



BNetzA-CAB-21/21-21

# Test Report

**Test report no.:** 22057392-27877-0

**Date of issue:** 2022-07-29

**Test result:** The test item - **passed** - and complies with the listed standards.

## Applicant

*Continental Automotive Technologies GmbH*

## Manufacturer

*Continental Automotive Technologies GmbH*

## Test Item

*TIS-10DL*

## Radio Frequency Testing according to:

**Title 47  
FCC Regulations Subpart 15C  
§15.231**

Tested by *B.Sc. Piotr Sardyko*  
(name, function, signature) *Deputy Test Lab Manager Radio*

  
signature

Approved by *Andreas Bender*  
(name, function, signature) *Deputy Managing Director*

  
signature

**Applicant and Test item details**

<b>Applicant</b>	Continental Automotive Technologies GmbH Siemensstr. 12, 93055 Regensburg Germany
<b>Manufacturer</b>	Continental Automotive Technologies GmbH Siemensstr. 12, 93055 Regensburg Germany
<b>Test item description</b>	Tyre Pressure Monitoring Sensor
<b>Model/Type reference</b>	TIS-10DL
<b>FCC ID</b>	KR5TIS-10DL

**Disclaimer and Notes**

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Within this test report, a  point /  comma is used as a decimal separator.  
If otherwise, a detailed note is added adjacent to its use.

Decision rule: Binary Statement for Simple Acceptance Rule according ILAC-G8:09/2019

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## 2 GENERAL INFORMATION

### 2.1 Administrative details

Testing laboratory	<b>IBL-Lab GmbH</b> Heinrich-Hertz-Allee 7 66386 Sankt Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: <a href="http://www.ib-lenhardt.de">www.ib-lenhardt.de</a> E-Mail: <a href="mailto:info@ib-lenhardt.de">info@ib-lenhardt.de</a>
Accreditation	The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkKS) in compliance with DIN EN ISO/IEC 17025:2018.  Scope of testing and registration number: <ul style="list-style-type: none"> <li>Electromagnetic Compatibility and Telecommunication (FCC requirements) <a href="#">D-PL-21375-01-03</a></li> <li>Telekommunikation (TK) <a href="#">D-PL-21375-01-05</a></li> </ul> ISED Company Number 27156 Testing Laboratory CAB Identifier DE0020  Website DAkKS: <a href="https://www.dakks.de/">https://www.dakks.de/</a>  The Deutsche Akkreditierungsstelle GmbH (DAkKS) is also a signatory to the <a href="#">ILAC Mutual Recognition Arrangement</a>
Date of receipt of test samples	2022-07-06
Start – End of tests	2022-07-06 – 2022-07-12

### 2.2 Possible verdicts of the results

Test sample meets the requirements	P (PASS) – the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) – the measured value is above the acceptance limit, AL = TL
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

### 2.3 Observations

No additional observations other than the reported observations within this test report have been made.

### 2.4 Opinions and Interpretations

No appropriate opinions or interpretations according ISO/IEC 17025:2017 clause 7.8.7 are within this test report.

### 2.5 Revision History

-0 Initial Version

### 2.6 Further documents

List of further applicable documents belonging to the present test report:

Measurement plots:	22057392-27877-0_Annex A
EUT photographs:	22057392-27877-0_Annex B
Test setup photographs:	22057392-27877-0_Annex C

## 2.7 Formula for determination of correction values ( $E_c$ )

$$E_c = E_R + AF + C_L + D_F - G_A \quad (1)$$

$$M = L_T - E_c \quad (2)$$

$E_c$  = Electrical field – corrected value

$E_R$  = Receiver reading

$M$  = Margin

$L_T$  = Limit

$AF$  = Antenna factor

$C_L$  = Cable loss

$D_F$  = Distance correction factor (if used)

$G_A$  = Gain of pre-amplifier (if used)

All units are dB-units, positive margin means value is below limit.

## 2.8 Software/Firmware used for measurements

All measurements were done directly with spectrum analyzer or SW R&S EMC32.

In some measurements (please see test equipment list for each test) R&S ESW 26 was used (please see chapter 8).

(Instrument) Firmware Version: **1.70**

In some measurements (please see test equipment list for each test) R&S FSW 50 was used (please see chapter 8).

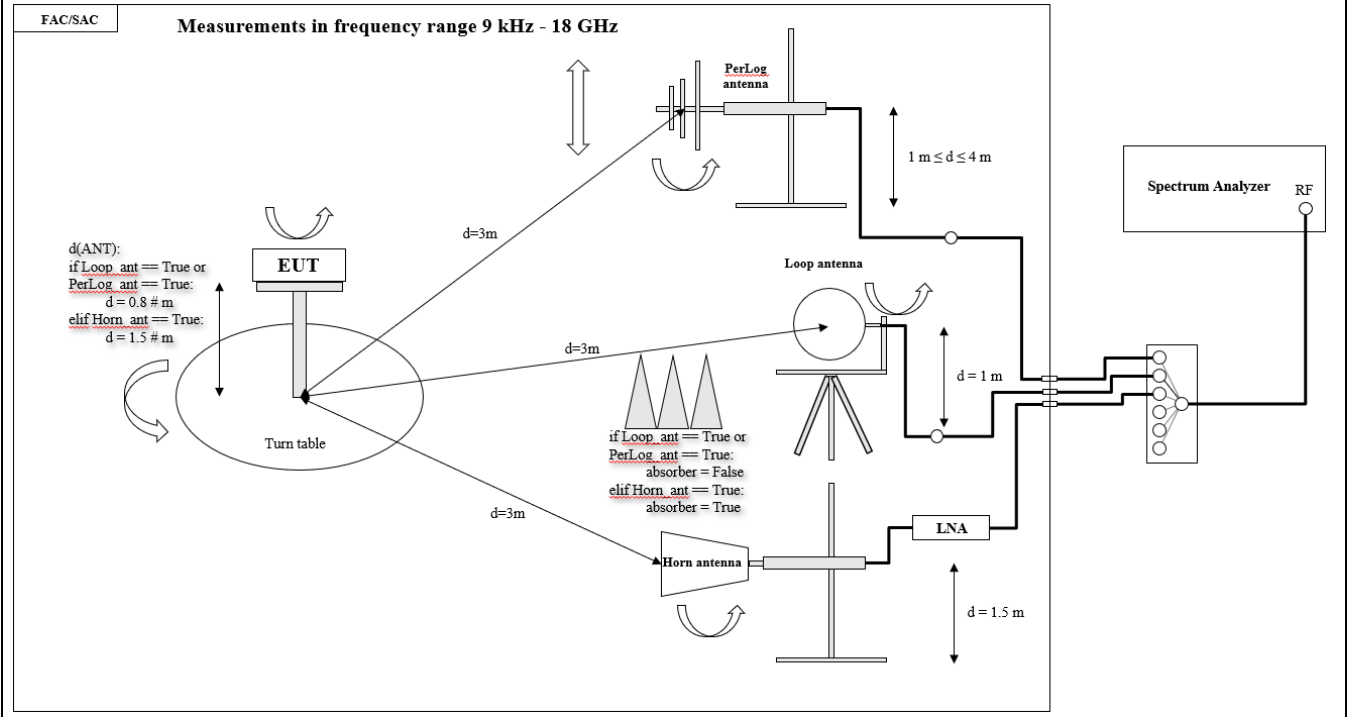
(Instrument) Firmware Version: **4.61**

In some measurements SW R&S EMC32 was used.

Version: **11.10.00**

## 2.9 Block diagrams

Block diagram 1:



### 3 ENVIRONMENTAL & TEST CONDITIONS

#### 3.1 Environmental conditions

Temperature	20°C ± 5°C
Relative humidity	25-75 % r.H.
Barometric Pressure	860-1060 mbar
Power supply	3V battery

### 4 TEST STANDARDS AND REFERENCES

#### Test standard (accredited)

FCC CFR Title 47 Part 15 Subpart C:2016	---
ANSI C63.10: 2013	---

#### Test standard (not accredited)

None
------

Reference	Description
none	---

## 5 EQUIPMENT UNDER TEST (EUT)

### 5.1 Product Description\*

The tire pressure monitoring system monitors a vehicle's tire pressure whilst driving or stationary. An electronic unit (wheel unit) inside each tire, mounted to the valve stem, periodically measures the actual tire pressure. By means of RF communication, this pressure information is transmitted to the RF receiver.

\*: declared by the applicant

### 5.2 Technical Data of Equipment\*

Number of channel:	1
Channel bandwidth:	103.7 kHz (99 % OBW)
Type of modulation:	Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK)
Channel tested:	$f_{\text{cent}}$ : 315 MHz
Spectrum Access Mechanism:	Duty Cycle
Antenna Type:	Internal
Antenna connector:	None
Type of power source:	3V battery (DC)
Test source voltage:	Vmin: 2.1 VDC, Vnom: 3 VDC, Vmax: 3.2 VDC

\*: declared by the applicant

### 5.3 Test Item (Equipment Under Test) Description\*

Short designation	EUT Model	EUT Description	Serial number	Hardware status	Software status
EUT A	TIS-10DL	TPMS	N/A	A2C15125000	FF02

\*: declared by the applicant

### 5.4 Auxiliary Equipment (AE) Description\*

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE1	-	LF trigger tool	-	-

\*: declared by the applicant

### 5.5 Test Item Operating Modes Description\*

EUT operating mode no.	Description of operating modes	Additional information
op. 1	Repetition of FSK frames	No other command can be sent until the 4 minutes expires. FSK.
op. 2	Repetition of ASK frames	No other command can be sent until the 4 minutes Expires. ASK.



op. 3	WUP + burst	Emission of WUP and then data frames (16s periodic). ASK + FSK modulation at the same time. Emission of burst during 4 minutes 16s periodic Tx. It is the mode, where Tx sequence is done periodically and when silent period is the smallest. Thus, this mode is a worst case mode for Transmit time test.
op. 4	Mode 5	-
op. 5	CW for 4 min	No other command can be sent until the 4 minutes expires. CW.

\*: declared by the applicant

### 5.6 Test Item Set-ups Description

set. 1	EUT A
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### 5.7 Normal test conditions

Temperatur, [°C]		Voltage, [V]	
Tnom	20 ± 5	Vnom	3

### 5.8 Additional Information

Test items differences	None
Additional application considerations to test a component or sub-assembly	None

## 6 SUMMARY OF TEST RESULTS

### Test specification

FCC 15.231

Requirement / Test Case	Test Conditions	Set-up	Operating mode	Result / Remark	Verdict
Fundamental field strength	Nominal	1	1,2	None	Pass
Radiated field strength measurements	Nominal	1	5	None	Pass
Transmit time	Nominal	1	3	None	Pass
Occupied Bandwidth	Nominal	1	3	None	Pass

### Notes

None

### Comments and observations

None

## 7 TEST RESULTS

### 7.1 Fundamental field strength

#### Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: C1, R1, A2

#### Description

The measurement was done according to ANSI C63.10-2013, Chapter 6.5.  
See photos in Annex C for test Set-up and block diagram 1 in Chapter 2.9.  
For spectrum analyzer settings please see plots in Annex A.

#### Limits

According to FCC 15.231(e) Field strength of fundamental:

Frequency [MHz]	Field strength@3m		Measurement distance [meters]	Remarks
	[ $\mu\text{V/m}$ ]	[dB $\mu\text{V/m}$ ]		
40.66-40.70	1000	60	3	40.66-40.70
70-130	500	53.98		70-130
130-174	500 to 1500	53.98 to 63.52		130-174
174-260	1500	63.52		174-260
260-470	1500 to 5000	63.52 to 73.98		260-470
Above 470	5000	73.98		Above 470

Measurement Level = Reading Level + Correction Factor.

Limit( $\mu\text{V/m}@433.9\text{MHz}$ ):

$X_{11}=260, Y_{11}=1500, X_{12}=470, Y_{12}=5000$

$f(x)=mx+b, m=(5000-1500)/(470-260)=3500/210=16.66, b=f(x)-mx=5000-16.66*470=-2833.33$

$\Rightarrow f(x)=16.66*x-2833.33 \Rightarrow f(315.95)=16.66*315.95-2833.33=2415.83$

Limit dB $\mu\text{V/m}$  RMS/Peak:

Average/RMS Limit =  $20\text{LOG}(2415.83) = 67.66 \text{ dB}\mu\text{V/m}$ . Peak Limit = RMS Limit + 20 dB = **87.66 dB $\mu\text{V/m}$** .

#### Results Peak Detector\*

Set./ Op.	Detector	Peak field strength, [dB $\mu\text{V/m}$ ]	Limit Peak, [dB $\mu\text{V/m}$ ]	Margin [dB]	Verdict
Set.1, Op. 1	Peak	68.94	87.66	18.72	Pass
Set.1, Op. 1	RMS	61.01	67.66	6.65	Pass
Set.1, Op. 2	Peak	68.78	87.66	18.88	Pass
Set.1, Op. 2	RMS	59.51	67.66	8.15	Pass

\* Please see measurement plots in Annex A.

## 7.2 Radiated field strength measurements

### Test equipment

#### Frequency range 9 kHz – 30 MHz

Measurement in a semianechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex B). The measurement was done with software R&S EMC 32 V11.00.

Radiated: A1, C1, R1

#### Frequency range 30 MHz – 1 GHz

Measurement in a semianechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex B). The measurement was done with software R&S EMC 32 V11.00.

Radiated: A2, C1, R1

#### Frequency range 1 GHz – 5 GHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex B). The measurement was done directly with spectrum analyzer.

Radiated: A3, Amp1, C1, R1

### Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013.

The measurement antenna was situated in 3 m distance to the EUT.

RBW for frequency range 9 kHz- 30 MHz: 200 Hz, 9 kHz.

RBW for frequency range 30 MHz- 1 GHz: 120 kHz.

RBW for frequency range 1 GHz- 5 GHz: 1 MHz.

See photos in Annex C for test Set-up and block diagram in Chapter 2.9.

### Limits

According to FCC 15.209(a):

Frequency (MHz)	Magnetic field strength (HField) ( $\mu\text{A}/\text{m}$ )**	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490*	6.37/F (F in kHz)	2400/F(kHz)	300
0.490-1.705*	63.7/F (F in kHz)	24000/F(kHz)	30
1.705-30.0*	0.08	30	30

\* Limit line was corrected due to measurement distance of 3 m

\*\* the measurement was done with dBuV/m units. Please see the appropriate dBuV/m limits in the same table

### Limits

According to FCC 15.231(e) Field strength of spurious emission:

Frequency [MHz]	Field strength@3m		Measurement distance [meters]	Remarks
	[ $\mu\text{V}/\text{m}$ ]	[dBuV/m]		
40.66-40.70	100	40	3	Linear interpolation
70-130	50	33.98		
130-174	50 to 150	33.98 to 43.52		
174-260	150	43.52		
260-470	150 to 500	43.52 to 53.98		
Above 470	500	53.98		

### Results\*

Op./ Set.	Frequency	Detector	Test distance [m]	Level [dB $\mu\text{V}/\text{m}$ ]	Limit [dB $\mu\text{V}/\text{m}$ ]	Margin [dB]	Verdict
Op.5, Set.1	9 kHz – 30 MHz	Peak	3	22.22	29.5	7.28	Pass

Op.5, Set.1	30 MHz – 1 GHz	Quasi-Peak	3	33.717	54	20.283	<b>Pass</b>
Op.5, Set.1	960 MHz – 5 GHz	Peak	3	51.22	74	22.78	<b>Pass</b>
Op.5, Set.1	960 MHz – 5 GHz	RMS	3	49.09	54	4.91	<b>Pass</b>
All Readings below 1 GHz are Quasi-Peak or Peak detector, above 1 GHz- with Peak and RMS detector.							

\* Please see measurement plots in Annex A.

\*\* Limit line was corrected due to measurement distance of 3 m

### 7.3 Transmit time

#### Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: R3, A4

#### Description

Please see test set-up photos in Annex C.  
Measurement was done radiated.

#### Limits

15.231(e): devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

#### Results\*

Plot No	Set./ Op.	Frequency, [MHz]	Measured value, [ms]	Limit**, [sec]	Result
3.2	1,3	315	481	1	Pass
3.3	1,3	315	16000	30*0.481=14.43	Pass

\* Please see measurement plots in Annex A.

\*\* The manufacturer is responsible for not exceeding this requirement.

## 7.4 Occupied Bandwidth

### Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: R3, A4

### Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013.

Please see test set-up photos in Annex C and block diagram in Chapter 2.9.

Please see Plots in Annex A for spectrum analyzer settings.

Measurement was done radiated.

### Limits

The bandwidth of the emission shall be not wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be not wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Results\*

Set./ Op.	Frequency, [MHz]	Measured value (99% BW), [kHz]	Limit, [MHz]	Result
Set.1, Op. 1	315	119.4	0.7875	<b>Pass</b>

\* Please see measurement plots in Annex A.

## 8 MEASUREMENT EQUIPMENT

No	Equipment	Type	Manufacturer	Serial No.	Int. No.	Last Calibration	Next Calibration
<b>Antennas (A):</b>							
1.	Active Loop Antenna	HFH2-Z2E	Rohde & Schwarz	100108	LAB000108	2020-03-25	2023-03-25
2.	Ultrabroadband antenna	HL562E	Rohde & Schwarz	102005	LAB000150	2020-07-05	2023-07-05
3.	Double-Ridged Waveguide Horn Antenna	HF-907	Rohde & Schwarz	102899	LAB000151	2020-04-23	2023-04-23
4.	Rod Antenna	-	-	-	LAB000290	-	-
5.	Horn Antenna (2.6 GHz – 3.95 GHz)	PE9863/SF-10	Pasternack	-	LAB000312	2021-01-13	-
6.	Horn Antenna (3.95 GHz – 5.85 GHz)	PE9861/SF-10	Pasternack	-	LAB000264	2020-09-29	-
7.	Horn Antenna (10 GHz – 15 GHz)	PE9855 SF-20	Pasternack	-	LAB000263	2020-09-29	-
8.	Horn Antenna (12.4 GHz – 18 GHz)	62-HA20-A-SMF	TTE Europe	-	LAB000282	2020-09-29	-
9.	Horn Antenna (17.6 GHz – 26.7 GHz)	20240-20	Flann Microwave Ltd	266402	LAB000127	2020-06-29	-
10.	Horn Antenna (26.4 GHz – 40.1 GHz)	22240-20	Flann Microwave Ltd	270447	LAB000129	2020-06-29	-
11.	Horn Antenna (33 GHz – 50.1 GHz)	23240-20	Flann Microwave Ltd	273430	LAB000132	2020-07-01	-
12.	Horn Antenna (49.9 GHz – 75.8 GHz)	25240-20	Flann Microwave Ltd	272860	LAB000133	2020-07-01	-
13.	Horn Antenna (60.5 GHz – 91.5 GHz)	26240-20	Flann Microwave Ltd	273417	LAB000135	2020-07-01	-
14.	Horn Antenna (73.8 GHz – 114 GHz)	27240-20	Flann Microwave Ltd	273368	LAB000138	2020-07-01	-
15.	Horn Antenna (114 GHz – 173 GHz)	29240-20	Flann Microwave Ltd	273382	LAB000139	2020-07-01	-
16.	Horn Antenna (145 GHz – 220 GHz)	30240-20	Flann Microwave Ltd	273390	LAB000178	2020-08-01	-
17.	Horn Antenna (217 GHz – 330 GHz)	32240-20	Flann Microwave Ltd	273469	LAB000152	2020-08-01	-
18.	Horn Antenna (49.9 GHz – 75.8 GHz)	25240-20	Flann Microwave Ltd	272861	LAB000134	2020-07-01	-
19.	Horn Antenna (60.5 GHz – 91.5 GHz)	26240-20	Flann Microwave Ltd	273418	LAB000136	2020-08-01	-
<b>Amplifiers (Amp)*:</b>							
1.	Pre-Amplifier	BBV 9718 C	Schwarzbeck Mess-Elektronik OHG	84	LAB000169	-	-
2.	Low noise amplifier	BZ-01000900-111550-202320	B&Z Technologies	24336	LAB000296	-	-
3.	Low noise amplifier	BZ-08001800-180855-202020	B&Z Technologies	22105	LAB000297	-	-



4.	Low noise amplifier	BZ-18004000-270845-252525	B&Z Technologies	22449	LAB000298	-	-
<b>Attenuator (Att)*:</b>							
1.	Attenuator	25081-20 (49.9 GHz - 75.8 GHz)	Flann Microwave Ltd	234411	LAB000229	-	-
2.	Attenuator	27081-20 (73.8 GHz - 112 GHz)	Flann Microwave Ltd	270004	LAB000230	-	-
<b>RF Cables (Cab)*:</b>							
1.	Coaxial cable	LU7-022-1000	Rosenberger	33	LAB000153	-	-
2.	Coaxial cable	LU7-022-1000	Rosenberger	34	LAB000153	-	-
3.	Coaxial cable	SF101/1.5m	Huber & Suhner	503987/1	LAB000165	-	-
<b>Chambers (C):</b>							
1.	Semi/Fully Anecoic Chamber	SAC5	Albatross Projects GmbH	20168.PRB	LAB000235	2021-08-24	2022-08-24
2.	Climatic chamber	T-65/50	CTS GmbH	204002	LAB000110	2022-05-11	2023-05-11
3.	Shielding Cover	CMU-Z11	Rohde & Schwarz	100876	LAB000039	-	-
4.	Climatic chamber	T-70/350	CTS GmbH	194027	LAB000066	2021-06-30	2023-06-30
<b>Corner Reflector (CR):</b>							
1.	Trihedral Corner Reflector	SAJ-080-S1	ERAVANT	04756-01	LAB000201	-	-
<b>Filter (F)*:</b>							
1.	High-pass filter (84 GHz - 110 GHz)	10-WHPF-84.5-UG387	TTE	-	LAB000299	-	-
2.	High-pass filter (7 GHz - 23 GHz)	HPF 7-23	AtlantRF	-	LAB000444	-	-
3.	High-pass filter (3.3 GHz - 12.75 GHz)	HPF 3.3-11	AtlantRF	-	LAB000382	-	-
4.	High-pass filter (1.3 GHz - 12.75 GHz)	H1G713G1	Microwave Circuits Inc	46291	LAB000443	-	-
<b>Harmonic mixers (H):</b>							
1.	Harmonic Mixer	FS-Z60	Rohde & Schwarz	101350	LAB000375	2022-03-18	2023-03-18
2.	Harmonic Mixer	FS-Z75	Rohde & Schwarz	102015	LAB000112	2022-04-20	2023-04-20
3.	Harmonic Mixer	FS-Z90	Rohde & Schwarz	102020	LAB000113	2022-04-05	2023-04-05
4.	Harmonic Mixer	FS-Z110	Rohde & Schwarz	102000	LAB000114	2022-03-11	2023-03-11
5.	Harmonic Mixer	FS-Z170	Rohde & Schwarz	100996	LAB000126	2022-04-12	2023-04-12
6.	Harmonic Mixer	FS-Z220	Rohde & Schwarz	101039	LAB000116	2022-03-28	2023-03-28
7.	Harmonic Mixer	FS-Z325	Rohde & Schwarz	101015	LAB000117	2022-04-12	2023-04-12
<b>Multimeters (M):</b>							
1.	Multimeter	U1242B	Keysight	MY59240021	LAB000187	2022-06-20	2024-06-20
2.	Multimeter	U1242B	Keysight	MY59160026	LAB000018	2021-08-30	2023-08-30
<b>Multipliers (Mp):</b>							
1.	Multiplier	SMZ75	Rohde & Schwarz	101307	-	2018-03-15	-
2.	Multiplier	SMZ110	Rohde & Schwarz	100001	-	2020-05-09	-
<b>Power Supply (P):</b>							

1.	Power Supply	PS 2042-10 B	Elektro-Automatic GmbH	2878350263	LAB000190	-	-
2.	Power Supply	PS 2042-10 B	Elektro-Automatic GmbH	2878350322	LAB000192	-	-
3.	Power Supply	E3640A	Agilent	MY40005693	LAB000036	-	-
<b>Power meters (PM):</b>							
1.	Power meter	NRP-Z81	Rohde & Schwarz	106194	LAB000120	2022-05-11	2023-05-11
<b>Receivers and Spectrumanalyzers (R):</b>							
1.	Test Receiver, SAC5	ESW-26	Rohde & Schwarz	101517	LAB000363	2022-02-03	2023-02-03
2.	Test Receiver	ESW-26	Rohde & Schwarz	101481	LAB000236	2022-07-07	2023-07-07
3.	Spectrum Analyzer 1 Hz – 50 GHz	FSW-50	Rohde & Schwarz	101450	LAB000111	2021-07-22	2022-07-22
4.	Spectrum Analyzer 2 Hz – 43 GHz	FSW-43	Rohde & Schwarz	101391	LAB000289	2022-06-10	2023-06-10
<b>Signal Generators (SG):</b>							
1.	Signal generator 8 kHz – 50 GHz	SMA100B	Rohde & Schwarz	103838	LAB000118	2021-06-30	2024-06-30
2.	Vector Signal Generator	SMW200A	Rohde & Schwarz	108822	LAB000288	-	-

\* The gain values of Amp and attenuation values of Cab and Att are remeasured annually internal.

## 9 MEASUREMENT UNCERTAINTIES

Test case	Measurement uncertainty*
Radiated field strength	$\leq \pm 6$ dB
Occupied bandwidth	$\pm 100$ kHz
Time domain measurement	$\pm 2.32$ ms
DC and low frequency voltages	$\pm 3$ %
Temperature	$\pm 1$ °C
Humidity	$\pm 3$ %

\*) The indicated expanded measurement uncertainty corresponds to the standard measurement uncertainty for the measurement results multiplied by the coverage factor  $k = 2$ . The true value is located in the corresponding interval with a probability of 95 %.

## END OF THE REPORT

# Annex A

Measurement plots

part of / in addition to

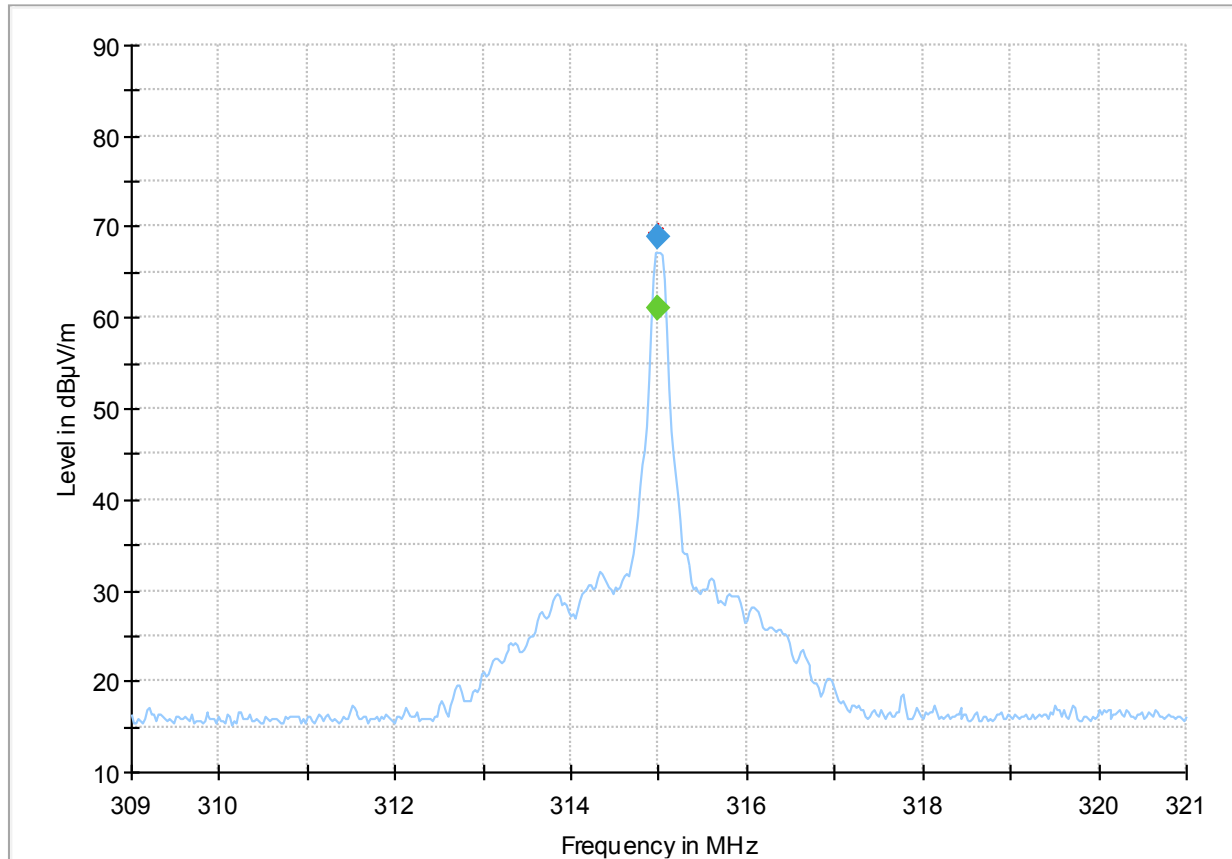
***Test report no.:*** 22057392-27877-0

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# 1 Fundamental field strength

## 1.1 Set-up 1, Op. 1, lying



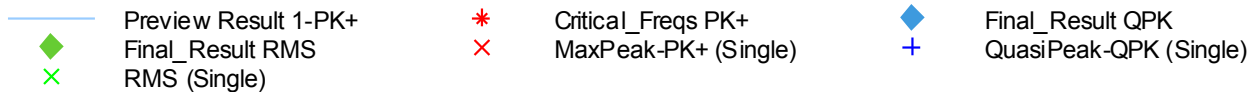
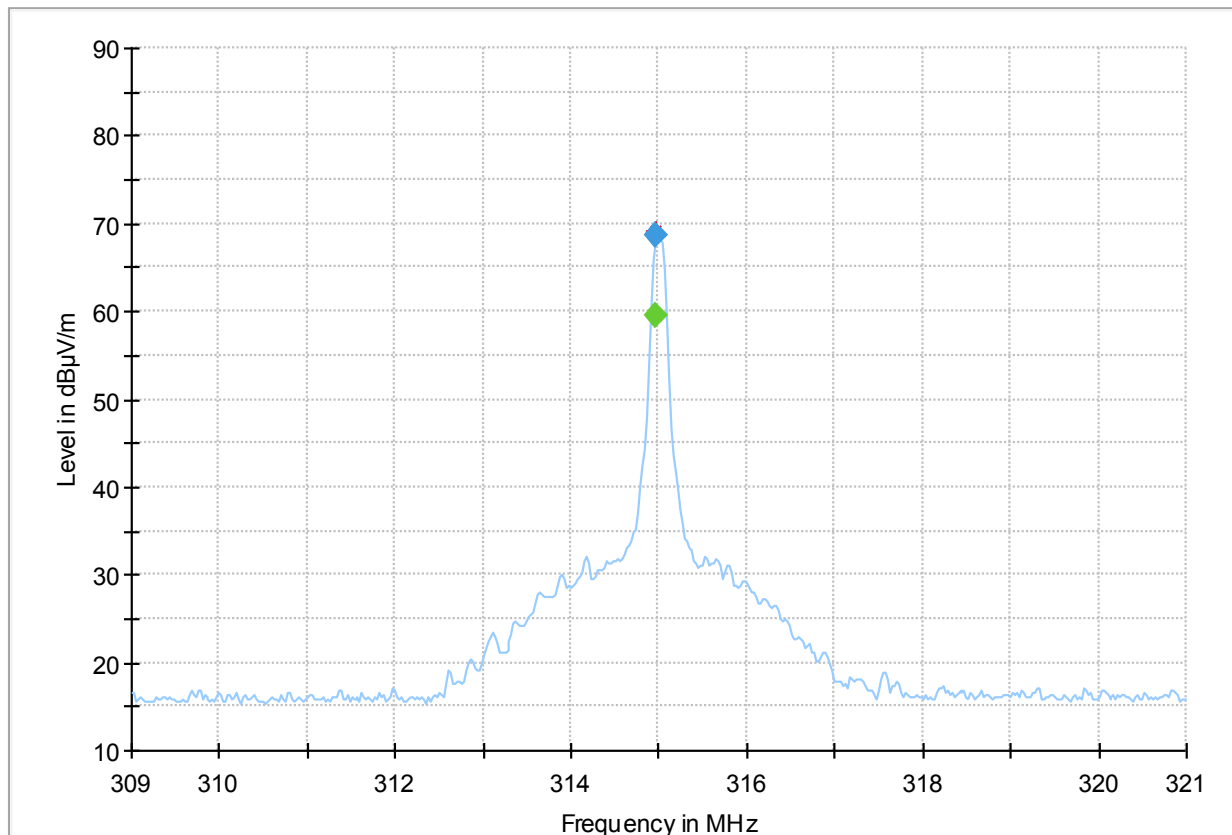
### Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
314.975000	---	61.01	---	---	100.0	120.000	221.0	H
314.975000	68.94	---	---	---	100.0	120.000	221.0	H

(continuation of the "Final\_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
314.975000	66.0	13.8	16:54:26 - 25.07.2022
314.975000	66.0	13.8	16:54:26 - 25.07.2022

## 1.2 Set-up 1, Op. 1, staying



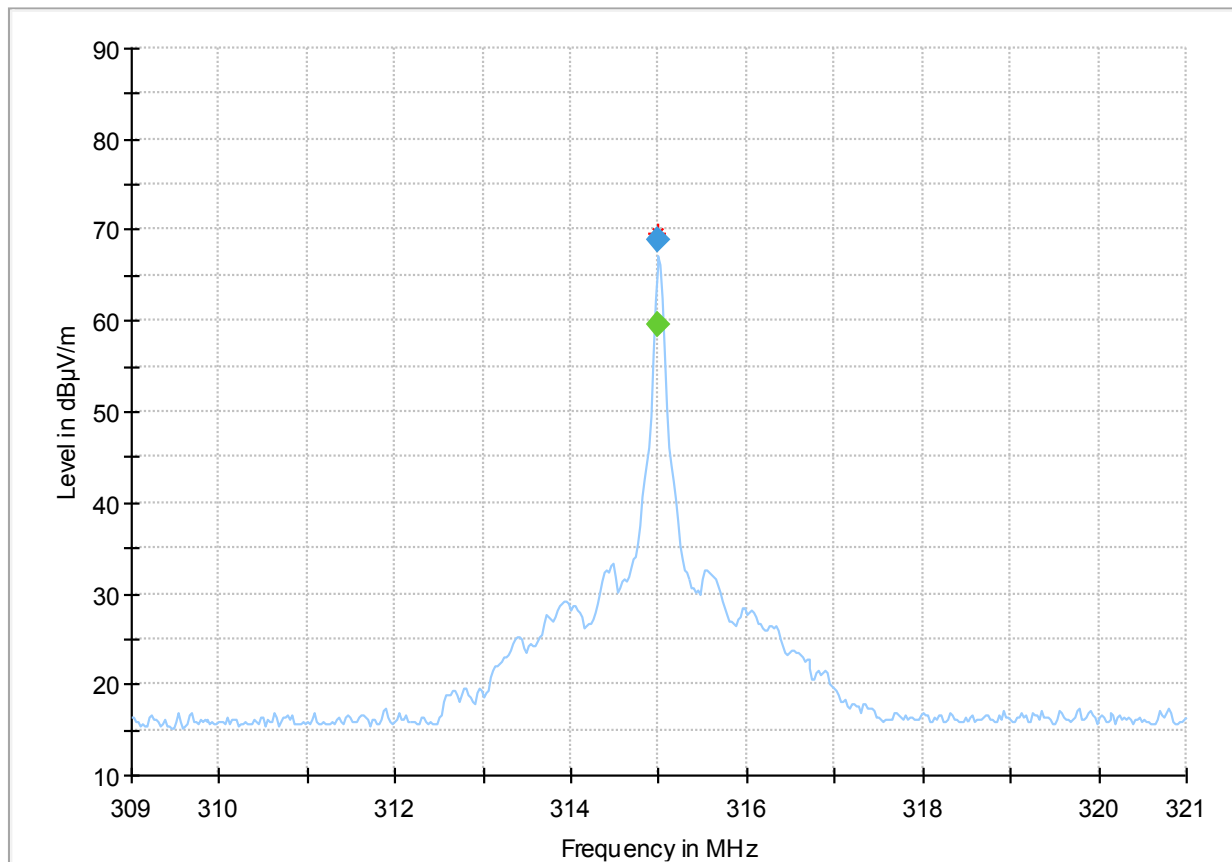
### Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
314.950000	68.63	---	---	---	100.0	120.000	235.0	H
314.950000	---	59.58	---	---	100.0	120.000	235.0	H

(continuation of the "Final\_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
314.950000	227.0	13.8	16:05:51 - 25.07.2022
314.950000	227.0	13.8	16:05:51 - 25.07.2022

### 1.3 Set-up 1, Op. 2, lying



◆ Preview Result 1-PK+  
◆ Final\_Result QPK
 ★ Critical\_Freqs PK+  
◆ Final\_Result RMS

### Final Result

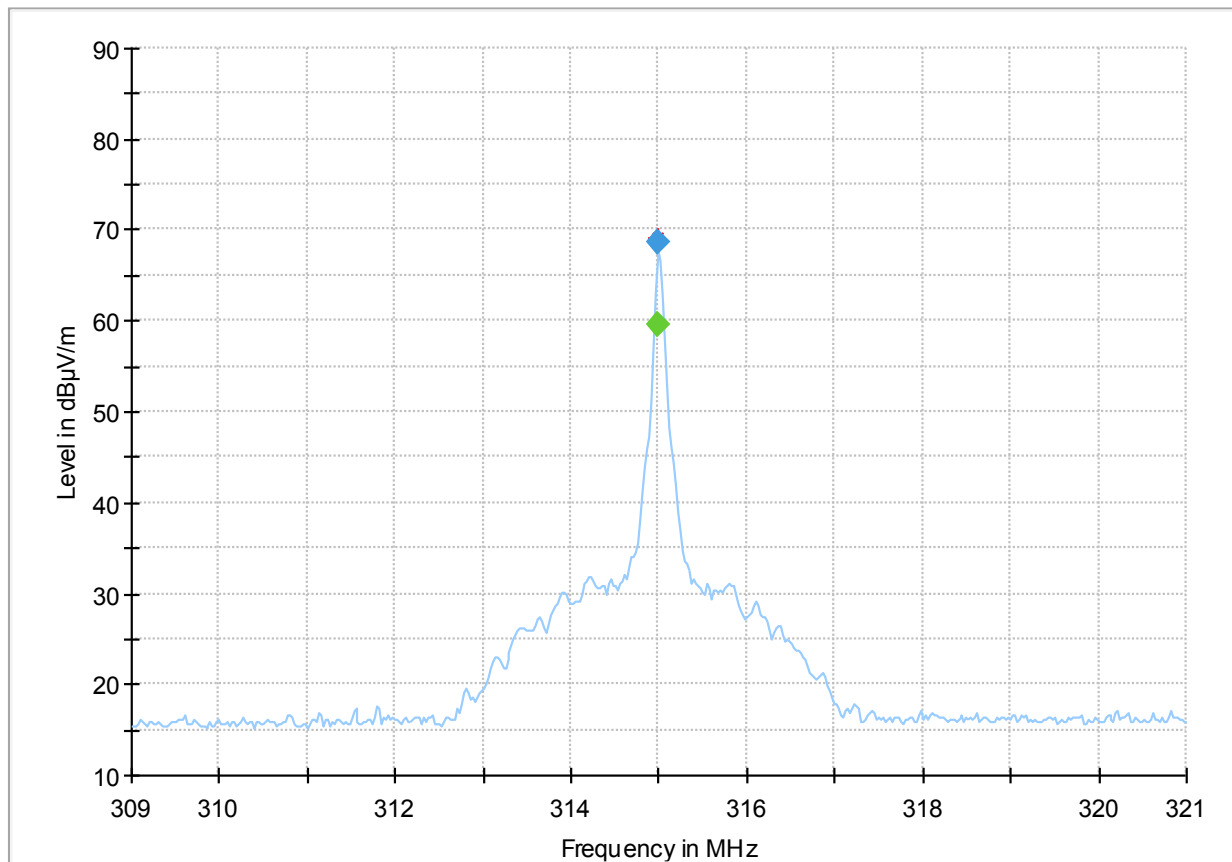
Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
315.000000	---	59.51	---	---	100.0	120.000	194.0	H
315.000000	68.78	---	---	---	100.0	120.000	194.0	H

(continuation of the "Final\_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
315.000000	66.0	13.8	16:40:46 - 25.07.2022
315.000000	66.0	13.8	16:40:46 - 25.07.2022



### 1.4 Set-up 1, Op. 2, staying



◆ Preview Result 1-PK+  
◆ Final\_Result QPK
 \* Critical\_Freqs PK+  
◆ Final\_Result RMS

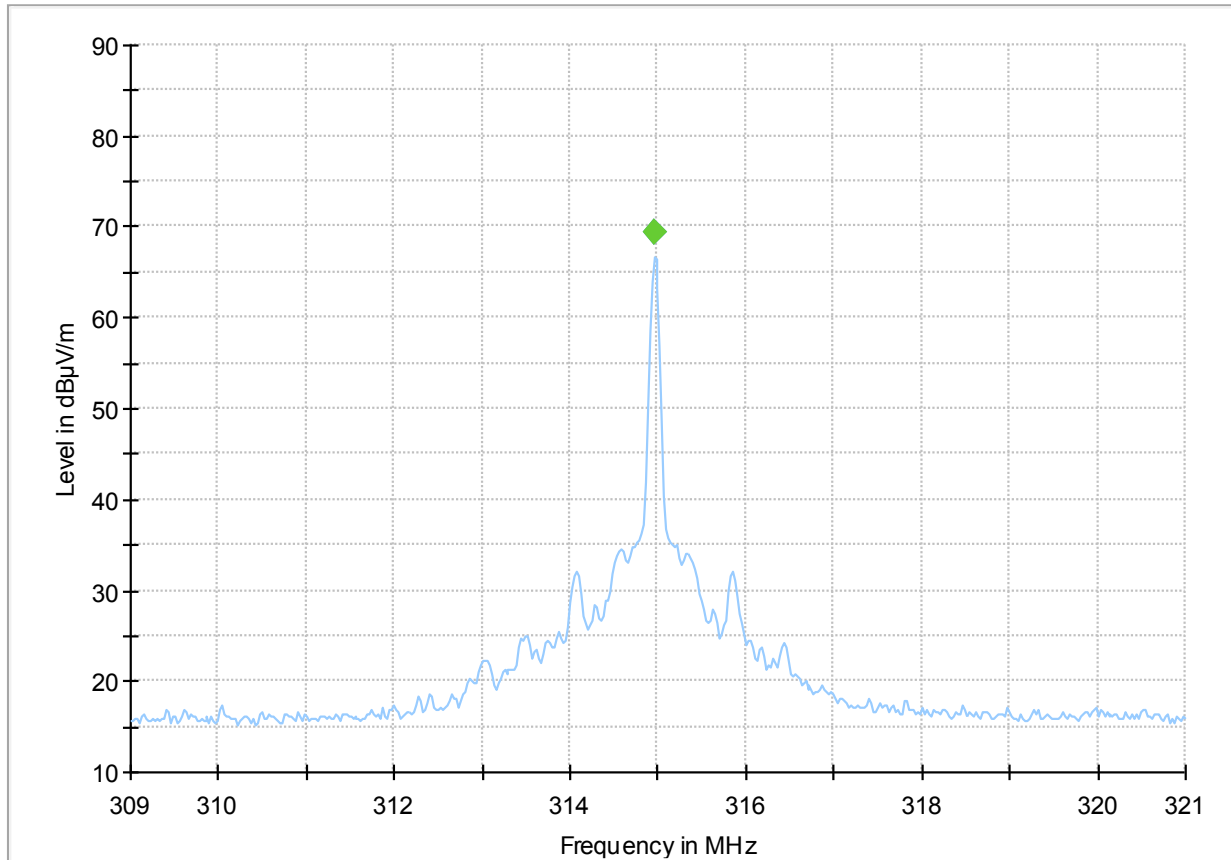
### Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
315.000000	---	59.45	---	---	100.0	120.000	235.0	H
315.000000	68.71	---	---	---	100.0	120.000	235.0	H

(continuation of the "Final\_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
315.000000	46.0	13.8	18:30:37 - 25.07.2022
315.000000	46.0	13.8	18:30:37 - 25.07.2022

**1.5 Set-up 1, Op. 6, lying (here only for comparison of peak power with mode 1 and mode 2)**



◆ Preview Result 1-PK+ Final\_Result QPK
 ◆ Critical\_Freqs PK+ Final\_Result RMS

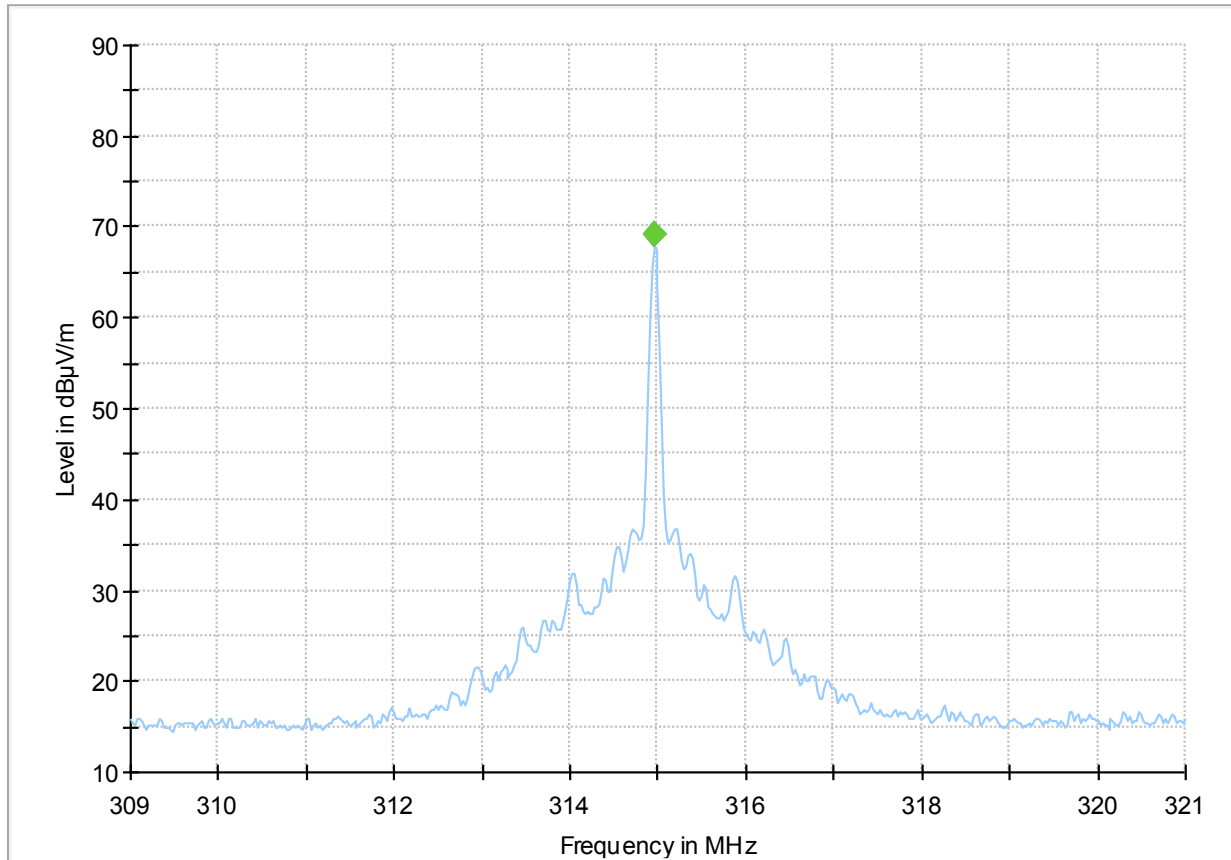
**Final\_Result**

Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
314.950000	---	69.40	---	---	100.0	120.000	198.0	H
314.950000	69.34	---	---	---	100.0	120.000	198.0	H

(continuation of the "Final\_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
314.950000	66.0	13.8	17:23:33 - 25.07.2022
314.950000	66.0	13.8	17:23:33 - 25.07.2022

**1.6 Set-up 1, Op. 6, staying (here only for comparison of peak power with mode 1 and mode 2)**



◆ Preview Result 1-PK+ Final\_Result QPK
 ◆ Critical\_Freqs PK+ Final\_Result RMS

**Final\_Result**

Frequency (MHz)	QuasiPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
314.950000	---	69.25	---	---	100.0	120.000	244.0	H
314.950000	69.20	---	---	---	100.0	120.000	244.0	H

(continuation of the "Final\_Result" table from column 14 ...)

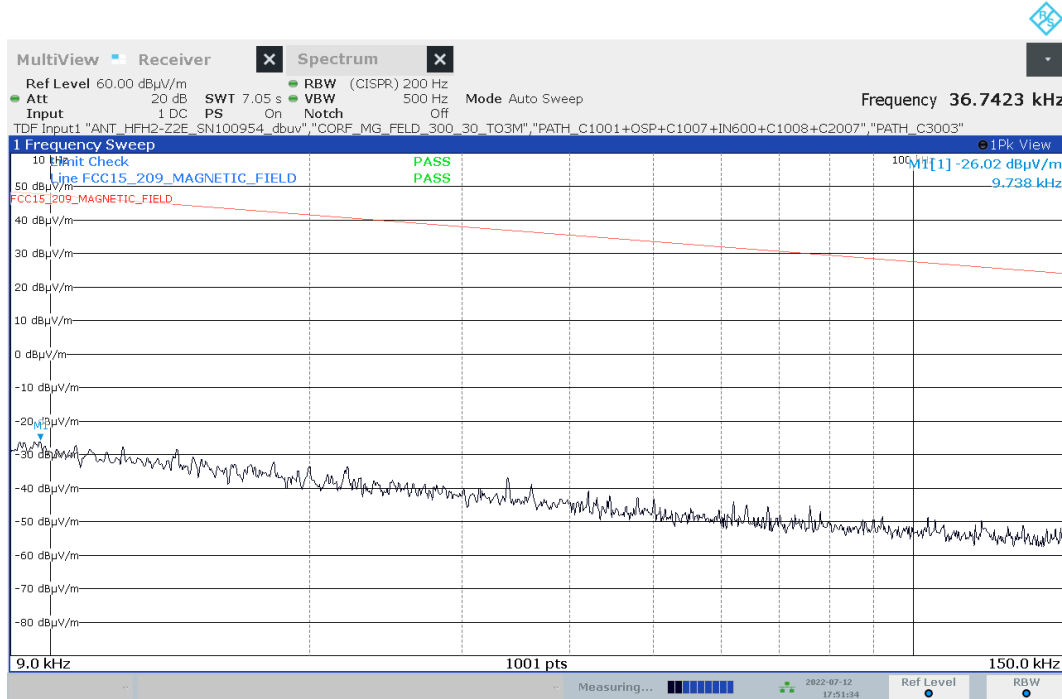
Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
314.950000	231.0	13.8	18:19:07 - 25.07.2022
314.950000	231.0	13.8	18:19:07 - 25.07.2022

Annex A of TR no.: 22057392-27877-0

## 2 General Limit - Radiated field strength emissions, 9 kHz - 5 GHz

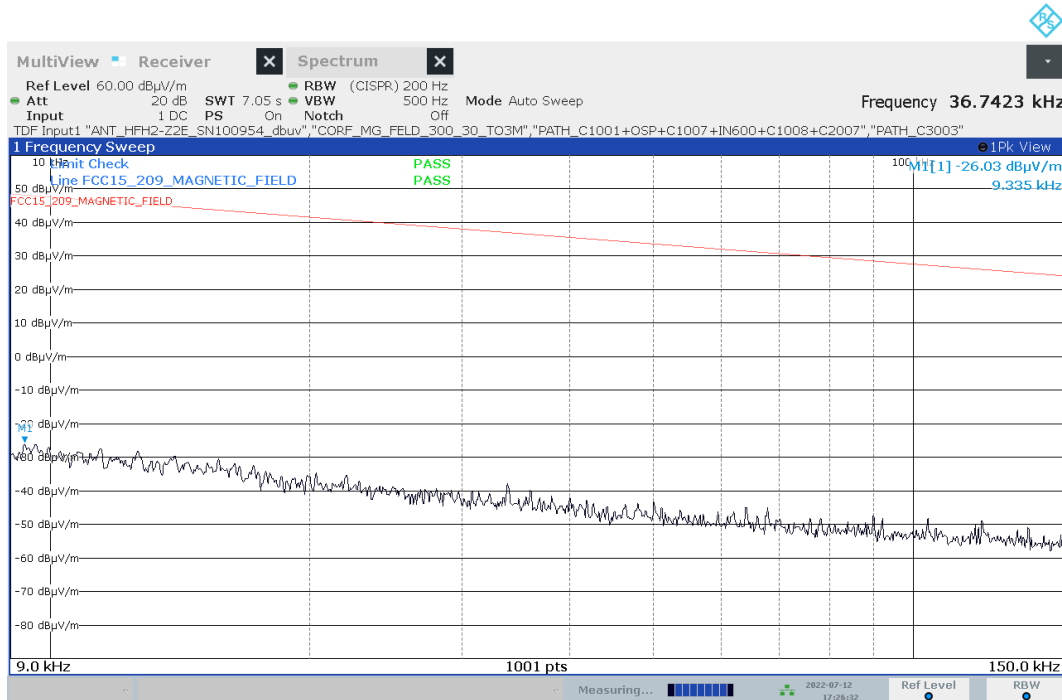
### 2.1 Radiated field strength measurements (f < 30 MHz)

#### 2.1.1 Set-up 1, 9 kHz – 150 kHz, Op. 5, EUT lying, ANT HOR



05:51:34 PM 07/12/2022

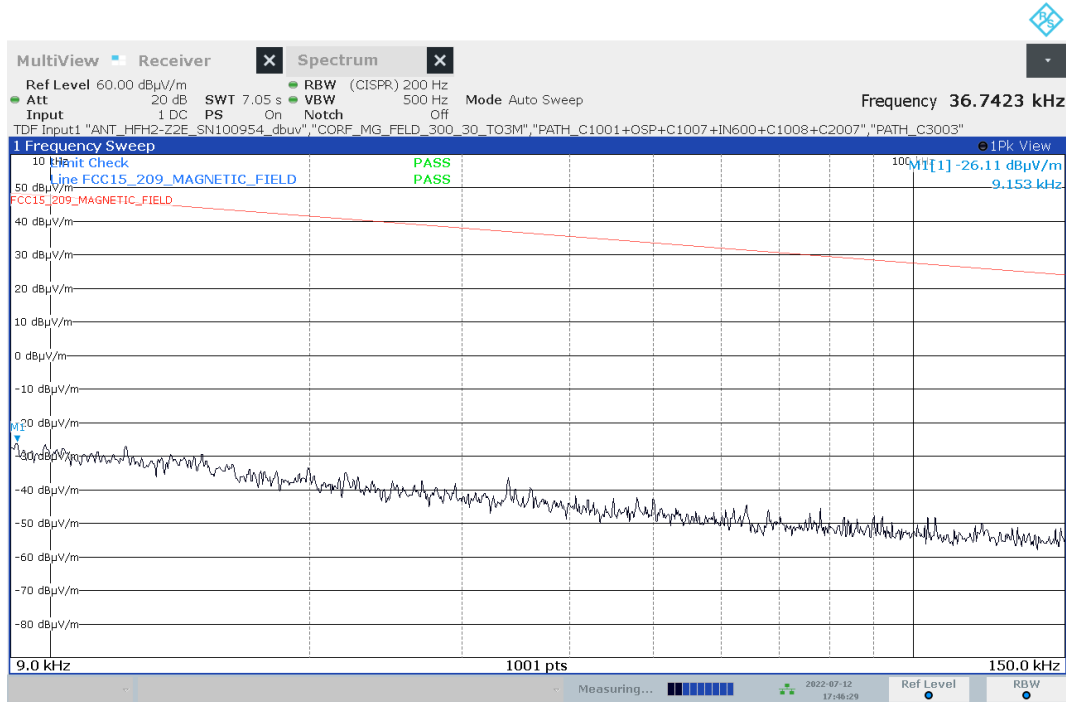
#### 2.1.2 Set-up 1, 9 kHz – 150 kHz, Op. 5, EUT lying, ANT VER



05:26:32 PM 07/12/2022

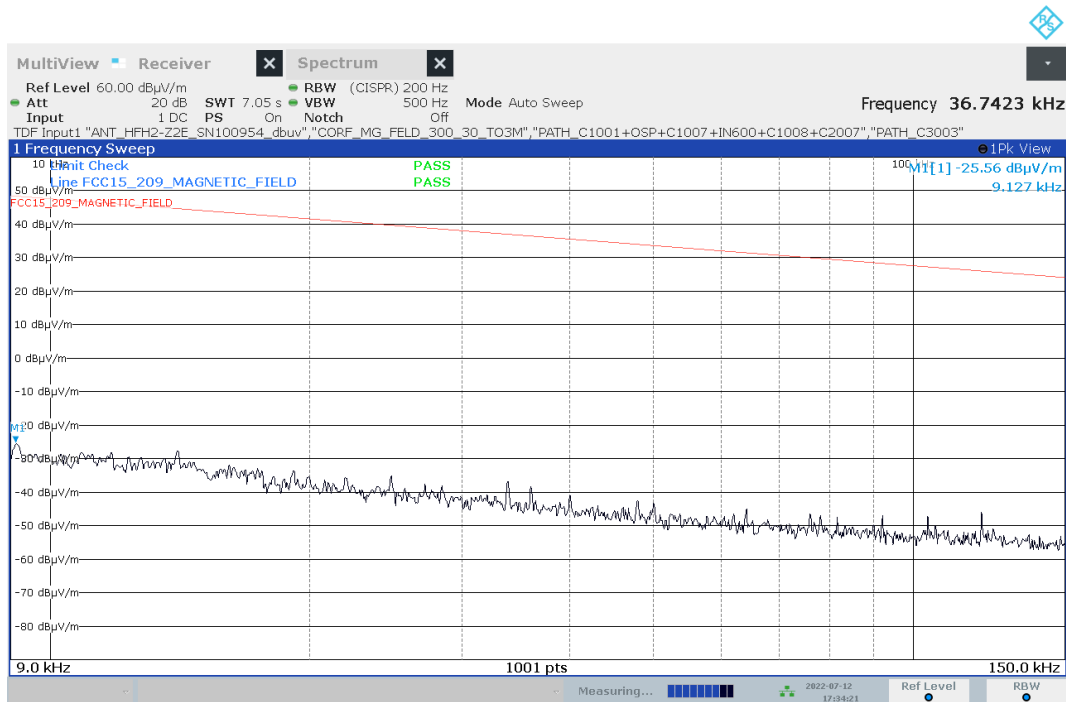
Annex A of TR no.: 22057392-27877-0

### 2.1.3 Set-up 1, 9 kHz – 150 kHz, Op. 5, EUT staying, ANT HOR



05:46:29 PM 07/12/2022

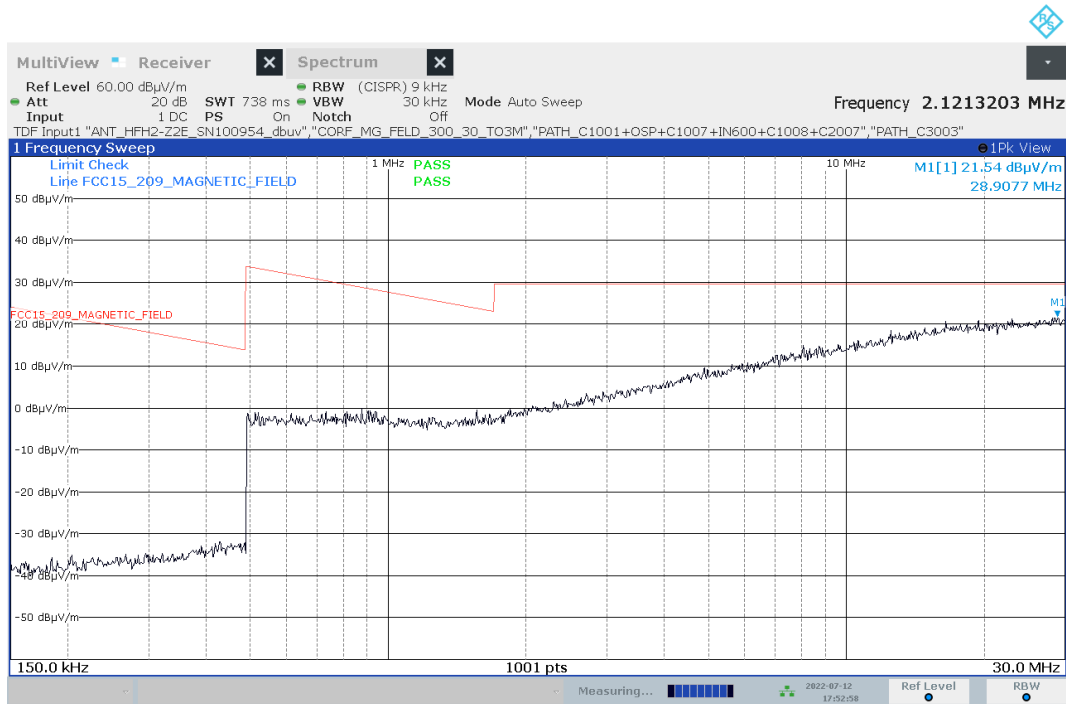
### 2.1.4 Set-up 1, 9 kHz – 150 kHz, Op. 5, EUT staying, ANT VER



05:34:21 PM 07/12/2022

Annex A of TR no.: 22057392-27877-0

### 2.1.5 Set-up 1, 150 kHz – 30 MHz, Op. 5, EUT lying, ANT HOR



05:52:59 PM 07/12/2022

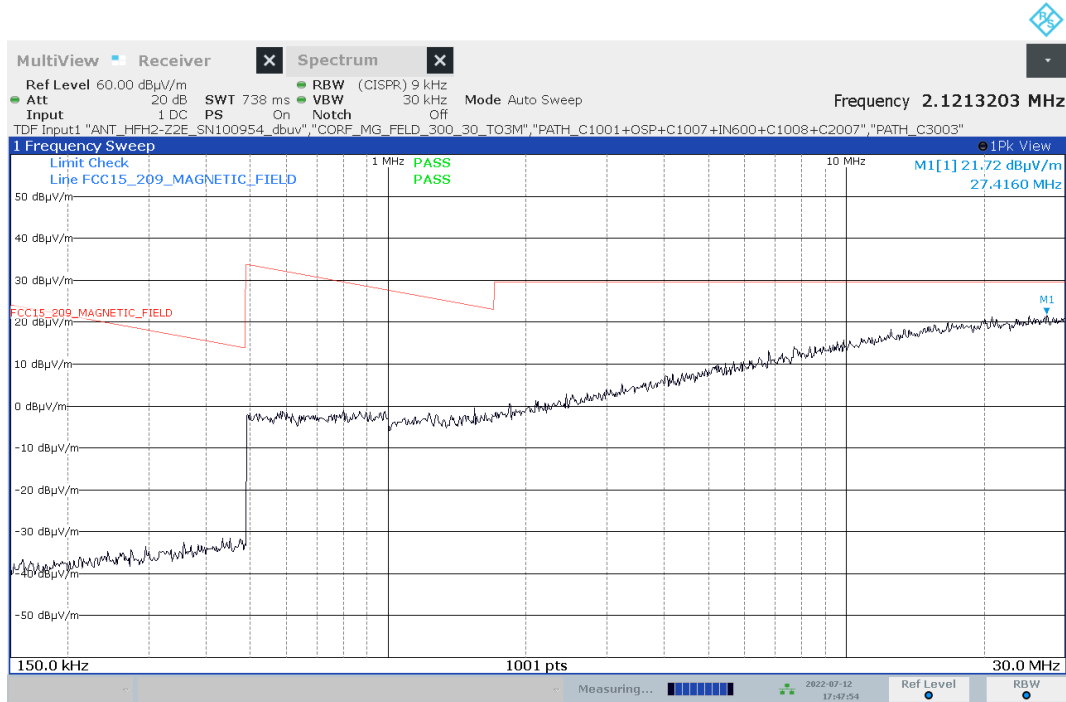
### 2.1.6 Set-up 1, 150 kHz – 30 MHz, Op. 5, EUT lying, ANT VER



05:27:57 PM 07/12/2022

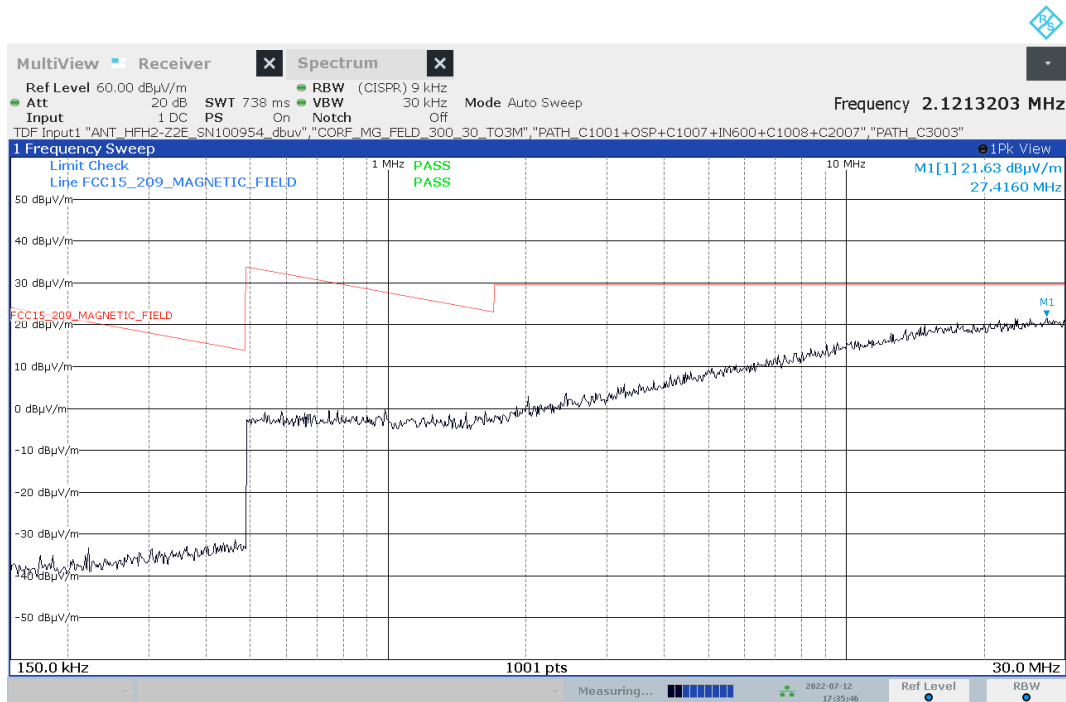
Annex A of TR no.: 22057392-27877-0

### 2.1.7 Set-up 1, 150 kHz – 30 MHz, Op. 5, EUT staying, ANT HOR



05:47:54 PM 07/12/2022

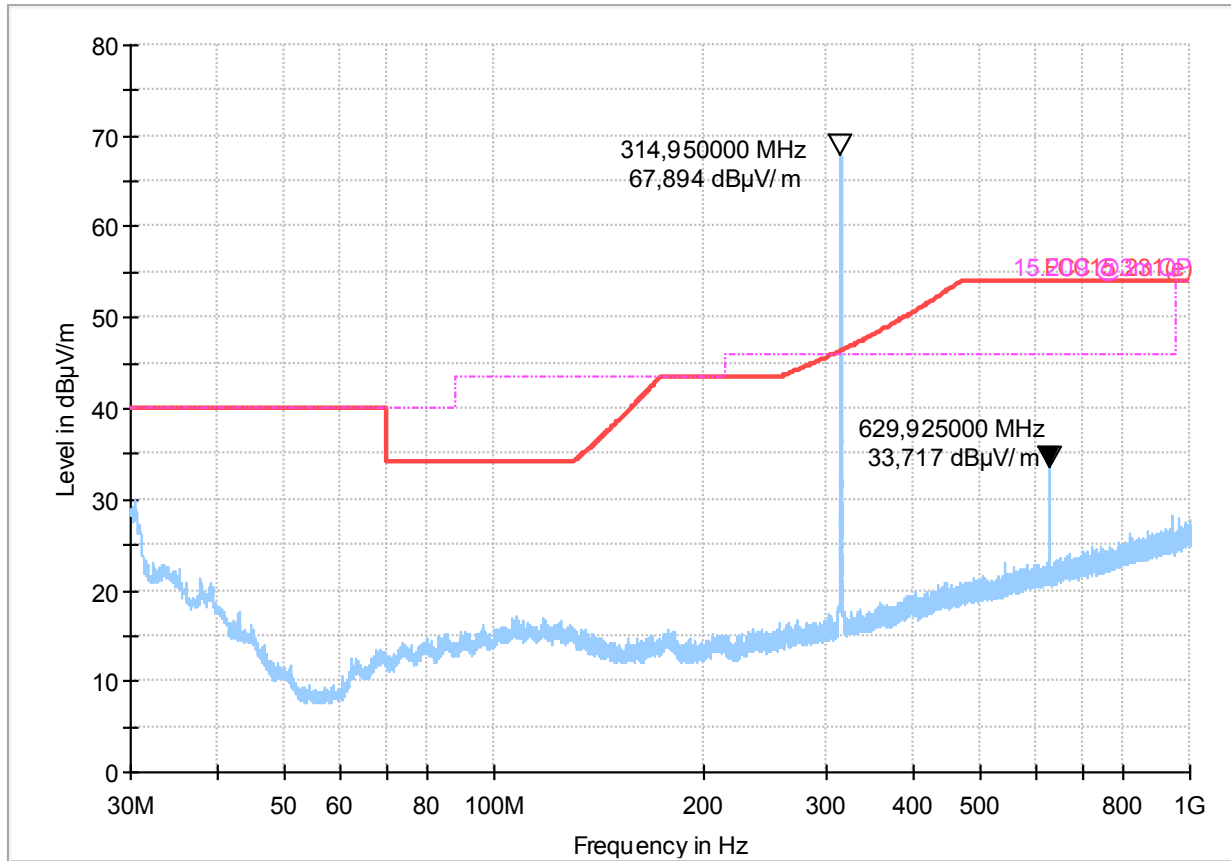
### 2.1.8 Set-up 1, 150 kHz – 30 MHz, Op. 5, EUT staying, ANT VER



05:35:46 PM 07/12/2022

## 2.2 Radiated field strength measurements (30 MHz < f < 1000 MHz)

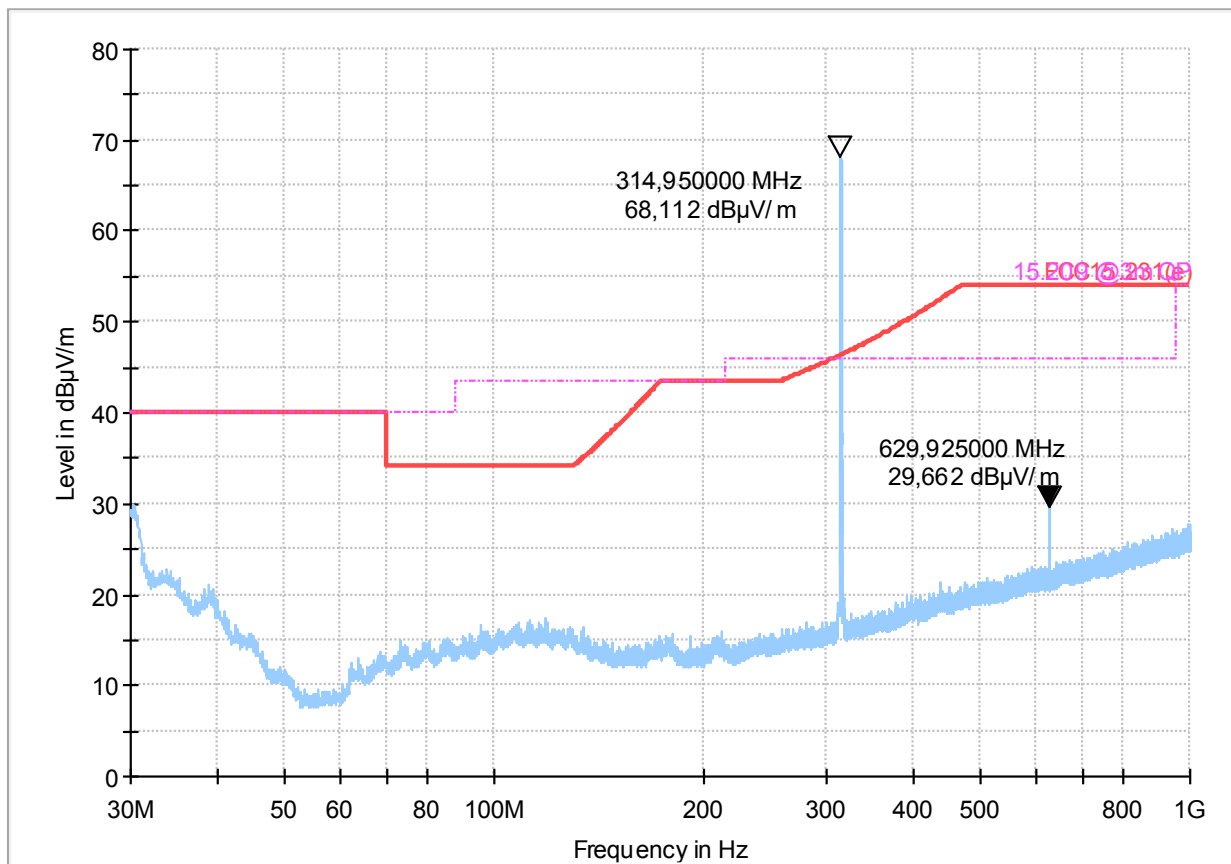
### 2.2.1 Lying, Set-up 1, Op. 5



— Preview Result 1-PK+  
- - - 15.209 @3m QP
 \* Critical\_Freqs PK+  
◆ Final\_Result QPK
 — FCC15.231(e)



2.2.2 Staying, Set-up 1, Op. 5

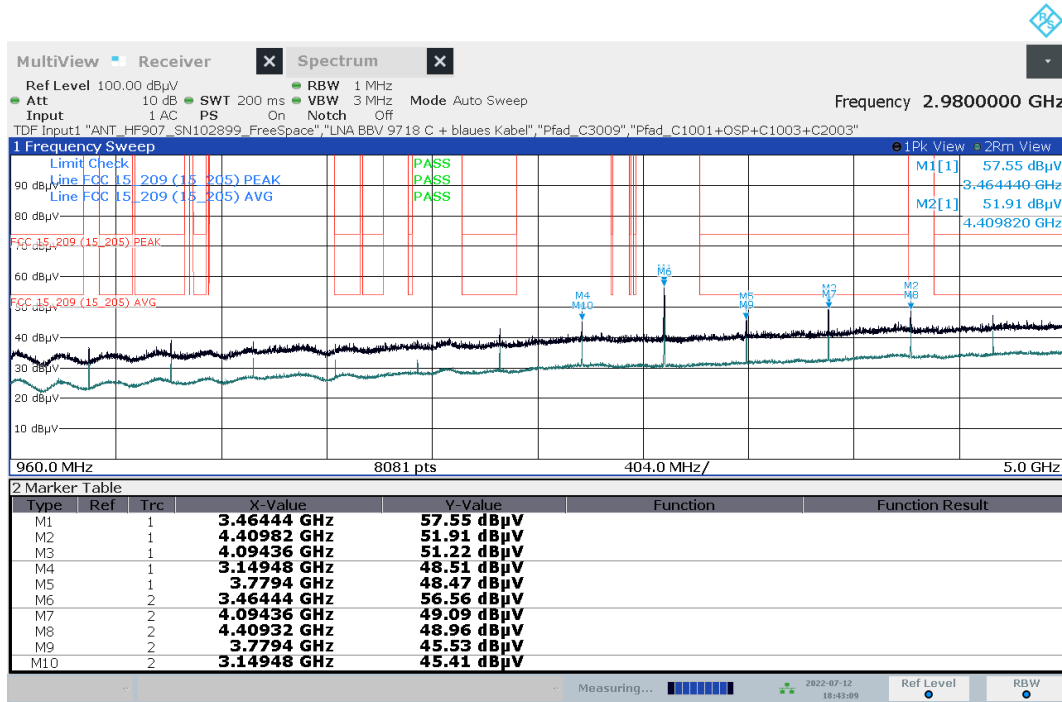


- Preview Result 1-PK+      \* Critical\_Freqs PK+      — FCC15.231(e)
- - - 15.209 @3m QP      ◆ Final\_Result QPK

Annex A of TR no.: 22057392-27877-0

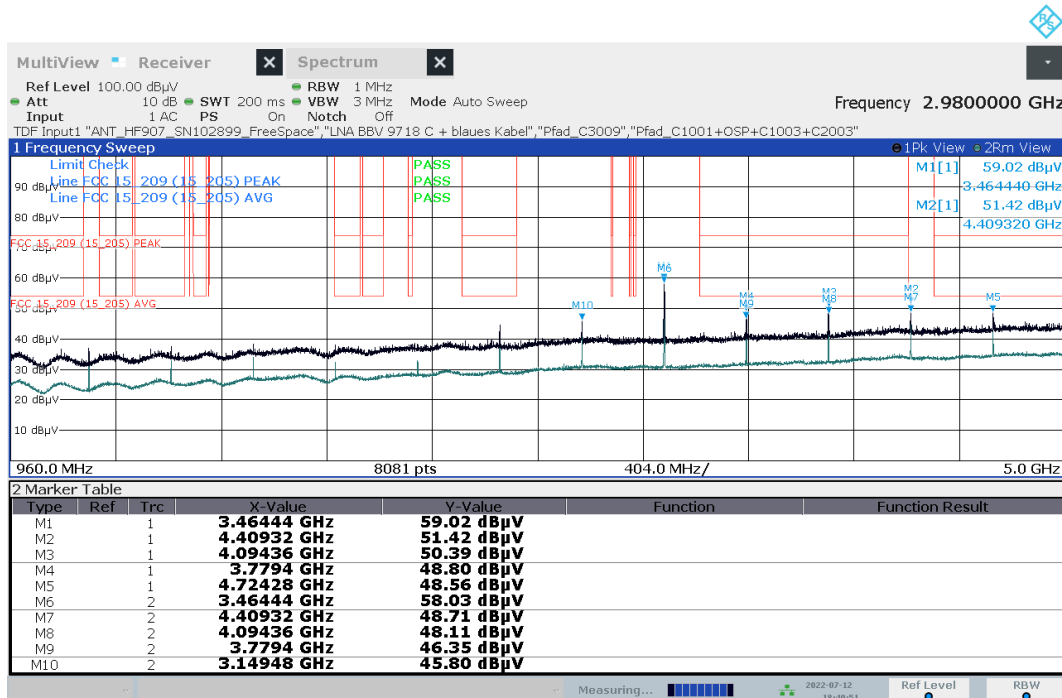
## 2.3 Radiated field strength measurements (1 GHz < f < 5 GHz)

### 2.3.1 960 MHz – 5000 MHz, Set-up 1, Op. 5, lying



06:43:10 PM 07/12/2022

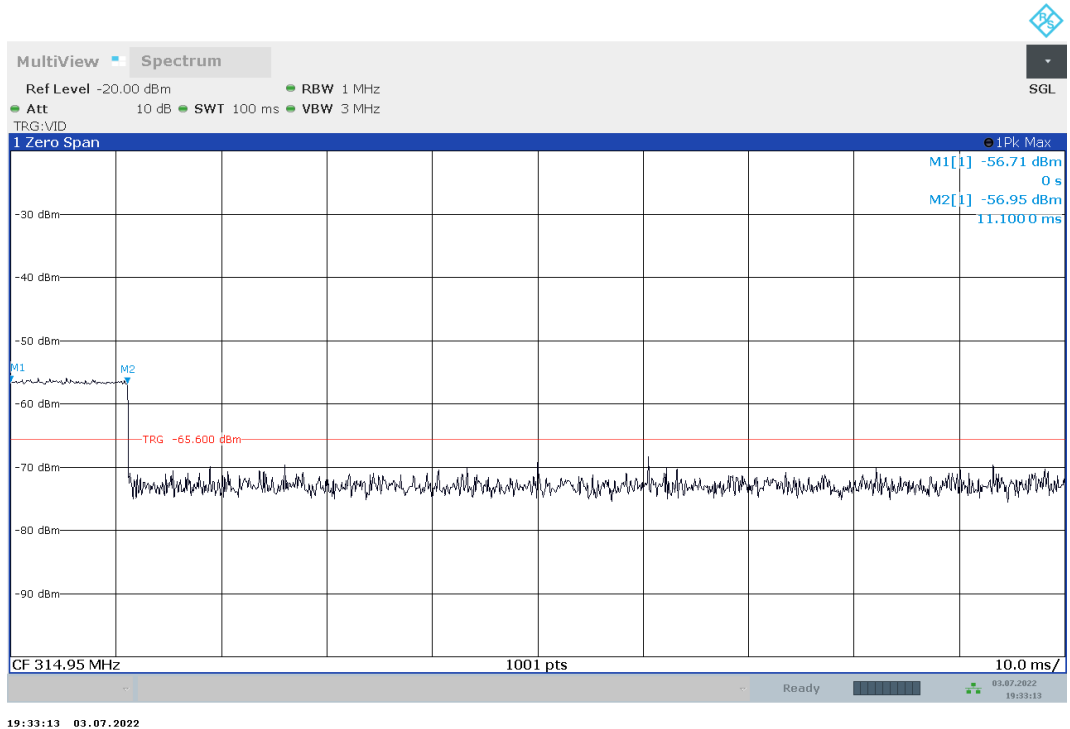
### 2.3.2 960 MHz – 5000 MHz, Set-up 1, Op. 5, staying



06:49:52 PM 07/12/2022

### 3 Transmit time

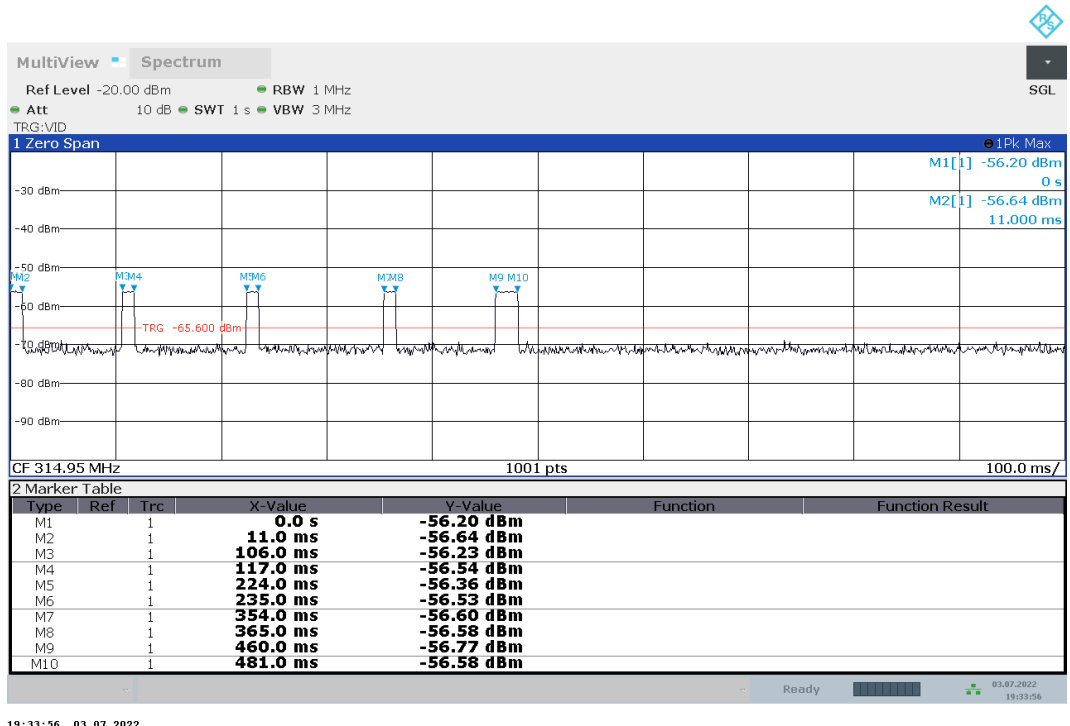
#### 3.1 Set-up 3, Op. mode 3, Measurement time 100 ms



19:33:13 03.07.2022

DC=11.188 % = pts above TRG level /1001 \* 100

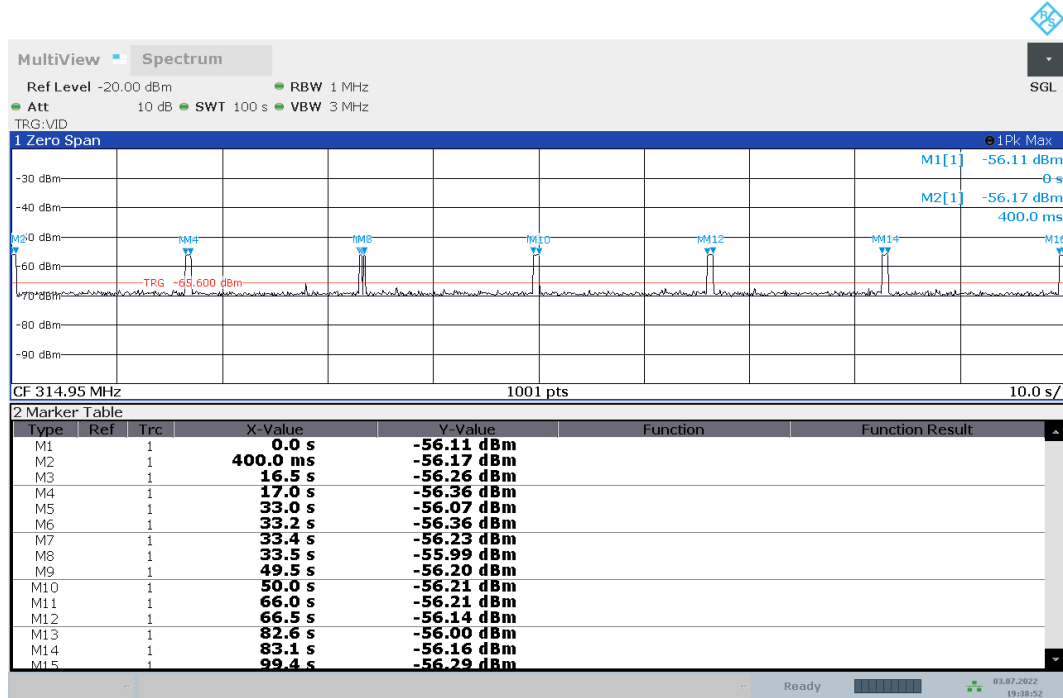
#### 3.2 Set-up 3, Op. mode 3, Measurement time 1 s



19:33:56 03.07.2022

Annex A of TR no.: 22057392-27877-0

### 3.3 Set-up 3, Op. mode 3, Measurement time 100 s



19:38:52 03.07.2022

Annex A of TR no.: 22057392-27877-0

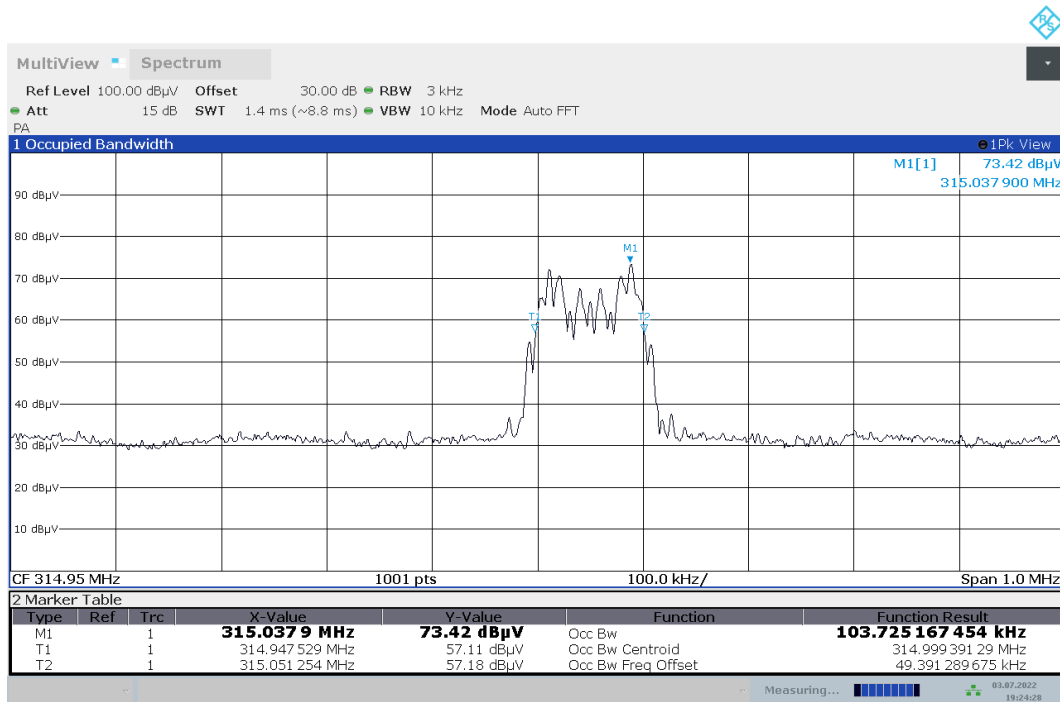
## 4 Occupied Bandwidth

### 4.1 20 dB bandwidth, set-up 1, op. 3



19:22:07 03.07.2022

### 4.2 99 % occupied bandwidth, set-up 1, op. 3



19:24:29 03.07.2022