



FCC RADIO TEST REPORT

FCC ID	: UZ7MC3401
Equipment	: Mobile Computer
Brand Name	: ZEBRA
Model Name	: MC3401
Applicant	: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742
Manufacturer	: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742
Standard	: FCC Part 15 Subpart C §15.247

The product was received on Apr. 30, 2024 and testing was performed from May 07, 2024 to Jun. 20, 2024. 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.)



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History of this test report

Report No.	Version	Description	Issue Date
FR443061A	01	Initial issue of report	Jul. 01, 2024



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) 15.247(b)(4)	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	7.04 dB under the limit at 33.24 MHz
3.9	15.207	AC Conducted Emission	Pass	16.13 dB under the limit at 0.30 MHz
3.10	15.203	Antenna Requirement	Pass	-

Conformity Assessment Condition:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

Disclaimer:

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

Reviewed by: Keven Cheng

Report Producer: Ming Chen

General Description 1

1.1 Product Feature of Equipment Under Test

Product Feature					
Equipment Mobile Computer					
Brand Name	ZEBRA				
Model Name	MC3401				
FCC ID	UZ7MC3401				
Sample 1	SKU 13 (Brick+SE5800+38 Keypad)				
Sample 2	SKU 9 (Gun+SE5500+47 Keypad)				
Sample 3	SKU 8 (Brick+SE4770+38 Keypad)				
EUT supports Radios applicationNFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE					
HW Version	EV				
MFD	23MAR24				
EUT Stage	Identical Prototype				

Remark: The EUT's information above is declared by manufacturer.

	SKU List												
Configuration	SKU 5	SKU 6	SKU 7	SKU 8	SKU 9	SKU 10	SKU 11	SKU 12	SKU 13				
WW/WL	WLAN	WLAN	WLAN	WLAN	WLAN	WLAN	WLAN	WLAN	WLAN				
Form Factor	FA	FA	FA	FA	FA	FA	FA	FA	FA				
SKU	Prem	Prem	Prem	Prem	Prem+	Prem+	Prem+	Prem+	Prem+				
Brick / Gun	Gun	Gun	Gun	Brick	Gun	Gun	Gun	Brick	Brick				
DDR size	6GB	6GB	6GB	6GB	6GB	6GB	6GB	6GB	6GB				
UFS size	64GB	64GB	64GB	64GB	128GB	128GB	128GB	128GB	128GB				
Scan engine	SE4770	SE5500	SE5800	SE4770	SE5500	SE5800	SE5800	SE5800	SE5800				
FF Camera	Nana	Nege	Nana	Neze	5MP (PN)	5MP (PN)	5MP (PN)	5MP (PN)	5MP (PN)				
RF Camera	None	None	None	NOTE	NUTLE	None	None	None	13MP (PN)				
Keypad	38	38	47	38	47	47	47	38	38				
Battery	7000mAh	7000mAh	7000mAh	7000mAh	7000mAh	7000mAh + BLE	7000mAh	7000mAh	7000mAh				
Region (ROW or NA)	RW	RW	NA	RW	RW	NA	RW	NA	RW				

: 01



	Specification	on of Acc	essories	
Adapter USB Wall Charger	Brand Name	Zebra	Model Number	PWR-WUA5V12W0US
Battery 1 Standard Battery (7000mAh)	Brand Name	Zebra	Model Number Manufacturer	BT-000375 TWS
Battery 2 Standard Battery (7000mAh)	Brand Name	Zebra	Model Number Manufacturer	BT-000375 Inventus
Battery 3 BLE Battery (7000mAh)	Brand Name	Zebra	Model Number	
Type C USB Cable	Brand Name	Zebra	Model Number	CBL-TC5X-USBC2A-01
USB Cable Cup	Brand Name	Zebra	Model Number	CBL-MC33-USBCHG-01
Soft Holster for Gun Type	Brand Name	Zebra	Model Number	SG-MC3021212-01R
Soft Holster for Brick Type	Brand Name	Zebra	Model Number	SG-MC3X-SHLSTB-01
USB-C PTT Headset	Brand Name	Zebra	Model Number	HDST-USBC-PTT1-01
USB-C to 3.5mm adapter	Brand Name	Zebra	Model Number	ADP-USBC-35MM1-01
3.5mm To Quick Disconnect (QD) Adapter Cable	Brand Name	Zebra	Model Number	ADP-35M-QDCBL1-01
3.5mm PTT Headset	Brand Name	Zebra	Model Number	HDST-35MM-PTT1-01
3.5mm PTT HS2100 Headset	Brand Name	Zebra	Model Number	HS2100
Quick Disconnect (QD) Cable	Brand Name	Zebra	Model Number	CBL-HS2100-QDC1-01



1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard				
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz			
Maximum Output Power to Antenna	<ant. 6=""> Bluetooth BR (1Mbps): 7.74 dBm (0.0059 W) Bluetooth EDR (2Mbps): 7.59 dBm (0.0057 W) Bluetooth EDR (3Mbps): 7.73 dBm (0.0059 W) <ant. 7=""> Bluetooth BR (1Mbps): 6.44 dBm (0.0044 W) Bluetooth EDR (2Mbps): 6.18 dBm (0.0041 W) Bluetooth EDR (3Mbps): 6.29 dBm (0.0043 W)</ant.></ant.>			
99% Occupied Bandwidth	Ant. 6> Bluetooth BR (1Mbps): 0.795 MHz Bluetooth EDR (2Mbps): 1.171 MHz Bluetooth EDR (3Mbps): 1.155 MHz Ant. 7> Bluetooth BR (1Mbps): 0.799 MHz Bluetooth EDR (2Mbps): 1.171 MHz Bluetooth EDR (3Mbps): 1.155 MHz			
Antenna Type / Gain	Ant. 6>: PIFA with gain 2.00 dBi Ant. 7>: PIFA with gain 1.69 dBi			
Type of Modulation	Bluetooth BR (1Mbps): GFSK Bluetooth EDR (2Mbps): π/4-DQPSK Bluetooth EDR (3Mbps): 8-DPSK			

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

1.3 Modification of EUT

No modifications made to the EUT during the testing.



1.4 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			
Toot Site No	Sporton Site No.			
Test Site No.	TH05-HY, CO07-HY, 03CH22-HY			

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

FCC designation No.: TW3786

1.5 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 15.247 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: 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 only the 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 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 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					
	E	Bluetooth BR 1Mbps GFS	K					
Radiated Test Cases	<pre><ant. 6=""> Mode 1: Bluetooth Tx CH00_2402 MHz Mode 2: Bluetooth Tx CH39_2441 MHz Mode 3: Bluetooth Tx CH78_2480 MHz <ant. 7=""> Mode 1: Bluetooth Tx CH00_2402 MHz Mode 2: Bluetooth Tx CH39_2441 MHz</ant.></ant.></pre>							

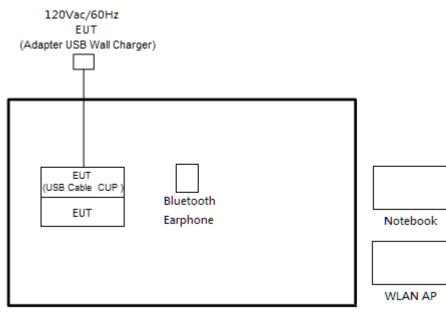


	Summary table of Test Cases
AC Conducted Emission	Mode 1 :WLAN (2.4GHz) Link + Bluetooth Link + MPEG4 + USB Cable Cup
	(Charging from Adapter USB Wall Charger) + Battery 1 Standard
Emission	Battery (7000mAh) for Sample 1

Remark:

- 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 Battery 1 Standard Battery (7000mAh).

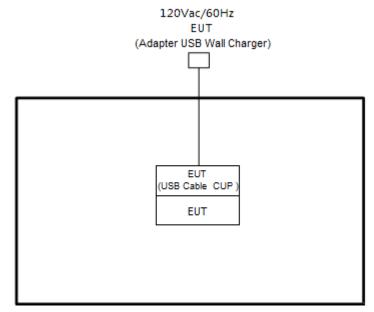
2.3 Connection Diagram of Test System



<AC Conducted Emission Mode>



<Bluetooth Tx Mode>



2.4 Support Unit used in test configuration and system

ltem	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
11.	Bluetooth Earphone	Sony	SBH20	PY7-RD0010	N/A	N/A
2.	WLAN AP	Netgear	RAXE500	PY320300508	N/A	Unshielded, 1.8 m
3.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

The RF test items, utility "QRCT Version 4.0.211.0" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes 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.

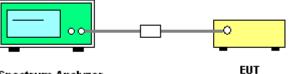
3.1.2 Measuring Instruments

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

3.1.5 Test Result of Number of Hopping Frequency

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.

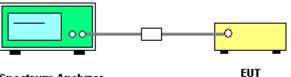
3.2.2 Measuring Instruments

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



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.

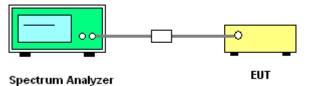
3.3.2 Measuring Instruments

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

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3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

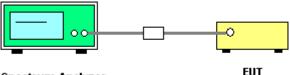
3.4.2 Measuring Instruments

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.

3.4.6 Test Result of 99% Occupied Bandwidth



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. If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi.

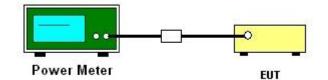
3.5.2 Measuring Instruments

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)



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.

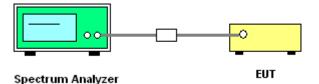
3.6.2 Measuring Instruments

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



3.6.5 Test Result of Conducted Band Edges

Please refer to Appendix A.

3.6.6 Test Result of Conducted Hopping Mode Band Edges

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.

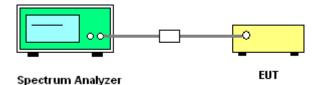
3.7.2 Measuring Instruments

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

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics / spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance		
(MHz)	(microvolts/meter)	(meters)		
0.009 - 0.490	2400/F(kHz)	300		
0.490 – 1.705	24000/F(kHz)	30		
1.705 – 30.0	30	30		
30 - 88	100	3		
88 – 216	150	3		
216 - 960	200	3		
Above 960	500	3		

3.8.2 Measuring Instruments

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



3.8.3 Test Procedures

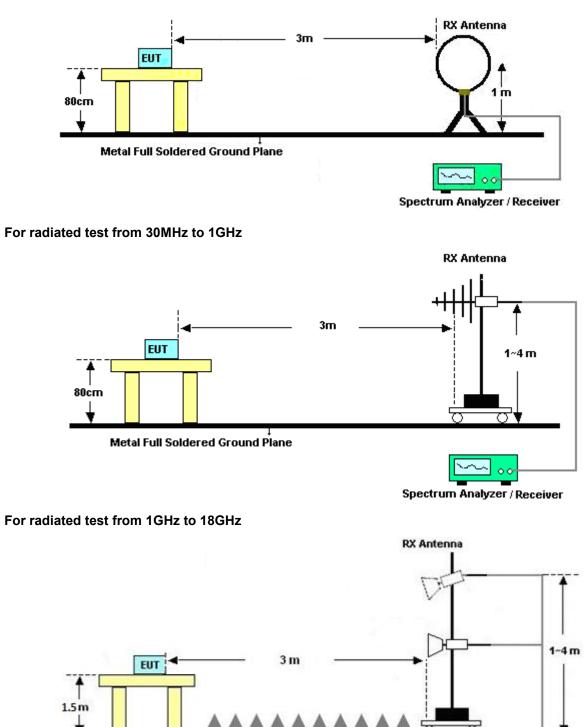
- 1. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
- 2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
- 3. For each suspected emission, the EUT is arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 4. Set the maximum power setting and enable the EUT to transmit continuously.
- 5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW = 100 kHz for f < 1 GHz, RBW = 1 MHz for f>1 GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - $\begin{array}{ll} \text{(3)} & \mbox{For average measurement: use duty cycle correction factor method per 15.35(c).} \\ & \mbox{Duty cycle = On time/100 milliseconds} \\ & \mbox{On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$} \\ & \mbox{Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.} \end{array}$
 - Average Emission Level = Peak Emission Level + 20*log (Duty cycle)
- 6. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 7. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".
- 8. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".

Note: The average levels are calculated from the peak level corrected with duty cycle correction factor (-24.79dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.



3.8.4 Test Setup

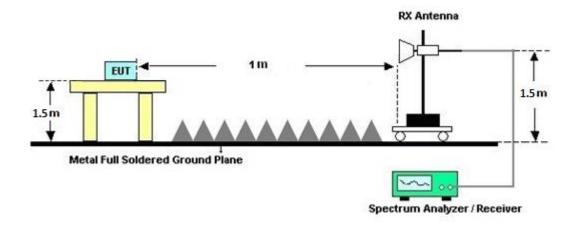
For radiated test below 30MHz



Spectrum Analyzer / Receiver



For radiated test above 18GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result comes out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.



3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBµV)				
Frequency of emission (MHZ)	Quasi-peak	Average			
0.15-0.5	66 to 56*	56 to 46*			
0.5-5	56	46			
5-30	60	50			

*Decreases with the logarithm of the frequency.

3.9.2 Measuring Instruments

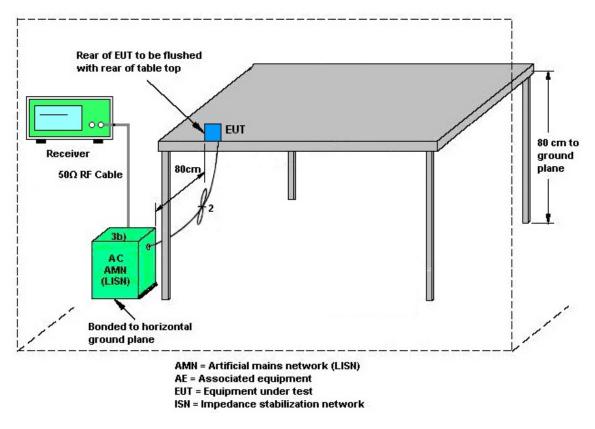
Please refer to the measuring equipment list in this test report.

3.9.3 Test Procedures

- 1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
- 6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
- 7. The frequency range from 150 kHz to 30 MHz is scanned.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission



3.10 Antenna Requirements

3.10.1 Standard Applicable

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 07, 2023	May. 31, 2024~ Jun. 07,2024	Nov. 06, 2024	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1036004	N/A	Jul. 27, 2023	May. 31, 2024~ Jun. 07,2024	Jul. 26, 2024	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Jul. 27, 2023	May. 31, 2024~ Jun. 07,2024	Jul. 26, 2024	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 23, 2023	May. 31, 2024~ Jun. 07,2024	Aug. 22, 2024	Conducted (TH05-HY)
AC Power Source	ACPOWER	AFC-11003G	F317040033	N/A	N/A	May. 20, 2024	N/A	Conduction (CO07-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	May. 20, 2024	N/A	Conduction (CO07-HY)
Pulse Limiter	SCHWARZBE CK	VTSD 9561-F N	9561-F N00373	9kHz-200MHz	Oct. 20, 2023	May 20, 2024	Oct. 19, 2024	Conduction (CO07-HY)
RF Cable	HUBER + SUHNER	RG 214/U	1358175	9kHz~30MHz	Mar. 14, 2024	May 20, 2024	Mar. 13, 2025	Conduction (CO07-HY)
Two-Line V-Network	TESEQ	NNB 51	45051	N/A	Mar. 10, 2024	May 20, 2024	Mar. 09, 2025	Conduction (CO07-HY)
Four-Line V-Network	TESEQ	NNB 52	36122	N/A	Mar. 07, 2024	May 20, 2024	Mar. 06, 2025	Conduction (CO07-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 20, 2023	May 20, 2024	Sep. 19, 2024	Conduction (CO07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9kHz~30MHz	Sep. 12, 2023	May 07, 2024~ Jun. 20, 2024	Sep. 11, 2024	Radiation (03CH22-HY)
Bilog Antenna with 6dB	TESEQ & WOKEN	CBL 6111D & 00802N1D-06	63304 & 002	30MHz~1GHz	Oct. 15, 2023	May 07, 2024~ Jun. 20, 2024	Oct. 14, 2024	Radiation (03CH22-HY)
Amplifier	SONOMA	310N	421581	N/A	Jul. 15, 2023	May 07, 2024~ Jun. 20, 2024	Jul. 14, 2024	Radiation (03CH22-HY)
Double Ridged Guide Horn Antenna	RFSPIN	DRH18-E	LE2C04A18EN	1GHz~18GHz	Jul. 12, 2023	May 07, 2024~ Jun. 20, 2024	Jul. 11, 2024	Radiation (03CH22-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	1224	18GHz-40GHz	Jul. 10, 2023	May 07, 2024~ Jun. 20, 2024	Jul. 09, 2024	Radiation (03CH22-HY)
Amplifier	EMEC	EM01G18GA	060877	N/A	Sep. 28, 2023	May 07, 2024~ Jun. 20, 2024	Sep. 27, 2024	Radiation (03CH22-HY)
Preamplifier	EMEC	EM18G40G	060872	18-40GHz	Sep. 06, 2023	May 07, 2024~ Jun. 20, 2024	Sep. 05, 2024	Radiation (03CH22-HY)
Signal Analyzer	Keysight	N9010B	MY62170278	10Hz~44GHz	Aug. 31, 2023	May 07, 2024~ Jun. 20, 2024	Aug. 30, 2024	Radiation (03CH22-HY)
EMI Test Receiver	Keysight	N9038B	MY62210111	20Hz~8.4GHz	Aug. 23, 2023	May 07, 2024~ Jun. 20, 2024	Aug. 22, 2024	Radiation (03CH22-HY)
Hygrometer	TECPEL	DTM-303A	TP211469	N/A	Jan. 03, 2024	May 07, 2024~ Jun. 20, 2024	Jan. 02, 2025	Radiation (03CH22-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	May 07, 2024~ Jun. 20, 2024	N/A	Radiation (03CH22-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	May 07, 2024~ Jun. 20, 2024	N/A	Radiation (03CH22-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	May 07, 2024~ Jun. 20, 2024	N/A	Radiation (03CH22-HY)
Software	Audix	E3 6.09824_20191 22	RK-002347	N/A	N/A	May 07, 2024~ Jun. 20, 2024	N/A	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9kHz~30MHz	Mar. 06, 2024	May 07, 2024~ Jun. 20, 2024	Mar. 05, 2025	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804390/2,8046 11/2,804615/2	N/A	Oct. 24, 2023	May 07, 2024~ Jun. 20, 2024	Oct. 23, 2024	Radiation (03CH22-HY)



5 Measurement Uncertainty

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	3.44 dB
of 95% (U = 2Uc(y))	3.44 UB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	6.5 dB
of 95% (U = 2Uc(y))	0.5 UB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence	A E dD
of 95% (U = 2Uc(y))	4.5 dB

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence	4.5 dB
of 95% (U = 2Uc(y))	4:5 dB

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	5.4 dB
of 95% (U = 2Uc(y))	5.4 UB

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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Willy Chang	Temperature:	21~25	°C
Test Date:	2024/5/31~2024/6/7	Relative Humidity:	51~54	%

	<u>TEST RESULTS DATA</u> 20dB and 99% Occupied Bandwidth and Hopping Channel Separation								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.850	0.795	0.999	0.5666	Pass
DH	1Mbps	1	39	2441	0.871	0.795	0.999	0.5806	Pass
DH	1Mbps	1	78	2480	0.868	0.795	0.999	0.5784	Pass
2DH	2Mbps	1	0	2402	1.253	1.171	1.003	0.8350	Pass
2DH	2Mbps	1	39	2441	1.255	1.167	1.003	0.8364	Pass
2DH	2Mbps	1	78	2480	1.256	1.169	1.003	0.8370	Pass
3DH	3Mbps	1	0	2402	1.235	1.155	1.003	0.8234	Pass
3DH	3Mbps	1	39	2441	1.239	1.153	1.003	0.8258	Pass
3DH	3Mbps	1	78	2480	1.239	1.153	1.003	0.8262	Pass

				RESULTS well Time		
Mod.	Hopping Channel Number Rate	Hops Over Occupanc y Time (hops)		Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH5	79	106.670	2.90	0.31	0.4	Pass
2DH5 (AFH)	20	53.330	2.90	0.15	0.4	Pass

					T RESUL eak Powe
DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
	0	1	7.60	20.97	Pass
DH1 [39	1	7.71	20.97	Pass
	78	1	7.74	20.97	Pass
	0	1	7.35	20.97	Pass
2DH1	39	1	7.48	20.97	Pass
	78	1	7.59	20.97	Pass
	0	1	7.54	20.97	Pass
3DH1	39	1	7.67	20.97	Pass
	78	1	7.73	20.97	Pass

				Ave	T RESULTS DATA erage Power Table Reporting Only)
DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)	
	0	1	6.37	5.17	
DH1	39	1	6.67	5.17	
	78	1	6.91	5.17	
	0	1	5.20	5.17	
2DH1	39	1	5.25	5.17	
	78	1	5.47	5.17	
	0	1	5.32	5.11	
3DH1	39	1	5.34	5.11	
	78	1	5.43	5.11	

		<u>TEST RE</u> Number of Ho	SULTS DA	
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail	
79	20	> 15	Pass	

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			20dB (and 99	% Оссир		SULTS DATA Ith and Hopping	Channel Separ	ration
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.859	0.795	0.999	0.5728	Pass
DH	1Mbps	1	39	2441	0.869	0.795	0.999	0.5794	Pass
DH	1Mbps	1	78	2480	0.868	0.799	1.003	0.5786	Pass
2DH	2Mbps	1	0	2402	1.256	1.171	1.003	0.8374	Pass
2DH	2Mbps	1	39	2441	1.258	1.169	1.007	0.8386	Pass
2DH	2Mbps	1	78	2480	1.256	1.169	1.003	0.8372	Pass
3DH	3Mbps	1	0	2402	1.242	1.155	1.003	0.8282	Pass
3DH	3Mbps	1	39	2441	1.220	1.153	1.003	0.8136	Pass
3DH	3Mbps	1	78	2480	1.242	1.153	1.003	0.8278	Pass

				RESULTS well Time		
Mod.	Hopping Channel Number Rate	Hops Over Occupanc y Time (hops)		Dwell Time (sec)	Limits (sec)	Pass/Fail
DH5	79	106.670	2.90	0.31	0.4	Pass
DH5 (AFH)	20	53.330	2.90	0.15	0.4	Pass

					<u>T RESUL</u> eak Powe
DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
	0	1	5.92	20.97	Pass
DH1	39	1	6.44	20.97	Pass
i I	78	1	6.17	20.97	Pass
	0	1	5.62	20.97	Pass
2DH1	39	1	6.18	20.97	Pass
	78	1	5.87	20.97	Pass
	0	1	5.63	20.97	Pass
3DH1	39	1	6.29	20.97	Pass
Ĺ	78	1	5.91	20.97	Pass

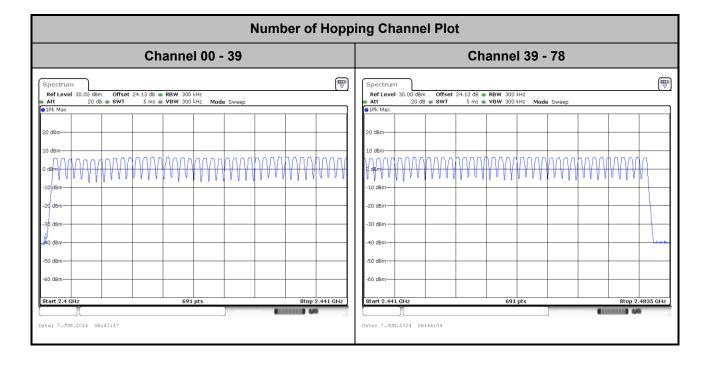
				Ave	<u>ET RESULTS DATA</u> erage Power Table Reporting Only)
DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)	
	0	1	4.69	5.23	
DH1	39	1	5.46	5.23	
	78	1	5.09	5.23	
	0	1	3.48	5.11	
2DH1	39	1	4.08	5.11	
[78	1	3.71	5.11	
	0	1	3.53	5.11	
3DH1	39	1	4.14	5.11	
ľ	78	1	3.73	5.11	

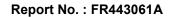
		<u>TEST RE</u> Number of He	SULTS DA
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass



<Ant 6>

Number of Hopping Frequency

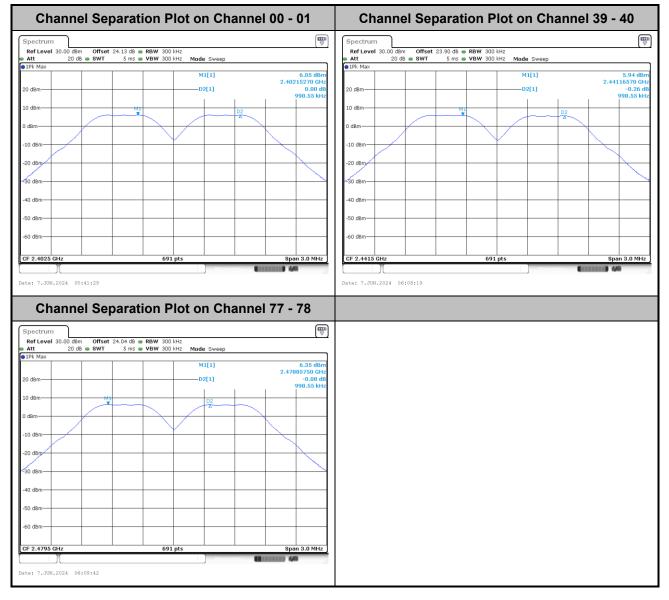






Hopping Channel Separation

<1Mbps>





<2Mbps>

Silainioi Cope	aration Plot o	on Channe	el 00 - 01	Channe	el Separatio	n Plot o	n Chann	iel 39 - 40
Spectrum				Spectrum				Ē
	.13 dB 👄 RBW 300 kHz 5 ms 👄 VBW 300 kHz 🛛 Mo	nde Sween	(*)	Ref Level 30.00 dBr		BW 300 kHz BW 300 kHz Mod	e Sween	
k Max				1Pk Max				
		M1[1]	4.82 dBm 2.40185310 GHz				11[1]	4.50 dB 2.44084880 GF
3m		-D2[1]	0.00 dB 1.00289 MHz	20 dBm		D	2[1]	-0.23 c 1.00289 Mi
mM1				10 dBm	M1			
n		D2 Δ	-	0 dBm	M1 V		D2 2	-
				0 UBII				
Bm				-10 dBm				
im-				-28 dBm				
Bm				-30 dBm				
3m				-40 dBm				
3m				-50 dBm				
511				-So ubin				
im				-60 dBm				
			Span 3.0 MHz					Span 3.0 MH
2.4025 GHz	691 pts		apan a.o MHz	CF 2.4415 GHz		691 pts		apan ato mi
Channel Sepa	aration Plot o	on Channe	el 77 - 78	Date: 7.JUN.2024 00	:19:22		Measurino	
Channel Sepa	aration Plot o	on Channe		Date: 7.JUN.2024 00	:19:22		Mea surina	
Channel Sepa	.04 dB 👄 RBW 300 kHz		el 77 - 78	Date: 7.JUN.2024 00	:19:22		Measurinn	
Channel Sepa				Date: 7.JUN.2024 00	:19:22		Measure an	
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● VBW 300 kHz Mc		5.03 dBm	Date: 7.JUN.2024 06	:19:22		H Parente Pro	
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	ode Sweep	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 00	:19:22		- Nexcircler	
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	ode Sweep M1[1]	5.03 dBm 2.47884880 GHz	Date: 7.JUN.2024 06	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	ode Sweep M1[1]	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 06	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JTM.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JTM.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 04	19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Dato: 7.JUN.2024 04	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 06	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 06	:19:22			
Channel Sepa	.04 dB ● RBW 300 kHz 5 ms ● YBW 300 kHz Mc	Dde Sweep M1[1] -D2[1] D2	5.03 dBm 2.47884880 GHz -0.08 dB	Date: 7.JUN.2024 06	:19:22			



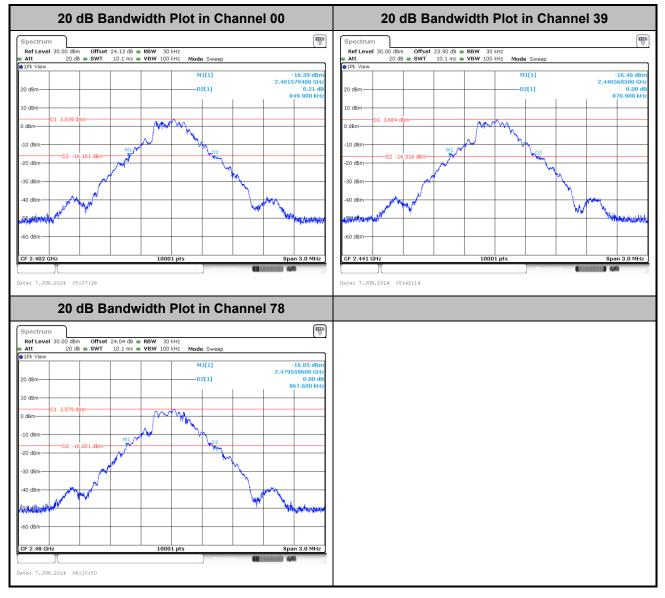
<3Mbps>

Channel Sepa	aration Plot on (Channel 00 - 01	Channe	I Separation F	Plot on Cha	annel 39 - 40
pectrum			Spectrum			
	.13 dB 🖷 RBW 300 kHz 5 ms 🖷 VBW 300 kHz 🛛 Mode Sw		Ref Level 30.00 dBm		D kHz D kHz Mode Sweep	(*
1Pk Max			1Pk Max			
	M1[1]	2.40215270 GHz			M1[1]	4.55 dBn 2.44115270 GH
D dBm	D2[1]	-0.02 dB 1.00289 MHz	20 dBm		D2[1]	-0.24 dl 1.00289 MH
dBm	M1		10 dBm	M1		
Bm		D2	0 dBm	¥		D2
			U UBIII			
dBm			-10 dBm			
/IBm-			-20 dBm			
Bm			-30 dBm			
Bm			-40 dBm			
Bm			-50 dBm			
200			-50 ubii			
m			-60 dBm			
2.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz	69	1 pts	Span 3.0 MH
	aration Plot on (Channel 77 - 78	Date: 7.JUN.2024 06:	39:45		
Channel Sepa	aration Plot on (Dato: 7.JUN.2024 06:3	39:45		
ectrum ef Level 30.00 dBm Offset 24.	.04 dB 🖷 RBW 300 kHz		Date: 7.JUN.2024 06::	39145		
Channel Sepa	.04 dB e RBW 300 kHz 5 ms e VBW 300 kHz Mode Sw	reep	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB • RBW 300 kHz 5 ms • VBW 300 kHz Mode Sw M1[1]	/// /// 5.02 dBm 2.47894880 GHZ	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB e RBW 300 kHz 5 ms e VBW 300 kHz Mode Sw	/// /// 5.02 dBm 2.47894880 GHZ	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB • RBW 300 kHz 5 ms • VBW 300 kHz Mode Sw M1[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39145		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		
Channel Sepa	.04 dB @ RBW 300 kHz 5 ms @ VBW 300 kHz Mode Sw M1[1] D2[1]	(₩) *eep 5.02 dBm 2.47984980 GHZ -0.08 dB	Date: 7.JJN.2024 06:	39:45		

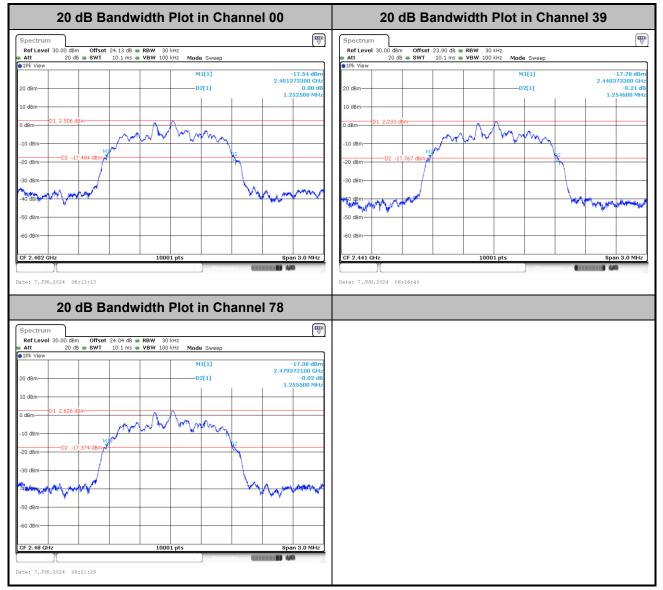


20dB Bandwidth

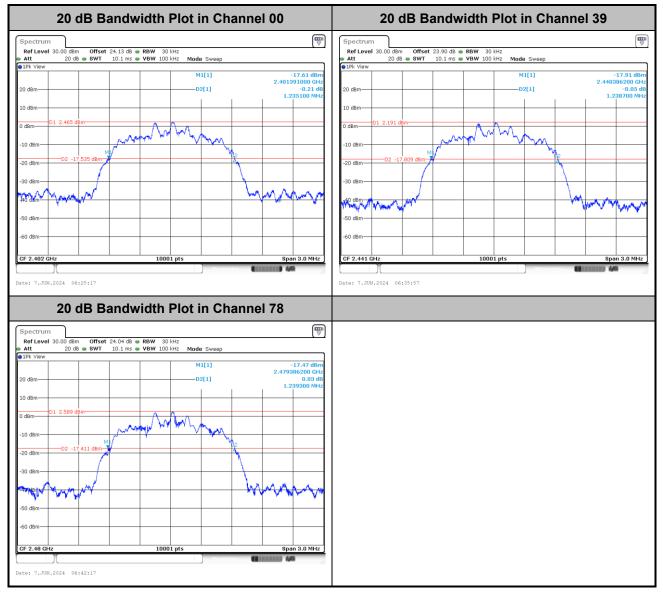
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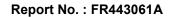






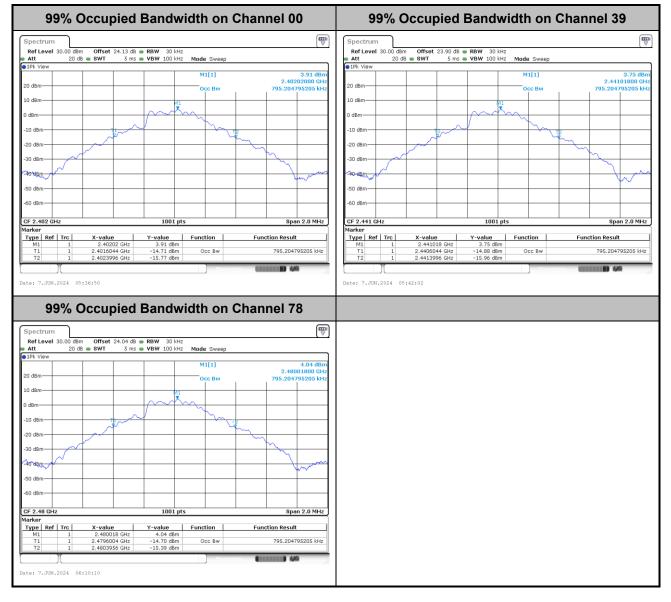




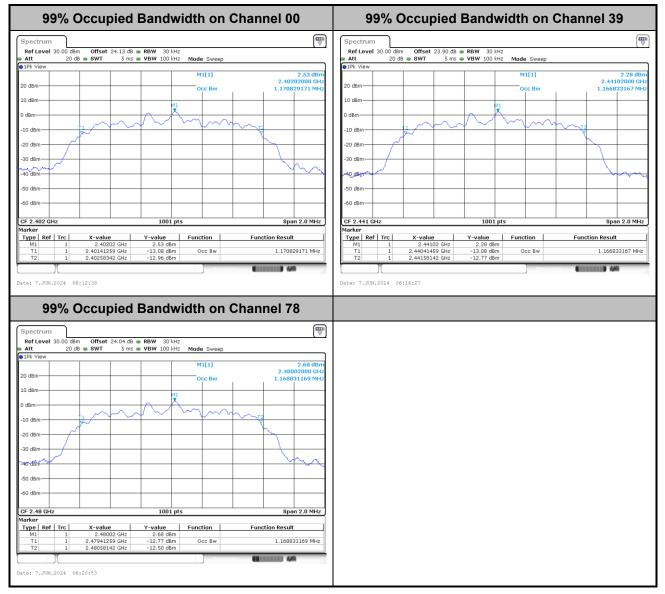




99% Occupied Bandwidth

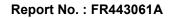








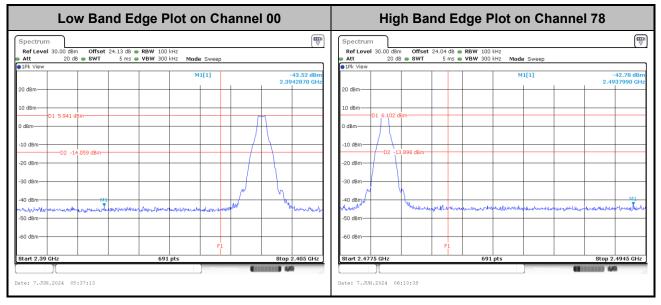


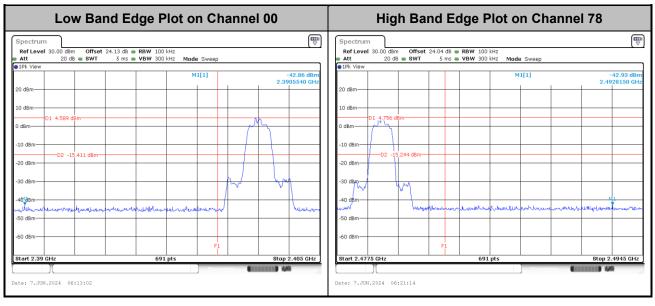




Band Edges

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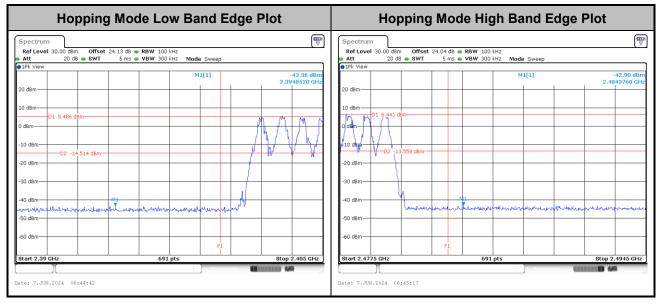


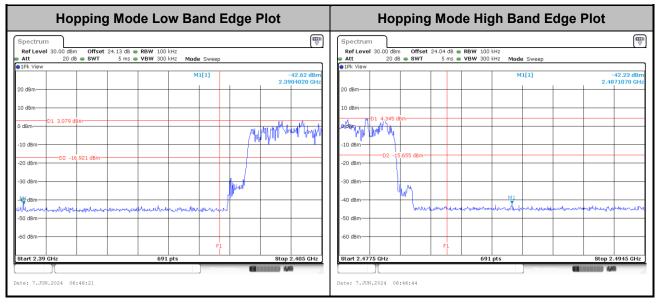
Low Band Edg	e Plot on Channel	00	High Band Edge Plot on Channel 78				
Spectrum Ref Level 30.00 dBm Offset 24.13 dB • RB Att 20 dB • SWT 5 ms • VB Itk View 5 ms • VB	W 100 kHz W 300 kHz Mode Sweep	₿	Spectrum RefLevel 30.00 dBm Offset 24.04 dB RBW 100 kHz Att 20 dB SWT 5 ms VBW 300 kHz Mode Sweep #1Pk / Wes SWT 5 ms VBW 300 kHz Mode Sweep				
20 dBm 01 4.595 dBm 0 0 dBm 01 4.595 dBm 0 -10 dBm 02 -15,405 dBm 0 -20 dBm 02 -15,405 dBm 0		-42.51 dBm 2.3951340 GHz	20 dBm M1[1] 10 dBm 0 dBm 0 dBm 0 dBm -10 dBm 0 dBm -20 dBm 0 dBm	-42.97 dBm 2.4891740 GHz			
-30 dBm	F1 691 pts	Stop 2.405 GHz	30 dbm 30 dbm<	ылана сулария Stop 2.4945 GHz			



Hopping Mode Band Edges

<1Mbps>



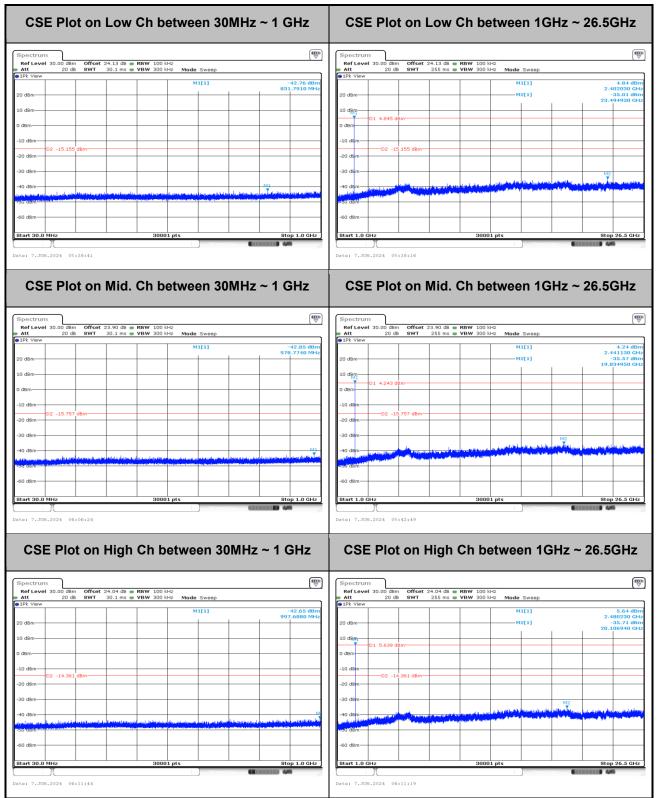




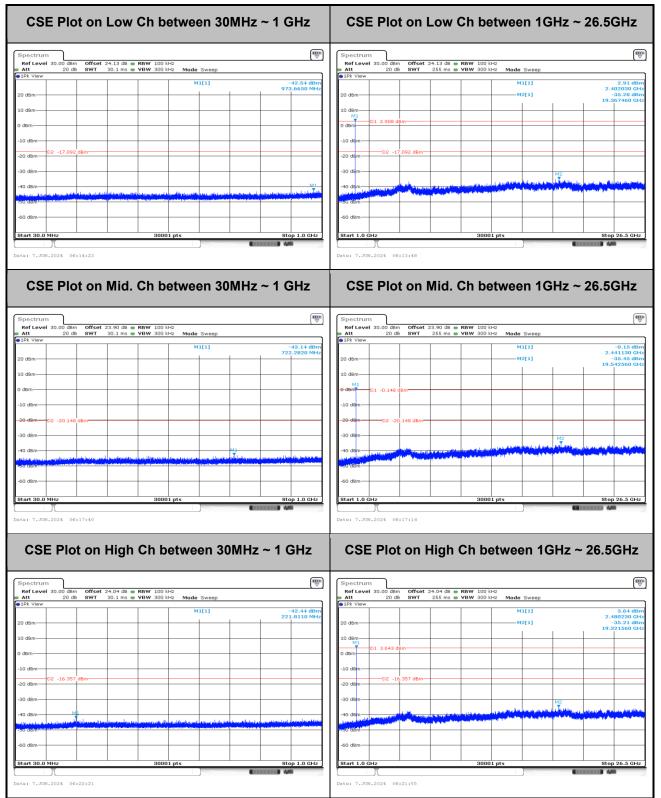
Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot				
Spectrum Image: Constraint of the second secon	Spectrum Image: Constraint of the second secon				
ראייישיאטארעאיישיעביארייעבעיאריעבעיארעעעעעעעעעעעעעעעעעעע	-50 dBm -50 dBm -60 dBm F1 Start 2.4775 GHz Stop 2.4945 GHz				
Date: 7.JUN.2024 06:47:15	Messuring				



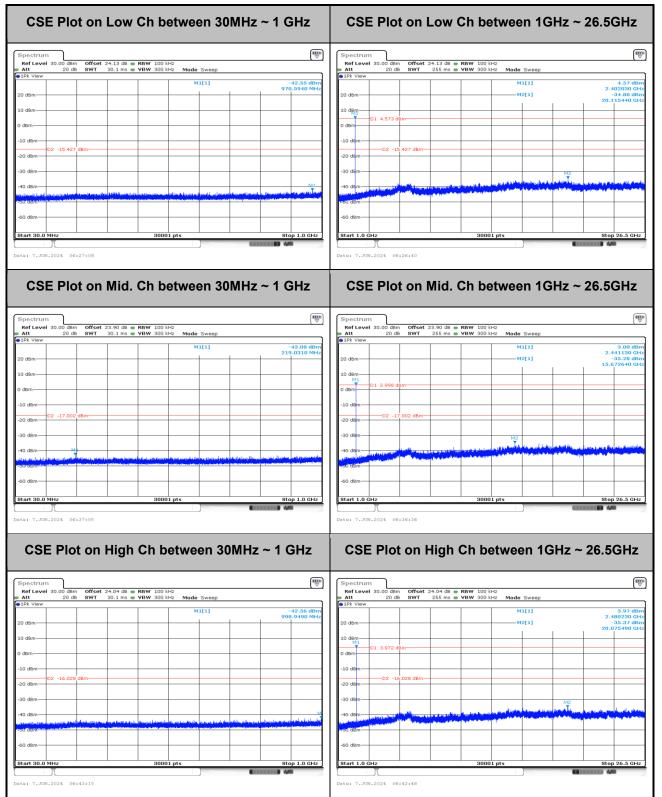
Conducted Spurious Emission







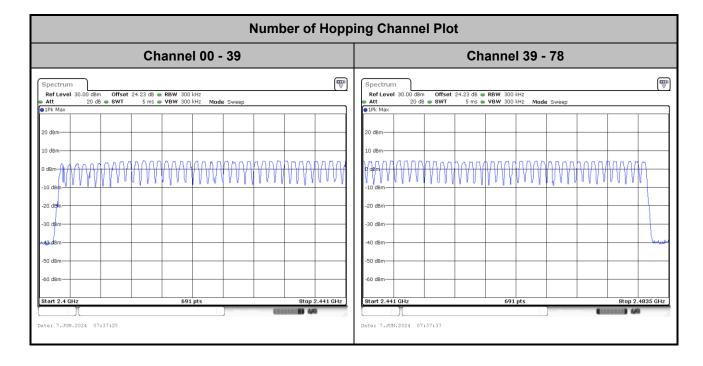


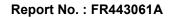




<Ant 7>

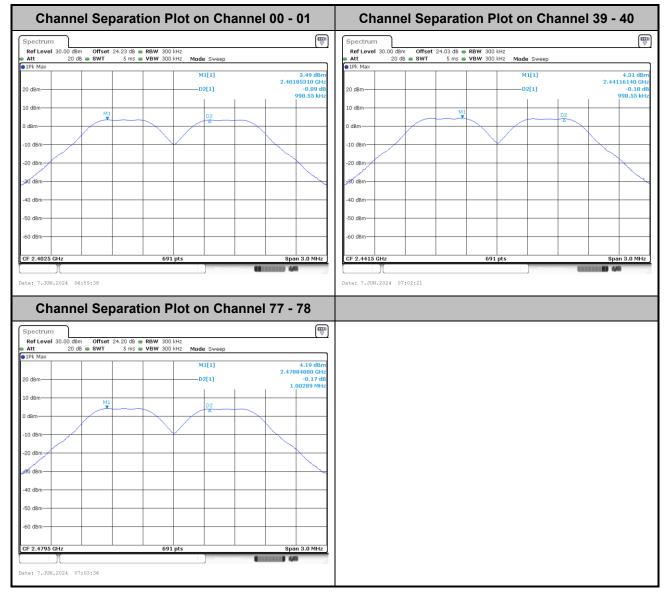
Number of Hopping Frequency







Hopping Channel Separation





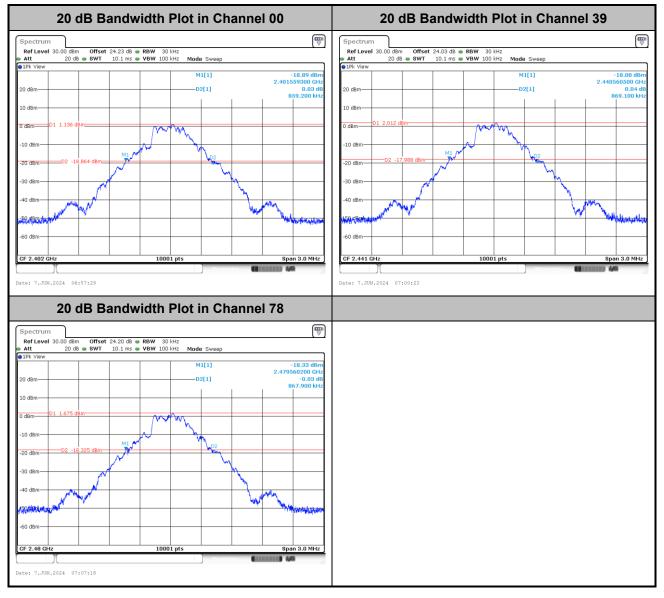
Channel Separa	tion Plot on Chan	nel 00 - 01	Channe	el Separatio	on Plot on Chai	nnel 39 - 40
ectrum			Spectrum			Ę
ef Level 30.00 dBm Offset 24.23 dB	8 e RBW 300 kHz 5 e VBW 300 kHz Mode Sweep		Ref Level 30.00 dBr		BW 300 kHz BW 300 kHz Mode Sweep	
nt 2008 swi sms	·		1Pk Max	3 115 9 VI		
	M1[1]	2.09 dBm 2.40184880 GHz			M1[1]	2.80 dB 2.44084880 GF
m	D2[1]	-0.06 dB 1.00289 MHz	20 dBm		D2[1]	-0.17 d 1.00724 MH
im			10 dBm			
M1	D2			M1	D2	
n			0 dBm			
im			-10 dBm-			
3m			-20 dBm			
			-20 0611			
Bm			-30 dBm			
Bm			-40 dBm			
			10 0.011			
m			-50 dBm			
m			-60 dBm-			
4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz		691 pts	Span 3.0 MH
	ntion Plot on Chan	nel 77 - 78	Date: 7.JUN.2024 07	:15:50		
Channel Separa	tion Plot on Chan		Date: 7.JUN.2024 07	:15:50		
Channel Separa		nel 77 - 78 🐨	Date: 7.JUN.2024 07	15150		
Channel Separa	Raw 300 kHz s • VBW 300 kHz Mode Sweep		Date: 7.JUN.2024 07	:15:50		
Channel Separa	3 🖝 RBW 300 kHz	.77 dBm	Date: 7.JUN.2024 07	:15:50		
Channel Separa	3 - RBW 300 kHz 5 - VBW 300 kHz Mode Sweep		Date: 7.JUN.2024 07	:15:50		
Channel Separa	8 • RBW 300 kHz • VBW 300 kHz Mode Sweep M1[1]	2,77 dBm 2.47884880 GHz	Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	8 • RBW 300 kHz • VBW 300 kHz Mode Sweep M1[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JUN.2024 07	:15:50		
Channel Separa	BW 300 kHz WBW 300 kHz Mode Sweep	2.77 dBm 2.478044800 GHz -0.16 dB 1.00209 MHz	Date: 7.JUN.2024 07	:15:50		
ectrum ef Level 30.00 d8m Offset 24.20 d8 20 d8 e SWT 5 ms % Max d8m	B = RBW 300 kHz S = VBW 300 kHz Mode Sweep M1[1] D2[1]		Date: 7.JTM.2024 07	:15:50		



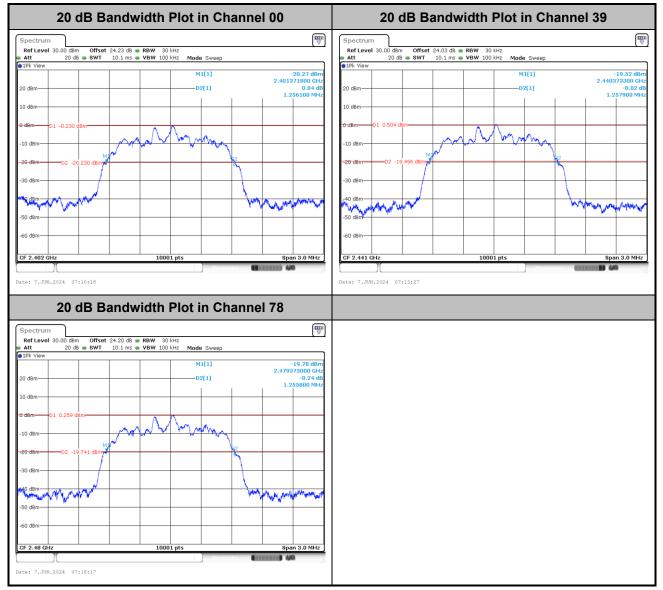
1Pk Max 20 dBm	RBW 300 kHz VBW 300 kHz Mode Sweep M1[1]		Spectrum			G
Rof Level 30.00 dBm Offset 24.23 dB. Att 20 dB 9 W/T 5 ms 1Pk Max 20 dB 9 W/T 5 ms 20 dBm 0 dBm 0 dBm 0 dBm 0 dBm	VBW 300 kHz Mode Sweep	(*)				E.
1Pk Max 20 dBm			RefLevel 30.00 dBm Att 20 dB e	Offset 24.03 dB = RBW 30	D kHz D kHz Mode Sweep	()
0 dBm	M1[1]		1Pk Max	3 m 3 m 30		
) dBm		2.08 dBm 2.40185310 GHz			M1[1]	2.84 dBr 2.44115700 GH
	D2[1]	-0.09 dB 1.00289 MHz	20 dBm-		D2[1]	-0.18 d 1.00289 MH
			10 dBm			
3m	D2		0 dBm	M1	2	2
			0 dbii			
dBm-			-10 dBm			
Bm			-20 dBm			
Bm			-30 dBm			
Bm			-40 dBm			
Bm			-50 dBm			
			-oo dalii			
Bm-	+ + + + + + + + + + + + + + + + + + + +		-60 dBm			
.4025 GHz	691 pts	Span 3.0 MHz	CF 2.4415 GHz		1 pts	Span 3.0 MH
indeb dine	Mease			0,	Measuring	
Channel Separa	tion Plot on Ch	annel 77 - 78	Date: 7.JUN.2024 07:33	:16		
Channel Separa	tion Plot on Ch		Date: 7.JUN.2024 07:33	:16		
Channel Separa	RBW 300 kHz	annel 77 - 78 🕎	Date: 7.JUN.2024 07:3	::16		
Channel Separa terum			Date: 7.JUN.2024 07:3	:16		
Channel Separa terum	• RBW 300 kHz	(₩ ▼ 2.76 dBm	Date: 7.JUN.2024 07:3	:16		
Channel Separa ctrum t uvel 30.00 dBm Offset 24.20 dB 20 dB SWT 5 ms	RBW 300 kHz VBW 300 kHz Mode Sweep	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa turum Level 30.00 dBm Offset 24.20 dB 20 dB 8 WT 5 ms Max	RBW 300 kHz VBW 300 kHz Mode Sweep M1[1]	₩ ₹ 2.76 dBm 2.47894880 GHz	Date: 7.JUN.2024 07:3	:16		
Channel Separa terum tevel 30.00 dBm Offset 24.20 dB 20 dB SWT Sms Max	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa trum tevel 30.00 dBm Offset 24.20 dB 20 dB SWT 5 ms Max	RBW 300 kHz VBW 300 kHz Mode Sweep M1[1]	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa tuvel 30.00 dBm Offset 24.20 dB 20 dB SWT 5 ms Max Bm ML m	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa strum fLevel 30.00 dBm Offset 24.20 dB 20 dB SWT Max Bm Max Bm M1	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa strum fLevel 30.00 dBm Offset 24.20 dB 20 dB SWT Max Bm Max Bm M1	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa terum f Level 30.00 dBm Offset 24.20 dB 20 dB SWT Sms Max Bm M1 m M1 Bm	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa setrum f Level 30.00 dBm Offset 24.20 dB 20 dB SWT Max Bm Mat Bm M1 m M1 Bm M1	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa strum Image: Construction of the second seco	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa terum tevel 30.00 dBm Offset 24.20 dB 20 dB SWT Sms Max m m Bm Ma Bm Bm Bm Bm Bm Bm Bm Bm Bm	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
Channel Separa	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		
ectrum af Level 30.00 dBm Offset 24.20 dB tt 20 dB SWT 5 ms k Max dBm	RBW 300 kHz VBW 300 kHz Made Sweep M1[1] D2[1] D2	2.76 dBm 2.47084800 GH2 -0-15 dB	Date: 7.JUN.2024 07:3	:16		



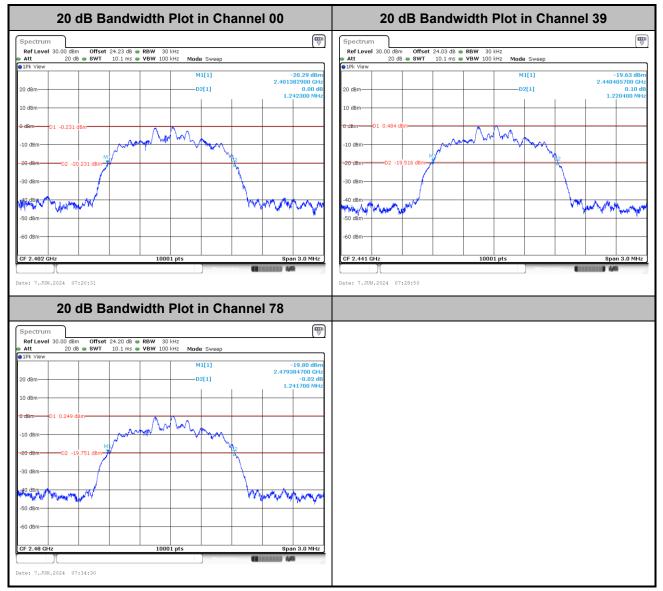
20dB Bandwidth

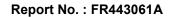






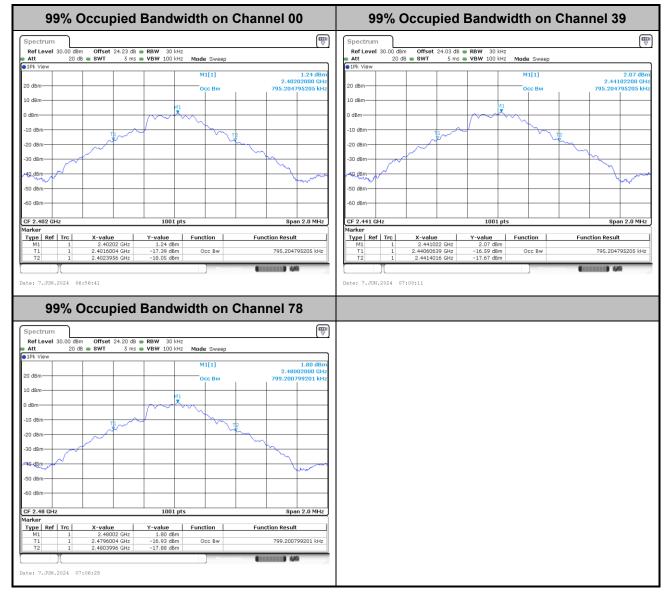




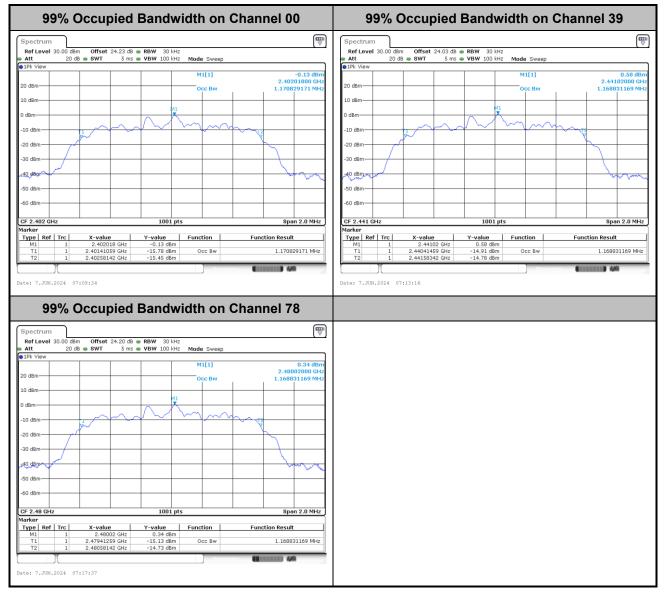




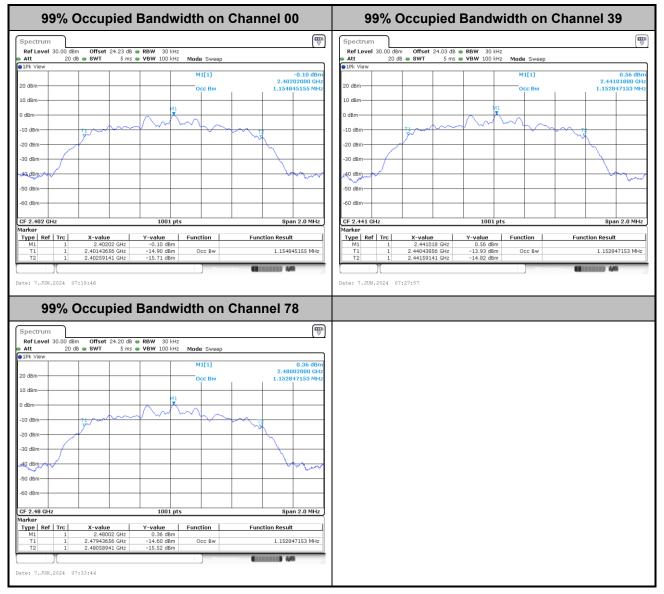
99% Occupied Bandwidth

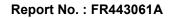








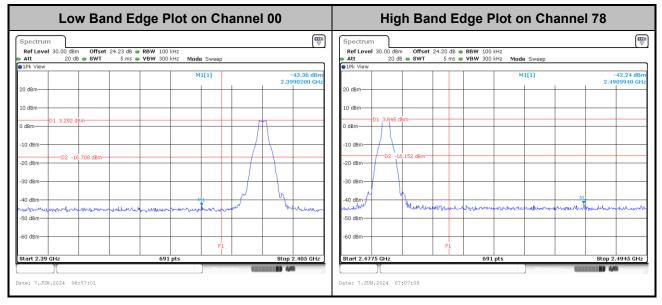






Band Edges

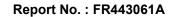
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Low Band Edge Plot on Channel 00	High Band Edge Plot on Channel 78				
Image: constraint of the sector of	Spectrum Image: Constraint of the system Image: Constand of the system				
Di dem Di dem Ol 1.918 dem Di 1.918 dem Di 1.918 dem Di 218.082 dem Di dem Di 3.918 dem Di	20 dBm 01 2,400 dBm 0 01 2,400 dBm 0 0 dBm 0 0 2,400 dBm 0 0 0 2,400 dBm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				
tart 2.39 GHz 691 pts Stop 2.405 GHz	Stort 2.4775 GHz 691 pts Stop 2.4945 GHz				



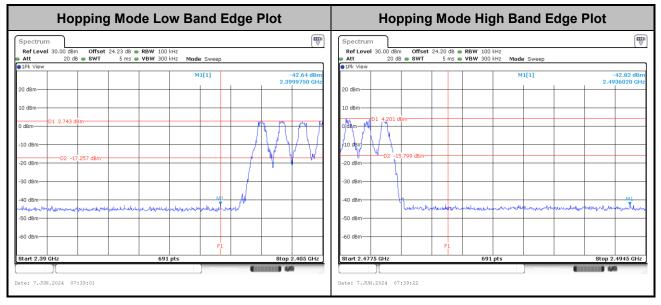
Low Band	d Edge Plot on Cha	annel 00	High Band Edge Plot on Channel 78				
Spectrum Ref Level 30.00 dBm Offset 24.	23 dB ● RBW 100 kHz 5 ms ● VBW 300 kHz Mode Sweep		Spectrum Ref Level 30.00 dBm Offset 24.20 dB RBW 100 kHz Att 20 dB SWT 5 ms VBW 300 kHz				
9 1Pk View	indu onoop	J	PIPK View				
	M1[1]	-42.90 dBm 2.3918130 GHz	M1[1]	-42.98 dBm 2.4850900 GHz			
20 dBm-			20 dBm				
10 dBm			10 dBm-				
0 dBm D1 1.963 dBm			0 dBm / 2,428 dBm / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /				
-10 dBm			-10 dBm				
-20 dBm D2 -18.037 dBm			-20 dBm	_			
-30 dBm		Mu lung	-30 dbm	_			
-40 dBm M1		. 00	-40 d8m M1				
···· ··· · · · · · · · · · · · · · · ·	uneringeneuridonication	hornand	-50 dBm	and an internet			
-60 dBm	F1		-60 dBm				
Start 2.39 GHz	691 pts	Stop 2.405 GHz	Start 2.4775 GHz 691 pts St	op 2.4945 GHz			
	Measure		Measuring				
Date: 7.JUN.2024 07:20:16			Date: 7.JUN.2024 07:34:08				





Hopping Mode Band Edges

<1Mbps>



Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot				
Spectrum Image: Construct and the system Ref Level 30.00 dBm Offset 24.23 dB RBW 100 kHz Att 20 dB SWT 5 ms VBW 300 kHz Mode Sweep 91Pk View -49.15 dBm -49.15 dBm -49.15 dBm 10 dBm 01 0.628 dBm -49.15 dBm -49.15 dBm -0 dBm 01 0.628 dBm -49.15 dBm -49.15 dBm -10 dBm -01 0.628 dBm -49.15 dBm -49.15 dBm -10 dBm -10 dBm -49.15 dBm -49.15 dBm -10 dBm -10 dBm -49.15 dBm -49.15 dBm	Incorpting infoctor trigin Dance Legen Lot Spectrum Image: Colspan="2">Image: Colspan="2">Image: Colspan="2" Image: Colspan="2">Image: Colspan="2" Image: Colspa="2" Image: Colspan="2" Image: Colspan="2" Image:				
-50 dBm	-50 dBm - F1				
Stort 2.39 GHz 691 pts Stop 2.405 GHz Date: 7.JUN.2024 07:39:56 0 0	Start 2.4775 GHz 691 pts Stop 2.4945 GHz Date: 7.JW.2024 07:40:21 000000000000000000000000000000000000				



Hopping Mc	Hopping Mode High Band Edge Plot					
Spectrum Ref Level 30.00 dBm Offset 24.23 dB	3 • RBW 100 kHz		Spectrum Ref Level 30.00 d	Bm Offset 24.20 dB RBW 1	100 kHz	
	s 🖶 VBW 300 kHz Mode Sweep			dB 🖷 SWT 5 ms 🖷 VBW 3	800 kHz Mode Sweep	
e 1Pk View	M1[1]	-42.61 dBm 2.3974570 GHz	●1Pk View		M1[1]	-42.65 dBm 2.4835640 GHz
20 dBm			20 dBm			
10 dBm			10 dBm	i dBm		
D dBm	ىر ا	Mayor March March 19	W WWWWWW			
-10 dBm			-10 dBm	17.665 dBm		
-30 dBm			-30 dBm			
-40 dBm	Maring		-40 dBm	Trup ve		
-50 dBm-	when we have a server and the server		-50 dBm	Valo martine	worknown when a solution	nain Massilian termination of the second state and
-60 dBm			-60 dBm			
	F1			F1		
Start 2.39 GHz	691 pts	Stop 2.405 GHz	Start 2.4775 GHz	6	591 pts	Stop 2.4945 GHz
Date: 7.JUN.2024 07:41:44	Neneweingen		Date: 7.JUN.2024 (07:42:07	Measuring	CIIIII 944



Conducted Spurious Emission

