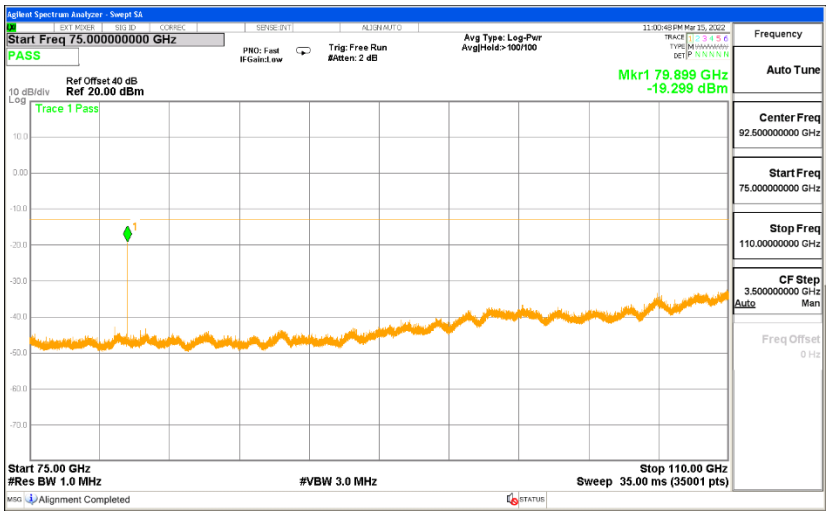
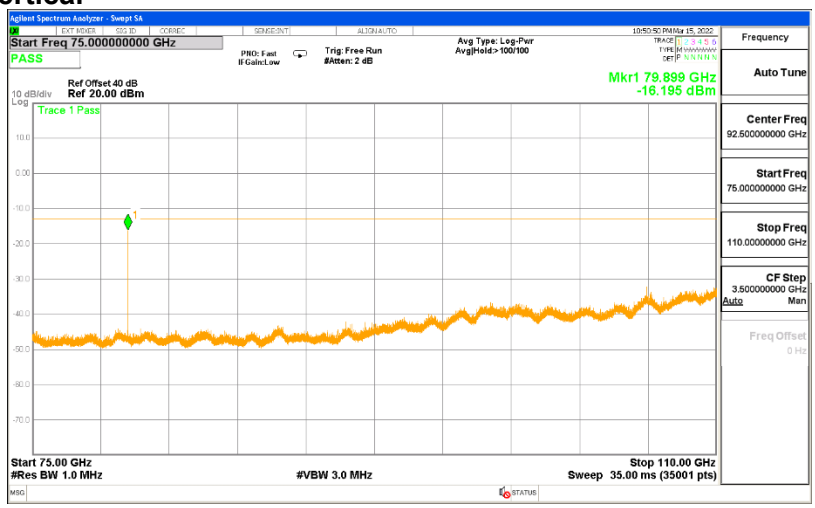
75 - 110 GHz, ANT M3 (Pre-scan using Pk Det.)
Horizontal



75 - 110 GHz, ANT M3 (Pre-scan using Pk Det.)
Vertical



Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

UL VERIFICATION SERVICES INC
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
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75 - 110 GHz n260, 1CC

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M2	76.999	1	H	-45.13	-13	-32.13
M2	76.999	1	V	-33.60	-13	-20.60
M3	79.899	1	H	-19.51	-13	-6.51
M3	79.899	1	V	-31.95	-13	-18.95

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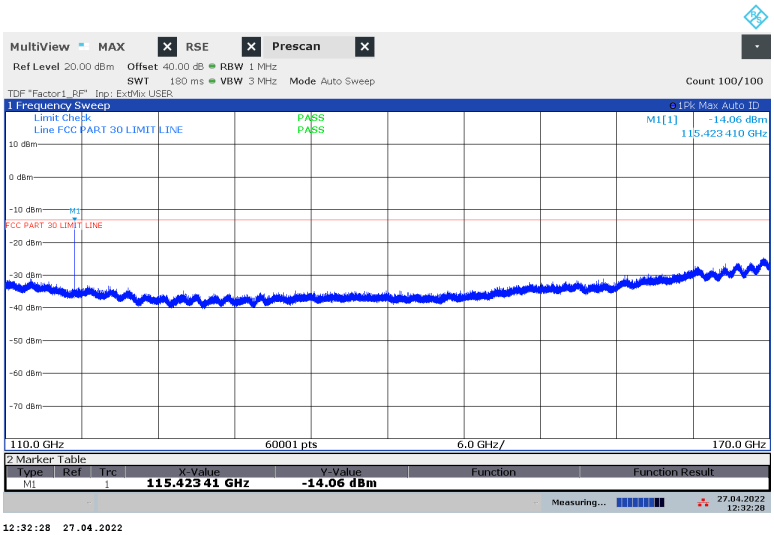
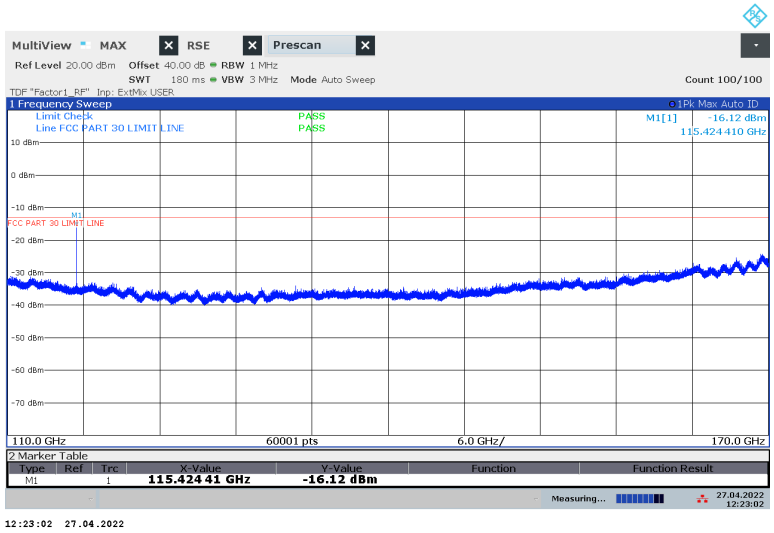
8.4.39. RSE n260 110 - 170 GHz

110 - 170 GHz, ANT M2 (Pre-scan using Pk Det.)
Horizontal



110 - 170 GHz, ANT M2 (Pre-scan using Pk Det.)
Vertical



Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

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47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
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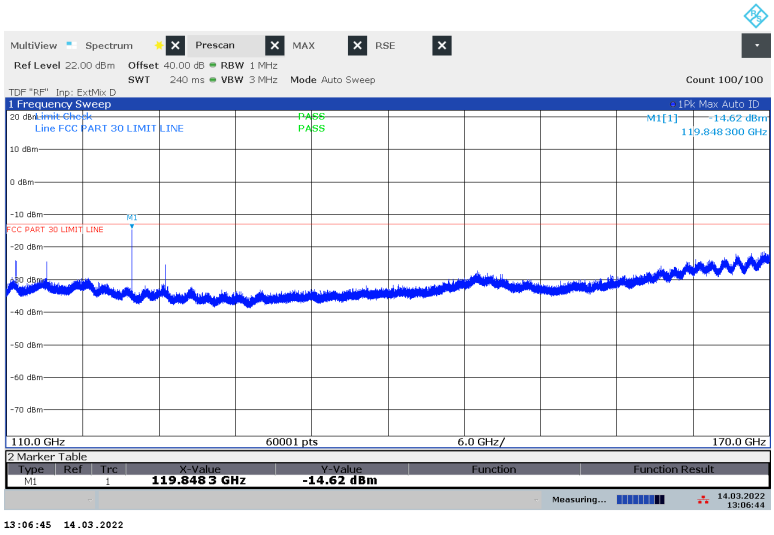
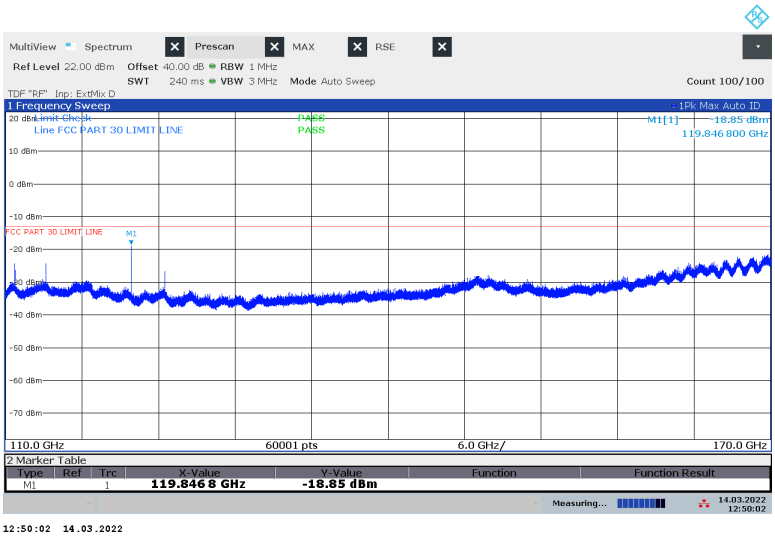
110 - 170 GHz, ANT M3 (Pre-scan using Pk Det.)
Horizontal



110 - 170 GHz, ANT M3 (Pre-scan using Pk Det.)
Vertical



Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

UL VERIFICATION SERVICES INC
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
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110 - 170 GHz n260, 1CC

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M2	115.496	1	H	-23.28	-13	-10.28
M2	115.496	1	V	-37.29	-13	-24.29
M3	119.847	1	H	-21.25	-13	-8.25
M3	119.847	1	V	-32.44	-13	-19.44

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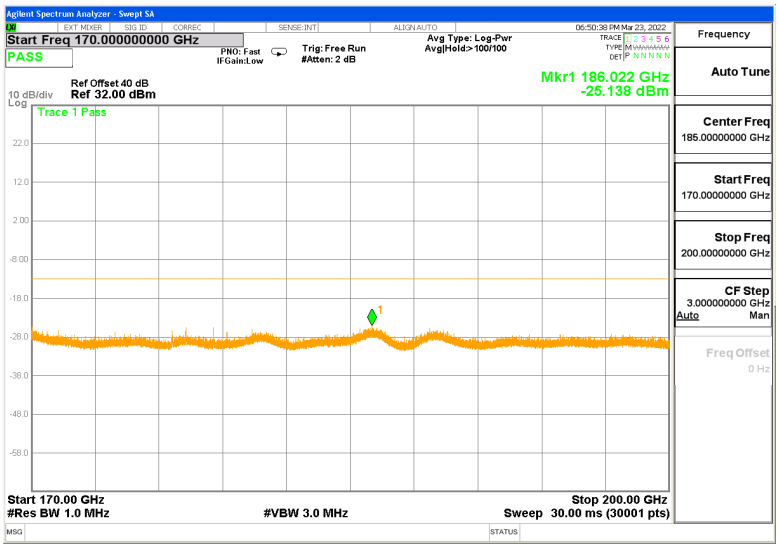
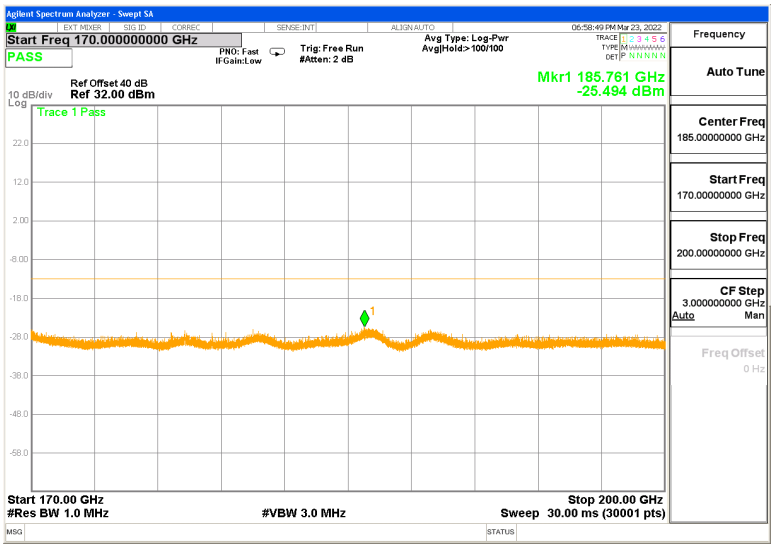
8.4.40. RSE n260 170 - 200 GHz

170 - 200 GHz, ANT M2 (Pre-scan using Pk Det.)
Horizontal



170 - 200 GHz, ANT M2 (Pre-scan using Pk Det.)
Vertical



No emission detected using Peak Detection.

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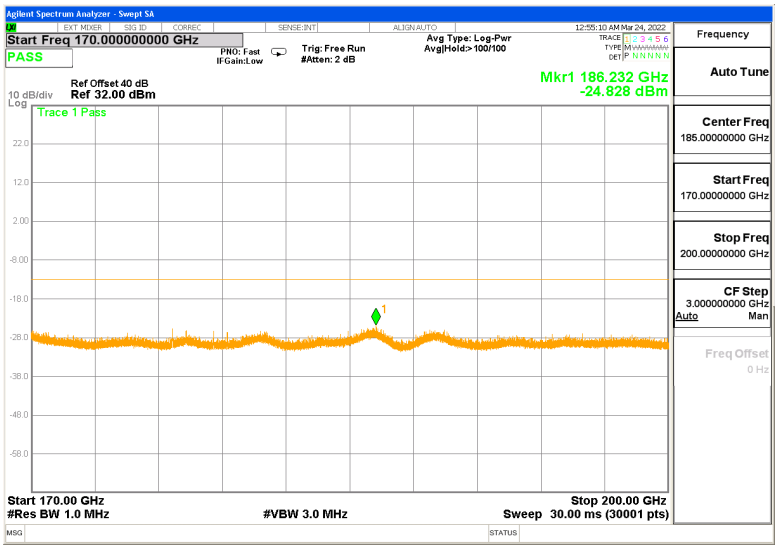
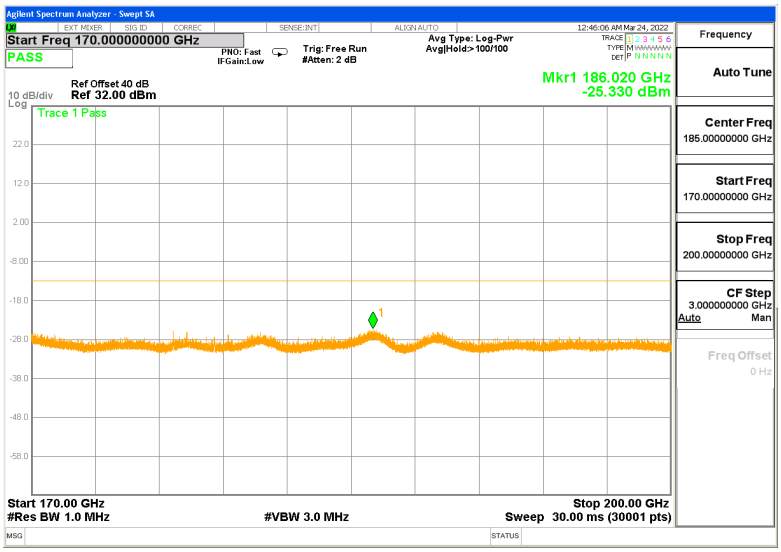
170 - 200 GHz, ANT M3 (Pre-scan using Pk Det.)
Horizontal



170 - 200 GHz, ANT M3 (Pre-scan using Pk Det.)
Vertical



No emission detected using Peak Detection.

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8.5. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055

LIMIT

For reporting purposes only

TEST PROCEDURES

KDB 842590 D01 Upper Microwave Flexible Use Service v01 Section 4.5
ANSI C63.26-2015 Section 5.6

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.

- Temp. = −30°C to +50°C

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 hand-carried, battery-powered equipment. primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

- Voltage = (85% - 115%)
- Nominal: 3.8 VDC; Low: 3.32VDC; High: 4.37 VDC

The measurements were performed with the CW signal of center frequency of each frequency band. Testing of n258 SB1 and n261 bands on Ant M2 represent the performance of Chipset 1. Likewise, testing of n258 SB2 and n260 bands on Ant M3, represent the performance of Chipset 2.

RESULTS

See the following pages.

Employee IDs: 19459 & 24303
Test Date: 5/27/2022
Test Location: Temperature Chamber

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8.5.1. FREQUENCY STABILITY n258 SB1

		Antenna M2 n258 SB1	
Input Voltage	Environment	Frequency	Delta
	Temperature (ºC)	(GHz)	(kHz)
Normal	50	24.3550000	-39.000
Normal	40	24.3550270	-12.000
Normal	30	24.3550270	-12.000
Normal	**20**	**24.3550390**	**Reference**
Normal	10	24.3550360	-3.000
Normal	0	24.3550659	26.900
Normal	-10	24.3550629	23.900
Normal	-20	24.3551139	74.900
Normal	-30	24.3551229	83.900
115%	20	24.3549580	-81.000
85%	20	24.3549610	-78.000

8.5.2. FREQUENCY STABILITY n258 SB2

		Antenna M3 n258 SB2	
Input Voltage	Environment	Frequency	Delta
	Temperature (ºC)	(GHz)	(kHz)
Normal	50	25.0049131	-30.000
Normal	40	25.0049221	-21.000
Normal	30	25.0049461	3.000
Normal	**20**	**25.0049431**	**Reference**
Normal	10	25.0049640	20.900
Normal	0	25.0049790	35.900
Normal	-10	25.0049850	41.900
Normal	-20	25.0049850	41.900
Normal	-30	25.0050270	83.900
115%	20	25.0049401	-3.000
85%	20	25.0049461	3.000

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8.5.3. FREQUENCY STABILITY n261

		Antenna M2 n261	
Input Voltage	Environment	Frequency	Delta
	Temperature (ºC)	(GHz)	(kHz)
Normal	50	27.9299551	-36.000
Normal	40	27.9299671	-24.000
Normal	30	27.9300030	11.900
Normal	**20**	**27.9299911**	**Reference**
Normal	10	27.9300270	35.900
Normal	0	27.9300420	50.900
Normal	-10	27.9300480	56.900
Normal	-20	27.9300690	77.900
Normal	-30	27.9300870	95.900
115%	20	27.9299911	0.000
85%	20	27.9299911	0.000

8.5.4. FREQUENCY STABILITY n260

		Antenna M3 n260	
Input Voltage	Environment	Frequency	Delta
	Temperature (ºC)	(GHz)	(kHz)
Normal	50	38.5049580	17.900
Normal	40	38.5049401	0.000
Normal	30	38.5048921	-48.000
Normal	**20**	**38.5049401**	**Reference**
Normal	10	38.5049700	29.900
Normal	0	38.5049820	41.900
Normal	-10	38.5050128	72.700
Normal	-20	38.5050300	89.900
Normal	-30	38.5050210	80.900
115%	20	38.5048891	-51.000
85%	20	38.5049880	47.900

The occupied bandwidths (Section 8.1) are smaller than the channel bandwidths by at least 3 MHz for all modes of operation, the signal is at least 1.5 MHz from either edge of the channel. As the channels are fully contained within the FCC-allocated bands, and the frequency stability is significantly less than 1.5 MHz, with maximum frequency shift of 95.9 kHz over the test conditions (Ant M2 n261 at -30ºC). The signal is always contained within the allocated channel, therefore, always contained within the allocated band.

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9. SETUP PHOTOS

Please refer to 14040867-EP20V1 for setup photos.

END OF REPORT

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APPENDIX A

1. 50 - 80 GHz Keysight M1970V

KEYSIGHT TECHNOLOGIES

Keysight Technologies Malaysia Sdn Bhd (463532-M)
Bayan Lepas Free Industrial Zone
11900 Penang, Malaysia
Keysight Approved Calibration provider #71456

5962-0476

Certificate Of Calibration

Certificate No: M1970VMY5139083020211007

Manufacturer: Keysight Technologies
Model No: M1970V
Options Installed With Specifications: 002

Description: Waveguide Harmonic Mixer
Serial No: MY51390830

Customer Asset:
Customer:
UL Verification Services Inc
47173 Benicia St
FREMONT CA 94538-7366
UNITED STATES

Location of Calibration:
Plot 44, Bayan Lepas Industrial Park IV
11900 Penang
Malaysia

Date of Calibration: 07-OCT-2021
Temperature: (23 ± 3)°C
Procedure: MTA-T0264

Received Date: 07-OCT-2021
Humidity: (20 to 70) % RH

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures in compliance with a quality management system registered to ISO 9001:2015.

As Received Conditions: Initial testing found the equipment to be IN SPECIFICATION at the points tested.

Action Taken: No corrective actions were necessary.

As Shipped Conditions: At the completion of calibration, measured values were IN SPECIFICATION at the parameters tested.

Remarks or special requirements:

Notes:
1. This calibration report may refer to equipment manufactured by HP, Agilent and Keysight as being manufactured by Keysight Technologies, Inc.
2. The test limits stated in the calibration report correspond to the published specifications of the equipment, at the points tested.
3. The documented test results relate to the equipment tested only.
4. This calibration report shall not be reproduced, except in full.

Traceability Information: Measurements are traceable to the International System of Units (SI) via national metrology institutes (www.keysight.com/find/NMI) that are signatories to the CIPM Mutual Recognition Arrangement.

Keysight Provider #71456

	DD	MM	YY	BY
CAL	07	10	21	NF
DUE				

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2. 75 - 110 GHz Keysight M1970W

KEYSIGHT TECHNOLOGIES

Keysight Technologies Malaysia Sdn Bhd (463532-M)
Bayan Lepas Free Industrial Zone
11900 Penang, Malaysia
Keysight Approved Calibration provider #71456

5962-0476

Certificate Of Calibration

Certificate No: M1970WMY5143078420211008

Manufacturer: Keysight Technologies
Model No: M1970W
Options Installed With Specifications: N/A

Description: Waveguide Harmonic Mixer
Serial No: MY51430784

Customer Asset:
Customer:
UL Verification Services Inc
47173 Benicia St
FREMONT CA 94538-7366
UNITED STATES

Location of Calibration:
Plot 44, Bayan Lepas Industrial Park IV
11900 Penang
Malaysia

Date of Calibration: 08-OCT-2021
Temperature: (23 ± 3)°C
Procedure: MTA-T0264

Received Date: 08-OCT-2021
Humidity: (20 to 70) % RH

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures in compliance with a quality management system registered to ISO 9001:2015.

As Received Conditions: Initial testing found the equipment to be IN SPECIFICATION at the points tested.

Action Taken: No corrective actions were necessary.

As Shipped Conditions: At the completion of calibration, measured values were IN SPECIFICATION at the parameters tested.

Remarks or special requirements:

Notes:
1. This calibration report may refer to equipment manufactured by HP, Agilent and Keysight as being manufactured by Keysight Technologies, Inc.
2. The test limits stated in the calibration report correspond to the published specifications of the equipment, at the points tested.
3. The documented test results relate to the equipment tested only.
4. This calibration report shall not be reproduced, except in full.

Traceability Information: Measurements are traceable to the International System of Units (SI) via national metrology institutes (www.keysight.com/find/NMI) that are signatories to the CIPM Mutual Recognition Arrangement.

Keysight Provider #71456

	DD	MM	YY	BY
CAL	08	10	21	NF
DUE				

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3. 110 - 170 GHz VDI WR6.5SAX

*WR6.5SAX, S/N: SAX 228

Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902
Phone: 434-297-3257
Fax: 434-297-3258

Certificate of Conformance

To: UL
47173 Benicia Street
Fremont, CA 94538
United States

From: Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902

Packing List No: 212797
Shipping Date: 08/10/21
Today's Date: 08/10/21
PO Number: 7862019815

Quantity Shipped	Unit	Description	Order-Job Number
1	EA	RETEST-WR10SAX SAX 649	21163-01
1	EA	RETEST-WR6.5SAX SAX 228	21163-02
1	EA	RETEST-WR4.3SAX SAX 229	21163-03

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature
Virginia Diodes, Inc

UL VERIFICATION SERVICES INC
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4. 170 - 260 GHz VDI WR4.3SAX

*WR4.3SAX, S/N: SAX 229

Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902
Phone: 434-297-3257
Fax: 434-297-3258

Certificate of Conformance

To: UL
47173 Benicia Street
Fremont, CA 94538
United States

From: Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902

Packing List No: 212797
Shipping Date: 08/10/21
Today's Date: 08/10/21
PO Number: 7862019815

Quantity Shipped	Unit	Description	Order-Job Number
1	EA	RETEST-WR10SAX SAX 649	21163-01
1	EA	RETEST-WR6.5SAX SAX 228	21163-02
1	EA	RETEST-WR4.3SAX SAX 229	21163-03

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature
Virginia Diodes, Inc

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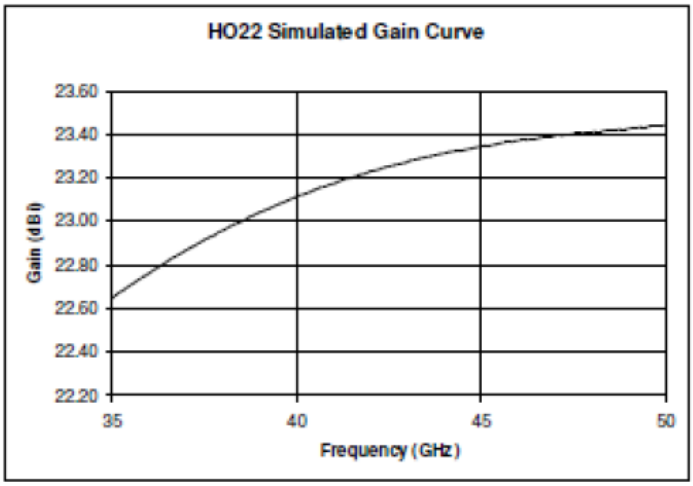
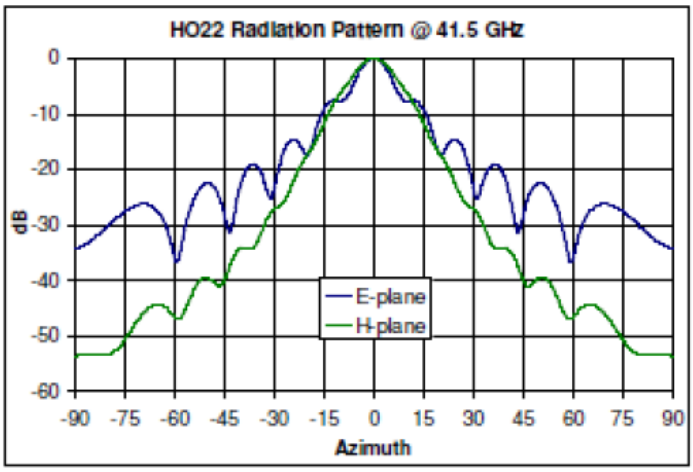
5. 35 - 50 GHz CMI HO22R HORN ANTENNA

custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.customimicrowave.com





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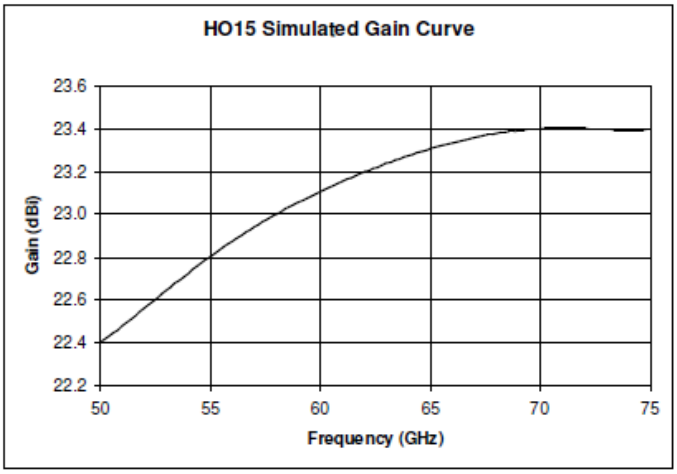
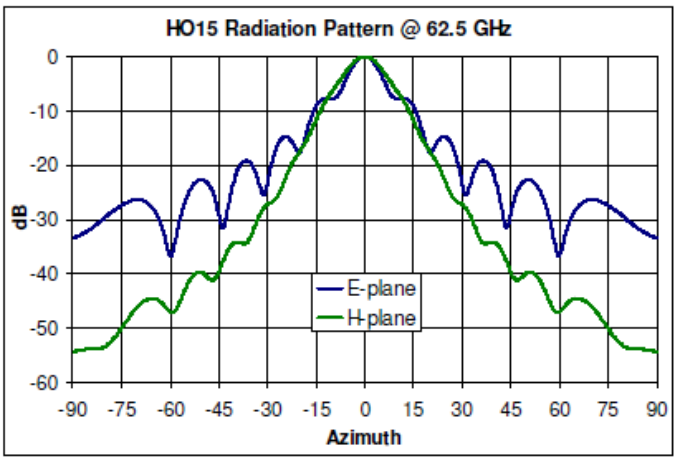
6. 50 - 75 GHz CMI HO15R HORN ANTENNA

custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.custommicrowave.com





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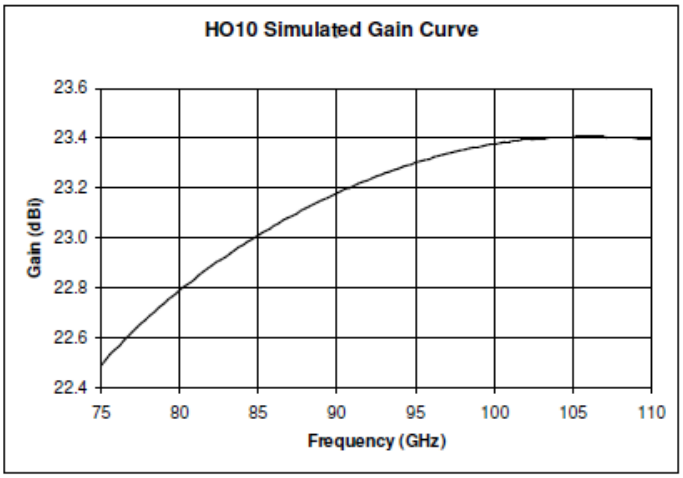
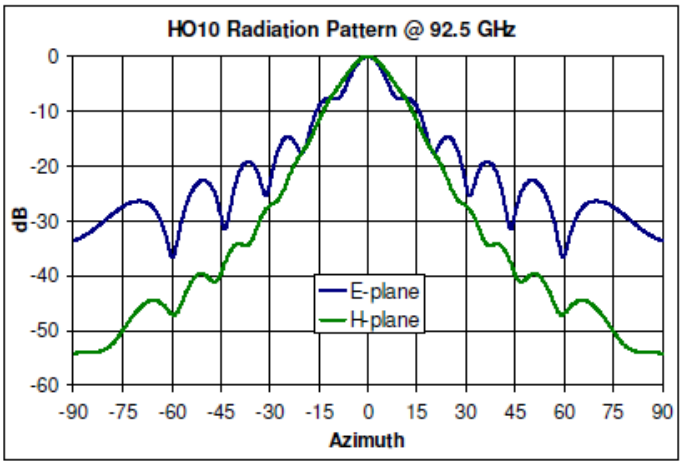
7. 75 - 110 GHz CMI HO10R HORN ANTENNA

custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.custommicrowave.com





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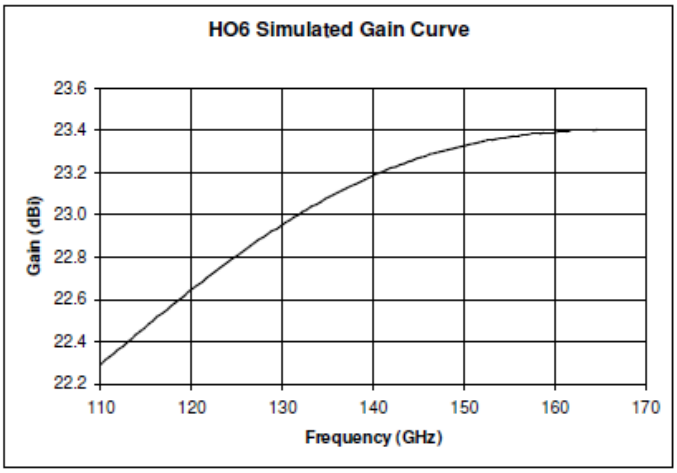
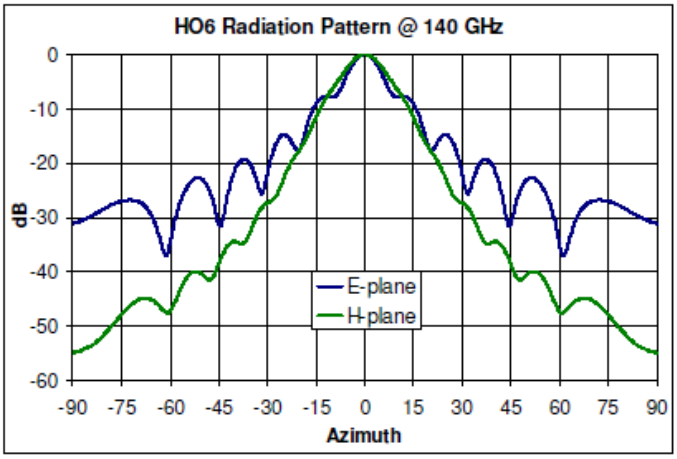
8. 110 - 170 GHz CMI HO6R HORN ANTENNA

custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.custommicrowave.com





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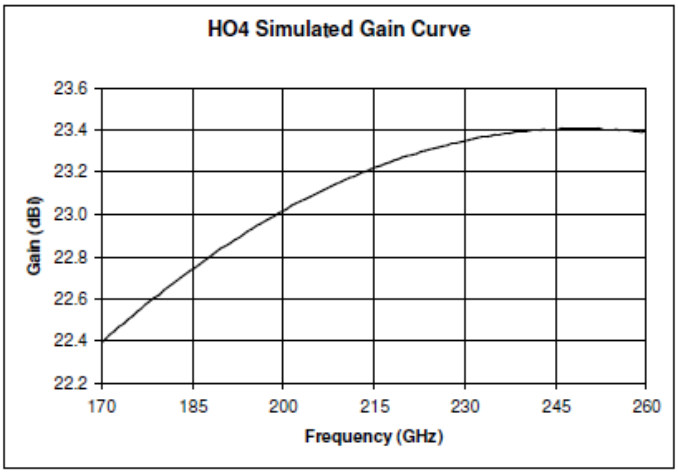

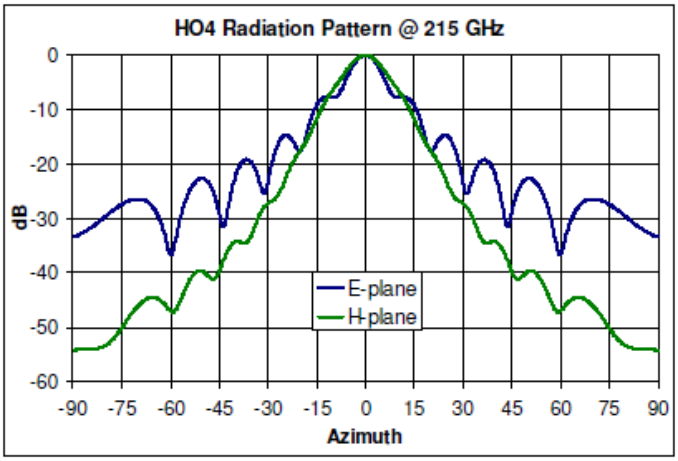

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