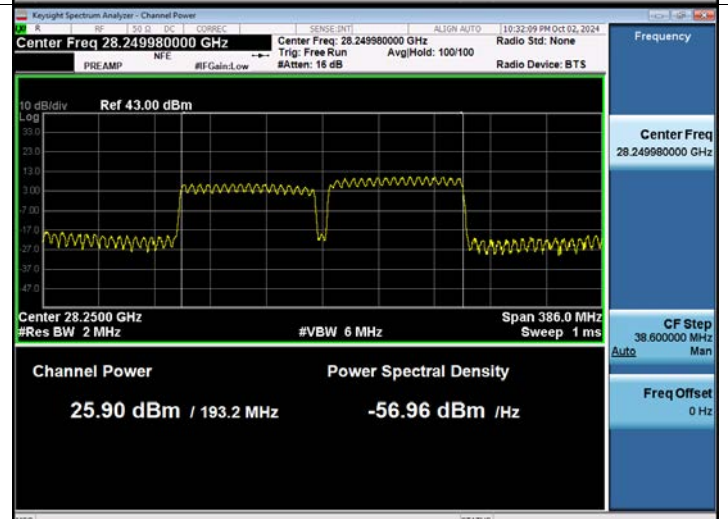
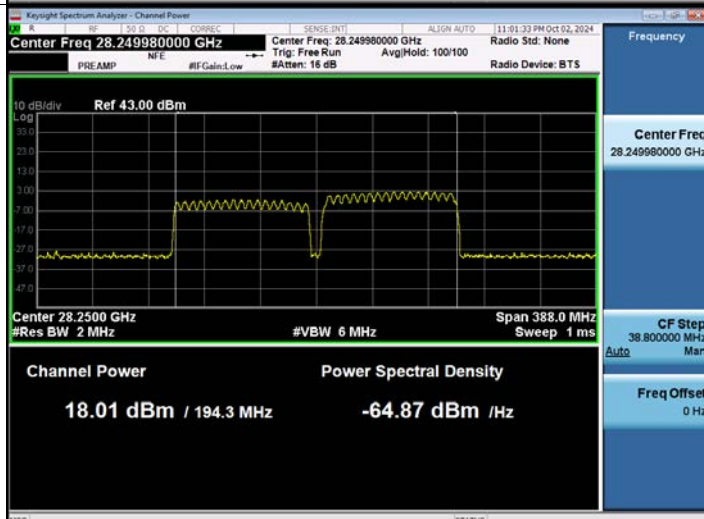
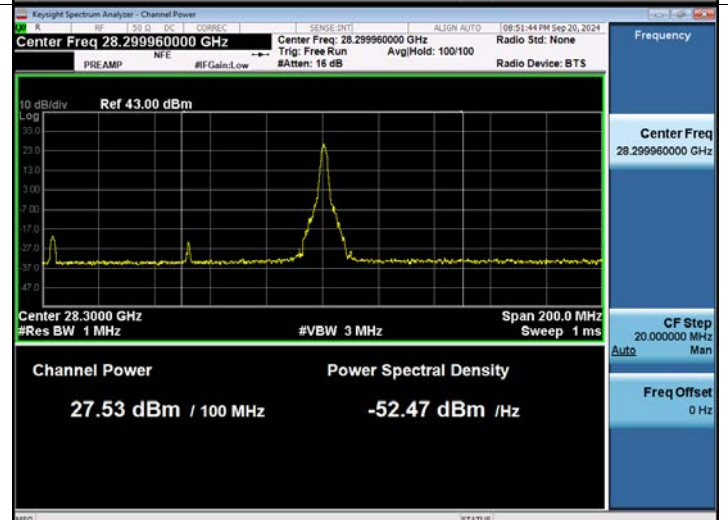
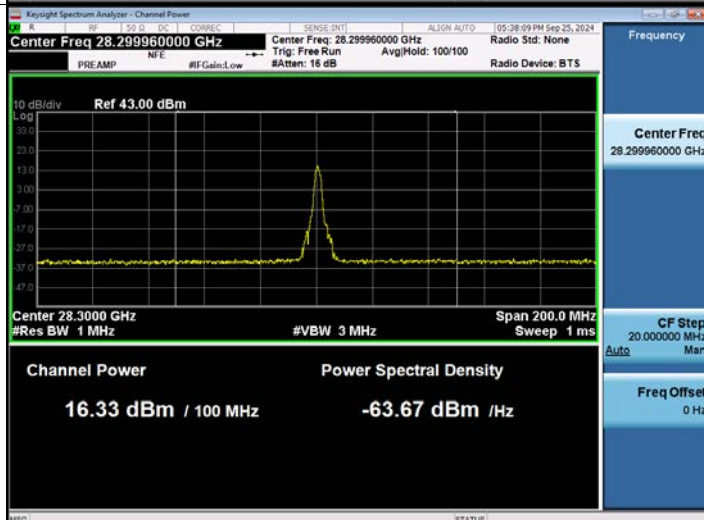
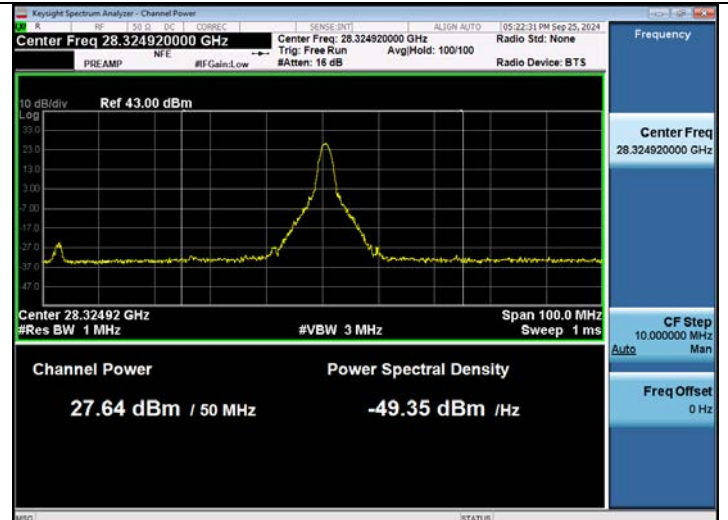
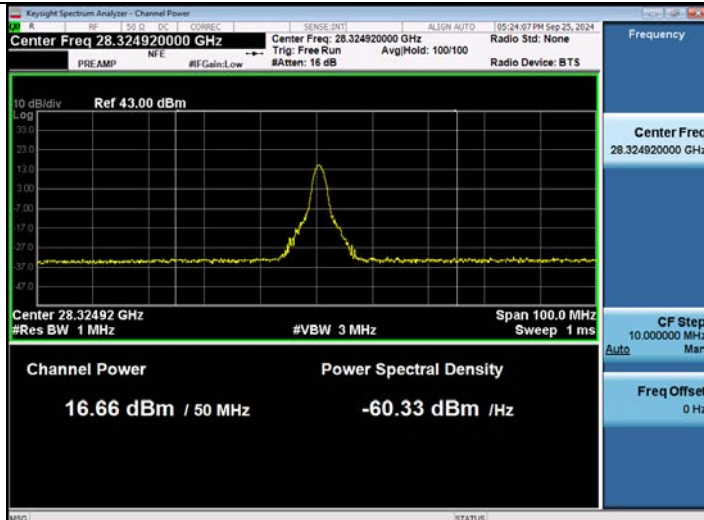
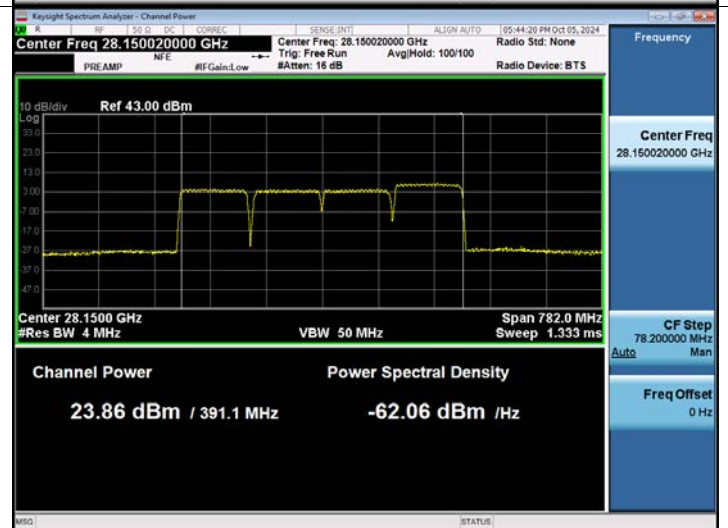
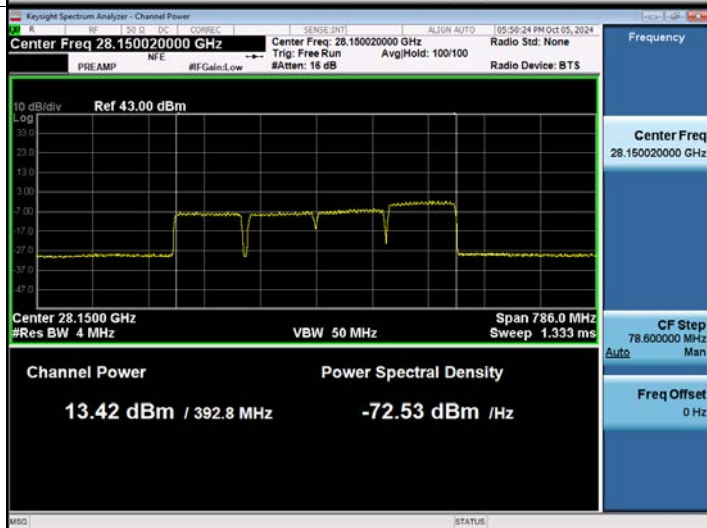
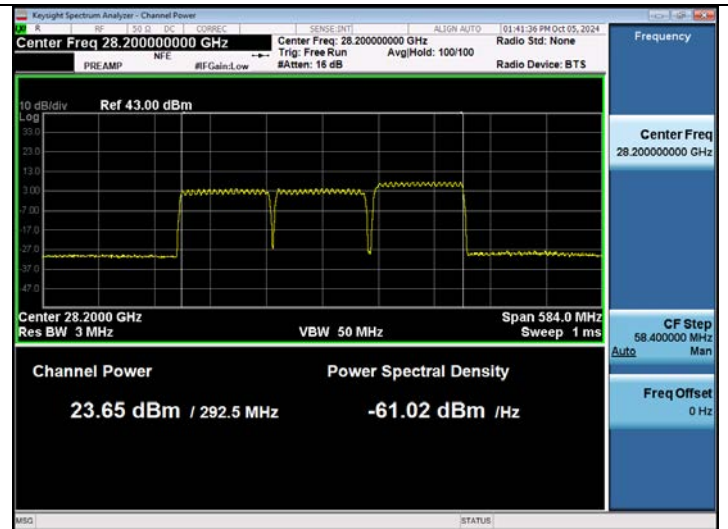
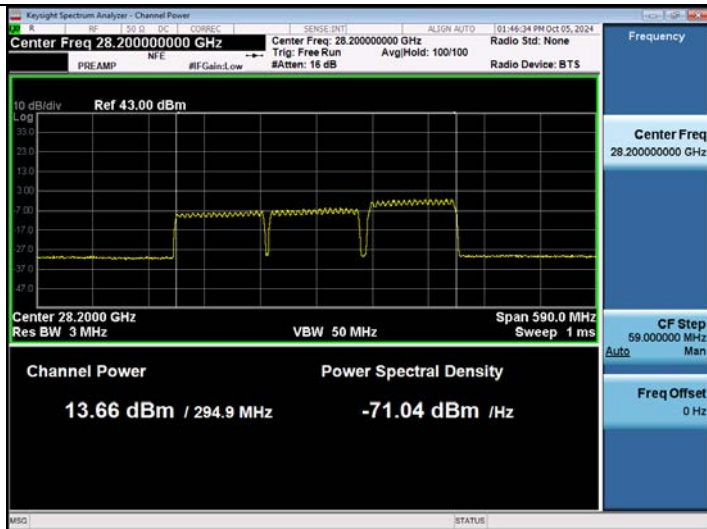


SISO Dual



SISO Dual



5.3. BAND EDGE

Test Overview

All out of band emissions are measured in a radiated setup while the EUT is operating at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is -13dBm/1MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

FCC Rules

Test Requirements:

§ 30.203 Emission limits.

- (a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.
- (b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.
- (3) The measurements of emission power can be expressed in peak or average values.

Test Procedures:

The measurement is performed in accordance with Section 5.7.3 of ANSI C63.26.

5.7.3 Out-of-band unwanted emissions measurements

- a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.
- b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.
- c) Set the number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
- d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:

1), 2) Omitted

3) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a free running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation $\leq \pm 2\%$).

4) Omitted

e) The test report shall include the plots of the measuring instrument display and the measured data.

- The TRP measurement is performed in accordance with Section 4.4.2.4 of KDB 842590 v01r02 (2021-04).

4.4.2.4 Spherical Grid Method

a) Measure the antenna dimensions, i.e., depth (d), width (w), and height (h) (see Figure A.1 in Appendix A). If the antenna dimensions are not accessible use the mechanical dimensions of the entire device.

b) Calculate the spherical and cylindrical diameters (D and D_{cyl}) using Equations (A.1) and (A.2) in Appendix A in KDB 842590 v01r02.

c) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps $\Delta\theta_{\text{ref}}$ and $\Delta\theta_{\text{ref}}$ using Equations (A.3) and (A.4) in Appendix A in KDB 842590 v01r02.

d) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta_{\text{ref}}$ for the vertical angle and $\Delta\theta \leq \Delta\theta_{\text{ref}}$ for the horizontal angle.

e) For each emission frequency, measure the total EIRP (sum of two orthogonal polarizations) on the selected grid.

f) For each emission frequency, calculate the TRP using weighted angular average value using numerical integration as described in Appendix B in KDB 842590 v01r02.

g) Compare measured TRP with the applicable TRP limit to make a pass/fail decision.

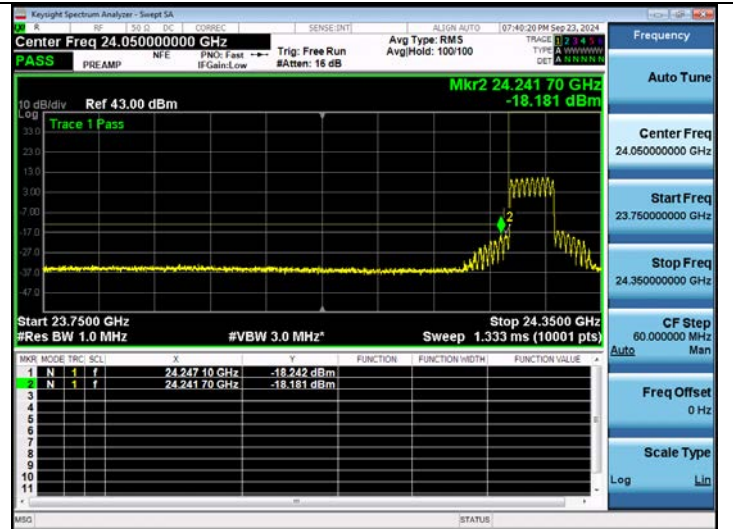
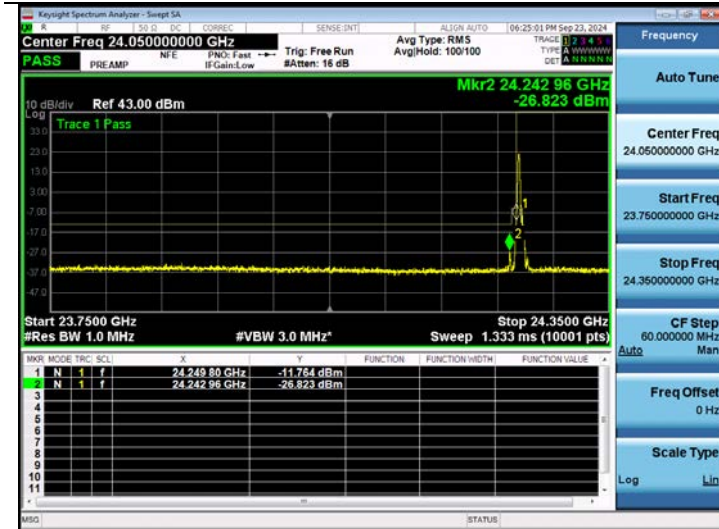
Test Results:
Tabular Data of Band Edge
n258a Band Antenna 0(M patch)

CCs active	BW [MHz]	Frequency [MHz]	Mode	Channel	Beam Pol	Modulation	Ant. Pol	RB Size/Offset	Result [dBm]	Limit [dBm]	Margin [dB]
1	50	24275.04	SISO Dual	Low	H+V	BPSK	H	1/0	-11.764	-5	6.8
		24275.04	SISO Dual	Low	H+V	BPSK	H	1/0	-26.823	-13	13.8
		24275.04	SISO Dual	Low	H+V	16QAM	H	32/0	-18.242	-5	13.2
		24275.04	SISO Dual	Low	H+V	16QAM	H	32/0	-18.181	-13	5.2
		24424.92	SISO Dual	High	H+V	QPSK	H	1/31	-13.51	-5	8.5
		24424.92	SISO Dual	High	H+V	QPSK	H	1/31	-30.629	-13	17.6
		24424.92	SISO Dual	High	H+V	16QAM	H	32/0	-15.294	-5	10.3
		24424.92	SISO Dual	High	H+V	16QAM	H	32/0	-15.326	-13	2.3
1	100	24300.00	SISO	Low	H	QPSK	V	1/0	-13.476	-5	8.5
		24300.00	SISO	Low	H	QPSK	V	1/0	-32.186	-13	19.2
		24300.00	SISO Dual	Low	H+V	QPSK	H	64/0	-20.334	-5	15.3
		24300.00	SISO Dual	Low	H+V	QPSK	H	64/0	-21.162	-13	8.2
		24399.96	SISO	High	H	QPSK	V	1/65	-14.163	-5	9.2
		24399.96	SISO	High	H	QPSK	V	1/65	-33.060	-13	20.1
		24399.96	SISO Dual	High	H+V	16QAM	H	64/0	-19.861	-5	14.9
		24399.96	SISO Dual	High	H+V	16QAM	H	64/0	-19.896	-13	6.9
2	100	24350.04	SISO	Low	H	16QAM	V	1/0	-18.550	-5	13.6
		24350.04	SISO	Low	H	16QAM	V	1/0	-19.067	-13	6.1
		24350.04	SISO	Low	V	BPSK	V	64/0	-27.252	-5	22.3
		24350.04	SISO	Low	V	BPSK	V	64/0	-15.482	-13	2.5
		24350.04	SISO	High	V	BPSK	V	1/65	-25.279	-5	20.3
		24350.04	SISO	High	V	BPSK	V	1/65	-25.108	-13	12.1
		24350.04	SISO	High	V	BPSK	V	64/0	-27.768	-5	22.8
		24350.04	SISO	High	V	BPSK	V	64/0	-14.165	-13	1.2*

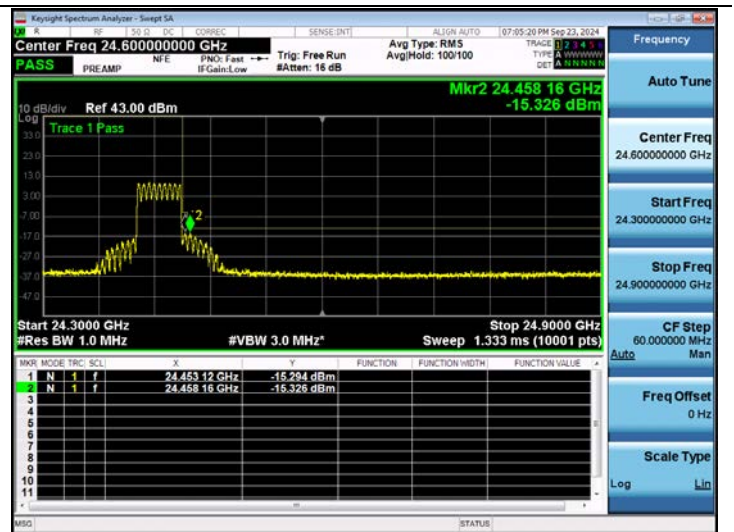
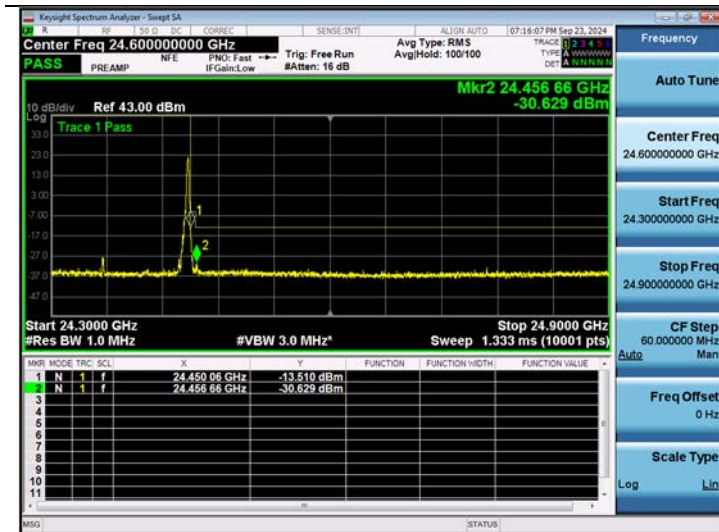
* **Note.** TRP: -23.65 dBm

Plot data of Band Edge
n258a Band Antenna 0(M patch)

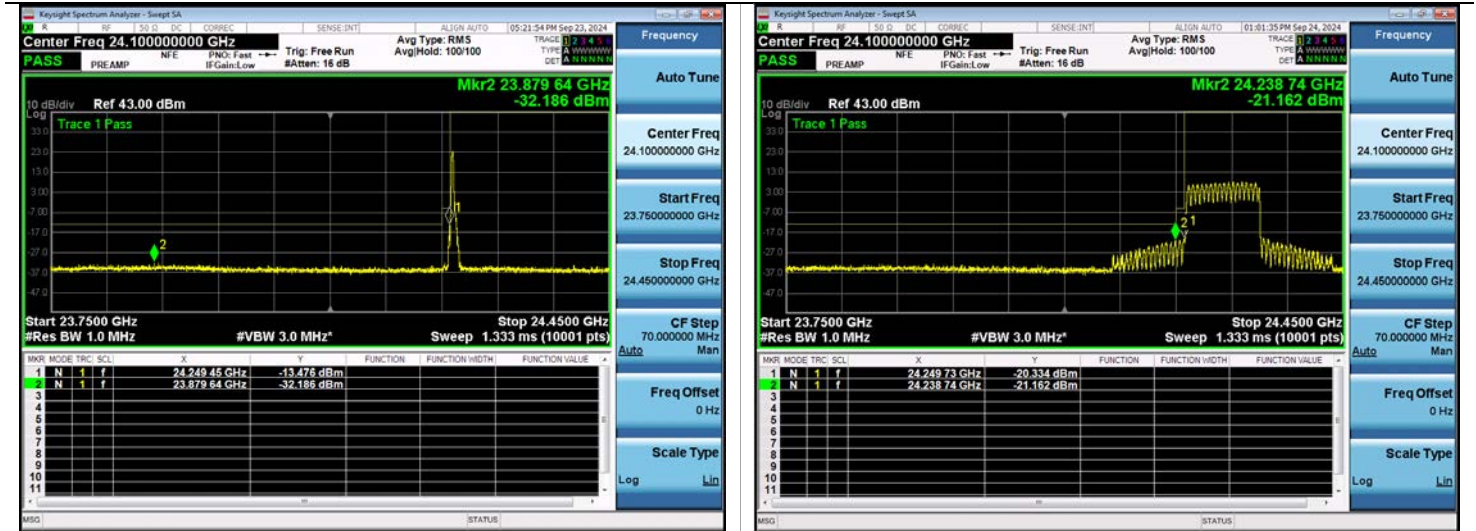
50 MHz, 1CC, Low



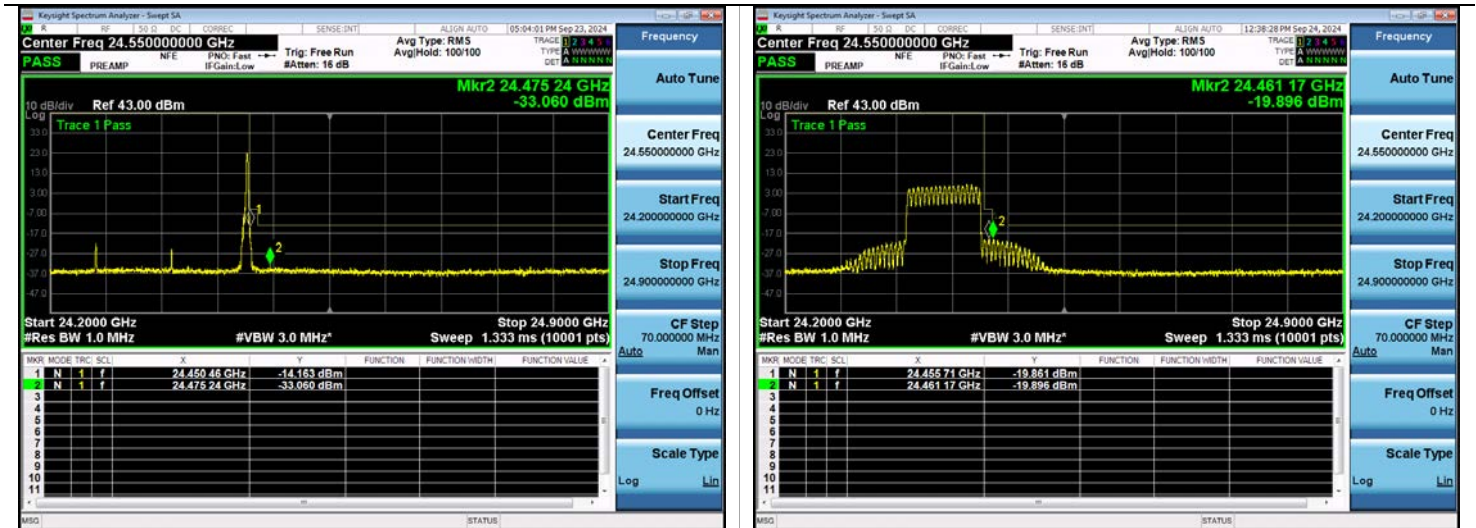
50 MHz, 1CC, High



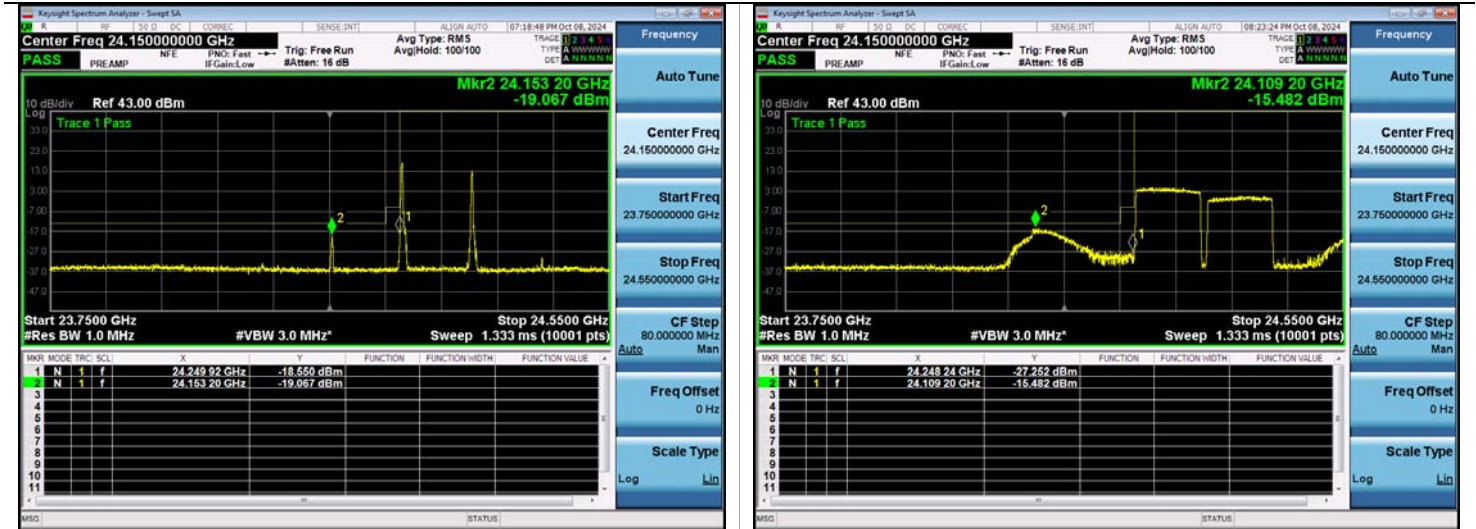
100 MHz, 1CC, Low



100 MHz, 1CC, High



100 MHz, 2CC, Low



100 MHz, 2CC, High



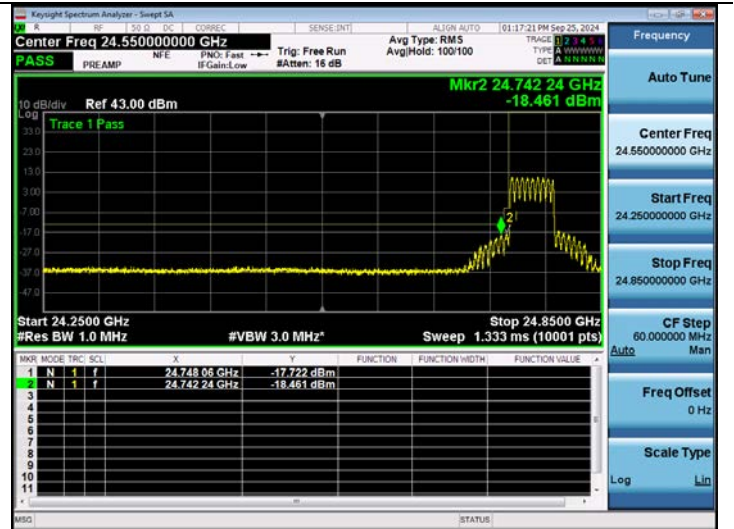
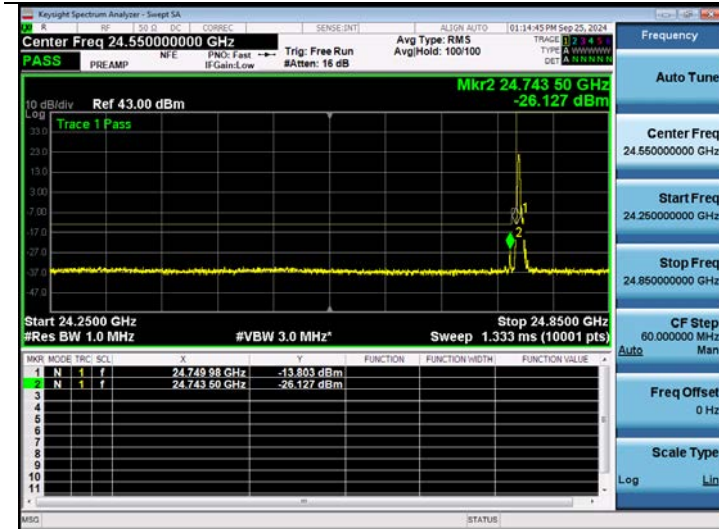
Tabular Data of Band Edge

n258b Band Antenna 0(M patch)

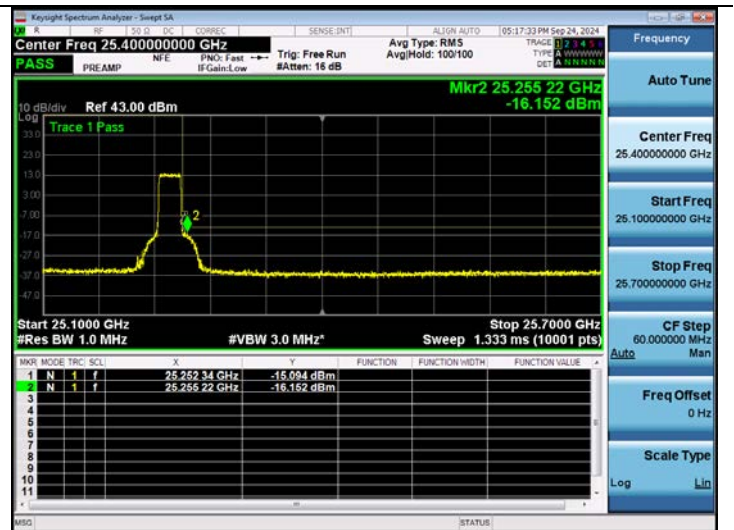
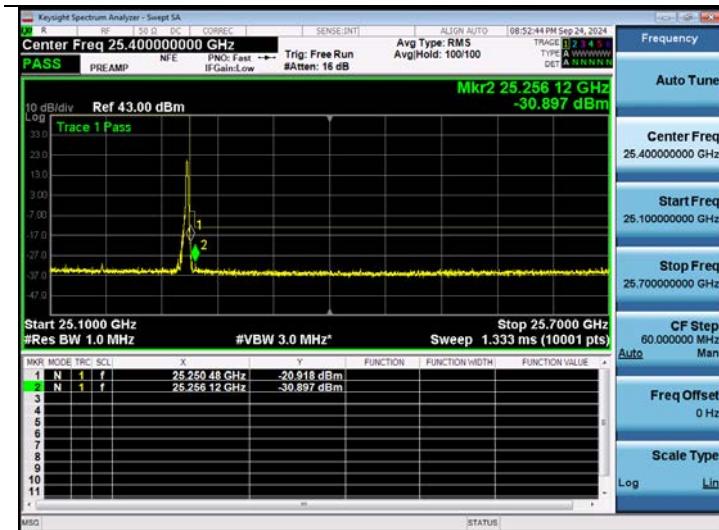
CCs active	BW [MHz]	Frequency [MHz]	Mode	Channel	Beam Pol	Modulation	Ant. Pol	RB Size/Offset	Result [dBm]	Limit [dBm]	Margin [dB]
1	50	24775.08	SISO Dual	Low	H+V	QPSK	H	1/0	-13.803	-5	8.8
		24775.08	SISO Dual	Low	H+V	QPSK	H	1/0	-26.127	-13	13.1
		24775.08	SISO Dual	Low	H+V	16QAM	H	32/0	-17.722	-5	12.7
		24775.08	SISO Dual	Low	H+V	16QAM	H	32/0	-18.461	-13	5.5
		25224.96	SISO Dual	High	H+V	64QAM	V	1/31	-20.918	-5	15.9
		25224.96	SISO Dual	High	H+V	64QAM	V	1/31	-30.897	-13	17.9
		25224.96	SISO	High	H	16QAM	V	16/16	-15.094	-5	10.1
		25224.96	SISO	High	H	16QAM	V	16/16	-16.152	-13	3.2
1	100	24800.04	SISO	Low	H	16QAM	V	1/0	-14.148	-5	9.1
		24800.04	SISO	Low	H	16QAM	V	1/0	-32.633	-13	19.6
		24800.04	SISO Dual	Low	H+V	16QAM	H	64/0	-20.083	-5	15.1
		24800.04	SISO Dual	Low	H+V	16QAM	H	64/0	-20.478	-13	7.5
		25200.00	SISO Dual	High	H+V	16QAM	V	1/65	-22.859	-5	17.9
		25200.00	SISO Dual	High	H+V	16QAM	V	1/65	-31.703	-13	18.7
		25200.00	SISO	High	H	16QAM	V	64/0	-19.676	-5	14.7
		25200.00	SISO	High	H	16QAM	V	64/0	-20.580	-13	7.6
2	100	24850.02	SISO	Low	H	QPSK	V	1/0	-23.363	-5	18.4
		24850.02	SISO	Low	H	QPSK	V	1/0	-21.183	-13	8.2
		24850.02	SISO Dual	Low	H+V	QPSK	H	64/0	-22.620	-5	17.6
		24850.02	SISO Dual	Low	H+V	QPSK	H	64/0	-17.069	-13	4.1
		25150.02	SISO	High	H	16QAM	V	1/65	-21.464	-5	16.5
		25150.02	SISO	High	H	16QAM	V	1/65	-23.917	-13	10.9
		25150.02	SISO Dual	High	H+V	QPSK	V	64/0	-25.516	-5	20.5
		25150.02	SISO Dual	High	H+V	QPSK	V	64/0	-19.860	-13	6.9
3	100	24900.00	SISO	Low	H	16QAM	V	1/0	-22.477	-5	17.5
		24900.00	SISO	Low	H	16QAM	V	1/0	-20.814	-13	7.8
		24900.00	SISO Dual	Low	H+V	QPSK	H	64/0	-32.059	-5	27.1
		24900.00	SISO Dual	Low	H+V	QPSK	H	64/0	-32.650	-13	19.7
		25100.04	SISO	High	V	BPSK	V	1/65	-33.513	-5	28.5
		25100.04	SISO	High	V	BPSK	V	1/65	-32.000	-13	19.0
		25100.04	SISO	High	H	QPSK	V	64/0	-28.029	-5	23.0
		25100.04	SISO	High	H	QPSK	V	64/0	-31.132	-13	18.1
4	100	24949.98	SISO	Low	H	BPSK	V	1/0	-34.685	-5	29.7
		24949.98	SISO	Low	H	BPSK	V	1/0	-21.612	-13	8.6
		24949.98	SISO Dual	Low	H+V	BPSK	H	64/0	-33.221	-5	28.2
		24949.98	SISO Dual	Low	H+V	BPSK	H	64/0	-32.661	-13	19.7
		25050.06	SISO	High	V	BPSK	V	1/65	-31.526	-5	26.5
		25050.06	SISO	High	V	BPSK	V	1/65	-29.683	-13	16.7
		25050.06	SISO	High	H	QPSK	V	64/0	-28.673	-5	23.7
		25050.06	SISO	High	H	QPSK	V	64/0	-28.680	-13	15.7

Plot data of Band Edge
n258b Band Antenna 0(M patch)

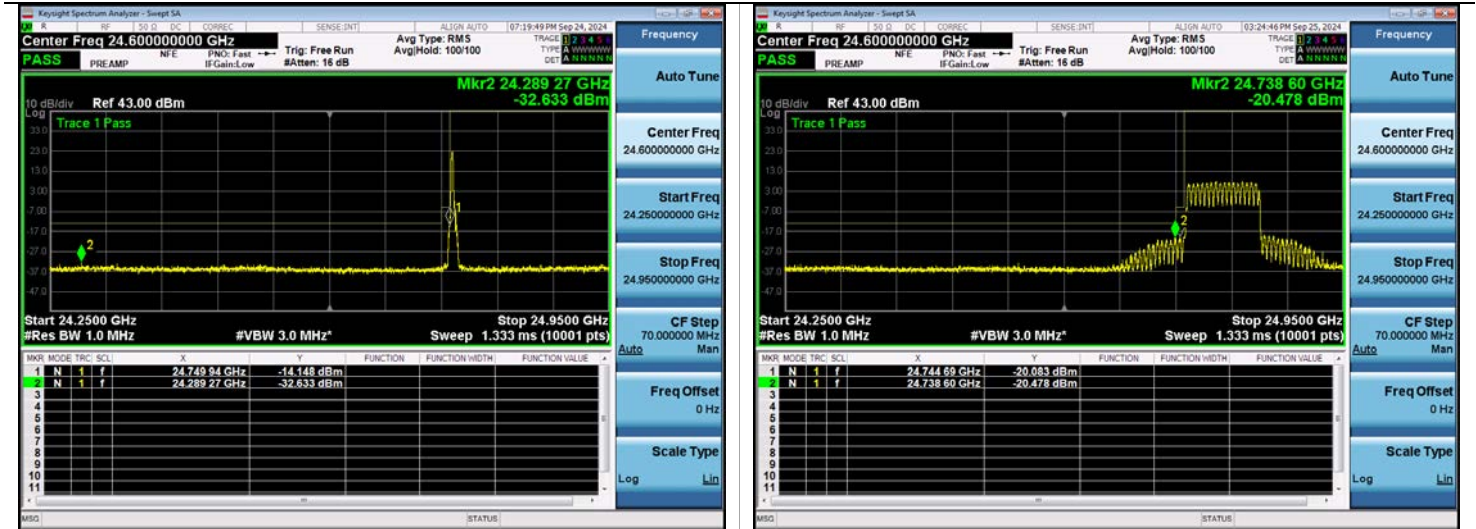
50 MHz, 1CC, Low



50 MHz, 1CC, High



100 MHz, 1CC, Low



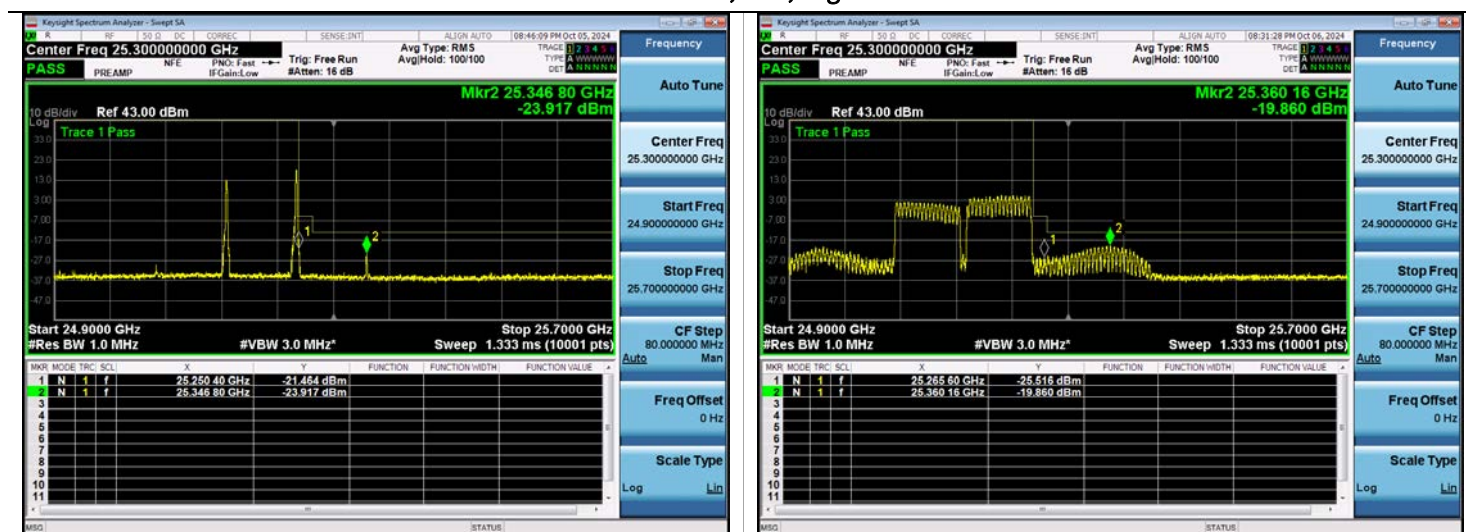
100 MHz, 1CC, High



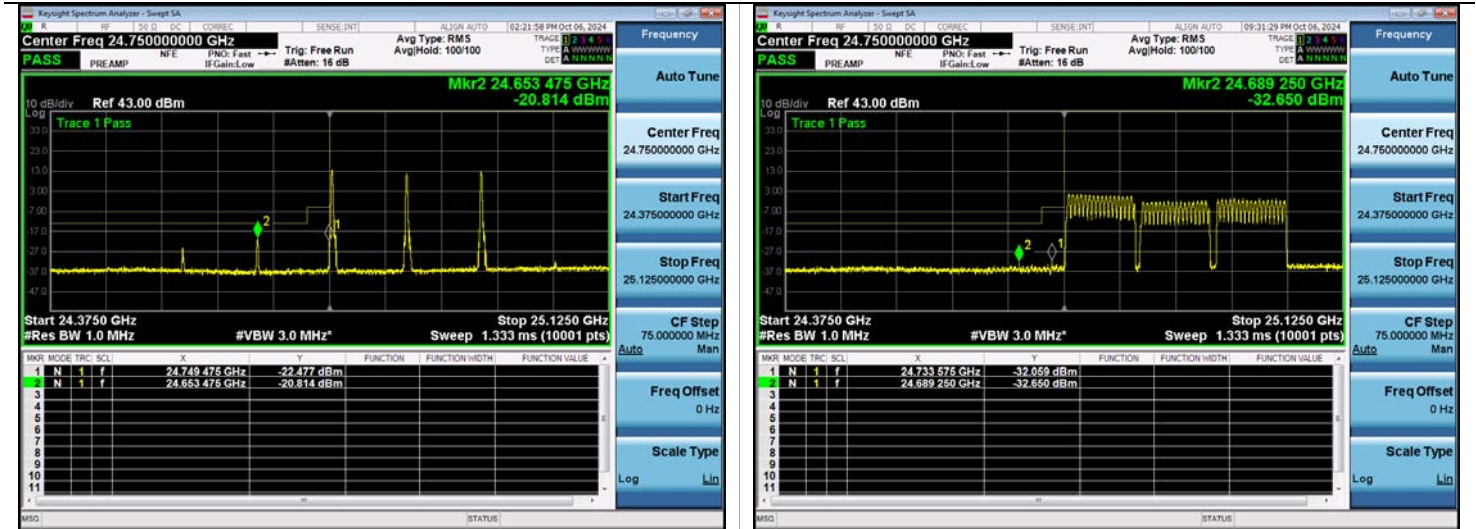
100 MHz, 2CC, Low



100 MHz, 2CC, High



100 MHz, 3CC, Low



100 MHz, 3CC, High



100 MHz, 4CC, Low



100 MHz, 4CC, High



Tabular Data of Band Edge

n260 Band Antenna 0(M patch)

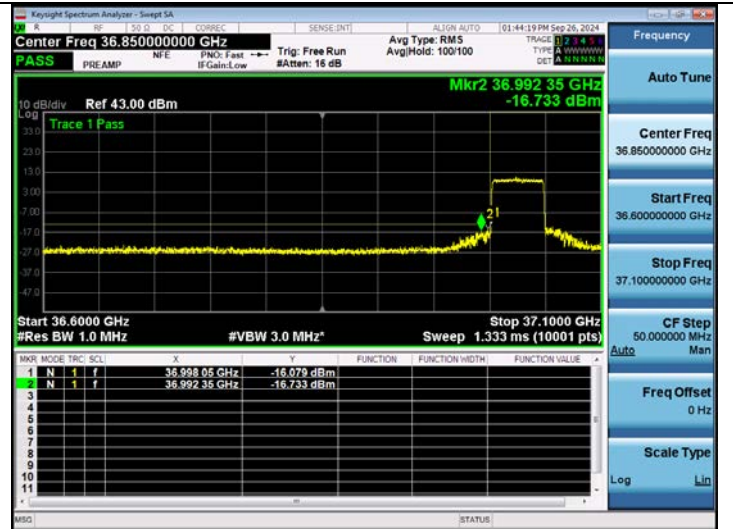
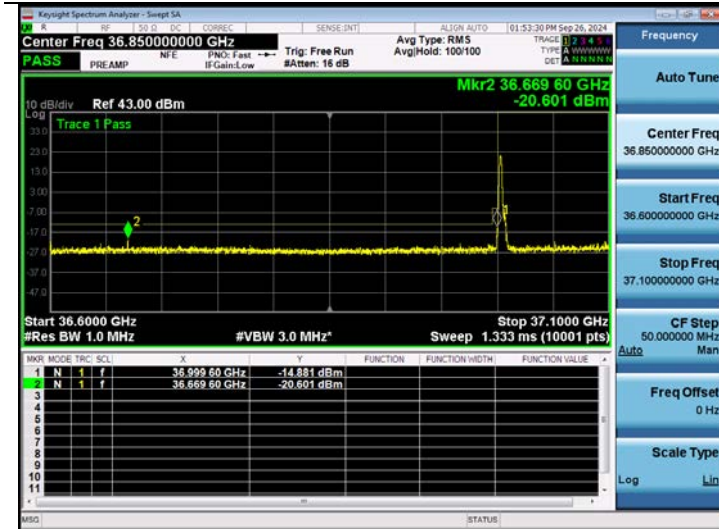
CCs active	BW [MHz]	Frequency [MHz]	Mode	Channel	Beam Pol	Modulation	Ant. Pol	RB Size/Offset	Result [dBm]	Limit [dBm]	Margin [dB]
1	50	37025.04	SISO	Low	V	16QAM	H	1/0	-14.881	-5	9.9
		37025.04	SISO	Low	V	16QAM	H	1/0	-20.601	-13	7.6
		37025.04	SISO	Low	V	16QAM	H	32/0	-16.079	-5	11.1
		37025.04	SISO	Low	V	16QAM	H	32/0	-16.733	-13	3.7
		39975.00	SISO Dual	High	H+V	64QAM	H	1/31	-17.114	-5	12.1
		39975.00	SISO Dual	High	H+V	64QAM	H	1/31	-18.191	-13	5.2
		39975.00	SISO Dual	High	H+V	16QAM	H	32/0	-12.208	-5	7.2
		39975.00	SISO Dual	High	H+V	16QAM	H	32/0	-12.897	-13	-0.1 ^{*1}
1	100	37050.00	SISO	Low	V	64QAM	H	1/0	-14.829	-5	9.8
		37050.00	SISO	Low	V	64QAM	H	1/0	-22.136	-13	9.1
		37050.00	SISO Dual	Low	H+V	QPSK	V	64/0	-18.741	-5	13.7
		37050.00	SISO Dual	Low	H+V	QPSK	V	64/0	-17.992	-13	5.0
		39949.92	SISO	High	V	BPSK	H	1/65	-16.281	-5	11.3
		39949.92	SISO	High	V	BPSK	H	1/65	-19.150	-13	6.2
		39949.92	SISO	High	V	QPSK	H	64/0	-16.908	-5	11.9
		39949.92	SISO	High	V	QPSK	H	64/0	-17.561	-13	4.6
2	100	37099.98	SISO Dual	Low	H+V	64QAM	V	1/0	-18.951	-5	14.0
		37099.98	SISO Dual	Low	H+V	64QAM	V	1/0	-13.636	-13	0.6 ^{*2}
		37099.98	SISO Dual	Low	H+V	QPSK	V	64/0	-19.470	-5	14.5
		37099.98	SISO Dual	Low	H+V	QPSK	V	64/0	-16.780	-13	3.8
		39899.94	SISO Dual	High	H+V	64QAM	H	1/65	-21.712	-5	16.7
		39899.94	SISO Dual	High	H+V	64QAM	H	1/65	-19.119	-13	6.1
		39899.94	SISO	High	H	BPSK	V	64/0	-20.660	-5	15.7
		39899.94	SISO	High	H	BPSK	V	64/0	-16.774	-13	3.8
3	100	37149.96	SISO Dual	Low	H+V	64QAM	V	1/0	-22.915	-5	17.9
		37149.96	SISO Dual	Low	H+V	64QAM	V	1/0	-16.205	-13	3.2
		37149.96	SISO	Low	V	64QAM	H	64/0	-24.019	-5	19.0
		37149.96	SISO	Low	V	64QAM	H	64/0	-21.566	-13	8.6
		39849.96	SISO	High	V	BPSK	H	1/65	-20.359	-5	15.4
		39849.96	SISO	High	V	BPSK	H	1/65	-19.562	-13	6.6
		39849.96	SISO Dual	High	H+V	BPSK	H	64/0	-21.185	-5	16.2
		39849.96	SISO Dual	High	H+V	BPSK	H	64/0	-18.361	-13	5.4
4	100	37199.94	SISO Dual	Low	H+V	QPSK	V	1/0	-19.145	-5	14.1
		37199.94	SISO Dual	Low	H+V	QPSK	V	1/0	-16.883	-13	3.9
		37199.94	SISO Dual	Low	H+V	BPSK	V	64/0	-21.423	-5	16.4
		37199.94	SISO Dual	Low	H+V	BPSK	V	64/0	-19.895	-13	6.9
		39799.98	SISO	High	V	64QAM	H	1/65	-20.158	-5	15.2
		39799.98	SISO	High	V	64QAM	H	1/65	-18.975	-13	6.0
		39799.98	SISO	High	V	64QAM	H	64/0	-21.244	-5	16.2
		39799.98	SISO	High	V	64QAM	H	64/0	-18.966	-13	6.0

^{*1} Note. TRP: -21.35 dBm

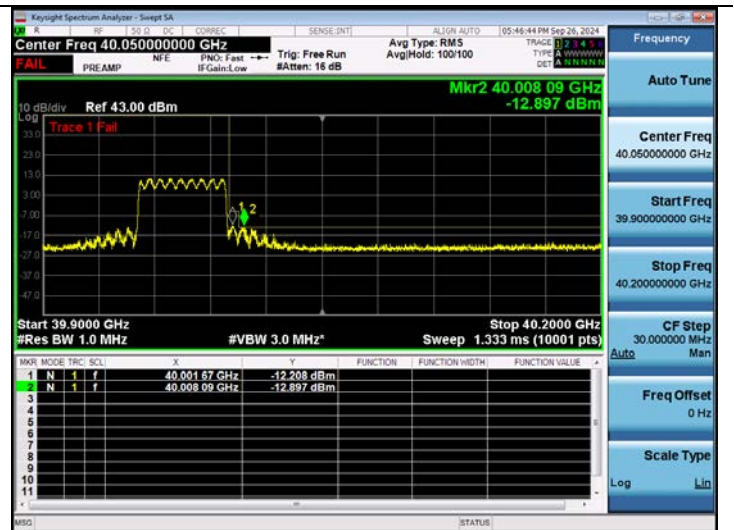
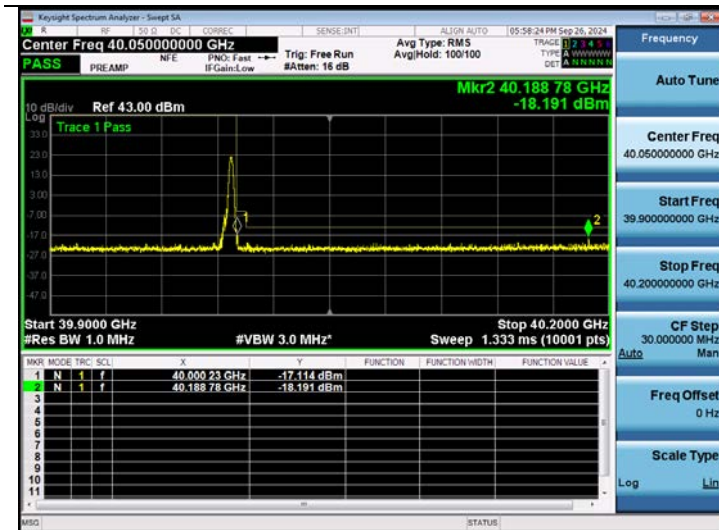
^{*2} Note. TRP: -23.83 dBm

Plot data of Band Edge
n260 Band Antenna 0(M patch)

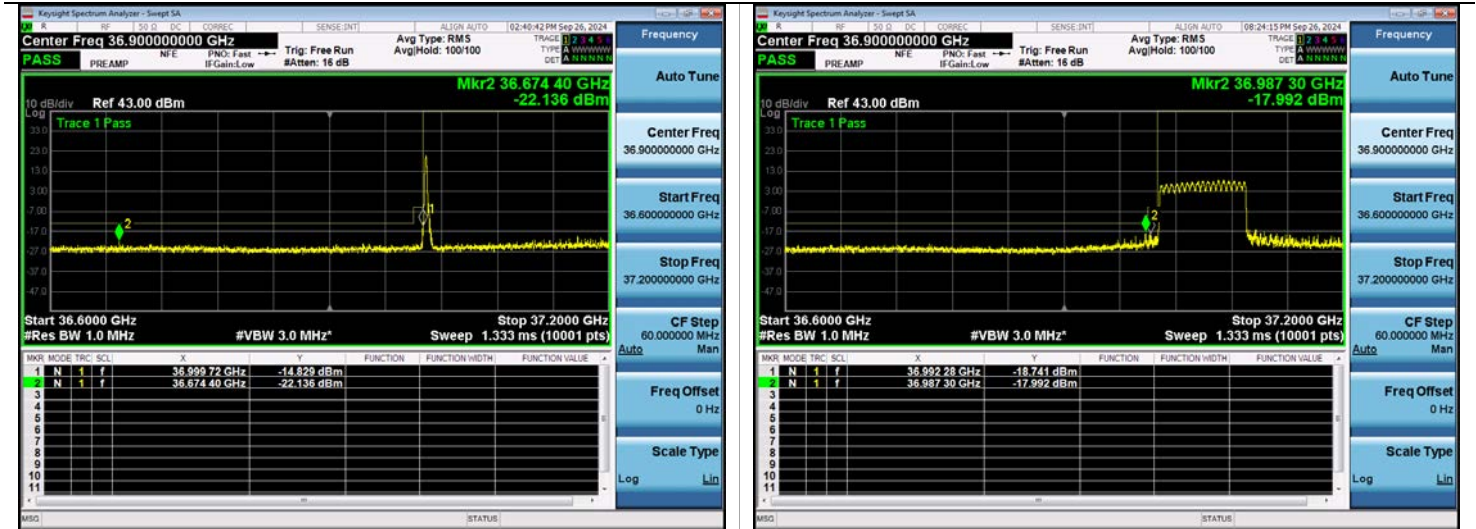
50 MHz, 1CC, Low



50 MHz, 1CC, High



100 MHz, 1CC, Low



100 MHz, 1CC, High



100 MHz, 2CC, Low



100 MHz, 2CC, High



100 MHz, 3CC, Low



100 MHz, 3CC, High



100 MHz, 4CC, Low



100 MHz, 4CC, High



Tabular Data of Band Edge

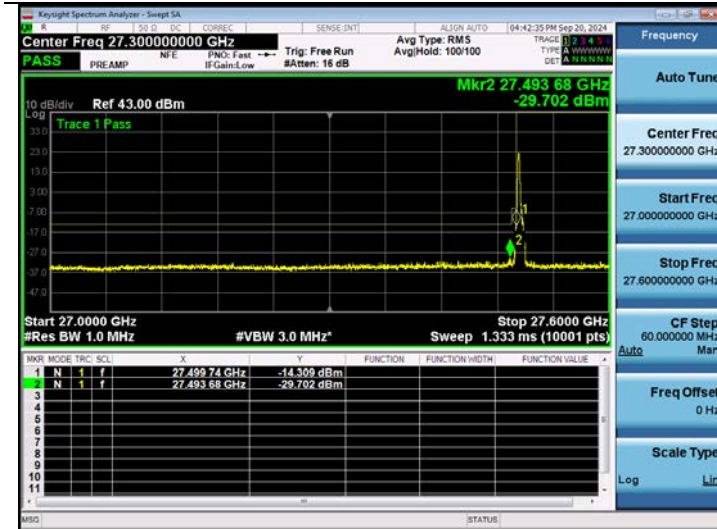
n261 Band Antenna 0(M patch)

CCs active	BW [MHz]	Frequency [MHz]	Mode	Channel	Beam Pol	Modulation	Ant. Pol	RB Size/Offset	Result [dBm]	Limit [dBm]	Margin [dB]
1	50	27525.00	SISO Dual	Low	H+V	BPSK	H	1/0	-14.309	-5	9.3
		27525.00	SISO Dual	Low	H+V	BPSK	H	1/0	-29.702	-13	16.7
		27525.00	SISO Dual	Low	H+V	16QAM	H	32/0	-14.878	-5	9.9
		27525.00	SISO Dual	Low	H+V	16QAM	H	32/0	-15.305	-13	2.3
		28324.92	SISO Dual	High	H+V	16QAM	V	1/31	-12.247	-5	7.2
		28324.92	SISO Dual	High	H+V	16QAM	V	1/31	-28.530	-13	15.5
		28324.92	SISO Dual	High	H+V	16QAM	V	32/0	-13.961	-5	9.0
		28324.92	SISO Dual	High	H+V	16QAM	V	32/0	-15.118	-13	2.1
1	100	27550.08	SISO Dual	Low	H+V	BPSK	H	1/0	-21.052	-5	16.1
		27550.08	SISO Dual	Low	H+V	BPSK	H	1/0	-30.575	-13	17.6
		27550.08	SISO Dual	Low	H+V	16QAM	H	64/0	-16.964	-5	12.0
		27550.08	SISO Dual	Low	H+V	16QAM	H	64/0	-17.182	-13	4.2
		28299.96	SISO Dual	High	H+V	16QAM	V	1/65	-19.977	-5	15.0
		28299.96	SISO Dual	High	H+V	16QAM	V	1/65	-29.165	-13	16.2
		28299.96	SISO Dual	High	H+V	16QAM	V	64/0	-16.296	-5	11.3
		28299.96	SISO Dual	High	H+V	16QAM	V	64/0	-16.581	-13	3.6
2	100	27600.06	SISO Dual	Low	H+V	BPSK	H	1/0	-29.854	-5	24.9
		27600.06	SISO Dual	Low	H+V	BPSK	H	1/0	-19.967	-13	7.0
		27600.06	SISO Dual	Low	H+V	QPSK	H	64/0	-17.736	-5	12.7
		27600.06	SISO Dual	Low	H+V	QPSK	H	64/0	-13.897	-13	0.9*
		28249.98	SISO	High	V	64QAM	H	1/65	-24.907	-5	19.9
		28249.98	SISO	High	V	64QAM	H	1/65	-25.690	-13	12.7
		28249.98	SISO	High	V	BPSK	H	64/0	-24.559	-5	19.6
		28249.98	SISO	High	V	BPSK	H	64/0	-18.525	-13	5.5
3	100	27650.04	SISO Dual	Low	H+V	QPSK	H	1/0	-26.185	-5	21.2
		27650.04	SISO Dual	Low	H+V	QPSK	H	1/0	-20.379	-13	7.4
		27650.04	SISO Dual	Low	H+V	BPSK	H	64/0	-30.146	-5	25.1
		27650.04	SISO Dual	Low	H+V	BPSK	H	64/0	-28.289	-13	15.3
		28200.00	SISO	High	V	QPSK	H	1/65	-30.314	-5	25.3
		28200.00	SISO	High	V	QPSK	H	1/65	-28.526	-13	15.5
		28200.00	SISO Dual	High	H+V	QPSK	V	64/0	-28.004	-5	23.0
		28200.00	SISO Dual	High	H+V	QPSK	V	64/0	-27.149	-13	14.1
4	100	27700.02	SISO Dual	Low	H+V	BPSK	H	1/0	-30.889	-5	25.9
		27700.02	SISO Dual	Low	H+V	BPSK	H	1/0	-21.268	-13	8.3
		27700.02	SISO Dual	Low	H+V	QPSK	H	64/0	-29.510	-5	24.5
		27700.02	SISO Dual	Low	H+V	QPSK	H	64/0	-28.769	-13	15.8
		28150.02	SISO	High	V	16QAM	H	1/65	-26.257	-5	21.3
		28150.02	SISO	High	V	16QAM	H	1/65	-26.207	-13	13.2
		28150.02	SISO Dual	High	H+V	QPSK	V	64/0	-25.089	-5	20.1
		28150.02	SISO Dual	High	H+V	QPSK	V	64/0	-25.671	-13	12.7

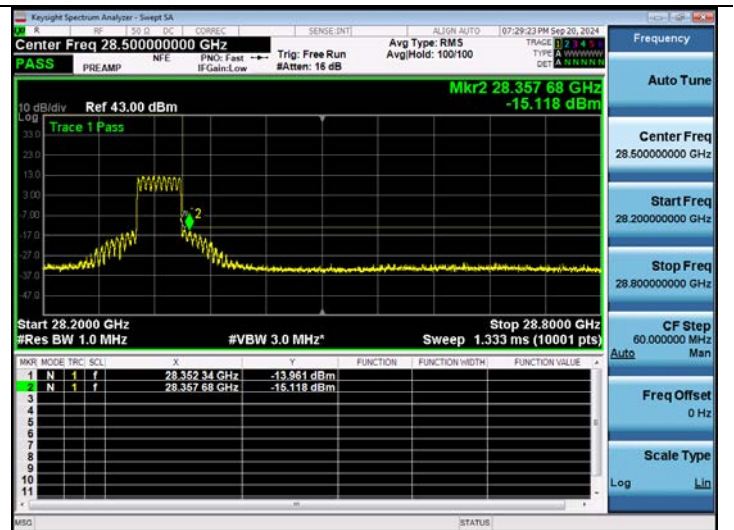
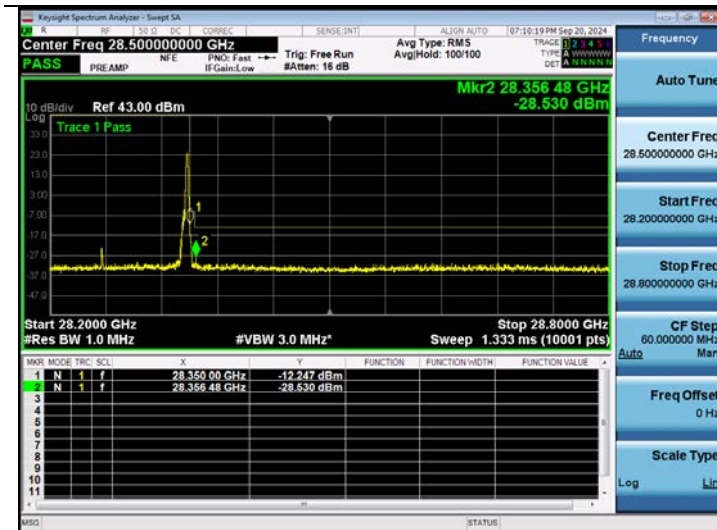
* Note. TRP: -23.52 dBm

Plot data of Band Edge
n261 Band Antenna 0(M patch)

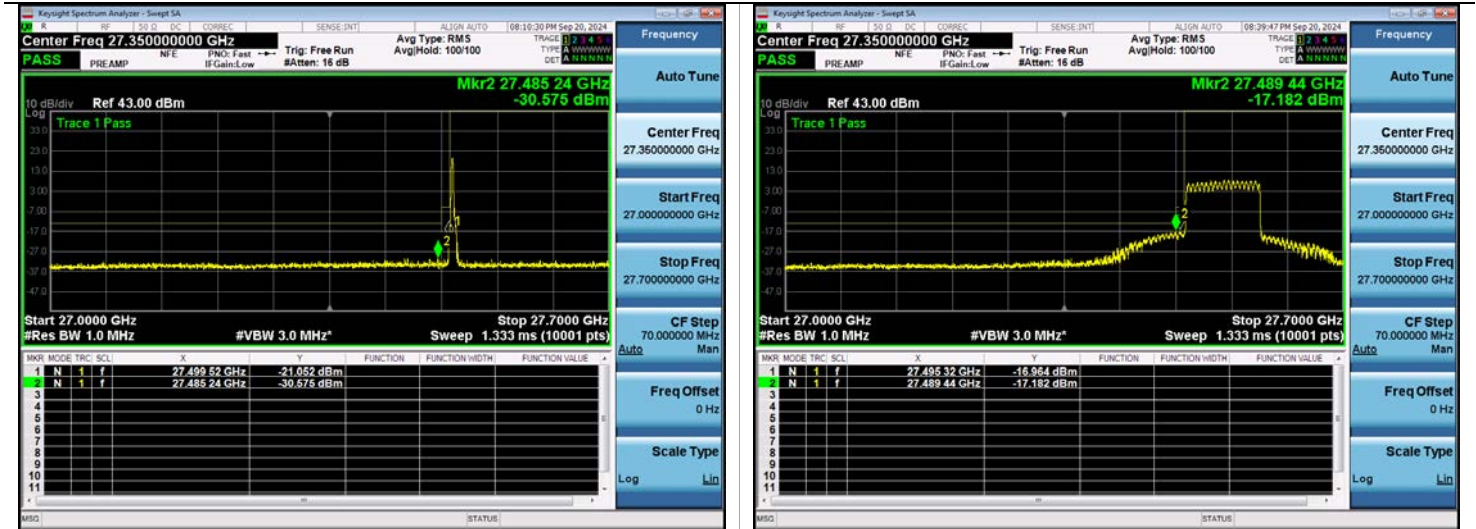
50 MHz, 1CC, Low



50 MHz, 1CC, High



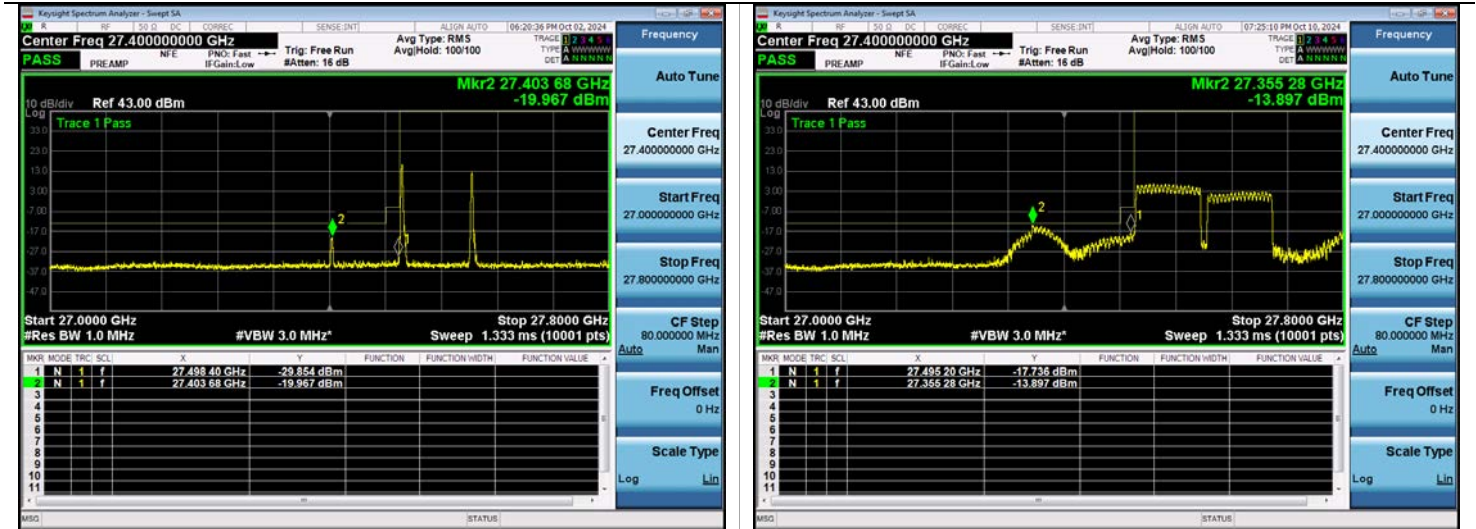
100 MHz, 1CC, Low



100 MHz, 1CC, High



100 MHz, 2CC, Low



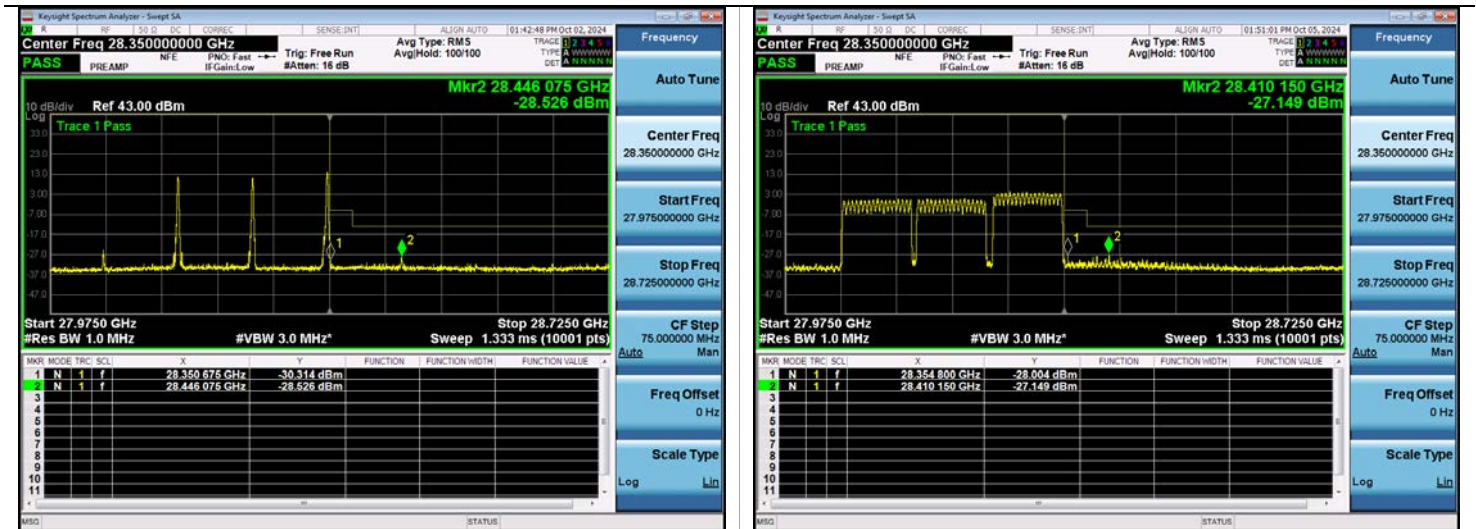
100 MHz, 2CC, High



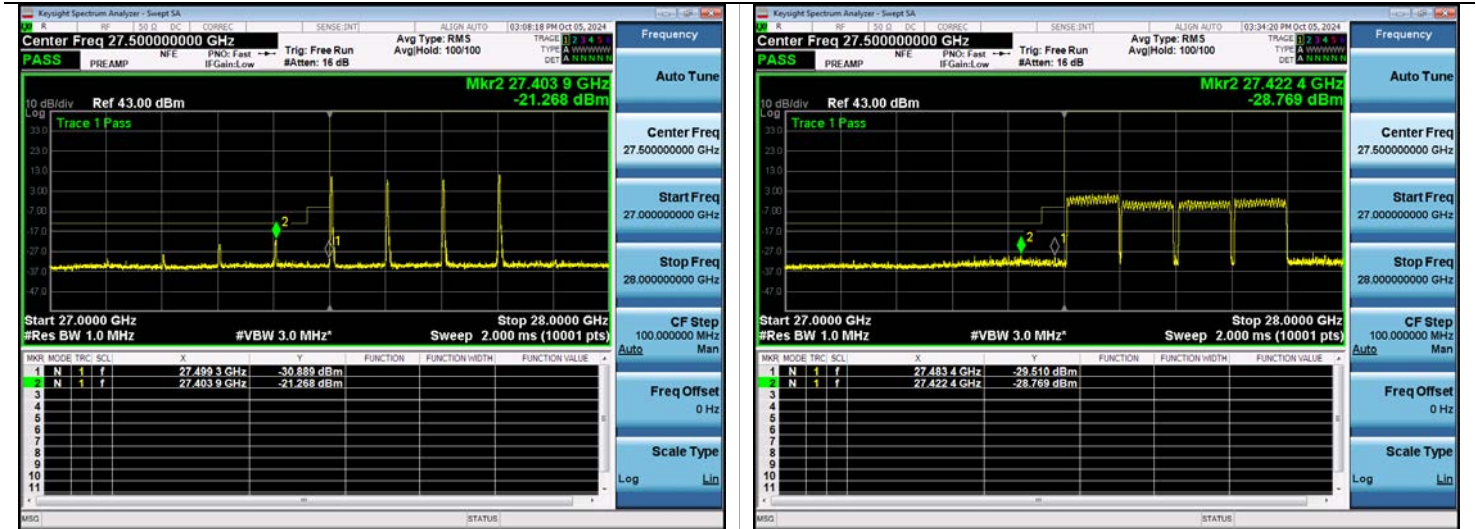
100 MHz, 3CC, Low



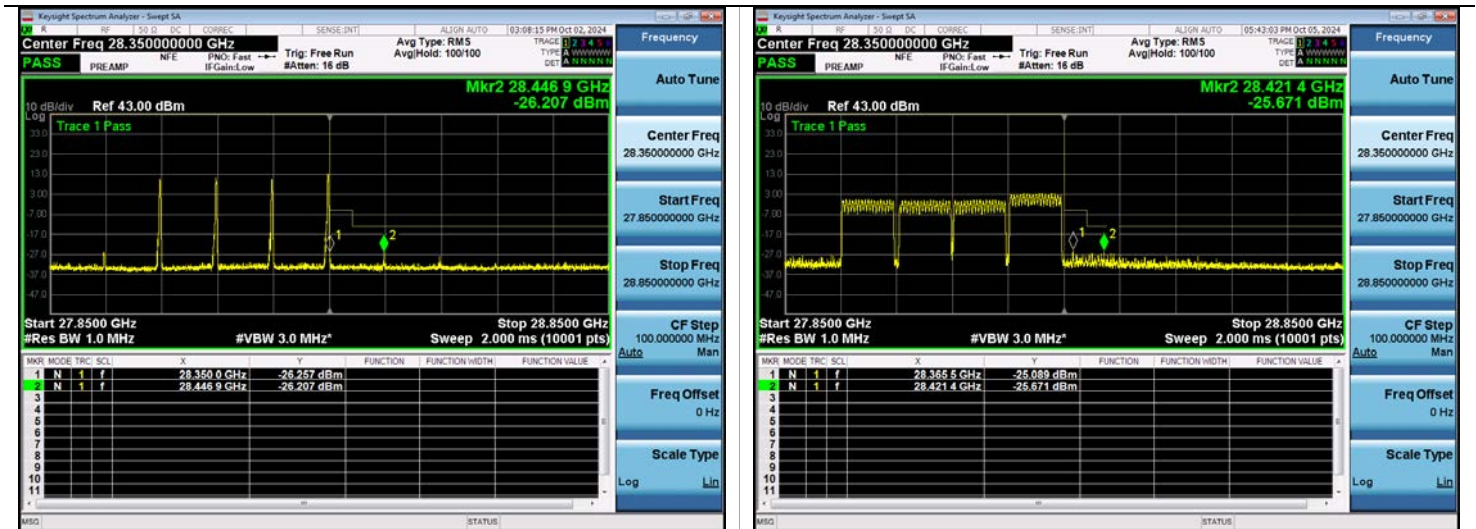
100 MHz, 3CC, High



100 MHz, 4CC, Low



100 MHz, 4CC, High



5.4. RADIATED SPURIOUS EMISSIONS

Test Overview

The test frequency range is from 9 kHz to 200GHz. All out of band emissions are measured in a radiated test setup while the EUT is operating at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The conductive power or total radiated power of any emissions outside a licensee's frequency block shall be -13dBm/1MHz.

FCC Rules

Test Requirements:

§ 30.203 Emission limits.

- (a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.
- (b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.
- (3) The measurements of emission power can be expressed in peak or average values.

EIRP Test Procedures:

The measurement is performed in accordance with Section 5.7.4 of ANSI C63.26.

5.7.4 Spurious unwanted emission measurements

- a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.
- b) When using an average power (rms) detector, ensure that the number of points in the sweep $\geq 2 \times (\text{span} / \text{RBW})$. This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power

measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation.

g) The test report shall include the data plots of the measuring instrument display and the measured data.

TRP Test Procedures:

The measurement is performed in accordance with Section 4.4.3.3.2 of KDB 842590 v01r02 (2021-04).

a) Align the EUT with a chosen xy-plane and the xz-plane of the antenna measurement coordinate system.

NOTE 1 For harmonics and spurious emission frequencies which are beamforming as identified in exploratory scan, it may be required to align the orthogonal cuts to include the peak based on exploratory scans.

b) Measure the EUT dimensions, i.e., depth (d), width (w), and height (h); see Figure A.1 in Appendix A.

c) Calculate the spherical and cylindrical diameters (D and D_{cyl}) using Equations (A.1) and (A.2) (see Appendix A).

d) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps $\Delta\theta_{\text{ref}}$ and $\Delta\phi_{\text{ref}}$ using Equations (A.3) and (A.4).

e) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta_{\text{ref}}$ for the vertical angle and $\Delta\phi \leq \Delta\phi_{\text{ref}}$ for the horizontal cut.

f) For each emission frequency, measure the EIRP (as a sum of two orthogonal polarizations) at each spatial sampling step on the selected grid.

g) For each emission frequency, calculate the average EIRP for both the cuts separately, and then take the average of these two average values.

h) Add 2 dB as a correction factor to the averaged value computed in step g).

i) If the TRP limit is exceeded, a third orthogonal cut in the yz-plane and using the $\Delta\theta$ angular step, can be added. Now, calculate the average values in all three cuts separately, and then take the average value of these three average values.

j) Add 1.5 dB as a correction factor to the averaged value computed in step i).

k) Evaluate the pass/fail decision by comparing TRP from step h) or step j) against the applicable TRP limit.

Note:

1. Spurious emission test is performed up to 200 GHz (up to 100 GHz for n258, n261) frequency according to section 5.1.1 of ANSI C63.26 -2015.
2. Measurement distance is applied far field condition on page 17.
3. All RSE's were measured with 1CC. It was determined that adding more CC's causes the overall amplitude of just 1CC to decrease, therefore, 1CC is the worst case for the purposes of spurious emissions measurements.
4. All RSE's were investigated in EN-DC/NR-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC/NR-DC mode, or the 802.11 chipset.
5. For EN-DC mode, n261 uses LTE B2, B5, B12, B13, B48 and B66, n260 uses LTE B2, B5, B12, B13, B14, B30, B48 and B66, n258 uses LTE B2, B5, B12, B66 and B71 as anchor bands. For NR-DC mode, n261 uses NR n2, n5, n25, n41, n48, n66, n71 and n77, n260 uses n2, n5, n25, n30, n41, n48, n66, n71 and n77, n258 band uses NR n25, n41, n66 and n77 as anchor bands.
6. LTE and FR1 anchor bands support default configuration and Tx hopping configuration. Both of which have been investigated. LTE B66 and NR n66 were used as a representative anchor bands for EN-DC and NR-DC investigations. There was no discernible difference in the spurious emission levels when using different LTE and NR FR1 anchor bands.
7. All factors except spectrum analyzer level are applied as correction factor each band in the analyzer and calculated in tabular data.
In this test, AFCL factor consists of antenna factor, cable loss, mixer loss, amplifier gain and duty correction. Emissions value is first converted by distance factor as follow.

Converted value (dBm) = Measured Value (dBuV) + 20 LOG(D) - 104.77

Final spurious emissions result is calculated as follows.

Spurious Emissions = Converted Value (dBm) + AFCL

8. Measurement RBW correction factor (Reference RBW : 1 MHz)
The measured value in table is included the RBW correction factor.

$10\log(\text{Reference RBW}/\text{Measured RBW})$

In case of 1 kHz RBW, correction factor is 30 dB.

In case of 10 kHz RBW, correction factor is 20 dB.

In case of 100 kHz RBW, correction factor is 10 dB.

9. Calculations

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses.

10. In case of 9 kHz to 30 MHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

11. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone, Simultaneous transmission scenarios
- Worst case : Stand alone

10. Correction Factor

30 MHz - 1 GHz		1 GHz - 3 GHz		3 GHz - 18 GHz		18 GHz - 40 GHz		40 GHz - 200 GHz	
Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)
30	-13.62	1000	-5.61	3000	-9.26	18	-1.16	40	57.50
40	-12.79	1200	-4.86	3200	-8.73	18.5	-0.36	45	55.08
50	-12.07	1400	-4.17	3400	-8.91	19	-0.38	50	57.40
60	-12.74	1600	-4.47	3600	-7.97	19.5	-0.37	55	58.81
70	-14.28	1800	-4.38	3800	-7.84	20	-0.06	60	61.84
80	-17.12	2000	-3.16	4000	-7.02	20.5	0.28	60	57.97
90	-17.56	2200	-1.04	4200	-5.83	21	0.75	65	59.10
100	-16.75	2400	-1.47	4400	-5.62	21.5	1.38	70	59.57
150	-11.98	2600	-1.35	4600	-5.26	22	1.62	75	57.63
200	-15.17	2800	0.05	4800	-4.65	22.5	2.12	80	60.02
250	-13.09	3000	0.74	5000	-4.28	23	2.59	85	59.29
300	-11.68	-	-	5200	-4.56	23.5	2.91	90	60.99
350	-10.73	-	-	5400	-4.34	24	3.19	90	59.79
400	-9.47	-	-	5600	-4.11	24.5	3.94	95	61.82
450	-7.71	-	-	5800	-3.87	25	4.03	100	61.24
500	-7.13	-	-	6000	-3.60	25.5	3.84	105	61.72
550	-6.35	-	-	6200	-4.00	26	3.32	110	63.02
600	-5.11	-	-	6400	-3.21	26.5	3.67	115	62.24
650	-4.37	-	-	6600	-2.56	27	3.68	120	62.81
700	-3.65	-	-	6800	-2.18	27.5	3.31	125	63.47
750	-2.36	-	-	7000	-2.10	28	3.27	130	63.54
800	-1.77	-	-	7200	-0.51	28.5	3.51	135	64.61
850	-1.23	-	-	7400	-0.13	29	4.10	140	64.75
900	-0.12	-	-	7600	-0.24	29.5	4.24	140	67.62
950	1.11	-	-	7800	-0.13	30	4.54	145	65.02
1000	2.02	-	-	8000	0.82	30.5	4.78	150	66.39
-	-	-	-	8200	0.06	31	5.11	155	64.28
-	-	-	-	8400	-0.07	31.5	5.34	160	64.68
-	-	-	-	8600	0.72	32	5.26	165	65.08
-	-	-	-	8800	1.06	32.5	6.15	170	67.99
-	-	-	-	9000	1.37	33	6.38	175	65.92
-	-	-	-	9200	2.54	33.5	7.07	180	65.55
-	-	-	-	9400	2.88	34	7.25	185	67.44
-	-	-	-	9600	3.05	34.5	6.33	190	66.83
-	-	-	-	9800	3.64	35	6.87	195	65.87

30 MHz - 1 GHz		1 GHz - 3 GHz		3 GHz - 18 GHz		18 GHz - 40 GHz		40 GHz - 200 GHz	
Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)
-	-	-	-	10000	3.59	35.5	7.46	200	67.01
-	-	-	-	10200	3.85	36	7.71	-	-
-	-	-	-	10400	4.53	36.5	8.79	-	-
-	-	-	-	10600	4.64	37	9.71	-	-
-	-	-	-	10800	4.95	37.5	10.67	-	-
-	-	-	-	11000	5.35	38	11.17	-	-
-	-	-	-	11200	5.08	38.5	12.22	-	-
-	-	-	-	11400	5.19	39	14.60	-	-
-	-	-	-	11600	5.12	39.5	15.82	-	-
-	-	-	-	11800	4.54	40	16.22	-	-
				12000	4.96				
				12200	5.11				
				12400	4.35				
				12600	4.48				
				12800	4.87				
				13000	5.07				
				13200	4.53				
				13400	5.00				
				13600	5.00				
				13800	5.32				
				14000	4.91				
				14200	3.47				
				14400	3.70				
				14600	4.09				
				14800	4.01				
				15000	2.99				
				15200	1.76				
				15400	0.42				
				15600	-0.32				
				15800	-0.80				
				16000	-0.43				
				16200	1.21				
				16400	1.85				
				16600	2.55				
				16800	3.80				
				17000	5.19				

30 MHz - 1 GHz		1 GHz - 3 GHz		3 GHz - 18 GHz		18 GHz - 40 GHz		40 GHz - 200 GHz	
Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (MHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)	Freq. (GHz)	AFCL (dB)
				17200	6.61				
				17400	8.19				
				17600	9.62				
				17800	10.91				
				18000	15.40				

*Correction Factor= Antenna Factor + Cable Loss – Amp. Gain + (Harmonic Mixer Conversion Loss)

Test Results: Tabular Data of Radiated Spurious Emissions
DFT-s OFDM (SISO or SISO Dual)

1. n258a

30 MHz ~ 1 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	V	52.23	3	-43.00
		100	24350.04	Mid	H	QPSK	V	51.99	3	-43.24
		100	24399.96	High	H	16QAM	V	52.19	3	-43.04
1 GHz ~ 3 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	V	59.78	3	-35.45
		100	24350.04	Mid	H	QPSK	V	59.31	3	-35.92
		100	24399.96	High	H	16QAM	V	60.06	3	-35.17
3 GHz ~ 18 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	H	60.78	3	-34.45
		100	24350.04	Mid	H	QPSK	V	61.21	3	-34.02
		100	24399.96	High	H	16QAM	V	61.95	3	-33.28
18 GHz ~ 23.75 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	V	68.04	3	-27.19
		100	24350.04	Mid	H	QPSK	V	66.58	3	-28.65
		100	24399.96	High	H	16QAM	V	67.46	3	-27.77

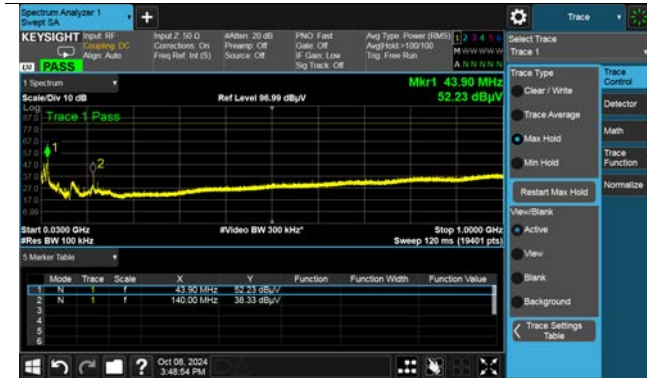
24.90 GHz ~ 40 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	H	71.08	3	-24.15
		100	24350.04	Mid	H	QPSK	H	71.51	3	-23.72
		100	24399.96	High	H	16QAM	H	71.23	3	-24.00
40 GHz ~ 60 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	H	80.25	1.5	-21.00
		100	24350.04	Mid	H	QPSK	H	78.39	1.5	-22.86
		100	24399.96	High	H	16QAM	H	78.60	1.5	-22.65
60 GHz ~ 90 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	H	73.02	1	-31.75
		100	24350.04	Mid	H	QPSK	H	72.09	1	-32.68
		100	24399.96	High	H	16QAM	H	71.98	1	-32.79
90 GHz ~ 100 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24300.00	Low	H	QPSK	V	74.90	1	-29.87
		100	24350.04	Mid	H	QPSK	H	75.10	1	-29.67
		100	24399.96	High	H	16QAM	H	75.06	1	-29.71

DFT-s OFDM (SISO or SISO Dual) Plot data of Radiated Spurious Emissions

Antenna 0(M patch), n258a

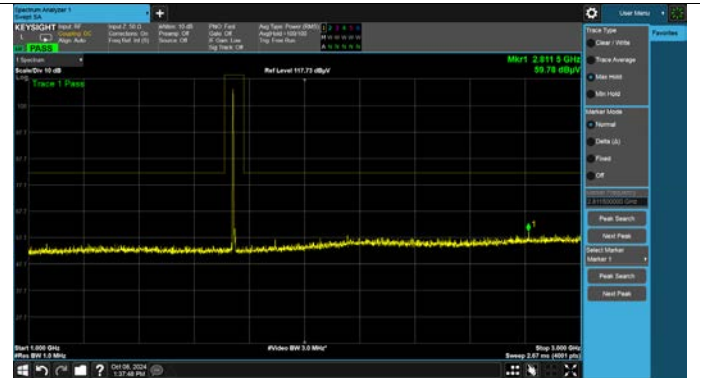
30 MHz ~ 1 GHz

Low Channel

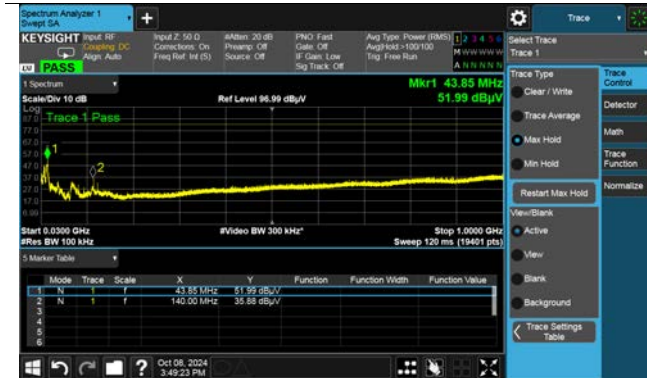


1 GHz ~ 3 GHz

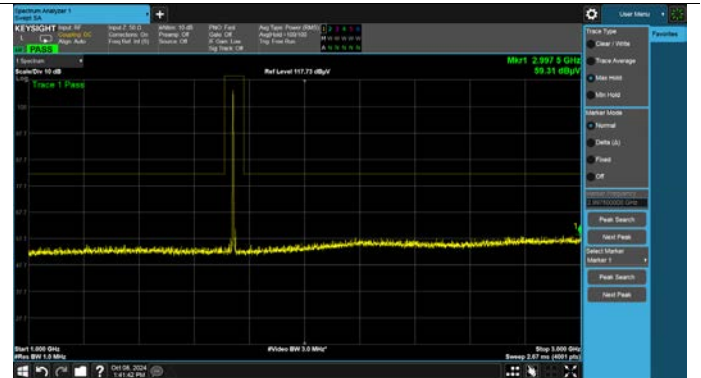
Low Channel



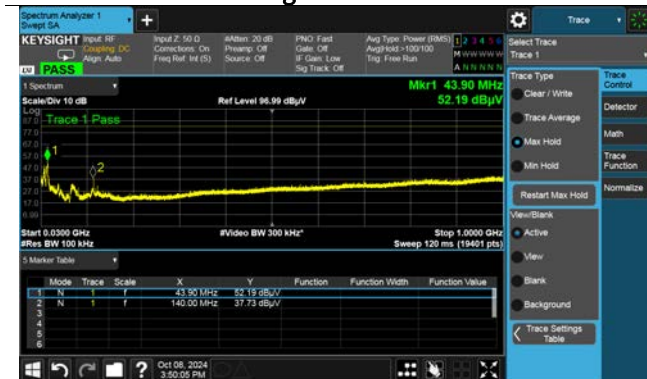
Middle Channel



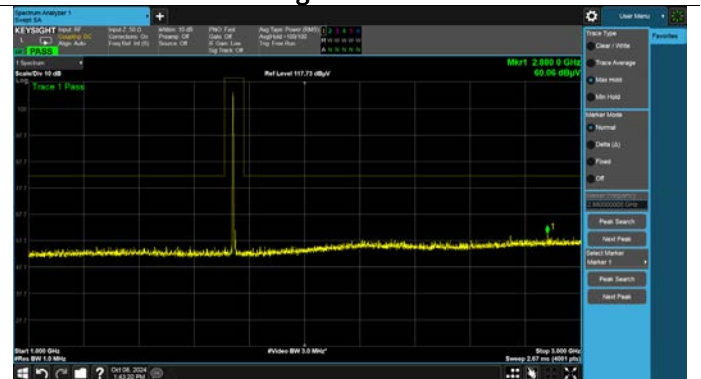
Middle Channel



High Channel



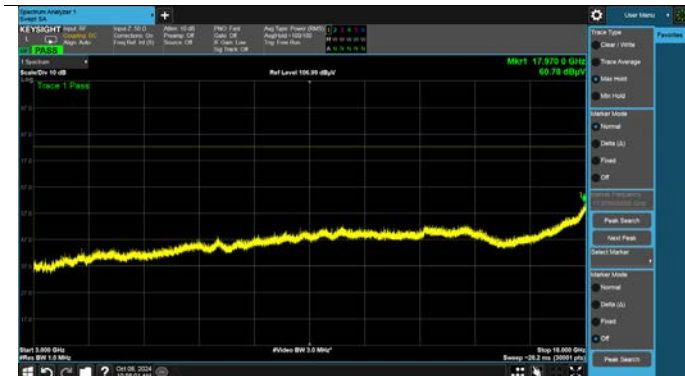
High Channel



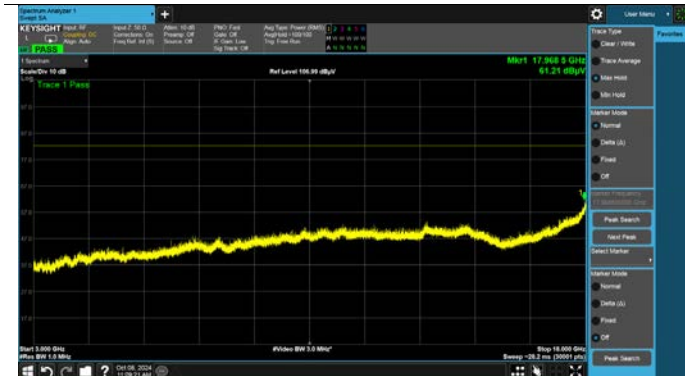
Antenna 0(M patch), n258a

3 GHz ~ 18 GHz

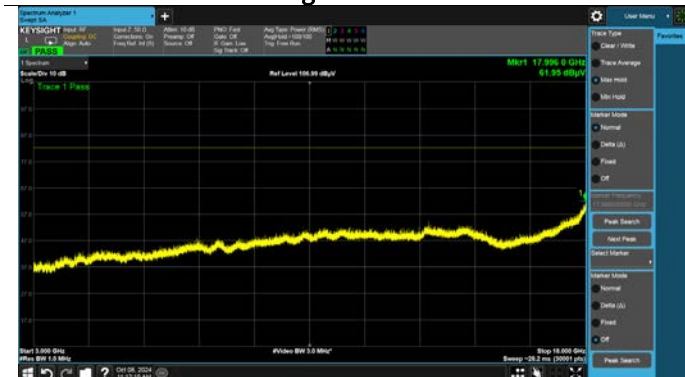
Low Channel



Middle Channel



High Channel



18 GHz ~ 23.75 GHz

Low Channel



Middle Channel



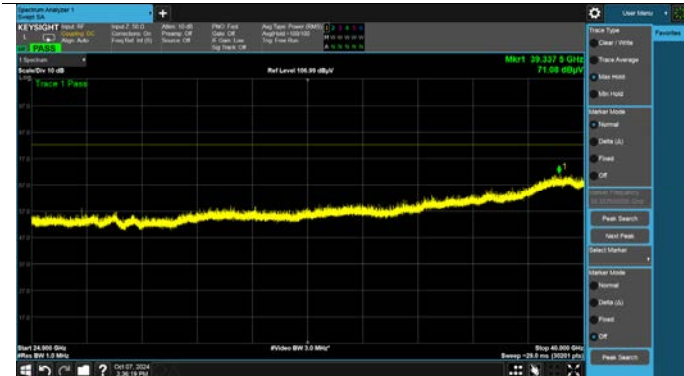
High Channel



Antenna 0(M patch), n258a

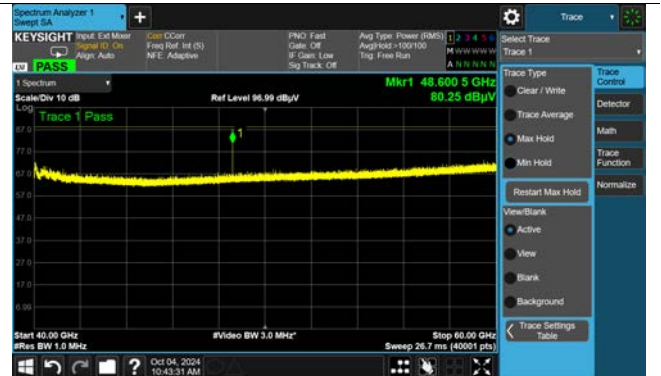
24.90 GHz ~ 40 GHz

Low Channel

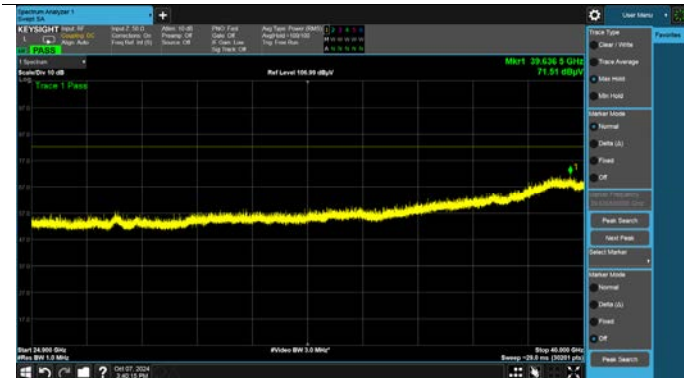


40 GHz ~ 60 GHz

Low Channel



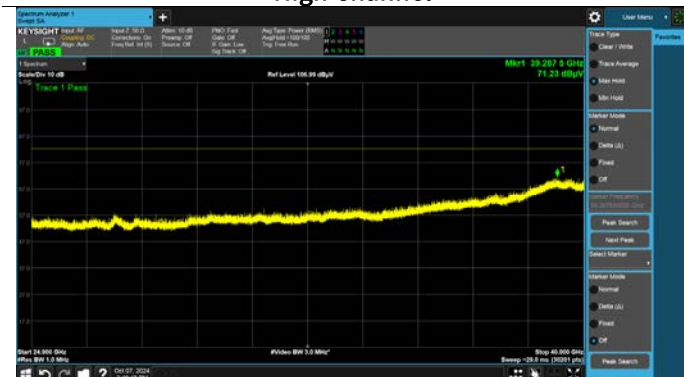
Middle Channel



Middle Channel



High Channel



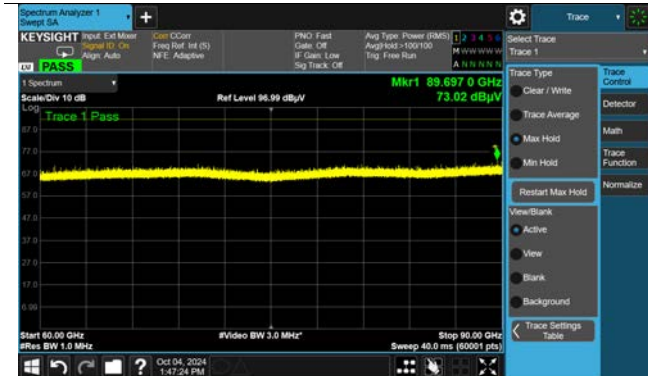
High Channel



Antenna 0(M patch), n258a

60 GHz ~ 90 GHz

Low Channel

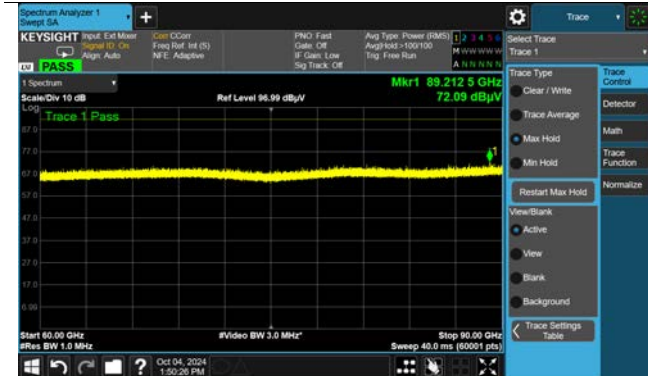


90 GHz ~ 100 GHz

Low Channel



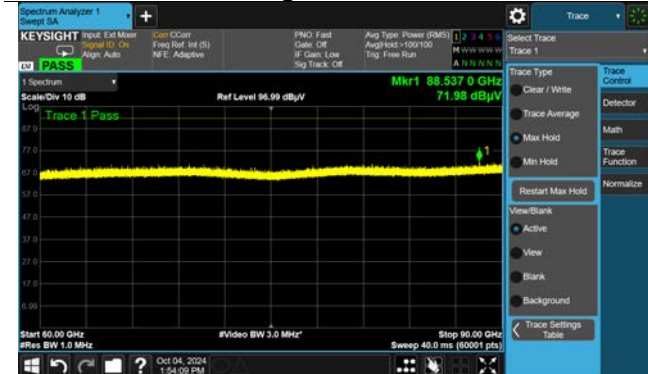
Middle Channel



Middle Channel



High Channel



High Channel



Test Results: Tabular Data of Radiated Spurious Emissions
DFT-s OFDM (SISO or SISO Dual)

2. n258b

30 MHz ~ 1 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	V	52.33	3	-42.90
		100	24999.96	Mid	H	QPSK	V	51.39	3	-43.84
		50	25224.96	High	H	BPSK	V	51.69	3	-43.54
1 GHz ~ 3 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	H	59.15	3	-36.08
		100	24999.96	Mid	H	QPSK	H	58.92	3	-36.31
		50	25224.96	High	H	BPSK	H	59.39	3	-35.84
3 GHz ~ 18 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	H	61.06	3	-34.17
		100	24999.96	Mid	H	QPSK	V	60.87	3	-34.36
		50	25224.96	High	H	BPSK	V	61.15	3	-34.08
18 GHz ~ 24.25 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	V	58.87	3	-36.36
		100	24999.96	Mid	H	QPSK	V	58.60	3	-36.63
		50	25224.96	High	H	BPSK	V	59.06	3	-36.17

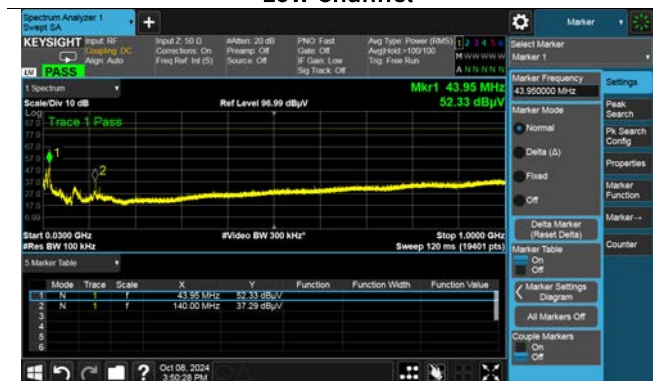
25.70 GHz ~ 40 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	V	72.16	3	-23.07
		100	24999.96	Mid	H	QPSK	V	71.15	3	-24.08
		50	25224.96	High	H	BPSK	V	71.09	3	-24.14
40 GHz ~ 60 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	V	74.25	1.5	-27.00
		100	24999.96	Mid	H	QPSK	H	78.59	1.5	-22.66
		50	25224.96	High	H	BPSK	H	79.23	1.5	-22.02
60 GHz ~ 90 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	H	72.51	1	-32.26
		100	24999.96	Mid	H	QPSK	H	71.87	1	-32.90
		50	25224.96	High	H	BPSK	H	71.53	1	-33.24
90 GHz ~ 100 GHz										
Ant. (Patch)	CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	Measured Value [dBuV]	Distance [m]	Conversion Value Result [dBm]
0 (M)	1	100	24800.04	Low	H+V	QPSK	H	75.11	1	-29.66
		100	24999.96	Mid	H	QPSK	H	75.23	1	-29.54
		50	25224.96	High	H	BPSK	H	74.85	1	-29.92

DFT-s OFDM (SISO or SISO Dual) Plot data of Radiated Spurious Emissions

Antenna 0(M patch), n258b

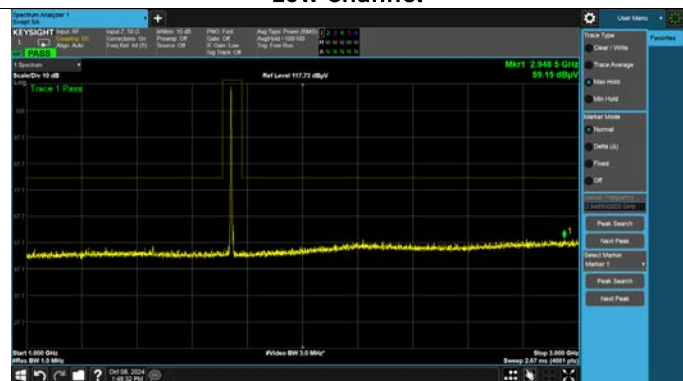
30 MHz ~ 1 GHz

Low Channel

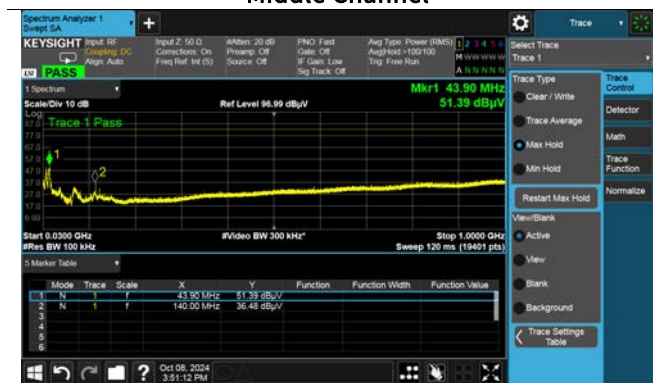


1 GHz ~ 3 GHz

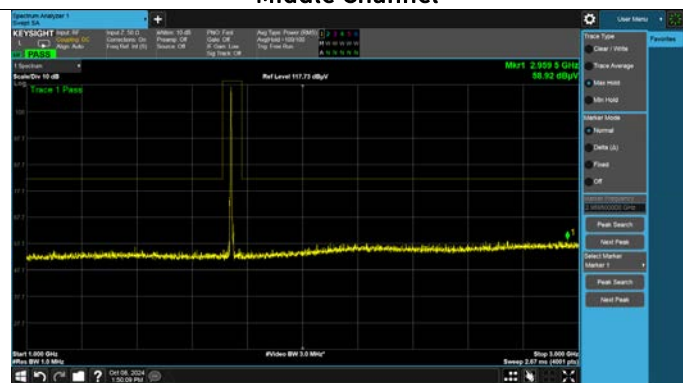
Low Channel



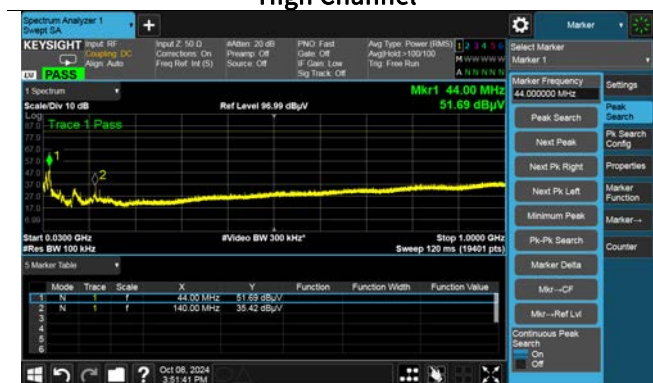
Middle Channel



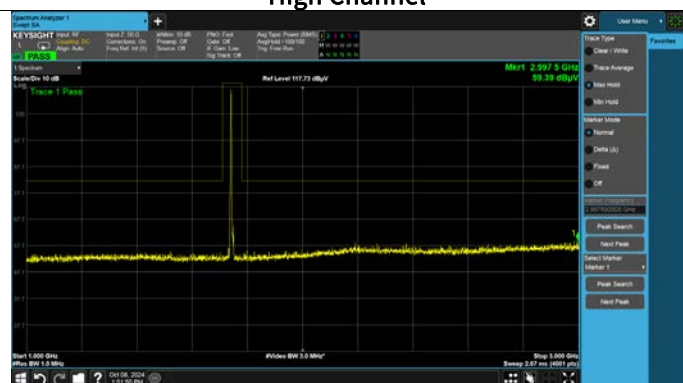
Middle Channel



High Channel

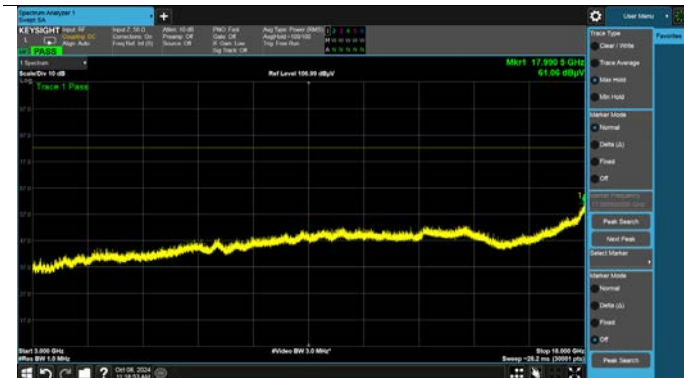


High Channel



Antenna 0(M patch), n258b

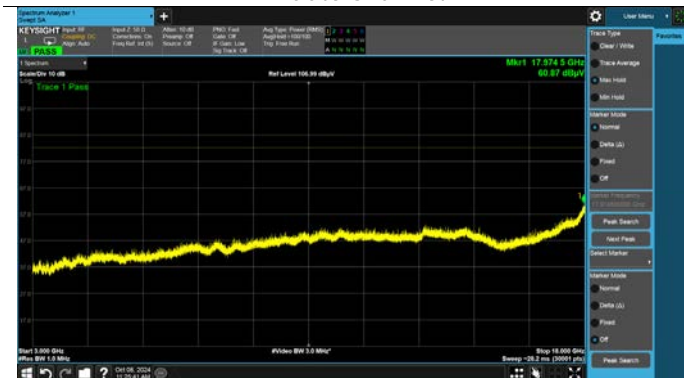
3 GHz ~ 18 GHz Low Channel



18 GHz ~ 24.25 GHz Low Channel



Middle Channel



Middle Channel



High Channel



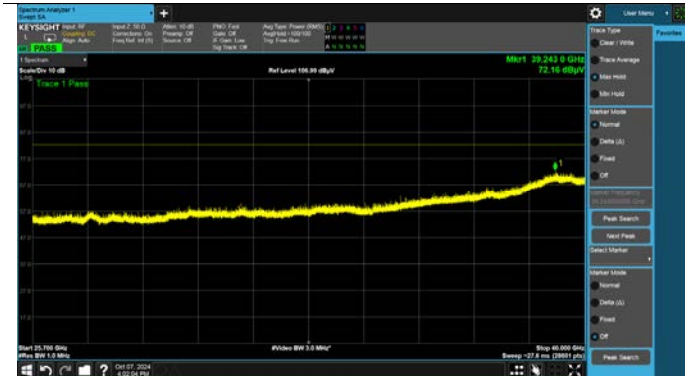
High Channel



Antenna 0(M patch), n258b

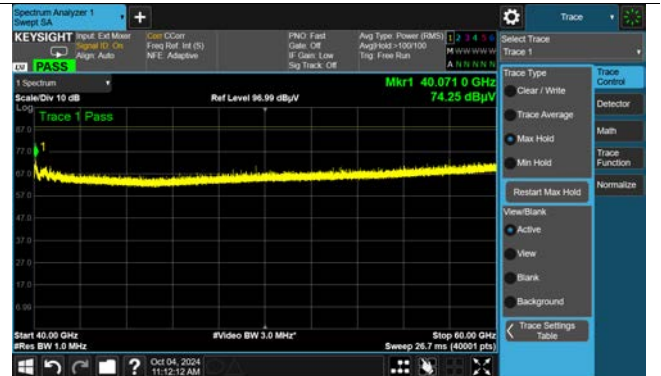
25.70 GHz ~ 40 GHz

Low Channel

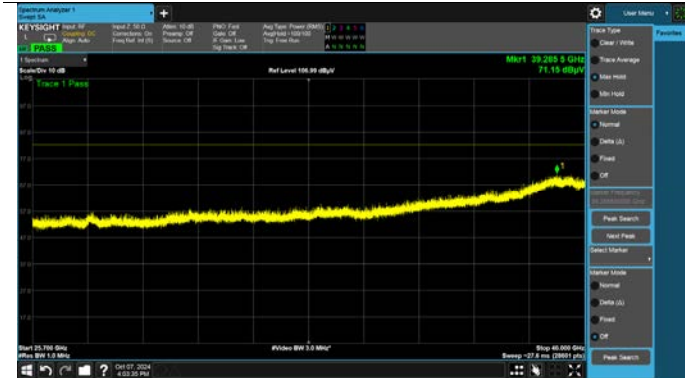


40 GHz ~ 60 GHz

Low Channel



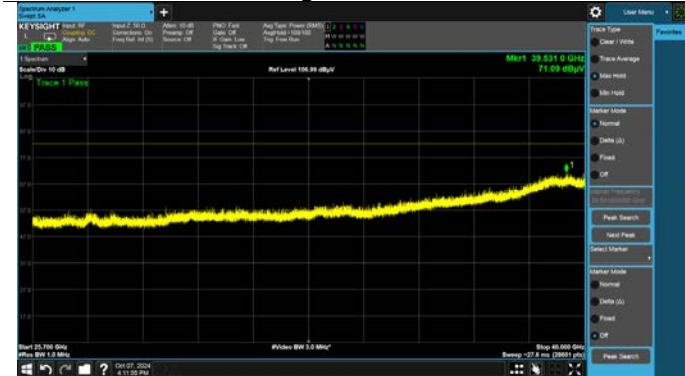
Middle Channel



Middle Channel



High Channel



High Channel

