

Address:
CSA Group Bayern GmbH
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 94342 STRASSKIRCHEN
 GERMANY

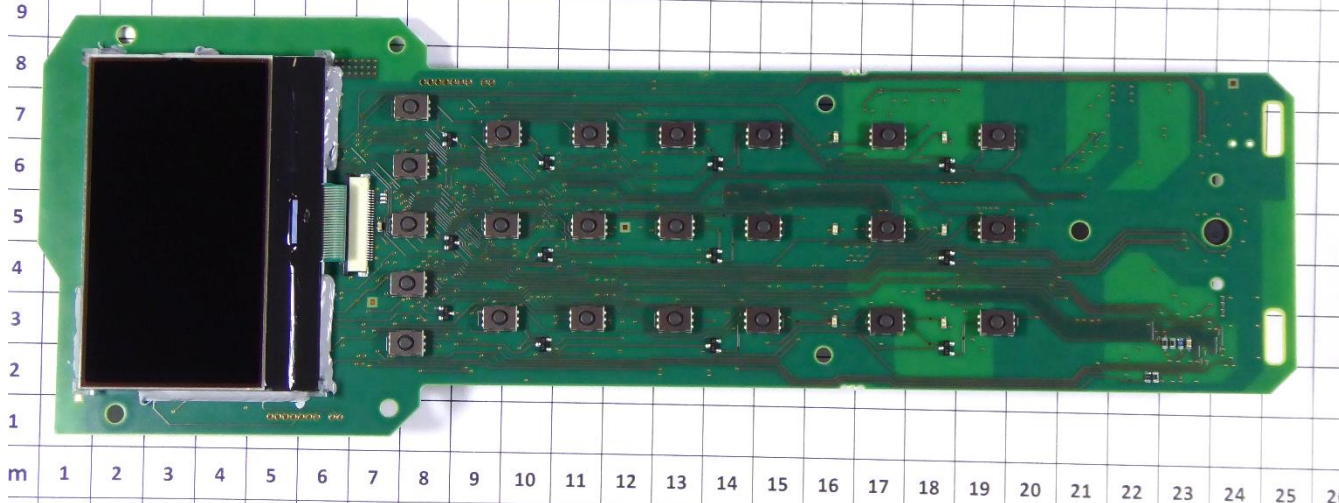
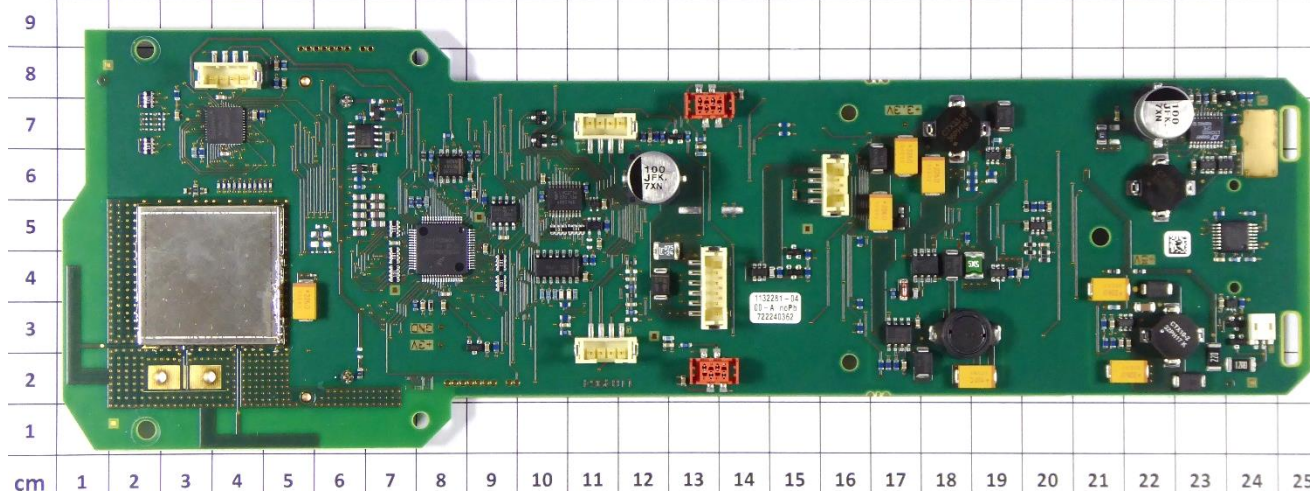
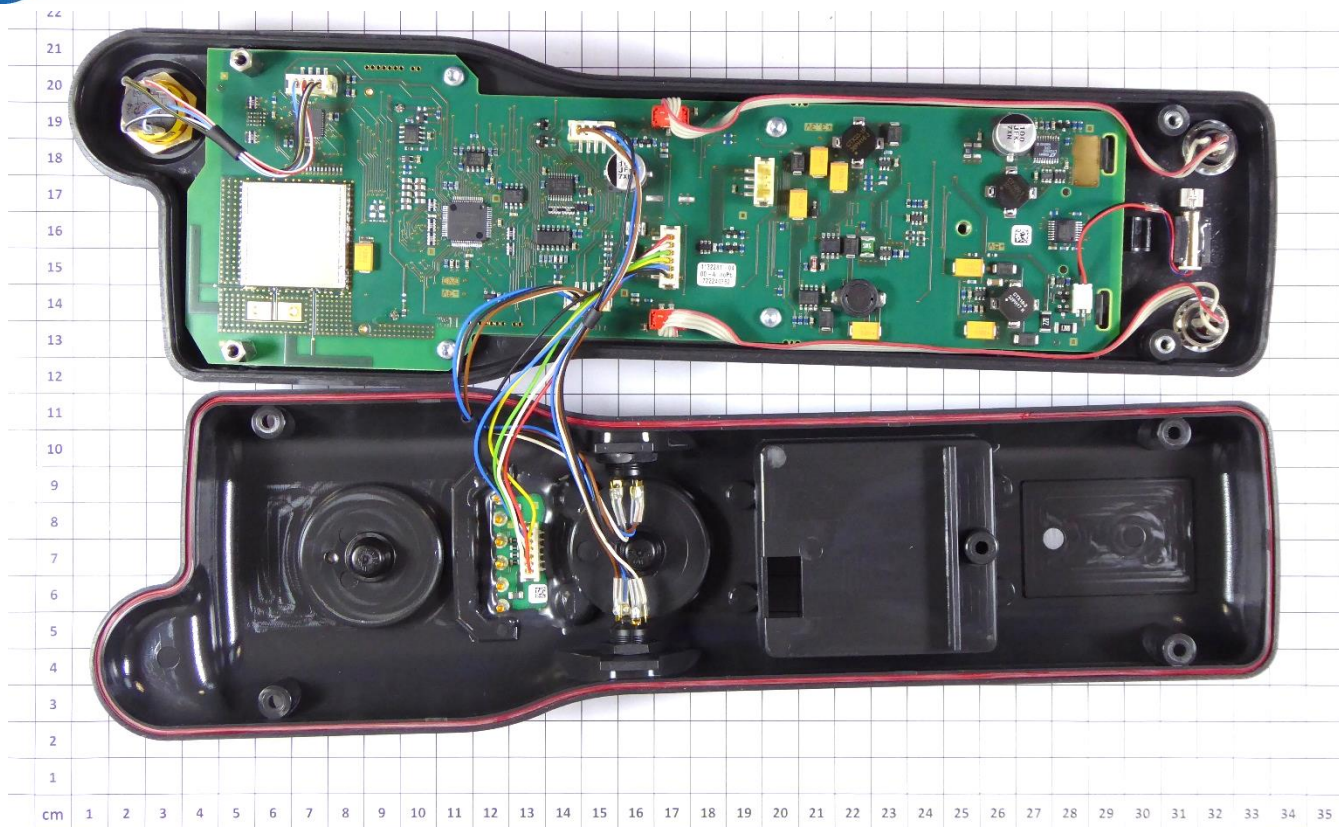
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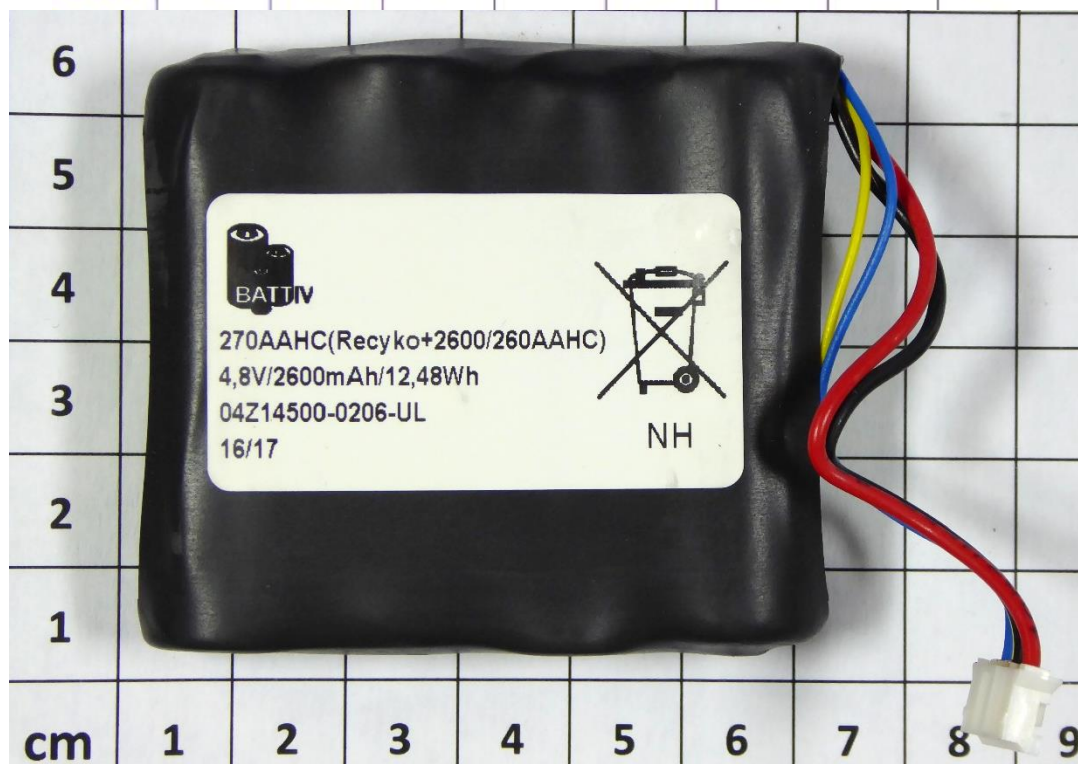
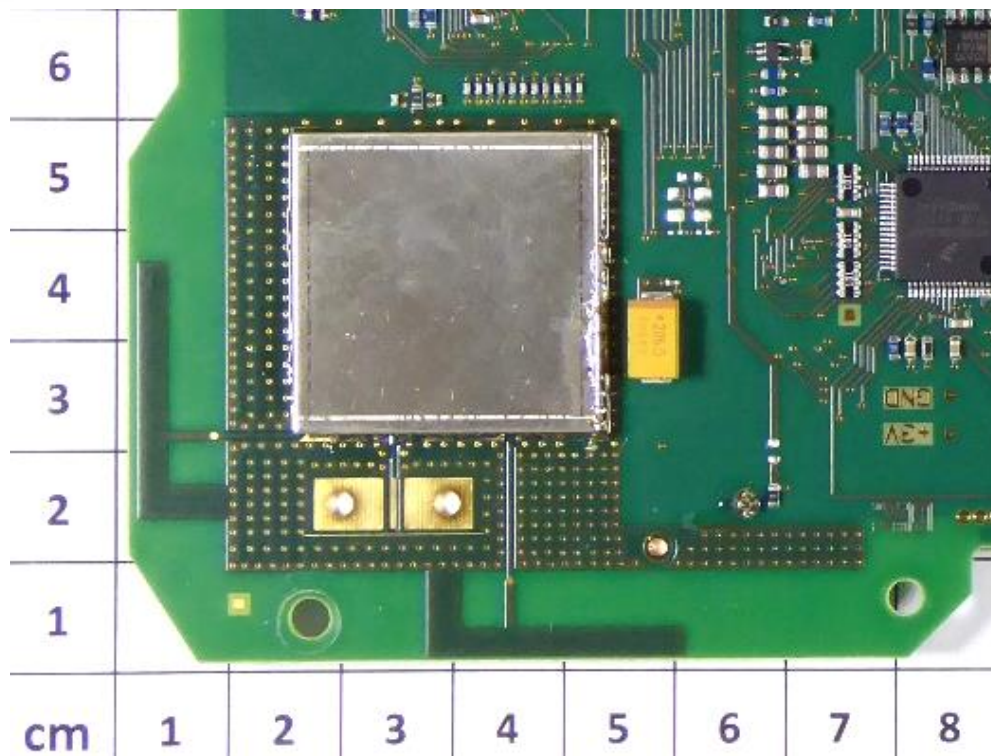
Test – Results				Order-No.: T38868-05-00HS		
Client	DR. JOHANNES HEIDENHAIN GmbH, Dr.-Johannes-Heidenhain-Strasse 5, 83301 TRAUNREUT, GERMANY					
Manufacturer	DR. JOHANNES HEIDENHAIN GmbH, Dr.-Johannes-Heidenhain-Strasse 5, 83301 TRAUNREUT, GERMANY					
Product Description	Wireless hand wheel system					
Type / Model Name	HR 550 FS					
Testing commenced on	2018-12-11	Retest are made according to FCC Part 15247				
Testing concluded on	2018-12-18					
Serial - No.	0065388548					
Type of test		Limits		Test Results		
Emission / Immunity		Margin (dB)	exceeded by (dB)	ok	not ok	meet criteria
SER2 328 MHz		-8.4 dB	-	☒	☐	-
SER3 2483.54 MHz		-1.4 dB	-	☒	☐	-
Remarks: FCC ID: YJKHR0GACZ4 IC: 11148A-HR0GACZ4 The EUT is a certified and approved device under FCC part 15.247. The main PCB of the EUT has been made a little bit smaller. Some devices have to be replaced and routed by new routes. The frequency determining devices and routes are identically as before. In order to check the new placement and routes spurious emissions are re-measured in order to show the further compliance to the FCC part 15.247.						
This test result consists of 15 page(s). The test result only corresponds to the tested sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.						
Date	Checked by		Tested by		Result	
2018-12-19	 Klaus Gegenfurtner I confirm the correctness and integrity of this document. 2018.12.20 09:26:41 +01'00'		 Hermann Smetana I am the author of this document. 2018.12.20 09:10:08 +01'00'		☒ passed ☐ not passed	

Photo documentation of the EUT









TEST RESULT SUMMARY

Operating in the 2400 MHz – 2483.5 MHz:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen, 8.8	AC power line conducted emissions	Not tested
15.247(a)(2)	RSS-247, 5.2(1)	-6 dB EBW	Not tested
15.247(b)(3)	RSS-247, 5.4(4)	Maximum peak conducted output power	Not tested
15.247(d)	RSS-247, 5.5	Unwanted emission, radiated	passed
15.247(d)	RSS-Gen, 8.10	Emissions in restricted bands	passed
15.247(e)	RSS-247, 5.2(2)	PSD	Not tested
	RSS-Gen, 6.11	Transmitter frequency stability	Not tested
	RSS-Gen, 6.6	99 % Bandwidth	Not tested

The mentioned RSS Rule Parts in the above table are related to:

RSS-Gen, Issue 5, April 2018

RSS-247, Issue 2, February 2017

Note: The EUT is connected to the base station and transmits data.

Test conditions and results

Unwanted emissions in restricted bands, radiated

For test instruments and accessories used see section 6 Part **SER 2**, **SER 3**.

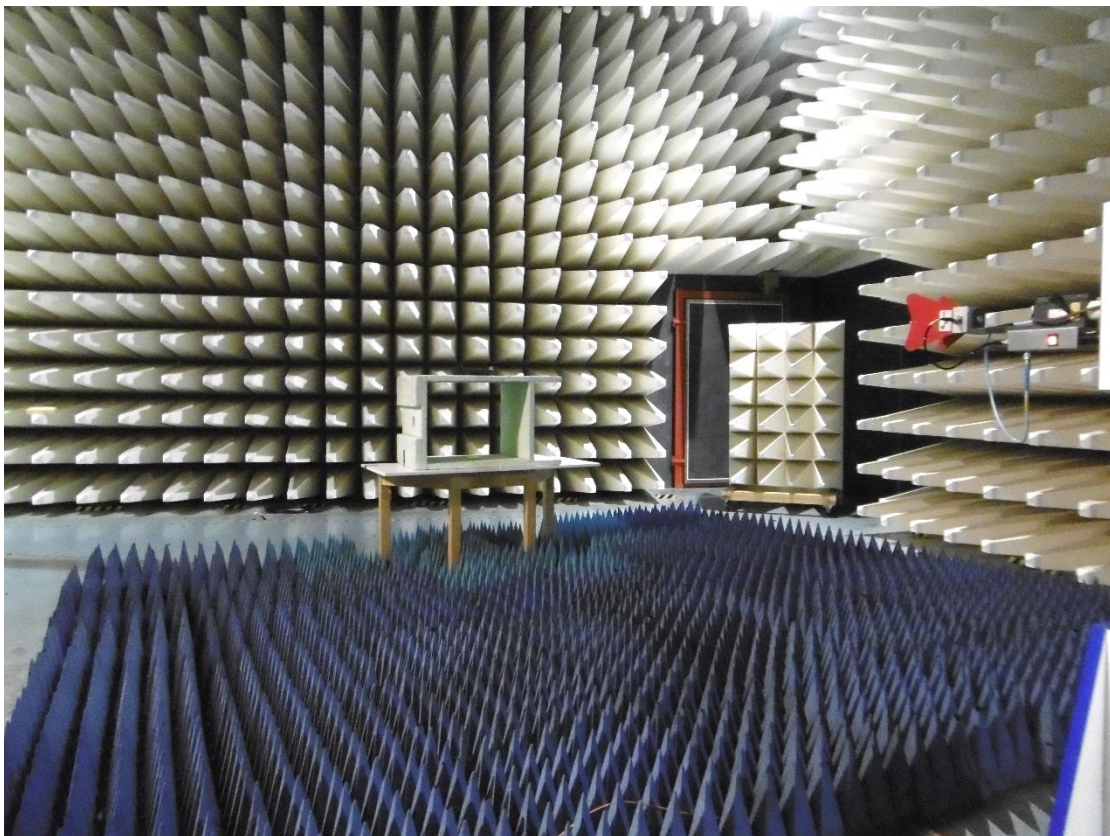
Description of the test location

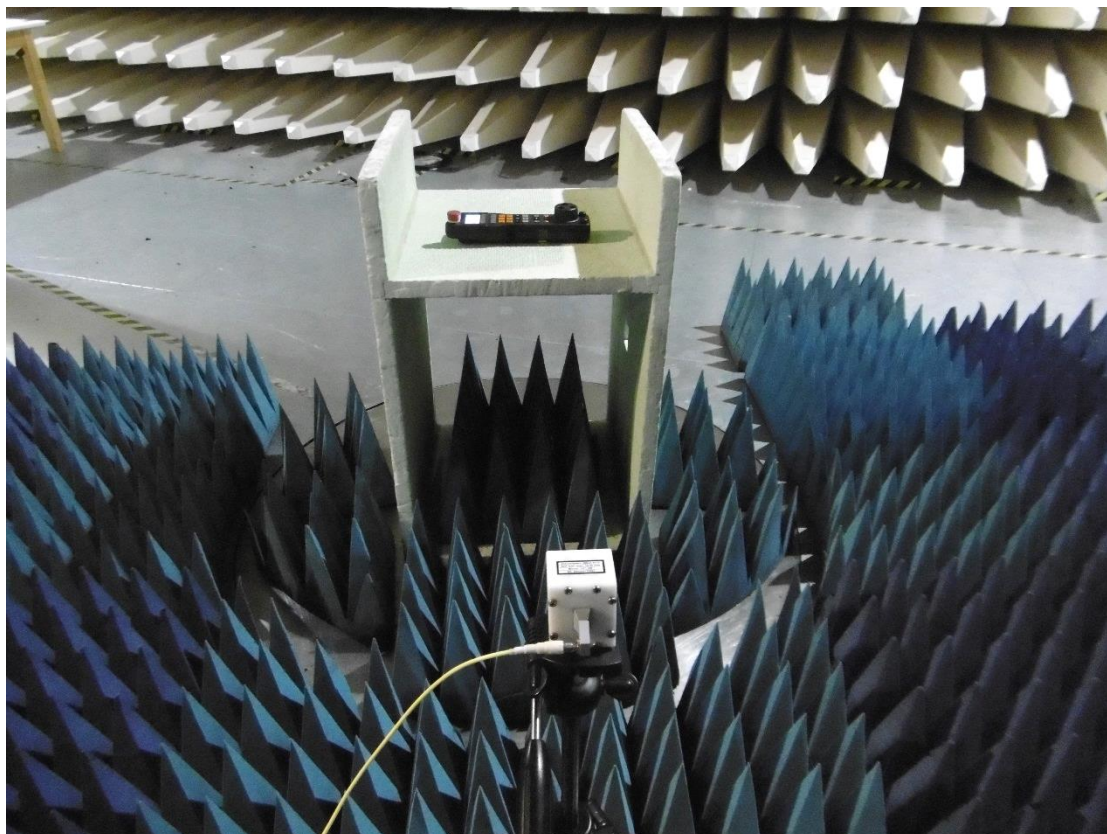
Test location: OATS 1
Test location: Anechoic chamber 1

Test distance: 3 m
Test distance: 1 m (18-26 GHz)

Photo documentation of the test set-up – Detailed photos see ATTACHMENT A







Applicability

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

Spectrum analyser settings:

30 MHz – 1000 MHz: RBW: 120 kHz

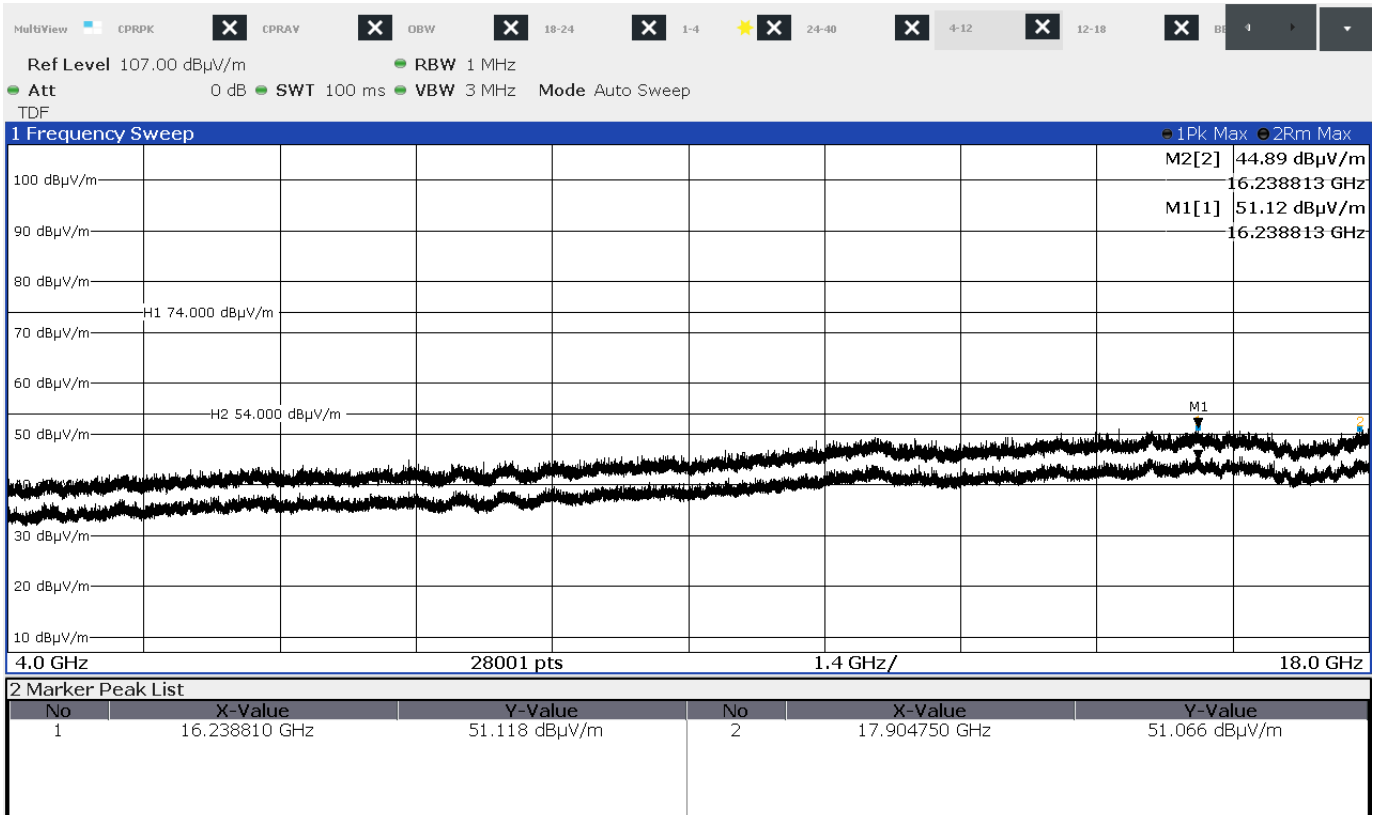
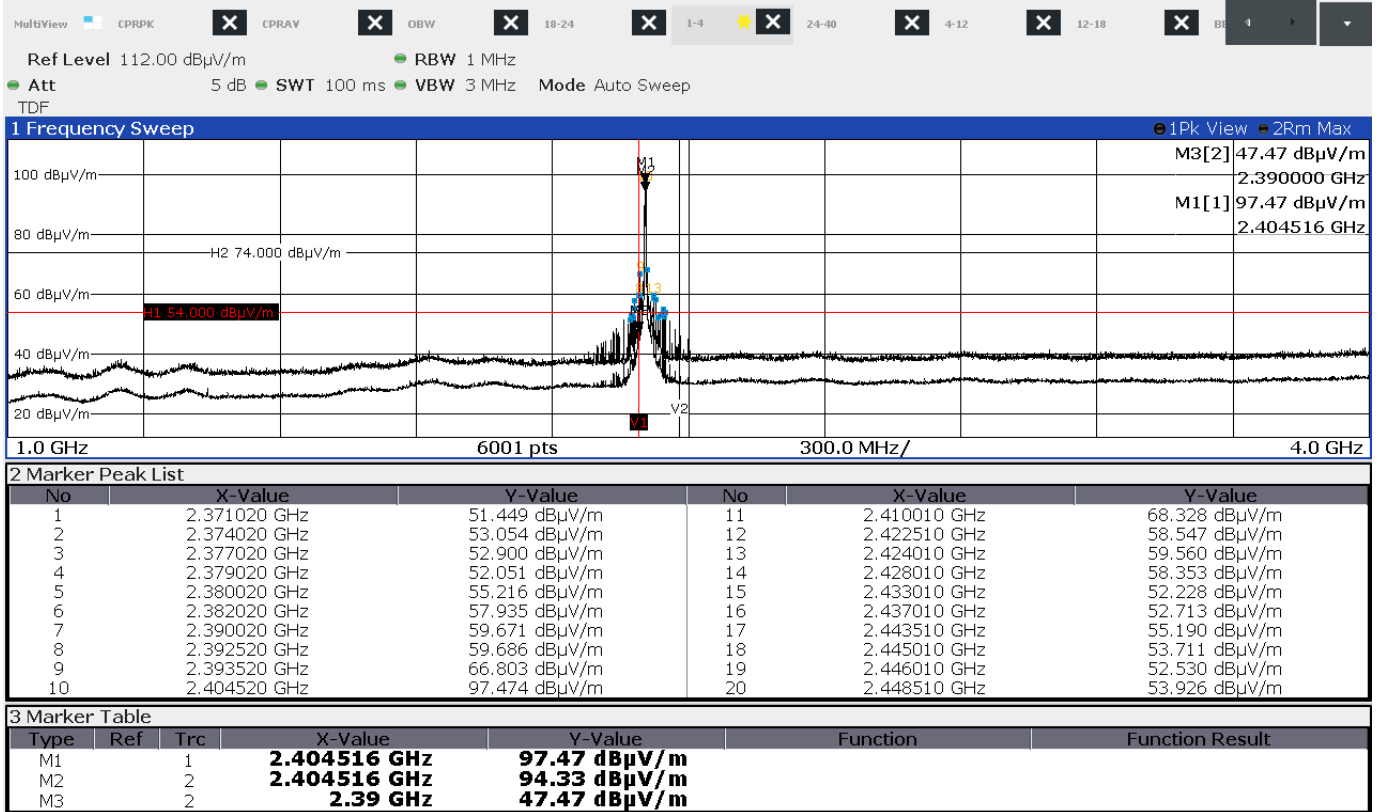
1000 MHz – 26 GHz: RBW: 1 MHz, VBW: 3 MHz, Sweep: Auto, Detector function: Peak

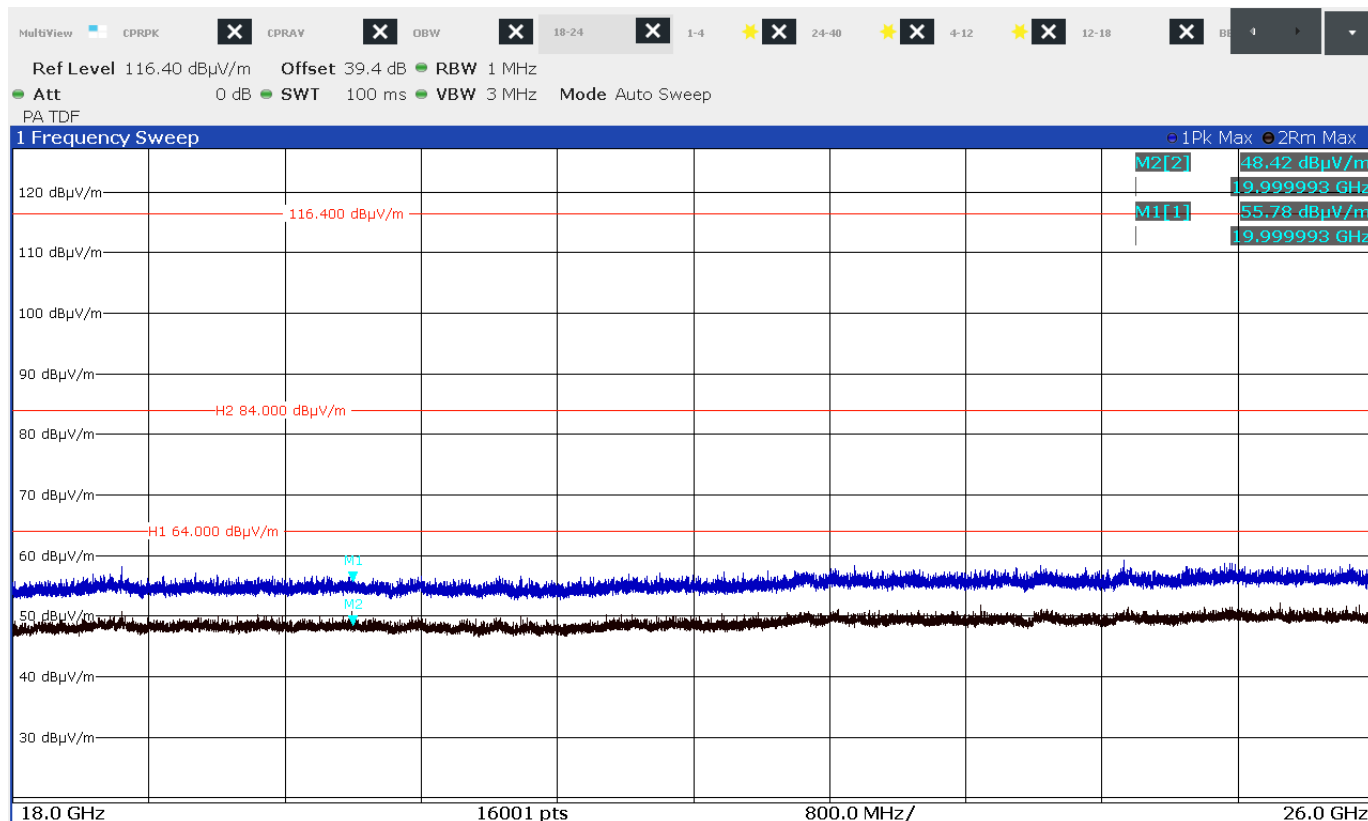
Test result

$f < 1$ GHz:

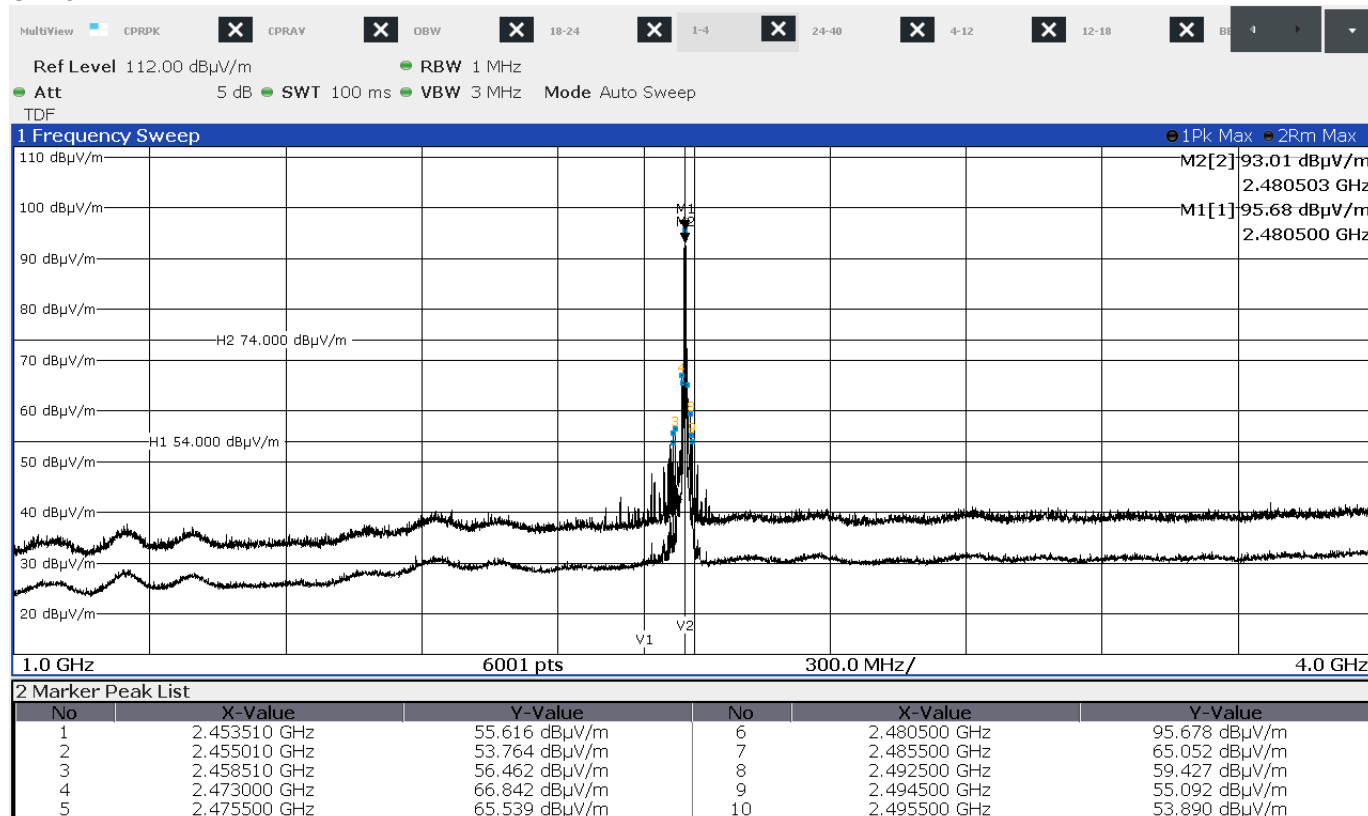
Frequency (MHz)	Reading Vert. (dB μ V)	Reading Hor. (dB μ V)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dB μ V/m)	Level Hor. (dB μ V/m)	Limit (dB μ V/m)	Dlimit (dB)
52.21	3.4	4.2	15.1	14.1	18.5	18.3	40.0	-21.5
61.82	5.3	8.8	14.6	13.7	19.9	22.5	40.0	-17.5
328.00	12.7	20.3	17.7	17.3	30.4	37.6	46.0	-8.4
829.00	3.5	4.1	30.0	29.5	33.5	33.6	46.0	-12.4
886.00	3.1	3.2	30.9	30.5	34.0	33.7	46.0	-12.0

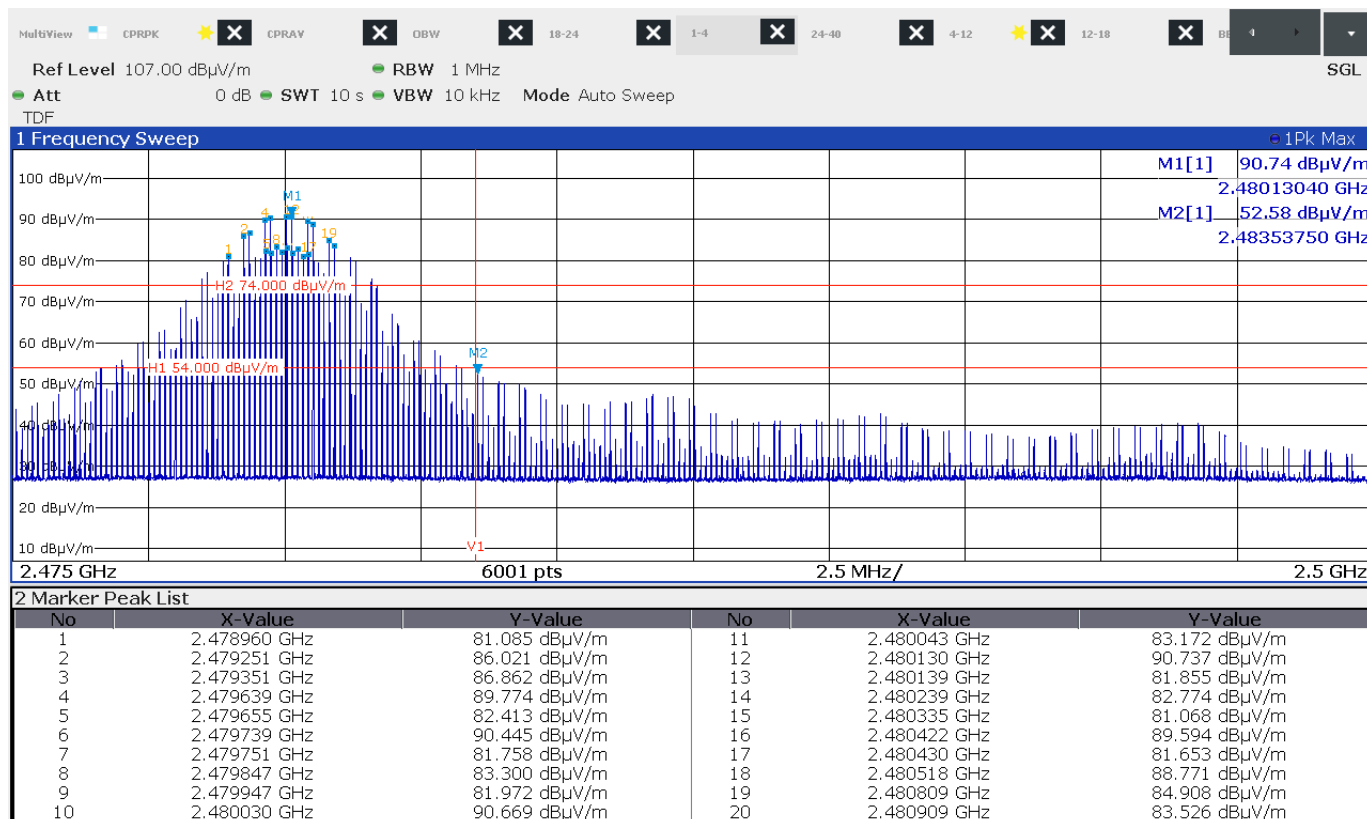
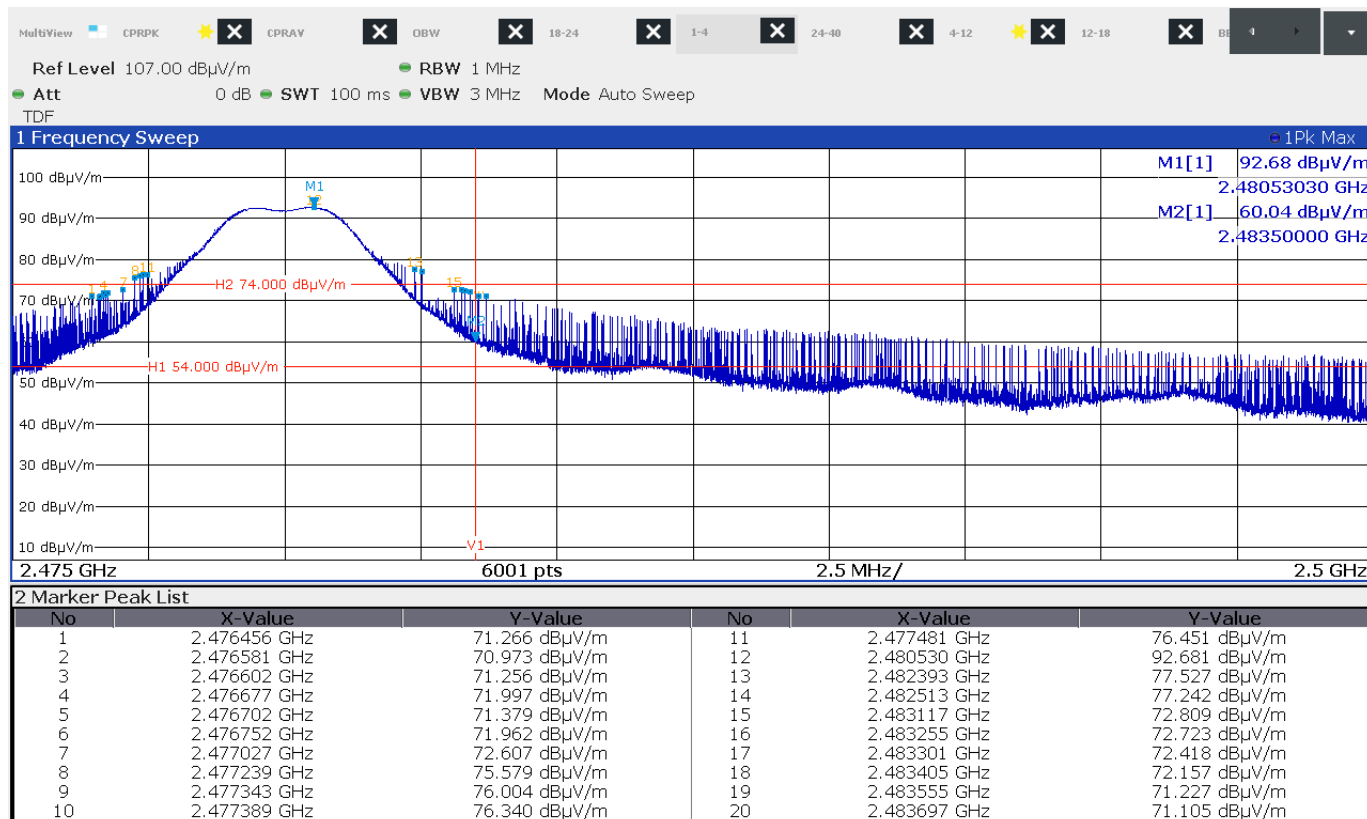
f > 1 GHz:
CH11

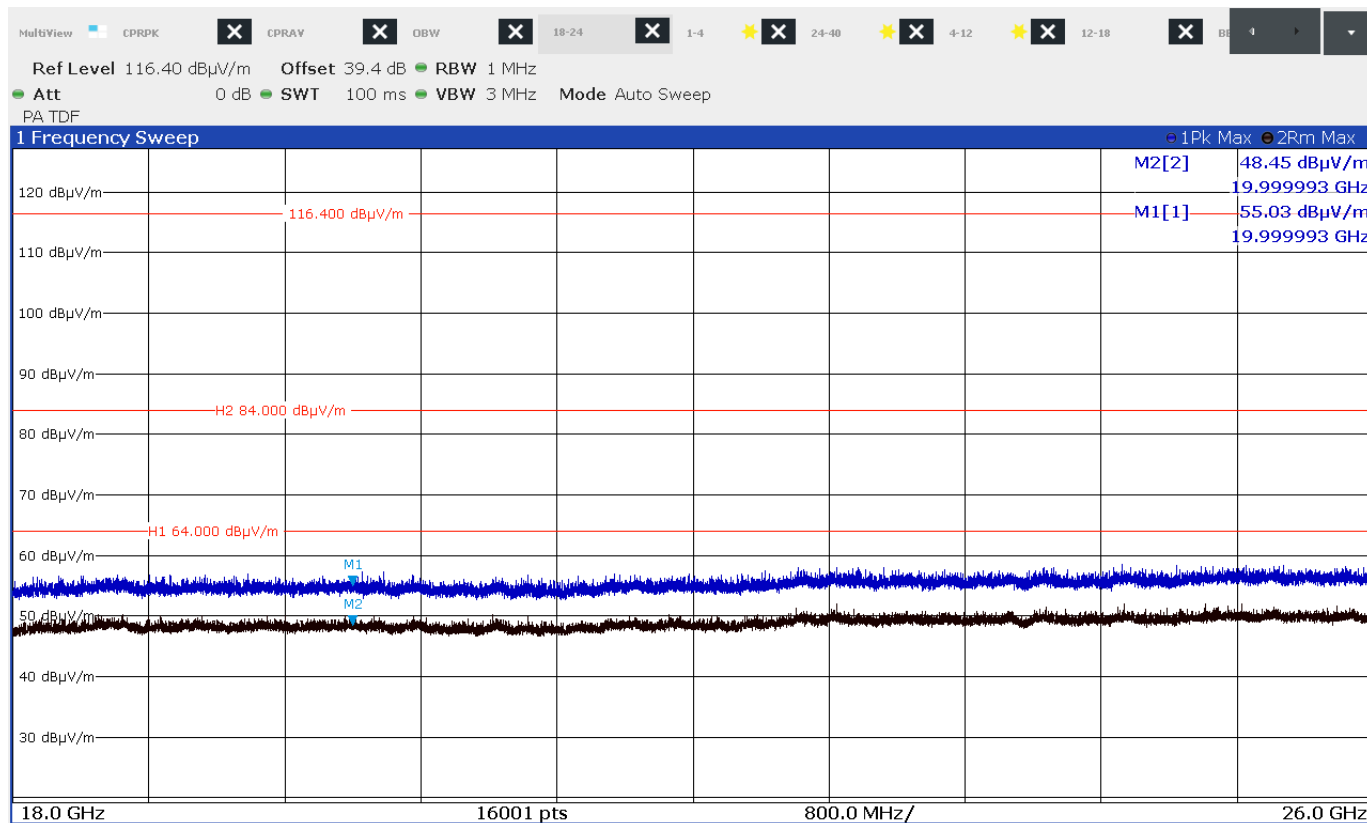
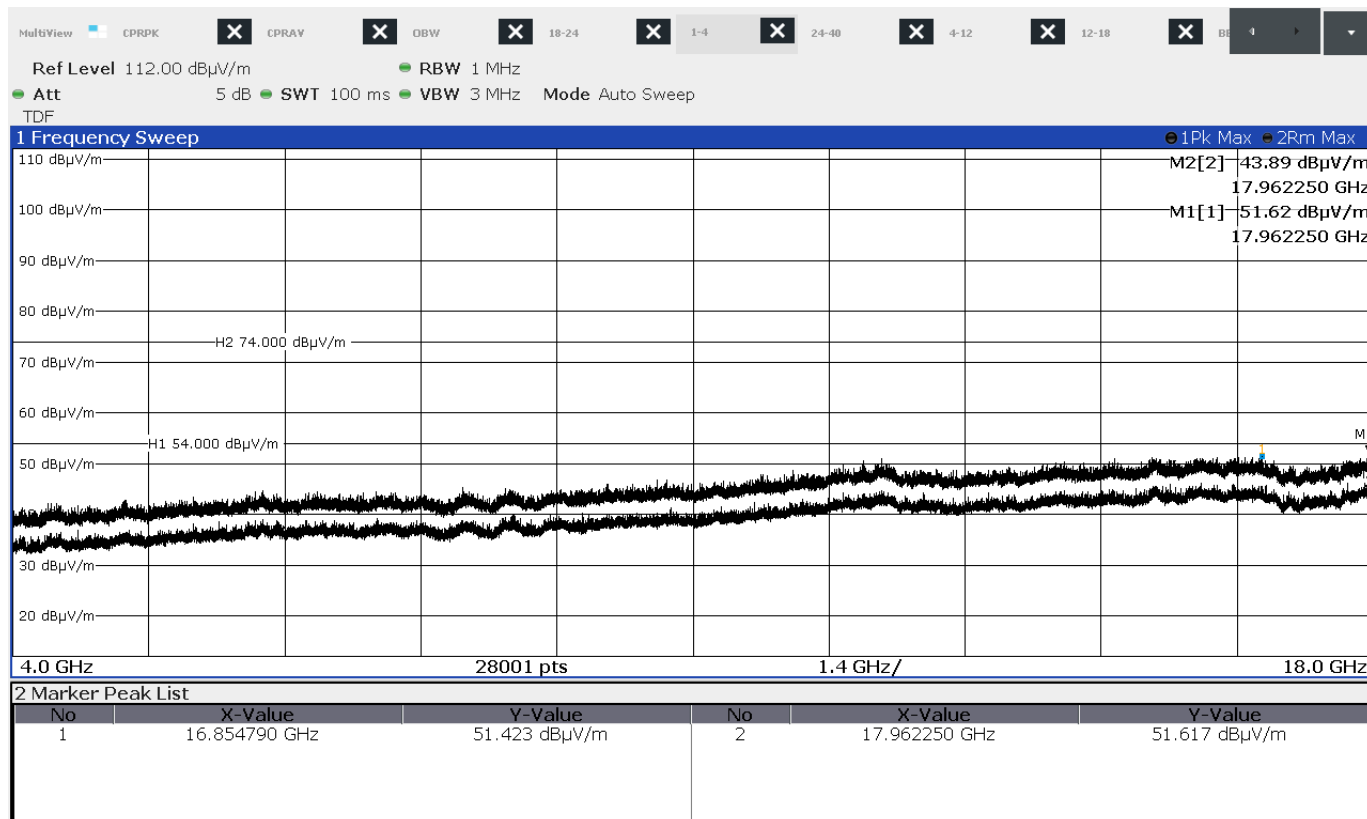




CH26







Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	($\mu\text{V/m}$)	$\text{dB}(\mu\text{V/m})$	
0.009-0.490	2400/F (kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

RSS-Gen, Table 6 – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	12.57675 - 12.57725	399.9 - 410	7.250 - 7.750
0.495 - 0.505	13.36 - 13.41	608 - 614	8.025 - 8.500
2.1735 - 2.1905	16.42 - 16.423	960 - 1427	9.0 - 9.2
3.020 - 3.026	16.69475 - 16.69525	1435 - 1626.5	9.3 - 9.5
4.125 - 4.128	16.80425 - 16.80475	1645.5 - 1646.5	10.6 - 12.7
4.17725 - 4.17775	25.5 - 25.67	1660 - 1710	13.25 - 13.4
4.20725 - 4.20775	37.5 - 38.25	1718.8 - 1722.2	14.47 - 14.5
5.677 - 5.683	73 - 74.6	2200 - 2300	15.35 - 16.2
6.215 - 6.218	74.8 - 75.2	2310 - 2390	17.7 - 21.4
6.26775 - 6.26825	108 - 138	2483.5 - 2500	22.01 - 23.12
6.31175 - 6.31225	149.9 - 150.05	2655 - 2900	23.6 - 24.0
8.291 - 8.294	156.52475 - 156.52525	3260 - 3267	31.2 - 31.8
8.362 - 8.366	156.7 - 156.9	3332 - 3339	36.43 - 36.5
8.37625 - 8.38675	162.0125 - 167.17	3345.8 - 3358	Above 38.6
8.41425 - 8.41475	167.72 - 173.2	3500 - 4400	
12.29 - 12.293	240 - 285	4500 - 5150	
12.51975 - 12.52025	322 - 335.4	5350 - 5460	

The requirements are **FULFILLED**.

Remarks: The measurement is performed up to the 10th harmonic.

USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
SER 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2019	18/04/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	FSW43	02-02/11-15-001	19/03/2019	19/03/2018		
	JS4-18004000-30-5A	02-02/17-05-017				
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	08/05/2019	08/05/2018		
	BBHA 9170	02-02/24-05-014	12/06/2021	12/06/2018	12/06/2019	12/06/2018
	KMS102-0.2 m	02-02/50-11-020				
	18N-20	02-02/50-17-003				
	NMS111-GL200SC01-NMS11	02-02/50-17-012				
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				