

FCC - TEST REPORT

Report Number : **64.790.19.02677.01** Date of Issue: July 9, 2019

Model : WB-109, MB-109, WB-601, MB-601, WB-602, WB-603

Product Type : Bluetooth Headphone

Trade mark : MINISO, mucro

Applicant : Shenzhen Muke Technology Co.,Ltd

License holder : Shenzhen Muke Technology Co.,Ltd

Address : 5/F, No.17 Langrong Road, Xinshi Community, Dalang

Street, Longhua District, Shenzhen

Test Result : ■ Positive □ Negative

Total pages including

Appendices :

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42

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Building 12&13, Zhiheng Wisdomland Business Park,

Nantou Checkpoint Road 2, Nanshan District,

Shenzhen City, 518052,

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FCC Registration

Number:

514049

IC Registration

10320A

Number:

86 755 8828 6998

Telephone: Fax:

86 755 828 5299



3 Description of the Equipment Under Test

Product: Bluetooth Headphone

Model no.: WB-109

FCC ID: 2ASDH-WB109

Rating: DC 3.7V

RF Transmission Frequency: 2402MHz to 2480MHz

Modulation: GFSK, π/4-DQPSK

Antenna Type: PCB Antenna

Antenna Gain: -0.58dBi

Description of the EUT: The EUT is a Bluetooth Headphone which can play music by

connecting Bluetooth.



4 Summary of Test Standards

Test Standards				
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES			
10-1-2017 Edition	Subpart C - Intentional Radiators			

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2013) and KDB558074 D01 v05r02 DTS Measurement Guidance.



5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition		Page s	Test Site	Test Result	
§15.207	Conducted emission AC power port	10-11	Site 1	Not Applicable	
§15.247(b)(1)	Conducted peak output power	12-15	Site 1	Pass	
§15.247(a)(2)	6dB bandwidth			N/A	
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	16-22	Site 1	Pass	
§15.247(a)(1)	Carrier frequency separation	23-24	Site 1	Pass	
§15.247(a)(1)(iii)	Number of hopping frequencies	25-26	Site 1	Pass	
§15.247(a)(1)(iii)	Dwell Time	27-29	Site 1	Pass	
§15.247(e)	Power spectral density*			N/A	
§15.247(d)	Spurious RF conducted emissions	30-33	Site 1	Pass	
§15.247(d)	Band edge	34-38	Site 1	Pass	
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter	39-40	Site 1	Pass	
§15.203	Antenna requirement	See	note 2	Pass	

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a PCB antenna, which gain is -0.58dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

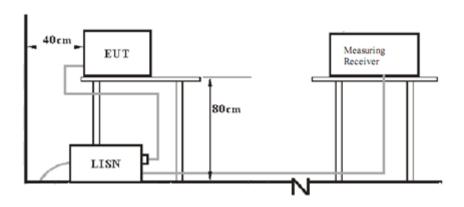
This submittal(s) (test report) is intended for FCC ID: 2ASDH-WB109, complies with Section 15.209, 15.247 of the FCC Part 15, Subpart C Rules. All models are the same except for appearance. Therefore, model WB-109 is selected to perform full tests.

CUMM A D.V.								
SUMMARY:								
All tests according to the reg	All tests according to the regulations cited on page 5 were							
■ - Performed								
☐ - Not Performed								
The Equipment Under Test								
■ - Fulfills the general appr	oval requirements.							
☐ - Does not fulfill the gene	ral approval requirements.							
Sample Received Date:	June 10, 2019							
Testing Start Date:	June 12, 2019							
Testing End Date:	July 2, 2019							
- TÜV SÜD Certification and	Testing (China) Co., Ltd. Gua	ingzhou Branch -						
Reviewed by:	Prepared by:	Tested by:						
		Louise Lin						
Tony Liu	Qiao Zhang	Louise Liu						

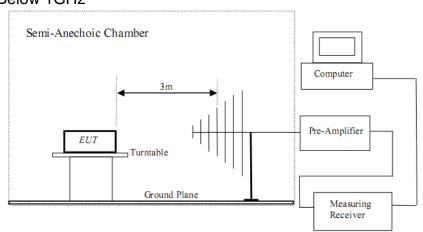


7 Test Setups

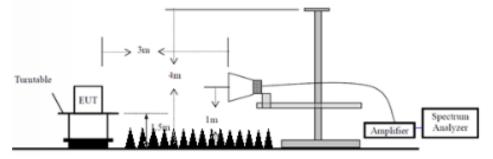
7.1 AC Power Line Conducted Emission test setups



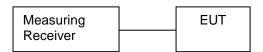
7.2 Radiated test setups Below 1GHz



Above 1GHz



7.3 Conducted RF test setups





8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Mobile Phone	SAMSUNG	GALAXY S3	

Test software: BK32XX RF Test V1.5, which used to control the EUT in continues transmitting mode

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power



9 Technical Requirement

9.1 Conducted Emission

Test Method

- 1. The EUT was placed on a table, which is 0.8m above ground plane
- 2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3. Maximum procedure was performed to ensure EUT compliance
- 4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency	QP Limit	AV Limit
MHz	dΒμV	dΒμV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

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Conducted Emission

Not Applicable

Remark: In charging mode, EUT will disconnect Bluetooth function.



9.2 Conducted peak output power

Test Method

- Use the following spectrum analyzer settings:
 Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
 Sweep = auto, Detector function = peak, Trace = max hold
- 2. Add a correction factor to the display.
- 3. Allow the 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

Limits

Frequency Range	Limit	Limit
MHz	W	dBm
2400-2483.5	≤1	≤30



Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

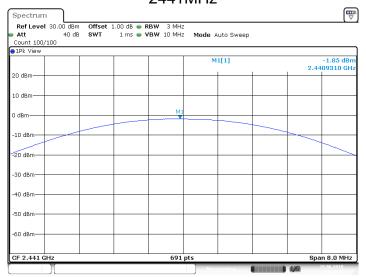
Frequency MHz	Output Power dBm	Result
Low channel 2402MHz	-1.87	Pass
Middle channel 2441MHz	-1.85	Pass
High channel 2480MHz	-1.57	Pass

2402MHz



Date: 15 JUN 2019 11:22:25

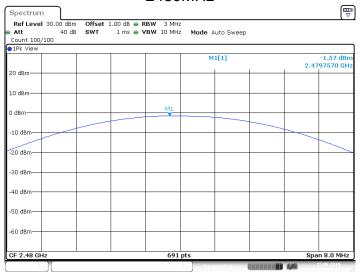
2441MHz



Date: 15 JUN 2019 11:24:32





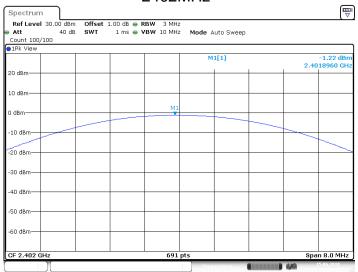


Date: 15 JUN 2019 11:26:15

Bluetooth Mode $\pi/4$ -DQPSK modulation Test Result

Frequency Output Power Result MHz dBm Low channel 2402MHz -1.22 Pass Middle channel 2441MHz -1.20 Pass High channel 2480MHz -0.90 Pass

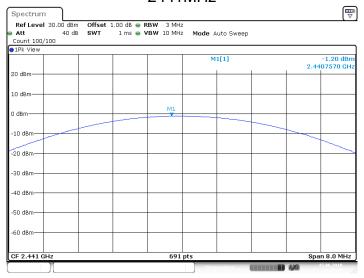
2402MHz



Date: 15 JUN 2019 11:28:45

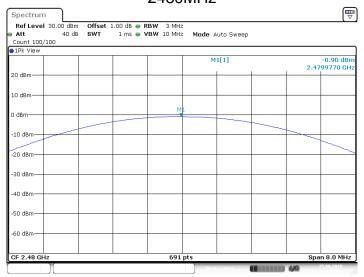


2441MHz



Date: 15 JUN 2019 11:30:37

2480MHz



Date: 15 JUN 2019 11:32:39



9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.

Limit [kHz]
 N/A



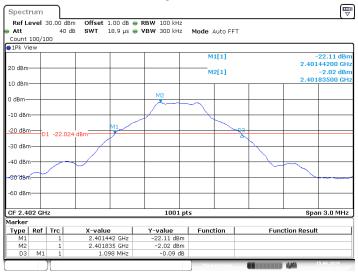
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency	20 dB Bandwidth	99% Bandwidth	Limit	Result	
MHz	kHz	kHz	kHz		
2402	1098	836		Pass	
2441	1104	839		Pass	
2480	1104	836		Pass	

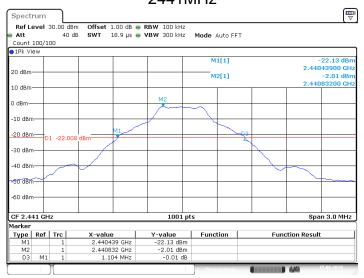
20db Bandwidth

2402MHz



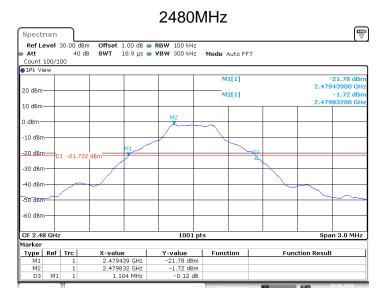
Date: 15 JUN 2019 11:22:45

2441MHz



Date: 15 JUN 2019 11:24:52





Date: 15 JUN 2019 11:26:35

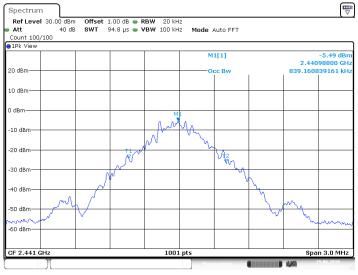
Date: 15 JUN 2019 11:22:57

99% Bandwidth

2402MHz Spectrum Ref Level 30.00 dBm Att 40 dB Offset 1.00 dB ● RBW 20 kHz SWT 94.8 µs ● VBW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.40198 20 dBm 36164 kH 10 dBm -10 dBm -20 dBm -30 dBr -40 dBm -50 dBm

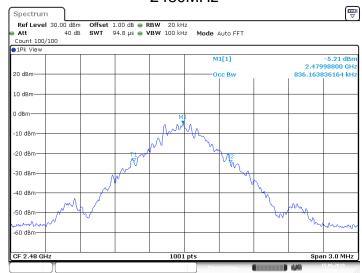


2441MHz



Date: 15 JUN 2019 11:25:04

2480MHz



Date: 15 JUN 2019 11:26:47

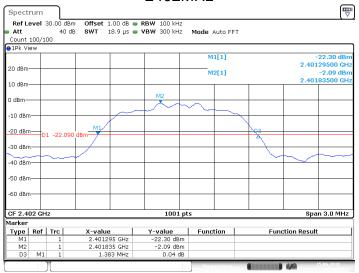


Bluetooth Mode π/4-DQPSK Modulation test result

Frequency	20 dB Bandwidth	99% Bandwidth	Limit	Result	
MHz	kHz	kHz	kHz		
2402	1383	1187		Pass	
2441	1377	1187		Pass	
2480	1383	1187		Pass	

20db Bandwidth

2402MHz

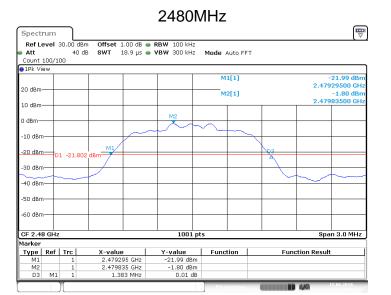


Date: 15 JUN 2019 11:29:05

2441MHz Spectrum Ref Level 30.00 dBm Att 40 dB Mode Auto FFT Count 100/100 M1[1] 22.10 d 2.44029800 GI -2.06 dB 20 dBm M2[1] 10 dBm n dBm -10 dBn -20 dBm--30 dBm -40 dBm -50 dBm--60 dBm-Y-value -22.10 dBm -2.06 dBm -0.05 dB Type | Ref | Trc

Date: 15 JUN 2019 11:30:57





Date: 15 JUN 2019 11:33:00

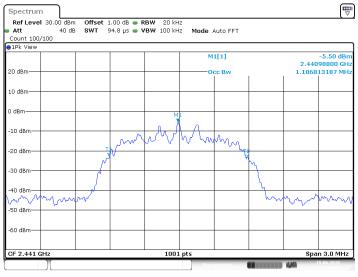
Date: 15 JUN 2019 11:29:16

99% Bandwidth

2402MHz Spectrum Ref Level 30.00 dBm Att 40 dB Offset 1.00 dB ● RBW 20 kHz SWT 94.8 µs ● VBW 100 kHz Mode Auto FFT Count 100/100 M1[1] -5.52 dl 2.40198800 GH 1.186813187 MH 20 dBm 10 dBm -10 dBm -20 dBm -30 dBi -40 dBm -50 dBm -60 dBr

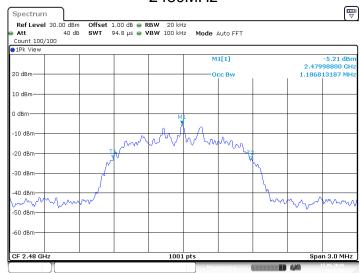


2441MHz



Date: 15 JUN 2019 11:31:09

2480MHz



Date: 15 JUN 2019 11:33:11



9.4 Carrier Frequency Separation

Test Method

- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
- 2. By using the Max-Hold function record the separation of two adjacent channels.
- 3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
- 4. Repeat above procedures until all frequencies measured were complete.

Limit

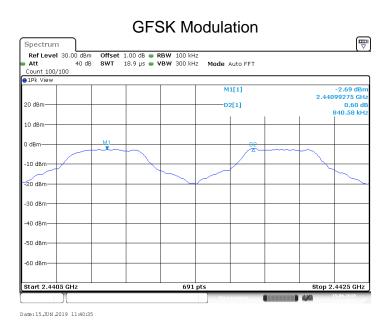
Limit				
kHz				
≥25KHz or 2/3 of the 20 dB bandwidth which is greater				

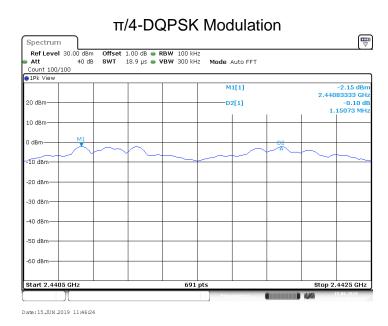


Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status).

Modulation	Carrier Frequency Separation	Result
	kHz	
GFSK	841	Pass
π/4-DQPSK	1151	Pass







9.5 Number of hopping frequencies

Test Method

- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
- 2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
- 3. Record all the signals from each channel until each one has been recorded.
- 4. Repeat above procedures until all frequencies measured were complete.

L	П	n	١	ı	t

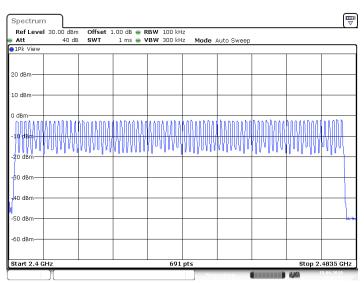
Limit				
number				
≥ 15				



Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.





Date: 15 JUN 2019 11:40:55



9.6 Dwell Time

Test Method

- Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
 Equipment mode: Spectrum analyzer
- 2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
- 3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
- 4. Measure the Dwell Time by spectrum analyzer Marker function.
- 5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.



Dwell Time

Dwell time

The maximum dwell time shall be 0,4 s.

According to the Bluetooth Core Specification, the worse result (2DH5 mode) was reported to show compliance.

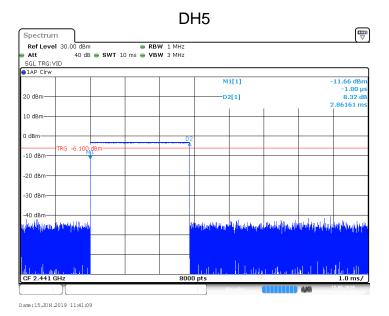
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows: The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

Test Result

Modulation	Mode	Reading (ms)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	2.86	40	114	< 400	Pass
π/4-DQPSK	2DH5	2.87	40	115	< 400	Pass

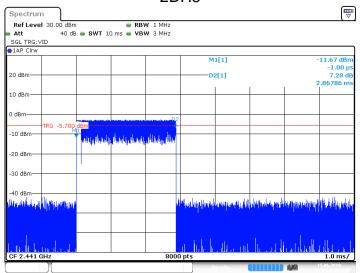
GFSK Modulation





π/4-DQPSK Modulation

2DH5



Date: 15 JUN 2019 11:43:5



9.7 Spurious RF conducted emissions

Test Method

- Use the following spectrum analyzer settings: Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span. RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 3. The level displayed must comply with the limit specified in this Section. Submit these plots.
- 4. Repeat above procedures until all frequencies measured were complete.

Limit

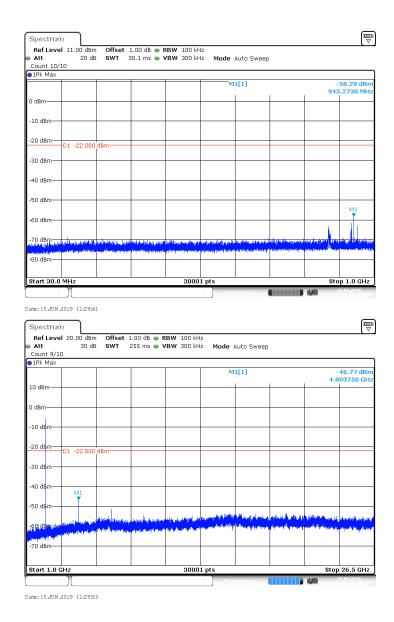
In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated 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) (see Section 15.205(c)).



Spurious RF conducted emissions

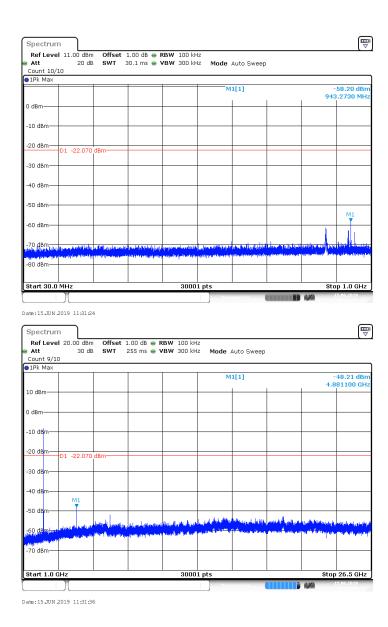
Only the worse case (which is subject to the maximum EIRP, $\pi/4$ -DQPSK mode) test result is listed in the report.

2402MHz



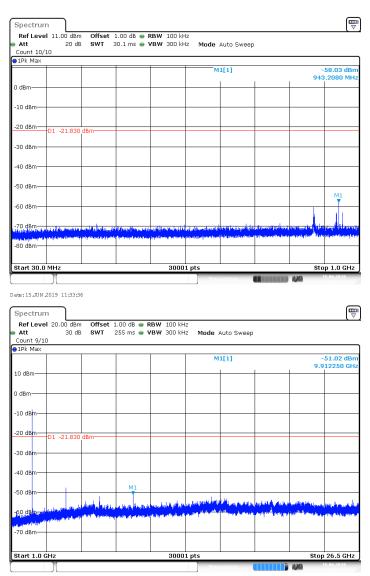


2441MHz



TÜV

2480MHz



Date: 15 JUN 2019 11:33:48



9.8 Band edge testing

Test Method

- 1 Use the following spectrum analyzer settings: Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

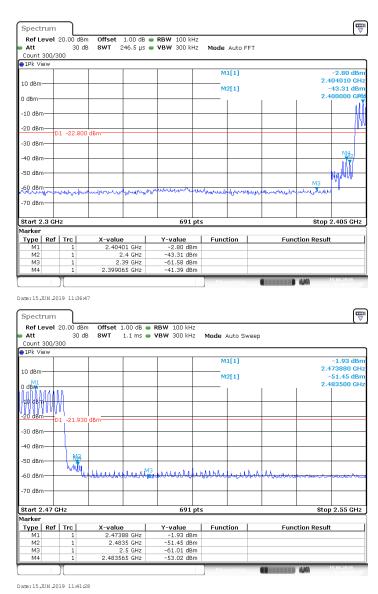
Limit:

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated 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) (see Section 15.205(c)).



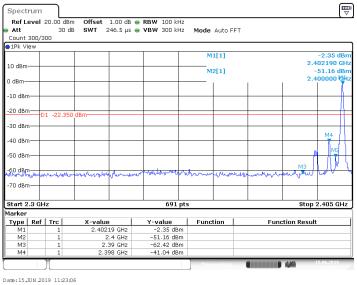
Band edge testing

GFSK Modulation Test Result: Hopping on mode:



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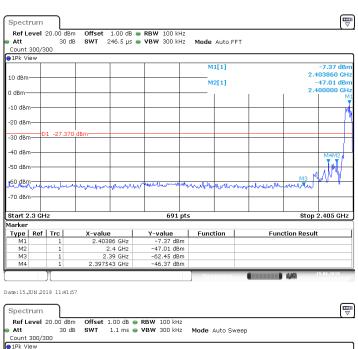
Hopping off mode:

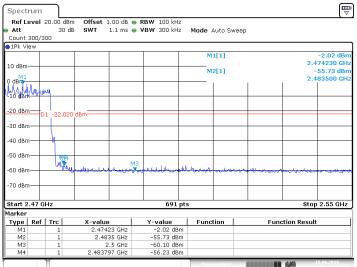


Date: 15 JUN 2019 11:26:56



π /4-DQPSK Modulation Test Result: Hopping on mode:

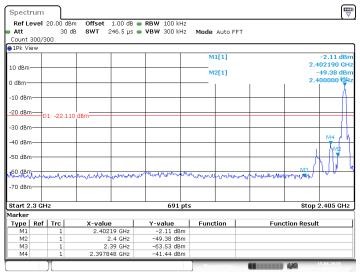




Date: 15 JUN 2019 11:44:38

TÜV

Hopping off mode:



Date:15 JUN 2019 11:33:20



9.9 Spurious radiated emissions for transmitter

Test Method

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 3. Use the following spectrum analyzer settings:

 Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥

 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak,

 Trace = max hold
- 4. Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency	Field Strength	Field Strength	Detector
MHz	uV/m	dBμV/m	
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (which is subject to the maximum EIRP, $\pi/4$ -DQPSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

Bluetooth Mode π/4-DQPSK Modulation 2402MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBuV/m	
876.702	33.47	Н	46.00	PK	12.53	Pass
884.570	34.66	V	46.00	PK	11.34	Pass
1257.062	31.47	Н	74.00	PK	42.53	Pass
2326.562	34.01	V	74.00	PK	39.99	Pass
15299.531	48.51	Н	74.00	PK	25.49	Pass
15328.125	47.13	V	74.00	PK	26.87	Pass

Bluetooth Mode π/4-DQPSK Modulation 2441MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBuV/m	
1260.250	30.88	Н	74.00	PK	43.12	Pass
2394.125	38.40	V	74.00	PK	35.60	Pass
15339.843	46.60	Н	74.00	PK	27.40	Pass
15285.000	46.88	V	74.00	PK	27.12	Pass

Bluetooth Mode π/4-DQPSK Modulation 2480MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBμV/m		dBuV/m	
1792.312	31.30	Н	74.00	PK	42.70	Pass
2392.375	37.40	V	74.00	PK	36.60	Pass
14551.875	45.83	Н	74.00	PK	28.17	Pass
15380.156	48.06	V	74.00	PK	25.94	Pass

Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain Below 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain



10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
	LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
	LISN	Rohde & Schwarz	ENV216	100326	2019-7-6
	ISN	Rohde & Schwarz	ENY81	100177	2019-7-6
CE	ISN	Rohde & Schwarz	ENY81- CAT6	101664	2019-7-6
	High Voltage Proble	Rohde & Schwarz	TK9420(VT9 420)	9420-584	2020-6-29
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2020-6-29
С	Signal Generator	Rohde & Schwarz	SMB100A	108272	2019-7-6
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2019-7-6
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/10085 1	2019-7-6
	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
RE	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-27
KE	Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-27
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
	3m Semi-anechoic chamber	TDK	9X6X6		2020-7-7

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- 20dB bandwidth and 99% Occupied Bandwidth
- Carrier frequency separation
- Number of hopping frequencies
- Dwell Time
- Spurious RF conducted emissions
- Band edge

RE - Radiated RF tests

• Spurious radiated emissions for transmitter



11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty					
Test Items	Extended Uncertainty				
Uncertainty for Radiated Emission in 3m chamber 30MHz-	Horizontal: 4.91dB;				
1000MHz	Vertical: 4.89dB;				
Uncertainty for Radiated Emission in 3m chamber 1000MHz-	Horizontal: 4.80dB;				
18000MHz	Vertical: 4.79dB;				
Uncertainty for Conducted Emission 150KHz-30MHz	U=3.21dB				
RF Power Conducted:	1.16dB				
Frequency test involved:	0.6×10 ⁻⁷ or 1%				
Spurious emissions Conducted measurement	1.43dB				