



FCC RADIO TEST REPORT

FCC ID	:	2AFZZ123G
Equipment	:	Mobile Phone
Brand Name	:	XIAOMI
Model Name	:	2201123G
Applicant	:	Xiaomi Communications Co., Ltd.
		#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer	:	Xiaomi Communications Co., Ltd. #019, 9th Floor, Building 6, 33 Xi'erqi Middle
		Road, Haidian District, Beijing, China, 100085
Standard	:	FCC Part 15 Subpart C §15.247

The product was received on Nov. 15, 2021 and testing was performed from Nov. 19, 2021 to Dec. 08, 2021. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Lunis Win

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
FR1N0901A	01	Initial issue of report	Dec. 20, 2021



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting only	-
3.5	15.247(b)(1)	Peak Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	10.19 dB under the limit at 947.620 MHz
3.9	15.207	AC Conducted Emission	Pass	15.90 dB under the limit at 2.396 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Lewis Ho Report Producer: Tina Chuang



1 General Description

1.1 Product Feature of Equipment Under Test

GSM/ WCDMA/LTE/5G NR, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, Wi-Fi 6GHz 802.11ax, NFC, WPC/WPT, and GNSS.

Product Feature					
Sample 1	EMMC 8G + 256GB				
Sample 2 EMMC 12G + 256GB					
Sample 3	EMMC 8G + 128GB				
	WWAN: PIFA Antenna				
	WLAN 2.4GHz:				
	<ant. 16="">: PIFA Antenna</ant.>				
	<ant. 18="">: PIFA Antenna</ant.>				
	WLAN 5GHz:				
	<ant. 17="">: PIFA Antenna</ant.>				
	<ant. 18="">: PIFA Antenna</ant.>				
Antenna Type	WLAN 6GHz:				
Antenna Type	<ant. 17="">: PIFA Antenna</ant.>				
	<ant. 18="">: PIFA Antenna</ant.>				
	Bluetooth:				
	<ant. 16="">: PIFA Antenna</ant.>				
	<ant. 18="">: PIFA Antenna</ant.>				
	GPS/Glonass/BDS/Galileo/SBAS/QZSS : PIFA Antenna				
	NFC: Planar Antenna				
	WPC/WPT: Coil Antenna				

Antenna information					
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	<ant. 16="">: -2.5 <ant. 18="">: -3.0</ant.></ant.>			

Remark: The above EUT's information is declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.



1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory		
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		
Test Sile No.	CO05-HY (TAF Code: 1190)		
Remark	The Conducted Emission test item subcontracted to Sporton International		
Kelliark	Inc. EMC & Wireless Communications Laboratory.		

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	Sporton International Inc. Wensan Laboratory		
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855		
Test Site No.	Sporton Site No. TH05-HY, 03CH20-HY		

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW3786

1.4 Applicable Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

- 1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
- 2. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	2411	36	2438	63	2465
	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
2400-2483.5 MHz	13	2415	40	2442	67	2469
	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	-	-
	26	2428	53	2455	-	-

2.2 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane and WPC Charging Mode as worst plane, and the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

The following summar	v table is showing	all test modes to	demonstrate in com	pliance with the standard.
The following summar	y lable is showing	j all lest modes to	demonstrate in com	

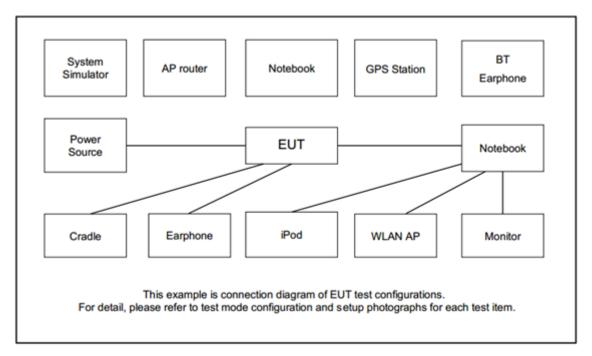
Summary table of Test Cases						
Test Item		Data Rate / Modulation				
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps π /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK			
Conducted	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz			
Test Cases	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz			
	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz			
		Bluetooth BR 1Mbps GFS	K			
		<ant. 16="">:</ant.>				
	Mode 1: CH78_2480 MHz					
Radiated	<ant. 18="">:</ant.>					
Test Cases	Mode 1: CH00_2402 MHz					
	Mode 2: CH39_2441 MHz					
	Mode 3: CH78_2480 MHz					
	Mode 4: 0	CH78_2480 MHz with Wirele	ss Charger			
AC Conducted	Mode 1 :Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + USB Cable 1					
Emission	(Charging from A	C Adapter) + Battery for Sar	nple 1			
 Remark: 1. For Radiated Test Cases, the worst mode data rate 1Mbps was reported only since the highest RF output power in the preliminary tests. The conducted spurious emissions and conducted band edge measurement for other data rates were not worse than 1Mbps, and no other 						

significantly frequencies found in conducted spurious emission.

2. For Radiated Test Cases, the tests were performed with USB Cable 1 and Sample 1



2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Wireless Charger	YU-live	К8	N/A	N/A	N/A
2.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8m
3.	Notebook	DELL	Latitude5310	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	DELL	Latitude3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A
6.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m



2.5 EUT Operation Test Setup

The RF test items, utility "QRCT 4 Version 4.0.00196.0" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to contact with base station to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)



3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.3.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings: Span = the frequency band of operation;
 RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. The number of hopping frequency used is defined as the number of total channel.
- 7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



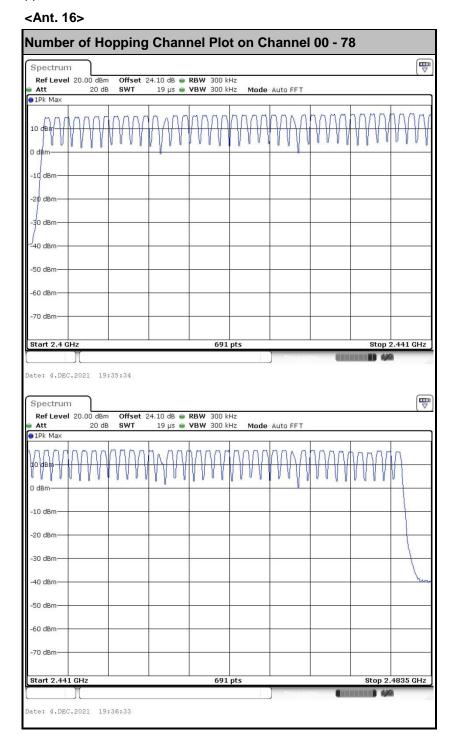
Spectrum Analyzer

EUT

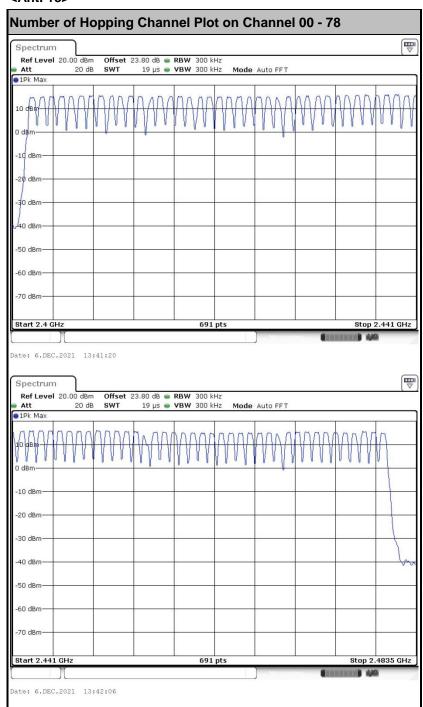


3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.







<Ant. 18>

TEL : 886-3-327-0868 FAX : 886-3-327-0855 Report Template No.: BU5-FR15CBT Version 2.4

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

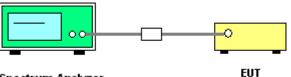
3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.2.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.2.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peaks of two adjacent channels;
 RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

3.2.4 Test Setup



Spectrum Analyzer

3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.



<Ant. 16>

<1Mbps>

Channel Sepa	ration Plot on Cha	annel 00 - 01	Channel Sep	paration Plot on Ch	nannel 39 - 40
Spectrum			Spectrum		
Ref Level 20.00 dBm Offset 24.10) dB 🖷 RBW 300 kHz 3 µs 🖷 VBW 300 kHz Mode Auto FFT	(*)	Ref Level 20.00 dBm Offset 24	4.10 dB 👄 RBW 300 kHz 6.3 µs 👄 VBW 300 kHz 🛛 Mode Auto FF	
PIPk Max			Att 20 0B SWI		
10 dBm	M1[1] D2[1]	D2 14.90 dBm	10 dBm	• M1[1] D2[1]	D2 16.11 dBm 2.44114830 GHz 0.03 dB 994.20 kHz
0 dBm			0 dBm		
-10 dBm-			-10 dBm		
~20 dBm			-20 dBm		
-30 dBm			-30 dBm		
-40 dBm			-40 dBm		
-50 dBm			-50 dBm		+ + + - +
-60 dBm			-60 dBm		
-70 dBm-			-70 dBm		
CF 2.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz	691 pts	Span 3.0 MHz
	Stearor	() 4/A		- Stear	CEREMON 4/9
Date: 4.DEC.2021 19:34:03			Date: 4.DEC.2021 19:47:47		
Channel Sepa	ration Plot on Cha	annel 77 - 78		N/A	
Spectrum					
Att 20 dB SWT 6.3) dB 👄 RBW 300 kHz 3 µs 🖷 VBW 300 kHz 🛛 Mode Auto FFT				
1Pk Max	Mt[1]	15.59 dBm 2.47884440 GHz			
10 dBm		-0.16 dB 998.60 kHz			
0 dBm					
-10 dBm					
-/20 dBm					
-30 dBm-					
-40 dBm					
-50 dBm					
-60 dBm					
-70 dBm-					
CF 2.4795 GHz	691 pts	Span 3.0 MHz			
	Stearur	(
Date: 4.DEC.2021 19:54:16					



<2Mbps>

Channel Se	eparation Plot o	on Channel 00 - 01	Channel S	eparation Plo	t on Channe	
Spectrum			Spectrum			
Att 20 dB SWT	t 24.10 dB e RBW 300 kHz 6.3 μs e VBW 300 kHz Mod	e Auto FFT	Att 20 dB SWT	et 24.10 dB 👄 RBW 300 kHz 6.3 µs 👄 VBW 300 kHz	Mode Auto FFT	
1Pk Max	M1	M1[1] D2 14.16 dBm	● 1Pk Max		M1[1] D2	15.77 dB
10 dBm		D2 2.40214830 GHz 0.21 dB	10 dBm			2.44114830 G
	T T	920.40 kHz				998.60 ki
) dBm			0 dBm			
19/dBm			-10 dBm-			
20 dBm-			-20 dBm			
20 0011			120 UBIN			
30 dBm			-30 dBm-			
40 dBm			-40 dBm			
50 dBm			50 dBm			
			-50 dBm			
60 dBm			-60 dBm			
-70 dBm			-70 dBm			
F 2.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz	691 pts		Span 3.0 MH
Channel Se	eparation Plot c	on Channel 77 - 78	Date: 4.DEC.2021 20:06:17	N/A		
Spectrum		[
Ref Level 20.00 dBm Offset Att 20 dB SWT	t 24.10 dB • RBW 300 kHz 6.3 μs • VBW 300 kHz Mod					
1Pk Max						
N		M1[1] 12.94 dBm D2 2.47884440 GHz				
10 dBm		D2[1] -0.16 dB 998.60 kHz				
0 dBm						
-10 dBm						
20 dBm-						
30 dBm						
40 dBm						
202203999301						
50 dBm						
60 dBm						
-70 dBm-						
/ 0 40m						
CF 2.4795 GHz	691 pts	Span 3.0 MHz				
1 M	1	Measuring Contracting 4/9				
ate: 4.DEC.2021 20:11:50						



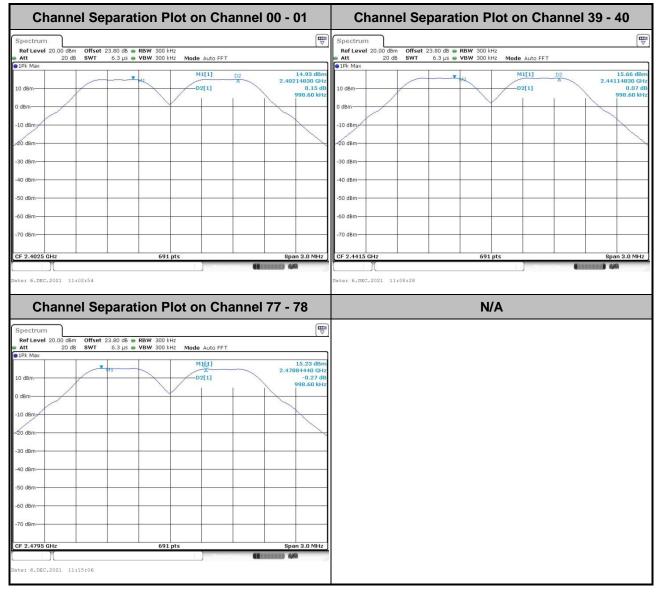
<3Mbps>

Channel Se	eparation Plot on Ch	annel 00 - 01	Channel Separation Plot on Channel 39 - 40
Spectrum			Spectrum 🕎
Ref Level 20.00 dBm Offset	: 24.10 dB	× 4	Ref Level 20.00 dBm Offset 24.10 dB RBW 300 kHz Att 20 dB SWT 6.3 µs VBW 300 kHz
●1Pk Max	M1513	11.57 dBm	e 1Pk Max
10 dBm	M1 D2[1]	D2 2.40215270 GHz 0.06 dB	10 dBm M1 M1[1] D2 2.4014800 GH 2.44114800 GH 2.63 df
		998.55 kHz	1.00290 MH
0 dBm			0 dBm
-10 dBm			-10,dBm
-20 dBm-			-20 dBm-
-30 dBm			-30 dBm
-30 dBm-			-30 dBm
-40 dBm			-40 d8m-
-50 dBm			-50 dBm-
-60 dBm			-60 dBm
-70 dBm-			-70 dBm
CF 2.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz 691 pts Span 3.0 MHz
	Stear	(111111) 4/4	Service (REEEE) 49
Date: 6.DEC.2021 08:55:41			Date: 6.DEC.2021 09:01:14
		·	
Channel Se	eparation Plot on Ch	annel 77 - 78	N/A
Spectrum			
	: 24.10 dB		
● 1Pk Max			
M		14.50 dBm 2.47884440 GHz	
10 dBm	D2[1]	0.08 dB 998.60 kHz	
0 dBm			
-10 dBm-			
-20 dBm			
-30 dBm-			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm-			
05.0.1705.011			
CF 2.4795 GHz	691 pts	Span 3.0 MHz	
Date: 6.DEC.2021 09:13:47			



<Ant. 18>

<1Mbps>





<2Mbps>

Channel Se	eparation Pl	lot on Chanr		Channel	ocparation		
Spectrum Ref Level 20.00 dBm Offset	23.80 dB 👄 RBW 300 kH	19		Spectrum Ref Level 20.00 dBm Of	fset 23.80 dB 🖷 RBW 3	200 kH2	
Att 20 dB SWT	6.3 µs • VBW 300 kH		1	Att 20 dB SV			
10 dBm		M1[1] D2[1]	14.62 dBm 2.40185310 GHz 0.23 dB	10 dBm	MI	M1[1] D2	14.82 dBm 2.44102680 GHz -0.11 dE
0 dBm			1.00720 MHz	0 dBm			1.00290 MHz
-10/dBm				-10 dBm			
-20 dBm-				-20 dBm			
-30 dBm				-30 dBm			
40 dBm				-40 dBm			
50 dBm				-50 dBm			
-60 dBm				-60 dBm			
70 dBm				-70 dBm			
CF 2.4025 GHz	691 p	nts	Span 3.0 MHz	CF 2.4415 GHz		691 pts	Span 3.0 MHz
1 2.1020 GHZ	001 p	,rs	opun oto minz				
		Stearoring	(IIIIIII) 4/A			Nexoring	4 11111111 4/6
te: 6.DEC.2021 11:28:07		Neasorina	(IIIIII) 40	Date: 6.DEC.2021 11:41:2		Measuring	44
	eparation PI	ot on Chanr	nel 77 - 78		8	N/A	449
Channel Se	-		nel 77 - 78		8	N/A	
Channel Se	23.80 dB RBW 300 kH 6.3 µs VBW 300 kH	Iz			8	N/A	
Spectrum Ref Level 20.00 dBm Offset 20 dB SWT 1Pk Max	23.80 dB RBW 300 kH	Mode Auto FFT	(₩ 7 14.99 dBm 2.47901370 GHz		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	iz iz Mode Auto FFT	(₩) ▼ 14.99 dBm		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se Spectrum Offset Ref Level 20.00 dBm Offset 20 dB Swr 19Pk Max OdBm 0 dBm OdBm 10 dBm OdBm 20 dB OdBm 10 dBm OdBm 20 dBm OdBm 20 dBm OdBm 40 dBm OdBm 60 dBm OdBm	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	
Channel Se	23.80 dB ● RBW 300 kH 6.3 µs ● VBW 300 kH	Mode Auto FFT	14.99 dBm 2.47901370 GHz −0.28 dB		8	N/A	



<3Mbps>

	aration Plot on Ch	nannel 00 - 01	Channel Se	eparation Plot o	n Channel 39 - 40
Spectrum			Spectrum		
Ref Level 20.00 dBm Offset 23.	80 dB 🖷 RBW 300 kHz 5.3 μs 🖷 VBW 300 kHz 🛛 Mode Auto FF'			23.80 dB RBW 300 kHz 6.3 µs VBW 300 kHz Mode	
IPk Max M1			e 1Pk Max		
×	M1[1] D2	14.65 dBm 2.40187050 GHz		T T	11[1] 13.09 dBm D2 2.44114830 GHz
10 dBm	D2[f]	-2.46 dB 998.60 kHz	10 dBm	, in the second se	2[1] 0.07 dE
0 dBm			0 dBm		
-10 dBm-			-10 dBm-		
-20 dBm-			-20 dBm		
-30 dBm-			-30 dBm		
-40 dBm-			-40 dBm		
-50 dBm-			-50 dBm		
-60 dBm			-60 dBm		
-70 dBm			-70 dBm-		
CF 2.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz	691 pts	Span 3.0 MHz
] [] [2Novi	(111111) 4/9			
Date: 6.DEC.2021 11:52:40			Date: 6.DEC.2021 12:04:09		
Channel Sep	aration Plot on Ch	nannel // - /8		N/A	
Spectrum					
	80 dB 🖷 RBW 300 kHz 5.3 us 🖷 VBW 300 kHz - Mode Auto FF				
● Att 20 dB SWT 6 ● 1Pk Max	5.3 µs 🖷 VBW 300 kHz Mode Auto FF	т			
Att 20 dB SWT 6	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz			
• Att 20 dB SWT 6 ● IPk Max 10 dBm	5.3 μs • VBW 300 kHz Mode Auto FF	T 12.66 dBm			
Att 20 dB SWT 6 1Pk Max	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
• Att 20 dB SWT 6 ● IPk Max 10 dBm	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 1Pk Max	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT e IPk Max M1 O dBm O dBm -10 dBm -20 dBm	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 IPk Max ID dBm O dBm -10 dBm	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT e IPk Max M1 O dBm O dBm -10 dBm -20 dBm	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 1Pk Max M1 M1 10 dBm 0 dBm -0 dBm -0 dBm -0 dBm -30 dBm -0 dBm<	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT e 1Pk Max M1 M1 M1 M1 10 dBm 0 dBm - <	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 I Di K Max M1 ////////////////////////////////////	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 IPIk Max M1 M1 M1 M1 10 dBm 0 dBm -	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			
Att 20 dB SWT 6 1Pik Max M1 </td <td>5.3 µs • VBW 300 kHz Mode Auto FF'</td> <td>T 12.66 dBm 2.47884440 GHz -0.27 dB 999.60 HHz 999.61 HHz 100 HHZ 10</td> <td></td> <td></td> <td></td>	5.3 µs • VBW 300 kHz Mode Auto FF'	T 12.66 dBm 2.47884440 GHz -0.27 dB 999.60 HHz 999.61 HHz 100 HHZ 10			
Att 20 dB SWT e ● IPk Max	5.3 µs • VBW 300 kHz Mode Auto FF	T 12.66 dBm 2.47884440 GHz -0.27 dB			



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

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

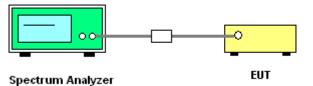
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.4.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- 5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

3.3.4 Test Setup

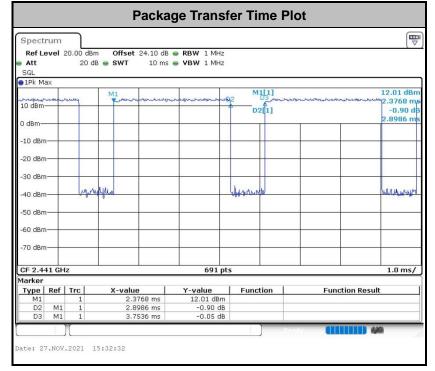


3.3.5 Test Result of Dwell Time

Please refer to Appendix A.



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Remark:

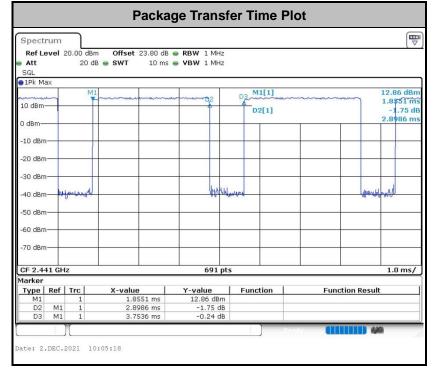
1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s),Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4×20) (s), Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$ hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time



<Ant. 18>



Remark:

4. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s),Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

5. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4×20) (s), Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$ hops.

6. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time



3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

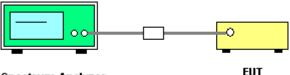
3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.4.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Use the following spectrum analyzer settings for 20 dB Bandwidth measurement.
 Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
 RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
 Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
 RBW ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- 6. Measure and record the results in the test report.

3.4.4 Test Setup



Spectrum Analyzer

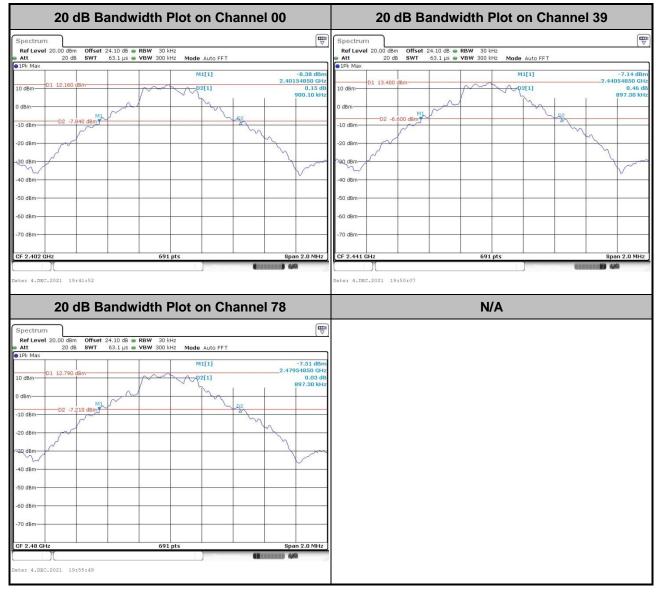
3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.



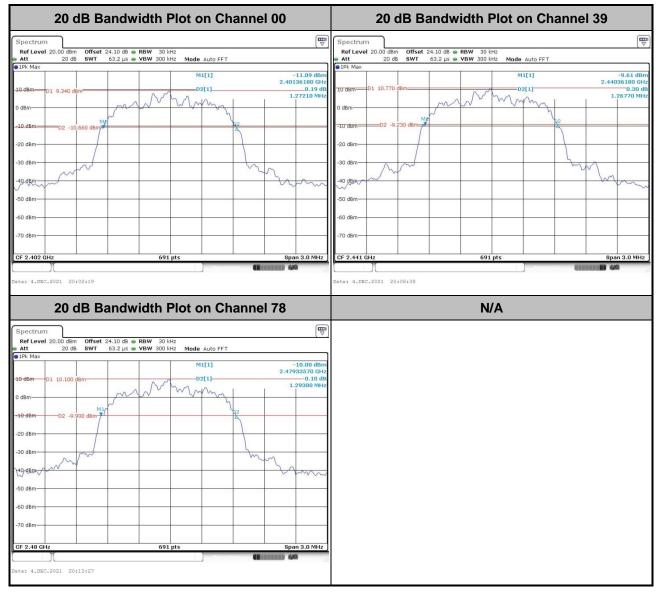
<Ant. 16>

<1Mbps>



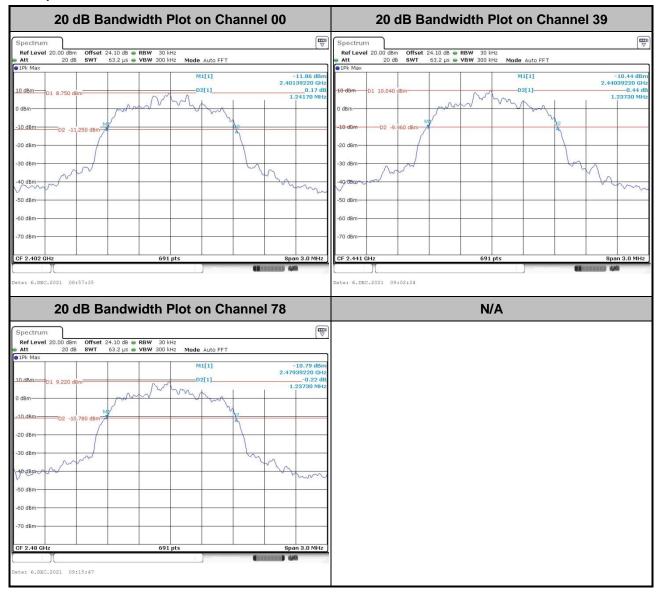


<2Mbps>





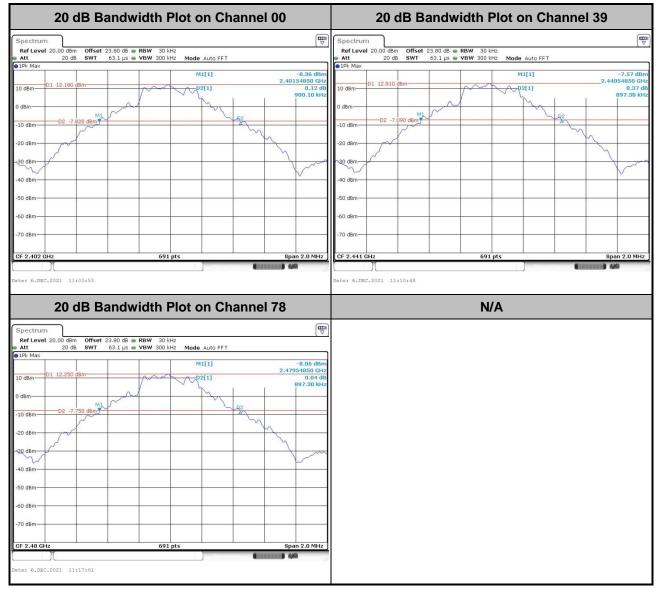
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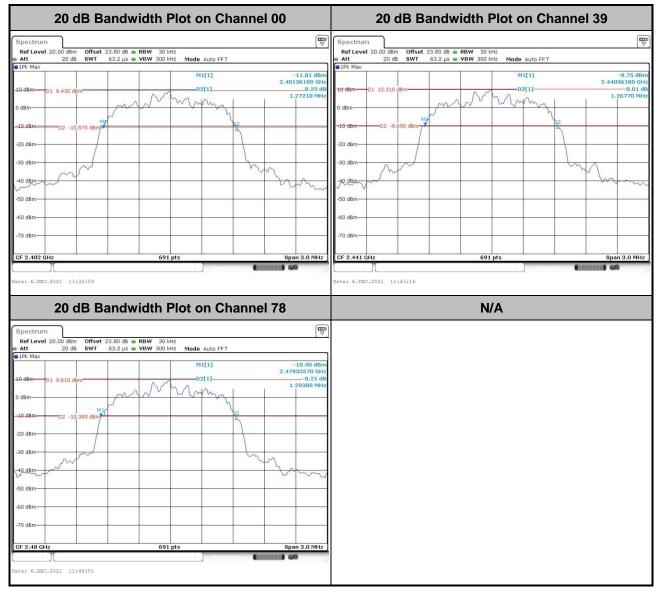
<Ant. 18>

<1Mbps>





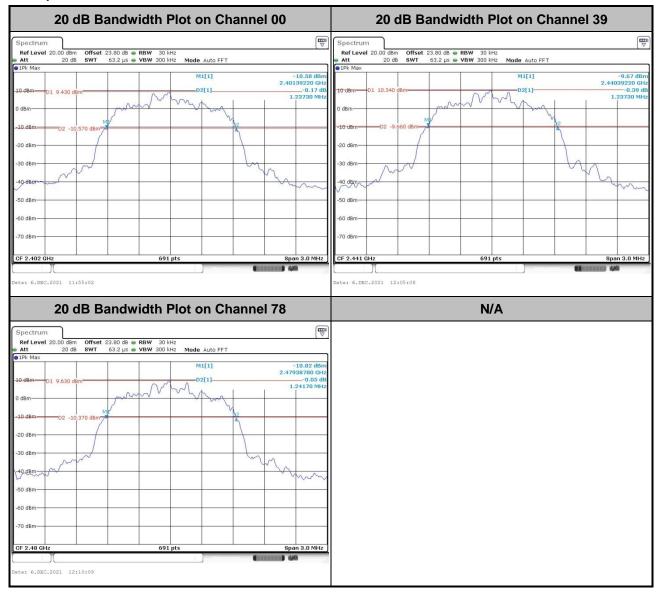
<2Mbps>



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<3Mbps>



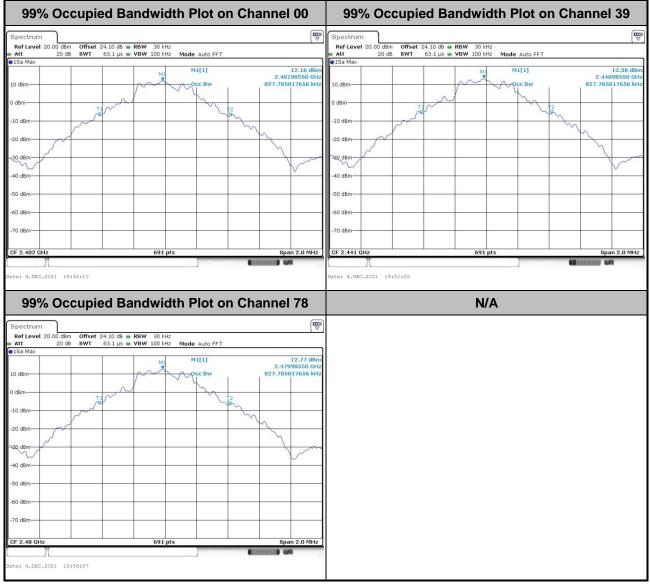


3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

<Ant. 16>

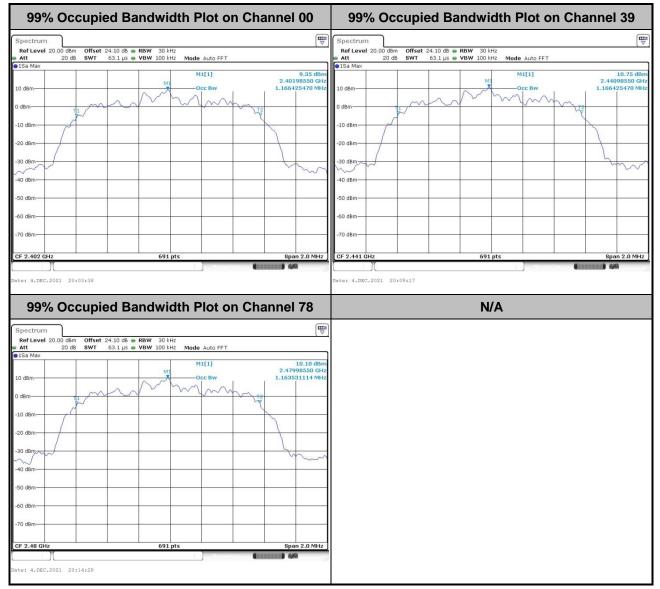
<1Mbps>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

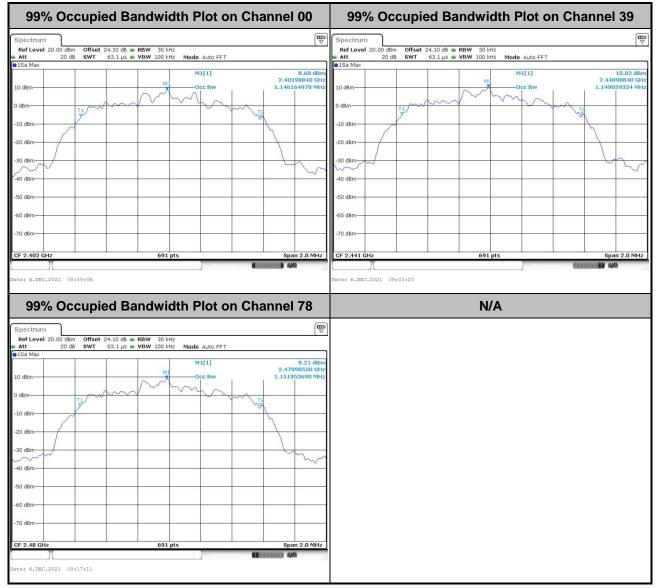


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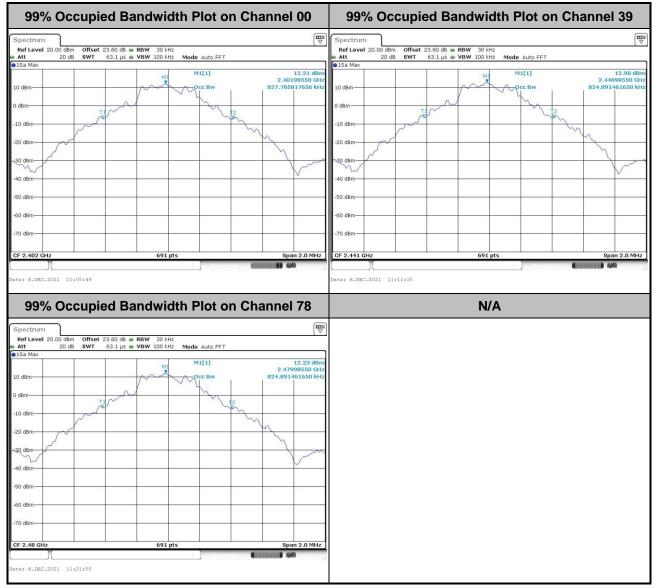
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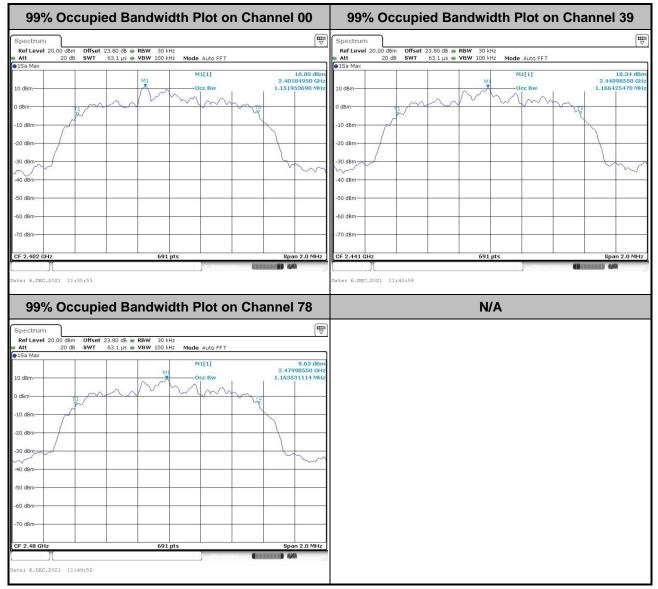
<Ant. 18>

<1Mbps>



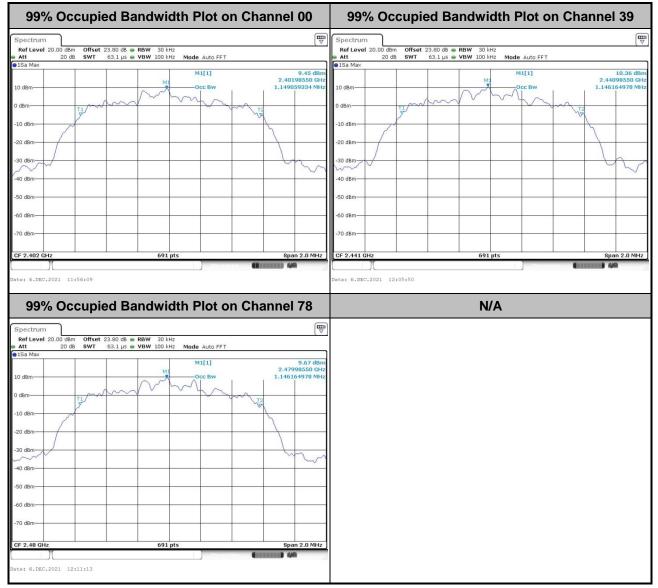


<2Mbps>





<3Mbps>





3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

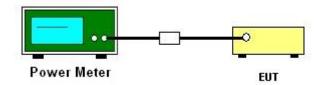
3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.5.
- 2. The RF output of EUT is connected to the power meter by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Measure the conducted output power with cable loss and record the results in the test report.
- 5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.5.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.



3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

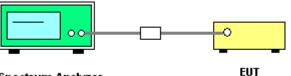
3.6.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.6.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.6.
- 2. Set the maximum power setting and enable the EUT to transmit continuously.
- 3. Set RBW = 100 kHz, VBW = 300 kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
- 4. Enable hopping function of the EUT and then repeat step 2 and 3.
- 5. Measure and record the results in the test report.

3.6.4 Test Setup



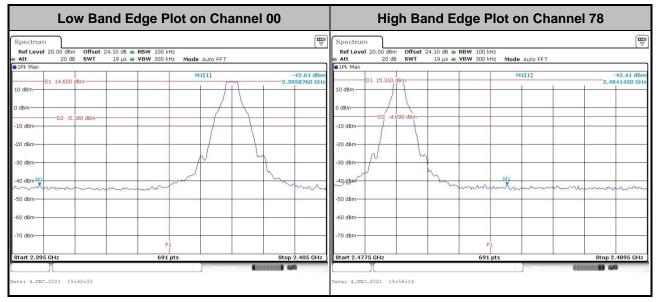
Spectrum Analyzer



3.6.5 Test Result of Conducted Band Edges

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Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
Spectrum Image: Constraint of the second seco	Spectrum The set 20:00 dBm Offset 24:10 dB RBW 100 kHz Att 20 dB SWT 19 µs VBW 300 kHz Mode Auto FFT			
-70 dBm -70 dBm -70 dBm -70 dBm F1 Start 2.395 GHz Stop 2.405 GHz Date: 4.DEC.2021 20:03:04	-50 dBm -70 dBm F1 Start 2.4775 GHz Start 2.4775 GHz Date: 4.0BC.2021 20:13:54			



<3Mbps>

Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
Spectrum Image: Constraint of the sector of th	Spectrum Image: Constraint of the second secon			
Start 2.395 GHz 691 pts Stop 2.405 GHz	-70 dBm F1 Start 2.4775 GHz 691 pts Stop 2.4895 GHz Date: 6.DEC.2021 09:16:17			

<Ant. 18>

<1Mbps>

Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
Spectrum Image: Constraint of the sector of t	Spectrum Ref Level 20.00 dBm Offset 23.80 dB @ RBW 100 kHz a Att 20 dB SWT 19 μs @ VBW 300 kHz Mode Auto FFT @ IPk Max 01 14.840 dBm M1[1] -43.4			
0 dBm D2 -5,340 dBm	0 dBm			
-70 dBm F1	-70 dBm F1 Start 2.4775 GHz 691 pts Stop 2.4895 Date: 6.DEC.2021 11:17:30	5 GHz		



<2Mbps>

Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
RefLevel 20.00 dBm Offset 23.80 dB RBW 100 kHz Att 20 dB SWT 19 µs VBW 300 kHz Mode Auto FFT	Ref Level 20.00 dBm Offset 23.80 dB RBW 100 kHz Mode Auto FFT 19k Max 0 113.920 dBm -40.20 dBm -40			
Start 2.395 GHz 691 pts Stop 2.405 GHz	Start 2.4775 GHz 691 pts Stop 2.4895 GHz			
Date: 6.DEC.2021 11:35:14	Date: 6.DEC.2021 11:49:16			

<3Mbps>

Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
Ref Level 20.00 dBm Offset 23.80 dB RBW 100 kHz C Att 20 dB SWT 19 µs VBW 300 kHz Mode Auto FFT E1rk Max	Spectrum mm Ref Level 20.00 dBm Offset 23.80 dB RBW 100 kHz Att 20 dB SWT 19 µs VBW 300 kHz Mode Auto FFT ●1Pk Max			
01 14.800 dBm M1[1] -40.83 dBm 10 dBm 2.3999280 GHz 2.3999280 GHz 0 dBm 0 0 0 -0 dBm 0 0 0 -0 dBm 0 0 0 -0 dBm 0 0 0 -10 dBm 0 0 0 -30 dBm 0 0 0 -30 dBm 0 0 0 -60 dBm 0 0 0	10 dbm D1 12.370 dbm -33.59 dbm 10 dbm 2.4876680 GH 0 dbm 0 0 -10 dbm D2 -7,630 dbm 0 -30 dbm 0 0 -40 dbh 0 0			
-70 dBm F1 Btart 2.395 GHz 691 pts Stop 2.405 GHz	-70 dBm F1 Btart 2.4775 GHz 691 pts Stop 2.4895 GHz			



3.6.6 Test Result of Conducted Hopping Mode Band Edges

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Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot
Spectrum Image: Constraint of the second secon	Spectrum TTP Ref Level 20.00 dBm Offset 24.10 dB @ RBW 100 kH2 # Att 20 dB SWT 19 Js @ VBW 300 kH2 Mode Auto FFT @ 1Pk Max 10 dBm 10 dBm -10 dBm -20 dB -30 dBm -50 dBm -70 dBm
F1 F1 Start 2.395 GHz 691 pts Stop 2.405 GHz	F1 Stop 2.4895 GHz Date: 4.DEC.2021 19:37:20 0

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Hopping N	Plot	Hopping Mode High Band Edge Plot				
Att 20 dB SWT 19 p	38 • RBW 100 kHz s • VBW 300 kHz Mode Auto FFT M1[1]	-42.52 dBm 2.3954560 GHz	Att 20 dB		3W 100 kHz 3W 300 kHz Mode Auto M1[1]	FFT -42.27 di -2.4938130 G
10 dBm 01 12.010 dBm 0 dBm 02 -7.990 dBm -10 dBm			01 3.160 dB 10 dBm 10 dBm 20 dBm 20 dBm 40 dBm 50 dBm	D dBm	MI	
-60 dBm	Fi 691 pts	Stop 2.405 GHz 8	60 dBm 70 dBm Start 2.4775 GHz 	0:46	F1 691 pts	Stop 2.4895 Gł



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Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot
0 d8m- -10 d8m- -20 d8m- -20 d8m- -30 d8m- -40 d8m- -50 d8m-	Spectrum Image: Constraint of the second secon
Start 2.395 CHz 691 pts Stop 2.405 CHz Date: 4.DEC.2021 19:39:15 0 0 0	Start 2.4775 GHz 691 pts Stop 2.4895 GHz

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<1Mbps>

Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot
Ropping Woode Low Band Loge Plot Spectrum Image: Colspan="2">Image: Colspan="2" Ref Level 20.00 dBm Offset 23.80 dB @ RBW 100 kH2 Mode Auto FFT Image: Colspan="2">Image: Colspan="2" Image: Colspan="2" Image: Colspa="2" Image: Colspan="2" Image:	Spectrum Image: Constraint of the sector of th
-30 dBm -40 dBm -50 dBm -50 dBm -70 dBm -70 dBm F1 Start 2.395 CHz 601 pts Start 2.395 CHz 51 pts 51 pts 5	-30 dBm -40 dBm -50 dBm -50 dBm -70 dBm -70 dBm F1 Start 2.4775 GHz 51 Start 2.4775 GHz 52 Start 2.4955 GHz
	Date: 6.DEC.2021 10:57:55