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CERTIFICATION TEST REPORT

Manufacturer: Securus Technologies
4000 International Parkway
Carrollton, Texas 75007 USA

Applicant: Same as Above

Product Description: 802.11ac Dual Band Module

Product Name: JP6S

Product Description: 7" Lithium Capacitive Touch Tablet for Inmates

Model: JP6S

FCC ID: 2AUJ4JP6S

Testing Commenced: Aug. 15, 2019

Testing Ended: Feb. 10, 2020

Summary of Test Results: **In Compliance, with Modifications**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

Rule(s):

- **FCC Part 15 Subpart E – Unlicensed National Information Infrastructure Devices, Section 15.407 General technical requirements**
- **FCC15.207 - Conducted Limits**



Order Number: F2P21445A

Applicant: Securus Technologies
Model: JP6S

Evaluation Conducted by:

Julius Chiller, EMC/Wireless Engineer

Report Reviewed by:

Ken Littell, Director of EMC & Wireless Operations

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TABLE OF CONTENTS

Section	Title	Page
1	ADMINISTRATIVE INFORMATION	4
2	SUMMARY OF TEST RESULTS/MODIFICATIONS	7
3	TABLE OF MEASURED RESULTS	8
4	ENGINEERING STATEMENT	9
5	EUT INFORMATION AND DATA	10
6	LIST OF MEASUREMENT INSTRUMENTATION	12
7	OCCUPIED BANDWIDTH	13
8	OUTPUT POWER	24
9	POWER SPECTRAL DENSITY	30
10	RADIATED SPURIOUS EMISSIONS	36
11	CONDUCTED SPURIOUS EMISSIONS	51
12	VOLTAGE VARIATIONS	84
13	CONDUCTED EMISSIONS	95
14	PHOTOGRAPHS	100



1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

1.2 Measurement Procedure:

All measurements were performed according to ANSI C63.10:2013 and recommended FCC procedure of measurement of NII operating under Section 15.407 and in KDB789033. A list of the measurement equipment can be found in Section 6.



1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used, and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor using a coverage factor of $k=2$. The Uncertainty for a laboratory are referred to as U_{lab} . For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the U_{cispr} values to determine if a specific margin is required to deem compliance.

U_{lab}

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66	3.32dB

U_{cispr}

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If U_{lab} is less than or equal to U_{cispr} , then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} in table 1, then:

- compliance is deemed to occur if no measured disturbance, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.



1.4 Document History

Document Number	Description	Issue Date	Approved By
F2P21445-02E	First Issue	Feb. 10, 2020	K. Littell

**2 SUMMARY OF TEST RESULTS**

Test Name	Standard(s)	Results
Radiated Spurious Emissions	CFR 47 Part 15.205 / KDB789033	Complies
Occupied Bandwidth	CFR 47 Part 15.407(e) / Part 15.209 / KDB789033	Complies
Output Power	CFR 47 Part 15.407(a)(1)(iv) / Part 15.407(a)(3) / KDB789033	Complies
Power Spectral Density	CFR 47 Part 15.407(a)(1)(iv) / Part 15.407(a)(3) / KDB789033	Complies
Conducted Spurious Emissions	CFR 47 Part 15.407(b)(1,4)	Complies
Voltage Variations	CFR 47 Part 15.31(e)	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies

Modifications Made to the Equipment
RF Power was reduced to 15dBm setting to reduce Power Spectral Density to passing level.

**3 TABLE OF MEASURED RESULTS**

Test			Low Channel	Mid Channel	High Channel
OFDM54 20M:			5180 MHz	5220 MHz	5240 MHz
OFDM54 40M:			5190 MHz	--	5230 MHz
RF Output Power	5.1 GHz	OFDM54 20M	36.29mW, 15.59dBm	36.0mW, 15.57dBm	36.6mW, 15.63dBm
		OFDM54 40M	38.3mW, 15.83dBm	--	37.1mW, 15.69dBm
	Output Power Limits		250mW, 24dBm	250mW, 24dBm	250mW, 24dBm
E.I.R.P.*	5.1 GHz	OFDM54 20M	57.41mW, 17.59dBm	57.14mW, 17.57dBm	57.94mW, 17.63dBm
		OFDM54 40M	60.67mW, 17.83dBm	--	58.75mW, 17.69dBm
	E.I.R.P. Limits		1000mW, 30dBm	1000mW, 30dBm	1000mW, 30dBm
Peak Power Spectral Density*	5.1 GHz	OFDM54 20M	7.33dBm	6.89dBm	6.69dBm
		OFDM54 40M	3.62dBm	--	3.76dBm
	Limit:		11dBm/1 MHz	11dBm/1 MHz	11dBm/1 MHz
-26dB Occupied Bandwidth (MHz)	5.1 GHz	OFDM54 20M	19.132	19.264	19.231
		OFDM54 40M	39.662	--	39.664
99% Occupied Bandwidth (MHz)	5.1 GHz	OFDM54 20M	16.450	16.430	16.454
		OFDM54 40M	36.008	--	36.012
Voltage Variations	OFDM54 20M	@ 85%	6.05dBm 5.1813GHz	5.36dBm 5.223 GHz	4.36dBm 5.2409 GHz
		@ 115%	6.76dBm 5.1832 GHz	5.49dBm 5.2210 GHz	4.81dBm 5.2448 GHz
	OFDM54 40M	@ 85%	2.33dBm 5.1968 GHz	--	1.65dBm 5.2253 GHz
		@ 115%	3.08dBm 5.1837 GHz	--	2.46dBm 5.2433 GHz

*RF power was reduced to 15dBm setting.



4 ENGINEERING STATEMENT

This report has been prepared on behalf of Securus Technologies to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.407 of the FCC Rules using ANSI C63.4 and KDB789033 standards. The test results found in this test report relate only to the items tested.



4 EUT INFORMATION AND DATA

4.1 Equipment Under Test:

Product: Tablet

Model: JP6S

Serial No.: None Specified

FCC ID: **2AUJ4JP6S**

4.2 Trade Name:

Securus Technologies

4.3 Power Supply:

Charger, Securus model MX15X-0502500UX

4.4 Applicable Rules:

CFR 47, Part 15.407, subpart E

4.5 Equipment Category:

Radio Transmitter-NII

4.6 Antenna:

Integral Antenna

4.7 Accessories:

N/A

4.8 Test Item Condition:

The equipment to be tested was received in good condition.



4.9 Testing Algorithm:

The EUT was set up in a test mode to continuous transmit with the Duty Cycle equal to or greater than 98% at high, mid and low frequencies of the 5.15-5.25GHz spectrum.

For the 5.15-5.25 GHz 20MHz band, 5.18 GHz was the Center frequency for the low channel, 5.220 GHz was the Center frequency for the mid channel, and 5.240 GHz was the Center frequency for the high channel. For the 40MHz band, 5.19 GHz was the Center frequency for the low channel, and 5.23 GHz was the Center frequency for the high channel.

EUT was powered at 120V, 60 Hz using the manufacturer supplied AC Adaptor. The highest emissions were recorded in the data tables.

**5 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	Mar. 31, 2020
Temp/Hum. Recorder	CL263	Extech	445814	06	Mar. 6, 2020
Temp/Hum. Recorder	CL261	Extech	445814	04	Mar. 6, 2020
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 21, 2020
Receiver	CL204	Rohde & Schwarz	ESR7	101714	Oct. 16, 2020
Horn Antenna	CL098	Emco	3115	9809-5580	Jan. 31, 2021
Pre-Amplifier	0197	Hewlett Packard	8447D	1726A01006	Jan. 31, 2020
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500791	Aug. 5, 2020
Amplifier w/Monopole & 18" Loop	CL163-Loop	A.H. Systems, Inc.	EHA-52B	100	July 24, 2020
Software:	Tile Version 3.4.B.3		Software Verified: Aug. 14-19, 2019: Jan. 21, 2020		
Software:	EMC 32, Version 8.53.0		Software Verified: Aug. 14-19, 2019; Jan. 21, 2020		
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Oct. 14, 2020
Antenna, Horn	CL114	A. H. Systems, Inc.	SAS-572	237	Feb. 4, 2021
Spectrum Analyzer	CL147	Agilent	E7402	MY45101241	Jan. 6, 2021
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	July 29, 2020
LISN	CL181	Com-Power	LI-125A	191226	Sept. 6, 2020
LISN	CL182	Com-Power	LI-125A	191225	Sept. 6, 2020
Horn Antenna (26.5-40 GHz)	CL188	Com-Power	AH-640	091065	July 23, 2021
Pre-Amplifier (18 GHz-40 GHz)	CL189	Com-Power	PAM-840A	461303	July 31, 2021



7 OCCUPIED BANDWIDTH

7.1 Requirements:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -26dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

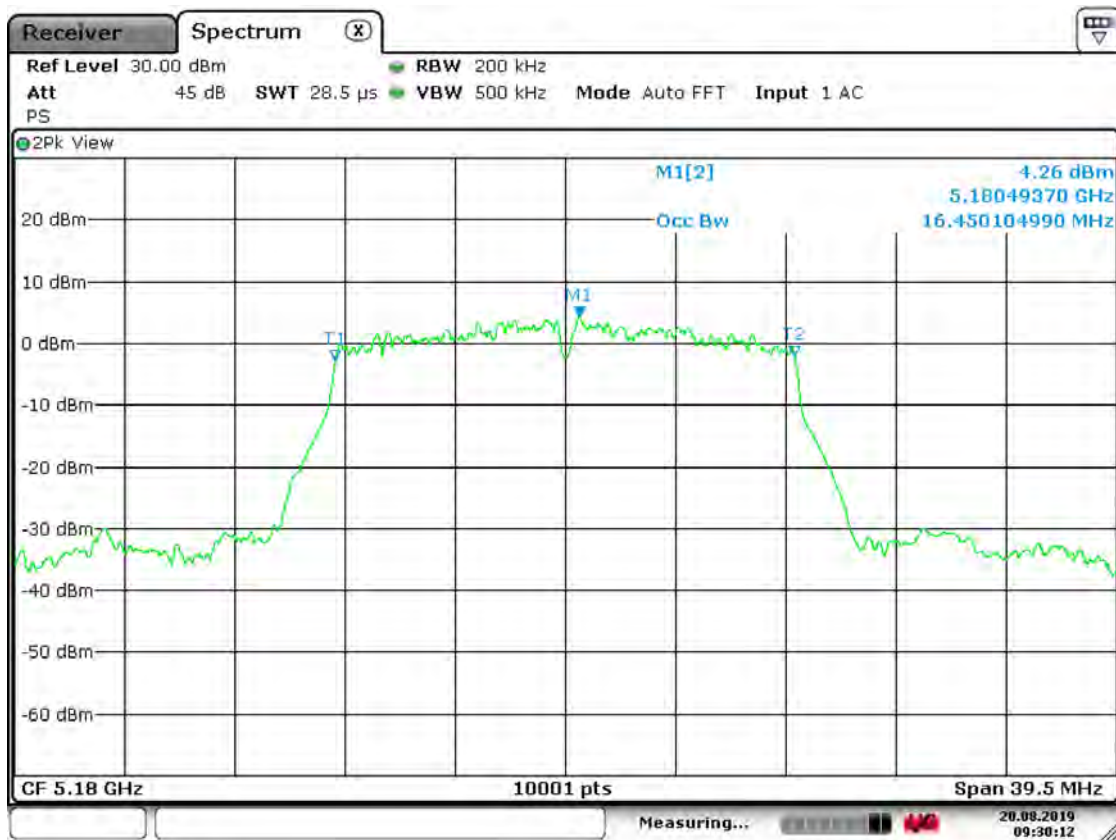
Bandwidth measurements were made at the low, mid and high frequencies. The -26dB bandwidth was measured using the marker delta method. The 99% bandwidth is included and was measured using the receiver's OBW function set for 99%.



7.2 Occupied Bandwidth Test Data

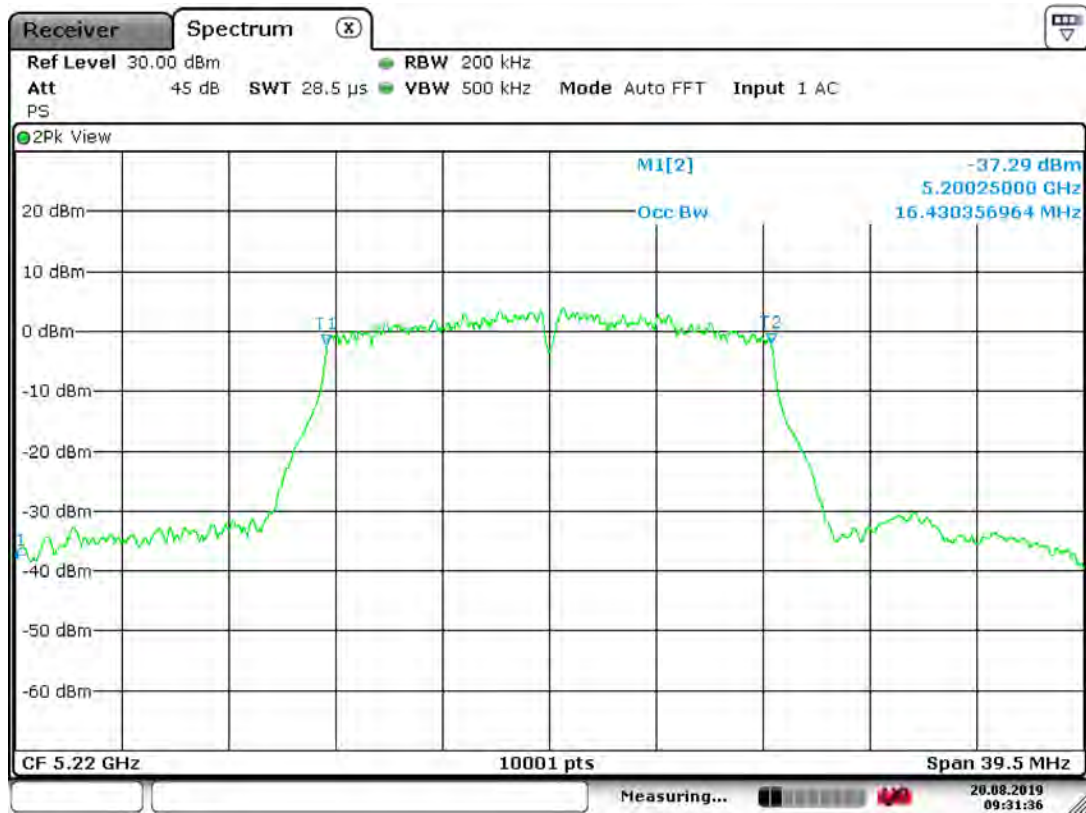
Test Date(s):	Aug. 20, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	22.2°C
		Relative Humidity:	38%

5.1 GHz, OFDM54 20M: 99% OBW, Low Channel



Date: 20.AUG.2019 09:30:12

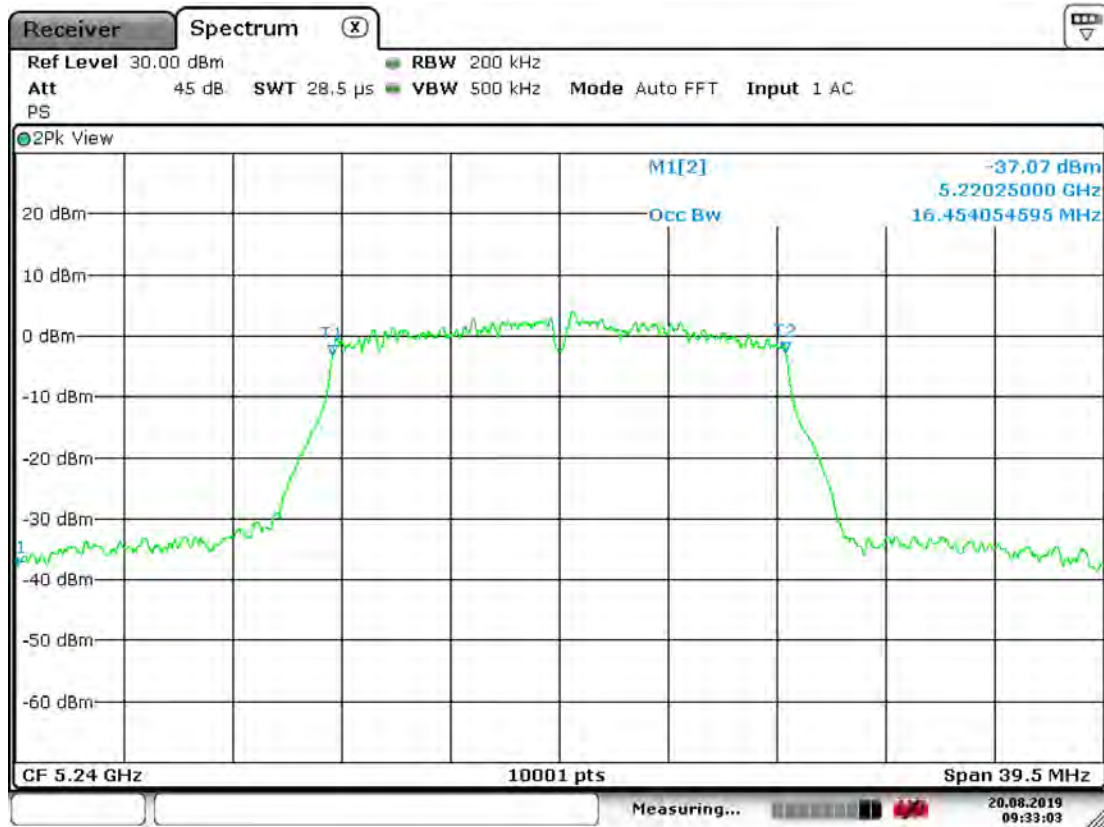
5.1 GHz, OFDM54 20M: 99% OBW, Mid Channel



Date: 20.AUG.2019 09:31:36



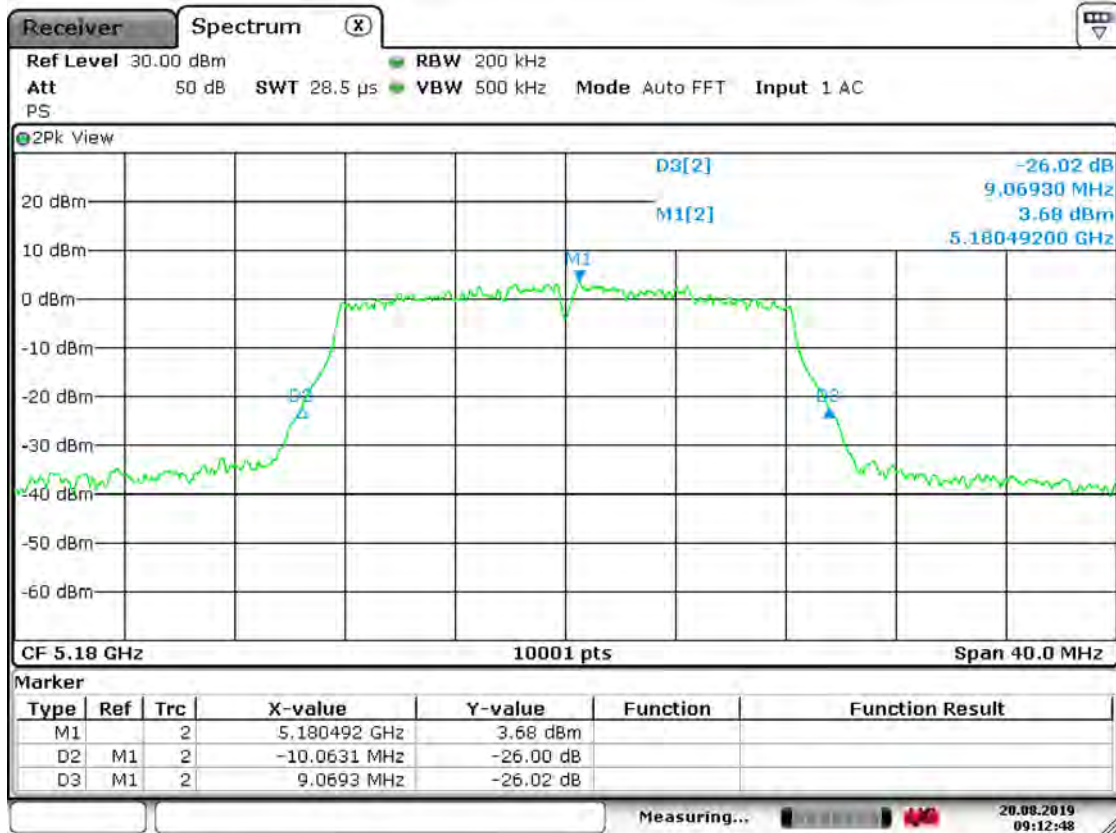
5.1 GHz, OFDM54 20M: 99% OBW, High Channel



Date: 20.AUG.2019 09:33:03



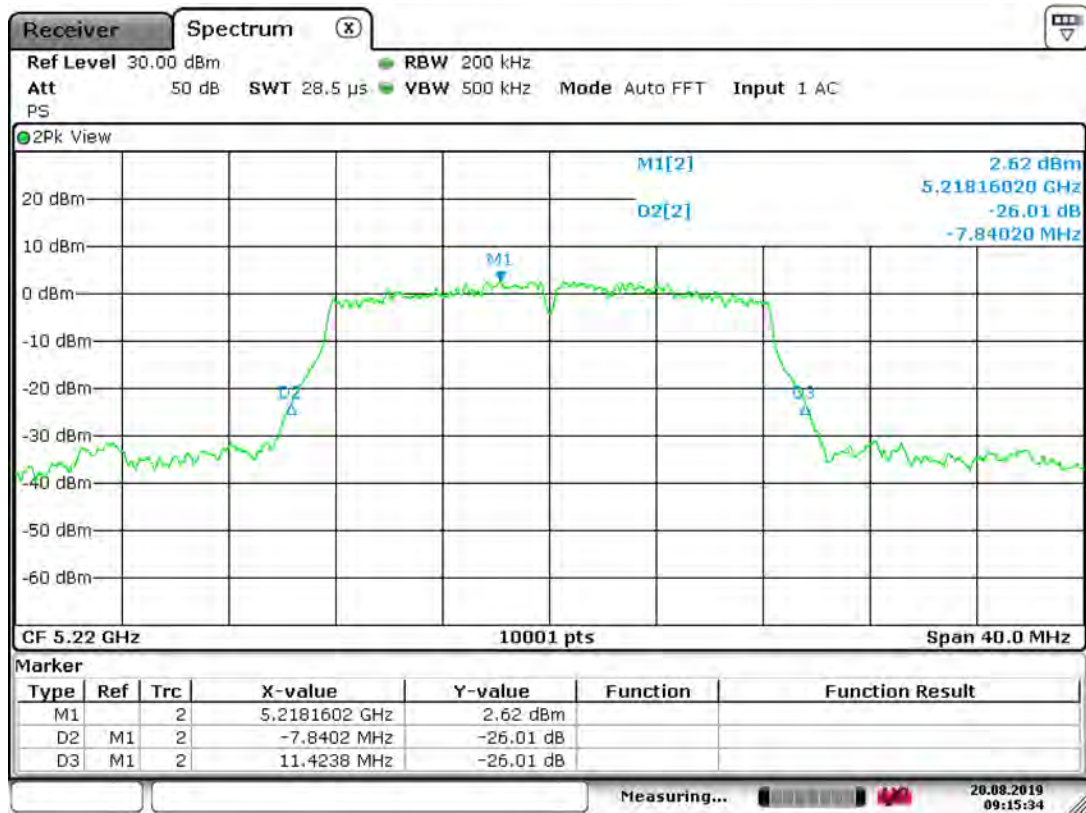
5.1 GHz, OFDM54 20M: -26dB OBW, Low Channel



Date: 20.AUG.2019 09:12:48



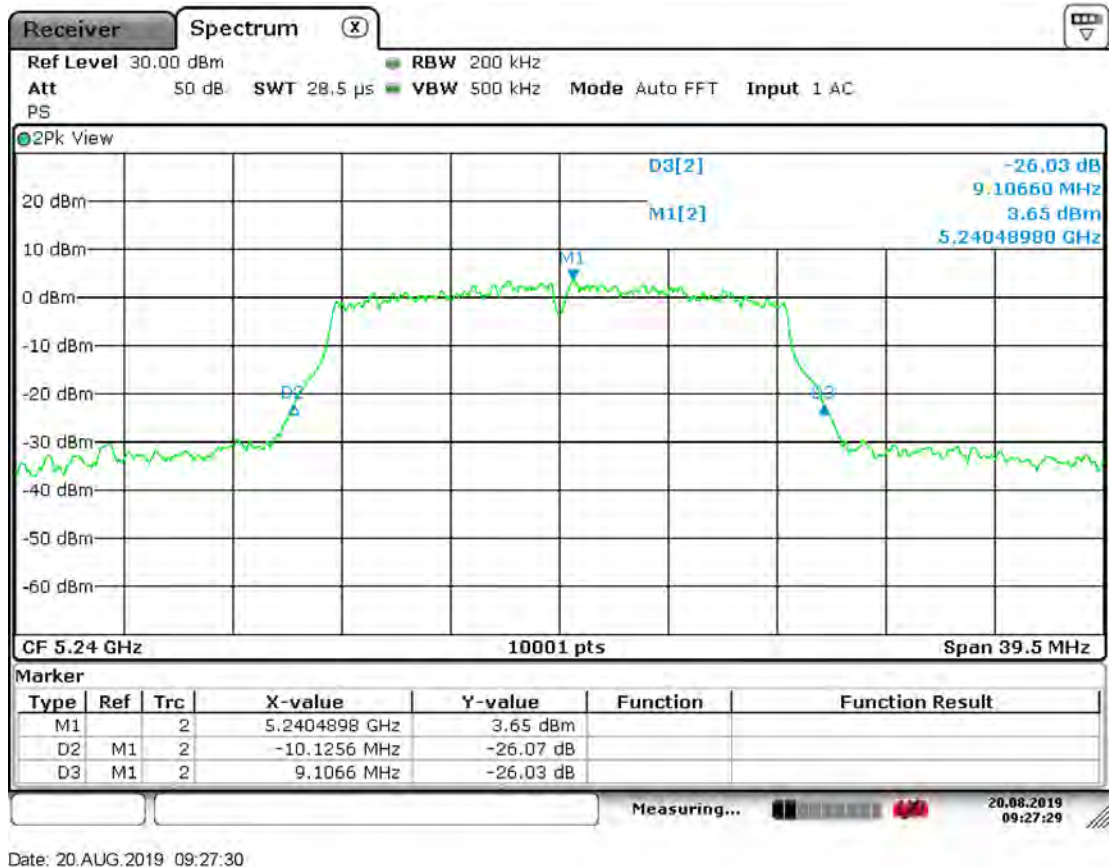
5.1 GHz, OFDM54 20M: -26dB OBW, Mid Channel



Date: 20.AUG.2019 09:15:35

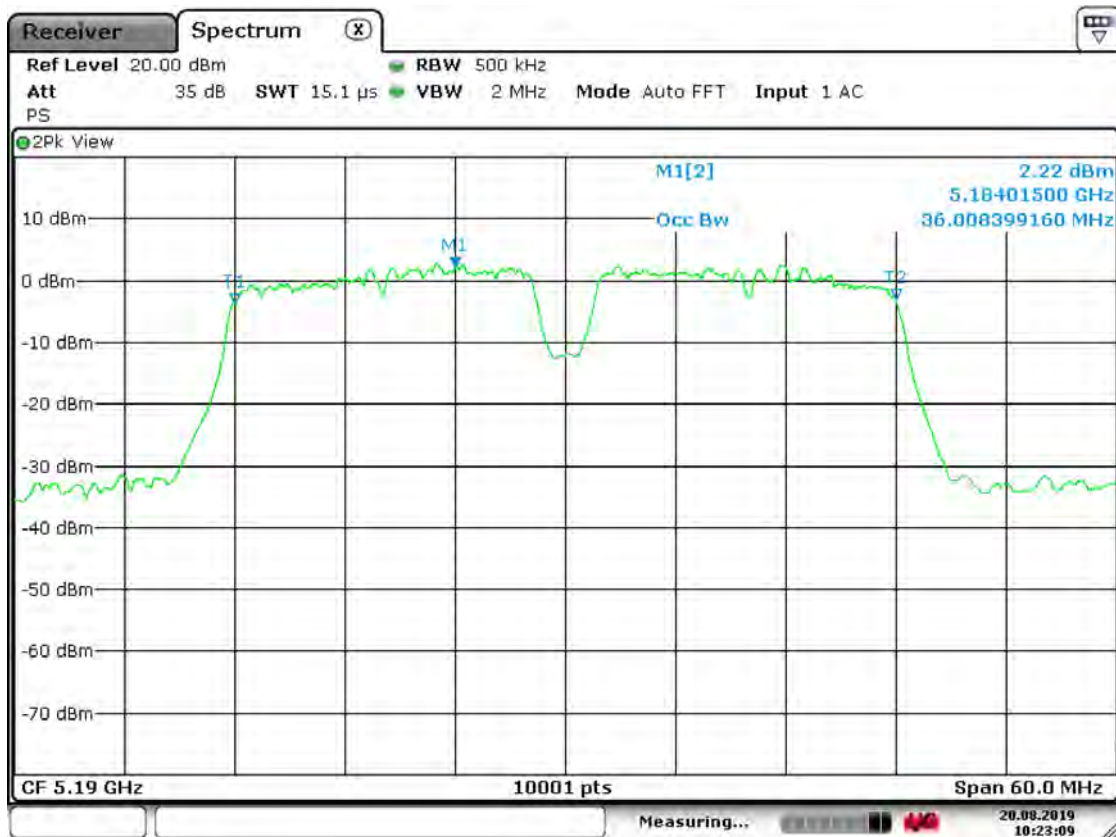


5.1 GHz, OFDM54 20M: -26dB OBW, High Channel





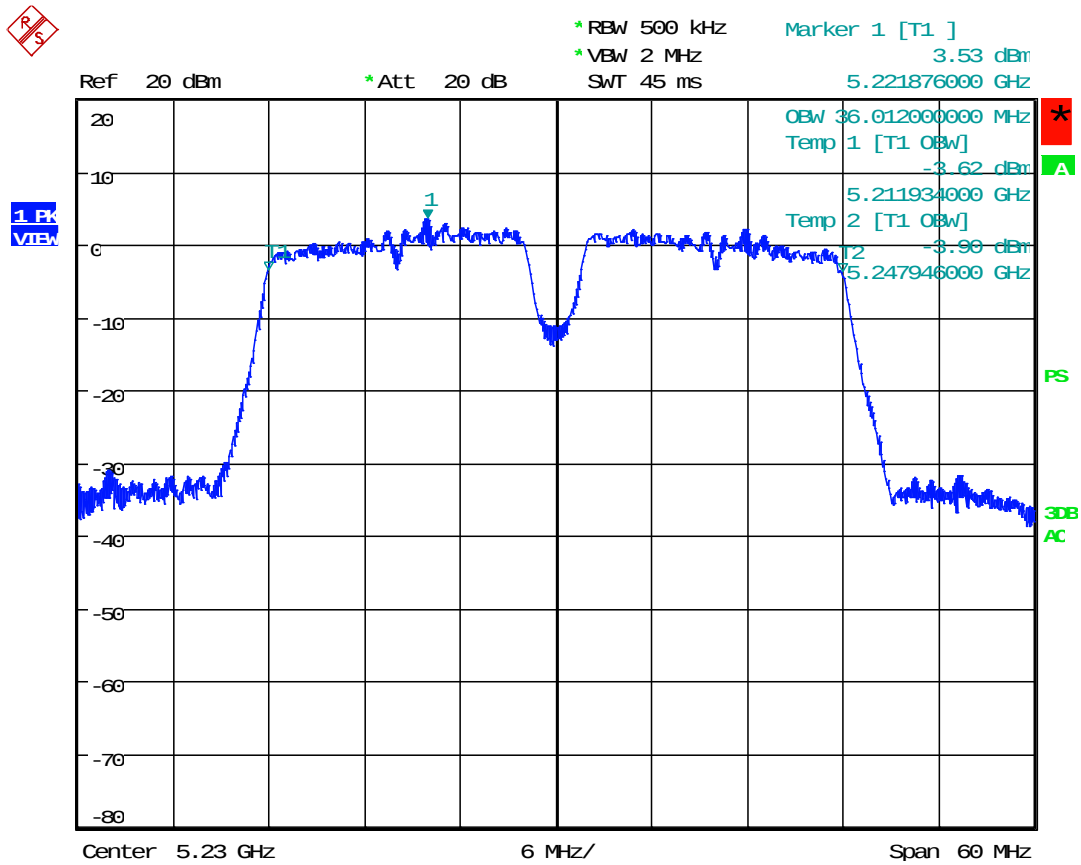
Test Date(s):	Aug. 20, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	21.6°C
		Relative Humidity:	39%

5.1 GHz, OFDM54 40M: 99% OBW, Low Channel

Date: 20.AUG.2019 10:23:08



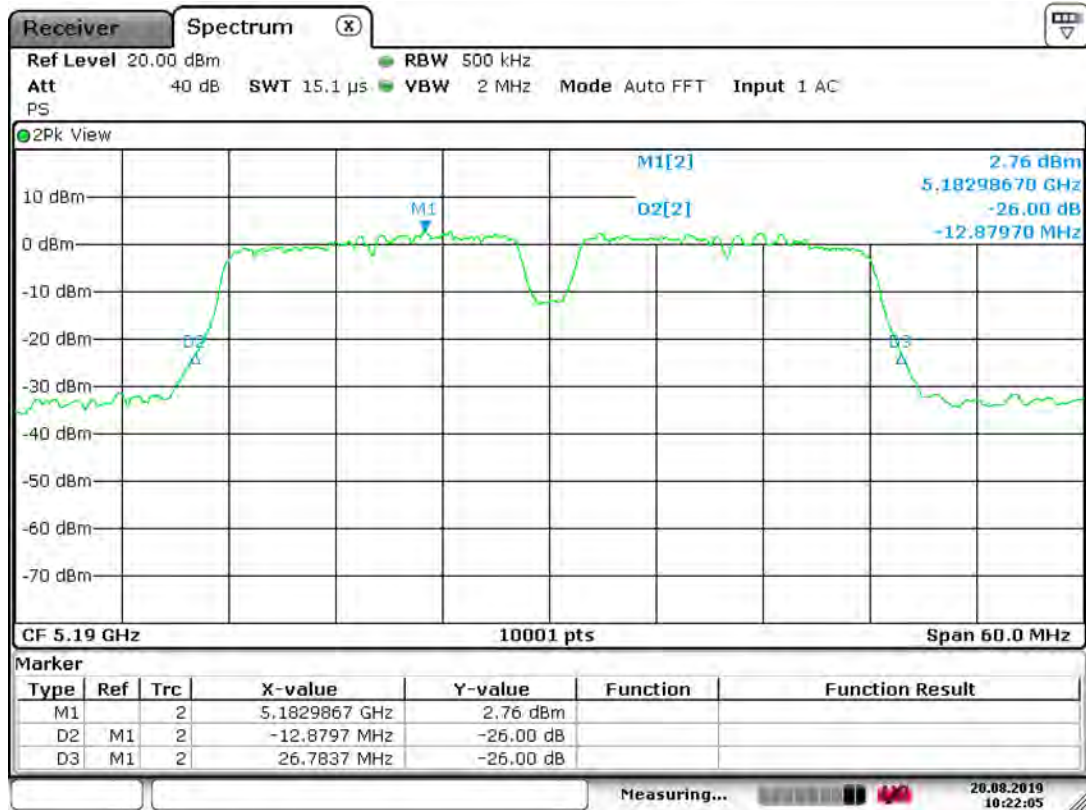
5.1 GHz, OFDM54 40M: 99% OBW, High Channel



Date: 22.AUG.2019 15:42:33



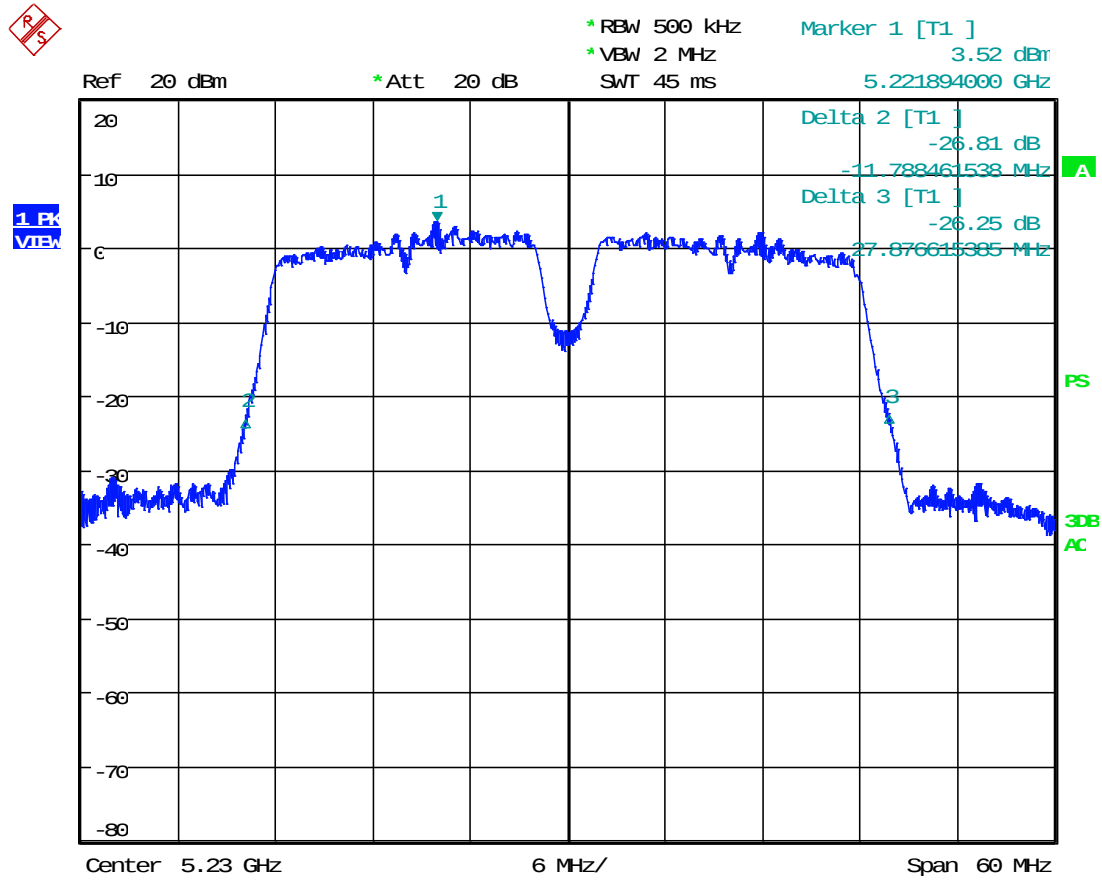
5.1 GHz, OFDM54 40M: -26dB OBW, Low Channel



Date: 20.AUG.2019 10:22:05



5.1 GHz, OFDM54 40M: -26dB OBW, High Channel



Date: 22.AUG.2019 15:40:42



8 OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

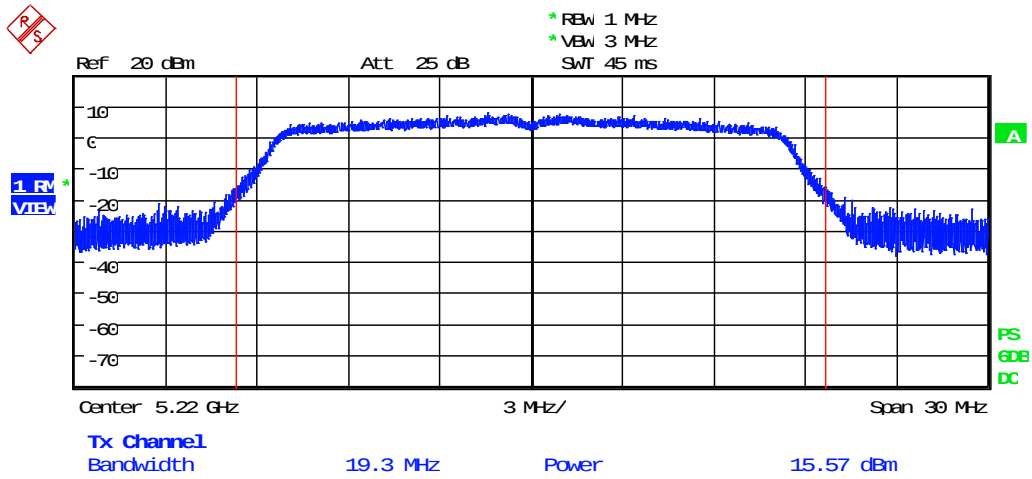
8.1 Requirements:

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi.

Antenna gain is 2.0dBi.



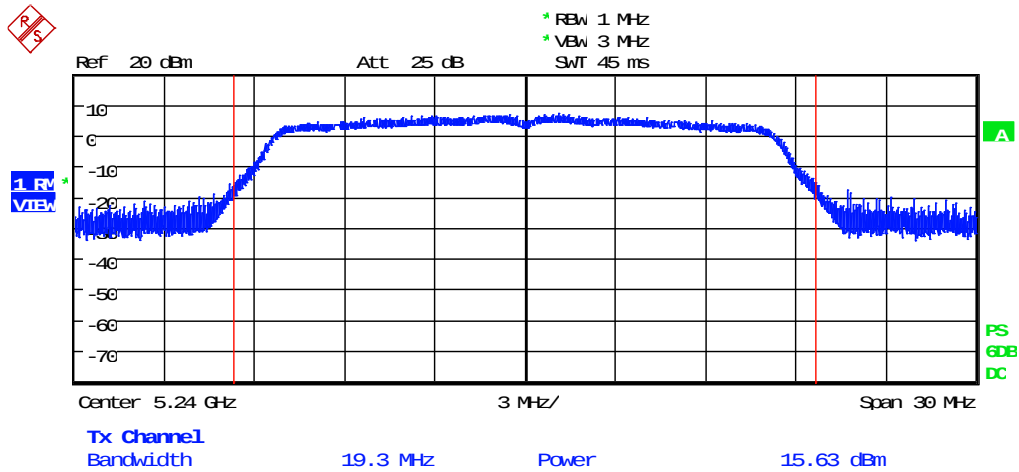
5.1 GHz, OFDM54 20M, Mid Channel



Date: 10.FEB.2020 09:49:54



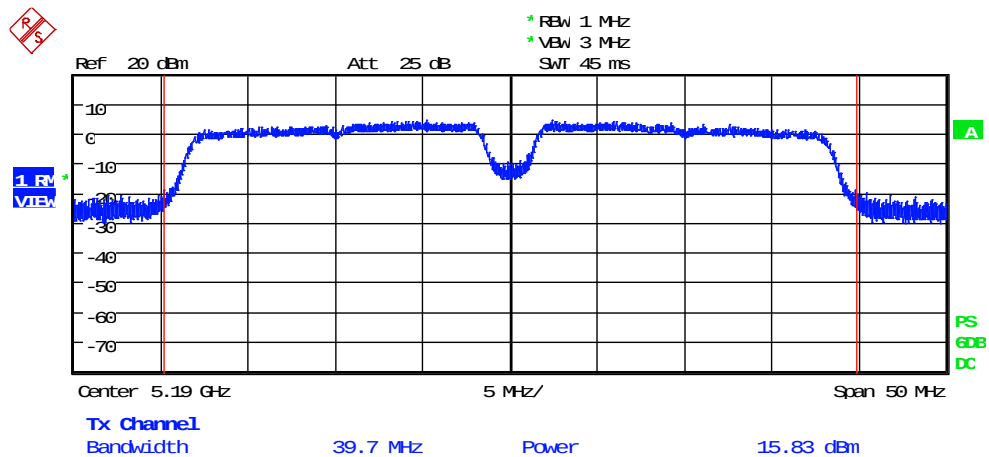
5.1 GHz, OFDM54 20M, High Channel



Date: 10.FEB.2020 09:51:12



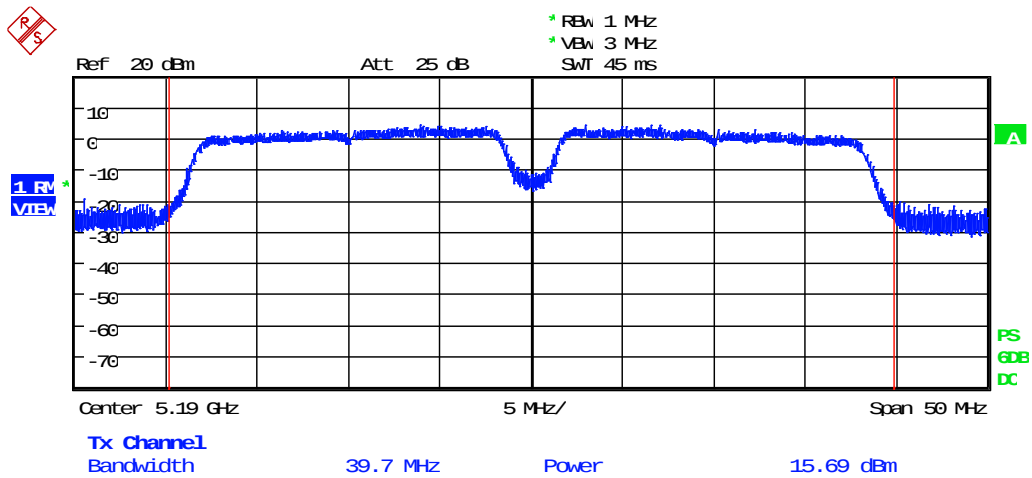
5.1 GHz, OFDM54 40M, Low Channel



Date: 10.FEB.2020 09:53:30



5.1 GHz, OFDM54 40M, High Channel



Date: 10.FEB.2020 09:56:50



9 PEAK POWER SPECTRAL DENSITY (PSD)

Peak power spectral density measurements were performed.

9.1 Requirements:

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 MHz band.

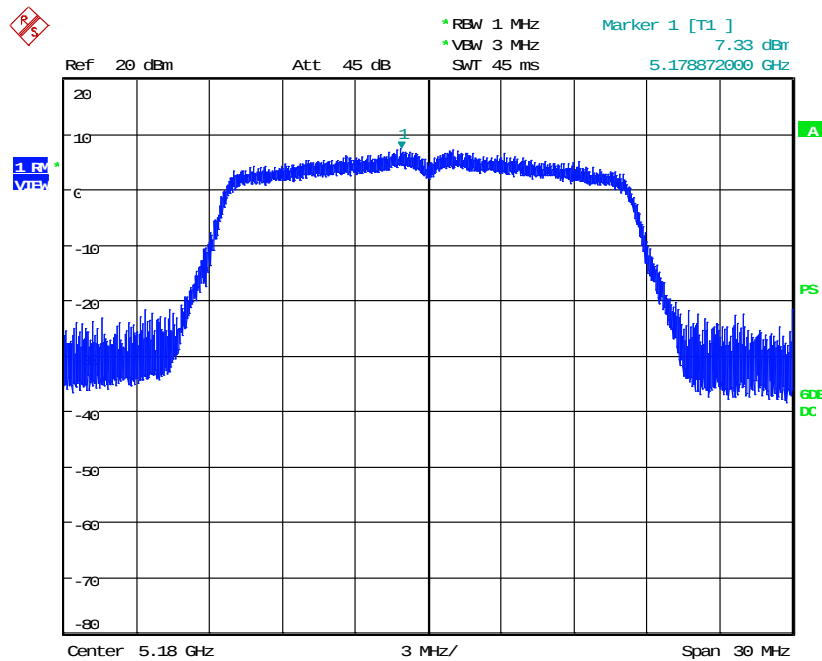


9.2 Peak Power Spectral Density Test Data

Test Date(s):	Feb. 10, 2020	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.407(a)(1,3); KDB789033	Air Temperature:	18.1°C
		Relative Humidity:	28%

Note: RF Power was reduced to 15dBm setting to reduce Power Spectral Density to passing level.

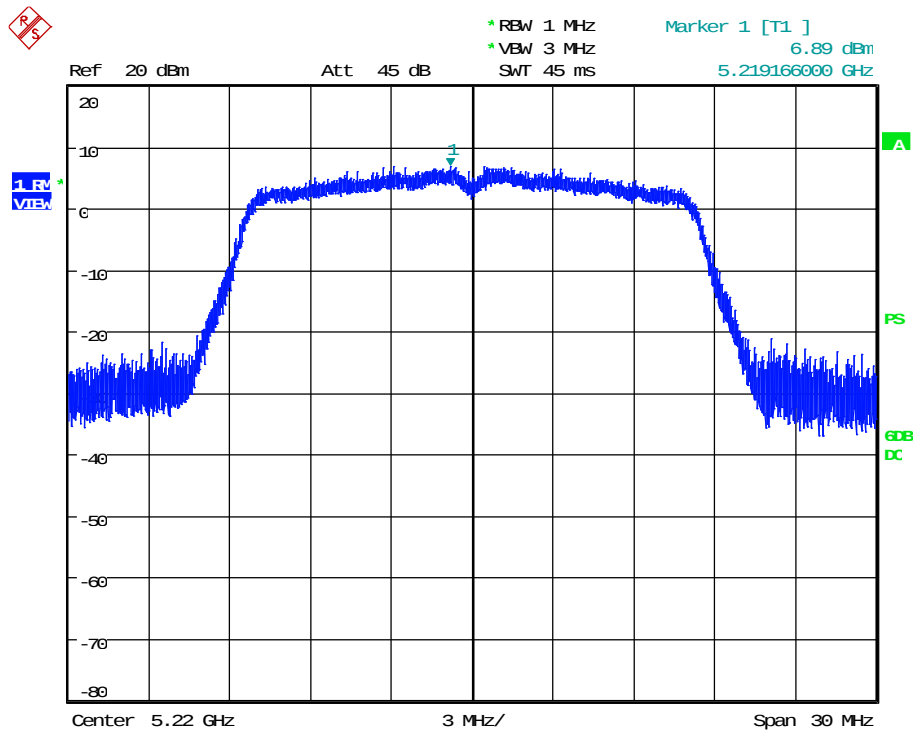
5.1 GHz, OFDM54 20M: Low Channel



Date: 10.FEB.2020 10:03:28



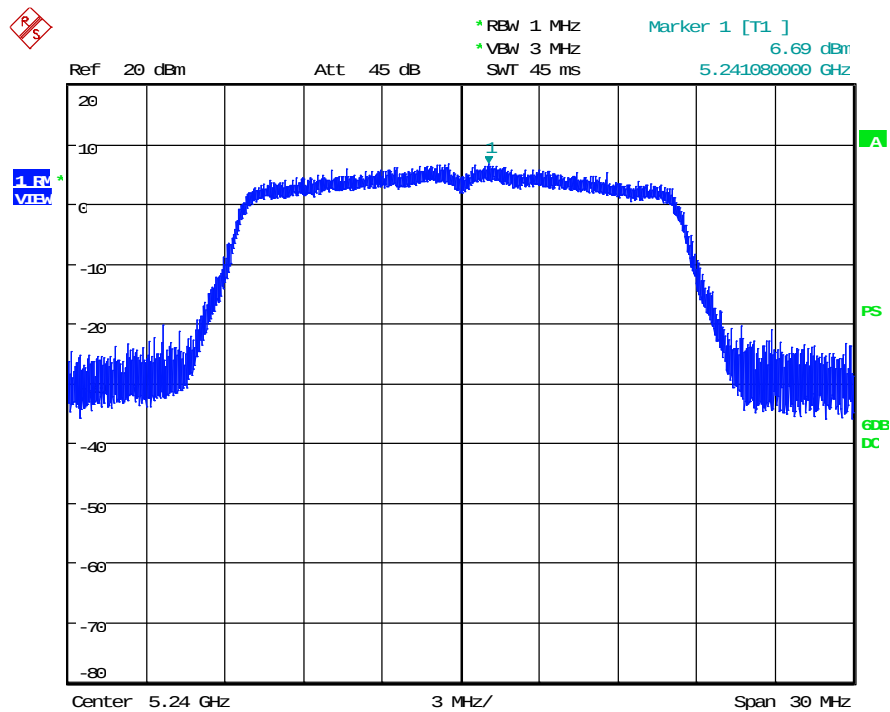
5.1 GHz, OFDM54 20M: Mid Channel



Date: 10.FEB.2020 10:04:42



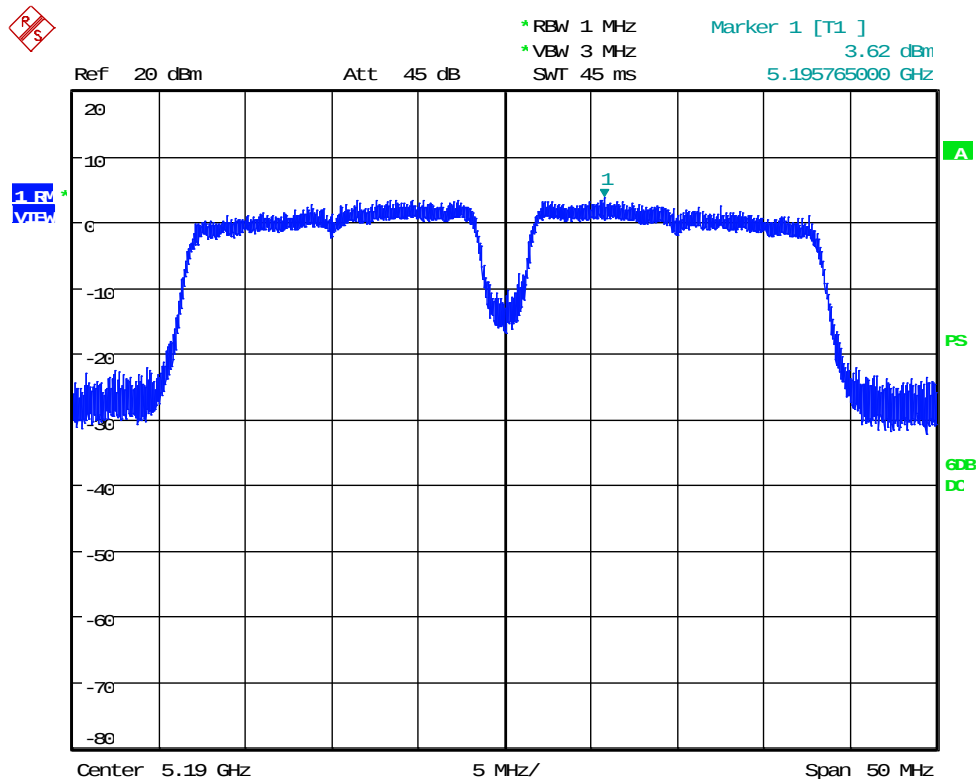
5.1 GHz, OFDM54 20M: High Channel



Date: 10.FEB.2020 10:05:47



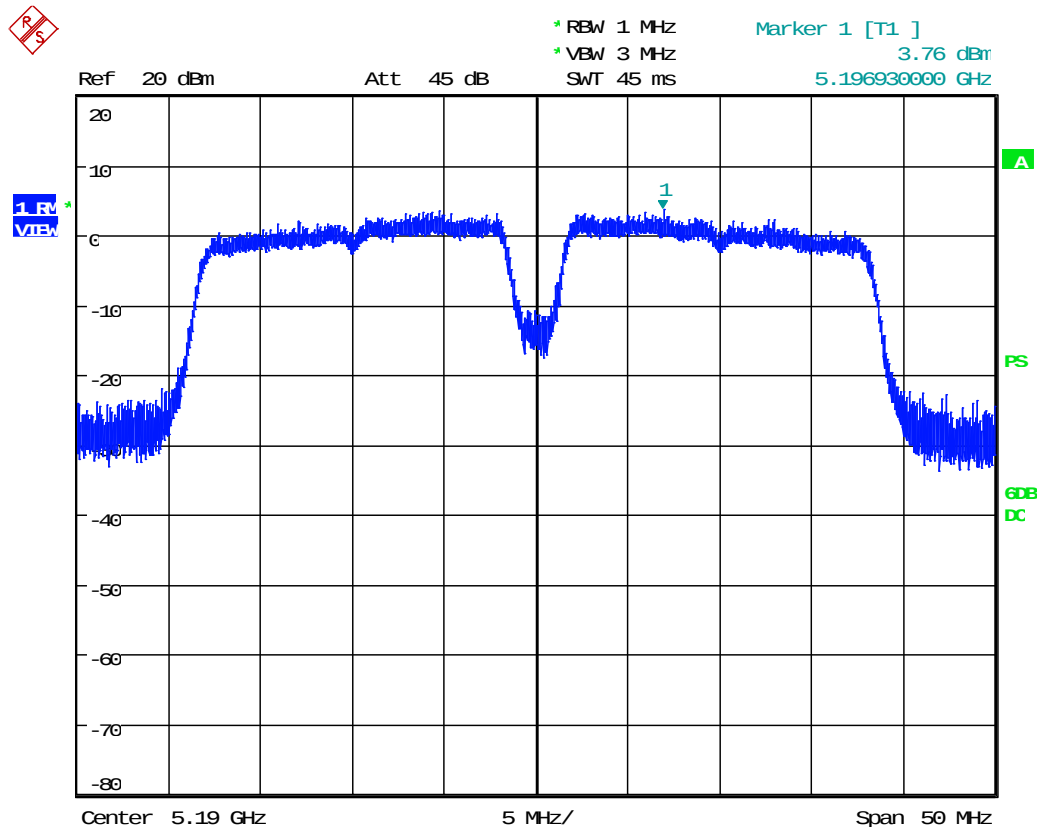
5.1 GHz, OFDM54 40M: Low Channel



Date: 10.FEB.2020 10:02:01



5.1 GHz, OFDM54 40M: High Channel



Date: 10.FEB.2020 10:00:46



10 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral/internal chip antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

10.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

All other undesirable emission that do not fall under the provisions of Part 15.205, shall meet the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.



10.2 Radiated Spurious Emission Test Data

Test Date(s):	Aug. 16, 2019; Dec. 11, 2019; Feb. 10, 2020	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.407; Part 15.209 / KDB789033	Air Temperature:	20.3°C; 18.5
		Relative Humidity:	62%; 28%

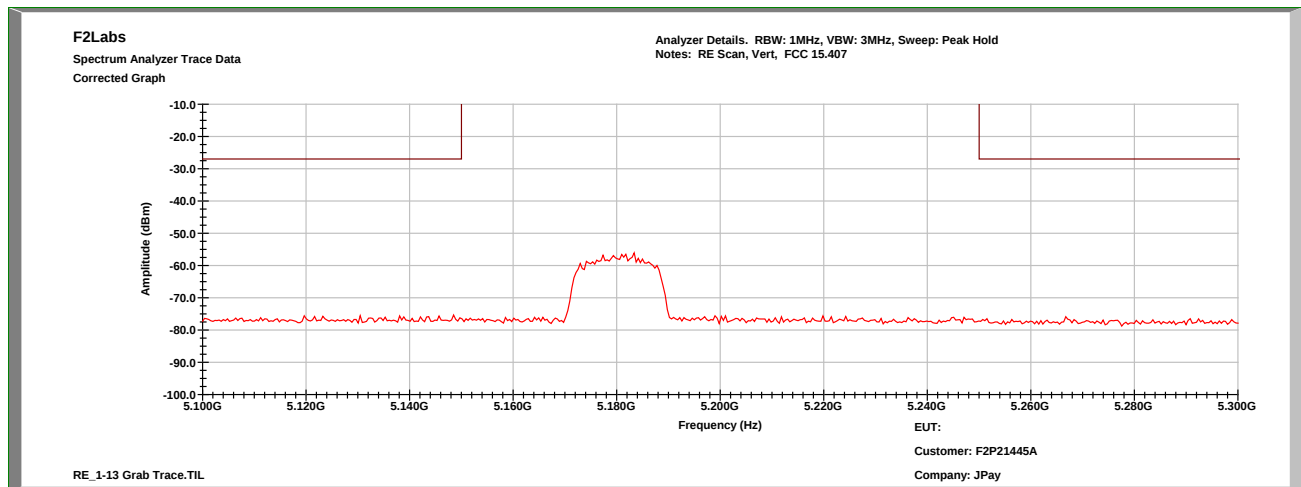
Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber, and rotated in all three orthogonal positions to maximize the emissions. The orthogonal position that showed the highest emissions was used. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

The equipment was fully exercised with all cabling attached to the EUT and was positioned in a semi-anechoic chamber for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

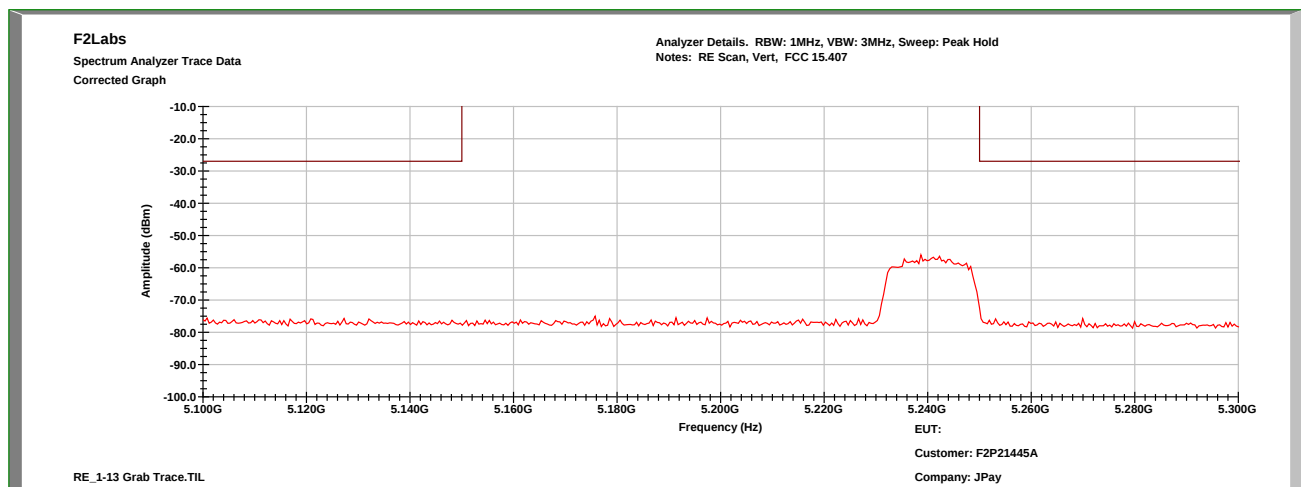
In the following plots, emissions to be found by the EUT were measured and listed in tables. The black lines are active scans while the green lines are the max peak scan of the unit during rotations. The plots for below 1 GHz are for the mid channel 20M bandwidth and the plots for greater than 1 GHz are for the high channel 40M Bandwidth which were determined worse-case. The table of results includes results for all channels.



Low Radiated Band Edge, 5.1 GHz, OFDM54 20M - Vertical

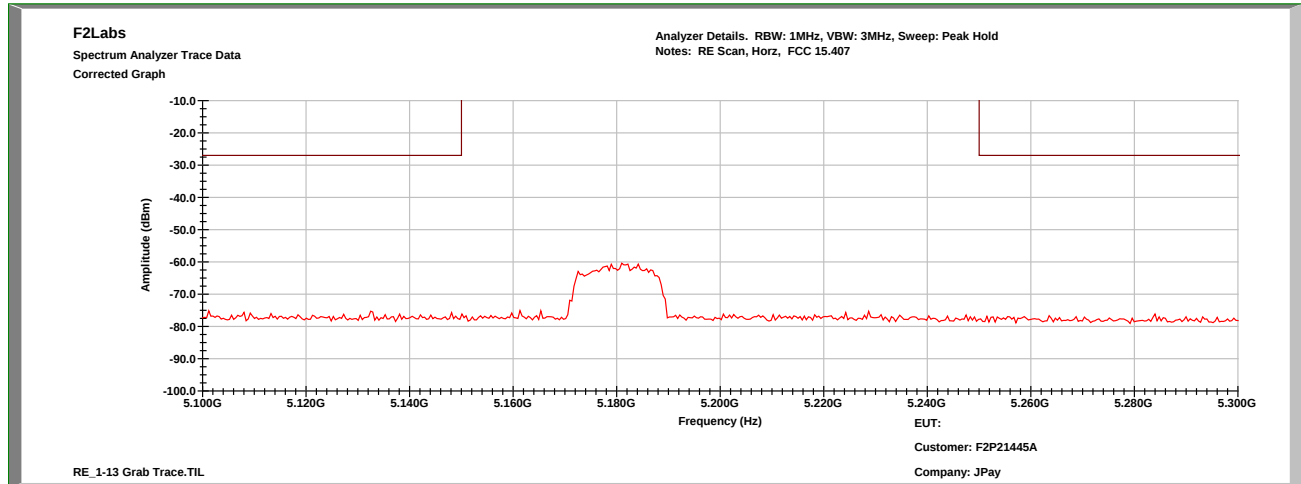


High Radiated Band Edge, 5.1 GHz, OFDM54 20M - Vertical

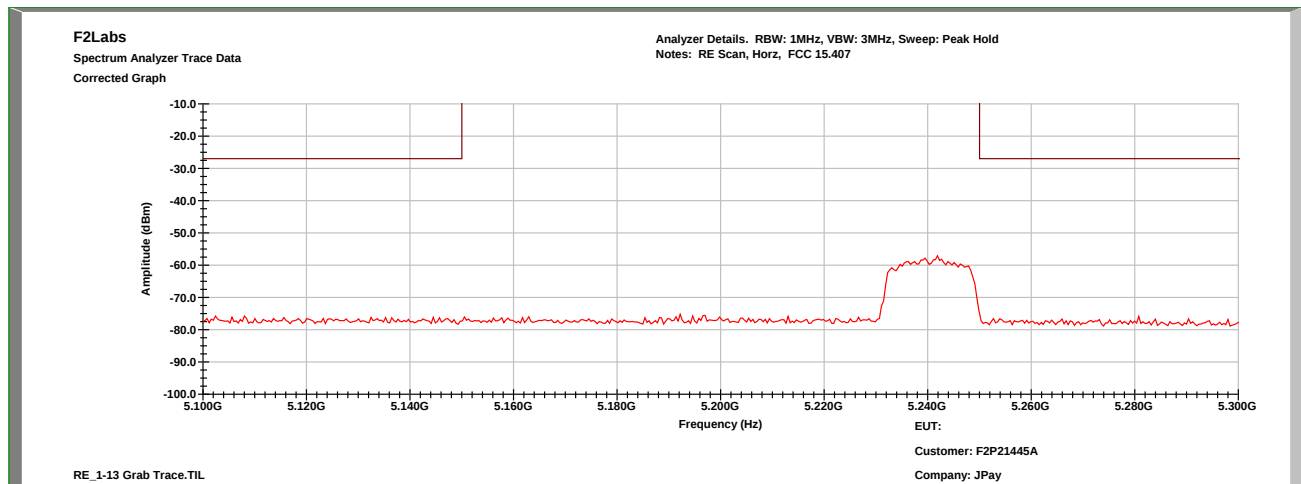




Low Radiated Band Edge, 5.1 GHz, OFDM54 20M - Horizontal

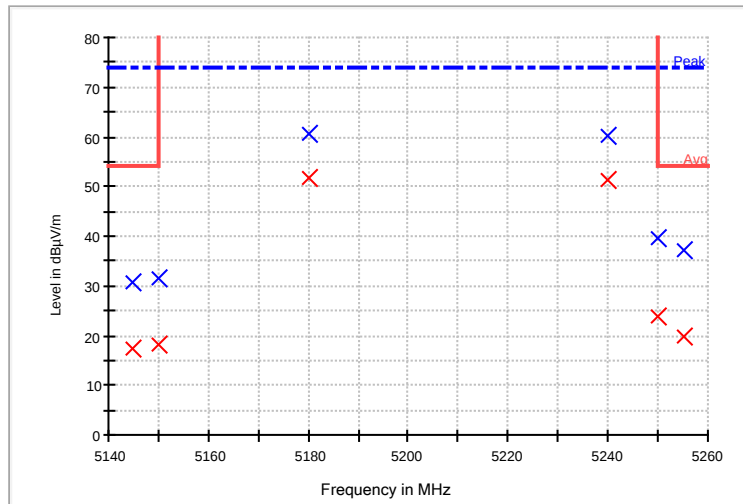


High Radiated Band Edge, 5.1 GHz, OFDM54 20M - Horizontal



**Radiated Band Edge 5.1 GHz, OFDM54 20M - Measurements**

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
5145.000000	30.7	17.3	1000.0	1000.000	150.0	H	150.0	-16.8	36.7	54.0
5150.000000	31.5	18.0	1000.0	1000.000	150.0	H	150.0	-16.5	36.0	54.0
5250.000000	39.5	24.0	1000.0	1000.000	150.0	H	205.0	-16.7	30.0	54.0
5255.000000	37.2	19.9	1000.0	1000.000	150.0	H	205.0	-16.6	34.1	54.0



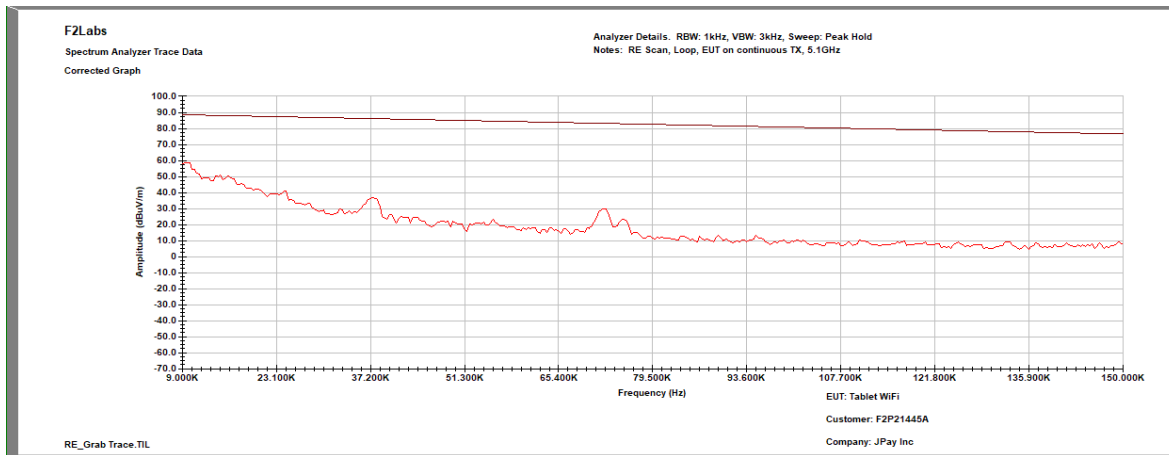
NOTE: The above table and graph are in dBuV/m. The -27dBm limited converted would be +68.2 dBuV/m. The results in the table show that the peak emissions are below the Average Limit. The above graph displays limit lines are just for reference. The table below reflects the measurements taken using dBm.

Radiated Band Edge 5.1 GHz, OFDM54 20M - Measurements

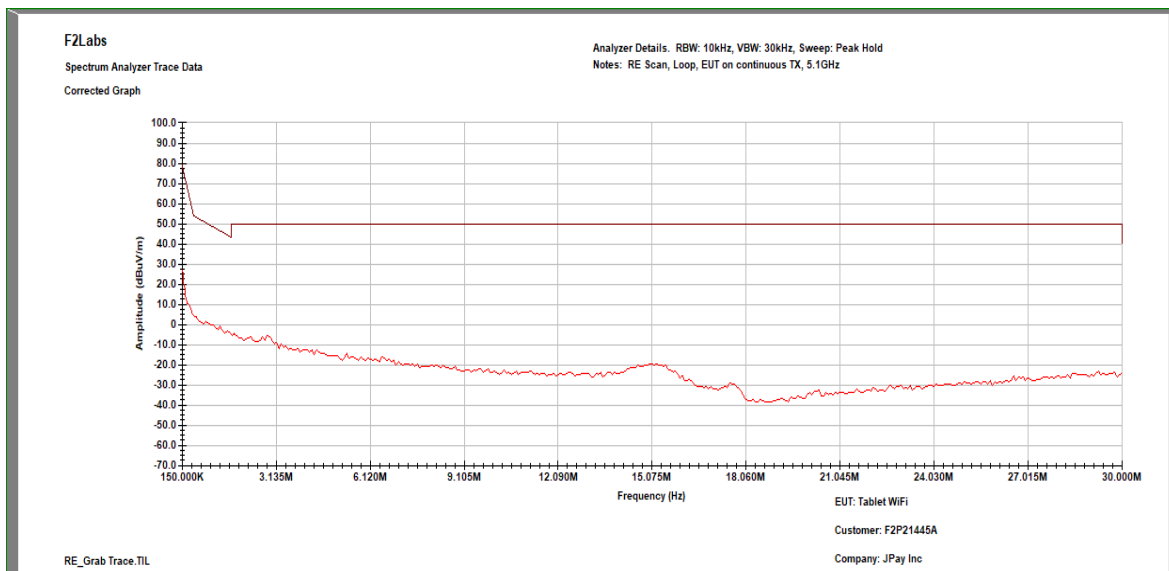
Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBm)
5150.000000	-72.9	1000.0	1000.000	H	-16.5	-45.9	-27.0
5250.000000	-73.9	1000.0	1000.000	H	-16.7	-46.9	-27.0
5150.000000	-73.3	1000.0	1000.000	V	-16.5	-46.3	-27.0
5250.000000	-72.5	1000.0	1000.000	V	-16.7	-45.5	-27.0



5.1 GHz, OFDM54 20M Radiated Spurious Emissions: Mid Channel, 0.009 MHz to 0.15 MHz

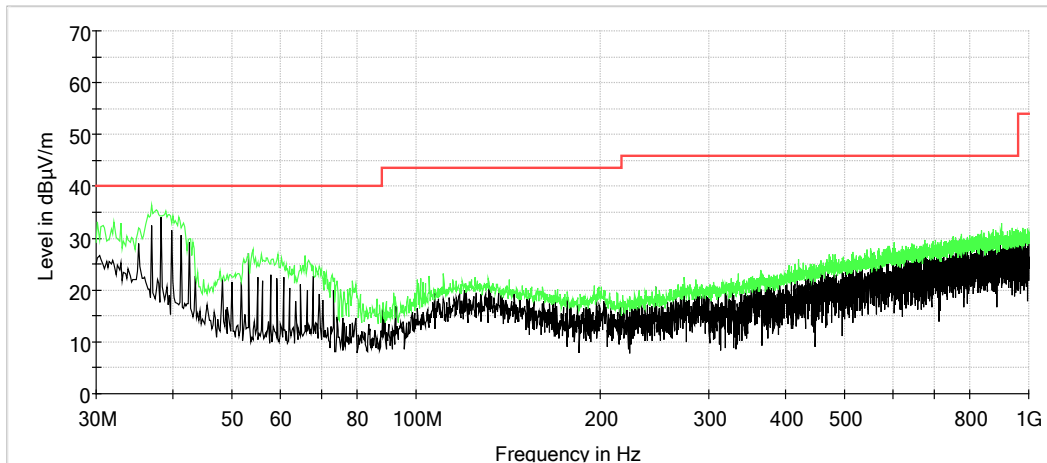


5.1 GHz, OFDM54 20M Radiated Spurious Emissions: Mid Channel, 0.15 MHz to 30.0 MHz

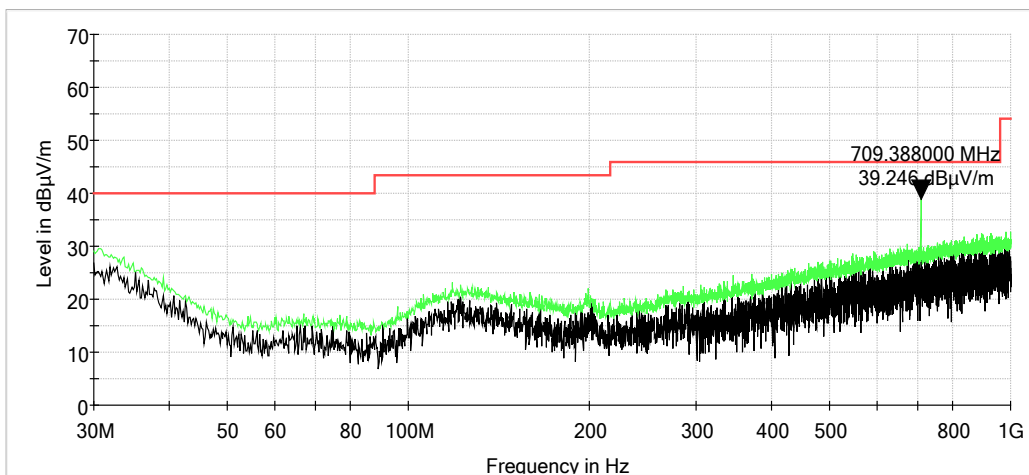




**5.1 GHz, OFDM54 20M, Radiated Spurious Emissions:
Mid Channel, 30 MHz to 1000 MHz, Vertical**



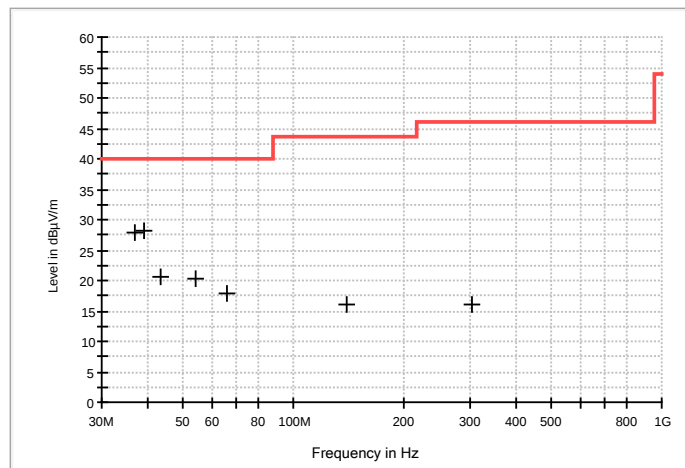
**5.1 GHz, OFDM54 20M, Radiated Spurious Emissions:
Mid Channel, 30 MHz to 1000 MHz, Horizontal**





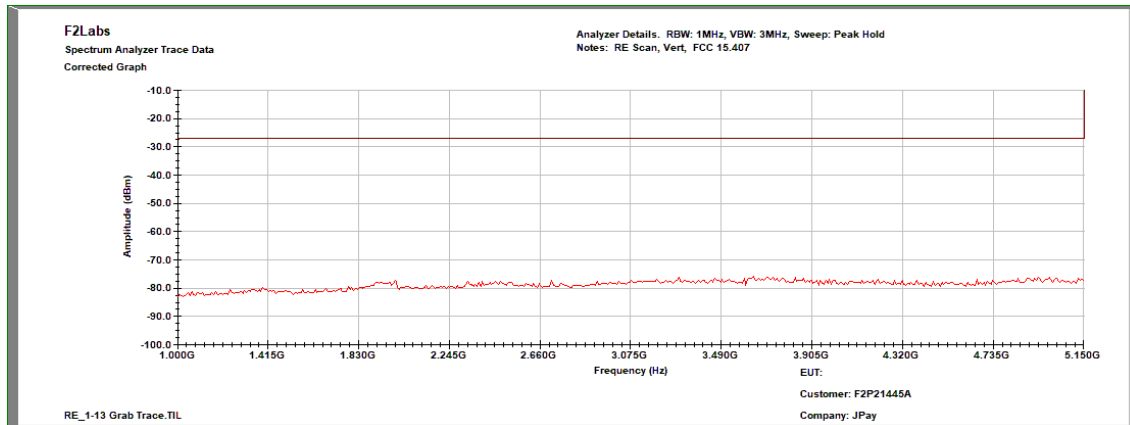
5.1 GHz, OFDM54 20M, 30 MHz to 1000 MHz: Data from all channels

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (deg)	Reading (dBμV)	Correction Factors (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.000000	V	100.00	0.00	29.2	-1.4	27.8	40.0	-12.2
38.920000	V	100.00	0.00	30.9	-2.8	28.1	40.0	-11.9
43.200000	V	100.00	0.00	26.6	-6.0	20.6	40.0	-19.4
54.040000	V	100.00	0.00	30.5	-10.3	20.2	40.0	-19.8
65.680000	V	100.00	0.00	27.8	-9.9	17.9	40.0	-22.1
138.840000	V	100.00	0.00	20.6	-4.6	16.0	43.5	-27.5
303.560000	V	100.00	0.00	20.1	-3.9	16.2	46.0	-29.8

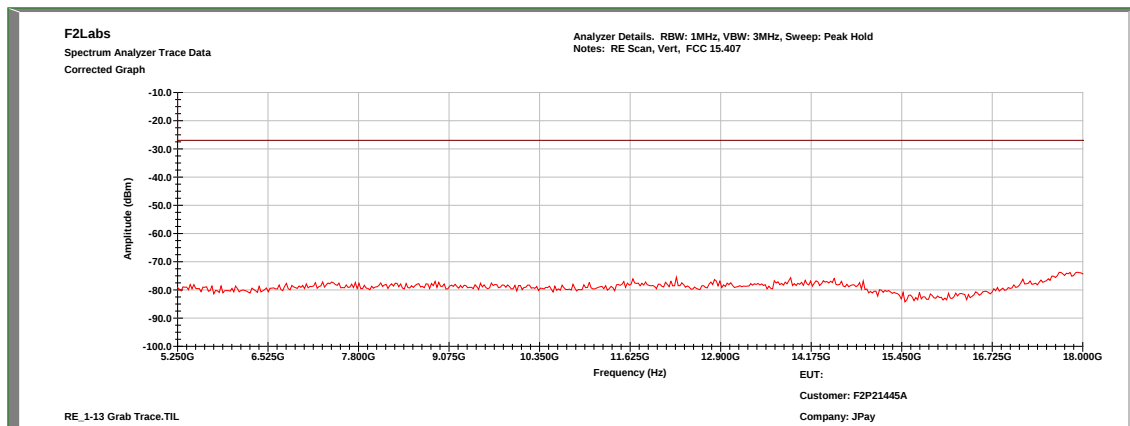




5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 1 GHz to 5.15 GHz, Vertical

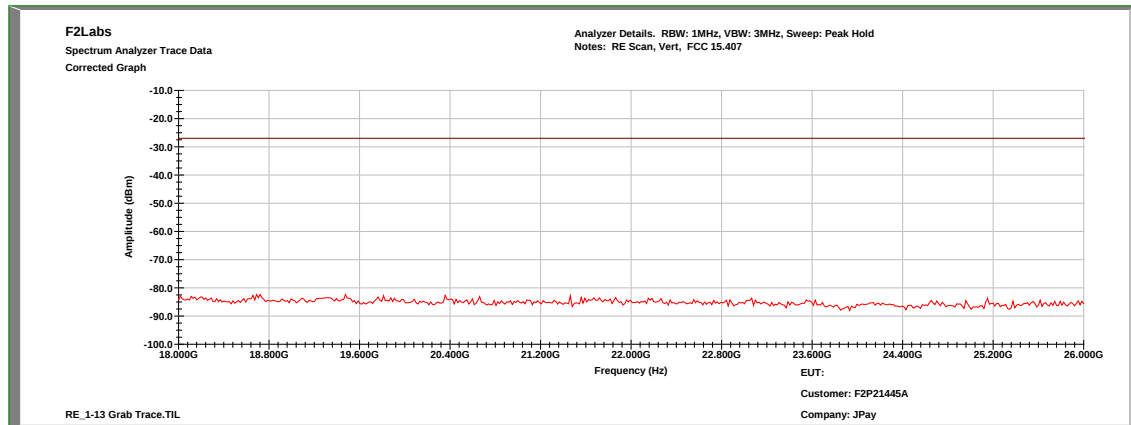


5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 5.25 GHz to 18 GHz, Vertical

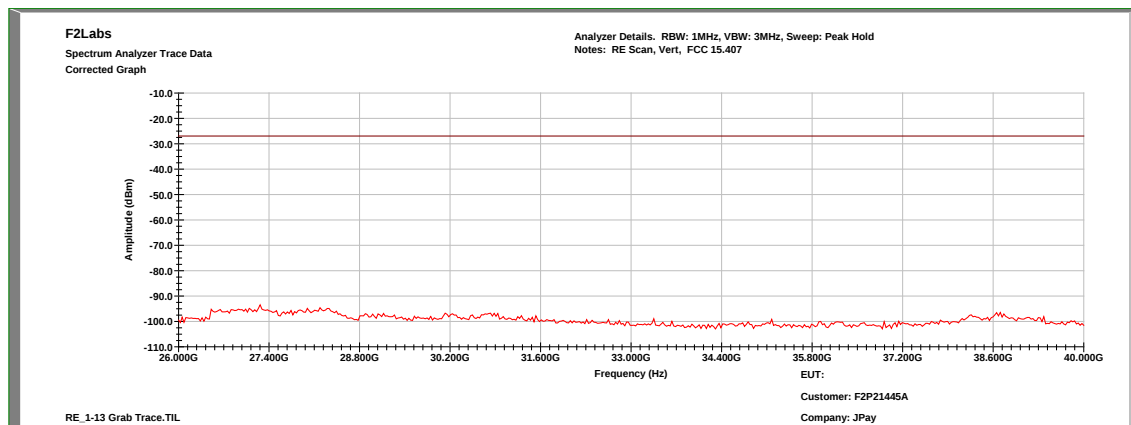




5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 18 GHz to 26 GHz, Vertical

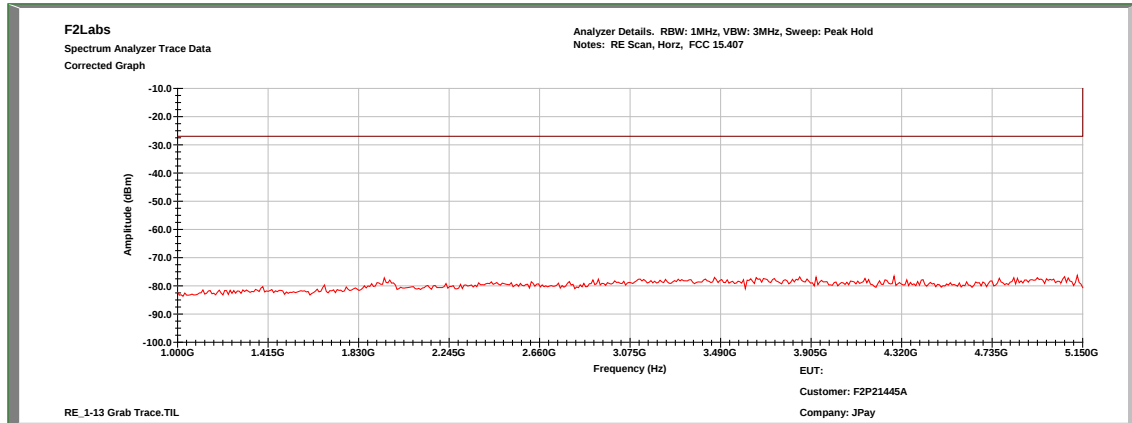


5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 26 GHz to 40 GHz, Vertical

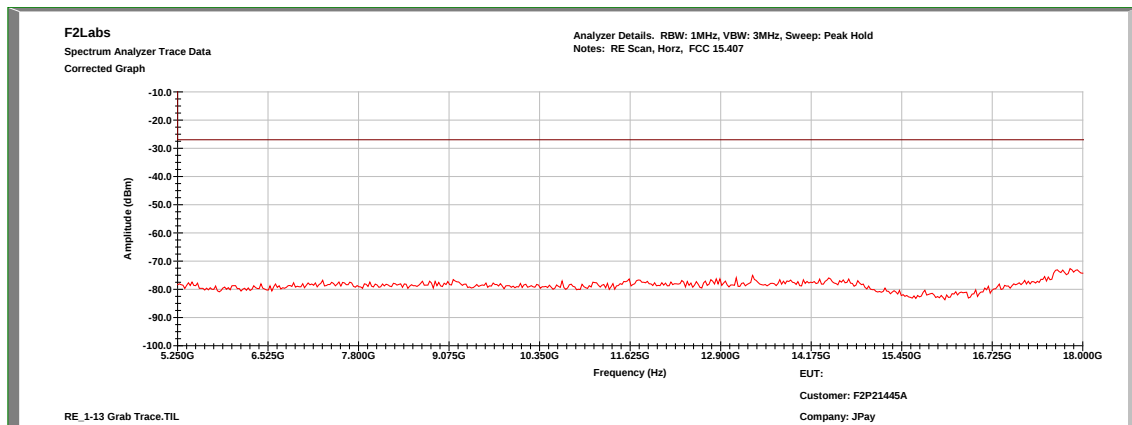




5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 1 GHz to 5.15 GHz, Horizontal

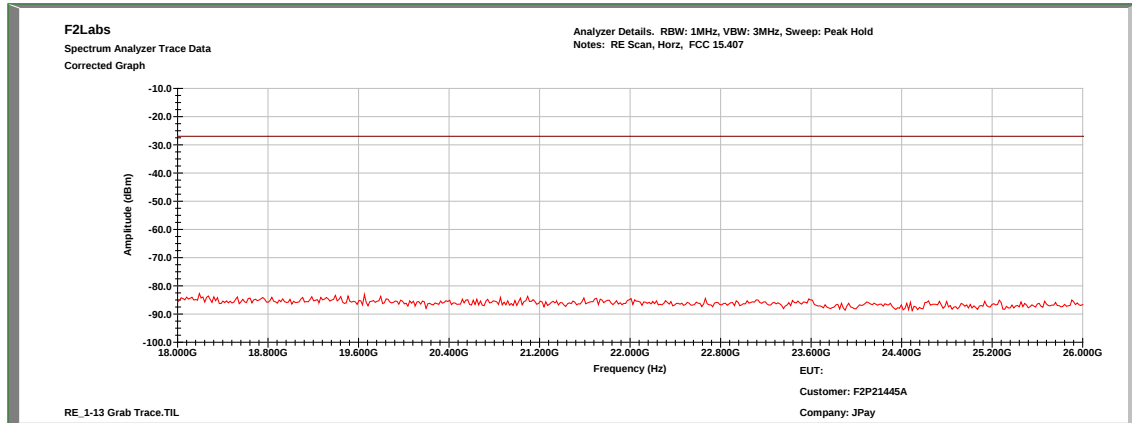


5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 5.25 GHz to 18 GHz, Horizontal

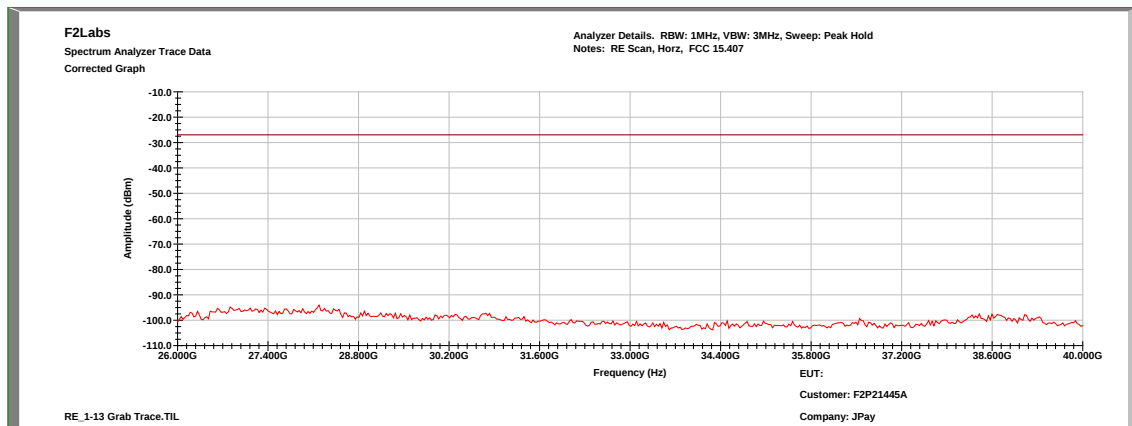




5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 18 GHz to 26 GHz, Horizontal

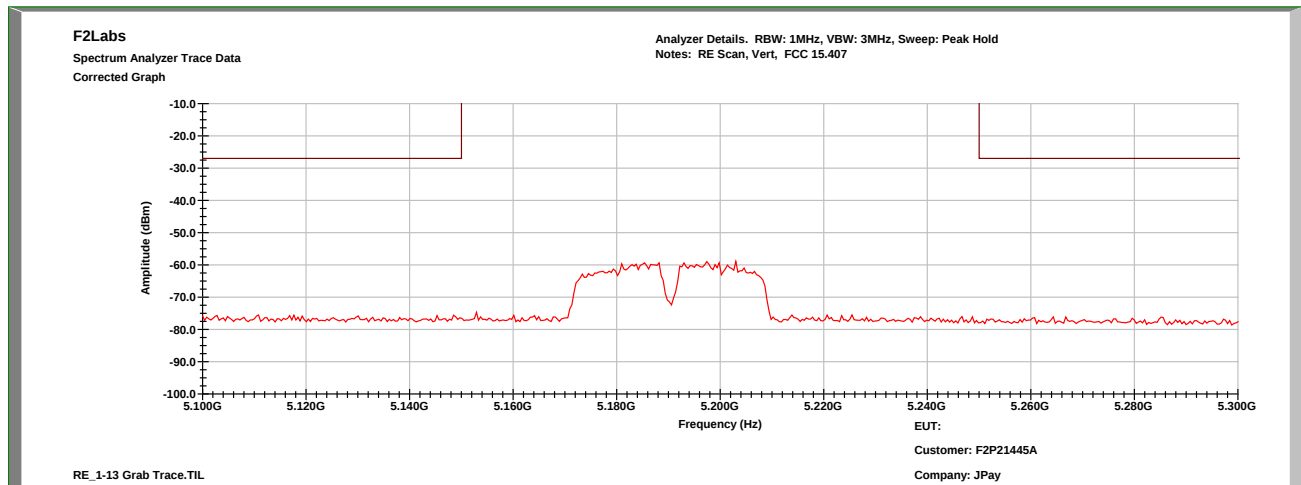


5.1 GHz, OFDM54 40M, Radiated Spurious Emissions: High Channel, 26 GHz to 40 GHz, Horizontal

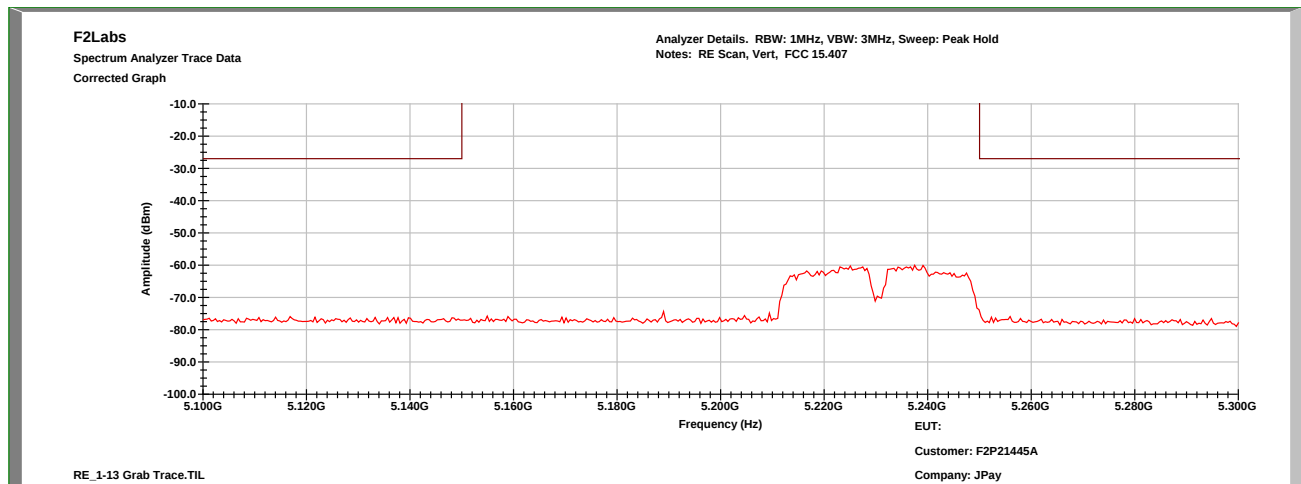




Low Radiated Band Edge, 5.1 GHz, OFDM54 40M - Vertical

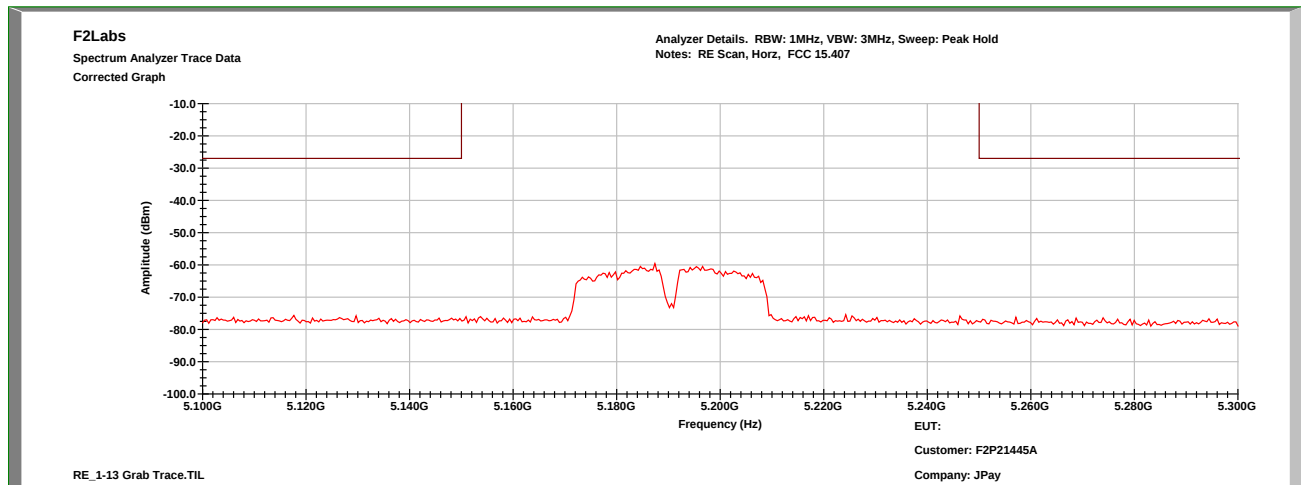


High Radiated Band Edge, 5.1 GHz, OFDM54 40M - Vertical

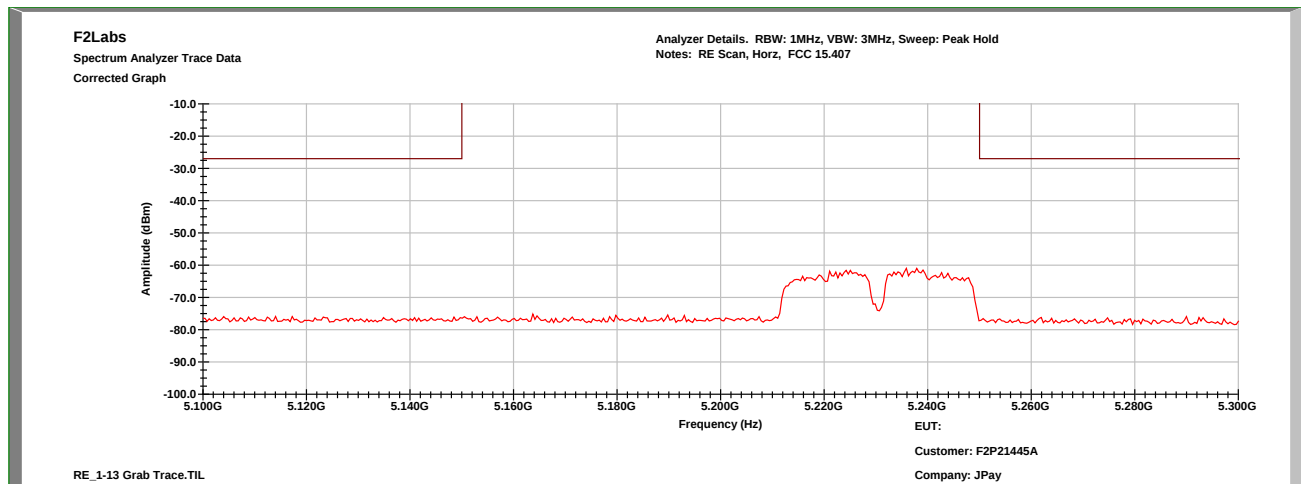




Low Radiated Band Edge, 5.1 GHz, OFDM54 40M - Horizontal

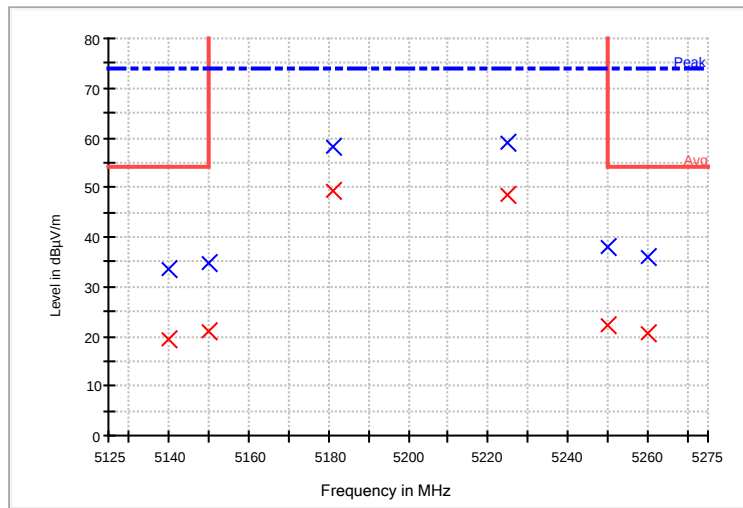


High Radiated Band Edge, 5.1 GHz, OFDM54 40M - Horizontal



**Radiated Band Edge 5.1 GHz, OFDM54 40M - Measurements**

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
5100.000000	30.7	17.3	1000.0	1000.000	150.0	H	155.0	-16.9	36.7	54.0
5140.000000	33.4	19.6	1000.0	1000.000	150.0	H	155.0	-16.9	34.4	54.0
5150.000000	34.8	20.9	1000.0	1000.000	150.0	H	155.0	-16.5	33.1	54.0
5250.000000	37.9	22.4	1000.0	1000.000	150.0	H	155.0	-16.7	31.6	54.0
5260.000000	35.8	20.7	1000.0	1000.000	150.0	H	155.0	-16.6	33.3	54.0



NOTE: The above table and graph are in dBuV/m. The -27dBm limited converted would be +68.2 dBuV/m. The results in the table show that the peak emissions are below the Average Limit. The above graph displays limit lines are just for reference. The table below reflects the measurements taken using dBm.

Radiated Band Edge 5.1 GHz, OFDM54 40M - Measurements

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - AVG (dB)	Limit (dBm)
5150.000000	-74.3	1000.0	1000.000	H	-16.5	-47.3	-27.0
5250.000000	-73.8	1000.0	1000.000	H	-16.7	-46.8	-27.0
5150.000000	-73.4	1000.0	1000.000	V	-16.5	-46.4	-27.0
5250.000000	-72.7	1000.0	1000.000	V	-16.7	-45.7	-27.0



11 CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

RF Antenna Conducted Test

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

11.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

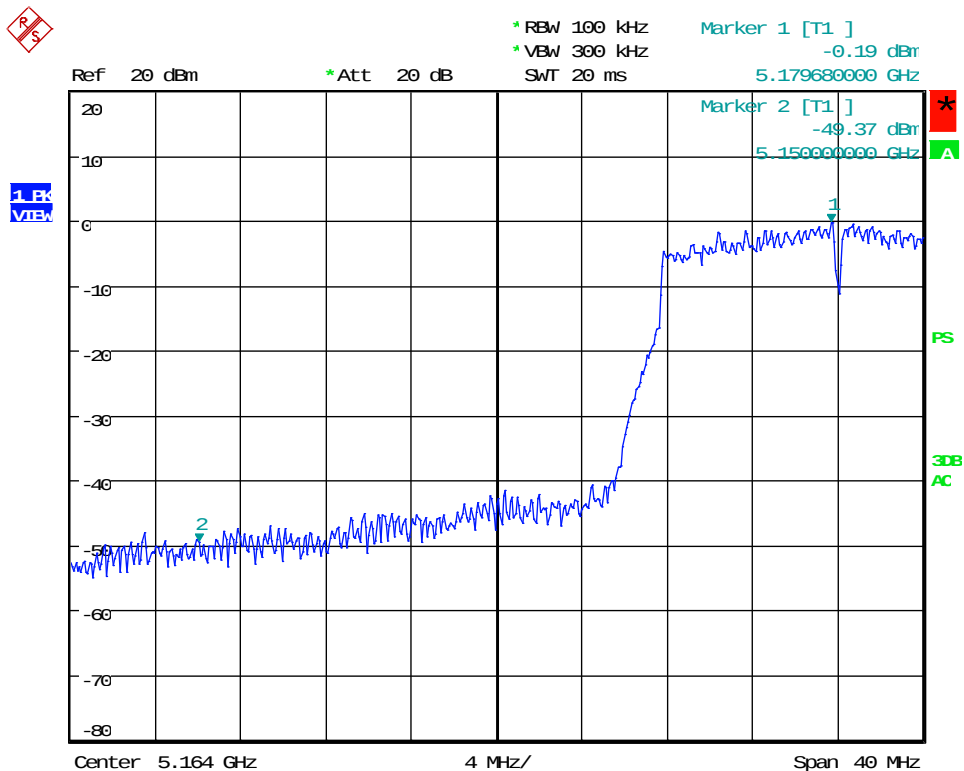
Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.



11.2 Conducted Spurious Emissions Test Data

Test Date:	Aug. 22, 2019 / Dec. 10, 2019	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.407(b)(1,4)	Air Temperature:	20.4°C / 22.0 °C
		Relative Humidity:	59% / 31%

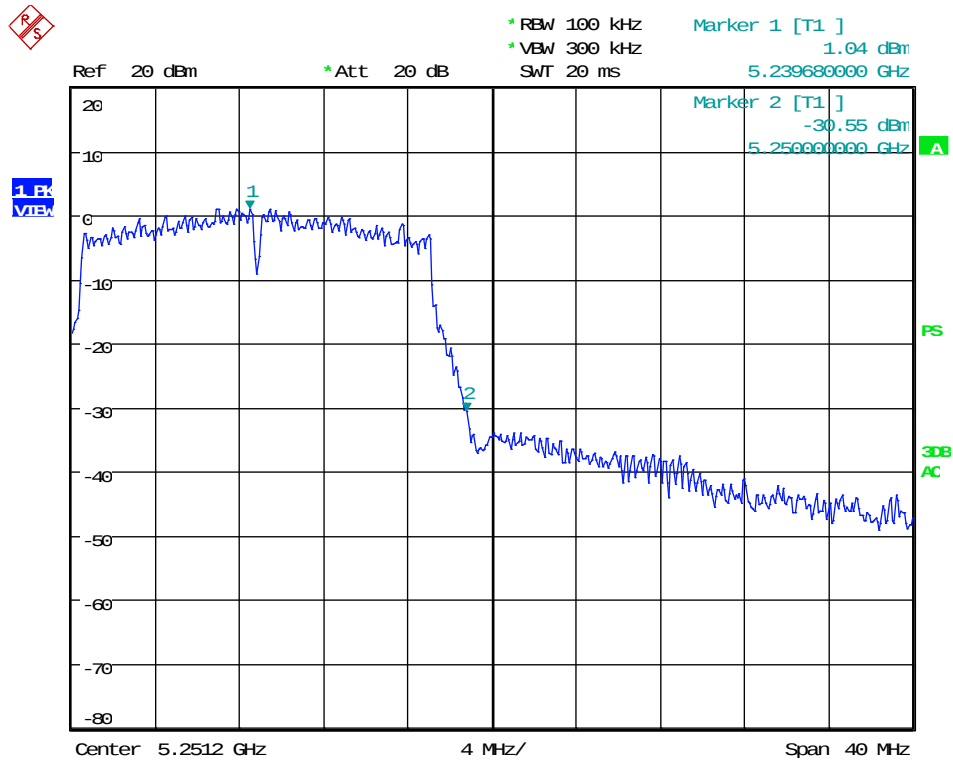
Lower Band Edge, 5.1 GHz, OFDM54 20M



Date: 22.AUG.2019 16:05:06



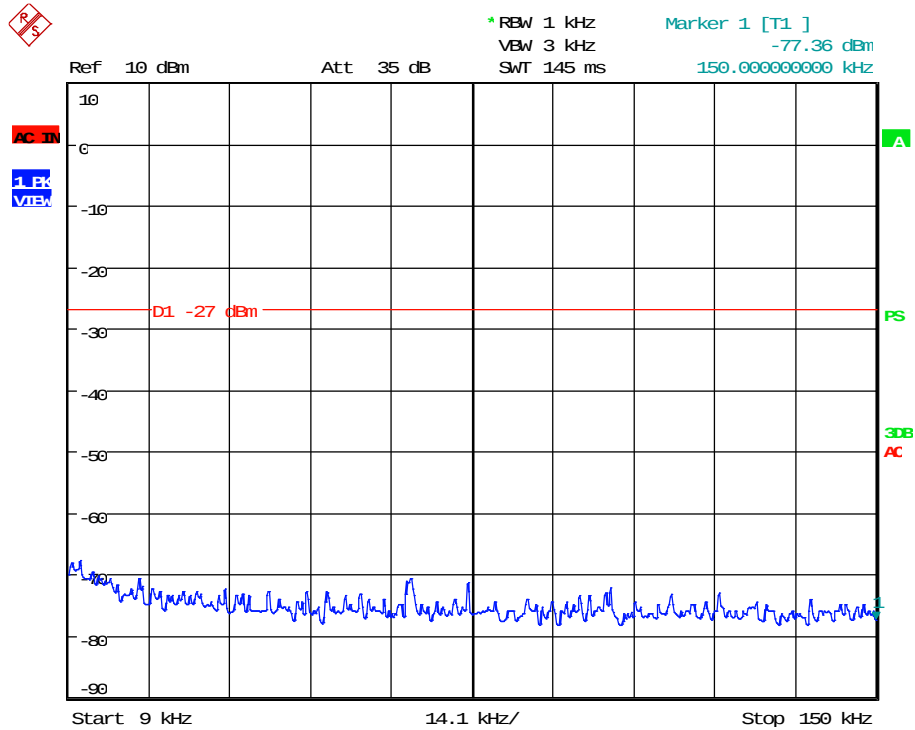
Upper Band Edge, 5.1 GHz, OFDM54 20M



Date: 22.AUG.2019 16:07:56



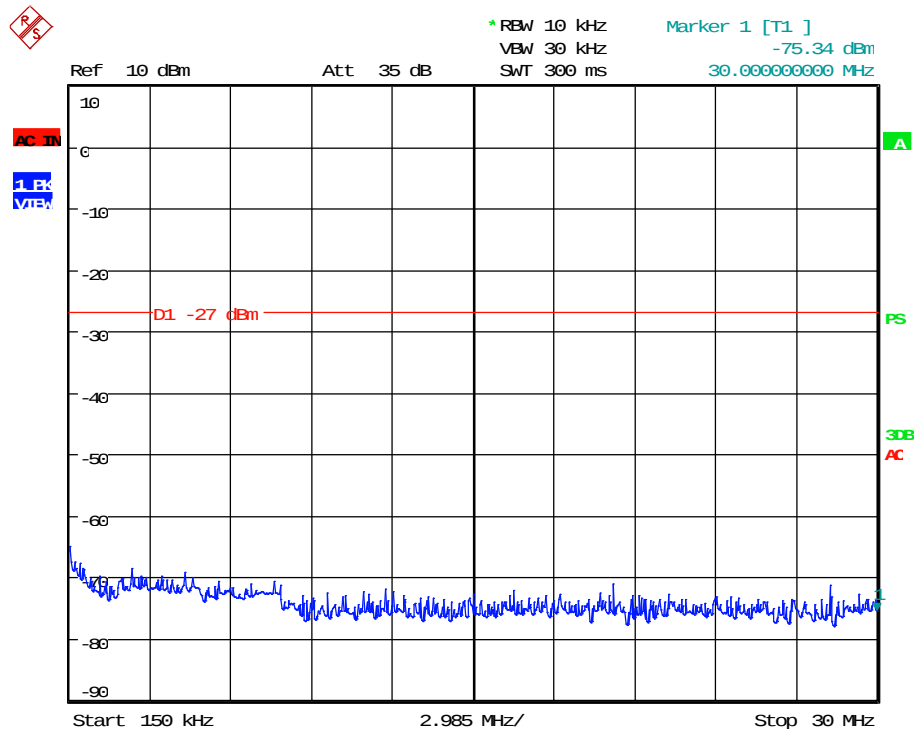
5.1 GHz, OFDM54 20M: Low Channel, 0.009 MHz to 0.15 MHz



Date: 10.DEC.2019 18:31:00



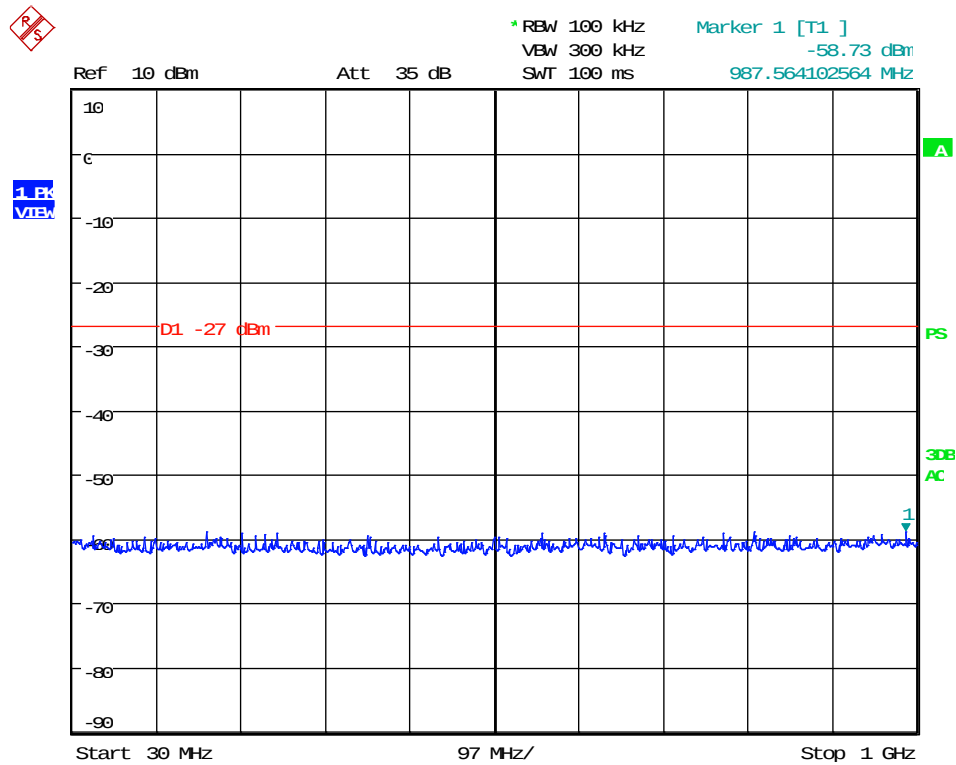
5.1 GHz, OFDM54 20M: Low Channel, 0.15 MHz to 30 MHz



Date: 10.DEC.2019 18:30:08



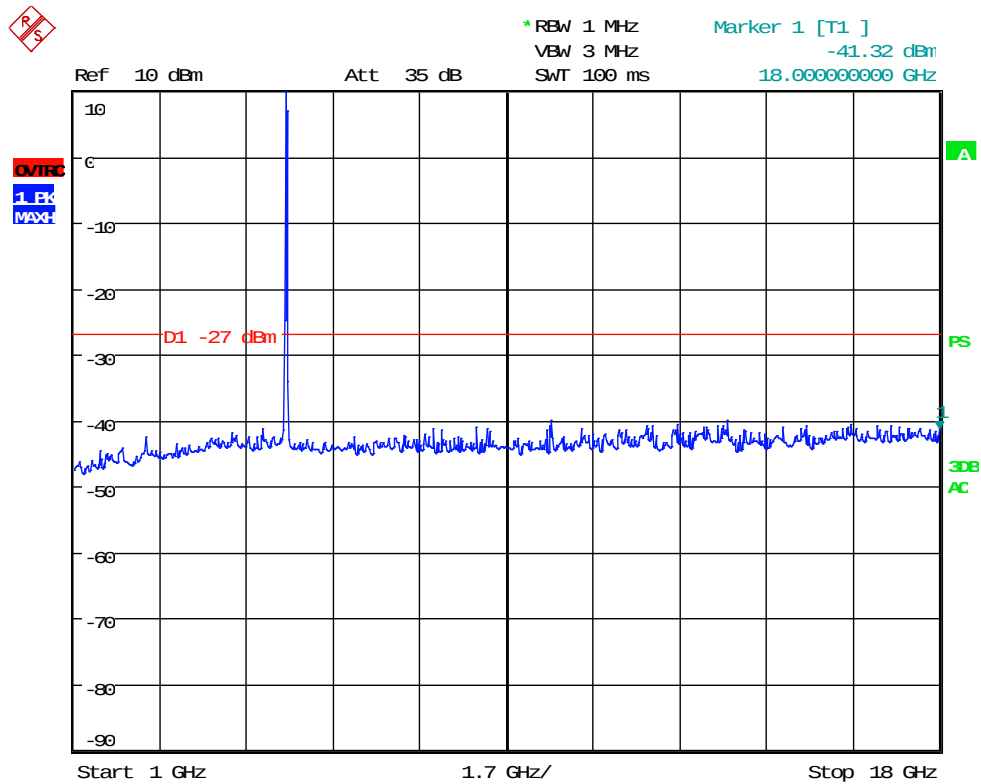
5.1 GHz, OFDM54 20M: Low Channel, 30 MHz to 1000 MHz



Date: 10.DEC.2019 18:29:13



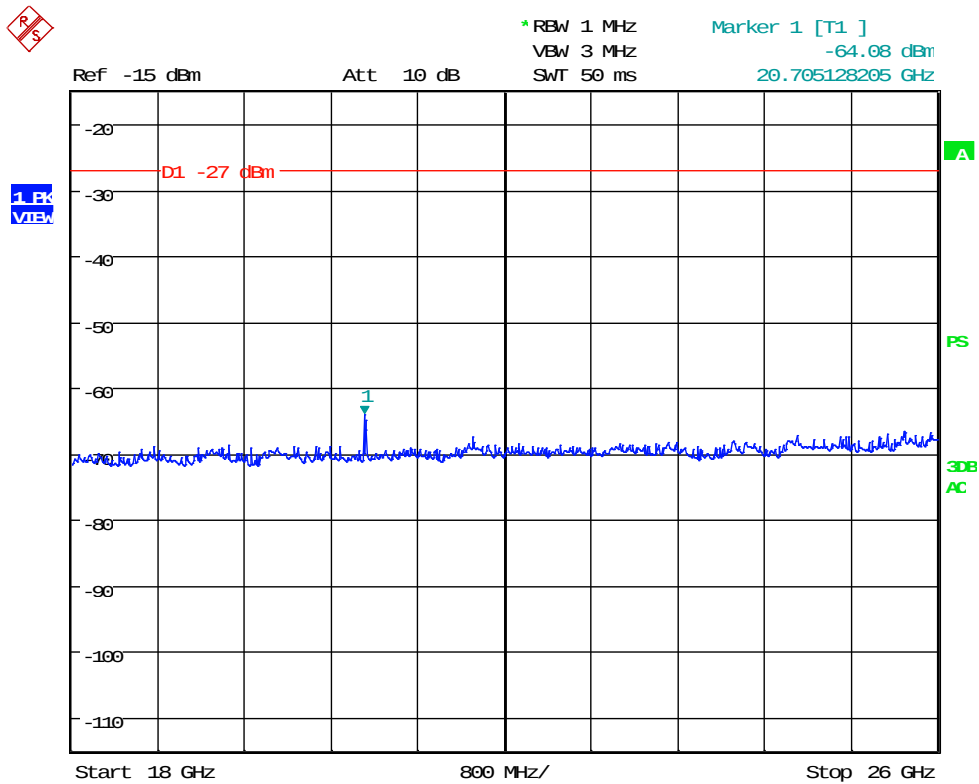
5.1 GHz, OFDM54 20M: Low Channel, 1 GHz to 18 GHz



Date: 10.DEC.2019 18:28:15



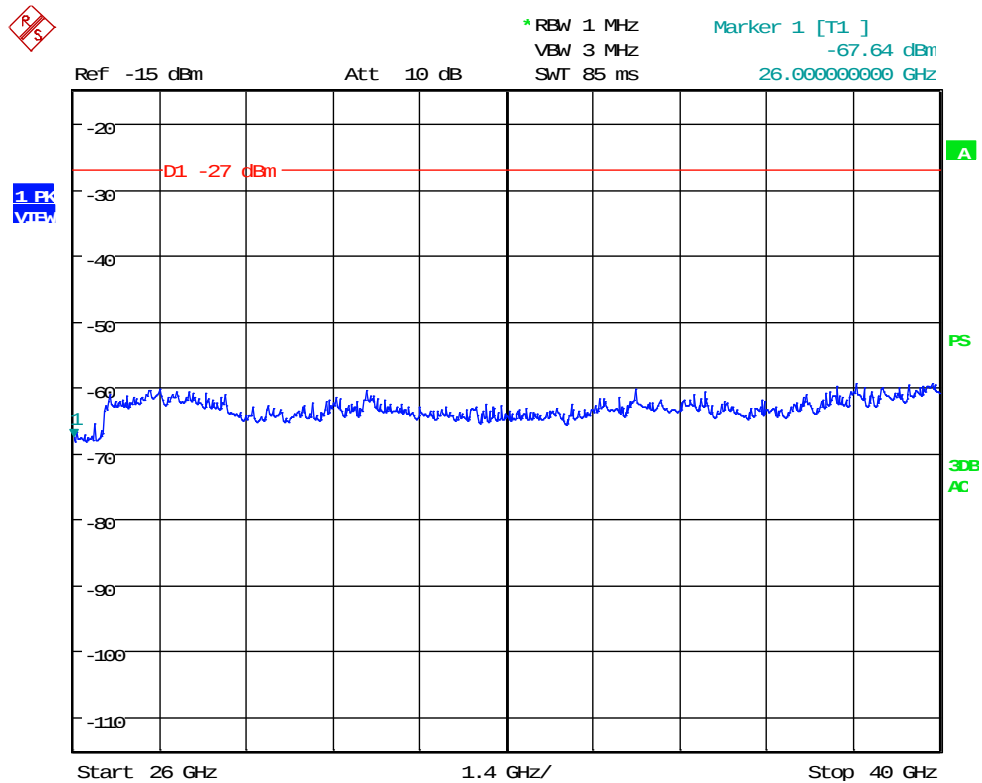
5.1 GHz, OFDM54 20M: Low Channel, 18 GHz to 26 GHz



Date: 10.DEC.2019 18:26:49



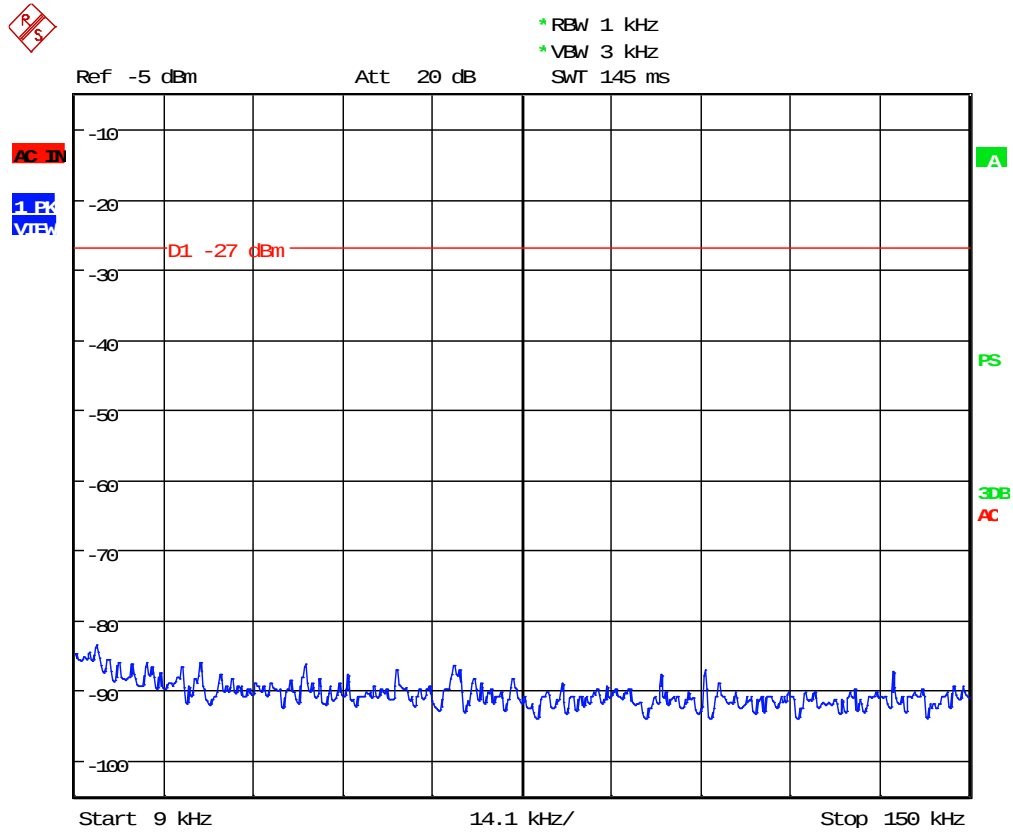
5.1 GHz, OFDM54 20M: Low Channel, 26 GHz to 40 GHz



Date: 10.DEC.2019 18:25:52



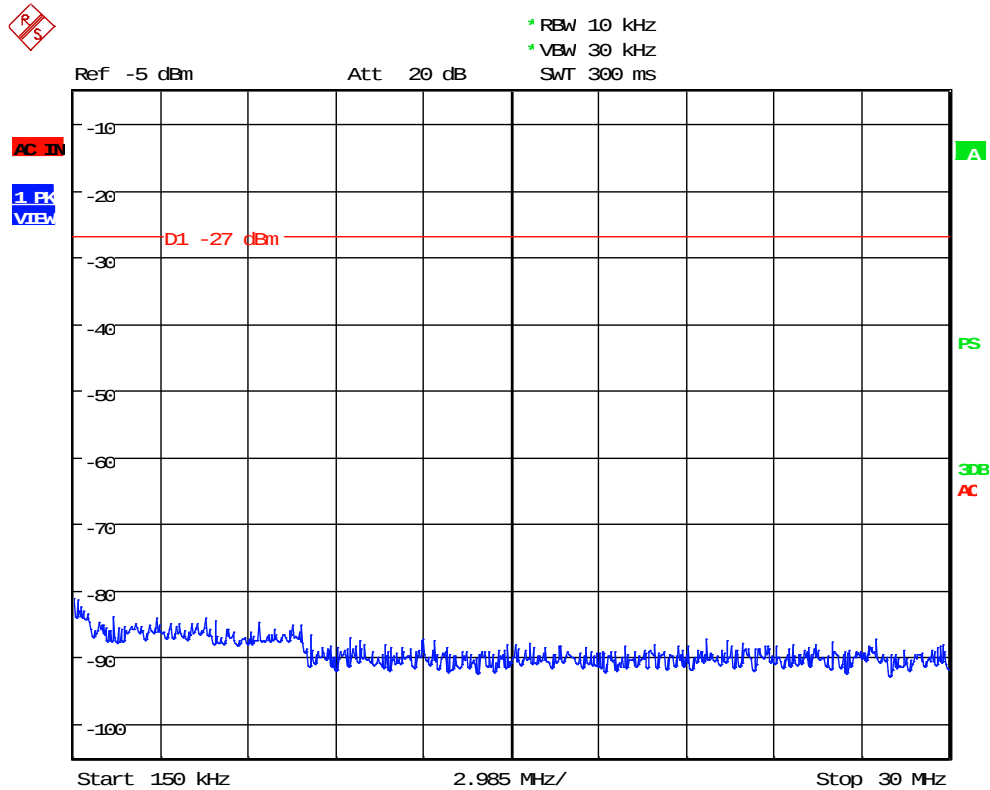
5.1 GHz, OFDM54 20M: Mid Channel, 0.009 MHz to 0.15 MHz



Date: 22.AUG.2019 13:37:56



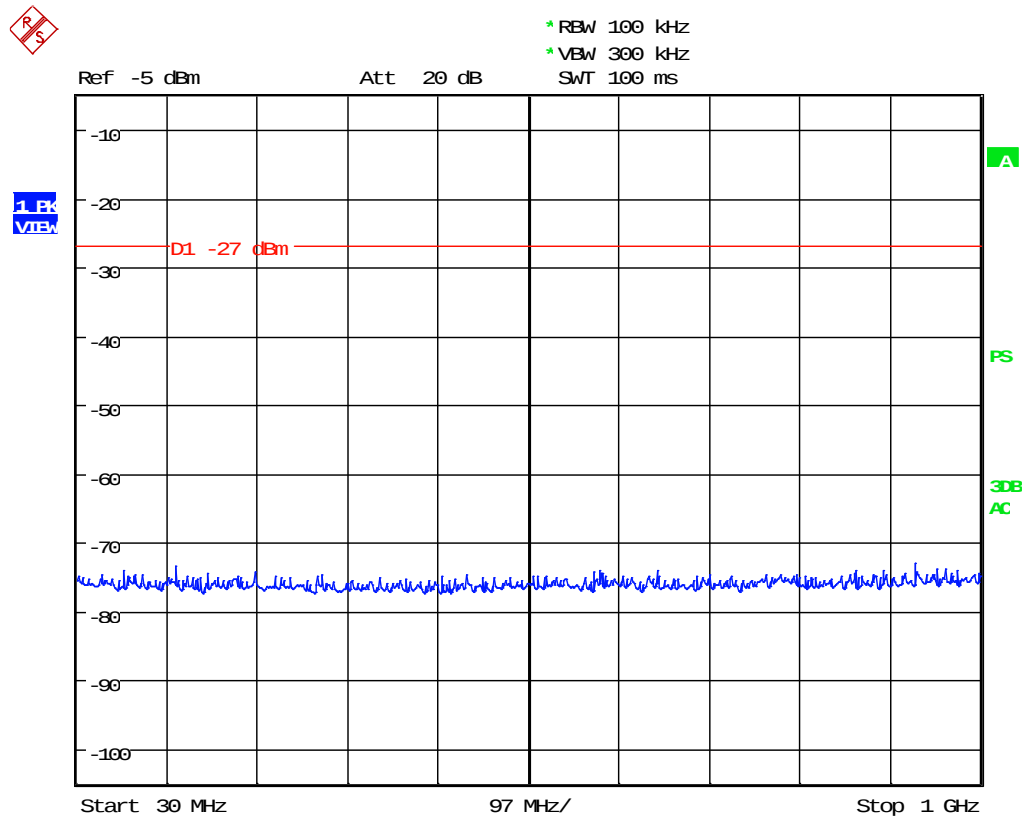
5.1 GHz, OFDM54 20M: Mid Channel, 0.15 MHz to 30 MHz



Date: 22.AUG.2019 13:39:14



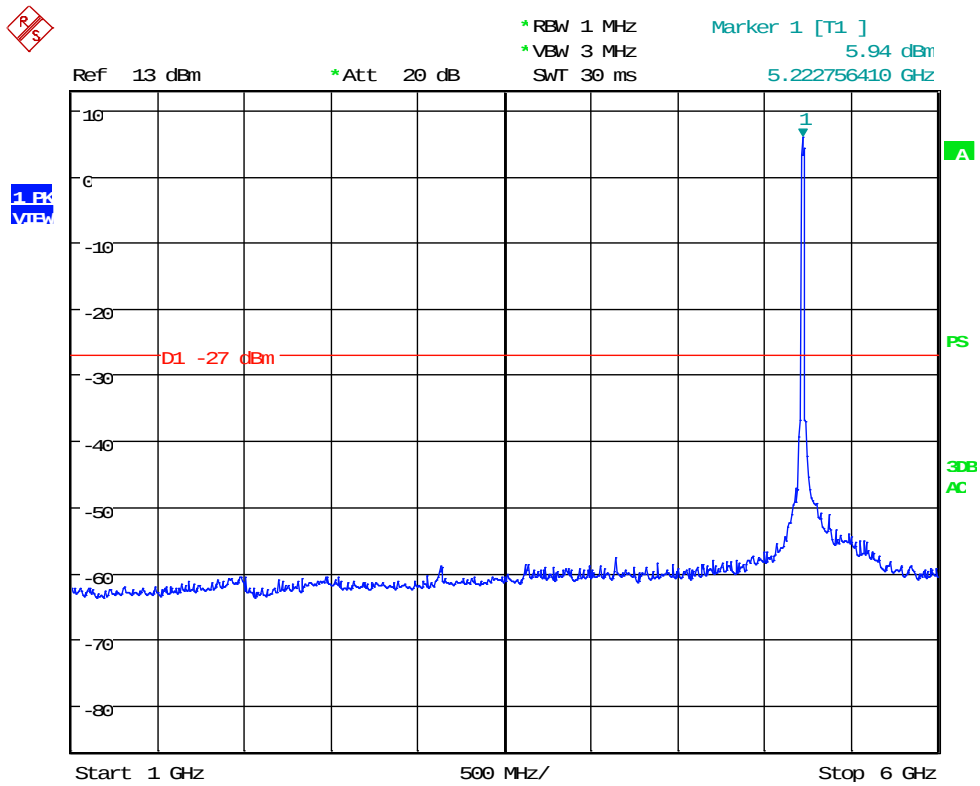
5.1 GHz, OFDM54 20M: Mid Channel, 30 MHz to 1000 MHz



Date: 22.AUG.2019 13:40:26



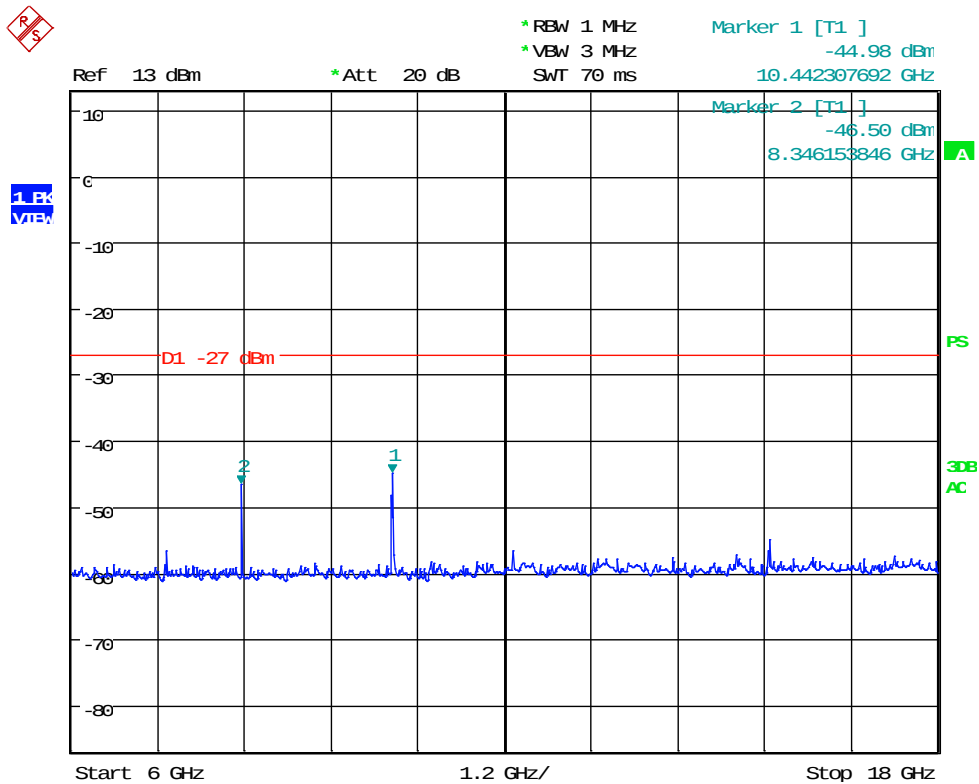
5.1 GHz, OFDM54 20M: Mid Channel, 1 GHz to 6 GHz



Date: 22.AUG.2019 13:46:59



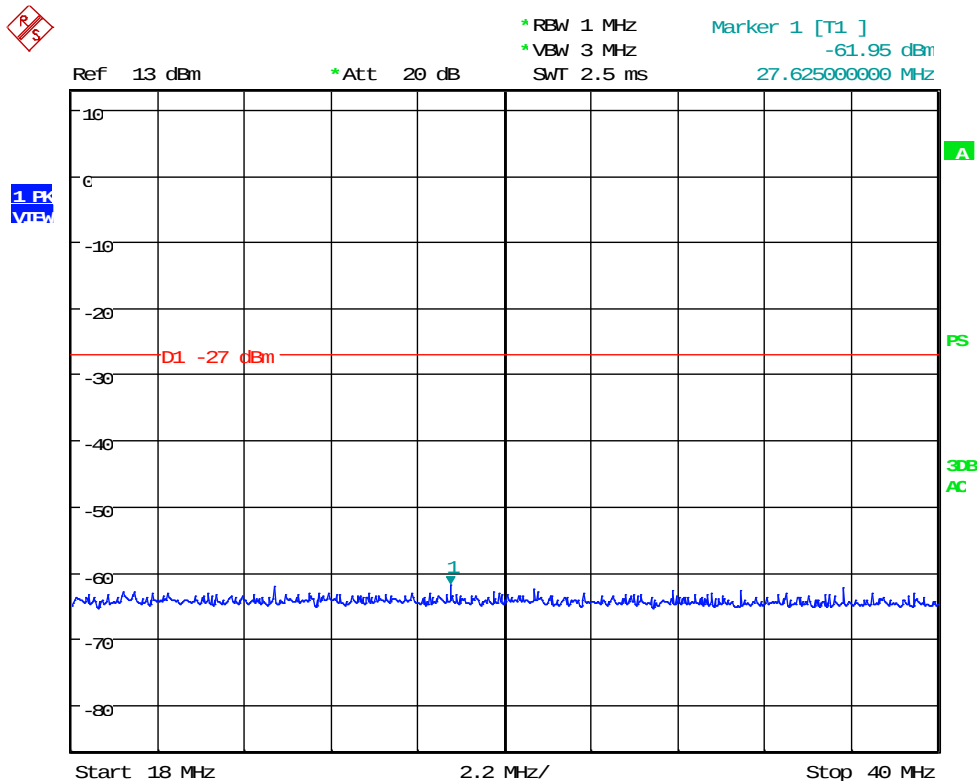
5.1 GHz, OFDM54 20M: Mid Channel, 6 GHz to 18 GHz



Date: 22.AUG.2019 13:48:26



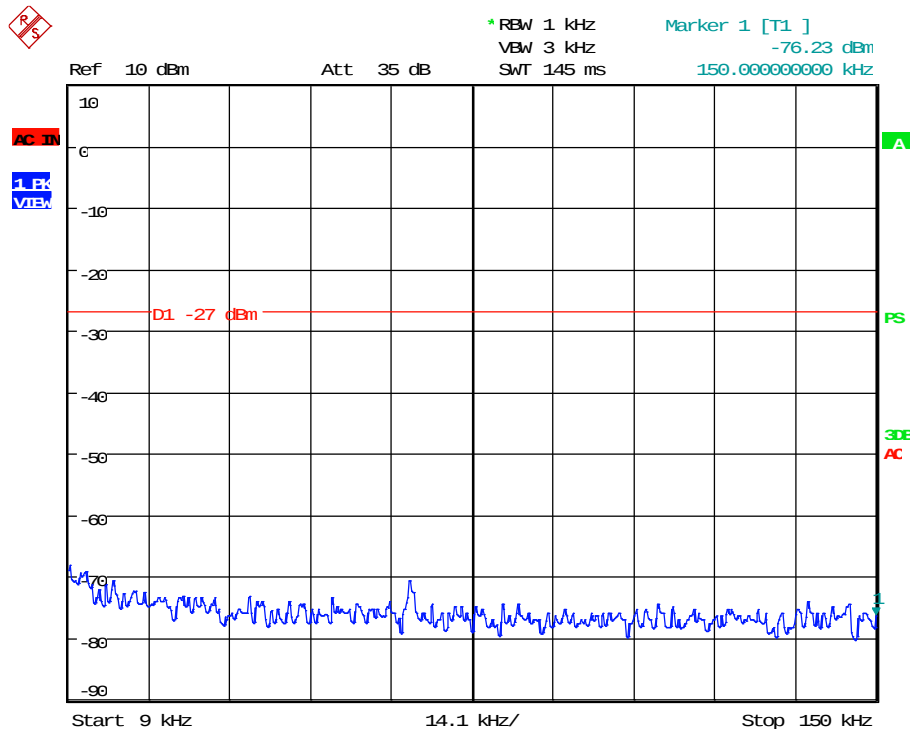
5.1 GHz, OFDM54 20M: Mid Channel, 18 GHz to 40 GHz



Date: 22.AUG.2019 13:49:28



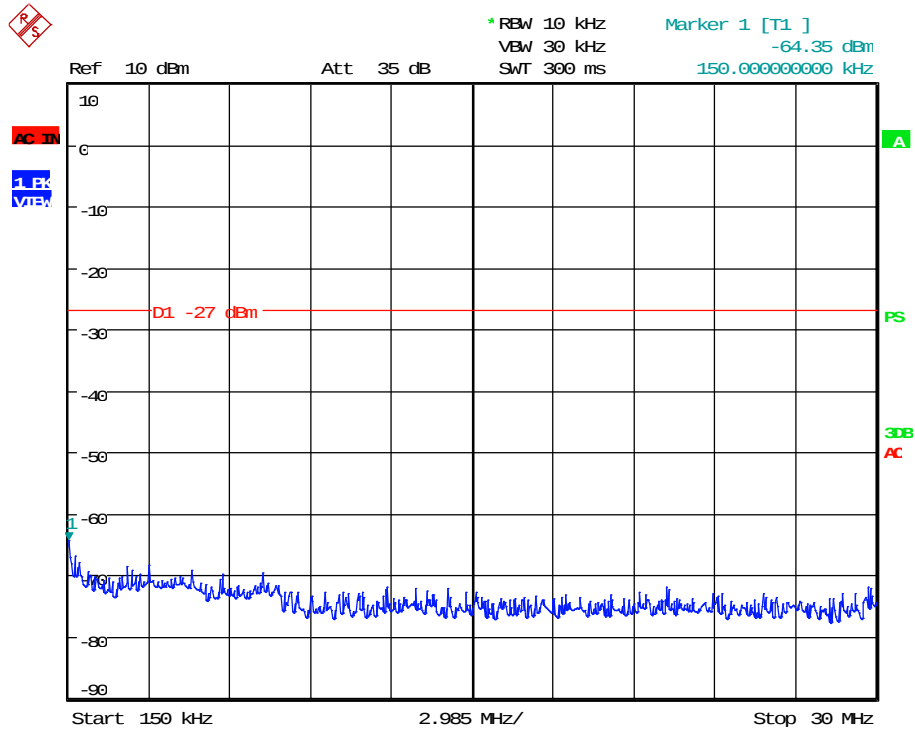
5.1 GHz, OFDM54 20M: High Channel, 0.009 MHz to 0.15 MHz



Date: 10.DEC.2019 18:32:24



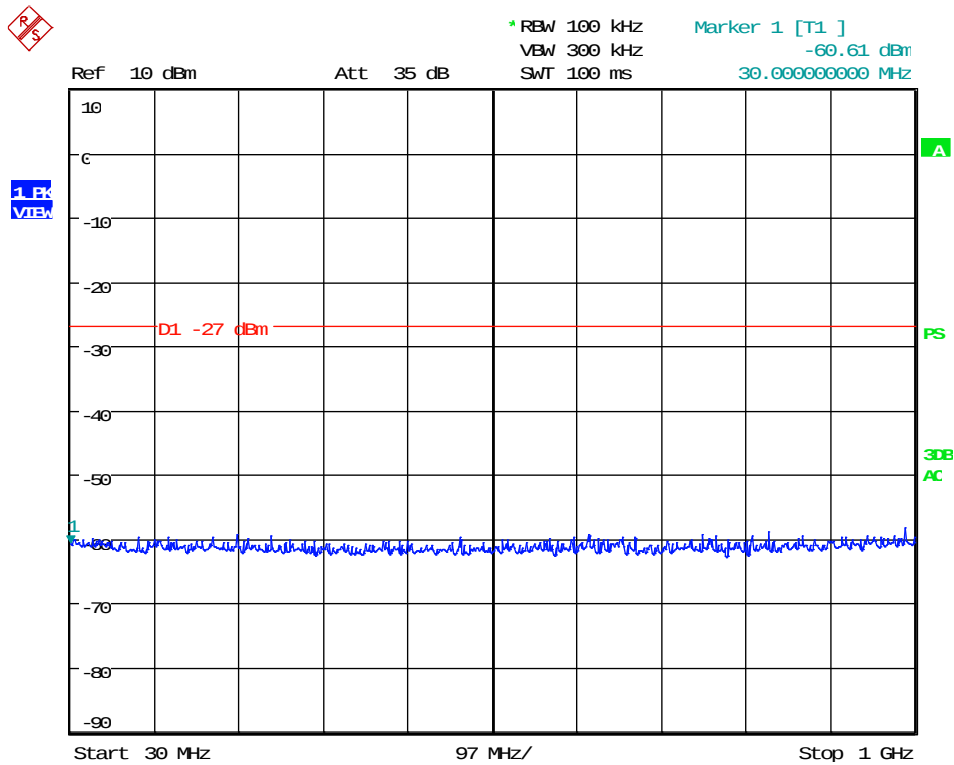
5.1 GHz, OFDM54 20M: High Channel, 0.15 MHz to 30 MHz



Date: 10.DEC.2019 18:33:15



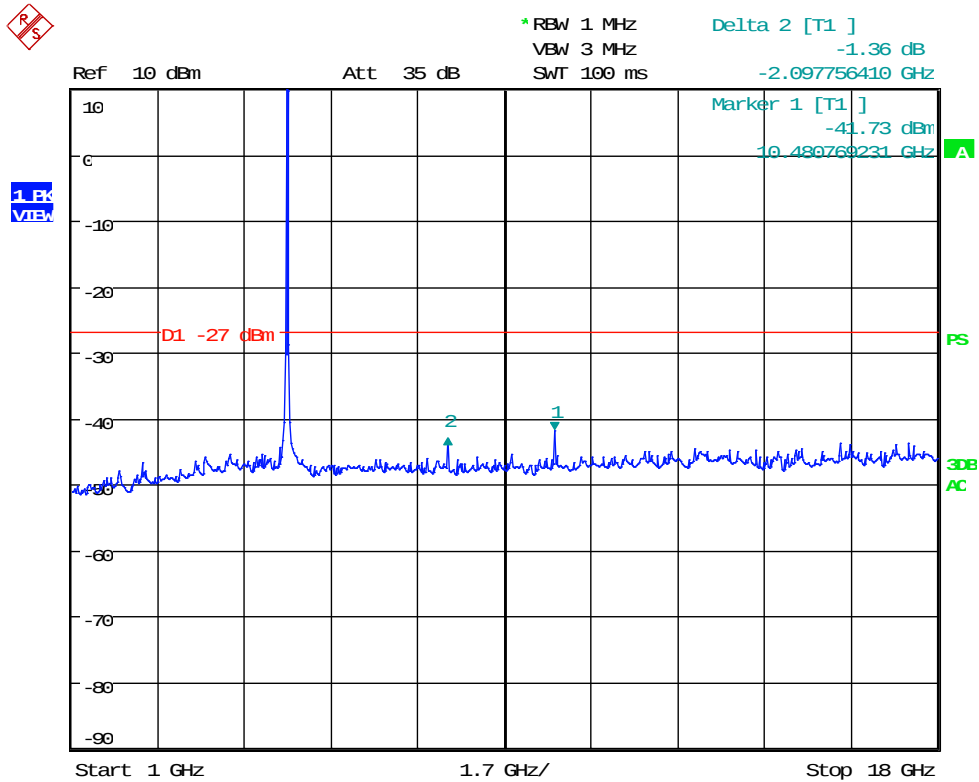
5.1 GHz, OFDM54 20M: High Channel, 30 MHz to 1000 MHz



Date: 10.DEC.2019 18:34:33



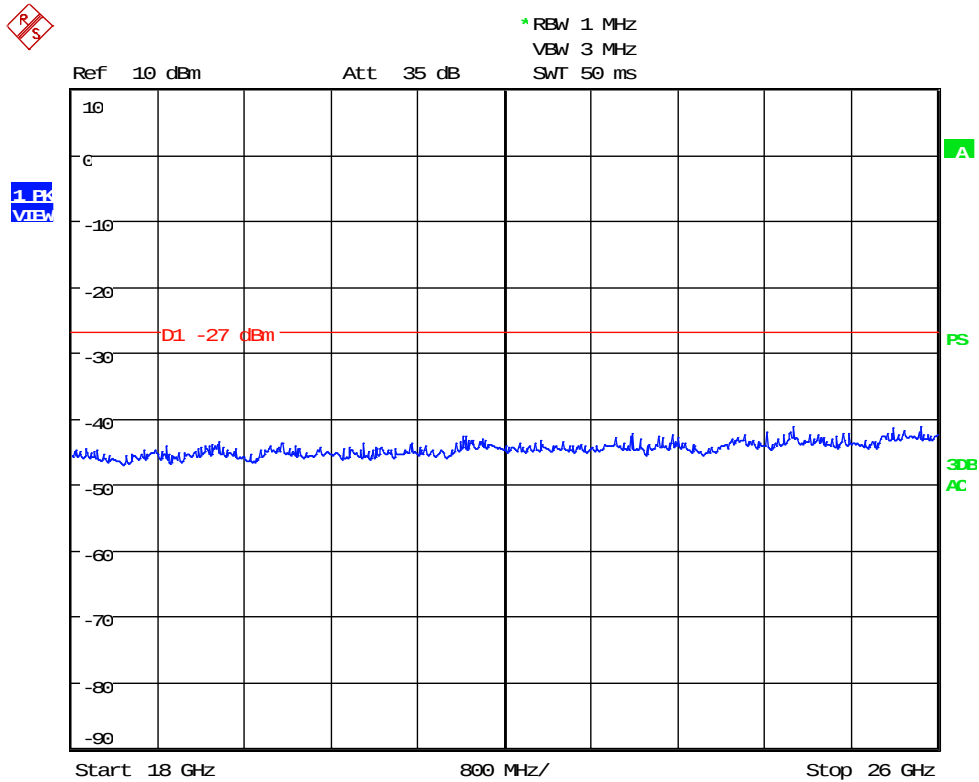
5.1 GHz, OFDM54 20M: High Channel, 1 GHz to 18 GHz



Date: 10.DEC.2019 18:36:48



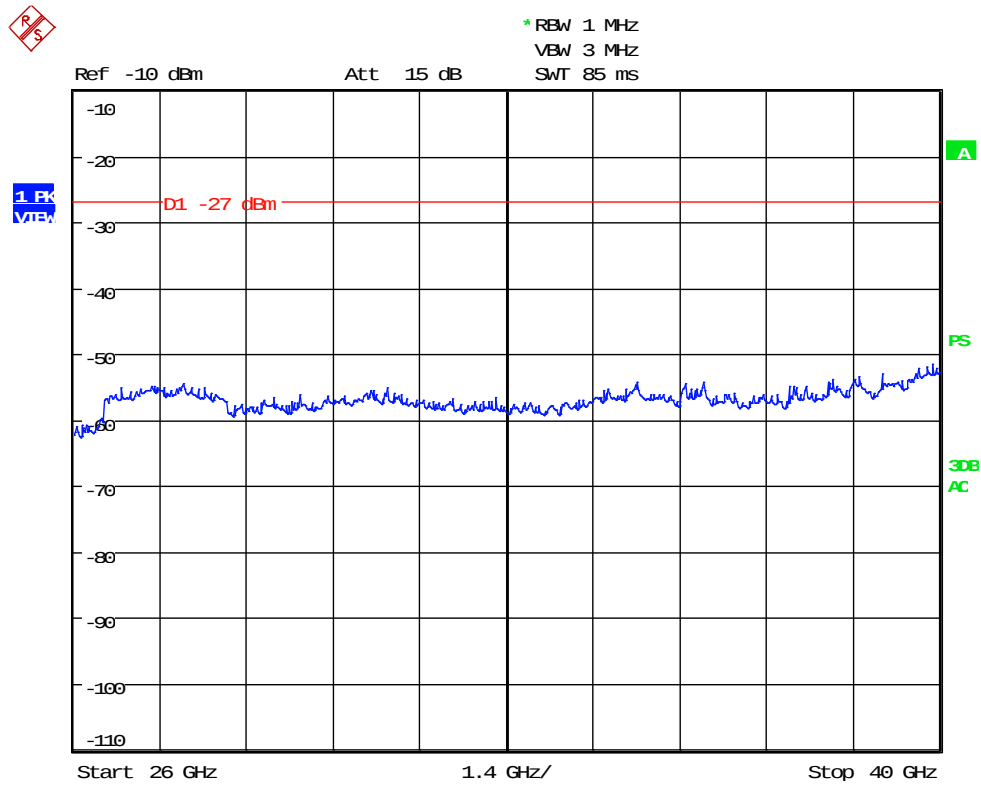
5.1 GHz, OFDM54 20M: High Channel, 18 GHz to 26 GHz



Date: 10.DEC.2019 18:38:28



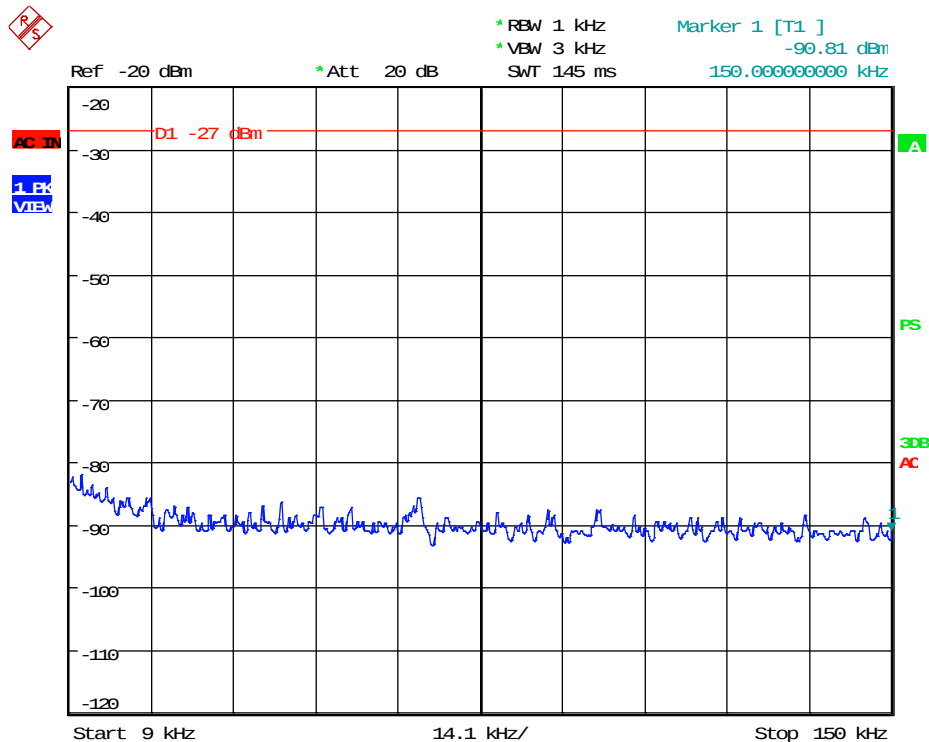
5.1 GHz, OFDM54 20M: High Channel, 26 GHz to 40 GHz



Date: 10.DEC.2019 18:39:23



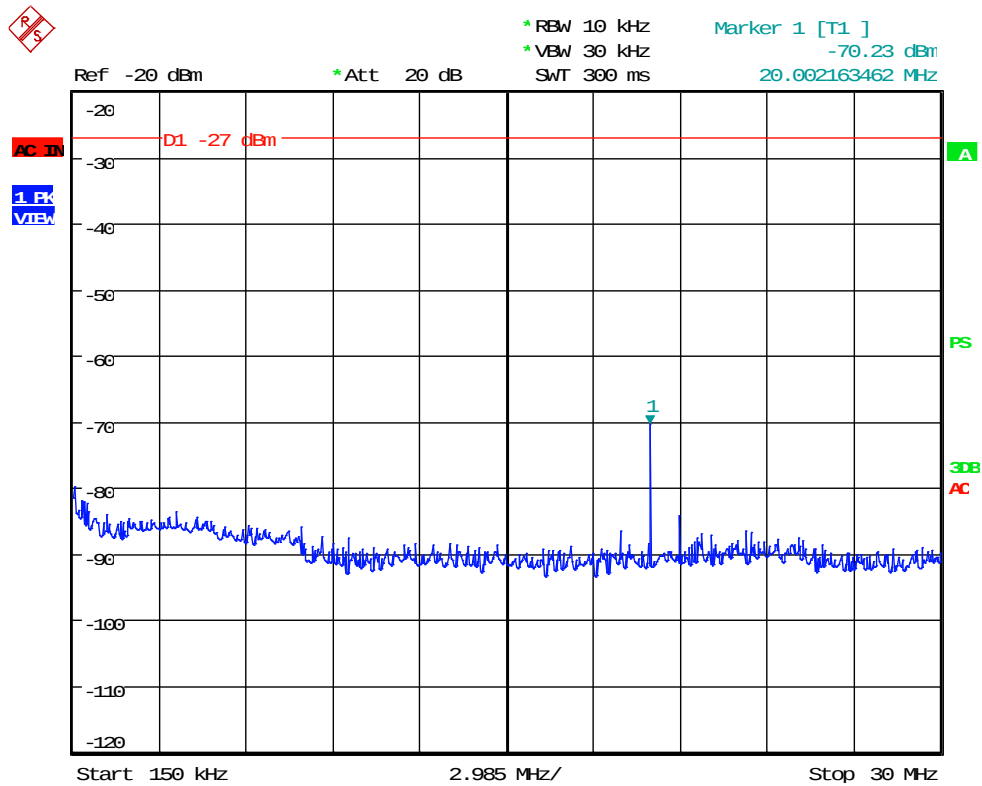
Test Date:	Aug. 22, 2019	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.407(b)(1,4)	Air Temperature:	20.4°C
		Relative Humidity:	60%

5.1 GHz, OFDM54 40M: Low Channel, 0.009 MHz to 0.15 MHz

Date: 22.AUG.2019 14:10:37



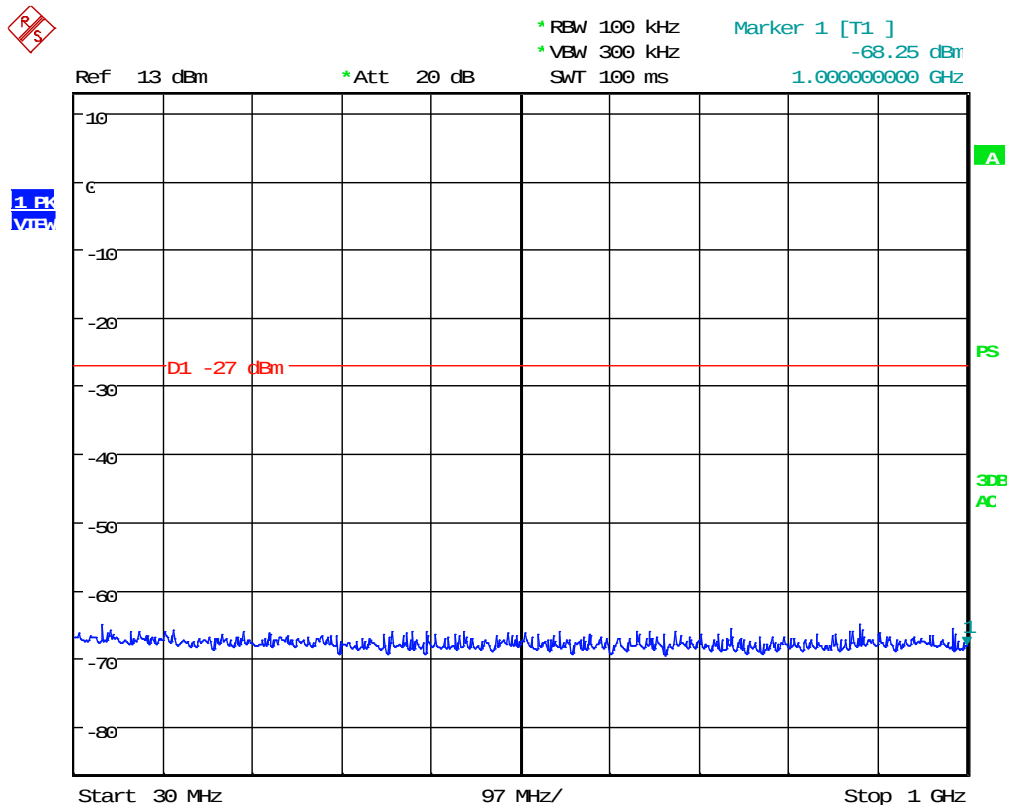
5.1 GHz, OFDM54 40M: Low Channel, 0.15 MHz to 30 MHz



Date: 22.AUG.2019 14:09:31



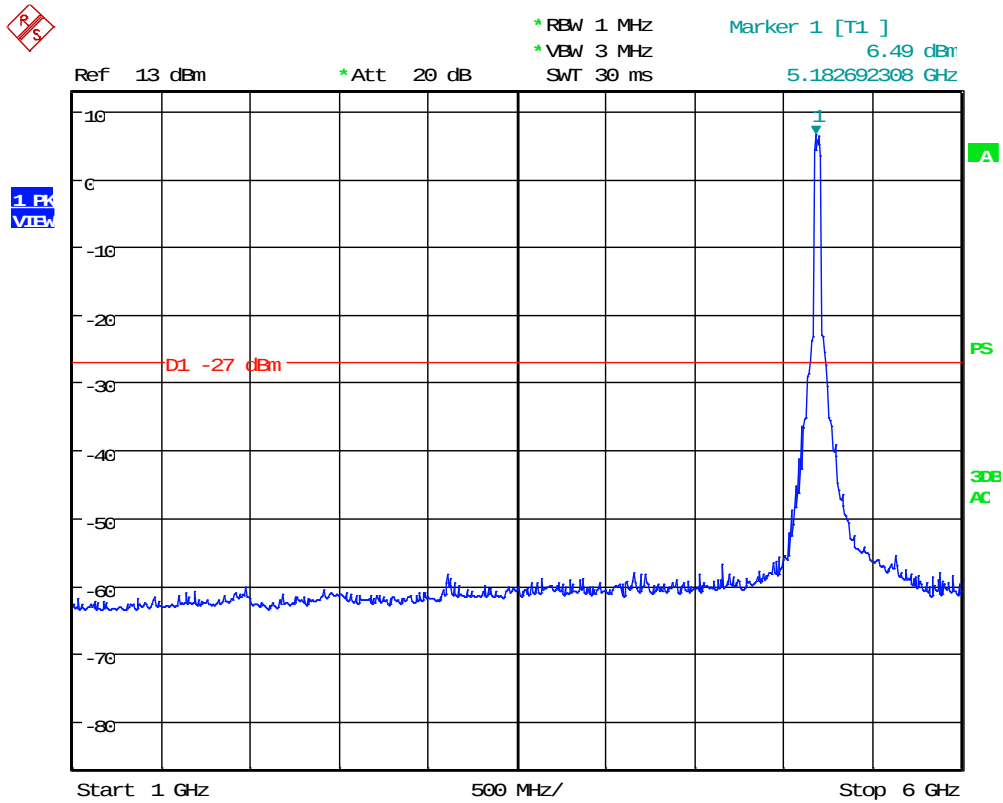
5.1 GHz, OFDM54 40M: Low Channel, 30 MHz to 1000 MHz



Date: 22.AUG.2019 14:07:59



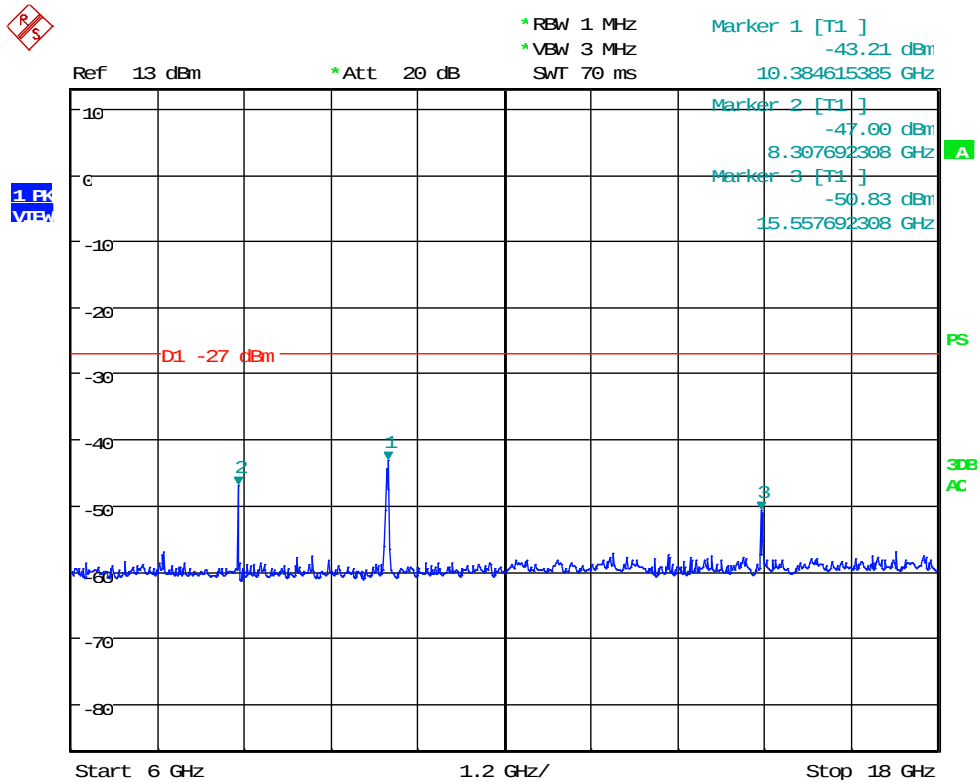
5.1 GHz, OFDM54 40M: Low Channel, 1 GHz to 6 GHz



Date: 22.AUG.2019 14:07:00



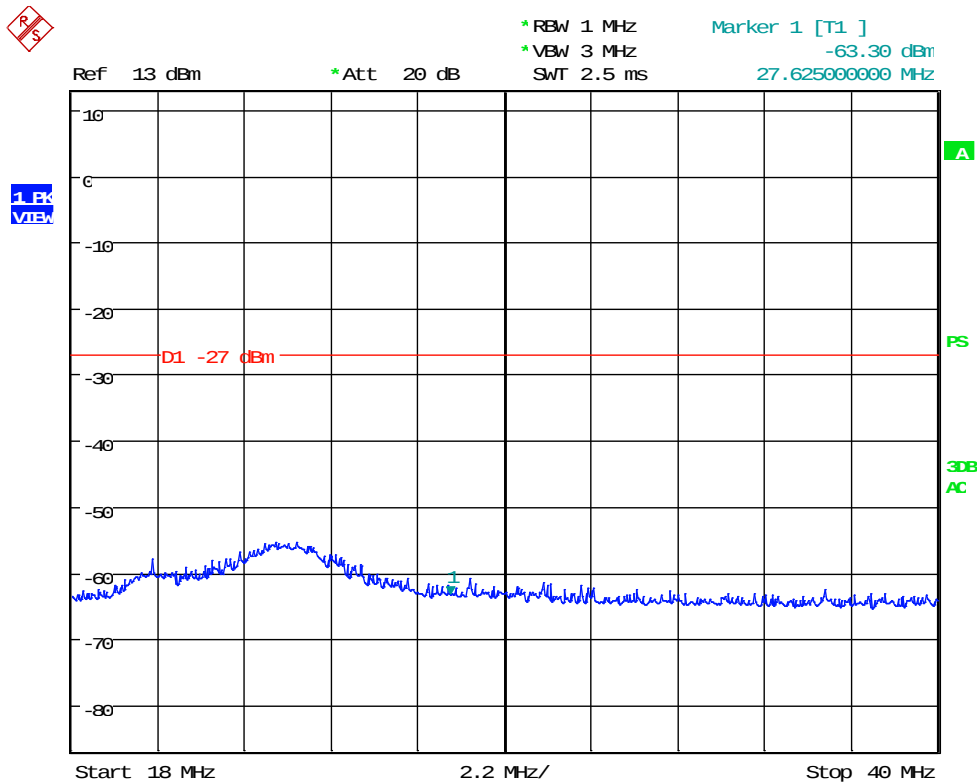
5.1 GHz, OFDM54 40M: Low Channel, 6 GHz to 18GHz



Date: 22.AUG.2019 14:05:59



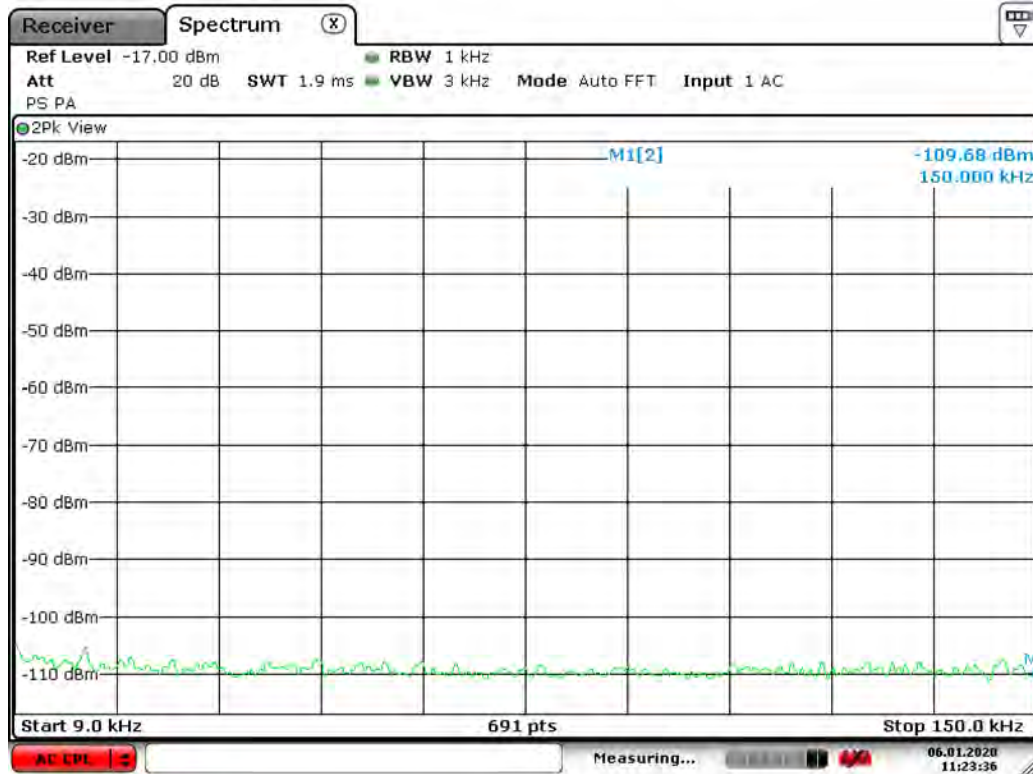
5.1 GHz, OFDM54 40M: Low Channel, 18 GHz to 40 GHz



Date: 22.AUG.2019 14:04:31

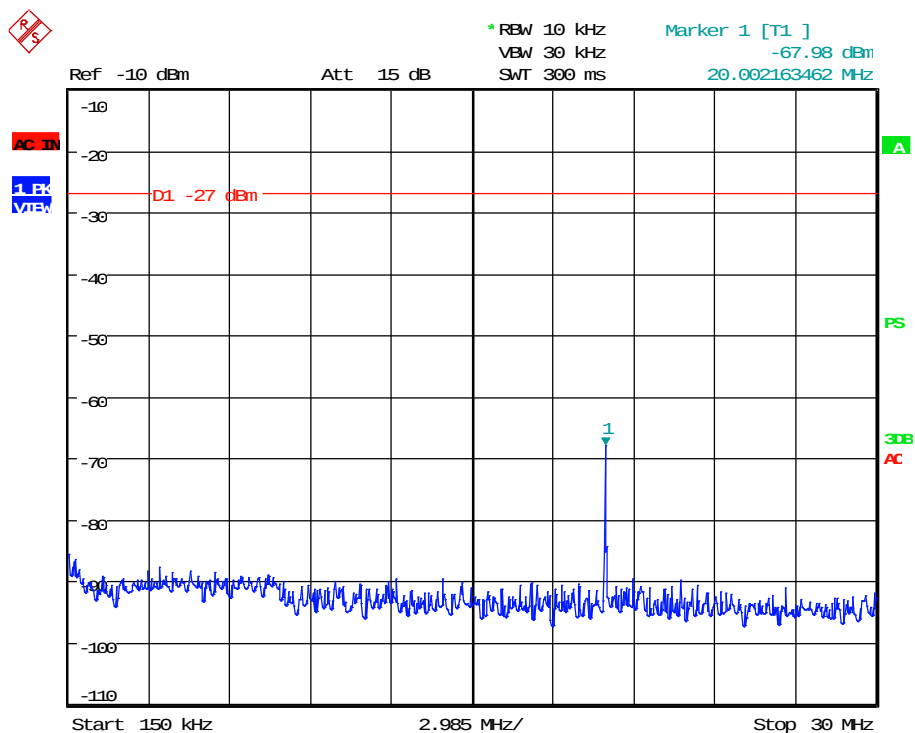


5.1 GHz, OFDM54 40M: High Channel, 0.009 MHz to 0.15 MHz



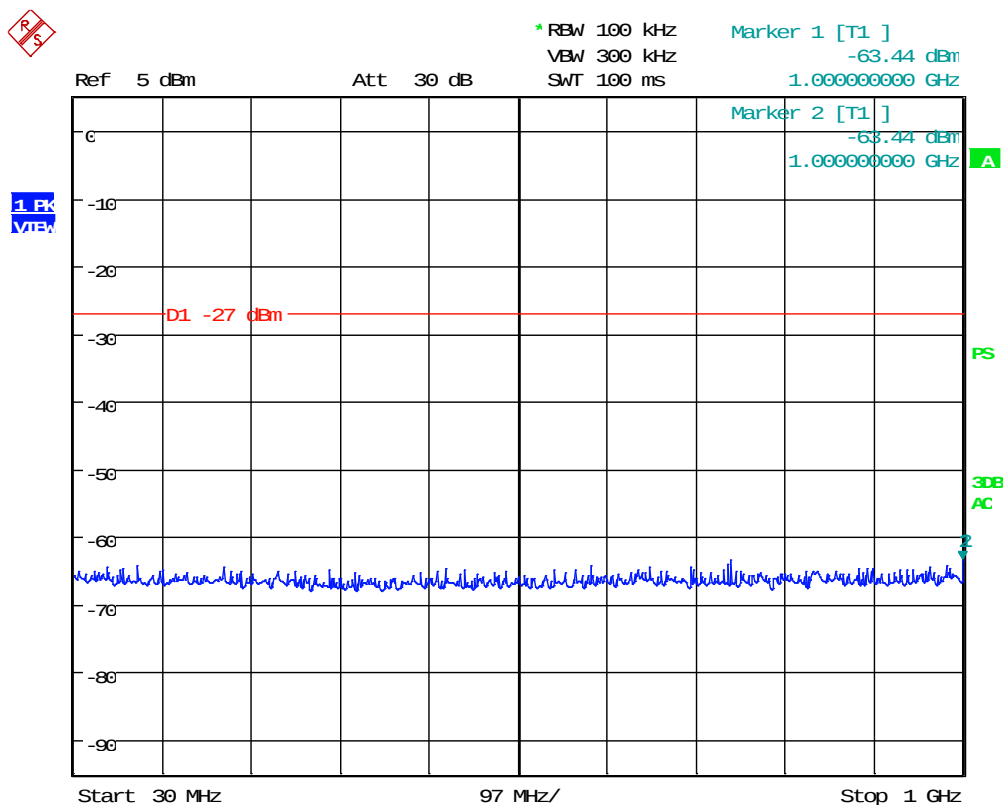
Date: 6 JAN 2020 11:23:37

5.1 GHz, OFDM54 40M: High Channel, 0.15 MHz to 30 MHz



Date: 10.DEC.2019 18:52:52

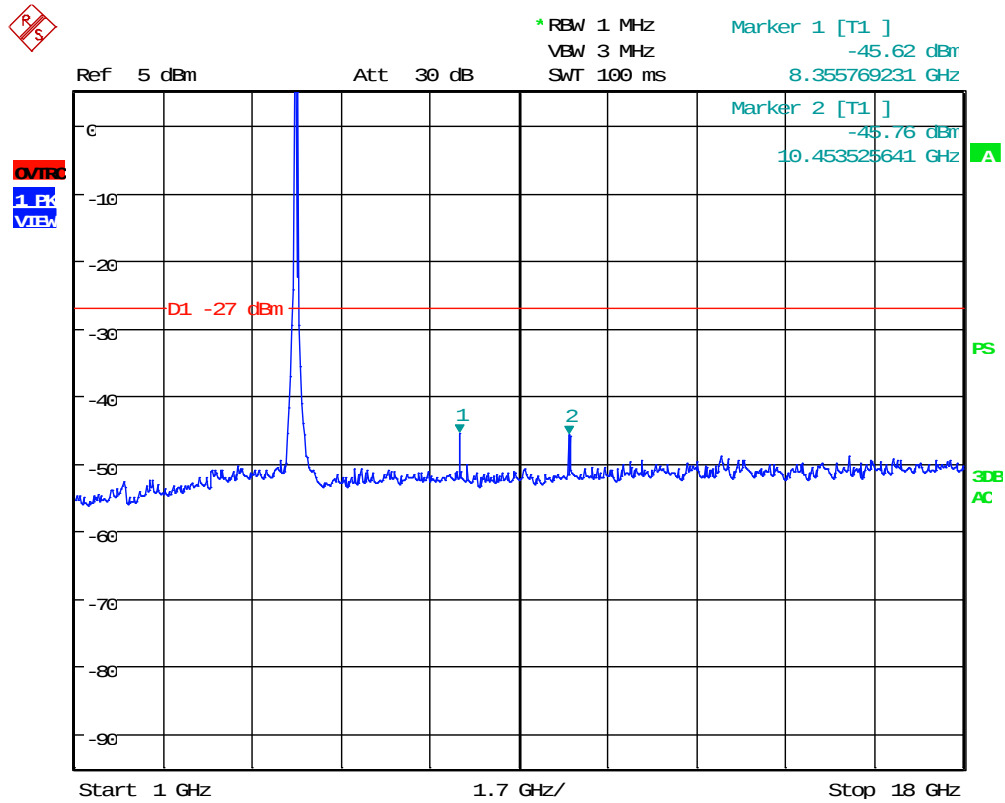
5.1 GHz, OFDM54 40M: High Channel, 30 MHz to 1000 MHz



Date: 10.DEC.2019 18:51:27



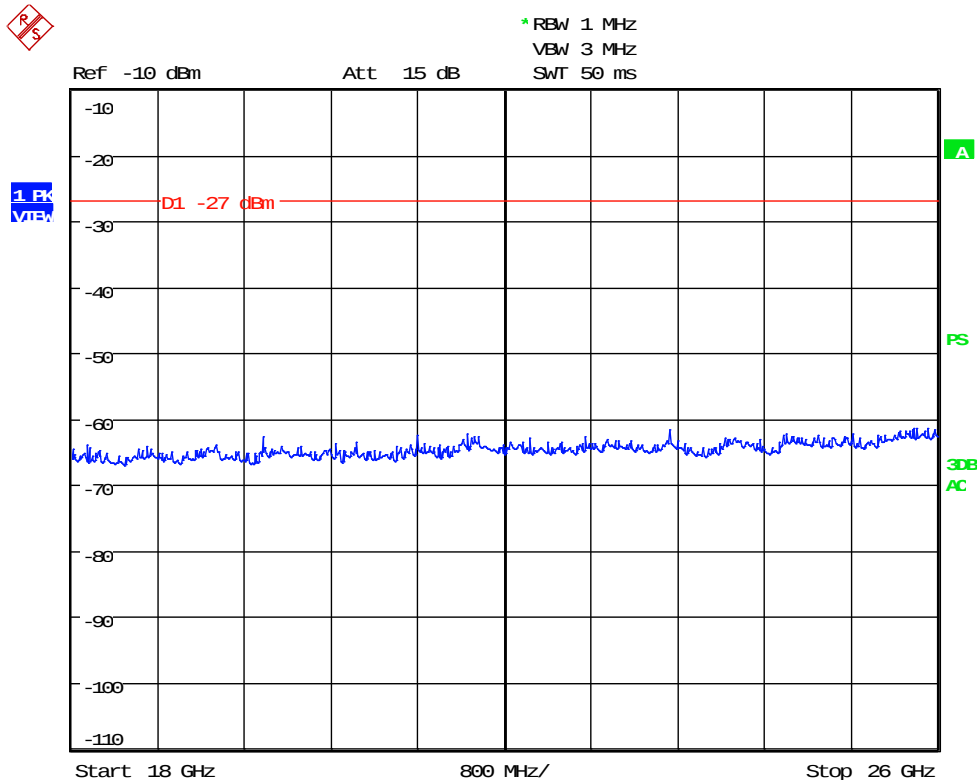
5.1 GHz, OFDM54 40M: High Channel, 1 GHz to 18 GHz



Date: 10.DEC.2019 18:50:35



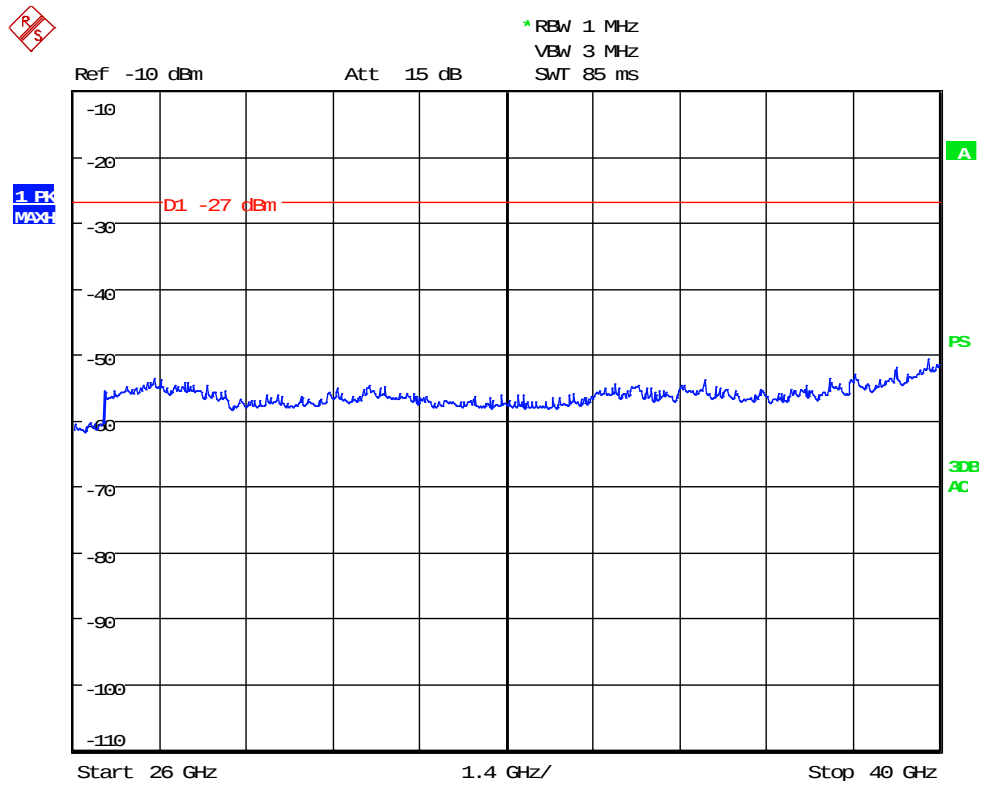
5.1 GHz, OFDM54 40M: High Channel, 18 GHz to 26 GHz



Date: 10.DEC.2019 18:48:14



5.1 GHz, OFDM54 40M: High Channel, 26 GHz to 40 GHz



Date: 10.DEC.2019 18:47:33



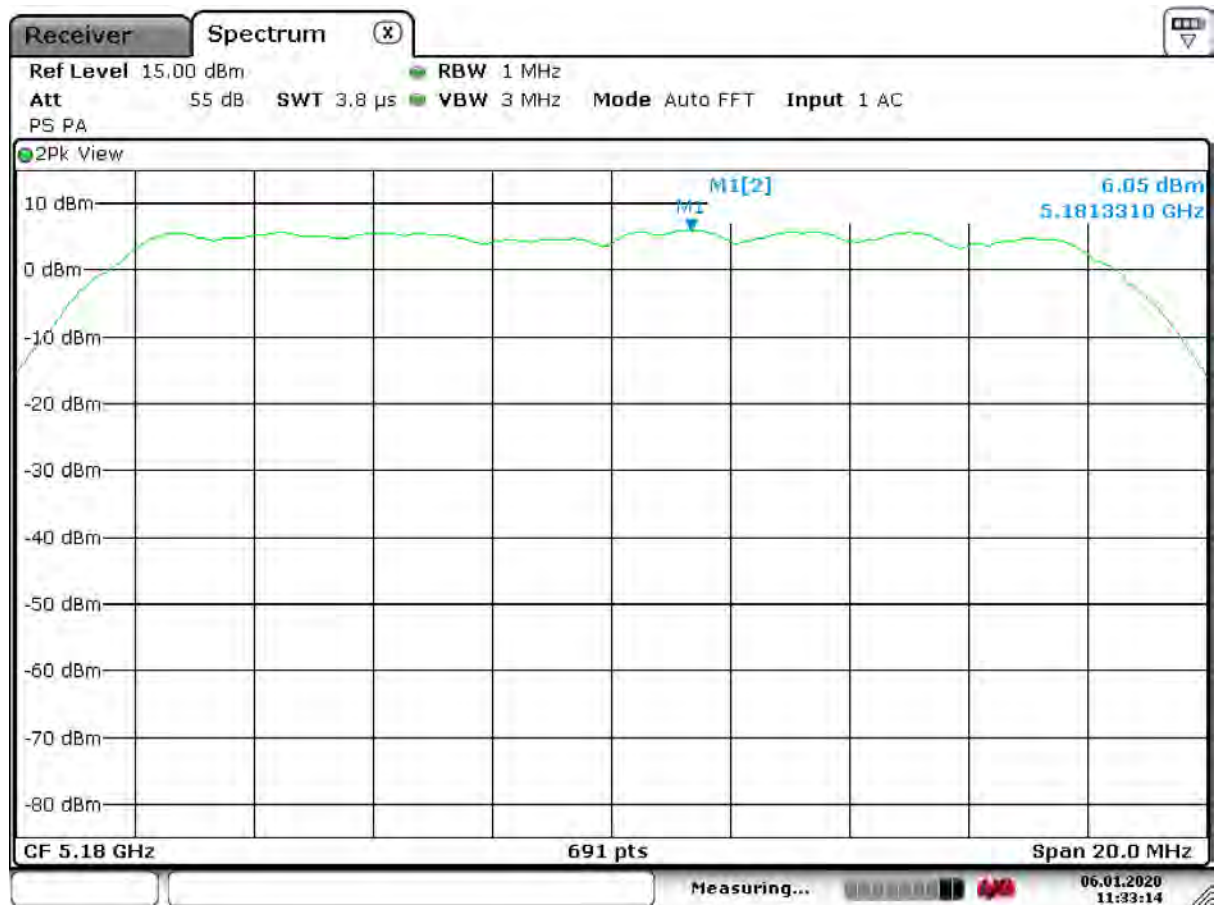
12 VOLTAGE VARIATIONS

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery

RESULTS: The results showed that the fundamental frequency did not move outside the frequency band and the output power did not increase above the limit during the variations.



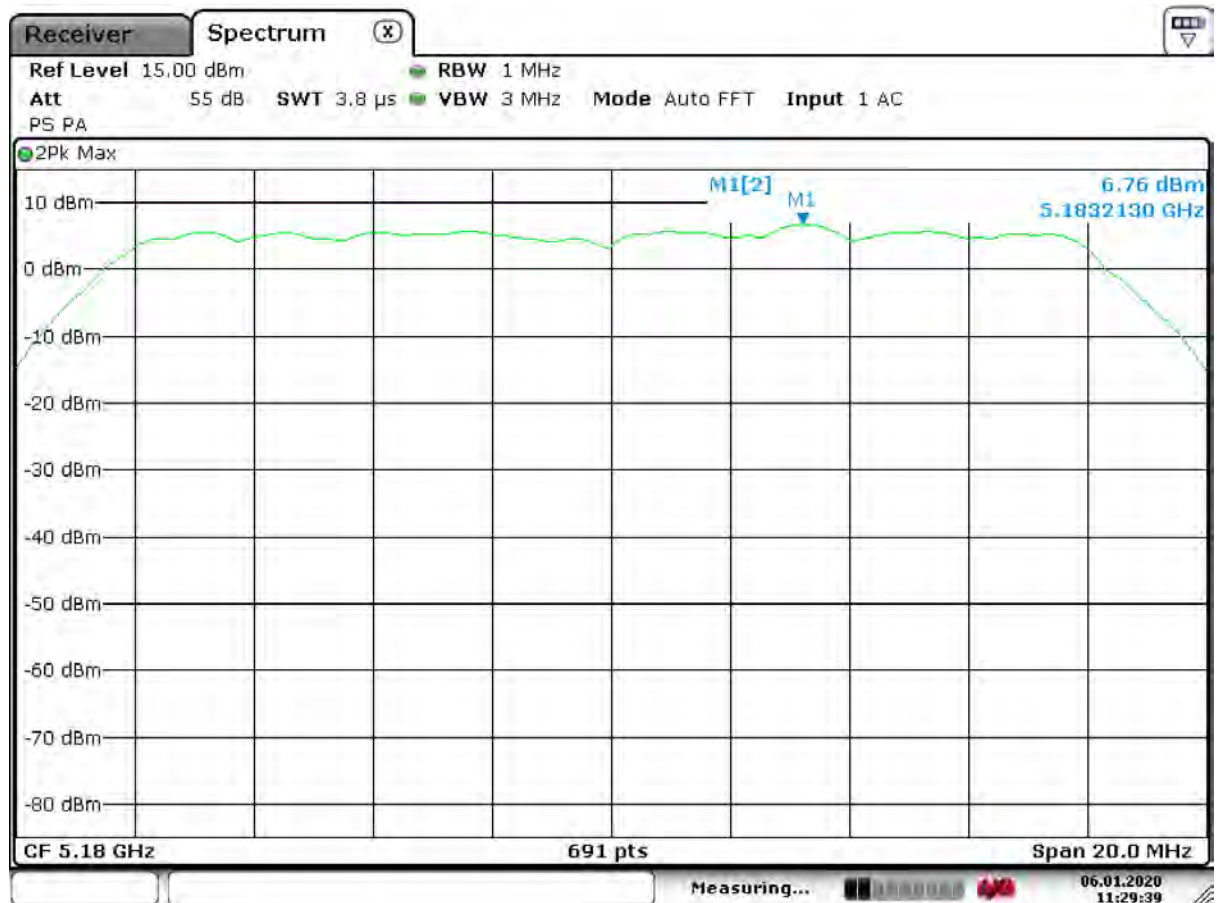
Test Date:	Jan. 6, 2020	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.31(e)	Air Temperature:	23.3°C
Test Results:	Complies	Humidity;	30%

5.1 GHz, OFDM 20M, Low Channel @ 85%

Date: 6.JAN.2020 11:33:15



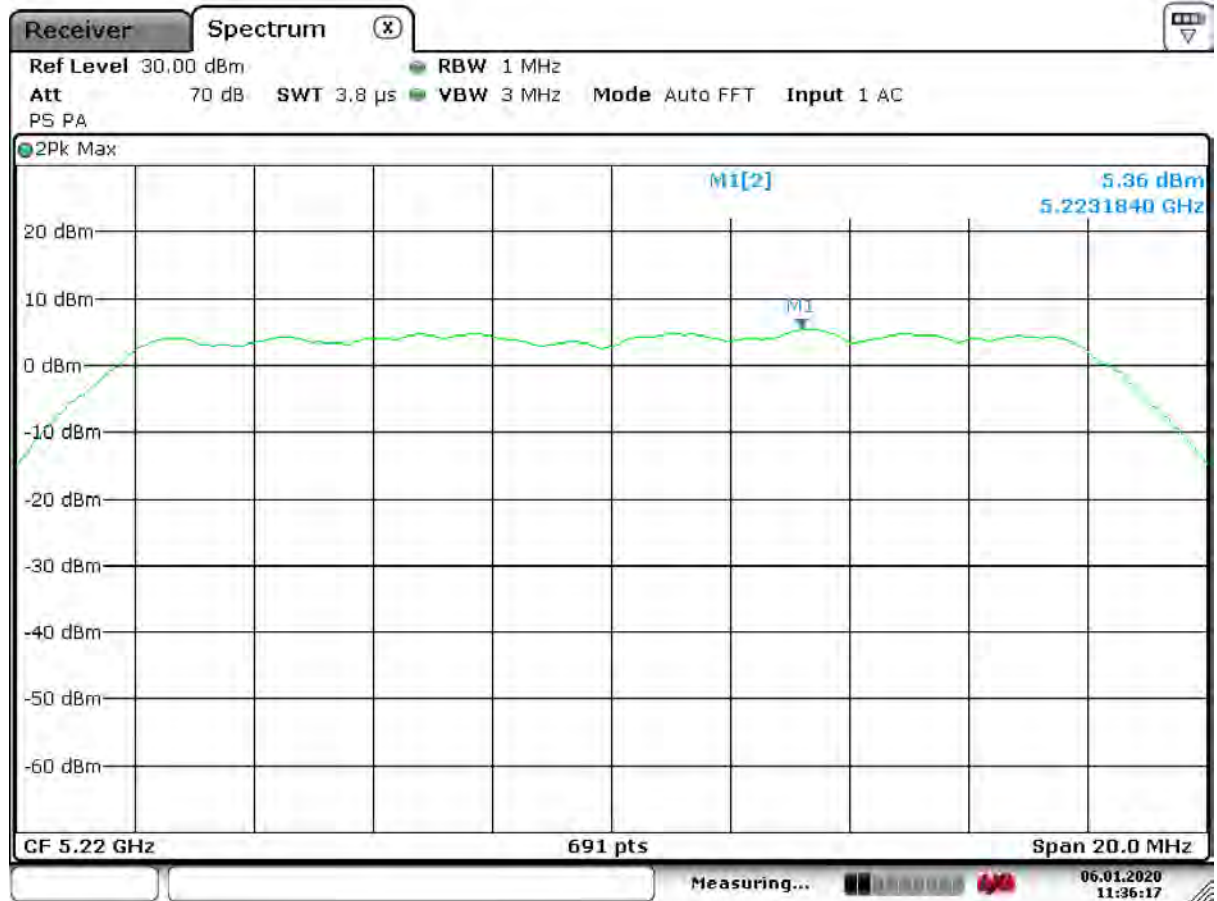
5.1 GHz, OFDM 20M, Low Channel @ 115%



Date: 6.JAN.2020 11:29:40



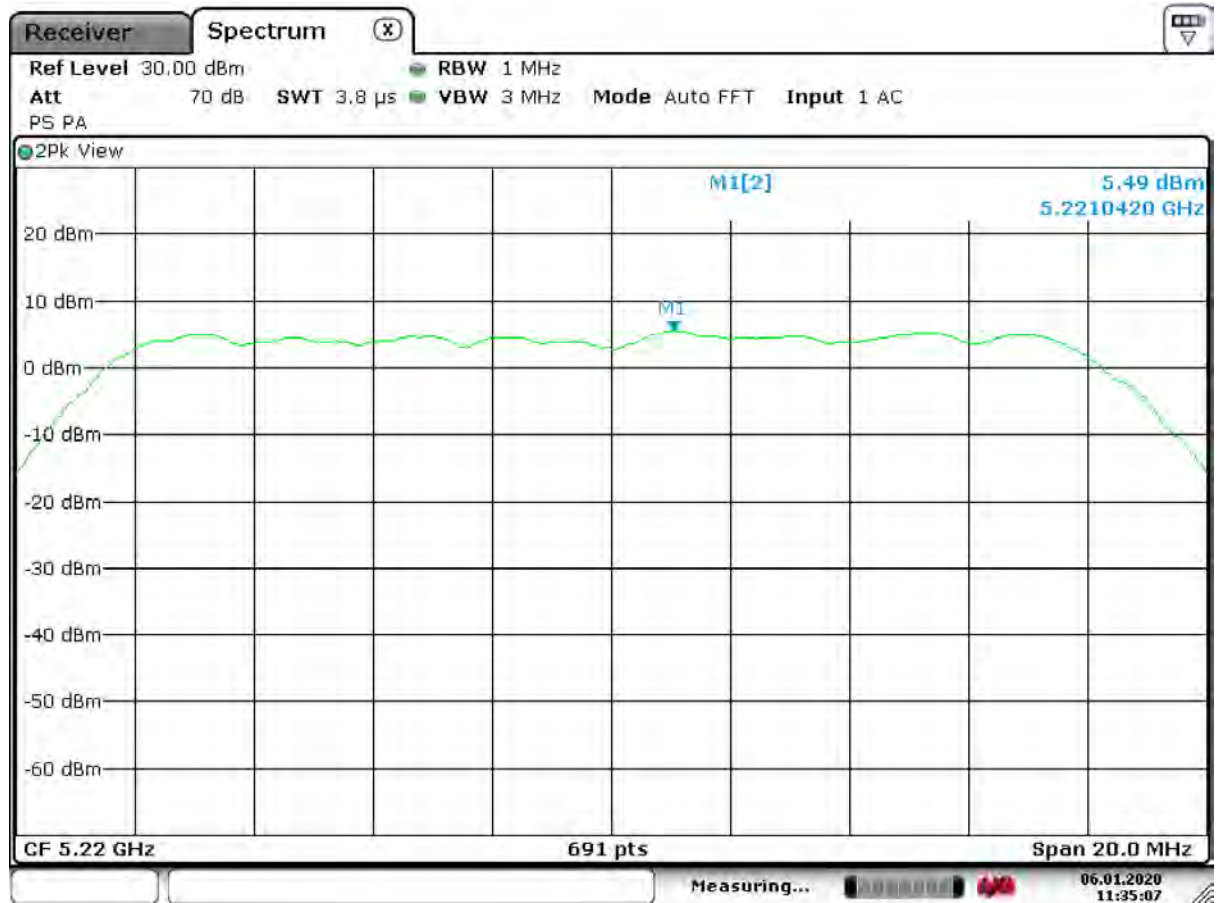
5.1 GHz, OFDM 20M, Mid Channel @ 85%



Date: 6.JAN.2020 11:36:17



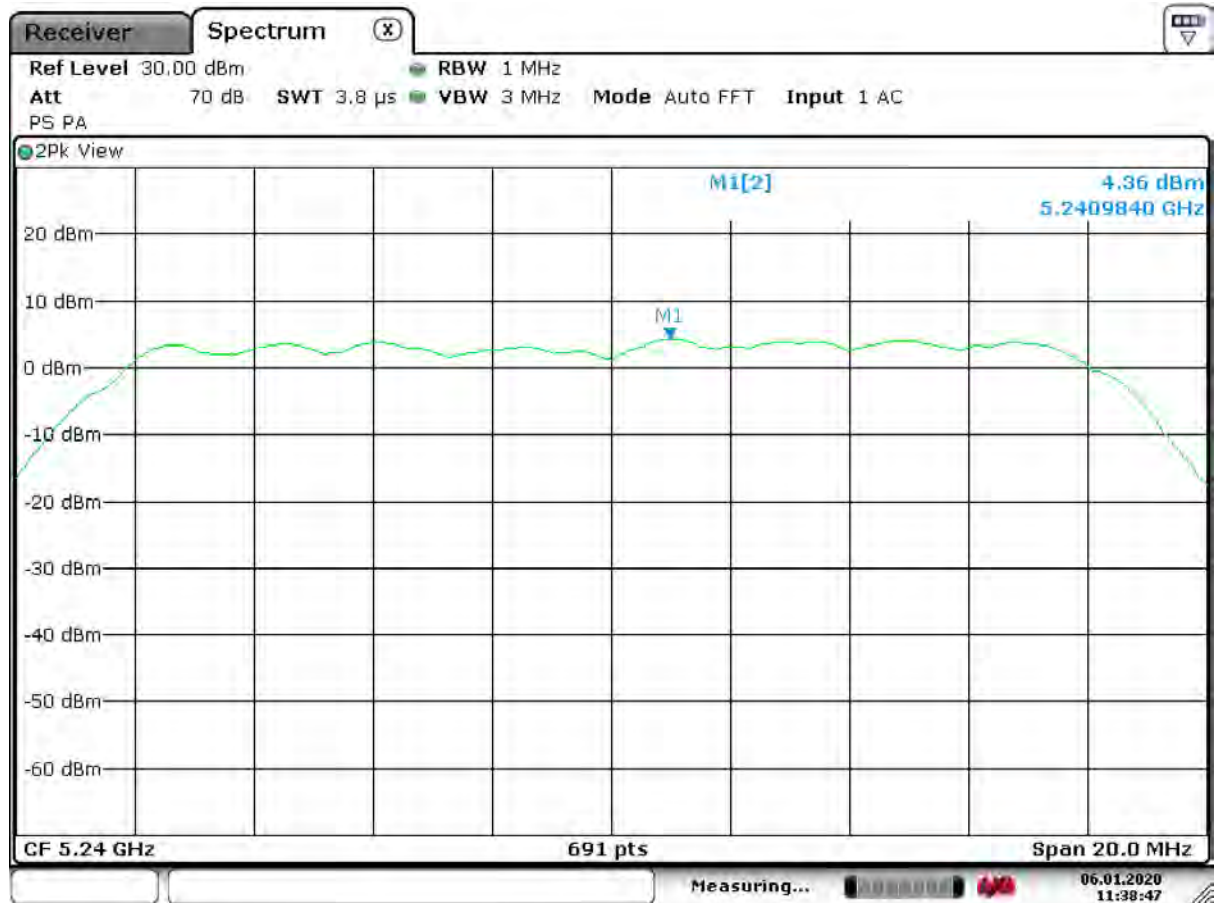
5.1 GHz, OFDM 20M, Mid Channel @ 115%



Date: 6.JAN.2020 11:35:07



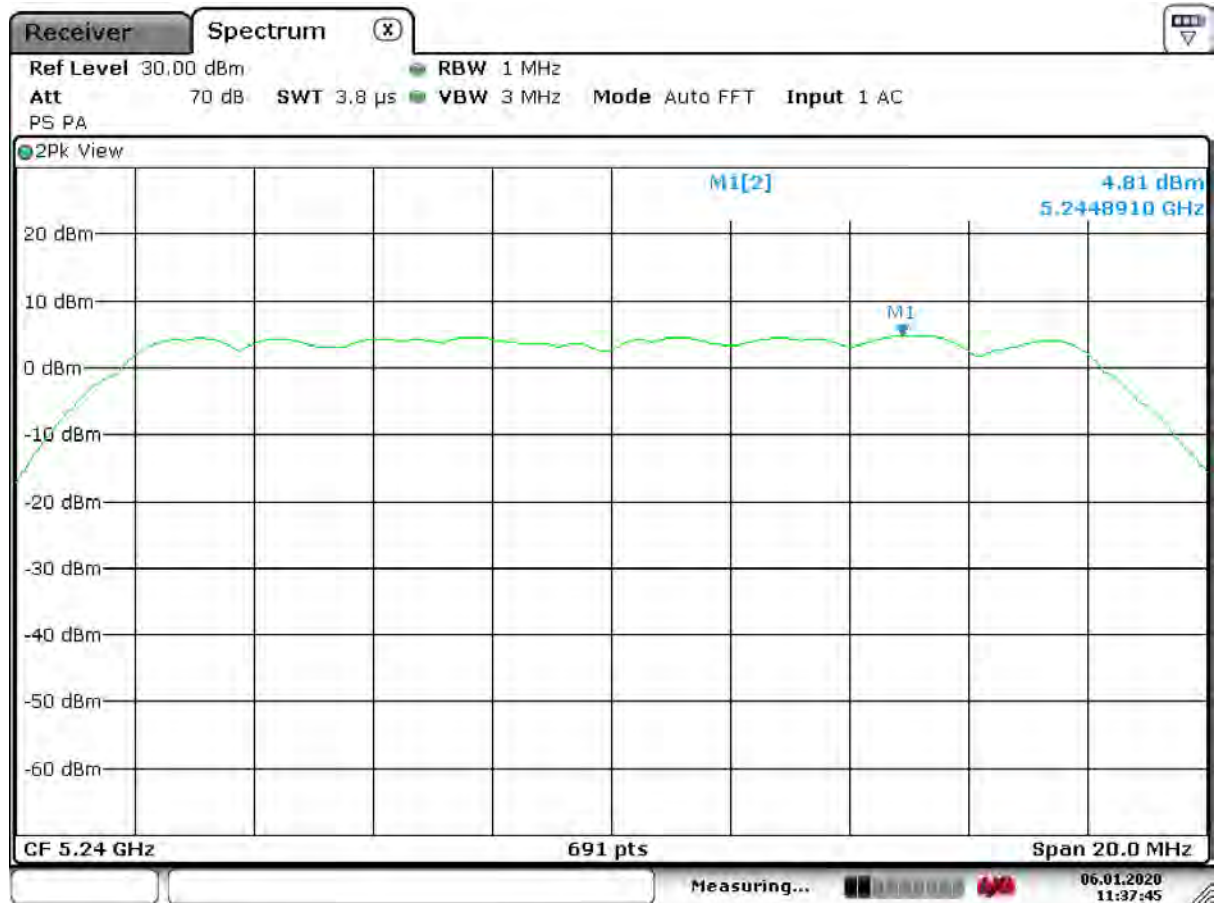
5.1 GHz, OFDM 20M, High Channel @ 85%



Date: 6.JAN.2020 11:38:47



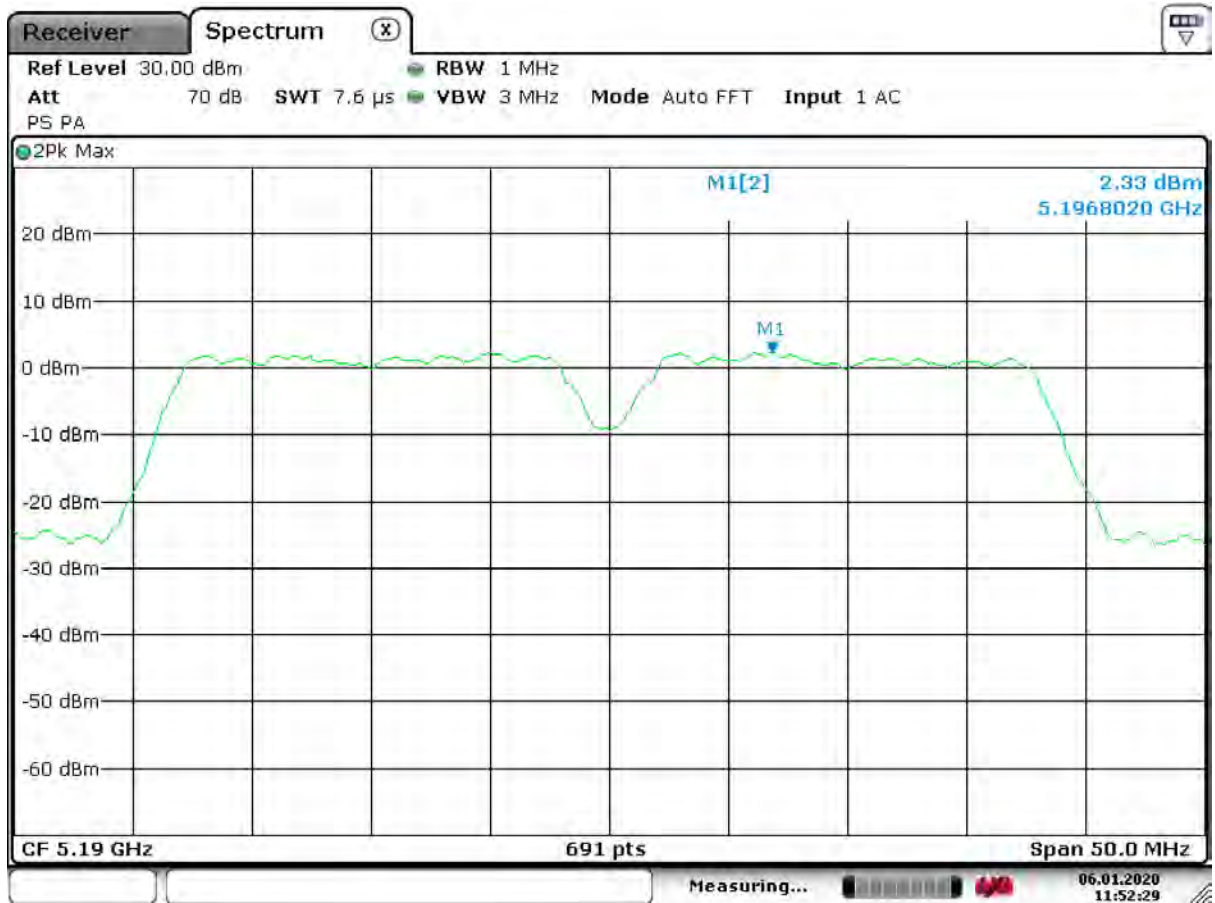
5.1 GHz, OFDM 20M, High Channel @ 115%



Date: 6.JAN.2020 11:37:45



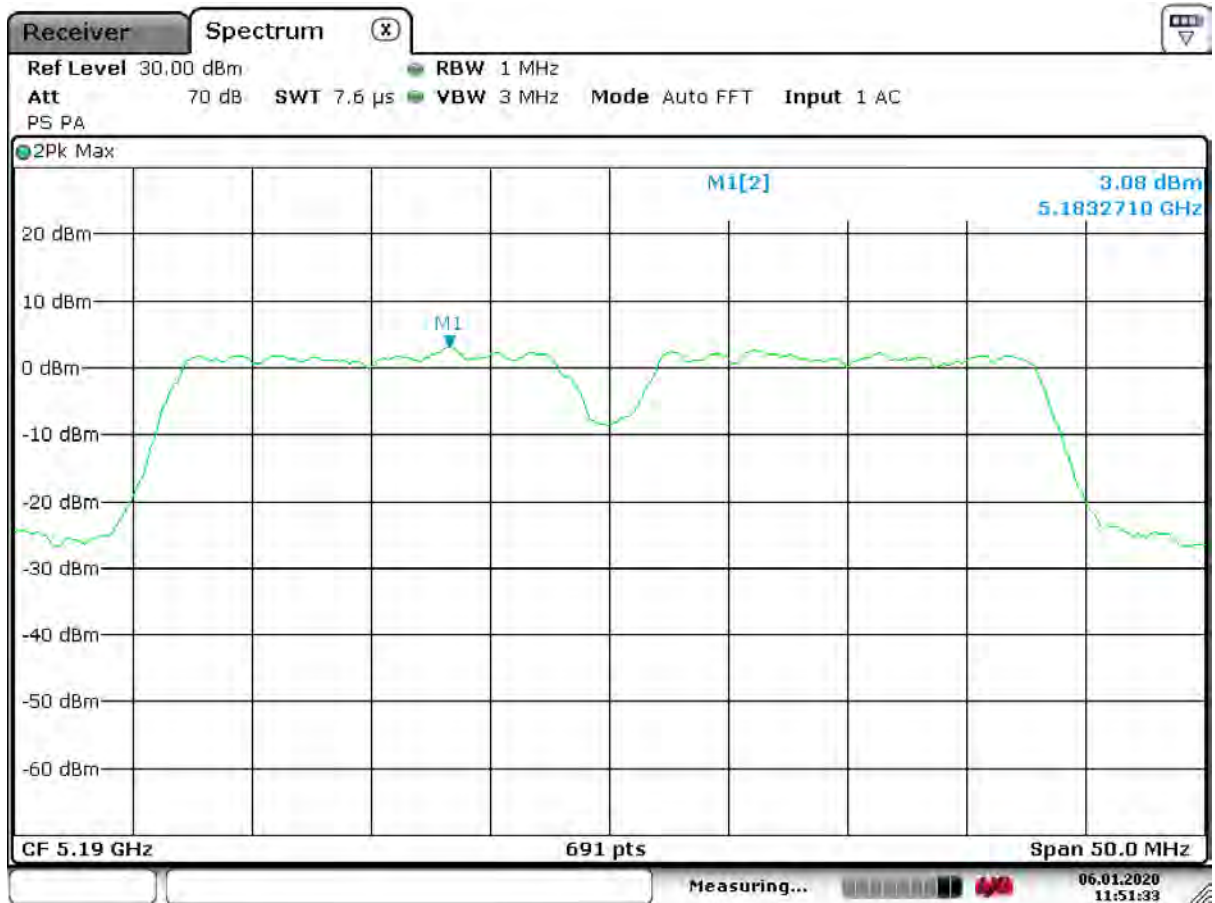
5.1 GHz, OFDM 40M, Low Channel @ 85%



Date: 6.JAN.2020 11:52:30



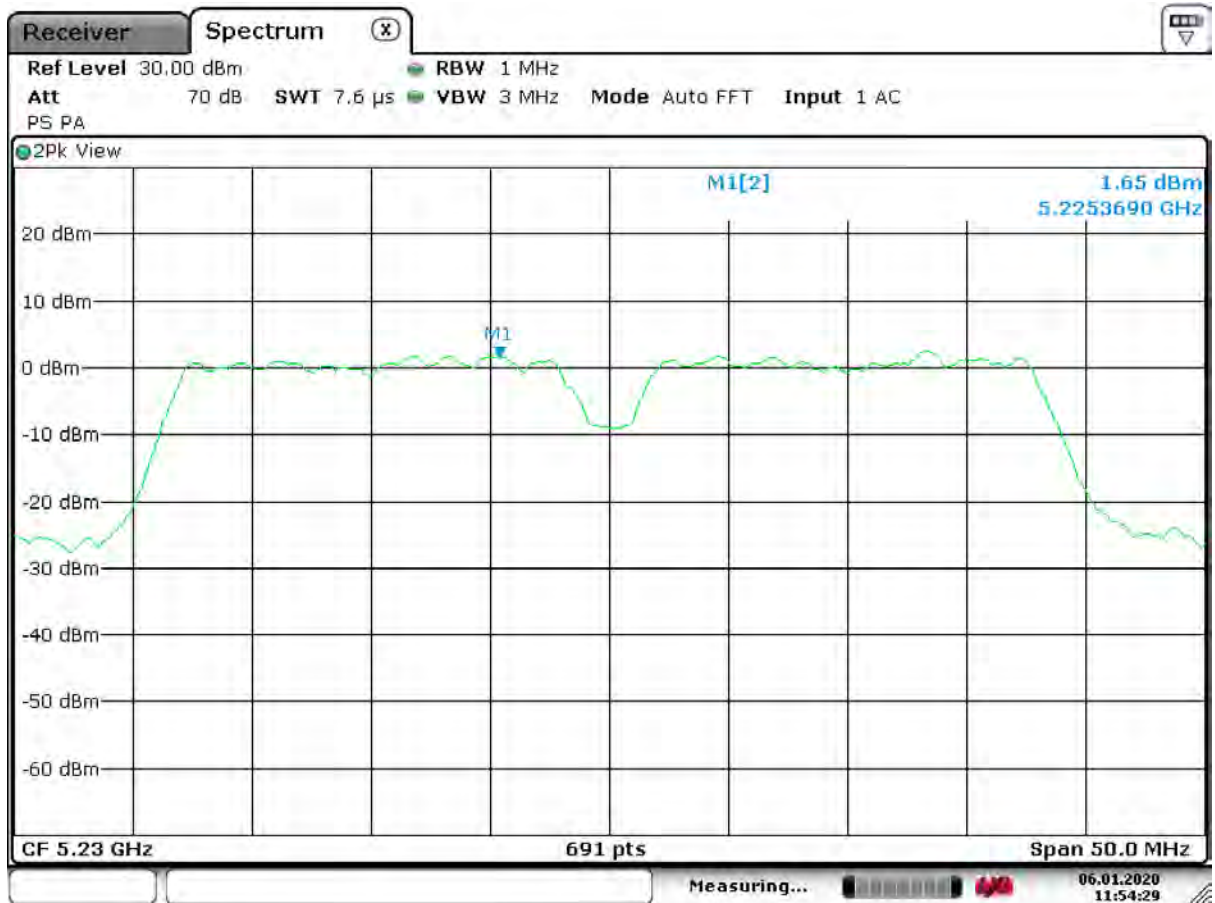
5.1 GHz, OFDM 40M, Low Channel @115%



Date: 6.JAN.2020 11:51:33



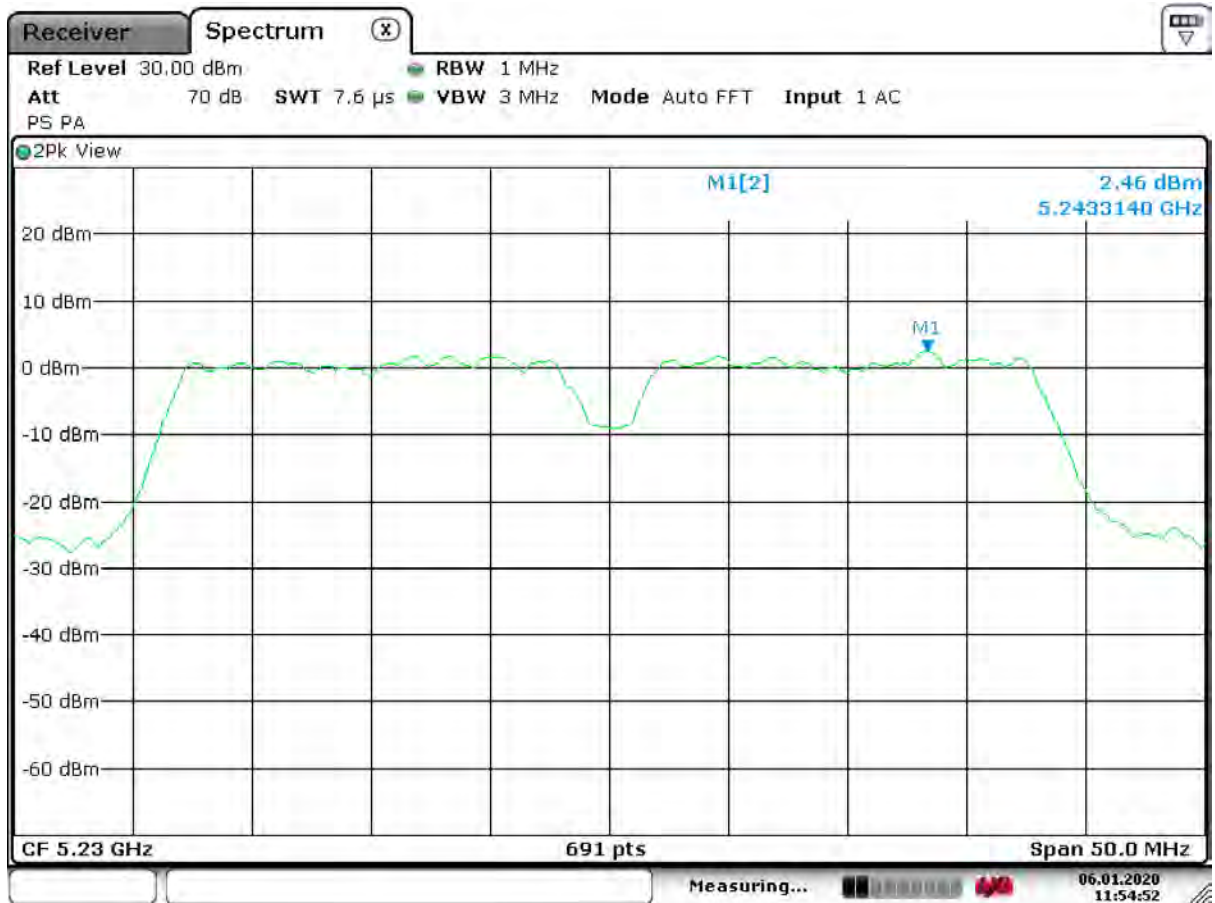
5.1 GHz, OFDM 40M, High Channel @ 85%



Date: 6.JAN.2020 11:54:29



5.1 GHz, OFDM 40M, High Channel @115%



Date: 6.JAN.2020 11:54:52



13 CONDUCTED EMISSIONS

13.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), "Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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.

13.2 Procedure

The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables.

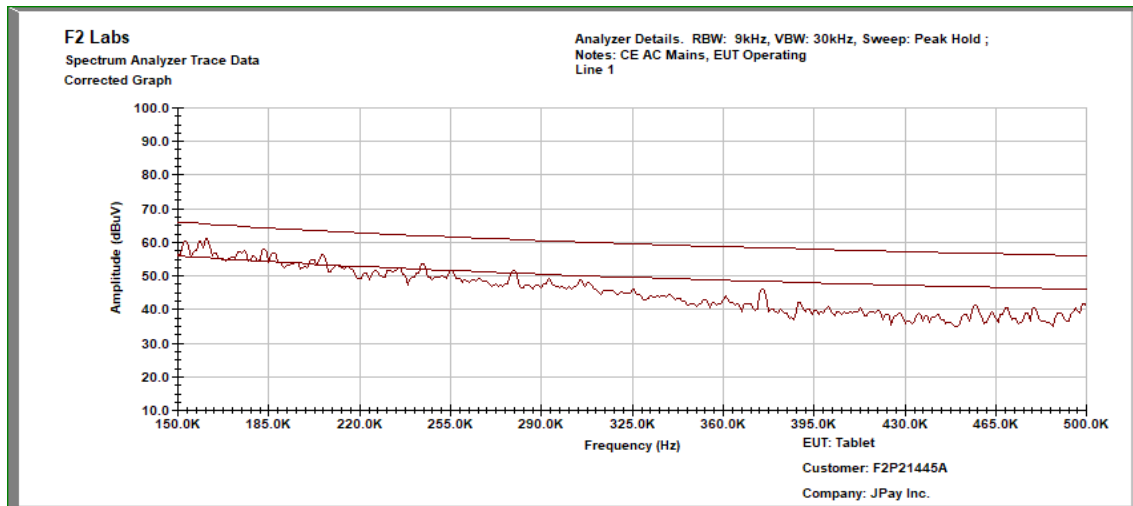
The following results are from the worse-case channel of the worse-case protocol, which was the high channel of OFDM 40M



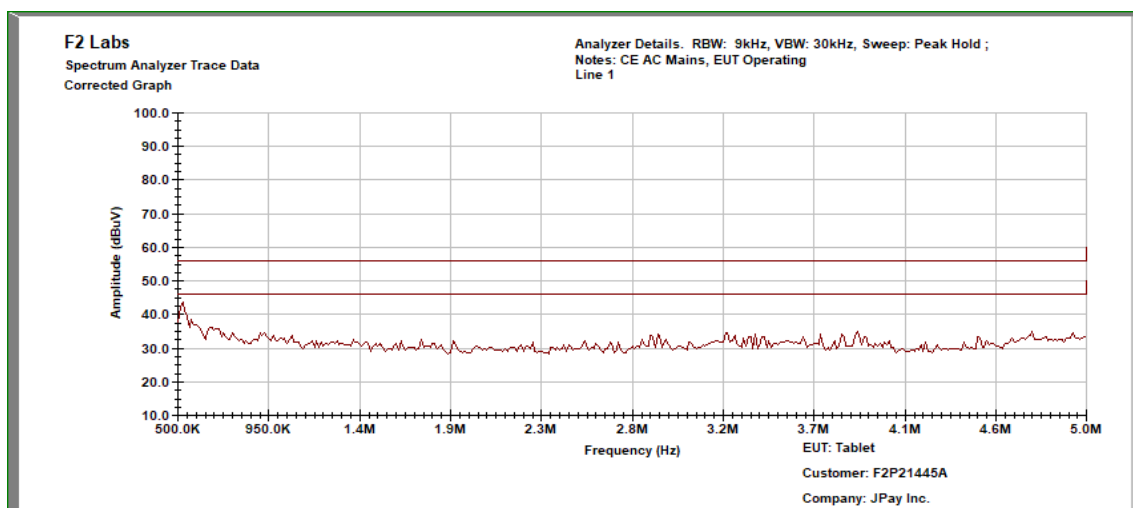
13.3 Conducted Emissions Test Data

Test Date(s):	Aug. 15, 2019	Test Engineer:	J. Chiller
Rule:	15.207	Air Temperature:	21.6° C
Test Results:	Complies	Relative Humidity:	47%

Conducted Test – Line 1: 0.15 MHz to 0.5 MHz

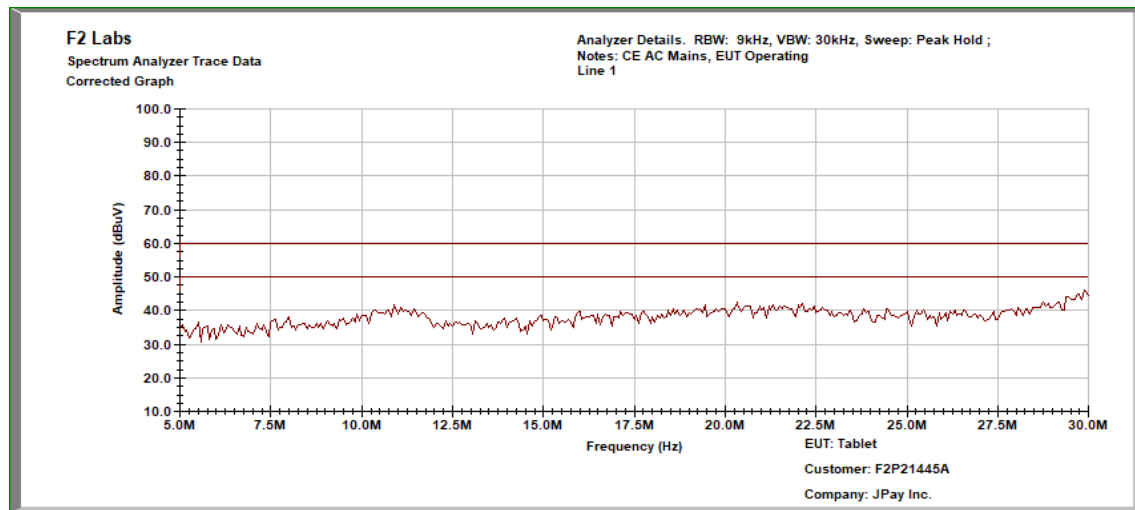


Conducted Test – Line 1: 0.5 MHz to 5.0 MHz





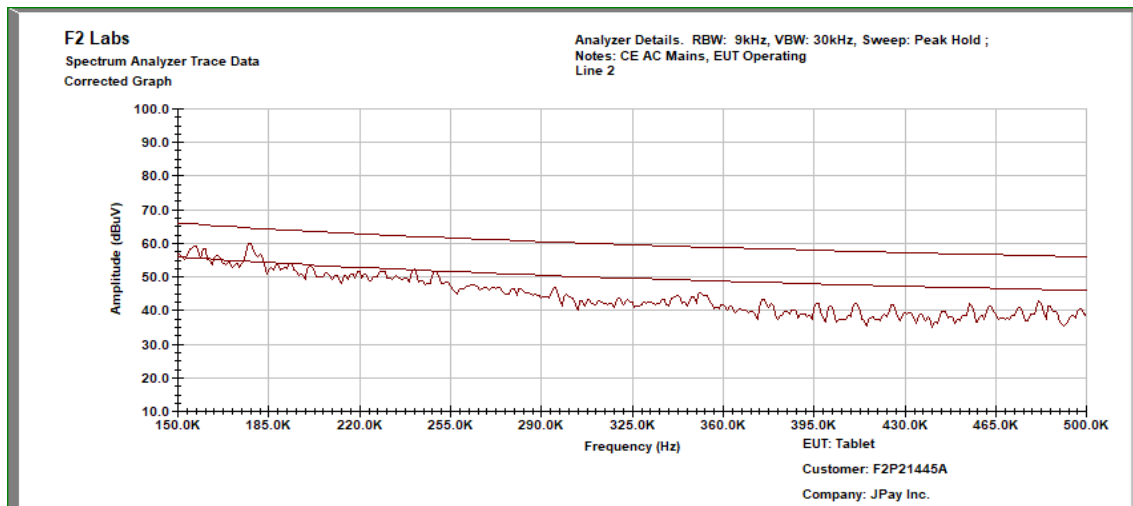
Conducted Test – Line 1: 5.0 MHz to 30.0 MHz



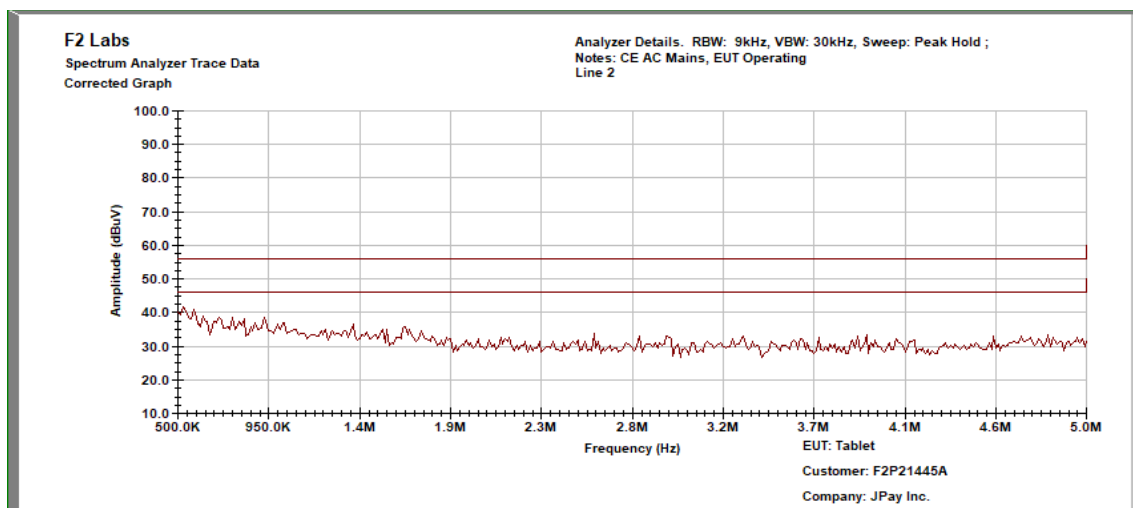
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 1	0.152625	Quasi-Peak	43.64	11.77	55.41	65.857	-10.4
			Average	26.42	11.77	38.19	55.857	-17.7
2	Line 1	0.161375	Quasi-Peak	40.16	11.668	51.83	65.394	-13.6
			Average	24.0	11.668	35.67	55.394	-19.7
3	Line 1	0.184125	Quasi-Peak	40.09	11.404	51.49	64.298	-12.8
			Average	22.71	11.404	34.11	54.298	-20.2
4	Line 1	0.206	Quasi-Peak	36.82	11.173	47.99	63.366	-15.4
			Average	20.52	11.173	31.69	53.366	-21.7
5	Line 1	0.2445	Quasi-Peak	33.58	10.873	44.45	61.942	-17.5
			Average	19.2	10.873	30.07	51.942	-21.9
6	Line 1	0.28	Quasi-Peak	31.8	10.77	42.57	60.805	-18.2
			Average	16.8	10.77	27.57	50.805	-23.2



Conducted Test – Line 2: 0.15 MHz to 0.5 MHz

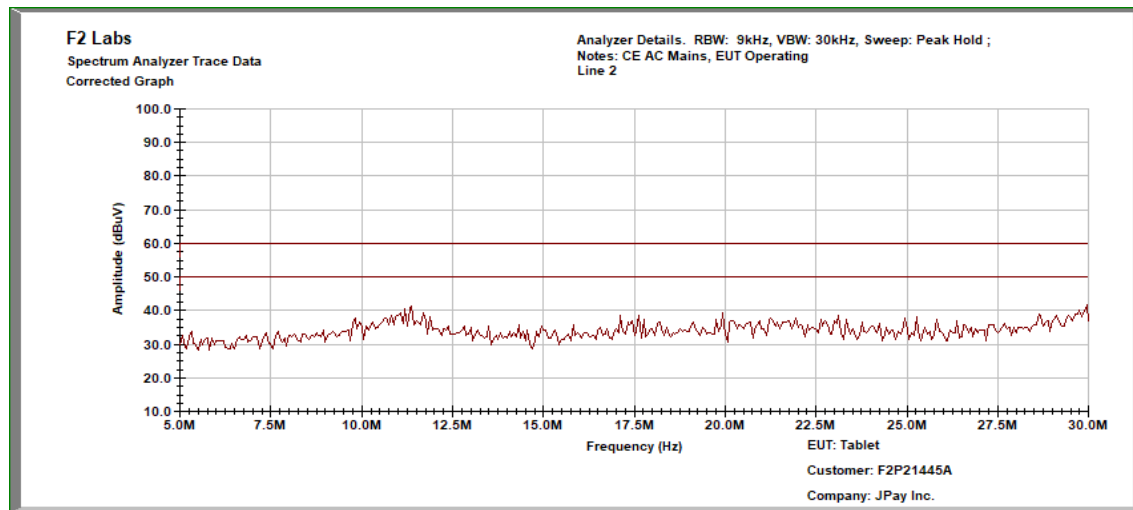


Conducted Test – Line 2: 0.5 MHz to 5.0 MHz





Conducted Test – Line 2: 5.0 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 2	0.157	Quasi-Peak	44.97	12.183	57.15	65.622	-8.5
			Average	22.41	12.183	34.59	55.622	-21.0
2	Line 2	0.178	Quasi-Peak	41.3	11.923	53.22	64.580	-11.4
			Average	21.33	11.923	33.25	54.580	-21.3
3	Line 2	0.19375	Quasi-Peak	40.28	11.727	52.01	63.875	-11.9
			Average	20.73	11.727	32.46	53.875	-21.4
4	Line 2	0.229625	Quasi-Peak	36.28	11.401	47.68	62.464	-14.8
			Average	18.91	11.401	30.31	52.464	-22.2
5	Line 2	0.2418	Quasi-Peak	35.5	11.298	46.80	62.032	-15.2
			Average	19.14	11.298	30.44	52.032	-21.6
6	Line 2	0.25	Quasi-Peak	33.81	11.228	45.04	61.736	-16.7
			Average	18.32	11.228	29.55	51.736	-22.2



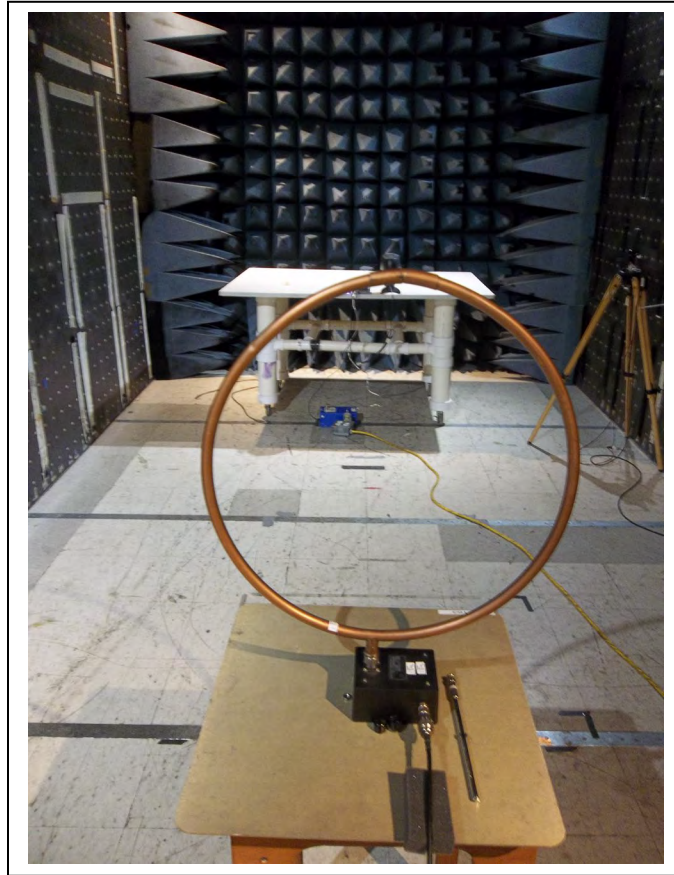
14 PHOTOGRAPHS

Occupied Bandwidth, RF Output Power, Power Spectral Density, Conducted Spurious Emissions



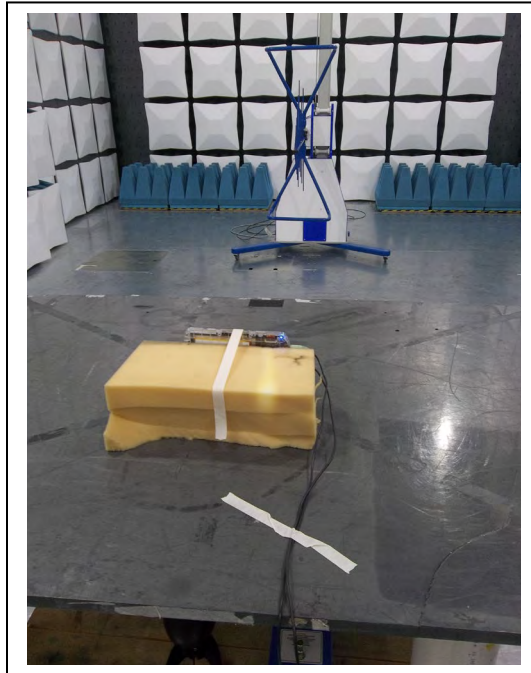


Radiated Spurious Emissions, Less Than 30 MHz





Radiated Spurious Emissions, 30 MHz to 1000 MHz

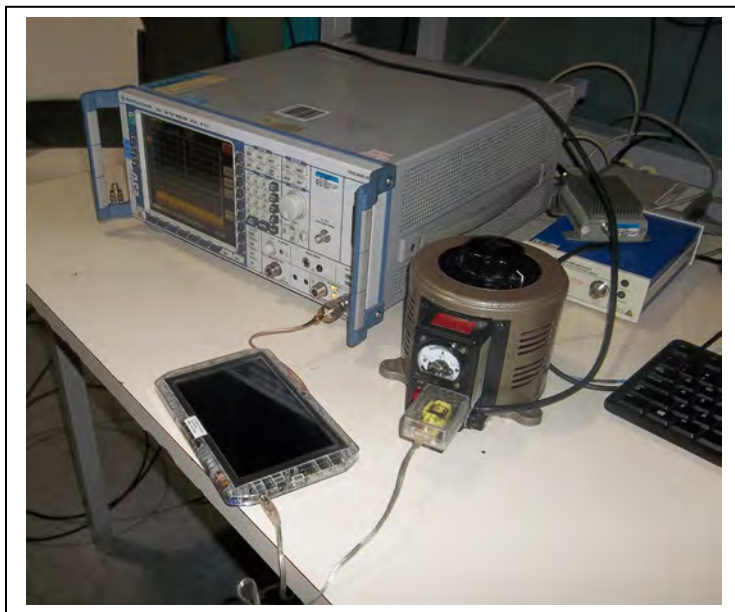


Radiated Spurious Emissions, above 1 GHz





Voltage Variations



Conducted Emissions

