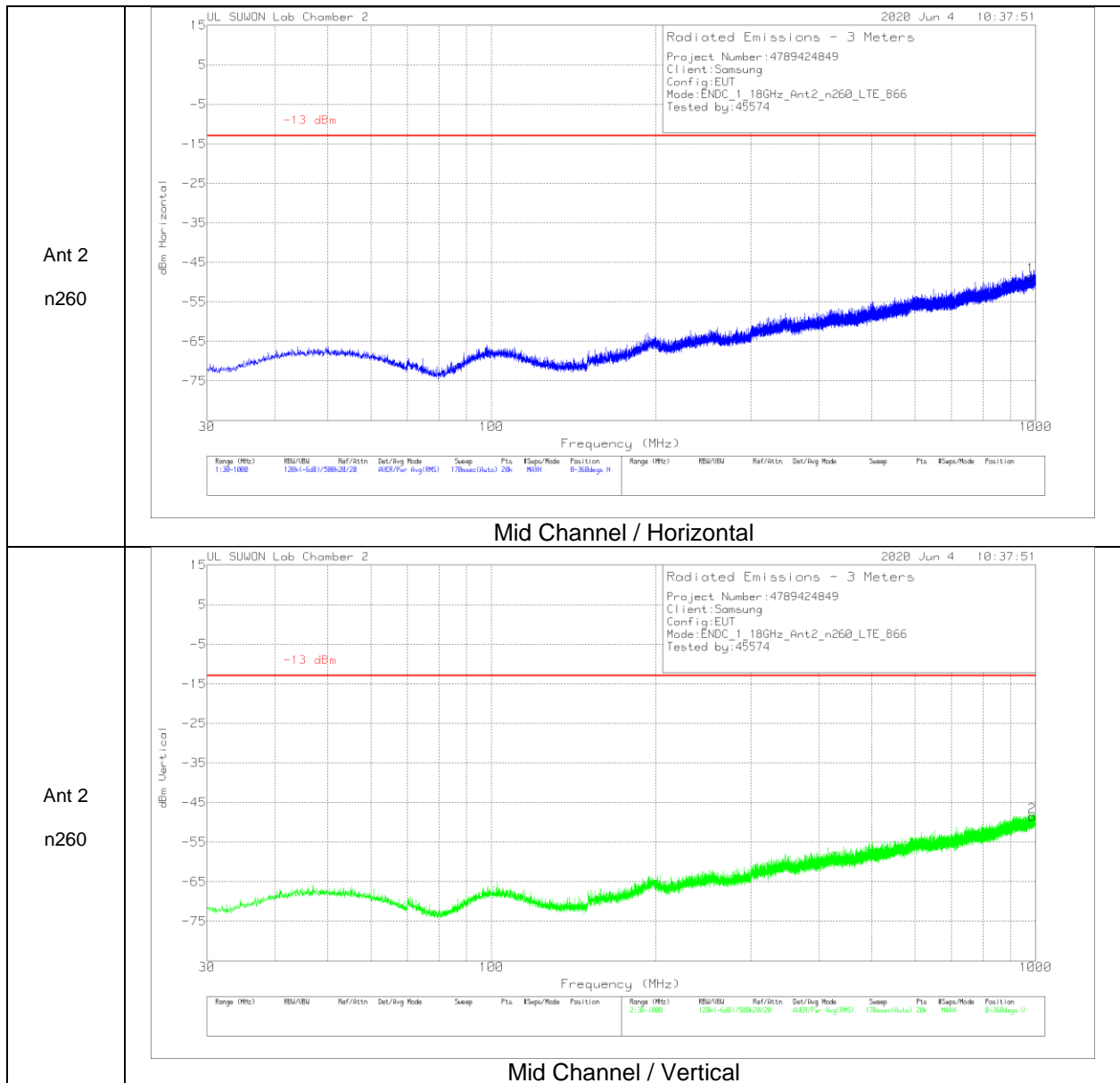


Antenna 2 / n260

30 – 1000 MHz Result



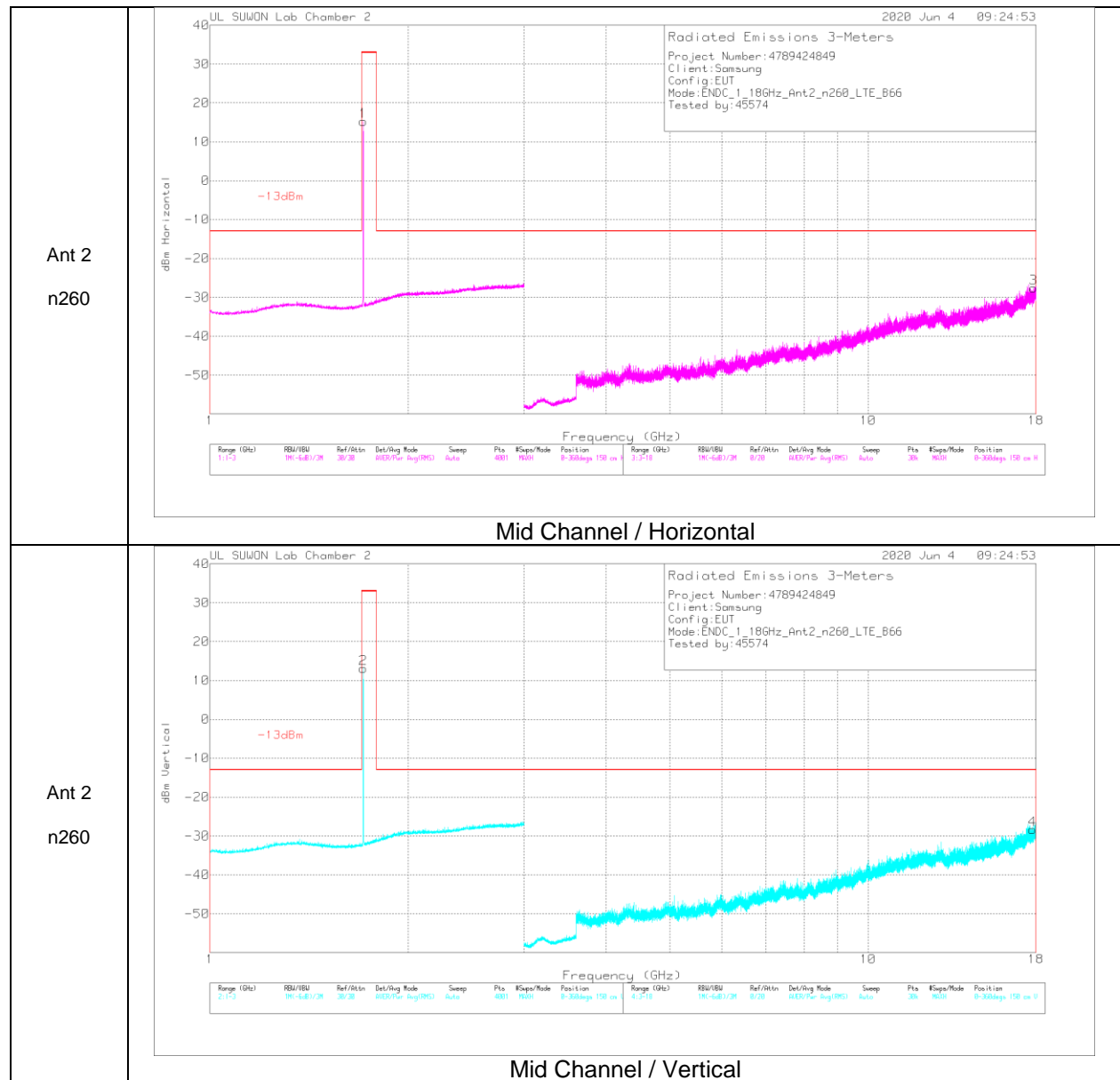
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	VULB9163_749	Below_1G[dB]	Conversion Factor[dB]	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	979.4453	-61.49	RMS	28.4	-27.2	11.8	-48.49	-13	-	0-360	200	H
2	986.3321	-61.47	RMS	28.3	-27.2	11.8	-48.57	-13	-	0-360	400	V

RMS - RMS detection

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

1 – 18 GHz Result



Trace Markers

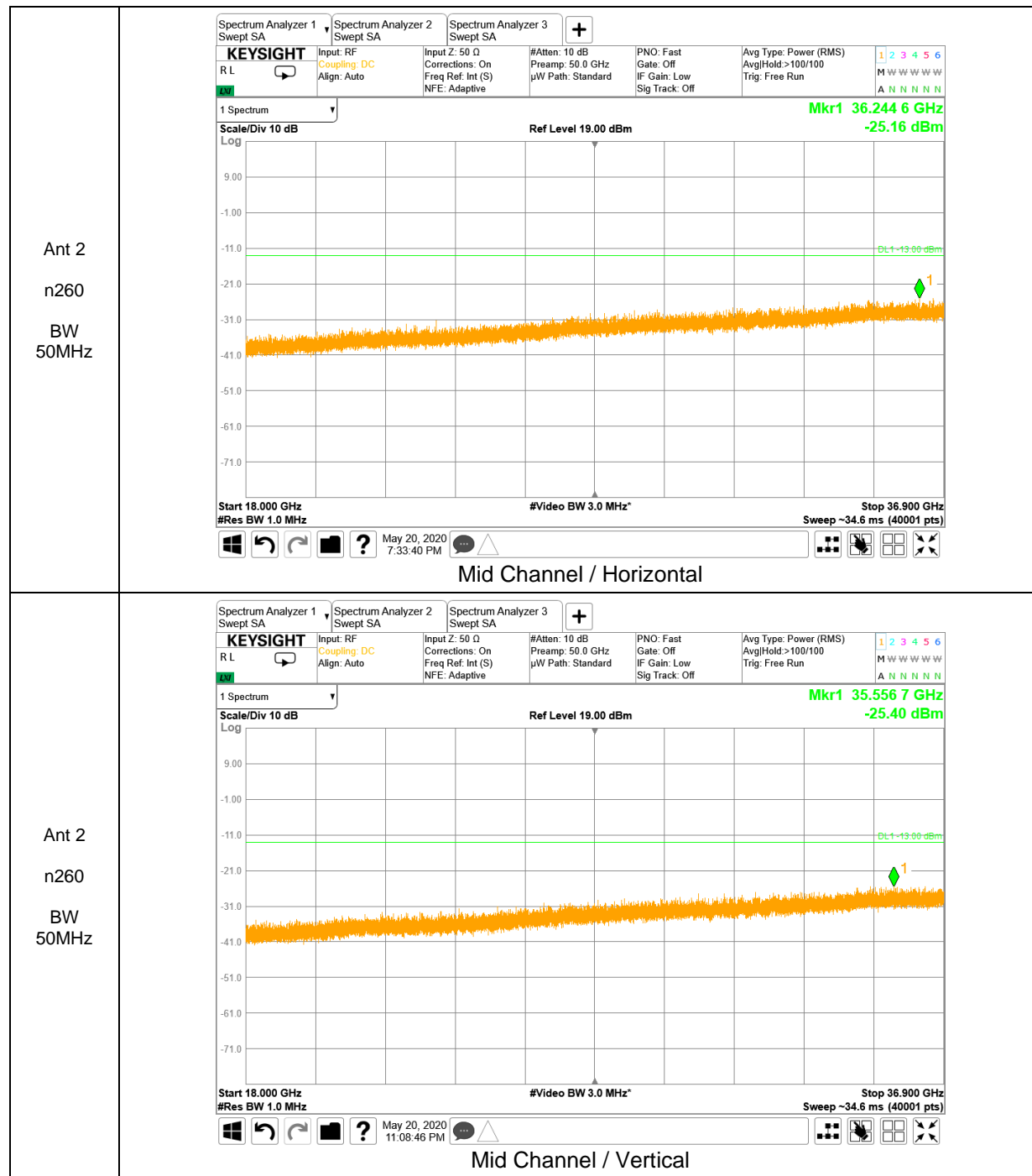
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	10dB_ATT[dB]	Conversion Factor[dB]	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.71	-3.89	RMS	28.8	-21.4	11.8	15.31	33	-17.69	0-360	150	H
2	1.71	-6.12	RMS	28.8	-21.4	11.8	13.08	33	-19.92	0-360	150	V

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP[dB]	Conversion Factor[dB]	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	17.85599	-63.77	RMS	41.6	-17.3	11.8	-27.67	-13	-14.67	0-360	150	H
4	17.785	-64.5	RMS	41.5	-17.2	11.8	-28.4	-13	-15.4	0-360	150	V

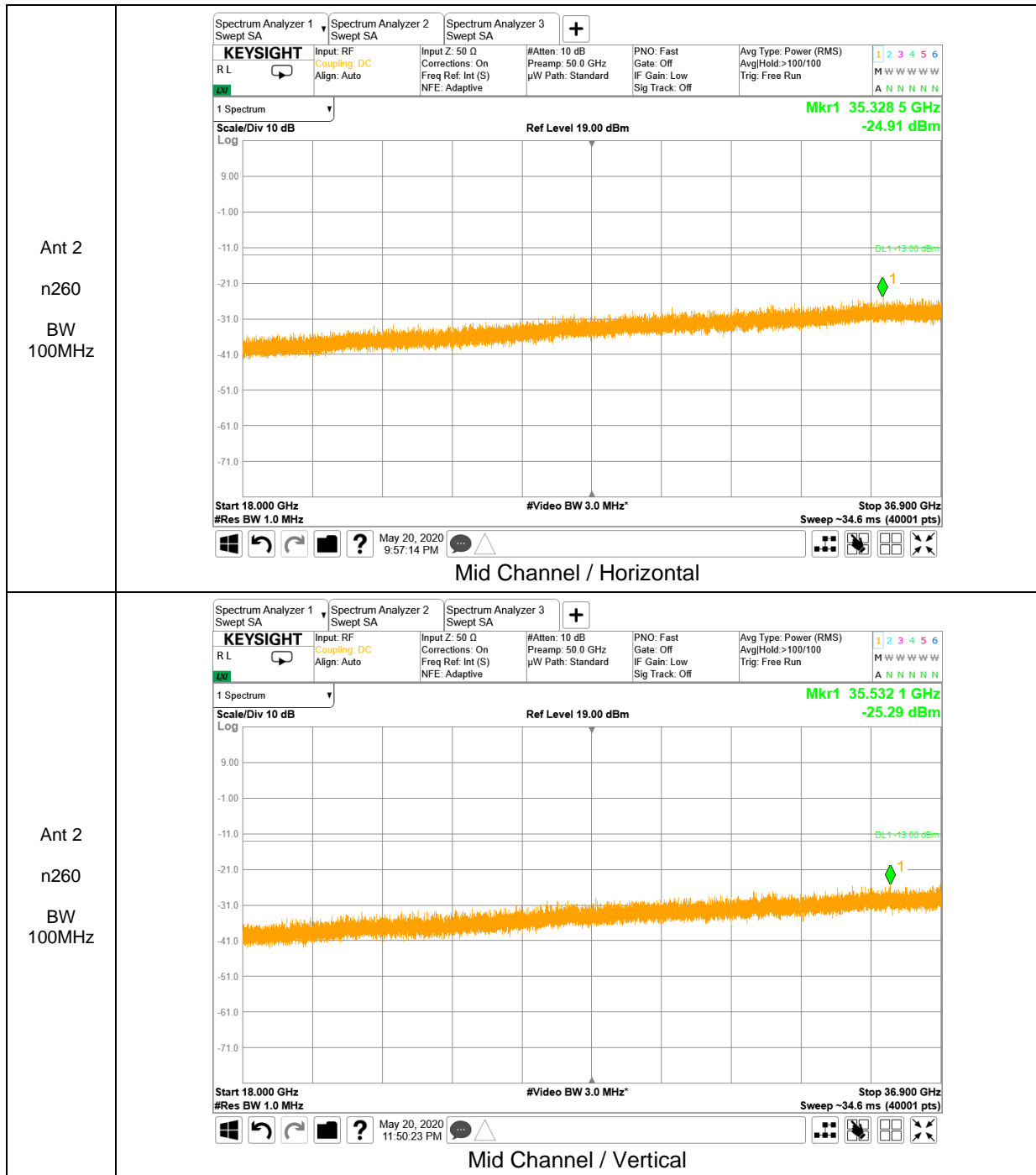
RMS - RMS detection

** 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 – 36.9 GHz Result

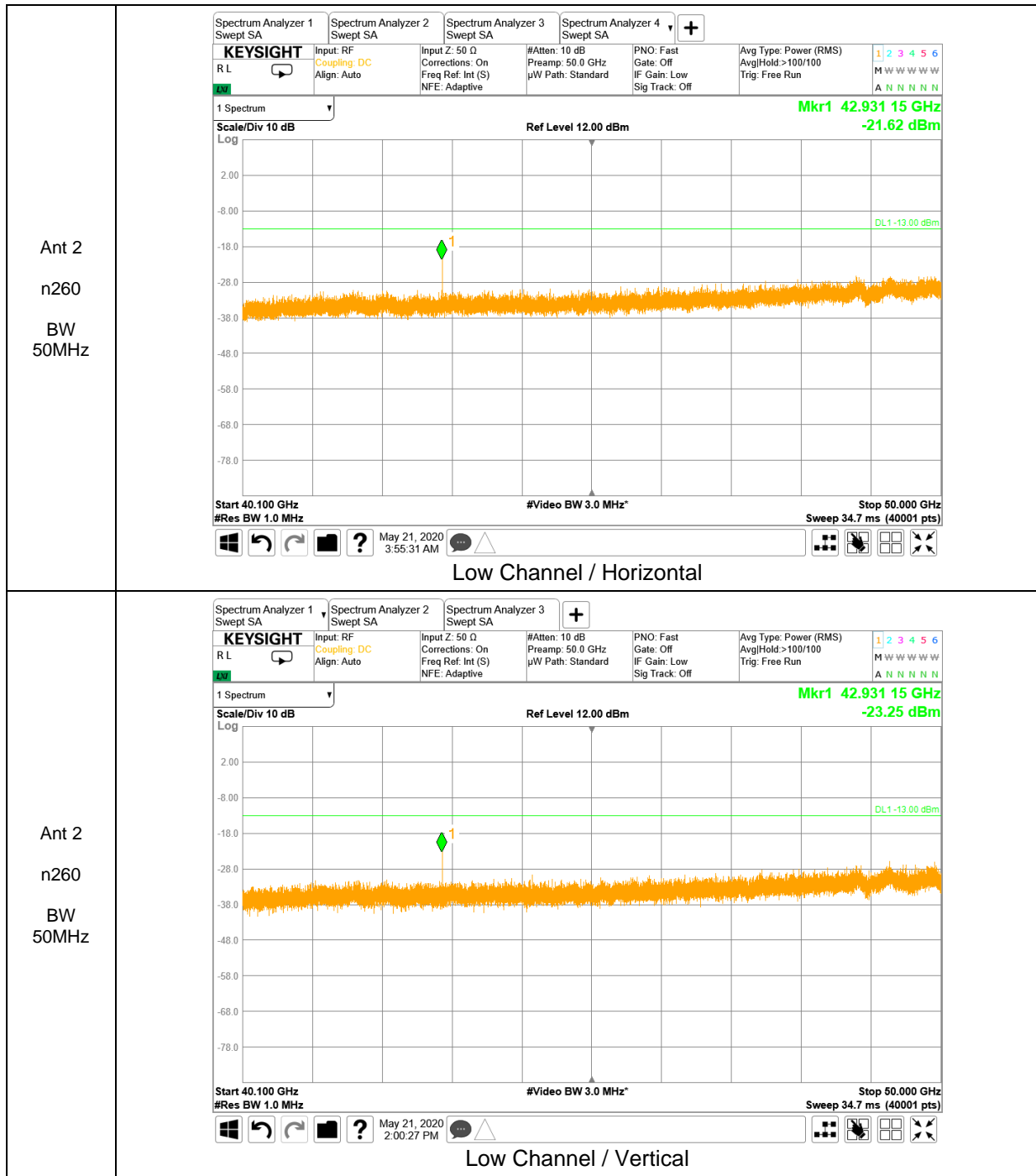


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.



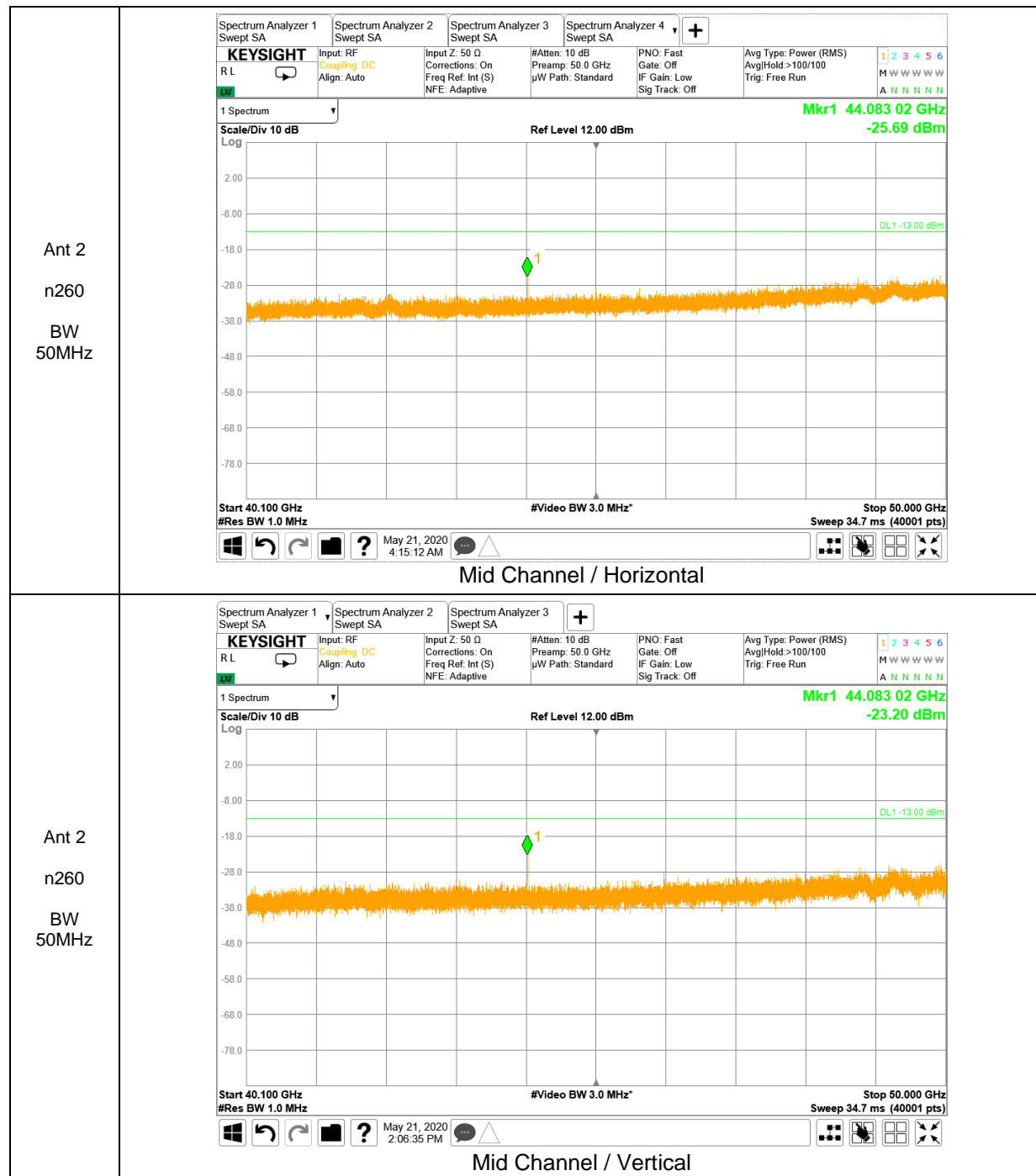
No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

40.1 – 50 GHz Result



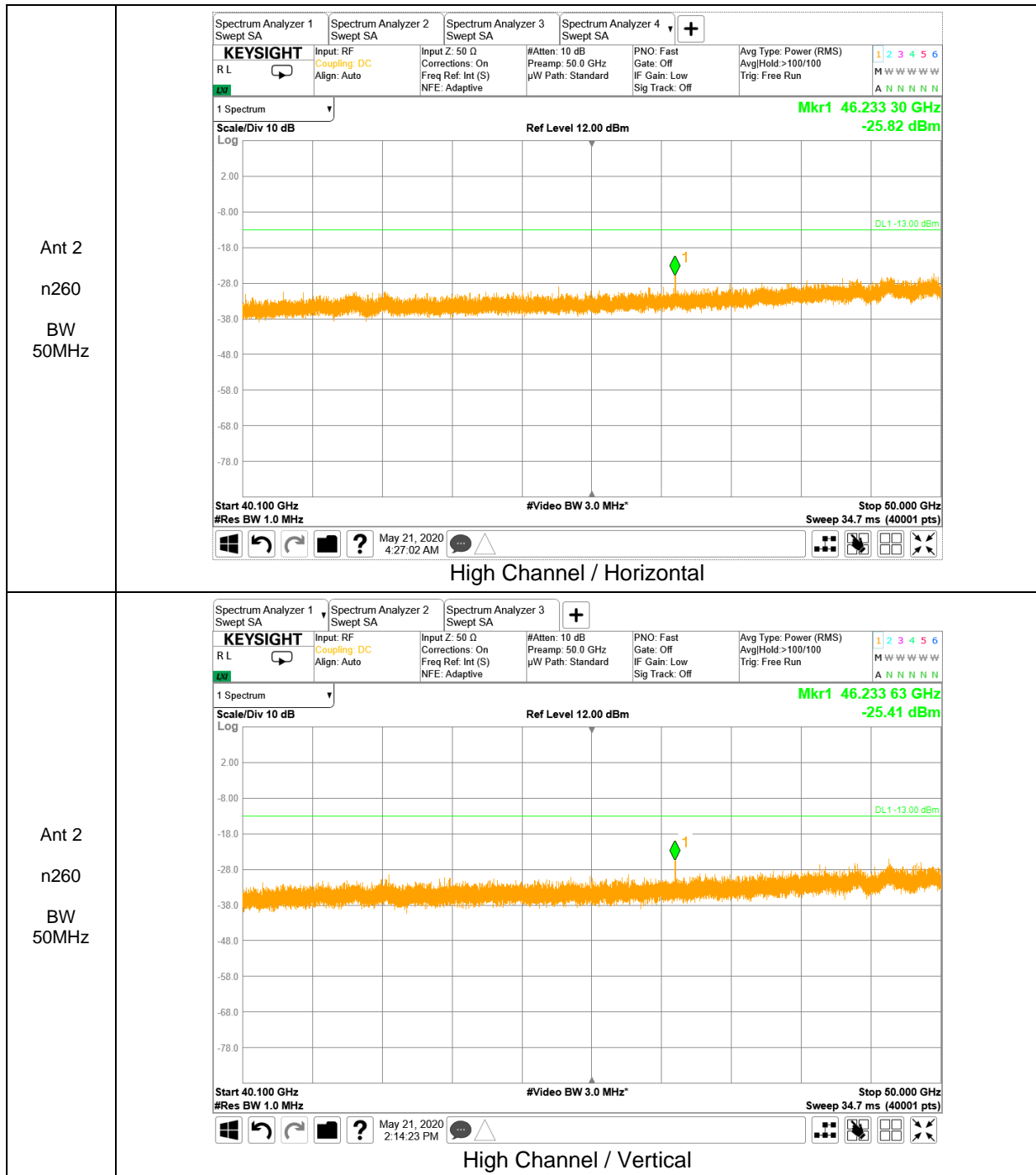
Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42930.99	50	MIMO	QPSK	H	253	86	-21.28	-13.00	-8.28
42931.02	50	MIMO	QPSK	V	261	56	-23.20	-13.00	-10.20



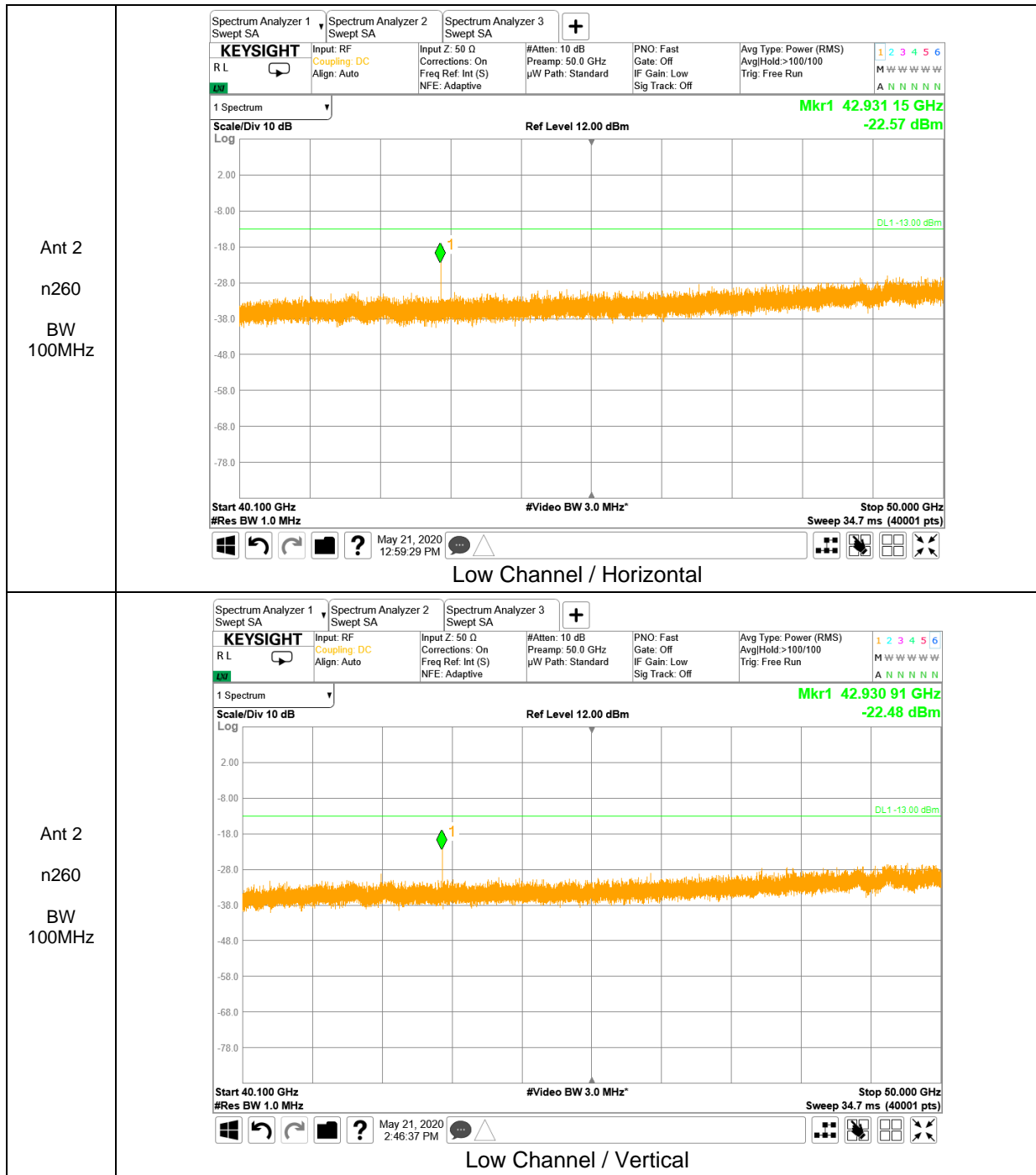
Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
44082.97	50	MIMO	QPSK	H	271	86	-29.75	-13.00	-16.75
44083.00	50	MIMO	QPSK	V	210	47	-25.24	-13.00	-12.24



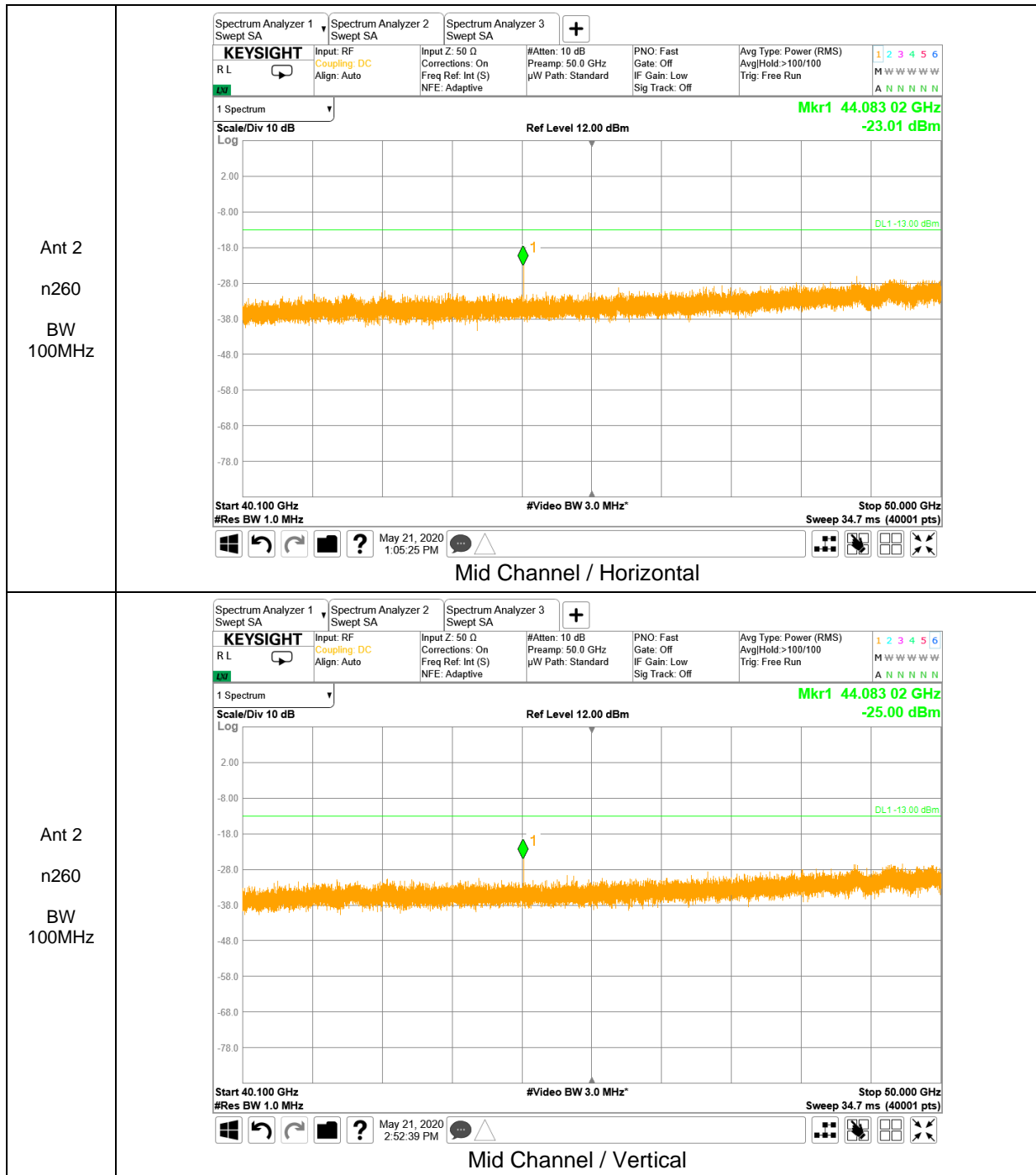
Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
46233.42	50	MIMO	QPSK	H	278	82	-28.86	-13.00	-15.86
46233.38	50	MIMO	QPSK	V	231	34	-27.64	-13.00	-14.64



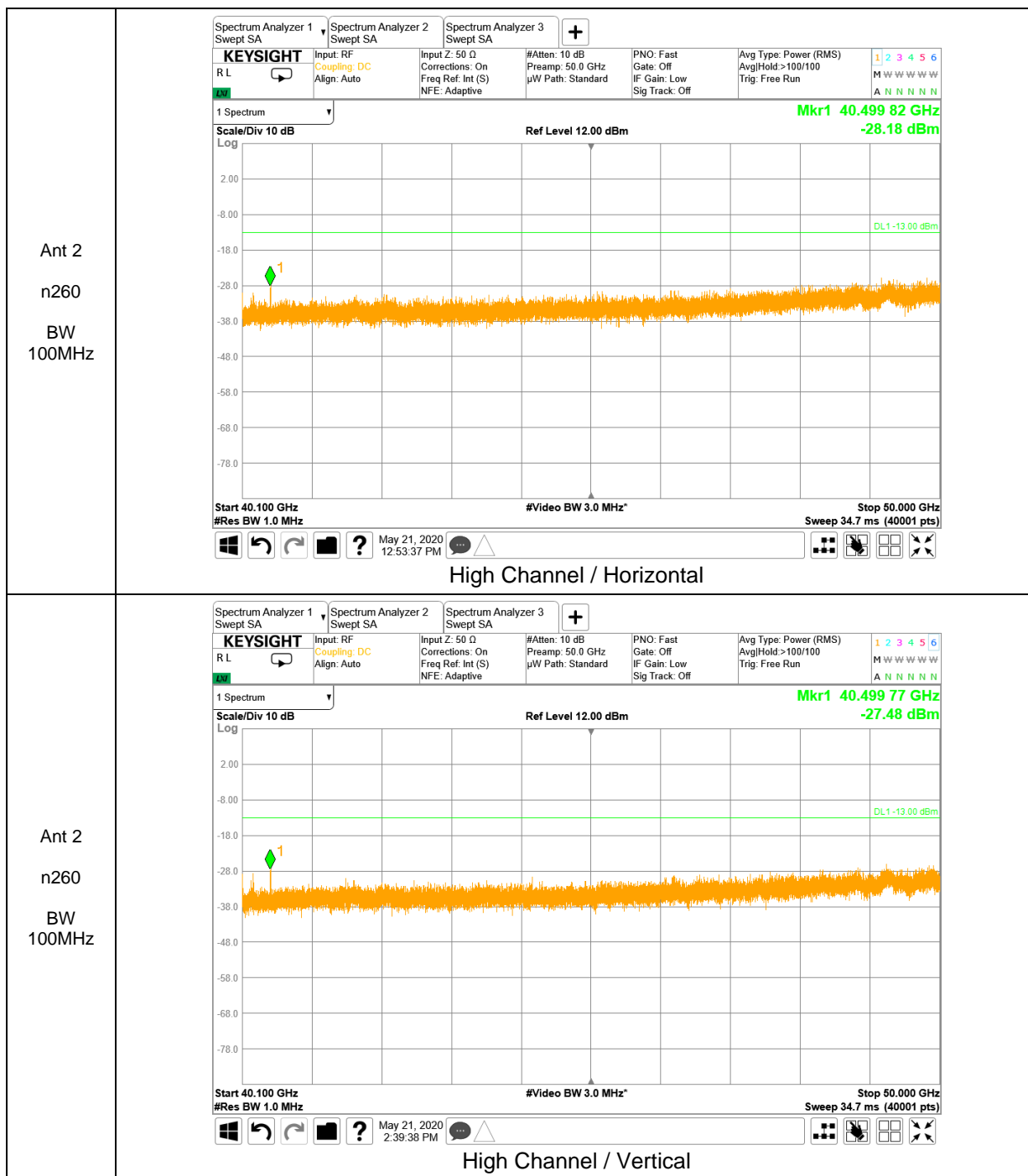
Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.04	100	MIMO	QPSK	H	237	79	-20.34	-13.00	-7.34
42931.07	100	MIMO	QPSK	V	265	65	-23.86	-13.00	-10.86



Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
44083.06	100	MIMO	QPSK	H	236	60	-24.84	-13.00	-11.84
44083.03	100	MIMO	QPSK	V	233	86	-27.28	-13.00	-14.28



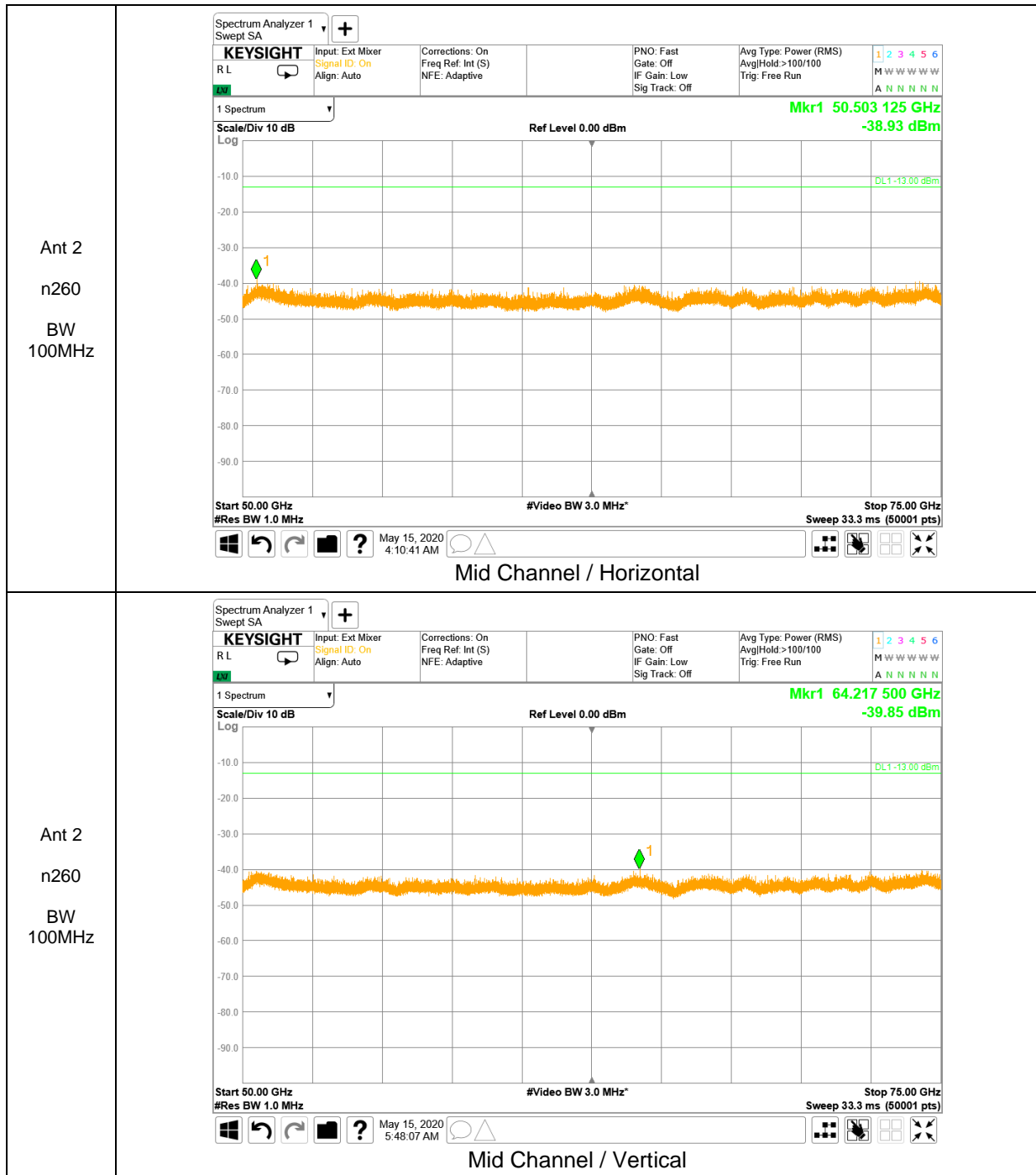
Final Measurement Data Table

Frequency [MHz]	Bandwidth [MHz]	EUT Beam	Modulation	Antenna Polarization [H/V]	X-Axis [degree]	Y-Axis [degree]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
40499.42	100	MIMO	QPSK	H	225	63	-33.73	-13.00	-20.73
40499.26	100	MIMO	QPSK	V	251	37	-32.21	-13.00	-19.21

50 – 75 GHz Result

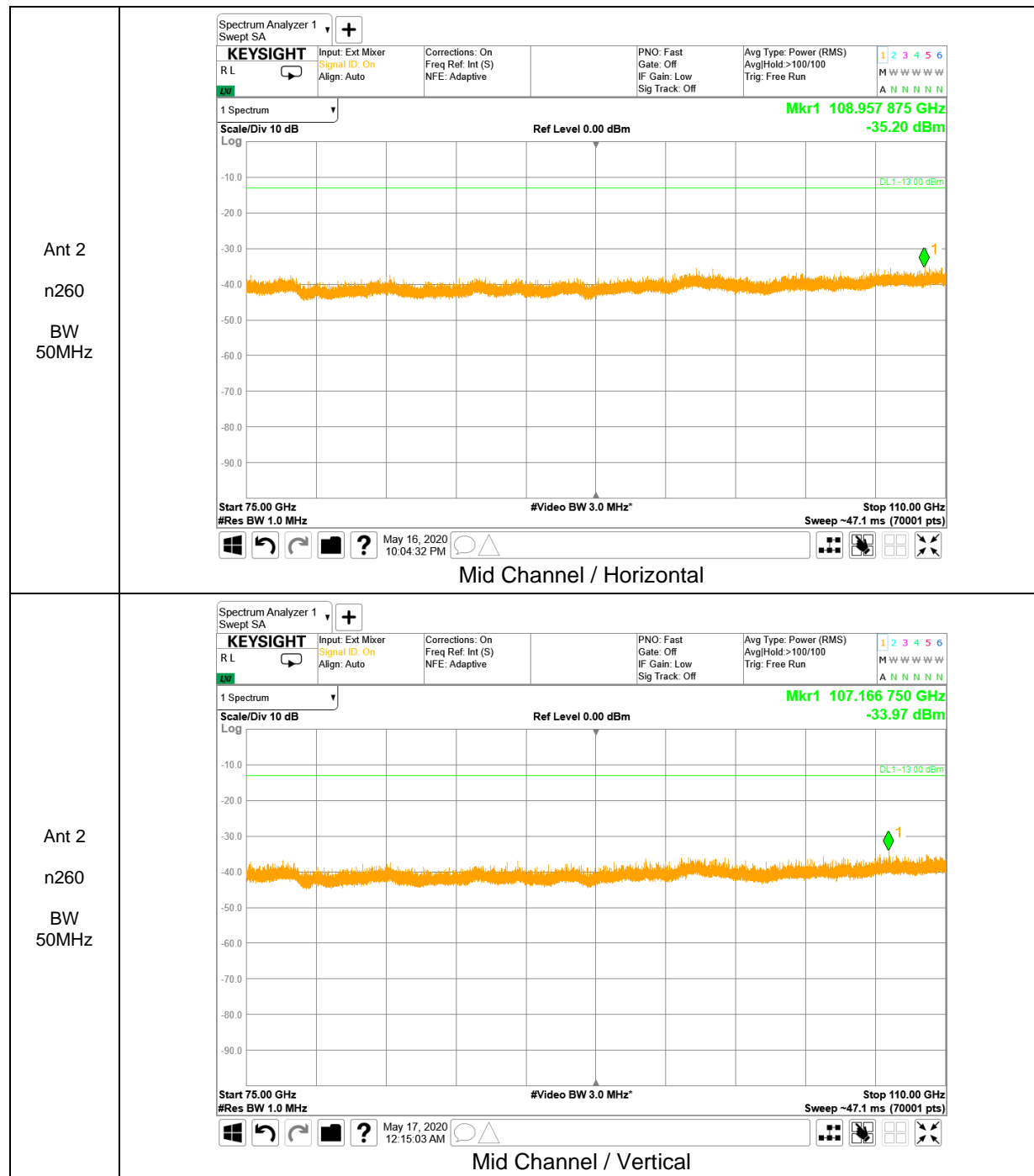


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

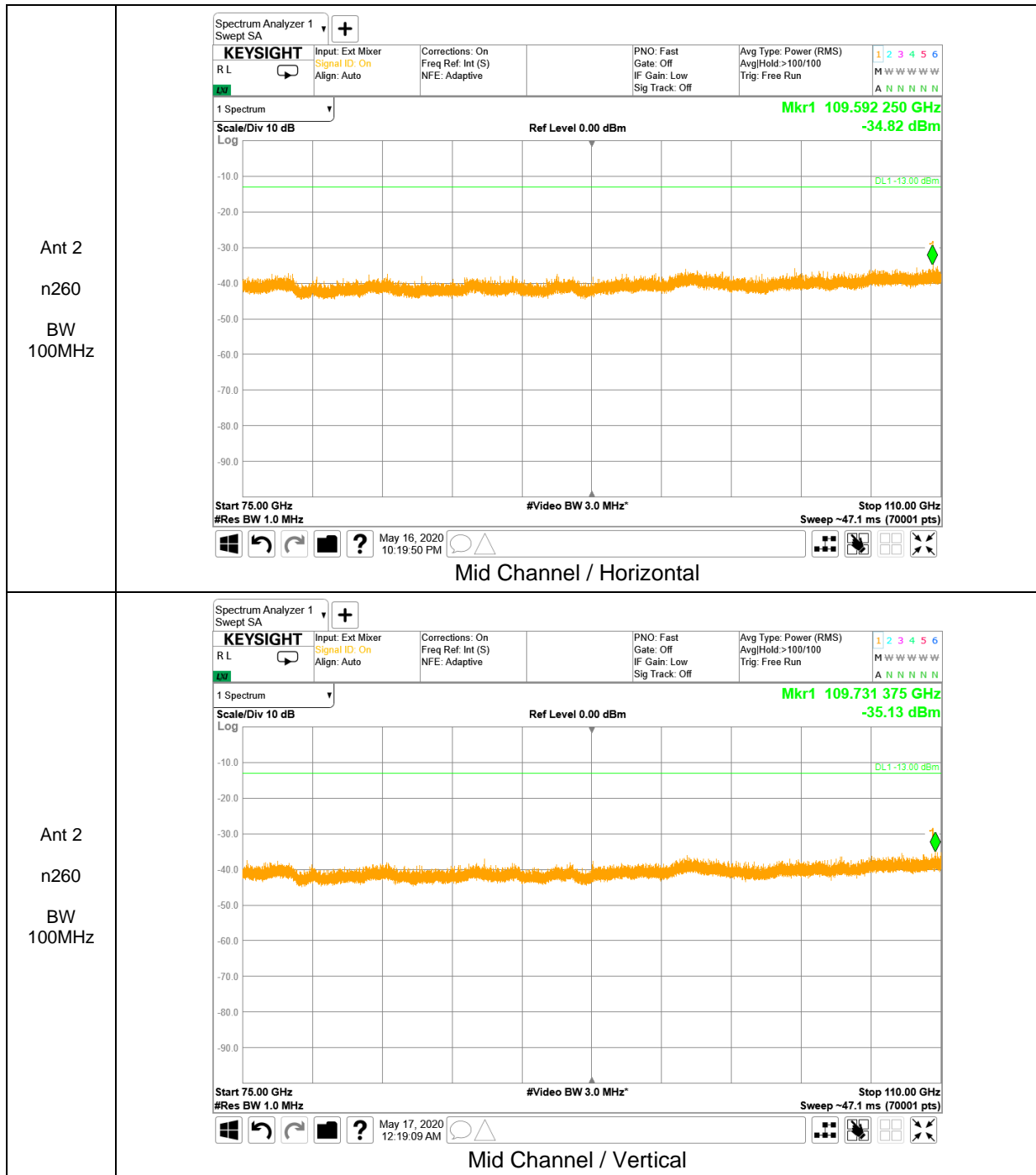


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

75 – 110 GHz Result



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



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

110 – 140 GHz Result

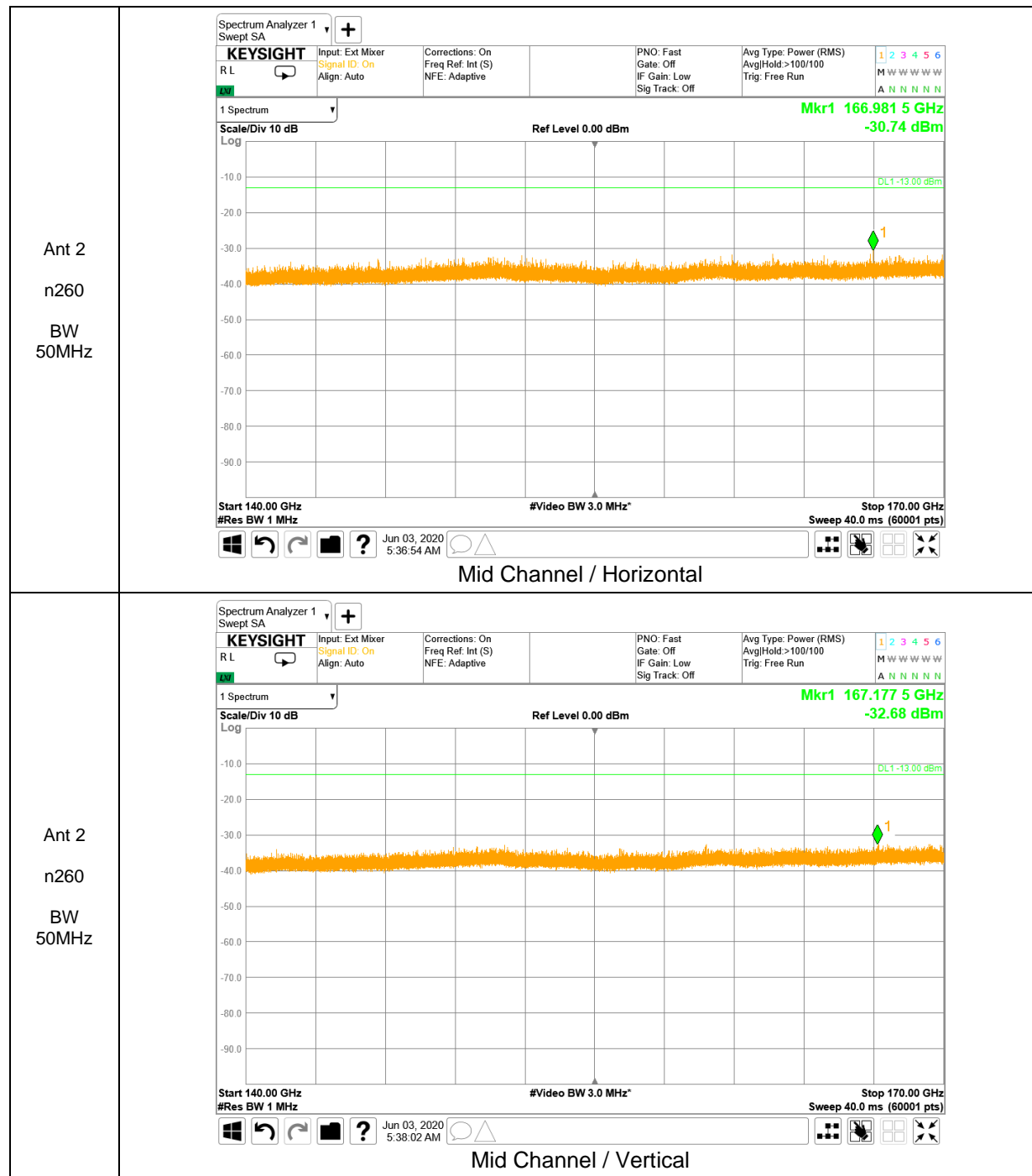


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

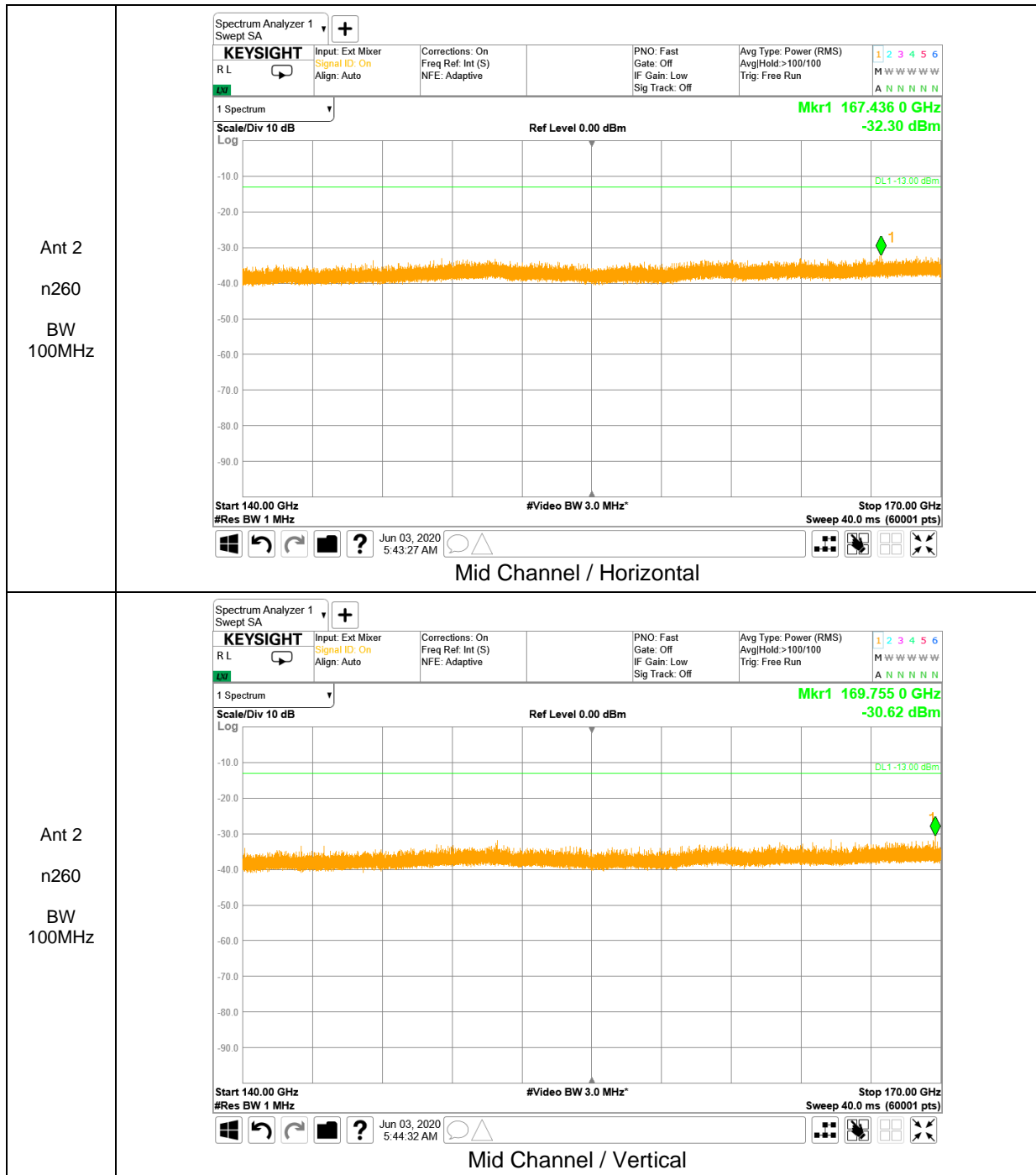


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

140 – 170 GHz Result

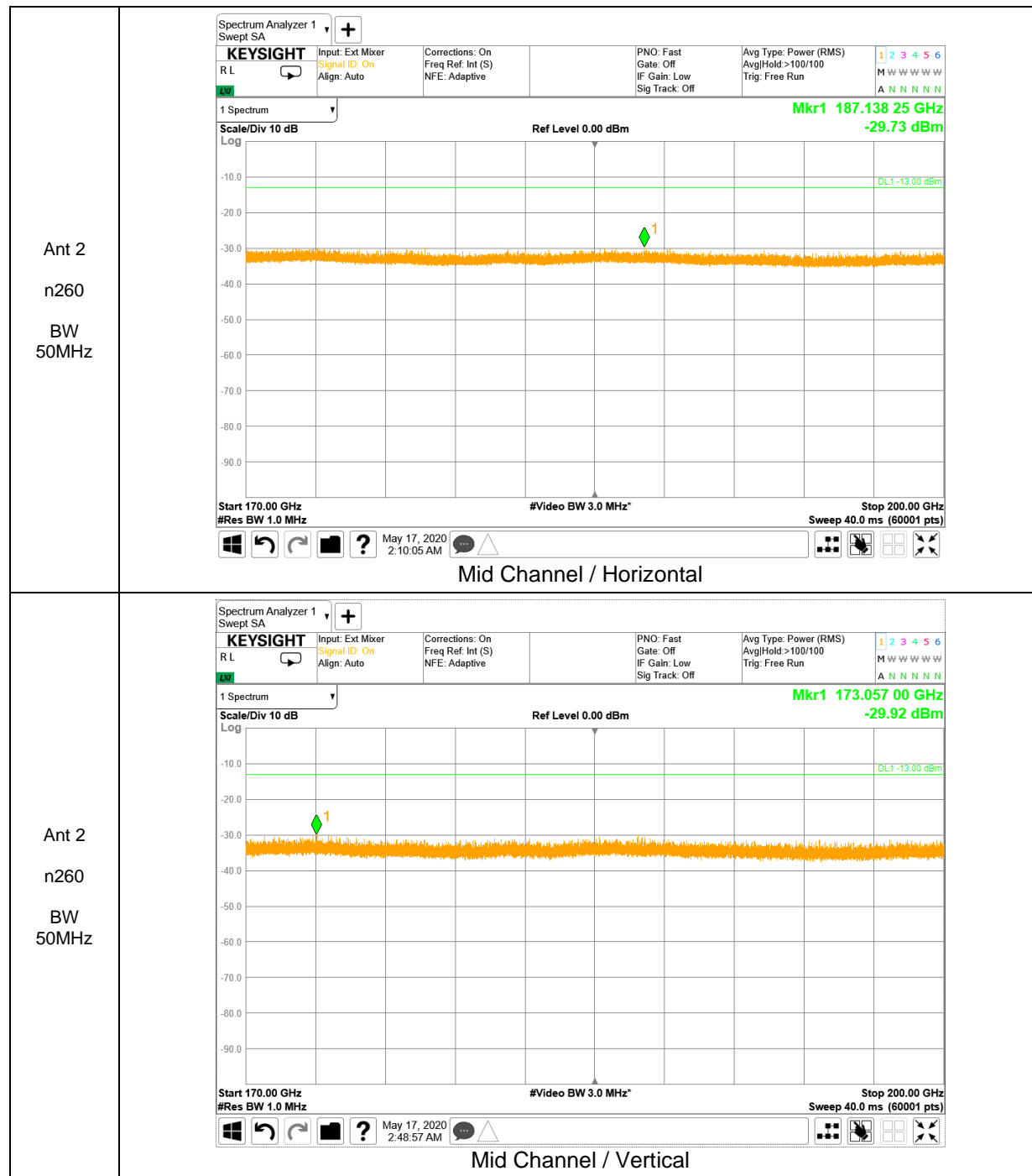


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

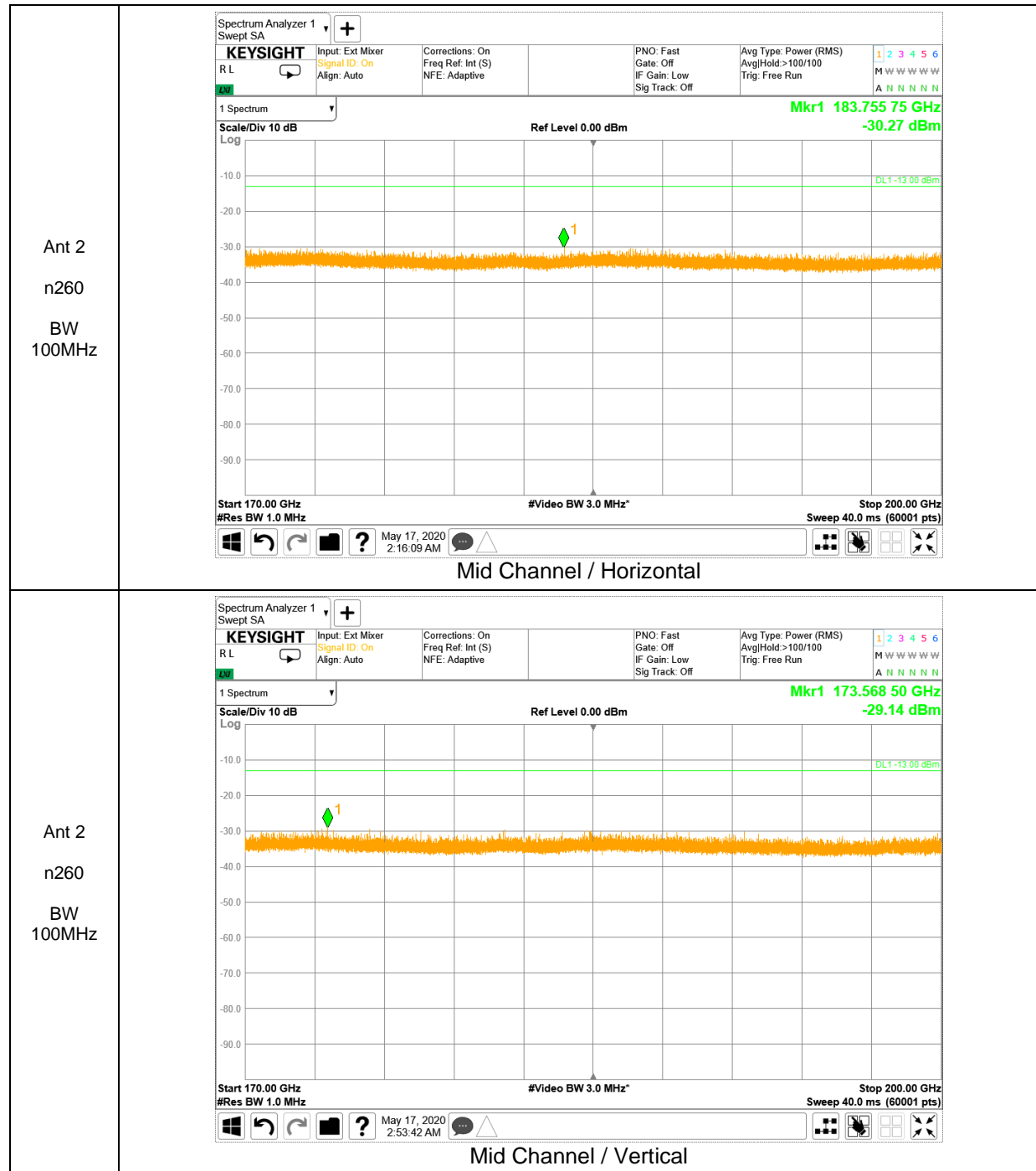


No emissions were detected above noise floor this antenna and band. Thus reported mid channel data.

170 – 200 GHz Result



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



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

7.5. 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 procedures 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 procedures 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 v01 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.

7.5.1. FREQUENCY STABILITY RESULTS

ANT 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	-0.706	-0.000003	28344.5200	-205.200	-0.000735
Extreme (50°C)		27509.8398	-216.360	-0.000775	28344.5198	-199.310	-0.000714
Extreme (40°C)		27509.8398	-196.480	-0.000704	28344.5197	-252.540	-0.000904
Extreme (30°C)		27509.8399	-86.661	-0.000310	28344.5199	-128.840	-0.000461
Extreme (10°C)		27509.8400	34.346	0.000123	28344.5202	174.690	0.000626
Extreme (0°C)		27509.8401	111.480	0.000399	28344.5203	286.690	0.001027
Extreme (-10°C)		27509.8404	383.700	0.001374	28344.5198	-205.170	-0.000735
Extreme (-20°C)		27509.8401	132.730	0.000475	28344.5199	-118.780	-0.000425
Extreme (-30°C)		27509.8404	427.600	0.001531	28344.5200	19.200	0.000069
Normal (20°C)	15%	27509.8398	51.234	0.000183	28344.5198	-150.790	-0.000540
	-15%	27509.8398	2.923	0.000010	28344.5198	-163.020	-0.000584
	End Point	27509.8399	86.579	0.000310	28344.5201	-147.550	-0.000528

ANT 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	-28.796	-0.000075	39991.2400	-122.250	-0.000318
Extreme (50°C)		37002.3197	-289.650	-0.000752	39991.2397	-292.820	-0.000761
Extreme (40°C)		37002.3197	-271.790	-0.000706	39991.2398	-201.970	-0.000525
Extreme (30°C)		37002.3198	-233.810	-0.000607	39991.2399	-115.790	-0.000301
Extreme (10°C)		37002.3200	10.226	0.000027	39991.2400	-41.008	-0.000107
Extreme (0°C)		37002.3201	142.830	0.000371	39991.2402	154.160	0.000400
Extreme (-10°C)		37002.3201	86.085	0.000224	39991.2403	324.370	0.000843
Extreme (-20°C)		37002.3201	117.720	0.000306	39991.2401	78.446	0.000204
Extreme (-30°C)		37002.3200	31.391	0.000082	39991.2400	-25.551	-0.000066
Normal (20°C)	15%	37002.3197	-30.841	-0.000080	39991.2399	-120.100	-0.000312
	-15%	37002.3197	-37.929	-0.000099	39991.2399	-61.268	-0.000159
	End Point	37002.3198	-45.279	-0.000118	39991.2400	-51.912	-0.000135

ANT 2, 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	84.145	0.000301	28344.5200	-272.460	-0.000976
Extreme (50°C)		27509.8398	-219.040	-0.000784	28344.5197	-284.470	-0.001019
Extreme (40°C)		27509.8398	-182.660	-0.000654	28344.5196	-350.310	-0.001254
Extreme (30°C)		27509.8400	14.816	0.000053	28344.5198	-163.310	-0.000585
Extreme (10°C)		27509.8402	235.860	0.000845	28344.5199	-74.387	-0.000266
Extreme (0°C)		27509.8403	293.250	0.001050	28344.5200	19.318	0.000069
Extreme (-10°C)		27509.8403	336.750	0.001206	28344.5201	54.537	0.000195
Extreme (-20°C)		27509.8403	325.490	0.001166	28344.5200	-18.548	-0.000066
Extreme (-30°C)		27509.8403	344.710	0.001234	28344.5201	120.950	0.000433
Normal (20°C)	15%	27509.8398	110.280	0.000395	28344.5196	-403.720	-0.001446
	-15%	27509.8398	76.454	0.000274	28344.5197	-332.170	-0.001190
	End Point	27509.8400	85.382	0.000306	28344.5201	-387.440	-0.001387

ANT 2, 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	341.460	0.000887	39991.2400	-5.268	-0.000014
Extreme (50°C)		37002.3198	-246.520	-0.000640	39991.2396	-381.210	-0.000990
Extreme (40°C)		37002.3198	-212.930	-0.000553	39991.2398	-229.090	-0.000595
Extreme (30°C)		37002.3198	-219.850	-0.000571	39991.2398	-219.510	-0.000570
Extreme (10°C)		37002.3200	5.157	0.000013	39991.2400	-35.227	-0.000091
Extreme (0°C)		37002.3201	113.580	0.000295	39991.2401	123.430	0.000321
Extreme (-10°C)		37002.3202	245.030	0.000636	39991.2403	324.860	0.000844
Extreme (-20°C)		37002.3202	225.340	0.000585	39991.2403	257.870	0.000670
Extreme (-30°C)		37002.3204	398.050	0.001034	39991.2402	169.830	0.000441
Normal (20°C)	15%	37002.3198	475.280	0.001234	39991.2400	24.651	0.000064
	-15%	37002.3198	349.060	0.000907	39991.2400	-8.840	-0.000023
	End Point	37002.3198	387.370	0.001006	39991.2404	-24.102	-0.000063

8. Appendix A

8.1. 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®num_specified=N&test_firm_id=7730.

8.2. VDI Mixer Certificate Report

Model : N9029AV15, S/N : SAX486



- Certificate No : IC-2020-04726-R1
 - Calibration No : C-2020-005722

page : 1 of 4

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

: 2020.01.22 The due date of next Calibration : 2021.01.22

4. Environment

- Temperature : (23.4 ± 0.1) °C - Humidity : (50 ± 2) % 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	2020/10/02	HCT CO., LTD.
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	HCT CO., LTD.
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2021/01/03	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2020/09/09	HCT CO., LTD.
WR-19 MULTIPLIER SOURCE MODULE	OML S19MS-A	160516-1	2020/09/09	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		Approved by	
	Name : Meenji Park		Title Technical Cal. Manager Name Seungchan Lee	

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

2020. 06. 02

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.

F-02P-02-014 (Rev.00)



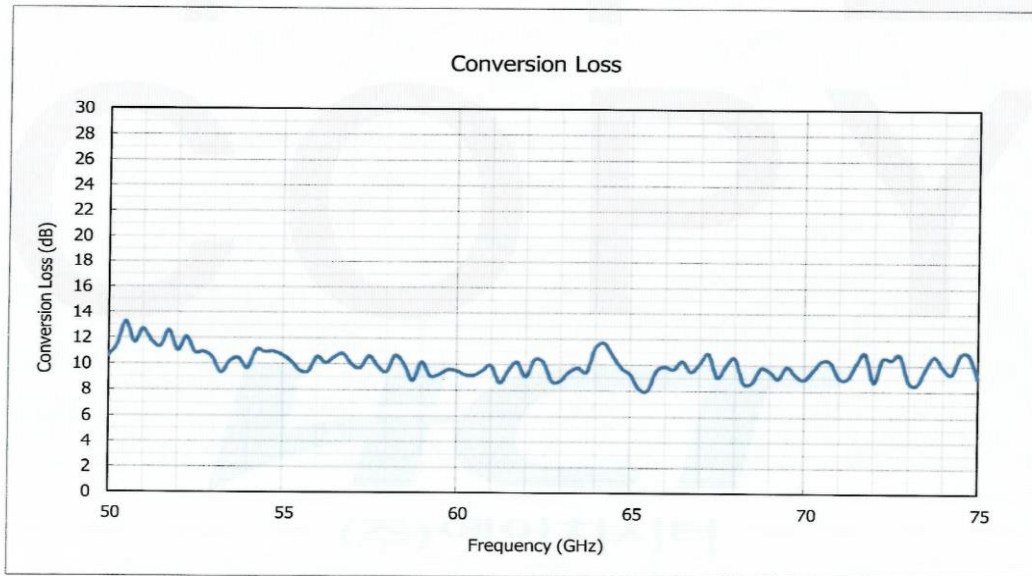
CALIBRATION RESULT



Certificate No : IC-2020-04726-R1
Calibration No : C-2020-005722

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1. Conversion Loss Graph



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

F-02P-02-014 (Rev.00)



CALIBRATION RESULT



Certificate No : IC-2020-04726-R1
 Calibration No : C-2020-005722

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2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
50.0	10.63	0.89	57.5	10.63	0.82
50.3	11.46	0.89	57.8	9.86	0.82
50.5	13.29	0.89	58.0	9.43	0.82
50.8	11.66	0.89	58.3	10.68	0.82
51.0	12.70	0.89	58.5	10.01	0.82
51.3	11.79	0.89	58.8	8.76	0.82
51.5	11.34	0.89	59.0	10.18	0.82
51.8	12.57	0.89	59.3	9.09	0.82
52.0	11.04	0.89	59.5	9.21	0.82
52.3	12.08	0.89	59.8	9.59	0.82
52.5	10.90	0.89	60.0	9.53	0.82
52.8	10.94	0.89	60.3	9.21	0.82
53.0	10.49	0.89	60.5	9.16	0.82
53.3	9.33	0.89	60.8	9.53	0.82
53.5	10.23	0.89	61.0	9.93	0.82
53.8	10.44	0.89	61.3	8.59	0.82
54.0	9.68	0.89	61.5	9.56	0.82
54.3	11.07	0.89	61.8	10.20	0.82
54.5	10.93	0.89	62.0	9.05	0.82
54.8	10.96	0.89	62.3	10.39	0.82
55.0	10.69	0.89	62.5	10.20	0.82
55.3	10.21	0.89	62.8	8.71	0.82
55.5	9.52	0.89	63.0	8.77	0.82
55.8	9.45	0.89	63.3	9.46	0.82
56.0	10.57	0.89	63.5	9.76	0.82
56.3	10.10	0.82	63.8	9.45	0.82
56.5	10.56	0.82	64.0	11.34	0.82
56.8	10.80	0.82	64.3	11.69	0.82
57.0	9.97	0.82	64.5	10.69	0.82
57.3	9.73	0.82	64.8	9.77	0.82

F-02P-02-014 (Rev.00)



CALIBRATION RESULT



Certificate No : IC-2020-04726-R1
 Calibration No : C-2020-005722

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2. Conversion Loss Data (cont.)

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
65.0	9.26	0.82	70.3	9.60	0.82
65.3	8.18	0.82	70.5	10.35	0.82
65.5	8.04	0.82	70.8	10.25	0.82
65.8	9.55	0.82	71.0	9.05	0.82
66.0	9.89	0.82	71.3	9.02	0.82
66.3	9.67	0.82	71.5	10.15	0.82
66.5	10.32	0.82	71.8	10.95	0.82
66.8	9.50	0.82	72.0	8.73	0.82
67.0	10.12	0.82	72.3	10.54	0.82
67.3	10.88	0.82	72.5	10.47	0.82
67.5	9.07	0.82	72.8	10.81	0.82
67.8	9.93	0.82	73.0	8.74	0.82
68.0	10.56	0.82	73.3	8.58	0.82
68.3	8.63	0.82	73.5	9.84	0.82
68.5	8.66	0.82	73.8	10.73	0.82
68.8	9.78	0.82	74.0	9.87	0.82
69.0	9.55	0.82	74.3	9.37	0.82
69.3	8.98	0.82	74.5	10.87	0.82
69.5	9.91	0.82	74.8	10.86	0.82
69.8	9.21	0.82	75.0	9.07	0.82
70.0	8.91	0.82	-	-	-

END.

F-02P-02-014 (Rev.00)

Model : N9029AV10, S/N : SAX388



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-2020-04731-R1
 - Calibration No : C-2020-005727

page : 1 of 4

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 : 376593
 - Description : SA EXTENSION MODULE
 - Manufacturer and Model Name : VDI / SAX WR10
 - Serial Number : SAX388

3. Date of Calibration

: 2020.01.22 The due date of next Calibration : 2021.01.22

4. Environment

- Temperature : (22.6 ± 0.2) °C - Humidity : (46 ± 1) % 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	2020/10/02	HCT CO., LTD.
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	HCT CO., LTD.
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2020/12/30	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2020/09/09	HCT CO., LTD.
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	164019-1	2020/09/09	HCT CO., LTD.

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, k = 2)

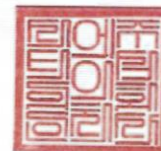
affirmation	Measurements performed by		Approved by	
	Name : Meenji Park		Title : Technical Cal. Manager Name : Seungchan Lee	

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

2020. 06. 02

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.

F-02P-02-014 (Rev.00)



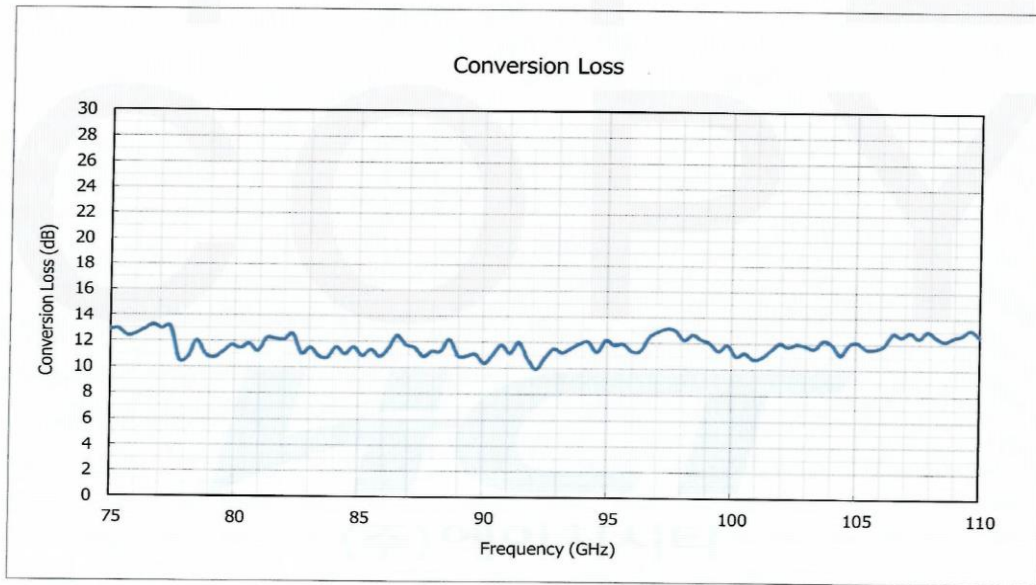
CALIBRATION RESULT



Certificate No : IC-2020-04731-R1
Calibration No : C-2020-005727

page : 2 of 4

1. Conversion Loss Graph



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

F-02P-02-014 (Rev.00)



CALIBRATION RESULT



Certificate No : IC-2020-04731-R1
 Calibration No : C-2020-005727

page : 3 of 4

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
75.0	12.90	0.89	85.5	11.39	0.82
75.4	12.94	0.89	85.9	10.86	0.82
75.7	12.40	0.89	86.2	11.47	0.82
76.1	12.55	0.89	86.6	12.48	0.82
76.4	12.91	0.89	86.9	11.77	0.82
76.8	13.25	0.89	87.3	11.58	0.82
77.1	12.98	0.89	87.6	10.87	0.82
77.5	13.11	0.89	88.0	11.27	0.82
77.8	10.53	0.89	88.3	11.27	0.82
78.2	10.76	0.89	88.7	12.18	0.82
78.5	12.04	0.89	89.0	10.93	0.82
78.9	11.00	0.89	89.4	10.91	0.82
79.2	10.74	0.89	89.7	11.06	0.82
79.6	11.17	0.89	90.1	10.37	0.82
79.9	11.69	0.89	90.4	11.03	0.82
80.3	11.48	0.89	90.8	11.79	0.82
80.6	11.81	0.89	91.1	11.15	0.82
81.0	11.25	0.89	91.5	12.00	0.82
81.3	12.25	0.89	91.8	10.72	0.82
81.7	12.20	0.89	92.2	9.94	0.82
82.0	12.15	0.89	92.5	10.82	0.82
82.4	12.57	0.89	92.9	11.51	0.82
82.7	11.06	0.89	93.2	11.21	0.82
83.1	11.53	0.89	93.6	11.57	0.82
83.4	10.86	0.89	93.9	11.92	0.82
83.8	10.78	0.82	94.3	12.06	0.82
84.1	11.59	0.82	94.6	11.26	0.82
84.5	11.03	0.82	95.0	12.19	0.82
84.8	11.59	0.82	95.3	11.83	0.82
85.2	10.92	0.82	95.7	11.91	0.82

F-02P-02-014 (Rev.00)



CALIBRATION RESULT



Certificate No : IC-2020-04731-R1
 Calibration No : C-2020-005727

page : 4 of 4

2. Conversion Loss Data (cont.)

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
96.0	11.36	0.82	103.4	11.64	0.82
96.4	11.40	0.82	103.7	12.25	0.82
96.7	12.46	0.82	104.1	11.97	0.82
97.1	12.87	0.82	104.4	11.16	0.82
97.4	13.13	0.82	104.8	11.99	0.82
97.8	13.00	0.82	105.1	12.10	0.82
98.1	12.26	0.82	105.5	11.63	0.82
98.5	12.67	0.82	105.8	11.65	0.82
98.8	12.30	0.82	106.2	11.94	0.82
99.2	12.02	0.82	106.5	12.82	0.82
99.5	11.40	0.82	106.9	12.60	0.82
99.9	11.90	0.82	107.2	12.92	0.82
100.2	11.02	0.82	107.6	12.48	0.82
100.6	11.27	0.82	107.9	13.03	0.82
100.9	10.79	0.82	108.3	12.56	0.82
101.3	10.97	0.82	108.6	12.27	0.82
101.6	11.50	0.82	109.0	12.55	0.82
102.0	12.04	0.82	109.3	12.75	0.82
102.3	11.76	0.82	109.7	13.13	0.82
102.7	12.00	0.82	110.0	12.66	0.82
103.0	11.84	0.82	-	-	-

END.

F-02P-02-014 (Rev.00)

Model : N9029AV06, S/N : SAX483



점검성적서

CHECK REPORTS

경기도 이천시 마장면 서이천로 578번길 74
 Tel : 031-645-6900, Fax : 031-645-6969

page : 1 of 4

성적서발급번호(Certificate No) : IC-2020-04724-R2
 점검번호(Checks No) : C-2020-005720

1. 의뢰자 (Client)
 - 기관명 (Name) : UL Korea, Ltd.
 - 주소 (Address) : Suwon Test Site: UL Korea, Ltd. Suwon Laboratory218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea
2. 측정기 (Check Subject) ◇ 등록번호 : 376587
 - 기기명 (Description) : SA EXTENSION MODULE
 - 제작회사 및 형식 (Manufacturer and Model Name) : VDI / SAX WR6.5
 - 기기번호 (Serial Number) : SAX483
3. 점검일자 (Date of Check) : 2020.01.22
4. 점검환경 (Environment Conditions)
 - 온도(Temperature) : (22.6 ± 0.2) °C - 습도(Humidity) : (46 ± 1) % R.H.
 - 점검장소 (Location) : Permanent Calibration Lab
 (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)
5. 측정표준의 소급성 (Traceability)
 - 점검방법 및 소급성 서술 (Check method and/or brief description)

The above equipment was checked with the following equipment according to the customer's requirements.

점검에 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	2020/10/02	HCT CO., LTD.
ERICKSON POWER METER	VDI PMS	394V	CHECK	HCT CO., LTD.
WR-05 MULTIPLIER SOURCE MODULE	OML S05MS-A	160419-1	CHECK	HCT CO., LTD.
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	160419-1	CHECK	HCT CO., LTD.

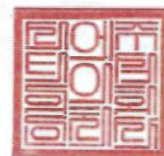
6. 점검결과 (Check result) : 점검결과 참조 (Refer to attachment)

확 인 (affirmation)	작성자 (checks performed by)		승인자 (Approved by)	
	성명 (Name) : Meenji Park		직위 (Title) : 기술책임자 (Technical Cal. Manager) (장)	
			성명 (Name) : Seungchan Lee	

2020. 06. 02



(주)에이치시티 대표이사
 President, HCT Co., Ltd.



본 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.

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

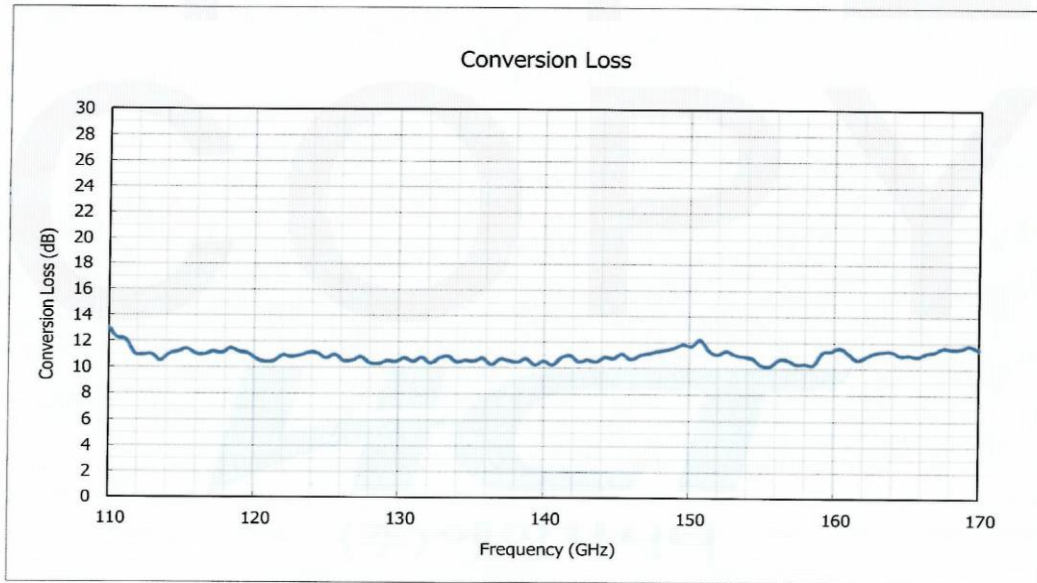


CHECK RESULT

page : 2 of 4

Certificate No : IC-2020-04724-R2
Checks No : C-2020-005720

1. Conversion Loss Graph



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

Note 2)

- 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)



CHECK RESULT

page : 3 of 4

Certificate No : IC-2020-04724-R2

Checks No : C-2020-005720

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
110.0	13.0	0.82	128.0	10.4	0.82
110.6	12.3	0.82	128.6	10.3	0.82
111.2	12.1	0.82	129.2	10.5	0.82
111.8	11.1	0.82	129.8	10.5	0.82
112.4	11.0	0.82	130.4	10.8	0.82
113.0	11.0	0.82	131.0	10.5	0.82
113.6	10.5	0.82	131.6	10.8	0.82
114.2	11.0	0.82	132.2	10.4	0.82
114.8	11.2	0.82	132.8	10.7	0.82
115.4	11.4	0.82	133.4	10.9	0.82
116.0	11.1	0.82	134.0	10.5	0.82
116.6	11.0	0.82	134.6	10.6	0.82
117.2	11.2	0.82	135.2	10.5	0.82
117.8	11.1	0.82	135.8	10.7	0.82
118.4	11.5	0.82	136.4	10.3	0.82
119.0	11.2	0.82	137.0	10.7	0.82
119.6	11.1	0.82	137.6	10.6	0.82
120.2	10.7	0.82	138.2	10.5	0.82
120.8	10.4	0.82	138.8	10.7	0.82
121.4	10.5	0.82	139.4	10.2	0.82
122.0	10.9	0.82	140.0	10.6	0.82
122.6	10.8	0.82	140.6	10.2	0.82
123.2	10.9	0.82	141.2	10.8	0.82
123.8	11.1	0.82	141.8	11.0	0.82
124.4	11.1	0.82	142.4	10.5	0.82
125.0	10.7	0.82	143.0	10.6	0.82
125.6	11.0	0.82	143.6	10.5	0.82
126.2	10.5	0.82	144.2	10.8	0.82
126.8	10.6	0.82	144.8	10.8	0.82
127.4	10.8	0.82	145.4	11.1	0.82

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



CHECK RESULT

page : 4 of 4

Certificate No : IC-2020-04724-R2
Checks No : C-2020-005720

2. Conversion Loss Data (cont.)

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
146.0	10.7	0.82	158.6	10.3	0.82
146.6	11.0	0.82	159.2	11.3	0.82
147.2	11.1	0.82	159.8	11.4	0.82
147.8	11.3	0.82	160.4	11.6	0.82
148.4	11.4	0.82	161.0	11.2	0.82
149.0	11.6	0.82	161.6	10.7	0.82
149.6	11.8	0.82	162.2	10.9	0.82
150.2	11.7	0.82	162.8	11.2	0.82
150.8	12.2	0.82	163.4	11.3	0.82
151.4	11.4	0.82	164.0	11.3	0.82
152.0	11.1	0.82	164.6	11.0	0.82
152.6	11.3	0.82	165.2	11.1	0.82
153.2	11.1	0.82	165.8	11.0	0.82
153.8	10.9	0.82	166.4	11.2	0.82
154.4	10.8	0.82	167.0	11.3	0.82
155.0	10.3	0.82	167.6	11.6	0.82
155.6	10.2	0.82	168.2	11.5	0.82
156.2	10.7	0.82	168.8	11.6	0.82
156.8	10.7	0.82	169.4	11.8	0.82
157.4	10.4	0.82	170.0	11.5	0.82
158.0	10.4	0.82	-	-	-

END.

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

Model : N9029AV04, S/N : SAX487



점검성적서

CHECK REPORTS

경기도 이천시 마장면 서이천로 578번길 74
 Tel : 031-645-6900, Fax : 031-645-6969

성적서발급번호(Certificate No) : IC-2020-04730-R3
 점검번호(Checks No) : C-2020-005726

페이지(page) : 1 of 4

1. 의뢰자 (Client)
 - 기관명 (Name) : UL Korea, Ltd.
 - 주소 (Address) : Suwon Test Site: UL Korea, Ltd. Suwon Laboratory 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea
2. 측정기 (Check Subject) ◇ 등록번호 : 376591
 - 기기명 (Description) : SA EXTENTION MODULE
 - 제작회사 및 형식 (Manufacturer and Model Name) : VDI / SAX WR4.5
 - 기기번호 (Serial Number) : SAX487
3. 점검일자 (Date of Check) : 2020.01.22
4. 점검환경 (Environment Conditions)
 - 온도(Temperature) : (22.4 ± 0.2) °C - 습도(Humidity) : (45 ± 3) % R.H.
 - 점검장소 (Location) : Permanent Calibration Lab
 (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)
5. 측정표준의 소급성 (Traceability)
 - 점검방법 및 소급성 서술 (Check method and/or brief description)

The above equipment was checked with the following equipment according to the customer's requirements.

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

기기명 (Description)	제조회사 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	2020/10/02	HCT CO., LTD.
ERICKSON POWER METER	VDI PMS	394V	CHECK	HCT CO., LTD.
WR-03 MULTIPLIER SOURCE MODULE	OML S03MS-A	160419-1	CHECK	HCT CO., LTD.
WR-05 MULTIPLIER SOURCE MODULE	OML S05MS-A	160419-1	CHECK	HCT CO., LTD.

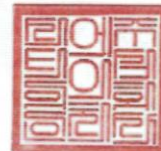
6. 점검결과 (Check result) : 점검결과 참조 (Refer to attachment)

확 인 (affirmation)	작성자 (checks performed by)		승인자 (Approved by)
	성명 (Name) : Meenji Park		직위 (Title) 기술책임자(Technical Cal. Manager) (정) 성명 (Name) Seungchan Lee

2020. 06. 02



(주)에이치시티 대표이사
 President, HCT Co., Ltd.



(주) 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.

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

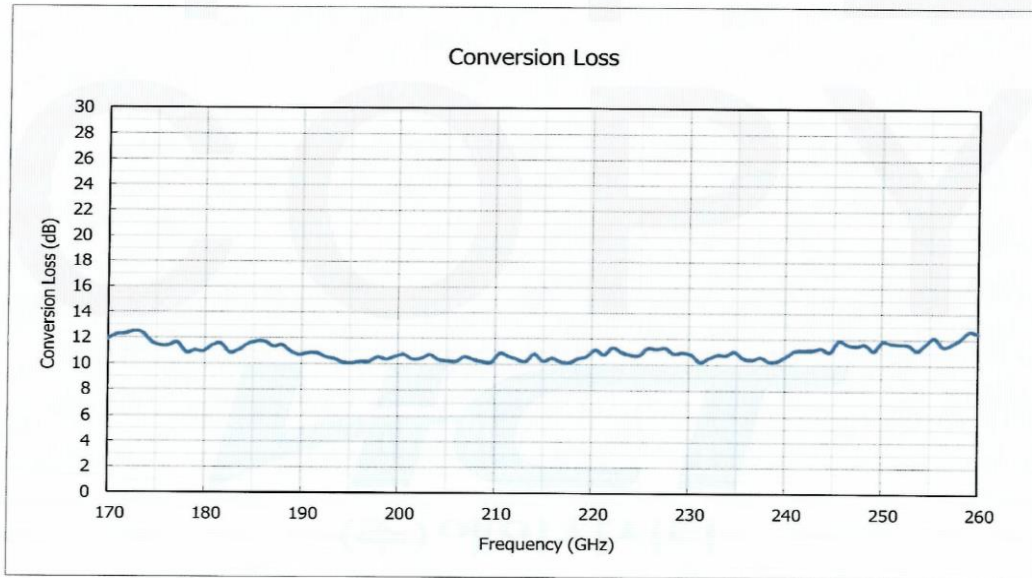


CHECK RESULT

page : 2 of 4

Certificate No : IC-2020-04730-R3
Checks No : C-2020-005726

1. Conversion Loss Graph



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

Note 2)

- 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)



CHECK RESULT

page : 3 of 4

Certificate No : IC-2020-04730-R3

Checks No : C-2020-005726

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
170.0	11.92	0.98	197.0	10.21	0.98
170.9	12.23	0.98	197.9	10.55	0.98
171.8	12.32	0.98	198.8	10.36	0.98
172.7	12.48	0.98	199.7	10.59	0.98
173.6	12.36	0.98	200.6	10.75	0.98
174.5	11.67	0.98	201.5	10.39	0.98
175.4	11.39	0.98	202.4	10.45	0.98
176.3	11.42	0.98	203.3	10.73	0.98
177.2	11.63	0.98	204.2	10.36	0.98
178.1	10.86	0.98	205.1	10.27	0.98
179.0	11.02	0.98	206.0	10.24	0.98
179.9	10.95	0.98	206.9	10.59	0.98
180.8	11.43	0.98	207.8	10.36	0.98
181.7	11.54	0.98	208.7	10.22	0.98
182.6	10.87	0.98	209.6	10.15	0.98
183.5	11.05	0.98	210.5	10.85	0.98
184.4	11.51	0.98	211.4	10.64	0.98
185.3	11.72	0.98	212.3	10.40	0.98
186.2	11.72	0.98	213.2	10.25	0.98
187.1	11.35	0.98	214.1	10.81	0.98
188.0	11.45	0.98	215.0	10.27	0.98
188.9	10.95	0.98	215.9	10.50	0.98
189.8	10.69	0.98	216.8	10.24	0.98
190.7	10.85	0.98	217.7	10.15	0.98
191.6	10.83	0.98	218.6	10.47	0.98
192.5	10.55	0.98	219.5	10.64	0.98
193.4	10.40	0.98	220.4	11.13	0.98
194.3	10.11	0.98	221.3	10.77	0.98
195.2	10.07	0.98	222.2	11.31	0.98
196.1	10.19	0.98	223.1	10.97	0.98

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CHECK RESULT

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2. Conversion Loss Data (cont.)

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
224.0	10.76	0.98	242.9	11.17	0.98
224.9	10.72	0.98	243.8	11.30	0.98
225.8	11.27	0.98	244.7	11.03	0.98
226.7	11.21	0.98	245.6	11.90	0.98
227.6	11.31	0.98	246.5	11.60	0.98
228.5	10.87	0.98	247.4	11.49	0.98
229.4	10.94	0.98	248.3	11.62	0.98
230.3	10.80	0.98	249.2	11.13	0.98
231.2	10.22	0.98	250.1	11.85	0.98
232.1	10.51	0.98	251.0	11.71	0.98
233.0	10.78	0.98	251.9	11.64	0.98
233.9	10.75	0.98	252.8	11.59	0.98
234.8	11.02	0.98	253.7	11.17	0.98
235.7	10.53	0.98	254.6	11.69	0.98
236.6	10.41	0.98	255.5	12.14	0.98
237.5	10.60	0.98	256.4	11.47	0.98
238.4	10.27	0.98	257.3	11.68	0.98
239.3	10.33	0.98	258.2	12.07	0.98
240.2	10.72	0.98	259.1	12.64	0.98
241.1	11.11	0.98	260.0	12.50	0.98
242.0	11.14	0.98	-	-	-

END.

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END OF TEST REPORT