FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2519-1, XT2519-2, XT2519V
FCC ID	:	IHDT56AU6
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	15E 6 GHz Low Power Indoor Client (6XD)
TEST DATE(S)	:	Jan. 13, 2025 ~ Mar. 06, 2025

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.

This report contains data that were produced under subcontract by Sporton International Inc. (ShenZhen)

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)
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History of this test report

Report No.	Version	Description	Issued Date
FR510740F	01	Initial issue of report	Mar. 07, 2025

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(a)(11)	26dB Emission Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Pass	-
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)(7)	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 3.33 dB at 53.040 MHz
3.7	15.207	AC Conducted Emission	Pass	Under limit 9.78 dB at 0.200 MHz
3.8	15.203 15.407(a)	Antenna Requirement	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

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

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W, Merchandise Mart Plaza,Chicago,IL60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W, Merchandise Mart Plaza,Chicago,IL60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2519-1, XT2519-2, XT2519V
FCC ID	IHDT56AU6
IMEI Code/SN	Conducted: 355782390034910/355782390034928 Conduction: 355782390040016/355782390040024 Radiation: 33810EB16A40 CBP: 355782390034779/355782390034787
HW Version	DVT2
SW Version	V2VD35.27
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. The three models XT2519-1, XT2519-2, XT2519V is only for market segment purpose, no other difference.

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	**<5925 MHz ~ 7125 MHz >** **<MIMO Ant.6+7>** 802.11ax HE20 : 7.56 dBm / 0.0057 W 802.11ax HE40 : 10.59 dBm / 0.0115 W 802.11ax HE80 : 11.35 dBm / 0.0136 W **<MIMO Ant.6+10>** 802.11ax HE20 : 7.79 dBm / 0.0060 W 802.11ax HE40 : 10.61 dBm / 0.0115 W 802.11ax HE80 : 11.38 dBm / 0.0137 W
99% Occupied Bandwidth	**<MIMO Ant.6+7>** 802.11ax HE20 : 19.246 MHz 802.11ax HE40 : 38.476 MHz 802.11ax HE80 : 78.984 MHz **<MIMO Ant.6+10>** 802.11ax HE20 : 19.118 MHz 802.11ax HE40 : 39.404 MHz 802.11ax HE80 : 78.648 MHz
Antenna Type / Gain	**<5925 MHz ~ 6425 MHz >** <Ant. 6> : Loop Antenna with gain -7.30 dBi <Ant. 7> : Loop Antenna with gain -7.60 dBi <Ant. 10> : IFA Antenna with gain -7.70 dBi **<6425 MHz ~ 6525 MHz >** <Ant. 6> : Loop Antenna with gain -8.00 dBi <Ant. 7> : Loop Antenna with gain -8.00 dBi <Ant. 10> : IFA Antenna with gain -7.70 dBi **<6525 MHz ~ 6875 MHz >** <Ant. 6> : Loop Antenna with gain -7.50 dBi <Ant. 7> : Loop Antenna with gain -7.60 dBi <Ant. 10> : IFA Antenna with gain -7.70 dBi **<6875 MHz ~ 7125 MHz >** <Ant. 6> : Loop Antenna with gain -7.80 dBi <Ant. 7> : Loop Antenna with gain -8.00 dBi <Ant. 10> : IFA Antenna with gain -7.90 dBi
Type of Modulation	802.11ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)

Remark:

1. WIFI MIMO support CDD mode.
2. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal output power.
3. 802.11ax 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.
4. The device does not support 802.11ax channel puncturing mode.

5. The device does not support UNII-8 CH233 (BW=20M, Center Frequency = 7115MHz).
6. The device does not support UNII-5 CH2 (BW=20M, Center Frequency = 5935MHz).
7. CBP test with antenna path of minimum gain (Antenna 6, gain=-8 dBi).
8. The device supports Ant 6+7 and Ant 6+10 MIMO mode.

1.5 Modification of EUT

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

1.6 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 03CH05-KS	CN1257	314309

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	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ DFS01-SZ	CN1256	421272

Note : Test data subcontracted: conducted& CBP test case in section 3.1~3.5 of this report

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH05-KS	AUDIX	E3	6.2009-8-24
2.	CO01-KS	AUDIX	E3	6.2009-8-24

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 987594 D02 U-NII 6 GHz EMC Measurement v03
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- 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.

1.9 Specification of Accessory

Specification of Accessory				
Battery	**Brand Name**	Motorola(ATL)	**Model Name**	RM52
USB Cable 1	**Brand Name**	Motorola(Saibao)	**Model Name**	SC18D86731
USB Cable 2	**Brand Name**	Motorola(Luxshare)	**Model Name**	SC18E08103

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 for Adapter mode, WPT charger mode and Earphone mode. The worst cases (X plane - Adapter mode) 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, 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 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 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 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 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 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 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 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
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle+ WLAN(6G) Link + BT Link+ USB Cable1(Charging From Adapter)
Remark: For Radiated Test Cases, the tests were performed with Adapter and USB Cable 1	

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE20	802.11ax HE20	802.11ax HE20	802.11ax HE20
L	Low	001	097	117	189
M	Middle	045	105	149	209
H	High	093	113	181	229
Straddle		-	-	-	185

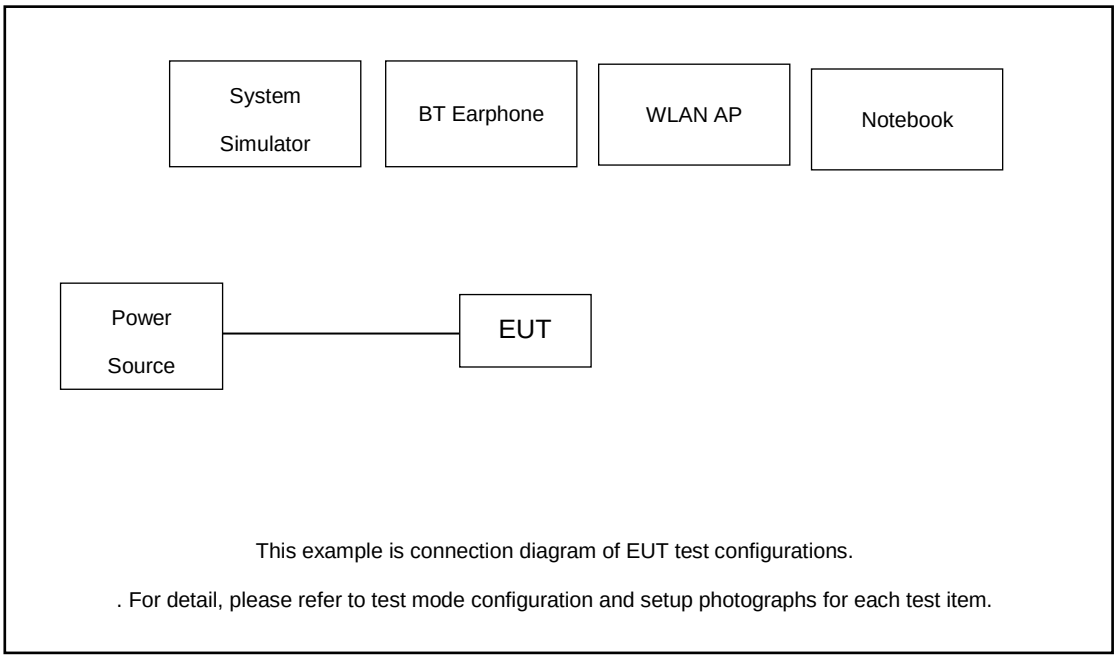
Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE40	802.11ax HE40	802.11ax HE40	802.11ax HE40
L	Low	003	099	123	195
M	Middle	043	-	147	203
H	High	091	107	179	227
Straddle		-	115	-	187

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE80	802.11ax HE80	802.11ax HE80	802.11ax HE80
L	Low	007	103	135	199
M	Middle	039		151	-
H	High	087		167	215
Straddle		-	119	183	-

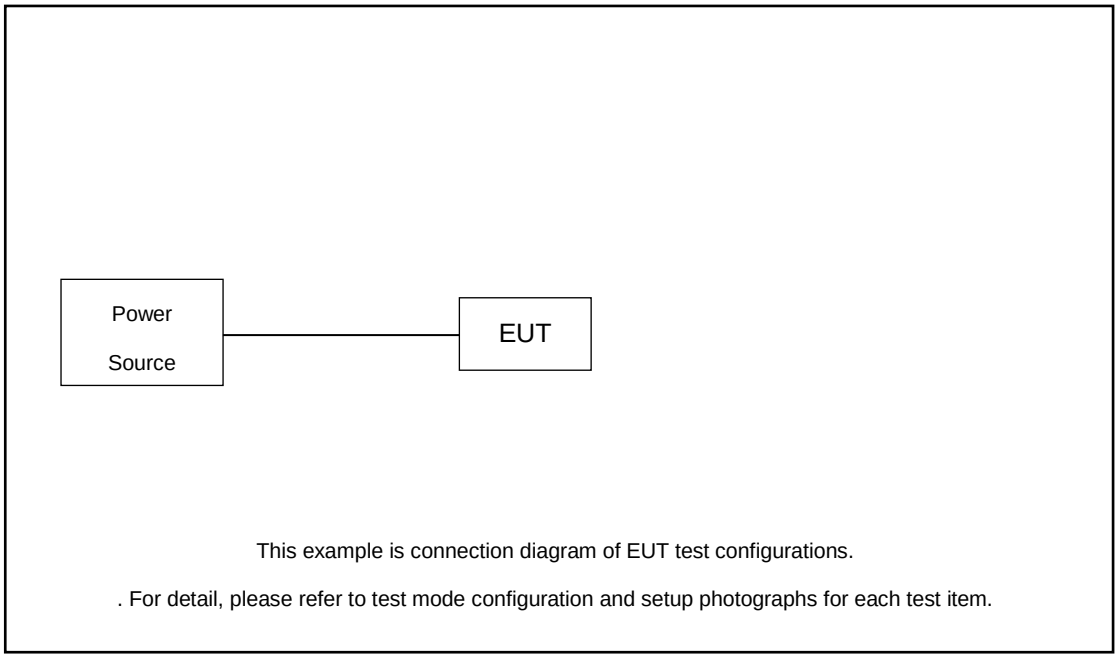
Remark: For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.

2.3 Connection Diagram of Test System

AC Conducted Emission:



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.	Base Station	Anritus	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Bluetooth Earphone	Lenovo	thinkplus-BH3	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
5.	SD Card	Kingston	8GB	N/A	N/A	N/A
6.	Adapter	N/A	N/A	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 5.86 dB and 10dB attenuator.

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

= 5.86 + 10 = 15.86 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 CFR 15.407 (a)(11)

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

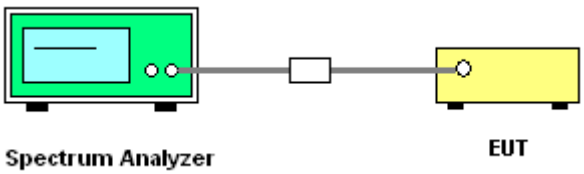
3.1.2 Measuring Instruments

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.

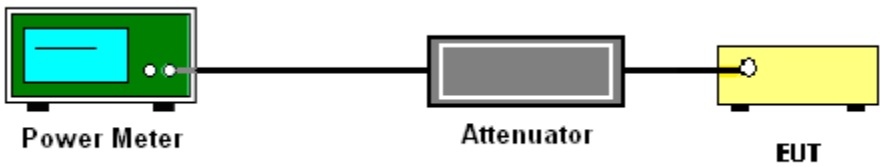
3.2.3 Test Procedures

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

<MIMO Ant.6+7>

Band V MIMO																
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	Power Setting	
					Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	SUM			Ant 6	Ant 7
HE20	MCS0	2	5955	Full	0.17	0.21	11.17	11.10	14.15	-7.30		6.85	24.00	Pass	11	
HE20	MCS0	2	6175	Full	0.17	0.21	10.93	11.07	14.01	-7.30		6.71	24.00	Pass	10.5	
HE20	MCS0	2	6415	Full	0.17	0.21	10.84	11.45	14.17	-7.30		6.87	24.00	Pass	11.5	
HE40	MCS0	2	5965	Full	0.39	0.32	13.60	13.56	16.59	-7.30		9.29	24.00	Pass	13	
HE40	MCS0	2	6165	Full	0.39	0.32	13.74	13.86	16.81	-7.30		9.51	24.00	Pass	13	
HE40	MCS0	2	6405	Full	0.39	0.32	13.59	14.40	17.02	-7.30		9.72	24.00	Pass	14	
HE80	MCS0	2	5985	Full	0.56	0.56	15.32	15.48	18.41	-7.30		11.11	24.00	Pass	15	
HE80	MCS0	2	6145	Full	0.56	0.56	15.48	15.79	18.65	-7.30		11.35	24.00	Pass	15	
HE80	MCS0	2	6385	Full	0.56	0.56	14.76	15.44	18.12	-7.30		10.82	24.00	Pass	15	

Band VI 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	Power Setting	
						Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	SUM			Ant 6	Ant 7
HE20	MCS0	2	097	6435	Full	0.17	0.21	11.73	11.52	14.64	-8.00		6.64	24.00	Pass	11.5	
HE20	MCS0	2	105	6475	Full	0.17	0.21	11.73	11.73	14.74	-8.00		6.74	24.00	Pass	11.5	
HE20	MCS0	2	113	6515	Full	0.17	0.21	11.06	11.69	14.40	-8.00		6.40	24.00	Pass	11	
HE40	MCS0	2	099	6445	Full	0.39	0.32	14.18	14.01	17.10	-8.00		9.10	24.00	Pass	13.5	
HE40	MCS0	2	107	6485	Full	0.39	0.32	14.03	14.00	17.02	-8.00		9.02	24.00	Pass	13.5	
HE40	MCS0	2	115	6525	Full	0.39	0.32	13.61	14.46	17.06	-8.00		9.06	24.00	Pass	13	
HE80	MCS0	2	103	6465	Full	0.56	0.56	15.47	15.58	18.54	-8.00		10.54	24.00	Pass	15	
HE80	MCS0	2	119	6545	Full	0.56	0.56	15.48	16.29	18.92	-8.00		10.92	24.00	Pass	15	

Band VII MIMO																
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	Power Setting	
					Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	SUM			Ant 6	Ant 7
HE20	MCS0	2	6535	Full	0.17	0.21	10.23	10.81	13.54	-7.50		6.04	24.00	Pass	10	
HE20	MCS0	2	6695	Full	0.17	0.21	10.01	11.00	13.54	-7.50		6.04	24.00	Pass	10.5	
HE20	MCS0	2	6855	Full	0.17	0.21	10.74	11.31	14.05	-7.50		6.55	24.00	Pass	11	

HE40	MCS0	2	6565	Full	0.39	0.32	13.59	14.09	16.86	-7.50	9.36	24.00	Pass	13
HE40	MCS0	2	6685	Full	0.39	0.32	13.44	14.67	17.11	-7.50	9.61	24.00	Pass	13.5
HE40	MCS0	2	6845	Full	0.39	0.32	13.69	14.22	16.97	-7.50	9.47	24.00	Pass	13.5
HE80	MCS0	2	6625	Full	0.56	0.56	15.24	15.92	18.60	-7.50	11.10	24.00	Pass	15
HE80	MCS0	2	6705	Full	0.56	0.56	14.60	15.09	17.86	-7.50	10.36	24.00	Pass	15
HE80	MCS0	2	6785	Full	0.56	0.56	14.66	15.02	17.86	-7.50	10.36	24.00	Pass	15
HE80	MCS0	2	6865	Full	0.56	0.56	14.35	14.86	17.62	-7.50	10.12	24.00	Pass	15

Band VIII MIMO																
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	Power Setting	
					Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	SUM			Ant 6	Ant 7
HE20	MCS0	2	6875	Full	0.17	0.21	10.94	11.32	14.14	-7.80		6.34	24.00	Pass	11	
HE20	MCS0	2	6895	Full	0.17	0.21	10.97	11.38	14.19	-7.80		6.39	24.00	Pass	11	
HE20	MCS0	2	6995	Full	0.17	0.21	10.86	12.06	14.51	-7.80		6.71	24.00	Pass	11.5	
HE20	MCS0	2	7095	Full	0.17	0.21	12.21	12.49	15.36	-7.80		7.56	24.00	Pass	11.5	
HE40	MCS0	2	6885	Full	0.39	0.32	13.88	14.28	17.09	-7.80		9.29	24.00	Pass	13.5	
HE40	MCS0	2	6925	Full	0.39	0.32	13.78	15.26	17.59	-7.80		9.79	24.00	Pass	13.5	
HE40	MCS0	2	6965	Full	0.39	0.32	14.20	15.52	17.92	-7.80		10.12	24.00	Pass	14	
HE40	MCS0	2	7085	Full	0.39	0.32	14.89	15.82	18.39	-7.80		10.59	24.00	Pass	14	
HE80	MCS0	2	6945	Full	0.56	0.56	15.11	16.73	19.01	-7.80		11.21	24.00	Pass	15	
HE80	MCS0	2	7025	Full	0.56	0.56	14.81	15.69	18.28	-7.80		10.48	24.00	Pass	15	

<MIMO Ant.6+10>

Band V MIMO																
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	Power Setting	
					Ant 6	Ant 10	Ant 6	Ant 10	SUM	Ant 6	Ant 10	SUM			Ant 6	Ant 10
HE20	MCS0	2	5955	Full	0.17	0.17	11.32	11.21	14.27	-7.30		6.97	24.00	Pass	11	
HE20	MCS0	2	6175	Full	0.17	0.17	11.27	11.00	14.15	-7.30		6.85	24.00	Pass	11	
HE20	MCS0	2	6415	Full	0.17	0.17	10.78	11.35	14.08	-7.30		6.78	24.00	Pass	11.5	
HE40	MCS0	2	5965	Full	0.32	0.39	13.98	13.98	16.99	-7.30		9.69	24.00	Pass	13.5	
HE40	MCS0	2	6165	Full	0.32	0.39	13.97	13.89	16.94	-7.30		9.64	24.00	Pass	13.5	
HE40	MCS0	2	6405	Full	0.32	0.39	13.56	14.23	16.92	-7.30		9.62	24.00	Pass	14	
HE80	MCS0	2	5985	Full	0.56	0.56	15.20	15.38	18.30	-7.30		11.00	24.00	Pass	15	
HE80	MCS0	2	6145	Full	0.56	0.56	15.41	15.47	18.45	-7.30		11.15	24.00	Pass	15	
HE80	MCS0	2	6385	Full	0.56	0.56	14.72	15.40	18.08	-7.30		10.78	24.00	Pass	15	

Band VI 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	Power Setting	
						Ant 6	Ant 10	Ant 6	Ant 10	SUM	Ant 6	Ant 10	SUM			Ant 6	Ant 10
HE20	MCS0	2	097	6435	Full	0.17	0.17	11.27	10.93	14.11	-7.70		6.41	24.00	Pass	11	
HE20	MCS0	2	105	6475	Full	0.17	0.17	11.65	11.62	14.64	-7.70		6.94	24.00	Pass	11.5	
HE20	MCS0	2	113	6515	Full	0.17	0.17	11.06	11.68	14.39	-7.70		6.69	24.00	Pass	11	
HE40	MCS0	2	099	6445	Full	0.32	0.39	14.01	13.84	16.93	-7.70		9.23	24.00	Pass	13.5	
HE40	MCS0	2	107	6485	Full	0.32	0.39	14.46	14.57	17.52	-7.70		9.82	24.00	Pass	14	
HE40	MCS0	2	115	6525	Full	0.32	0.39	13.36	14.37	16.90	-7.70		9.20	24.00	Pass	13	
HE80	MCS0	2	103	6465	Full	0.56	0.56	15.28	15.52	18.41	-7.70		10.71	24.00	Pass	15	
HE80	MCS0	2	119	6545	Full	0.56	0.56	15.21	16.24	18.77	-7.70		11.07	24.00	Pass	15	

Band VII MIMO																	
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	Power Setting	
					Ant 6	Ant 10	Ant 6	Ant 10	SUM	Ant 6	Ant 10	SUM			Ant 6	Ant 10
HE20	MCS0	2	6535	Full	0.17	0.17	10.60	11.29	13.97	-7.50		6.47	24.00	Pass	10.5	
HE20	MCS0	2	6695	Full	0.17	0.17	10.52	11.95	14.30	-7.50		6.80	24.00	Pass	11	
HE20	MCS0	2	6855	Full	0.17	0.17	10.67	11.94	14.36	-7.50		6.86	24.00	Pass	11	
HE40	MCS0	2	6565	Full	0.32	0.39	13.81	14.67	17.27	-7.50		9.77	24.00	Pass	13.5	
HE40	MCS0	2	6685	Full	0.32	0.39	12.98	14.52	16.83	-7.50		9.33	24.00	Pass	13	
HE40	MCS0	2	6845	Full	0.32	0.39	13.41	14.79	17.16	-7.50		9.66	24.00	Pass	13.5	
HE80	MCS0	2	6625	Full	0.56	0.56	15.05	16.40	18.79	-7.50		11.29	24.00	Pass	15	
HE80	MCS0	2	6705	Full	0.56	0.56	15.45	15.31	18.39	-7.50		10.89	24.00	Pass	15	
HE80	MCS0	2	6785	Full	0.56	0.56	15.43	16.26	18.88	-7.50		11.38	24.00	Pass	15	
HE80	MCS0	2	6865	Full	0.56	0.56	15.01	16.22	18.67	-7.50		11.17	24.00	Pass	15	

Band VIII MIMO																
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	Power Setting	
					Ant 6	Ant 10	Ant 6	Ant 10	SUM	Ant 6	Ant 10	SUM			Ant 6	Ant 10
HE20	MCS0	2	6875	Full	0.17	0.17	10.87	12.00	14.48	-7.80		6.68	24.00	Pass	11	
HE20	MCS0	2	6895	Full	0.17	0.17	10.93	12.09	14.56	-7.80		6.76	24.00	Pass	11	
HE20	MCS0	2	6995	Full	0.17	0.17	10.39	12.06	14.31	-7.80		6.51	24.00	Pass	11	
HE20	MCS0	2	7095	Full	0.17	0.17	11.88	13.18	15.59	-7.80		7.79	24.00	Pass	11.5	
HE40	MCS0	2	6885	Full	0.32	0.39	13.63	14.91	17.33	-7.80		9.53	24.00	Pass	13.5	
HE40	MCS0	2	6925	Full	0.32	0.39	13.16	15.25	17.34	-7.80		9.54	24.00	Pass	13	
HE40	MCS0	2	6965	Full	0.32	0.39	13.05	15.02	17.16	-7.80		9.36	24.00	Pass	13	
HE40	MCS0	2	7085	Full	0.32	0.39	14.52	16.13	18.41	-7.80		10.61	24.00	Pass	14	
HE80	MCS0	2	6945	Full	0.56	0.56	15.05	16.96	19.12	-7.80		11.32	24.00	Pass	15	
HE80	MCS0	2	7025	Full	0.56	0.56	14.56	16.56	18.69	-7.80		10.89	24.00	Pass	15	

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).

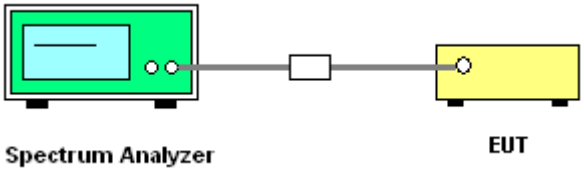
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), 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)(7) 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.

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:

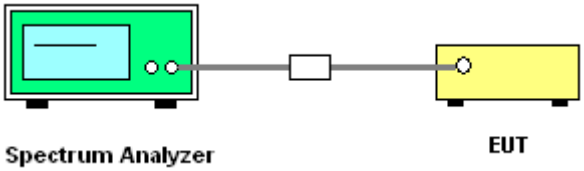
   a. Suppressed by 20 dB at 1 MHz outside of the channel edge.

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) All U-NII transmitters, except for standard power access points and fixed client devices, operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

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

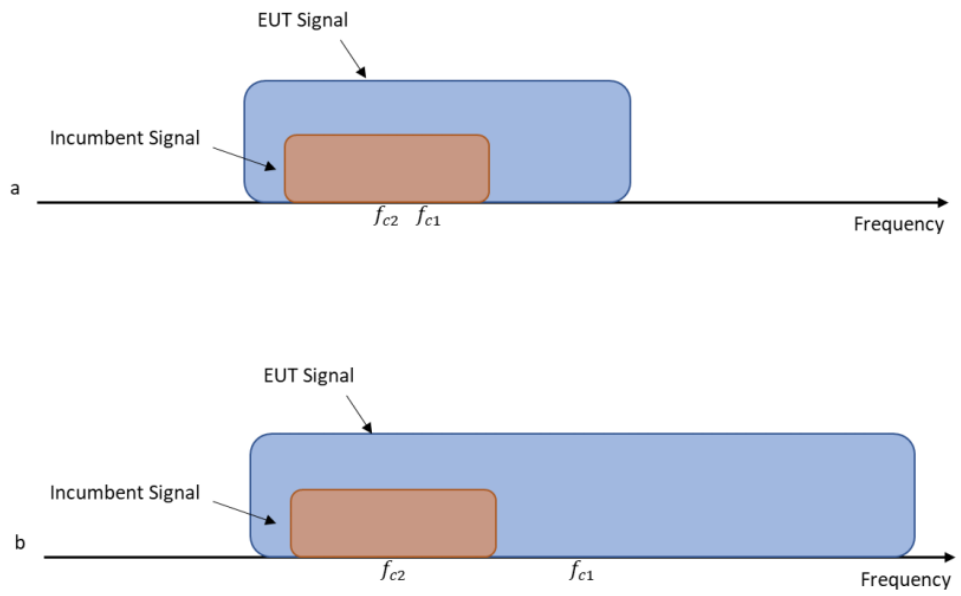


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

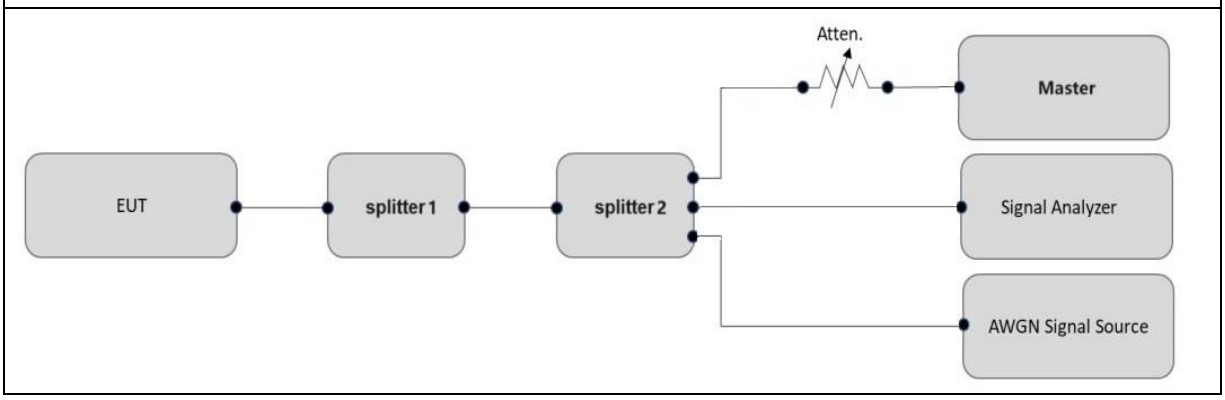
1. To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency $fc2$) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified 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



3.5.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
Signal Generator	Keysight	5182B/5182BX07	9KHz~7.2GHz
Spectrum Analyzer	R&S	FSV40	10kHz~40GHz
Terminal (NB Server)	DELL	P78G	LAN
Combiner (splitter1)	Tojoin	N/A	2G~8GHz
Combiner (splitter2)	MTJ Cooperation	MTJ7144-M	0.5GHz~18GHz
Attenuator	Keysight	8494B	0-110dBm
WLAN AP	ASUS	GT-AXE11000	Dual Band AP

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	6135	20	6135	-77.29	100	-62	-69.29	7.29
					Result: Stop Transmission			
				-78.29	<90	-62	-70.29	8.29
					Result: Minimal Operation			
				-79.29	=0	-62	-71.29	9.29
					Result: Normal Operation			
	6145	80	6110	-74.96	100	-62	-66.96	4.96
					Result: Stop Transmission			
				-75.96	<90	-62	-67.96	5.96
					Result: Minimal Operation			
				-76.96	=0	-62	-68.96	6.96
					Result: Normal Operation			
			6145	**-71.72 (worst)**	100	-62	-63.72	1.72
					Result: Stop Transmission			
				-72.72	<90	-62	-64.72	2.72
					Result: Minimal Operation			
				-73.72	=0	-62	-65.72	3.72
					Result: Normal Operation			
			6180	-74.01	100	-62	-66.01	4.01
					Result: Stop Transmission			
				-75.01	<90	-62	-67.01	5.01
					Result: Minimal Operation			
				-76.01	=0	-62	-68.01	6.01
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 6, gain=-8dBi)

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 6	6455	20	6455	-74.99	100	-62	-66.99	4.99
					Result: Stop Transmission			
				-75.99	<90	-62	-67.99	5.99
					Result: Minimal Operation			
				-76.99	=0	-62	-68.99	6.99
					Result: Normal Operation			
	6465	80	6430	-72.71	100	-62	-64.71	2.71
					Result: Stop Transmission			
				-73.71	<90	-62	-65.71	3.71
					Result: Minimal Operation			
				-74.71	=0	-62	-66.71	4.71
					Result: Normal Operation			
			6465	-72.43	100	-62	-64.43	2.43
					Result: Stop Transmission			
				-73.43	<90	-62	-65.43	3.43
					Result: Minimal Operation			
				-74.43	=0	-62	-66.43	4.43
					Result: Normal Operation			
			6500	-74.26	100	-62	-66.26	4.26
					Result: Stop Transmission			
				-75.26	<90	-62	-67.26	5.26
					Result: Minimal Operation			
				-76.26	=0	-62	-68.26	6.26
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain(Antenna 6, gain=-8dBi)

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	6695	20	6695	-76.56	100	-62	-68.56	6.56
					Result: Stop Transmission			
				-77.56	<90	-62	-69.56	7.56
					Result: Minimal Operation			
				-78.56	=0	-62	-70.56	8.56
					Result: Normal Operation			
	6625	80	6590	-77.12	100	-62	-69.12	7.12
					Result: Stop Transmission			
				-78.12	<90	-62	-70.12	8.12
					Result: Minimal Operation			
				-79.12	=0	-62	-71.12	9.12
					Result: Normal Operation			
			6625	-72.14	100	-62	-64.14	2.14
					Result: Stop Transmission			
				-73.14	<90	-62	-65.14	3.14
					Result: Minimal Operation			
				-74.14	=0	-62	-66.14	4.14
					Result: Normal Operation			
			6660	-76.68	100	-62	-68.68	6.68
					Result: Stop Transmission			
				-77.68	<90	-62	-69.68	7.68
					Result: Minimal Operation			
				-78.68	=0	-62	-70.68	8.68
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain(Antenna 6, gain=-8dBi)

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

Note 3: Margin = Regulated Threshold level - Adjusted Power

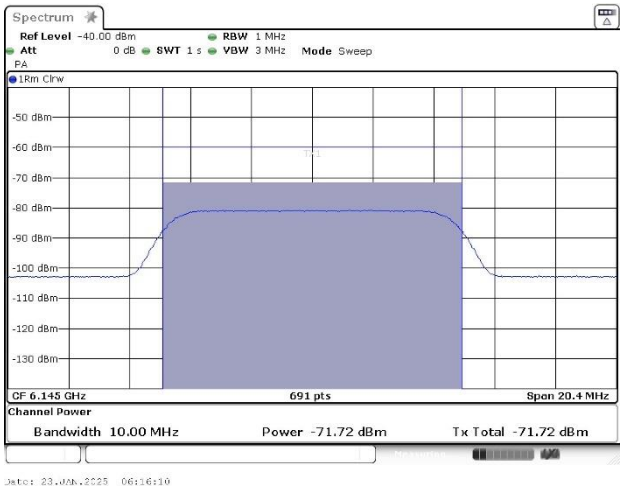
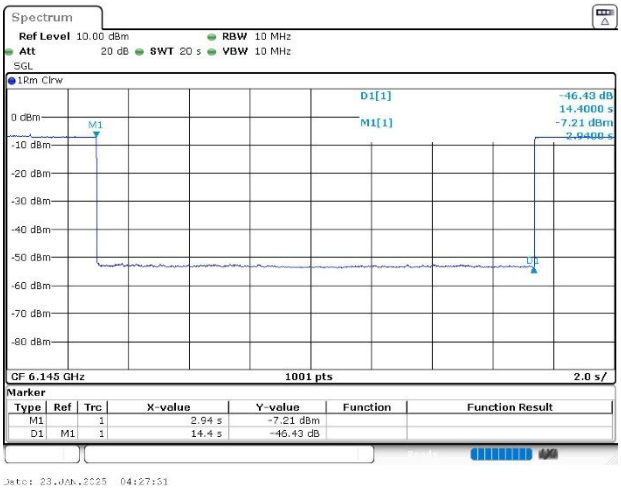
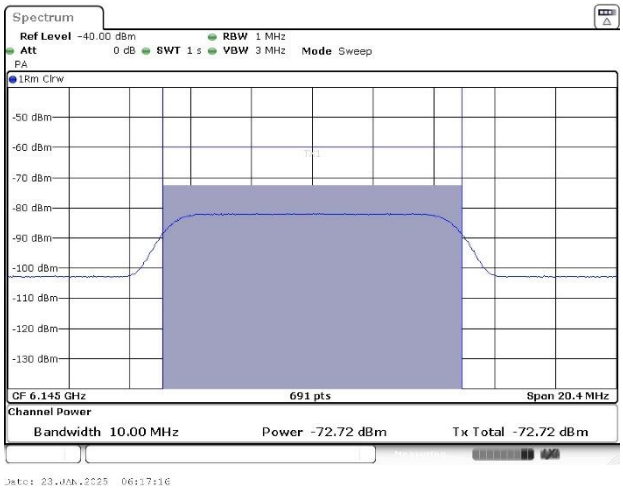
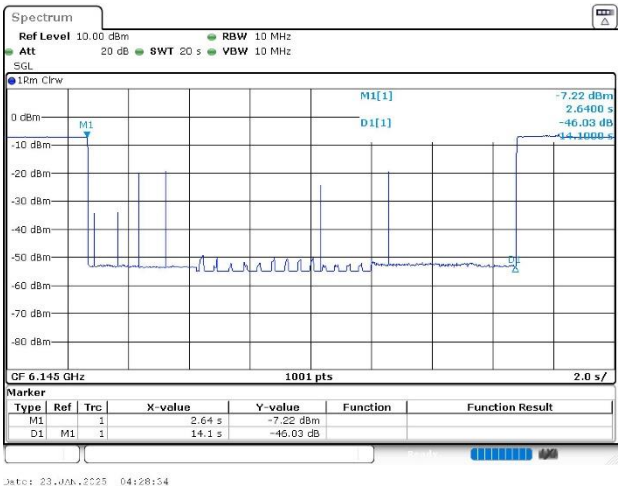
Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 8	7015	20	7015	-79.43	100	-62	-71.43	9.43
					Result: Stop Transmission			
				-80.43	<90	-62	-72.43	10.43
					Result: Minimal Operation			
				-81.43	=0	-62	-73.43	11.43
					Result: Normal Operation			
	6945	80	6910	-75.36	100	-62	-67.36	5.36
					Result: Stop Transmission			
				-76.36	<90	-62	-68.36	6.36
					Result: Minimal Operation			
				-77.36	=0	-62	-69.36	7.36
					Result: Normal Operation			
			6945	-73.71	100	-62	-65.71	3.71
					Result: Stop Transmission			
				-74.71	<90	-62	-66.71	4.71
					Result: Minimal Operation			
				-75.71	=0	-62	-67.71	5.71
					Result: Normal Operation			
			6980	-79.11	100	-62	-71.11	9.11
					Result: Stop Transmission			
				-80.11	<90	-62	-72.11	10.11
					Result: Minimal Operation			
				-81.11	=0	-62	-73.11	11.11
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 6, gain=-8dBi)

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 5 (AWGN Interference)	
802.11ax (HE80) / 6145MHz (Middle) Threshold Level (TL) = -71.72 dBm	802.11ax (HE80) / CH39 (Middle) Test result is pass due to no transmission occur.
	
802.11ax (HE80) / 6145MHz (Middle) Threshold Level (TL) = -72.72 dBm	802.11ax (HE80) / CH39 (Middle) Transmit when the interferer is 1dB lower.
	

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

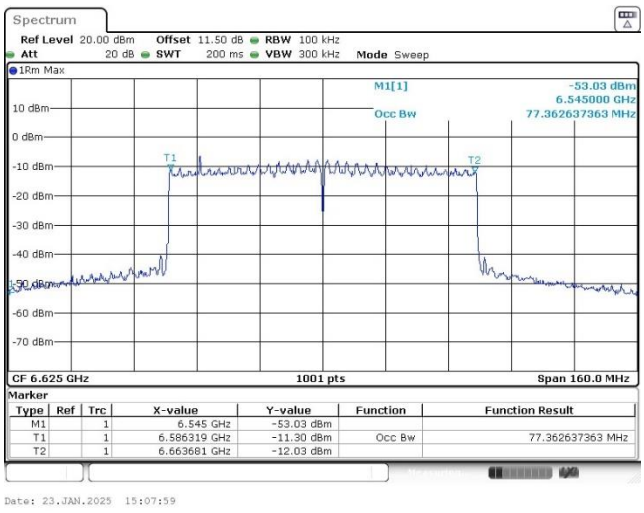
3.5.8 Worst Case of Contention Based Protocol Transmission Bandwidth

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

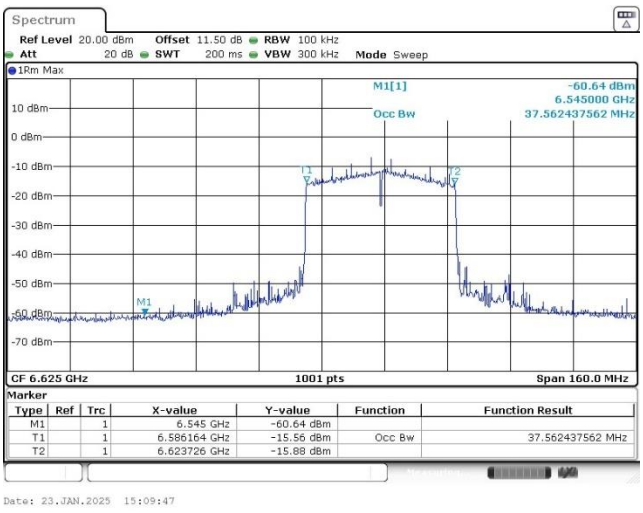
1. When Incumbent Signal inject at lowest frequency, the transmission bandwidth reduced to 40MHz;
2. When Incumbent Signal inject at middle frequency, the whole 80MHz bandwidth stop transmission;
3. When Incumbent Signal inject at highest frequency, the transmission bandwidth reduced to 40MHz;
4. This device does not support channel puncturing mode for incumbent avoidance but bandwidth reduction mechanism is supported.

UNII 7_CH135 (6625MHz / BW=80MHz)

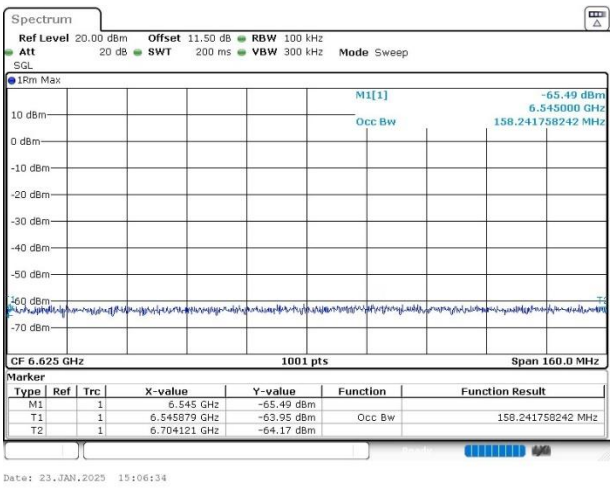
Non-Incumbent Signal



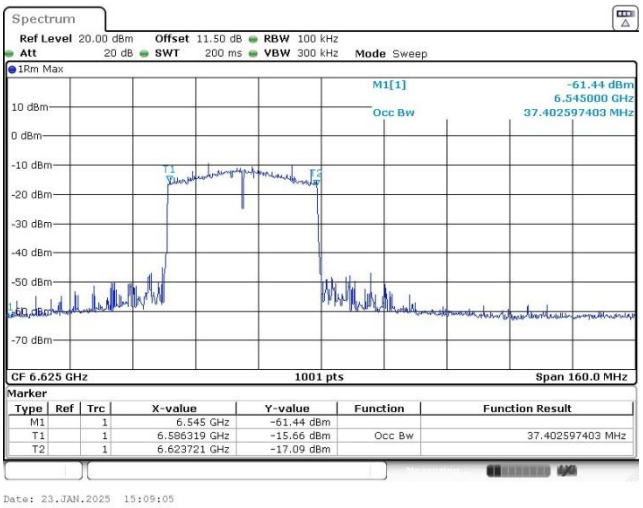
Incumbent freq @ 6590MHz



Incumbent freq @ 6625MHz



Incumbent freq @ 6660 MHz



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

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

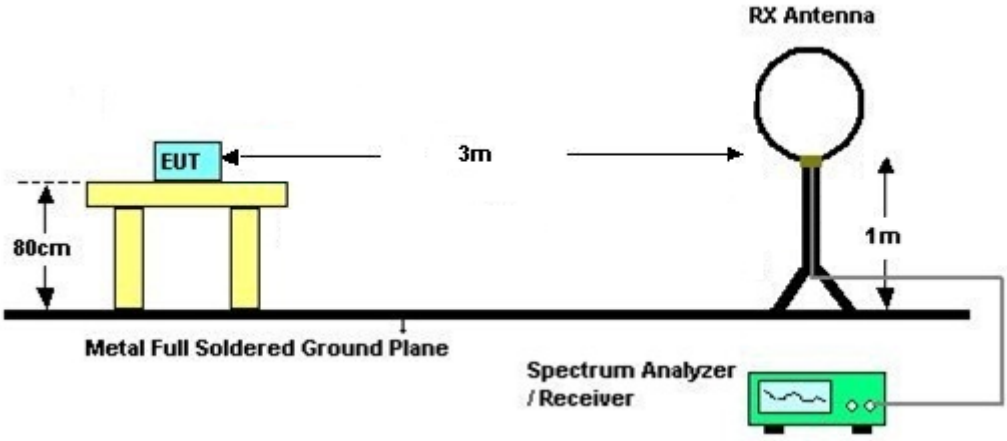
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - 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.

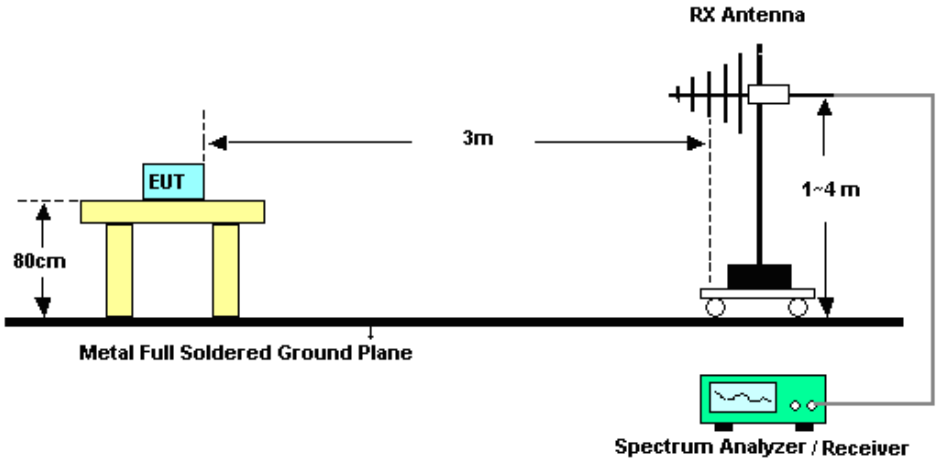
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

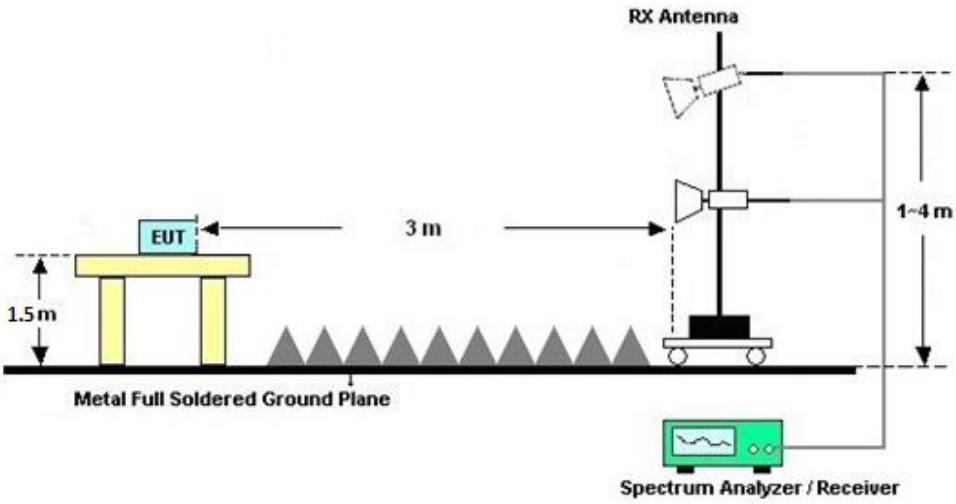
For radiated emissions below 30MHz



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 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 C.

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

3.7 AC Conducted Emission Measurement

3.7.1 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.

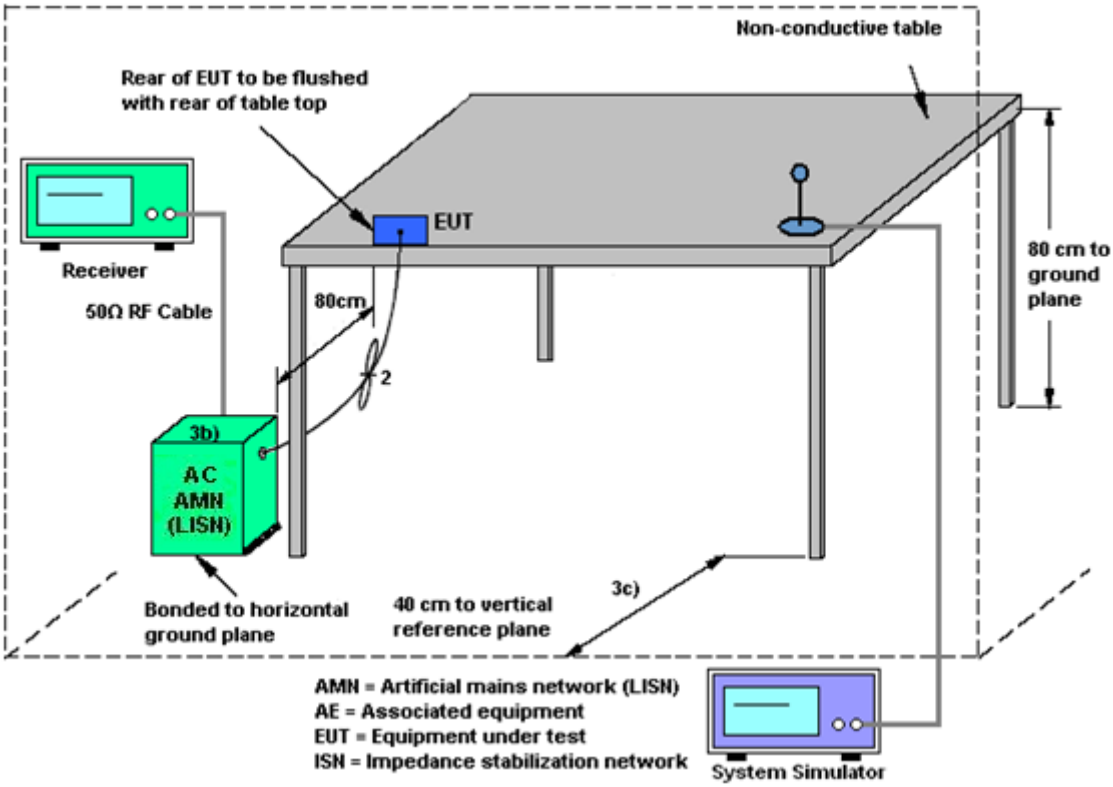
3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 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.

3.7.4 Test Setup



3.7.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.8 Antenna Requirements

3.8.1 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.

3.8.2 Antenna Anti-Replacement Construction

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

3.8.3 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)

<MIMO Ant.6+7>

<CDD Modes>				
	Ant. 6 (dBi)	Ant. 7 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	-7.30	-7.60	-7.30	-4.44
U-NII-6	-8.00	-8.00	-8.00	-4.99
U-NII-7	-7.50	-7.60	-7.50	-4.54
U-NII-8	-7.80	-8.00	-7.80	-4.89

<MIMO Ant.6+10>

<CDD Modes>				
	Ant. 6 (dBi)	Ant. 10 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
U-NII-5	-7.30	-7.70	-7.30	-4.49
U-NII-6	-8.00	-7.70	-7.70	-4.84
U-NII-7	-7.50	-7.70	-7.50	-4.59
U-NII-8	-7.80	-7.90	-7.80	-4.84

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. 09, 2024	Jan. 13, 2025~ Jan. 19, 2025	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 25, 2024	Jan. 13, 2025~ Jan. 19, 2025	Dec. 24, 2025	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081 803	-40~+150°C	Jul. 03, 2024	Jan. 13, 2025~ Jan. 19, 2025	Jul. 02, 2025	Conducted (TH01-SZ)
EMI Test Receiver	Keysight	N9038A	MY572901 51	3Hz~8.5GHz;M ax 30dBm	Jul. 04, 2024	Feb. 17, 2025~ Mar. 06, 2025	Jul. 03, 2025	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY602421 26	10Hz-44G,MAX 30dB	Oct. 10, 2024	Feb. 17, 2025~ Mar. 06, 2025	Oct. 09, 2025	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Feb. 17, 2025~ Mar. 06, 2025	Sep. 07, 2025	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	Apr. 18, 2024	Feb. 17, 2025~ Mar. 06, 2025	Apr. 17, 2025	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 11, 2024	Feb. 17, 2025~ Mar. 06, 2025	Apr. 10, 2025	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101116	18GHz~40GHz	Oct. 22, 2024	Feb. 17, 2025~ Mar. 06, 2025	Oct. 21, 2025	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul. 03, 2024	Feb. 17, 2025~ Mar. 06, 2025	Jul. 02, 2025	Radiation (03CH05-KS)
Amplifier	EM	EM18G40GA	060851	18~40GHz	Jan. 02, 2025	Feb. 17, 2025~ Mar. 06, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
high gain Amplifier	EM	EM01G18GA	060843	1Ghz-18Ghz	Jan. 02, 2025	Feb. 17, 2025~ Mar. 06, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
Amplifier	EM	EM01G18GA	060833	1Ghz-18Ghz	Jan. 02, 2025	Feb. 17, 2025~ Mar. 06, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Feb. 17, 2025~ Mar. 06, 2025	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 17, 2025~ Mar. 06, 2025	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 17, 2025~ Mar. 06, 2025	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Feb. 08, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	Feb. 08, 2025	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Feb. 08, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	Feb. 08, 2025	Oct. 08, 2025	Conduction (CO01-KS)
Signal Analyzer	R&S	FSV7	101473	10Hz~7GHz	Dec. 25, 2024	Jan. 23, 2025	Dec. 24, 2025	CBP (DFS01-SZ)
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY562004 24	9kHz~6GHz	Apr. 09, 2024	Jan. 23, 2025	Apr. 08, 2025	CBP (DFS01-SZ)
Combiner	TOJOIN	PS-2AM-0460	SZE14011 007	0.4~6GHz	Sep. 05, 2024	Jan. 23, 2025	Sep. 04, 2025	CBP (DFS01-SZ)

NCR: No Calibration Required

5 Measurement Uncertainty

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.012 MHz
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz
Conducted Generated signal Levels	±0.62 dB
Conducted Time	0.38%

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.84dB

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.30dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.02dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.22dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.34dB

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

Appendix A. Conducted Test Results

<MIMO Ant.6+7>

Emission Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11AX20MIMO	Ant6	5955	21.60	5944.30	5965.90	≤320	PASS
	Ant7	5955	20.90	5944.60	5965.50	≤320	PASS
	Ant6	6175	21.30	6164.30	6185.60	≤320	PASS
	Ant7	6175	21.40	6164.20	6185.60	≤320	PASS
	Ant6	6415	21.30	6404.40	6425.70	≤320	PASS
	Ant7	6415	21.00	6404.50	6425.50	≤320	PASS
	Ant6	6435	21.10	6424.50	6445.60	≤320	PASS
	Ant7	6435	22.00	6424.10	6446.10	≤320	PASS
	Ant6	6475	21.60	6464.30	6485.90	≤320	PASS
	Ant7	6475	21.40	6464.40	6485.80	≤320	PASS
	Ant6	6515	21.70	6504.20	6525.90	≤320	PASS
	Ant7	6515	21.50	6504.40	6525.90	≤320	PASS
	Ant6	6535	21.30	6524.40	6545.70	≤320	PASS
	Ant7	6535	20.90	6524.50	6545.40	≤320	PASS
	Ant6	6695	21.60	6684.30	6705.90	≤320	PASS
	Ant7	6695	20.90	6684.50	6705.40	≤320	PASS
	Ant6	6855	20.80	6844.50	6865.30	≤320	PASS
	Ant7	6855	21.20	6844.50	6865.70	≤320	PASS
	Ant6	6875	21.40	6864.20	6885.60	≤320	PASS
	Ant7	6875	21.20	6864.40	6885.60	≤320	PASS
	Ant6	6895	21.80	6883.90	6905.70	≤320	PASS
	Ant7	6895	21.20	6884.40	6905.60	≤320	PASS
	Ant6	6995	21.40	6984.20	7005.60	≤320	PASS
	Ant7	6995	21.40	6984.10	7005.50	≤320	PASS
	Ant6	7095	21.30	7084.40	7105.70	≤320	PASS
	Ant7	7095	21.10	7084.40	7105.50	≤320	PASS
11AX40MIMO	Ant6	5965	39.74	5944.98	5984.72	≤320	PASS
	Ant7	5965	39.52	5945.06	5984.58	≤320	PASS
	Ant6	6165	39.54	6145.06	6184.60	≤320	PASS
	Ant7	6165	39.56	6145.10	6184.66	≤320	PASS
	Ant6	6405	39.78	6384.94	6424.72	≤320	PASS
	Ant7	6405	39.82	6384.92	6424.74	≤320	PASS
	Ant6	6445	39.70	6424.92	6464.62	≤320	PASS
	Ant7	6445	39.54	6425.08	6464.62	≤320	PASS
	Ant6	6485	39.64	6465.00	6504.64	≤320	PASS
	Ant7	6485	39.58	6464.96	6504.54	≤320	PASS
	Ant6	6525	39.66	6505.00	6544.66	≤320	PASS
	Ant7	6525	39.72	6504.92	6544.64	≤320	PASS
	Ant6	6565	39.70	6544.94	6584.64	≤320	PASS
	Ant7	6565	39.70	6544.94	6584.64	≤320	PASS

	Ant6	6685	39.64	6664.98	6704.62	≤320	PASS
	Ant7	6685	39.56	6665.06	6704.62	≤320	PASS
	Ant6	6845	39.66	6824.92	6864.58	≤320	PASS
	Ant7	6845	39.52	6825.04	6864.56	≤320	PASS
	Ant6	6885	39.74	6864.96	6904.70	≤320	PASS
	Ant7	6885	39.66	6864.96	6904.62	≤320	PASS
	Ant6	6925	41.98	6902.66	6944.64	≤320	PASS
	Ant7	6925	40.76	6904.78	6945.54	≤320	PASS
	Ant6	6965	60.48	6932.64	6993.12	≤320	PASS
	Ant7	6965	39.54	6945.08	6984.62	≤320	PASS
	Ant6	7085	72.82	7047.30	7120.12	≤320	PASS
	Ant7	7085	39.48	7065.08	7104.56	≤320	PASS
11AX80MIMO	Ant6	5985	80.72	5944.48	6025.20	≤320	PASS
	Ant7	5985	80.60	5944.52	6025.12	≤320	PASS
	Ant6	6145	80.56	6104.52	6185.08	≤320	PASS
	Ant7	6145	80.56	6104.56	6185.12	≤320	PASS
	Ant6	6385	80.48	6344.56	6425.04	≤320	PASS
	Ant7	6385	80.80	6344.44	6425.24	≤320	PASS
	Ant6	6465	90.04	6424.60	6514.64	≤320	PASS
	Ant7	6465	80.44	6424.60	6505.04	≤320	PASS
	Ant6	6545	80.72	6504.48	6585.20	≤320	PASS
	Ant7	6545	80.52	6504.64	6585.16	≤320	PASS
	Ant6	6625	80.72	6584.56	6665.28	≤320	PASS
	Ant7	6625	80.36	6584.52	6664.88	≤320	PASS
	Ant6	6705	80.60	6664.56	6745.16	≤320	PASS
	Ant7	6705	80.40	6664.64	6745.04	≤320	PASS
	Ant6	6785	81.60	6744.48	6826.08	≤320	PASS
	Ant7	6785	80.88	6744.36	6825.24	≤320	PASS
	Ant6	6865	80.72	6824.52	6905.24	≤320	PASS
	Ant7	6865	80.56	6824.44	6905.00	≤320	PASS
	Ant6	6945	106.04	6887.28	6993.32	≤320	PASS
	Ant7	6945	89.52	6901.60	6991.12	≤320	PASS
	Ant6	7025	144.68	6940.76	7085.44	≤320	PASS
	Ant7	7025	82.32	6982.96	7065.28	≤320	PASS

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Test Graphs

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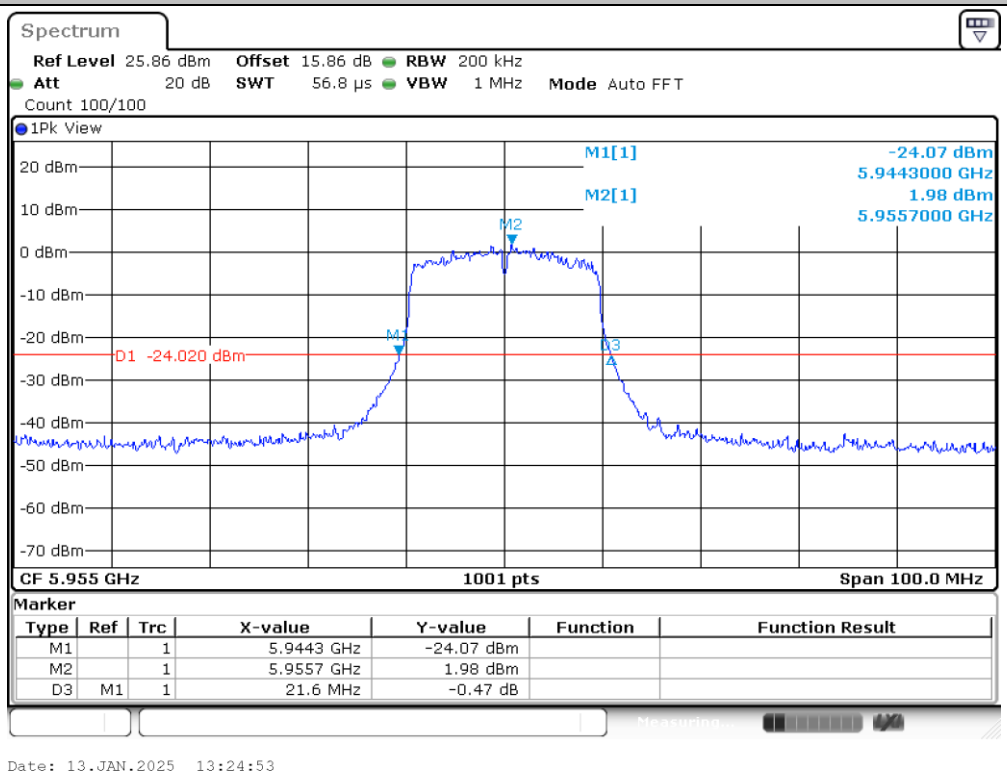

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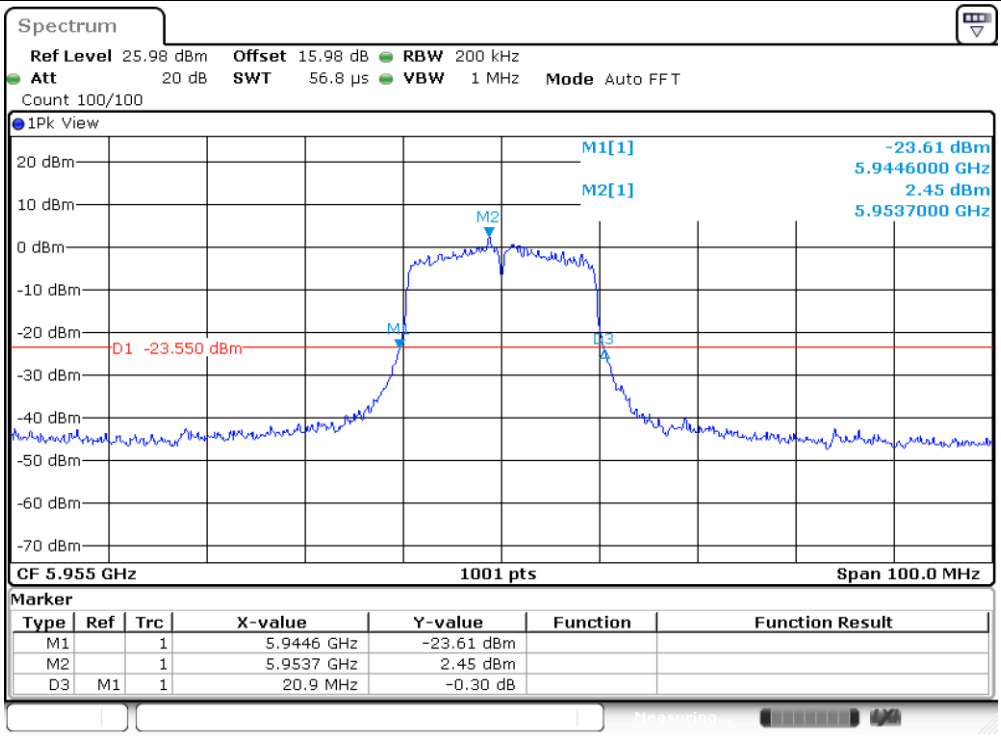

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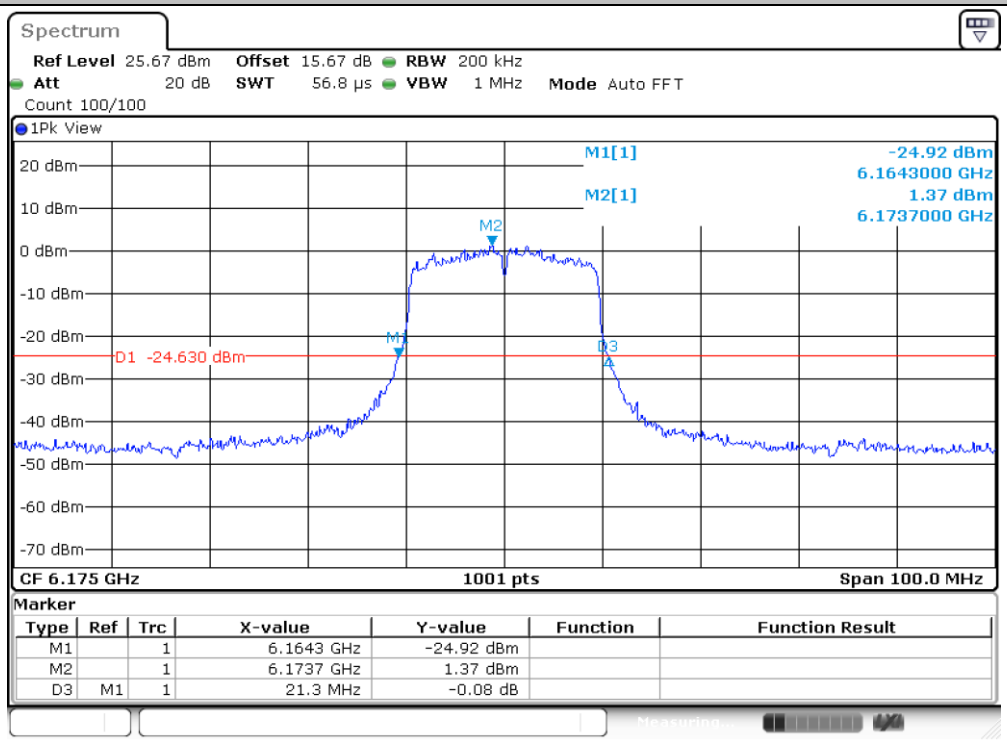

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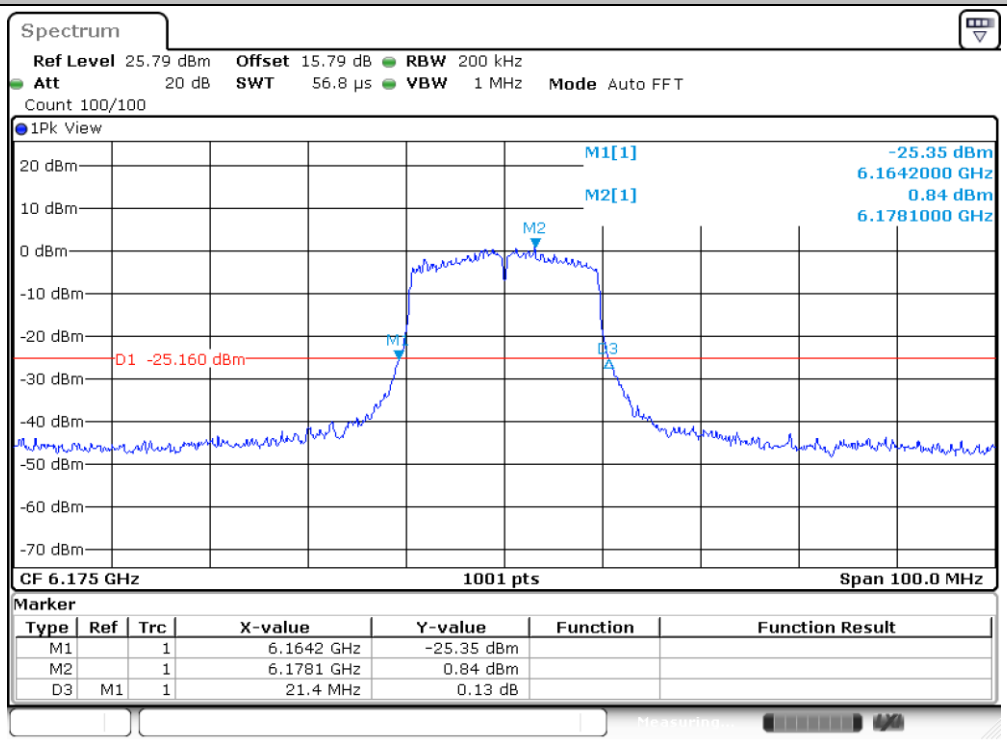

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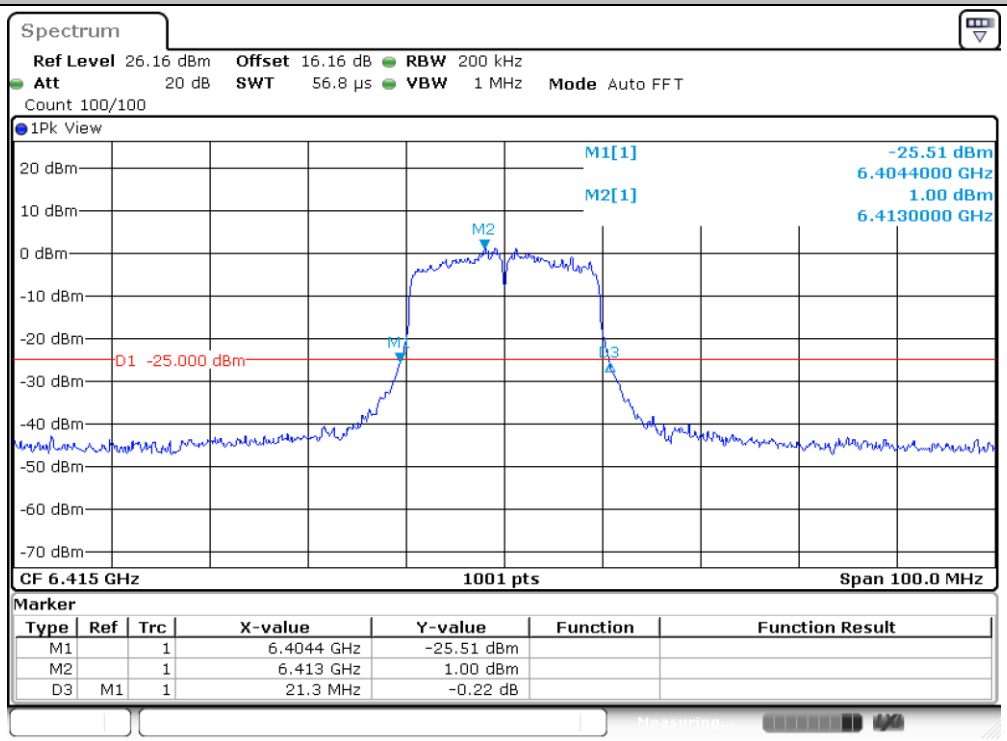

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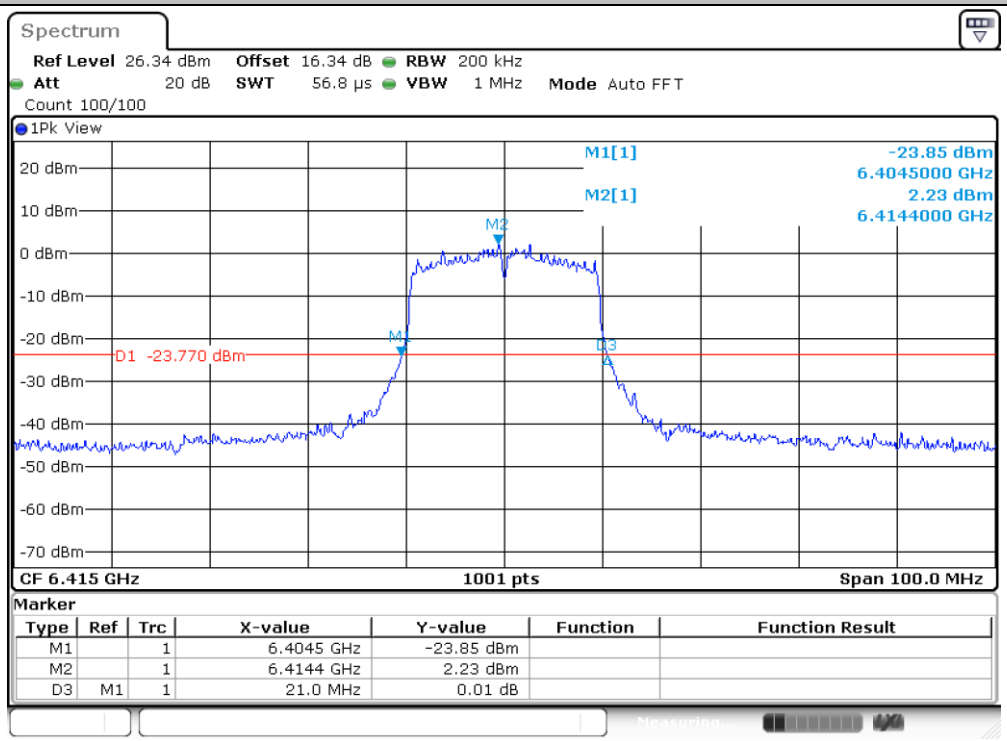

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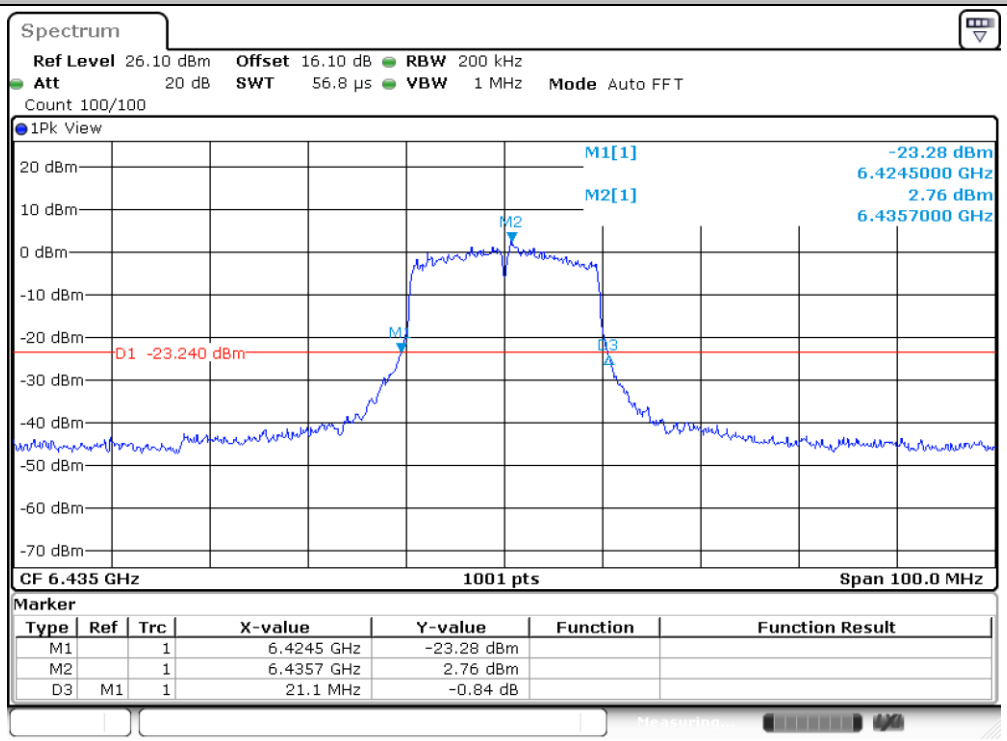

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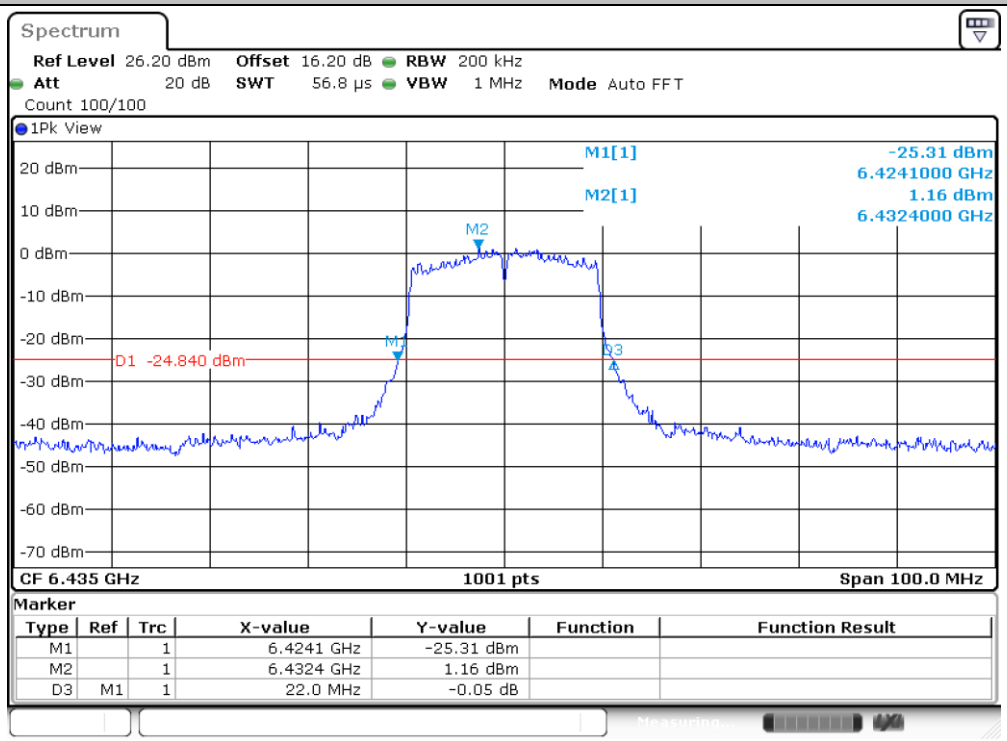

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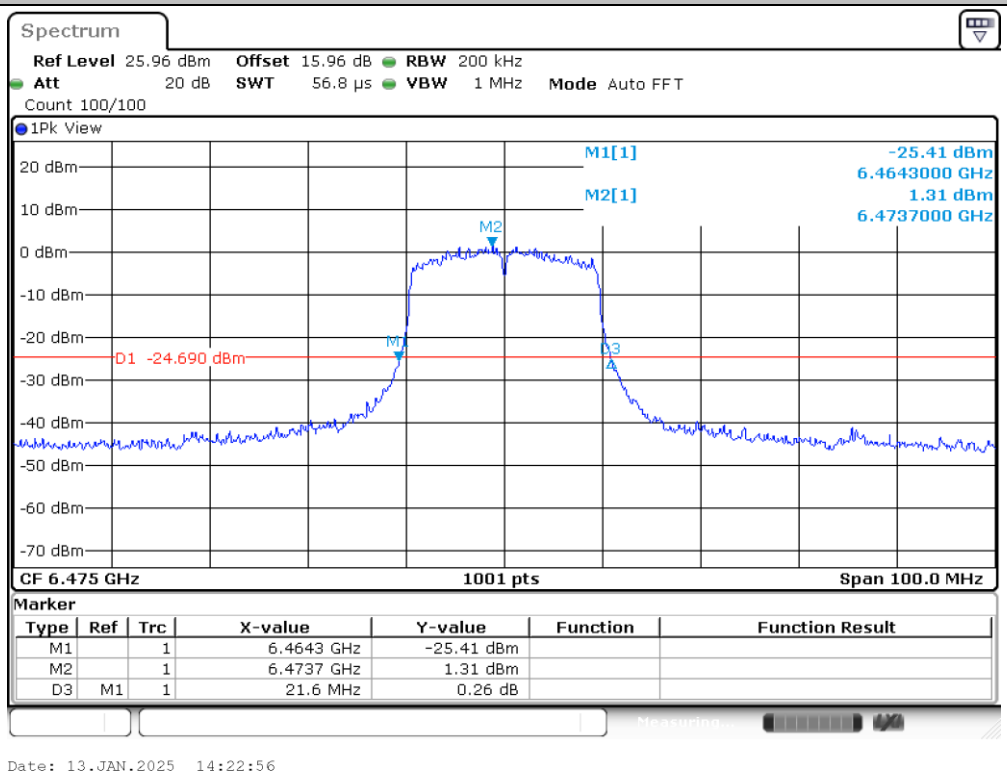

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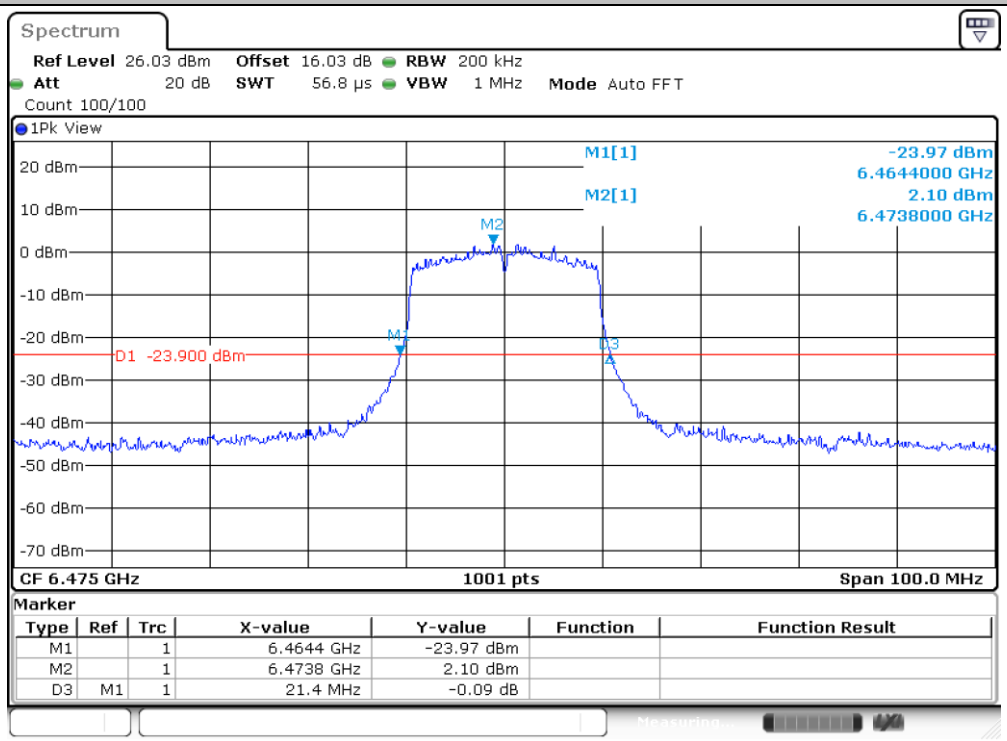

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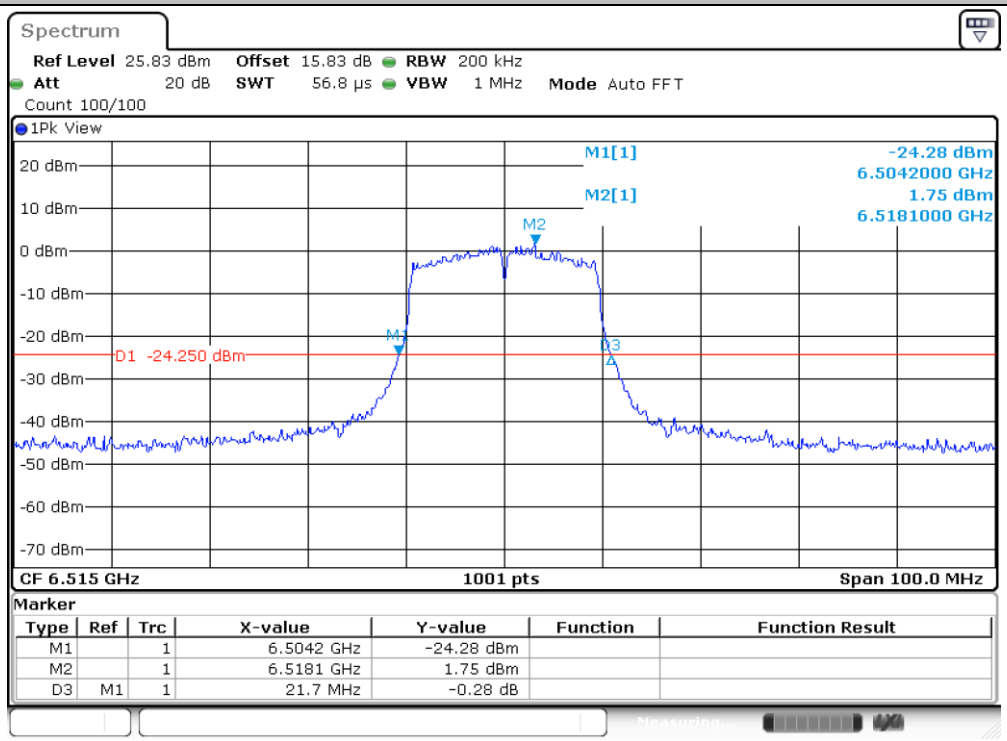

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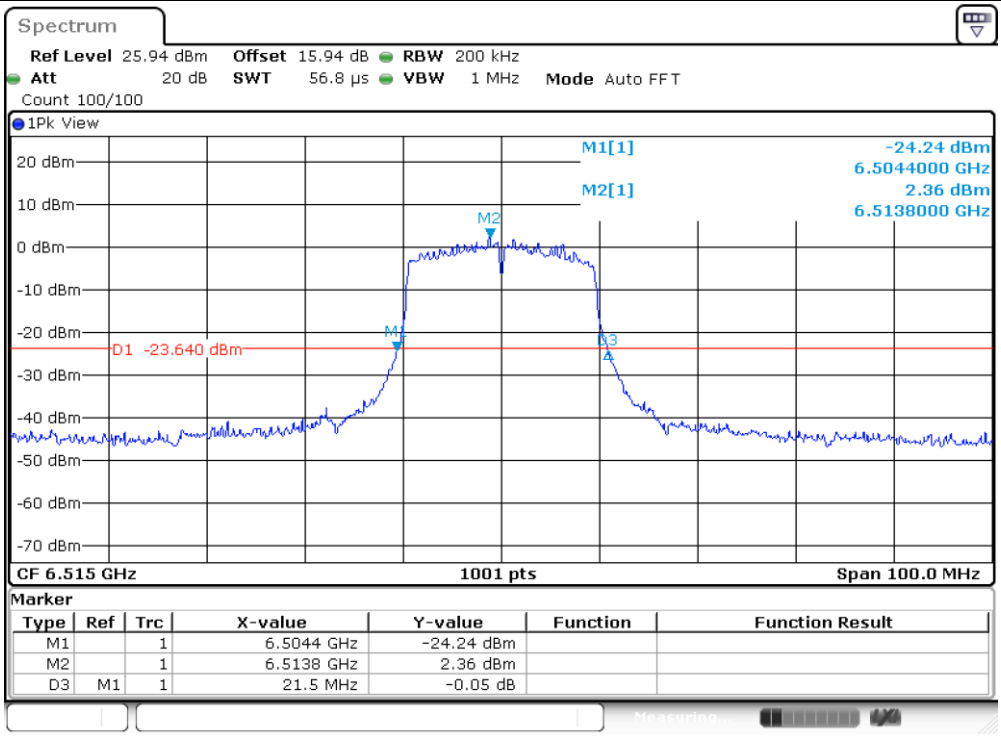

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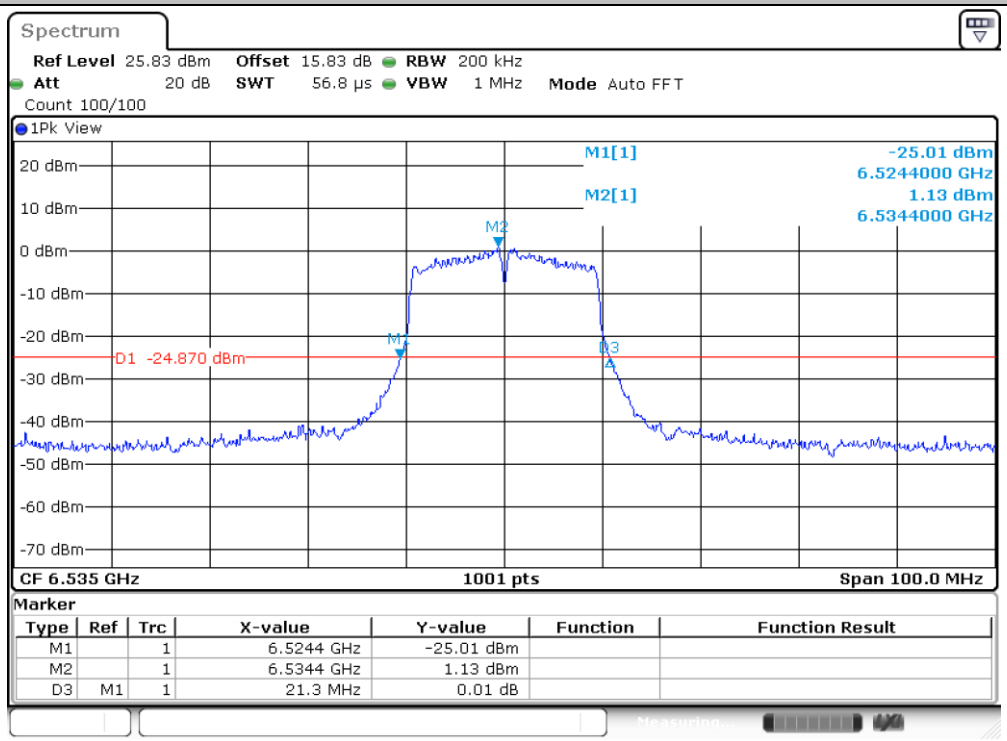

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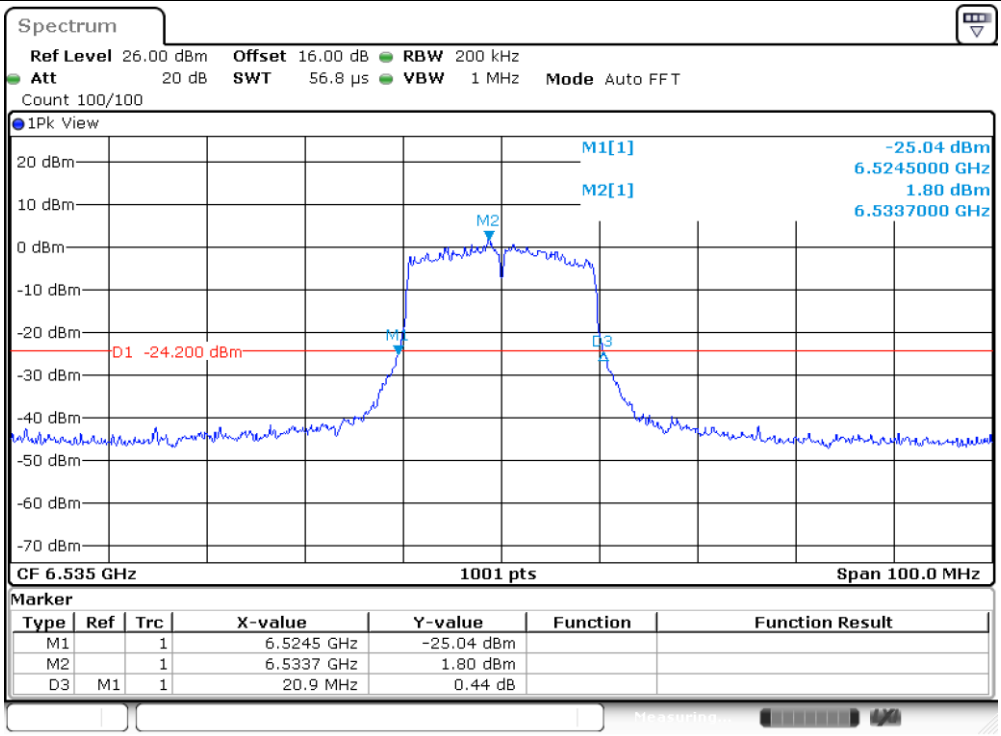

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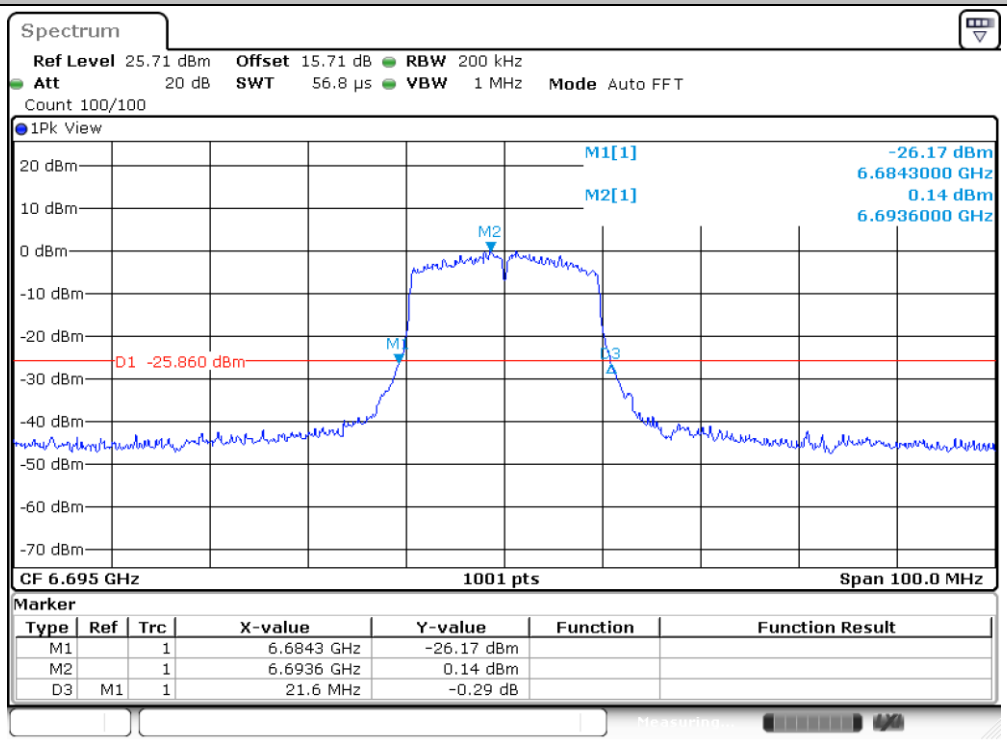

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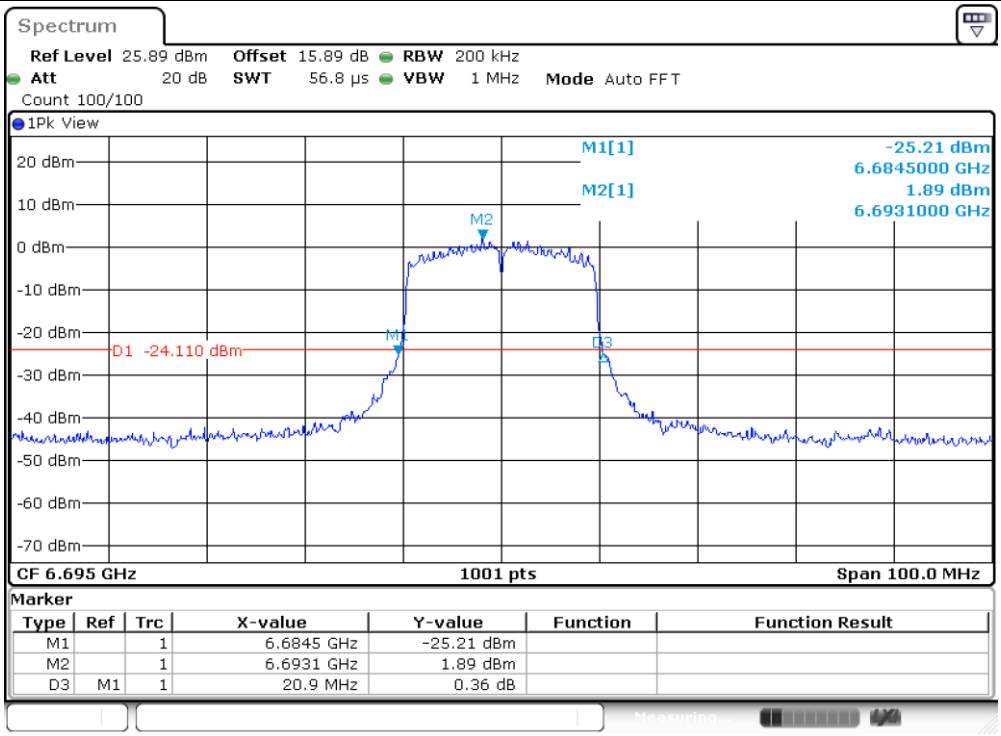

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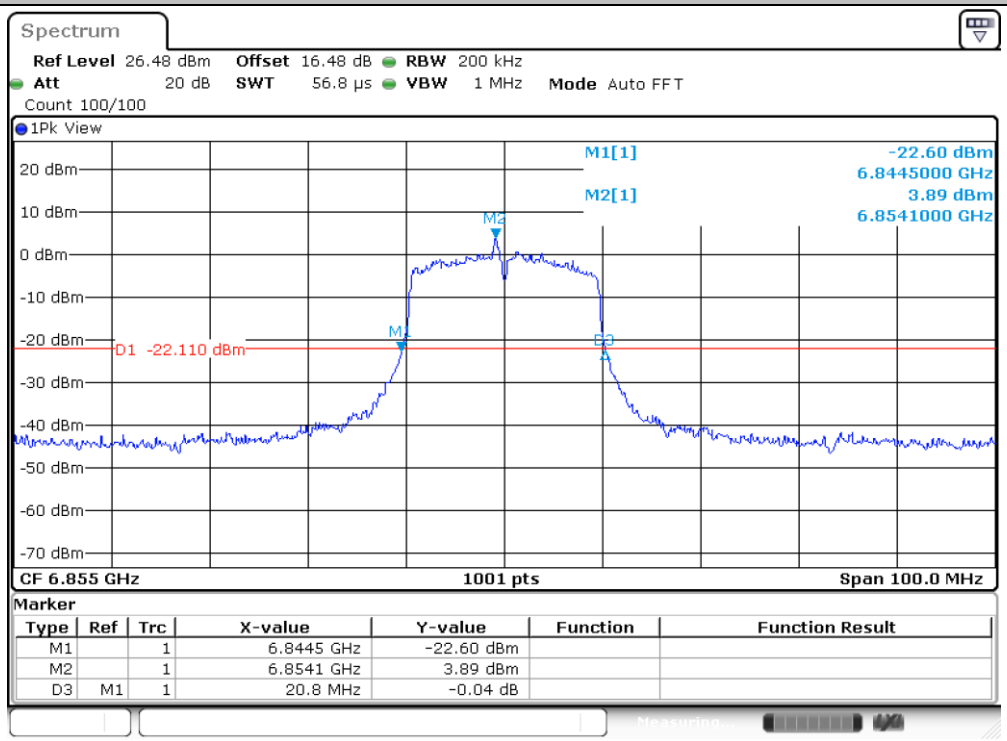

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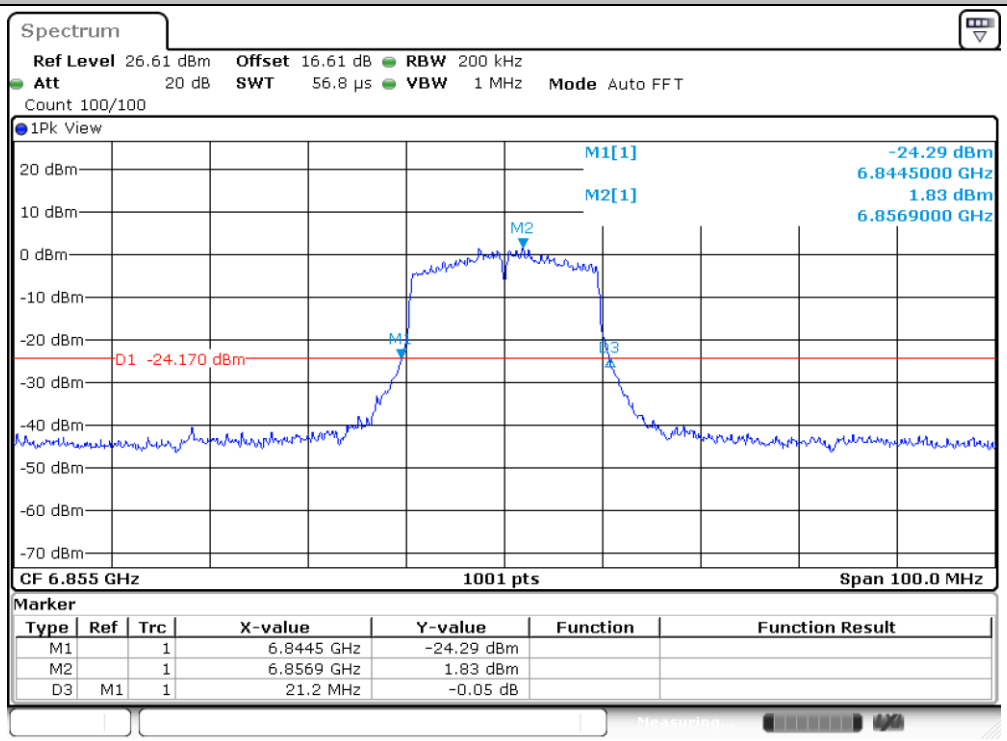

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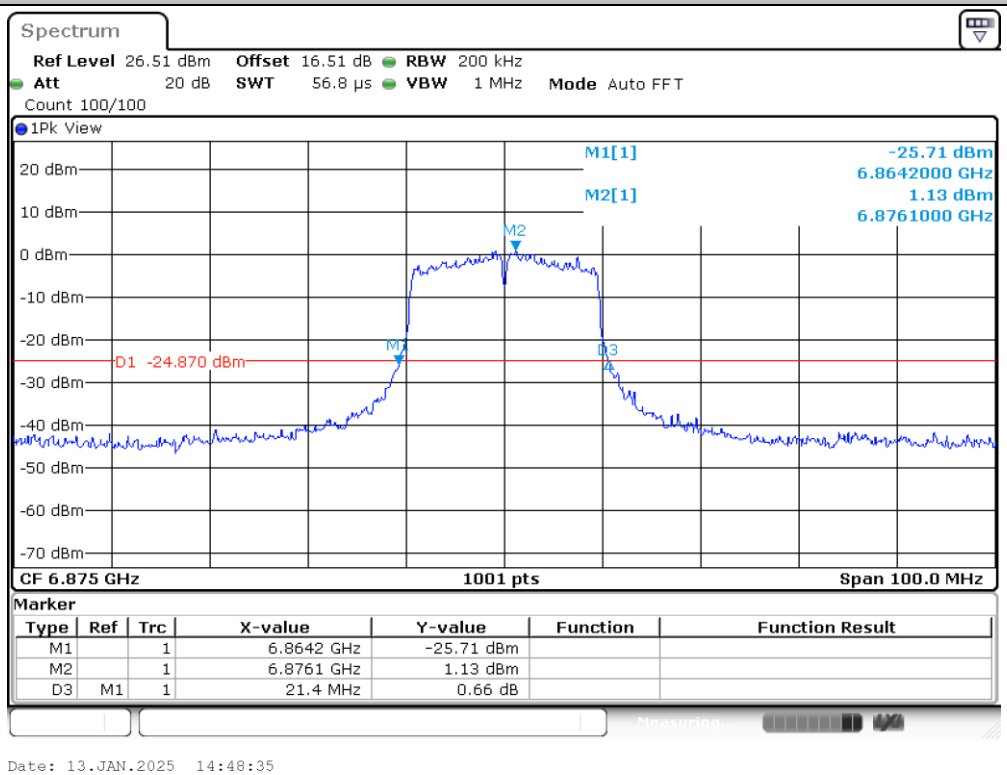

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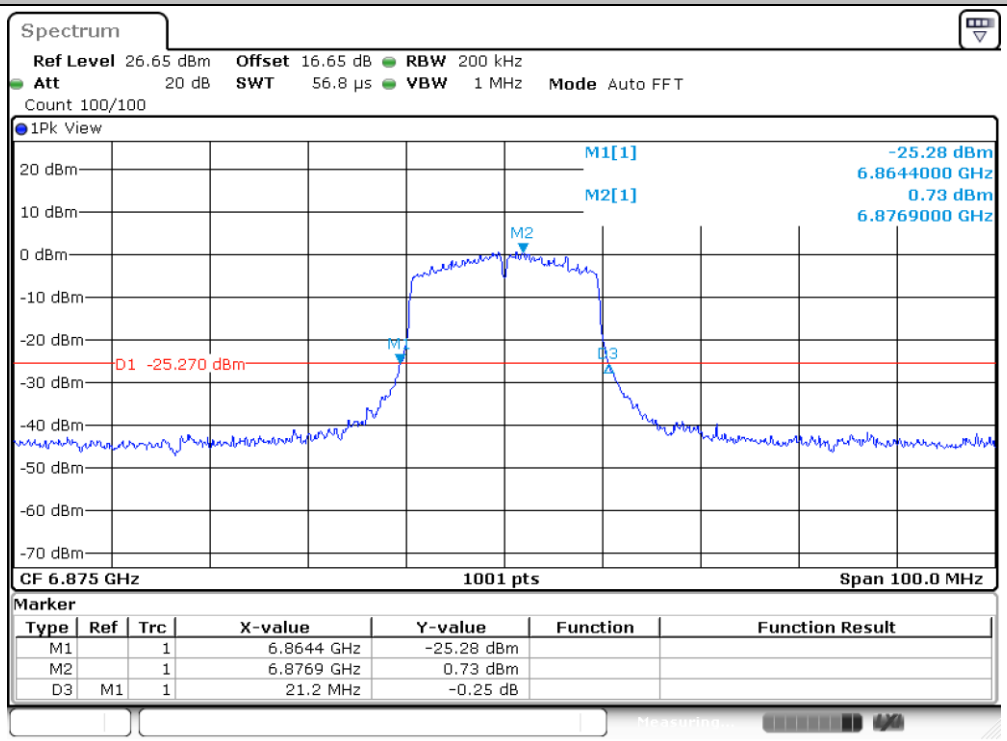

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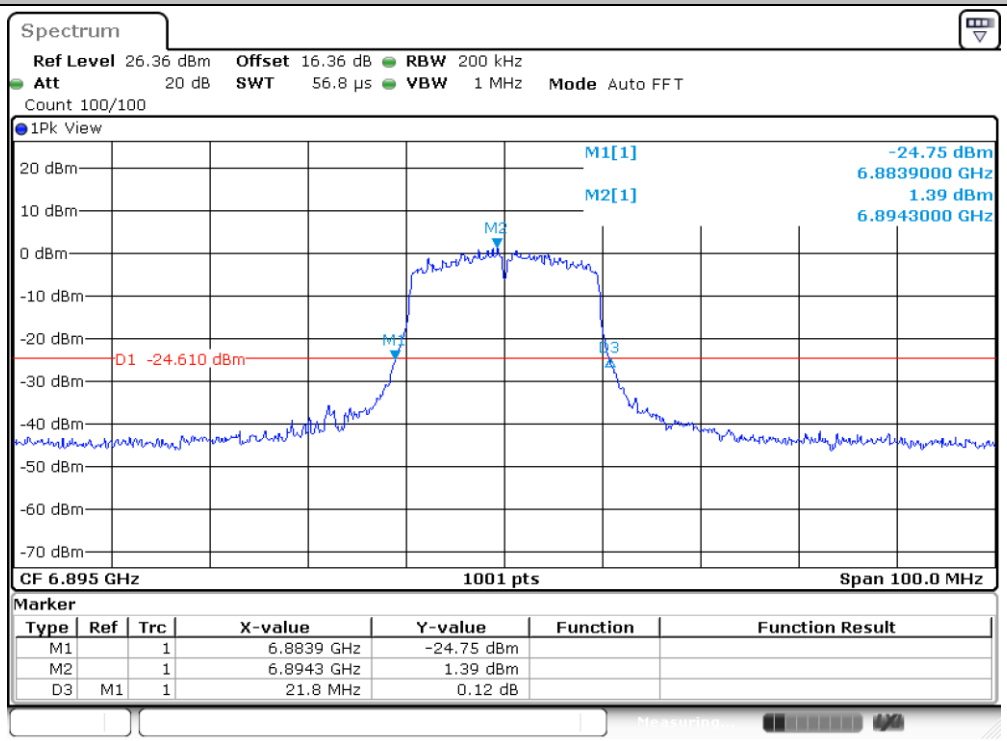

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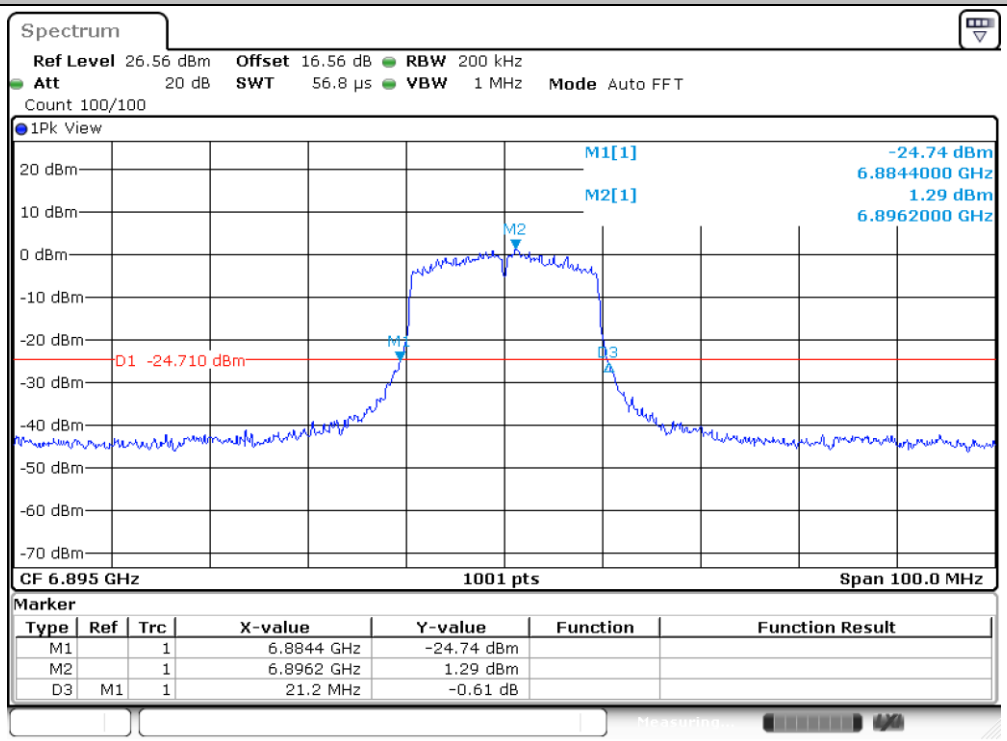

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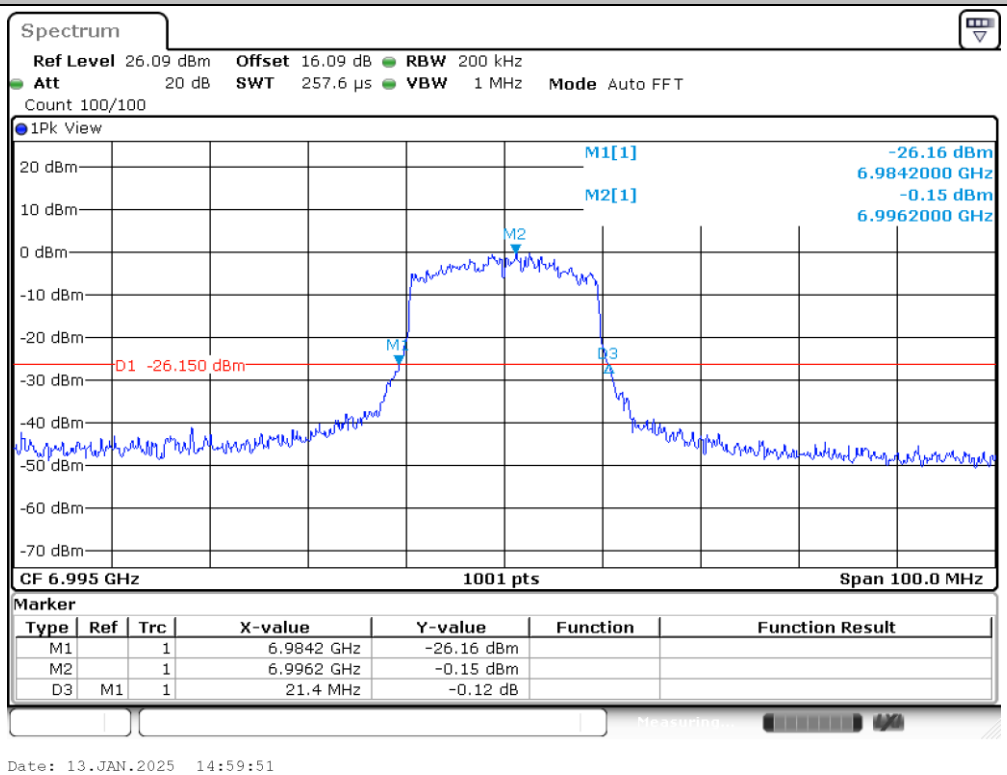

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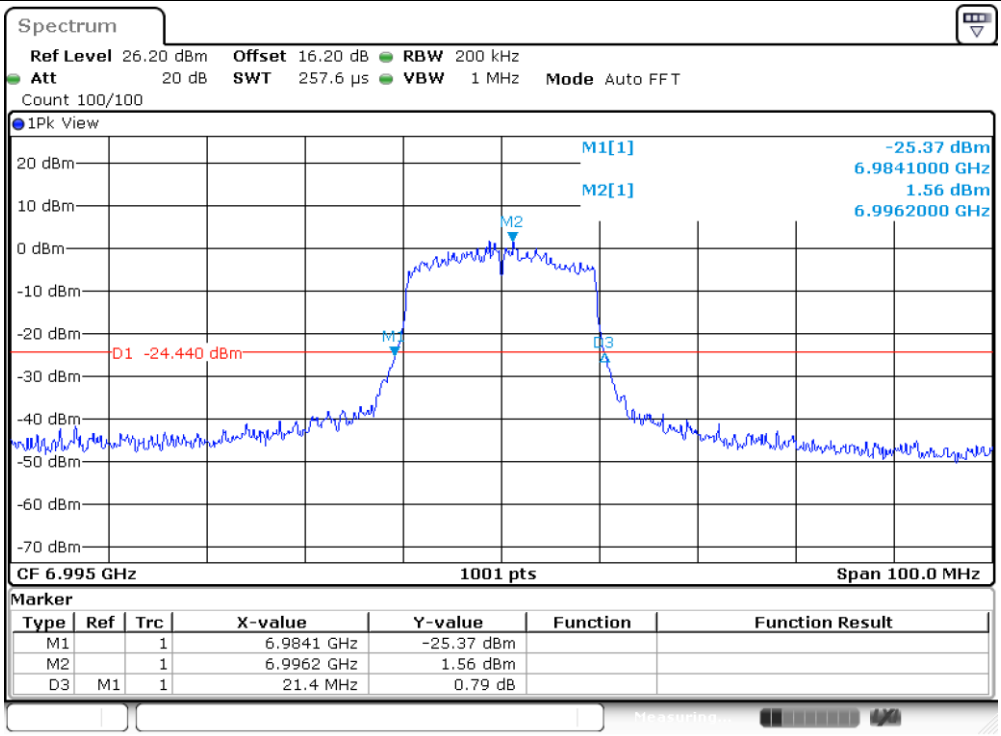

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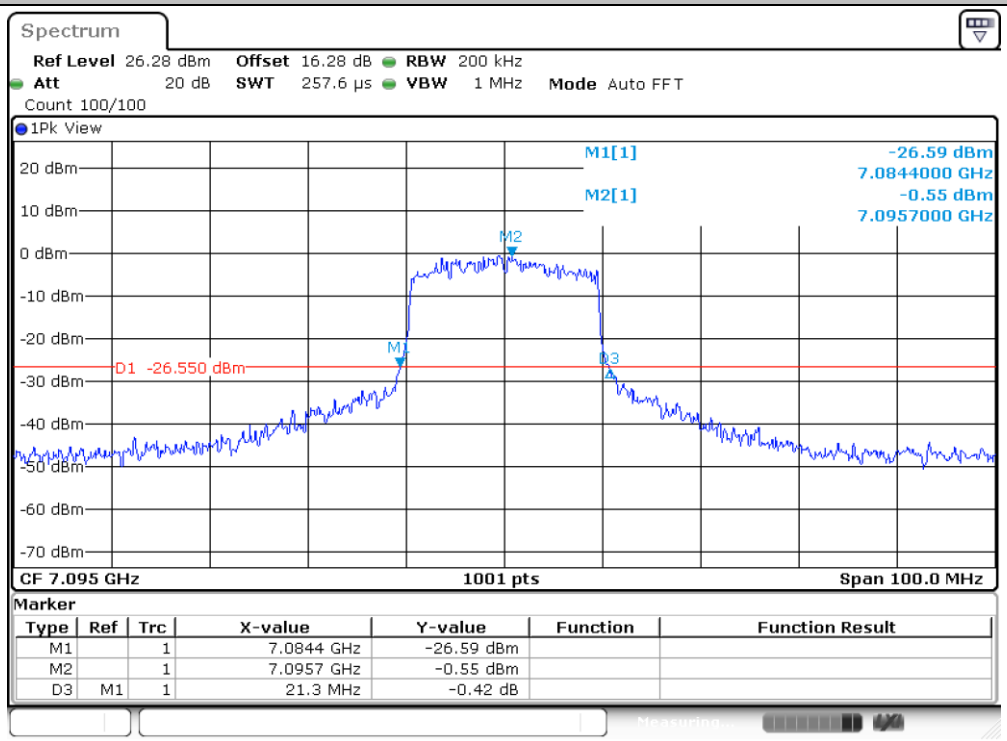

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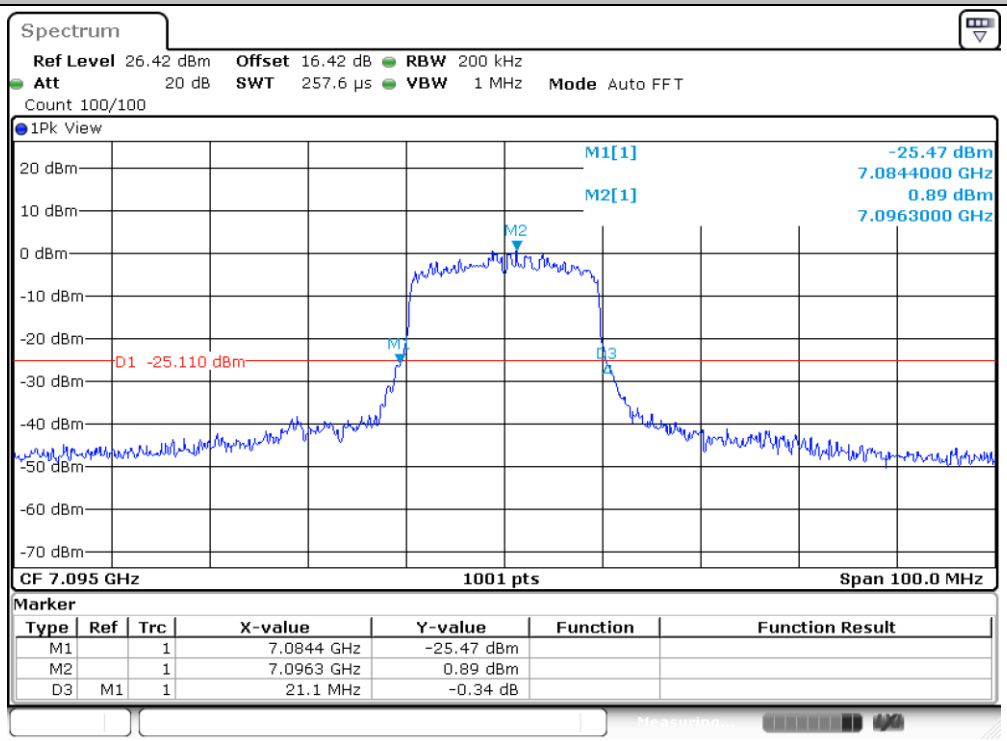

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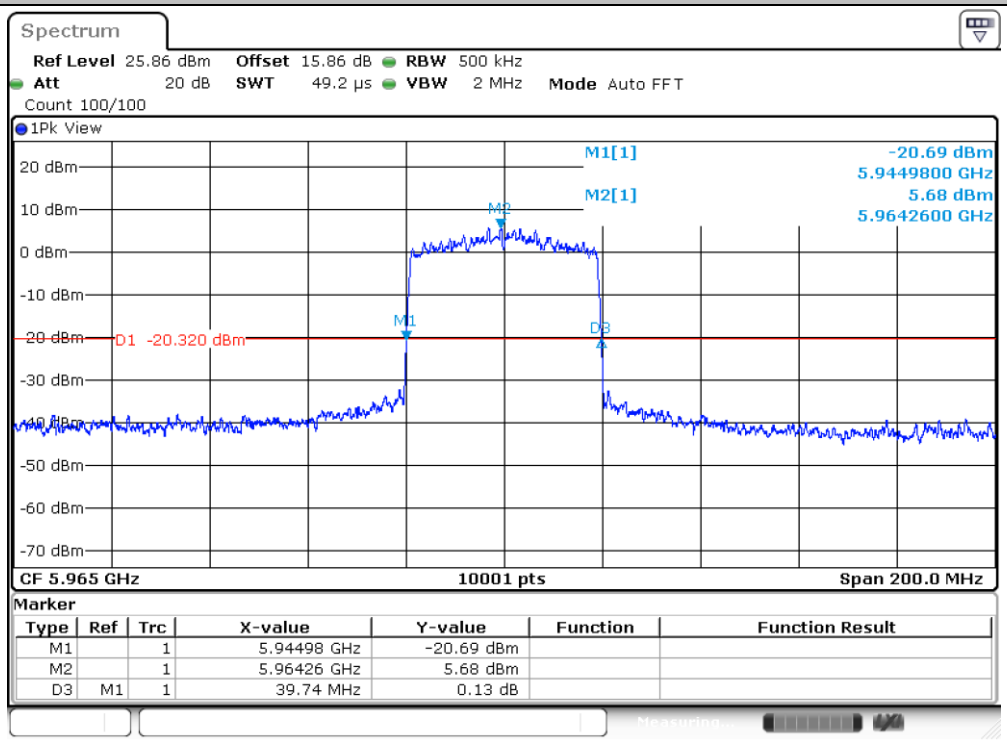

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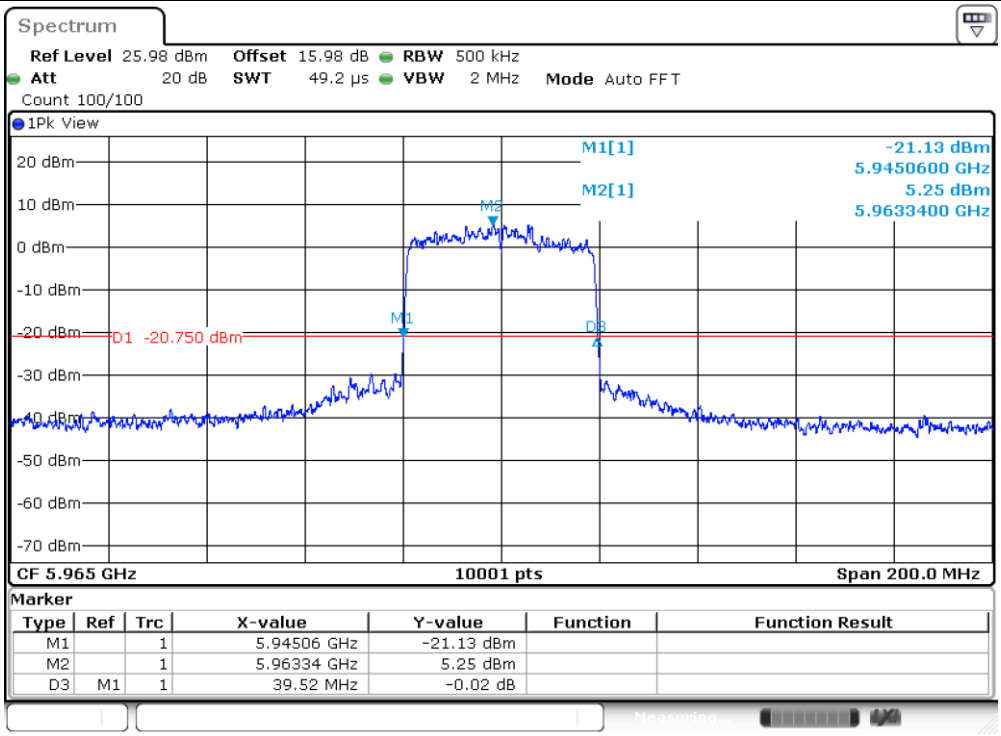

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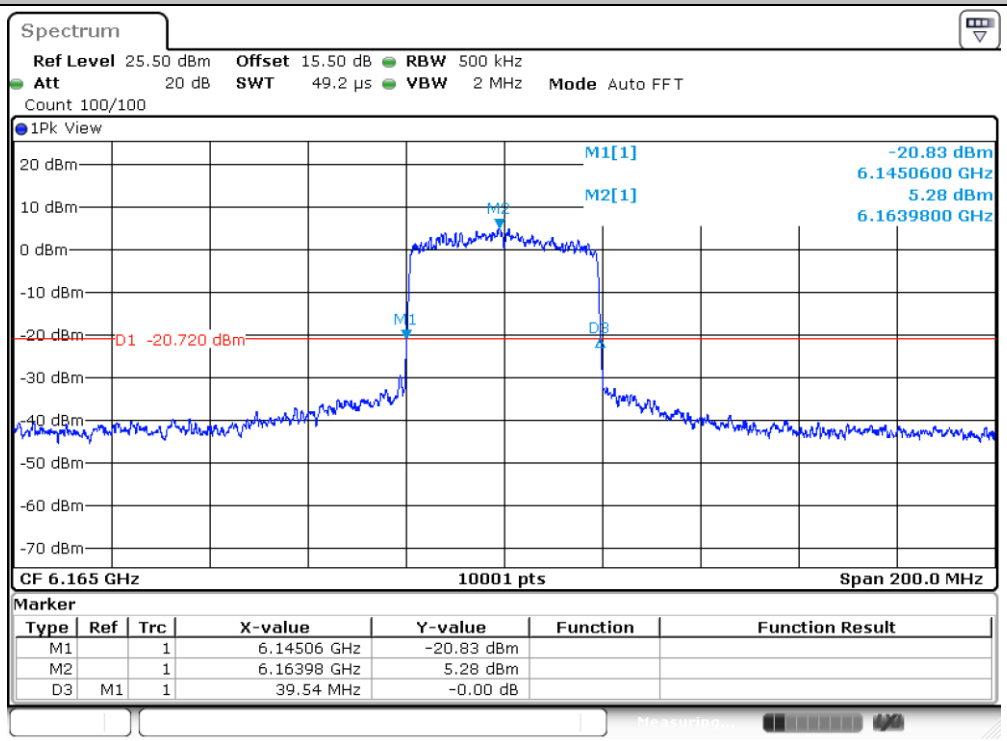

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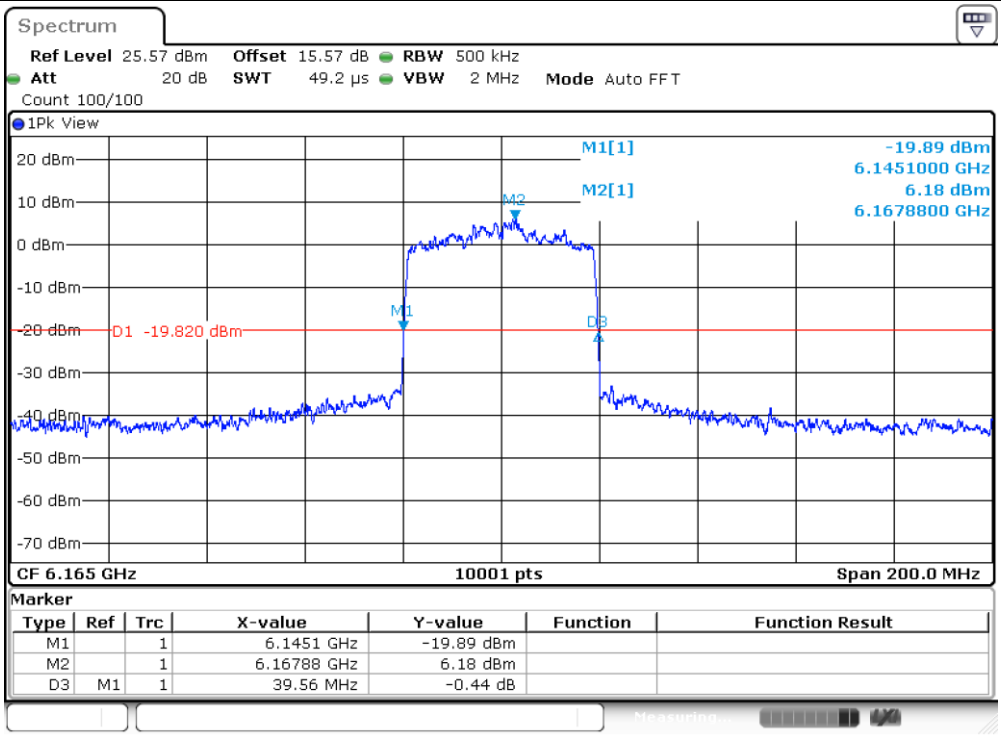

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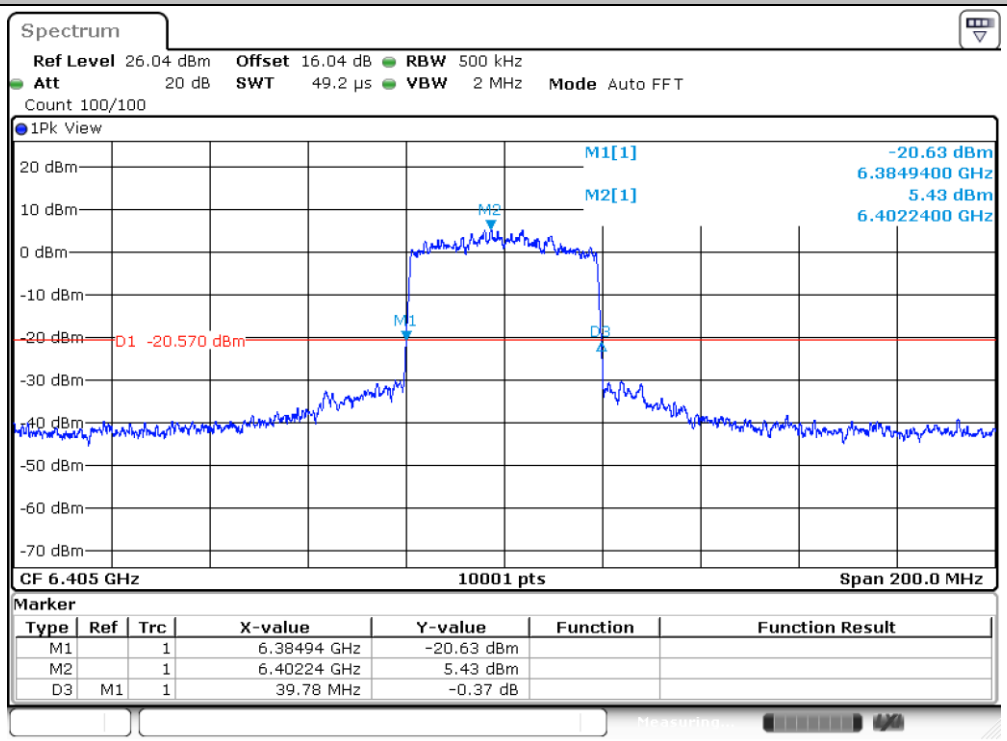

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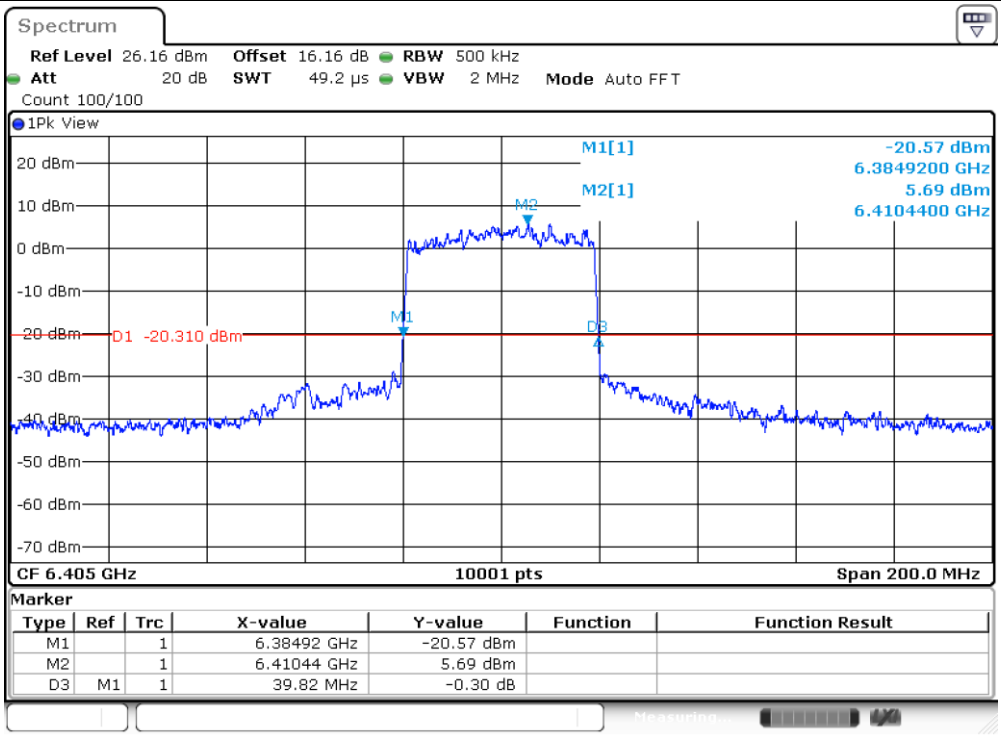

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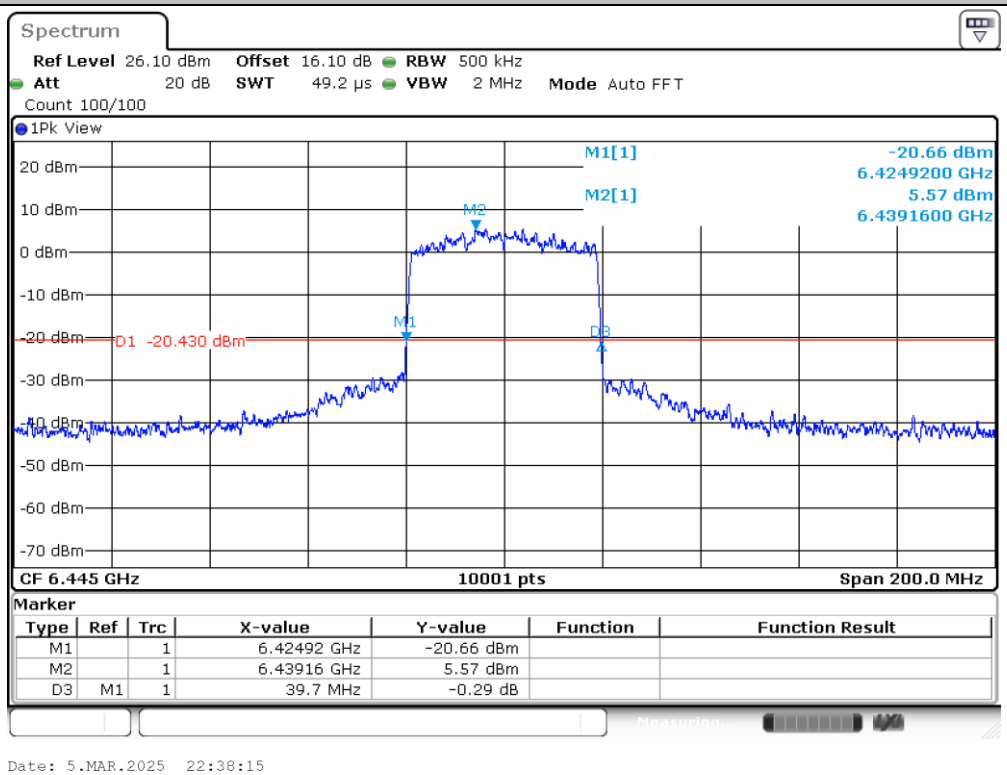

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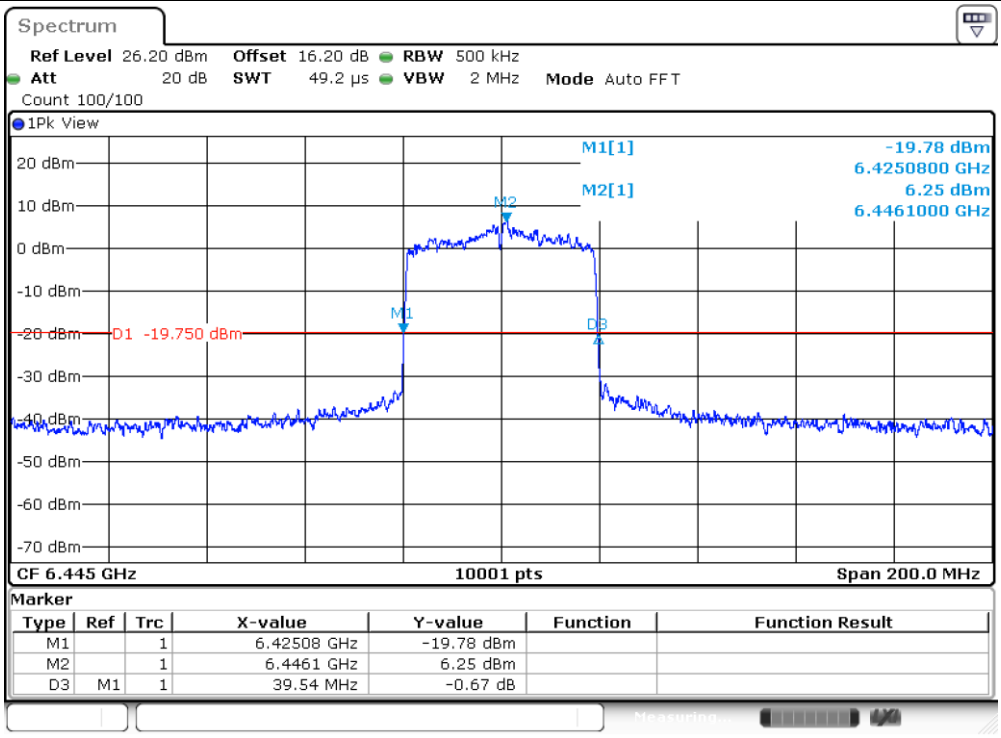

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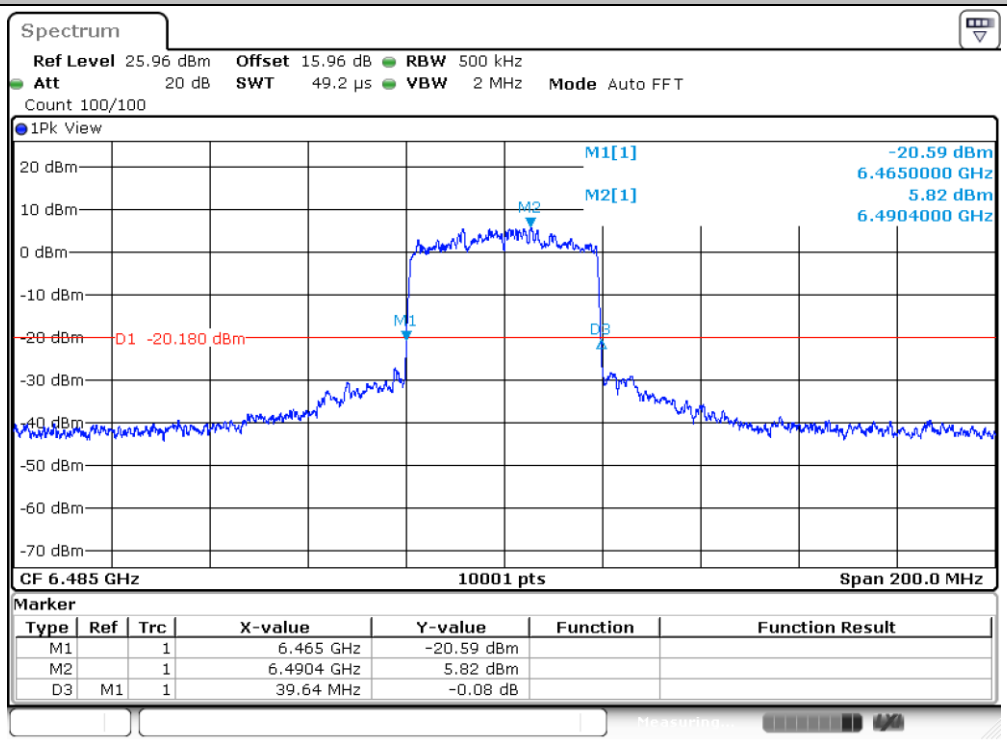

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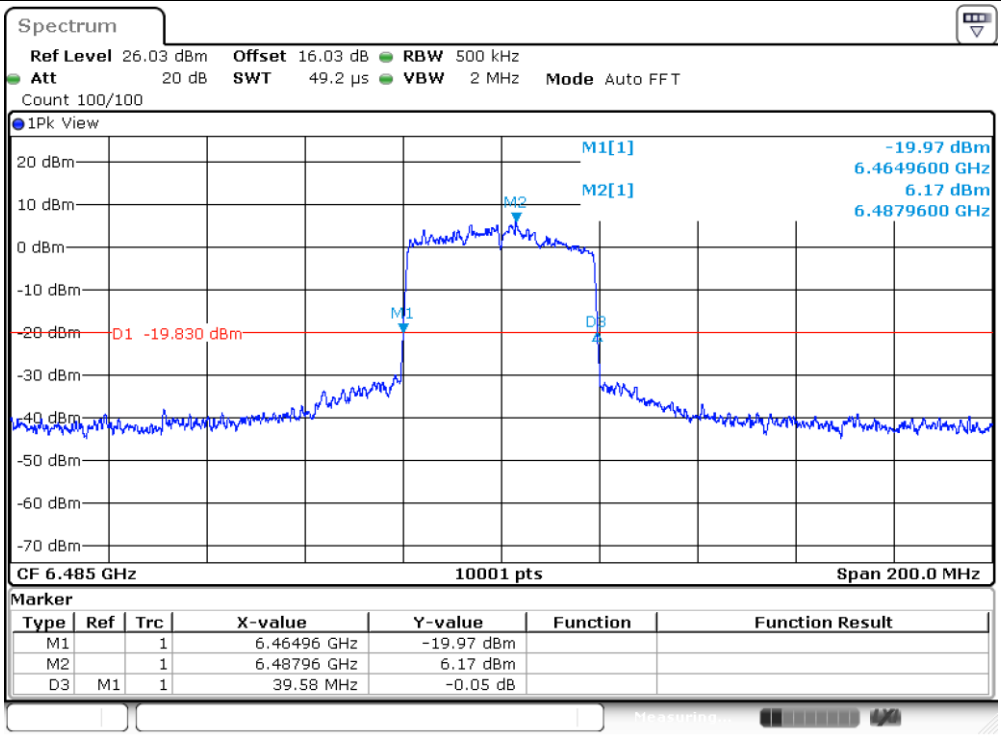

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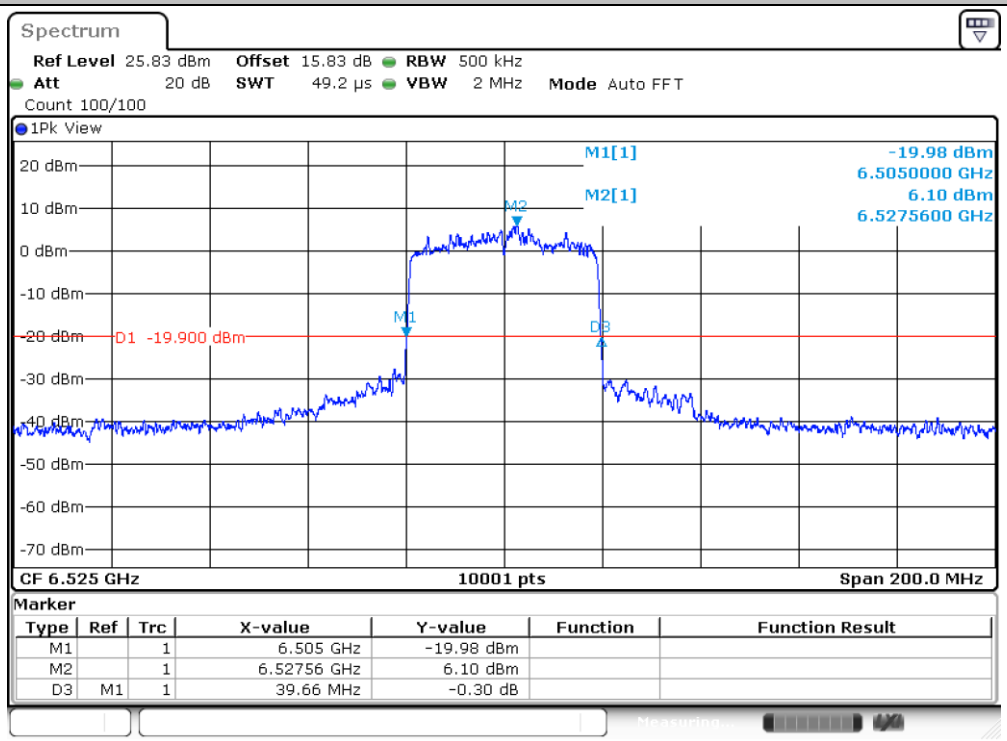

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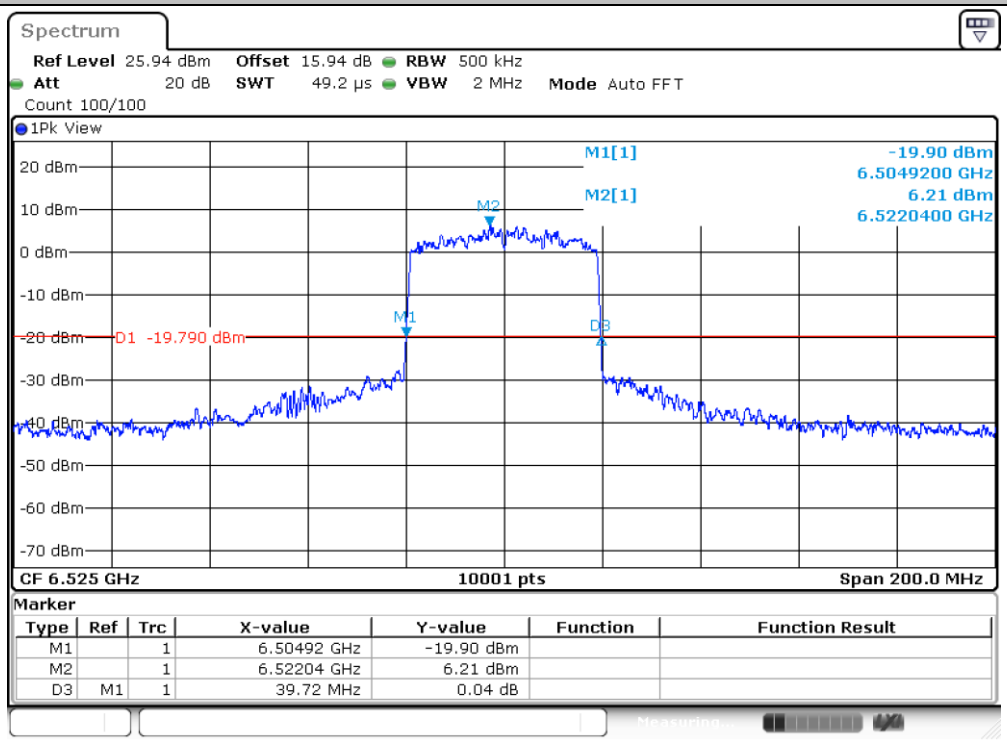

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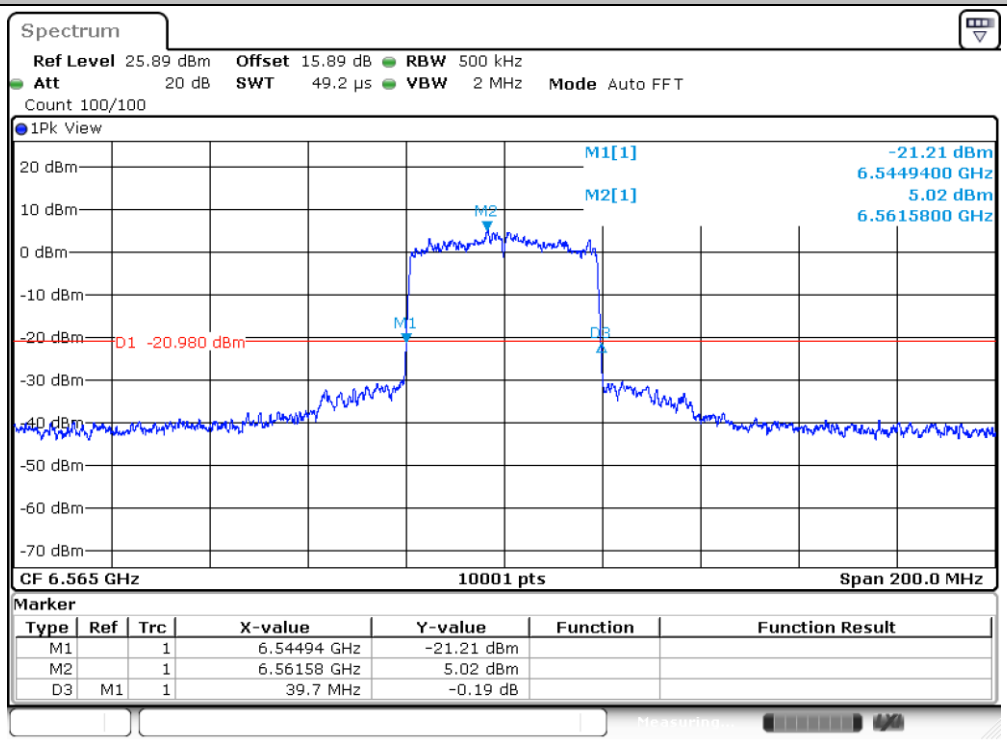

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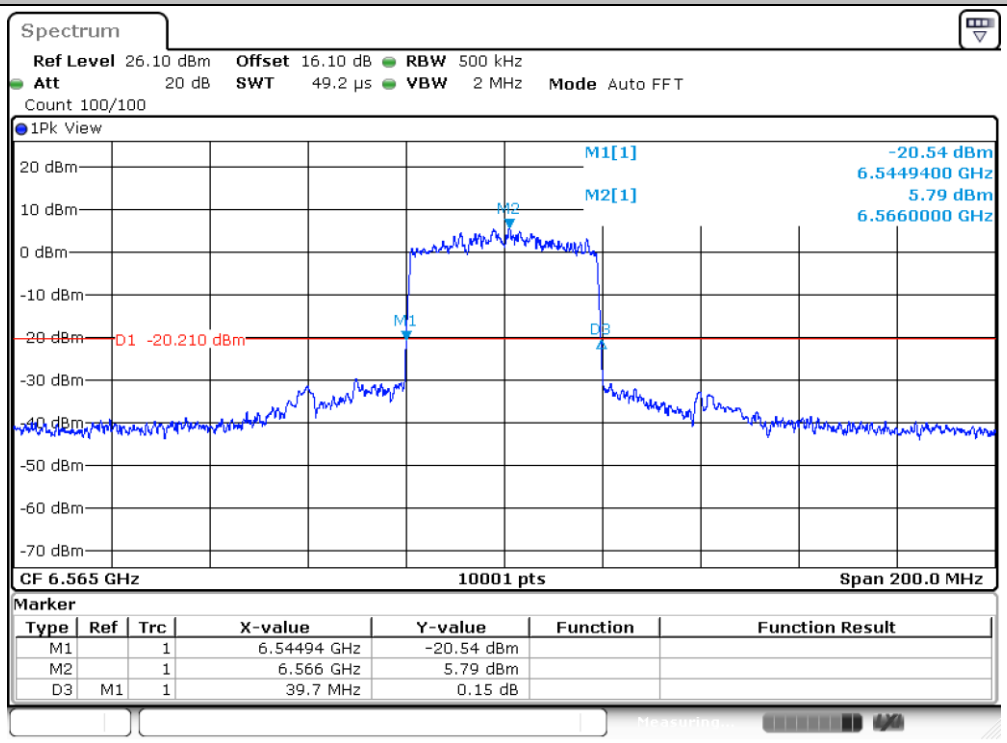

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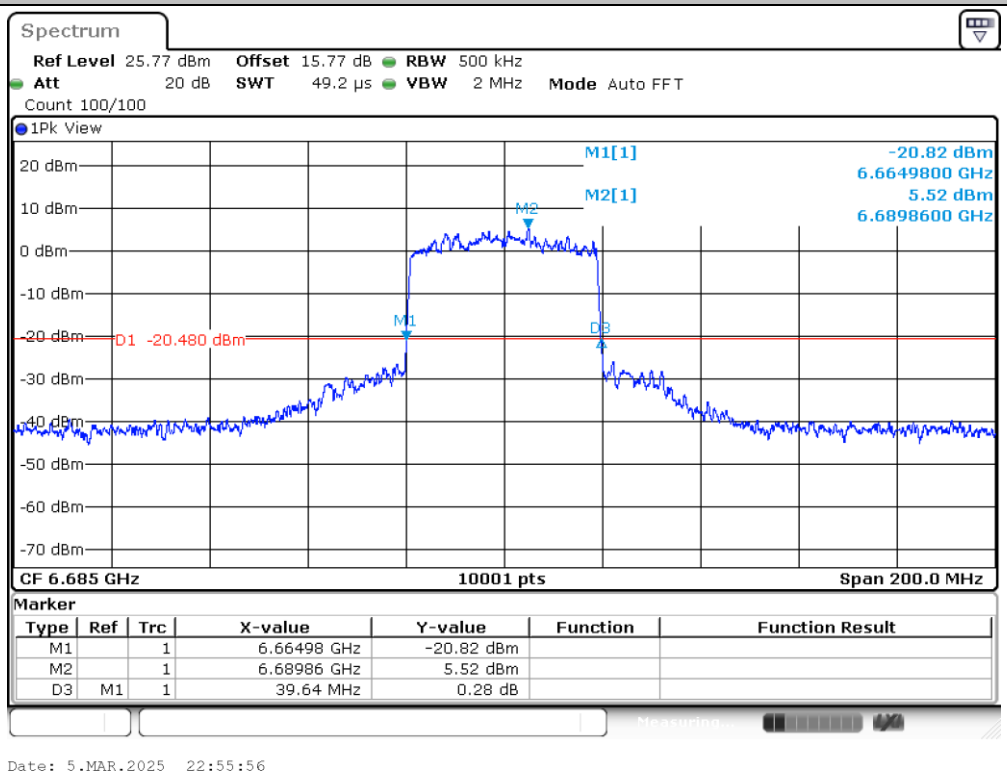

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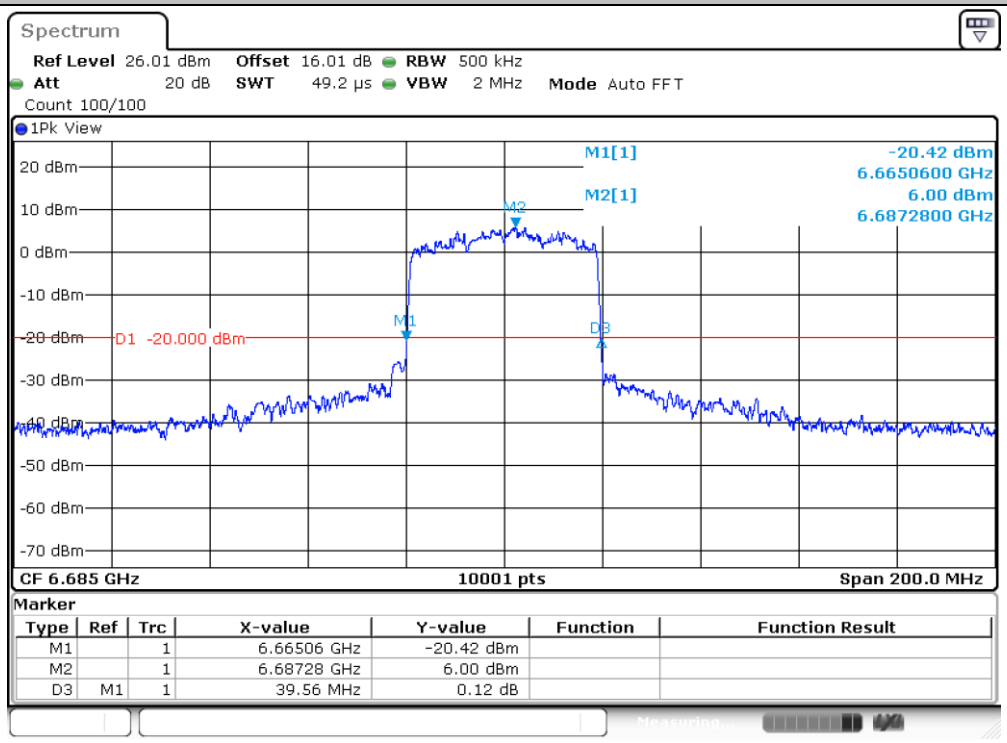
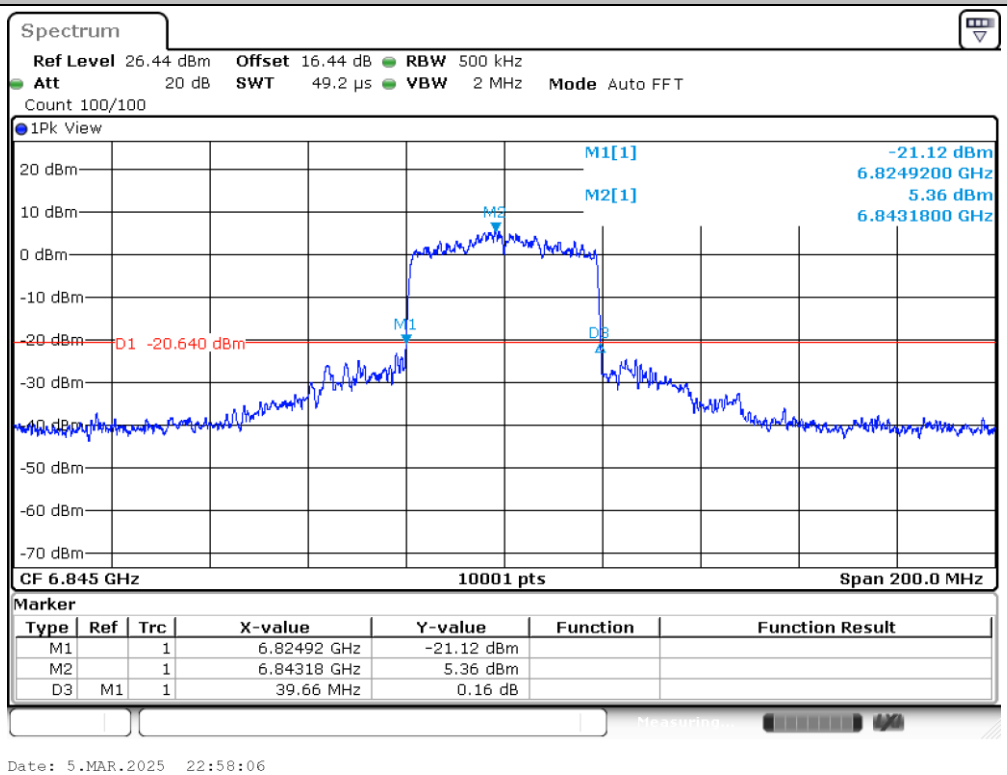
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