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Radio measurements on AIR 5322 B260 with FCC ID TA8AKRD901168

Rev1 2022-04-12: Frequency stability added

Product name: AIR 5322 B260

Product number: KRD 901 168/4 and KRD 901 168/1

RISE Research Institutes of Sweden AB Vehicles and Automation – EMC-ICT

Performed by



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Accred. No. 1002
Testing
ISO/IEC 17025

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Summary

Standard Listed part of	Compliant
FCC CFR 47 part 30 Subpart C	
2.1046/ 30.202 RF power output	Yes
2.1049 Occupied bandwidth	Yes
2.1053/ 30.203 Field strength of spurious radiation	Yes
2.1055 Frequency stability	Yes

Description of the test object

Equipment:	Radio equipment AIR 5322 B260 Product number: KRD 901 168/4 (AC powered) and KRD 901 168/1 (DC powered) FCC ID: TA8AKRD901168
Hardware revision state:	R1A
Tested configuration:	3GPP NR TDD
Frequency range:	TX/ RX: 37000 – 40000 MHz
No of supported beams:	Config mode 0: 4 beams in 2 orthogonal polarizations each, 8 beams in total. Config mode 1: 2 beams in 2 orthogonal polarizations each, 4 beams in total. Config mode 2: 1 beam in 2 orthogonal polarizations each, 2 beams in total.
Operating bandwidth:	Config mode 0: Four segments of 200MHz Config mode 1: Two segments of 400 MHz Config mode 2: One segment of 400 MHz
Nominal Output power (EIRP):	57 dBm/ beam and polarization config mode 2 53 dBm/ beam and polarization config mode 1 47 dBm/ beam and polarization config mode 0
RF configurations:	TX Diversity, SU and MU MIMO up to 2 layers 1x(2x2), Contiguous Spectrum (CS) and Non-Contiguous spectrum (NCS), Carrier Aggregation (CA) intra-band supported
Antenna beam steering:	Azimuth ± 60 deg, elevation ± 15 deg
Channel bandwidth(s)/ Sub Carrier Spacing:	50 MHz and 100 MHz/ 120 kHz
Modulations:	QPSK, 16QAM and 64QAM
Emission designators:	46M1W7D and 95M3W7D
Emission designators Carrier Aggregation:	394MW7D (4x 100 MHz) and 792MW7D (8x 100 MHz)
RF power Tolerance:	+2.4/ -2.0 dB
CPRI Speed	10.1 and 24.3 Gbps

The information above is supplied by the manufacturer.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47 Part 30.

Operation modes during measurements

The measurements were performed with the test object transmitting test models as defined in 3GPP TS 38.141-2. Test model NR-FR2 TM 1.1 is used to represent QPSK, test model NR-FR2 TM 3.2 to represent 16QAM, test model NR-FR2 TM 3.1 to represent 64QAM modulation

The settings below were deemed representative for worst case settings, for all traffic scenarios when settings with different modulations and RF configurations was found to represent worst case settings.

MIMO mode, NR-FR2 TM1.1, QPSK with the beams locked in boresight. All measurements were performed with the test object configured for maximum transmit power.

MIMO mode, NR-FR2 TM1.1, QPSK with the beams locked in boresight. All measurements were performed with the test object configured for maximum transmit power.

The measurement shall be done during active part of transmission, or if the measurement is performed with constant duty cycle <98%, the result shall be adjusted for the duty cycle according to ANSI C63.26 5.2.4.3.4. The duty cycle was measured to 74% and to compensate for this 1.30 dB was added to the test results.

Measurements

The test object was powered with 120 VAC 60 Hz/ -48 VDC by an external power supply. Additional connections are documented in the setup drawings for radiated measurements. If not otherwise stated all measurements were performed on the AC powered version.

Evaluation of spurious emissions have been done in several beam directions, including extreme settings both in azimuth and elevation planes. Results have shown that Beam index 0/Boresight can represent worst case.

Far field distance for power, OBW and Band edge measurements is 3.83 m, based on the EUT antenna dimensions and the highest transmitter frequency (40 GHz).

Far field distances for OOB emissions is based on the measurement antenna dimension and highest frequency in the measurement range :

Frequency range [GHz]	Far field distance R [m]	Measurement distance [m]
18 – 26.5	0.73	4
26.5 – 40	0.48	4
40 – 60	0.34	3
60 – 90	0.22	1
90 – 110	0.17	1
110 – 150	0.13	1
150 – 170	0.13	0.5
170 – 200	0.10	0.5

Formula for far field distance calculation, with R being far field distance and D meaning antenna aperture size:

$$R = 2 \times D^2 / \lambda$$

References

Measurements were done according to relevant parts of the following standards:

CFR 47 part 30, April 2021

ANSI C63.26-2015

KDB 842590 D01 Upper Microwave Flexible Use Service v01r02

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 971168 D03 IM Emission Repeater Amp v01

3GPP TR 38.141-2 V15.9.0

3GPP TR 37.842 V13.3.0 (2020-01)

Measurement equipment

	Calibration Due	RISE number
Anechoic chamber, Hertz	2021-09	BX50194
R&S FSW 43	2021-07	902 073
R&S ESU 40	2021-07	901 385
R&S ZNB 40	2021-07	BX50051
RF Cable VNA-calibration	2022-01	BX50189
RF Cable VNA-calibration	2022-01	BX50190
RF Cable	2021-05	BX50236
RF Cable	2021-09	BX50192
RF Cable	2022-01	BX81431
RF Cable	2021-05	BX81423
RF Cable	2021-09	503 681
RF Cable FSW-B21	2021-09	BX62069
RF Cable FSW-B21	2021-09	BX62073
Bilog antenna Schaffner 6143A	2021-08	504079
EMCO Horn Antenna 3115	2021-07	502 175
EMCO Horn Antenna 3115	2021-12	902 212
EMCO Horn Antenna 3116	2021-07	503 279
Flann STD Gain Horn Antenna 20240-20	-	KWP02600
Flann STD Gain Horn Antenna 22240-20	-	KWP02601
Flann STD Gain Horn Antenna 24240-20	-	BX92414
Flann STD Gain Horn Antenna 26240-20	-	BX92416
Flann STD Gain Horn Antenna 27240-20	-	BX92417
Flann STD Gain Horn Antenna 29240-20	-	BX92419
Flann STD Gain Horn Antenna 30240-20	-	BX92420
Mixer FS-Z60	2023-09	BX90566
Mixer FS-Z90	2022-01	BX90567
Mixer FS-Z110	2024-01	BX81425
Mixer FS-Z170	2024-01	BX81426
Mixer FS-Z220	2024-01	BX81427
µComp Nordic, Low Noise Amplifier	2022-01	901 544
Miteq, Low Noise Amplifier	2022-01	503 278
Temperature and humidity meter, Testo 615	2021-06	503 498

Frequency stability 2022-02

	Calibration Due	RISE number
R&S FSW 43	2022-07	902 073
RF Cable	2022-04	BX50236
EMCO Horn Antenna 3116	2024-06	503 279
Temperature Chamber	-	503 360
Testo 635, temperature and humidity meter	2022-07	504 203
Multimeter Fluke 87	2022-05	502 190

EAB Measurement equipment

Calibrated at RISE before testing.

	Calibration Due	S/N
Marki Microwave FLP2650 Low pass filter	2022-04	1827
Qualwave QBF-26400-33000-60 Band pass filter	2022-04	182704

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation "SP-QD 10885". The uncertainties are calculated with a coverage factor $k=2$ (95% level of confidence).

Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test object was delivered: 2021-04-07.

Manufacturer's representative

Mikael Jansson, Ericsson AB.

Test engineers

Tomas Lennhager and Björn Skönvall, RISE

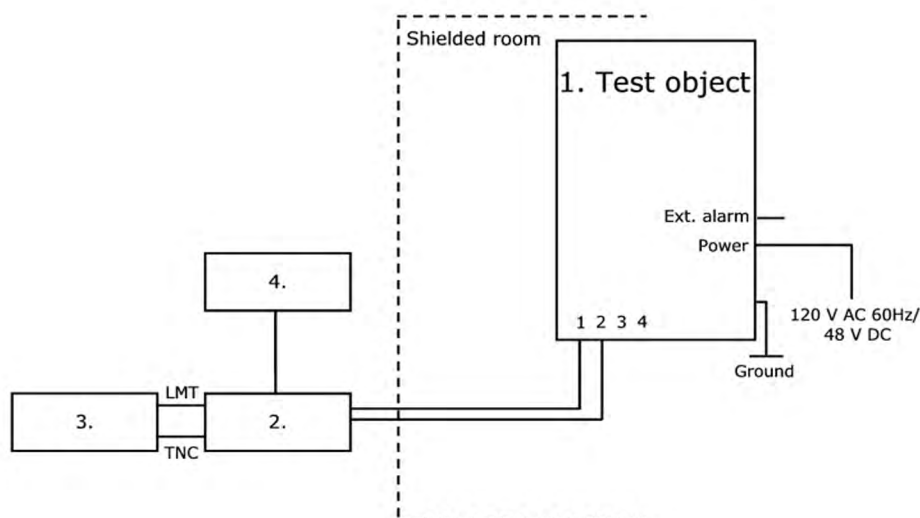
Test participant(-s)

None

Test frequencies used for radiated measurements

Frequency Hor/ Ver [MHz]	Symbolic name	Config mode	Comment
37025.04	BL ₅₀	2	50 MHz BW, TX bottom frequency configuration lower band
37800.00	ML ₅₀	2	50 MHz BW, TX middle frequency configuration lower band
38574.96	TL ₅₀	2	50 MHz BW, TX top frequency configuration lower band
38625.00	BH ₅₀	2	50 MHz BW, TX bottom frequency configuration higher band
39300.00	MH ₅₀	2	50 MHz BW, TX middle frequency configuration higher band
39975.00	TH ₅₀	2	50 MHz BW, TX top frequency configuration higher band
37050.00	BL ₁₀₀	2	100 MHz BW, TX bottom frequency configuration lower band
37800.00	ML ₁₀₀	2	100 MHz BW, TX middle frequency configuration lower band
38550.00	TL ₁₀₀	2	100 MHz BW, TX top frequency configuration lower band
38649.96	BH ₁₀₀	2	100 MHz BW, TX bottom frequency configuration lower band
39300.00	MH ₁₀₀	2	100 MHz BW, TX middle frequency configuration higher band
39949.92	TH ₁₀₀	2	100 MHz BW, TX top frequency configuration higher band
37025.00 37074.96 37374.96	Bim ₅₀	2	50 MHz BW, 3 carrier, TX bottom frequencies configuration lower band
39625.08 39924.96 39975.00	Tim ₅₀	2	50 MHz BW, 3 carrier, TX top frequencies configuration higher band
37050.00 37149.96 37249.92 37350.00	BL ₄₁₀₀	2	100 MHz BW, 4 carrier, TX bottom frequencies configuration lower band
38250.00 38349.96 38449.92 38550.00	TL ₄₁₀₀	2	100 MHz BW, 4 carrier, TX top frequencies configuration lower band
39649.92 39750.00 39849.96 39949.92	TH ₄₁₀₀	2	100 MHz BW, 4 carrier, TX top frequencies configuration higher band

Frequency Hor/ Ver [MHz]	Symbolic name	Config mode	Comment
37050.00 37149.96 37249.92 37350.00 37449.96 37549.92 37650.00 37749.96	BL8 ₁₀₀	1	100 MHz BW, 8 carrier, TX Bottom frequencies configuration lower band
38250.00 38349.96 38449.92 38550.00 38649.96 38749.92 38850.00 38949.96	M8 ₁₀₀	1	100 MHz BW, 8 carrier, TX top frequencies configuration lower band and bottom frequencies configuration higher band
39249.96 39349.92 39450.00 39549.96 39649.92 39750.00 39849.96 39949.92	TH8 ₁₀₀	1	100 MHz BW, 8 carrier, TX top frequencies configuration higher band
37050.00 37149.96 38000.04 38100.00 39000.00 39099.96 39849.96 39949.92	BMT8 ₁₀₀	0	100 MHz BW, 8 carrier, bottom near mid and top frequencies configuration

Test setup: radiated measurements**Test object:**

1.	Air 5322 B260, KRD 901 168/4, rev. R1A, s/n: E23C627580, AC version Air 5322 B260, KRD 901 168/1, rev. R1A, s/n: E23C627931, DC version With FCC ID: TA8AKRD901168 Radio Software: CXP 203 0045/1, rev. R8A427 For Frequency stability test 2022-02 Air 5322 B260, KRD 901 168/4, rev. R1A, s/n: E23C666994, AC version Air 5322 B260, KRD 901 168/1, rev. R1A, s/n: E23C627931, DC version With FCC ID: TA8AKRD901168 Radio Software: CXP 203 0045/1, rev. R11C957
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Associated equipment:

2.	Testing Equipment: Baseband 6648, KDU 137 0015/1, rev. R3A, s/n: E23B849367 with software: CXP2010174/1, rev. R26A82 For Frequency stability test 2022-02 Baseband 6630, KDU 137 848/1, rev. R3B, s/n: E23B220402 with software: CXP9024418/15, rev. R47A306
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Functional test equipment:

3.	Computer, HP ZBook, BAMS - 1001530471
4.	GPS Active Antenna, KRE 101 2082/1 GPS 02 01, NCD 901 41/1, rev. R1D, s/n: A401804384

Interfaces:

Power input configuration AC (KRD 901 168/4): 120 VAC 60Hz	Power
Power input configuration DC (KRD 901 168/1): -48 VDC	Power
EXT Alarm, shielded multi-wire	Signal
1, Optical Interface Link, single mode opto fibre	Signal
2, Optical Interface Link, single mode opto fibre	Signal
3, Optical Interface Link, single mode opto fibre, not connected in this configuration	Signal
4, Optical Interface Link, single mode opto fibre, not connected in this configuration	Signal
Ground wire	Ground

RF power output measurements according to CFR 47 §30.202

Date	Temperature	Humidity
2021-04-14	23 °C ± 3 °C	20 % ± 5 %
2021-04-15	23 °C ± 3 °C	17 % ± 5 %

Test set-up and procedure

The test object was located in a anechoic chamber. The measuring antenna was aligned to the centre of the PAAM. A turn table was used to find the highest output power. A signal analyzer with the channel power function activated was used to measure the output power with the RMS detector activated. The bandwidth setting of the channel power function was set to 100 MHz.

A substitution measurement defined in 3GPP TR 37.842 chapter 10.3.1.1.2 was used to get the actual correction factor (Transducer factor A-D in the figure 1 below) with a Network analyzer (ZNB 40).

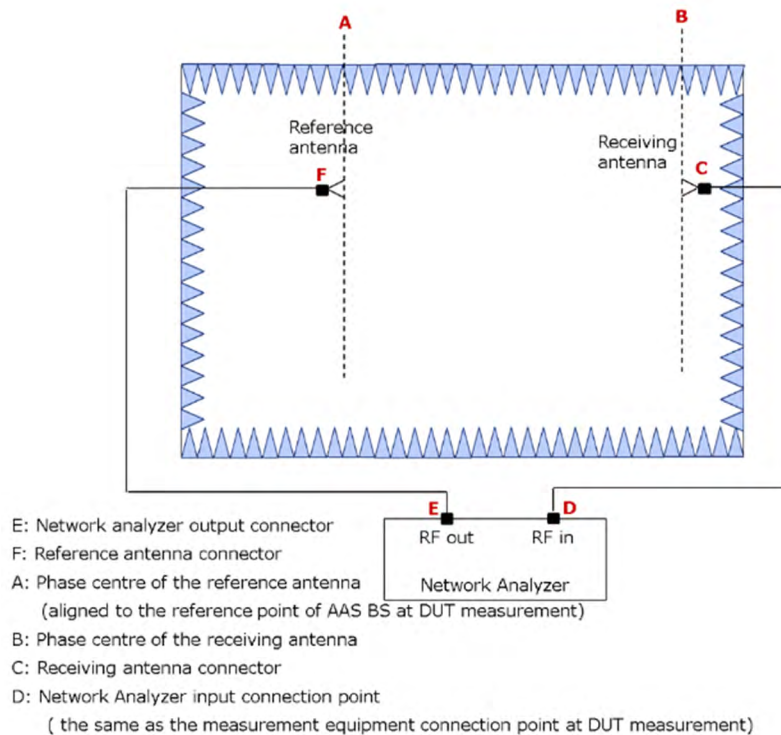


Figure 1: Indoor Anechoic Chamber calibration system setup for EIRP

Stage 1 - Calibration:

- 1) Connect the reference antenna and the receiving antenna to the measurement RF out port and RF in port of the network analyzer, respectively, as shown in figure 1.
- 2) Install the reference antenna with its *beam peak direction* and the height of its phase centre aligned with the receiving antenna.
- 3) Set the centre frequency of the network analyzer to the carrier centre frequency of the tested signal for EIRP measurement of the EUT and measure $LF_{EIRP, E \rightarrow D}$, which is equivalent to $20\log|S_{21}|$ (dB) obtained by the network analyzer:
 $LF_{EIRP, E \rightarrow D}$: Pathloss between E and D in figure 1.
- 4) Measure the cable loss, $LF_{EIRP, E \rightarrow F}$ between the reference antenna connector and the network analyzer connector:
 $LF_{EIRP, E \rightarrow F}$: Cable loss between E and F in figure 1.
- 5) Calculate the calibration value between A and D with the following formula:
 $L_{EIRP_cal, A \rightarrow D} = LF_{EIRP, E \rightarrow D} + G_{REF_ANT_EIRP, A \rightarrow F} - LF_{EIRP, E \rightarrow F}$.
 $L_{EIRP_cal, A \rightarrow D}$: Calibration value between A and D in figure 1. Was implemented in the spectrum analyzer as a transducer.
 $G_{REF_ANT_EIRP, A \rightarrow F}$: Antenna gain of the reference antenna.

Stage 2 - Measurement:

- 6) Uninstall the reference antenna and install the EUT with the manufacturer declared coordinate system reference point in the same place as the phase centre of the reference antenna. The manufacturer declared coordinate system orientation of the EUT is set to be aligned with the testing system.
- 7) Measure the mean power, $P_{R_EUT_EIRP, D}$, D in figure 1.
- 8) Calculate the EIRP with the following formula:

$$EIRP = P_{R_EUT_EIRP, D} + L_{EIRP_cal, A \rightarrow D}$$

Test Setup, measuring distance 4m:

Measurement equipment	RISE number
Anechoic chamber, Hertz	BX50194
R&S FSW 43	902 073
R&S ZNB 40	BX50051
EMCO Horn Antenna 3116	503 279
FLANN Std gain 22240-20	KWP02601
RF Cable	BX81423
RF Cable VNA-calibration	BX50189
RF Cable VNA-calibration	BX50190
RF Cable	BX50236
RF Cable	BX50192
Testo 615, temperature and humidity meter	503 498

Measurement uncertainty: 3.3 dB

Results

Test object, KRD 901 168/4 AC version:

Single carrier Config mode 2

Beam index 0 Bore site, Bandwidth 50MHz, QPSK

Nominal rated output power (EIRP) per Beam: 57 dBm/ Polarization.

	Output power per 100 MHz, EIRP [RMS dBm] Vertical/ Horizontal
Symbolic name	Carrier 1
BL ₅₀	57.04/ 57.64
ML ₅₀	56.72/ 57.20
TL ₅₀	57.62/ 56.94
BH ₅₀	57.69/ 57.17
MH ₅₀	58.23/ 57.50
TH ₅₀	57.71/ 57.30

Beam index 0 Bore site, Bandwidth 100MHz, QPSK

Nominal rated output power (EIRP) per Beam: 57 dBm/ Polarization.

	Output power per 100 MHz, EIRP [RMS dBm] Vertical/ Horizontal
Symbolic name	Carrier 1
BL ₁₀₀	56.94/ 57.45
ML ₁₀₀	56.68/ 57.08
TL ₁₀₀	57.51/ 56.96
BH ₁₀₀	57.58/ 57.03
MH ₁₀₀	58.33/ 57.30
TH ₁₀₀	57.25/ 57.37

Multi carrier

4-Carrier Config mode 2

Beam index 0 Bore site, Bandwidth 100MHz, QPSK

Nominal rated output power (EIRP) per Beam: 57 dBm/ Polarization.

	Output power per 100 MHz, EIRP [RMS dBm] Vertical/ Horizontal				
Symbolic name	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Total (per 400 MHz)
BL4 ₁₀₀	49.11/ 50.87	49.52/ 50.62	50.48/ 51.19	50.69/ 51.97	56.02/ 57.21
TL4 ₁₀₀	49.67/ 50.25	50.36/ 50.22	51.21/ 50.70	50.94/ 50.88	56.61/ 56.54
TH4 ₁₀₀	52.03/ 52.74	51.54/ 51.49	50.66/ 50.18	49.39 49.35	57.04/ 57.15

8-Carrier Config mode 1

Beam index 0 Boresight, Carrier Bandwidth 100 MHz, QPSK

Nominal rated output power (EIRP) per Beam: 53 dBm/ Polarization.

	Output power per 100 MHz, EIRP [RMS dBm] Vertical/ Horizontal									
	Beam 1					Beam 2				
Symbolic name	A	B	C	D	Total Power Beam 1 (per 400 MHz)	E	F	G	H	Total power Beam 2 (per 400 MHz)
BL8 ₁₀₀	46.17/ 47.09	46.00/ 46.86	46.91/ 47.66	46.95/ 48.07	52.55/ 53.47	46.19/ 47.15	46.51/ 47.11	46.78/ 47.57	46.83/ 47.87	52.61/ 53.46
M8 ₁₀₀	46.69/ 46.72	46.81/ 46.62	47.67/ 47.06	47.14/ 47.07	53.11/ 52.89	47.21/ 47.21	47.49/ 46.87	47.67/ 47.05	47.32/ 46.87	53.45/ 53.02
TH8 ₁₀₀	48.11/ 48.26	47.56/ 47.42	48.00/ 47.28	46.97/ 46.76	53.70/ 53.48	48.10/ 48.93	47.46/ 47.60	46.75/ 46.74	45.96/ 46.15	53.16/ 53.50

8-Carrier Config mode 0

Beam index 0 Boresight, Carrier Bandwidth 100 MHz

Nominal rated output power (EIRP) per Beam: 47 dBm/ Polarization.

		Output power per 100 MHz, EIRP [RMS dBm] Vertical/ Horizontal					
		Beam 1			Beam 2		
Modulation	Symbolic name	A	B	Total Power Beam 1	C	D	Total power Beam 2
QPSK	BMT8 ₁₀₀	43.66/ 44.69	43.90/ 44.52	46.79/ 47.62	42.55/ 43.06	43.24/ 43.32	45.92/ 46.20
		Beam 3			Beam 4		
Modulation	Symbolic name	E	F	Total Power Beam 3	G	H	Total power Beam 4
QPSK	BMT8 ₁₀₀	44.83/ 44.02	45.10/ 44.11	47.98/ 47.08	43.87/ 44.10	43.89/ 43.83	46.89/ 46.98

Limits

CFR47 §30.202 Power limits.

- (a) For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 MHz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 MHz.

Complies?	Yes
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Occupied bandwidth measurements according to CFR47 2.1049

Date	Temperature	Humidity
2021-04-14	23 °C ± 3 °C	20 % ± 5 %
2021-04-15	23 °C ± 3 °C	17 % ± 5 %

Test set-up and procedure

The test object was located in a anechoic chamber. The measuring antenna was aligned to the centre of the of the PAAM. A turn table was used to find the highest output power. A signal analyzer with Peak detector and max hold was used to measure the OBW.

Test Setup, measuring distance 3m:

Measurement equipment	RISE number
Anechoic chamber, Hertz	BX50194
R&S FSW 43	902 073
R&S ZNB 40	BX50051
EMCO Horn Antenna 3116	503 279
FLANN Std gain 22240-20	KWP02601
RF Cable	BX81423
RF Cable VNA-calibration	BX50189
RF Cable VNA-calibration	BX50190
RF Cable	BX50236
RF Cable	BX50192
Testo 615, temperature and humidity meter	503 498

Measurement uncertainty: 3.3 dB

Results

Test object, KRD 901 168/4 AC version:

Single carrier, Config mode 2, Bandwidth: 50MHz Modulation: QPSK

Diagram	Symbolic name	Polarization	Occupied BW (99%) [MHz]
1.1	TL ₅₀	Hor	46.138
1.2	TL ₅₀	Ver	46.147

Single carrier, Config mode 2, Bandwidth: 100MHz Modulation: QPSK

Diagram	Symbolic name	Polarization	Occupied BW (99%) [MHz]
1.3	TL ₁₀₀	Hor	95.205
1.4	TL ₁₀₀	Ver	95.259

Carrier Aggregation, Config mode 2, Bandwidth: 4x 100MHz, Modulation: QPSK

Diagram	Symbolic name	Polarization	Occupied BW (99%) [MHz]
1.5	TL ₄ ₁₀₀	Hor	393.601
1.6	TL ₄ ₁₀₀	Ver	393.530

Carrier Aggregation, Config mode 1, Bandwidth: 8x 100MHz, Modulation: QPSK

Diagram	Symbolic name	Polarization	Occupied BW (99%) [MHz]
1.7	M8 ₁₀₀	Hor	791.403
1.8	M8 ₁₀₀	Ver	791.846

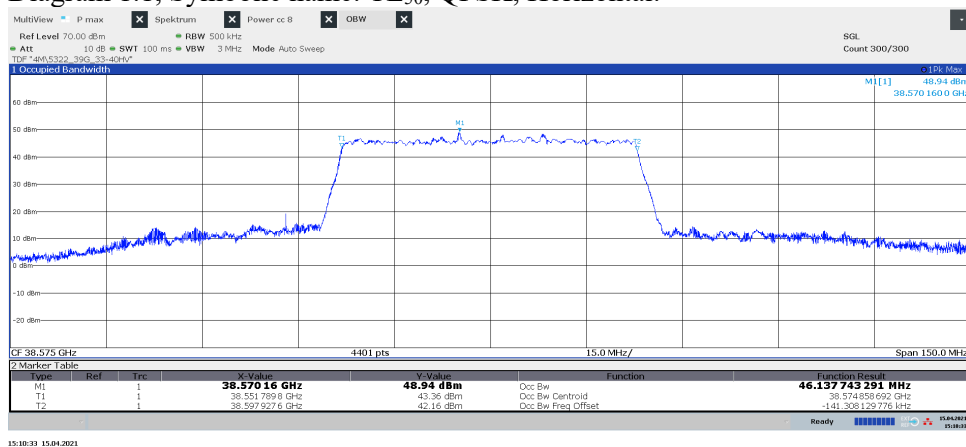
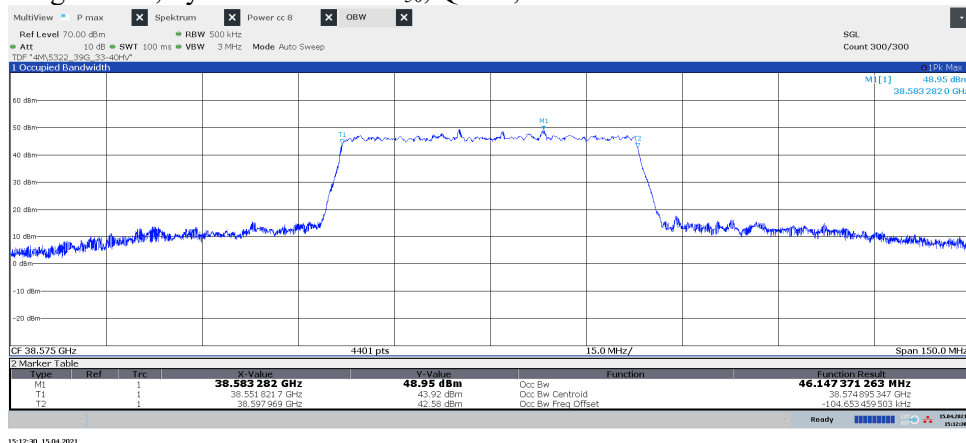
Diagram 1.1, Symbolic name: TL₅₀, QPSK, Horizontal:Diagram 1.2, Symbolic name: TL₅₀, QPSK, Vertical:

Diagram 1.3, Symbolic name: TL₁₀₀, QPSK, Horizontal:

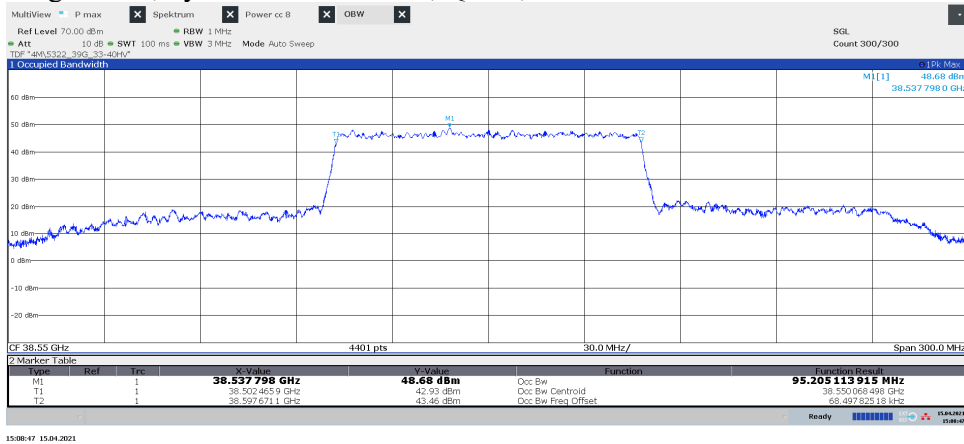


Diagram 1.4, Symbolic name: TL₁₀₀, QPSK, Vertical:

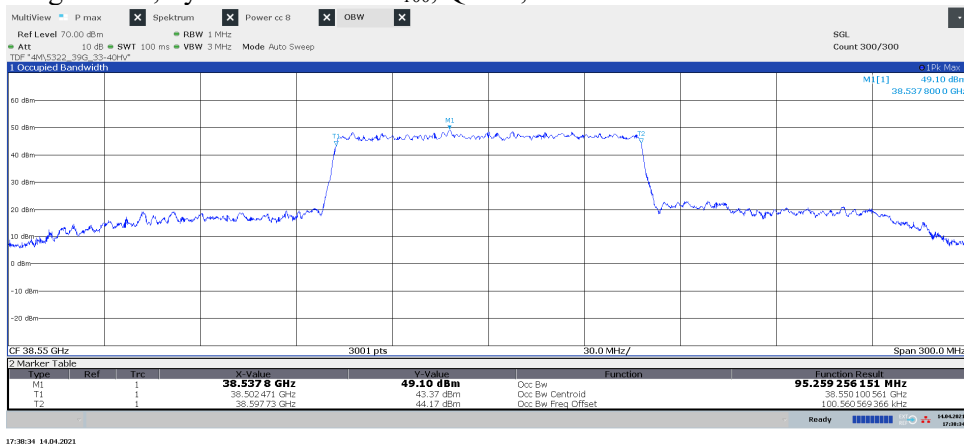


Diagram 1.5, Symbolic name: TL4₁₀₀, QPSK, Horizontal:

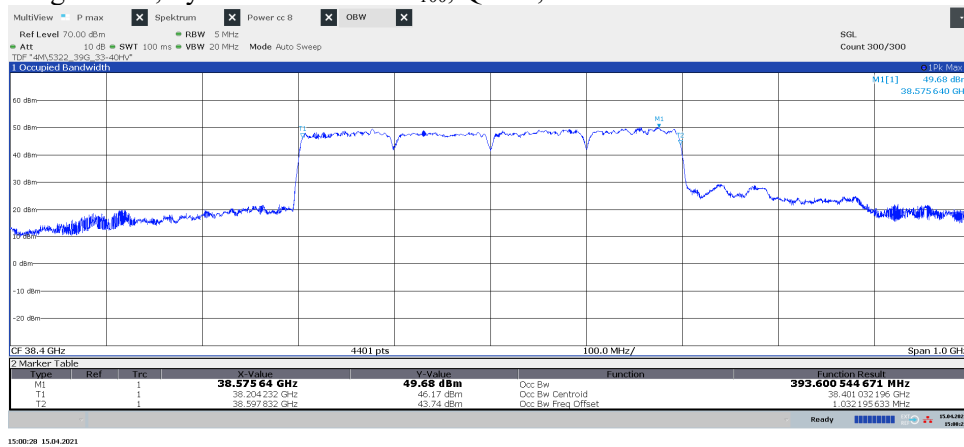


Diagram 1.6, Symbolic name: TL4₁₀₀, QPSK, Vertical:

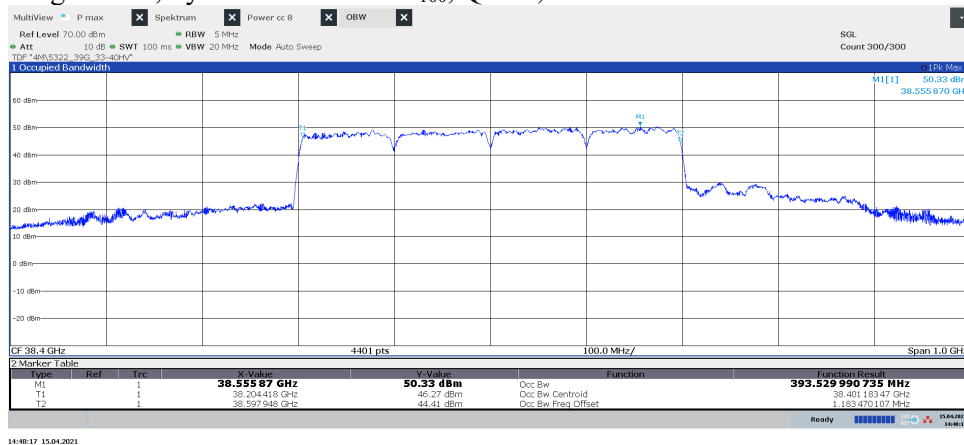
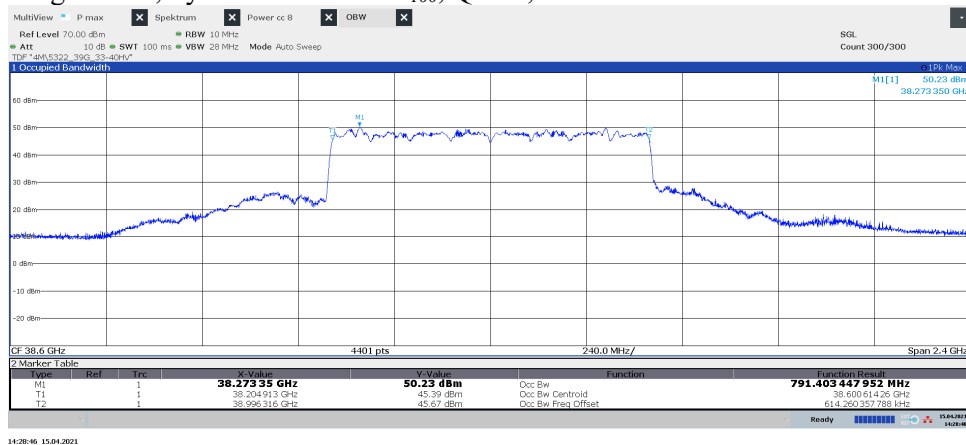


Diagram 1.7, Symbolic name: M8₁₀₀, QPSK, Horizontal:Diagram 1.8, Symbolic name: M8₁₀₀, QPSK, Vertical::

Field strength of spurious radiation measurements according to CFR 47 §30.203

Date	Temperature	Humidity
2021-04-16	23 °C ± 3 °C	15 % ± 5 %
2021-04-19	23 °C ± 3 °C	13 % ± 5 %
2021-04-20	23 °C ± 3 °C	16 % ± 5 %
2021-04-21	23 °C ± 3 °C	17 % ± 5 %
2021-04-22	23 °C ± 3 °C	13 % ± 5 %
2021-04-23	23 °C ± 3 °C	9 % ± 5 %
2021-04-26	23 °C ± 3 °C	15 % ± 5 %
2021-04-27	23 °C ± 3 °C	13 % ± 5 %
2021-04-28	23 °C ± 3 °C	11 % ± 5 %
2021-04-29	23 °C ± 3 °C	16 % ± 5 %
2021-04-30	23 °C ± 3 °C	11 % ± 5 %

The measurements were performed with both horizontal and vertical polarization of the antenna. The measurement was performed with a RBW of 1 MHz. The antenna distance and test object height in the different frequency ranges is described below.

In the test range from 40 – 200 GHz

A propagation loss in free space was calculated. The used formula was

$$\gamma = 20 \log \left(\frac{4\pi D}{\lambda} \right), \gamma \text{ is the propagation loss and } D \text{ is the antenna distance.}$$

For 40 – 60 GHz D was 3.0m, for 60 – 150 GHz D was 1.0m and for 150 – 200 GHz D was 0.5m.

In the test range from 30MHz – 40 GHz a substitution measurement defined in 3GPP TR 37.842 chapter 10.3.1.1.2 was used to get the actual correction factor (Transducer factor A-D in the figure 1 below) with a Network analyzer (ZNB 40).

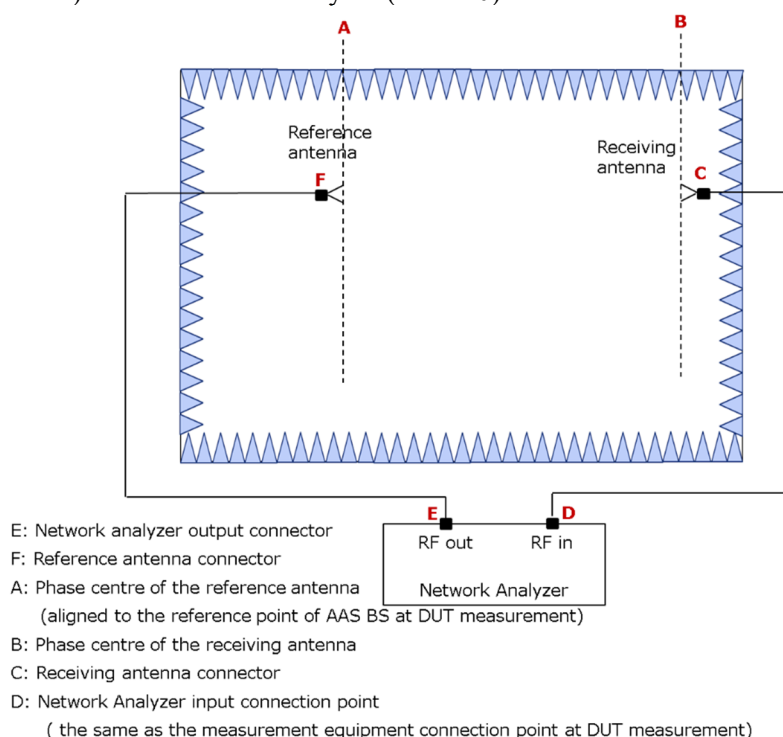


Figure 1: Indoor Anechoic Chamber calibration system setup for EIRP

Stage 1 - Calibration:

- 1) Connect the reference antenna and the receiving antenna to the measurement RF out port and RF in port of the network analyzer, respectively, as shown in figure 1.
- 2) Install the reference antenna with its *beam peak direction* and the height of its phase centre aligned with the receiving antenna.
- 3) Set the centre frequency of the network analyzer to the carrier centre frequency of the tested signal for EIRP measurement of the EUT and measure $LF_{EIRP, E \rightarrow D}$, which is equivalent to $20\log|S_{21}|$ (dB) obtained by the network analyzer:
 $LF_{EIRP, E \rightarrow D}$: Pathloss between E and D in figure 1.
- 4) Measure the cable loss, $LF_{EIRP, E \rightarrow F}$ between the reference antenna connector and the network analyzer connector:
 $LF_{EIRP, E \rightarrow F}$: Cable loss between E and F in figure 1.
- 5) Calculate the calibration value between A and D with the following formula:
 $L_{EIRP_cal, A \rightarrow D} = LF_{EIRP, E \rightarrow D} + G_{REF_ANT_EIRP, A \rightarrow F} - LF_{EIRP, E \rightarrow F}$.
 $L_{EIRP_cal, A \rightarrow D}$: Calibration value between A and D in figure 1. Was implemented in the spectrum analyzer as a transducer.
 $G_{REF_ANT_EIRP, A \rightarrow F}$: Antenna gain of the reference antenna.

Stage 2 - Measurement:

- 6) Uninstall the reference antenna and install the EUT with the manufacturer declared coordinate system reference point in the same place as the phase centre of the reference antenna. The manufacturer declared coordinate system orientation of the EUT is set to be aligned with the testing system.
- 7) Measure the mean power, $P_{R_EUT_EIRP, D}$, D in figure 1.
- 8) Calculate the EIRP with the following formula:

$$EIRP = P_{R_EUT_EIRP, D} + L_{EIRP_cal, A \rightarrow D}$$

The measurement procedure was as the following:

- 1) An EIRP pre-scan with the measurement antenna in horizontal and vertical polarization is performed with RMS detector and Max Hold on the spectrum analyzer. The turn table was slowly rotating from 0-360 degrees.
- 2) EIRP spurious radiation on frequencies closer than 10 dB to the TRP limit in the pre-scan a manual search for maximum response was done.
- 3) If the recorded EIRP value was above the TRP limit, a TRP measurement was done according to KDB 842590 D01 chapter 4.4. Overview of the methods.
 - a) Two Cut method according to KDB 842590 D01 chapter 4.4.2.2
 - i. EUT set in vertical orientation
 - ii. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT
 - iii. EUT set in horizontal orientation
 - iv. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT.
 - v. $TRP = EIRP \text{ measurement samples averaged} + \Delta TRP$.
(ΔTRP = Margin factor based on grid selection).

- b) Two Cut method when pattern multiplication is applicable and used according to KDB 842590 D01 chapter 4.4.2.3
 - i. EUT set in vertical orientation
 - ii. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT
 - iii. EUT set in horizontal orientation
 - iv. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT.
 - v. TRP is calculated using the formula in Appendix E of KDB 842590 D01
- c) EIRP to Conducted Power Conversion in Band Edge Using Antenna Gain according to KDB 842590 D01 chapter 4.4.2.5
 - i. Convert each radiated measurement to conducted power/BW using the equations:
$$\text{Conducted Power level (dBm) at any frequency/BW} = \text{Measured EIRP level (dBm)/BW} - \text{EUT antenna Gain (dBi)}$$
 - ii. Sum the radiated power Horizontal and Vertical polarisations for total conducted power level/BW.
 - iii. Evaluate the pass/fail decision by comparing total conducted power level/BW against the applicable TRP limit.
- d) Spherical Grid Method, according to KDB 842590 D01 chapter 4.4.2.4
 - i. EUT set in horizontal orientation bottom of the EUT to the right.
 - ii. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size of the turn table was 15 degrees from 0 – 165 degrees and 195 – 360 degrees. In cone of radiation 165 – 195 degrees the step size of the turn table was 1 degree.
 - iii. EUT was changed in 15 degrees step from horizontal bottom right to horizontal bottom to the left (twelve steps). Step ii. was repeated for all twelve steps.
 - iv. TRP was calculated according to Appendix B in KDB 842590 D01.

Measurement equipment

	RISE number
Anechoic chamber, Hertz	BX50194
R&S FSW 43	902 073
R&S ESU 40	901 385
R&S ZNB 40	BX50051
RF Cable VNA-calibration	BX50189
RF Cable VNA-calibration	BX50190
RF Cable	BX50236
RF Cable	BX50192
RF Cable	BX81431
RF Cable	BX81423
RF Cable	503 681
RF Cable FSW-B21	BX62069
RF Cable FSW-B21	BX62073
Bilog antenna Schaffner 6143A	504079
EMCO Horn Antenna 3115	502 175
EMCO Horn Antenna 3115	902 212
EMCO Horn Antenna 3116	503 279
Flann STD Gain Horn Antenna 20240-20	KWP02600
Flann STD Gain Horn Antenna 22240-20	KWP02601
Flann STD Gain Horn Antenna 24240-20	BX92414
Flann STD Gain Horn Antenna 26240-20	BX92416
Flann STD Gain Horn Antenna 27240-20	BX92417
Flann STD Gain Horn Antenna 29240-20	BX92419
Flann STD Gain Horn Antenna 30240-20	BX92420
Mixer FS-Z60	BX90566
Mixer FS-Z90	BX90567
Mixer FS-Z110	BX81425
Mixer FS-Z170	BX81426
Mixer FS-Z220	BX81427
µComp Nordic, Low Noise Amplifier	901 544
Miteq, Low Noise Amplifier	503 278
Temperature and humidity meter, Testo 615	503 498

EAB Measurement equipment

Calibrated at RISE before testing.

	S/N
Marki Microwave FLP2650 Low pass filter	1827
Qualwave QBF-26400-33000-60 Band pass filter	182704

Results

Test object, KRD 901 168/4 AC version:

Evaluation of spurious emissions have been done in several beam directions, including extreme settings both in azimuth and elevation planes. Results have shown that Beam index 0/Boresight can represent worst case.

The diagrams represents worst case configurations (Beam index 0 /Boresight) for each frequency range.

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.1a	BL ₅₀	2	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.1b	BL ₅₀	2	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.2a	M8 ₁₀₀	1	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.2b	M8 ₁₀₀	1	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.3a	BMT8 ₁₀₀	0	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.3b	BMT8 ₁₀₀	0	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.4a	BL ₅₀	2	Hor	1-18 GHz	Pre scan Max hold EIRP	Yes
2.4b	BL ₅₀	2	Ver	1-18 GHz	Pre scan Max hold EIRP	Yes
2.5a	M8 ₁₀₀	1	Hor	1-18 GHz	Pre scan Max hold EIRP	Yes
2.5b	M8 ₁₀₀	1	Ver	1-18 GHz	Pre scan Max hold EIRP	Yes
2.6a	BMT8 ₁₀₀	0	Hor	1-18 GHz	Pre scan Max hold EIRP	Yes
2.6b	BMT8 ₁₀₀	0	Ver	1-18 GHz	Pre scan Max hold EIRP	Yes
2.7a	BL ₅₀	2	Hor	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.7b	BL ₅₀	2	Ver	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.8a	M8 ₁₀₀	1	Hor	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.8b	M8 ₁₀₀	1	Ver	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.9a	BMT8 ₁₀₀	0	Hor	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.9b	BMT8 ₁₀₀	0	Ver	18-26.5 GHz	Pre scan Max hold EIRP	Yes
2.10a	TH ₅₀	2	Hor	26.5-33 GHz	Pre scan Max hold EIRP	No
2.10b	TH ₅₀	2	Ver	26.5-33 GHz	Pre scan Max hold EIRP	No
2.10c	TH ₅₀	2	Hor/ Ver	28.65-28.75 GHz	Two cut TRP	Compliant to TRP limit
2.11a	M8 ₁₀₀	1	Hor	26.5-33 GHz	Pre scan Max hold EIRP	Yes
2.11b	M8 ₁₀₀	1	Ver	26.5-33 GHz	Pre scan Max hold EIRP	Yes
2.12a	BMT8 ₁₀₀	0	Hor	26.5-33 GHz	Pre scan Max hold EIRP	Yes
2.12b	BMT8 ₁₀₀	0	Ver	26.5-33 GHz	Pre scan Max hold EIRP	Yes
2.13a	TH ₁₀₀	2	Hor	33-40 GHz	Pre scan Max hold EIRP	No
2.13b	TH ₁₀₀	2	Ver	33-40 GHz	Pre scan Max hold EIRP	No
2.13c	TH ₁₀₀	2	Hor/ Ver	35.8-35.9 GHz	Spherical grid Method TRP	Compliant to TRP limit
2.14a	ML ₅₀	2	Hor	33-40 GHz 33-36.85 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ² Yes ¹
2.14b	ML ₅₀	2	Ver	33-40 GHz 33-36.85 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ² Yes ¹
2.14c	ML ₅₀	2	Hor/ Ver	36.85-37GHz	Two cut TRP	Compliant to TRP limit

¹⁾ Calculated conducted power based on antenna gain below limit

²⁾ Compliant (5x LO) to TRP limit based on Lower EIRP compared to TH₁₀₀ (Diagram 2.13)

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.15a	BL ₅₀	2	Hor	33-40 GHz 33-35 GHz 35-36.5 GHz 36.5-37 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ² Yes ³ Yes ⁴ Yes ¹
2.15b	BL ₅₀	2	Ver	33-40 GHz 33-35 GHz 35-36.5 GHz 36.5-37 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ² Yes ³ Yes ⁴ Yes ¹
2.15c	BL ₅₀	2	Hor	36-37GHz 36-36.3 GHz 36.3-37 GHz	Pre scan Max average EIRP	No Yes ³ Yes ^{1,4}
2.15d	BL ₅₀	2	Ver	36-37GHz 36-36.3 GHz 36.3-37 GHz	Pre scan Max average EIRP	No Yes ³ Yes ^{1,4}
2.16a	Bim ₅₀	2	Hor	33-40 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ¹
2.16b	Bim ₅₀	2	Ver	33-40 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ¹
2.16c	Bim ₅₀	2	Hor	36-37 GHz	Pre scan Max average EIRP	No
2.16d	Bim ₅₀	2	Ver	36-37 GHz	Pre scan Max average EIRP	No
2.16e	Bim ₅₀	2	Hor/ Ver	36.3-37 GHz	Pattern multiplication TRP	Compliant to TRP limit
2.17a	BL ₈₁₀₀	1	Hor	33-40 GHz 33-36.5 GHz 36.5-37 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ³ Yes ⁴ Yes ¹
2.17b	BL ₈₁₀₀	1	Ver	33-40 GHz 33-37 GHz 38.6-40 GHz	Pre scan Max hold EIRP	No Yes ⁴ Yes ¹
2.17c	BL ₈₁₀₀	1	Hor	36-37 GHz	Pre scan Max average EIRP	Yes ^{1,4}
2.17d	BL ₈₁₀₀	1	Ver	36-37 GHz	Pre scan Max average EIRP	Yes ^{1,4}
2.18a	BMT ₈₁₀₀	0	Hor	33-40 GHz 33-36.5 GHz 36.5-37 GHz	Pre scan Max hold EIRP	No Yes ² Yes ⁴
2.18b	BMT ₈₁₀₀	0	Ver	33-40 GHz	Pre scan Max hold EIRP	No
2.18c	BMT ₈₁₀₀	0	Hor	36-37 GHz	Pre scan Max average EIRP	Yes ^{1,4}
2.18d	BMT ₈₁₀₀	0	Ver	36-37 GHz	Pre scan Max average EIRP	Yes ^{1,4}

¹⁾ Calculated conducted power based on antenna gain below limit

²⁾ Compliant (5x LO) to TRP limit based on Lower EIRP compared to TH₁₀₀ (Diagram 2.13)

³⁾ Compliant to TRP limit based on Lower EIRP compared to ML₅₀ (Diagram 2.14)

⁴⁾ Compliant to TRP limit based on Lower EIRP compared to Bim₅₀ (Diagram 2.16)

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.19a	TL ₅₀	0	Hor	38.35-38.85 GHz	Pre scan Max average EIRP	Yes ¹
2.19b	TL ₅₀	0	Ver	38.35-38.85 GHz	Pre scan Max average EIRP	Yes ¹
2.20a	BH ₅₀	0	Hor	38.35-38.85 GHz	Pre scan Max average EIRP	Yes ¹
2.20b	BH ₅₀	0	Ver	38.35-38.85 GHz	Pre scan Max average EIRP	Yes ¹
2.21a	TH ₅₀	2	Hor	40-43 GHz	Pre scan Max hold EIRP	No
2.21b	TH ₅₀	2	Ver	40-43 GHz 40.4-43 GHz	Pre scan Max hold EIRP	No Yes ⁶
2.21c	TH ₅₀	2	Hor	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.21d	TH ₅₀	2	Ver	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.22a	TH ₈₁₀₀	1	Hor	40-43 GHz	Pre scan Max hold EIRP	No
2.22b	TH ₈₁₀₀	1	Ver	40-43 GHz	Pre scan Max hold EIRP	No
2.22c	TH ₈₁₀₀	1	Hor	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.22d	TH ₈₁₀₀	1	Ver	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.23a	BMT ₈₁₀₀	1	Hor	40-43 GHz	Pre scan Max hold EIRP	No
2.23b	BMT ₁₀₀	1	Ver	40-43 GHz	Pre scan Max hold EIRP	No
2.23c	BMT ₈₁₀₀	1	Hor	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.23d	BMT ₈₁₀₀	1	Ver	40-43 GHz	Pre scan Max average EIRP	Yes ^{1,5}
2.24a	Tim ₅₀	2	Hor	40-43 GHz	Pre scan Max hold EIRP	No
2.24b	Tim ₅₀	2	Ver	40-43 GHz 40.7-43 GHz	Pre scan Max hold EIRP	No Yes ⁶
2.24c	Tim ₅₀	2	Hor	40-43 GHz	Pre scan Max average EIRP	No
2.24d	Tim ₅₀	2	Ver	40-43 GHz 40.7-43 GHz	Pre scan Max average EIRP	No Yes ⁶
2.24e	Tim ₅₀	2	Hor/ Ver	40-40.7 GHz	Pattern multiplication TRP	Compliant to TRP limit
2.25a	BL ₅₀	2	Hor	40-43 GHz	Pre scan Max hold EIRP	No
2.25b	BL ₅₀	2	Ver	40-43 GHz	Pre scan Max hold EIRP	No
2.25c	BL ₅₀	2	Hor/ Ver	40.05-40.15 GHz	Spherical grid Method TRP	Compliant to TRP limit
2.26a	TL ₅₀	2	Hor	40-43 GHz 41-43GHz	Pre scan Max hold EIRP	No Yes ⁶
2.26b	TL ₅₀	2	Ver	40-43 GHz 41-43GHz	Pre scan Max hold EIRP	No Yes ⁶
2.26c	TL ₅₀	2	Hor/ Ver	40.5-40.8 GHz	Two cut TRP	Compliant to TRP limit

¹⁾ Calculated conducted power based on antenna gain below limit

⁵⁾ Compliant to TRP limit based on Lower EIRP compared to Tim₅₀ (Diagram 2.24)

⁶⁾ Compliant (6x LO) to TRP limit based on Lower EIRP compared to BL₅₀ (Diagram 2.25)

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.27a	BL ₅₀	2	Hor	43-60 GHz	Pre scan Max hold EIRP	No
2.27b	BL ₅₀	2	Ver	43-60 GHz	Pre scan Max hold EIRP	No
2.27c	BL ₅₀	2	Hor/ Ver	43.1-43.25 GHz	Two cut TRP	Compliant to TRP limit
2.28a	M8 ₁₀₀	1	Hor	43-60 GHz	Pre scan Max hold EIRP	Yes
2.28b	M8 ₁₀₀	1	Ver	43-60 GHz	Pre scan Max hold EIRP	Yes
2.29a	BMT8 ₁₀₀	0	Hor	43-60 GHz	Pre scan Max hold EIRP	Yes
2.29b	BMT8 ₁₀₀	0	Ver	43-60 GHz	Pre scan Max hold EIRP	Yes
2.30a	BL ₅₀	2	Hor	60-75 GHz	Pre scan Max hold EIRP	Yes
2.30b	BL ₅₀	2	Ver	60-75 GHz	Pre scan Max hold EIRP	Yes
2.31a	M8 ₁₀₀	1	Hor	60-75 GHz	Pre scan Max hold EIRP	Yes
2.31b	M8 ₁₀₀	1	Ver	60-75 GHz	Pre scan Max hold EIRP	Yes
2.32a	BMT8 ₁₀₀	0	Hor	60-75 GHz	Pre scan Max hold EIRP	Yes
2.32b	BMT8 ₁₀₀	0	Ver	60-75 GHz	Pre scan Max hold EIRP	Yes
2.33a	BL ₅₀	2	Hor	75-90 GHz	Pre scan Max hold EIRP	Yes
2.33b	BL ₅₀	2	Ver	75-90 GHz	Pre scan Max hold EIRP	Yes
2.34a	M8 ₁₀₀	1	Hor	75-90 GHz	Pre scan Max hold EIRP	Yes
2.34b	M8 ₁₀₀	1	Ver	75-90 GHz	Pre scan Max hold EIRP	Yes
2.35a	BMT8 ₁₀₀	0	Hor	75-90 GHz	Pre scan Max hold EIRP	Yes
2.35b	BMT8 ₁₀₀	0	Ver	75-90 GHz	Pre scan Max hold EIRP	Yes
2.36a	BL ₅₀	2	Hor	90-110 GHz	Pre scan Max hold EIRP	Yes
2.36b	BL ₅₀	2	Ver	90-110 GHz	Pre scan Max hold EIRP	Yes
2.37a	M8 ₁₀₀	1	Hor	90-110 GHz	Pre scan Max hold EIRP	Yes
2.37b	M8 ₁₀₀	1	Ver	90-110 GHz	Pre scan Max hold EIRP	Yes
2.38a	BMT8 ₁₀₀	0	Hor	90-110 GHz	Pre scan Max hold EIRP	Yes
2.38b	BMT8 ₁₀₀	0	Ver	90-110 GHz	Pre scan Max hold EIRP	Yes
2.39a	BL ₅₀	2	Hor	110-130 GHz	Pre scan Max hold EIRP	Yes
2.39b	BL ₅₀	2	Ver	110-130 GHz	Pre scan Max hold EIRP	Yes
2.40a	M8 ₁₀₀	1	Hor	110-130 GHz	Pre scan Max hold EIRP	Yes
2.40b	M8 ₁₀₀	1	Ver	110-130 GHz	Pre scan Max hold EIRP	Yes
2.41a	BMT8 ₁₀₀	0	Hor	110-130 GHz	Pre scan Max hold EIRP	Yes
2.41b	BMT8 ₁₀₀	0	Ver	110-130 GHz	Pre scan Max hold EIRP	Yes
2.42a	BL ₅₀	2	Hor	130-150 GHz	Pre scan Max hold EIRP	Yes
2.42b	BL ₅₀	2	Ver	130-150 GHz	Pre scan Max hold EIRP	Yes
2.43a	M8 ₁₀₀	1	Hor	130-150 GHz	Pre scan Max hold EIRP	Yes
2.43b	M8 ₁₀₀	1	Ver	130-150 GHz	Pre scan Max hold EIRP	Yes
2.44a	BMT8 ₁₀₀	0	Hor	130-150 GHz	Pre scan Max hold EIRP	Yes
2.44b	BMT8 ₁₀₀	0	Ver	130-150 GHz	Pre scan Max hold EIRP	Yes

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.45a	BL ₅₀	2	Hor	150-170 GHz	Pre scan Max hold EIRP	Yes
2.45b	BL ₅₀	2	Ver	150-170 GHz	Pre scan Max hold EIRP	Yes
2.46a	M8 ₁₀₀	1	Hor	150-170 GHz	Pre scan Max hold EIRP	Yes
2.46b	M8 ₁₀₀	1	Ver	150-170 GHz	Pre scan Max hold EIRP	Yes
2.47a	BMT8 ₁₀₀	0	Hor	150-170 GHz	Pre scan Max hold EIRP	Yes
2.47b	BMT8 ₁₀₀	0	Ver	150-170 GHz	Pre scan Max hold EIRP	Yes
2.48a	BL ₅₀	2	Hor	170-185 GHz	Pre scan Max hold EIRP	Yes
2.48b	BL ₅₀	2	Ver	170-185 GHz	Pre scan Max hold EIRP	Yes
2.49a	M8 ₁₀₀	1	Hor	170-185 GHz	Pre scan Max hold EIRP	Yes
2.49b	M8 ₁₀₀	1	Ver	170-185 GHz	Pre scan Max hold EIRP	Yes
2.50a	BMT8 ₁₀₀	0	Hor	170-185 GHz	Pre scan Max hold EIRP	Yes
2.50b	BMT8 ₁₀₀	0	Ver	170-185 GHz	Pre scan Max hold EIRP	Yes
2.51a	BL ₅₀	2	Hor	185-200 GHz	Pre scan Max hold EIRP	Yes
2.51b	BL ₅₀	2	Ver	185-200 GHz	Pre scan Max hold EIRP	Yes
2.52a	M8 ₁₀₀	1	Hor	185-200 GHz	Pre scan Max hold EIRP	Yes
2.52b	M8 ₁₀₀	1	Ver	185-200 GHz	Pre scan Max hold EIRP	Yes
2.53a	BMT8 ₁₀₀	0	Hor	185-200 GHz	Pre scan Max hold EIRP	Yes
2.53b	BMT8 ₁₀₀	0	Ver	185-200 GHz	Pre scan Max hold EIRP	Yes

Test object, KRD 901 168/1 DC version:

Diagram	Symbolic name	Config mode	Pol	Frequency range	Measurement method	“Early exit?”
2.54a	BL ₅₀	2	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.54b	BL ₅₀	2	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.55a	M8 ₁₀₀	1	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.55b	M8 ₁₀₀	1	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.56a	BMT8 ₁₀₀	0	Hor	30-1000 MHz	Pre scan Max hold EIRP	Yes
2.56b	BMT8 ₁₀₀	0	Ver	30-1000 MHz	Pre scan Max hold EIRP	Yes

Measurement uncertainty: 30 – 1000 MHz 3.1 dB

1 – 18 GHz, 3.0 dB

18 – 40 GHz, 3.1 dB

40 – 60 GHz, 2.27 dB

60 – 75 GHz, 2.70 dB

75 – 110 GHz, 4.24 dB

110 – 150 GHz, 3.61 dB

150 – 170 GHz, 4.67 dB

170 – 200 GHz, 5.10 dB

Limits

CFR 47 §30.203 Emission limits.

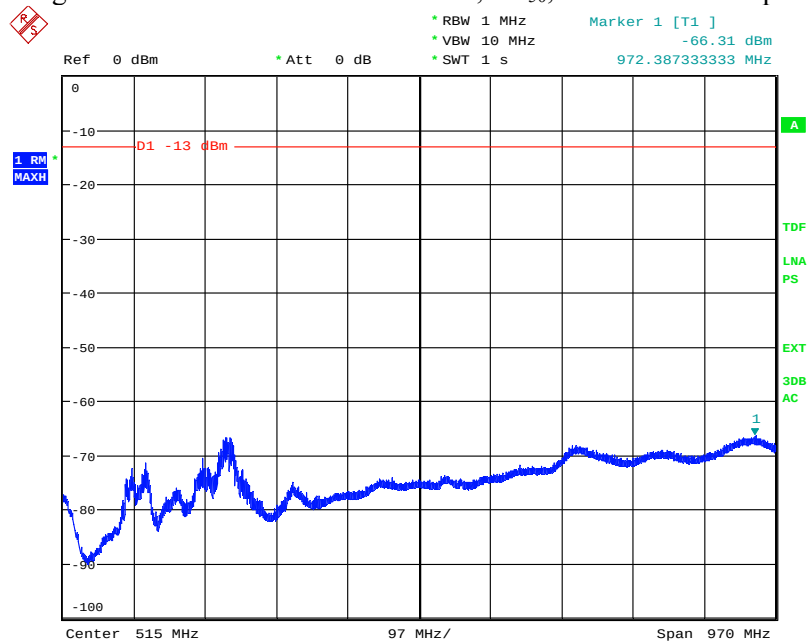
(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

(b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

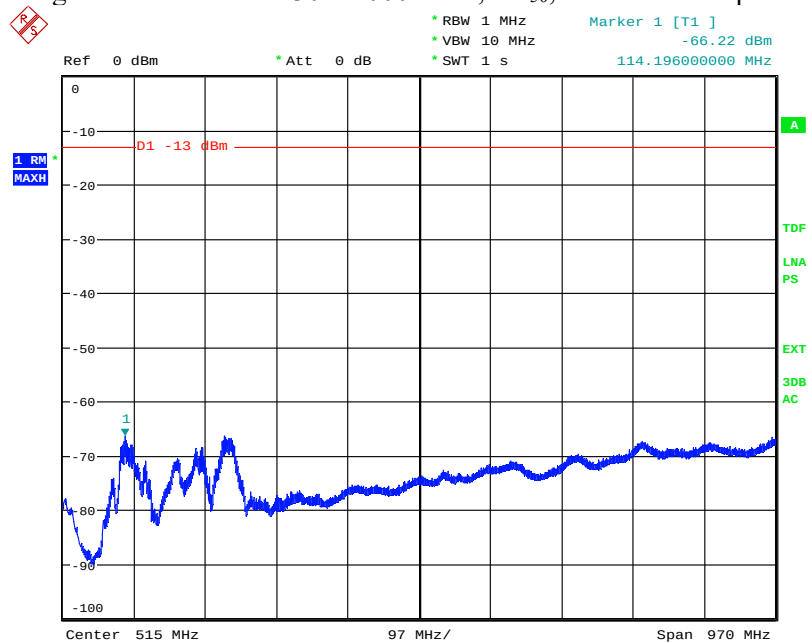
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

Complies?	Yes
-----------	-----

Diagram 2.1a: Pre scan 30 – 1000 MHz, BL₅₀, EIRP Horizontal polarization

Date: 28.APR.2021 13:29:57

Diagram 2.1b: Pre scan 30 – 1000 MHz, BL₅₀, EIRP Vertical polarization

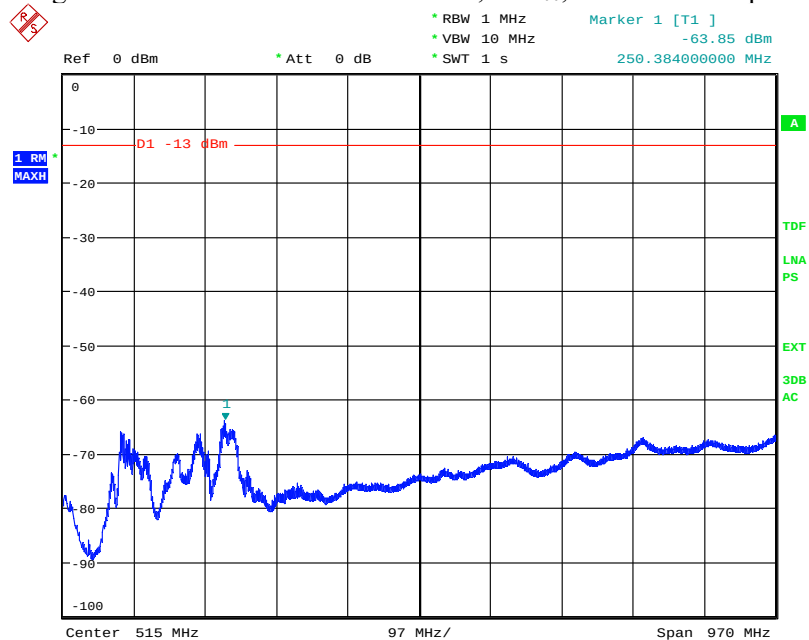
Date: 28.APR.2021 13:28:14

Diagram 2.2a: Pre scan 30 – 1000 MHz, M8₁₀₀, EIRP Horizontal polarization

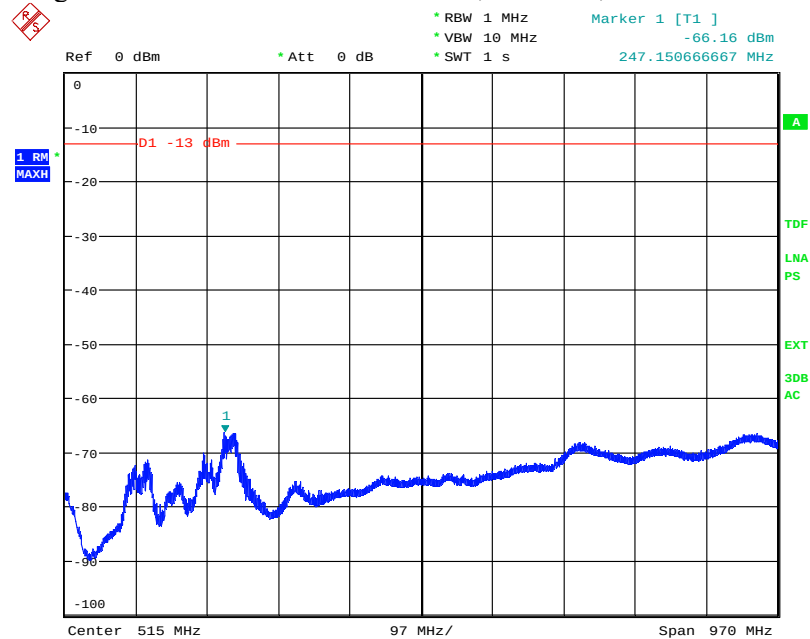


Date: 28.APR.2021 13:17:09

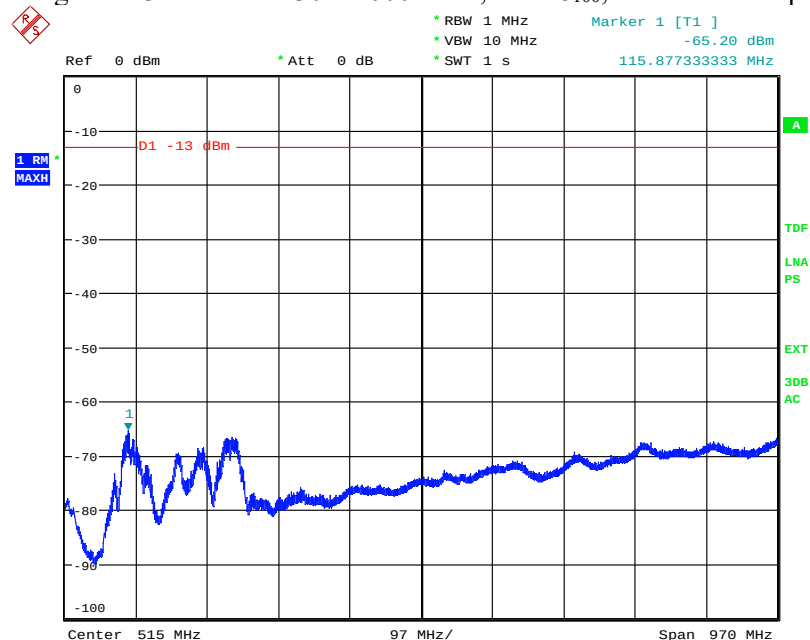
Diagram 2.2b: Pre scan 30 – 1000 MHz, M8₁₀₀, EIRP Vertical polarization



Date: 28.APR.2021 13:15:18

Diagram 2.3a: Pre scan 30 – 1000 MHz, BMT8₁₀₀, EIRP Horizontal polarization

Date: 28.APR.2021 13:20:28

Diagram 2.3b: Pre scan 30 – 1000 MHz, BMT8₁₀₀, EIRP Vertical polarization

Date: 28.APR.2021 13:22:09

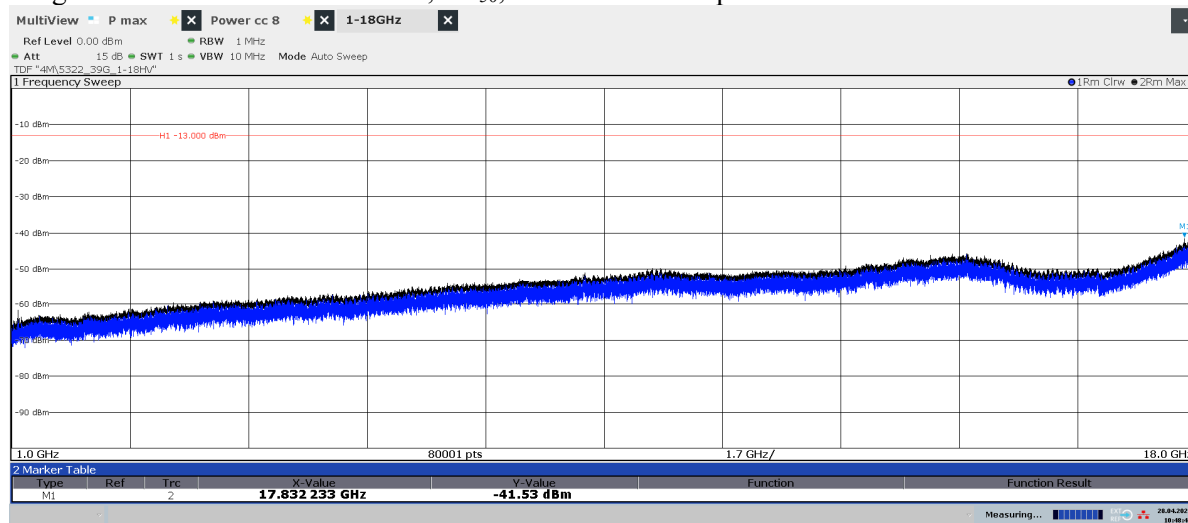
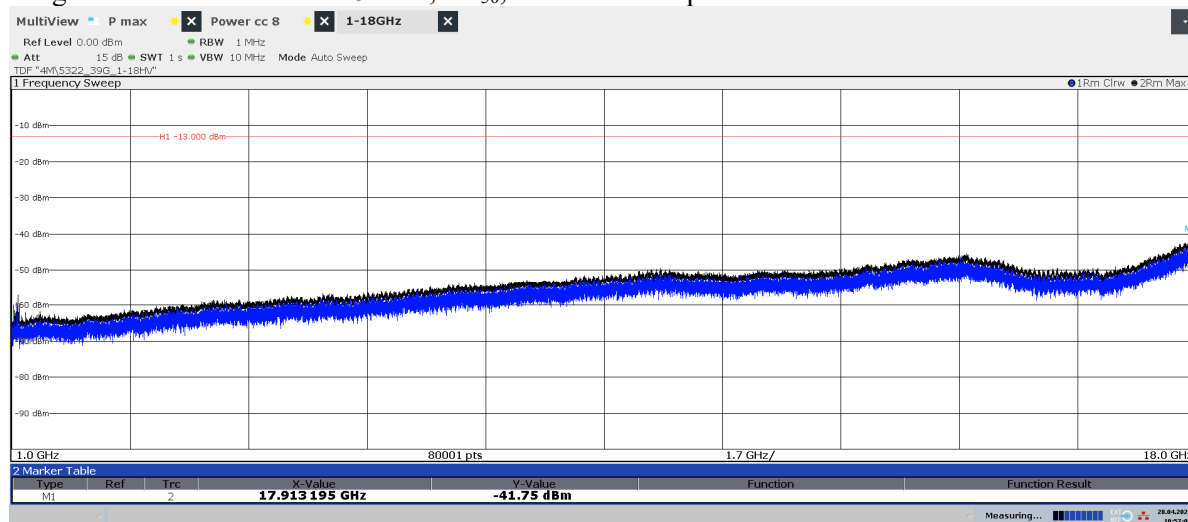
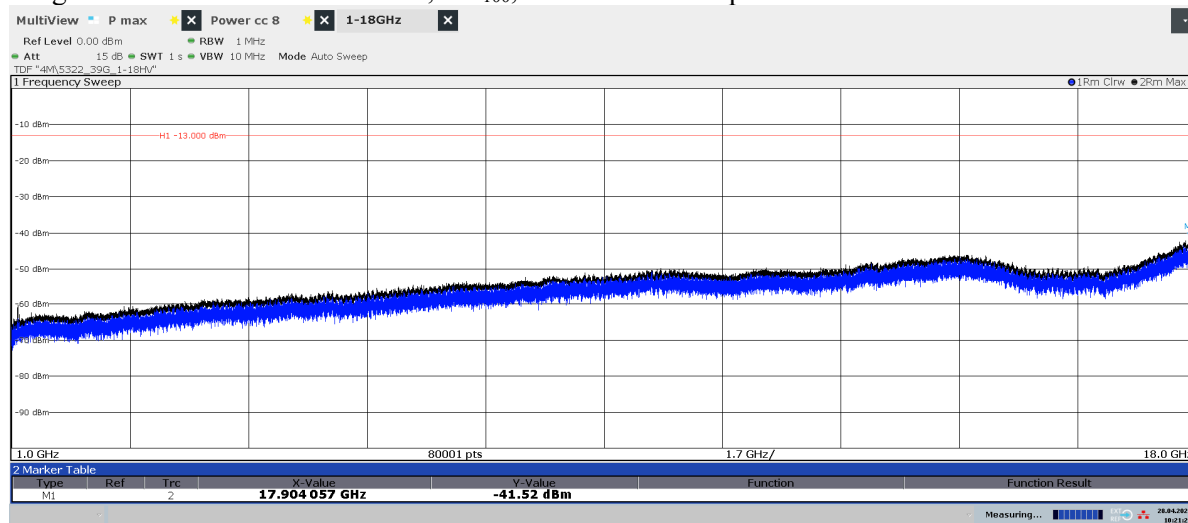
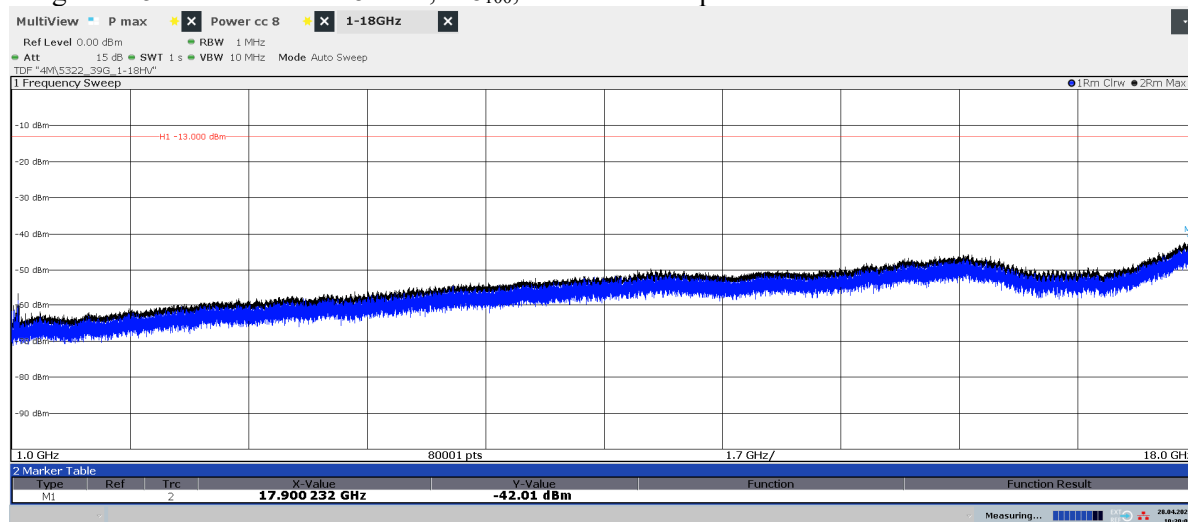
Diagram 2.4a: Pre scan 1 – 18 GHz, BL₅₀, EIRP Horizontal polarizationDiagram 2.4b: Pre scan 1 – 18 GHz, BL₅₀, EIRP Vertical polarization

Diagram 2.5a: Pre scan 1 – 18 GHz, M8₁₀₀, EIRP Horizontal polarization

10:21:24 28.04.2021

Diagram 2.5b: Pre scan 1 – 18 GHz, M8₁₀₀, EIRP Vertical polarization

10:30:08 28.04.2021

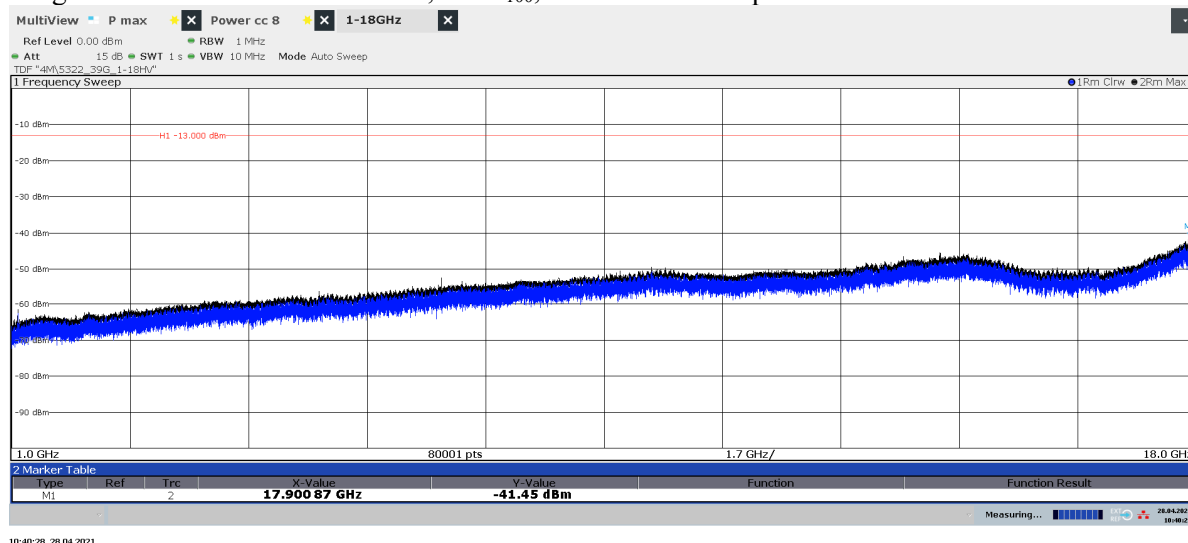
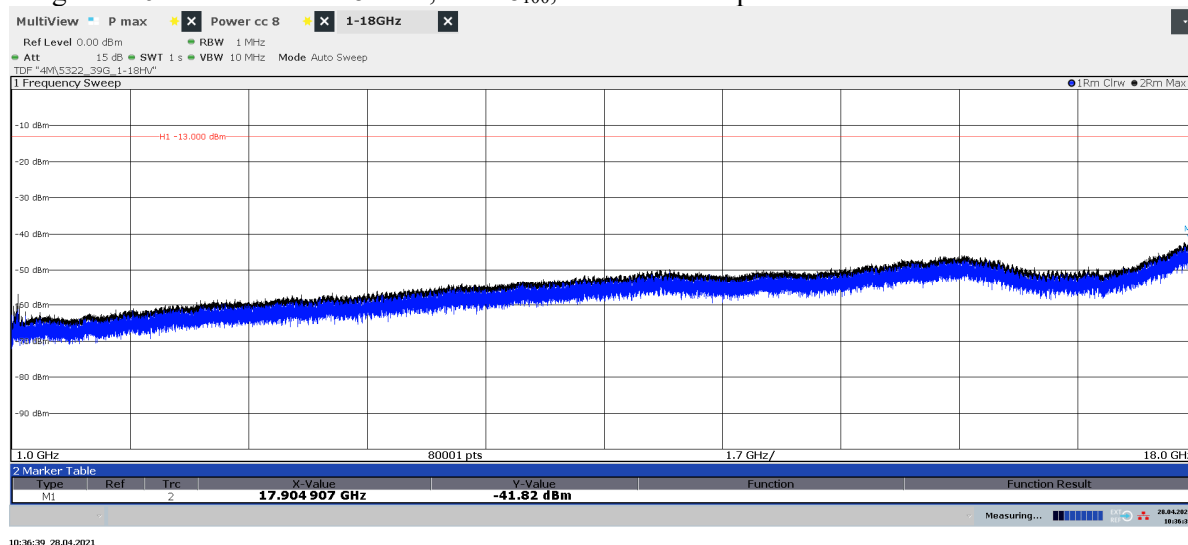
Diagram 2.6a: Pre scan 1 – 18 GHz, BMT₁₀₀, EIRP Horizontal polarizationDiagram 2.6b: Pre scan 1 – 18 GHz, BMT₈₁₀₀, EIRP Vertical polarization

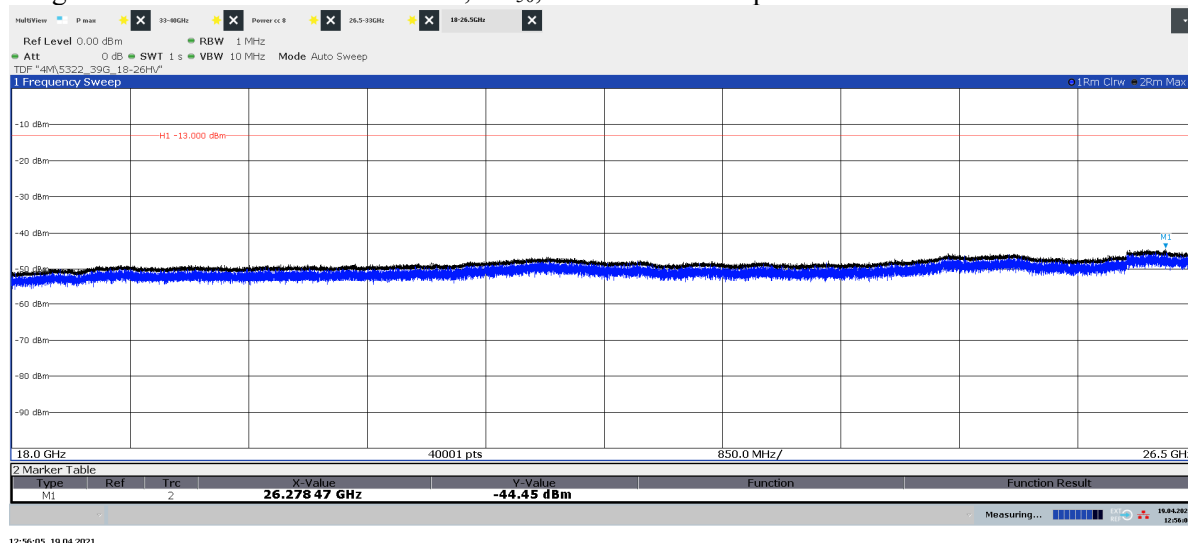
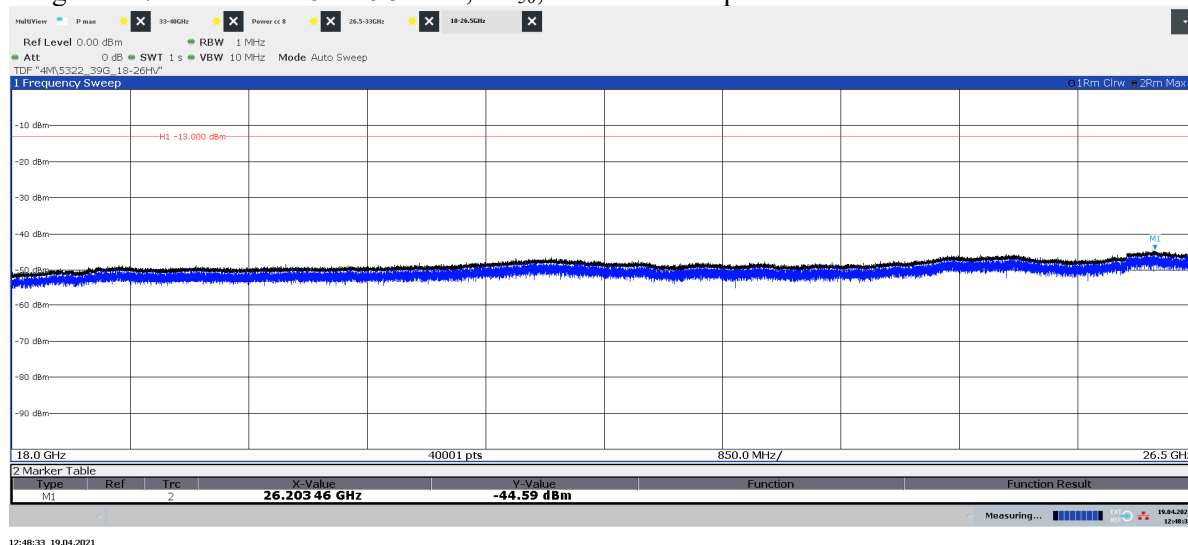
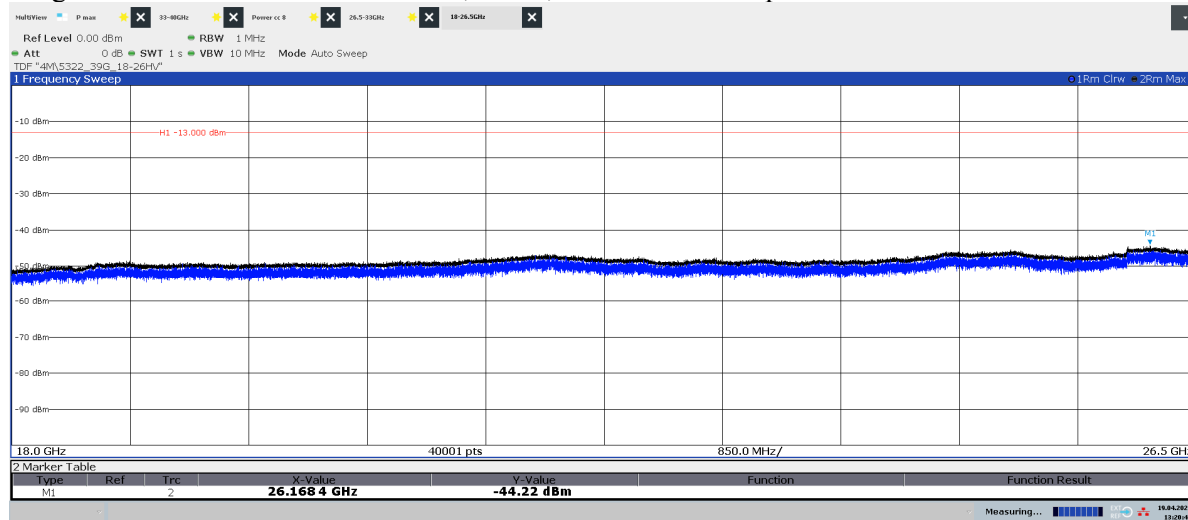
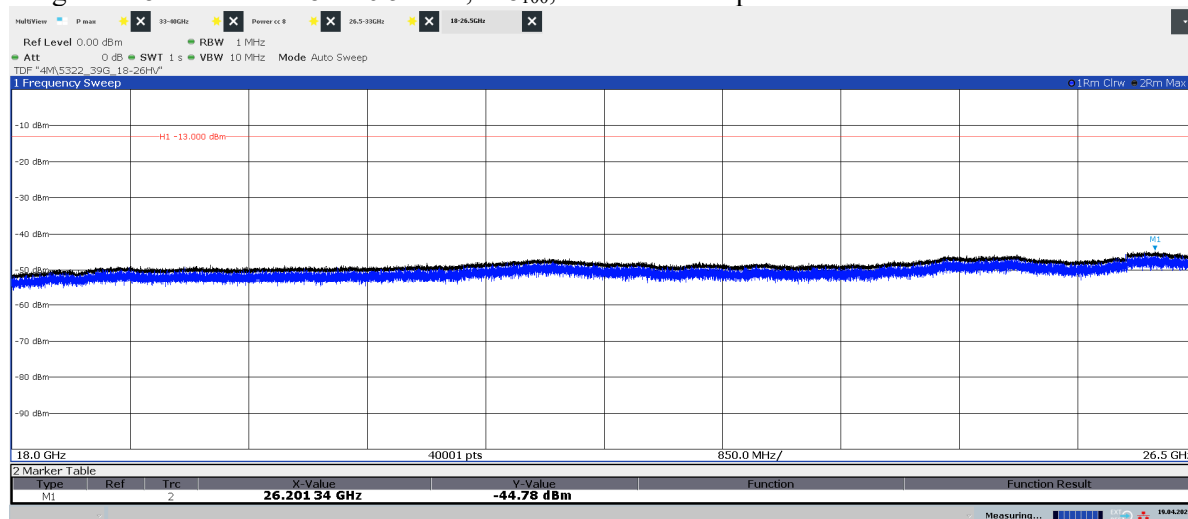
Diagram 2.7a: Pre scan 18 – 26.5 GHz, BL₅₀, EIRP Horizontal polarizationDiagram 2.7b: Pre scan 18 – 26.5 GHz, BL₅₀, EIRP Vertical polarization

Diagram 2.8a: Pre scan 18 – 26.5 GHz, M8₁₀₀, EIRP Horizontal polarization

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Diagram 2.8b: Pre scan 18 – 26.5 GHz, M8₁₀₀, EIRP Vertical polarization

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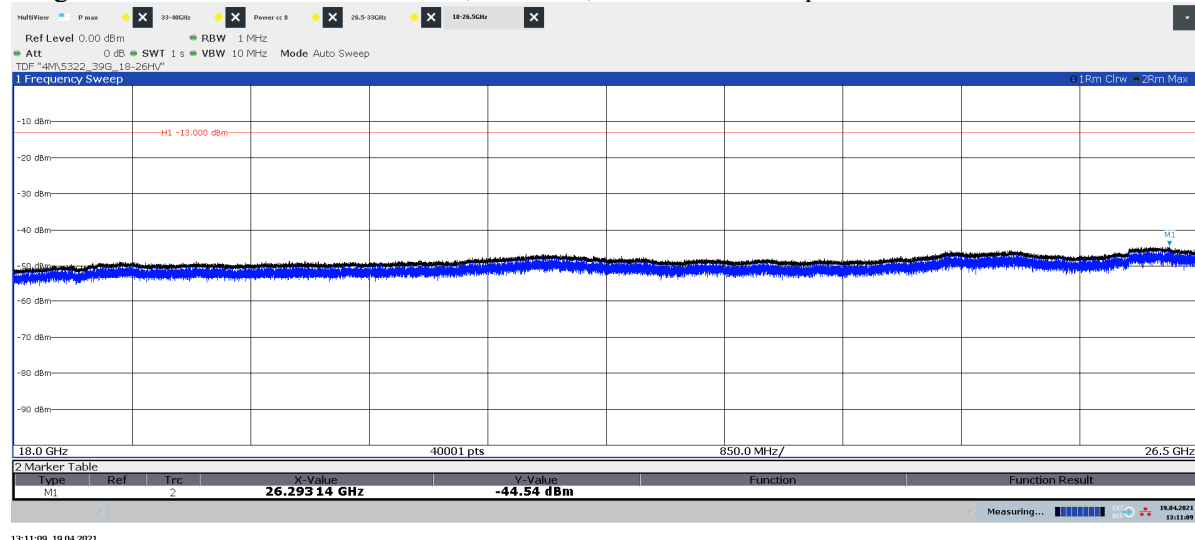
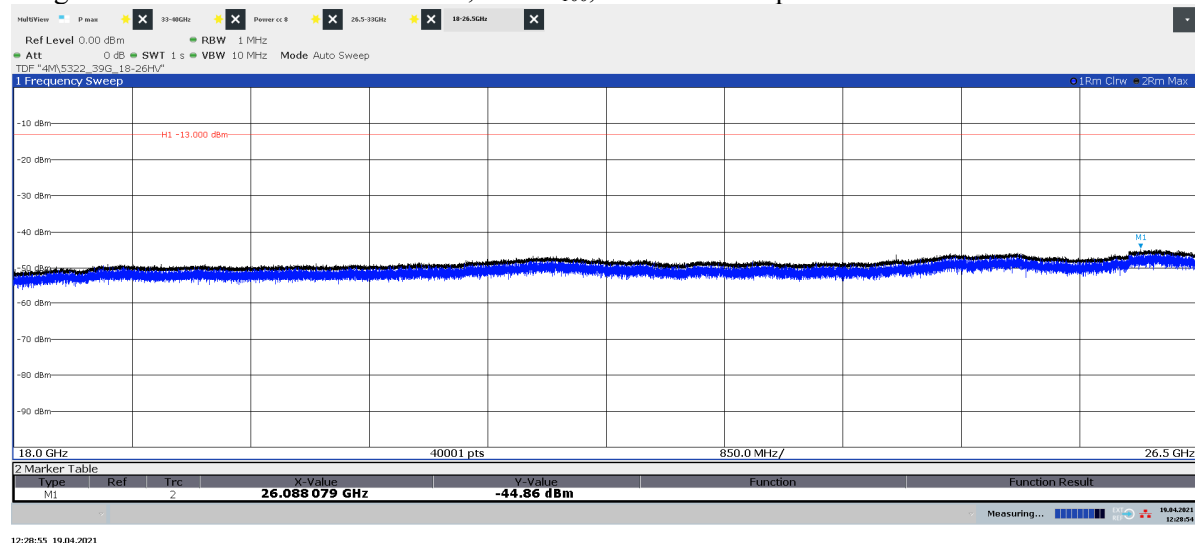
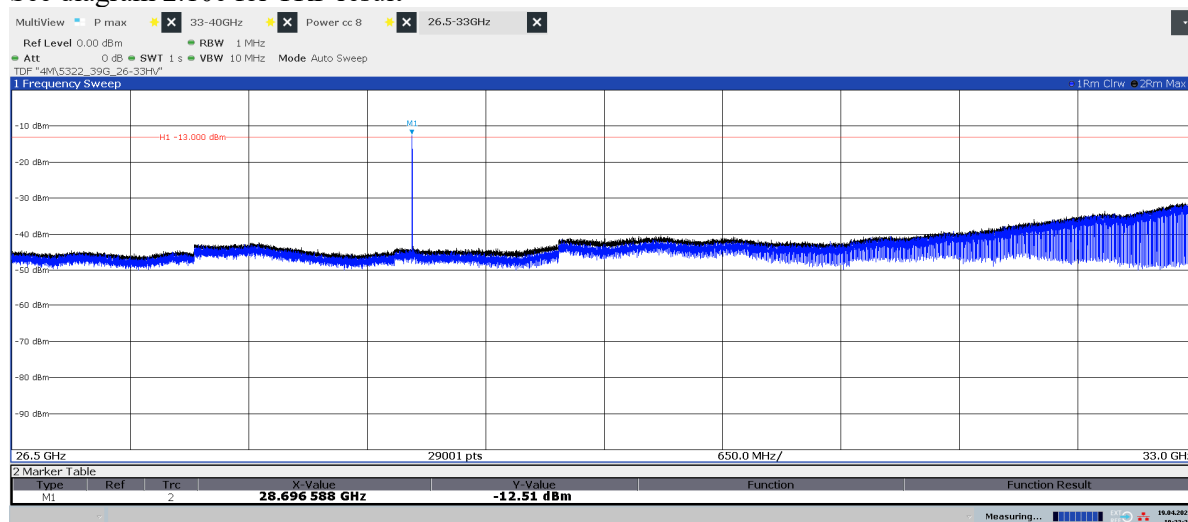
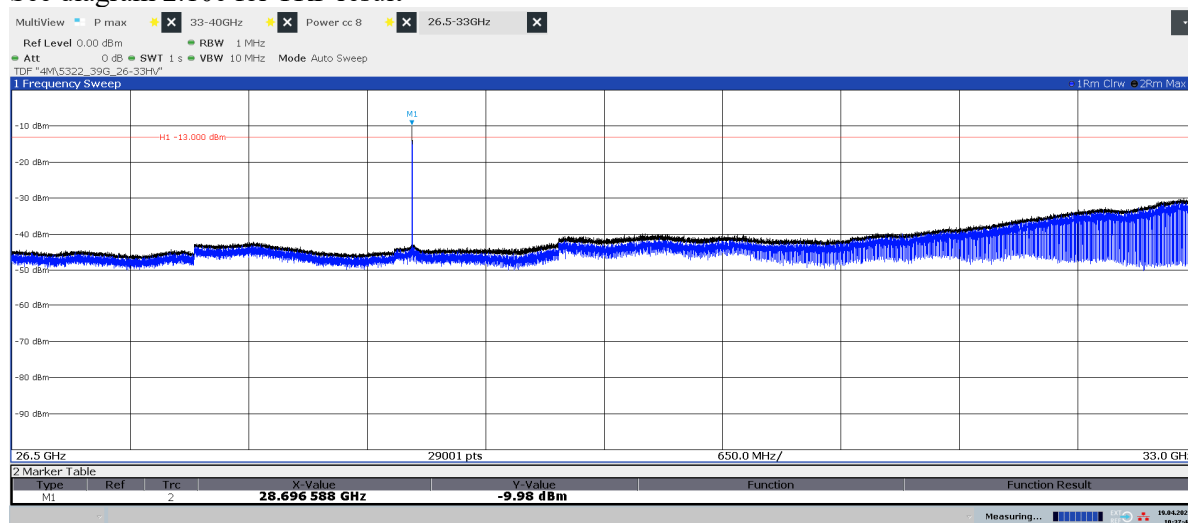
Diagram 2.9a: Pre scan 18 – 26.5 GHz, BMT8₁₀₀, EIRP Horizontal polarizationDiagram 2.9b: Pre scan 18 – 26.5 GHz, BMT8₁₀₀, EIRP Vertical polarization

Diagram 2.10a: Pre scan 26.5 – 33 GHz, TH₅₀, EIRP Horizontal polarization
See diagram 2.10c for TRP result



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Diagram 2.10b: Pre scan 26.5 – 33 GHz, TH₅₀, EIRP Vertical polarization
See diagram 2.10c for TRP result



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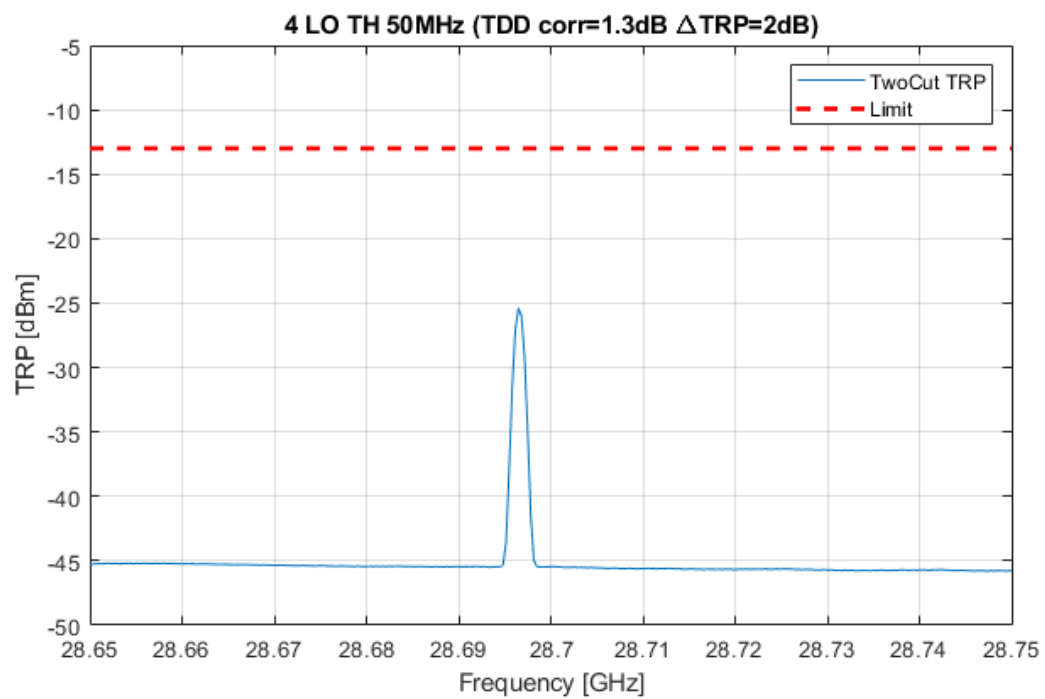
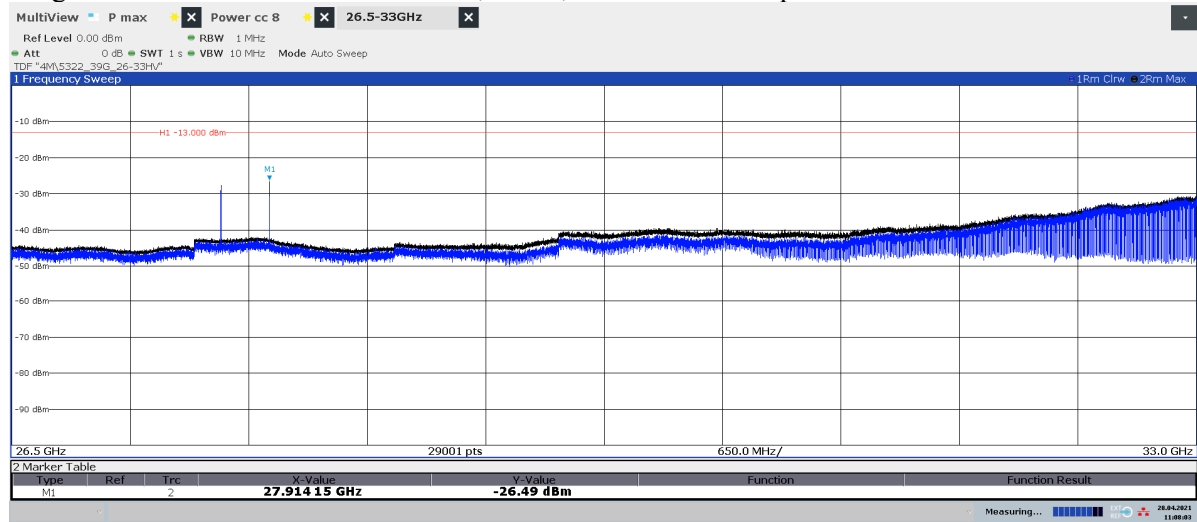
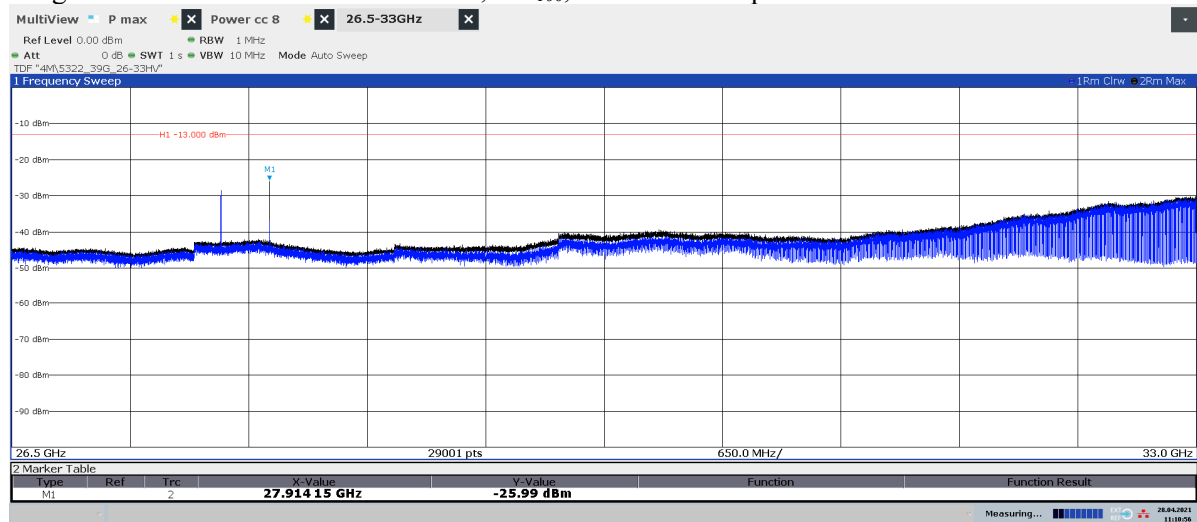
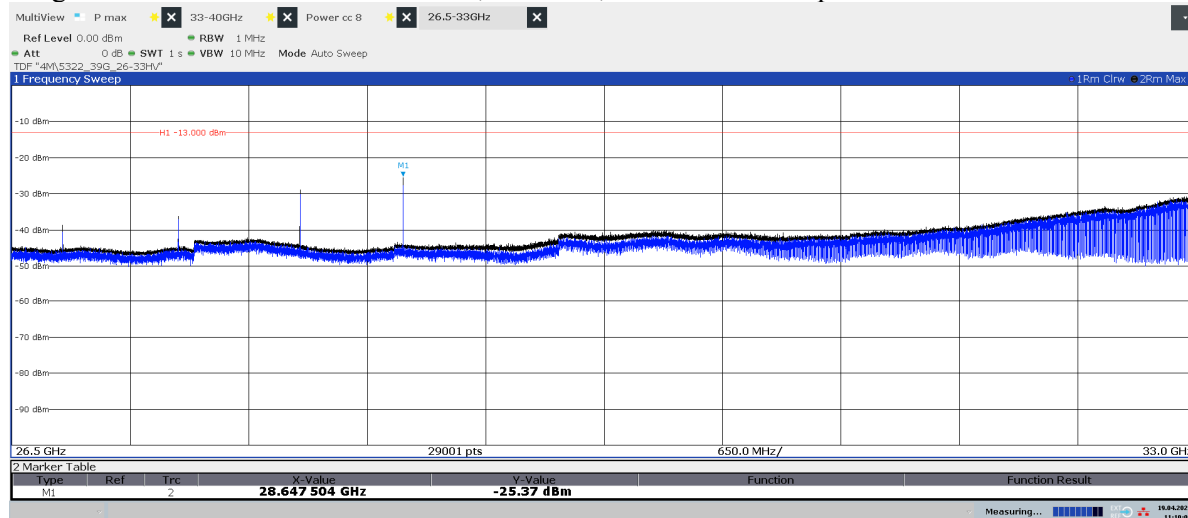
Diagram 2.10c: Two cut TRP 28.65 – 28.75 GHz, TH₅₀

Diagram 2.11a: Pre scan 26.5 – 33 GHz, M8₁₀₀, EIRP Horizontal polarization

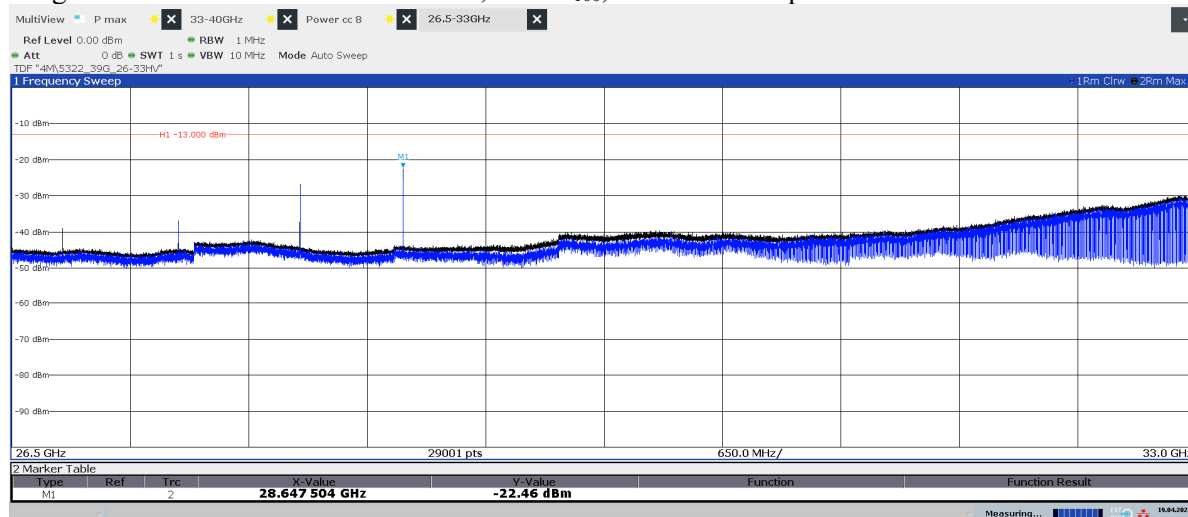
11:08:04 28.04.2021

Diagram 2.11b: Pre scan 26.5 – 33 GHz, M8₁₀₀, EIRP Vertical polarization

11:10:56 28.04.2021

Diagram 2.12a: Pre scan 26.5 – 33 GHz, BMT8₁₀₀, EIRP Horizontal polarization

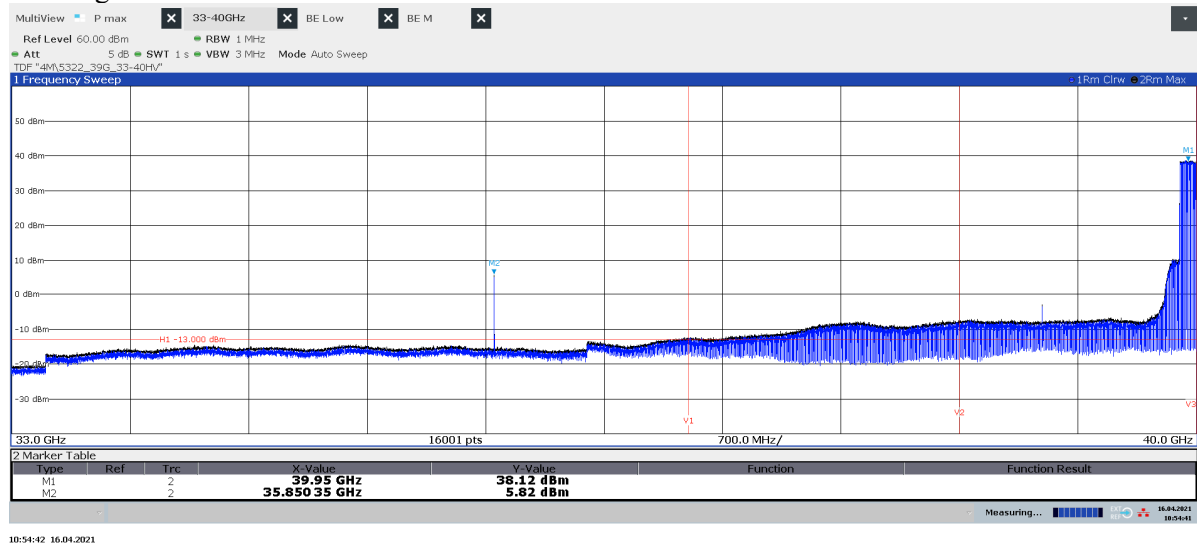
11:10:09 19.04.2021

Diagram 2.12b: Pre scan 26.5 – 33 GHz, BMT8₁₀₀, EIRP Vertical polarization

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Diagram 2.13a: 33 – 40 GHz, QPSK, TH₁₀₀, EIRP Horizontal polarization

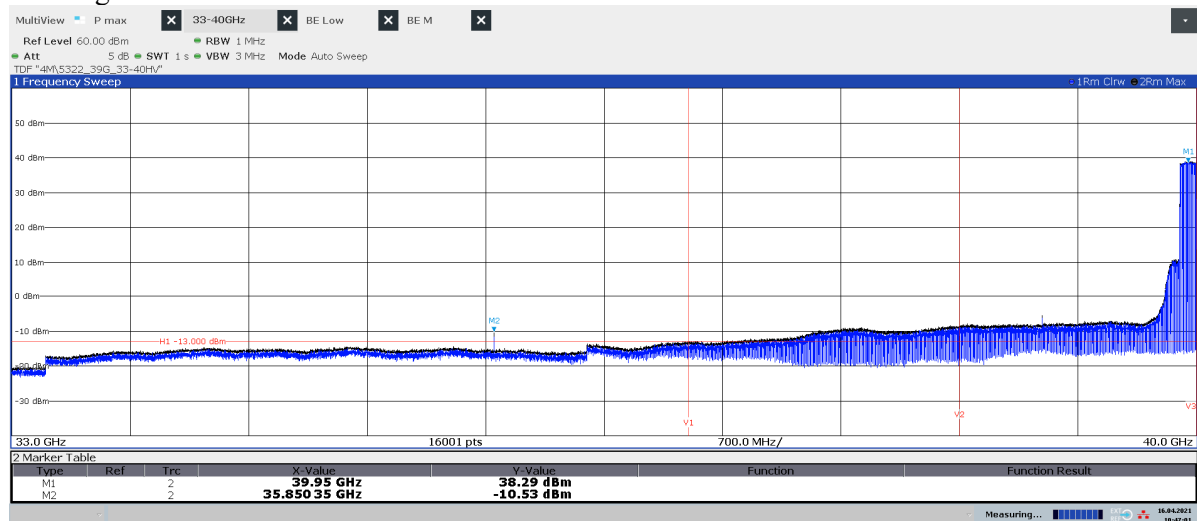
See diagram 2.13c for TRP result



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Diagram 2.13b: 33 – 40 GHz, QPSK, TH₁₀₀, EIRP Vertical polarization

See diagram 2.13c for TRP result



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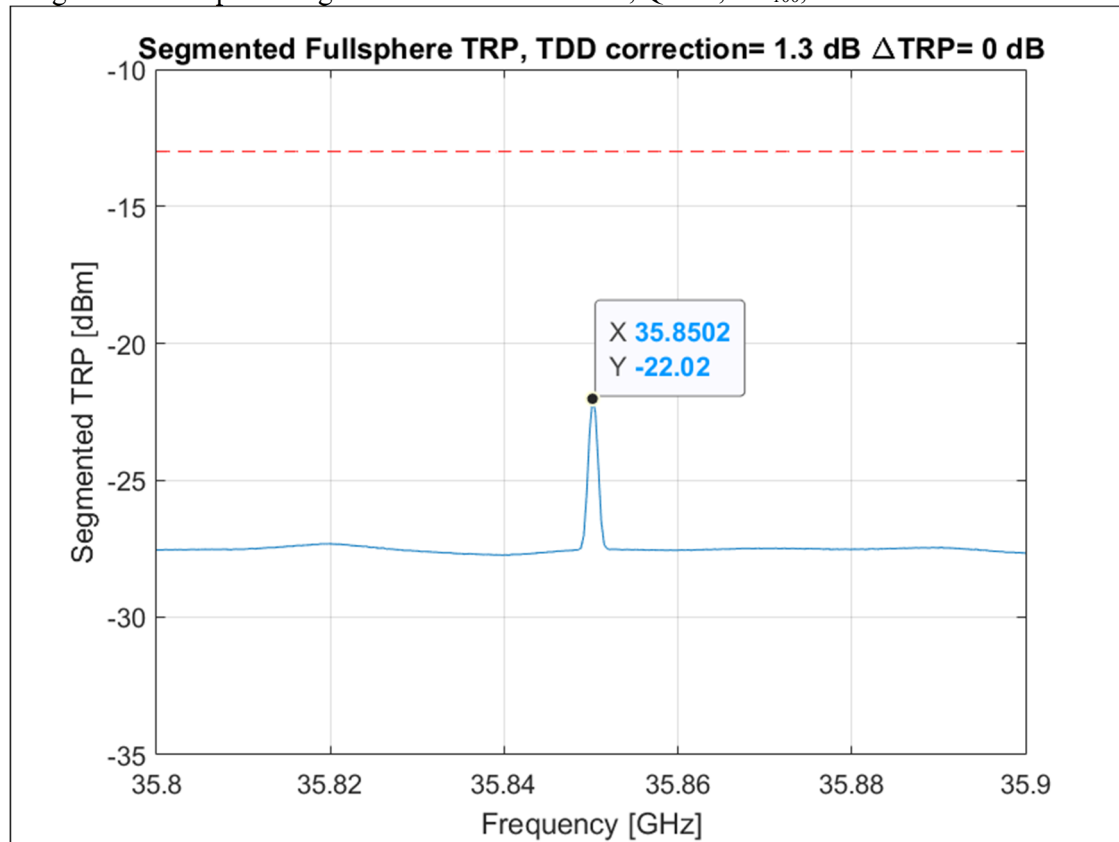
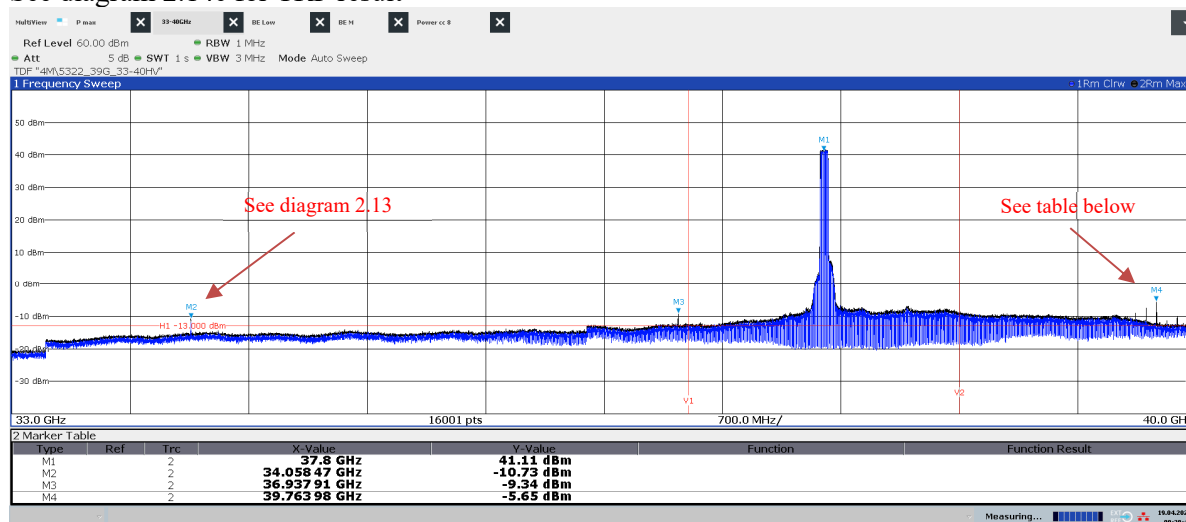
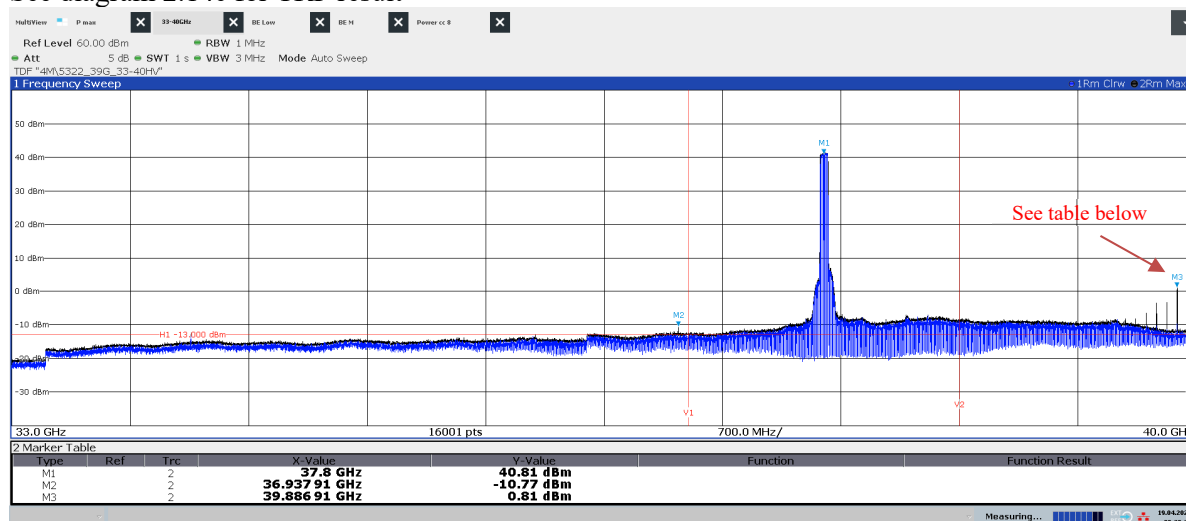
Diagram 2.13c: Spherical grid TRP 35.8 – 35.9 GHz, QPSK, TH₁₀₀, 5x LO

Diagram 2.14a: 33 – 40 GHz, QPSK, ML₅₀, EIRP Horizontal polarization
See diagram 2.14c for TRP result



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Diagram 2.14b: 33 – 40 GHz, QPSK, ML₅₀, EIRP Vertical polarization
See diagram 2.14c for TRP result



09:28:27 19.04.2021

Freq [GHz]	Power Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW (Limit -13 dBm) [dBm]/ Verdict
39.763	-5.65/ -3.0	32.05/ 31.92	-33.08/ Pass
39.886	-10.0 / -0.81	32.05/ 31.92	-32.24/ Pass

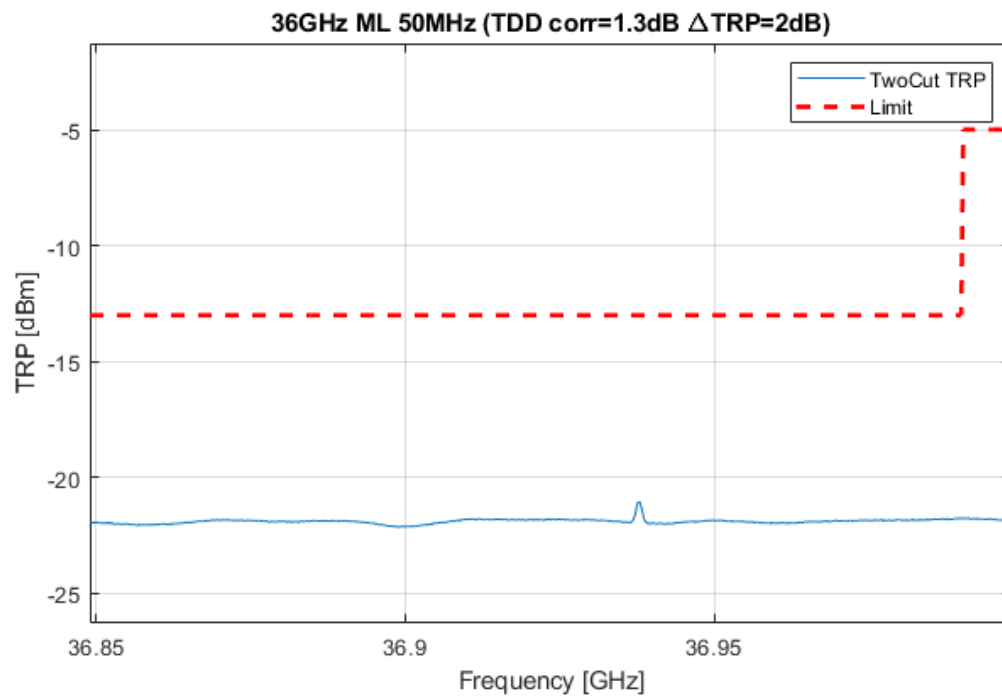
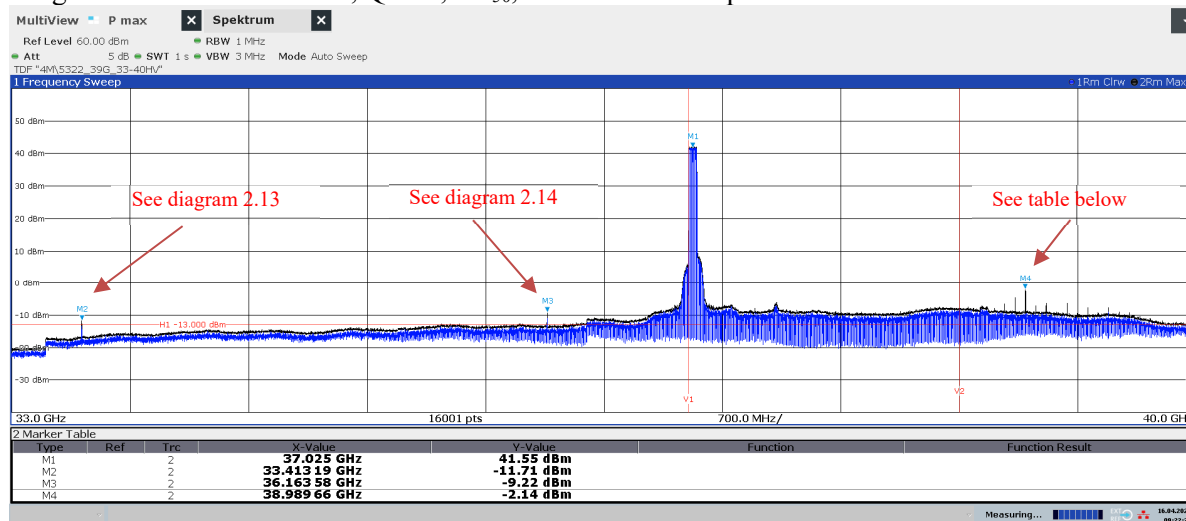
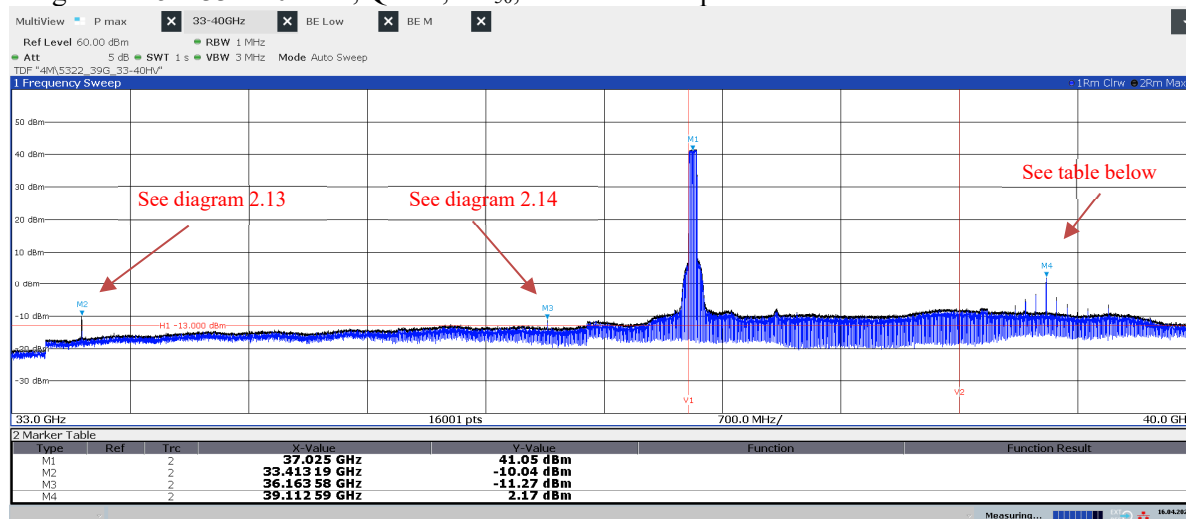
Diagram 2.14c: Two cut TRP 36.85 – 37 GHz, QPSK, ML_{50} 

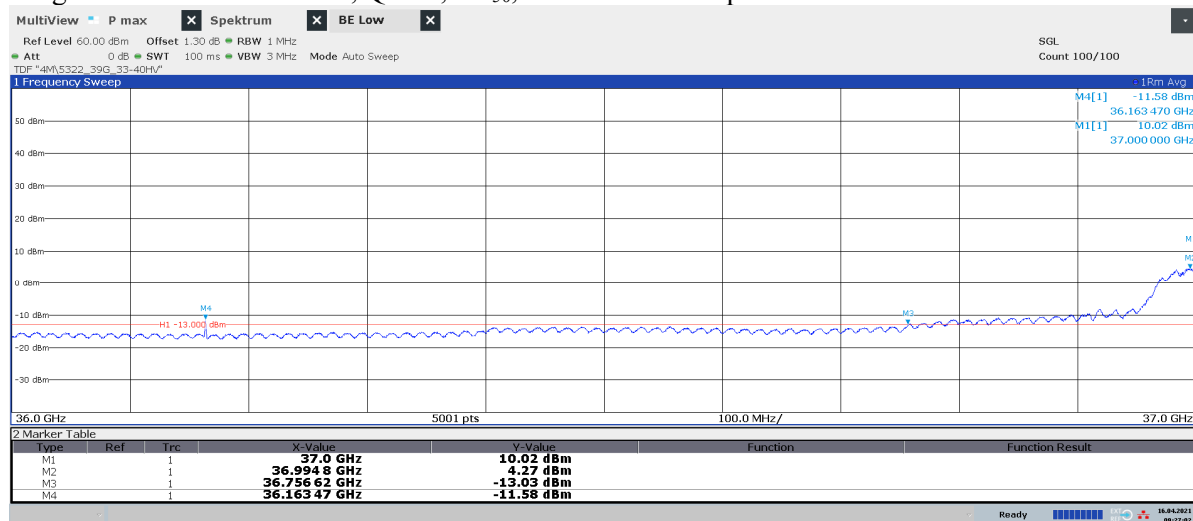
Diagram 2.15a: 33 – 40 GHz, QPSK, BL₅₀, EIRP Horizontal polarization

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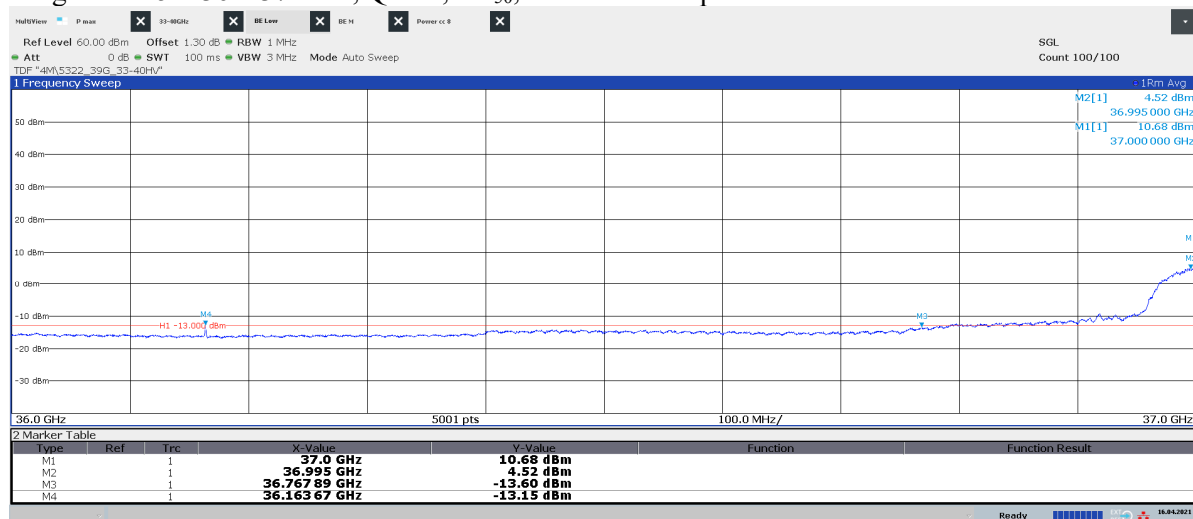
Diagram 2.15b: 33 – 40 GHz, QPSK, BL₅₀, EIRP Vertical polarization

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Freq [GHz]	Power Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW (Limit -13 dBm) [dBm]/ Verdict
38.989	-2.14/ -5.0	32.01/ 32.24	-32.42/ Pass
39.112	-6.0 / 2.17	32.01/ 32.24	-29.42/ Pass

Diagram 2.15c: 36 – 37 GHz, QPSK, BL₅₀, EIRP Horizontal polarization

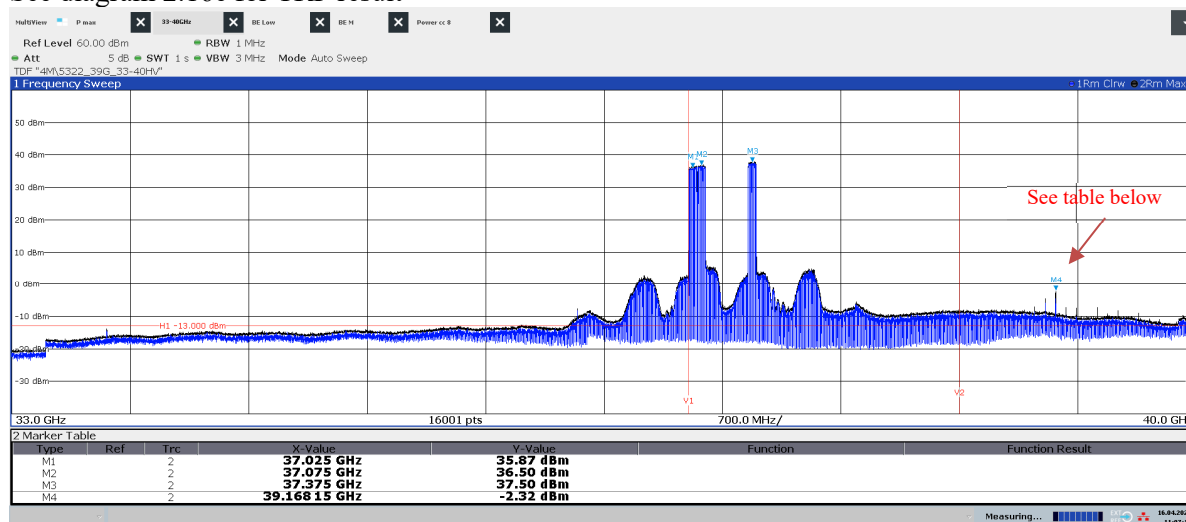
09:27:02 16.04.2021

Diagram 2.15d: 36 – 37 GHz, QPSK, BL₅₀, EIRP Vertical polarization

13:11:26 16.04.2021

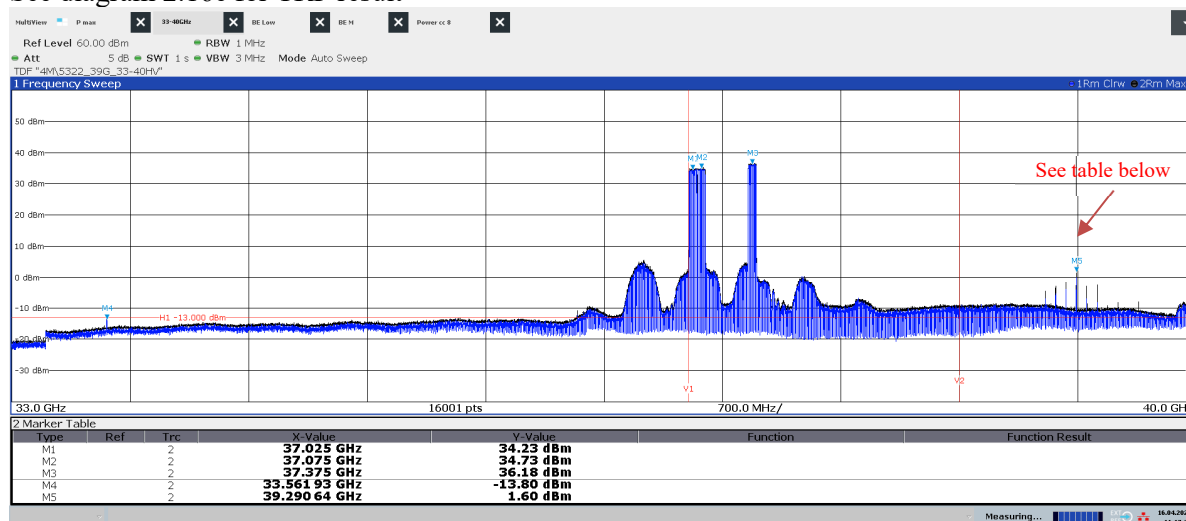
Power EIRP for 37.0 GHz Hor/ Ver [dBm]	Power EIRP for 36.995 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 37.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 36.995 GHz (Limit -13 dBm) [dBm]/ Verdict
10.02/ 10.68	4.27/ 4.52	31.75/ 31.62	-18.31/ Pass	-24.28/ Pass

Diagram 2.16a: 33 – 40 GHz, QPSK, Bim₅₀, EIRP Horizontal polarization
See diagram 2.16e for TRP result



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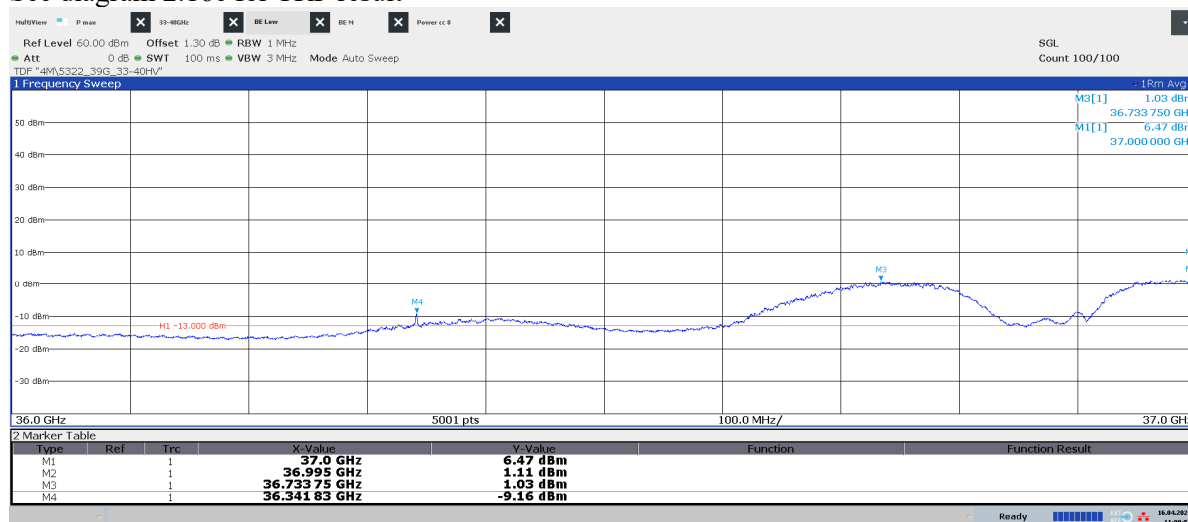
Diagram 2.16b: 33 – 40 GHz, QPSK, Bim₅₀, EIRP Vertical polarization
See diagram 2.16e for TRP result



11:17:20 16.04.2021

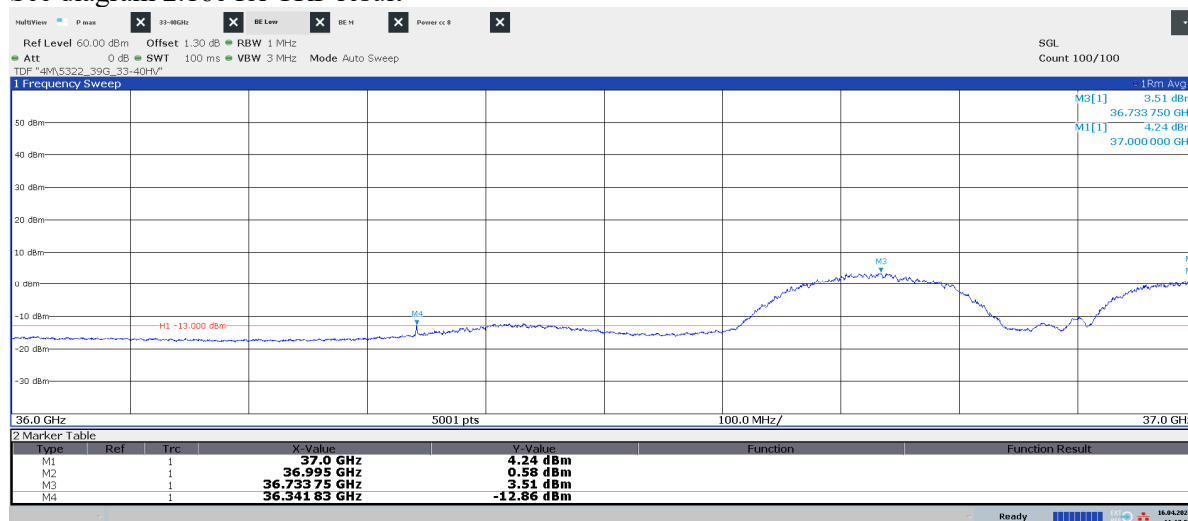
Freq [GHz]	Power Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW (Limit -13 dBm) [dBm]/ Verdict
39.168	-2.32/ -3.0	32.01/ 32.24	-31.75/ Pass
39.290	-7.0/ 1.60	32.01/ 32.24	-30.05/ Pass

Diagram 2.16c: 36 – 37 GHz, QPSK, Bim₅₀, EIRP Horizontal polarization
See diagram 2.16e for TRP result



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Diagram 2.16d: 36 – 37 GHz, QPSK, Bim₅₀, EIRP Vertical polarization
See diagram 2.16e for TRP result



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Power EIRP for 37.0 GHz Hor/ Ver [dBm]	Power EIRP for 36.995 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 37.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 36.995 GHz (Limit -13 dBm) [dBm]/ Verdict
10.02/ 10.68	4.27/ 4.52	31.75/ 31.62	-18.31/ Pass	-24.28/ Pass

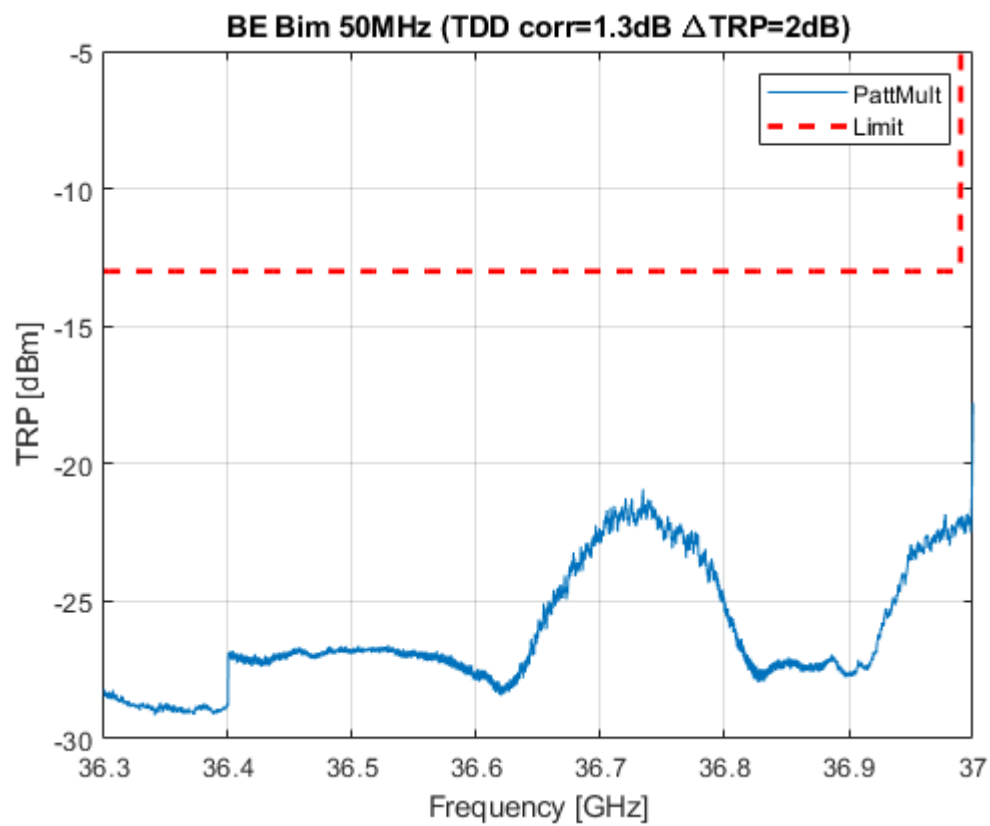
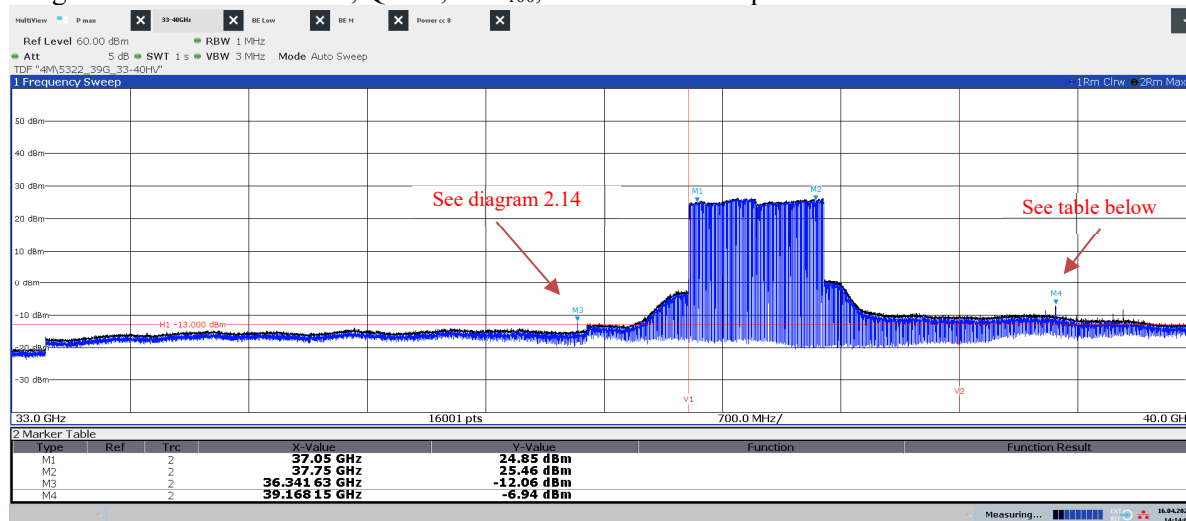
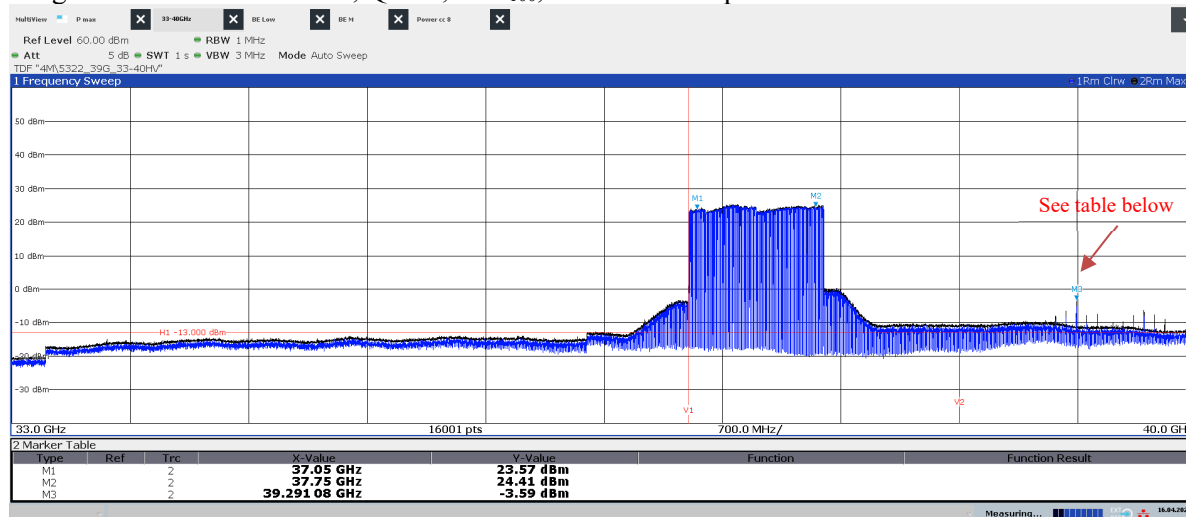
Diagram 2.16e: Pattern multiplication TRP 36.3 – 37 GHz, QPSK, Bim₅₀

Diagram 2.17a: 33 – 40 GHz, QPSK, BL₈₁₀₀, EIRP Horizontal polarization



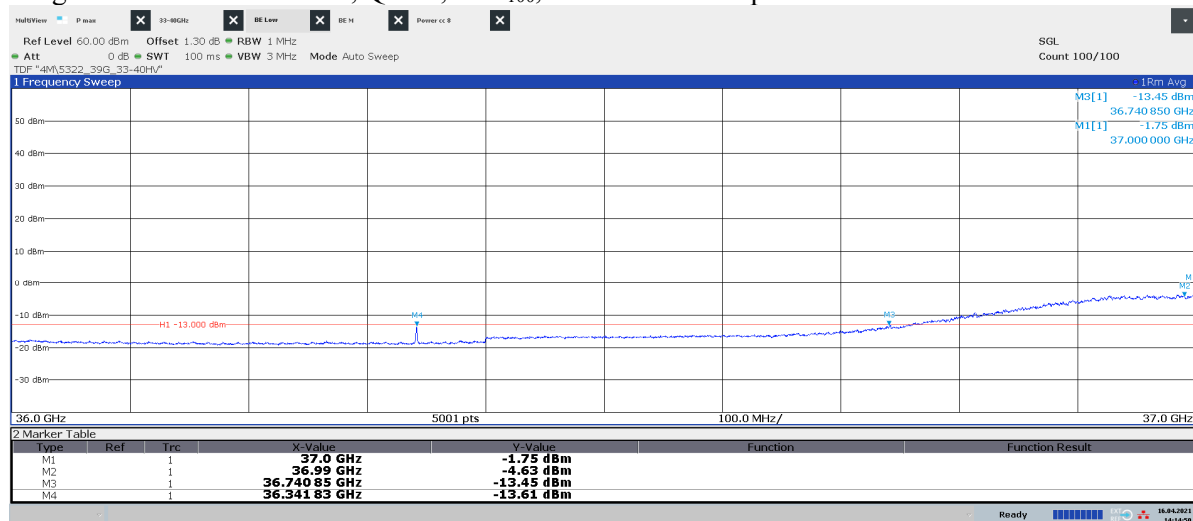
14:14:02 16.04.2021

Diagram 2.17b: 33 – 40 GHz, QPSK, BL₈₁₀₀, EIRP Vertical polarization

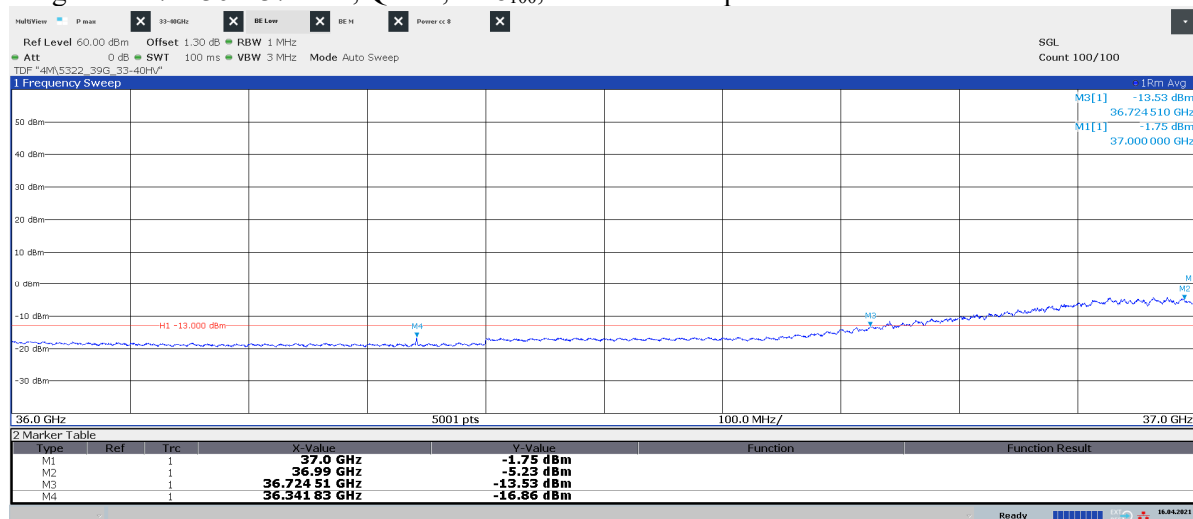


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Freq [GHz]	Power Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW (Limit -13 dBm) [dBm]/ Verdict
39.168	-6.94/ -8.0	29.32/ 29.45	-34.61/ Pass
39.291	-10.0 / -3.59	29.32/ 29.45	-32.12/ Pass

Diagram 2.17c: 36 – 37 GHz, QPSK, BL₈₁₀₀, EIRP Horizontal polarization

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Diagram 2.17d: 36 – 37 GHz, QPSK, BL₈₁₀₀, EIRP Vertical polarization

14:29:02 16.04.2021

Power EIRP for 37.0 GHz Hor/ Ver [dBm]	Power EIRP for 36.990GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 37.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 36.990 GHz (Limit -13 dBm) [dBm]/ Verdict
-1.75/ -1.75	-4.63/ -5.23	29.03/ 28.92	-27.71/ Pass	-30.89/ Pass

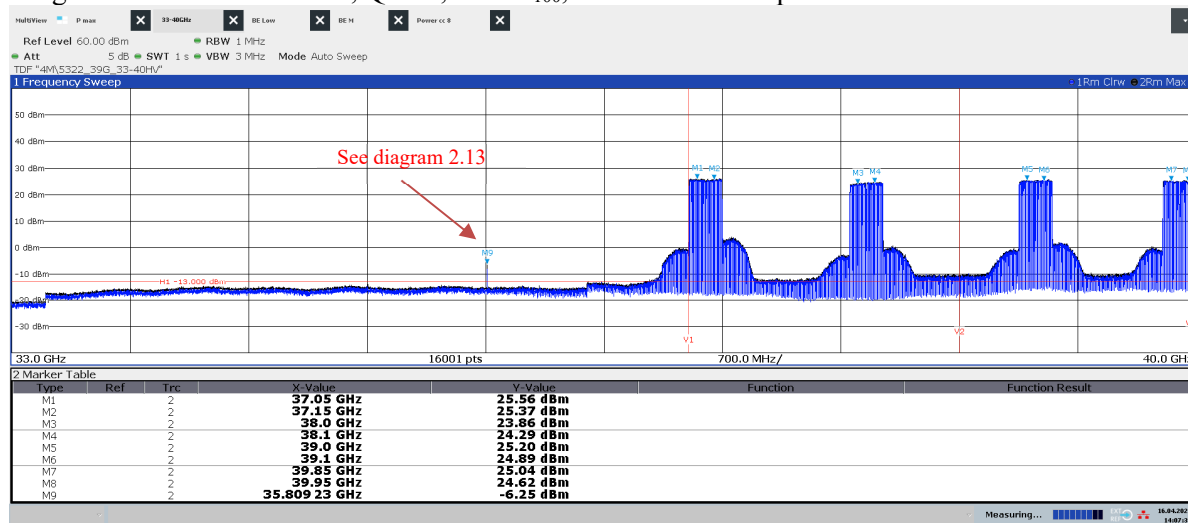
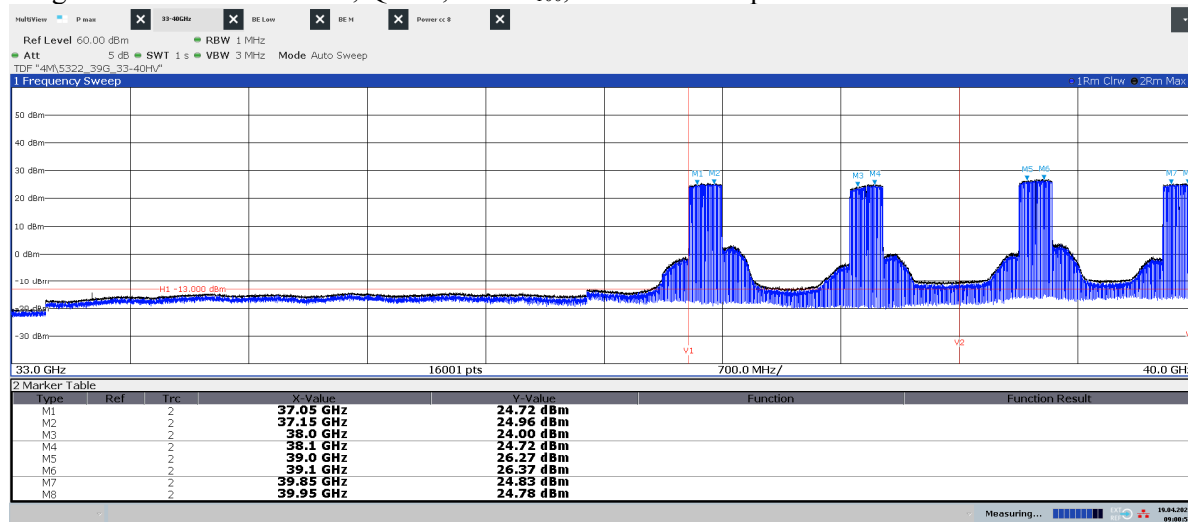
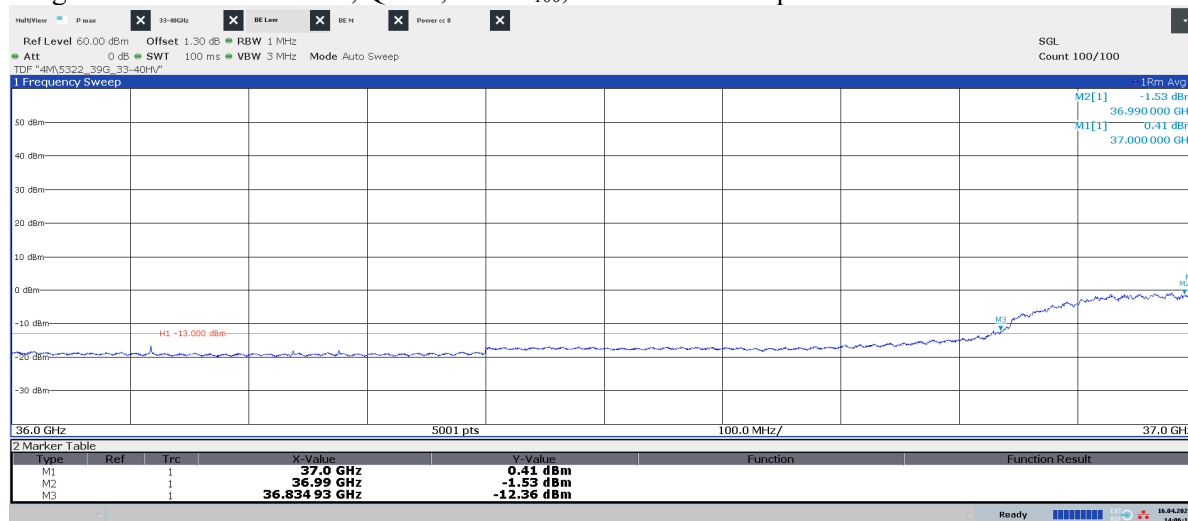
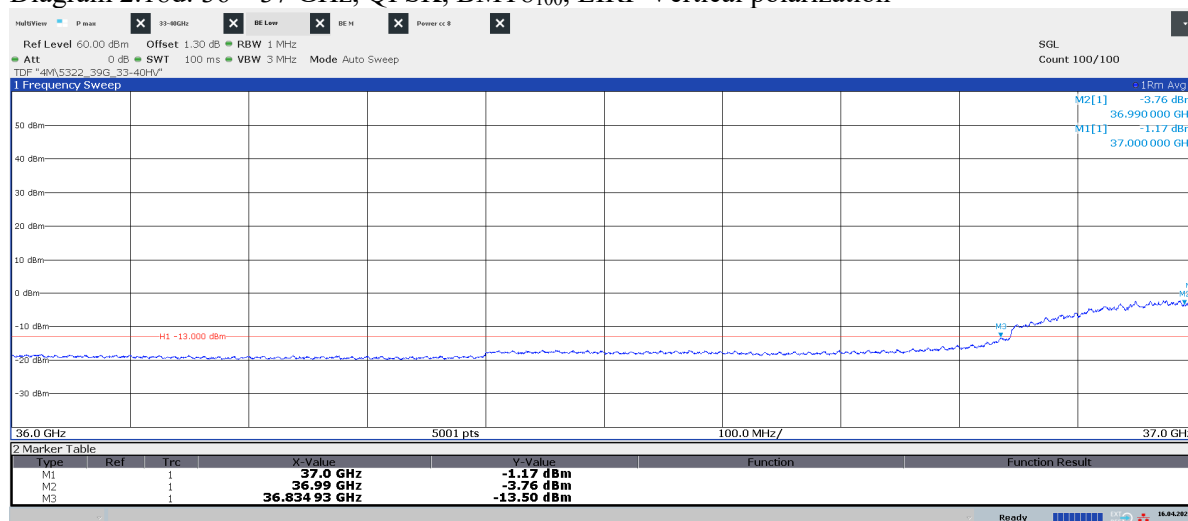
Diagram 2.18a: 33 – 40 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarizationDiagram 2.18b: 33 – 40 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

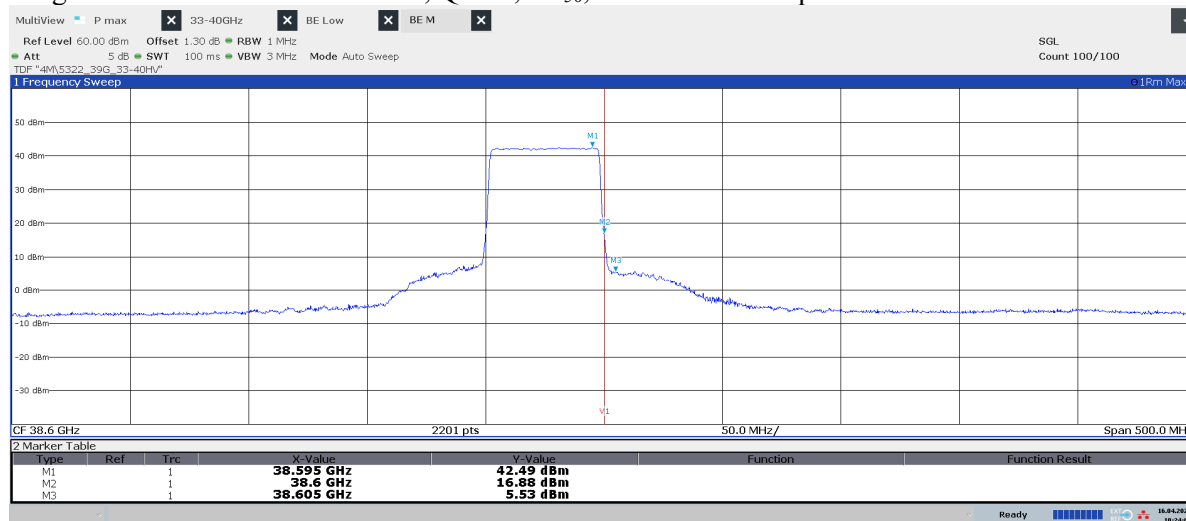
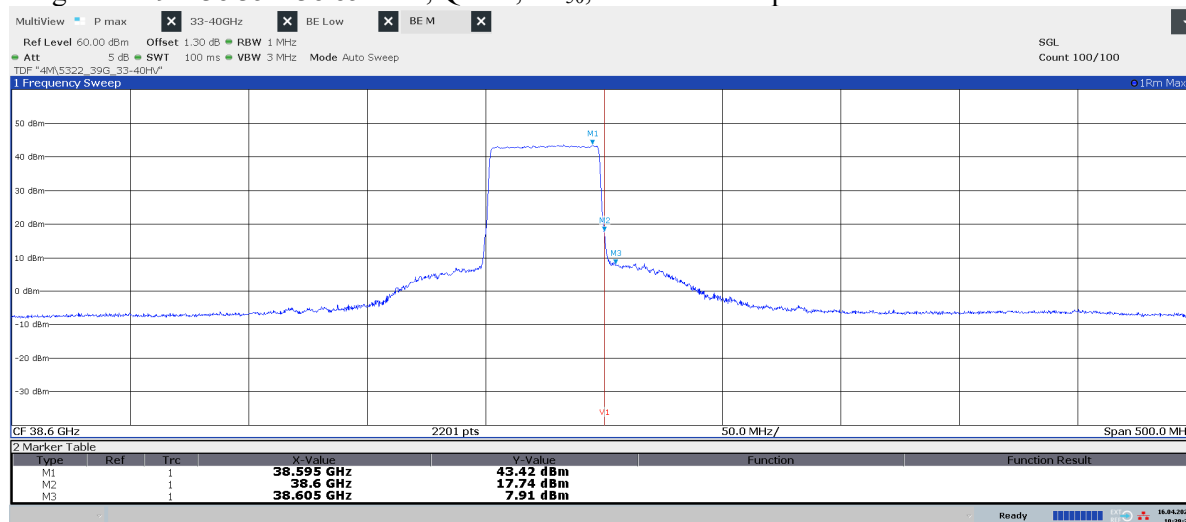
Diagram 2.18c: 36 – 37 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

14:06:15 16.04.2021

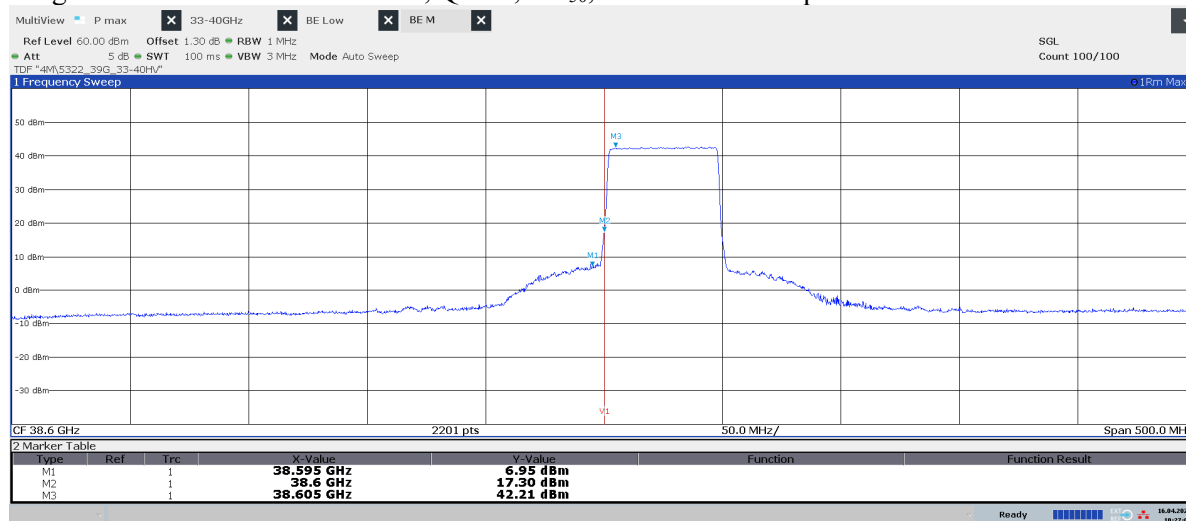
Diagram 2.18d: 36 – 37 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

14:04:41 16.04.2021

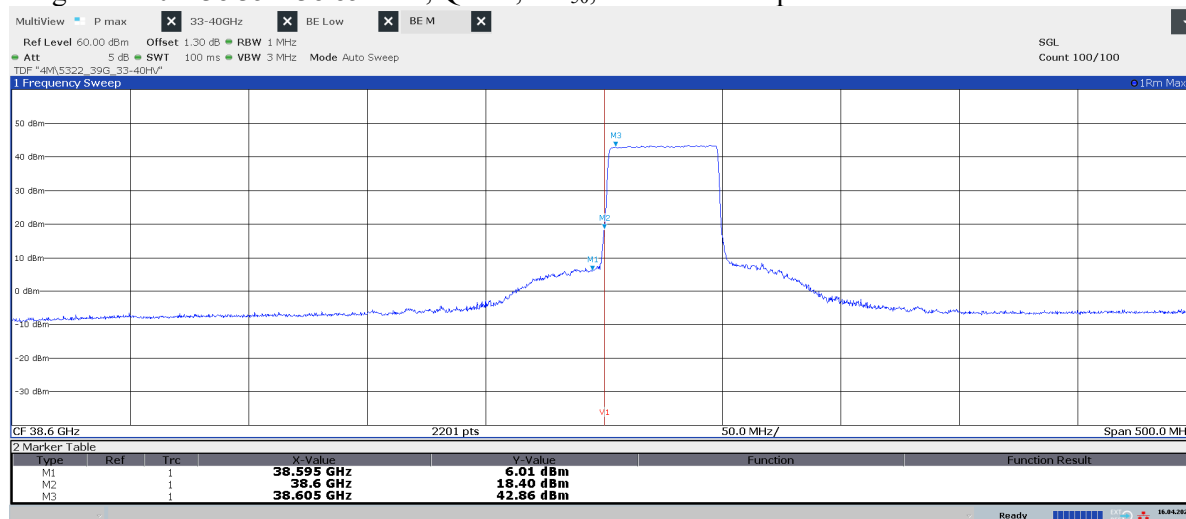
Power EIRP for 37.0 GHz Hor/ Ver [dBm]	Power EIRP for 36.990GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 37.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 36.990 GHz (Limit -13 dBm) [dBm]/ Verdict
0.45/ -1.17	-1.53/ -3.76	26.14/ 26.04	-23.37/ Pass	-25.60/ Pass

Diagram 2.19a: 38.35 – 38.85 GHz, QPSK, TL₅₀, EIRP Horizontal polarizationDiagram 2.19b: 38.35 – 38.85 GHz, QPSK, TL₅₀, EIRP Vertical polarization

Power EIRP for 38.6 GHz Hor/ Ver [dBm]	Power EIRP for 38.605 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 38.6 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 38.605 GHz (Limit -13 dBm) [dBm]/ Verdict
16.88/ 17.74	5.53/ 7.91	32.01/ 32.24	-11.79/ Pass	-22.26/ Pass

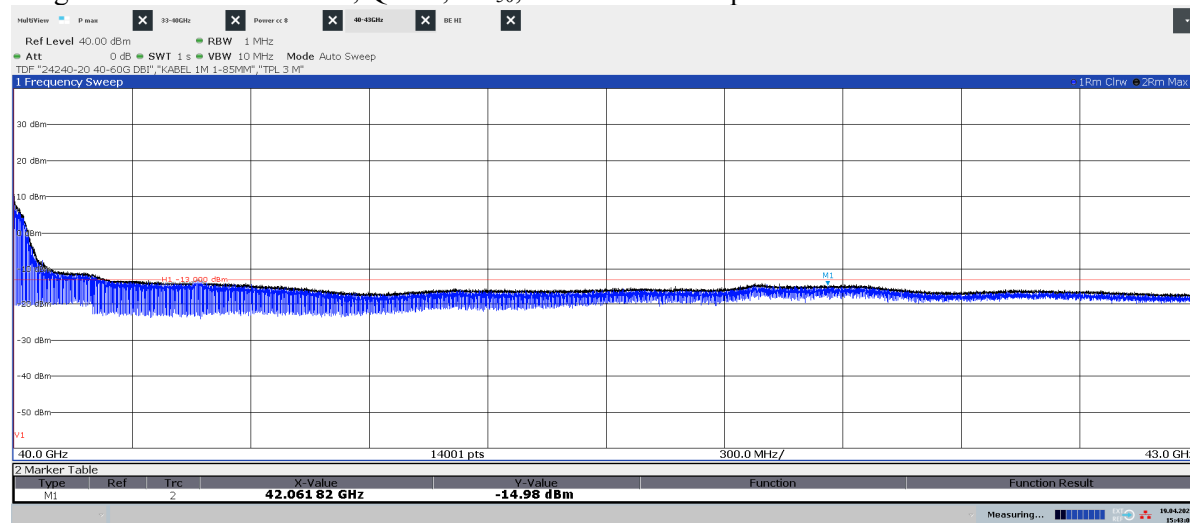
Diagram 2.20a: 38.35 – 38.85 GHz, QPSK, BH₅₀, EIRP Horizontal polarization

10:27:01 16.04.2021

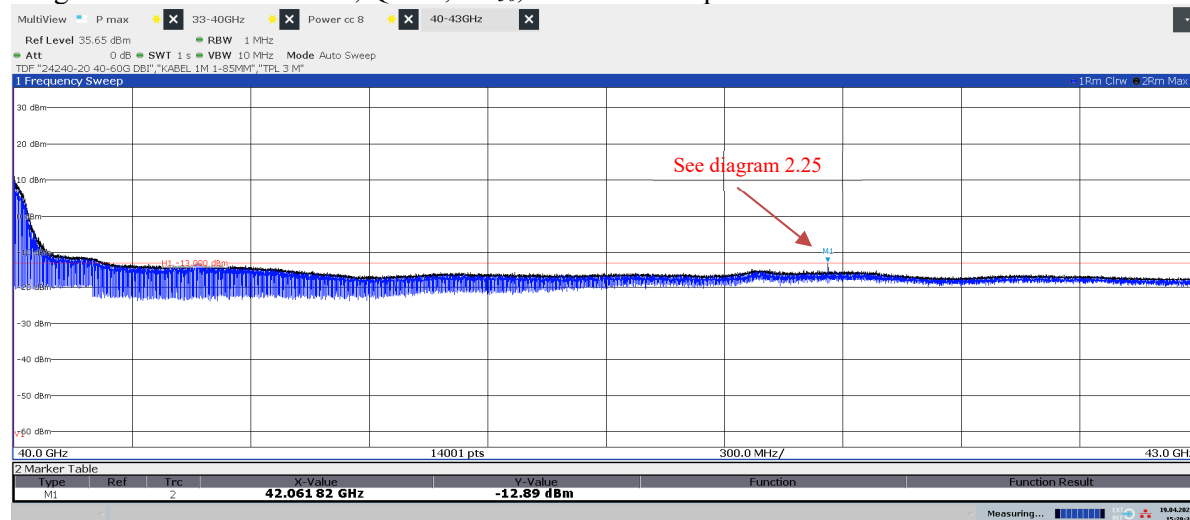
Diagram 2.20b: 38.35 – 38.85 GHz, QPSK, BH₅₀, EIRP Vertical polarization

10:37:41 16.04.2021

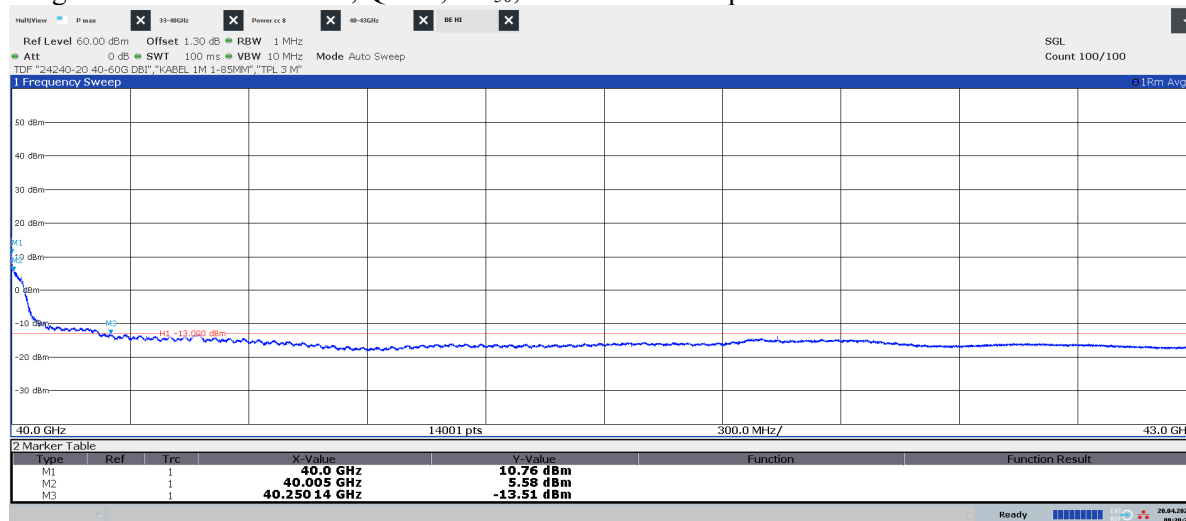
Power EIRP for 38.6 GHz Hor/ Ver [dBm]	Power EIRP for 38.595 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 38.6 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 38.595 GHz (Limit -13 dBm) [dBm]/ Verdict
17.30/ 18.40	6.95/ 6.01	32.01/ 32.24	-11.24/ Pass	-22.60/ Pass

Diagram 2.21a: 40 – 43 GHz, QPSK, TH₅₀, EIRP Horizontal polarization

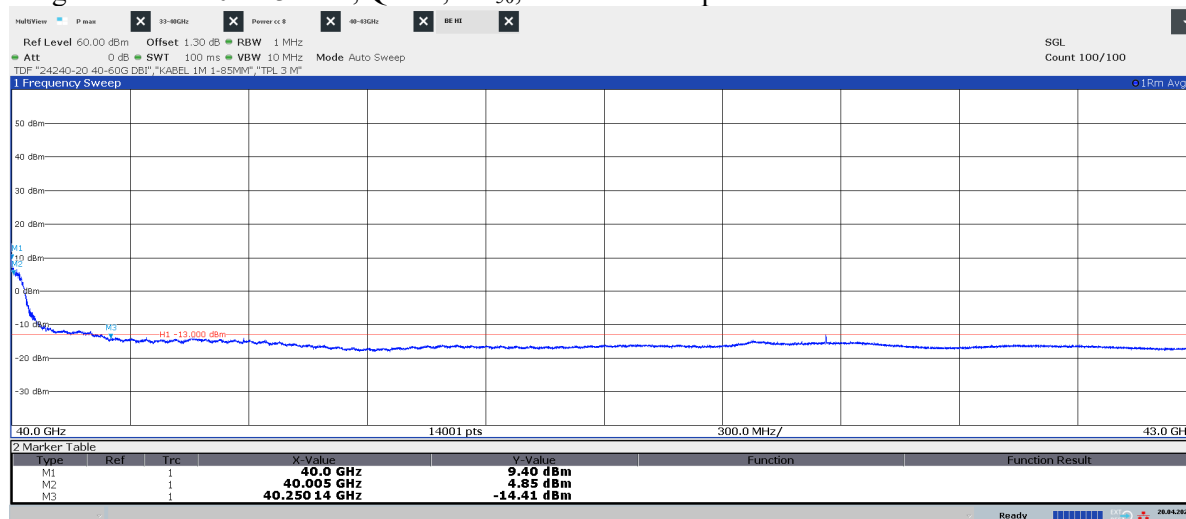
15:43:02 19.04.2021

Diagram 2.21b: 40 – 43 GHz, QPSK, TH₅₀, EIRP Vertical polarization

15:29:31 19.04.2021

Diagram 2.21c: 40 – 43 GHz, QPSK, TH₅₀, EIRP Horizontal polarization

09:30:27 20.04.2021

Diagram 2.21d: 40 – 43 GHz, QPSK, TH₅₀, EIRP Vertical polarization

09:31:51 20.04.2021

Power EIRP for 40.0 GHz Hor/ Ver [dBm]	Power EIRP for 40.005 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 40.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 40.005 GHz (Limit -13 dBm) [dBm]/ Verdict
10.76/ 9.40	5.58/ 4.85	32.05/ 31.92	-18.85/ Pass	-23.75/ Pass

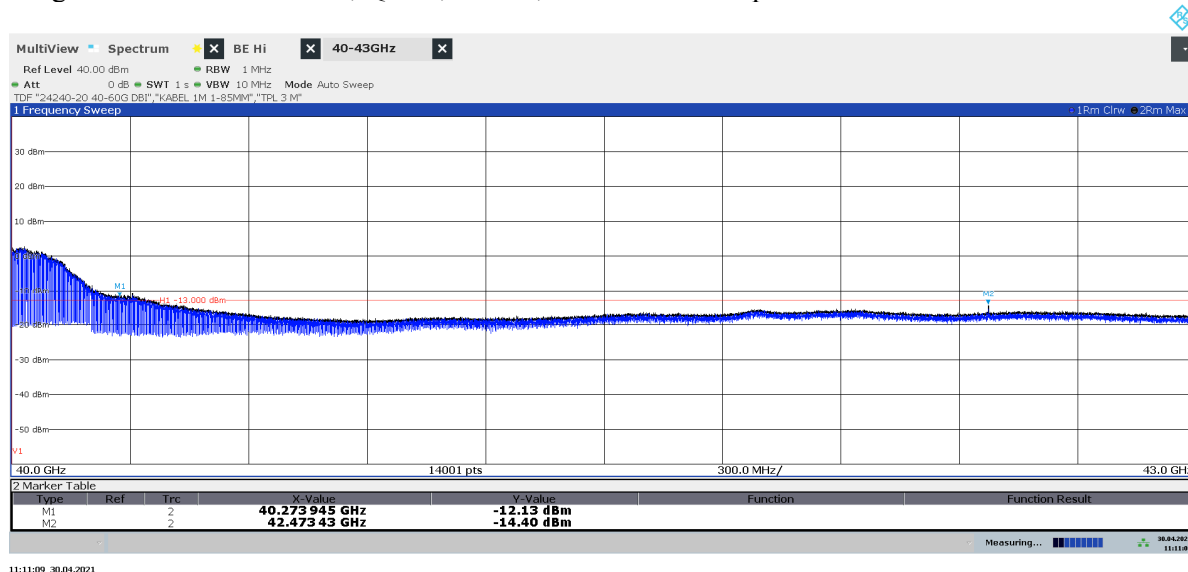
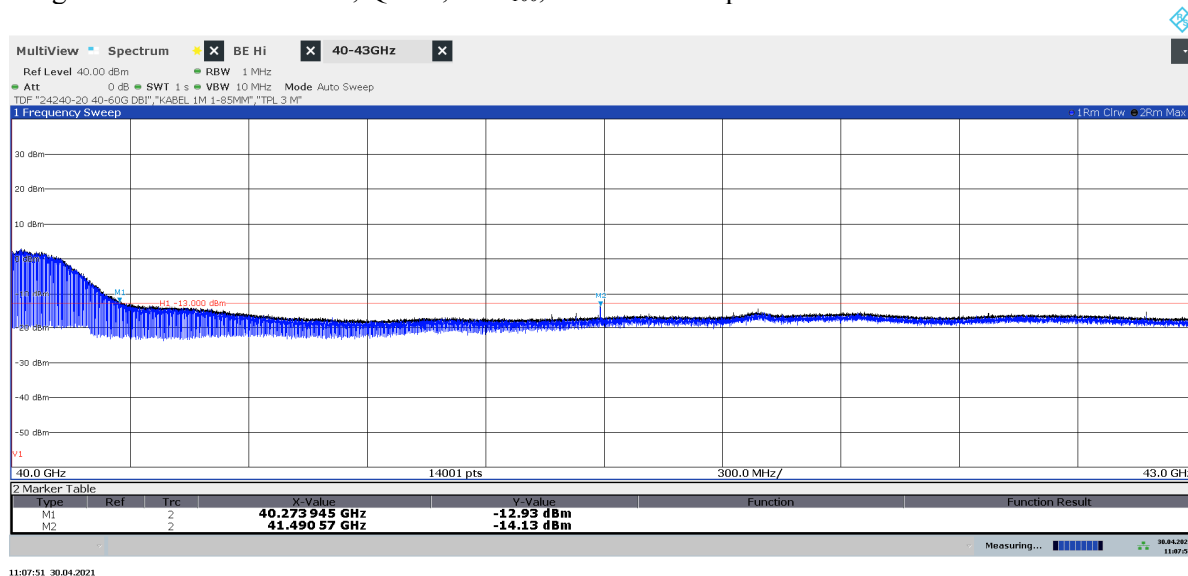
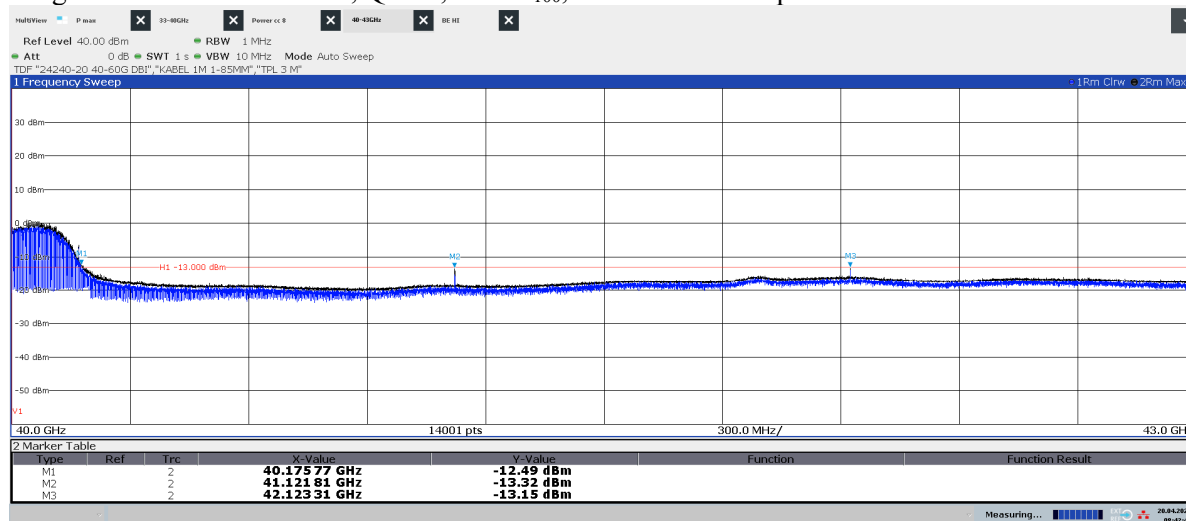
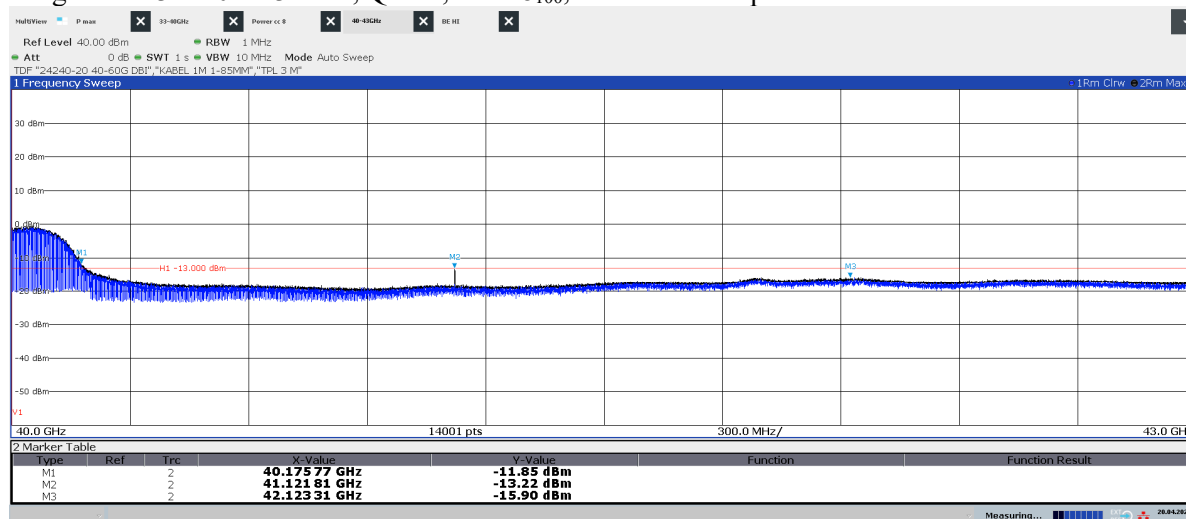
Diagram 2.22a: 40 – 43 GHz, QPSK, TH₈₁₀₀, EIRP Horizontal polarizationDiagram 2.22b: 40 – 43 GHz, QPSK, TH₈₁₀₀, EIRP Vertical polarization

Diagram 2.22c: 40 – 43 GHz, QPSK, TH₈₁₀₀, EIRP Horizontal polarizationDiagram 2.22d: 40 – 43 GHz, QPSK, TH₈₁₀₀, EIRP Vertical polarization

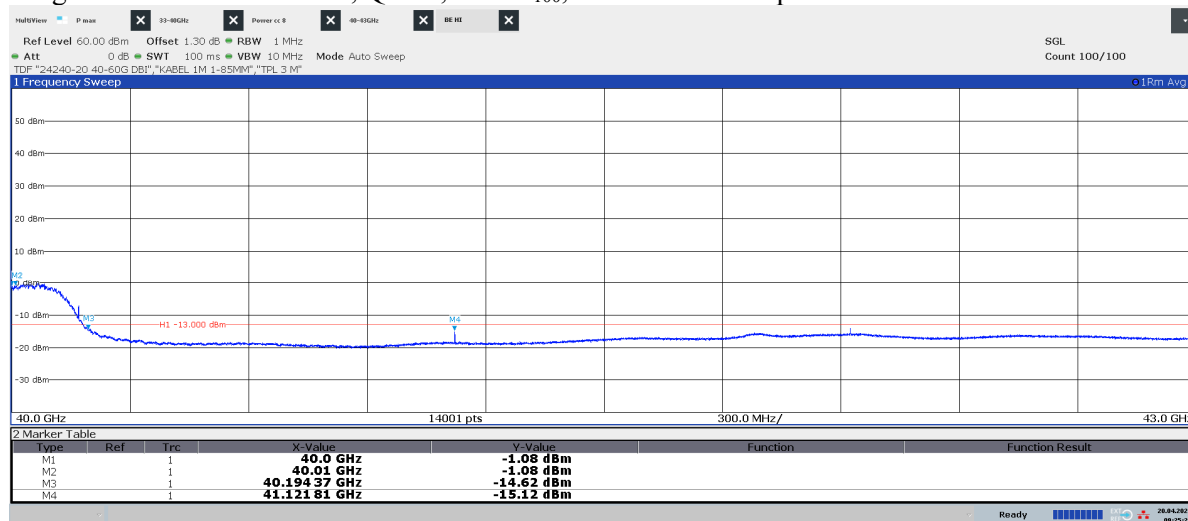
Power EIRP for 40.0 GHz Hor/ Ver [dBm]	Power EIRP for 40.01 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 40.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 40.01 GHz (Limit -13 dBm) [dBm]/ Verdict
1.59/ 2.14	0.83/ 1.25	29.49/ 29.52	-24.62/ Pass	-25.45/ Pass

Diagram 2.23a: 40 – 43 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

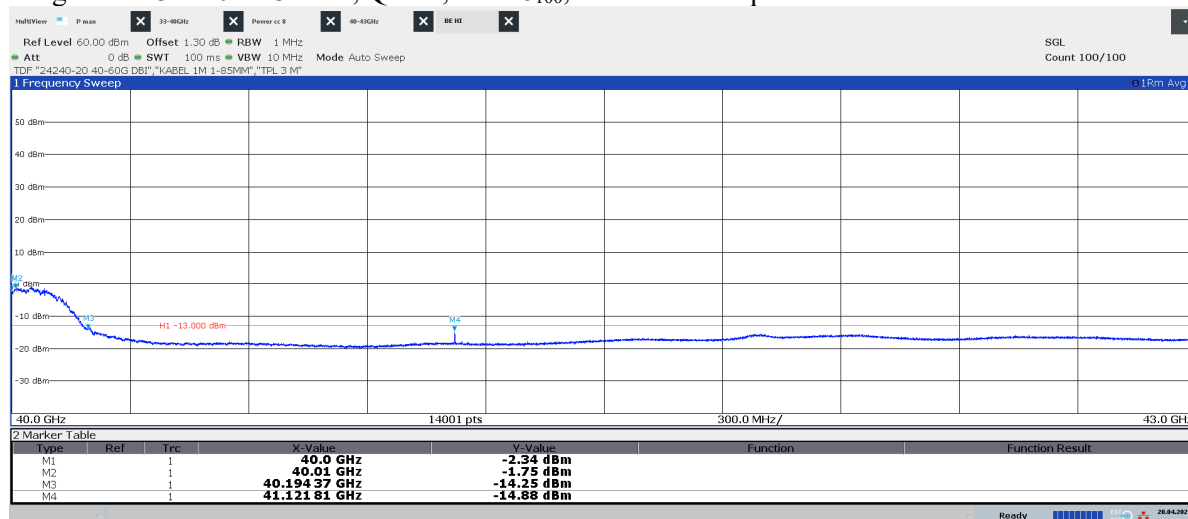
08:42:44 20.04.2021

Diagram 2.23b: 40 – 43 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

08:51:48 20.04.2021

Diagram 2.23c: 40 – 43 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

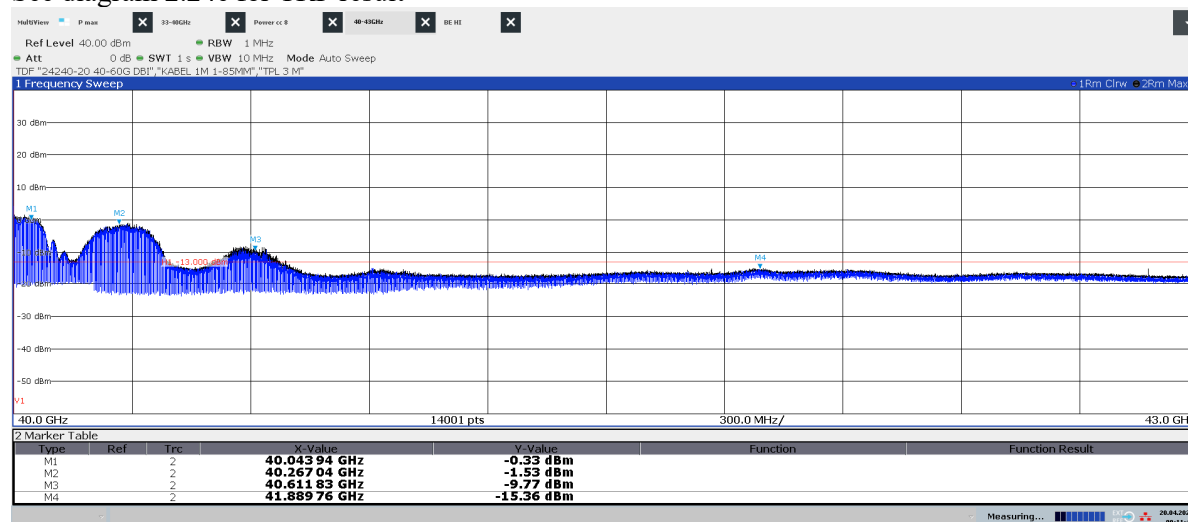
09:25:21 20.04.2021

Diagram 2.23d: 40 – 43 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

09:24:10 20.04.2021

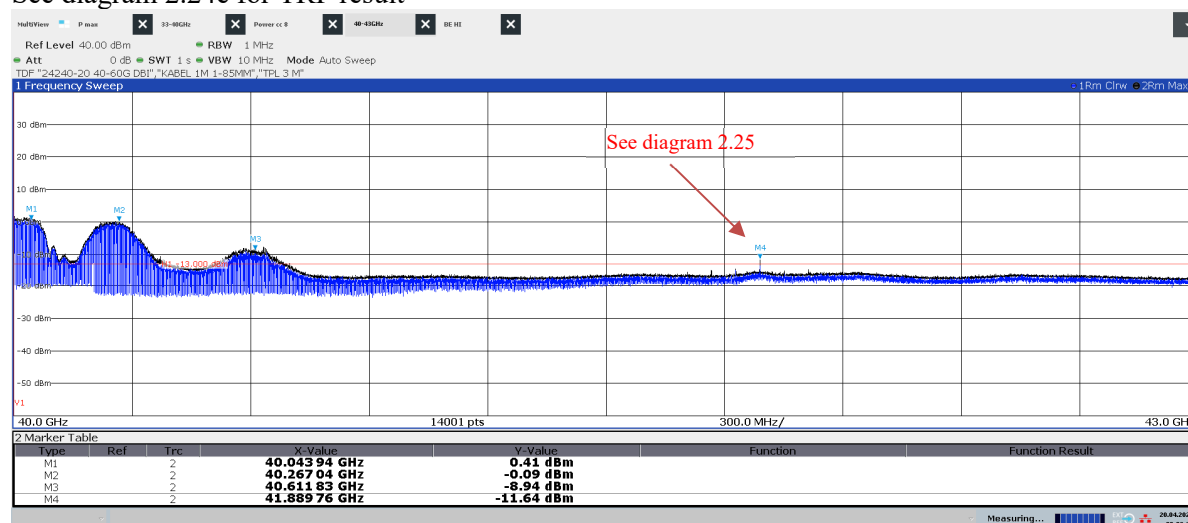
Power EIRP for 40.0 GHz Hor/ Ver [dBm]	Power EIRP for 40.01 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 40.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 40.01 GHz (Limit -13 dBm) [dBm]/ Verdict
-1.08/ -2.34	-1.08/ -1.75	26.26/ 26.61	-25.06/ Pass	-24.81/ Pass

Diagram 2.24a: 40 – 43 GHz, QPSK, Tim₅₀, EIRP Horizontal polarization
See diagram 2.24e for TRP result



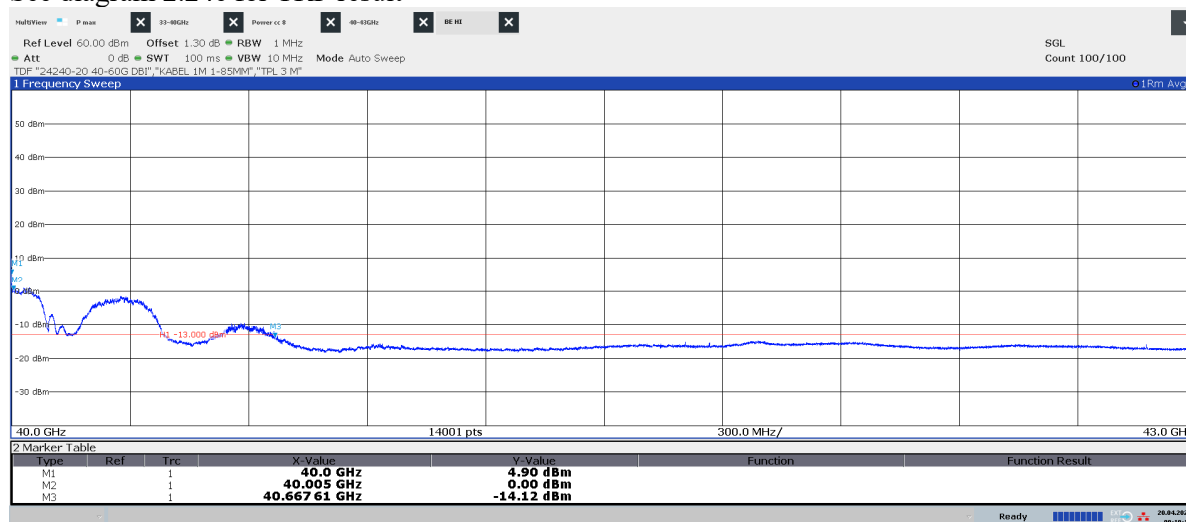
09:11:44 20.04.2021

Diagram 2.24b: 40 – 43 GHz, QPSK, Tim₅₀, EIRP Vertical polarization
See diagram 2.24e for TRP result



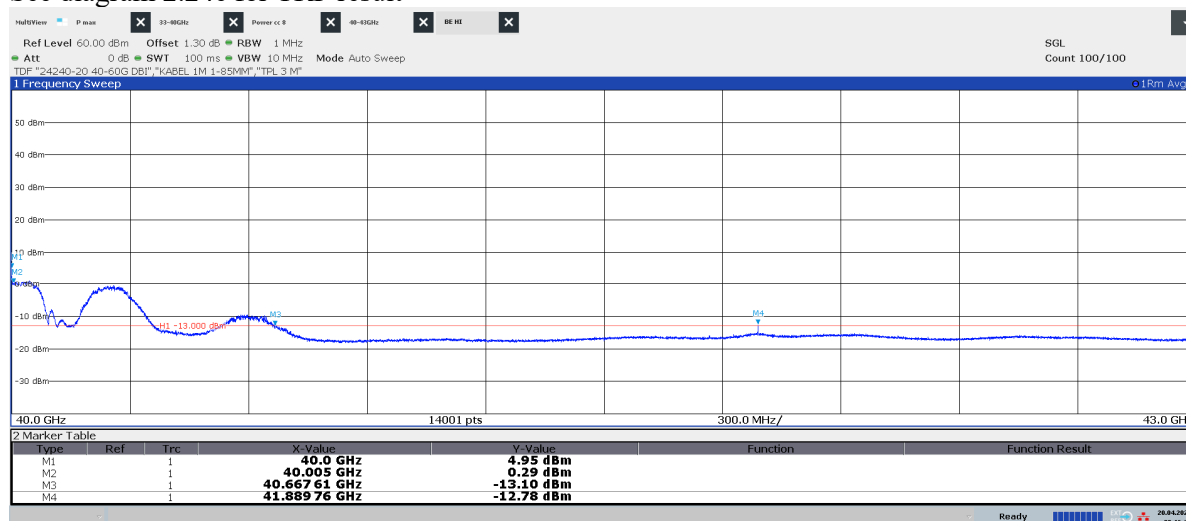
09:03:34 20.04.2021

Diagram 2.24c: 40 – 43 GHz, QPSK, Tim₅₀, EIRP Horizontal polarization
See diagram 2.24e for TRP result



09:10:18 20.04.2021

Diagram 2.24d: 40 – 43 GHz, QPSK, Tim₅₀, EIRP Vertical polarization
See diagram 2.24e for TRP result



09:16:37 20.04.2021

Power EIRP for 40.0 GHz Hor/ Ver [dBm]	Power EIRP for 40.005 GHz Hor/ Ver [dBm]	Antenna Gain Hor/ Ver [dBi]	Total conducted power/BW for 40.0 GHz (Limit -5 dBm) [dBm]/ Verdict	Total conducted power/BW for 40.005 GHz (Limit -13 dBm) [dBm]/ Verdict
4.90/ 4.95	0.00/ 0.29	32.05/ 31.92	-24.05/ Pass	-28.82/ Pass

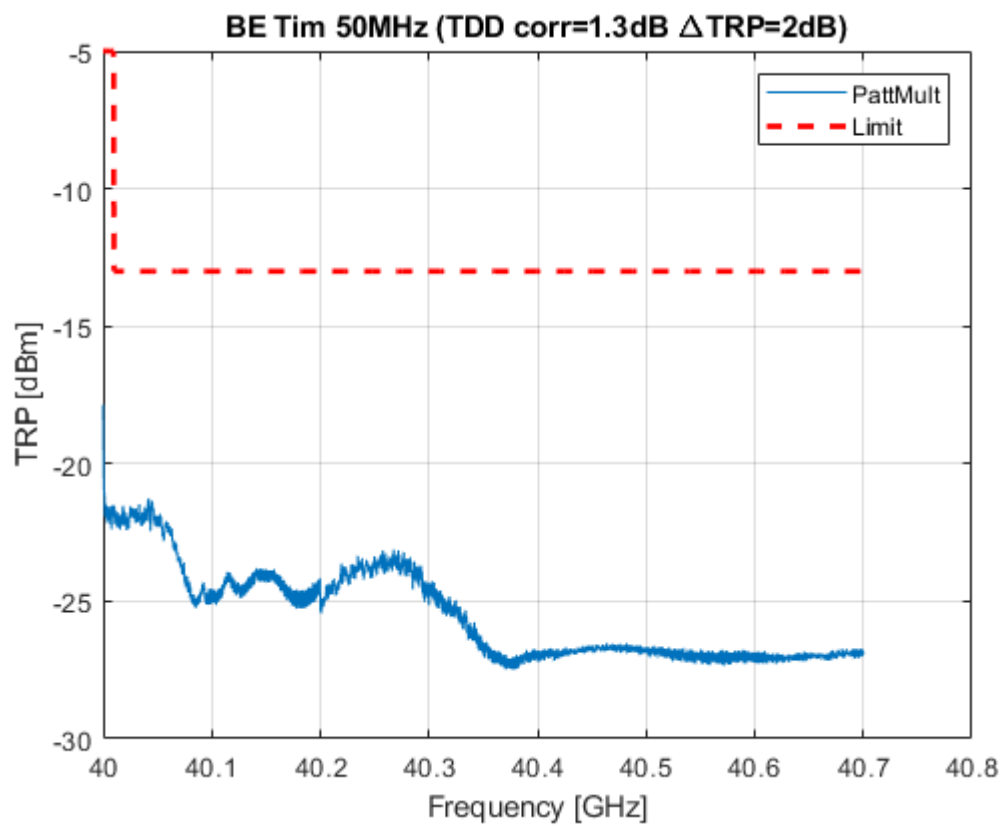
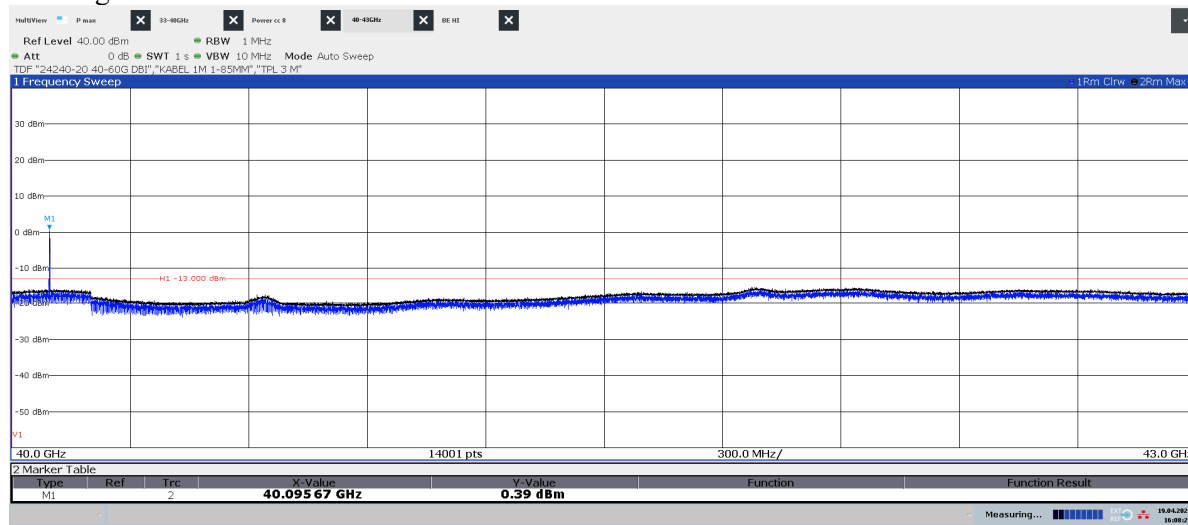
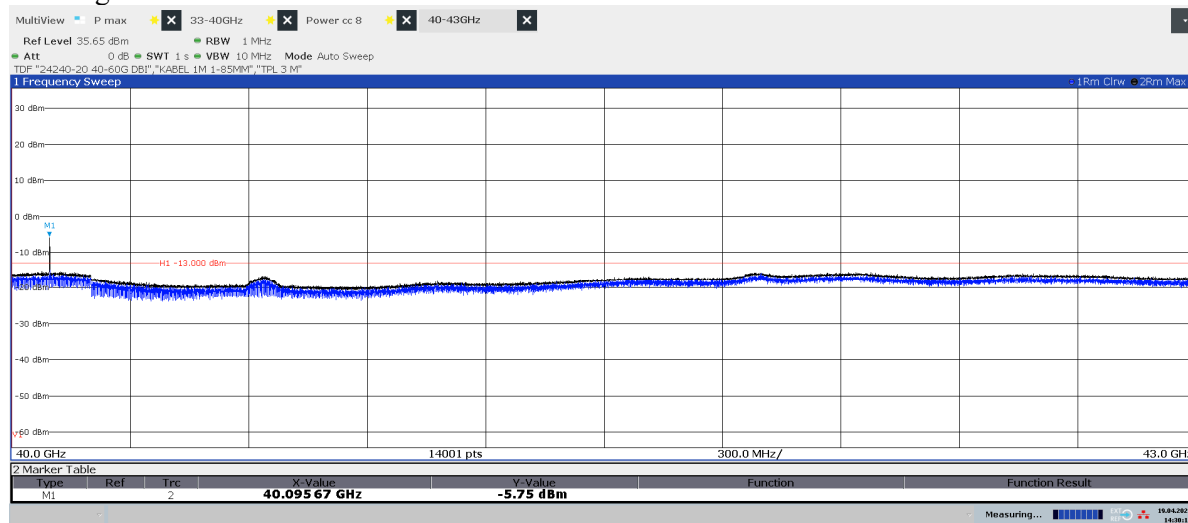
Diagram 2.24e: Pattern multiplication TRP 40 – 40.7 GHz, QPSK, Tim₅₀

Diagram 2.25a: 40 – 43 GHz, QPSK, BL₅₀, EIRP Horizontal polarization
See diagram 2.25c for TRP result



16:08:22 19.04.2021

Diagram 2.25b: 40 – 43 GHz, QPSK, BL₅₀, EIRP Vertical polarization
See diagram 2.25c for TRP result



16:30:12 19.04.2021

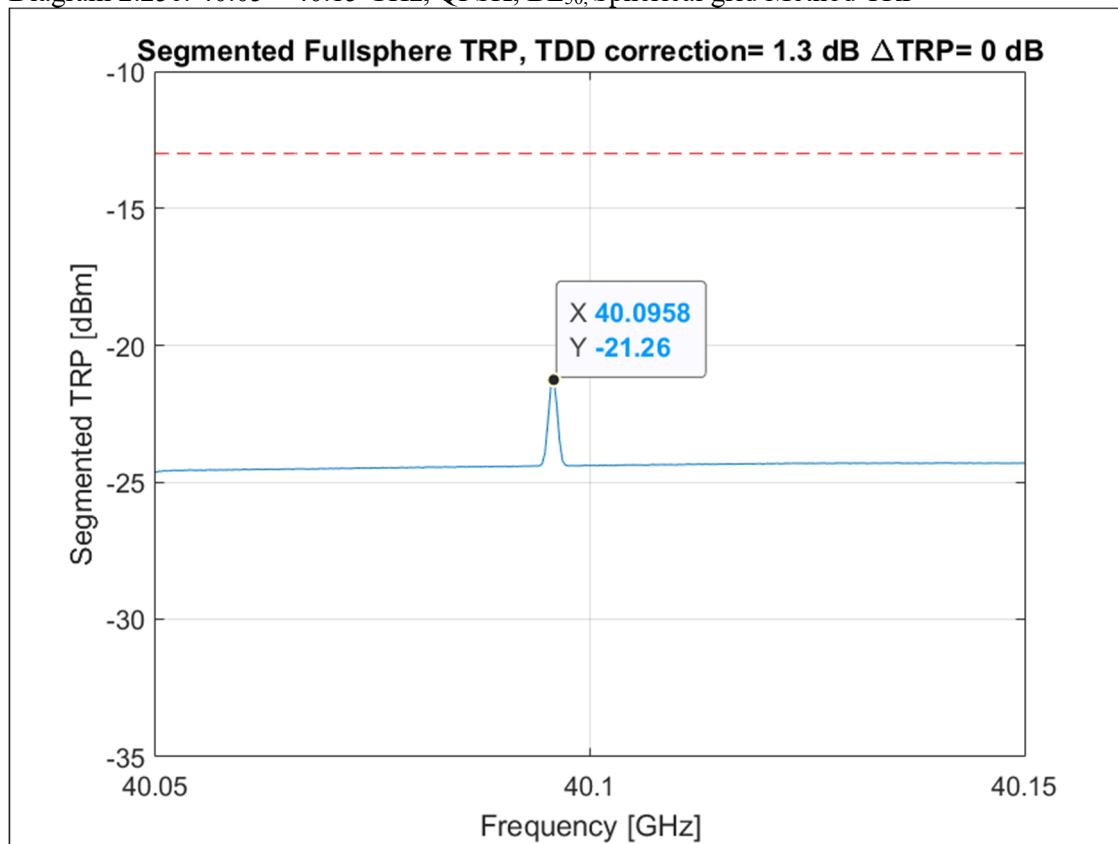
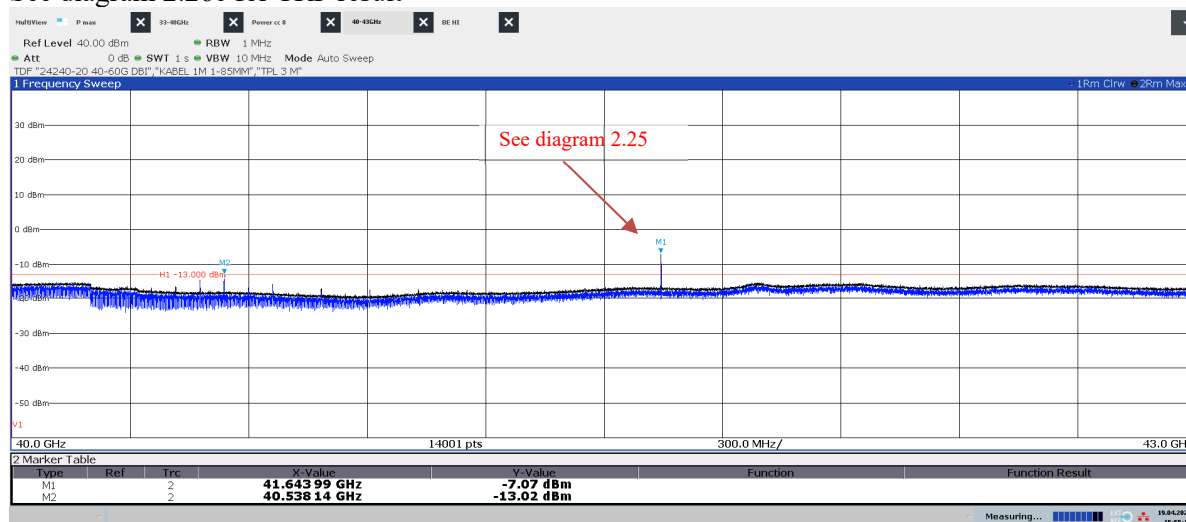
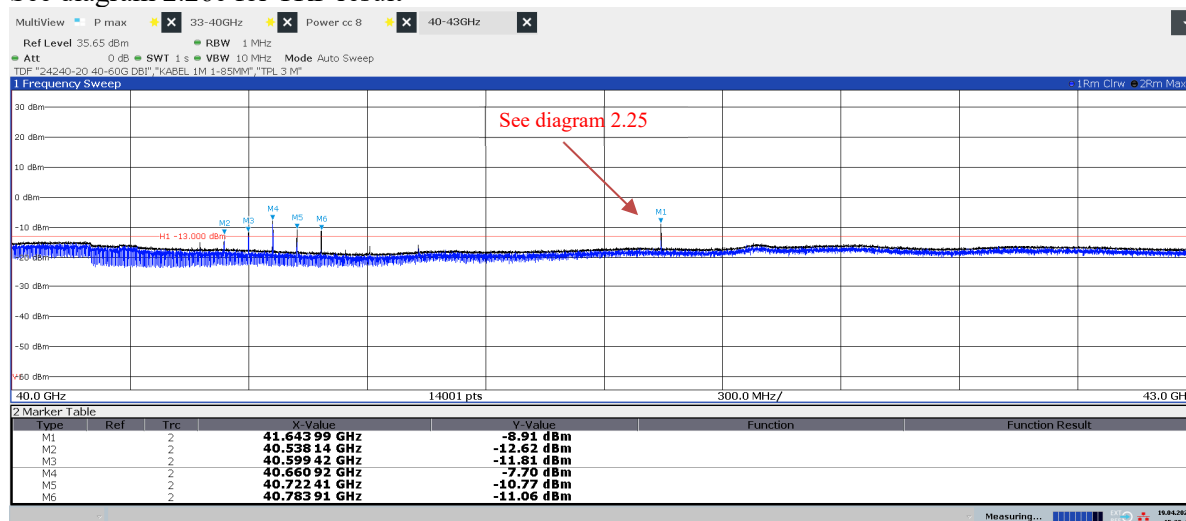
Diagram 2.25c: 40.05 – 40.15 GHz, QPSK, BL₅₀, Spherical grid Method TRP

Diagram 2.26a: 40 – 43 GHz, QPSK, TL₅₀, EIRP Horizontal polarization
See diagram 2.26c for TRP result



15:55:18 19.04.2021

Diagram 2.26b: 40 – 43 GHz, QPSK, TL₅₀, EIRP Vertical polarization
See diagram 2.26c for TRP result



15:26:42 19.04.2021

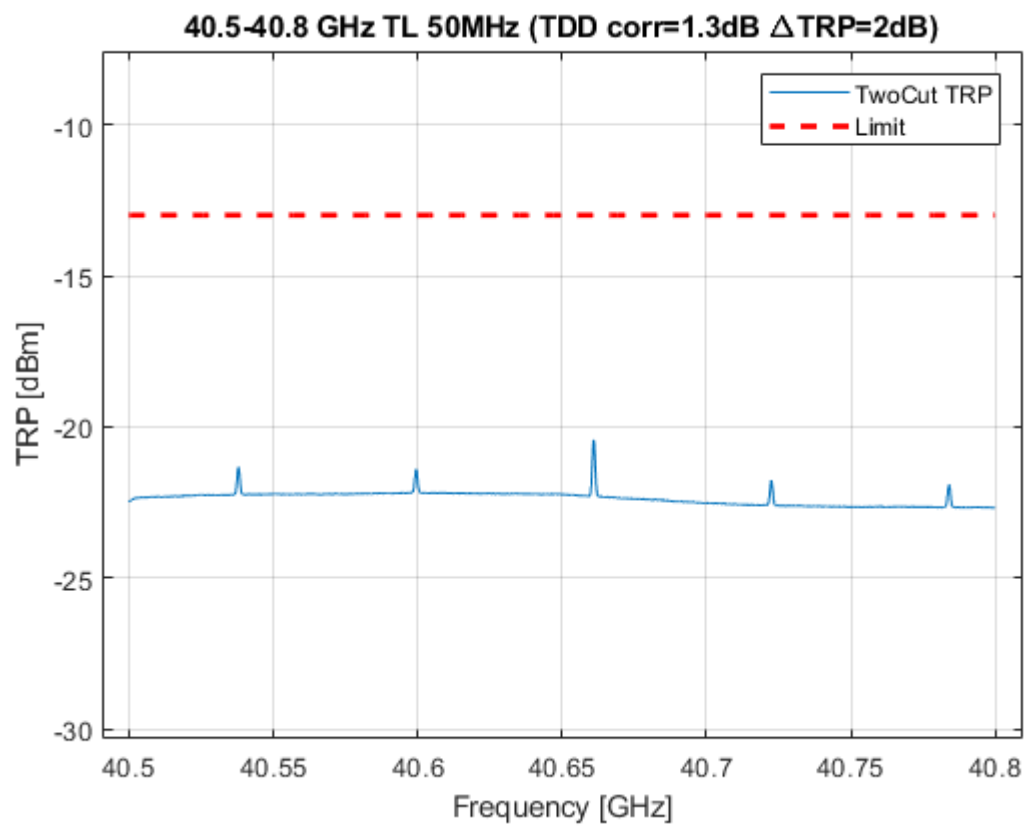
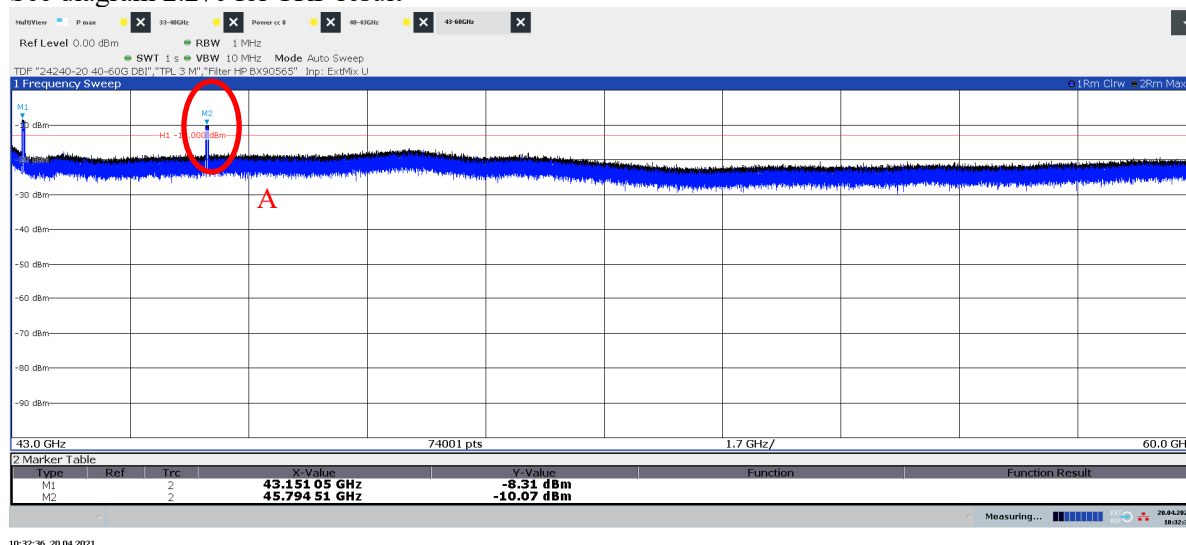
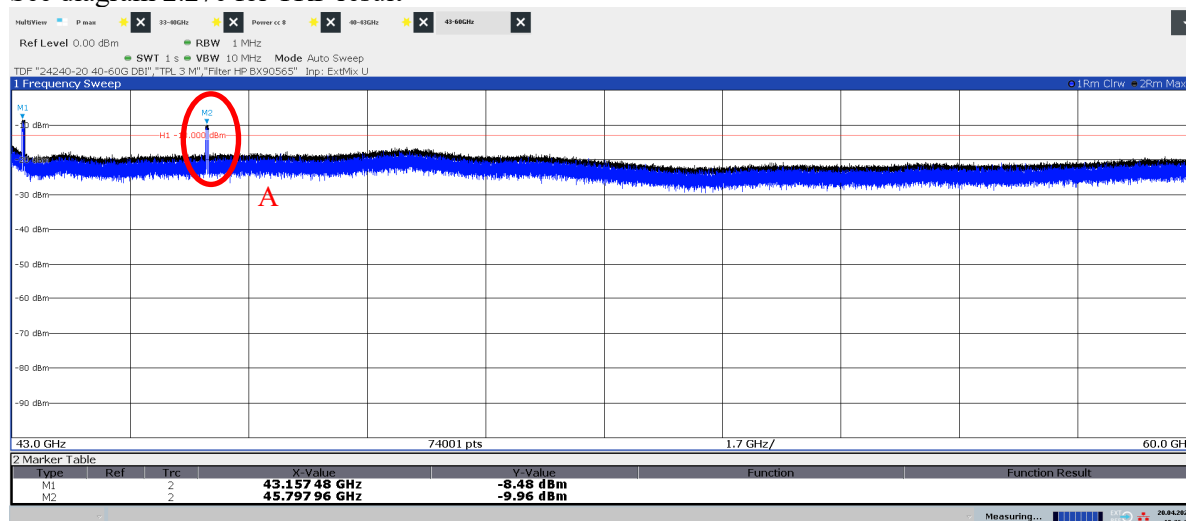
Diagram 2.26c: 40.5 – 40.8 GHz, QPSK, TL₅₀, Two cut TRP

Diagram 2.27a: 43 – 60 GHz, QPSK, BL₅₀, EIRP Horizontal polarization
See diagram 2.27c for TRP result



10:32:36 20.04.2021

Diagram 2.27b: 43 – 60 GHz, QPSK, BL₅₀, EIRP Vertical polarization
See diagram 2.27c for TRP result



10:36:24 20.04.2021

“False signals” originating from unwanted mixer products between LO signal generated by the spectrum analyzer and the strong out of measurement band RF-signal (EUT carrier frequencies) are marked with red circles. The frequency of the “false signals” can be calculated and are show in the table below.

Plot label	Mixing indicies			
	F EUT [GHz]	n [-]	m [-]	"False F" [GHz]
A	37.025	4	1	45.8

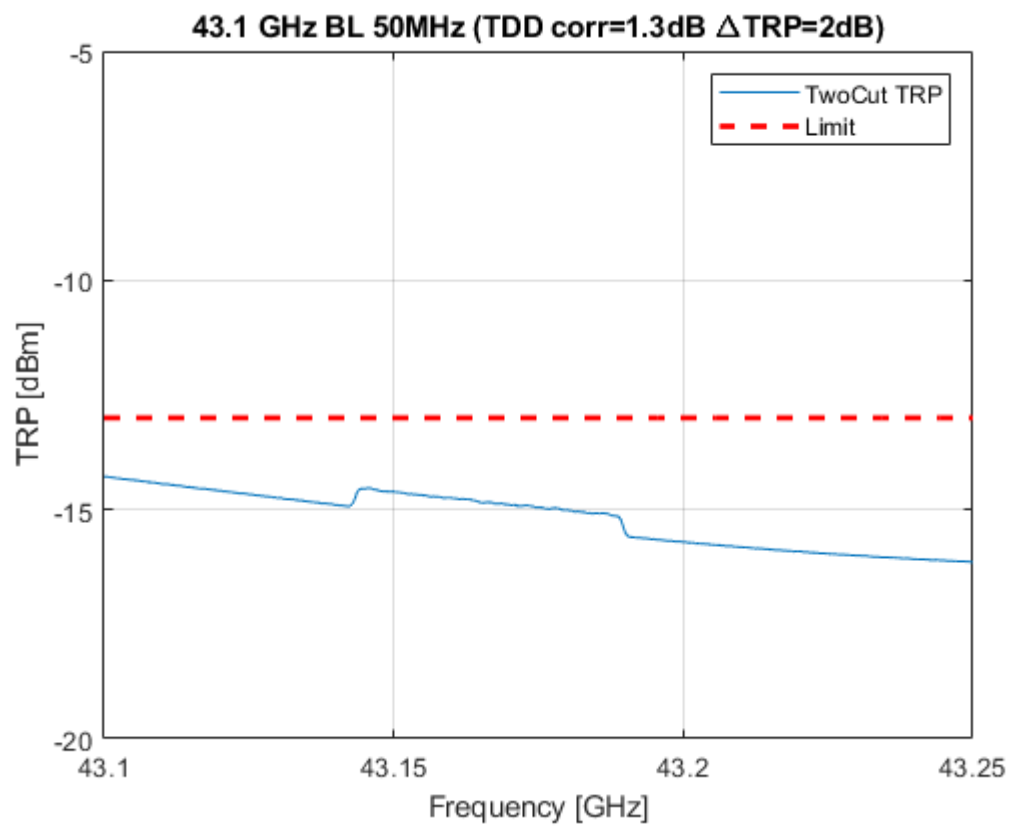
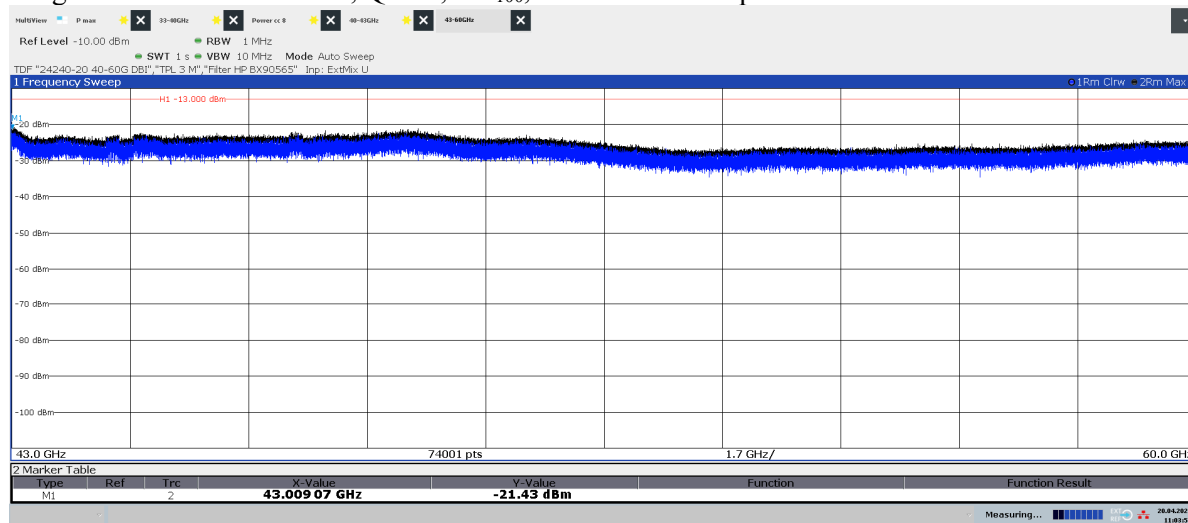
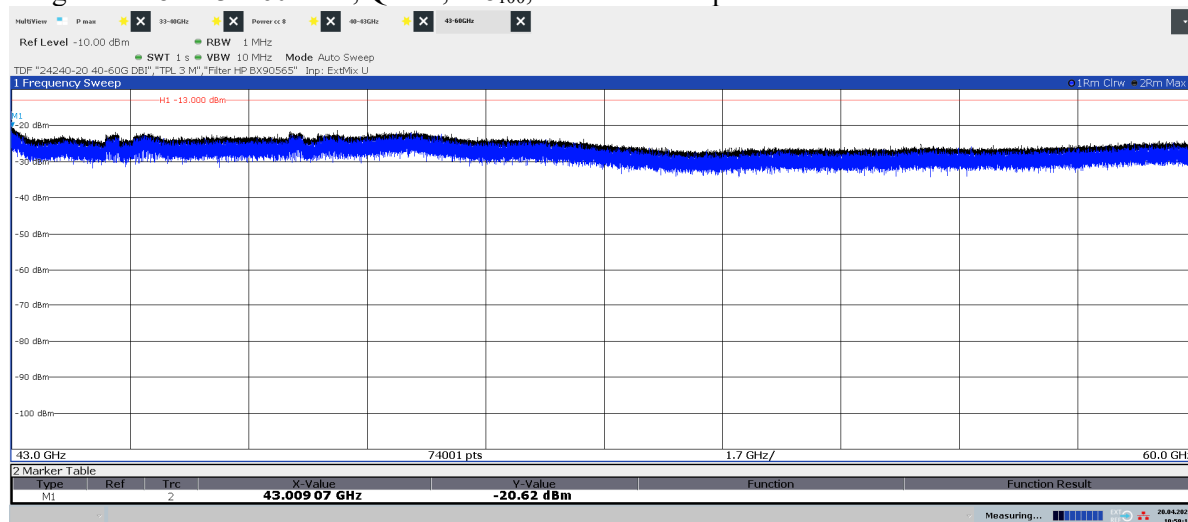
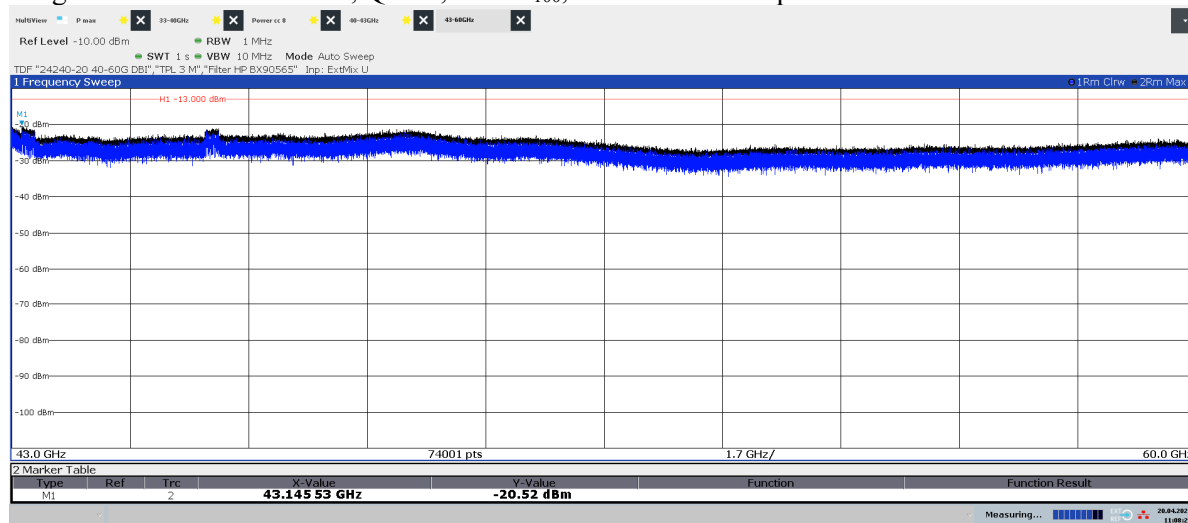
Diagram 2.27c: 43.1 – 43.25 GHz, QPSK, BL₅₀, Two cut TRP

Diagram 2.28a: 43 – 60 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

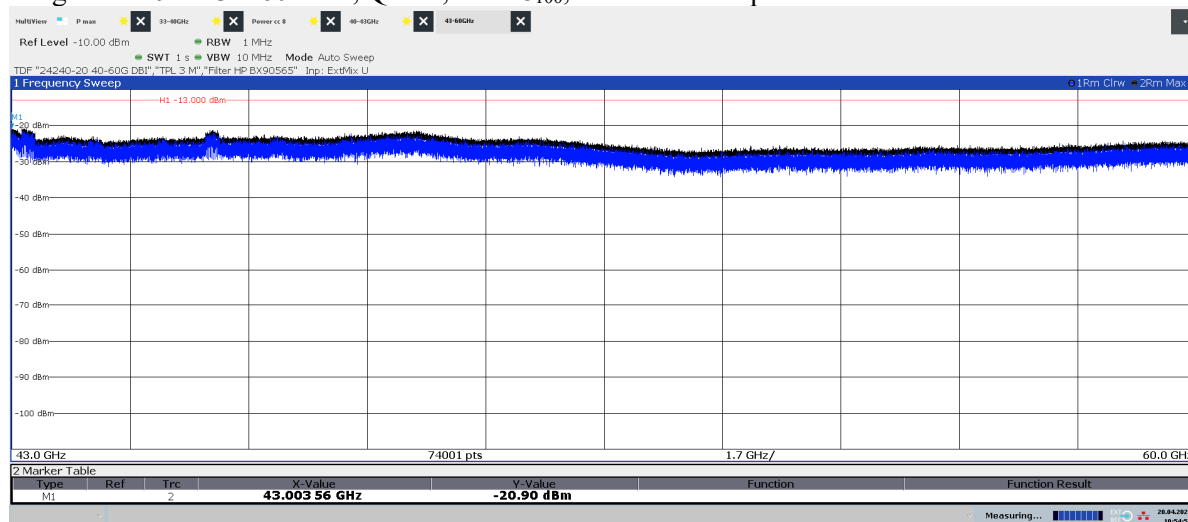
11:03:54 20.04.2021

Diagram 2.28b: 43 – 60 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

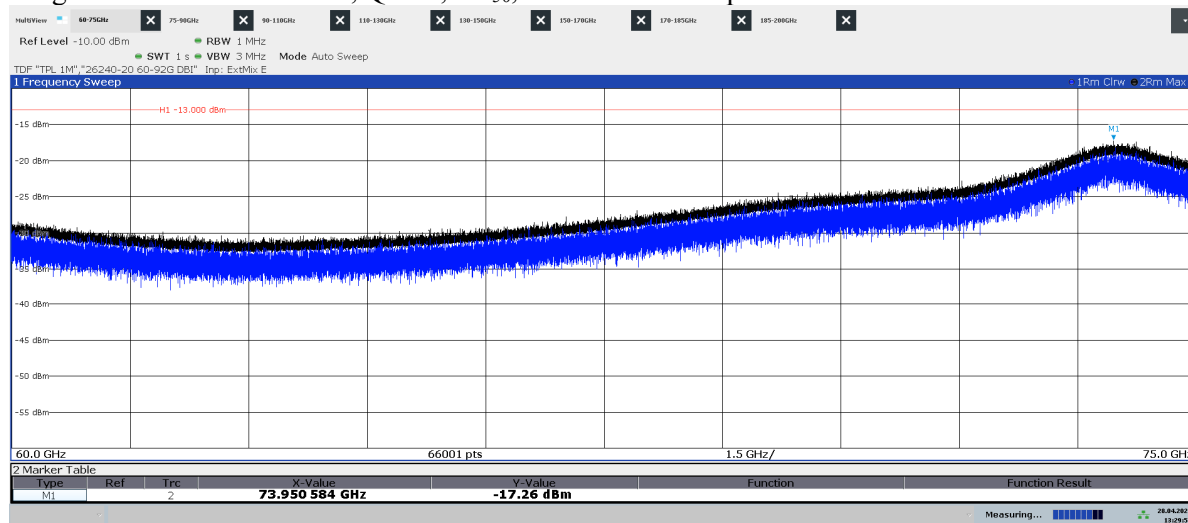
10:59:11 20.04.2021

Diagram 2.29a: 43 – 60 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

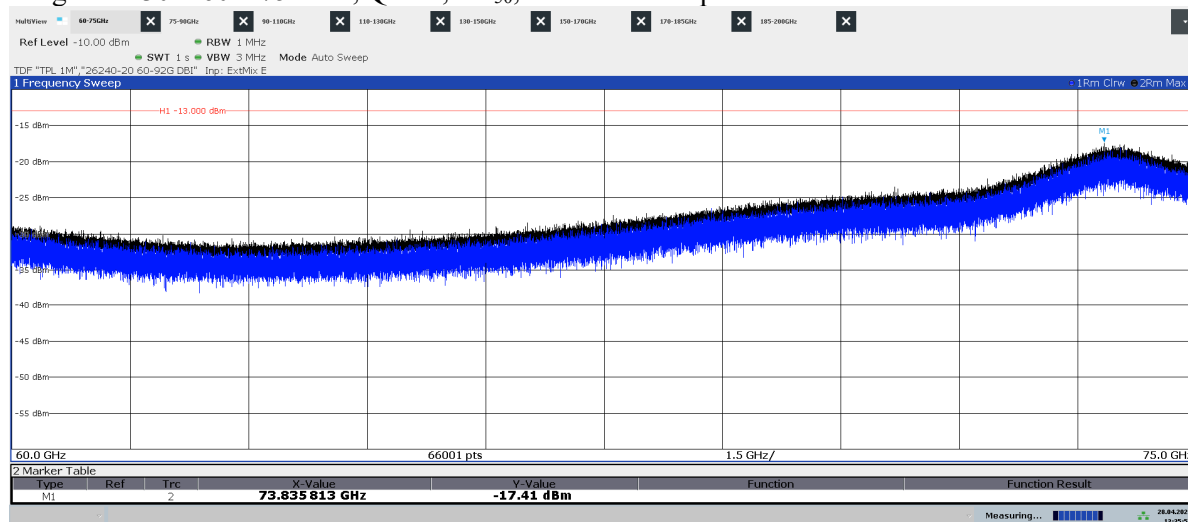
11:08:25 20.04.2021

Diagram 2.29b: 43 – 60 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

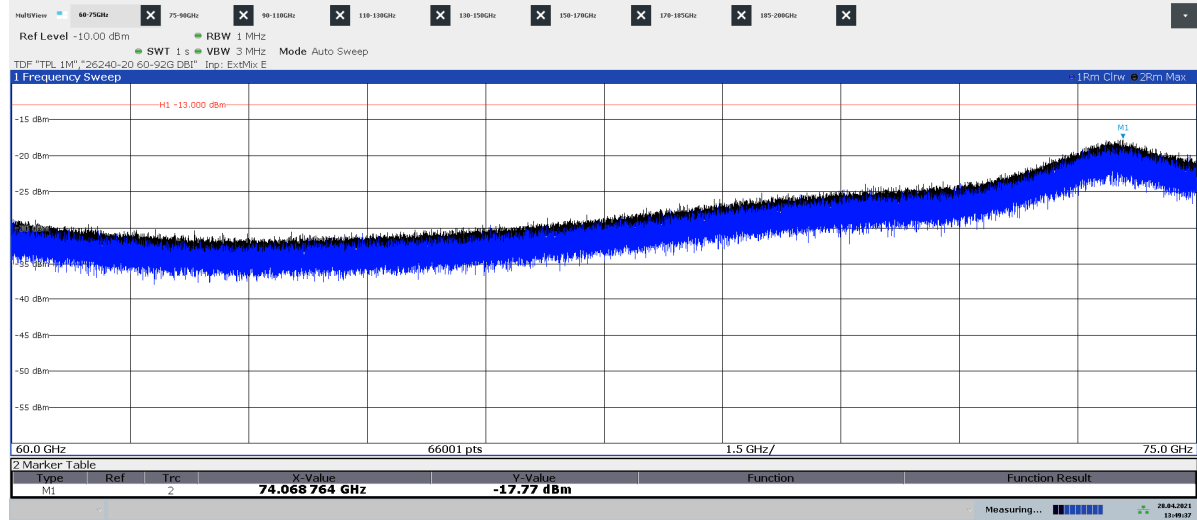
10:54:53 20.04.2021

Diagram 2.30a: 60 – 75 GHz, QPSK, BL₅₀, EIRP Horizontal polarization

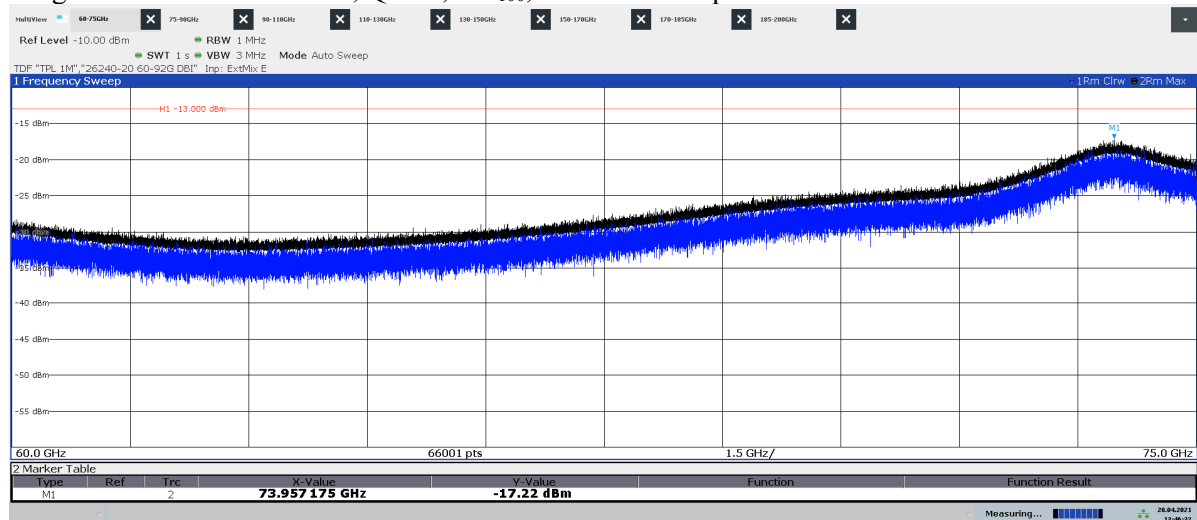
13:29:54 28.04.2021

Diagram 2.30b: 60 – 75 GHz, QPSK, BL₅₀, EIRP Vertical polarization

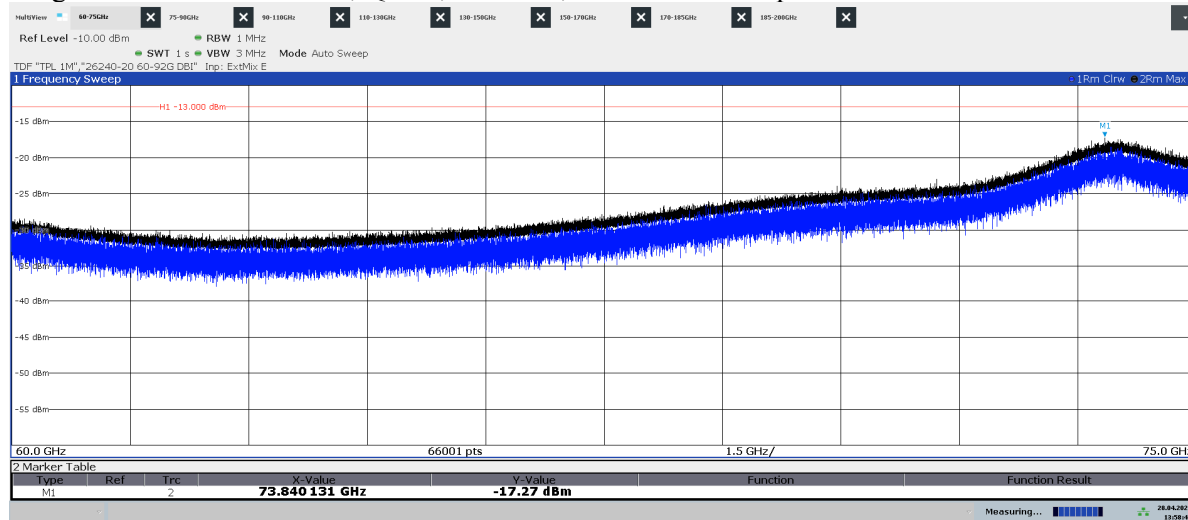
13:35:54 28.04.2021

Diagram 2.31a: 60 – 75 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

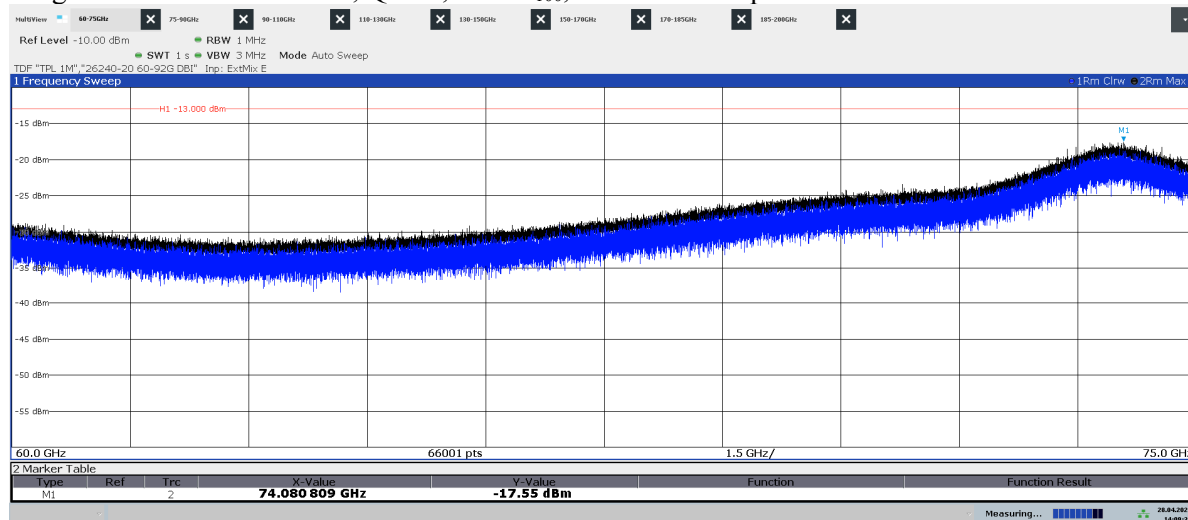
13:49:37 28.04.2021

Diagram 2.31b: 60 – 75 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

13:46:32 28.04.2021

Diagram 2.32a: 60 – 75 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

13:58:45 28.04.2021

Diagram 2.32b: 60 – 75 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

14:09:32 28.04.2021

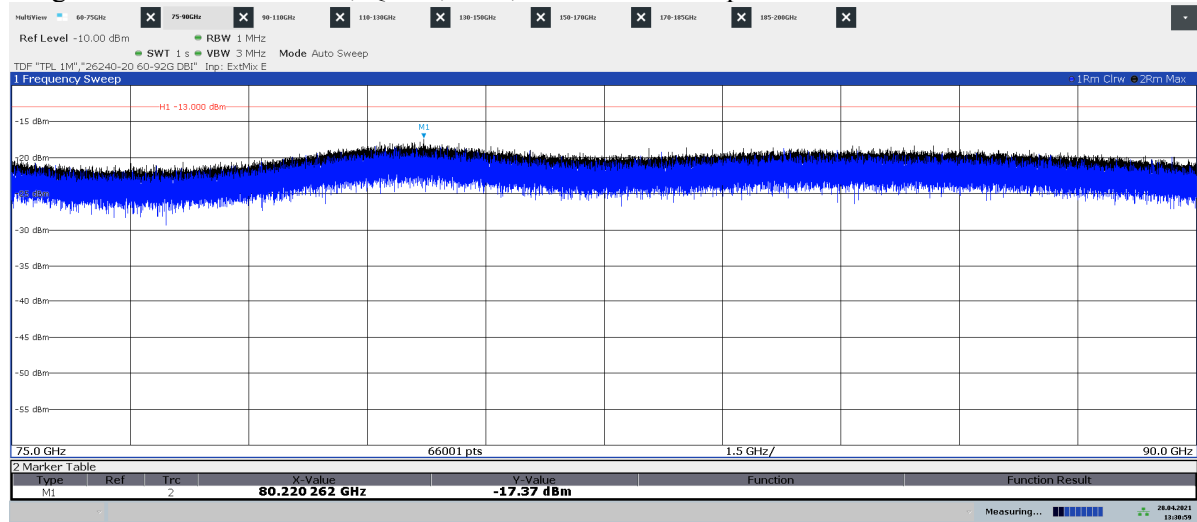
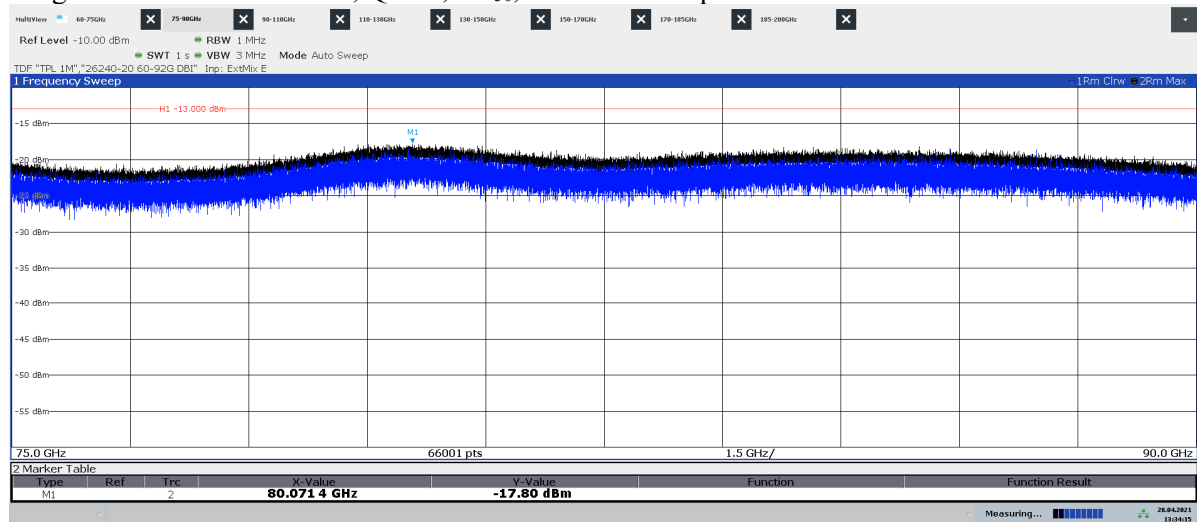
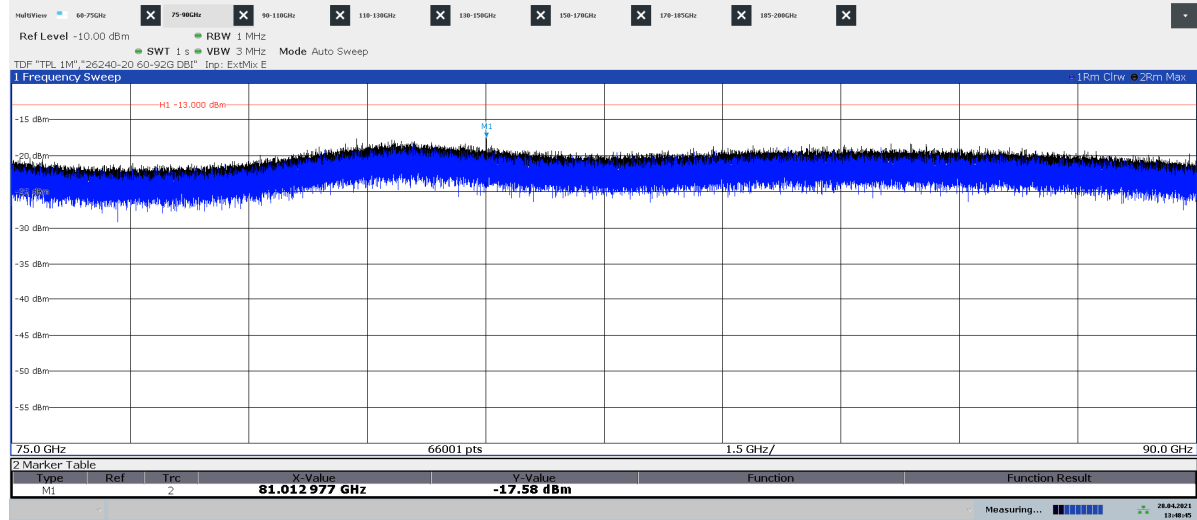
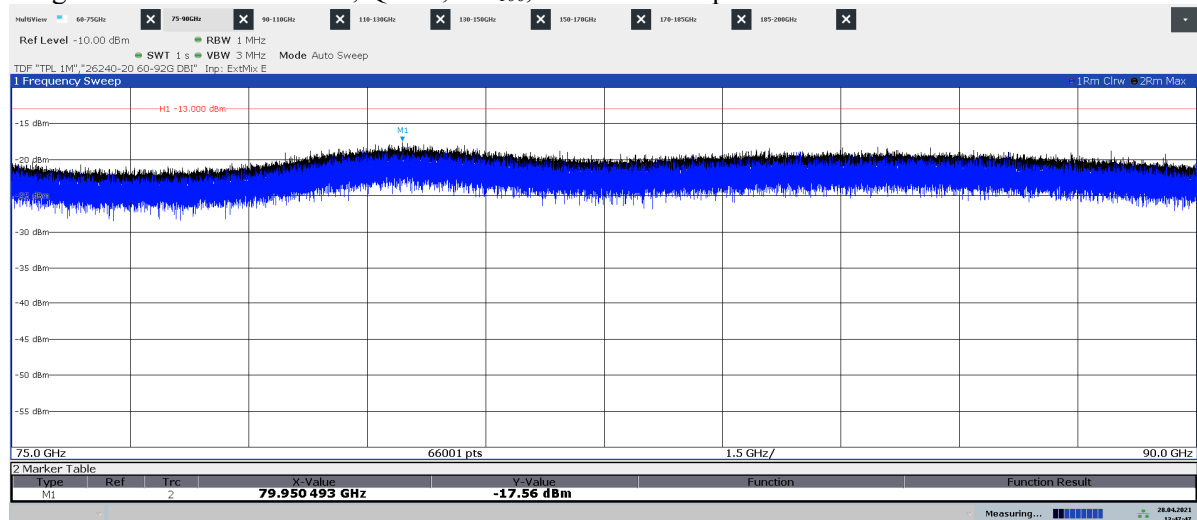
Diagram 2.33a: 75 – 90 GHz, QPSK, BL₅₀, EIRP Horizontal polarizationDiagram 2.33b: 75 – 90 GHz, QPSK, BL₅₀, EIRP Vertical polarization

Diagram 2.34a: 75 – 90 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

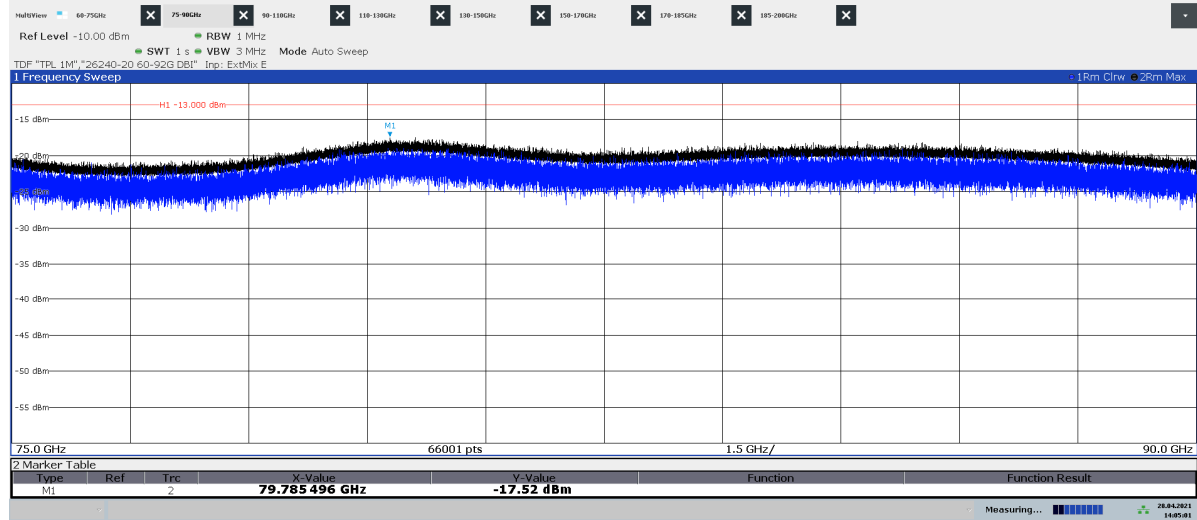


13:48:46 28.04.2021

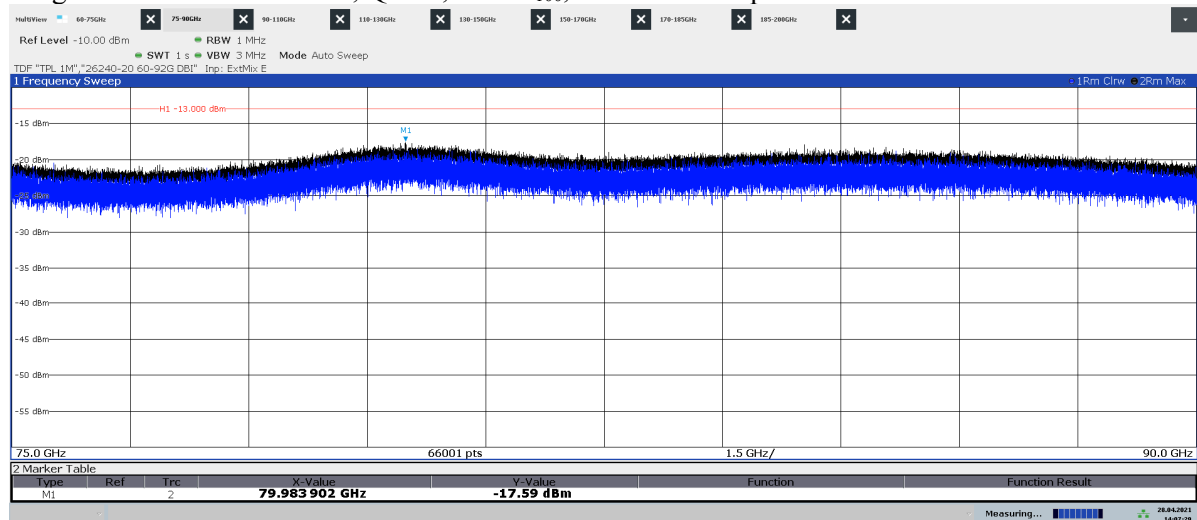
Diagram 2.34b: 75 – 90 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization



13:47:47 28.04.2021

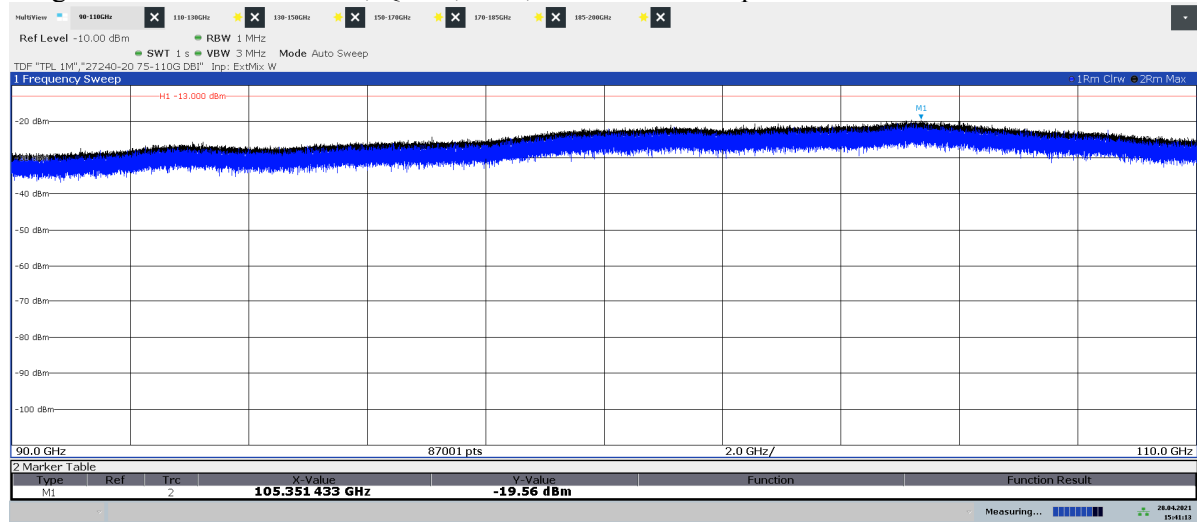
Diagram 2.35a: 75 – 90 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

14:05:01 28.04.2021

Diagram 2.35b: 75 – 90 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

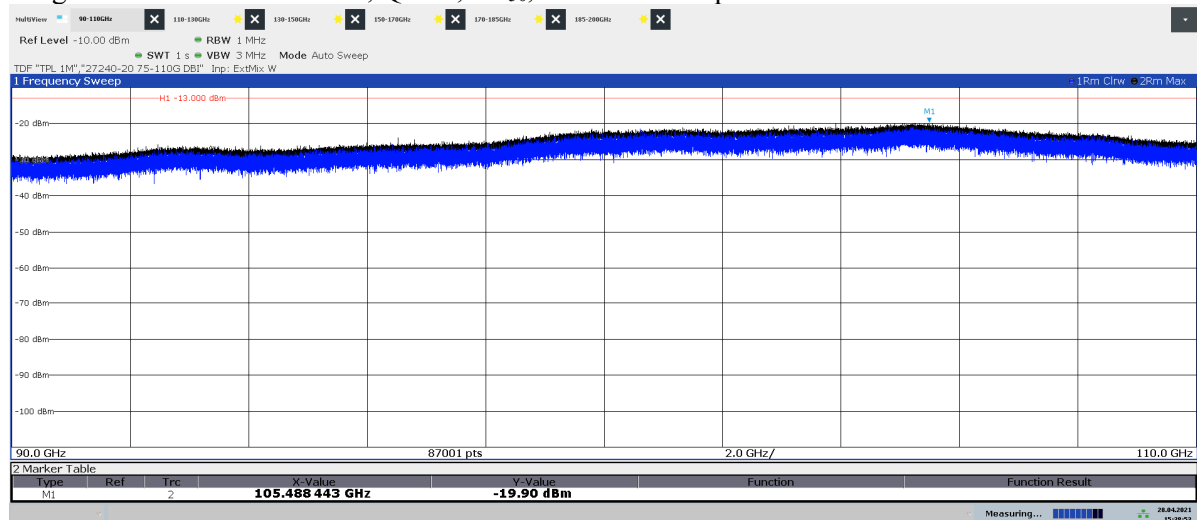
14:07:30 28.04.2021

Diagram 2.36a: 90 – 110 GHz, QPSK, BL₅₀, EIRP Horizontal polarization



15:41:13 28.04.2021

Diagram 2.36b: 90 – 110 GHz, QPSK, BL₅₀, EIRP Vertical polarization



15:38:53 28.04.2021

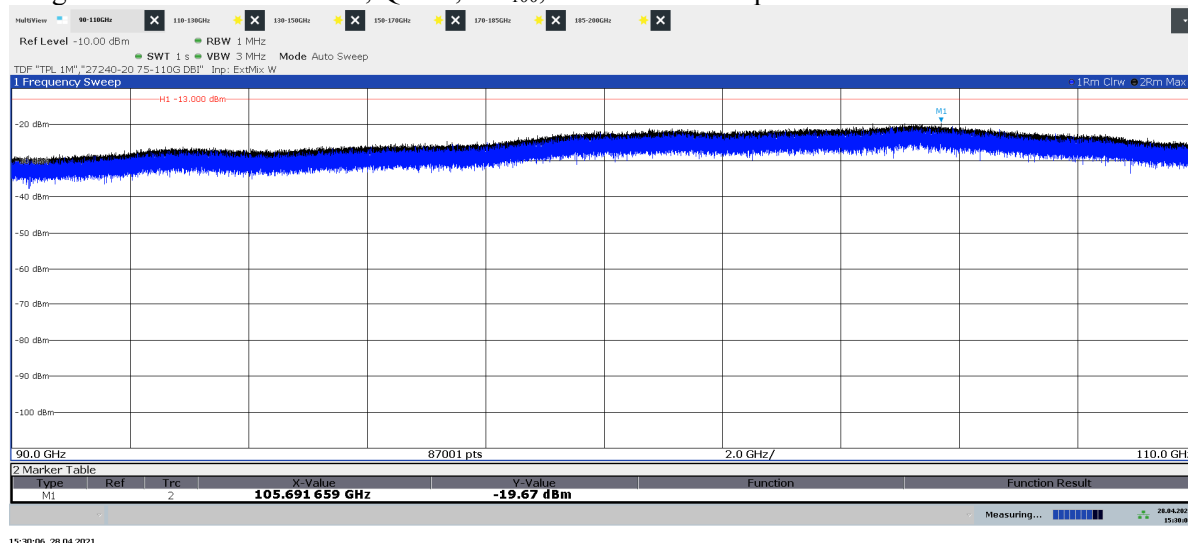
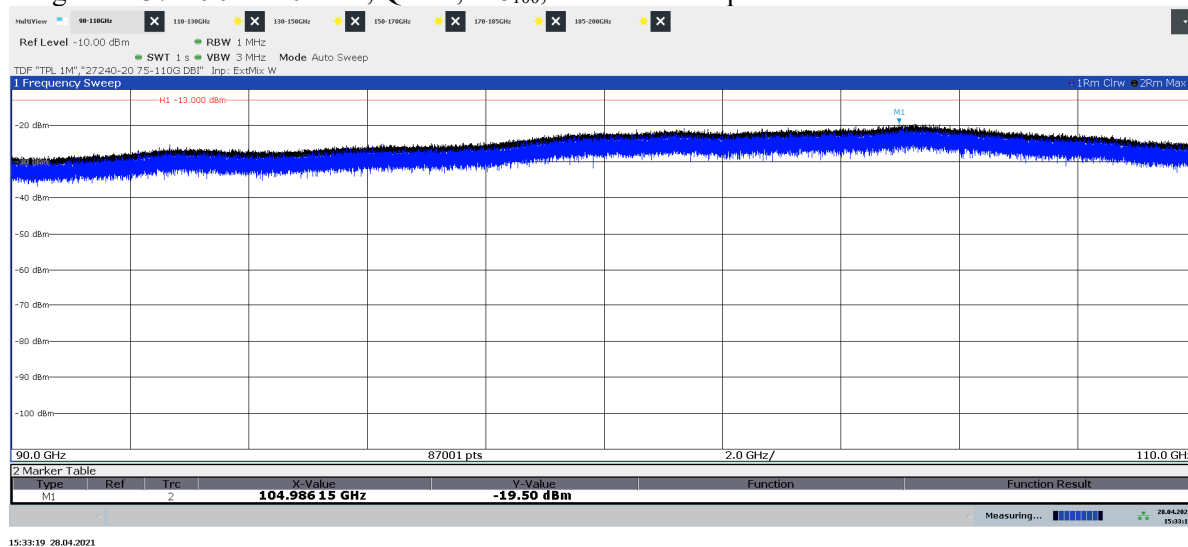
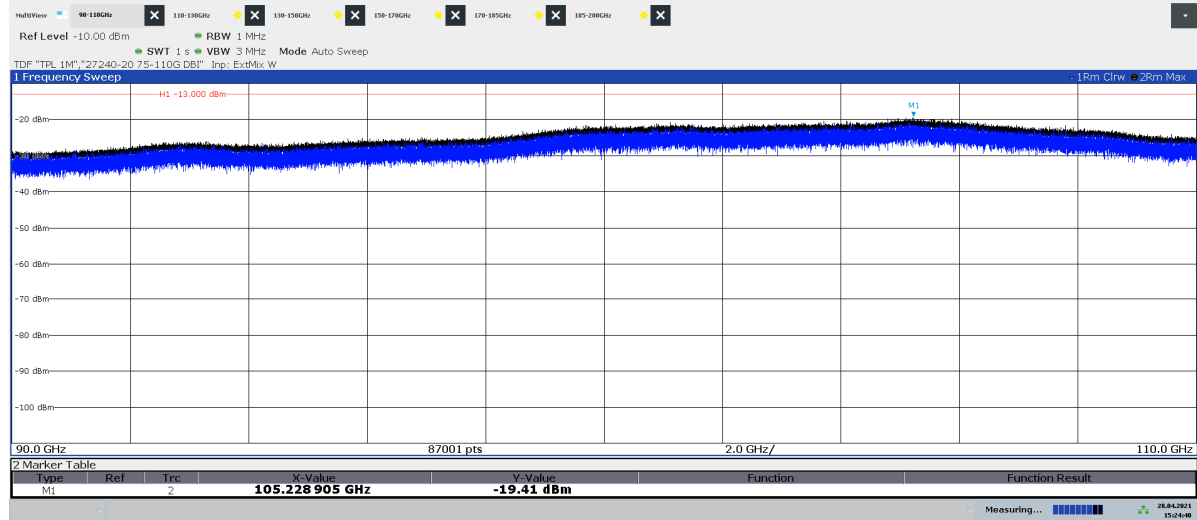
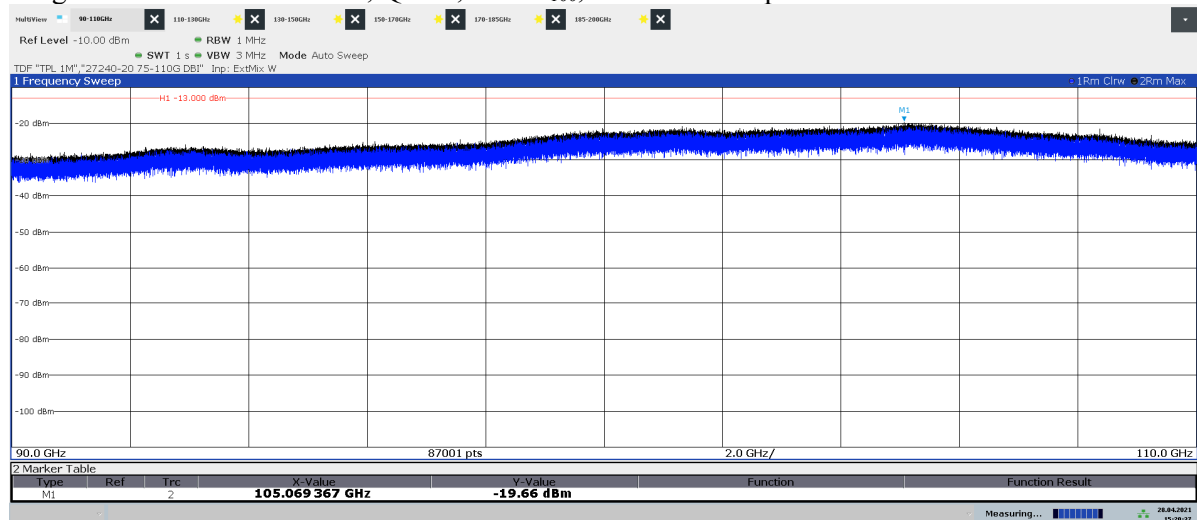
Diagram 2.37a: 90 – 110 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarizationDiagram 2.37b: 90 – 110 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

Diagram 2.38a: 90 – 110 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

15:24:40 28.04.2021

Diagram 2.38b: 90 – 110 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

15:26:37 28.04.2021

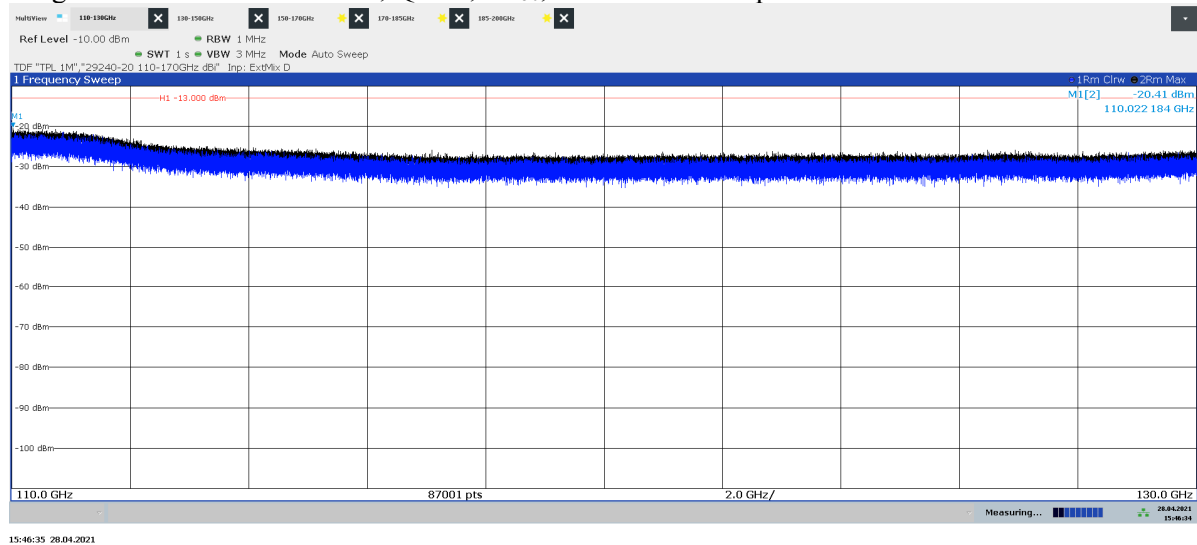
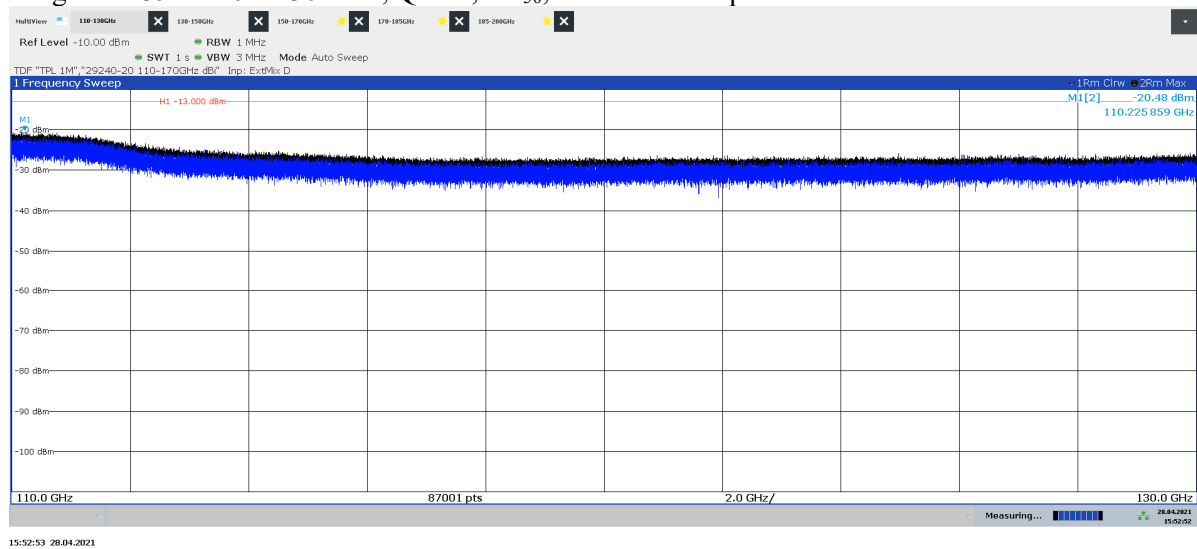
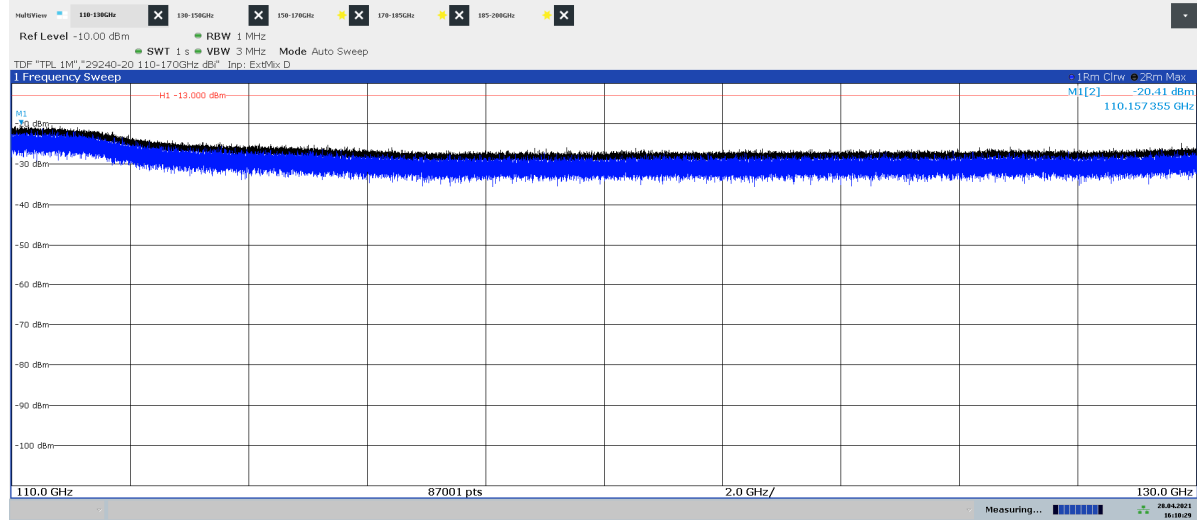
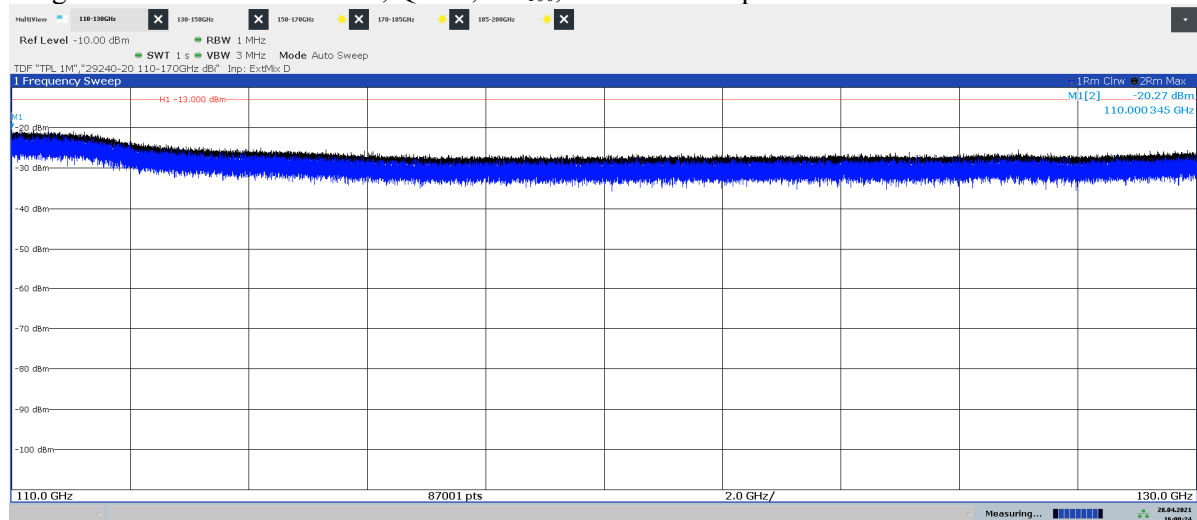
Diagram 2.39a: 110 – 130 GHz, QPSK, BL₅₀, EIRP Horizontal polarizationDiagram 2.39b: 110 – 130 GHz, QPSK, BL₅₀, EIRP Vertical polarization

Diagram 2.40a: 110 – 130 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

16:10:29 28.04.2021

Diagram 2.40b: 110 – 130 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

16:00:24 28.04.2021

[illegible]

Signed TL, DL

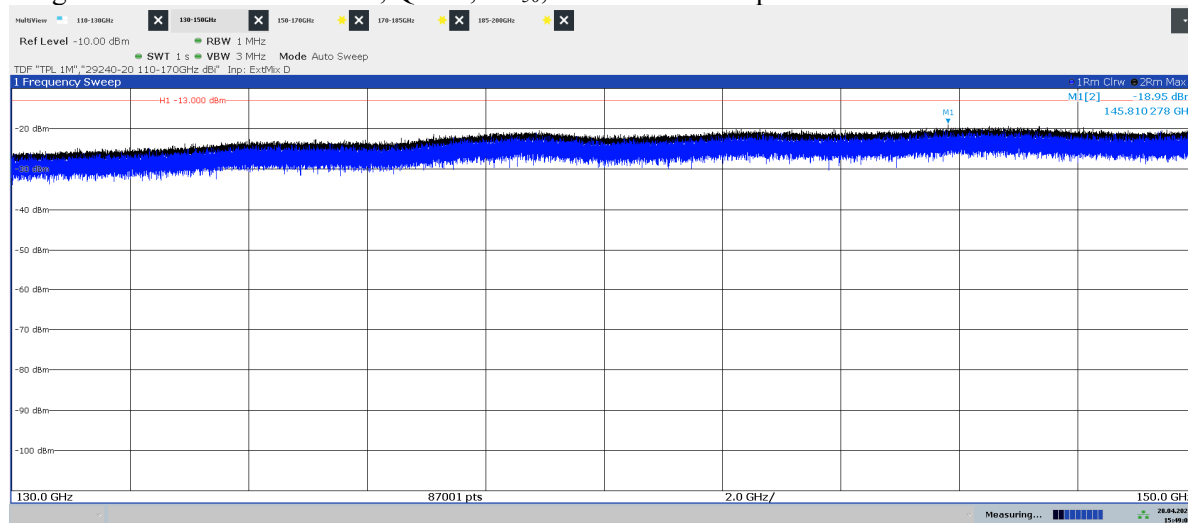
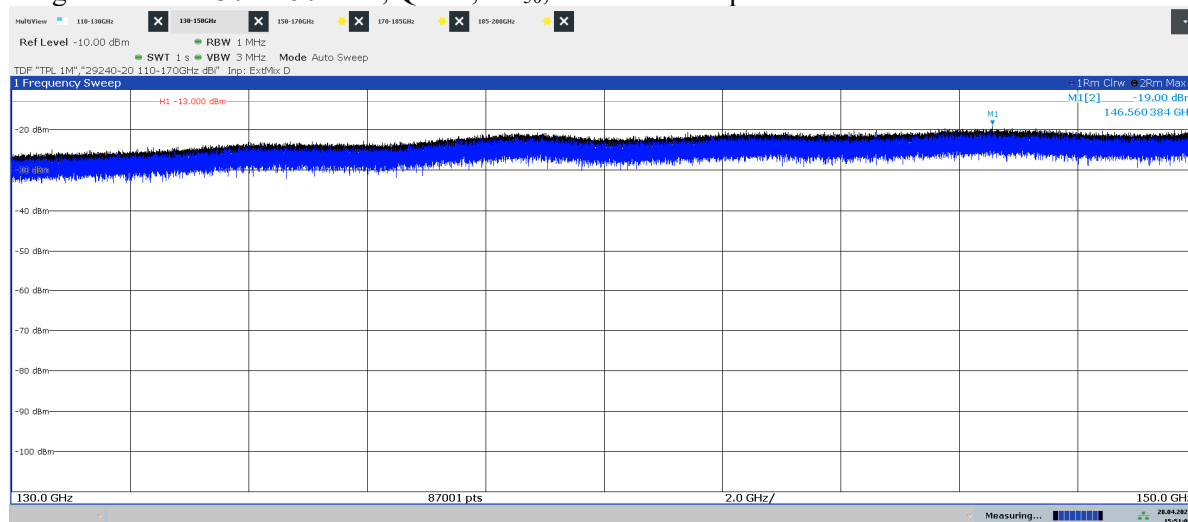
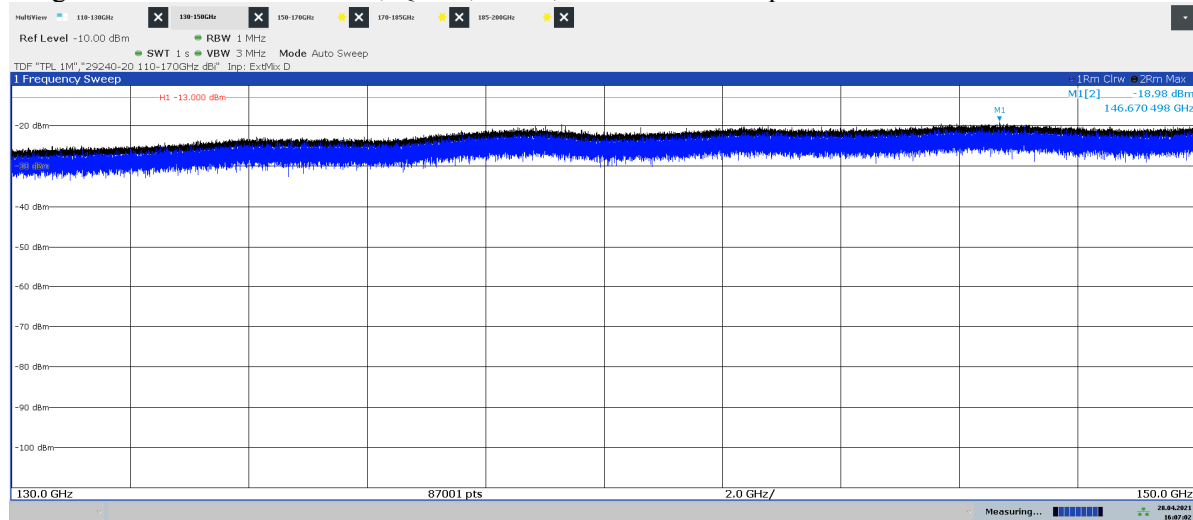
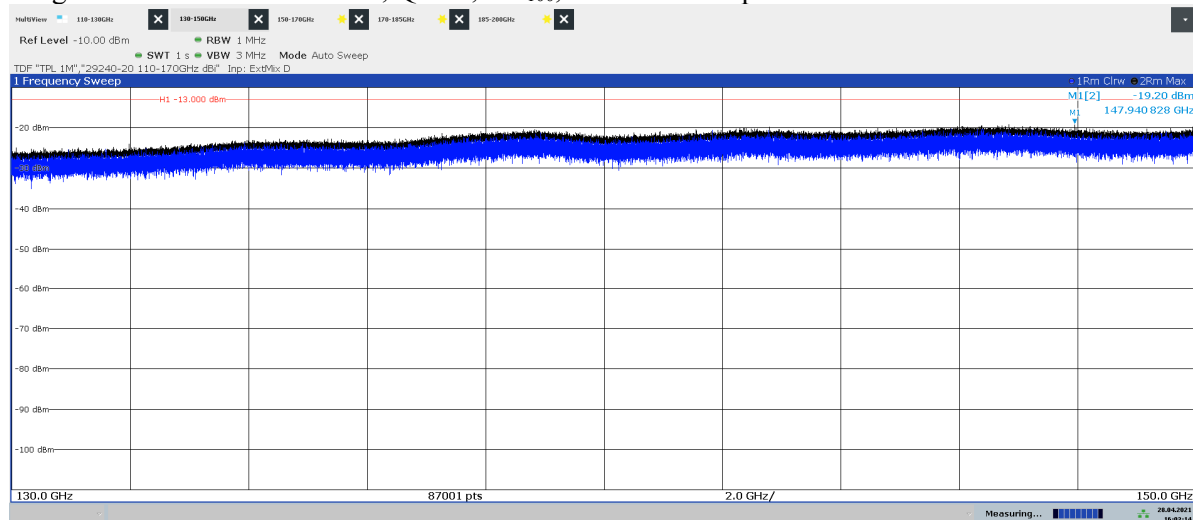
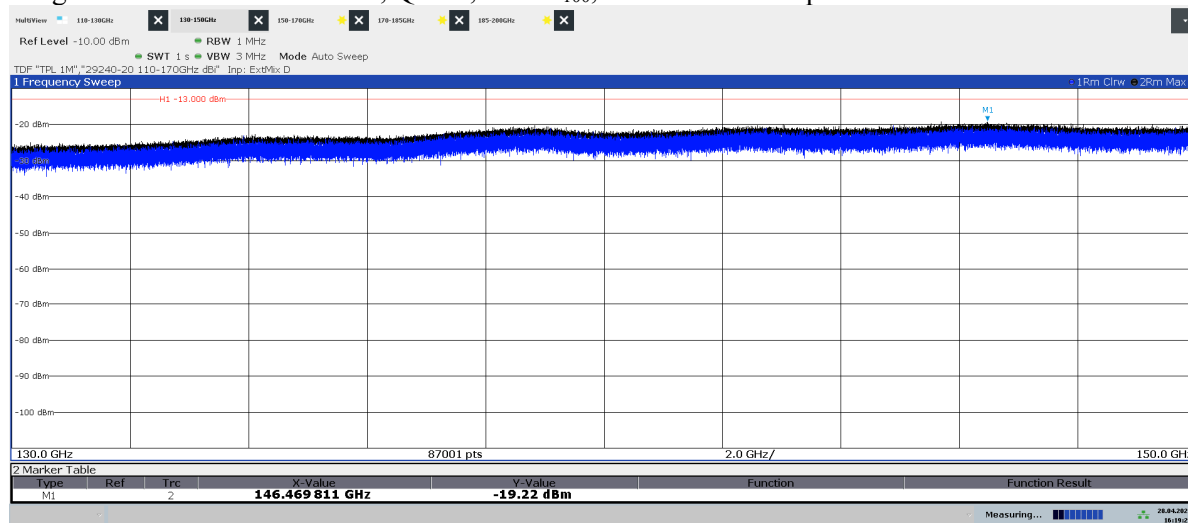
Diagram 2.42a: 130 – 150 GHz, QPSK, BL₅₀, EIRP Horizontal polarizationDiagram 2.42b: 130 – 150 GHz, QPSK, BL₅₀, EIRP Vertical polarization

Diagram 2.43a: 130 – 150 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

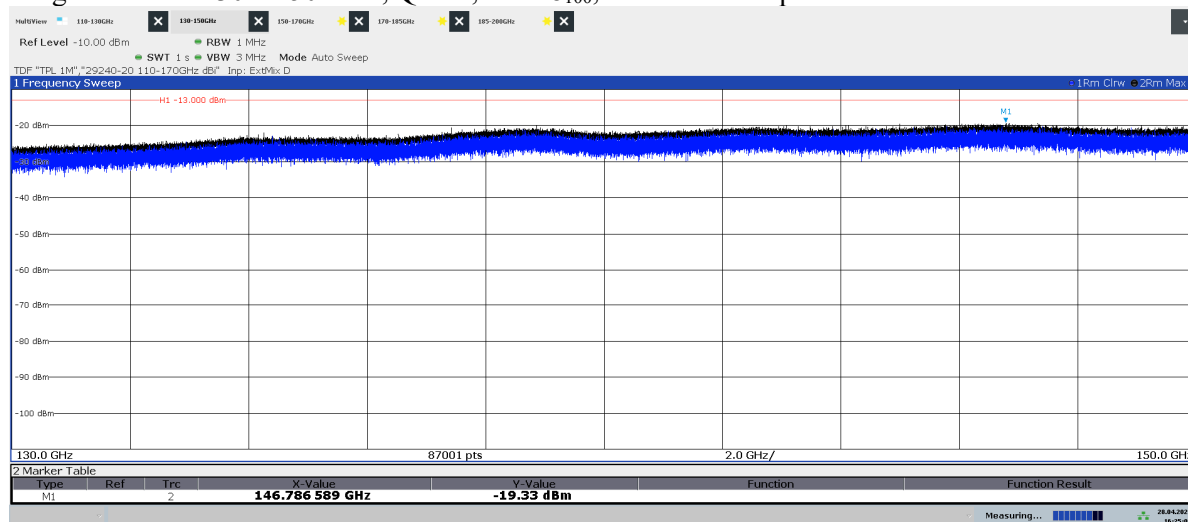
16:07:02 28.04.2021

Diagram 2.43b: 130 – 150 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

16:03:14 28.04.2021

Diagram 2.44a: 130 – 150 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

16:19:25 28.04.2021

Diagram 2.44b: 130 – 150 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

16:25:09 28.04.2021

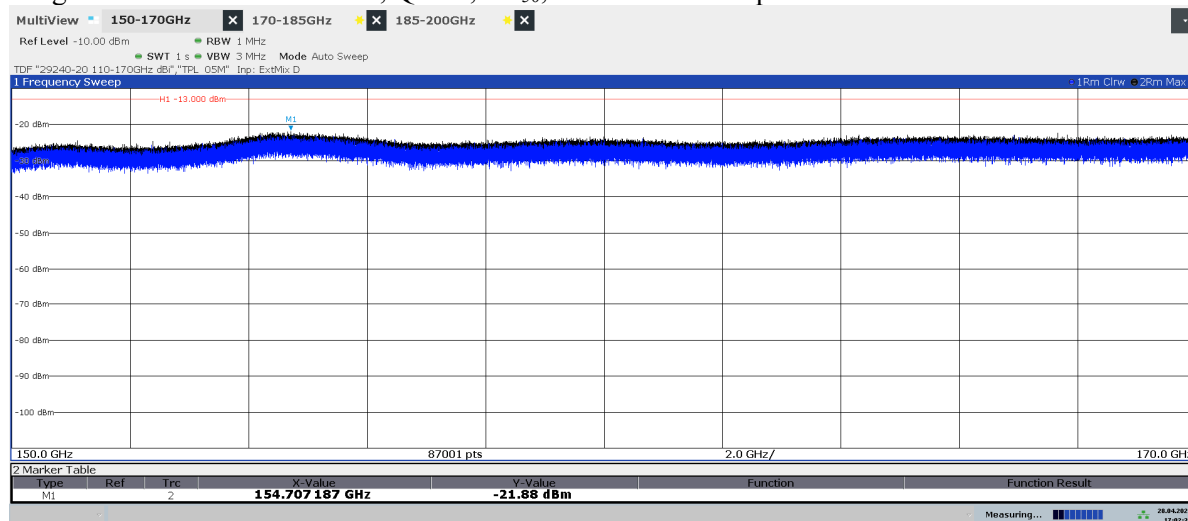
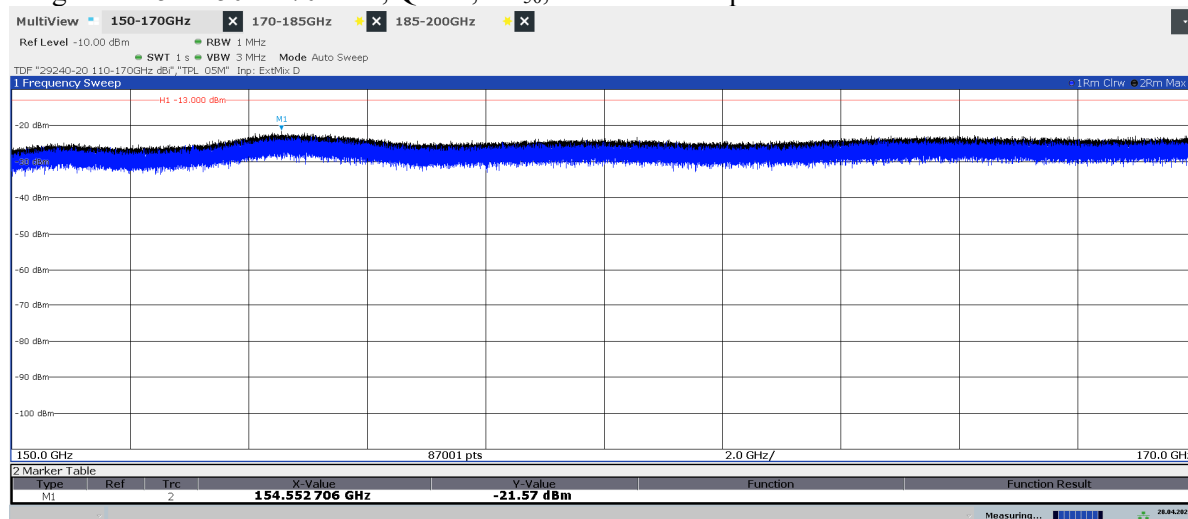
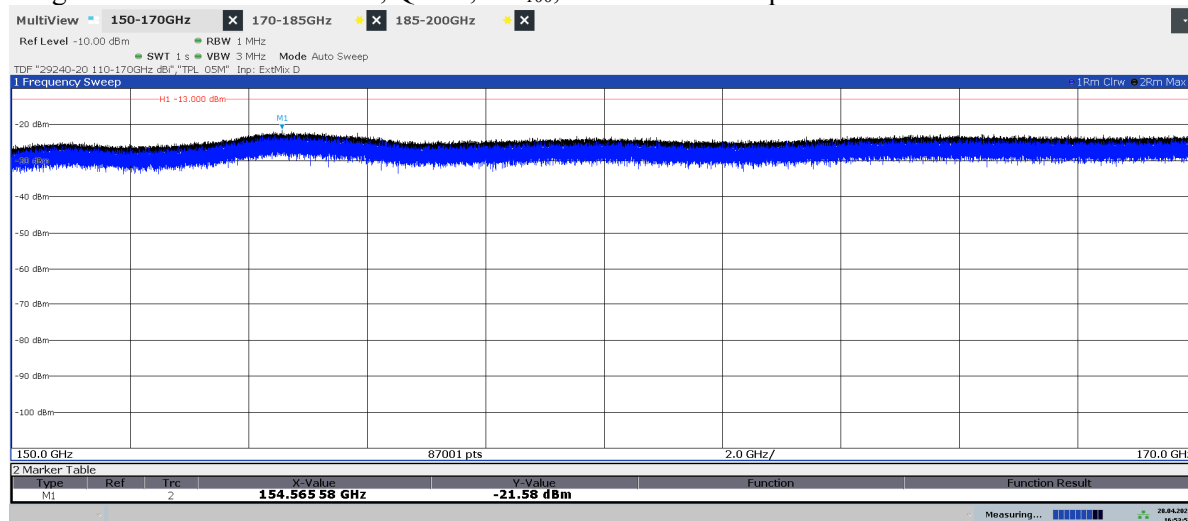
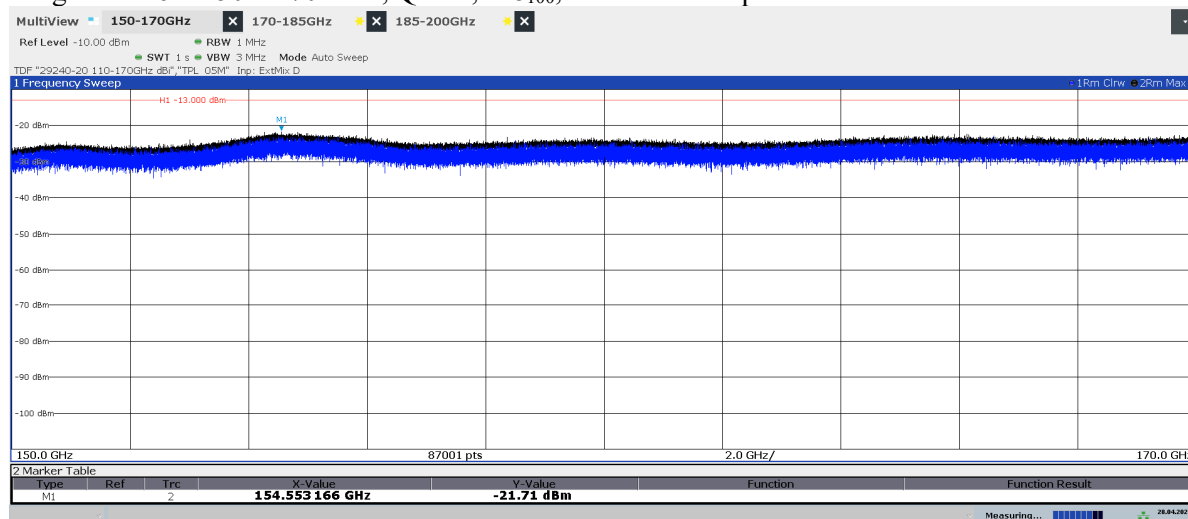
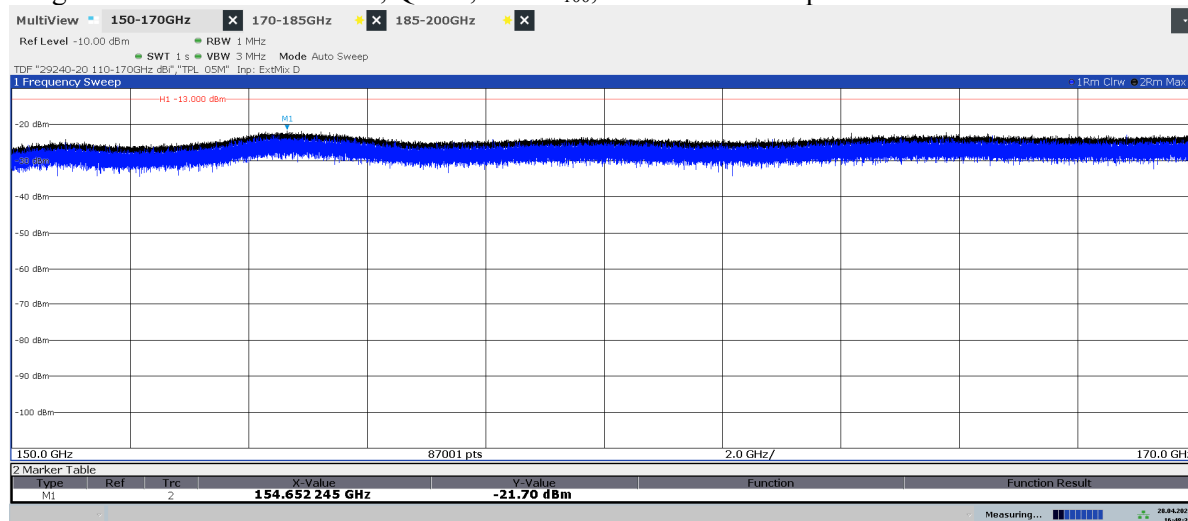
Diagram 2.45a: 150 – 170 GHz, QPSK, BL₅₀, EIRP Horizontal polarizationDiagram 2.45b: 150 – 170 GHz, QPSK, BL₅₀, EIRP Vertical polarization

Diagram 2.46a: 150 – 170 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

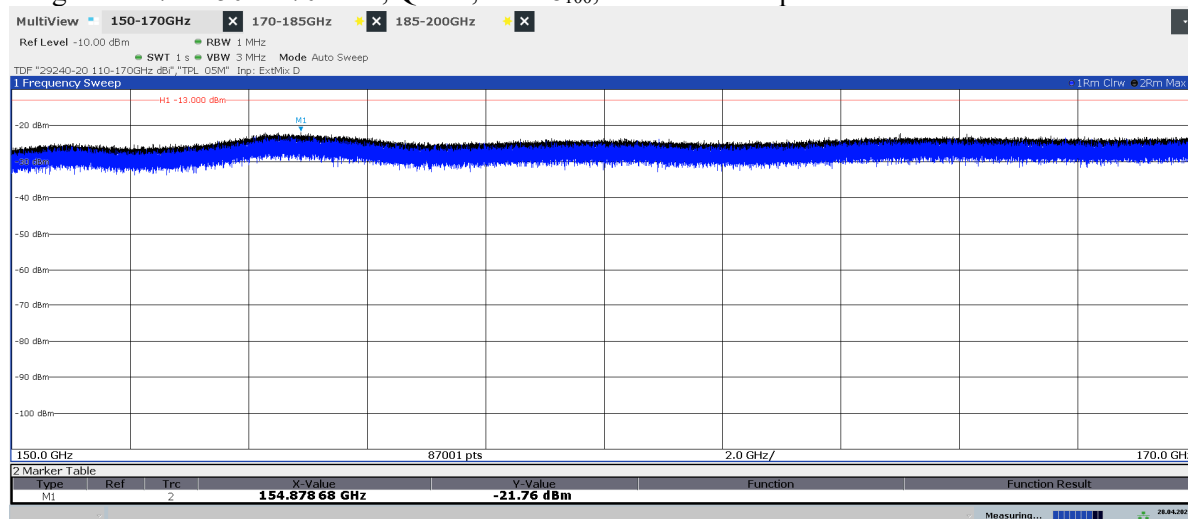
16:53:53 28.04.2021

Diagram 2.46b: 150 – 170 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

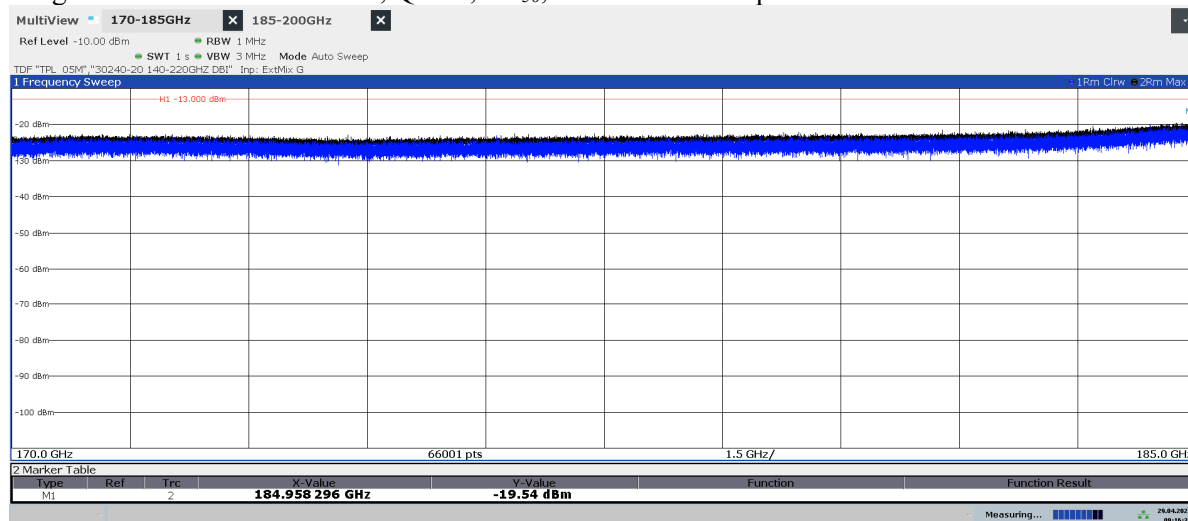
16:57:02 28.04.2021

Diagram 2.47a: 150 – 170 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

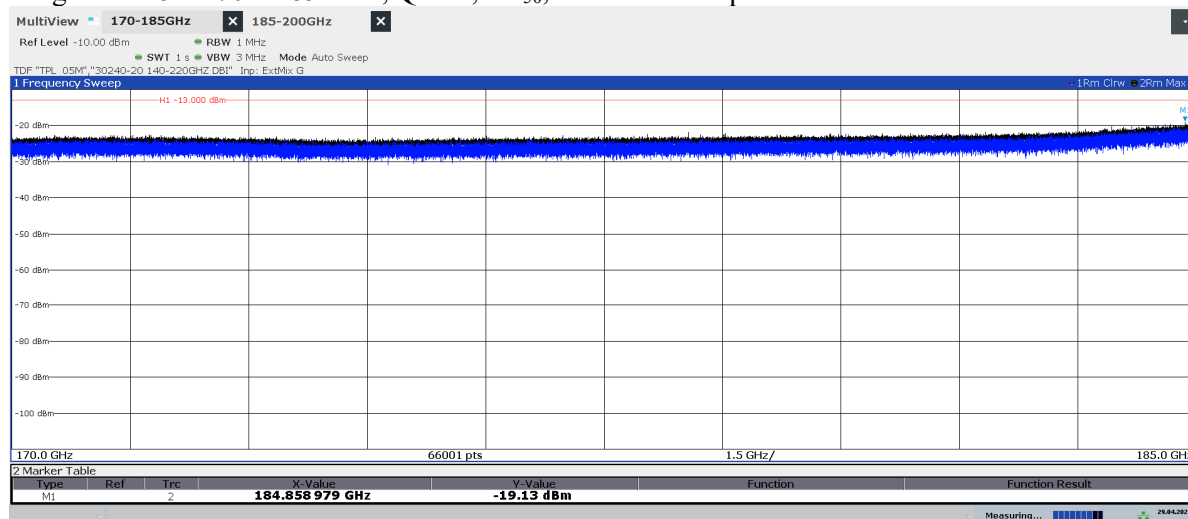
16:48:33 28.04.2021

Diagram 2.47b: 150 – 170 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

16:44:57 28.04.2021

Diagram 2.48a: 170 – 185 GHz, QPSK, BL₅₀, EIRP Horizontal polarization

09:16:34 29.04.2021

Diagram 2.48b: 170 – 185 GHz, QPSK, BL₅₀, EIRP Vertical polarization

09:22:21 29.04.2021

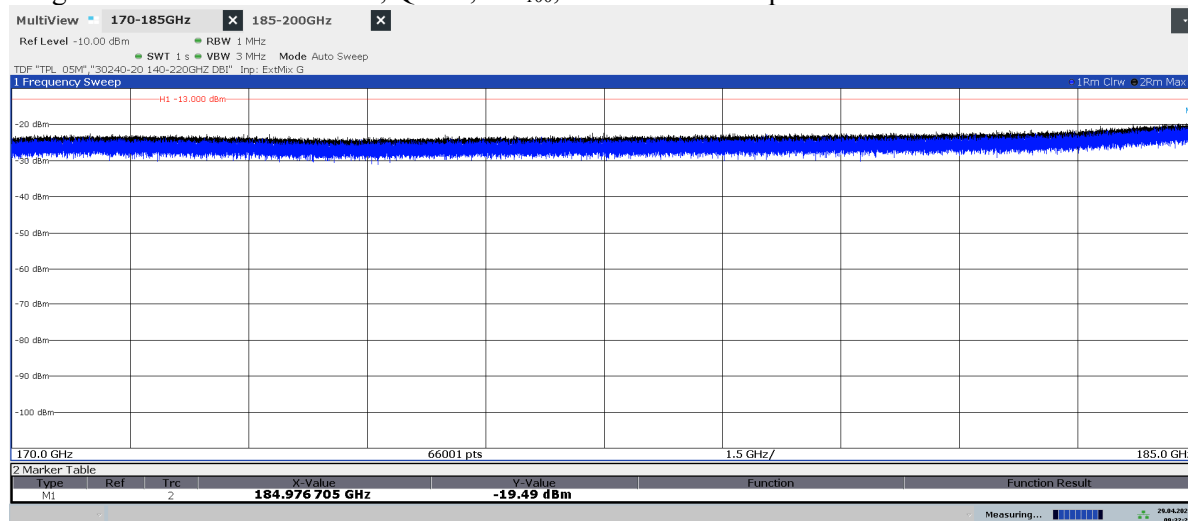
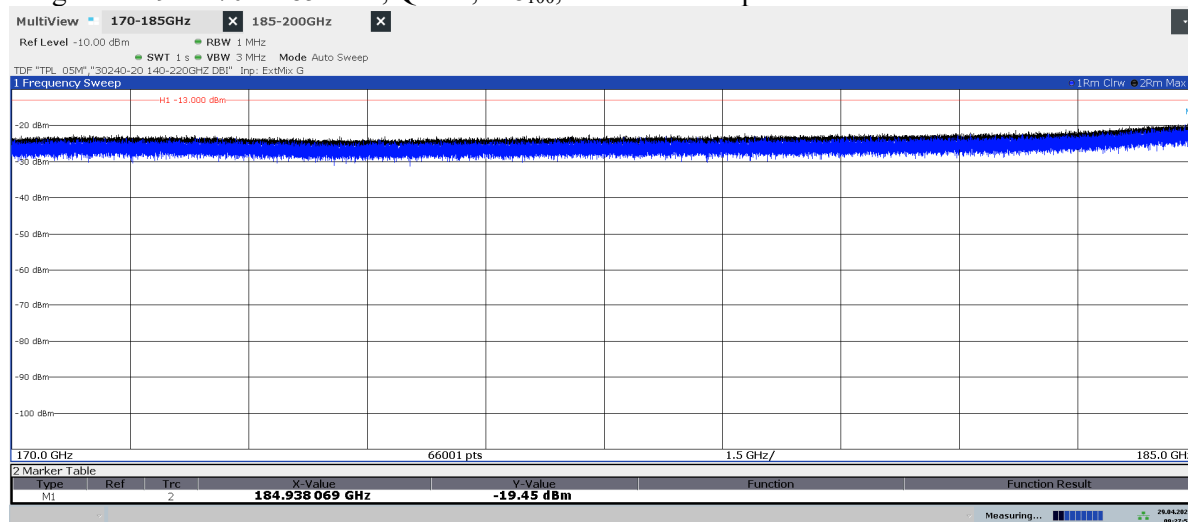
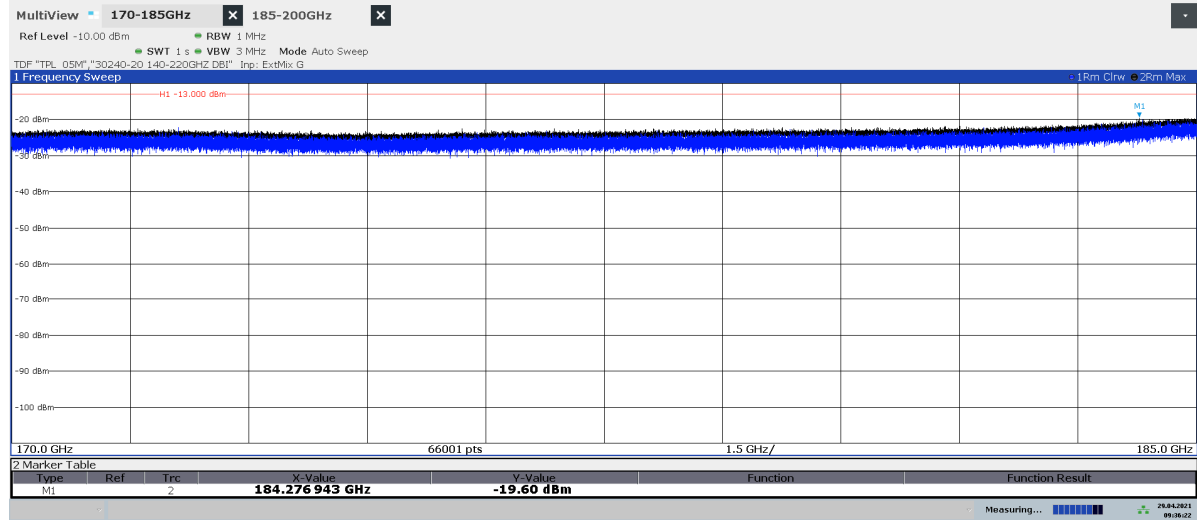
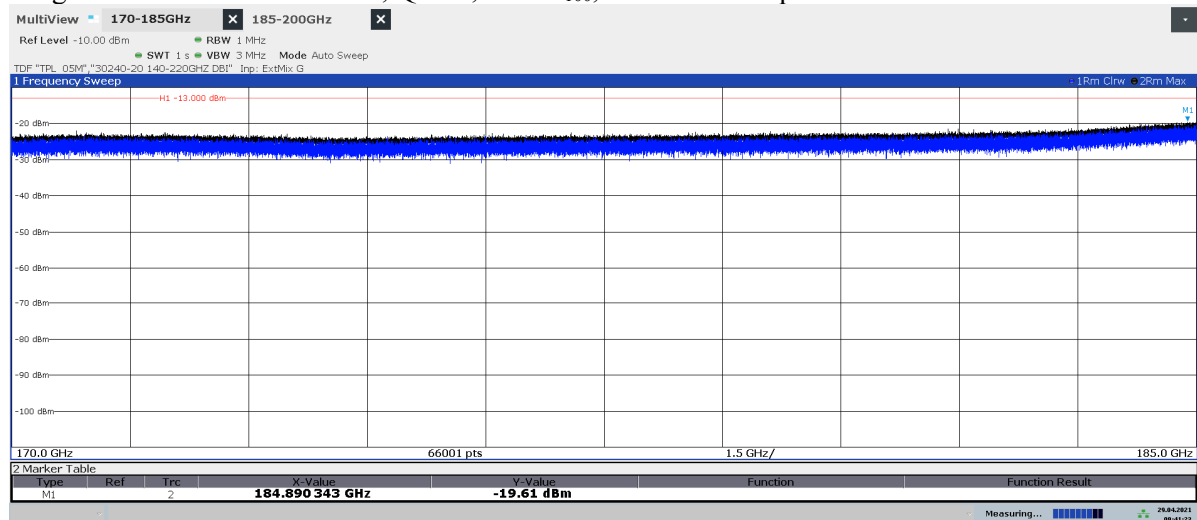
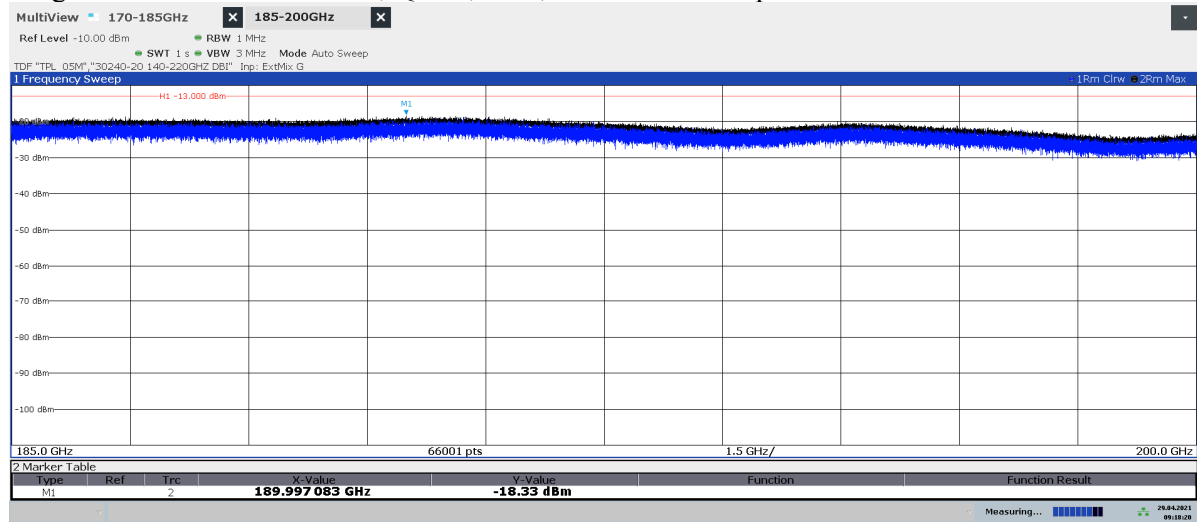
Diagram 2.49a: 170 – 185 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarizationDiagram 2.49b: 170 – 185 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization

Diagram 2.50a: 170 – 185 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

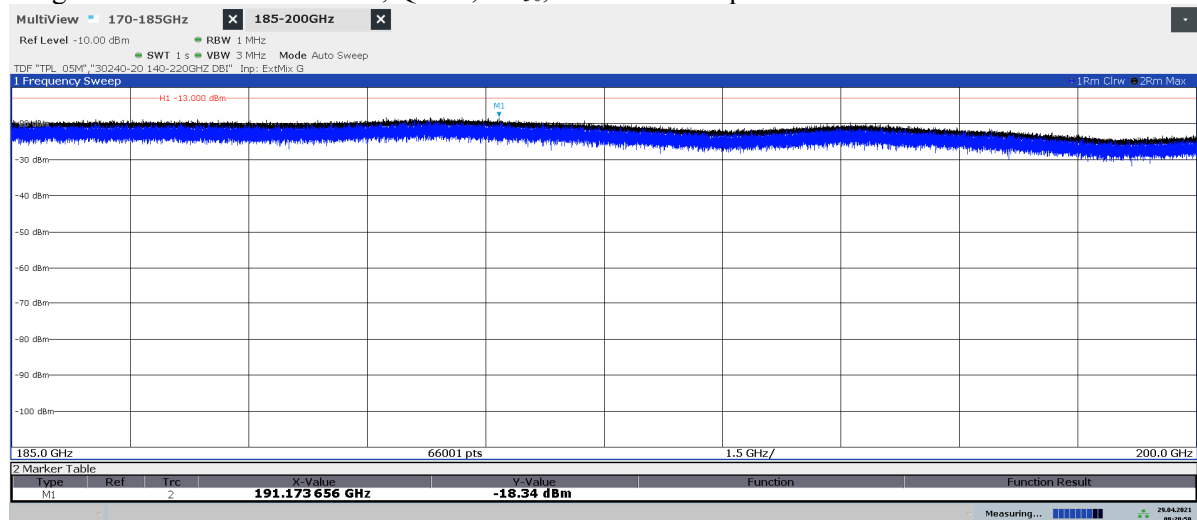
09:36:22 29.04.2021

Diagram 2.50b: 170 – 185 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

09:41:23 29.04.2021

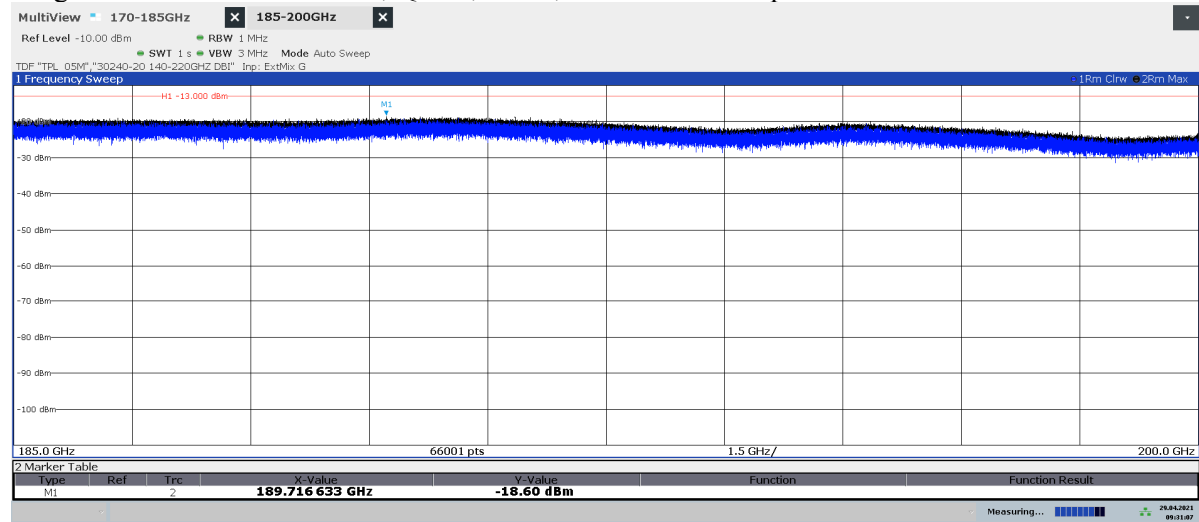
Diagram 2.51a: 185 – 200 GHz, QPSK, BL₅₀, EIRP Horizontal polarization

09:18:20 29.04.2021

Diagram 2.51b: 185 – 200 GHz, QPSK, BL₅₀, EIRP Vertical polarization

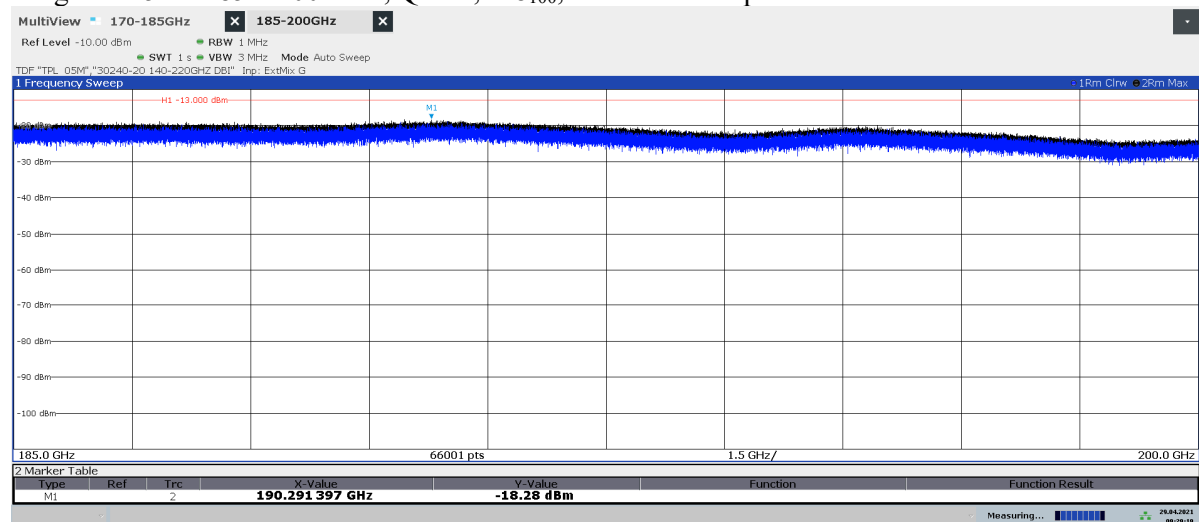
09:20:59 29.04.2021

Diagram 2.52a: 185 – 200 GHz, QPSK, M8₁₀₀, EIRP Horizontal polarization

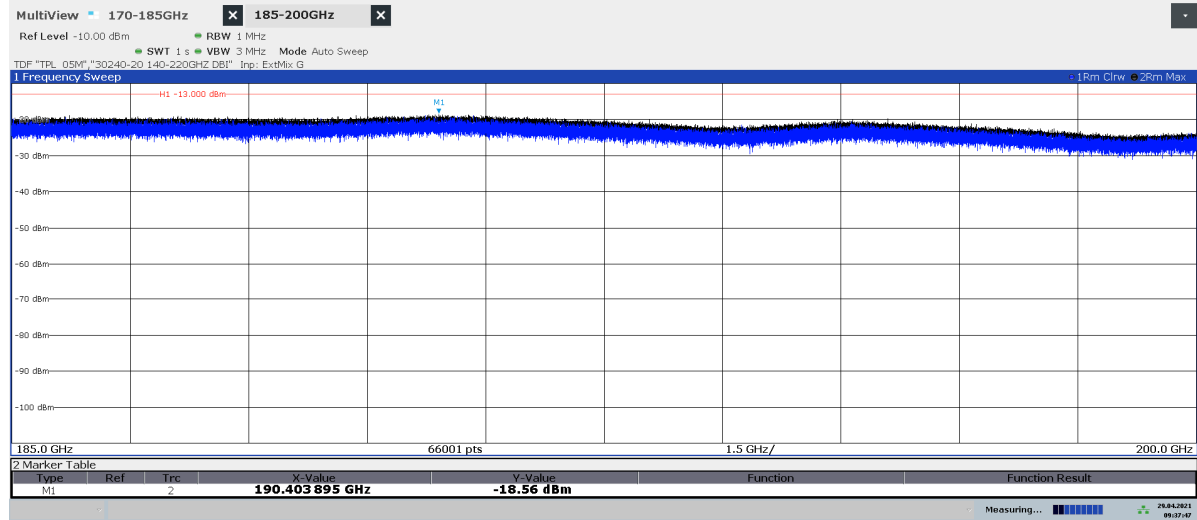


09:31:07 29.04.2021

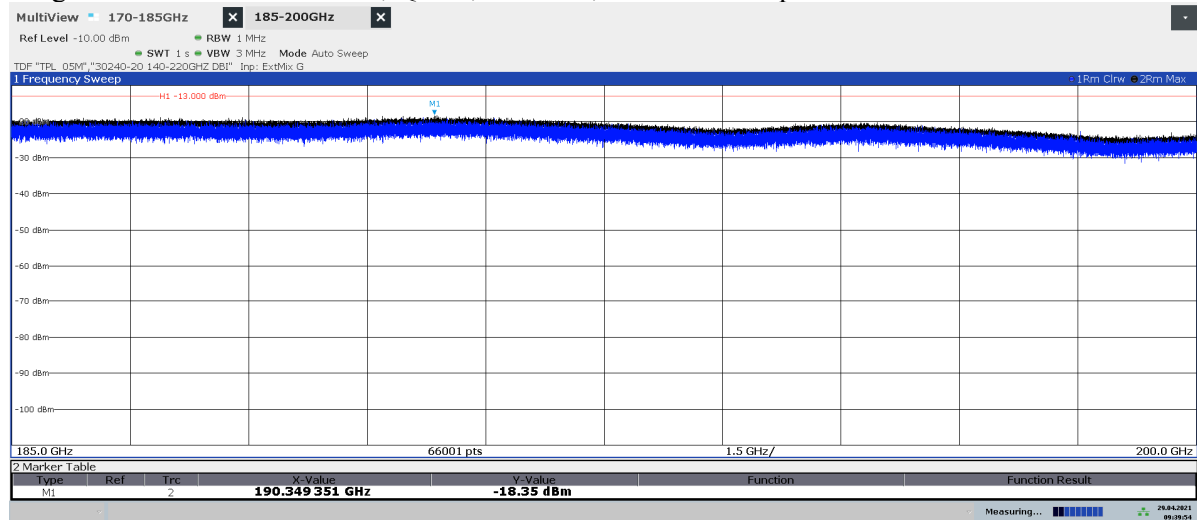
Diagram 2.52b: 185 – 200 GHz, QPSK, M8₁₀₀, EIRP Vertical polarization



09:29:20 29.04.2021

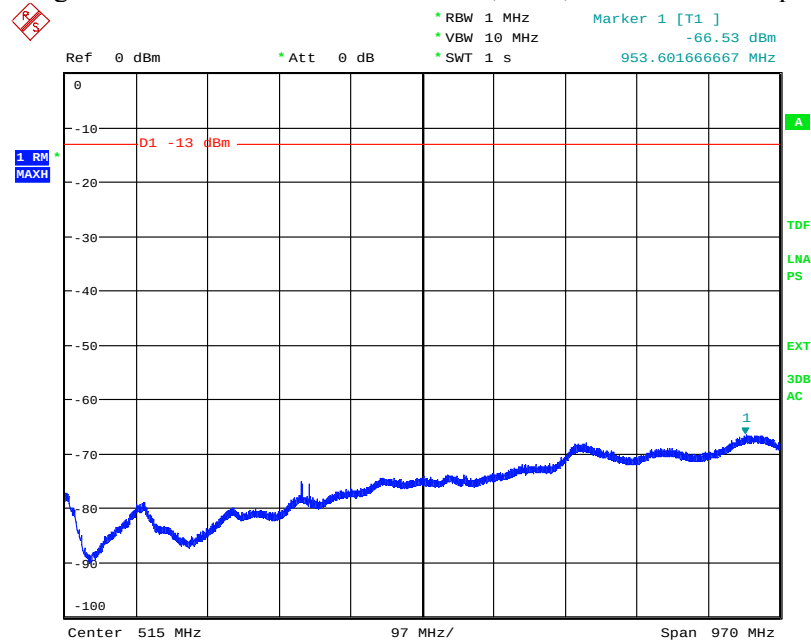
Diagram 2.53a: 185 – 200 GHz, QPSK, BMT8₁₀₀, EIRP Horizontal polarization

09:37:47 29.04.2021

Diagram 2.53b: 185 – 200 GHz, QPSK, BMT8₁₀₀, EIRP Vertical polarization

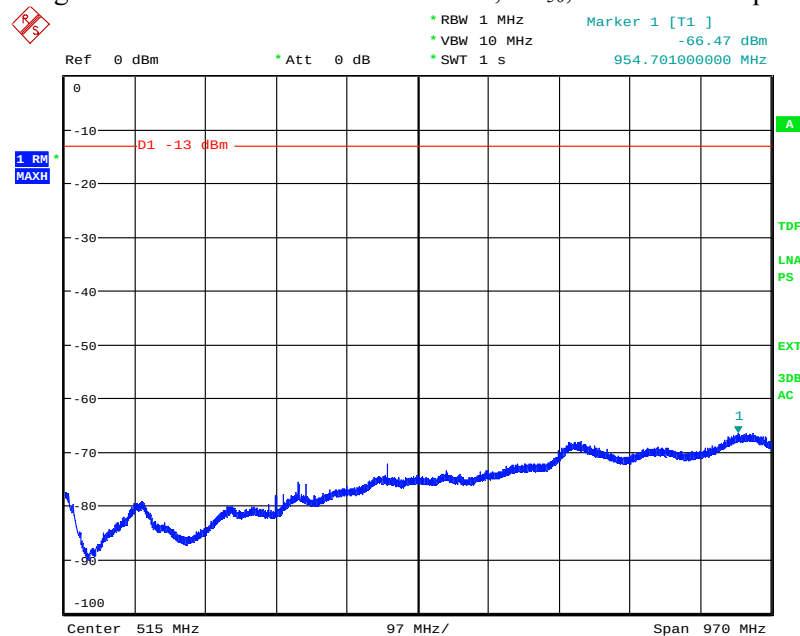
09:39:54 29.04.2021

Diagram 2.54a: Pre scan 30 – 1000 MHz, BL₅₀, EIRP Horizontal polarization



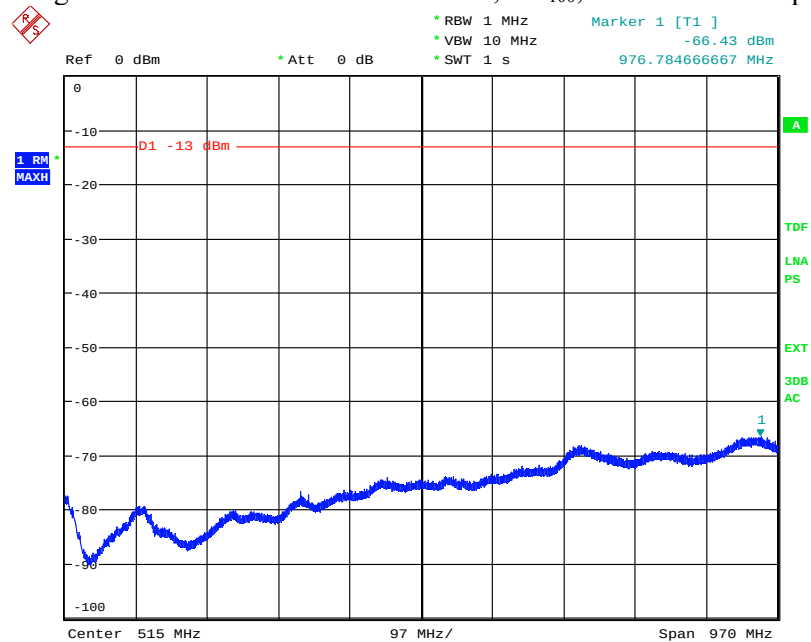
Date: 30.APR.2021 10:00:17

Diagram 2.54b: Pre scan 30 – 1000 MHz, BL₅₀, EIRP Vertical polarization



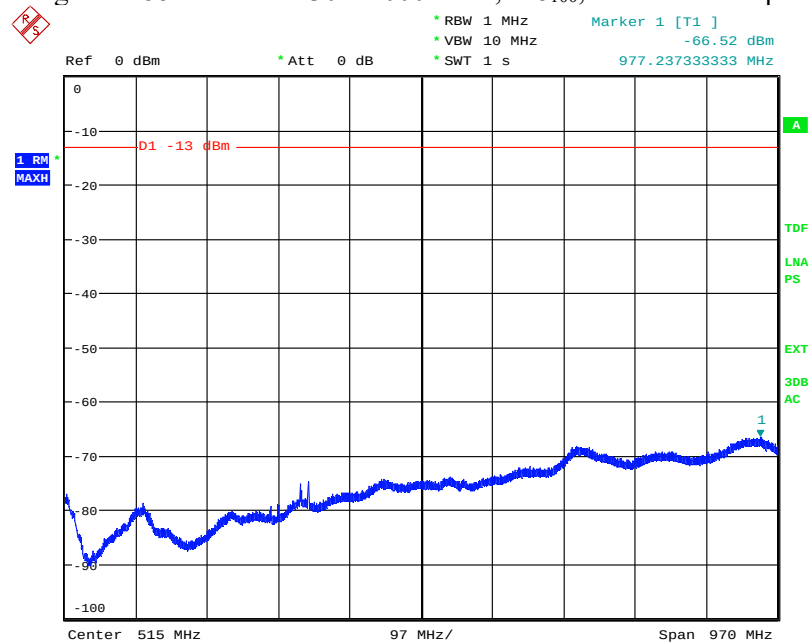
Date: 30.APR.2021 10:01:30

Diagram 2.55a: Pre scan 30 – 1000 MHz, M8₁₀₀, EIRP Horizontal polarization

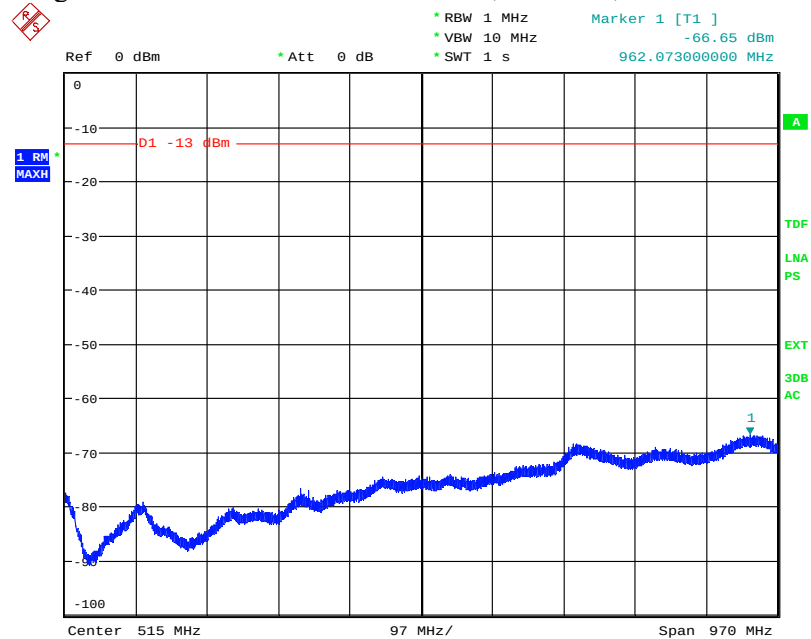


Date: 30.APR.2021 09:53:38

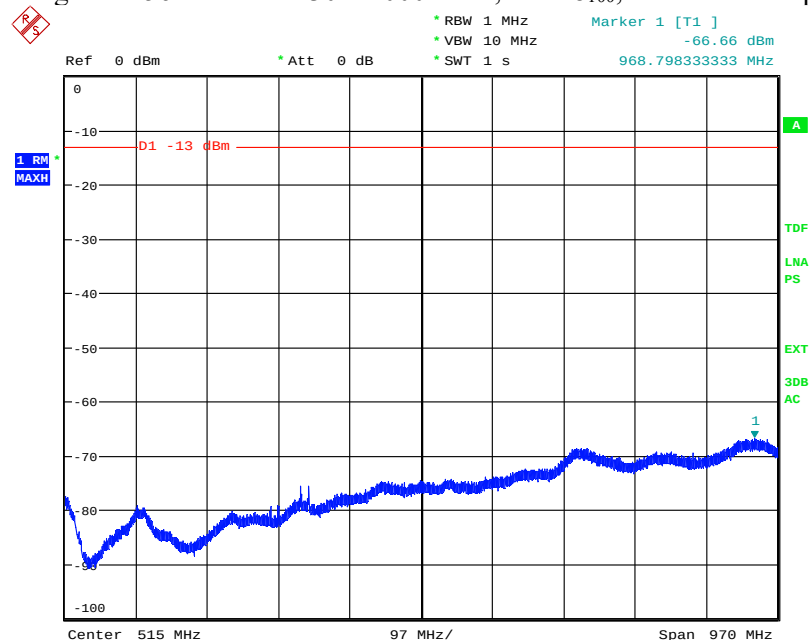
Diagram 2.55b: Pre scan 30 – 1000 MHz, M8₁₀₀, EIRP Vertical polarization



Date: 30.APR.2021 09:50:15

Diagram 2.56a: Pre scan 30 – 1000 MHz, BMT8₁₀₀, EIRP Horizontal polarization

Date: 30.APR.2021 09:45:04

Diagram 2.56b: Pre scan 30 – 1000 MHz, BMT8₁₀₀, EIRP Vertical polarization

Date: 30.APR.2021 09:45:46

Frequency stability measurements according to 47 CFR §2.1055

Date	Temperature (test equipment)	Humidity (test equipment)
2022-02-08	23 °C ± 3 °C	20 % ± 5 %
2022-02-09	23 °C ± 3 °C	22 % ± 5 %
2022-02-10	23 °C ± 3 °C	25 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.6.

A temperature chamber with a RF transparent door was used and a measurement antenna was aligned outside the temperature chamber. The option NR 5G downlink measurements K144 in the spectrum analyser was used to demodulate the signal and report the frequency error.

Measurement equipment	RISE number
R&S FSW 43	902 073
RF Cable	BX50236
EMCO Horn Antenna 3116	503 279
Temperature Chamber	503 360
Testo 635, temperature and humidity meter	504 203
Multimeter Fluke 87	502 190

Results

Nominal transmitter frequency was 37025.04 MHz (BL) with a carrier bandwidth of 50 MHz.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
40.8	+20	+59
55.2	+20	+65
48.0	+20	-68
Maximum freq. error (Hz)		68
Measurement uncertainty		< ± 1 x 10 ⁻⁷

Test conditions		Frequency error (Hz)
Supply voltage AC (V)	Temp. (°C)	
102	+20	-62
138	+20	-60
120	+20	-62
120	+30	-62
120	+40	-62
120	+50	-65
120	+10	-65
120	0	-60
120	-10	-71
120	-20	-60
120	-30	-60
Maximum freq. error (Hz)		71
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Remark

The frequency stability performance is sufficient to ensure that the fundamental emission stays within the authorized frequency band.

End of report.

Verification

Transaction 09222115557467084679

Document

P110210-F30-rev1

Main document

106 pages

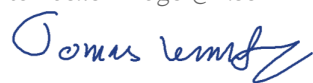
Initiated on 2022-04-12 13:56:02 CEST (+0200) by Tomas Lennhager (TL)

Finalised on 2022-04-12 14:56:54 CEST (+0200)

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Signed 2022-04-12 13:58:40 CEST (+0200)

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Signed 2022-04-12 14:56:54 CEST (+0200)

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