

FCC Test Report

Report No.: AGC15344250202FR01

FCC ID	:	2AXEL-TW2S
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	WIRELESS EARPHONE
BRAND NAME	:	N/A
MODEL NAME	:	TW2S
APPLICANT	:	Shenzhen Calion Power Co., Ltd.
DATE OF ISSUE	:	Feb. 20, 2025
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0







Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes	
V1.0	/	Feb. 20, 2025	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	9
2.9 Equipment Modifications	9
2.10 Antenna Requirement	9
3. Test Environment	10
3.1 Address of The Test Laboratory	
3.2 Test Facility	
3.3 Environmental Conditions	11
3.4 Measurement Uncertainty	11
3.5 List of Equipment Used	
4.System Test Configuration	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	
5. Description of Test Modes	
6. RF Output Power Measurement	
6.1 Provisions Applicable	
6.2 Measurement Procedure	
6.3 Measurement Setup (Block Diagram of Configuration)	
6.4 Measurement Result	
7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement	24
7.1 Provisions Applicable	
7.2 Measurement Procedure	24
7.3 Measurement Setup (Block Diagram of Configuration)	24
7.4 Measurement Results	
8. Conducted Band Edge and Out-of-Band Emissions	
8.1 Provisions Applicable	
8.2 Measurement Procedure	
8.3 Measurement Setup (Block Diagram of Configuration)	
8.4 Measurement Results	



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



1. General Information

Applicant	Shenzhen Calion Power Co., Ltd.				
Applicatit					
Address	1301. Huitong Building, No. 10 Longgang Road, Longgang Street, Longgang				
	District, Shenzhen China				
Manufacturer	Shenzhen Zhonglineng Technology Co., LTD				
Address	501, B2 Building, 2nd Industrial park, NO.56, Xiakeng 2st Road, Tongde				
Address	community, Baolong street, Longgang District, Shenzhen China				
Factory	Shenzhen Zhonglineng Technology Co., LTD				
Address	501, B2 Building, 2nd Industrial park, NO.56, Xiakeng 2st Road, Tongde				
Address	community, Baolong street, Longgang District, Shenzhen China				
Product Designation	WIRELESS EARPHONE				
Brand Name	N/A				
Test Model	TW2S				
Series Model(s)	N/A				
Difference Description	N/A				
Date of receipt of test item	Feb. 12, 2025				
Date of Test	Feb. 12, 2025 to Feb. 20, 2025				
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.

Thea Huang Prepared By Thea Huang Feb. 20, 2025 (Project Engineer) vin Lin **Reviewed By** Calvin Liu Feb. 20, 2025 (Reviewer) Approved By 1de Angela Li Feb. 20, 2025 (Authorized Officer)



2. Product Information

2.1 Product Technical Description

Technology Type	Classic Bluetooth
Frequency Band	2400M-2483.5MHz
Operation Frequency Range	2402MHz-2480MHz
Bluetooth Version	V5.4
Modulation Type	BR 🖾 GFSK, EDR 🖾 π /4-DQPSK, 🖾 8DPSK
Number of channels	79 of Channels
Channel Separation	1 MHz
Maximum Transmitter Power	-3.593dBm
Hardware Version	V2.0
Software Version	V3.0
Antenna Designation	Ceramic Antenna
Antenna Gain	-0.5dBi
Power Supply	DC 3.7V by Battery

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+1*k MHz, k=0	,, 78; "f" is the operating frequency (N	MHz); "k" is the operating channel.		



2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2AXEL-TW2S, 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:

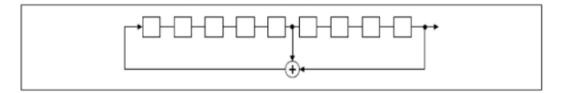
The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth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



2.7 Pseudorandom Frequency Hopping Sequence

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

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



Linear Feedback Shift Register for Generation of The PRBS Sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

44	35	78	03	20	76	02	19		21	64 7	5
]			٦
			!								
						: :			i.		
				i		<u>'i</u>		1	i_		

Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their

Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



2.8 Special Accessories

Not available for this EUT intended for grant.

2.9 Equipment Modifications

Not available for this EUT intended for grant.

2.10 Antenna Requirement

Standard Requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(b) (4) requirement:**

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

EUT Antenna

The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is -0.5dBi.



3. Test Environment

3.1 Address of The Test Laboratory

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

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

3.2 Test Facility

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

CNAS-Lab Code: L5488

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

A2LA-Lab Cert. No.: 5054.02

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

FCC-Registration No.: 975832

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

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

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



3.3 Environmental Conditions

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

3.4 Measurement Uncertainty

The reported uncertainty of measurement y \pm U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF Power, Conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF Power Density, Conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of Spurious Emissions, Conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$
Uncertainty of Dwell Time	$U_c = \pm 2 \%$



3.5 List of Equipment Used

RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	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	2025-01-14	2026-01-13
	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2025-01-14	2026-01-13
	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
• R	Radiated Spurio	us 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	2025-01-14	2026-01-13

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	2025-01-14	2026-01-13
\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	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

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



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					
	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0					



Cable

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

n

1

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:

X	I est Accessories Come From The Laboratory										
No.	Equipment	Manufacturer	Model No.	Specification Information							
1	Control Box	RISYM	USB-TTL								

. . . .

1	Control Box	RISYM	USB-TTL								
	Test Accessories Come From The Manufacturer										
No.	Equipment	Manufacturer	Model No.	Specification Information	Cable						



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						
iest nem	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 6: Bluetooth Tx CH78_2480 MHz_3Mbps (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) Mode 10: Bluetooth Tx CH78_2480 MHz_3Mbps (Battery powered) Mode10: Bluetooth Tx Hopping-1Mbps (Battery powered) Mode11: 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.

Software Setting Diagram

BI_TOOI				0		23
COMx Baudra	te					
Classic BI	LE					
Test Mode						
FCC Test	BT	addre	133			
DUT Test	0 55	55555	55555	Stop		
RF Control						
RF Mode	TX TEST	•	Packet Type	3DH5	•	
Hopping	OFF	•	TX Frequency	2480	•	
TX Power	6	•	RX Frequency	2480	+	
Scenario	PRBS Pat	tern			•	
LOG: BR/ED	R Test					
LOG: Test						
LOG: [COM9 LOG: [COM9		500000	bps			
LOG: BR/ED	R Test		-			
LOG: Test LOG: BR/ED					Ċ	
						*
COM9 is ope	n		1500000bps			



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

 \square For Peak power test:

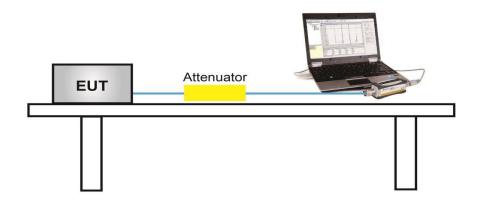
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW \geq RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.
- 8. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

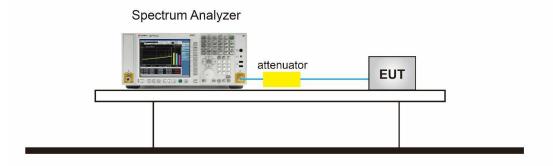
6.3 Measurement Setup (Block Diagram of Configuration)

For Average power test setup





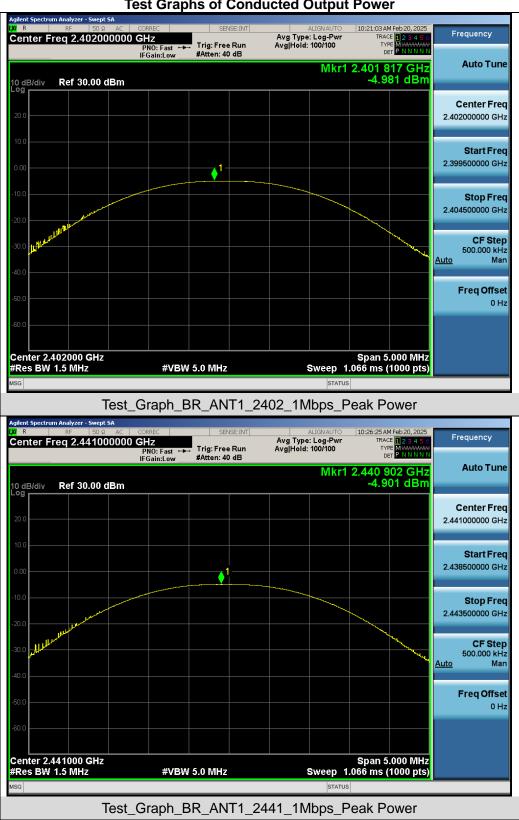
For peak power test setup



6.4 Measurement Result

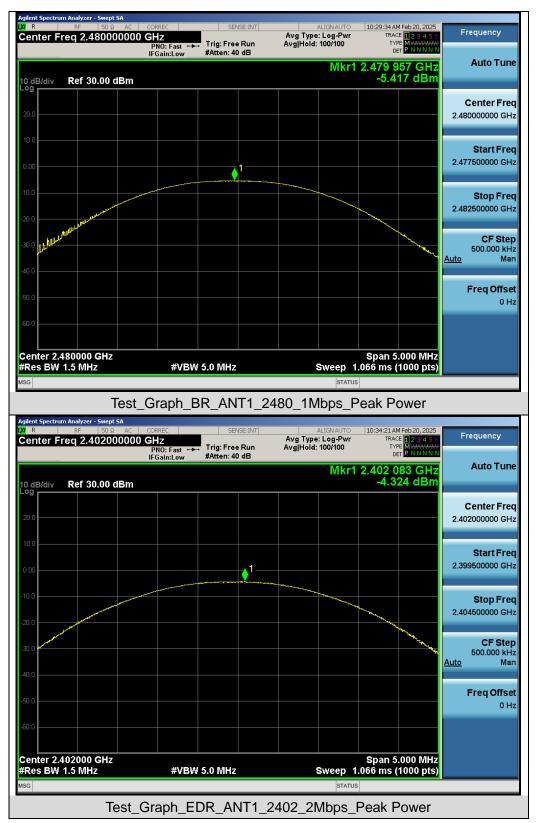
Test Data of Conducted Output Power									
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail					
	2402	-4.981	≤21	Pass					
GFSK	2441	2441 -4.901		Pass					
	2480	-5.417	≤21	Pass					
	2402	-4.324	≤21	Pass					
π /4-DQPSK	2441	-4.269	≤21	Pass					
	2480	-4.849	≤21	Pass					
	2402	-3.682	≤21	Pass					
8DPSK	2441	-3.593	≤21	Pass					
	2480	-4.199	≤21	Pass					



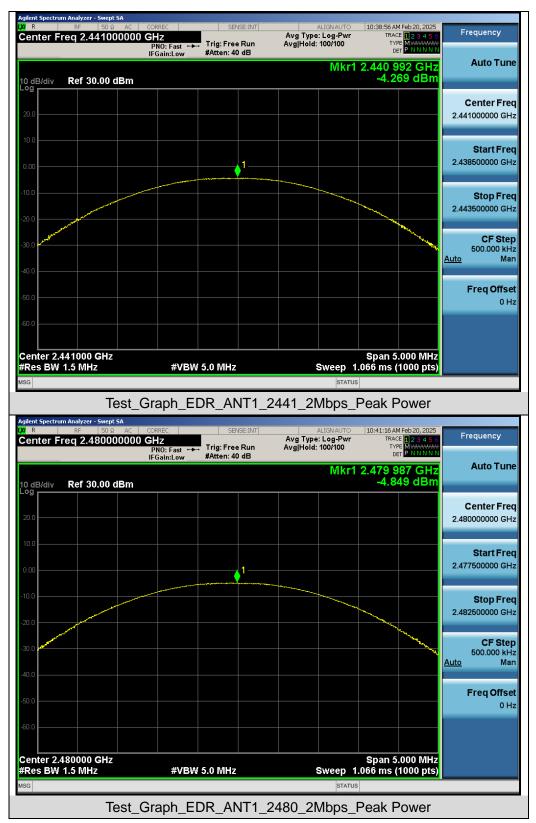


Test Graphs of Conducted Output Power

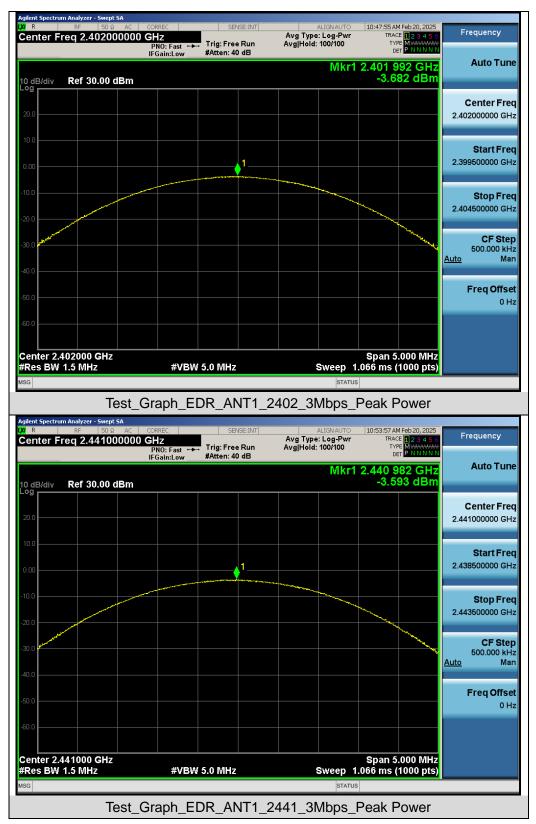














Agilent Spectrum Analyzer - Swept SA WRRRF50 Q AC Center Freq 2.480000000	CORREC GH7	SENSE:INT	Avg Type:	LIGNAUTO	TRAC	4 Feb 20, 2025 E 1 2 3 4 5 6	Frequency	
10 dB/div Ref 30.00 dBm	PNO: Fast +++ Trig: F	ree Run : 40 dB	Avg Hold:		TYF DE 2.479 9	47 GHz 99 dBm	Auto Tun	
20.0							Center Fre 2.480000000 GH	
0.00		↓1					Start Fre 2.477500000 GH	
-10.0							Stop Fre 2.482500000 GH	
-30.0						and the second s	CF Ste 500.000 kH <u>Auto</u> Ma	
50.0							Freq Offse 0 H	
-60.0 Center 2.480000 GHz #Res BW 1.5 MHz	#VBW 5.0 MI	Hz		Sweep_1	Span 5 .066 ms (.000 MHz 1000 pts)		
Res BW 1.5 MHz #VBW 5.0 MHz Sweep 1.066 ms (1000 pts) sc								



7. 20dB Bandwidth and 99% Occupied Bandwidth Measurement

7.1 Provisions Applicable

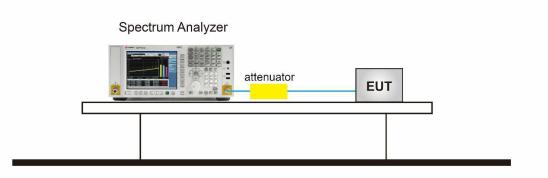
There is no corresponding limit requirement for this test item.

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

7.3 Measurement Setup (Block Diagram of Configuration)

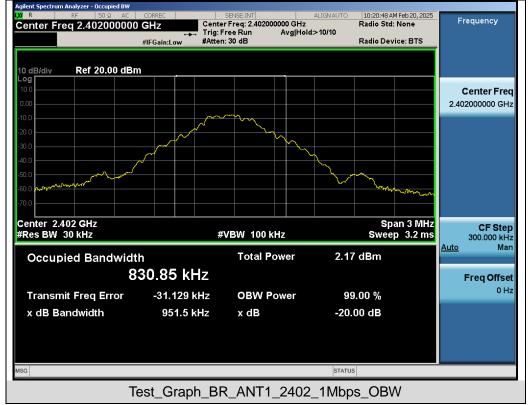




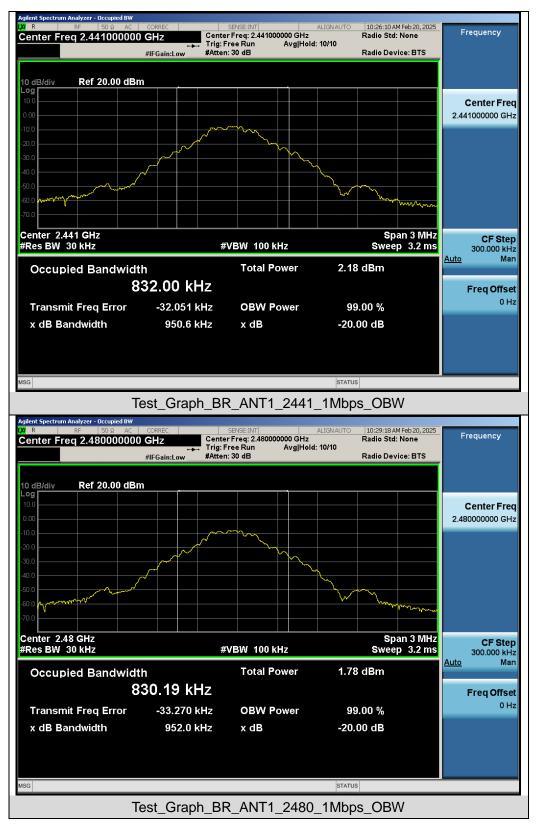
7.4 Measurement Results

Test Data of Occupied Bandwidth and -20dB Bandwidth									
Test Mode	Test Frequency (MHz)	99% Occupied Bandwidth (MHz)	-20dB Bandwidth (MHz)	Limits	Pass or Fail				
	2402	0.831	0.951	N/A	Pass				
GFSK	2441	0.832	0.951	N/A	Pass				
	2480	0.830	0.952	N/A	Pass				
	2402	1.154	1.280	N/A	Pass				
π /4-DQPSK	2441	1.153	1.283	N/A	Pass				
	2480	1.153	1.281	N/A	Pass				
	2402	1.160	1.299	N/A	Pass				
8DPSK	2441	1.162	1.301	N/A	Pass				
	2480	1.162	1.300	N/A	Pass				

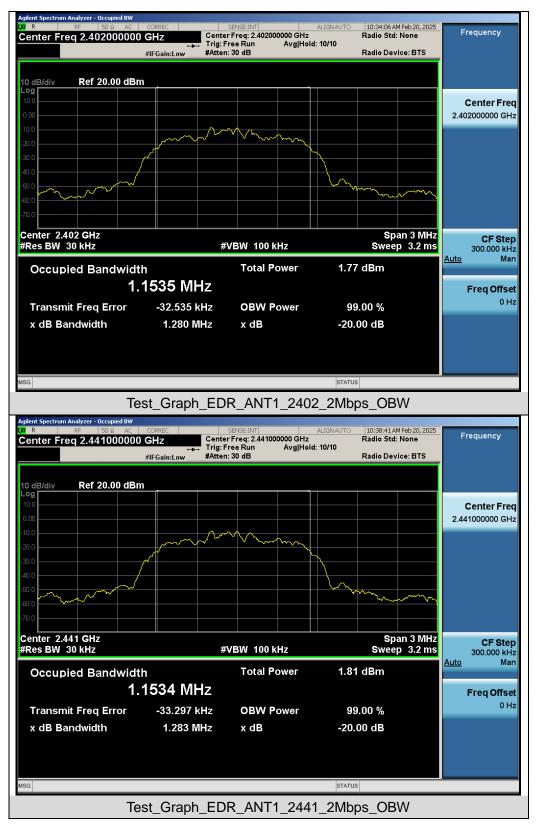
Test Graphs of Occupied Bandwidth and -20 Bandwidth



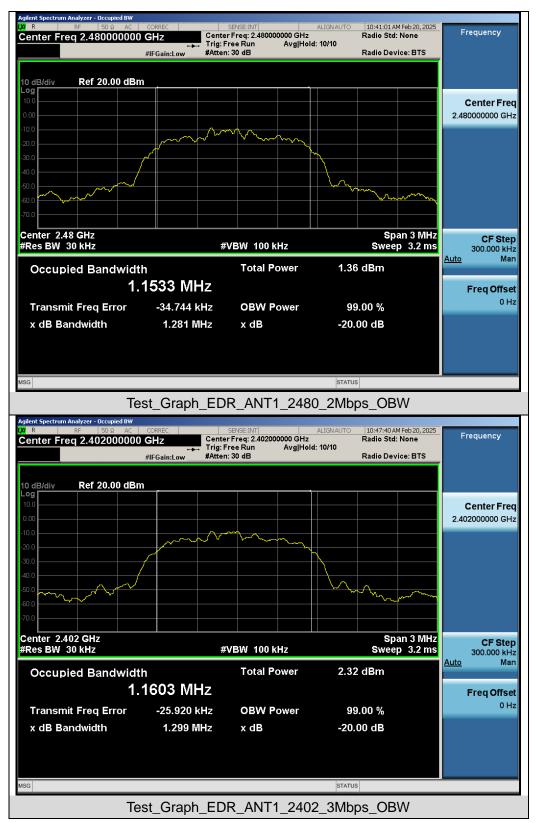




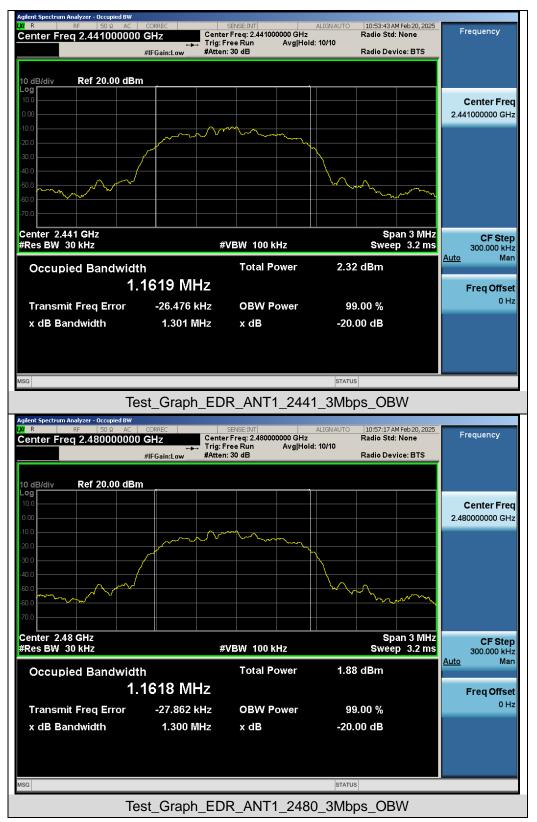














8. Conducted Band Edge and Out-of-Band Emissions

8.1 Provisions Applicable

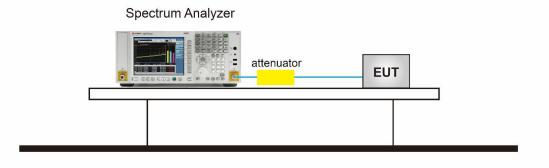
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

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 = 100 kHz
- 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)



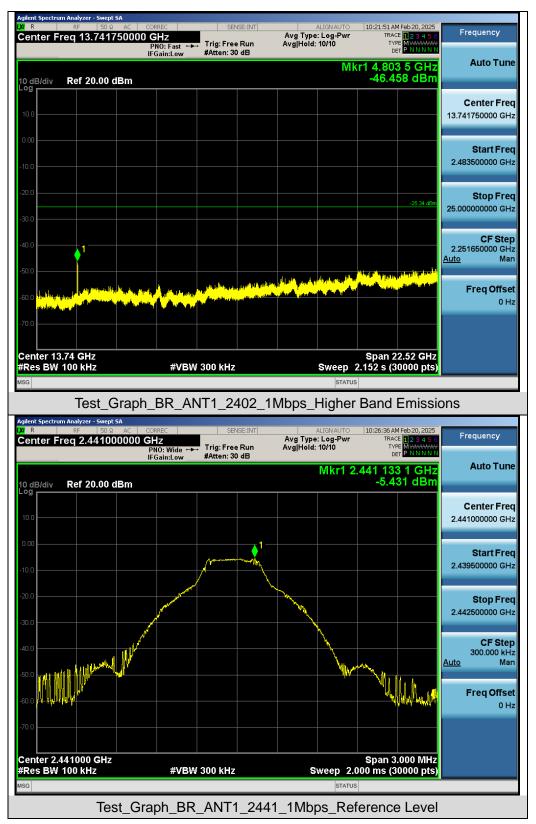


8.4 Measurement Results

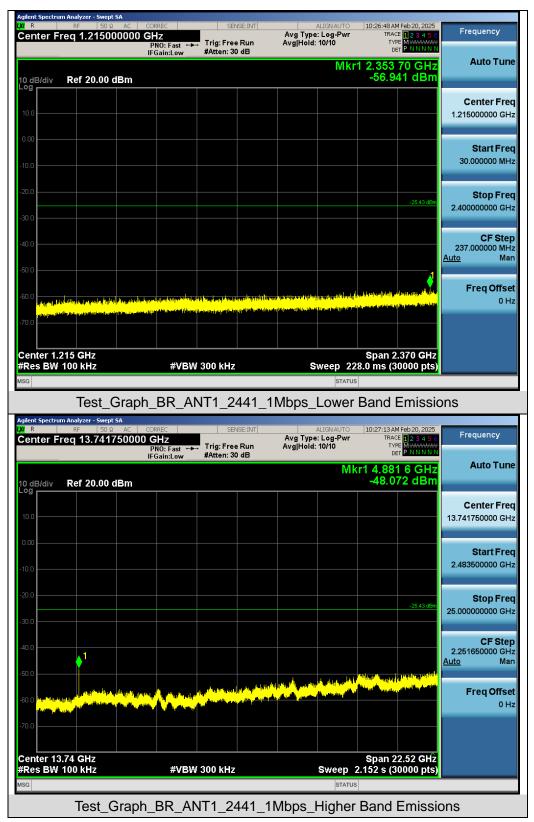


Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands





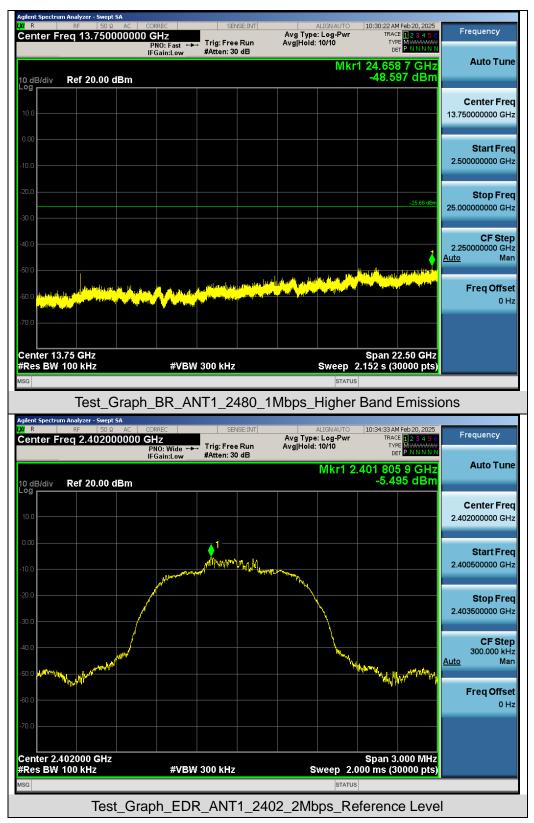




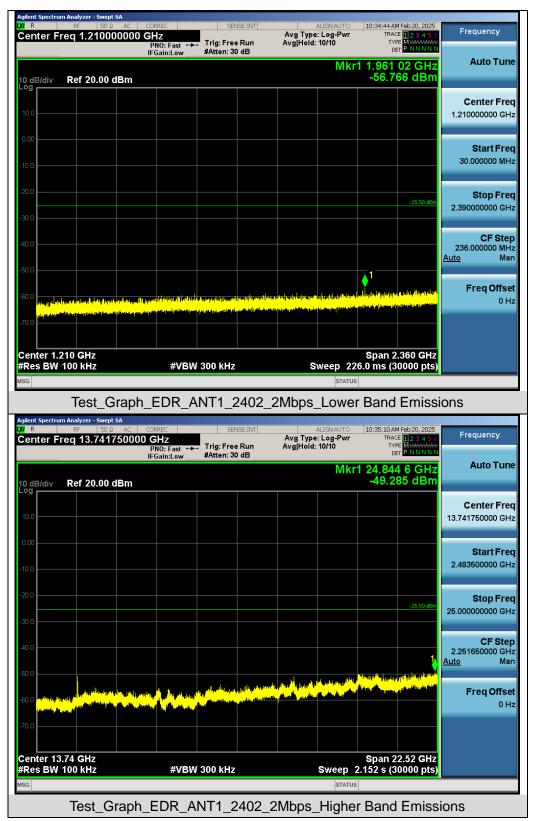








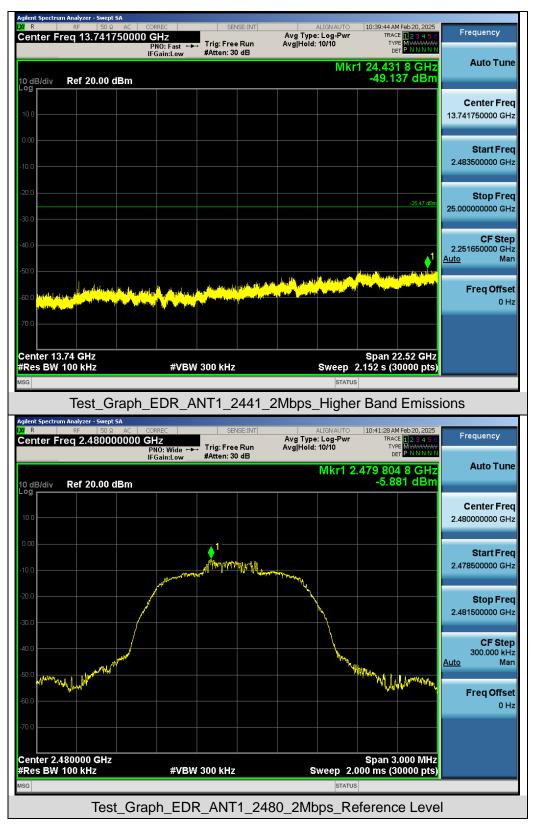




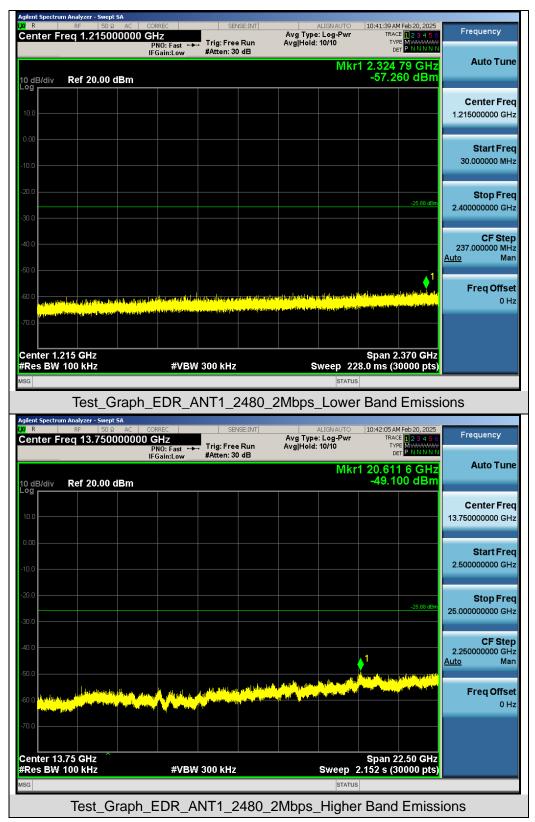








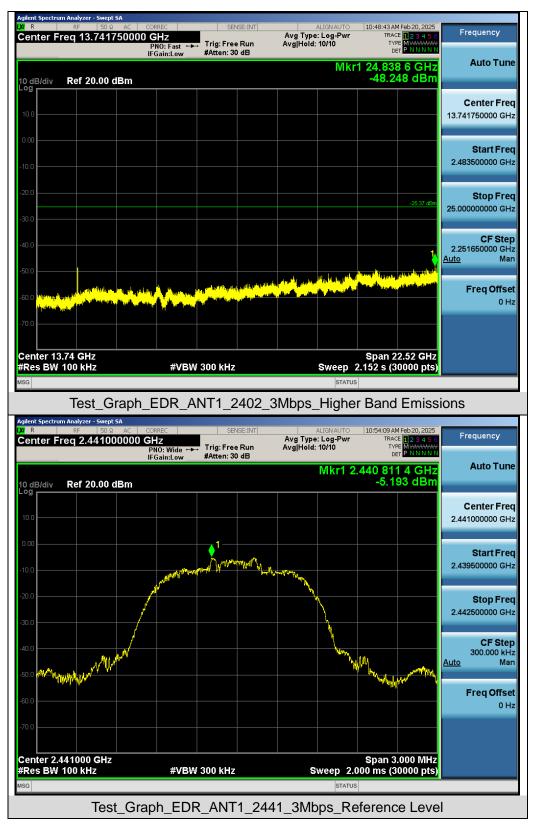




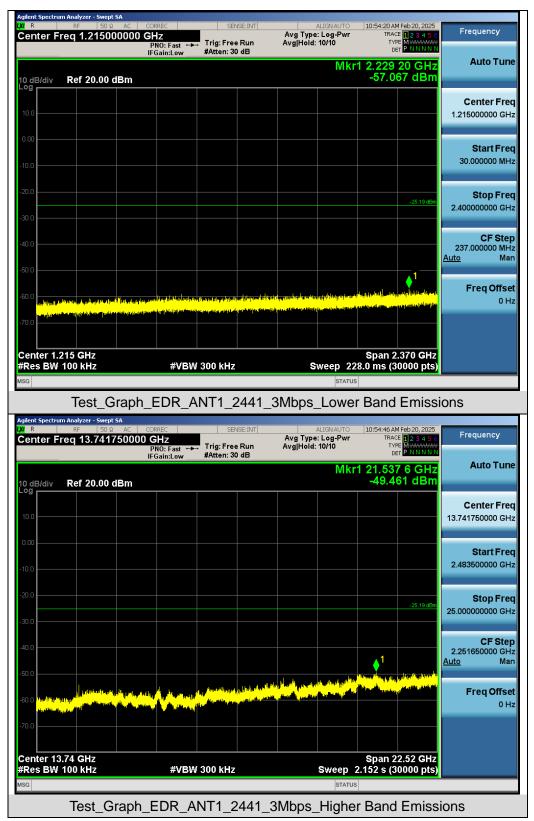




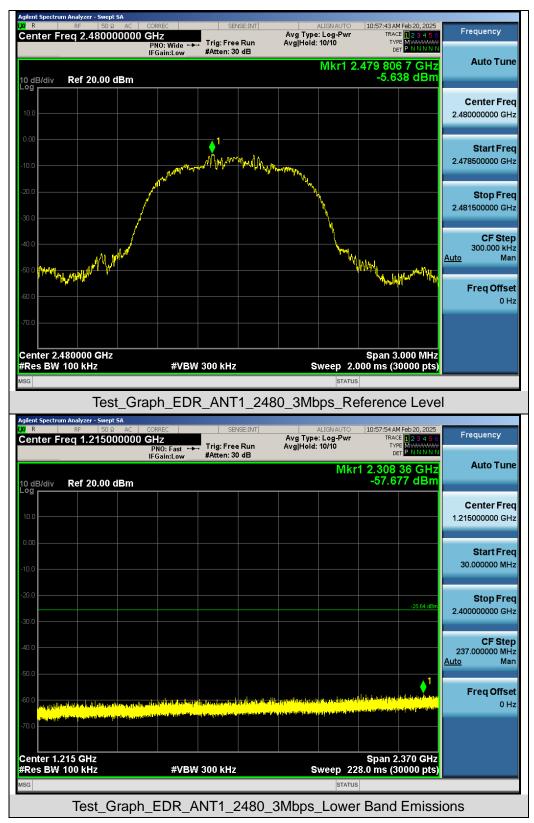






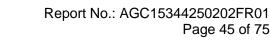




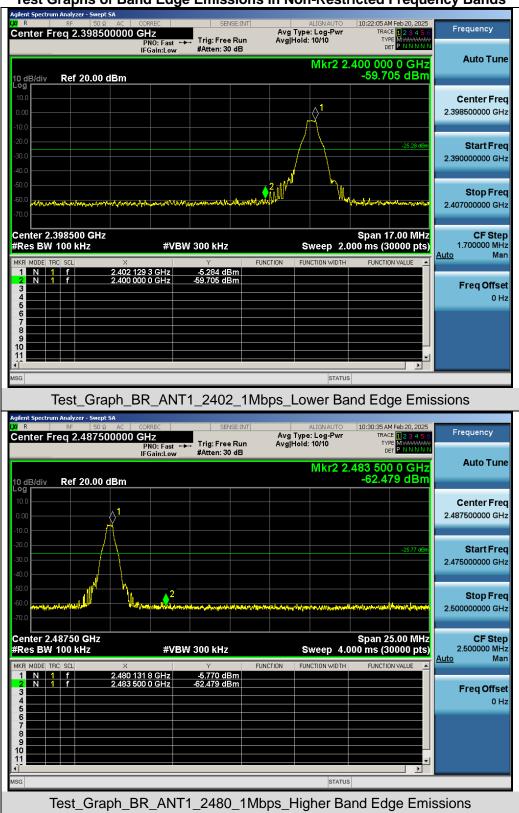




gilent Spectrum Analyzer - Swept SA R RF 50 Q AC Center Freq 13.75000000		ALIGNAUTO Avg Type: Log-Pwr	10:58:20 AM Feb 20, 2025 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Hold: 10/10	TYPE MWWWWW DET PNNNN	Auto Tun
0 dB/div Ref 20.00 dBm			1 24.772 0 GHz -48.579 dBm	
10.0				Center Fre 13.750000000 GH
0.00				13.730000000 81
				Start Fre 2.500000000 GH
10.0				
20.0			-25.64 dBm	Stop Fre
30.0				
40.0			1	CF Ste 2.250000000 GH Auto Ma
50.0				Auto Ma
60.0 <mark>malik kanada ka</mark>				FreqOffse 0⊦
70.0				
Center 13.75 GHz Res BW 100 kHz	#VBW 300 kHz	Sweep 2	Span 22.50 GHz 2.152 s (30000 pts)	
SG		STATUS		

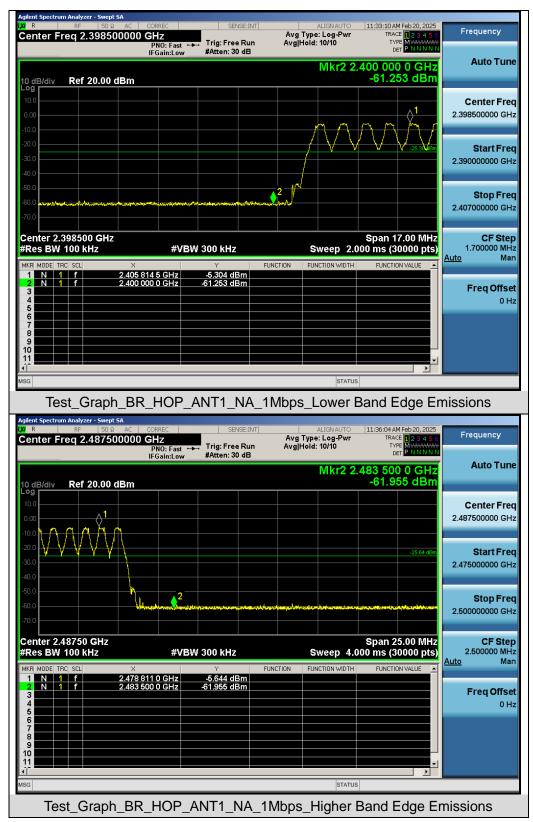




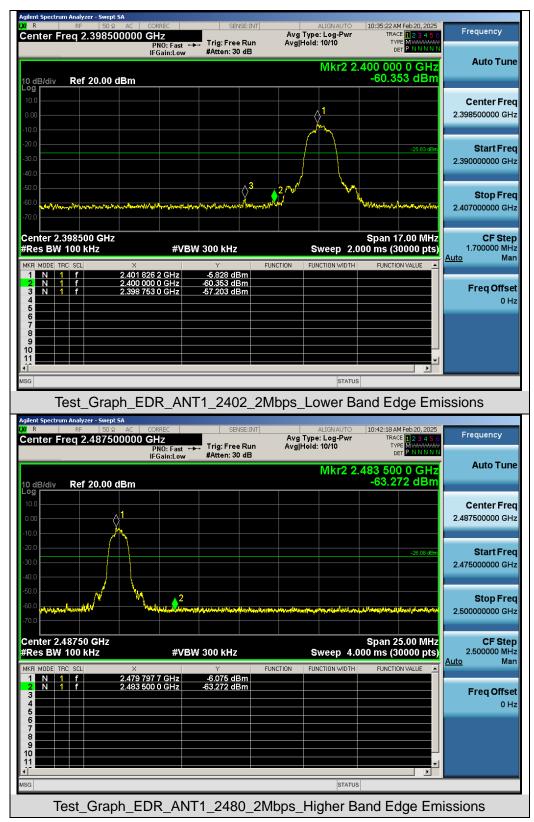


Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands





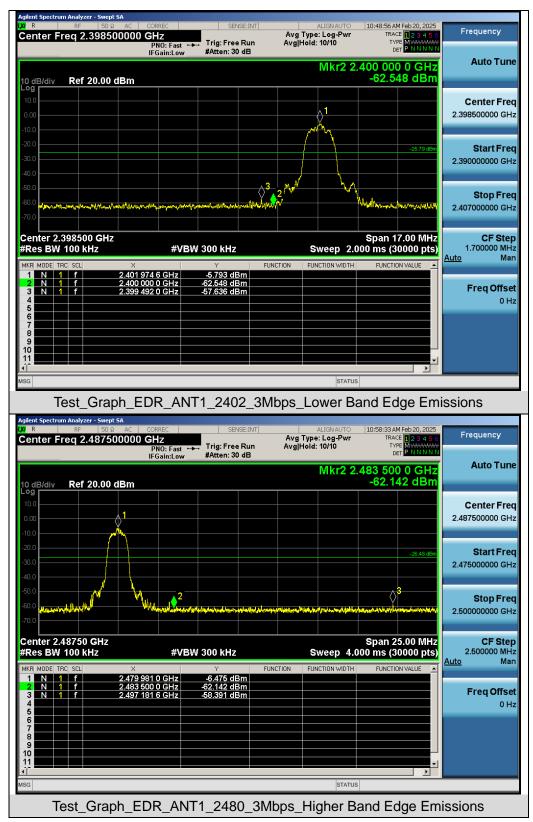






a RF 50 Ω Center Freq 2.39850	PNO: Fast 🔸	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10	11:23:13 AM Feb 20, 2025 TRACE 1 2 3 4 5 6 TYPE M	Frequency		
10 dB/div Ref 20.00 d	IFGain:Low	#Atten: 30 dB	Mkr2 2.4	400 000 0 GHz -59.917 dBm	Auto Tur		
-og 10.0 0.00 -10.0			- March March	1	Center Fre 2.398500000 GF		
-20.0 -30.0 -40.0				-25.47 dBm	Start Fre 2.390000000 GH		
-50.0 -60.0	omoteuriteri on one of the state of the section of the	ฉนางระประสารที่สารที่สาราวไปหมู่สาราวไปหารสาราส	2 / J ^M		Stop Fro 2.407000000 Gi		
Center 2.398500 GHz #Res BW 100 kHz	#VBN	/ 300 kHz		Span 17.00 MHz 00 ms (30000 pts)	CF Ste 1.700000 Mi <u>Auto</u> Ma		
MKR MODE TRC SCL 1 N 1 F 2 N 1 F 3	× 2.405 966 4 GHz 2.400 000 0 GHz	-5.474 dBm -59.917 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 01		
7 8 9 9 10 11							
			STATUS				
-		ANT1_NA_	status 2Mbps_Lower I	Band Edge E	missions		
Test_Graph_ gilent Spectrum Analyzer - Swept S R RF 50 Ω	A AC CORREC 0 0000 GHz PN0: Fast ↔	SENSE:INT		Band Edge E	MISSIONS Frequency		
Test_Graph_ gilent Spectrum Analyzer - Swept S R R RF 50 Q Center Freq 2.48750	A AC CORREC 0000 GHz PN0: Fast ↔ IFGain:Low	SENSE:INT	2Mbps_Lower I Augnauto Avg Type: Log-Pwr Avg Hold: 10/10	11:29:35 AM Feb 20, 2025	Frequency		
Test_Graph_ gilent Spectrum Analyzer - Swept S R RF 50 Q Center Freq 2.48750	A AC CORREC 0000 GHz PN0: Fast ↔ IFGain:Low	SENSE:INT	2Mbps_Lower I Augnauto Avg Type: Log-Pwr Avg Hold: 10/10	11:29:35 AM Feb 20, 2025 TRACE 2 3 4 5 6 TYPE M HANNANY DET P N N N N N	Frequency Auto Tur Center Fre		
Test_Graph_ gilent Spectrum Analyzer - Swept 9 R RF 50 0 Center Freq 2.48750	A AC CORREC 0000 GHz PN0: Fast ↔ IFGain:Low	SENSE:INT	2Mbps_Lower I Augnauto Avg Type: Log-Pwr Avg Hold: 10/10	11:29:35 AM Feb 20, 2025 TRACE 2 3 4 5 6 TYPE M HANNANY DET P N N N N N	Frequency Auto Tur Center Fre 2.48750000 Gi Start Fre		
Test_Graph_ gilent Spectrum Analyzer - Swept S Q R RF 50 Q Center Freq 2.48750 Center Freq 2.48750 10 dB/div Ref 20.00 d 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1	A AC CORREC 0000 GHz PN0: Fast ↔ IFGain:Low	SENSE:INT	2Mbps_Lower I Augnauto Avg Type: Log-Pwr Avg Hold: 10/10	11:29:35 AM Feb 20, 2025 TRACE 23 4 5 6 TYPE MWWWW Det MWWWWW 483 500 0 GHz -60.570 dBm	Frequency Auto Tur Center Fre 2.487500000 Gl Start Fre 2.475000000 Gl Stop Fre		
Test_Graph_ gilent Spectrum Analyzer - Swept S R RF 50 Q Center Freq 2.48750 0 dB/div Ref 20.00 d 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	A AC CORREC DOUOD GHZ PNO: Fast IFGain:Low Bm 	SENSE:INT	2Mbps_Lower I	11:29:35 AM Feb 20, 2025 TRACE 12 3 4 5 6 TVPE P NNNNN 183 500 0 GHz -60.570 dBm -25 93 dBm -25	Frequency Auto Tur Center Fre 2.487500000 Gl Start Fre 2.47500000 Gl Stop Fre 2.5000000 Gl CF Ste 2.500000 MI		
Test_Graph_ glent Spectrum Analyzer - Swept S QR RF 50 Q Center Freq 2.48750 Glenter Glenter 10 dB/div Ref 20.00 d Glenter 20 0	A AC CORREC DOUOD GHZ PNO: Fast IFGain:Low Bm 	SENSE:INT Trig: Free Run #Atten: 30 dB	2Mbps_Lower I	11:29:35 AM Feb 20, 2025 TRACE 2 3 4 5 6 TYPE MANNINN 483 500 0 GHz -60.570 dBm -25.89 dBm -25.89 dBm -25.89 dBm -25.89 dBm	Frequency Auto Tur Center Fre 2.487500000 GI Start Fre 2.47500000 GI Stop Fre 2.50000000 GI CF Ste 2.500000 MI Auto		
Test_Graph_ glent Spectrum Analyzer - Swept 5 glent Spectrum Analyzer - Swept 5 Center Freq 2.48750 Center Freq 2.48750 100 0 <th <="" colspan="2" td=""><td>A AC CORREC DODO GHZ PRO: Fast → IFGain:Low Bm 4 4 4 4 4 4 4 4 4 4 4 4 4</td><td>Trig: Free Run #Atten: 30 dB</td><td>2Mbps_Lower E</td><td>11:29:35 AM Feb 20, 2025 TRACE 12 3 4 5 6 TVPE P NNNNN 183 500 0 GHz -60.570 dBm -25 93 dBm -25</td><td>Frequency Auto Tur Center Fre 2.487500000 Gl Start Fre 2.475000000 Gl Stop Fre 2.50000000 Gl CF Ste 2.500000 Mi Auto Mi</td></th>	<td>A AC CORREC DODO GHZ PRO: Fast → IFGain:Low Bm 4 4 4 4 4 4 4 4 4 4 4 4 4</td> <td>Trig: Free Run #Atten: 30 dB</td> <td>2Mbps_Lower E</td> <td>11:29:35 AM Feb 20, 2025 TRACE 12 3 4 5 6 TVPE P NNNNN 183 500 0 GHz -60.570 dBm -25 93 dBm -25</td> <td>Frequency Auto Tur Center Fre 2.487500000 Gl Start Fre 2.475000000 Gl Stop Fre 2.50000000 Gl CF Ste 2.500000 Mi Auto Mi</td>		A AC CORREC DODO GHZ PRO: Fast → IFGain:Low Bm 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig: Free Run #Atten: 30 dB	2Mbps_Lower E	11:29:35 AM Feb 20, 2025 TRACE 12 3 4 5 6 TVPE P NNNNN 183 500 0 GHz -60.570 dBm -25 93 dBm -25	Frequency Auto Tur Center Fre 2.487500000 Gl Start Fre 2.475000000 Gl Stop Fre 2.50000000 Gl CF Ste 2.500000 Mi Auto Mi
Test_Graph_ glent Spectrum Analyzer - Swept S Center Freq 2.48750 Center Freq 2.48750 10 dB/div Ref 20.00 d 10 d	A AC CORREC DODO GHZ PRO: Fast → IFGain:Low Bm 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig: Free Run #Atten: 30 dB	2Mbps_Lower E	11:29:35 AM Feb 20, 2025 TRACE 12 3 4 5 6 TVPE P NNNNN 183 500 0 GHz -60.570 dBm -25 93 dBm -25	Frequency Auto Tur Center Fre 2.487500000 GH Start Fre 2.47500000 GH Stop Fre 2.5000000 GH CF Ste 2.500000 MH		







WKY 2 2400 000 0 CGRz -60.467 dBm O -60.467 dBm Start Freq -60.467 dBm -700 -700 dBm -700 dBm -700 -700 dBm -700 dBm -700 dBm -700 -700 dBm -700 dBm -700 dBm -700 dBm -700 dBm -700 dBm -700 dBm -700 dBm <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
Mkr2 2.400 000 0 GHz -80.457 GEnt 10 g gloder Ref 20.00 dBm -60.457 GEnt Ref 20.00 dBm -60.457 GENT -50.457		00000 GHz PN0: Fast ↔	Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
000 0				Mkr2 2.	400 000 0 GHz -60.467 dBm	Auto Tune
Start Freq Start	10.0				Marin Marina A	Center Fred 2.398500000 GH;
000 0	-30.0				-25.61 dBm	Start Fred 2.390000000 GH;
#Res BW 100 KHz #VBW 300 KHz Sweep 2.000 ims (30000 pts) 1.70000 KHz MRF MODE TRC SQL 2.406 522 6 GHz 6.609 GHz Function Wolth Function	-60.0	undersent met die ander beinne ander alt det die alt ander	newstaat and the second se	2 M /		Stop Fred 2.407000000 GH:
1 N 1 7 2.400,000,0,012 5609,0,000 60,457,0,000 Freq.0ffse 0 1 N 1 7 2.400,000,0,012 50,457,0,000 Freq.0ffse 0 0 1 1 1 1 2.400,000,0,012 50,457,0,000 Freq.0ffse 0	#Res BW 100 kHz				00 ms (30000 pts)	CF Step 1.700000 MHz <u>Auto</u> Mar
start Free Center Freq 2.48750 GHz WB MOE TE SKI X WEW 300 KHz WB MOE TE SKI X WEW 300 KHz MB MOE T	1 N 1 f 2 N 1 f 3 4 5 5 6	2.406 822 6 GHz 2.400 000 0 GHz	-5.609 dBm	INCTION FUNCTION WIDTH		Freq Offse 0 Ha
Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Lower Band Edge Emissions	8 9 10 11					
Aglent Spectrum Analyzer Swept SA Frequency RF SENSE INT ALIGNAUTO ILIO7:31:AM Feb 20, 2025 Center Freq 2.48750000 GHz Freq Run AvgType: Log-Pwr AvgHold: 10/10 Trig: Free Run AvgType: Log-Pwr Autor Turket Sense: INT Autor Turket Center Freq 2.843 500 Genter Freq 2.843 500 Genter Freq 2.843 500 Genter Freq 2.847500000 GHZ 100 Image frequency Image frequency Image frequency Autor Turket Image frequency Image frequency Image frequency Image frequency I	MSG					
Image: Ref SUB_ACC CORREC SENEELNT ALIGNATO ILIGNATO ILIGNATO <tdi< th=""><th></th><th></th><th>_ANT1_NA_</th><th>3Mbps_Lower</th><th>Band Edge E</th><th>missions</th></tdi<>			_ANT1_NA_	3Mbps_Lower	Band Edge E	missions
Mkr2 2.483 500 0 GHz -61.321 dBm Auto Tune 100 -61.321 dBm -61.321 dBm Center Free 2.48750000 GH 100 -1 -1 -2 <td>🗶 RF 50 ឆ</td> <td></td> <td></td> <td></td> <td></td> <td></td>	🗶 RF 50 ឆ					
100 1		00000 GHz PN0: Fast ↔	Trig: Free Run	Avg Type: Log-Pwr	11:07:31 AM Feb 20, 2025 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
200 3000 30000 30000 30000 3000		00000 GHz PN0: Fast IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWW DET PNNNNN	
-600 -700	10 dB/div Ref 20.00	00000 GHz PN0: Fast → IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWW DET PNNNNN	Auto Tun Center Free
#Res BW 100 kHz #VBW 300 kHz Sweep 4.000 ms (30000 pts) 2.500000 MH 1 N 1 f 2.478 999 3 GHz -6.411 dBm 2 N 1 f 2.483 500 0 GHz -6.1321 dBm 3 - - - - 4 - - - - 5 - - - - 6 - - - - 7 - - - - 8 - - - - 9 - - - - 10 - - - - 11 - - - - 9 - - - - 10 - - - - 11 - - - - 11 - - - - 12 - - - -	10 dB/div Ref 20.00 10.	00000 GHz PN0: Fast → IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 12.3 4 5 G TYPE MUNIMUM DET PNNNNN 483 500 0 GHz -61.321 dBm	Auto Tun Center Free 2.48750000 GH Start Free
1 N 1 f 2.478 989 3 GHz -6.411 dBm 2 N 1 f 2.483 600 0 GHz -61.321 dBm 3 - - - - - - 4 -	10 dB/div Ref 20.00 10.	00000 GHz PN0: Fast → IFGain:Low dBm	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 12.3 4 5 G TYPE MUNIMUM DET PNNNNN 483 500 0 GHz -61.321 dBm	Auto Tuno Center Free 2.487500000 GH Start Free 2.475000000 GH Stop Free
5 6 1 <td>10 dB/div Ref 20.00 10.</td> <td>00000 GHz PN0: Fast → IFGain:Low dBm dBm dBm dBm dBm dBm dBm dBm</td> <td>Trig: Free Run #Atten: 30 dB</td> <td>Avg Type: Log-Pwr Avg Hold: 10/10 Mkr2 2.</td> <td>TRACE 12:34 5 G TYPE MANNAN 483 500 0 GHz -61.321 dBm -25.41 dBm -</td> <td>Auto Tun Center Fre 2.487500000 GH Start Fre 2.475000000 GH Stop Fre 2.500000000 GH</td>	10 dB/div Ref 20.00 10.	00000 GHz PN0: Fast → IFGain:Low dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkr2 2.	TRACE 12:34 5 G TYPE MANNAN 483 500 0 GHz -61.321 dBm -25.41 dBm -	Auto Tun Center Fre 2.487500000 GH Start Fre 2.475000000 GH Stop Fre 2.500000000 GH
11 Image: Status Image: Status	10 dE/div Ref 20.00 100	00000 GHz PN0: Fast → IFGain:Low dBm dBm 2 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkr2 2.	TRACE 12:34 5 G TYPE MANNAN 483 500 0 GHz -61.321 dBm -25.41 dBm -	Auto Tun Center Free 2.487500000 GH Start Free 2.475000000 GH Stop Free 2.50000000 GH CF Step 2.500000 MH Auto Ma
	10 dB/div Ref 20.00 10.0	00000 GHz PN0: Fast → IFGain:Low dBm dBm 2 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkr2 2.	TRACE 12:34 5 G TYPE MANNAN 483 500 0 GHz -61.321 dBm -25.41 dBm -	Auto Tune Center Free 2.487500000 GH Start Free 2.475000000 GH Stop Free 2.50000000 GH CF Step 2.500000 MH Auto Mar
	10 dB/div Ref 20.00 100	00000 GHz PN0: Fast → IFGain:Low dBm dBm 2 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkr2 2. Mkr2 2. Sweep 4.0 Sweep 4.0	TRACE III 2 3 4 5 G TYPE III 2 4 5 G TYPE IIII 2 4 5 G NNNNN 483 500 0 GHz -61.321 dBm -25.41 dBm -	Auto Tune Center Free 2.487500000 GH Start Free 2.475000000 GH Stop Free 2.500000000 GH CF Step 2.500000 MH Auto Mar



9. Radiated Spurious Emission

9.1 Measurement Limit

15.209 Limit in the below 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

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



- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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

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

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



Quasi-Peak Measurements below 1GHz

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

• Peak Measurements above 1GHz

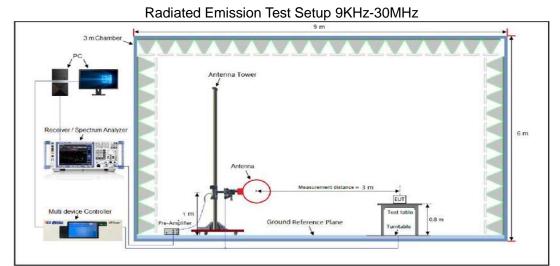
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

<u>Average Measurements above 1GHz</u>

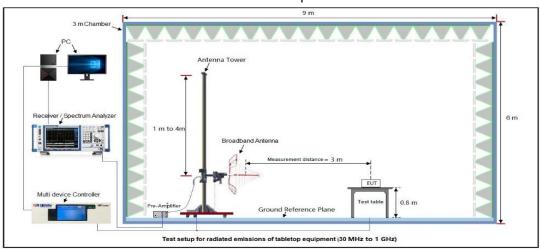
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. $VBW \ge [3 \times RBW]$
- 4. Detector = Power averaging (rms)
- 5. Averaging type = power (i.e., rms)
- 6. Sweep time = auto
- 7. Perform a trace average of at least 100 traces.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



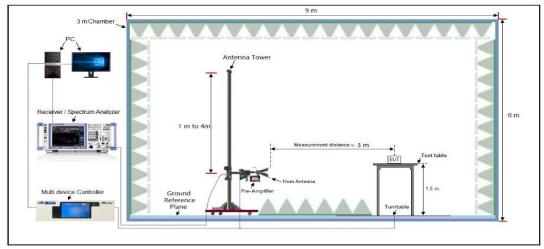
9.3 Measurement Setup (Block Diagram of Configuration)



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz





9.4 Measurement Result

Radiated Emission Below 30MHz

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

				Ra	adia	ated E	miss	sion Test R	esults	at 30	MHz-1	GH	Z				
EUT Name	W	/IRE	LES	S EA	RP	HONE	Ξ		I	Mode	I Nam	е		Т	W2	S	
Temperature	1	7.9℃	2						F	Relati	ive Hu	mic	lity	5	52.5	%	
Pressure	9	60hF	Pa						-	Test \	Voltage	е	DC 3.7V				
Test Mode	Ν	lode	8							Anter	nna Po	lar	ity	ŀ	Horiz	zont	tal
72.0	dBuV	/m															
															mit: argin:		
		_															
					_												-6
32												4	5			ىلى	Ă.
												Ň	S	in mar	And	MARCA	
		1										anar i					
		1 ×	hunne	witholed	الداملين	melmen	2	3 Minutes and a second	North March 1949	and the state	Hundryland	ypur					
e and the	Ward we	1 ******	hanna	ese Mandred	lenfolgen/	Northern	2	3 million where we want	Whank	and the second	Warman and a service	yur -					
reads	W. W.	1 	hansonad	eterat mederal	lendolyw/	Northand	2 Martin Inn	and the second	Whenmen	a.a.gode,aught	You which we are	μw 					
-8	kanan kana kana kana kana kana kana kan	1 X	henry	esenthurbert	landolani	Kalenhand	2	3 Minutes war war	Umanne	e	and and a series	, jun					
		1 × × 40	¹ 444444-44-44	60	70	80	2	(NHz)		3	00 4	400	500	600	700		
-8 30.0	00		50		70				Meas	3 sure-	00 4	400			700		000.000
-8 30.0	00	40	50	60	70	80 Read	el	(MH2) Correct	Meas	э sure- nt	00 ⁱ	400 it	500	er			
-8 30.0	00	40	50	60 Freq	70	80 Reac	el _{IV}	(MH₂) Correct Factor	Meas	3 sure- nt //m	oo ,	400 it '/m	500 Ov	er 3	Det	1	or
-8 30.0	00	40 Mk.	50	60 Freq MHz 1320	70	80 Reac Lev dBu	el IV 57	(MH₂) Correct Factor dB	Meas me dBu\	3 sure- nt //m 39	DO Lim dBuV	400 it //m 0	500 Ov dl	er 3	Det	1 tecto	or :
-8 30.0	00 No.	40 Mk.	50	60 Freq MHz 1320 359	70 . 0 7	80 Reac Lev dBu	el 1V 57 04	(MH₂) Correct Factor dB 13.82	Meas me dBuv 20.3	3 sure- nt //m 39 26	00 / Lim dBuV 40.0	400 it //m 0	500 Ov dl	er 3 .61 .24	Det pe	tecto	
-8 30.0	00 No. 1 2	40 Mk.	50 50 41. 102.	60 Freq MHz 1320 359 265	70 . 70 7 5	80 Read Lev dBu 6.9 5.0	el 1V 57 04	(MH₂) Correct Factor dB 13.82 16.22	Meas me dBuv 20.3	3 sure- nt 7/m 39 26 82	00 / Lim dBuV 40.0 43.5	400 it 0 0	500 Ov dl -19 -22	er 3 .61 .24 .68	Det pe	tecto	
-8 30.0	00 No. 1 2 3	40 Mk.	50 41. 102. 123.	60 Freq MHz 1320 359 2653 1350	70 . 7 5 0	80 Read Lev dBu 6.9 5.0	el 1√ 57 04 62 99	(мн₂) Correct Factor dB 13.82 16.22 16.20	Meas me dBuV 20.3 21.2 21.8	3 sure- int 39 26 32 70	00 / Lim dBuV 40.0 43.5 43.5	400 it //m 0 0 0	500 Ov dl -19 -22	er 61 24 .68 .30	Det pe pe	tecto eak eak	



				Ra	adia	ted Emiss	ion Test R	esults at 3	30M	Hz-1G	Hz				
EUT Name	V	VIRE	ELES	SEA	٩RP	HONE		Мо	del N	lame			TW2	S	
Temperature	1	7.9°(С					Rel	ative	e Hum	idity	Ę	52.5%		
Pressure	9	60hl	Pa					Tes	Test Voltage				DC 3	.7V	
Test Mode	N	lode	8					Ant	enna	a Pola	rity	١	/ertic	cal	
72.0	dBuV.	/m													
													mit: argin:		
													6		
32							_		4	W. T. M. March	a wardeni	an we	447004	was a	
	erette tet	1	Midano	2	munaly	where where a month of	how which with the provide starting	a when a white the set	an ann	h-p-1/P-1/V					
her	Maleria					- and sharper to a									
-															
-8 30.00	0	40	50	60	70	80	(MHz)		300	400	500	600	700	1000.00	
						Reading	Correct	Measure	e-						
1	No.	Mk.		Freq	-	Level	Factor	ment		Limit	٥١	/er			
_				MHz		dBuV	dB	dBuV/m	0	dBuV/m	n d	В	Dete	ector	
_	1		45	.216	6	6.54	16.95	23.49	4	0.00	-16	.51	pe	eak	
_	2		64	.6594	4	6.45	17.05	23.50	4	0.00	-16	.50	pe	eak	
_	3		152	.129	7	6.08	18.20	24.28	4	3.50	-19	.22	pe	ak	
_	4		314	.376	5	5.65	19.91	25.56	4	6.00	-20	.44	pe	eak	
-	-			31.09	1.09 46.00			-14.91		· · · · · · · · · · · · · · · · · · ·					
	5	5 438.6554			4	0.21	20.00	01.00							

RESULT: Pass

Note:

- 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- 2. All test modes had been pre-tested. The mode 8 is the worst case and recorded in the report.



Radiated Emissions Test Results Above 1GHz

EU	Г Name	WIRELESS	EARPHONE		Mode	el Name	TW2S		
Ten	nperature	17.9 ℃			Relat	ive Humidity	52.5%		
Pre	ssure	960hPa			Test	Voltage	DC 3.7\	/	
Tes	t Mode	Mode 7			Ante	nna Polarity	Horizon	tal	
[Frequency	Meter Reading	Factor	Emission	n Level	Limits	Margin		
	(MHz)	(dBµV)	(dB)	(dBµV	//m)	(dBµV/m)	(dB)	- Value Type	
	4804.000	46.32	0.08	46.4	4	74	-27.6	peak	
	4804.000	37.42	0.08	37.5	5	54	-16.5	AVG	
ĺ	7206.000	41.35	2.21	43.5	i6	74	-30.44	peak	
	7206.000	32.48	2.21	34.6	69	54	-19.31	AVG	
	Remark:								
		enna Factor + C	able Loss – F	re-amplifi	ier.				
EU			able Loss – F EARPHONE	Pre-amplifi		el Name	TW2S		
	Factor = Ante		-	Pre-amplifi	Mode	el Name	TW2S 52.5%		
Ten	Factor = Ante F Name	WIRELESS	-	Pre-amplifi	Mode Relat			/	
Ten Pre	Factor = Ante F Name nperature	WIRELESS 17.9℃	-	Pre-amplifi	Mode Relat Test	ive Humidity	52.5%	/	
Ten Pre	Factor = Ante F Name hperature ssure t Mode	WIRELESS 17.9℃ 960hPa Mode 7	-		Mode Relat Test	ive Humidity Voltage nna Polarity	52.5% DC 3.7 Vertical	1	
Ten Pre	Factor = Ante F Name hperature ssure	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading	EARPHONE	Pre-amplifi Emission	Mode Relat Test Anter	ive Humidity Voltage	52.5% DC 3.7\	/ Value Type	
Ten Pre	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7	EARPHONE	Emission	Mode Relat Test ¹ Anter Level	ive Humidity Voltage nna Polarity Limits	52.5% DC 3.7 Vertical Margin	1	
Ten Pre	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading (dBµV)	EARPHONE Factor (dB)	Emissior (dBµV	Mode Relat Test ¹ Anter h Level //m) 4	ive Humidity Voltage nna Polarity Limits (dBµV/m)	52.5% DC 3.7 Vertical Margin (dB)	– Value Type	
Ten Pre	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading (dBµV) 46.32	EARPHONE Factor (dB) 0.08	Emission (dBµV 46.4	Mode Relat Test Anter Anter (/m) 4 5	ive Humidity Voltage nna Polarity Limits (dBµV/m) 74	52.5% DC 3.7 Vertical Margin (dB) -27.6	Value Type	
Ten Pre	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading (dBµV) 46.32 37.42	EARPHONE Factor (dB) 0.08 0.08	Emission (dBµV 46.4 37.5	Mode Relat Test Anter //m) 4 5 5 66	ive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54	52.5% DC 3.7 Vertical Margin (dB) -27.6 -16.5	Value Type peak AVG	
Ten Pre	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading (dBµV) 46.32 37.42 41.35	EARPHONE Factor (dB) 0.08 0.08 2.21	Emissior (dBµV 46.4 37.5 43.5	Mode Relat Test Anter //m) 4 5 5 66	ive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54 74	52.5% DC 3.7 Vertical Margin (dB) -27.6 -16.5 -30.44	Value Type peak AVG peak	
Ten Pre Tes	Factor = Ante	WIRELESS 17.9℃ 960hPa Mode 7 Meter Reading (dBµV) 46.32 37.42 41.35	EARPHONE Factor (dB) 0.08 0.08 2.21	Emissior (dBµV 46.4 37.5 43.5	Mode Relat Test Anter //m) 4 5 5 66	ive Humidity Voltage nna Polarity Limits (dBµV/m) 74 54 74	52.5% DC 3.7 Vertical Margin (dB) -27.6 -16.5 -30.44	Value Type peak AVG peak	

RESULT: PASS



Radiated Emissions Test Results for Above 1GHz

EUT Name		WIRELES	S EARPHON	E	Mode	el Name		TW2S			
Temperature		17.9 ℃			Rela	tive Humidit	y	52.5%			
Pressure		960hPa			Test	Voltage		DC 3.7	V		
Test Mode		Mode 8			Ante	nna Polarity	Polarity Horizontal				
Frequency	Μ	leter Reading	Factor	Emissio	n Level	Limits		Margin	Value Type		
(MHz)		(dBµV)	(dB)	(dBµ\	//m)	(dBµV/m)		(dB)	value Type		
4882.000		45.77	0.14	45.9	91	74		-28.09	peak		
4882.000		38.19	0.14	38.3	33	54		-15.67	AVG		
7323.000		41.63	2.36	43.9	99	74		-30.01	peak		
7323.000		34.25	2.36	36.6	61	54		-17.39	AVG		
						ļ					
Remark:											
Factor = Ante	enna l	Factor + Ca	ole Loss – Pre	e-amplifier.							
EUT Name		WIRELES	S EARPHON	E	Model Name			TW2S	TW2S		
Temperature		17.9 ℃	17.9℃			Relative Humidity			52.5%		
Pressure		960hPa)hPa			Test Voltage			DC 3.7V		
Test Mode		Mode 8			Ante	nna Polarity	/	Vertical			
	Mata	v Deeding	Fastar	Emission	aval	Linsite	N				
Frequency (MHz)		er Reading (dBµV)	Factor (dB)	Emission L				largin (dB)	Value Type		
4882.000		(dБµV) 45.29	<u>(ub)</u> 0.14	(dBµV/m 45.43	/	(dBµV/m) 74		(ub) 28.57	peak		
4882.000		45.29 37.62	0.14	45.43		54		28.57 16.24	AVG		
7323.000		40.95	2.36	43.31		74		30.69	peak		
7323.000		33.79	2.36	36.15		54		17.85	AVG		
1020.000		00.19	2.50	30.13		74	-	17.00	////		
Remark:											
Factor = Anteni	na Fa	ctor + Cable	loss – Pre-a	mnlifier							
	uia										

RESULT: PASS



Radiated Emissions Test Results for Above 1GHz

EUT Name	WIRELESS	WIRELESS EARPHONE			Name	TW2S		
Temperature	17.9 ℃			Relativ	ve Humidity	52.5%		
Pressure	960hPa	960hPa			oltage	DC 3.7V		
Test Mode	Mode 9	Mode 9			na Polarity	Horizontal		
	·					·		
Frequency	Meter Reading Factor E		Emissic	on Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµ	V/m)	(dBµV/m)	(dB)	value Type	
4960.000	46.59	0.22	46.	.81	74	-27.19	peak	
4960.000	38.43	0.22	38.	.65	54	-15.35	AVG	
7440.000	41.27	2.64	43.		74	-30.09	peak	
7440.000	32.88	2.64	35.	.52	54	-18.48	AVG	
Remark:		La La cara a Dua d						
	nna Factor + Cab	le Loss – Pre-a	amplifier.					
		le Loss – Pre-a	amplifier.	Model	Name	TW2S		
Factor = Anter			amplifier.		Name ve Humidity	TW2S 52.5%		
Factor = Anter	WIRELESS		amplifier.		ve Humidity	_		
Factor = Anter EUT Name Temperature	WIRELESS 17.9℃		amplifier.	Relativ Test V	ve Humidity	52.5%		
Factor = Anter	WIRELESS 17.9℃ 960hPa Mode 9	EARPHONE		Relativ Test V Anten	ve Humidity oltage na Polarity	52.5% DC 3.7V Vertical		
Factor = Anter	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading	EARPHONE	Emissic	Relativ Test V Anten	ve Humidity oltage na Polarity	52.5% DC 3.7V Vertical	Value Type	
Factor = Anter	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV)	EARPHONE Factor (dB)	Emissic (dBµ	Relativ Test V Anten on Level V/m)	ve Humidity oltage na Polarity Limits (dBµV/m)	52.5% DC 3.7V Vertical Margin (dB)		
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000	WIRELESS 17.9 °C 960hPa Mode 9 Meter Reading (dBµV) 46.12	EARPHONE Factor (dB) 0.22	Emissic (dBµ 46.	Relativ Test V Anten on Level V/m) 34	ve Humidity oltage na Polarity Limits (dBµV/m) 74	52.5% DC 3.7V Vertical Margin (dB) -27.66	peak	
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000 4960.000	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV) 46.12 38.54	Factor (dB) 0.22 0.22	Emissic (dBµ 46. 38.	Relativ Test V Anten on Level V/m) 34 .76	ve Humidity oltage na Polarity Limits (dBµV/m) 74 54	52.5% DC 3.7V Vertical Margin (dB) -27.66 -15.24	peak AVG	
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000 7440.000	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV) 46.12 38.54 40.79	EARPHONE Factor (dB) 0.22 0.22 2.64	Emissic (dBµ 46. 38. 43.	Relative Test V Anten on Level V/m) 34 .76 .43	Limits (dBµV/m) 74 54 74	52.5% DC 3.7V Vertical Margin (dB) -27.66 -15.24 -30.57	peak AVG peak	
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000 4960.000	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV) 46.12 38.54	Factor (dB) 0.22 0.22	Emissic (dBµ 46. 38.	Relative Test V Anten on Level V/m) 34 .76 .43	ve Humidity oltage na Polarity Limits (dBµV/m) 74 54	52.5% DC 3.7V Vertical Margin (dB) -27.66 -15.24	peak AVG	
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000 7440.000	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV) 46.12 38.54 40.79	EARPHONE Factor (dB) 0.22 0.22 2.64	Emissic (dBµ 46. 38. 43.	Relative Test V Anten on Level V/m) 34 .76 .43	Limits (dBµV/m) 74 54 74	52.5% DC 3.7V Vertical Margin (dB) -27.66 -15.24 -30.57	peak AVG peak	
Factor = Anter EUT Name Temperature Pressure Test Mode Frequency (MHz) 4960.000 7440.000	WIRELESS 17.9℃ 960hPa Mode 9 Meter Reading (dBµV) 46.12 38.54 40.79	EARPHONE Factor (dB) 0.22 0.22 2.64	Emissic (dBµ 46. 38. 43.	Relative Test V Anten on Level V/m) 34 .76 .43	Limits (dBµV/m) 74 54 74	52.5% DC 3.7V Vertical Margin (dB) -27.66 -15.24 -30.57	peak AVG peak	

RESULT: PASS

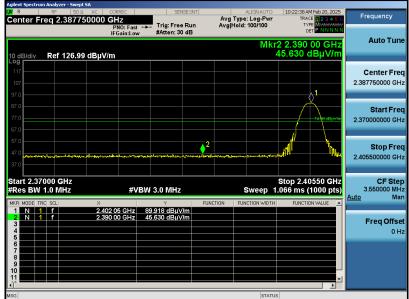
Note:

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

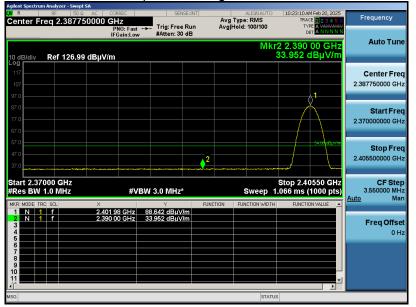


EUT Name	WIRELESS EARPHONE	Model Name	TW2S
Temperature	25 ℃	Relative Humidity	48%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 1	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

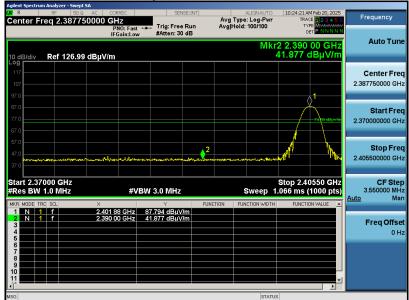


RESULT: PASS

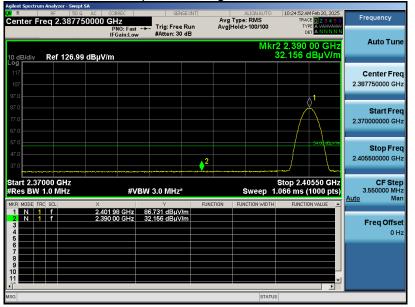


EUT Name	WIRELESS EARPHONE	Model Name	TW2S
Temperature	25 ℃	Relative Humidity	48%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 1	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement

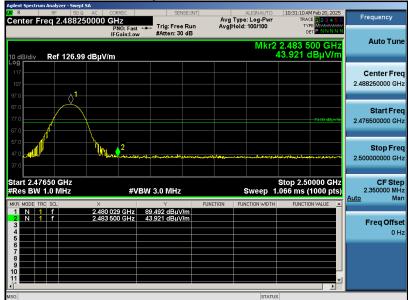


RESULT: PASS

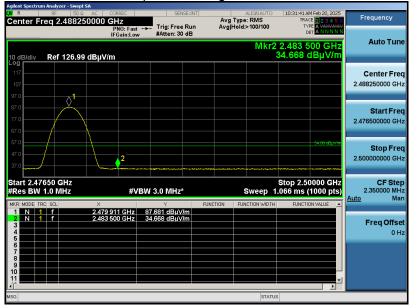


EUT Name	WIRELESS EARPHONE	Model Name	TW2S
Temperature	25 ℃	Relative Humidity	48%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

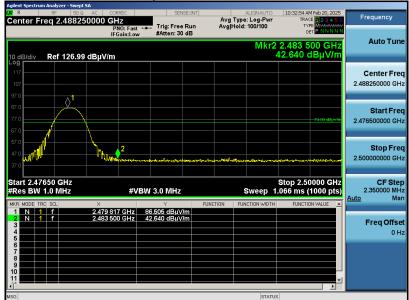


RESULT: PASS

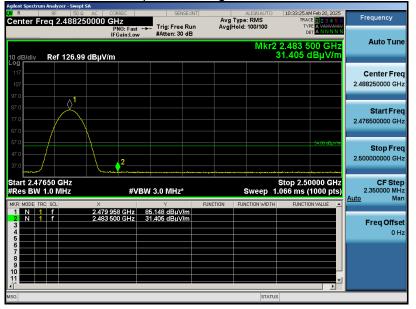


EUT Name	WIRELESS EARPHONE	Model Name	TW2S
Temperature	25 ℃	Relative Humidity	48%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

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



10. Number of Hopping Frequency Measurement

10.1 Provisions Applicable

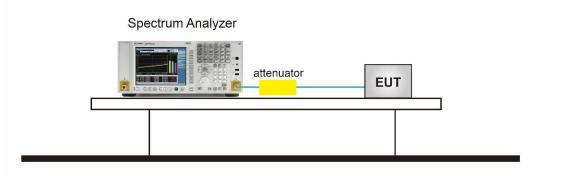
This frequency hopping system must employ a minimum of 15 hopping channels.

10.2 Measurement Procedure

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

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

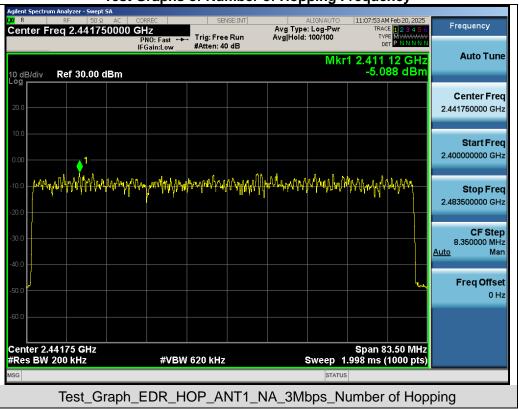
10.3 Measurement Setup (Block Diagram of Configuration)



10.4 Measurement Result

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





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.



11. Time of Occupancy (Dwell Time) Measurement

11.1 Provisions Applicable

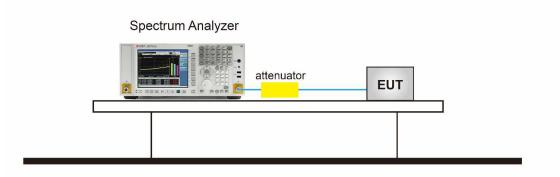
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

11.2 Measurement Procedure

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

- 1. Span = Zero span, centered on a hopping channel.
- 2. RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3. VBW \geq RBW
- 4. Sweep time = As necessary to capture the entire dwell time per hopping channel
- 5. Detector = Peak
- 6. Trace mode = Free Run
- 7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

11.3 Measurement Setup (Block Diagram of Configuration)

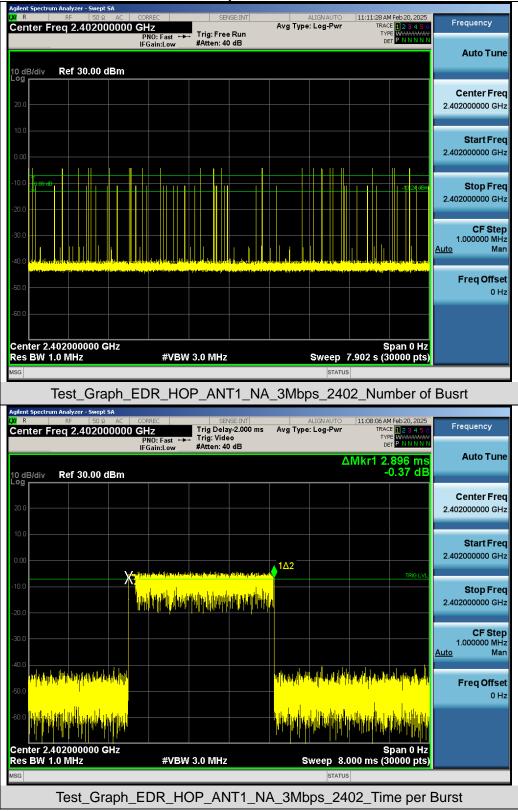


11.4 Measurement Result

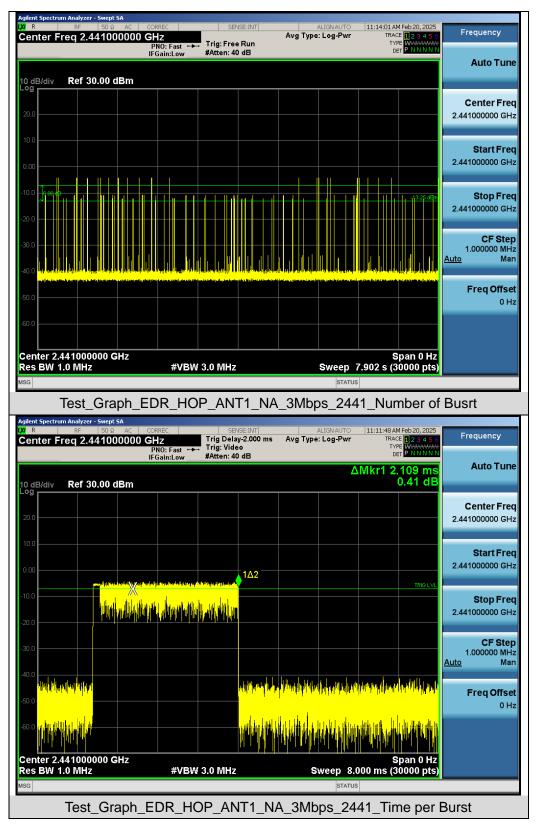
Test Data of Dwell Time					
Channel	Time of Pulse for 3DH5 (ms)	Number of hops in the period specified in the requirements	Dwell Time (ms)	Limit (ms)	Pass or Fail
2402	2.896	26.0*4	301.184	400	Pass
2441	2.109	23.0*4	194.028	400	Pass
2480	2.896	22.0*4	254.848	400	Pass



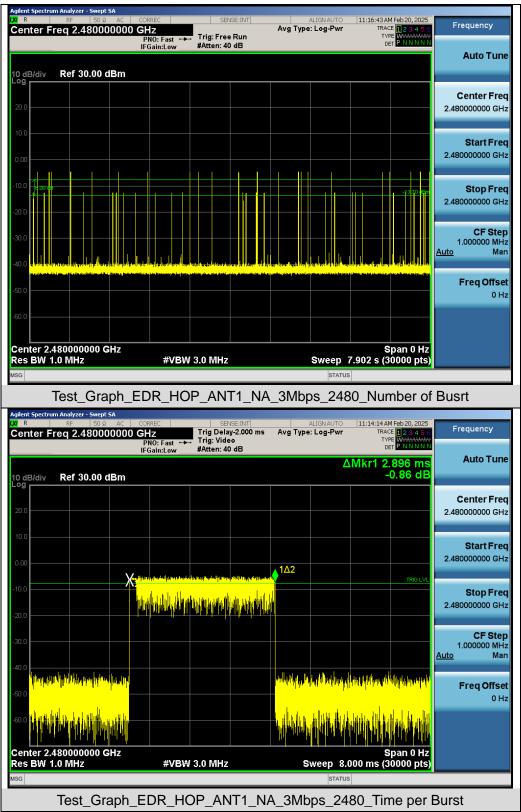
Test Graphs of Dwell Time











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



12. Frequency Separation Measurement

12.1 Provisions Applicable

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

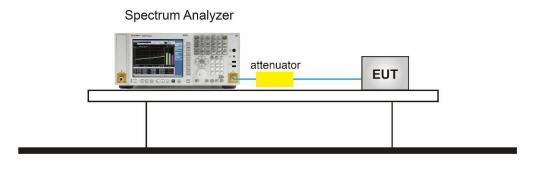
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

12.2 Measurement Procedure

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

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

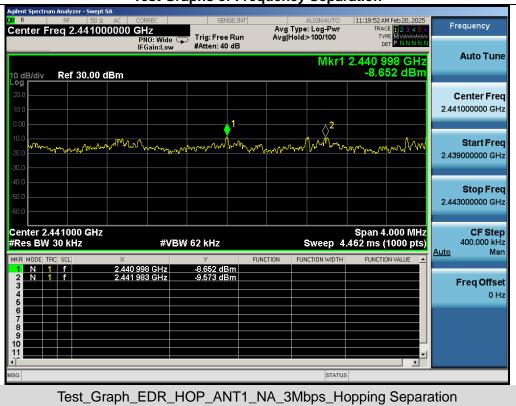
12.3 Measurement Setup (Block Diagram of Configuration)



12.4 Measurement Result

Test Data of Frequency Separation			
Test Mode	Channel Separation (MHz)	Limits (MHz)	Pass or Fail
8DPSK	0.985	≥0.867	Pass





Test Graphs of Frequency Separation

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



13. AC Power Line Conducted Emission Test

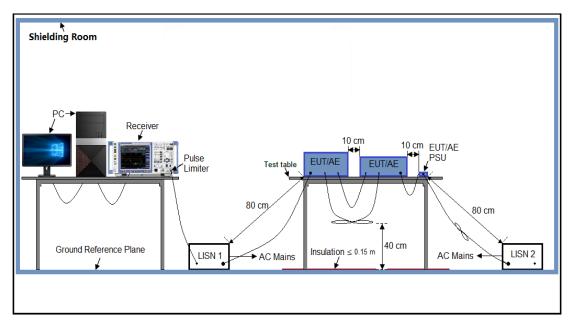
13.1 Measurement Limit

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

Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2 Measurement Setup (Block Diagram of Configuration)





13.3 Preliminary Procedure of Line Conducted Emission Test

- 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.
- 8. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 9. During the above scans, the emissions were maximized by cable manipulation.
- 10. The test mode(s) were scanned during the preliminary test.
- 11. 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.
- 3. 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.
- 4. The test data of the worst case condition(s) was reported on the Summary Data page.
- 5. A conducted emission is calculated by the following equation:
 - Measurement Level (dBµV) = Receiver reading (dBµV) + Transd (dB)
 - Transd (dB)= AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
 - Margin= Limit-Level

13.5 Measurement Result

N/A

Note: The BT function cannot transmit when charging

Report No.: AGC15344250202FR01 Page 74 of 75



Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC15344250202AP02

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC15344250202AP03



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.

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