



# FCC RADIO TEST REPORT

FCC ID	J9CQCARD7280N2
Equipment	CARD7280
Brand Name	: Qualcomm
Model Name	CARD7280N2
Applicant	: Qualcomm Technologies, Inc.
	5775 Morehouse Drive, San Diego, California 92121, United State
Manufacturer	: Qualcomm Semiconductor Limited
	No. 16-1 Zhanye 2nd Rd. East District
	Hsinchu City, 300091 (Taiwan)
Standard	: FCC Part 15 Subpart C §15.247

The product was received on Feb. 16, 2022 and testing was performed from Feb. 25, 2022 to Aug. 11, 2022. 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.

Louis Wu

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.)

Page Number: 1 of 67Issue Date: Sep. 12, 2022Report Version: 01



# **Table of Contents**

His	tory o	f this test report	3
Sur	nmary	of Test Result	4
1	Gene	ral Description	5
	1.1	Product Feature of Equipment Under Test	5
	1.2	Modification of EUT	6
	1.3	Testing Location	6
	1.4	Applicable Standards	6
2	Test	Configuration of Equipment Under Test	7
	2.1	Carrier Frequency Channel	7
	2.2	Test Mode	8
	2.3	Connection Diagram of Test System	9
	2.4	Support Unit used in test configuration and system	9
	2.5	EUT Operation Test Setup	.10
	2.6	Measurement Results Explanation Example	.10
3	Test	Result	.11
	3.1	Number of Channel Measurement	.11
	3.2	Hopping Channel Separation Measurement	
	3.3	Dwell Time Measurement	.20
	3.4	20dB and 99% Bandwidth Measurement	.23
	3.5	Output Power Measurement	.36
	3.6	Conducted Band Edges Measurement	.37
	3.7	Conducted Spurious Emission Measurement	.46
	3.8	Radiated Band Edges and Spurious Emission Measurement	.59
	3.9	Antenna Requirements	.64
4	List c	of Measuring Equipment	.65
5	Unce	rtainty of Evaluation	.67
Арр	pendix	A. Conducted Test Results	
Арр	pendix	B. Conducted Spurious Emission	
		C. Conducted Spurious Emission Plots	
		D. Radiated Spurious Emission	
		E. Radiated Spurious Emission Plots	
Арр	pendix	x F. Duty Cycle Plots	

Appendix G. Setup Photographs



# History of this test report

Report No.	Version	Description	Issue Date
FR1N1011A	01	Initial issue of report	Sep. 12, 2022



# 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	7.86 dB under the limit at 57.160 MHz
-	15.207	AC Conducted Emission	Not Required	
3.9	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note: Not required means after assessing, test items are not necessary to carry out.

#### Declaration of Conformity:

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
  - It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- 2. The measurement uncertainty please refer to report "Uncertainty of Evaluation".

#### 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: Avis Chuang

#### **Report Producer: Dewi Huang**



# **1** General Description

# **1.1 Product Feature of Equipment Under Test**

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

				Ar	ntenna Information														
Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (MHz)	Ant. Type	Connector Type	Cable Length (mm)											
				3.53 3.06	2.4~2.4835 GHz 5.15~5.25 GHz														
A	Chain0/1	HONG BO	260-250 94	3.07	5.25~5.35 GHz	PIFA	i-pex (MHF 4L)	300mm											
		00	54	4.81	5.47~5.725 GHz 5.725~5.850 GHz		(101111												
				5.09	5.850~5.895 GHz														
		hain0/1 BO	HONG	HONG	HONG	HONG	HONG	HONG	HONG	HONG	HONG	HONG	HONG	260-250	5.14	5.925~6.425 GHz	-	i-pex	
В	Chain0/1		O 83	5.09 5.16	6.425~6.525 GHz 6.525~6.875 GHz	PIFA	(MHF 4L)	300mm											
				5.12	6.875~7.125 GHz														
				3.22 3.35	2.4~2.4835 GHz 5.15~5.25 GHz														
				3.42	5.25~5.35 GHz														
				4.77	5.47~5.725 GHz														
С	Chain0/1	HONG BO	260-250 84	4.72	5.725~5.850 GHz 5.850~5.895 GHz	Monopole	i-pex (MHF 4L)	200mm											
				4.75	5.925~6.425 GHz	-													
				4.29 4.81	6.425~6.525 GHz 6.525~6.875 GHz														
				4.74	6.875~7.125 GHz														

#### Remark: .

- 1. Ant. 5 means Chain 0 and Ant. 4 means Chain 1.
- 2. The maximum gain was chosen for test.
- 3. The EUT's information above 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. 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, 03CH15-HY

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

FCC designation No.: 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.
- 3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 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

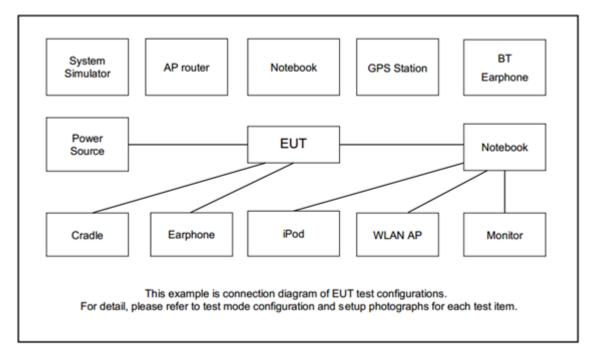
a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following summary table is showing all test modes to demonstrate in compliance with the standard.

	Summary table of Test Cases										
Test Item	Data Rate / Modulation										
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi$ /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 EDR 3Mbps 8-DPSK										
Radiated	Mode 1: CH00_2402 MHz										
Test Cases	Mode 2: CH39_2441 MHz										
		Mode 3: CH78_2480 MHz									



# 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.	Notebook	Dell	Latitude 3400	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Power Supply	GW Instek	GPE-2323	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Base Station	R&S	СВТ	N/A	N/A	Unshielded, 1.8 m
4.	Fixture	Qualcomm	20-33568-H1	N/A	N/A	N/A



# 2.5 EUT Operation Test Setup

The RF test items, utility "QRCT Ver.4.0.00175.0" 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



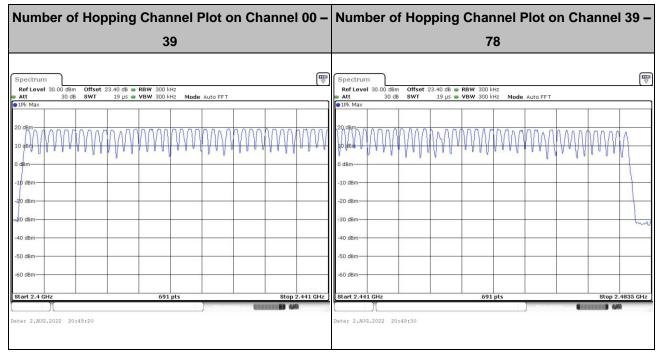
Spectrum Analyzer

EUT

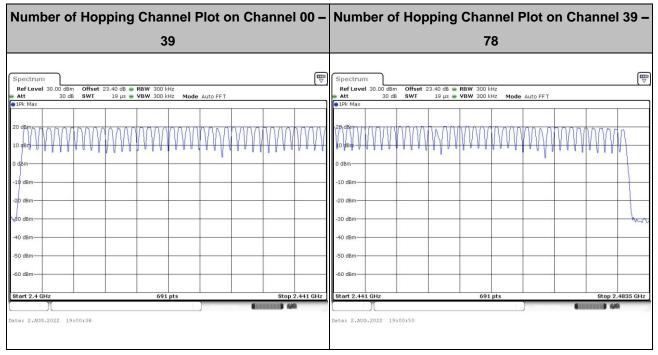


#### 3.1.5 Test Result of Number of Hopping Frequency

#### <for Ant.4>



#### <for Ant.5>



### **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



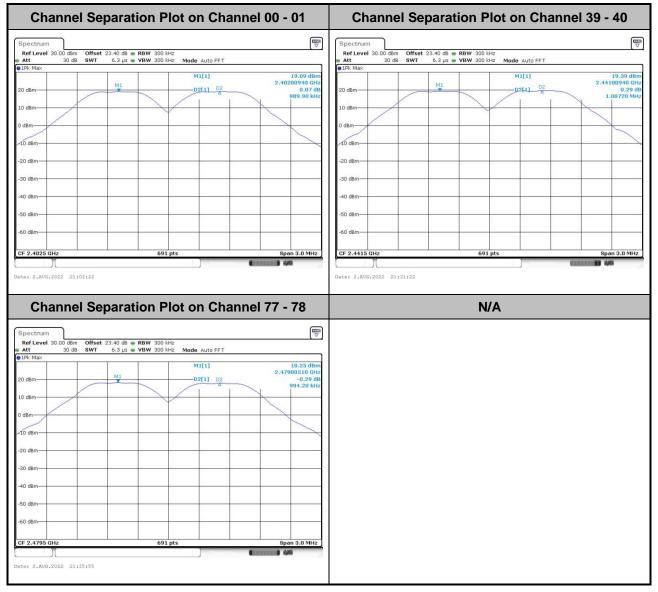
Spectrum Analyzer

### 3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.

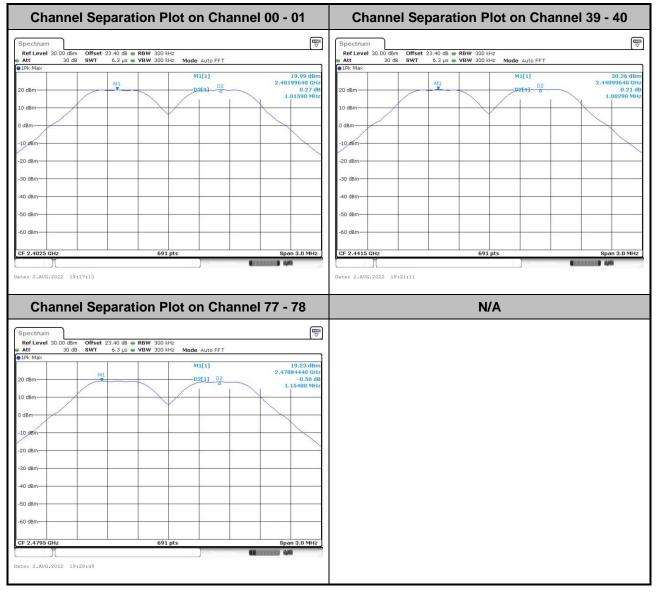


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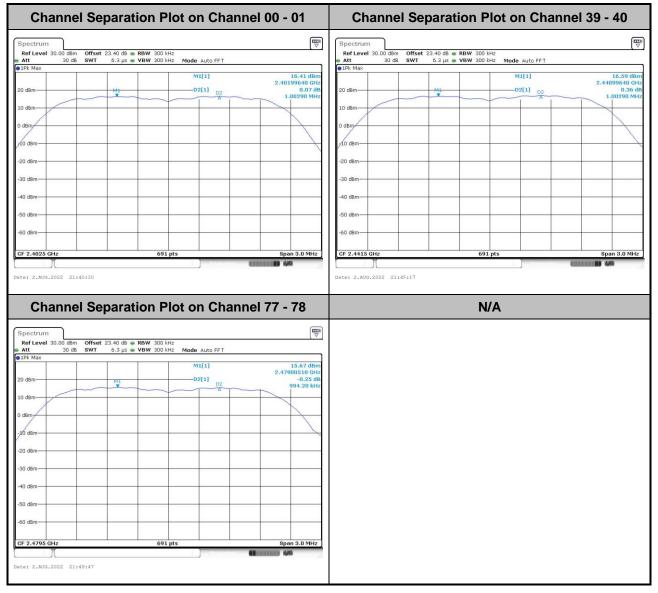


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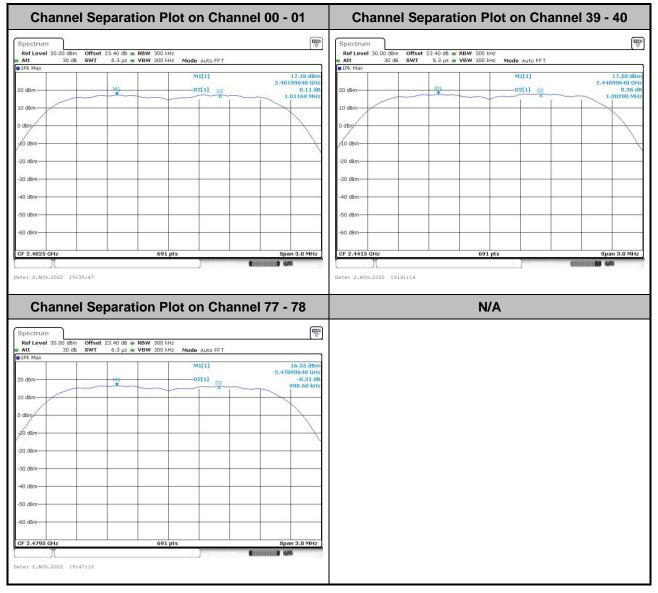


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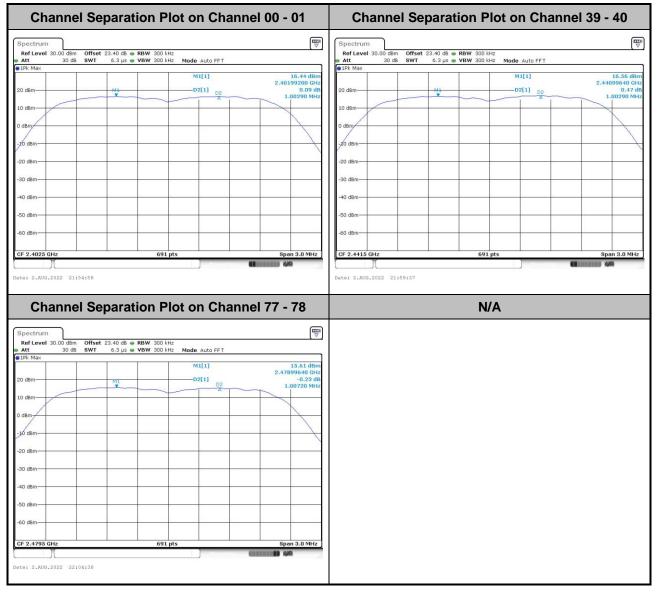


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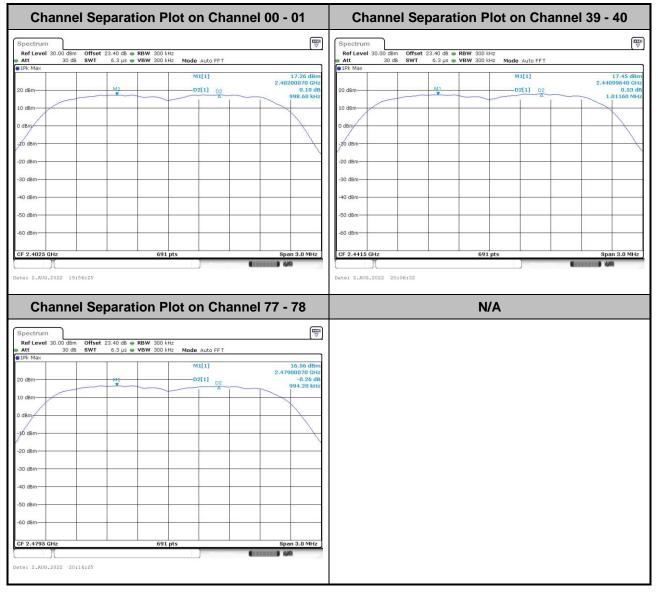


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### 3.3 Dwell Time Measurement

#### 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.

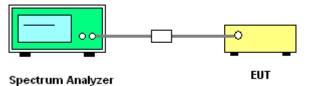
#### 3.3.2 Measuring Instruments

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.
- Enable the EUT hopping function. 4.
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping 5. channel; RBW = 1 MHz; VBW  $\geq$  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.

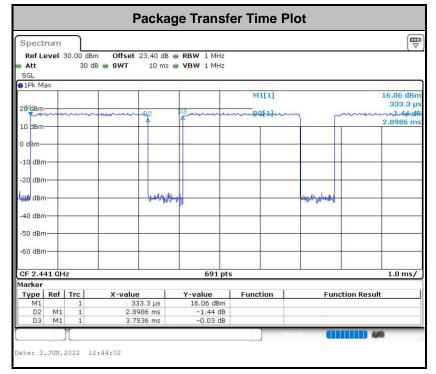
#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Dwell Time

Please refer to Appendix A.





#### 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  $(0.4 \times 79)$  (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  $(0.4 \times 20)$  (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



Spect										T T
Ref Le	evel 3	30.00 dB	m Offset 23 IB <b>e SWT</b>		RBW 1 MH					
SGL		30 0	5 - 3WI	10 1115	V D W I MF	12				
●1Pk Ma	эх					a 11				
						N	11[1]			16.90 dB
20 dBm			M1			D	3			2.1594 m
contraction of	where	m	Lothermonia	unico	mannen	2 7	2hr	manneration	wanny	-1.57 d
10 dBm-		-	++				1	-		×.0900 II
- 112										
0 dBm-										
-10 dBm	-				_					
-20 dBm	-							-		
-30 dBm		ud the dy				Minhouse				Hutand
		a i wa J				a and 0. (b. 1996).				and Anna
-40 dBm							-		-	
-50 dBm										
-60 dBm	-									
00 001	2									
CF 2.4	1 GH	z	1		691	pts			1	1.0 ms/
Marker										
Туре	Ref	Trc	X-value	1	Y-value		ction	Fun	ction Resul	t
M1		1	2.159		16.90 dB					
D2 D3	M1 M1	1	2.898		-1.57 c					
D3	M1	1	3,753	o ms	-0.03 0	B				
										6

#### Remark:

- 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 x 79) (s), Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 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 x 20) (s), Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
- 3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

TEL : 886-3-327-0868	Page Number	: 22 of 67
FAX : 886-3-327-0855	Issue Date	: Sep. 12, 2022
Report Template No.: BU5-FR15CBT Version 2.4	Report Version	: 01



### 3.4 20dB and 99% Bandwidth Measurement

#### 3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

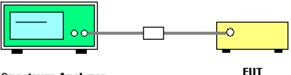
#### 3.4.2 Measuring Instruments

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



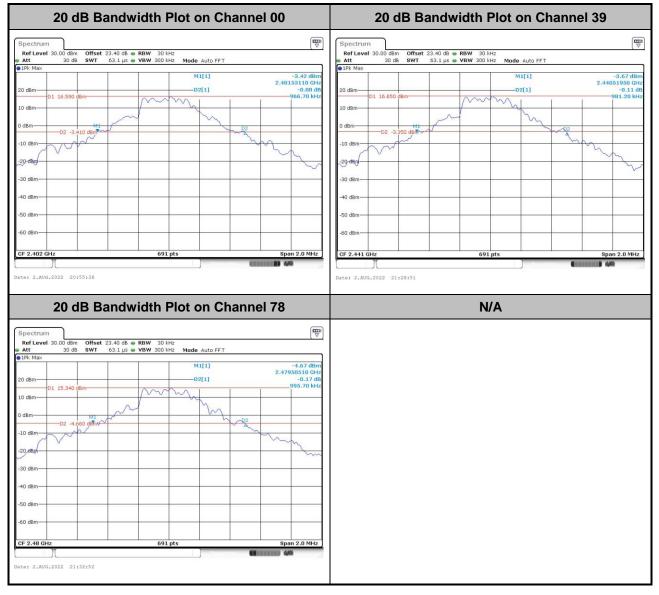
Spectrum Analyzer

#### 3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.

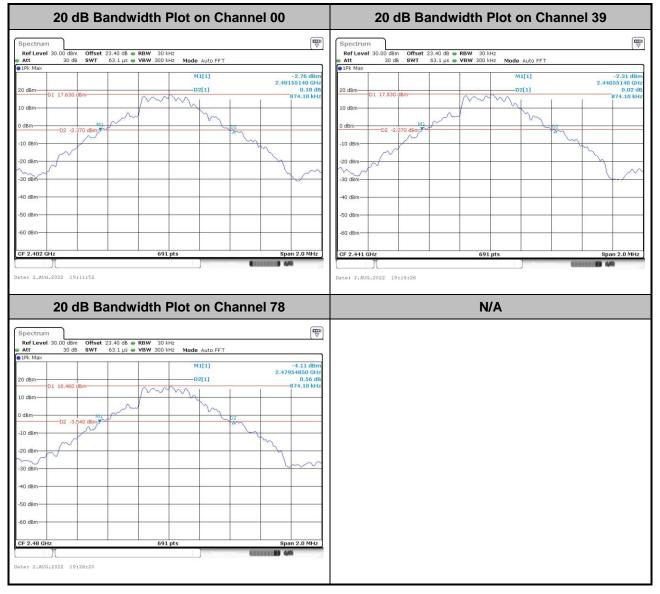


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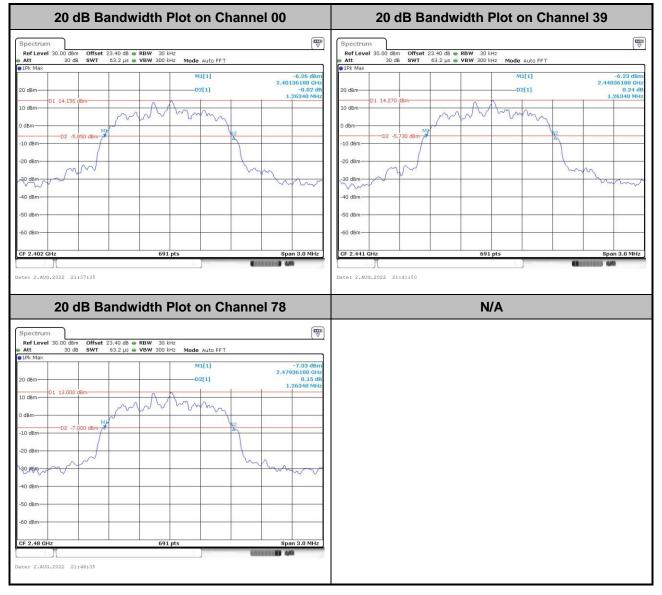


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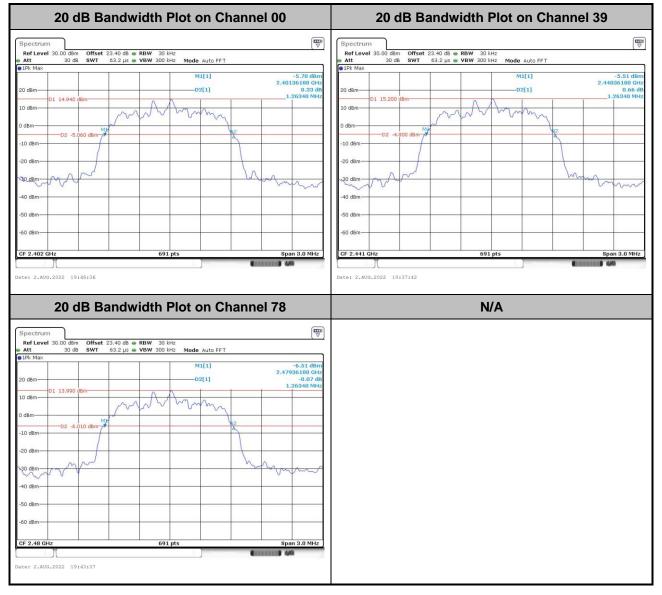


#### <2Mbps>



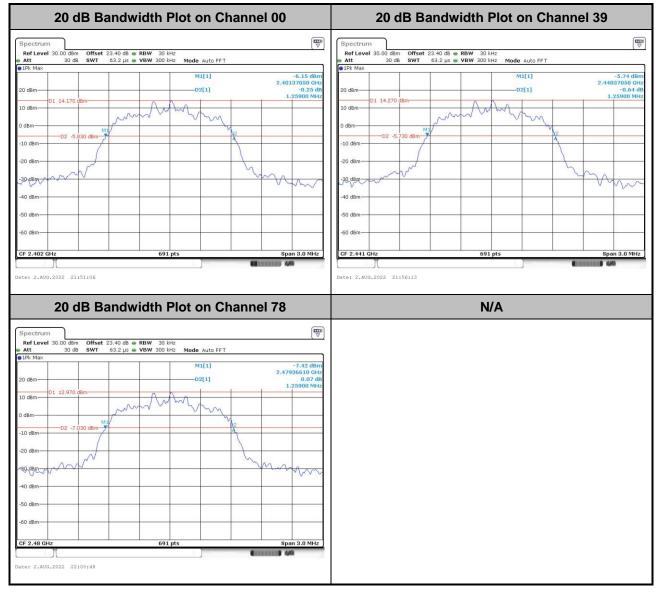


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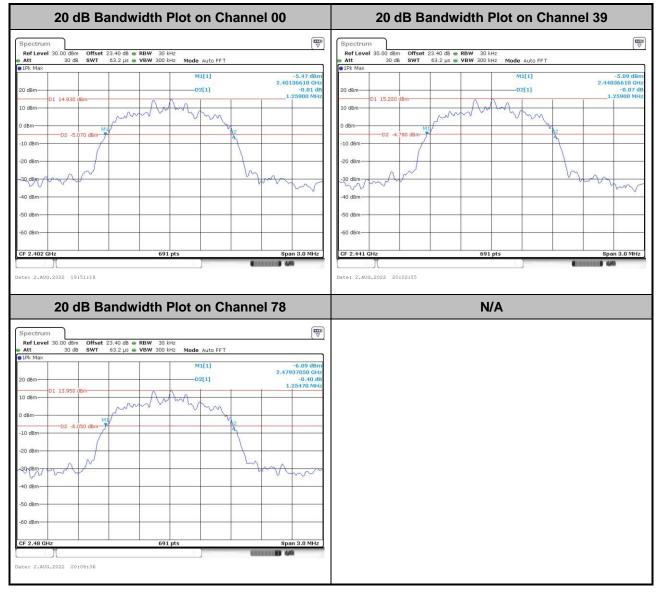


#### <3Mbps>





#### <3Mbps>



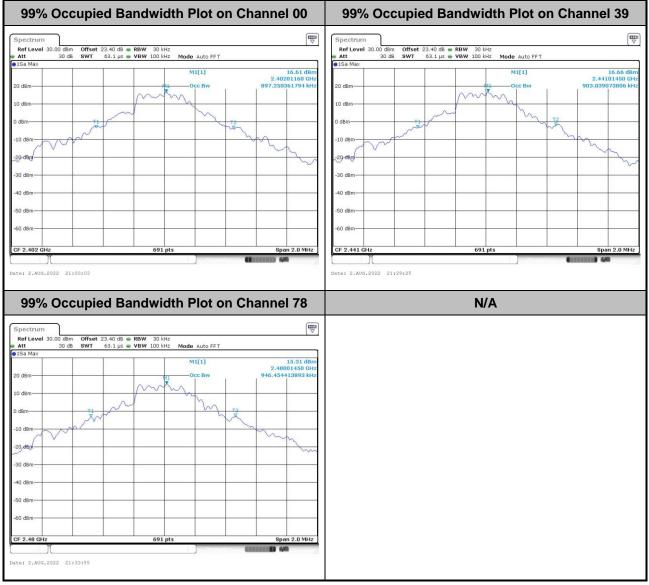


#### 3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

#### <for Ant.4>

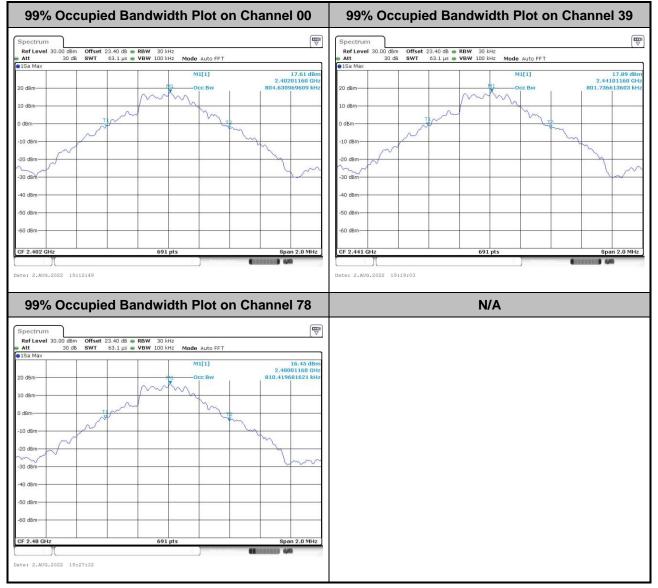
#### <1Mbps>



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

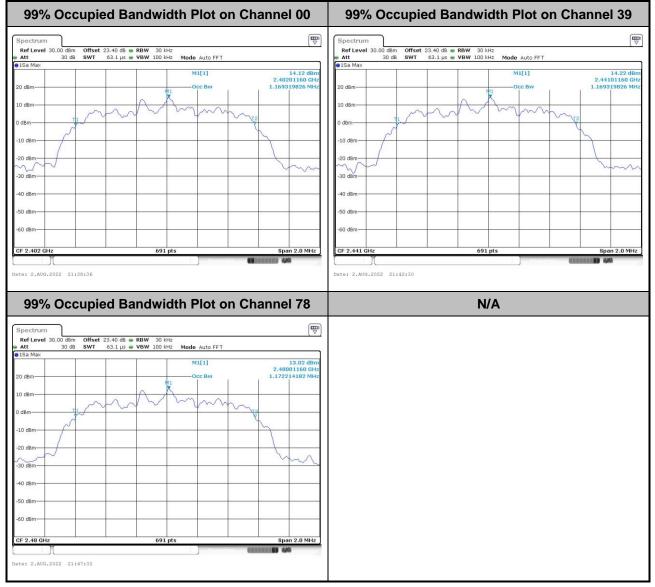


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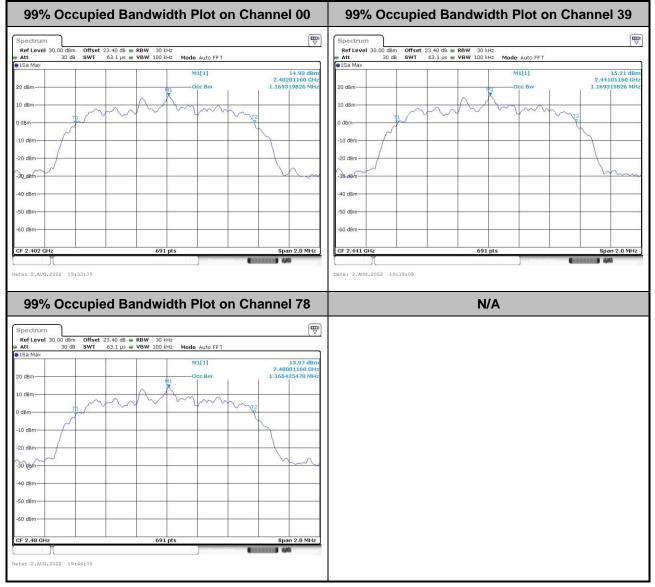


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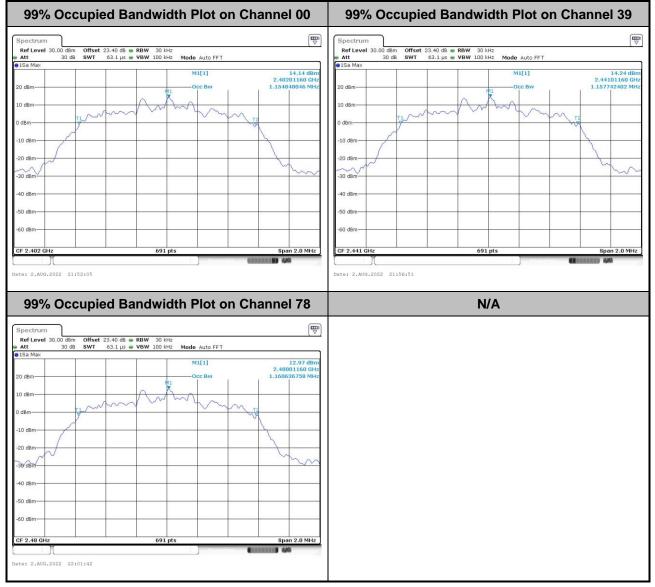


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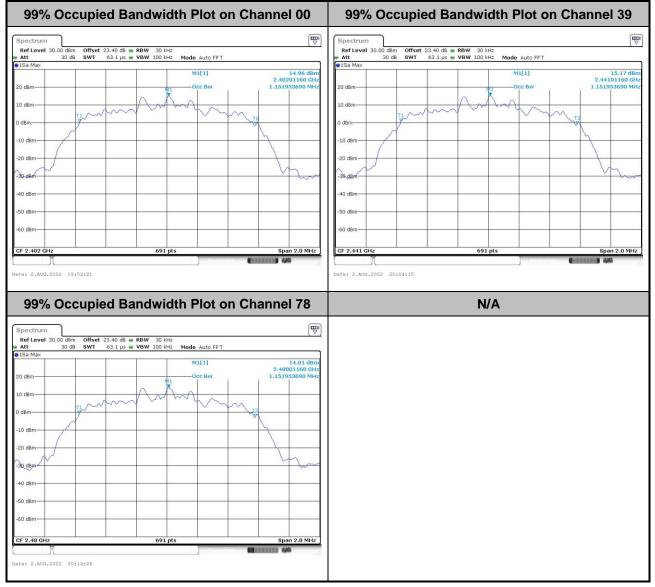


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### 3.5 Output Power Measurement

#### 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.

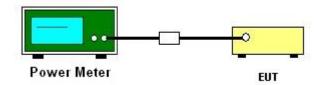
#### **3.5.2 Measuring Instruments**

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.

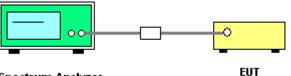
## 3.6.2 Measuring Instruments

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



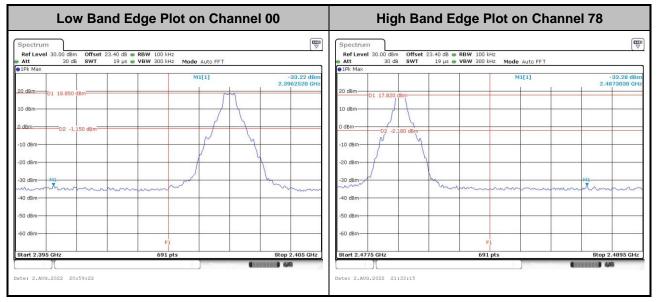
Spectrum Analyzer

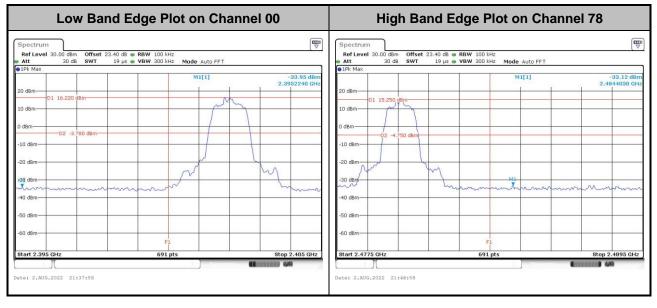


# 3.6.5 Test Result of Conducted Band Edges

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### <1Mbps>





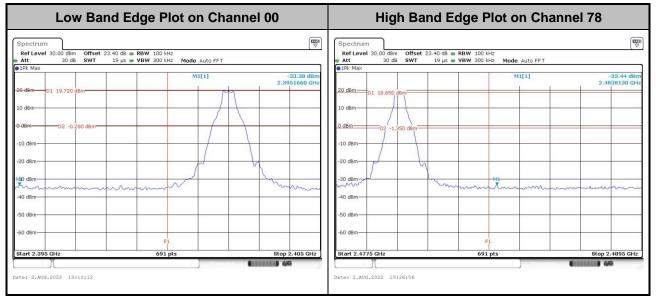


Low Band Ed	High	High Band Edge Plot on Channel 78				
Spectrum Ref Level 30.00 dBm Offset 23.40 dB ● R Att 30 dB SWT 19 µs ● V ● 1Pk Max	Spectrum Ref Level 30.00 dBm C Att 30 dB S	Dffset 23.40 dB ● RBW 100 kHz WT 19 µs ● VBW 300 kHz n	Mode Auto FFT	-33,59 dBm		
20 dBm 01 16.260 dBm 01 0 dBm 01 0 dBm 01 0 dBm 002 -3.740 dBm 01 0 dBm 02 -3.740 dBm 01 0 dB		-33.12 dBm 2.3953400 GHz	20 dBm 01 15.210 dBm 10 dBm 02 -4.790 -10 dBm			
-60 dBm	F1 691 pts	Stop 2.405 GHz	-60 dBm	691 pts		Stop 2.4895 GHz



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Low Band	Edge Plot on Chann	el 00	High Band Edge Plot on Channel 78			
	dB ● RBW 100 kHz µs ● VBW 300 kHz Mode Auto FFT		Spectrum           RefLevel 30.00 dBm         Offset 23.40 dB <ul> <li>RBW 100 kHz</li> <li>Att 30 dB SWT</li> <li>19 µs              </li> <li>VBW 300 kHz</li> <li>Mode Auto FFT</li> </ul>			
20 dBm 01 17.000 dBm 10 dBm 02 -3.000 dBm -10 dBm		-33.32 dBm 2.3956580 GHz	20 dBm         01 16.120 dBm         2.488970 d           10 dBm         0         0         0           -0 dBm         02 -3.880 dBm         0         0           -10 dBm         -02 -3.880 dBm         0         0           -20 dBm         -0         -0         0			
-50 dBm -60 dBm Start 2.395 GHz Date: 2.AUG.2022 19:32:41	F1 691 pts	Stop 2.405 GHz )	-50 dBm F1 -60 dBm F1 Start 2.4775 GHz 691 pts Stop 2.4895 G Date: 2.405.2022 19:43:59			



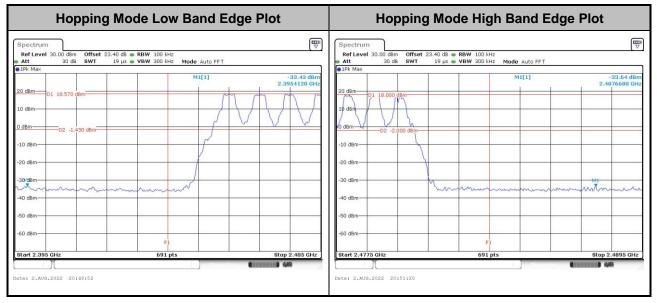
Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78			
Spectrum         Image: Constraint of the second secon	Spectrum         Image: Constraint of the sector of t			
20 dBm         01 17.000 dBm         2.9956870 GHz           10 dBm         0         0         0           0 dBm         02 -3.000 dBm         0         0           -10 dBm         0         0         0         0           -20 dBm         0         0         0         0           -20 dBm         0         0         0         0	20 dsm         M1[1]         -33.06 dsm           20 dsm         2.4863650 GHz         2.4863650 GHz           10 dsm         0 dsm         0         0           -0 dsm         -02 -3.830 dsm         -0         -0           -10 dsm         -02 -3.830 dsm         -0         -0			
-30 d8m -40 d8m -50 d8m -50 d8m -50 d8m -50 d8m -50 d8m -51 Stort 2.395 GHz -50 g2.405 GHz	-30 dBm -40 dBm -50 dBm -60 dBm -51 Stort 2.4775 GHz -51 Stor 2.4775 GHz -51 -51 -51 -51 -51 -51 -51 -51			
Date: 2,AUG.2022 19:51:37	Date: 2,AUG.2022 20:11:52			



# 3.6.6 Test Result of Conducted Hopping Mode Band Edges

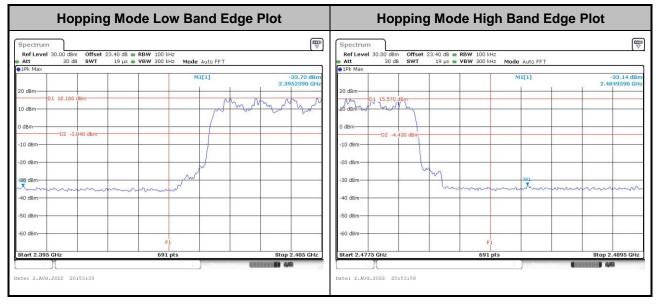
### <for Ant.4>

### <1Mbps>



Hopping N	Node Low Band Edge Plot	Hopping Mode High Band Edge Plot				
	D d8 ⊕ RBW 100 iHz µs ⊕ VBW 300 iHz Mode Auto FFT N1[1] -33.43 dBm	Spectrum         T           Ref Level 30.00 dBm         Offset 23.40 dB         RBW 100 kHz           Att         30 dB         SWT         19 µs         VBW 300 kHz         Mode Auto FFT           •1Pk Max				
20 dBm 01 16.150 dBm 0 10 dBm 02 -3.850 dBm - -10 dBm - -20 dBm - -20 dBm - -40 dBm - -50 dBm -		MI[1]        33.30 dBm           20 dBm         2.4802060 GHz           10 dBm				
-60 d8m	F1 691 pts Stop 2.405 GHz	-60 dBm         F1           Start 2.4775 GHz         691 pts           Stort 2.4705 GHz         691 pts           Date: 2.AUG.2022 20:52:51         400				



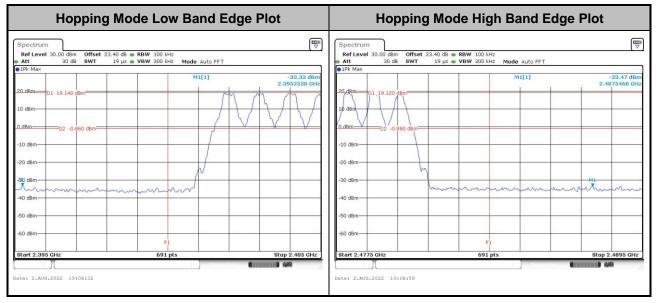




# 3.6.7 Test Result of Conducted Hopping Mode Band Edges

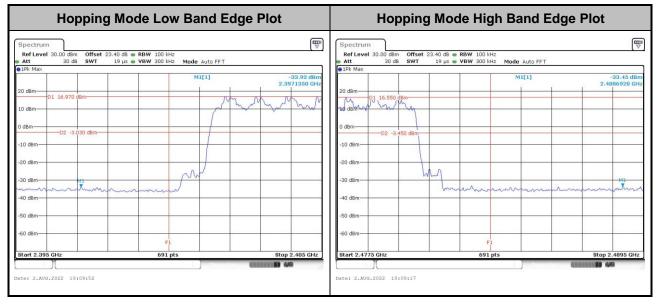
### <for Ant.5>

### <1Mbps>



Hopping Mod	e Low Band Edge	e Plot	Hopping Mode High Band Edge Plot				
Spectrum           Ref Level 30.00 dBm         Offset 23.40 dB = F           10 dBm         30 dB SWT         19 µs = V           10 dBm         01 16.980 dBm         10 dBm           10 dBm         02 -3.020 dBm         -02 -3.020 dBm           -20 dBm         -02 -3.020 dBm         -030 dBm	<u> </u>	-33.43 dBm 2.3953690 GHz	Spectrum         Image: Constraint of the second secon				
-50 dBm			-50 dBm				
60 dBm	F1 691 pts	Stop 2.405 GHz	-60 dBm         F1           Start 2.4775 GHz         691 pts           Stort 2.4775 GHz         691 pts           Date: 2.AUG.2022 19:08:33         19:08:33				





# 3.7 Conducted Spurious Emission Measurement

## 3.7.1 Limit of Spurious Emission Measurement

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.

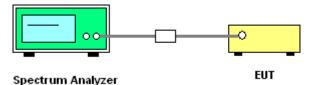
## 3.7.2 Measuring Instruments

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

## 3.7.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.8.
- 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.
- Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurious must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

# 3.7.4 Test Setup





# 3.7.5 Test Result of Conducted Spurious Emission

### <for Ant.4>

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ectrum			Spectrum			ſ
ef Level 30.00 dBm Offset 23.40 dB t 30 dB SWT 29.7 ms	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee		Ref Level 30.00 dBm Offset 23 Att 30 dB SWT 2	1.40 dB 🖷 RBW 100 kHz 230 ms 🖷 VBW 300 kHz - Mode Au		
k View			Pk View			0.000
	M1[1]	18.78 dBm 2.40040 GHz		M1[1	]	17.60 d 2.4160 (
Bm D1 18.780 dBm	M2[1]	-31.34 dBm 2.63680 GHz	20 dBm 01 17.600 dBm	-M2[1	1	-21.68 d
Bm			1D dBm			
D2 -1.220 dBm			0 dBm			
18m			-10 dBm-			
Bm			-20 dBm	inhi	T I I I I I I I I I I I I I I I I I I I	
Bm		M2	-30 dBm	May work of the second and the	man man man man	conversion the
allow neghus send and the bur record water makers	4man tengen patrick and a presidence	way many parties why prove denores	want to			
l8m			-40 dBm-			
Bm			-50 dBm			
Bm			-60 dBm			
: 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHz	691 pts		Stop 25.0 G
	091 pts	atop 3.5 the	atart 2.0 GHZ	091 pts	Constant of Consta	atop 20.0 G
CSE Plot on CH	39 between 30			CH 39 between	2 GHz ~ 25	-
CSE Plot on CH	RBW 100 kHz		CSE Plot on	1.40 dB 👄 <b>RBW</b> 100 kHz		-
CSE Plot on CH			CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 Att 30 db SWT			GHz
CSE Plot on CH	RBW 100 kHz	p 18.86 dbm	CSE Plot on	1.40 dB 👄 <b>RBW</b> 100 kHz	to Sweep	19.06 d
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 Att 30 db SWT	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au	to Sweep	19.06 c 2.4490 -21.56 c
CSE Plot on CH	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	₽ 18.86 dBm 2.43910 GHz	CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 Att 30 dB SWT 1 19.060 dBm	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au M1[1	to Sweep	19.06 d 2.4490 0 -21.56 d
CSE Plot on CH ctrum Level 30.00 dBm Offset 23.40 dB 30 dB SWT 29.7 ms View 01 18.860 dBm	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 att 30 dB swr 2 blv: View ML	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au M1[1	to Sweep	19.06 c 2.4490 -21.56 c
CSE Plot on CH	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 Att 30 dB SWT 1 19.060 dBm	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au M1[1	to Sweep	19.06 c 2.4490 -21.56 c
CSE Plot on CH	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	CSE Plot on Spectrum Ref Level 30.00 dBm Offset 23 Att 30 dB SWT 2 DFL View Mi dBm 01 19.060 dBm 10 dBm	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au M1[1	to Sweep	19.06 ( 2.4490 -21.56 (
CSE Plot on CH	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30 dB         SWT           Street         30 dB         SWT           Street         10 dBm         110 dBm           10 dBm         02 -0.940 dBm         -10 dBm	1.40 dB ● RBW 100 kHz 230 ms ● VBW 300 kHz Mode Au M1[1	to Sweep	19.06 c 2.4490 -21.56 c
CSE Plot on CH	RBW         100 kHz           VBW         300 kHz         Mode         Auto Sweet           M1[1]         M1[1]         M1[1]         M1[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30 dB           SWT         2           It         30 dB           MI         01 19.060 dBm           10 dBm         02           0.040 dBm	1.40 dB • RBW 100 14tz 230 ms • VBW 300 14tz Mode Au M1[1 	to Sweep	19.06 c 2.4490 21.56 15.8970
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	Spectrum           Ref Level 30.00 dBm         Offset 23           9 JPK View         30 dB           MdBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -20 dBm         -20 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 c 2.4490 21.56 15.8970
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	p 18.86 dBm 2.43910 GHz ▼ -32.48 dBm	CSE Plot on           Spectrum           Ref Level 30.00 dBm           Att           30 dB           SWT           10 dBm           10 dBm           -02           -0.940 dBm           -30 dB	1.40 dB • RBW 100 14tz 230 ms • VBW 300 14tz Mode Au M1[1 	to Sweep	19.06 d 2.4490 21.56 d 15.8970 d
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	Spectrum           Ref Level 30.00 dBm         Offset 23           9 JPK View         30 dB           MdBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -20 dBm         -20 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 d 2.4490 -21.56 d 15.0970 d
CSE Plot on CH           ctrum           'Level 30.00 dBm           30 dB           SWT           29.7 ms           View           am           01 18.860 dBm           Bm           Bm           Bm           Bm           Bm           Bm           Bm           Bm           Bm	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	CSE Plot on           Spectrum           Ref Level 30.00 dBm           Att           30 dB           SWT           10 dBm           10 dBm           -02           -0.940 dBm           -30 dB	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	GHz
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30.06           SWT         30           DFL View         Minimum Offset 23           DA dBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -10 dBm         -00 dBm           -20 dBm         -30 dBm           -30 dBm         -50 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 c 2.4490 21.56 15.8970
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	CSE Plot on           Ref Level 30.00 dBm         Offset 23           Att         30 dB           9 18: View           MidBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -10 dBm         -20 dBm           -30 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 d 2.4490 21.56 d 15.8970 d
CSE Plot on CH	RBW 100 kHz         Mode Auto Swee           VBW 300 kHz         Mode Auto Swee           M1[1]	р 18.86 dBm 2.49010 GHz -32.48 dBm 2.37640 GHz -32.48 dBm 2.37640 GHz -32.48 dBm -32.48 dBm	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30 dB           SWT         2           It         30 dB           MidBm         01 19.060 dBm           10 dBm         02           -0 dBm         -0           -0 dBm         -0           -60 dBm         -0	1.40 dB = RBW 100 EH2 230 ms = VBW 300 EH2 Mode Au M1[1 M2[1 M2] M2[1 M2]	to Sweep	19.06 d 2.4490 21.56 d 15.8970 d 15.8970 d
c View 01 18.860 dBm	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30.06           SWT         30           DFL View         Minimum Offset 23           DA dBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -10 dBm         -00 dBm           -20 dBm         -30 dBm           -30 dBm         -50 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 2.4490 21.56 15.8970
CSE Plot on CH	RBW 100 kHz     VBW 300 kHz     Mode Auto Swee     M1[1]     M2[1]	P 18.86 dBm 2.49910 GHz -32.48 dBm 2.37540 GHz -32.48 dBm 2.37540 GHz -32.48 dBm -32.48 dBm -34.48 dBm -	Spectrum           Ref Level 30.00 dBm         Offset 23           Att         30.06           SWT         30           DFL View         Minimum Offset 23           DA dBm         01 19.060 dBm           10 dBm         02 -0.940 dBm           -10 dBm         -00 dBm           -20 dBm         -30 dBm           -30 dBm         -50 dBm	1.40 dB = RBW 100 kHz 230 ms = VBW 300 kHz Mode Au M1[1 	to Sweep	19.06 c 2.4490 21.56 15.8970

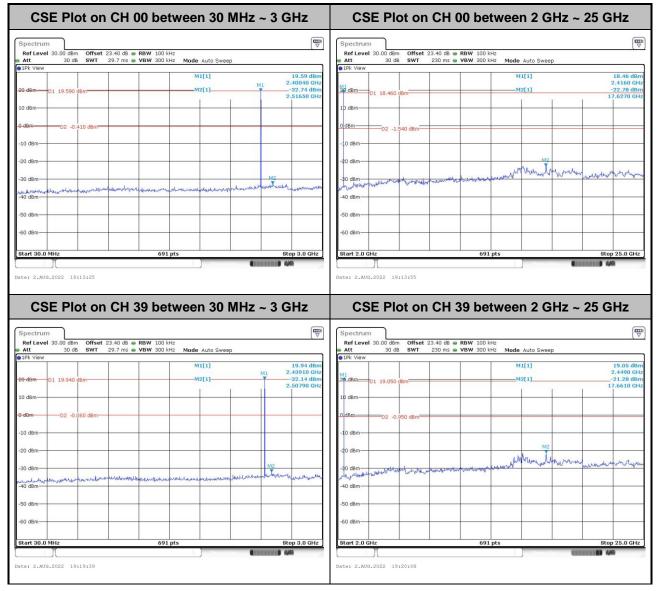


Spectrum			Spectrum			
	1.40 dB		Ref Level 30.00 dBm Offs	at 23.40 dB  RBW 100 kHz 230 ms  VBW 300 kHz	Mode Auto Sweep	
1Pk View			1Pk View	-		
	M1[1]	17.70 dBm 2.47780 GHz M1 -22.47 dBm			M1[1]	17.07 dB 2.4830 Gi
0 dBm 01 17.700 dBm	M2[1]	M1 -32.47 dBm 2.65830 GHz	D1 17.070 dBm		M2[1]	-21.76 dB 15.8630 GF
0 dBm			10 dBm			
) dBm			0 dBm			
10 dBm-			-10 d8m-			
20 dBm			-20 dBm		M2	
30 dBm		M2	-30 dBm	I an a free bould	withouthurs	had some more more
manuscher and a show when the show when the stand and and the stand and	hannels remember when a burder a strand a same and a second	which we have the parameter was		entropy and a contraction of the		
40 dBm			-40 dBm			
50 dBm			-50 dBm			
60 dBm			-60 dBm			
itart 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHz	691 pts		Stop 25.0 GH
M	Measuring	Entering and	, in the second se	012 PG	Margaret Margaret	A49



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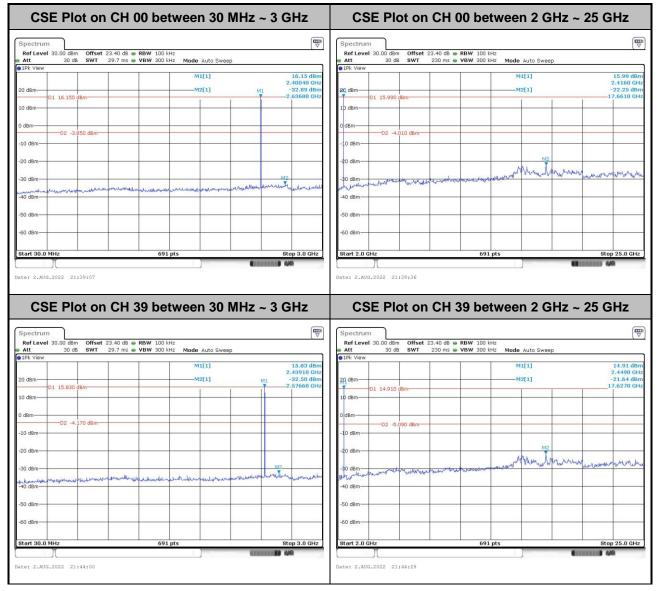




Spectrum			Spectrum			E C
	.40 dB  RBW 100 kHz 9.7 ms  VBW 300 kHz Mode Auto Sweep	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	Ref Level 30.00 dBm Off Att 30 dB SW	set 23.40 dB 👄 RBW 100 T 230 ms 👄 VBW 300	) kHz ) kHz Mode Auto Sweep	
1Pk View	MAT # 2	10 10 10-1	e 1Pk View		******	17 00 40
	M1[1]	18.42 dBm 2.48210 GHz	0.001		M1[1]	17.83 dB 2.4830 GF
0 dBm 01 18.420 dBm	-M2[1]	-32.75 dBm 2.52510 GHz	20 dBm 01 17.830 dBm		-M2[1]	-22.02 dB 17.6610 GF
LO dBm		2.02010 GHz	10 dBm			17.0010 Gr
to usin			10 dbm			
0 dBm D2 -1.580 dBm			0 dBm			
10 dBm-			-10 dBm-			
20 dBm			-20 dBm-		M2	
					when the	Jour moundary
30 dBm		M2	-30 dBm	our manuter manuser	retunner war w	a manufacture and
metrocompanytheather whether the	Hermother algerer second s	nautonautonauton	and the second se			
40 dBm			-40 dBm			
50 dBm-			-50 dBm-			
60 dBm			-60 dBm			
itart 30.0 MHz	601 sta		Start 2.0 GHz			01 05 0 011
start 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHZ	6	91 pts	Stop 25.0 GH



### <for Ant.4>





Spectrum			Spectrum			
	0 dB 🖷 RBW 100 kHz 1 ms 🖷 VBW 300 kHz - Mode Auto Sweep		Ref Level 30.00 dBm Offset	23.40 dB   RBW 100 kHz 230 ms   VBW 300 kHz	ode Auto Sweep	
1Pk View			• 1Pk View			
10 dBm	M1[1] M2[1]	15.16 dBm 2.47780 GHz -32.64 dBm 2.51220 GHz	20 dBm-		M1[1] —M2[1]	14.37 dB 2.4830 GI -22.30 dB 17.6270 GI
D1 15.160 dBm		2.51220 GHZ	D1 14.370 dBm			17.8270 GF
0 dBm			0 dBm			
10 dBm			-10 dBm		M2	
30 dBm		harance and the second and a second	-30 dBm	Munuphan Burnand and Barner	monutering	hanner
O dBm	hours of a strange with the second strange with the second s	dament of	-40 dBm			
50 dBm			-50 d8m			
50 dBm			-60 dBm			
itart 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHz	691 pts		Stop 25.0 GH
The second secon	Me adopting	E	T T			444