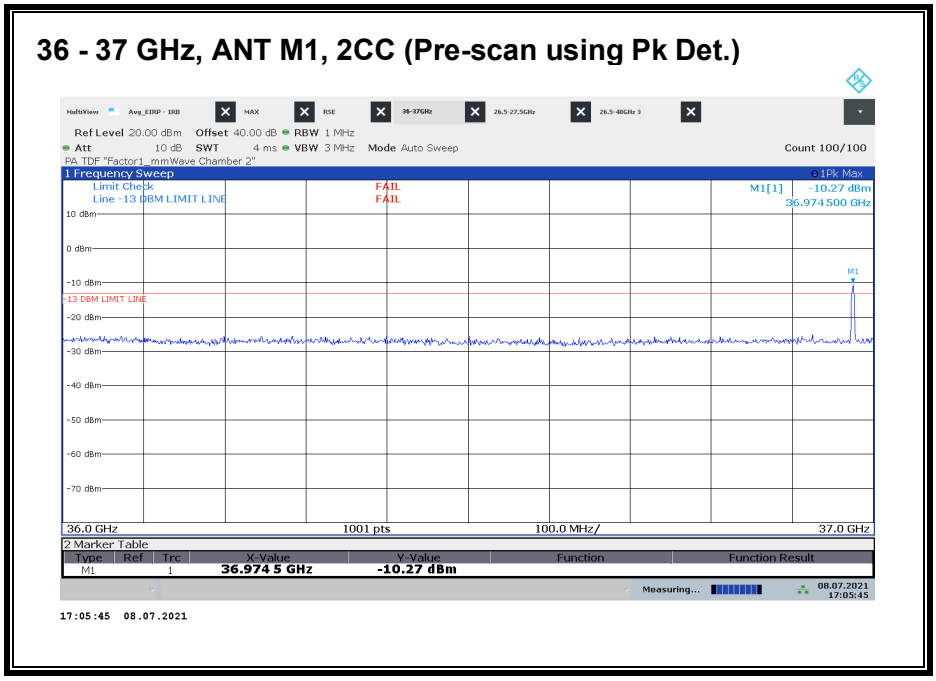
36 - 37 GHz n260, 2CC



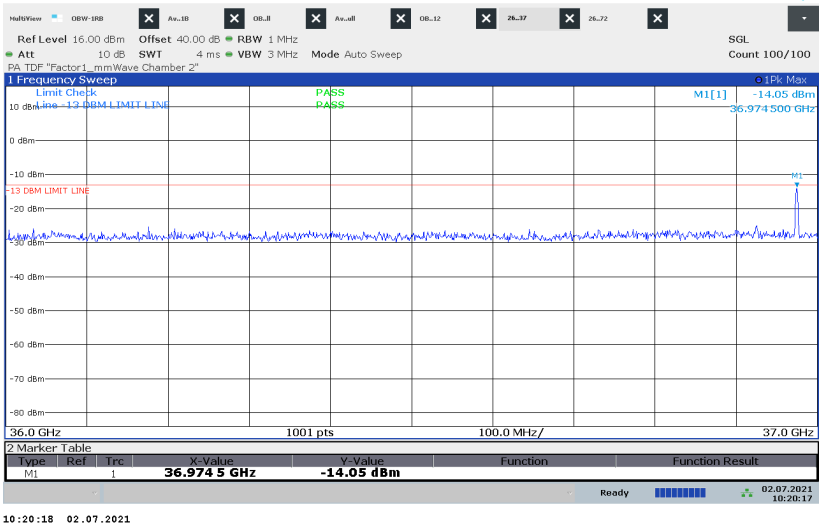
Worst case configuration:
SISO-DUAL_QPSK_(50 MHz + 50 MHz)_Low CH_RB Offset 1/15 (1RB-M)

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

Highest emission in this band was investigated.

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M1	36.974	3	H	-20.07	-13	-7.07

36 - 37 GHz, ANT M2, 2CC (Pre-scan using Pk Det.)



Worst case configuration:
SISO-DUAL_QPSK_(100 MHz + 100 MHz)_Low CH_RB Offset 1/32 (1RB-M)

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

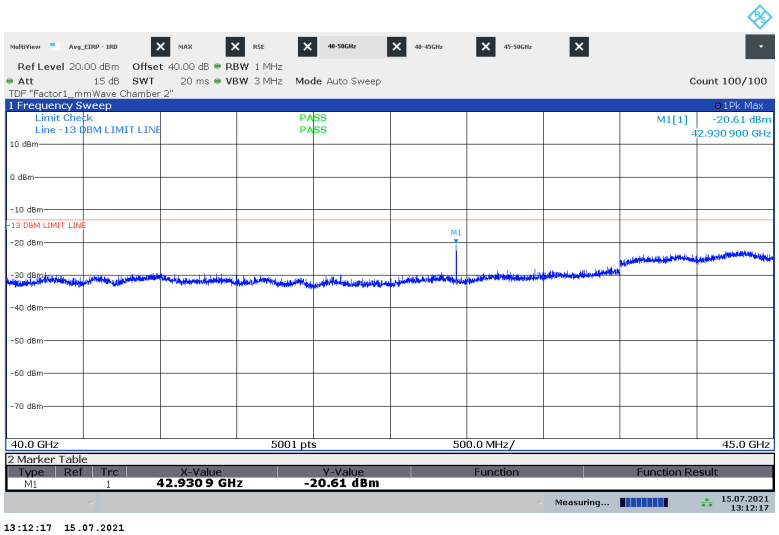
Highest emission in this band was investigated.

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M2	36.974	3	V	-22.26	-13	-9.26

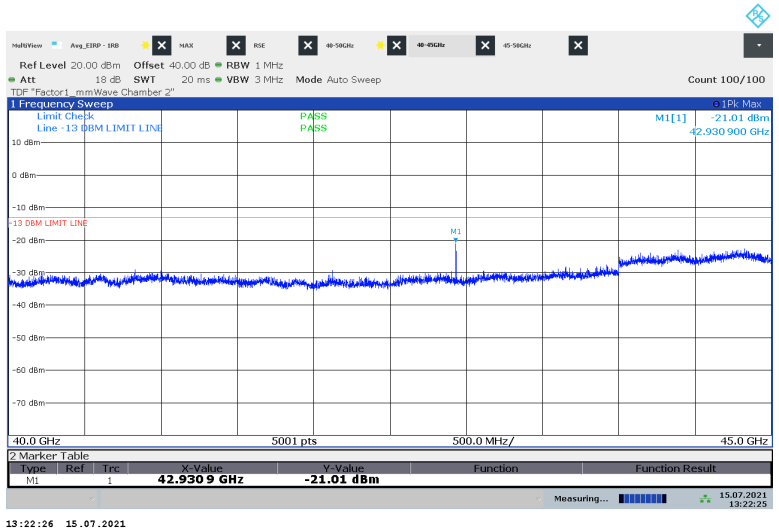
8.4.30. RSE n260 40 - 50 GHz

Note: 37 - 40 GHz covered by Fundamental and BE measurements.

40 – 45 GHz, ANT M1, 1CC (Pre-scan using Pk Det.)
Horizontal

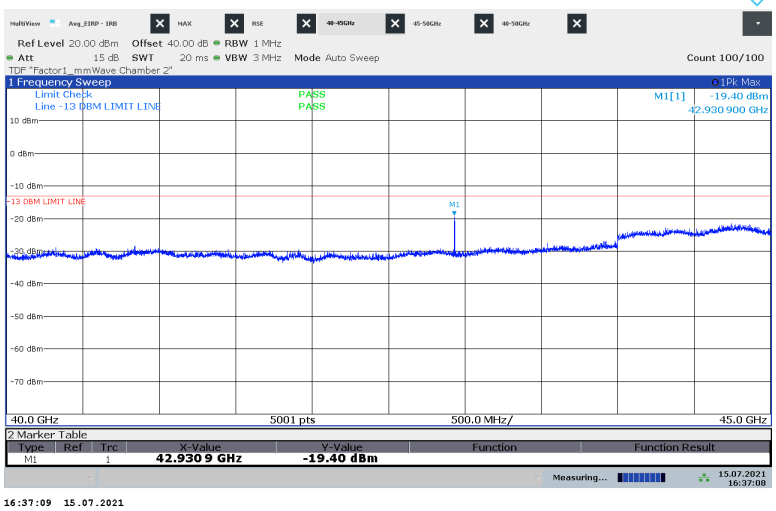


40 – 45 GHz, ANT M1, 1CC (Pre-scan using Pk Det.)
Vertical

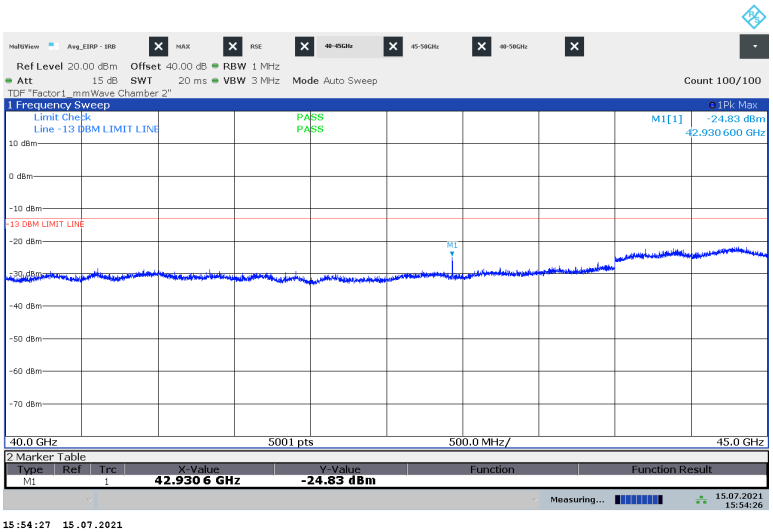


Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

40 – 45 GHz, ANT M2, 1CC (Pre-scan using Pk Det.)
Horizontal



40 – 45 GHz, ANT M2, 1CC (Pre-scan using Pk Det.)
Vertical

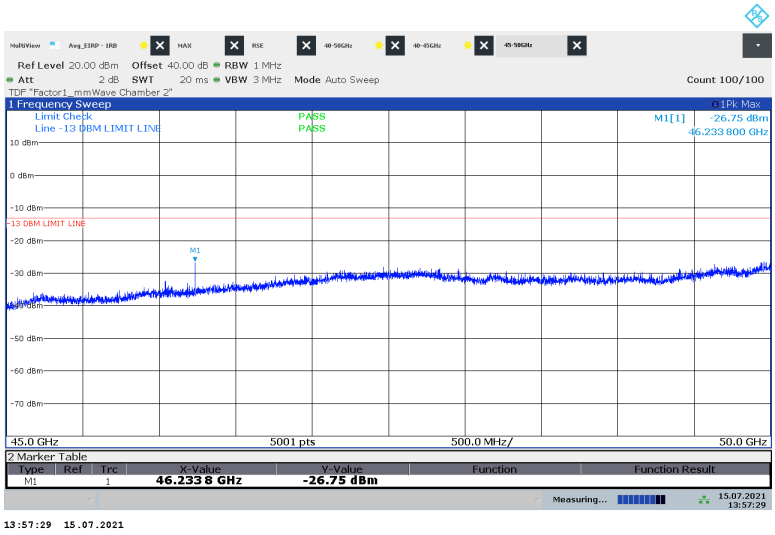


Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

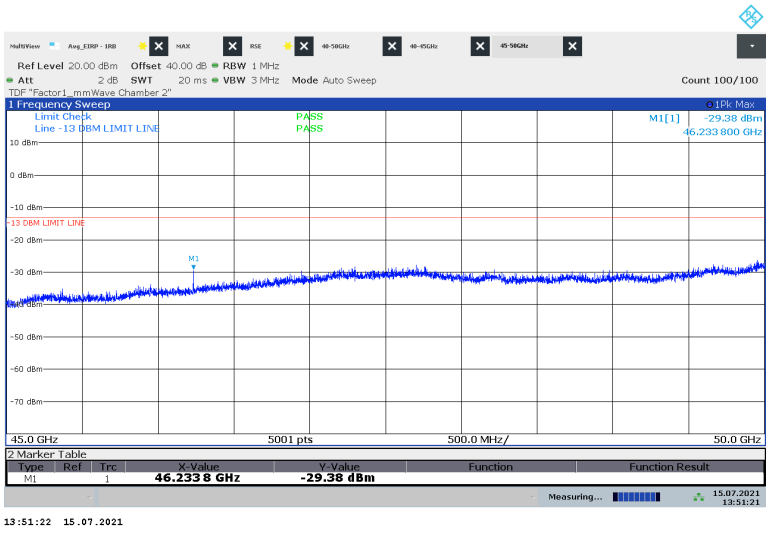
40 - 45 GHz n260, 1CC

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M1	42.931	3	H	-22.35	-13	-9.35
M1	42.931	3	V	-23.28	-13	-10.28
M2	42.931	3	H	-22.52	-13	-9.52
M2	42.931	3	V	-32.01	-13	-19.01

45 – 50 GHz, ANT M1, 1CC (Pre-scan using Pk Det.)
Horizontal

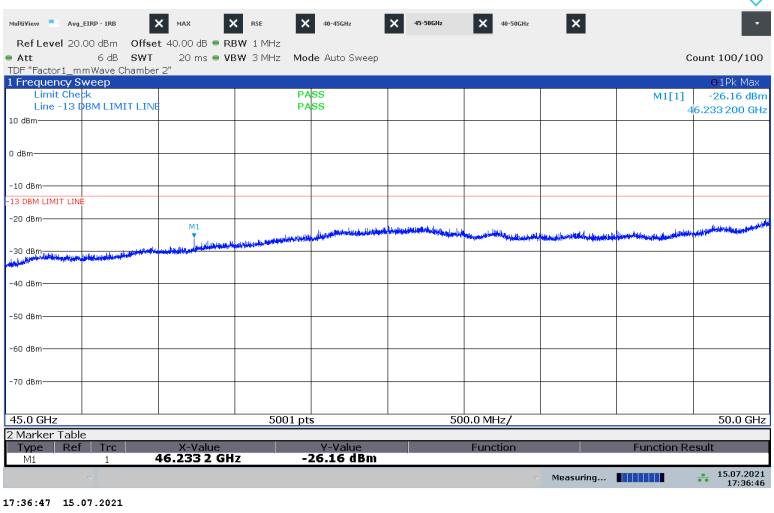


45 – 50 GHz, ANT M1, 1CC (Pre-scan using Pk Det.)
Vertical

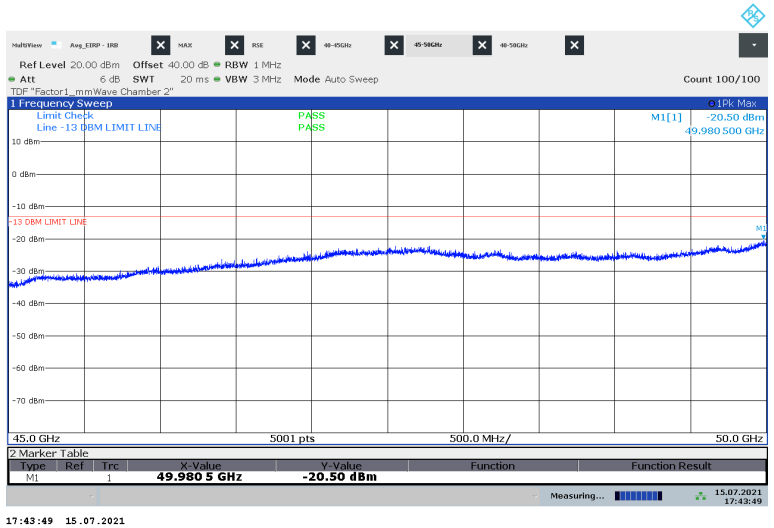


Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

45 – 50 GHz, ANT M2, 1CC (Pre-scan using Pk Det.)
Horizontal



45 – 50 GHz, ANT M2, 1CC (Pre-scan using Pk Det.)
Vertical

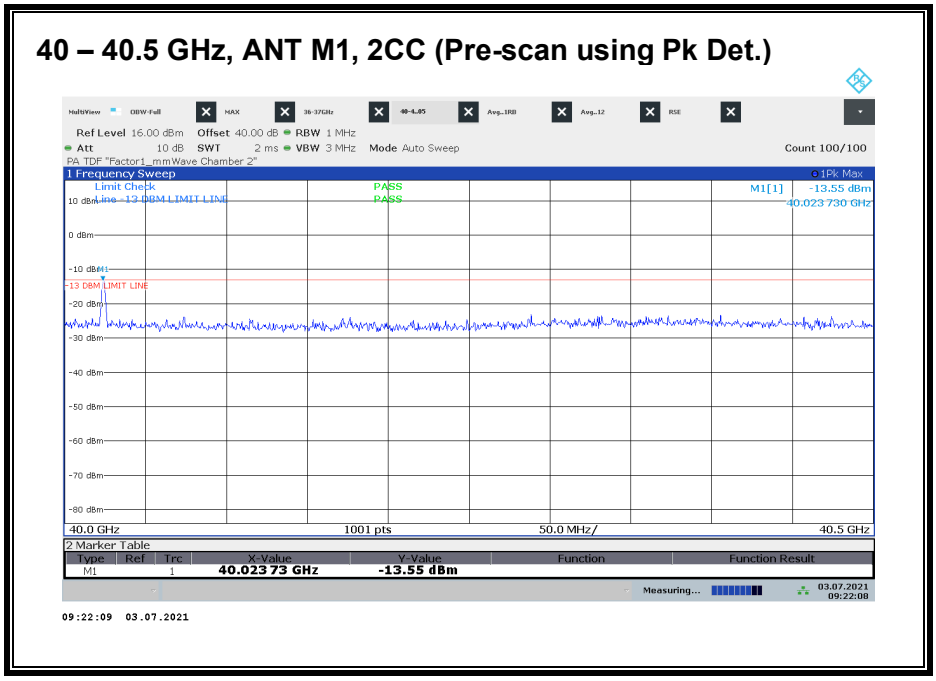


Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

45 - 50 GHz n260, 1CC

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M1	46.233	3	H	-30.16	-13	-17.16
M1	46.233	3	V	-32.17	-13	-19.17
M2	46.233	3	H	-30.56	-13	-17.56
M2	46.233	3	V	-40.29	-13	-27.29

40 – 40.5 GHz n260, 2CC



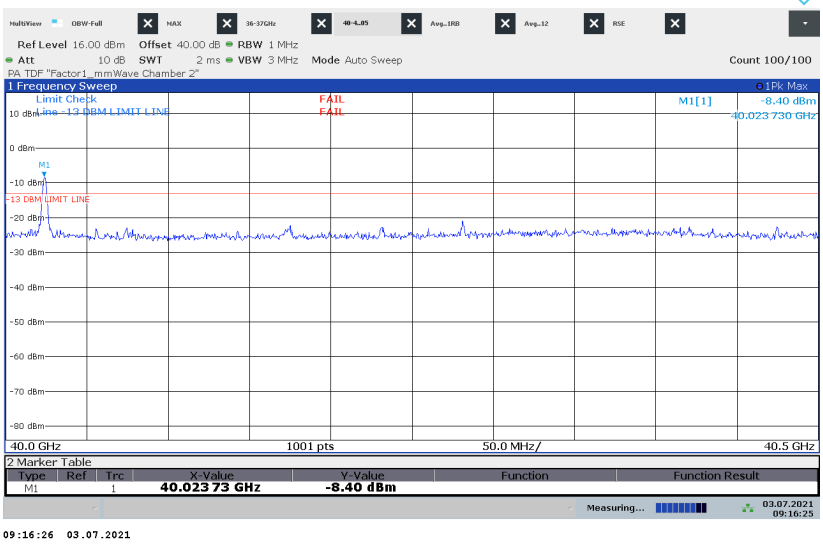
Worst case configuration:
SISO-DUAL_QPSK_(50 MHz + 50 MHz)_High CH_RB Offset 1/15 (1RB-M)

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

Highest emission in this band was investigated.

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M1	40.024	3	H	-21.17	-13	-8.17

40 – 40.5 GHz, ANT M2, 2CC (Pre-scan using Pk Det.)



Worst case configuration:
SISO-DUAL_QPSK_(100 MHz + 100 MHz)_High CH_RB Offset 1/32 (1RB-M)

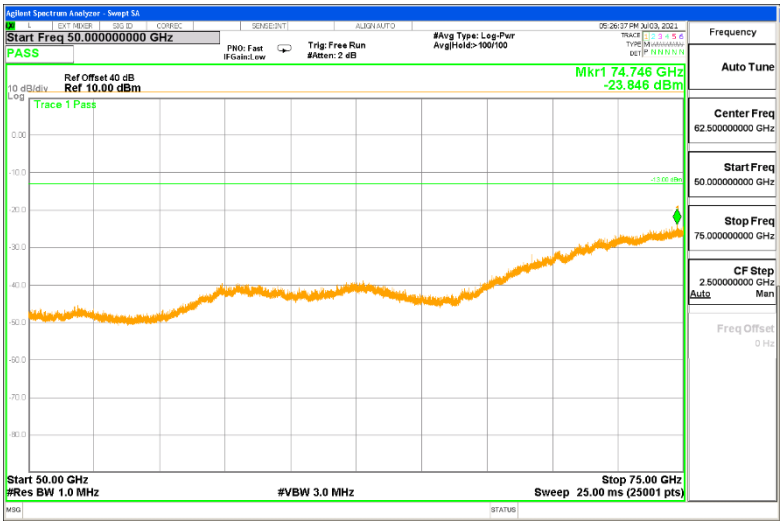
Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

Highest emission in this band was investigated.

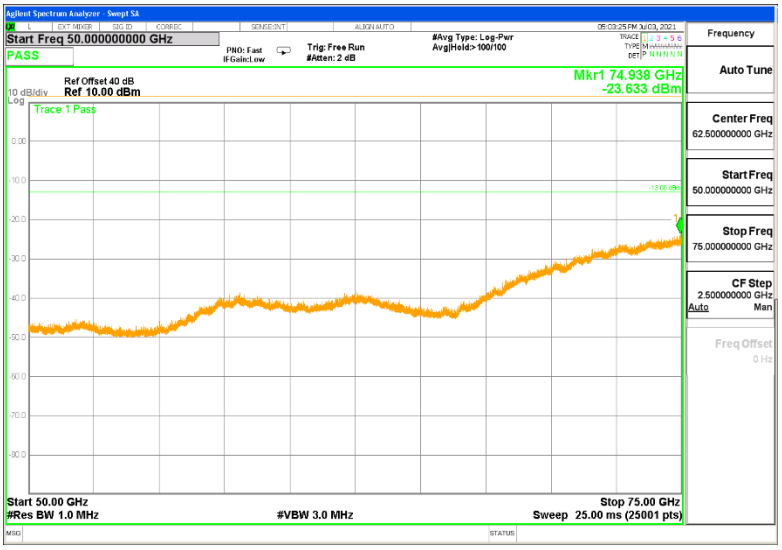
Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M2	40.024	3	V	-21.61	-13	-8.61

8.4.31. RSE n260 50 - 75 GHz

50 - 75 GHz, ANT M1 (Pre-scan using Pk Det.)
Horizontal

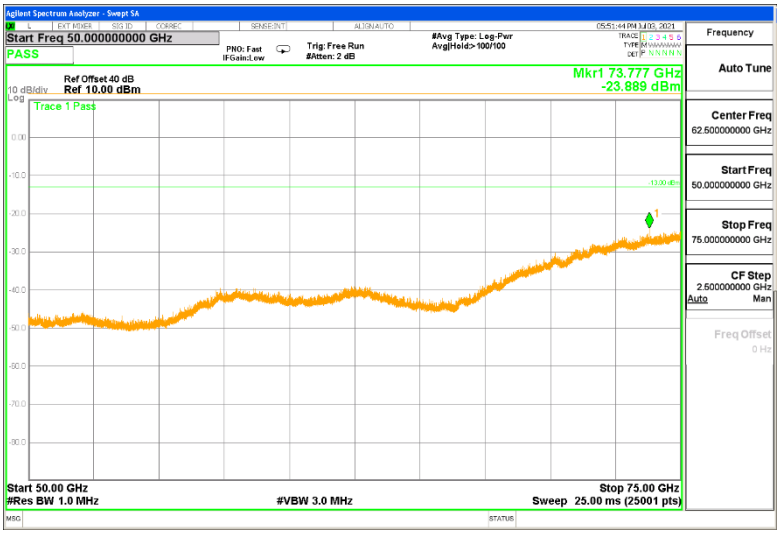


50 - 75 GHz, ANT M1 (Pre-scan using Pk Det.)
Vertical

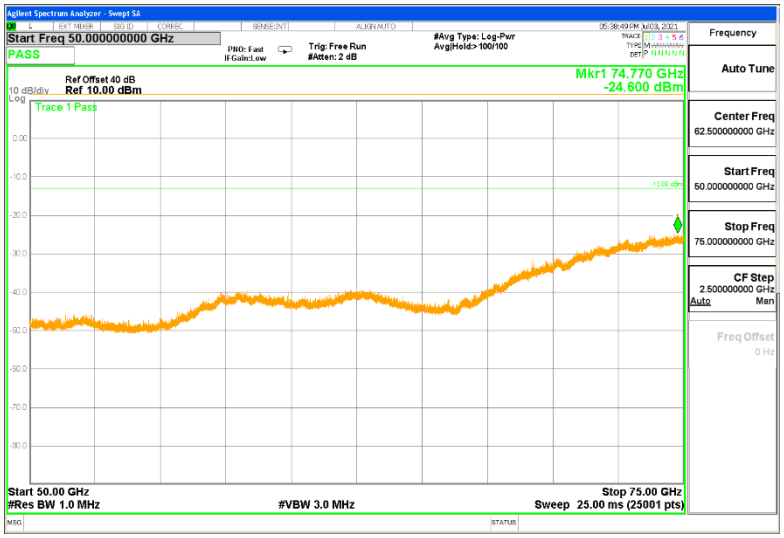


No emission detected using Peak Detection.

50 - 75 GHz, ANT M2 (Pre-scan using Pk Det.)
Horizontal



50 - 75 GHz, ANT M2 (Pre-scan using Pk Det.)
Vertical

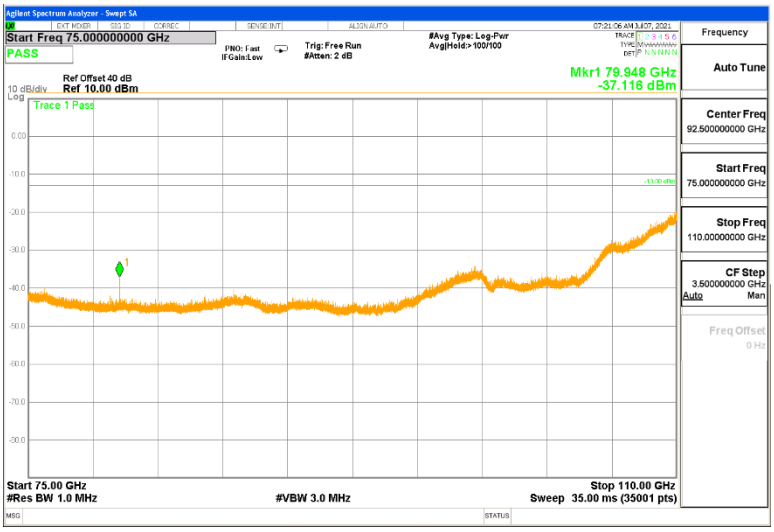


No emission detected using Peak Detection.

8.4.32. RSE n260 75 - 110 GHz

75 - 110 GHz, ANT M1 (Pre-scan using Pk Det.)
Horizontal

75 - 110 GHz, ANT M1 (Pre-scan using Pk Det.)
Vertical



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

75 - 110 GHz, ANT M2 (Pre-scan using Pk Det.)
Horizontal

75 - 110 GHz, ANT M2 (Pre-scan using Pk Det.)
Vertical

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

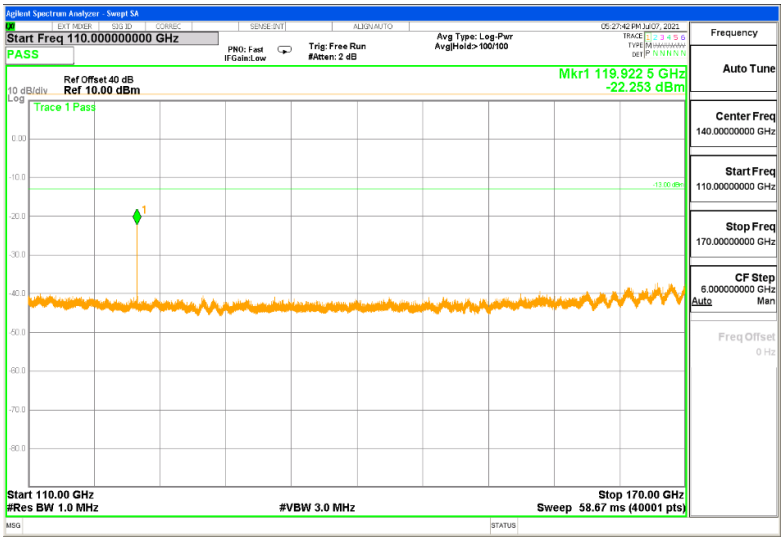
75 - 110 GHz n260, 1CC

Antenna	Freq.	Meas. Distance	Rx Ant. Polarity	Corrected Avg EIRP	TRP Limit	Margin
	(GHz)	(m)	H/V	(dBm)	(dBm)	(dB)
M1	79.948	1	H	-41.36	-13	-28.36
M1	79.948	1	V	-39.86	-13	-26.86
M2	79.898	1	H	-30.44	-13	-17.44
M2	79.898	1	V	-34.17	-13	-21.17

8.4.33. RSE n260 110 - 170 GHz

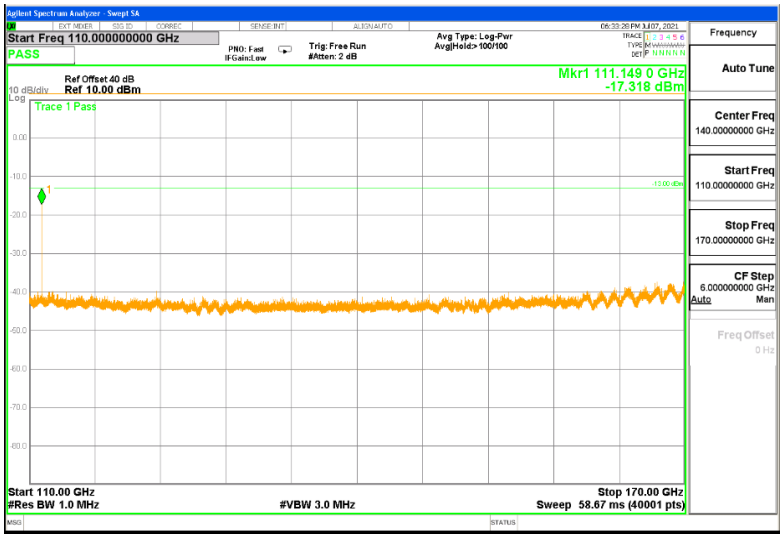
110 - 170 GHz, ANT M1 (Pre-scan using Pk Det.)
Horizontal

110 - 170 GHz, ANT M1 (Pre-scan using Pk Det.)
Vertical

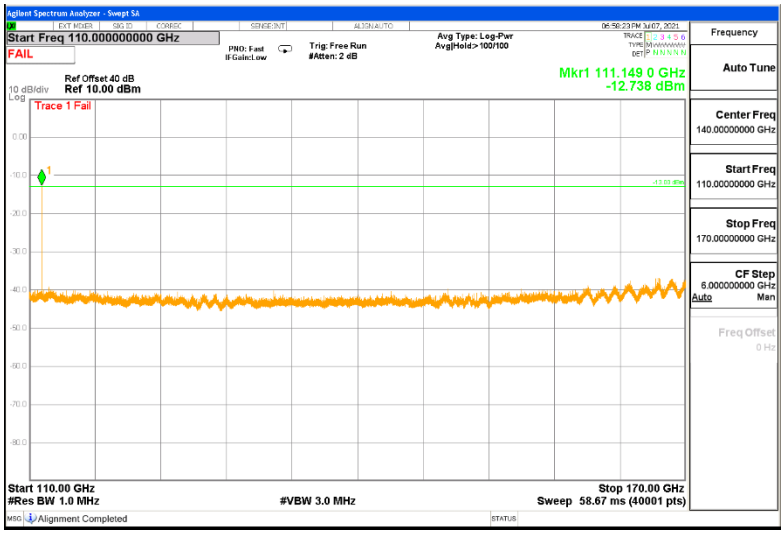


Emissions detected using Peak Detection at pre-scan. Avg EIRP was measured.

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.

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)
M1	119.923	1	H	-24.93	-13	-11.93
M1	119.923	1	V	-29.23	-13	-16.23
M2	111.149	1	H	-31.50	-13	-18.50
M2	111.149	1	V	-19.77	-13	-6.77

8.4.34. RSE n260 170 - 200 GHz

170 - 200 GHz, ANT M1 (Pre-scan using Pk Det.)
Horizontal

170 - 200 GHz, ANT M1 (Pre-scan using Pk Det.)
Vertical

No emission detected using Peak Detection.

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.

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 SB2 and n260 bands on Ant M1 represent the performance of Chipset 1. Likewise, testing of n258 SB1 and n261 bands on Ant M2 represent the performance of Chipset 2.

RESULTS

See the following pages.

Employee IDs: 19437 & 19459
Test Date: 6/18/2021
Test Location: Temperature Chamber

8.5.1. FREQUENCY STABILITY n258 SB1

			Antenna M2 n258 SB1	
Input Voltage	Environment	Frequency	Frequency	Delta
	Temperature (ºC)	(Hz)	(MHz)	(kHz)
Normal	50	2435490000	2435.4900000	-5.990
Normal	40	2435479010	2435.4790100	-16.980
Normal	30	2435489500	2435.4895000	-6.490
Normal	**20**	***2435495990***	**2435.4959900**	**Reference**
Normal	10	2435498990	2435.4989900	3.000
Normal	0	2435496490	2435.4964900	0.500
Normal	-10	2435504490	2435.5044900	8.500
Normal	-20	2435507480	2435.5074800	11.490
Normal	-30	2435510980	2435.5109800	14.990
115%	20	2435486500	2435.4865000	-9.490
85%	20	2435480510	2435.4805100	-15.480

8.5.2. FREQUENCY STABILITY n258 SB2

			Antenna M1 n258 SB2	
Input Voltage	Environment	Frequency	Frequency	Delta
	Temperature (ºC)	(Hz)	(MHz)	(kHz)
Normal	50	2500491510	2500.4915100	12.990
Normal	40	2500482520	2500.4825200	4.000
Normal	30	2500484020	2500.4840200	5.500
Normal	***20***	***2500478520***	**2500.4785200**	***Reference***
Normal	10	2500491510	2500.4915100	12.990
Normal	0	2500500000	2500.5000000	21.480
Normal	-10	2500503500	2500.5035000	24.980
Normal	-20	2500505000	2500.5050000	26.480
Normal	-30	2500511490	2500.5114900	32.970
115%	20	2500482020	2500.4820200	3.500
85%	20	2500482020	2500.4820200	3.500

8.5.3. FREQUENCY STABILITY n261

			Antenna M2 n261	
Input Voltage	Environment	Frequency	Frequency	Delta
	Temperature (°C)	(Hz)	(MHz)	(kHz)
Normal	50	2792990000	2792.9900000	8.490
Normal	40	2792980510	2792.9805100	-1.000
Normal	30	2792978510	2792.9785100	-3.000
Normal	**20**	***2792981510***	**2792.9815100**	**Reference**
Normal	10	2793002990	2793.0029900	21.480
Normal	0	2793000490	2793.0004900	18.980
Normal	-10	2793011980	2793.0119800	30.470
Normal	-20	2793005980	2793.0059800	24.470
Normal	-30	2793001990	2793.0019900	20.480
115%	20	2792981010	2792.9810100	-0.500
85%	20	2792985000	2792.9850000	3.490

8.5.4. FREQUENCY STABILITY n260

			Antenna M1 n260	
Input Voltage	Environment	Frequency	Frequency	Delta
	Temperature (°C)	(Hz)	(MHz)	(kHz)
Normal	50	3850488010	3850.4880100	14.010
Normal	40	3850474030	3850.4740300	0.030
Normal	30	3850471030	3850.4710300	-2.970
Normal	**20**	***3850474000***	**3850.4740000**	**Reference**
Normal	10	3850497480	3850.4974800	23.480
Normal	0	3850499000	3850.4990000	25.000
Normal	-10	3850517480	3850.5174800	43.480
Normal	-20	3850505990	3850.5059900	31.990
Normal	-30	3850505490	3850.5054900	31.490
115%	20	3850477500	3850.4775000	3.500
85%	20	3850476500	3850.4765000	2.500

UL VERIFICATION SERVICES INC
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

9. SETUP PHOTOS

Please refer to 13573777-EP20V1 for setup photos.

END OF REPORT

UL VERIFICATION SERVICES INC
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

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: M1970VMY5139083020200903

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: 03-SEP-2020
Temperature: (23 ± 3)°C
Procedure: MTA-T0264

Received Date: 03-SEP-2020
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	03	09	20	NF
DUE				

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: M1970WMY5143078420200902

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: 02-SEP-2020
Temperature: (23 ± 3)°C
Procedure: MTA-T0264

Received Date: 02-SEP-2020
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	02	09	20	NF
DUE				

3. 110 - 170 GHz VDI WR6.5SAX

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 LLC
47173 Benicia Street
Fremont, CA 94538
United States

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

Packing List No: 211178 **Today's Date:** 04/06/21
Shipping Date: 04/06/21 **PO Number:** 7862019330

Quantity Shipped	Unit	Description	Order-Job Number
1	EA	UPGRADE-WR6.5SAX TO WR6.5SAX-F WR6.5SAX-F / SN: SAX 624	21064B-01

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).

AJL for GAS
Authorized Signature
Virginia Diodes, Inc

Page 1 of 1

4. 170 - 260 GHz VDI WR4.3SAX

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 LLC
47173 Benicia Street
Fremont, CA 94538
United States

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

Packing List No: 211687 **Today's Date:** 05/18/21
Shipping Date: 05/18/21 **PO Number:** 7862019330

Quantity Shipped	Unit	Description	Order-Job Number
1	EA	UPGRADE-WR4.3SAX TO WR4.3SAX-F SAX 651	21064C-01

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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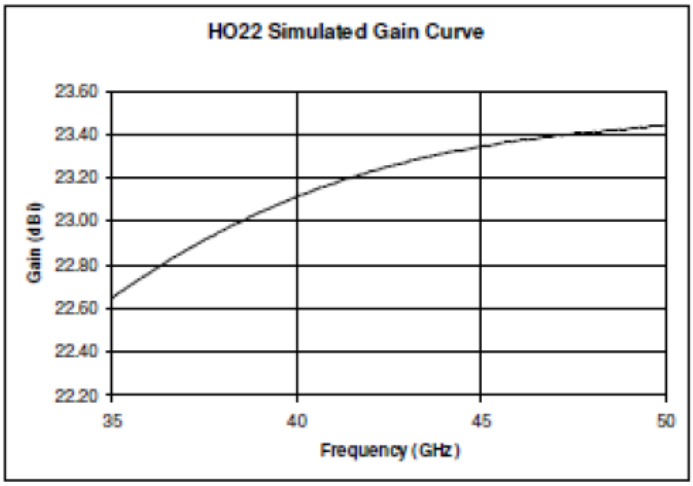
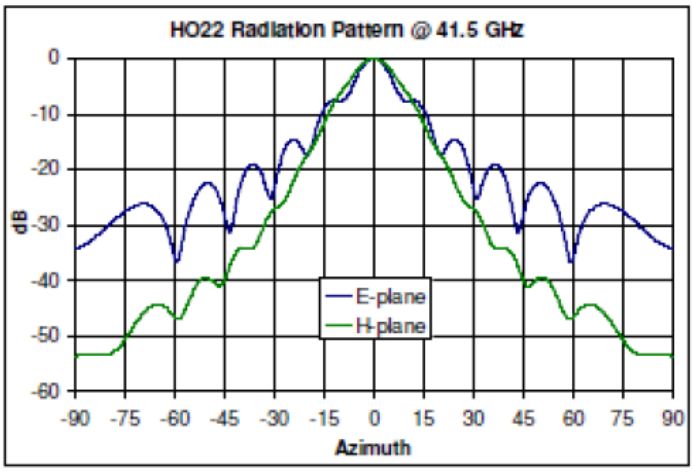
5. 35 - 50 GHz CMI HO22R HORN ANTENNA

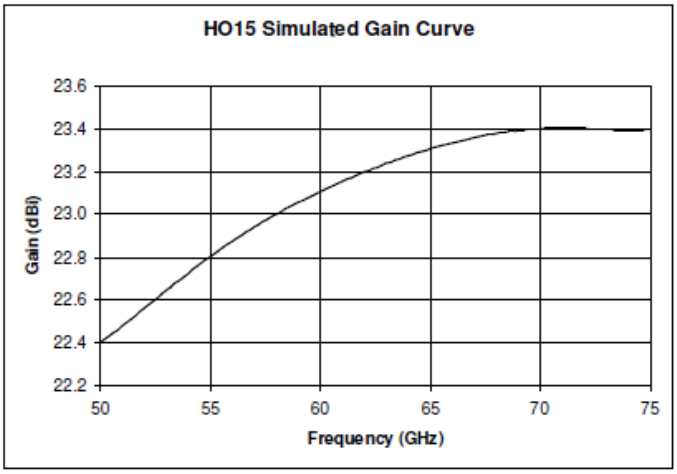
24 Boston Court
Longmont, CO 80501
303 651-0707 (P)
303 651-0706 (F)
www.custommicrowave.com

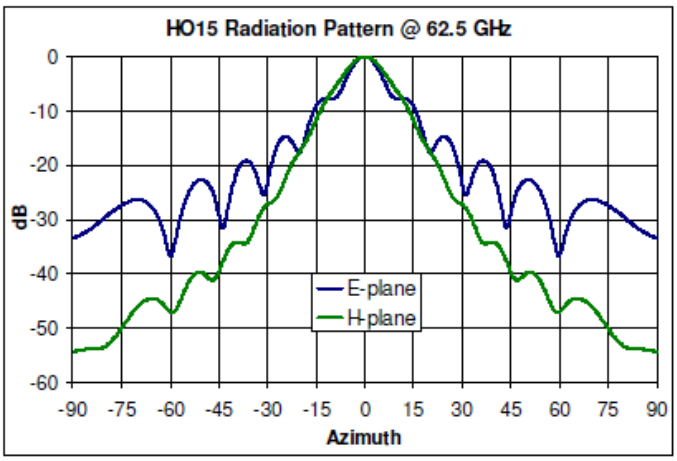




6. 50 - 75 GHz CMI HO15R HORN ANTENNA

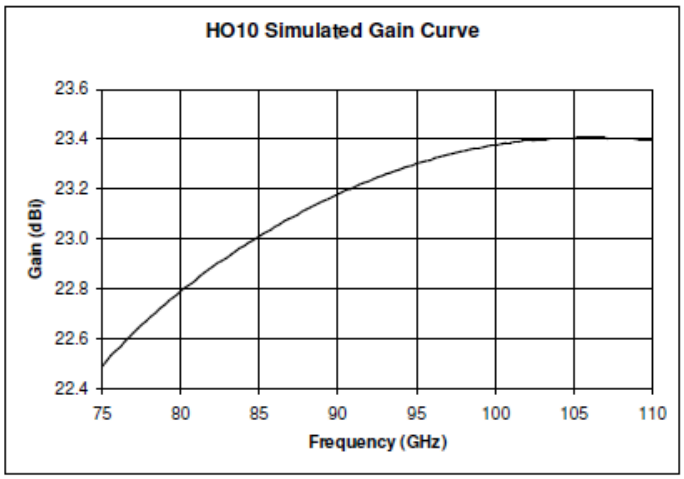
custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.custommicrowave.com

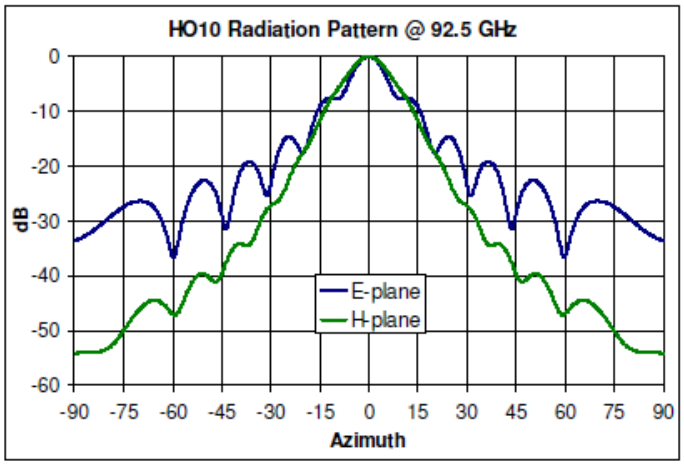




7. 75 - 110 GHz CMI HO10R HORN ANTENNA

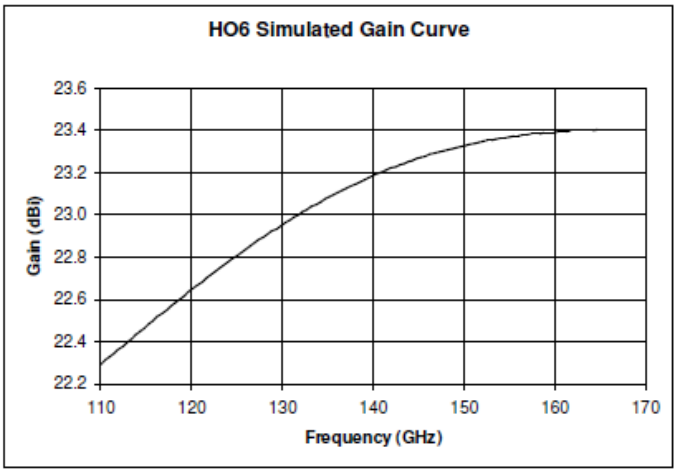
custom microwave inc.
24 Boston Court
Longmont, CO 80501
303 651-0707(P)
303 651-0706(F)
www.custommicrowave.com

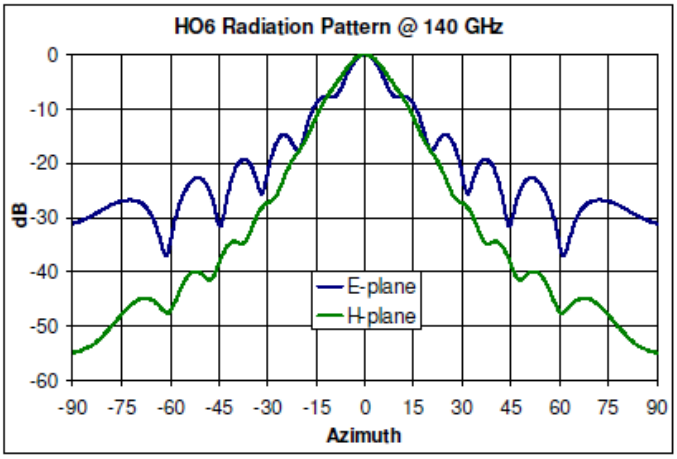




8. 110 - 170 GHz CMI HO6R HORN ANTENNA

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





9. 170 - 260 GHz CMI HO4R HORN ANTENNA

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