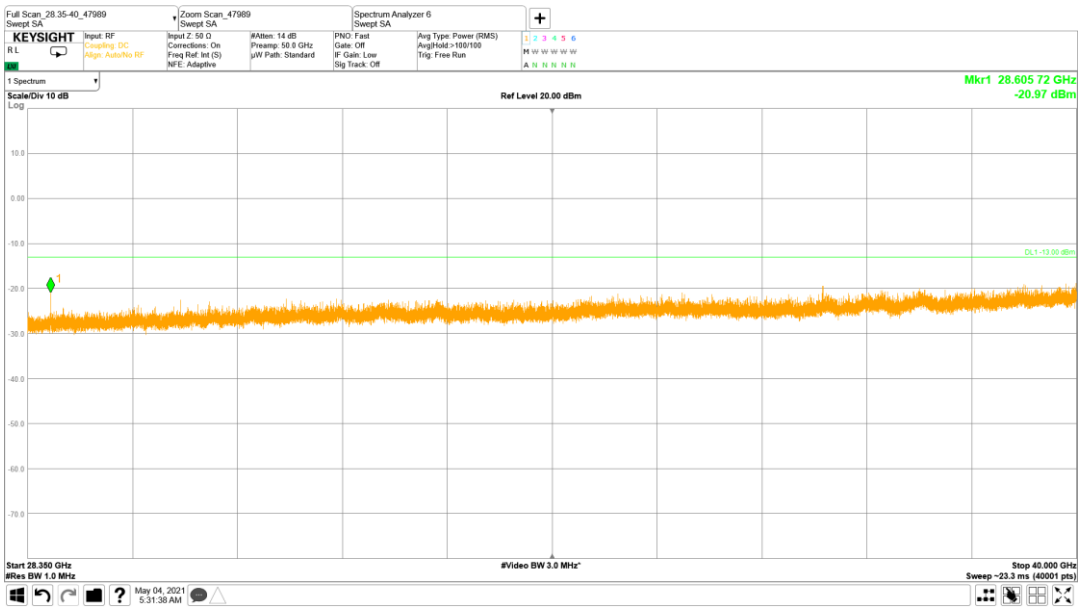
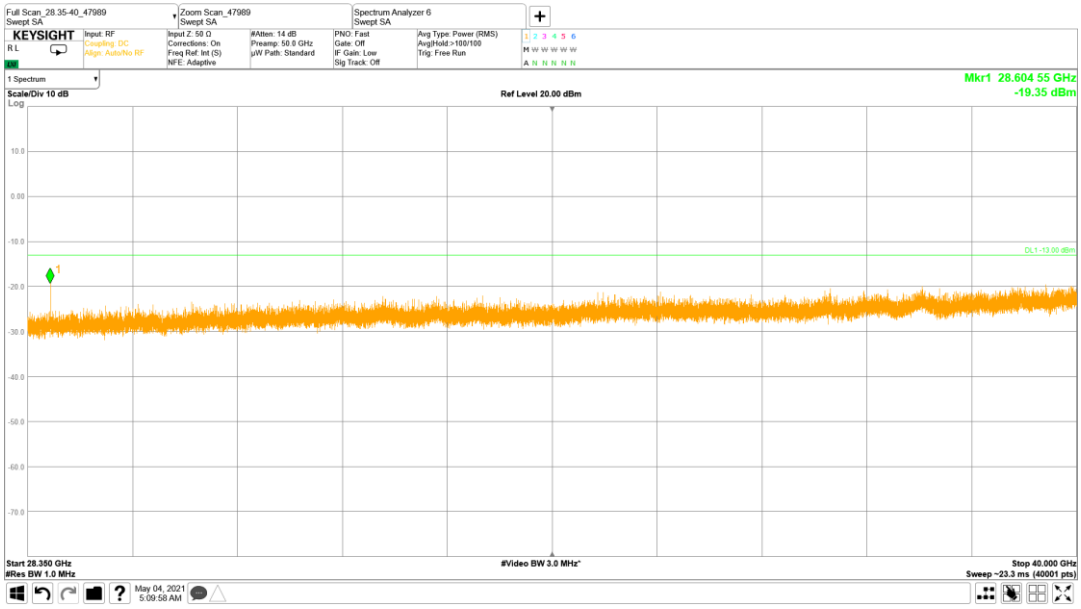
28.35 – 40 GHz Result

M 1 n261 BW 50MHz	 Low Channel / Horizontal
M 1 n261 BW 50MHz	 Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
28605.19	50	SISO-Dual	QPSK	H	344.5	230.7	-24.23	-13	11.23
28605.40	50	SISO-Dual	QPSK	V	205.3	72.8	-19.21	-13	6.21

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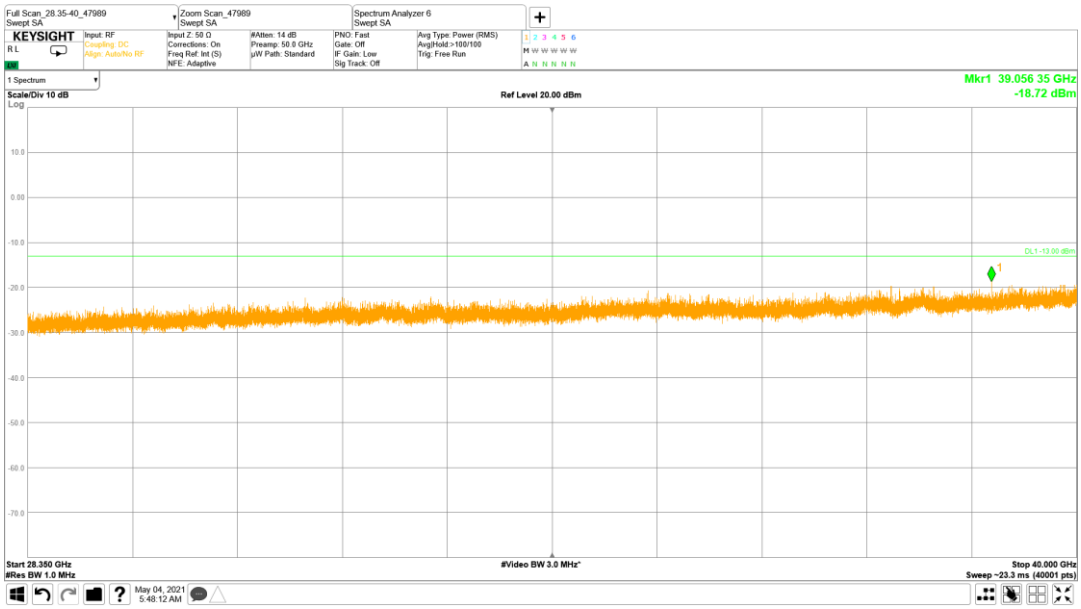
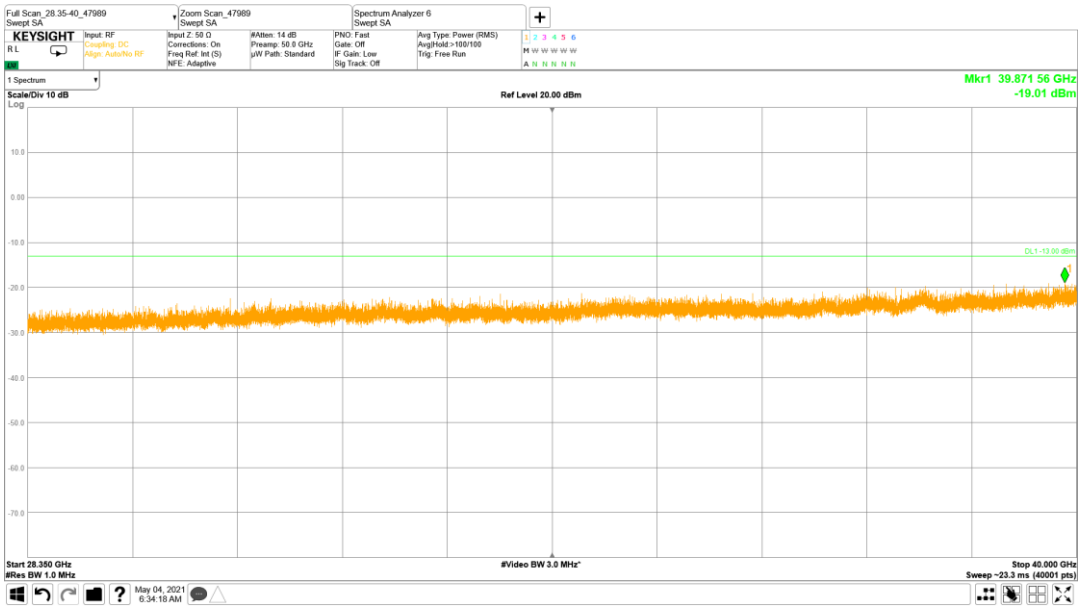
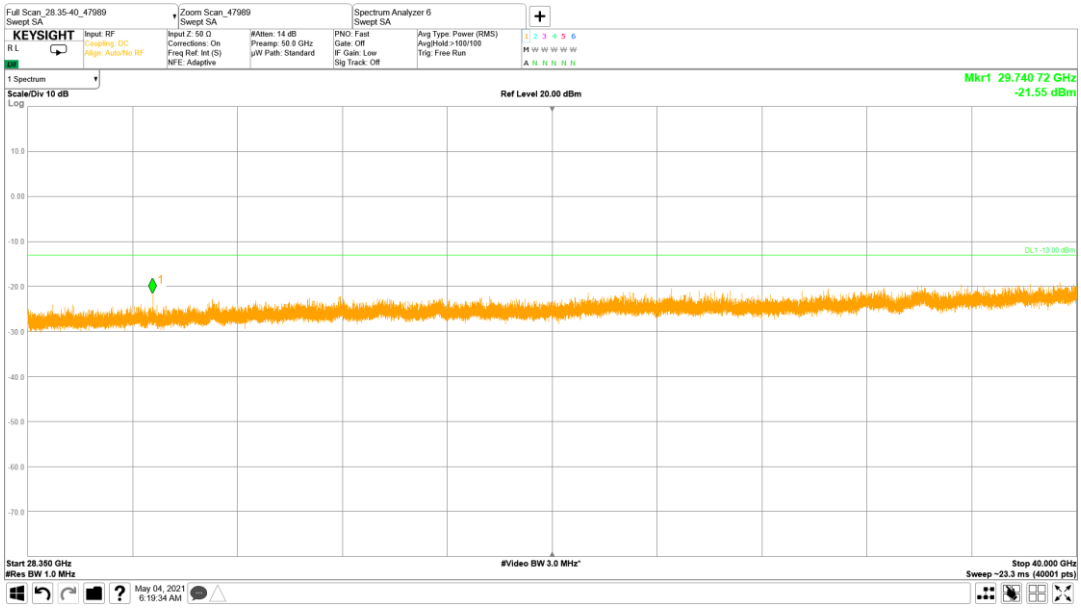
M 1 n261 BW 50MHz	 Mid Channel / Horizontal
M 1 n261 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor.

M 1 n261l BW 50MHz	 High Channel / Horizontal
M 1 n261 BW 50MHz	 High Channel / Vertical

No emissions were detected above noise floor.

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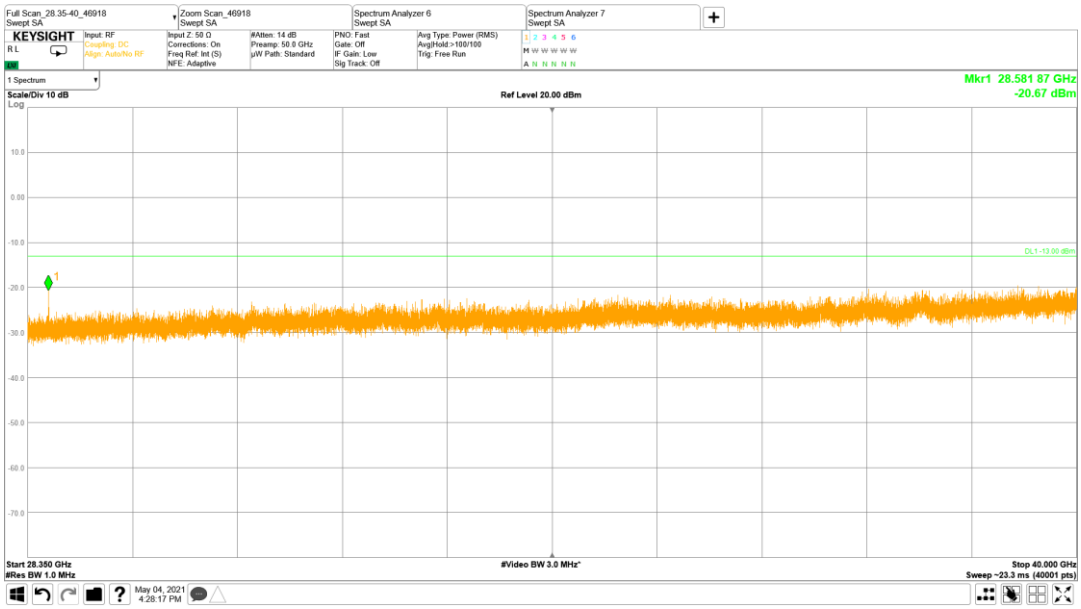
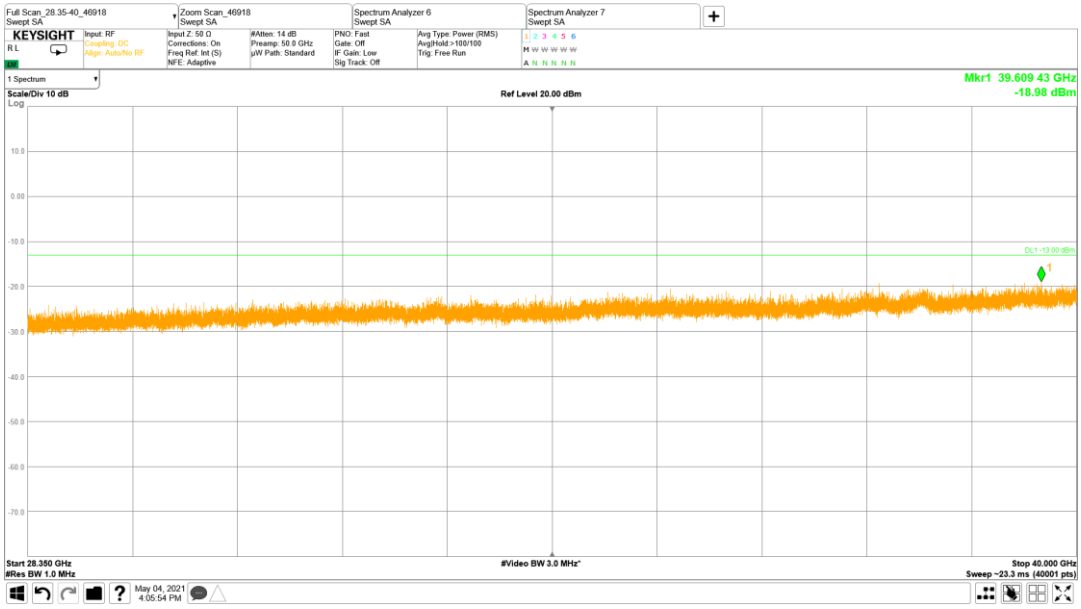
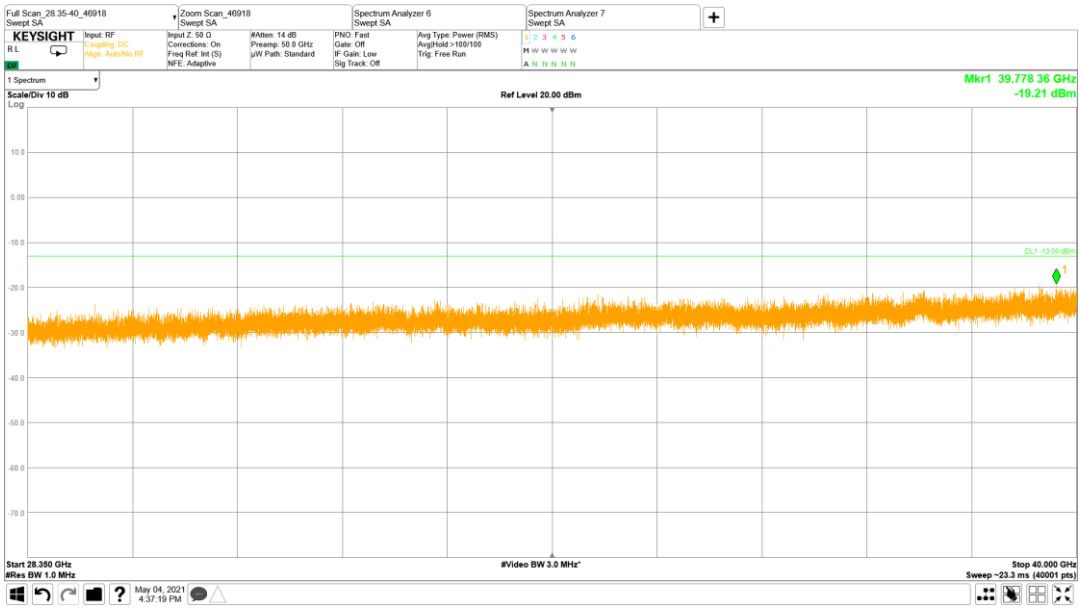
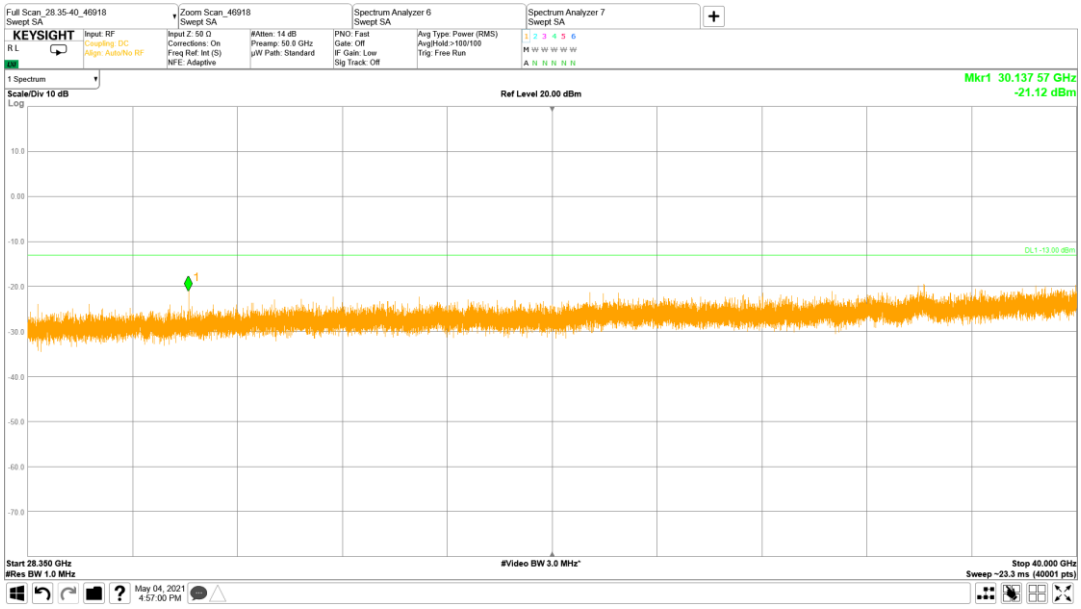
M 1 n261 BW 100MHz	 Low Channel / Horizontal
M 1 n261 BW 100MHz	 Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
28582.21	100	SISO-Dual	QPSK	H	187.0	112.5	-25.47	-13	12.47

M 1 n261 BW 100MHz	 Mid Channel / Horizontal
M 1 n261 BW 100MHz	 Mid Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
30138.06	100	SISO-Dual	QPSK	V	194.8	85.5	-24.84	-13	11.84

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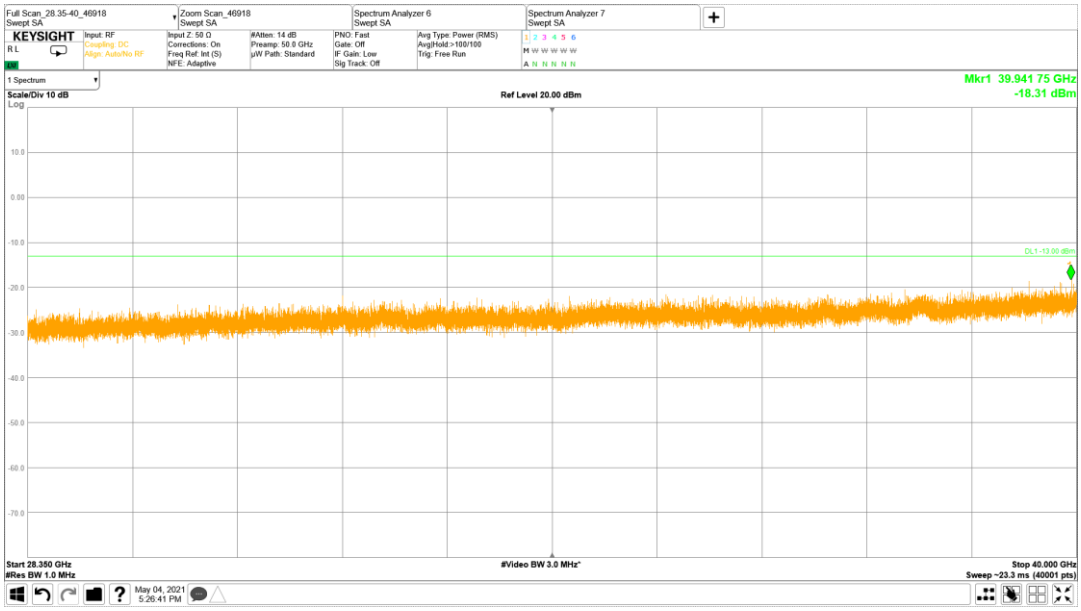
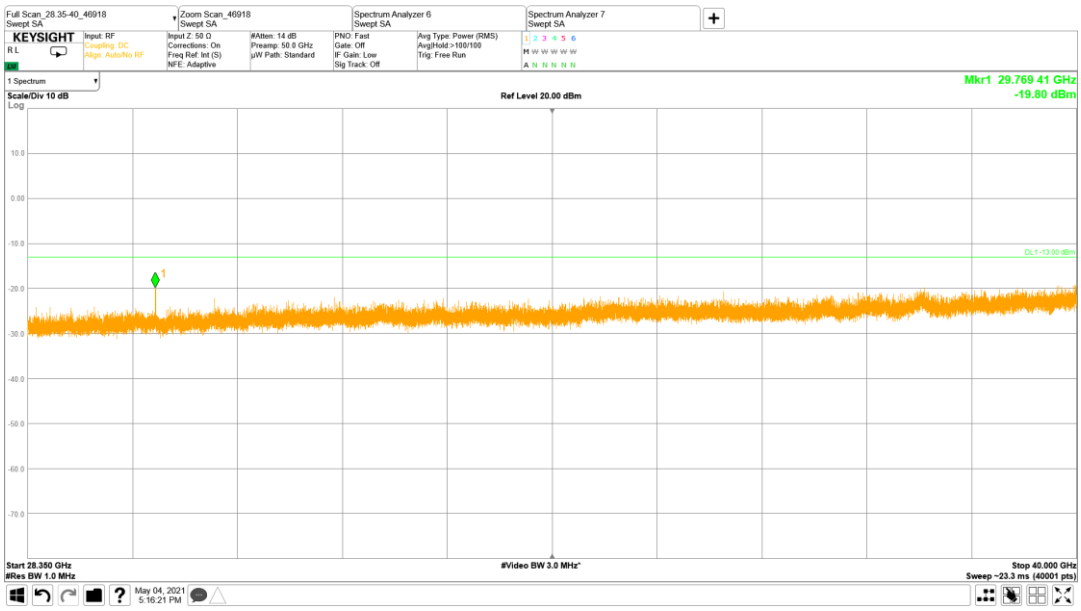
M 1 n261 BW 100MHz	 High Channel / Horizontal
M 1 n261 BW 100MHz	 High Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
29769.38	100	SISO-Dual	QPSK	V	192.0	101.1	-23.51	-13	10.51

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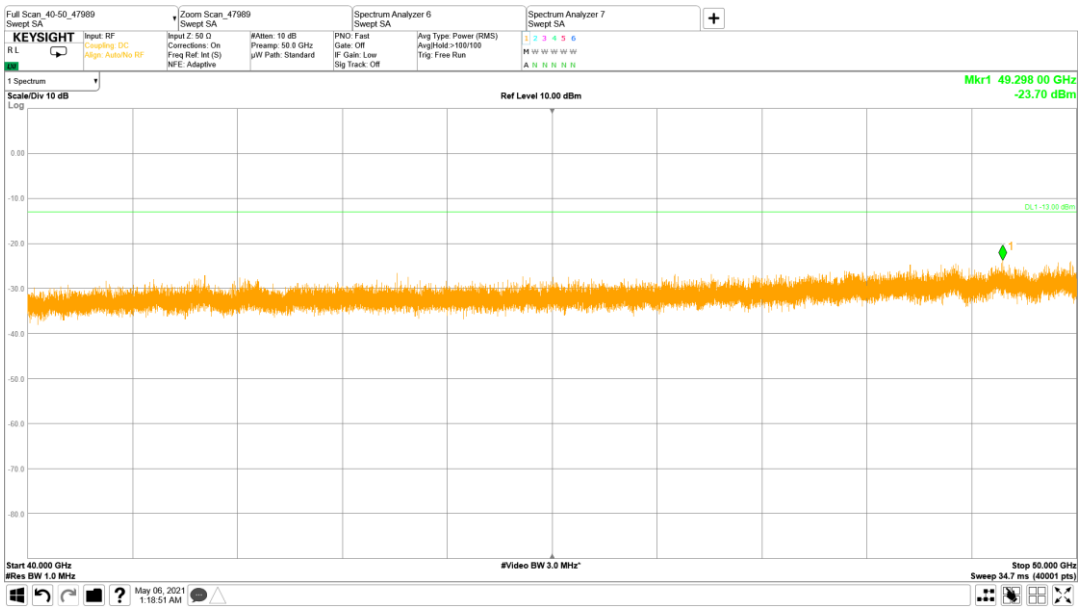
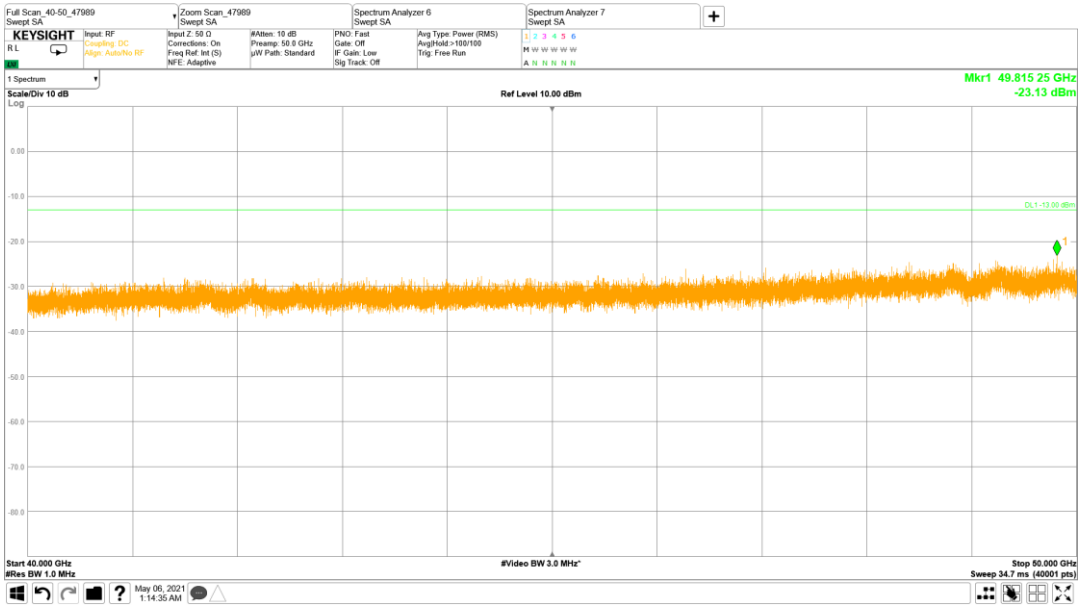
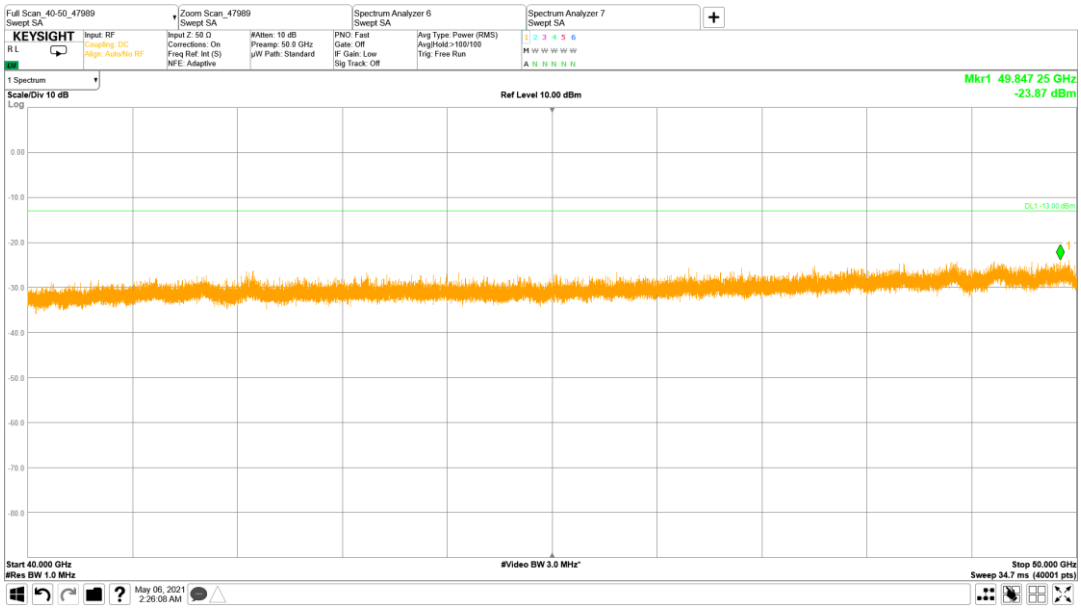
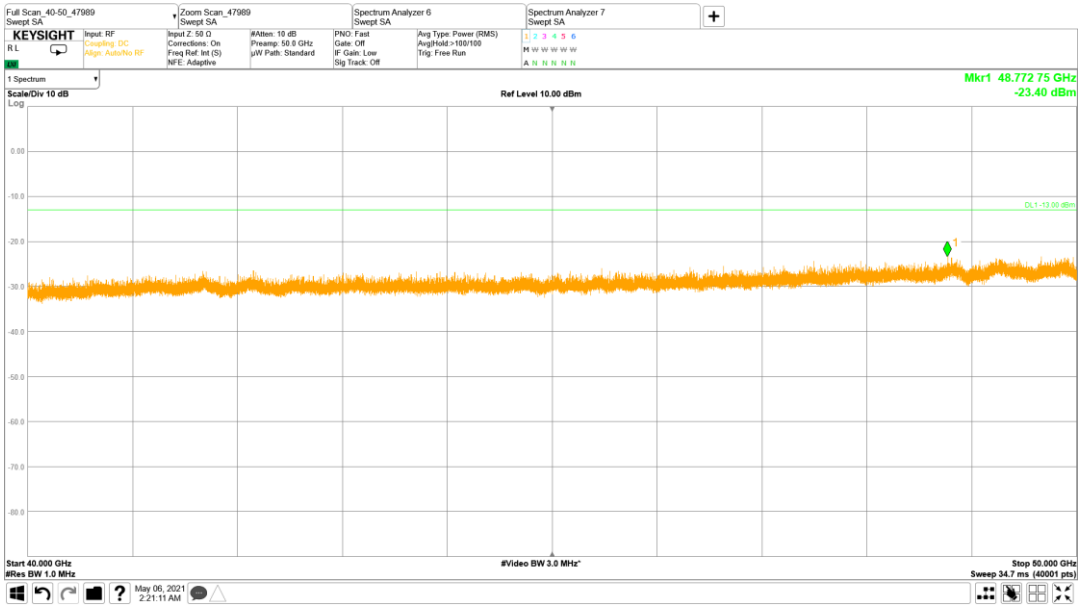
40 – 50 GHz Result

M 1 n261 BW 50MHz	 Mid Channel / Horizontal
M 1 n261 BW 50MHz	 Mid Channel / Vertical

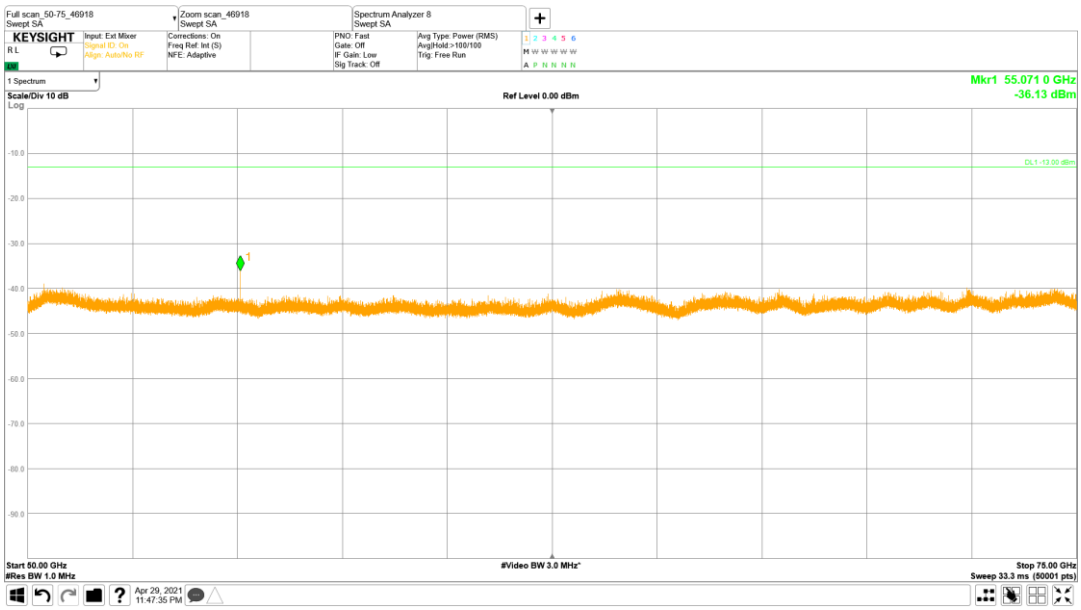
No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

M 1 n261 BW 100MHz	 Mid Channel / Horizontal
M 1 n261 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

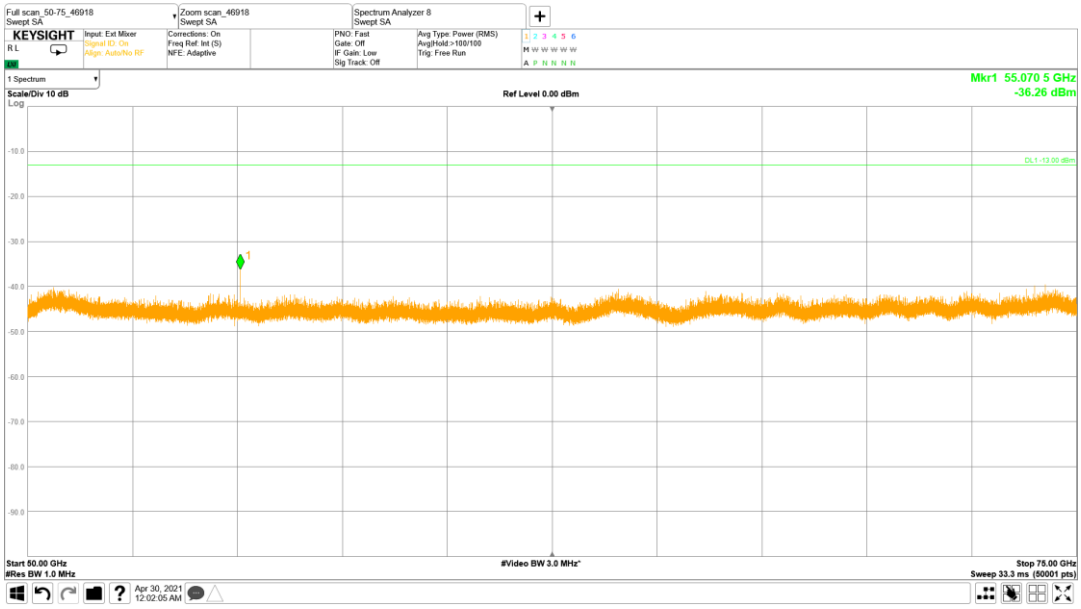
50 – 75 GHz Result

M 1
n261
BW
50MHz



Low Channel / Horizontal

M 1
n261
BW
50MHz



Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
55070.91	50	SISO-Dual	QPSK	H	131.8	124.5	-42.37	-13	29.37
55071.07	50	SISO-Dual	QPSK	V	217.4	135.9	-41.18	-13	28.18

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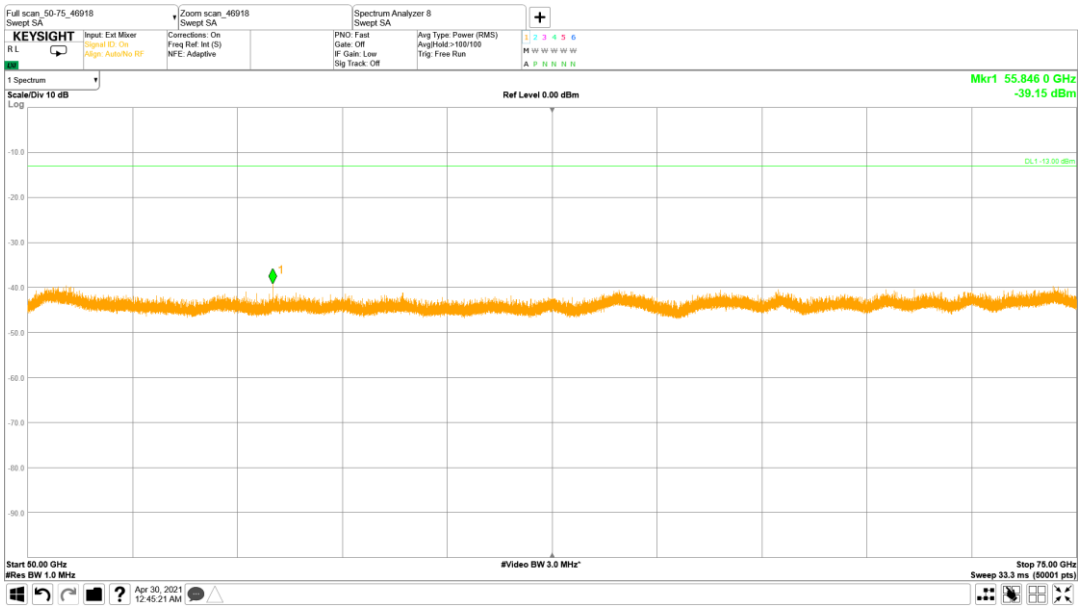
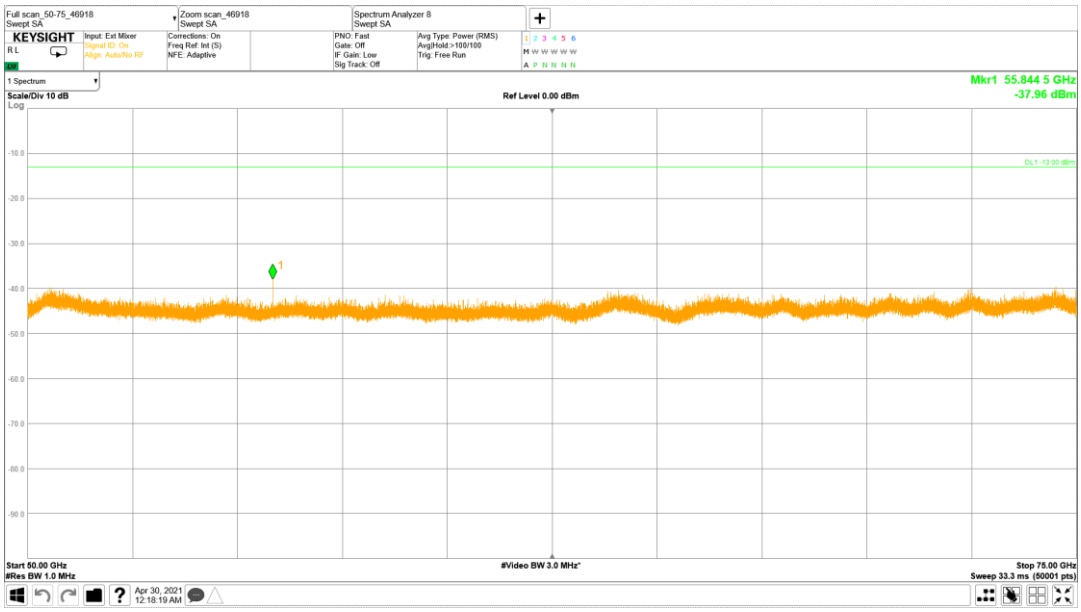
M 1 n261 BW 50MHz	 Mid Channel / Horizontal
M 1 n261 BW 50MHz	 Mid Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
55845.40	50	SISO-Dual	QPSK	H	172.5	167.4	-44.32	-13	31.32
55845.27	50	SISO-Dual	QPSK	V	216.3	130.2	-44.80	-13	31.80

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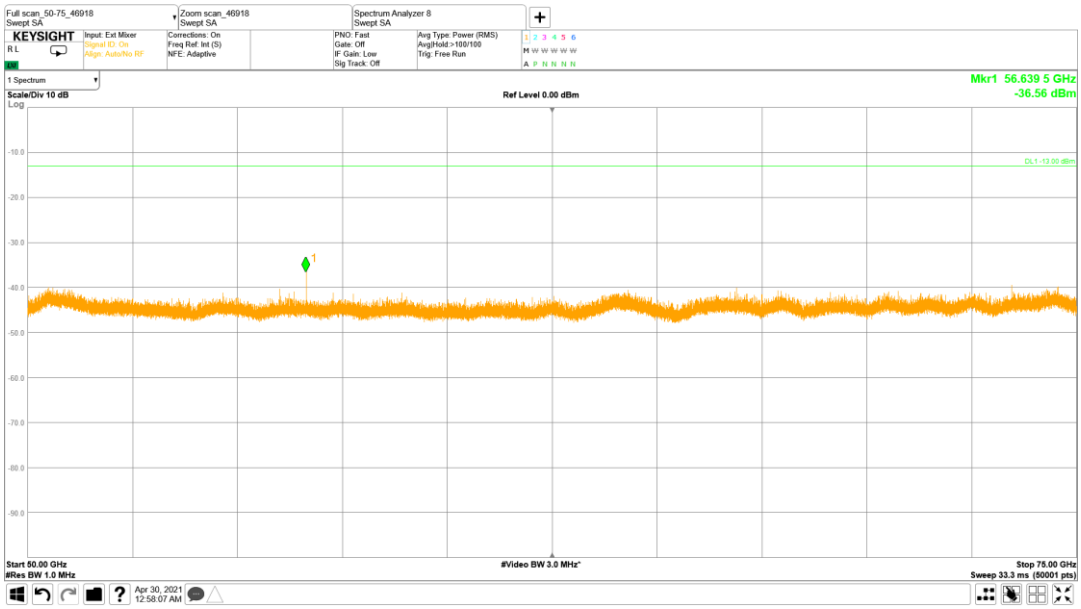
M 1 n261 BW 50MHz	 High Channel / Horizontal
M 1 n261 BW 50MHz	 High Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
56640.23	50	SISO-Dual	QPSK	H	148.0	33.3	-41.89	-13	28.89
56640.20	50	SISO-Dual	QPSK	V	244.0	82.5	-38.89	-13	25.89

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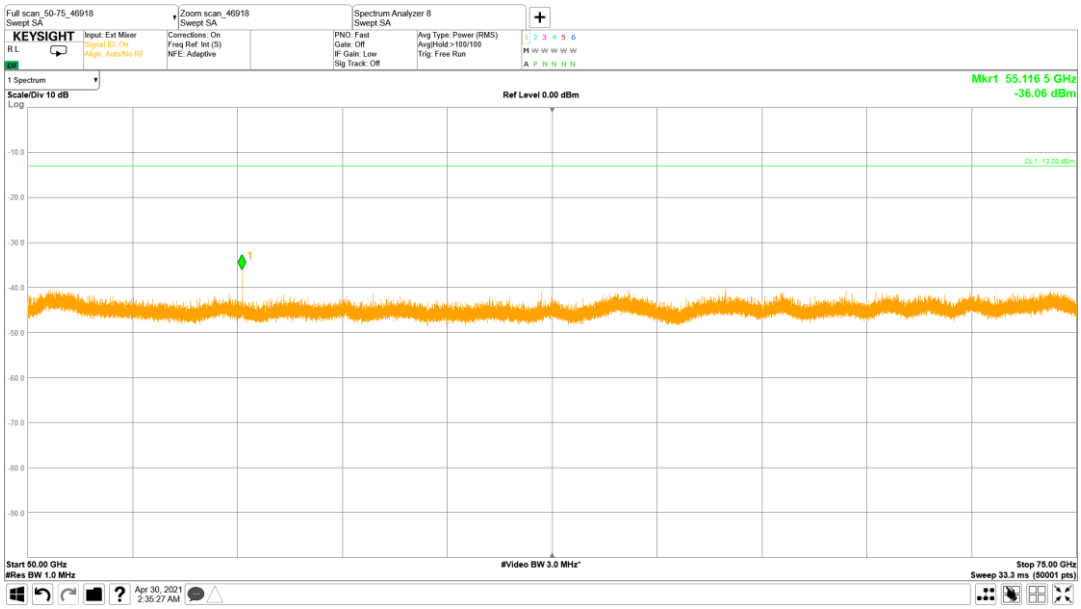
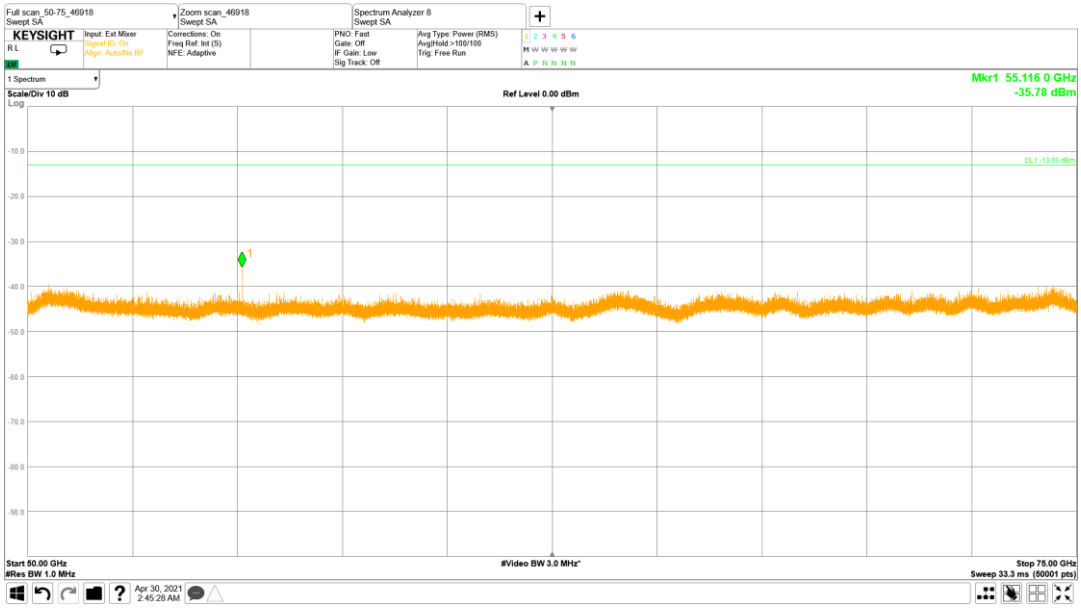
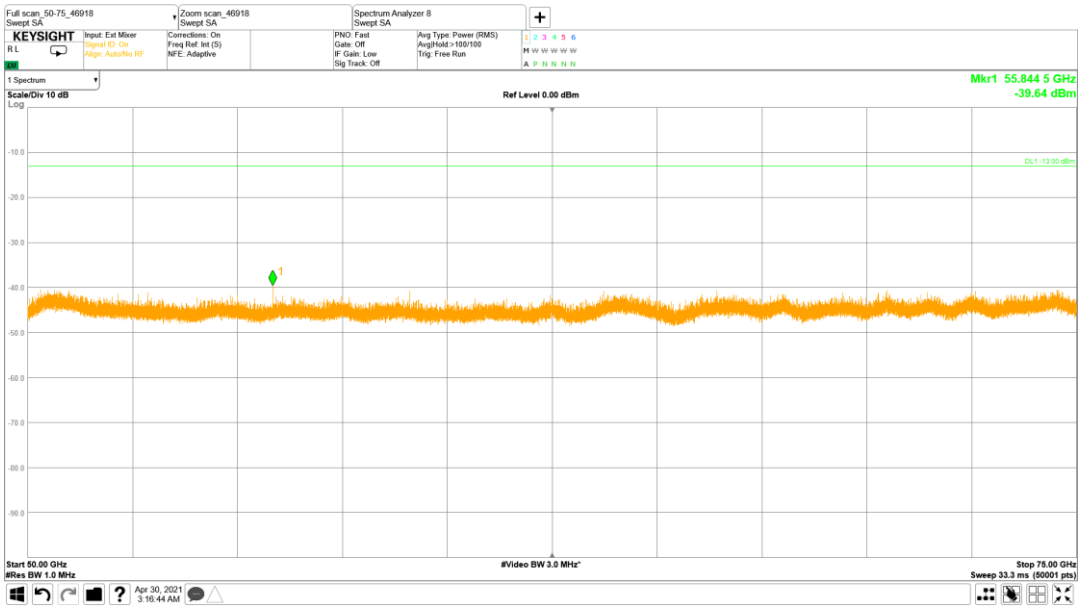
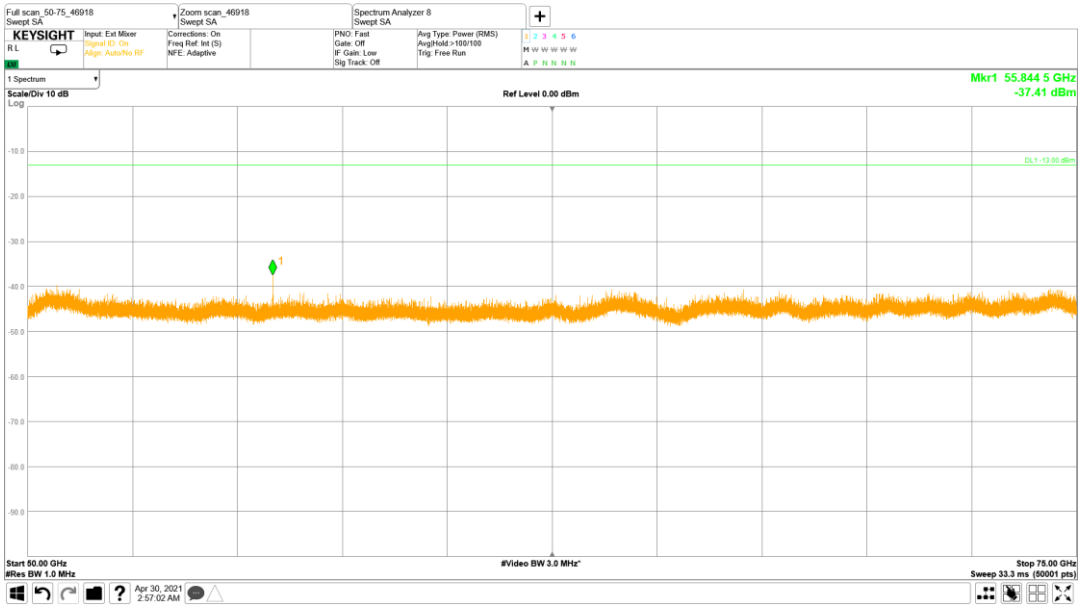
M 1 n261 BW 100MHz	 Low Channel / Horizontal
M 1 n261 BW 100MHz	 Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
55116.96	100	SISO-Dual	QPSK	H	310.2	217.2	-41.76	-13	28.76
55116.94	100	SISO-Dual	QPSK	V	297.9	278.0	-40.32	-13	27.32

M 1 n261 BW 100MHz	 Mid Channel / Horizontal
M 1 n261 BW 100MHz	 Mid Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
55844.85	100	SISO-Dual	QPSK	H	336.4	268.3	-45.25	-13	32.25
55845.39	100	SISO-Dual	QPSK	V	295.5	243.6	-42.72	-13	29.72

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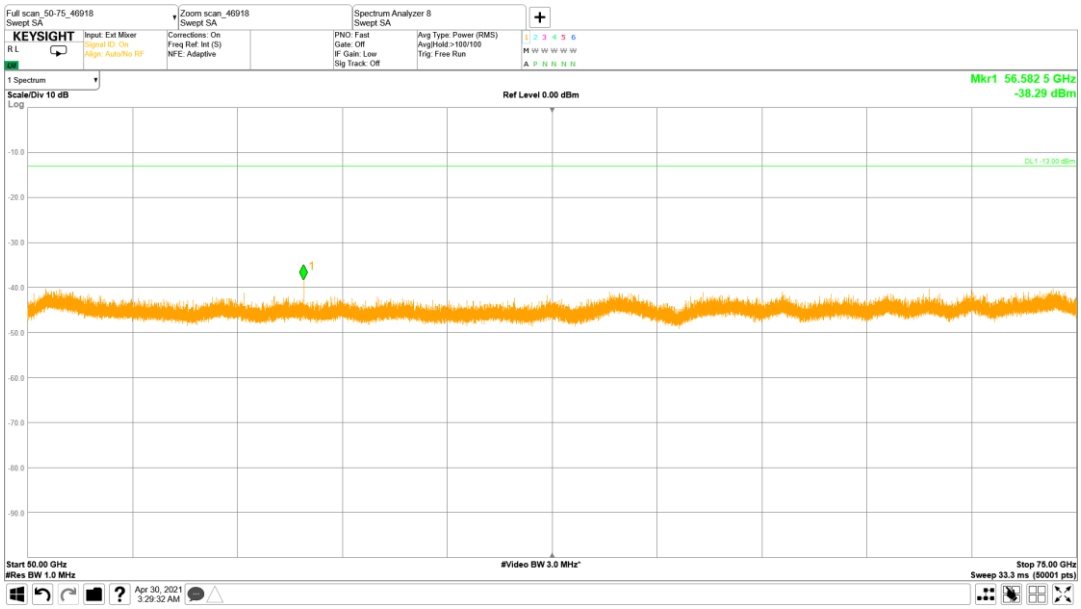
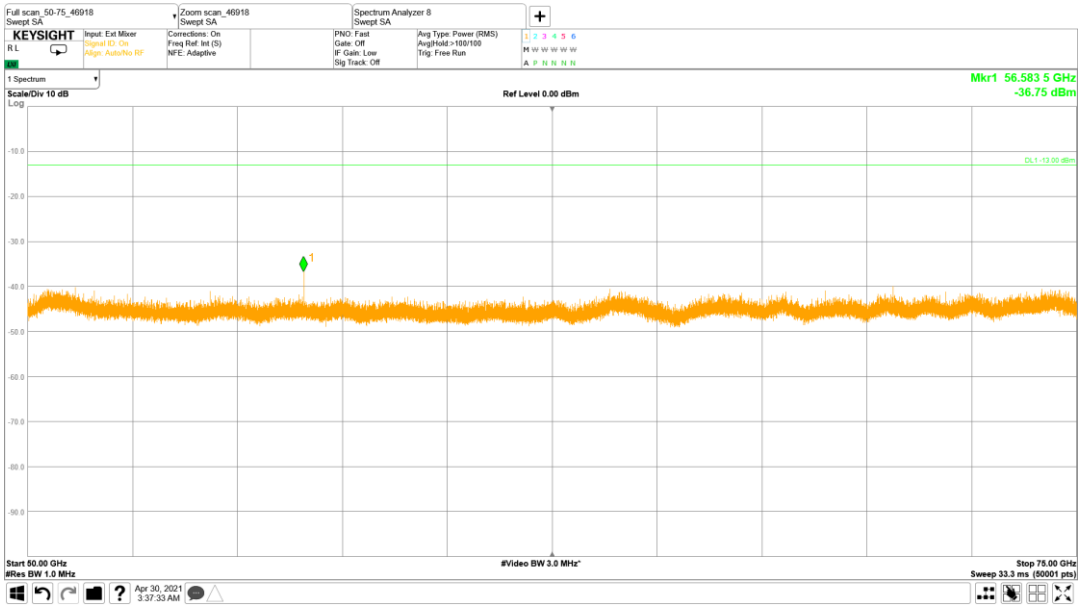
M 1 n261 BW 100MHz	 High Channel / Horizontal
M 1 n261 BW 100MHz	 High Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
56582.30	100	SISO-Dual	QPSK	H	334.5	284.4	-43.50	-13	30.50
56582.74	100	SISO-Dual	QPSK	V	296.8	265.7	-41.13	-13	28.13

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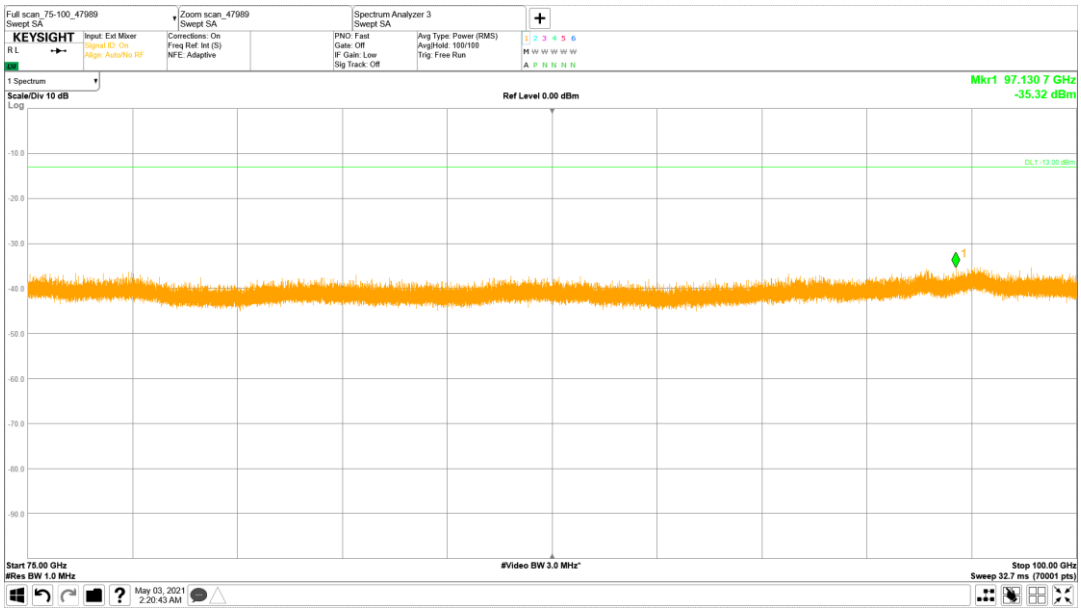
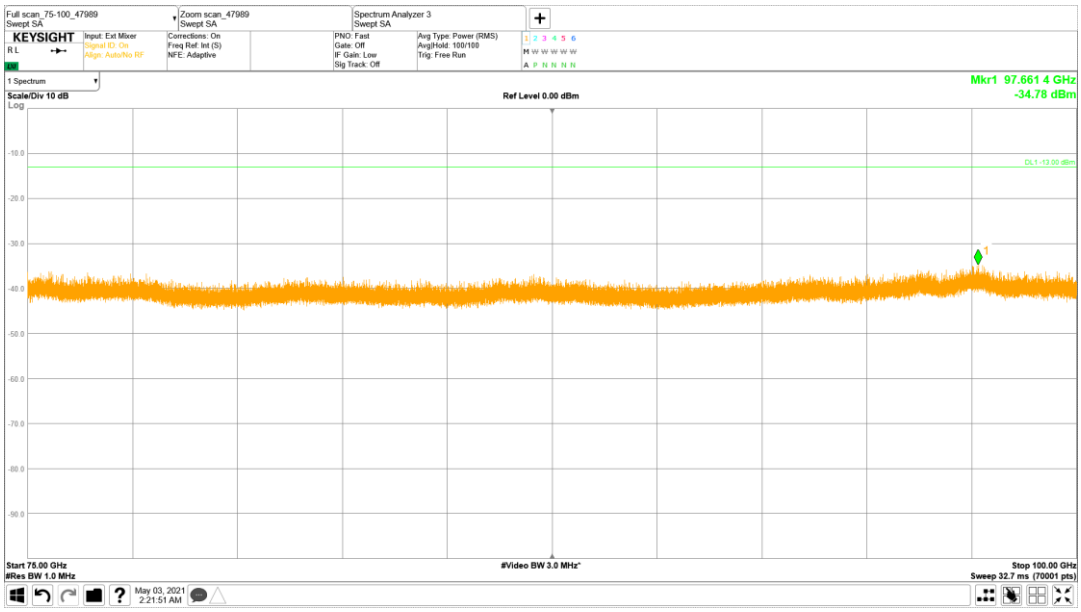
75 – 100 GHz Result

M 1 n261 BW 50MHz	 Mid Channel / Horizontal
M 1 n261 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

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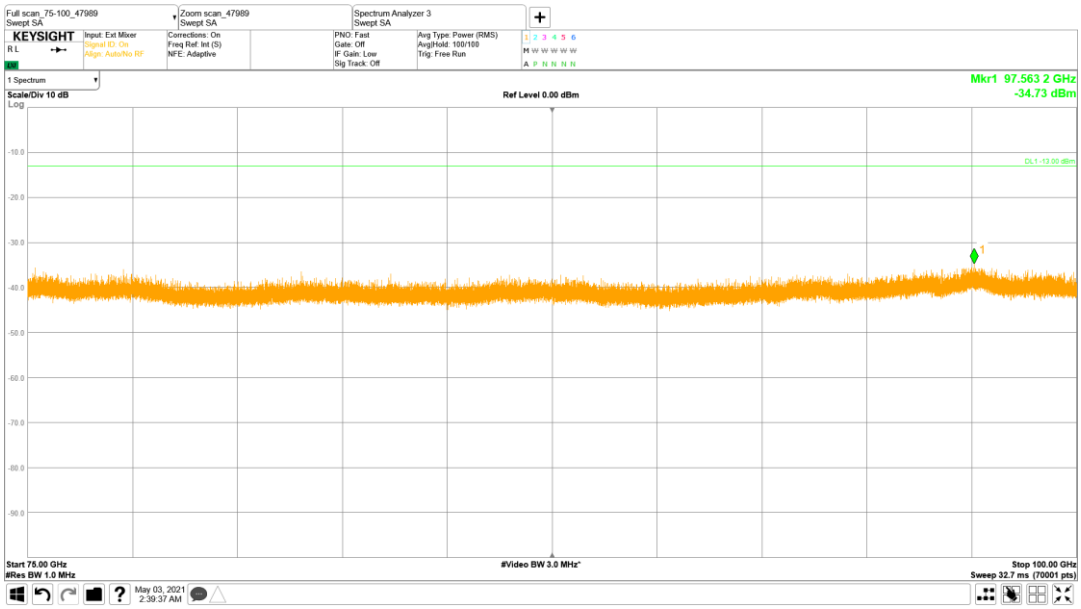
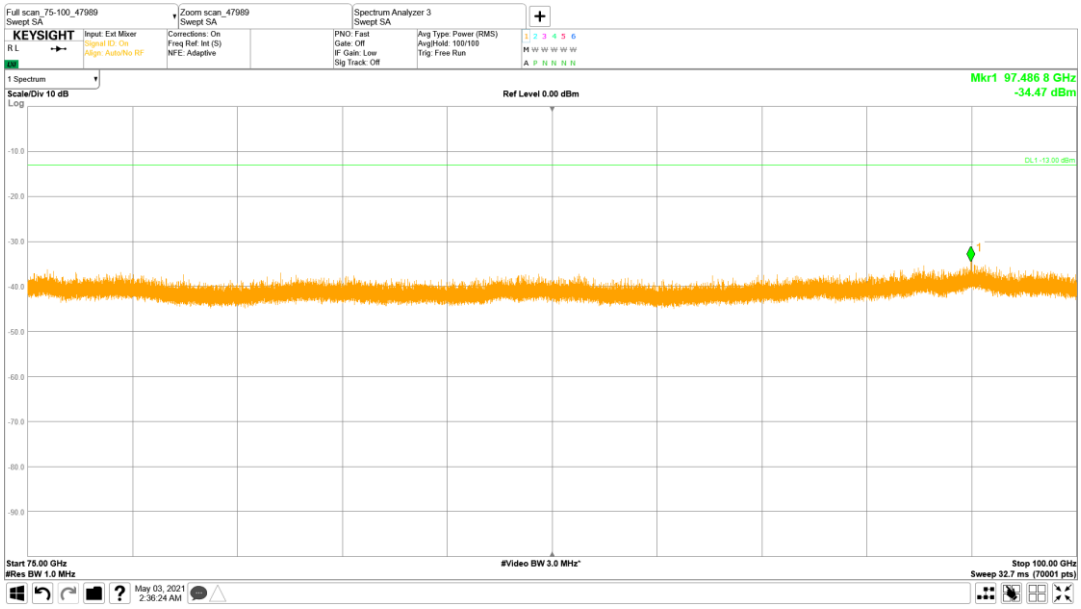
M 1 n261 BW 100MHz	 Mid Channel / Horizontal
M 1 n261 BW 100MHz	 Mid Channel / Vertical

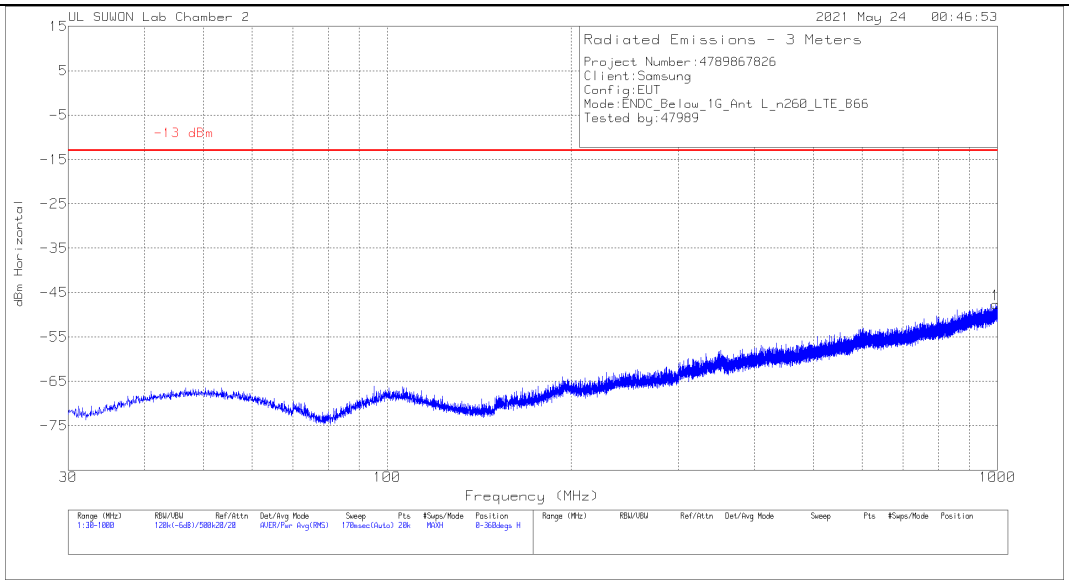
No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

Module 1 / n260

30 – 1000 MHz Result

M 1

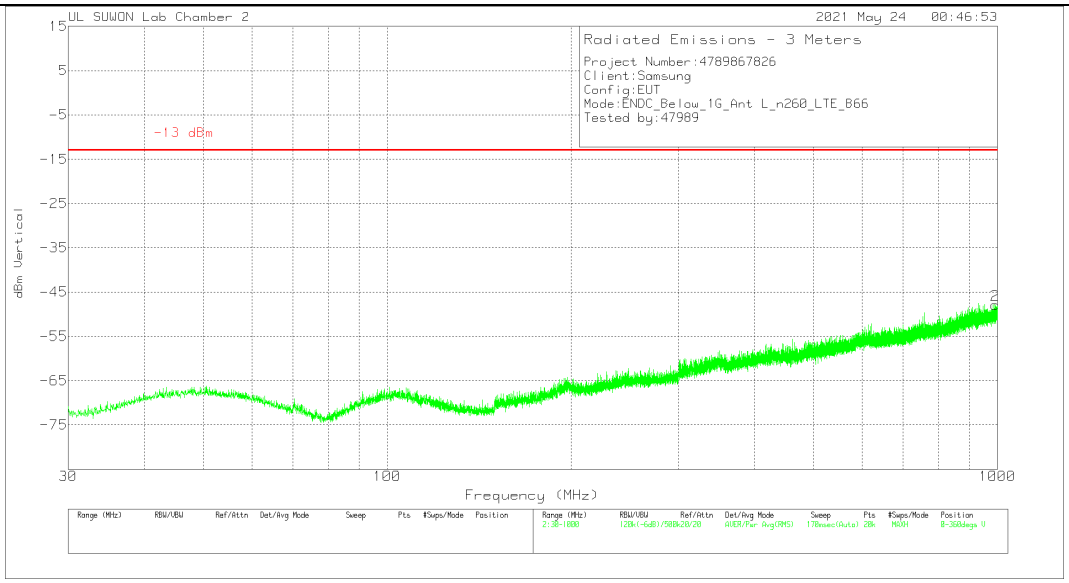
n260



Mid Channel / Horizontal

M 1

n260



Mid Channel / Vertical

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	VULB9163_749	Below 1G[dB]	Conversion Factor[dB]	Corrected Reading dBm	-13 dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	993.3643	-60.8	RMS	28.4	-27.1	11.8	-47.7	-	-	0-360	400	H
2	991.7638	-60.78	RMS	28.3	-27.2	11.8	-47.88	-	-	0-360	300	V

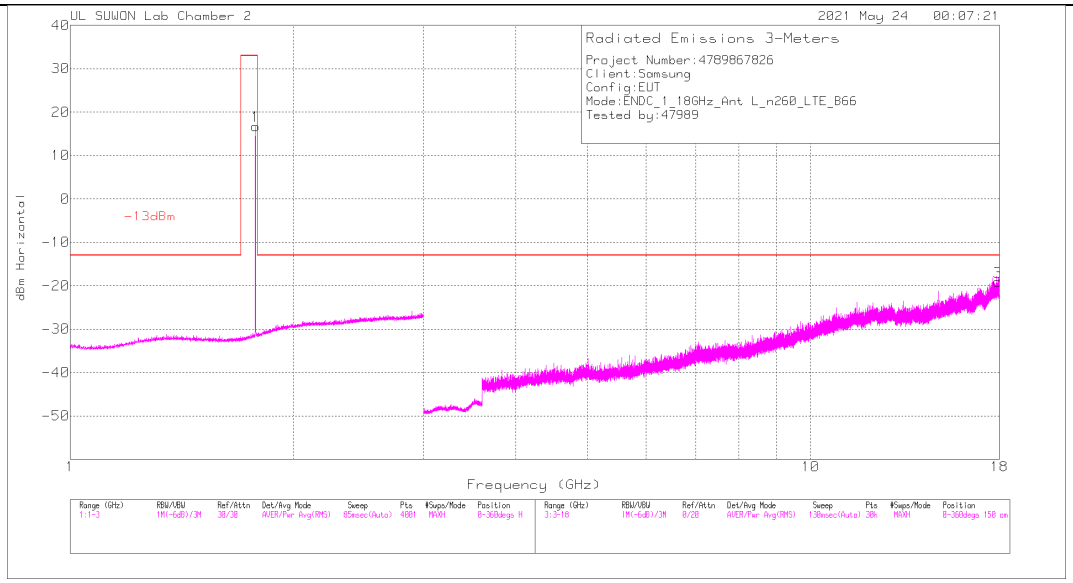
RMS - RMS detection

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

1 – 18 GHz Result

M 1

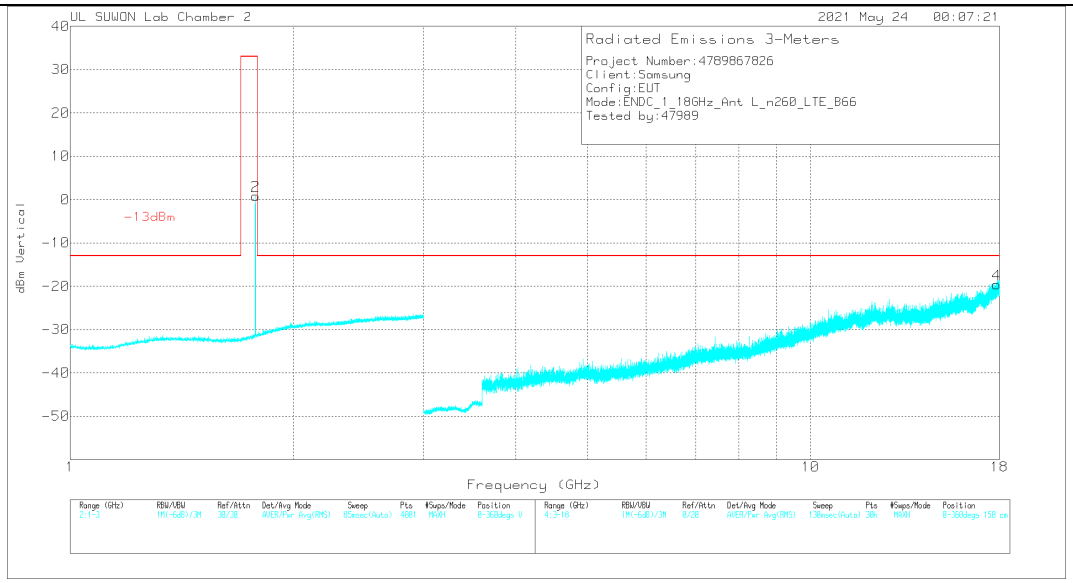
n260



Mid Channel / Horizontal

M 1

n260



Mid Channel / Vertical

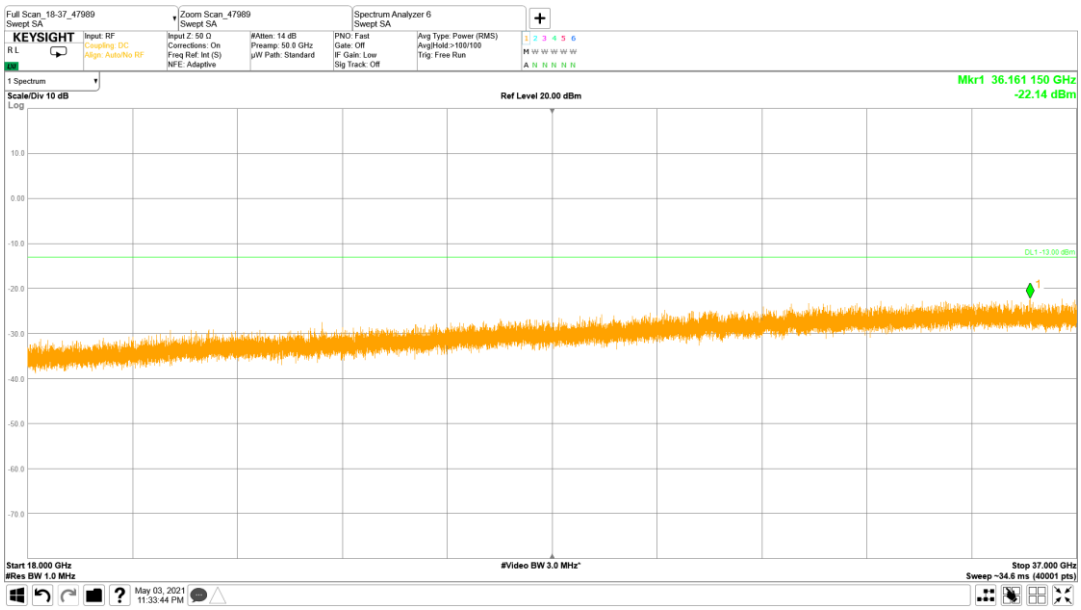
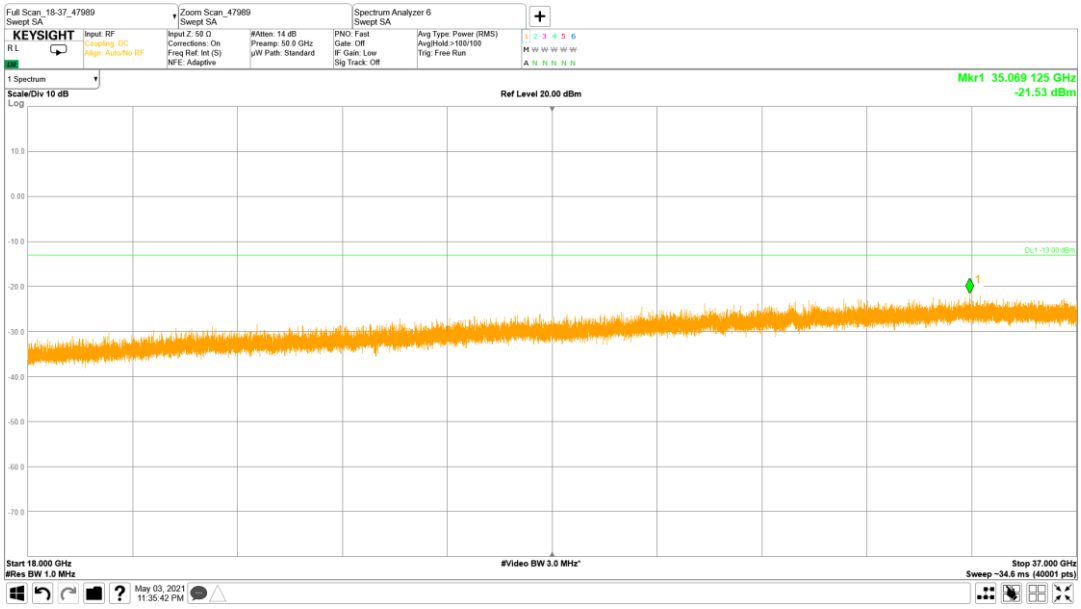
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	10dB ATT[dB]	Conversion Factor[dB]	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
**1	1.779	-3.12	RMS	29.6	-21.5	11.8	16.78	33	-16.22	0-360	150	H
**2	1.779	-19.05	RMS	29.6	-21.5	11.8	.85	33	-32.15	0-360	150	V
3	17.90049	-64.2	RMS	41.7	-8.4	11.8	-19.1	-13	-6.1	0-360	150	H
4	17.84	-64.77	RMS	41.7	-8.3	11.8	-19.57	-13	-6.57	0-360	150	V

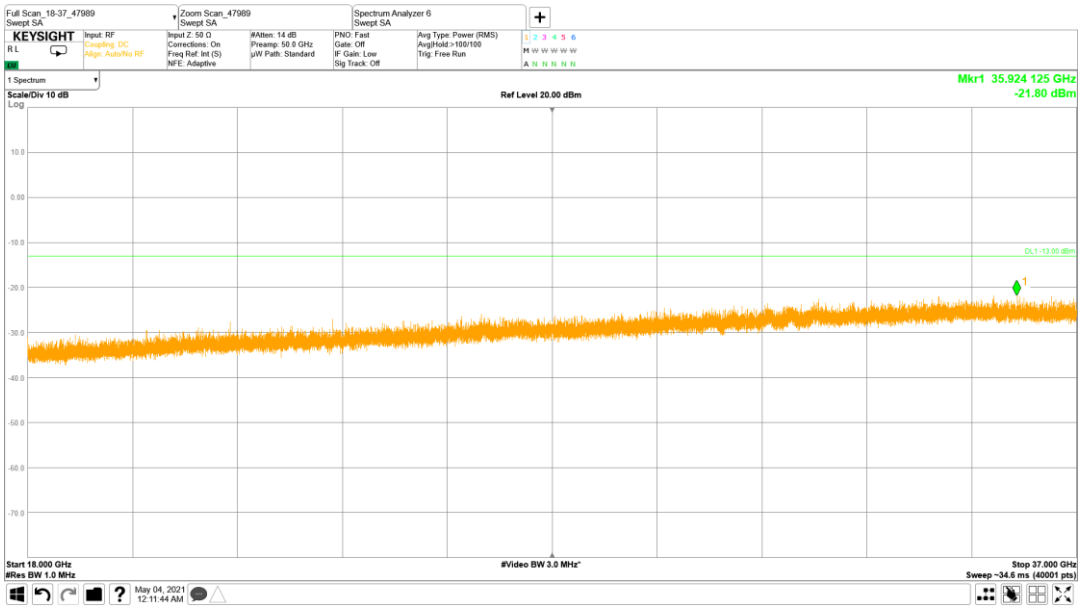
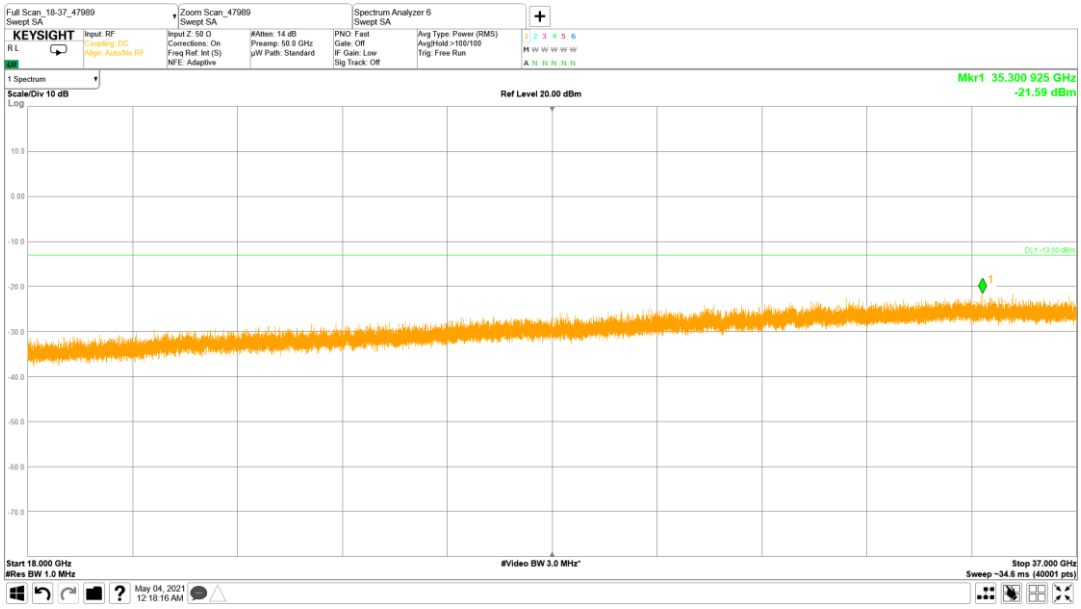
RMS - RMS detection

** Marker 1 and 2 were the fundamental signal of LTE Band 66 that was used as a representative anchor band for EN-DC investigations.
No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

18 – 37 GHz Result

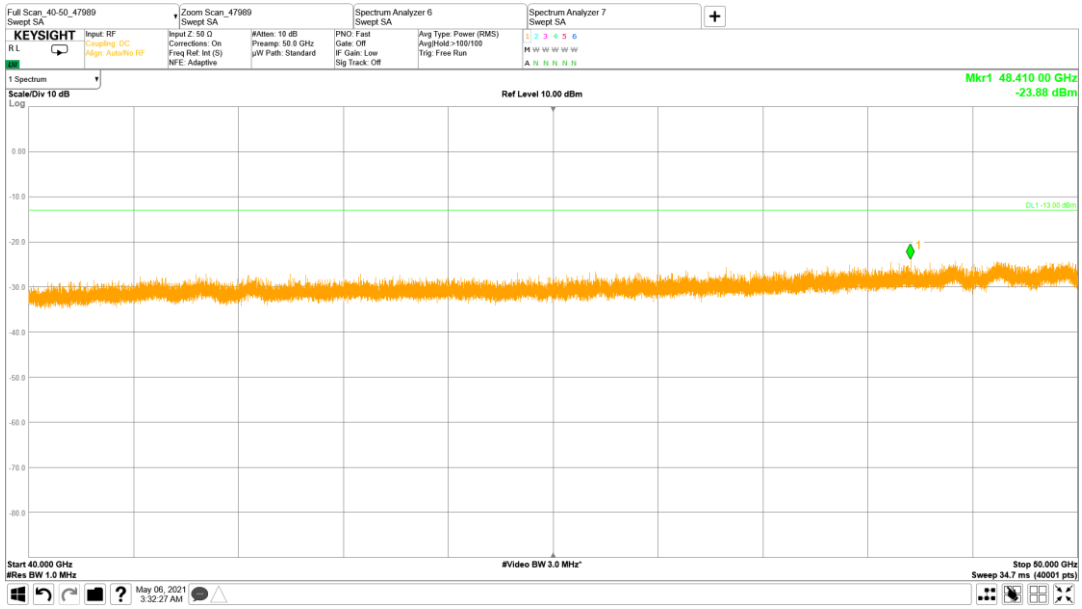
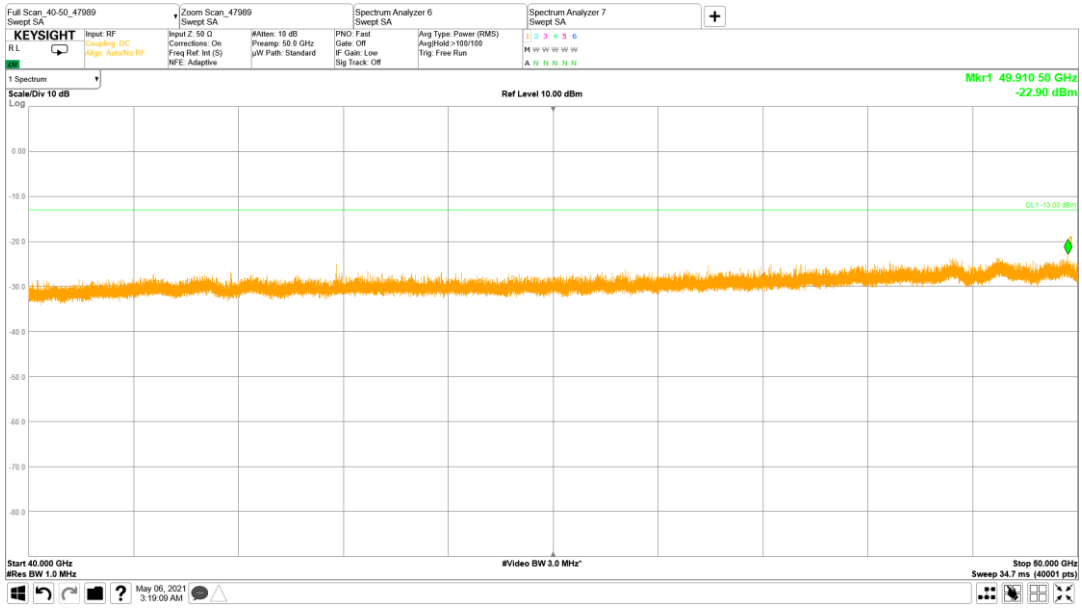
M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

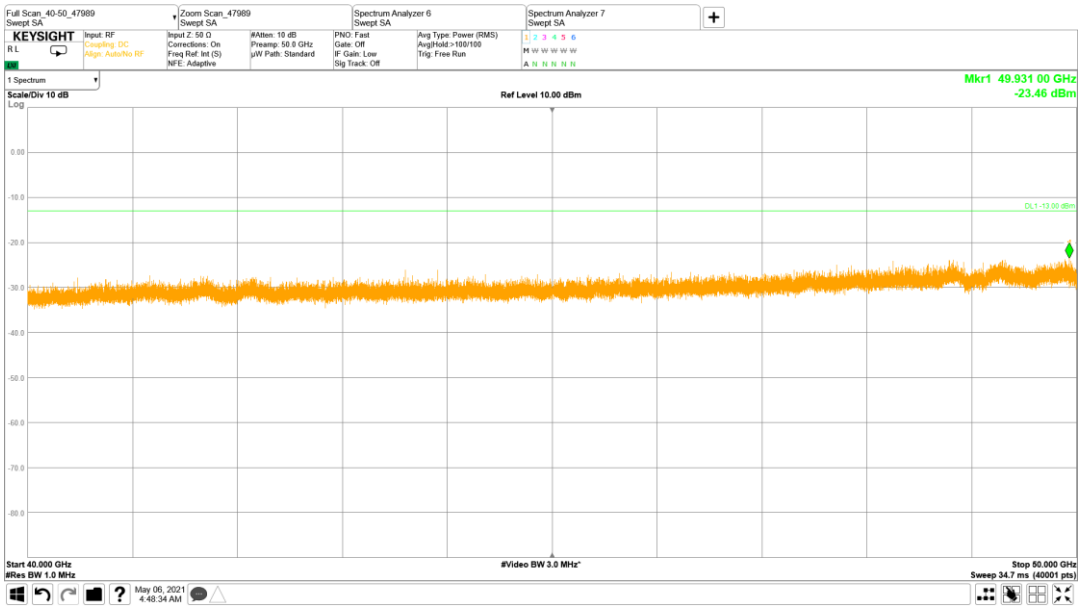
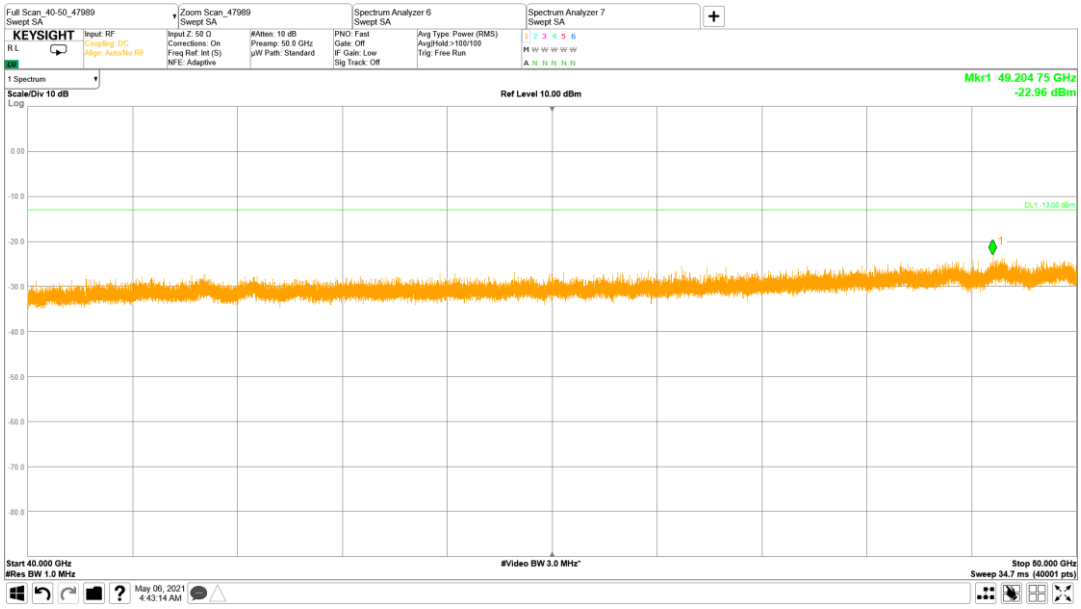
M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

40 – 50 GHz Result

M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

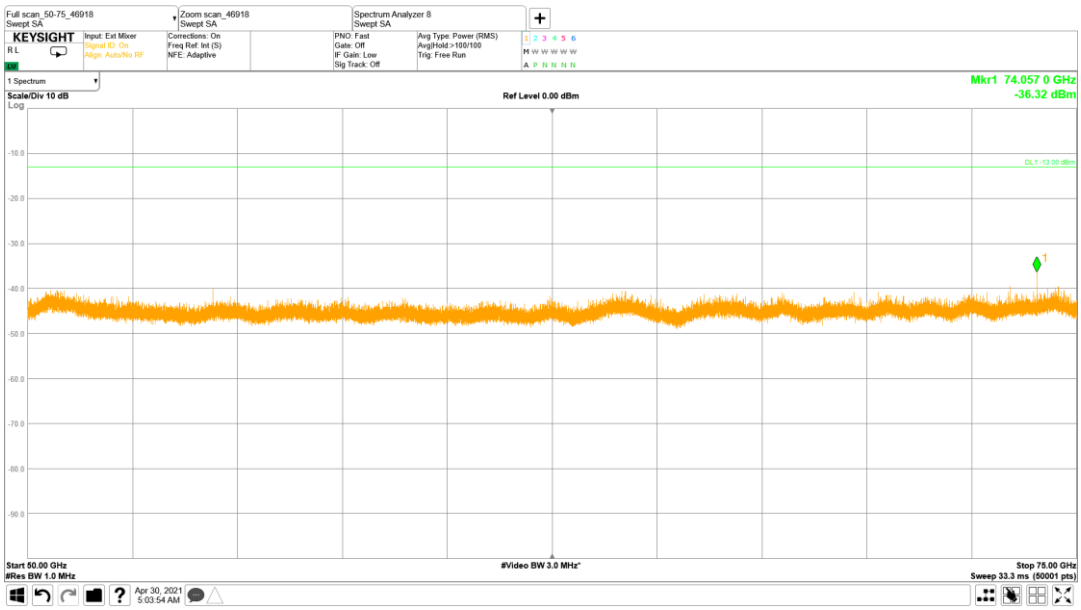
No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

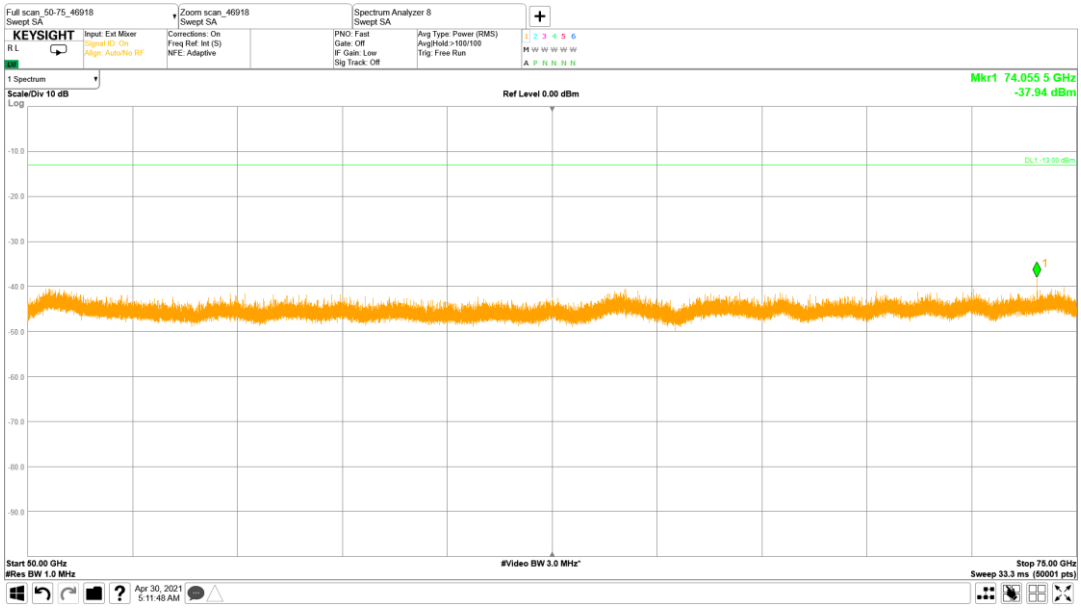
50 – 75 GHz Result

M 1
n260
BW
50MHz



Low Channel / Horizontal

M 1
n260
BW
50MHz



Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
74055.71	50	SISO-Dual	QPSK	H	128.5	86.2	-40.54	-13	27.54
74055.80	50	SISO-Dual	QPSK	V	127.7	81.7	-41.23	-13	28.23

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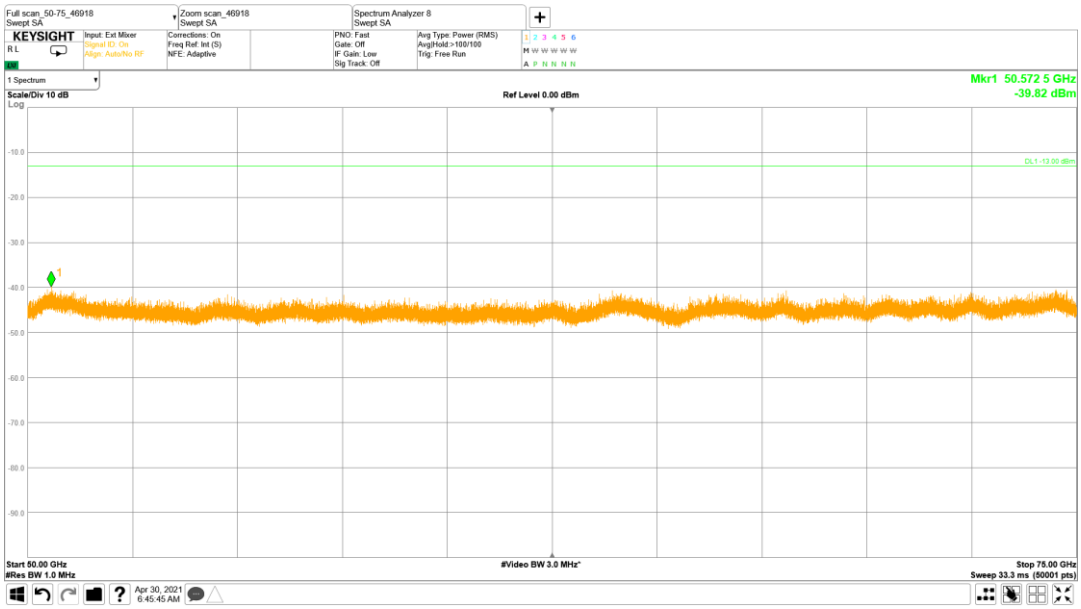
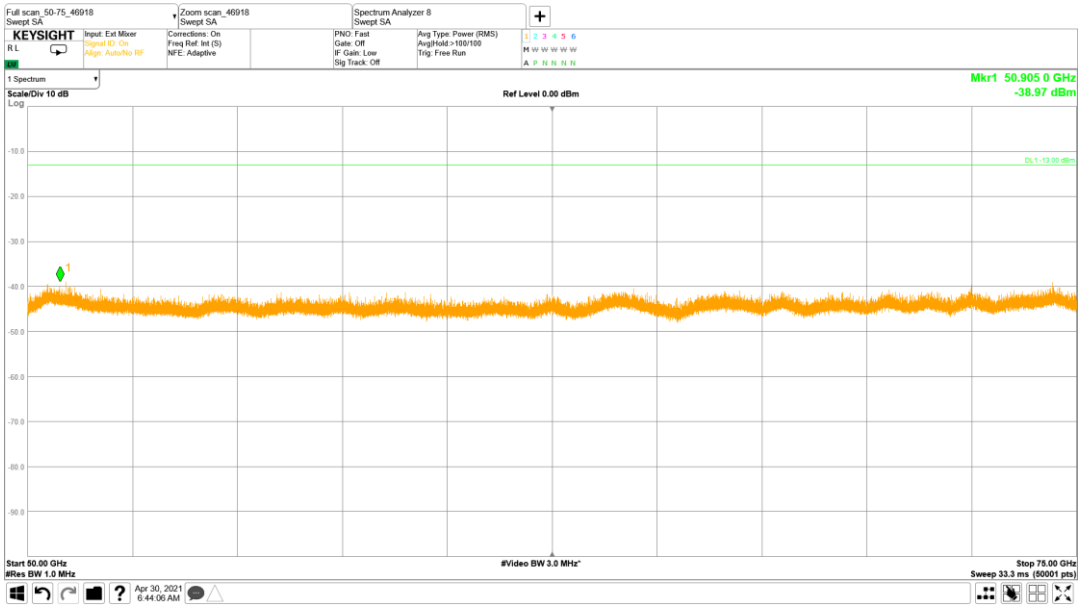
M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor.

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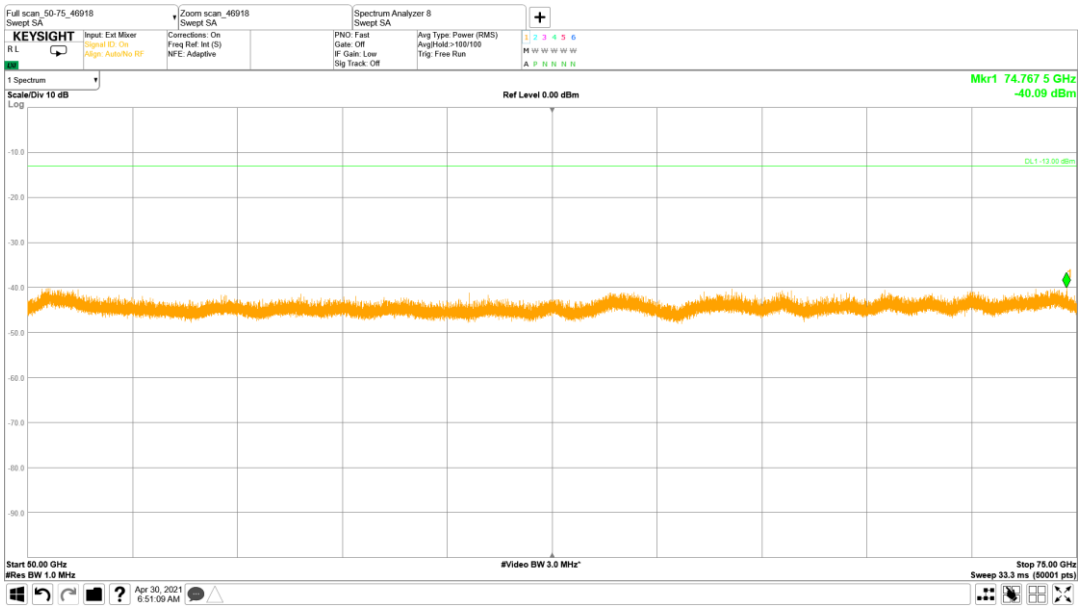
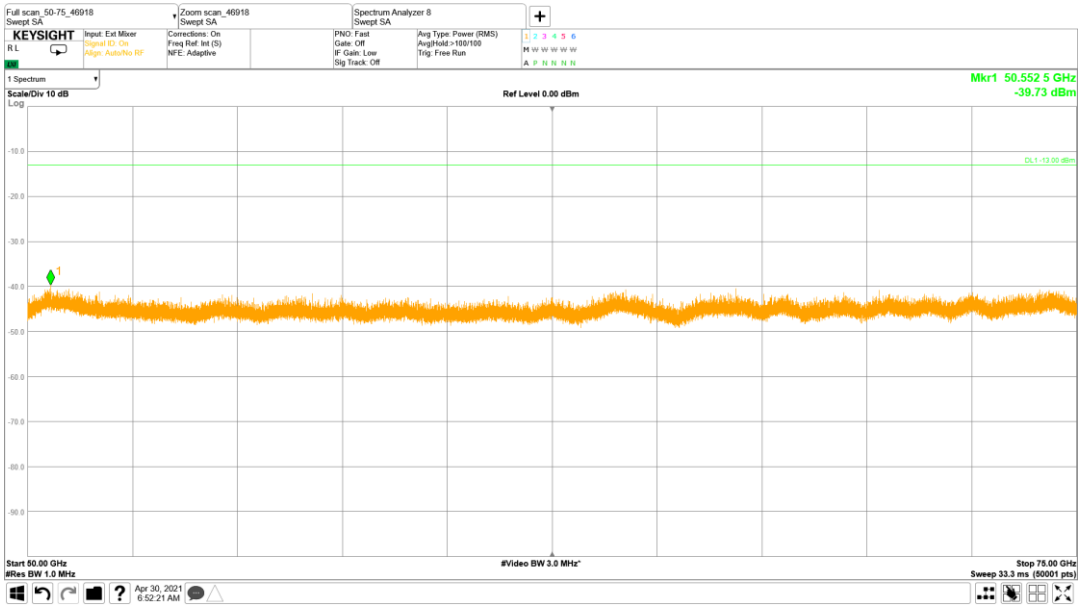
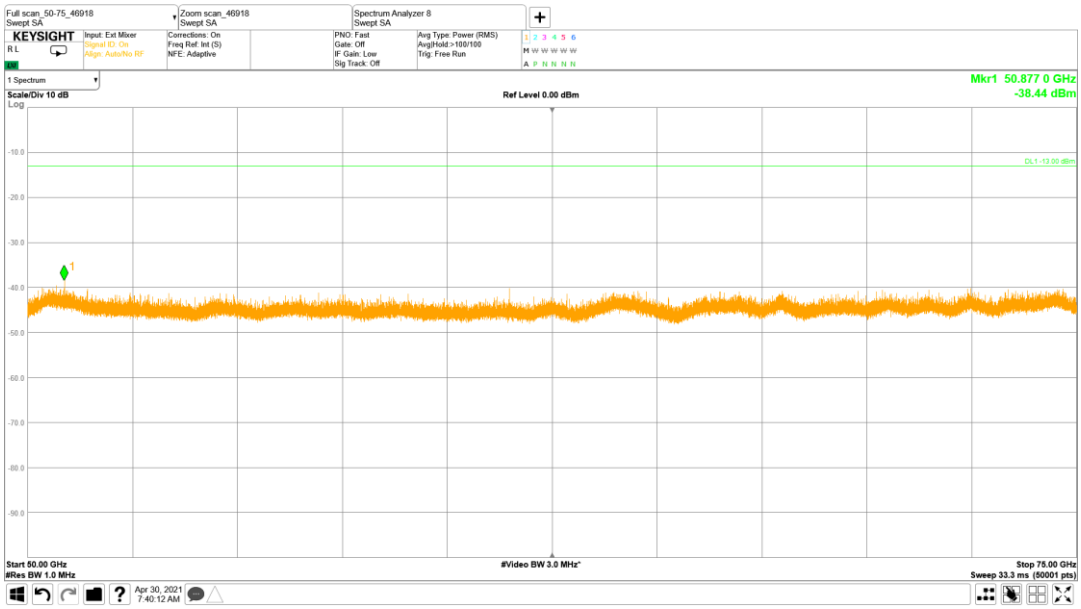
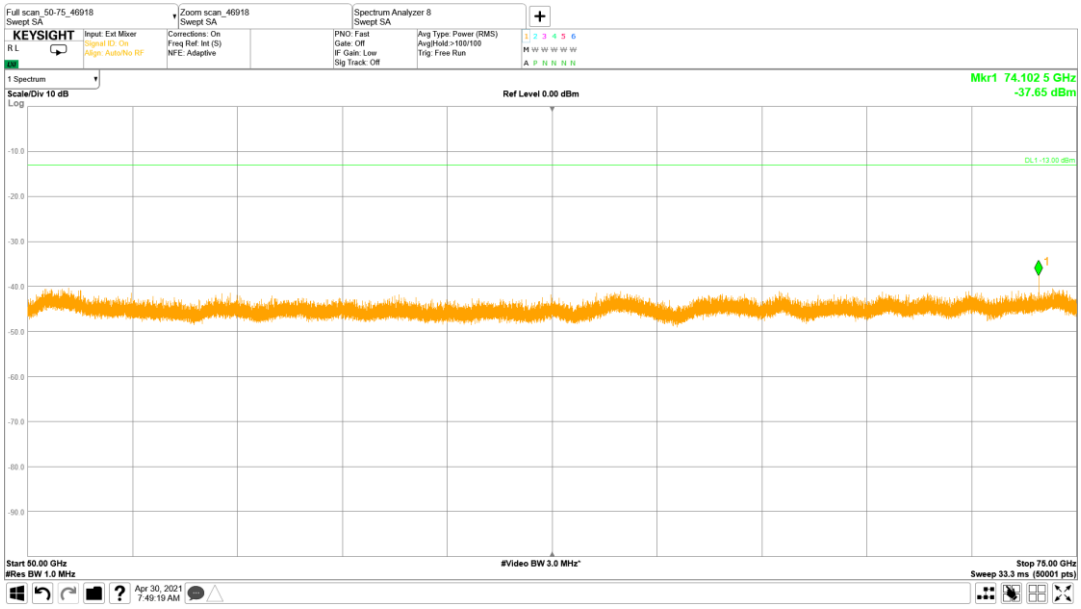
M 1 n260 BW 50MHz	 High Channel / Horizontal
M 1 n260 BW 50MHz	 High Channel / Vertical

No emissions were detected above noise floor.

M 1 n260 BW 100MHz	 Low Channel / Horizontal
M 1 n260 BW 100MHz	 Low Channel / Vertical

Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Ant pol [H/V]	X-Axis [degree]	Y-Axis [degree]	Result [dBm]	Limit [dBm]	Margin [dB]
74101.86	100	SISO-Dual	QPSK	V	362.2	290.7	-42.89	-13	29.89

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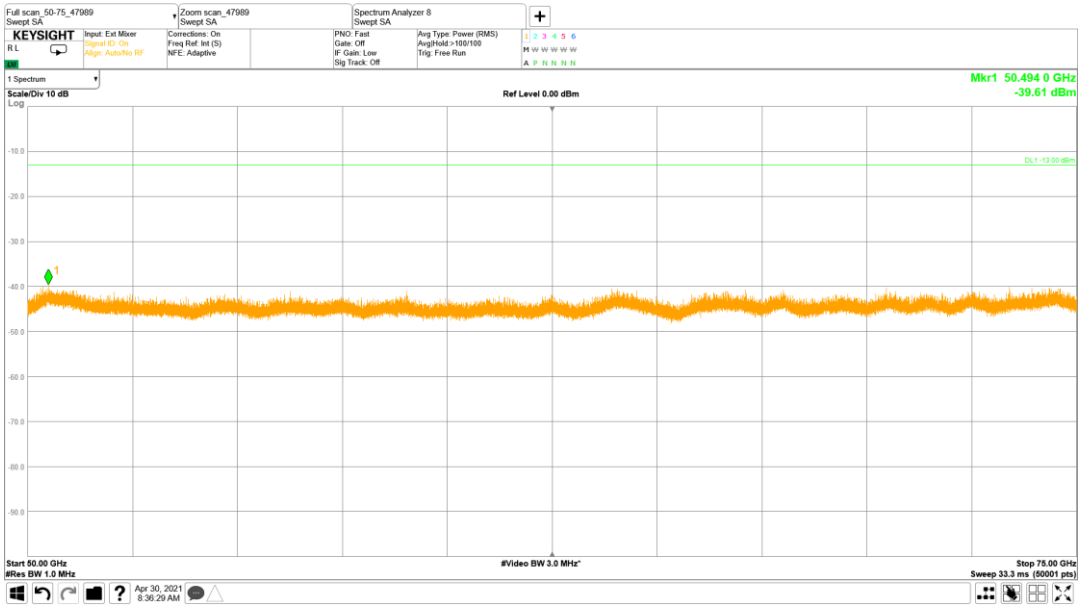
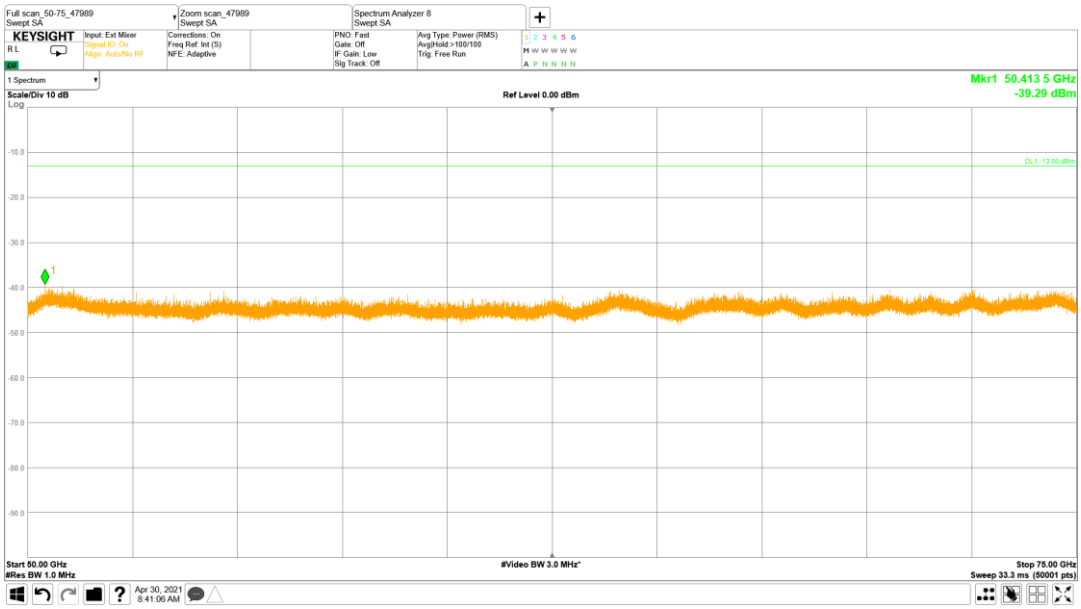
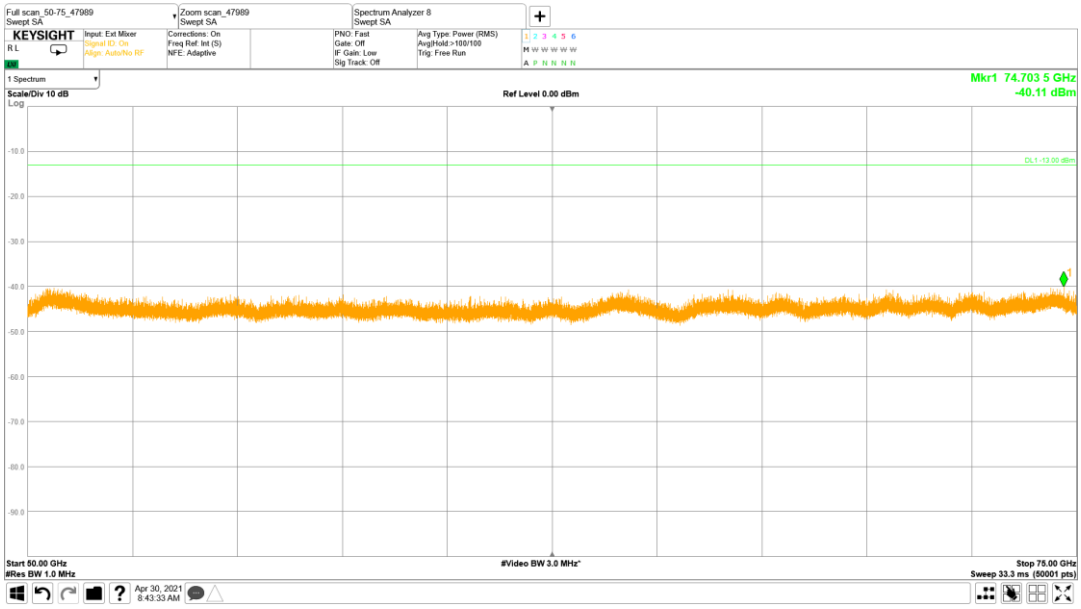
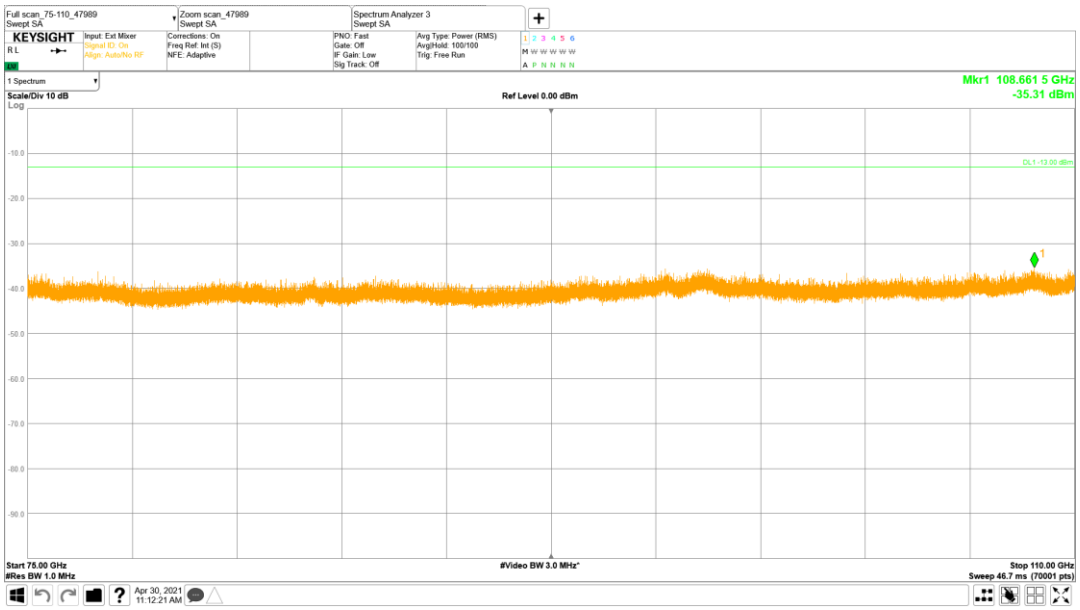
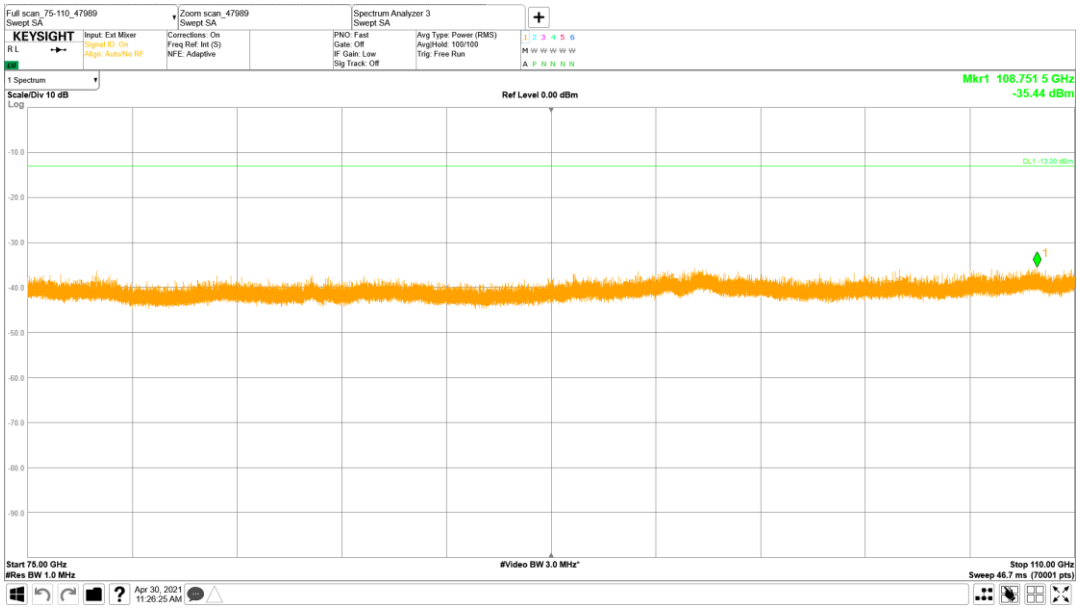
M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor.

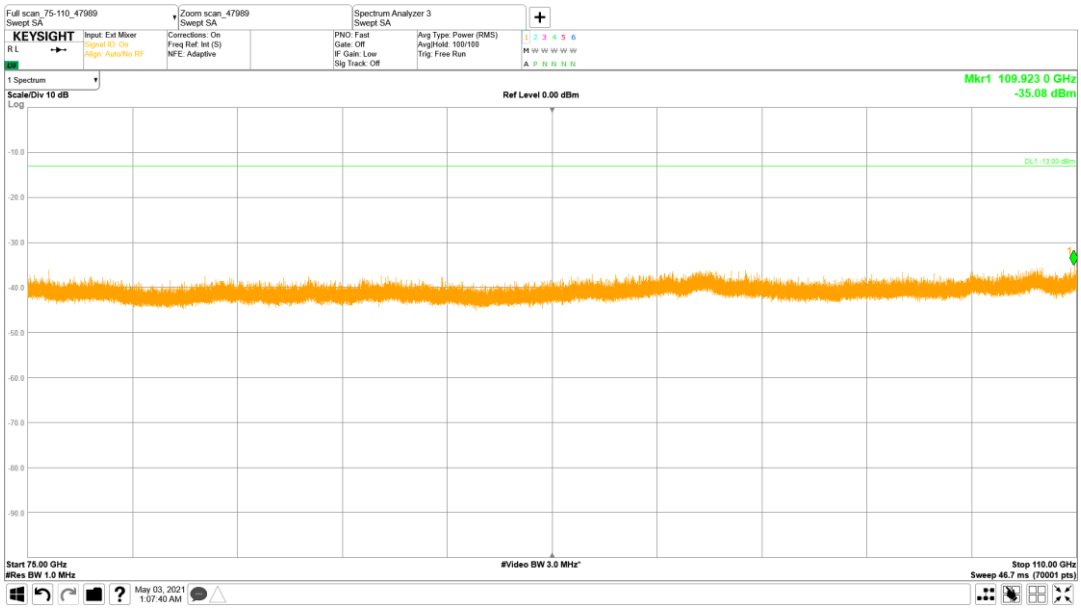
M 1 n260 BW 100MHz	 High Channel / Horizontal
M 1 n260 BW 100MHz	 High Channel / Vertical

No emissions were detected above noise floor.

75 – 110 GHz Result

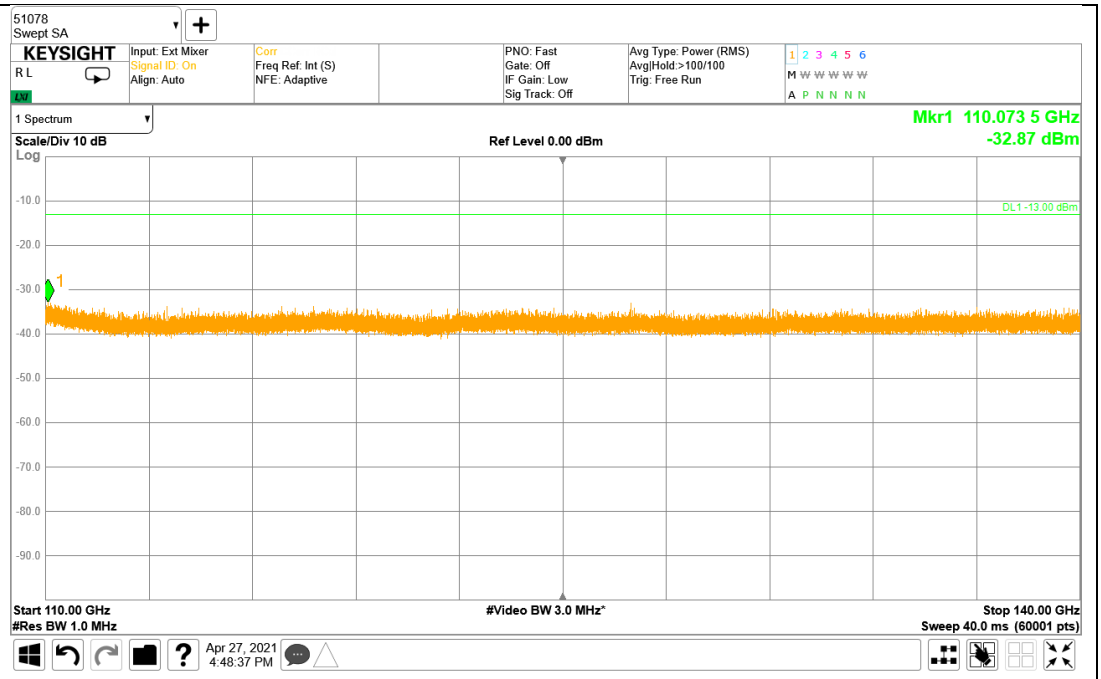
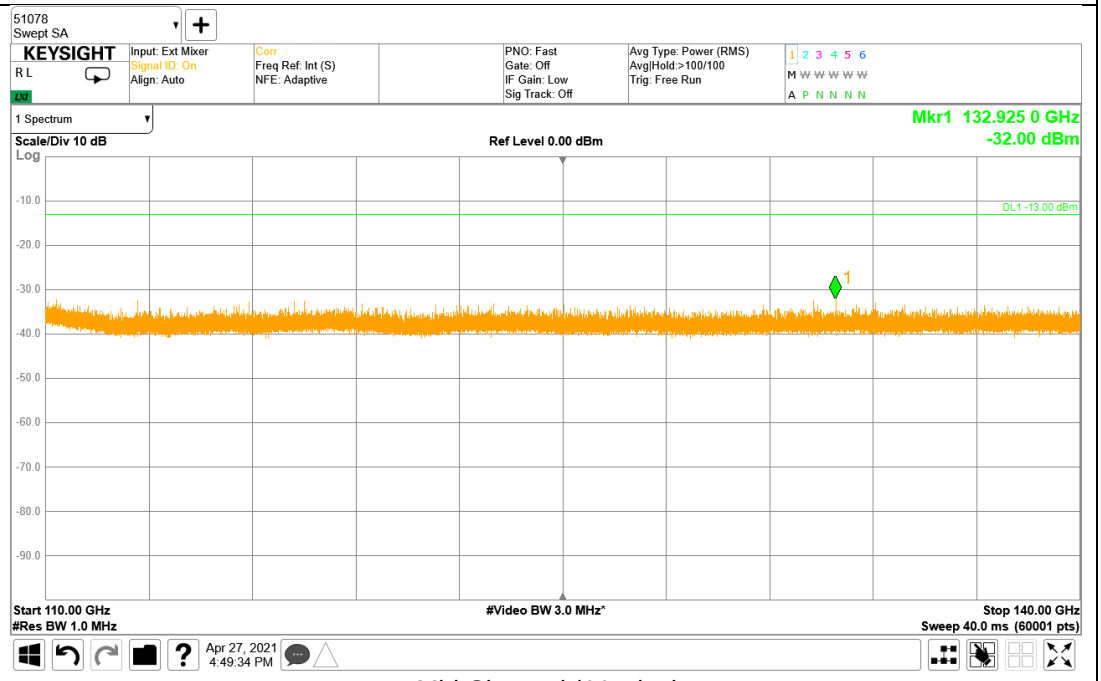
M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

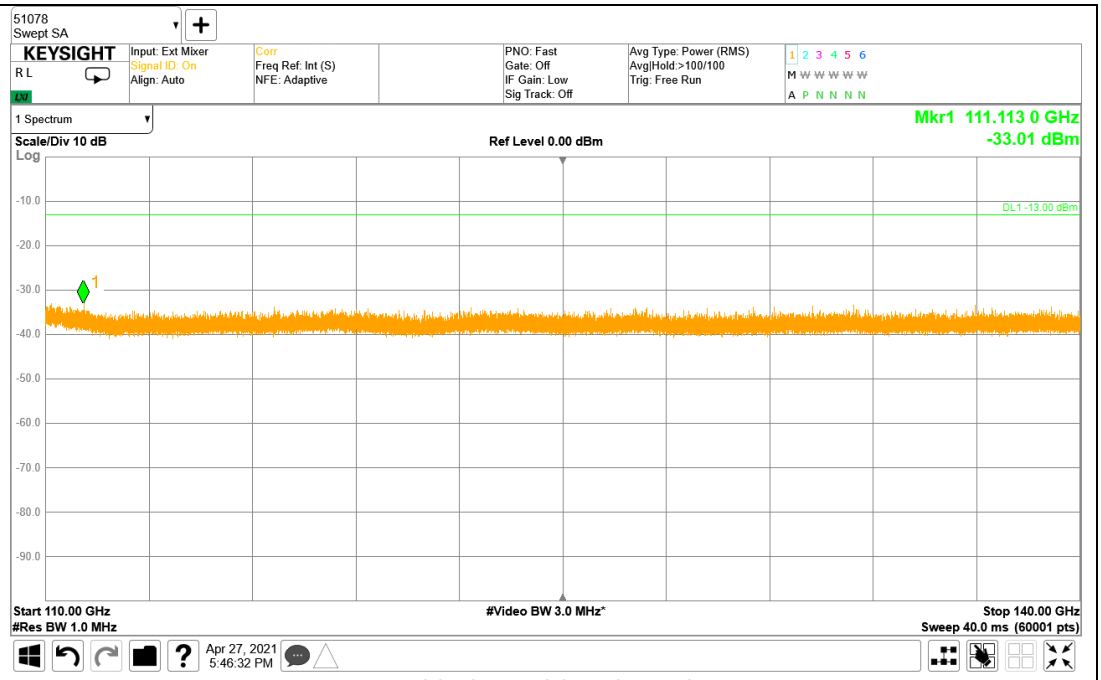
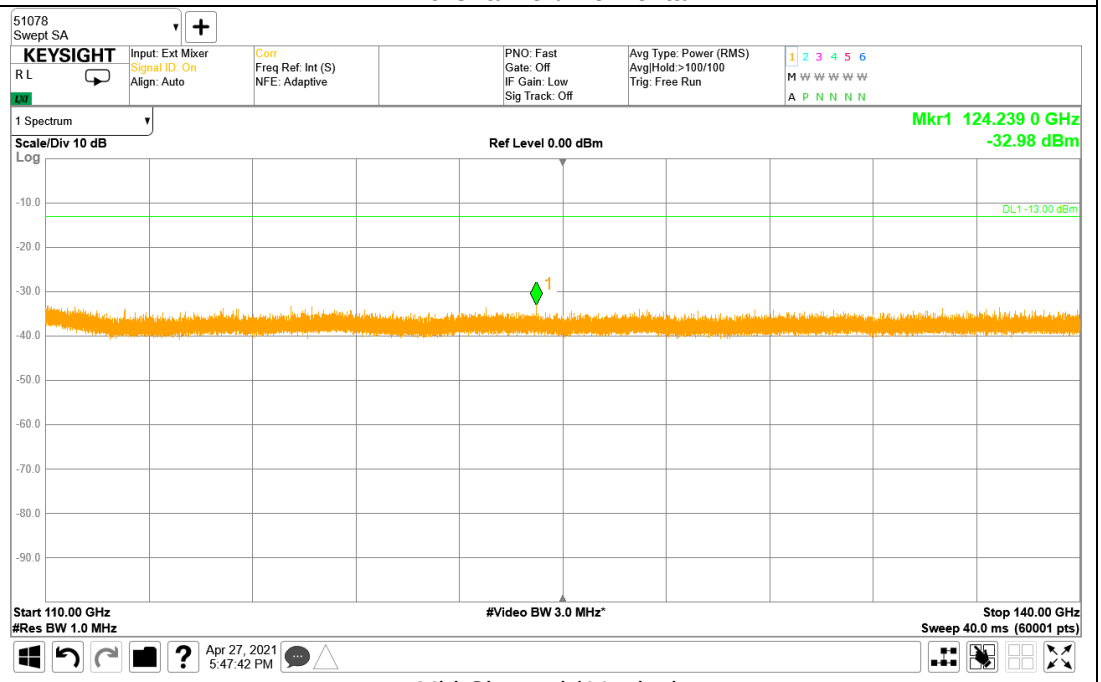
M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

110 – 140 GHz Result

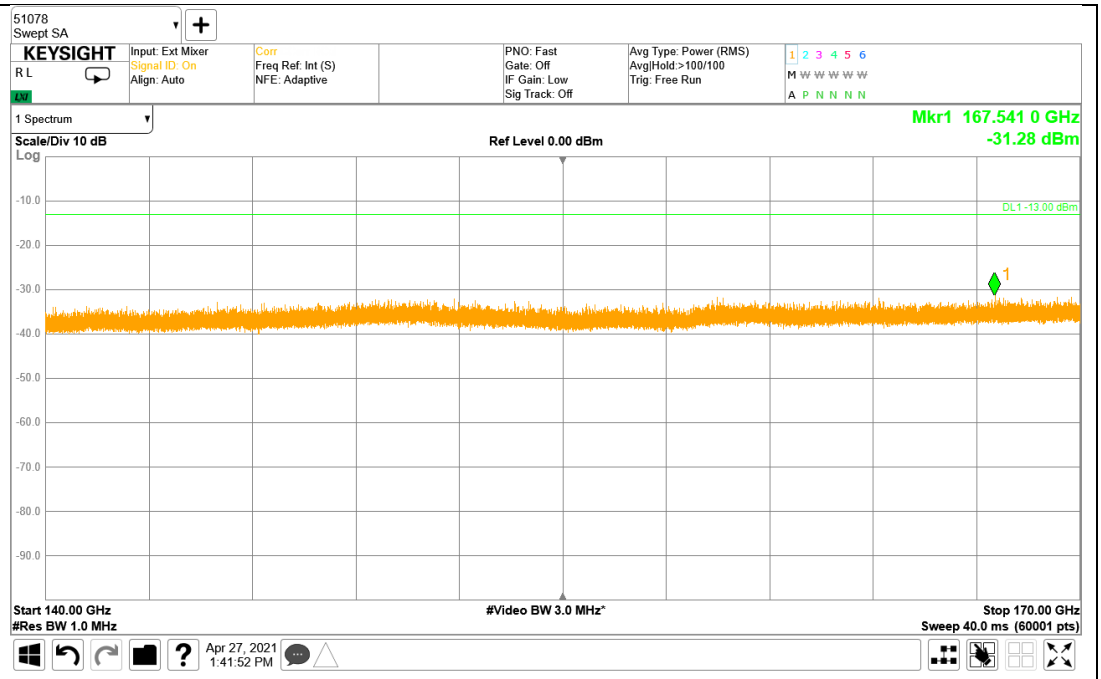
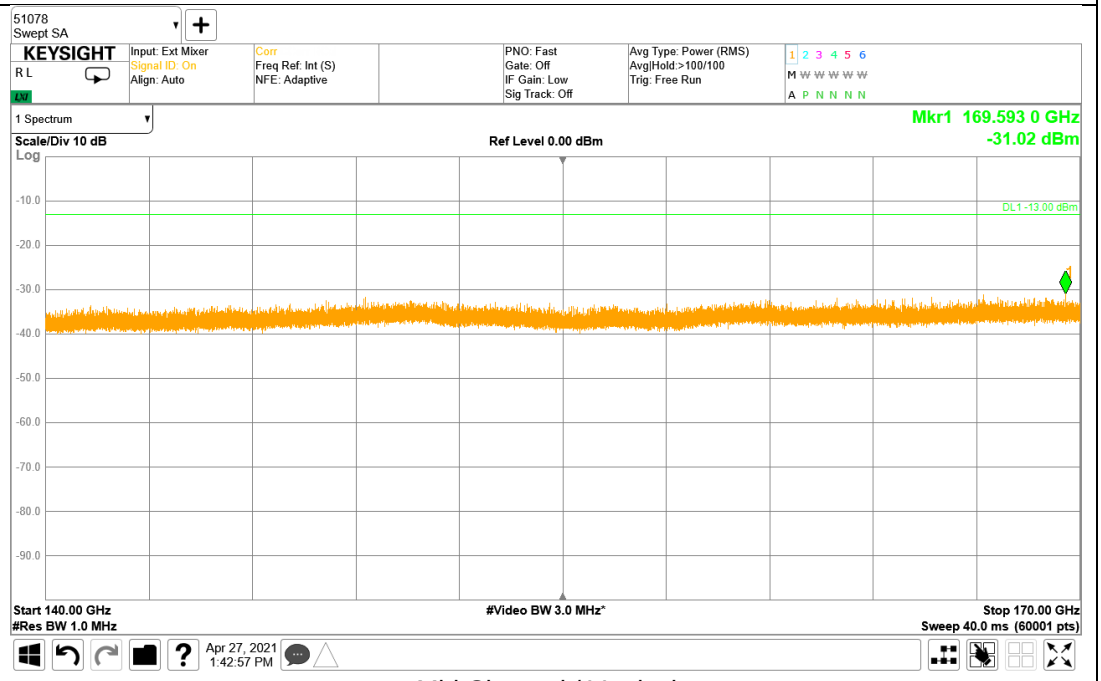
M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

140 – 170 GHz Result

M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

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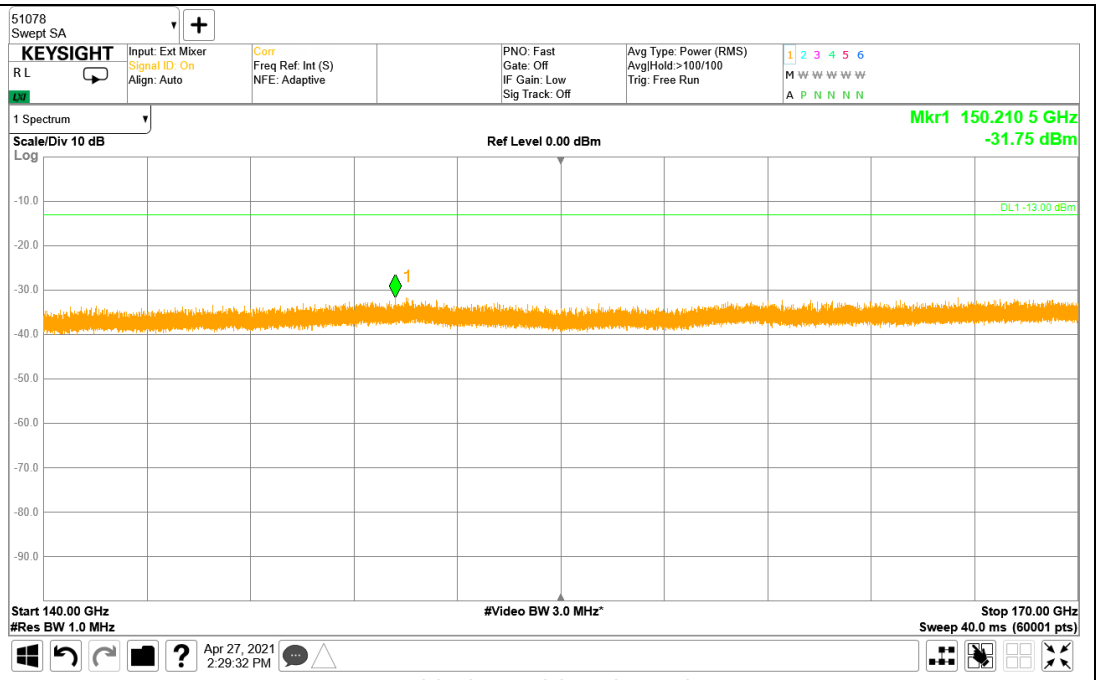
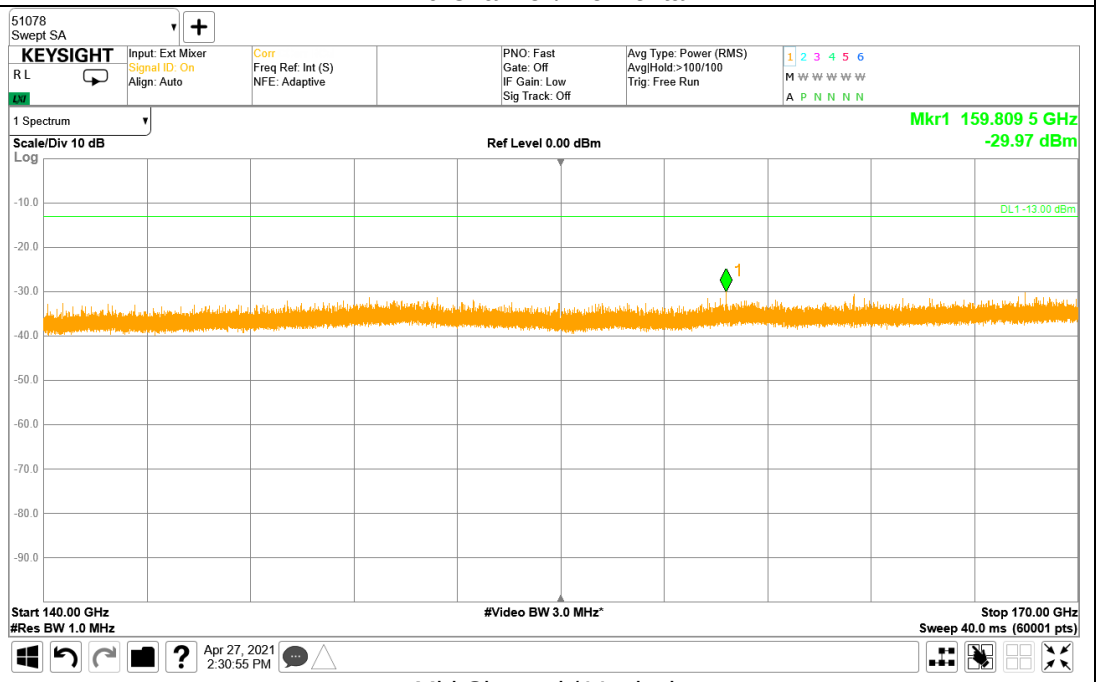
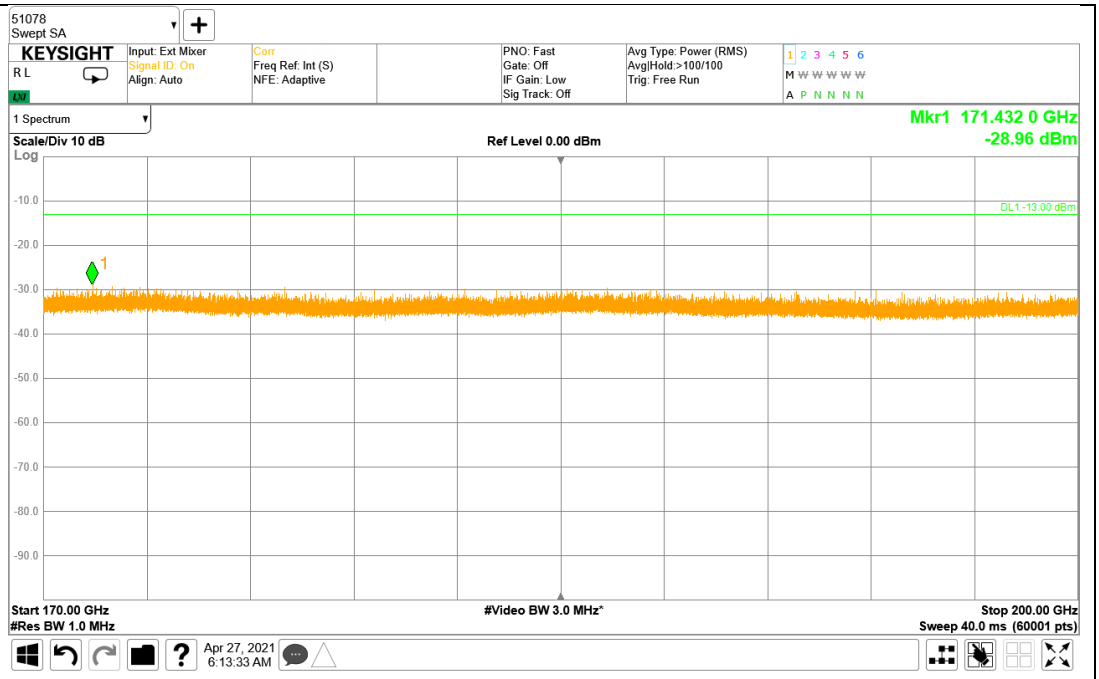
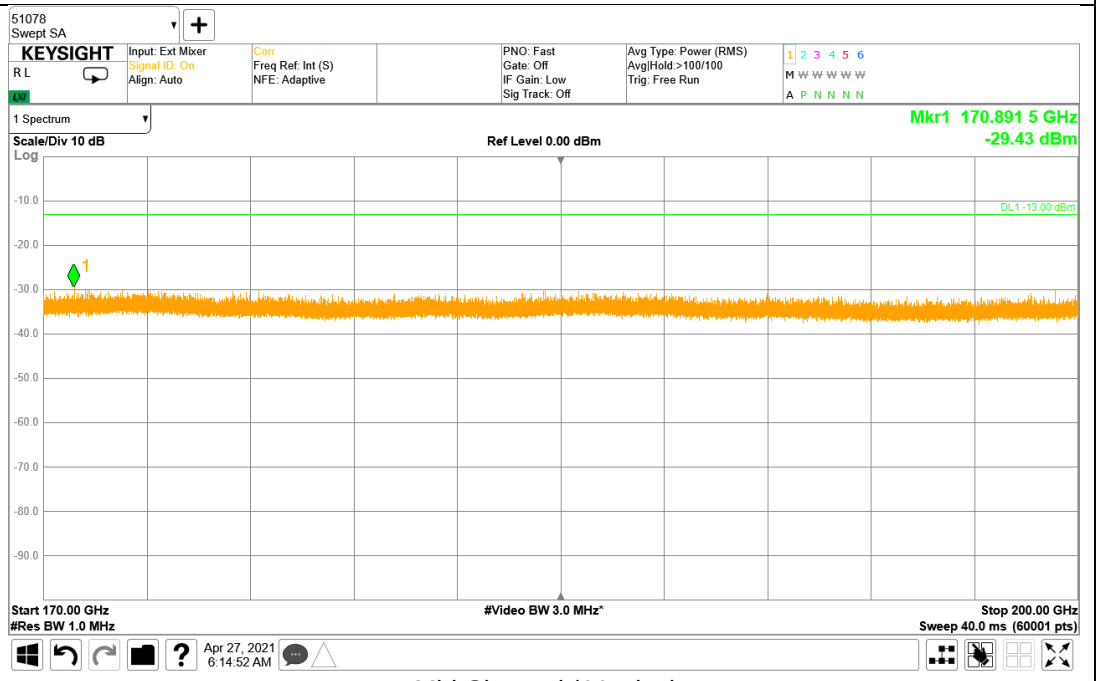
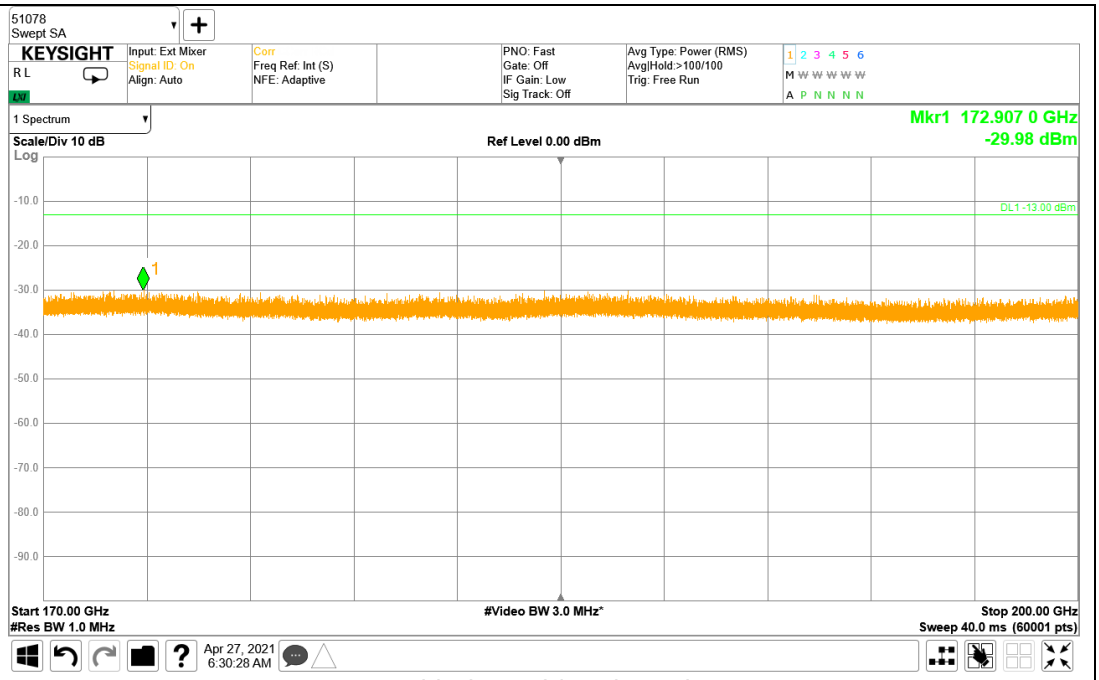
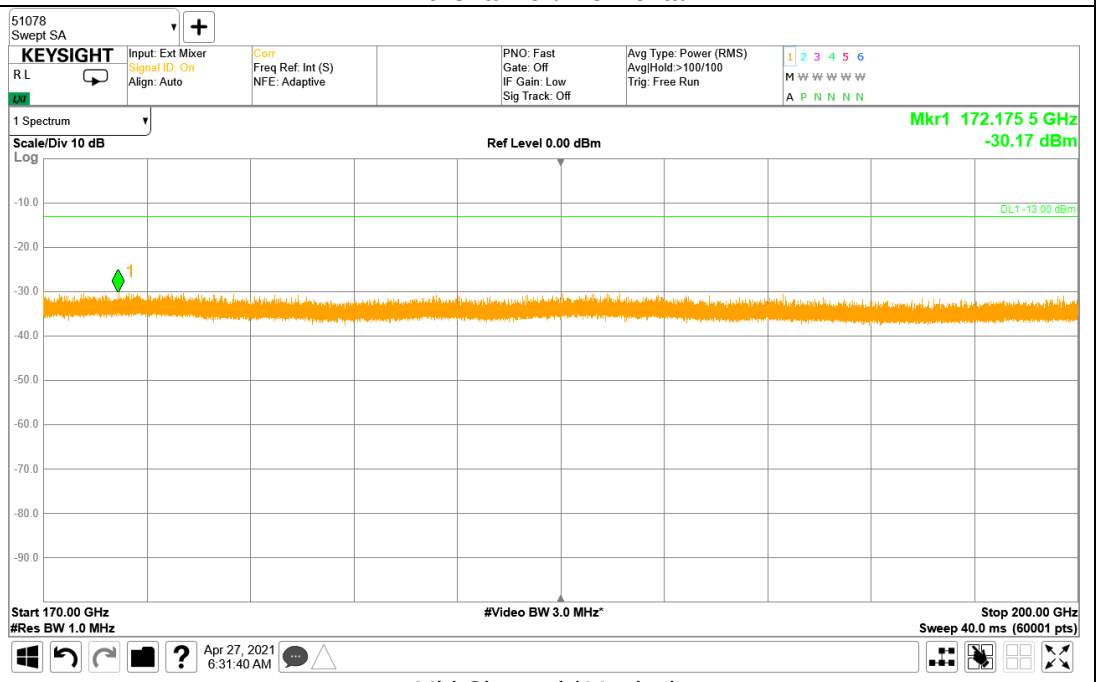
M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

170 – 200 GHz Result

M 1 n260 BW 50MHz	 Mid Channel / Horizontal
M 1 n260 BW 50MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

M 1 n260 BW 100MHz	 Mid Channel / Horizontal
M 1 n260 BW 100MHz	 Mid Channel / Vertical

No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

8.5. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055

LIMITS

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Test procesures for temperature variation

a) Position the EUT in temperature/humidity chamber with power off.
b) Set chamber temperature to -30°C and stabilize the EUT for at least 30 minutes.
c) Record maximum change in frequency within one minute after powering the EUT.
d) Increase chamber temperature at 10°C intervals from -30°C to 50°C. Record maximum change in frequency at each temperature.
e) A period of at least 30 minutes is provided to allow stabilization of the equipment at each temperature level.

Test procesures for voltage variation

a) Position the EUT in temperature/humidity chamber with power off.
b) Set chamber temperature to 20°C.
c) Record maximum frequency change within one minute after powering the EUT.
d) The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

(KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 Section 4.5)
(ANSI C63.26-2015 Section 5.6)

NOTE :

The Deviation column in the table below is the amount of deviation measured from the center frequency of the authorized bands of operation.

5G NR: All Waveforms (CP-OFDM vs DFT-s OFDM) 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.

RESULTS

See the following pages.

8.5.1. FREQUENCY STABILITY RESULTS

Module 0, Band n261

Limit (MHz)		27500			28350		
Condition		F low @ End of OBW	Delta (kHz)	Deviation (%)	F high @ End of OBW	Delta (kHz)	Deviation (%)
Temperature	Voltage	(MHz)			(MHz)		
Normal (20°C) (Ref)	Normal	27509.8400	104.910	0.000376	28344.5200	354.760	0.001270
Extreme (50°C)		27509.8404	399.800	0.001432	28344.5200	8.250	0.000030
Extreme (40°C)		27509.8406	598.960	0.002145	28344.5202	191.690	0.000686
Extreme (30°C)		27509.8406	551.980	0.001977	28344.5202	201.360	0.000721
Extreme (10°C)		27509.8403	335.270	0.001201	28344.5204	425.660	0.001524
Extreme (0°C)		27509.8401	77.537	0.000278	28344.5204	419.820	0.001503
Extreme (-10°C)		27509.8401	75.974	0.000272	28344.5207	725.670	0.002599
Extreme (-20°C)		27509.8401	146.400	0.000524	28344.5203	296.940	0.001063
Extreme (-30°C)		27509.8404	369.550	0.001323	28344.5200	31.944	0.000114
Normal (20°C)	15%	27509.8404	370.020	0.001325	28344.5204	352.900	0.001264
	-15%	27509.8406	109.280	0.000391	28344.5203	294.580	0.001055
	End Point	27509.8406	104.350	0.000374	28344.5201	201.200	0.000721

Module 0, Band n260

Limit (MHz)		37000			40000		
Condition		F low @ End of OBW	Delta (kHz)	Deviation (%)	F high @ End of OBW	Delta (kHz)	Deviation (%)
Temperature	Voltage	(MHz)			(MHz)		
Normal (20°C) (Ref)	Normal	37002.3200	85.020	0.000221	39991.2400	41.119	0.000107
Extreme (50°C)		37002.3203	318.200	0.000826	39991.2403	324.270	0.000842
Extreme (40°C)		37002.3201	63.489	0.000165	39991.2402	158.760	0.000412
Extreme (30°C)		37002.3200	21.749	0.000056	39991.2402	166.760	0.000433
Extreme (10°C)		37002.3201	54.690	0.000142	39991.2403	300.580	0.000781
Extreme (0°C)		37002.3201	77.677	0.000202	39991.2404	422.890	0.001098
Extreme (-10°C)		37002.3204	405.440	0.001053	39991.2405	470.820	0.001223
Extreme (-20°C)		37002.3203	334.680	0.000869	39991.2408	841.780	0.002186
Extreme (-30°C)		37002.3204	413.740	0.001075	39991.2405	502.580	0.001305
Normal (20°C)	15%	37002.3203	113.560	0.000295	39991.2402	162.500	0.000422
	-15%	37002.3201	104.200	0.000271	39991.2402	150.300	0.000390
	End Point	37002.3200	154.880	0.000402	39991.2402	151.840	0.000394

Module 1, Band n261

Limit (MHz)		27500			28350		
Condition		F low @ End of OBW	Delta (kHz)	Deviation (%)	F high @ End of OBW	Delta (kHz)	Deviation (%)
Temperature	Voltage	(MHz)			(MHz)		
Normal (20°C) (Ref)	Normal	27509.8400	57.903	0.000207	28344.5200	266.600	0.000955
Extreme (50°C)		27509.8403	299.340	0.001072	28344.5200	28.771	0.000103
Extreme (40°C)		27509.8401	143.140	0.000513	28344.5204	394.720	0.001414
Extreme (30°C)		27509.8400	14.805	0.000053	28344.5203	304.040	0.001089
Extreme (10°C)		27509.8402	154.830	0.000554	28344.5203	315.180	0.001129
Extreme (0°C)		27509.8401	148.900	0.000533	28344.5202	194.990	0.000698
Extreme (-10°C)		27509.8404	388.610	0.001392	28344.5201	121.580	0.000435
Extreme (-20°C)		27509.8404	398.270	0.001426	28344.5201	108.650	0.000389
Extreme (-30°C)		27509.8403	316.330	0.001133	28344.5202	199.740	0.000715
Normal (20°C)	15%	27509.8403	307.830	0.001102	28344.5201	135.270	0.000484
	-15%	27509.8401	290.130	0.001039	28344.5201	141.600	0.000507
	End Point	27509.8400	268.740	0.000962	28344.5203	142.050	0.000509

Module 1, Band n260

Limit (MHz)		37000			40000		
Condition		F low @ End of OBW	Delta (kHz)	Deviation (%)	F high @ End of OBW	Delta (kHz)	Deviation (%)
Temperature	Voltage	(MHz)			(MHz)		
Normal (20°C) (Ref)	Normal	37002.3200	257.410	0.000669	39991.2400	326.640	0.000848
Extreme (50°C)		37002.3201	125.910	0.000327	39991.2400	0.905	0.000002
Extreme (40°C)		37002.3200	48.793	0.000127	39991.2401	67.644	0.000176
Extreme (30°C)		37002.3200	0.298	0.000001	39991.2402	191.340	0.000497
Extreme (10°C)		37002.3201	111.180	0.000289	39991.2401	132.180	0.000343
Extreme (0°C)		37002.3204	411.010	0.001068	39991.2403	291.730	0.000758
Extreme (-10°C)		37002.3203	311.070	0.000808	39991.2404	364.120	0.000946
Extreme (-20°C)		37002.3201	75.001	0.000195	39991.2403	284.080	0.000738
Extreme (-30°C)		37002.3201	129.460	0.000336	39991.2401	107.610	0.000280
Normal (20°C)	15%	37002.3201	246.000	0.000639	39991.2403	308.250	0.000801
	-15%	37002.3200	252.310	0.000655	39991.2402	161.280	0.000419
	End Point	37002.3200	292.380	0.000759	39991.2403	157.240	0.000408

Appendix A

1. Accreditation Scope

A transmitter operating at 40 GHz requires spurious emissions to be investigated up to 200 GHz. In this case, the test laboratory scope should reflect that it has capability to measure up to 200 GHz.

UL Korea, Ltd. test sites and facilities are covered under FCC test Firm Registrations #KR0161.
The scope of accreditation can be viewed at
https://apps.fcc.gov/oetcf/eas/reports/ViewTestFirmAccredScopes.cfm?calledFromFrame=N&RequestTimeout=500&regnum_specified=N&test_firm_id=7730.

2. VDI Mixer Certificate Report

2.1. Model : N9029AV15, S/N : SAX486

CALIBRATION CERTIFICATE

74, SEOICHEON-RO 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, KOREA 17383
TEL: 82-31-645-6900, FAX: 82-31-645-6969

- Certificate No : IC-2021-26368-R1 [Amendment to Report, Certificate No 'IC-2021-26368']
- Calibration No : C-2021-031910

1. Client
- Name : UL Korea, Ltd.
- Address : Suwon Test Site: UL Korea, Ltd. Suwon Laboratory218 Maeyeong-ro, Yeongtong-gu,Suwon-si, Gyeonggi-do, 16675, Korea

2. Calibration Subject ◇Registration No : 376588
- Description : SA EXTENSION MODULE
- Manufacturer and Model Name : VDI / SAX WR15
- Serial Number : SAX486

3. Date of Calibration : 2021.03.29 The due date of next Calibration : 2022.03.29

4. Environment
- Temperature : (22.9 ± 0.2) ℃ - Humidity : (47 ± 3) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability

Calibration method and/or brief description

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-125-40641), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer and Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	HCT CO., LTD.
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2021/11/02	HCT CO., LTD.
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2022/01/25	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2021/09/09	HCT CO., LTD.
WR-19 MULTIPLIER SOURCE MODULE	OML S19MS-A	160516-1	2021/09/09	HCT CO., LTD.

6. Calibration result : **Refer to attachment**

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

affirmation	Measurements performed by Name : **Meenji Park**	Approved by Title Technical Cal. Manager Name **Seungchan Lee** (signature)

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2021. 03. 31

Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

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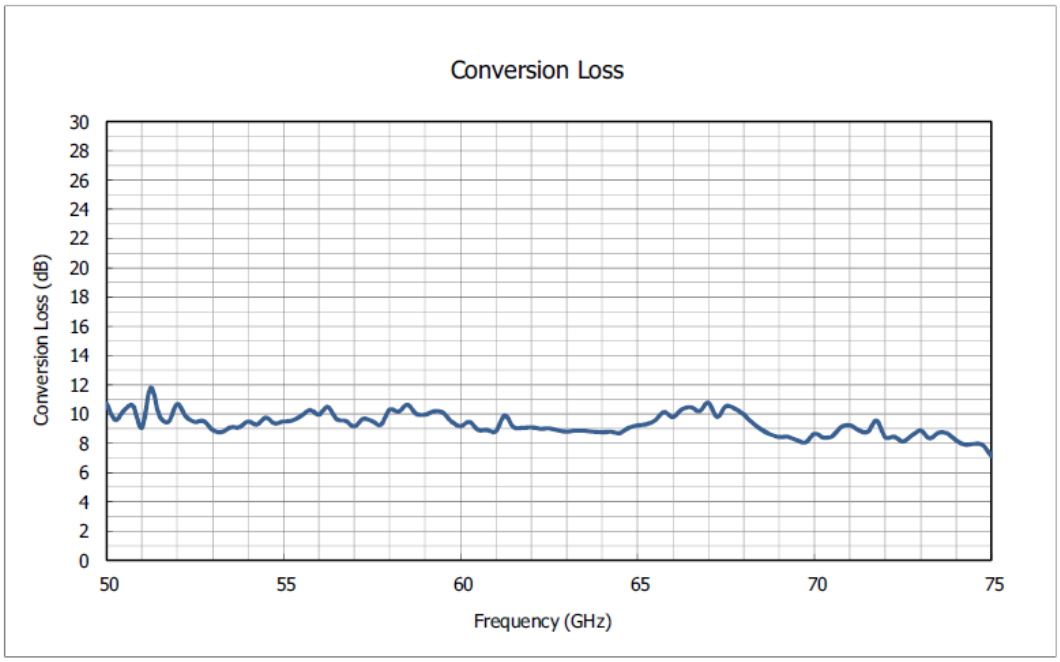
■Asset Number: SUW-E0173

Calibration Results

Certificate No : IC-2021-26368-R1
Calibration No : C-2021-031910

1. Conversion Loss Graph



Note 1) This is the result of measuring the requested equipment and Keysight N9040B (SN US57212313) together.

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Calibration Results

Certificate No : IC-2021-26368-R1
Calibration No : C-2021-031910

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
50.0	10.73	0.89	57.5	9.52	0.82
50.3	9.59	0.89	57.8	9.27	0.82
50.5	10.26	0.89	58.0	10.31	0.82
50.8	10.56	0.89	58.3	10.16	0.82
51.0	9.07	0.89	58.5	10.63	0.82
51.3	11.80	0.89	58.8	10.01	0.82
51.5	9.86	0.89	59.0	9.95	0.82
51.8	9.47	0.89	59.3	10.18	0.82
52.0	10.68	0.89	59.5	10.09	0.82
52.3	9.81	0.89	59.8	9.48	0.82
52.5	9.47	0.89	60.0	9.17	0.82
52.8	9.52	0.89	60.3	9.47	0.82
53.0	8.90	0.89	60.5	8.91	0.82
53.3	8.76	0.89	60.8	8.91	0.82
53.5	9.09	0.89	61.0	8.82	0.82
53.8	9.10	0.89	61.3	9.89	0.82
54.0	9.49	0.89	61.5	9.11	0.82
54.3	9.28	0.89	61.8	9.05	0.82
54.5	9.75	0.89	62.0	9.10	0.82
54.8	9.36	0.89	62.3	8.99	0.82
55.0	9.49	0.89	62.5	9.02	0.82
55.3	9.55	0.89	62.8	8.88	0.82
55.5	9.88	0.89	63.0	8.80	0.82
55.8	10.27	0.89	63.3	8.86	0.82
56.0	9.97	0.89	63.5	8.85	0.82
56.3	10.48	0.82	63.8	8.78	0.82
56.5	9.65	0.82	64.0	8.75	0.82
56.8	9.53	0.82	64.3	8.78	0.82
57.0	9.15	0.82	64.5	8.70	0.82
57.3	9.67	0.82	64.8	9.05	0.82

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