Antenna 0(K patch), n260

CCs active	BW	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Band Edge [dBm]
1	50 MHz	37025.04	Low	H+V	BPSK	H	1/0	-10.892※
		37025.04	Low	H+V	QPSK	V	32/0	-16.881
		39975	High	H+V	QPSK	V	1/31	-7.058※
		39975	High	H+V	QPSK	V	32/0	-12.835※
	100 MHz	37050	Low	H+V	BPSK	H	1/0	-13.095※
		37050	Low	H+V	16QAM	V	64/0	-21.676
		39949.92	High	H+V	QPSK	V	1/63	-7.343※
		39949.92	High	H+V	QPSK	V	64/0	-16.237
2	50 MHz	37050.04	Low	H+V	BPSK	V	1/0	-20.150
		37050.04	Low	H+V	QPSK	H	32/0	-25.037
		39950	High	H+V	QPSK	V	1/31	-14.212※
		39950	High	H+V	QPSK	V	32/0	-21.209
	100 MHz	37100	Low	H+V	BPSK	V	1/0	-19.295
		37100	Low	H+V	BPSK	V	64/0	-29.056
		39899.92	High	H+V	BPSK	V	1/65	-15.434※
		39899.92	High	H+V	BPSK	V	64/0	-23.861

※ **Note :** Limit: -5 dBm

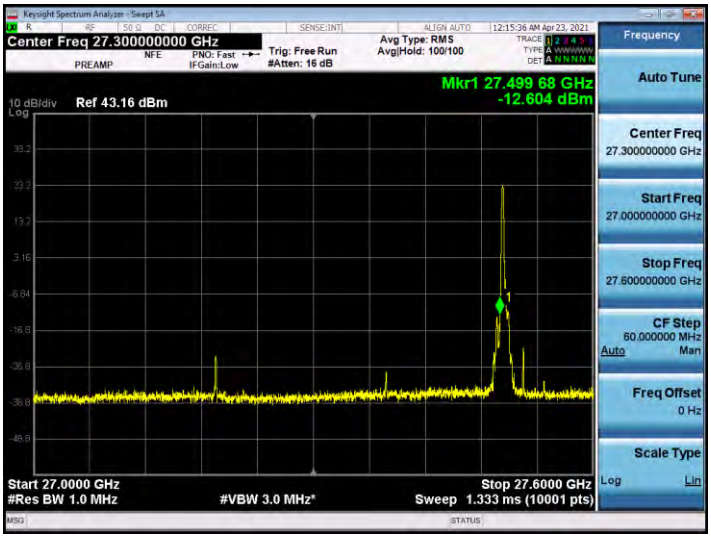
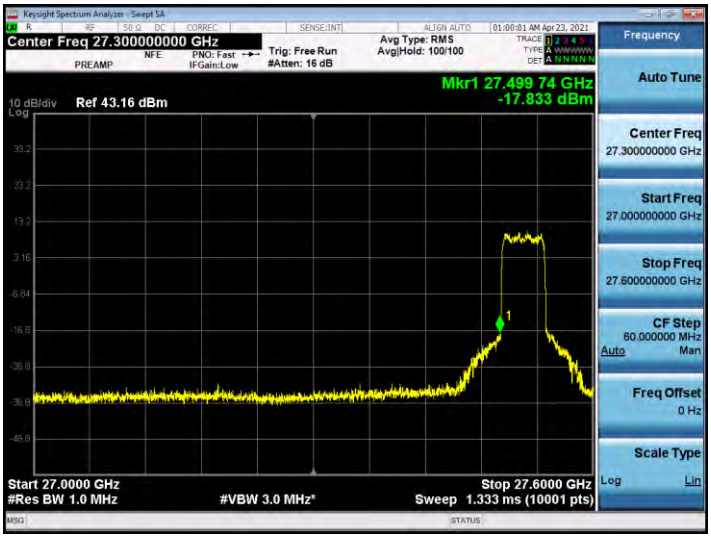
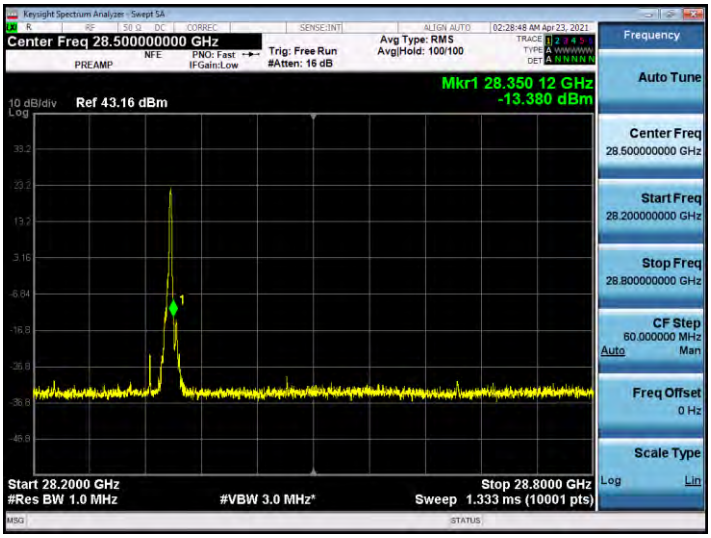
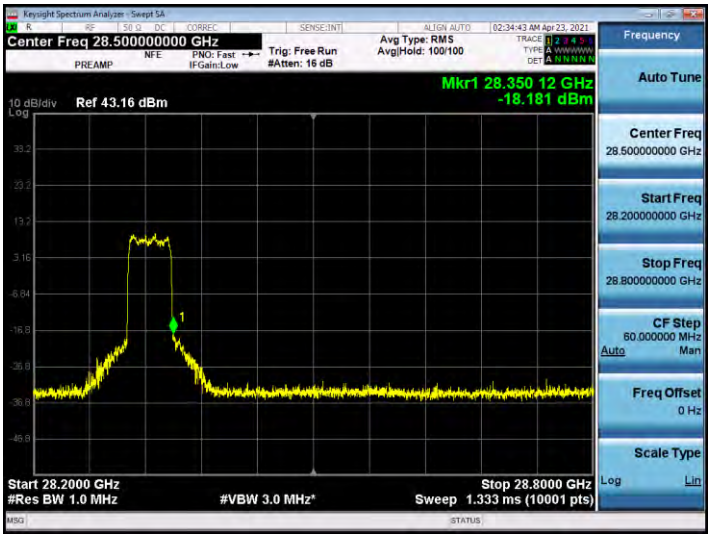
Antenna 1(L patch), n260

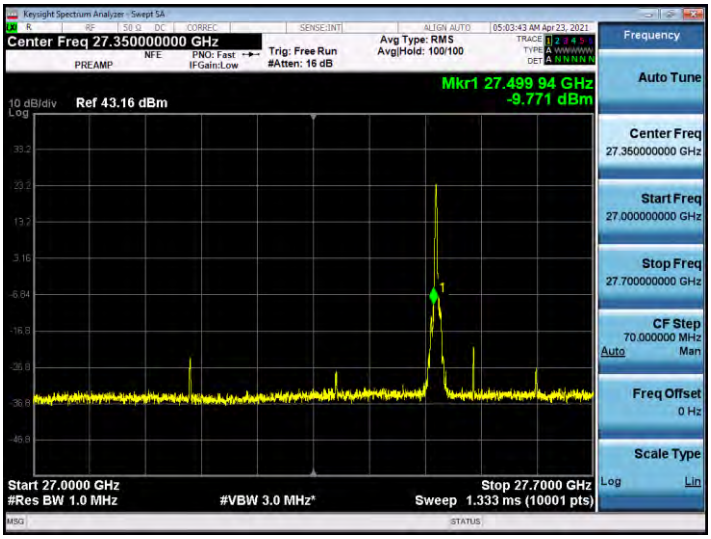
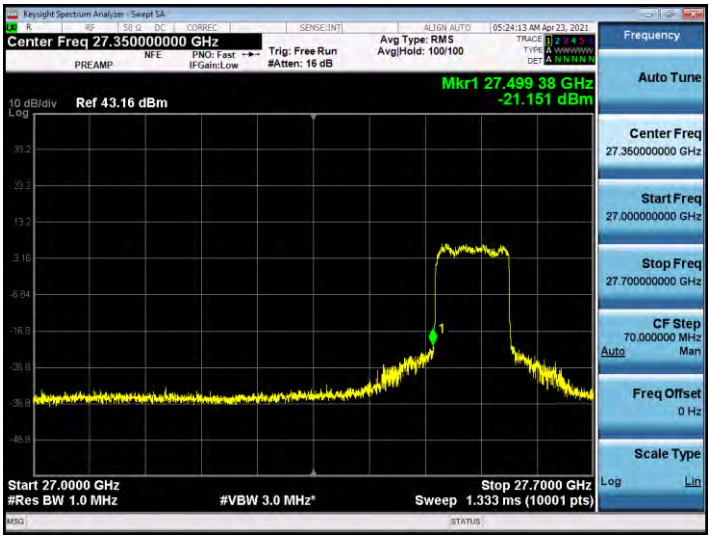
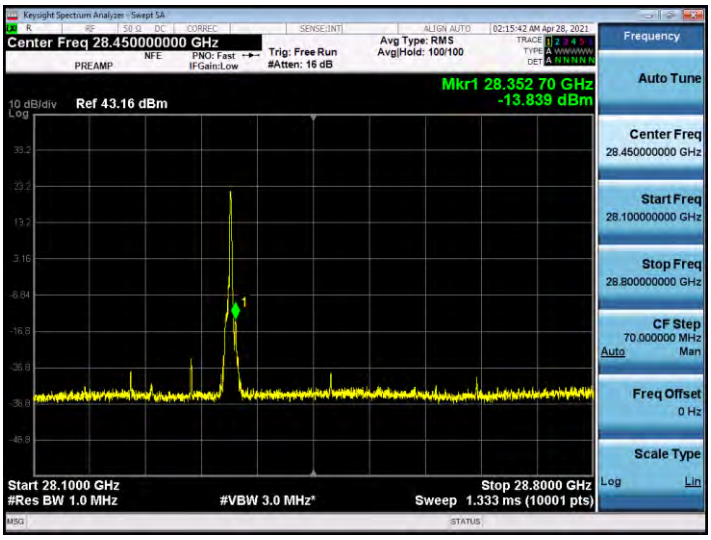
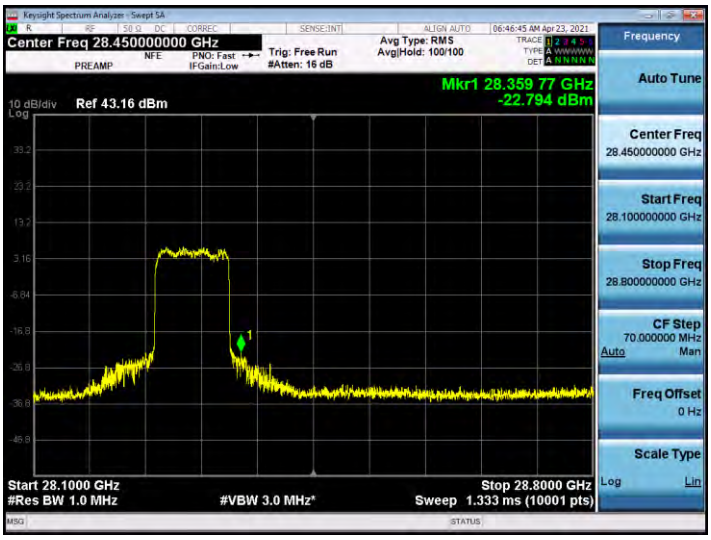
CCs active	BW	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Band Edge [dBm]
1	50 MHz	37025.04	Low	H+V	BPSK	V	1/0	-10.551※
		37025.04	Low	H+V	QPSK	H	32/0	-16.896
		39975	High	H+V	QPSK	V	1/31	-10.970※
		39975	High	H+V	QPSK	H	32/0	-17.548
	100 MHz	37050	Low	H+V	BPSK	H	1/0	-11.395※
		37050	Low	H+V	QPSK	V	64/0	-20.419
		39949.92	High	H+V	BPSK	H	1/65	-12.985※
		39949.92	High	H+V	BPSK	V	64/0	-18.602
2	50 MHz	37050.04	Low	H+V	BPSK	V	1/0	-19.014
		37050.04	Low	H+V	BPSK	V	32/0	-25.000
		39950	High	H+V	BPSK	V	1/31	-19.393
		39950	High	H+V	BPSK	V	10/11	-22.085
	100 MHz	37100	Low	H+V	BPSK	V	1/0	-18.452
		37100	Low	H+V	BPSK	V	20/22	-25.575
		39899.92	High	H+V	BPSK	V	1/65	-19.838
		39899.92	High	H+V	BPSK	V	64/0	-26.893

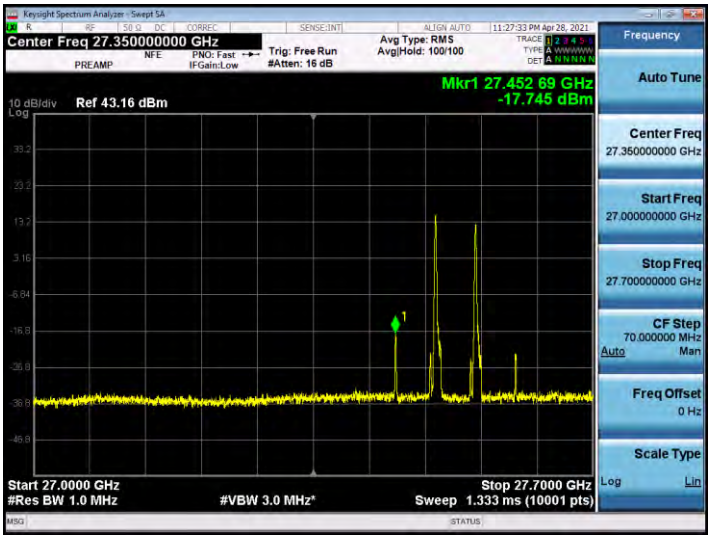
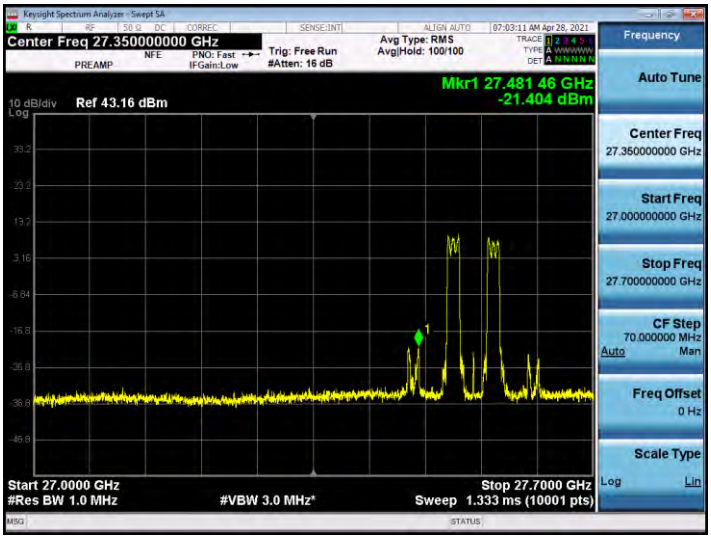
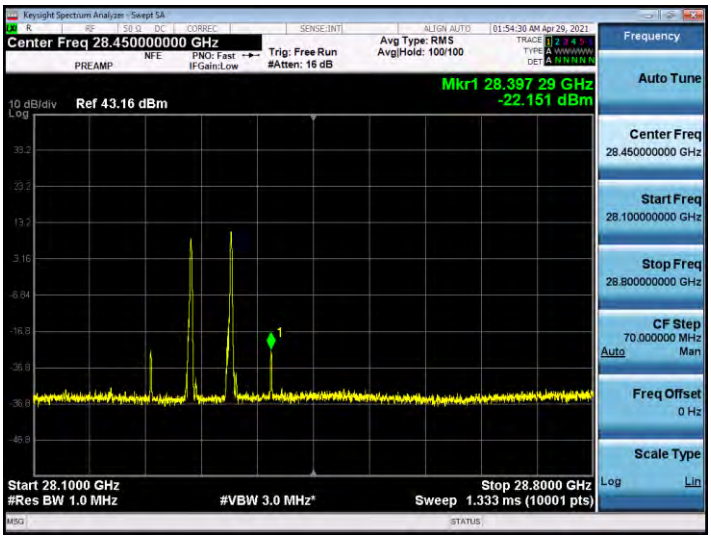
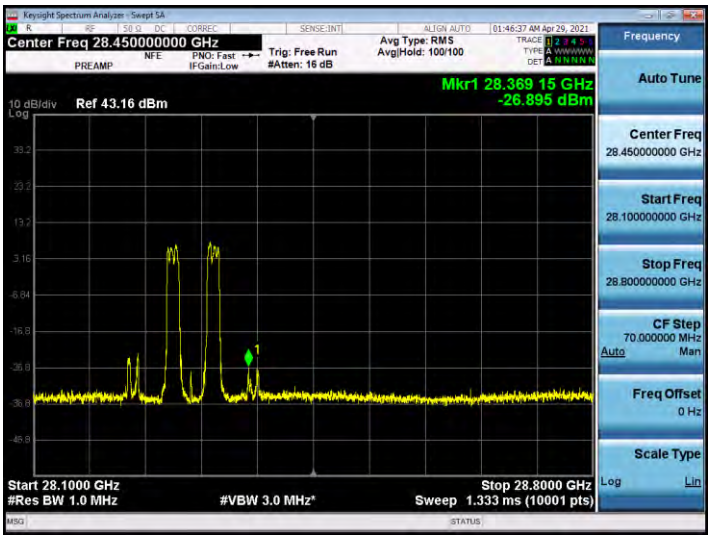
※ **Note :** Limit: -5 dBm

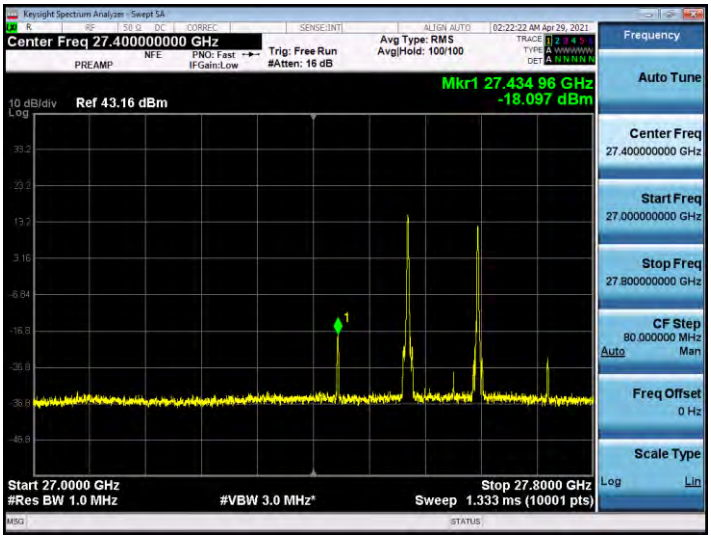
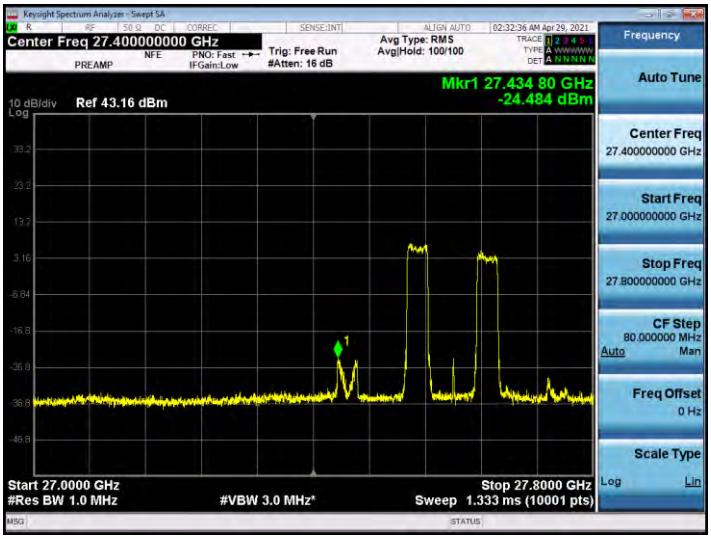
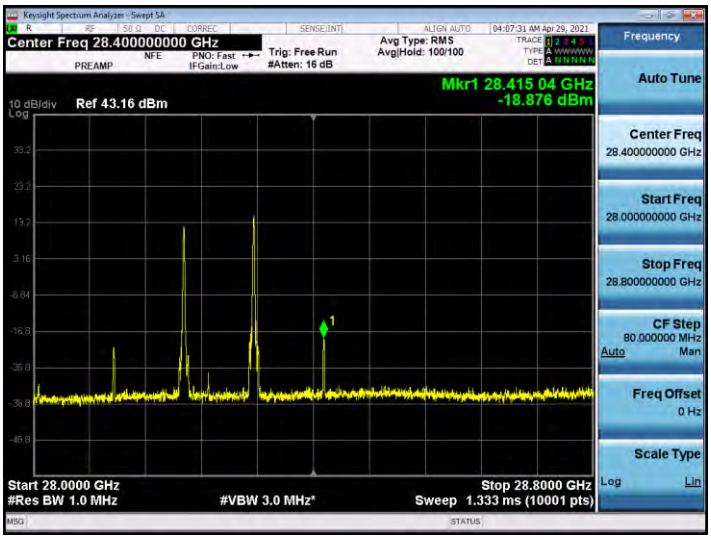
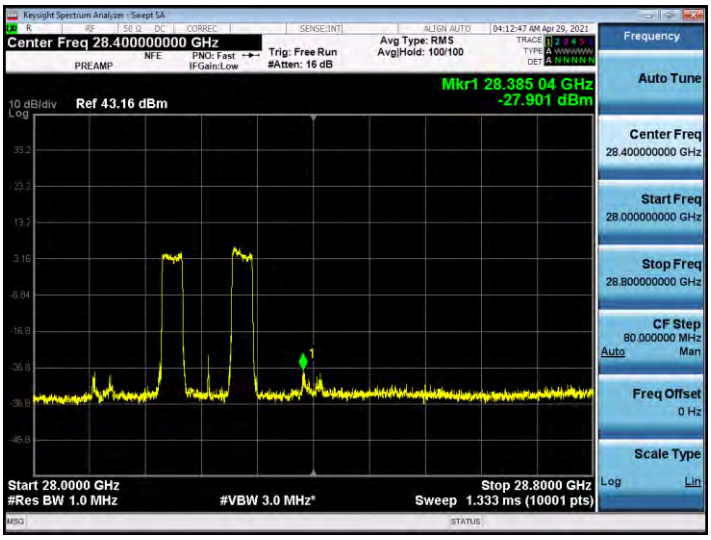
Plot data of Band Edge

1. **Antenna 0(K patch), n261**

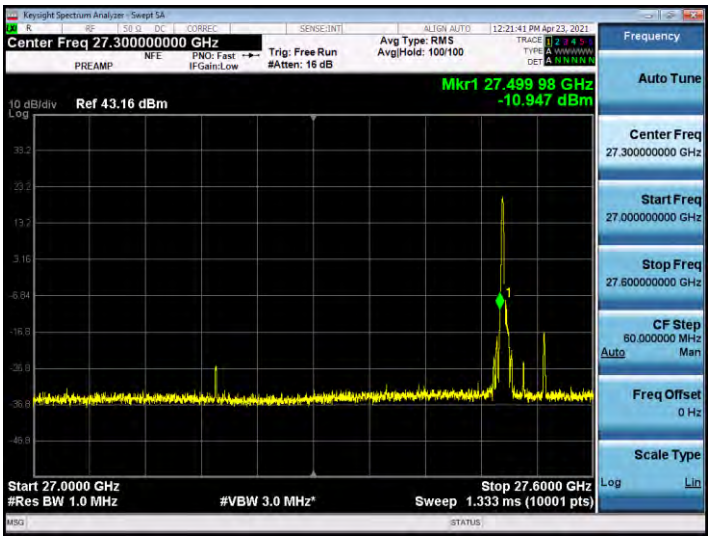
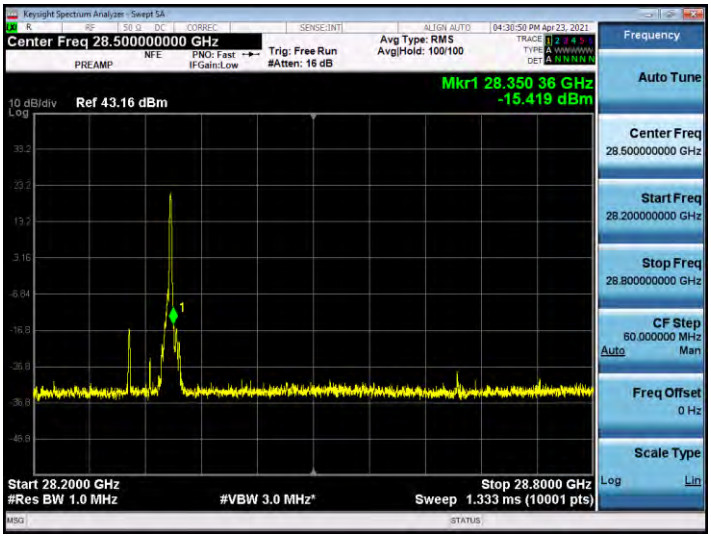
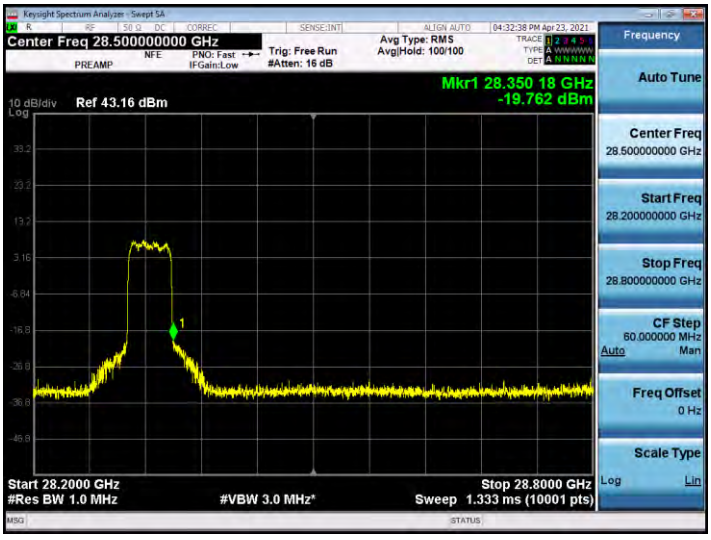
50 MHz, 1CC SISO Dual	
	
	

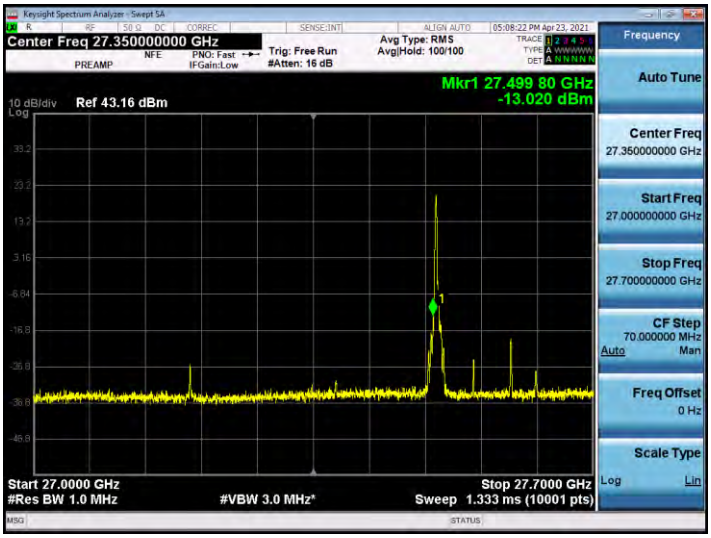
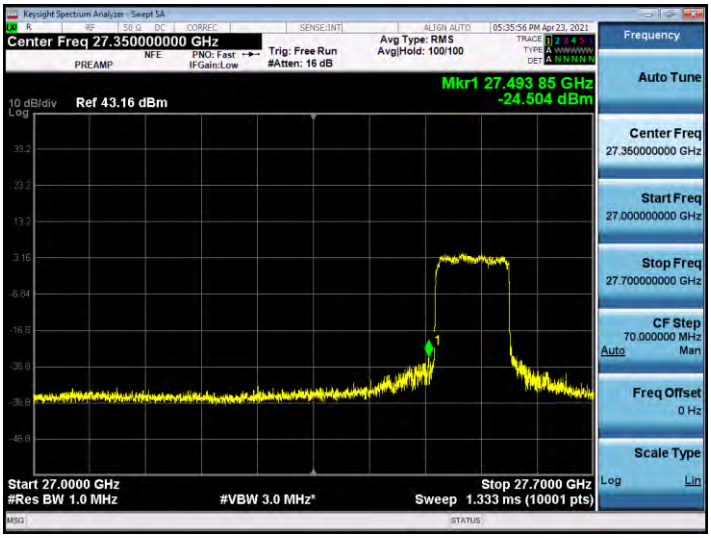
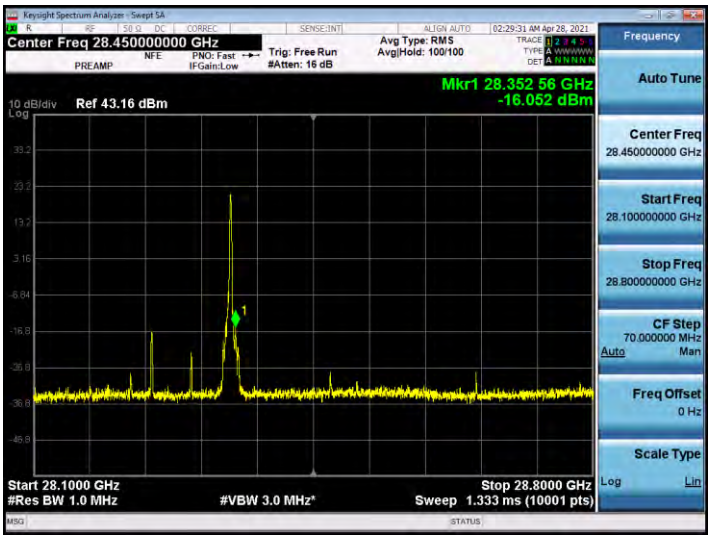
100 MHz, 1CC SISO Dual	
	
	

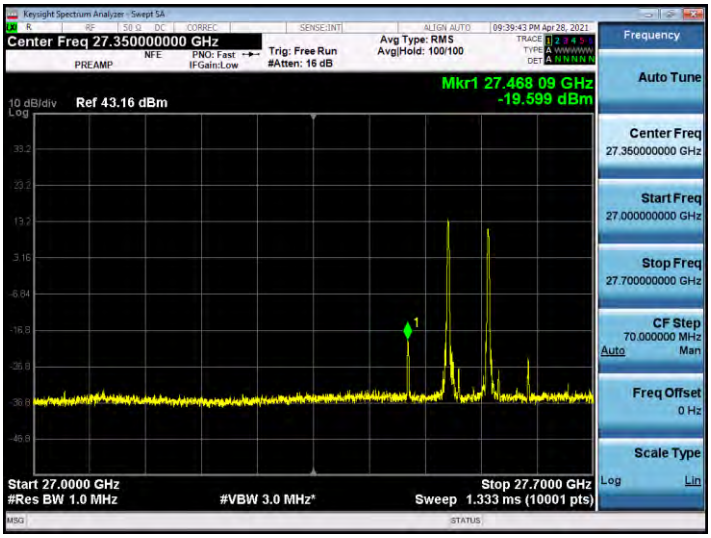
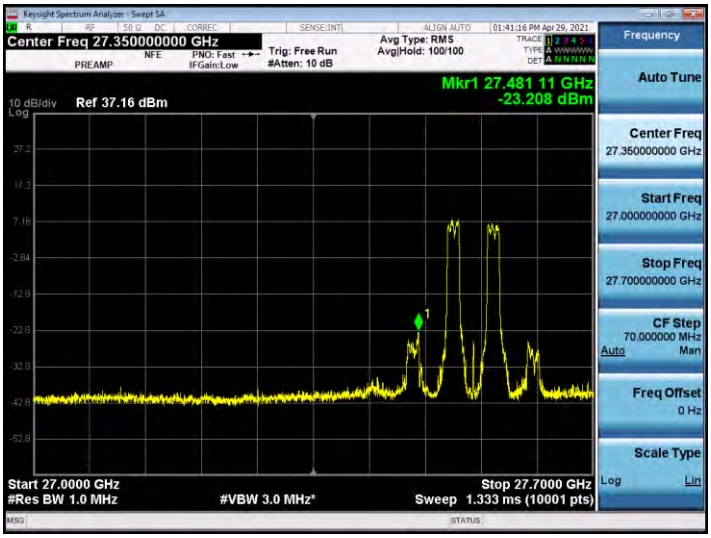
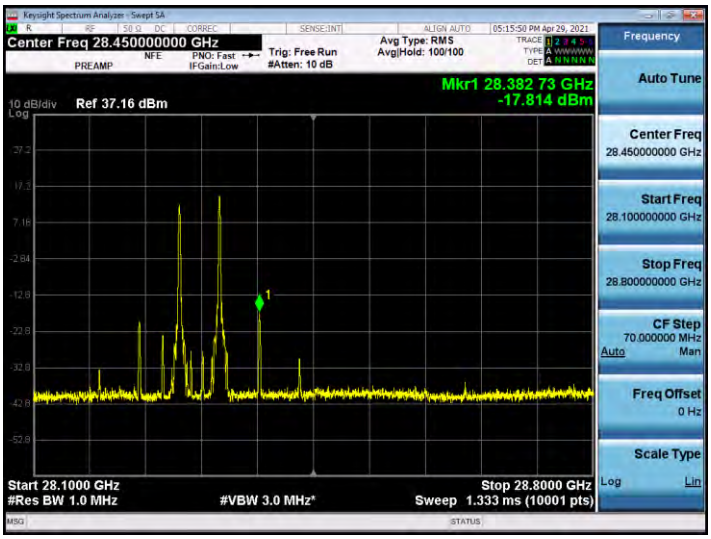
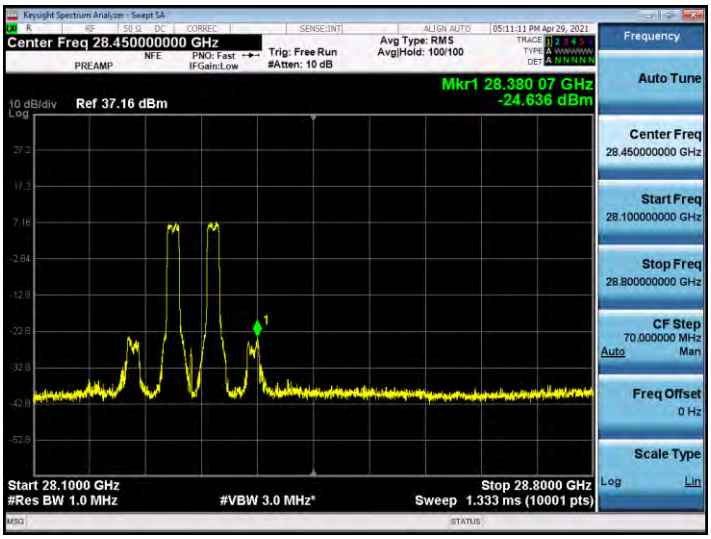
50 MHz, 2CC SISO Dual	
	
	

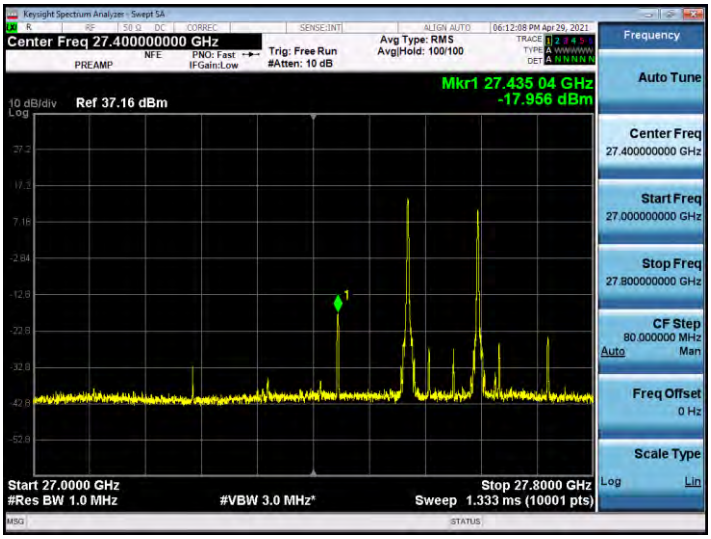
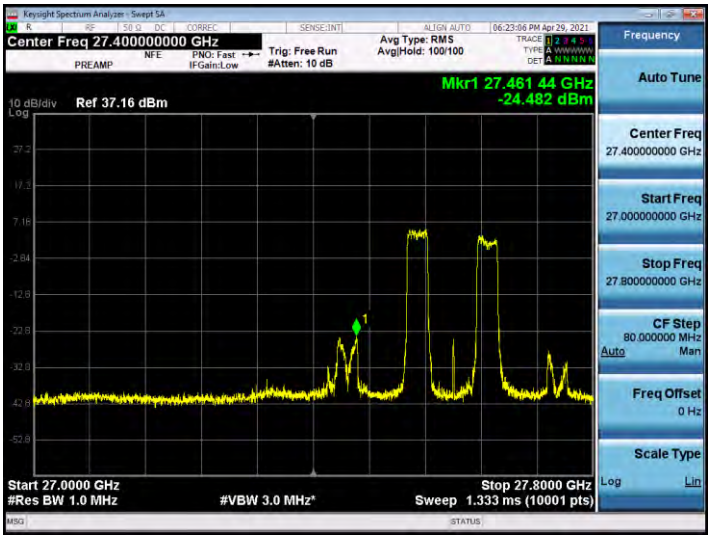
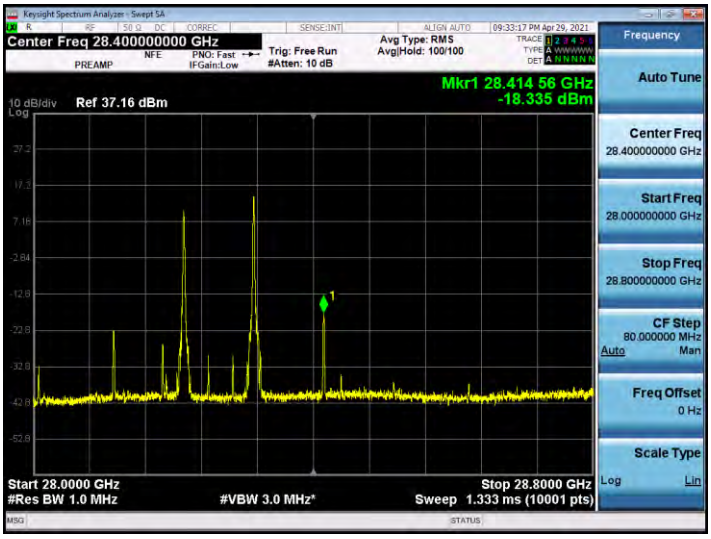
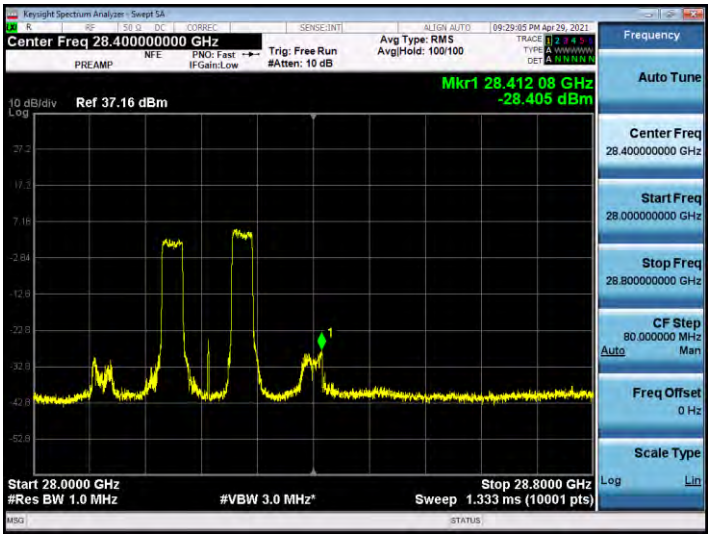
100 MHz, 2CC SISO Dual	
	
	

2. Antenna 1(L patch), n261

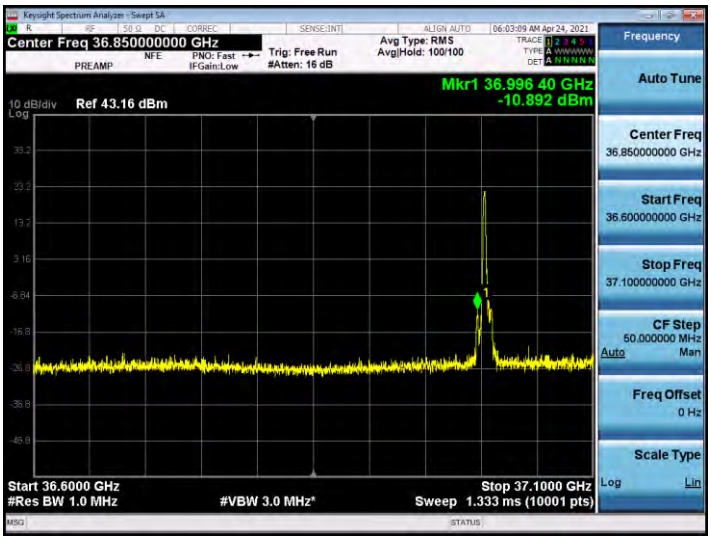
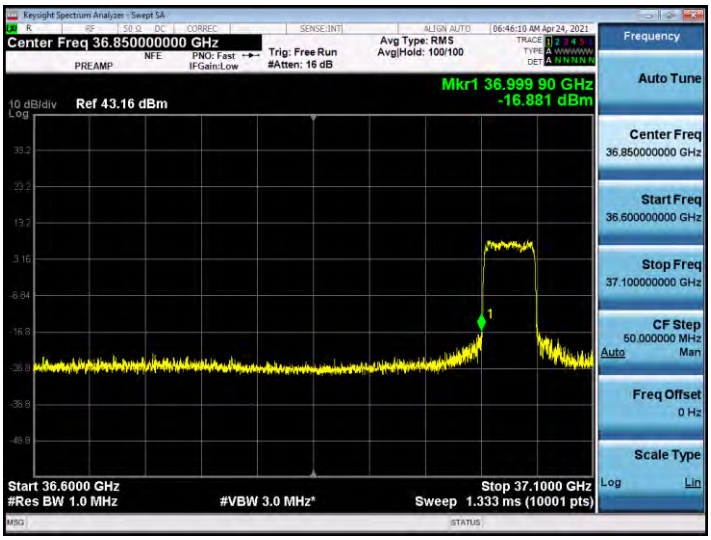
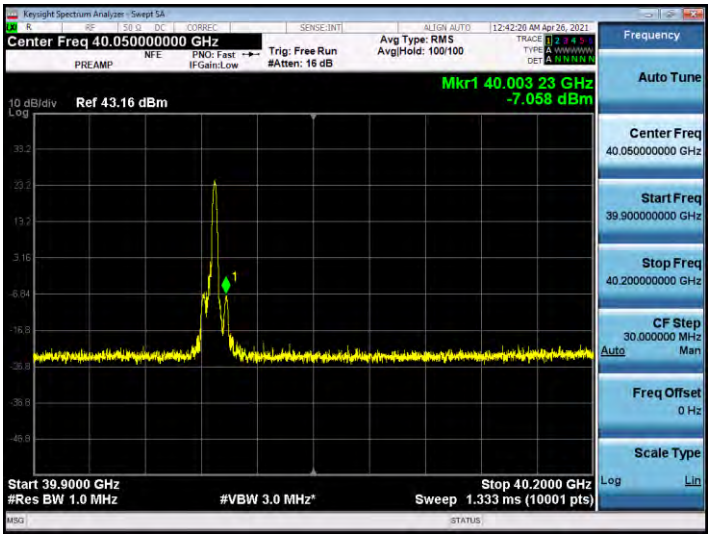
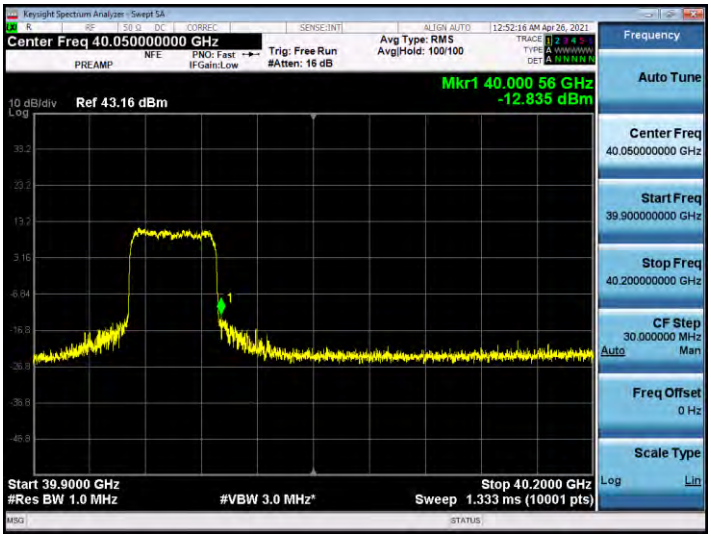
50 MHz, 1CC SISO Dual	
	
	

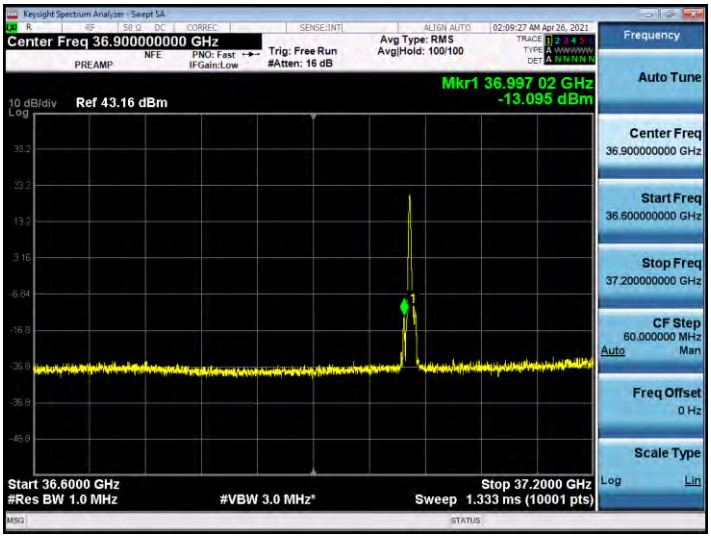
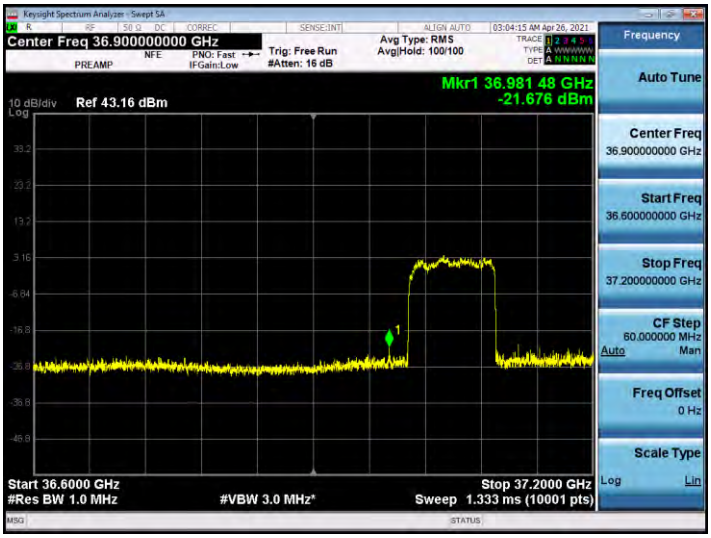
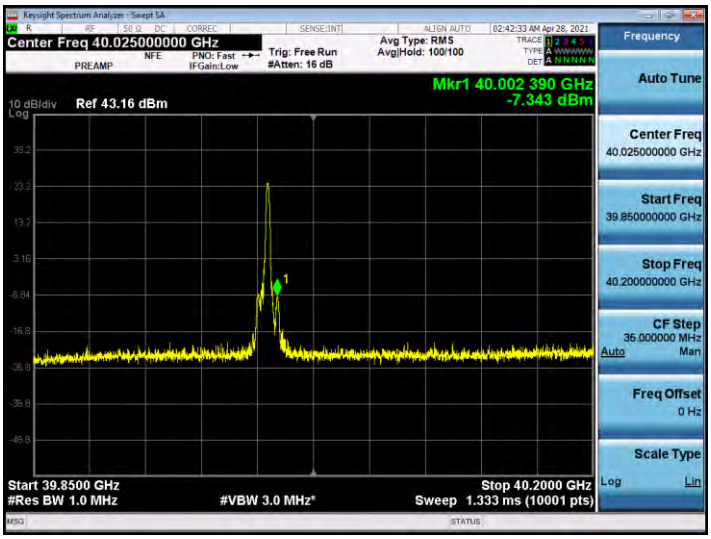
100 MHz, 1CC SISO Dual	
	
	

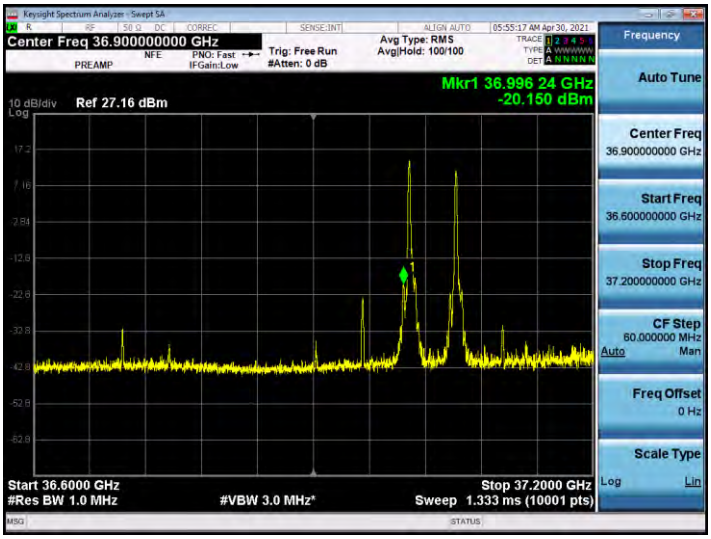
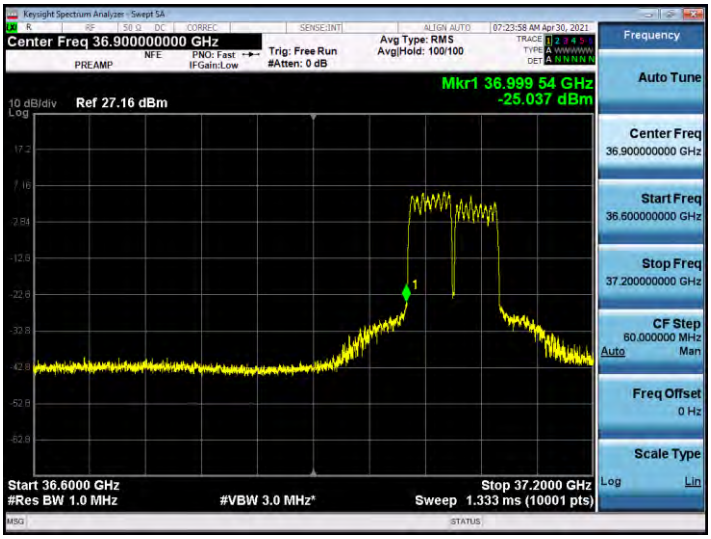
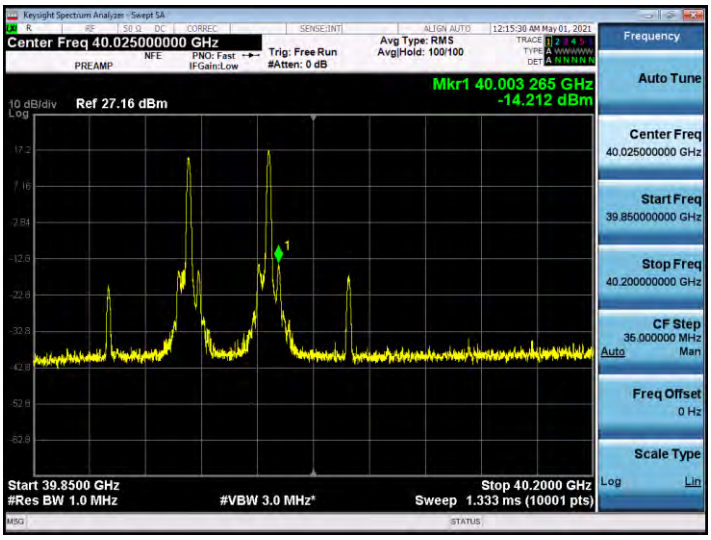
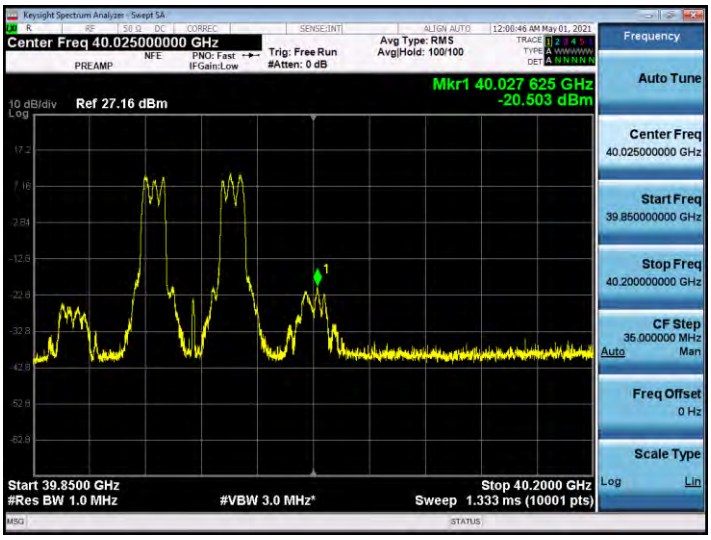
50 MHz, 2CC SISO Dual	
	
	

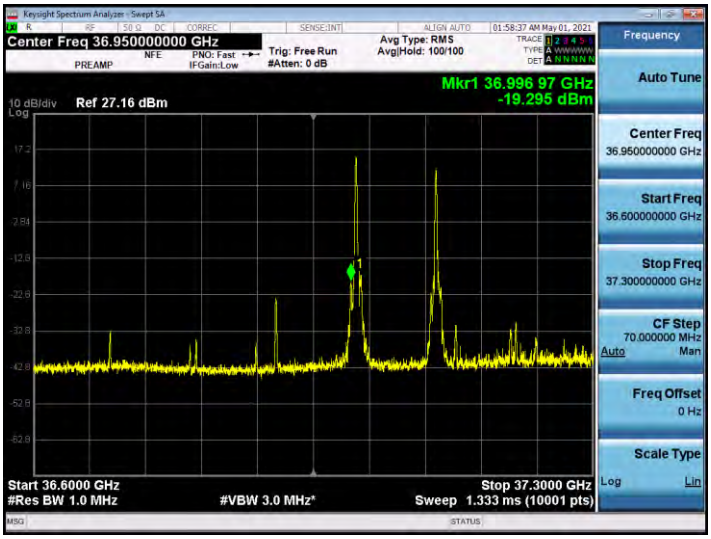
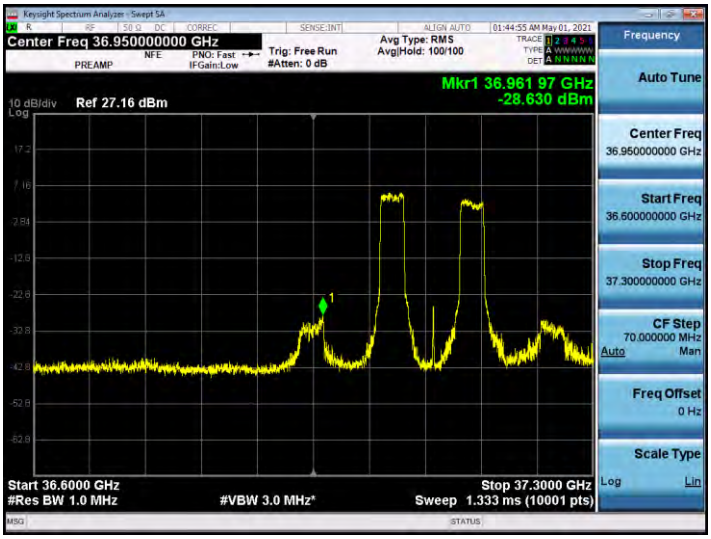
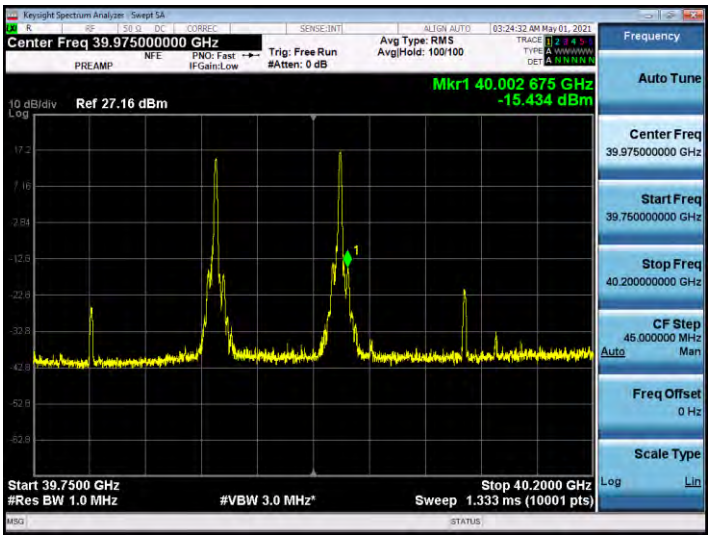
100 MHz, 2CC SISO Dual	
	
	

3. Antenna 0(K patch), n260

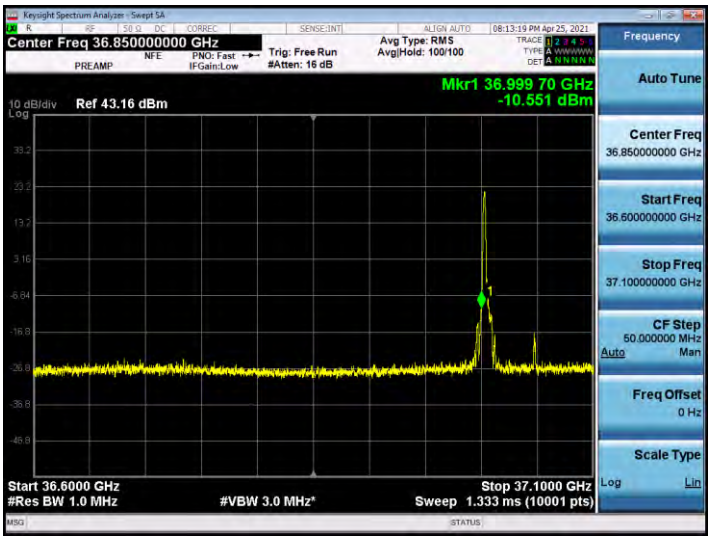
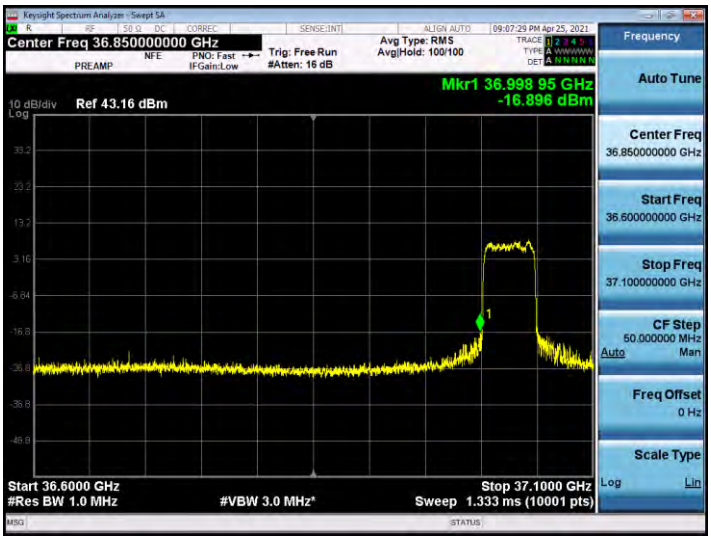
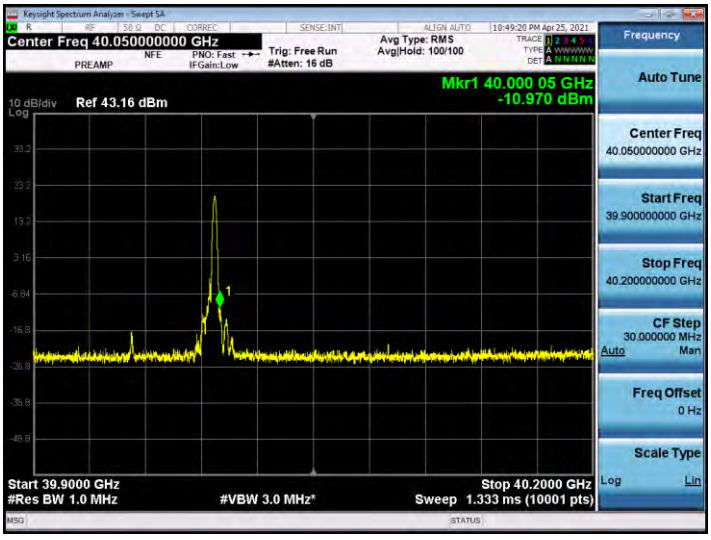
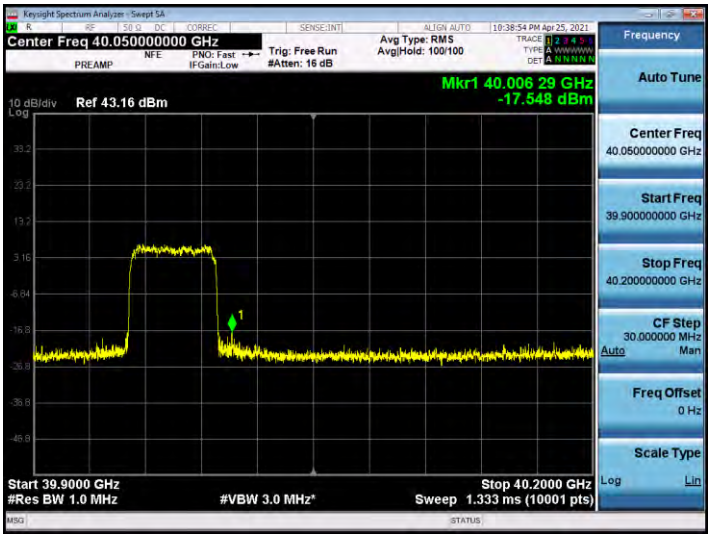
50 MHz, 1CC SISO Dual	
	
	

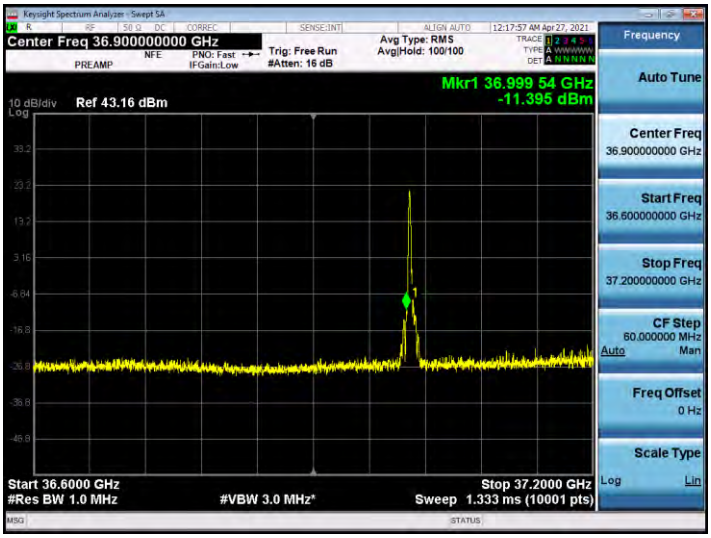
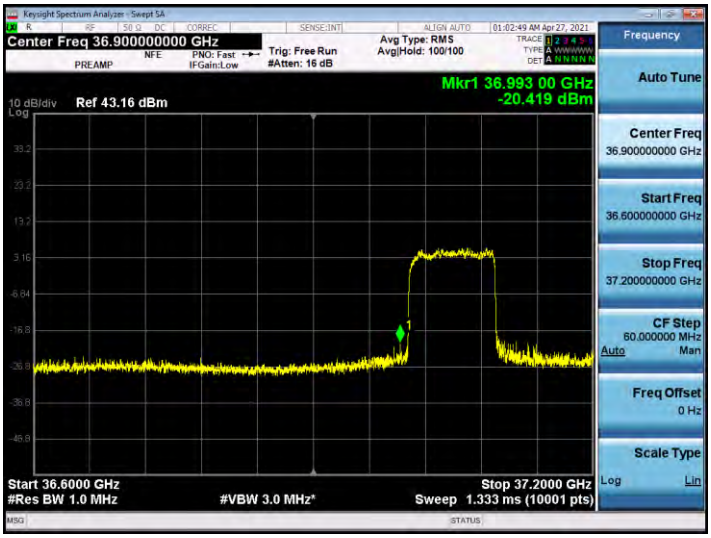
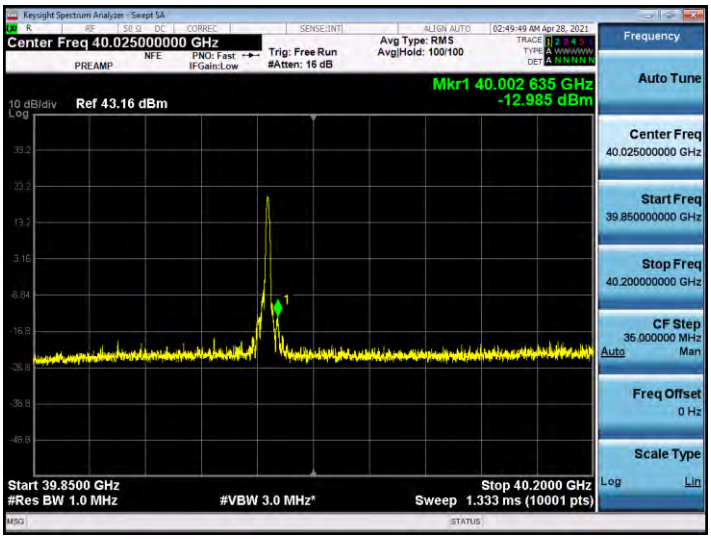
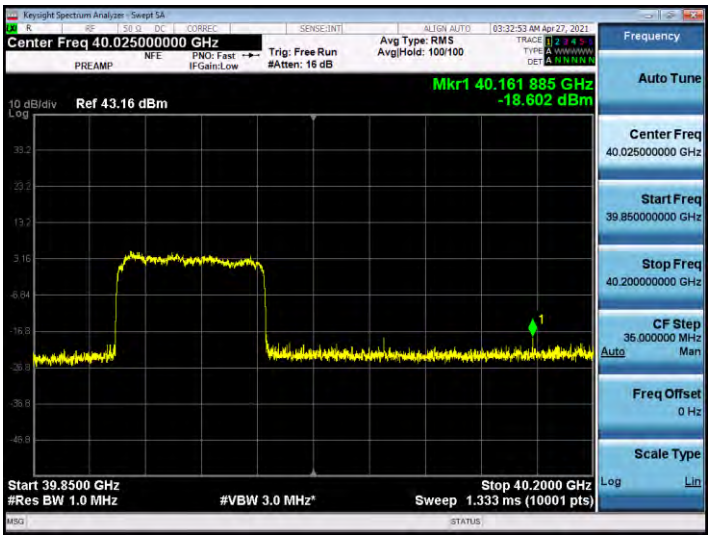
100 MHz, 1CC SISO Dual	
	
	

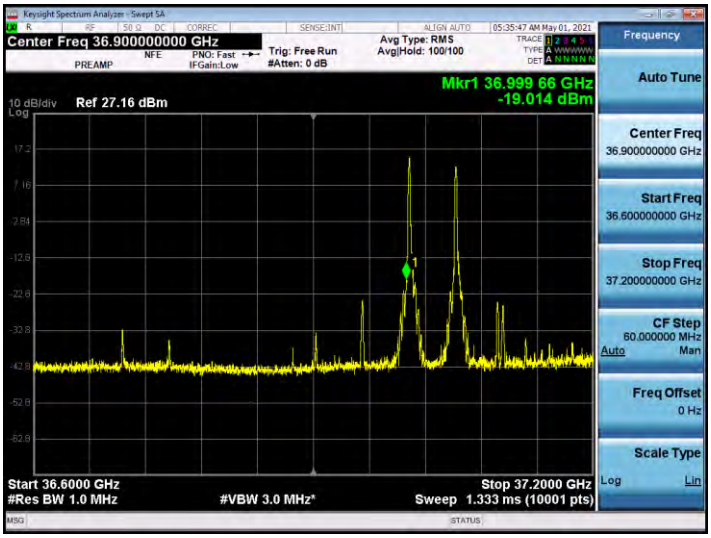
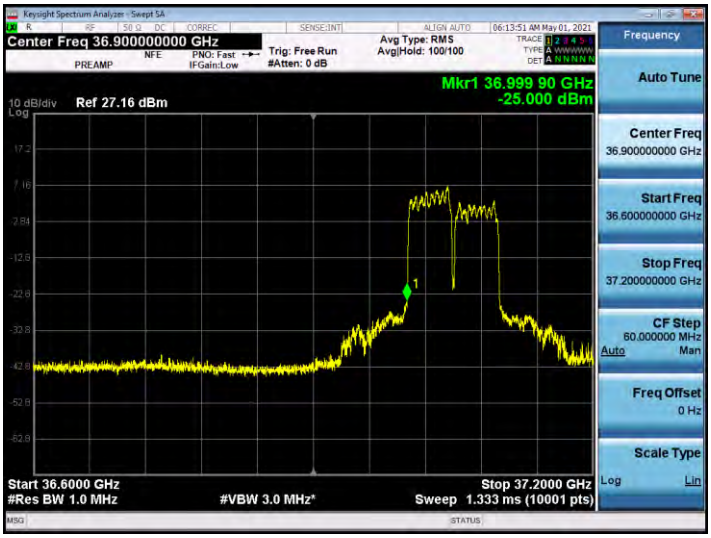
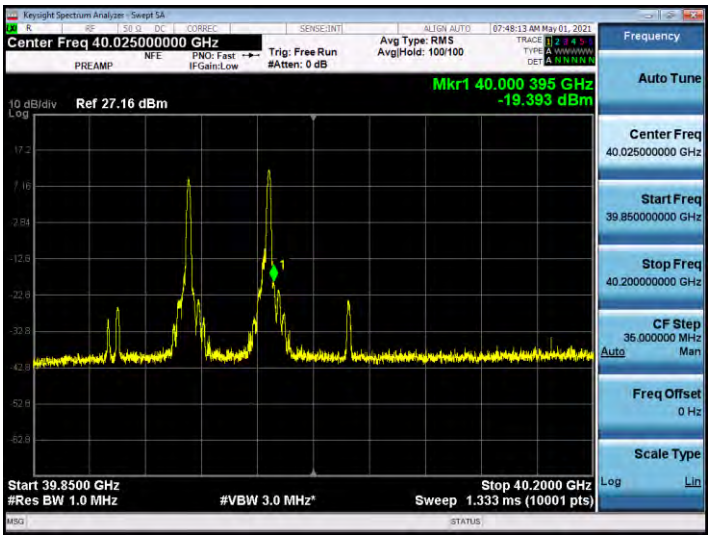
50 MHz, 2CC SISO Dual	
	
	

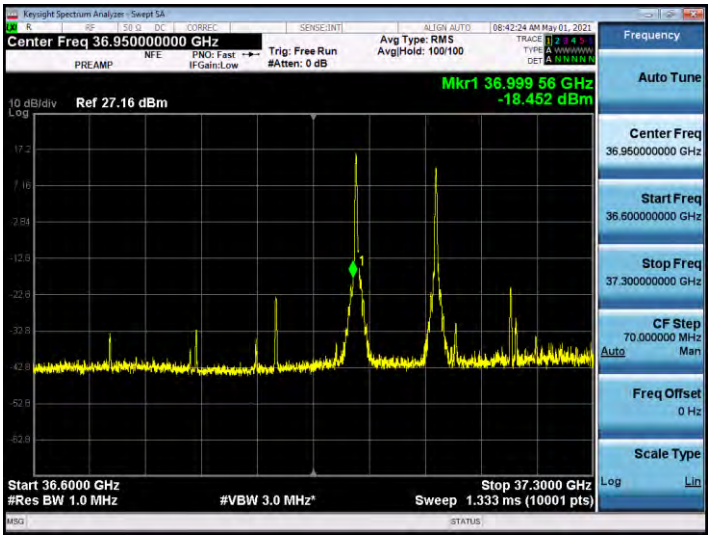
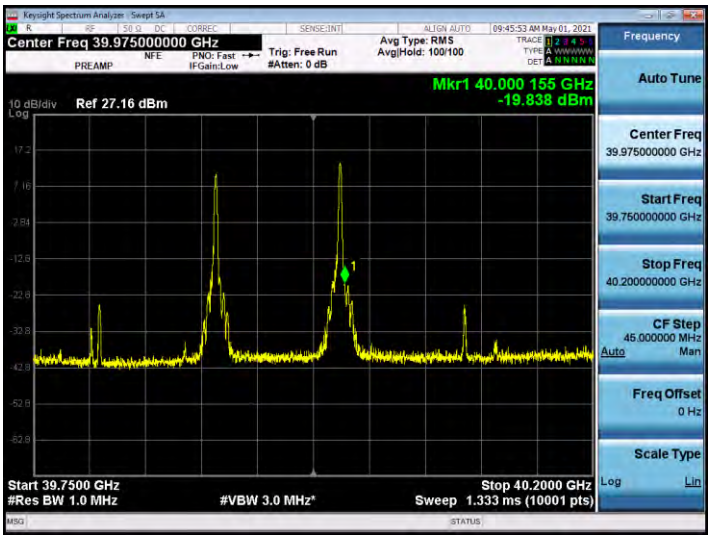
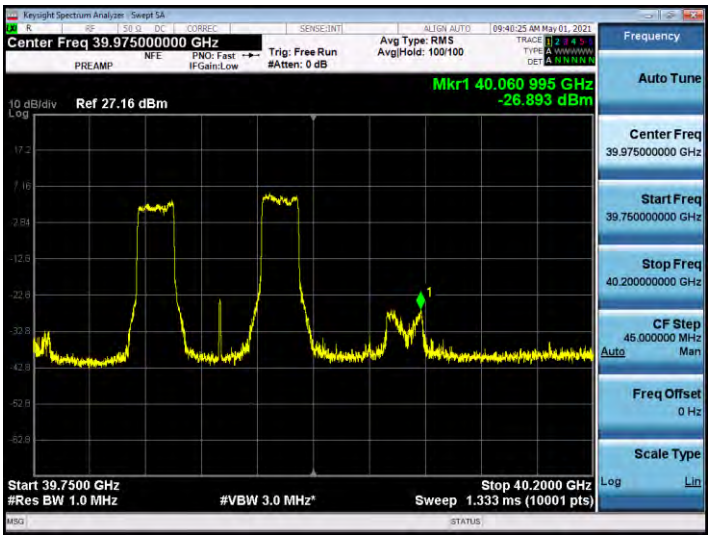
100 MHz, 2CC SISO Dual	
	
	

4. Antenna 1(L patch), n260

50 MHz, 1CC SISO Dual	
	
	

100 MHz, 1CC SISO Dual	
	
	

50 MHz, 2CC SISO Dual	
	
	

100 MHz, 2CC SISO Dual	
	
	

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 ≥ 2 × (span / 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 Dcyl) 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 $\Delta\theta$ref and $\Delta\phi$ref using Equations (A.3) and (A.4).

e) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta$ref for the vertical angle and $\Delta\phi \leq \Delta\phi$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 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. Additionally, we were performed the RSE test in EN-DC mode. It was determined that there is no new emission introduced by EN-DC mode.
4. All RSE were measured with 1CC and 2CC. In case of modulation, worst case is QPSK or PI/2BPSK.
5. Test plot is included any factors and all factors such as AFCL is 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

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

10log(Reference RBW/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.

7. 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.

8. 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.

Test Results:Tabular Data of Radiated Spurious Emissions

1. Antenna 0(K patch), n261

SISO Dual

30 MHz ~ 1 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	64.34	3	-30.89
		27924.96	Mid	H+V	BPSK	V	10/11	63.89	3	-31.34
		28324.92	High	H+V	BPSK	H	1/11	63.82	3	-31.41
	100	27550.08	Low	H+V	QPSK	H	1/33	64.08	3	-31.15
		27924.96	Mid	H+V	QPSK	V	1/33	64.24	3	-30.99
		28299.96	High	H+V	QPSK	H	1/33	64.08	3	-31.15

1 GHz ~ 10 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	54.56	3.75	-38.73
		27924.96	Mid	H+V	BPSK	V	10/11	49.70	3.75	-43.59
		28324.92	High	H+V	BPSK	H	1/11	46.21	3.75	-47.08
	100	27550.08	Low	H+V	QPSK	H	1/33	54.82	3.75	-38.47
		27924.96	Mid	H+V	QPSK	V	1/33	51.08	3.75	-42.21
		28299.96	High	H+V	QPSK	H	1/33	53.40	3.75	-39.89

10 GHz ~ 18 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	54.77	3.75	-38.52
		27924.96	Mid	H+V	BPSK	V	10/11	54.91	3.75	-38.38
		28324.92	High	H+V	BPSK	H	1/11	54.87	3.75	-38.42
	100	27550.08	Low	H+V	QPSK	H	1/33	55.02	3.75	-38.27
		27924.96	Mid	H+V	QPSK	V	1/33	54.83	3.75	-38.46
		28299.96	High	H+V	QPSK	H	1/33	54.73	3.75	-38.56

18 GHz ~ 27 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	58.76	3.75	-34.53
		27924.96	Mid	H+V	BPSK	V	10/11	47.60	3.75	-45.69
		28324.92	High	H+V	BPSK	H	1/11	52.22	3.75	-41.07
	100	27550.08	Low	H+V	QPSK	H	1/33	59.28	3.75	-34.01
		27924.96	Mid	H+V	QPSK	V	1/33	50.91	3.75	-42.38
		28299.96	High	H+V	QPSK	H	1/33	53.78	3.75	-39.51

28.8 GHz ~ 40 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	50.82	3.75	-42.47
		27924.96	Mid	H+V	BPSK	V	10/11	50.97	3.75	-42.32
		28324.92	High	H+V	BPSK	H	1/11	48.69	3.75	-44.60
	100	27550.08	Low	H+V	QPSK	H	1/33	51.07	3.75	-42.22
		27924.96	Mid	H+V	QPSK	V	1/33	51.13	3.75	-42.16
		28299.96	High	H+V	QPSK	H	1/33	48.98	3.75	-44.31

40 GHz ~ 60 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	62.48	3.75	-30.81
		27924.96	Mid	H+V	BPSK	V	10/11	62.43	3.75	-30.86
		28324.92	High	H+V	BPSK	H	1/11	62.78	3.75	-30.51
	100	27550.08	Low	H+V	QPSK	H	1/33	62.68	3.75	-30.61
		27924.96	Mid	H+V	QPSK	V	1/33	62.77	3.75	-30.52
		28299.96	High	H+V	QPSK	H	1/33	62.59	3.75	-30.70

60 GHz ~ 90 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	61.54	1	-43.23
		27924.96	Mid	H+V	BPSK	V	10/11	61.77	1	-43.00
		28324.92	High	H+V	BPSK	H	1/11	62.39	1	-42.38
	100	27550.08	Low	H+V	QPSK	H	1/33	62.10	1	-42.67
		27924.96	Mid	H+V	QPSK	V	1/33	62.40	1	-42.37
		28299.96	High	H+V	QPSK	H	1/33	62.17	1	-42.60

90 GHz ~ 100 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	27525	Low	H+V	BPSK	H	1/11	80.42	1	-24.35
		27924.96	Mid	H+V	BPSK	V	10/11	80.41	1	-24.36
		28324.92	High	H+V	BPSK	H	1/11	80.26	1	-24.51
	100	27550.08	Low	H+V	QPSK	H	1/33	80.26	1	-24.51
		27924.96	Mid	H+V	QPSK	V	1/33	80.29	1	-24.48
		28299.96	High	H+V	QPSK	H	1/33	80.34	1	-24.43

2. Antenna 0(K patch), n260

SISO Dual

30 MHz ~ 1 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	64.03	3	-31.20
		38499.96	Mid	H+V	QPSK	V	10/11	63.92	3	-31.31
		39975	High	H+V	QPSK	V	1/16	64.04	3	-31.19
	100	37050	Low	H+V	BPSK	H	1/22	64.19	3	-31.04
		38499.96	Mid	H+V	BPSK	V	1/22	64.12	3	-31.11
		39949.92	High	H+V	BPSK	V	20/22	64.14	3	-31.09

1 GHz ~ 10 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	42.80	3.75	-50.49
		38499.96	Mid	H+V	QPSK	V	10/11	43.04	3.75	-50.25
		39975	High	H+V	QPSK	V	1/16	52.27	3.75	-41.02
	100	37050	Low	H+V	BPSK	H	1/22	46.89	3.75	-46.40
		38499.96	Mid	H+V	BPSK	V	1/22	49.38	3.75	-43.91
		39949.92	High	H+V	BPSK	V	20/22	43.75	3.75	-49.54

10 GHz ~ 18 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	54.83	3.75	-38.46
		38499.96	Mid	H+V	QPSK	V	10/11	54.81	3.75	-38.48
		39975	High	H+V	QPSK	V	1/16	55.14	3.75	-38.15
	100	37050	Low	H+V	BPSK	H	1/22	54.89	3.75	-38.40
		38499.96	Mid	H+V	BPSK	V	1/22	54.97	3.75	-38.32
		39949.92	High	H+V	BPSK	V	20/22	55.01	3.75	-38.28

18 GHz ~ 26.5 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	37.05	3.75	-56.24
		38499.96	Mid	H+V	QPSK	V	10/11	36.76	3.75	-56.53
		39975	High	H+V	QPSK	V	1/16	43.07	3.75	-50.22
	100	37050	Low	H+V	BPSK	H	1/22	35.37	3.75	-57.92
		38499.96	Mid	H+V	BPSK	V	1/22	36.33	3.75	-56.96
		39949.92	High	H+V	BPSK	V	20/22	42.88	3.75	-50.41

26.5 GHz ~ 36.6 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	51.35	3.75	-41.94
		38499.96	Mid	H+V	QPSK	V	10/11	41.61	3.75	-51.68
		39975	High	H+V	QPSK	V	1/16	50.88	3.75	-42.41
	100	37050	Low	H+V	BPSK	H	1/22	62.43	3.75	-30.86
		38499.96	Mid	H+V	BPSK	V	1/22	44.53	3.75	-48.76
		39949.92	High	H+V	BPSK	V	20/22	51.02	3.75	-42.27

40 GHz ~ 60 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	62.60	3.75	-30.69
		38499.96	Mid	H+V	QPSK	V	10/11	62.68	3.75	-30.61
		39975	High	H+V	QPSK	V	1/16	62.67	3.75	-30.62
	100	37050	Low	H+V	BPSK	H	1/22	62.64	3.75	-30.65
		38499.96	Mid	H+V	BPSK	V	1/22	62.75	3.75	-30.54
		39949.92	High	H+V	BPSK	V	20/22	62.59	3.75	-30.70

60 GHz ~ 90 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	73.44	1	-31.33
		38499.96	Mid	H+V	QPSK	V	10/11	73.34	1	-31.43
		39975	High	H+V	QPSK	V	1/16	73.34	1	-31.43
	100	37050	Low	H+V	BPSK	H	1/22	73.60	1	-31.17
		38499.96	Mid	H+V	BPSK	V	1/22	73.86	1	-30.91
		39949.92	High	H+V	BPSK	V	20/22	73.48	1	-31.29

90 GHz ~ 140 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	86.01	1	-22.28
		38499.96	Mid	H+V	QPSK	V	10/11	85.98	1	-22.31
		39975	High	H+V	QPSK	V	1/16	86.13	1	-22.16
	100	37050	Low	H+V	BPSK	H	1/22	86.05	1	-22.24
		38499.96	Mid	H+V	BPSK	V	1/22	86.04	1	-22.25
		39949.92	High	H+V	BPSK	V	20/22	86.12	1	-22.17

140 GHz ~ 170 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	100.17	0.5	-20.16
		38499.96	Mid	H+V	QPSK	V	10/11	100.06	0.5	-20.27
		39975	High	H+V	QPSK	V	1/16	100.06	0.5	-20.27
	100	37050	Low	H+V	BPSK	H	1/22	100.17	0.5	-20.16
		38499.96	Mid	H+V	BPSK	V	1/22	99.99	0.5	-20.34
		39949.92	High	H+V	BPSK	V	20/22	100.21	0.5	-20.12

170 GHz ~ 200 GHz										
CCs active	BW [MHz]	Frequency [MHz]	Channel	Beam Pol.	Modulation	Ant. Pol. [H/V]	RB Size/Offset	Measured Value (dBuV)	Distance (m)	Conversion Value Result (dBm)
1	50	37025.04	Low	H+V	QPSK	H	10/11	81.41	0.5	-29.38
		38499.96	Mid	H+V	QPSK	V	10/11	81.15	0.5	-29.64
		39975	High	H+V	QPSK	V	1/16	81.37	0.5	-29.42
	100	37050	Low	H+V	BPSK	H	1/22	81.37	0.5	-29.42
		38499.96	Mid	H+V	BPSK	V	1/22	81.18	0.5	-29.61
		39949.92	High	H+V	BPSK	V	20/22	81.33	0.5	-29.46

Plot data of Radiated Spurious Emissions

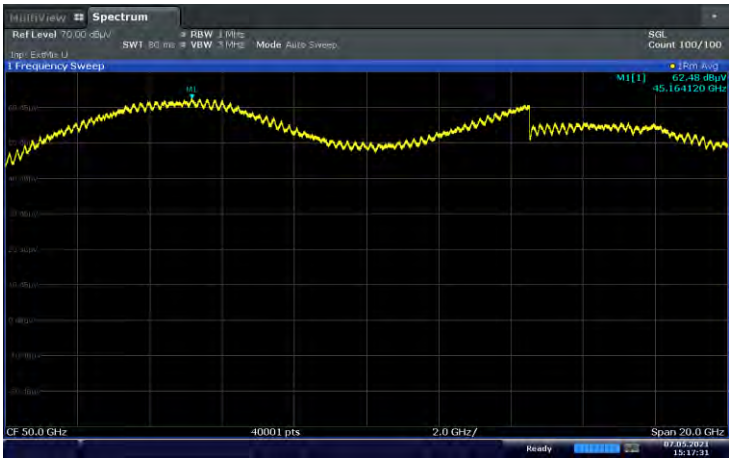
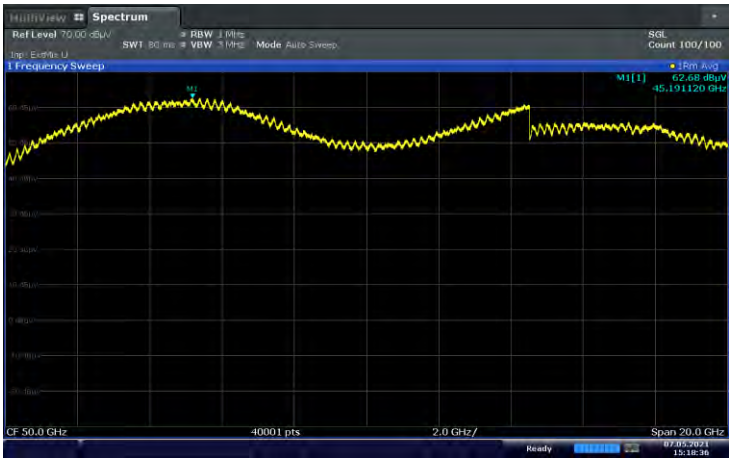
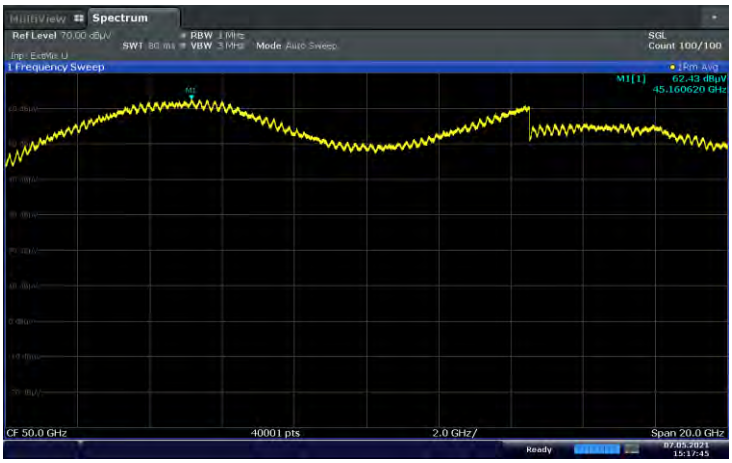
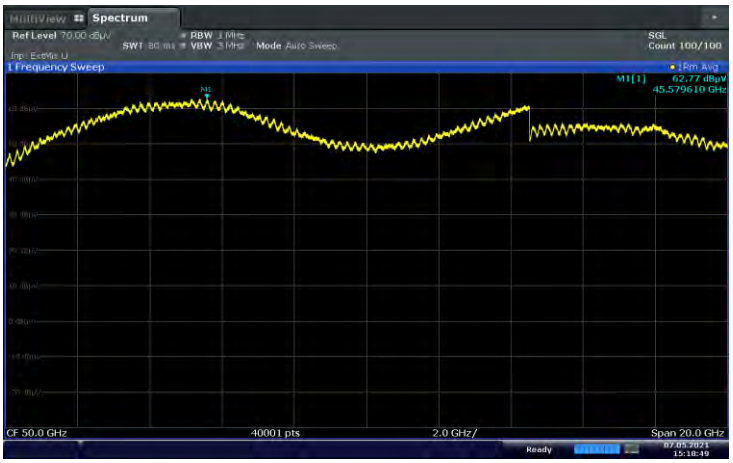
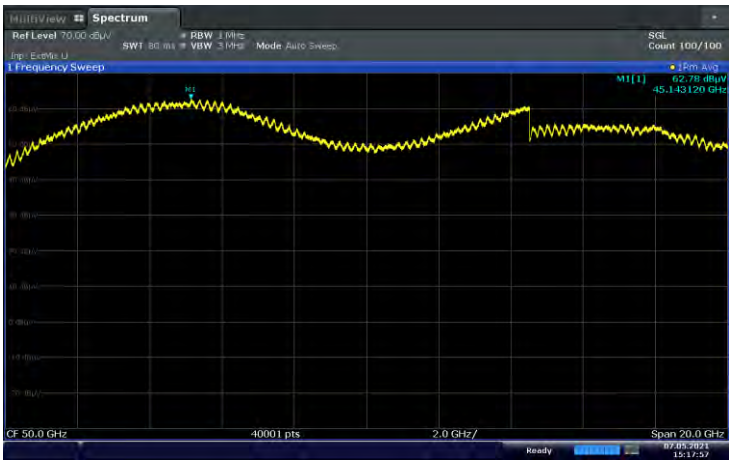
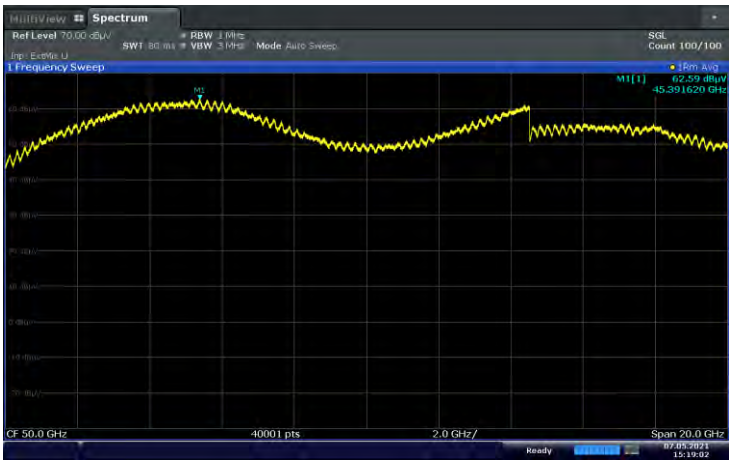
Antenna 0(K patch), n261 SISO Dual [30 MHz ~ 1 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

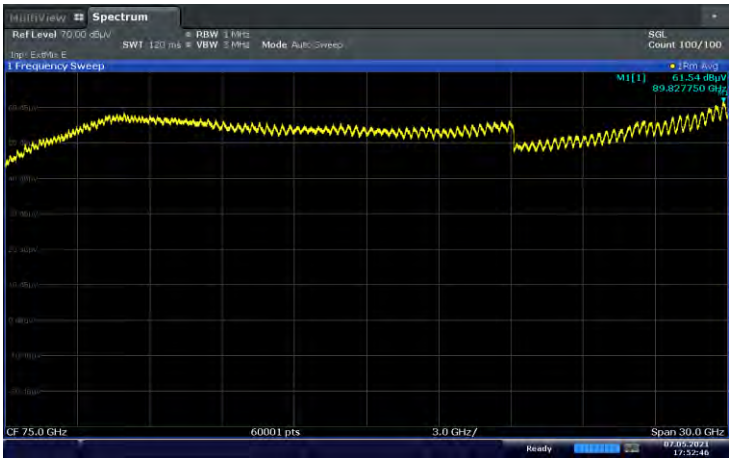
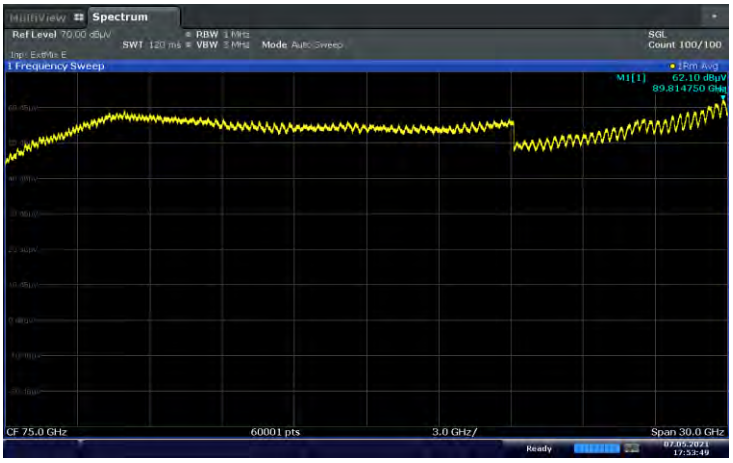
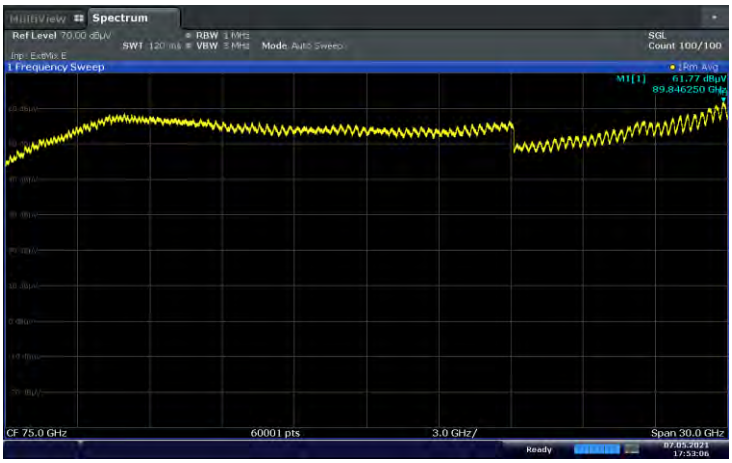
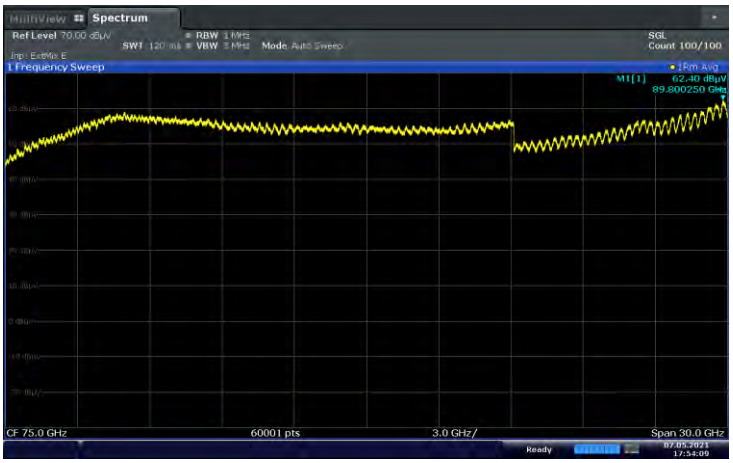
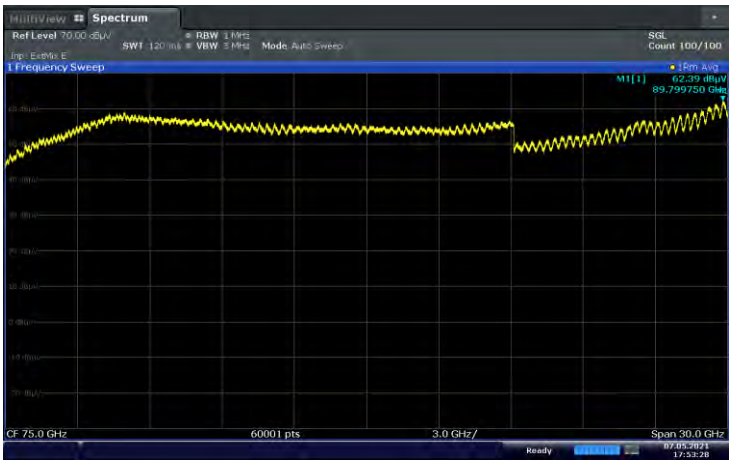
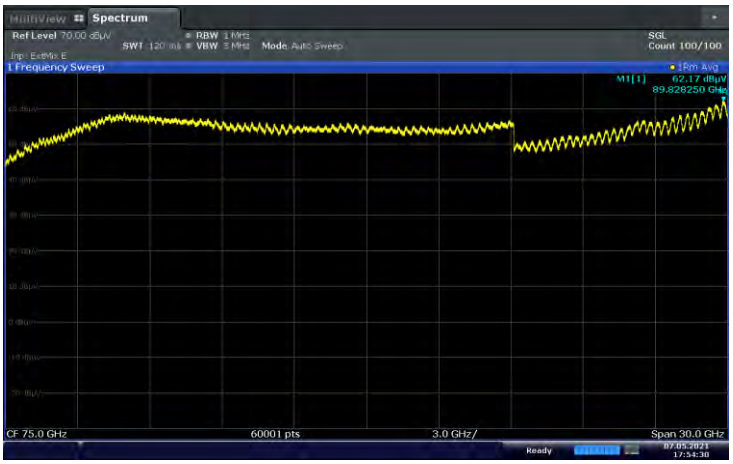
Antenna 0(K patch), n261 SISO Dual [1 GHz ~ 10 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

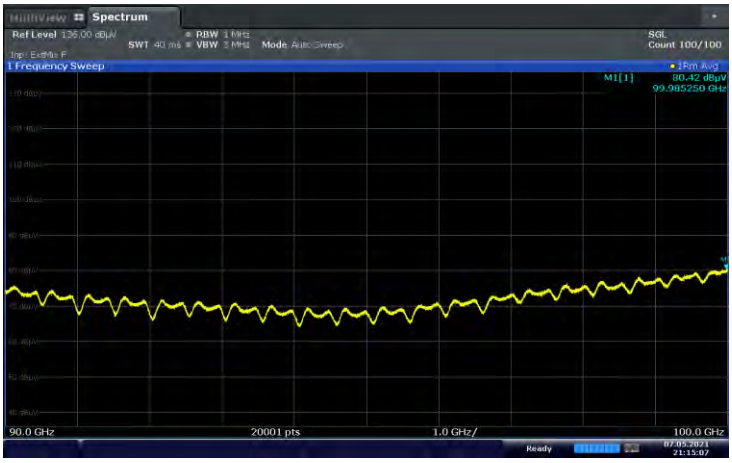
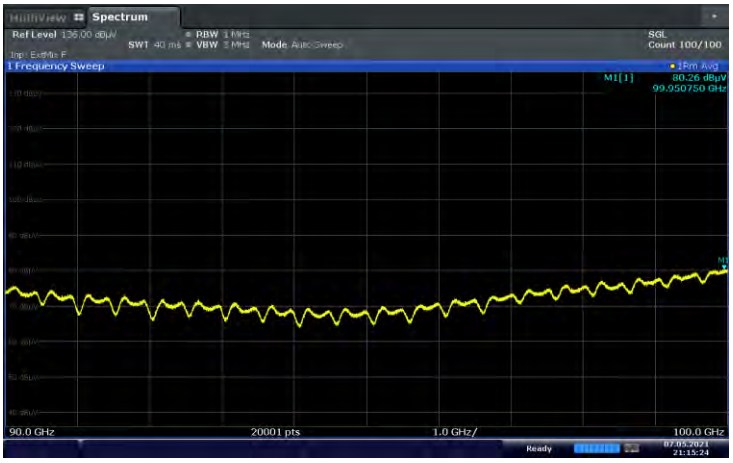
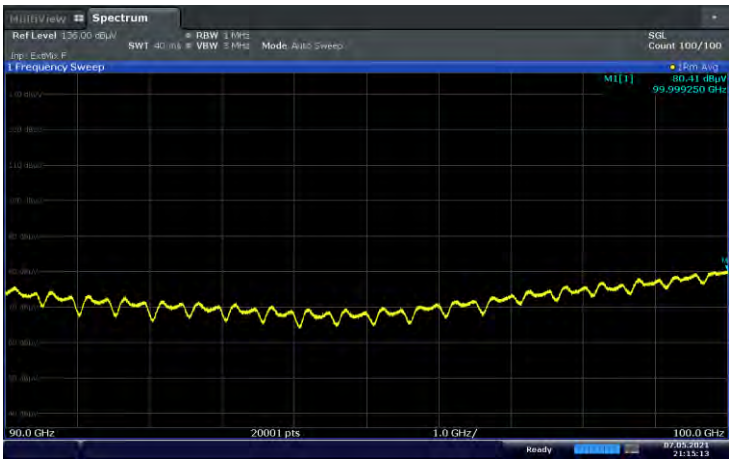
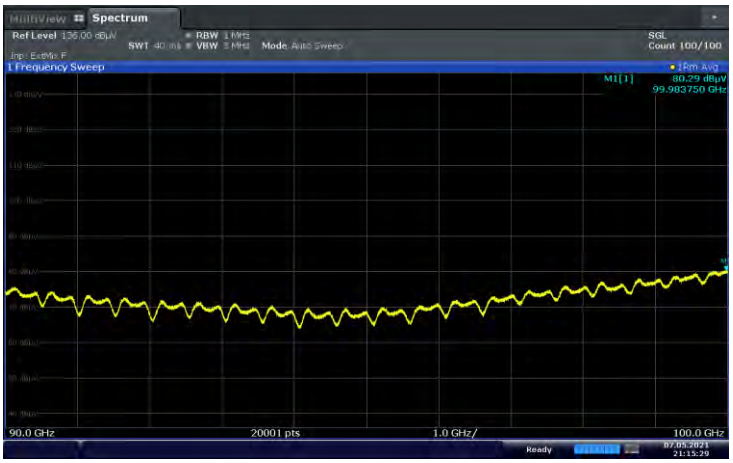
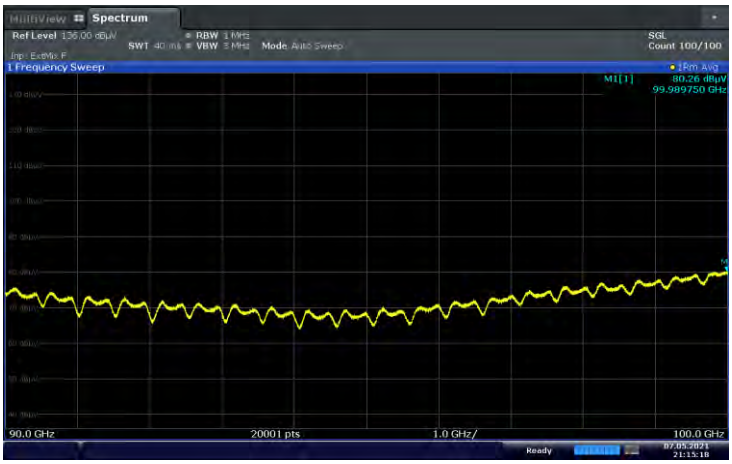
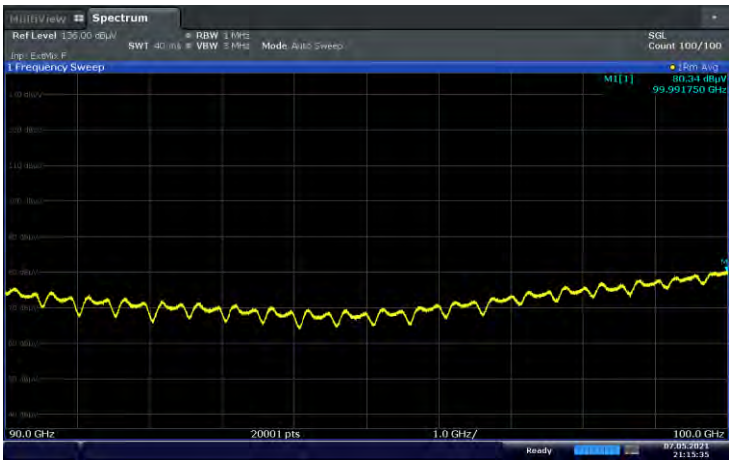
Antenna 0(K patch), n261 SISO Dual [10 GHz ~ 18 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

Antenna 0(K patch), n261 SISO Dual [18 GHz ~ 27 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

Antenna 0(K patch), n261 SISO Dual [28.8 GHz ~ 40 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

Antenna 0(K patch), n261 SISO Dual [40 GHz ~ 60 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

Antenna 0(K patch), n261 SISO Dual [60 GHz ~ 90 GHz]	
50 MHz 1 CC	100 MHz 1 CC
Low Channel Pol. H	Low Channel Pol. H
	
Middle Channel Pol. V	Middle Channel Pol. V
	
High Channel Pol. H	High Channel Pol. H
	

Antenna 0(K patch), n261 SISO Dual [90 GHz ~ 100 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. H	**High Channel Pol. H**
	

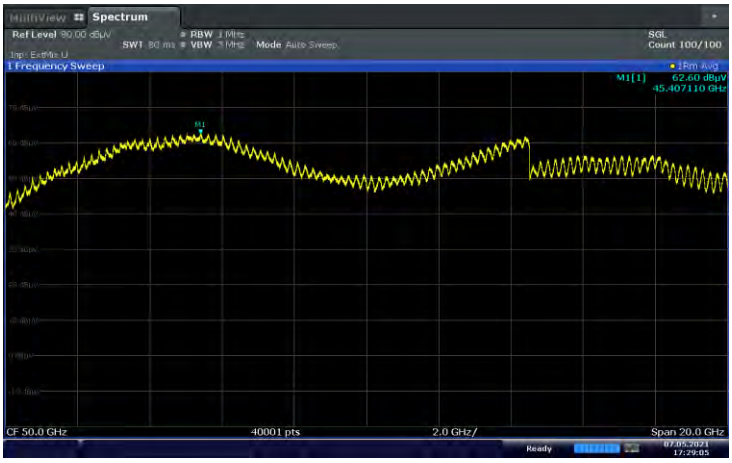
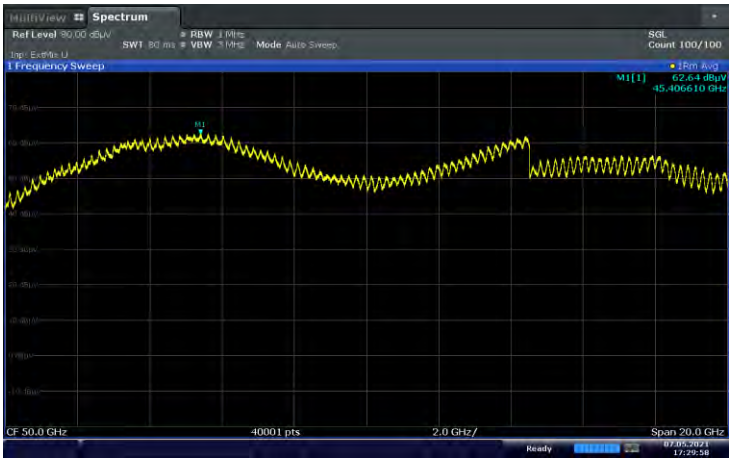
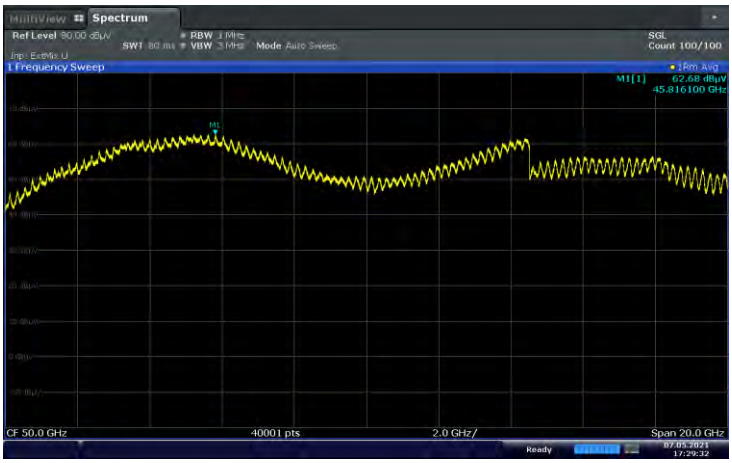
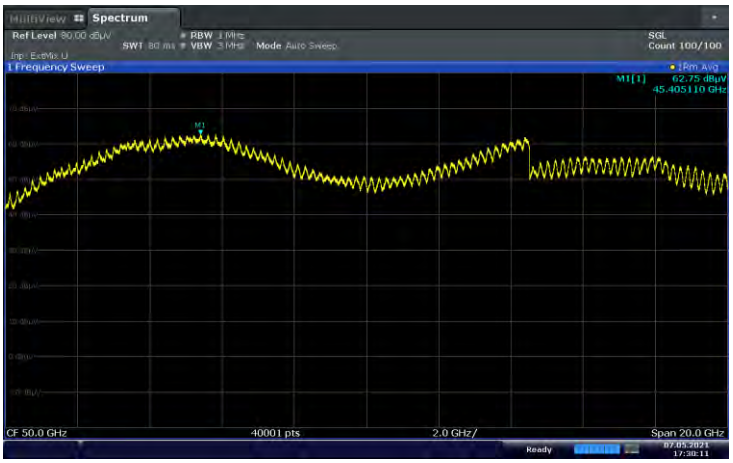
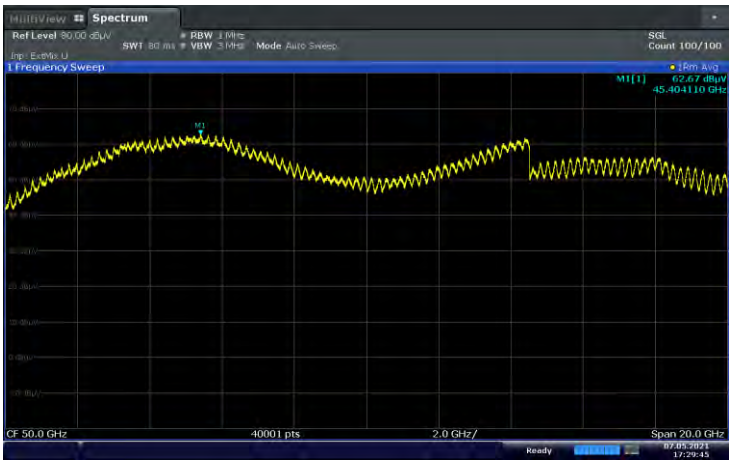
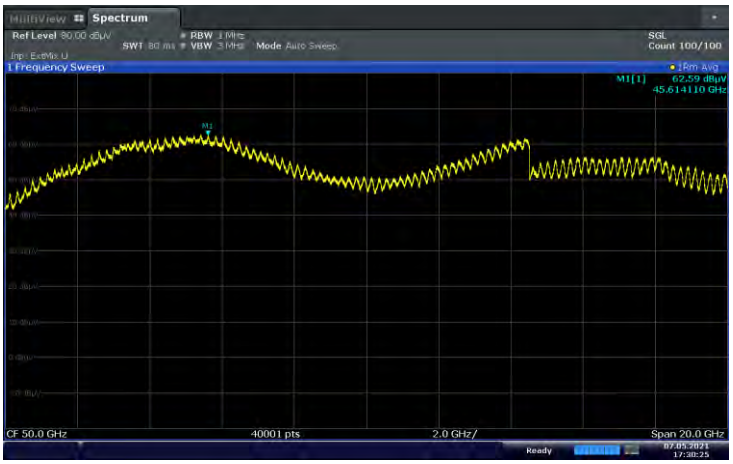
Antenna 0(K patch), n260 SISO Dual [30 MHz ~ 1 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

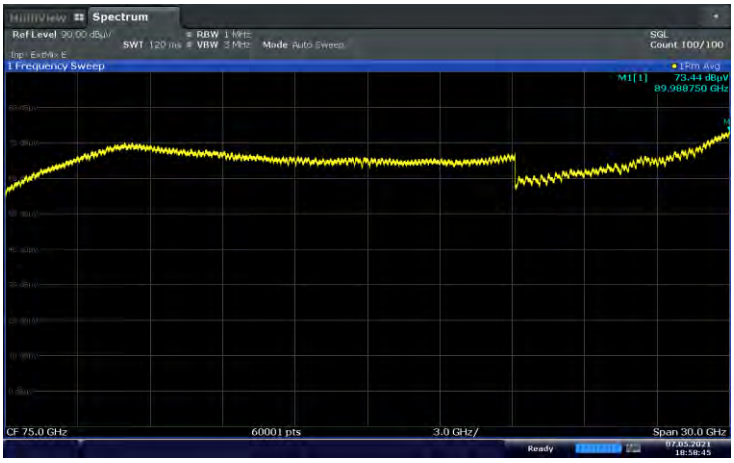
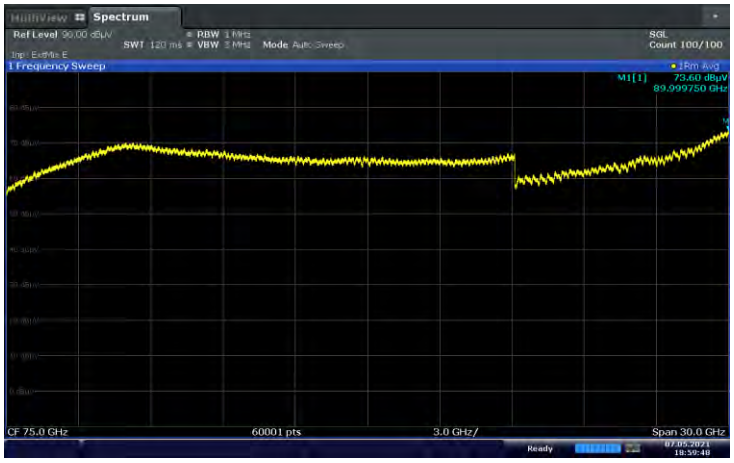
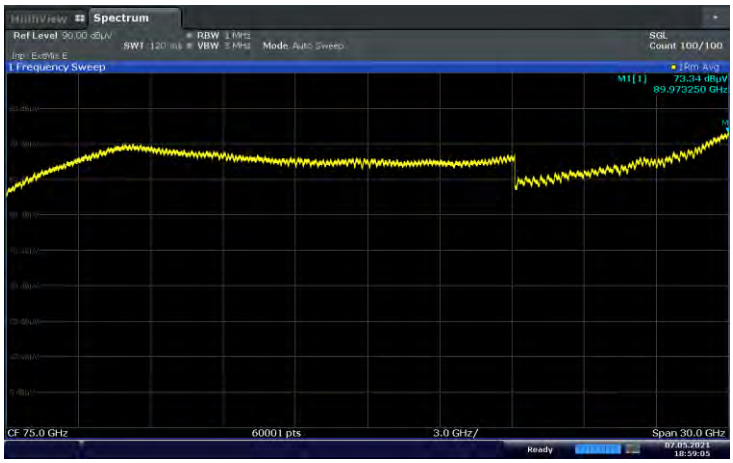
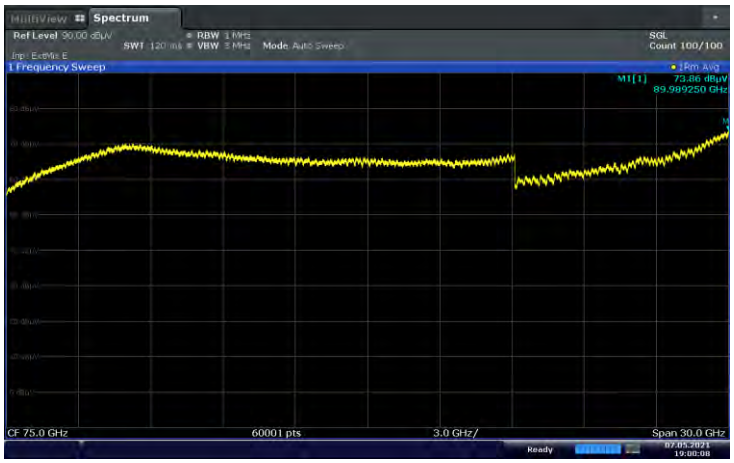
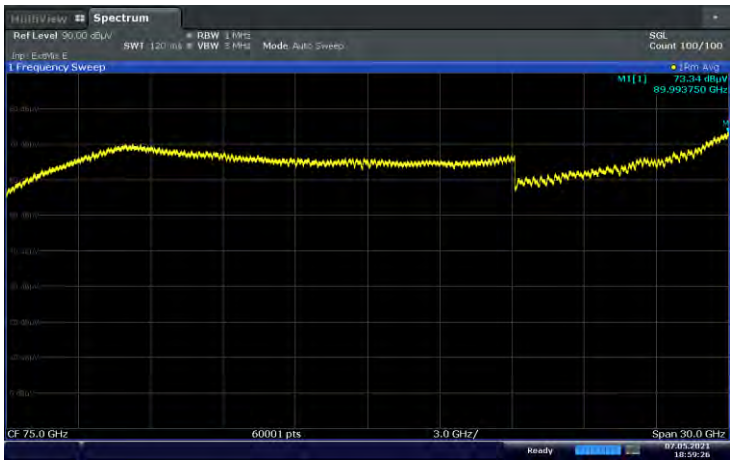
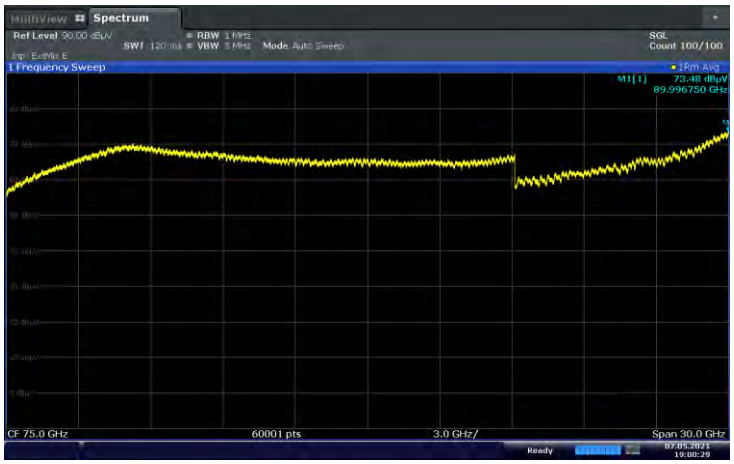
Antenna 0(K patch), n260 SISO Dual [1 GHz ~ 10 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

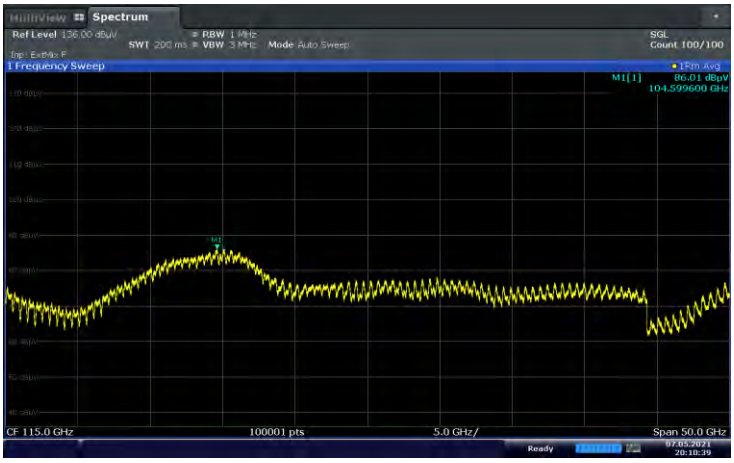
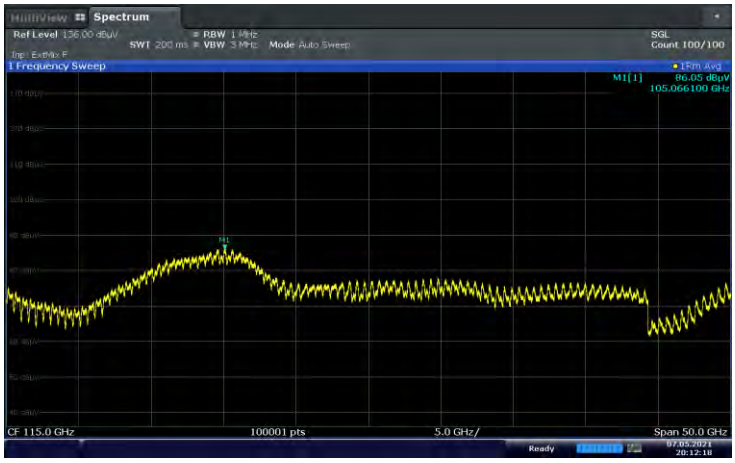
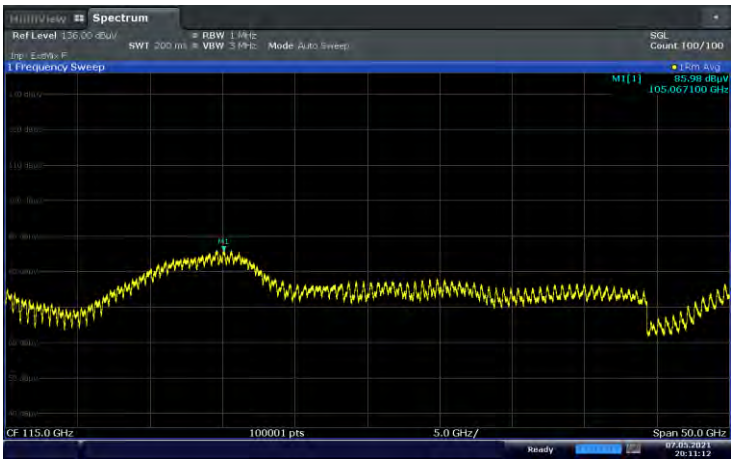
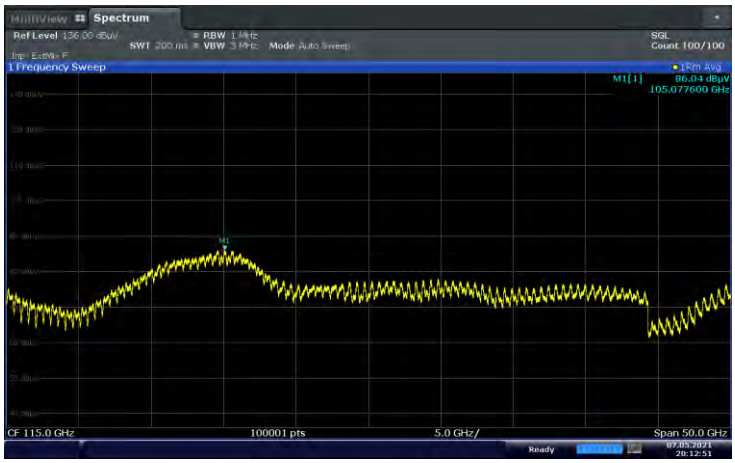
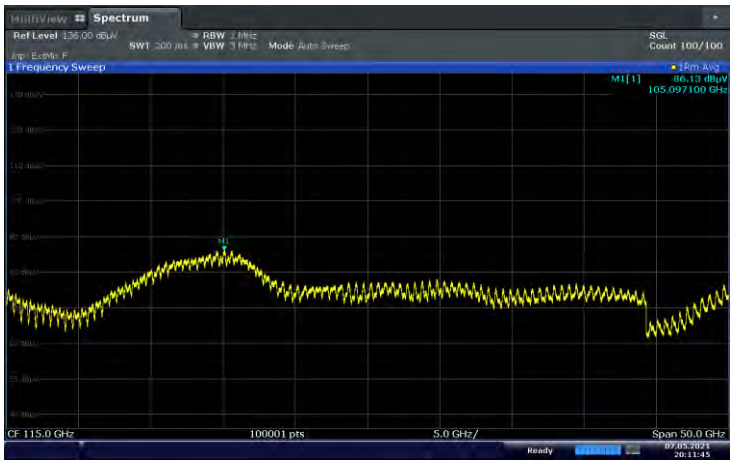
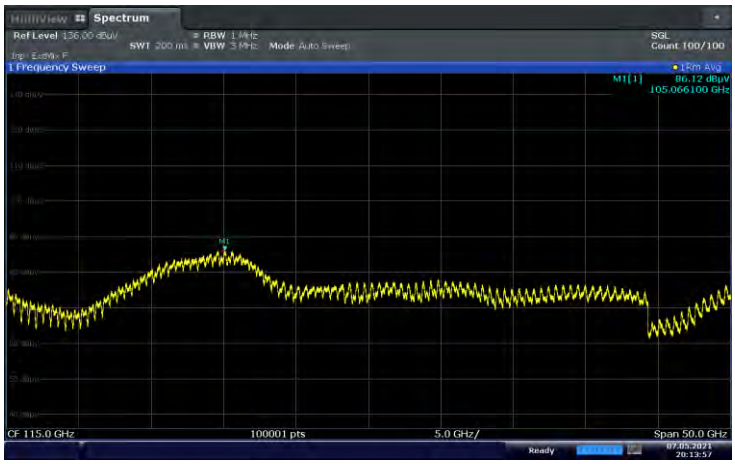
Antenna 0(K patch), n260 SISO Dual [10 GHz ~ 18 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

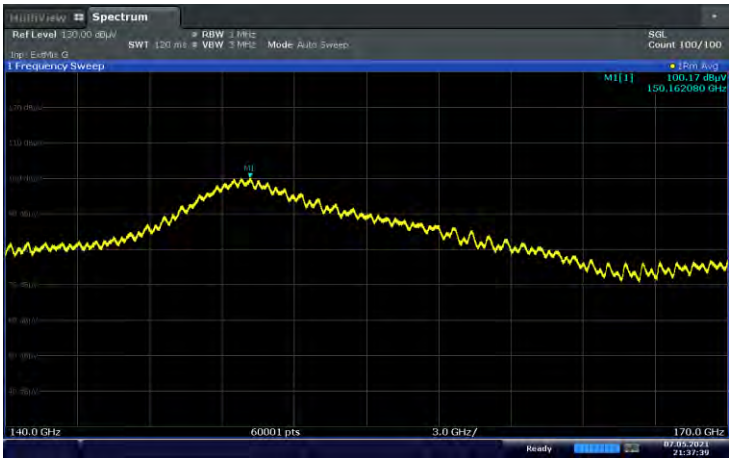
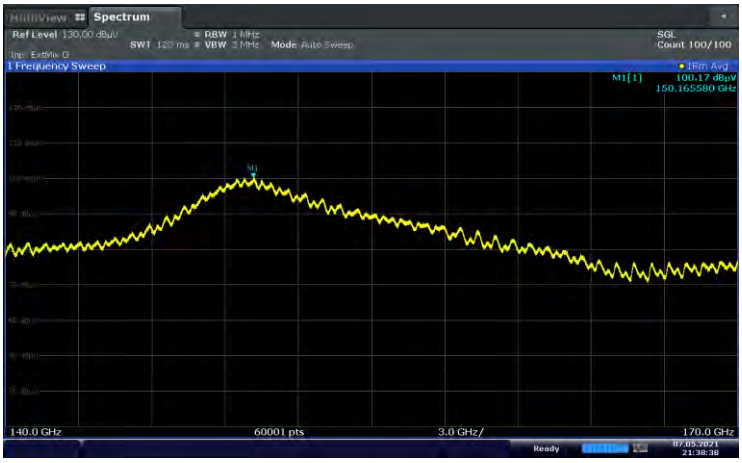
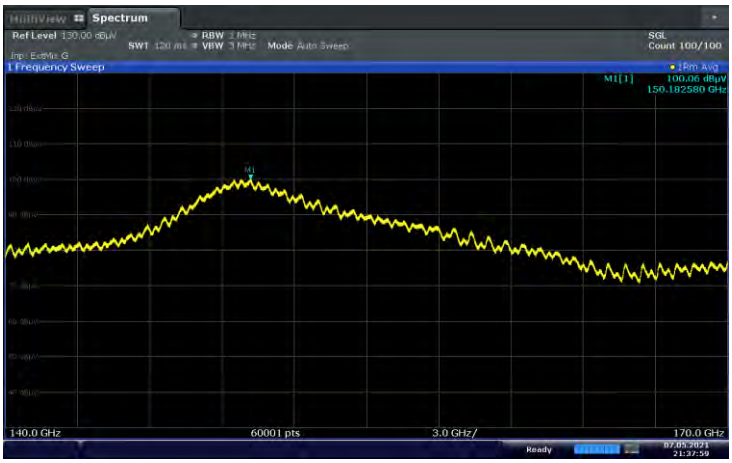
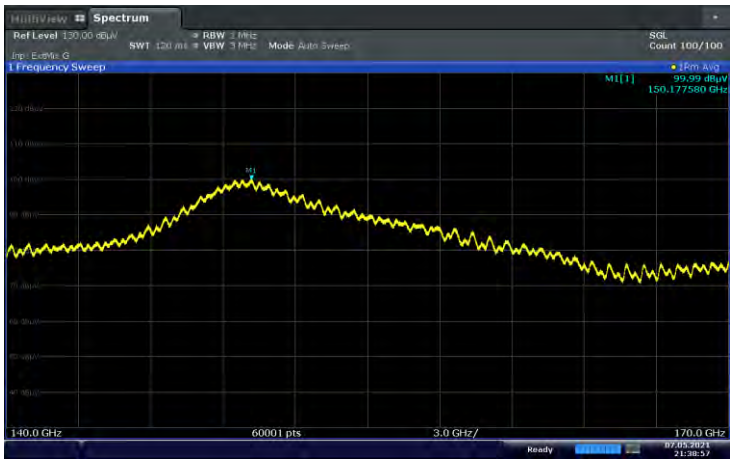
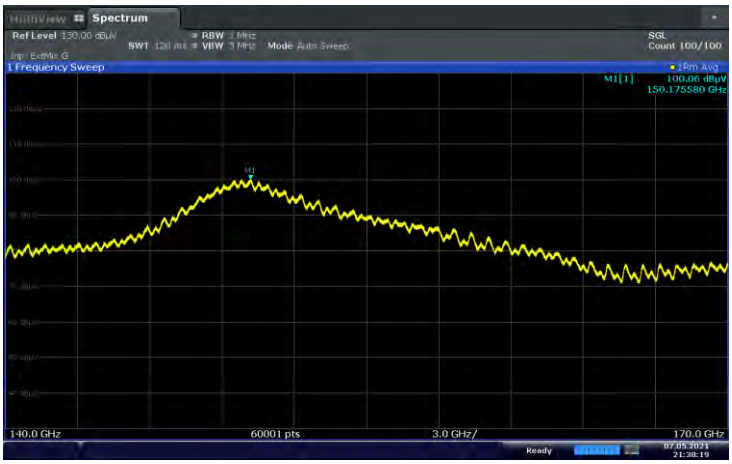
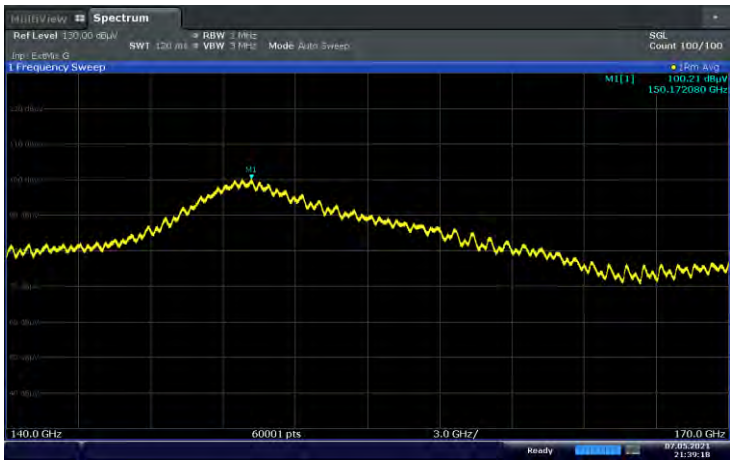
Antenna 0(K patch), n260 SISO Dual [18 GHz ~ 26.5 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

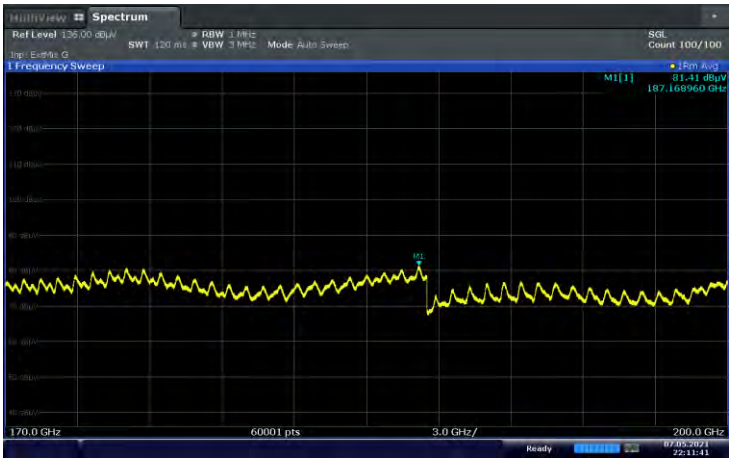
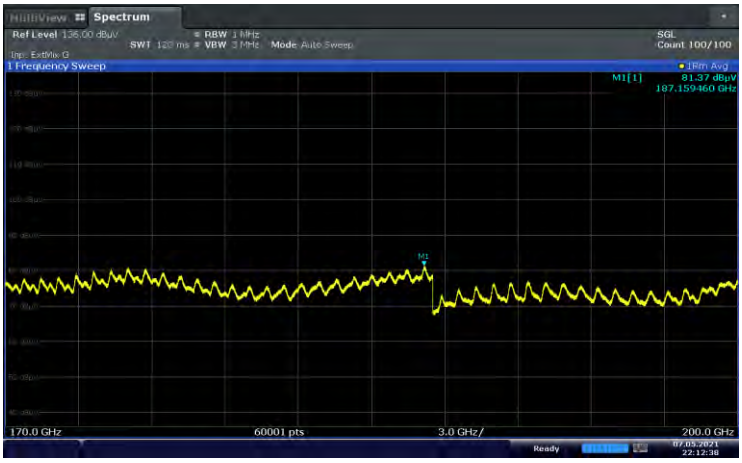
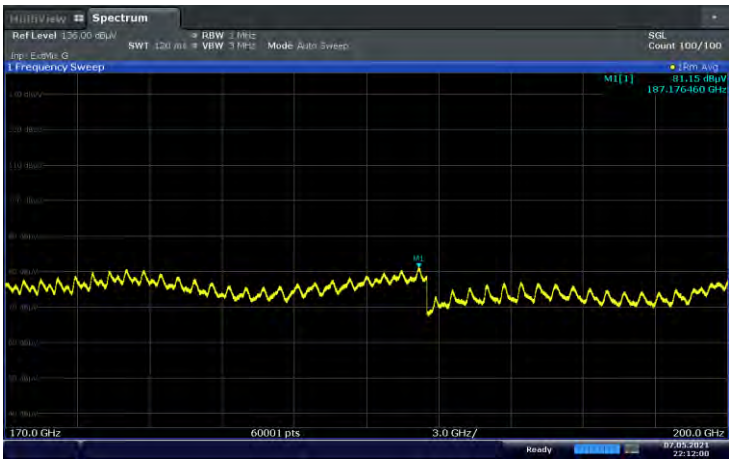
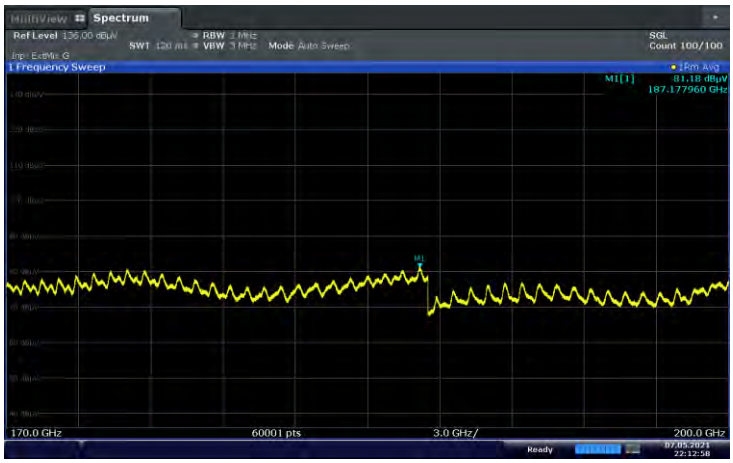
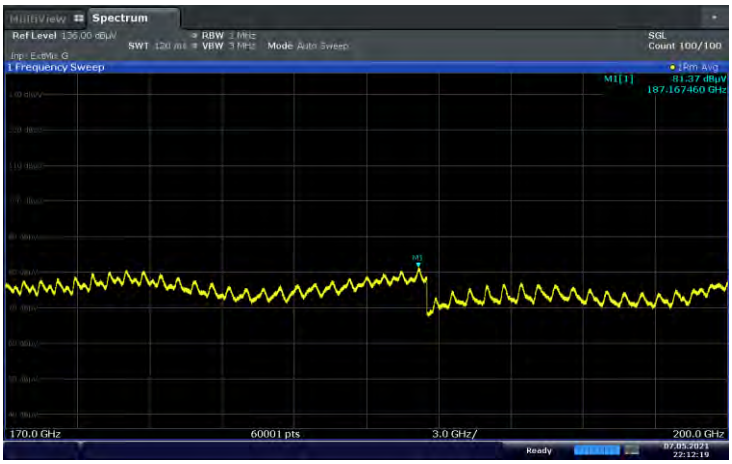
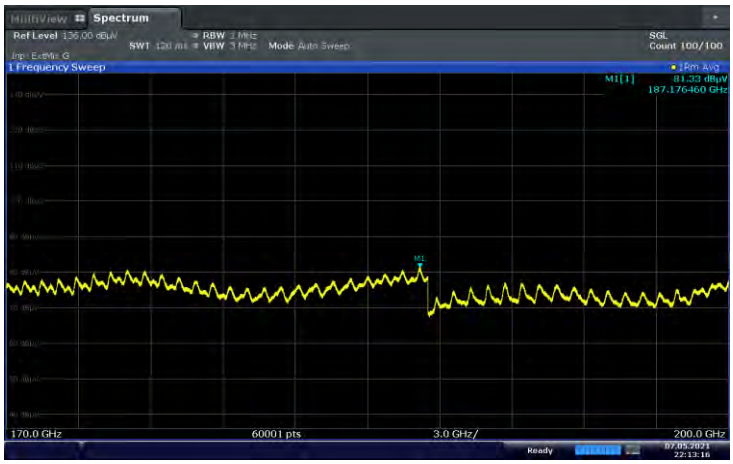
Antenna 0(K patch), n260 SISO Dual [26.5 GHz ~ 36.6 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

Antenna 0(K patch), n260 SISO Dual [40 GHz ~ 60 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

Antenna 0(K patch), n260 SISO Dual [60 GHz ~ 90 GHz]	
50 MHz 1 CC	100 MHz 1 CC
Low Channel Pol. H	Low Channel Pol. H
	
Middle Channel Pol. V	Middle Channel Pol. V
	
High Channel Pol. V	High Channel Pol. V
	

Antenna 0(K patch), n260 SISO Dual [90 GHz ~ 140 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

Antenna 0(K patch), n260 SISO Dual [140 GHz ~ 170 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

Antenna 0(K patch), n260 SISO Dual [170 GHz ~ 200 GHz]	
50 MHz 1 CC	**100 MHz 1 CC**
Low Channel Pol. H	**Low Channel Pol. H**
	
Middle Channel Pol. V	**Middle Channel Pol. V**
	
High Channel Pol. V	**High Channel Pol. V**
	

5.5. FREQUENCY STABILTY

FCC Rules

Test Requirements:

§ 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

Test Procedures:

The measurement is performed in accordance with Section 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.4 Frequency stability over variations in temperature

a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.

b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.

c) Turn on the EUT, and tune it to the center frequency of the operating band.

d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

g) Set the temperature control on the chamber to the highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.

h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.

i) Measure the frequency.

j) Switch off the EUT, but do not switch off the oscillator heater.

k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.

l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be −30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.

m) Omitted

5.6.5 Frequency stability when varying supply voltage

a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)

b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.

d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Measure the frequency.

f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and high channel of the operating band.

Note:

1) The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each path, so we are attached only the worst case data.
2) We were performed the test using call simulator

Test Results:

Reference: Voltage = DC 3.88 V

Antenna 0(K patch), n261

Low Frequency = 27 525.00 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	27525 000 000	0.030	0.000	0.00000
		-30	27525 000 008	7.575	7.545	0.00998
		-20	27525 000 004	4.177	4.147	0.00549
		-10	27525 000 003	3.070	3.040	0.00402
		0	27525 000 008	8.323	8.292	0.01097
		+10	27525 000 004	4.123	4.093	0.00542
		+30	27525 000 009	8.892	8.861	0.01172
		+40	27525 000 007	6.872	6.842	0.00905
		+50	27525 000 005	5.009	4.979	0.00659
HIGH	4.47	+20	27525 000 002	2.124	2.094	0.00277
LOW	3.65	+20	27525 000 009	9.037	9.007	0.01192

High Frequency = 28 324.92 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	28324 920 000	1.581	0.000	0.00000
		-30	28324 920 010	9.551	7.970	0.01055
		-20	28324 920 010	9.893	8.312	0.01100
		-10	28324 920 001	1.372	-0.209	-0.00028
		0	28324 920 008	7.994	6.413	0.00849
		+10	28324 920 002	1.656	0.075	0.00010
		+30	28324 920 004	4.235	2.655	0.00351
		+40	28324 920 002	2.418	0.837	0.00111
		+50	28324 920 002	2.069	0.488	0.00065
HIGH	4.47	+20	28324 920 004	3.625	2.044	0.00270
LOW	3.65	+20	28324 920 002	1.678	0.097	0.00013

Antenna 1(L patch), n261

Low Frequency = 27 525.00 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	27525 000 000	6.337	0.000	0.00000
		-30	27525 000 010	9.887	3.550	0.00470
		-20	27525 000 001	1.357	-4.980	-0.00659
		-10	27525 000 007	7.085	0.748	0.00099
		0	27525 000 000	0.051	-6.286	-0.00832
		+10	27525 000 003	2.890	-3.447	-0.00456
		+30	27525 000 009	9.025	2.688	0.00356
		+40	27525 000 009	8.548	2.211	0.00293
		+50	27525 000 010	9.757	3.420	0.00452
HIGH	4.47	+20	27525 000 004	4.387	-1.950	-0.00258
LOW	3.65	+20	27525 000 002	1.836	-4.501	-0.00595

High Frequency = 28 324.92 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	28324 920 000	8.490	0.000	0.00000
		-30	28324 920 005	4.545	-3.944	-0.00522
		-20	28324 920 003	2.591	-5.899	-0.00781
		-10	28324 920 004	3.502	-4.988	-0.00660
		0	28324 920 007	6.904	-1.585	-0.00210
		+10	28324 920 007	7.218	-1.272	-0.00168
		+30	28324 920 008	8.319	-0.171	-0.00023
		+40	28324 920 003	3.449	-5.041	-0.00667
		+50	28324 920 006	6.481	-2.008	-0.00266
HIGH	4.47	+20	28324 920 006	6.206	-2.284	-0.00302
LOW	3.65	+20	28324 920 009	8.728	0.238	0.00032

Antenna 0(K patch), n260

Low Frequency = 37 025.04 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	37025 040 000	4.508	0.000	0.00000
		-30	37025 040 009	9.328	4.820	0.00638
		-20	37025 040 009	9.205	4.697	0.00621
		-10	37025 040 001	0.846	-3.661	-0.00484
		0	37025 040 003	3.143	-1.365	-0.00181
		+10	37025 040 008	8.374	3.866	0.00511
		+30	37025 040 008	7.807	3.299	0.00437
		+40	37025 040 001	0.996	-3.512	-0.00465
		+50	37025 040 006	5.764	1.257	0.00166
HIGH	4.47	+20	37025 040 009	8.779	4.271	0.00565
LOW	3.65	+20	37025 040 002	2.424	-2.084	-0.00276

High Frequency = 39 975.00 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	39975 000 000	7.638	0.000	0.00000
		-30	39975 000 005	4.552	-3.086	-0.00408
		-20	39975 000 003	2.672	-4.966	-0.00657
		-10	39975 000 000	0.205	-7.432	-0.00983
		0	39975 000 007	7.176	-0.461	-0.00061
		+10	39975 000 009	8.609	0.971	0.00129
		+30	39975 000 001	0.748	-6.890	-0.00912
		+40	39975 000 003	3.458	-4.179	-0.00553
		+50	39975 000 003	2.785	-4.852	-0.00642
HIGH	4.47	+20	39975 000 002	1.840	-5.798	-0.00767
LOW	3.65	+20	39975 000 004	3.971	-3.666	-0.00485

Antenna 1(L patch), n260

Low Frequency = 37 025.04 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	37025 040 000	0.474	0.000	0.00000
		-30	37025 040 007	7.431	6.957	0.00920
		-20	37025 040 001	1.115	0.641	0.00085
		-10	37025 040 003	2.934	2.460	0.00325
		0	37025 040 001	0.773	0.298	0.00039
		+10	37025 040 002	1.656	1.182	0.00156
		+30	37025 040 005	5.015	4.540	0.00601
		+40	37025 040 001	1.121	0.647	0.00086
		+50	37025 040 002	1.696	1.221	0.00162
HIGH	4.47	+20	37025 040 002	2.003	1.528	0.00202
LOW	3.65	+20	37025 040 001	1.024	0.550	0.00073

High Frequency = 39 975.00 MHz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.88	+20(Ref)	39975 000 000	7.302	0.000	0.00000
		-30	39975 000 000	0.138	-7.164	-0.00948
		-20	39975 000 000	0.034	-7.268	-0.00962
		-10	39975 000 010	9.884	2.582	0.00342
		0	39975 000 003	2.549	-4.752	-0.00629
		+10	39975 000 005	4.713	-2.589	-0.00342
		+30	39975 000 004	4.448	-2.854	-0.00378
		+40	39975 000 007	6.748	-0.554	-0.00073
		+50	39975 000 003	3.499	-3.803	-0.00503
HIGH	4.47	+20	39975 000 009	9.053	1.751	0.00232
LOW	3.65	+20	39975 000 007	6.798	-0.504	-0.00067

6. MIXER VERIFICATION CERTIFICATE & CHECK

열 람 용
This certificate may not be reproduced other than in full except with permission of the issuing laboratory.

교 정 성 적 서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

KOREA LABORATORY ACCREDITATION SCHEME KOLAS CALIBRATION NO KC20-011

성적서발급번호(Certificate No) : IC-2020-68829
교 정 번 호(Calibration No) : C-2020-080148

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject) ◇ 등록번호 : 288234
- 기기명 (Description) : WR-19 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M19HWD
- 기기번호 (Serial Number) : 160429-1

3. 교정일자 (Date of Calibration) : 2020.09.09 **차기교정예정일자** : 2021.09.09 (The due date of next Calibration)

4. 교정환경 (Environment)
- 온도(Temperature) : (23.0 ± 0.6) ℃ - 습도(Humidity) : (50 ± 2) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab) (주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	(주)에이치시티
POWER SENSOR	AGILENT 8487A	MY41092450	2021/01/15	Keysight Technologies
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2021/01/03	Keysight Technologies
WR-19 MULTIPLIER SOURCE MODULE	OML S19MS-A	160516-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : **교정결과 참조** (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : **교정결과 참조** (Refer to attachment)
신뢰수준 약 95 %, $k = 2$ (Confidence level about 95 %, $k = 2$)

확 인 (affirmation)	작성자 (Measurements performed by) 성명 (Name) 박 민 지	승인자 (Approved by) 직위 (Title) 기술책임자(Technical Cal. Manager) (정) 성명 (Name) 이 승 찬 (서명)

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2020. 09. 10

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
***President*, HCT Co., Ltd.**

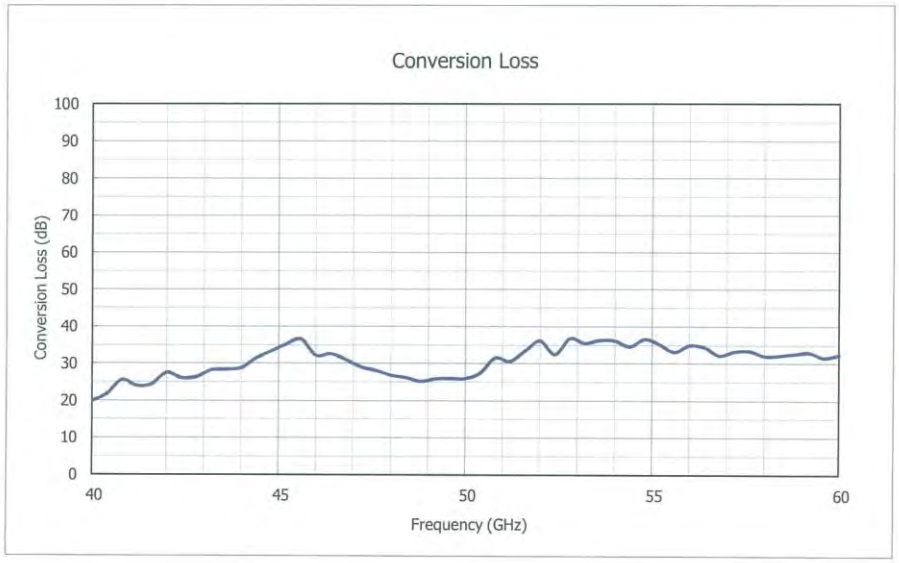
㈜ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.
※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.
※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2020-68829
교 정 번 호(Calibration No) : C-2020-080148

1. Conversion Loss Graph



Note 1) R&S FSW (SN 104544)와 함께 교정된 결과임
Note 2) 측정 조건 : RF = -25 dBm, Harmonic Order = 4, L.O. Level = 15.5 dBm, Bias Value = 5.70 mA

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2020-68829
교 정 번 호(Calibration No) : C-2020-080148

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
40.0	19.8	0.8	50.4	27.4	0.8
40.4	21.7	0.8	50.8	31.4	0.8
40.8	25.5	0.8	51.2	30.5	0.8
41.2	23.9	0.8	51.6	33.4	0.8
41.6	24.4	0.8	52.0	36.1	0.8
42.0	27.5	0.8	52.4	32.4	0.8
42.4	26.0	0.8	52.8	36.7	0.8
42.8	26.3	0.8	53.2	35.4	0.8
43.2	28.2	0.8	53.6	36.3	0.8
43.6	28.3	0.8	54.0	36.1	0.8
44.0	28.7	0.8	54.4	34.6	0.8
44.4	31.4	0.8	54.8	36.5	0.8
44.8	33.3	0.8	55.2	35.2	0.8
45.2	35.1	0.8	55.6	33.1	0.8
45.6	36.5	0.8	56.0	34.9	0.8
46.0	32.1	0.8	56.4	34.4	0.8
46.4	32.6	0.8	56.8	32.1	0.8
46.8	30.9	0.8	57.2	33.2	0.8
47.2	29.0	0.8	57.6	33.4	0.8
47.6	28.1	0.8	58.0	32.0	0.8
48.0	26.8	0.8	58.4	32.1	0.8
48.4	26.2	0.8	58.8	32.5	0.8
48.8	25.2	0.8	59.2	32.9	0.8
49.2	25.8	0.8	59.6	31.5	0.8
49.6	26.0	0.8	60.0	32.3	0.8
50.0	25.9	0.8	-	-	-

끝.

F-02P-02-008 (Rev.02)

교 정 성 적 서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

성적서발급번호(Certificate No) : IC-2020-68830
교 정 번 호(Calibration No) : C-2020-080149

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject) ◇ 등록번호 : 288235
- 기기명 (Description) : WR-12 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M12HWD
- 기기번호 (Serial Number) : 160419-1

3. 교정일자 (Date of Calibration) : 2020.09.09 **차기교정예정일자** : 2021.09.09 (The due date of next Calibration)

4. 교정환경 (Environment)
- 온도(Temperature) : (23.0 ± 0.6) ℃ - 습도(Humidity) : (50 ± 2) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab) (주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	(주)에이치시티
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2021/01/03	Keysight Technologies
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2020/12/30	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : **교정결과 참조** (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : **교정결과 참조** (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (정) (서명)
		성명 (Name) 이 승 찬

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2020. 09. 10

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
***President*, HCT Co., Ltd.**

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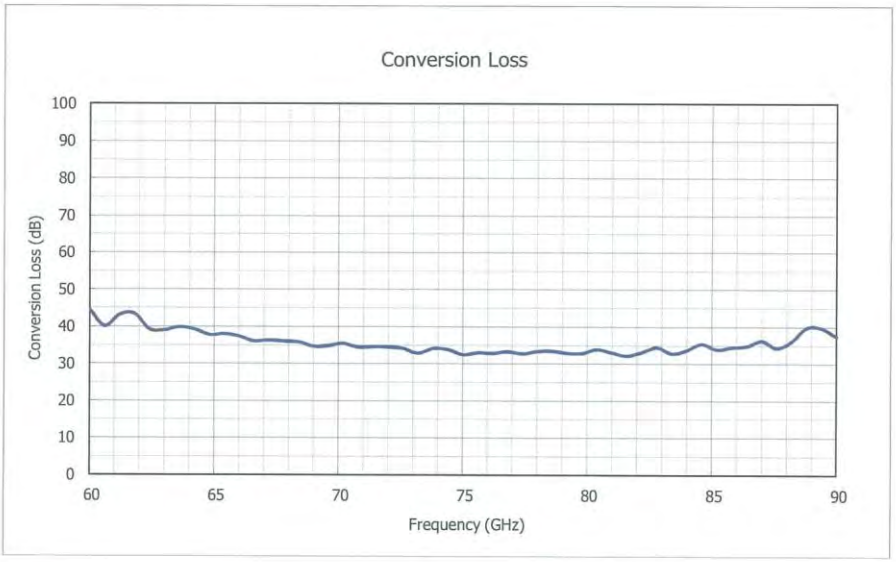
※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.
※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2020-68830
교 정 번 호(Calibration No) : C-2020-080149

1. Conversion Loss Graph



Note 1) R&S FSW (SN 104544)와 함께 교정된 결과임
Note 2) 측정 조건 : RF = -25 dBm, Harmonic Order = 6, L.O. Level = 17 dBm, Bias Value = 4.98 mA

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2020-68830
교 정 번 호(Calibration No) : C-2020-080149

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
60.0	44.49	0.89	75.6	32.95	0.82
60.6	40.08	0.89	76.2	32.82	0.82
61.2	43.11	0.89	76.8	33.25	0.82
61.8	43.39	0.89	77.4	32.70	0.82
62.4	39.27	0.89	78.0	33.35	0.82
63.0	39.01	0.89	78.6	33.45	0.82
63.6	39.85	0.89	79.2	32.85	0.82
64.2	39.28	0.89	79.8	32.83	0.82
64.8	37.77	0.89	80.4	33.86	0.82
65.4	37.98	0.89	81.0	32.98	0.82
66.0	37.32	0.89	81.6	32.15	0.82
66.6	36.03	0.89	82.2	33.14	0.82
67.2	36.27	0.89	82.8	34.43	0.82
67.8	36.01	0.89	83.4	32.78	0.82
68.4	35.78	0.89	84.0	33.70	0.82
69.0	34.65	0.89	84.6	35.37	0.82
69.6	34.81	0.89	85.2	33.87	0.82
70.2	35.41	0.89	85.8	34.48	0.82
70.8	34.42	0.89	86.4	34.79	0.82
71.4	34.55	0.89	87.0	36.20	0.82
72.0	34.50	0.89	87.6	34.31	0.82
72.6	34.09	0.89	88.2	36.05	0.82
73.2	32.81	0.89	88.8	39.77	0.82
73.8	34.08	0.89	89.4	39.68	0.82
74.4	33.83	0.89	90.0	37.36	0.82
75.0	32.43	0.82	-	-	-

끝.

F-02P-02-008 (Rev.02)

열 람 용

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2020-68832
측 정 번 호(Measurement No) : C-2020-080151

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item) ◇ HCT 등록번호 : 288237
- 기기명 (Description) : WR-05 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M05HWD
- 기기번호 (Serial Number) : 160419-1

3. 측정일자 (Measurement date) : 2020.09.09

4. 측정환경 (Environment)
- 온도(Temperature) : (23.0 ± 0.6) ℃ - 습도(Humidity) : (50 ± 2) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 아래의 표준장비와 자체 점검된 장비를 이용하여 점검 되었음.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
ERICKSON POWER METER	VDI PM5	394V	측정	(주)에이치시티
WR-05 MULTIPLIER SOURCE MODULE	OML S05MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Messurement result) **: 측정결과 참조** (Refer to attachment)

㈜ 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.
The messuremen results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : 박 민 지	직위 (Title) 기술책임자(Technical Manager)
		성명 (Name) 이 승 찬 (서명)

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association for Laboratory Accreditation), a ILAC MRA signatory.

2020. 09. 10

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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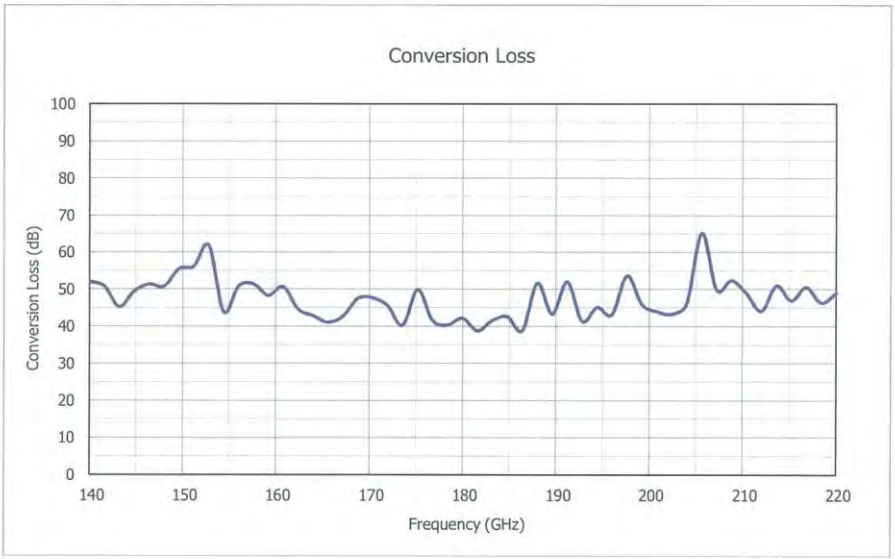
F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2020-68832 페이지(page) : 2 of 3
측 정 번 호(Measurement No) : C-2020-080151

1. Conversion Loss Graph



Note 1) R&S FSW (SN 101256)와 함께 교정된 결과임
Note 2) 측정 조건 : RF = -25 dBm, Harmonic Order = 16, L.O. Level = 17 dBm, Bias Value = 0.00 mA
Note 3) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT에서 자체 점검된 기준기로 점검되었음.
- In the absence of power standards above 110 GHz, power measurements above 110 GHz are to confirm operation functionality and traceable only to HCT.

F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
140.0	52.0	0.86	181.6	38.7	0.86
141.6	50.8	0.86	183.2	41.5	0.86
143.2	45.2	0.86	184.8	42.5	0.86
144.8	49.4	0.86	186.4	38.8	0.86
146.4	51.3	0.86	188.0	51.5	0.86
148.0	50.8	0.86	189.6	43.2	0.86
149.6	55.5	0.86	191.2	51.9	0.86
151.2	56.1	0.86	192.8	41.3	0.86
152.8	61.8	0.86	194.4	45.0	0.86
154.4	43.8	0.86	196.0	43.1	0.86
156.0	50.8	0.86	197.6	53.6	0.86
157.6	51.4	0.86	199.2	45.9	0.86
159.2	48.2	0.86	200.8	43.9	0.86
160.8	50.6	0.86	202.4	43.2	0.86
162.4	44.5	0.86	204.0	46.0	0.86
164.0	42.8	0.86	205.6	65.1	0.86
165.6	41.0	0.86	207.2	49.8	0.86
167.2	42.6	0.86	208.8	52.3	0.86
168.8	47.5	0.86	210.4	48.9	0.86
170.4	47.6	0.86	212.0	44.0	0.86
172.0	45.4	0.86	213.6	50.9	0.86
173.6	40.2	0.86	215.2	46.9	0.86
175.2	49.8	0.86	216.8	50.5	0.86
176.8	41.5	0.86	218.4	46.3	0.86
178.4	40.3	0.86	220.0	48.9	0.86
180.0	42.1	0.86	-	-	-

끝.

F-02P-02-010 (Rev.01)

열 람 용

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2020-68833
측 정 번 호(Measurement No) : C-2020-080152

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item) ◇ HCT 등록번호 : 366196
- 기기명 (Description) : WR-08 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M08HWD
- 기기번호 (Serial Number) : 160419-1

3. 측정일자 (Measurement date) : 2020.09.09

4. 측정환경 (Environment)
- 온도(Temperature) : (23.0 ± 0.6) ℃ - 습도(Humidity) : (50 ± 2) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 아래의 표준장비와 자체 점검된 장비를 이용하여 점검 되었음.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
ERICKSON POWER METER	VDI PM5	394V	측정	(주)에이치시티
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Messurement result) **: 측정결과 참조** (Refer to attachment)

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확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : 박 민 지	직위 (Title) 기술책임자(Technical Manager)
		성명 (Name) 이 승 찬 (서명)

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2020. 09. 10

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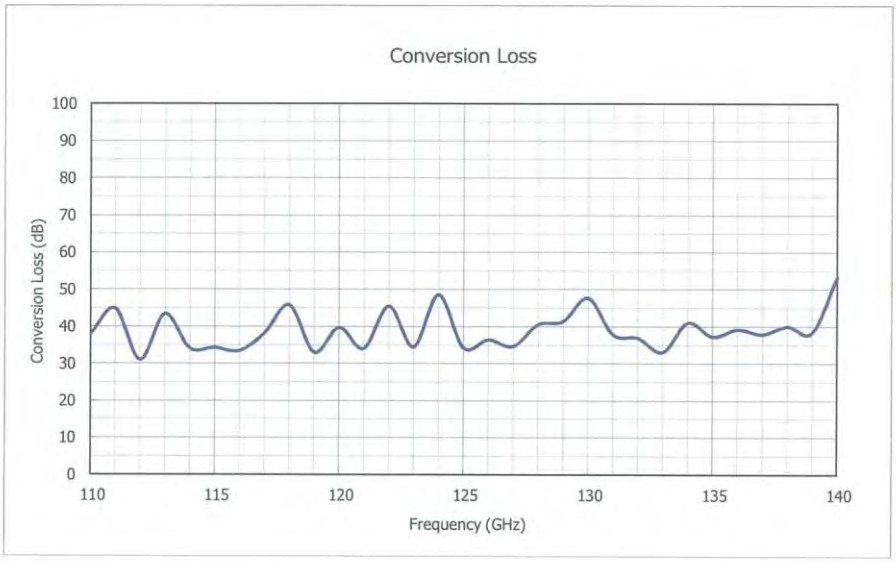
F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2020-68833 페이지(page) : 2 of 3
측 정 번 호(Measurement No) : C-2020-080152

1. Conversion Loss Graph



Note 1) R&S FSW (SN 104544)와 함께 교정된 결과임
Note 2) 측정 조건 : RF = -25 dBm, Harmonic Order = 10, L.O. Level = 17 dBm, Bias Value = 0.01 mA
Note 3) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT에서 자체 점검된 기준기로 점검되었음.
- In the absence of power standards above 110 GHz, power measurements above 110 GHz are to confirm operation functionality and traceable only to HCT.

F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2020-68833 페이지(page) : 3 of 3
측 정 번 호(Measurement No) : C-2020-080152

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
110.0	37.8	0.82	126.0	36.4	0.82
111.0	44.8	0.82	127.0	34.6	0.82
112.0	31.0	0.82	128.0	40.5	0.82
113.0	43.4	0.82	129.0	41.4	0.82
114.0	34.1	0.82	130.0	47.6	0.82
115.0	34.3	0.82	131.0	37.8	0.82
116.0	33.5	0.82	132.0	36.9	0.82
117.0	38.1	0.82	133.0	33.1	0.82
118.0	45.8	0.82	134.0	41.0	0.82
119.0	33.0	0.82	135.0	37.2	0.82
120.0	39.7	0.82	136.0	39.2	0.82
121.0	34.0	0.82	137.0	37.9	0.82
122.0	45.4	0.82	138.0	40.0	0.82
123.0	34.5	0.82	139.0	38.4	0.82
124.0	48.5	0.82	140.0	53.3	0.82
125.0	34.2	0.82	-	-	-

끝.

F-02P-02-010 (Rev.01)

7. Annex A_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2105-FC046-P