REPORT

issued by an Accredited Testing Laboratory

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Testing

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Radio measurements on AIR 5121 B257A equipment with FCC ID TA8AKRD901059-1

Rev 4. 2018-05-25: Note added in field strength of spurious radiation measurements.

Product name: AIR 5121 B257A
Product number: KRD 901 059/1

RISE Research Institutes of Sweden AB
Electronics - EMC

Performed by

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Accred. No. 1002
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ISO/IEC 17025

Summary

Standard Listed part of	Compliant
FCC CFR 47 part 30	
2.1046 RF power output	Yes
2.1049 Occupied bandwidth	Yes
2.1053 Field strength of spurious radiation	Yes

Description of the test object

Equipment:	Radio equipment AIR 5121 B257A Product number KRD 901 059/1 FCC ID: TA8AKRD901059-1
Hardware revision state:	R1C. Two different versions of PAAM modules were tested, ROR 101 0031/2 (PAAM/3) and ROR 101 0031/3(PAAM/2)
Tested configuration:	Single RAT V5G TDD
Frequency band:	TX/ RX: 27500 – 28350 MHz
Total BW:	850 MHz
Output power:	Maximum output power / PAAM per Polarization: 40 W
RF configurations:	2 beams/ PAAM 2x2 MIMO, Contiguous Spectrum (CS) and Non-Contiguous spectrum (NCS), Carrier Aggregation (CA) intra-band supported
Antenna beam steering:	Azimuth ±60 deg, elevation ±15 deg
Channel bandwidths:	100 MHz
Modulations:	QPSK, 16QAM and 64QAM
RF power Tolerance:	+1.5/ -2.6 dB
CPRI Speed	Up to 10.1 Gbit/s

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 Subpart C.

Operation modes during measurements

The measurements were performed with the test object transmitting test models as defined in 4/2882-700/FCP 131 6395 A. Test model V5G1.1 was used to represent QPSK, test model V5G3.2 to represent 16QAM, test model V5G3.1 to represent 64QAM modulation

Different index of the PAAM in locked and in scan mode was tested. Locked mode in bore site was found to represent worst case.
All measurements were performed with the test object configured for maximum transmit power at bore site. The measured configurations is representative for worst case settings.

According to ANSI C63.26 5.2.4.3.4 the duty cycle was measured. TDD configuration of 89/ 11 was used during test. The measurement shall be done during active part of transmission. TX activity is 72.1% to compensate for this 1.42 dB was added to the test results.

Radiated measurements

The test object was powered with 120 VAC 60 Hertz by an external power supply. Additional connections are documented in the set-up drawings for radiated measurements.

References

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

CFR 47 part 30, December 2017
ANSI C63.26-2015
EAB 1/1548-150/FCP 131 6395 D Uen
662911 D01 Multiple Transmitter Output v02r01 (2013-10-31)
662911 D02 MIMO with Cross Polarized Antenna v01 (2011-10-25)
971168 D01 Power Meas License Digital Systems v03 (2017-10-27)

Measurement equipment

	Calibration Due	RISE number
Anechoic chamber, Hertz	2018-11	BX50194
R&S FSW 43	2018-08	902 073
R&S ZNB 40	2018-08	BX50051
Bilog antenna Chase CBL 6111A	2020-08	502181
Flann STD Gain Horn Antenna 20240-20	-	503 674
Flann STD Gain Horn Antenna 22240-20	-	503 674
Flann STD Gain Horn Antenna 24240-20	-	503 674
Flann STD Gain Horn Antenna 26240-20	-	503 674
Flann STD Gain Horn Antenna 27240-20	-	503 674
Mixer FS-Z60	-	502 987
Mixer FS-Z90	-	503 569
Mixer FS-Z110	2019-01	BX81427
Miteq, Low Noise Amplifier	2019-01	503 278
EMCO Horn Antenna 3115	2019-09	501 548
EMCO Horn Antenna 3116	2020-10	503 279
µComp Nordic, Low Noise Amplifier	2018-12	901 544
Temperature and humidity meter, Testo 615	2018-06	503 498

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: 2018-02-20.

Manufacturer’s representative

Mikael Jansson, Ericsson AB.

Test engineers

Tomas Lennhager and Hyder Khalaf, RISE

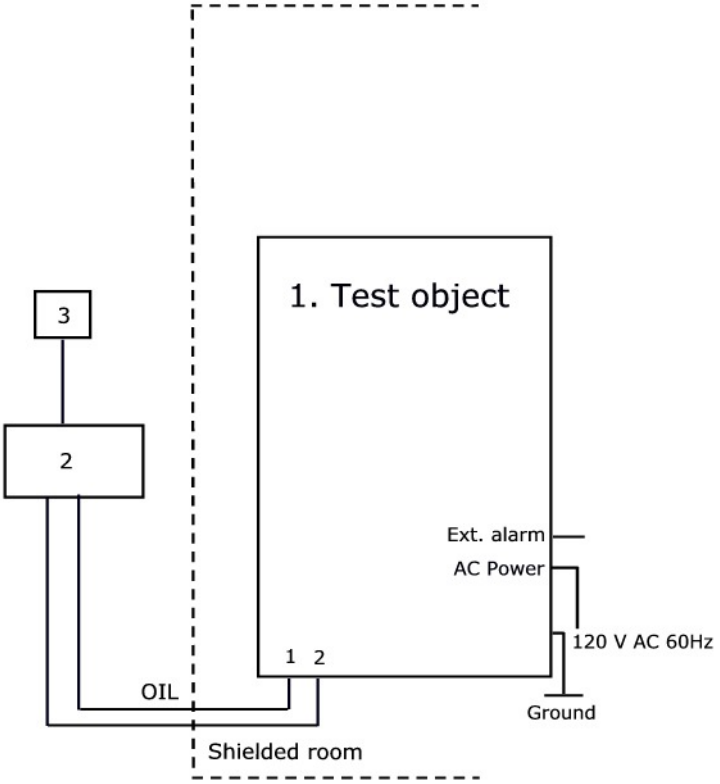
Test participant(-s)

Mikael Jansson, Patrik Hellström, Tomas Johansson and Gunnar Svensson, Ericsson AB.

Test frequencies used for radiated measurements

Frequency PAAM 0 Hor/ Ver [MHz]	Frequency PAAM 1 Hor/ Ver [MHz]	Frequency PAAM 2 Hor/ Ver [MHz]	Frequency PAAM 3 Hor/ Ver [MHz]	Symbolic name	Comment
27550	27650	27750	27850	B	TX bottom frequency configuration
28000	28100	28200	28300	T	TX top frequency configuration
27550	28300	27550	28300	2E	2 carriers TX edge configuration
27900	28000	27900	28000	2M	2 carriers TX mid configuration
-	27875	27975	-	CA2	2 Carrier Aggregation configuration

Test setup: radiated measurements



Test object:

1.	AIR 5121 B257A, KRD 901 059/1, rev. R1C, s/n: D16X580039 and D16X580037 With Radio Software: CXP 9013268/16, rev. R71TK29. FCC ID: TA8AKRD901059-1

Associated equipment:

2.	Testing Equipment: CT10, LPC 102 487/1, rev. R1C, s/n: T01F289490, BAMS – 1000724377 with software CXC1726763/1, rev. R7A26, TCA software R12A02

Functional test equipment:

3.	Computer, HP EliteBook 8770w, BAMS - 1001450166

Interfaces:

Power input configuration AC: -120 VAC 60Hz	Power
1, Optical Interface Link, single mode opto fibre	Signal
2, Optical Interface Link, single mode opto fibre	Signal
EXT Alarm, shielded multi-wire	Signal
Ground wire	Ground

RF power output measurements according to CFR 47 §30.202

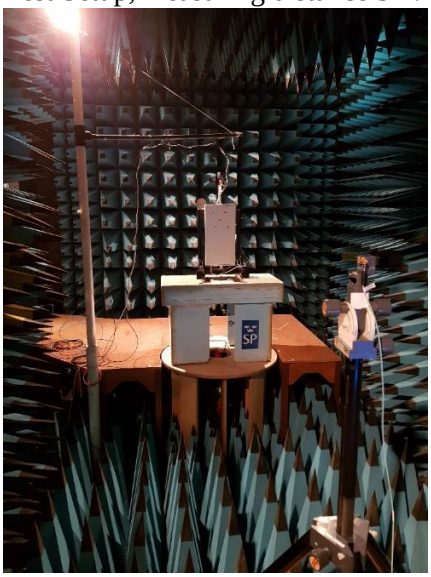
Date	Temperature	Humidity
2018-02-20	21 °C ± 3 °C	20 % ± 5 %
2018-02-21	21 °C ± 3 °C	14 % ± 5 %
2018-02-22	21 °C ± 3 °C	12 % ± 5 %
2018-03-08	21 °C ± 3 °C	17 % ± 5 %
2018-03-09	21 °C ± 3 °C	13 % ± 5 %
2018-03-12	21 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The test object was located in a anechoic chamber at a height of 80 cm. The measuring antenna was aligned to the centre of the test object antennas. A turn table was used to find the highest output power. A signal analyser 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 Network analyzer (ZNB 40) was used to measure the total correction factor for the measurement chain, including the receiver antenna gain, cable loss, and the pathloss for the measurement distance using a reference antenna(EMCO 3116) replacing the EUT. The reference antenna was located in the center of the EUT PAAMs. The antenna gain of the reference antenna was subtracted from the S21 measurement and the result was entered into the spectrum analyzer as a transducer factor.

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	503 674
Testo 615, temperature and humidity meter	503 498

Measurement uncertainty: 3.3 dB

Results for PAAM/2

QPSK Beam index 0 Bore site

Rated output power level at each PAAM 1x 46 dBm/ Polarization.

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	44.73/ 44.69	44.34/ 44.50	44.07/ 43.98	44.56/ 44.29
T	45.80/ 46.12	45.20/ 45.18	44.91/ 44.80	44.89/ 44.12

16 QAM Beam index 0 Bore site

Rated output power level at each PAAM 1x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	44.71/ 44.97	44.36/ 44.85	44.14/ 44.42	44.71/ 44.70
T	45.86/ 46.18	45.18/ 45.31	44.93/ 44.85	44.90/ 44.23

64 QAM Beam index 0 Bore sit

Rated output power level at each PAAM 1x 44.2 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	42.58/ 42.62	42.17/ 42.44	41.88/ 41.84	42.42/ 42.24
T	43.75/ 44.02	42.94/ 42.99	42.88/ 42.74	42.70/ 42.02

QPSK Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	47.88/ 47.75	-
2M	48.33/ 48.76	48.58/ 49.44
2E	-	47.75/ 47.31

16 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	47.97/ 47.87	-
2M	49.60/ 48.87	49.97/ 50.03
2E	-	47.81/ 47.42

64 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 44.2 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	46.04/ 45.78	-
2M	46.28/ 47.47	46.35/ 48.10
2E	-	45.75/ 45.24

Carrier Aggregation 16 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal
Symbolic name	PAAM 1+2
CA2	48.54/ 48.50

Results for PAAM/3

QPSK Beam index 0 Bore site

Rated output power level at each PAAM 1x 46 dBm/ Polarization.

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	45.05/ 44.46	44.03/ 44.23	44.48/ 44.24	44.41/ 44.73
T	46.30/ 46.39	45.20/ 45.27	45.29/ 46.08	44.41/ 44.64

16 QAM Beam index 0 Bore site

Rated output power level at each PAAM 1x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	44.64/ 44.49	43.97/ 44.22	44.34/ 44.14	44.56/ 44.47
T	45.91/ 46.36	44.99/ 45.29	45.05/ 45.11	44.26/ 44.63

64 QAM Beam index 0 Bore sit

Rated output power level at each PAAM 1x 44.2 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal			
Symbolic name	PAAM 0	PAAM 1	PAAM 2	PAAM 3
B	42.68/ 42.81	41.88/ 42.46	42.23/ 42.24	42.65/ 42.80
T	43.72/ 44.42	42.69/ 43.23	42.63/ 42.83	42.04/ 42.63

QPSK Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	47.82/ 47.33	-
2M	48.51/ 48.21	49.21/ 49.39
2E	-	47.34/ 47.83

16 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	47.90/ 47.56	-
2M	48.20/ 48.19	49.24/ 49.40
2E	-	47.65/ 47.97

64 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal	
Symbolic name	PAAM 0+2	PAAM 1+3
2E	45.80/ 45.58	-
2M	46.06/ 46.20	47.18/ 47.40
2E	-	44.97/ 45.68

Carrier Aggregation 16 QAM Beam index 0 Bore site

Rated output power level with two PAAM transmitting on the same frequency, 2x 46 dBm/ Polarization

	Output power per 100 MHz [RMS dBm] Vertical/ Horizontal
Symbolic name	PAAM 1+2
CA2	48.54/ 48.58

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

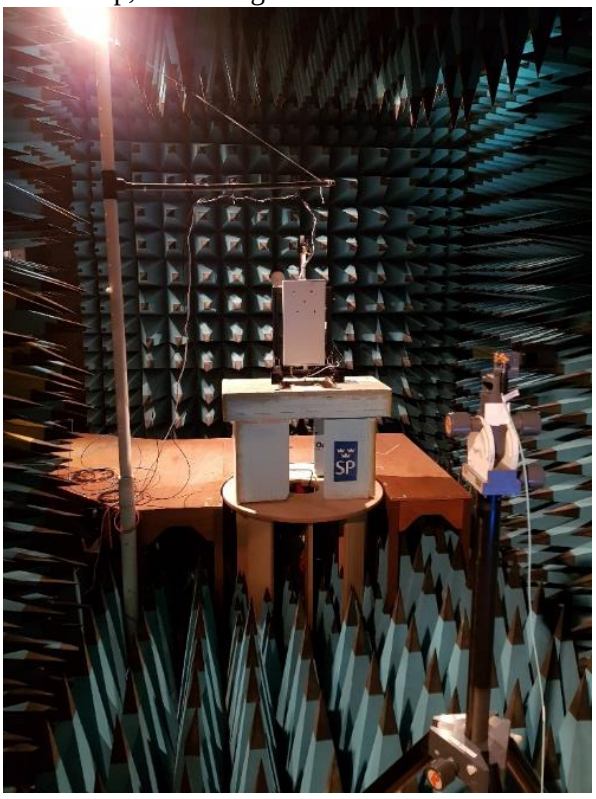
Occupied bandwidth measurements according to CFR47 2.1049

Date	Temperature	Humidity
2018-03-08	21 °C ± 3 °C	17 % ± 5 %
2018-03-12	21 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The test object was located in a anechoic chamber at a height of 80 cm. The measuring antenna was aligned to the centre of the test object antennas. A turn table was used to find the highest output power. A signal analyser 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	503 674
Testo 615, temperature and humidity meter	503 498

Measurement uncertainty: 3.3 dB

Results for PAAM/2

QPSK

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
1	B	0	Hor	89.845
2	B	0	Ver	89.863
3	T	1	Hor	90.014
4	T	1	Ver	90.004
5	B	2	Hor	89.942
6	B	2	Ver	89.870
7	T	3	Hor	90.135
8	T	3	Ver	89.946

64 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
9	B	0	Hor	89.581
10	B	0	Ver	89.499
11	T	1	Hor	89.827
12	T	1	Ver	89.682
13	B	2	Hor	89.687
14	B	2	Ver	89.595
15	T	3	Hor	89.865
16	T	3	Ver	89.738

16 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
17	B	0	Hor	89.913
18	B	0	Ver	89.809
19	T	1	Hor	90.002
20	T	1	Ver	89.939
21	B	2	Hor	89.827
22	B	2	Ver	89.815
23	T	3	Hor	90.100
24	T	3	Ver	89.914

Carrier Aggregation 16 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
25	CA2	1 2	Hor	188.686
26	CA2	1 2	Ver	188.538

Results PAAM/3

QPSK

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
27	B	0	Hor	90.210
28	B	0	Ver	89.828
29	T	1	Hor	89.942
30	T	1	Ver	89.867
31	B	2	Hor	90.119
32	B	2	Ver	89.934
33	T	3	Hor	90.181
34	T	3	Ver	90.017

64 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
35	B	0	Hor	89.641
36	B	0	Ver	89.515
37	T	1	Hor	86.682
38	T	1	Ver	89.660
39	B	2	Hor	89.836
40	B	2	Ver	89.631
41	T	3	Hor	89.655
42	T	3	Ver	89.731

16 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
43	B	0	Hor	90.377
44	B	0	Ver	89.856
45	T	1	Hor	89.933
46	T	1	Ver	89.918
47	B	2	Hor	90.074
48	B	2	Ver	89.870
49	T	3	Hor	90.145
50	T	3	Ver	90.001

Carrier Aggregation 16 QAM

Diagram	Symbolic name	PAAM	Polarization	Occupied BW (99%) [MHz]
51	CA2	1 2	Hor	188.608
52	CA2	1 2	Ver	188.474

Diagram 1:

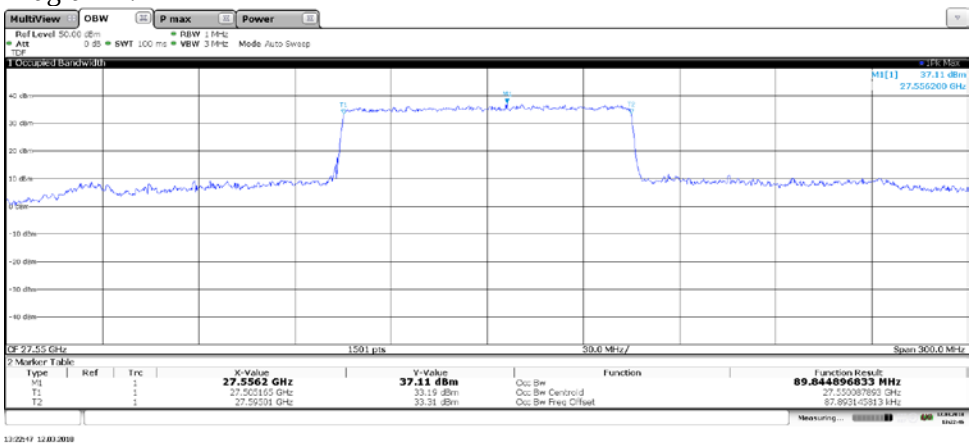


Diagram 2:

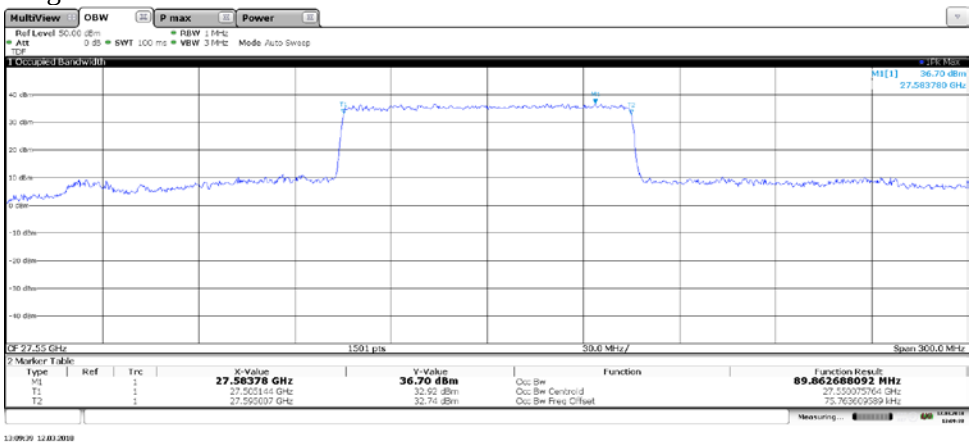


Diagram 3:

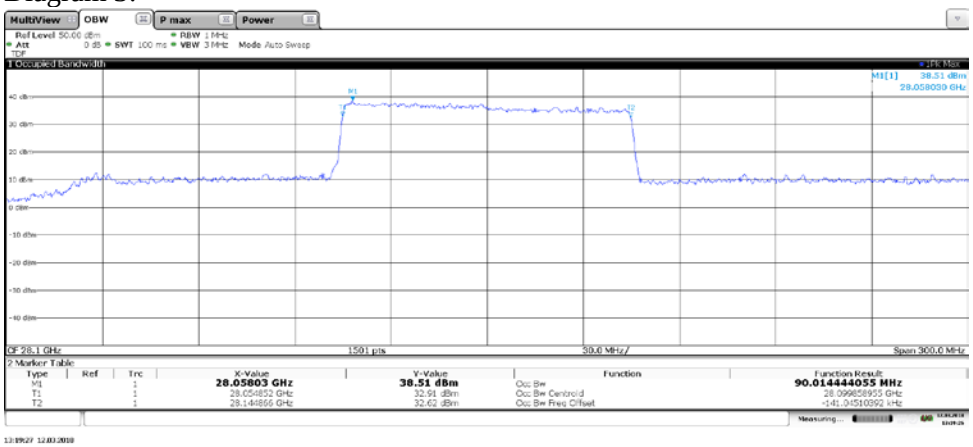


Diagram 4:

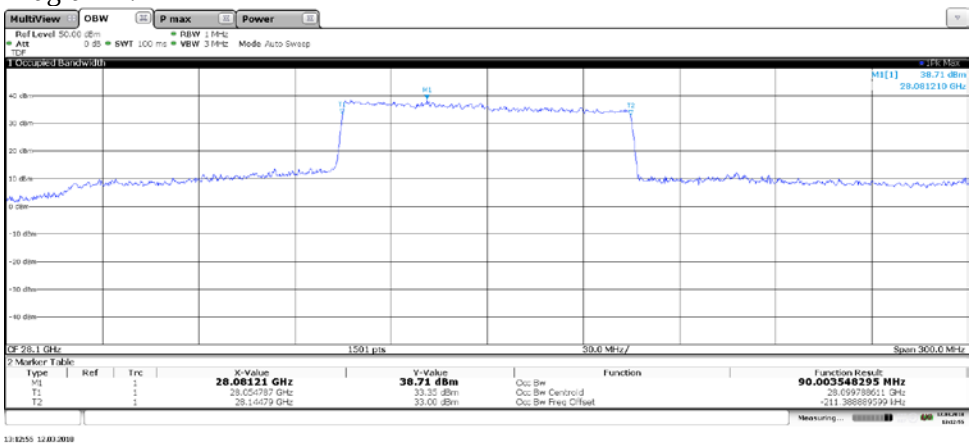


Diagram 5:

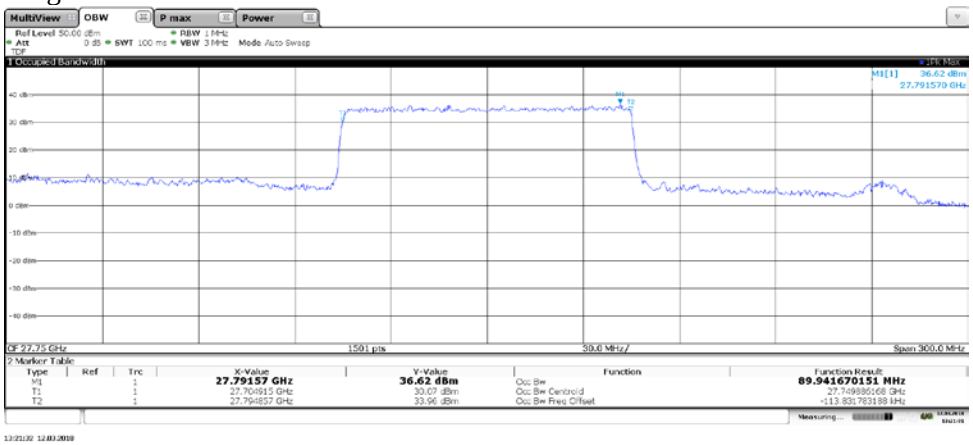


Diagram 6:

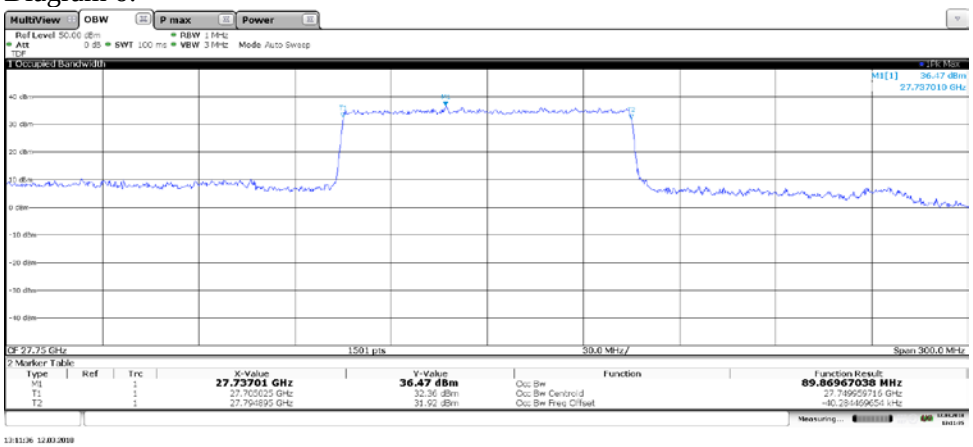


Diagram 7:

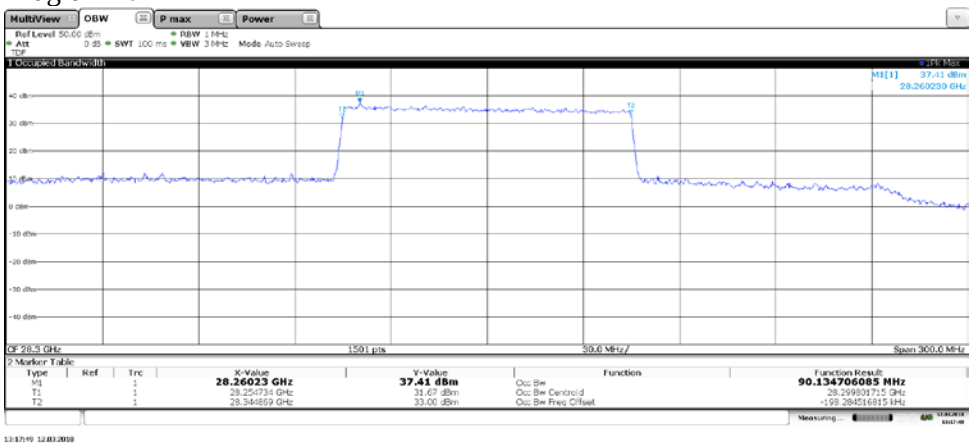


Diagram 8:

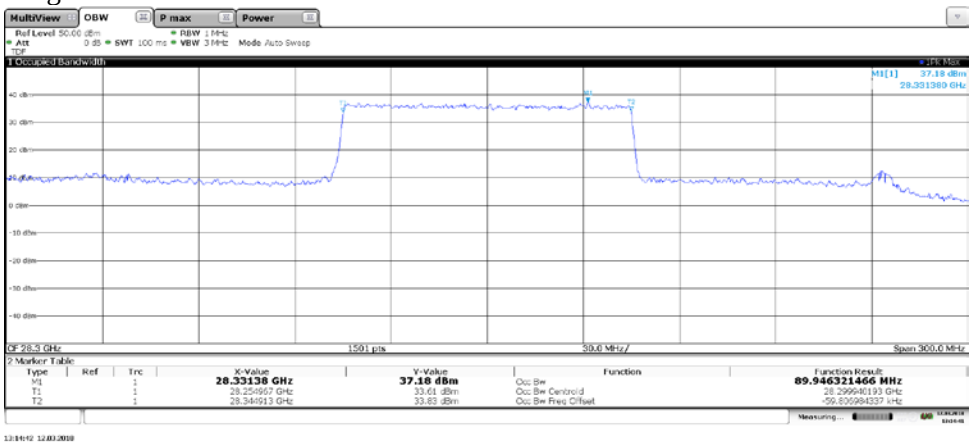


Diagram 9:

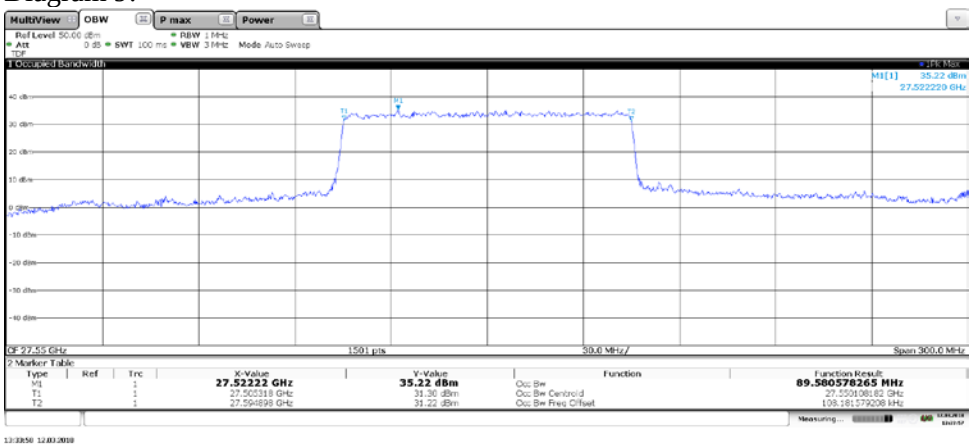


Diagram 10:

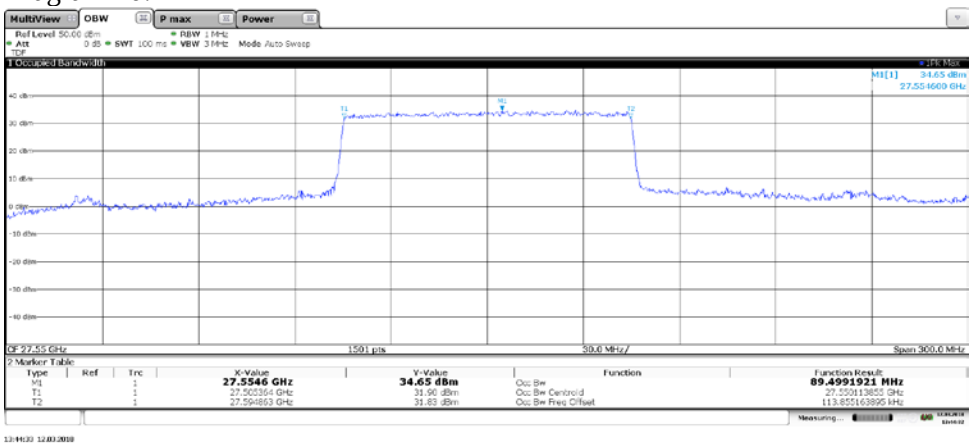


Diagram 11:

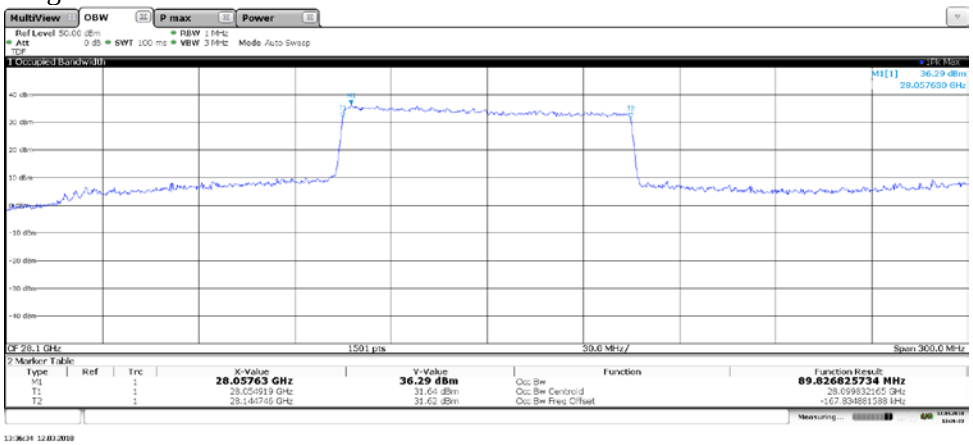


Diagram 12:

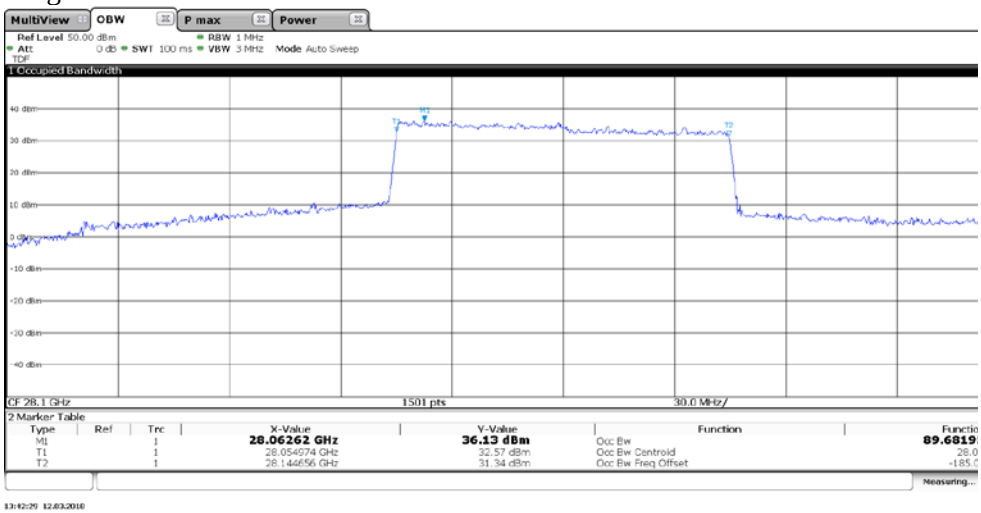


Diagram 13:

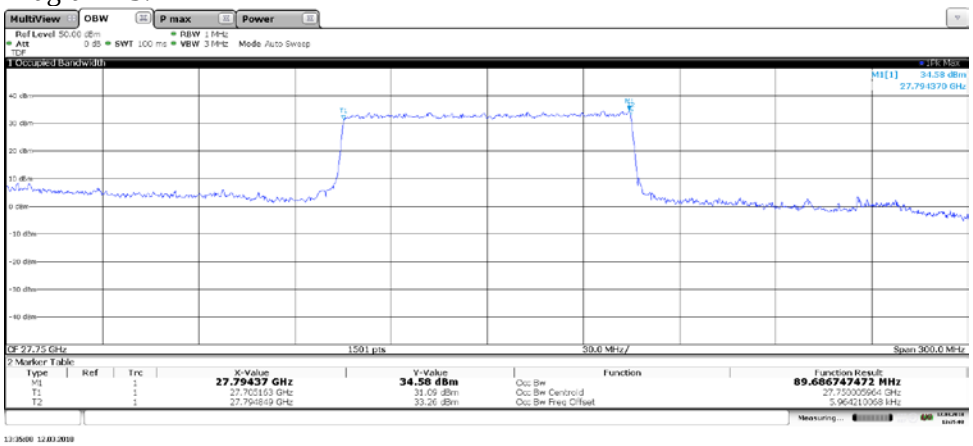


Diagram 14:

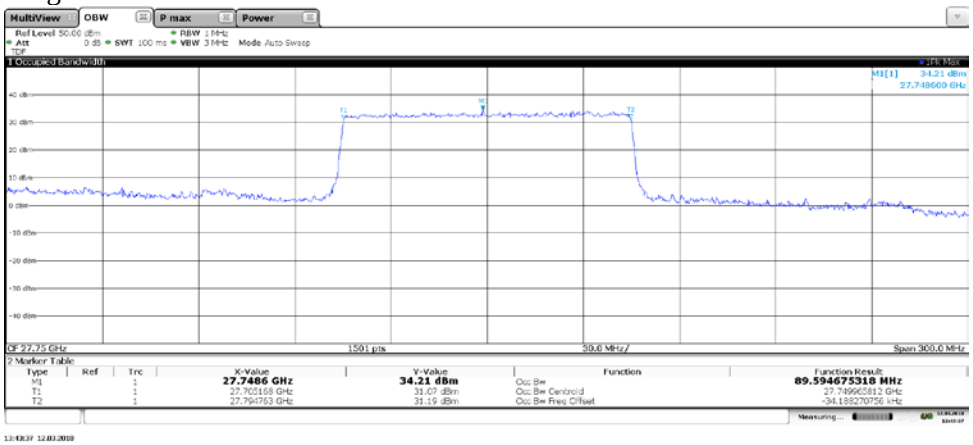


Diagram 15:

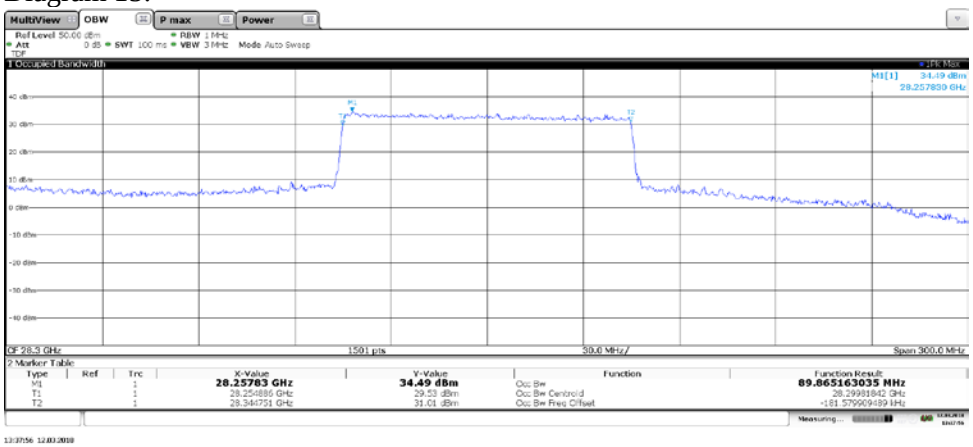


Diagram 16:

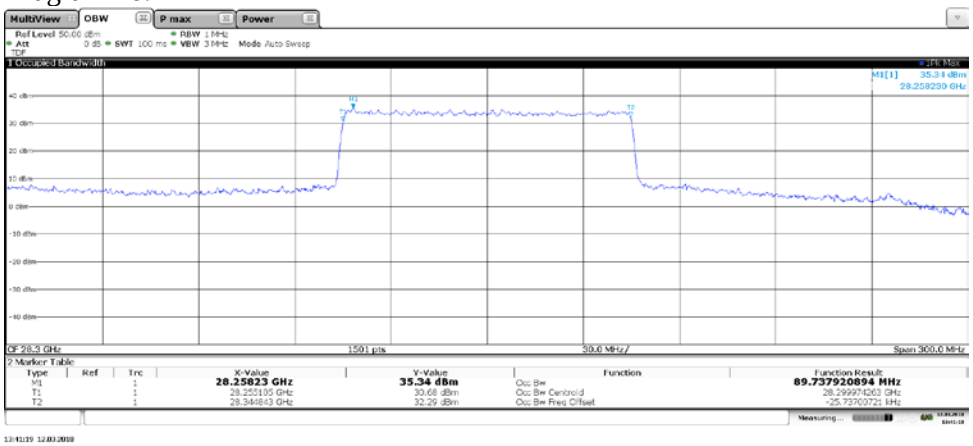


Diagram 17:

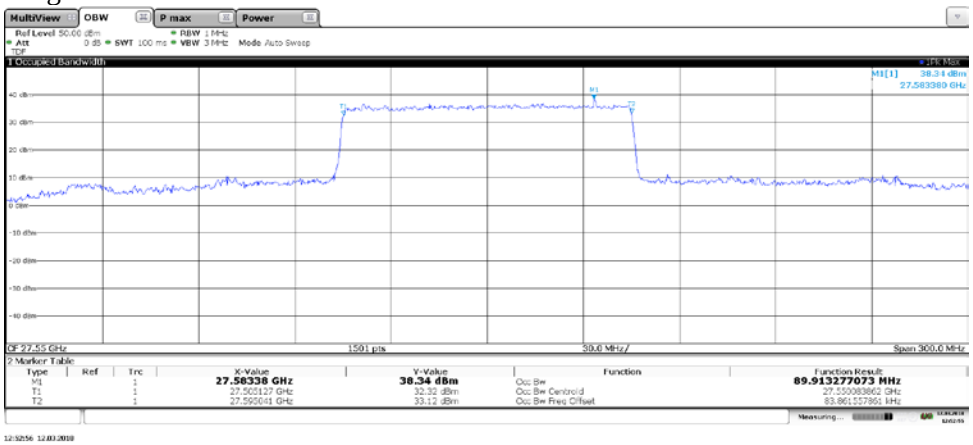
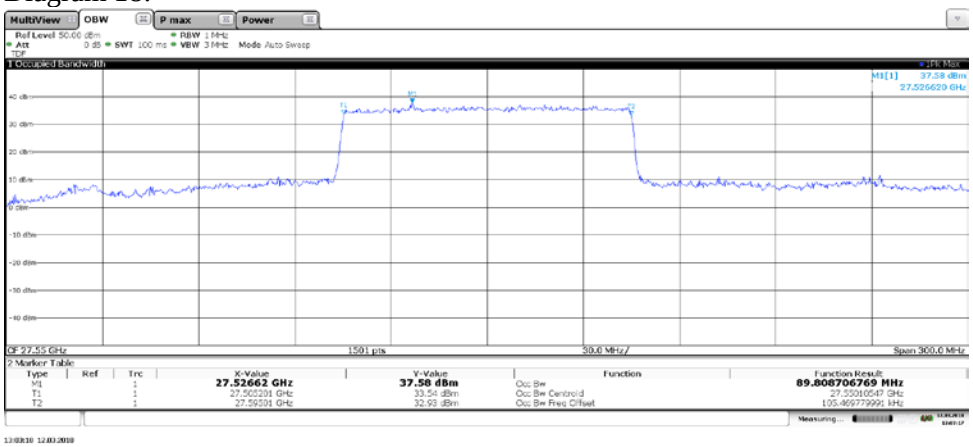


Diagram 18:



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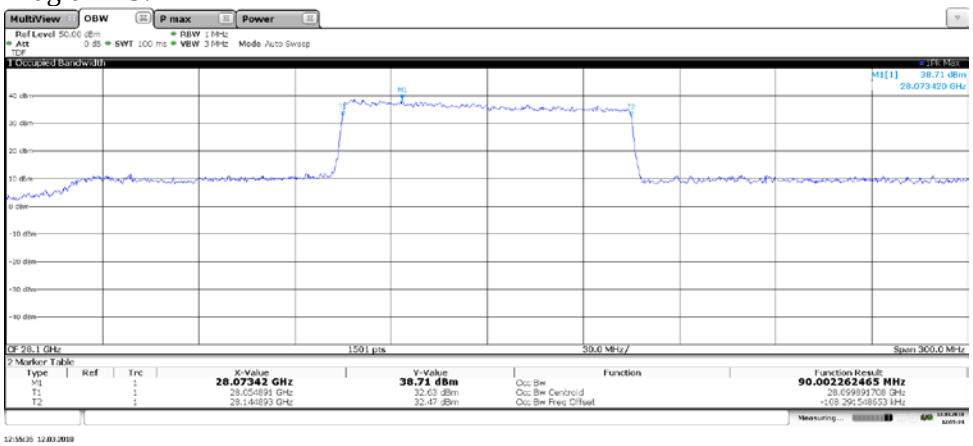

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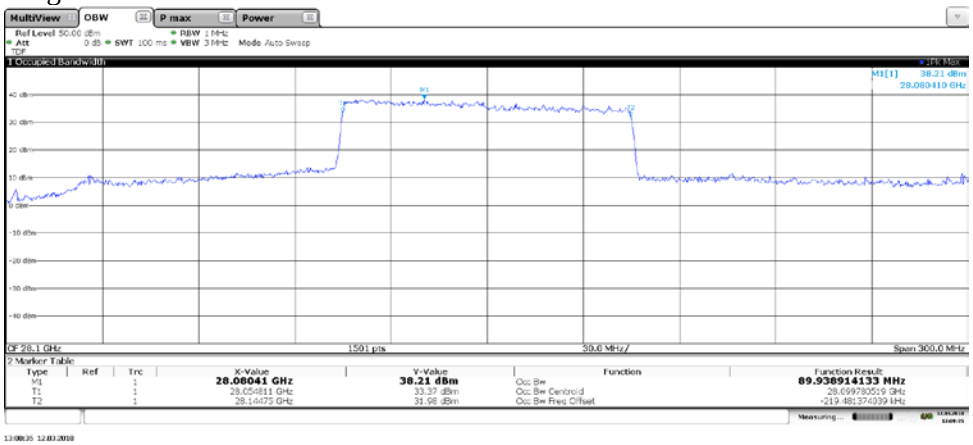

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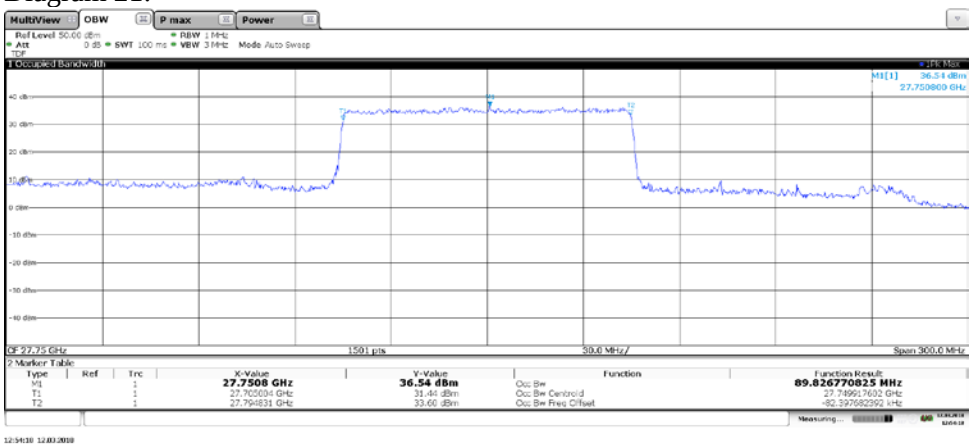

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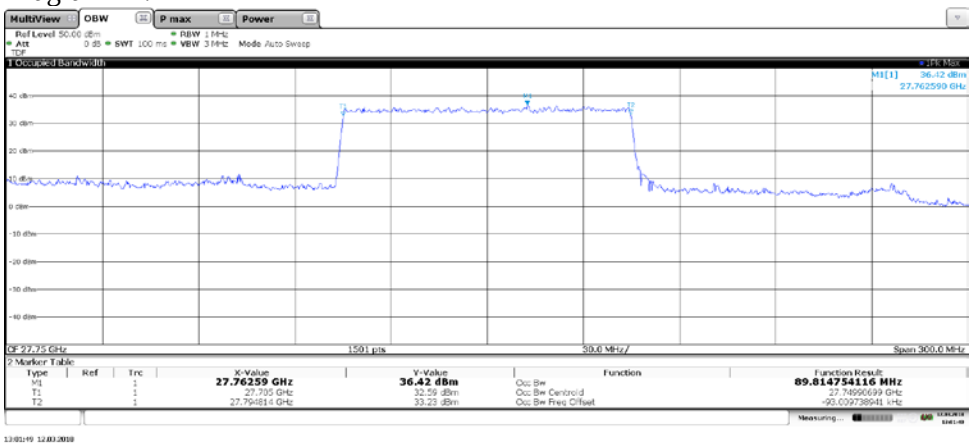

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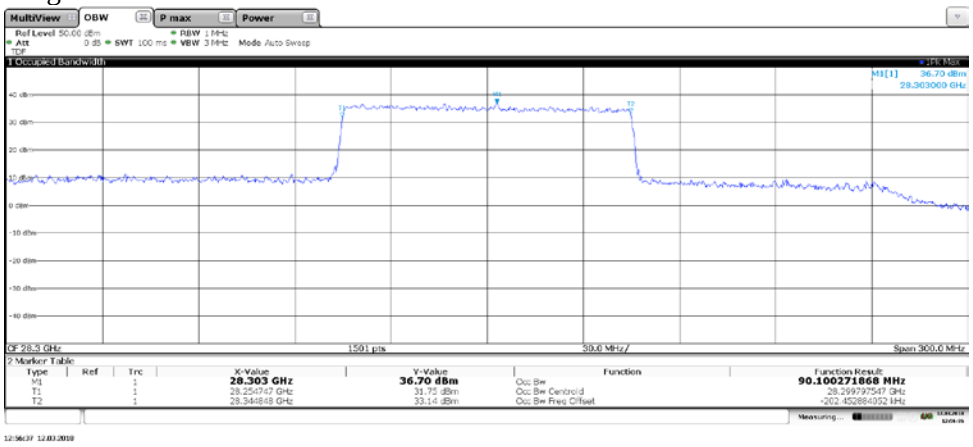

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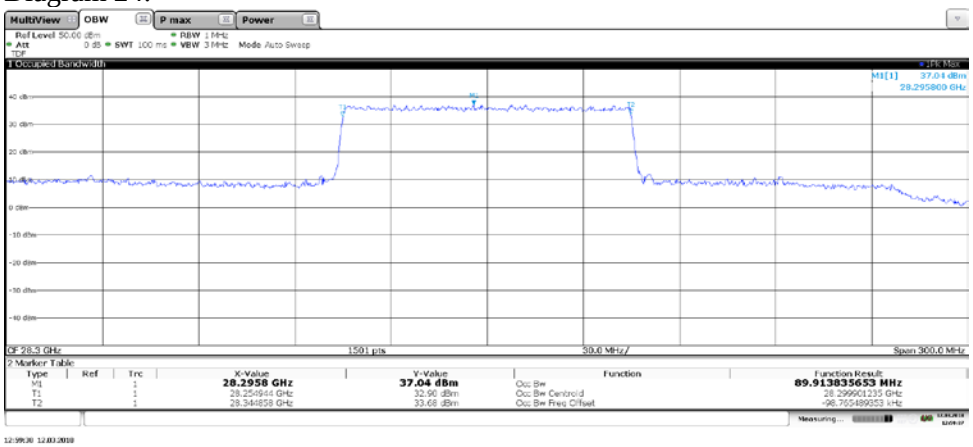

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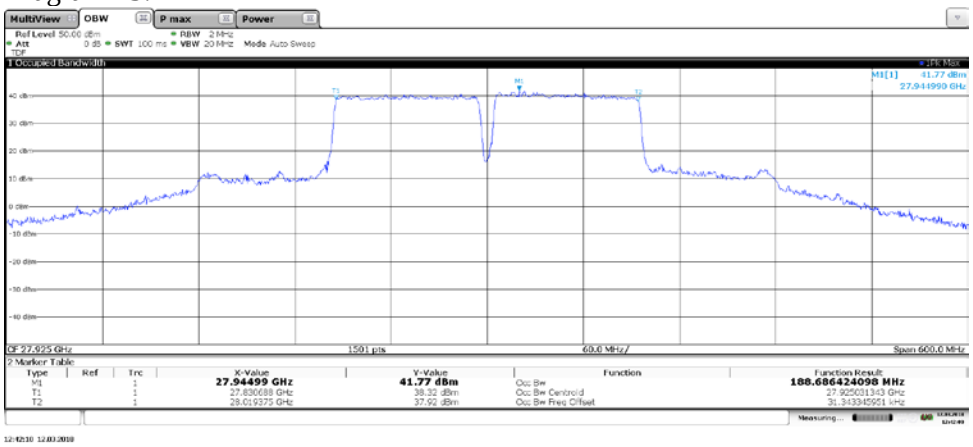


Diagram 26:

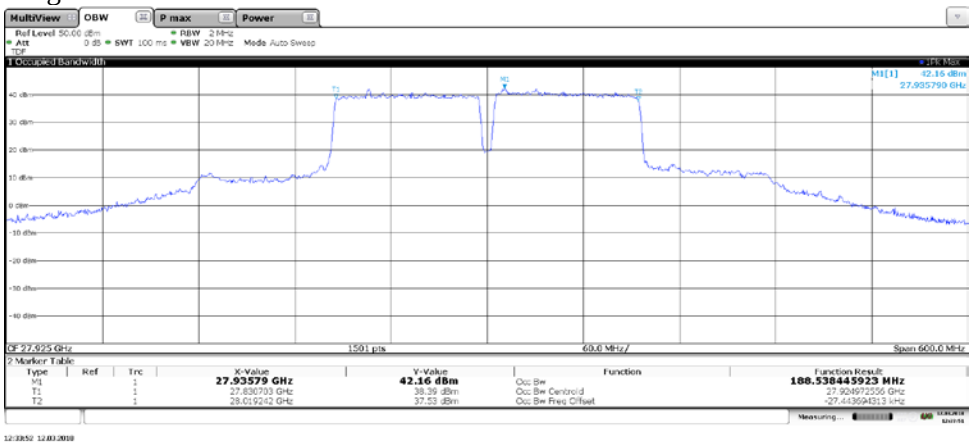


Diagram 27:

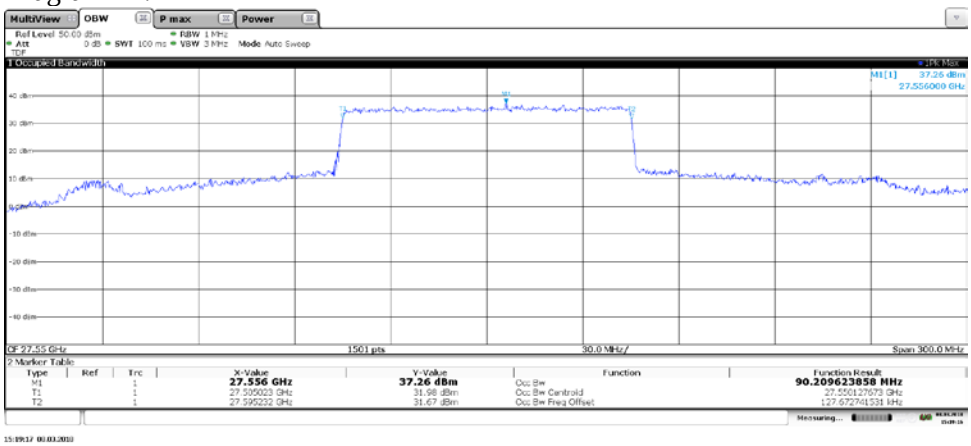


Diagram 28:

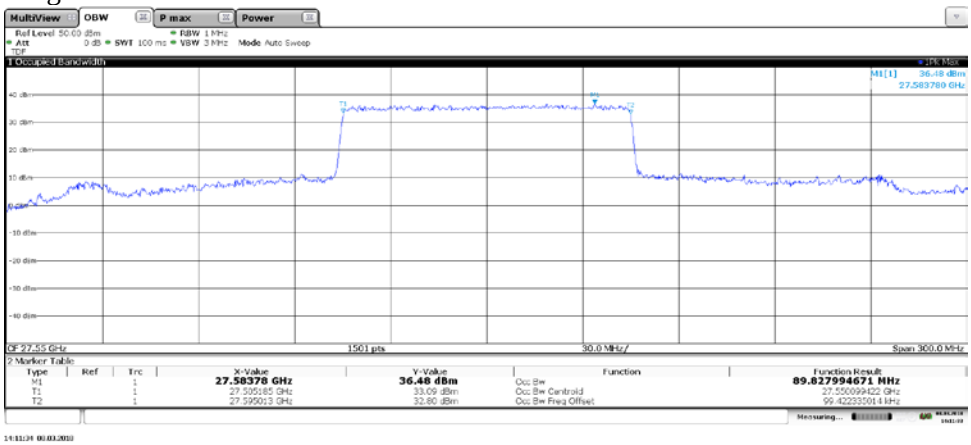


Diagram 29:

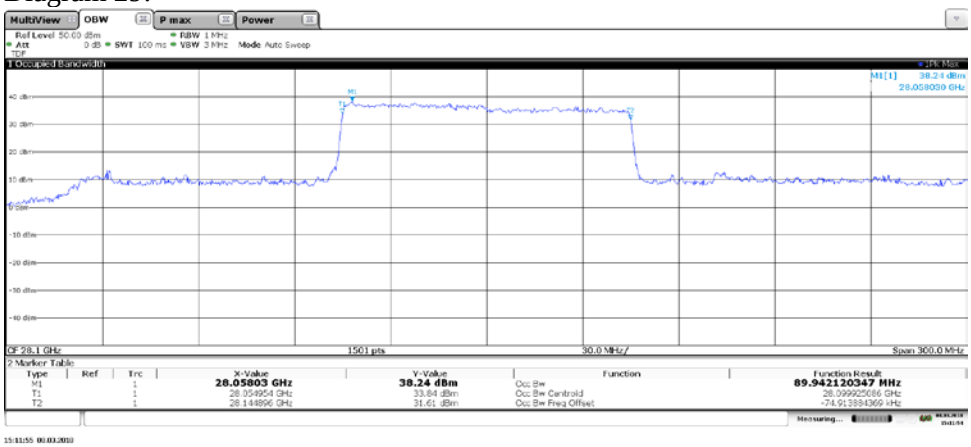


Diagram 30:

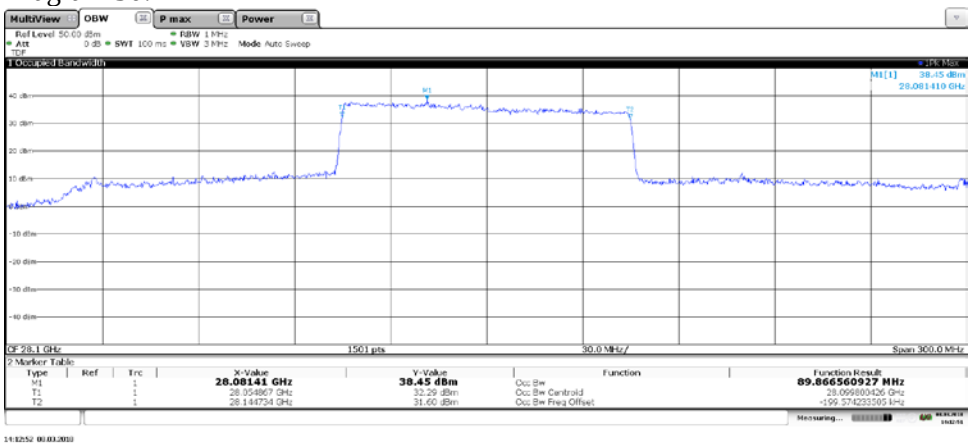


Diagram 31:

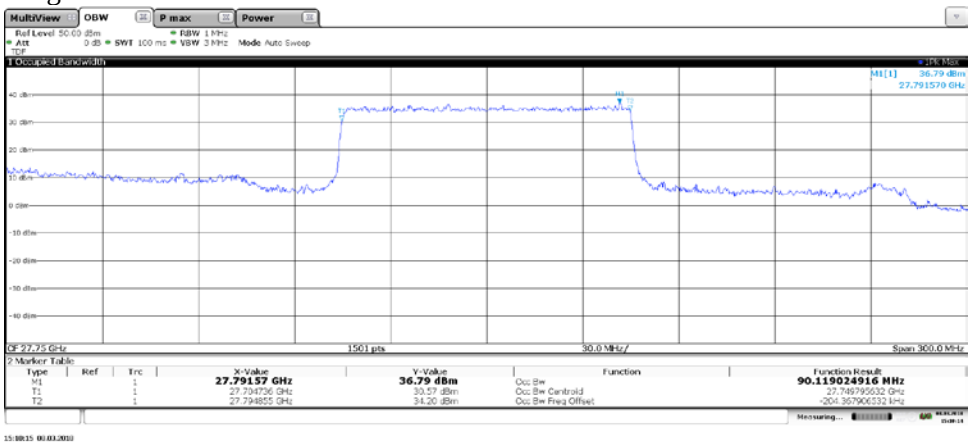


Diagram 32:

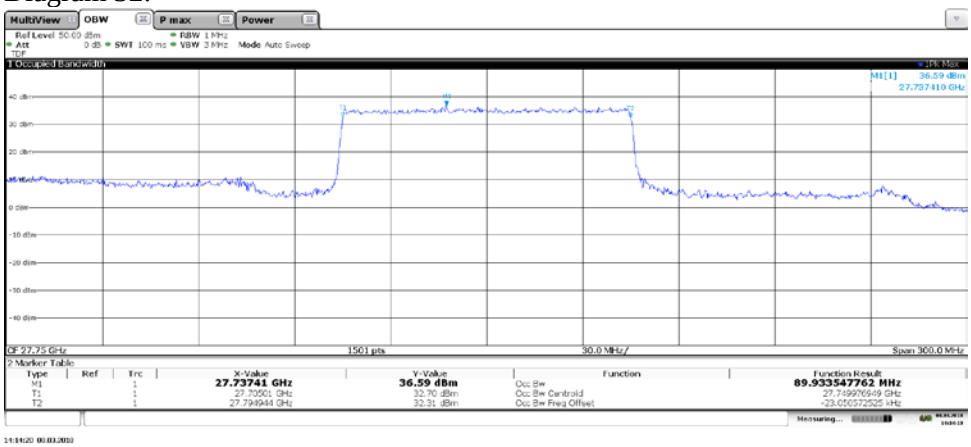


Diagram 33:

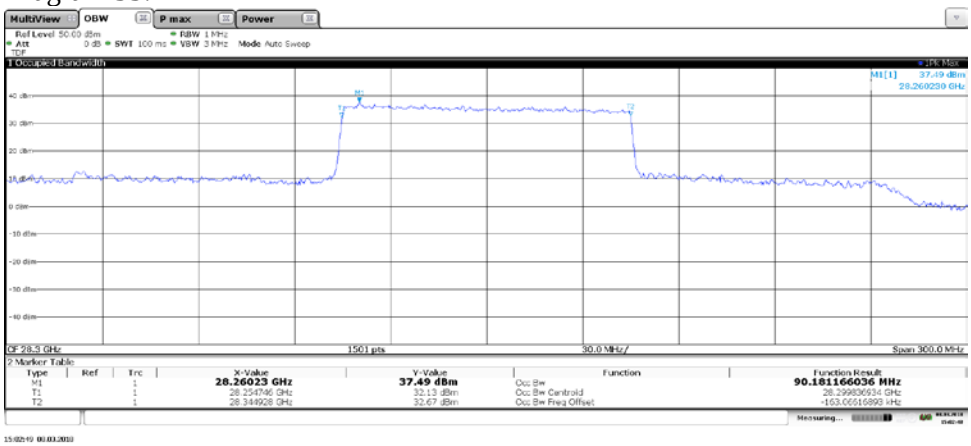


Diagram 34:

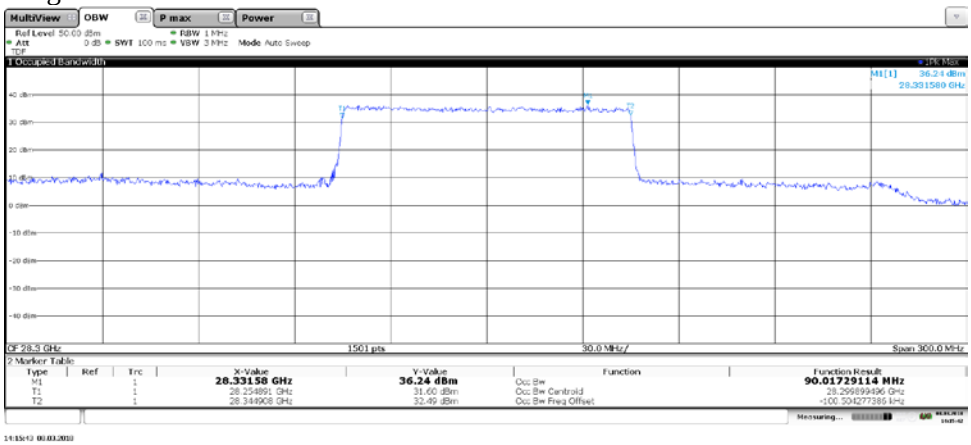


Diagram 35:

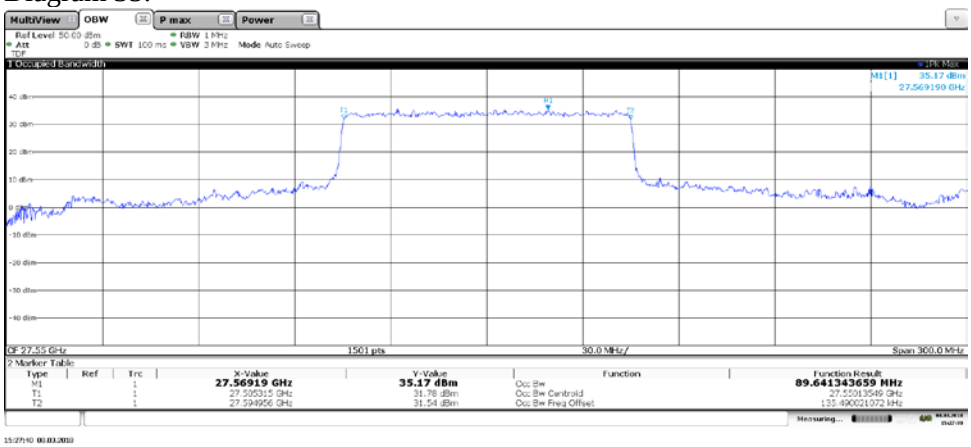


Diagram 36:

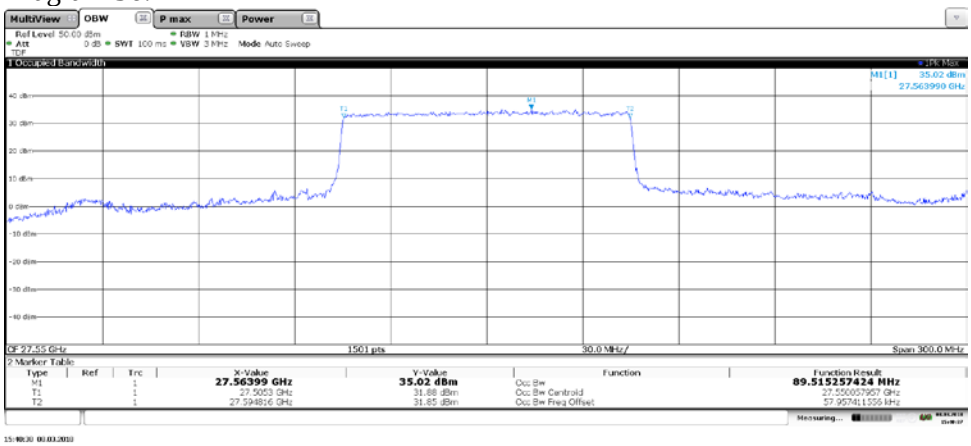


Diagram 37:

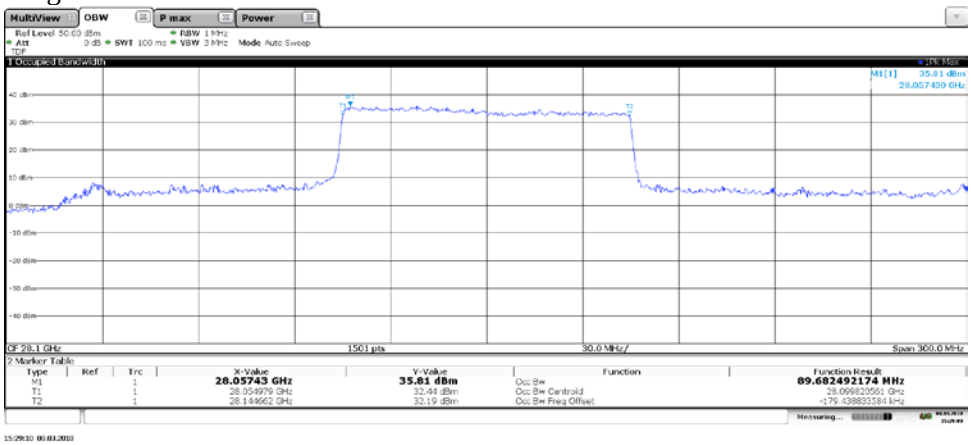


Diagram 38:

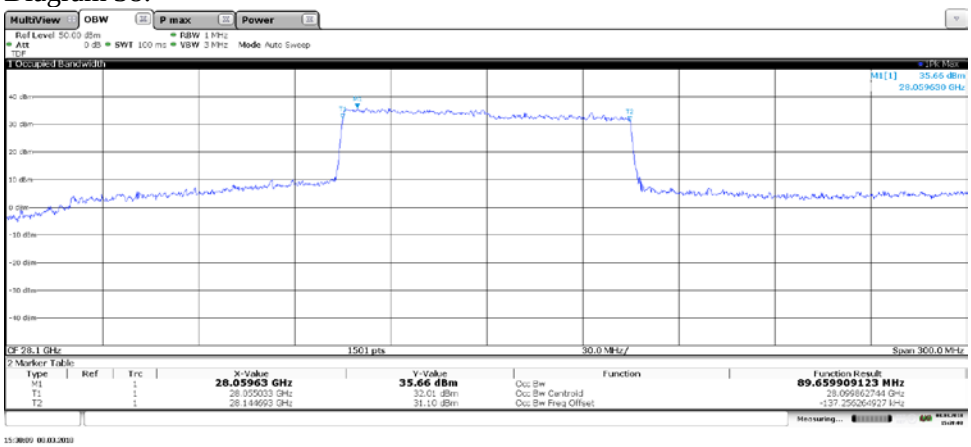


Diagram 39:

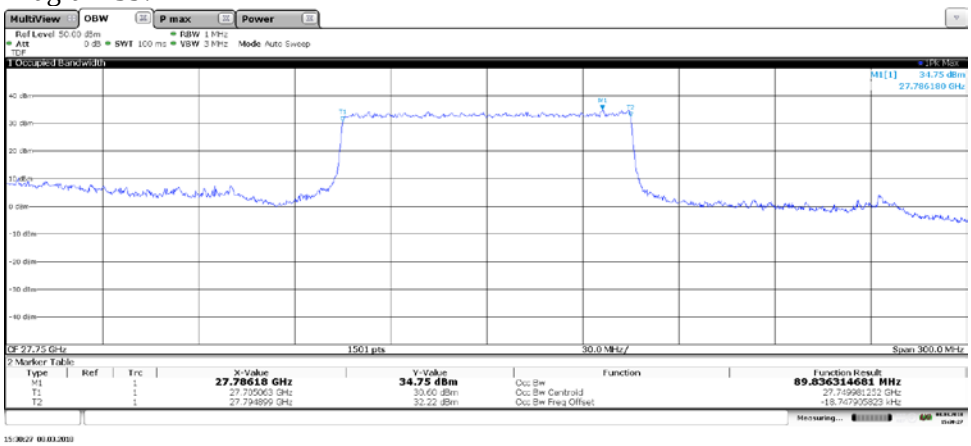


Diagram 40:

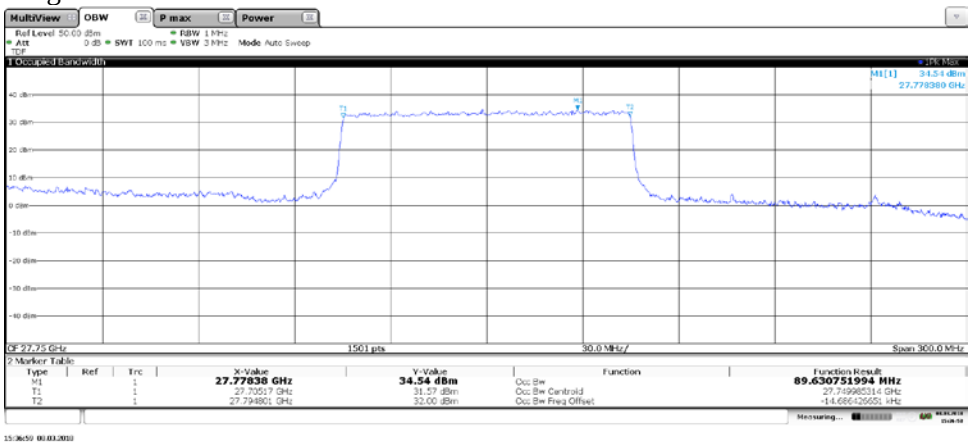


Diagram 41:

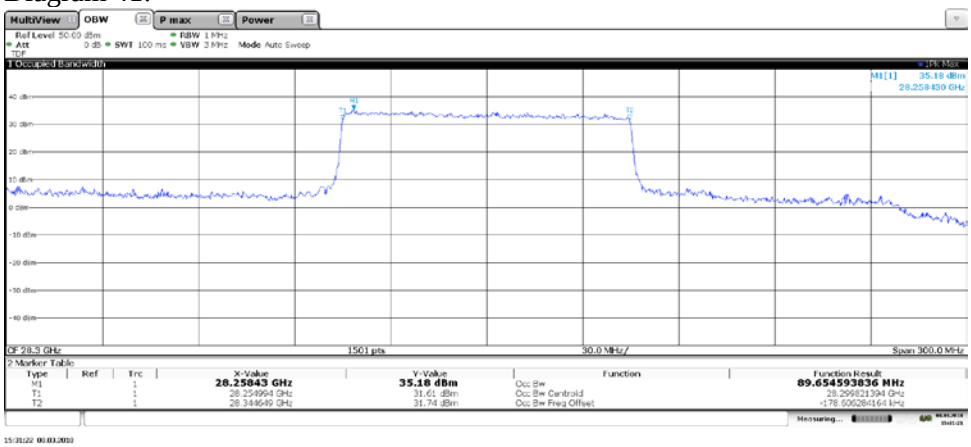


Diagram 42:

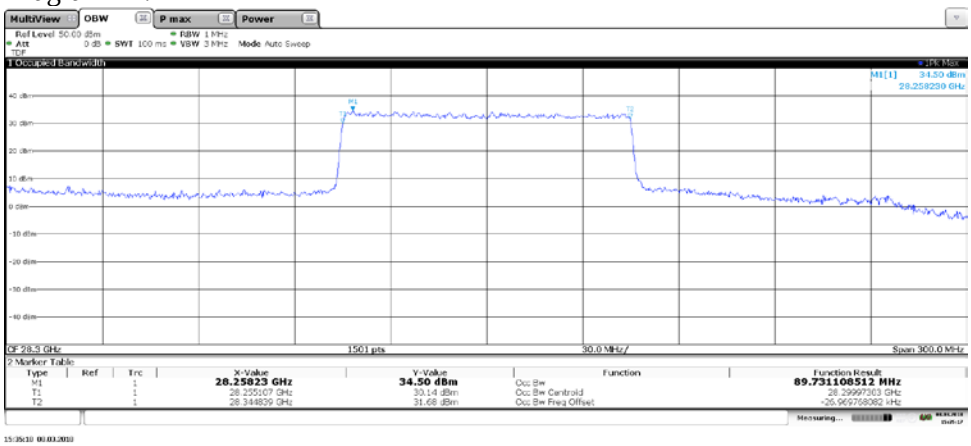


Diagram 43:

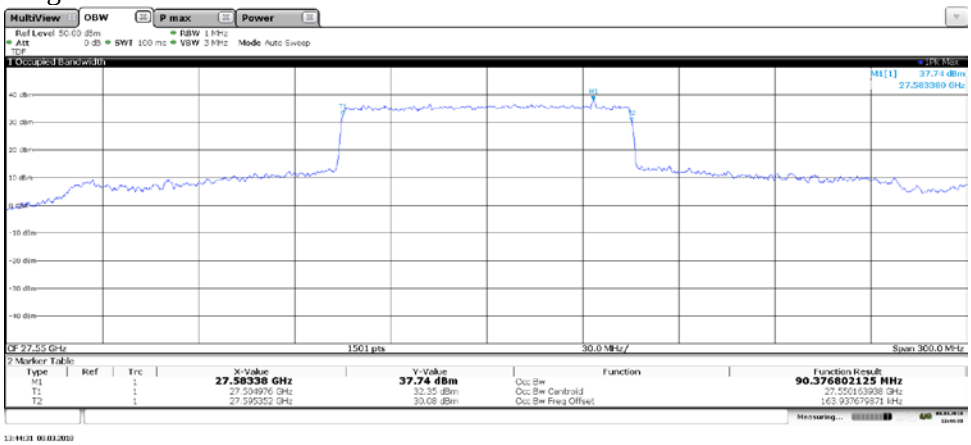


Diagram 44:

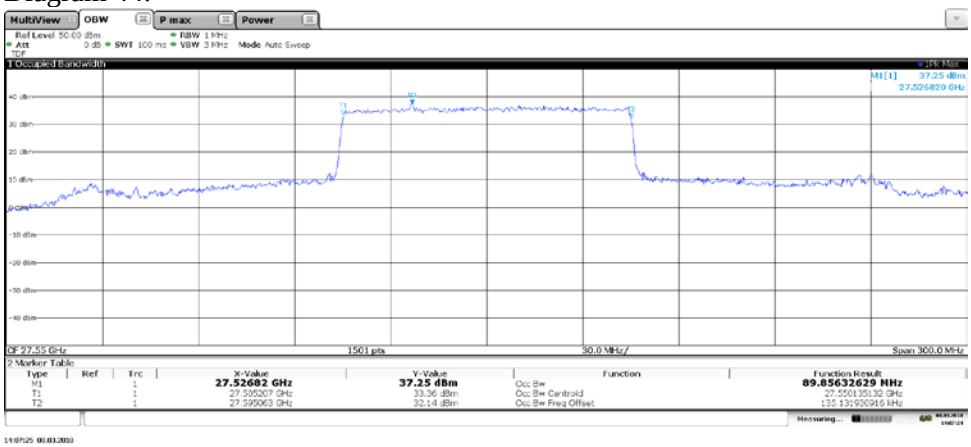


Diagram 45:

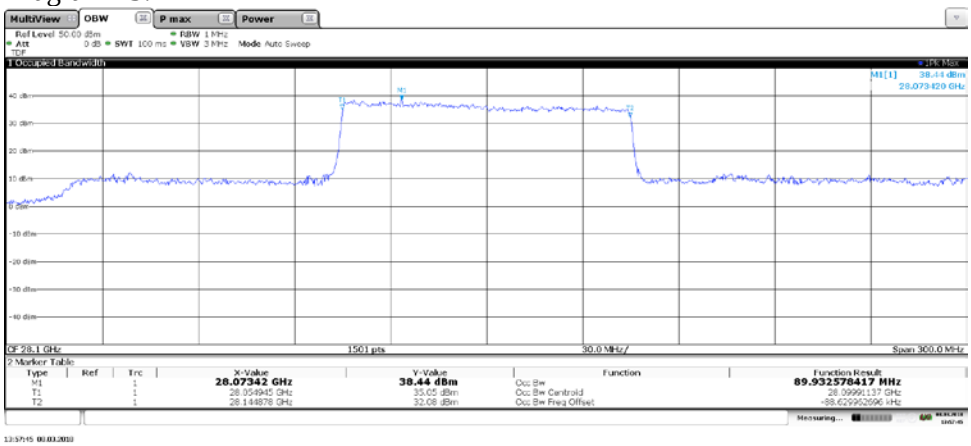
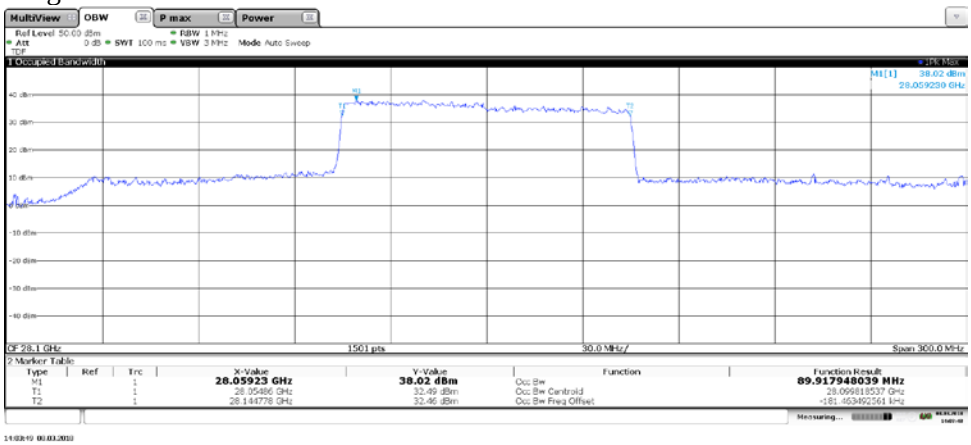


Diagram 46:



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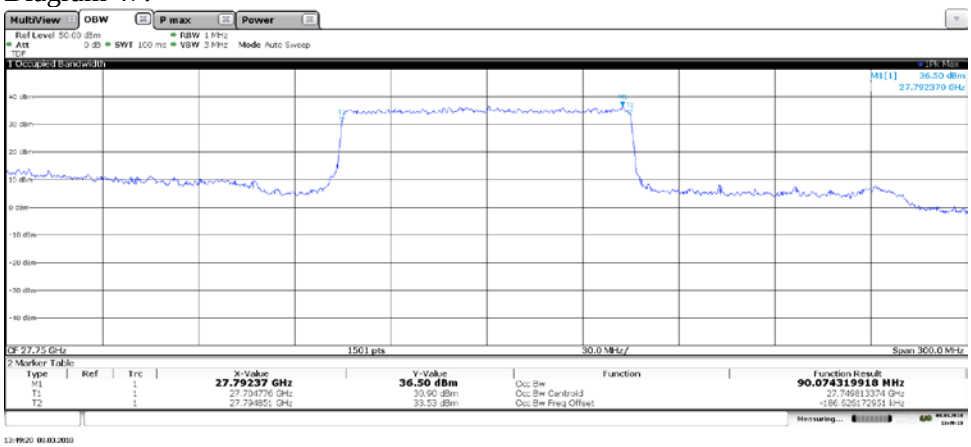

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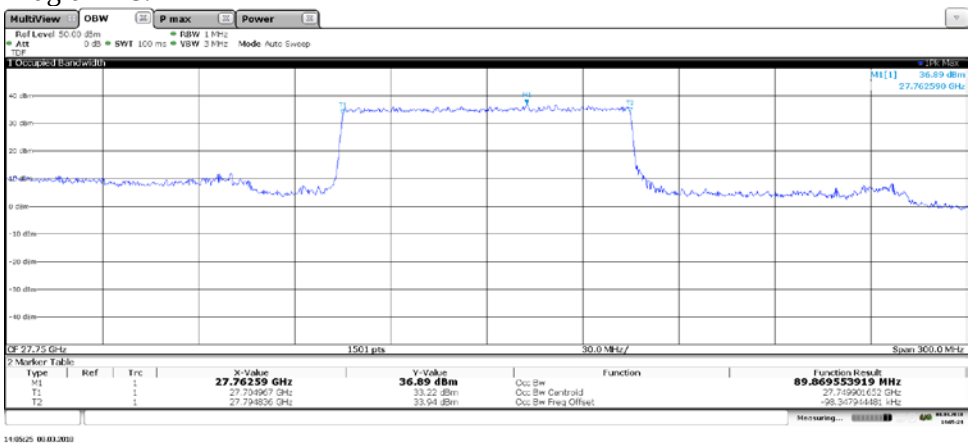


Diagram 49:

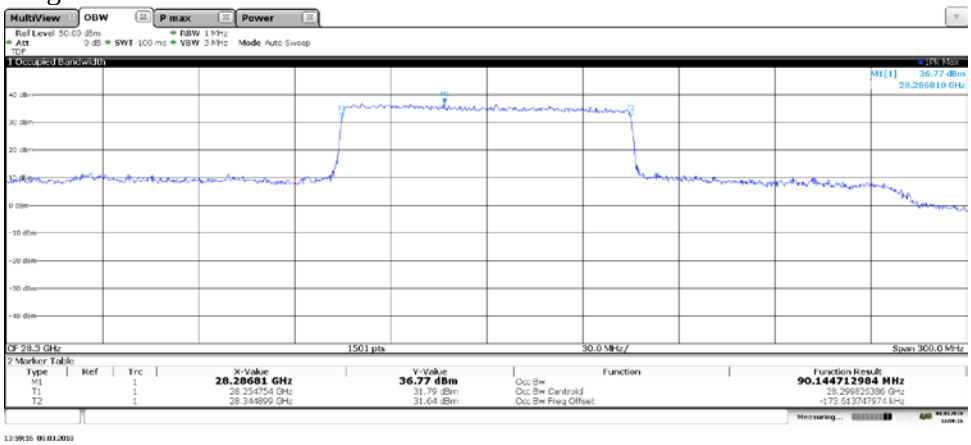


Diagram 50:

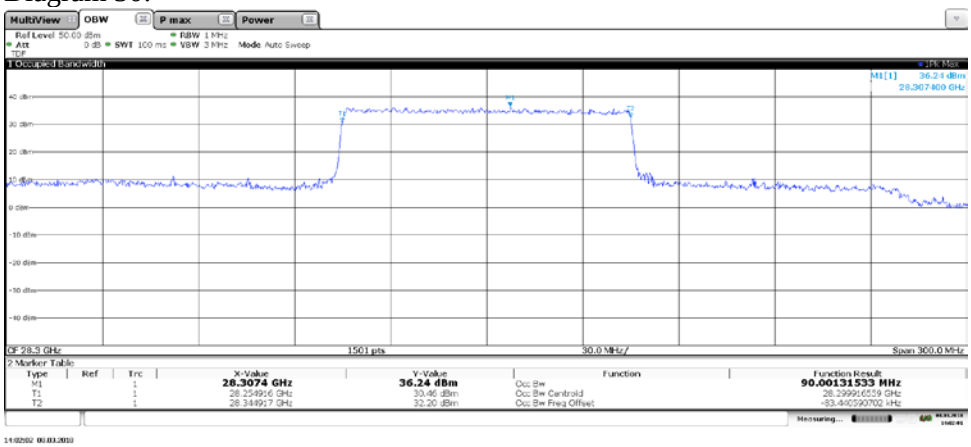


Diagram 51:

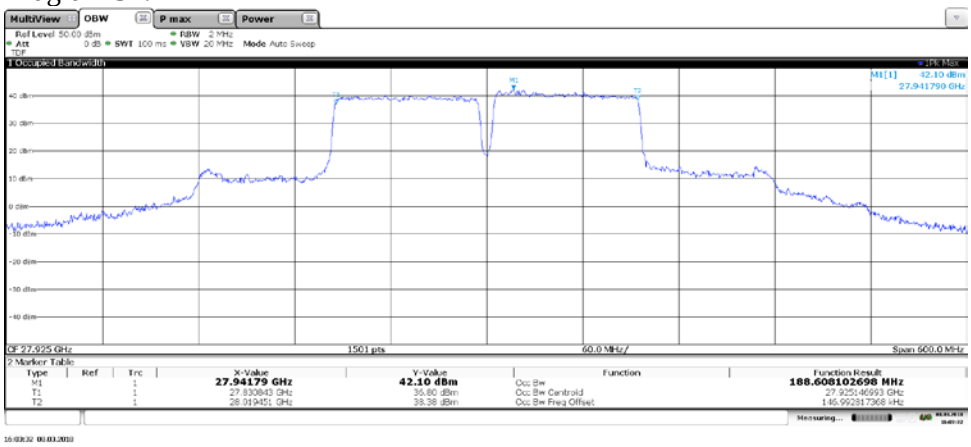
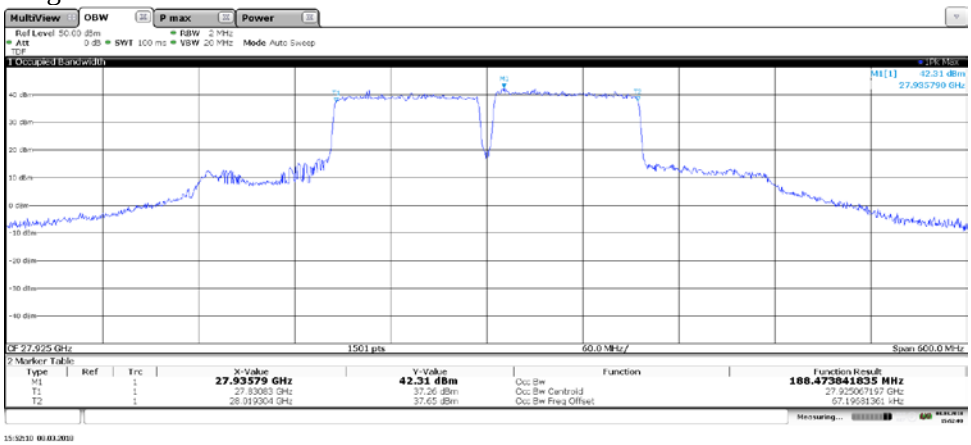


Diagram 52:



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

Date	Temperature	Humidity
2018-02-20	21 °C ± 3 °C	20 % ± 5 %
2018-02-21	21 °C ± 3 °C	14 % ± 5 %
2018-02-22	21 °C ± 3 °C	12 % ± 5 %
2018-02-23	21 °C ± 3 °C	15 % ± 5 %
2018-03-06	21 °C ± 3 °C	17 % ± 5 %
2018-03-07	21 °C ± 3 °C	17 % ± 5 %
2018-03-12	21 °C ± 3 °C	22 % ± 5 %
2018-03-13	21 °C ± 3 °C	25 % ± 5 %
2018-03-14	21 °C ± 3 °C	20 % ± 5 %
2018-03-15	21 °C ± 3 °C	22 % ± 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 descried below.

In the test range from 30 MHz – 18 GHz and 40 – 100 GHz
A propagation loss in free space was calculated. The used formula was
$\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.
For 30 Mhz – 18 GHz and 40 – 60 Ghz *D* was 3m and for 60 – 100 Ghz *D* was 0.5m.

In the test range from 18 – 40 GHz A Network analyzer (ZNB 40) was used to measure the total correction factor for the measurement chain, including the receiver antenna gain, cable loss, and the pathloss for the measurement distance using a reference antenna(EMCO 3116) replacing the EUT. The reference antenna was located in the center of the EUT PAAMs. The antenna gain of the reference antenna was subtracted from the S21 measurement and the result was entered into the spectrum analyzer as a transducer factor.

The measurement procedure was as the following:

1. A pre-measurement is performed with RMS detector and Max Hold on the spectrum analyser. The turn table was slowly rotating form 0-360 degrees.

2. Spurious radiation on frequencies closer than 10 dB to the limit in the pre-measurement a manual search for maximum response was done.

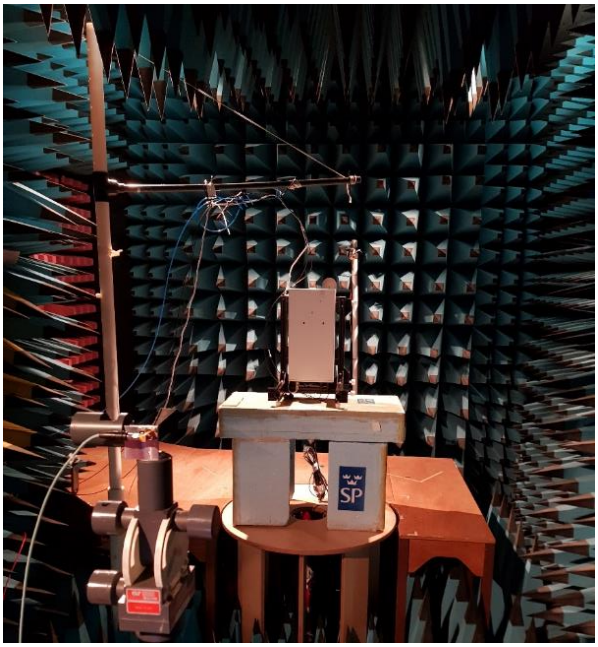
3. If the recorded EIRP value was close or above the limit, a Two Cut TRP measurement was done according to EAB 1/1548-150/FCP 131 6395 D Uen. This method is not included in our scope of accreditation. Overview of the method.

    a. EUT set in vertical orientation
    b. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT
    c. EUT set in horizontal orientation

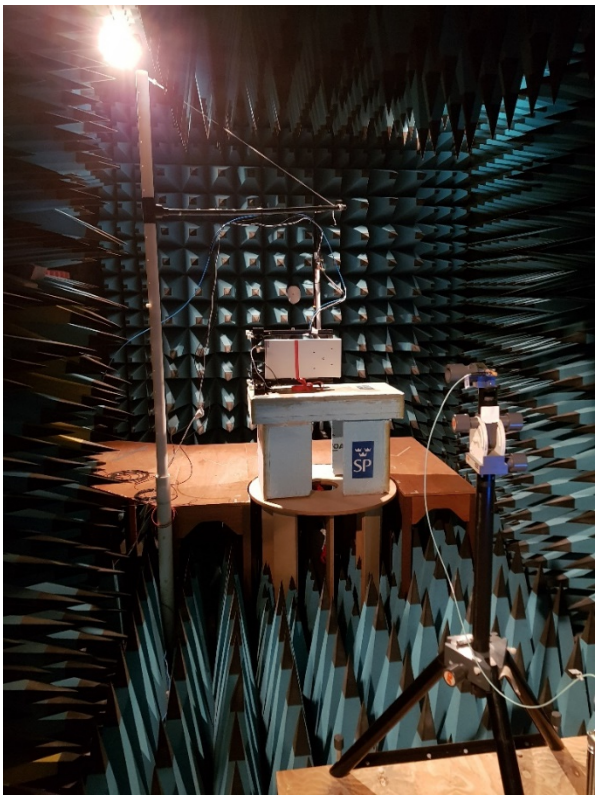
d. EIRP measurement samples with horizontal and vertical polarization of the measurement antenna. Angular step size based on frequency and dimension of the EUT.
e. TRP = EIRP measurement samples averaged+ΔTRP.
(ΔTRP= Margin factor based on grid selection).

The test set-up during the spurious radiation measurements is shown in the pictures below:

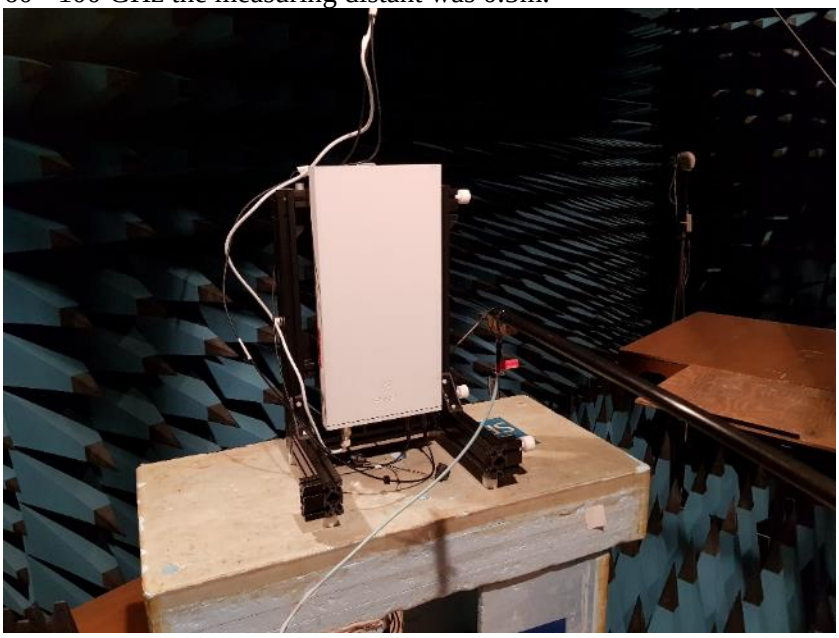
30MHz - 60 GHz vertical orientation: the measuring distant was 3m



30MHz - 60 GHz horizontal orientation: the measuring distant was 3m



60 - 100 GHz the measuring distant was 0.5m:



Measurement equipment

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
Bilog antenna Chase CBL 6111A	502181
Flann STD Gain Horn Antenna 20240-20	503 674
Flann STD Gain Horn Antenna 22240-20	503 674
Flann STD Gain Horn Antenna 24240-20	503 674
Flann STD Gain Horn Antenna 26240-20	503 674
Flann STD Gain Horn Antenna 27240-20	503 674
Mixer FS-Z60	502 987
Mixer FS-Z90	503 569
Mixer FS-Z110	BX81427
Miteq, Low Noise Amplifier	503 278
EMCO Horn Antenna 3115	501 548
µComp Nordic, Low Noise Amplifier	901 544
Temperature and humidity meter, Testo 615	503 498

Results

Representing worst case:

PAAM/2: Symbolic name 2E with test model QPSK shown in Diagram 1 - 28

PAAM/3: Symbolic name 2E with test model 16 QAM shown in Diagram 29 – 38 and from 43-55
For Diagram 39-42 2E with test model QPSK was used.

Measurement uncertainty: 30 – 1000 MHz 3.1 dB
1-18 GHz, 3.1 dB
18 – 40 GHz, 3.3 dB
40 – 60 GHz, 3.95 dB
60 – 100 GHz, 4.6 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.

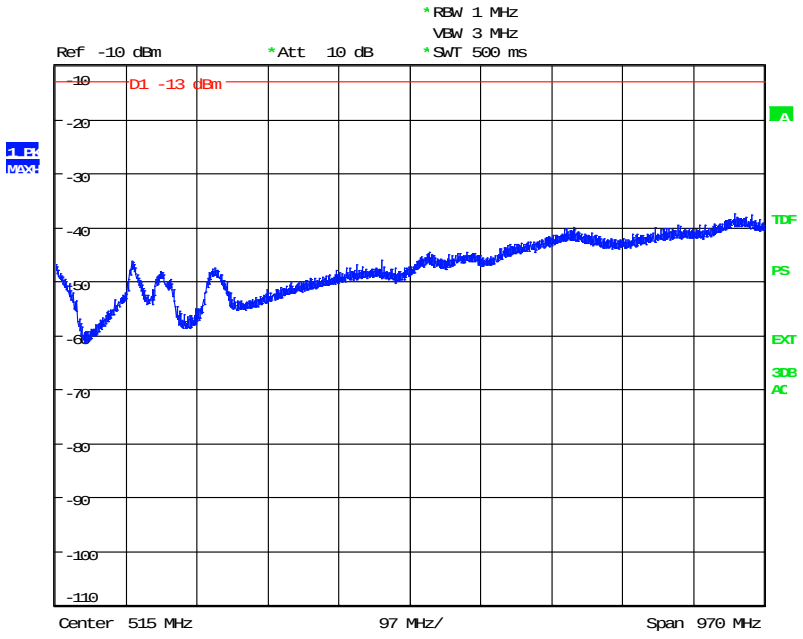
(b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(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.

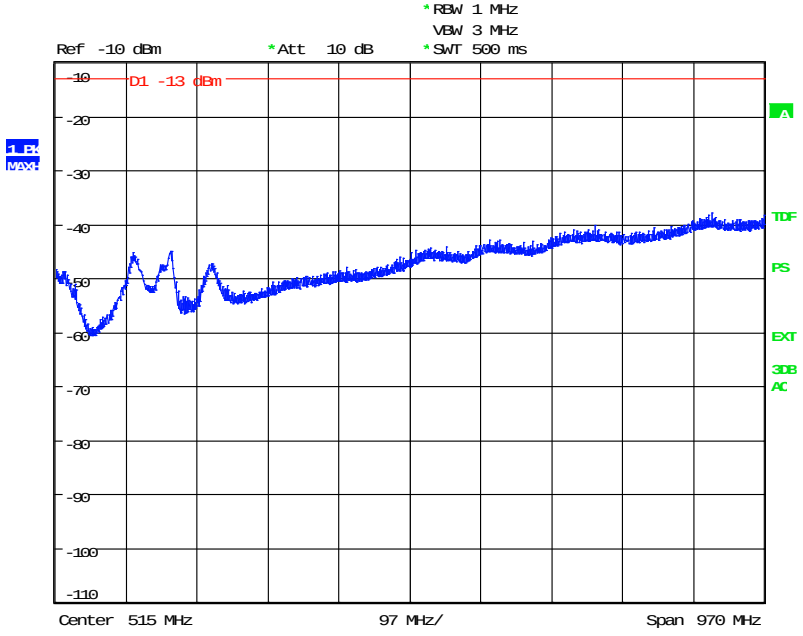
Complies?	Yes

Diagram 1: 30 – 1000 MHz, EIRP Horizontal polarization



Date: 13.MAR.2018 15:53:19

Diagram 2: 30 – 1000 MHz, EIRP Vertical polarization



Date: 13.MAR.2018 15:50:17

Diagram 3: 1 – 18 GHz, EIRP Horizontal polarization

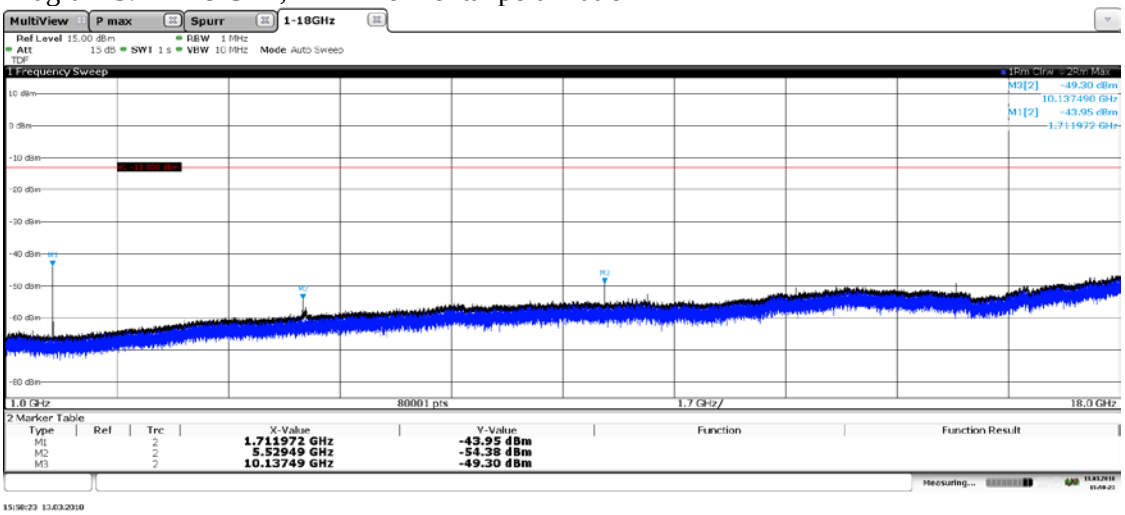


Diagram 4: 1 – 18 GHz, EIRP Vertical polarization

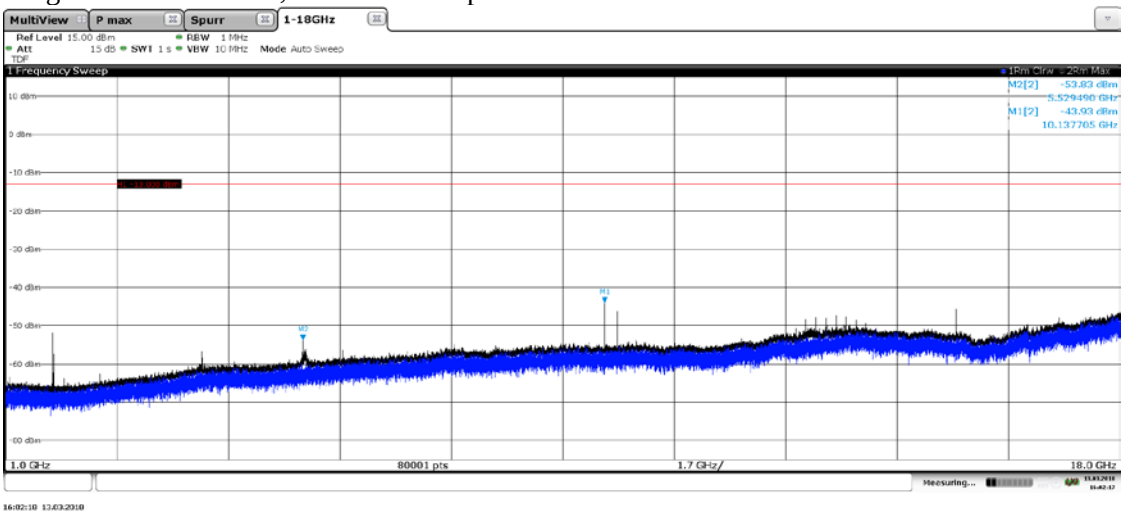
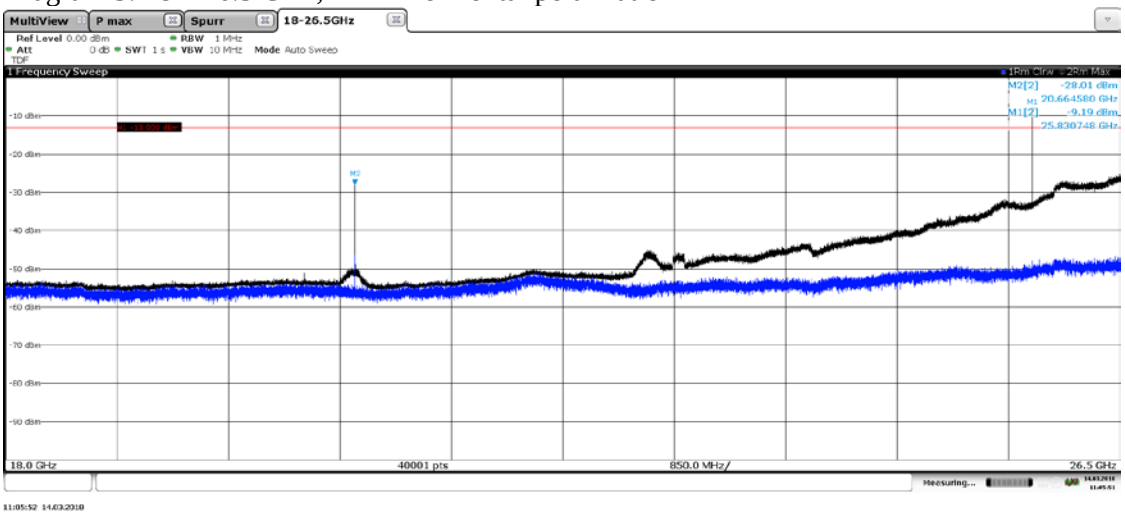


Diagram 5: 18 – 26.5 GHz, EIRP Horizontal polarization



Note: Even though the EIRP levels fail at 25.83 GHz the TRP levels are within limit.

Diagram 6: 18 – 26.5 GHz, EIRP Vertical polarization

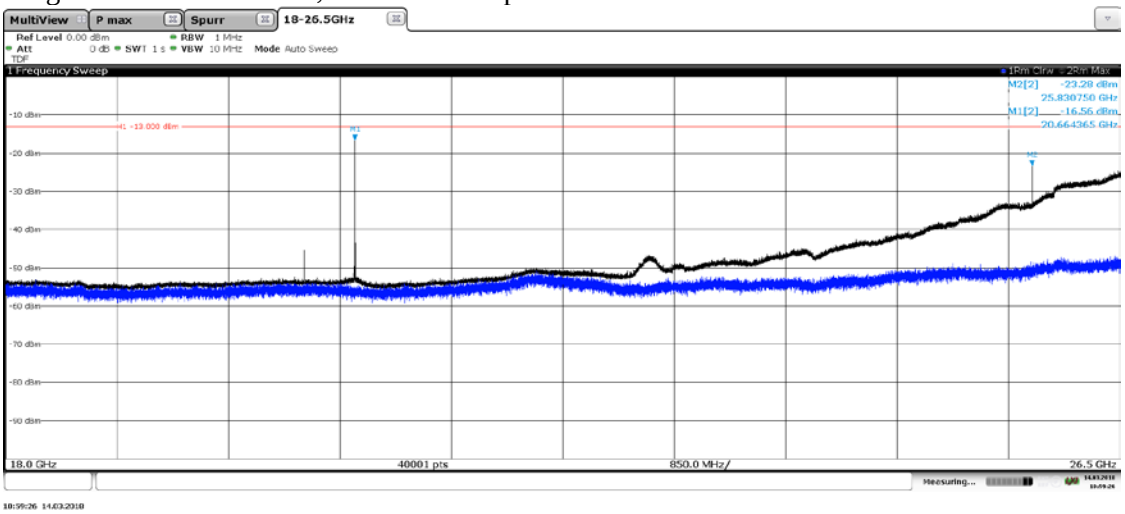


Diagram 7: 20.56 – 20.76 GHz, Two Cut TRP

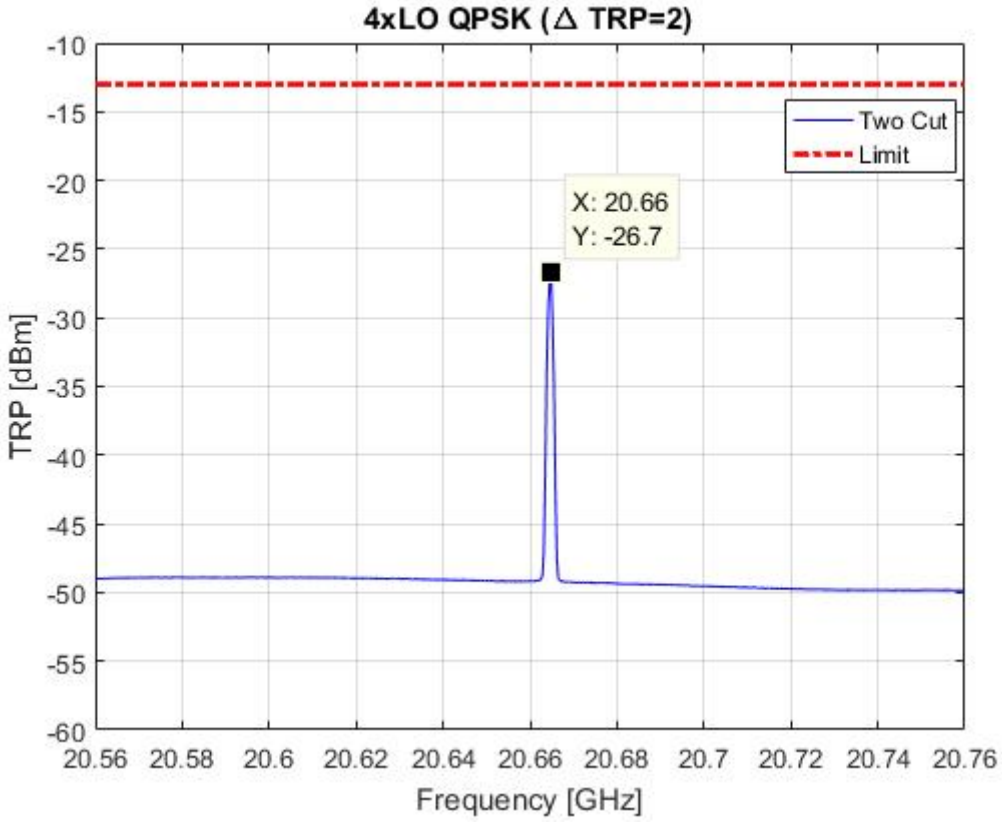


Diagram 8: 25.73 – 25.93 GHz, Two Cut TRP

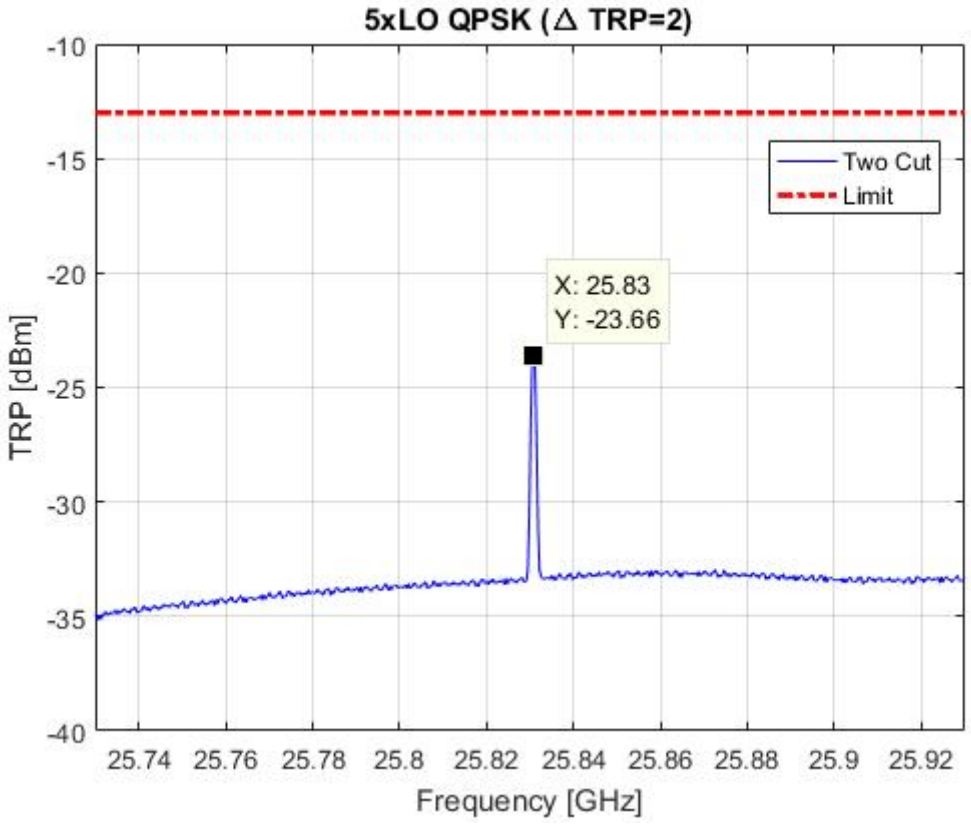


Diagram 9: 26.5 – 27.4 GHz, EIRP Horizontal polarization

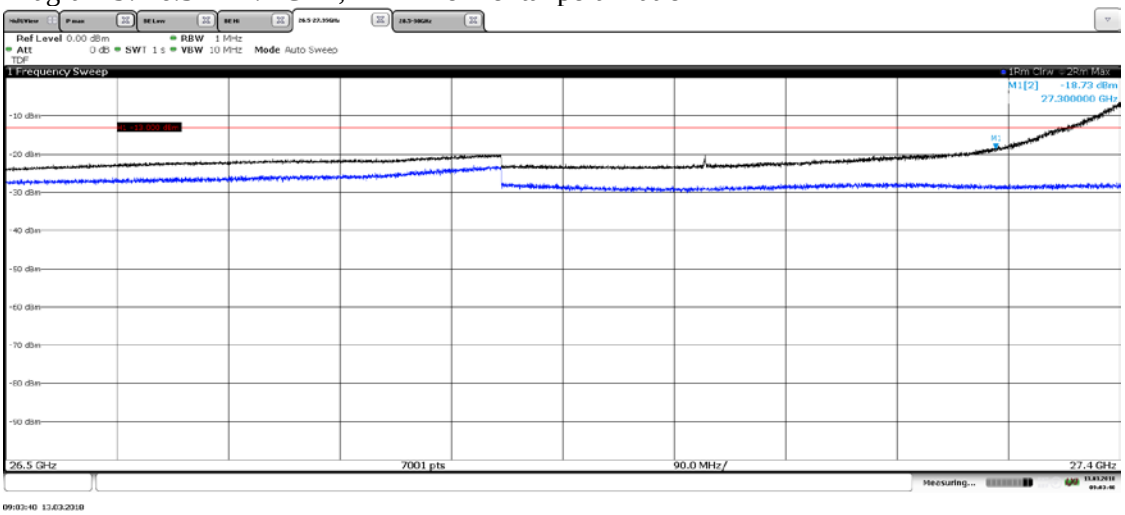


Diagram 10: 26.5 – 27.4 GHz, EIRP Vertical polarization

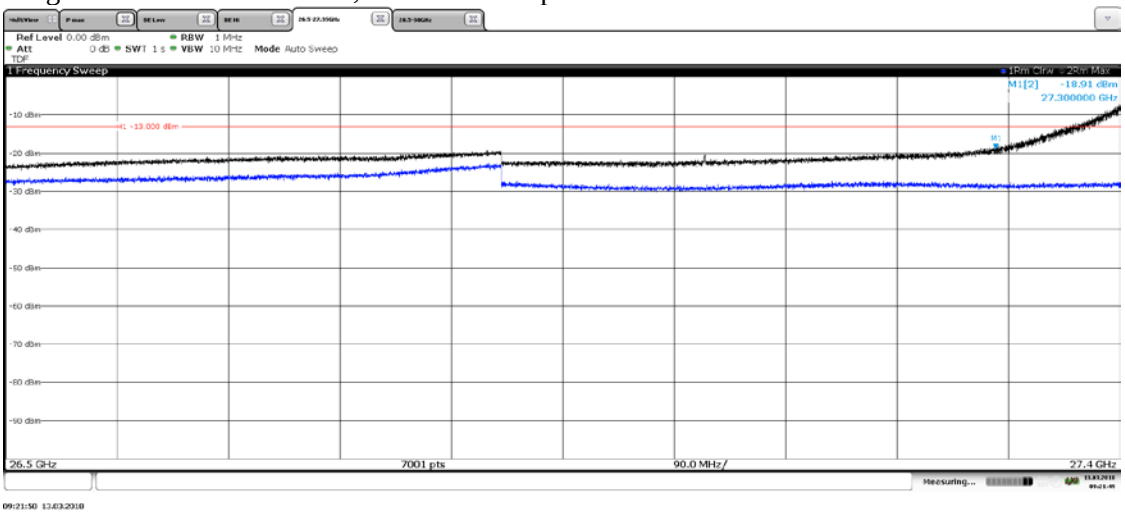


Diagram 11: 27.35 – 27.5 GHz, EIRP Horizontal polarization

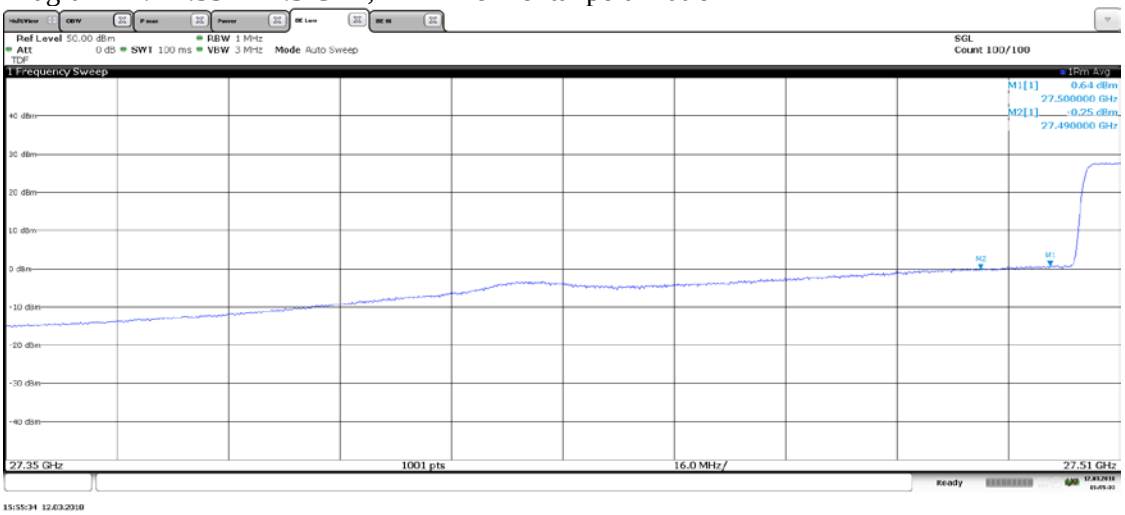
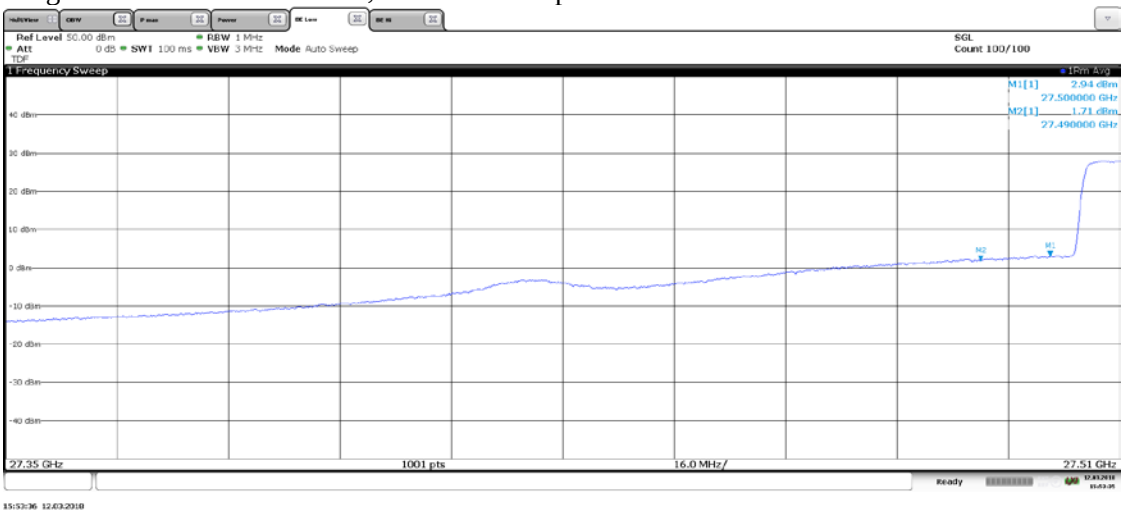


Diagram 12: 27.35 – 27.5 GHz, EIRP Vertical polarization



Note: According to KDB 662911 D02 The conducted Power value can be calculated:

Power EIRP Be Low Hor/ Ver [dbm]	Power EIRP Be Low - 10MHz[dBm]	Antenna Gain[dBi]	Conducted power (Hor/ Ver) – antenna gain. BE/ Be -10MHz [dBm]
0.64/ 2.94	-0.25/ 1.71	24	-19.05/ -20.15

Diagram 13: 28.35 – 28.5 GHz, Horizontal polarization

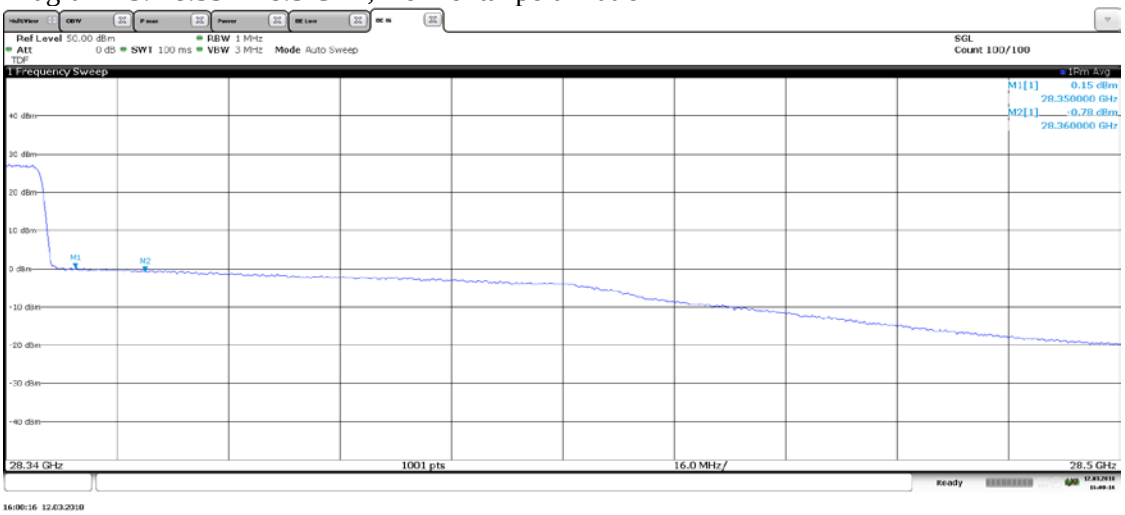
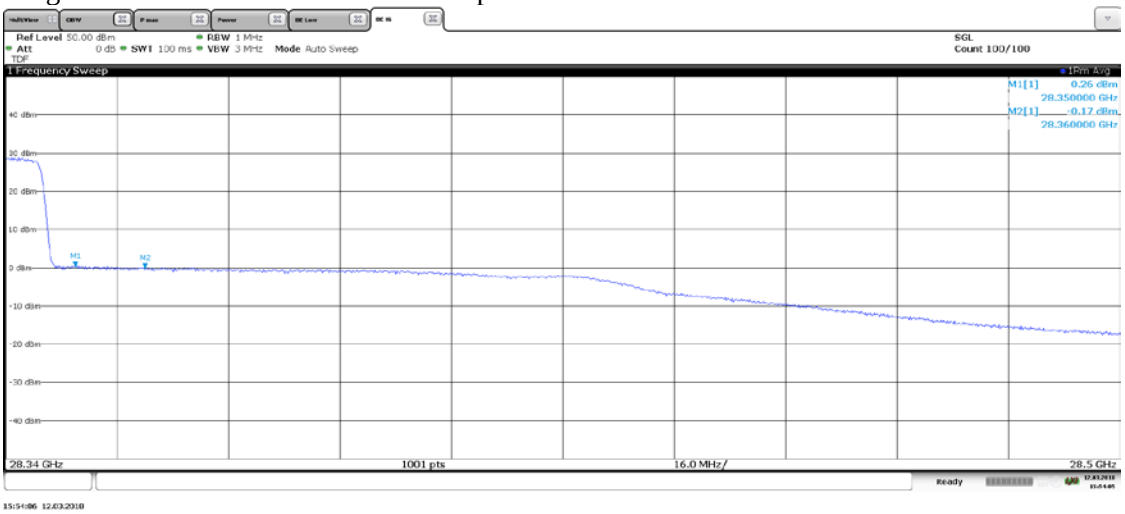


Diagram 14: 28.35 – 28.5 GHz Vertical polarization



Note: According to KDB 662911 D02 The conducted Power value can be calculated:

Power EIRP Be High Hor/ Ver [dbm]	Power EIRP Be High + 10MHz[dBm]	Antenna Gain[dBi]	Conducted power (Hor/ Ver) – antenna gain. BE/ Be +10MHz [dBm]
0.15/ 0.26	-0.78/ -0.17	24	-20.78/ -21.45

Diagram 15: 28.45 – 30 GHz, EIRP Horizontal polarization

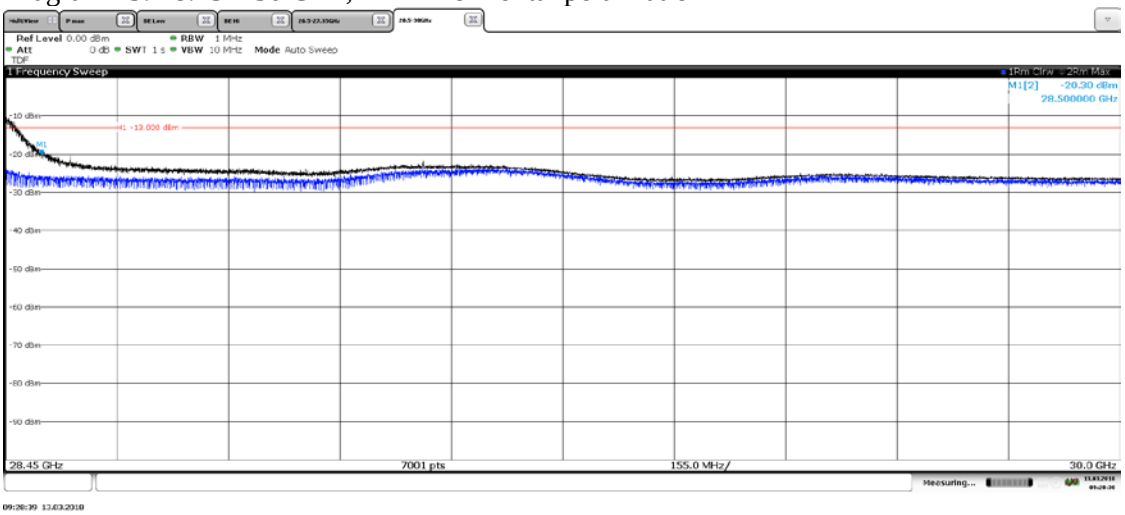


Diagram 16: 28.45 – 30 GHz, EIRP Vertical polarization

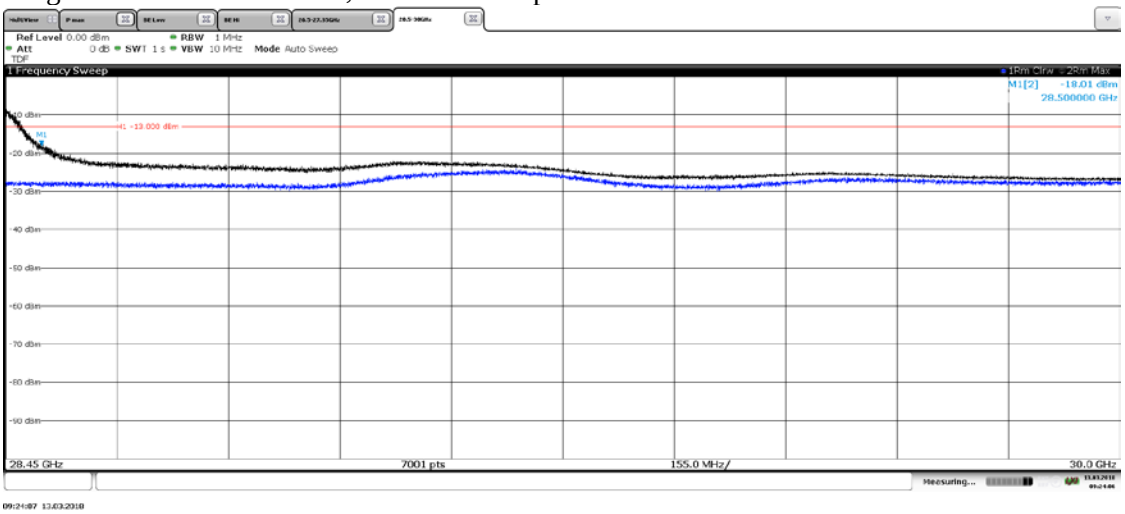
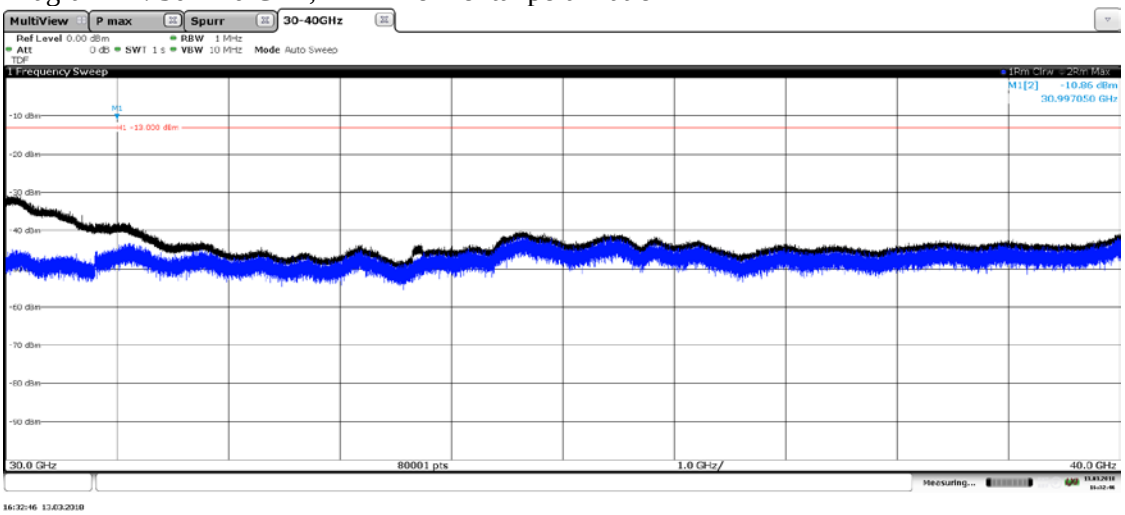


Diagram 17: 30 – 40 GHz, EIRP Horizontal polarization



Note: Even though the EIRP levels fail at 31.00 GHz the TRP levels are within limit.

Diagram 18: 30 – 40 GHz, EIRP Vertical polarization

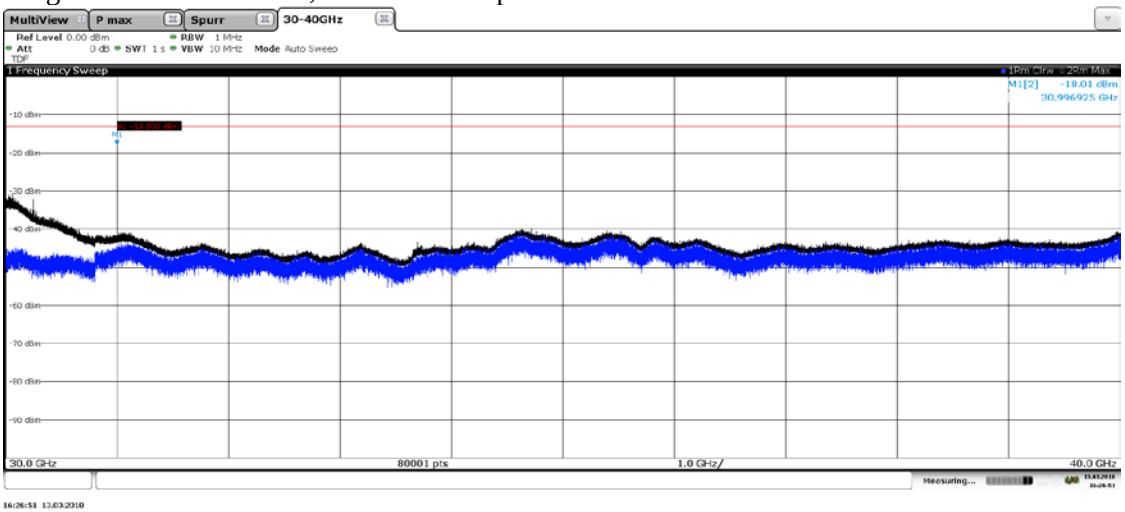


Diagram 19: 30.9 – 31.1 GHz, Two Cut TRP

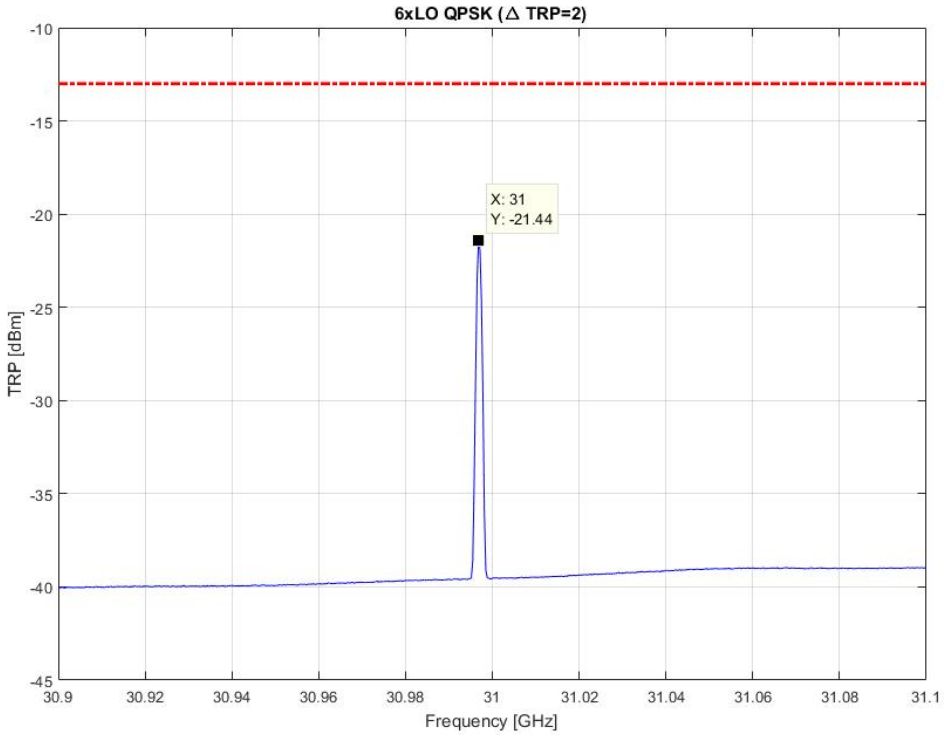
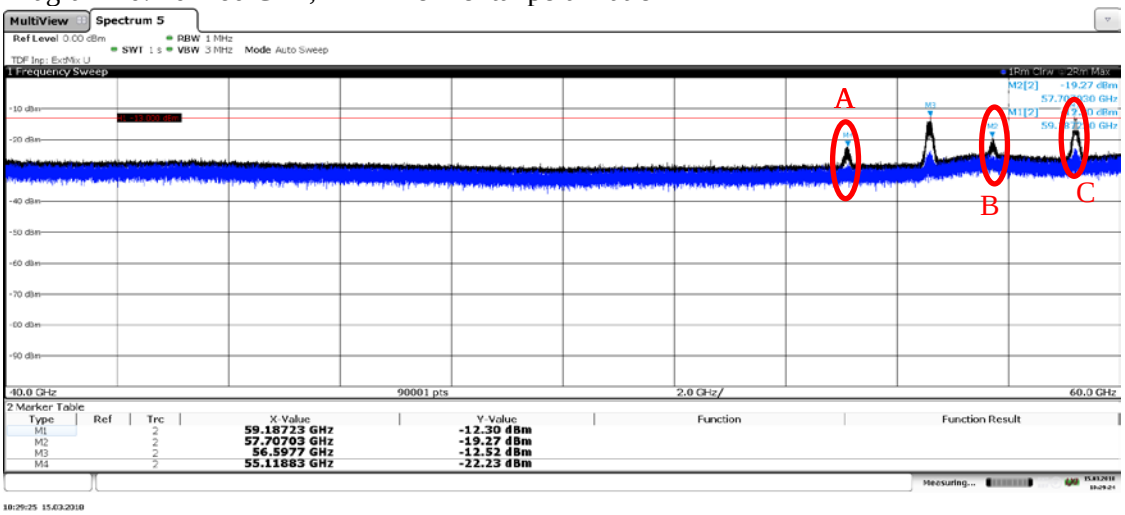


Diagram 20: 40 – 60 GHz, EIRP Horizontal polarization



Note: Even though the EIRP levels fail at 56.60 GHz the TRP levels are within limit.

"False signals" originating from unwanted mixer products between LO signal generated by the spectrum analyser 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	F EUT	Mixing indicies n	m	"False F"
	[GHz]	[-]	[-]	[GHz]
A	28.3	1	-2	55.27
B	28.3	1	2	57.93
C	28.3	-2	4	59.26

Diagram 21: 40 – 60 GHz, EIRP Vertical polarization

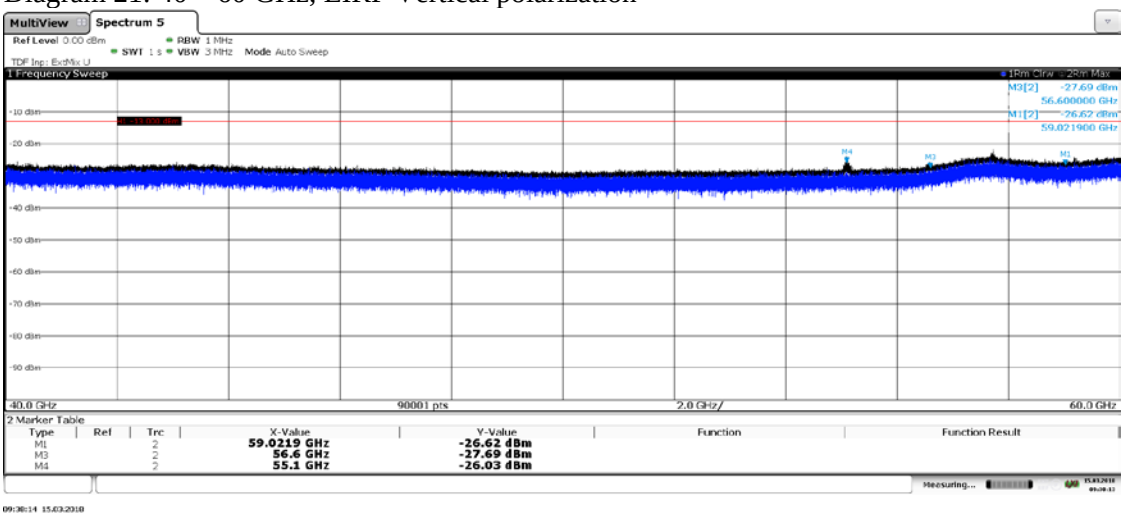


Diagram 22: 56 – 57 GHz, Two Cut TRP

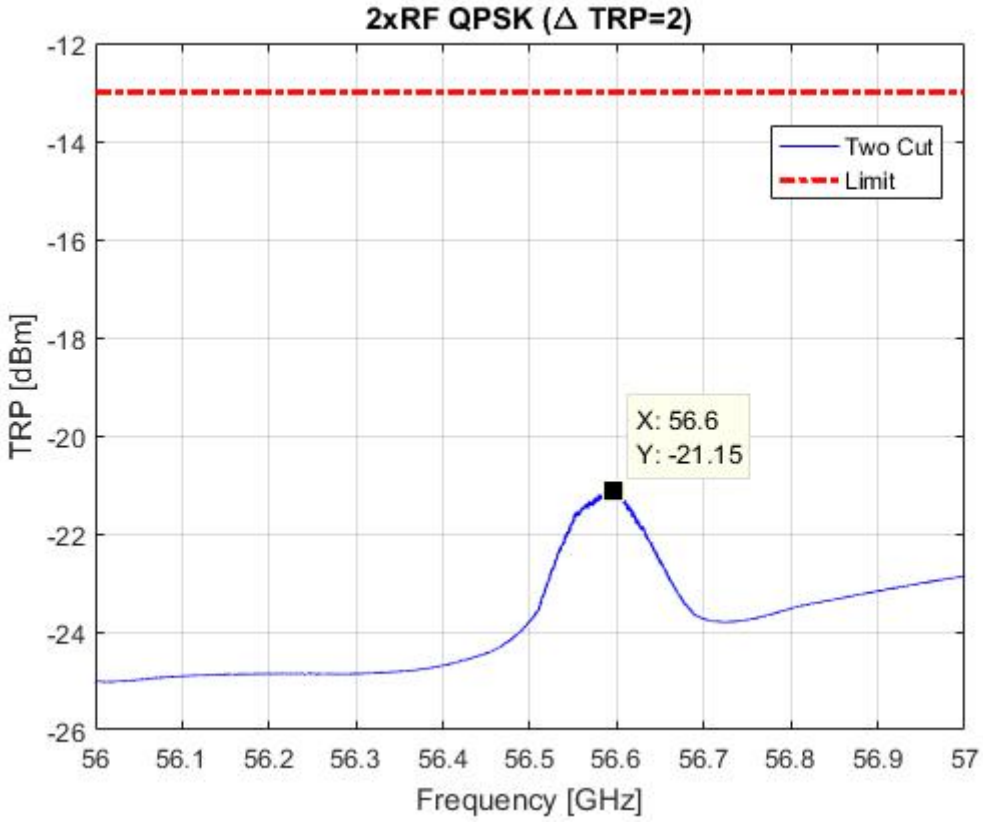


Diagram 23: 60 – 75 GHz, EIRP Horizontal polarization

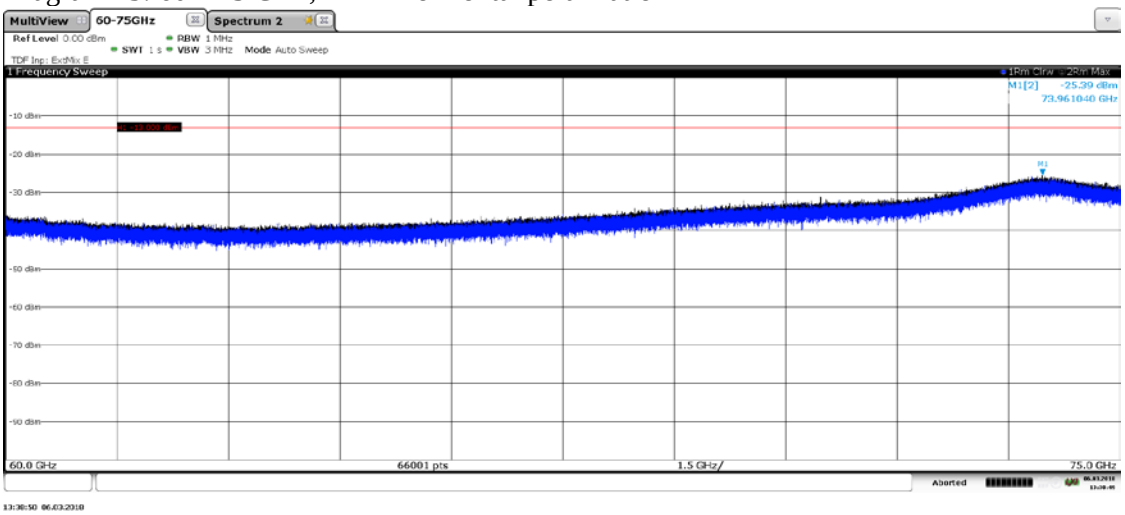


Diagram 24: 60 – 75 GHz, EIRP Vertical polarization

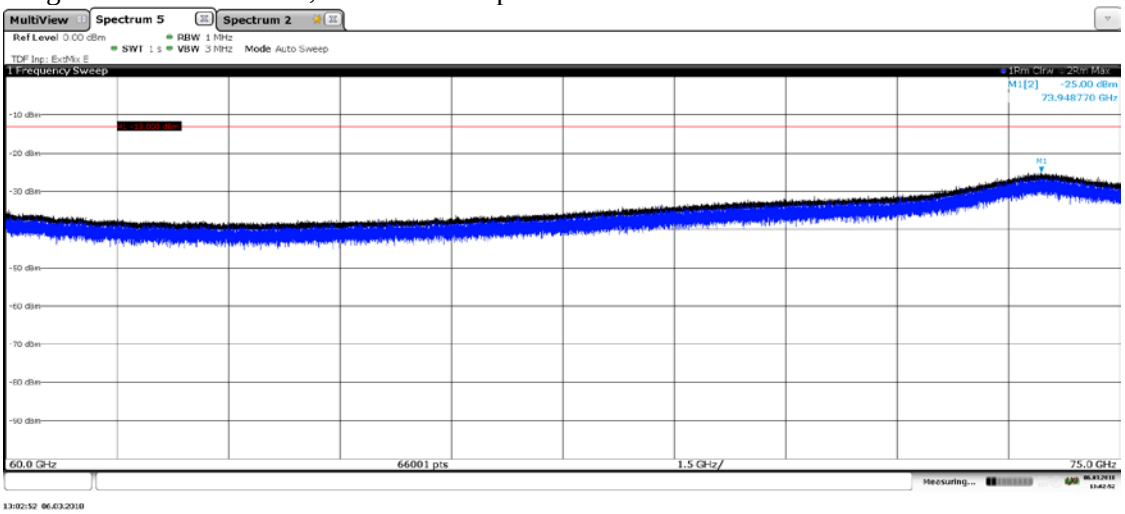


Diagram 25: 75 – 90 GHz, EIRP Horizontal polarization

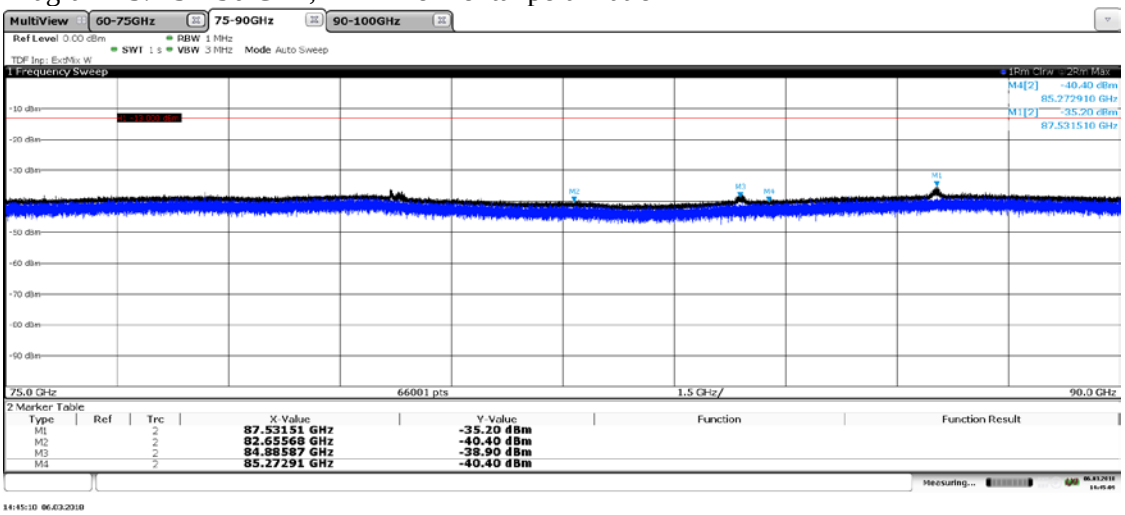


Diagram 26: 75 – 90 GHz, EIRP Vertical polarization

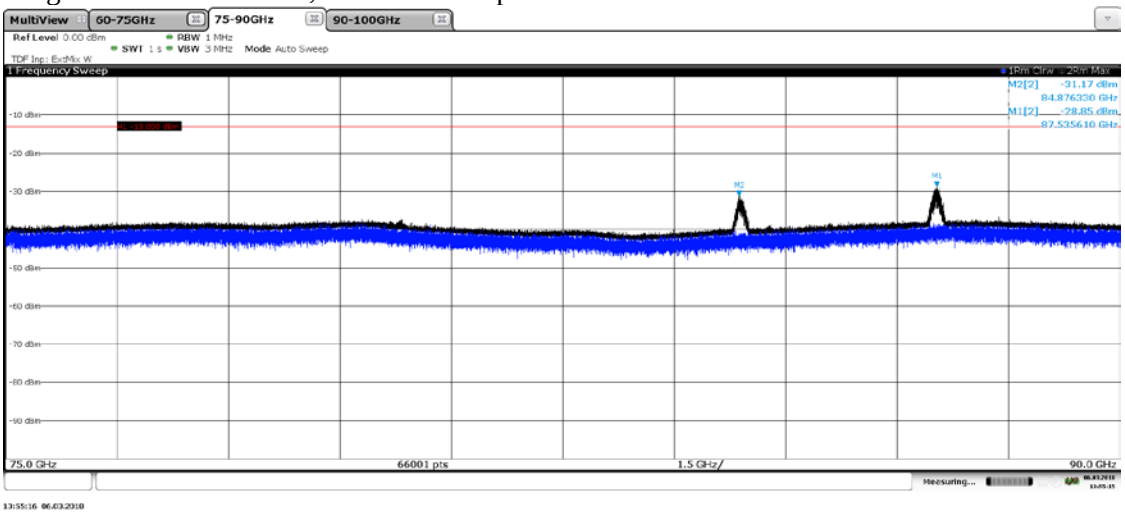


Diagram 27: 90 – 100 GHz, EIRP Horizontal polarization

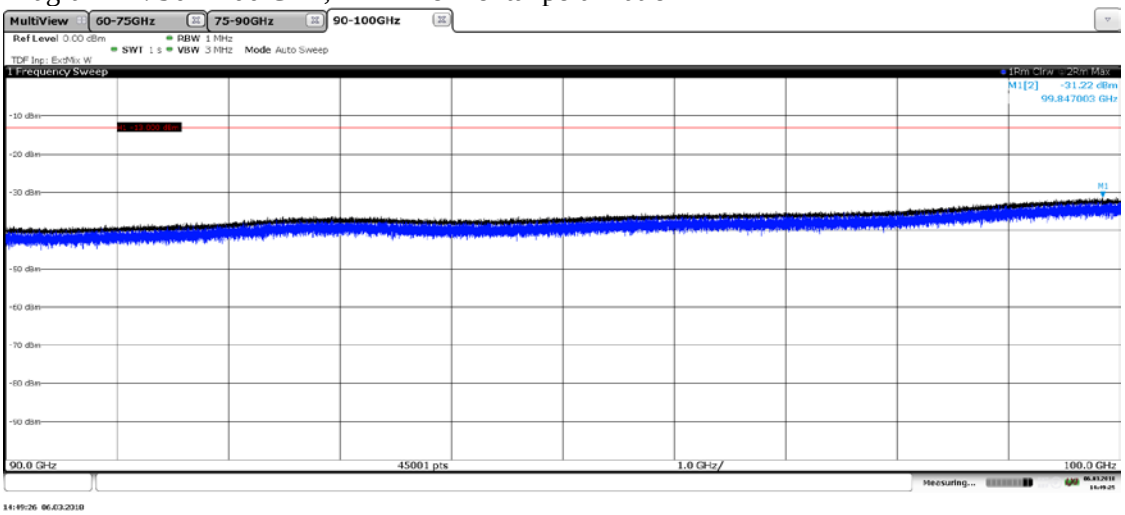


Diagram 28: 90 – 100 GHz, EIRP Vertical polarization

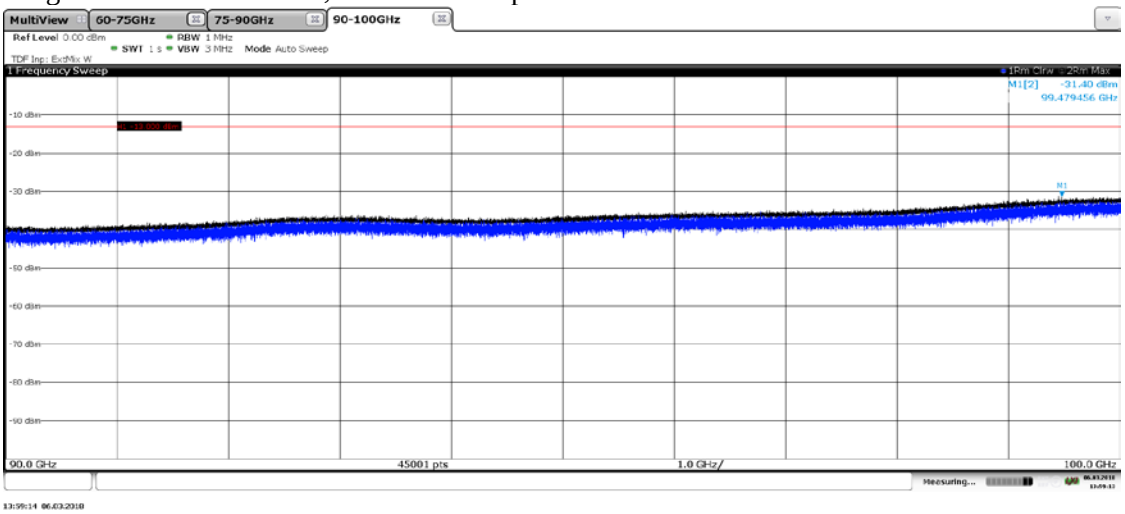
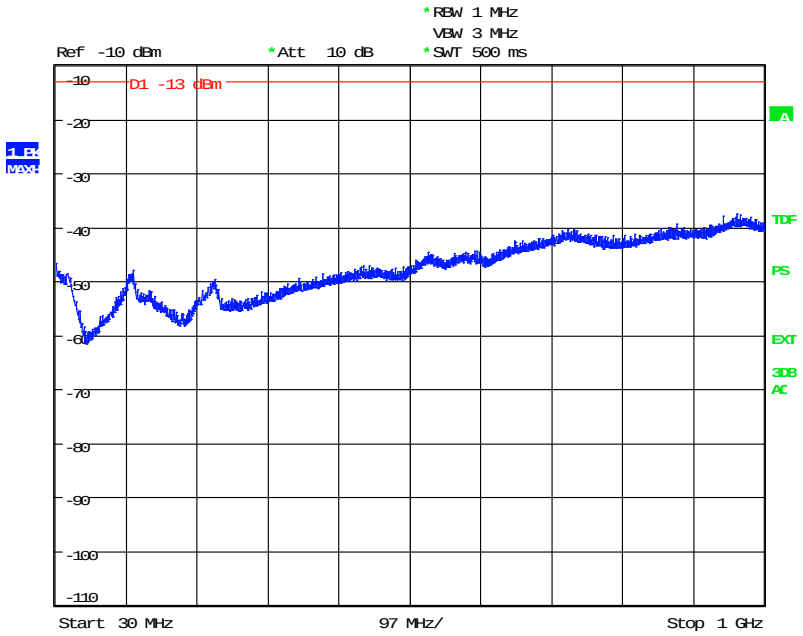
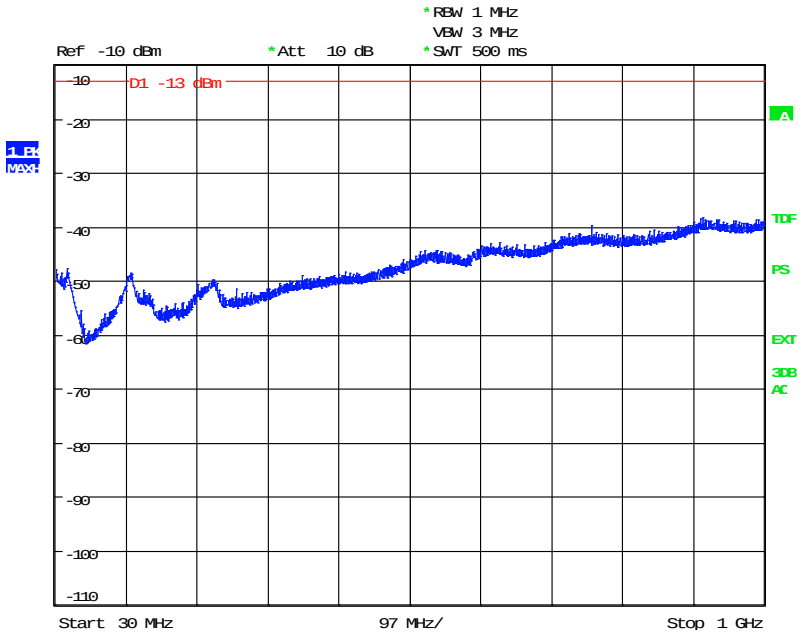


Diagram 29: 30 – 1000 MHz, EIRP Horizontal polarization



Date: 7.MAR.2018 09:53:31

Diagram 30: 30 – 1000 MHz, EIRP Vertical polarization



Date: 7.MAR.2018 09:49:39

Diagram 31: 1 – 18 GHz, EIRP Horizontal polarization

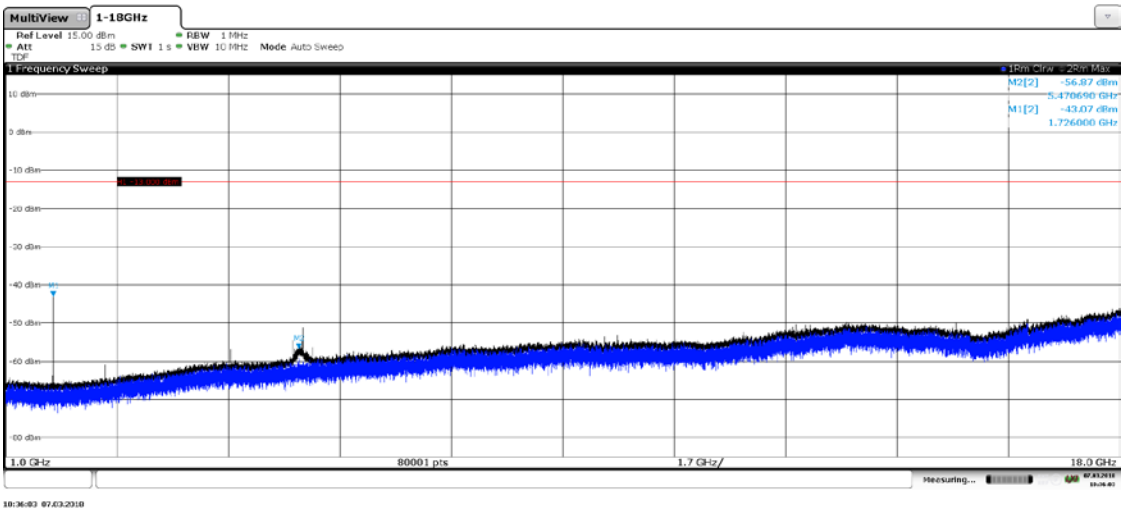


Diagram 32: 1 – 18 GHz, EIRP Vertical polarization

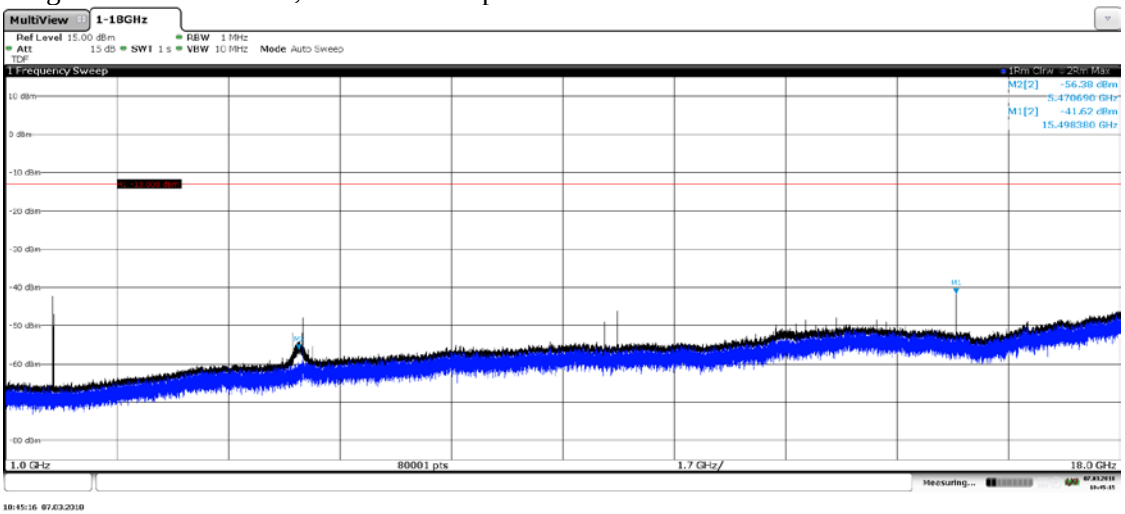
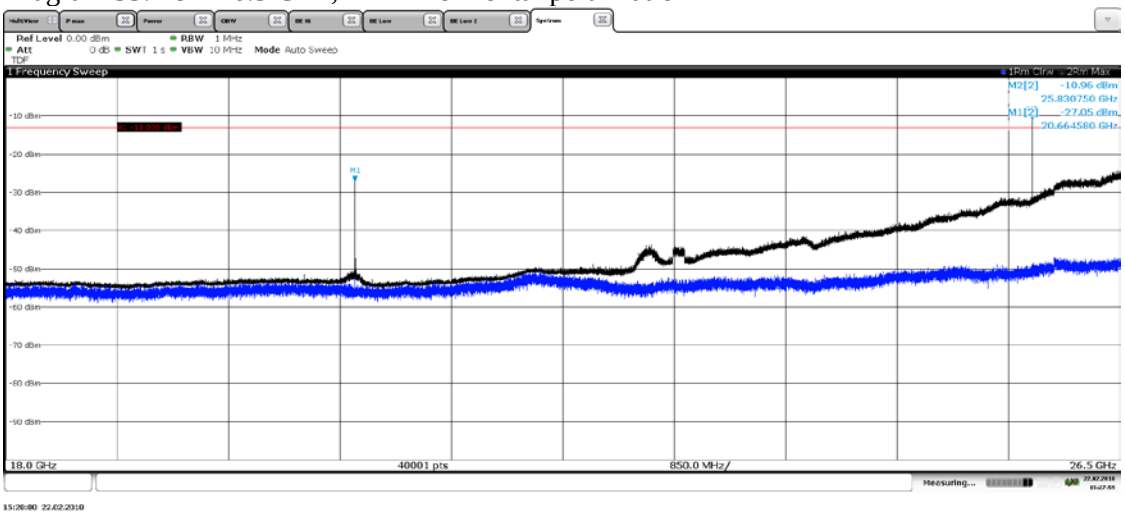


Diagram 33: 18 – 26.5 GHz, EIRP Horizontal polarization



Note: Even though the EIRP levels fail at 25.83 GHz the TRP levels are within limit.

Diagram 34: 18 – 26.5 GHz, EIRP Vertical polarization

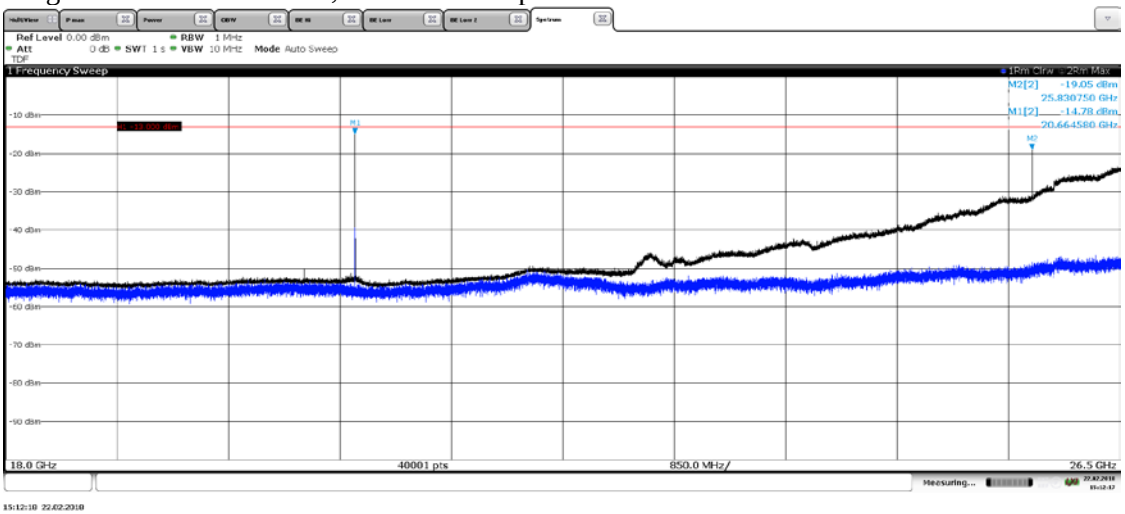


Diagram 35: 20.56 – 20.476 GHz, Two Cut TRP

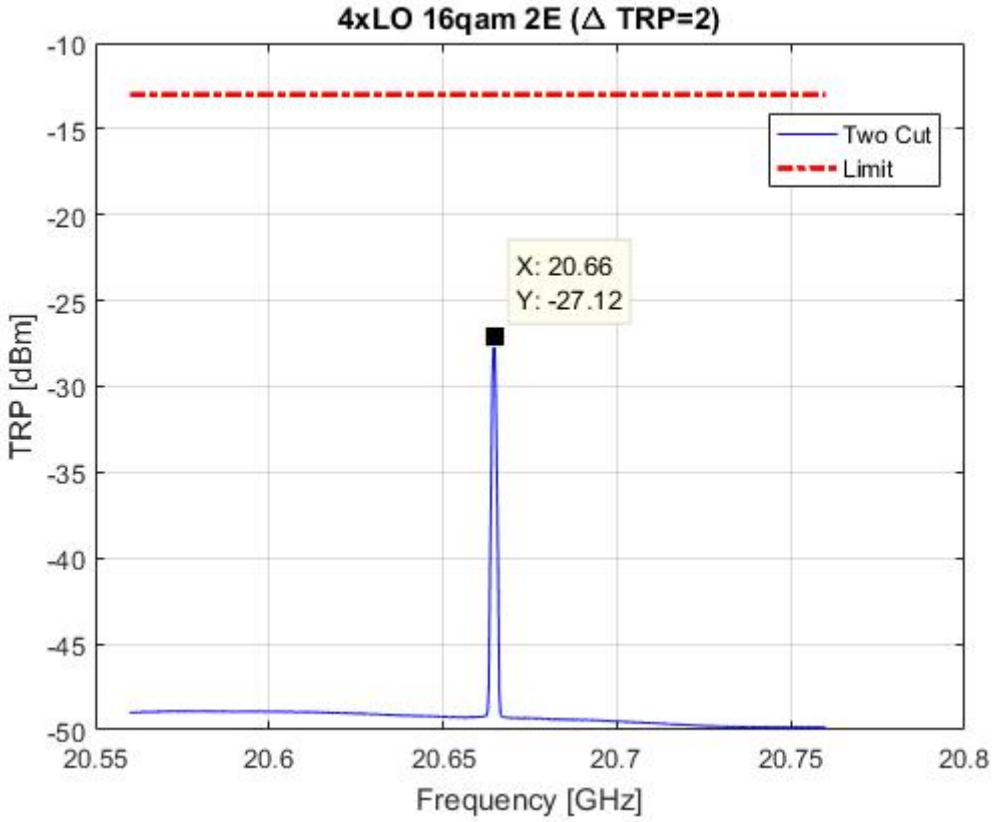


Diagram 36: 25.82 – 25.84 GHz, Two Cut TRP

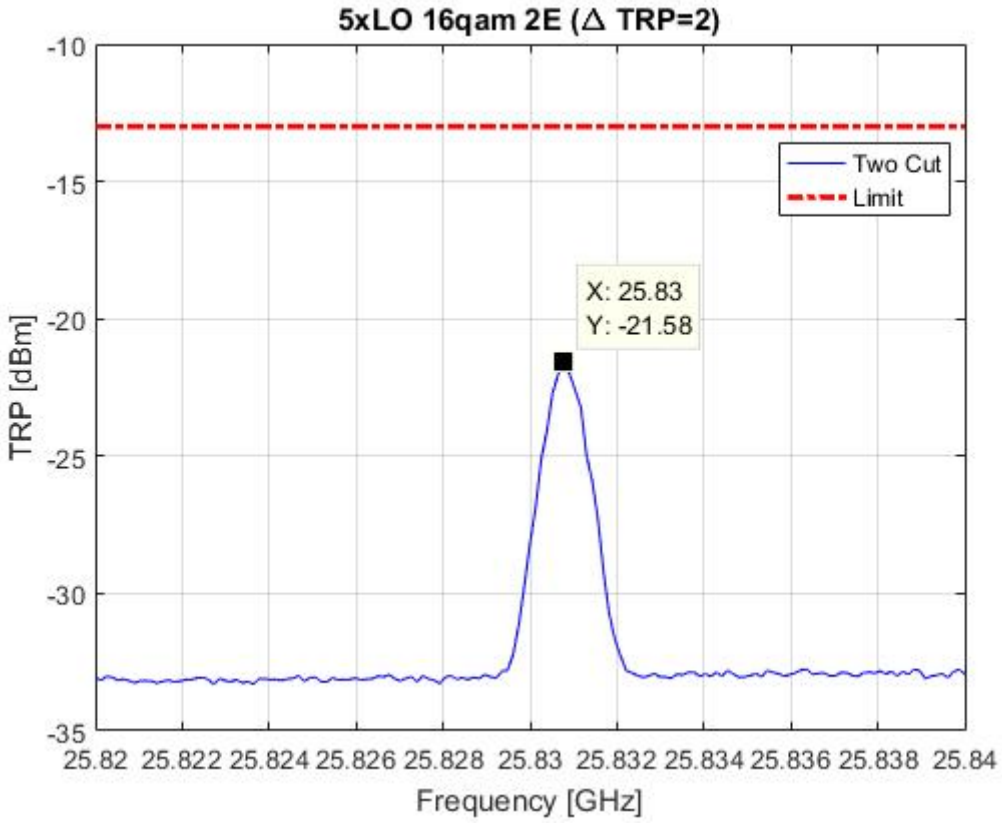


Diagram 37: 26.5 – 27.4 GHz, EIRP Horizontal polarization

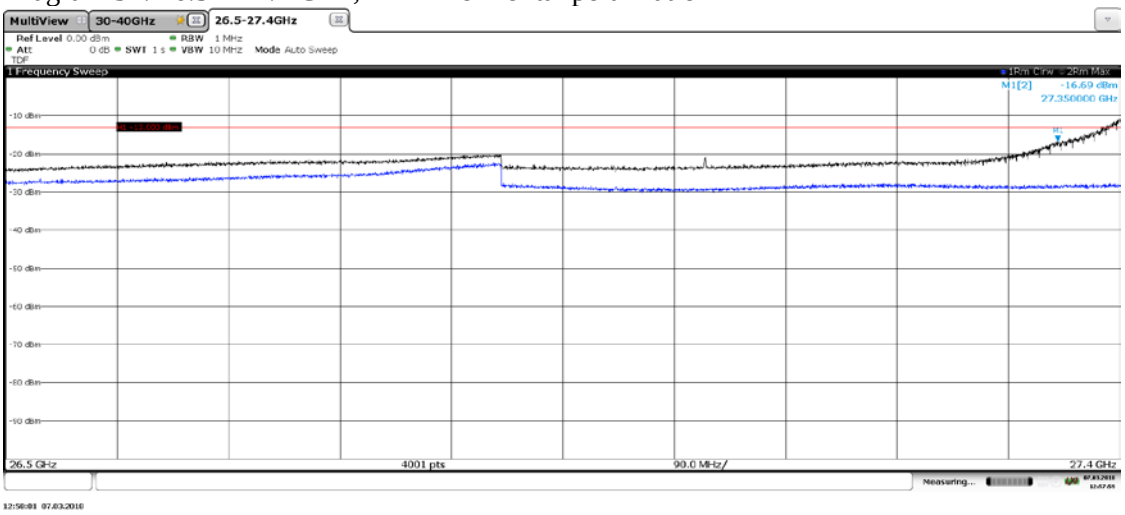


Diagram 48: 26.5 – 27.4 GHz, EIRP Vertical polarization

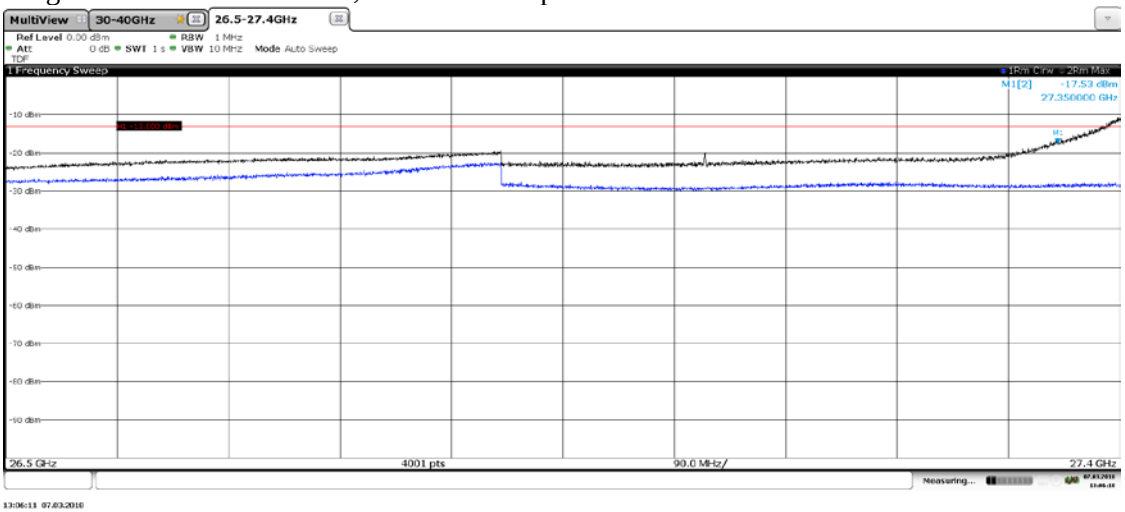


Diagram 39: 27.35 – 27.5 GHz, EIRP Horizontal polarization

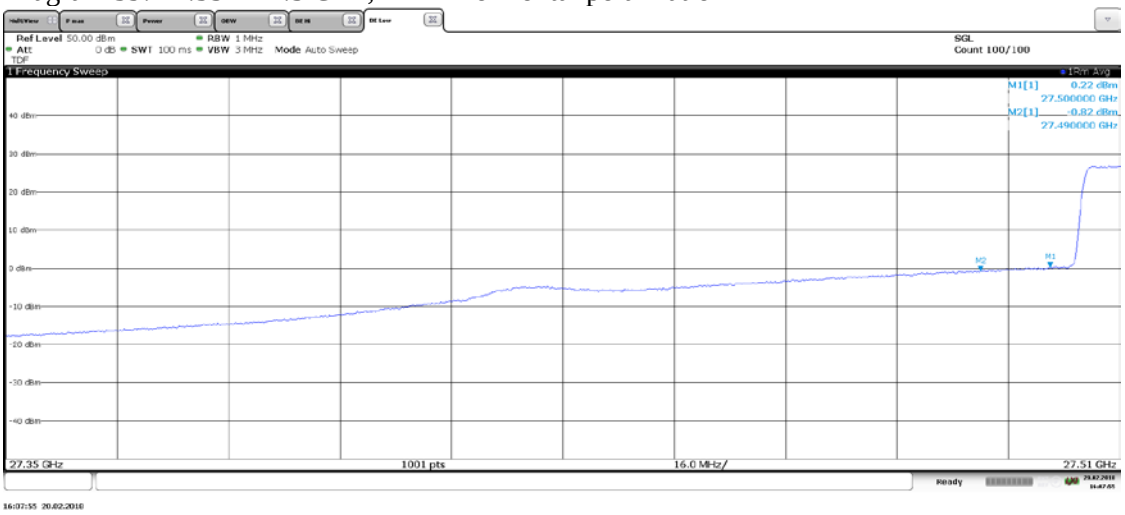
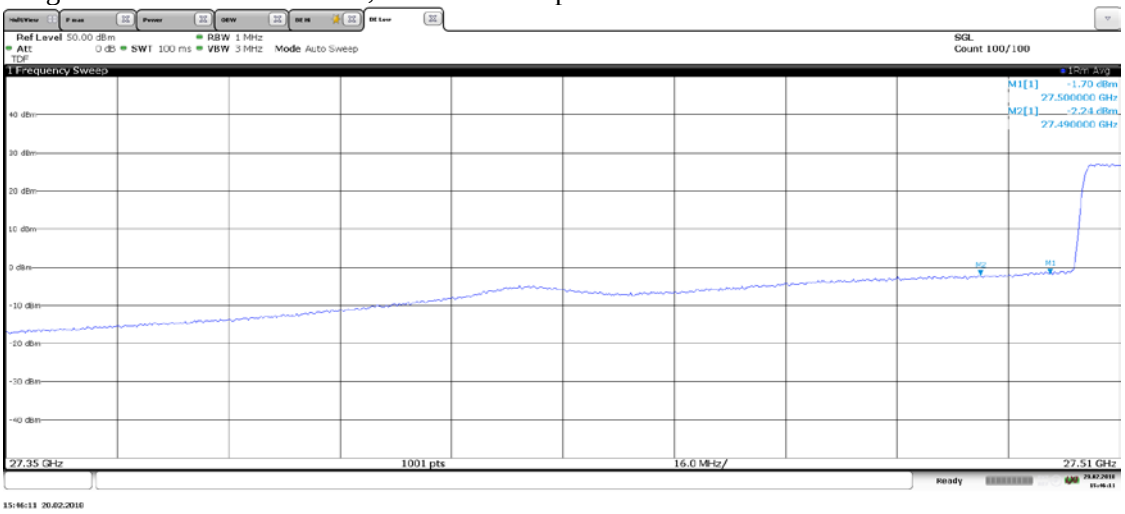


Diagram 40: 27.35 – 27.5 GHz, EIRP Vertical polarization



Note: According to KDB 662911 D02 The conducted Power value can be calculated:

Power EIRP Be Low Hor/ Ver [dbm]	Power EIRP Be Low - 10MHz[dBm]	Antenna Gain[dBi]	Conducted power (Hor/ Ver) – antenna gain. BE/ Be -10MHz [dBm]
0.22/ -1.7	-0.82/ -2.24	24	-21.62/ -22.46

Diagram 41: 28.35 – 28.5 GHz, Horizontal polarization

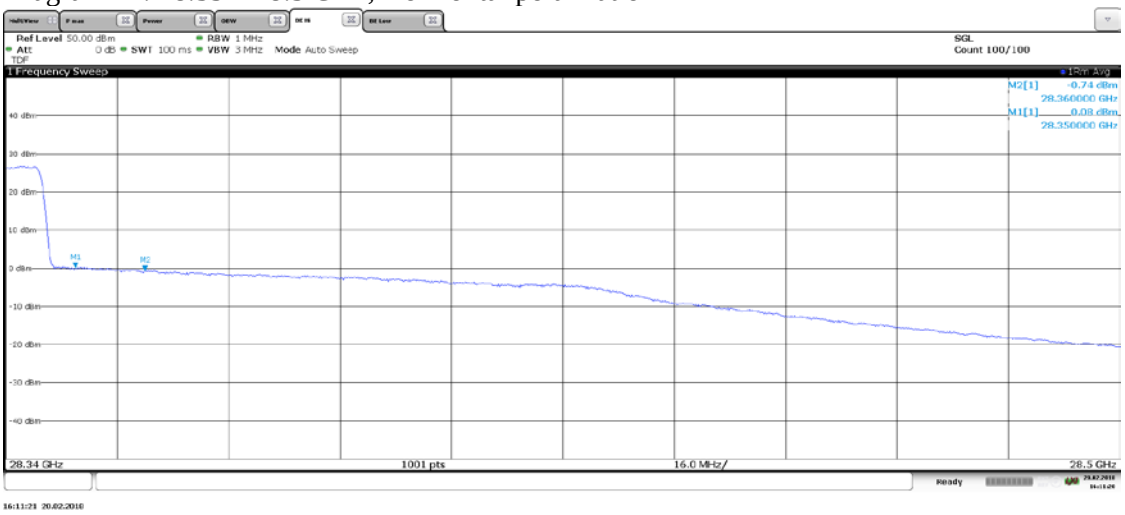
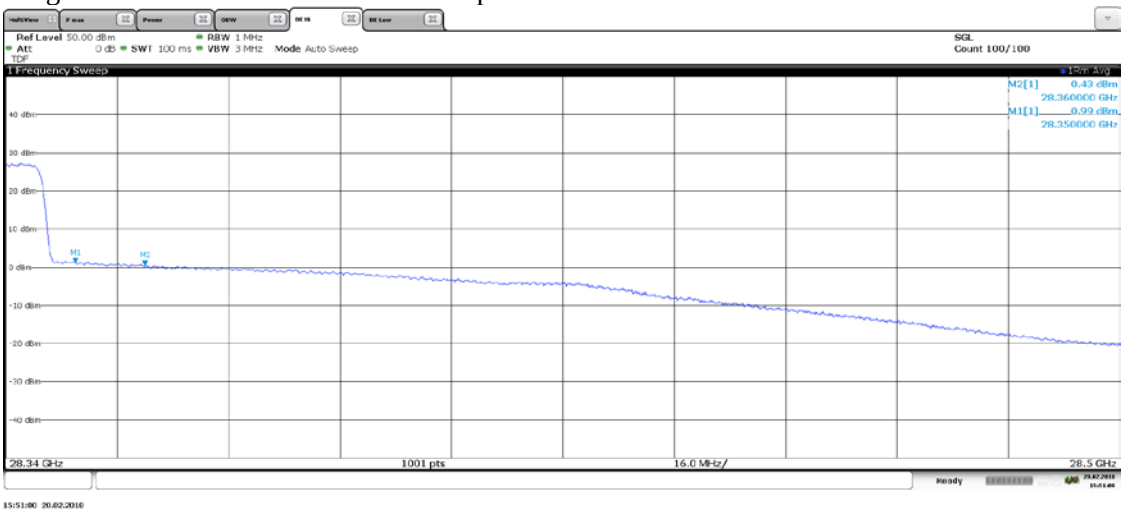


Diagram 42: 28.35 – 28.5 GHz Vertical polarization



Note: According to KDB 662911 D02 The conducted Power value can be calculated:

Power EIRP Be High Hor/ Ver [dbm]	Power EIRP Be High + 10MHz[dBm]	Antenna Gain[dBi]	Conducted power (Hor/ Ver) – antenna gain. BE/ Be + 10MHz [dBm]
0.08/ 0.99	-0.74/ 0.43	24	-20.43/ -21.11

Diagram 43: 28.4 – 30 GHz, EIRP Horizontal polarization

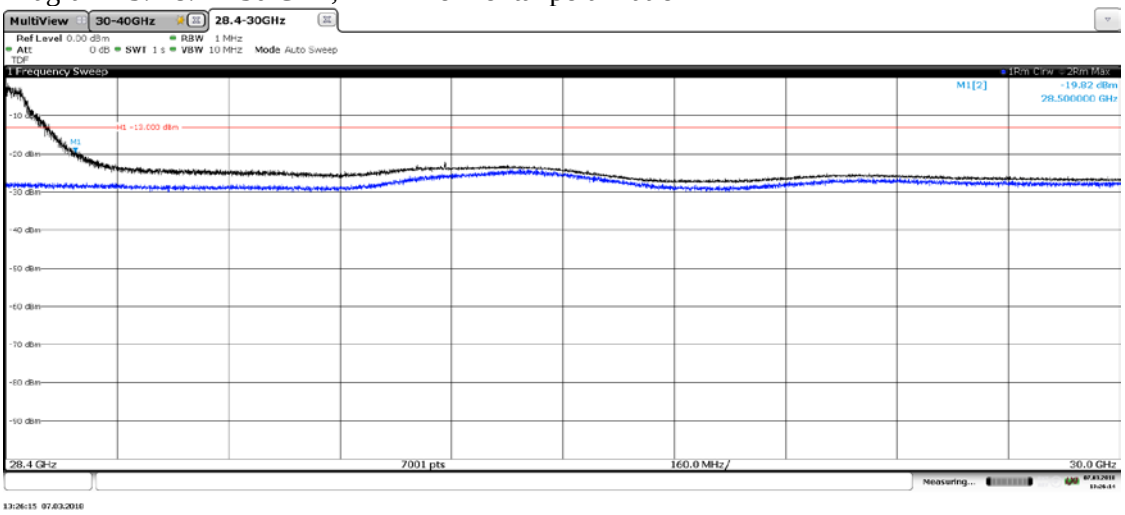


Diagram 44: 28.4 – 30 GHz, EIRP Vertical polarization

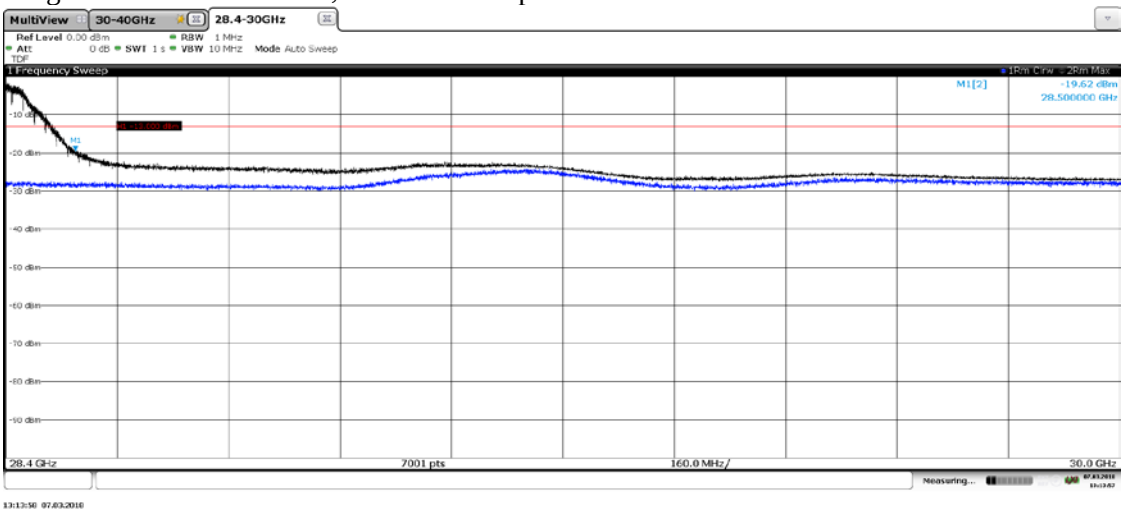


Diagram 45: 30 – 40 GHz, EIRP Horizontal polarization

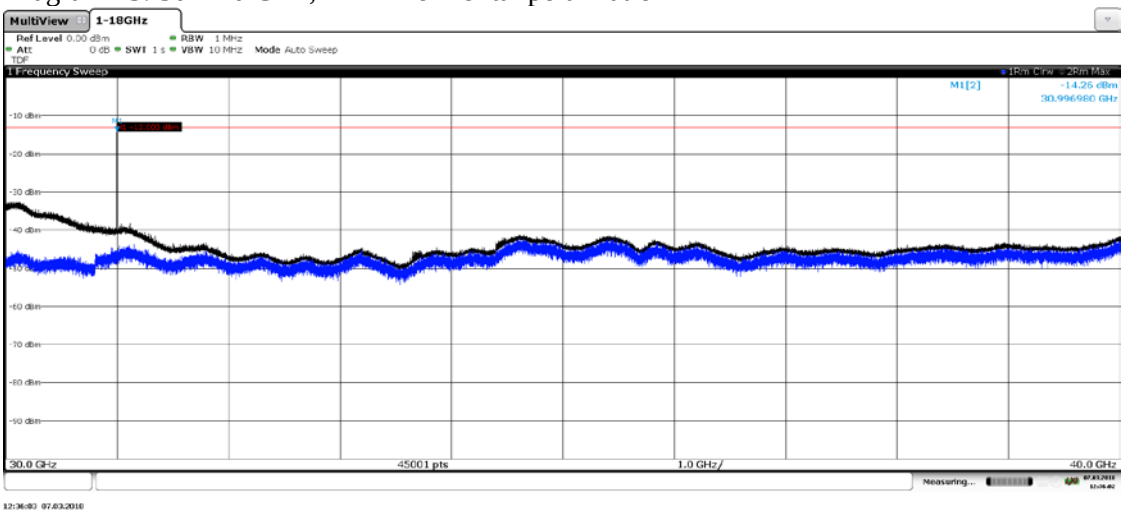


Diagram 46: 30 – 40 GHz, EIRP Vertical polarization

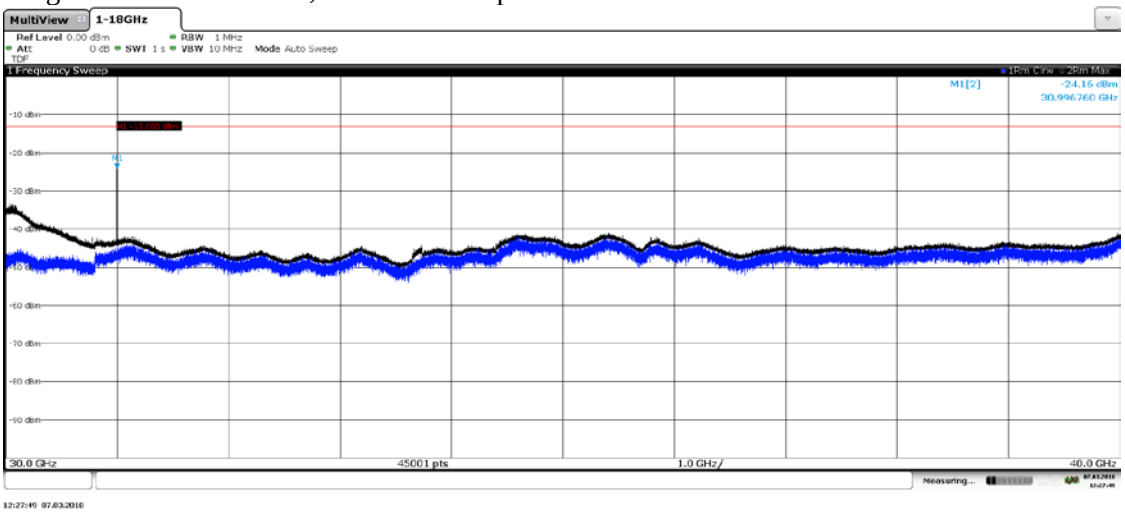


Diagram 47: 30.9 – 31.1 GHz, Two Cut TRP

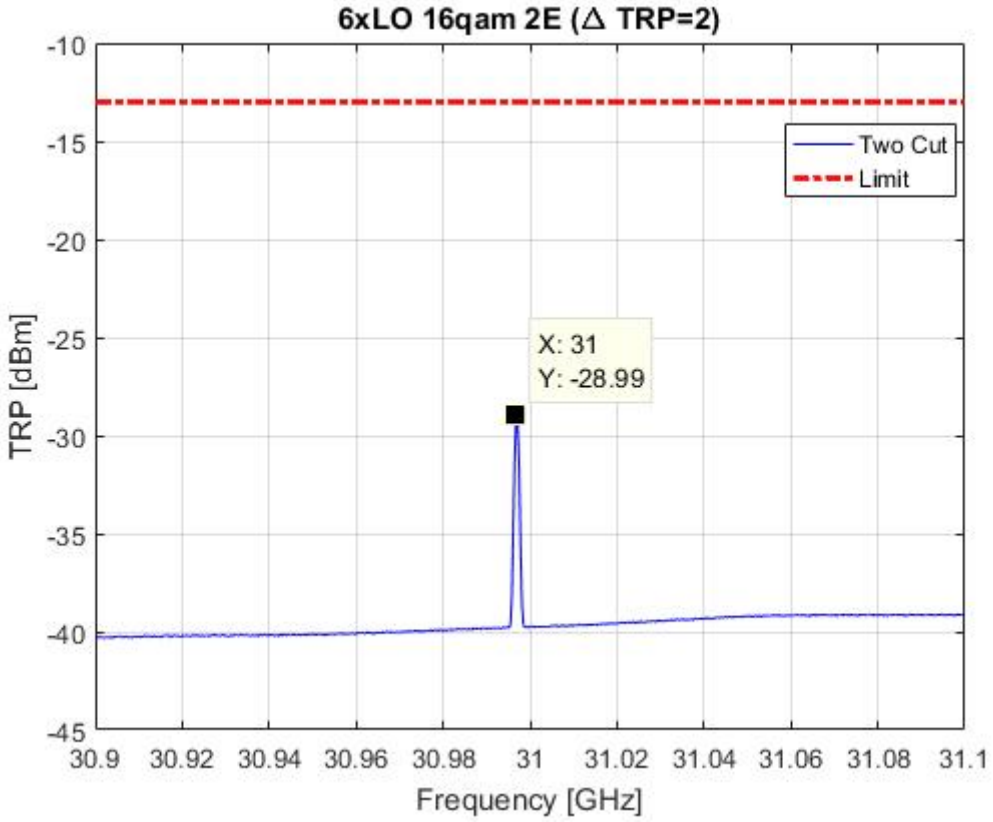


Diagram 48: 40 – 60 GHz, EIRP Horizontal polarization

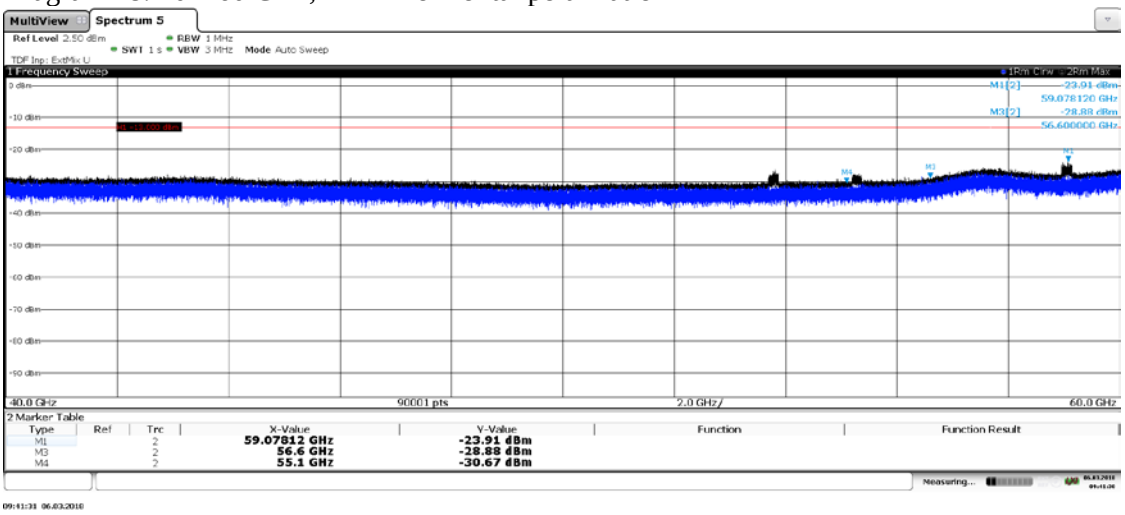


Diagram 49: 40 – 60 GHz, EIRP Vertical polarization

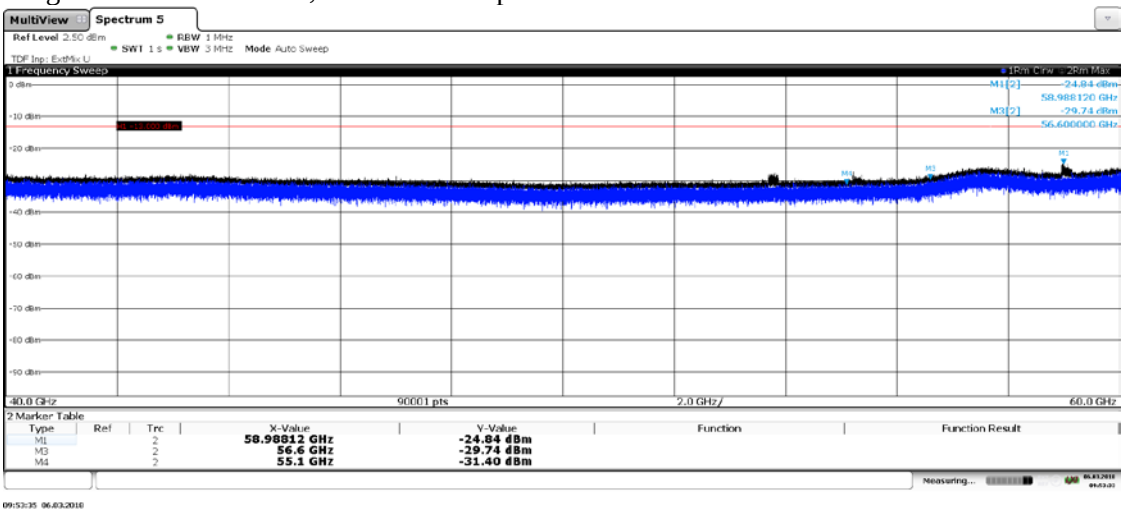


Diagram 50: 60 – 75 GHz, EIRP Horizontal polarization

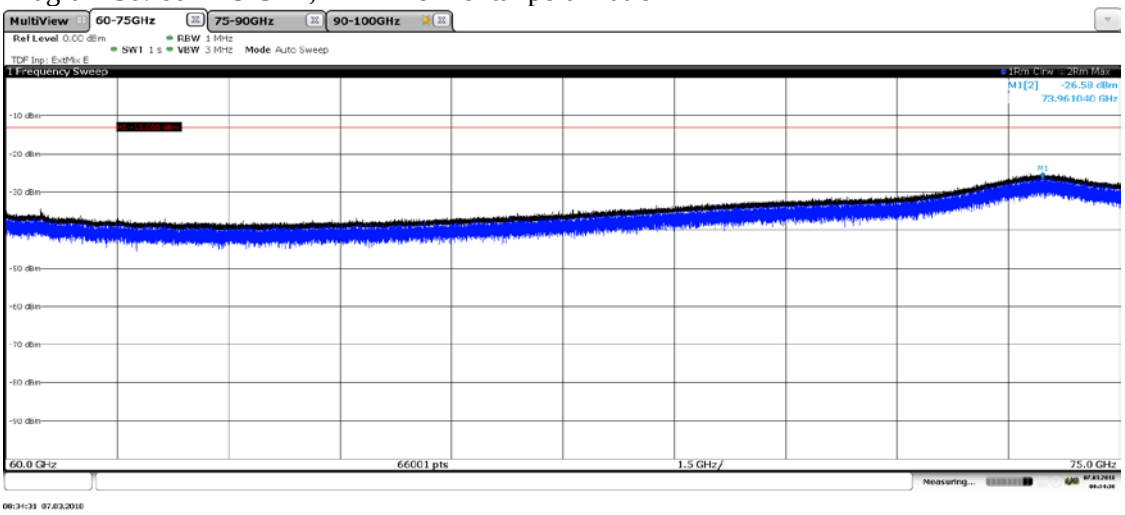


Diagram 51: 60 – 75 GHz, EIRP Vertical polarization

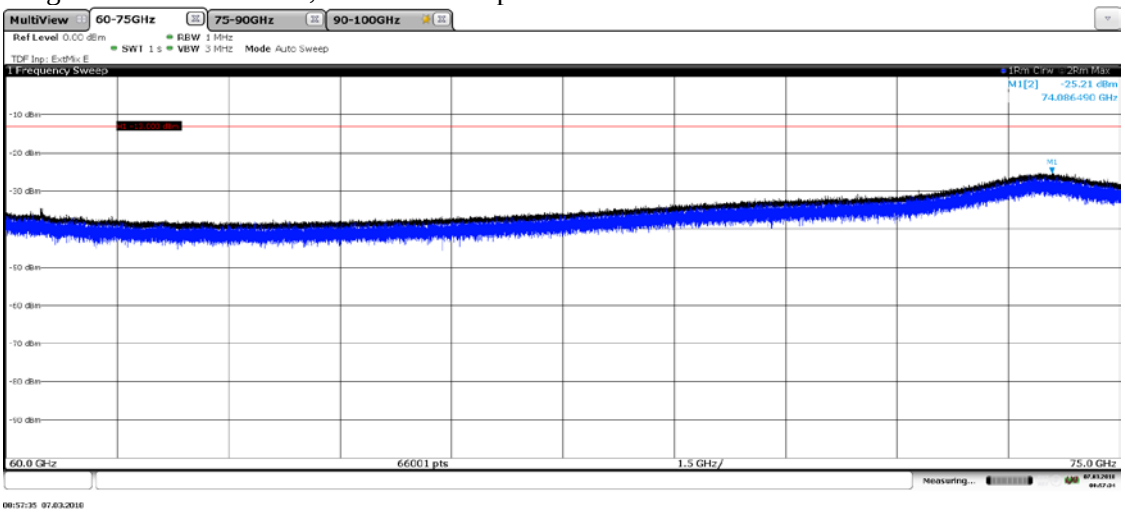


Diagram 52: 75 – 90 GHz, EIRP Horizontal polarization

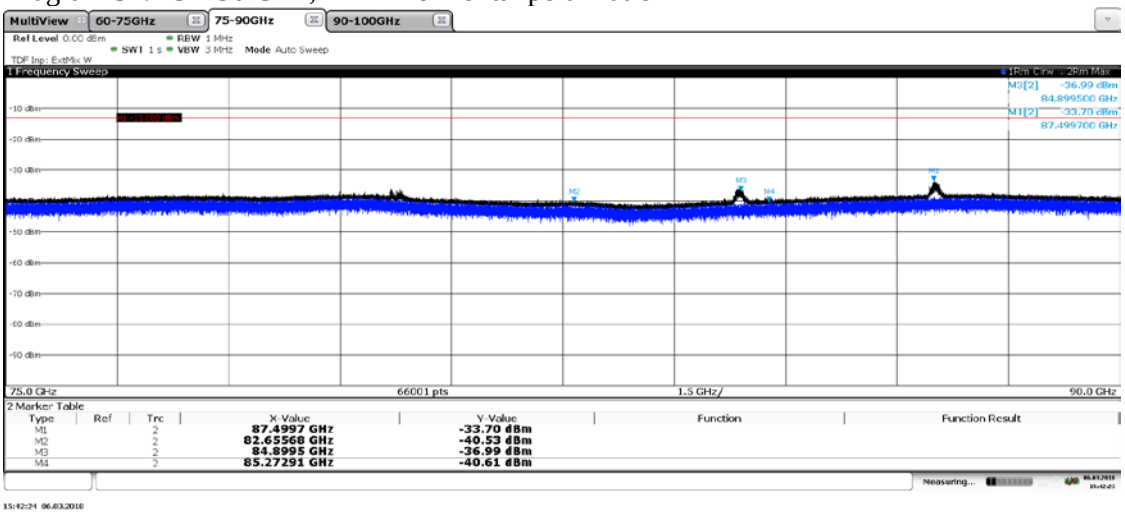


Diagram 53: 75 – 90 GHz, EIRP Vertical polarization

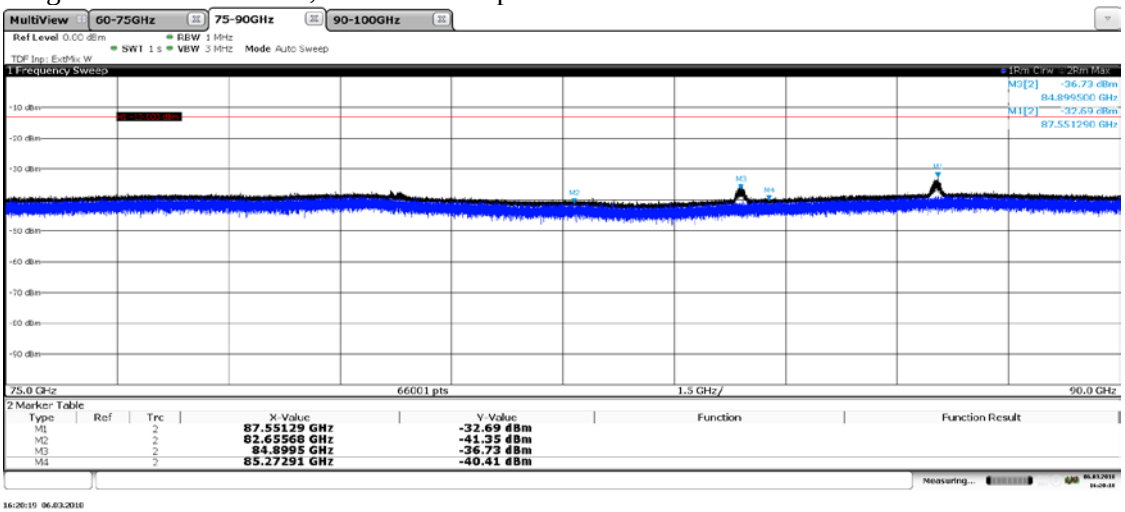


Diagram 54: 90 – 100 GHz, EIRP Horizontal polarization

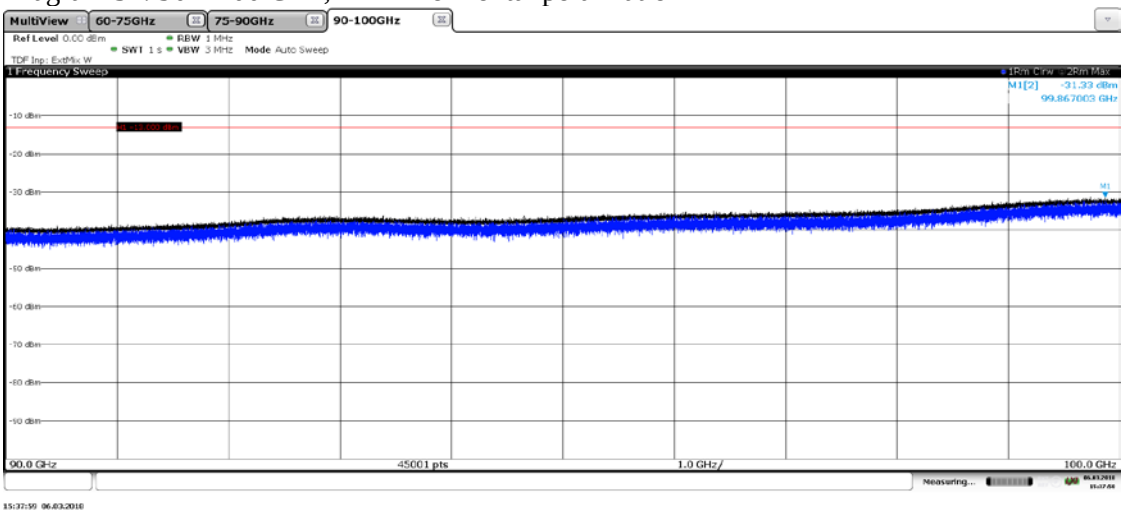
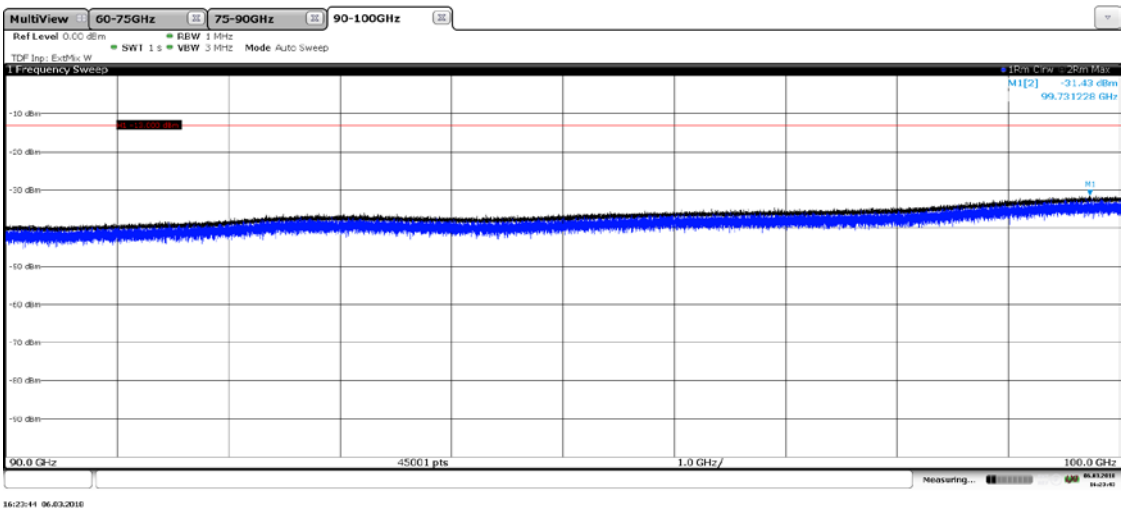


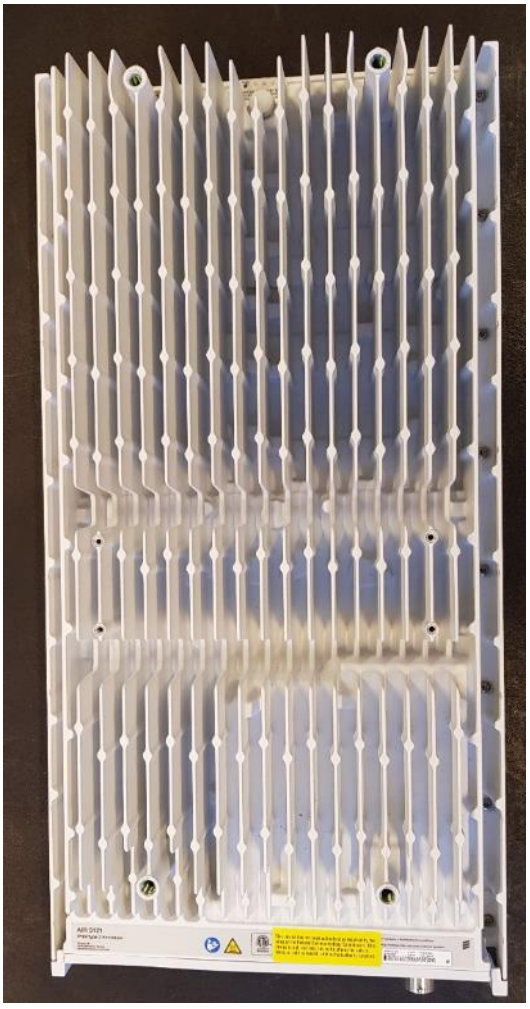
Diagram 55: 90 – 100 GHz, EIRP Vertical polarization



Photos of test object

Front side

Rear side

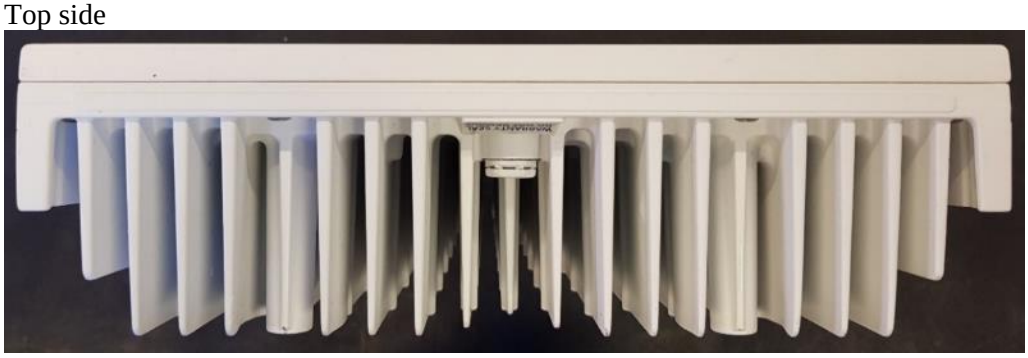


Test object label PAAM/2:

Test object label PAAM/3:

Bottom side

Top side



Left side

Right side

SFP module Data 1:

SFP module Data 2: