FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	Xiaomi
MODEL NAME	:	23078PND5G
FCC ID	:	2AFZZND5G
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	15E 6 GHz Low Power Indoor Client (6XD)
TEST DATE(S)	:	May 18, 2023 ~ Aug. 02, 2023

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

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)

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People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FR351205-03	01	Initial issue of report	Aug. 04, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403(i)	26dB Emission Bandwidth	Reporting only	-
3.1	15.407(a)(10)	99% Occupied Bandwidth	Pass	1
3.2	15.407(a)(8)	Maximum Conducted Output Power	Reporting only	-
3.2	15.407(a)(8)	Fundamental Maximum EIRP	Pass	-
3.3	15.407(a)(8)	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	Pass	
3.6	15.407(b)	Unwanted Emissions	Pass	Under limit 5.64 dB at 7332.500 MHz
-	15.207	AC Conducted Emission	Not Required	-
3.7	15.203 15.407(a)	Antenna Requirement	Pass	-

Remark:

1. For operation bandwidth 320MHz, the channel bandwidth limit 320MHz is judged by 99% Occupied Bandwidth.
2. This is a variant report, the purpose is to enable 320M bandwidth by software. According to the differences, only the related test cases of 320MHz were tested, all the other test results are referred to original test report (Sporton Report Number ER351205F).

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.

1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Xiaomi
Model Name	23078PND5G
FCC ID	2AFZZND5G
IMEI Code	Conducted: 861585060041561/861585060041579 Radiation: 861585060051503/861585060051551 CBP: 861585060020847/861585060020854
HW Version	P2.0
SW Version	MIUI 14
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	U-NII-5: 5925 MHz ~ 6425 MHz U-NII-6: 6425 MHz ~ 6525 MHz U-NII-7: 6525 MHz ~ 6875 MHz U-NII-8: 6875 MHz ~ 7125 MHz
Maximum EIRP	**<MIMO Ant.5+18>** **<5925 MHz ~ 7125 MHz >** 802.11be EHT320 : 12.97 dBm / 0.0198 W
99% Occupied Bandwidth	**<MIMO Ant.5+18>** 802.11 be EHT320 : 317.123 MHz
Antenna Type / Gain	**<5925 MHz ~ 6425 MHz >** <Ant. 5> : Fixed Internal Antenna with gain -0.43 dBi <Ant. 18> : Fixed Internal Antenna with gain 0.00 dBi **<6425 MHz ~ 6525 MHz >** <Ant. 5> : Fixed Internal Antenna with gain -2.05 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.54 dBi **<6525 MHz ~ 6875 MHz >** <Ant. 5> : Fixed Internal Antenna with gain -3.01 dBi

	<Ant. 18> : Fixed Internal Antenna with gain -1.33 dBi **<6875 MHz ~ 7125 MHz >** <Ant. 5> : Fixed Internal Antenna with gain -2.04 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.67 dBi
Type of Modulation	802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM) 802.11be: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)

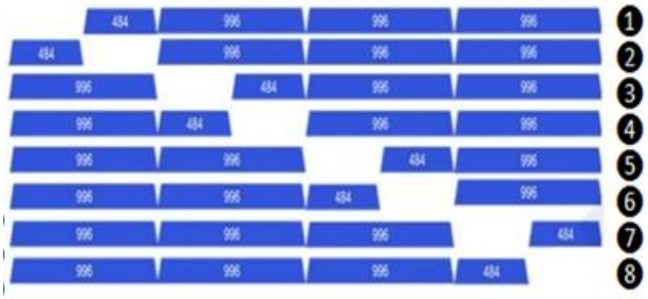
Remark:

1. WLAN MIMO only support CDD mode.
2. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal conducted power.
3. U-NII-5/-6/-7/-8 can't transmit simultaneously.
4. CBP test with minimum antenna gain (Antenna 5 path for each band).
5. 802.11be support full RU tone and partial RU 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.
6. 802.11be support small size RU, Large size RU and Puncturing modes as below, which is less than full RU conducted power, therefore have assessed only Power Density/RSE.

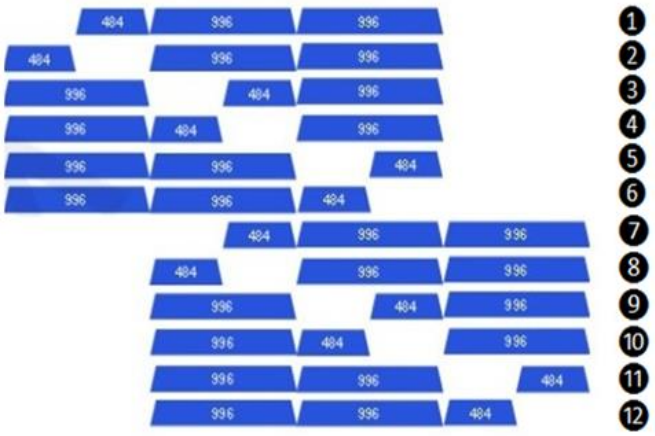
<Large size RU 3*996 tone> & <320M BW Puncturing 80MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4

<Large size RU 3*996+484 tone> & <320M BW Puncturing 40MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4
			5
			6
			7
			8

<Large size RU 2*996+484 tone> & <320M BW Puncturing 80+40MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12

Only the worse cases are shown in this report.

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ DFS01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-SZ	AUDIX	E3	6.2009-8-24a
2.	CO01-SZ	AUDIX	E3	6.120613b

1.8 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

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

2.1 Carrier Frequency and Channel

<U-NII-5, 6, 7, 8>

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 320M	**Channel**	31				63			
	Freq. (MHz)	6105				6265			

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							
BW 320M	Channel	95							
	Freq. (MHz)	6425							

BW 20M	Channel	97	101	105	109	113	117	121	125
	Freq. (MHz)	6435	6455	6475	6495	6515	6535	6555	6575
BW 40M	Channel	99		107		115		123	
	Freq. (MHz)	6445		6485		6525		6565	
BW 80M	Channel	103				119			
	Freq. (MHz)	6465				6545			
BW 160M	Channel	111							
	Freq. (MHz)	6505							

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 320M	Channel	127							
	Freq. (MHz)	6585							

BW 20M	Channel	161	165	169	173	177	181	185	189
	Freq. (MHz)	6755	6775	6795	6815	6835	6855	6875	6895
BW 40M	Channel	163		171		179		187	
	Freq. (MHz)	6765		6805		6845		6885	
BW 80M	Channel	167				183			
	Freq. (MHz)	6785				6865			
BW 160M	Channel	175							
	Freq. (MHz)	6825							
BW 320M	Channel	159							
	Freq. (MHz)	6745							

BW 20M	Channel	193	197	201	205	209	213	217	221
	Freq. (MHz)	6915	6935	6955	6975	6995	7015	7035	7055
BW 40M	Channel	195		203		211		219	
	Freq. (MHz)	6925		6965		7005		7045	
BW 80M	Channel	199				215			
	Freq. (MHz)	6945				7025			
BW 160M	Channel	207							
	Freq. (MHz)	6985							
BW 320M	Channel	191							
	Freq. (MHz)	6905							

BW 20M	Channel	225	229
	Freq. (MHz)	7075	7095
BW 40M	Channel	227	
	Freq. (MHz)	7085	

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11be EHT320	MCS0

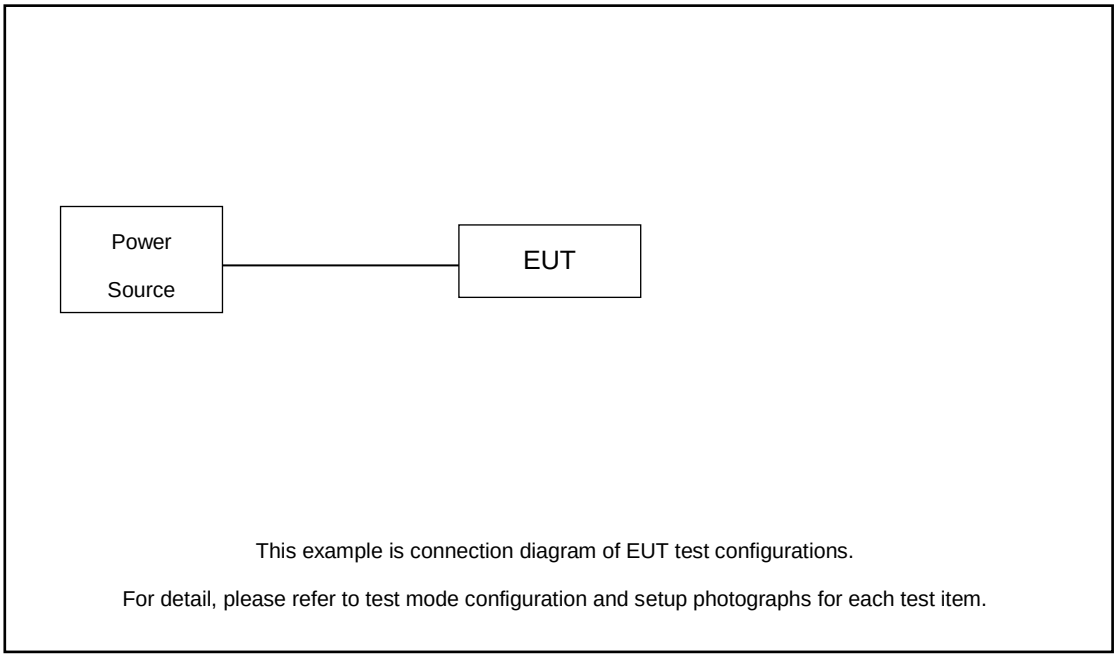
Ch. #		UNII-5	UNII-6	UNII-7	UNII-8
		802.11be EHT320	802.11be EHT320	802.11be EHT320	802.11be EHT320
L	Low	-	-	-	-
M	Middle	31			
H	High	63			
Straddle		95	127	159	191

Remark:

1. For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.
2. For Radiated Test Cases, the tests were performed with Adapter, USB Cable

2.3 Connection Diagram of Test System

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	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	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.

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 5.31 dB and 10dB attenuator.

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

= 5.31 + 10 = 15.31 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 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.

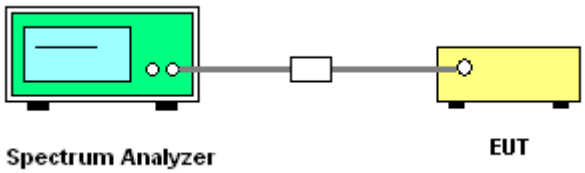
3.1.2 Measuring Instruments

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)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

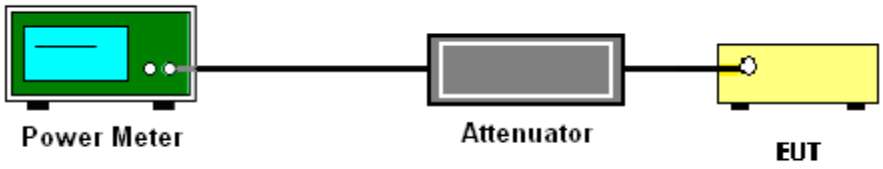
3.2.3 Test Procedures

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

U-NII-5/6/7/8														
Mod.	Data Rate	NTX	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 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	SUM		
BE320	MCS0	2	6105	Full	1.76	1.76	9.13	10.12	12.66	0.00		12.66	24.00	Pass
BE320	MCS0	2	6265	Full	1.76	1.76	9.00	8.98	12.00	0.00		12.00	24.00	Pass
BE320	MCS0	2	6425	Full	1.76	1.76	9.48	9.81	12.66	0.00		12.66	24.00	Pass
BE320	MCS0	2	6585	Full	1.76	1.76	10.89	11.48	14.21	-1.33		12.88	24.00	Pass
BE320	MCS0	2	6745	Full	1.76	1.76	11.18	11.39	14.30	-1.33		12.97	24.00	Pass
BE320	MCS0	2	6905	Full	1.76	1.76	10.10	11.12	13.65	-1.33		12.32	24.00	Pass

3.3 Fundamental Power Spectral Density Measurement

3.3.1 Limit of Fundamental Power Spectral Density

<FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed −1 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).

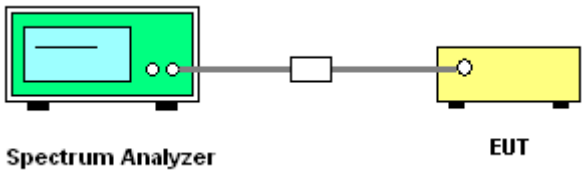
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), 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 (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.

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.

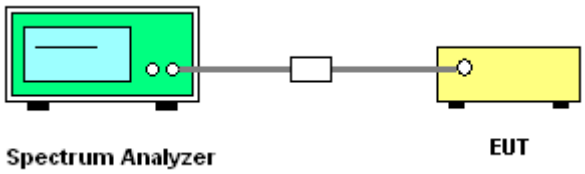
Section J) In-Band Emissions.

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 Contention Based Protocol

3.5.1 Limit of Contention Based Protocol

<FCC 14-30 CFR 15.407>

(d)(6) Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

where:
$BWEUT$: Transmission bandwidth of EUT signal
$BWInc$: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)
$fc1$: Center frequency of EUT transmission
$fc2$: Center frequency of simulated incumbent signal

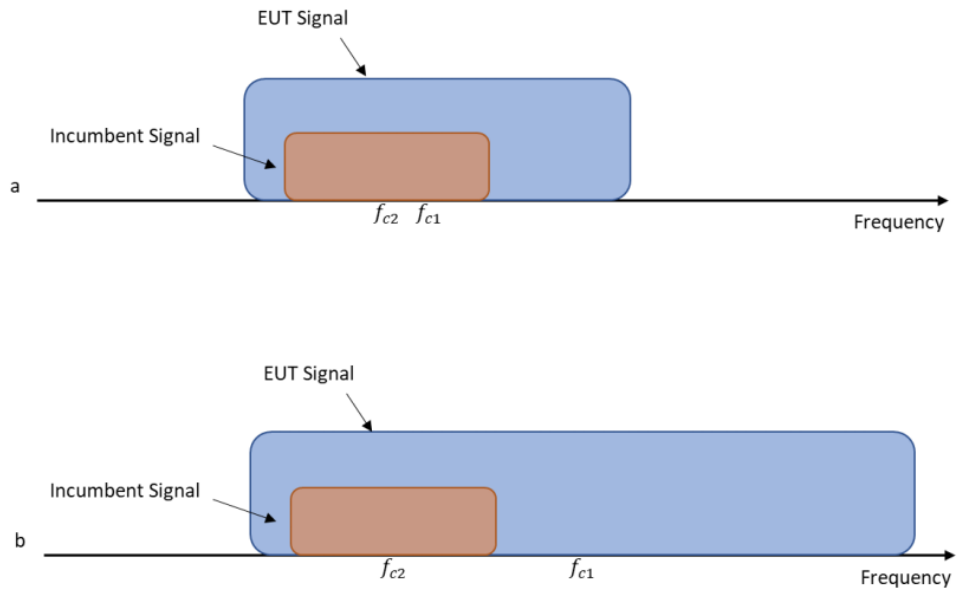


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

Refer to KDB 987594 D02 v01r01.

1. To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency $fc2$) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed
2. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
3. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
4. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

5. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center frequency for the AWGN signal and repeat the process.
6. EUT was driven in MIMO mode, the interferer signal was injected to both chains to monitor the performance, while the interferer level is determined according to the lowest antenna gain among both antennas.

3.5.4 Test Setup

Conducted Setup

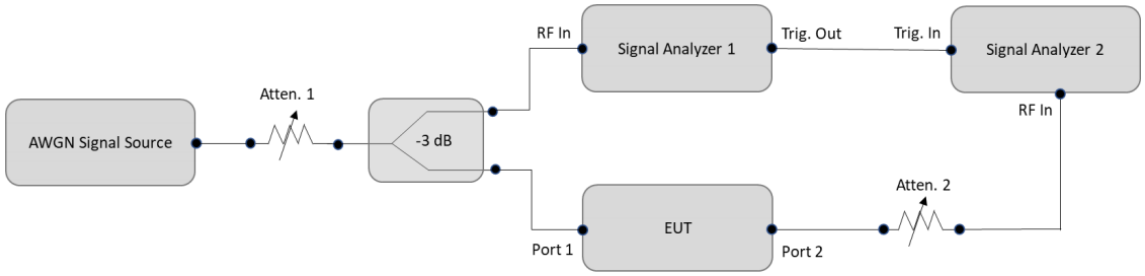


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

3.5.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
WLAN AP	ASUS	GT-AXE11000	Dual Band AP
Notebook	Acer	N15C1	LAN

3.5.6 Test Summary of Contention Based Protocol Test

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 5	6105	320	5950	-70.95	100	-62	-70.52	8.52
					Result: Stop Transmission			
				-71.95	<90	-62	-71.52	9.52
					Result: Minimal Operation			
				-72.95	=0	-62	-72.52	10.52
					Result: Normal Operation			
			6105	-68.83	100	-62	-68.40	6.40
					Result: Stop Transmission			
				-69.83	<90	-62	-69.40	7.40
					Result: Minimal Operation			
				-70.83	=0	-62	-70.40	8.40
					Result: Normal Operation			
			6260	-79.64	100	-62	-79.21	17.21
					Result: Stop Transmission			
				-80.64	<90	-62	-80.21	18.21
					Result: Minimal Operation			
				-81.64	=0	-62	-81.21	19.21
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -0.43 dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 5/6/7	6425	320	6270	-68.83	100	-62	-66.78	4.78
					Result: Stop Transmission			
				-69.83	<90	-62	-67.78	5.78
					Result: Minimal Operation			
				-70.83	=0	-62	-68.78	6.78
					Result: Normal Operation			
			6425	-69.06	100	-62	-67.01	5.01
					Result: Stop Transmission			
				-70.06	<90	-62	-68.01	6.01
					Result: Minimal Operation			
				-71.06	=0	-62	-69.01	7.01
					Result: Normal Operation			
			6580	-78.92	100	-62	-76.87	14.87
					Result: Stop Transmission			
				-79.92	<90	-62	-77.87	15.87
					Result: Minimal Operation			
				-80.92	=0	-62	-78.87	16.87
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -2.05dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 7(8)	6745	320	6590	-72.66	100	-62	-69.65	7.65
					Result: Stop Transmission			
				-73.66	<90	-62	-70.65	8.65
					Result: Minimal Operation			
				-74.66	=0	-62	-71.65	9.65
					Result: Normal Operation			
			6745	**-68.21 (worst)**	100	-62	-65.20	**3.20**
					Result: Stop Transmission			
				-69.21	<90	-62	-66.20	4.20
					Result: Minimal Operation			
				-70.21	=0	-62	-67.20	5.20
					Result: Normal Operation			
			6900	-75.84	100	-62	-72.83	10.83
					Result: Stop Transmission			
				-76.84	<90	-62	-73.83	11.83
					Result: Minimal Operation			
				-77.84	=0	-62	-74.83	12.83
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -3.01dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

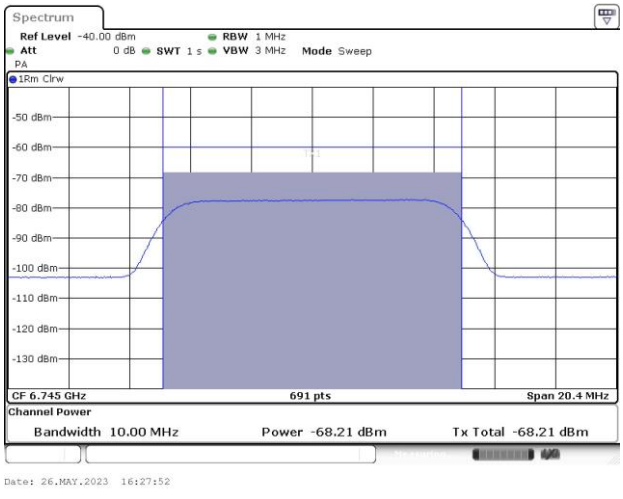
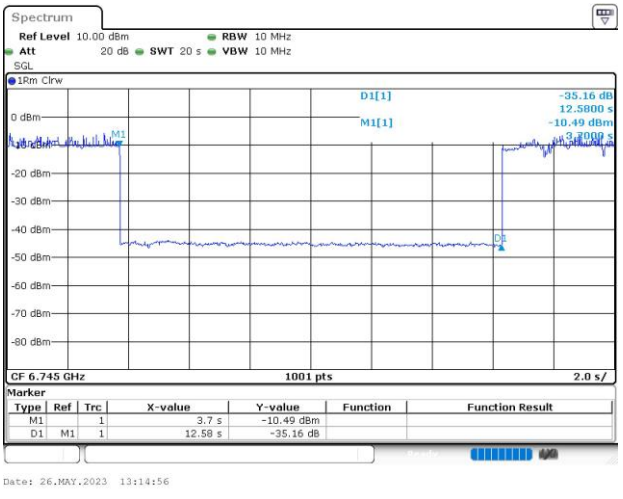
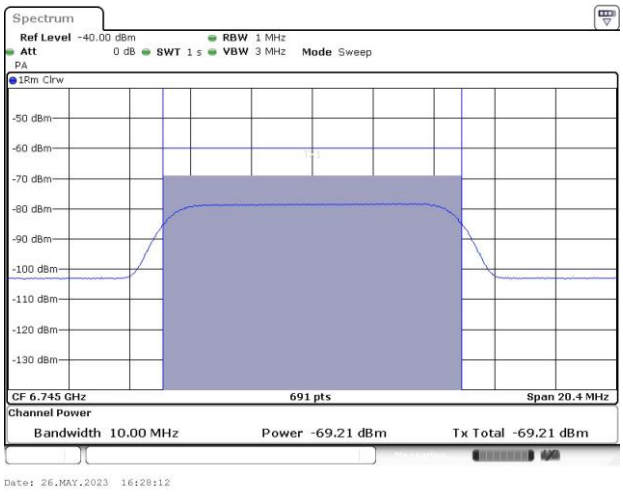
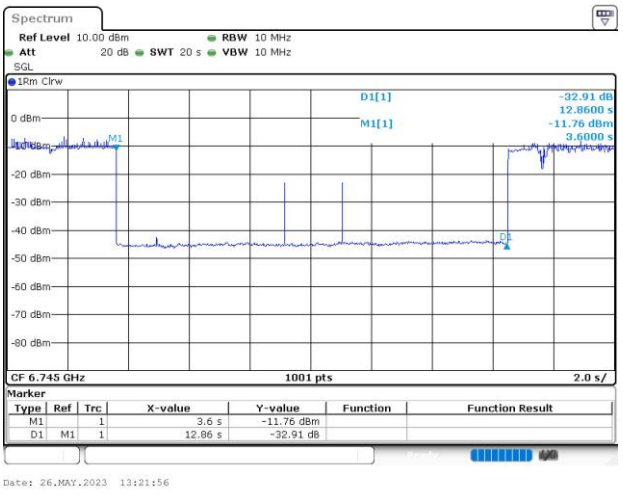
Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 8(7)	6745	320	6590	-72.66	100.00	-62.00	-70.62	8.62
					Result: Stop Transmission			
				-73.66	<90	-62.00	-71.62	9.62
					Result: Minimal Operation			
				-74.66	=0	-62.00	-72.62	10.62
					Result: Normal Operation			
			6745	-68.21	100.00	-62.00	-66.17	4.17
					Result: Stop Transmission			
				-69.21	<90	-62.00	-67.17	5.17
					Result: Minimal Operation			
				-70.21	=0	-62.00	-68.17	6.17
					Result: Normal Operation			
			6900	-75.84	100.00	-62.00	-73.80	11.80
					Result: Stop Transmission			
				-76.84	<90	-62.00	-74.80	12.80
					Result: Minimal Operation			
				-77.84	=0	-62.00	-75.80	13.80
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -2.04dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

3.5.7 Worst Case Plots of Contention Based Protocol

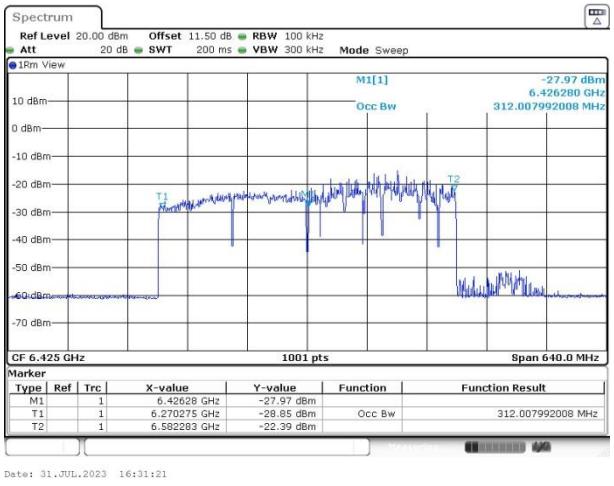
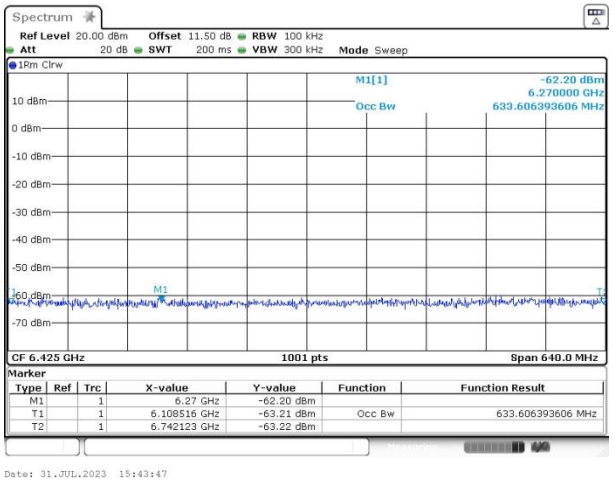
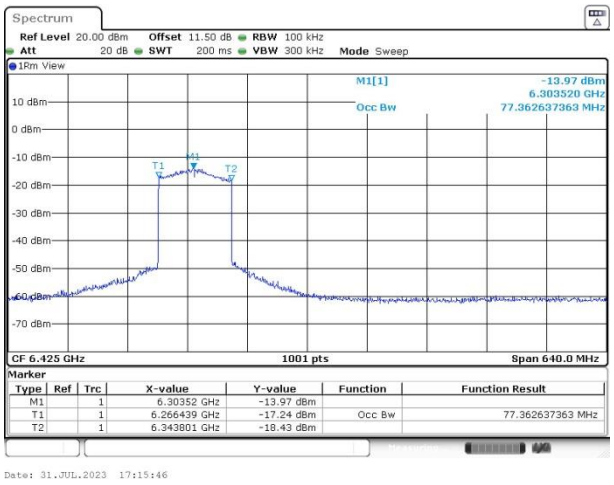
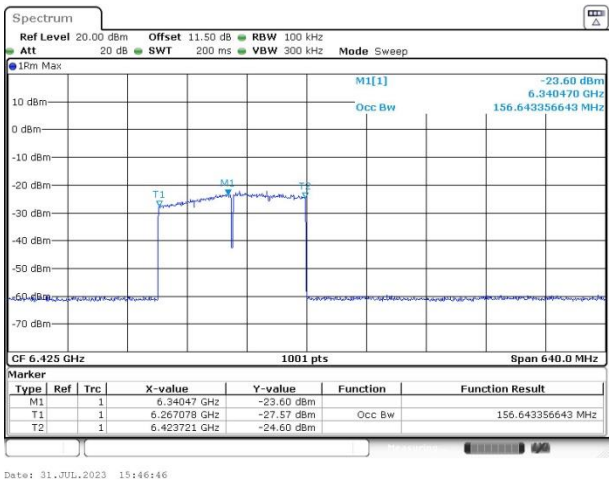
Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
802.11be (EHT320) / 6745MHz (Middle) Threshold Level (TL) = -68.21 dBm	802.11be (EHT320) / CH159 (Middle) Test result is pass due to no transmission occur.
	
802.11be (EHT320) / 6745MHz (Middle) Threshold Level (TL) = -69.21 dBm	802.11be (EHT320) / CH159 (Middle) Transmit when the interferer is 1dB lower.
	

Remark: M1: Injection of AWGN signal, D1: Removal of AWGN signal

3.5.8 Verify Contention Based Protocol Transmission Bandwidth

Verify transmission absence when Incumbent signal at different frequency (frequency domain plots).

1. When Incumbent Signal inject at lowest frequency (6270MHz), the whole 320MHz bandwidth stop transmission;
2. When Incumbent Signal inject at middle frequency (6425MHz), the transmission bandwidth reduced to 80MHz;
3. When Incumbent Signal inject at highest frequency (6580MHz), the transmission bandwidth reduced to 160MHz;

<table>
<tr><th colspan="2">UNII 5/6/7_CH95 (6425MHz / BW=320MHz)</th></tr>
<tr><td>Non-Incumbent Signal (full 320MHz)</td><td>Incumbent freq @ 6270MHz</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Incumbent freq @ 6425MHz</td><td>Incumbent freq @ 6580MHz</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

Note: the other channels also have the same characteristic, only CH95 is reported as representative.

3.6 Unwanted Emissions Measurement

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

3.6.1 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)

3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 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

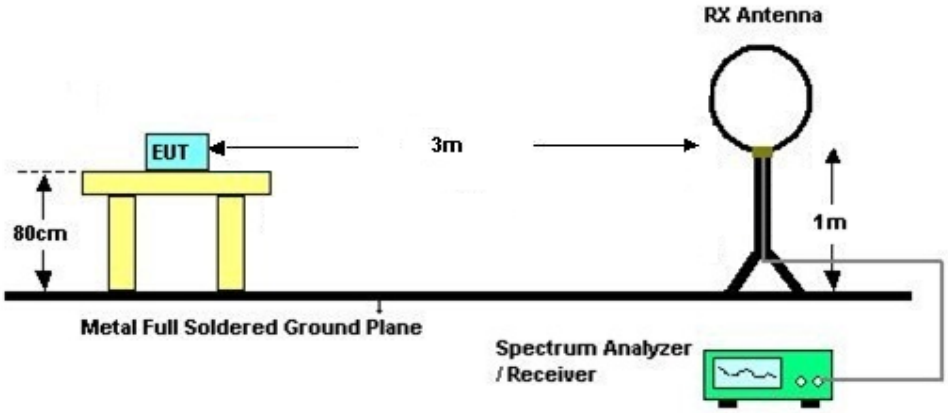
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - 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.

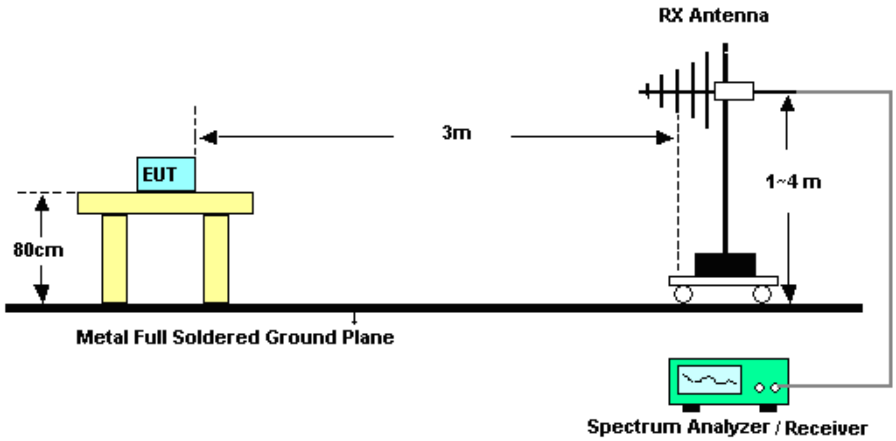
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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.

3.6.4 Test Setup

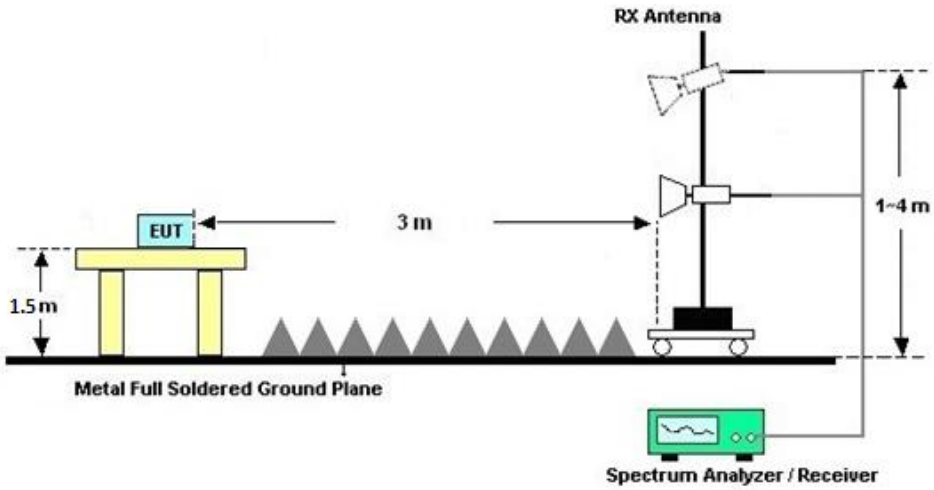
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.6.5 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.

3.6.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B&C.

3.6.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B&C.

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 CDD transmissions, 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)

For completely uncorrelated transmissions, directional gain is calculated as,

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

<CDD Modes>

	Ant. 5 (dBi)	Ant. 18 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	-0.43	0.00	0.00	2.80
U-NII-6	-2.05	-1.54	-1.54	1.22
U-NII-7	-3.01	-1.33	-1.33	0.88
U-NII-8	-2.04	-1.67	-1.67	1.16

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	101078	10Hz~40GHz	Apr. 06, 2023	May 25, 2023~ Aug. 02, 2023	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	May 25, 2023~ Aug. 02, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	Average PM	Dec. 27, 2022	May 25, 2023~ Aug. 02, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2022	May 18, 2023~ Jun. 30, 2023	Jul. 06, 2023	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	May 18, 2023~ Jun. 30, 2023	Jul. 27, 2024	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Sep. 28, 2021	May 18, 2023~ Jun. 30, 2023	Sep. 27, 2023	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 07, 2022	May 18, 2023~ Jun. 30, 2023	Jul. 06, 2023	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08, 2023	May 18, 2023~ Jun. 30, 2023	Apr. 07, 2024	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 19, 2022	May 18, 2023~ Jun. 30, 2023	Oct. 18, 2023	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	May 18, 2023~ Jun. 30, 2023	Oct. 18, 2023	Radiation (03CH02-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 19, 2022	May 18, 2023~ Jun. 30, 2023	Oct. 18, 2023	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2022	May 18, 2023~ Jun. 30, 2023	Jul. 06, 2023	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010003043	N/A	Nov. 10, 2022	May 18, 2023~ Jun. 30, 2023	Nov. 10, 2023	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	May 18, 2023~ Jun. 30, 2023	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	May 18, 2023~ Jun. 30, 2023	NCR	Radiation (03CH02-SZ)
Signal Analyzer	R&S	FSV7	101473	10Hz~7GHz	Dec. 27, 2022	May 26, 2023~ Jul. 31, 2023	Dec. 26, 2023	CBP (DFS01- SZ)
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200424	9kHz~6GHz	Apr. 04, 2023	May 26, 2023~ Jul. 31, 2023	Apr. 03, 2024	CBP (DFS01- SZ)
Vector Signal Generator	R&S	SMJ100A	101909	100kHz~6GHz	Dec. 27, 2022	May 26, 2023~ Jul. 31, 2023	Dec. 26, 2023	CBP (DFS01- SZ)
Combiner	MTJ Cooperation	MTJ7112	N/A	0.4-6GHz	NCR	May 26, 2023~ Jul. 31, 2023	NCR	CBP (DFS01- SZ)

NCR: No Calibration Required

5 Measurement Uncertainty

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±1.34 dB
Conducted Emissions	±1.34 dB
Occupied Channel Bandwidth	±0.13 %
Conducted Power Spectral Density	±1.32 dB

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))	5.1dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1dB

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

Appendix A. Conducted Test Results

Ambient Condition: 24~26 ℃, 45~55 %RH	
Test Date: 2023/5/25~2023/8/2	**Test Engineer:** Zhang Xue Yi

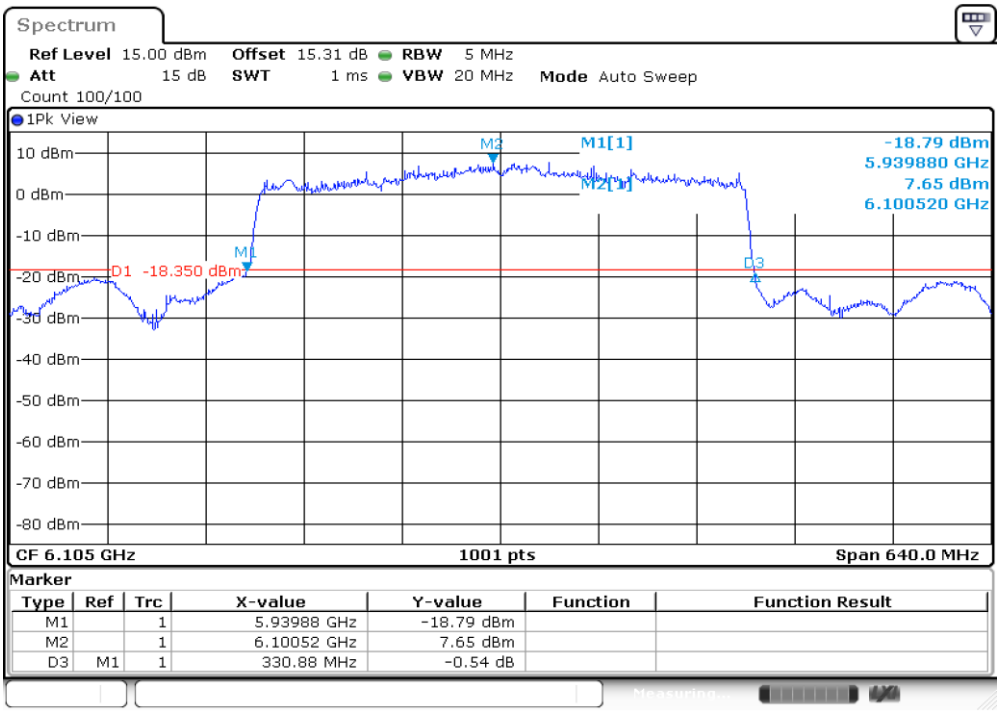
Emission Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]
11BE320MIMO	Ant5	6105	330.88	5939.88	6270.76
	Ant18	6105	328.96	5940.52	6269.48
	Ant5	6265	348.16	6082.60	6430.76
	Ant18	6265	329.60	6100.52	6430.12
	Ant5	6425	335.36	6258.60	6593.96
	Ant18	6425	328.96	6260.52	6589.48
	Ant5	6585	328.96	6420.52	6749.48
	Ant18	6585	329.60	6419.88	6749.48
	Ant5	6745	328.96	6579.88	6908.84
	Ant18	6745	329.60	6579.88	6909.48
	Ant5	6905	328.96	6740.52	7069.48
	Ant18	6905	328.32	6740.52	7068.84

Test Graphs

11BE320MIMO_Ant5_6105



Date: 26.MAY.2023 03:03:01

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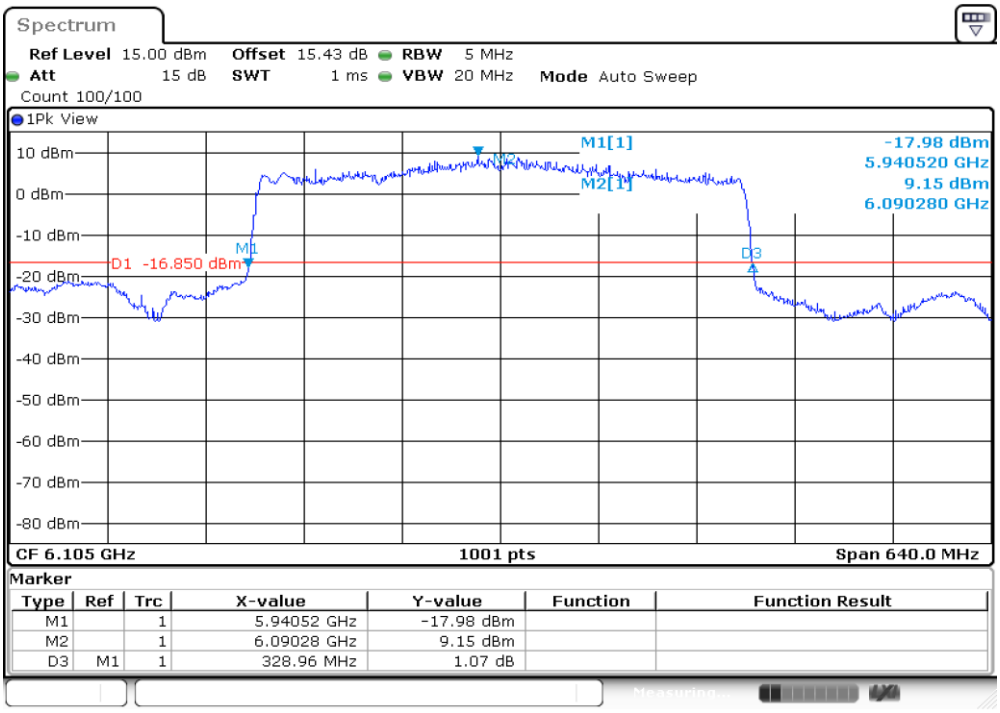
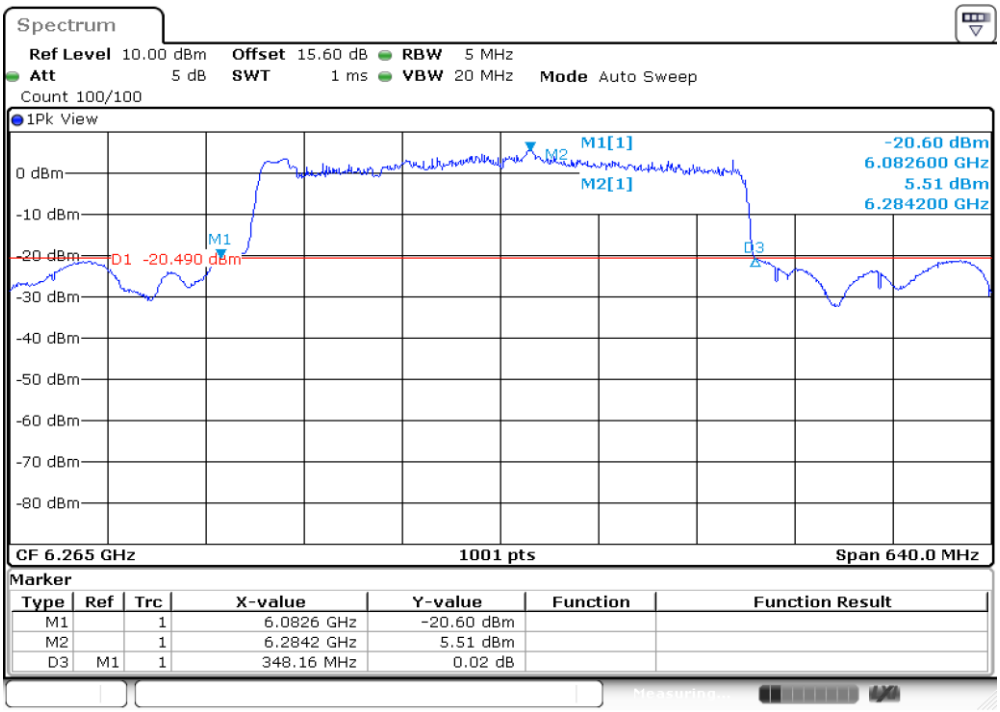


Date: 26.MAY.2023 03:03:12

11BE320MIMO_Ant5_6265



Date: 29.JUN.2023 16:30:37

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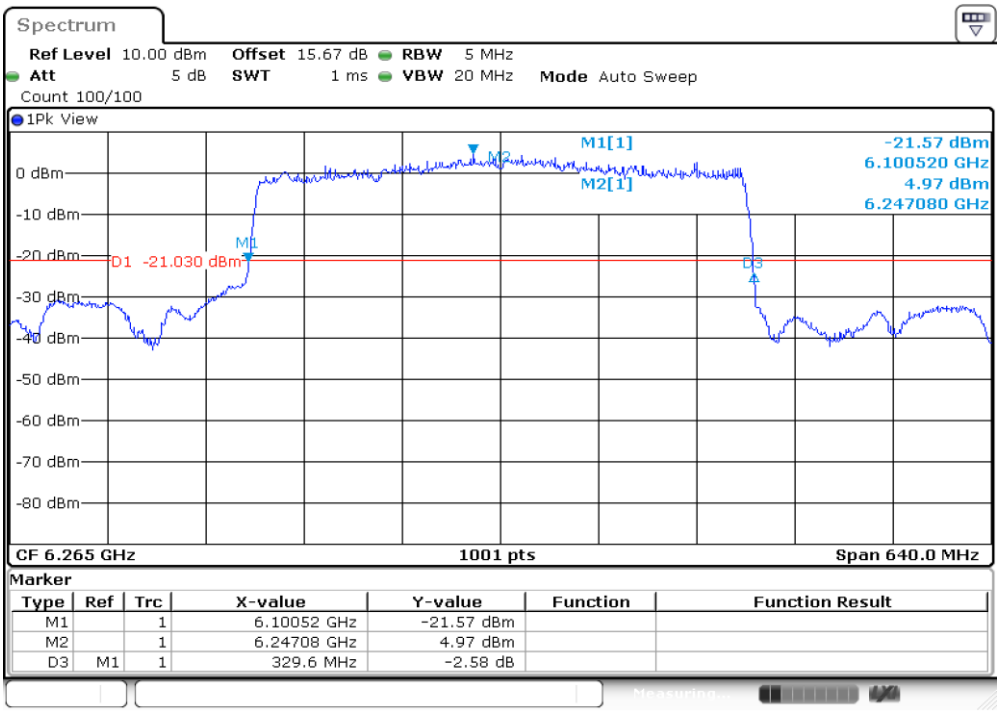
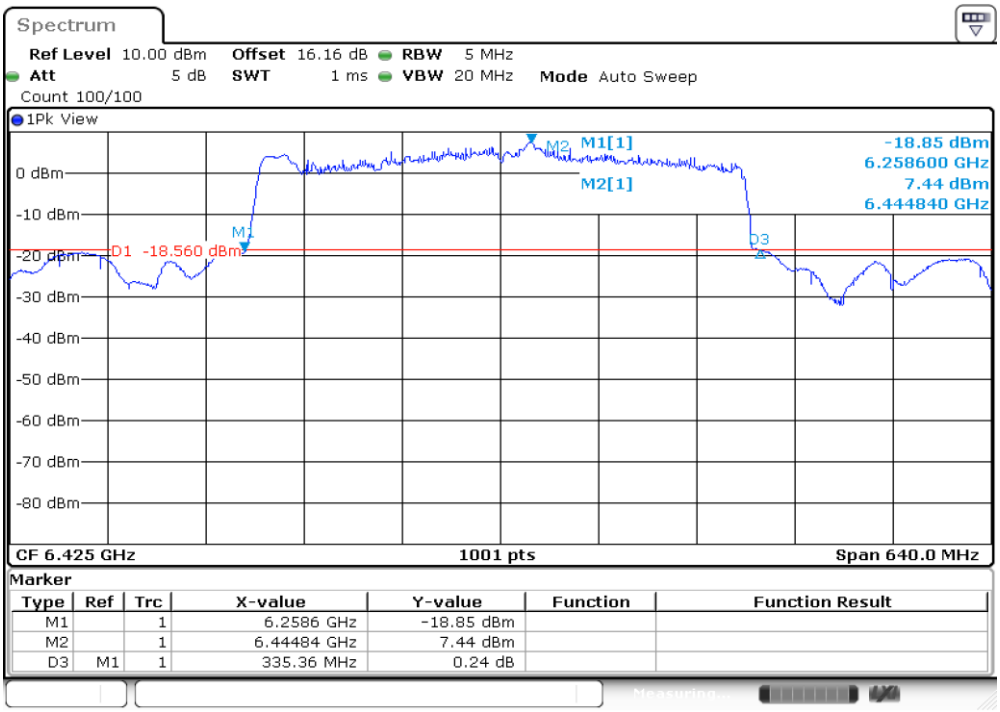


Date: 29.JUN.2023 16:31:28

11BE320MIMO_Ant5_6425



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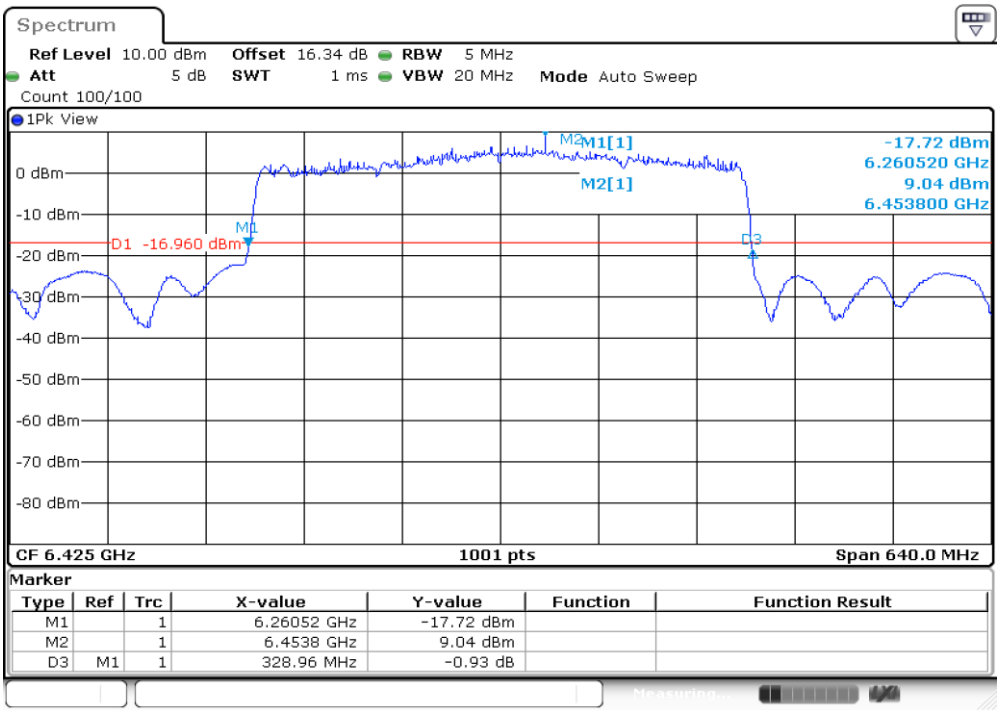
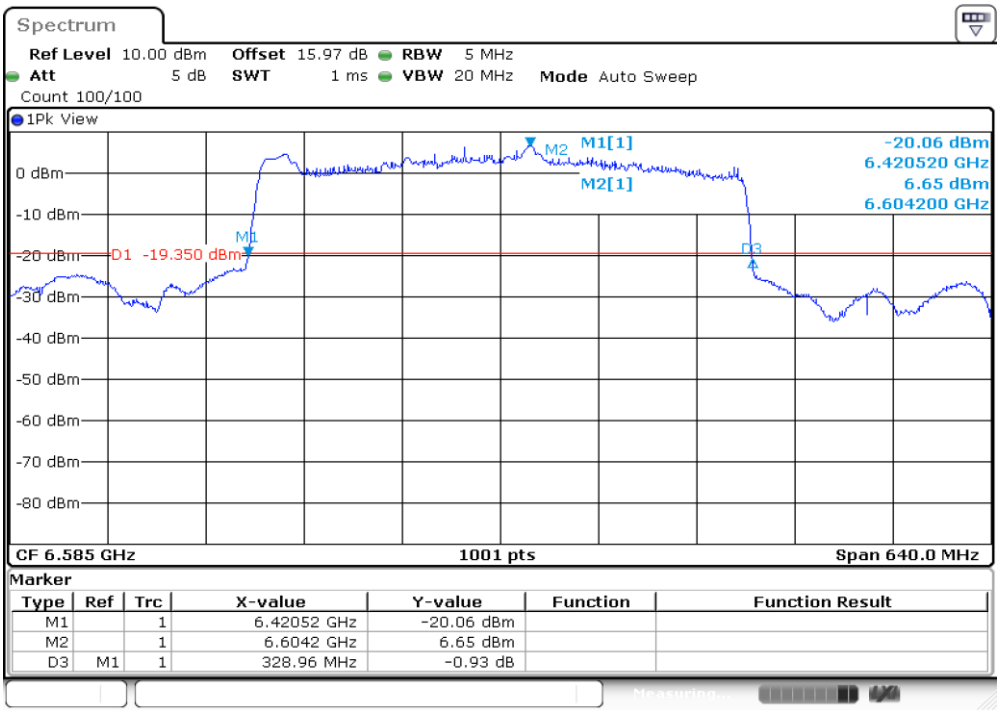


Date: 29.JUN.2023 16:34:07

11BE320MIMO_Ant5_6585



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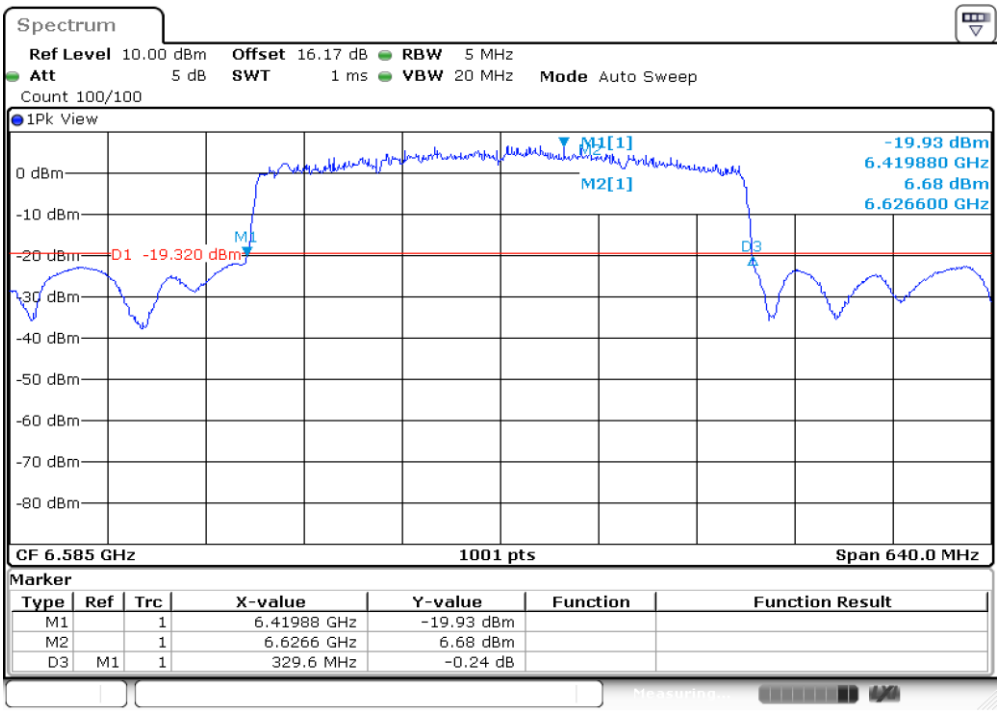

Date: 29.JUN.2023 16:36:36

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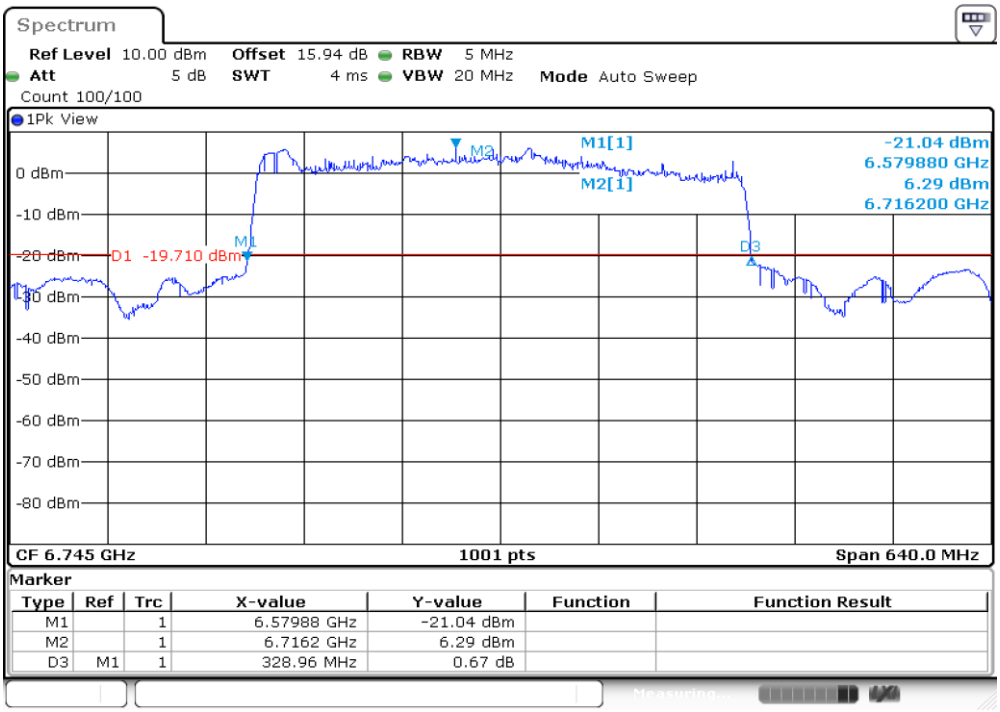
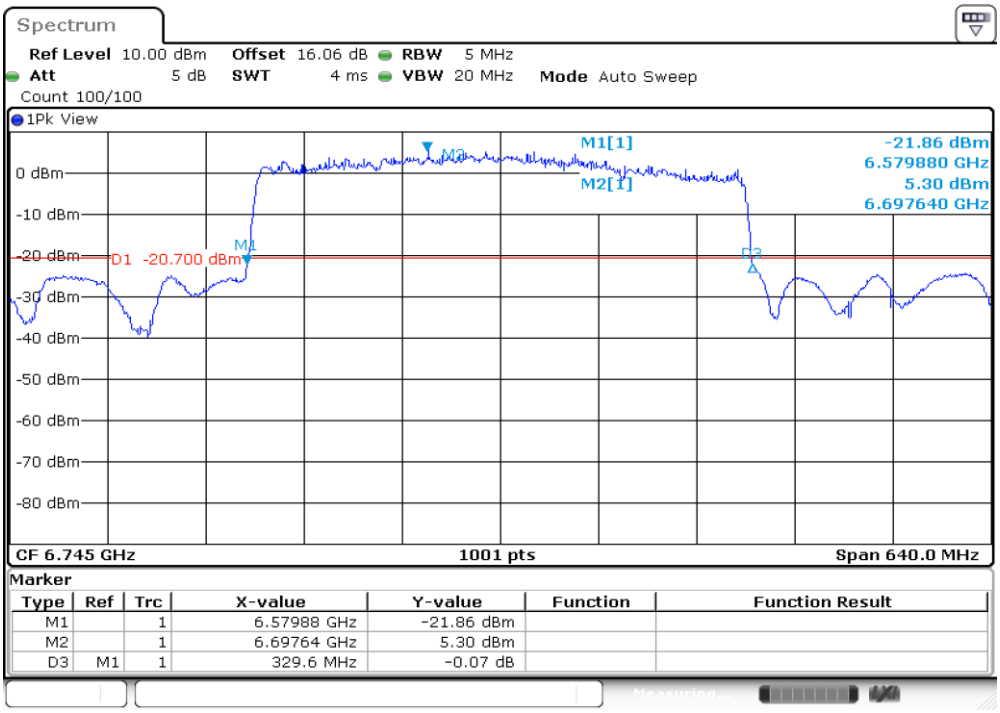


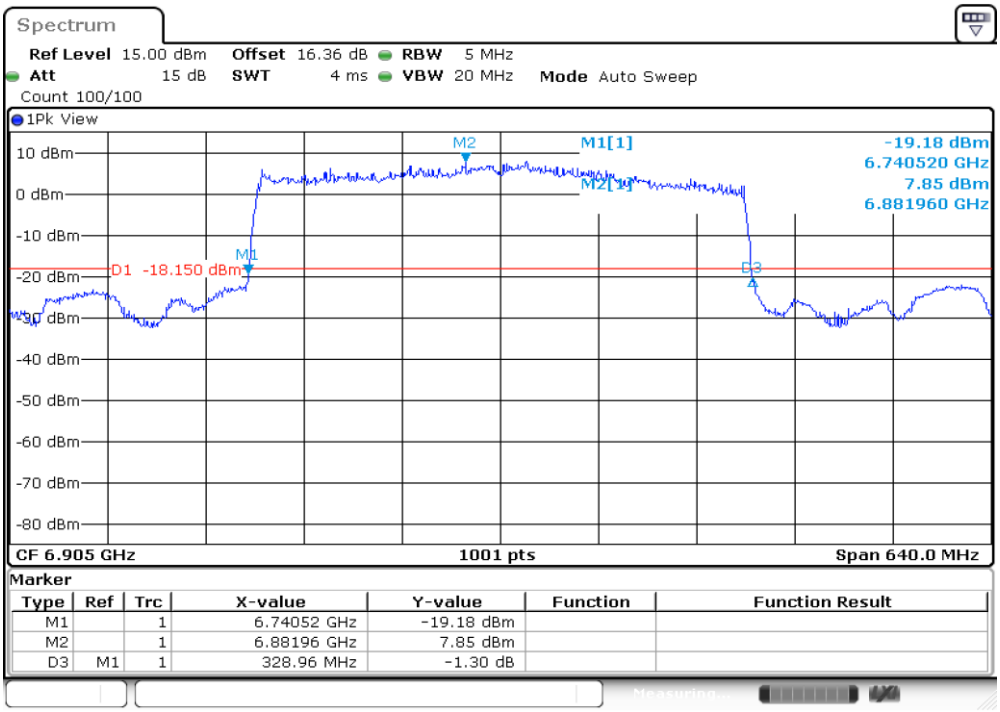
Date: 29.JUN.2023 16:36:59

11BE320MIMO_Ant18_6745



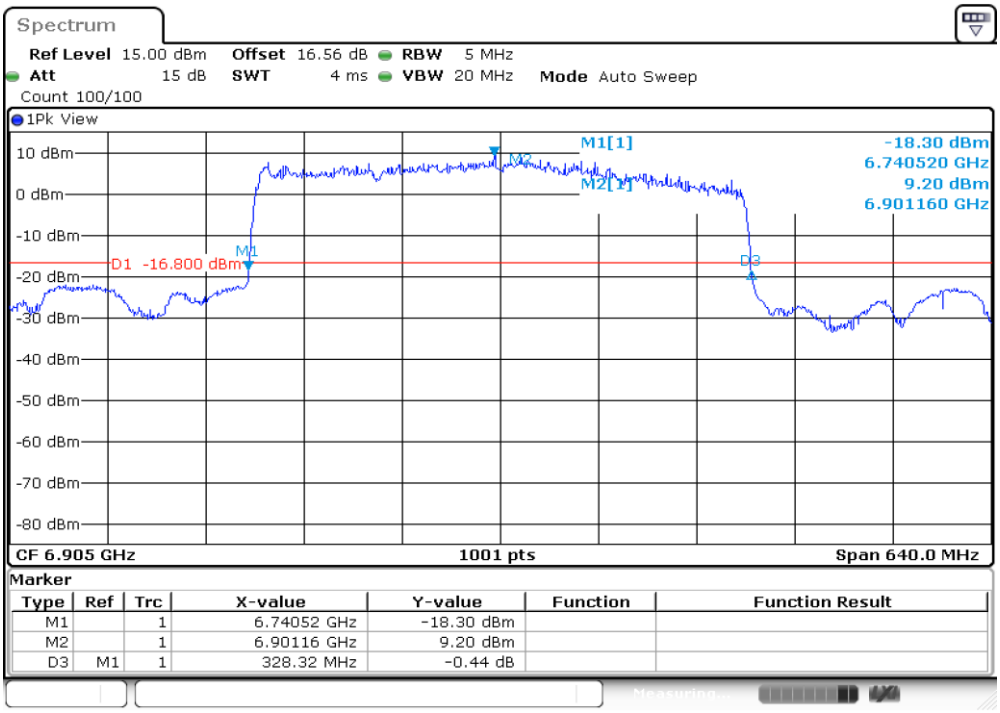
Date: 29.JUN.2023 16:37:12

11BE320MIMO_Ant5_6905



Date: 26.MAY.2023 03:03:30

11BE320MIMO_Ant18_6905



Date: 26.MAY.2023 03:03:41

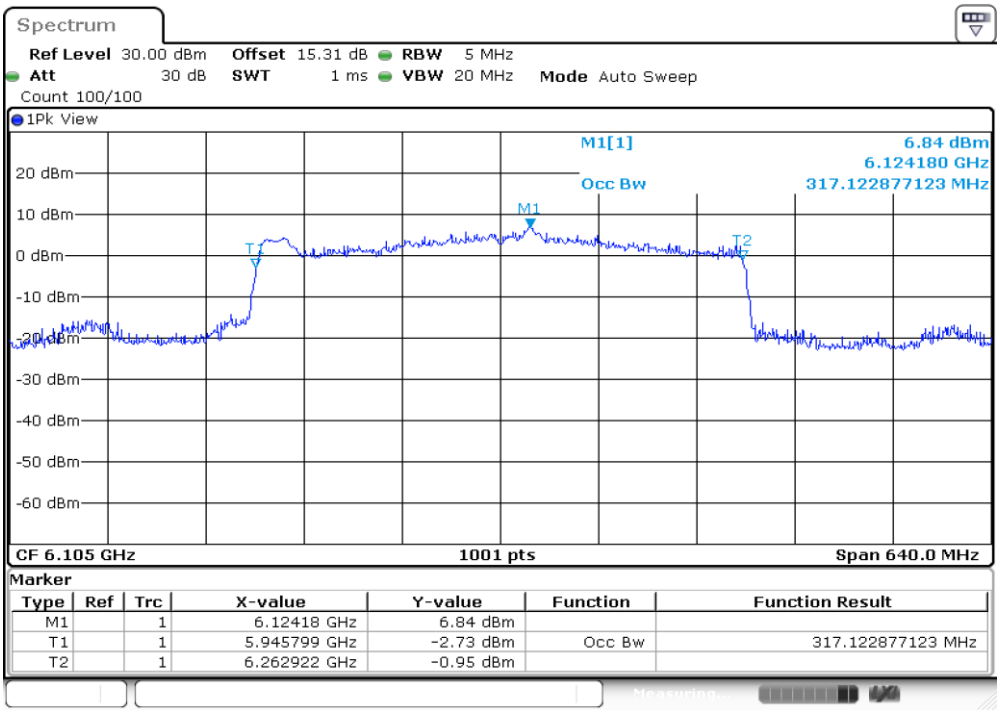
Occupied channel bandwidth

Test Result

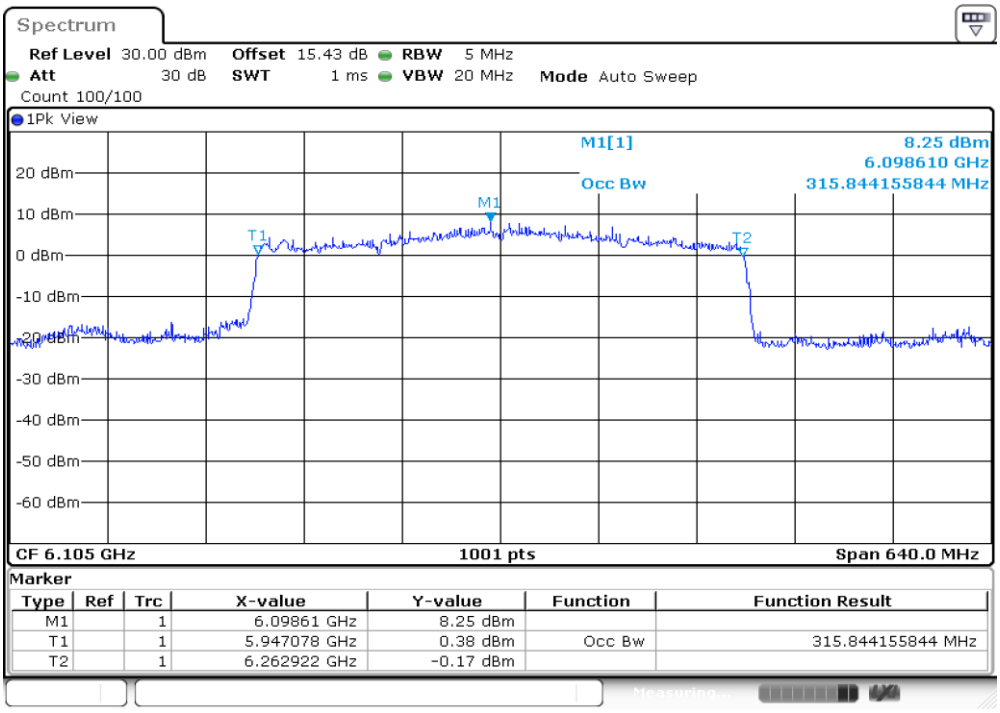
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11BE320MIMO	Ant5	6105	317.123	5945.7992	6262.9221	≤320	PASS
	Ant18	6105	315.844	5947.0779	6262.9221	≤320	PASS
	Ant5	6265	317.123	6106.4386	6423.5614	≤320	PASS
	Ant18	6265	316.484	6107.0779	6423.5614	≤320	PASS
	Ant5	6425	317.123	6266.4386	6583.5614	≤320	PASS
	Ant18	6425	316.484	6267.0779	6583.5614	≤320	PASS
	Ant5	6585	316.484	6426.4386	6742.9221	≤320	PASS
	Ant18	6585	316.484	6426.4386	6742.9221	≤320	PASS
	Ant5	6745	316.484	6586.4386	6902.9221	≤320	PASS
	Ant18	6745	317.123	6585.7992	6902.9221	≤320	PASS
	Ant5	6905	317.123	6745.7992	7062.9221	≤320	PASS
	Ant18	6905	316.484	6745.1598	7061.6434	≤320	PASS

Test Graphs

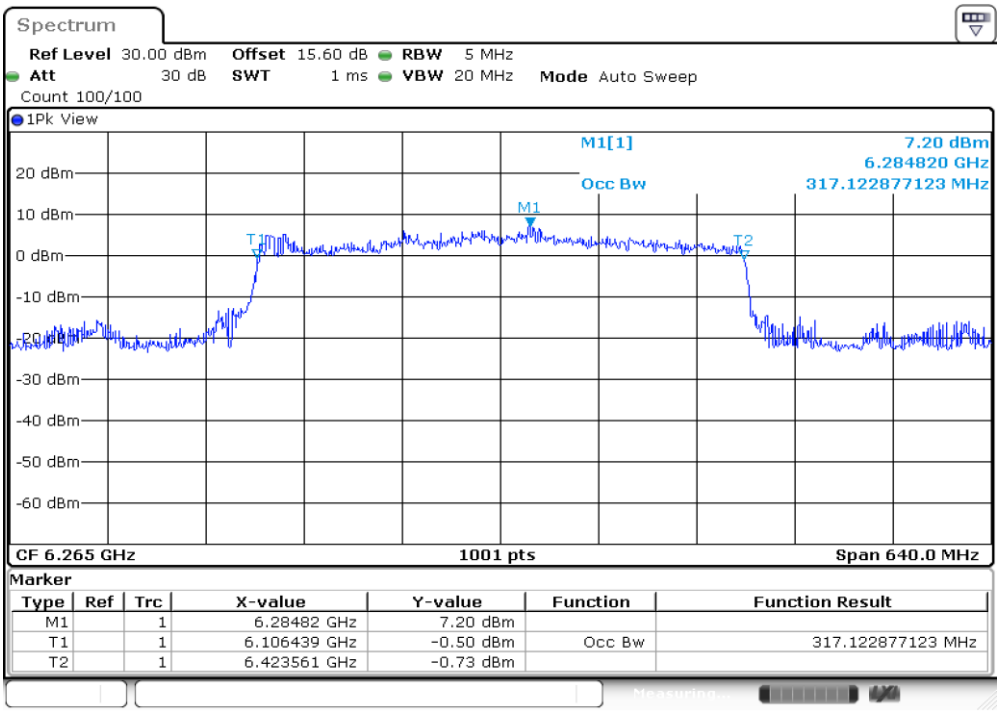
11BE320MIMO_Ant5_6105



11BE320MIMO_Ant18_6105



11BE320MIMO_Ant5_6265



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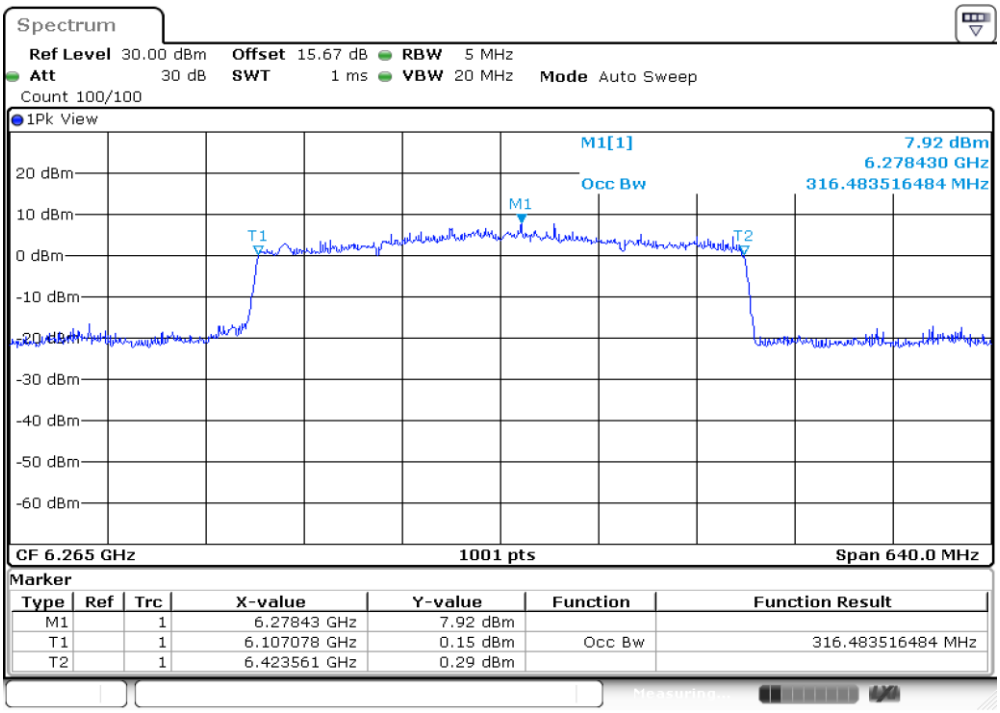

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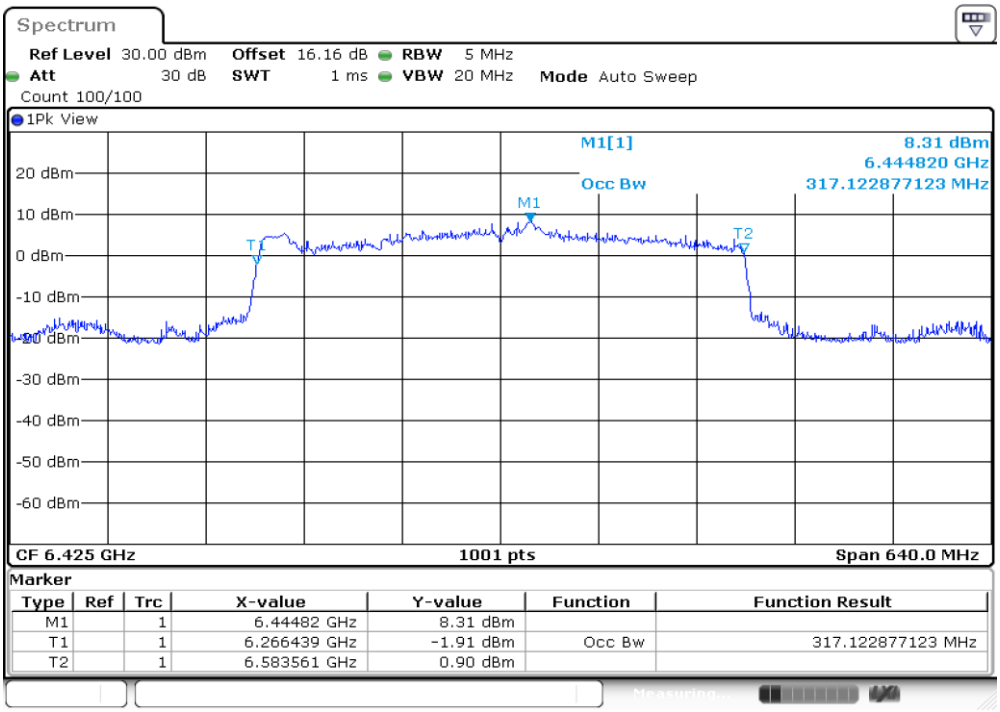
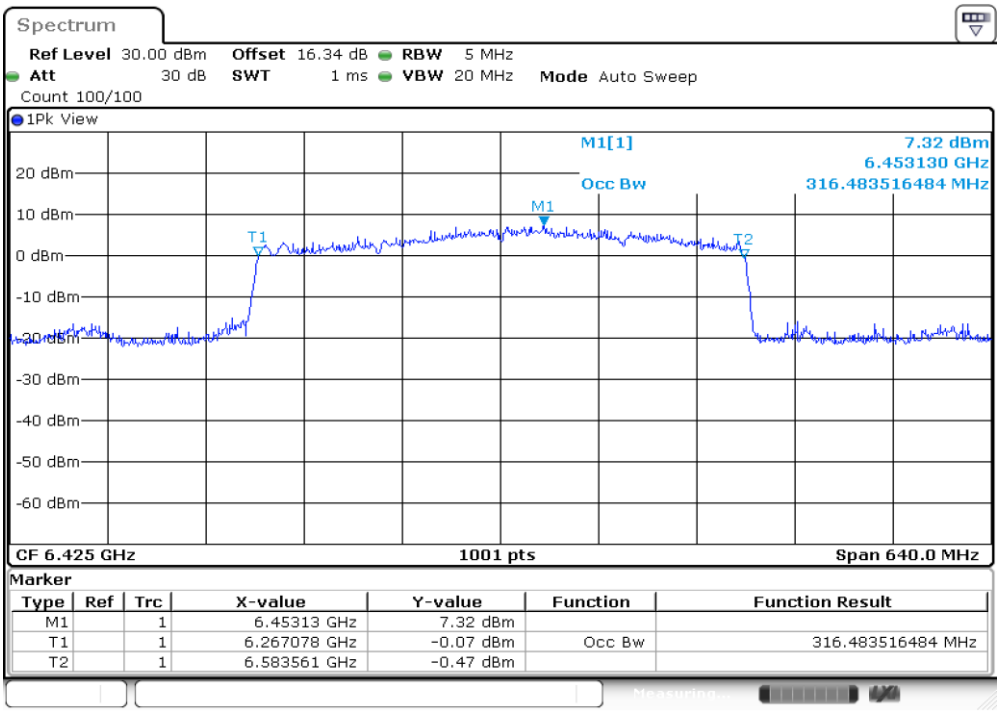
11BE320MIMO_Ant5_6425



Date: 29.JUN.2023 16:41:22

11BE320MIMO_Ant18_6425



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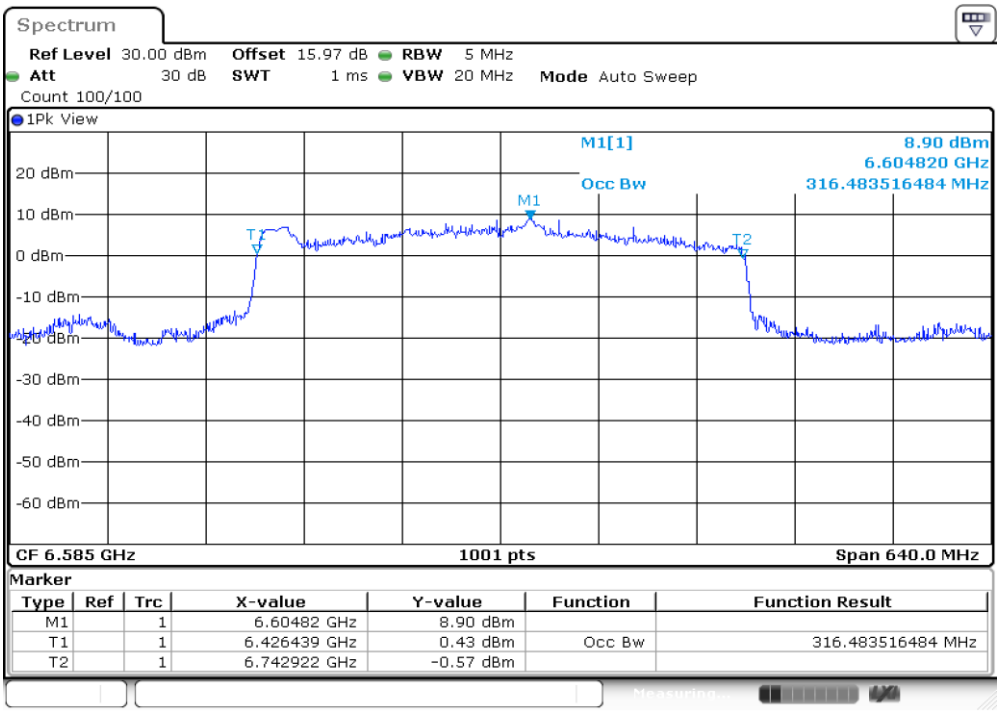
11BE320MIMO_Ant5_6585



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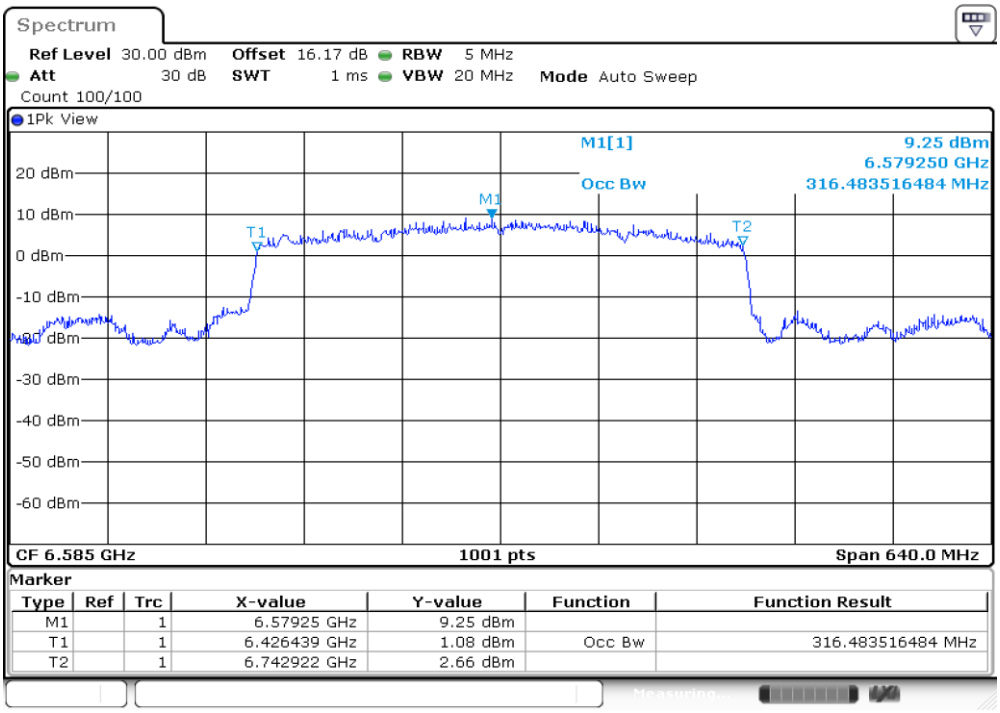

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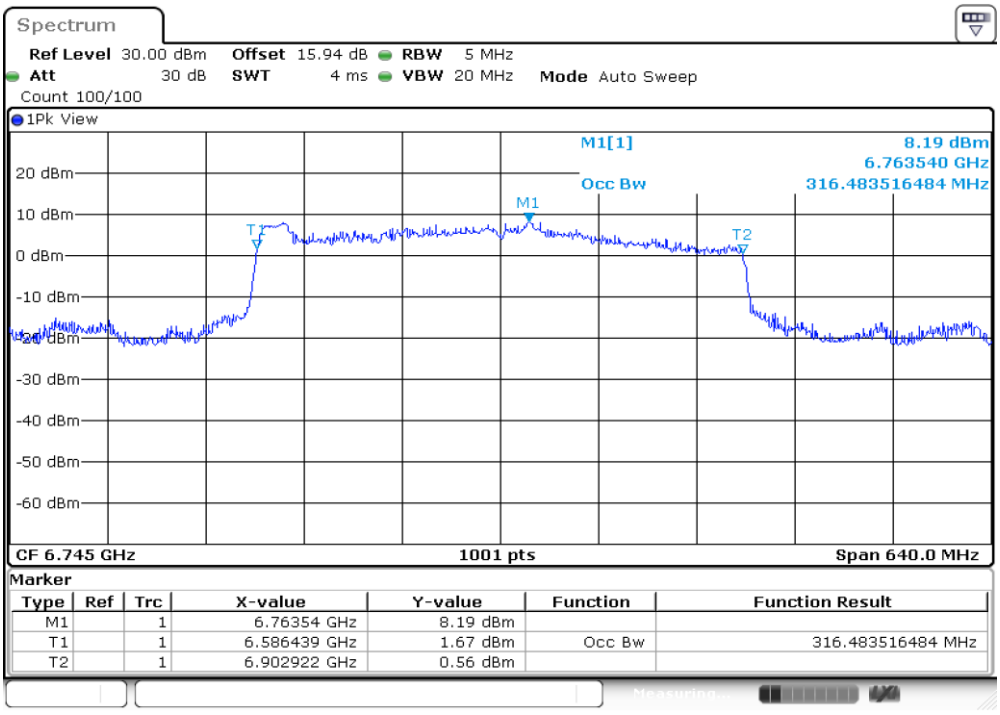

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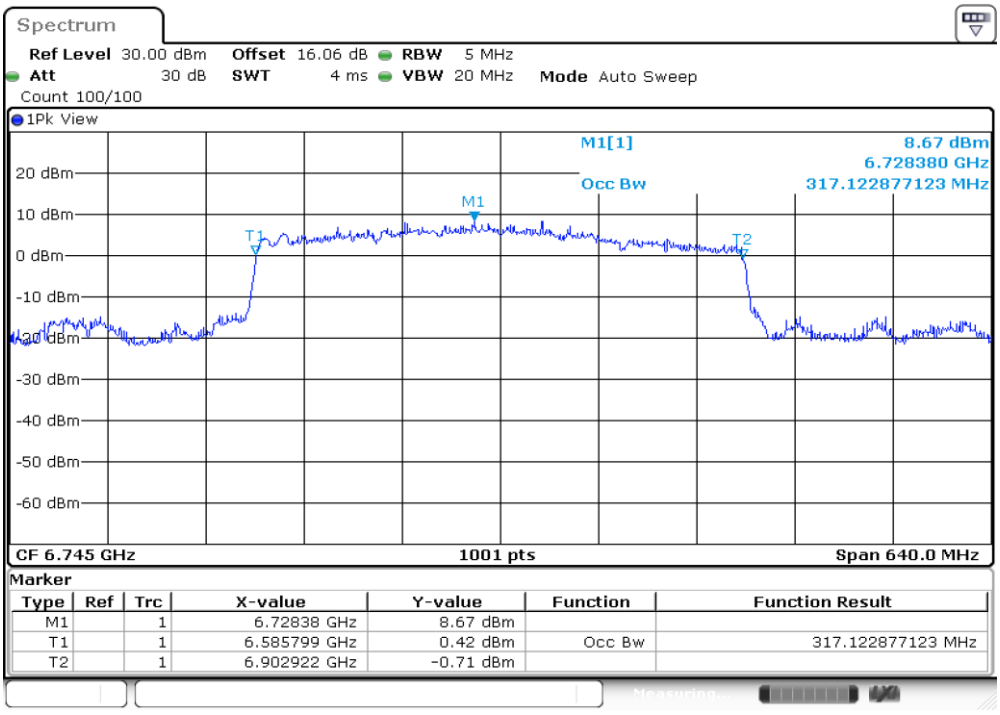

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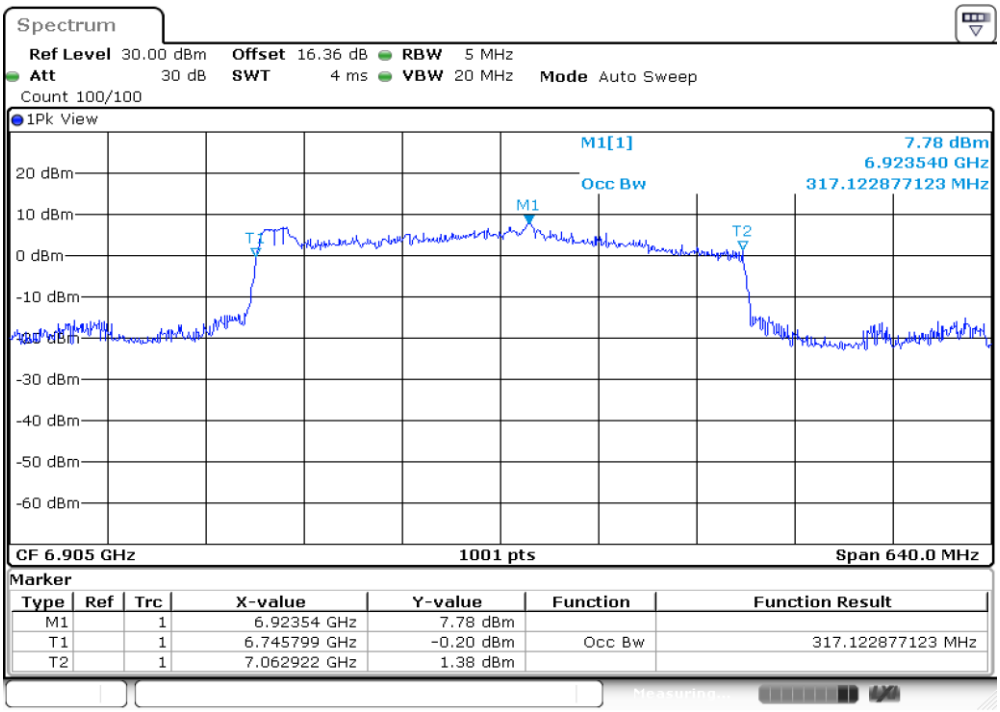
11BE320MIMO_Ant5_6905



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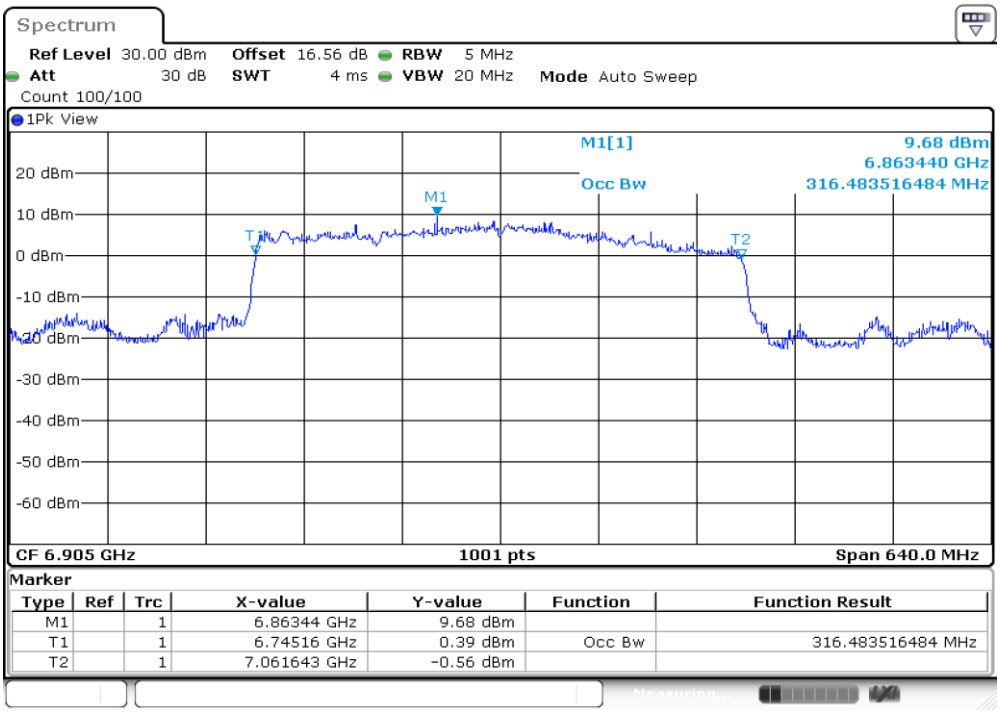
11BE320MIMO_Ant18_6905



Date: 29.JUN.2023 16:46:24

Maximum power spectral density

Test Result

TestMode	Antenna	Freq(MHz)	Result [dBm/MHz]	Limit [dBm/MHz]	Gain [dBi]	EIRP [dBm/MHz]	Limit [dBm/MHz]	Verdict
11BE320MIMO	Ant5	6105	-8.74	≤-0.57	-0.43	-9.17	≤-1.00	PASS
	Ant18	6105	-8.27	≤-1.00	0.00	-8.27	≤-1.00	PASS
	total	6105	-5.49	≤-3.80	2.80	-2.69	≤-1.00	PASS
	Ant5	6265	-7.87	≤-0.57	-0.43	-8.30	≤-1.00	PASS
	Ant18	6265	-8.85	≤-1.00	0.00	-8.85	≤-1.00	PASS
	total	6265	-5.32	≤-3.80	2.80	-2.52	≤-1.00	PASS
	Ant5	6425	-9.49	≤-0.57	-0.43	-9.92	≤-1.00	PASS
	Ant18	6425	-10.19	≤-1.00	0.00	-10.19	≤-1.00	PASS
	total	6425	-6.82	≤-3.80	2.80	-4.02	≤-1.00	PASS
	Ant5	6585	-7.79	≤1.05	-2.05	-9.84	≤-1.00	PASS
	Ant18	6585	-7.19	≤0.33	-1.33	-8.52	≤-1.00	PASS
	total	6585	-4.47	≤-2.33	1.33	-3.14	≤-1.00	PASS
	Ant5	6745	-7.39	≤1.04	-2.04	-9.43	≤-1.00	PASS
	Ant18	6745	-7.27	≤0.33	-1.33	-8.60	≤-1.00	PASS
	total	6745	-4.32	≤-2.33	1.33	-2.99	≤-1.00	PASS
	Ant5	6905	-8.4	≤1.04	-2.04	-10.44	≤-1.00	PASS
	Ant18	6905	-7.48	≤0.33	-1.33	-8.81	≤-1.00	PASS
	total	6905	-4.91	≤-2.33	1.33	-3.58	≤-1.00	PASS

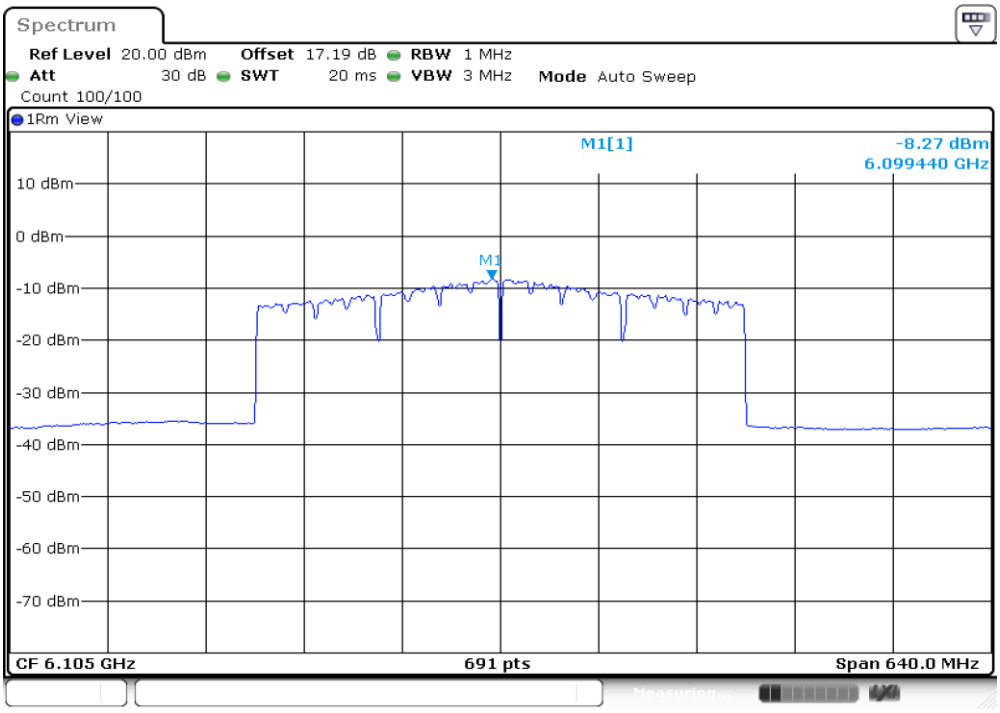
Note：The Duty Cycle Factor and is compensated in the graph.

Test Graphs

11BE320MIMO_Ant5_6105

Date: 19.MAY.2023 07:54:36

11BE320MIMO_Ant18_6105



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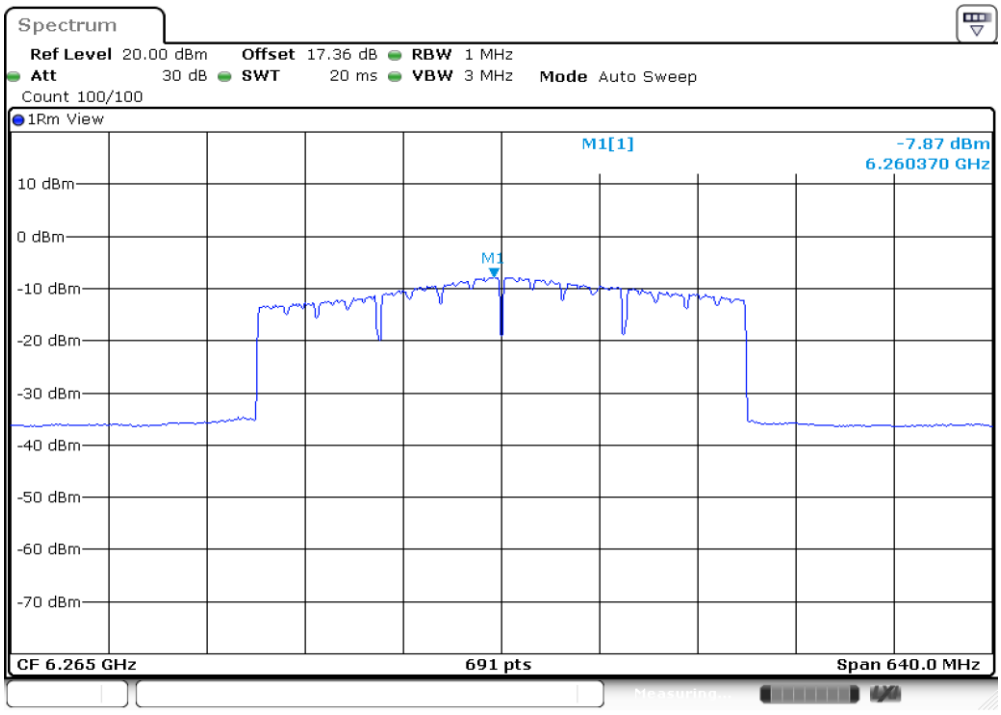
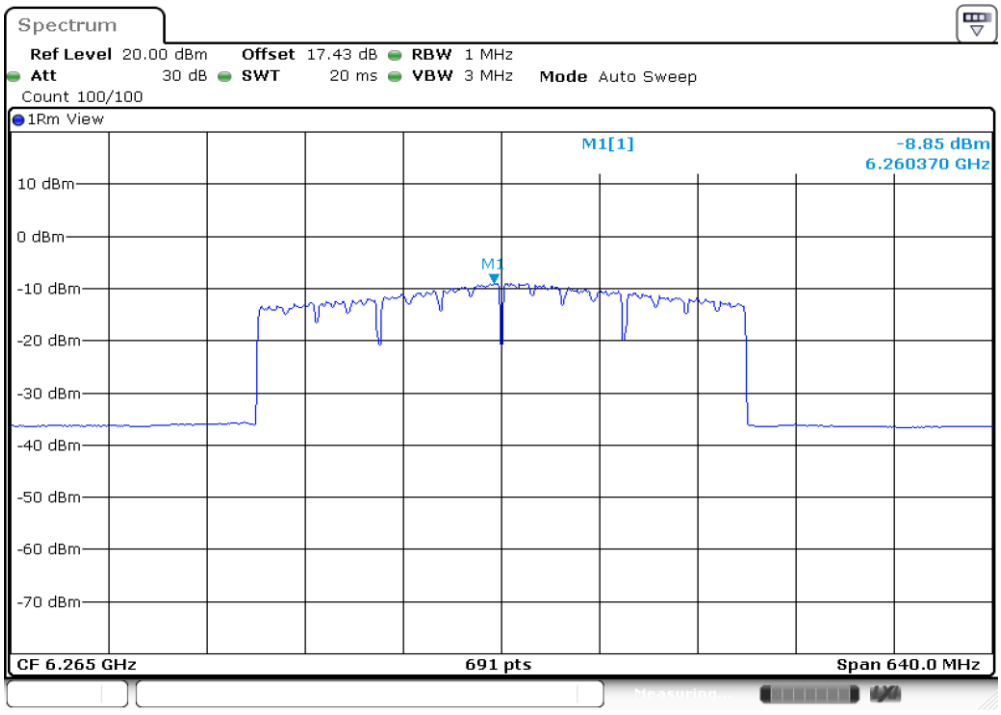


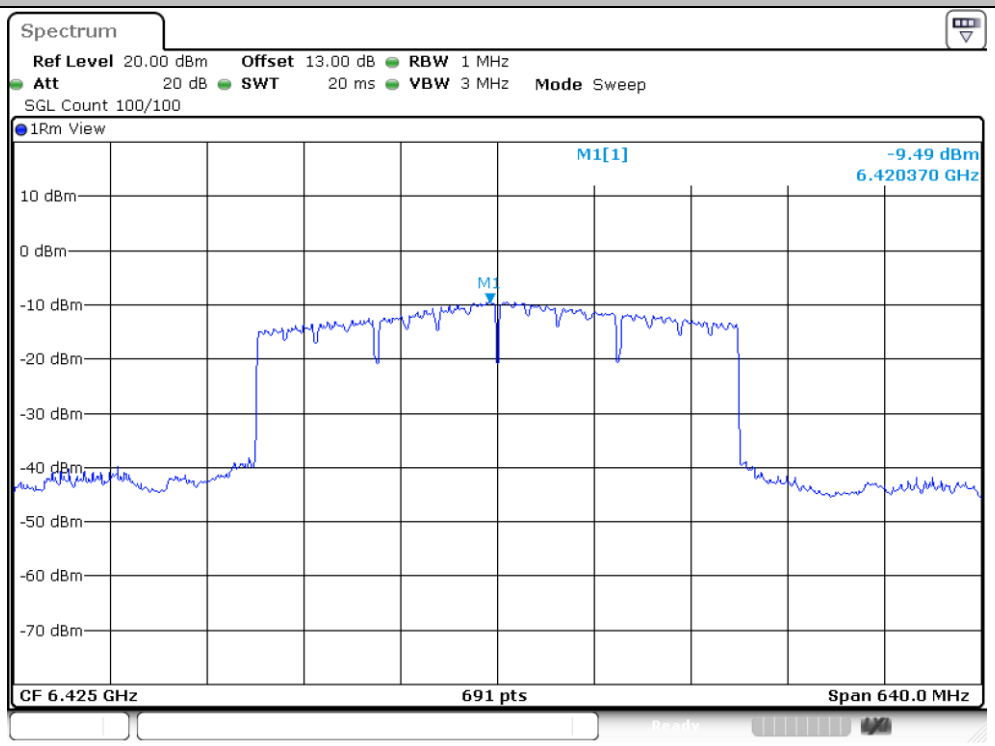
Date: 19.MAY.2023 07:38:10

11BE320MIMO_Ant18_6265



Date: 19.MAY.2023 07:38:21

11BE320MIMO_Ant5_6425



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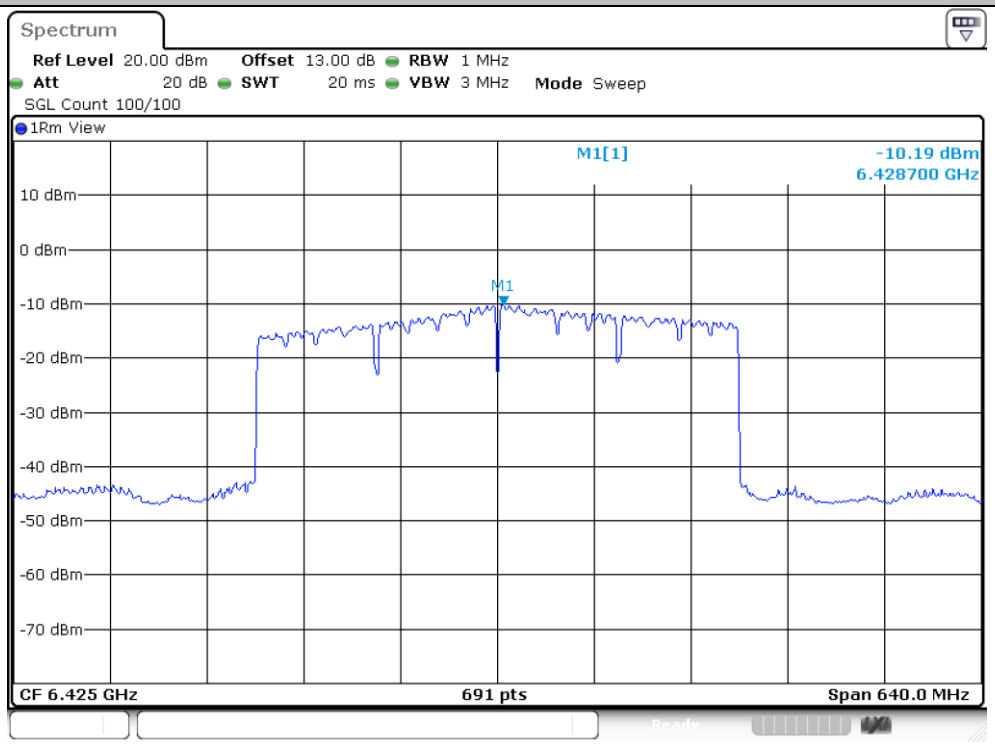

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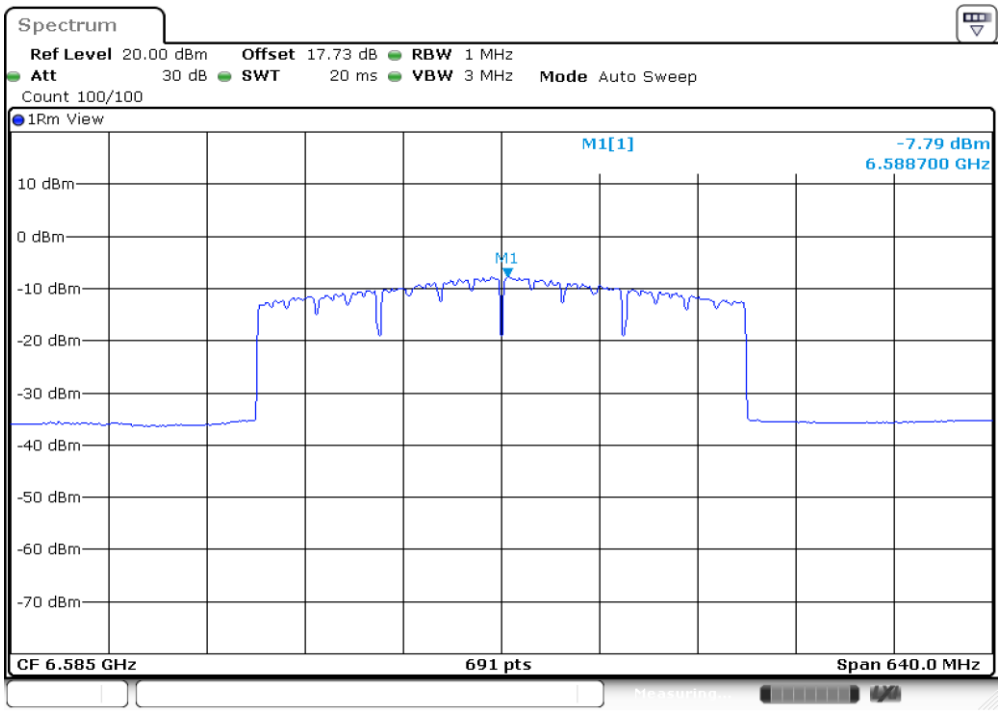

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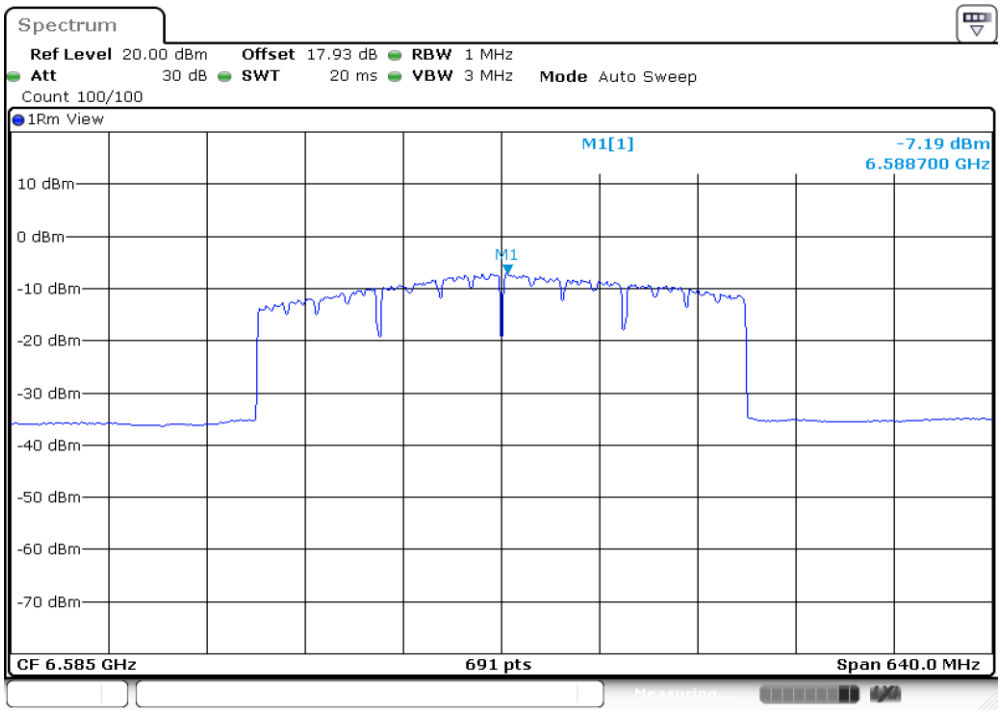

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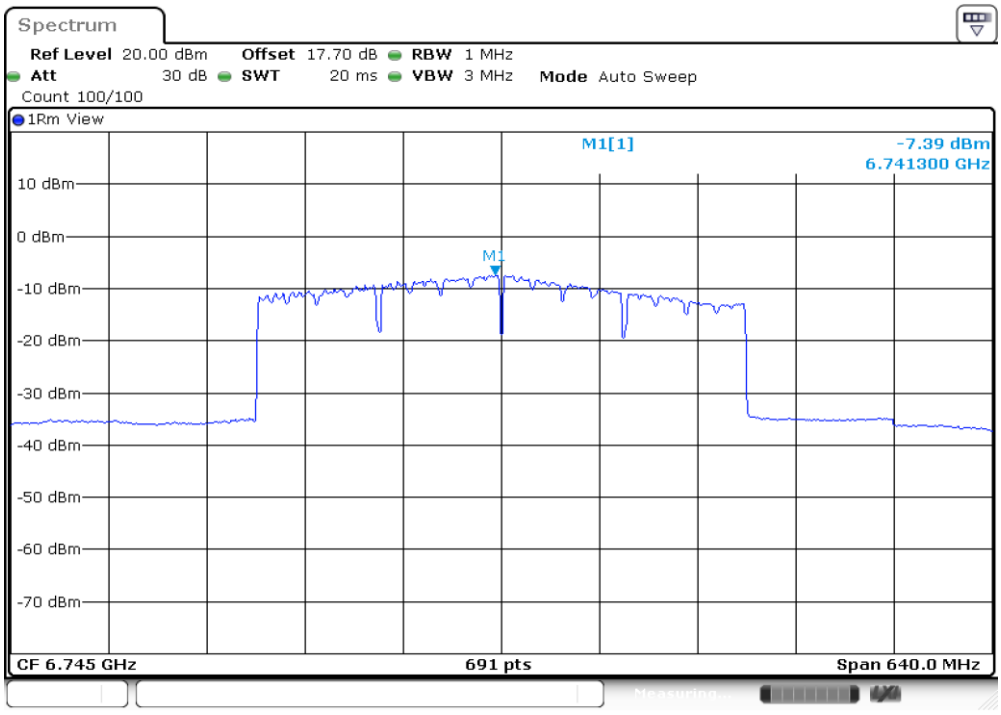
11BE320MIMO_Ant5_6745



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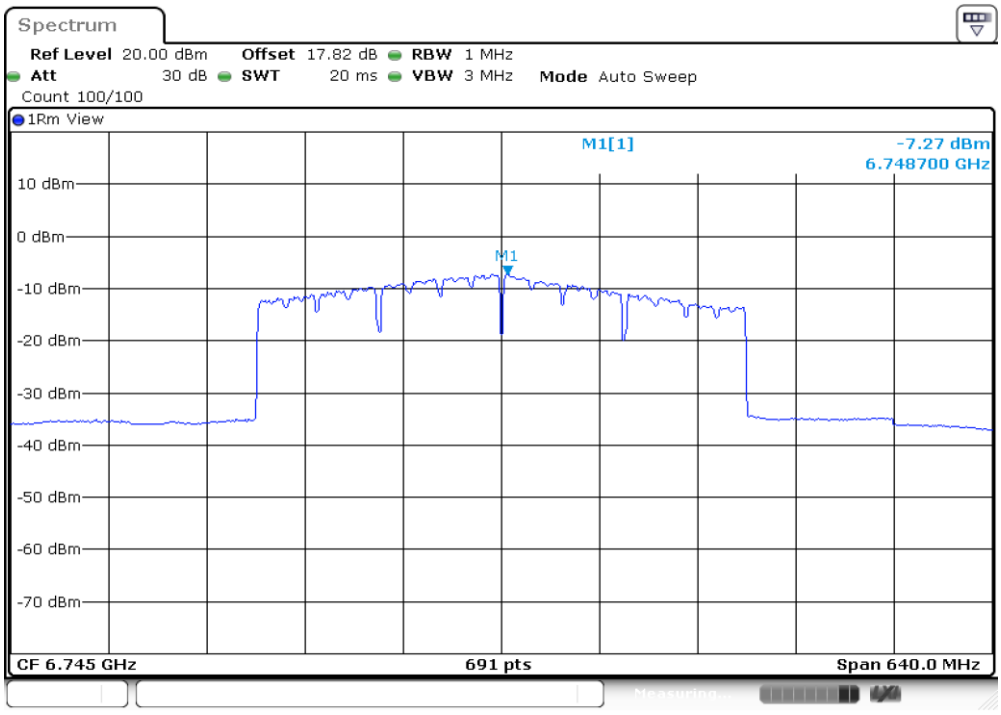
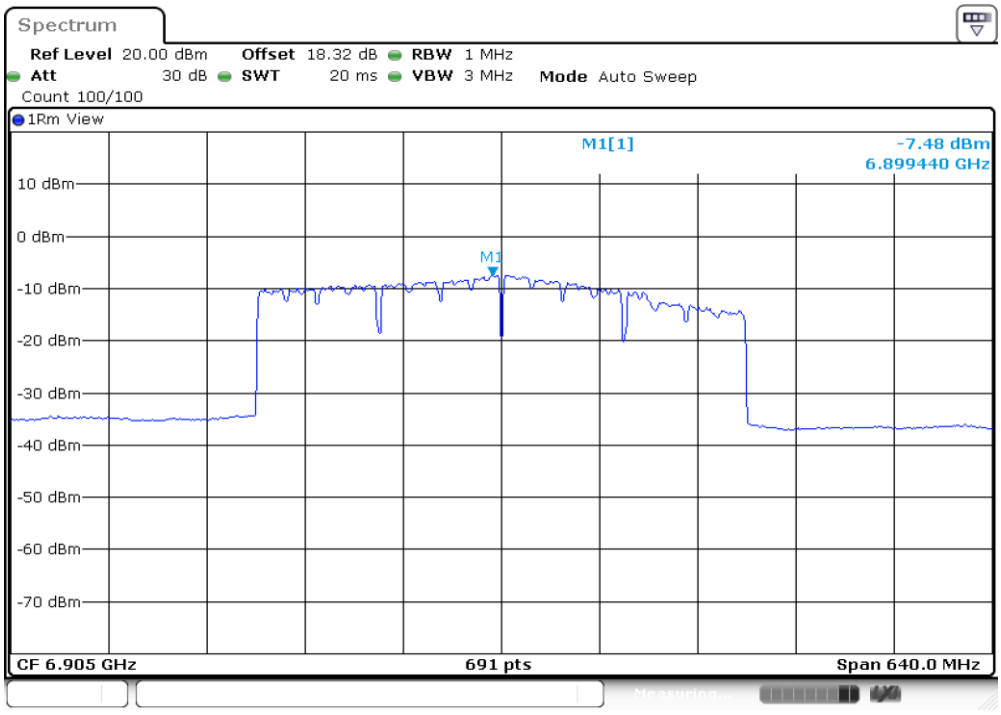


Date: 19.MAY.2023 07:39:21

11BE320MIMO_Ant5_6905

11BE320MIMO_Ant18_6905



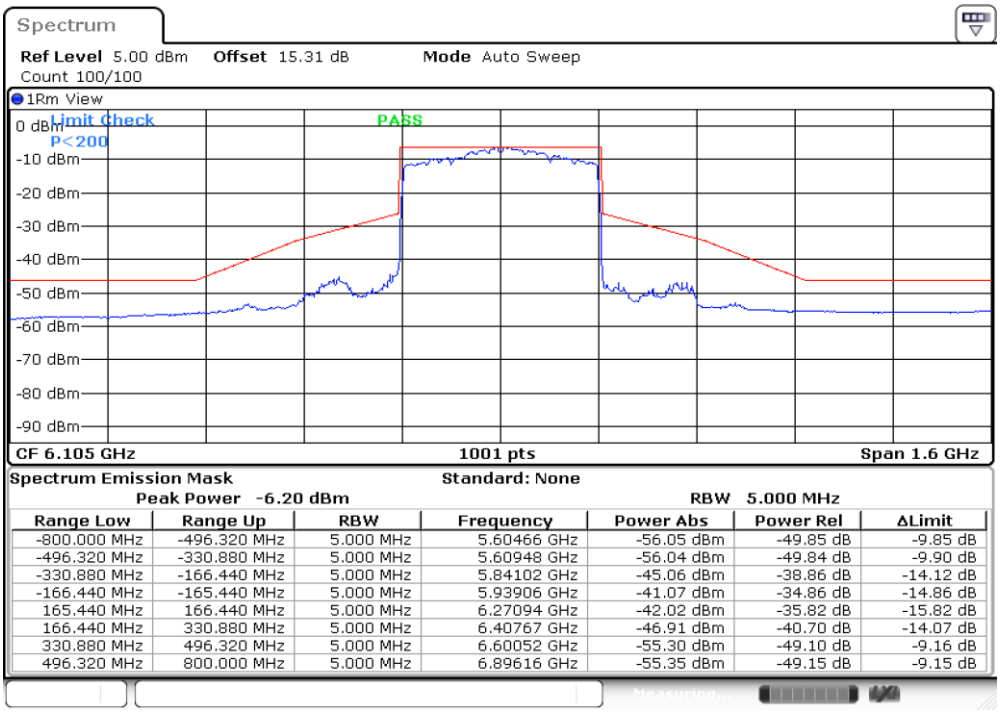
In-Band Emissions

Test Result

TestMode	Antenna	Freq(MHz)	Result	Limit	Verdict
11BE320MIMO	Ant5	6105	See test graph	See test graph	PASS
	Ant18	6105	See test graph	See test graph	PASS
	Ant5	6265	See test graph	See test graph	PASS
	Ant18	6265	See test graph	See test graph	PASS
	Ant5	6425	See test graph	See test graph	PASS
	Ant18	6425	See test graph	See test graph	PASS
	Ant5	6585	See test graph	See test graph	PASS
	Ant18	6585	See test graph	See test graph	PASS
	Ant5	6745	See test graph	See test graph	PASS
	Ant18	6745	See test graph	See test graph	PASS
	Ant5	6905	See test graph	See test graph	PASS
	Ant18	6905	See test graph	See test graph	PASS

Test Graphs

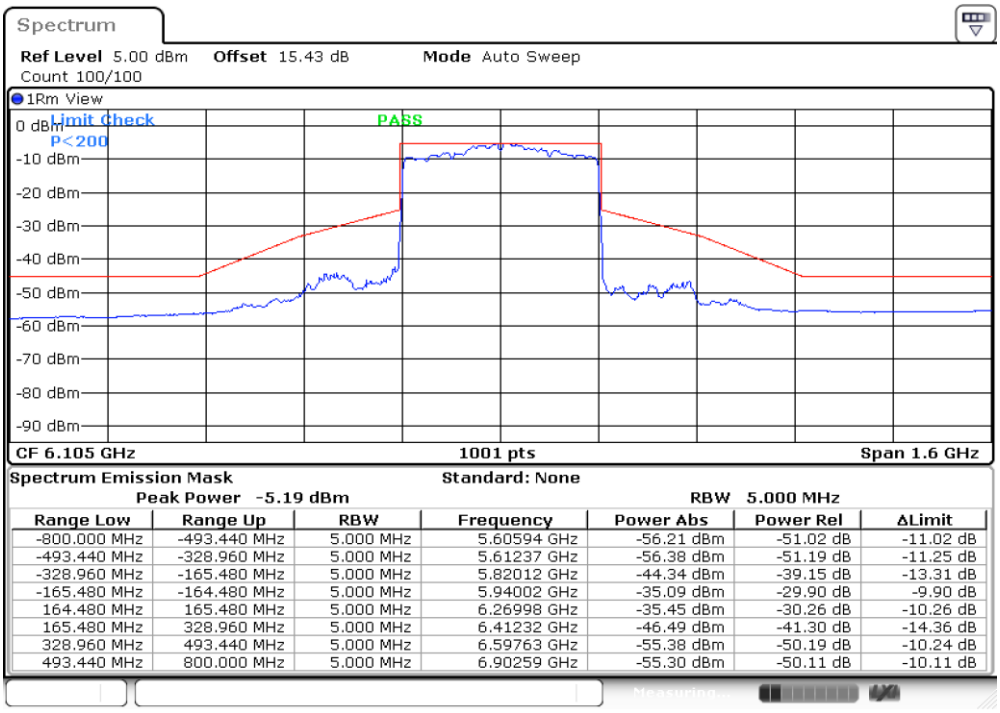
11BE320MIMO_Ant5_6105



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-496.320 MHz	5.000 MHz	5.60466 GHz	-56.05 dBm	-49.85 dB	-9.85 dB
-496.320 MHz	-330.880 MHz	5.000 MHz	5.60948 GHz	-56.04 dBm	-49.84 dB	-9.90 dB
-330.880 MHz	-166.440 MHz	5.000 MHz	5.84102 GHz	-45.06 dBm	-38.86 dB	-14.12 dB
-166.440 MHz	-165.440 MHz	5.000 MHz	5.93906 GHz	-41.07 dBm	-34.86 dB	-14.86 dB
165.440 MHz	166.440 MHz	5.000 MHz	6.27094 GHz	-42.02 dBm	-35.82 dB	-15.82 dB
166.440 MHz	330.880 MHz	5.000 MHz	6.40767 GHz	-46.91 dBm	-40.70 dB	-14.07 dB
330.880 MHz	496.320 MHz	5.000 MHz	6.60052 GHz	-55.30 dBm	-49.10 dB	-9.16 dB
496.320 MHz	800.000 MHz	5.000 MHz	6.89616 GHz	-55.35 dBm	-49.15 dB	-9.15 dB

Date: 29.JUN.2023 16:38:15

11BE320MIMO_Ant18_6105



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-493.440 MHz	5.000 MHz	5.60594 GHz	-56.21 dBm	-51.02 dB	-11.02 dB
-493.440 MHz	-328.960 MHz	5.000 MHz	5.61237 GHz	-56.38 dBm	-51.19 dB	-11.25 dB
-328.960 MHz	-165.480 MHz	5.000 MHz	5.82012 GHz	-44.34 dBm	-39.15 dB	-13.31 dB
-165.480 MHz	-164.480 MHz	5.000 MHz	5.94002 GHz	-35.09 dBm	-29.90 dB	-9.90 dB
164.480 MHz	165.480 MHz	5.000 MHz	6.26998 GHz	-35.45 dBm	-30.26 dB	-10.26 dB
165.480 MHz	328.960 MHz	5.000 MHz	6.41232 GHz	-46.49 dBm	-41.30 dB	-14.36 dB
328.960 MHz	493.440 MHz	5.000 MHz	6.59763 GHz	-55.38 dBm	-50.19 dB	-10.24 dB
493.440 MHz	800.000 MHz	5.000 MHz	6.90259 GHz	-55.30 dBm	-50.11 dB	-10.11 dB

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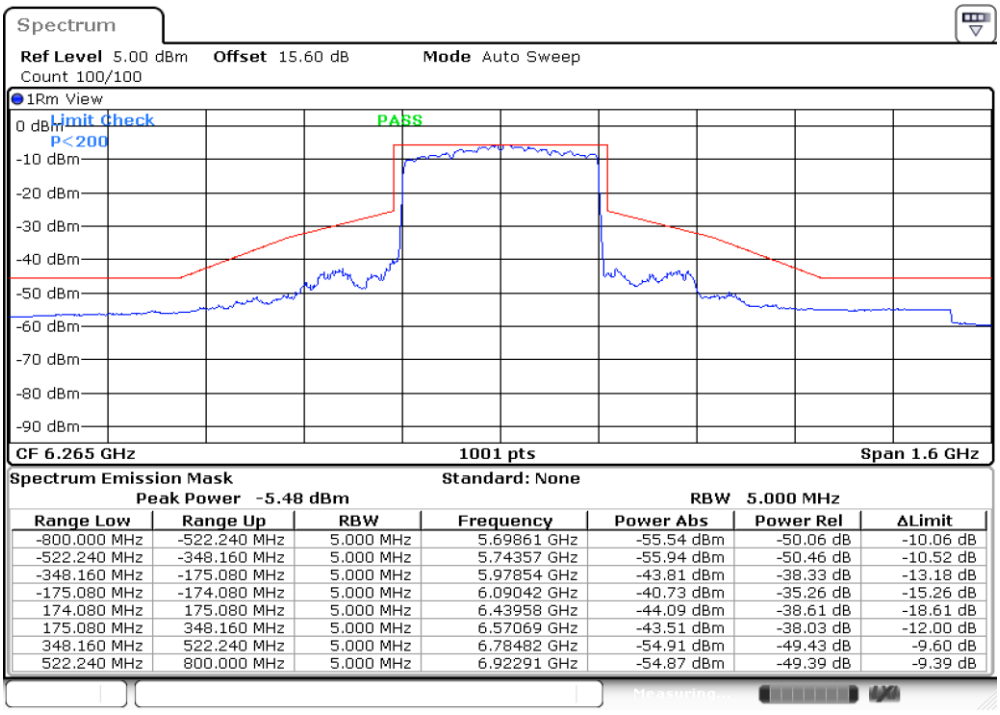
11BE320MIMO_Ant5_6265



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-522.240 MHz	5.000 MHz	5.69861 GHz	-55.54 dBm	-50.06 dB	-10.06 dB
-522.240 MHz	-348.160 MHz	5.000 MHz	5.74357 GHz	-55.94 dBm	-50.46 dB	-10.52 dB
-348.160 MHz	-175.080 MHz	5.000 MHz	5.97854 GHz	-43.81 dBm	-38.33 dB	-13.18 dB
-175.080 MHz	-174.080 MHz	5.000 MHz	6.09042 GHz	-40.73 dBm	-35.26 dB	-15.26 dB
174.080 MHz	175.080 MHz	5.000 MHz	6.43958 GHz	-44.09 dBm	-38.61 dB	-18.61 dB
175.080 MHz	348.160 MHz	5.000 MHz	6.57069 GHz	-43.51 dBm	-38.03 dB	-12.00 dB
348.160 MHz	522.240 MHz	5.000 MHz	6.78482 GHz	-54.91 dBm	-49.43 dB	-9.60 dB
522.240 MHz	800.000 MHz	5.000 MHz	6.92291 GHz	-54.87 dBm	-49.39 dB	-9.39 dB

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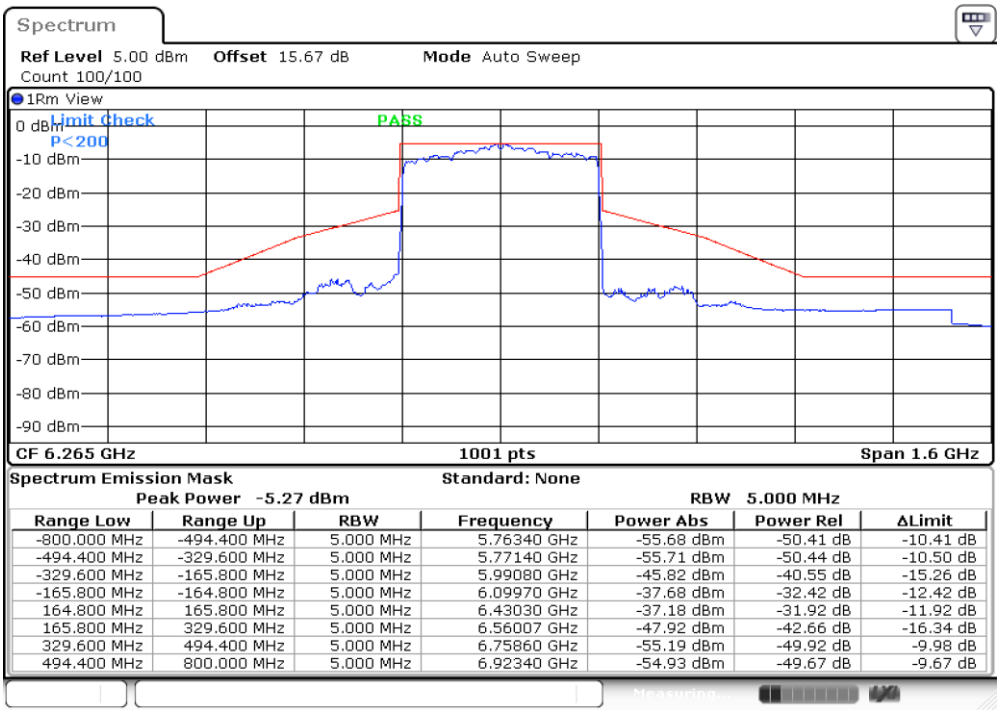
11BE320MIMO_Ant18_6265



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-494.400 MHz	5.000 MHz	5.76340 GHz	-55.68 dBm	-50.41 dB	-10.41 dB
-494.400 MHz	-329.600 MHz	5.000 MHz	5.77140 GHz	-55.71 dBm	-50.44 dB	-10.50 dB
-329.600 MHz	-165.800 MHz	5.000 MHz	5.99080 GHz	-45.82 dBm	-40.55 dB	-15.26 dB
-165.800 MHz	-164.800 MHz	5.000 MHz	6.09970 GHz	-37.68 dBm	-32.42 dB	-12.42 dB
164.800 MHz	165.800 MHz	5.000 MHz	6.43030 GHz	-37.18 dBm	-31.92 dB	-11.92 dB
165.800 MHz	329.600 MHz	5.000 MHz	6.56007 GHz	-47.92 dBm	-42.66 dB	-16.34 dB
329.600 MHz	494.400 MHz	5.000 MHz	6.75860 GHz	-55.19 dBm	-49.92 dB	-9.98 dB
494.400 MHz	800.000 MHz	5.000 MHz	6.92340 GHz	-54.93 dBm	-49.67 dB	-9.67 dB

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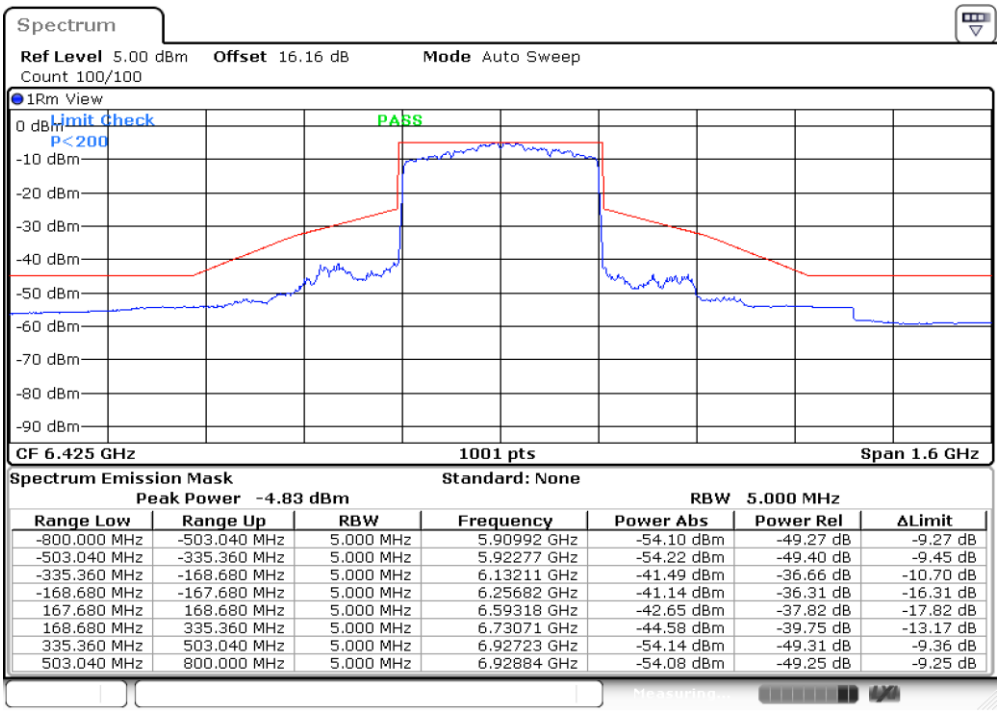
11BE320MIMO_Ant5_6425



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-503.040 MHz	5.000 MHz	5.90992 GHz	-54.10 dBm	-49.27 dB	-9.27 dB
-503.040 MHz	-335.360 MHz	5.000 MHz	5.92277 GHz	-54.22 dBm	-49.40 dB	-9.45 dB
-335.360 MHz	-168.680 MHz	5.000 MHz	6.13211 GHz	-41.49 dBm	-36.66 dB	-10.70 dB
-168.680 MHz	-167.680 MHz	5.000 MHz	6.25682 GHz	-41.14 dBm	-36.31 dB	-16.31 dB
167.680 MHz	168.680 MHz	5.000 MHz	6.59318 GHz	-42.65 dBm	-37.82 dB	-17.82 dB
168.680 MHz	335.360 MHz	5.000 MHz	6.73071 GHz	-44.58 dBm	-39.75 dB	-13.17 dB
335.360 MHz	503.040 MHz	5.000 MHz	6.92723 GHz	-54.14 dBm	-49.31 dB	-9.36 dB
503.040 MHz	800.000 MHz	5.000 MHz	6.92884 GHz	-54.08 dBm	-49.25 dB	-9.25 dB

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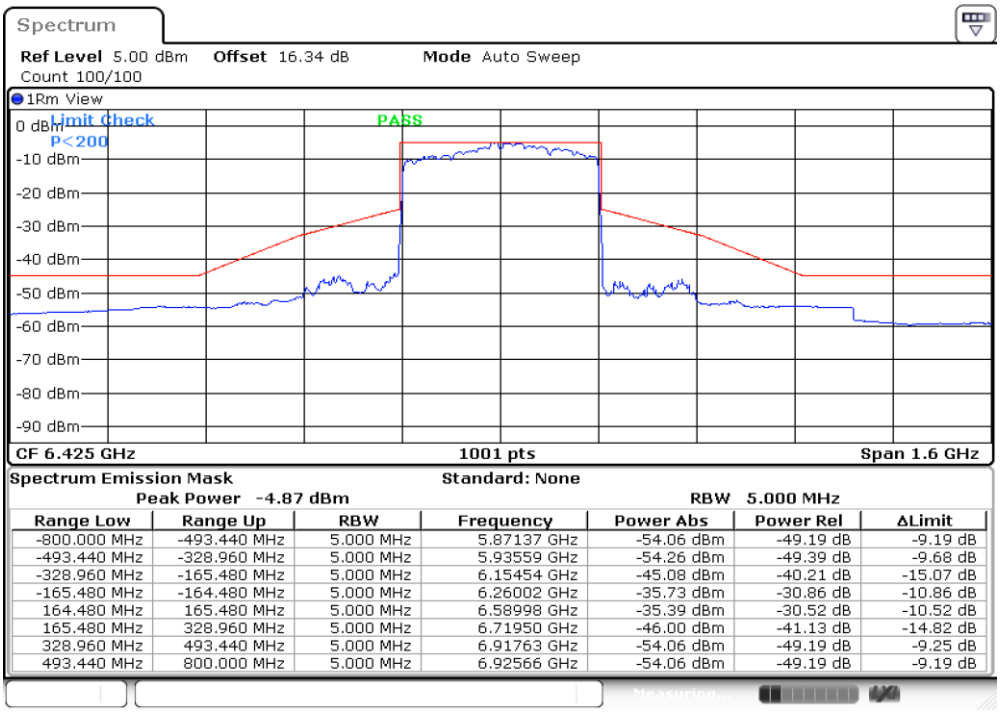
11BE320MIMO_Ant18_6425



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-493.440 MHz	5.000 MHz	5.87137 GHz	-54.06 dBm	-49.19 dB	-9.19 dB
-493.440 MHz	-328.960 MHz	5.000 MHz	5.93559 GHz	-54.26 dBm	-49.39 dB	-9.68 dB
-328.960 MHz	-165.480 MHz	5.000 MHz	6.15454 GHz	-45.08 dBm	-40.21 dB	-15.07 dB
-165.480 MHz	-164.480 MHz	5.000 MHz	6.26002 GHz	-35.73 dBm	-30.86 dB	-10.86 dB
164.480 MHz	165.480 MHz	5.000 MHz	6.58998 GHz	-35.39 dBm	-30.52 dB	-10.52 dB
165.480 MHz	328.960 MHz	5.000 MHz	6.71950 GHz	-46.00 dBm	-41.13 dB	-14.82 dB
328.960 MHz	493.440 MHz	5.000 MHz	6.91763 GHz	-54.06 dBm	-49.19 dB	-9.25 dB
493.440 MHz	800.000 MHz	5.000 MHz	6.92566 GHz	-54.06 dBm	-49.19 dB	-9.19 dB

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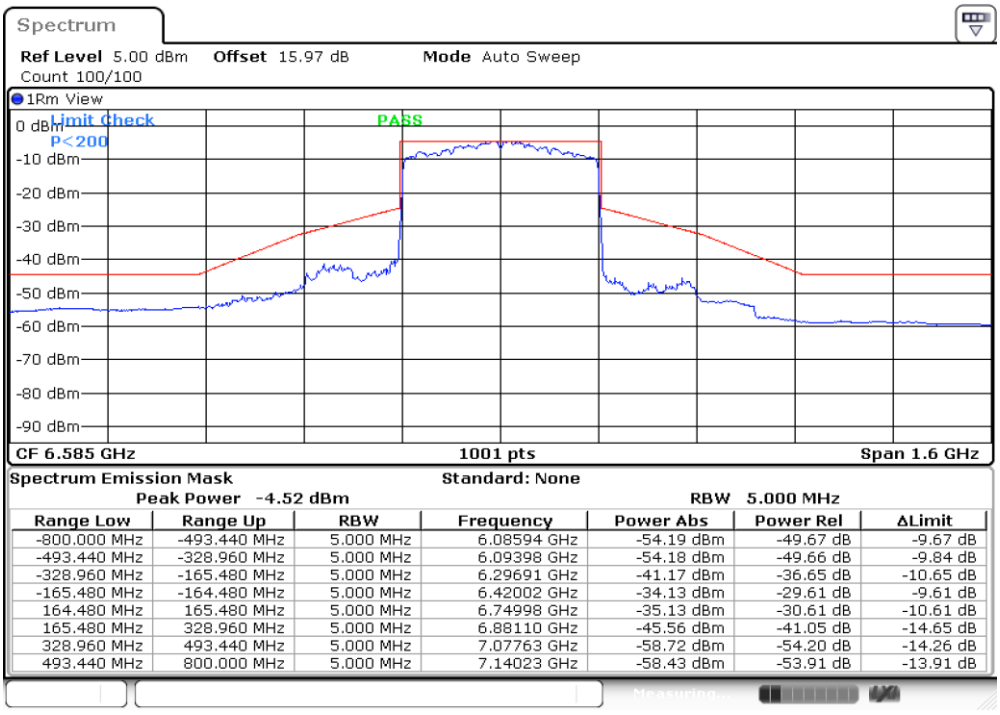
11BE320MIMO_Ant5_6585



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-493.440 MHz	5.000 MHz	6.08594 GHz	-54.19 dBm	-49.67 dB	-9.67 dB
-493.440 MHz	-328.960 MHz	5.000 MHz	6.09398 GHz	-54.18 dBm	-49.66 dB	-9.84 dB
-328.960 MHz	-165.480 MHz	5.000 MHz	6.29691 GHz	-41.17 dBm	-36.65 dB	-10.65 dB
-165.480 MHz	-164.480 MHz	5.000 MHz	6.42002 GHz	-34.13 dBm	-29.61 dB	-9.61 dB
164.480 MHz	165.480 MHz	5.000 MHz	6.74998 GHz	-35.13 dBm	-30.61 dB	-10.61 dB
165.480 MHz	328.960 MHz	5.000 MHz	6.88110 GHz	-45.56 dBm	-41.05 dB	-14.65 dB
328.960 MHz	493.440 MHz	5.000 MHz	7.07763 GHz	-58.72 dBm	-54.20 dB	-14.26 dB
493.440 MHz	800.000 MHz	5.000 MHz	7.14023 GHz	-58.43 dBm	-53.91 dB	-13.91 dB

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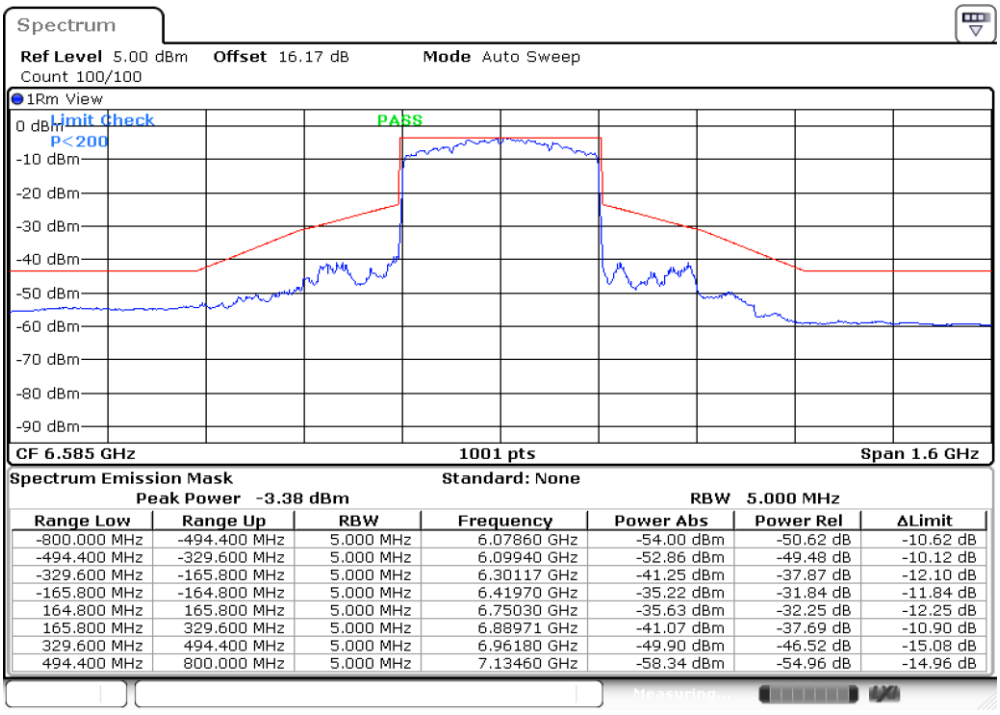
11BE320MIMO_Ant18_6585



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-800.000 MHz	-494.400 MHz	5.000 MHz	6.07860 GHz	-54.00 dBm	-50.62 dB	-10.62 dB
-494.400 MHz	-329.600 MHz	5.000 MHz	6.09940 GHz	-52.86 dBm	-49.48 dB	-10.12 dB
-329.600 MHz	-165.800 MHz	5.000 MHz	6.30117 GHz	-41.25 dBm	-37.87 dB	-12.10 dB
-165.800 MHz	-164.800 MHz	5.000 MHz	6.41970 GHz	-35.22 dBm	-31.84 dB	-11.84 dB
164.800 MHz	165.800 MHz	5.000 MHz	6.75030 GHz	-35.63 dBm	-32.25 dB	-12.25 dB
165.800 MHz	329.600 MHz	5.000 MHz	6.88971 GHz	-41.07 dBm	-37.69 dB	-10.90 dB
329.600 MHz	494.400 MHz	5.000 MHz	6.96180 GHz	-49.90 dBm	-46.52 dB	-15.08 dB
494.400 MHz	800.000 MHz	5.000 MHz	7.13460 GHz	-58.34 dBm	-54.96 dB	-14.96 dB

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