

FCC Test Report

Report No.: AGC02320200802FE03

FCC ID	: 2AO47-K200
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: TRUE WIRELESS EARPHONE
BRAND NAME	: N/A
MODEL NAME	: VAC666, VHP-TW23, IT, K200
APPLICANT	: Shenzhen Kingstar Industrial Co., Ltd
DATE OF ISSUE	: Aug. 20, 2020
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0

Attestation of Global Compliance(Shenzhen) Co., Ltd



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 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

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



REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.20, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Kingstar Industrial Co., Ltd
Address	Room 211, Min Le technology Building Meiban Road, LongHua District, Shenzhen, China.
Manufacturer	Shenzhen Kingstar Industrial Co., Ltd
Address	Room 211, Min Le technology Building Meiban Road, LongHua District, Shenzhen, China.
Factory	Shenzhen Kingstar Industrial Co., Ltd
Address	Room 211, Min Le technology Building Meiban Road, LongHua District, Shenzhen, China.
Product Designation	TRUE WIRELESS EARPHONE
Brand Name	N/A
Test Model	VAC666
Series Model	VHP-TW23,IT,K200
Difference Description	All the same except for the model name
Date of test	Aug.17, 2020 to Aug.20, 2020
Deviation	No any deviation from the test method
Condition of Test Sample	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, dataevaluation, 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

Eddy · Liu

Eddy Liu (ProjectEngineer)

Aug. 20,2020

Max Zhank

Max Zhang (Reviewer)

Aug. 20,2020

Approved By

fores

Forrest Lei (Authorized Officer)

Aug. 20,2020

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2. GENERAL INFORMATION

2.1.PRODUCT DESCRIPTION

The EUT is designed as "TRUE WIRELESS EARPHONE". 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 2.480GHz
RF Output Power	7.624dBm(Max)
Bluetooth Version	V 5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK,⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	V1.1
Software Version	V5.0
Antenna Designation	Ceramic Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0dBi
Power Supply	DC 3.7V by battery

The EUT comprises left and right channel headsets, both are the same, the right headset had been tested and recorded in this report as the worst case.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2403 MHz
	38	2440 MHz
2402~2480MHz	39	2441 MHz
o ^C c	40	2442 MHz
	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. Bothdevices shift between RX and TX time slot according to the clock of the master. Additionally, the type of connection (e.g. single of multislot 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: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01,51,03,55,05,04

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. 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

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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**: 2A047-K200 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 = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 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 =±2 %
- Uncertainty of Frequency:Uc =±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 connect or is provided by the manufacture.

Software Setting

COM UART Port 44 Baudrate=11520		REALTEK
Non Link Mode Hopping LE Test Tx Settings Battery Re Dhannel 78 Packet Type 30H5 Payload Type PRBS9 Tx Packet Count 0 PHY LE 1M PHY Writering Enable Hit Taget 0x00000c6957e Value 1000000c6957e Value 10000000c6957e Value 100000000c6957e Value 10000000c6957e	sistance Cal Pkt-Tx (for MP) FV Mode Exec Stop Clear Report Item Value Tx bits 483357450 Tx Pkt Count 59935 TX Report RK Report	Hot Key Mode HCI Reset Test Mode
Parameter 1 [Parameter 2] Cal Message >>ActorControlEscute(PhilTu ((or MP)) Stop!! >>Run hopping mode Begin >>Sho hopping mode Begin	^	Power Tracking C OFF C OFF C ON Get

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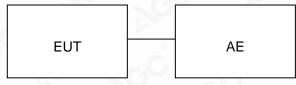
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:

EUT	AE

5.2.EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	TWS True Wireless Headset	K200	2AO47-K200	EUT
2	Adapter	TY0500100E1MN	N/A	AE
3	Charger line	G258	N/A	AE
4	control board	EPS-35-3.3	N/A	AE

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	N/A

Note: 1.N/A means not applicable in this report.

2. The EUT is powered by battery.

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6. TEST FACILITY

TestSite	Attestation of Global Compliance(Shenzhen) Co., Ltd			
Location	1-2/F,Building19,JunfengIndustrialPark,ChongqingRoad,HepingCommunity,FuhaiStrett,Bao'anDistrict,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	Aug.26, 2019	Aug.25, 2020
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. 12, 2019	Dec. 11, 2020
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Aug.26, 2019	Aug.25, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 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	Oct. 15, 2019	Oct. 16, 2020
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.

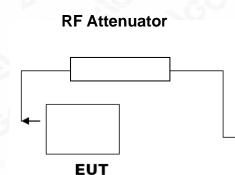
6. Detector function: Peak.

7. Trace: Max hold.

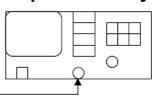
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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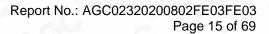
7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR GFSK MOUL	DULATION			
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	7.266	21	Pass		
2.441	6.744	21	Pass		
2.480	6.453	21	Pass		

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CH78

Center Freq 2.480000000 GHz Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Trig: Free Run Atten: 30 dB PNO: Fast + IFGain:Low Auto Tune Mkr1 2.479 995 GHz 6.453 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 2.48000000 GHz Start Freq 2.477500000 GHz Stop Freq 2.482500000 GHz CF Step 500.000 kHz <u>Auto</u> Mar **Freq Offset** 0 Hz Center 2.480000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) #VBW 5.0 MHz

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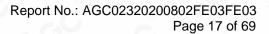


	PEAK OUTPUT POWER MEASUREMENT RESULT FORΠ/4-DQPSK MODULATION					
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail						
2.402	7.305	21	Pass			
2.441	6.521	21	Pass			
2.480	6.270	21	Pass			



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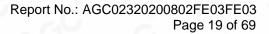
	PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR 8-DPSK MODULA	TION				
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail						
2.402	7.624	21	Pass			
2.441	7.176	21	Pass			
2.480	6.611	21	Pass			



CH0



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CH78

Agilent Spectrum Analyzer - Swept SA Μ RF 50 Ω AC Center Freq 2.480000000		SENSE:INT	AL Avg Type:	.IGN AUTO		Aug 20, 2020 E 1 2 3 4 5 6	Frequency
Center Freq 2.48000000	PNO: Fast +++ IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Hold: 1		TYP		
10 dB/div Ref 20.00 dBm				Mkr1	2.480 0 6.6	20 GHz 11 dBm	Auto Tune
10.0		1					Center Freq 2.480000000 GHz
-10.0					*		Start Freq 2.477500000 GHz
-20.0							Stop Freq 2.482500000 GHz
-40.0							CF Step 500.000 kHz <u>Auto</u> Man
-60.0							Freq Offset 0 Hz
Center 2.480000 GHz					Span 5.	.000 MHz 1001 pts)	
#Res BW 1.5 MHz	#VBW	5.0 MHz	S	weep 1.	000 ms (1001 pts)	
1100				STATUS			

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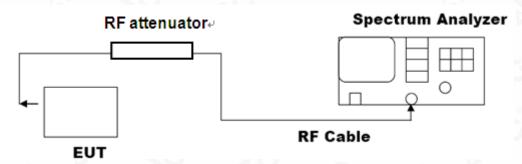


8. 20DB BANDWIDTH

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					
Annlinghla Limita	Measurement Result				
Applicable Limits	Test Da	Criteria			
	Low Channel	961.7	PASS		
N/A	Middle Channel	960.7	PASS		
	High Channel	962.0	PASS		



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

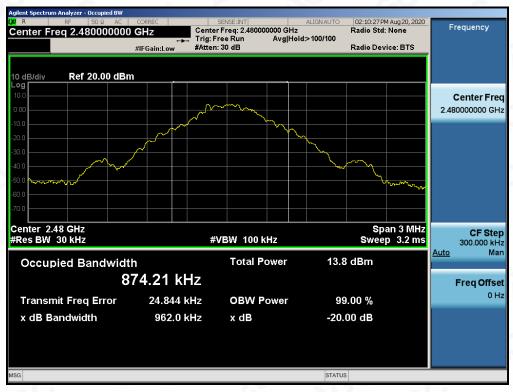
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

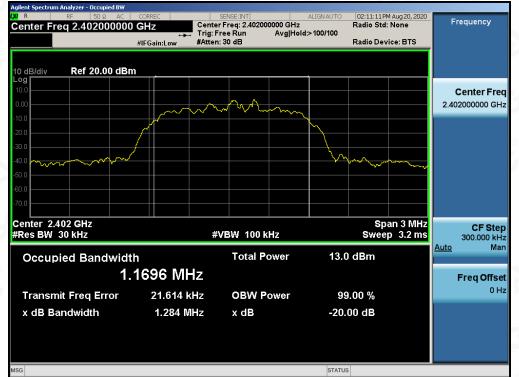


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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION					
Annlinghig Limite		Measurement Result			
Applicable Limits	Test Data	Test Data (MHz)			
N/A	Low Channel	1.284	PASS		
	Middle Channel	1.283	PASS		
	High Channel	1.316	PASS		

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



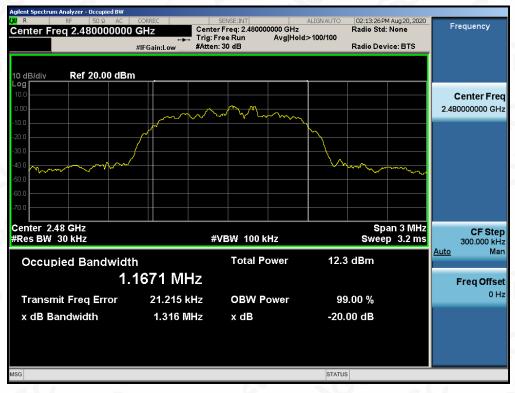
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR 8-DPSK MODULATION						
Applicable Limite		Measurement Result				
Applicable Limits	Test Da	Test Data (MHz)				
N/A	Low Channel	1.306	PASS			
	Middle Channel	1.306	PASS			
	High Channel	1.304	PASS			

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



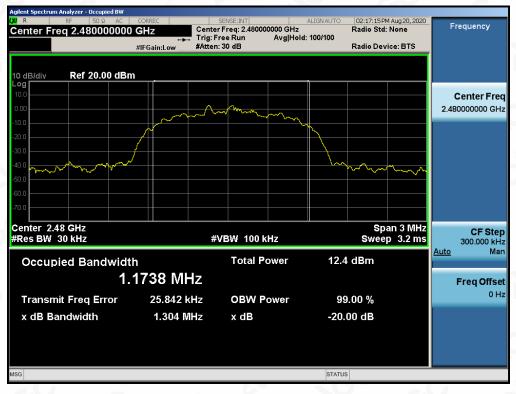
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

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

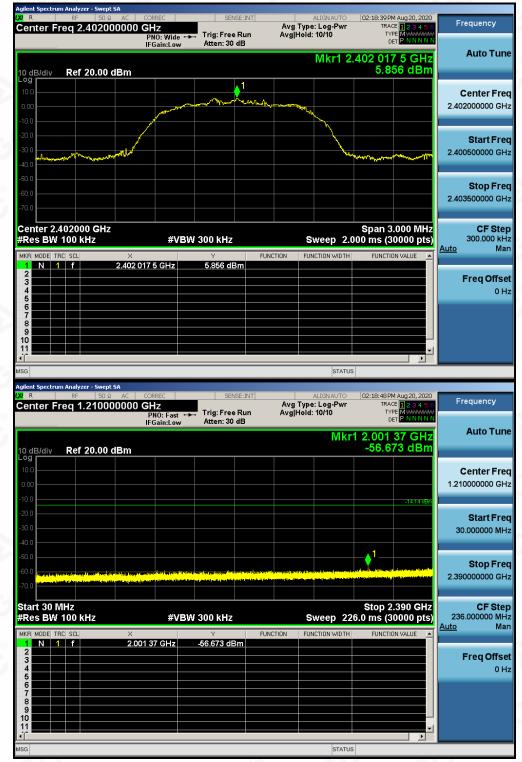
LIMITS AND MEASUREMENT RESULT						
	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM Channel	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 OF8DPSK MODULATION IN LOW CHANNEL



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Report No.: AGC02320200802FE03FE03 Page 29 of 69

Agilent Spectrum Analyzer - Swept SA	CORREC SENSE: IN	ALIGN AUTO	00-10-10-04 4	
Center Freq 13.741750000	0 GHz	Avg Type: Log-Pwr	02:19:13PM Aug 20, 2020 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dBm	PN0: Fast ++ Trig: Free Run IFGain:Low Atten: 30 dB		r1 4.804 3 GHz -32.472 dBm	Auto Tune
Log 10.0 .000 .10.0			-14.14 dBm	Center Freq 13.741750000 GHz
-20.0 1				Start Freq 2.483500000 GHz
-50.0 -60.0 -70.0				Stop Freq 25.000000000 GHz
Start 2.48 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 2	Stop 25.00 GHz 2.152 s (30000 pts)	CF Step 2.251650000 GHz <u>Auto</u> Man
	Y 304 3 GHz -32.472 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	
2 3 4 5				Freq Offset 0 Hz
6 7 8 9				
			· ·	
MSG		STATUS	· · · · · · · · · · · · · · · · · · ·	

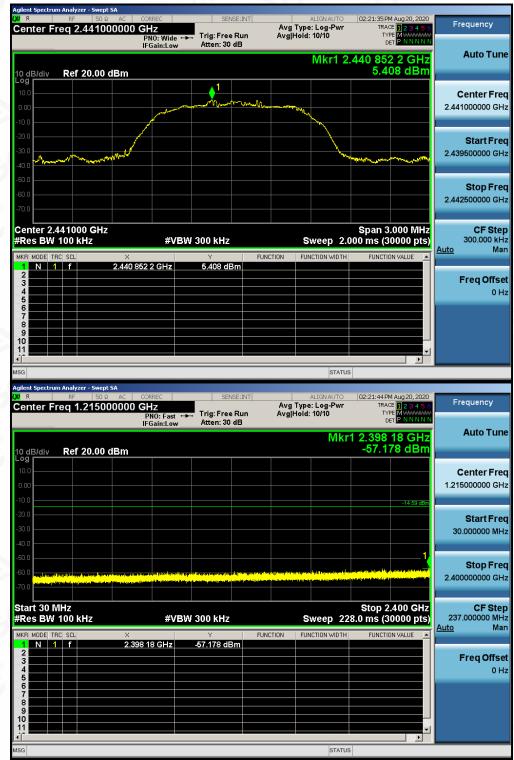
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 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF8DPSK MODULATION IN MIDDLE CHANNEL

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Report No.: AGC02320200802FE03FE03 Page 31 of 69

Agilent Spectrum Analyzer - Swept SA								
κ RF 50 Ω AC Center Freq 13.741750000	CORREC SENSE:II	Avg Type: Log-Pwr	02:22:09 PM Aug 20, 2020 TRACE 1 2 3 4 5 6 TYPE M	Frequency				
10 dB/div Ref 20.00 dBm	Auto Tune							
10.0 0.00 -10.0			-14.59 dBm	Center Freq 13.741750000 GHz				
-20.0 -30.0 -40.0				Start Freq 2.483500000 GHz				
-50.0 -60.0 -70.0				Stop Freq 25.00000000 GHz				
Start 2.48 GHz #Res BW 100 kHz	CF Step 2.251650000 GHz Auto Man							
MKR MODE TRC SCL X 1 N 1 f 4.5 2 3 - - - 3 - - - - 5 - - - - 6 - - - - 8 - - - - 9 - - - - 10 - - - - 11 - - - - -	¥ 181 6 GHz35.802 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz				
MSG STATUS								

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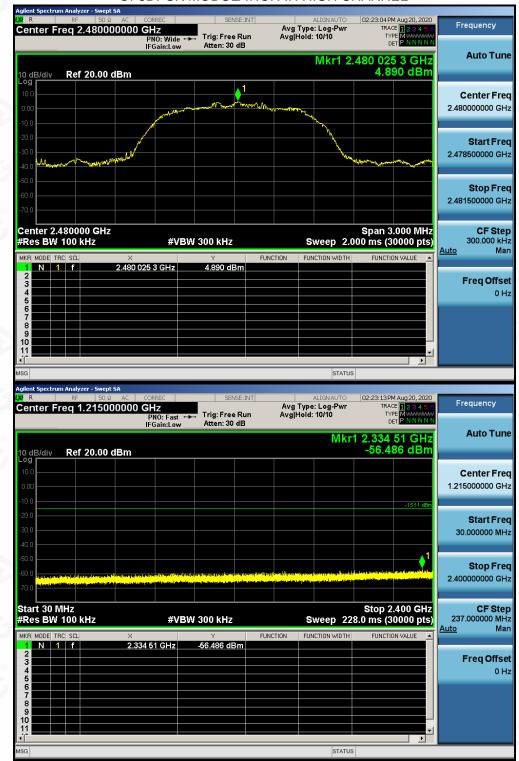
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TEST PLOT OF OUT OF BAND EMISSIONS OF8DPSK MODULATION IN HIGH CHANNEL

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Report No.: AGC02320200802FE03FE03 Page 33 of 69

Agilent Spectr	um Analy	zer - Swept	SA						1		
LXI R	RF	50 Ω		DRREC	SEM	NSE:INT		ALIGN AUTO		M Aug 20, 2020	Frequency
Center	-req 1	3.7500		GHz PNO: Fast ↔ FGain:Low	Trig: Free Atten: 30		Avg Typ Avg Hol	pe: Log-Pwr d: 10/10	TY	CE 123456 PE MWWWWW ET P N N N N N	Frequency
10 dB/div	10 dB/div Ref 20.00 dBm -33.447 dBm									Auto Tune	
Log 10.0 0.00 -10.0										-15.11 dBm	Center Freq 13.75000000 GHz
-20.0 -30.0 -40.0		1									Start Freq 2.50000000 GHz
-50.0 -60.0		ala ya shi ya kara kita									Stop Freq 25.00000000 GHz
Start 2.5 #Res BV	V 100 H	kHz		#VBV	V 300 kHz			-	2.152 s (3	25.00 GHz 10000 pts)	CF Step 2.250000000 GHz <u>Auto</u> Man
MKR MODE 1 N 2 3 4 5 6 7 8 9 10 11 ✓ 1			× 4.960	0 1 GHz	¥ _33.447 dE		CTION FU	UNCTION WIDTH			Freq Offset 0 Hz
MSG								STATUS	S		

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

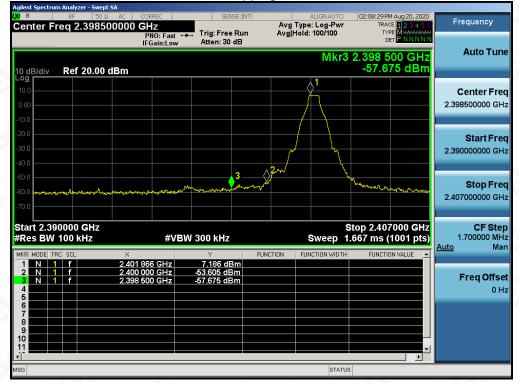
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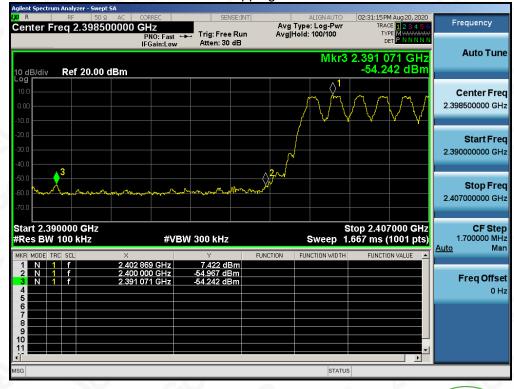
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

Hopping off

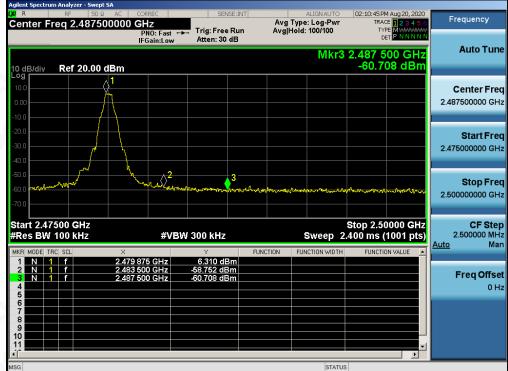


Hopping on



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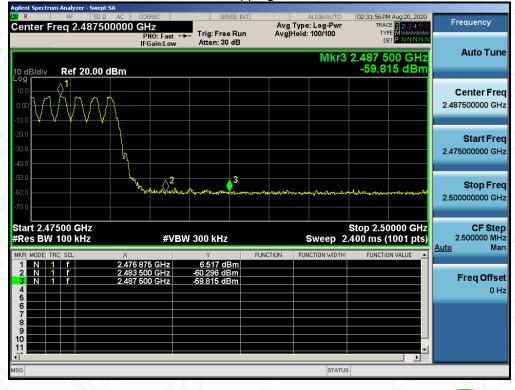




GFSK MODULATION IN HIGH CHANNEL

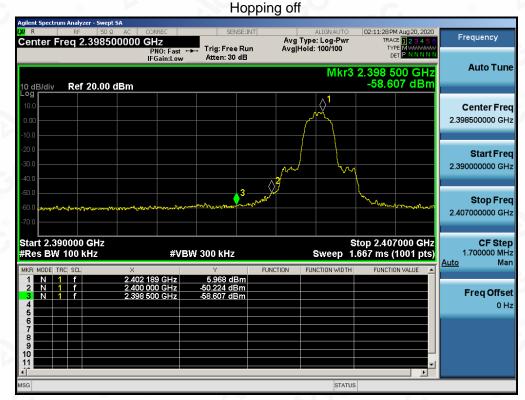
Hopping off

Hopping on



Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the solution of the stamp o





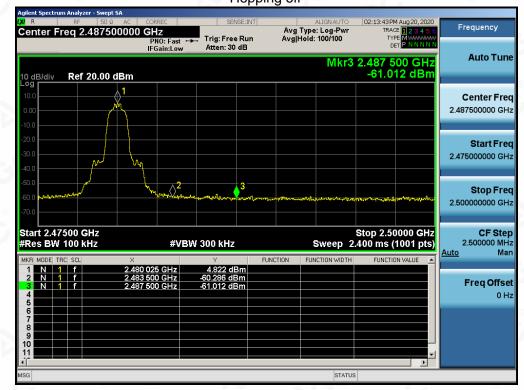
π /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



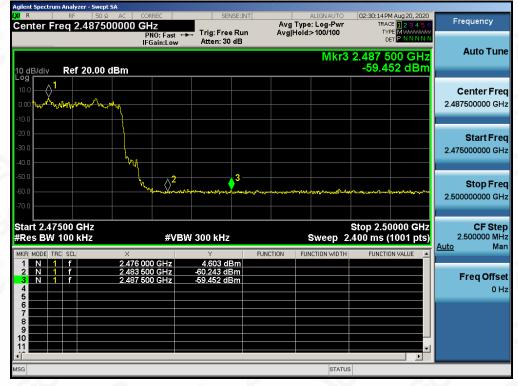
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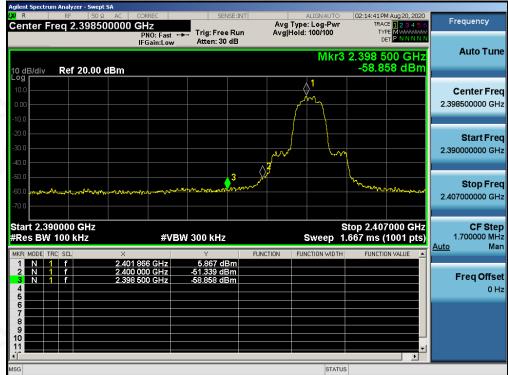
π /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



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8-DPSK MODULATION IN LOW CHANNEL

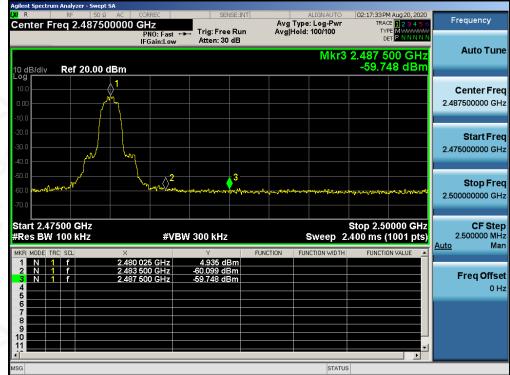
Hopping off

Hopping on



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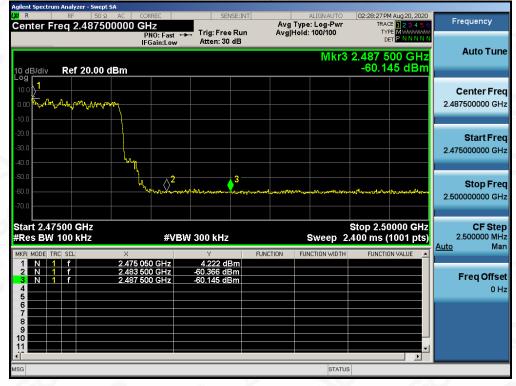




8-DPSK MODULATION IN HIGH CHANNEL

Hopping off

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

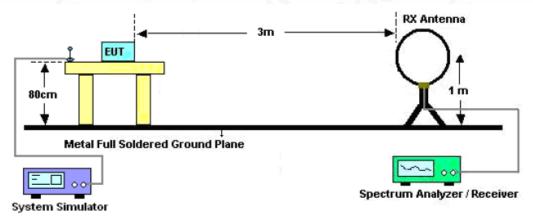
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Pesting/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written approver, and the test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuer of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



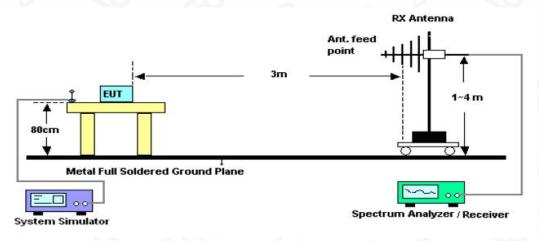
Report No.: AGC02320200802FE03FE03 Page 42 of 69

10.2. TEST SETUP

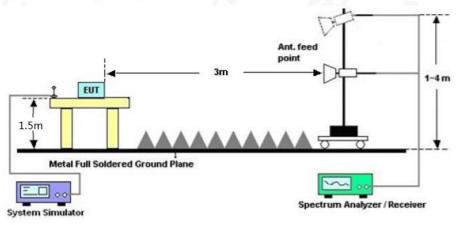
Radiated Emission Test-Setup Frequency Below 30MHz



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 9kHzto30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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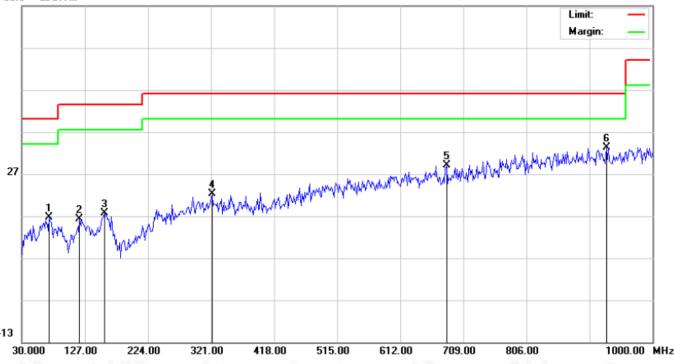


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RADIATED EMISSION BELOW 1GHz

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal





No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		72.0333	-0.08	16.67	16.59	40.00	-23.41	peak
2		118.9167	-1.30	17.59	16.29	43.50	-27.21	peak
3		157.7167	-1.11	18.62	17.51	43.50	-25.99	peak
4		322.6167	0.93	21.36	22.29	46.00	-23.71	peak
5		683.1332	1.03	27.95	28.98	46.00	-17.02	peak
6	*	928.8667	1.31	31.95	33.26	46.00	-12.74	peak

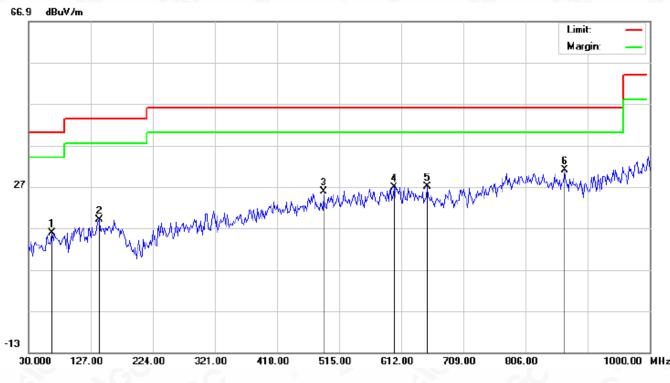
RESULT: PASS

Compliance Dedicated Fe Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Fest Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the writter authorization of AGE presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day. after the issuerce /Inspection he test results Bf he test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



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EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical



No	. Mł	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		67.1833	-0.87	16.76	15.89	40.00	-24.11	peak
2		139.9333	-0.32	19.23	18.91	43.50	-24.59	peak
3		490.7500	1.04	24.80	25.84	46.00	-20.16	peak
4		600.6833	-0.04	26.94	26.90	46.00	-19.10	peak
5		652.4167	1.03	26.01	27.04	46.00	-18.96	peak
6	*	867.4333	2.46	28.58	31.04	46.00	-14.96	peak

RESULT: PASS

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

2. All test modes had been pre-tested. The mode 4 is the worst case and recorded in the report.

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RADIATED EMISSION ABOVE 1GHz

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
45.82	0.08	45.9	74	-28.1	peak
37.41	0.08	37.49	54	-16.51	AVG
40.18	2.21	42.39	74	-31.61	peak
32.33	2.21	34.54	54	-19.46	AVG
				- 6	0
	5	©		<u> </u>	60
	(dBµV) 45.82 37.41 40.18	(dBµV) (dB) 45.82 0.08 37.41 0.08 40.18 2.21	(dBµV) (dB) (dBµV/m) 45.82 0.08 45.9 37.41 0.08 37.49 40.18 2.21 42.39	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.82 0.08 45.9 74 37.41 0.08 37.49 54 40.18 2.21 42.39 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 45.82 0.08 45.9 74 -28.1 37.41 0.08 37.49 54 -16.51 40.18 2.21 42.39 74 -31.61

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.42	0.08	44.5	74	-29.5	peak
4804.000	36.24	0.08	36.32	54	-17.68	AVG
7206.000	39.35	2.21	41.56	74	-32.44	peak
7206.000	30.32	2.21	32.53	54	-21.47	AVG
-66	0			50	<u>.</u>	6
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EUT	TWS True Wireless Headset	e Wireless Headset Model Name	
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	45.17	0.14	45.31	74	-28.69	peak
4882.000	38.39	0.14	38.53	54	-15.47	AVG
7323.000	41.41	2.36	43.77	74	-30.23	peak
7323.000	34.59	2.36	36.95	54	-17.05	AVG
8				() ()		
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Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	45.91	0.14	46.05	74	-27.95	🕨 peak
4882.000	37.45	0.14	37.59	54	-16.41	AVG
7323.000	40.17	2.36	42.53	74	-31.47	peak
7323.000	31.46	2.36	33.82	54	-20.18	AVG
ß						
Ci	®					
emark:	a.C	®		- C		C
actor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.			

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EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
46.25	0.22	46.47	74	-27.53	peak
38.27	0.22	38.49	54	-15.51	AVG
41.15	2.64	43.79	74	-30.21	peak
32.64	2.64	35.28	54	-18.72	AVG
			®		
8				8	
- 6	8			- 6	®
na Factor + Cable	Loss – Pre-	amplifier.			- C
	(dBµV) 46.25 38.27 41.15 32.64	(dBµV) (dB) 46.25 0.22 38.27 0.22 41.15 2.64 32.64 2.64	(dBµV) (dB) (dBµV/m) 46.25 0.22 46.47 38.27 0.22 38.49 41.15 2.64 43.79	(dBµV) (dB) (dBµV/m) (dBµV/m) 46.25 0.22 46.47 74 38.27 0.22 38.49 54 41.15 2.64 43.79 74 32.64 2.64 35.28 54	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 46.25 0.22 46.47 74 -27.53 38.27 0.22 38.49 54 -15.51 41.15 2.64 43.79 74 -30.21 32.64 2.64 35.28 54 -18.72

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	45.28	0.22	45.5	74	-28.5	peak
4960.000	38.22	0.22	38.44	54	-15.56	AVG
7440.000	41.11	2.64	43.75	74	-30.25	peak
7440.000	33.29	2.64	35.93	54	-18.07	AVG
		G	0	©		6

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, Margin= Limit-Emission Level.

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

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

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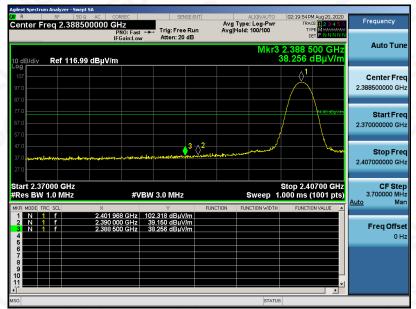


Report No.: AGC02320200802FE03FE03 Page 49 of 69

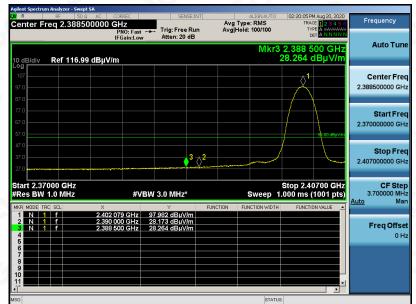
TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

PK



AV



RESULT: PASS

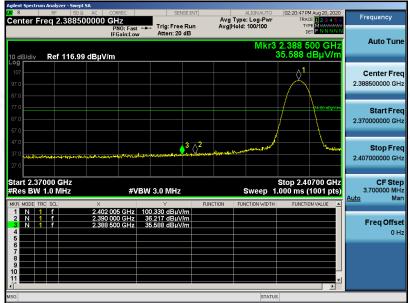
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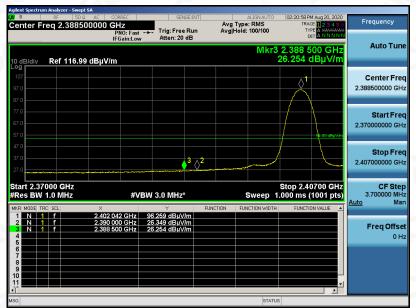
Report No.: AGC02320200802FE03FE03 Page 50 of 69

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV



RESULT: PASS

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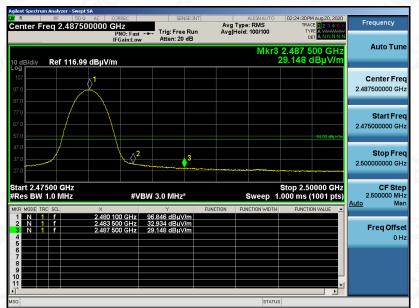
Report No.: AGC02320200802FE03FE03 Page 51 of 69

[
EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

PK

Frequen enter Freq 2.487500000 GHz Avg Type: Log-Pw Avg|Hold: 100/100 Trig: Free Run Atten: 20 dB PNO: Fast Auto Tun Mkr3 2.487 Ref 116.99 dBµV/m Center Fre 2.487500000 GH Start Free 2.475000000 GH ∆<mark>2</mark> Stop Free 2.50000000 GH CF Stej 2.500000 MH Stop 2.50000 000 ms (1001 #VBW 3.0 MHz Sweep uto Freq Offse 0 H

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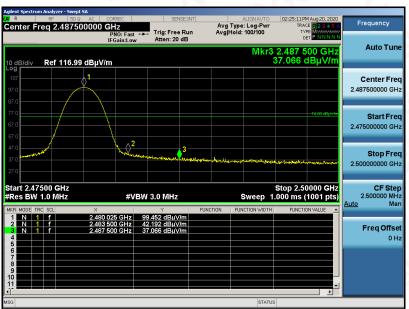
RESULT: PASS

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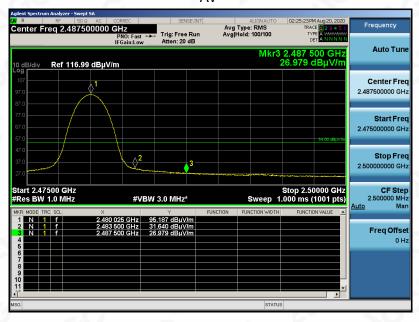
Report No.: AGC02320200802FE03FE03 Page 52 of 69

EUT	TWS True Wireless Headset	Model Name	K200
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



PK

AV



RESULT: PASS

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

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11. NUMBER OF HOPPING FREQUENCY

11.1. 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 supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.

2. 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.

3. VBW \geq RBW. Sweep: Auto.Detector function: Peak. Trace: Max hold.

4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

TOTAL NO. OF HOPPING CHANNEL	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
	>=15	79	PASS



TEST PLOT FOR NO. OF TOTAL CHANNELS

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

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12. TIME OF OCCUPANCY (DWELL TIME)

12.1. 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. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

4. Detector function: Peak. Trace: Max hold.

5. Use the marker-delta function to determine the transmit time per hop.

6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

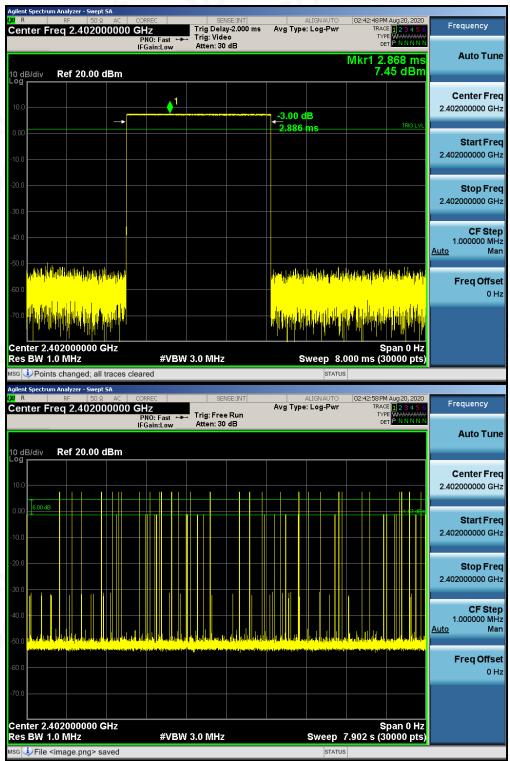
12.4. LIMITS AND MEASUREMENT RESULT

Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)
Low	2.886	28*4	323.232	400
Middle	2.887	26*4	300.248	400
High	2.887	26*4	300.248	400

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

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TEST PLOT OF LOW CHANNEL

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