FCC 47 CFR PART 24 SUBPART E

TEST REPORT

For

ActiveHome

Model No.: AH11-22-11

Trade Name: Upstreem S.A

Issued to

UPSTREEM S.A
Rue de Gosselies 13/9 Jumet 6040 Belgium

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)
Issued Date: July 22, 2021

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 22, 2021	Initial Issue	ALL	Doris Chu

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1. TEST RESULT CERTIFICATION

Applicant: UPSTREEM S.A
Rue de Gosselies 13/9 Jumet 6040 Belgium

Manufacturer: IMEC Taiwan Co.
4F. No.6-2, Dusing Rd., Hsinchu Science Park, Hsinchu, Taiwan

Equipment Under Test: ActiveHome

Trade Name: Upstreem S.A

Model No.: AH11-22-11

Date of Test: March 29 ~ April 21, 2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR PART 24 SUBPART E	No non-compliance noted
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA -603-E and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rule FCC PART 22 Subpart H, and PART 24 Subpart E.

Approved by:

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	ActiveHome	
Model No.	AH11-22-11	
Model Discrepancy	N/A	
Trade	Upstreem S.A	
Received Date	March 8, 2021	
Power Supply	1. Power from Adapter. Microsoft Japan Co., Ltd / 1621 I/P: 100-240VAC, 50/60Hz, 0.18A O/P: 5.0VDC, 1.2A 2. Power from Battery. Rating: 3.7Vdc, 650mAh	
Frequency Range	Cat-M1 Band 2 Channel Bandwidth: 1.4MHz	1850.7MHz ~1909.2MHz
	Cat-M1 Band 2 Channel Bandwidth: 3MHz	1851.5 MHz ~ 1908.4 MHz
	Cat-M1 Band 2 Channel Bandwidth: 5MHz	1852.5MHz ~1907.5MHz
	Cat-M1 Band 2 Channel Bandwidth: 10MHz	1855MHz ~1905MHz
	Cat-M1 Band 2 Channel Bandwidth: 15MHz	1857.5 MHz ~ 1902.5 MHz
	Cat-M1 Band 2 Channel Bandwidth: 20MHz	1860MHz ~1900MHz
Modulation Technique	Cat-M1 Band 2	QPSK, 16QAM
Antenna Specification	Antenna type: FPC Antenna / Gain: 4.7 dBi	

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to C63.26: 2015, FCC CFR 47, Part 2 and Part 24 Subpart E.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 DESCRIPTION OF TEST MODES

The EUT (Model: AH11-22-11) had been tested under operating condition.
The EUT be set in maximum power transmission via call box during testing.

LTE Band 2: 1850MHz ~ 1910MHz
Three channels had been tested for each channel bandwidth.

Channel	1.4MHz		3MHz		5MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Lowest	18607	1850.7	18615	1851.5	18625	1852.5
Middle	18900	1880.0	18900	1880.0	18900	1880.0
Highest	19193	1909.2	19184	1908.4	19175	1907.5
Channel	**10MHz**		**15MHz**		**20MHz**	
	Channel	**Frequency(MHz)**	**Channel**	**Frequency(MHz)**	**Channel**	**Frequency(MHz)**
Lowest	18650	1855.0	18675	1857.5	18700	1860.0
Middle	18900	1880.0	18900	1880.0	18900	1880.0
Highest	19150	1905.0	19125	1902.5	19100	1900.0

3.2.1 The worst mode of measurement

Radiated Emission Measurement Above 1G	
Test Condition	**Radiated Emission Above 1G**
Power supply Mode	**Mode 1: EUT power by Adapter** **Mode 2: EUT power by Battery**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**
Worst Position	**☒ Placed in fixed position at X-Plane (E2-Plane)**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Adapter** **Mode 2: EUT power by Battery**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in axis X and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report

4. TEST SUMMARY

FCC Standard Sec.	Report Section	Test Item	Result
-	2	Antenna Requirement	Pass
24.232(c)	8.1	EIRP Measurement	Pass
2.1055, 24.235	8.2	Frequency Stability v.s. temperature measurement	Pass
2.1049	8.3	Occupied Bandwidth Measurement	Pass
24.232(d)	8.4	Peak to Average Ratio	Pass
24.238(a)	8.5	Conducted Band Edge	Pass
24.238(a)	8.6	Conducted Spurious Emission	Pass
24.238(a)	8.7	Spurious Radiation Measurement	Pass

5. INSTRUMENT CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/08/2021	02/07/2022
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/24/2021	02/23/2022
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
Loop Ant	COM-POWER	AL-130	121051	04/07/2021	04/06/2022
Pre-Amplifier	EMEC	EM330	060609	02/24/2021	02/23/2022
Pre-Amplifier	HP	8449B	3008A00965	12/25/2020	12/24/2021
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	07/23/2021
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Radio Communication Analyzer	Anritsu	MT-8820C	6201240043	07/17/2020	07/16/2021
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021
Wideband Radio Communication Tester	R&S	CMW 500	116875	07/19/2020	07/18/2021
Software	e3 6.11-20180413				

RF Conducted Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Coaxial Cable	Woken	WC12	CC001	06/29/2020	06/28/2021
Coaxial Cable	Woken	WC12	CC003	06/29/2020	06/28/2021
Power Divider	Solvang Technology	STI08-0015	008	08/05/2020	08/04/2021
Signal Analyzer	R&S	FSV 40	101561	08/17/2020	08/16/2021
Thermostatic/Humidity Chamber	GWINSTEK	GTC-288MH-CC	TH160402	05/07/2020	05/06/2021
Radio Communication Analyzer	Anritsu	MT-8821C	6201300618	05/27/2020	05/26/2021
Software	N/A				

Remark: Each piece of equipment is scheduled for calibration once a year.

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
Tel: 886-2-2299-9720 / Fax: 886-2-2299-9721

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID
1.	DC Power Source	Agilent	E3640A	N/A	N/A

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8. FCC PART 24 REQUIREMENTS

8.1 EIRP MEASUREMENT

LIMIT

According to FCC §2.1046

FCC 24.232(b):

The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

TEST PROCEDURES

CONDUCTED POWER MEASUREMENT:

1. The transmitter output power was connected to the call box.
2. Set EUT at maximum output power via call box.
3. Set Call box at lowest, middle and highest channels for each band and modulation.

TEST RESULTS

No non-compliance noted.

Temperature: 22.4℃ **Humidity:** 52.1% RH
Tested by: Dally Hong **Test Date:** April 15, 2021

LTE Band 2

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18607	18900	19193	18607	18900	19193
						1850.7 MHz	1880 MHz	1909.3 MHz	1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	21.94	21.74	21.62	**26.64**	26.44	26.32
			1	2	0	21.93	21.71	21.58	26.63	26.41	26.28
			1	5	0	21.81	21.45	21.39	26.51	26.15	26.09
			3	0	0	20.73	20.67	20.68	25.43	25.37	25.38
			3	2	0	20.71	20.38	20.64	25.41	25.08	25.34
			3	3	0	20.70	20.28	20.61	25.40	24.98	25.31
			6	0	0	19.77	19.45	19.76	24.47	24.15	24.46
		16QAM	1	0	0	20.89	20.96	20.84	25.59	25.66	25.54
			1	2	0	20.82	20.76	20.68	25.52	25.46	25.38
			1	5	0	20.68	20.37	20.57	25.38	25.07	25.27
			3	0	0	20.02	19.63	19.65	24.72	24.33	24.35
			3	2	0	19.86	19.32	19.43	24.56	24.02	24.13
			3	3	0	19.41	19.20	19.30	24.11	23.90	24.00
			5	0	0	19.69	19.67	19.95	24.39	24.37	24.65

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18615	18900	19185	18615	18900	19185
						1851.5 MHz	1880 MHz	1908.5 MHz	1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	21.50	21.41	21.65	26.20	26.11	26.35
			1	2	0	21.57	21.42	21.67	26.27	26.12	**26.37**
			1	5	0	21.30	21.20	21.43	26.00	25.90	26.13
			3	0	0	20.61	20.14	20.54	25.31	24.84	25.24
			3	2	0	20.59	20.12	20.51	25.29	24.82	25.21
			3	3	0	20.50	20.02	20.49	25.20	24.72	25.19
			6	0	0	19.54	19.19	19.66	24.24	23.89	24.36
		16QAM	1	0	0	20.66	20.15	20.92	25.36	24.85	25.62
			1	2	0	20.62	20.11	20.71	25.32	24.81	25.41
			1	5	0	20.41	20.10	20.68	25.11	24.80	25.38
			3	0	0	19.31	19.08	19.48	24.01	23.78	24.18
			3	2	0	19.29	18.86	19.27	23.99	23.56	23.97
			3	3	0	19.52	18.84	19.15	24.22	23.54	23.85
			5	0	0	19.60	19.26	19.76	24.30	23.96	24.46

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18625	18900	19175	18625	18900	19175
						1852.5 MHz	1880 MHz	1907.5 MHz	1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	21.46	21.54	21.50	26.16	26.24	26.20
			1	2	0	21.40	21.39	21.55	26.10	26.09	26.25
			1	5	0	21.14	21.13	21.29	25.84	25.83	25.99
			3	0	0	21.40	21.35	21.73	26.10	26.05	26.43
			3	2	0	21.38	21.32	21.78	26.08	26.02	26.48
			3	3	0	21.37	21.26	21.70	26.07	25.96	26.40
			6	0	0	20.55	20.15	20.76	25.25	24.85	25.46
		16QAM	1	0	0	21.62	21.44	21.84	26.32	26.14	26.54
			1	2	0	21.56	21.38	21.90	26.26	26.08	**26.60**
			1	5	0	21.38	21.19	21.68	26.08	25.89	26.38
			3	0	0	21.46	21.38	21.73	26.16	26.08	26.43
			3	2	0	21.39	21.33	21.84	26.09	26.03	26.54
			3	3	0	21.35	21.06	21.68	26.05	25.76	26.38
			5	0	0	20.73	20.50	21.00	25.43	25.20	25.70

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18650	18900	18150	18650	18900	18150
						1855 MHz	1880 MHz	1905 MHz	1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	21.45	21.32	21.92	26.15	26.02	26.62
			1	2	0	21.48	21.25	21.89	26.18	25.95	26.59
			1	5	0	21.30	21.14	21.85	26.00	25.84	26.55
			3	0	0	21.54	21.54	21.94	26.24	26.24	26.64
			3	2	0	21.52	21.37	21.91	26.22	26.07	26.61
			3	3	0	21.46	21.22	21.84	26.16	25.92	26.54
			6	0	0	20.66	20.32	20.90	25.36	25.02	25.60
		16QAM	1	0	0	21.54	21.43	21.98	26.24	26.13	**26.68**
			1	2	0	21.47	21.36	21.93	26.17	26.06	26.63
			1	5	0	21.28	21.19	21.91	25.98	25.89	26.61
			3	0	0	21.53	21.47	21.79	26.23	26.17	26.49
			3	2	0	21.45	21.38	21.76	26.15	26.08	26.46
			3	3	0	21.39	21.24	21.74	26.09	25.94	26.44
			5	0	0	21.57	21.45	21.87	26.27	26.15	26.57

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18675	18900	19125	18675	18900	19125
						1857.5 MHz	1880 MHz	1902.5 MHz	1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	21.59	21.51	21.50	26.29	26.21	26.20
			1	2	0	21.48	21.37	21.43	26.18	26.07	26.13
			1	5	0	21.21	21.08	21.30	25.91	25.78	26.00
			3	0	0	21.46	21.45	21.75	26.16	26.15	26.45
			3	2	0	21.51	21.46	21.77	26.21	26.16	**26.47**
			3	3	0	21.42	21.47	21.58	26.12	26.17	26.28
			6	0	0	21.74	21.52	21.64	26.44	26.22	26.34
		16QAM	1	0	0	21.60	21.49	21.76	26.30	26.19	26.46
			1	2	0	21.52	21.44	21.69	26.22	26.14	26.39
			1	5	0	21.32	21.16	21.49	26.02	25.86	26.19
			3	0	0	21.48	21.46	21.56	26.18	26.16	26.26
			3	2	0	21.43	21.41	21.65	26.13	26.11	26.35
			3	3	0	21.34	21.31	21.55	26.04	26.01	26.25
			5	0	0	21.65	21.39	21.73	26.35	26.09	26.43

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)			EIRP Power(dBm)		
						18700	18900	19100	18700	18900	19100
						1860 MHz	1880 MHz	1900 MHz	1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	21.65	21.45	21.60	26.35	26.15	26.30
			1	2	0	21.57	21.31	21.43	26.27	26.01	26.13
			1	5	0	21.17	21.07	21.19	25.87	25.77	25.89
			3	0	0	21.50	21.37	21.57	26.20	26.07	26.27
			3	2	0	21.50	21.34	21.54	26.20	26.04	26.24
			3	3	0	21.43	21.26	21.47	26.13	25.96	26.17
			6	0	0	21.57	21.38	21.51	26.27	26.08	26.21
		16QAM	1	0	0	21.62	21.54	21.56	26.32	26.24	26.26
			1	2	0	21.56	21.39	21.55	26.26	26.09	26.25
			1	5	0	21.40	21.27	21.39	26.10	25.97	26.09
			3	0	0	21.55	21.41	21.50	26.25	26.11	26.20
			3	2	0	21.53	21.52	21.75	26.23	26.22	**26.45**
			3	3	0	21.48	21.43	21.73	26.18	26.13	26.43
			5	0	0	21.59	21.40	21.54	26.29	26.10	26.24

8.2 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §24.235.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure

Use Anritsu 8821 with frequency Error measurement capability.
Temp = -20℃ to +50℃
Voltage= 85% to 115% of the nominal value for AC powered equipment.

NOTE: The frequency error was recorded frequency error from the communication simulator.

TEST RESULTS

No non-compliance noted.

TEST RESULTS

Temperature: 22.4℃ **Humidity:** 52.1% RH

Tested by: Dally Hong **Test Date:** April 15, 2021

FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT:

Band2_10M_QPSK_Full RB																										
Channel	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	
Freq. (MHz)	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	
Test Time	0 Minutes			2 Minutes			5 Minutes			10 Minutes			0 Minutes			2 Minutes			5 Minutes			10 Minutes			
Temp.	Deviation																								Limit
(℃)	(Hz)												(ppm)												
-20	3.4	2.8	-5.2	7.1	-1.9	4.7	3.3	-2.8	6.5	3.9	7.2	-6.4	0.002	0.001	-0.003	0.004	-0.001	0.002	0.002	-0.001	0.003	0.002	0.004	-0.003	0.1
-10	9.3	5.4	6.7	11.3	-4.8	3.7	5.5	-3.1	7.5	2.6	4.9	-12.5	0.005	0.003	0.004	0.006	-0.003	0.002	0.003	-0.002	0.004	0.001	0.003	-0.007	0.1
0	6.6	3.5	7.1	-2.5	-3.0	2.2	5.7	3.8	-6.7	-2.9	-3.6	4.8	0.004	0.002	0.004	-0.001	-0.002	0.001	0.003	0.002	-0.004	-0.002	-0.002	0.003	0.1
10	-7.5	4.2	6.8	4.0	5.4	0.8	-3.3	-4.4	6.9	-7.2	3.6	5.9	-0.004	0.002	0.004	0.002	0.003	0.000	-0.002	-0.002	0.004	-0.004	0.002	0.003	0.1
20	-1.1	6.5	7.1	9.6	4.2	4.4	9.4	-3.7	1.6	7.4	8.7	3.3	-0.001	0.003	0.004	0.005	0.002	0.002	0.005	-0.002	0.001	0.004	0.005	0.002	0.1
30	3.9	6.6	-3.4	2.2	2.9	1.5	8.1	4.5	-3.5	7.4	6.5	-1.4	0.002	0.004	-0.002	0.001	0.002	0.001	0.004	0.002	-0.002	0.004	0.003	-0.001	0.1
40	-0.8	5.1	3.7	9.8	7.4	2.2	3.1	-4.0	-2.1	1.3	8.2	6.5	0.000	0.003	0.002	0.005	0.004	0.001	0.002	-0.002	-0.001	0.001	0.004	0.003	0.1
50	6.6	8.8	13.7	-3.4	-2.4	8.2	4.6	-3.1	1.6	0.5	0.7	1.4	0.004	0.005	0.007	-0.002	-0.001	0.004	0.002	-0.002	0.001	0.000	0.000	0.001	0.1

FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

Band2_10M_QPSK_Full RB																									
Channel	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	18650	18900	19150	
Freq. (MHz)	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	1855	1880	1905	
Test Time	0 Minutes			2 Minutes			5 Minutes			10 Minutes			0 Minutes			2 Minutes			5 Minutes			10 Minutes			
Voltage	Deviation																								Limit
[V]	(Hz)												(ppm)												
5.75	2.1	-3.3	5.2	0.5	-3.7	2.8	6.4	-4.2	8.1	3.0	14.1	7.5	0.001	-0.002	0.003	0.000	-0.002	0.001	0.003	-0.002	0.004	0.002	0.008	0.004	0.1
5	5.5	7.9	3.0	-2.1	4.4	-3.2	1.8	3.4	-6.4	7.2	5.5	6.3	0.003	0.004	0.002	-0.001	0.002	-0.002	0.001	0.002	-0.003	0.004	0.003	0.003	0.1
4.25	0.4	6.2	1.1	-4.2	6.5	8.9	4.7	-4.4	5.2	16.2	12.1	13.7	0.000	0.003	0.001	-0.002	0.003	0.005	0.003	-0.002	0.003	0.009	0.006	0.007	0.1

8.3 OCCUPIED BANDWIDTH MEASUREMENT

Limits

For Reporting purposes only.

TEST PROCEDURES

KDB 971168 D01

1. The occupied bandwidth was measured with the spectrum analyzer at the lowest, middle and highest channels in each band and different modulation. The 99% and -26dB bandwidth was measured and recorded.
2. RBW = 1-5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max. hold

Test Result

Temperature:	21.5℃	**Humidity:**	56.2% RH
Tested by:	Dally Hong	**Test Date:**	March 29, 2021
Temperature:	23.7℃	**Humidity:**	52.4% RH
Tested by:	Dally Hong	**Test Date:**	April 13, 2021
Temperature:	23.1℃	**Humidity:**	52.5% RH
Tested by:	Dally Hong	**Test Date:**	April 14, 2021

LTE Band 2

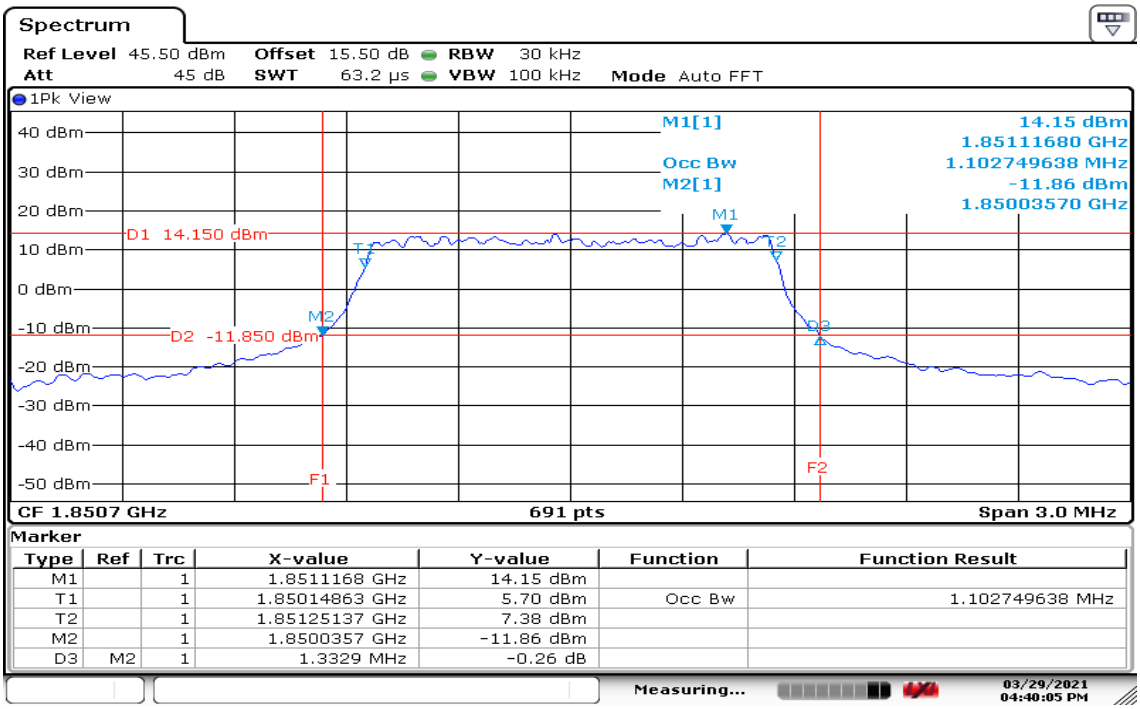
Frequency (MHz)	Channel	99%BW(MHz)		26dB BW(MHz)	
		QPSK	16QAM	QPSK	16QAM
Band 2 Channel Bandwidth 1.4MHz					
1850.7	18607	1.1027	0.9291	1.3329	1.1331
1880	18900	1.1027	0.9334	1.3415	1.1288
1909.3	19193	1.1027	0.9334	1.3372	1.1476
Band 2 Channel Bandwidth 3MHz					
1851.5	18615	1.1027	0.9291	1.3198	0.8953
1880	18900	1.1027	0.9291	1.3155	1.1201
1908.5	19185	1.1027	0.9291	1.3259	1.1392
Band 2 Channel Bandwidth 5MHz					
1852.5	18625	1.0680	0.9204	1.1679	1.0289
1880	18900	1.0984	0.9334	1.3230	1.1710
1907.5	19175	1.1027	0.9501	1.3376	1.3463
Band 2 Channel Bandwidth 10MHz					
1855	18650	1.0984	0.9378	1.3111	1.2677
1880	18900	1.0941	0.9378	1.2721	1.2721
1905	19150	1.0941	0.9465	1.3155	1.2894
Band 2 Channel Bandwidth 15MHz					
1857.5	18675	1.1071	0.9334	1.3415	1.3068
1880	18900	1.1071	0.9334	1.3415	1.3154
1902.5	19125	1.1071	0.9378	1.3502	1.3459
Band 2 Channel Bandwidth 20MHz					
1860	18700	1.0984	0.9421	1.3329	1.3155
1880	18900	1.0984	0.9421	1.3372	1.3546
1900	19100	1.0984	0.9421	1.3763	1.3546

LTE Band 2

26dB & OBW (99%) / QPSK

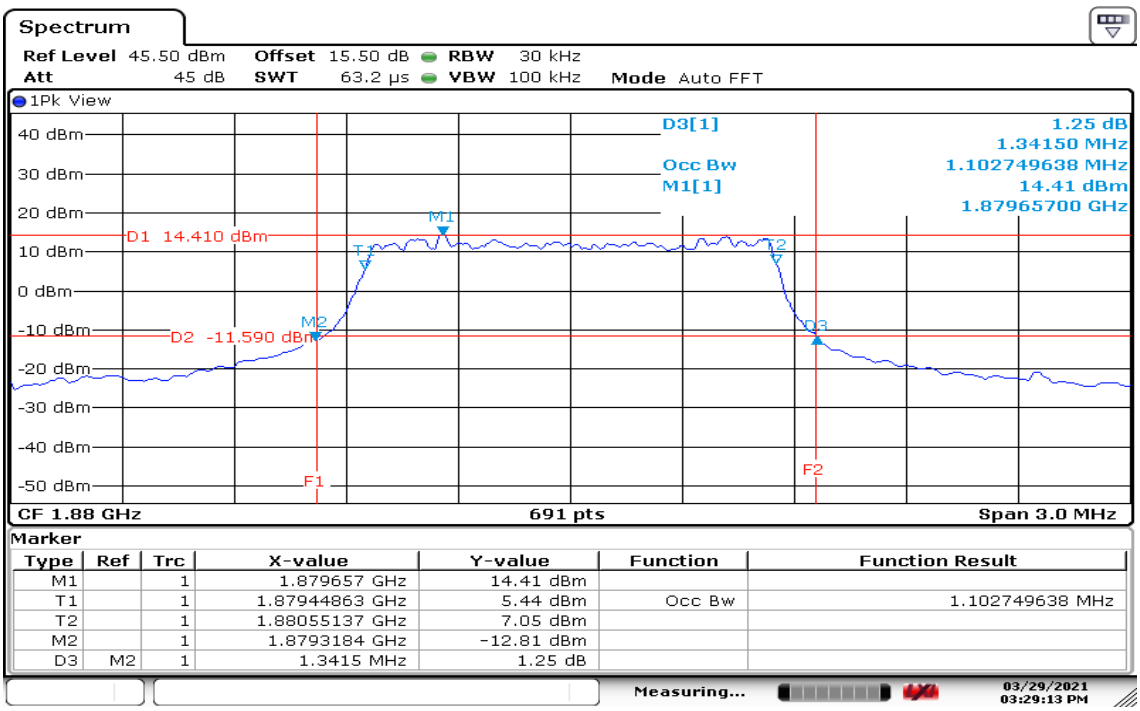
BW: 1.4MHz

CH Low



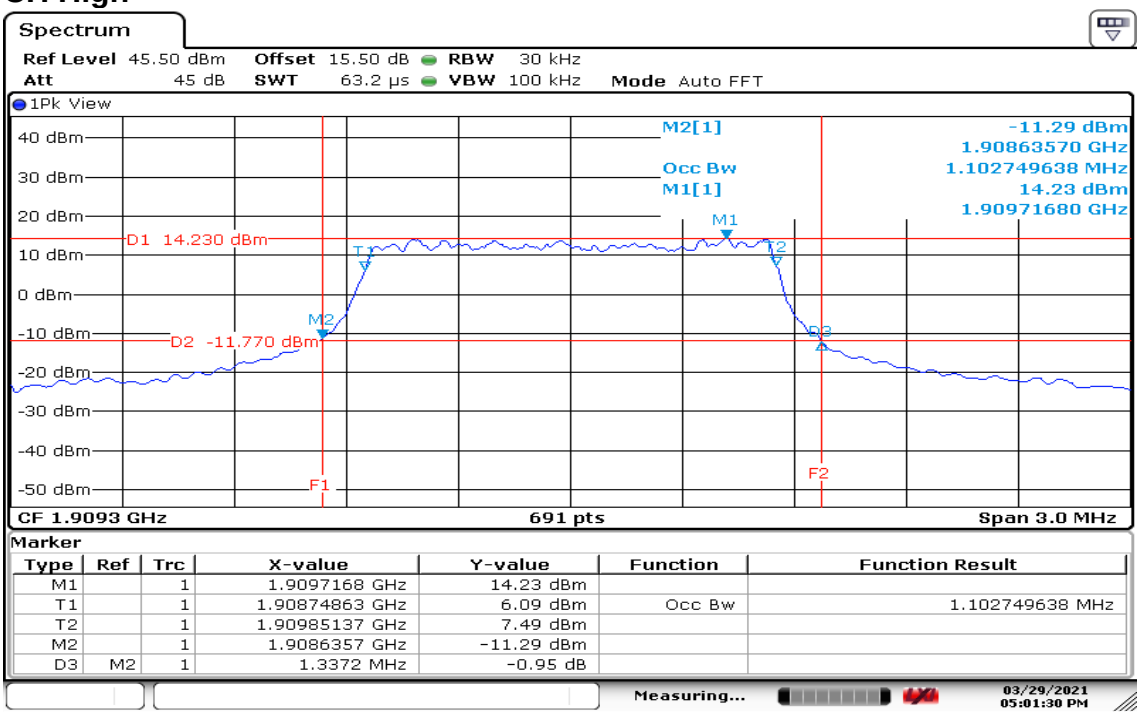
Date: 29.MAR.2021 16:40:06

CH Mid



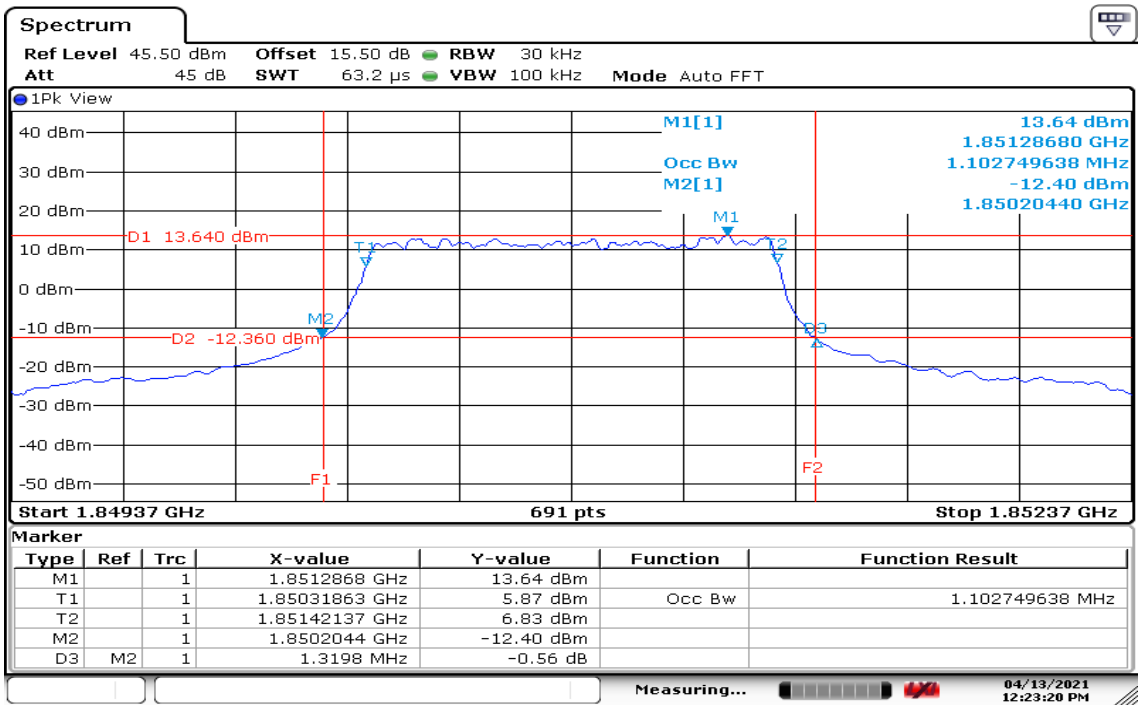
Date: 29.MAR.2021 15:29:13

CH High



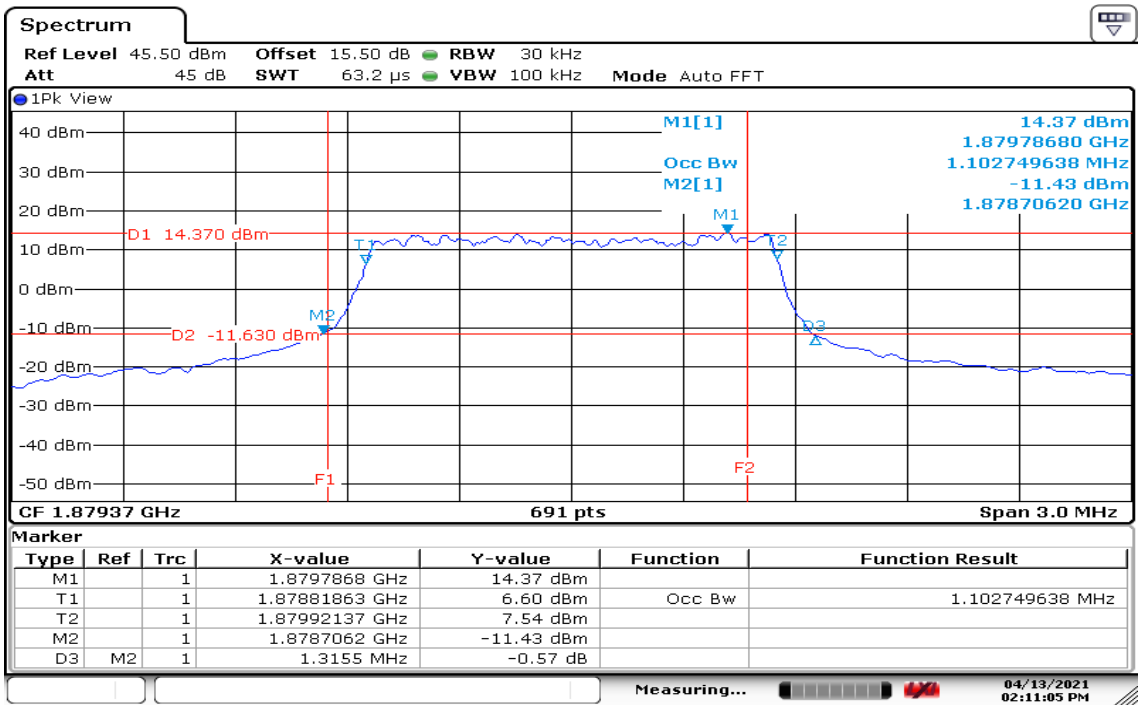
Date: 29.MAR.2021 17:01:30

BW: 3MHz
CH Low



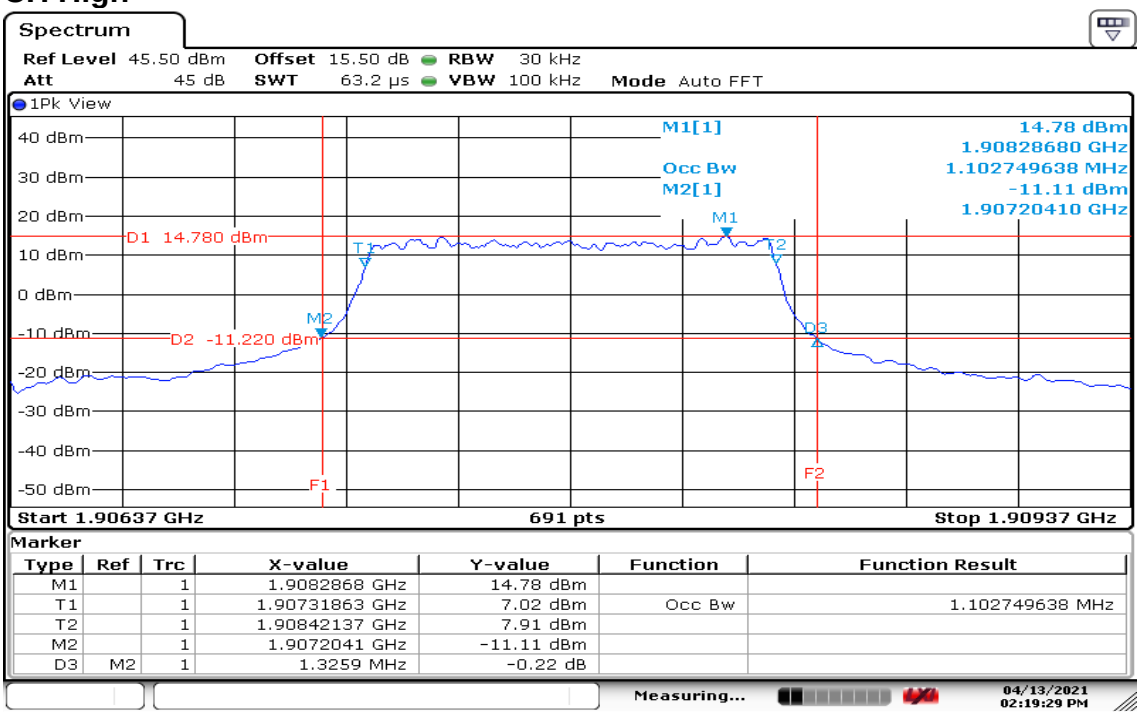
Date: 13.APR.2021 12:23:21

CH Mid



Date: 13.APR.2021 14:11:05

CH High

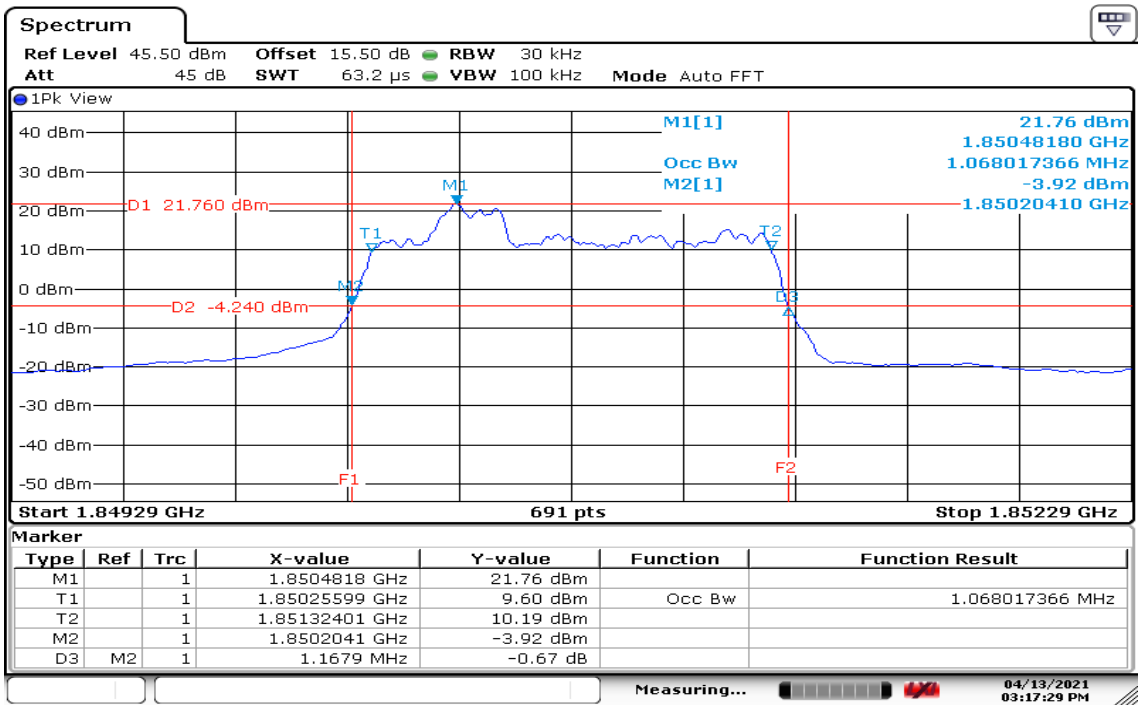


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.9082868 GHz	14.78 dBm		
T1		1	1.90731863 GHz	7.02 dBm	Occ Bw	1.102749638 MHz
T2		1	1.90842137 GHz	7.91 dBm		
M2		1	1.9072041 GHz	-11.11 dBm		
D3	M2	1	1.3259 MHz	-0.22 dB		

Date: 13.APR.2021 14:19:29

BW: 5MHz
CH Low

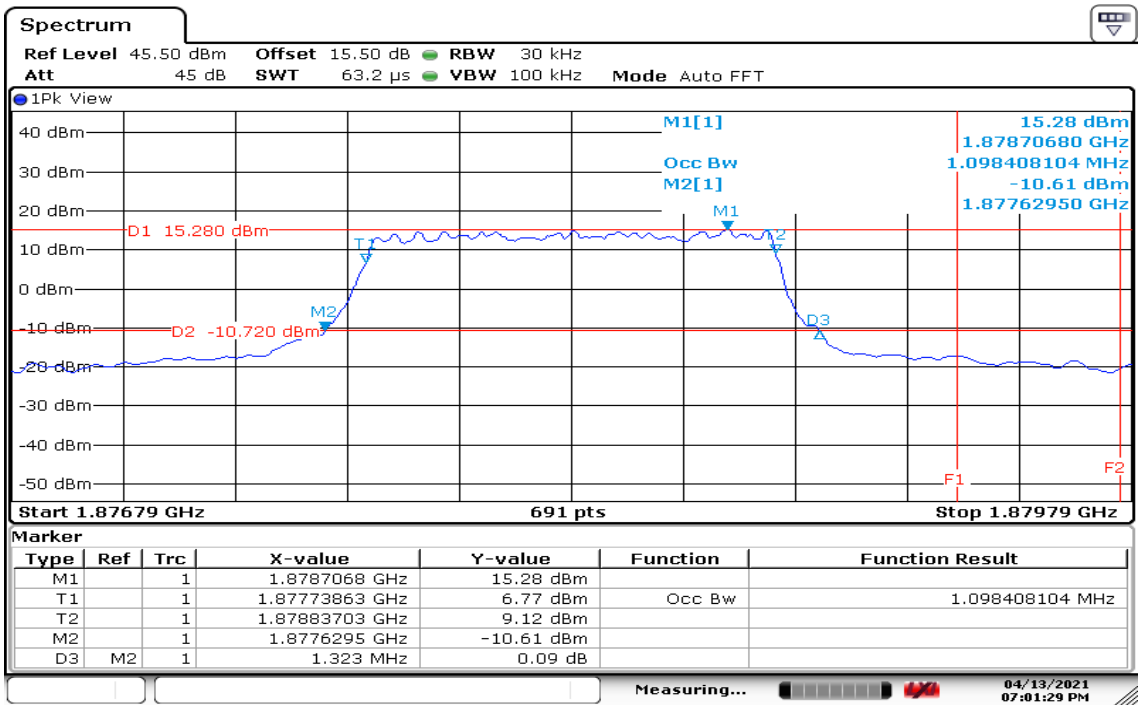


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8504818 GHz	21.76 dBm		
T1		1	1.85025599 GHz	9.60 dBm	Occ Bw	1.068017366 MHz
T2		1	1.85132401 GHz	10.19 dBm		
M2		1	1.8502041 GHz	-3.92 dBm		
D3	M2	1	1.1679 MHz	-0.67 dB		

Date: 13.APR.2021 15:17:29

CH Mid

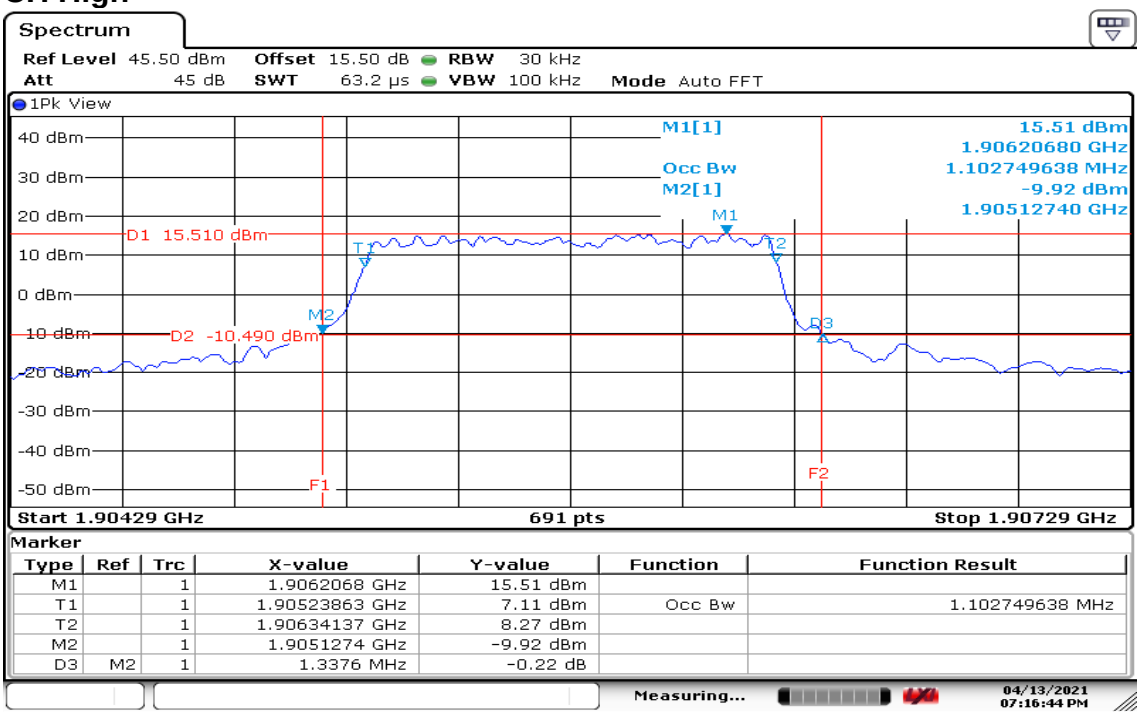


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8787068 GHz	15.28 dBm		
T1		1	1.87773863 GHz	6.77 dBm	Occ Bw	1.098408104 MHz
T2		1	1.87883703 GHz	9.12 dBm		
M2		1	1.8776295 GHz	-10.61 dBm		
D3	M2	1	1.323 MHz	0.09 dB		

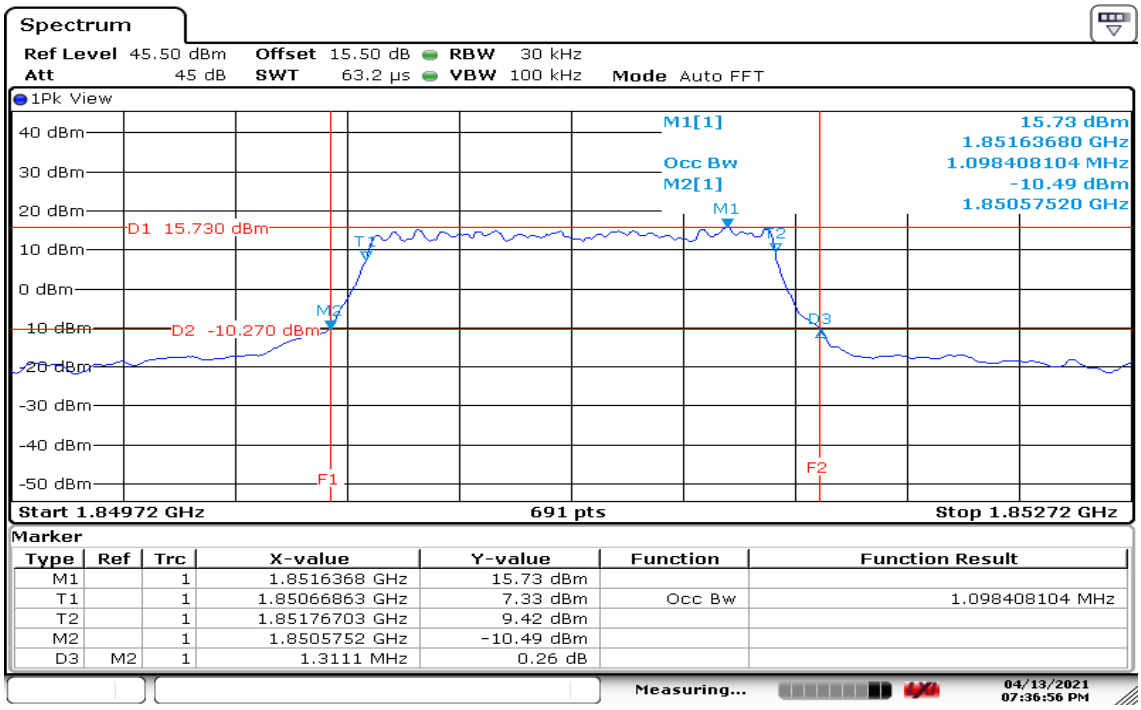
Date: 13.APR.2021 19:01:29

CH High



Date:13.APR.2021 19:16:45

BW: 10MHz
CH Low

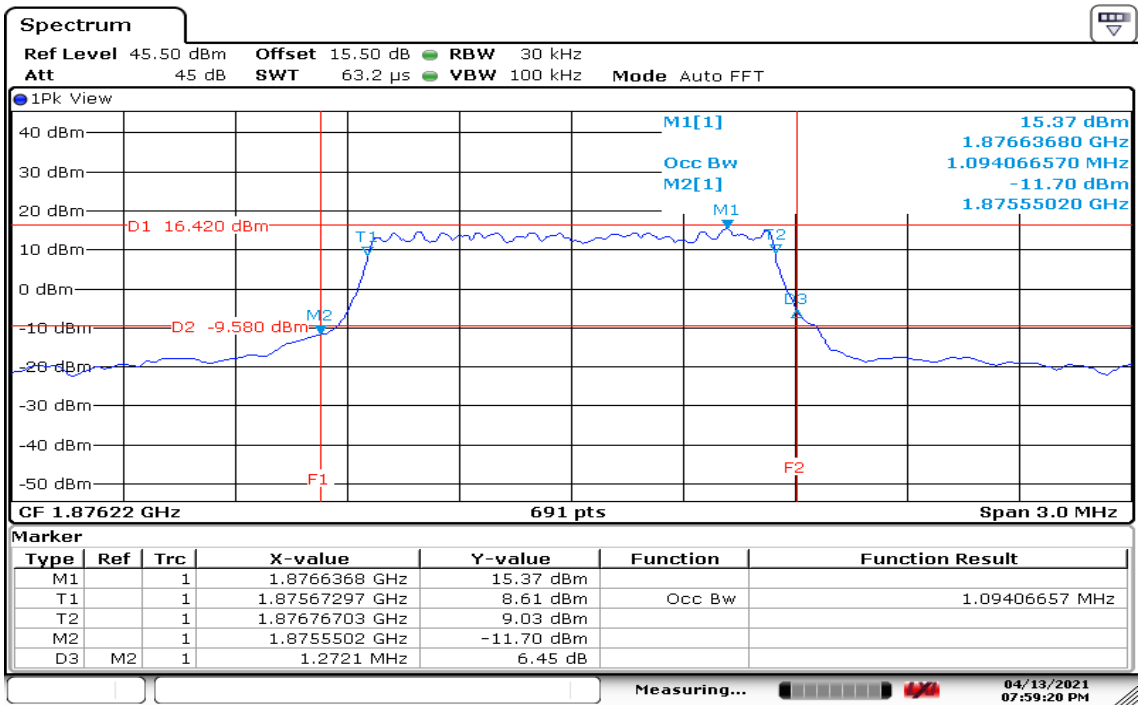


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8516368 GHz	15.73 dBm		
T1		1	1.85066863 GHz	7.33 dBm	Occ Bw	1.098408104 MHz
T2		1	1.85176703 GHz	9.42 dBm		
M2		1	1.8505752 GHz	-10.49 dBm		
D3	M2	1	1.3111 MHz	0.26 dB		

Date: 13.APR.2021 19:36:56

CH Mid

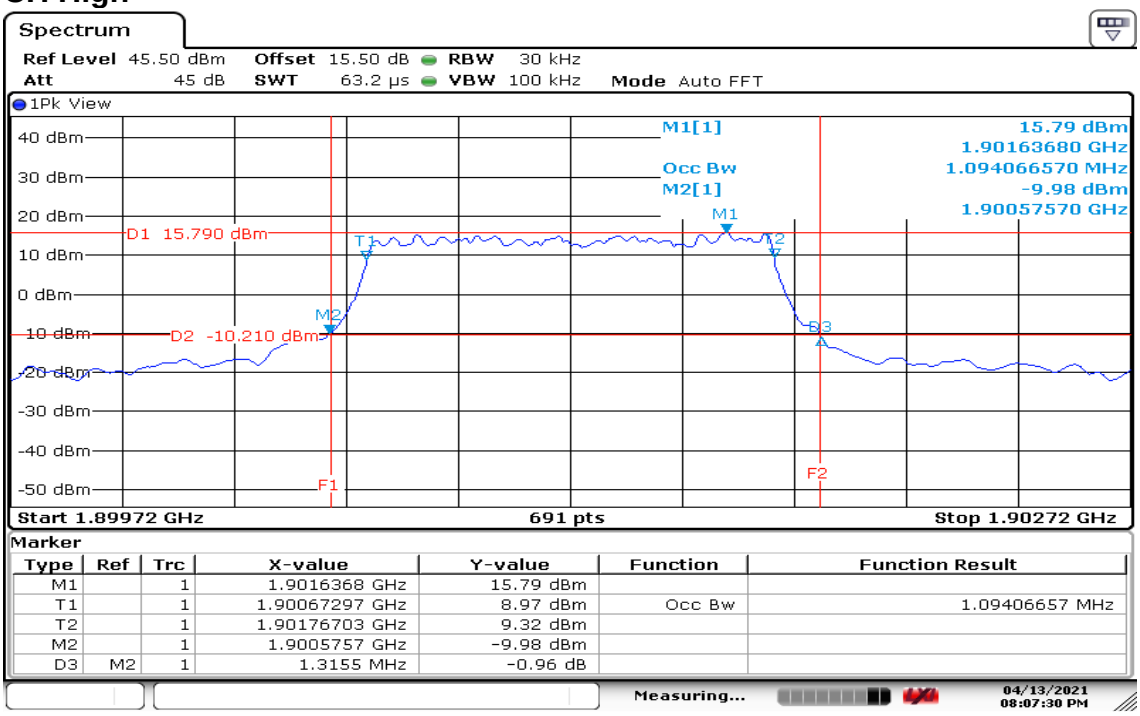


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8766368 GHz	15.37 dBm		
T1		1	1.87567297 GHz	8.61 dBm	Occ Bw	1.09406657 MHz
T2		1	1.87676703 GHz	9.03 dBm		
M2		1	1.8755502 GHz	-11.70 dBm		
D3	M2	1	1.2721 MHz	6.45 dB		

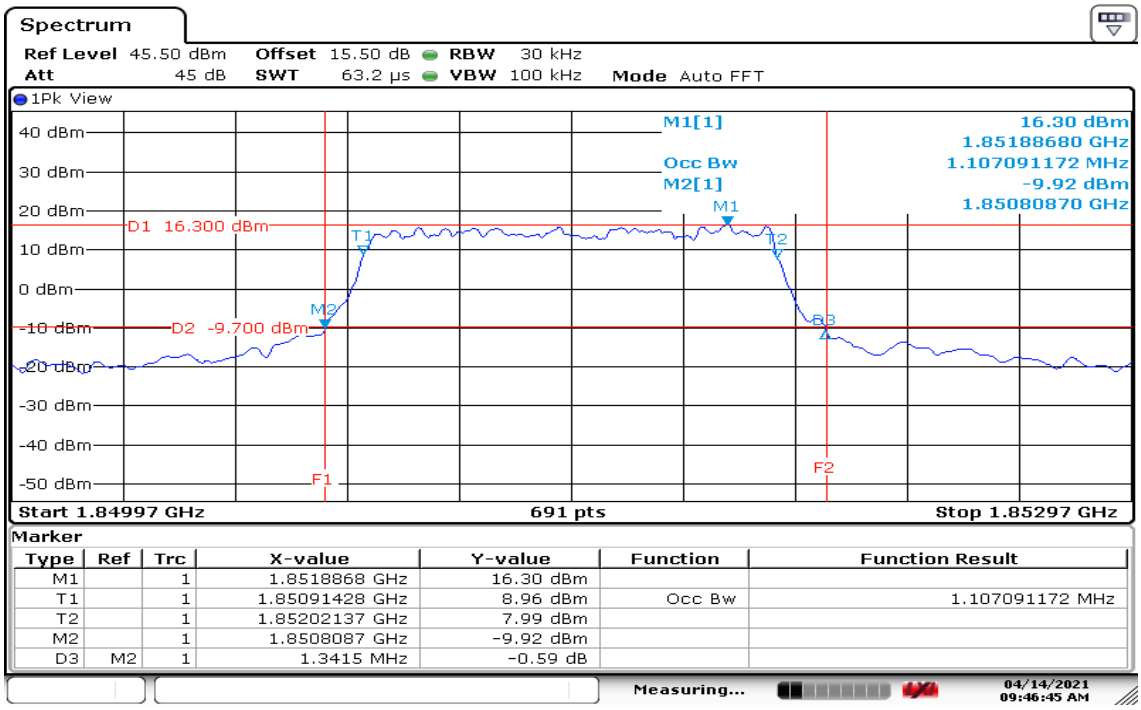
Date: 13.APR.2021 19:59:21

CH High



Date: 13.APR.2021 20:07:30

BW: 15MHz
CH Low

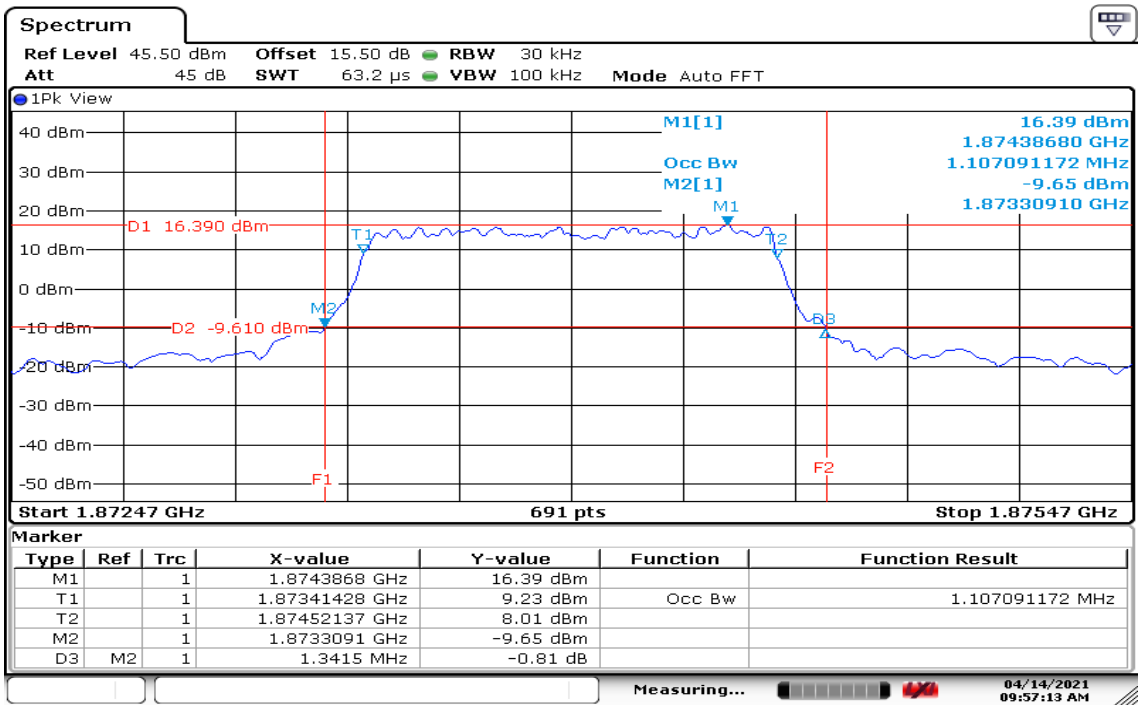


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8518868 GHz	16.30 dBm		
T1		1	1.85091428 GHz	8.96 dBm	Occ Bw	1.107091172 MHz
T2		1	1.85202137 GHz	7.99 dBm		
M2		1	1.8508087 GHz	-9.92 dBm		
D3	M2	1	1.3415 MHz	-0.59 dB		

Date: 14.APR.2021 09:46:45

CH Mid

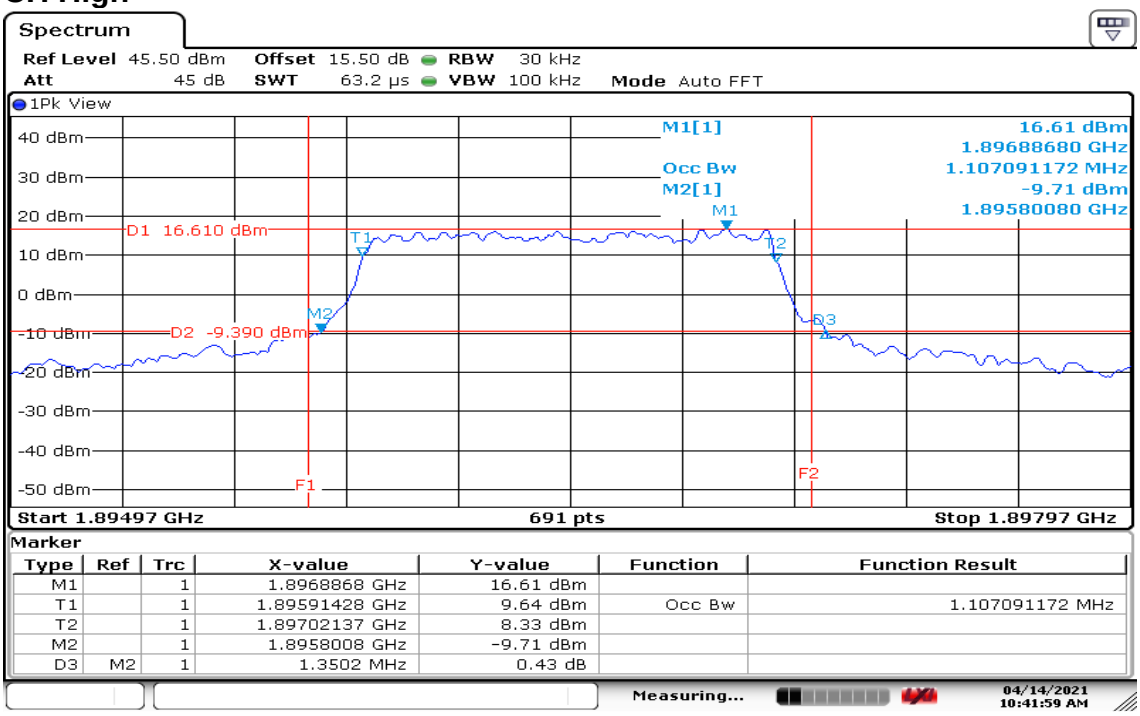


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8743868 GHz	16.39 dBm		
T1		1	1.87341428 GHz	9.23 dBm	Occ Bw	1.107091172 MHz
T2		1	1.87452137 GHz	8.01 dBm		
M2		1	1.8733091 GHz	-9.65 dBm		
D3	M2	1	1.3415 MHz	-0.81 dB		

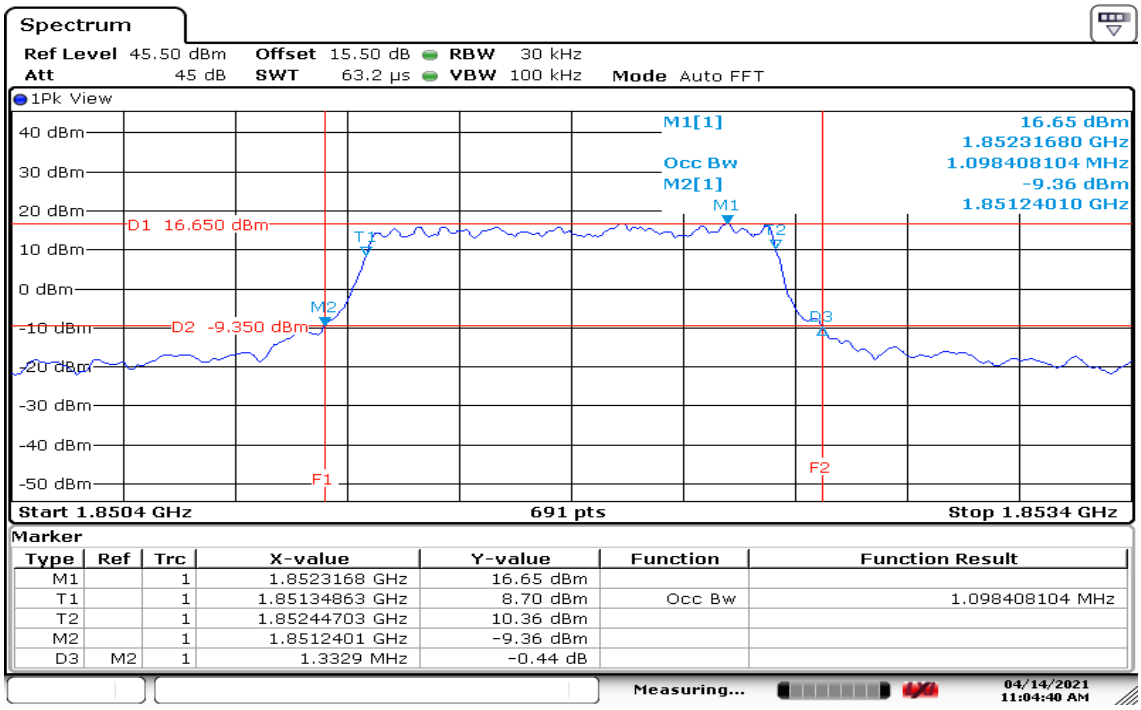
Date: 14.APR.2021 09:57:14

CH High



Date: 14.APR.2021 10:42:00

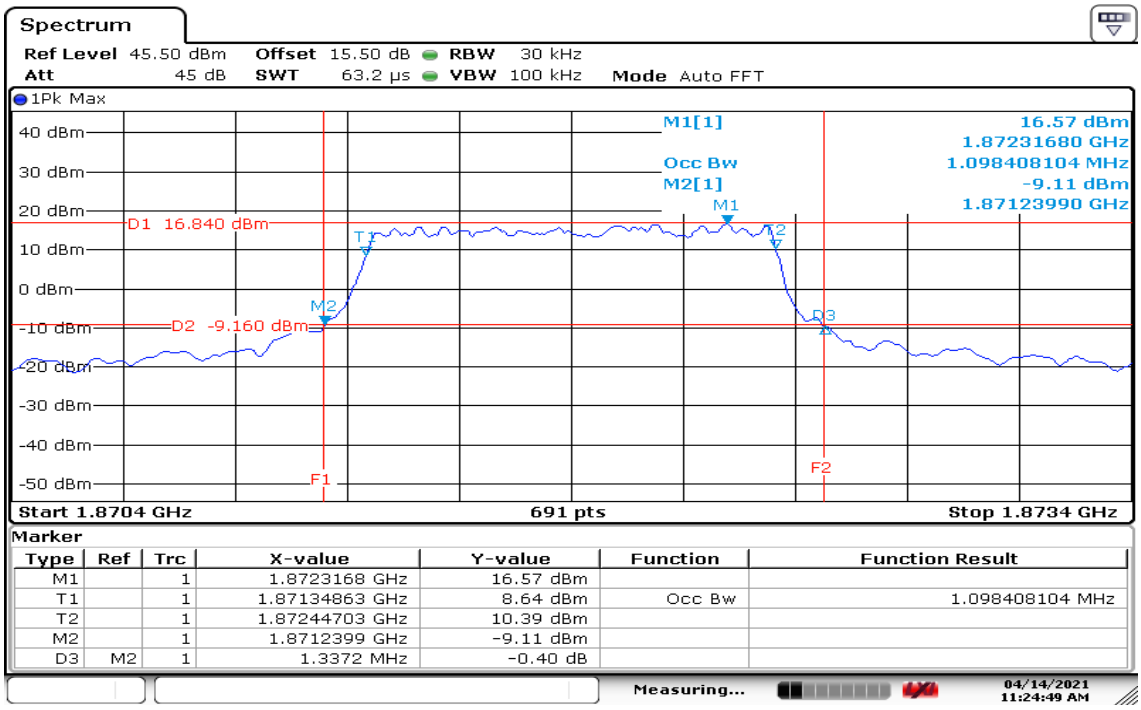
BW: 20MHz
CH Low



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8523168 GHz	16.65 dBm		
T1		1	1.85134863 GHz	8.70 dBm	Occ Bw	1.098408104 MHz
T2		1	1.85244703 GHz	10.36 dBm		
M2		1	1.8512401 GHz	-9.36 dBm		
D3	M2	1	1.3329 MHz	-0.44 dB		

Date: 14.APR.2021 11:04:40

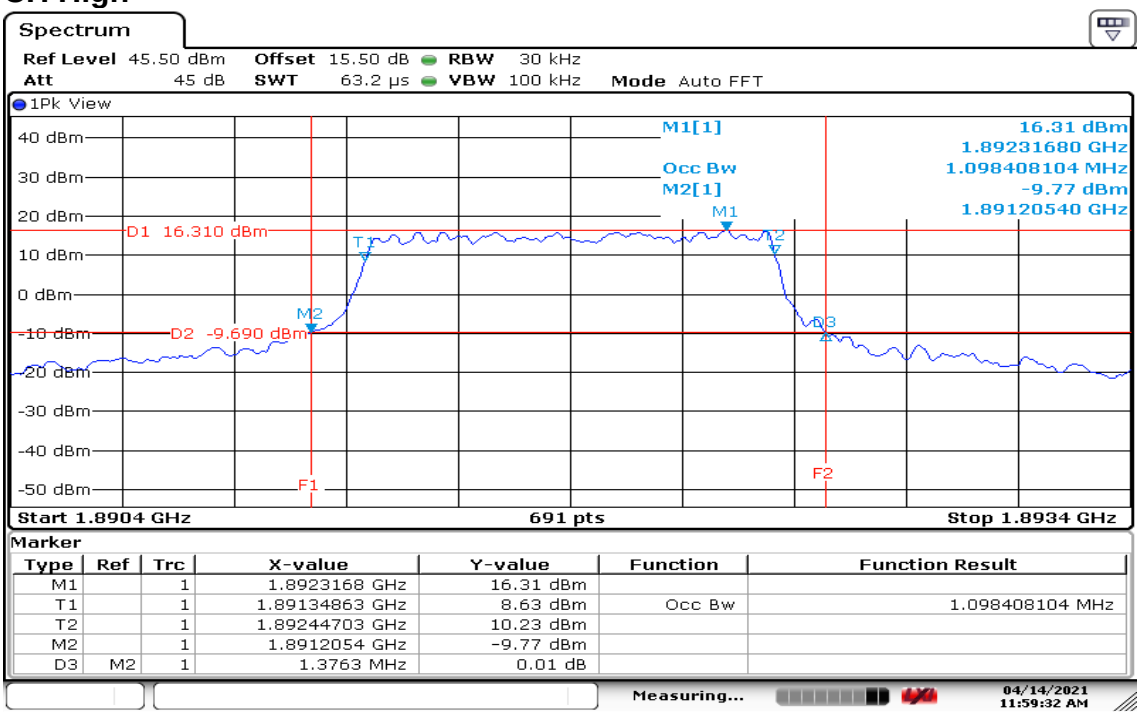
CH Mid



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8723168 GHz	16.57 dBm		
T1		1	1.87134863 GHz	8.64 dBm	Occ Bw	1.098408104 MHz
T2		1	1.87244703 GHz	10.39 dBm		
M2		1	1.8712399 GHz	-9.11 dBm		
D3	M2	1	1.3372 MHz	-0.40 dB		

Date: 14.APR.2021 11:24:49

CH High

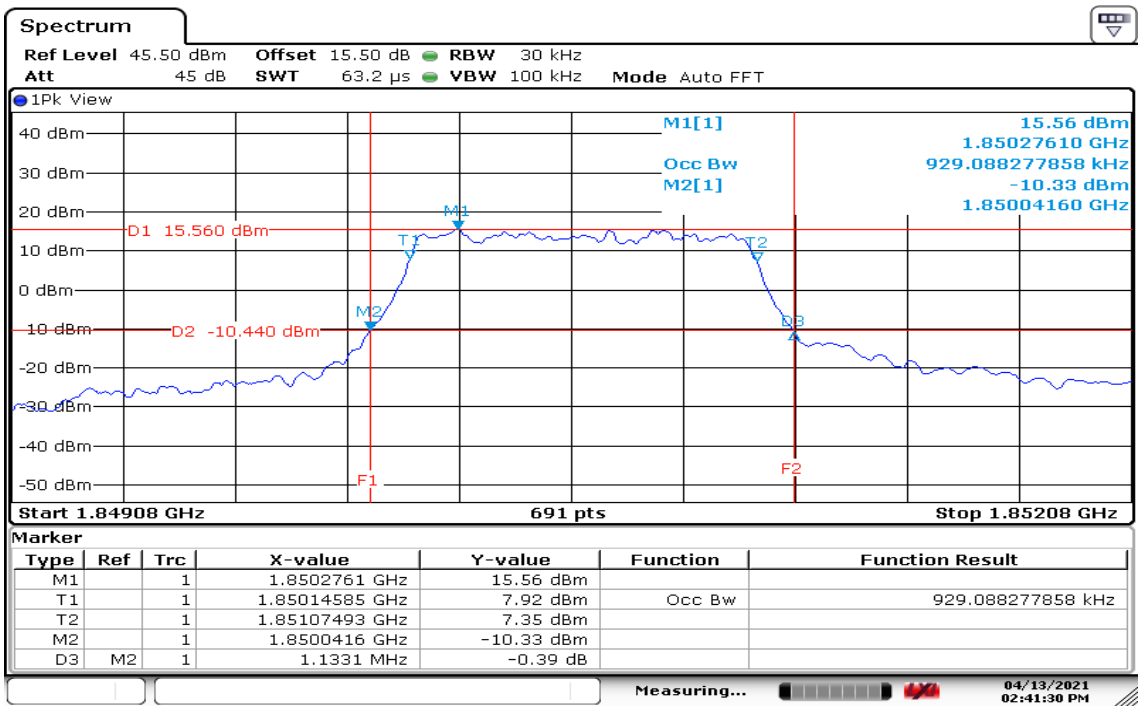


Date: 14.APR.2021 11:59:32

26dB & OBW (99%) / 16QAM

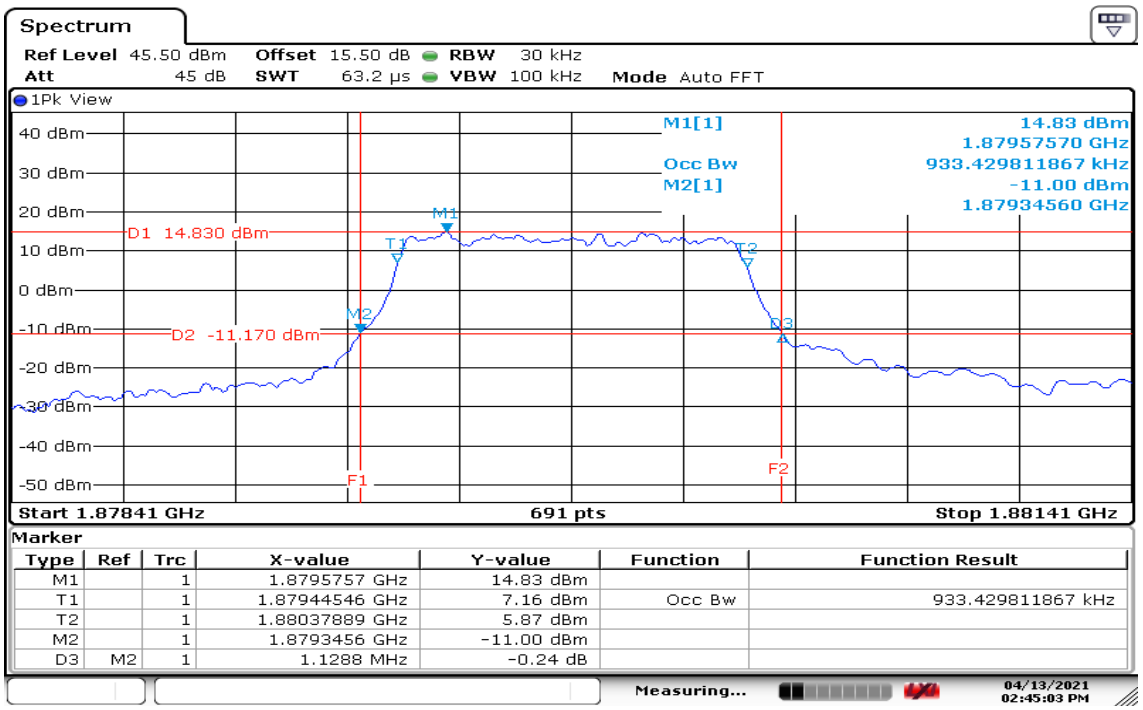
BW: 1.4MHz

CH Low



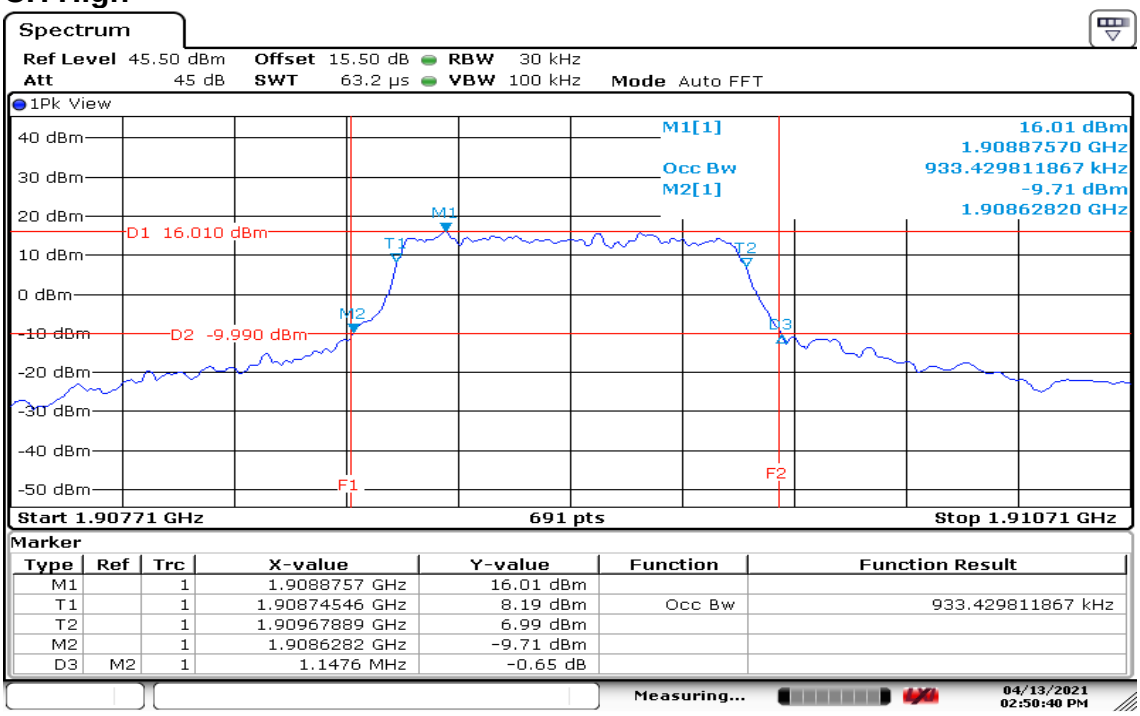
Date: 13.APR.2021 14:41:31

CH Mid



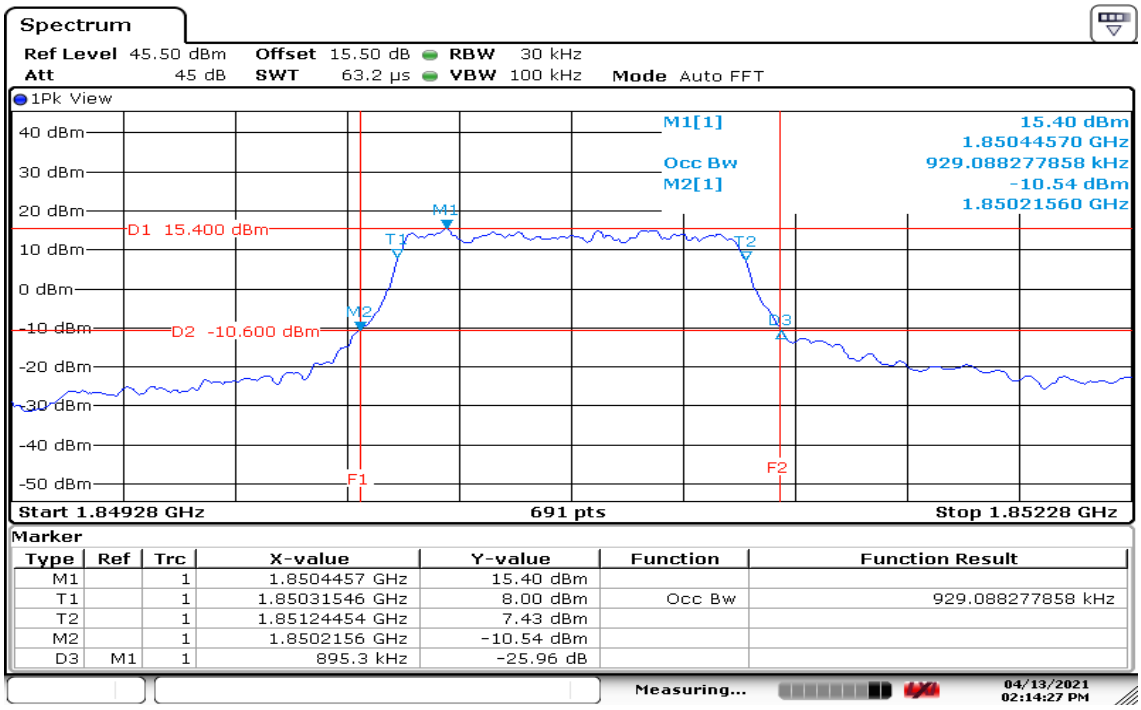
Date: 13.APR.2021 14:45:03

CH High



Date: 13.APR.2021 14:50:40

BW: 3MHz
CH Low

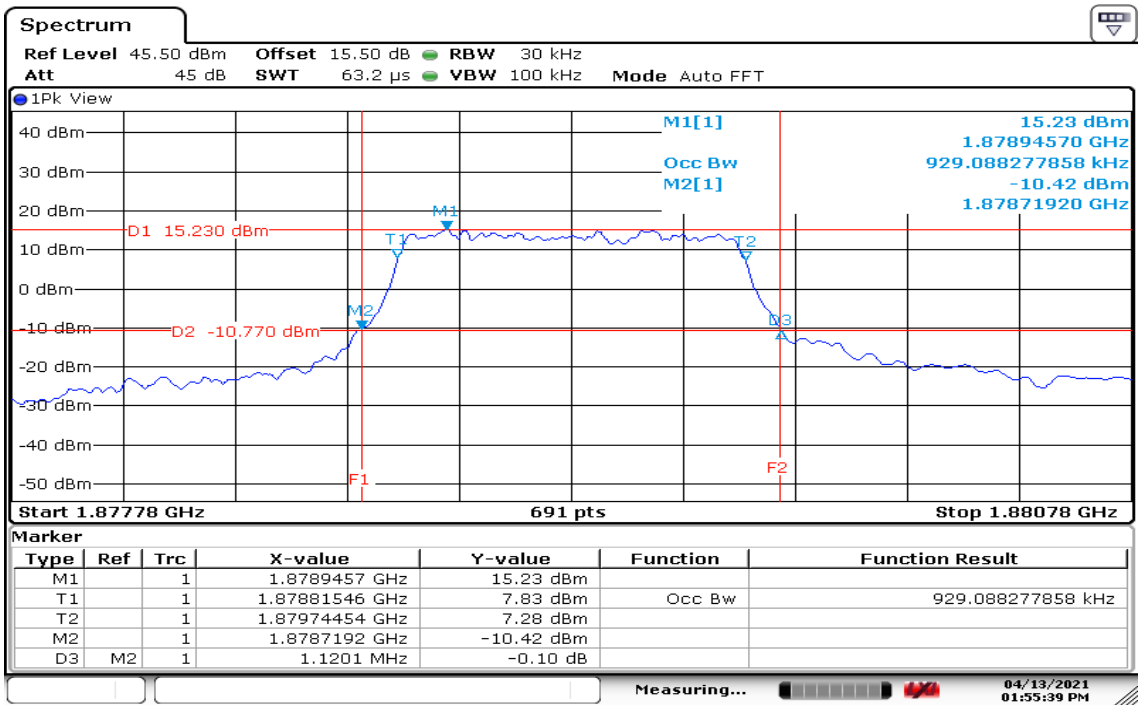


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8504457 GHz	15.40 dBm		
T1		1	1.85031546 GHz	8.00 dBm	Occ Bw	929.088277858 kHz
T2		1	1.85124454 GHz	7.43 dBm		
M2		1	1.8502156 GHz	-10.54 dBm		
D3	M1	1	895.3 kHz	-25.96 dB		

Date: 13.APR.2021 14:14:26

CH Mid

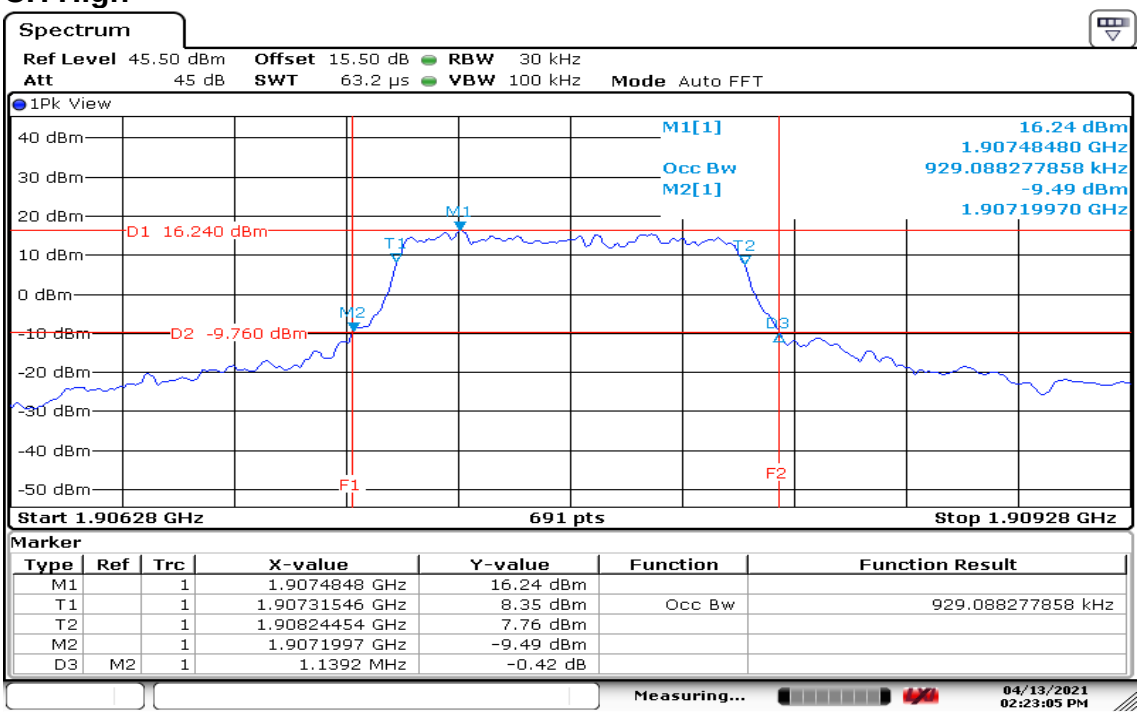


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8789457 GHz	15.23 dBm		
T1		1	1.87881546 GHz	7.83 dBm	Occ Bw	929.088277858 kHz
T2		1	1.87974454 GHz	7.28 dBm		
M2		1	1.8787192 GHz	-10.42 dBm		
D3	M2	1	1.1201 MHz	-0.10 dB		

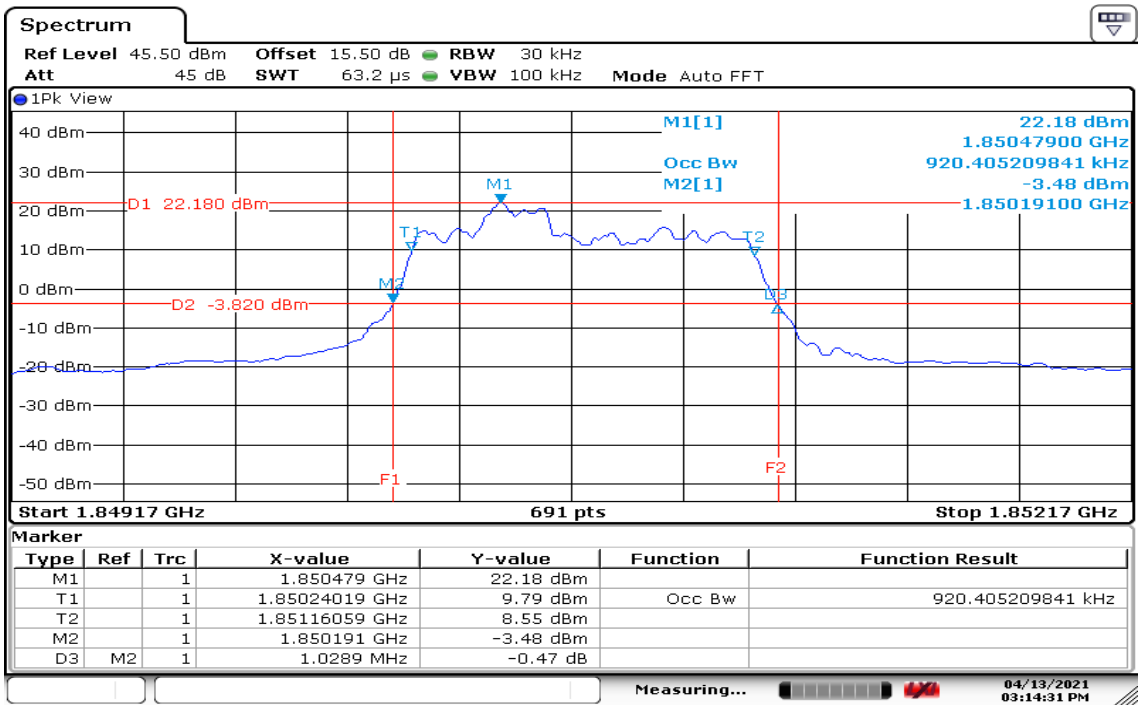
Date: 13.APR.2021 13:55:39

CH High



Date:13.APR.2021 14:23:05

BW: 5MHz
CH Low

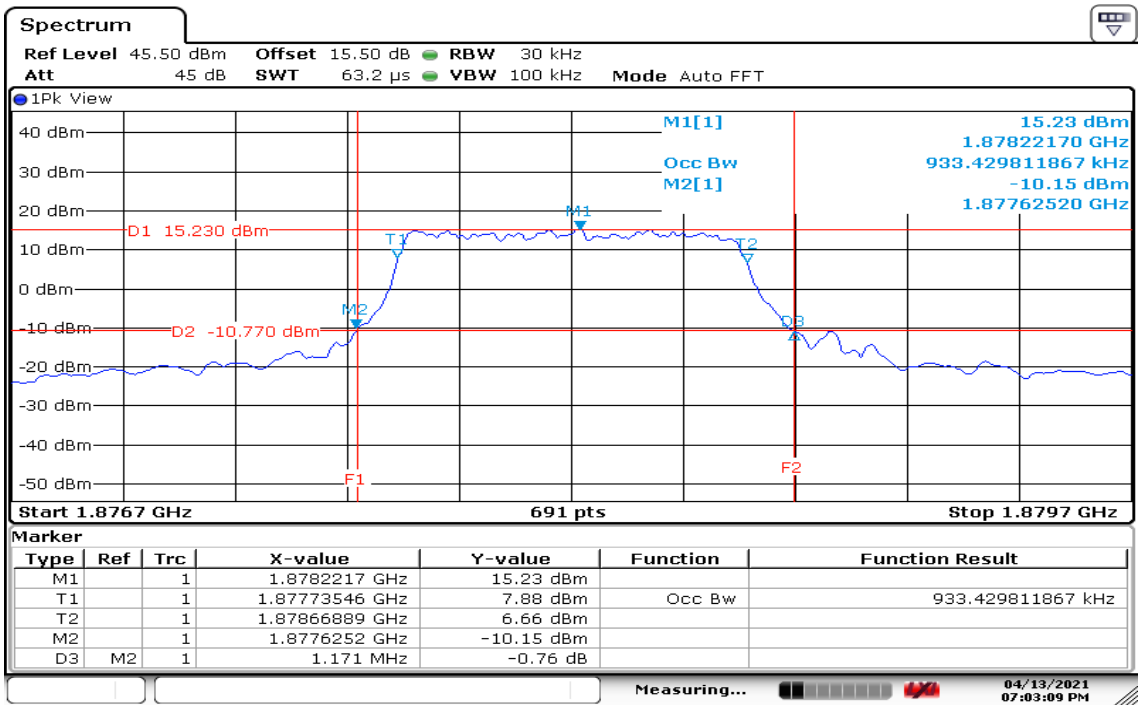


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.850479 GHz	22.18 dBm		
T1		1	1.85024019 GHz	9.79 dBm	Occ Bw	920.405209841 kHz
T2		1	1.85116059 GHz	8.55 dBm		
M2		1	1.850191 GHz	-3.48 dBm		
D3	M2	1	1.0289 MHz	-0.47 dB		

Date: 13.APR.2021 15:14:32

CH Mid



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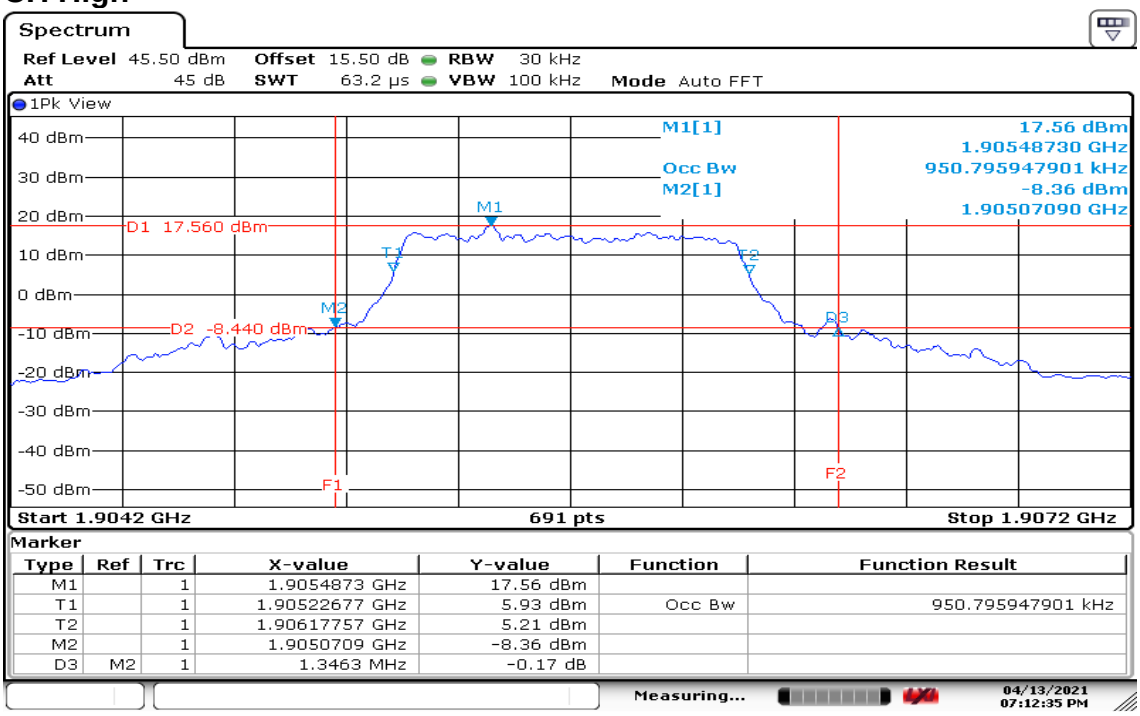
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8782217 GHz	15.23 dBm		
T1		1	1.87773546 GHz	7.88 dBm	Occ Bw	933.429811867 kHz
T2		1	1.87866889 GHz	6.66 dBm		
M2		1	1.8776252 GHz	-10.15 dBm		
D3	M2	1	1.171 MHz	-0.76 dB		

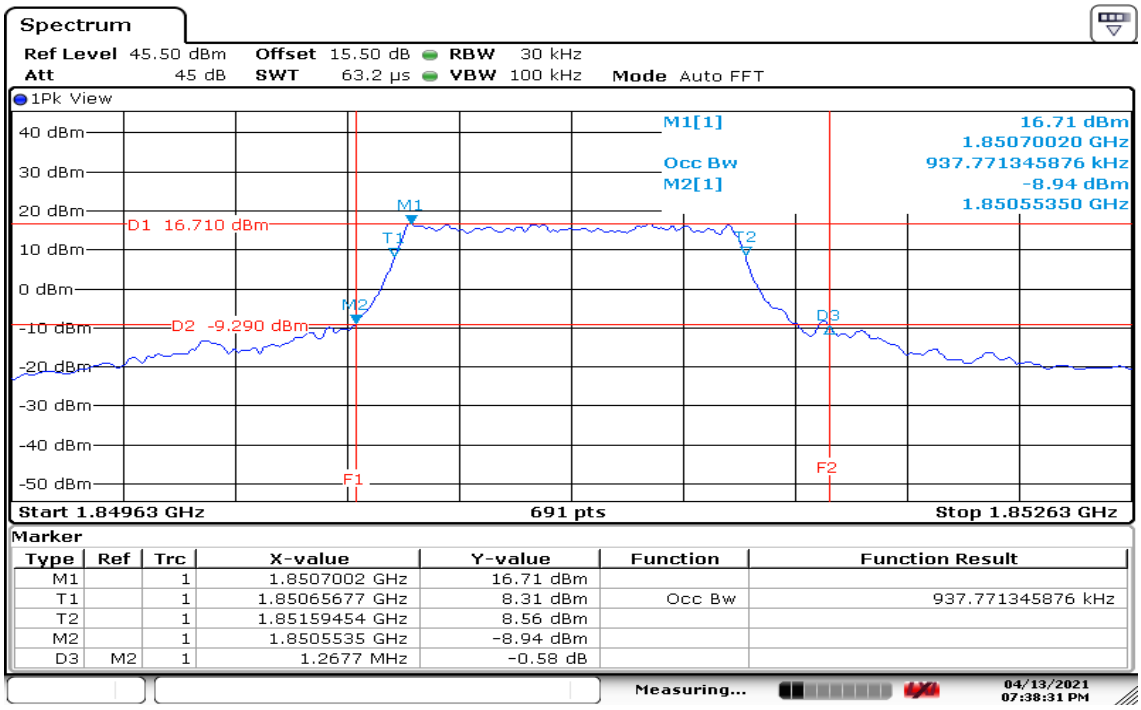
Date: 13.APR.2021 19:03:09

CH High



Date: 13.APR.2021 19:12:36

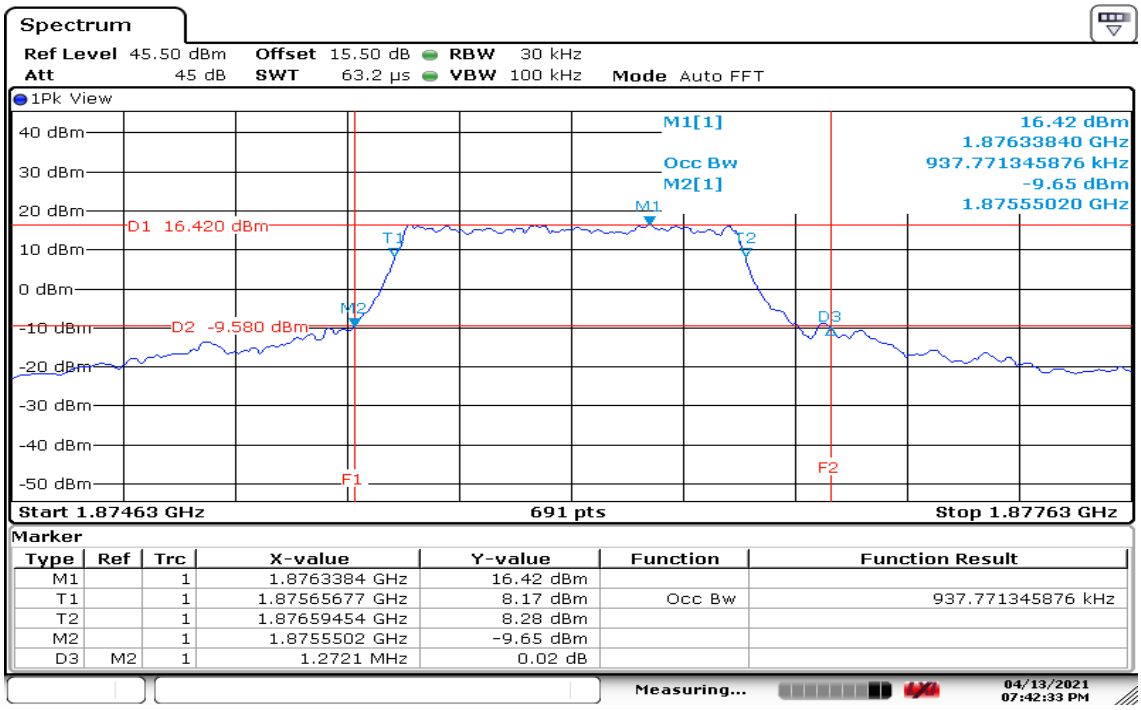
BW: 10MHz
CH Low



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8507002 GHz	16.71 dBm		
T1		1	1.85065677 GHz	8.31 dBm	Occ Bw	937.771345876 kHz
T2		1	1.85159454 GHz	8.56 dBm		
M2		1	1.8505535 GHz	-8.94 dBm		
D3	M2	1	1.2677 MHz	-0.58 dB		

Date: 13.APR.2021 19:38:31

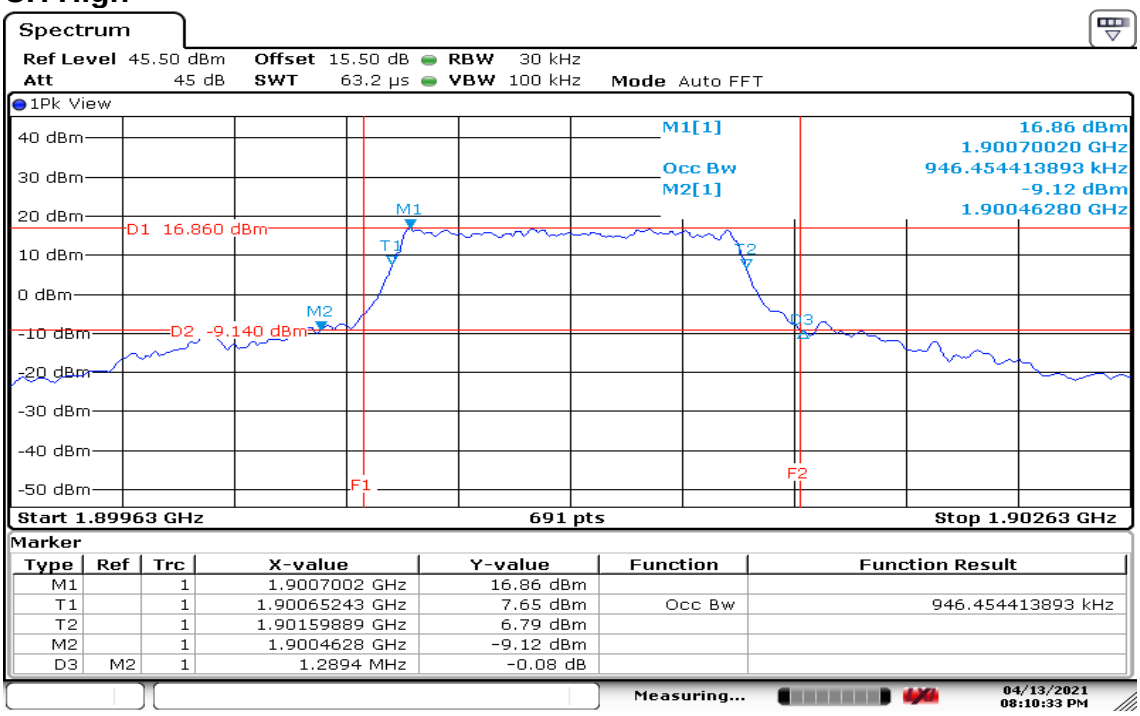
CH Mid



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8763384 GHz	16.42 dBm		
T1		1	1.87565677 GHz	8.17 dBm	Occ Bw	937.771345876 kHz
T2		1	1.87659454 GHz	8.28 dBm		
M2		1	1.8755502 GHz	-9.65 dBm		
D3	M2	1	1.2721 MHz	0.02 dB		

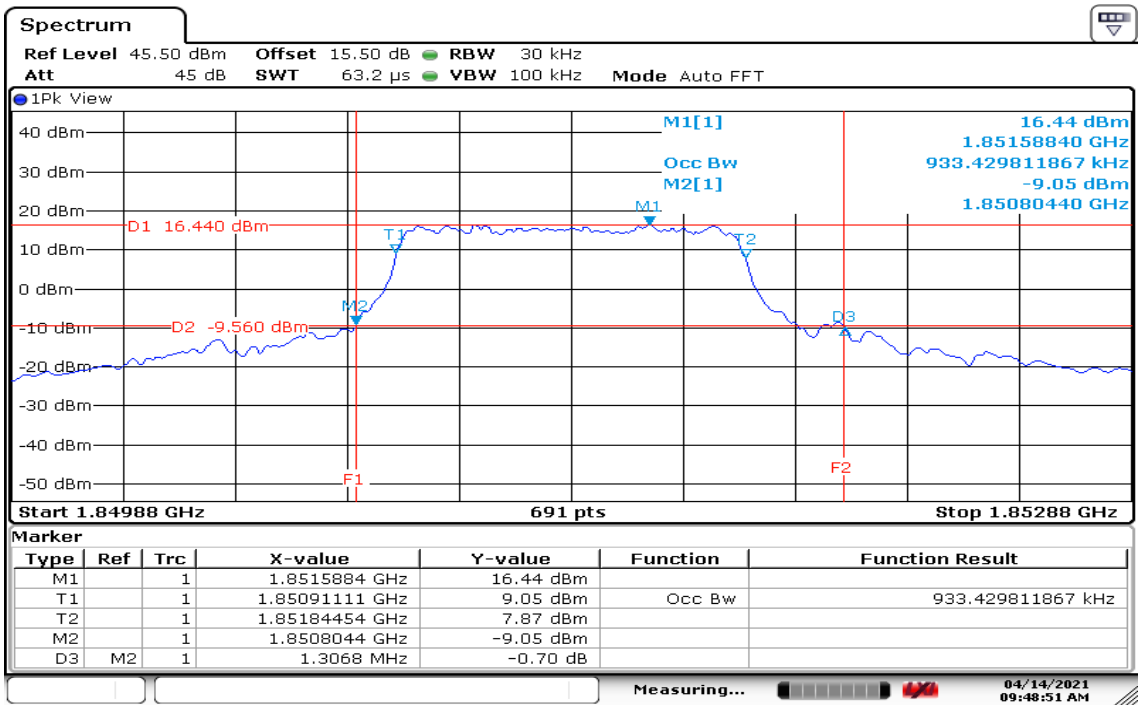
Date: 13.APR.2021 19:42:34

CH High



Date:13.APR.2021 20:10:32

BW: 15MHz
CH Low

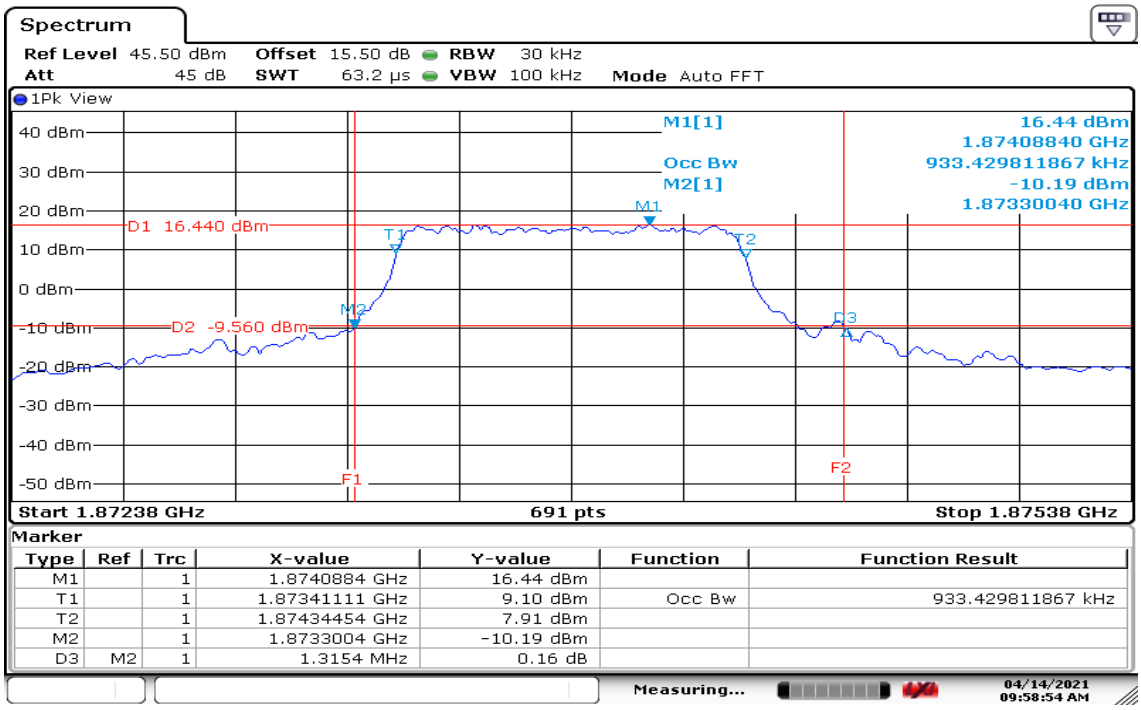


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8515884 GHz	16.44 dBm		
T1		1	1.85091111 GHz	9.05 dBm	Occ Bw	933.429811867 kHz
T2		1	1.85184454 GHz	7.87 dBm		
M2		1	1.8508044 GHz	-9.05 dBm		
D3	M2	1	1.3068 MHz	-0.70 dB		

Date: 14.APR.2021 09:48:51

CH Mid

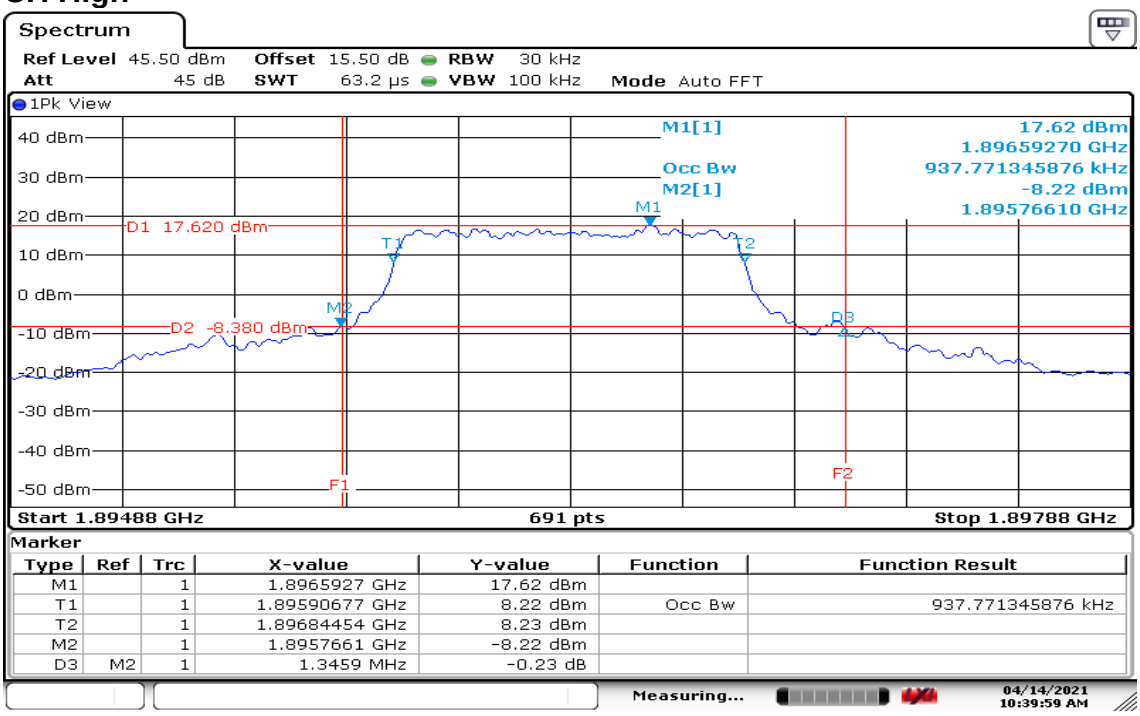


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8740884 GHz	16.44 dBm		
T1		1	1.87341111 GHz	9.10 dBm	Occ Bw	933.429811867 kHz
T2		1	1.87434454 GHz	7.91 dBm		
M2		1	1.8733004 GHz	-10.19 dBm		
D3	M2	1	1.3154 MHz	0.16 dB		

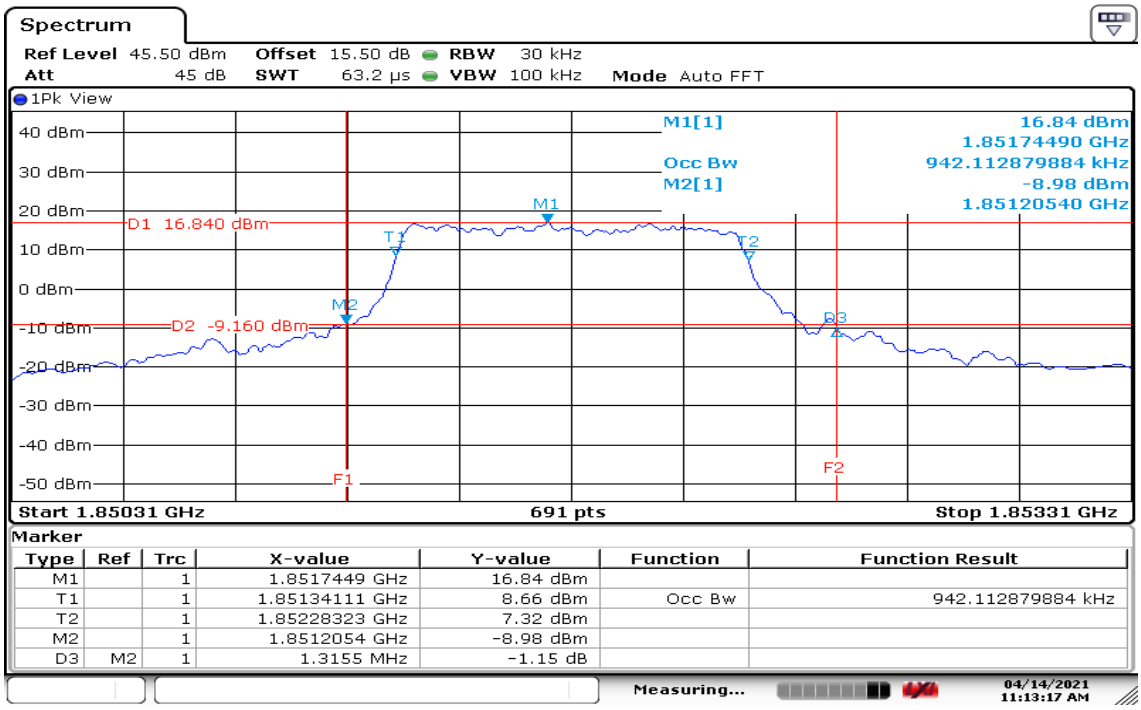
Date: 14.APR.2021 09:58:54

CH High



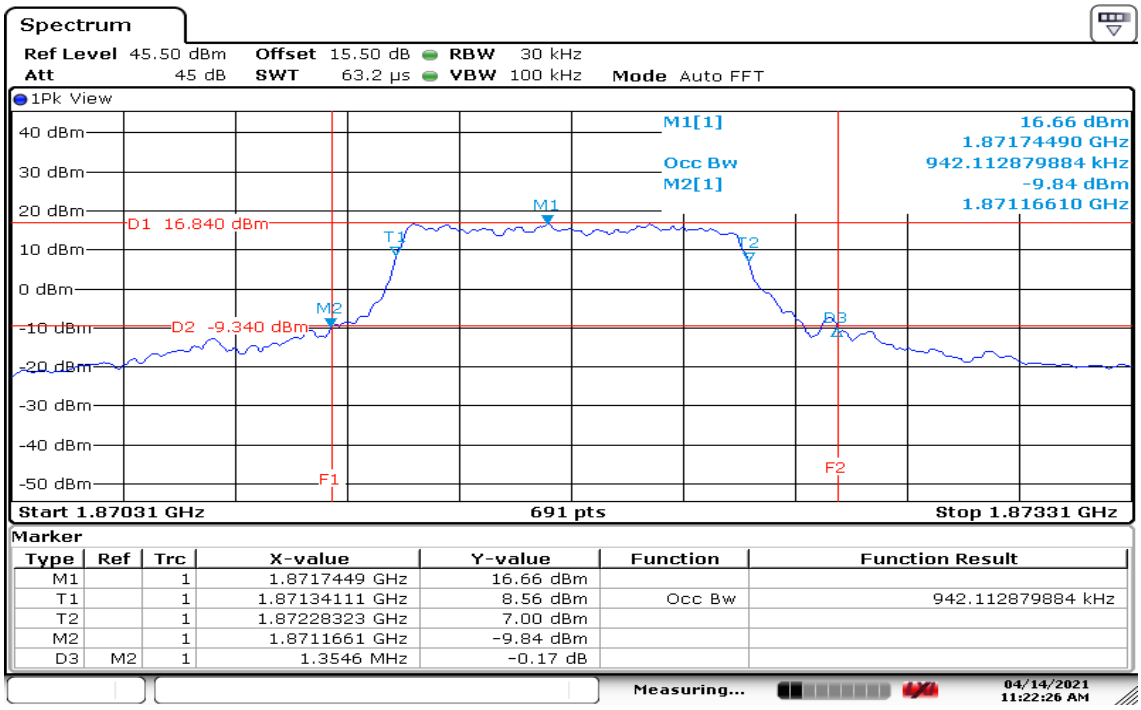
Date: 14.APR.2021 10:39:59

BW: 20MHz
CH Low



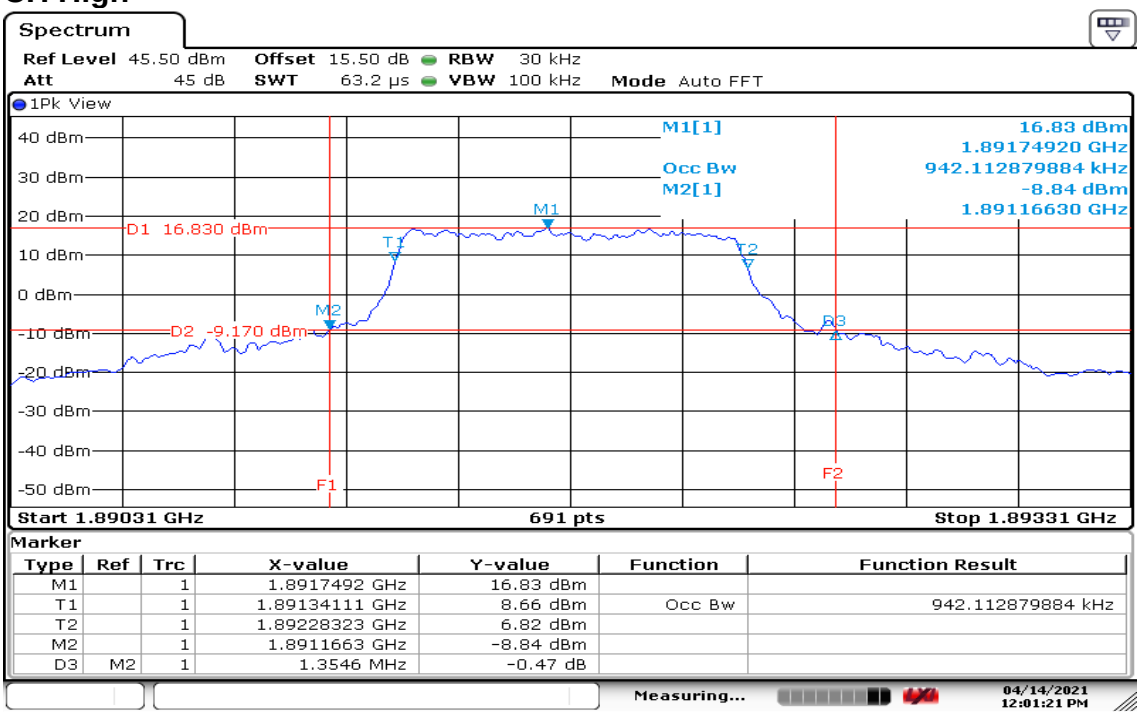
Date: 14.APR.2021 11:13:18

CH Mid



Date: 14.APR.2021 11:22:26

CH High



Date: 14.APR.2021 12:01:21

8.4 PEAK TO AVERAGE POWER RATIO

Limit

In measuring transmissions in this band using an average power technique, the peak to average power ratio (PAPR) of the transmission may not exceed 13 dB.

Test Procedures

1. According to KDB 971168 D01,
2. The EUT was connect to spectrum analyzer and call box.
3. Set the CCDF function in spectrum analyzer.
4. The highest RF output power were measured and recorded the maximum PAPR level associated with a probability of 0.1%.
5. Record the Peak to Average Power Ratio.

Note: We selected worst case to performed test in middle channel, the results can be meet other channel.

TEST RESULTS

Temperature:	21.5℃	**Humidity:**	56.2% RH
Tested by:	Dally Hong	**Test Date:**	March 29, 2021
Temperature:	23.7℃	**Humidity:**	52.4% RH
Tested by:	Dally Hong	**Test Date:**	April 13, 2021
Temperature:	23.1℃	**Humidity:**	52.5% RH
Tested by:	Dally Hong	**Test Date:**	April 14, 2021

LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK / Full RB

Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1850.7	18607	8.46
1880	18900	8.41
1909.3	19193	8.38

CHANNEL BANDWIDTH: 3MHz / QPSK / Full RB

Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1851.5	18615	4.90
1880	18900	6.26
1908.5	19185	8.64

CHANNEL BANDWIDTH: 5MHz / QPSK / Full RB

Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1852.5	18625	5.77
1880	18900	6.38
1907.5	19175	5.86

CHANNEL BANDWIDTH: 10MHz / QPSK / Full RB

Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1855	18650	8.61
1880	18900	5.22
1905	19150	5.54

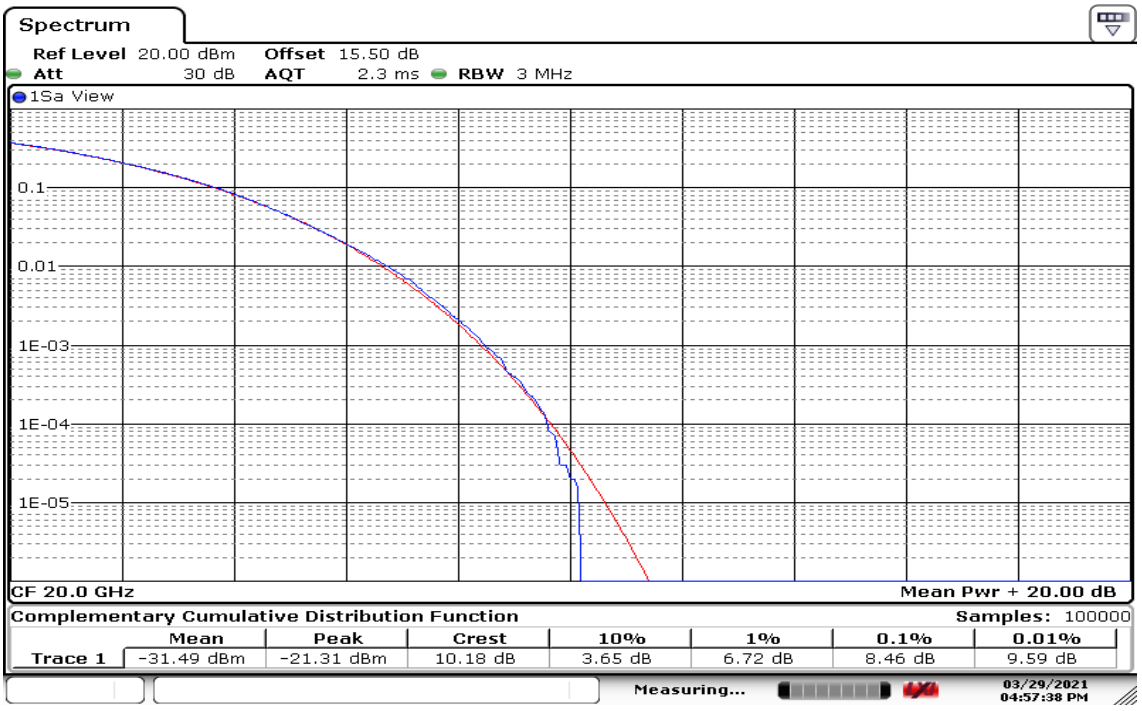
CHANNEL BANDWIDTH: 15MHz / QPSK / Full RB

Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1857.5	18675	8.17
1880	18900	8.43
1902.5	19125	8.61

CHANNEL BANDWIDTH: 20MHz / QPSK / Full RB

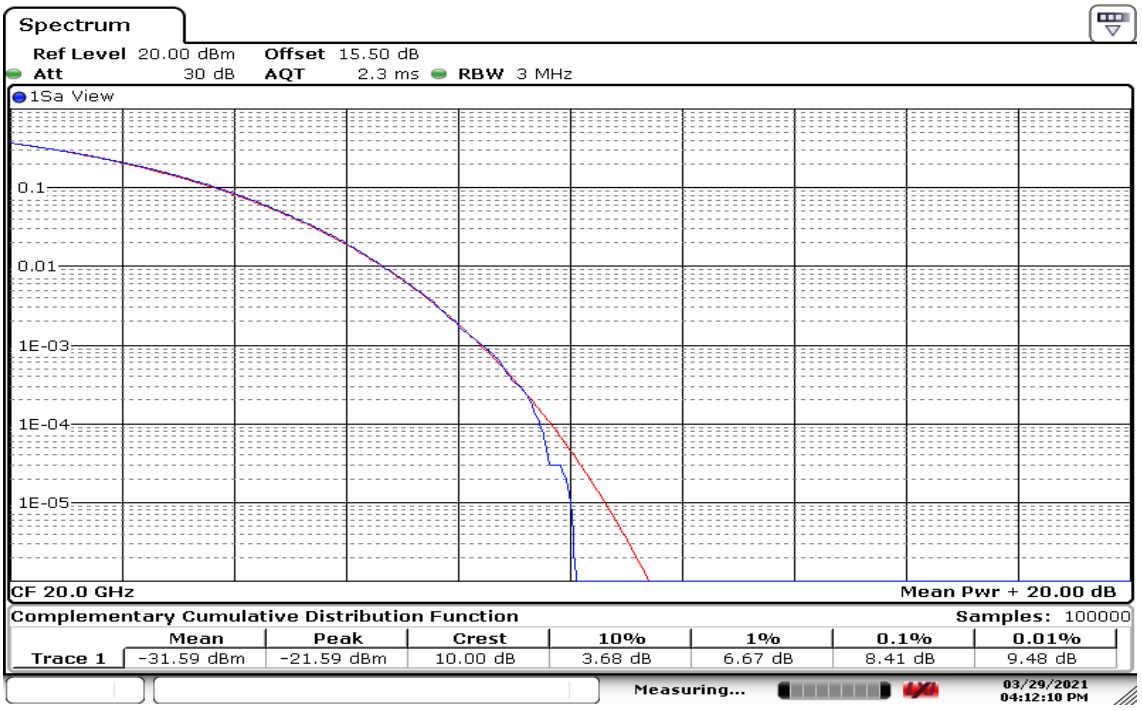
Frequency (MHz)	Channel	PEAK TO AVERAGE RATIO (dB)
1860	18700	8.29
1880	18900	8.38
1900	19100	8.32

LTE Band 2
QPSK / RB =6, RB Offset = 0
BW: 1.4MHz
CH Low



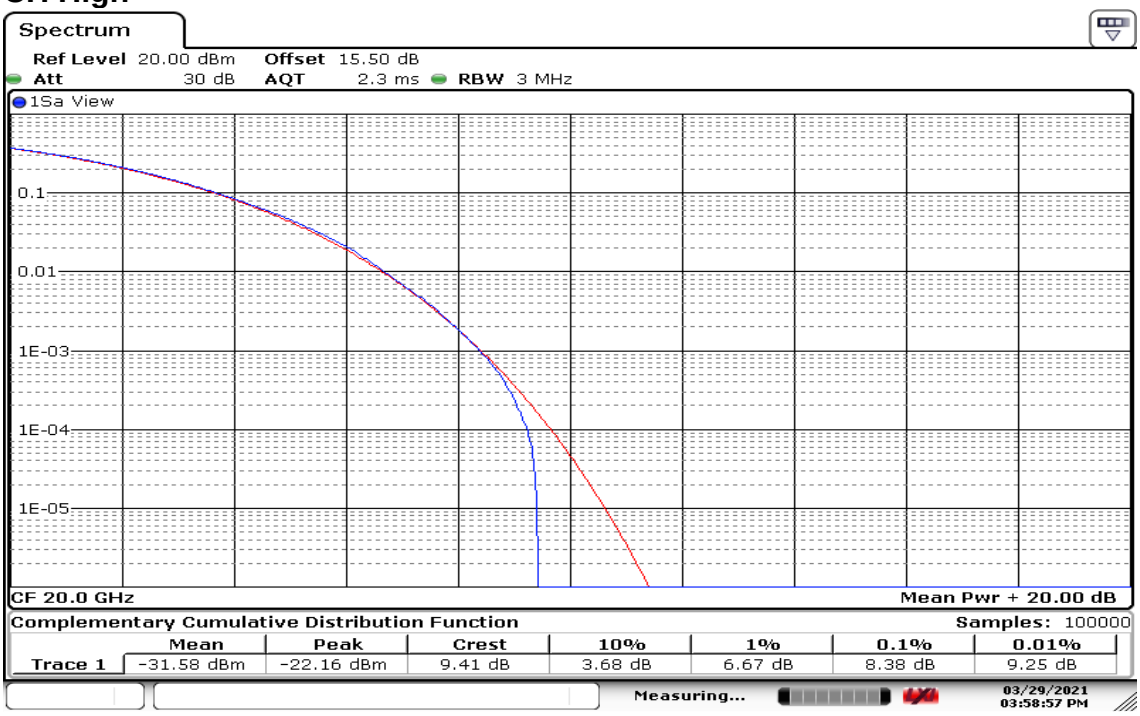
Date: 29.MAR.2021 16:57:38

CH Mid



Date: 29.MAR.2021 16:12:10

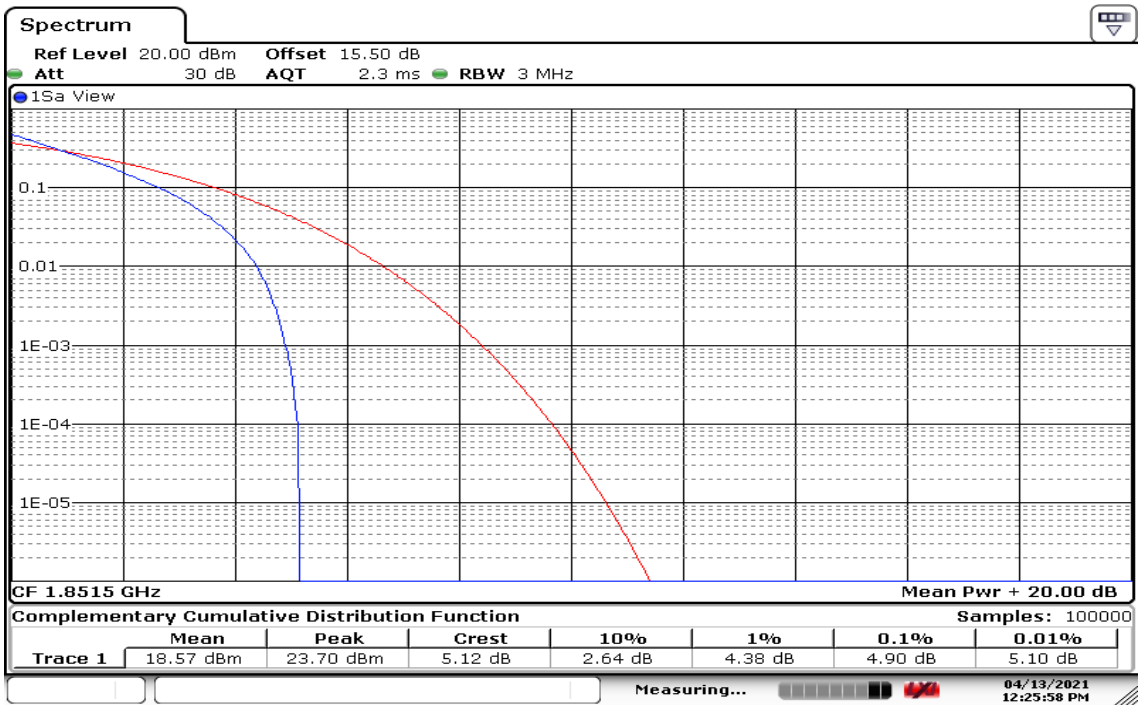
CH High



Date: 29.MAR.2021 15:58:58

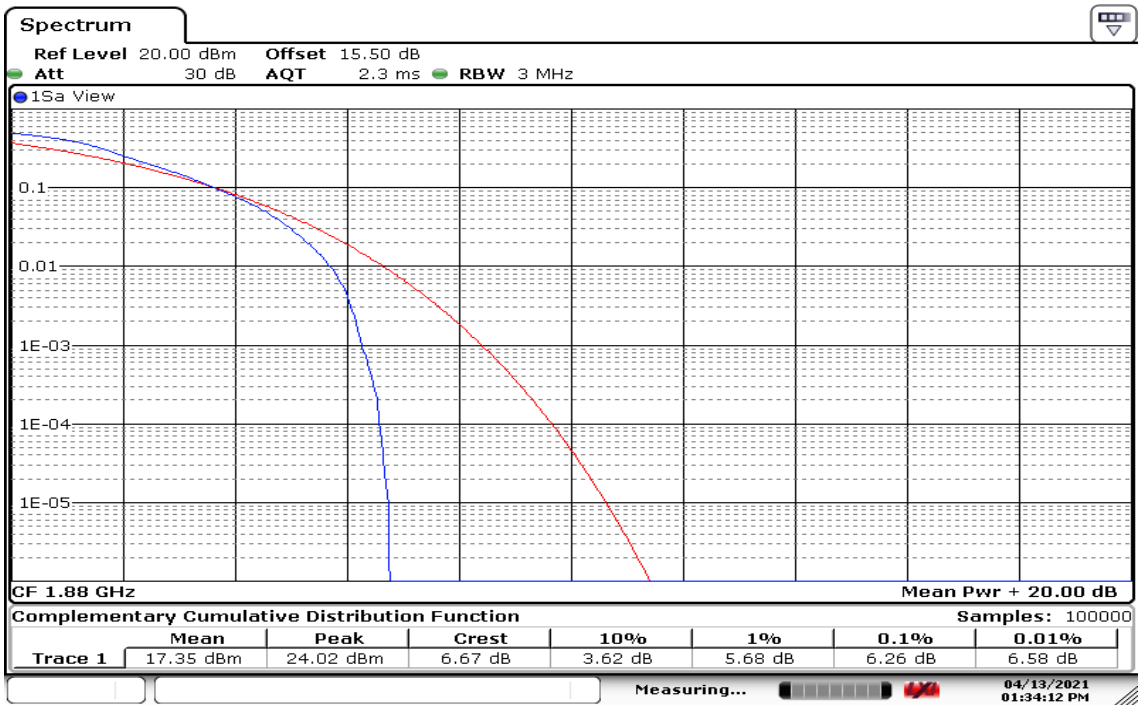
BW: 3MHz

CH Low



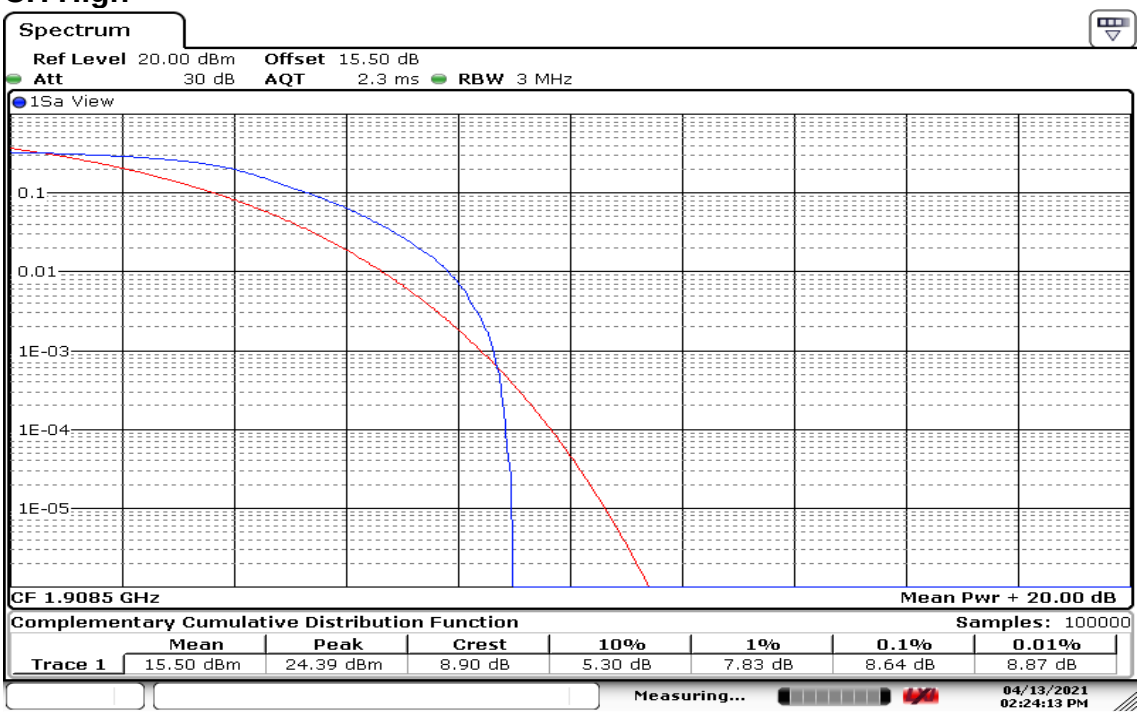
Date: 13.APR.2021 12:25:58

CH Mid



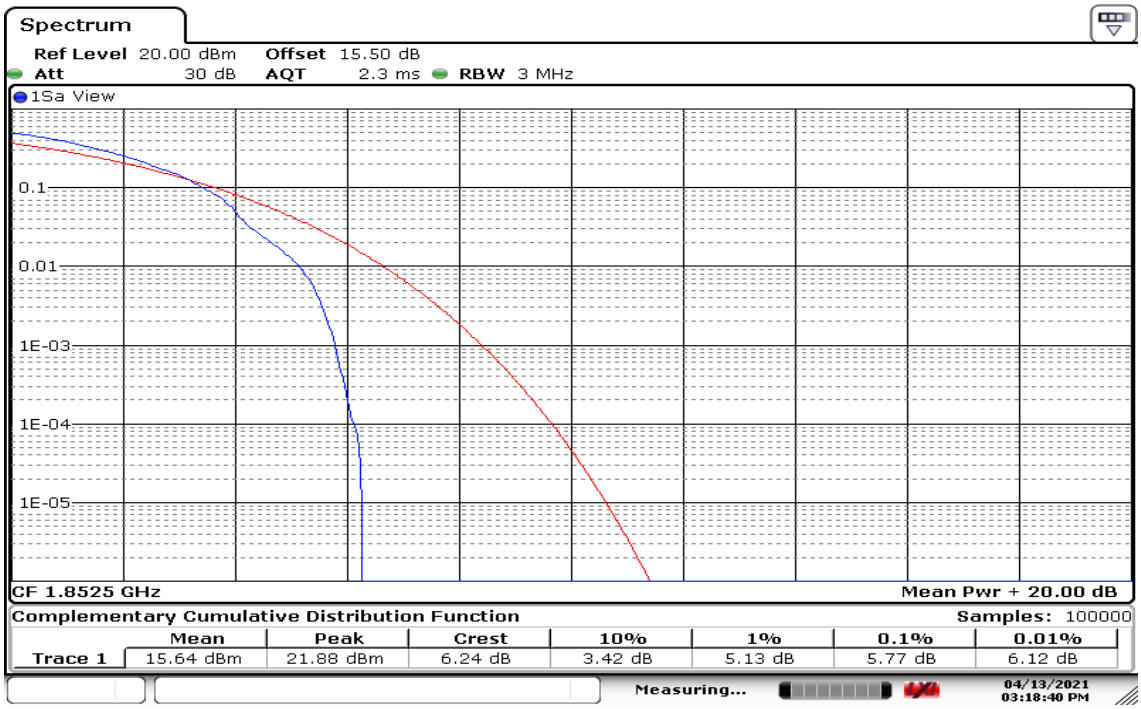
Date: 13.APR.2021 13:34:13

CH High



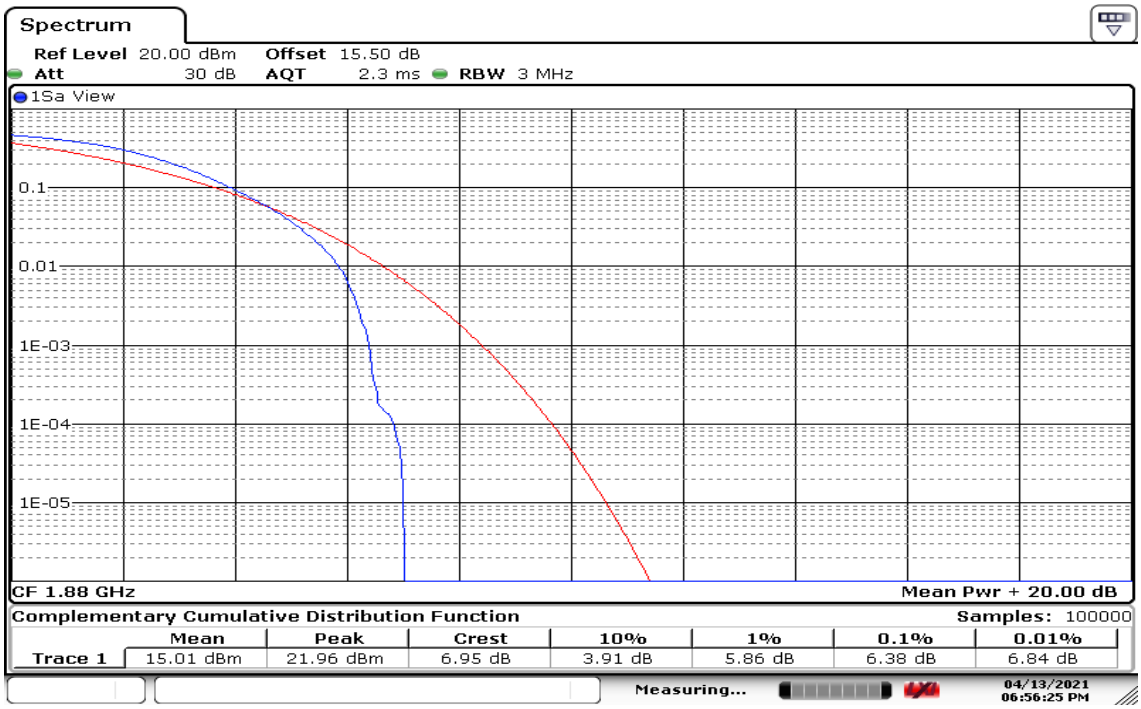
Date: 13.APR.2021 14:24:13

BW: 5MHz
CH Low



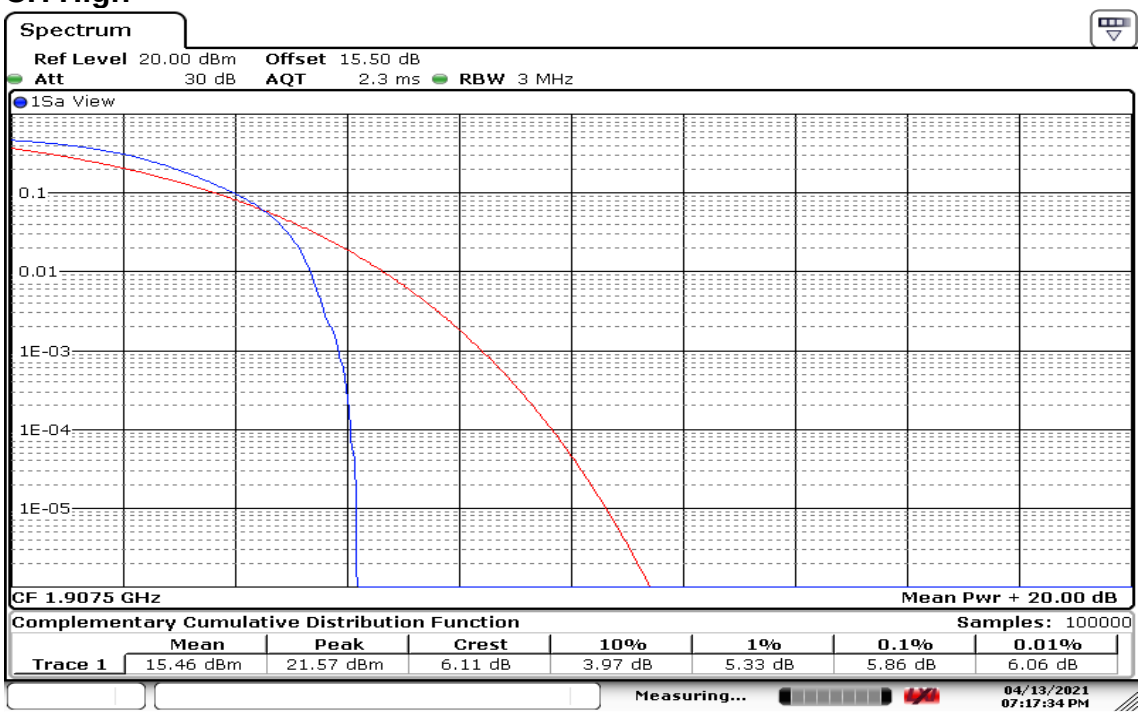
Date: 13.APR.2021 15:18:40

CH Mid



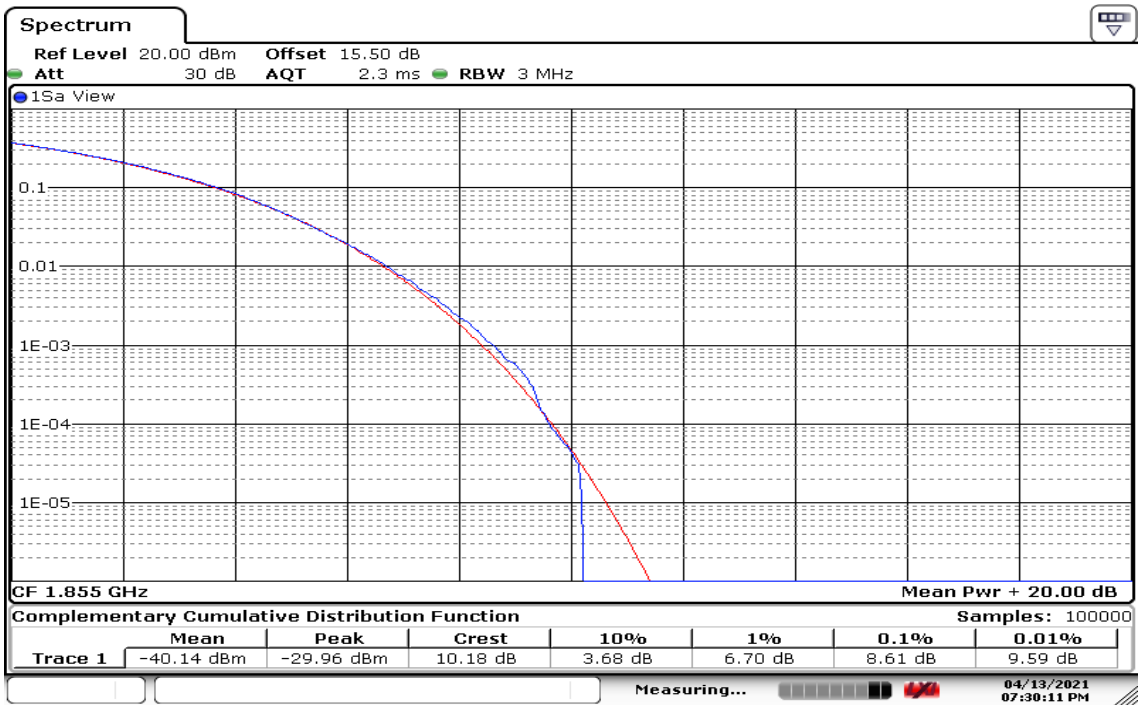
Date: 13.APR.2021 18:56:26

CH High



Date: 13.APR.2021 19:17:34

BW: 10MHz
CH Low



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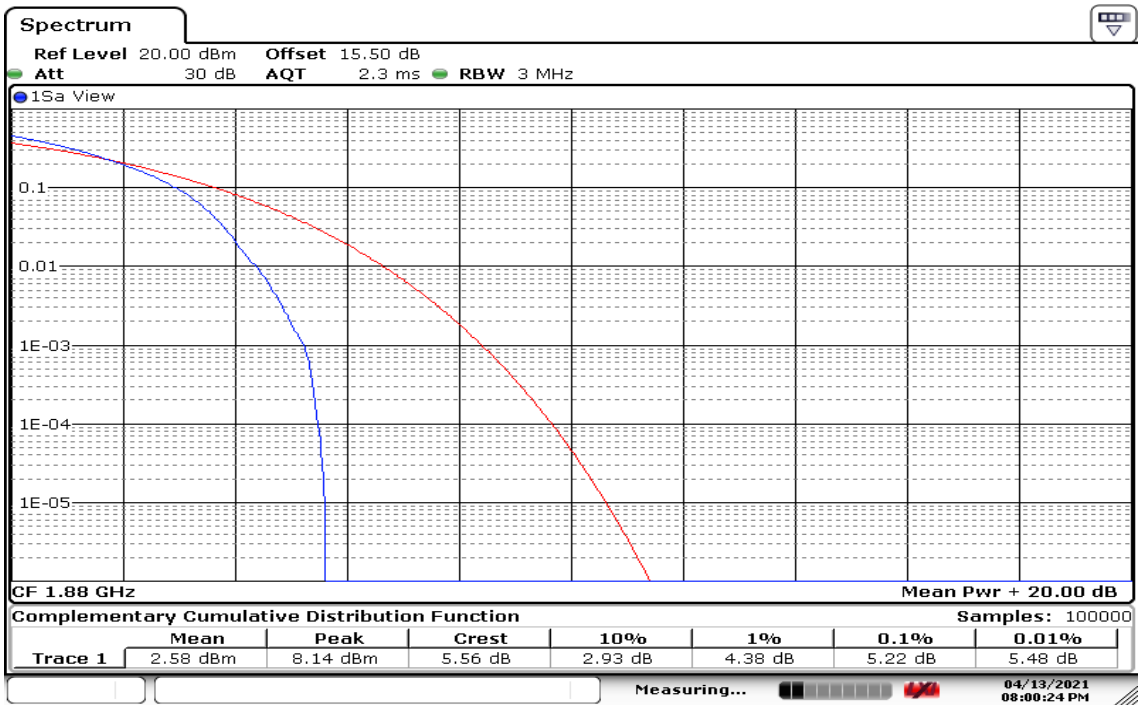
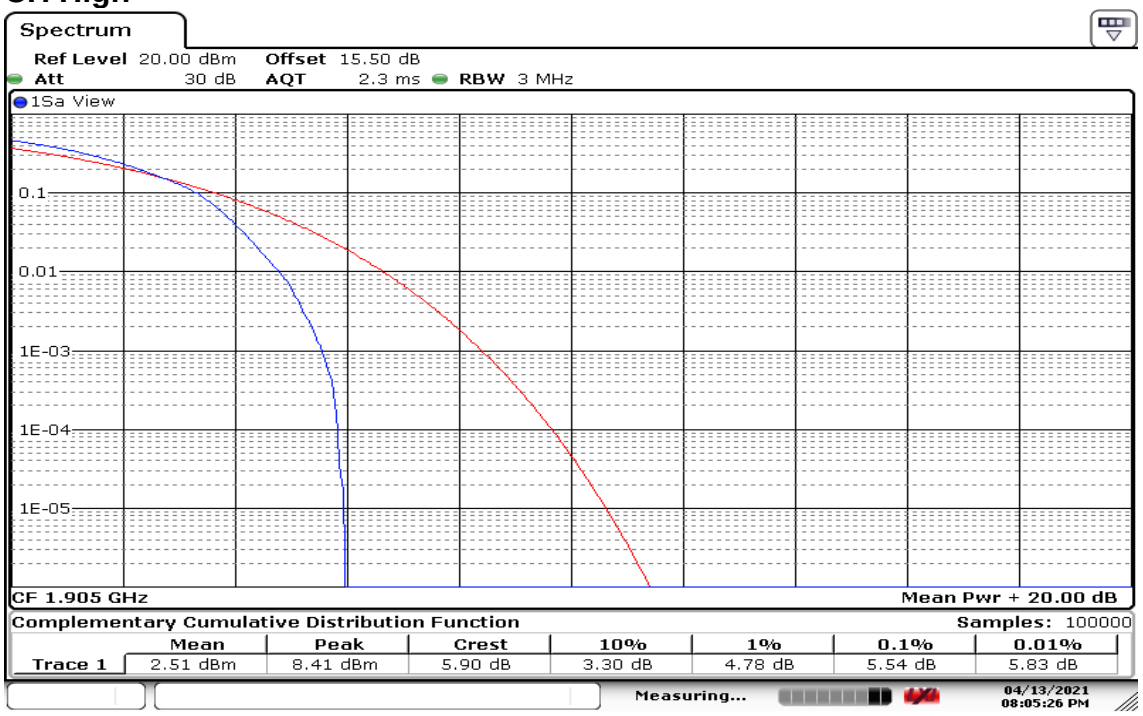
CH Mid



Date: 13.APR.2021 20:00:24

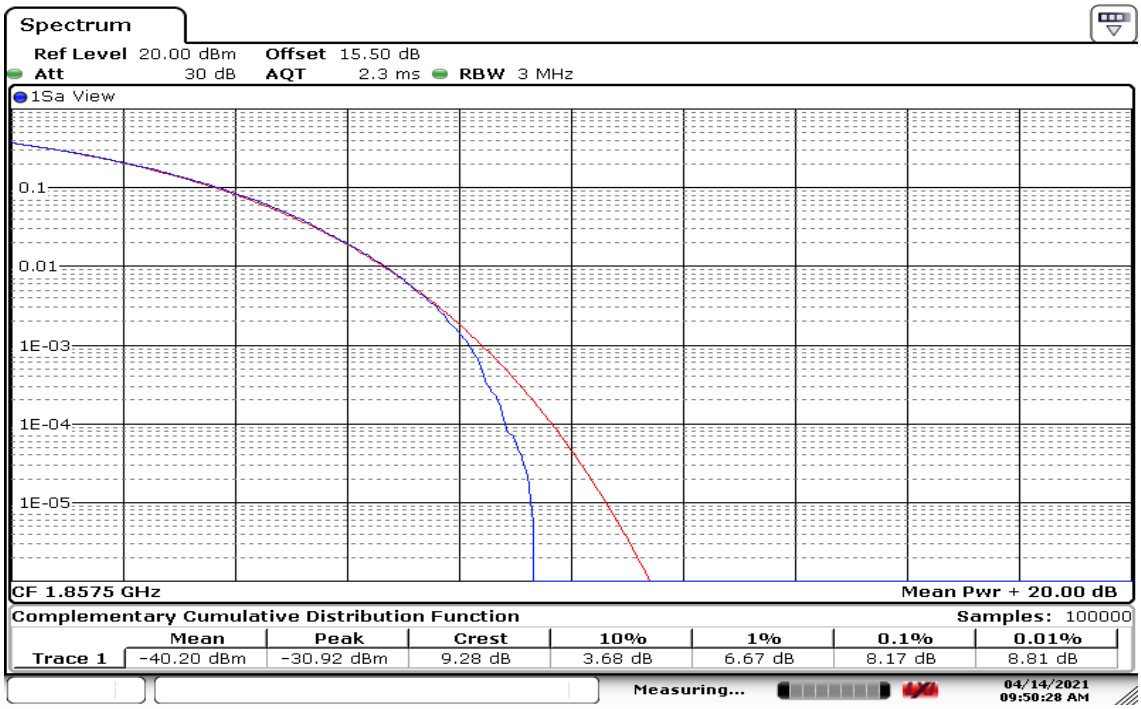
CH High



Date: 13.APR.2021 20:05:26

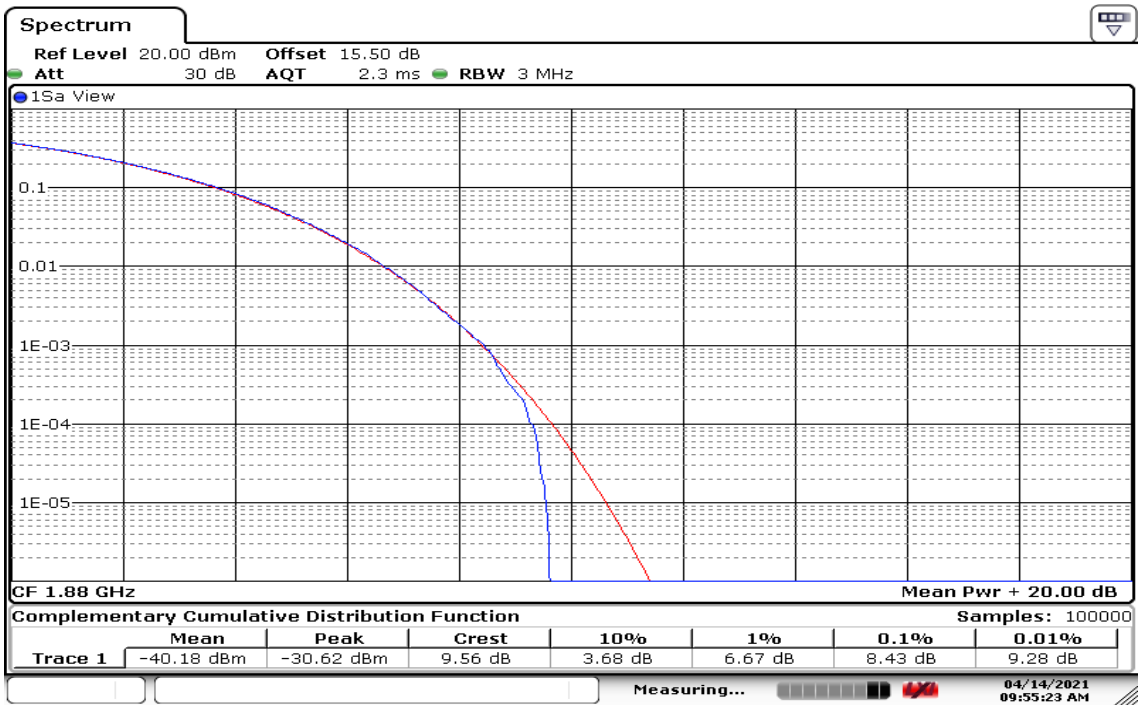
BW: 15MHz

CH Low



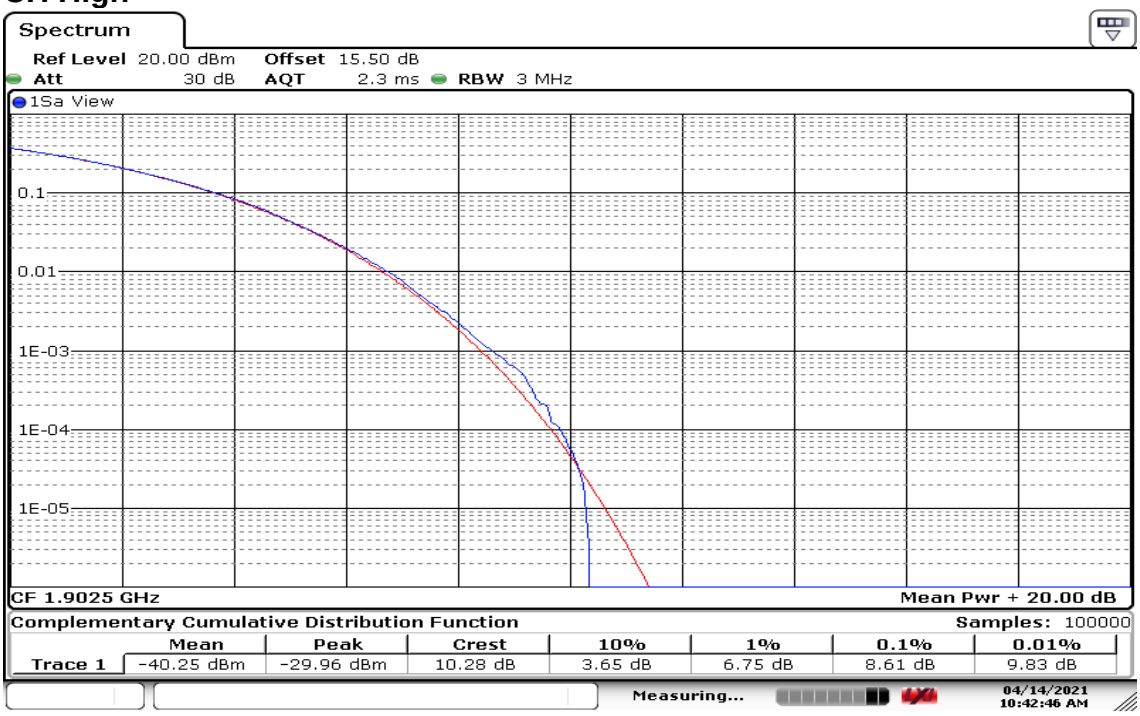
Date: 14.APR.2021 09:50:28

CH Mid



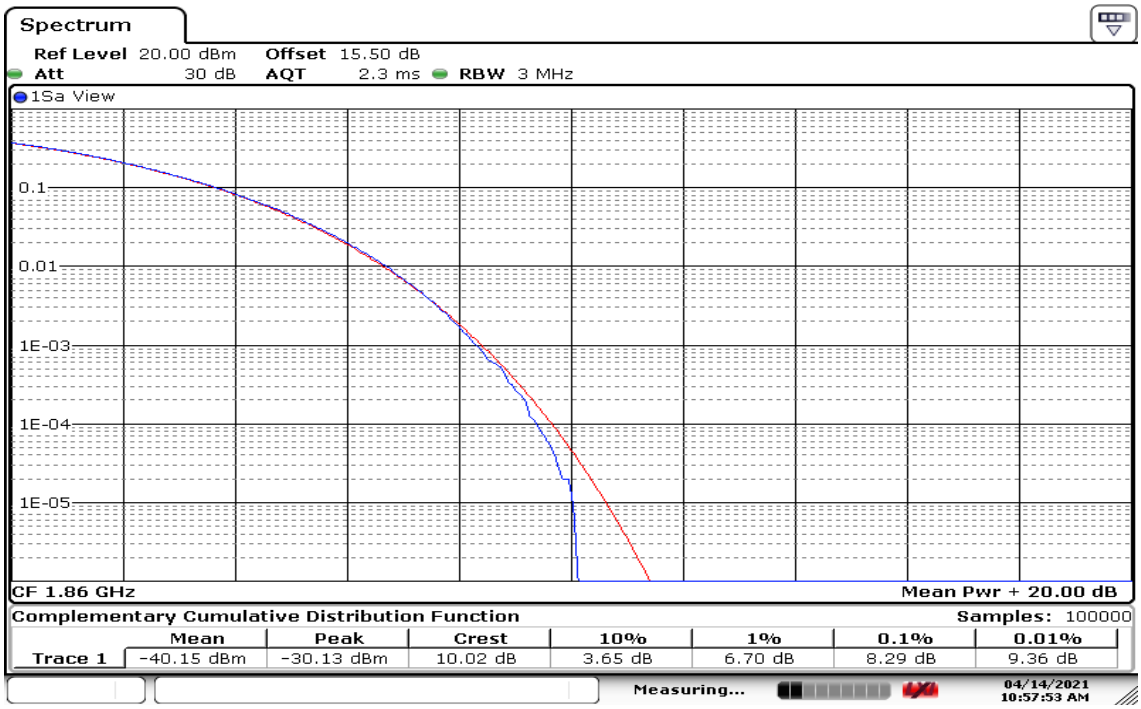
Date: 14.APR.2021 09:55:24

CH High



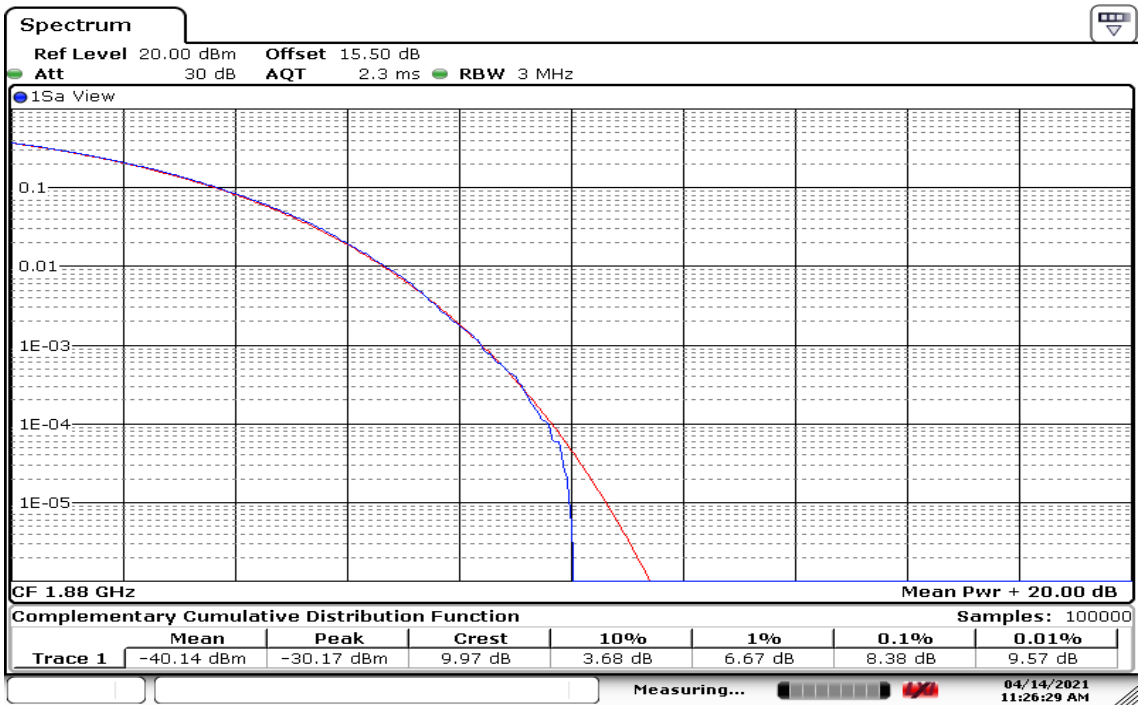
Date: 14.APR.2021 10:42:47

BW: 20MHz
CH Low



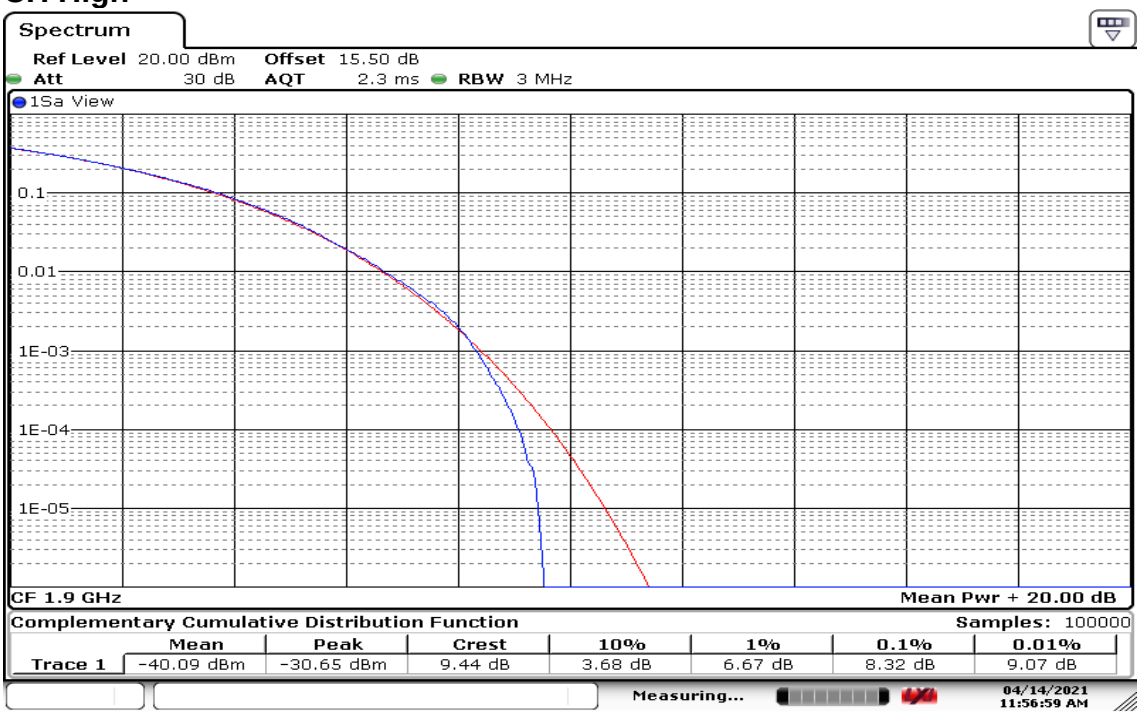
Date: 14.APR.2021 10:57:53

CH Mid



Date: 14.APR.2021 11:26:30

CH High



Date: 14.APR.2021 11:56:59

8.5 CONDUCTED BAND EDGE MEASUREMENT

Limit

FCC §24.238(a), Band 2

For operations in the 1850-1910 and 1930-1950 MHz band , Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Test Procedures

KDB 971168 D01,
1. RBW ≥ 1% of the emission bandwidth
2. VBW ≥ 3 x RBW
3. Span was set large enough so as to capture all out of emissions near the band edge.

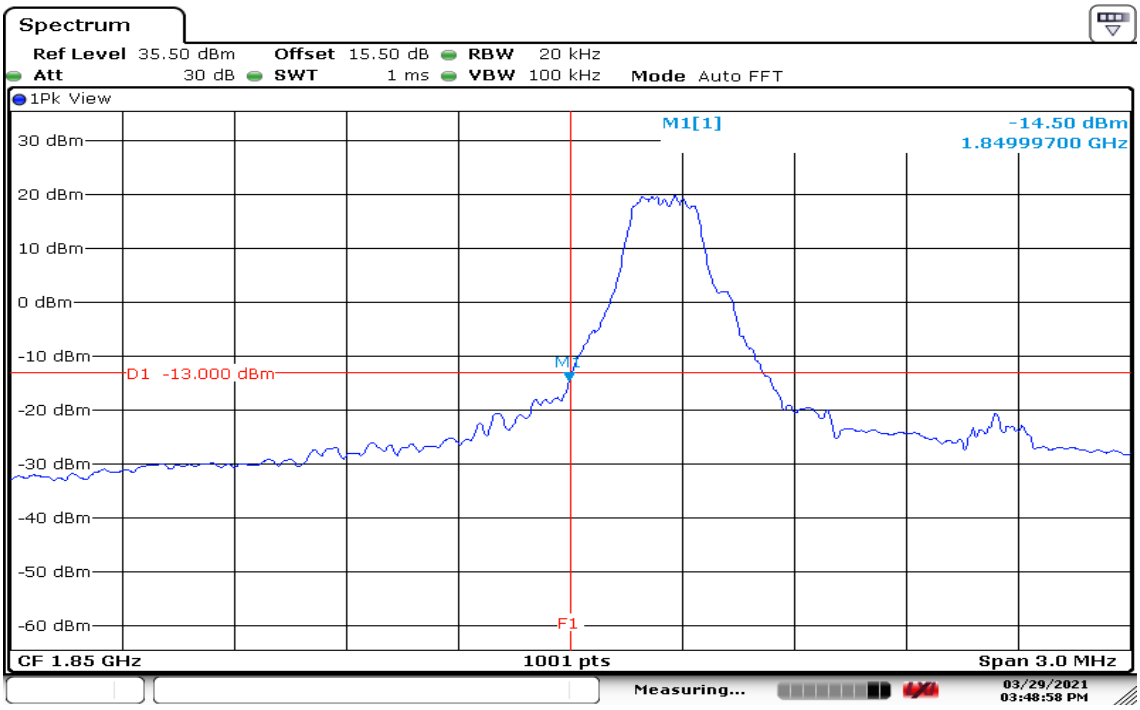
Test Results:

Temperature:	21.5℃	**Humidity:**	56.2% RH
Tested by:	Dally Hong	**Test Date:**	March 29, 2021
Temperature:	23.7℃	**Humidity:**	52.4% RH
Tested by:	Dally Hong	**Test Date:**	April 13, 2021
Temperature:	23.1℃	**Humidity:**	52.5% RH
Tested by:	Dally Hong	**Test Date:**	April 14, 2021

LTE Band 2

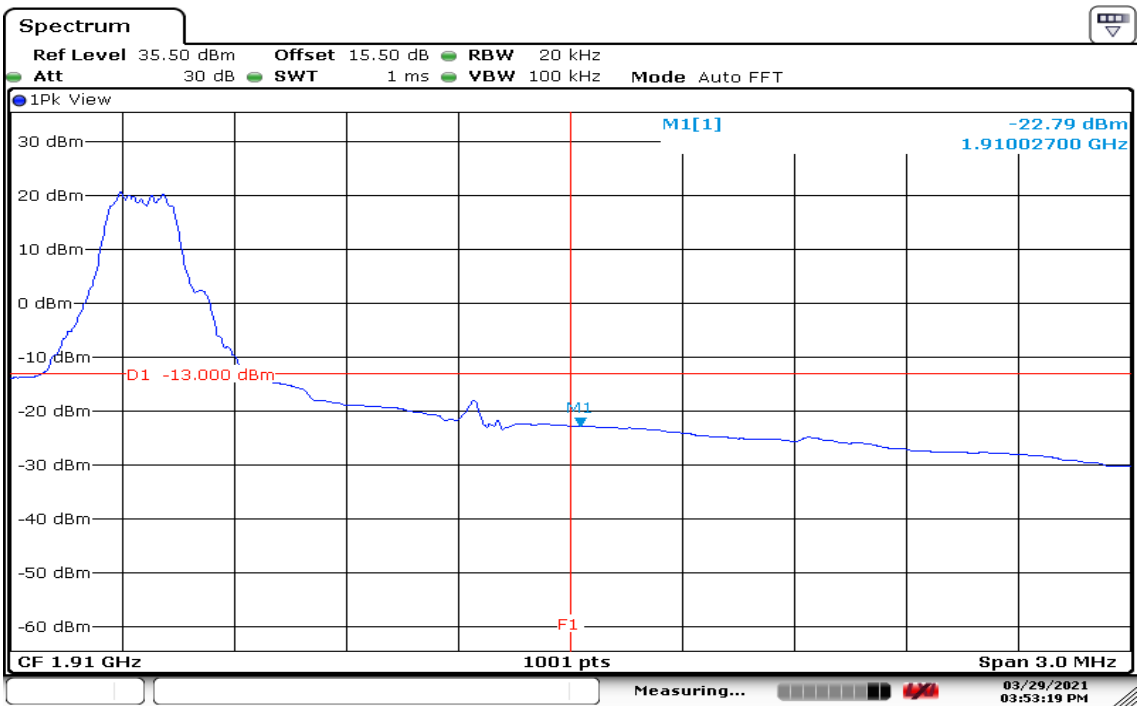
CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB ALLOCATED

LOWER BAND EDGE



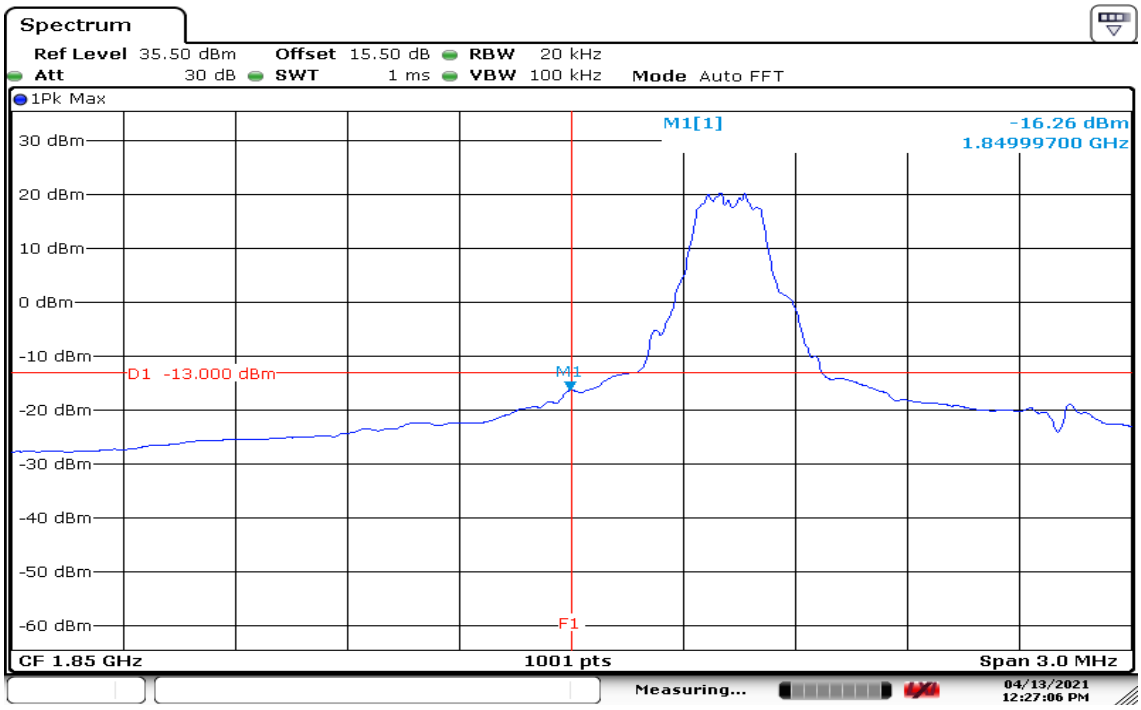
Date: 29.MAR.2021 15:48:59

HIGHER BAND EDGE



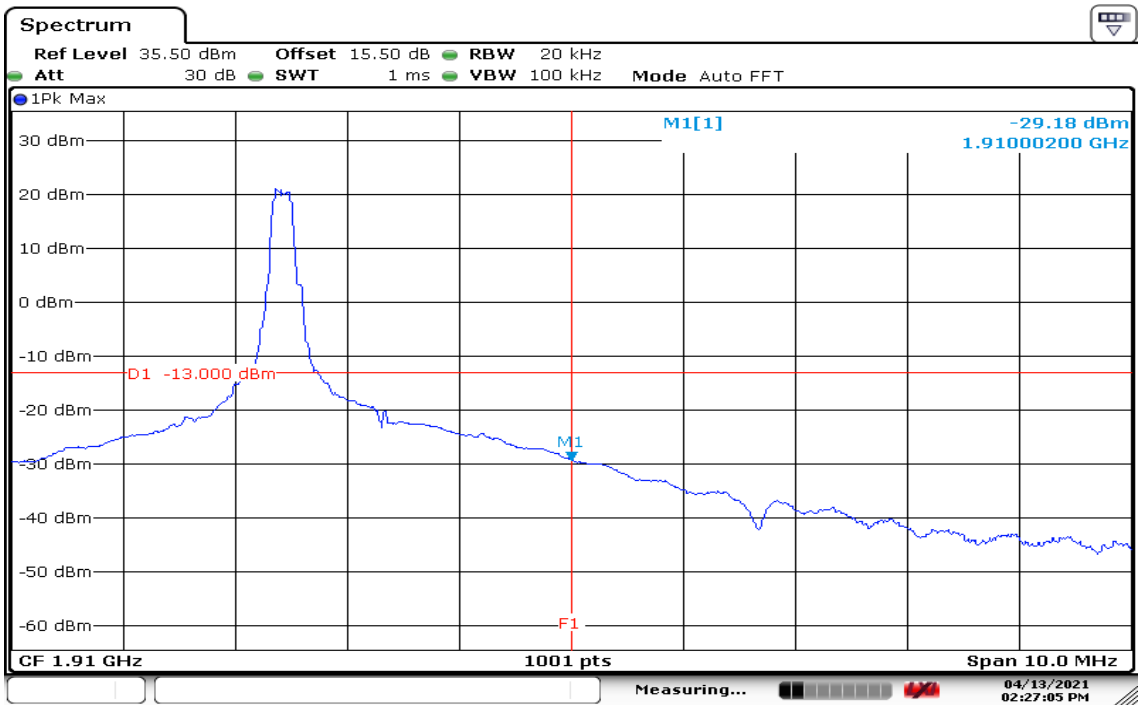
Date: 29.MAR.2021 15:53:19

CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



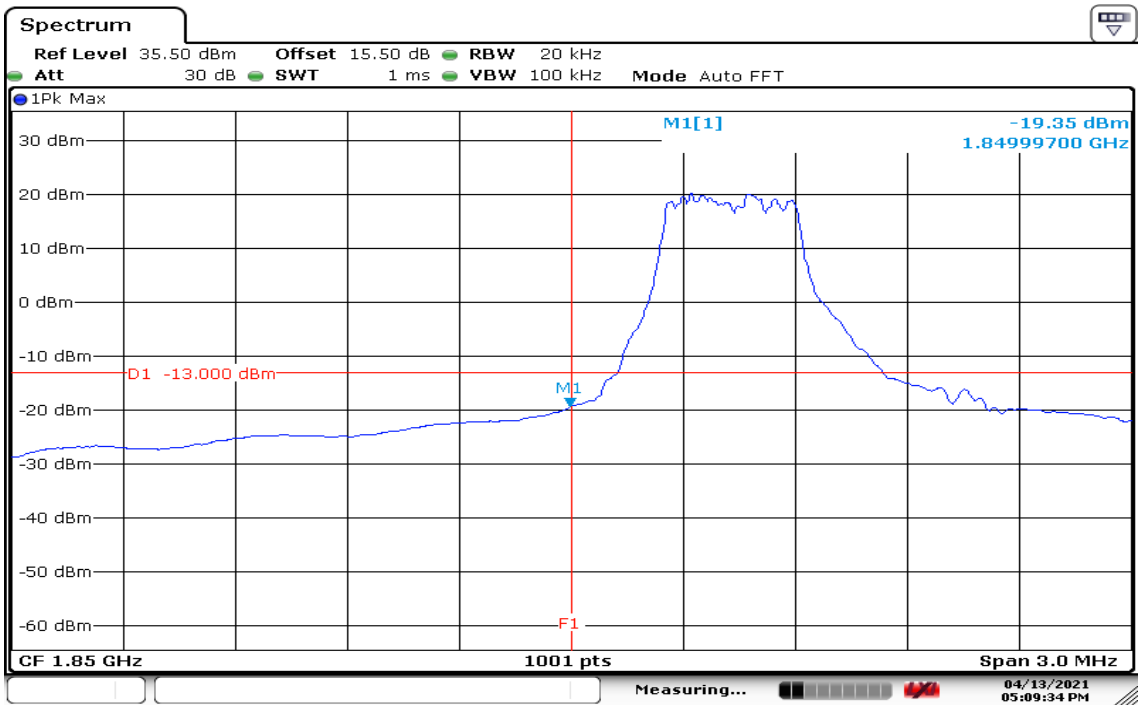
Date: 13.APR.2021 12:27:06

HIGHER BAND EDGE



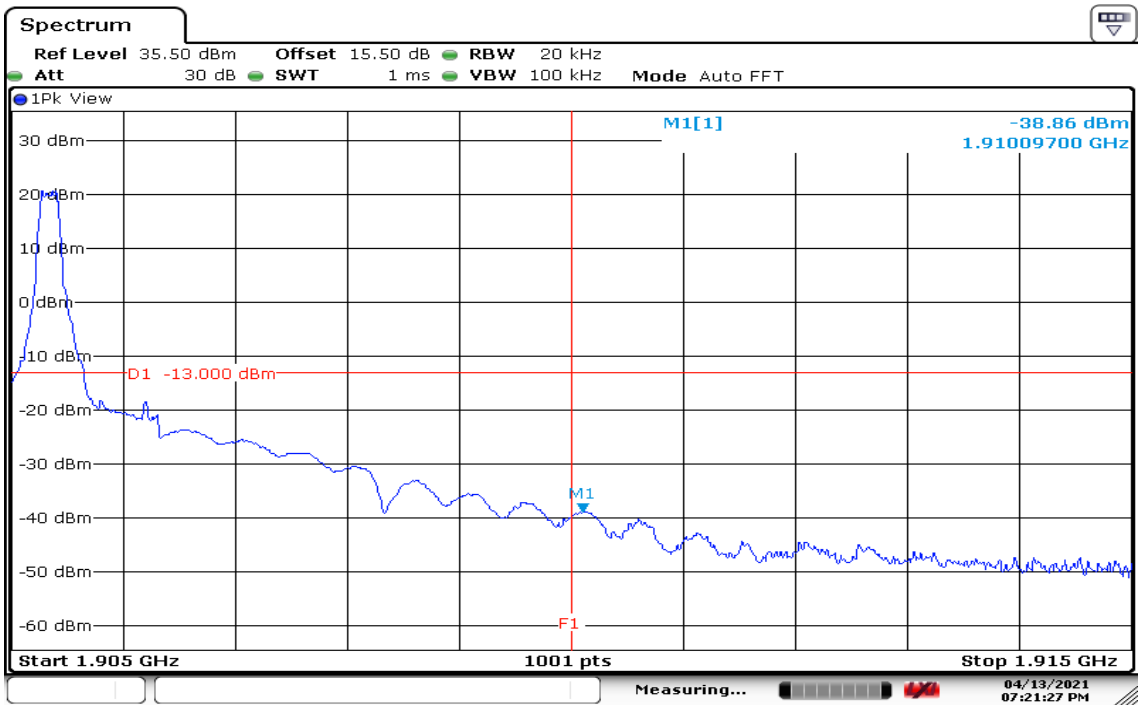
Date: 13.APR.2021 14:27:05

CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



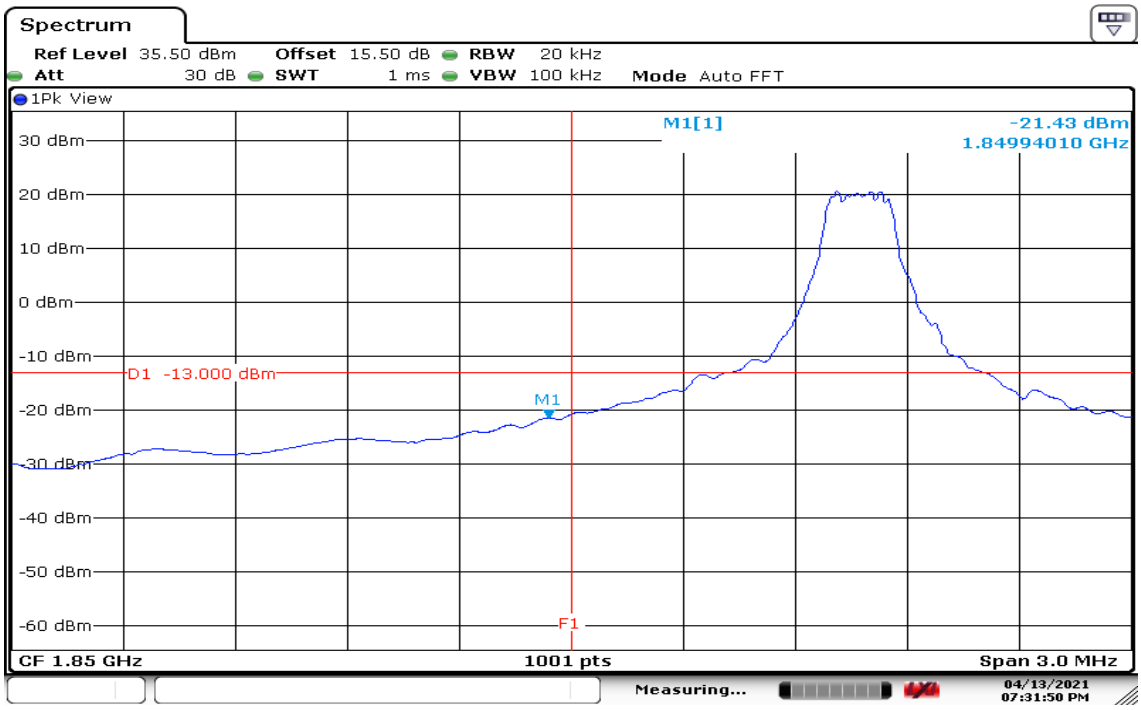
Date: 13.APR.2021 17:09:34

HIGHER BAND EDGE



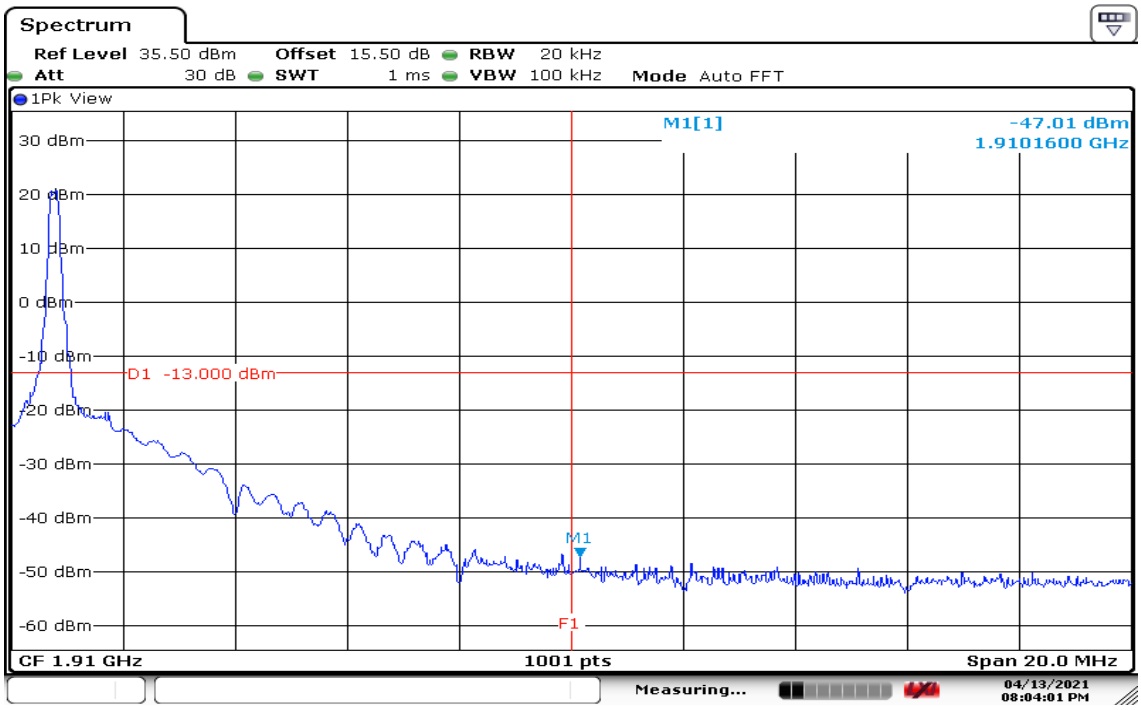
Date: 13.APR.2021 19:21:27

CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



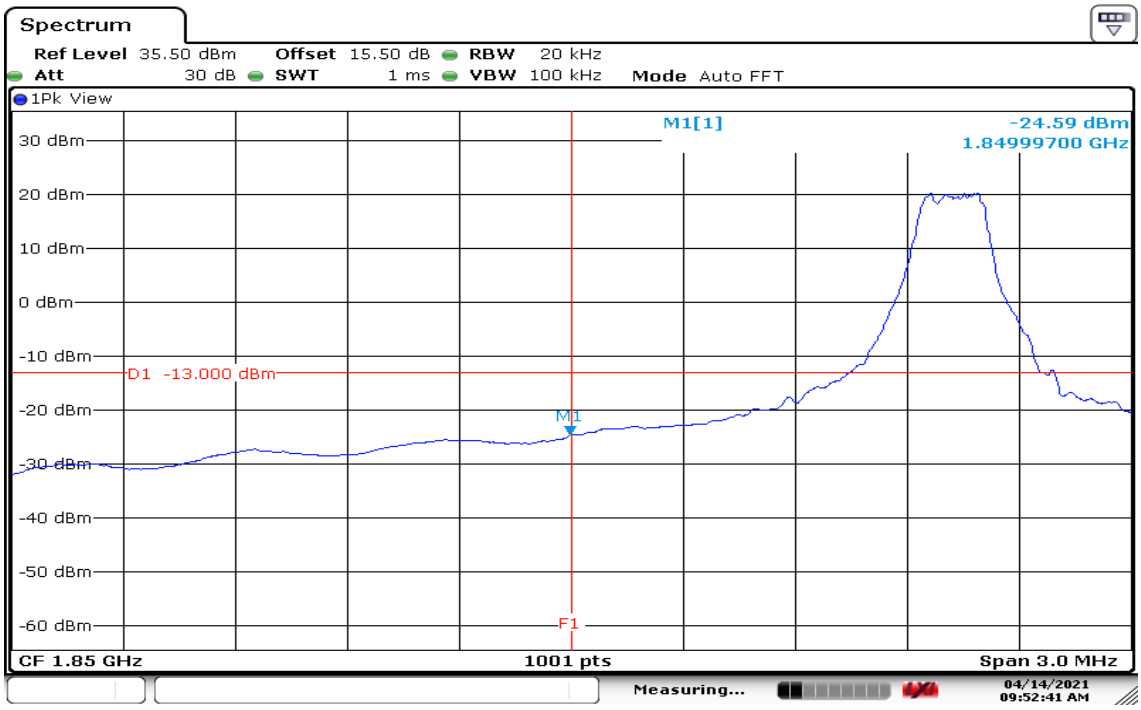
Date: 13.APR.2021 19:31:51

HIGHER BAND EDGE



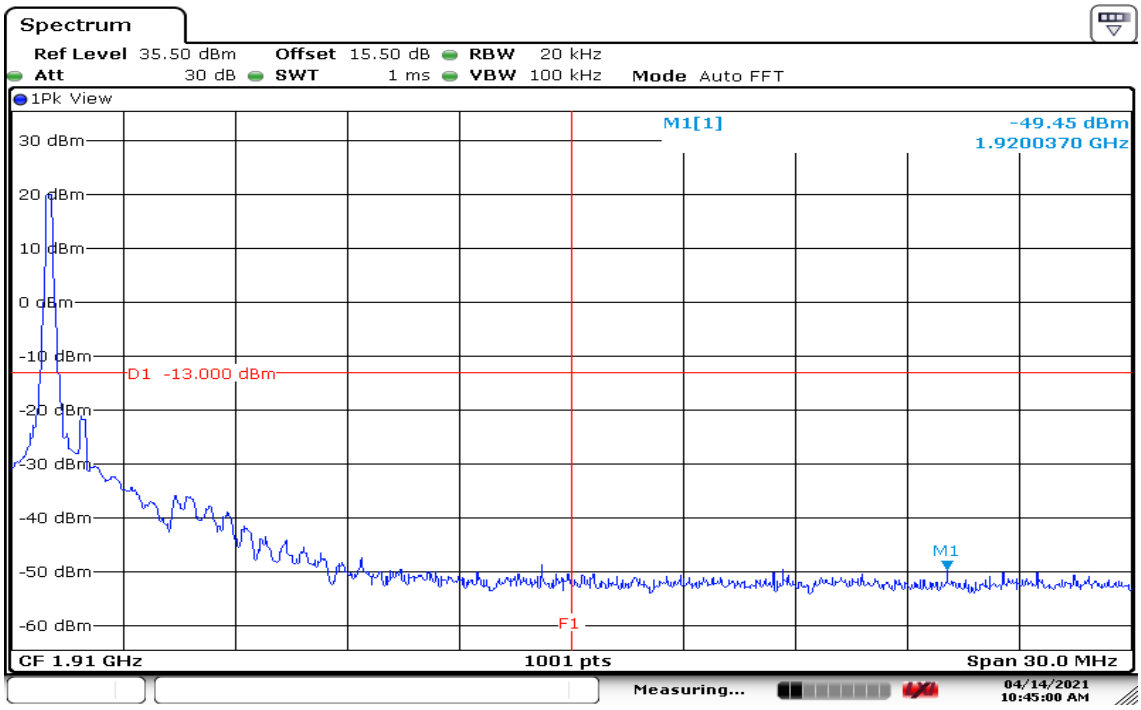
Date: 13.APR.2021 20:04:01

CHANNEL BANDWIDTH: 15MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



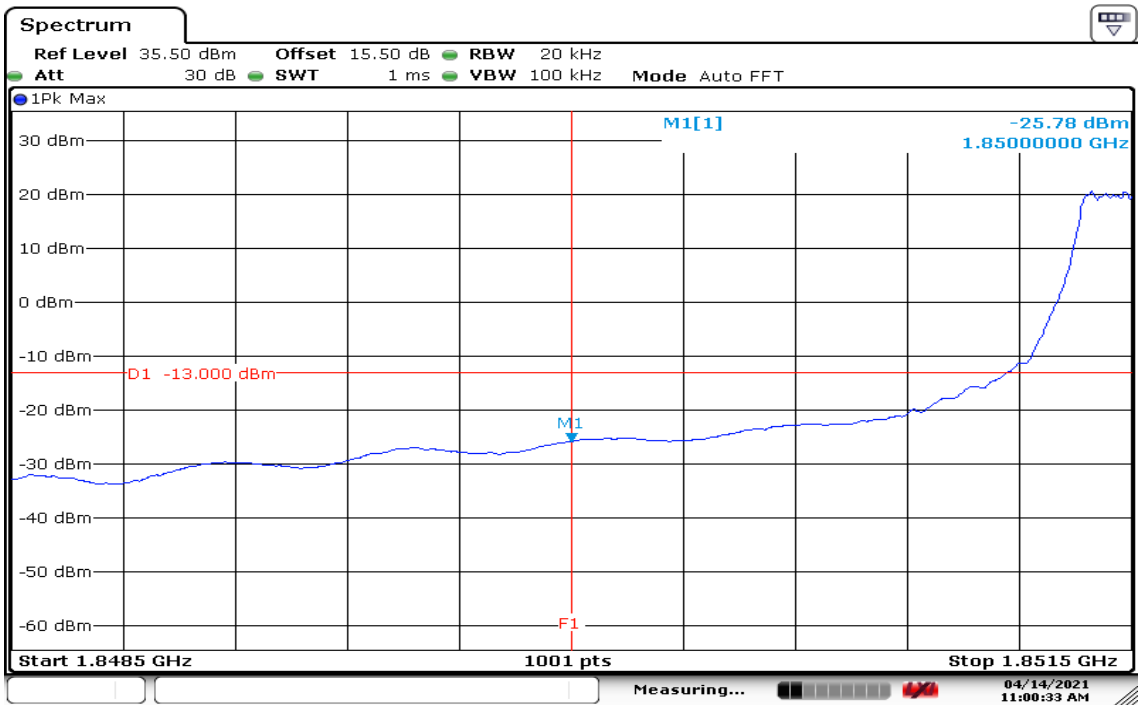
Date: 14.APR.2021 09:52:41

HIGHER BAND EDGE



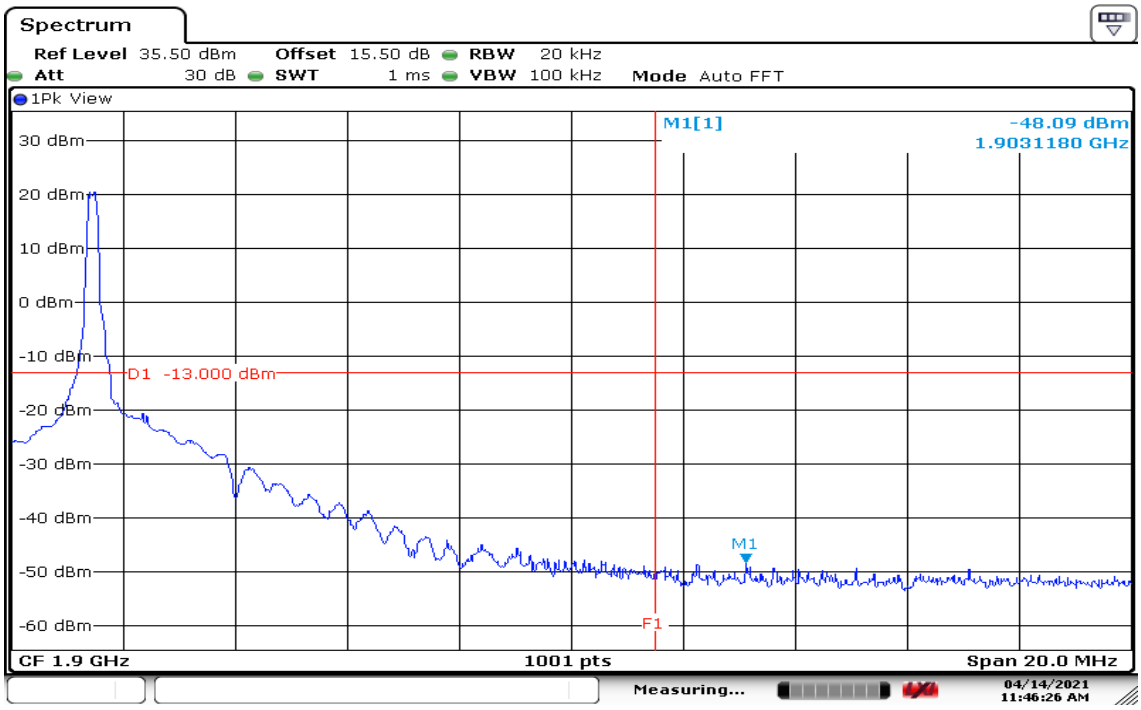
Date: 14.APR.2021 10:45:00

CHANNEL BANDWIDTH: 20MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



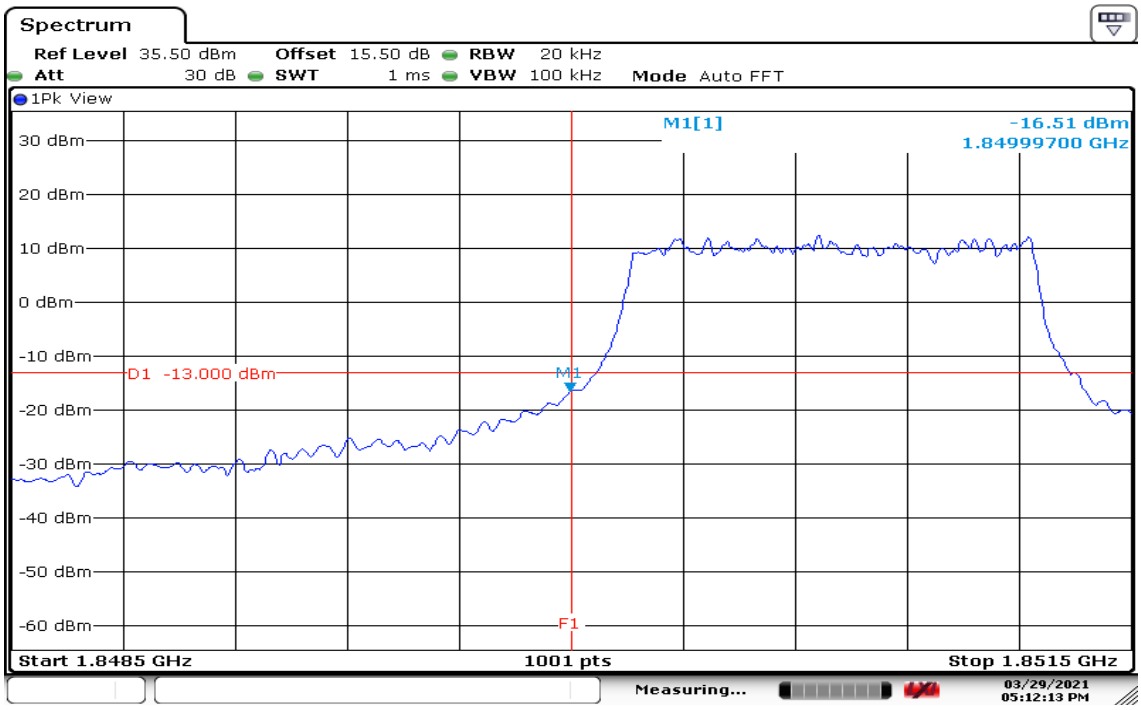
Date: 14.APR.2021 11:00:33

HIGHER BAND EDGE



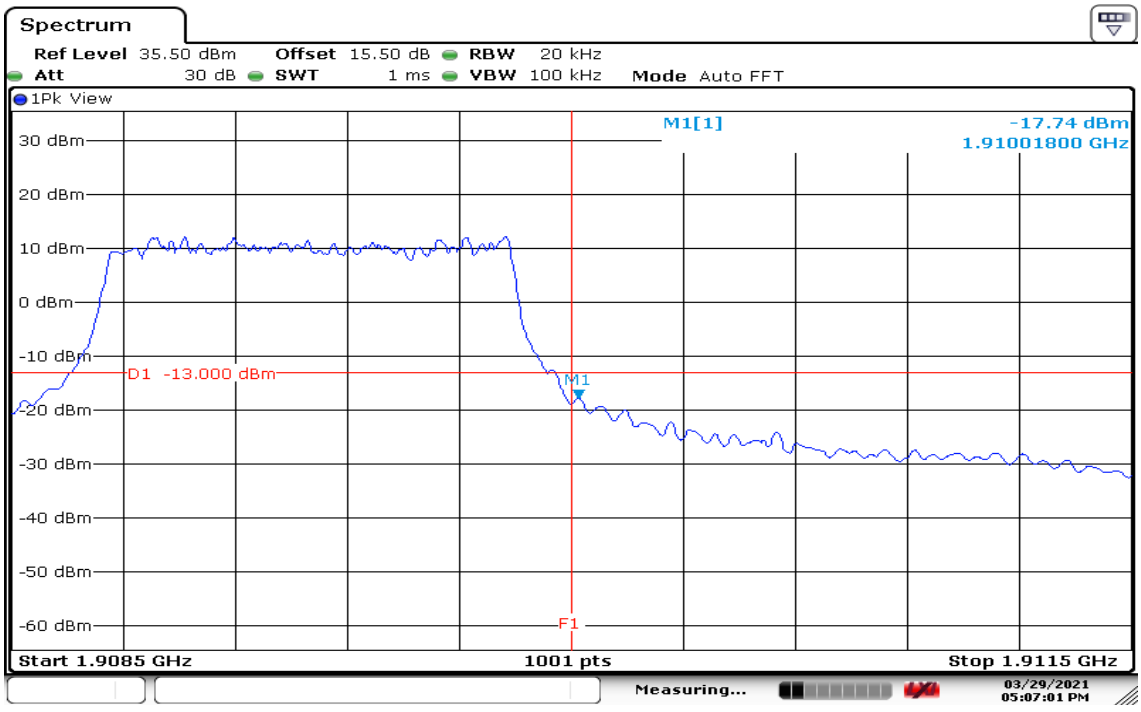
Date: 14.APR.2021 11:46:27

CHANNEL BANDWIDTH: 1.4MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



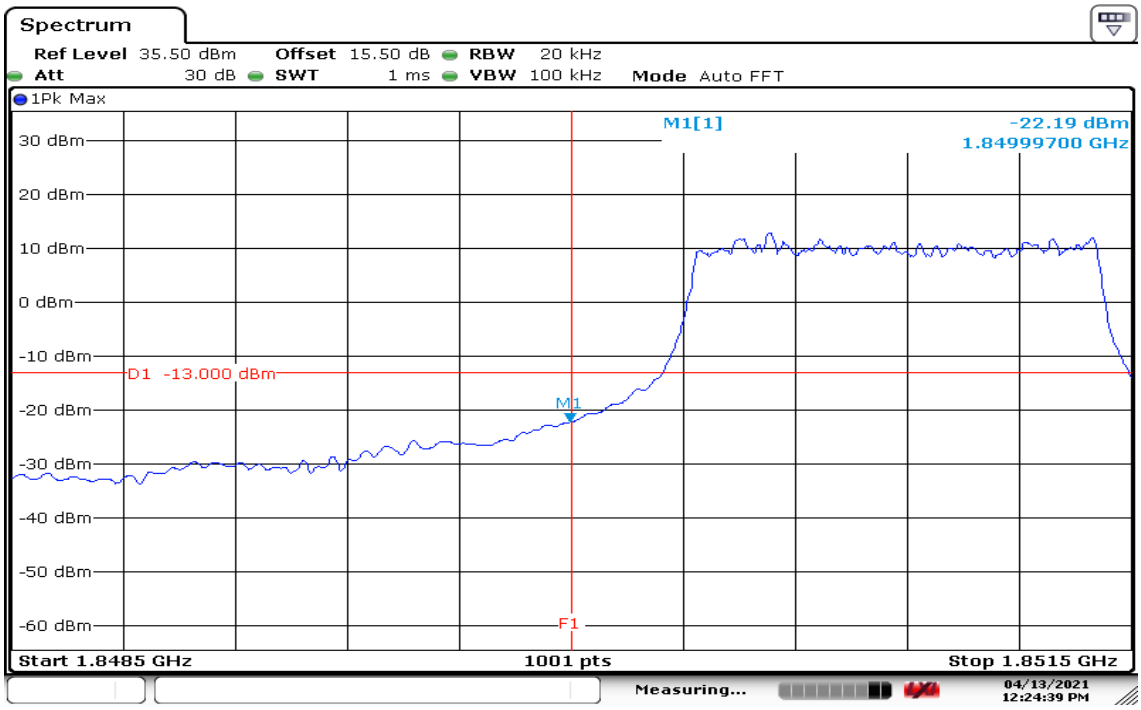
Date: 29.MAR.2021 17:12:13

HIGHER BAND EDGE



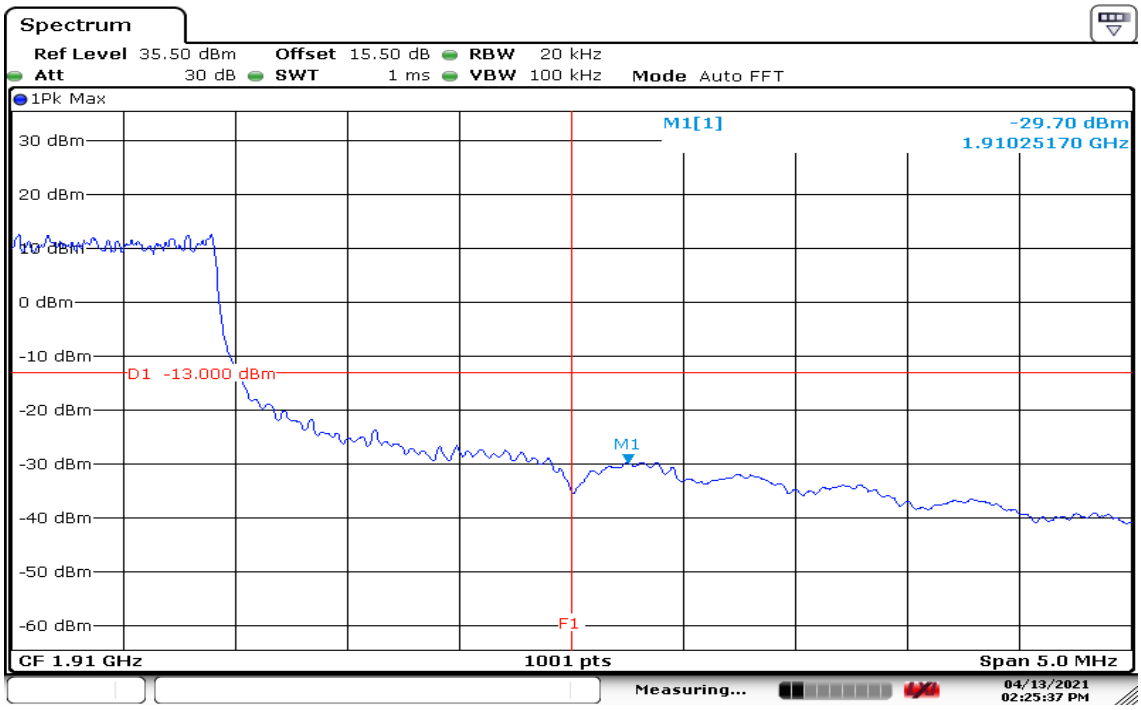
Date: 29.MAR.2021 17:07:02

CHANNEL BANDWIDTH: 3MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



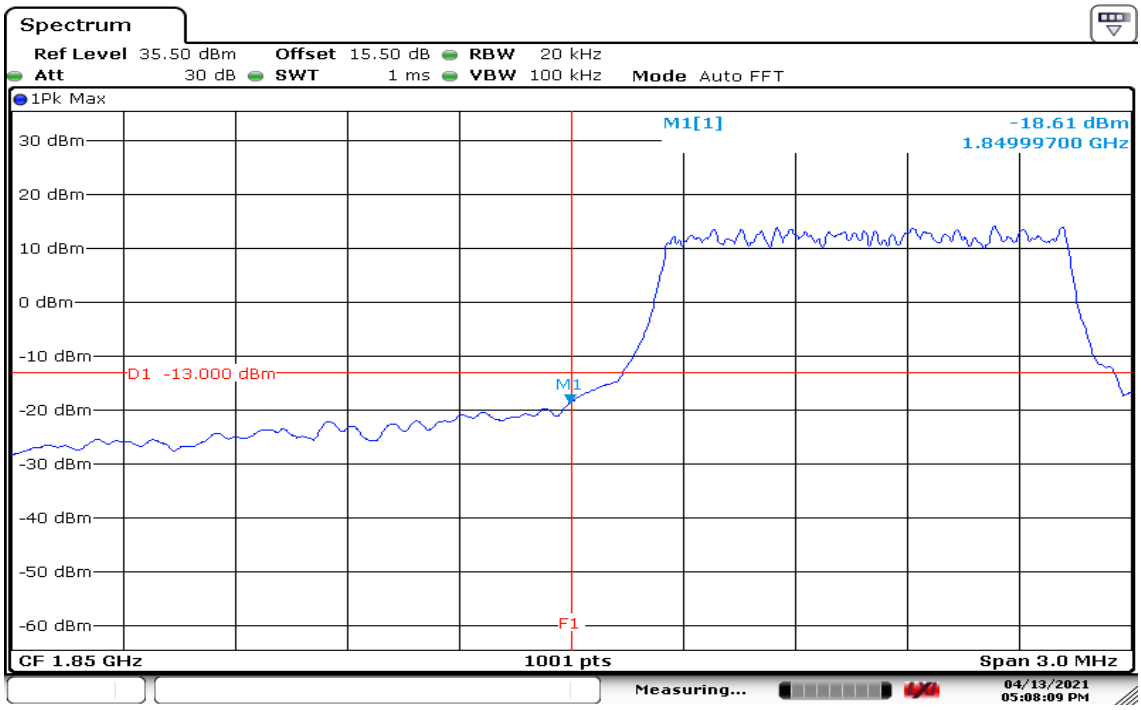
Date: 13.APR.2021 12:24:39

HIGHER BAND EDGE



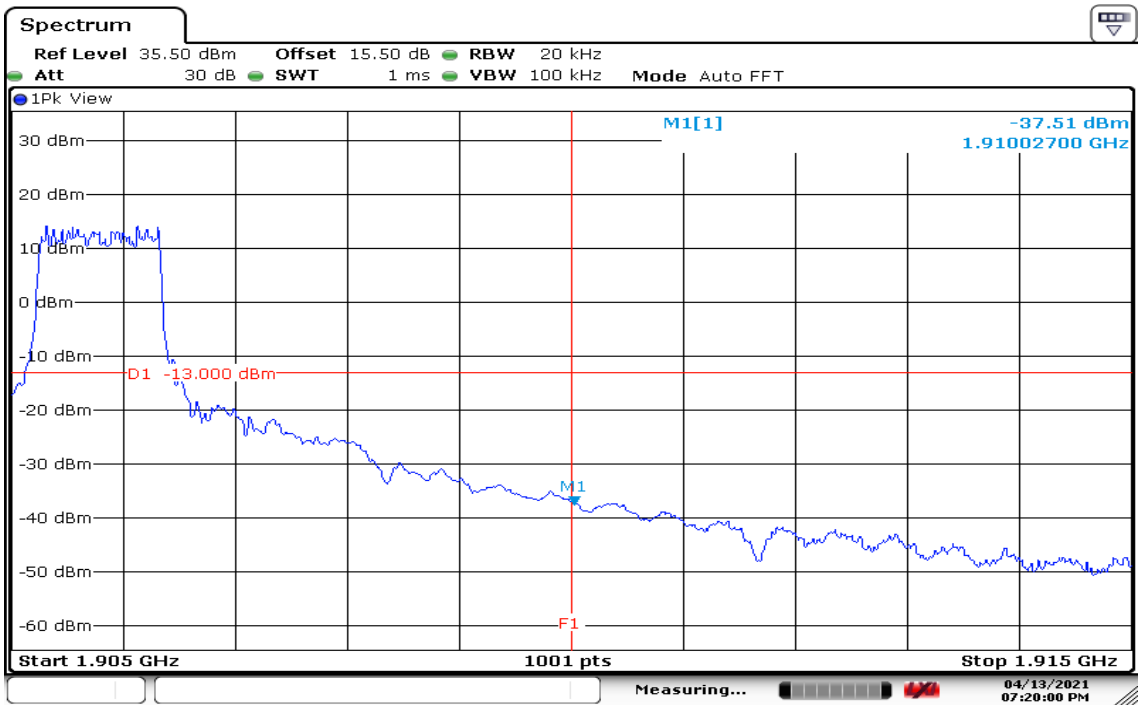
Date: 13.APR.2021 14:25:37

CHANNEL BANDWIDTH: 5MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



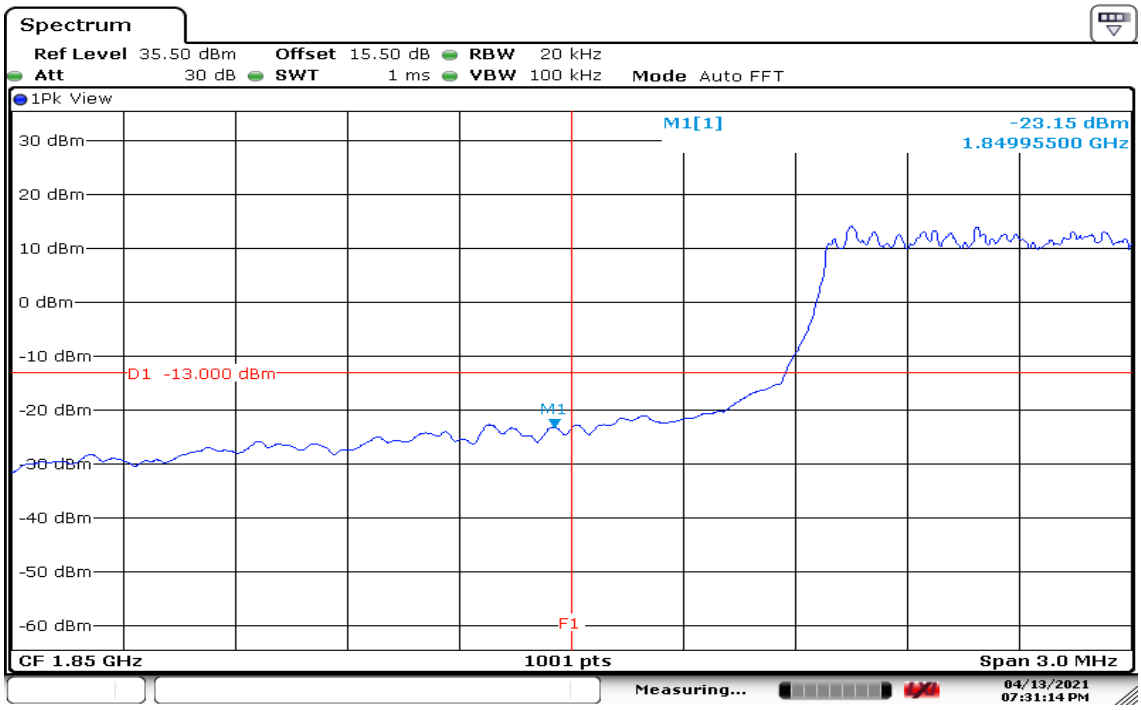
Date: 13.APR.2021 17:08:10

HIGHER BAND EDGE



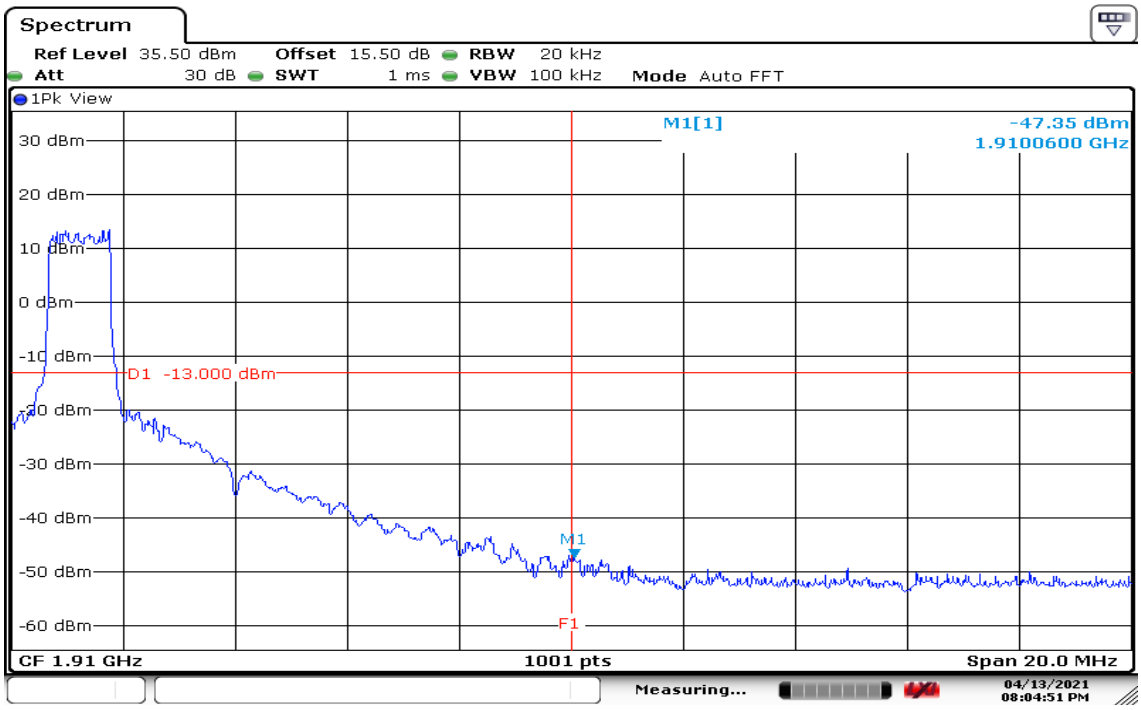
Date: 13.APR.2021 19:20:00

CHANNEL BANDWIDTH: 10MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



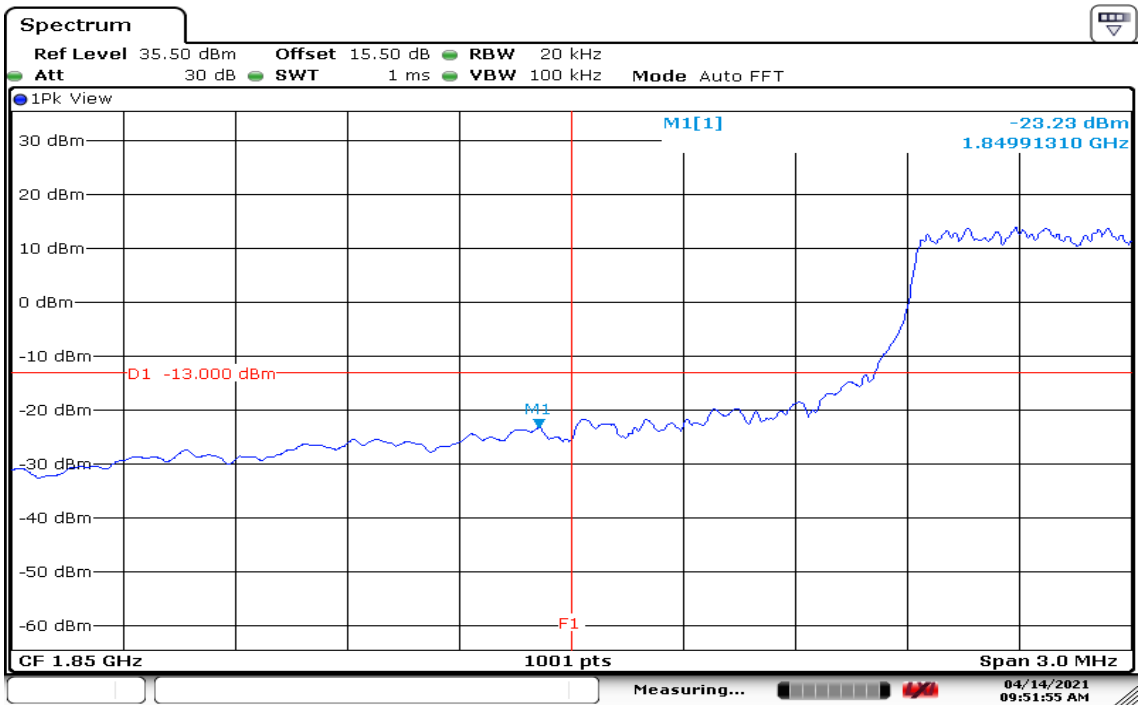
Date: 13.APR.2021 19:31:14

HIGHER BAND EDGE



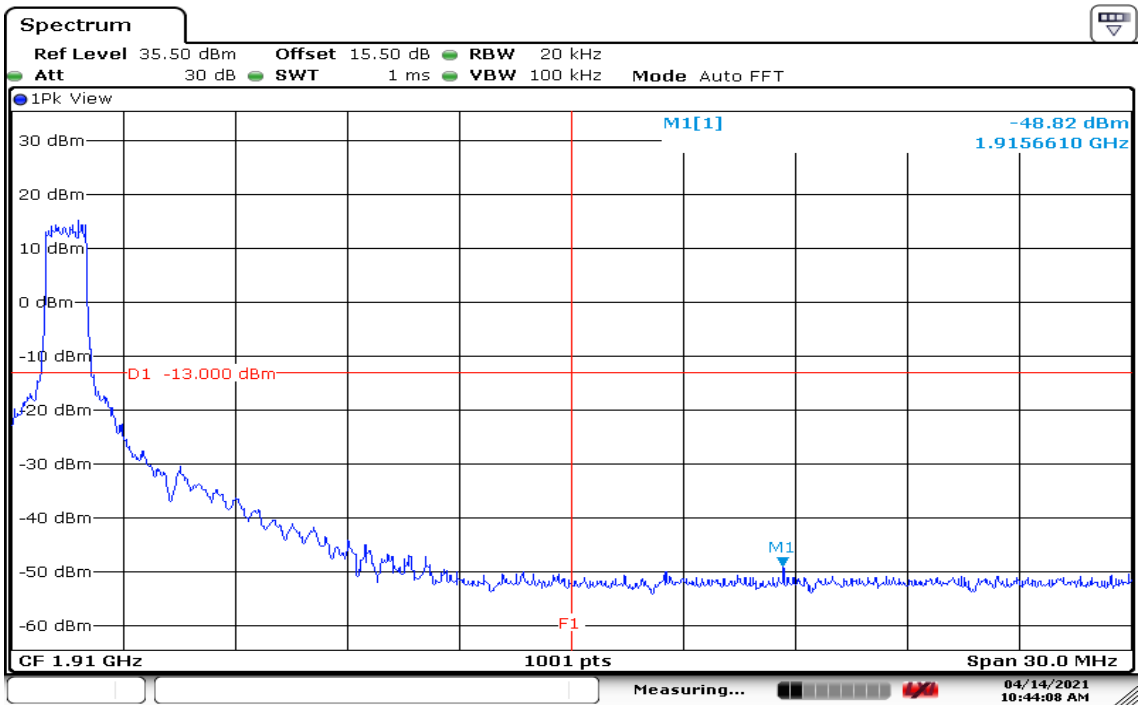
Date: 13.APR.2021 20:04:52

CHANNEL BANDWIDTH: 15MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



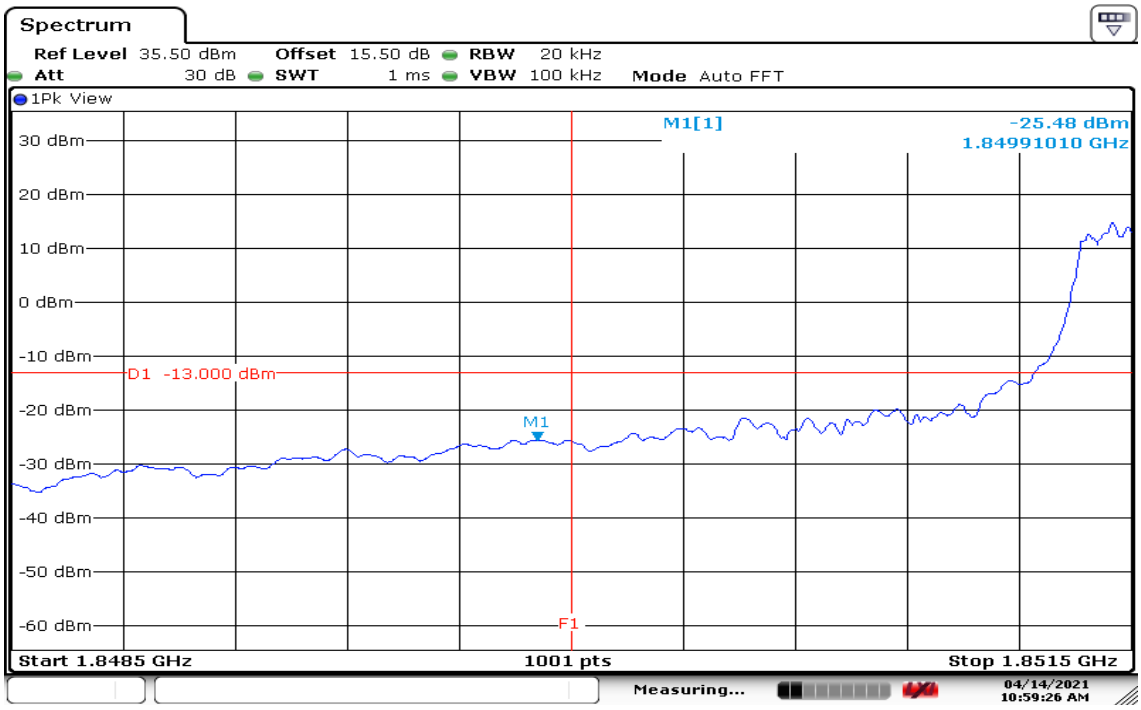
Date: 14.APR.2021 09:51:55

HIGHER BAND EDGE



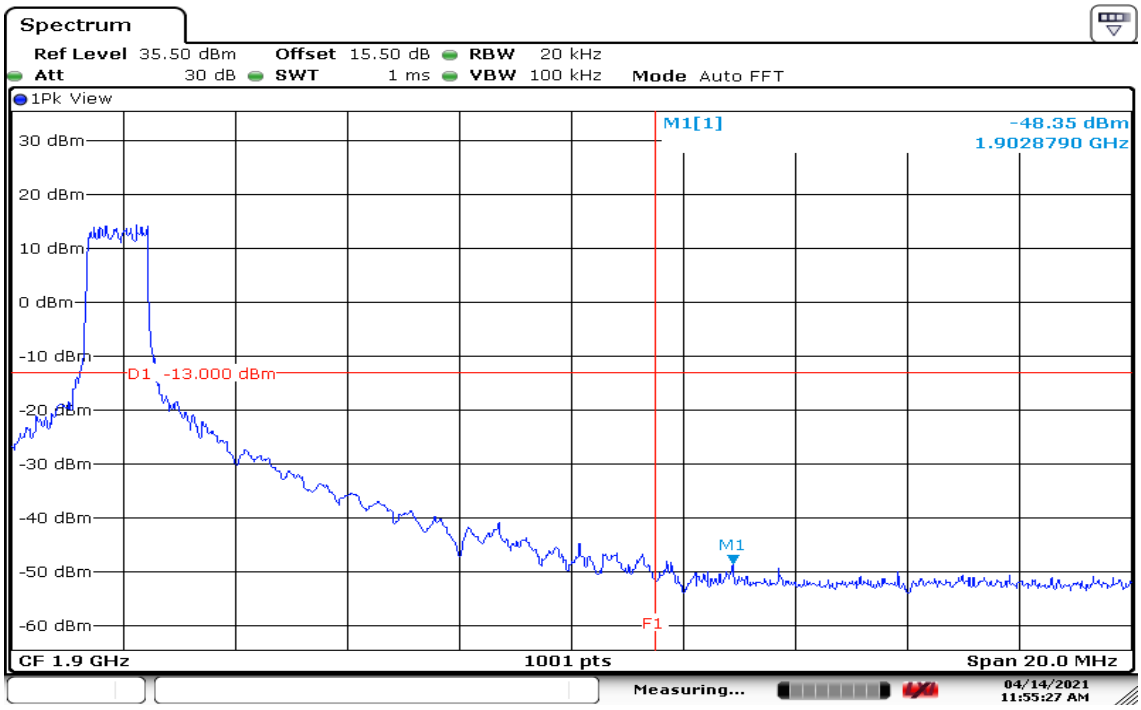
Date: 14.APR.2021 10:44:09

CHANNEL BANDWIDTH: 20MHz / QPSK / 100%RB ALLOCATED
LOWER BAND EDGE



Date: 14.APR.2021 10:59:26

HIGHER BAND EDGE



Date: 14.APR.2021 11:55:28

8.6 CONDUCTED SPURIOUS EMISSIONS

Limits

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

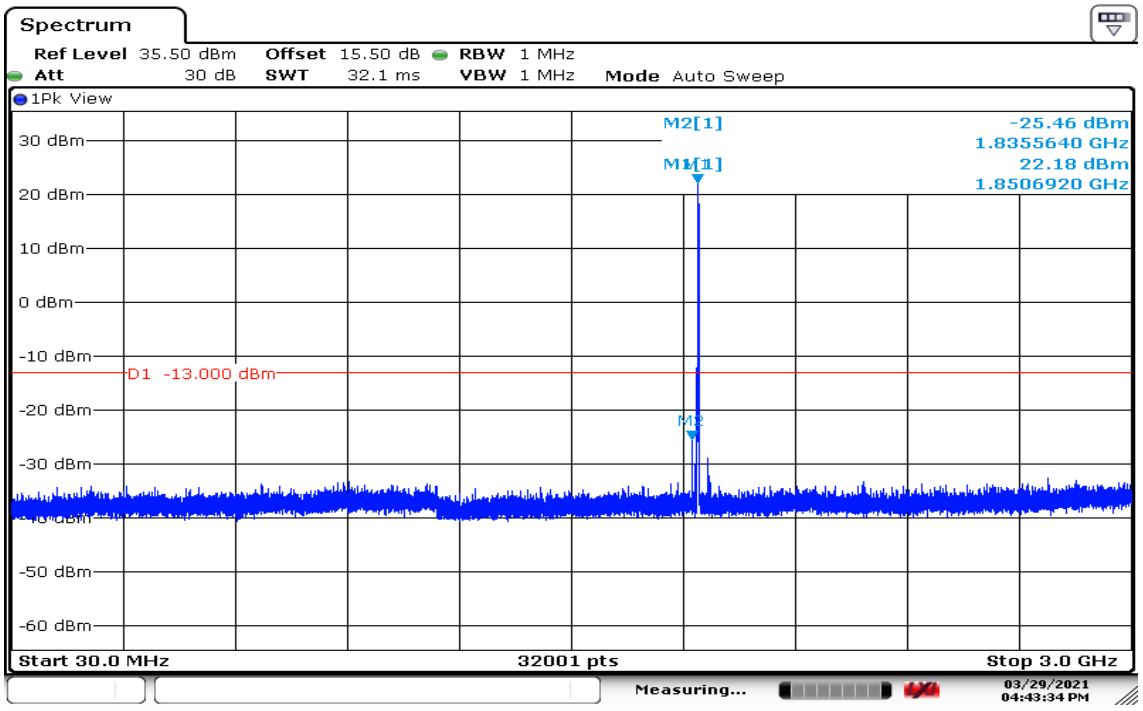
Test Procedures

1. According to KDB 971168 D01,
2. The EUT was connect to spectrum analyzer and call box.
3. The RF output of EUT was connected to the spectrum analyzer.
4. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
5. Record the maximum spurious emission.
6. The fundamental frequency should be excluded against the limit in operating band.

Test Results

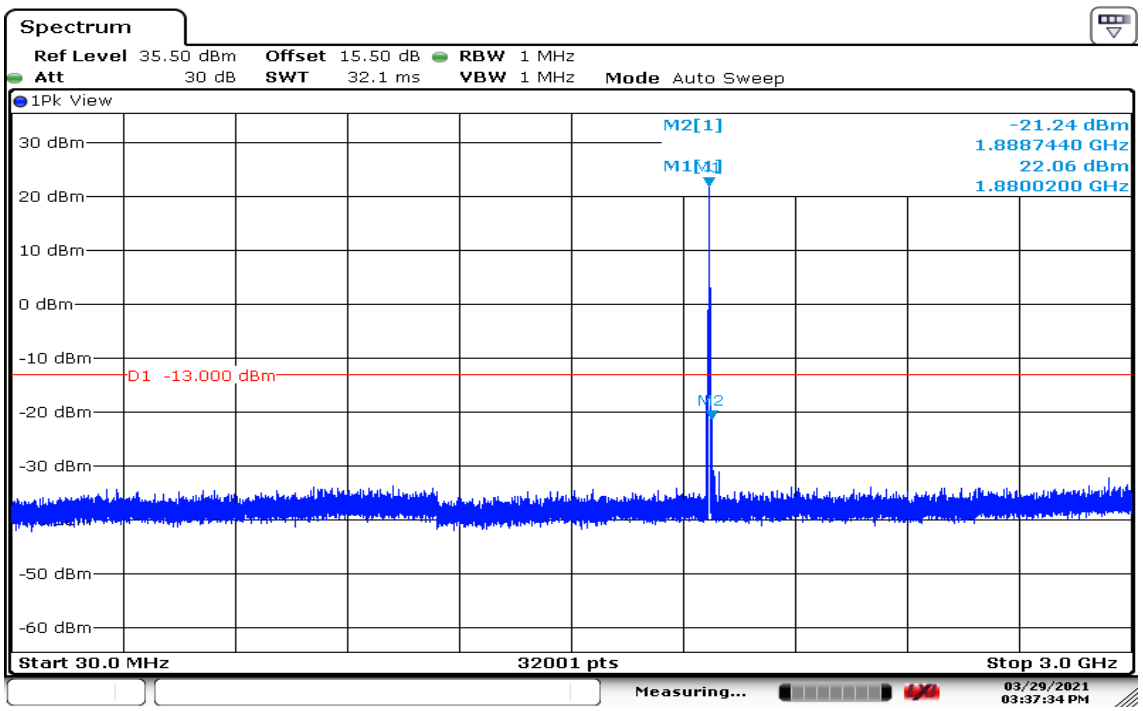
Temperature:	21.5℃	**Humidity:**	56.2% RH
Tested by:	Dally Hong	**Test Date:**	March 29, 2021
Temperature:	22.7℃	**Humidity:**	54.3% RH
Tested by:	Dally Hong	**Test Date:**	March 30, 2021
Temperature:	23.7℃	**Humidity:**	52.4% RH
Tested by:	Dally Hong	**Test Date:**	April 13, 2021
Temperature:	23.1℃	**Humidity:**	52.5% RH
Tested by:	Dally Hong	**Test Date:**	April 14, 2021

LTE Band 2
QPSK / 1RB
CHANNEL BANDWIDTH: 1.4MHz / 30MHz-3GHz
CH Low



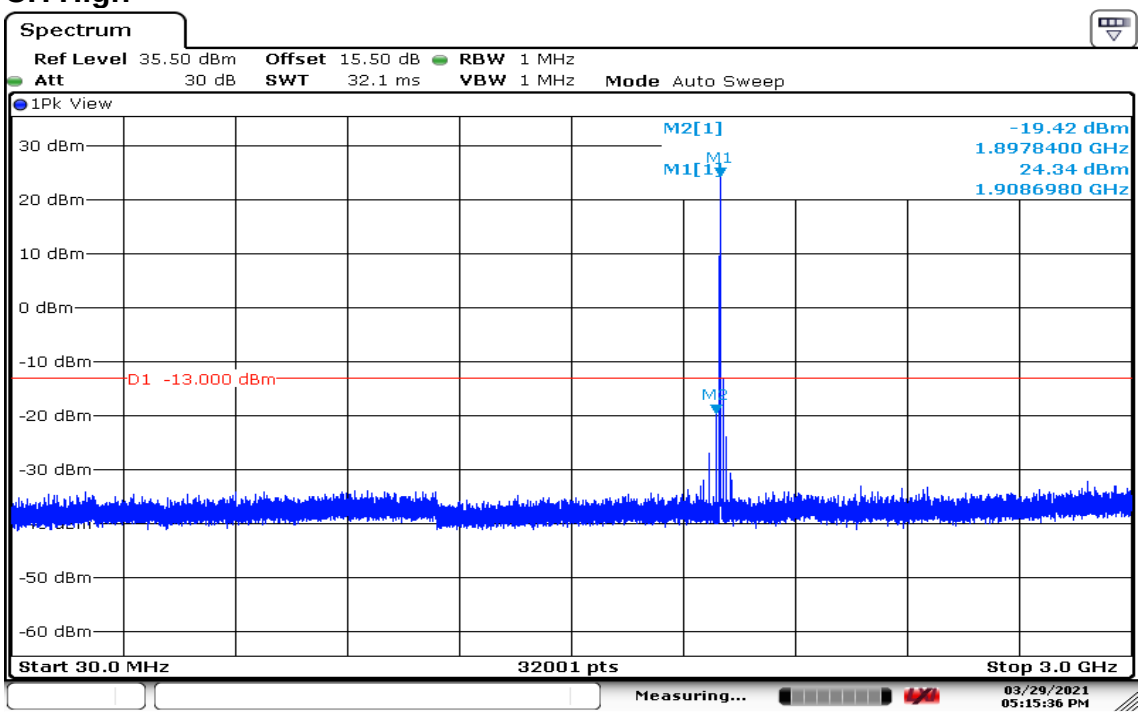
Date: 29.MAR.2021 16:43:35

CH Mid



Date: 29.MAR.2021 15:37:34

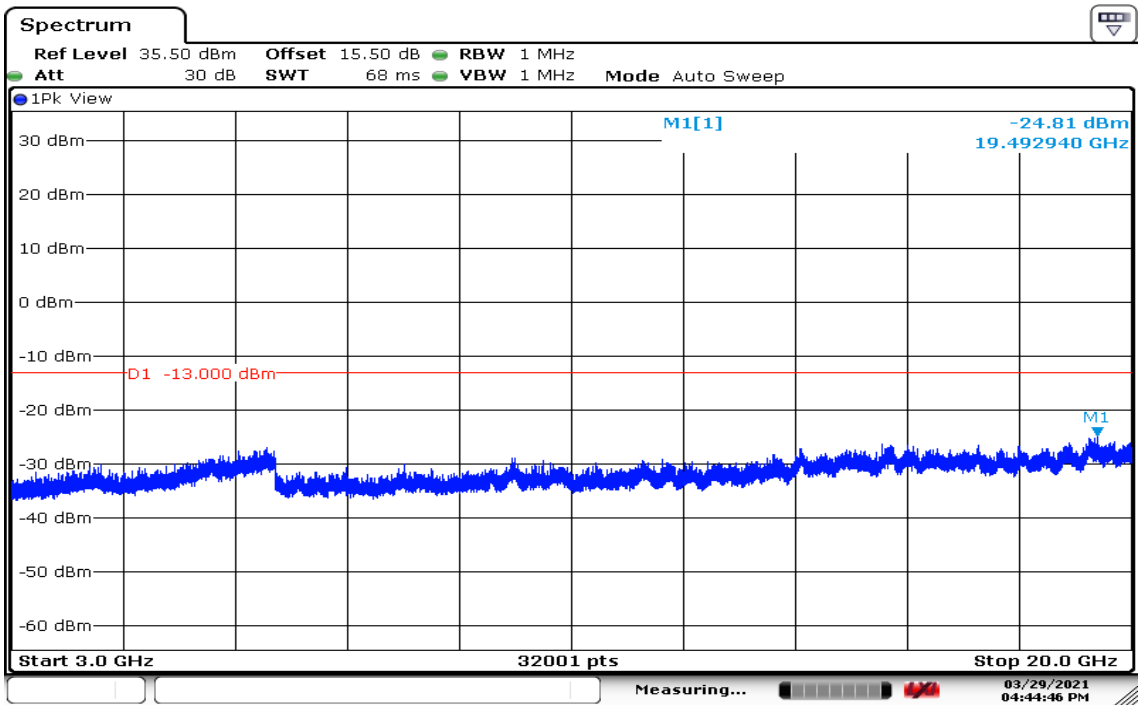
CH High



Date: 29.MAR.2021 17:15:36

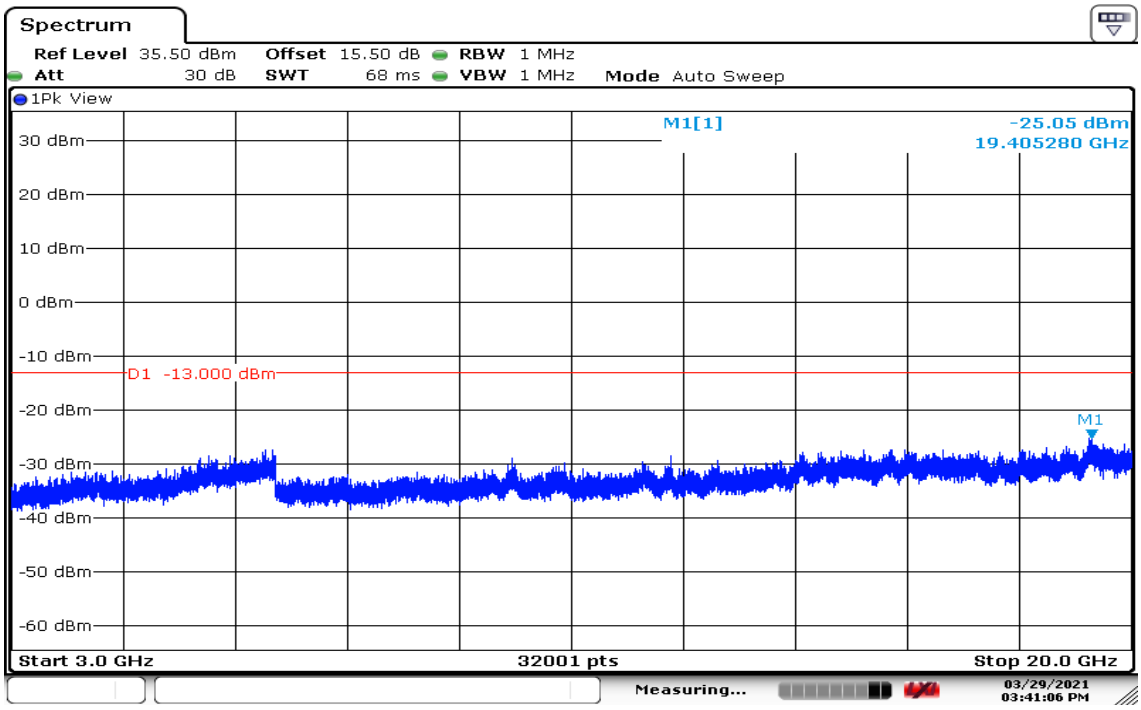
CHANNEL BANDWIDTH: 1.4MHz / 3GHz-20GHz

CH Low



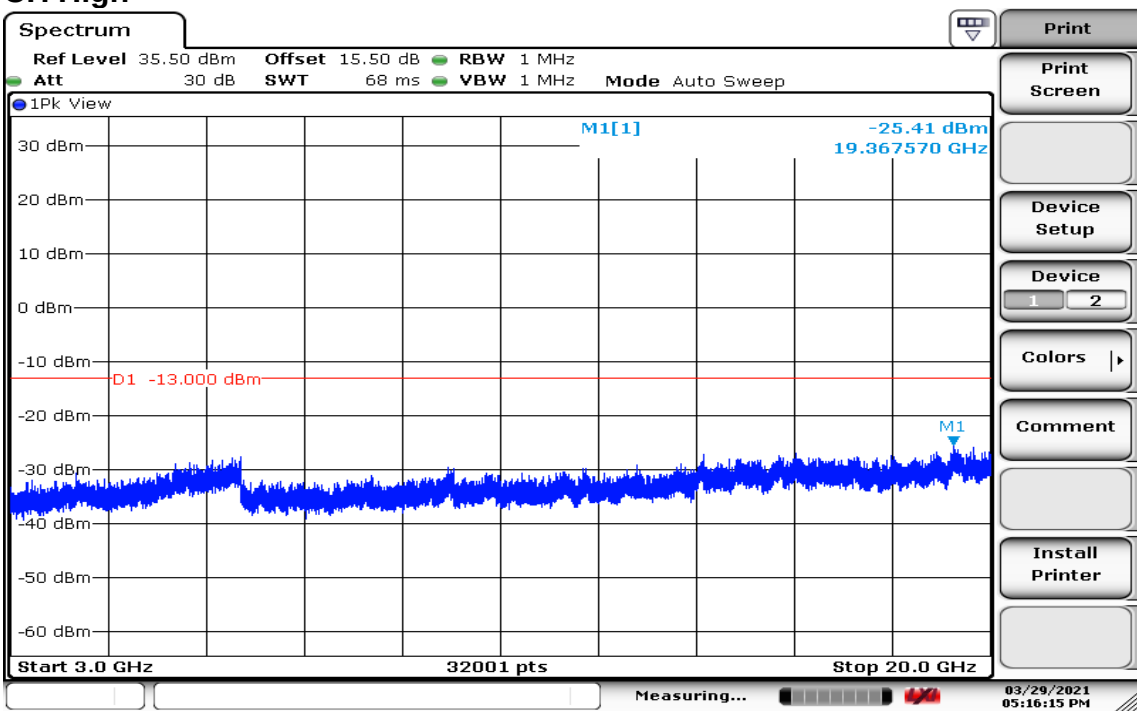
Date: 29.MAR.2021 16:44:47

CH Mid



Date: 29.MAR.2021 15:41:07

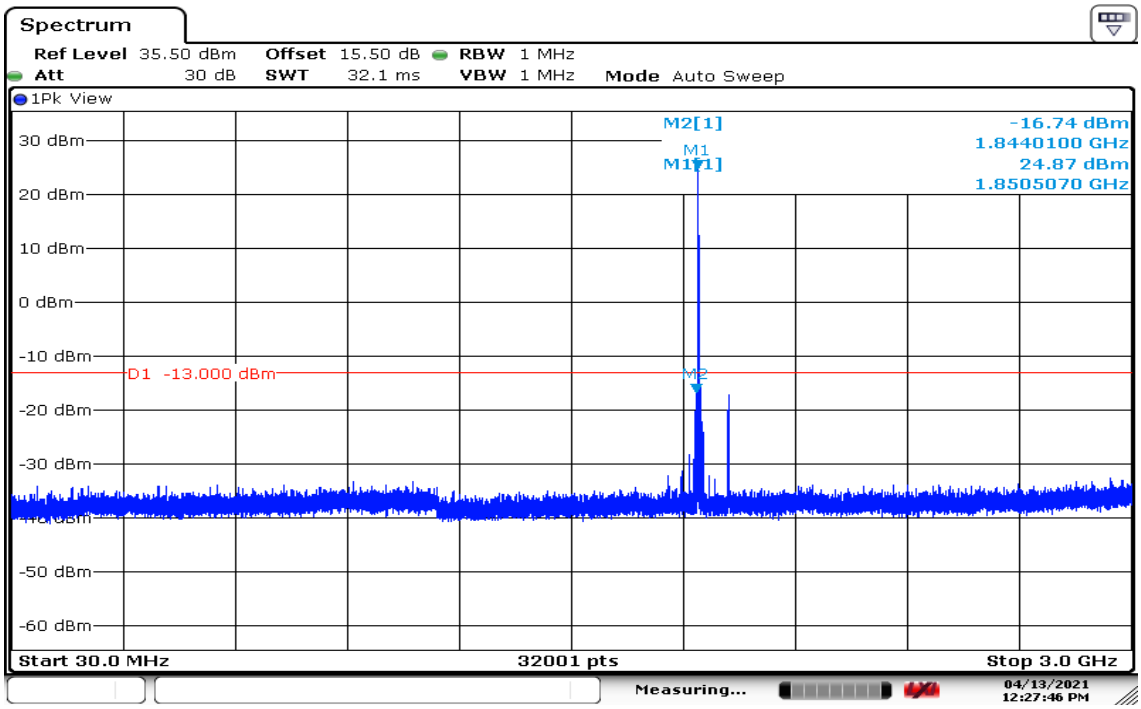
CH High



Date: 29.MAR.2021 17:16:16

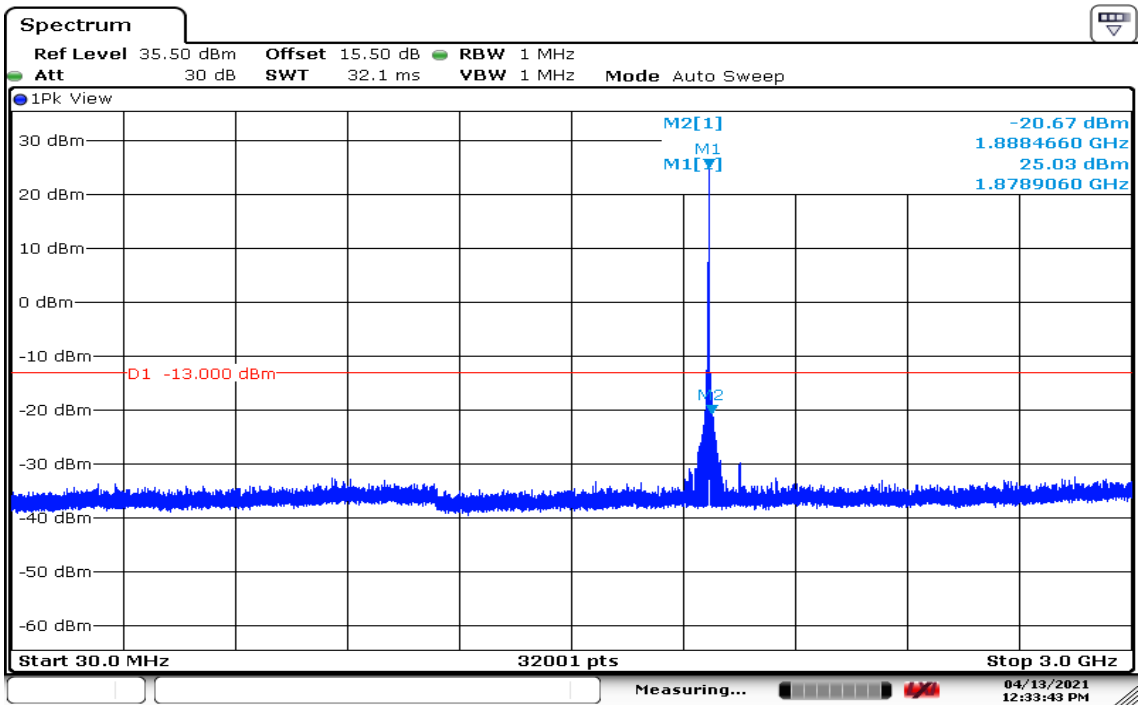
CHANNEL BANDWIDTH: 3MHz / 30MHz-3GHz

CH Low



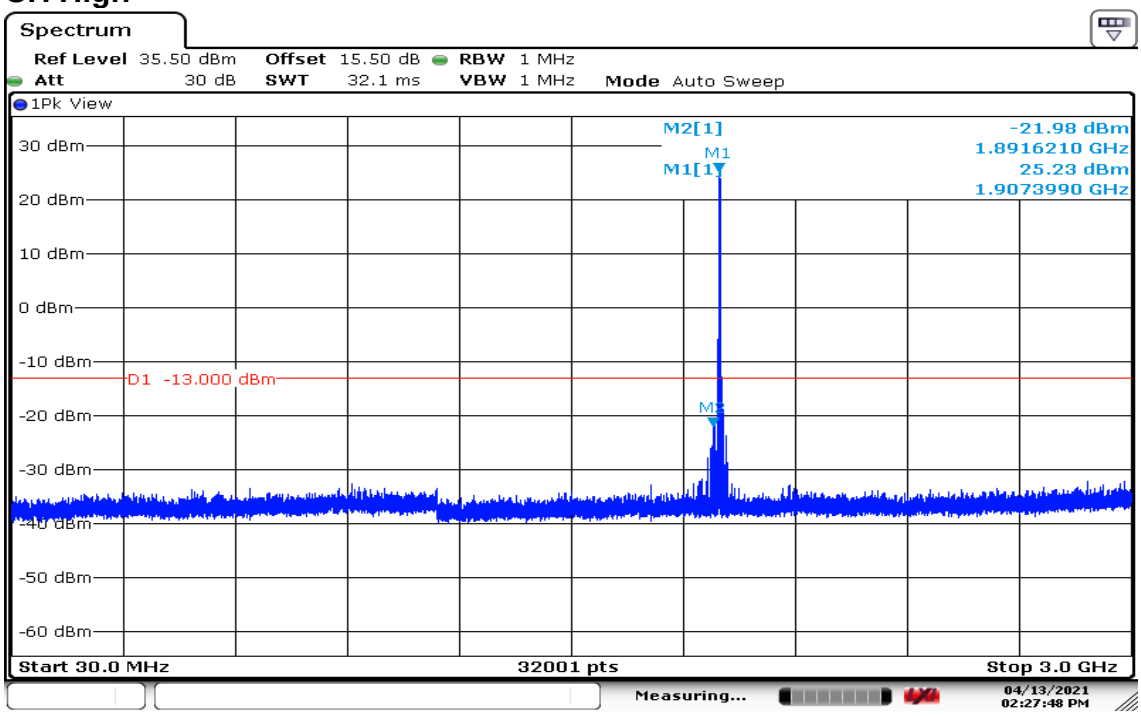
Date: 13.APR.2021 12:27:46

CH Mid



Date: 13.APR.2021 12:33:43

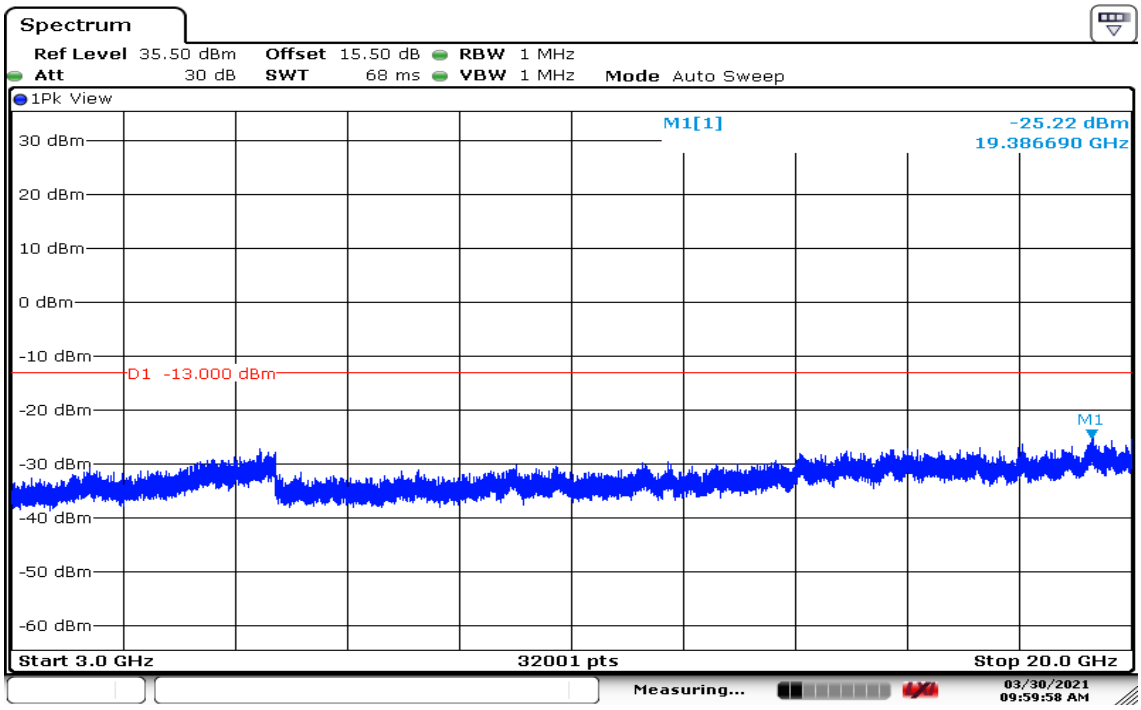
CH High



Date: 13.APR.2021 14:27:48

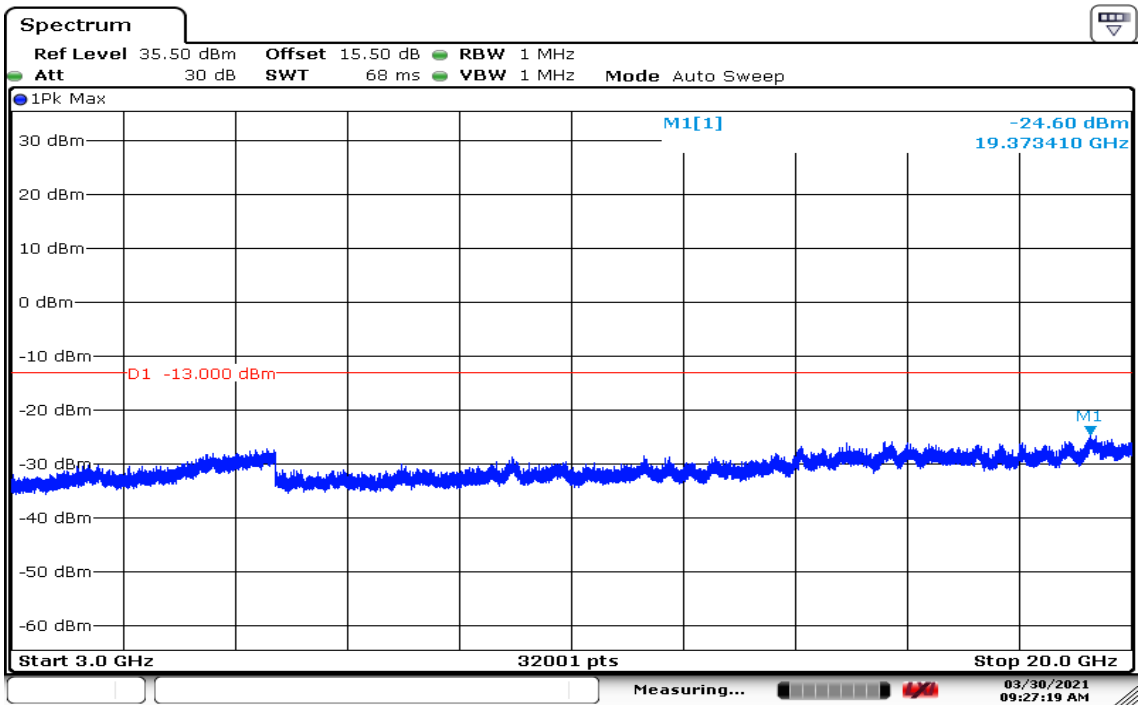
CHANNEL BANDWIDTH: 3MHz / 3GHz-20GHz

CH Low



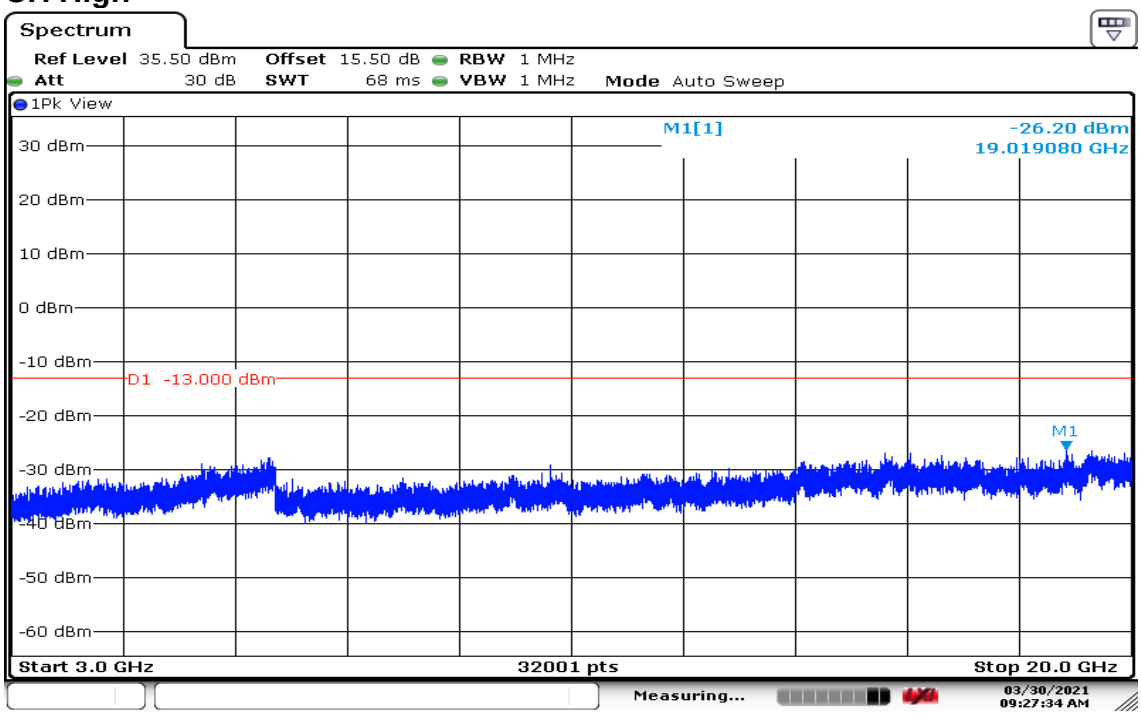
Date: 30.MAR.2021 09:59:58

CH Mid



Date: 30.MAR.2021 09:27:19

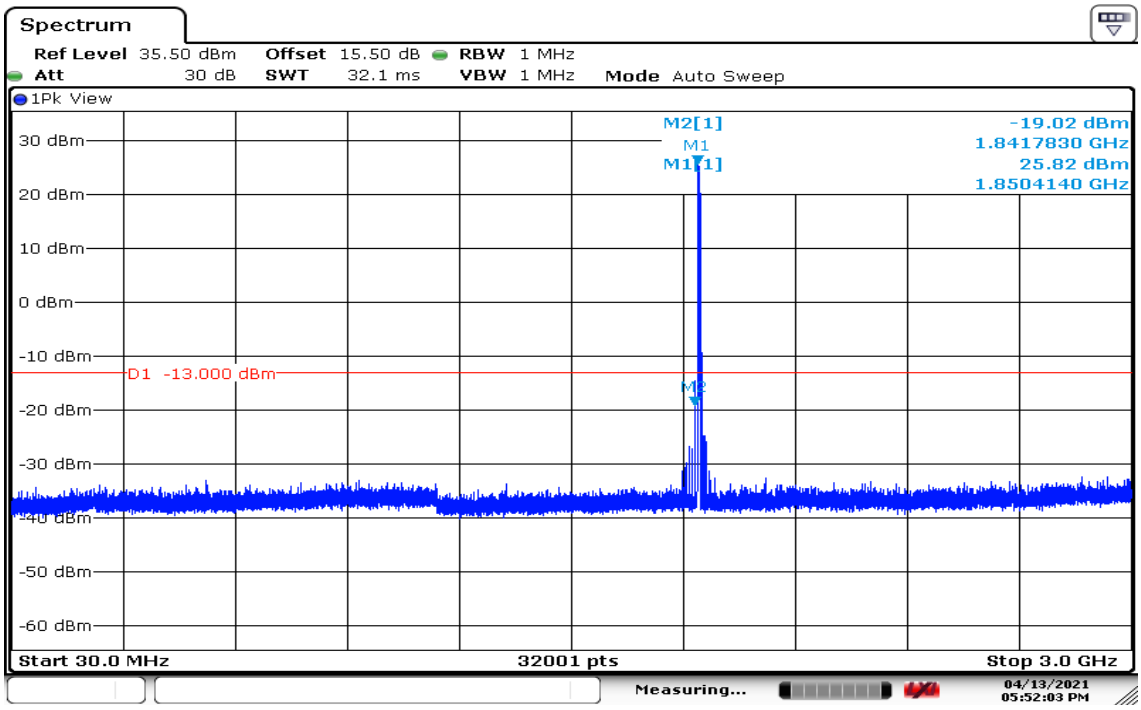
CH High



Date: 30.MAR.2021 09:27:34

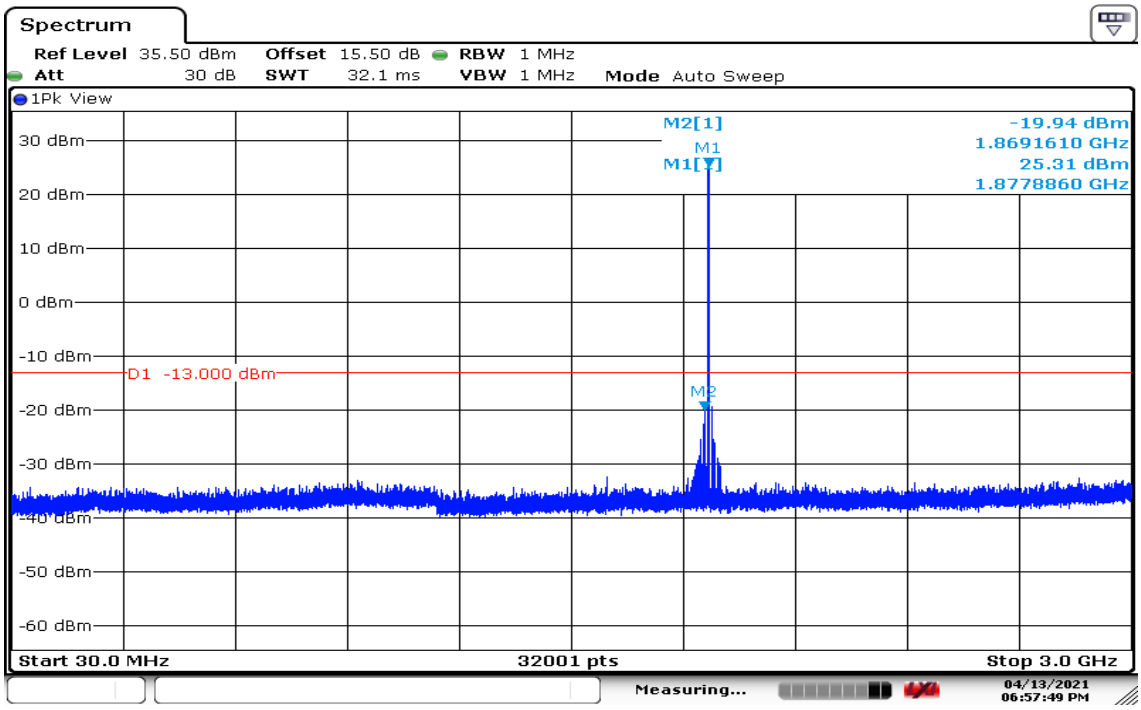
CHANNEL BANDWIDTH: 5MHz / 30MHz-3GHz

CH Low



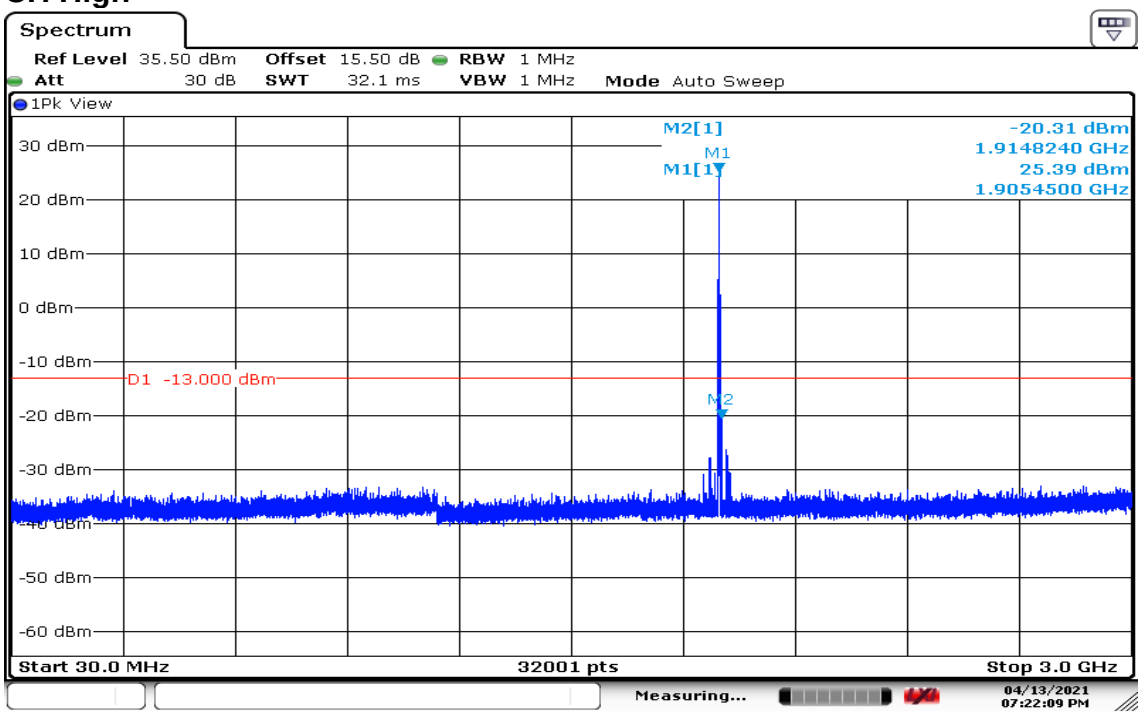
Date: 13.APR.2021 17:52:04

CH Mid



Date: 13.APR.2021 18:57:49

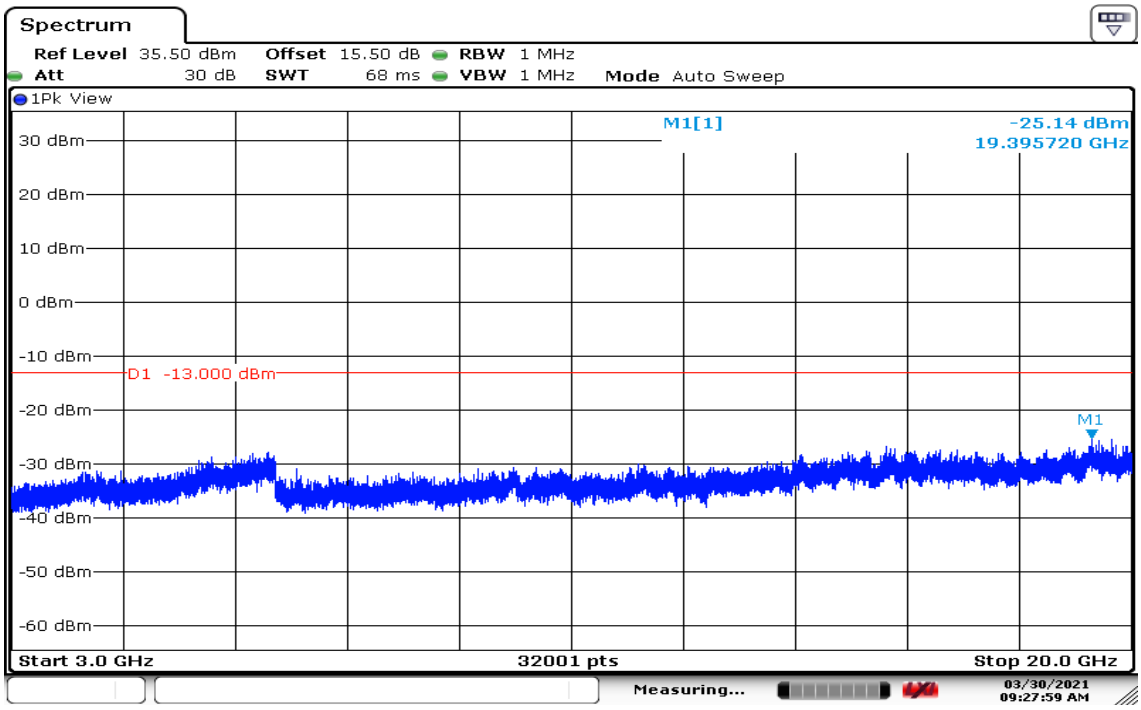
CH High



Date: 13.APR.2021 19:22:09

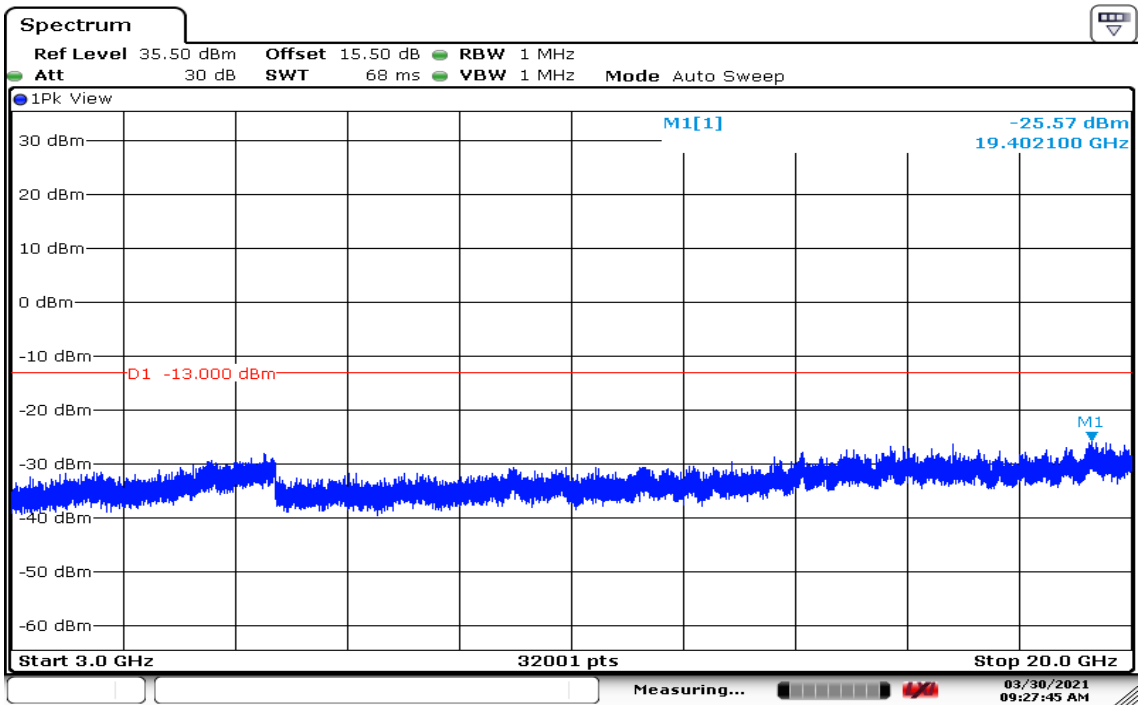
CHANNEL BANDWIDTH: 5MHz / 3GHz-20GHz

CH Low



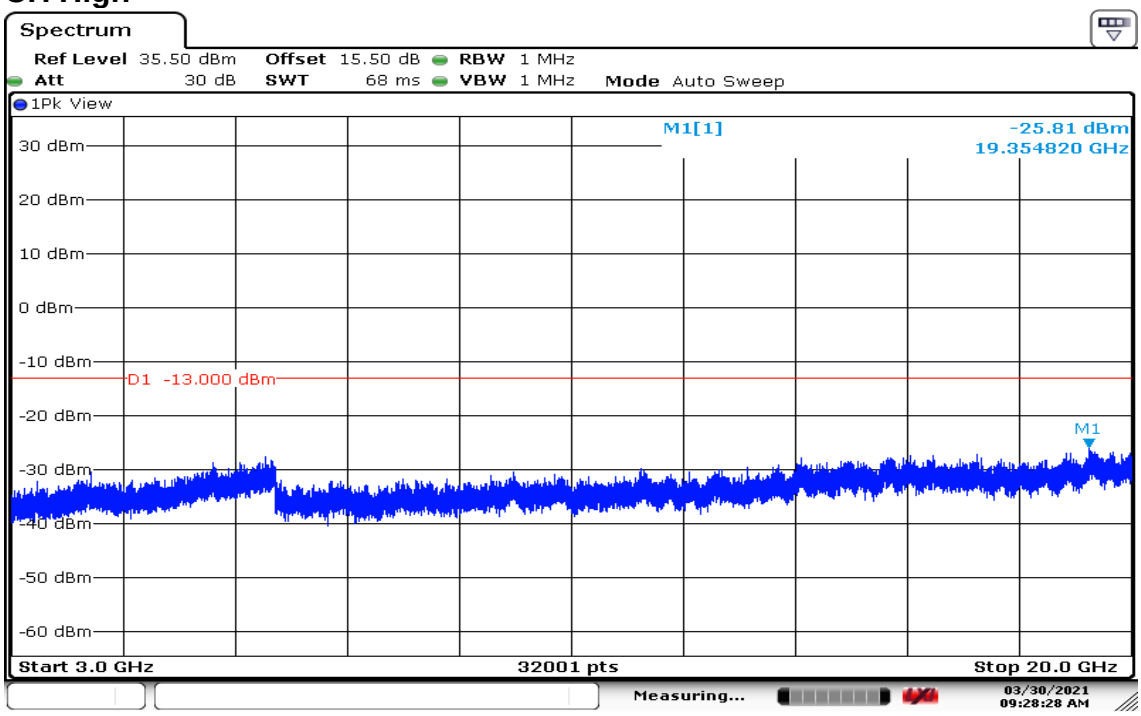
Date: 30.MAR.2021 09:27:59

CH Mid



Date: 30.MAR.2021 09:27:45

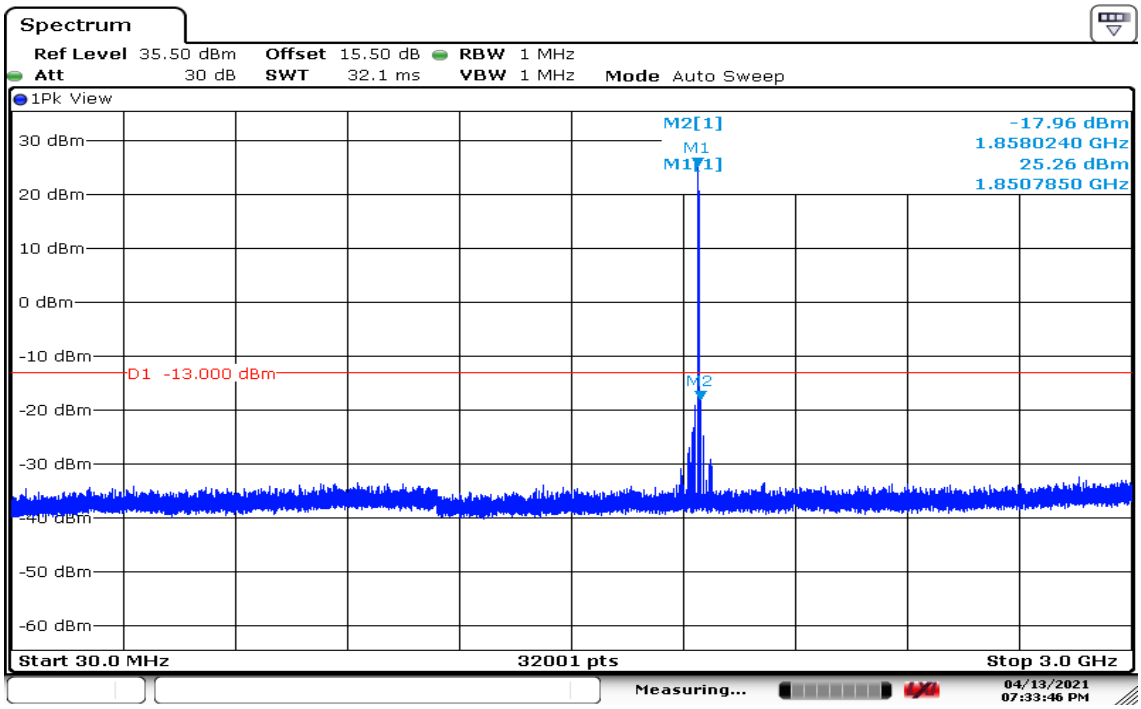
CH High



Date: 30.MAR.2021 09:28:29

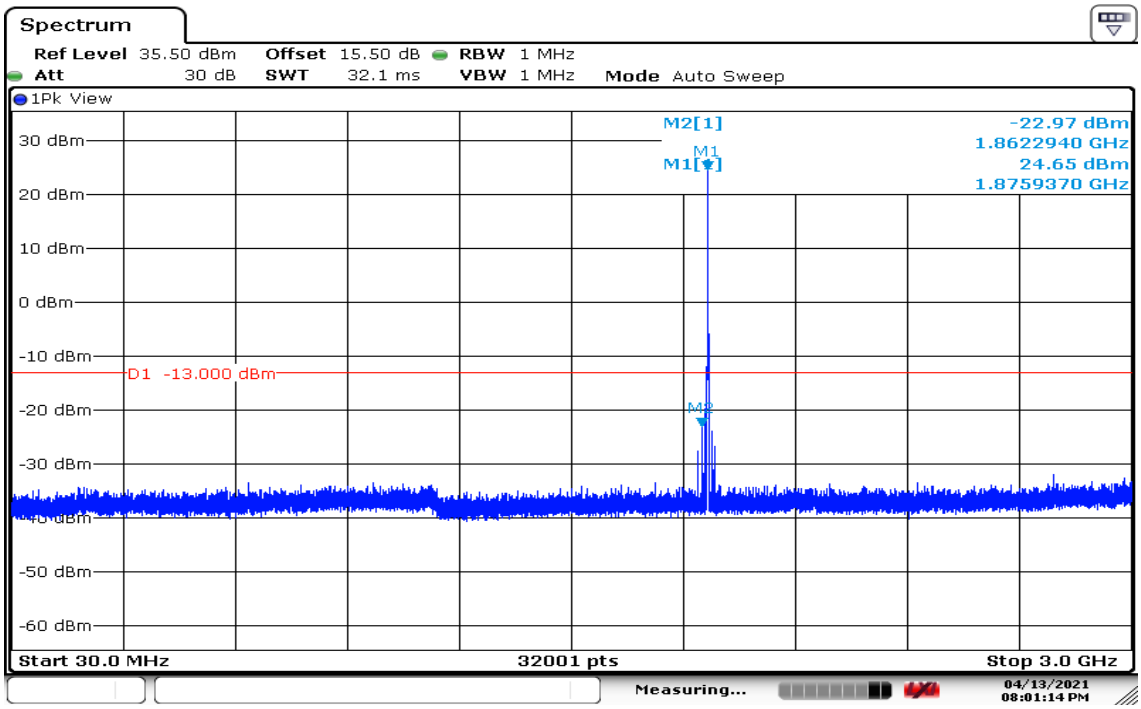
CHANNEL BANDWIDTH: 10MHz / 30MHz-3GHz

CH Low



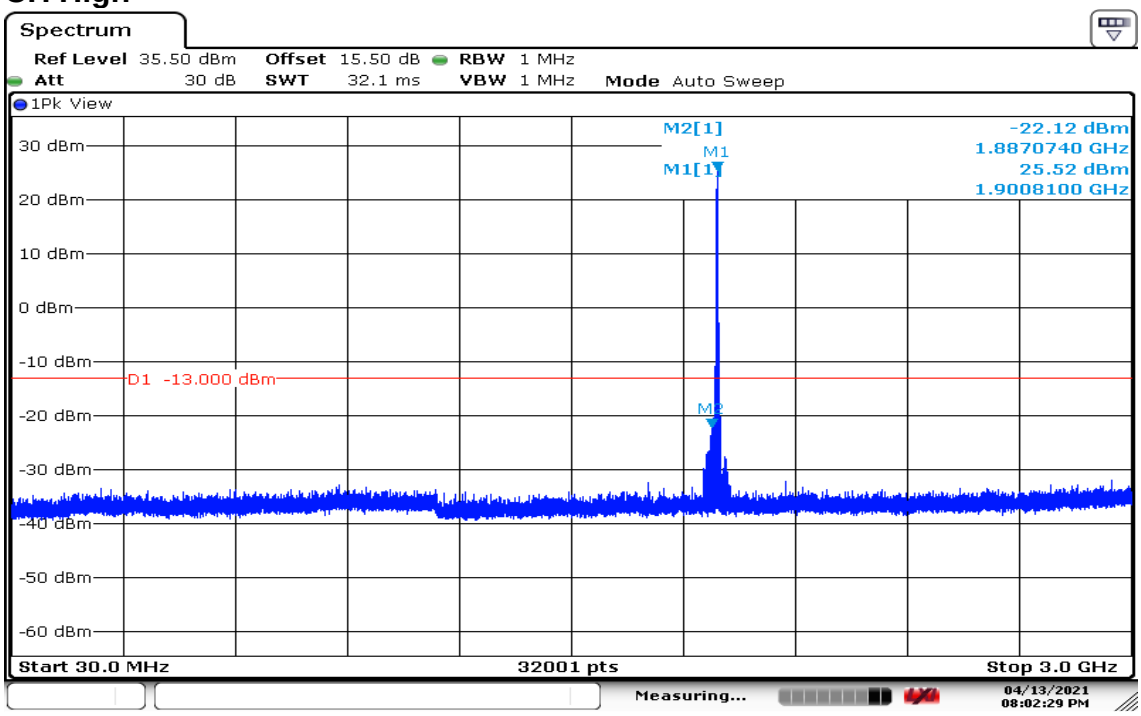
Date: 13.APR.2021 19:33:47

CH Mid



Date: 13.APR.2021 20:01:14

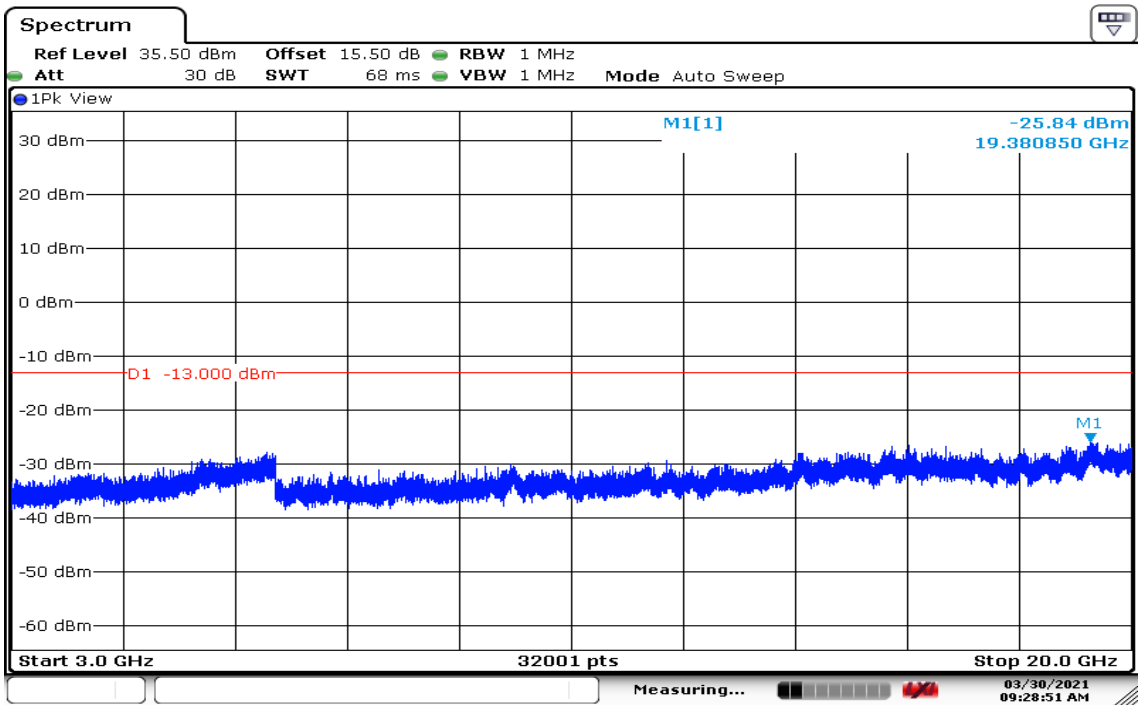
CH High



Date: 13.APR.2021 20:02:29

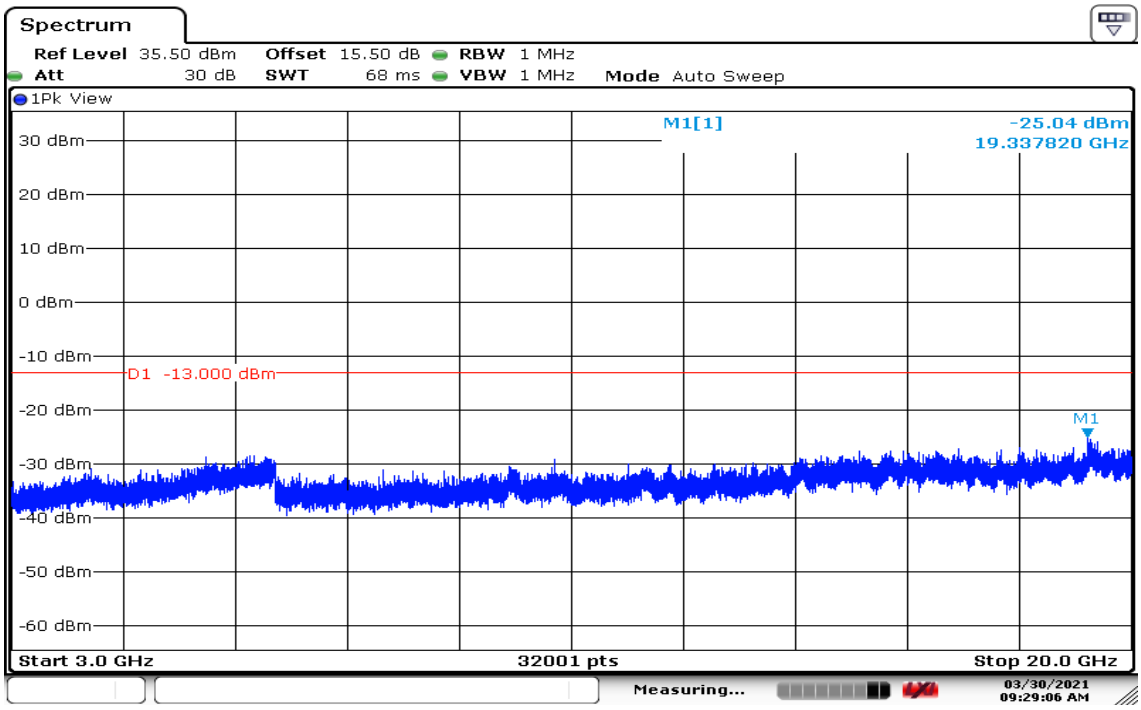
CHANNEL BANDWIDTH: 10MHz / 3GHz-20GHz

CH Low



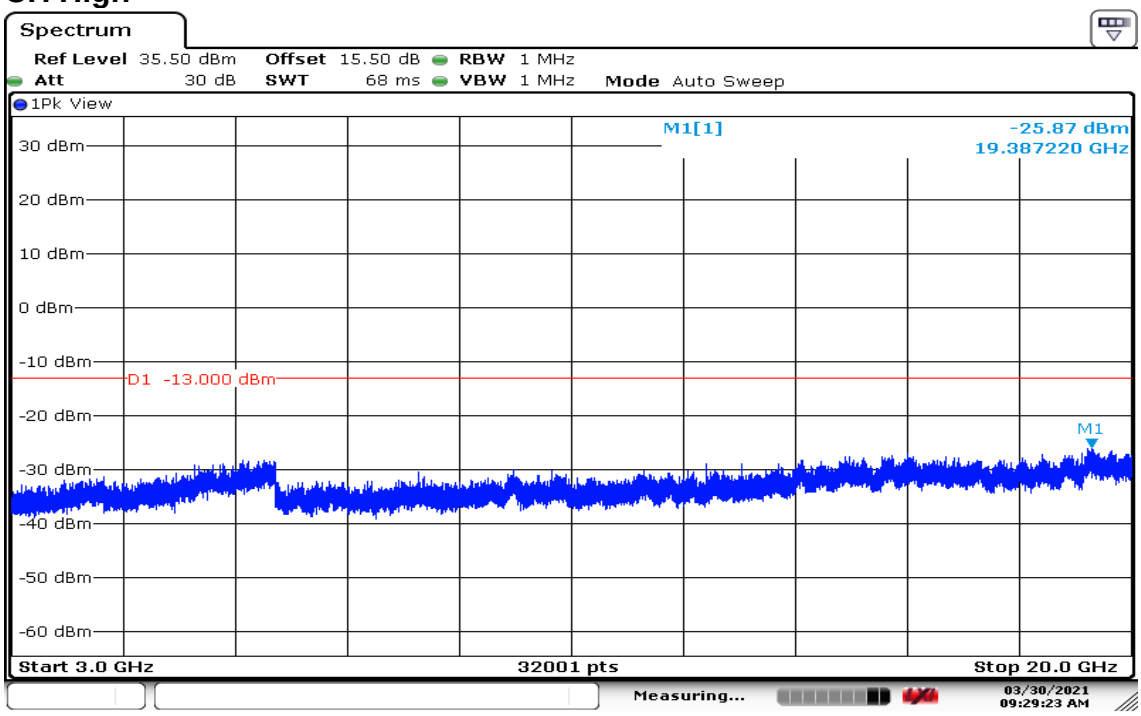
Date: 30.MAR.2021 09:28:51

CH Mid



Date: 30.MAR.2021 09:29:06

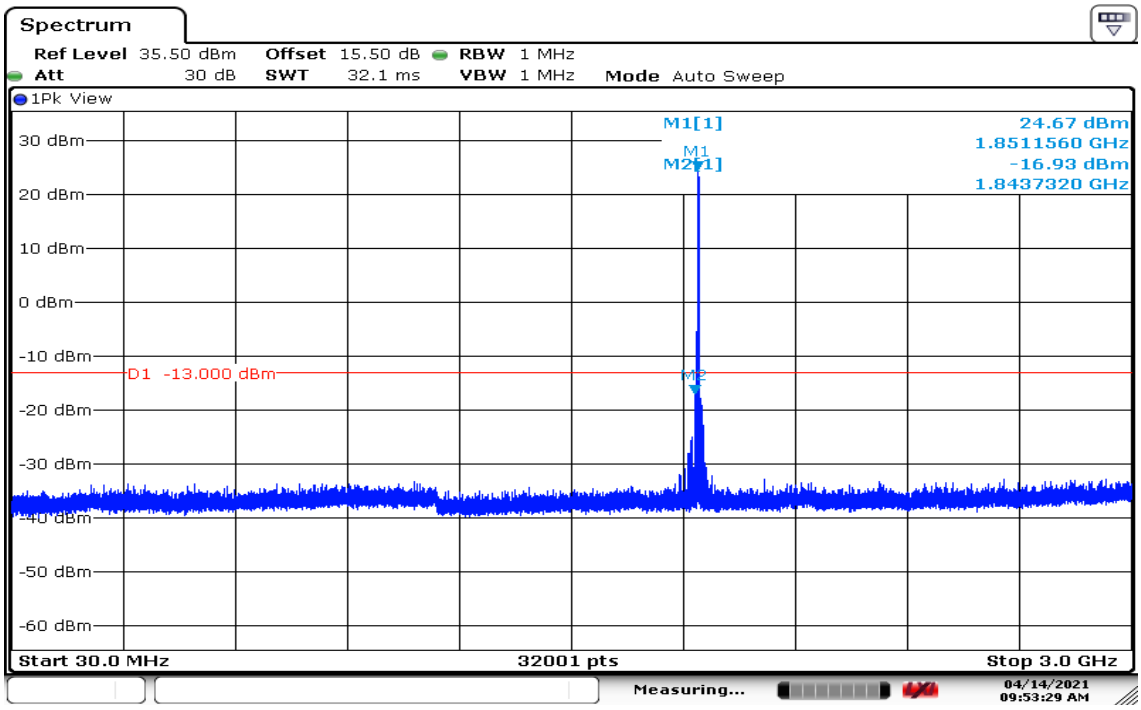
CH High



Date: 30.MAR.2021 09:29:23

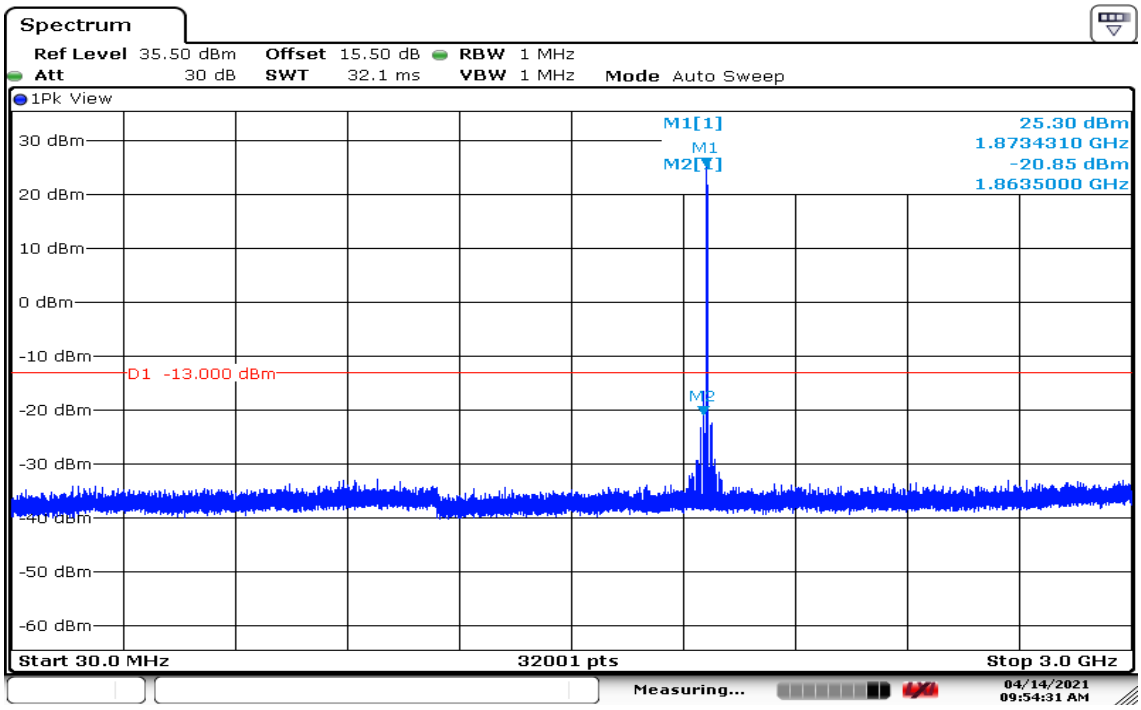
CHANNEL BANDWIDTH: 15MHz / 30MHz-3GHz

CH Low



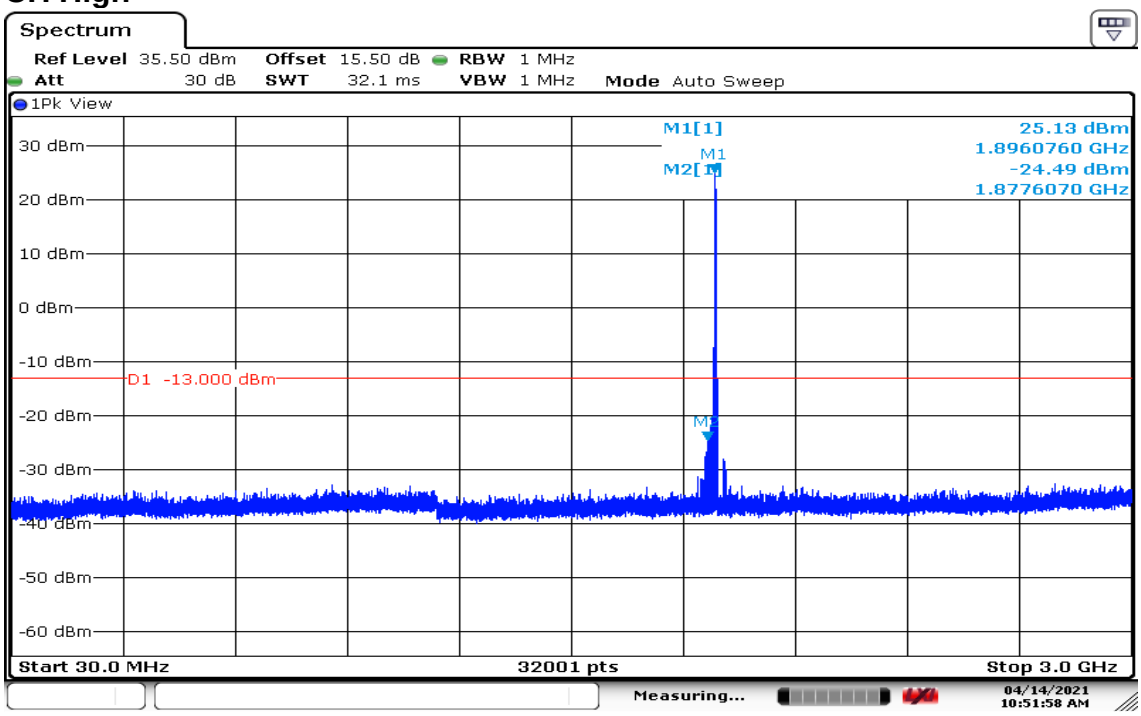
Date: 14.APR.2021 09:53:29

CH Mid



Date: 14.APR.2021 09:54:32

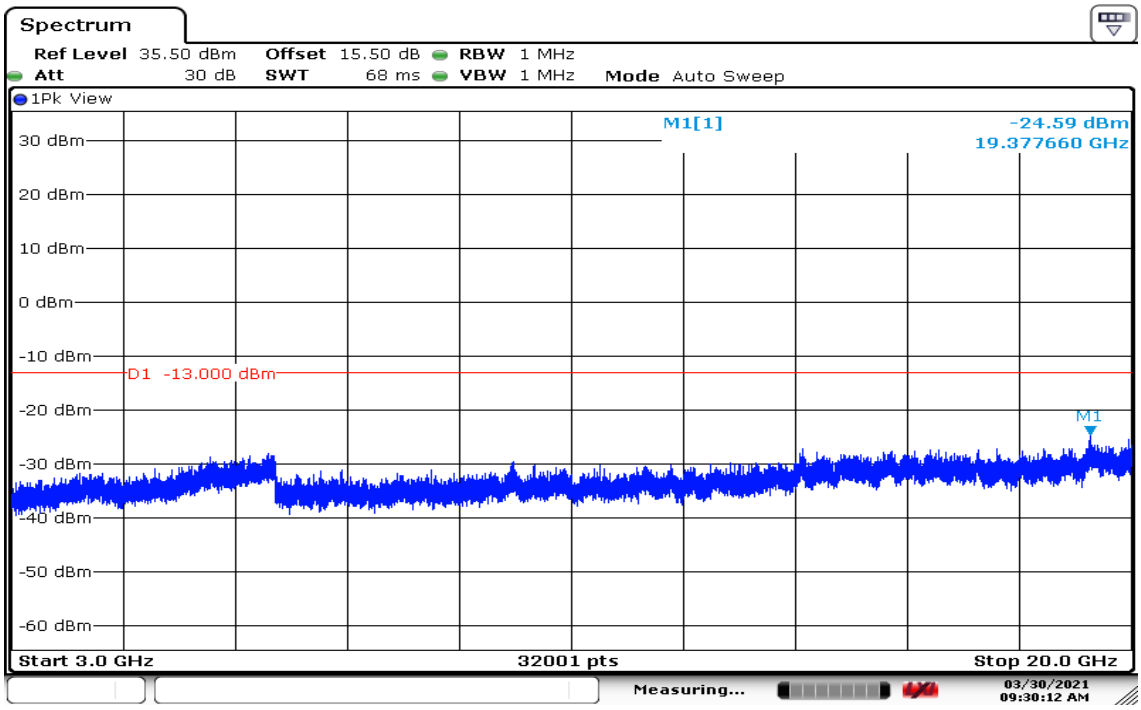
CH High



Date: 14.APR.2021 10:51:59

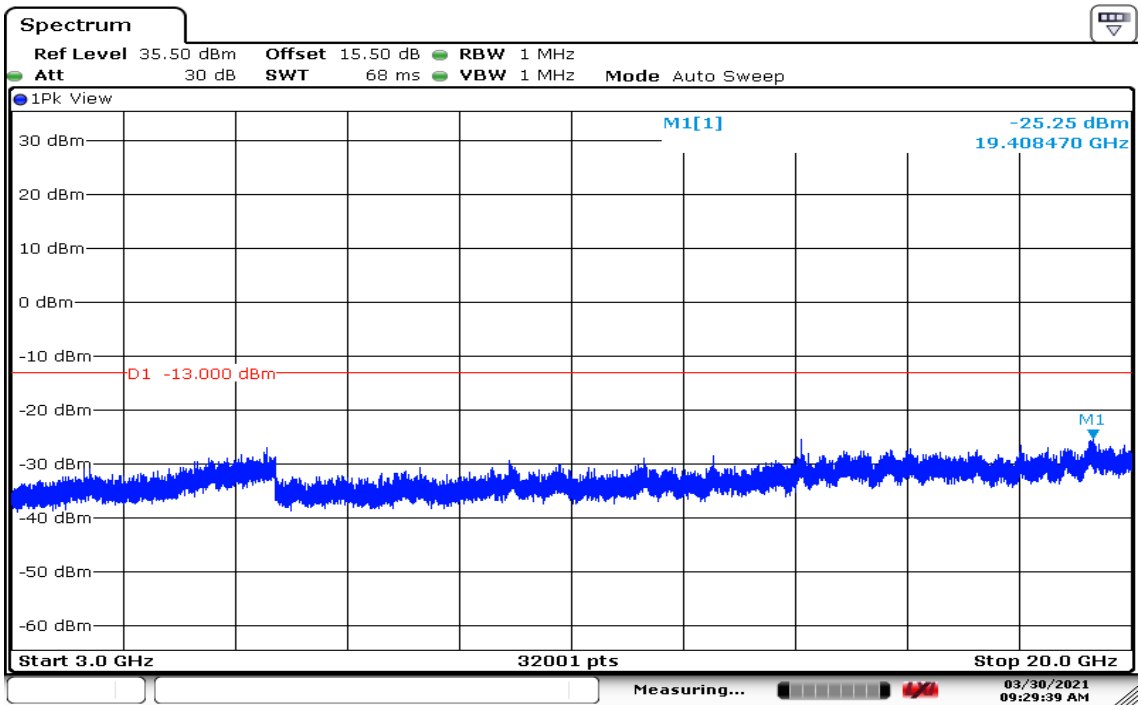
CHANNEL BANDWIDTH: 15MHz / 3GHz-20GHz

CH Low



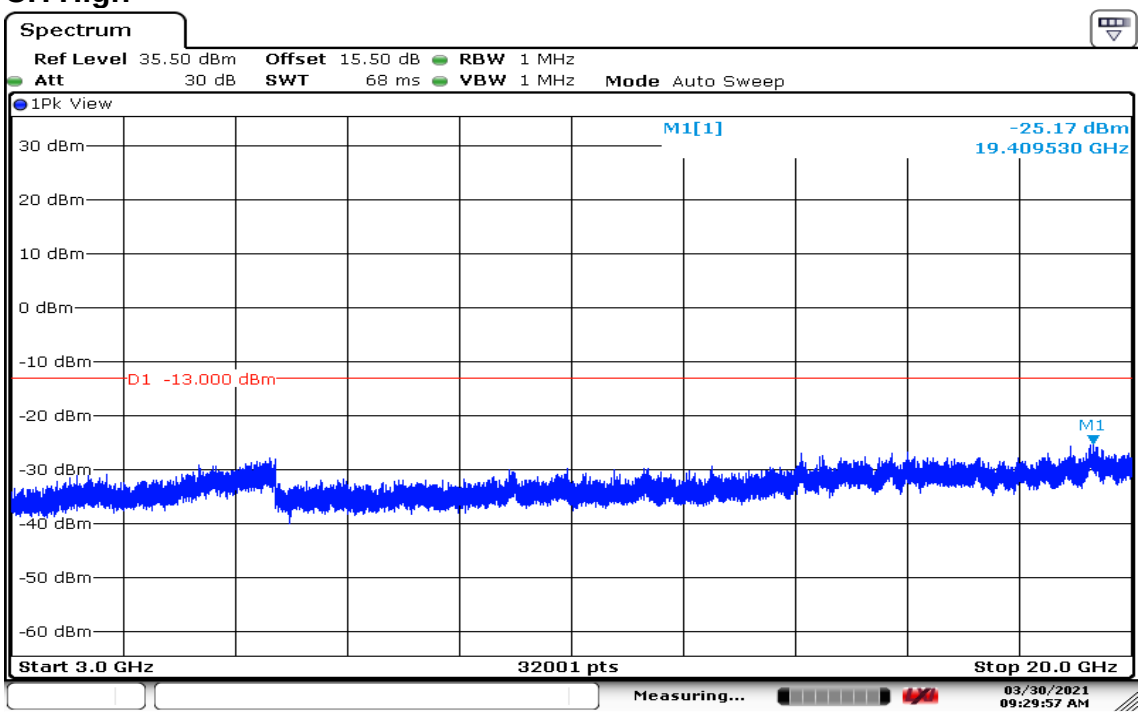
Date: 30.MAR.2021 09:30:12

CH Mid



Date: 30.MAR.2021 09:29:39

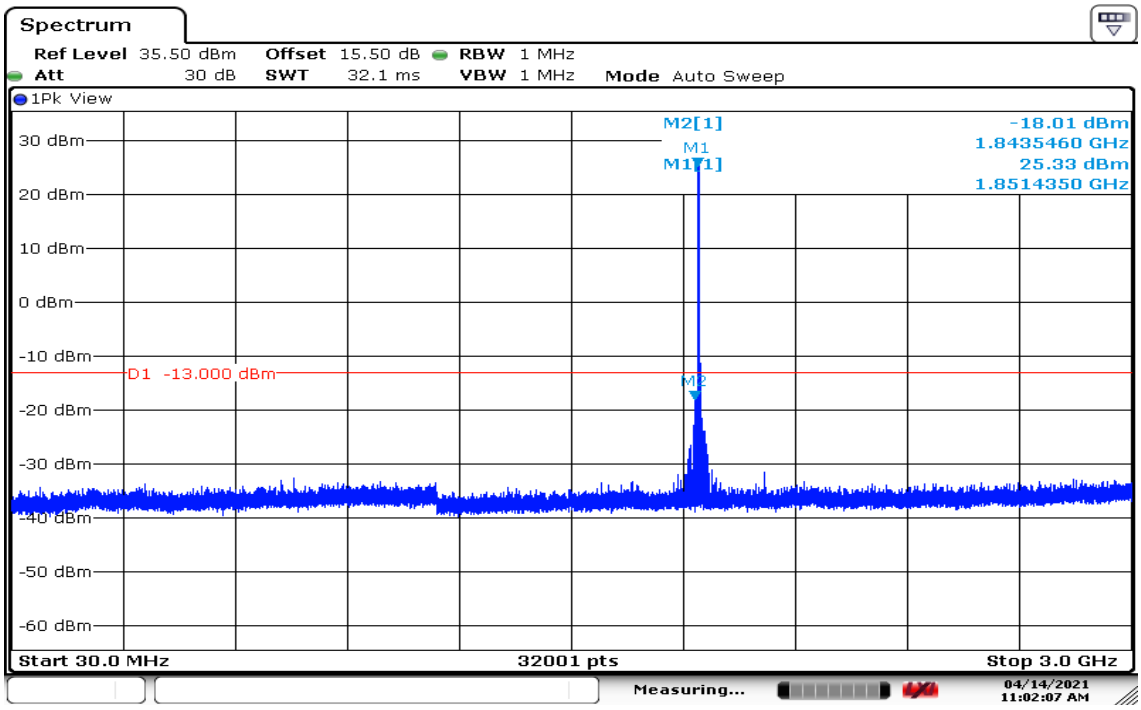
CH High



Date: 30.MAR.2021 09:29:57

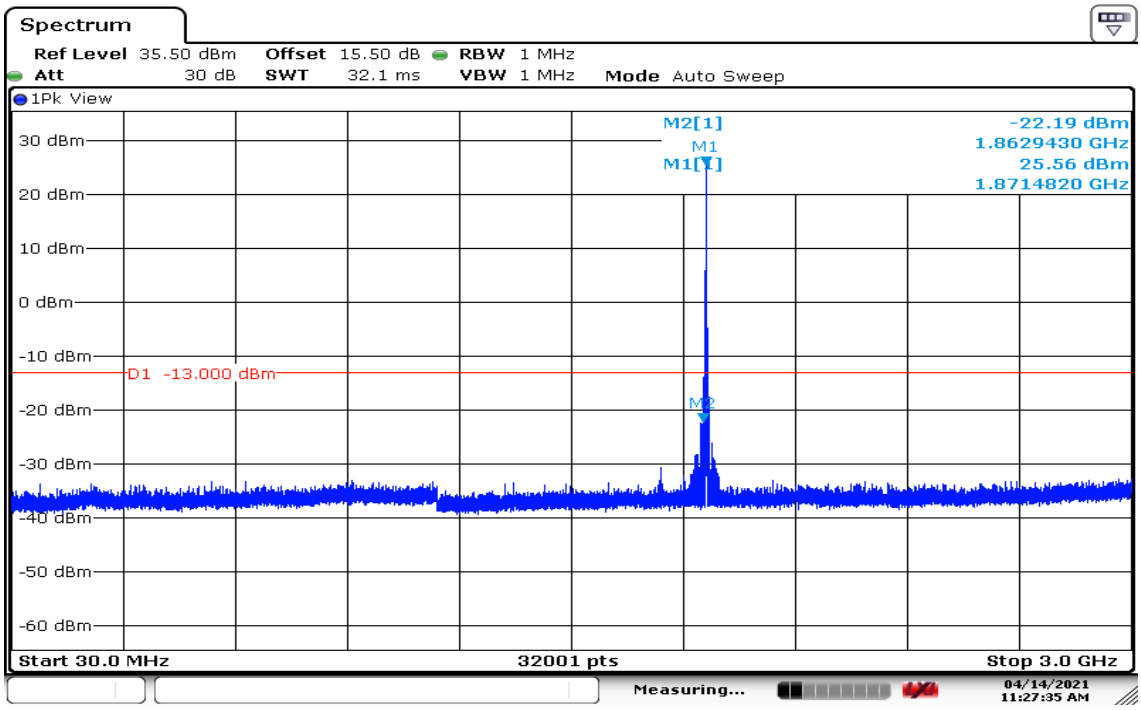
CHANNEL BANDWIDTH: 20MHz / 30MHz-3GHz

CH Low



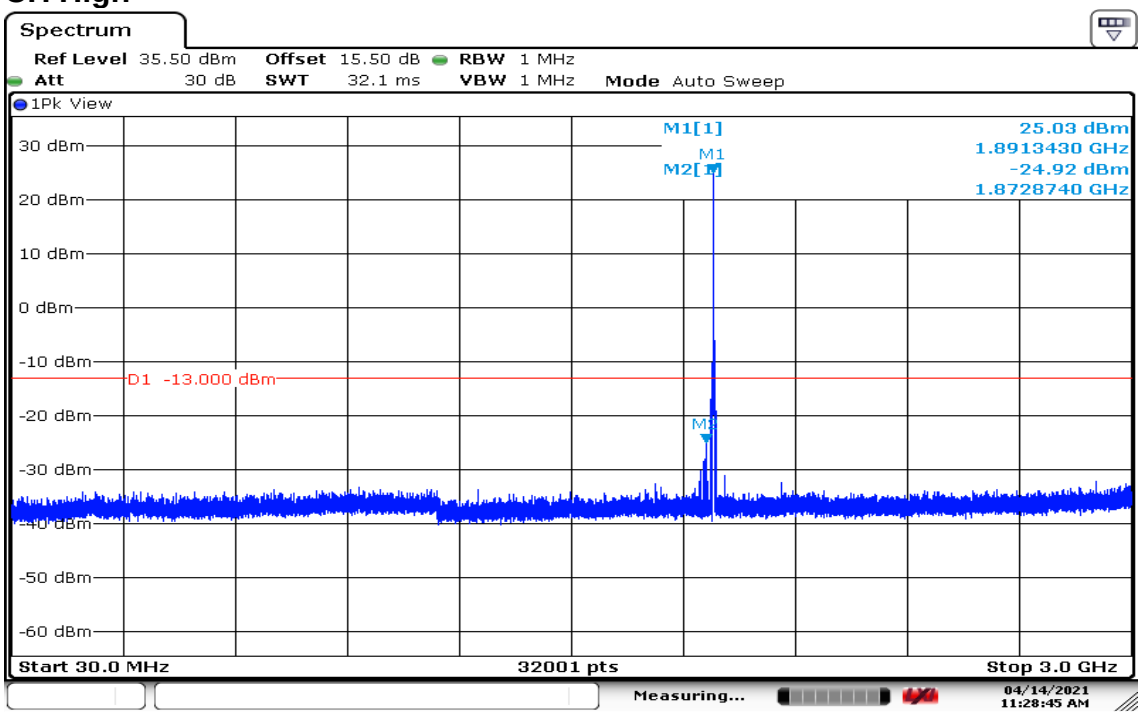
Date: 14.APR.2021 11:02:08

CH Mid



Date: 14.APR.2021 11:27:35

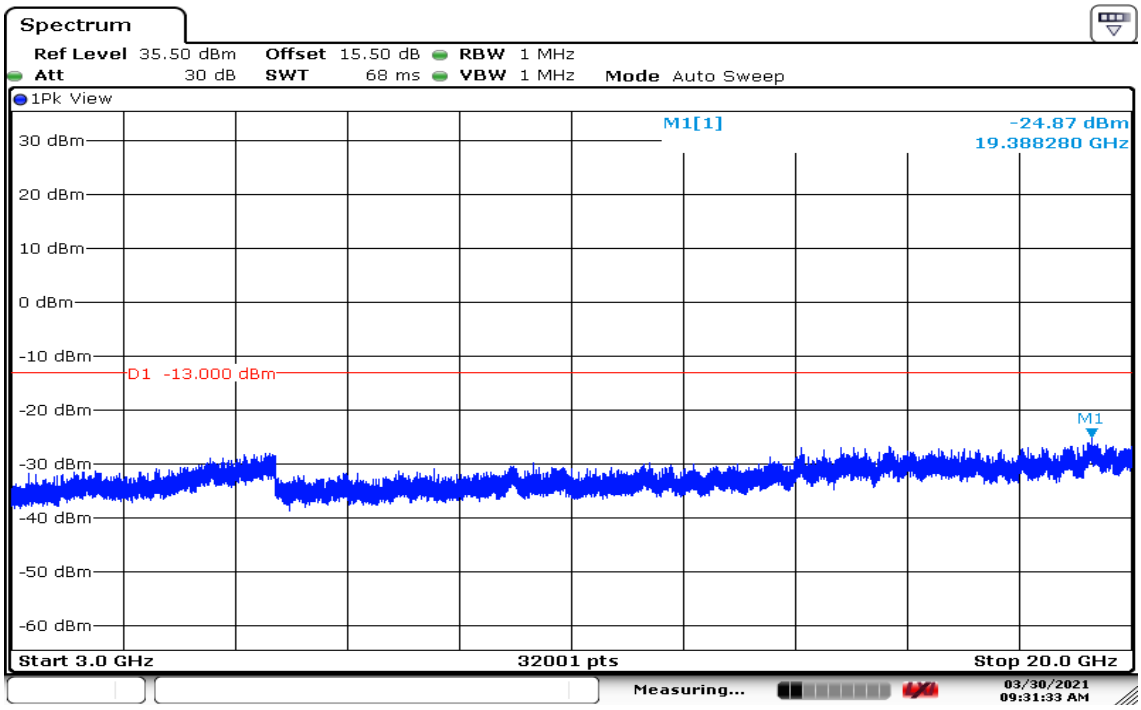
CH High



Date: 14.APR.2021 11:28:46

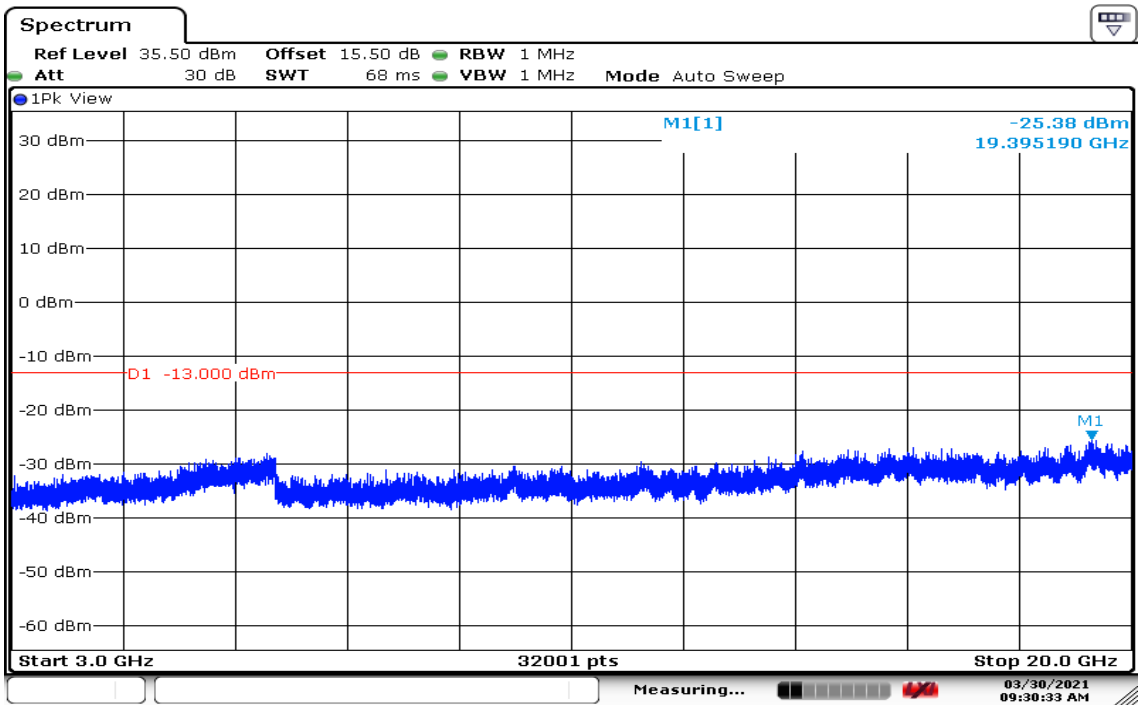
CHANNEL BANDWIDTH: 20MHz / 3GHz-20GHz

CH Low



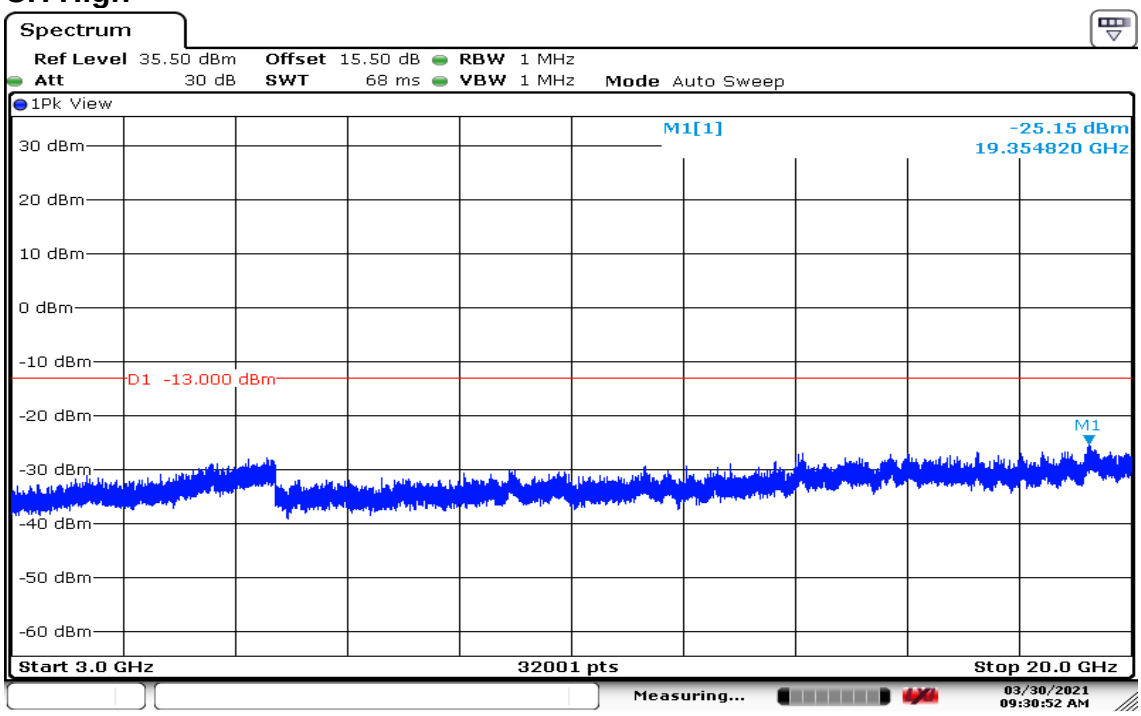
Date: 30.MAR.2021 09:31:33

CH Mid



Date: 30.MAR.2021 09:30:33

CH High



Date: 30.MAR.2021 09:30:52

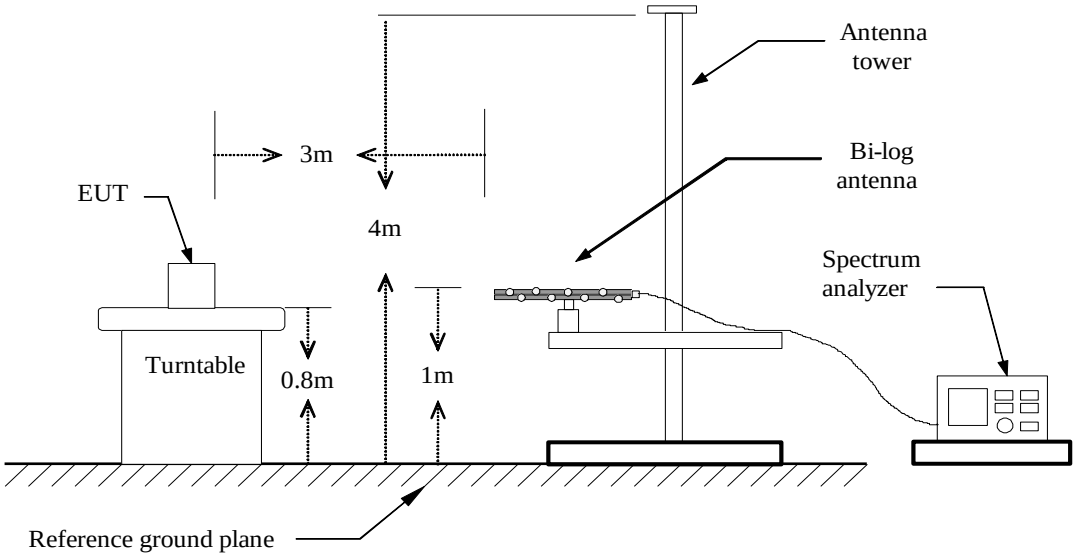
8.7 SPURIOUS RADIATION MEASUREMENT

LIMIT

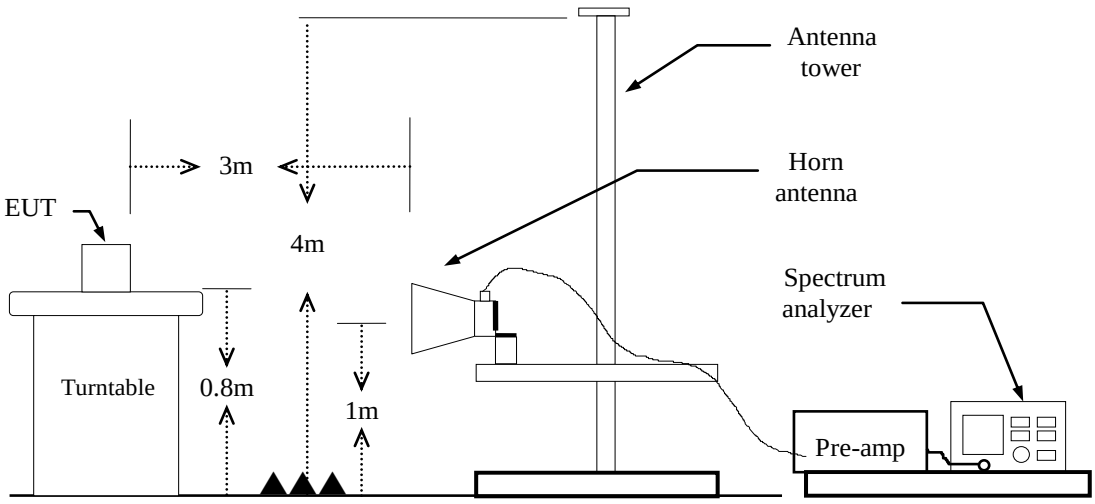
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

Test Configuration

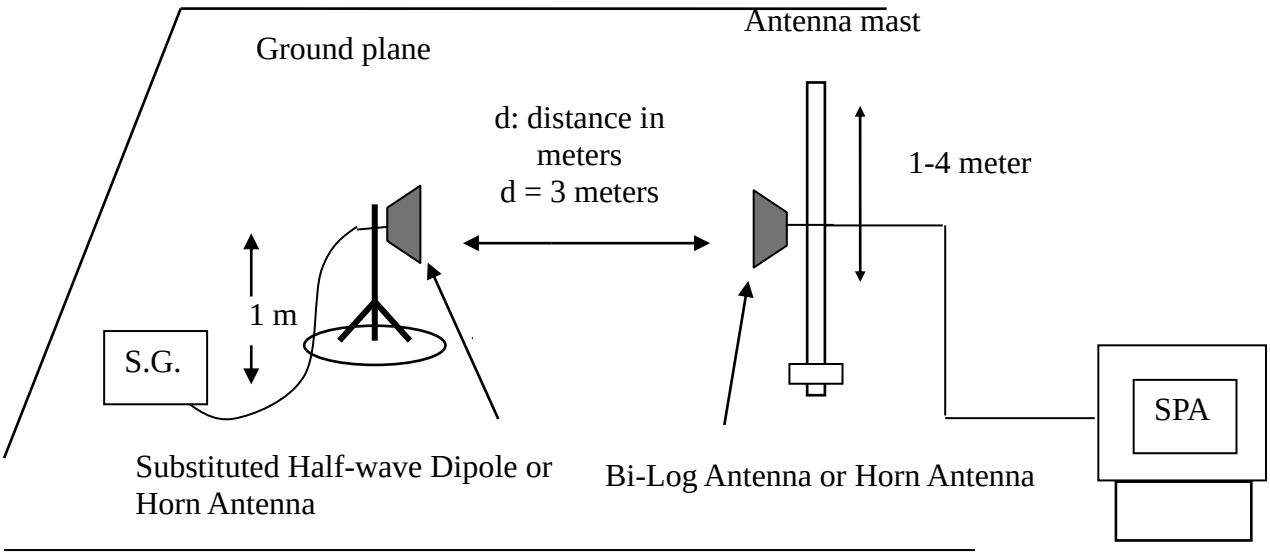
Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up



TEST PROCEDURE

1. According to KDB 971168 D01 Power Meas License Digital Systems and TIA-603-E Section 2.2.12.
2. The EUT was placed on a turntable
   (1) Below 1G : 0.8m
   (2) Above 1G : 0.8m
   (3) EUT set 3m from the receiving antenna
   (4) The table was rotated 360 degrees of the highest spurious emission to determine the position.
3. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
4. A horn antenna was driven by a signal generator.
5. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

ERP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)-2.15

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

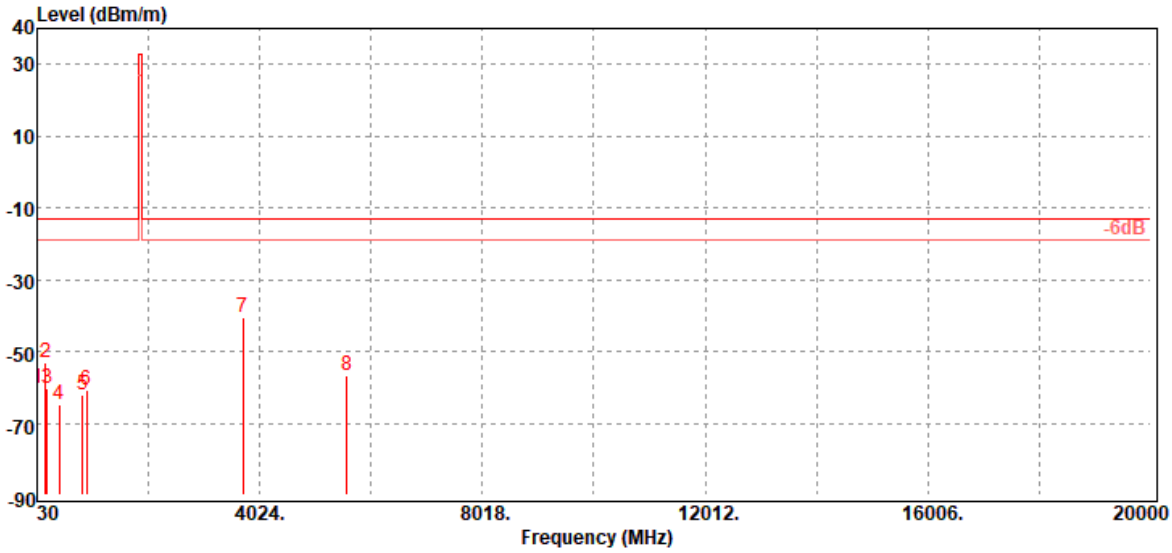
TEST RESULTS

Refer to the attached tabular data sheets.
Remark: Above 1GHz
Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Results

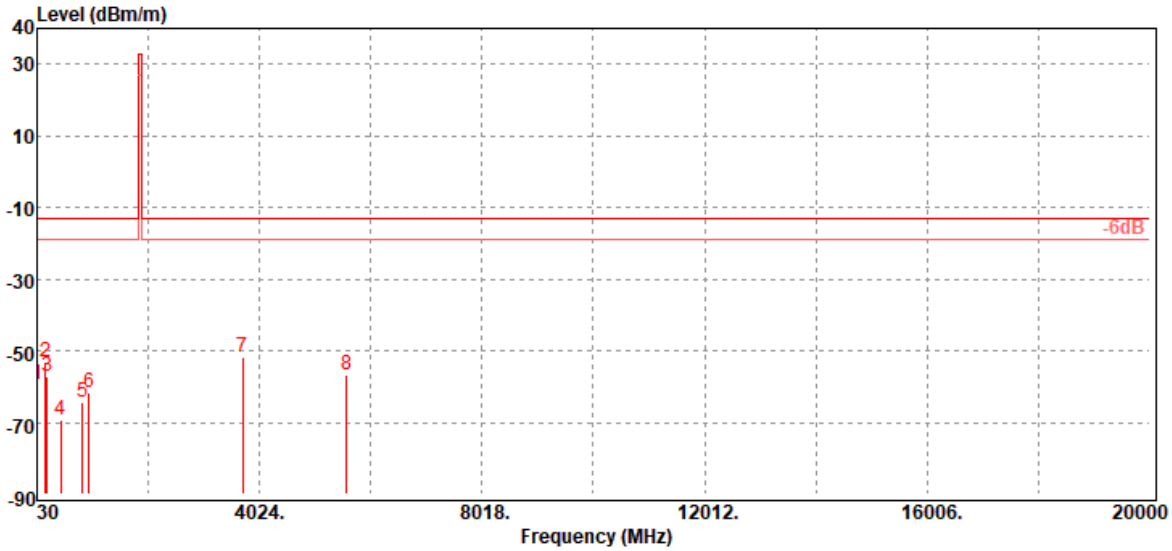
LTE Band 2 / BW: 20MHz / 16QAM / RB =1, RB Offset = 0

Operation Mode:	Tx / Low CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Ver.



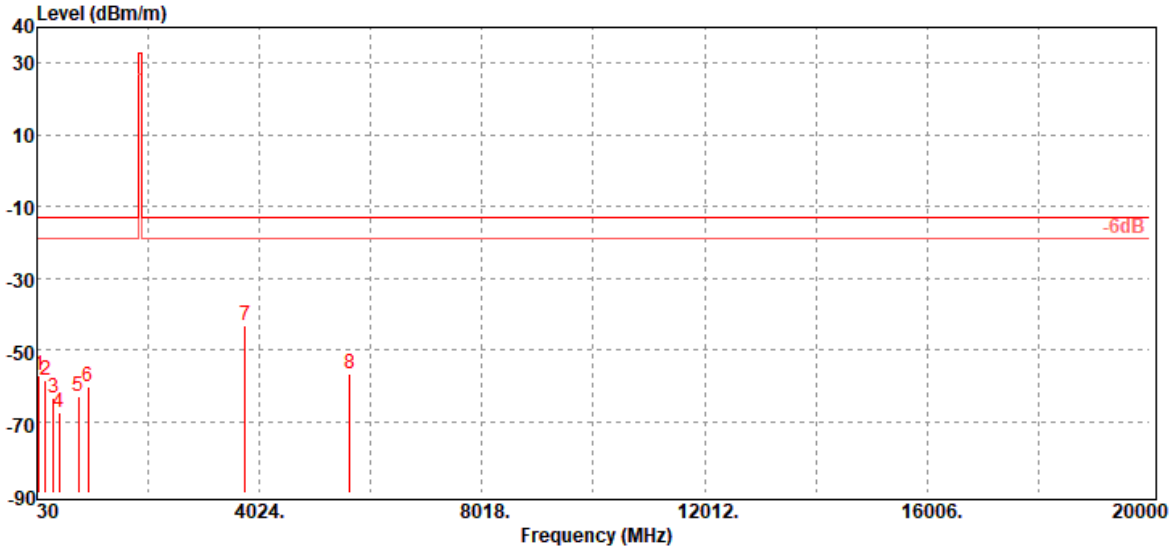
Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
34.85	-60.20	-34.40	-25.32	-0.48	-13.00	-47.20	V
187.14	-53.26	-48.14	-3.99	-1.13	-13.00	-40.26	V
212.36	-60.38	-57.08	-2.10	-1.20	-13.00	-47.38	V
427.70	-64.84	-61.23	-1.90	-1.71	-13.00	-51.84	V
841.89	-62.09	-58.25	-1.40	-2.44	-13.00	-49.09	V
919.49	-60.71	-56.84	-1.30	-2.57	-13.00	-47.71	V
3720.00	-40.56	-47.29	12.46	-5.73	-13.00	-27.56	V
5580.00	-56.93	-62.96	13.14	-7.11	-13.00	-43.93	V

Operation Mode:	Tx / Low CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Hor.



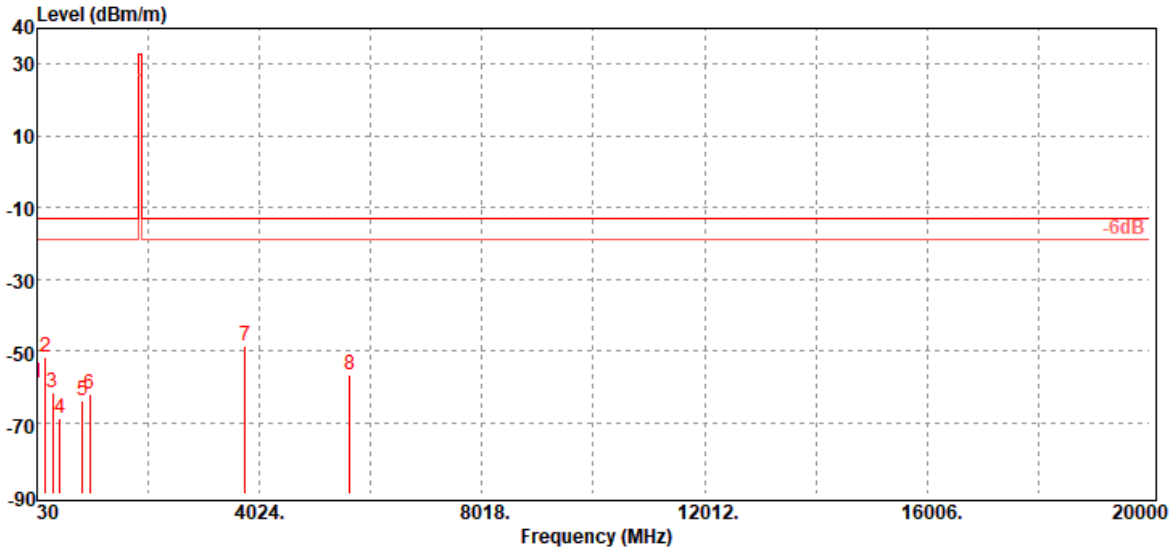
Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
31.94	-59.63	-31.00	-28.16	-0.47	-13.00	-46.63	H
187.14	-53.12	-48.00	-3.99	-1.13	-13.00	-40.12	H
209.45	-57.27	-53.90	-2.18	-1.19	-13.00	-44.27	H
451.95	-69.39	-65.53	-2.10	-1.76	-13.00	-56.39	H
847.71	-64.58	-60.78	-1.35	-2.45	-13.00	-51.58	H
967.99	-61.68	-57.74	-1.30	-2.64	-13.00	-48.68	H
3720.00	-51.85	-58.58	12.46	-5.73	-13.00	-38.85	H
5580.00	-56.92	-62.95	13.14	-7.11	-13.00	-43.92	H

Operation Mode:	Tx / Mid CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Ver.



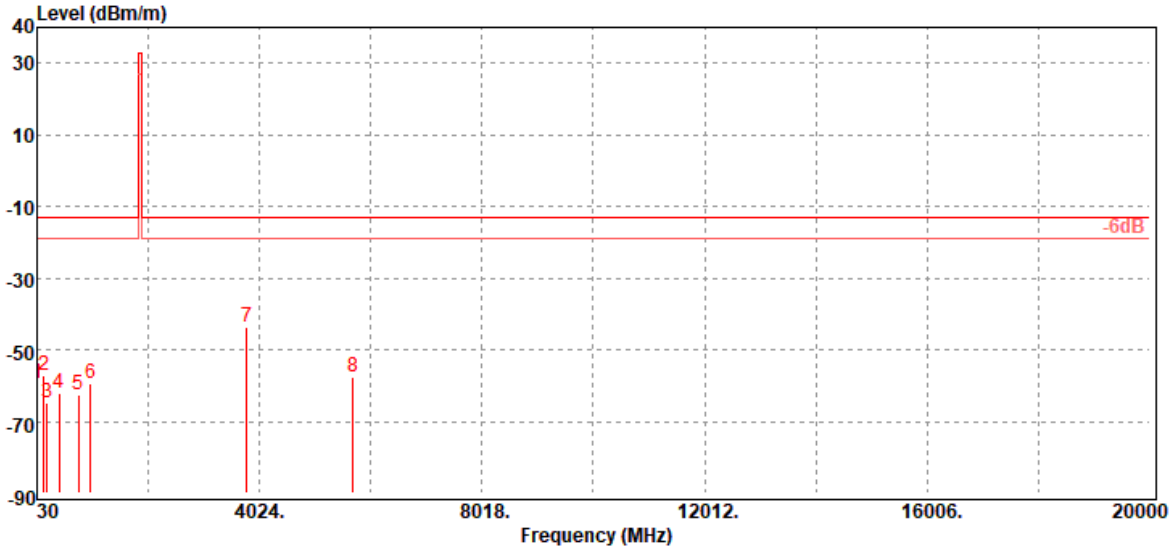
Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
66.86	-57.14	-46.50	-9.97	-0.67	-13.00	-44.14	V
187.14	-58.70	-53.58	-3.99	-1.13	-13.00	-45.70	V
321.00	-63.51	-60.23	-1.80	-1.48	-13.00	-50.51	V
427.70	-67.51	-63.90	-1.90	-1.71	-13.00	-54.51	V
779.81	-63.18	-59.34	-1.50	-2.34	-13.00	-50.18	V
941.80	-60.45	-56.59	-1.26	-2.60	-13.00	-47.45	V
3760.00	-43.37	-50.03	12.42	-5.76	-13.00	-30.37	V
5640.00	-56.92	-63.04	13.26	-7.14	-13.00	-43.92	V

Operation Mode:	Tx / Mid CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Hor.



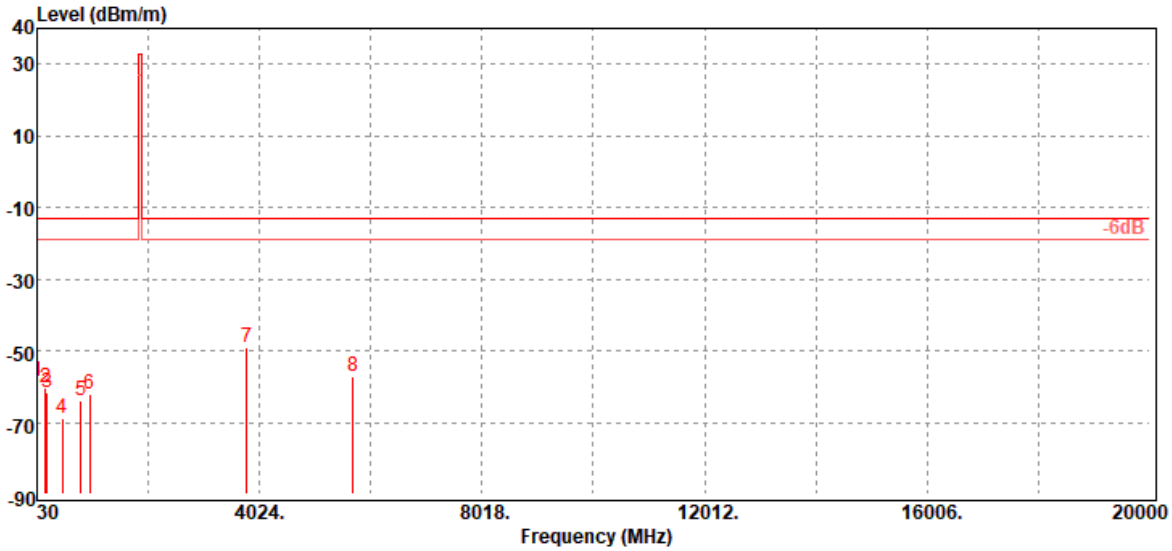
Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
32.91	-59.09	-31.43	-27.19	-0.47	-13.00	-46.09	H
187.14	-51.75	-46.63	-3.99	-1.13	-13.00	-38.75	H
308.39	-61.45	-58.03	-1.97	-1.45	-13.00	-48.45	H
442.25	-68.76	-64.92	-2.10	-1.74	-13.00	-55.76	H
849.65	-63.99	-60.23	-1.31	-2.45	-13.00	-50.99	H
978.66	-62.01	-58.03	-1.33	-2.65	-13.00	-49.01	H
3760.00	-48.57	-55.23	12.42	-5.76	-13.00	-35.57	H
5640.00	-56.77	-62.89	13.26	-7.14	-13.00	-43.77	H

Operation Mode:	Tx / High CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Ver.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
34.85	-59.26	-33.46	-25.32	-0.48	-13.00	-46.26	V
149.31	-57.30	-49.13	-7.17	-1.00	-13.00	-44.30	V
212.36	-64.97	-61.67	-2.10	-1.20	-13.00	-51.97	V
427.70	-62.33	-58.72	-1.90	-1.71	-13.00	-49.33	V
773.99	-62.50	-58.76	-1.40	-2.34	-13.00	-49.50	V
987.39	-59.50	-55.44	-1.40	-2.66	-13.00	-46.50	V
3800.00	-43.51	-50.22	12.50	-5.79	-13.00	-30.51	V
5700.00	-57.57	-63.50	13.10	-7.17	-13.00	-44.57	V

Operation Mode:	Tx / High CH	**Test Date:**	April 21, 2021
Temperature:	22.4℃	**Tested by:**	Ray Li
Humidity:	53% RH	**Polarity:**	Hor.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
31.94	-58.36	-29.73	-28.16	-0.47	-13.00	-45.36	H
187.14	-60.11	-54.99	-3.99	-1.13	-13.00	-47.11	H
216.24	-61.51	-58.22	-2.08	-1.21	-13.00	-48.51	H
481.05	-68.87	-64.67	-2.38	-1.82	-13.00	-55.87	H
812.79	-63.84	-60.01	-1.44	-2.39	-13.00	-50.84	H
975.75	-62.28	-58.26	-1.38	-2.64	-13.00	-49.28	H
3800.00	-49.24	-55.95	12.50	-5.79	-13.00	-36.24	H
5700.00	-56.95	-62.88	13.10	-7.17	-13.00	-43.95	H

- End of Test Report -