

5.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard **FCC PART 96 Subpart E**

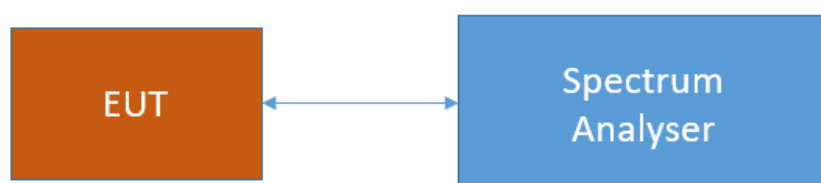
The test was performed according to:

ANSI C63.26: 2015; 5.7.4

5.4.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per § 2.1051. The limit comes from the applicable rule part for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 96

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings:

Subrange	Detector	RBW	VBW	Sweep Time
9kHz – 30kHz	RMS	1kHz	3kHz	1s
30kHz – 50kHz	RMS	3kHz	10kHz	1s
50kHz – 1MHz	RMS	10kHz	30kHz	1s
1MHz – 10MHz	RMS	100kHz	300kHz	1s
10MHz – 500MHz	RMS	1MHz	3MHz	3s
500MHz – 1GHz	RMS	1MHz	3MHz	3s
1GHz – 3GHz	RMS	1MHz	3MHz	20s
3GHz – 3.5GHz	RMS	1MHz	3MHz	10s
3.75GHz – 4GHz	RMS	1MHz	3MHz	10s
4GHz – 7GHz	RMS	1MHz	3MHz	20s
7GHz – 10GHz	RMS	1MHz	3MHz	15s
10GHz – 13GHz	RMS	1MHz	3MHz	15s
13GHz – 16GHz	RMS	1MHz	3MHz	15s
16GHz – 19GHz	RMS	1MHz	3MHz	15s
19GHz – 20GHz	RMS	1MHz	3MHz	15s
20GHz – 26GHz	RMS	1MHz	3MHz	50s
26GHz – 32GHz	RMS	1MHz	3MHz	50s
32GHz – 37GHz	RMS	1MHz	3MHz	50s

5.4.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

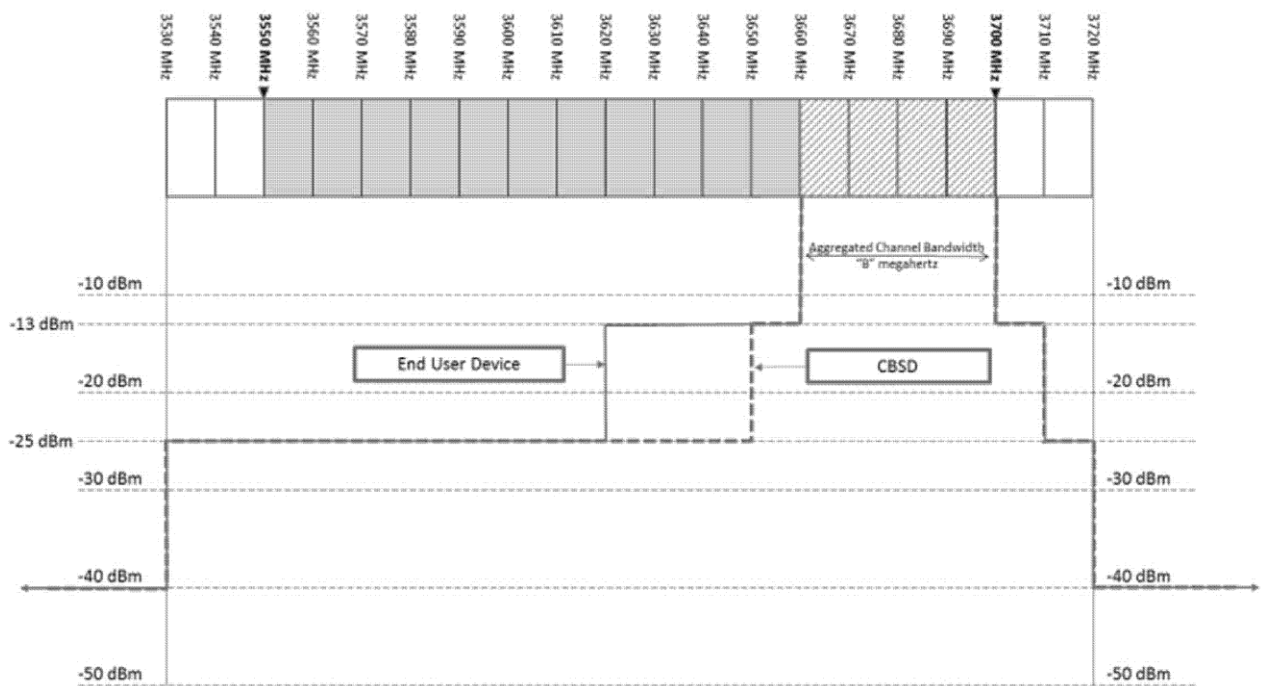
Part 96, Subpart E

§96.41 – General radio requirements

(e) *3.5 GHz Emissions and Interference Limits.*

(1) General protection levels

Figure 1 to paragraph (e) – Protection levels



(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

5.4.3 TEST PROTOCOL

Ambient temperature: 25 °C
 Relative humidity: 40 %

Op mode: one RB

Antenna Port 0

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth [kHz]	Frequency [GHz]	max Peak Value [dBm]	Limit [dBm]	Margin to Limit [dB]
NR 48	low	rms	maxhold	1000	3.5000	-48.4	-40.0	8.4
NR 48	low	rms	maxhold	1000	3.7553	-51.0	-40.0	11.0
NR 48	low	rms	maxhold	1000	36.9980	-51.4	-40.0	11.4
NR 48	mid	rms	maxhold	1000	3.3179	-46.9	-40.0	6.9
NR 48	mid	rms	maxhold	1000	3.7505	-49.4	-40.0	9.4
NR 48	mid	rms	maxhold	1000	36.9950	-51.4	-40.0	11.4
NR 48	high	rms	maxhold	1000	3.3179	-49.6	-40.0	9.6
NR 48	high	rms	maxhold	1000	3.7508	-49.4	-40.0	9.4
NR 48	high	rms	maxhold	1000	36.9980	-51.4	-40.0	11.4

Antenna Port 1

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth [kHz]	Frequency [GHz]	max Peak Value [dBm]	Limit [dBm]	Margin to Limit [dB]
NR 48	low	rms	maxhold	1000	3.5000	-48.9	-40.0	8.9
NR 48	low	rms	maxhold	1000	4.3021	-51.0	-40.0	11.0
NR 48	low	rms	maxhold	1000	36.9985	-51.4	-40.0	11.4
NR 48	mid	rms	maxhold	1000	3.4408	-47.6	-40.0	7.6
NR 48	mid	rms	maxhold	1000	3.7505	-49.8	-40.0	9.8
NR 48	mid	rms	maxhold	1000	37.0000	-51.5	-40.0	11.5
NR 48	high	rms	maxhold	1000	2.8514	-49.6	-40.0	9.6
NR 48	high	rms	maxhold	1000	3.7500	-49.8	-40.0	9.8
NR 48	high	rms	maxhold	1000	36.9950	-51.5	-40.0	11.5

Antenna Port 2

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth [kHz]	Frequency [GHz]	max Peak Value [dBm]	Limit [dBm]	Margin to Limit [dB]
NR 48	low	rms	maxhold	1000	3.5000	-48.6	-40.0	8.6
NR 48	low	rms	maxhold	1000	4.2726	-50.9	-40.0	10.9
NR 48	low	rms	maxhold	1000	36.9970	-51.4	-40.0	11.4
NR 48	mid	rms	maxhold	1000	3.3796	-46.9	-40.0	6.9
NR 48	mid	rms	maxhold	1000	3.7500	-49.6	-40.0	9.6
NR 48	mid	rms	maxhold	1000	35.9185	-51.4	-40.0	11.4
NR 48	high	rms	maxhold	1000	2.8514	-49.6	-40.0	9.6
NR 48	high	rms	maxhold	1000	3.7500	-49.1	-40.0	9.1
NR 48	high	rms	maxhold	1000	36.9985	-51.5	-40.0	11.5

Antenna Port 3

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth [kHz]	Frequency [GHz]	max Peak Value [dBm]	Limit [dBm]	Margin to Limit [dB]
NR 48	low	rms	maxhold	1000	3.5000	-45.1	-40.0	5.1
NR 48	low	rms	maxhold	1000	4.2987	-50.9	-40.0	10.9
NR 48	low	rms	maxhold	1000	36.9945	-51.4	-40.0	11.4
NR 48	mid	rms	maxhold	1000	3.4975	-47.5	-40.0	7.5
NR 48	mid	rms	maxhold	1000	3.7505	-49.7	-40.0	9.7
NR 48	mid	rms	maxhold	1000	35.9070	-51.5	-40.0	11.5
NR 48	high	rms	maxhold	1000	3.4988	-47.4	-40.0	7.4
NR 48	high	rms	maxhold	1000	3.7502	-49.2	-40.0	9.2
NR 48	high	rms	maxhold	1000	36.9985	-51.3	-40.0	11.3

Sum table. Values calculated using methods "*Measure and sum spectral maxima across the outputs.*" as described in the KDB 662911 D01 v02r01 chapter E 3 ii.

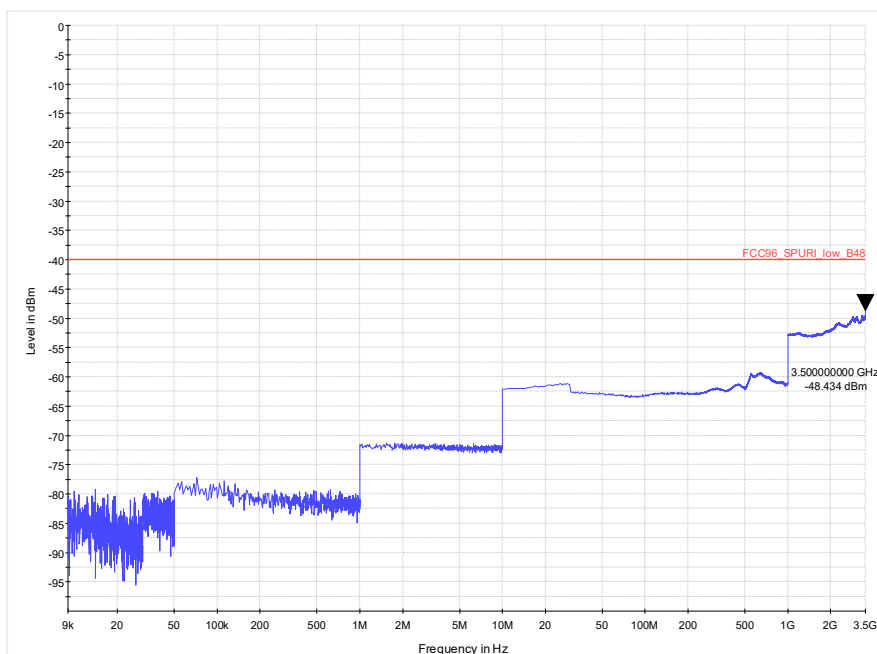
Radio Technology	Channel	Detector	Trace	Resolution Bandwidth [kHz]	Frequency range	max Peak Value [dBm]	Limit [dBm]	Margin to Limit [dB]
NR 48	low	rms	maxhold	1000	9kHz 3.5GHz	-41.4	-40.0	1.4
NR 48	low	rms	maxhold	1000	3.75GHz 20GHz	-44.9	-40.0	4.9
NR 48	low	rms	maxhold	1000	20GHz 37GHz	-45.4	-40.0	5.4
NR 48	mid	rms	maxhold	1000	9kHz 3.5GHz	-41.2	-40.0	1.2
NR 48	mid	rms	maxhold	1000	3.75GHz 20GHz	-43.6	-40.0	3.6
NR 48	mid	rms	maxhold	1000	20GHz 37GHz	-45.4	-40.0	5.4
NR 48	high	rms	maxhold	1000	9kHz 3.5GHz	-42.9	-40.0	2.9
NR 48	high	rms	maxhold	1000	3.75GHz 20GHz	-43.4	-40.0	3.4
NR 48	high	rms	maxhold	1000	20GHz 37GHz	-45.4	-40.0	5.4

Remark: Please see next sub-clause for the measurement plot.

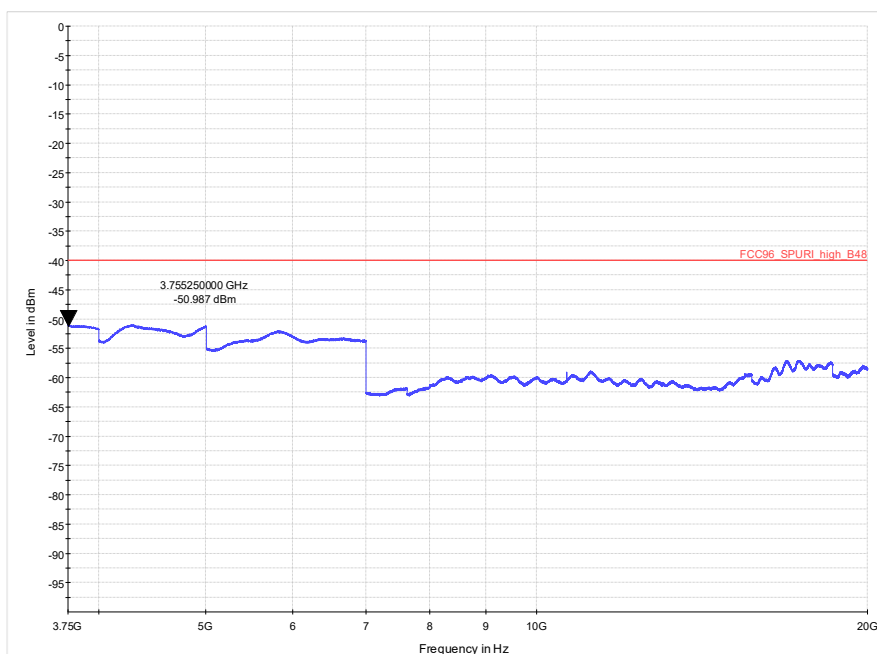
5.4.4 MEASUREMENT PLOT

Antenna port 0

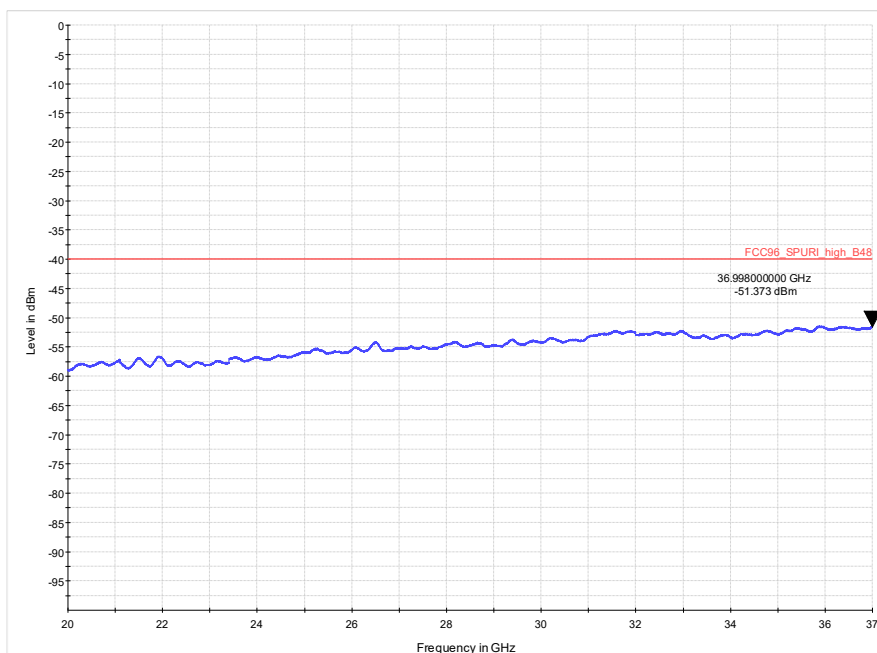
Channel LOW



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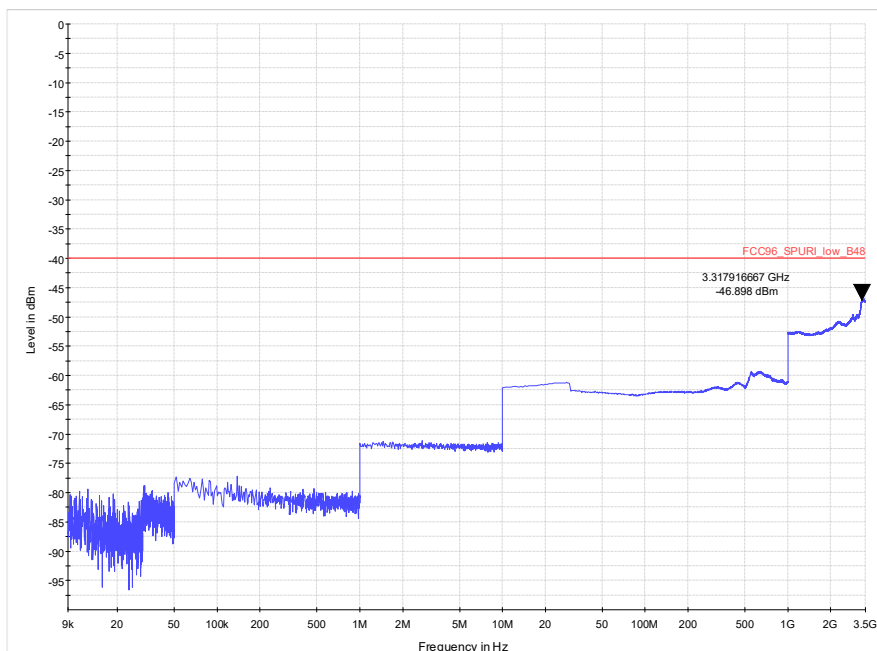


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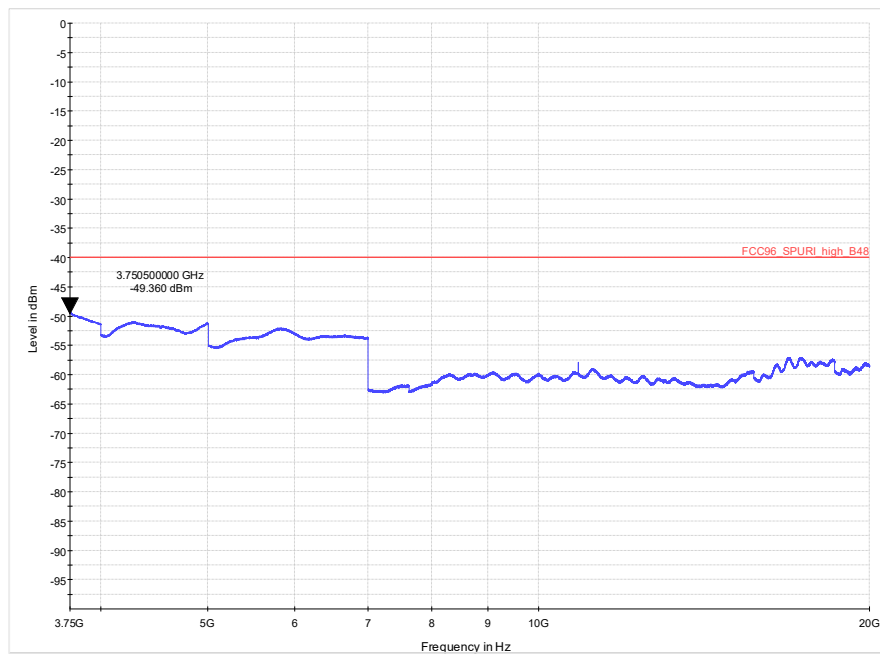


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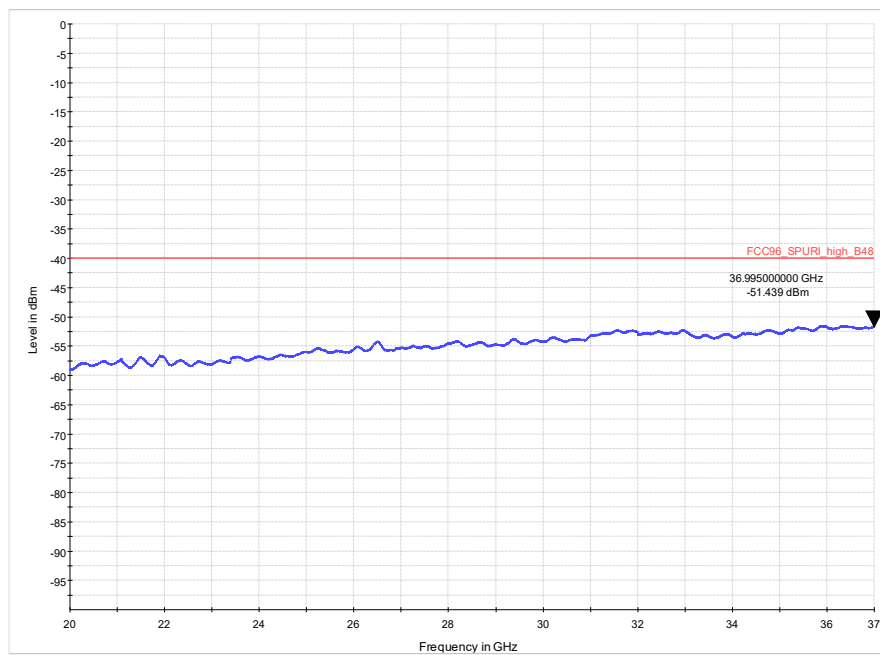
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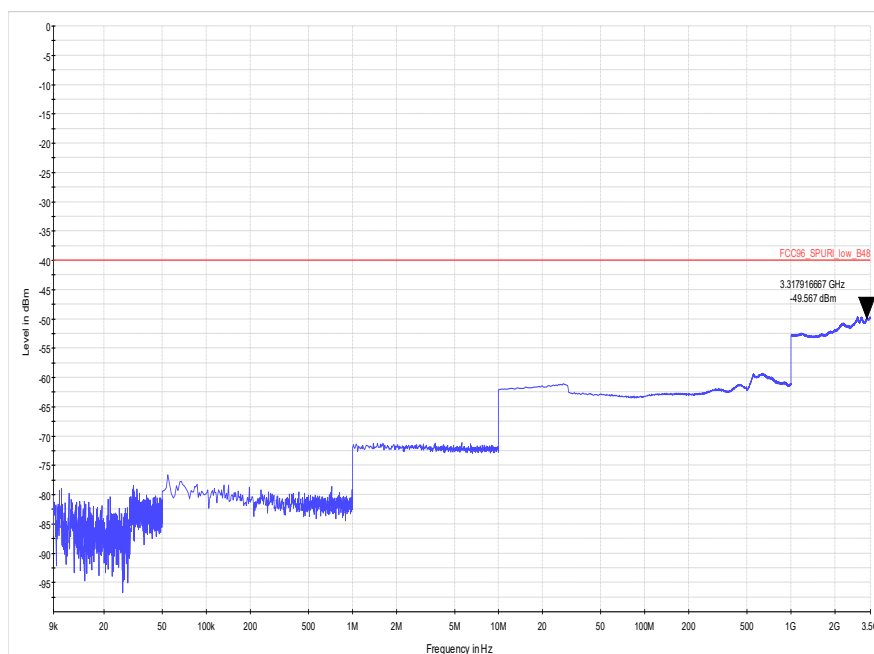


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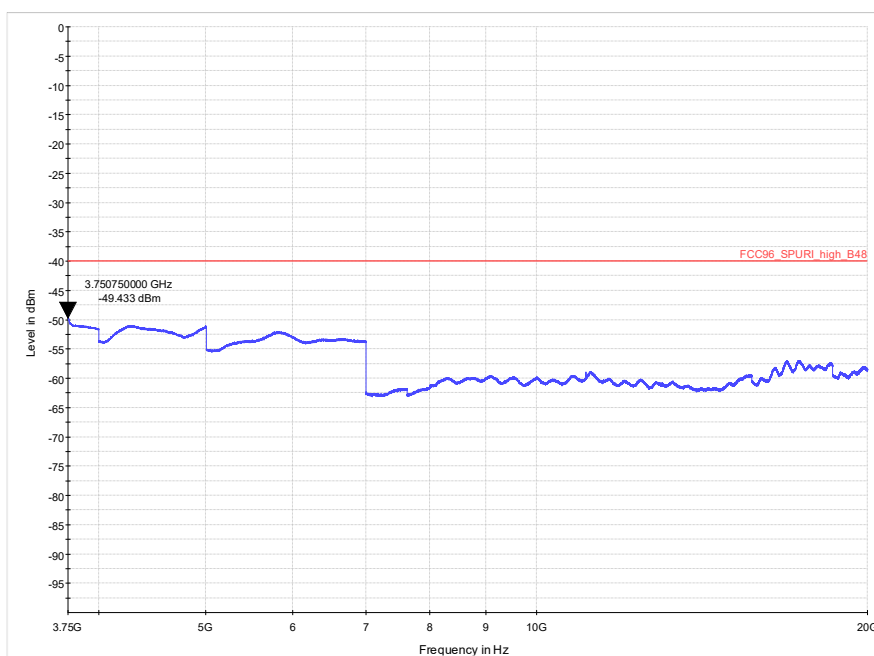


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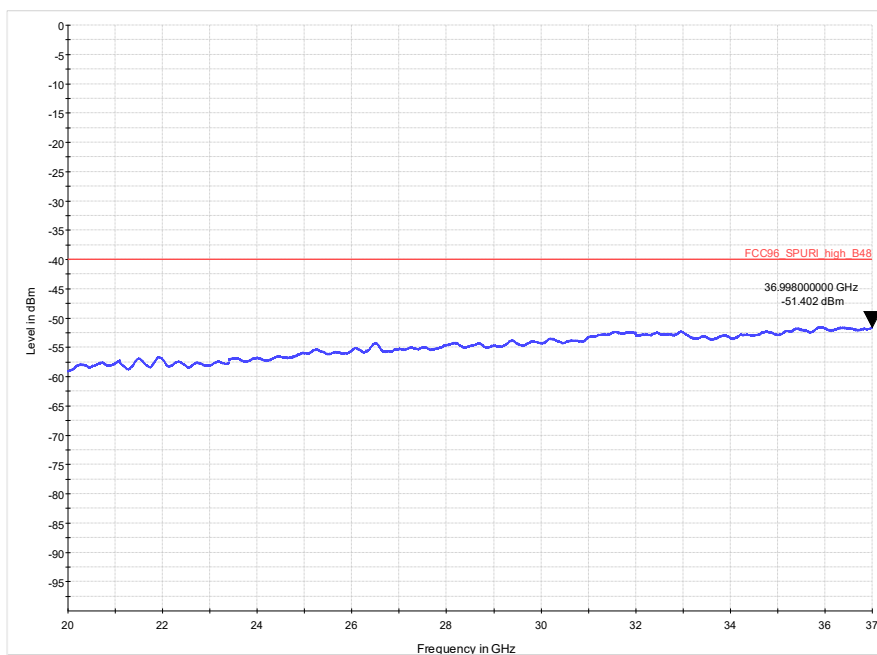
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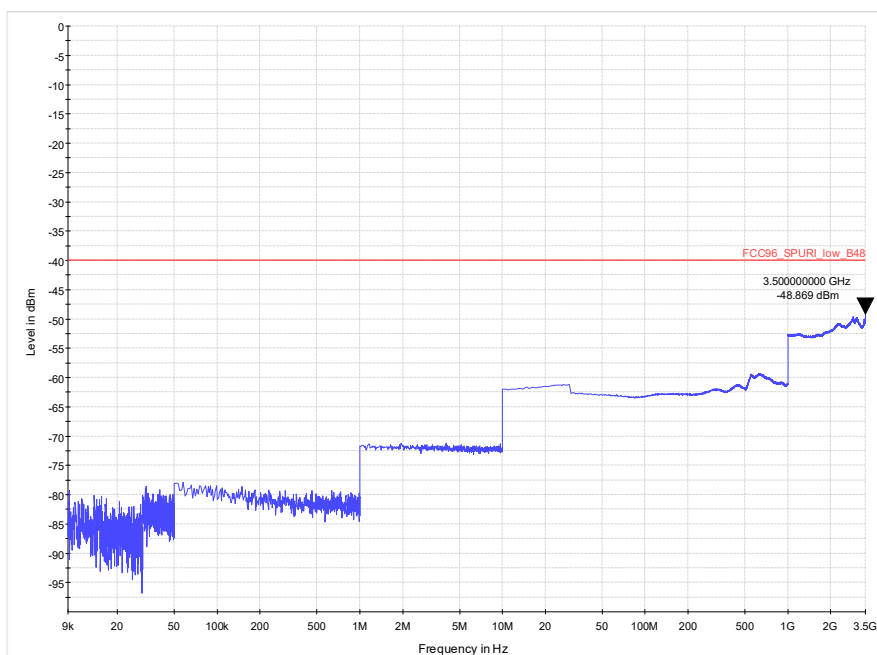
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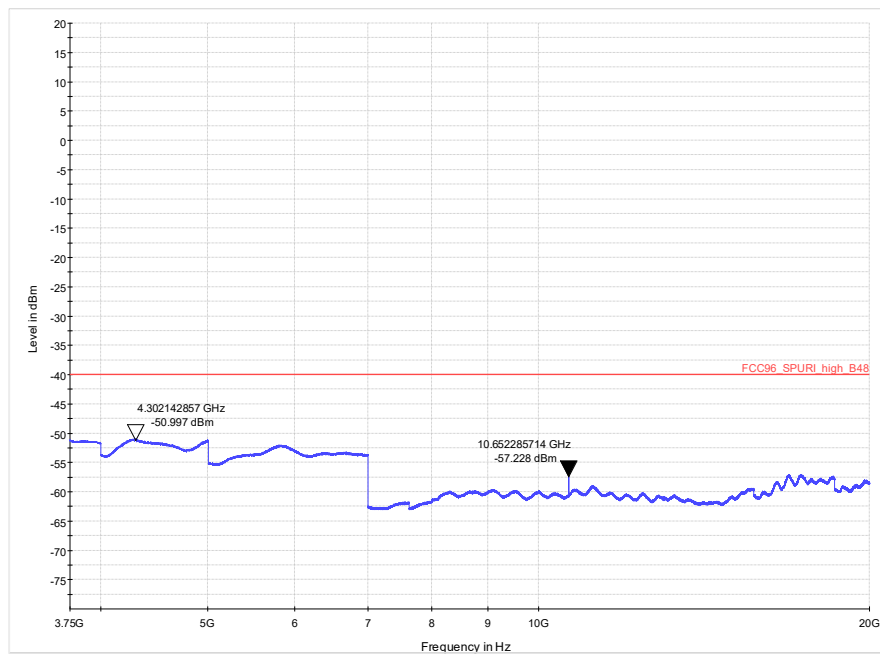
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Antenna port 1

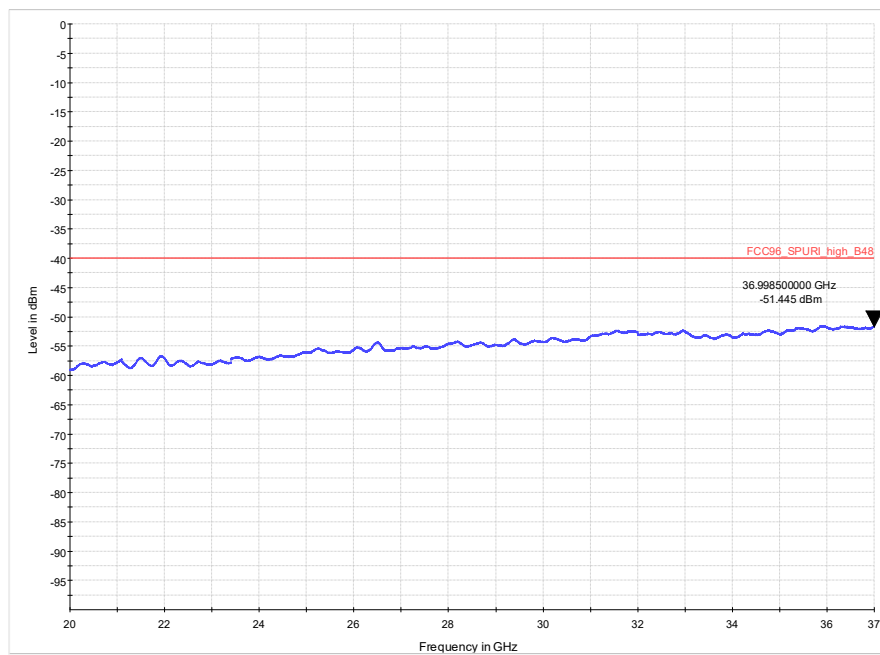
Channel LOW



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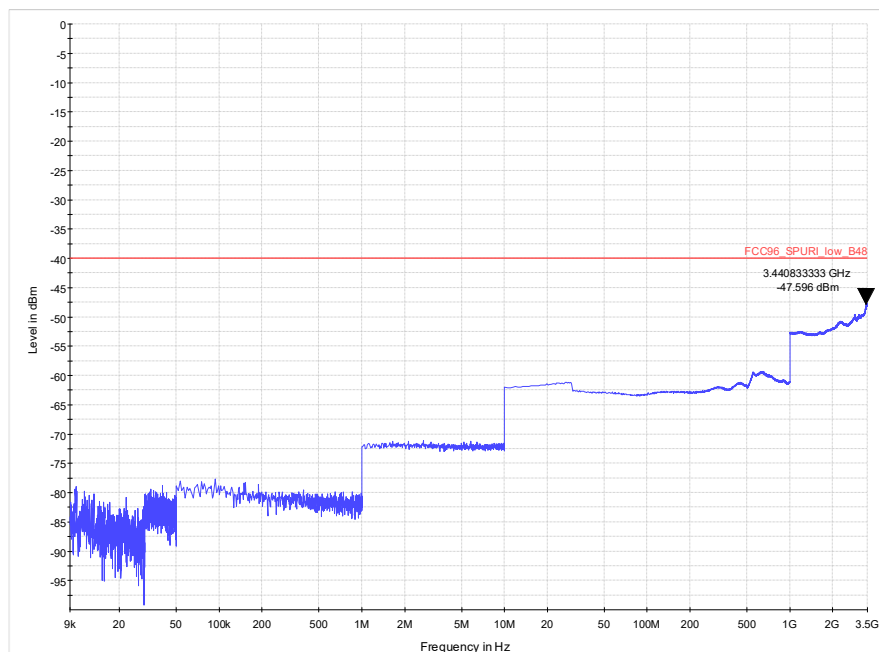


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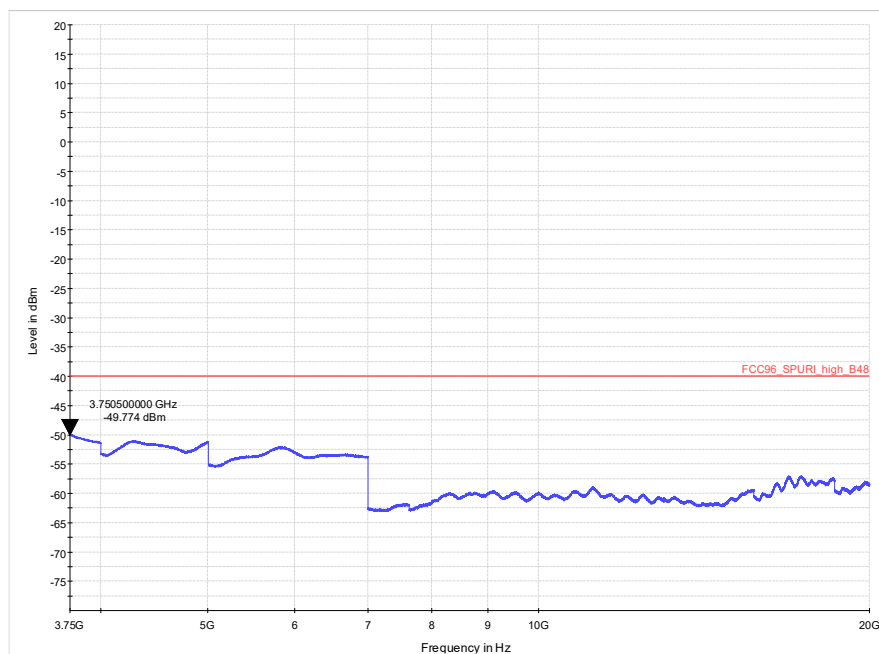


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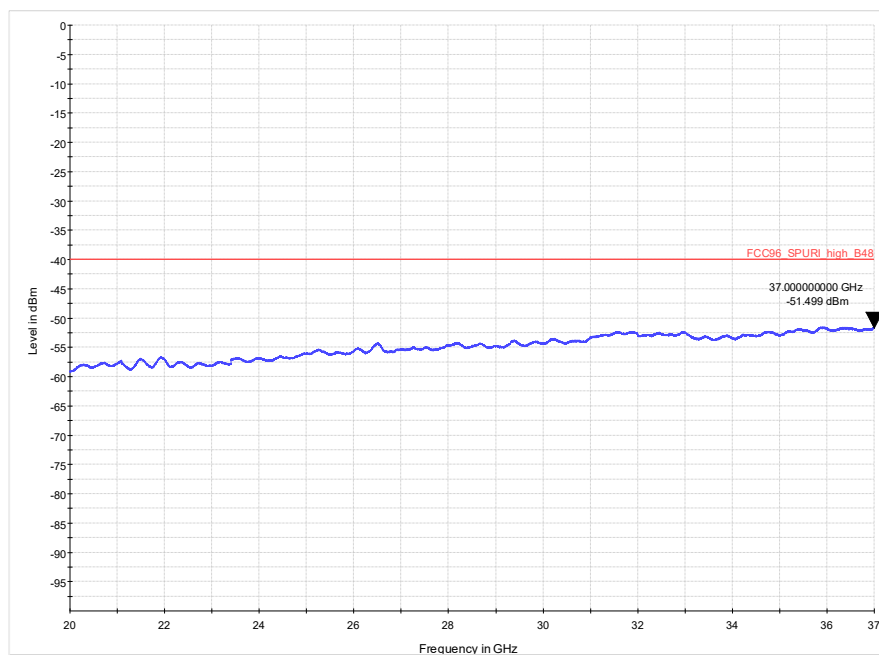
Channel MID



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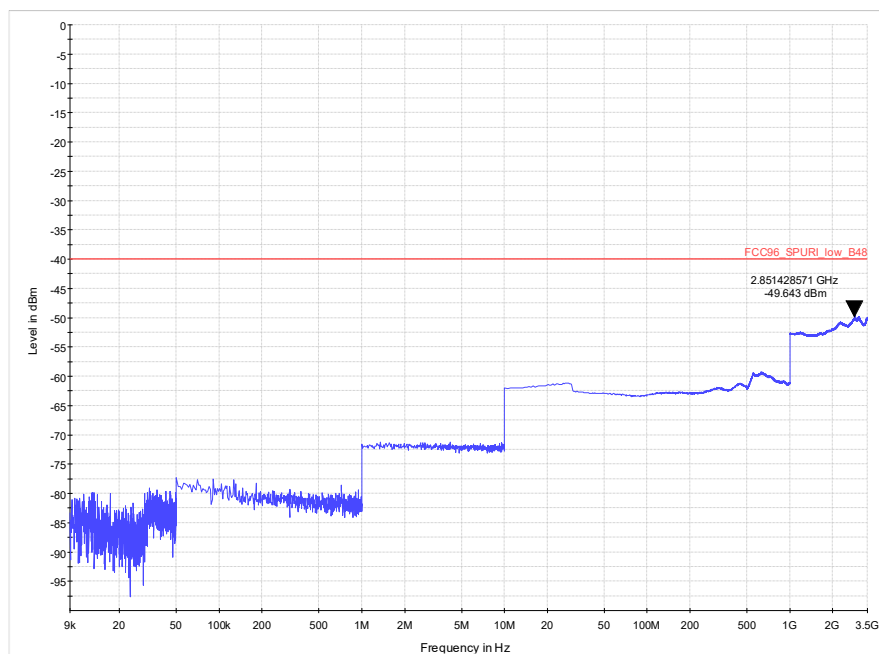


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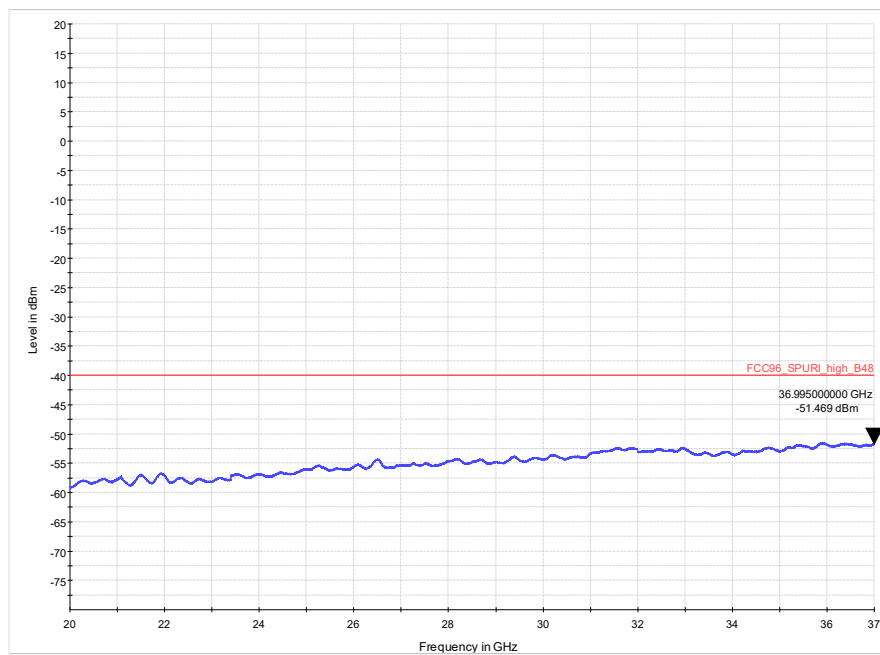
Channel High



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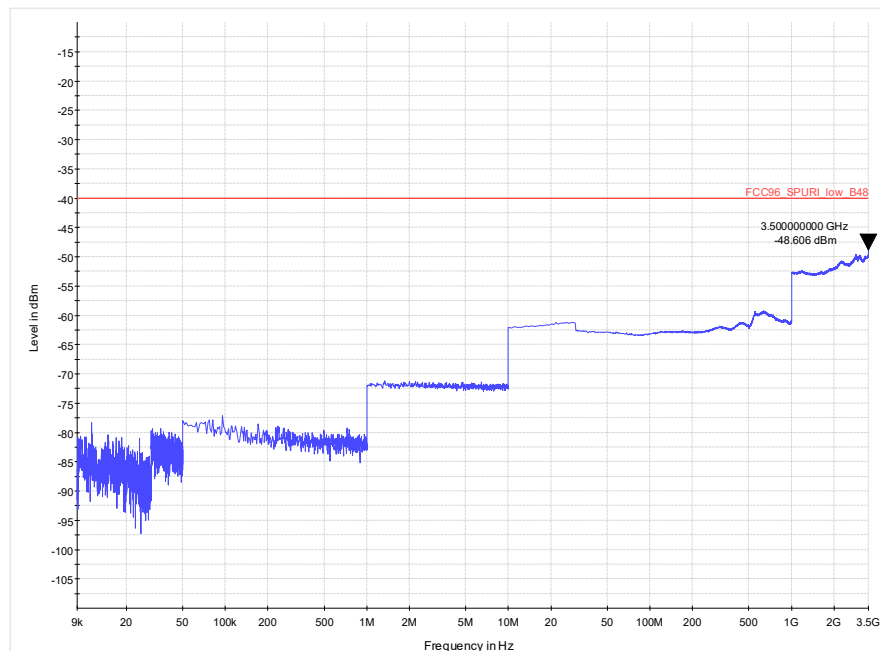
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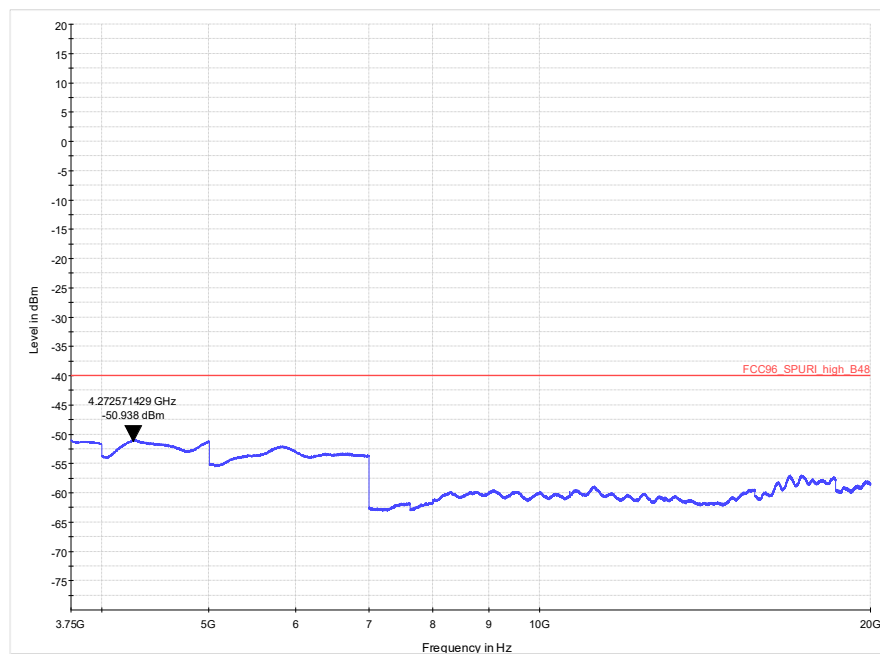
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Antenna port 2

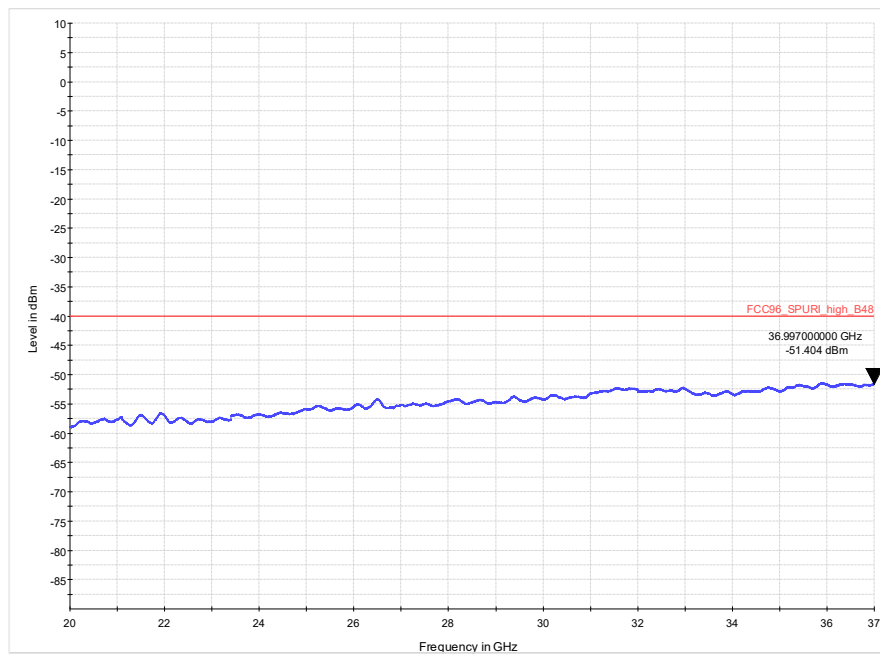
Channel LOW



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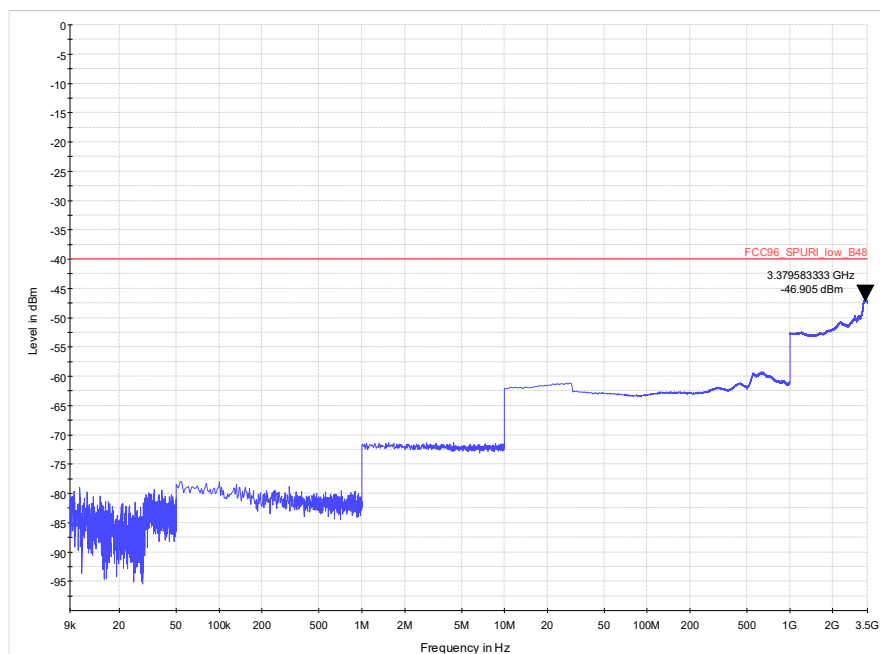


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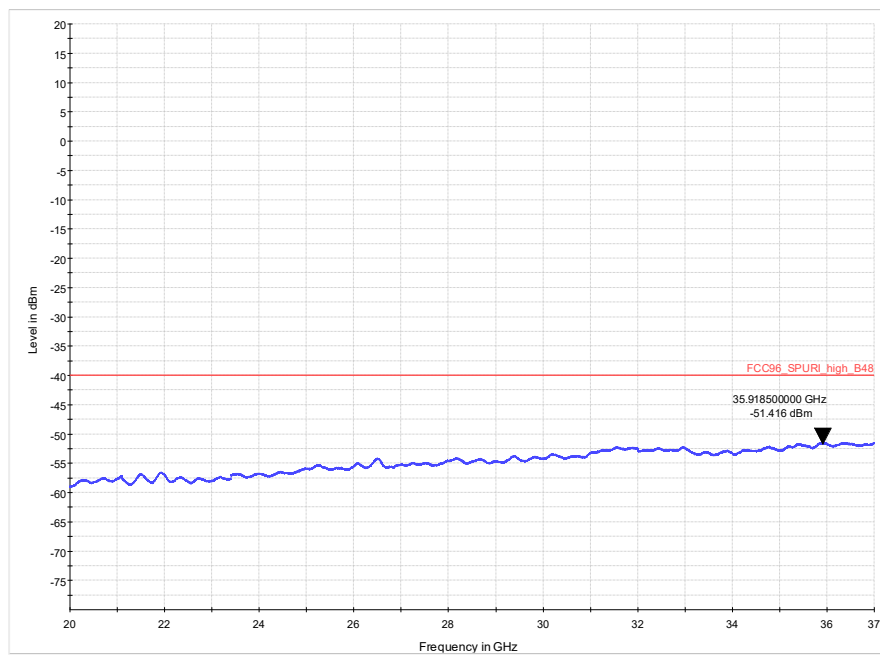
Channel MID



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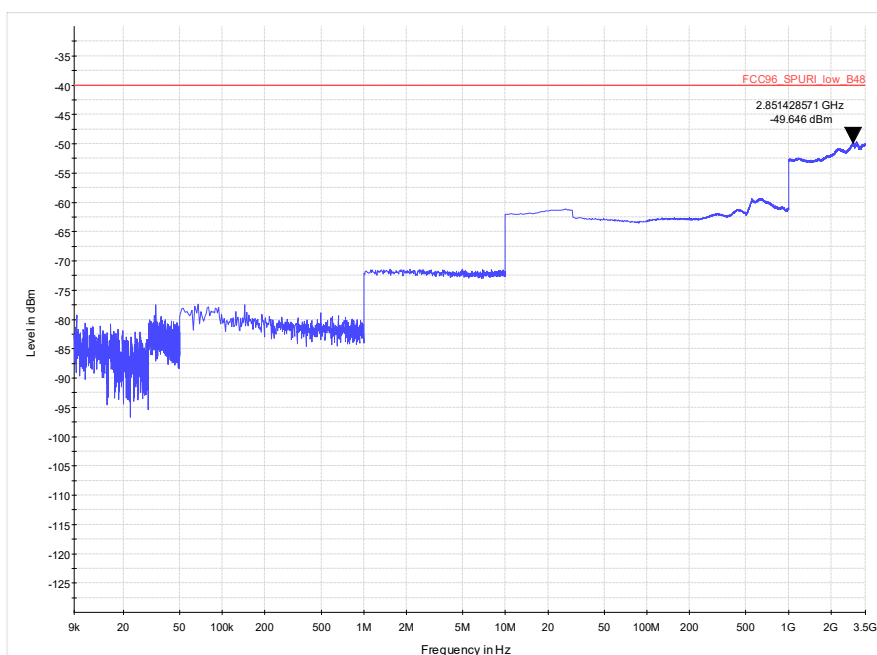


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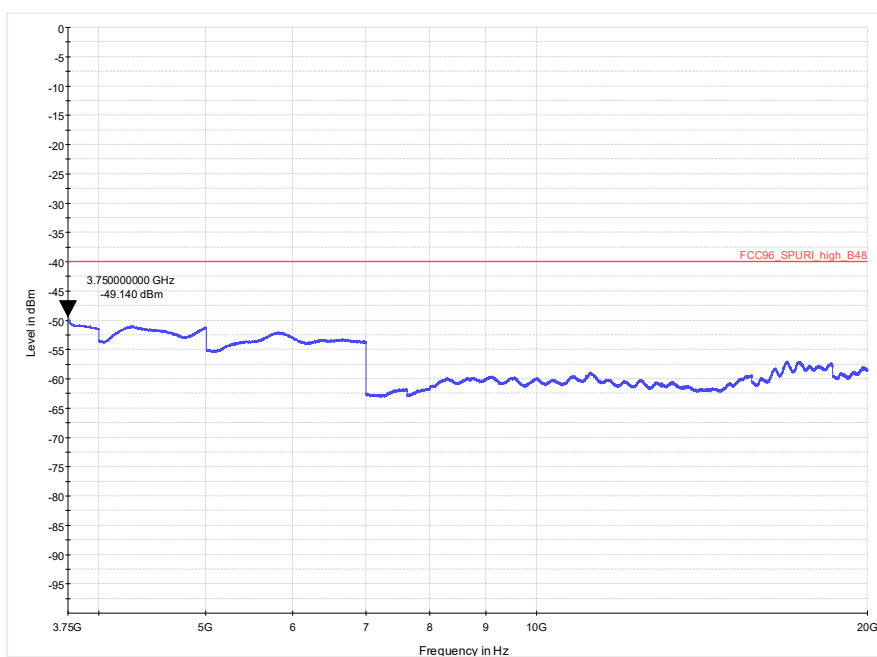


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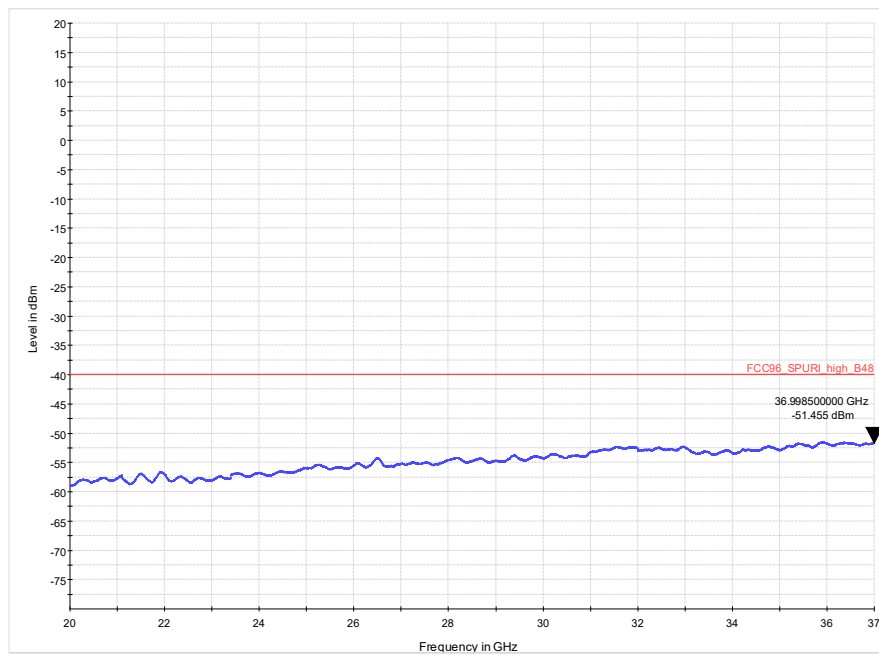
Channel High



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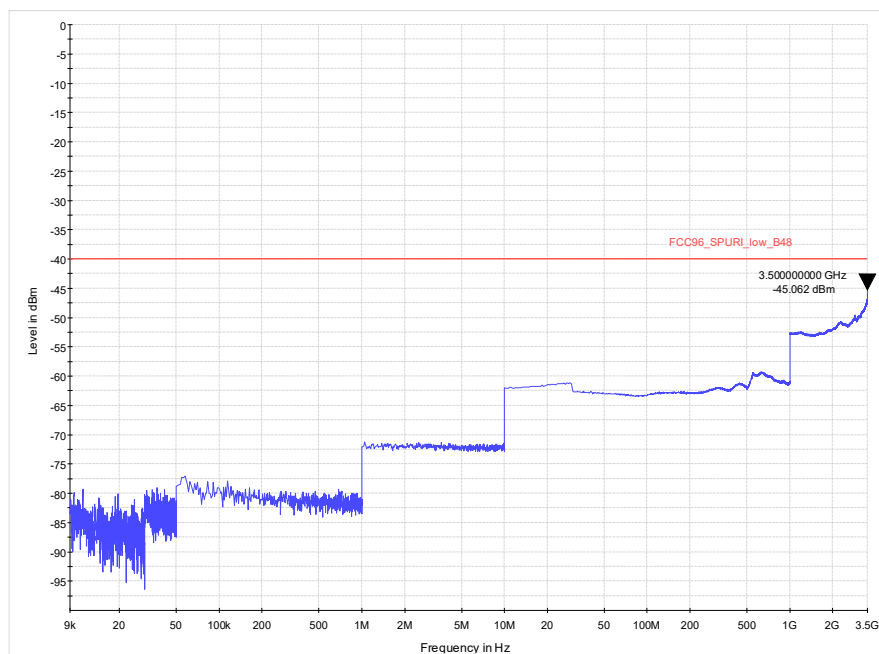
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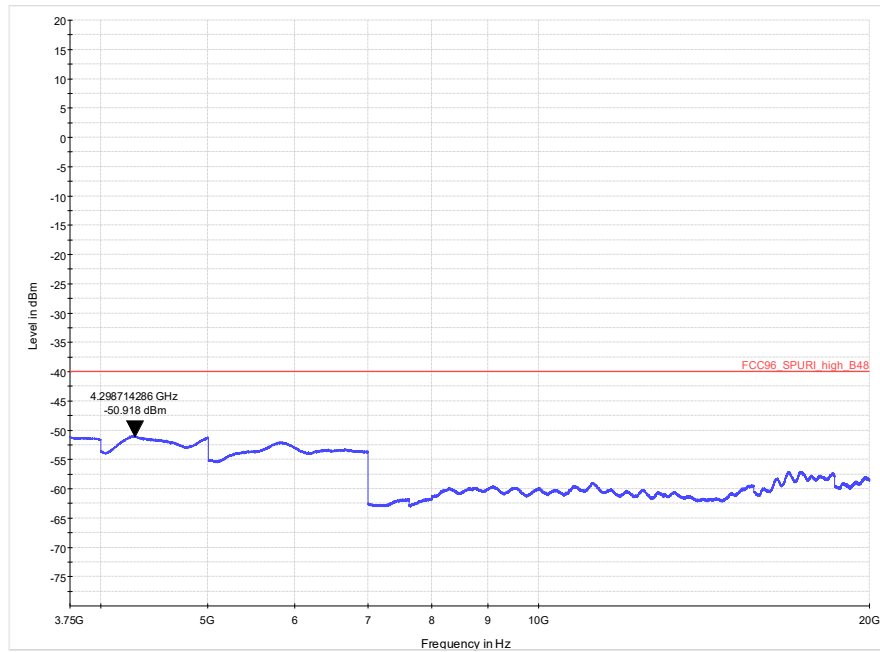
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Antenna port 3

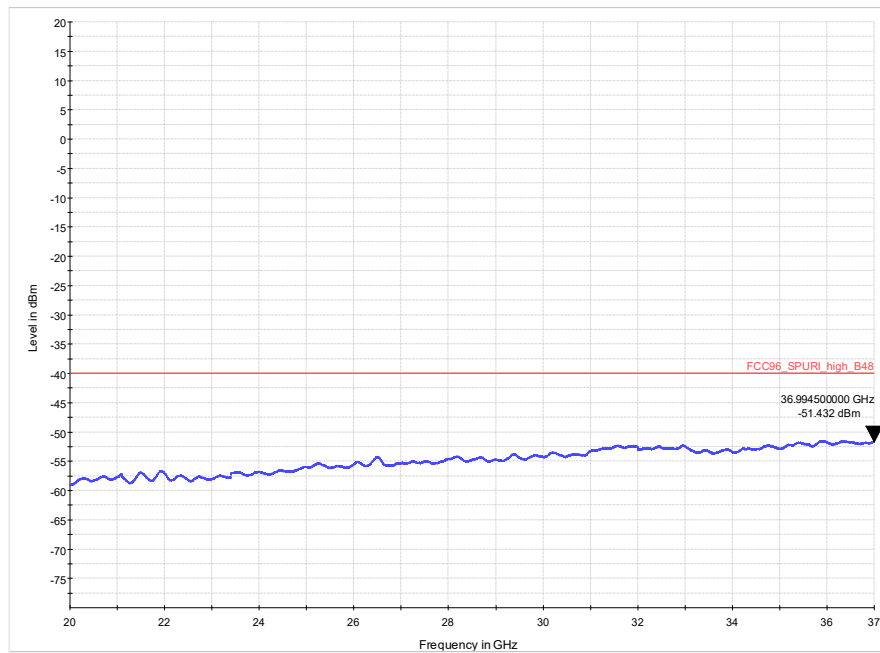
Channel LOW



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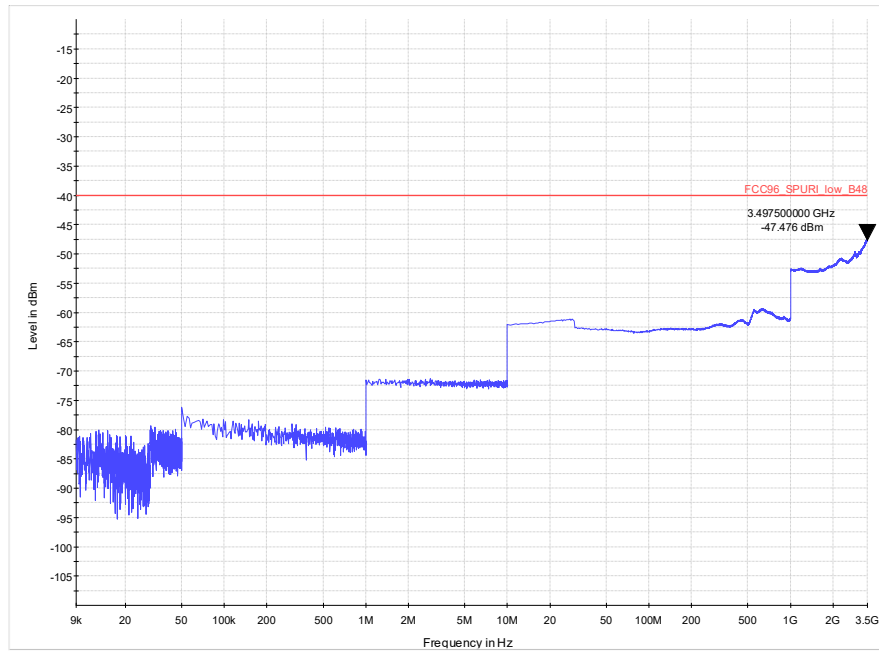


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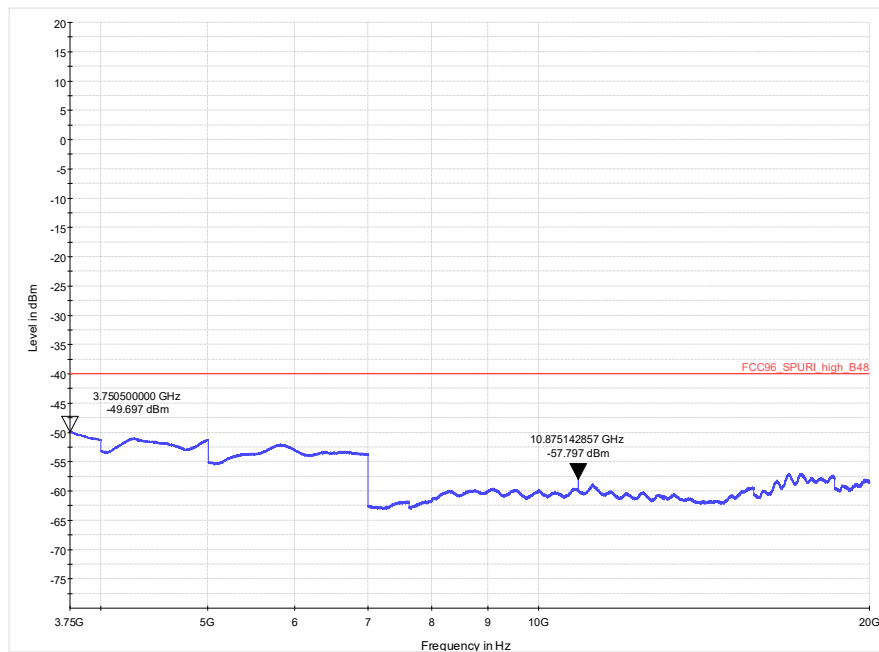


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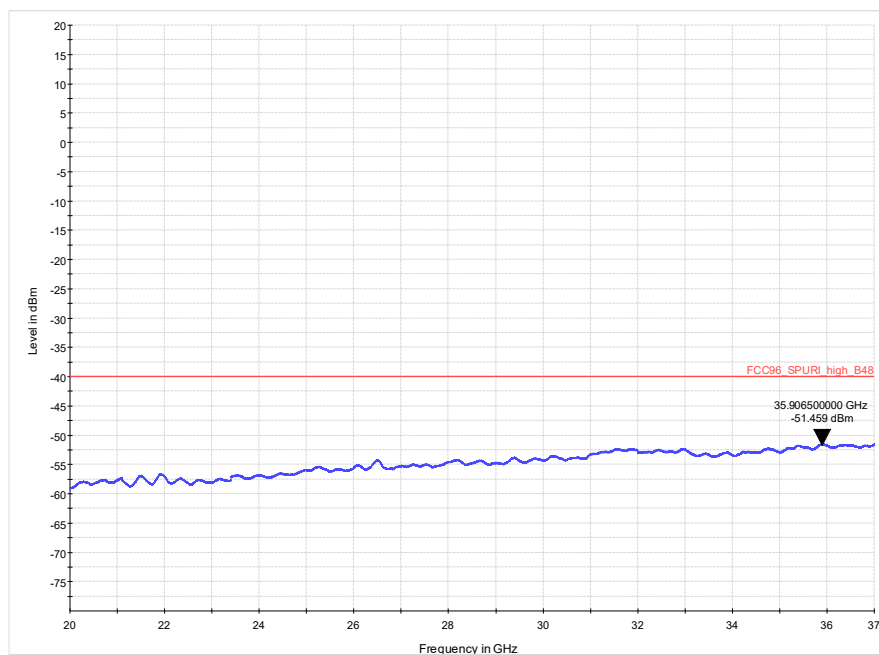
Channel MID



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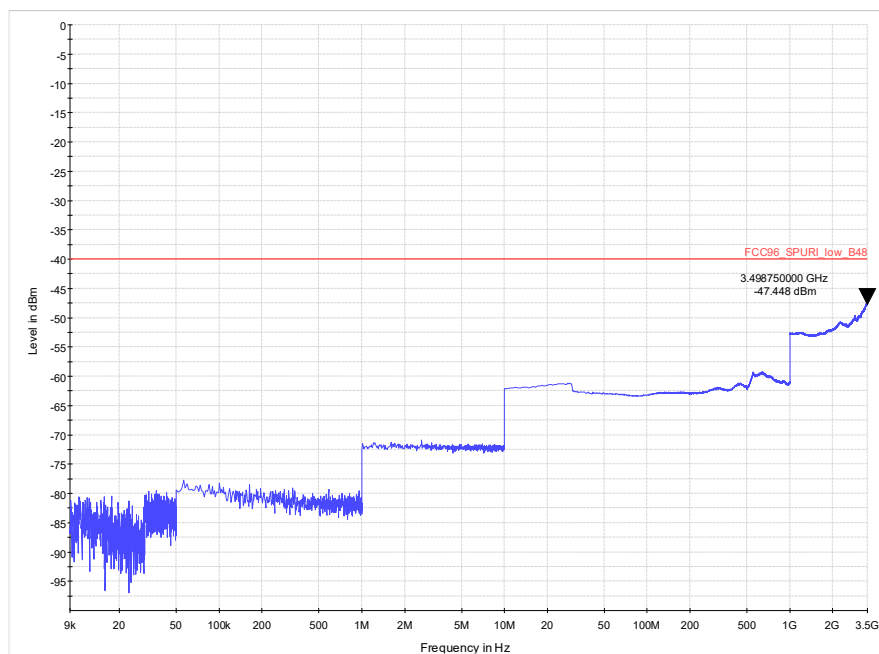


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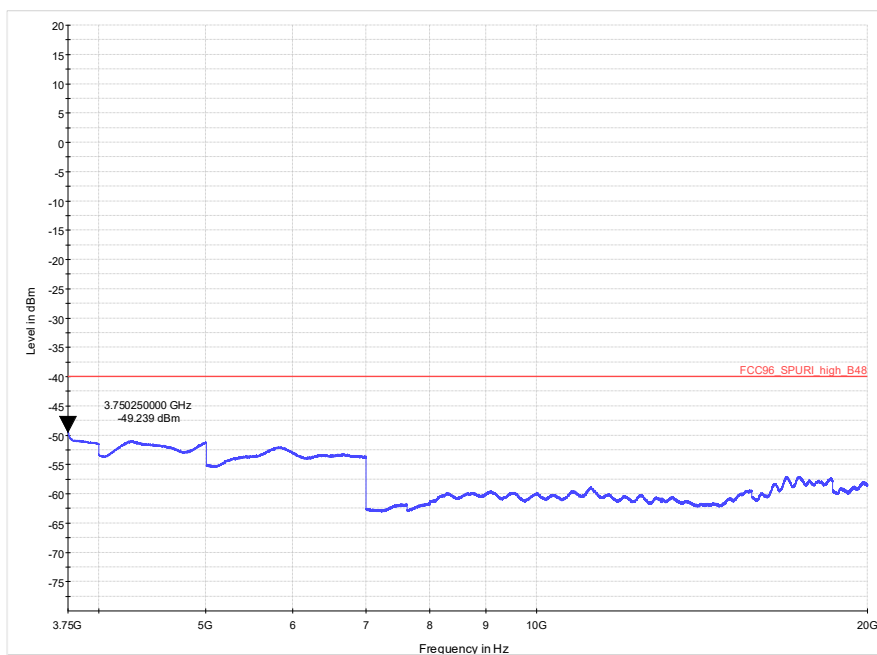


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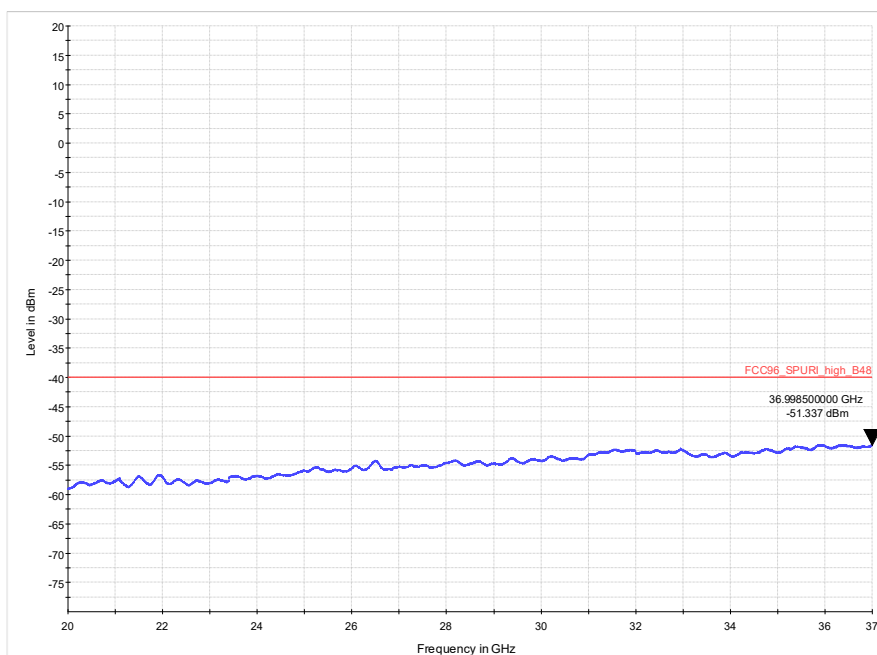
Channel High



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SPURI_3.75G_20G_3695_10M_QPSK_1RB



SPURI_20G_37G_3695_10M_QPSK_1RB

5.4.5 TEST EQUIPMENT USED

- Radio Lab

5.5 FIELD STRENGTH OF SPURIOUS RADIATION

Standard **FCC PART 96 Subpart E**

The test was performed according to:

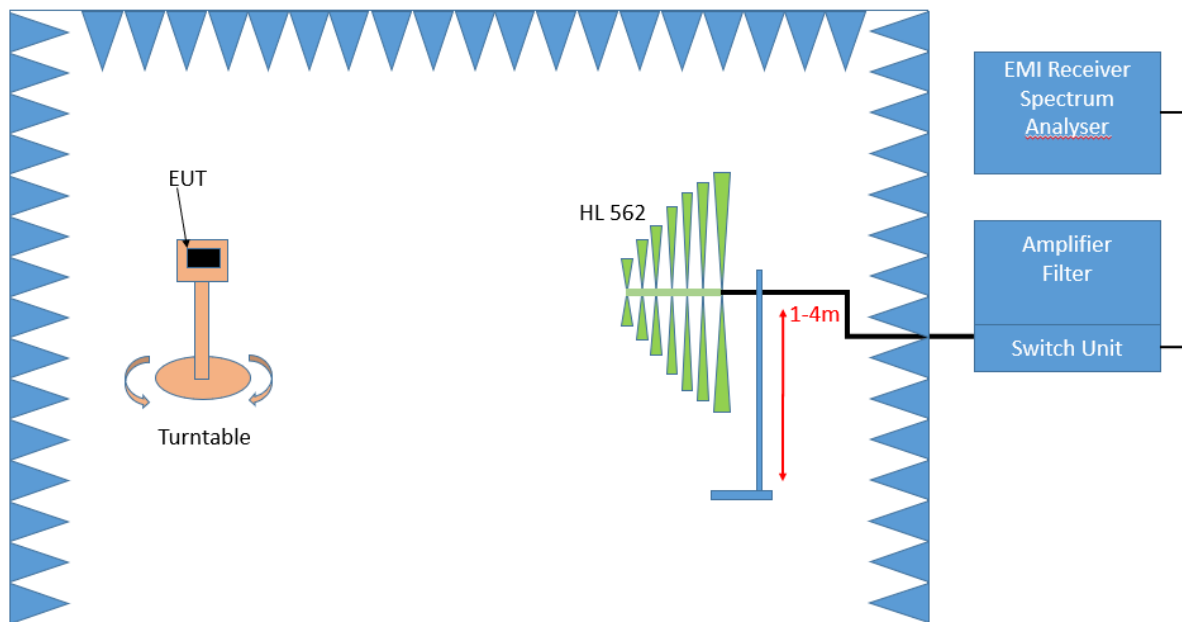
ANSI C63.26: 2015; 5.5.2.3.1

5.5.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053. The limit and requirements come from the applicable rule part for the operating band of the cellular device.

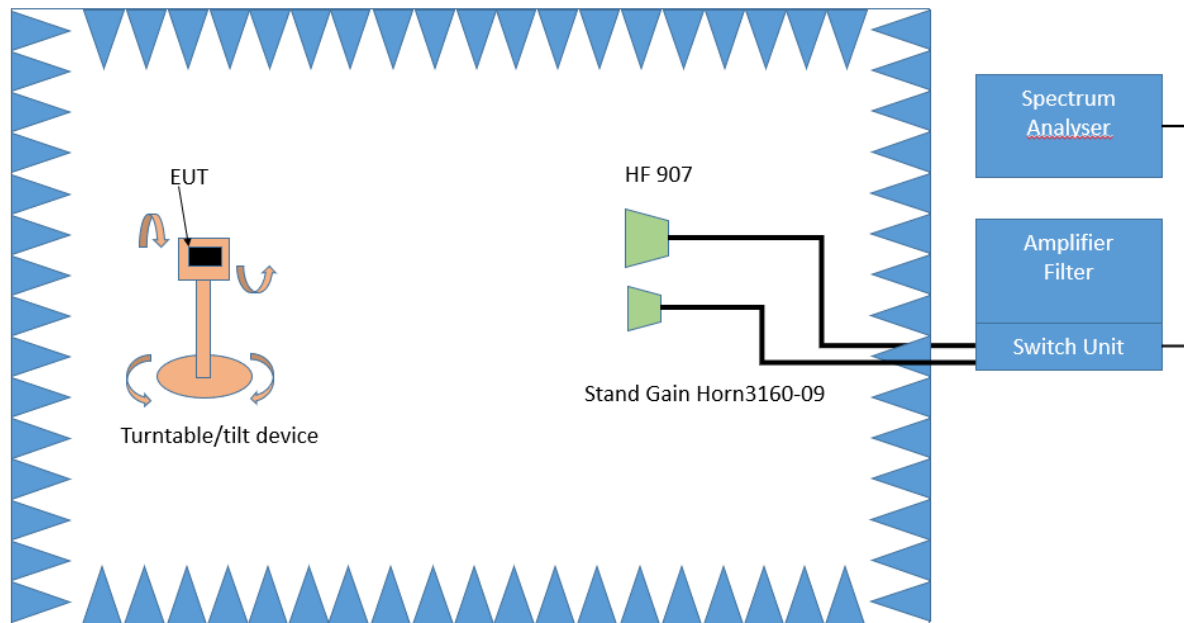
The EUT was connected to the test setup according to the following diagram:

Frequency Range: 30 MHz – 1 GHz:



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Frequency Range: 1 GHz – 26.5 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

The test set-up was made in accordance to the general provisions of ANSI C63.26 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

1. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

This is a preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: Peak
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: -180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by $\pm 45^{\circ}$ around this value. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission

will be recorded and adjusted. In this position, the antenna height will also slowly vary by ± 100 cm around the antenna height determined. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: $\pm 45^\circ$ around the determined value
- Height variation range: ± 100 cm around the determined value
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with RMS detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: RMQ
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90° .

The turn table step size (azimuth angle) for the preliminary measurement is 45° .

- Antenna distance: 3 m
- Detector: Peak
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: -180° to 90°
- Turntable step size: 90°
- Polarisation: Horizontal + Vertical

Step 2:

Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna in step 2 is omitted. Instead of this, a maximum search with a step size $\pm 45^\circ$ for the elevation axis is performed.

The turn table azimuth will slowly vary by $\pm 22.5^\circ$.

The elevation angle will slowly vary by $\pm 45^\circ$

EMI receiver settings (for all steps):

- Detector: Peak,
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled

Step 3:

Spectrum analyser settings for step 3:

- Detector: RMS
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep Time: 1 s

5.5.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

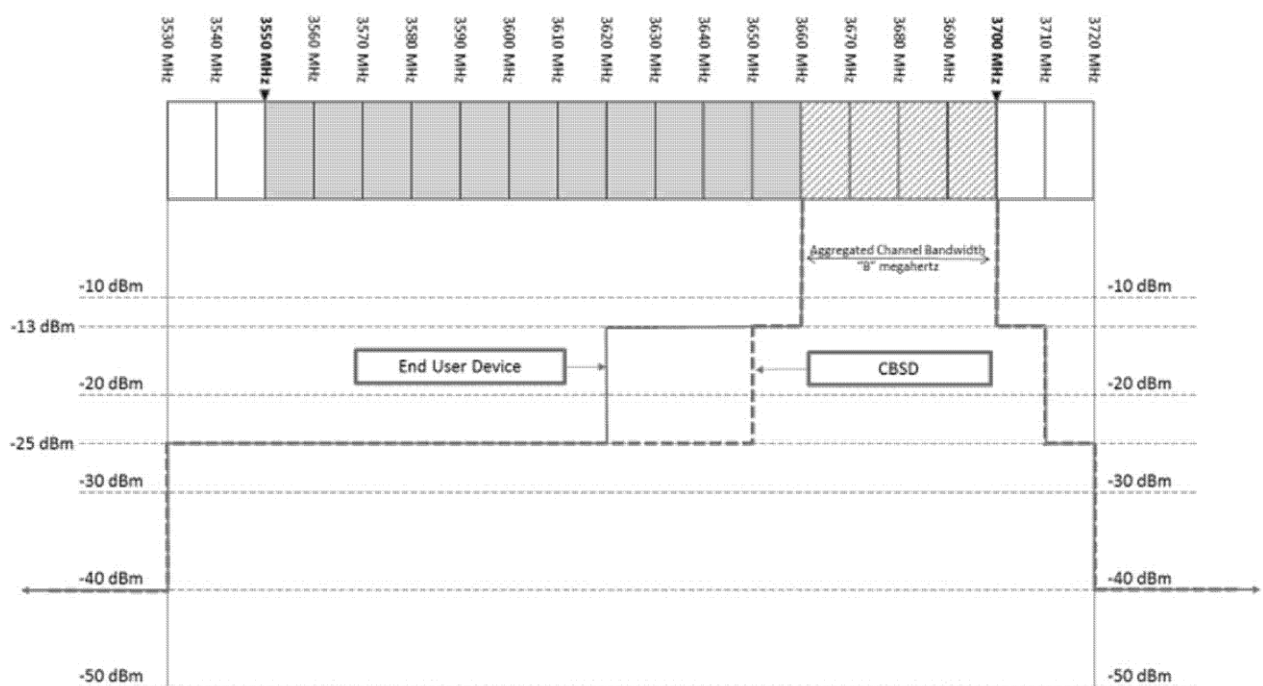
Part 96, Subpart E

§96.41 – General radio requirements

(e) 3.5 GHz Emissions and Interference Limits.

(1) General protection levels

Figure 1 to paragraph (e) – Protection levels



(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside

the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

5.5.3 TEST PROTOCOL

Ambient temperature: 25 °C
 Relative humidity: 38 %

RSE channel 3555MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
1576	-58.3	RMS	1000	-40.0	18.3
3194.908	-46.8	RMS	1000	-40.0	6.8
3440.695	-43.3	RMS	1000	-40.0	3.3
3513.57	-41.7	RMS	1000	-40.0	1.7
5294.81	-47.9	RMS	1000	-40.0	7.9
10311.917	-53.7	RMS	1000	-40.0	13.7
25041	-53.9	RMS	1000	-40.0	13.9

RSE channel 3625MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
1572	-58.8	RMS	1000	-40.0	18.8
3440.695	-41	RMS	1000	-40.0	1.0
3723.69	-45.4	RMS	1000	-40.0	5.4
6706.85	-46	RMS	1000	-40.0	6.0
17494.917	-51.4	RMS	1000	-40.0	11.4
25225	-53	RMS	1000	-40.0	13.0

RSE channel 3695MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
1574	-58.6	RMS	1000	-40.0	18.6
3440.695	-41	RMS	1000	-40.0	1.0
3721.23	-41.1	RMS	1000	-40.0	1.1
11081.917	-54.9	RMS	1000	-40.0	14.9
17931.25	-51	RMS	1000	-40.0	11.0
25881	-53.6	RMS	1000	-40.0	13.6

RSE channel 3555MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
1650	-58.6	RMS	1000	-40.0	18.6
2974	-53.6	RMS	1000	-40.0	13.6
3528.278	-42.1	RMS	1000	-40.0	2.1
3740.09	-49.1	RMS	1000	-40.0	9.1
6639.61	-46	RMS	1000	-40.0	6.0
10666.667	-47.9	RMS	1000	-40.0	7.9
25189	-53	RMS	1000	-40.0	13.0

RSE channel 3625MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
3349.138	-44.1	RMS	1000	-40.0	4.1
3744.6	-46	RMS	1000	-40.0	6.0
6898.73	-46	RMS	1000	-40.0	6.0
10312.833	-50.2	RMS	1000	-40.0	10.2
10874.75	-52.7	RMS	1000	-40.0	12.7
17926.667	-51.2	RMS	1000	-40.0	11.2
25282	-53.1	RMS	1000	-40.0	13.1

RSE channel 3695MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC

Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
1574	-58.8	RMS	1000	-40.0	18.8
3518.208	-47.2	RMS	1000	-40.0	7.2
3735.99	-42.7	RMS	1000	-40.0	2.7
10311.917	-53.4	RMS	1000	-40.0	13.4
11083.75	-54.3	RMS	1000	-40.0	14.3
17916.583	-50.8	RMS	1000	-40.0	10.8
25588	-54.1	RMS	1000	-40.0	14.1

Remark:

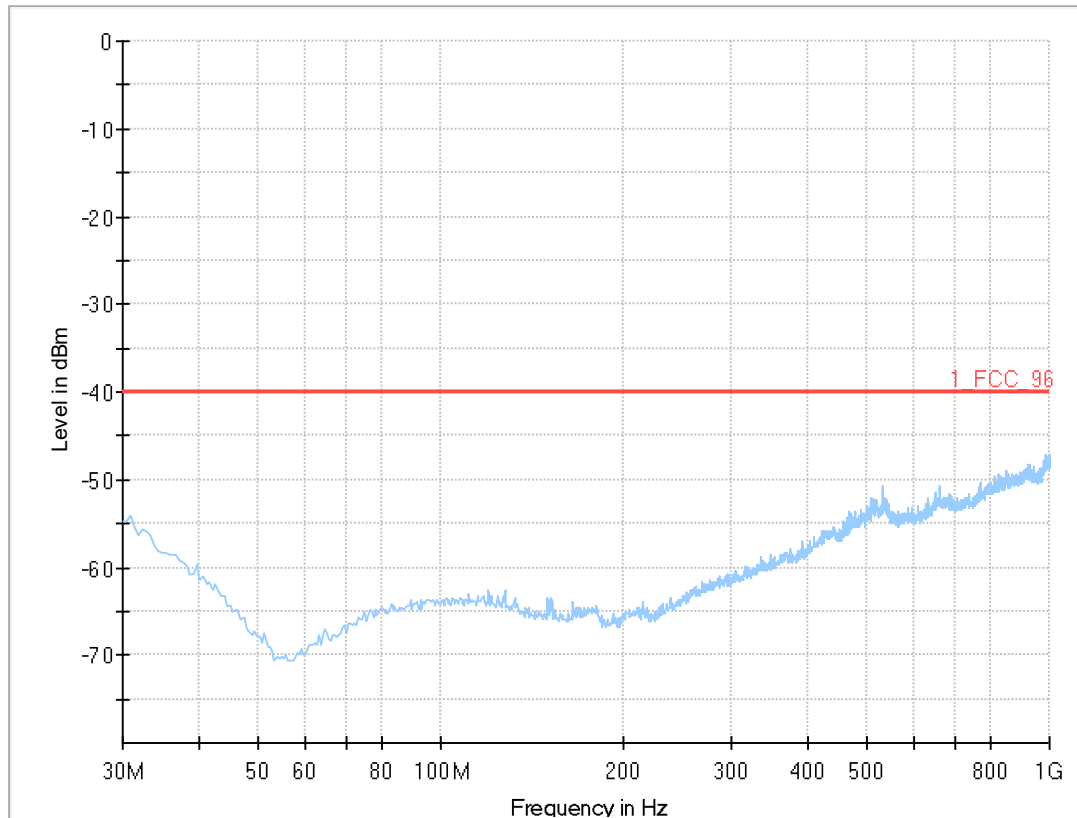
All outputs are on in at same channel

Please see next sub-clause for the measurement plot.

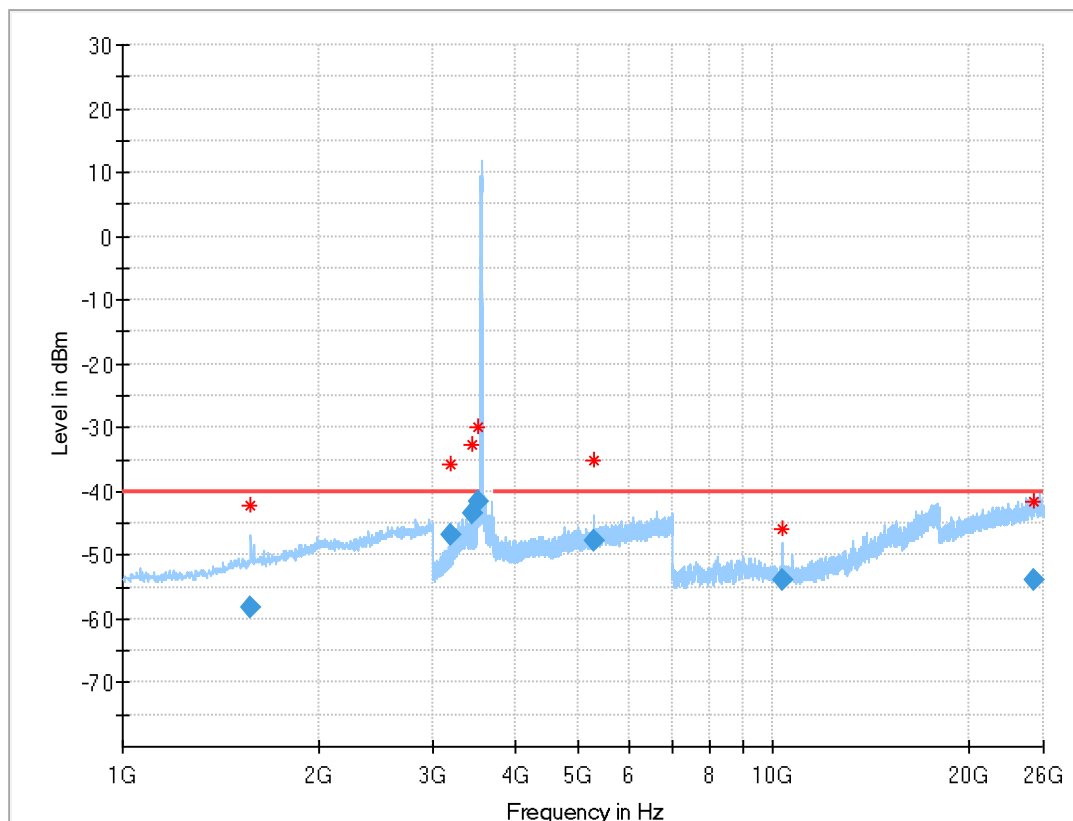
5.5.4 MEASUREMENT PLOT

RSE chanel 3555MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supply DC

Measurement 30MHz – 1GHz



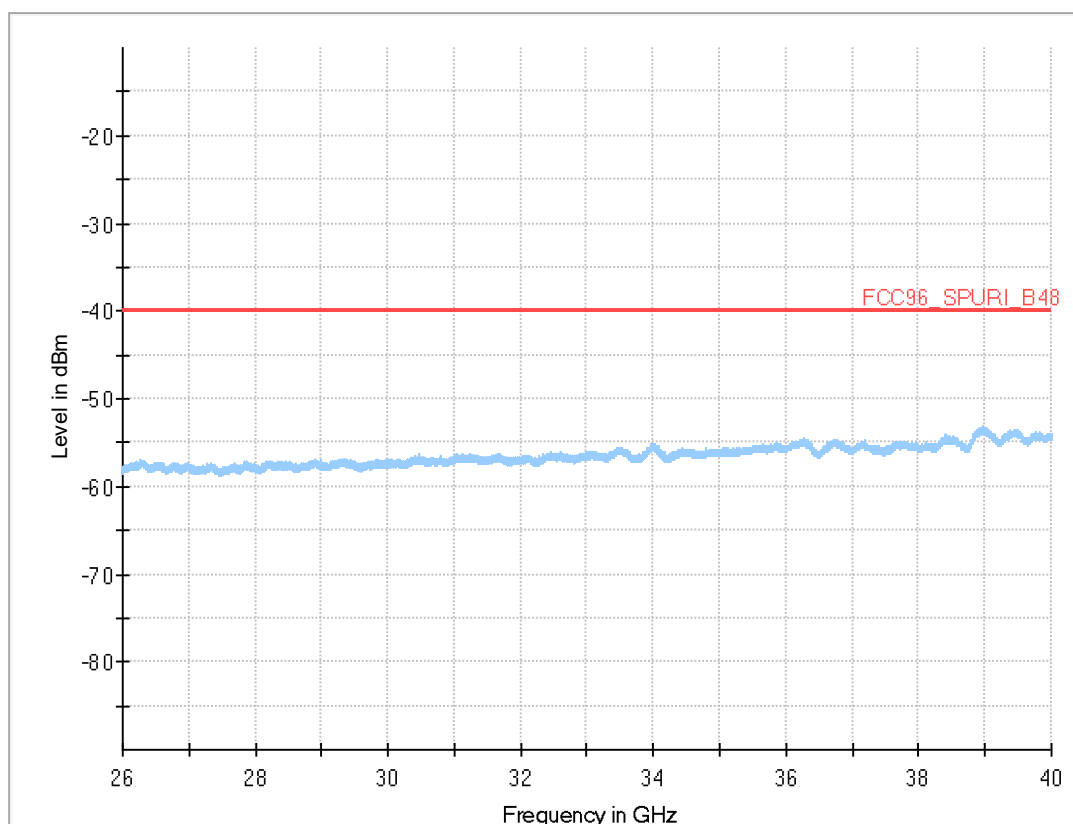
Measurement 1GHz – 26GHz



Final Result

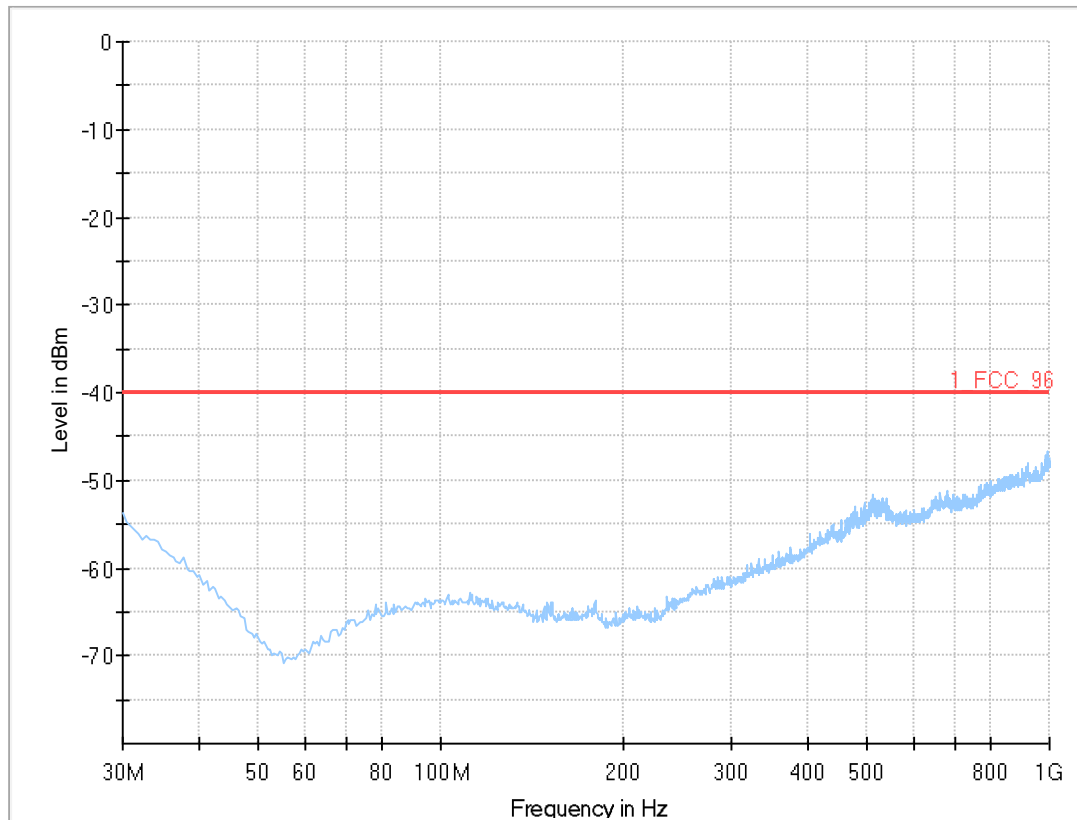
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
1576.000	-58.3	-40.00	18.33	1000.0	1000.000	150.0	V	-94.0	85.0	-91.4
3194.908	-46.8	-40.00	6.76	1000.0	1000.000	150.0	V	99.0	82.0	-84.0
3440.695	-43.3	-40.00	3.29	1000.0	1000.000	150.0	V	103.0	92.0	-83.7
3513.570	-41.7	-40.00	1.66	1000.0	1000.000	150.0	V	99.0	76.0	-83.7
5294.810	-47.9	-40.00	7.88	1000.0	1000.000	150.0	V	168.0	-8.0	-79.1
10311.917	-53.7	-40.00	13.74	1000.0	1000.000	150.0	H	-30.0	-6.0	-92.2
25041.000	-53.9	-40.00	13.89	1000.0	1000.000	150.0	H	-174.0	22.0	-75.8

Measurement 26GHz – 40GHz

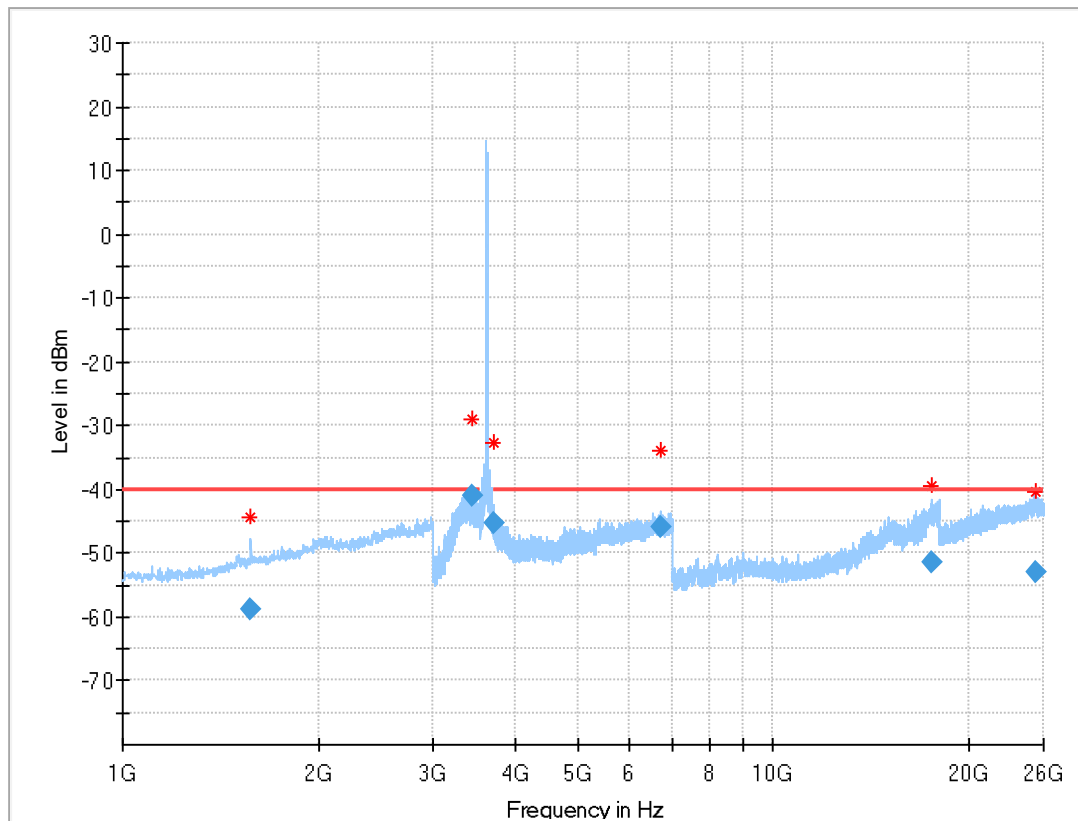


RSE chanel 3625MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supplay DC

Measurement 30MHz – 1GHz



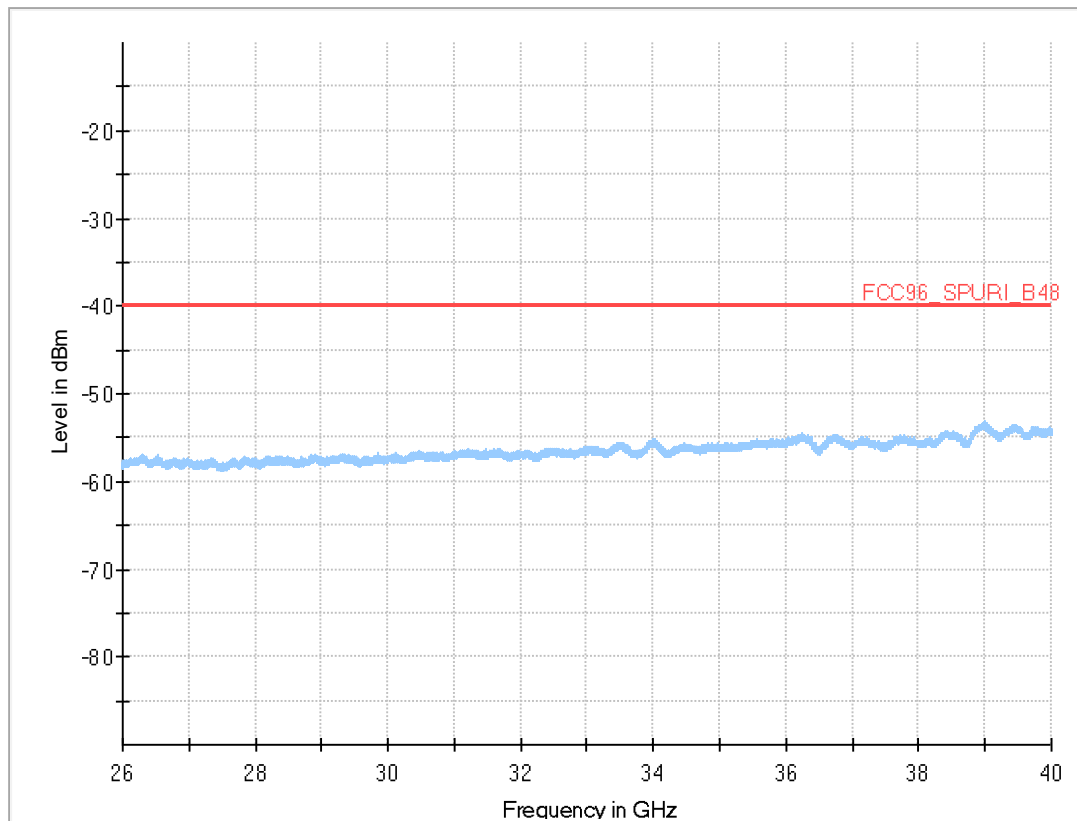
Measurement 1GHz – 26GHz



Final Result

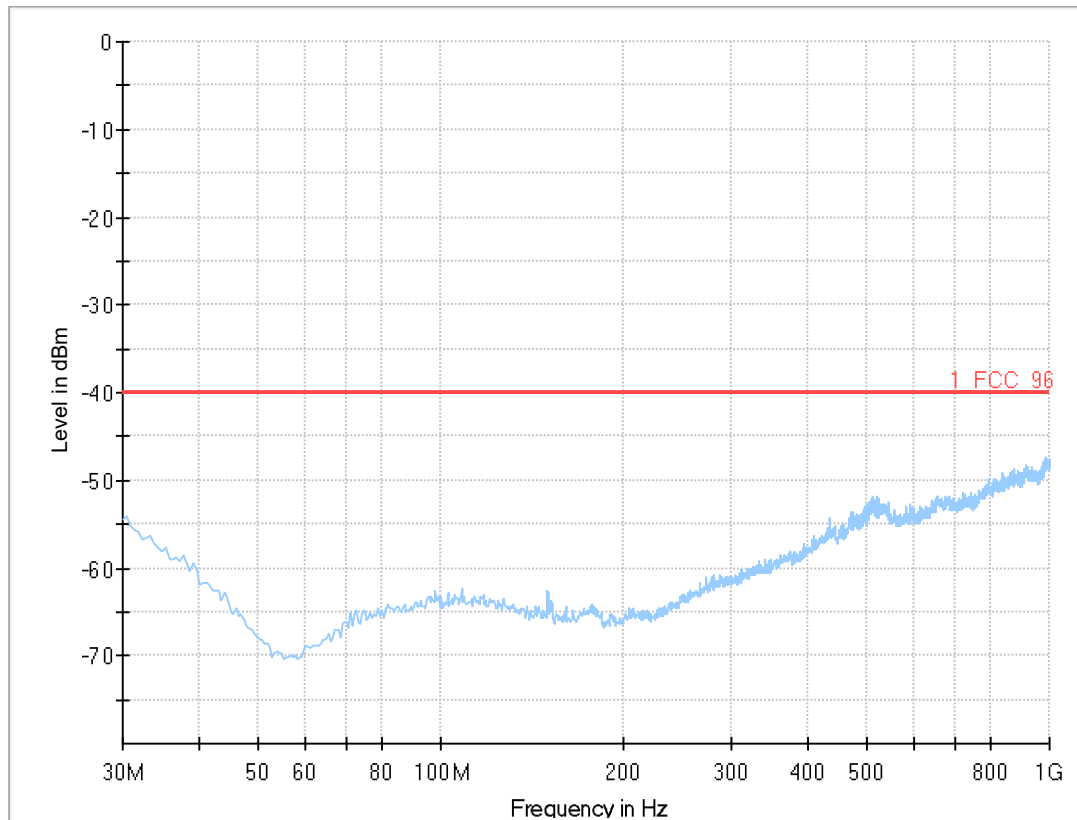
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
1572.000	-58.8	-40.00	18.84	1000.0	1000.000	150.0	V	17.0	88.0	-91.4
3440.695	-41.0	-40.00	1.03	1000.0	1000.000	150.0	H	107.0	109.0	-83.7
3723.690	-45.4	-40.00	5.36	1000.0	1000.000	150.0	H	92.0	-13.0	-82.6
6706.850	-46.0	-40.00	6.00	1000.0	1000.000	150.0	V	-182.0	-4.0	-76.4
17494.917	-51.4	-40.00	11.43	1000.0	1000.000	150.0	V	157.0	14.0	-79.6
25225.000	-53.0	-40.00	12.96	1000.0	1000.000	150.0	H	-60.0	5.0	-75.7

Measurement 26GHz – 40GHz

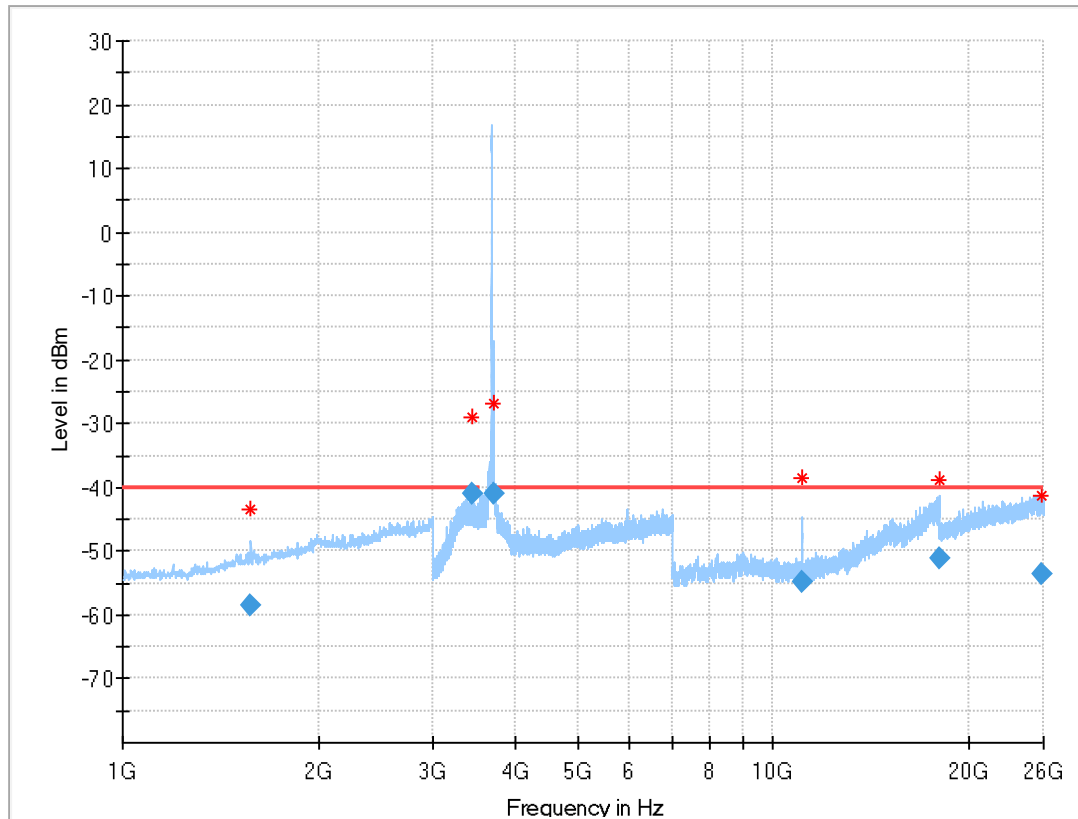


RSE chanel 3695MHz; Antenna AN_02 6GK5897-5FF00-0AA0; Power supplay DC

Measurement 30MHz – 1GHz



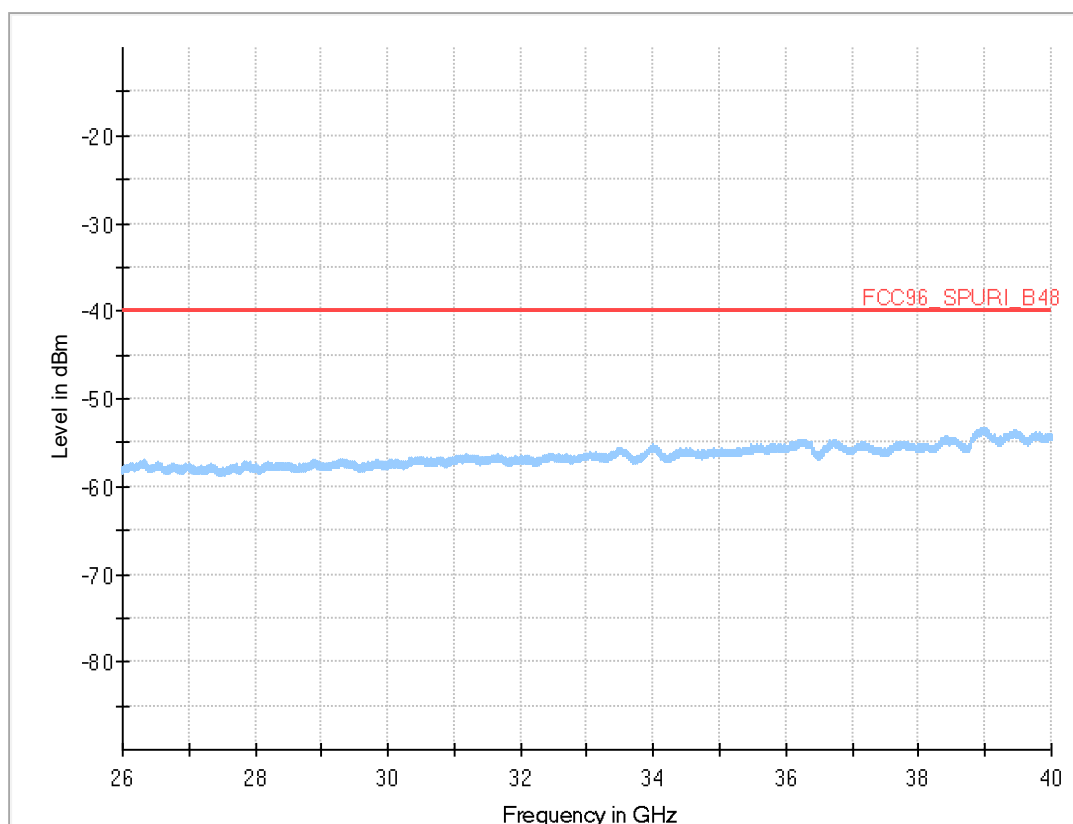
Measurement 1GHz – 26GHz



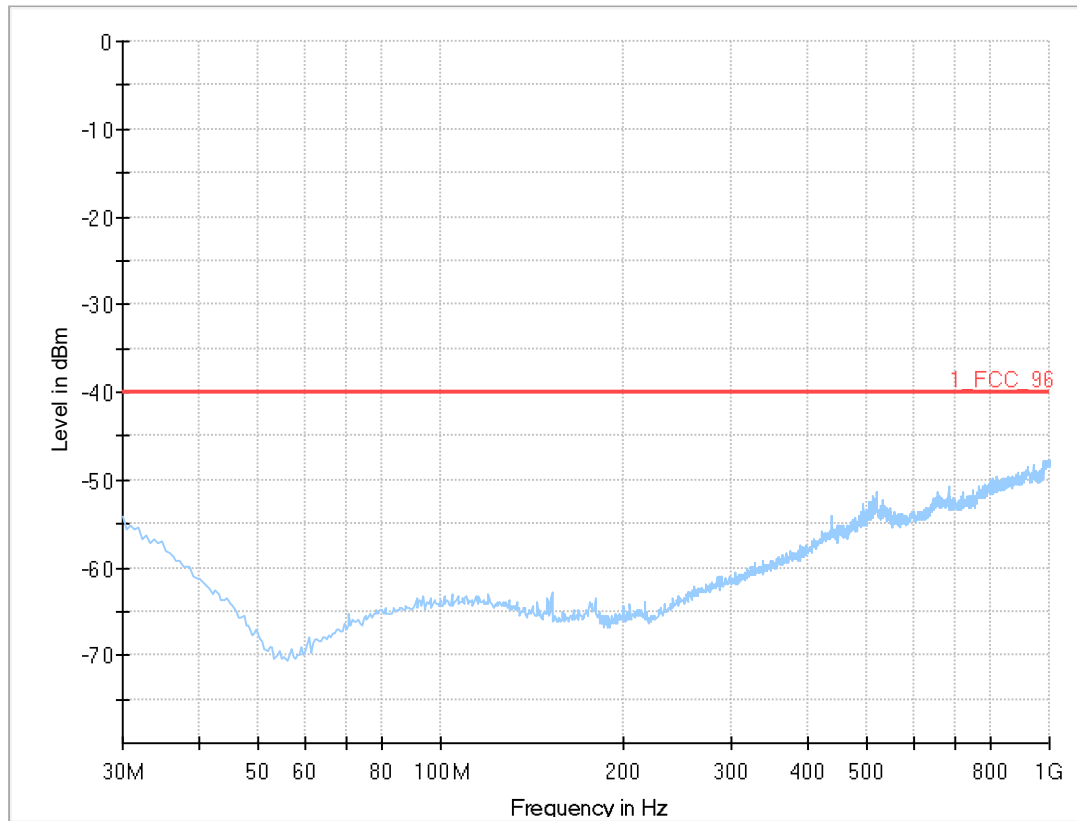
Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
1574.000	-58.6	-40.00	18.58	1000.0	1000.000	150.0	V	-3.0	79.0	-91.4
3440.695	-41.0	-40.00	0.99	1000.0	1000.000	150.0	V	116.0	71.0	-83.7
3721.230	-41.1	-40.00	1.09	1000.0	1000.000	150.0	V	105.0	110.0	-82.6
11081.917	-54.9	-40.00	14.95	1000.0	1000.000	150.0	V	74.0	78.0	-91.8
17931.250	-51.0	-40.00	11.01	1000.0	1000.000	150.0	H	-17.0	92.0	-77.9
25881.000	-53.6	-40.00	13.62	1000.0	1000.000	150.0	H	145.0	87.0	-76.5

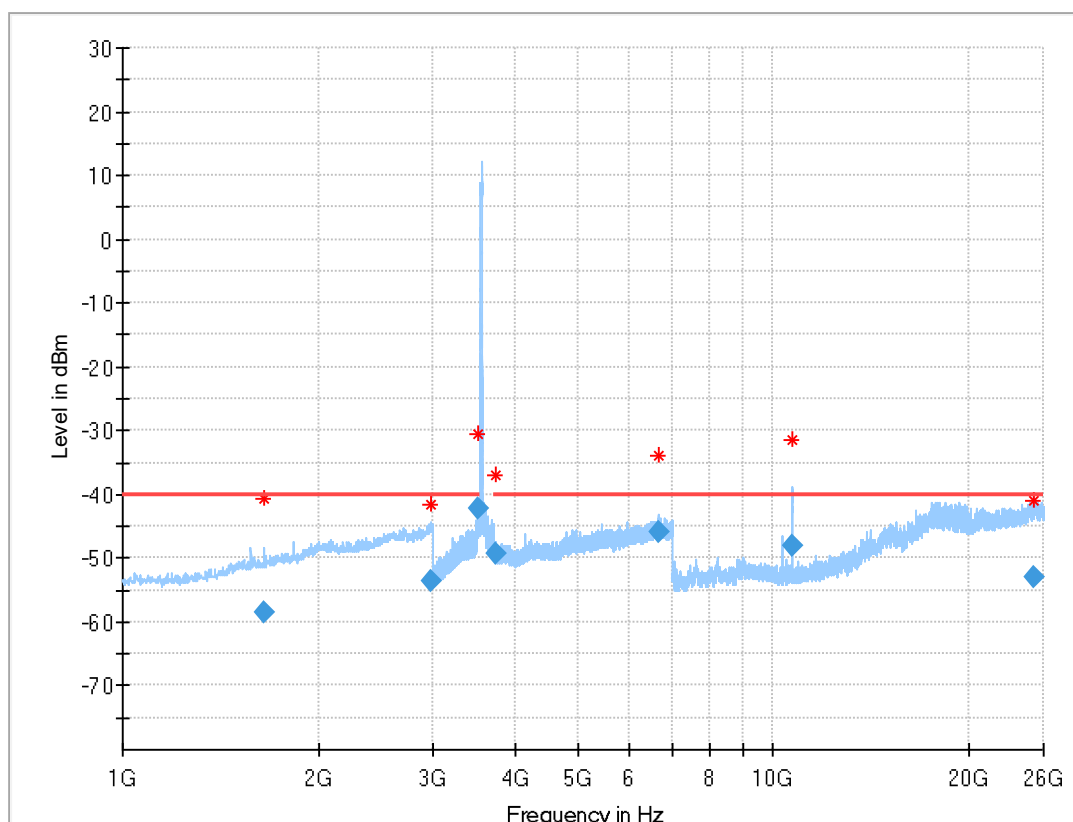
Measurement 26GHz – 40GHz



RSE chanel 3555MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC



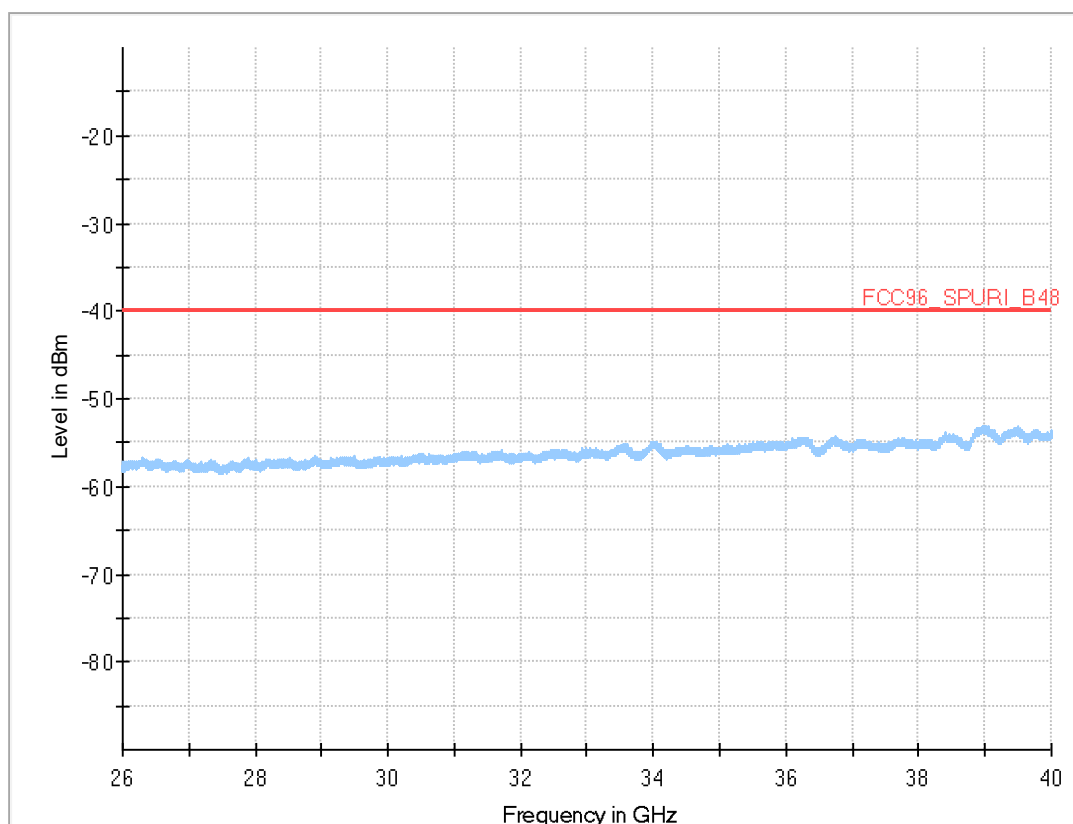
Measurement 1GHz – 26GHz



Final Result

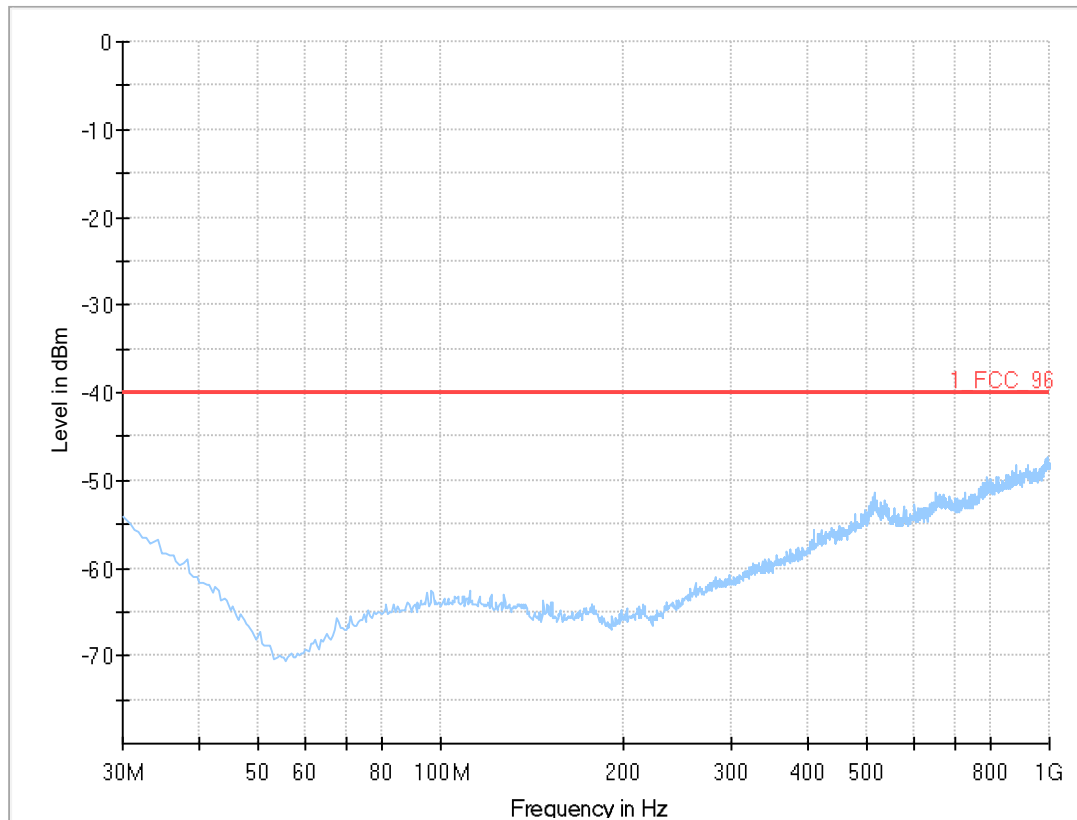
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
1650.000	-58.6	-40.00	18.62	1000.0	1000.000	150.0	V	-2.0	85.0	-91.5
2974.000	-53.6	-40.00	13.57	1000.0	1000.000	150.0	V	81.0	110.0	-85.7
3528.278	-42.1	-40.00	2.11	1000.0	1000.000	150.0	V	54.0	98.0	-83.5
3740.090	-49.1	-40.00	9.15	1000.0	1000.000	150.0	H	120.0	102.0	-82.6
6639.610	-46.0	-40.00	5.97	1000.0	1000.000	150.0	V	86.0	-8.0	-76.4
10666.667	-47.9	-40.00	7.90	1000.0	1000.000	150.0	H	60.0	1.0	-91.8
25189.000	-53.0	-40.00	13.02	1000.0	1000.000	150.0	H	71.0	22.0	-75.7

Measurement 26GHz – 40GHz

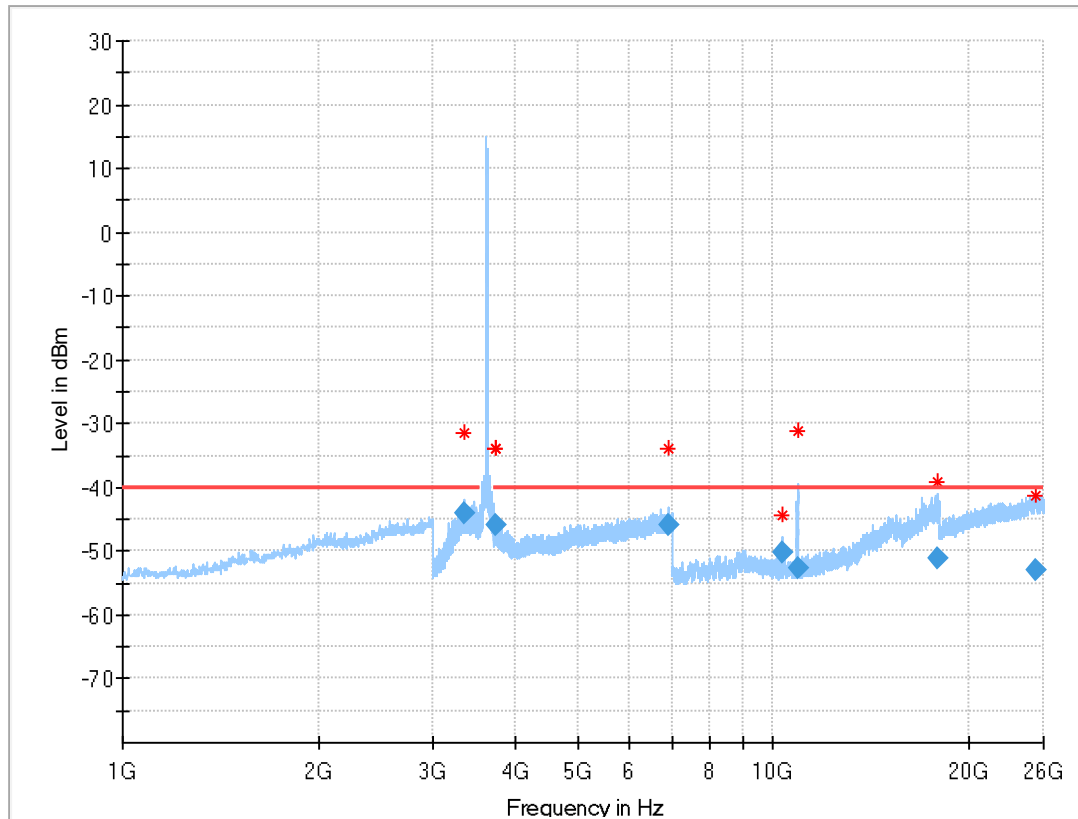


RSE chanel 3625MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC

Measurement 30MHz – 1GHz



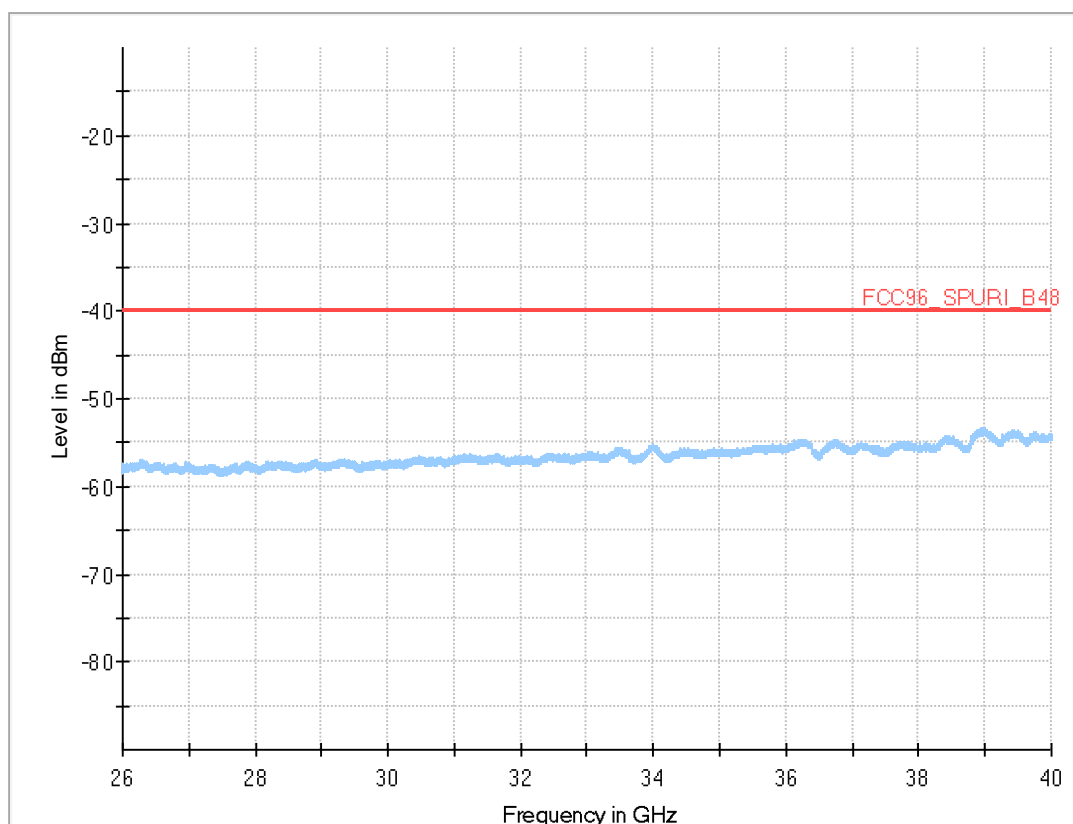
Measurement 1GHz – 26GHz



Final Result

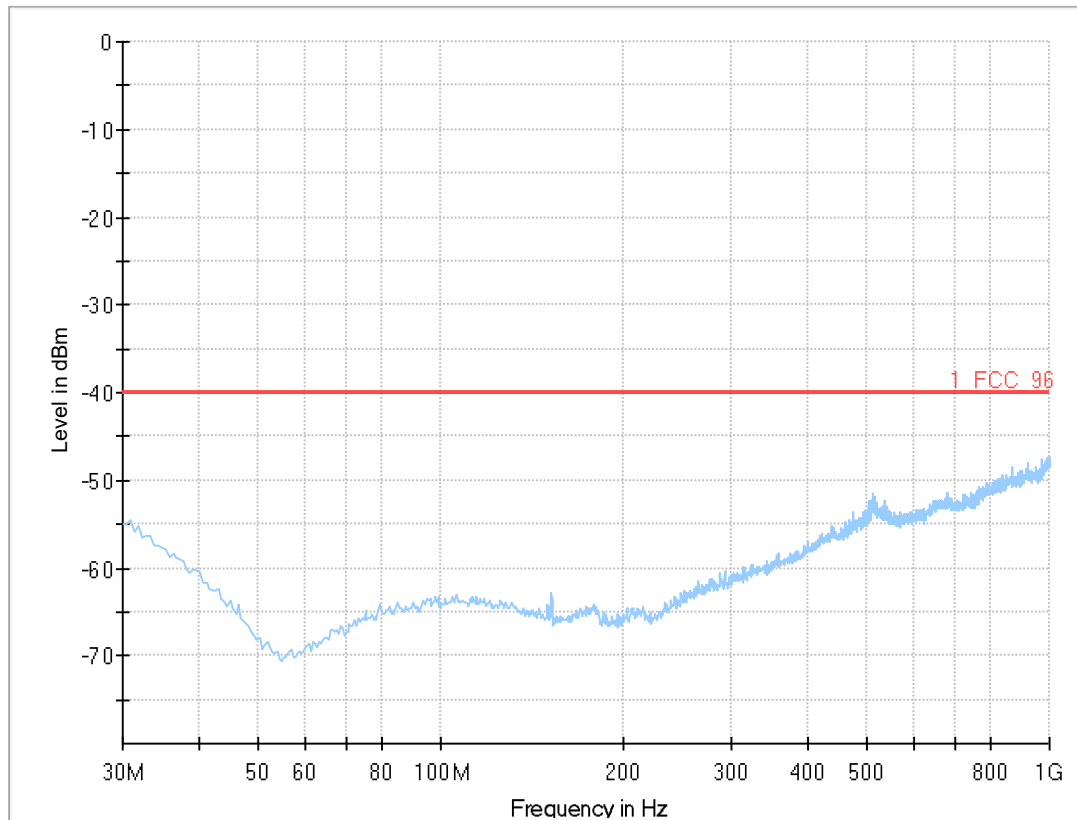
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
3349.138	-44.1	-40.00	4.14	1000.0	1000.000	150.0	V	30.0	110.0	-83.5
3744.600	-46.0	-40.00	6.02	1000.0	1000.000	150.0	V	33.0	88.0	-82.6
6898.730	-46.0	-40.00	6.04	1000.0	1000.000	150.0	H	106.0	22.0	-76.2
10312.833	-50.2	-40.00	10.19	1000.0	1000.000	150.0	H	-10.0	-2.0	-92.2
10874.750	-52.7	-40.00	12.71	1000.0	1000.000	150.0	V	117.0	95.0	-91.6
17926.667	-51.2	-40.00	11.17	1000.0	1000.000	150.0	H	-179.0	-4.0	-77.9
25282.000	-53.1	-40.00	13.09	1000.0	1000.000	150.0	V	-38.0	86.0	-75.9

Measurement 26GHz – 40GHz

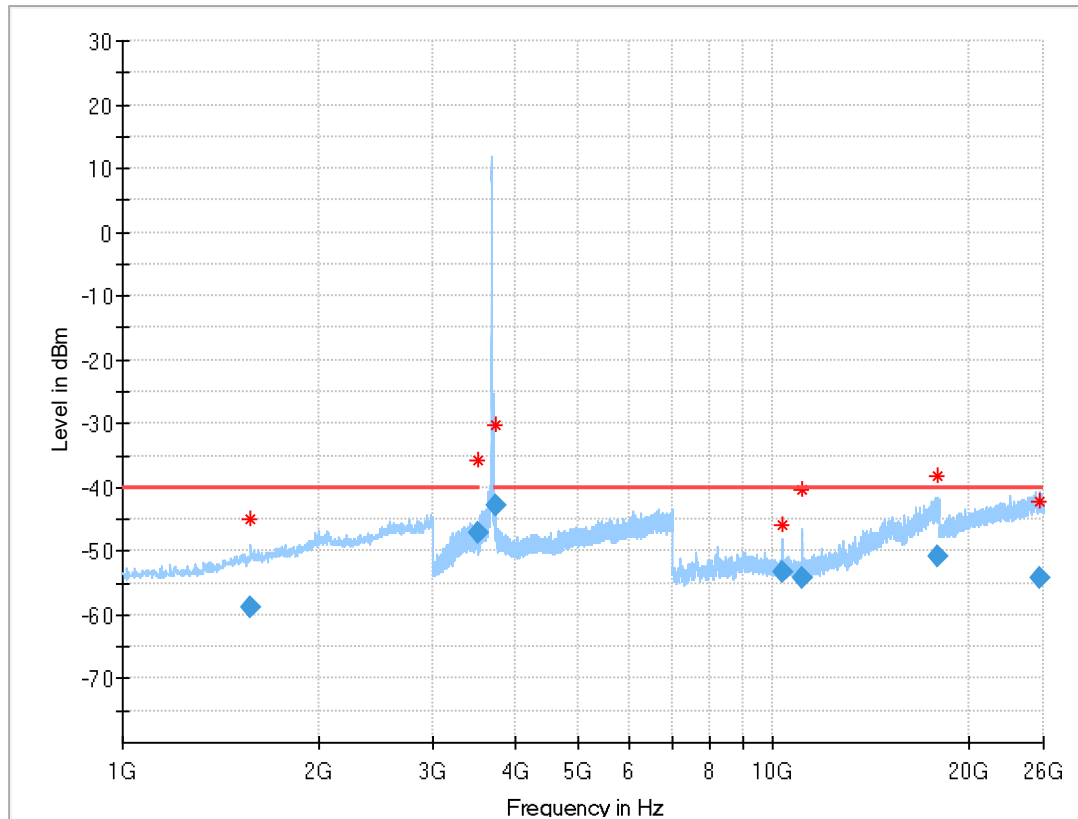


RSE chanel 3695MHz; Antenna AN_01 6GK5897-5PN00-0AA0; Power supply DC

Measurement 30MHz – 1GHz



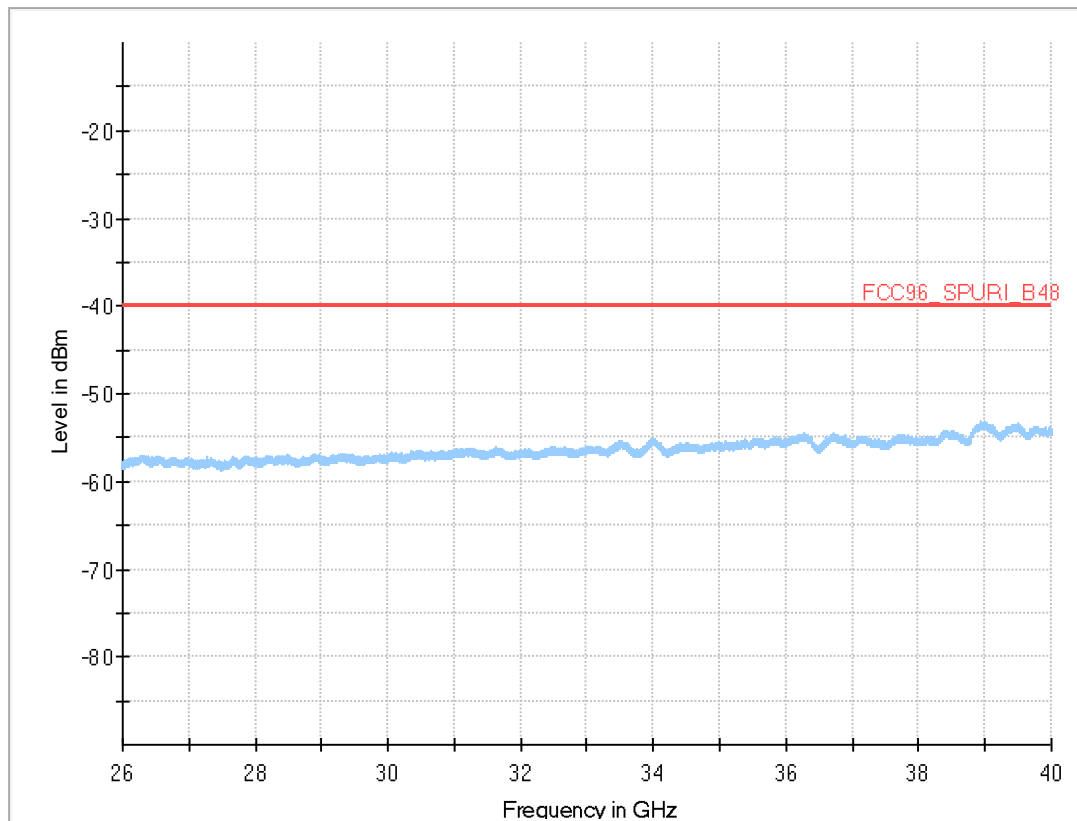
Measurement 1GHz – 26GHz



Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation	Corr. (dB)
1574.000	-58.8	-40.00	18.77	1000.0	1000.000	150.0	H	135.0	-13.0	-91.4
3518.208	-47.2	-40.00	7.21	1000.0	1000.000	150.0	V	57.0	96.0	-83.6
3735.990	-42.7	-40.00	2.73	1000.0	1000.000	150.0	V	32.0	88.0	-82.6
10311.917	-53.4	-40.00	13.38	1000.0	1000.000	150.0	H	-12.0	6.0	-92.2
11083.750	-54.3	-40.00	14.33	1000.0	1000.000	150.0	H	-183.0	-8.0	-91.8
17916.583	-50.8	-40.00	10.82	1000.0	1000.000	150.0	H	-68.0	20.0	-77.7
25588.000	-54.1	-40.00	14.12	1000.0	1000.000	150.0	V	-77.0	-17.0	-76.2

Measurement 26GHz – 40GHz



5.5.5 TEST EQUIPMENT USED

- Radiated Emissions FAR
- Radiated Emissions SAC up to 1 GHz

5.6 EMISSION AND OCCUPIED BANDWIDTH

Standard **FCC PART 96 Subpart E**

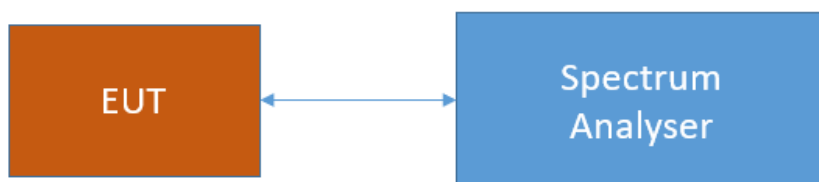
The test was performed according to:

ANSI C63.26: 2015; 5.4.3 (relative meas. Procedure [26 dB], 5.4.4 (Power bandwidth [99%])

5.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per FCC §2.1049. The limit and the requirements come from the applicable rule part for the operating band of the cellular device.

The EUT was connected to the test setups according to the following diagram:



Test Setup FCC Part 96

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.6.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

5.6.3 TEST PROTOCOL

Ambient temperature: 25 °C
 Relative humidity: 36 %

antenna port	frequency [MHz]	modulation	Nominal BW [MHz]	26 dB BW [MHz]	99 % BW [MHz]
0	3625	QPSK	10	9.5935	8.6291
0	3625	16 QAM	10	9.1996	8.5671
0	3625	64 QAM	10	9.4156	8.6271
0	3625	256 QAM	10	9.4295	8.6271
0	3625	QPSK	20	19.7565	18.3742
0	3625	16 QAM	20	19.6340	18.4222
0	3625	64 QAM	20	19.6461	18.3502
0	3625	256 QAM	20	19.6420	18.3502

antenna port	frequency [MHz]	modulation	Nominal BW [MHz]	26 dB BW [MHz]	99 % BW [MHz]
1	3625	QPSK	10	9.4891	8.6191
1	3625	16 QAM	10	9.1830	8.5591
1	3625	64 QAM	10	9.3991	8.6211
1	3625	256 QAM	10	9.3831	8.6211
1	3625	QPSK	20	19.6460	18.3342
1	3625	16 QAM	20	19.5901	18.4022
1	3625	64 QAM	20	19.6421	18.3422
1	3625	256 QAM	20	19.6260	18.3422

antenna port	frequency [MHz]	modulation	Nominal BW [MHz]	26 dB BW [MHz]	99 % BW [MHz]
2	3625	QPSK	10	9.4291	8.6231
2	3625	16 QAM	10	9.1871	8.5651
2	3625	64 QAM	10	9.4171	8.6251
2	3625	256 QAM	10	9.4490	8.6271
2	3625	QPSK	20	19.6501	18.3422
2	3625	16 QAM	20	19.6100	18.4022
2	3625	64 QAM	20	19.6381	18.3462
2	3625	256 QAM	20	19.6220	18.3462

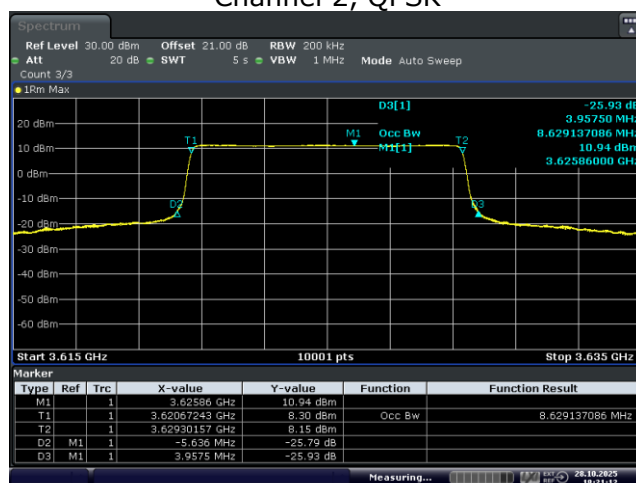
antenna port	frequency [MHz]	modulation	Nominal BW [MHz]	26 dB BW [MHz]	99 % BW [MHz]
3	3625	QPSK	10	9.4211	8.6171
3	3625	16 QAM	10	9.1891	8.5591
3	3625	64 QAM	10	9.4370	8.6271
3	3625	256 QAM	10	9.4530	8.6231
3	3625	QPSK	20	19.6401	18.3382
3	3625	16 QAM	20	19.6041	18.3982
3	3625	64 QAM	20	19.6121	18.3342
3	3625	256 QAM	20	19.6241	18.3422

Remark: Please see next sub-clause for the measurement plot.

5.6.4 MEASUREMENT PLOT

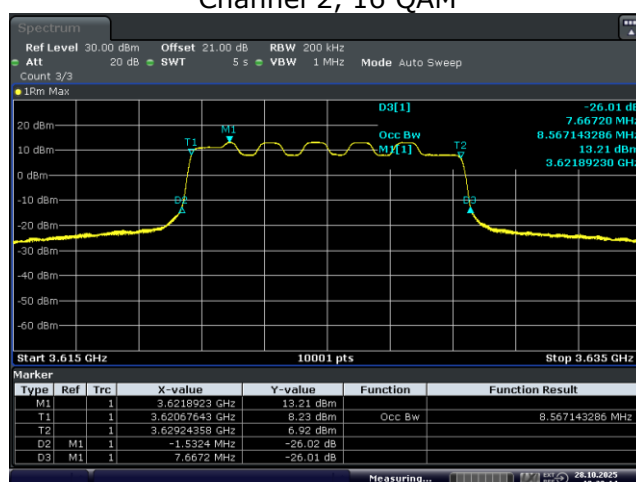
Antenna port 0; BW 10 MHz

Channel 2, QPSK



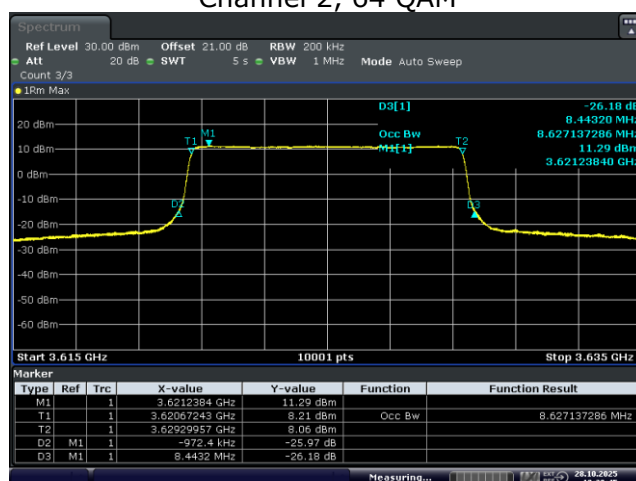
Date: 28.OCT.2025 18:21:12

Channel 2, 16 QAM



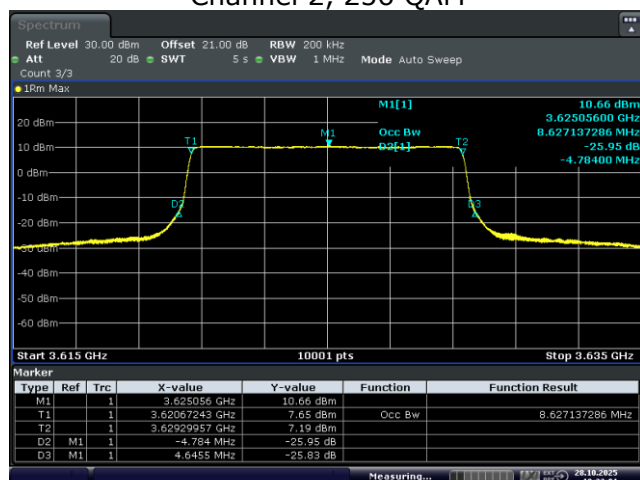
Date: 28.OCT.2025 18:28:15

Channel 2, 64 QAM



Date: 28.OCT.2025 18:30:46

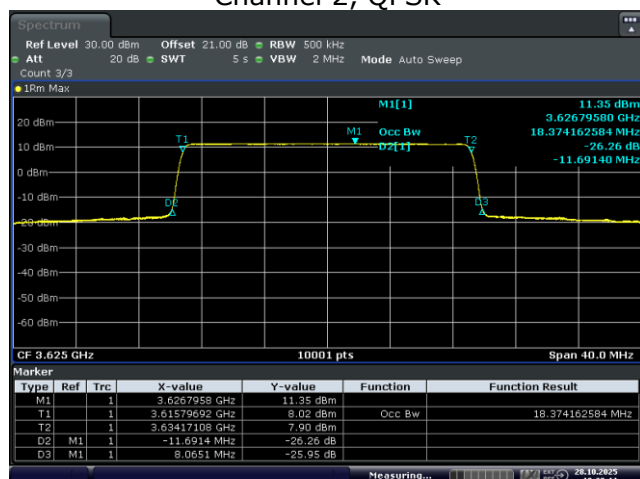
Channel 2, 256 QAM



Date: 28 OCT.2025 18:33:02

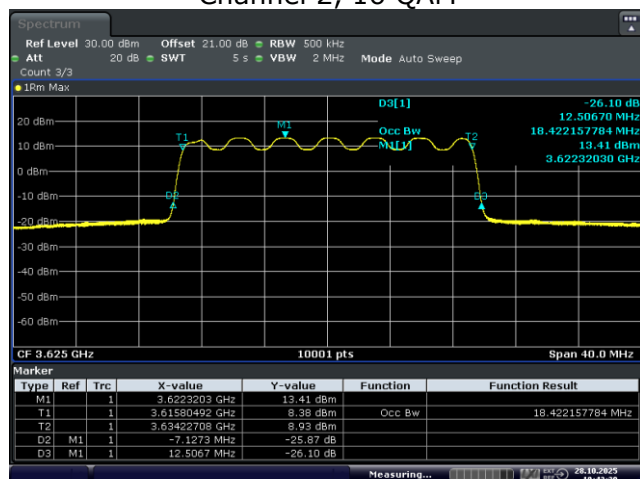
Antenna port 0; BW 20 MHz

Channel 2, QPSK



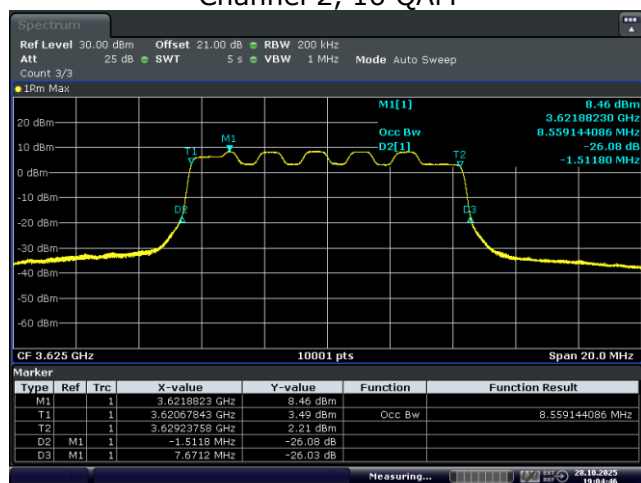
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Channel 2, 16 QAM



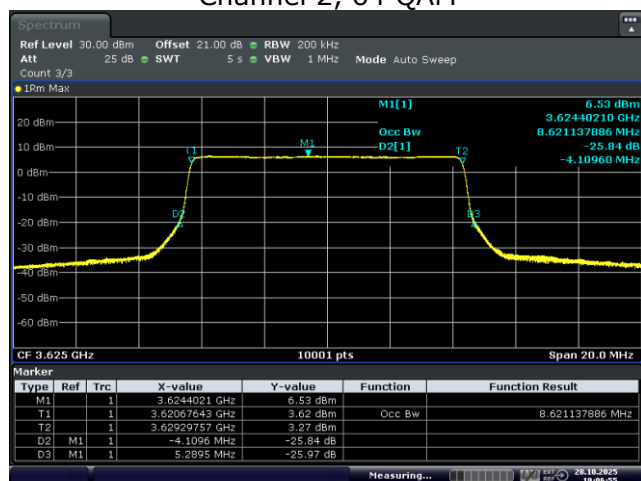
Date: 28 OCT.2025 18:43:40

Channel 2, 16 QAM



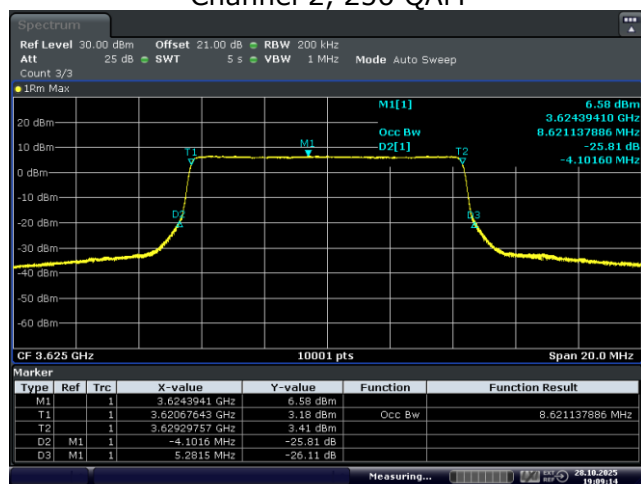
Date: 28.OCT.2025 19:04:46

Channel 2, 64 QAM



Date: 28.OCT.2025 19:06:56

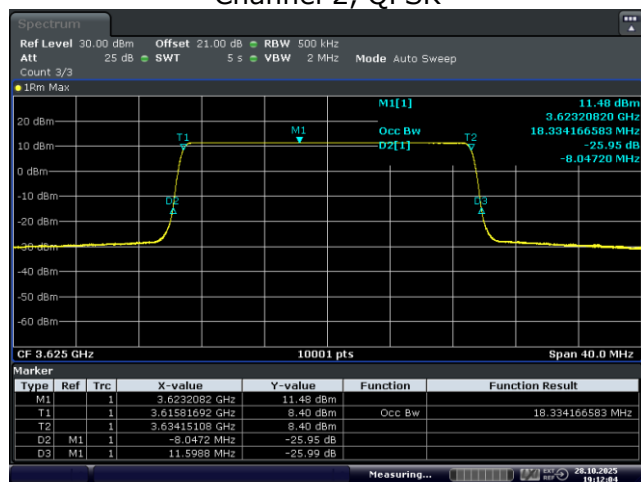
Channel 2, 256 QAM



Date: 28.OCT.2025 19:09:15

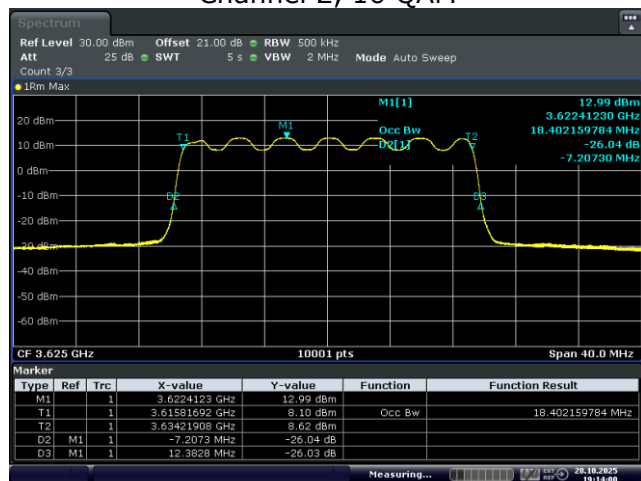
Antenna port 1; BW 20 MHz

Channel 2, QPSK



Date: 28.OCT.2025 19:12:04

Channel 2, 16 QAM



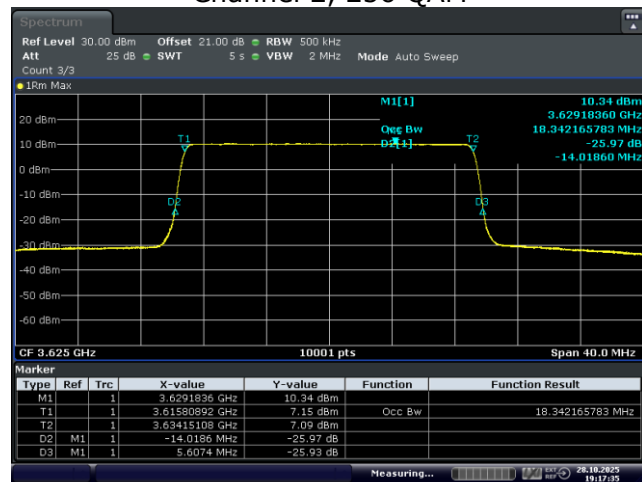
Date: 28.OCT.2025 19:14:01

Channel 2, 64 QAM



Date: 28.OCT.2025 19:15:55

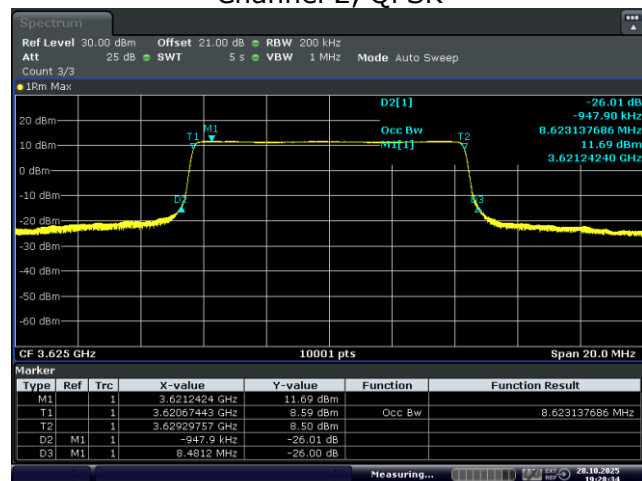
Channel 2, 256 QAM



Date: 28.OCT.2025 19:17:36

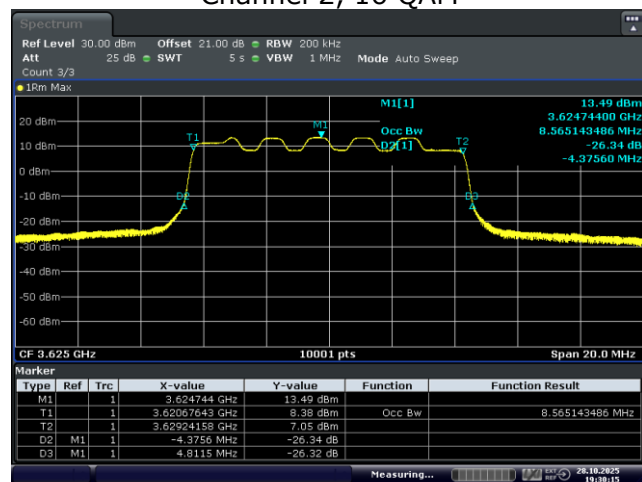
Antenna port 2; BW 10 MHz

Channel 2, QPSK



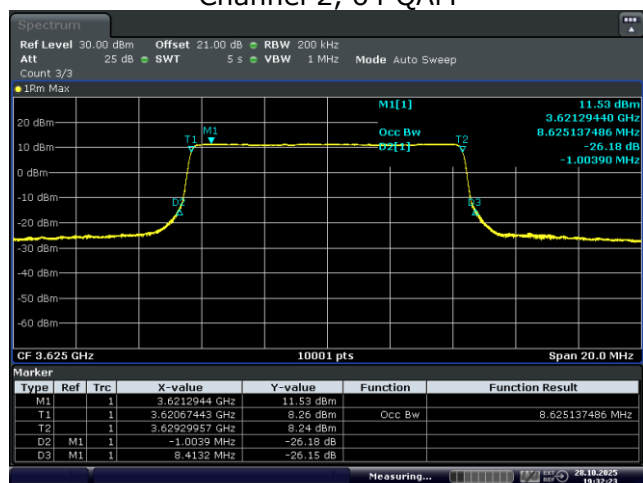
Date: 28.OCT.2025 19:28:35

Channel 2, 16 QAM



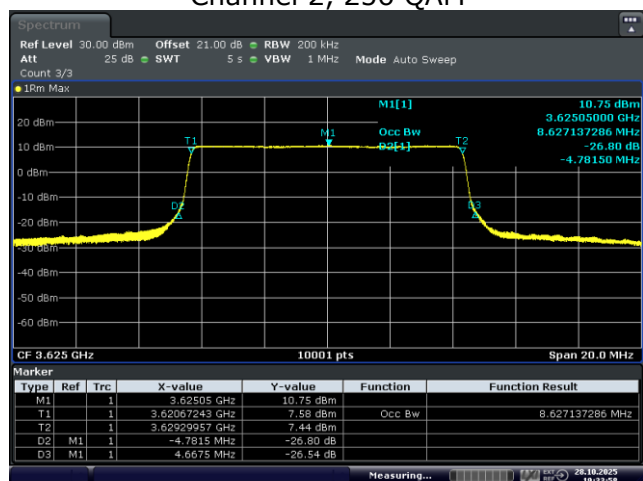
Date: 28.OCT.2025 19:30:16

Channel 2, 64 QAM



Date: 28 OCT.2025 19:32:23

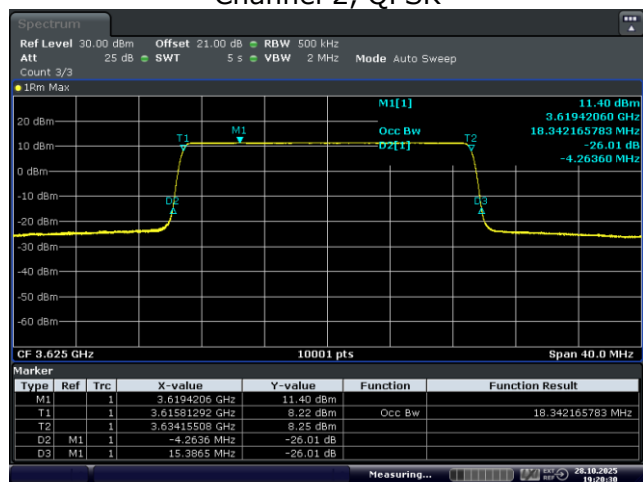
Channel 2, 256 QAM



Date: 28 OCT.2025 19:33:58

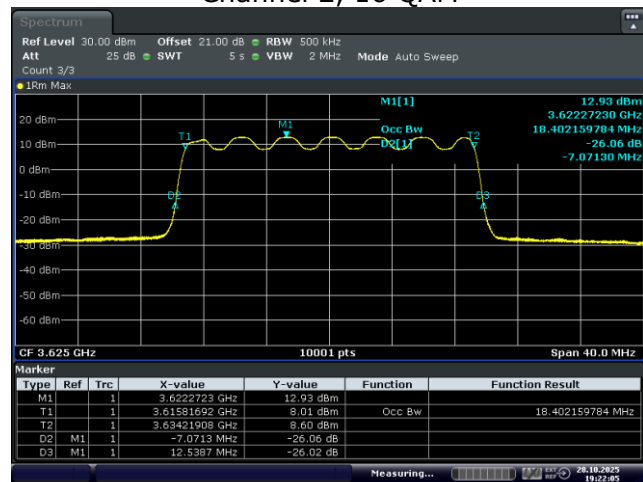
Antenna port 2; BW 20 MHz

Channel 2, QPSK



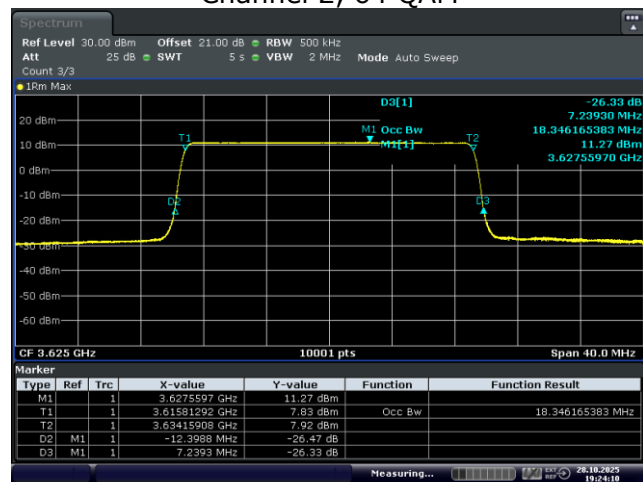
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Channel 2, 16 QAM



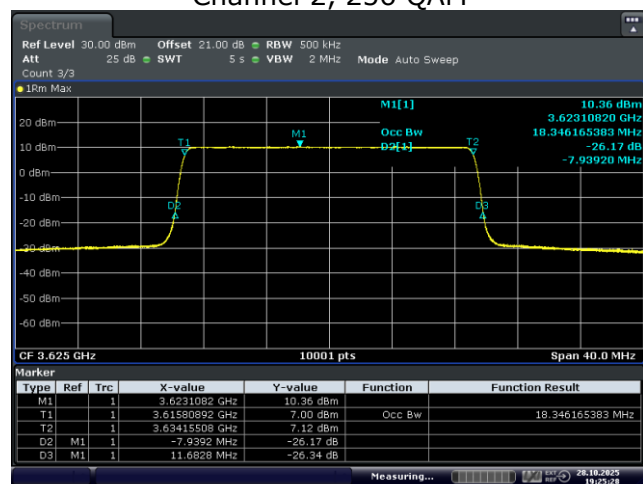
Date: 28.OCT.2025 19:22:05

Channel 2, 64 QAM



Date: 28.OCT.2025 19:24:10

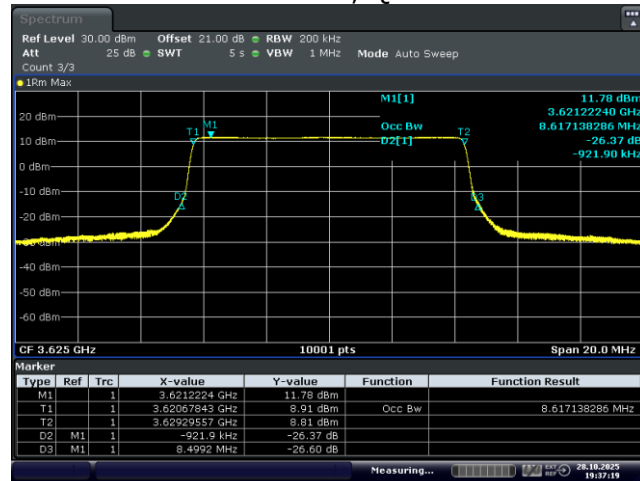
Channel 2, 256 QAM



Date: 28.OCT.2025 19:25:28

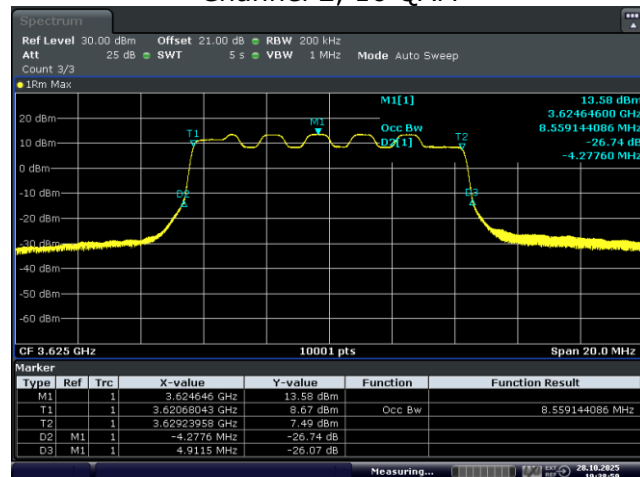
Antenna port 3; BW 10 MHz

Channel 2, QPSK



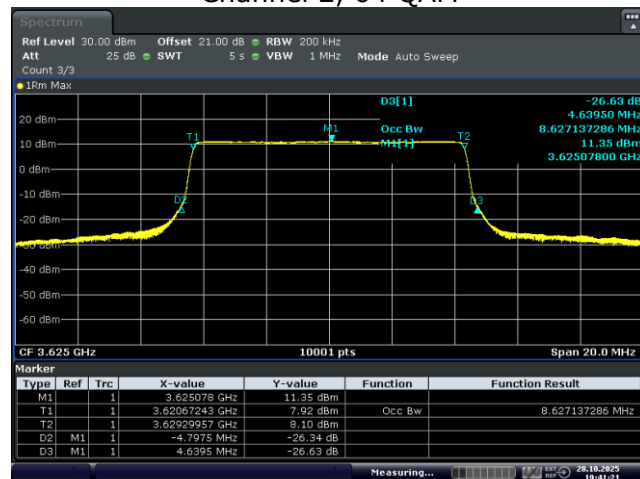
Date: 28.OCT.2025 19:37:19

Channel 2, 16 QAM



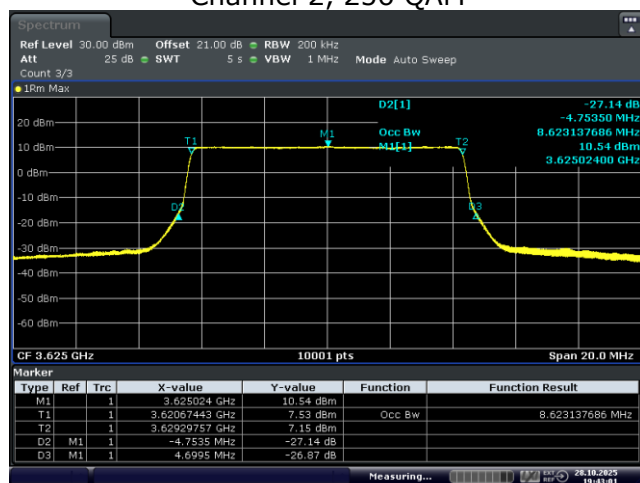
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Channel 2, 64 QAM



Date: 28.OCT.2025 19:41:21

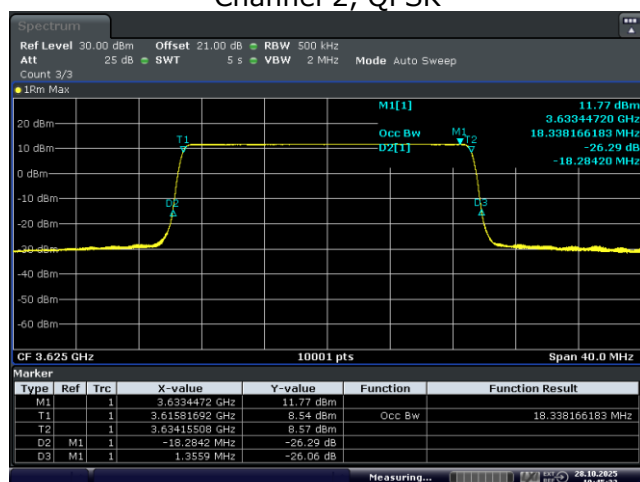
Channel 2, 256 QAM



Date: 28 OCT.2025 19:43:02

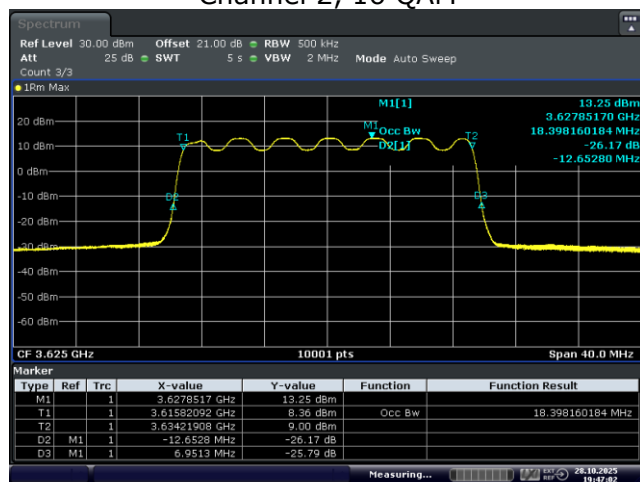
Antenna port 3; BW 20 MHz

Channel 2, QPSK



Date: 28 OCT.2025 19:45:33

Channel 2, 16 QAM



Date: 28 OCT.2025 19:47:02

