

# **FCC Test Report**

Report No.: AGC08189240502FR01

FCC ID : 2ACP4CBT100

**APPLICATION PURPOSE**: Original Equipment

**PRODUCT DESIGNATION**: Bluetooth Headphones

**BRAND NAME** : SENTRY

BTKID, BT100, BT105, BT106, BTDINO, BTPRIN,

BTSHARK, BTALIEN, BTDEVIL, BTBEAR, BTFIN, BTA100,

BTAKID, BTA200, BT170, BTA170, BT200, BTA1000,

**MODEL NAME** : BTA2000, BTA3000, BTAND, BTANC, BTUNI, BTCAT,

BTAUNI, BTACAT, BTAPRIN, BTADINO, BTASHARK, BTAALIEN, BTADEVIL, BTABEAR, BTAFIN, BTANDZ,

BT170Z, BT800, BTA800

**APPLICANT** : Sentry Industries limited

**DATE OF ISSUE** : Jun. 04, 2024

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

REPORT VERSION :

Attestation of Global Compliance (Shenzhen) Co., Ltd



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# **Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes	
V1.0	/	Jun. 04, 2024	Valid	Initial Release	

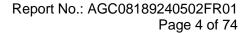


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Web: http://www.agccert.com/





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# 1. General Information

Applicant	Sentry Industries limited				
Address	UNIT 904, 9/F CHINACHEM GOLDEN PLAZA, 77 MODY ROAD, TSIM SHA TSUI				
/ ludi Coo	EAST, KOWLOON, HONG KONG, China				
Manufacturer	Guangdong SAIYO Eletronics Industry Co.,Ltd				
Address	Xibian Industry Zone, Tongyu Town, Chaoyang District, Shantou City, Guangdong				
Address	Province, China				
Factory	Guangdong SAIYO Eletronics Industry Co.,Ltd				
Address	Xibian Industry Zone, Tongyu Town, Chaoyang District, Shantou City, Guangdong				
Address	Province, China				
Product Designation	Bluetooth Headphones				
Brand Name	SENTRY				
Test Model	BTKID				
	BT100, BT105, BT106, BTDINO , BTPRIN, BTSHARK, BTALIEN, BTDEVIL,				
	BTBEAR, BTFIN, BTA100, BTAKID, BTA200, BT170, BTA170, BT200, BTA1000,				
Series Model(s)	BTA2000, BTA3000, BTAND, BTANC, BTUNI, BTCAT, BTAUNI, BTACAT,				
	BTAPRIN, BTADINO, BTASHARK, BTAALIEN, BTADEVIL, BTABEAR, BTAFIN,				
	BTANDZ , BT170Z , BT800, BTA800				
Difference Description	All the series models are the same as the test model except for the model names				
Dillerence Description	and the color of appearance.				
Date of receipt of test item	May 28, 2024				
Date of Test	May 28, 2024 to Jun. 04, 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.

Reviewed By

Cool Cheng (Project Engineer)

Calvin Liu (Reviewer)

Approved By

Max Zhang
Authorized Officer

Jun. 04, 2024

Jun. 04, 2024



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## 2. Product Information

# 2.1 Product Technical Description

Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2402MHz-2480MHz
Bluetooth Version	V5.3
Modulation Type	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK
Number of channels	79 Channels
Channel Separation	1 MHz
Maximum Transmitter Power	-4.058dBm
Hardware Version	2.0
Software Version	V1.0
Antenna Designation	PCB Antenna
Antenna Gain	-0.58dBi
Power Supply	DC 3.7V by battery

# 2.2 Test Frequency List

Frequency Band	Channel Number	Frequency				
2400~2483.5MHz	0	2402 MHz				
	1	2403 MHz				
	:	:				
	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.						



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# 2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2ACP4CBT100, 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 regu				
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.

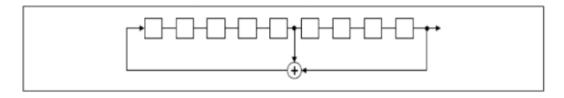


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# 2.7 Pseudorandom Frequency Hopping Sequence

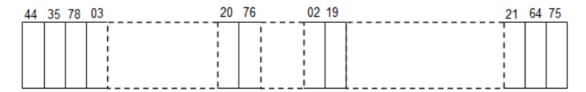
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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



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## 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 -0.58dBi.



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#### 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.



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#### 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 ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%

_	uncertainty multiplied by a coverage factor of k=2, provi	ullig 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	$U_c = \pm 2.6 \text{ dB}$
Ī	Uncertainty of spurious emissions, conducted	U <sub>c</sub> = ±2 %
	Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$



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# 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	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-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08	
	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	
$\boxtimes$	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	2022-08-04	2024-08-03	
$\boxtimes$	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	

AC Power Line Conducted Emission								
Illsed I Equipment No. I Lest Equipment   Manufacturer   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	



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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		
$\boxtimes$	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6		
	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0		



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# 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:



## 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	Control Box		USB-TTL	1	

☐ Test Accessories Come From The Manufacturer

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1					

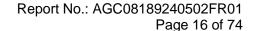


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# 4.5 Summary of Test Results

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	Not applicable

Note: The BT function cannot transmit when charging.



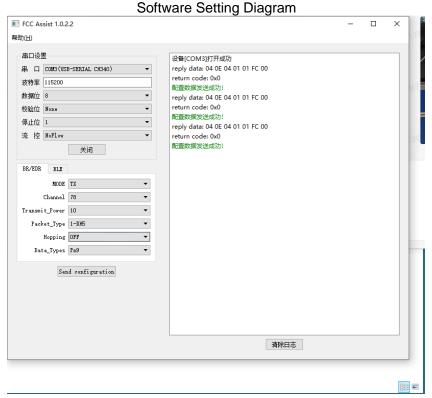


# 5. Description of Test Modes

Summary table of Test Cases				
Test Item	Data Rate / Modulation			
rest item	Bluetooth – BR_EDR (GFSK/π /4-DQPSK/8DPSK)			
Radiated & Conducted Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps (Battery powered) Mode 2: Bluetooth Tx CH39_2441 MHz_1Mbps (Battery powered) Mode 3: Bluetooth Tx CH78_2480 MHz_1Mbps (Battery powered) Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps (Battery powered) Mode 5: Bluetooth Tx CH39_2441 MHz_2Mbps (Battery powered) Mode 6: Bluetooth Tx CH78_2480 MHz_2Mbps (Battery powered) Mode 7: Bluetooth Tx CH00_2402 MHz_3Mbps (Battery powered) Mode 8: Bluetooth Tx CH39_2441 MHz_3Mbps (Battery powered) Mode 9: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered) Mode10: Bluetooth Tx Hopping-1Mbps (Battery powered) Mode11: Bluetooth Tx Hopping-2Mbps (Battery powered) Mode12: Bluetooth Tx Hopping-3Mbps (Battery powered)			
AC Conducted Emission	N/A			

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





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# 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:

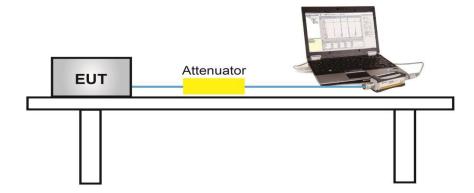
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW ≥RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: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

I	For	Average	power	test:
	 	/ WCI auc		icoi.

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)

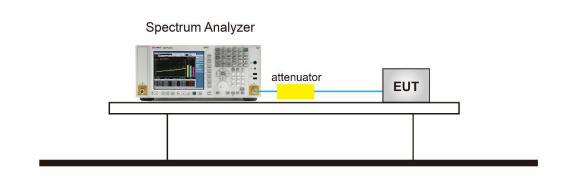
For Average power test setup





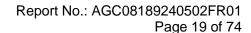
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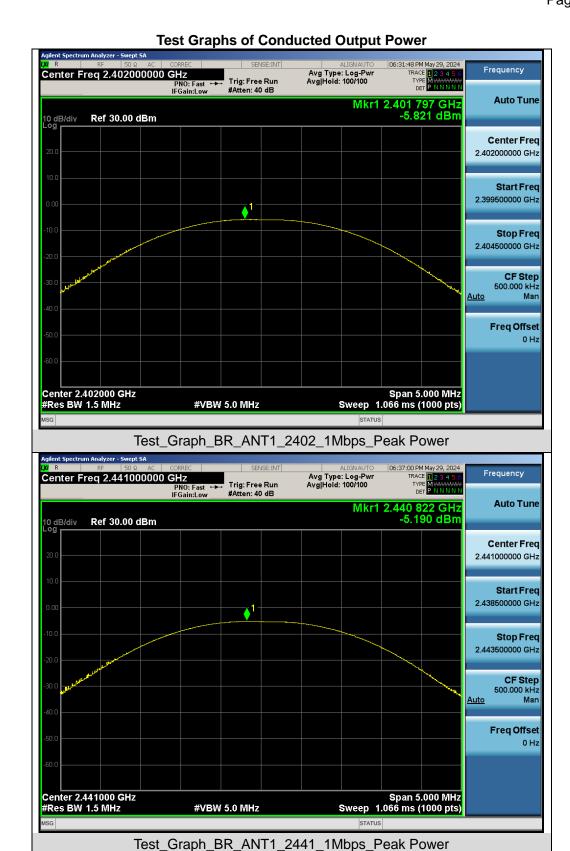


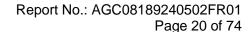
#### **6.4 Measurement Result**

Test Data of Conducted Output Power					
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail	
	2402	-5.821	≤21	Pass	
GFSK	2441	-5.190	≤21	Pass	
	2480	-5.164	≤21	Pass	
	2402	-5.089	≤21	Pass	
π /4-DQPSK	2441	-4.301	≤21	Pass	
	2480	-4.296	≤21	Pass	
	2402	-4.662	≤21	Pass	
8DPSK	2441	-4.058	≤21	Pass	
	2480	-4.067	≤21	Pass	













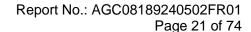
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Test Graph EDR ANT1 2402 2Mbps Peak Power

**#VBW 5.0 MHz** 

Span 5.000 MHz Sweep 1.066 ms (1000 pts)

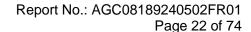
Center 2.402000 GHz #Res BW 1.5 MHz







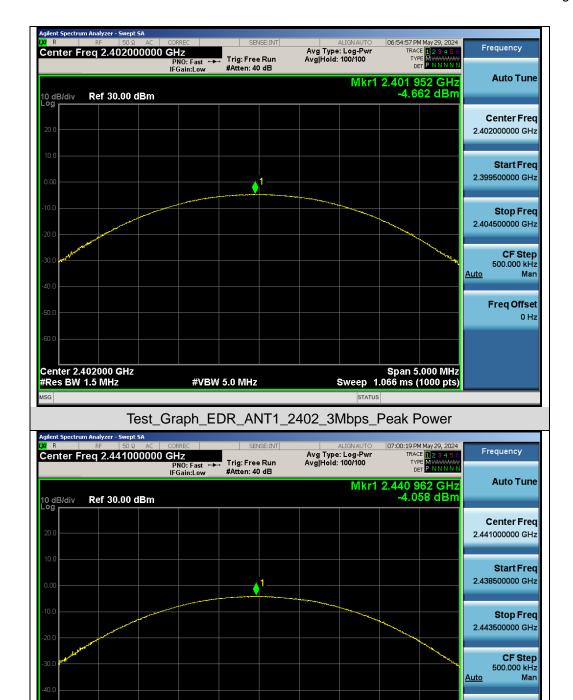




Freq Offset

Span 5.000 MHz Sweep 1.066 ms (1000 pts)



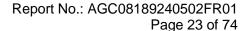


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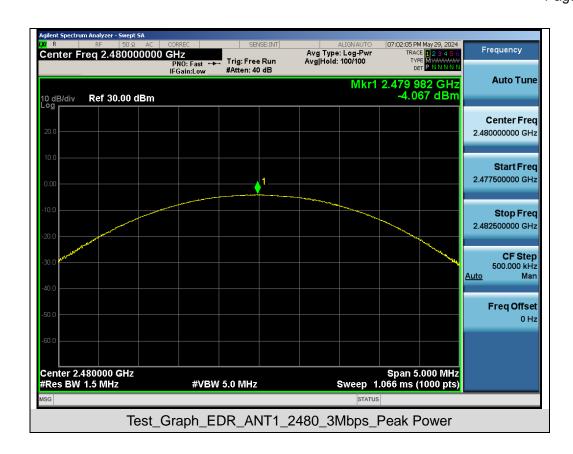
Test Graph EDR ANT1 2441 3Mbps Peak Power

**#VBW 5.0 MHz** 

Center 2.441000 GHz #Res BW 1.5 MHz









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# 7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement

# 7.1 Provisions Applicable

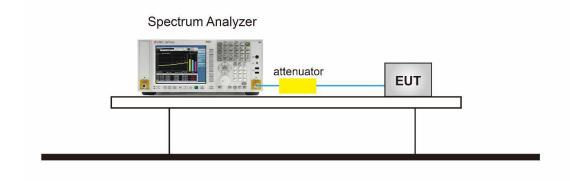
There is no corresponding limit requirement for this test item.

#### 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
- 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)

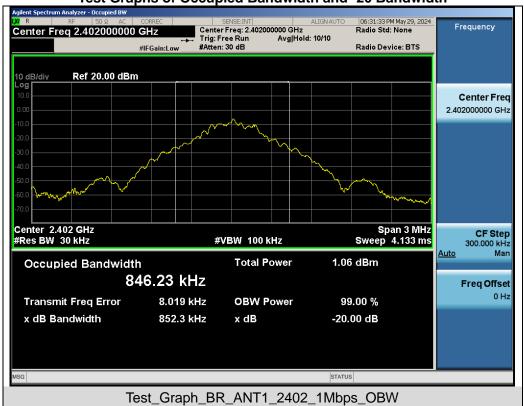


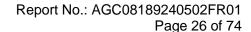


#### 7.4 Measurement Results

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	0.846	0.852	N/A	Pass	
GFSK	2441	0.844	0.855	N/A	Pass	
	2480	0.845	0.855	N/A	Pass	
	2402	1.167	1.219	N/A	Pass	
π /4-DQPSK	2441	1.166	1.218	N/A	Pass	
	2480	1.167	1.221	N/A	Pass	
	2402	1.171	1.249	N/A	Pass	
8DPSK	2441	1.174	1.248	N/A	Pass	
	2480	1.174	1.249	N/A	Pass	

Test Graphs of Occupied Bandwidth and -20 Bandwidth

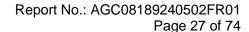






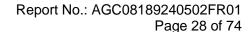


Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/



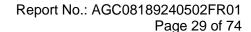




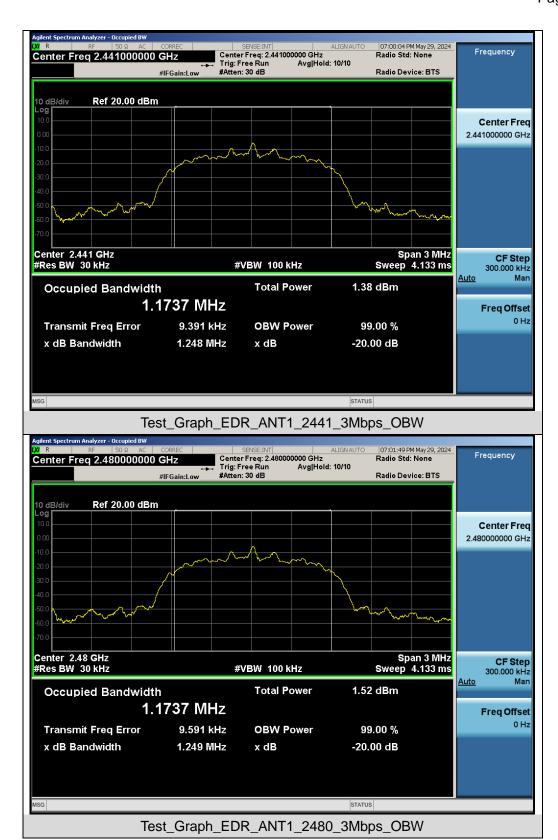














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# 8. Conducted Band Edge and Out-of-Band Emissions

# 8.1 Provisions Applicable

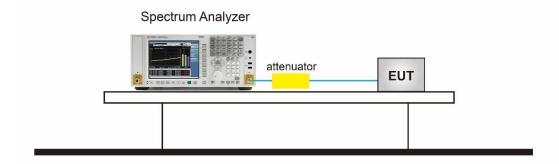
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

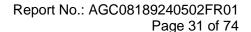
#### 8.2 Measurement Procedure

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
- 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)



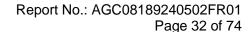




#### 8.4 Measurement Results

Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

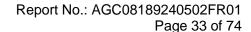




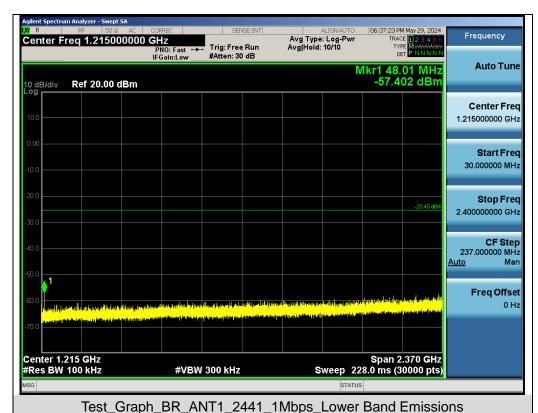


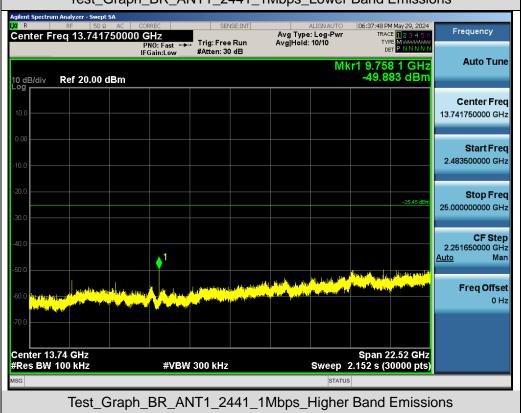


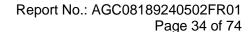














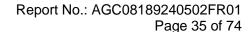


Test Graph BR ANT1 2480 1Mbps Lower Band Emissions

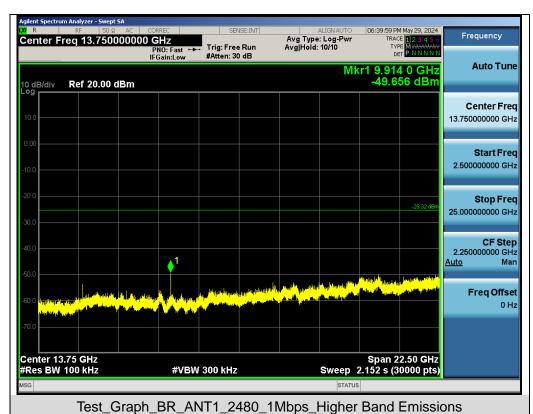
#VBW 300 kHz

Span 2.370 GHz Sweep 228.0 ms (30000 pts)

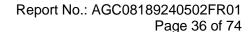
Center 1.215 GHz #Res BW 100 kHz



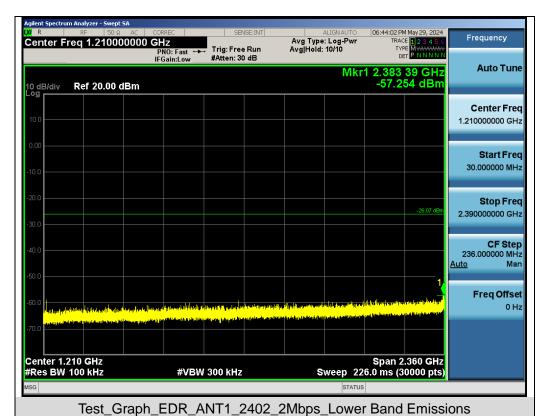


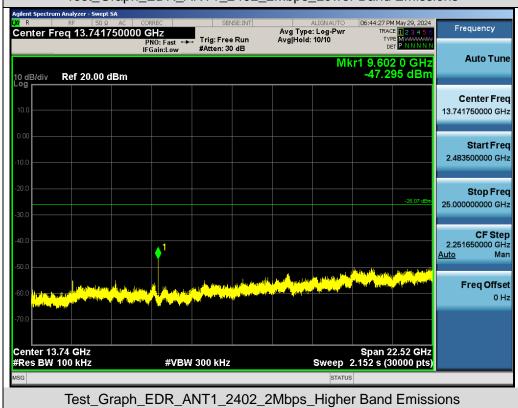


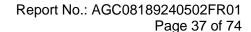












**Stop Freq** 2.400000000 GHz

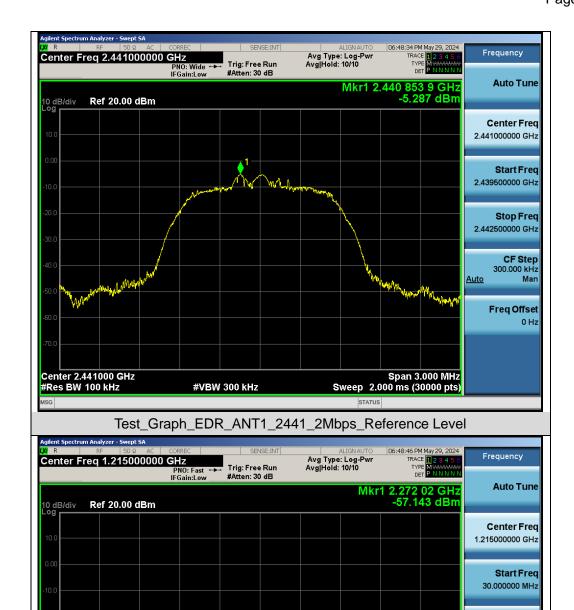
**CF Step** 237.000000 MHz <u>ito</u> Man

> Freq Offset 0 Hz

<u>Auto</u>

Span 2.370 GHz Sweep 228.0 ms (30000 pts)



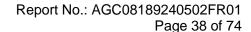


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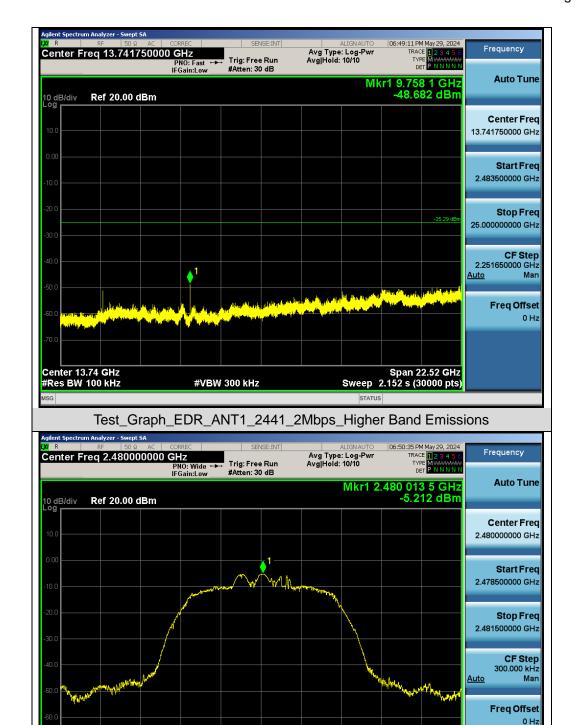
Test Graph EDR ANT1 2441 2Mbps Lower Band Emissions

**#VBW 300 kHz** 

Center 1.215 GHz #Res BW 100 kHz







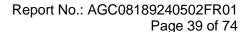
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Test Graph EDR ANT1 2480 2Mbps Reference Level

**#VBW 300 kHz** 

Span 3.000 MHz Sweep 2.000 ms (30000 pts)

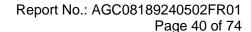
Center 2.480000 GHz #Res BW 100 kHz











2.390000000 GHz



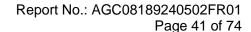


CF Step 236.000000 MHz Auto Man

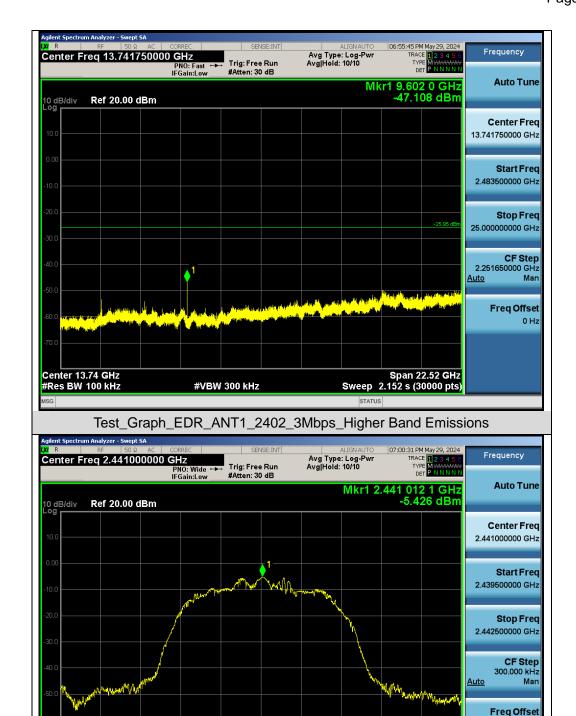
Freq Offset
0 Hz

Center 1.210 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 226.0 ms (30000 pts)

Test\_Graph\_EDR\_ANT1\_2402\_3Mbps\_Lower Band Emissions







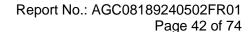
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Test Graph EDR ANT1 2441 3Mbps Reference Level

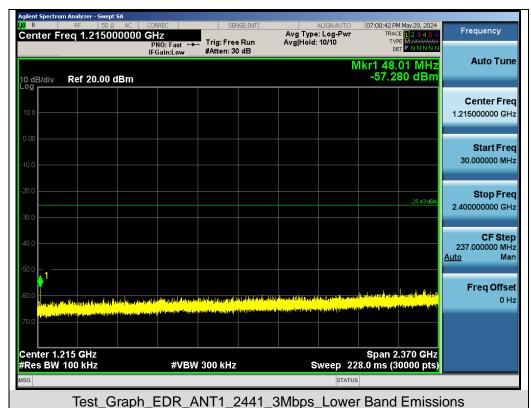
**#VBW 300 kHz** 

Span 3.000 MHz Sweep 2.000 ms (30000 pts)

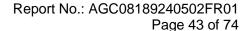
Center 2.441000 GHz #Res BW 100 kHz





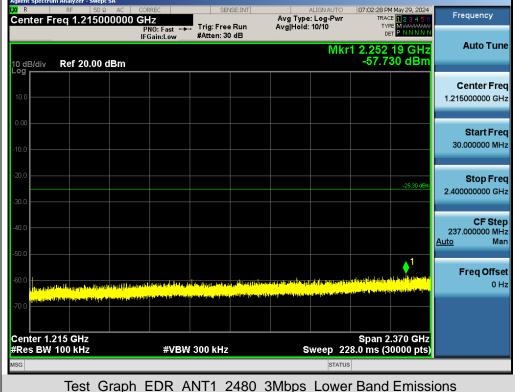


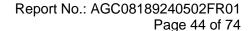




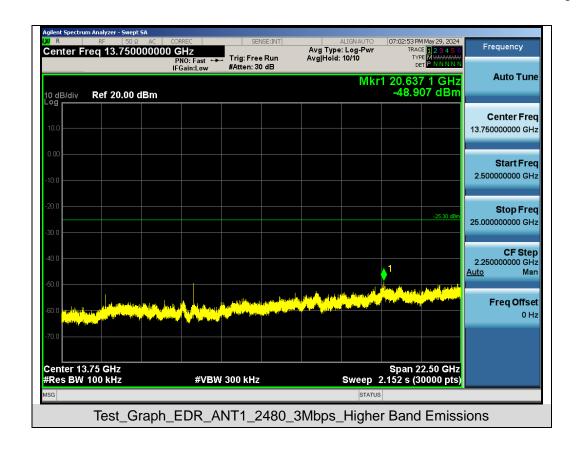


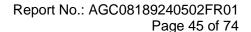






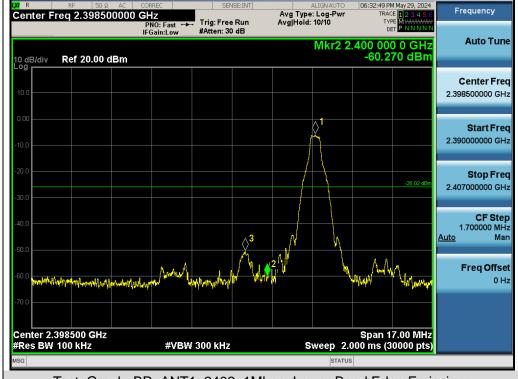




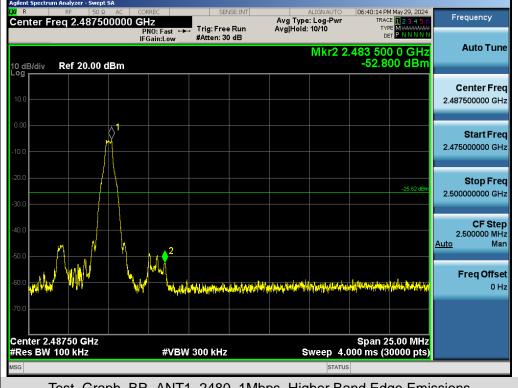




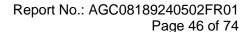
# Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands Agailent Spectrum Analyzer - Swept SA W R RF | 50 \( \text{Q} \) AC | CORREC | SENSE:INT | ALIGN AUTO | 06:32:49 PM May 29, 2024 | Center Freq 2.398500000 GHz Avg Type: Log-Pwr | TRACE | 2.398500000 GHz



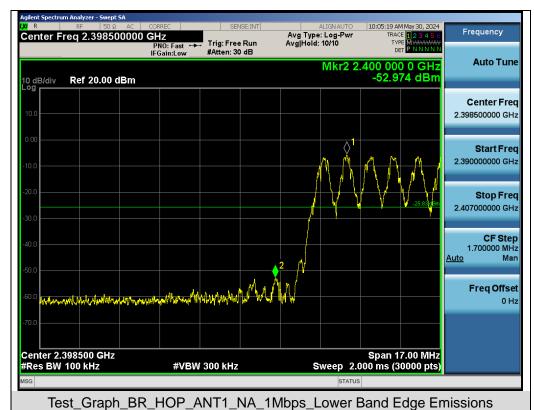


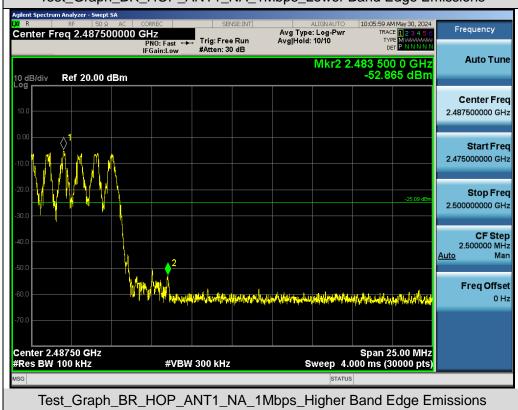


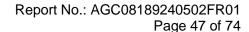
Test\_Graph\_BR\_ANT1\_2480\_1Mbps\_Higher Band Edge Emissions



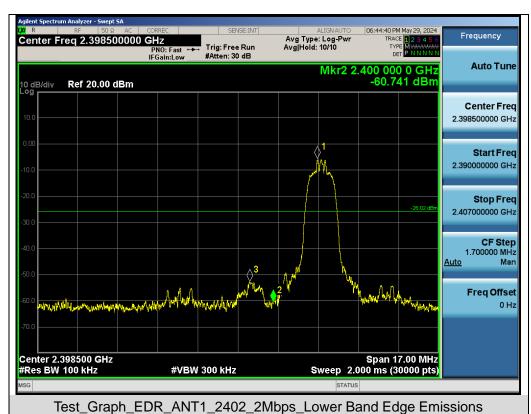


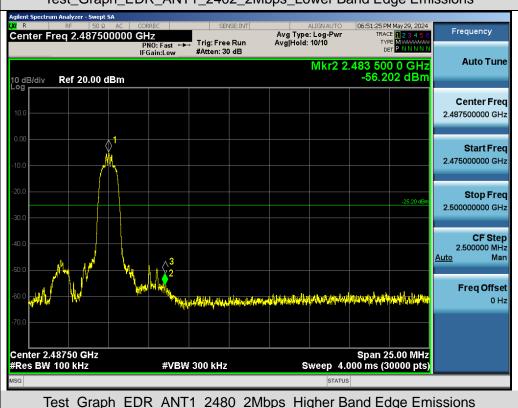


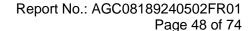






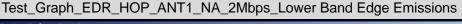


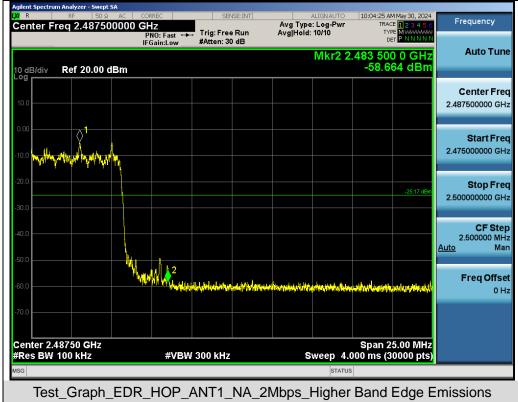


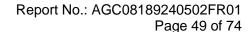




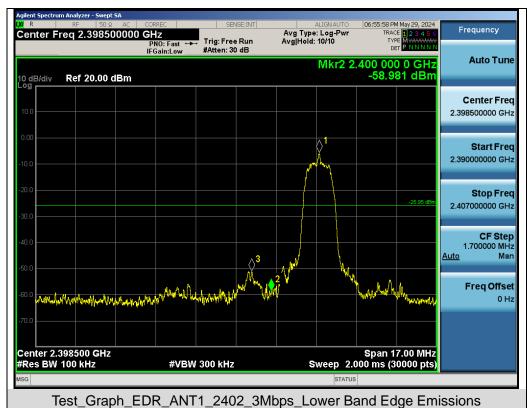


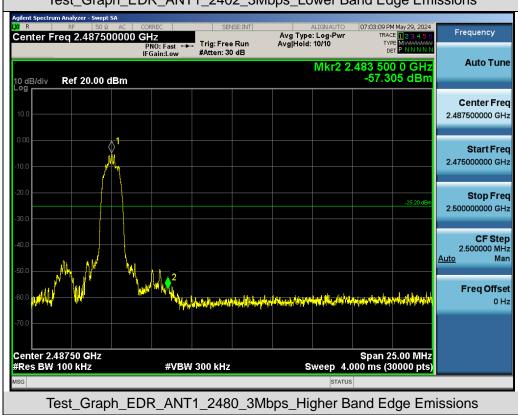


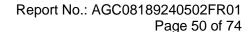




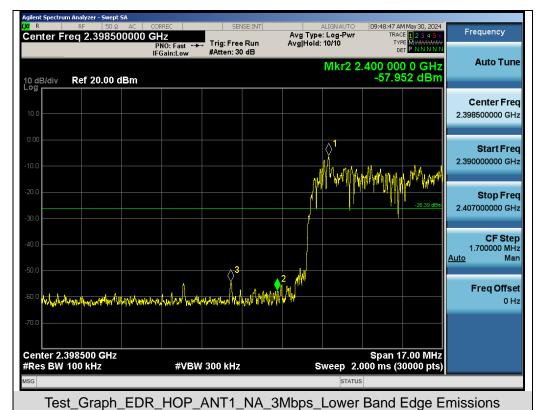


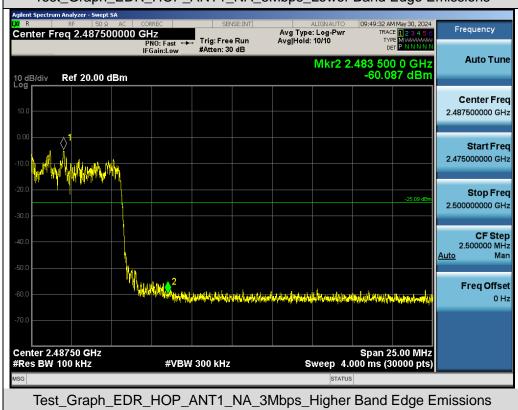














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# 9. Radiated Spurious Emission

## 9.1 Measurement Limit

15,209 Limit in the below table has to be followed.

10.200 Elittik ili tilo bolow table rias		
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.
- 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



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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.

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
Start ~Stop 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



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## Quasi-Peak Measurements below 1GHz

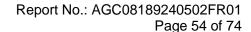
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. Span was set greater than 1MHz
- 3. RBW = as shown in the table above
- 4. Detector = CISPR quasi-peak
- 5. Sweep time = auto couple
- 6. Trace was allowed to stabilize

## 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

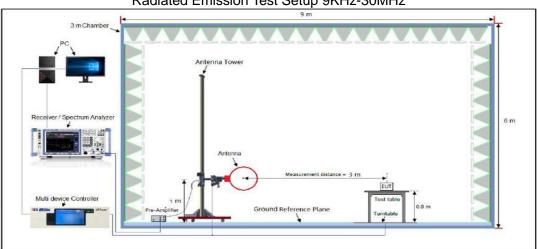
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3.  $VBW \ge [3 \times RBW]$
- 4. Detector = Power averaging (rms)
- 5. Averaging type = power (i.e., rms)
- 6. Sweep time = auto
- 7. Perform a trace average of at least 100 traces.
- 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.



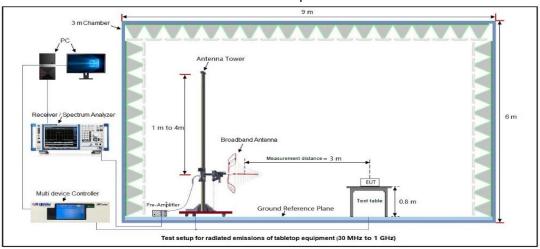


# 9.3 Measurement Setup (Block Diagram of Configuration)

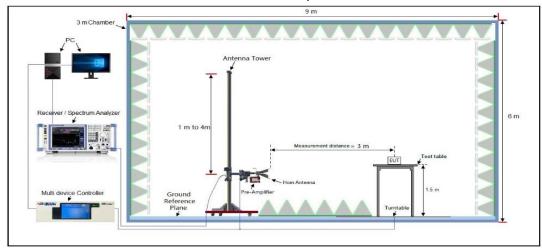
Radiated Emission Test Setup 9KHz-30MHz



# Radiated Emission Test Setup 30MHz-1000MHz



## Radiated Emission Test Setup Above 1000MHz



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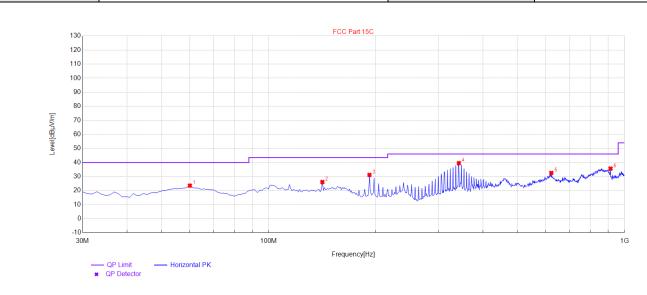
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#### 9.4 Measurement Result

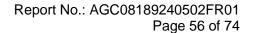
## **Radiated Emission Below 30MHz**

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						
<b>EUT Name</b>	Bluetooth Headphones	Model Name	BTKID			
Temperature	23.3℃	Relative Humidity	60.5 %			
Pressure	960hPa	Test Voltage	DC 3.7V by battery			
Test Mode	Mode 8	Antenna Polarity	Horizontal			

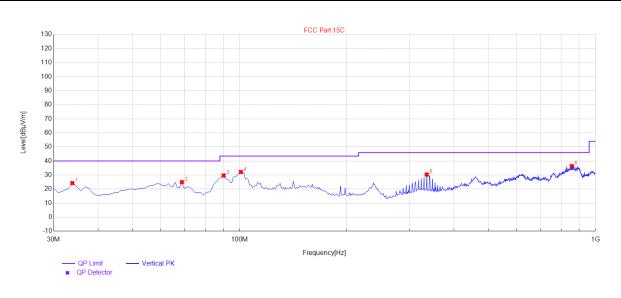


Final [	Data List							
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	60.07	23.52	17.86	40.00	16.48	100	281	Horizontal
2	141.55	26.10	16.13	43.50	17.40	100	1	Horizontal
3	191.99	31.16	11.38	43.50	12.34	100	0	Horizontal
4	342.34	39.56	15.08	46.00	6.44	100	119	Horizontal
5	622.67	32.56	25.54	46.00	13.44	100	74	Horizontal
6	913.67	35.64	26.39	46.00	10.36	100	123	Horizontal





Radiated Emission Test Results at 30MHz-1GHz						
EUT Name	Bluetooth Headphones	Model Name	BTKID			
Temperature	23.3℃	Relative Humidity	60.5 %			
Pressure	960hPa	Test Voltage	DC 3.7V by battery			
Test Mode	Mode 8	Antenna Polarity	Vertical			



Final D	Data List							
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	33.88	24.24	12.12	40.00	15.76	100	257	Vertical
2	68.8	24.94	15.04	40.00	15.06	100	269	Vertical
3	90.14	29.67	14.10	43.50	13.83	100	78	Vertical
4	100.81	32.15	17.03	43.50	11.35	100	229	Vertical
5	335.55	30.37	15.34	46.00	15.63	100	90	Vertical
6	857.41	36.40	29.93	46.00	9.60	100	5	Vertical

# **RESULT: Pass**

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



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# **Radiated Emissions Test Results Above 1GHz**

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	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	47.98	0.08	48.06	74	-25.94	peak
4804.000	38.52	0.08	38.6	54	-15.4	AVG
7206.000	42.16	2.21	44.37	74	-29.63	peak
7206.000	31.24	2.21	33.45	54	-20.55	AVG

Remark:

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

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	\/alua Tima
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	47.54	0.08	47.62	74	-26.38	peak
4804.000	38.42	0.08	38.5	54	-15.5	AVG
7206.000	42.58	2.21	44.79	74	-29.21	peak
7206.000	31.26	2.21	33.47	54	-20.53	AVG
		_				

Remark:

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

# **RESULT: Pass**



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Radiated Emissions Test Results for Above 1GHz

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 8	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	47.69	0.14	47.83	74	-26.17	peak
4882.000	38.42	0.14	38.56	54	-15.44	AVG
7323.000	42.46	2.36	44.82	74	-29.18	peak
7323.000	31.27	2.36	33.63	54	-20.37	AVG
Domork:						

Remark:

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

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 8	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	48.67	0.14	48.81	74	-25.19	peak
4882.000	37.53	0.14	37.67	54	-16.33	AVG
7323.000	42.19	2.36	44.55	74	-29.45	peak
7323.000	32.35	2.36	34.71	54	-19.29	AVG

Remark:

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

# **RESULT: Pass**



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Radiated Emissions Test Results for Above 1GHz

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	Antenna Polarity	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
47.91	0.22	48.13	74	-25.87	peak
38.63	0.22	38.85	54	-15.15	AVG
42.47	2.64	45.11	74	-28.89	peak
32.18	2.64	34.82	54	-19.18	AVG
	_				
	(dBµV) 47.91 38.63 42.47	(dBµV) (dB) 47.91 0.22 38.63 0.22 42.47 2.64	(dBμV)     (dB)     (dBμV/m)       47.91     0.22     48.13       38.63     0.22     38.85       42.47     2.64     45.11	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)       47.91     0.22     48.13     74       38.63     0.22     38.85     54       42.47     2.64     45.11     74	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)     (dBμV/m)       47.91     0.22     48.13     74     -25.87       38.63     0.22     38.85     54     -15.15       42.47     2.64     45.11     74     -28.89

≺emark:

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

EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	23.3℃	Relative Humidity	60.5%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	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	48.65	0.22	48.87	74	-25.13	peak
4960.000	37.51	0.22	37.73	54	-16.27	AVG
7440.000	42.16	2.64	44.8	74	-29.2	peak
7440.000	32.35	2.64	34.99	54	-19.01	AVG

Remark:

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

## **RESULT: Pass**

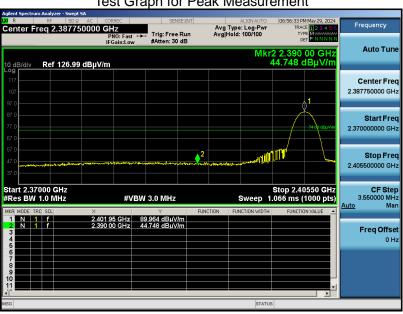
## Note:

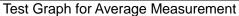
- The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
- 2. Factor = Antenna Factor + Cable loss Pre-amplifier gain, Margin = Emission Level-Limit.
- 3. The "Factor" value can be calculated automatically by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



EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna Polarity	Horizontal

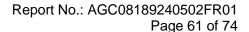
Test Graph for Peak Measurement







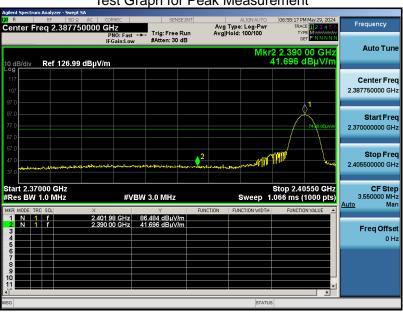
## **RESULT: Pass**

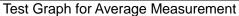


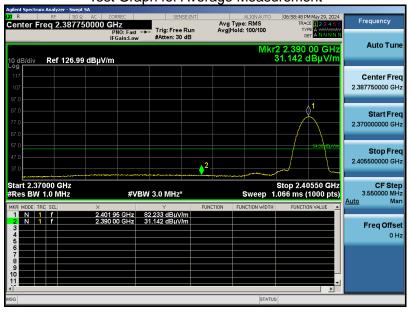


EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna Polarity	Vertical

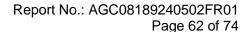
Test Graph for Peak Measurement







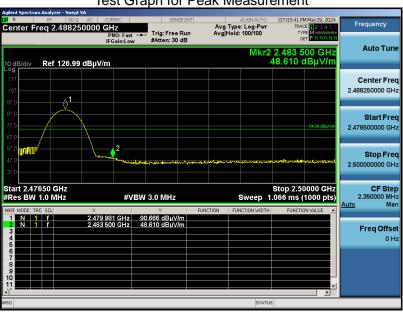
## **RESULT: Pass**



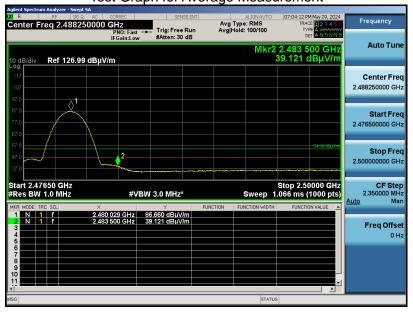


EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna Polarity	Horizontal

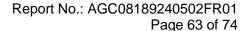
Test Graph for Peak Measurement







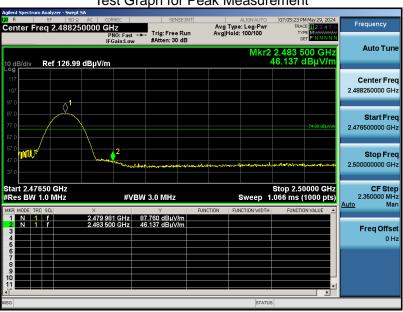
## **RESULT: Pass**



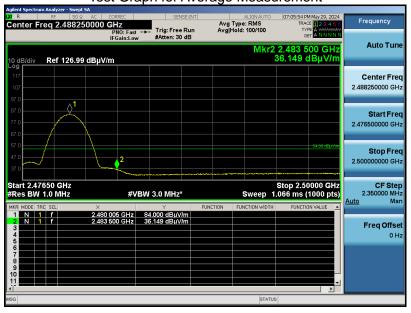


EUT Name	Bluetooth Headphones	Model Name	BTKID
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna Polarity	Vertical

Test Graph for Peak Measurement







## **RESULT: Pass**

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



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# 10. Number of Hopping Frequency Measurement

# 10.1 Provisions Applicable

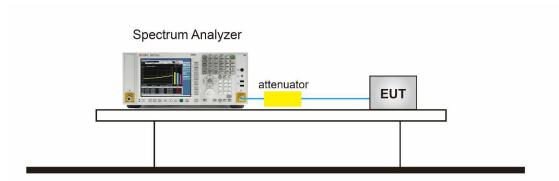
This frequency hopping system must employ a minimum of 15 hopping channels.

#### **10.2 Measurement Procedure**

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

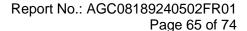
- 1. Span = The frequency band of operation. Depending on the number of channels the device
- 2. supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- 3. RBW: To identify clearly the individual channels, 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 F					
8DPSK Hopping	79	>=15	Pass		





Center Freq 2.441750000 GHz
PN0: Fast -IFGain:Low Frequency Avg Type: Log-Pwi Avg|Hold: 100/100 Trig: Free Run #Atten: 40 dB **Auto Tune** Mkr1 2.460 85 GHz -5.019 dBm Ref 30.00 dBm Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz **CF Step** 8.350000 MHz <u>Auto</u> Mar Freq Offset 0 Hz Center 2.44175 GHz #Res BW 200 kHz Span 83.50 MHz Sweep 1.998 ms (1000 pts) #VBW 620 kHz Test\_Graph\_EDR\_HOP\_ANT1\_NA\_3Mbps\_Number of Hopping

**Test Graphs of Number of Hopping Frequency** 

Note: All mode rates are tested and evaluated, 8DPSK modulated 3DH5 mode is the worst case and documented in the report.



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# 11. Time of Occupancy (Dwell Time) Measurement

## 11.1 Provisions Applicable

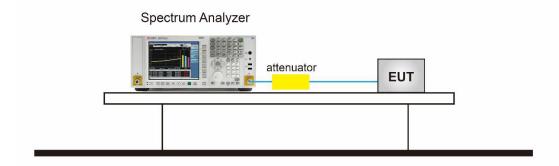
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

#### 11.2 Measurement Procedure

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

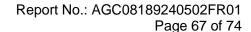
- 1. Span = Zero span, centered on a hopping channel.
- 2. RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3. VBW ≥ RBW
- 4. Sweep time = As necessary to capture the entire dwell time per hopping channel
- 5. Detector = Peak
- 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)

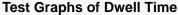


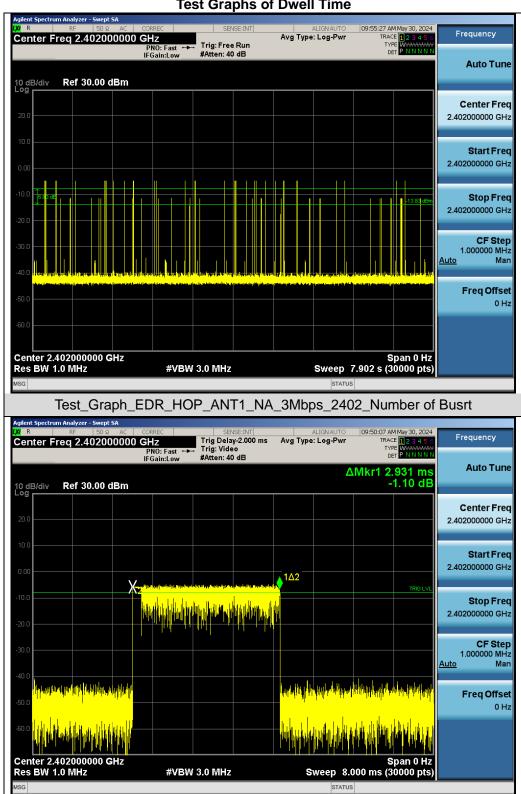
#### 11.4 Measurement Result

Test Data of Dwell Time							
Channel	Time of Pulse for 3DH5 (ms)	Number of hops in the period specified in the requirements	Dwell Time (ms)	Limit (ms)	Pass or Fail		
2402	2.931	27.0*4	316.548	400	Pass		
2441	2.932	31.0*4	363.568	400	Pass		
2480	2.932	24.0*4	281.472	400	Pass		



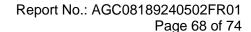




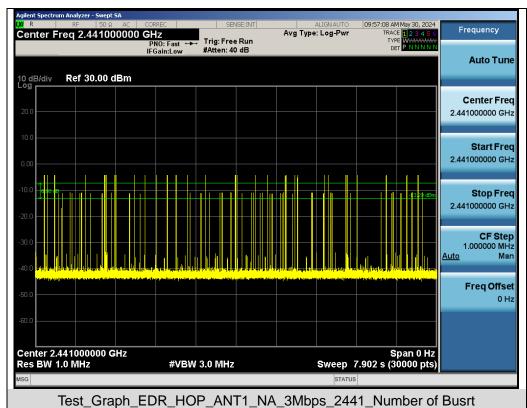


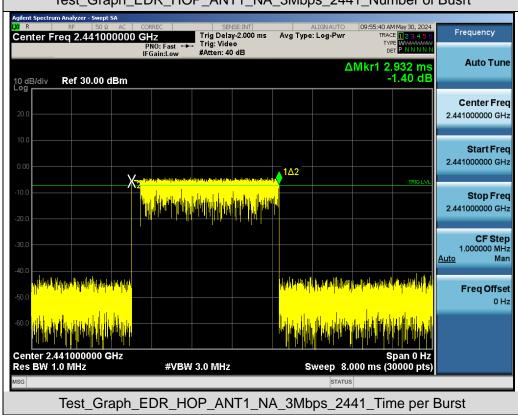
Test\_Graph\_EDR\_HOP\_ANT1\_NA\_3Mbps\_2402\_Time per Burst

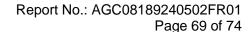
Web: http://www.agccert.com/



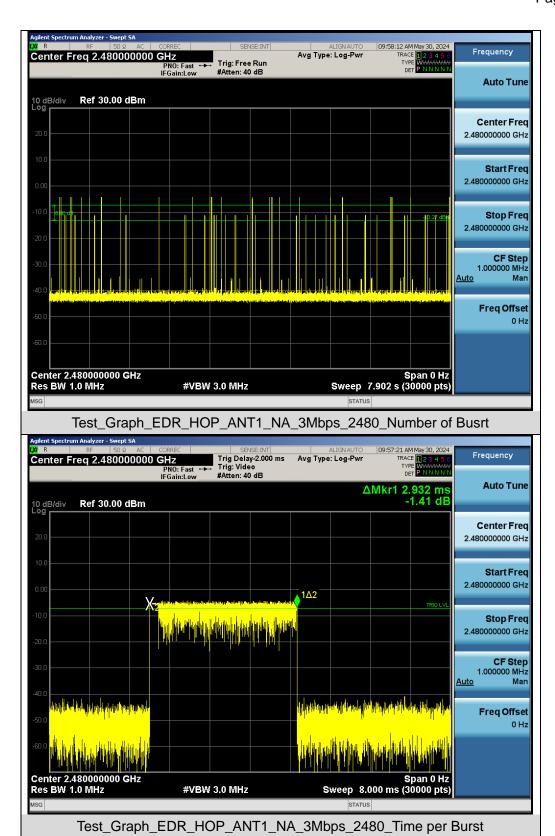












Note: All mode rates are tested and evaluated, 8DPSK modulated 3DH5 mode is the worst case and documented in the report.



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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.

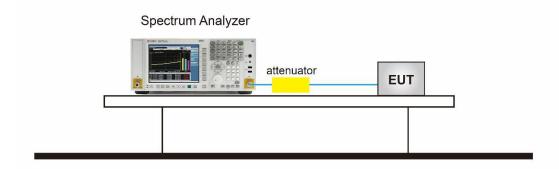
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

#### 12.2 Measurement Procedure

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

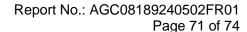
- 1. Span: Wide enough to capture the peaks of two adjacent channels.
- 2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- 3. Video (or average) bandwidth (VBW) ≥ RBW.
- 4. Sweep: Auto.
- 5. Detector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

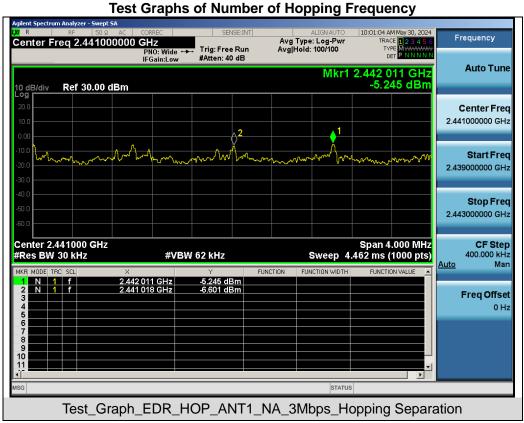


## 12.4 Measurement Result

Test Data of Frequency Separation					
Test Mode	Channel Separation (MHz)	Limits (MHz)	Pass or Fail		
8DPSK	0.993	≥0.832	Pass		







Note: All mode rates are tested and evaluated, 8DPSK modulated 3DH5 mode is the worst case and documented in the report.



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# 13. AC Power Line Conducted Emission Test

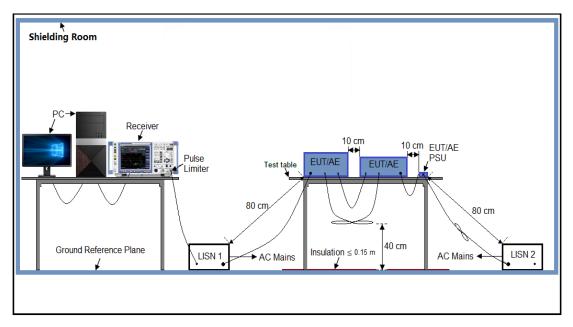
## 13.1 Measurement Limit

Fraguenay	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)





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## 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

- 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.
- The test data of the worst case condition(s) was reported on the Summary Data page.

#### 13.5 Measurement Results

N/A

Note: The BT function cannot transmit when charging



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**Appendix I: Photographs of Test Setup** 

Refer to the Report No.: AGC08189240502AP01

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC08189240502AP02

----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").
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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.
- 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.