



FCC TEST REPORT

Application No: ZR/2020/70006

Applicant: LG Electronics USA, Inc

Address of Applicant: 111 Sylvan Avenue, North Building Englewood Cliffs, NJ 07632

Manufacturer: Huaqin Telecom Technology Co.,Ltd.

Address of Manufacturer: No.1 Building, No.9 Building, No.399,Keyuan Road,Zhangjiang Hi-tech Park,Shanghai,P.R.China

EUT Description: Mobile handset

Model No.: LM-K520HMW, LM-K520HM, LM-K525HMW, LM-K525HM

Trade Mark: LG

FCC ID: ZNFK520HMW

Standards: 47 CFR FCC Part 2, Subpart J
47 CFR FCC Part 15, Subpart C
47 CFR FCC Part 15, Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02
FCC KDB 558074 D01 DTS Meas Guidance v0502
KDB 662911 D01 Multiple Transmitter Output v02r01

Test Method: KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 905462 D03 Client Without DFS New Rules v01r02
ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

Date of Receipt: 2020/7/10

Date of Test: 2020/7/10 to 2020/8/20

Date of Issue: 2020/8/20

Test Result:	PASS *
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. * In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Derek Yang
Wireless Laboratory Manager



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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020/8/20		Original

Authorized for issue by:				
Tested By		<i>Mike Hu</i>		
		(Mike Hu) /Project Engineer		
Checked By		<i>David Chen</i>		
		(David Chen) /Reviewer		



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2 Test Summary

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
Emission Bandwidth	5150-5250	15.403(i) 15.407(a)(1)	No limit.	Clause 4.4 Clause 4.5	Pass
	5250-5350	15.403(i) 15.407(a)(2)			
	5470-5725	15.403(i) 15.407(a)(2)			
	5725-5850	15.403(i) 15.407(e)	≥ 500 kHz.		
Occupied Bandwidth	5150-5250	KDB 789033 D02§ D	No limit.		Pass
	5250-5350				
	5470-5725				
	5725-5850				
Duty Cycle	5150-5850	--	No limit.		
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4)	FCC < 250mW (avg during transmission)	Clause 4.3	Pass
	5250-5350	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*lg(EBW)} (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*lg(EBW)} (avg during transmission)		
	5725-5850	15.407(a)(3)	< 1W (avg during transmission)		
maximum Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4)	<11dBm/MHz (avg during transmission)	Clause 4.6	
	5250-5350	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5725-5850	15.407(a)(3) 15.407(a)(4)	<30dBm/500KHz (avg during transmission)		
Unwanted Emissions that fall Outside of the Restricted Bands(Radiated)	5150-5250	15.407(b)(1) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).	Clause 4.7	Pass
	5250-5350	15.407(b)(2)	F<1GHz:		



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Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
		15.407(b)(6) 15.407(b)(7) 15.209	§15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5470-5750	15.407(b)(3) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: §15.209/§7.2.5 limit (QP) F≥1GHz & out-restricted:(QP) a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges; b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges; c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges. F≥1GHz & in-restricted: §15.209/§7.2.5 limit		



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Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
			(AV&PK).		
Unwanted Emissions in the Restricted Bands (Radiated)	5150-5250 5250-5350 5470-5725 5725-5850	15.209		Clause 4.8	Pass
AC Power Line Conducted Emissions	5150-5250 5250-5350 5470-5725 5725-5850	15.207		Clause 4.2	Pass
Frequency Stability	5150-5250 5250-5350 5470-5600 5650-5725 5725-5850	15.209		Clause 4.9	Pass
Dynamic Frequency Selection	5250-5350 5470-5725	47 CFR Part 15, Subpart E 15.407	Channel Move Time:10 Seconds	Clause 4.10	Pass
			Transmission Time: milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.		
			Non-occupancy period: Minimum 30 minutes		



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3 General Information

3.1 Client Information

Applicant:	LG Electronics USA, Inc
Address of Applicant:	111 Sylvan Avenue, North Building Englewood Cliffs, NJ 07632
Manufacturer:	Huaqin Telecom Technology Co.,Ltd.
Address of Manufacturer:	No.1 Building, No.9 Building, No.399,Keyuan Road,Zhangjiang Hi-tech Park,Shanghai,P.R.China

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
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Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	ee.shenzhen@sgs.com

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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3.4 General Description of EUT

EUT Description:	Mobile handset
Model No.:	LM-K520HWMW, LM-K520HM, LM-K525HWMW, LM-K525HM
Trade Mark:	LG
IEEE 802.11 WLAN Mode Supported:	☒ 802.11a (20 MHz channel bandwidth) ; ☒ 802.11n (20 MHz channel bandwidth); ☒ 802.11n (40 MHz channel bandwidth); ☒ 802.11ac (20 MHz channel bandwidth); ☒ 802.11ac (40 MHz channel bandwidth); ☒ 802.11ac (80 MHz channel bandwidth); ☐ 802.11ac (160 MHz channel bandwidth),
Operation Frequency:	IEEE 802.11n(HT20/40)/ ac(HT20/40/80/): 5150MHz to 5250MHz IEEE 802.11n(HT20/40)/ ac(HT20/40/80/160): 5250MHz to 5350MHz IEEE 802.11n(HT20/40)/ ac(HT20/40/80/160): 5470MHz to 5725MHz IEEE 802.11n(HT20/40)/ ac(HT20/40/80): 5725MHz to 5850MHz
Type of Modulation:	OFDM
DFS mode:	☐ Master ☐ Slave with radar detection ☒ Slave without radar detection
Sample Type:	☒ Portable Device, ☐ Module
Antenna Type:	☐ External, ☒ Integrated
Antenna Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
Smart System	☒ SISO (for 802.11a/n/ac), ☐ MIMO (for 802.11n/ac), ☐ Diversity (for 802.11a) : Tx & Rx
Antenna Gain:	-4.56dBi,
Power Supply	☒ AC/DC Adapter; ☐ PoE;; ☐ Other:

Difference description:

The differences between LM-K520HWMW and other models are shown in the below table:

Model		LM-K520HWMW	LM-K520HM	LM-K525HWMW	LM-K525HM
		(Full approval)	(Update approval)	(Updated approval)	(Update approval)
Software version		different	different	different	different
Licensed Frequency	LTE	B1/B2/B3/B4/ B5/B7/B8/B12/B1 3/B17/B28/ B38/B66	B1/B2/B3/B4/ B5/B7/B8/B12/B1 3/B17/B28/ B38/B66	B1/B2/B3/B4/ B5/B7/B8/B12/B13/ B17/B28/ B38/B66	B1/B2/B3/B4/ B5/B7/B8/B12/B1 3/B17/B28/ B38/B66
	UMTS	B1/B2/B4/B5/ B8	B1/B2/B4/B5/ B8	B1/B2/B4/B5/ B8	B1/B2/B4/B5/ B8
	GSM	the same	the same	the same	the same
	IC	the same	the same	the same	the same



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	Antenna	the same	the same	the same	the same
Unlicensed Frequency	Bluetooth	the same	the same	the same	the same
	2.4G Wi-Fi	the same	the same	the same	the same
	IC	the same	the same	the same	the same
	Antenna	the same	the same	the same	the same
Hardware	Ram / Rom	4G/64G	4G/64G	4G/128G	4G/128G
	Camera	the same	the same	the same	the same
	PCB	the same	the same	the same	the same
	USB Port	the same	the same	the same	the same
	RJ11 Port	the same	the same	the same	the same
	RJ45 Port	the same	the same	the same	the same
	NFC	Not support	Not support	Not support	Not support
	FM	Support	Support	Support	Support
Appearance	Dimension	the same	the same	the same	the same
	Color	the same	the same	the same	the same
Accessory	Battery	the same	the same	the same	the same
	External Charger	the same	the same	the same	the same
	USB label	the same	the same	the same	the same
other	SIM card	Double SIM	Single SIM	Double SIM	Single SIM

Remark:

According to the difference description above, only the model LM-K520HWM was fully tested, for other models were performed the Radiated Emission test for discrepancy, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. With difference being on mode, appearance and color.



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Remark:

In FCC 15.31, for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:

Frequency Range of Operation Operating Frequency Range (in each Band)	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

For UNII Band I:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n/ac 40MHz	The Lowest channel	5190
	The Highest channel	5230
IEEE 802.11ac 80MHz	The Middle channel	5210

For UNII Band II-A:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n/ac 40MHz	The Lowest channel	5270
	The Highest channel	5310
IEEE 802.11ac 80MHz	The Middle channel	5290

For UNII Band II-C:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5700
IEEE 802.11n/ac 40MHz	The Lowest channel	5510
	The Middle channel	5500
	The Highest channel	5670
IEEE 802.11ac 80MHz	The Lowest channel	5500



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	The Highest channel	5580
--	---------------------	------

For UNII Band III:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n/ac 40MHz	The Lowest channel	5755
	The Highest channel	5795
IEEE 802.11ac 80MHz	The Middle channel	5775

3.5 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	101.32 KPa
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.



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4 Test results and Measurement Data

4.1 Antenna Requirement

Test Requirement:	47 CFR Part 15 Section 15.203
The antenna is integrated antenna and no consideration of replacement. The best case gain of the antenna is -4.56dBi.	

4.2 Conducted Emissions

Test Requirement:	47 CFR Part 15 Section 15.407(b)		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		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.			
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.		

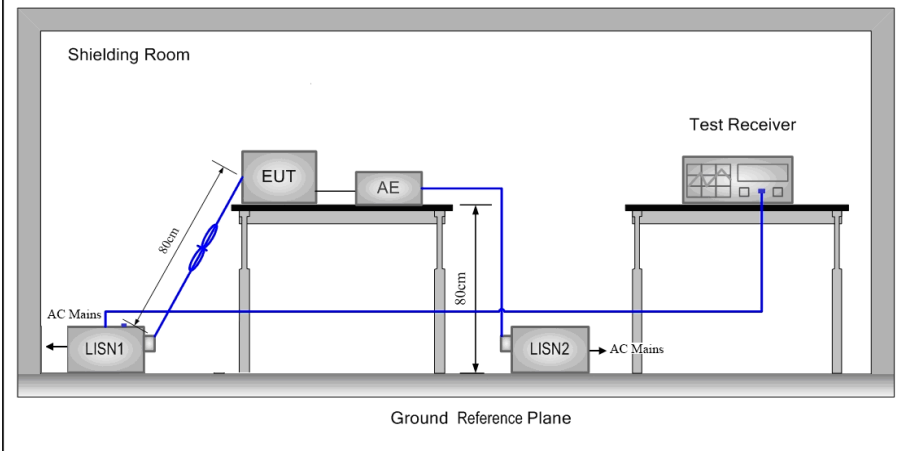




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Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate of 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



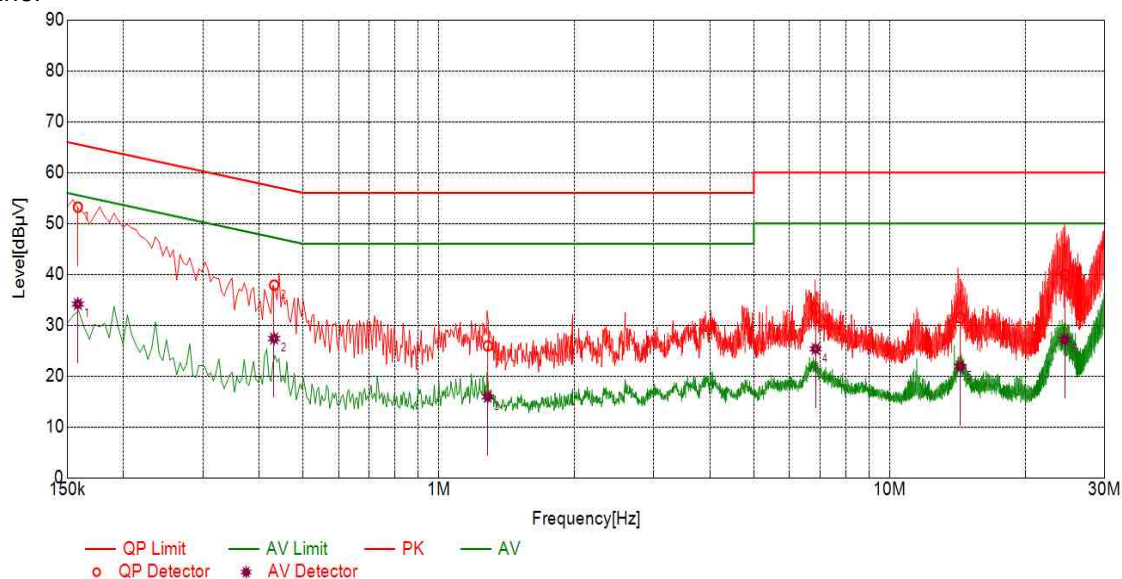
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Live Line:



Test Graph

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Type
1	0.1584	10.10	53.21	65.55	12.34	34.14	55.55	21.41	L
2	0.4315	10.10	37.87	57.22	19.35	27.38	47.22	19.84	L
3	1.2849	10.10	25.93	56.00	30.07	15.91	46.00	30.09	L
4	6.8520	10.10	33.31	60.00	26.69	25.34	50.00	24.66	L
5	14.3456	10.11	31.47	60.00	28.53	21.89	50.00	28.11	L
6	24.4575	10.11	39.91	60.00	20.09	27.19	50.00	22.81	L

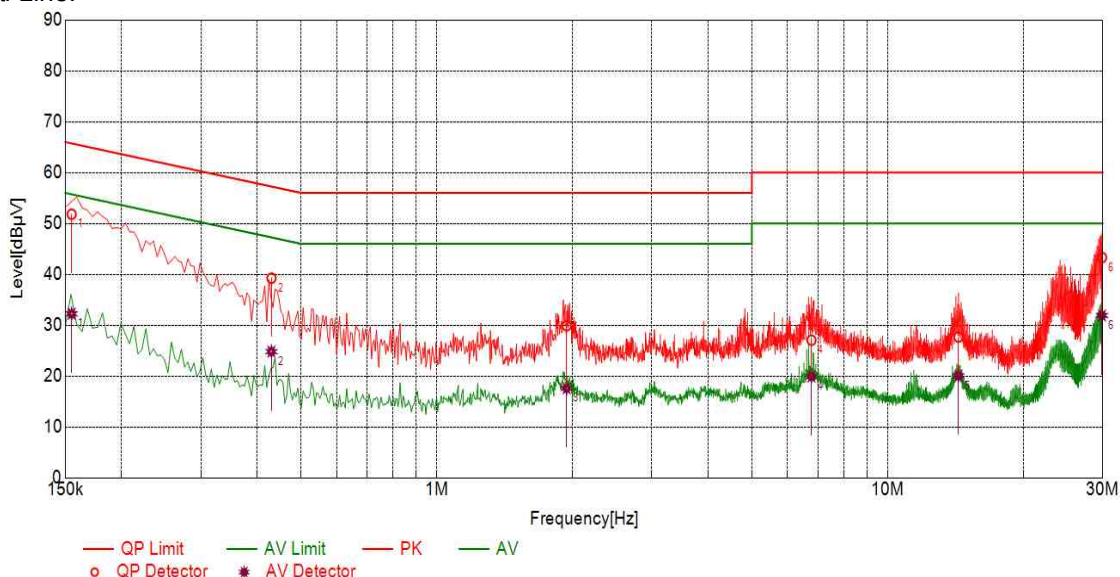


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Neutral Line:



Test Graph

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Type
1	0.1550	10.10	51.81	65.73	13.92	32.23	55.73	23.50	N
2	0.4300	10.10	39.26	57.25	17.99	24.80	47.25	22.45	N
3	1.9416	10.10	29.91	56.00	26.09	17.60	46.00	28.40	N
4	6.7781	10.10	27.06	60.00	32.94	19.90	50.00	30.10	N
5	14.3586	10.11	27.69	60.00	32.31	20.04	50.00	29.96	N
6	29.8905	10.11	43.31	60.00	16.69	31.90	50.00	18.10	N

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



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4.3 Duty Cycle

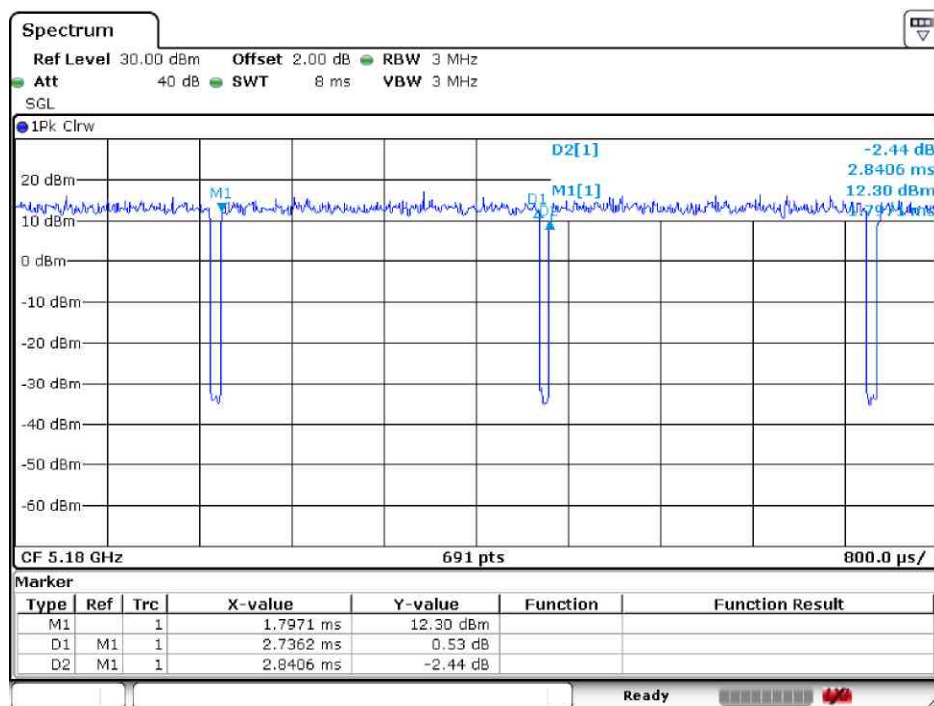
4.3.1 Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
11A	Ant 1: CH149, CH157, CH165	96.32
11N20	Ant 1: CH149, CH157, CH165	95.63
11N40	Ant 1: CH151, CH159	87.74
11AC20	Ant 1: CH149, CH157, CH165	96.18
11AC40	Ant 1: CH151, CH159	87.77
11AC80	Ant 1: CH155	77.65

4.3.1 Test Plots

4.3.1.1 ANT1

4.3.1.1.1 11A

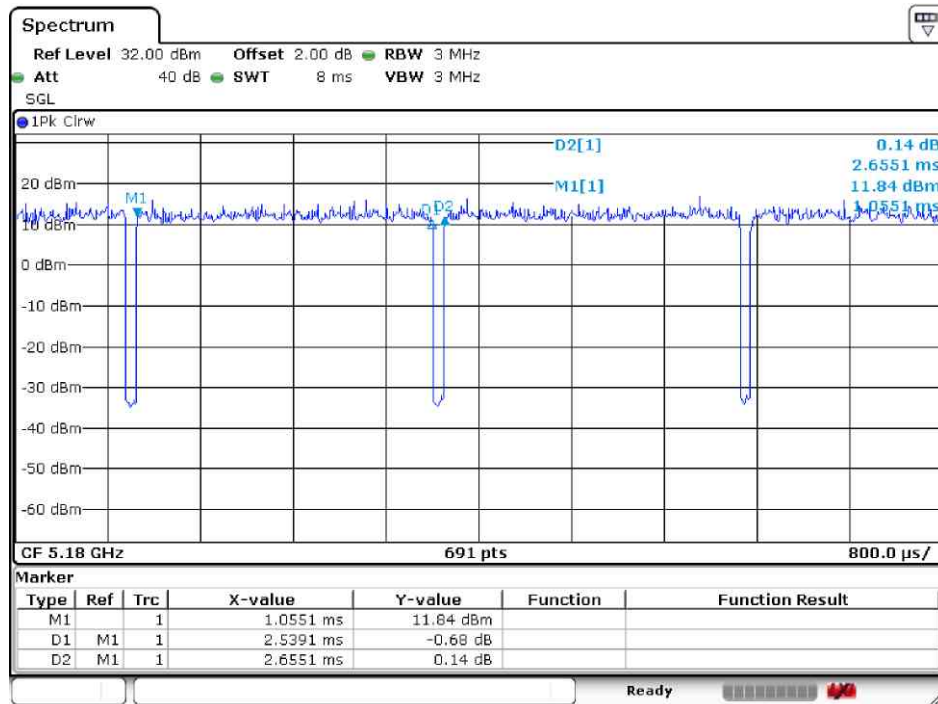


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4.3.1.1.2 11N20



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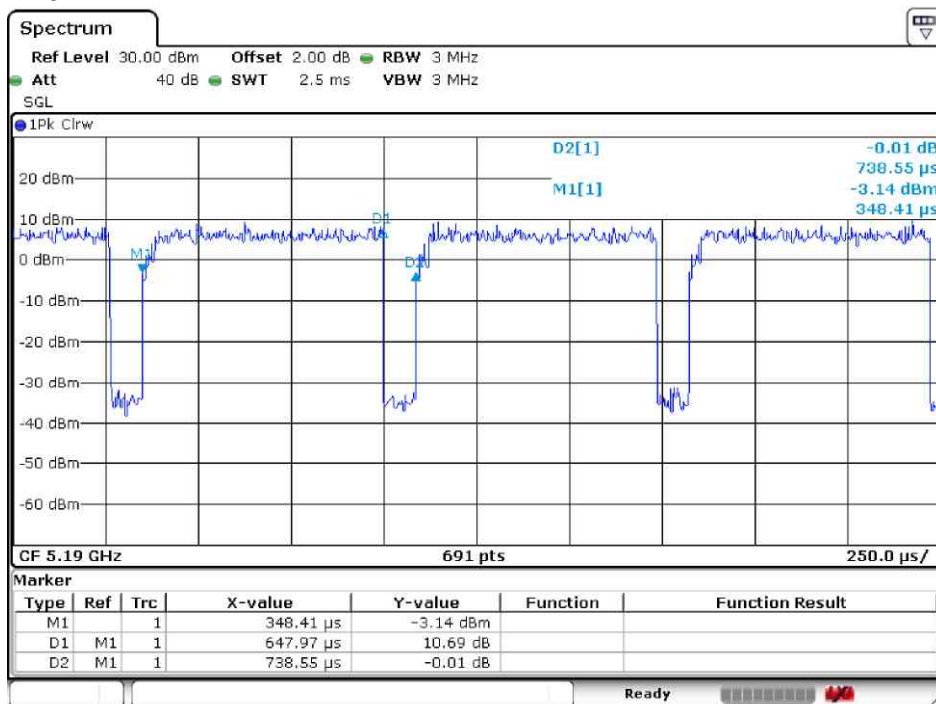
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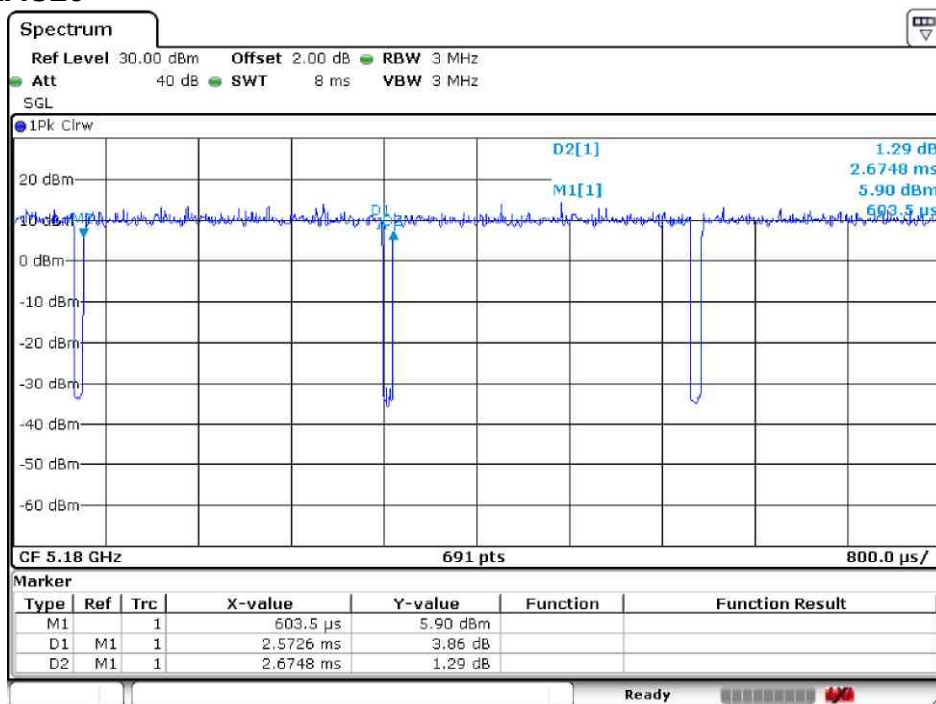
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4.3.1.1.3 11N40



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4.3.1.1.4 11AC20



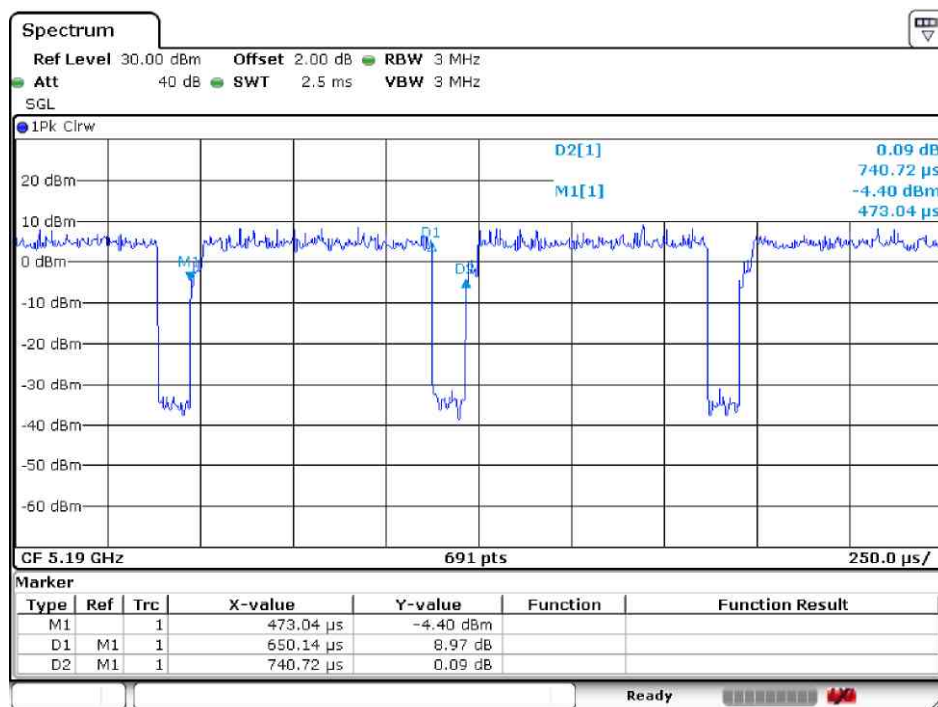
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4.3.1.1.5 11AC40



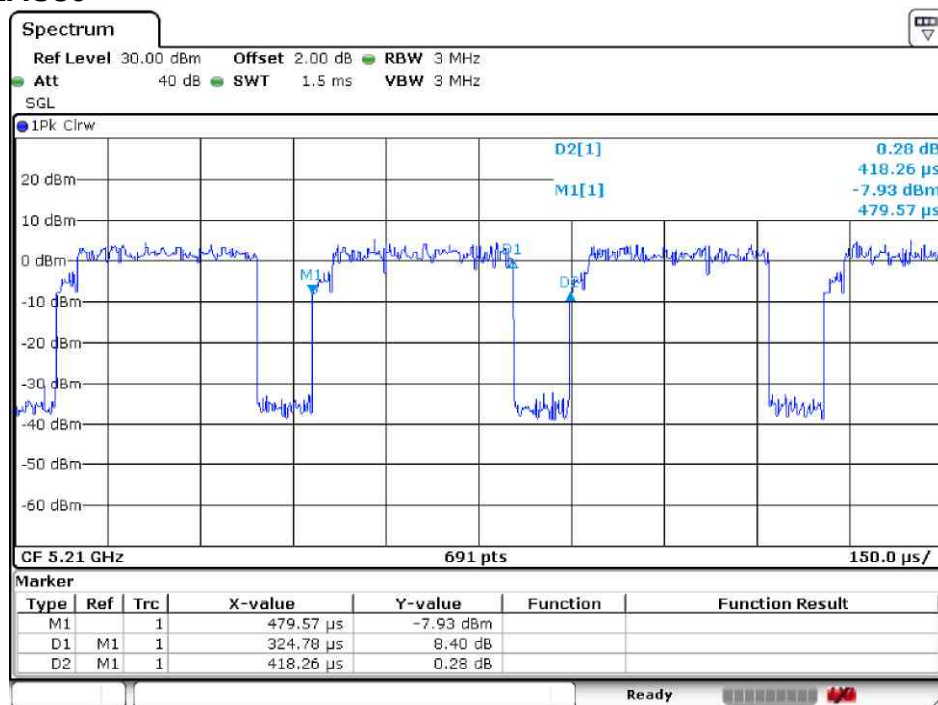
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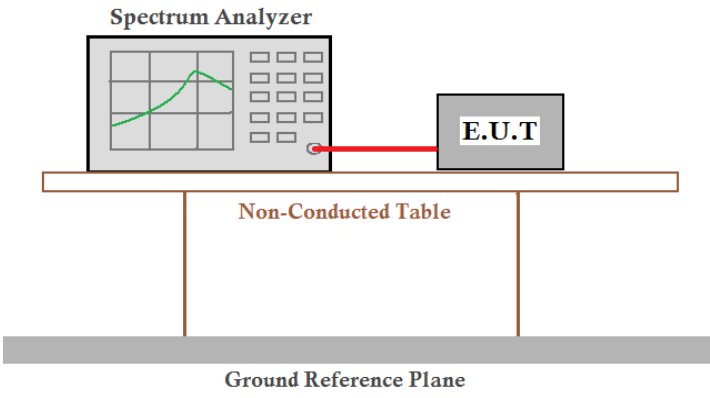
4.3.1.1.6 11AC80



Date: 19 AUG. 2020 12:00:31



4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10: 2013	
Test Setup:		
Test Instruments:	Refer to section 5.10 for details	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Through Pre-scan, find that 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20); MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(HT20); MCS0 of rate is the worst case of 802.11ac(HT40); MCS0 of rate is the worst case of 802.11ac(HT80) Only the worst case is recorded in the report.	
Limit:	Frequency Band	Limit
	5150-5250MHz	Not exceed 250mW(24dBm)
	5250-5350MHz	The lesser of 250mW(24dBm) or $11 + 10\log B$
	5470-5725MHz	The lesser of 250mW(24dBm) or $11 + 10\log B$
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	





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4.4.1 Test Results for Conducted Output Power

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	Meas. Level (Cond.) [dBm]	Meas. Level (EIRP.) [dBm]	Verdict
11A20	36	5180	ANT 1	13.44	8.88	PASS
	44	5220	ANT 1	14.17	9.61	PASS
	48	5240	ANT 1	14.48	9.92	PASS
	52	5260	ANT 1	14.74	10.18	PASS
	60	5300	ANT 1	15.03	10.47	PASS
	64	5320	ANT 1	14.81	10.25	PASS
	100	5500	ANT 1	15.63	11.07	PASS
	116	5580	ANT 1	15.25	10.69	PASS
	140	5700	ANT 1	15.27	10.71	PASS
	149	5745	ANT 1	15.36	10.8	PASS
	157	5785	ANT 1	15.37	10.81	PASS
	165	5825	ANT 1	15.56	11	PASS
11N20	36	5180	ANT 1	12.89	8.33	PASS
	44	5220	ANT 1	13.77	9.21	PASS
	48	5240	ANT 1	14.02	9.46	PASS
	52	5260	ANT 1	14.09	9.53	PASS
	60	5300	ANT 1	14.22	9.66	PASS
	64	5320	ANT 1	14.3	9.74	PASS
	100	5500	ANT 1	14.93	10.37	PASS
	116	5580	ANT 1	14.52	9.96	PASS
	140	5700	ANT 1	14.99	10.43	PASS
	149	5745	ANT 1	14.84	10.28	PASS
	157	5785	ANT 1	14.89	10.33	PASS
	165	5825	ANT 1	14.93	10.37	PASS
11N40	38	5190	ANT 1	11.12	6.56	PASS
	46	5230	ANT 1	11.81	7.25	PASS
	54	5270	ANT 1	12.15	7.59	PASS
	62	5310	ANT 1	12.22	7.66	PASS
	102	5510	ANT 1	13.02	8.46	PASS



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	110	5550	ANT 1	12.9	8.34	PASS
	134	5670	ANT 1	12.94	8.38	PASS
	151	5755	ANT 1	12.91	8.35	PASS
	159	5795	ANT 1	12.92	8.36	PASS
11AC20	36	5180	ANT 1	10.68	6.12	PASS
	44	5220	ANT 1	11.63	7.07	PASS
	48	5240	ANT 1	11.96	7.4	PASS
	52	5260	ANT 1	12.16	7.6	PASS
	60	5300	ANT 1	12.27	7.71	PASS
	64	5320	ANT 1	12.23	7.67	PASS
	100	5500	ANT 1	12.96	8.4	PASS
	116	5580	ANT 1	12.83	8.27	PASS
	140	5700	ANT 1	12.88	8.32	PASS
	149	5745	ANT 1	12.95	8.39	PASS
	157	5785	ANT 1	12.83	8.27	PASS
	165	5825	ANT 1	12.84	8.28	PASS
11AC40	38	5190	ANT 1	9.98	5.42	PASS
	46	5230	ANT 1	10.92	6.36	PASS
	54	5270	ANT 1	11.29	6.73	PASS
	62	5310	ANT 1	11.3	6.74	PASS
	102	5510	ANT 1	11.89	7.33	PASS
	110	5550	ANT 1	11.87	7.31	PASS
	134	5670	ANT 1	11.93	7.37	PASS
	151	5755	ANT 1	11.75	7.19	PASS
	159	5795	ANT 1	11.76	7.2	PASS
11AC80	42	5210	ANT 1	10.49	5.93	PASS
	58	5290	ANT 1	11.26	6.7	PASS
	106	5530	ANT 1	11.78	7.22	PASS
	122	5610	ANT 1	11.82	7.26	PASS
	138	5690	ANT 1	11.75	7.19	PASS
	155	5775	ANT 1	11.78	7.22	PASS



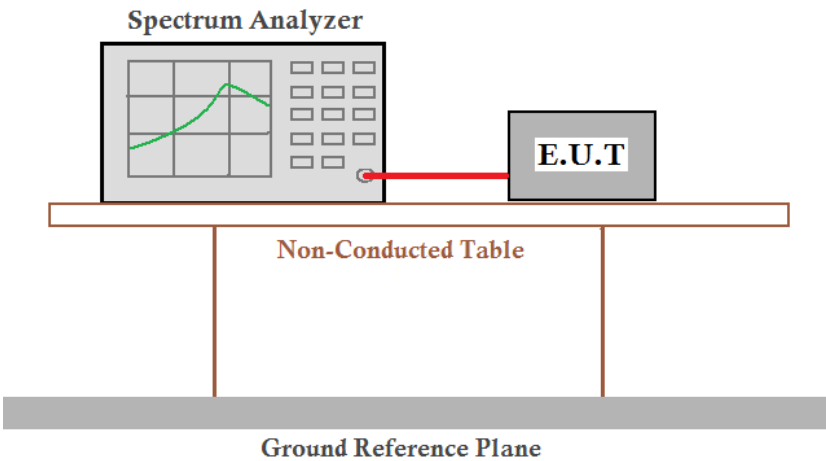
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4.5 26dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(a)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20); MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(HT20); MCS0 of rate is the worst case of 802.11ac(HT40); MCS0 of rate is the worst case of 802.11ac(HT80). Only the worst case is recorded in the report.
Limit:	No restriction limits
Test Results:	Pass





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4.5.1 Test Results for 26dB Emission Bandwidth

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	26dB Emission Bandwidth [MHz]	Verdict
11A20	36	5180	ANT 1	20.73	PASS
	44	5220	ANT 1	20.61	PASS
	48	5240	ANT 1	24.09	PASS
	60	5300	ANT 1	21.51	PASS
	52	5260	ANT 1	25.02	PASS
	64	5320	ANT 1	20.91	PASS
	100	5500	ANT 1	22.11	PASS
	116	5580	ANT 1	27.36	PASS
	140	5700	ANT 1	25.68	PASS
11N20	36	5180	ANT 1	21.87	PASS
	44	5220	ANT 1	23.67	PASS
	48	5240	ANT 1	22.11	PASS
	52	5260	ANT 1	22.47	PASS
	60	5300	ANT 1	21.96	PASS
	64	5320	ANT 1	22.08	PASS
	100	5500	ANT 1	25.65	PASS
	116	5580	ANT 1	24.09	PASS
	140	5700	ANT 1	25.86	PASS
11N40	38	5190	ANT 1	41.1	PASS
	46	5230	ANT 1	41.16	PASS
	54	5270	ANT 1	41.04	PASS
	62	5310	ANT 1	41.04	PASS
	102	5510	ANT 1	40.98	PASS
	110	5550	ANT 1	41.22	PASS
	134	5670	ANT 1	41.16	PASS
11AC20	36	5180	ANT 1	20.61	PASS
	44	5220	ANT 1	20.55	PASS
	48	5240	ANT 1	20.58	PASS
	52	5260	ANT 1	20.67	PASS
	60	5300	ANT 1	20.58	PASS
	64	5320	ANT 1	20.7	PASS
	100	5500	ANT 1	20.67	PASS
	116	5580	ANT 1	20.58	PASS
	140	5700	ANT 1	20.64	PASS
11AC40	38	5190	ANT 1	41.04	PASS
	46	5230	ANT 1	40.98	PASS
	54	5270	ANT 1	41.4	PASS



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	62	5310	ANT 1	41.16	PASS
	102	5510	ANT 1	41.16	PASS
	110	5550	ANT 1	40.98	PASS
	134	5670	ANT 1	41.22	PASS
11AC80	42	5210	ANT 1	81.76	PASS
	58	5290	ANT 1	81.6	PASS
	106	5530	ANT 1	81.44	PASS
	122	5610	ANT 1	81.6	PASS
	138	5690	ANT 1	81.76	PASS



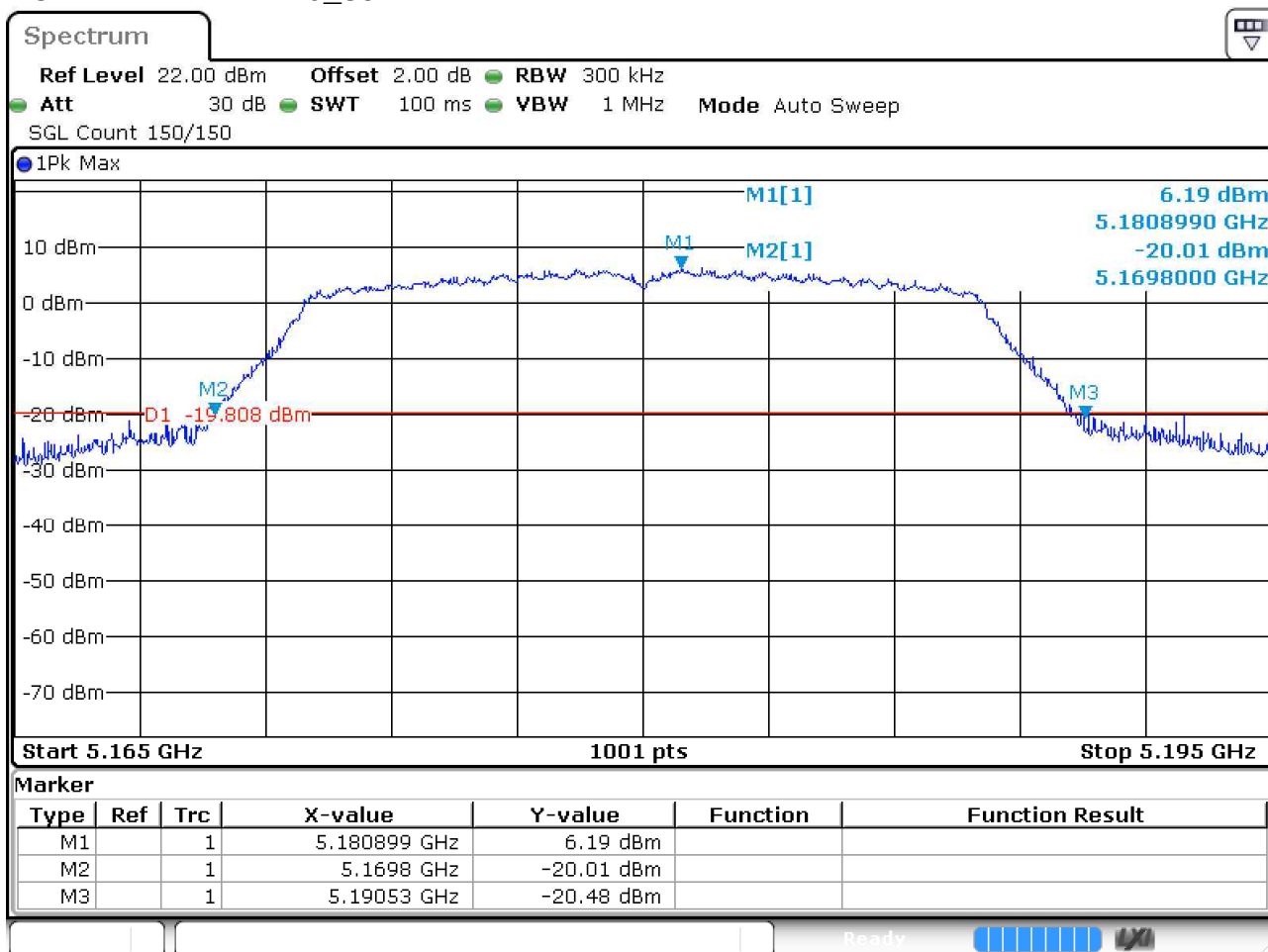
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4.5.2 Plots for 26dB Emission Bandwidth

4.5.2.1 11A20_36 ANT 1



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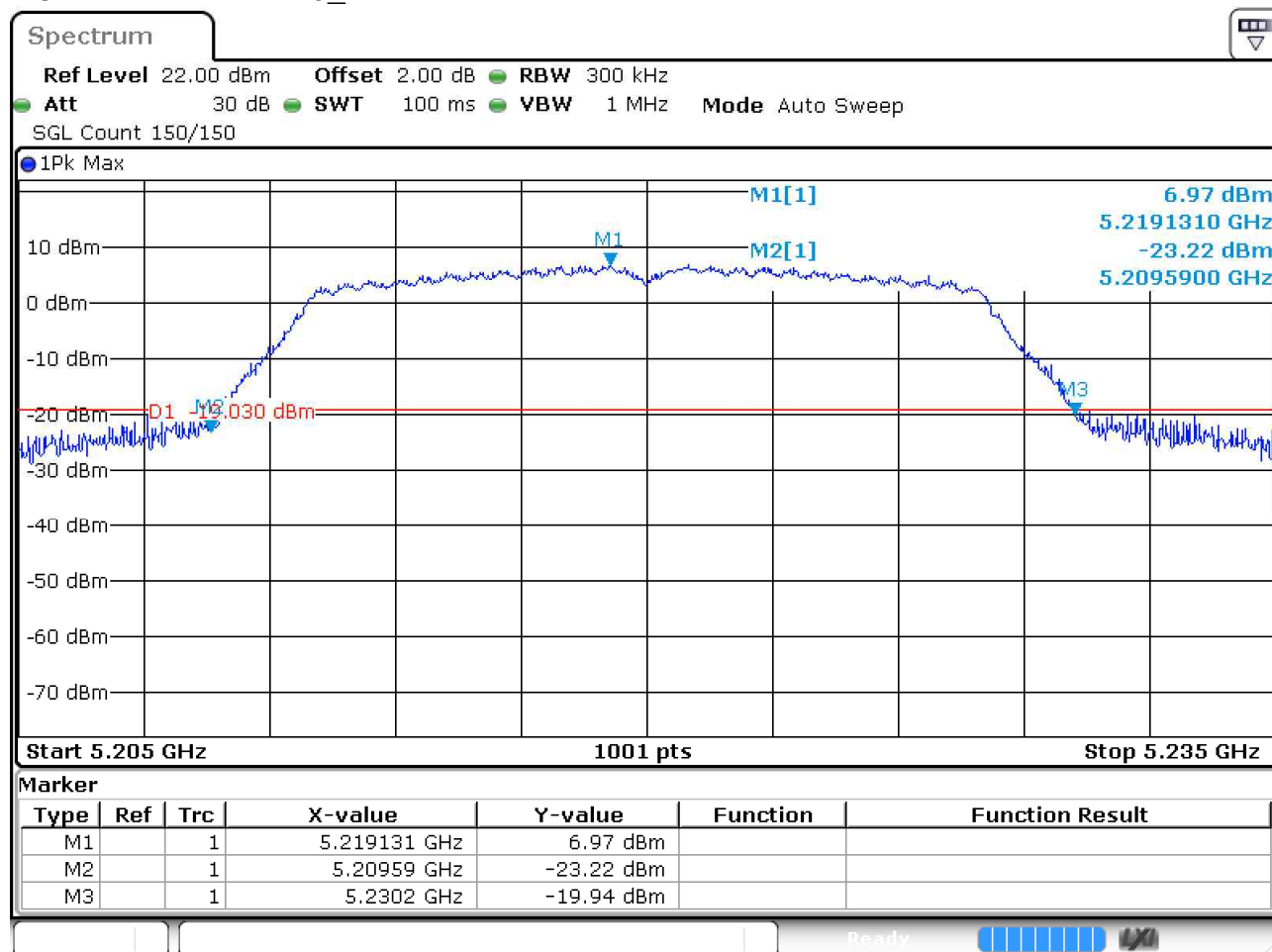


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4.5.2.2 11A20_44 ANT 1



Date: 19.AUG.2020 14:33:04



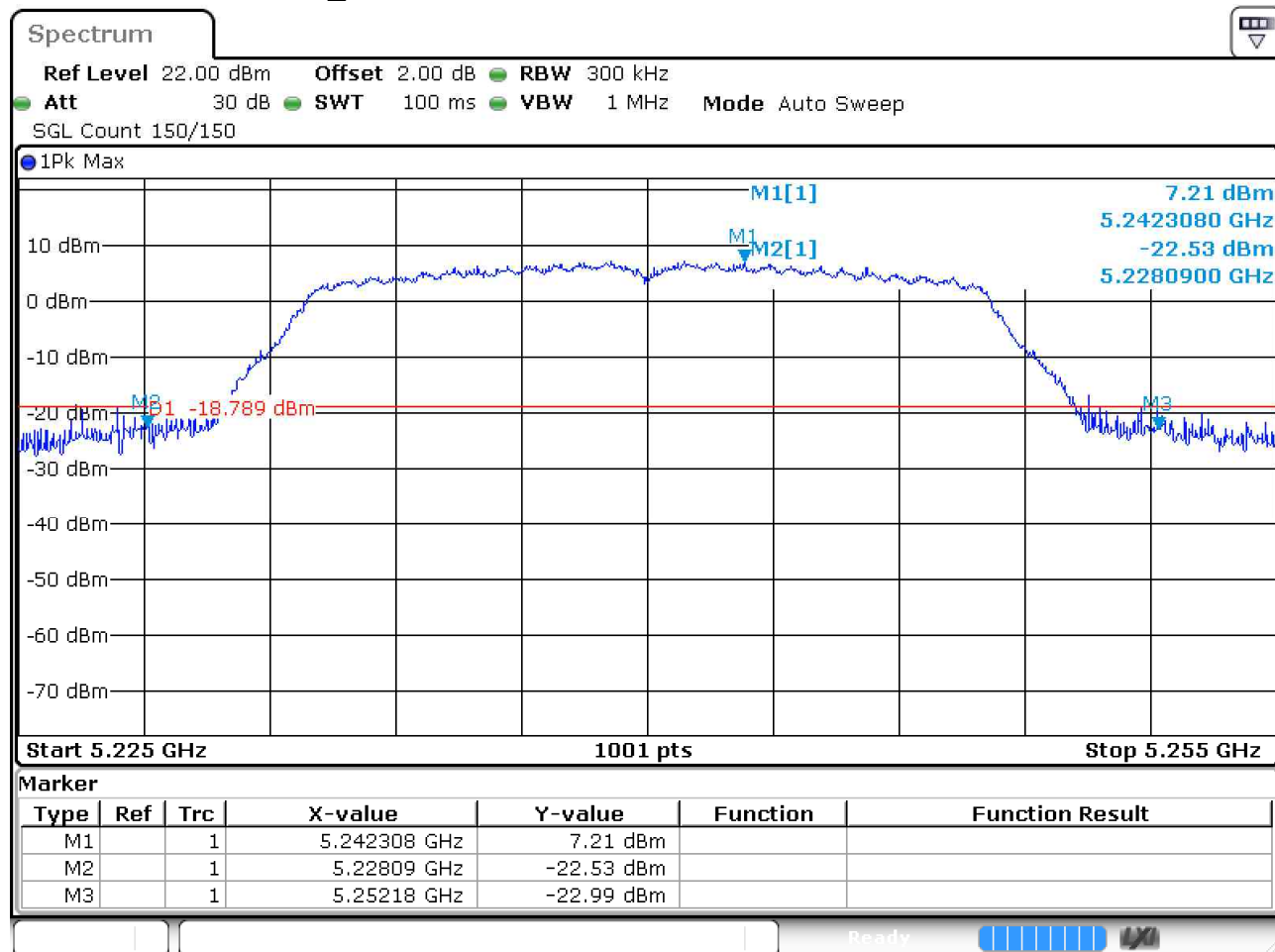
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4.5.2.3 11A20_48 ANT 1



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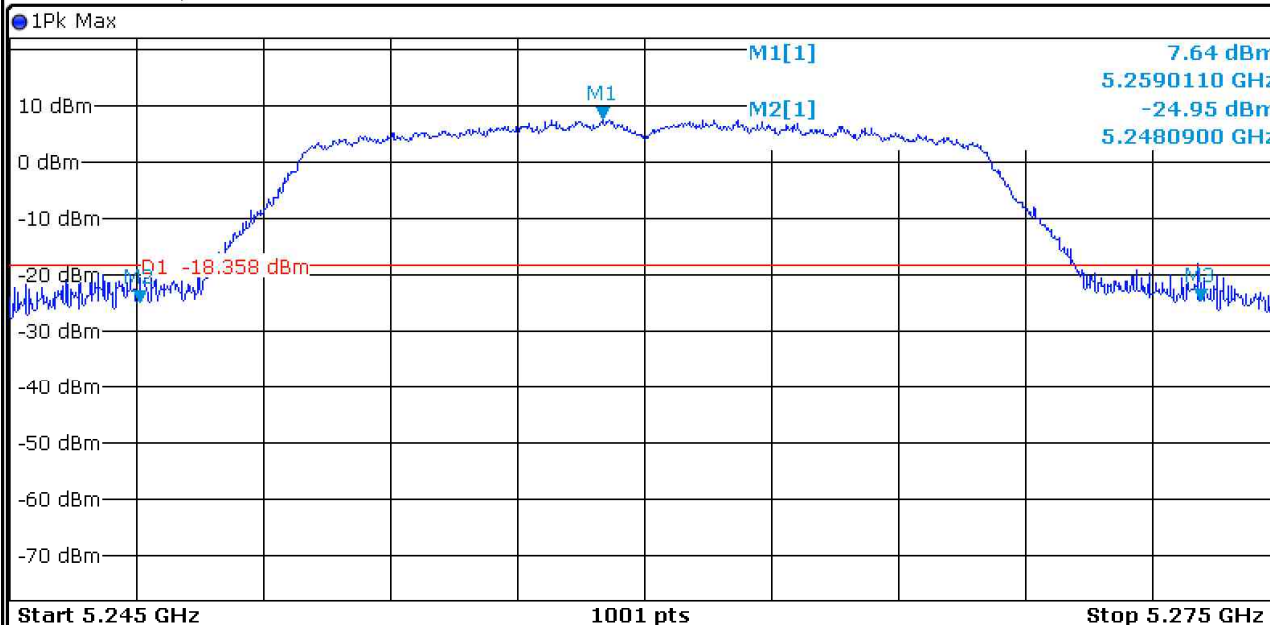
4.5.2.4

11A20_52 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz
Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.259011 GHz	7.64 dBm		
M2		1	5.24809 GHz	-24.95 dBm		
M3		1	5.27311 GHz	-24.45 dBm		

Ready



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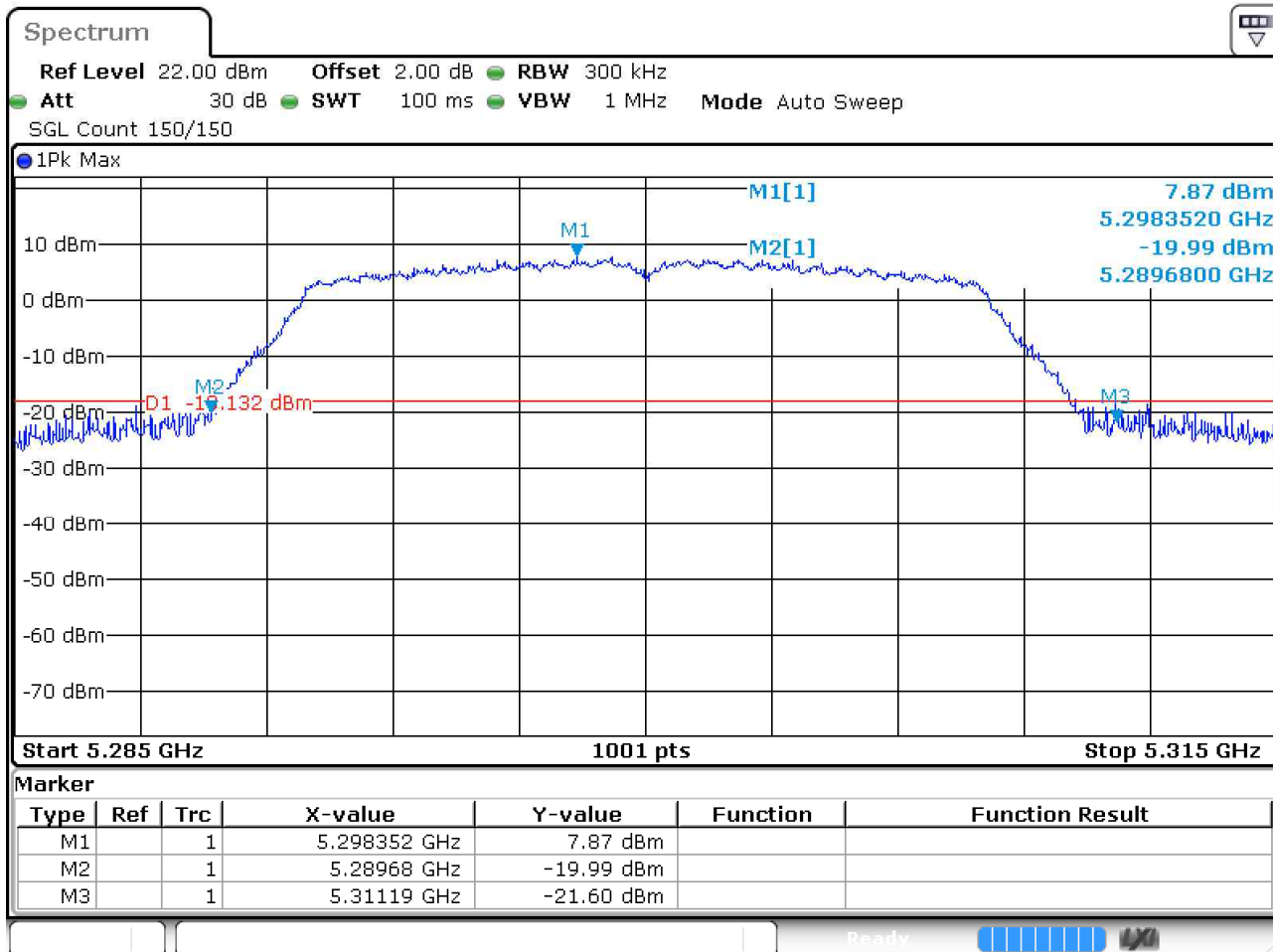


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4.5.2.5 11A20_60 ANT 1



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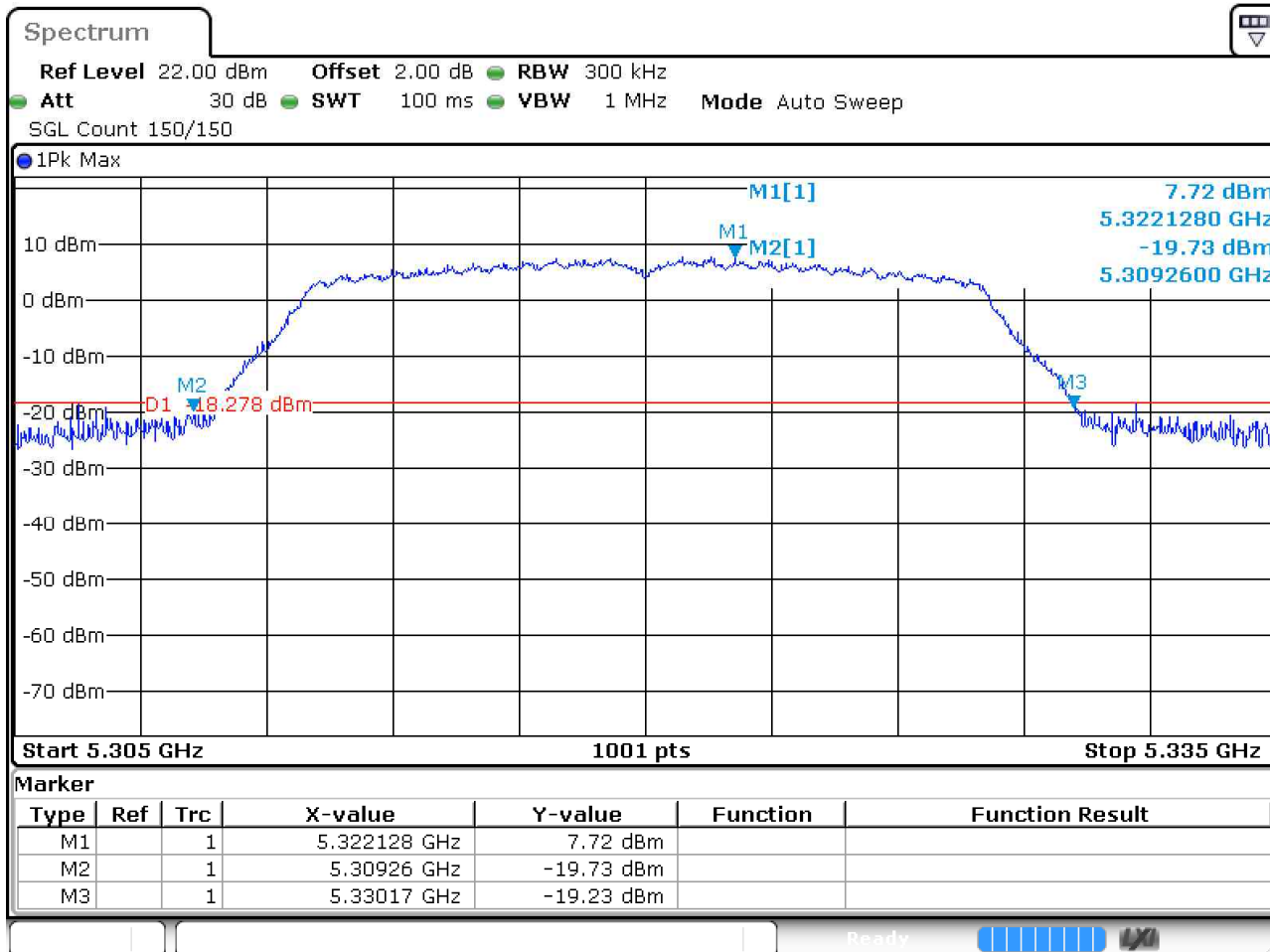
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4.5.2.6

11A20_64 ANT 1



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4.5.2.7

11A20_100 ANT 1

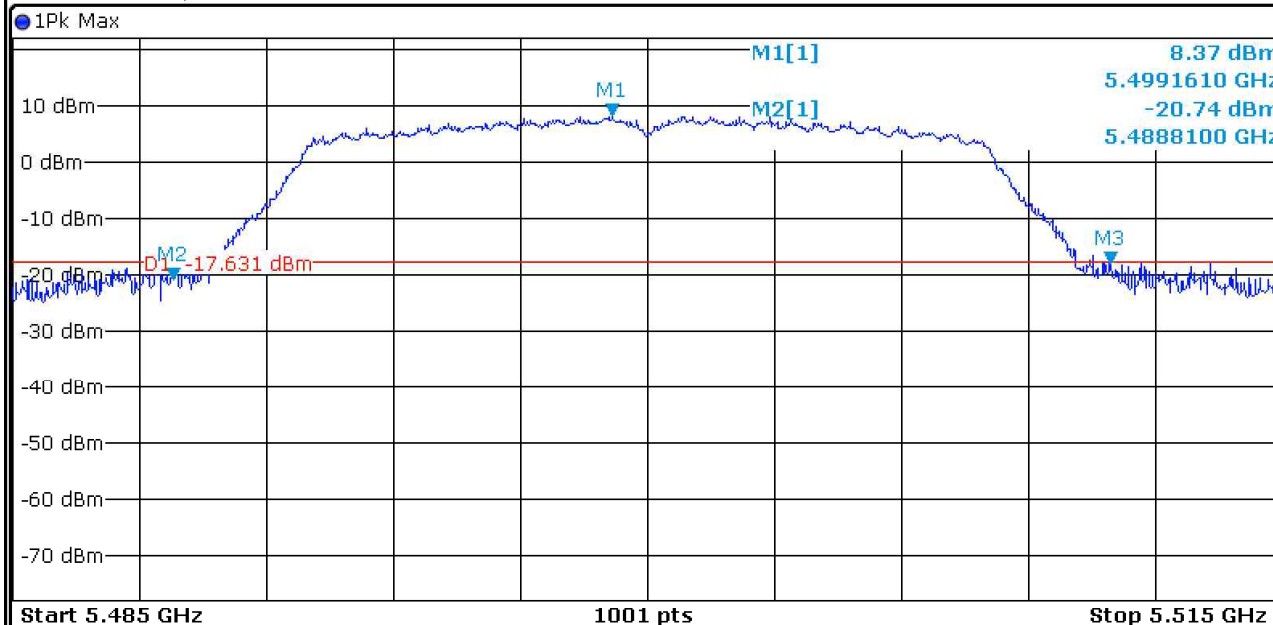


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.499161 GHz	8.37 dBm		
M2		1	5.48881 GHz	-20.74 dBm		
M3		1	5.51092 GHz	-18.11 dBm		

Ready



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4.5.2.8

11A20_116 ANT 1

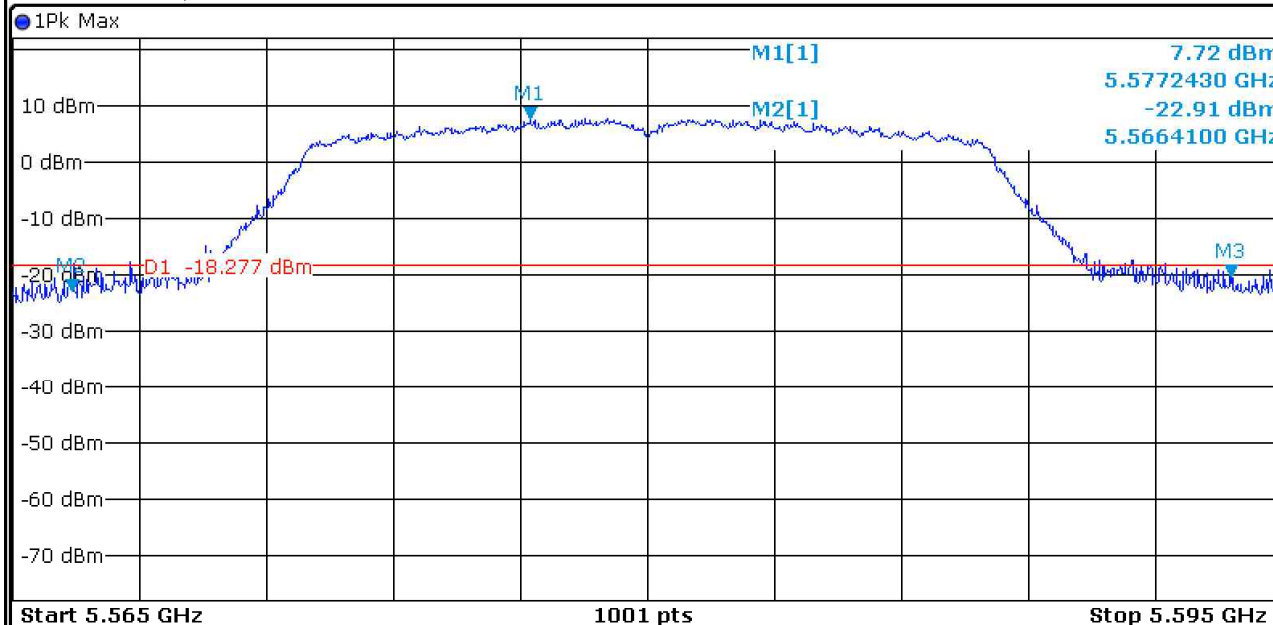


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.577243 GHz	7.72 dBm		
M2		1	5.56641 GHz	-22.91 dBm		
M3		1	5.59377 GHz	-20.37 dBm		

Ready



Date: 19.AUG.2020 14:42:40



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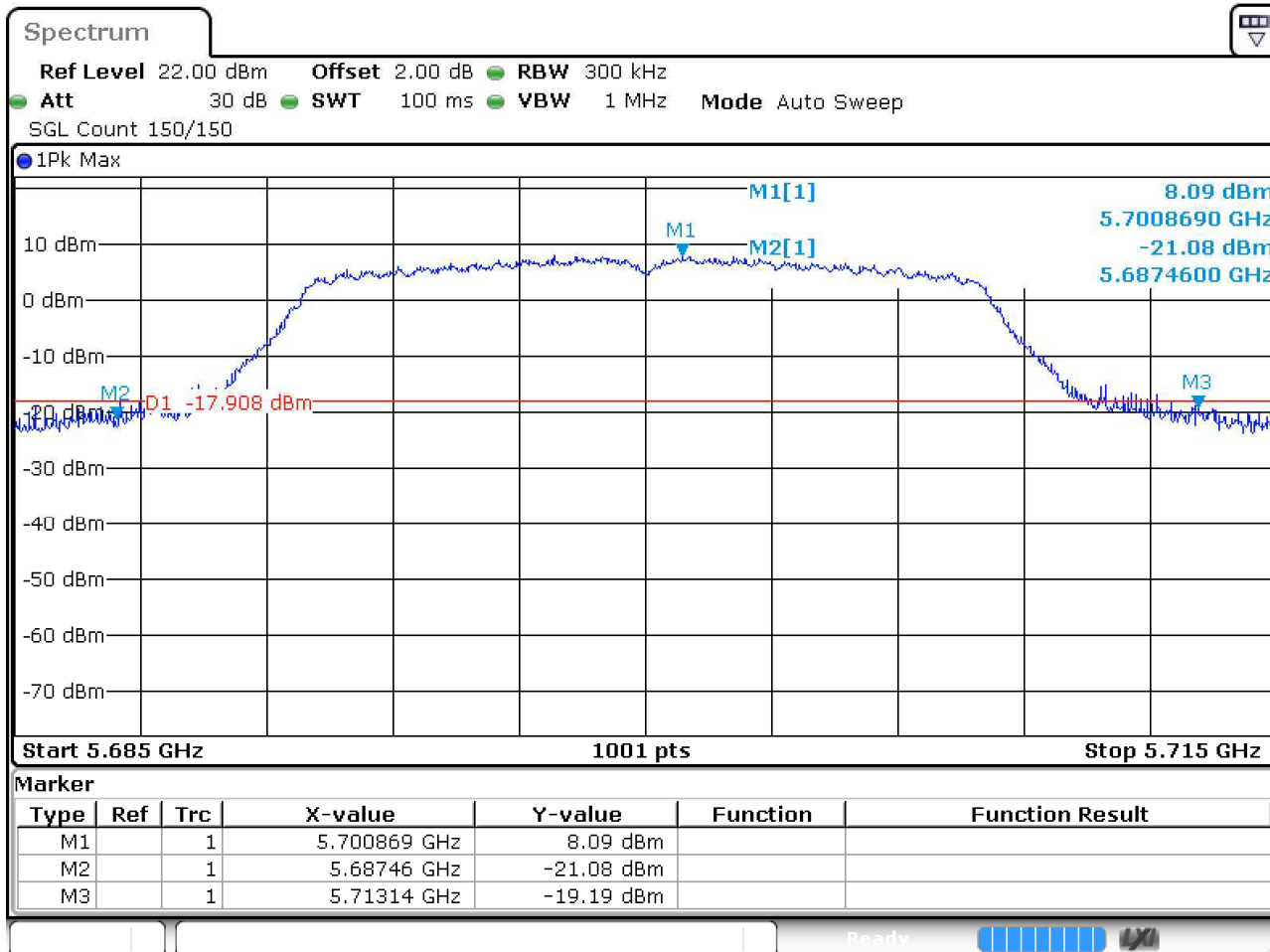
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4.5.2.9

11A20_140 ANT 1



Date: 19.AUG.2020 14:44:01



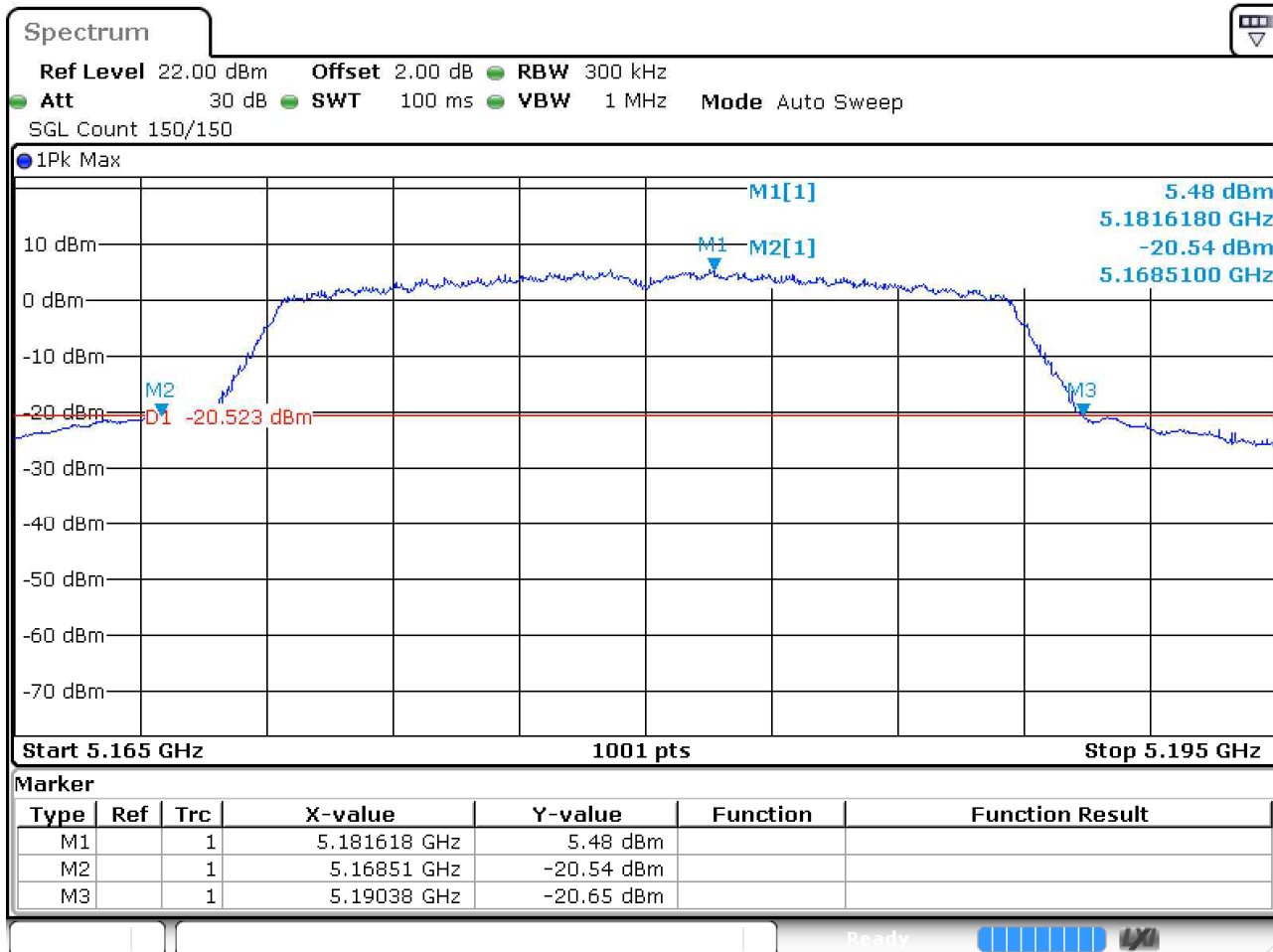
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4.5.2.10 11N20_36 ANT 1



Date: 19.AUG.2020 14:50:13



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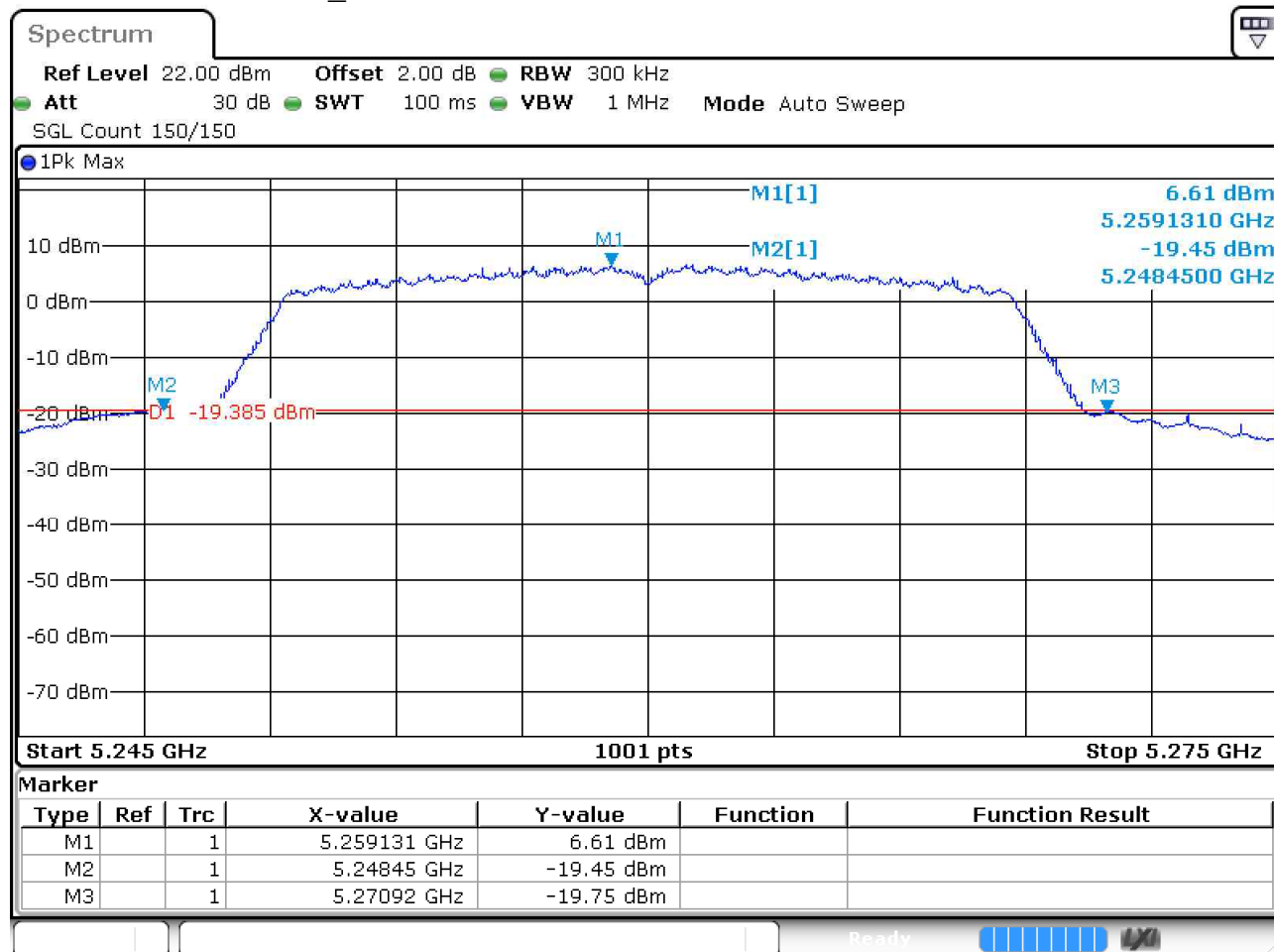
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4.5.2.11 11N20_52 ANT 1



Date: 19.AUG.2020 14:54:19



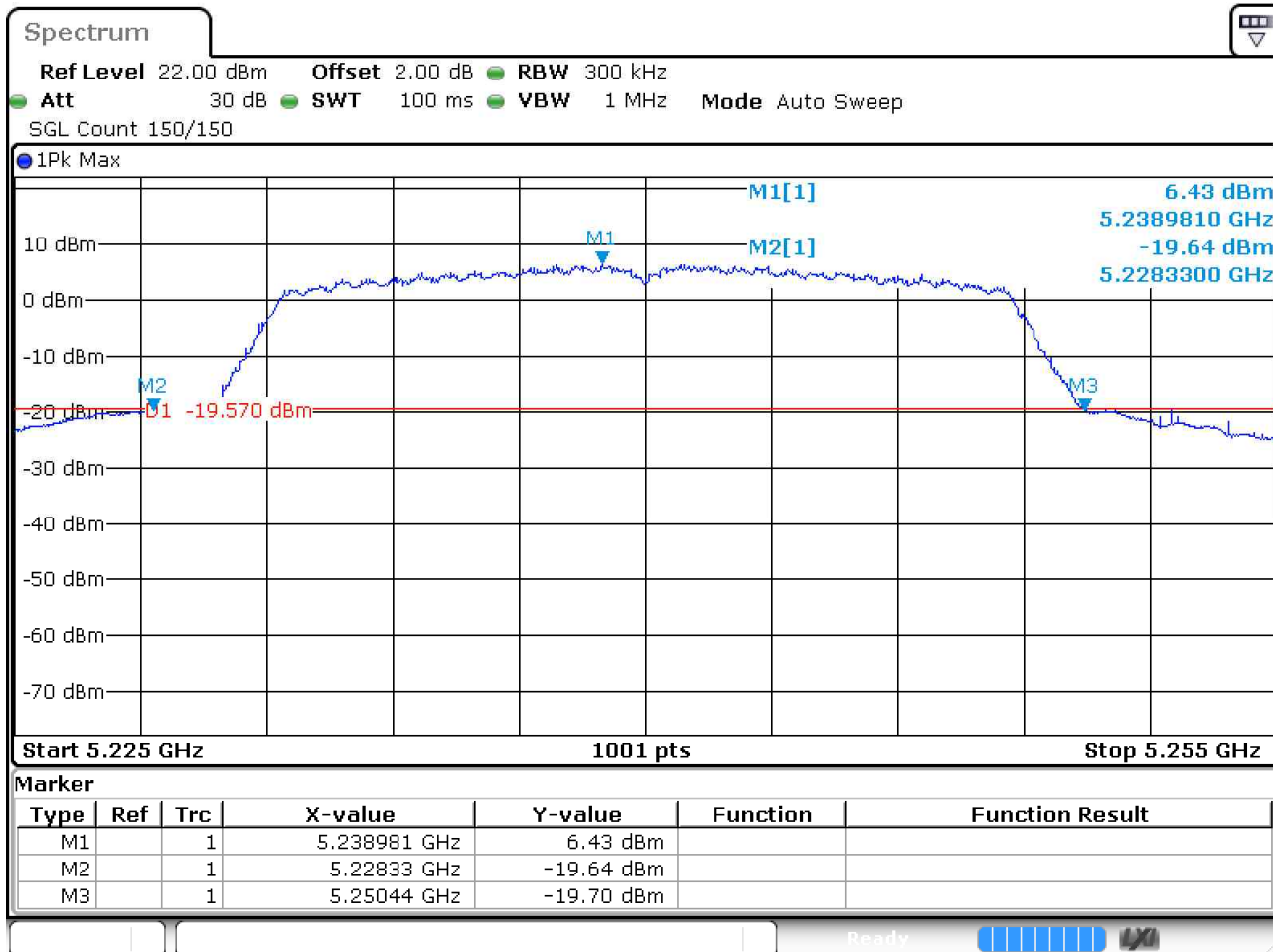


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4.5.2.12 11N20_48 ANT 1



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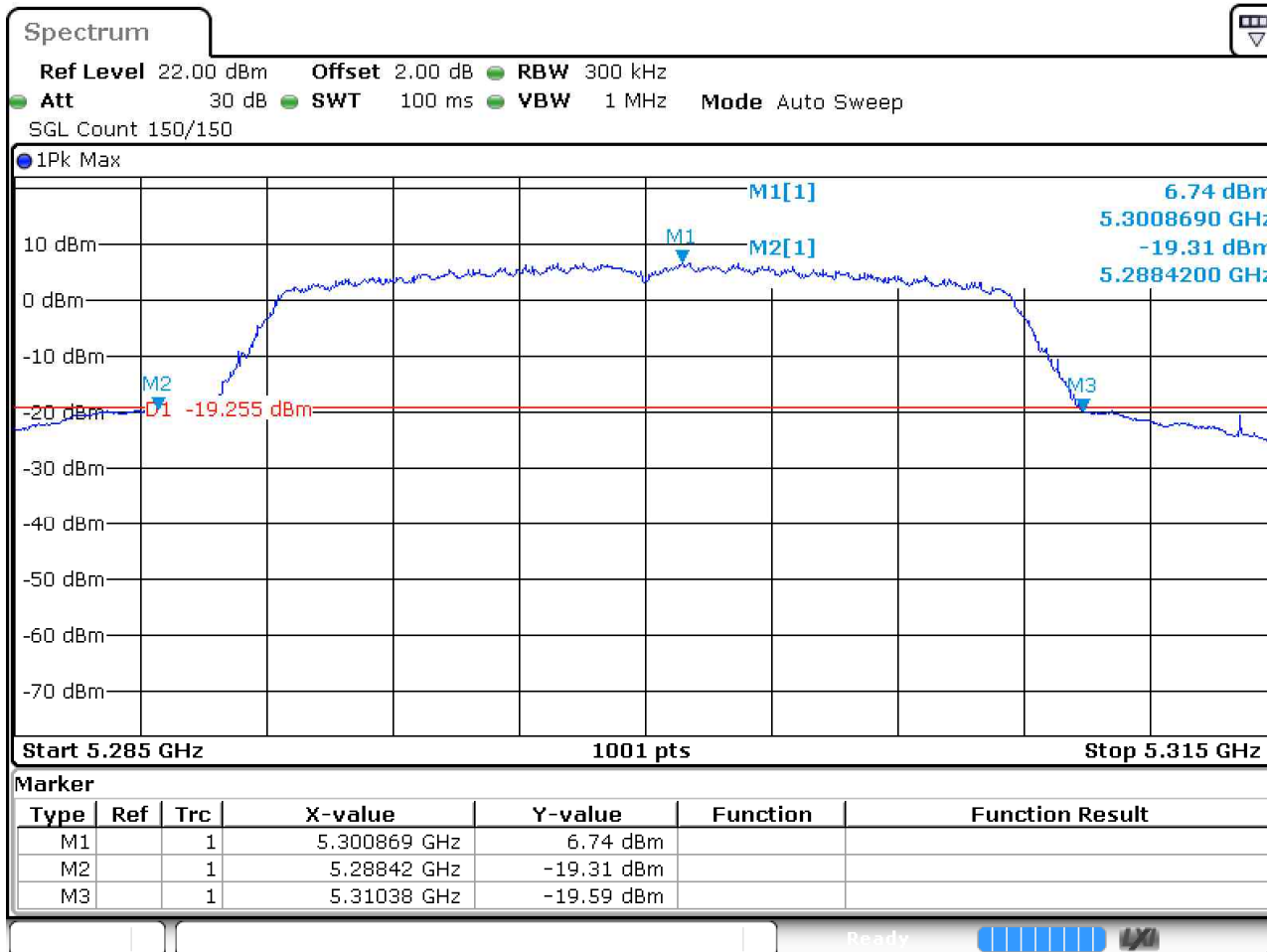
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4.5.2.13 11N20_60 ANT 1



Date: 19.AUG.2020 14:55:36





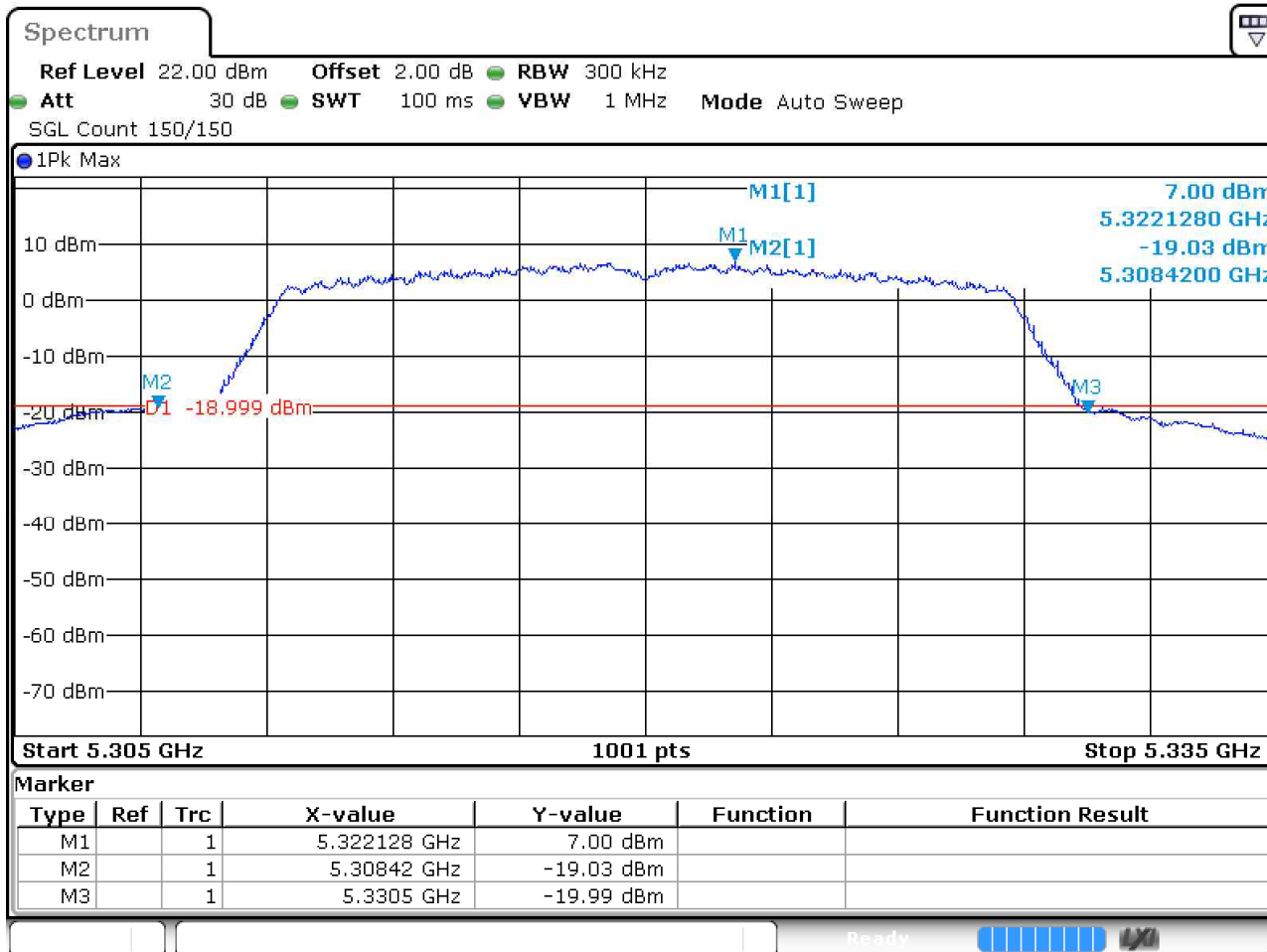
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4.5.2.14

11N20_64 ANT 1



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4.5.2.15

11N20_100 ANT 1

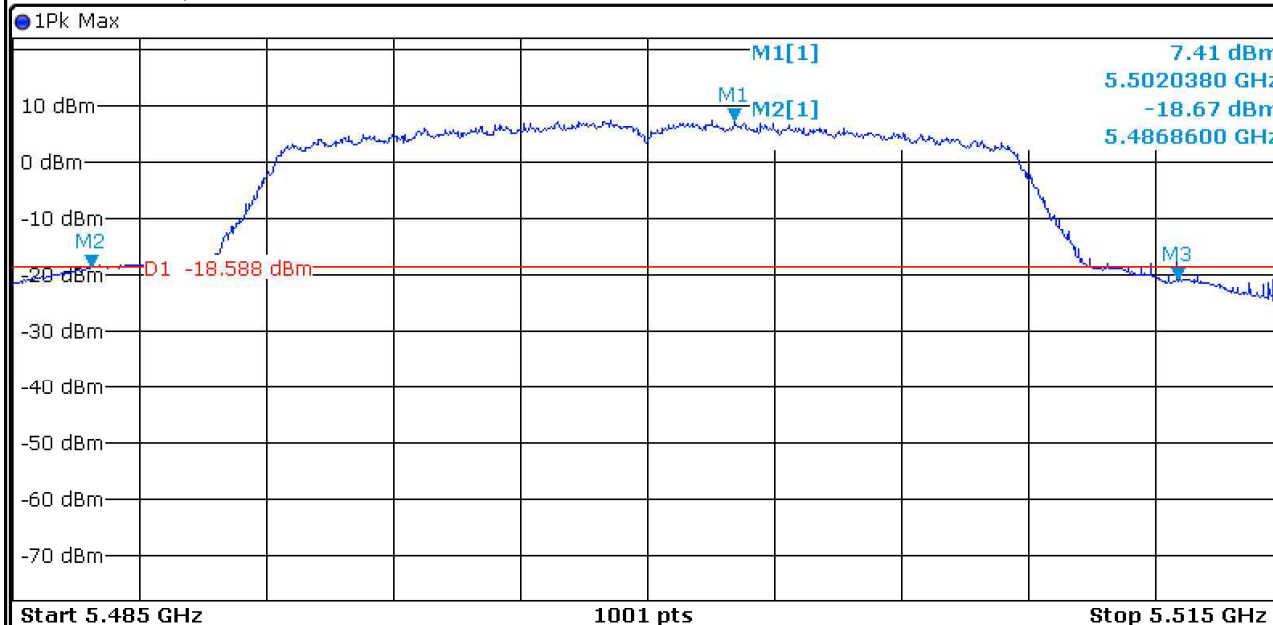


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.502038 GHz	7.41 dBm		
M2		1	5.48686 GHz	-18.67 dBm		
M3		1	5.51251 GHz	-20.78 dBm		

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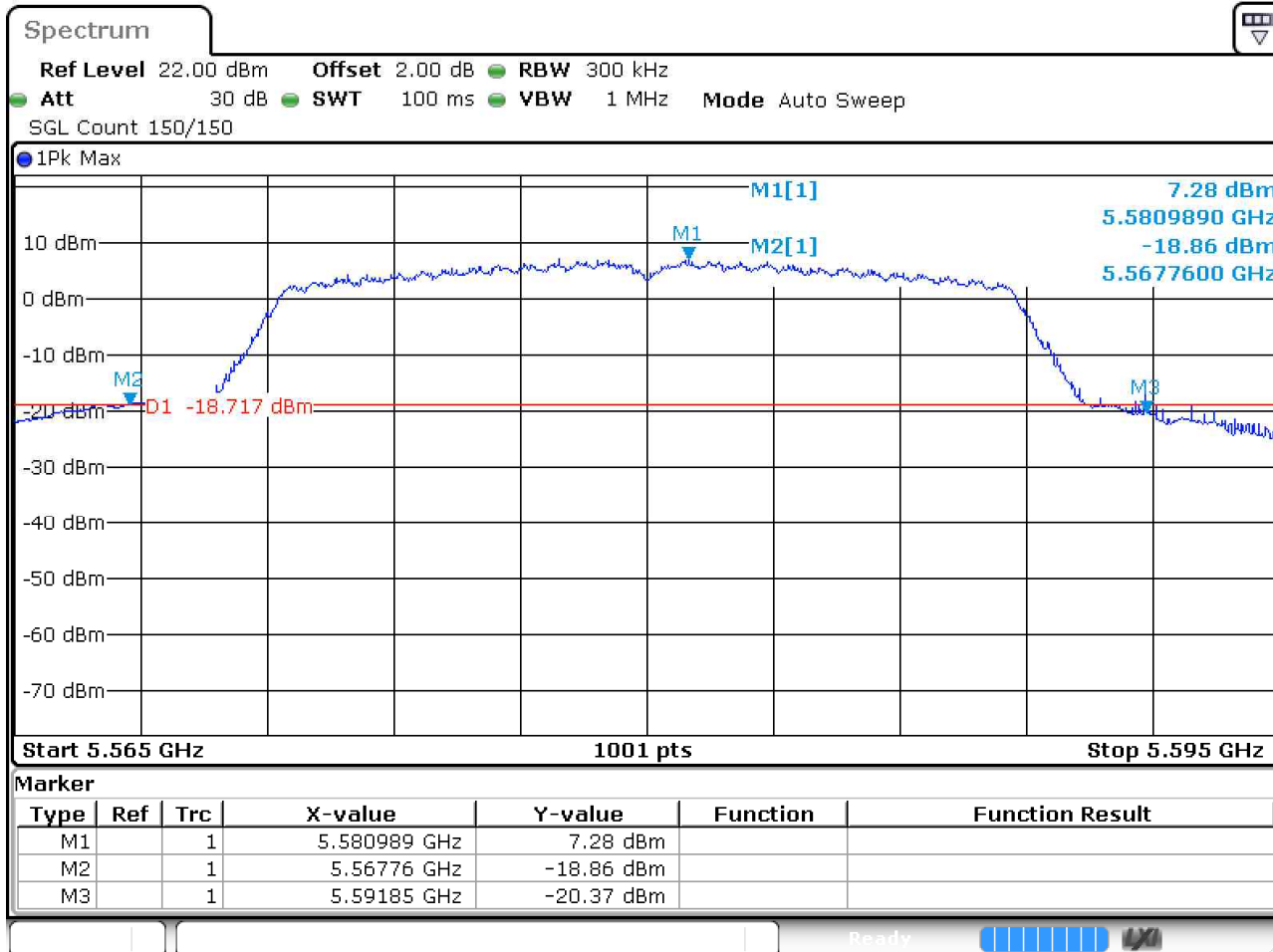


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4.5.2.16 11N20_116 ANT 1



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4.5.2.17 11N20_140 ANT 1



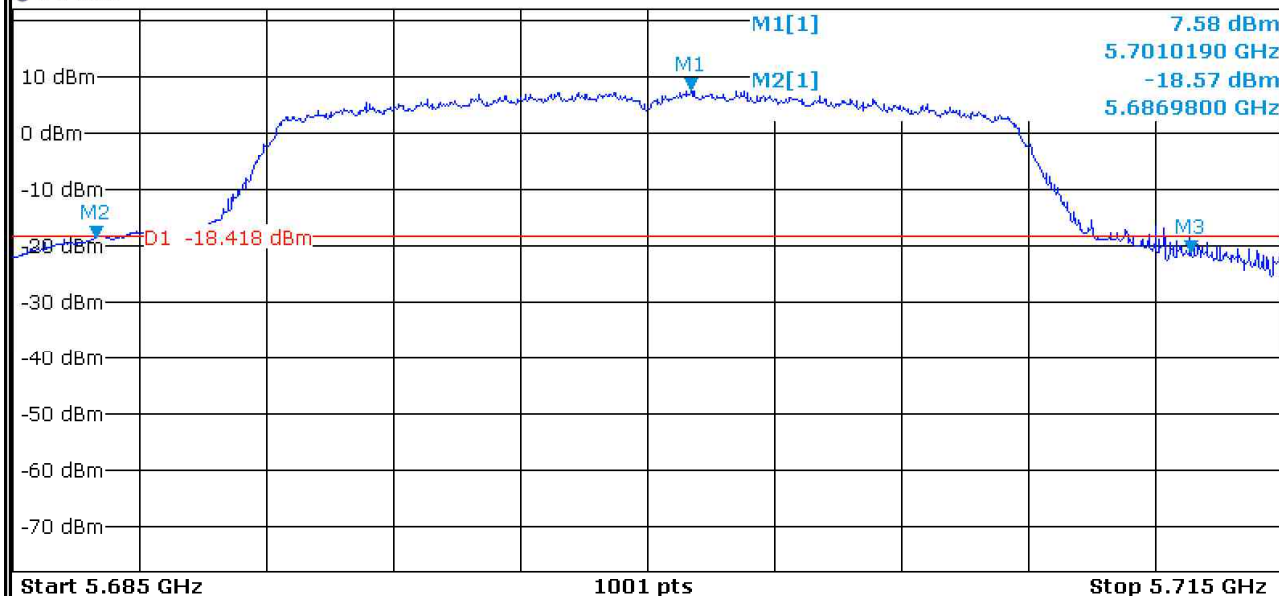
Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150

1Pk Max



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.701019 GHz	7.58 dBm		
M2		1	5.68698 GHz	-18.57 dBm		
M3		1	5.71284 GHz	-21.22 dBm		

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4.5.2.18 11N40_38 ANT 1



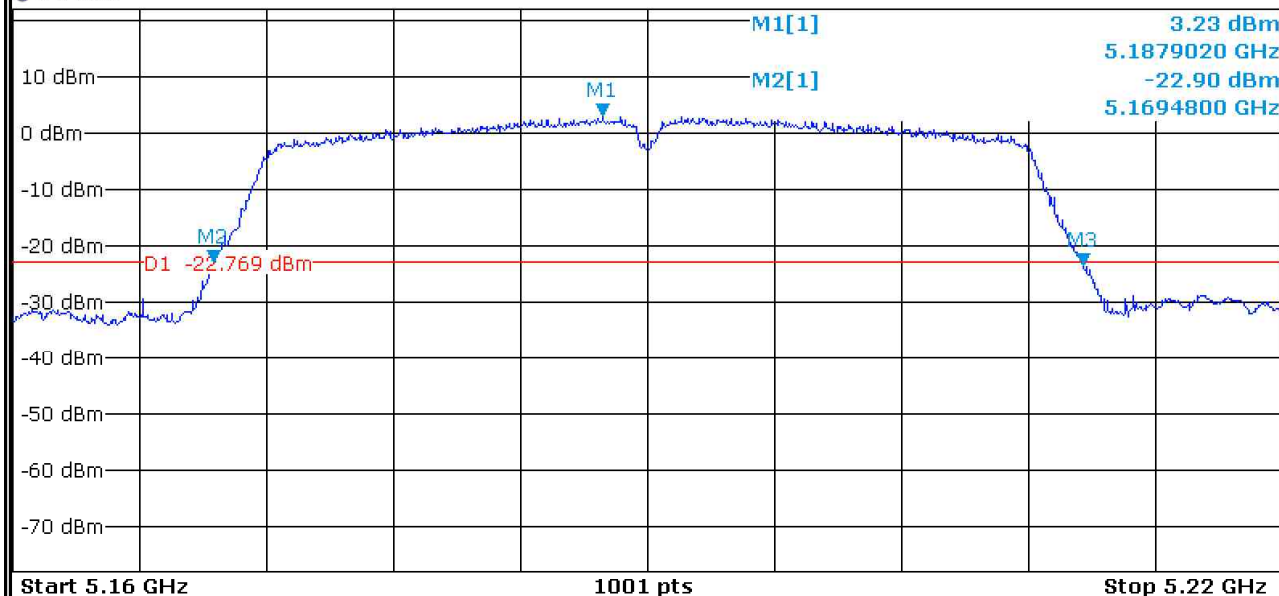
Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150

1Pk Max



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.187902 GHz	3.23 dBm		
M2		1	5.16948 GHz	-22.90 dBm		
M3		1	5.21058 GHz	-23.47 dBm		

Ready



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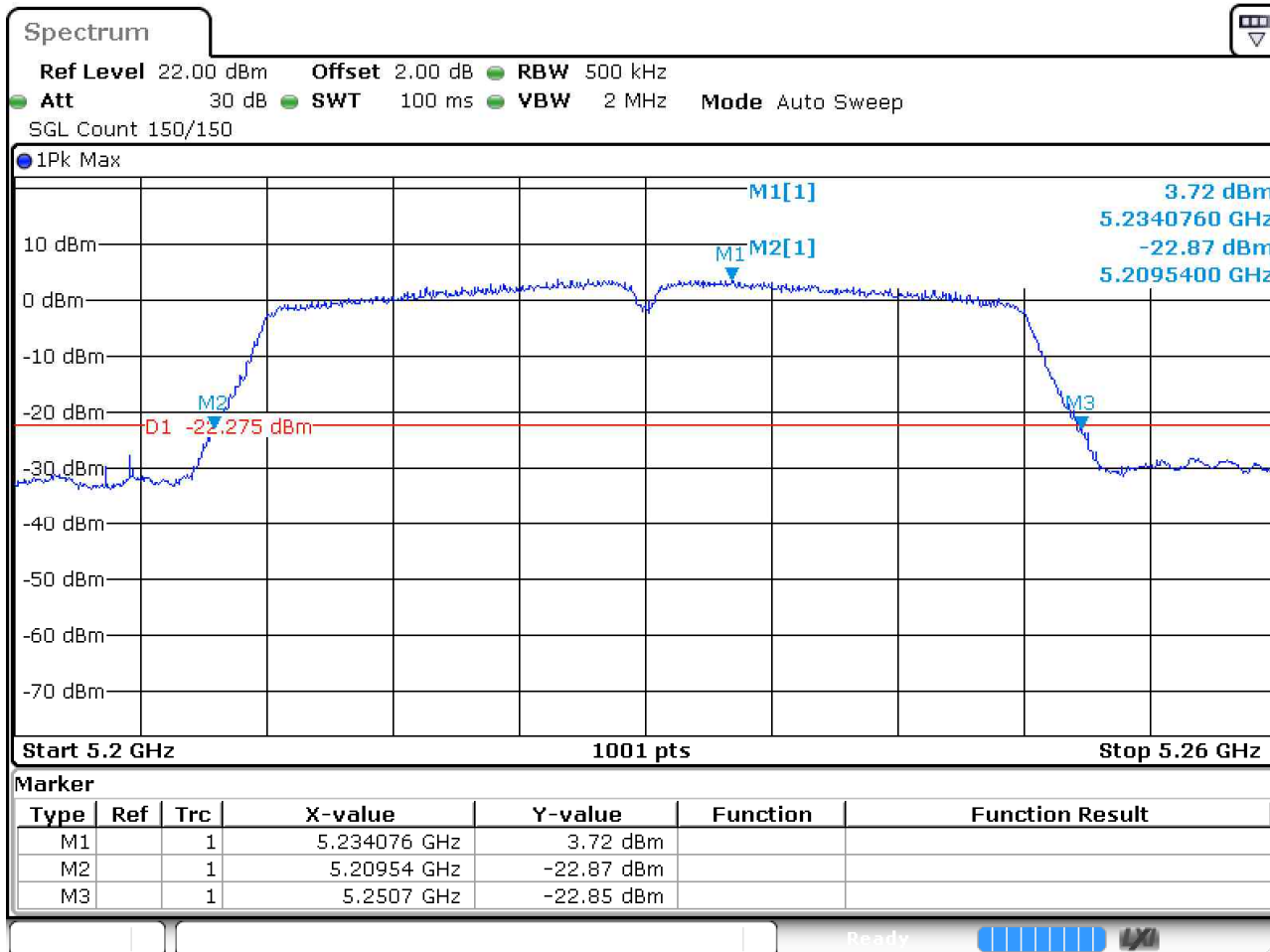
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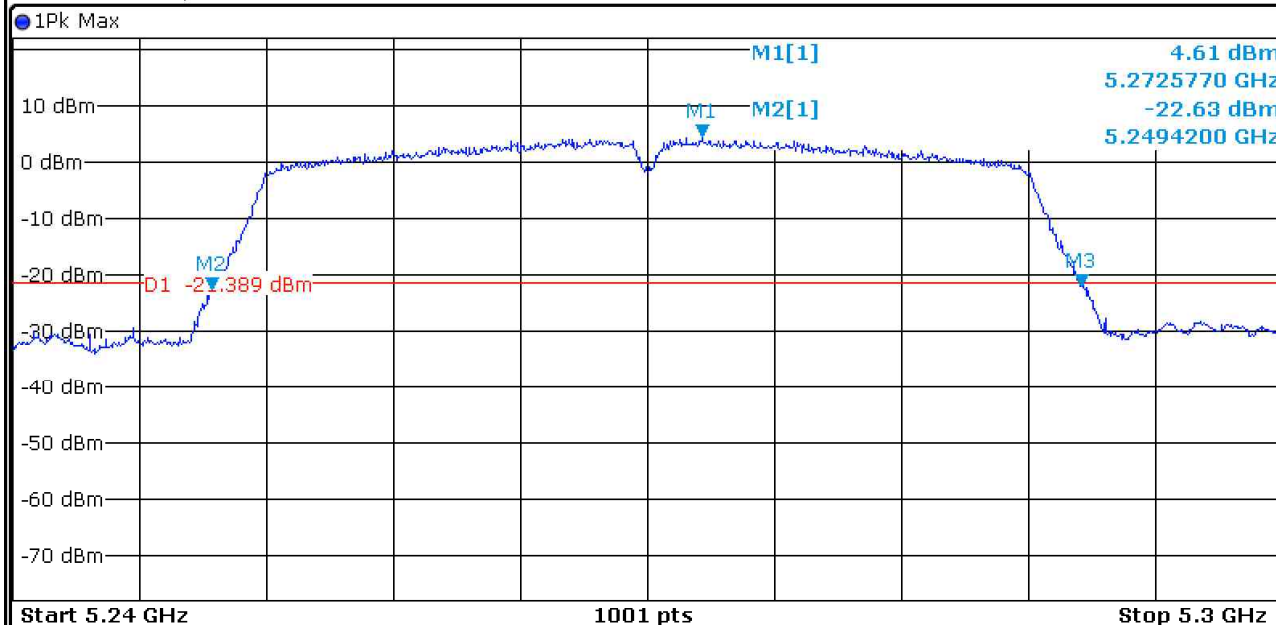


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.272577 GHz	4.61 dBm		
M2		1	5.24942 GHz	-22.63 dBm		
M3		1	5.29046 GHz	-22.03 dBm		

Ready



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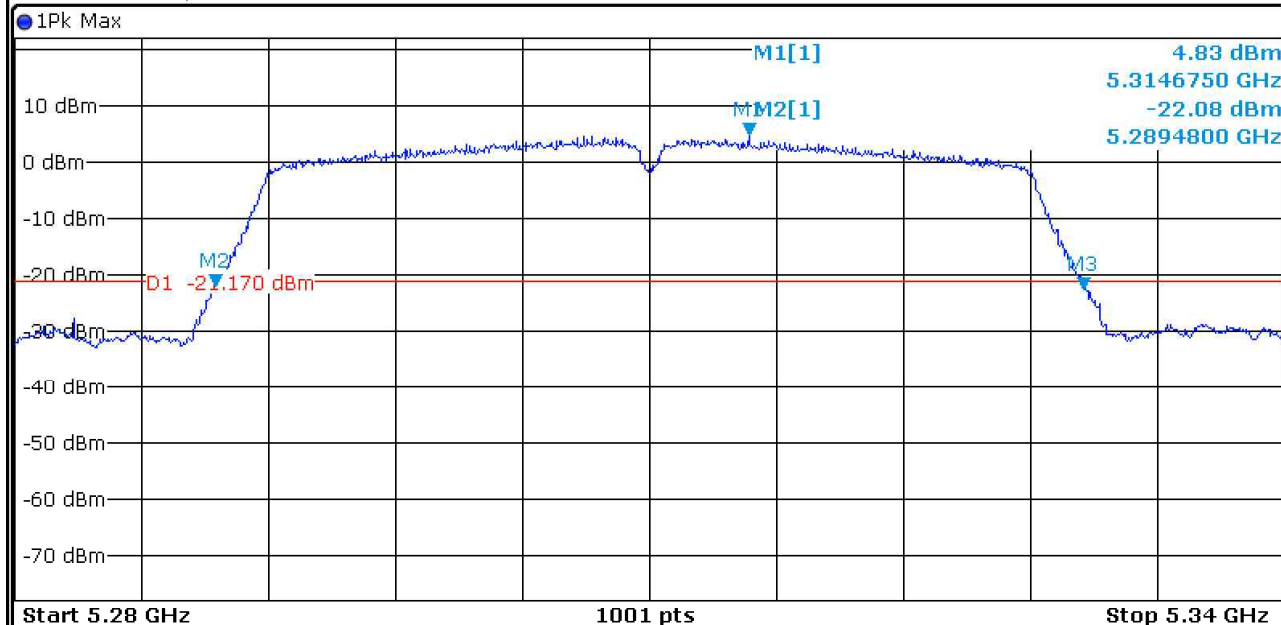


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.314675 GHz	4.83 dBm		
M2		1	5.28948 GHz	-22.08 dBm		
M3		1	5.33052 GHz	-22.44 dBm		

Ready



Date: 19.AUG.2020 15:13:29



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4.5.2.22

11N40_102 ANT 1

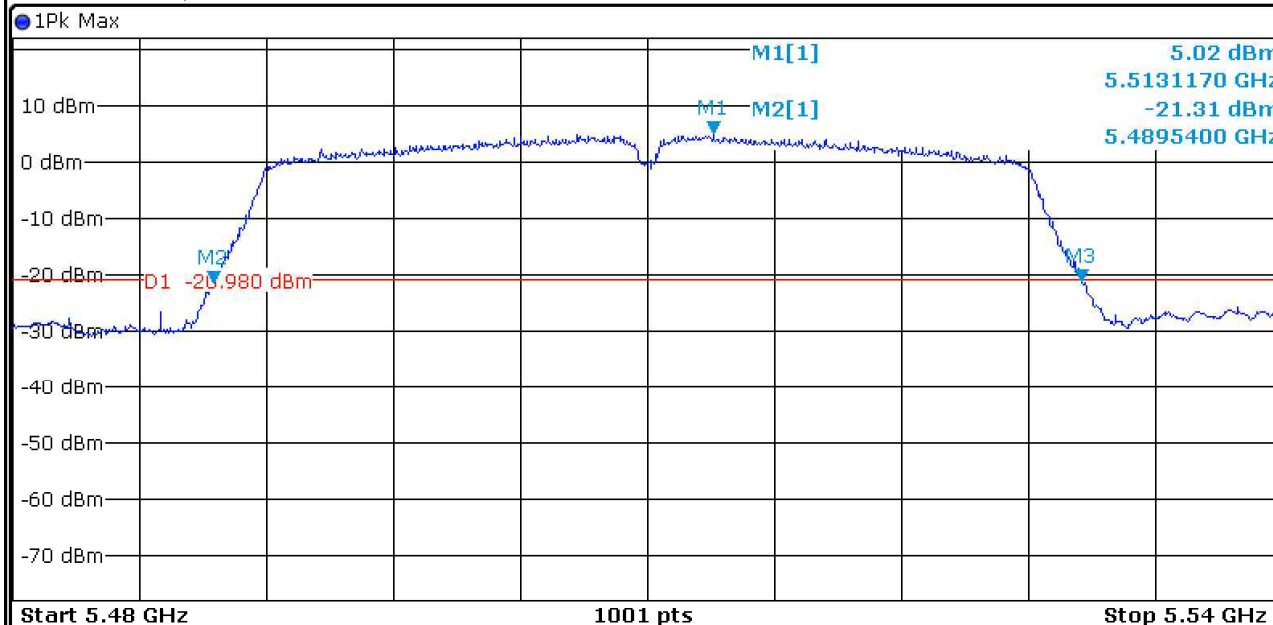


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.513117 GHz	5.02 dBm		
M2		1	5.48954 GHz	-21.31 dBm		
M3		1	5.53052 GHz	-21.02 dBm		

Ready



Date: 19.AUG.2020 15:14:57



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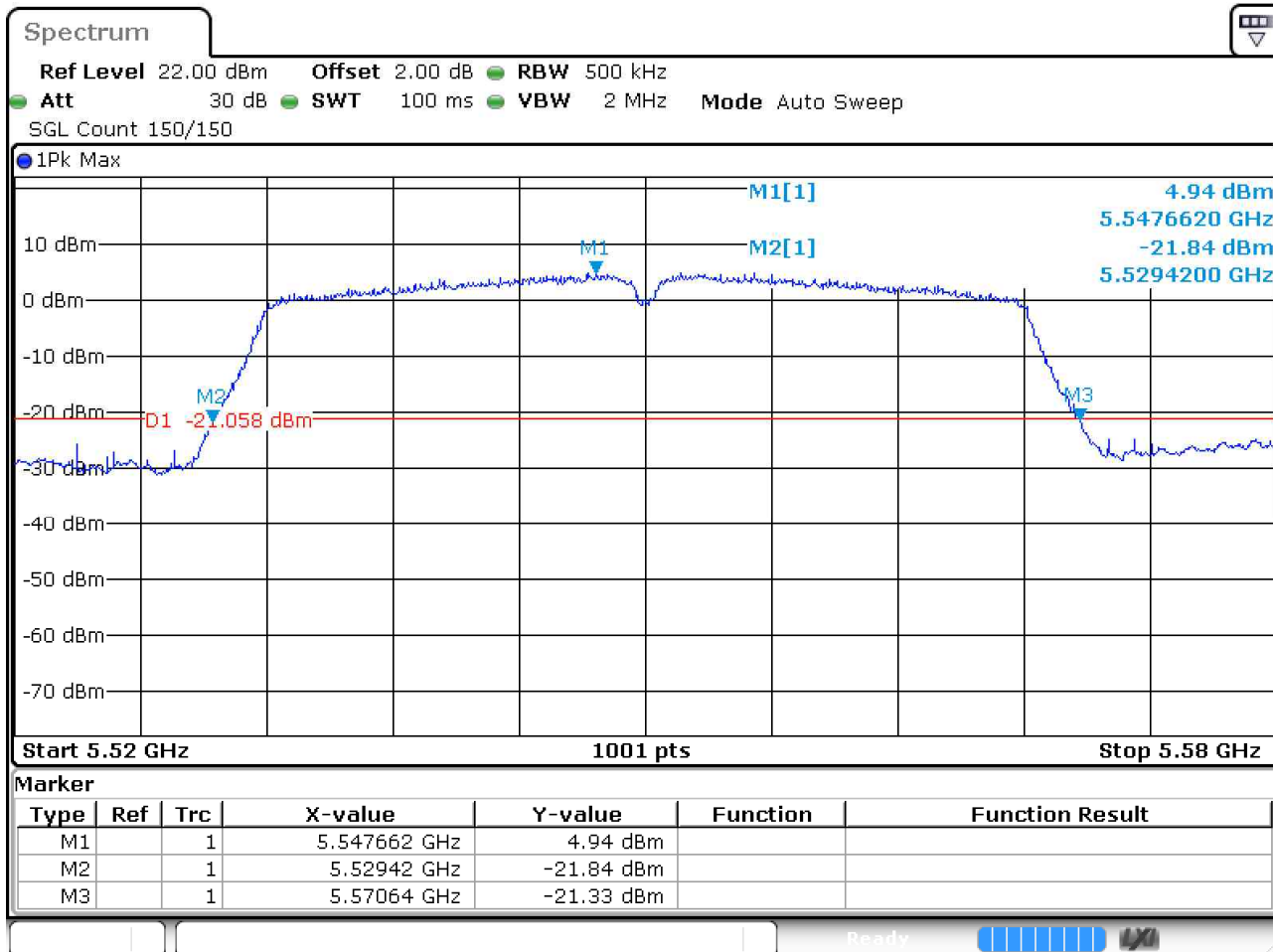
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4.5.2.23 11N40_110 ANT 1



Date: 19.AUG.2020 15:16:39





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Report No.: ZR/2020/7000607

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4.5.2.24

11N40_134 ANT 1

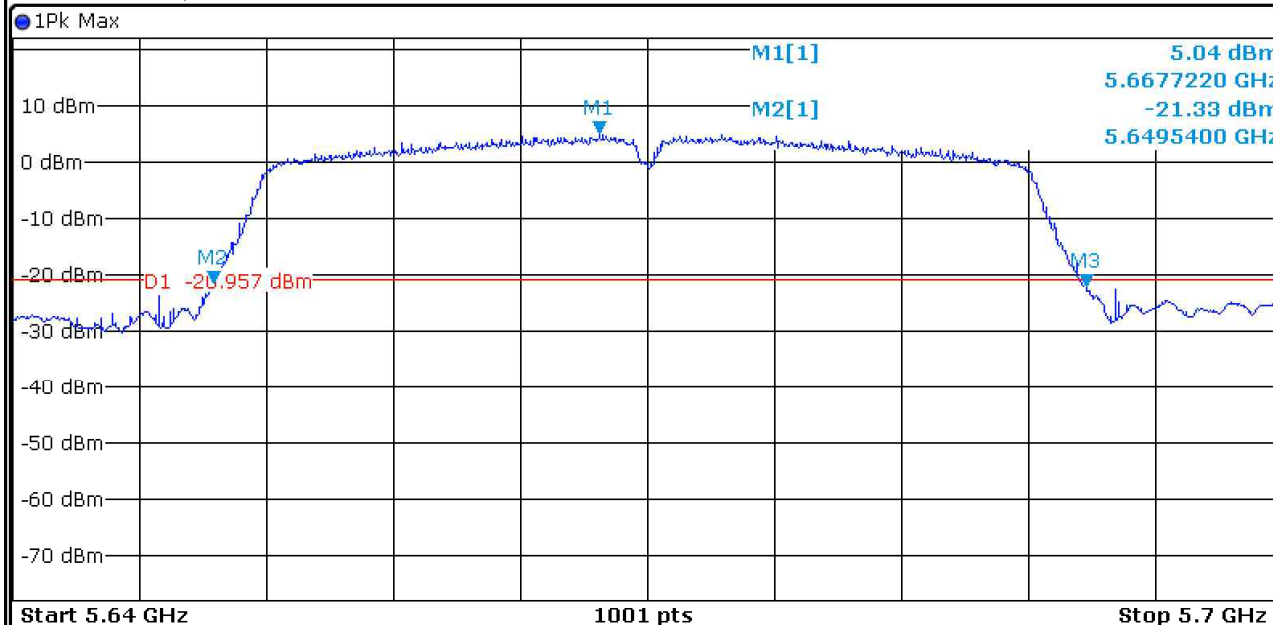


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.667722 GHz	5.04 dBm		
M2		1	5.64954 GHz	-21.33 dBm		
M3		1	5.6907 GHz	-21.87 dBm		

Ready



Date: 19.AUG.2020 15:17:59



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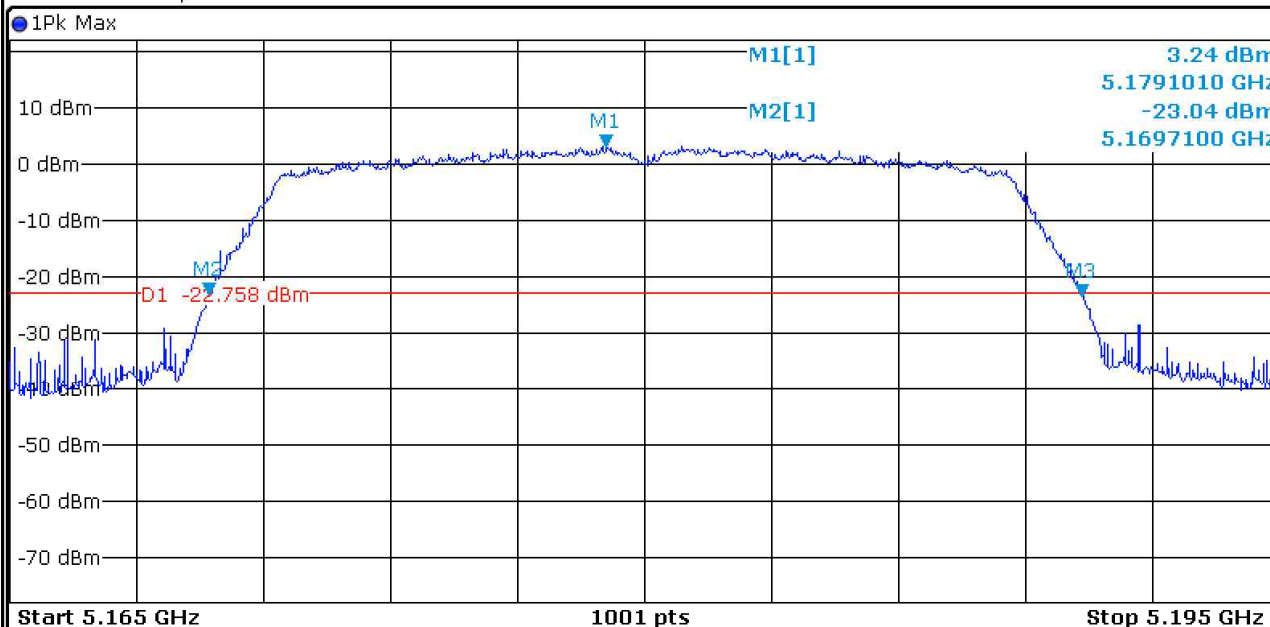


4.5.2.25 11AC20_36 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz
Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.179101 GHz	3.24 dBm		
M2		1	5.16971 GHz	-23.04 dBm		
M3		1	5.19032 GHz	-23.33 dBm		

Ready



Date: 19.AUG.2020 15:22:50



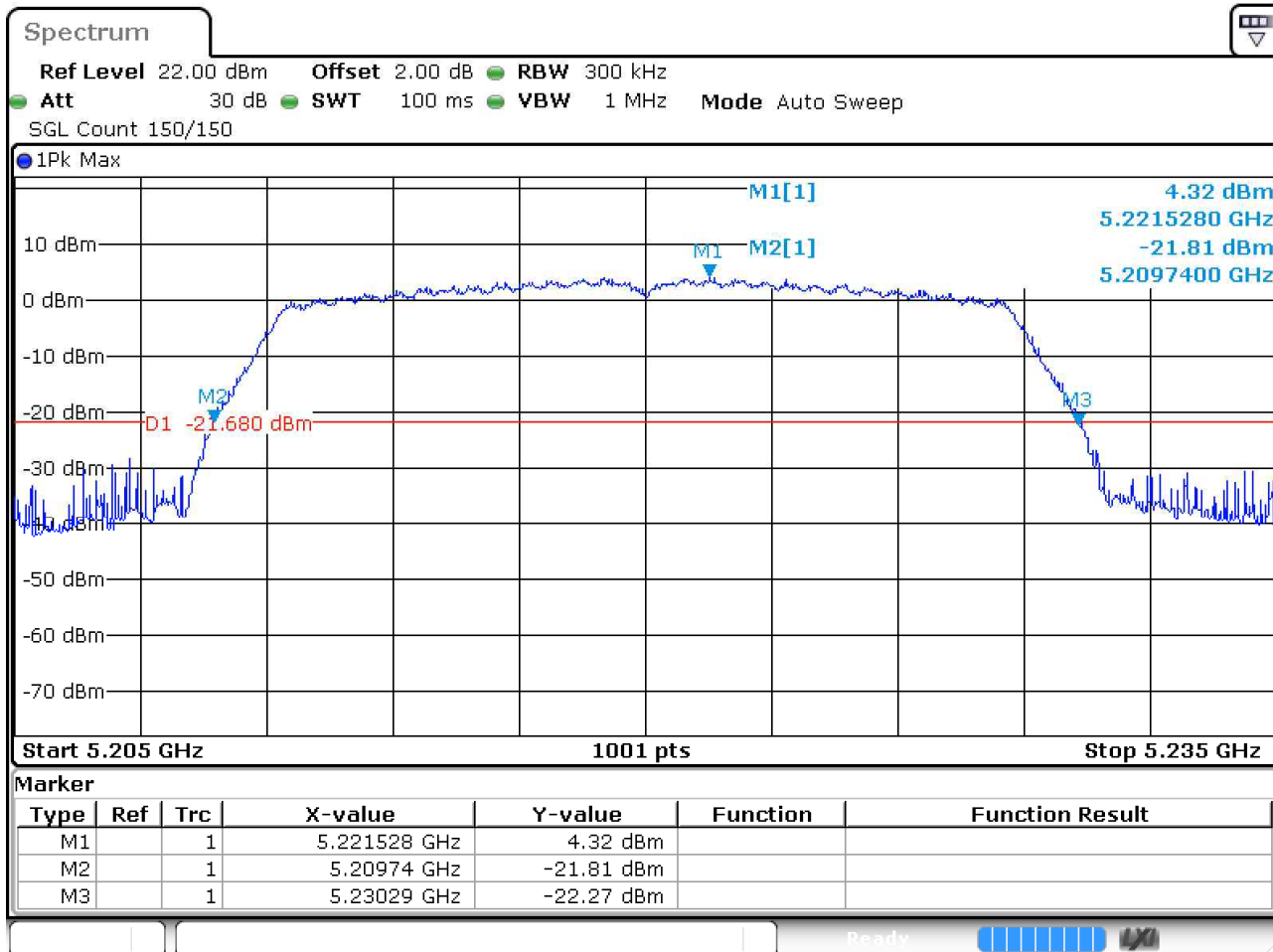
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4.5.2.26 11AC20_44 ANT 1



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4.5.2.27 11AC20_48 ANT 1

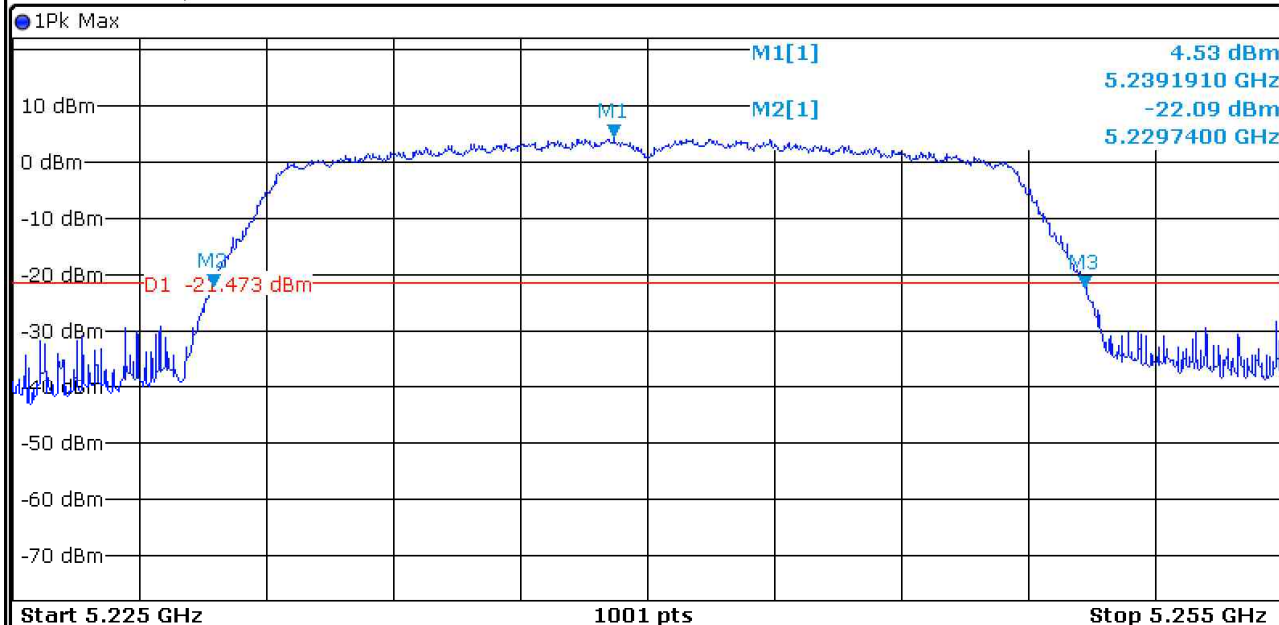


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.239191 GHz	4.53 dBm		
M2		1	5.22974 GHz	-22.09 dBm		
M3		1	5.25032 GHz	-22.15 dBm		

Ready



Date: 19.AUG.2020 15:25:38





4.5.2.28

11AC20_52 ANT 1

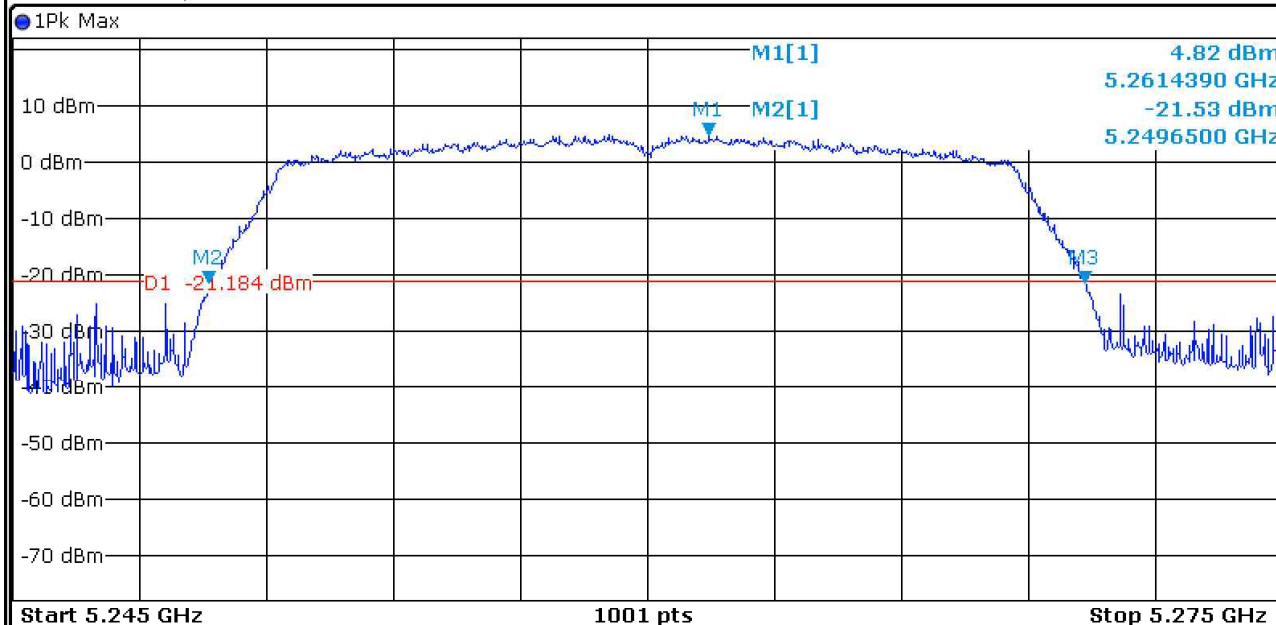


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.261439 GHz	4.82 dBm		
M2		1	5.24965 GHz	-21.53 dBm		
M3		1	5.27032 GHz	-21.44 dBm		

Ready



Date: 19.AUG.2020 15:27:09



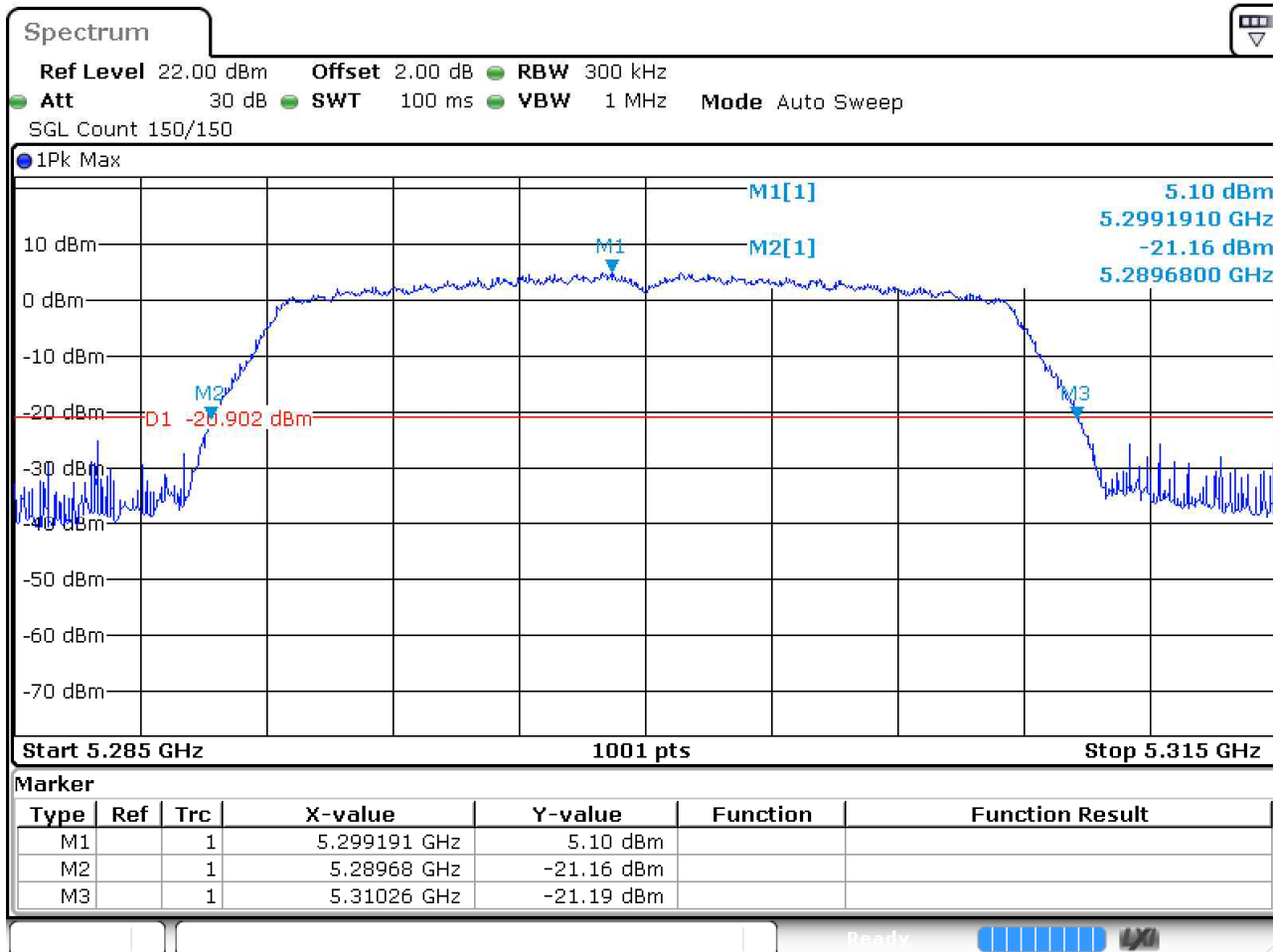
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4.5.2.29 11AC20_60 ANT 1



Date: 19.AUG.2020 15:28:36





4.5.2.30

11AC20_64 ANT 1

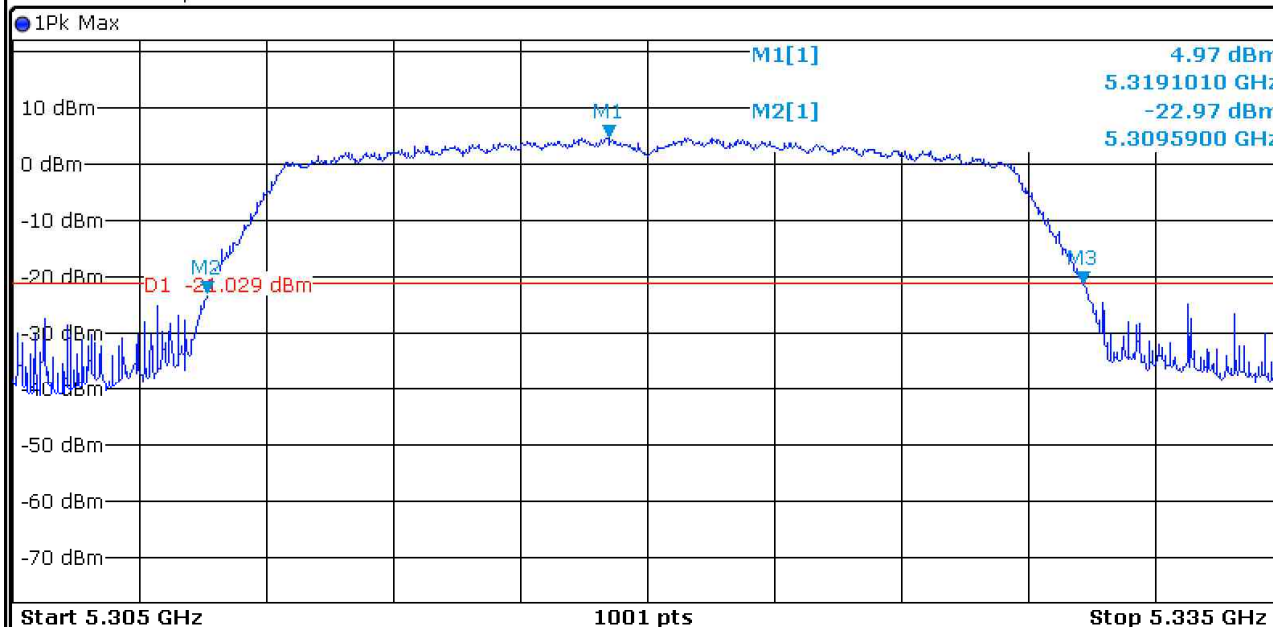


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.319101 GHz	4.97 dBm		
M2		1	5.30959 GHz	-22.97 dBm		
M3		1	5.3095900 GHz	-21.09 dBm		

Ready



Date: 19.AUG.2020 15:29:53



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4.5.2.31 11AC20_100 ANT 1

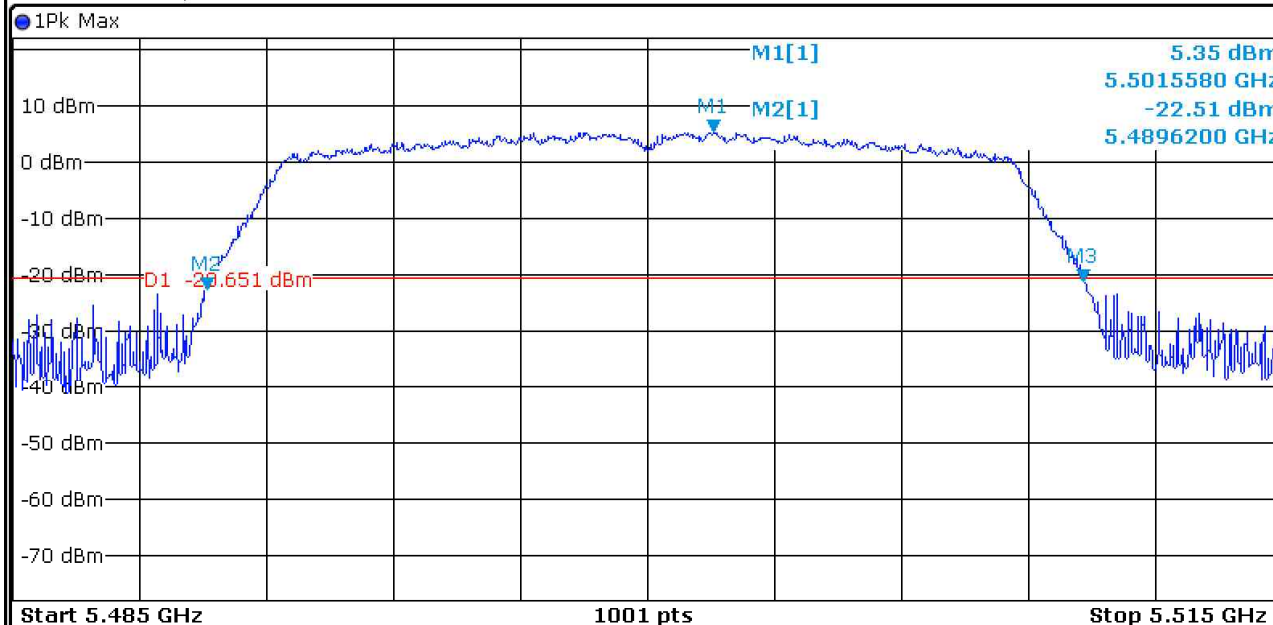


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.501558 GHz	5.35 dBm		
M2		1	5.48962 GHz	-22.51 dBm		
M3		1	5.51029 GHz	-21.20 dBm		

Ready



Date: 19.AUG.2020 15:31:21



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4.5.2.32 11AC20_116 ANT 1

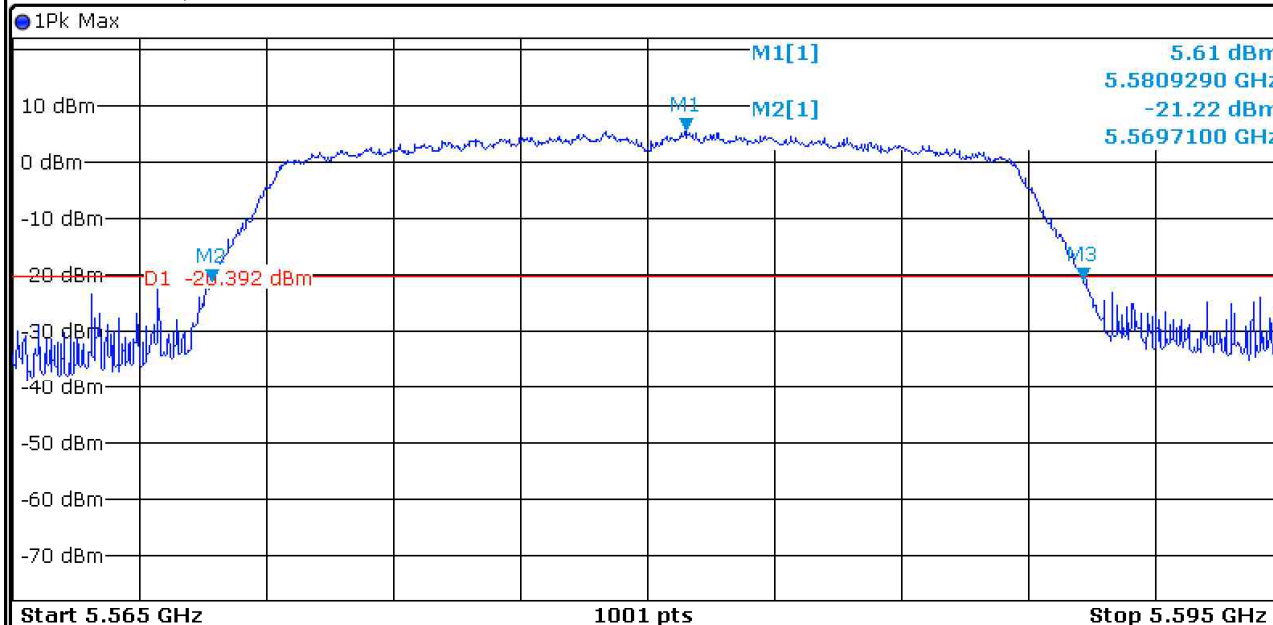


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.580929 GHz	5.61 dBm		
M2		1	5.56971 GHz	-21.22 dBm		
M3		1	5.56971 GHz	-20.77 dBm		

Ready



Date: 19.AUG.2020 15:32:47



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4.5.2.33 11AC20_140 ANT 1

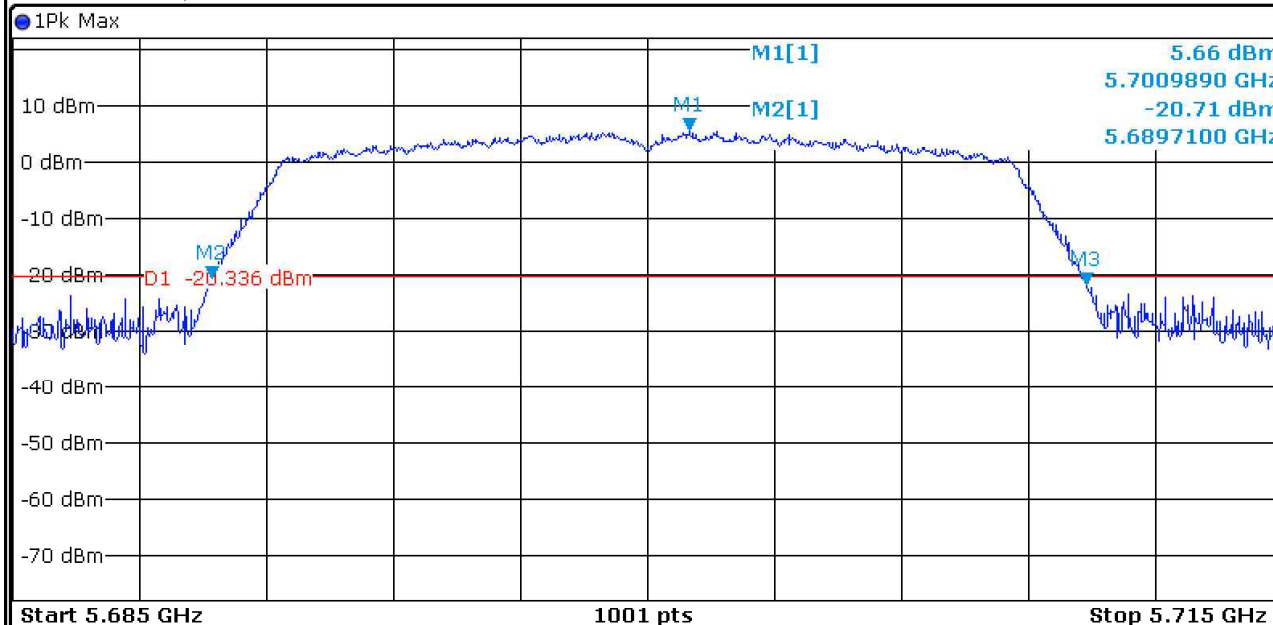


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 300 kHz

Att 30 dB SWT 100 ms VBW 1 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.700989 GHz	5.66 dBm		
M2		1	5.68971 GHz	-20.71 dBm		
M3		1	5.71035 GHz	-21.58 dBm		

Ready



Date: 19.AUG.2020 15:34:05



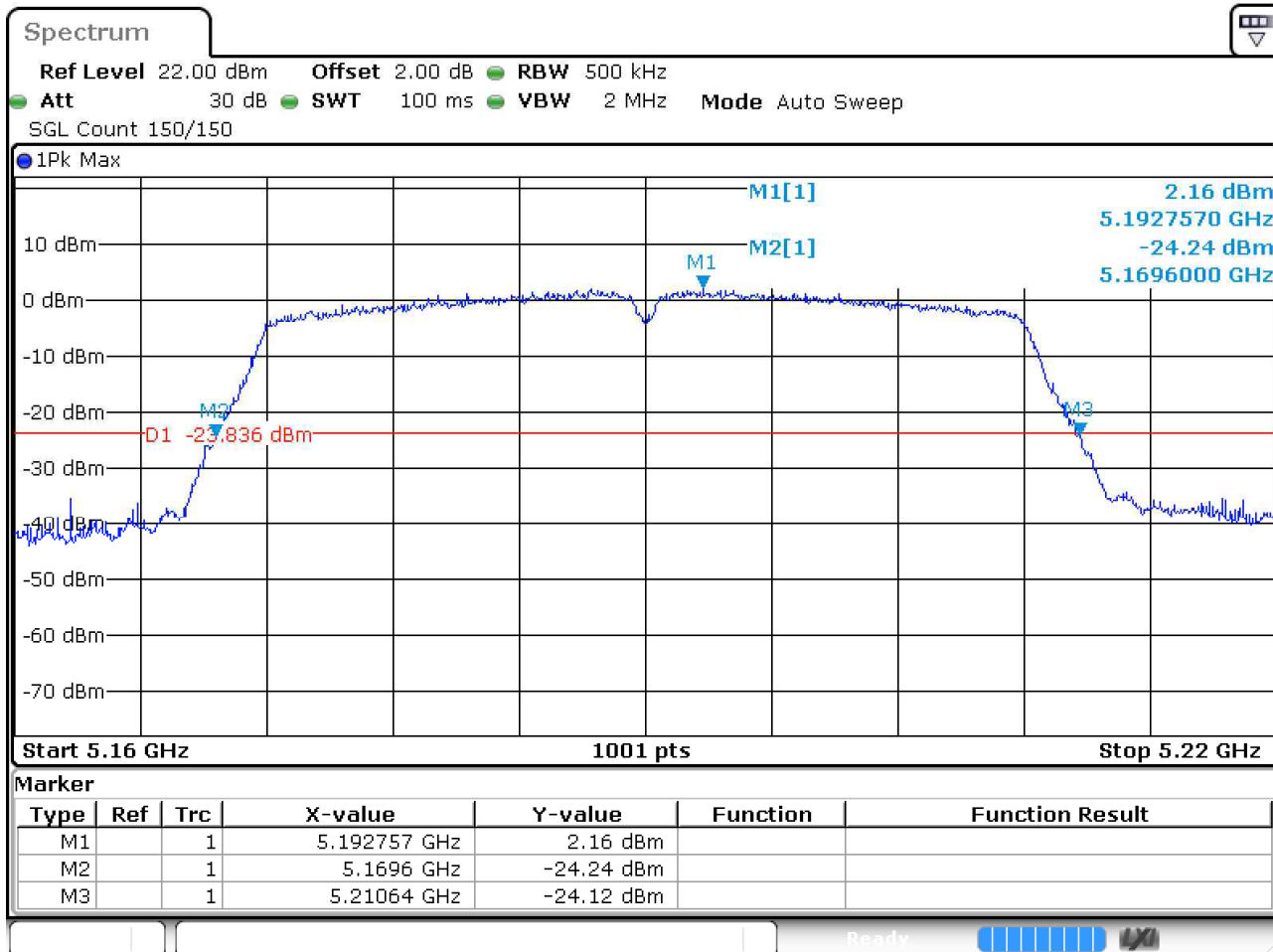
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4.5.2.34 11AC40_38 ANT 1



Date: 19.AUG.2020 15:40:17



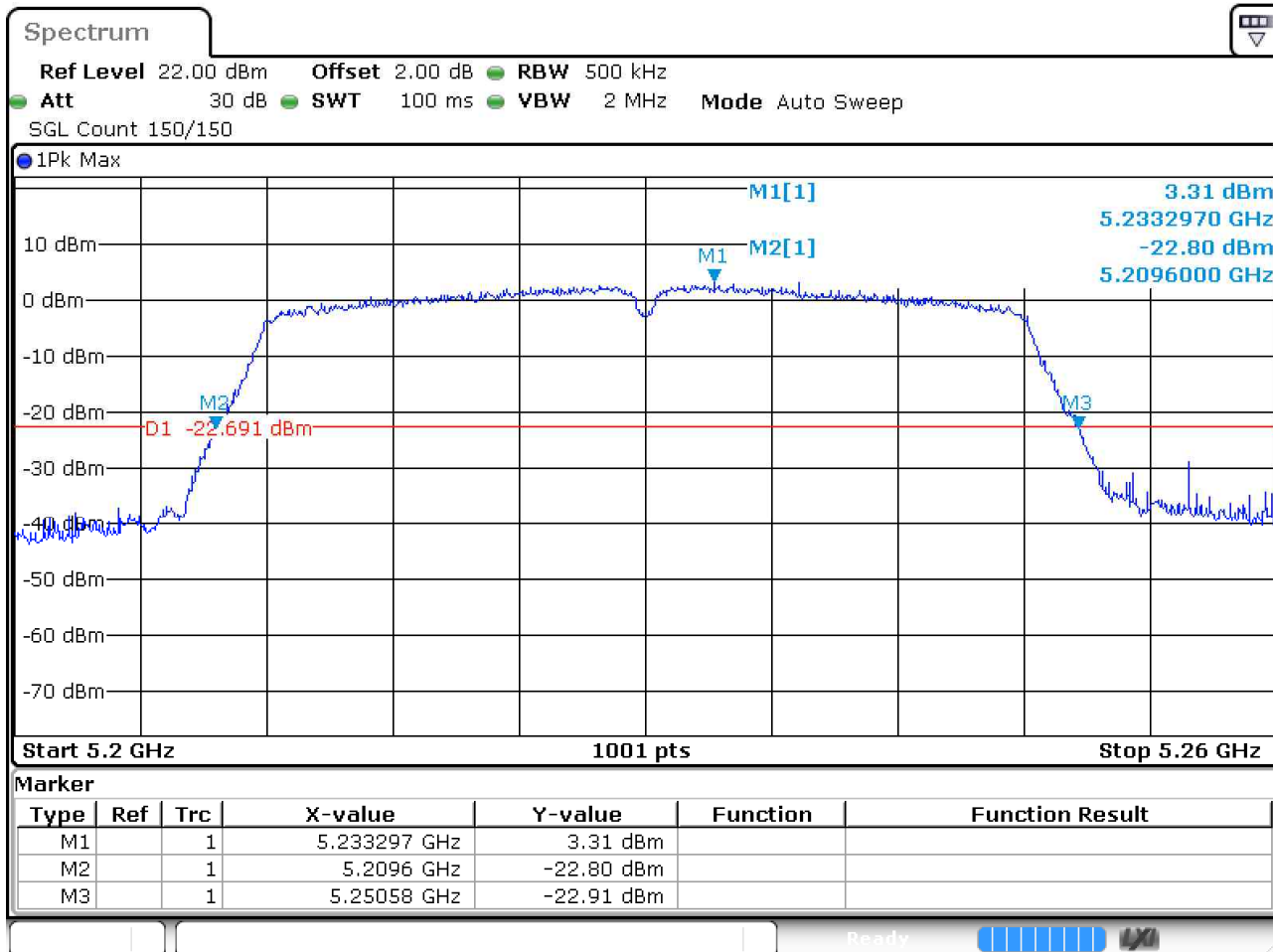
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4.5.2.35 11AC40_46 ANT 1



Date: 19.AUG.2020 15:41:35





4.5.2.36

11AC40_54 ANT 1

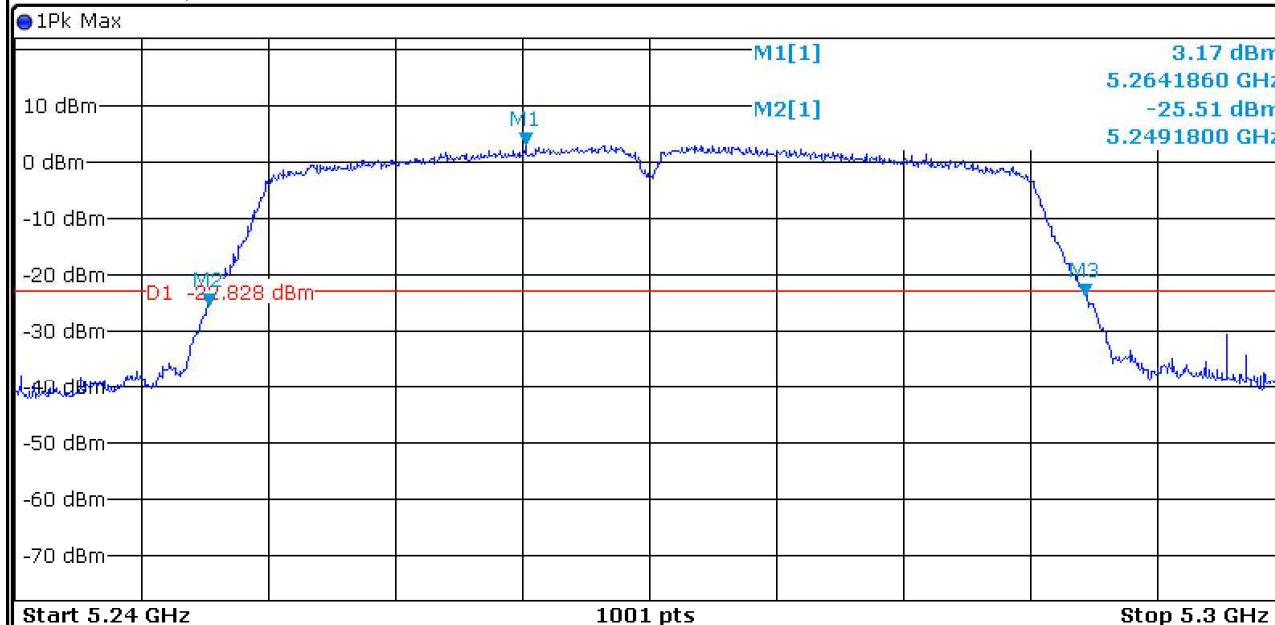


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.264186 GHz	3.17 dBm		
M2		1	5.24918 GHz	-25.51 dBm		
M3		1	5.29058 GHz	-23.70 dBm		

Ready



Date: 19.AUG.2020 15:43:55



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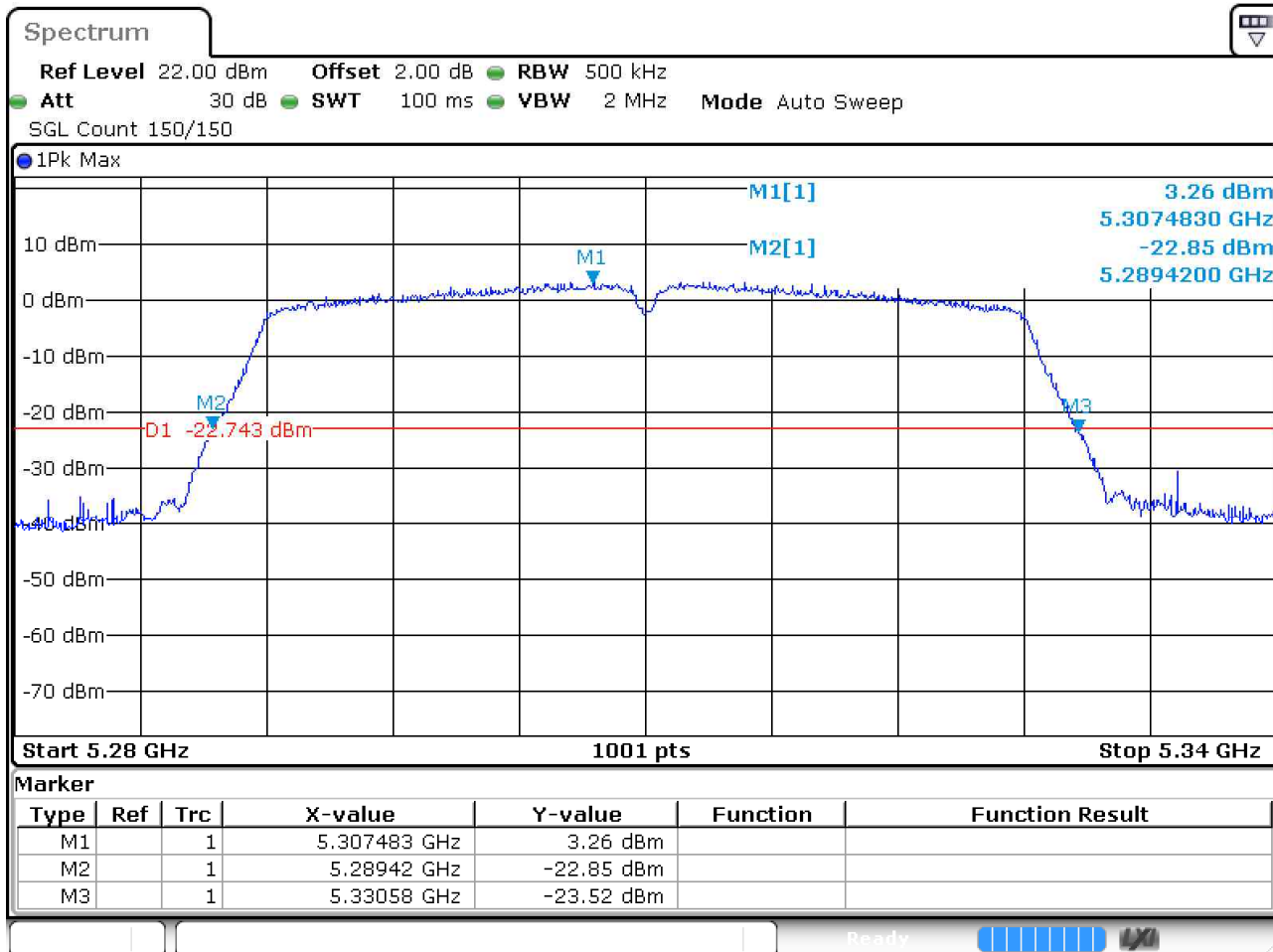
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4.5.2.37 11AC40_62 ANT 1



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4.5.2.38

11AC40_102 ANT 1

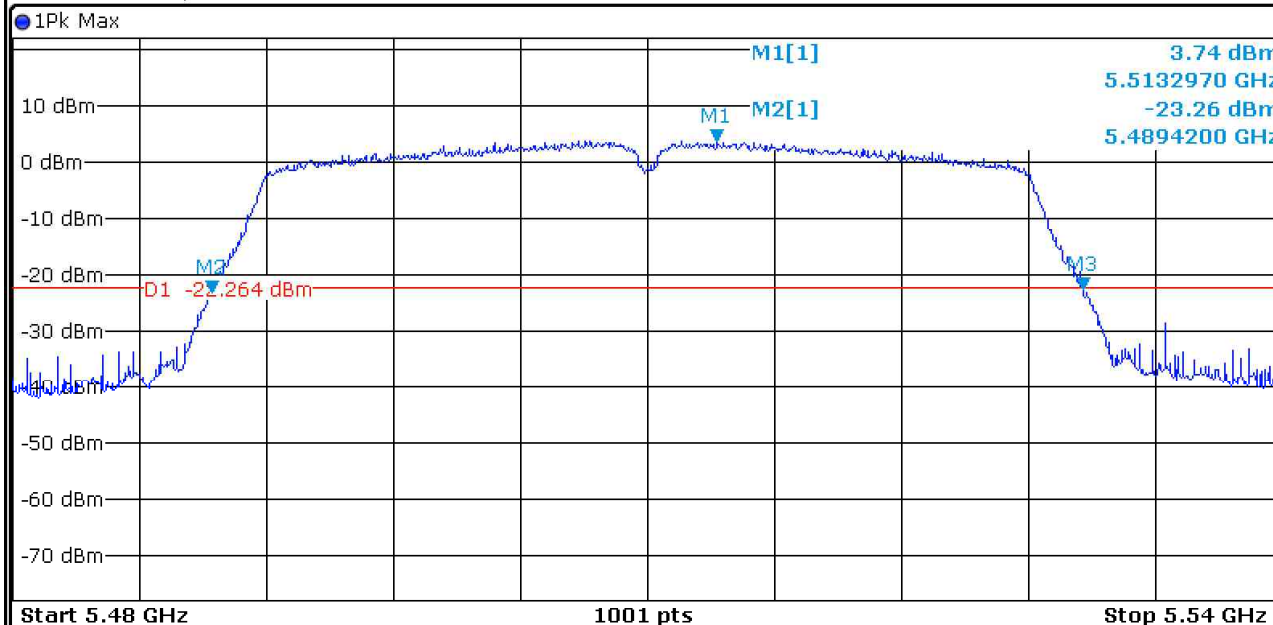


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.513297 GHz	3.74 dBm		
M2		1	5.48942 GHz	-23.26 dBm		
M3		1	5.53058 GHz	-22.50 dBm		

Ready



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4.5.2.39 11AC40_110 ANT 1

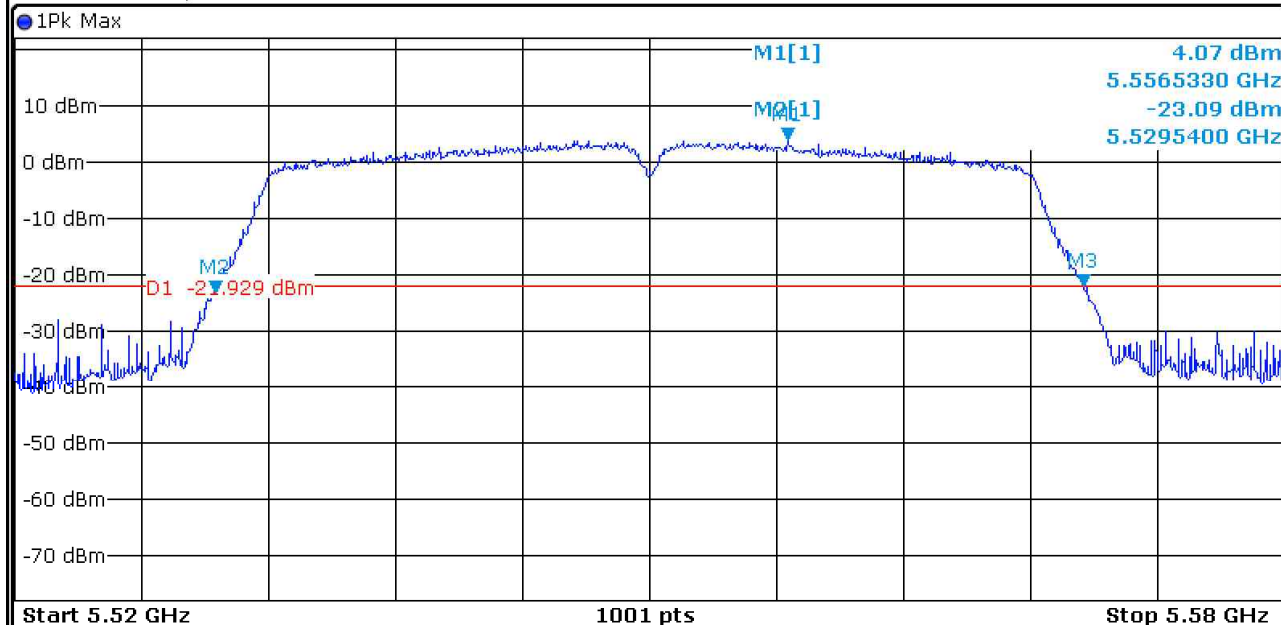


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.556533 GHz	4.07 dBm		
M2		1	5.52954 GHz	-23.09 dBm		
M3		1	5.52952 GHz	-22.00 dBm		

Ready



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4.5.2.40

11AC40_134 ANT 1

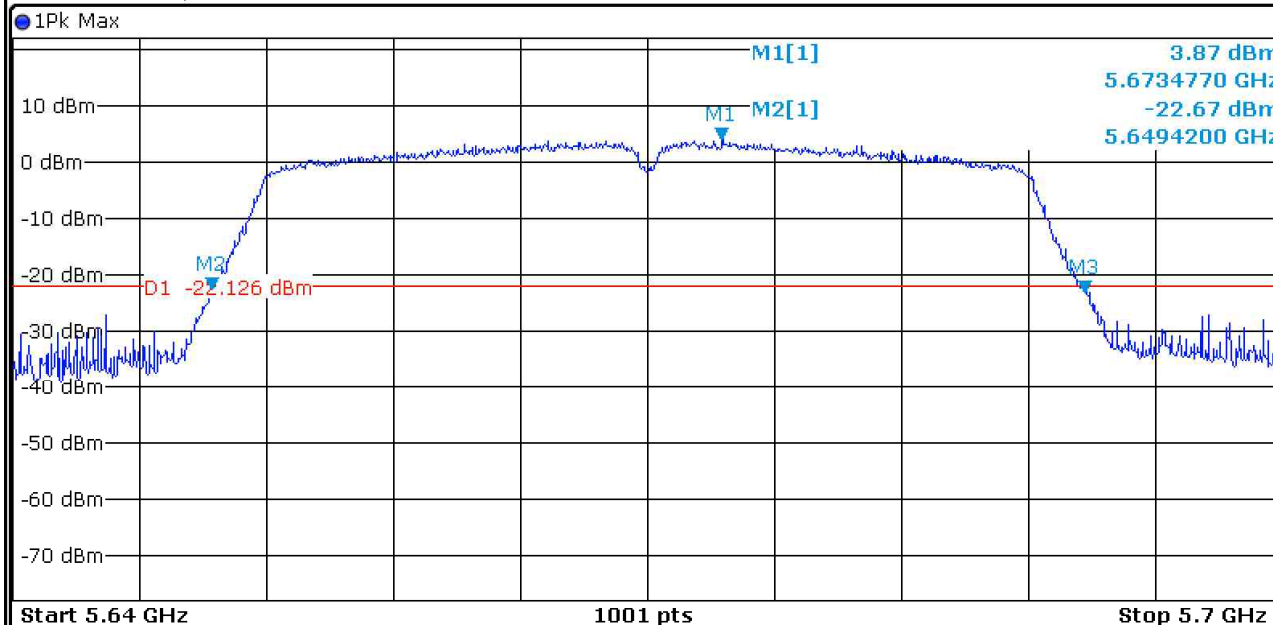


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 500 kHz

Att 30 dB SWT 100 ms VBW 2 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.673477 GHz	3.87 dBm		
M2		1	5.64942 GHz	-22.67 dBm		
M3		1	5.69064 GHz	-23.06 dBm		

Ready



Date: 19.AUG.2020 15:49:32



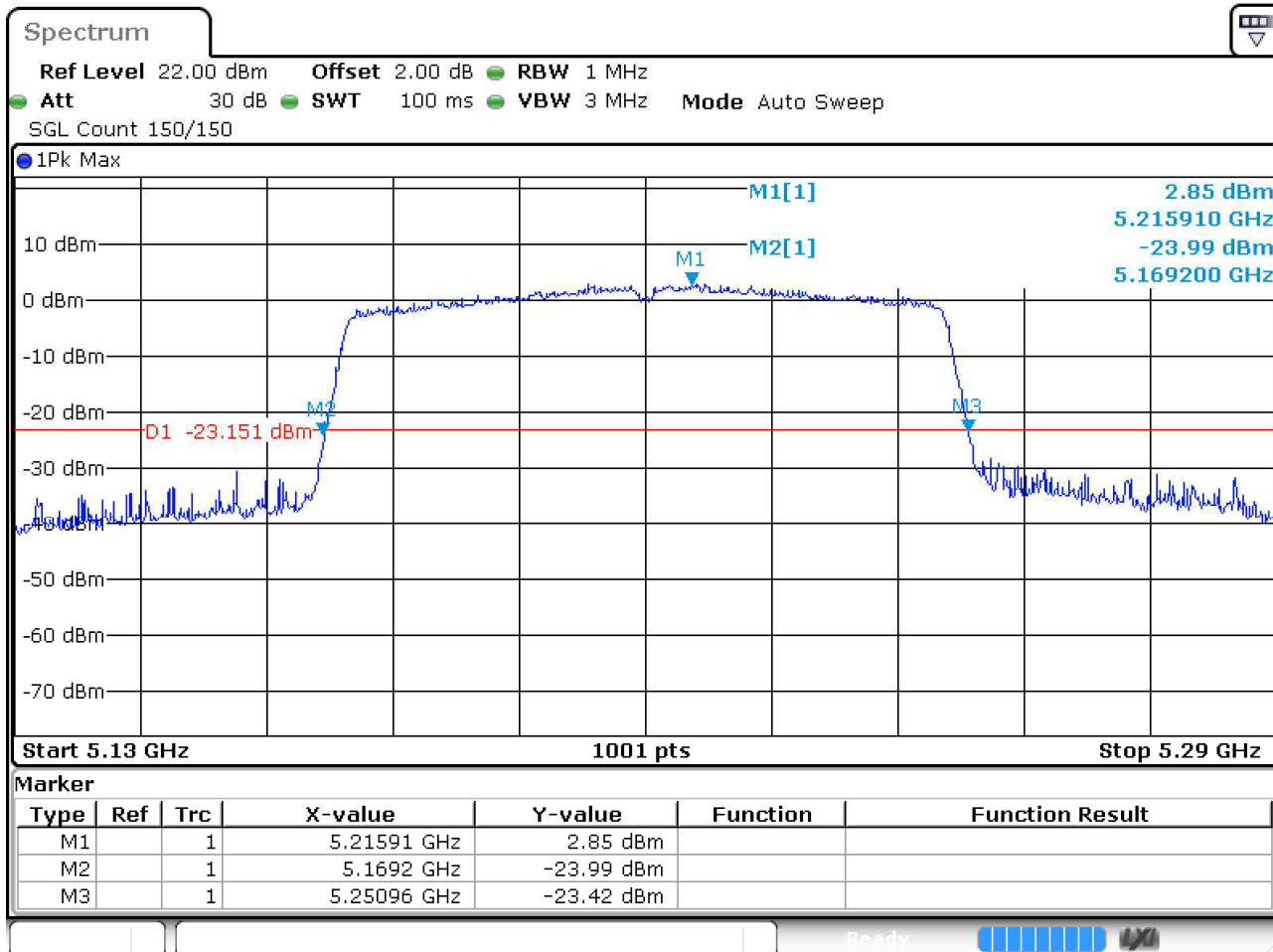
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4.5.2.41 11AC80_42 ANT 1



Date: 19.AUG.2020 15:54:10



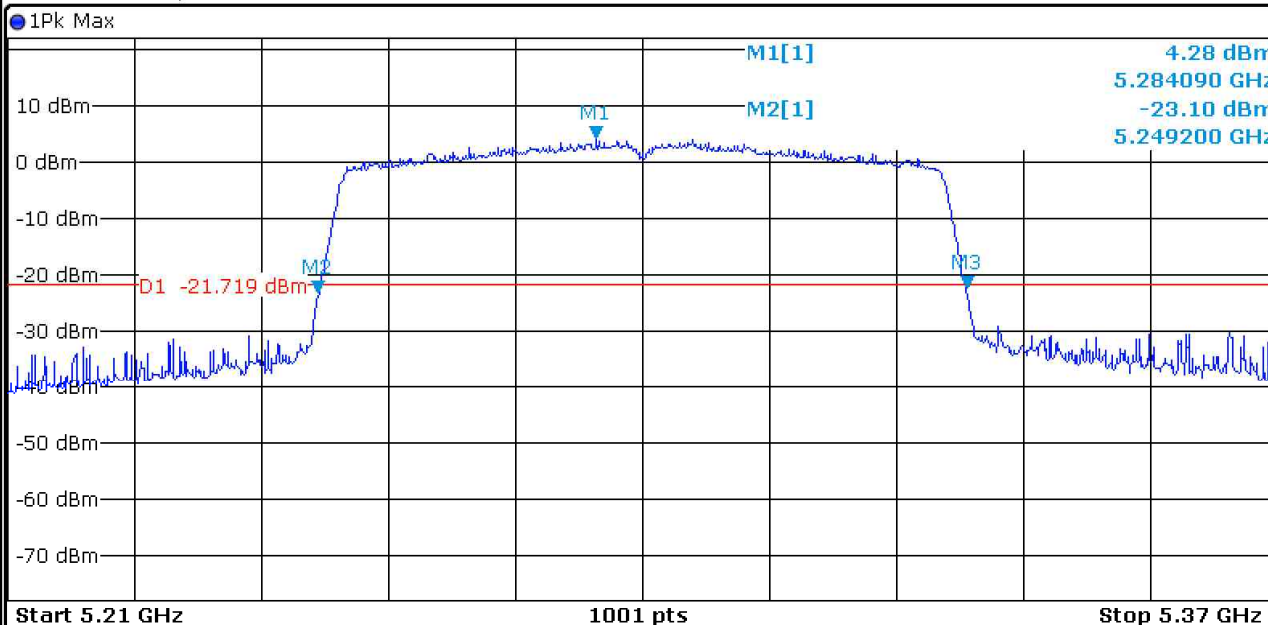


4.5.2.42 11AC80_58 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 1 MHz
Att 30 dB SWT 100 ms VBW 3 MHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.28409 GHz	4.28 dBm		
M2		1	5.2492 GHz	-23.10 dBm		
M3		1	5.3308 GHz	-22.15 dBm		

Ready



Date: 19.AUG.2020 15:55:49



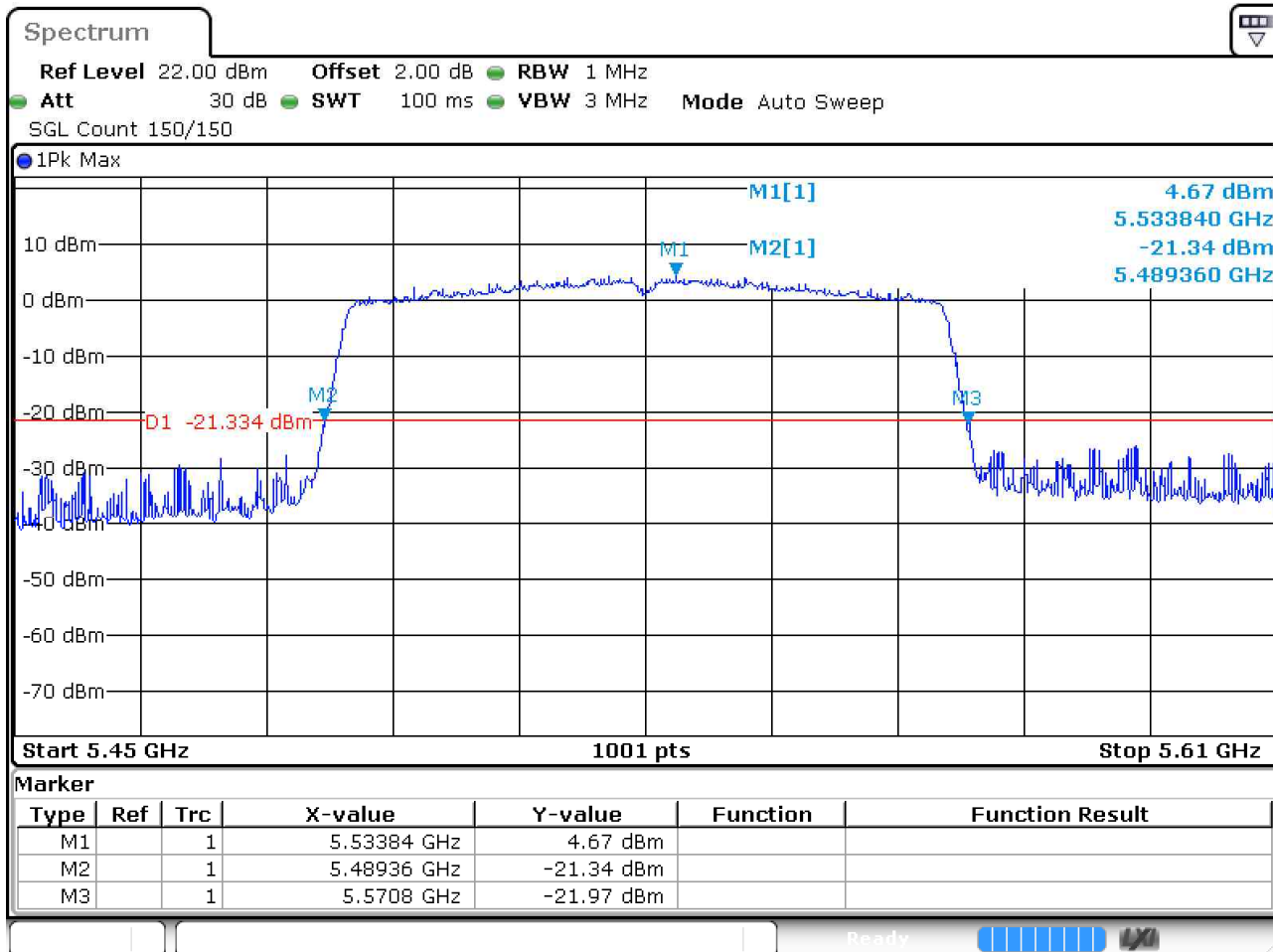
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4.5.2.43 11AC80_106 ANT 1



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4.5.2.44 11AC80_122 ANT 1

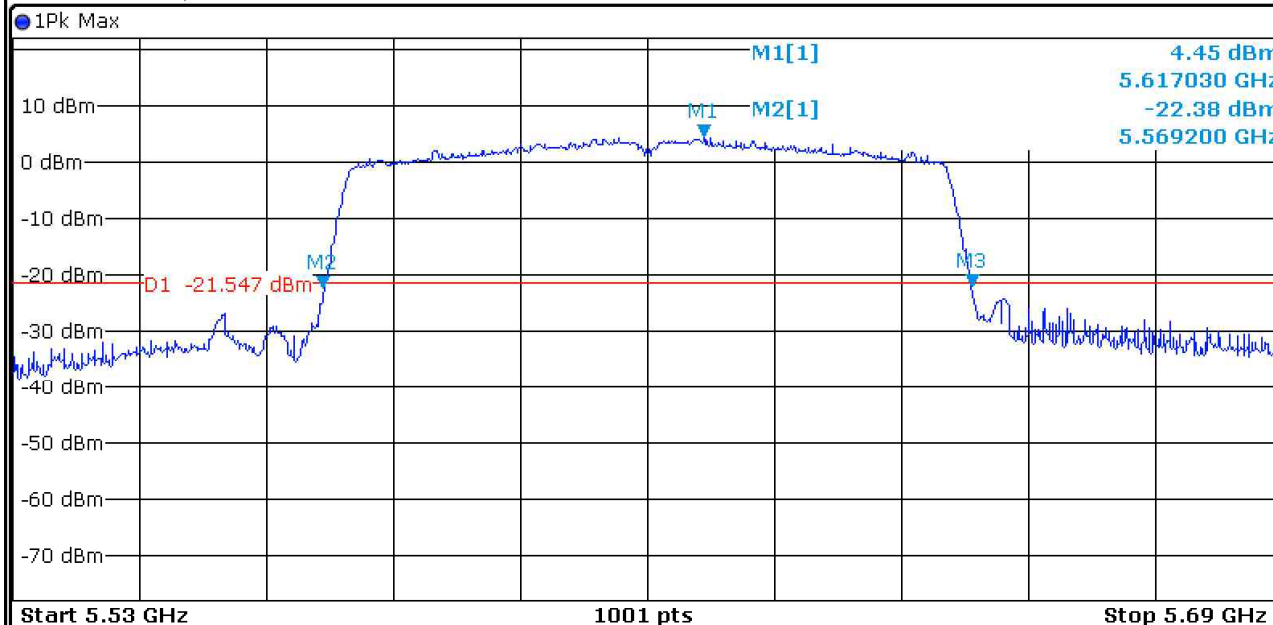


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 1 MHz

Att 30 dB SWT 100 ms VBW 3 MHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.61703 GHz	4.45 dBm		
M2		1	5.5692 GHz	-22.38 dBm		
M3		1	5.6508 GHz	-21.88 dBm		

Ready



Date: 19.AUG.2020 15:58:32



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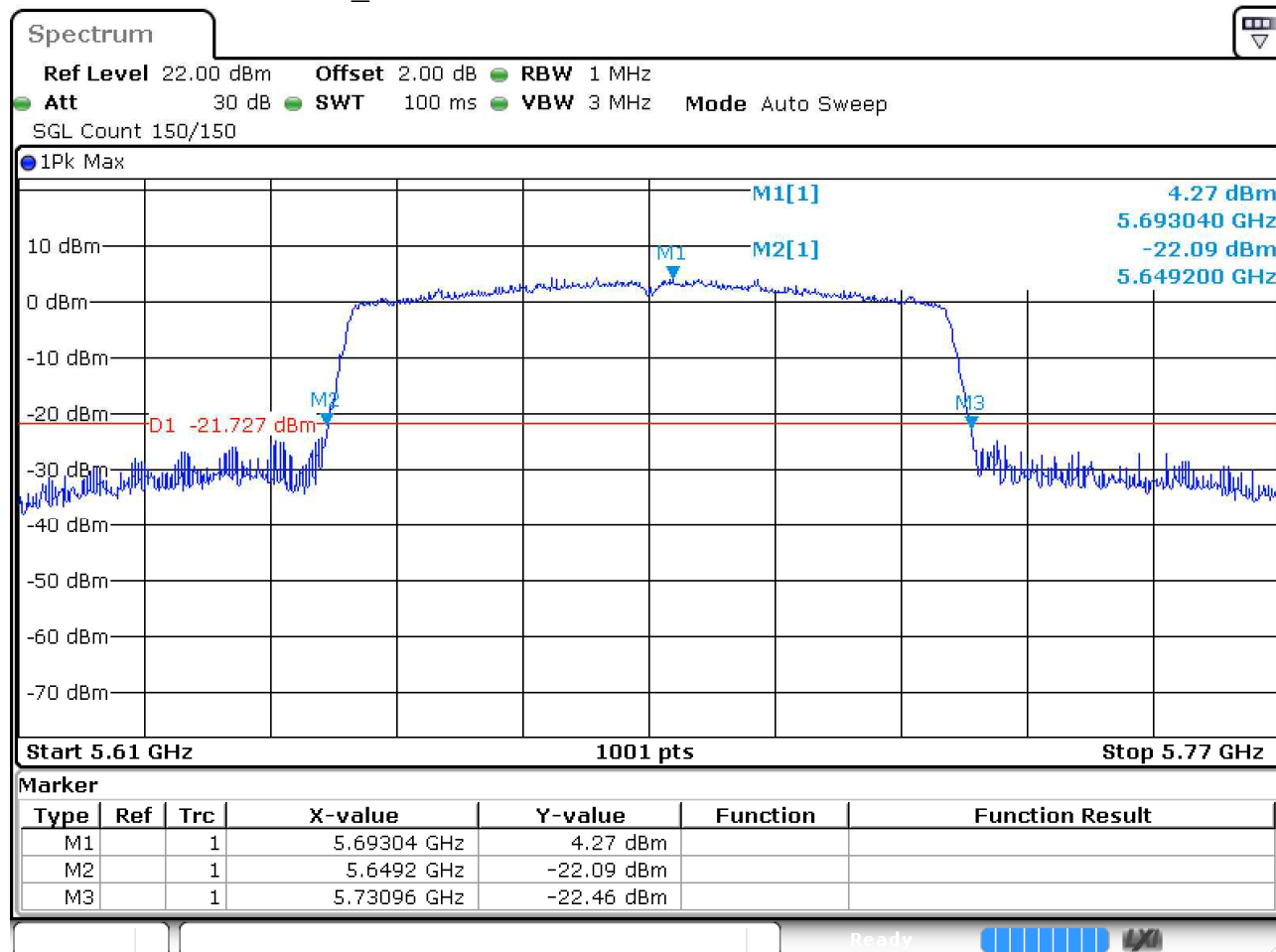
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4.5.2.45 11AC80_138 ANT 1



Date: 19.AUG.2020 15:59:53





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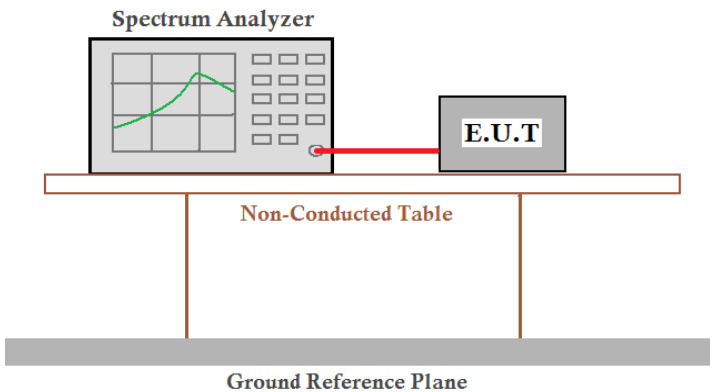
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4.6 6dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(e)	
Test Method:	ANSI C63.10: 2013	
Test Setup:		
Test Instruments:	Refer to section 5.10 for details	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a; MCS0 of rate is the worst case of 802.11n(HT20); MCS0 of rate is the worst case of 802.11n(HT40); MCS0 of rate is the worst case of 802.11ac(HT20); MCS0 of rate is the worst case of 802.11ac(HT40); MCS0 of rate is the worst case of 802.11ac(HT80). Only the worst case is recorded in the report.	
Limit:	Frequency Band	Limit
	5725-5850MHz	At lease 500kHz
Test Results:	Pass	





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4.6.1 Test Results for 6dB Emission Bandwidth

Test Mode	Test Channel	Frequency [MHz]	ANT	6dB Emission Bandwidth [MHz]	Verdict
11A20	149	5745	ANT 1	15.21	PASS
	157	5785	ANT 1	15.39	PASS
	165	5825	ANT 1	15.18	PASS
11N20	149	5745	ANT 1	15.18	PASS
	157	5745	ANT 1	15.18	PASS
	165	5825	ANT 1	15.18	PASS
11N40	151	5755	ANT 1	35.28	PASS
	159	5795	ANT 1	35.28	PASS
11AC20	149	5745	ANT 1	15.18	PASS
	149	5785	ANT 1	15.18	PASS
	165	5825	ANT 1	15.18	PASS
11AC40	151	5755	ANT 1	35.28	PASS
	159	5795	ANT 1	35.28	PASS
11AC80	155	5775	ANT 1	75.52	PASS



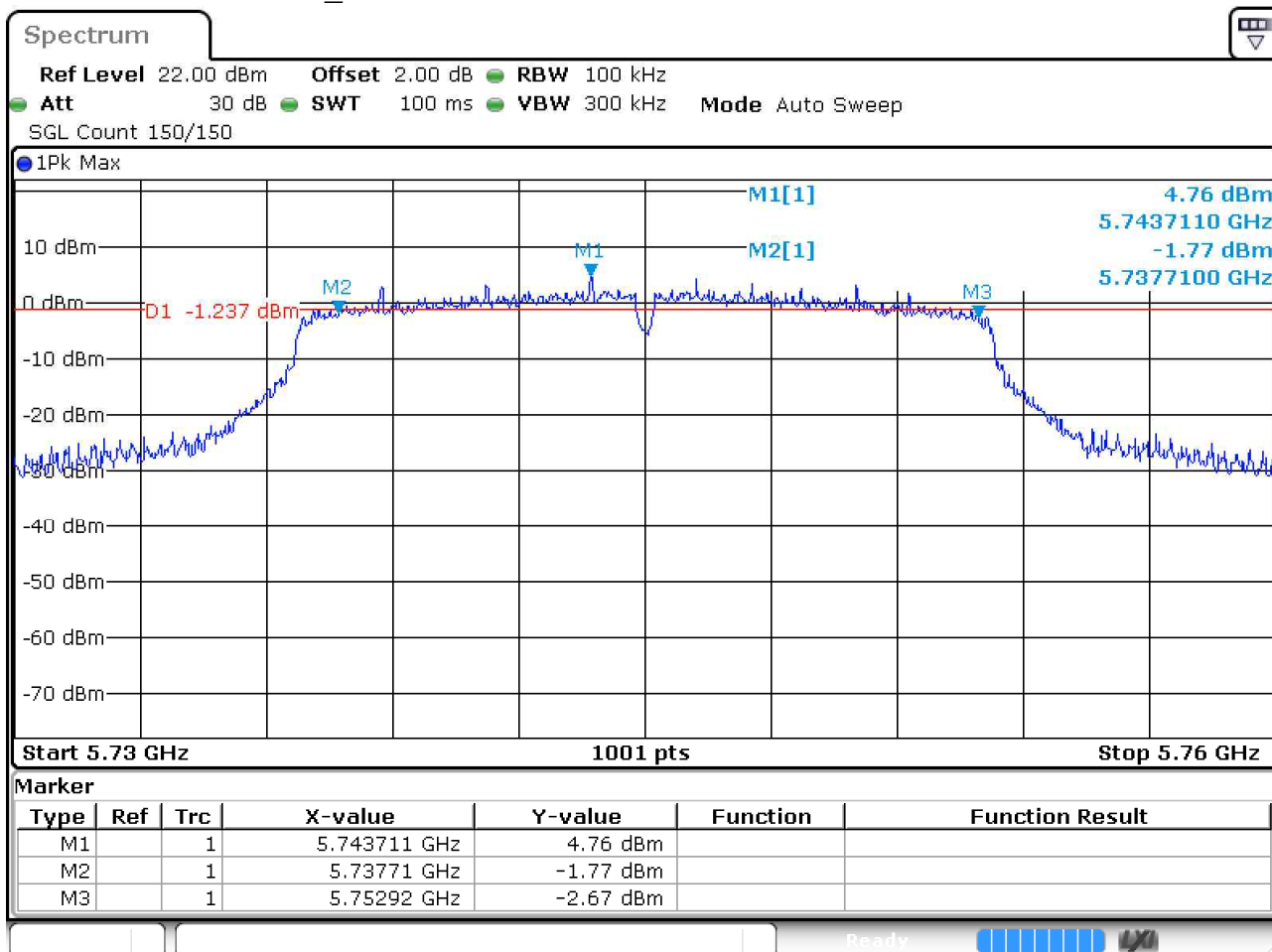
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4.6.2 Plots for 6dB Emission Bandwidth

4.6.2.1 11A20_149 ANT 1



Date: 19.AUG.2020 14:45:29



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4.6.2.2

11A20_157ANT 1

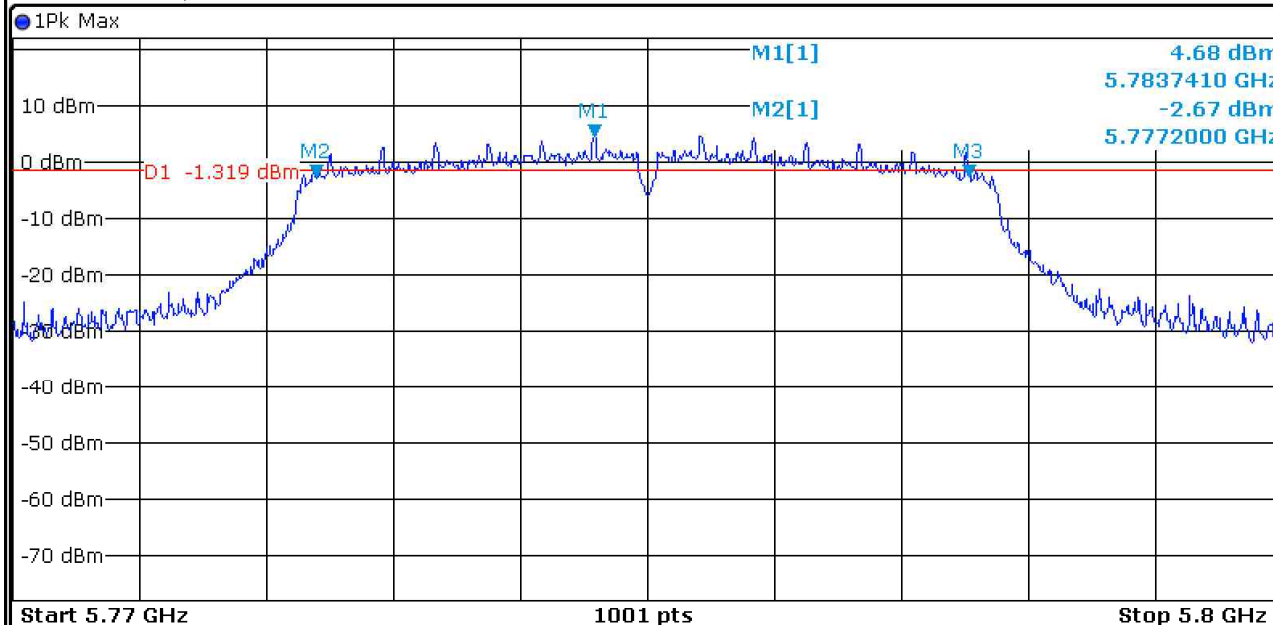


Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 100 kHz

Att 30 dB SWT 100 ms VBW 300 kHz Mode Auto Sweep

SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.783741 GHz	4.68 dBm		
M2		1	5.7772 GHz	-2.67 dBm		
M3		1	5.79259 GHz	-2.70 dBm		

Ready



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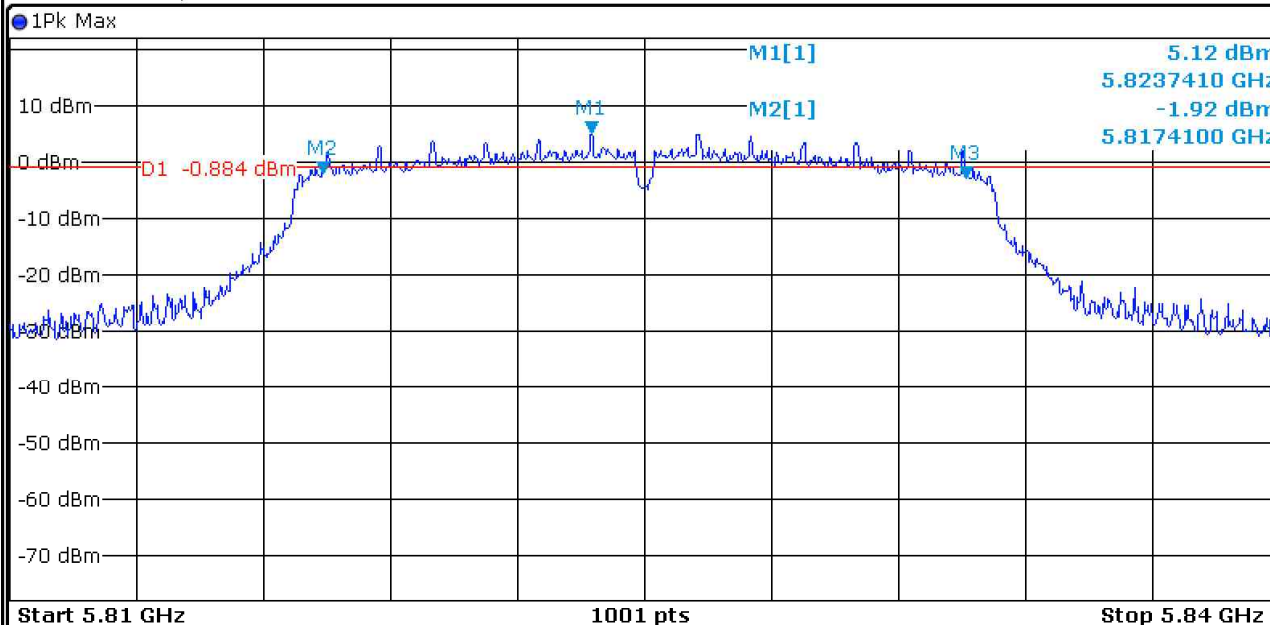
4.6.2.3

11A20_165 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 100 kHz
Att 30 dB SWT 100 ms VBW 300 kHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.823741 GHz	5.12 dBm		
M2		1	5.81741 GHz	-1.92 dBm		
M3		1	5.83259 GHz	-2.84 dBm		

Ready



Date: 19.AUG.2020 14:48:37



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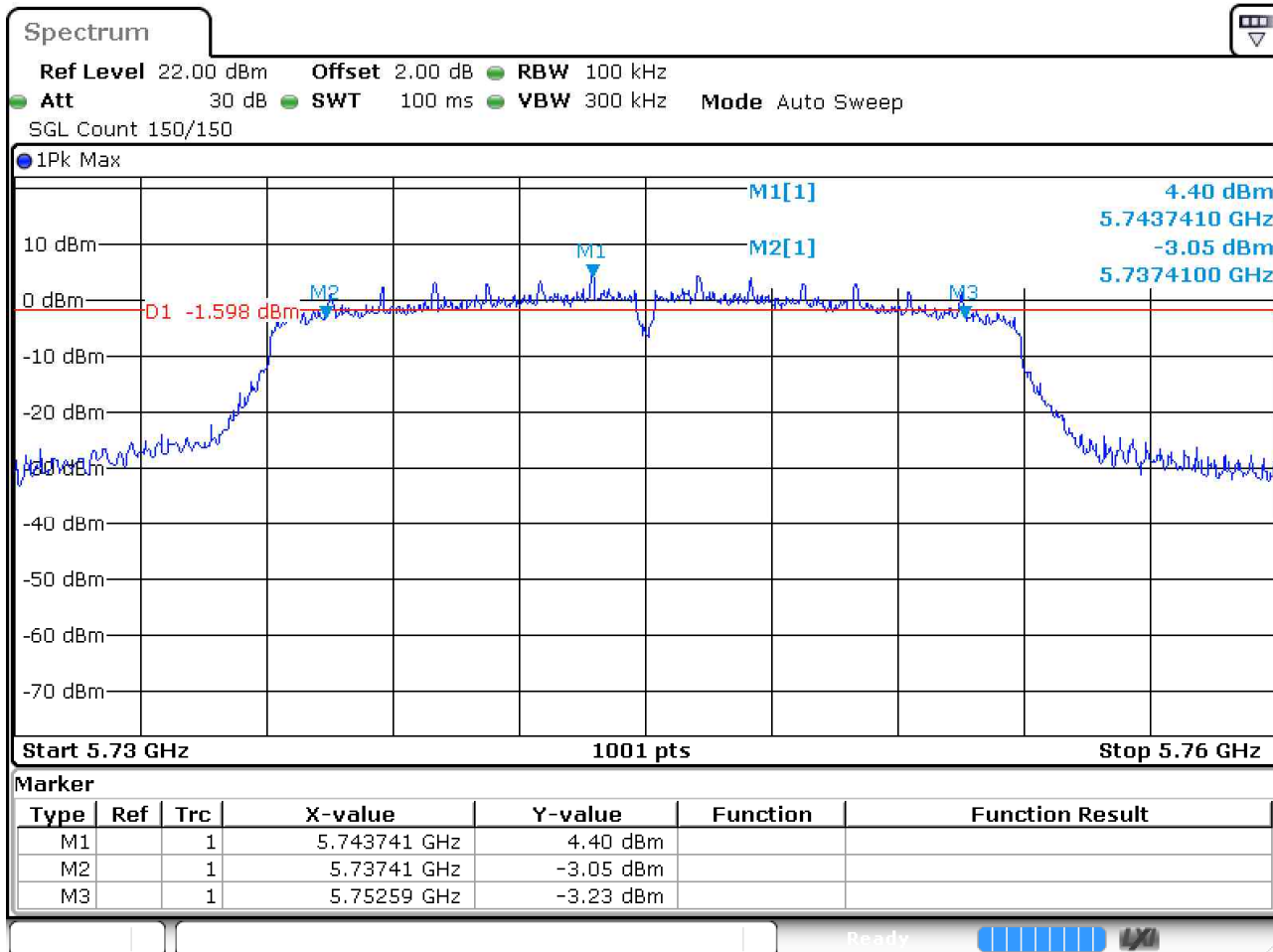


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4.6.2.4 11N20_149 ANT 1



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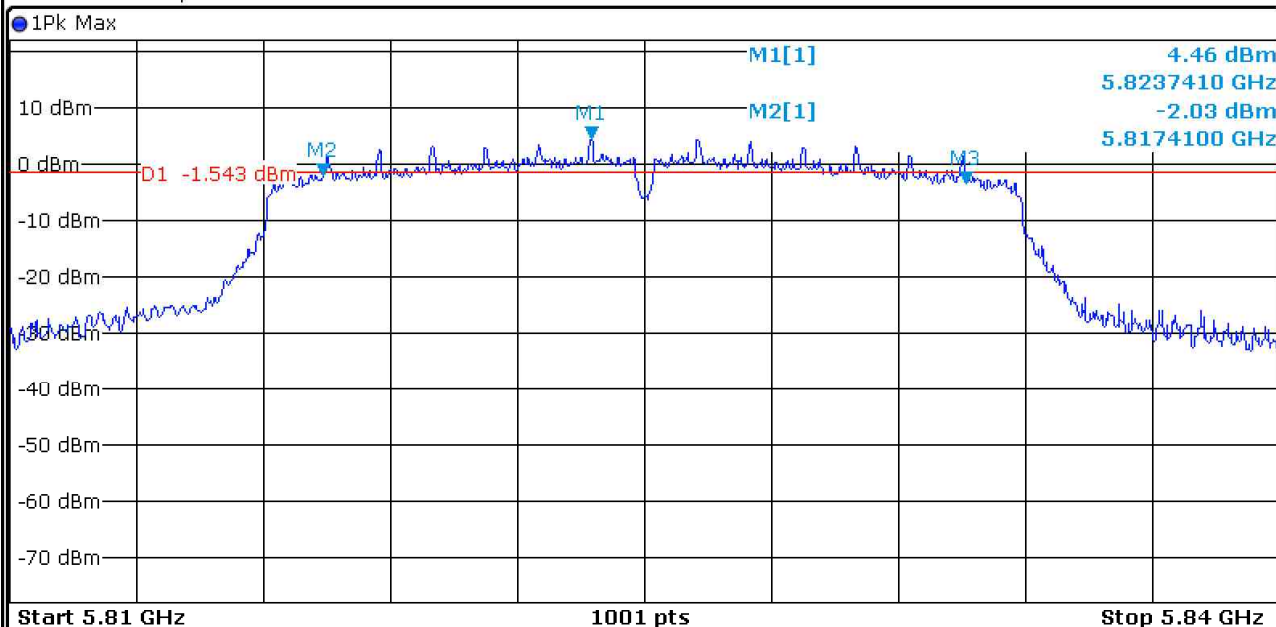
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4.6.2.5 11N20_165 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 100 kHz
Att 30 dB SWT 100 ms VBW 300 kHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.823741 GHz	4.46 dBm		
M2		1	5.81741 GHz	-2.03 dBm		
M3		1	5.83259 GHz	-3.30 dBm		

Ready



Date: 19.AUG.2020 15:07:39



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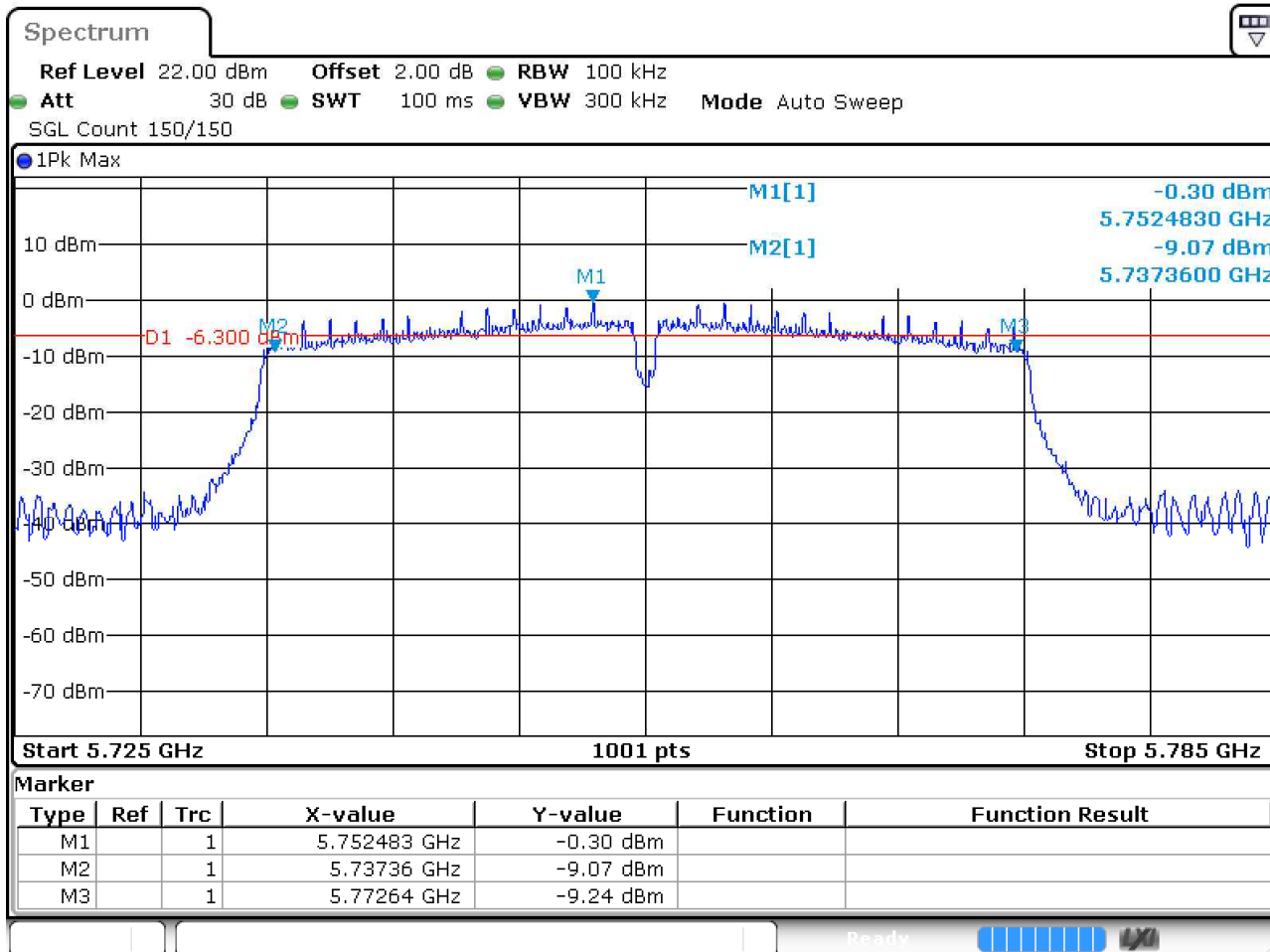
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4.6.2.6

11N40_151 ANT 1



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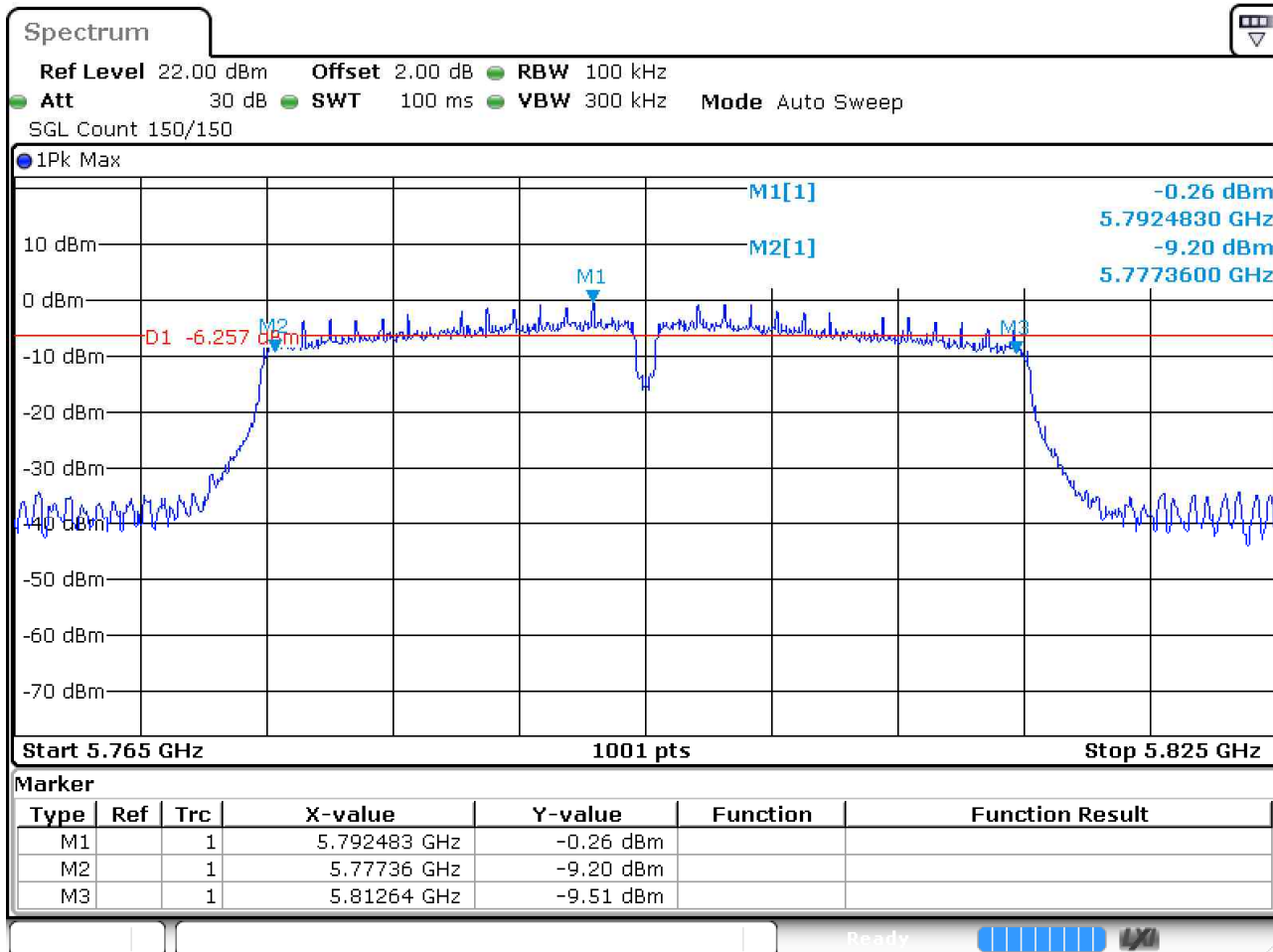
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11N40_159 ANT 1



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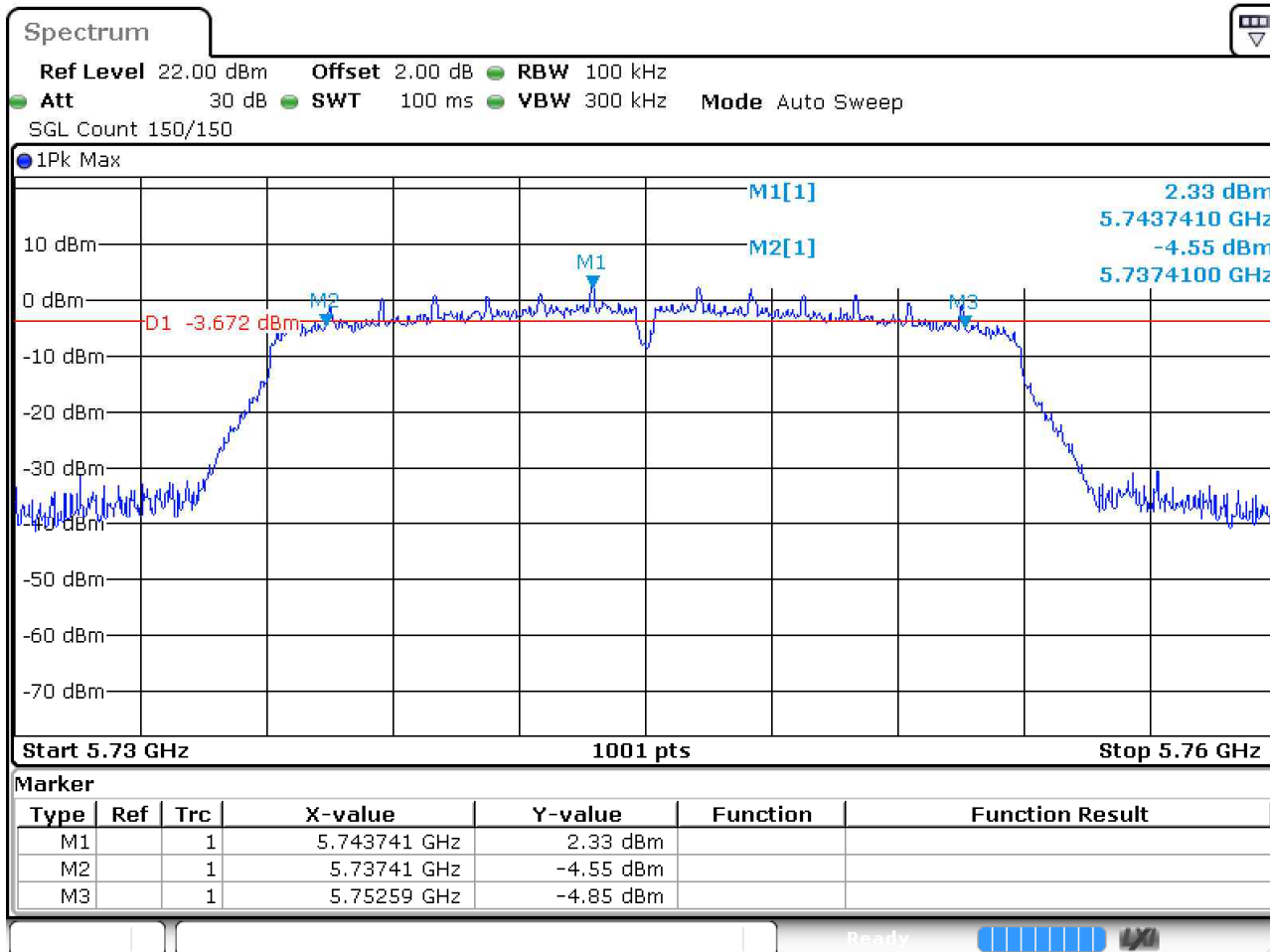
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4.6.2.8

11AC20_149 ANT 1



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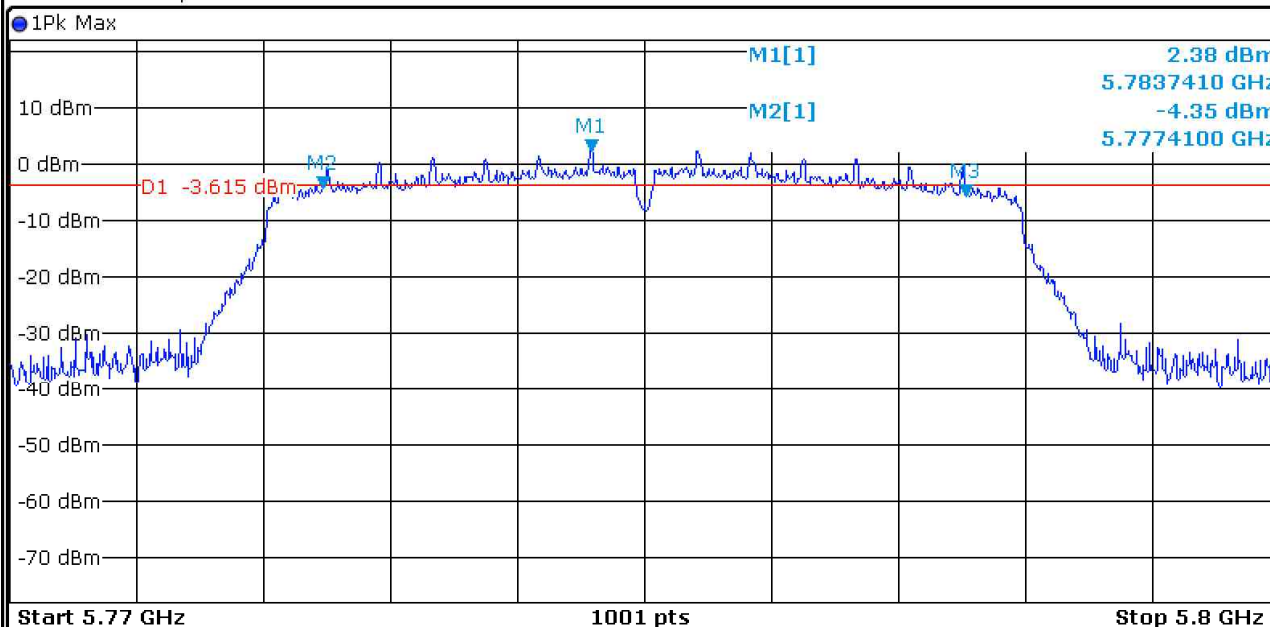
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4.6.2.9 11AC20_157 ANT 1



Spectrum

Ref Level 22.00 dBm Offset 2.00 dB RBW 100 kHz
Att 30 dB SWT 100 ms VBW 300 kHz Mode Auto Sweep
SGL Count 150/150



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.783741 GHz	2.38 dBm		
M2		1	5.77741 GHz	-4.35 dBm		
M3		1	5.79259 GHz	-5.80 dBm		

Ready



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