



FCC Test Report

Report No.: AGC03615210301FE03

FCC ID	: 2AFKR-S32
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: Bluetooth Speaker
BRAND NAME	: zealot
MODEL NAME	 S32, S1, S2, S5, S6, S7, S8, S9, S11, S12, S13, S15, S16, S17, S18, S19, S20, S21, S23, S24, S25, S26, S27, S28, S29, S30, S31, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45, S46, S47, S48, S49, S50, S51, S52, S53, S54, S55, S56, S57, S58, S59, S60, S61, S62, S63, S64, S65, S66, S67, S68, S69, S70, S71, S72, S73, S74, Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, Z9, Z10, Z11, Z12, Z13, Z14, Z15, Z16, Z17, Z18, Z19, Z20, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, M68, M88, M71
APPLICANT	: Shenzhen fanatics digital technology co., LTD
DATE OF ISSUE	: Apr. 08, 2021
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0
Attestation of (Global Concliance (Shenzhen) Co., Ltd

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	. /	Apr. 08, 2021	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen fanatics digital technology co., LTD	
Address	401、501, building 3,NO.8,Yong Tai Road, east District, BaiShi xia Community, Fu Yong street, BaoAn District, ShenZhen	
Manufacturer	Shenzhen fanatics digital technology co., LTD	
Address	401、501, building 3,NO.8,Yong Tai Road, east District, BaiShi xia Community, Fu Yong street, BaoAn District, ShenZhen	
Factory	Shenzhen fanatics digital technology co., LTD	
Address	401、501, building 3,NO.8,Yong Tai Road, east District, BaiShi xia Community, Fu Yong street, BaoAn District, ShenZhen	
Product Designation	Bluetooth Speaker	
Brand Name	zealot	
Test Model	S32	
Series Model	 S1, S2, S5, S6, S7, S8, S9, S11, S12, S13, S15, S16, S17, S18, S19, S20, S21, S23, S24, S25, S26, S27, S28, S29, S30, S31, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45, S46, S47, S48, S49, S50, S51, S52, S53, S54, S55, S56, S57, S58, S59, S60, S61, S62, S63, S64, S65, S66, S67, S68, S69, S70, S71, S72, S73, S74, Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, Z9, Z10, Z11, Z12, Z13, Z14, Z15, Z16, Z17, Z18, Z19, Z20, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, M68, M88, M71 	
Difference description	All the series models are the same as the test model except for the model names.	
Date of test	Mar. 23, 2021 to Apr. 08, 2021	
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, 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.

Eddy Lin Prepared By Eddy Liu Apr. 08, 2021 (Project Engineer) Max Zhang **Reviewed By** Max Zhang Apr. 08, 2021 (Reviewer) Approved By Forrest Lei Apr. 08, 2021 (Authorized Officer) dicated Fes Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by t a/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 he test results 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 ce of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com. Attestation of Global Compliance(Shenzhen)Co., Ltd

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "Bluetooth Speaker". It is designed by way of utilizing the GFSK and Pi/4 DQPSK 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	-1.315dBm (Max)
Bluetooth Version	V5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, □8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	v1.1
Software Version	v1.1
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	-0.58dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2403 MHz
6		
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
S GC G		
	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: 2AFKR-S32** 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	Hopping mode GFSK
8	Hopping mode π/4-DQPSK

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

Command Type TX_TEST_CMD Ilen of test data Ch_index (19 - 2440) Package Payload P		
2021-03-26_15:34:58 TX_TEST_CMD ch_index: (0 - 2402) len of test data:0 package payload: PRBS9	Serial Port COM8	G Send configuration
[OK] test ok Reply BYTE: 0x4 0xe 0x4 0x1 0x1e 0x20 0x0 2021-03-26_15:46:02 TX_TEST_OMD ch_index: (19 - 2440) ien of test data:0 package payload: PRBS9 [OK] test ok Reply BYTE: 0x4 0xe 0x4 0x1 0x1e 0x20 0x0		orresponding frequency 2.402GHz-2.480GHZ 0-10, 0 is the minimum, maximum 10
+70.0		Span 1.0
Center 2.4800000 GHz #Res BW 10 kHz	#VBW 10 kHz	Sweep 12.07 ms (10

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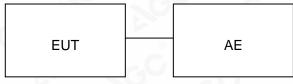
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



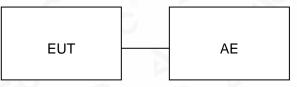
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Speaker	S32	2AFKR-S32	EUT
2	Adapter	TPA-46050100VU	DC 5V	AE
3	Charger line	N/A	1m unshielded	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	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

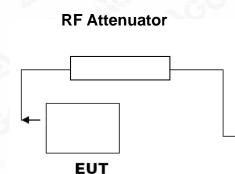
For peak power test:

- 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.

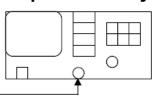
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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 MOUDULATION Frequency Peak Power Applicable Limits Pass or Fail (GHz) (dBm) (dBm) Pass or Fail					
2.441	-2.474	21	Pass		
2.480	-1.897	21	Pass		

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	PEAK OUTPUT POWER MEASUREMENT RESULT					
	FOR II/4-DQPSK MODUL	ATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail			
2.402	-2.899	21	Pass			
2.441	-1.873	21	Pass			
2.480	-1.315	21	Pass			

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CH39

CH78

RL	i <mark>m Analyzer - Swept SA</mark> RF 50 Ω AC	CORREC	SENSE:PULSE	ALIGN AU		Francisco
enter Fr	eq 2.480000000	PNO: Fast ↔ IFGain:Low	- Trig: Free Run Atten: 30 dB	Avg Type: Log-F Avg Hold: 100/10		Frequency
0 dB/div	Ref 20.00 dBm			М	kr1 2.479 790 GHz -1.315 dBm	Auto Tui
og 10.0			.1			Center Fr 2.480000000 G
.00						Start Fr 2.477500000 G
0.0						Stop Fr 2.482500000 G
0.0						CF St 500.000 I <u>Auto</u> M
).0						Freq Off 0
0.0	80000 GHz				Span 5 000 MHz	
Res BW 1		#VBW	/ 5.0 MHz	Swee	Span 5.000 MHz p 1.000 ms (1001 pts)	
G				S	TATUS	

Compliances Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Perton Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issues of the requiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com. g/Inspection The test results Bf he test report.

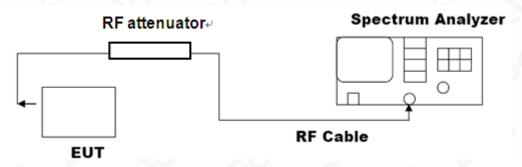


8. 20DB BANDWIDTH

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					
Applicable Limite		Measurement Resu	lt		
Applicable Limits	Test Data (MHz)		Criteria		
N/A	Low Channel	0.953	PASS		
	Middle Channel	0.945	PASS		
	High Channel	0.950	PASS		

02:42:39 AM Mar 26, 2021 Radio Std: None Frequency Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hold: 100/100 #Atten: 30 dB 402000000 GHz Center Radio Device: BTS #IFGain:Low 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> Mar Total Power 3.86 dBm Occupied Bandwidth 838.68 kHz Freq Offset 0 Hz -14.853 kHz **Transmit Freq Error OBW Power** 99.00 % x dB Bandwidth 952.7 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 Limite		Measurement Resu	lt		
Applicable Limits	Test Data	(MHz)	Criteria		
N/A	Low Channel	1.311	PASS		
	Middle Channel	1.315	PASS		
	High Channel	1.309	PASS		

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

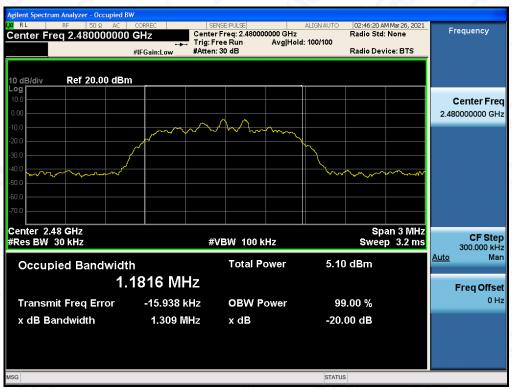


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

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

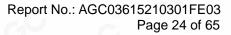
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT					
Annlinghta Limita	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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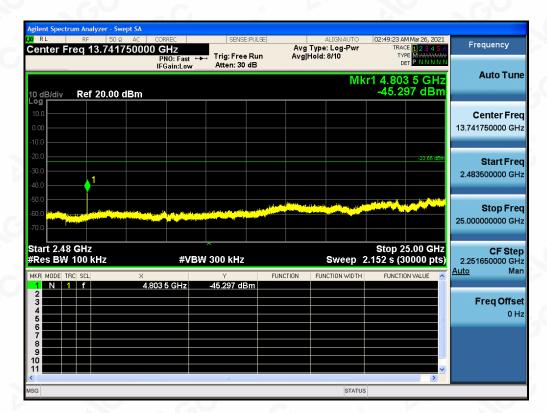
TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF π /4-DQPSK MODULATION IN LOW CHANNEL



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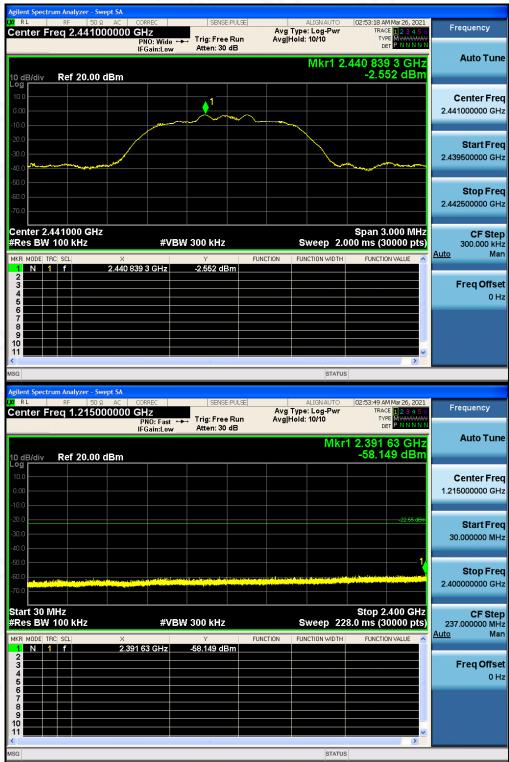
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 Attestation of Global Compliance(Shenzhen)Co., Ltd

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

 Tel: +86-755 2523 4088
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 Web: http://cn.agc-cert.com/



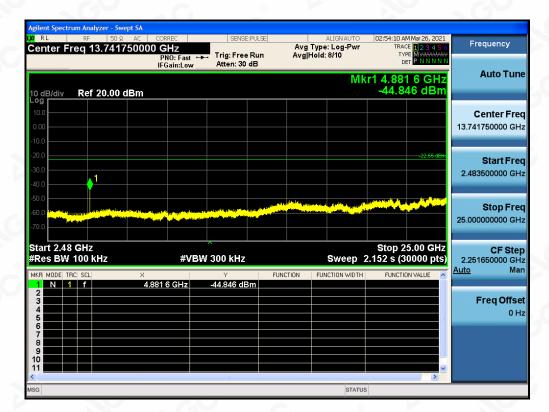


TEST PLOT OF OUT OF BAND EMISSIONS OF π /4-DQPSK MODULATION IN MIDDLE CHANNEL

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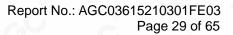
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



© (
Agilent Spectrum Analyzer - S X RL RF 50	Swept SA	SENSE:PULSE	ALIGN AUTO	02:55:23 AM Mar 26, 2021	
Center Freq 2.4800	000000 GHz	Talas France Dava	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWWW	Frequency
	PNO: Wide ← IFGain:Low	Atten: 30 dB		DET PNNNN	
			Mkr1 2.	479 834 2 GHz	Auto Tun
10 dB/div Ref 20.00) dBm			-2.031 dBm	
Log 10.0					O under a Fran
0.00		1			Center Fre 2.480000000 GH
-10.0					2.480000000 GH
-20.0					
-30.0					Start Fre
-30.0 -40.0				- man man man	2.478500000 GH
-40.0					
-60.0					Stop Fre
-70.0					2.481500000 GH
-70.0					
Center 2.480000 GH				Span 3.000 MHz	CF Ste
#Res BW 100 kHz	#VB	№ 300 kHz	Sweep 2.0	00 ms (30000 pts)	300.000 kH <u>Auto</u> Ma
MKR MODE TRC SCL	× 2.479 834 2 GHz	Y F	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Wa
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Agilent Spectrum Analyzer - S XV RL RF 50	Ω AC CORREC	SENSE:PULSE	ALIGNAUTO Avg Type: Log-Pwr	02:55:54 AM Mar 26, 2021 TRACE 1 2 3 4 5 6	Frequency
Agilent Spectrum Analyzer - S XV RL RF 50	Ω AC CORREC	Talas France Dava	ALIGN AUTO	02:55:54 AM Mar 26, 2021	Frequency
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Agilent Spectrum Analyzer – S R RL RF 50 Center Freq 1.215(10 dB/div Ref 20.00	Ω AC CORREC 0000000 GHz PN0: Fast ← IFGain:Low	Trig: Free Run	ALIGNAUTO Avg Type: Log-Pwr Avg Hold: 10/10	02:55:54 AM Mar 26, 2021 TRACE [] 3 3 4 5 6 TYPE MUMMUM DET P NNNN 2.375 19 GHz	Auto Tun
Agient Spectrum Analyzer - S X RL RF 50 Center Freq 1.215(10 dB/div Ref 20.00 10 0	Ω AC CORREC 0000000 GHz PN0: Fast ← IFGain:Low	Trig: Free Run	ALIGNAUTO Avg Type: Log-Pwr Avg Hold: 10/10	02:55:54 AM Mar 26, 2021 TRACE [] 3 3 4 5 6 TYPE MUMMUM DET P NNNN 2.375 19 GHz	Auto Tun Center Fre
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Agient Spectrum Analyzer - S X RL RF 50 Center Freq 1.2150 10 dB/div Ref 20.00 100 100 100 100 100	Ω AC CORREC 0000000 GHz PN0: Fast ← IFGain:Low	Trig: Free Run	ALIGNAUTO Avg Type: Log-Pwr Avg Hold: 10/10	02:55:54 AM Mar 26, 2021 TRACE [] 3 3 4 5 6 TYPE MUMMUM DET P NNNN 2.375 19 GHz	Auto Tur Center Fre 1.215000000 GH
Agient Spectrum Analyzer - S V RL RF 50 Center Freq 1.215(10 dB/div Ref 20.00 9 100 -00 -100 -200	Ω AC CORREC 0000000 GHz PN0: Fast ← IFGain:Low	Trig: Free Run	ALIGNAUTO Avg Type: Log-Pwr Avg Hold: 10/10	02:55:54 AM Mar 26, 2021 TRACE 1	Auto Tur Center Fre 1.21500000 GF Start Fre
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TEST PLOT OF OUT OF BAND EMISSIONS OF π /4-DQPSK MODULATION IN HIGH CHANNEL

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Note: The π /4-DQPSK modulation is the worst case and only those data recorded in the report.

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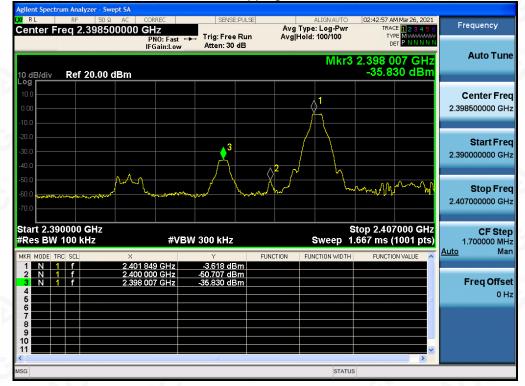
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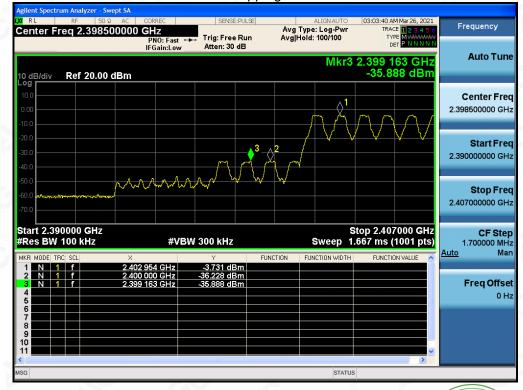
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

Hopping off

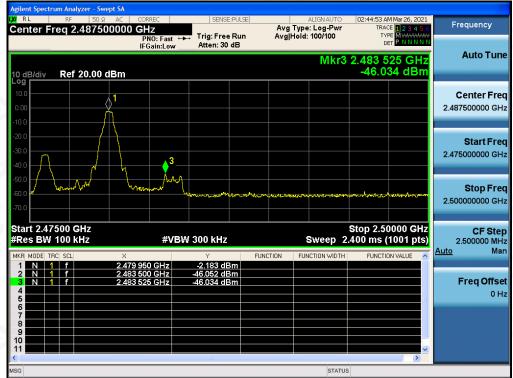


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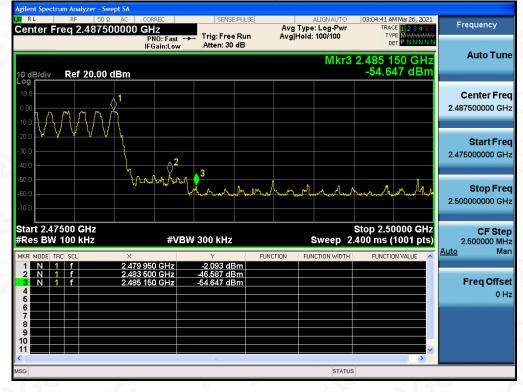




GFSK MODULATION IN HIGH CHANNEL

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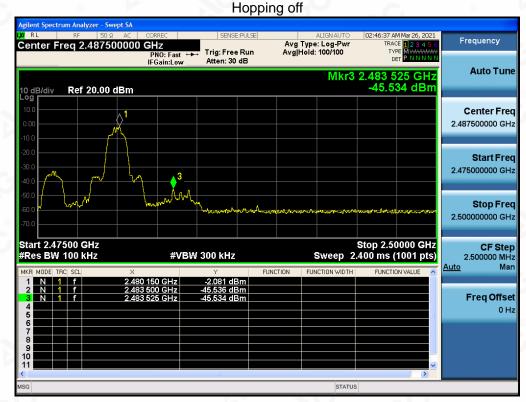
π /4-DQPSK MODULATION IN LOW CHANNEL Hopping off

Hopping on



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π /4-DQPSK MODULATION IN HIGH CHANNEL

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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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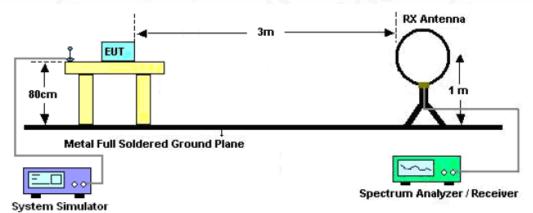
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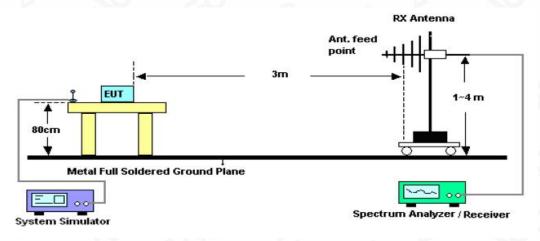


10.2. TEST SETUP

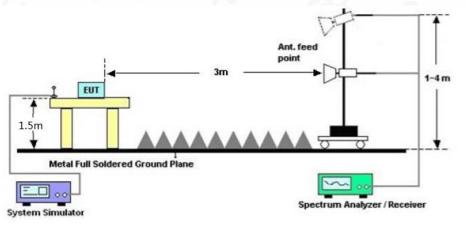
Radiated Emission Test-Setup Frequency Below 30MHz



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

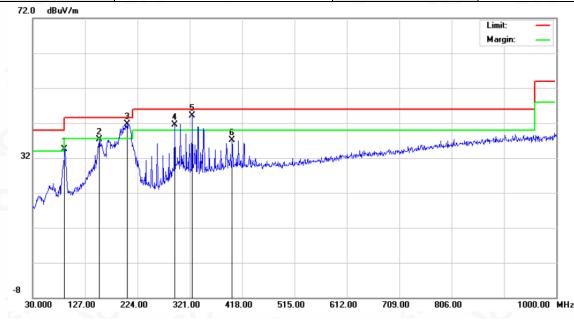
The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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RADIATED EMISSION BELOW 1GHz

EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		89.1700	19.56	14.98	34.54	43.50	-8.96	peak
2		153.1900	17.40	19.88	37.28	43.50	-6.22	peak
3	*	205.5700	27.56	14.22	41.78	43.50	-1.72	peak
4	İ	292.8700	20.55	20.92	41.47	46.00	-4.53	peak
5	ļ	324.8800	21.86	22.34	44.20	46.00	-1.80	peak
6		399.5700	12.16	24.96	37.12	46.00	-8.88	peak

RESULT: PASS

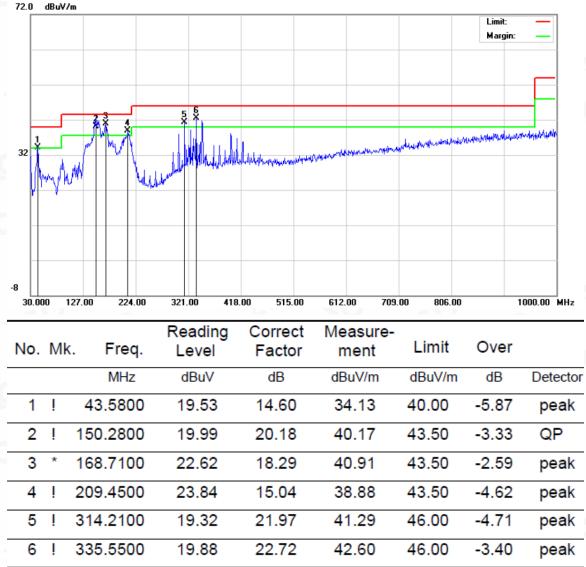
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EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical



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	Bluetooth Speaker	Model Name	S32
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
45.35	0.08	45.43	74	-28.57	peak
36.49	0.08	36.57	54	-17.43	AVG
41.27	2.21	43.48	74	-30.52	peak
32.57	2.21	34.78	54	-19.22	AVG
		2		- 62	6
	(dBµV) 45.35 36.49 41.27	(dBµV) (dB) 45.35 0.08 36.49 0.08 41.27 2.21	(dBµV) (dB) (dBµV/m) 45.35 0.08 45.43 36.49 0.08 36.57 41.27 2.21 43.48	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.35 0.08 45.43 74 36.49 0.08 36.57 54 41.27 2.21 43.48 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 45.35 0.08 45.43 74 -28.57 36.49 0.08 36.57 54 -17.43 41.27 2.21 43.48 74 -30.52

EUT	Bluetooth Speaker	Model Name	S32
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	45.19	0.08	45.27	74	-28.73	peak
4804.000	36.47	0.08	36.55	54	-17.45	AVG
7206.000	39.57	2.21	41.78	74	-32.22	peak
7206.000	29.45	2.21	31.66	54	-22.34	AVG
emark:					<u>,</u>	

Factor Antenna Factor Cable Loss ampiitiei

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EUT	Bluetooth Speaker	Model Name	S32
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	46.18	0.14	46.32	74	-27.68	peak
4882.000	37.48	0.14	37.62	54	-16.38	AVG
7323.000	41.58	2.36	43.94	74	-30.06	peak
7323.000	32.55	2.36	34.91	54	-19.09	AVG
®				®		

EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
45.81	0.14	45.95	74	-28.05	peak
36.47	0.14	36.61	54	-17.39	AVG
40.28	2.36	42.64	74	-31.36	peak
31.54	2.36	33.9	54	-20.1	AVG
©			0		
	0				
	(dBµV) 45.81 36.47 40.28	(dBµV) (dB) 45.81 0.14 36.47 0.14 40.28 2.36	(dBµV) (dB) (dBµV/m) 45.81 0.14 45.95 36.47 0.14 36.61 40.28 2.36 42.64	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.81 0.14 45.95 74 36.47 0.14 36.61 54 40.28 2.36 42.64 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dBµ 45.81 0.14 45.95 74 -28.05 36.47 0.14 36.61 54 -17.39 40.28 2.36 42.64 74 -31.36

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



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EUT	Bluetooth Speaker	Model Name	S32
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
46.18	0.22	46.4	74	-27.6	peak
38.57	0.22	38.79	54	-15.21	AVG
41.35	2.64	43.99	74	-30.01	peak
32.68	2.64	35.32	54	-18.68	AVG
			8		2
8				8	
- 6	8			- 6	0
na Factor + Cable	Loss – Pre-	amplifier.		~0~	- G
	(dBµV) 46.18 38.57 41.35 32.68	(dBµV) (dB) 46.18 0.22 38.57 0.22 41.35 2.64 32.68 2.64	(dBµV) (dB) (dBµV/m) 46.18 0.22 46.4 38.57 0.22 38.79 41.35 2.64 43.99	(dBµV) (dB) (dBµV/m) (dBµV/m) 46.18 0.22 46.4 74 38.57 0.22 38.79 54 41.35 2.64 43.99 74 32.68 2.64 35.32 54	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 46.18 0.22 46.4 74 -27.6 38.57 0.22 38.79 54 -15.21 41.35 2.64 43.99 74 -30.01 32.68 2.64 35.32 54 -18.68

			8
EUT	Bluetooth Speaker	Model Name	S32
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	46.16	0.22	46.38	74	-27.62	peak
4960.000	38.57	0.22	38.79	54	-15.21	AVG
7440.000	41.27	2.64	43.91	74	-30.09	peak
7440.000	32.44	2.64	35.08	54	-18.92	AVG
			0			6
emark:				8		

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 GFSK modulation is the worst case and recorded in the report.

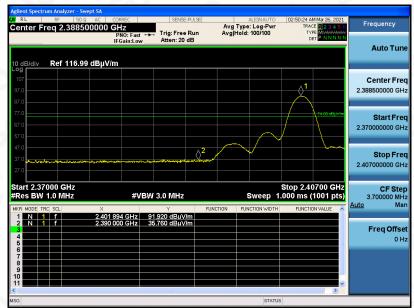
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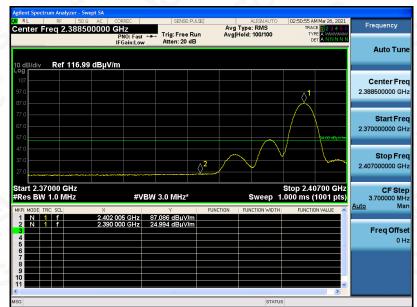
EUT	Bluetooth Speaker	Model Name S32		
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 1	Antenna	Horizontal	

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

PK



AV



RESULT: PASS

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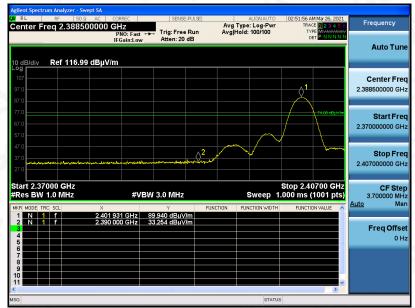
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EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV



RESULT: PASS

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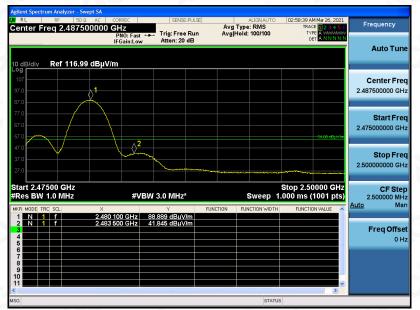
Report No.: AGC03615210301FE03 Page 45 of 65

EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

PK



AV



RESULT: PASS

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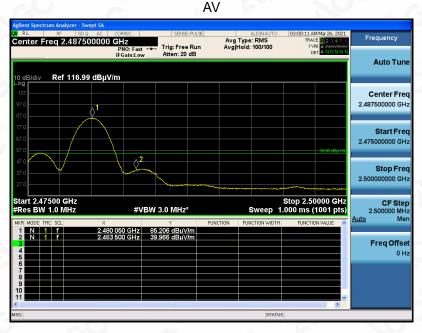


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EUT	Bluetooth Speaker	Model Name	S32
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



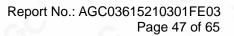
PK



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

2 AM Mar 26, 2021 Frequency Center Freg 2.441750000 GHz Avg Type: Log-Pw Avg[Hold: 100/100 Trig: Free Run Atten: 30 dB IEGain'l ov Auto Tune Ref 20.00 dBm 0 dB/div Center Freq 2.441750000 GHz Start Fred 2.40000000 GHz Stop Freq 2.483500000 GHz **CF** Step 8.350000 MH <u>Auto</u> Mar Freq Offset $0 H_2$ Start 2.40000 GHz #Res BW 200 kHz Stop 2.48350 GHz Sweep 2.000 ms (1001 pts) #VBW 620 kHz

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	2.879	25*4	287.900	400
Middle	2.879	23*4	264.868	400
High	2.879	25*4	287.900	400

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

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