



# FCC RADIO TEST REPORT

**FCC ID** : A4RG9BQD  
**Equipment** : Phone  
**Model Name** : G9BQD  
**Applicant** : Google LLC  
1600 Amphitheatre Parkway,  
Mountain View, California, 94043 USA  
**Standard** : FCC Part 15 Subpart C §15.247

The product was received on Feb. 06, 2023 and testing was performed from Feb. 27, 2023 to May 16, 2023. 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.)



## Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
<b>1 General Description.....</b>	<b>5</b>
1.1 Product Feature of Equipment Under Test.....	5
1.2 Product Specification of Equipment Under Test.....	6
1.3 Modification of EUT .....	8
1.4 Testing Location .....	8
1.5 Applicable Standards.....	9
<b>2 Test Configuration of Equipment Under Test .....</b>	<b>10</b>
2.1 Carrier Frequency Channel .....	10
2.2 Test Mode.....	12
2.3 Connection Diagram of Test System.....	14
2.4 Support Unit used in test configuration and system .....	15
2.5 EUT Operation Test Setup .....	15
2.6 Measurement Results Explanation Example.....	15
<b>3 Test Result.....</b>	<b>16</b>
3.1 6dB and 99% Bandwidth Measurement .....	16
3.2 Output Power Measurement.....	17
3.3 Power Spectral Density Measurement .....	18
3.4 Conducted Band Edges and Spurious Emission Measurement .....	19
3.5 Radiated Band Edges and Spurious Emission Measurement .....	20
3.6 AC Conducted Emission Measurement.....	24
3.7 Antenna Requirements.....	26
<b>4 List of Measuring Equipment .....</b>	<b>27</b>
<b>5 Measurement Uncertainty .....</b>	<b>29</b>
<b>Appendix A. Conducted Test Results</b>	
<b>Appendix B. AC Conducted Emission Test Result</b>	
<b>Appendix C. Radiated Spurious Emission</b>	
<b>Appendix D. Radiated Spurious Emission Plots</b>	
<b>Appendix E. Duty Cycle Plots</b>	
<b>Appendix F. Setup Photographs</b>	



### History of this test report

Report No.	Version	Description	Issue Date
FR2D0208-07B	01	Initial issue of report	Jul. 04, 2023



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)(3) 15.247(b)(4)	Output Power	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	1.70 dB under the limit at 2483.52 MHz
3.6	15.207	AC Conducted Emission	Pass	14.38 dB under the limit at 1.38 MHz
3.7	15.203	Antenna Requirement	Pass	-

**Conformity Assessment Condition:**

1. 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: William Chen**  
**Report Producer: Cindy Fang**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Phone
FCC ID	A4RG9BQD
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/NFC/GNSS/WPT WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 WLAN 11be EHT20/EHT40/EHT80/EHT160 Bluetooth BR/EDR/LE/HR

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

EUT Information List	
S/N	Performed Test Item
31051FDJH0006A 33251FDJH00035	RF Conducted Measurement
33241FDJH0004A	Radiated Spurious Emission
33201FDJH000KR	AC Conducted Emission



## 1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
<b>Tx/Rx Frequency Range</b>	2402 MHz ~ 2480 MHz
<b>Number of Channels</b>	Bluetooth – LE: 40 Bluetooth HR : 75
<b>Carrier Frequency of Each Channel</b>	Bluetooth – LE : 40 Channel (37 hopping + 3 advertising channel) Bluetooth HR : 75 Channel
<b>Maximum Output Power to Antenna</b>	<p><b>&lt;Ant. 3&gt;</b>                      Bluetooth -LE(1Mbps): 19.25 dBm / 0.0841 W                      Bluetooth -LE (2Mbps): 19.65 dBm / 0.0923 W                      Bluetooth HR (4Mbps): 20.55 dBm / 0.1135 W                      Bluetooth HR (8Mbps): 20.48 dBm / 0.1117 W</p> <p><b>&lt;Ant. 4&gt;</b>                      Bluetooth -LE (1Mbps): 19.45 dBm / 0.0881 W                      Bluetooth -LE (2Mbps): 19.75 dBm / 0.0944 W                      Bluetooth HR (4Mbps): 20.61 dBm / 0.1151 W                      Bluetooth HR (8Mbps): 20.70 dBm / 0.1175 W</p>
<b>Maximum Output Power to Antenna &lt;TXBF Modes&gt;</b>	<p><b>MIMO &lt;Ant. 3+4&gt;</b>                      Bluetooth – LE (1Mbps): 22.41 dBm / 0.1742 W                      Bluetooth – LE (2Mbps): 22.76 dBm / 0.1888 W                      Bluetooth HR (4Mbps): 20.83 dBm / 0.1211 W                      Bluetooth HR (8Mbps): 20.80 dBm / 0.1202 W</p>
<b>99% Occupied Bandwidth</b>	<p><b>&lt;Ant. 3&gt;</b>                      Bluetooth – LE (1Mbps): 1.053 MHz                      Bluetooth – LE (2Mbps): 2.094 MHz                      Bluetooth HR (4Mbps): 2.406 MHz                      Bluetooth HR (8Mbps): 4.715 MHz</p> <p><b>&lt;Ant. 4&gt;</b>                      Bluetooth – LE (1Mbps): 1.053 MHz                      Bluetooth – LE (2Mbps): 2.094 MHz                      Bluetooth HR (4Mbps): 2.406 MHz                      Bluetooth HR (8Mbps): 4.699 MHz</p>
<b>99% Occupied Bandwidth &lt;TXBF Mode&gt;</b>	<p><b>MIMO &lt;Ant. 3+4&gt;</b>                      Bluetooth – LE (1Mbps): 1.053 MHz                      Bluetooth – LE (2Mbps): 2.094 MHz                      Bluetooth HR(4Mbps): 2.406 MHz                      Bluetooth HR(8Mbps): 4.699 MHz</p>
<b>Antenna Type / Gain</b>	<p><b>&lt;Ant. 3&gt;</b>: Loop Antenna with gain -2.20 dBi  <b>&lt;Ant. 4&gt;</b>: Monopole Antenna with gain -0.60 dBi</p>
<b>Type of Modulation</b>	Bluetooth - LE : GFSK Bluetooth HR: 8PSK



Product Specification is subject to this standard			
Antenna Function Description		Ant. 3	Ant. 4
	Bluetooth - LE	V	V
	Bluetooth- LE TXBF	V	V
	Bluetooth HR	V	V
	Bluetooth HR TXBF	V	V

Remark:

1. MIMO Ant. 3+4 Directional Gain is a calculated result from MIMO Ant. 3 and MIMO Ant. 4. The formula used in calculation is documented in section 1.2.1.
2. Power of MIMO Ant. 3 + Ant. 4 is a calculated result from sum of the power MIMO Ant. 3 and MIMO Ant. 4.
3. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2.1 Antenna Directional Gain

Follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)e)i)

Directional gain = G<sub>ANT</sub> + 10 log(N<sub>ANT</sub>/N<sub>SS</sub>) dBi, where N<sub>SS</sub> = the number of independent spatial streams of data and G<sub>ANT</sub> is the antenna gain in dBi. (This formula can also be applied when antennas have different gains if the highest antenna gain is substituted for G<sub>ANT</sub>.)

The directional gain "DG" is calculated as following table.

			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant 3 (dBi)	Ant 4 (dBi)				
Bluetooth	-2.20	-0.60	-0.60	-0.60	0.00	0.00

Calculation example:

If a device has two antenna, G<sub>ANT1</sub>= -2.20dBi; G<sub>ANT2</sub>=-0.60dBi

$$-0.6 \text{ dBi} + 10 \times \log (2 / 2)$$

$$= -0.6 \text{ dBi}$$

Power and PSD limit reduction = Composite gain – 6dBi, ( min = 0 )



### 1.3 Modification of EUT

No modifications made to the EUT during the testing.

### 1.4 Testing Location

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

<b>Test Site</b>	Sporton International Inc. Wensan Laboratory
<b>Test Site Location</b>	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
<b>Test Site No.</b>	<b>Sporton Site No.</b> TH05-HY, 03CH16-HY

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

FCC designation No.: TW1190 and 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
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ 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

<Bluetooth - LE>

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
20	2442	-	-	



<Bluetooth HR>

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



## **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 accessory (Adapter or Earphone) and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.
  
- b. AC power line Conducted Emission was tested under maximum output power.

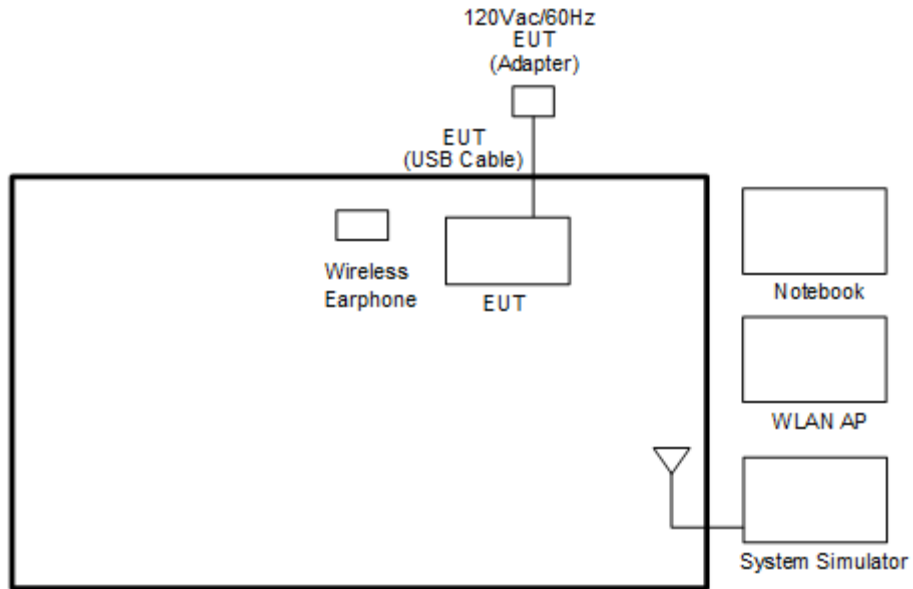


The following summary table is showing all test modes to demonstrate in compliance with the standard.

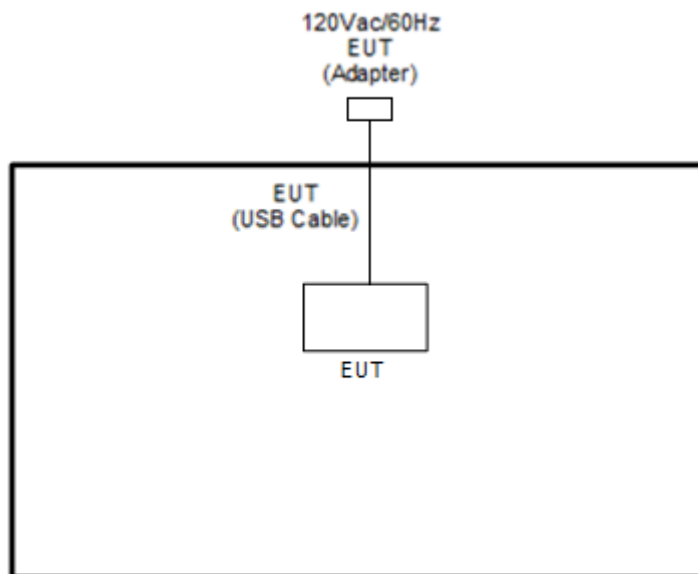
Summary table of Test Cases	
Test Item	Data Rate / Modulation
<b>Conducted Test Cases</b>	<b>Bluetooth – LE / GFSK</b>
	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
	Mode 7: Bluetooth HR CH02_2404 MHz_4Mbps
	Mode 8: Bluetooth HR CH39_2441 MHz_4Mbps
	Mode 9: Bluetooth HR CH76_2478 MHz_4Mbps
	Mode 10: Bluetooth HR CH02_2404 MHz_8Mbps
	Mode 11: Bluetooth HR CH39_2441 MHz_8Mbps
	Mode 12: Bluetooth HR CH76_2478 MHz_8Mbps
<b>Radiated Test Cases</b>	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
	Mode 7: Bluetooth HR CH02_2404 MHz_4Mbps
	Mode 8: Bluetooth HR CH39_2441 MHz_4Mbps
	Mode 9: Bluetooth HR CH76_2478 MHz_4Mbps
	Mode 10: Bluetooth HR CH02_2404 MHz_8Mbps
	Mode 11: Bluetooth HR CH39_2441 MHz_8Mbps
	Mode 12: Bluetooth HR CH76_2478 MHz_8Mbps
	<b>AC Conducted Emission</b>
<b>Remark:</b>	
<ol style="list-style-type: none"> <li>For Radiated Test Cases, the tests were performed with USB Cable 1.</li> <li>During the preliminary test, both charging modes (Adapter mode and WPT Charging mode) were verified. It is determined that the adaptor mode is the worst case for official test.</li> <li>For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.</li> </ol>	

## 2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<Bluetooth- Tx Mode>





## 2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
2.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	Wireless Earphone	Google	G1007/G1008	A4RG1007/ A4RG1008	N/A	N/A
4.	Notebook	DELL	Latitude3420	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 “cmd 10.0.19042.1526” 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.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 6dB and 99% Bandwidth Measurement

##### 3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

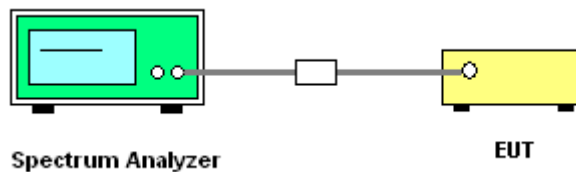
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\geq 3 * RBW$ .
6. Measure and record the results in the test report.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

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

Please refer to Appendix A.



## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

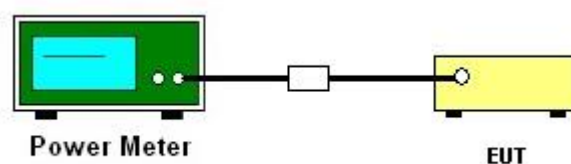
### 3.2.2 Measuring Instruments

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

### 3.2.3 Test Procedures

1. For BT HR modes, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1 Peak power meter method.
2. For BLE modes Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
3. The RF output of EUT is connected to the power meter by RF cable and attenuator.
4. The path loss is compensated to the results for each measurement.
5. Set the maximum power setting and enable the EUT to transmit continuously.
6. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

### 3.2.6 Test Result of Average Output Power

Please refer to Appendix A.

### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band at any time interval of continuous transmission.

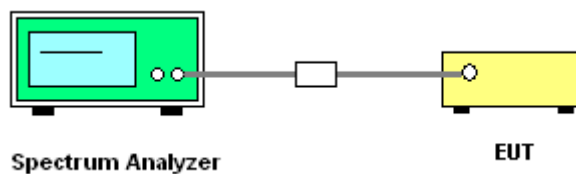
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth (VBW) = 10 kHz. In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6 dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100 kHz is a reference level and is used as 20 dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

## 3.4 Conducted Band Edges and Spurious Emission Measurement

### 3.4.1 Limit of Conducted Band Edges and Spurious Emission

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

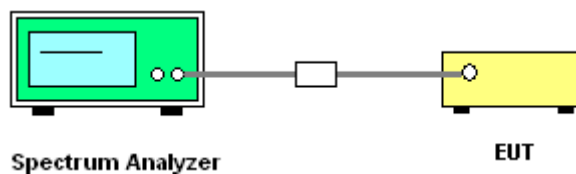
### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedure

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
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. Set RBW = 100 kHz, VBW = 300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
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.

### 3.4.4 Test Setup



### 3.4.5 Test Result of Conducted Band Edges Plots

Please refer to Appendix A.

### 3.4.6 Test Result of Conducted Spurious Emission Plots

Please refer to Appendix A.



### 3.5 Radiated Band Edges and Spurious Emission Measurement

#### 3.5.1 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. If the output power of this device is measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

#### 3.5.2 Measuring Instruments

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

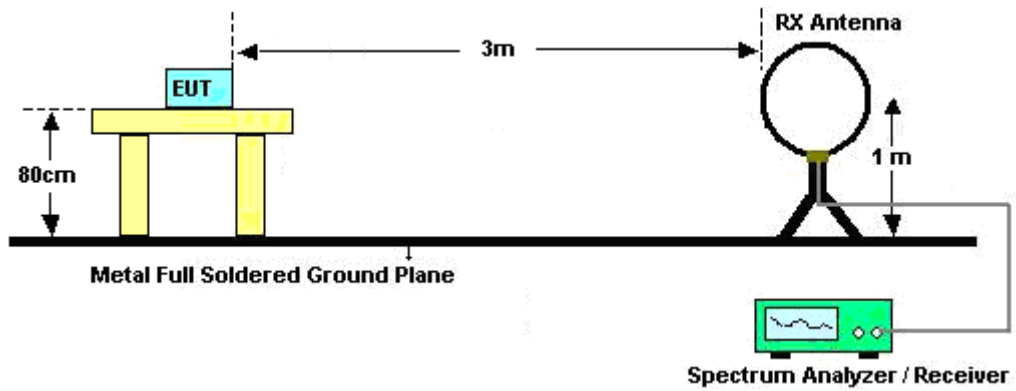


### 3.5.3 Test Procedures

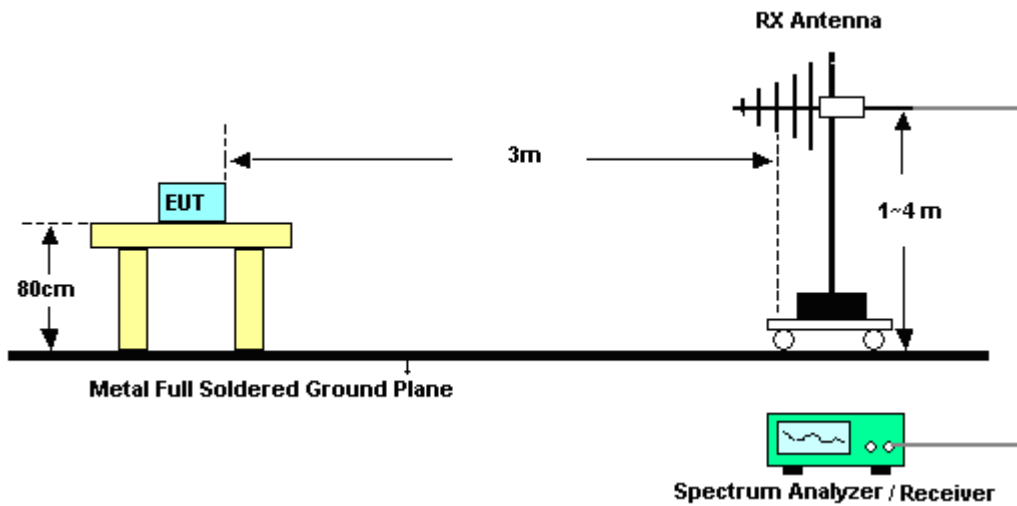
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. 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 “-”.
7. 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 “-”.
8. 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; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW = 3 MHz for  $f \geq 1$  GHz for peak measurement.  
For average measurement:
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW  $\geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.5.4 Test Setup

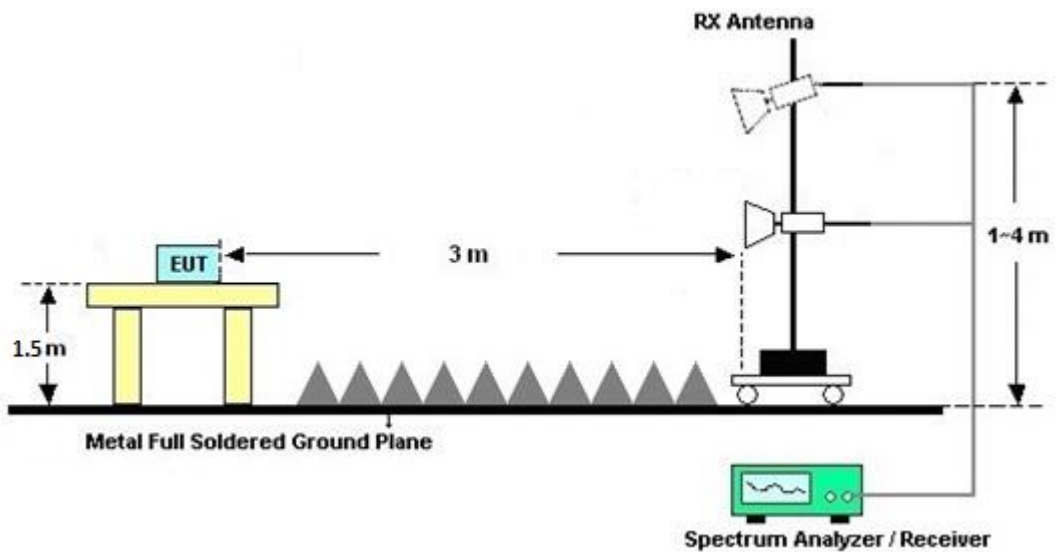
For radiated test below 30MHz



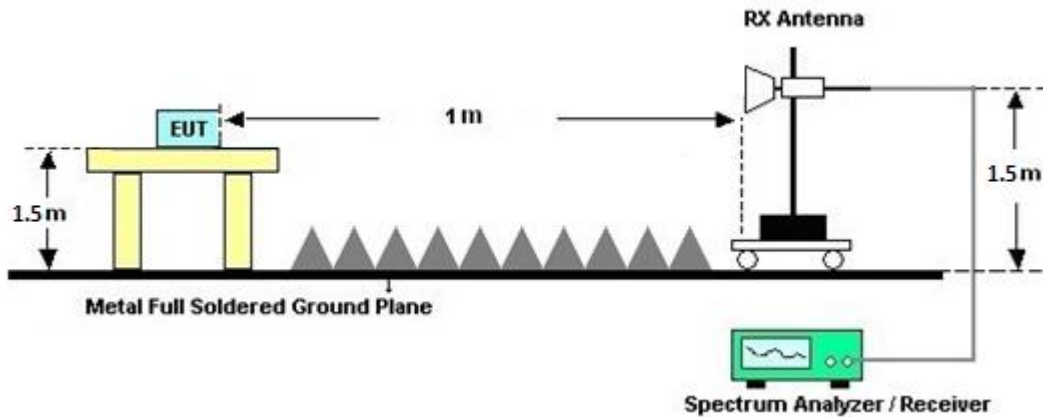
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



### 3.5.5 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.

### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

### 3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.



### 3.6 AC Conducted Emission Measurement

#### 3.6.1 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 (dB $\mu$ V)	
	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.

#### 3.6.2 Measuring Instruments

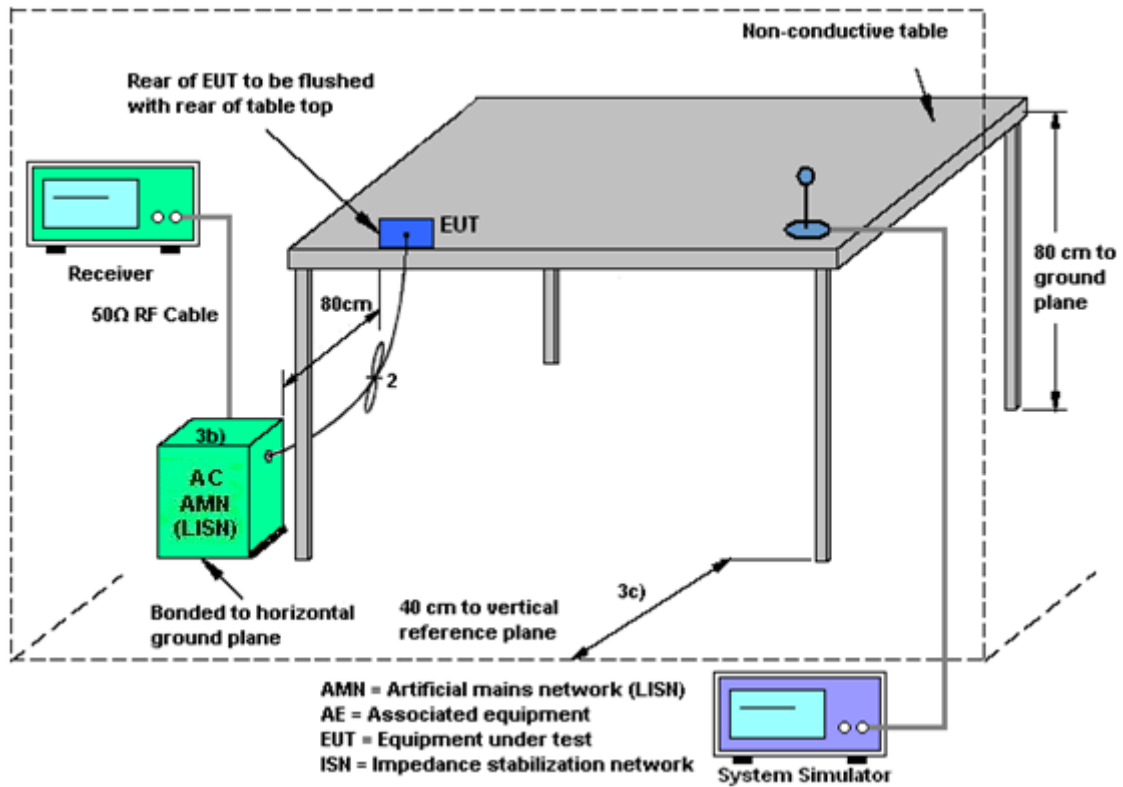
Please refer to the measuring equipment list in this test report.

#### 3.6.3 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.
8. 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.



### 3.6.4 Test Setup



### 3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



## **3.7 Antenna Requirements**

### **3.7.1 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.

### **3.7.2 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
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1GHz~18GHz	Mar. 23, 2023	Apr. 11, 2023~ May 05, 2023	Mar. 22, 2024	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz~40GHz	Nov. 24, 2022	Apr. 11, 2023~ May 05, 2023	Nov. 23, 2023	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N -06	47020 & 06	30MHz~1GHz	Oct. 08, 2022	Apr. 11, 2023~ May 05, 2023	Oct. 07, 2023	Radiation (03CH16-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 20, 2022	Apr. 11, 2023~ May 05, 2023	Sep. 19, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 28, 2022	Apr. 11, 2023~ May 05, 2023	Jun. 27, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Dec. 26, 2022	Apr. 11, 2023~ May 05, 2023	Dec. 25, 2023	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 09, 2022	Apr. 11, 2023~ May 05, 2023	Dec. 08, 2023	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1GHz	Jul. 04, 2022	Apr. 11, 2023~ May 05, 2023	Jul. 03, 2023	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	3Hz~26.5GHz	Dec. 15, 2022	Apr. 11, 2023~ May 05, 2023	Dec. 14, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	805935/4	N/A	Aug. 09, 2022	Apr. 11, 2023~ May 05, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	802434/4	N/A	Aug. 09, 2022	Apr. 11, 2023~ May 05, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5 757	N/A	Aug. 09, 2022	Apr. 11, 2023~ May 05, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Apr. 11, 2023~ May 05, 2023	N/A	Radiation (03CH16-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Apr. 11, 2023~ May 05, 2023	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Apr. 11, 2023~ May 05, 2023	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Apr. 11, 2023~ May 05, 2023	N/A	Radiation (03CH16-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECEPEL	DTM-303A	TP201996	N/A	Nov. 17, 2022	Feb. 27, 2023~ May 16, 2023	Nov. 16, 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 13, 2022	Mar. 09, 2023~ May 12, 2023	Dec. 12, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101905	10Hz - 40GHz(amp)	Aug. 03, 2022	Feb. 27, 2023~ May 16, 2023	Aug. 02, 2023	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1036004	N/A	Aug. 08, 2022	Feb. 27, 2023~ May 16, 2023	Aug. 07, 2023	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 08, 2022	Feb. 27, 2023~ May 16, 2023	Aug. 07, 2023	Conducted (TH05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2022	Apr. 19, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2022	Apr. 19, 2023	Nov. 16, 2023	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 17, 2022	Apr. 19, 2023	Nov. 16, 2023	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Apr. 19, 2023	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	N/A	Aug. 01, 2022	Apr. 19, 2023	Jul. 31, 2023	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 29, 2022	Apr. 19, 2023	Dec. 28, 2023	Conduction (CO05-HY)



## 5 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.50 dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	6.50 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.60 dB
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### Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.50 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.60 dB
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### Appendix A. Test Result of Conducted Test Items

Test Engineer:	Junyu Zhou	Temperature:	21~25	°C
Test Date:	2023/02/27-2023/5/16	Relative Humidity:	51~54	%

<BLE Ant. 3>

<b>TEST RESULTS DATA</b>								
<b>6dB and 99% Occupied Bandwidth</b>								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.053	0.724	0.50	Pass
BLE	1Mbps	1	19	2440	1.053	0.726	0.50	Pass
BLE	1Mbps	1	39	2480	1.053	0.724	0.50	Pass

<b>TEST RESULTS DATA</b>										
<b>Average Power Table</b>										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	19.25	30.00	-2.20	17.05	36.00	Pass
BLE	1Mbps	1	19	2440	19.15	30.00	-2.20	16.95	36.00	Pass
BLE	1Mbps	1	39	2480	18.85	30.00	-2.20	16.65	36.00	Pass

<b>TEST RESULTS DATA</b>									
<b>Peak Power Density</b>									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	18.31	3.45	-2.20	8.00	Pass
BLE	1Mbps	1	19	2440	17.78	2.95	-2.20	8.00	Pass
BLE	1Mbps	1	39	2480	17.89	3.10	-2.20	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.094	1.260	0.50	Pass
BLE	2Mbps	1	19	2440	2.094	1.264	0.50	Pass
BLE	2Mbps	1	39	2480	2.094	1.264	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	19.65	30.00	-2.20	17.45	36.00	Pass
BLE	2Mbps	1	19	2440	18.95	30.00	-2.20	16.75	36.00	Pass
BLE	2Mbps	1	39	2480	19.05	30.00	-2.20	16.85	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	18.57	0.04	-2.20	8.00	Pass
BLE	2Mbps	1	19	2440	18.41	-0.14	-2.20	8.00	Pass
BLE	2Mbps	1	39	2480	18.25	-0.18	-2.20	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

&lt;BLE Ant. 4&gt;

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.051	0.720	0.50	Pass
BLE	1Mbps	1	19	2440	1.053	0.726	0.50	Pass
BLE	1Mbps	1	39	2480	1.053	0.724	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	19.25	30.00	-0.60	18.65	36.00	Pass
BLE	1Mbps	1	19	2440	19.45	30.00	-0.60	18.85	36.00	Pass
BLE	1Mbps	1	39	2480	18.75	30.00	-0.60	18.15	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	18.58	3.74	-0.60	8.00	Pass
BLE	1Mbps	1	19	2440	18.82	3.99	-0.60	8.00	Pass
BLE	1Mbps	1	39	2480	17.63	2.83	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.090	1.256	0.50	Pass
BLE	2Mbps	1	19	2440	2.094	1.260	0.50	Pass
BLE	2Mbps	1	39	2480	2.094	1.264	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	19.65	30.00	-0.60	19.05	36.00	Pass
BLE	2Mbps	1	19	2440	19.75	30.00	-0.60	19.15	36.00	Pass
BLE	2Mbps	1	39	2480	18.95	30.00	-0.60	18.35	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	18.61	0.40	-0.60	8.00	Pass
BLE	2Mbps	1	19	2440	18.74	0.25	-0.60	8.00	Pass
BLE	2Mbps	1	39	2480	17.90	-0.57	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

<HR 4Mbps 8Mbps Ant. 3>

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	4Mbps	1	2	2404	2.406	1.662	0.50	Pass
BTHR	4Mbps	1	39	2441	2.406	1.642	0.50	Pass
BTHR	4Mbps	1	76	2478	2.406	1.650	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	4Mbps	1	2	2404	20.55	30.00	-2.20	18.35	36.00	Pass
BTHR	4Mbps	1	39	2441	19.97	30.00	-2.20	17.77	36.00	Pass
BTHR	4Mbps	1	76	2478	20.23	30.00	-2.20	18.03	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	4Mbps	1	2	2404	16.97	1.26	-2.20	8.00	Pass
BTHR	4Mbps	1	39	2441	16.50	0.74	-2.20	8.00	Pass
BTHR	4Mbps	1	76	2478	16.72	0.99	-2.20	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	8Mbps	1	2	2404	4.683	0.664	0.50	Pass
BTHR	8Mbps	1	39	2441	4.699	0.664	0.50	Pass
BTHR	8Mbps	1	76	2478	4.715	0.664	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	8Mbps	1	2	2404	20.48	30.00	-2.20	18.28	36.00	Pass
BTHR	8Mbps	1	39	2441	20.09	30.00	-2.20	17.89	36.00	Pass
BTHR	8Mbps	1	76	2478	20.34	30.00	-2.20	18.14	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	8Mbps	1	2	2404	16.75	1.97	-2.20	8.00	Pass
BTHR	8Mbps	1	39	2441	16.24	1.48	-2.20	8.00	Pass
BTHR	8Mbps	1	76	2478	16.50	1.76	-2.20	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

<HR 4Mbps 8Mbps Ant. 4>

<b>TEST RESULTS DATA</b> <b>6dB and 99% Occupied Bandwidth</b>								
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	4Mbps	1	2	2404	2.406	1.604	0.50	Pass
BTHR	4Mbps	1	39	2441	2.406	1.659	0.50	Pass
BTHR	4Mbps	1	76	2478	2.406	1.654	0.50	Pass

<b>TEST RESULTS DATA</b> <b>Peak Power Table</b>										
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	4Mbps	1	2	2404	20.61	30.00	-0.60	20.01	36.00	Pass
BTHR	4Mbps	1	39	2441	19.99	30.00	-0.60	19.39	36.00	Pass
BTHR	4Mbps	1	76	2478	19.66	30.00	-0.60	19.06	36.00	Pass

<b>TEST RESULTS DATA</b> <b>Peak Power Density</b>									
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	4Mbps	1	2	2404	17.11	1.38	-0.60	8.00	Pass
BTHR	4Mbps	1	39	2441	16.30	0.72	-0.60	8.00	Pass
BTHR	4Mbps	1	76	2478	16.06	0.41	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	8Mbps	1	2	2404	4.683	0.664	0.50	Pass
BTHR	8Mbps	1	39	2441	4.699	0.664	0.50	Pass
BTHR	8Mbps	1	76	2478	4.683	0.684	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	8Mbps	1	2	2404	20.70	30.00	-0.60	20.10	36.00	Pass
BTHR	8Mbps	1	39	2441	19.94	30.00	-0.60	19.34	36.00	Pass
BTHR	8Mbps	1	76	2478	19.59	30.00	-0.60	18.99	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	8Mbps	1	2	2404	16.69	1.93	-0.60	8.00	Pass
BTHR	8Mbps	1	39	2441	16.12	1.40	-0.60	8.00	Pass
BTHR	8Mbps	1	76	2478	15.75	1.00	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

&lt;TXBF BLE Ant. 3+4&gt;

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	2	0	2402	1.051	0.722	0.50	Pass
BLE	1Mbps	2	19	2440	1.053	0.724	0.50	Pass
BLE	1Mbps	2	39	2480	1.053	0.724	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power Ant 4 (dBm)	Average Conducted Power Ant 3 (dBm)	Total Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	Total EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	2	0	2402	19.35	19.35	22.36	30.00	-0.60	21.76	36.00	Pass
BLE	1Mbps	2	19	2440	19.25	19.55	22.41	30.00	-0.60	21.81	36.00	Pass
BLE	1Mbps	2	39	2480	19.35	18.85	22.12	30.00	-0.60	21.52	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	Peak PSD Worst +3.01 (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	2	0	2402	17.56	2.71	5.72	-0.60	8.00	Pass
BLE	1Mbps	2	19	2440	18.36	3.51	6.52	-0.60	8.00	Pass
BLE	1Mbps	2	39	2480	17.33	2.52	5.53	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	2	0	2402	2.090	1.260	0.50	Pass
BLE	2Mbps	2	19	2440	2.094	1.260	0.50	Pass
BLE	2Mbps	2	39	2480	2.090	1.264	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power Ant 4 (dBm)	Average Conducted Power Ant 3 (dBm)	Total Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	Total EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	2	0	2402	19.75	19.75	22.76	30.00	-0.60	22.16	36.00	Pass
BLE	2Mbps	2	19	2440	19.45	19.85	22.66	30.00	-0.60	22.06	36.00	Pass
BLE	2Mbps	2	39	2480	19.55	19.05	22.32	30.00	-0.60	21.72	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	Peak PSD Worst +3.01 (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	2	0	2402	18.56	0.03	3.04	-0.60	8.00	Pass
BLE	2Mbps	2	19	2440	18.33	-0.17	2.84	-0.60	8.00	Pass
BLE	2Mbps	2	39	2480	18.33	-0.09	2.92	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

&lt;TXBF HR 4Mbps 8Mbps Ant. 3+4&gt;

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	4Mbps	2	2	2404	2.406	1.606	0.50	Pass
BTHR	4Mbps	2	39	2441	2.406	1.660	0.50	Pass
BTHR	4Mbps	2	76	2478	2.406	1.651	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power Ant 4 (dBm)	Peak Conducted Power Ant 3 (dBm)	Total Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	Total EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	4Mbps	2	2	2404	17.78	17.85	20.83	30.00	-0.60	20.23	36.00	Pass
BTHR	4Mbps	2	39	2441	17.40	17.35	20.39	30.00	-0.60	19.79	36.00	Pass
BTHR	4Mbps	2	76	2478	16.83	17.54	20.21	30.00	-0.60	19.61	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	Peak PSD Worst +3.01 (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	4Mbps	2	2	2404	14.19	-1.56	1.45	-0.60	8.00	Pass
BTHR	4Mbps	2	39	2441	13.85	-1.87	1.14	-0.60	8.00	Pass
BTHR	4Mbps	2	76	2478	13.30	-2.45	0.56	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BTHR	8Mbps	2	2	2404	4.699	0.980	0.50	Pass
BTHR	8Mbps	2	39	2441	4.683	0.664	0.50	Pass
BTHR	8Mbps	2	76	2478	4.699	0.664	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power Ant 4 (dBm)	Peak Conducted Power Ant 3 (dBm)	Total Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	Total EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BTHR	8Mbps	2	2	2404	17.77	17.80	20.80	30.00	-0.60	20.20	36.00	Pass
BTHR	8Mbps	2	39	2441	17.39	17.33	20.37	30.00	-0.60	19.77	36.00	Pass
BTHR	8Mbps	2	76	2478	16.93	17.64	20.31	30.00	-0.60	19.71	36.00	Pass

**TEST RESULTS DATA**  
**Peak Power Density**

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	Peak PSD Worst +3.01 (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BTHR	8Mbps	2	2	2404	14.13	-0.77	2.24	-0.60	8.00	Pass
BTHR	8Mbps	2	39	2441	13.88	-1.18	1.83	-0.60	8.00	Pass
BTHR	8Mbps	2	76	2478	13.54	-1.64	1.37	-0.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



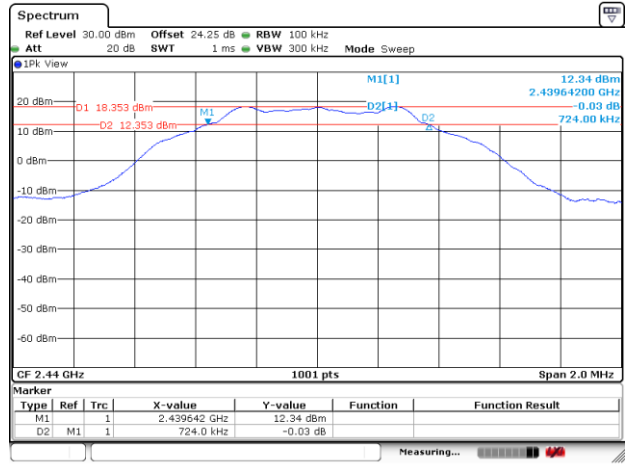
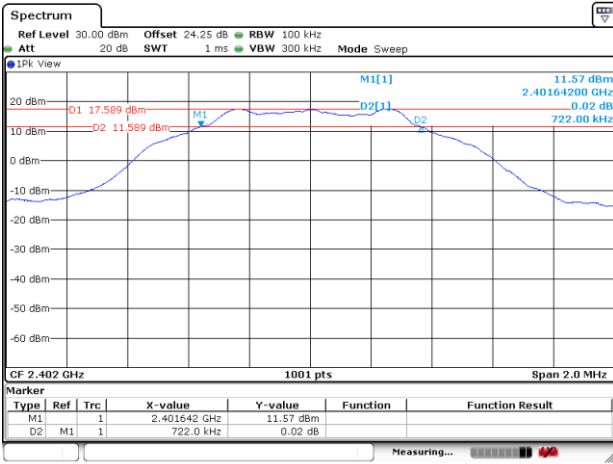
< TXBF BLE Ant. 3 >

6dB Bandwidth

<1Mbps>

6 dB Bandwidth Plot on Channel 00

6 dB Bandwidth Plot on Channel 19



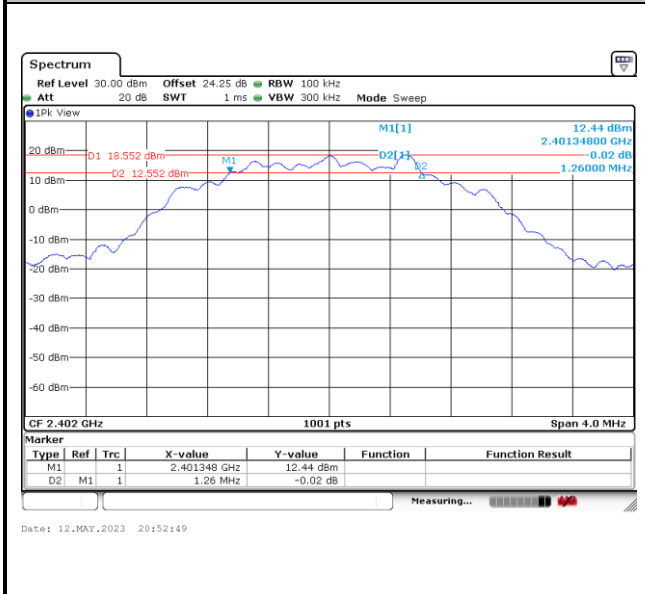
6 dB Bandwidth Plot on Channel 39



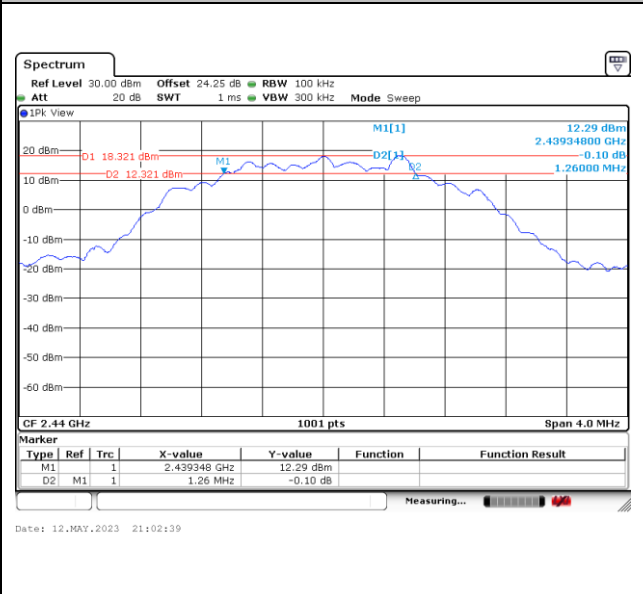


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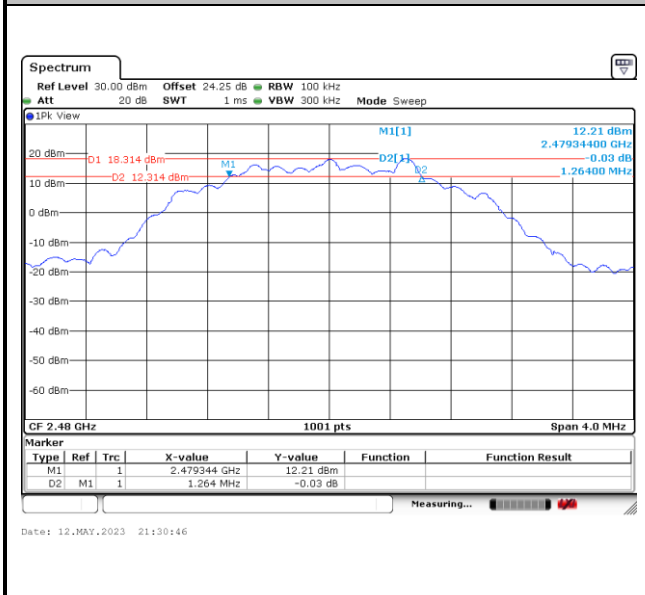
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



6 dB Bandwidth Plot on Channel 39

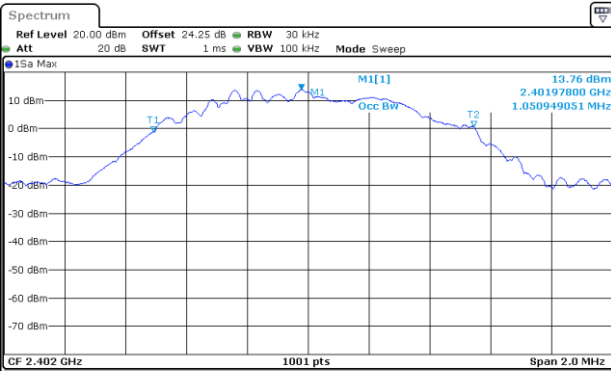




99% Occupied Bandwidth

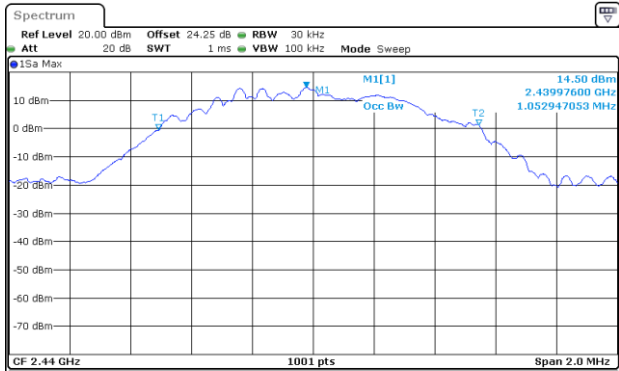
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99% Occupied Bandwidth Plot on Channel 00



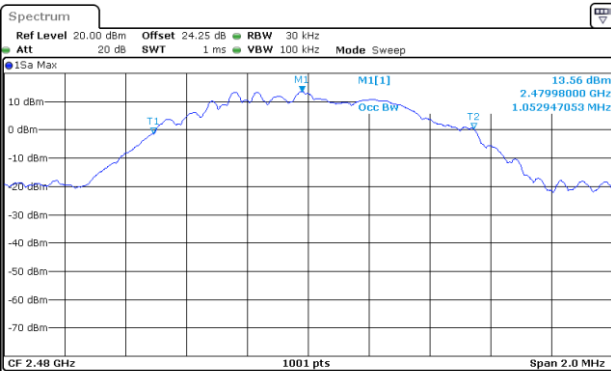
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99% Occupied Plot Bandwidth on Channel 19



Date: 12.MAY.2023 20:57:56

99% Occupied Bandwidth Plot on Channel 39



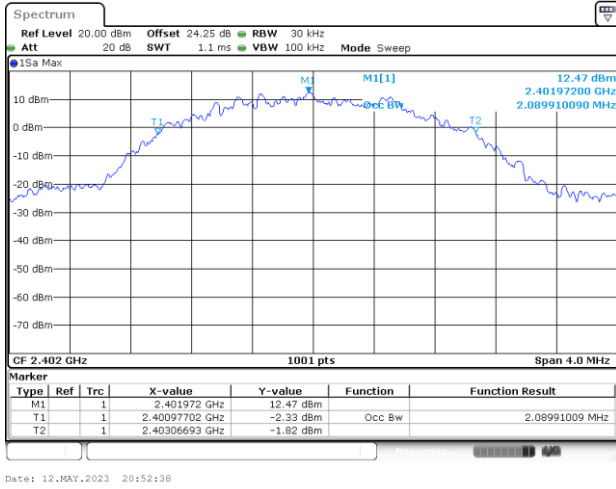
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Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

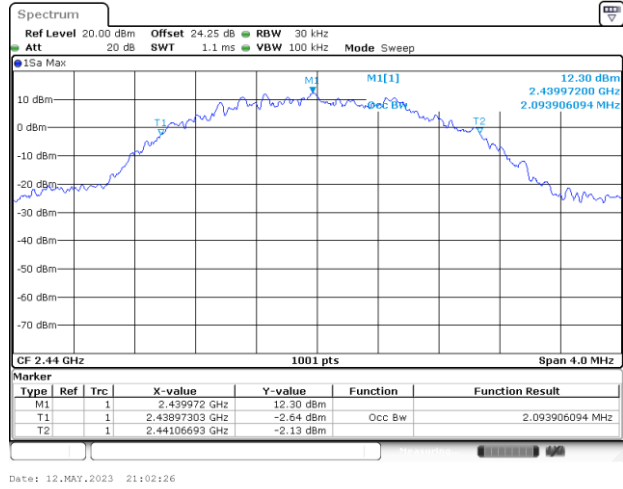


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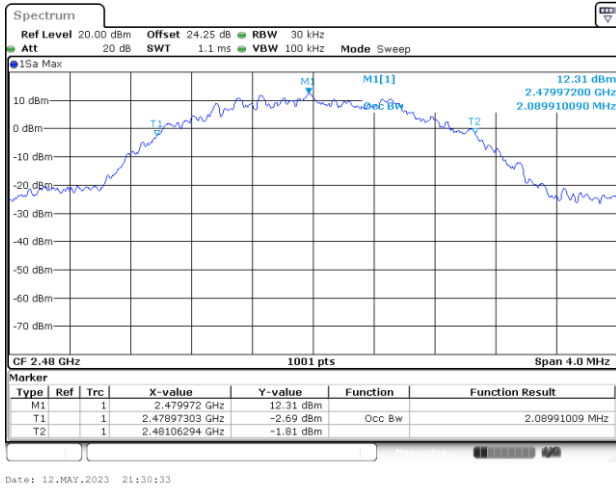
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Plot Bandwidth on Channel 19



99% Occupied Bandwidth Plot on Channel 39

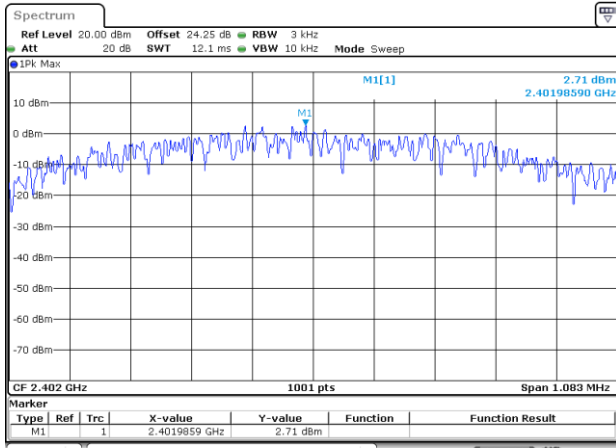




# Power Spectral Density (dBm/3kHz)

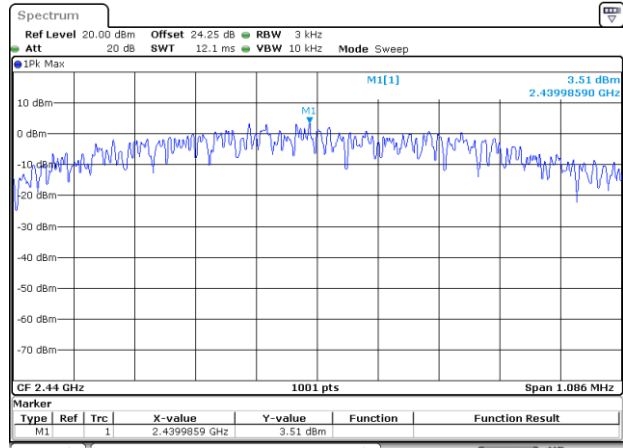
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### Power Density (dBm/3kHz) Plot Channel 00



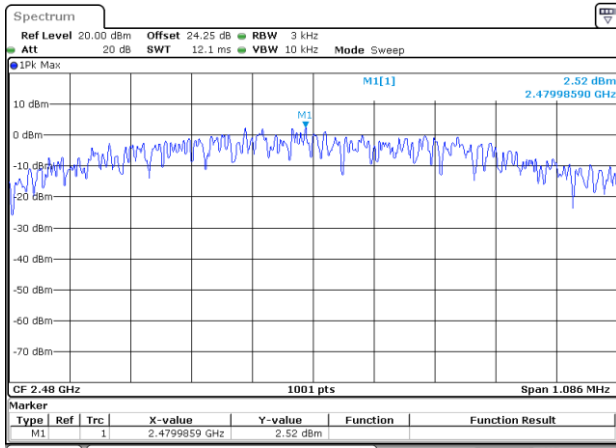
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### Power Density (dBm/3kHz) Plot Channel 19



Date: 12.MAY.2023 20:58:22

### Power Density (dBm/3kHz) Plot Channel 39



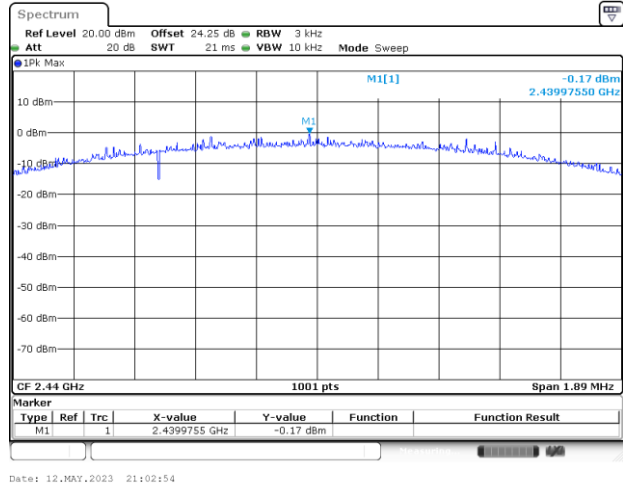
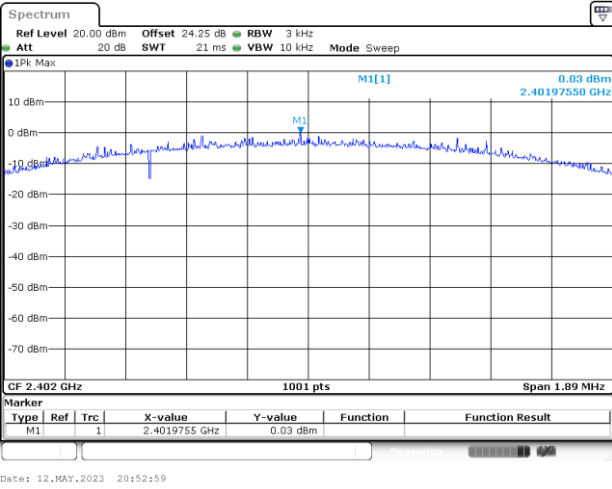
Date: 12.MAY.2023 21:09:36



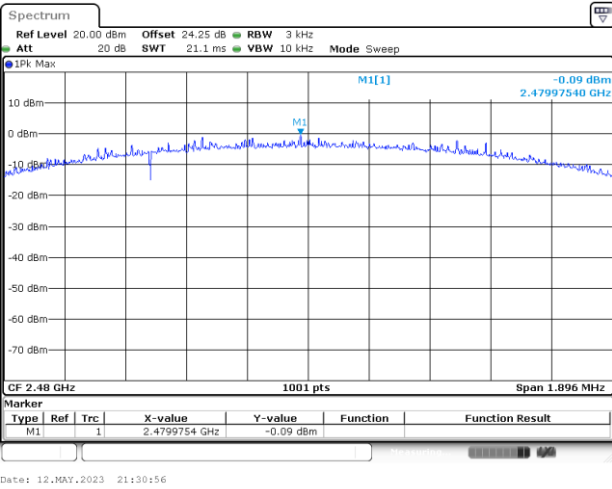
<2Mbps>

Power Density (dBm/3kHz) Plot Channel 00

Power Density (dBm/3kHz) Plot Channel 19



Power Density (dBm/3kHz) Plot Channel 39

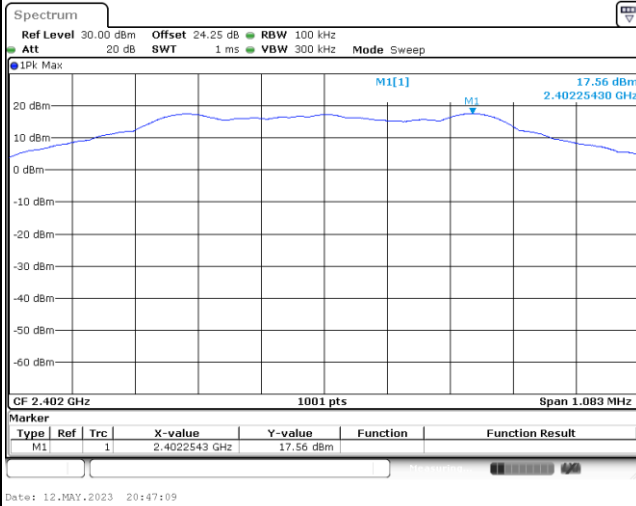




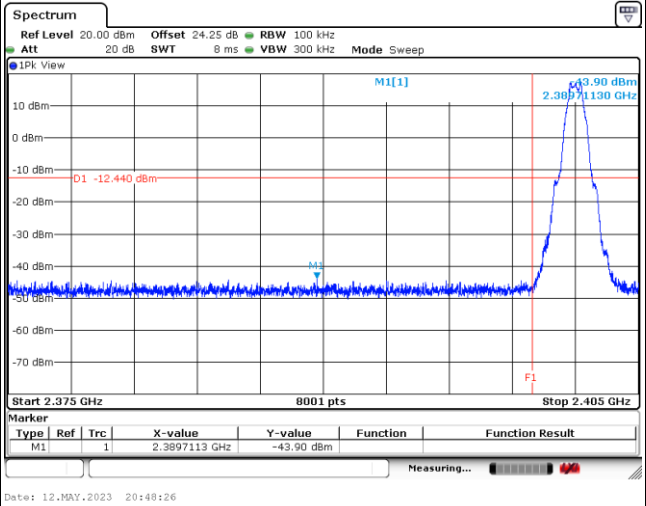
# Band Edge and Spurious Emission

<1Mbps> Channel 00

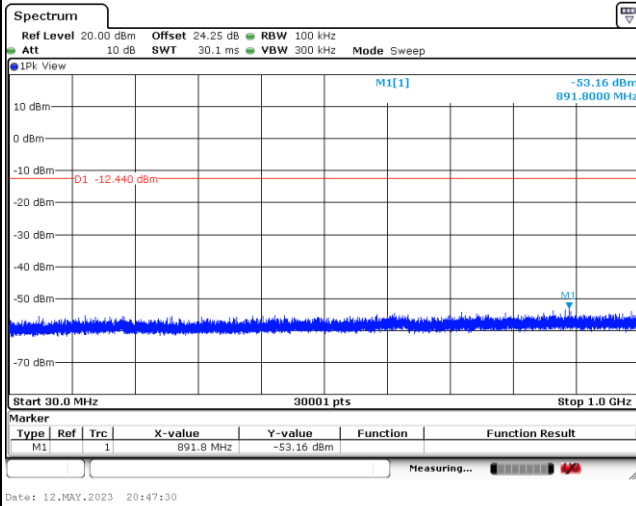
### 100kHz PSD reference Level Plot



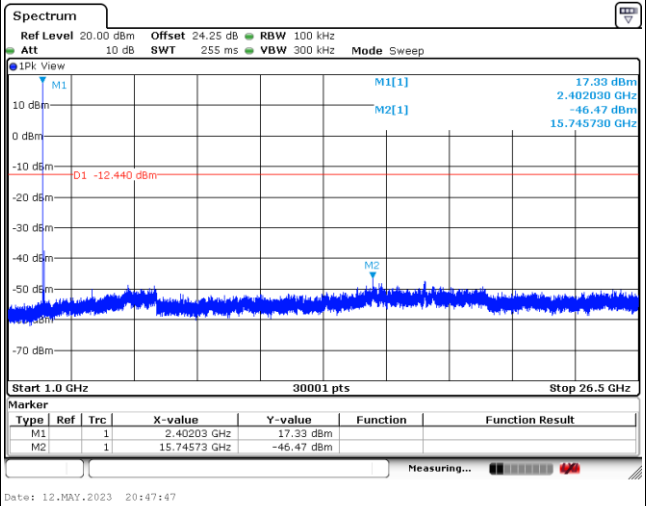
### Low Channel Plot



### Spurious Emission 30MHz~3GHz Plot



### Spurious Emission 2GHz~25GHz Plot

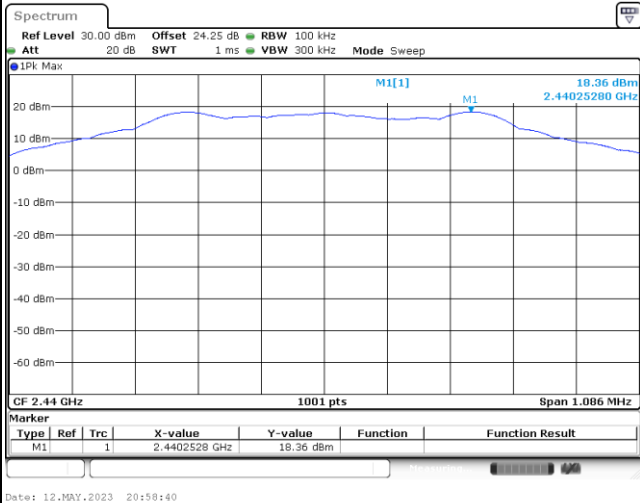






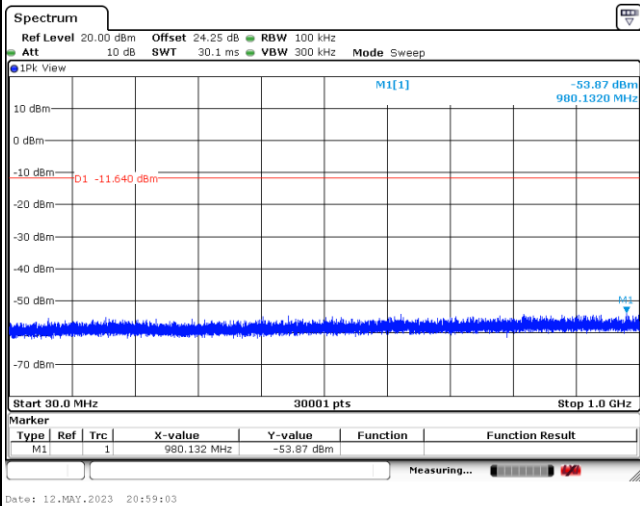
<1Mbps> Channel 19

100kHz PSD reference Level Plot

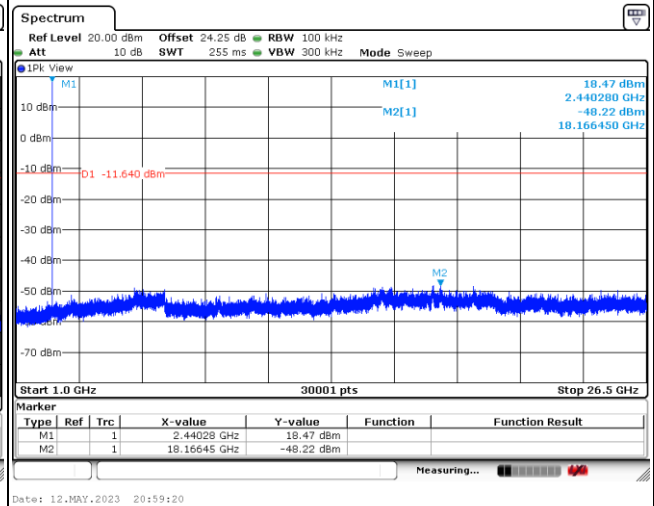


Low Channel Plot

Spurious Emission 30MHz~3GHz Plot



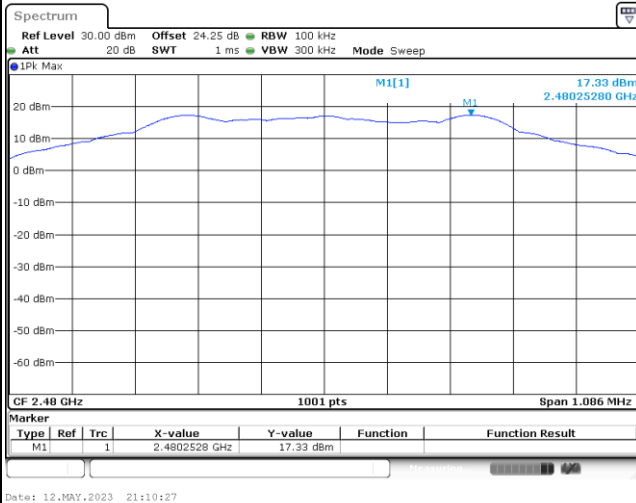
Spurious Emission 2GHz~25GHz Plot



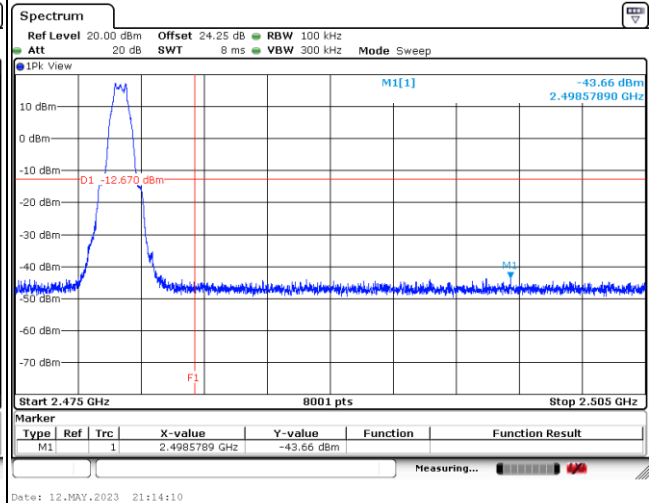


<1Mbps> Channel 39

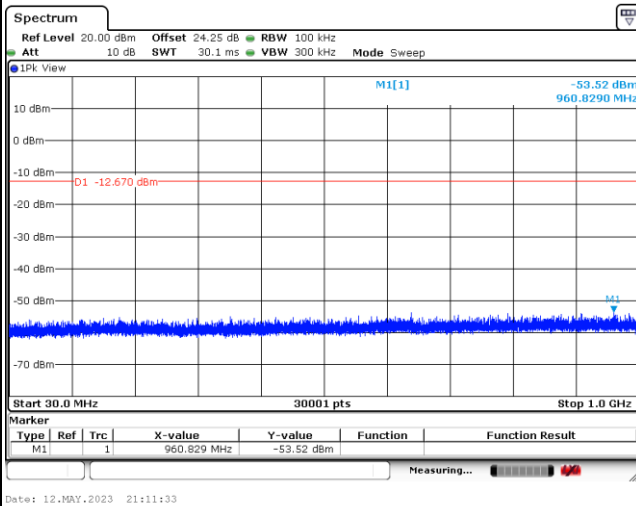
100kHz PSD reference Level Plot



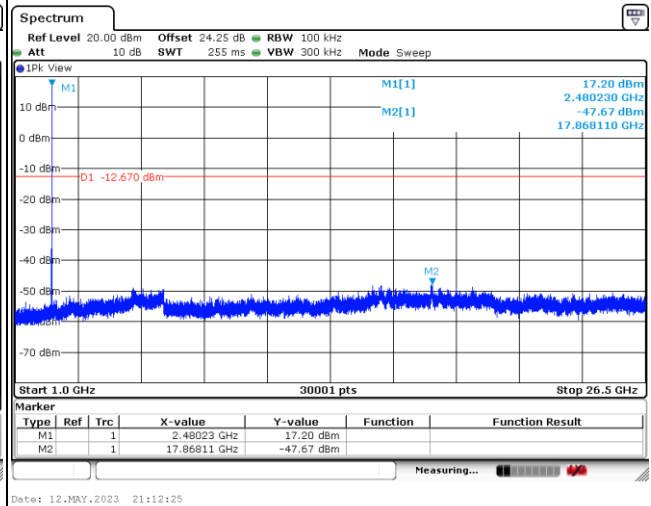
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



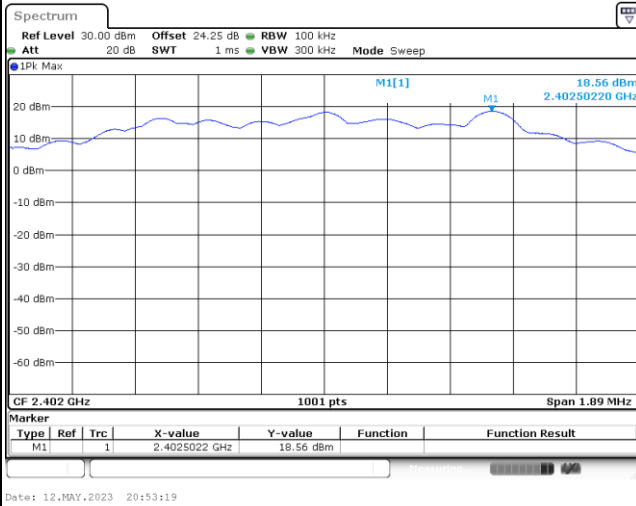
Spurious Emission 2GHz~25GHz Plot



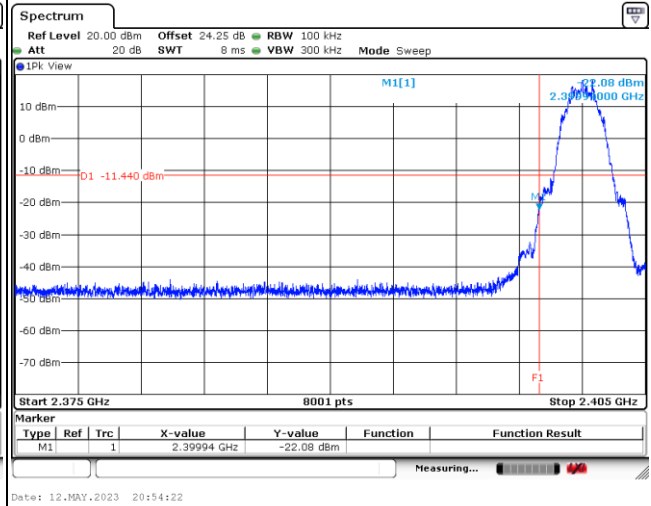


<2Mbps> Channel 00

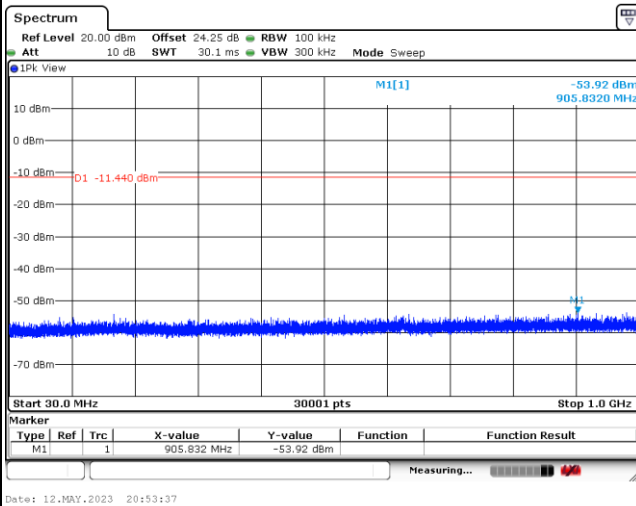
100kHz PSD reference Level Plot



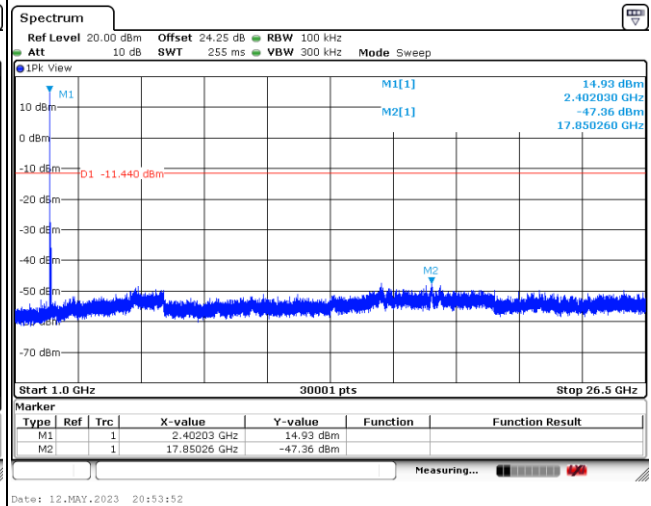
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



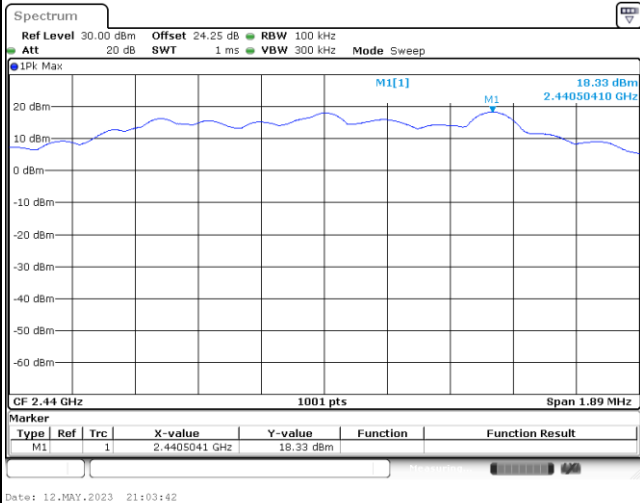
Spurious Emission 2GHz~25GHz Plot





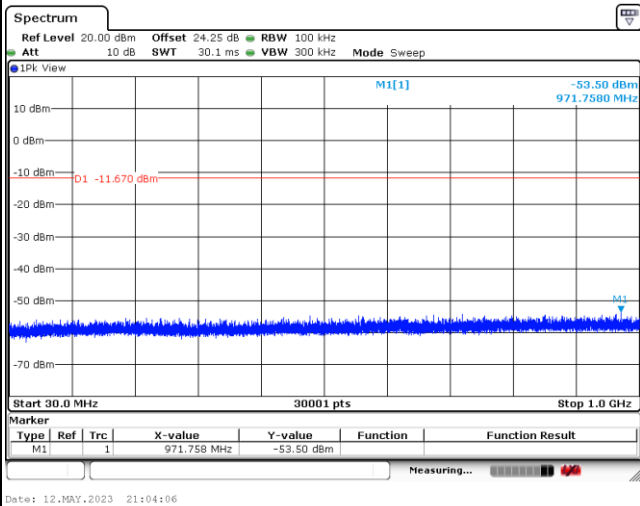
<2Mbps> Channel 19

100kHz PSD reference Level Plot

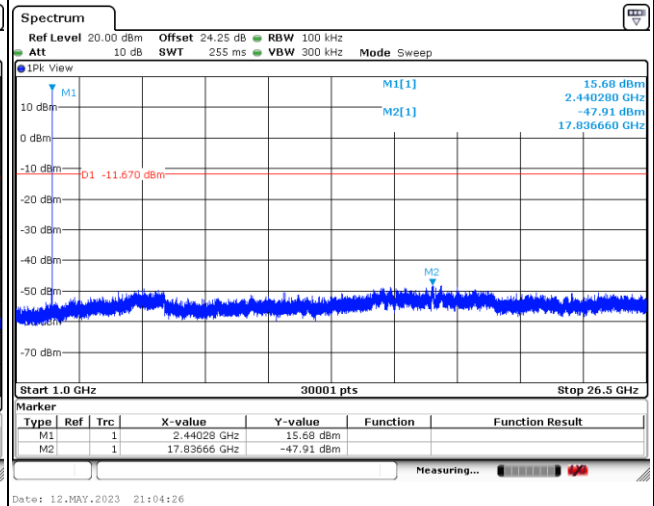


Low Channel Plot

Spurious Emission 30MHz~3GHz Plot



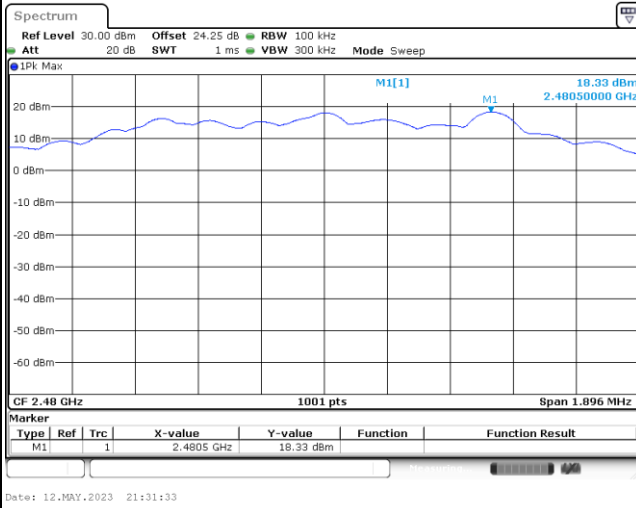
Spurious Emission 2GHz~25GHz Plot



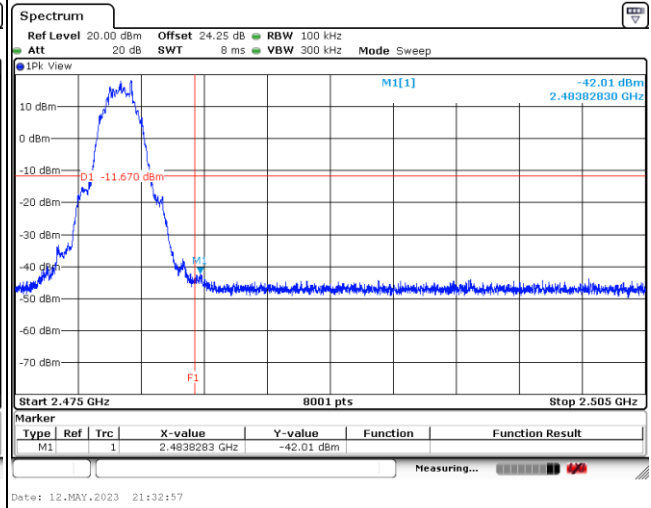


<2Mbps> Channel 39

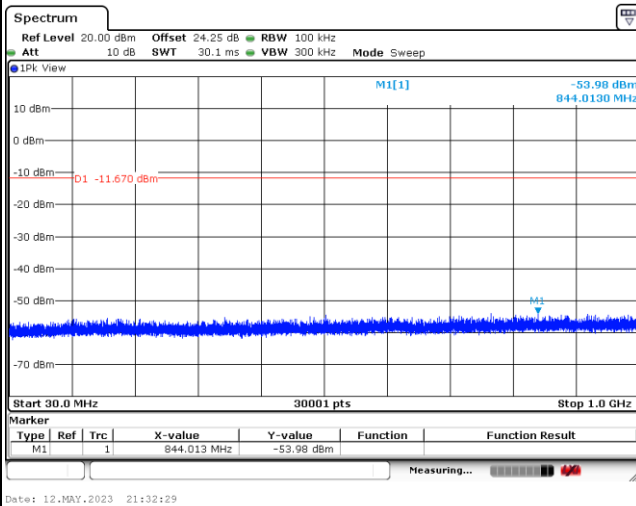
100kHz PSD reference Level Plot



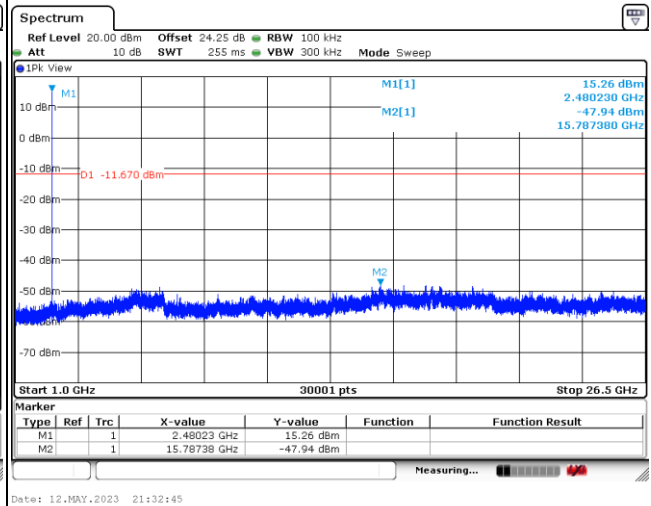
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



Spurious Emission 2GHz~25GHz Plot



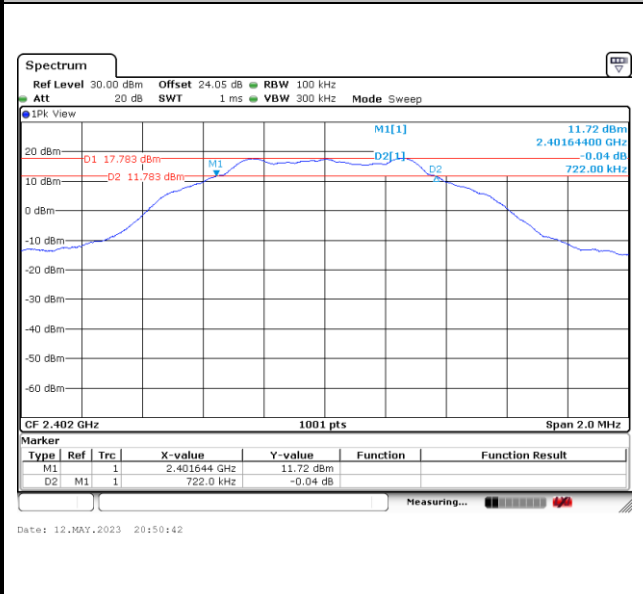


<TXBF BLE Ant. 4>

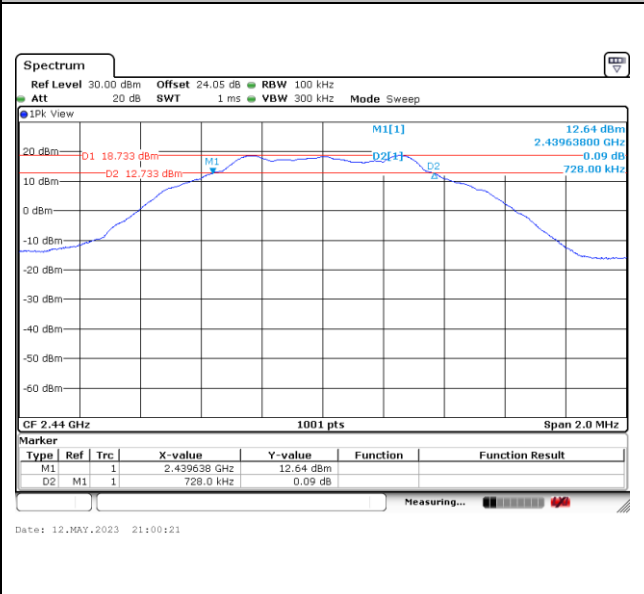
6dB Bandwidth

<1Mbps>

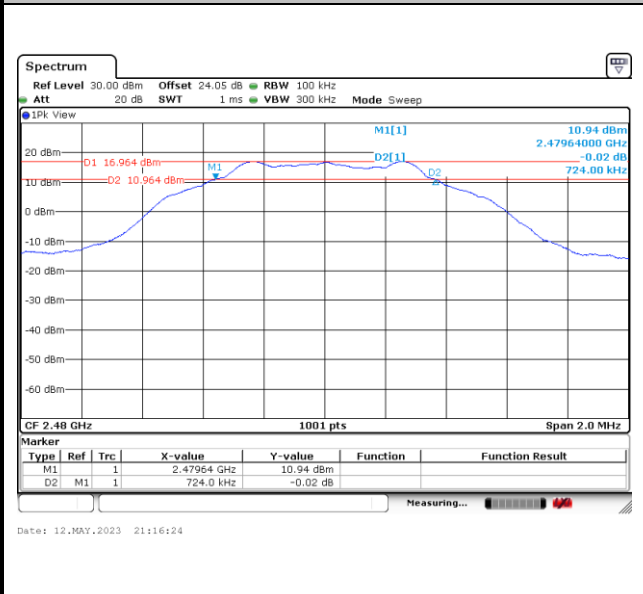
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



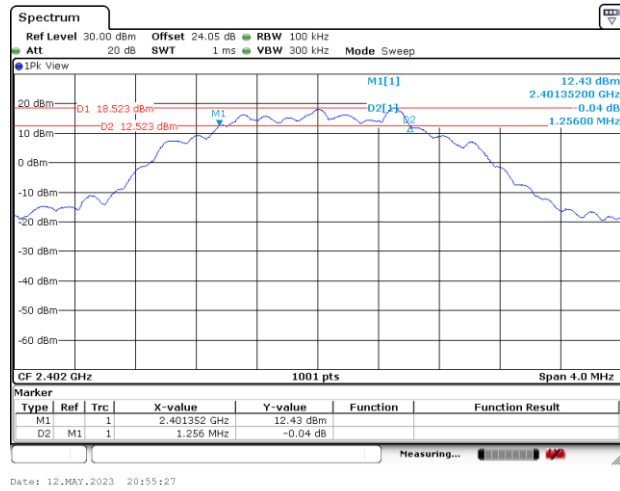
6 dB Bandwidth Plot on Channel 39



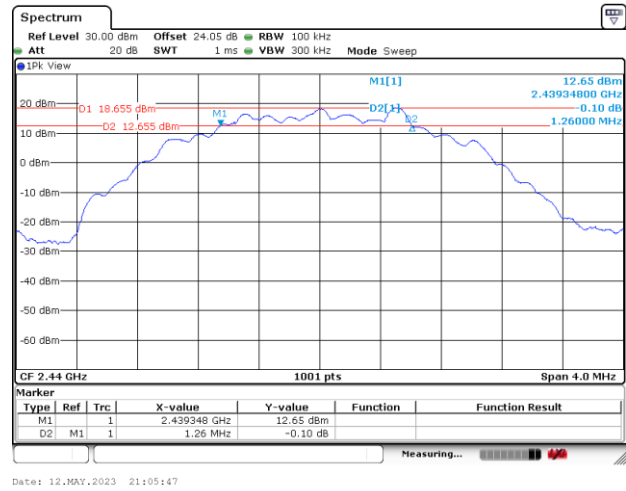


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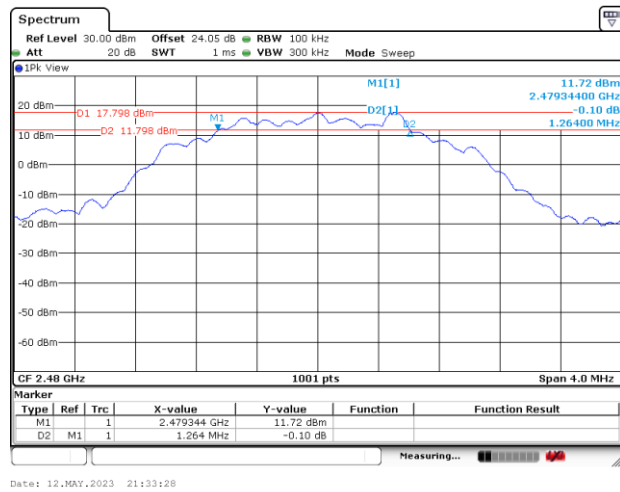
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



6 dB Bandwidth Plot on Channel 39





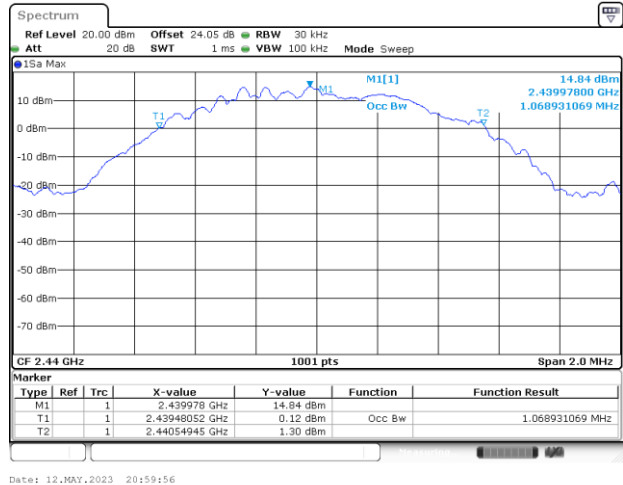
**99% Occupied Bandwidth**

<1Mbps>

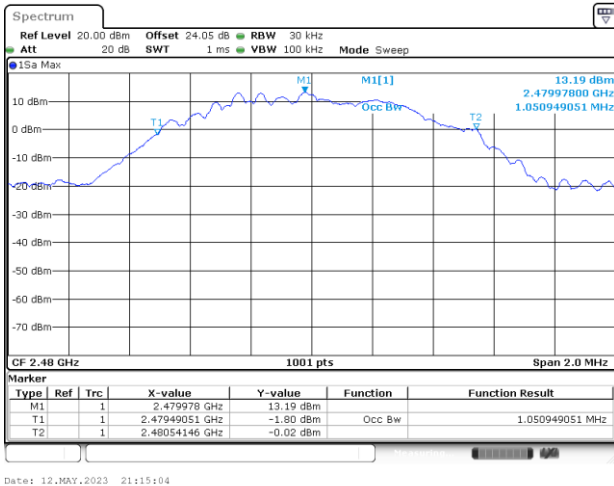
**99% Occupied Bandwidth Plot on Channel 00**



**99% Occupied Plot Bandwidth on Channel 19**



**99% Occupied Bandwidth Plot on Channel 39**



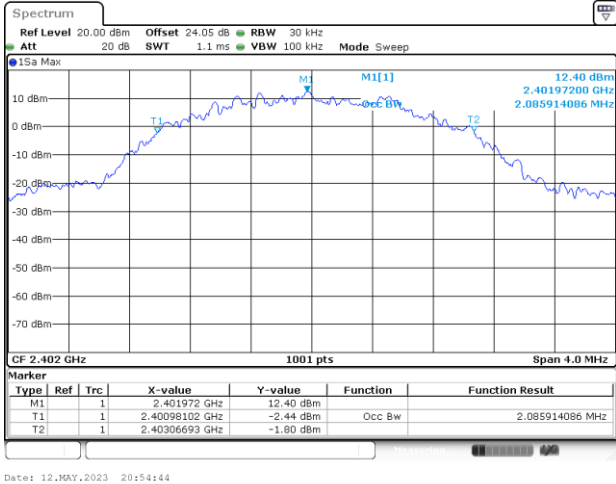
**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



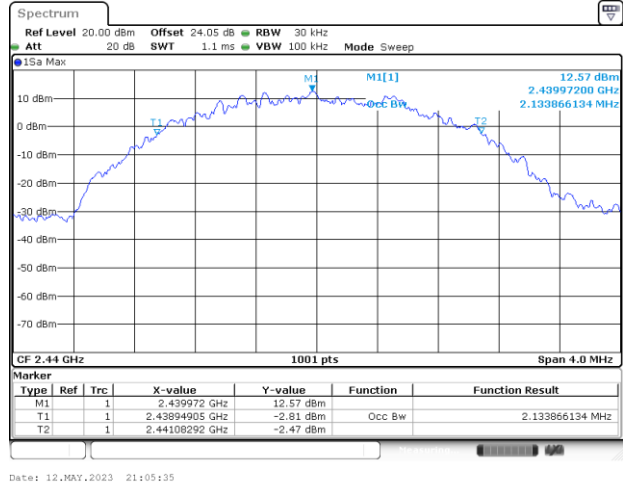


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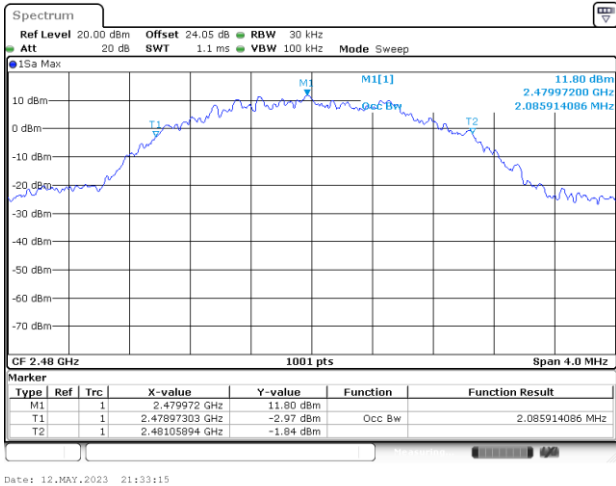
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Plot Bandwidth on Channel 19



99% Occupied Bandwidth Plot on Channel 39

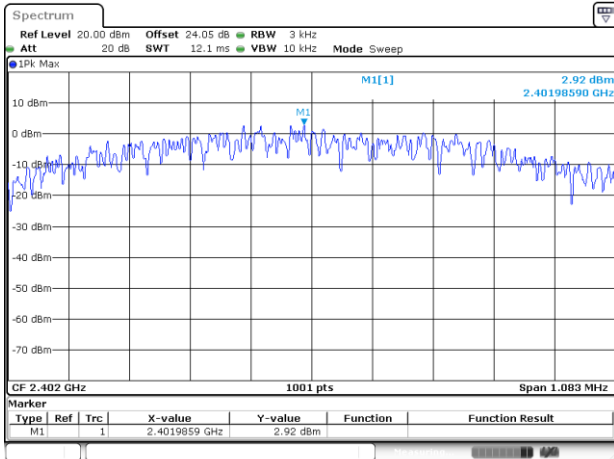




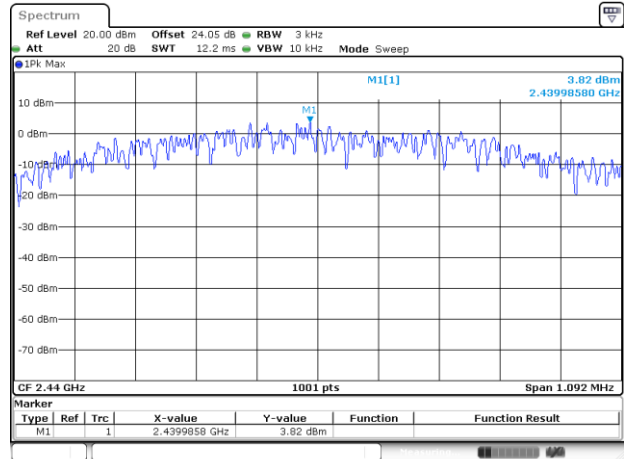
# Power Spectral Density (dBm/3kHz)

<1Mbps>

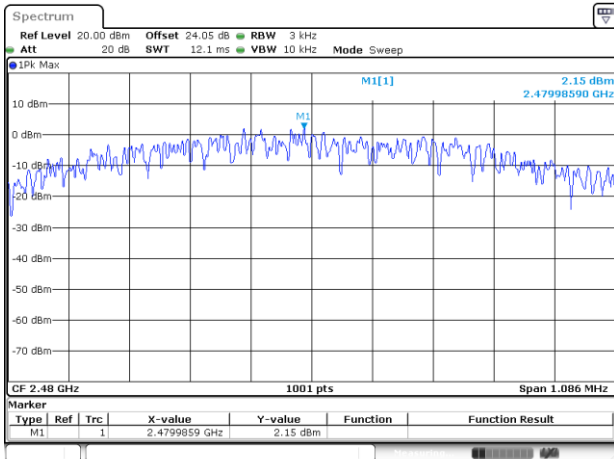
### Power Density (dBm/3kHz) Plot Channel 00



### Power Density (dBm/3kHz) Plot Channel 19



### Power Density (dBm/3kHz) Plot Channel 39

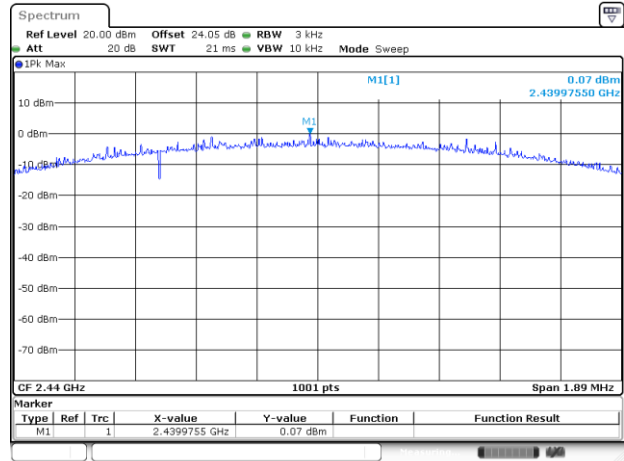
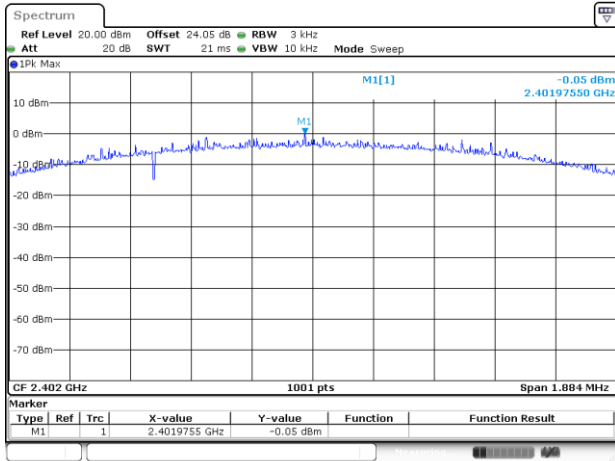




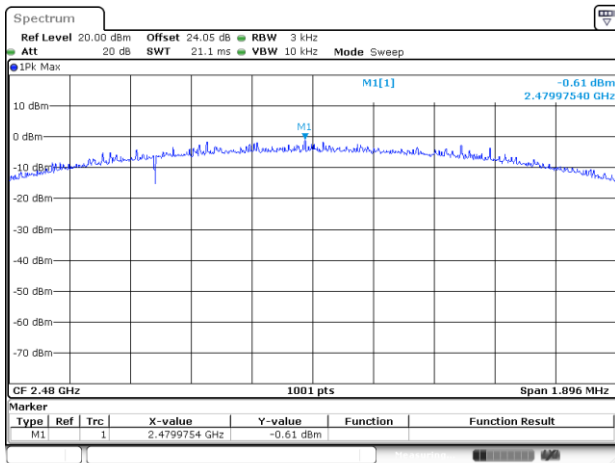
<2Mbps>

Power Density (dBm/3kHz) Plot Channel 00

Power Density (dBm/3kHz) Plot Channel 19



Power Density (dBm/3kHz) Plot Channel 39

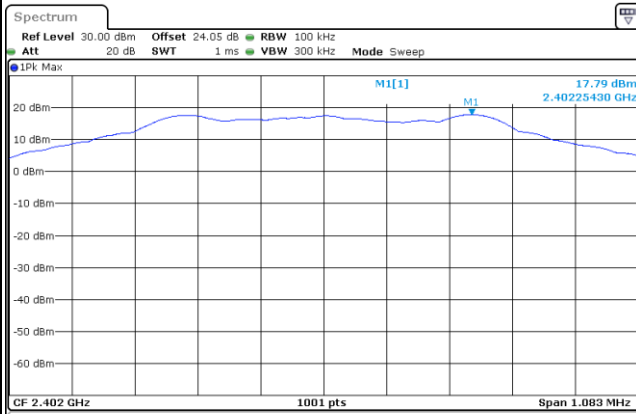




# Band Edge and Spurious Emission

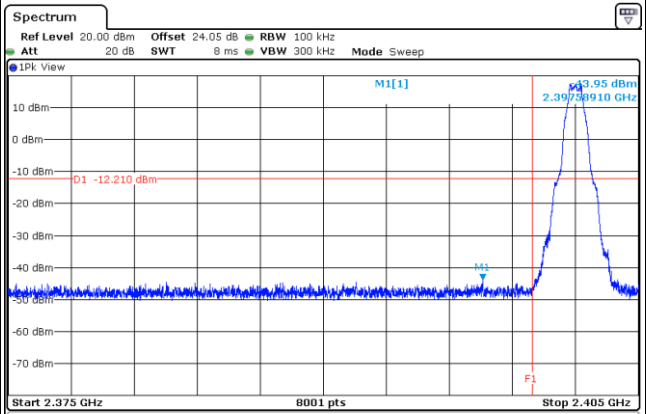
## <1Mbps> Channel 00

### 100kHz PSD reference Level Plot



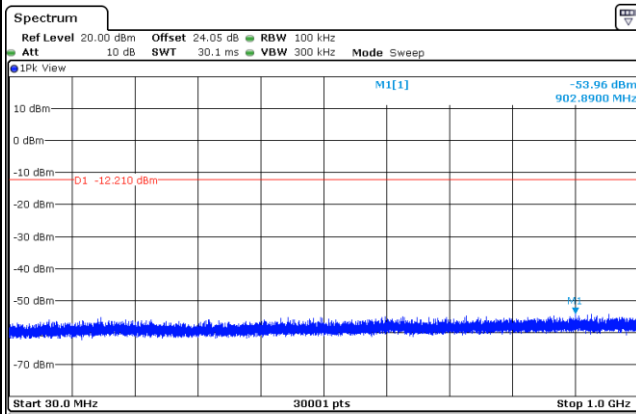
Date: 12.MAY.2023 20:51:13

### Low Channel Plot



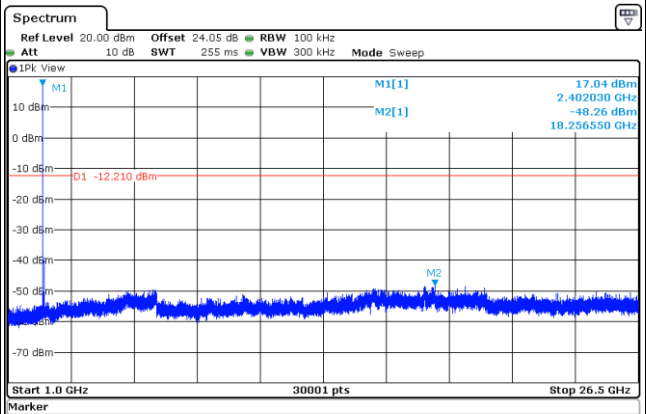
Date: 12.MAY.2023 20:52:01

### Spurious Emission 30MHz~3GHz Plot



Date: 12.MAY.2023 20:51:31

### Spurious Emission 2GHz~25GHz Plot

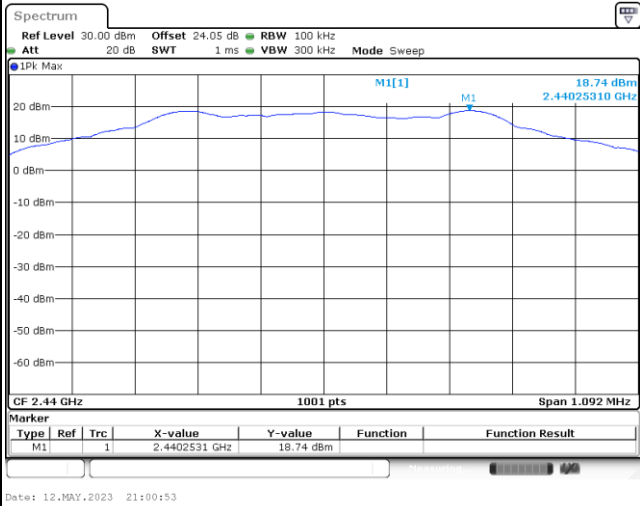


Date: 12.MAY.2023 20:51:47



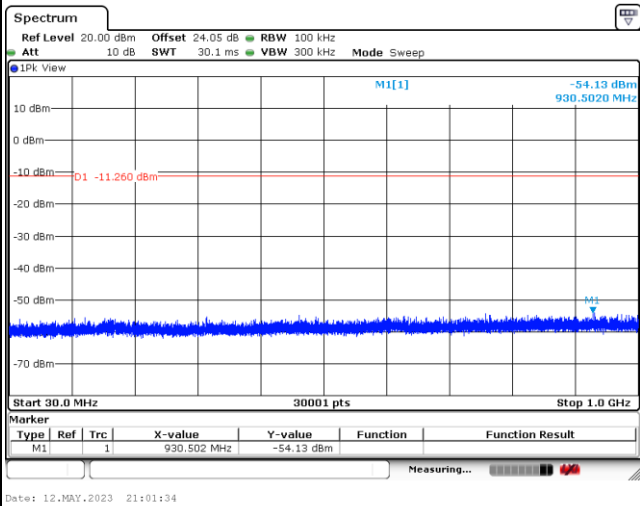
<1Mbps> Channel 19

100kHz PSD reference Level Plot

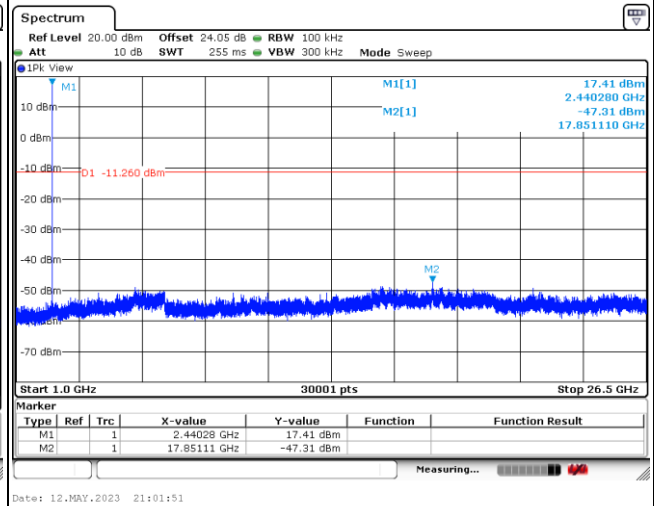


Low Channel Plot

Spurious Emission 30MHz~3GHz Plot



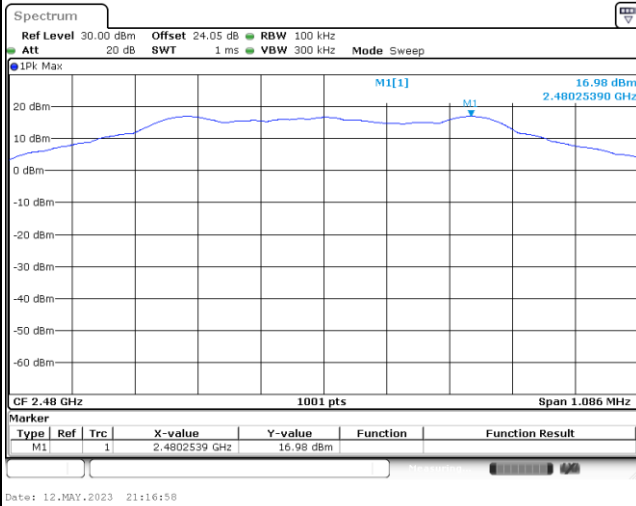
Spurious Emission 2GHz~25GHz Plot



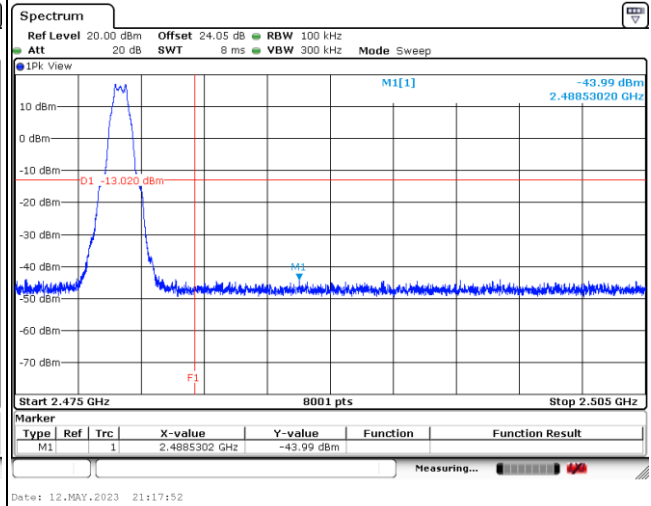


<1Mbps> Channel 39

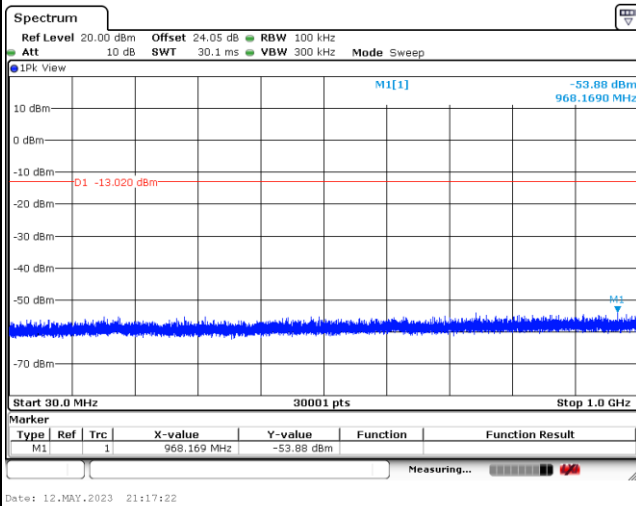
100kHz PSD reference Level Plot



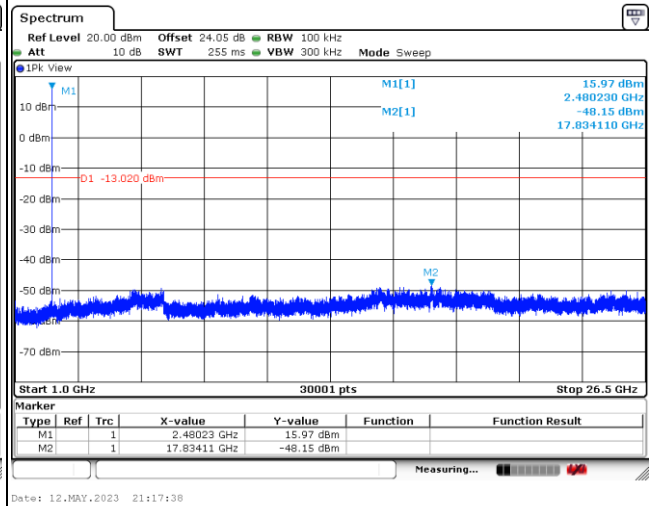
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



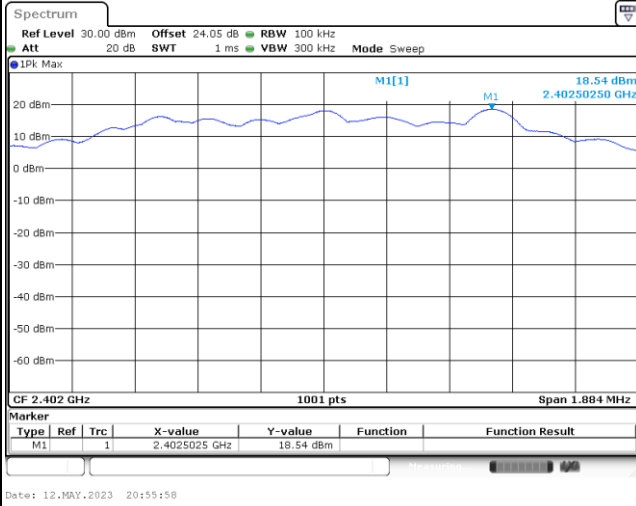
Spurious Emission 2GHz~25GHz Plot



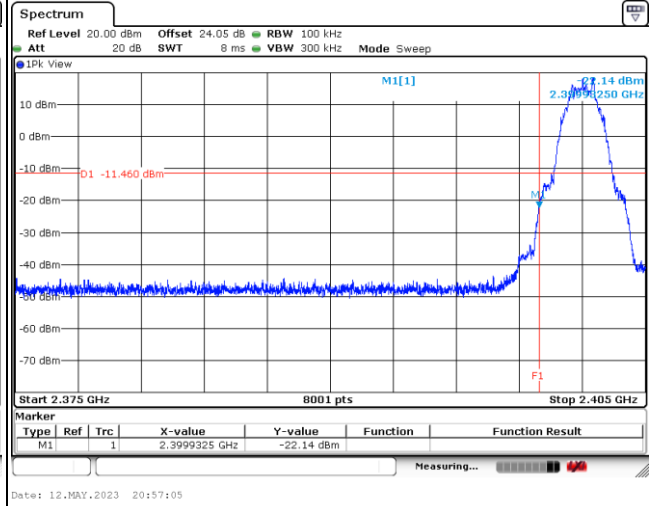


<2Mbps> Channel 00

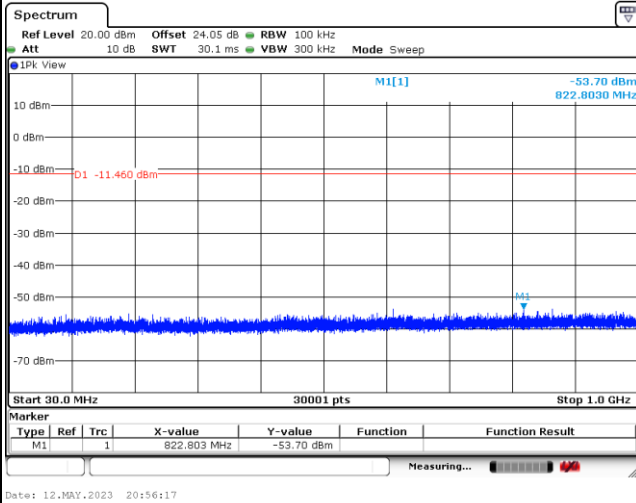
100kHz PSD reference Level Plot



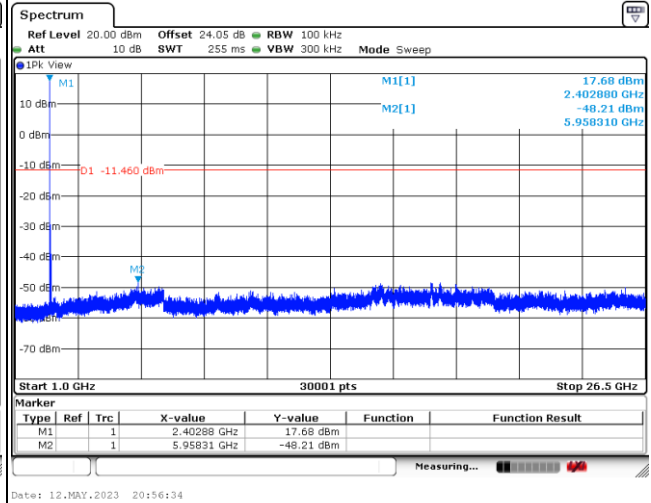
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



Spurious Emission 2GHz~25GHz Plot

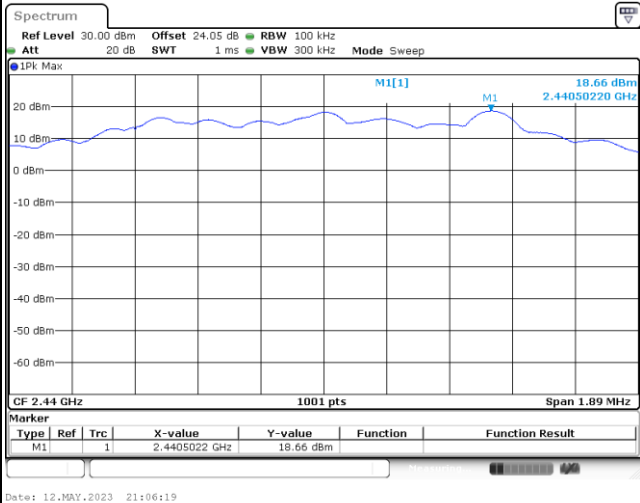




<2Mbps> Channel 19

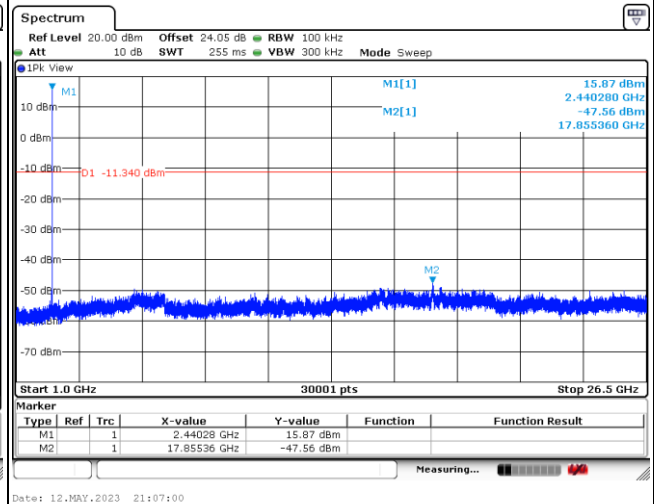
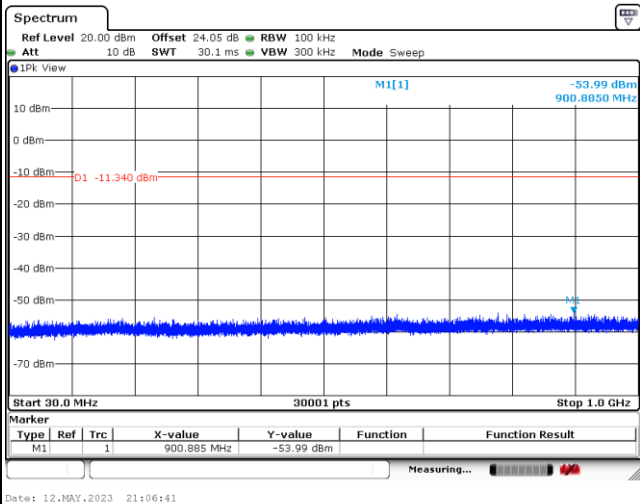
100kHz PSD reference Level Plot

Low Channel Plot



Spurious Emission 30MHz~3GHz Plot

Spurious Emission 2GHz~25GHz Plot

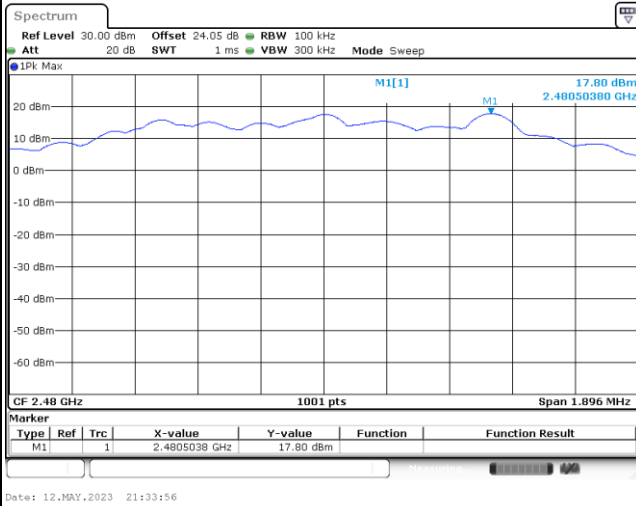




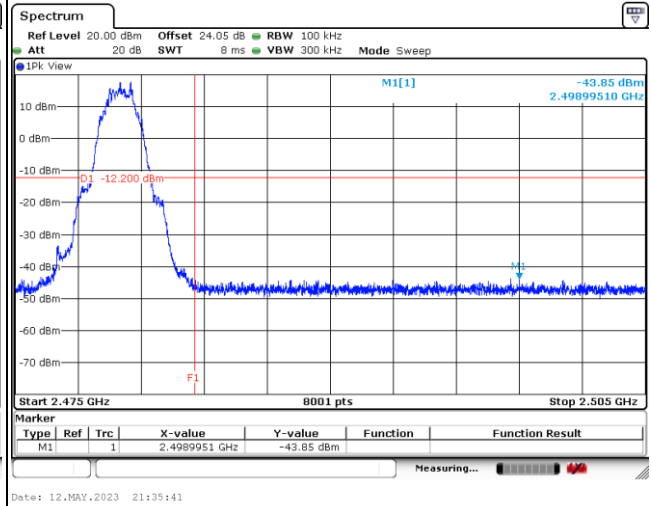


<2Mbps> Channel 39

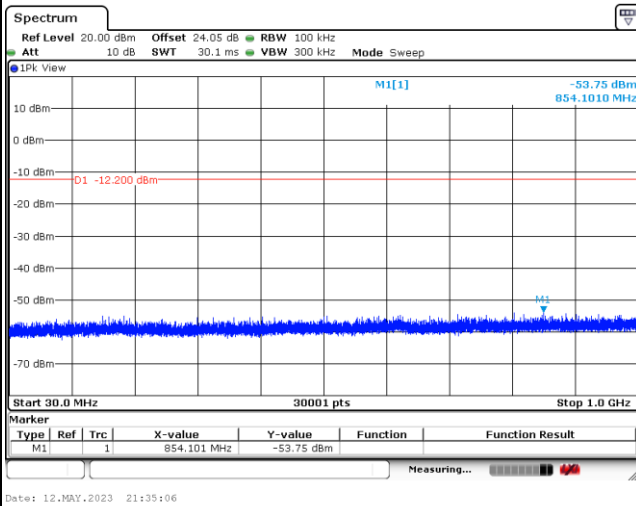
100kHz PSD reference Level Plot



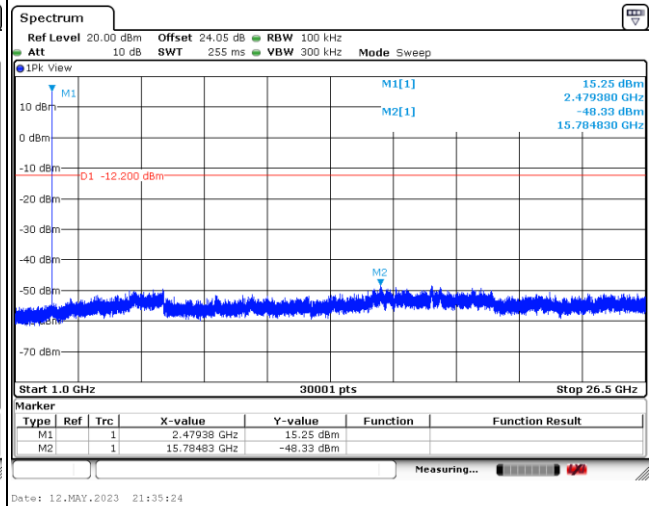
Low Channel Plot



Spurious Emission 30MHz~3GHz Plot



Spurious Emission 2GHz~25GHz Plot



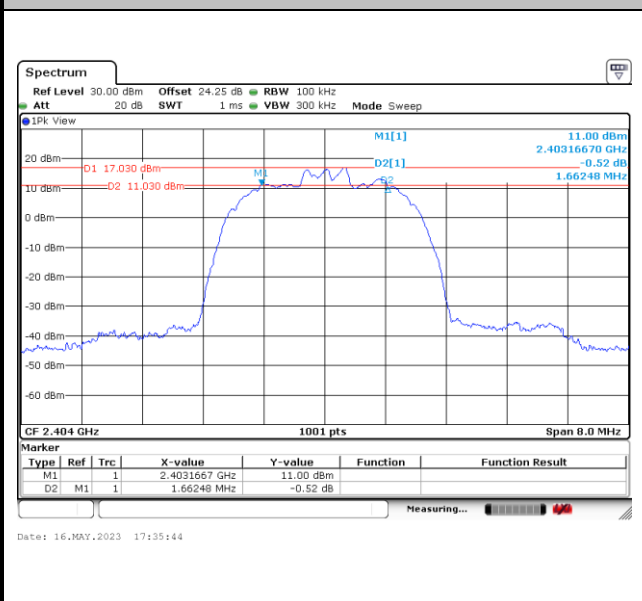


<HR Ant. 3>

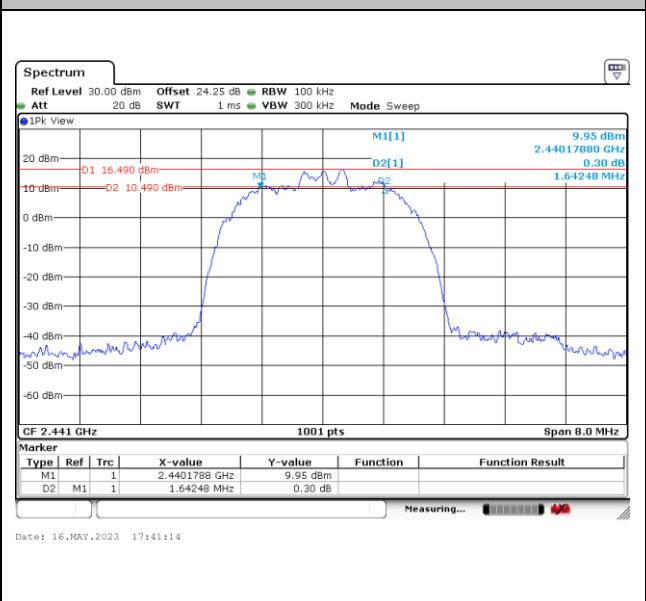
### 6dB Bandwidth

<HR 4Mbps>

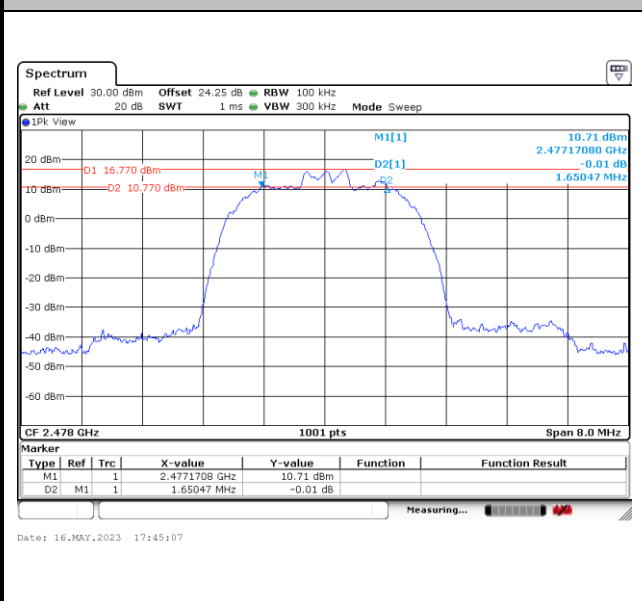
6 dB Bandwidth Plot on Channel 02



6 dB Bandwidth Plot on Channel 39



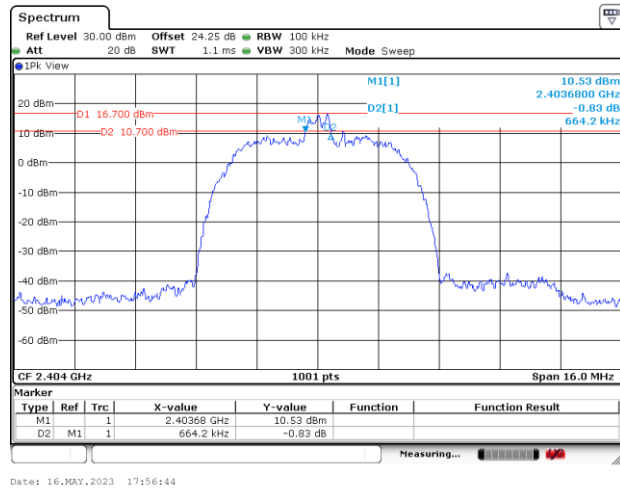
6 dB Bandwidth Plot on Channel 76



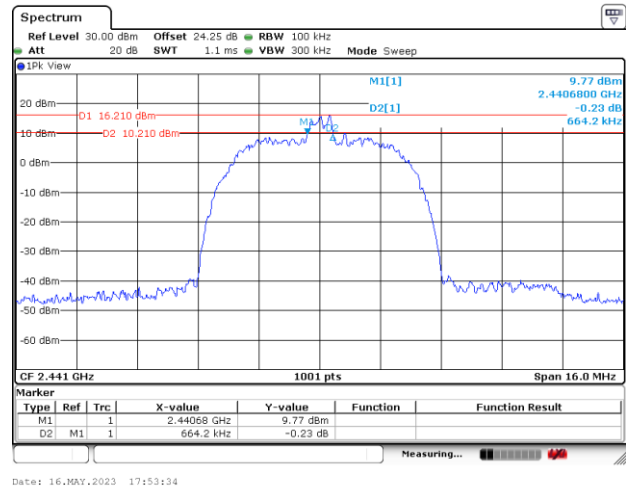


< HR 8Mbps >

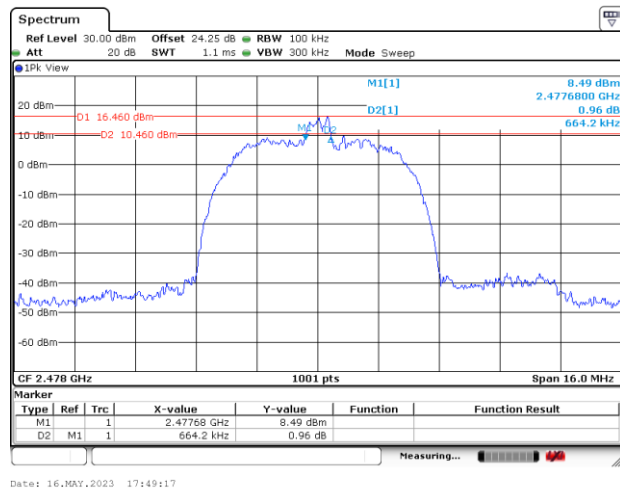
6 dB Bandwidth Plot on Channel 20



6 dB Bandwidth Plot on Channel 39



6 dB Bandwidth Plot on Channel 76

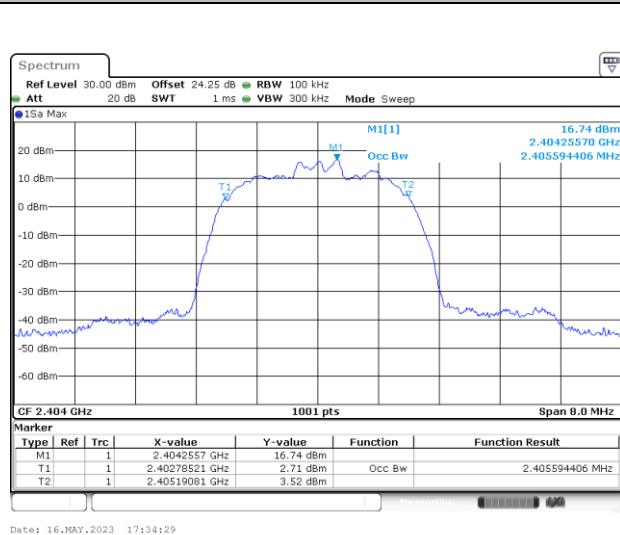




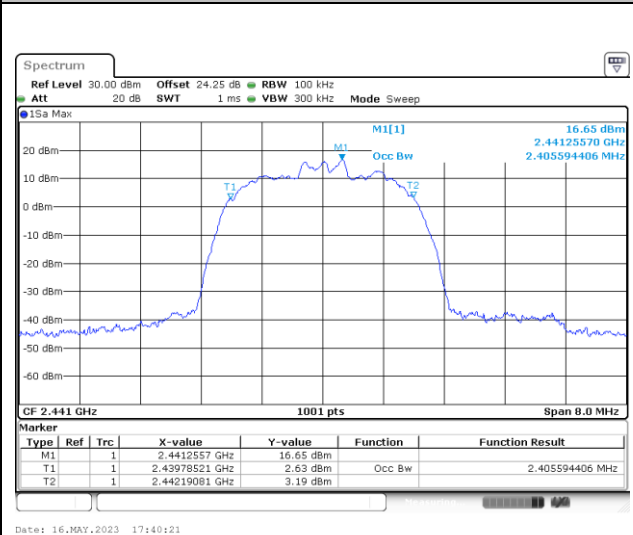
99% Occupied Bandwidth

< HR 4Mbps >

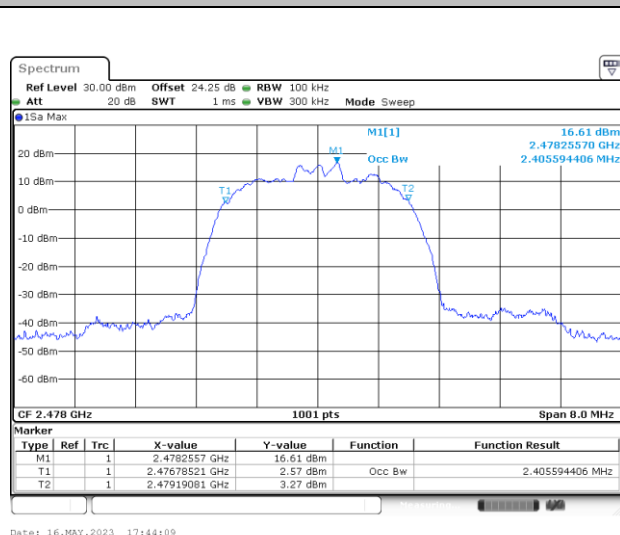
99% Occupied Bandwidth Plot on Channel 02



99% Occupied Plot Bandwidth on Channel 39



99% Occupied Bandwidth Plot on Channel 76

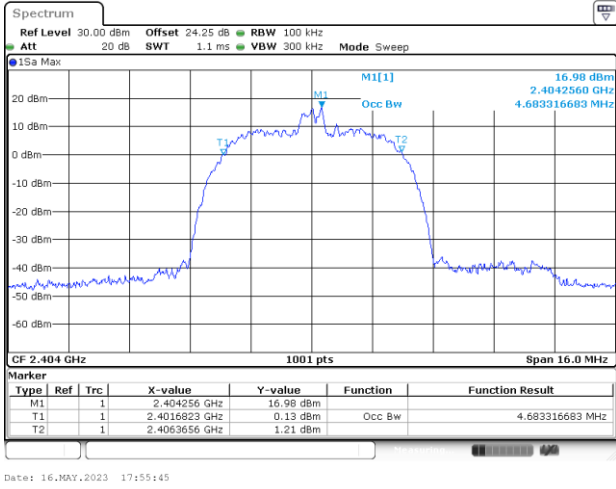


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

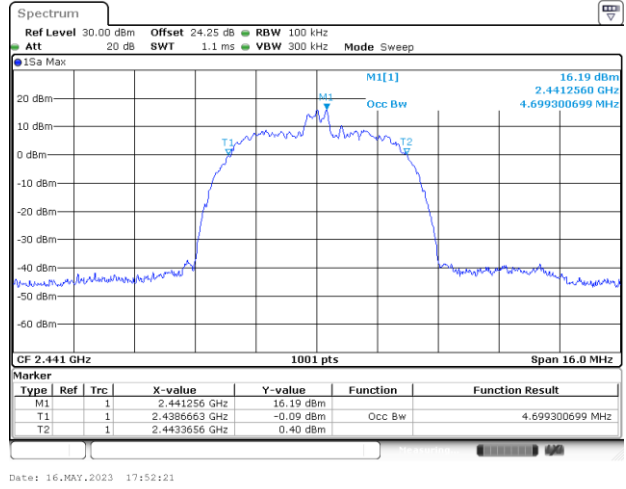


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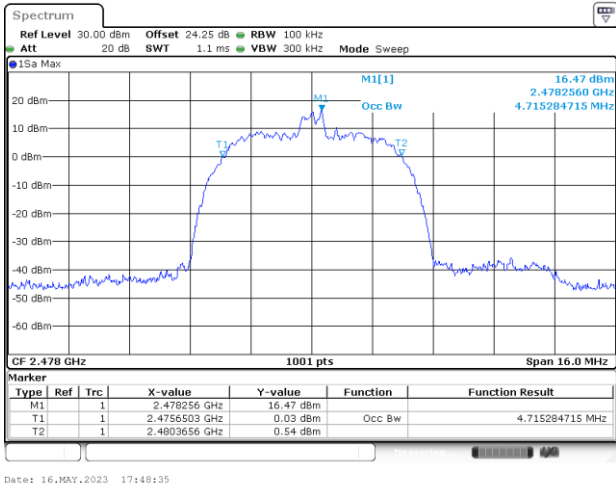
99% Occupied Bandwidth Plot on Channel 02



99% Occupied Plot Bandwidth on Channel 39



99% Occupied Bandwidth Plot on Channel 76

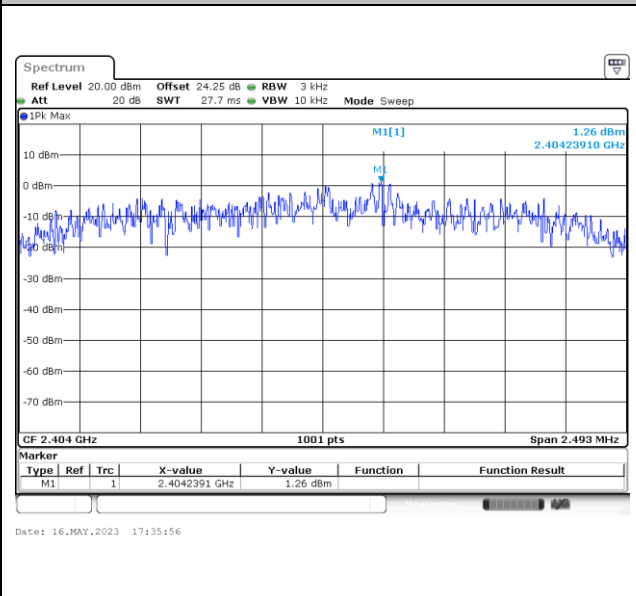




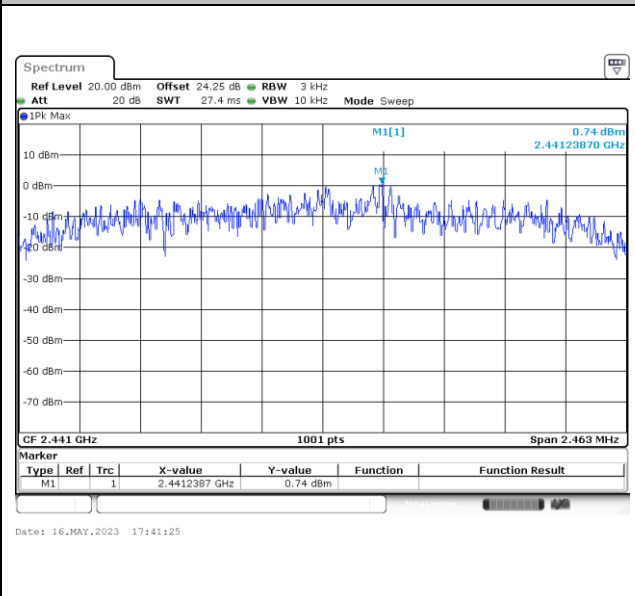
# Power Spectral Density (dBm/3kHz)

< HR 4Mbps >

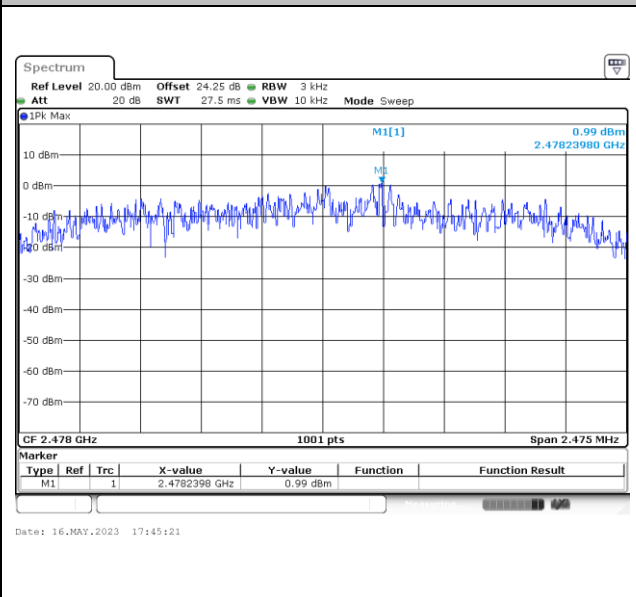
### Power Density (dBm/3kHz) Plot Channel 02



### Power Density (dBm/3kHz) Plot Channel 39



### Power Density (dBm/3kHz) Plot Channel 76

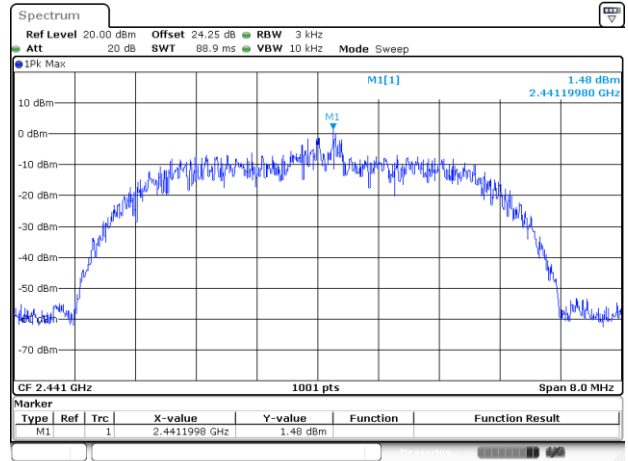
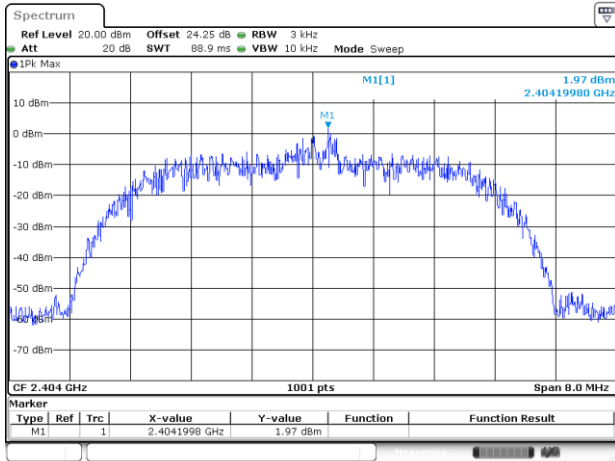




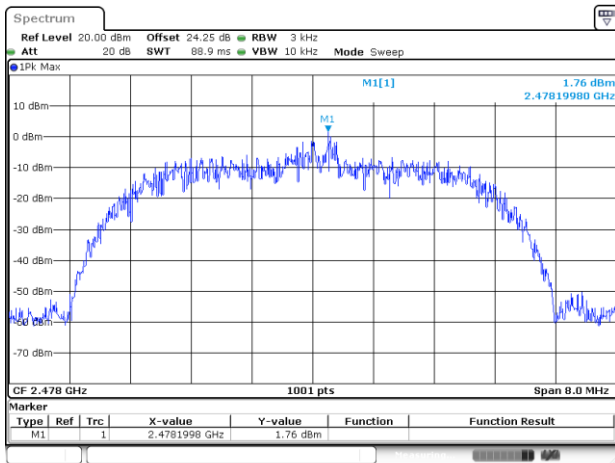
< HR 8Mbps >

Power Density (dBm/3kHz) Plot Channel 02

Power Density (dBm/3kHz) Plot Channel 39



Power Density (dBm/3kHz) Plot Channel 76

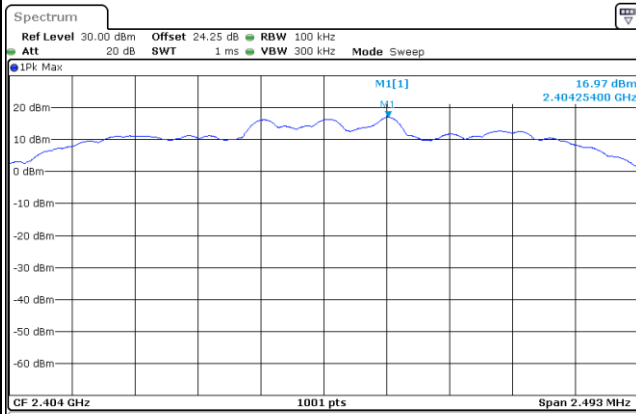




# Band Edge and Spurious Emission

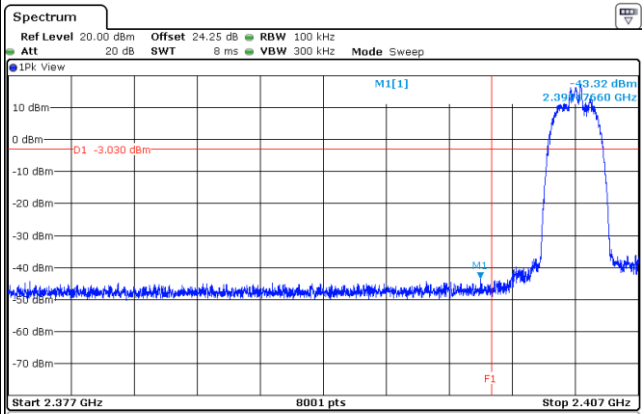
< HR 4Mbps > Channel 02

### 100kHz PSD reference Level Plot



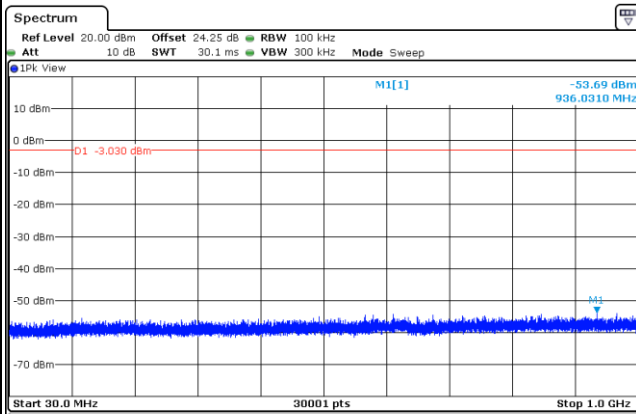
Date: 16.MAY.2023 17:37:16

### Low Channel Plot



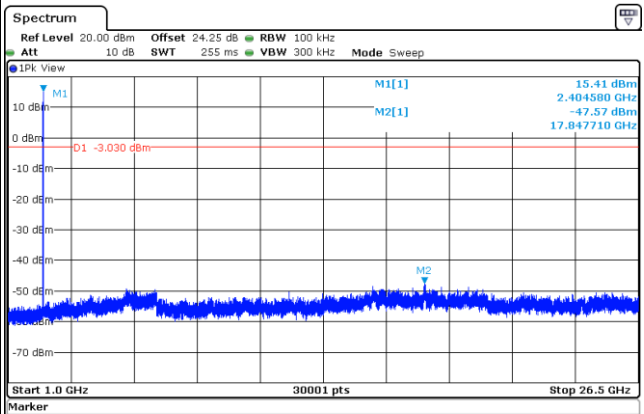
Date: 16.MAY.2023 17:39:21

### Spurious Emission 30MHz~3GHz Plot



Date: 16.MAY.2023 17:37:33

### Spurious Emission 2GHz~25GHz Plot



Date: 16.MAY.2023 17:37:52