

FCC Test Report

Report No.: AGC08073201202FE03

FCC ID	8	2ATZS-T3
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Transmitter and Receiver
BRAND NAME	E	N/A
MODEL NAME	: 6	See page 5
APPLICANT	59	Shenzhen Leadinway Technology Co.,Ltd
DATE OF ISSUE	: 3	Dec. 23, 2020
STANDARD(S)	:	FCC Part 15.247
REPORT VERSION		V1.0

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	© /	Dec. 23, 2020	Valid	Initial Release

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TABLE OF CONTENTS

	1. VERIFICATION OF CONFORMITY	5
	2. GENERAL INFORMATION	
	2.1. PRODUCT DESCRIPTION	6
	2.2. TABLE OF CARRIER FREQUENCYS	
	2.3. RECEIVER INPUT BANDWIDTH	7
	2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE	7
	2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR	7
	2.6. RELATED SUBMITTAL(S) / GRANT (S)	
	2.7. TEST METHODOLOGY	8
	2.8. SPECIAL ACCESSORIES	8
	2.9. EQUIPMENT MODIFICATIONS	
	2.10. ANTENNA REQUIREMENT	8
	3. MEASUREMENT UNCERTAINTY	9
	4. DESCRIPTION OF TEST MODES	
	5. SYSTEM TEST CONFIGURATION	11
	5.1. CONFIGURATION OF EUT SYSTEM	11
	5.2. EQUIPMENT USED IN TESTED SYSTEM	11
	5.3. SUMMARY OF TEST RESULTS	11
	6. TEST FACILITY	12
	7. PEAK OUTPUT POWER	13
	7.1. MEASUREMENT PROCEDURE	
	7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	13
	7.3. LIMITS AND MEASUREMENT RESULT	14
	8. 20DB BANDWIDTH	20
	8.1. MEASUREMENT PROCEDURE	20
	8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	20
	8.3. LIMITS AND MEASUREMENT RESULTS	21
	9. CONDUCTED SPURIOUS EMISSION	27
	9.1. MEASUREMENT PROCEDURE	
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9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
9.3. MEASUREMENT EQUIPMENT USED	
9.4. LIMITS AND MEASUREMENT RESULT	
10. RADIATED EMISSION	
10.1. MEASUREMENT PROCEDURE	
10.2. TEST SETUP	
10.3. LIMITS AND MEASUREMENT RESULT	
10.4. TEST RESULT	
11. NUMBER OF HOPPING FREQUENCY	
11.1. MEASUREMENT PROCEDURE	
11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
11.3. MEASUREMENT EQUIPMENT USED	
11.4. LIMITS AND MEASUREMENT RESULT	
12. TIME OF OCCUPANCY (DWELL TIME)	
12.1. MEASUREMENT PROCEDURE	
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
12.3. MEASUREMENT EQUIPMENT USED	
12.4. LIMITS AND MEASUREMENT RESULT	
13. FREQUENCY SEPARATION	
13.1. MEASUREMENT PROCEDURE	
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
13.3. MEASUREMENT EQUIPMENT USED	
13.4. LIMITS AND MEASUREMENT RESULT	
14. FCC LINE CONDUCTED EMISSION TEST	
14.1. LIMITS OF LINE CONDUCTED EMISSION TEST	
14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	
14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	
14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	
14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	
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APPENDIX B: PHOTOGRAPHS OF EUT	

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Leadinway Technology Co., Ltd			
Address	29 Building, Baotian industrial District Chentian, Xixiang Town, Shenzhen, Guangdong, China			
Manufacturer	Shenzhen Leadinway Technology Co., Ltd			
Address	29 Building, Baotian industrial District Chentian, Xixiang Town, Shenzhen Guangdong, China			
Factory	Shenzhen Leadinway Technology Co., Ltd			
Address	29 Building, Baotian industrial District Chentian, Xixiang Town, Shenzhen, Guangdong, China			
Product Designation	Bluetooth Transmitter and Receiver			
Brand Name	N/A			
Test Model	T3			
Series Model	T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20			
Difference Description	All the same except for the model name.			
Date of test	Dec. 10, 2020 to Dec. 22, 2020			
Deviation	No any deviation from the test method			
Condition of Test Sample	ample Normal			
Test Result	Pass			
Report Template	AGCRT-US-BR/RF			

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Prepared By

Reviewed By

John Zerry

John Zeng (Project Engineer)

Dec. 22, 2020

Max Zhan

Max Zhang (Reviewer)

Dec. 23, 2020

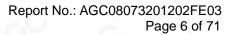
Approved By

Forrest Lei (Authorized Officer)

Dec. 23, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

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

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480 GHz	
RF Output Power	2.042dBm (Max)	
Bluetooth Version	V5.0	
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps	
Number of channels	79	
Hardware Version	YHW-T3(ATS2831)-V1.2-20200914	
Software Version	ATS2831_YHW_T3_SVN1664_20201117	
Antenna Designation	Ceramic Antenna (Comply with requirements of the FCC part 15.203)	
Antenna Gain	0dBi	
Power Supply	DC 3.7V by battery	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
0	0	2402 MHz
	。 1	2403 MHz
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
C 2 L		
	77	2479 MHz
	78	2480 MHz

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2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHz, in every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally, the type of connection (e.g. single of multi slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also, the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a hopping sequence in data mode: 40, 21, 44, 23, 04, 15, 66, 56, 19, 78, 07, 28, 69, 55, 36, 45, 05, 13, 43, 74, 57, 35, 67, 76, 02, 34, 54, 63, 42, 11, 30, 06, 64, 25, 75, 48, 17, 33, 58, 01, 29, 14, 51, 72, 03, 31, 50, 61, 77, 18, 10, 47, 12, 68, 08, 49, 20, 79, 73, 09, 16, 60, 71, 41, 24, 53, 38, 26, 46, 37, 65, 32, 70, 52, 27, 59, 22, 62, 39

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.

2. Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For behavior action with other units only offset is used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bits counter. For the deriving of the hopping sequence the entire. LAP (24 bits),4LSB's(4bits) (Input 1) and the 27MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended.

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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.

2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ATZS-T3** filing to comply with the FCC PART 15.247 requirements.

2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.10. ANTENNA REQUIREMENT

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

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard

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

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: $Uc = \pm 2\%$
- Uncertainty of Frequency: $Uc = \pm 2 \%$

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION			
1	Low channel GFSK			
2	Middle channel GFSK			
3	High channel GFSK			
4	Low channel π/4-DQPSK			
5	Middle channel π/4-DQPSK			
6	High channel π/4-DQPSK			
7	Low channel 8DPSK			
8	Middle channel 8DPSK			
9	High channel 8DPSK			
10	Hopping mode GFSK			
11	Hopping mode π/4-DQPSK			
12	Hopping mode 8DPSK			

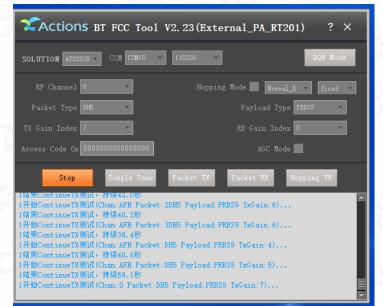
Note:

1. Only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

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

Software Setting



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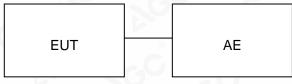
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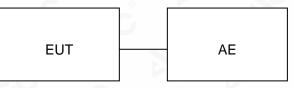
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Transmitter and Receiver	Т3	2ATZS-T3	EUT
2	Control Box	N/A	USB-TTL	AE
3	USB Cable	N/A	0.8m unshielded	Accessory
4	Adapter	TY0500100E1MN	N/A	AE
5	AUX Cable	N/A	0.6m unshielded	Accessory

5.3. SUMMARY OF TEST RESULTS

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

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6. TEST FACILITY

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

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

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

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

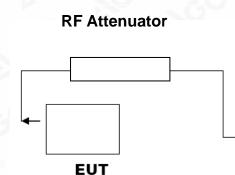
For peak power test:

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

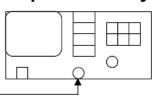
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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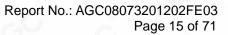
7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR GFSK MOUL	DULATION			
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fa					
2.402	1.446	21	Pass		
2.441	1.576	21	Pass		
2.480	1.906	21	Pass		

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CH39



CH78

Keysight Spectrum Analyzer - Swept SA					
X RL RF 50 Ω AC Center Freq 2.480000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:06:45 PM Dec 11, 2020 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB	AvgiHold: 100/100	2.480 190 GHz 1.906 dBm	Auto Tune
10.0		1			Center Fred 2.480000000 GH;
-10.0					Start Free 2.477500000 GH
-20.0					Stop Fre 2.482500000 GH
-40.0					CF Ste 500.000 kH <u>Auto</u> Ma
-60.0					Freq Offse ० म
-70.0 Center 2.480000 GHz	2) (B)44			Span 5.000 MHz	
#Res BW 1.5 MHz ^{MSG}	#VBW	5.0 MHz	Sweep 1 STATUS	.000 ms (1001 pts)	

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π/4-DQPSK MODULATION					
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	1.309	21	Pass		
2.441	1.538	21	Pass		
2.480	1.864	21	Pass		



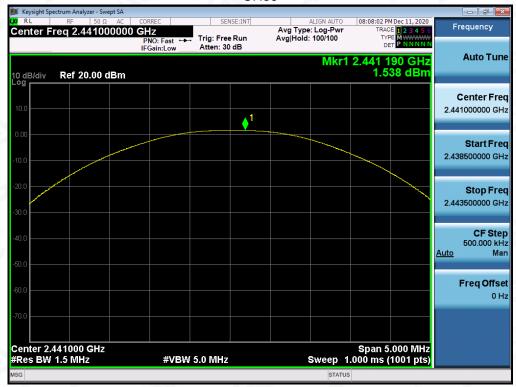
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Report No.: AGC08073201202FE03 Page 17 of 71



CH39

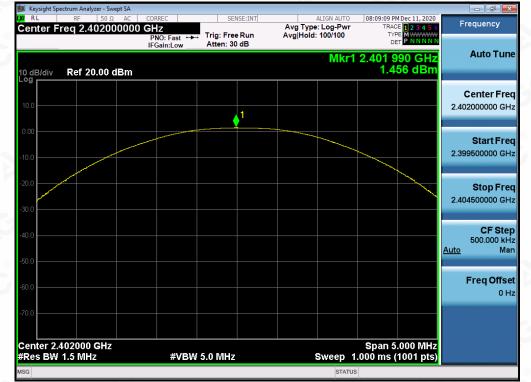


CH78

Keysight Spectrum Analyzer -		2050		os sur				10 11 0000	- 0 - E
Center Freq 2.480	000000 GI	RREC IZ NO: Fast ↔→→		SE:INT		LIGN AUTO Log-Pwr 100/100	TRAC	MDec 11, 2020 E 1 2 3 4 5 6 E M WWWW	Frequency
10 dB/div Ref 20.00	IF	Gain:Low	Atten: 30				2.480 1	70 GHz 64 dBm	Auto Tun
- og 10.0				▲1					Center Fre 2.480000000 GH
.10.0									Start Fre 2.477500000 G⊦
-20.0									Stop Fre 2.482500000 G⊦
40.0									CF Ste 500.000 kH <u>Auto</u> Ma
60.0									Freq Offs 0 ⊦
-70.0	7						Span 5	.000 MHz	
#Res BW 1.5 MHz		#VBW	5.0 MHz				.000 ms (1001 pts)	
MSG		_		_	_	STATUS			

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PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR 8-DPSK MODULA	TION			
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	1.456	21	Pass		
2.441	1.772	21	Pass		
2.480	2.042	21	Pass		



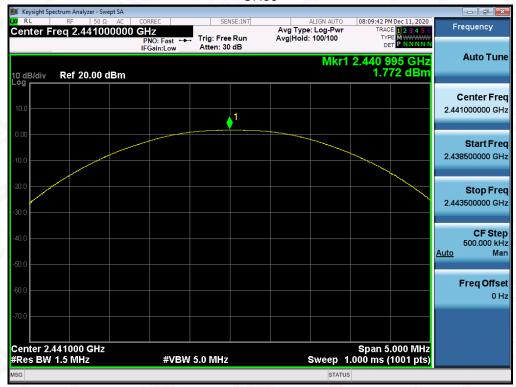
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Report No.: AGC08073201202FE03 Page 19 of 71



CH39



CH78

Keysight Spectrum Analyzer - Swept SA					
RL RF 50 Ω AC Center Freq 2.480000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:10:14 PM Dec 11, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast +++ IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Hold: 100/100	DET P N N N N N	
0 dB/div Ref 20.00 dBm			Mkr1	2.480 010 GHz 2.042 dBm	Auto Tur
10.0		. 1			Center Fre 2.480000000 Gi
0.00					Start Fr
10.0					2.477500000 G
30.0					Stop Fr 2.482500000 G
40.0					CF St 500.000 k <u>Auto</u> M
50.0					Freq Offs 0
70.0					
Center 2.480000 GHz Res BW 1.5 MHz	#VBW	5.0 MHz	Sweep	Span 5.000 MHz .000 ms (1001 pts)	
SG			STATU	5	

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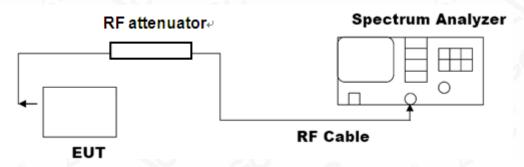


8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

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



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8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION					
Appliachta Limita		Measurement Resu	lt		
Applicable Limits	Test Data	ı (MHz)	Criteria		
	Low Channel	0.942	PASS		
N/A	Middle Channel	0.942	PASS		
	High Channel	0.942	PASS		

08:04:13 PM Dec 11, 2020 SENSE:INT Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hol #Atten: 30 dB Frequency 102000000 GHz Radio Std: None Avg|Hold: 100/100 #IFGain:Low Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.402000000 GHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 3.2 ms CF Step 300.000 kHz #VBW 100 kHz <u>Auto</u> 8.96 dBm **Occupied Bandwidth Total Power** 852.40 kHz Freq Offset 0 Hz 35.352 kHz **Transmit Freq Error OBW Power** 99.00 % x dB Bandwidth 941.5 kHz x dB -20.00 dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION						
Applicable Limits		Measurement Result				
	Test Data	(MHz)	Criteria			
N/A	Low Channel	1.263	PASS			
	Middle Channel	1.271	PASS			
	High Channel	1.267	PASS			

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



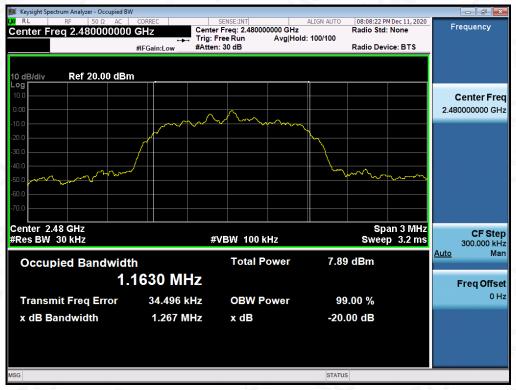
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR 8-DPSK MODULATION						
Applicable Limits Measurement Result						
Applicable Limits	Test Da	ta (MHz)	Criteria			
	Low Channel	1.247	PASS			
N/A	Middle Channel	1.247	PASS			
-0	High Channel	1.248	PASS			

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
 RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

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

The same as described in section 8.2

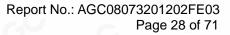
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEAS	SUREMENT RESULT				
Annlinghig Limite	Measurement Result				
Applicable Limits	Test Data	Criteria			
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS			
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS			

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TEST RESULT FOR ENTIRE FREQUENCY RANGE

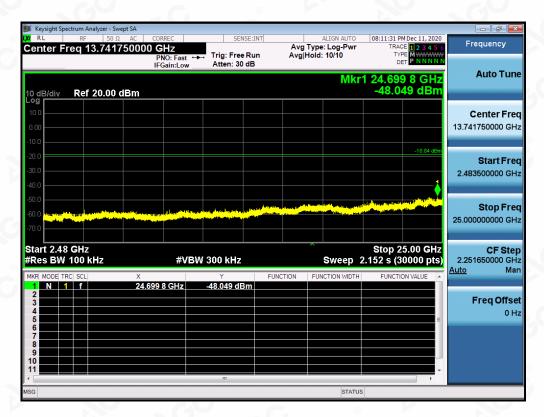
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL



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Report No.: AGC08073201202FE03 Page 29 of 71





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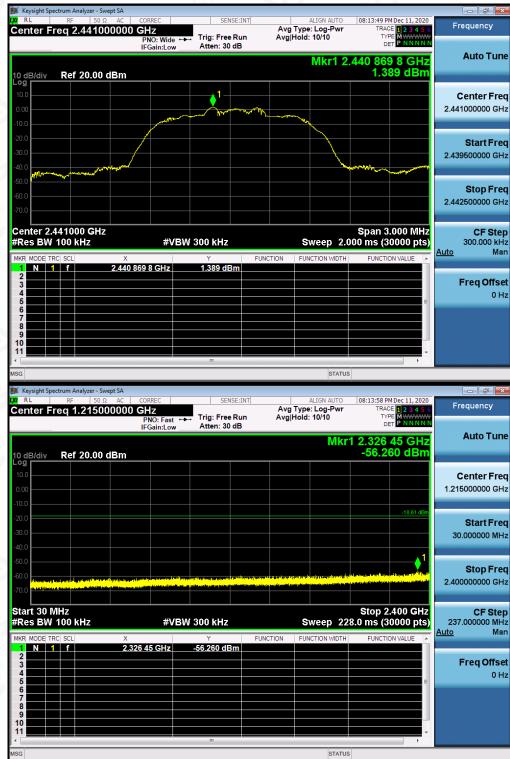
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 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com

Web: http://cn.agc-cert.com/



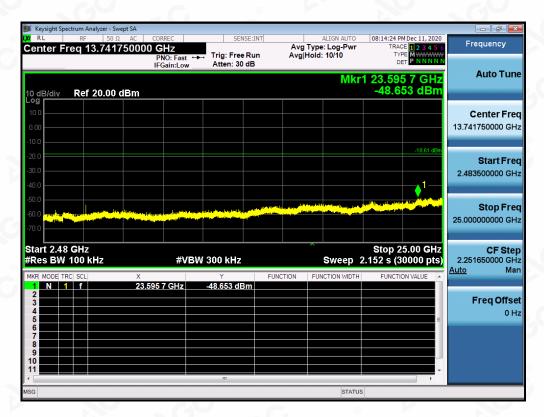


TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL

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Report No.: AGC08073201202FE03 Page 31 of 71





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 E-mail: agc@agc-cert.com

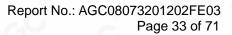
Web: http://cn.agc-cert.com/



Keysight Spectrum Analyzer - S RL RF 50	wept SA Ω AC CORREC	SENSE:INT	ALIGN AUTO	08:15:42 PM Dec 11, 2020	-
enter Freq 2.4800	000000 GHz	Trin Frank	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456	Frequency
	PNO: Wide ↔ IFGain:Low	Atten: 30 dB		DET P NNNN	
			Mkr1 2	.479 868 9 GHz	Auto Tun
B/div Ref 20.00	dBm			1.714 dBm	
		↓			Center Fre
			m		2.48000000 GH
					Start Fre
					2.478500000 GH
and a second and a second seco				and the second s	
					Stop Fre
					2.481500000 GH
- 0 100000 011					
er 2.480000 GH BW 100 kHz		V 300 kHz	Sweep 2.0	Span 3.000 MHz 000 ms (30000 pts)	CF Step 300.000 kH
IODE TRC SCL	X		UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mai
N 1 f	2.479 868 9 GHz	1.714 dBm			
					Freq Offse
				E	0 H:
		m	STATUS	•	
			STATUS		
sight Spectrum Analyzer - S RF 50	Ω AC CORREC	SENSE:INT	ALIGN AUTO	08:15:51 PM Dec 11, 2020	Frequency
er Freq 1.2150	000000 GHz PNO: Fast ↔	⊢ Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW	Frequency
	IFGain:Low	Atten: 30 dB		DET	Auto Tune
D-5 30.00			Mkr	1 2.368 40 GHz -56.371 dBm	
/div Ref 20.00					
					Center Fred
					1.215000000 GHz
				-18.29 dBm	
					Start Free 30.000000 MH;
					30.000000 WH2
				`	01 E
مالية الحدور ودوران مقدمة ماريا أورين المعتمد ا	l kan di beraja kan kapana posah at kapana binken di k	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			Stop Fred 2.400000000 GHz
annes y stande and a sea and a sea of the	ald a finale a court for to constant in this bir the base of the birds				
30 MHz				Stop 2.400 GHz	CF Step
8W 100 kHz	#VBV	V 300 kHz	Sweep 22	8.0 ms (30000 pts)	237.000000 MH Auto Mar
ODE TRC SCL	× 2.368 40 GHz		UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Mai
	2.308 40 GHZ	-56.371 dBm			Freq Offse
					0 Hi
				E	

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

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

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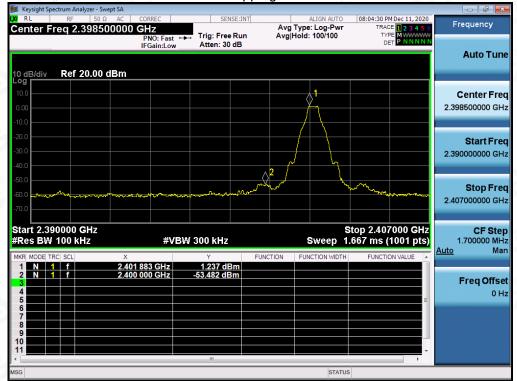
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



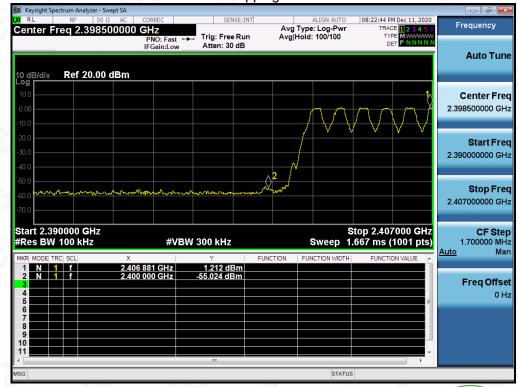
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

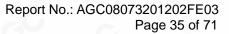
Hopping off



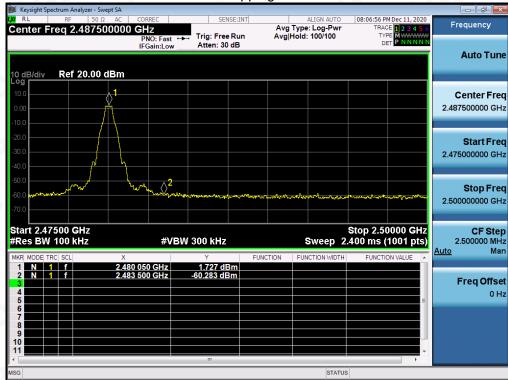
Hopping on



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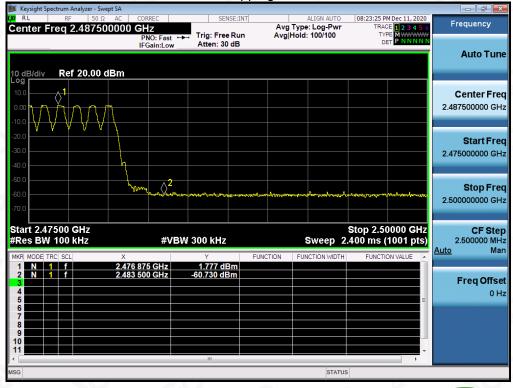




GFSK MODULATION IN HIGH CHANNEL

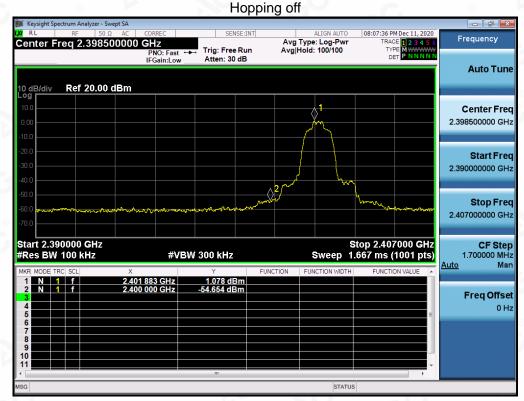
Hopping off

Hopping on



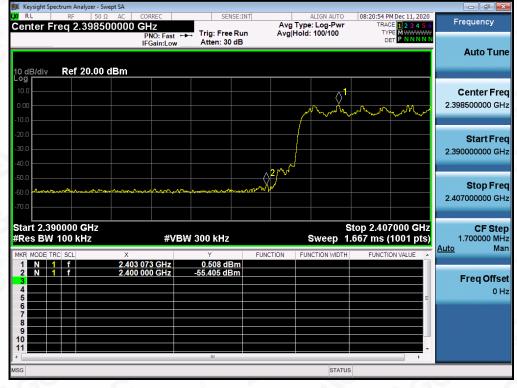
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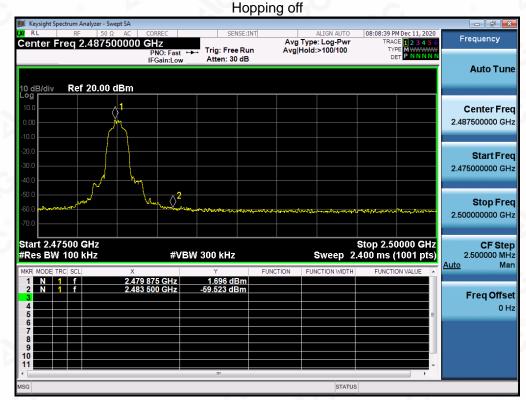
π /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



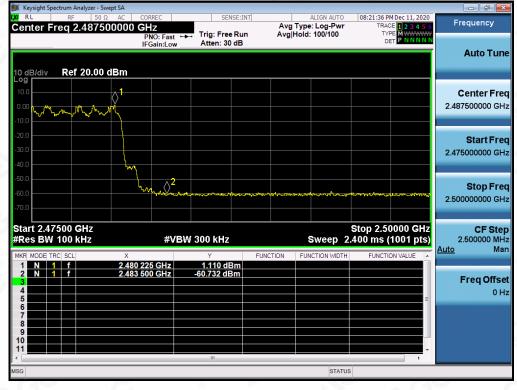
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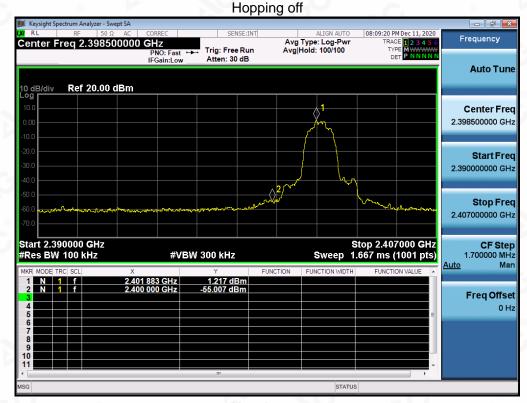
π /4-DQPSK MODULATION IN HIGH CHANNEL

Hopping on



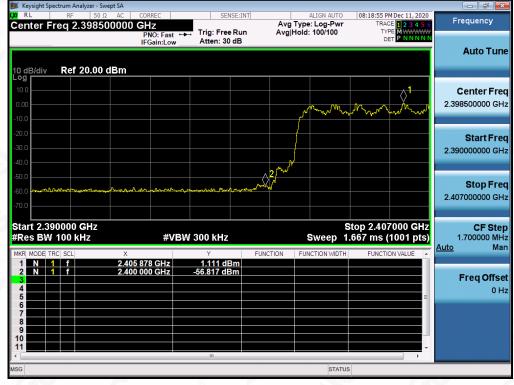
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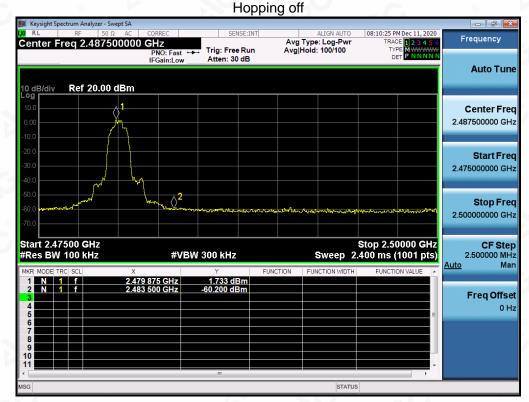
8-DPSK MODULATION IN LOW CHANNEL

Hopping on



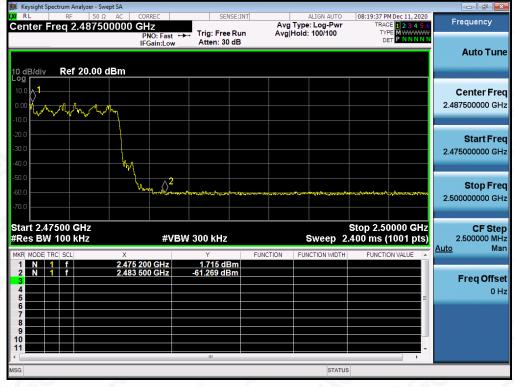
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8-DPSK MODULATION IN HIGH CHANNEL

Hopping on



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10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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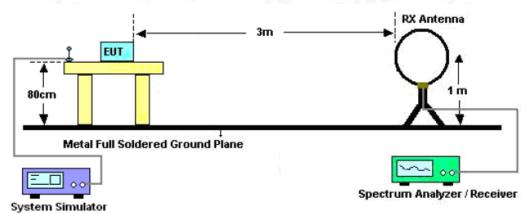
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 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com
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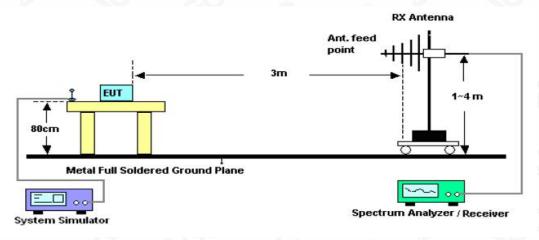


10.2. TEST SETUP

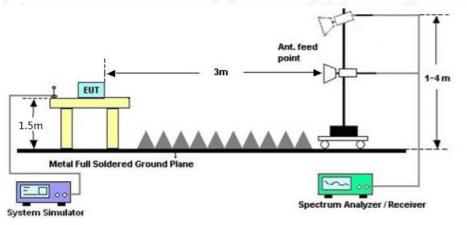
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

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

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

10.4. TEST 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.

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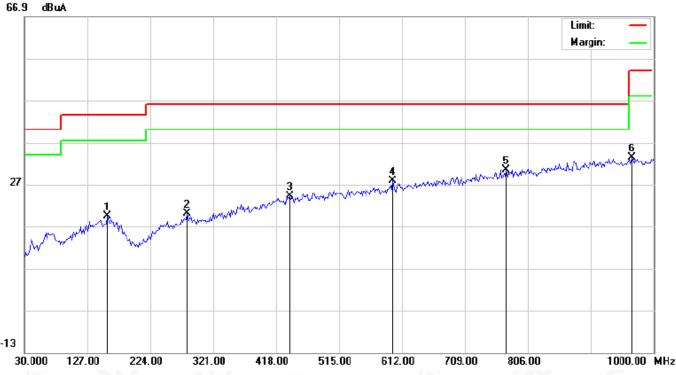


Report No.: AGC08073201202FE03 Page 44 of 71

RADIATED EMISSION BELOW 1GHz

EUT	Bluetooth Transmitter and Receiver	Model Name	Т3
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

66.9



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector
1		157.7167	0.14	19.19	19.33	43.50	-24.17	peak
2		280.5833	-0.01	19.93	19.92	46.00	-26.08	peak
3		439.0167	0.38	23.76	24.14	46.00	-21.86	peak
4		597.4500	0.91	26.90	27.81	46.00	-18.19	peak
5	*	772.0500	0.62	29.78	30.40	46.00	-15.60	peak
6		966.0500	1.20	32.27	33.47	54.00	-20.53	peak

RESULT: PASS

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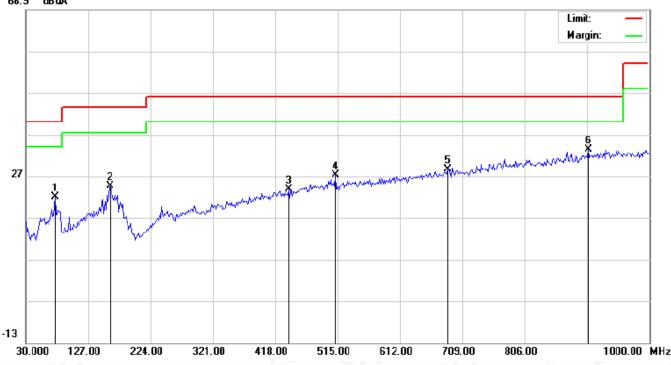
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Report No.: AGC08073201202FE03 Page 45 of 71

EUT	Bluetooth Transmitter and Receiver	Model Name	ТЗ
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Vertical

66.9 dBuA



	Over	Limit	Measure- ment	Correct Factor	Reading Level	. Freq.	No. N
Detecto	dB	dBuA	dBuA	dB	dBuA	MHz	
peak	-17.97	40.00	22.03	15.97	6.06	75.2667	1
peak	-18.84	43.50	24.66	19.09	5.57	160.9500	2
peak	-22.19	46.00	23.81	23.76	0.05	439.0167	3
peak	-18.84	46.00	27.16	25.22	1.94	511.7667	4
peak	-17.32	46.00	28.68	27.99	0.69	686.3667	5
peak	-12.56	46.00	33.44	31.74	1.70	904.6167	6 *

RESULT: PASS

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

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

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RADIATED EMISSION ABOVE 1GHz

EUT	Bluetooth Transmitter and Receiver	Model Name	ТЗ
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
44.85	0.08	44.93	74	-29.07	peak
37.74	0.08	37.82	54	-16.18	AVG
40.54	2.21	42.75	74	-31.25	peak
33.12	2.21	35.33	54	-18.67	AVG
0.0	0			- 60-	0
		©			G
	(dBµV) 44.85 37.74 40.54	(dBµV) (dB) 44.85 0.08 37.74 0.08 40.54 2.21	(dBµV) (dB) (dBµV/m) 44.85 0.08 44.93 37.74 0.08 37.82 40.54 2.21 42.75	(dBµV) (dB) (dBµV/m) (dBµV/m) 44.85 0.08 44.93 74 37.74 0.08 37.82 54 40.54 2.21 42.75 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 44.85 0.08 44.93 74 -29.07 37.74 0.08 37.82 54 -16.18 40.54 2.21 42.75 74 -31.25

EUT	Bluetooth Transmitter and Receiver	Model Name	Т3
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.14	0.08 💿	44.22	74	-29.78	peak
4804.000	36.76	0.08	36.84	54	-17.16	AVG
7206.000	39.25	2.21	41.46	74	-32.54	peak
7206.000	31.42	2.21	33.63	54	-20.37	AVG
	20	®			6	

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

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Report No.: AGC08073201202FE03 Page 47 of 71

EUT	Bluetooth Transmitter and Receiver	Model Name	ТЗ
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	45.65	0.14	45.79	74	-28.21	peak
4882.000	38.91	0.14	39.05	54	-14.95	AVG
7323.000	41.98	2.36	44.34	74	-29.66	peak
7323.000	35.03	2.36	37.39	54	-16.61	AVG
emark:				- CC	8	

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

EUT	Bluetooth Transmitter and Receiver	Model Name	ТЗ
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type	
4882.000	46.13	0.14	46.27	74	-27.73	peak	
4882.000	38.24	0.14	38.38	54	-15.62	AVG	
7323.000	41.61	2.36	43.97	74	-30.03	peak	
7323.000	31.79	2.36	34.15	54	-19.85	AVG	
emark:						8	

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

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Report No.: AGC08073201202FE03 Page 48 of 71

EUT	Bluetooth Transmitter and Receiver Model Name		ТЗ
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	46.56	0.22	46.78	74	-27.22	peak
4960.000	38.41	0.22	38.63	54	-15.37	AVG
7440.000	41.89	2.64	44.53	74	-29.47	peak
7440.000	33.14	2.64	35.78	54	-18.22	AVG
emark:			1 104	- CG	8	

EUT Bluetooth Transmitter and Receiver		Model Name	ТЗ	
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 9	Antenna	Vertical	

ter Reading	Factor	Emission Level	Limits	Margin	
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
45.94	0.22	46.16	74	-27.84	peak
39.36	0.22	39.58	54	-14.42	AVG
42.52	2.64	45.16	74	-28.84	peak
34.67	2.64	37.31	54	-16.69	AVG
		20			
			6		
	45.94 39.36 42.52 34.67	(dBµV) (dB) 45.94 0.22 39.36 0.22 42.52 2.64 34.67 2.64	(dBµV) (dB) (dBµV/m) 45.94 0.22 46.16 39.36 0.22 39.58 42.52 2.64 45.16	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.94 0.22 46.16 74 39.36 0.22 39.58 54 42.52 2.64 45.16 74 34.67 2.64 37.31 54	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

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.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

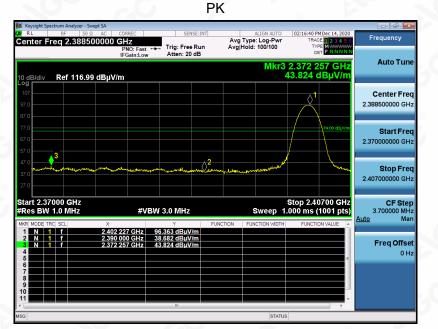
The "Factor" value can be calculated automatically by software of measurement system.

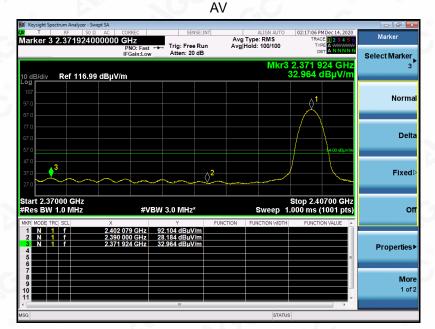
All test modes had been tested. The 8DPSK modulation is the worst case and recorded in the report.

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EUT	Bluetooth Transmitter and Receiver	Model Name	Т3
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS





RESULT: PASS

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