FCC RF Test Report

FCC ID	:	UZ7WCMTA
EQUIPMENT	:	Touch Computer
BRAND NAME	:	Zebra
MODEL NAME	:	WCMTA
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 E §15.407
CLASSIFICATION	:	15E 6 GHz Low Power Dual Client (6CD)
TEST DATE(S)	:	Feb. 05, 2023 ~ Mar. 27, 2023

We, Sporton International Inc. (Kunshan), 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 of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FR311602G	01	Initial issue of report	Apr. 27, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403(i) 15.407(a)(10)	26dB Emission Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407(a)(7)	Maximum Conducted Output Power	Reporting only	-
3.2	15.407(a)(7)	Fundamental Maximum EIRP	Pass	-
3.3	15.407(a)(7)	Fundamental Power Spectral Density	Pass	-
3.4	15.407(b)(6)	In-Band Emissions (Channel Mask)	Pass	-
3.5	15.407(d)(6)	Contention Based Protocol	Not Applicable	-
3.5	15.407(b)	Unwanted Emissions	Pass	Under limit 1.89 dB at 5924.96 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 15.35 dB at 0.182 MHz
3.7	15.203 15.407(a)	Antenna Requirement	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Touch Computer
Brand Name	Zebra
Model Name	WCMTA
FCC ID	UZ7WCMTA
Sample 1	Scanner(SE4710)
Sample 2	Scanner(SE5500)
HW Version	DV
SW Version	13-09-09.00-TG-U00-PRD-ATH-04
FW Version	FUSION_QA_4_1.1.0.001_T
MFD	09MAR23
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT: the difference between them is that the scanner model is different. According to the difference, we choose the Sample 1 to perform full test.
3. WIFI 6E 6CD contains two separate reports. This report (FR311602G) is standard client mode for U-NII-5&7, and another report (FR311602F) is indoor client mode for U-NII-5~8.

Specification of Accessory				
Battery 1	**Brand Name**	Zebra	**Model Number**	BT-000473

Supported Unit used in test configuration and system				
Battery 2	**Brand Name**	Zebra	**Model Number**	BT-000473B
Battery 3	**Brand Name**	Zebra	**Model Number**	BT-000473E
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-WUA5V12W0US
Earphone 1	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTT1-01
Earphone 2	**Brand Name**	Zebra	**Part Number**	HDST-USBC-PTT1-01
USB Cable (Type C to Type A)	**Brand Name**	Zebra	**Part Number**	CBL-TC5X-USBC2A-01
Type C-Audio Cable (Type C to 3.5mm)	**Brand Name**	Zebra	**Part Number**	ADP-USBC-35MM1-01
Trigger Handle	**Brand Name**	Zebra	**Part Number**	TRG-TC2L-SNP1-01
Hand Strap	**Brand Name**	Zebra	**Part Number**	SG-TC2L-HSTRP1-01
Soft Holster	**Brand Name**	Zebra	**Part Number**	SG-TC2L-HLSTR1-01

1.2 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Frequency Range</td><td>U-NII-5: 5925 MHz ~ 6425 MHz
U-NII-7: 6525 MHz ~ 6875 MHz</td></tr>
<tr><td>Maximum EIRP</td><td><MIMO Ant.7+8>
<U-NII-5>
802.11a : 17.93 dBm / 0.0621 W
802.11ax HE20 : 17.79 dBm / 0.0601 W
802.11ax HE40 : 17.74 dBm / 0.0594 W
802.11ax HE80 : 17.81 dBm / 0.0604 W
802.11ax HE160 : 17.84 dBm / 0.0608 W
<U-NII-7>
802.11a : 19.47 dBm / 0.0885 W
802.11ax HE20 : 19.42 dBm / 0.0875 W
802.11ax HE40 : 19.20 dBm / 0.0832 W
802.11ax HE80 : 19.43 dBm / 0.0877 W
802.11ax HE160 : 19.25 dBm / 0.0841 W</td></tr>
<tr><td>99% Occupied Bandwidth</td><td>802.11a : 20.500 MHz
802.11ax HE20 : 19.740 MHz
802.11ax HE40 : 39.081 MHz
802.11ax HE80 : 78.322 MHz
802.11ax HE160 : 157.283 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td><5925 MHz ~ 6425 MHz >
<Ant. 7> : IFA Antenna with gain 1.52 dBi
<Ant. 8> : IFA Antenna with gain 1.68 dBi
<6525 MHz ~ 6875 MHz >
<Ant. 7> : IFA Antenna with gain 0.58 dBi
<Ant. 8> : IFA Antenna with gain -0.70 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11a : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)</td></tr>
<tr><td>Antenna Function Description</td><td><table>
<tr><td></td><td>Ant. 7</td><td>Ant. 8</td></tr>
<tr><td>802.11 a/ax SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 a/ax CDD</td><td colspan="2">V</td></tr>
<tr><td>802.11 ax SDM</td><td colspan="2">V</td></tr>
<tr><td>802.11 ax TxBF</td><td colspan="2">V</td></tr>
</table></td></tr>
</table>

Remark:

1. 802.11ax support full RU tone and partial RU tone(26/52/242/484/996-tone), both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) are tested for conducted power/PSD/Channel Mask in appendix A, all the other test case were performed with full RU with its maximum power/PSD.
2. The EUT does not support channel puncturing mode.
3. WIFI MIMO support CDD & SDM & Tx Beamforming mode by manufacturer declared.
4. For WLAN SISO & MIMO(CDD) mode of 802.11a, the whole testing has assessed CDD mode by referring to the higher normal conducted power.
5. For WLAN SISO & MIMO(CDD) & MIMO(SDM) mode of 802.11ax, the whole testing has assessed CDD mode by referring to the higher normal conducted power.

6. 802.11ax support Tx Beamforming mode for 802.11ax, and the manufacturer declares that Tx Beamforming power/EIRP is not greater than CDD&SDM mode, so CDD&SDM mode covers Tx Beamforming mode. The detail TX Beamforming power, please refer to “WCMTA_Operation Description”.
7. The device supports 1S2T (CDD & Tx Beamforming) and 2S2T (SDM) mode;
   1S2T: Nss=1, MIMO 2Tx; 2S2T: Nss=2, MIMO 2Tx.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People’s Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH08-KS TH01-KS	CN1257	314309

1.5 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH08-KS	AUDIX	E3	6.2009-8-24
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.6 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. 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

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, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

<U-NII-5>

BW 20M	**Channel**	1	5	9	13	17	21	25	29
	Freq. (MHz)	5955	5975	5995	6015	6035	6055	6075	6095
BW 40M	**Channel**	3		11		19		27	
	Freq. (MHz)	5965		6005		6045		6085	
BW 80M	**Channel**	7				23			
	Freq. (MHz)	5985				6065			
BW 160M	**Channel**	15							
	Freq. (MHz)	6025							

BW 20M	**Channel**	33	37	41	45	49	53	57	61
	Freq. (MHz)	6115	6135	6155	6175	6195	6215	6235	6255
BW 40M	**Channel**	35		43		51		59	
	Freq. (MHz)	6125		6165		6205		6245	
BW 80M	**Channel**	39				55			
	Freq. (MHz)	6145				6225			
BW 160M	**Channel**	47							
	Freq. (MHz)	6185							

BW 20M	**Channel**	65	69	73	77	81	85	89	93
	Freq. (MHz)	6275	6295	6315	6335	6355	6375	6395	6415
BW 40M	**Channel**	67		75		83		91	
	Freq. (MHz)	6285		6325		6365		6405	
BW 80M	**Channel**	71				87			
	Freq. (MHz)	6305				6385			
BW 160M	**Channel**	79							
	Freq. (MHz)	6345							

<U-NII- 7>

BW 20M	**Channel**	-	-	-	-	-	117	121	125
	Freq. (MHz)	-	-	-	-	-	6535	6555	6575
BW 40M	**Channel**	-		-		-		123	
	Freq. (MHz)	-		-		-		6565	
BW 80M	**Channel**	-				-			
	Freq. (MHz)	-				-			
BW 160M	**Channel**	-							
	Freq. (MHz)	-							

BW 20M	**Channel**	129	133	137	141	145	149	153	157
	Freq. (MHz)	6595	6615	6635	6655	6675	6695	6715	6735
BW 40M	**Channel**	131		139		147		155	
	Freq. (MHz)	6605		6645		6685		6725	
BW 80M	**Channel**	135				151			
	Freq. (MHz)	6625				6705			
BW 160M	**Channel**	143							
	Freq. (MHz)	6665							

BW 20M	**Channel**	161	165	169	173	177	181	-	-
	Freq. (MHz)	6755	6775	6795	6815	6835	6855	-	-
BW 40M	**Channel**	163		171		179		-	
	Freq. (MHz)	6765		6805		6845		-	
BW 80M	**Channel**	167				-			
	Freq. (MHz)	6785				-			
BW 160M	**Channel**	-							
	Freq. (MHz)	-							

2.2 Test Mode

Radiated Spurious Emission Test Modes

For Radiated Test Cases, The tests were performed with Adapter. All radiated test mode refer to Appendix C of this report.

Test Cases	
AC Conducted Emission	Mode 1 : 5G NR n71 Rx + BT Link + WLAN Link(6E) + Battery(BT-000473) + USB Cable (CBL-TC5X-USBC2A-01) + Charging from AC Adapter (PWR-WUA5V12W0US)

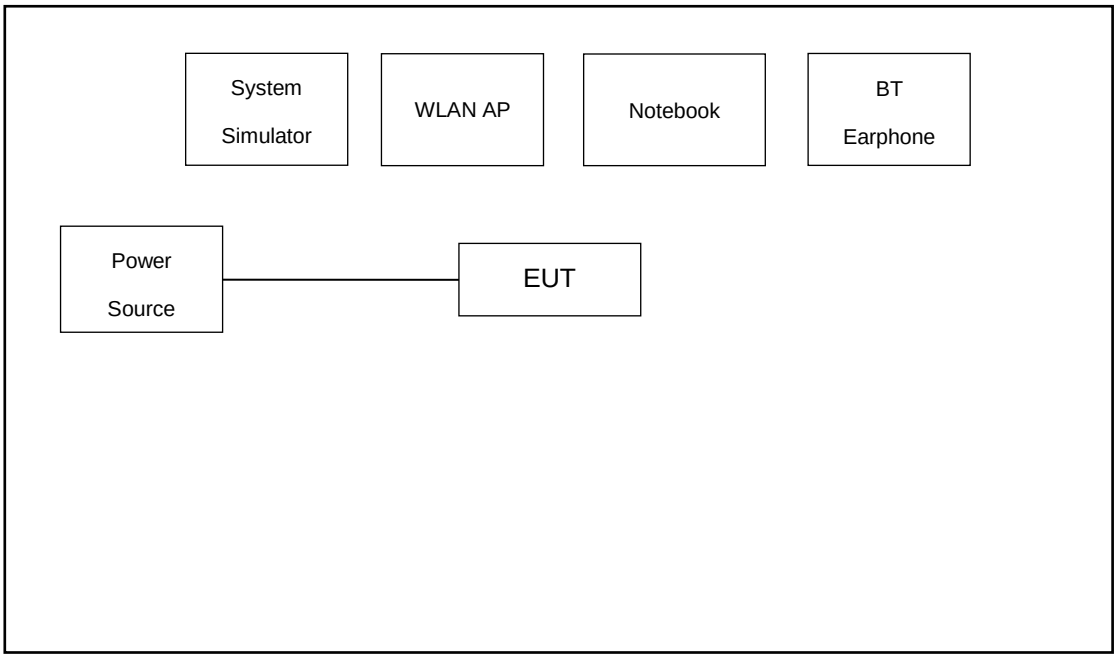
Ch. #		5925-6425 MHz UNII-5	6525-6875 MHz UNII-7	5925-6425 MHz UNII-5	6525-6875 MHz UNII-7
		802.11a/ax HE20	802.11a/ax HE20	802.11ax HE40	802.11ax HE40
L	Low	001	117	003	123
M	Middle	049	149	051	147
H	High	093	181	091	179

Ch. #		5925-6425 MHz UNII-5	6525-6875 MHz UNII-7	5925-6425 MHz UNII-5	6525-6875 MHz UNII-7
		802.11ax HE80	802.11ax HE80	802.11ax HE160	802.11ax HE160
L	Low	007	135	015	143
M	Middle	055	151	047	-
H	High	087	167	079	-

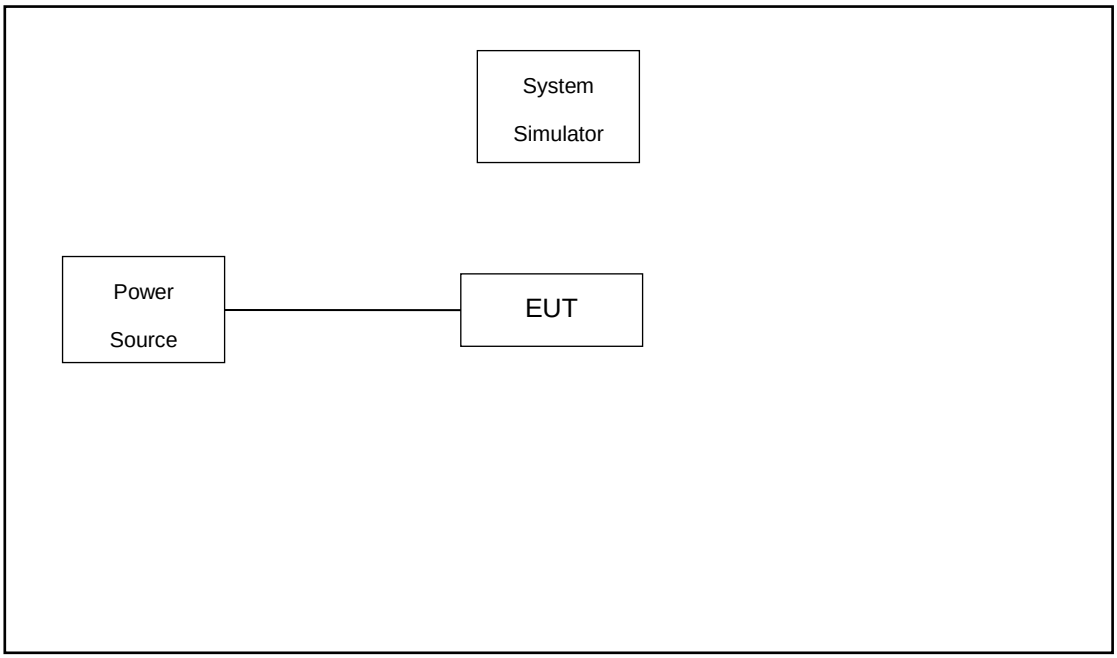
Remark: For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.

2.3 Connection Diagram of Test System

For Conducted Emission:



For Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Anritsu	MT8000A	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded, 1.8m
4.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program (QRCT TX Tool) was provided and enabled to make EUT continuously transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

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 6.29 dB and 10dB attenuator.

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

= 6.29 + 10 = 16.29 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Limit of 26dB & 99% Occupied Bandwidth

<FCC 14-30 CFR 15.407>

(a)(10) The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.

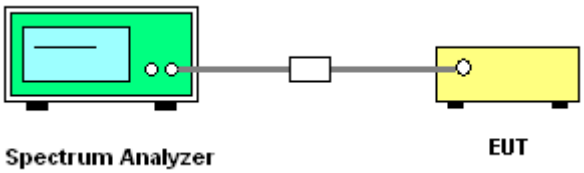
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. 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) ≥ 3 * RBW.
8. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.

3.2 Maximum conducted Output Power and Fundamental Maximum EIRP Measurement

3.2.1 Limit of Fundamental Maximum EIRP

<FCC 14-30 CFR 15.407>

(a)(7) For client devices, except for fixed client devices as defined in this subpart, operating under the control of a standard power access point in 5.925-6.425 GHz and 6.525-6.875 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 30 dBm and the device must limit its power to no more than 6 dB below its associated standard power access point's authorized transmit power.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

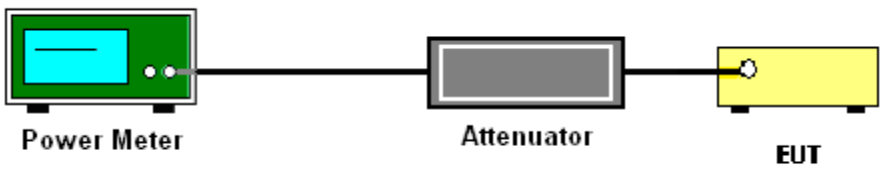
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

3.2.4 Test Setup



3.2.5 Test Result of Fundamental Maximum EIRP

Please refer to Appendix A.

3.3 Fundamental Power Spectral Density Measurement

3.3.1 Limit of Fundamental Power Spectral Density

<FCC 14-30 CFR 15.407>

(a)(7) For client devices, except for fixed client devices as defined in this subpart, operating under the control of a standard power access point in 5.925-6.425 GHz and 6.525-6.875 GHz bands, the maximum power spectral density must not exceed 17 dBm e.i.r.p. in any 1-megahertz band.

3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section F) Maximum power spectral density.

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, attenuator loss and duty factor. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (a): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

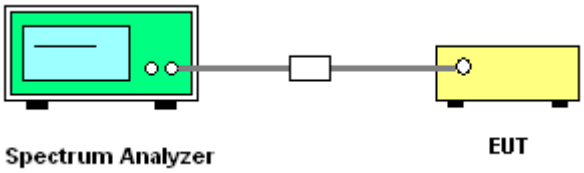
Method (b): Measure and sum spectral maxima across the outputs.

The measurement on each individual output were performed with the same span and number on each individual output. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs.

Method (c): Measure and add 10 log(N_{ANT}) dB, where N_{ANT} is the number of outputs.

The measurement on each individual output were performed with the same span and number on each individual output. The quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

3.4 In-Band Emissions (Channel Mask)

3.4.1 Limit of Unwanted Emissions

<FCC 14-30 CFR 15.407>

(b)(6) For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01.

Section J) In-Band Emissions.

1. Take nominal bandwidth as reference channel bandwidth provided that 26 dB emission bandwidth is always larger than nominal bandwidth
2. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:

   a) Set the span to encompass the entire 26 dB EBW of the signal.

   b) Set RBW = same RBW used for 26 dB EBW measurement.

   c) Set VBW ≥ 3 X RBW

   d) Number of points in sweep ≥ [2 X span / RBW].

   e) Sweep time = auto.

   f) Detector = RMS (i.e., power averaging)

   g) Trace average at least 100 traces in power averaging (rms) mode.

   h) Use the peak search function on the instrument to find the peak of the spectrum.
3. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:

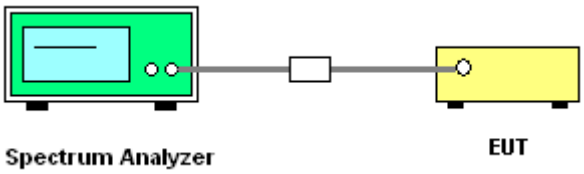
   a. Suppressed by 20 dB at 1 MHz outside of the channel edge.

   b. Suppressed by 28 dB at one channel bandwidth from the channel center.

c. Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.

4. Adjust the span to encompass the entire mask as necessary.
5. Clear trace.
6. Trace average at least 100 traces in power averaging (rms) mode.
7. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

3.4.4 Test Setup



3.4.5 Test Result

Please refer to Appendix A.

3.5 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.5.1 Limit of Unwanted Emissions

(1) For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.

EIRP (dBm)	Field Strength at 3m (dBµV/m)
- 27 (RMS)	68.3
- 7 (Peak)	88.3

According 987594 D02 U-NII 6GHz EMC Measurement v01r01 section G:
Unwanted emissions outside of restricted bands are measured with a RMS detector.
In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table:

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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ µV/m, where P is the eirp (Watts)

3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

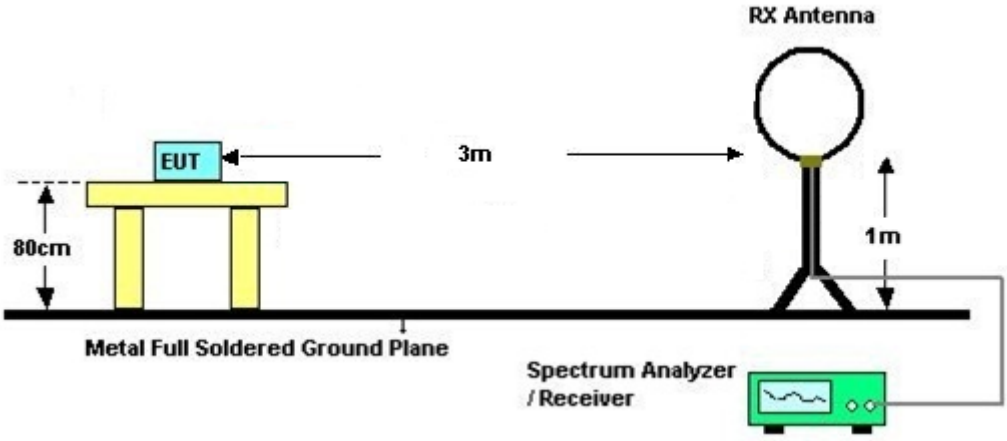
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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.

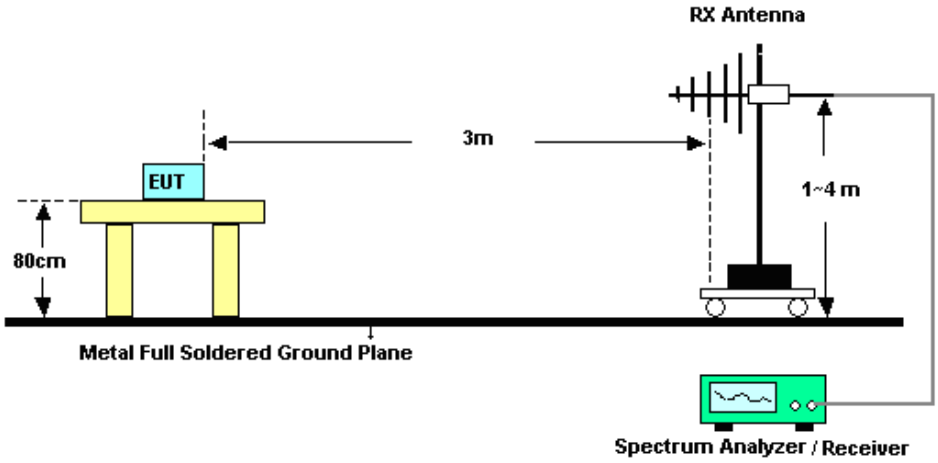
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.5.4 Test Setup

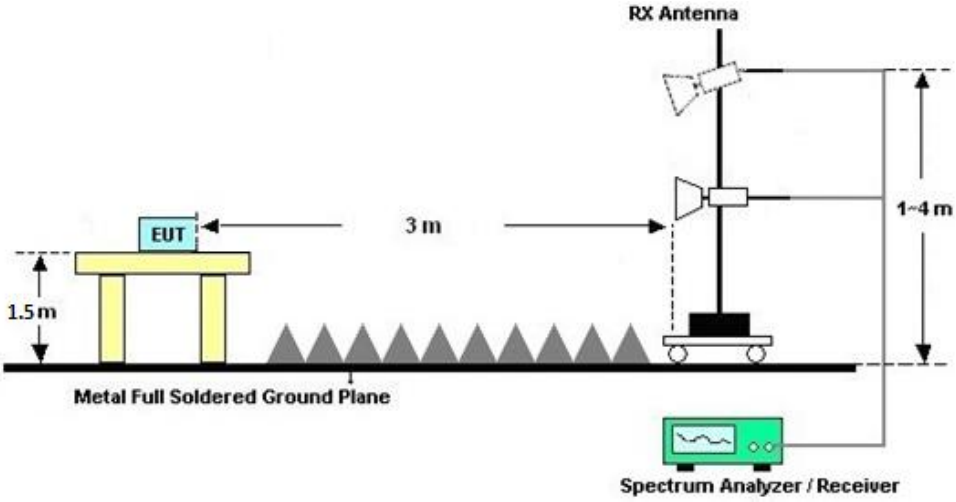
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was 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 came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

The emission level above 18GHz is checked that the emission level is noise floor only, so it is not reflected in the report.

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 (dBµV)	
	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.

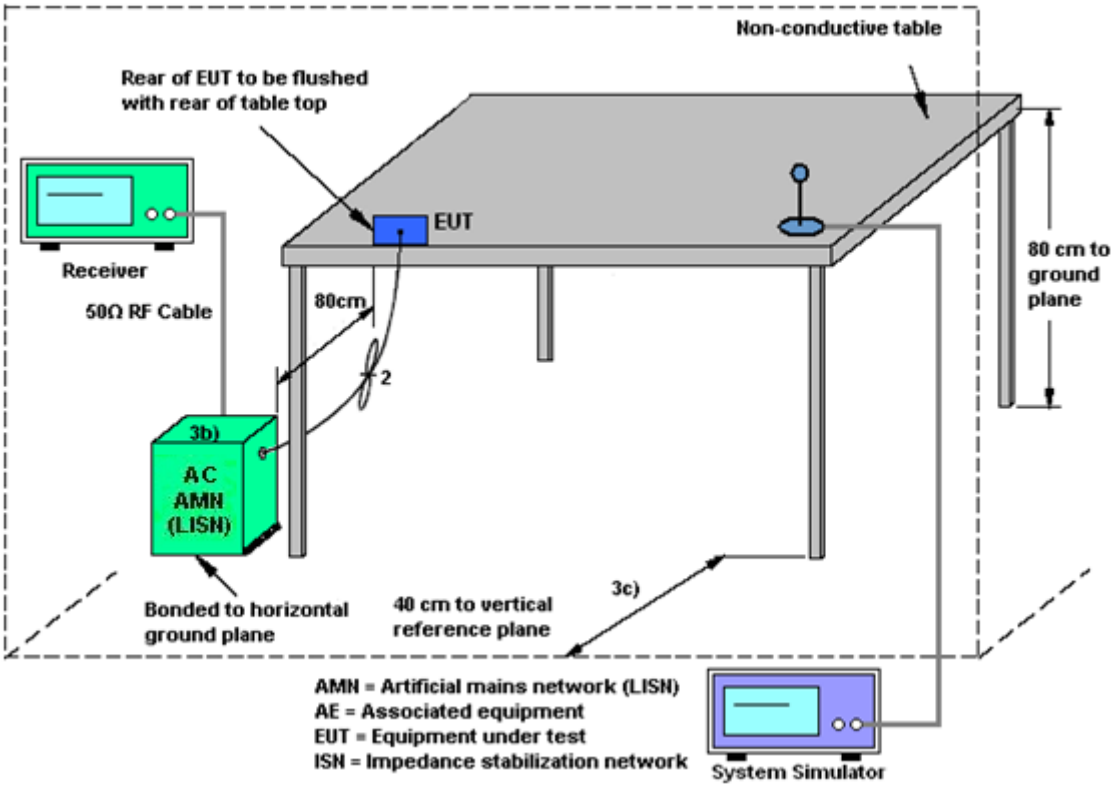
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was 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 should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

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

§15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used. The EUT complies with the requirement of 15.203.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For 802.11a/ax mode, directional gain is calculated as

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e.,

Directional gain = $G_{ANT\ MAX}$(Ant.1 Gain, Ant.2 Gain,…) + Array Gain, as following table for Power,

where Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

For PSD, the directional gain calculation is following,

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{Gn/20})^2 / N_{ANT}]$ dBi, as following table for PSD.

N_{ANT} = number of transmit antennas

N_{SS} = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

	Ant. 7 (dBi)	Ant. 8 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	1.52	1.68	1.68	4.61
U-NII-7	0.58	-0.70	0.58	2.97

<SDM Modes>

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For 802.11ax mode, directional gain is calculated as

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e.,

Directional gain = $G_{ANT\ MAX}$(Ant.1 Gain, Ant.2 Gain,…) + Array Gain, as following table for Power,

where Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

For PSD, the directional gain calculation is following,

Directional gain = 10 log[($10^{G1/10}$ + $10^{G2/10}$ + … + $10^{Gn/10}$)/N_{ANT}] dBi, as following table for PSD.

N_{ANT} = number of transmit antennas

	Ant. 7 (dBi)	Ant. 8 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	1.52	1.68	1.68	1.60
U-NII-7	0.58	-0.70	0.58	-0.01

<TXBF modes>

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For 802.11ax mode, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

The directional gain calculation is following F)2)e)ii) of KDB 662911 D01 v02r01.

The directional gain “DG” is calculated as following table.

	Ant. 7 (dBi)	Ant. 8 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	1.52	1.68	4.61	4.61
U-NII-7	0.58	-0.70	2.97	2.97

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	Feb. 05, 2023~ Mar. 27, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2023	Feb. 05, 2023~ Mar. 27, 2023	Jan. 04, 2024	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2023	Feb. 05, 2023~ Mar. 27, 2023	Jan. 04, 2024	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jul. 11, 2022	Mar. 07, 2023	Jul. 10, 2023	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Oct. 12, 2022	Mar. 07, 2023	Oct. 11, 2023	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	Mar. 07, 2023	Oct. 15, 2023	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 26, 2022	Mar. 07, 2023	Aug. 25, 2023	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 08, 2022	Mar. 07, 2023	Jul. 07, 2023	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2023	Mar. 07, 2023	Jan. 07, 2024	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2023	Mar. 07, 2023	Jan. 04, 2024	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Oct. 12, 2022	Mar. 07, 2023	Oct. 11, 2023	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2023	Mar. 07, 2023	Jan. 04, 2024	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2023	Mar. 07, 2023	Jan. 04, 2024	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Mar. 07, 2023	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Mar. 07, 2023	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Mar. 07, 2023	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Mar. 02, 2023	May 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2022	Mar. 02, 2023	Oct. 12, 2023	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Mar. 02, 2023	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2022	Mar. 02, 2023	Oct. 11, 2023	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %
Conducted Power Spectral Density	±0.40 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.78dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

---------- THE END ----------

Appendix A. Conducted Test Results

Test Engineer:	Jiang Jun	Temperature:	21~25	°C
Test Date:	2023/2/5~2023/3/27	Relative Humidity:	51~54	%

<11a CDD Mode>

Report Number : FR311602G

TEST RESULTS DATA
EIRP Power Table

UNII-5 MIMO														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
					Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
11a	6Mbps	2	001	5955	0.06	0.08	13.40	13.07	16.25	1.68		17.93	30.00	Pass
11a	6Mbps	2	045	6175	0.06	0.08	13.24	12.95	16.11	1.68		17.79	30.00	Pass
11a	6Mbps	2	093	6415	0.06	0.08	13.28	12.62	15.97	1.68		17.65	30.00	Pass

Report Number : FR311602G

TEST RESULTS DATA
EIRP Power Table

UNII-7 MIMO														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
					Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
11a	6Mbps	2	117	6535	0.06	0.08	16.05	15.70	18.89	0.58		19.47	30.00	Pass
11a	6Mbps	2	149	6695	0.06	0.08	15.71	15.65	18.69	0.58		19.27	30.00	Pass
11a	6Mbps	2	181	6855	0.06	0.08	15.12	15.90	18.54	0.58		19.12	30.00	Pass

<11ax CDD Mode>

Report Number : FR311602G

TEST RESULTS DATA
EIRP Power Table

UNII-5 MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
						Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
HE20	MCS0	2	001	5955	Full	0.00	0.00	13.28	12.91	16.11	1.68		17.79	30.00	Pass
HE20	MCS0	2	001	5955	26/0	0.00	0.00	2.74	3.53	6.16	1.68		7.84	30.00	Pass
HE20	MCS0	2	001	5955	52/37	0.00	0.00	6.36	6.89	9.64	1.68		11.32	30.00	Pass
HE20	MCS0	2	001	5955	106/53	0.00	0.00	10.47	10.24	13.37	1.68		15.05	30.00	Pass
HE20	MCS0	2	049	6195	Full	0.00	0.00	13.13	12.74	15.95	1.68		17.63	30.00	Pass
HE20	MCS0	2	049	6195	26/0	0.00	0.00	1.97	4.03	6.13	1.68		7.81	30.00	Pass
HE20	MCS0	2	049	6195	52/37	0.00	0.00	4.79	6.75	8.89	1.68		10.57	30.00	Pass
HE20	MCS0	2	049	6195	106/53	0.00	0.00	8.16	10.31	12.38	1.68		14.06	30.00	Pass
HE20	MCS0	2	093	6415	Full	0.00	0.00	13.27	12.52	15.92	1.68		17.60	30.00	Pass
HE20	MCS0	2	093	6415	26/8	0.00	0.00	2.49	2.57	5.54	1.68		7.22	30.00	Pass
HE20	MCS0	2	093	6415	52/40	0.00	0.00	5.34	5.63	8.50	1.68		10.18	30.00	Pass
HE20	MCS0	2	093	6415	106/54	0.00	0.00	8.25	8.66	11.47	1.68		13.15	30.00	Pass
HE40	MCS0	2	003	5965	Full	0.00	0.00	13.25	12.84	16.06	1.68		17.74	30.00	Pass
HE40	MCS0	2	003	5965	242/61	0.00	0.00	10.43	10.17	13.31	1.68		14.99	30.00	Pass
HE40	MCS0	2	051	6205	Full	0.00	0.00	13.12	12.75	15.95	1.68		17.63	30.00	Pass
HE40	MCS0	2	051	6205	242/61	0.00	0.00	8.13	10.24	12.32	1.68		14.00	30.00	Pass
HE40	MCS0	2	091	6405	Full	0.00	0.00	13.15	12.45	15.82	1.68		17.50	30.00	Pass
HE40	MCS0	2	091	6405	242/62	0.00	0.00	9.17	9.77	12.49	1.68		14.17	30.00	Pass
HE80	MCS0	2	007	5985	Full	0.03	0.03	13.27	12.96	16.13	1.68		17.81	30.00	Pass
HE80	MCS0	2	007	5985	484/65	0.04	0.04	10.66	9.98	13.35	1.68		15.03	30.00	Pass
HE80	MCS0	2	055	6225	Full	0.03	0.03	13.21	12.54	15.90	1.68		17.58	30.00	Pass
HE80	MCS0	2	055	6225	484/65	0.04	0.04	9.09	11.21	13.29	1.68		14.97	30.00	Pass
HE80	MCS0	2	087	6385	Full	0.03	0.03	13.15	12.76	15.97	1.68		17.65	30.00	Pass
HE80	MCS0	2	087	6385	484/66	0.04	0.04	9.68	10.40	13.07	1.68		14.75	30.00	Pass
HE160	MCS0	2	015	6025	Full	0.03	0.03	13.21	13.10	16.16	1.68		17.84	30.00	Pass
HE160	MCS0	2	015	6025	996/67	0.05	0.05	11.43	11.02	14.24	1.68		15.92	30.00	Pass
HE160	MCS0	2	047	6185	Full	0.03	0.03	12.74	12.71	15.73	1.68		17.41	30.00	Pass
HE160	MCS0	2	047	6185	996/67	0.05	0.05	8.69	10.39	12.63	1.68		14.31	30.00	Pass
HE160	MCS0	2	079	6345	Full	0.03	0.03	13.25	12.86	16.07	1.68		17.75	30.00	Pass
HE160	MCS0	2	079	6345	996/67	0.05	0.05	9.40	10.08	12.76	1.68		14.44	24.00	Pass

Report Number : FR311602G

TEST RESULTS DATA
EIRP Power Table

UNII-7 MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
						Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
HE20	MCS0	2	117	6535	Full	0.00	0.00	16.02	15.63	18.84	0.58		19.42	30.00	Pass
HE20	MCS0	2	117	6535	26/0	0.00	0.00	5.35	5.76	8.57	0.58		9.15	30.00	Pass
HE20	MCS0	2	117	6535	52/37	0.00	0.00	8.57	9.11	11.86	0.58		12.44	30.00	Pass
HE20	MCS0	2	117	6535	106/53	0.00	0.00	12.82	12.64	15.74	0.58		16.32	30.00	Pass
HE20	MCS0	2	149	6695	Full	0.00	0.00	15.59	15.55	18.58	0.58		19.16	30.00	Pass
HE20	MCS0	2	149	6695	26/4	0.00	0.00	6.47	6.81	9.65	0.58		10.23	30.00	Pass
HE20	MCS0	2	149	6695	52/38	0.00	0.00	8.91	9.35	12.15	0.58		12.73	30.00	Pass
HE20	MCS0	2	149	6695	106/53	0.00	0.00	12.26	12.33	15.31	0.58		15.89	30.00	Pass
HE20	MCS0	2	181	6855	Full	0.00	0.00	14.97	15.79	18.41	0.58		18.99	30.00	Pass
HE20	MCS0	2	181	6855	26/8	0.00	0.00	5.07	5.68	8.40	0.58		8.98	30.00	Pass
HE20	MCS0	2	181	6855	52/40	0.00	0.00	8.41	8.06	11.25	0.58		11.83	30.00	Pass
HE20	MCS0	2	181	6855	106/54	0.00	0.00	11.29	12.06	14.70	0.58		15.28	30.00	Pass
HE40	MCS0	2	123	6565	Full	0.00	0.00	15.53	15.46	18.51	0.58		19.09	30.00	Pass
HE40	MCS0	2	123	6565	242/61	0.00	0.00	12.56	12.75	15.67	0.58		16.25	30.00	Pass
HE40	MCS0	2	147	6685	Full	0.00	0.00	15.63	15.58	18.62	0.58		19.20	30.00	Pass
HE40	MCS0	2	147	6685	242/61	0.00	0.00	12.84	13.02	15.94	0.58		16.52	30.00	Pass
HE40	MCS0	2	179	6845	Full	0.00	0.00	15.11	15.74	18.45	0.58		19.03	30.00	Pass
HE40	MCS0	2	179	6845	242/62	0.00	0.00	12.36	12.95	15.68	0.58		16.26	30.00	Pass
HE80	MCS0	2	135	6625	Full	0.03	0.03	15.55	15.70	18.63	0.58		19.21	30.00	Pass
HE80	MCS0	2	135	6625	484/65	0.04	0.04	12.58	13.06	15.84	0.58		16.42	30.00	Pass
HE80	MCS0	2	151	6705	Full	0.03	0.03	15.48	15.59	18.54	0.58		19.12	30.00	Pass
HE80	MCS0	2	151	6705	484/65	0.04	0.04	12.53	13.01	15.79	0.58		16.37	30.00	Pass
HE80	MCS0	2	167	6785	Full	0.03	0.03	15.79	15.90	18.85	0.58		19.43	30.00	Pass
HE80	MCS0	2	167	6785	484/66	0.04	0.04	13.16	13.13	16.16	0.58		16.74	30.00	Pass
HE160	MCS0	2	143	6665	Full	0.03	0.03	15.68	15.65	18.67	0.58		19.25	30.00	Pass
HE160	MCS0	2	143	6665	996/67	0.05	0.05	13.40	13.04	16.23	0.58		16.81	30.00	Pass

<11ax SDM Mode>

Report Number : FR311602G

TEST RESULTS DATA
EIRP Power Table

UNII-5 MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
						Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
HE20	MCS0	2	001	5955	Full	0.00	0.00	13.23	12.83	16.04	1.68		17.72	30.00	Pass
HE20	MCS0	2	001	5955	26/0	0.00	0.00	2.70	3.48	6.12	1.68		7.80	30.00	Pass
HE20	MCS0	2	001	5955	52/37	0.00	0.00	6.28	6.83	9.57	1.68		11.25	30.00	Pass
HE20	MCS0	2	001	5955	106/53	0.00	0.00	10.42	10.19	13.32	1.68		15.00	30.00	Pass
HE20	MCS0	2	049	6195	Full	0.00	0.00	13.10	12.67	15.90	1.68		17.58	30.00	Pass
HE20	MCS0	2	049	6195	26/0	0.00	0.00	1.91	4.00	6.09	1.68		7.77	30.00	Pass
HE20	MCS0	2	049	6195	52/37	0.00	0.00	4.72	6.72	8.84	1.68		10.52	30.00	Pass
HE20	MCS0	2	049	6195	106/53	0.00	0.00	8.13	10.27	12.34	1.68		14.02	30.00	Pass
HE20	MCS0	2	093	6415	Full	0.00	0.00	13.25	12.47	15.89	1.68		17.57	30.00	Pass
HE20	MCS0	2	093	6415	26/8	0.00	0.00	2.46	2.51	5.50	1.68		7.18	30.00	Pass
HE20	MCS0	2	093	6415	52/40	0.00	0.00	5.30	5.58	8.45	1.68		10.13	30.00	Pass
HE20	MCS0	2	093	6415	106/54	0.00	0.00	8.20	8.62	11.43	1.68		13.11	30.00	Pass
HE40	MCS0	2	003	5965	Full	0.00	0.00	13.20	12.78	16.01	1.68		17.69	30.00	Pass
HE40	MCS0	2	003	5965	242/61	0.00	0.00	10.35	10.14	13.26	1.68		14.94	30.00	Pass
HE40	MCS0	2	051	6205	Full	0.00	0.00	13.05	12.71	15.89	1.68		17.57	30.00	Pass
HE40	MCS0	2	051	6205	242/61	0.00	0.00	8.07	10.19	12.27	1.68		13.95	30.00	Pass
HE40	MCS0	2	091	6405	Full	0.00	0.00	13.12	12.37	15.77	1.68		17.45	30.00	Pass
HE40	MCS0	2	091	6405	242/62	0.00	0.00	9.13	9.70	12.43	1.68		14.11	30.00	Pass
HE80	MCS0	2	007	5985	Full	0.03	0.03	13.24	12.92	16.09	1.68		17.77	30.00	Pass
HE80	MCS0	2	007	5985	484/65	0.04	0.04	10.62	9.91	13.29	1.68		14.97	30.00	Pass
HE80	MCS0	2	055	6225	Full	0.03	0.03	13.14	12.45	15.82	1.68		17.50	30.00	Pass
HE80	MCS0	2	055	6225	484/65	0.04	0.04	9.00	11.13	13.21	1.68		14.89	30.00	Pass
HE80	MCS0	2	087	6385	Full	0.03	0.03	13.07	12.71	15.90	1.68		17.58	30.00	Pass
HE80	MCS0	2	087	6385	484/66	0.04	0.04	9.63	10.36	13.03	1.68		14.71	30.00	Pass
HE160	MCS0	2	015	6025	Full	0.03	0.03	13.18	13.03	16.11	1.68		17.79	30.00	Pass
HE160	MCS0	2	015	6025	996/67	0.05	0.05	11.38	10.98	14.19	1.68		15.87	30.00	Pass
HE160	MCS0	2	047	6185	Full	0.03	0.03	12.67	12.66	15.67	1.68		17.35	30.00	Pass
HE160	MCS0	2	047	6185	996/67	0.05	0.05	8.65	10.33	12.58	1.68		14.26	30.00	Pass
HE160	MCS0	2	079	6345	Full	0.03	0.03	13.20	12.83	16.03	1.68		17.71	30.00	Pass
HE160	MCS0	2	079	6345	996/67	0.05	0.05	9.34	10.03	12.70	1.68		14.38	24.00	Pass

TEST RESULTS DATA
EIRP Power Table

UNII-7 MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
						Ant 7	Ant 8	Ant 7	Ant 8	SUM	Ant 7	Ant 8	SUM		
HE20	MCS0	2	117	6535	Full	0.00	0.00	15.96	15.60	18.79	0.58		19.37	30.00	Pass
HE20	MCS0	2	117	6535	26/0	0.00	0.00	5.28	5.72	8.52	0.58		9.10	30.00	Pass
HE20	MCS0	2	117	6535	52/37	0.00	0.00	8.52	9.06	11.81	0.58		12.39	30.00	Pass
HE20	MCS0	2	117	6535	106/53	0.00	0.00	12.79	12.59	15.70	0.58		16.28	30.00	Pass
HE20	MCS0	2	149	6695	Full	0.00	0.00	15.55	15.52	18.55	0.58		19.13	30.00	Pass
HE20	MCS0	2	149	6695	26/4	0.00	0.00	6.39	6.77	9.59	0.58		10.17	30.00	Pass
HE20	MCS0	2	149	6695	52/38	0.00	0.00	8.85	9.27	12.08	0.58		12.66	30.00	Pass
HE20	MCS0	2	149	6695	106/53	0.00	0.00	12.21	12.27	15.25	0.58		15.83	30.00	Pass
HE20	MCS0	2	181	6855	Full	0.00	0.00	14.93	15.74	18.36	0.58		18.94	30.00	Pass
HE20	MCS0	2	181	6855	26/8	0.00	0.00	5.04	5.61	8.34	0.58		8.92	30.00	Pass
HE20	MCS0	2	181	6855	52/40	0.00	0.00	8.39	8.03	11.22	0.58		11.80	30.00	Pass
HE20	MCS0	2	181	6855	106/54	0.00	0.00	11.23	11.99	14.64	0.58		15.22	30.00	Pass
HE40	MCS0	2	123	6565	Full	0.00	0.00	15.48	15.40	18.45	0.58		19.03	30.00	Pass
HE40	MCS0	2	123	6565	242/61	0.00	0.00	12.52	12.68	15.61	0.58		16.19	30.00	Pass
HE40	MCS0	2	147	6685	Full	0.00	0.00	15.57	15.49	18.54	0.58		19.12	30.00	Pass
HE40	MCS0	2	147	6685	242/61	0.00	0.00	12.77	12.97	15.88	0.58		16.46	30.00	Pass
HE40	MCS0	2	179	6845	Full	0.00	0.00	15.02	15.71	18.39	0.58		18.97	30.00	Pass
HE40	MCS0	2	179	6845	242/62	0.00	0.00	12.34	12.91	15.64	0.58		16.22	30.00	Pass
HE80	MCS0	2	135	6625	Full	0.03	0.03	15.49	15.66	18.58	0.58		19.16	30.00	Pass
HE80	MCS0	2	135	6625	484/65	0.04	0.04	12.54	13.01	15.80	0.58		16.38	30.00	Pass
HE80	MCS0	2	151	6705	Full	0.03	0.03	15.43	15.56	18.50	0.58		19.08	30.00	Pass
HE80	MCS0	2	151	6705	484/65	0.04	0.04	12.50	12.97	15.76	0.58		16.34	30.00	Pass
HE80	MCS0	2	167	6785	Full	0.03	0.03	15.75	15.83	18.80	0.58		19.38	30.00	Pass
HE80	MCS0	2	167	6785	484/66	0.04	0.04	13.09	13.04	16.08	0.58		16.66	30.00	Pass
HE160	MCS0	2	143	6665	Full	0.03	0.03	15.60	15.58	18.60	0.58		19.18	30.00	Pass
HE160	MCS0	2	143	6665	996/67	0.05	0.05	13.37	13.00	16.20	0.58		16.78	30.00	Pass

Emission Bandwidth

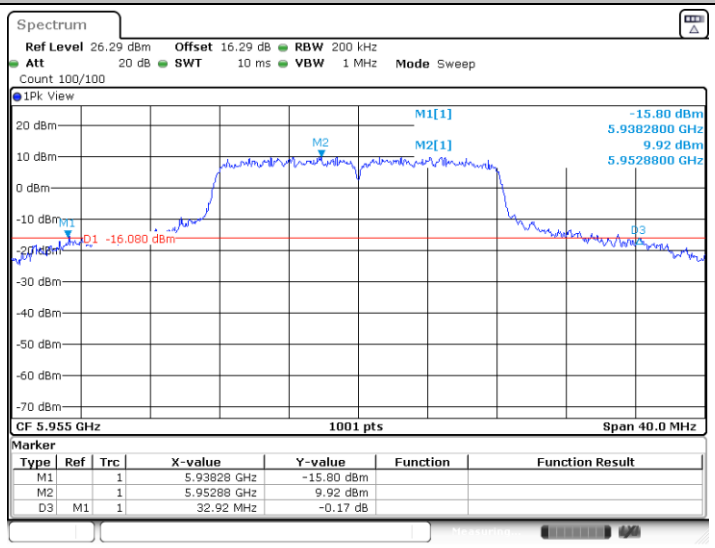
Test Result

TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]
11A-CDD	Ant7	5955	32.92	5938.28	5971.20
	Ant8	5955	34.16	5938.64	5972.80
	Ant7	6195	20.84	6184.68	6205.52
	Ant8	6195	28.12	6181.88	6210.00
	Ant7	6415	20.48	6404.72	6425.20
	Ant8	6415	21.48	6404.56	6426.04
	Ant7	6535	22.24	6523.80	6546.04
	Ant8	6535	22.96	6524.24	6547.20
	Ant7	6695	22.00	6684.04	6706.04
	Ant8	6695	23.92	6683.68	6707.60
	Ant7	6855	20.56	6844.60	6865.16
	Ant8	6855	**35.80**	6837.08	6872.88
11AX20MIMO	Ant7	5955	29.08	5942.44	5971.52
	Ant8	5955	32.76	5938.36	5971.12
	Ant7	6195	21.80	6184.12	6205.92
	Ant8	6195	27.96	6180.24	6208.20
	Ant7	6415	21.72	6404.24	6425.96
	Ant8	6415	21.56	6404.36	6425.92
	Ant7	6535	21.92	6523.96	6545.88
	Ant8	6535	23.72	6523.92	6547.64
	Ant7	6695	22.00	6683.88	6705.88
	Ant8	6695	25.28	6682.68	6707.96
	Ant7	6855	21.48	6844.12	6865.60
	Ant8	6855	**37.04**	6836.72	6873.76
11AX40MIMO	Ant7	5965	48.16	5940.68	5988.84
	Ant8	5965	70.88	5930.12	6001.00
	Ant7	6205	41.28	6184.52	6225.80
	Ant8	6205	51.92	6181.80	6233.72
	Ant7	6405	47.20	6383.16	6430.36
	Ant8	6405	41.60	6384.04	6425.64
	Ant7	6565	40.80	6544.52	6585.32
	Ant8	6565	41.20	6544.36	6585.56
	Ant7	6685	41.04	6664.44	6705.48
	Ant8	6685	40.88	6664.44	6705.32
	Ant7	6845	41.44	6824.36	6865.80
	Ant8	6845	**77.36**	6807.56	6884.92
11AX80MIMO	Ant7	5985	82.56	5943.88	6026.44
	Ant8	5985	82.72	5943.56	6026.28
	Ant7	6225	83.20	6183.56	6266.76
	Ant8	6225	82.72	6183.40	6266.12
	Ant7	6385	83.04	6343.24	6426.28
	Ant8	6385	83.52	6343.40	6426.92

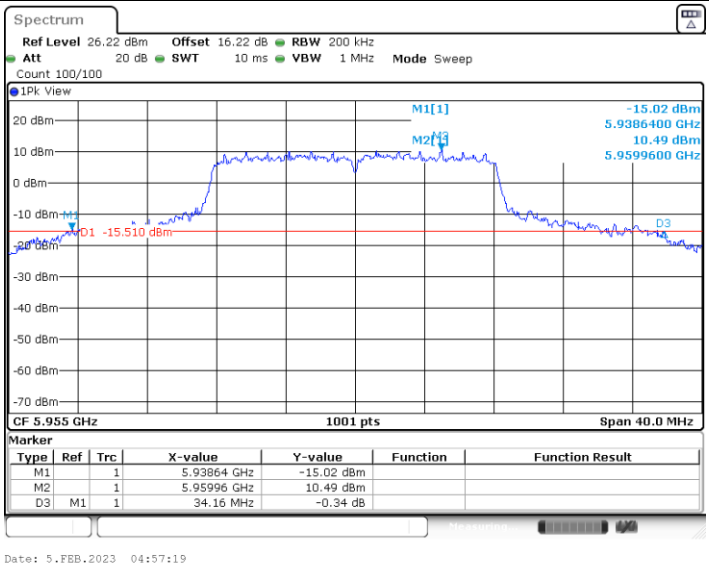
	Ant7	6625	83.36	6583.24	6666.60
	Ant8	6625	82.56	6583.40	6665.96
	Ant7	6705	82.56	6663.88	6746.44
	Ant8	6705	83.68	6663.24	6746.92
	Ant7	6785	83.04	6743.40	6826.44
	Ant8	6785	**104.64**	6734.44	6839.08
11AX160MIMO	Ant7	6025	164.80	5942.44	6107.24
	Ant8	6025	165.12	5942.44	6107.56
	Ant7	6185	166.40	6101.48	6267.88
	Ant8	6185	165.12	6102.44	6267.56
	Ant7	6345	165.76	6262.12	6427.88
	Ant8	6345	165.12	6262.12	6427.24
	Ant7	6665	**166.40**	6582.12	6748.52
	Ant8	6665	164.80	6582.44	6747.24

Test Graphs

11A-CDD_Ant7_5955



11A-CDD_Ant8_5955



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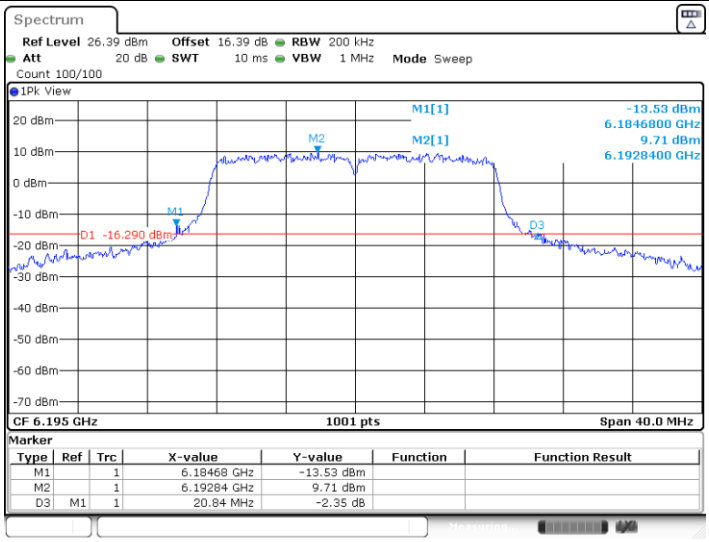

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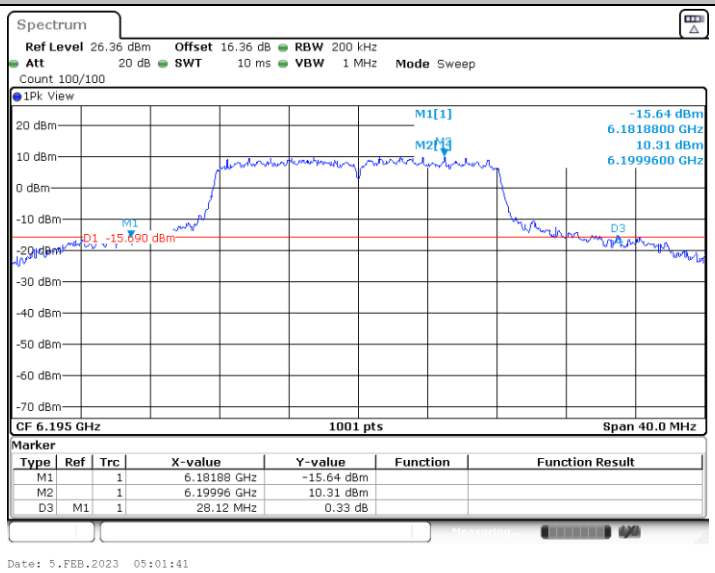

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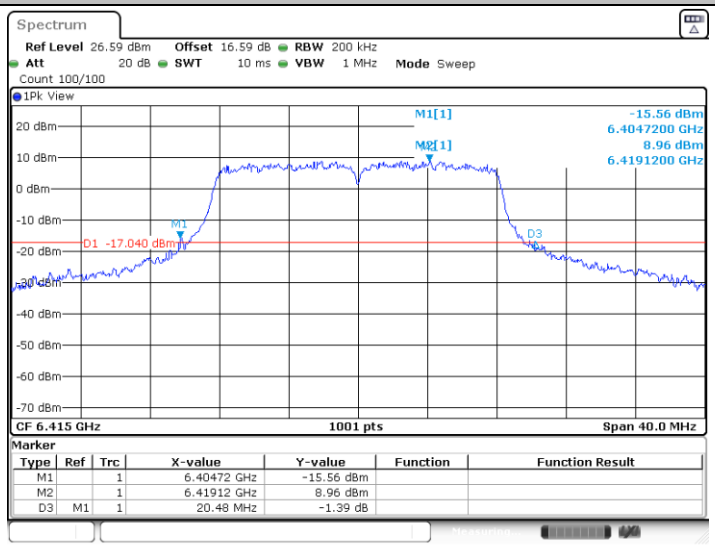

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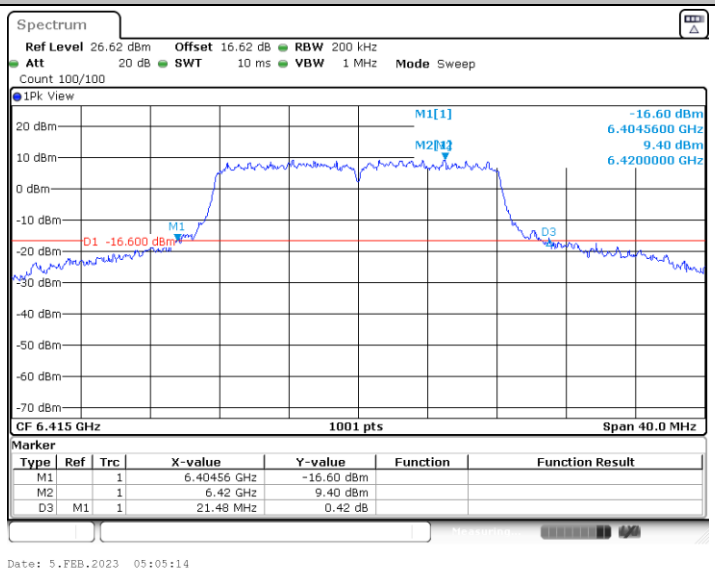

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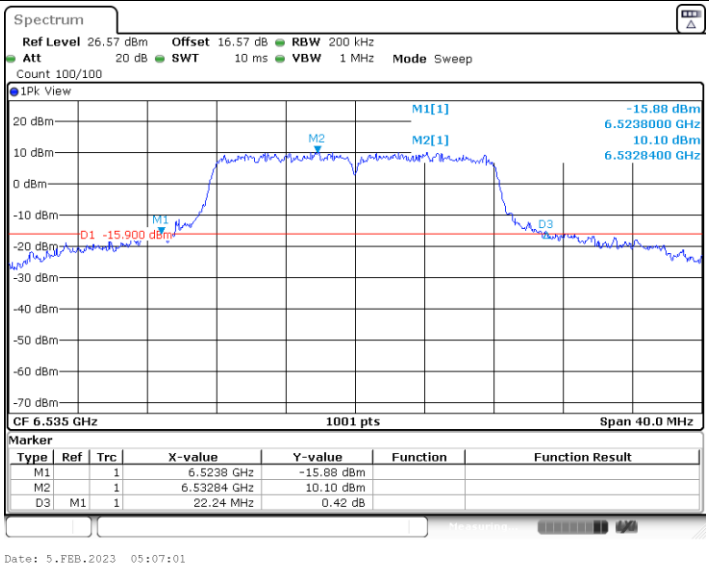

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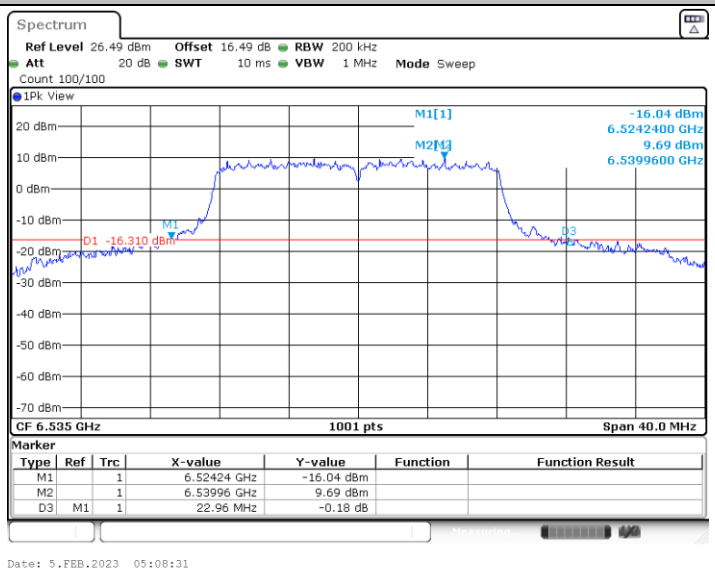

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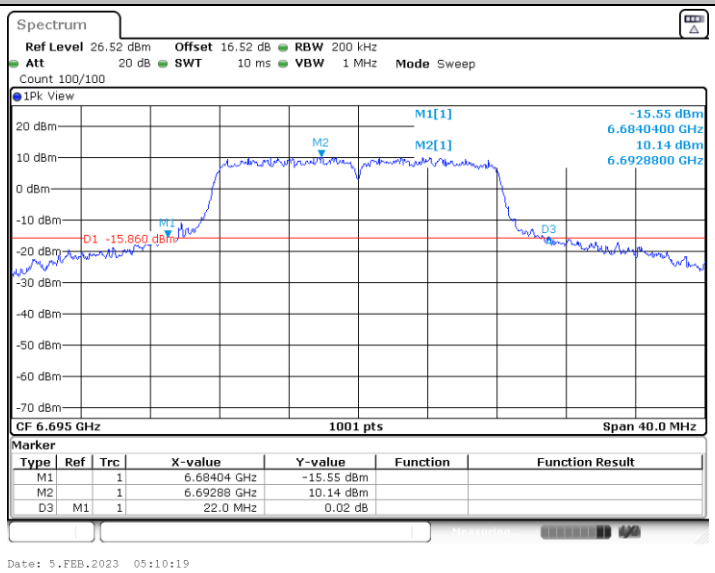

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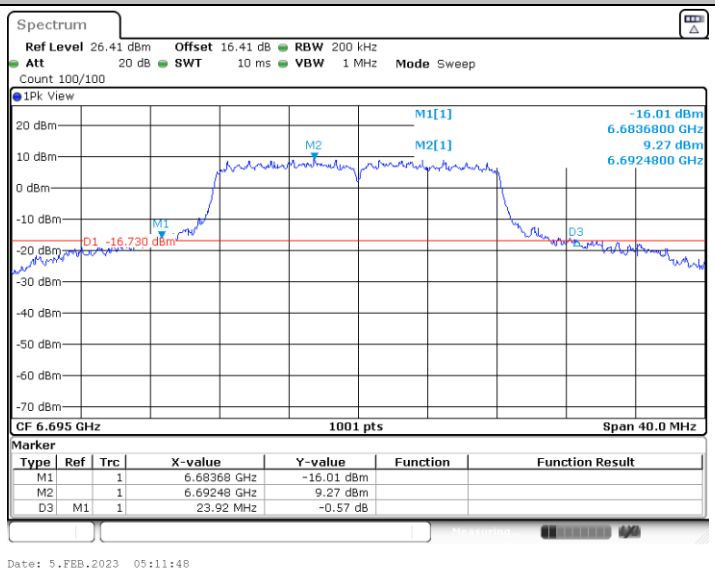

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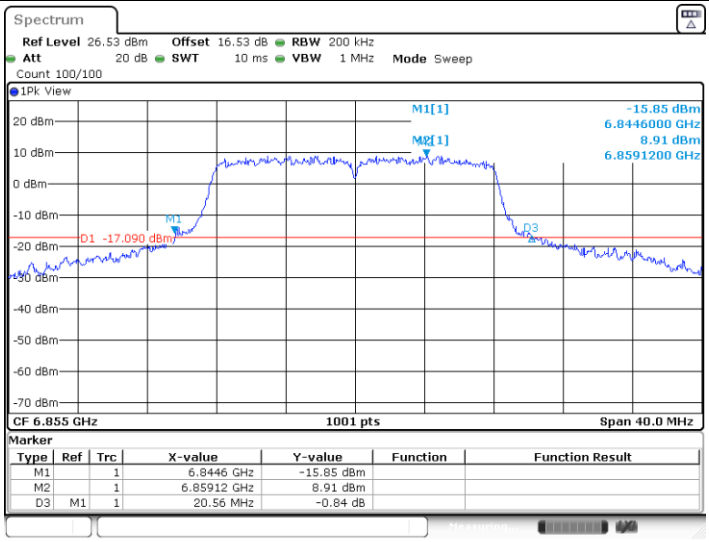

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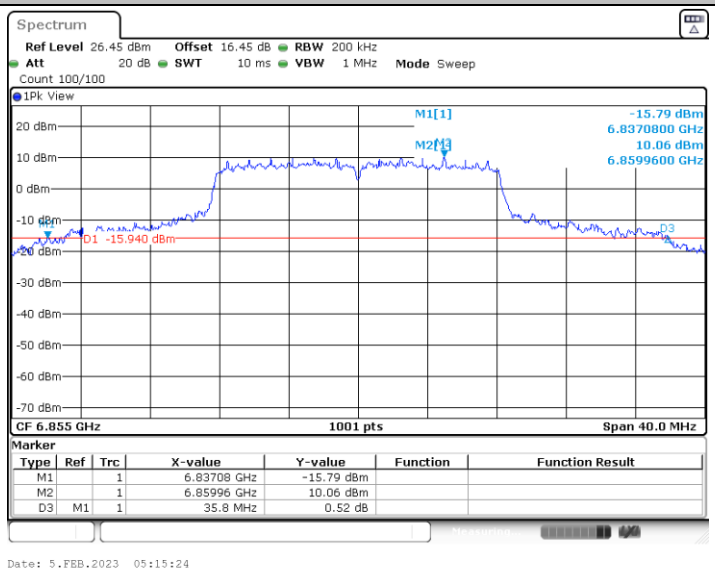

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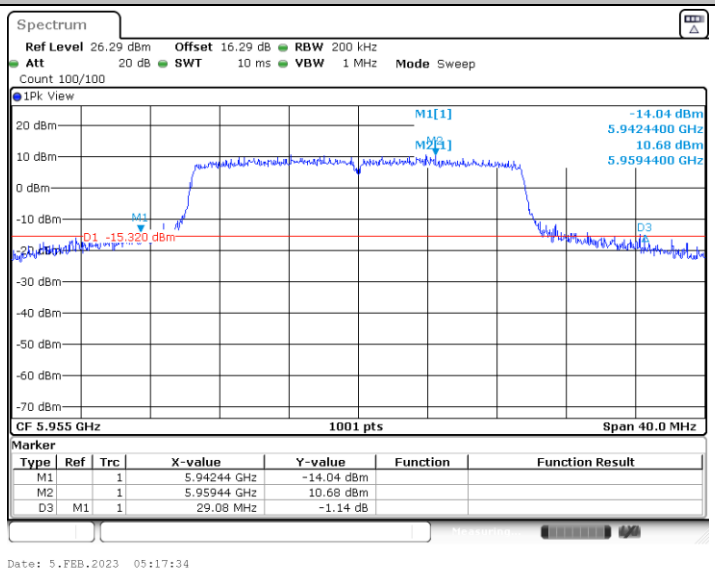

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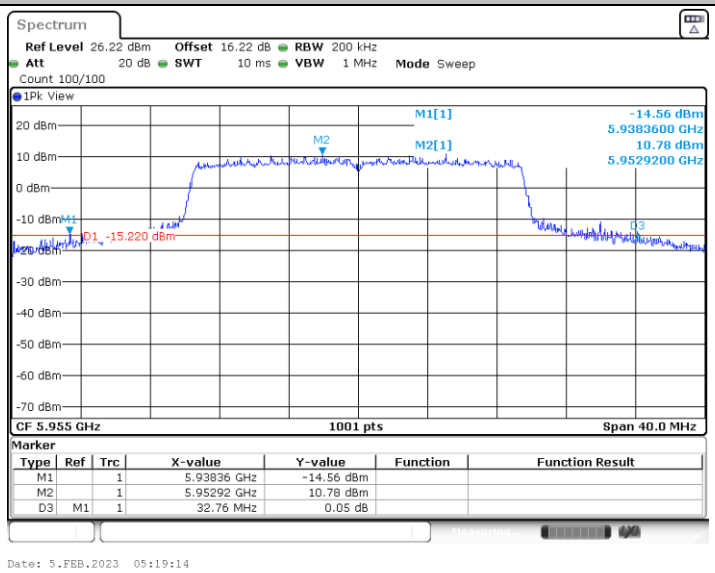

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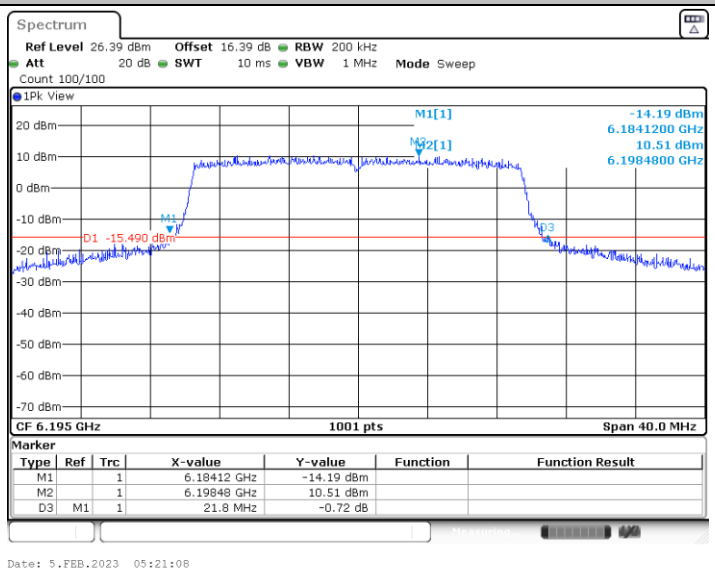

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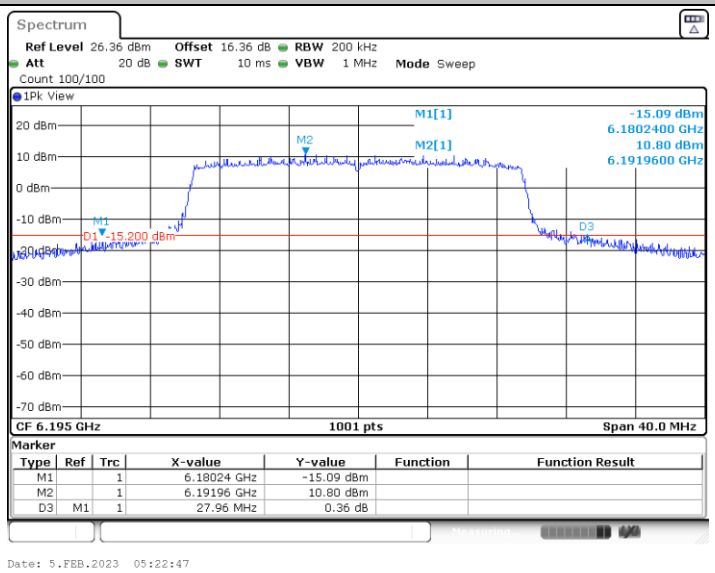

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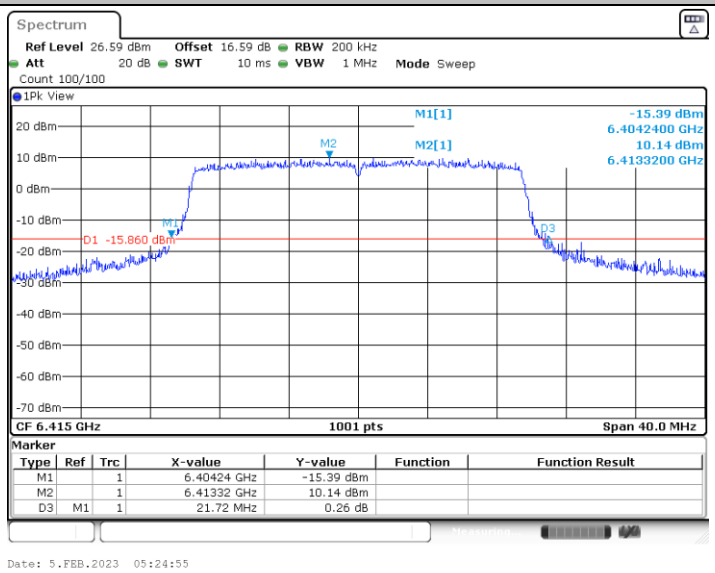

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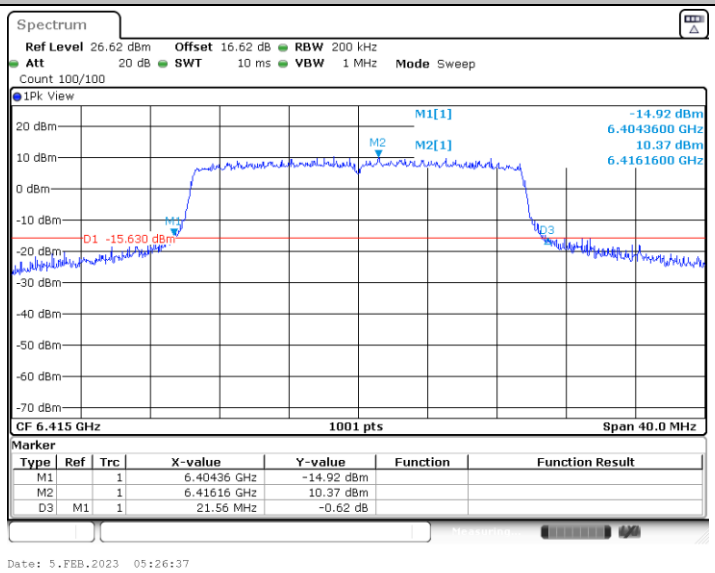
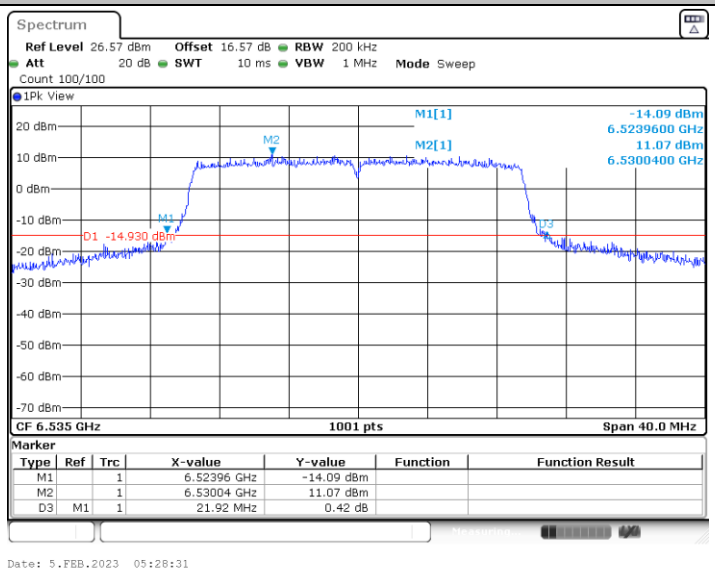
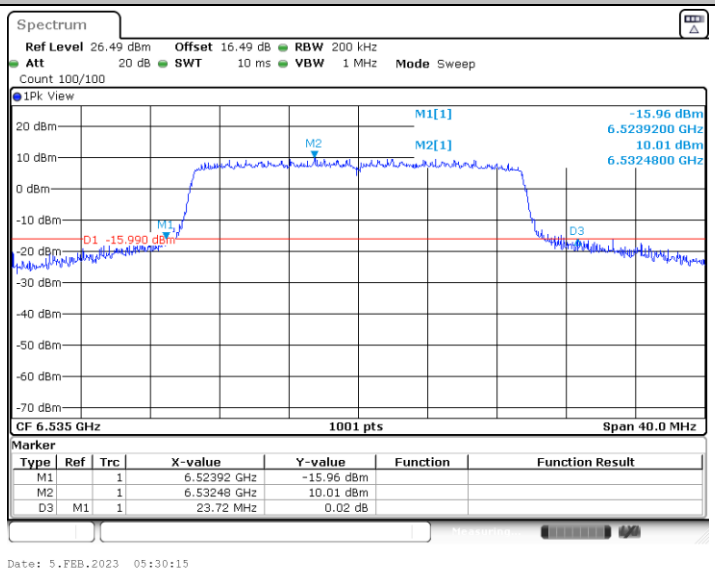


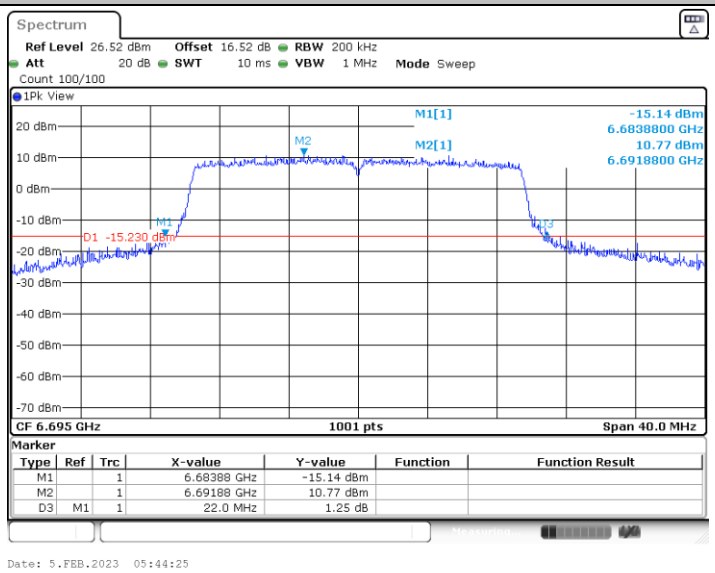
11AX20MIMO_Ant7_6535



11AX20MIMO_Ant8_6535



11AX20MIMO_Ant7_6695



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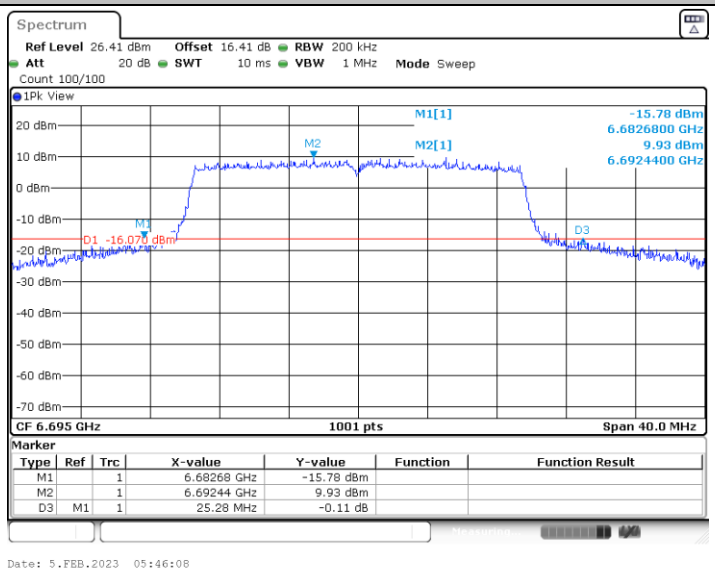

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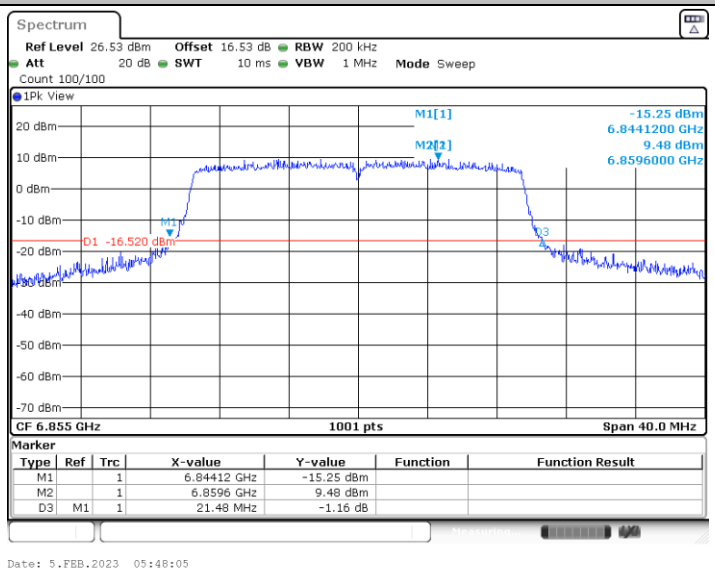

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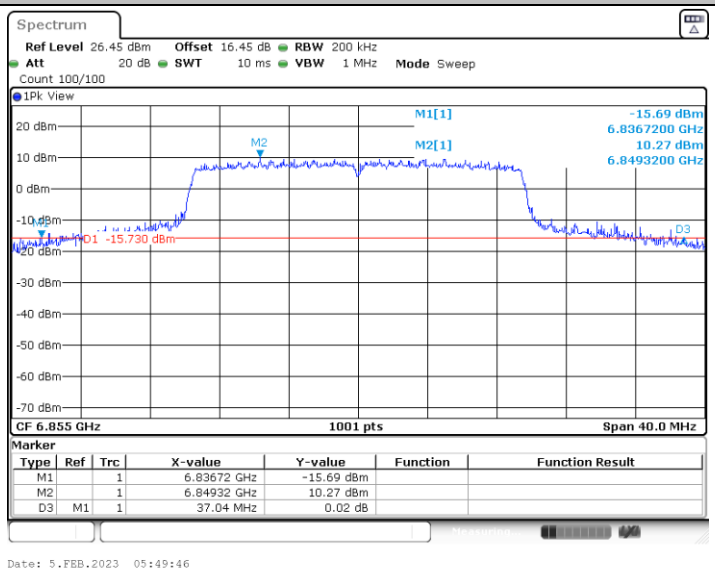

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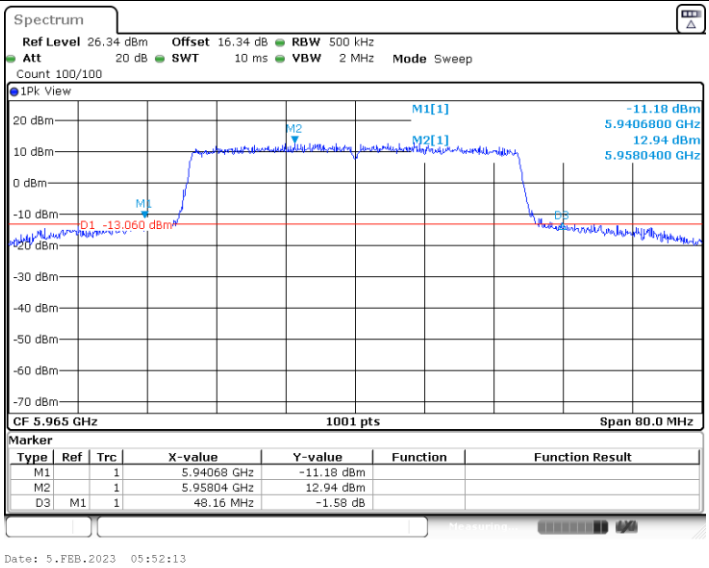

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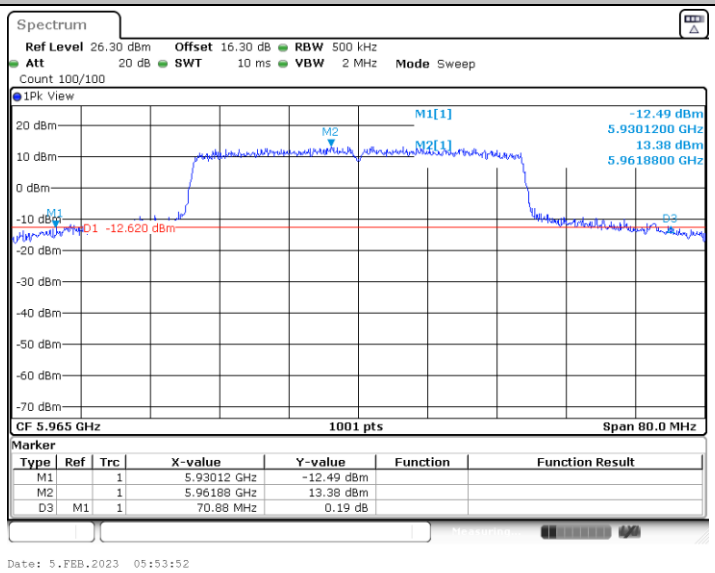

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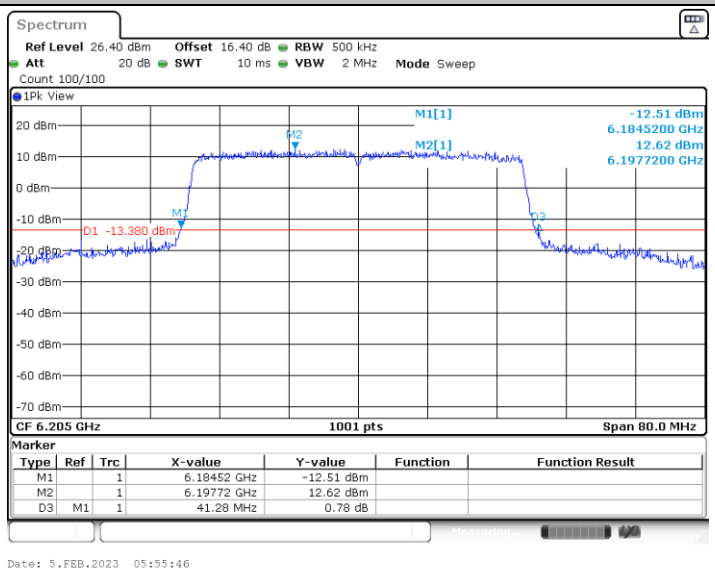

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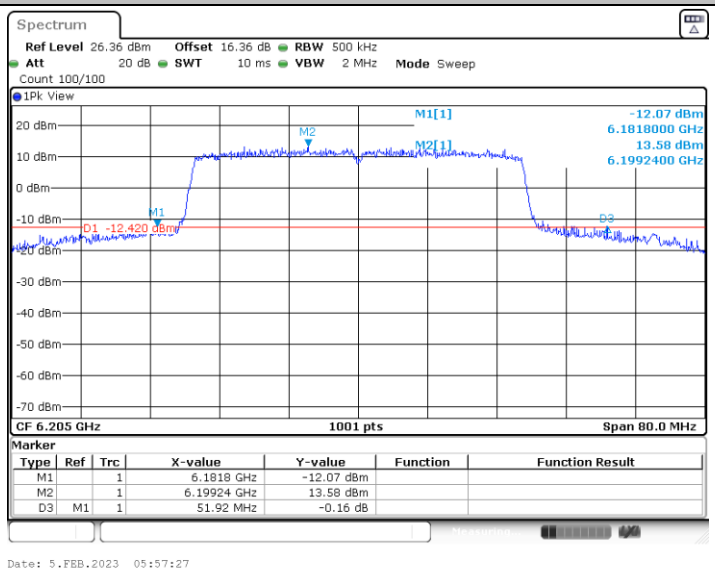

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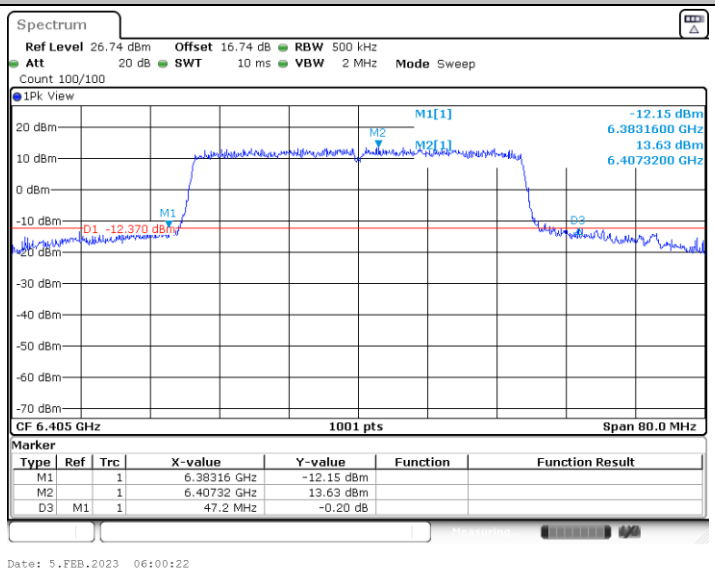

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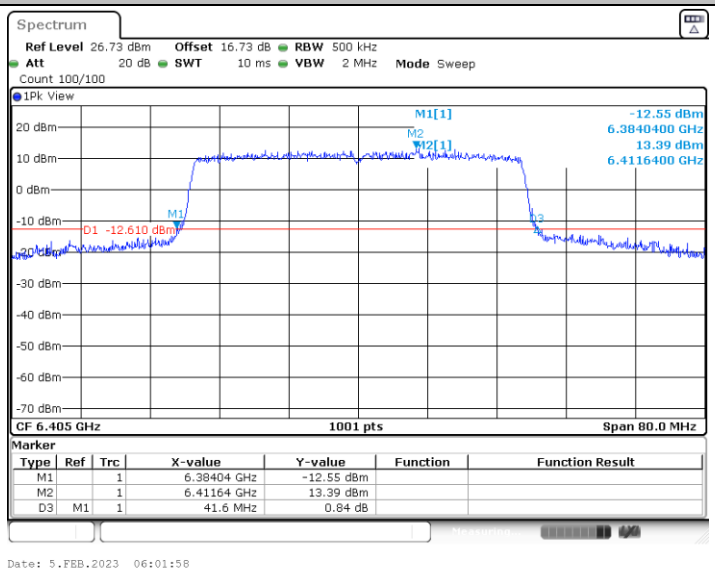

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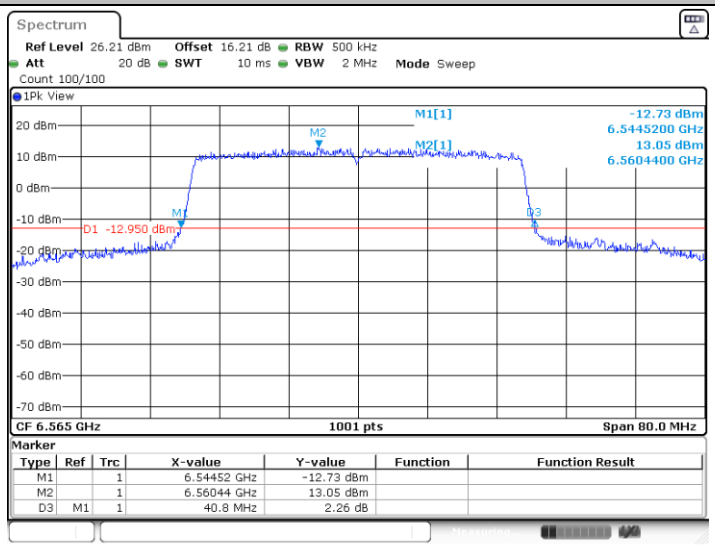

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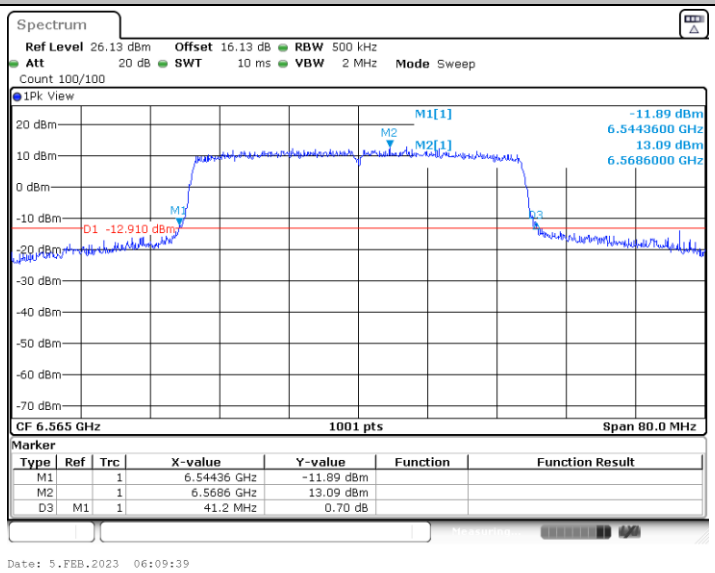

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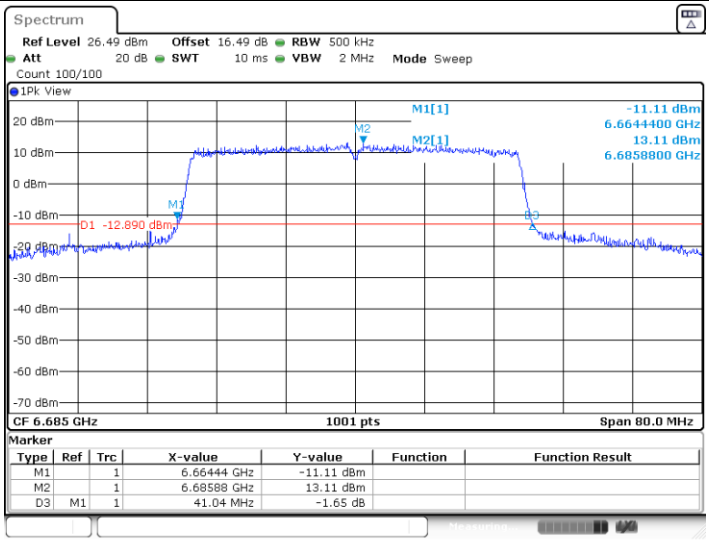

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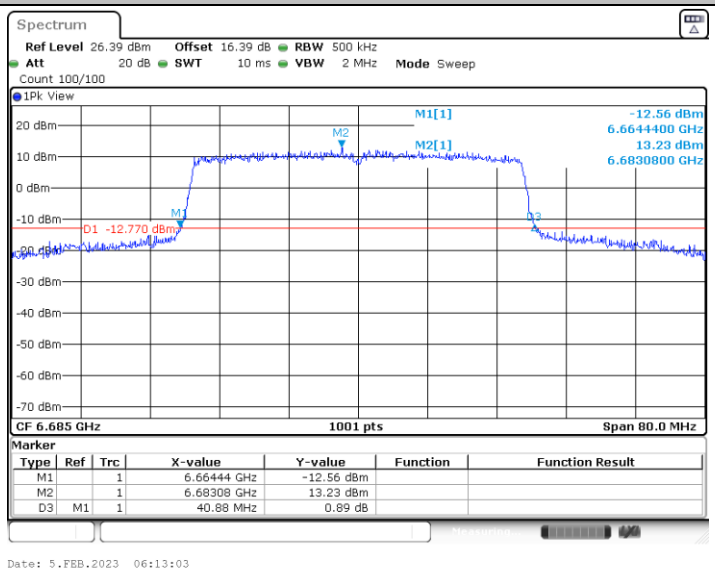

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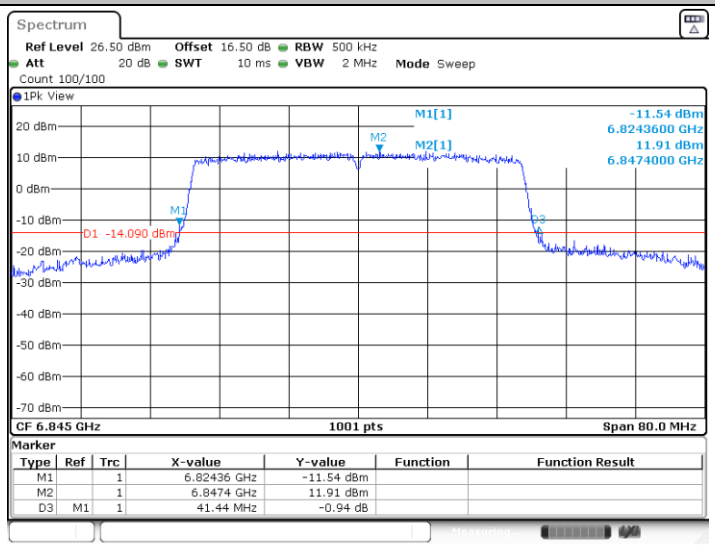

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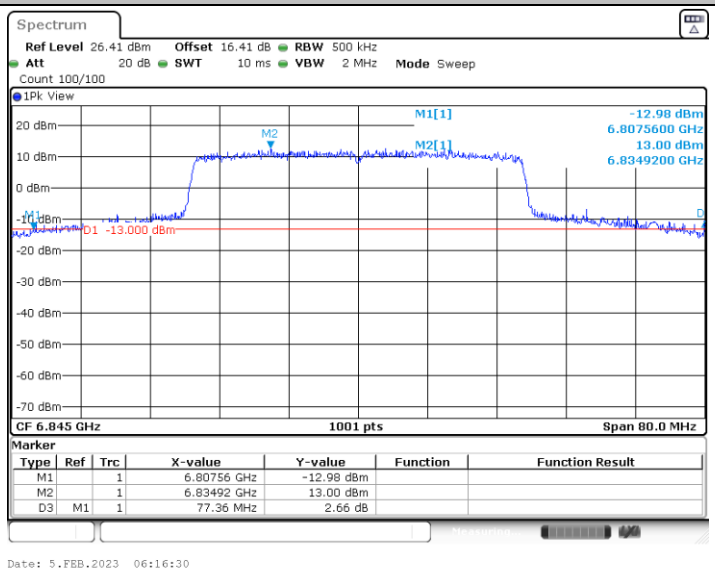

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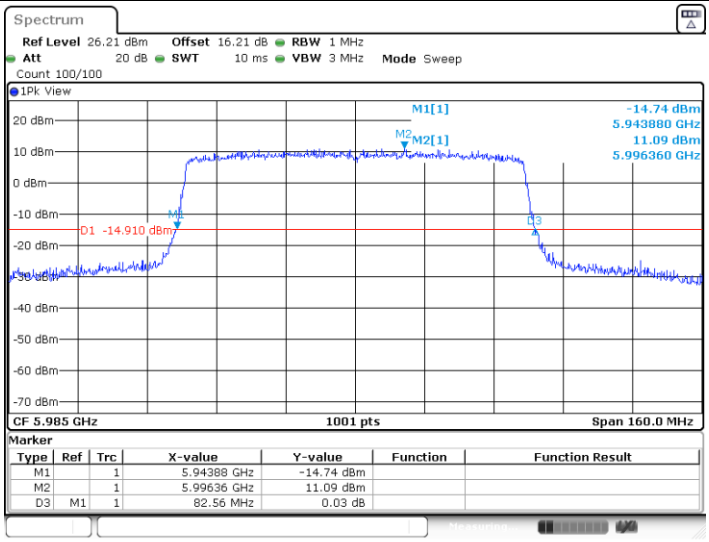

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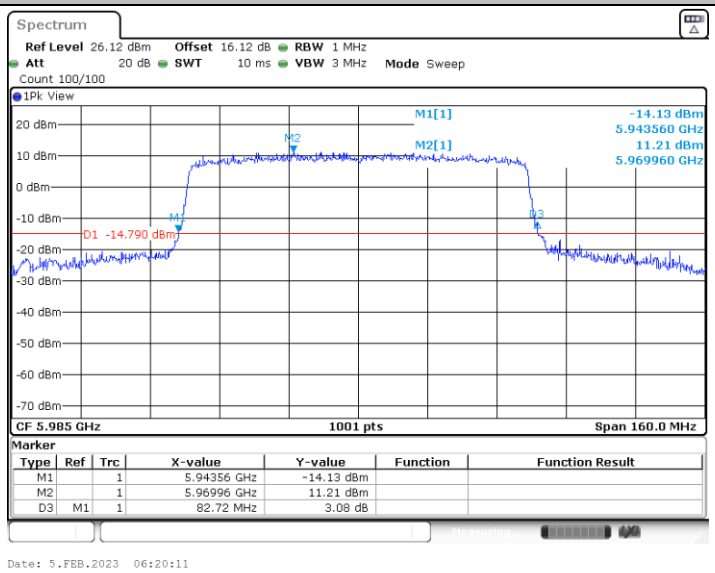

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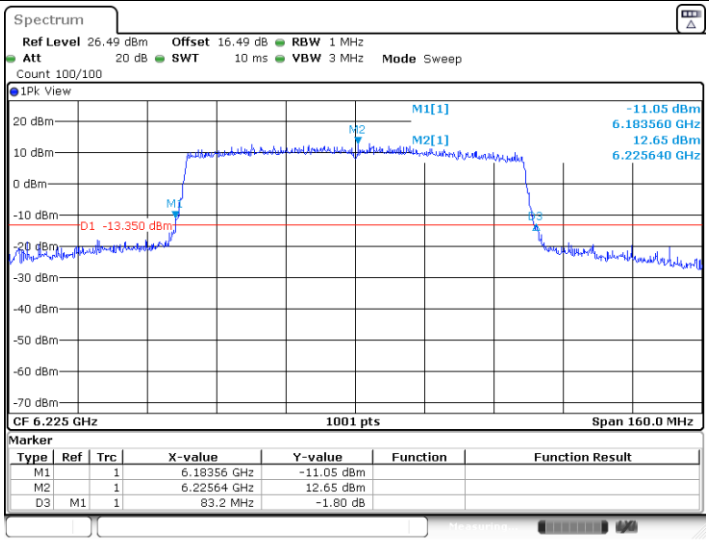

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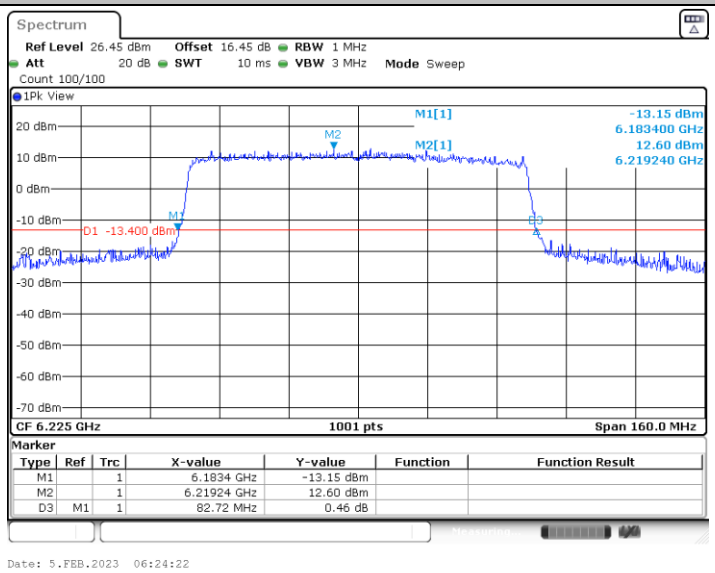

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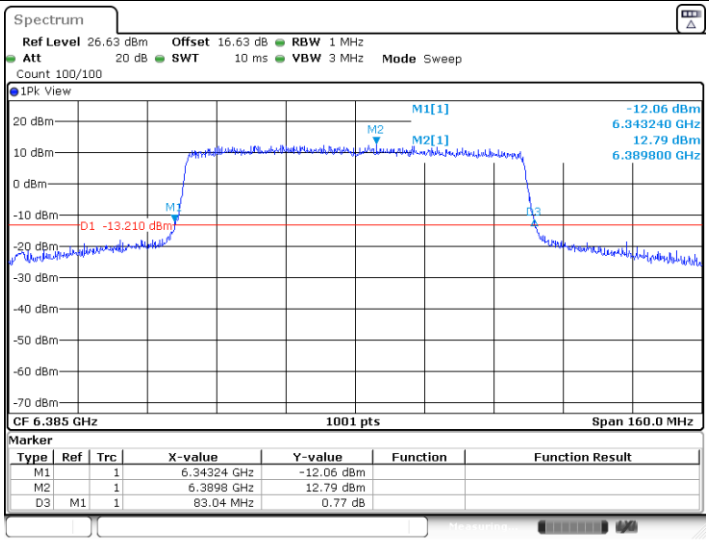

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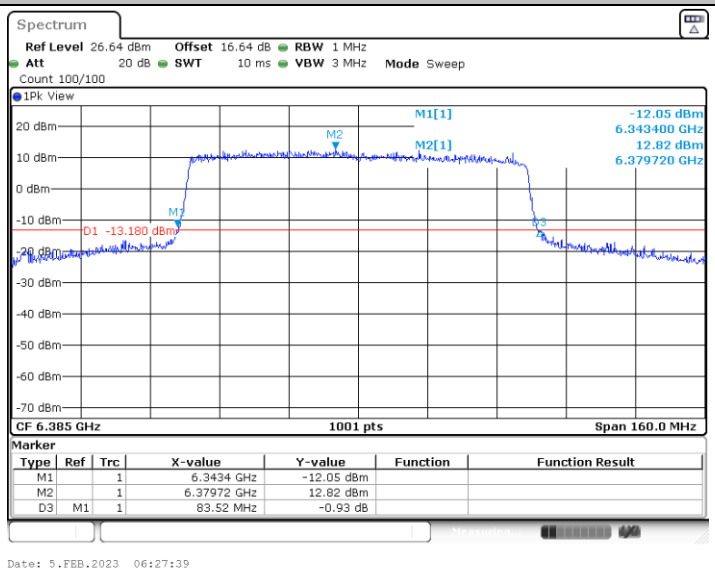

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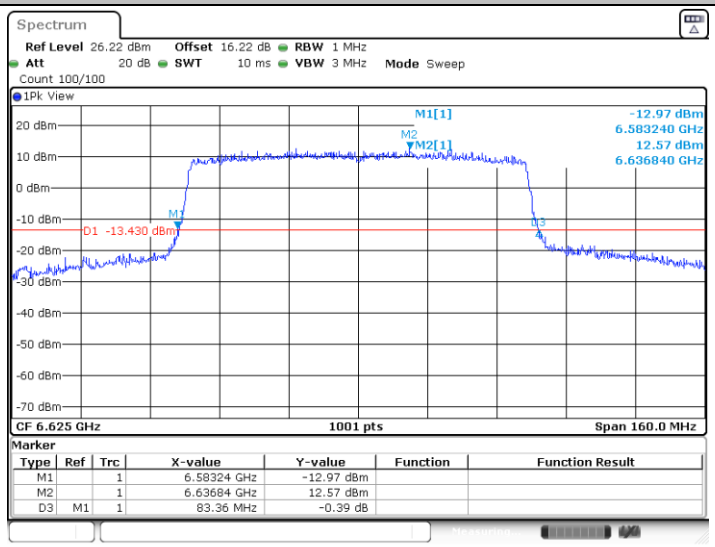

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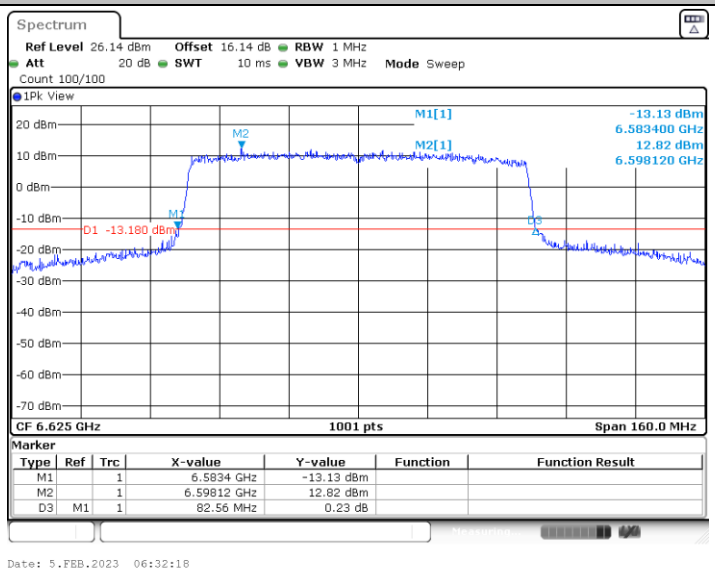

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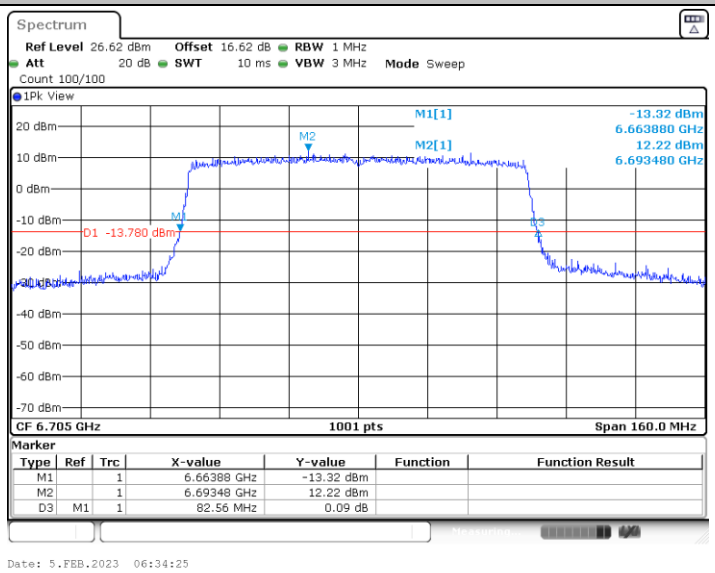

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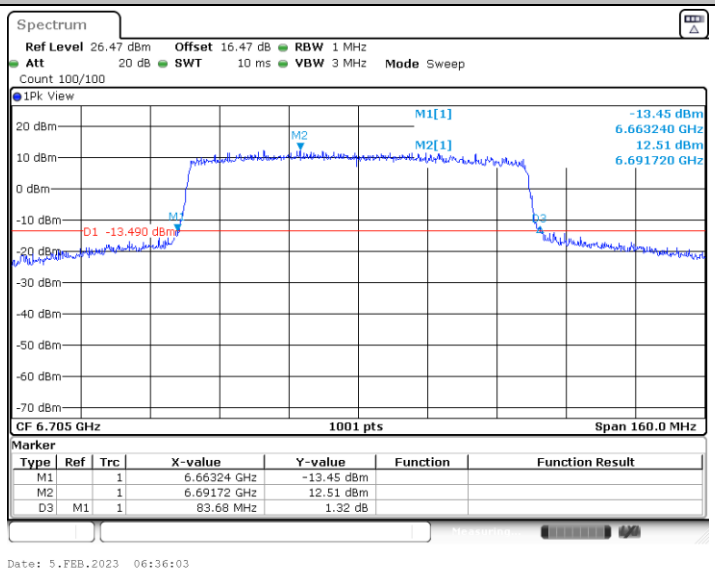

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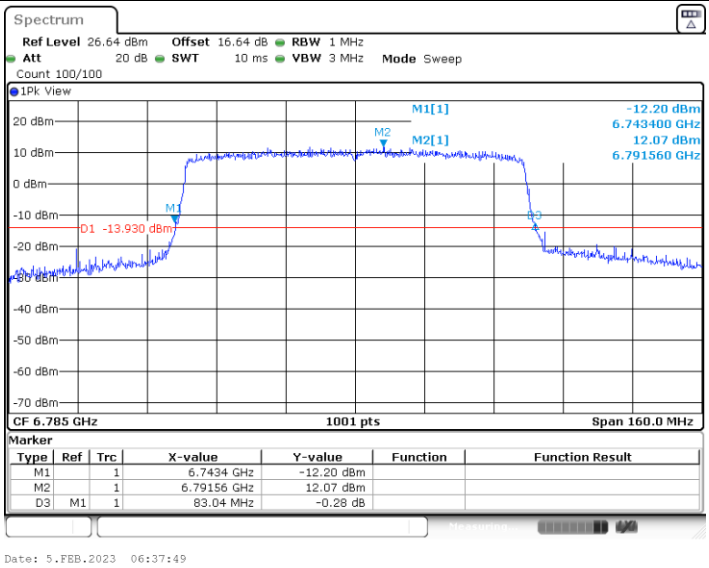

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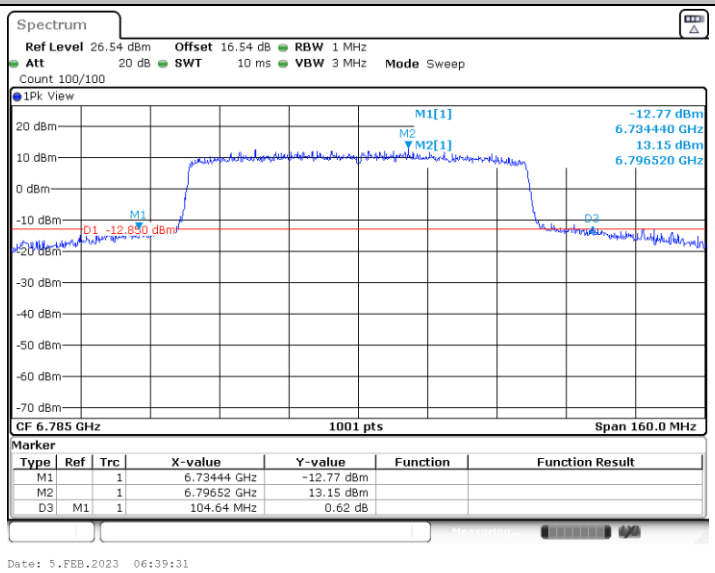

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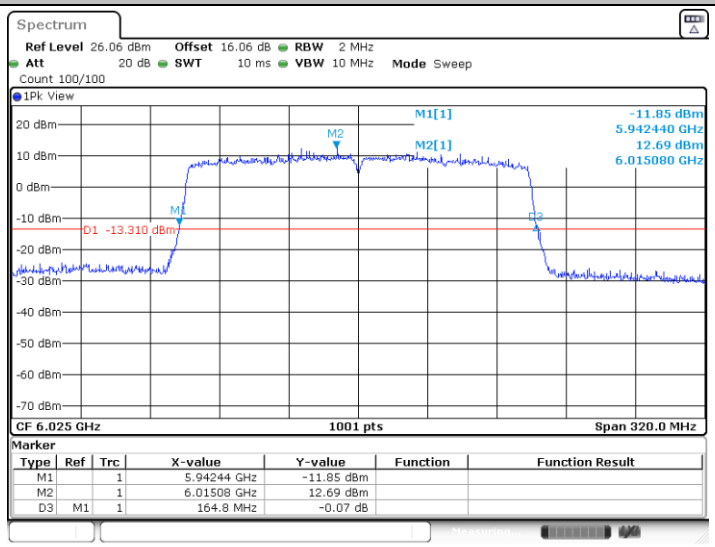

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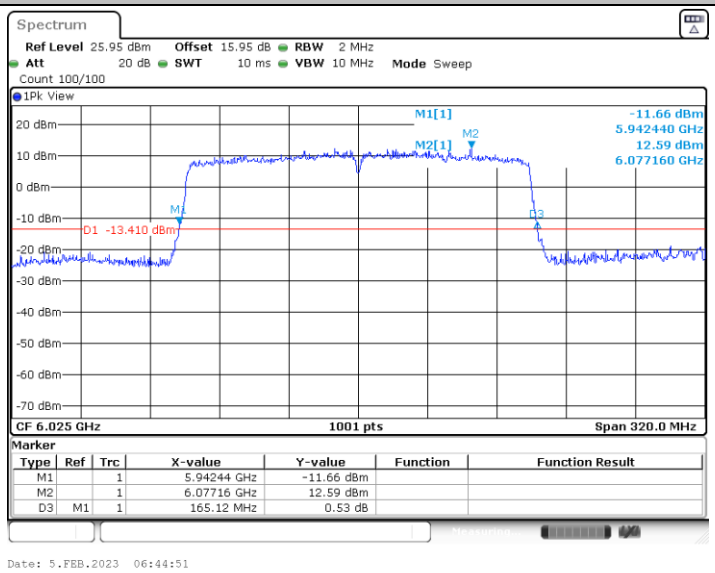

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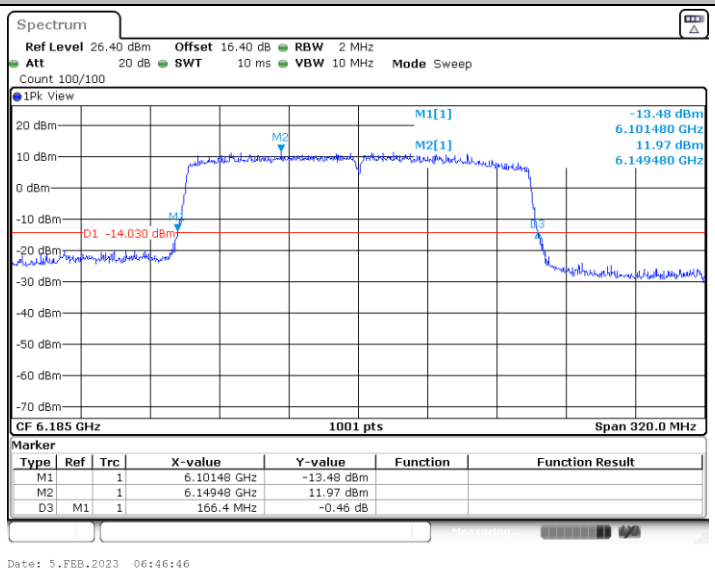

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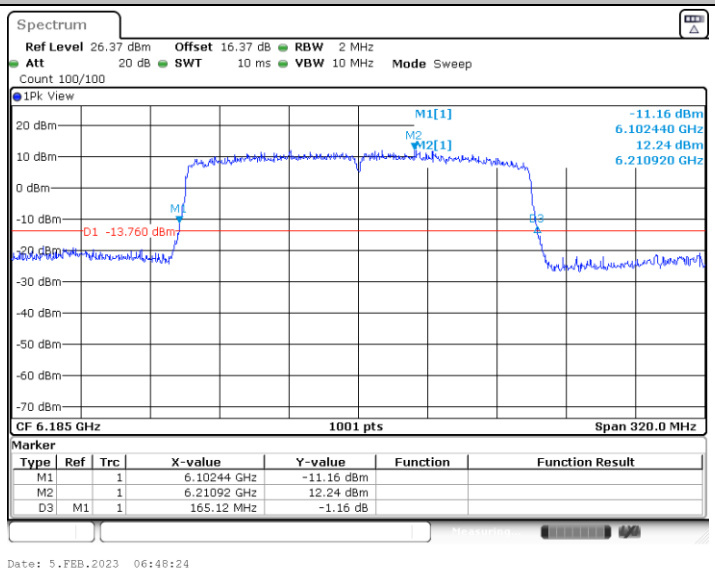

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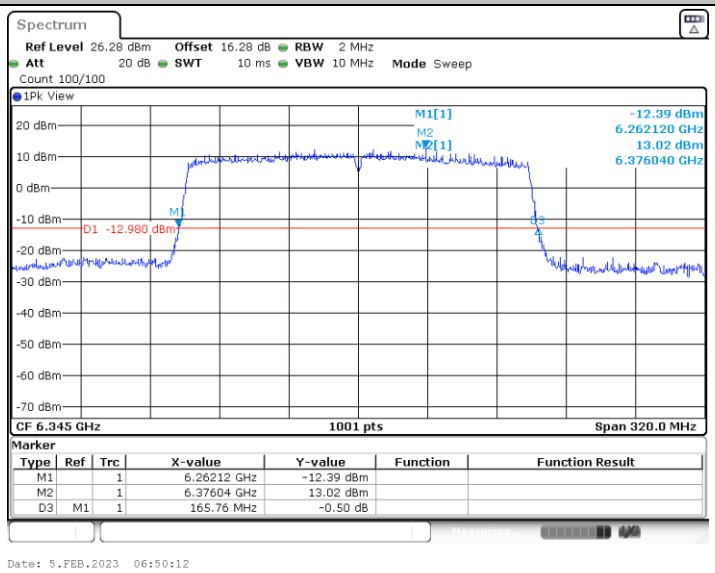

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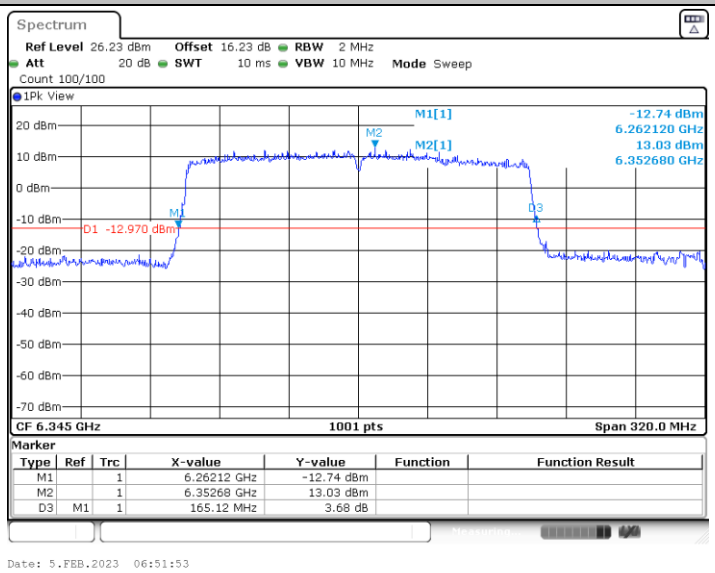

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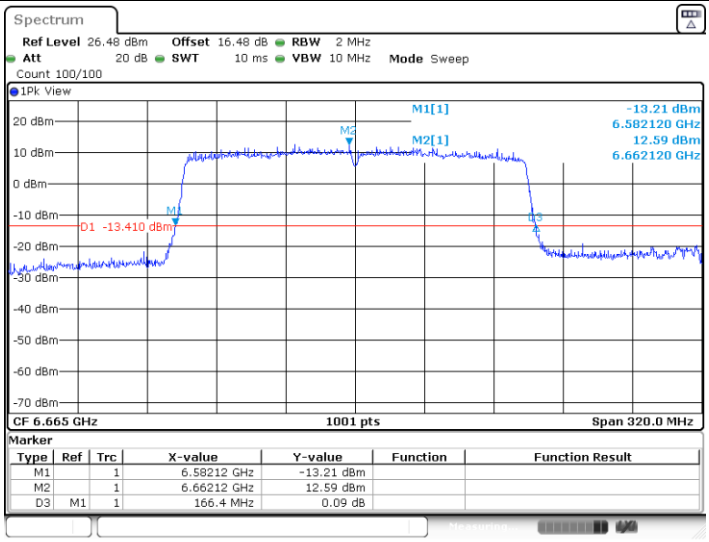

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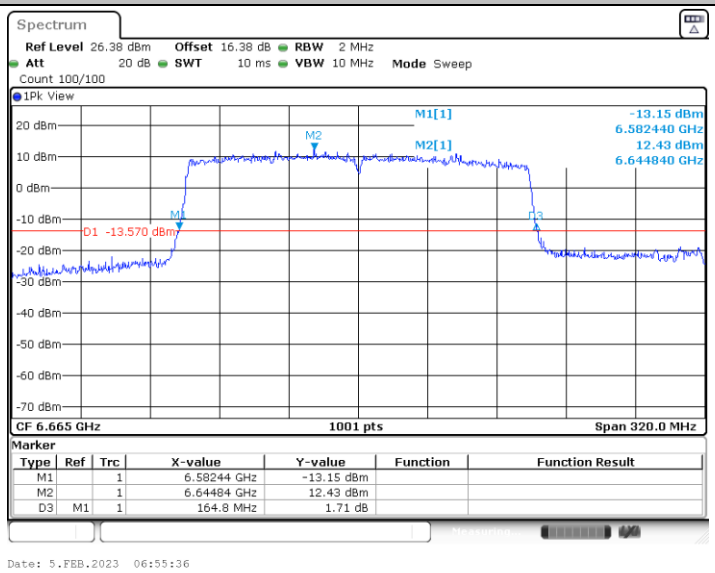


Occupied channel bandwidth

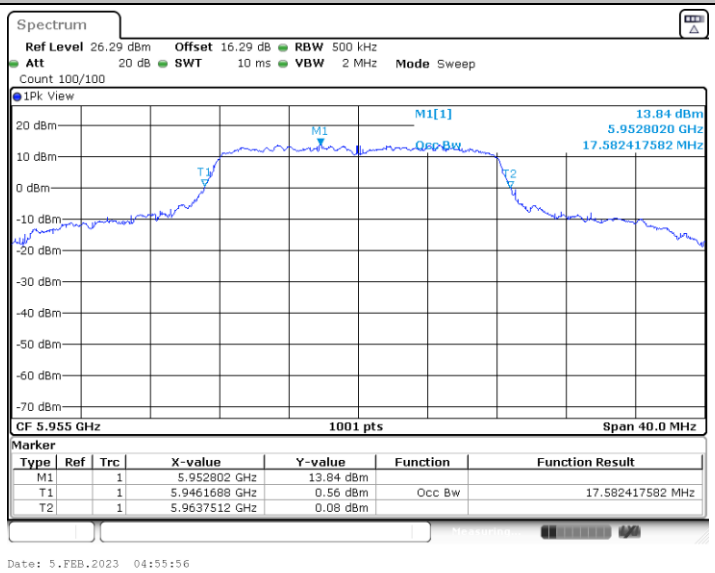
Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A-CDD	Ant7	5955	17.582	5946.1688	5963.7512	320	PASS
	Ant8	5955	17.742	5946.2088	5963.9510	320	PASS
	Ant7	6195	16.903	6186.4486	6203.3516	320	PASS
	Ant8	6195	17.103	6186.4086	6203.5115	320	PASS
	Ant7	6415	16.783	6406.5285	6423.3117	320	PASS
	Ant8	6415	16.783	6406.6084	6423.3916	320	PASS
	Ant7	6535	17.103	6526.4086	6543.5115	320	PASS
	Ant8	6535	16.903	6526.5285	6543.4316	320	PASS
	Ant7	6695	17.023	6686.4086	6703.4316	320	PASS
	Ant8	6695	16.943	6686.4885	6703.4316	320	PASS
	Ant7	6855	16.903	6846.4486	6863.3516	320	PASS
	Ant8	6855	**20.5**	6844.8102	6865.3097	320	PASS
11AX20MIMO	Ant7	5955	19.261	5945.3297	5964.5904	320	PASS
	Ant8	5955	19.381	5945.2897	5964.6703	320	PASS
	Ant7	6195	19.141	6185.3696	6204.5105	320	PASS
	Ant8	6195	19.261	6185.3297	6204.5904	320	PASS
	Ant7	6415	19.101	6405.4096	6424.5105	320	PASS
	Ant8	6415	19.141	6405.4096	6424.5504	320	PASS
	Ant7	6535	19.141	6525.4096	6544.5504	320	PASS
	Ant8	6535	19.181	6525.3696	6544.5504	320	PASS
	Ant7	6695	19.101	6685.4096	6704.5105	320	PASS
	Ant8	6695	19.181	6685.3696	6704.5504	320	PASS
	Ant7	6855	19.101	6845.4096	6864.5105	320	PASS
	Ant8	6855	**19.74**	6845.0899	6864.8302	320	PASS
11AX40MIMO	Ant7	5965	38.282	5945.8192	5984.1009	320	PASS
	Ant8	5965	38.521	5945.7393	5984.2607	320	PASS
	Ant7	6205	38.042	6185.8991	6223.9411	320	PASS
	Ant8	6205	38.282	6185.8192	6224.1009	320	PASS
	Ant7	6405	38.202	6385.8991	6424.1009	320	PASS
	Ant8	6405	38.122	6385.8991	6424.0210	320	PASS
	Ant7	6565	38.042	6545.9790	6584.0210	320	PASS
	Ant8	6565	38.042	6545.9790	6584.0210	320	PASS
	Ant7	6685	38.122	6665.8991	6704.0210	320	PASS
	Ant8	6685	38.122	6665.8991	6704.0210	320	PASS
	Ant7	6845	38.042	6825.9790	6864.0210	320	PASS
	Ant8	6845	**39.081**	6825.4995	6864.5804	320	PASS
11AX80MIMO	Ant7	5985	77.682	5946.1588	6023.8412	320	PASS

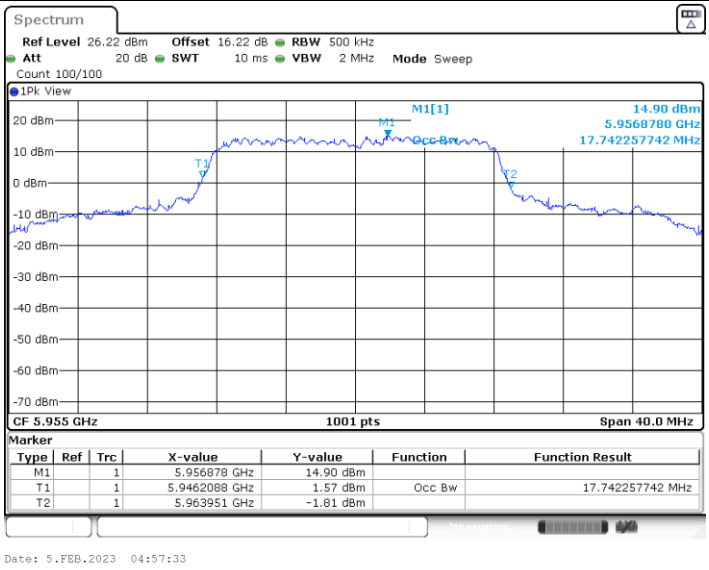
	Ant8	5985	77.682	5946.1588	6023.8412	320	PASS
	Ant7	6225	77.363	6186.1588	6263.5215	320	PASS
	Ant8	6225	77.522	6186.1588	6263.6813	320	PASS
	Ant7	6385	77.842	6345.9990	6423.8412	320	PASS
	Ant8	6385	77.842	6345.9990	6423.8412	320	PASS
	Ant7	6625	77.522	6586.1588	6663.6813	320	PASS
	Ant8	6625	77.682	6585.9990	6663.6813	320	PASS
	Ant7	6705	77.682	6666.1588	6743.8412	320	PASS
	Ant8	6705	77.842	6665.9990	6743.8412	320	PASS
	Ant7	6785	77.682	6746.1588	6823.8412	320	PASS
	Ant8	6785	**78.322**	6745.8392	6824.1608	320	PASS
11AX160MIMO	Ant7	6025	157.283	5946.0390	6103.3217	320	PASS
	Ant8	6025	156.963	5946.6783	6103.6414	320	PASS
	Ant7	6185	156.963	6106.0390	6263.0020	320	PASS
	Ant8	6185	156.963	6106.3586	6263.3217	320	PASS
	Ant7	6345	157.283	6266.3586	6423.6414	320	PASS
	Ant8	6345	157.283	6266.3586	6423.6414	320	PASS
	Ant7	6665	157.283	6586.3586	6743.6414	320	PASS
	Ant8	6665	**157.283**	6586.0390	6743.3217	320	PASS

Test Graphs

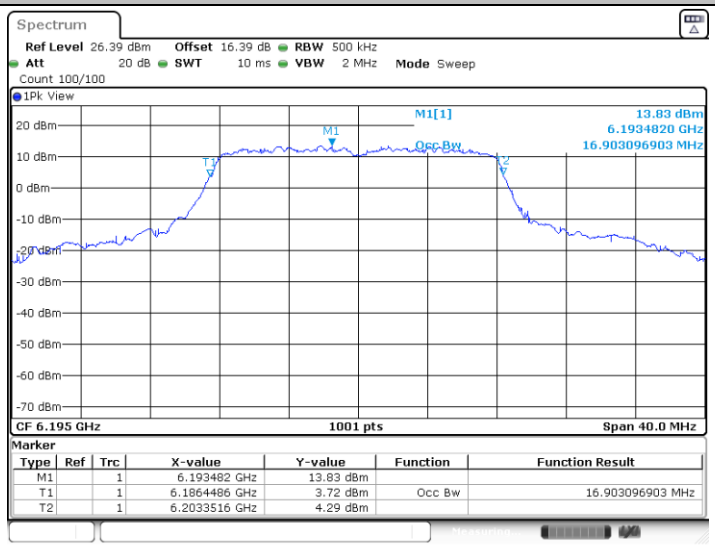
11A-CDD_Ant7_5955



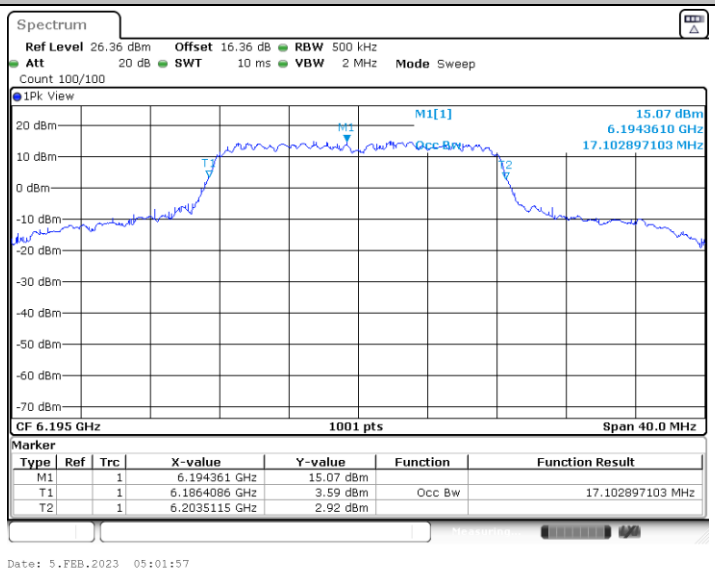
11A-CDD_Ant8_5955



11A-CDD_Ant7_6195



11A-CDD_Ant8_6195



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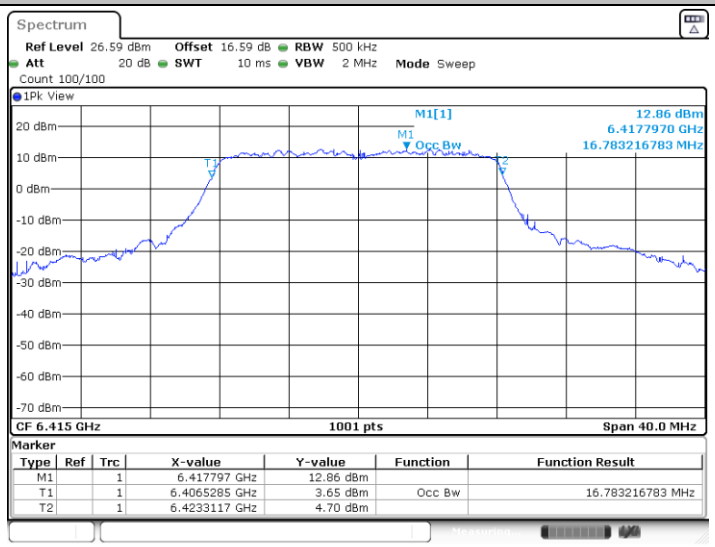

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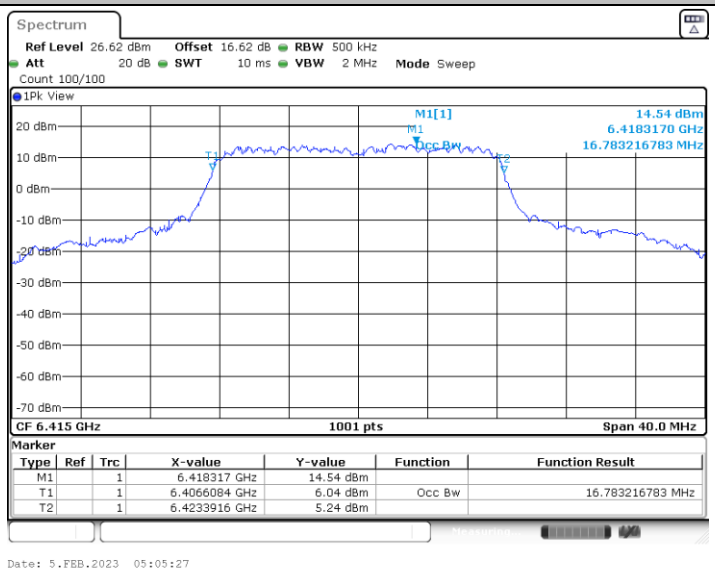

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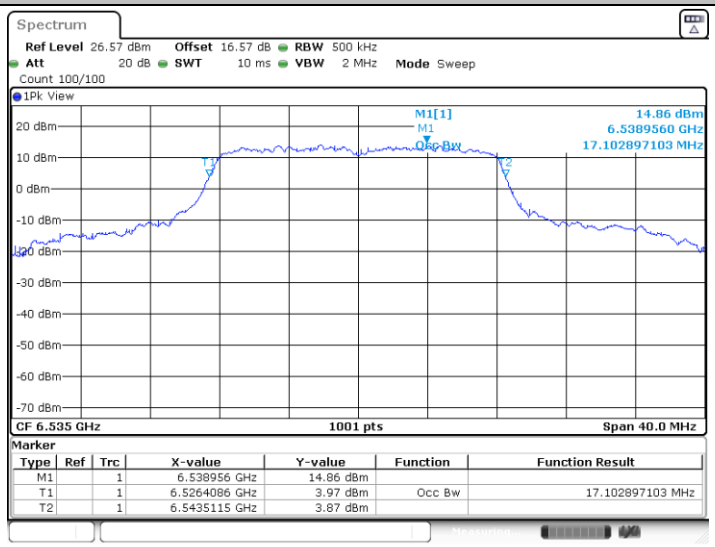

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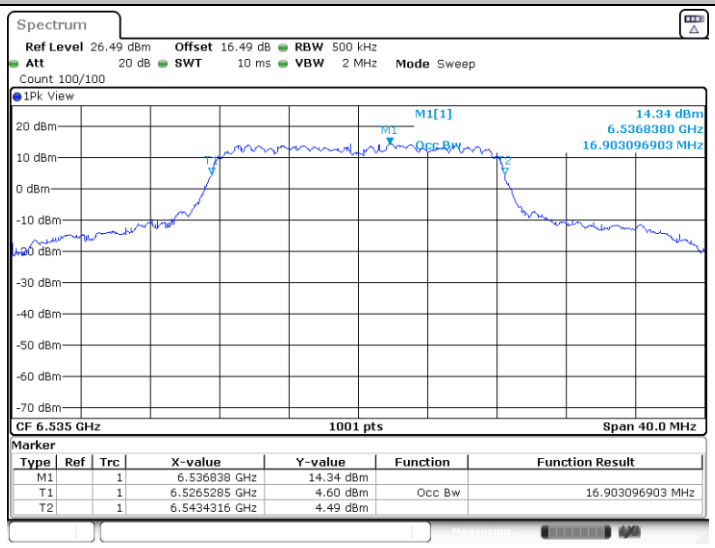

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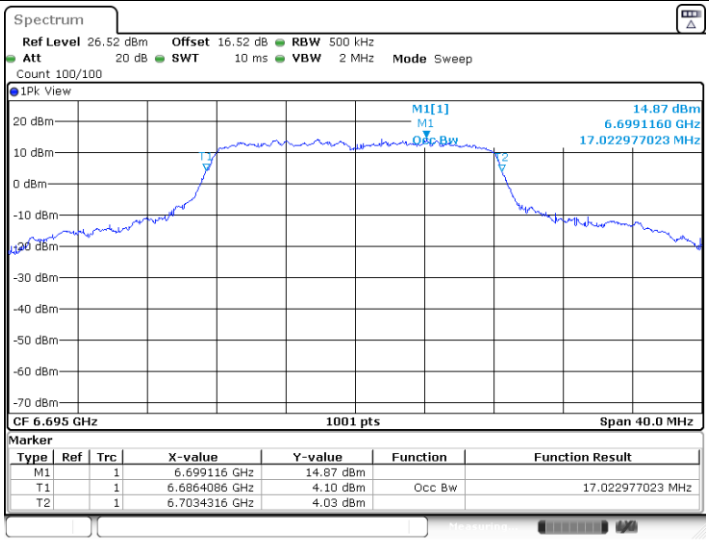

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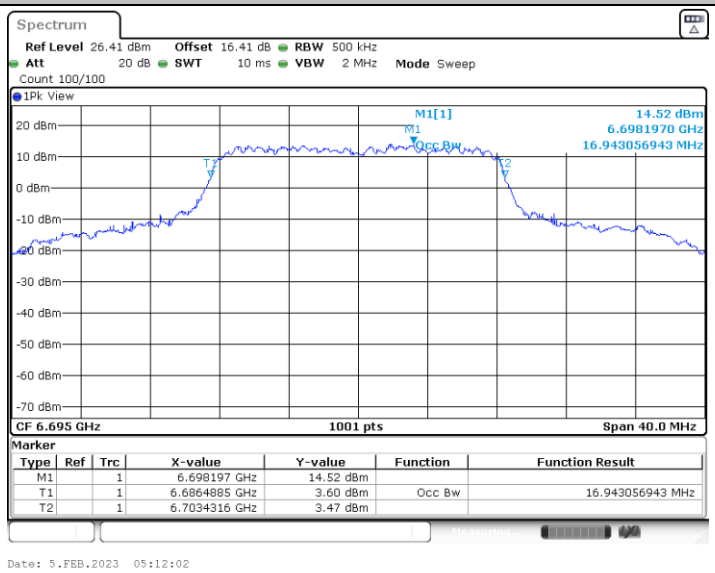

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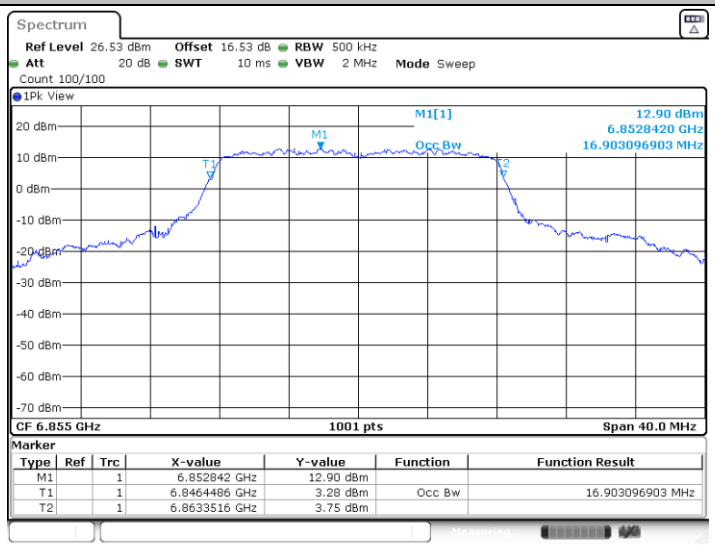

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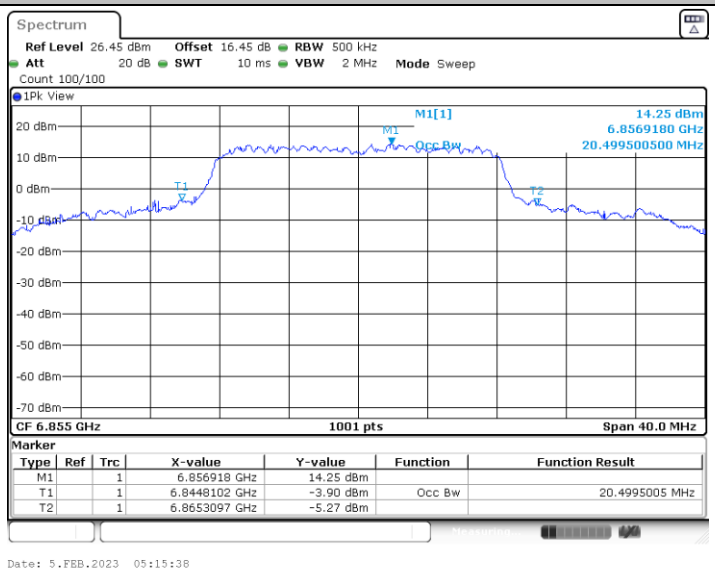

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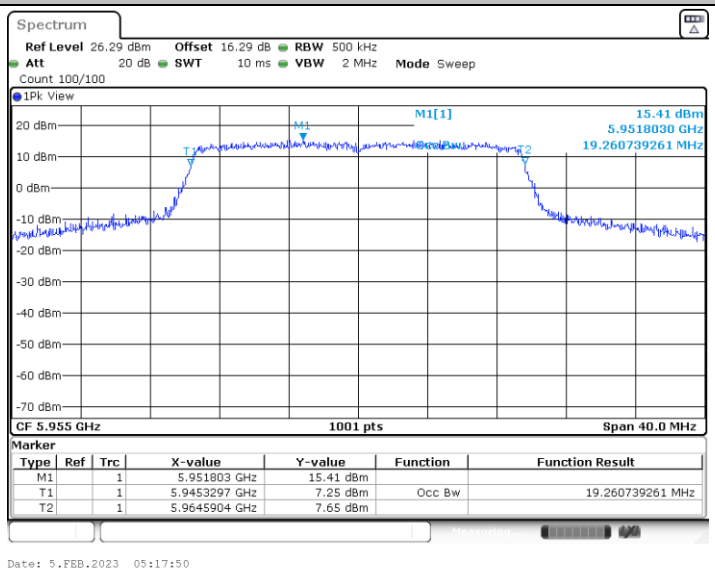

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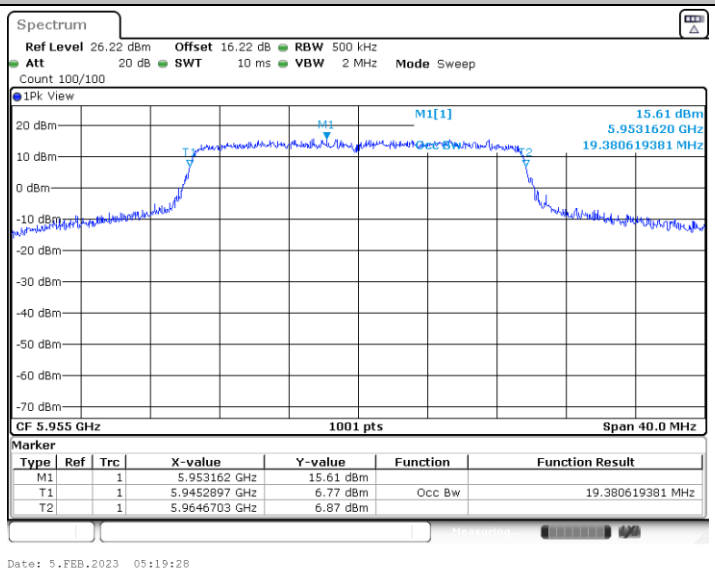

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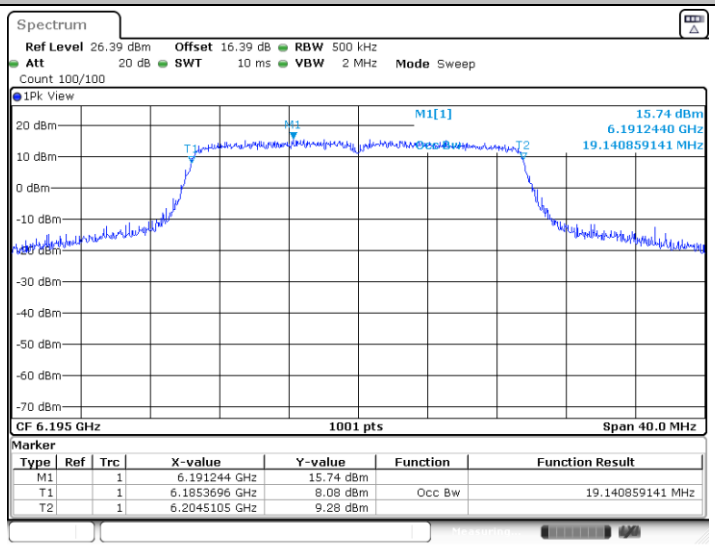

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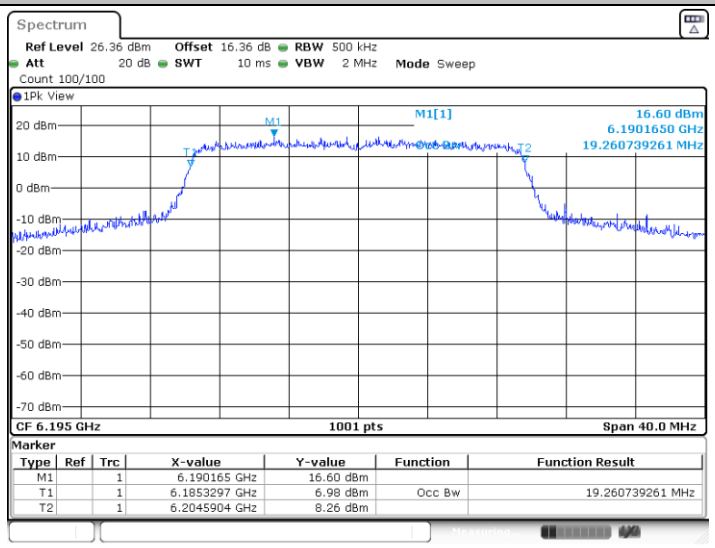

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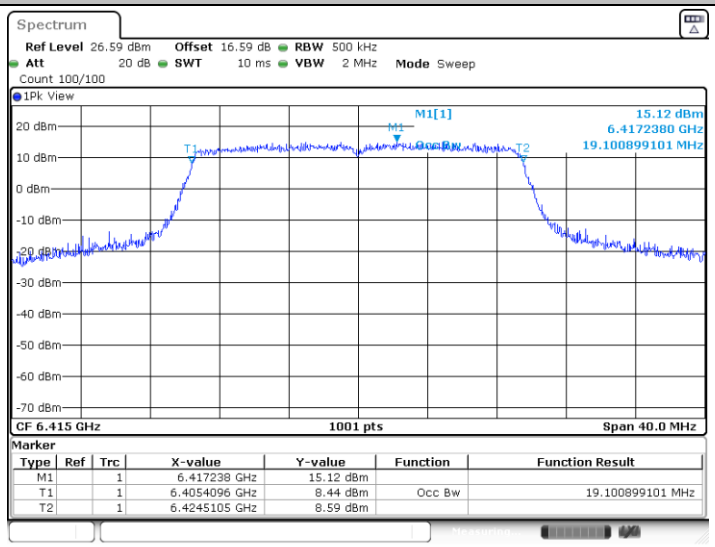

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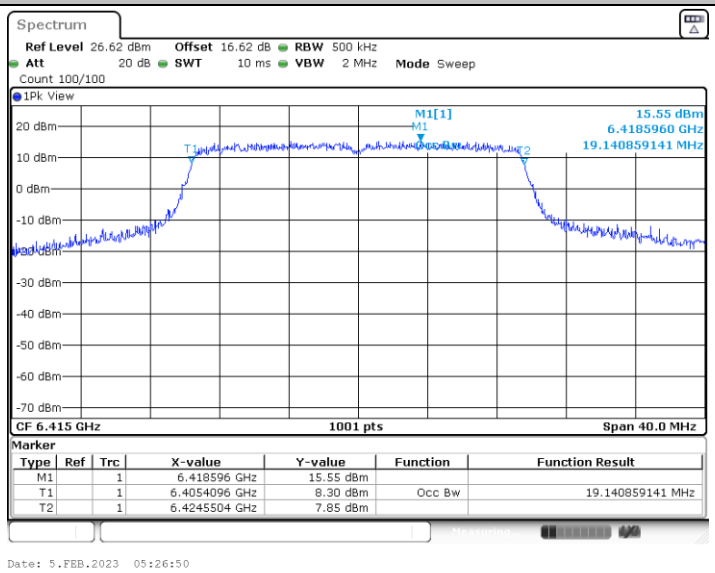

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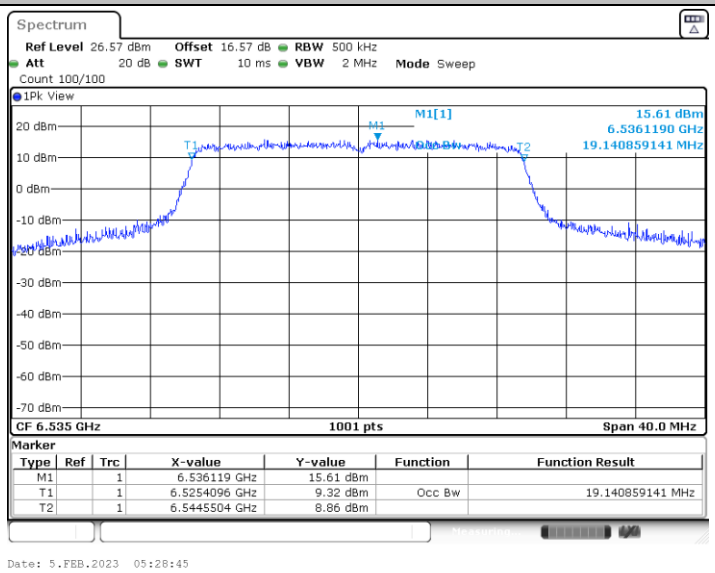
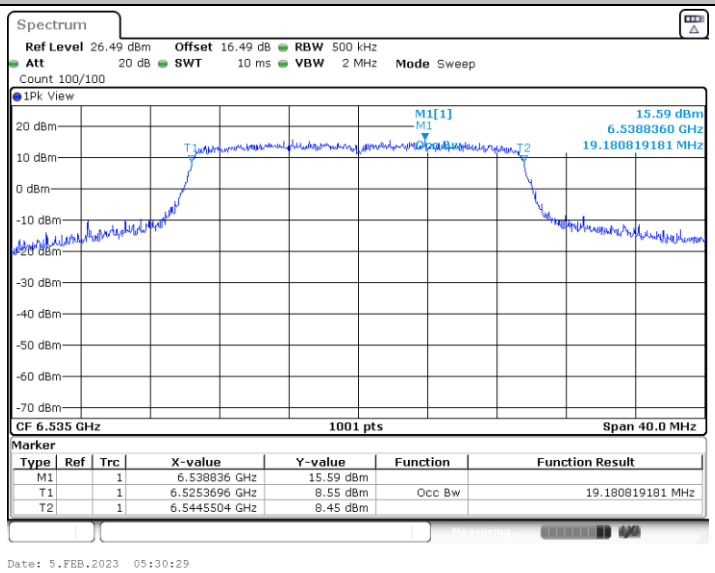
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