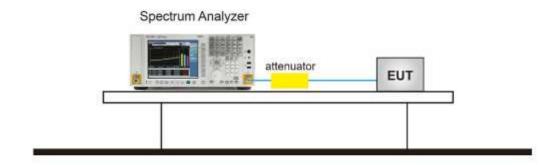
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 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.

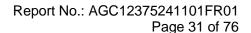
8.2 Measurement Procedure

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
- 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
- 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)

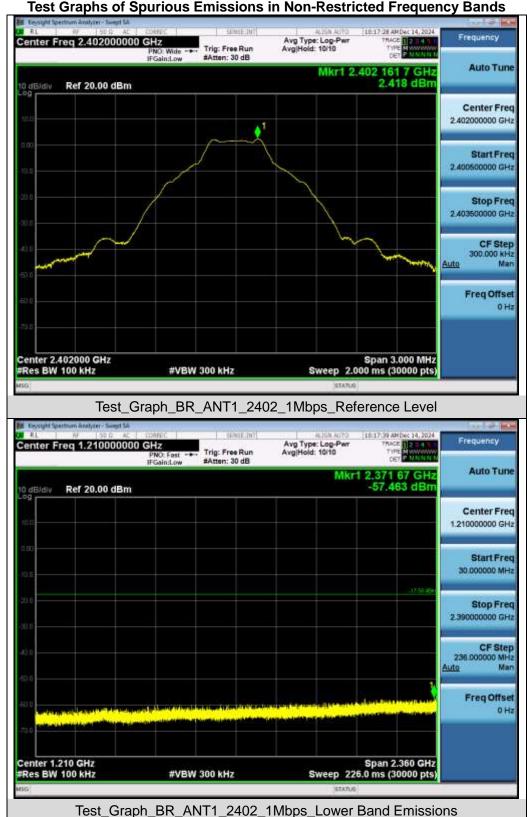


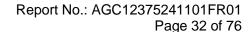




8.4 Measurement Results

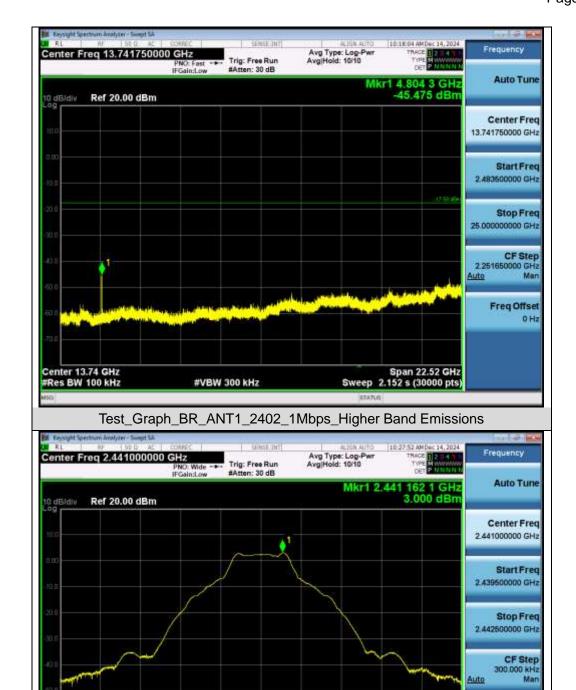
Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands





Freq Offset





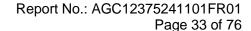
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Test_Graph_BR_ANT1_2441_1Mbps_Reference Level

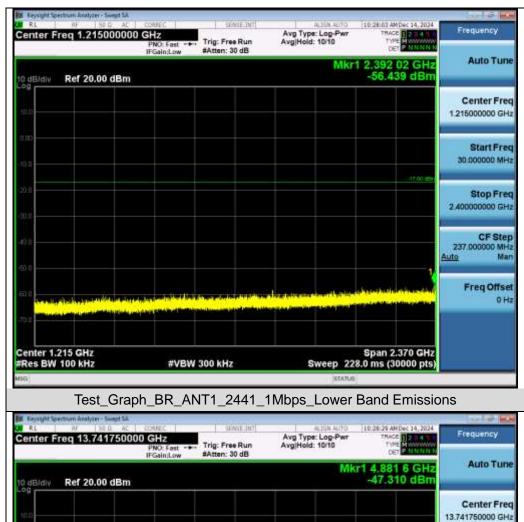
#VBW 300 kHz

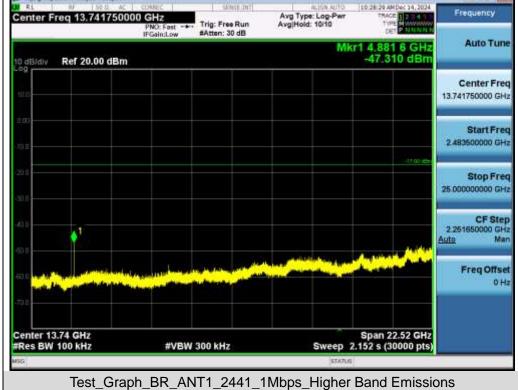
Span 3.000 MHz Sweep 2.000 ms (30000 pts)

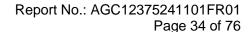
Center 2.441000 GHz #Res BW 100 kHz





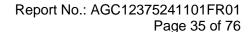










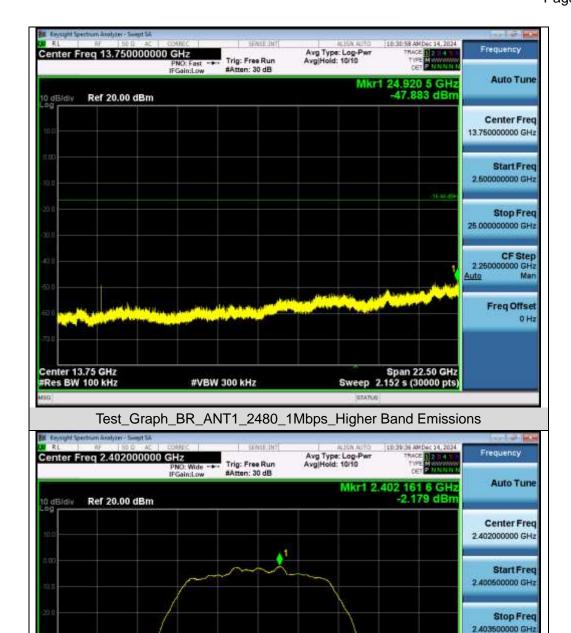


CF Step 300,000 kHz Man

Freq Offset

Span 3.000 MHz Sweep 2.000 ms (30000 pts)



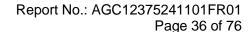


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Test_Graph_EDR_ANT1_2402_2Mbps_Reference Level

#VBW 300 kHz

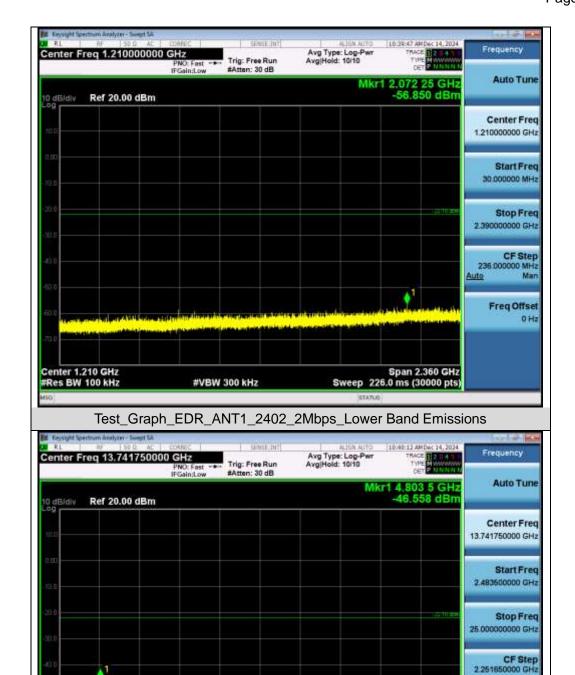
Center 2.402000 GHz #Res BW 100 kHz



Freq Offset

Span 22.52 GHz Sweep 2.152 s (30000 pts)



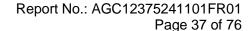


Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

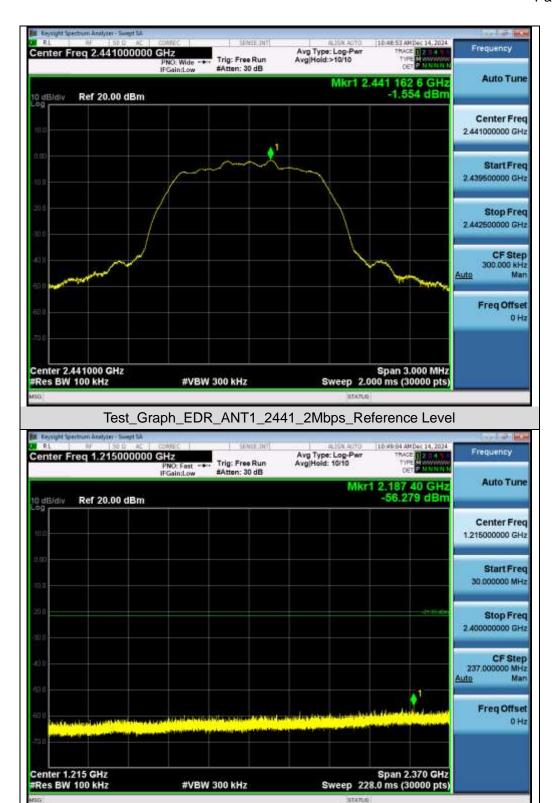
Test_Graph_EDR_ANT1_2402_2Mbps_Higher Band Emissions

#VBW 300 kHz

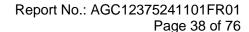
Center 13.74 GHz #Res BW 100 kHz



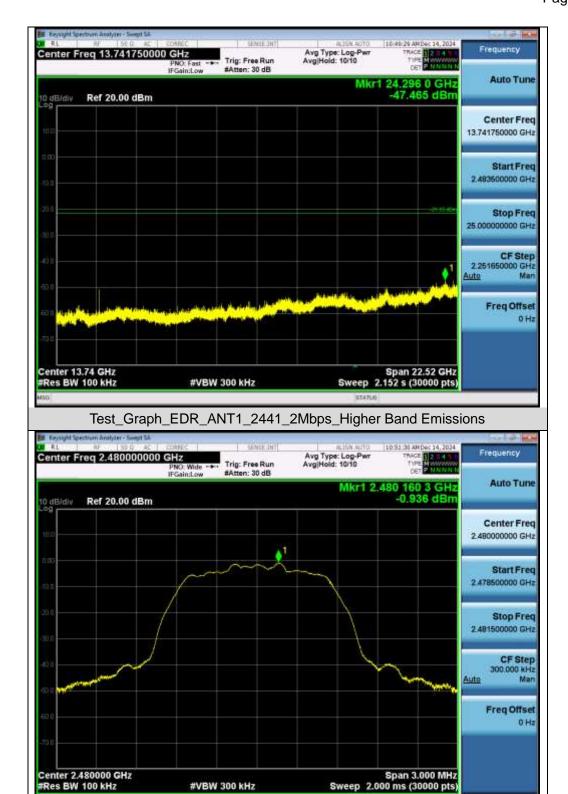




Test_Graph_EDR_ANT1_2441_2Mbps_Lower Band Emissions

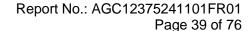




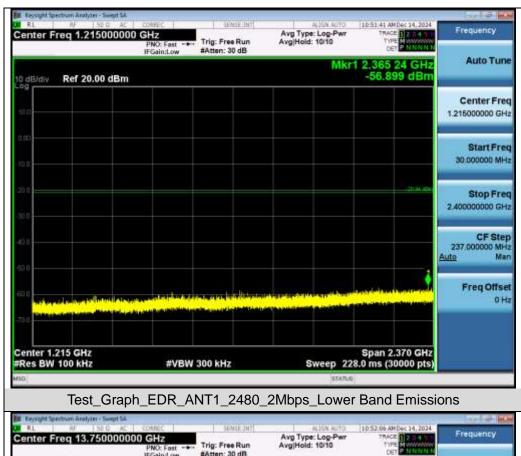


Test_Graph_EDR_ANT1_2480_2Mbps_Reference Level

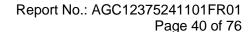
#VBW 300 kHz



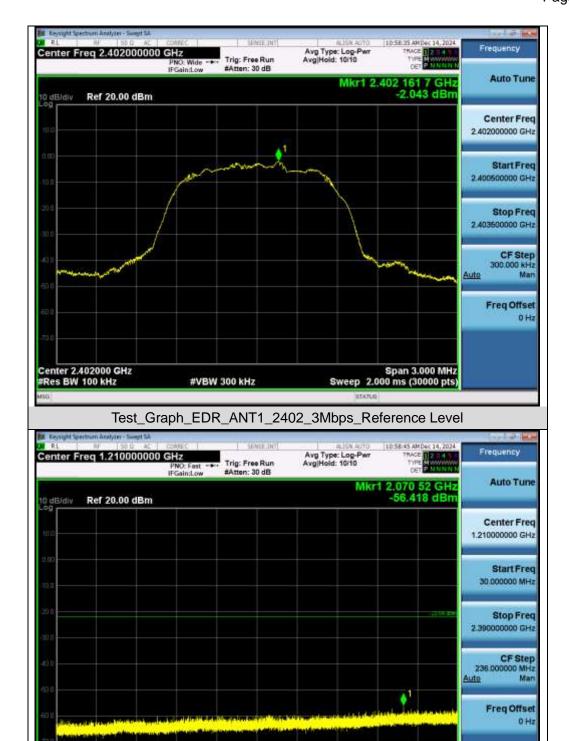










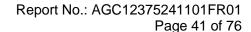


Test_Graph_EDR_ANT1_2402_3Mbps_Lower Band Emissions

#VBW 300 kHz

Span 2.360 GHz Sweep 226.0 ms (30000 pts)

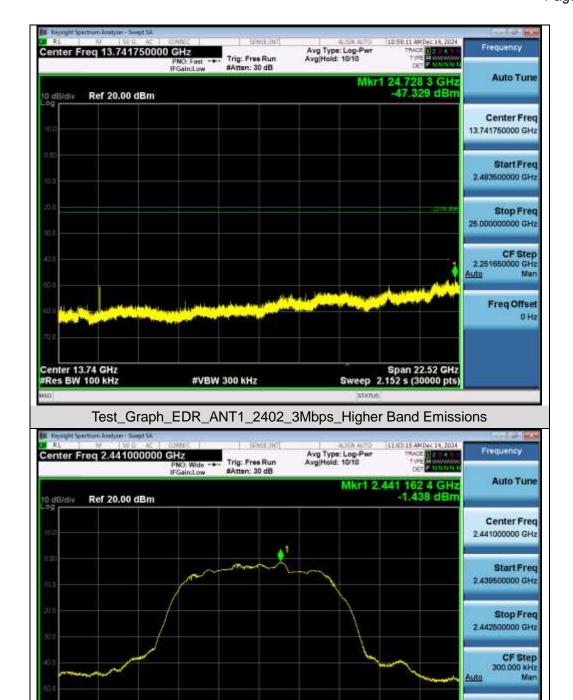
Center 1.210 GHz #Res BW 100 kHz



Freq Offset

Span 3.000 MHz Sweep 2.000 ms (30000 pts)



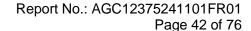


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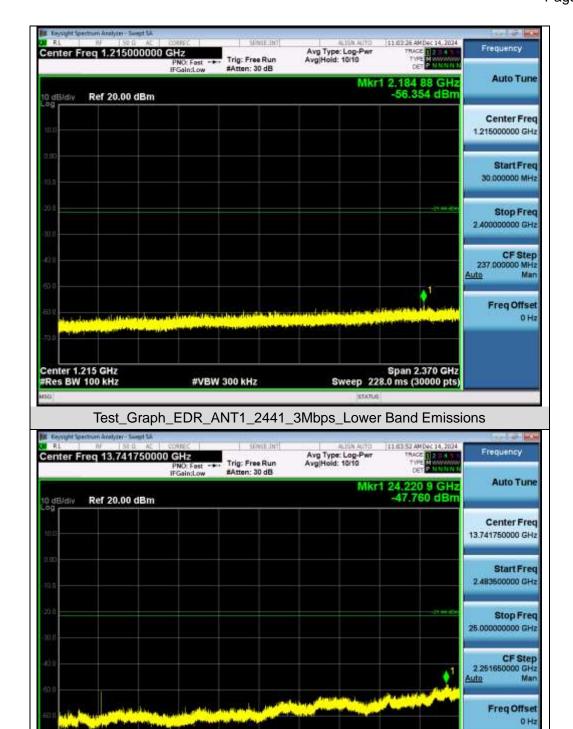
Test_Graph_EDR_ANT1_2441_3Mbps_Reference Level

#VBW 300 kHz

Center 2.441000 GHz #Res BW 100 kHz







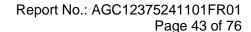
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_EDR_ANT1_2441_3Mbps_Higher Band Emissions

#VBW 300 kHz

Span 22.52 GHz Sweep 2.152 s (30000 pts)

Center 13.74 GHz #Res BW 100 kHz





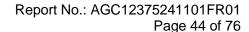


Test_Graph_EDR_ANT1_2480_3Mbps_Lower Band Emissions

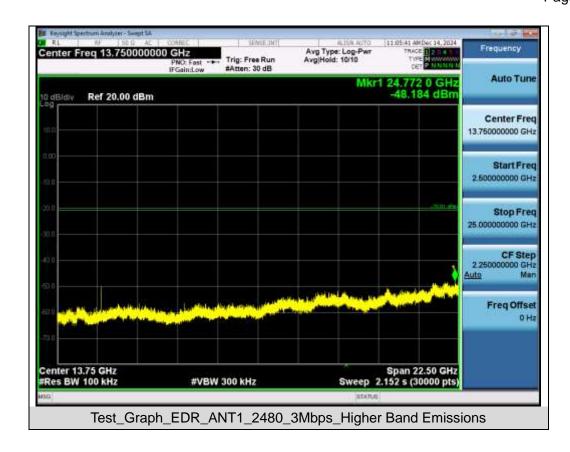
#VBW 300 kHz

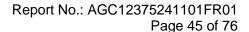
Span 2.370 GHz Sweep 228.0 ms (30000 pts)

Center 1.215 GHz #Res BW 100 kHz







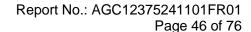




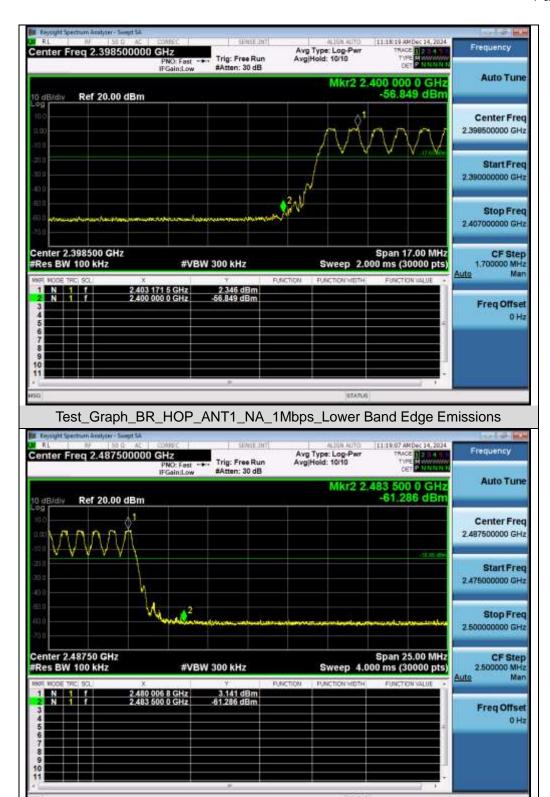
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands Frequency Avg Type: Log-Pw Avg|Hold: 10/10 Center Freq 2.398500000 GHz Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr2 2.400 000 0 GHz -50.751 dBm Ref 20.00 dBm Center Freq 2.398500000 GHz Start Freq 2.390000000 GHz Stop Freq 2.407000000 GH Center 2.398500 GHz #Res BW 100 kHz Span 17.00 MHz CF Step **#VBW** 300 kHz Sweep 2.000 ms (30000 pts) 1,700000 MH Auto 2.452 dBn -50.751 dBm Freq Offset Test_Graph_BR_ANT1_2402_1Mbps_Lower Band Edge Emissions Avg Type: Log-Pwr Avg|Hold: 10/10 Center Freq 2.487500000 GHz Frequency Trig: Free Run #Atten: 30 dB **Auto Tune** -57.616 dBm Ref 20.00 dBm Center Freq 2 487500000 GHz Start Freq 2.475000000 GHz 12 Stop Freq 2 5000000000 GHz Span 25.00 MHz Center 2.48750 GHz #Res BW 100 kHz **CF Step** Sweep 4.000 ms (30000 pts) **#VBW** 300 kHz 2.500000 MH -57.616 dBm Freq Offset

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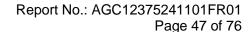
Test_Graph_BR_ANT1_2480_1Mbps_Higher Band Edge Emissions



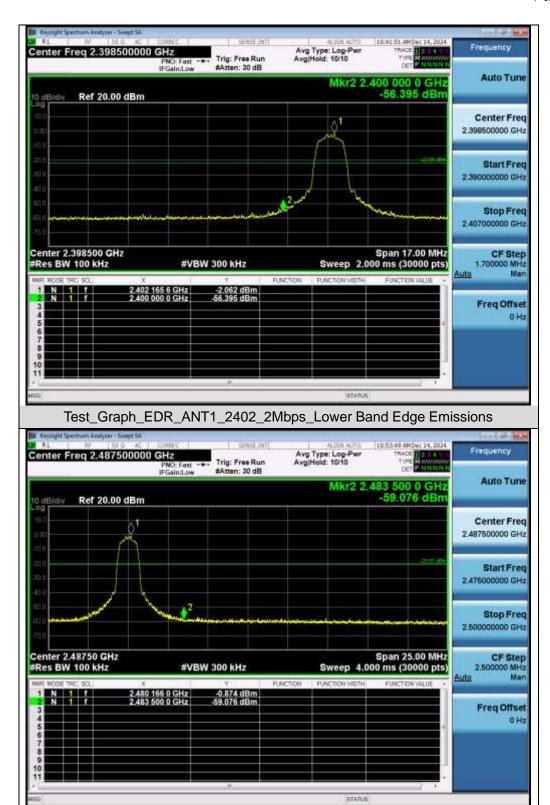




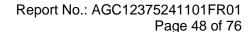
Test_Graph_BR_HOP_ANT1_NA_1Mbps_Higher Band Edge Emissions





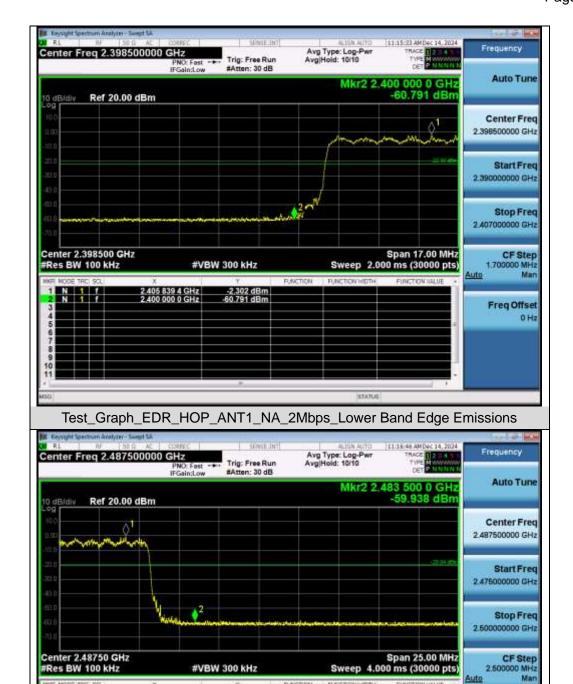


Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Edge Emissions



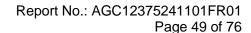
Freq Offset



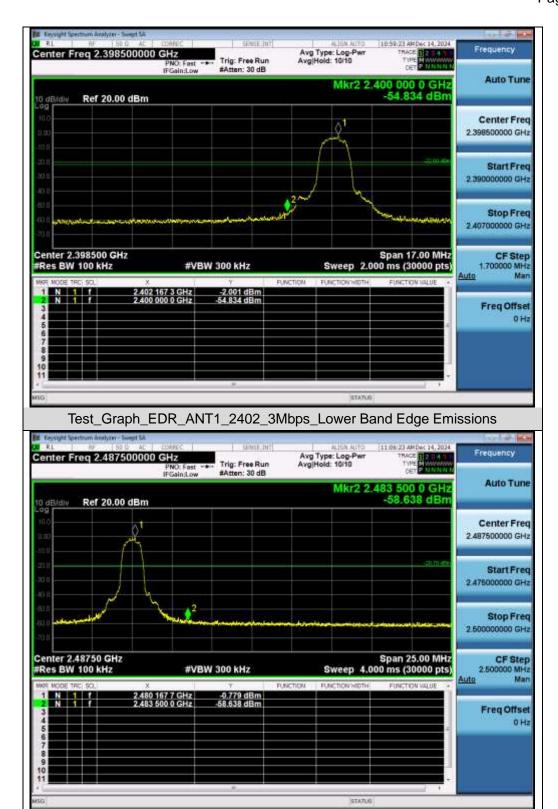


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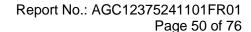
Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions



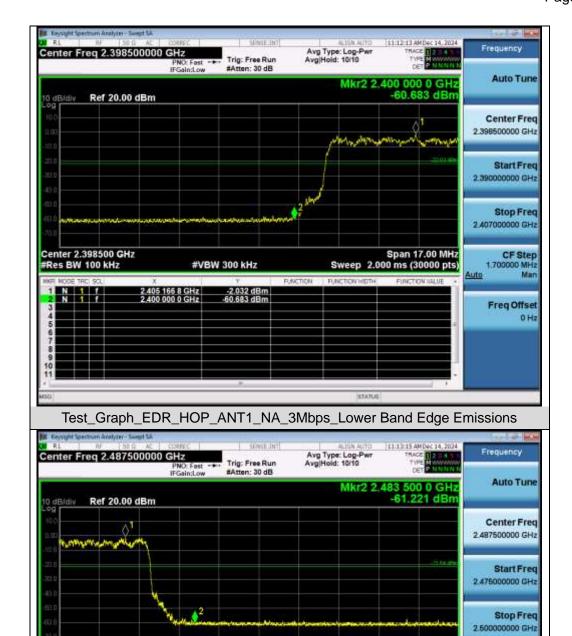




Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Edge Emissions







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Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions

#VBW 300 kHz

Span 25.00 MHz

Sweep 4.000 ms (30000 pts)

CF Step 2.500000 MHz Man

Freq Offset

Center 2.48750 GHz

#Res BW 100 kHz



Page 51 of 76

9. Radiated Spurious Emission

9.1 Measurement Limit

15.209 Limit in the below table has to be followed

10.200 Elittik iii tilo bolow table ilas	10.200 Elittik iii tile belew table has to be followed					
Frequencies	Field Strength	Measurement Distance				
(MHz)	(microvolts/meter)	(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

- 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.
- The height of the broadband receiving antenna was varied between one meter and four meters above 3. ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 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.
- 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.
- When the radiated emissions limits are expressed in terms of the average value of the emissions, and 7. 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



Page 52 of 76

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.

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

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		
Clart - Clop i requerity	1MHz/3MHz for Peak, 1MHz/3MHz for Average		

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		



Page 53 of 76

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

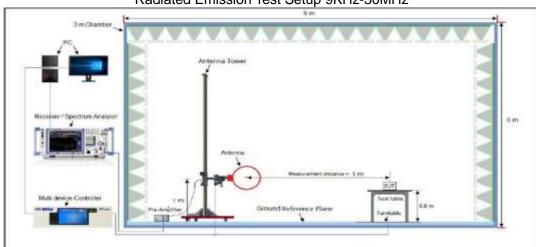
Average Measurements above 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW ≥ [3 × RBW]
- 4. Detector = Power averaging (rms)
- 5. Averaging type = power (i.e., rms)
- 6. Sweep time = auto
- 7. Perform a trace average of at least 100 traces.
- 8. The applicable correction factor is [10*log (1 / D)], where D is the duty cycle. The factor had been edited in the "Input Correction" of the Spectrum Analyzer.

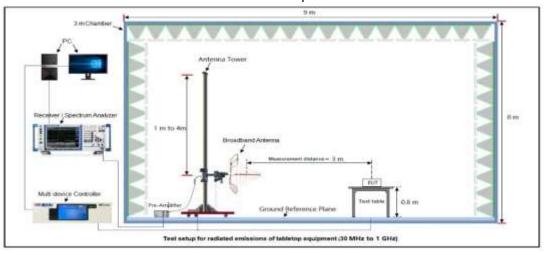


9.3 Measurement Setup (Block Diagram of Configuration)

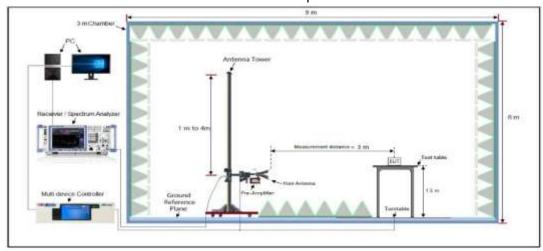
Radiated Emission Test Setup 9KHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz





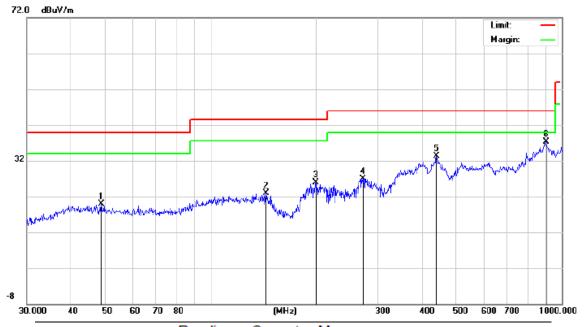
Report No.: AGC12375241101FR01 Page 55 of 76

9.4 Measurement Result

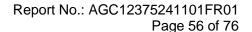
Radiated Emission Below 30MHz

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

Radiated Emission Test Results at 30MHz-1GHz					
EUT Name Wireless Audio Receiver & Transmitter Model Name RTS2					
Temperature	21.4℃	Relative Humidity	58.8%		
Pressure	960hPa	Test Voltage	DC 5V		
Test Mode	Mode 3	Antenna Polarity	Horizontal		

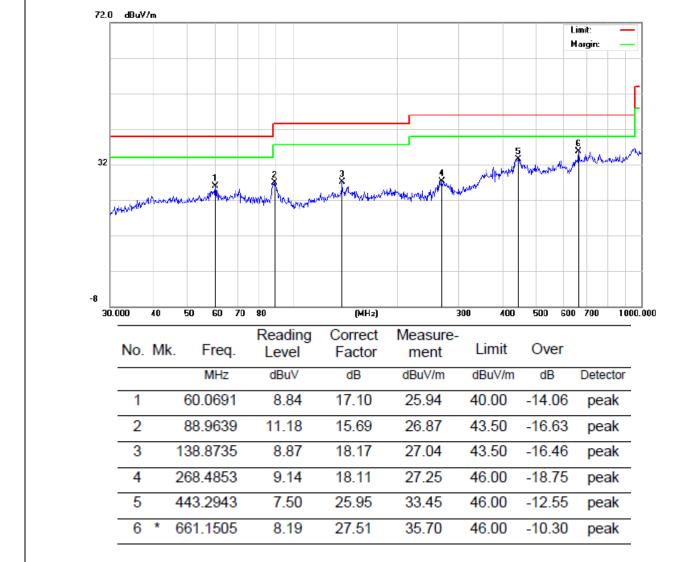


No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		48.8429	6.72	13.28	20.00	40.00	-20.00	peak
2		143.8295	8.22	14.64	22.86	43.50	-20.64	peak
3		199.9856	11.49	14.50	25.99	43.50	-17.51	peak
4		272.2776	12.13	14.86	26.99	46.00	-19.01	peak
5		440.1963	8.25	25.09	33.34	46.00	-12.66	peak
6	*	903.3094	5.92	31.34	37.26	46.00	-8.74	peak





Radiated Emission Test Results at 30MHz-1GHz					
EUT Name Wireless Audio Receiver & Transmitter Model Name RTS2					
Temperature	21.4℃	Relative Humidity	58.8%		
Pressure	960hPa	Test Voltage	DC 5V		
Test Mode	Mode 3	Antenna Polarity	Vertical		



RESULT: Pass

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

2. All test modes had been pre-tested. The mode 3 is the worst case and recorded in the report.



Page 57 of 76

Radiated Emissions Test Results Above 1GHz

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 1	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	47.56	0.08	47.64	74	-26.36	peak
4804.000	38.46	0.08	38.54	54	-15.46	AVG
7206.000	42.38	2.21	44.59	74	-29.41	peak
7206.000	31.68	2.21	33.89	54	-20.11	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 1	Antenna Polarity	Vertical

(dBµV)	(10)				במעו בעובעו.
(== = - /	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
47.98	0.08	48.06	74	-25.94	peak
38.54	0.08	38.62	54	-15.38	AVG
42.56	2.21	44.77	74	-29.23	peak
32.39	2.21	34.6	54	-19.4	AVG
	38.54 42.56	38.54 0.08 42.56 2.21	38.54 0.08 38.62 42.56 2.21 44.77	38.54 0.08 38.62 54 42.56 2.21 44.77 74	38.54 0.08 38.62 54 -15.38 42.56 2.21 44.77 74 -29.23

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

RESULT: Pass



Report No.: AGC12375241101FR01 Page 58 of 76

Radiated Emissions Test Results for Above 1GHz

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 2	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4882.000	46.89	0.14	47.03	74	-26.97	peak	
4882.000	37.54	0.14	37.68	54	-16.32	AVG	
7323.000	42.28	2.36	44.64	74	-29.36	peak	
7323.000	32.66	2.36	35.02	54	-18.98	AVG	
Remark:	Remark:						

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

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 2	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	47.48	0.14	47.62	74	-26.38	peak
4882.000	38.54	0.14	38.68	54	-15.32	AVG
7323.000	41.59	2.36	43.95	74	-30.05	peak
7323.000	32.37	2.36	34.73	54	-19.27	AVG

Remark

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

RESULT: Pass



Page 59 of 76

Radiated Emissions Test Results for Above 1GHz

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 3	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	47.58	0.22	47.8	74	-26.2	peak
4960.000	38.52	0.22	38.74	54	-15.26	AVG
7440.000	42.76	2.64	45.4	74	-28.6	peak
7440.000	32.39	2.64	35.03	54	-18.97	AVG
Remark:	·	·	·			

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

EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	21.4℃	Relative Humidity	58.8%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 3	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	47.56	0.22	47.78	74	-26.22	peak
4960.000	38.52	0.22	38.74	54	-15.26	AVG
7440.000	42.37	2.64	45.01	74	-28.99	peak
7440.000	41.96	2.64	44.6	54	-9.4	AVG

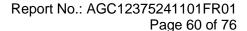
Remark:

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

RESULT: Pass

Note:

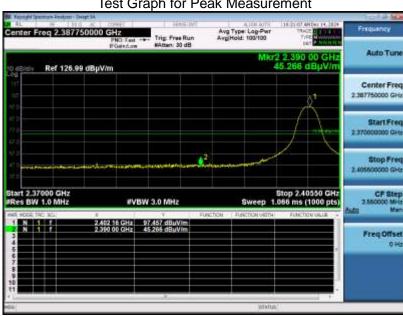
- The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
- 2. Factor = Antenna Factor + Cable loss - Pre-amplifier gain, Margin = Emission Level-Limit.
- The "Factor" value can be calculated automatically by software of measurement system.

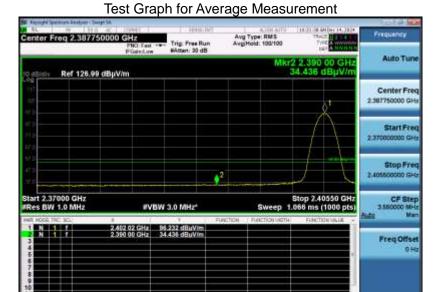




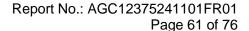
EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	22℃	Relative Humidity	31%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 1	Antenna Polarity	Horizontal

Test Graph for Peak Measurement





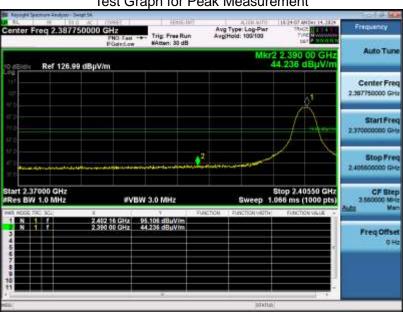
RESULT: Pass

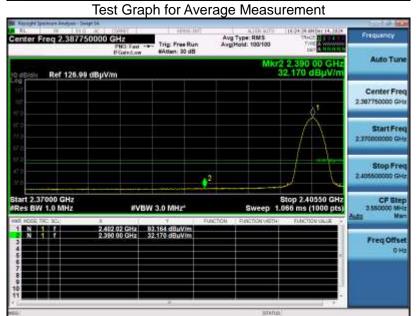




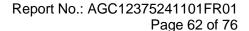
EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	22℃	Relative Humidity	31%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 1	Antenna Polarity	Vertical

Test Graph for Peak Measurement





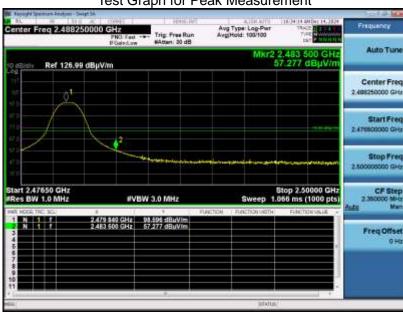
RESULT: Pass

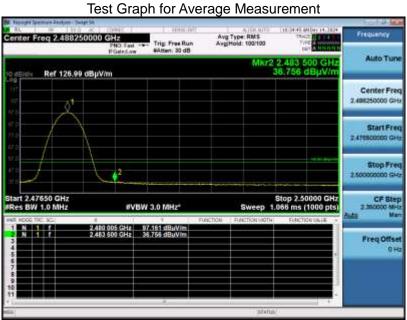




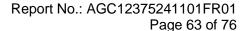
EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	22℃	Relative Humidity	31%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 3	Antenna Polarity	Horizontal

Test Graph for Peak Measurement





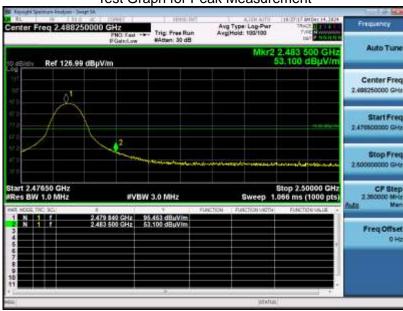
RESULT: Pass

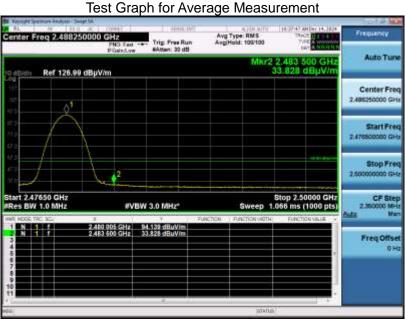




EUT Name	Wireless Audio Receiver & Transmitter	Model Name	RTS2
Temperature	22℃	Relative Humidity	31%
Pressure	960hPa	Test Voltage	DC 5V
Test Mode	Mode 3	Antenna Polarity	Vertical

Test Graph for Peak Measurement





RESULT: Pass

Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer.



Page 64 of 76

10. Number of Hopping Frequency Measurement

10.1 Provisions Applicable

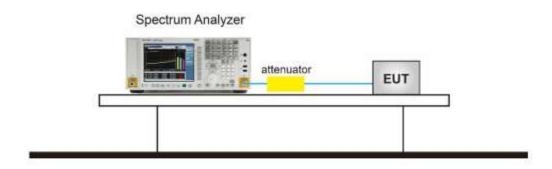
This frequency hopping system must employ a minimum of 15 hopping channels.

10.2 Measurement Procedure

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

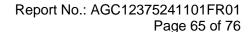
- 1. Span = The frequency band of operation. Depending on the number of channels the device
- 2. supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- 3. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- 4. VBW ≥ 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)

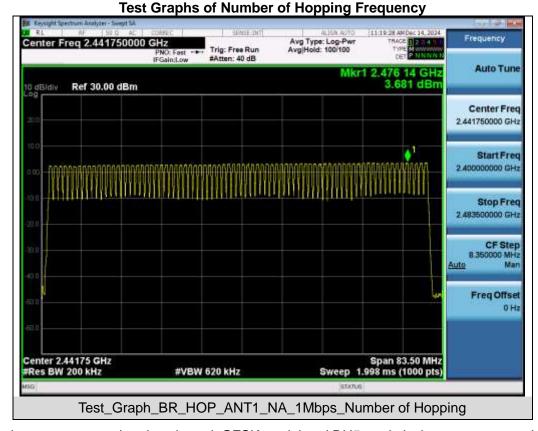


10.4 Measurement Result

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







Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.



Report No.: AGC12375241101FR01 Page 66 of 76

11. Time of Occupancy (Dwell Time) Measurement

11.1 Provisions Applicable

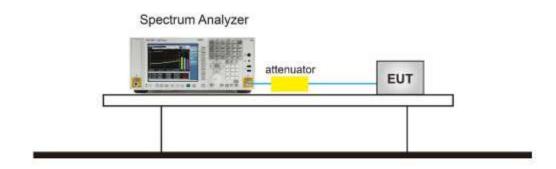
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

11.2 Measurement Procedure

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

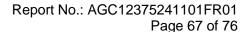
- 1. Span = Zero span, centered on a hopping channel.
- 2. RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3. VBW ≥ RBW
- 4. Sweep time = As necessary to capture the entire dwell time per hopping channel
- 5. Detector = Peak
- 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	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Dwell Time (ms)	Limit (ms)	Pass or Fail		
2402	2.884	28.0*4	323.008	400	Pass		
2441	2.884	26.0*4	299.936	400	Pass		
2480	2.884	30.0*4	346.080	400	Pass		

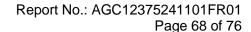




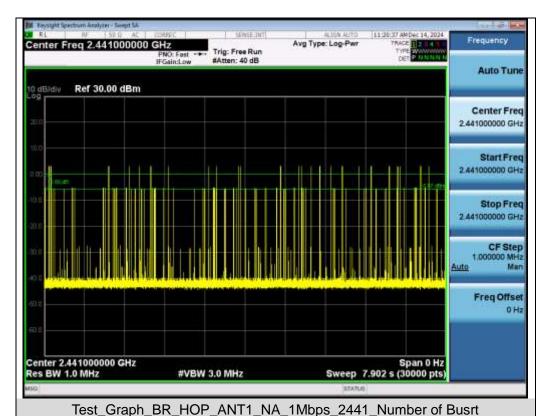
Test Graphs of Dwell Time Avg Type: Log-Pwr Center Freq 2.402000000 GHz Trig: Free Run #Atten: 40 dB **Auto Tune** Ref 30.00 dBm Center Freq 2.402000000 GHz Start Freq 2.402000000 GHz Stop Freq 2.402000000 GHz CF Step 1.000000 MH Freq Offset 0 Hz Center 2.402000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 7.902 s (30000 pts)

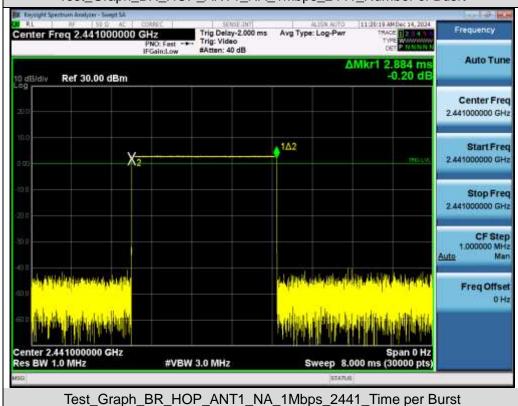
#VBW 3.0 MHz

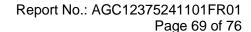
Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Number of Busrt Center Freq 2.402000000 GHz Trig Delay-2.000 ms Avg Type: Log-Pwr Trig: Video #Atten: 40 dB Frequency PNO: Fast ---IFGain:Low **Auto Tune** ΔMkr1 2.884 ms -1.65 dB Ref 30.00 dBm Center Freq 2 402000000 GHz Start Freq 142 2.402000000 GHz Stop Freq 2 402000000 GHz CF Step 1.000000 MH Freq Offset Center 2.402000000 GHz Res BW 1.0 MHz **#VBW 3.0 MHz** Sweep 8.000 ms (30000 pts Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst



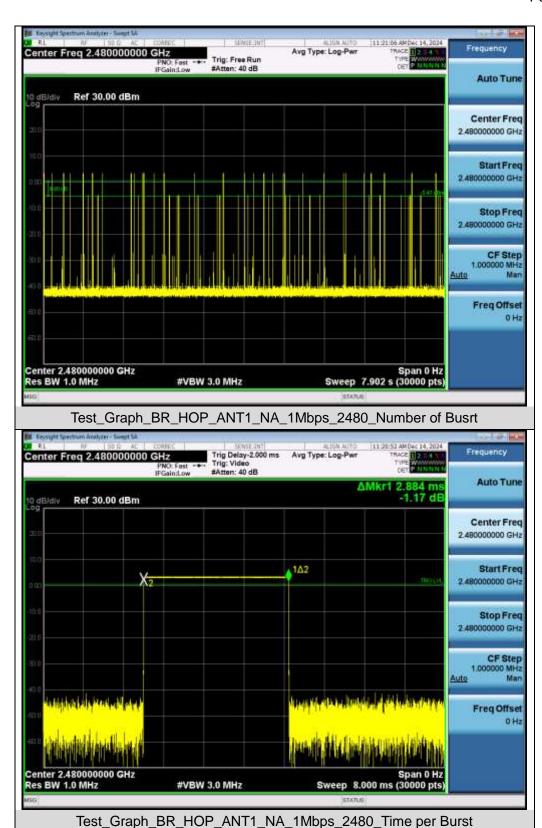












Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.



Page 70 of 76

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.

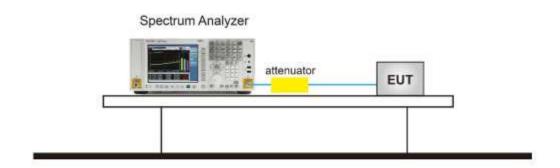
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

12.2 Measurement Procedure

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

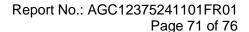
- 1. Span: Wide enough to capture the peaks of two adjacent channels.
- 2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- 3. Video (or average) bandwidth (VBW) ≥ RBW.
- 4. Sweep: Auto.
- 5. Detector 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)

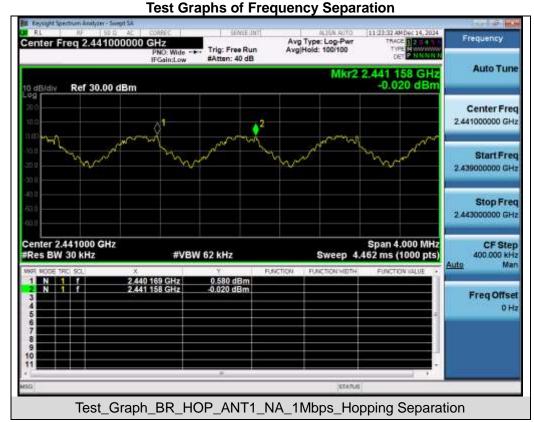


12.4 Measurement Result

Test Data of Frequency Separation			
Test Mode	Channel Separation (MHz)	Limits (MHz)	Pass or Fail
GFSK	0.989	≥0.889	Pass







Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.



Report No.: AGC12375241101FR01 Page 72 of 76

13. AC Power Line Conducted Emission Test

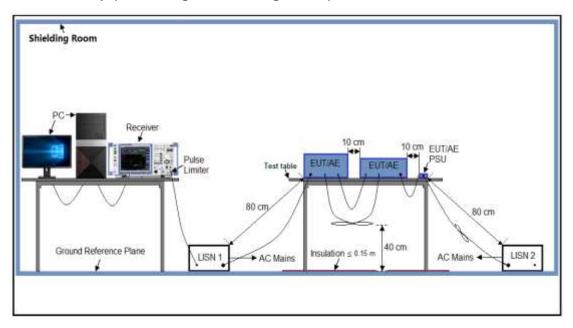
13.1 Measurement Limit

Frequency	Maximum RF Line Voltage		
	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)





Report No.: AGC12375241101FR01 Page 73 of 76

13.3 Preliminary Procedure of Line Conducted Emission Test

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support 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.

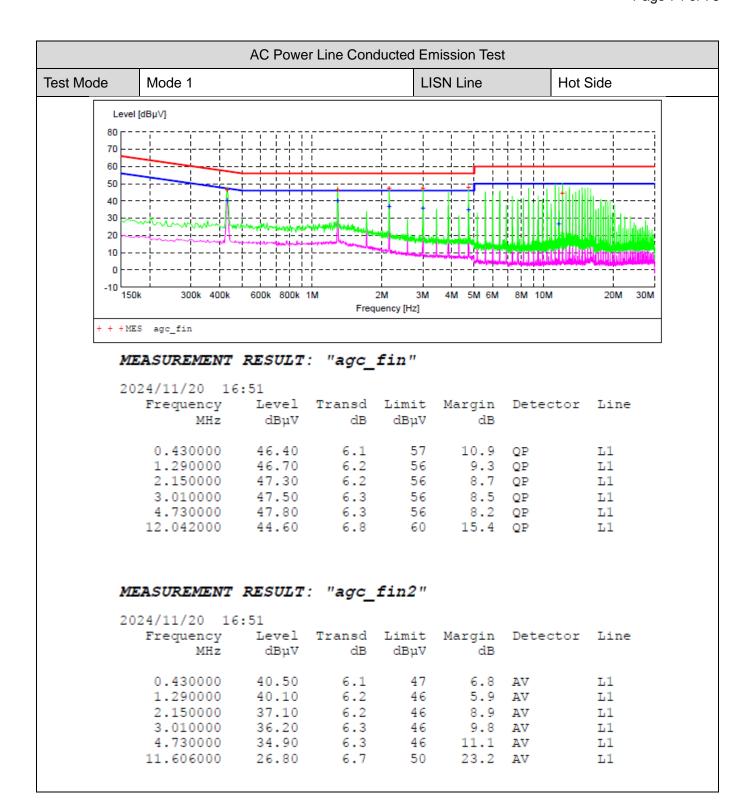
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4 Final Procedure of Line Conducted Emission Test

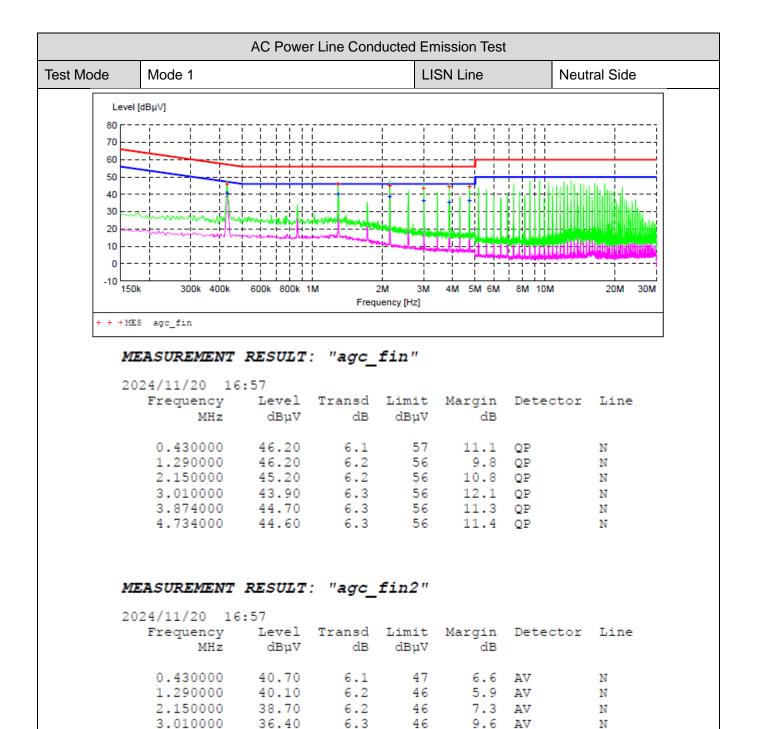
- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were 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









6.3

6.3

46

46

10.5

9.7

ΑV

ΑV

Ν

Ν

3.874000

4.734000

35.50

36.30



Page 76 of 76

Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC12375241101AP02

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC12375241101AP03

----End of Report----



Conditions of Issuance of Test Reports

- 1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").
- 2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
- 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.
- 5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 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.