

Test Report

Report Number:

F241004E11, 2nd version

Equipment under Test (EUT):

Steering unit for welding inverters

Einschub TPS/i Touch G3

Applicant:

Fronius International GmbH

Manufacturer:

Fronius International GmbH



Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

[1] **ANSI C63.10: 2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024*** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

*Remark: This standard is not in accreditation scope of the laboratory yet.

[2] **FCC CFR 47 Part 15**, Radio Frequency Devices

[3] **558074 D01 15.247 Meas Guidance v05r02 (April 2019)**, GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES

[4] **RSS-247, Issue 4 (2025-07)** Digital Transmission Systems, Frequency Hopping Systems and Licence-Exempt Local Area Network Devices in 902-928 MHz, 2400-2483.5 MHz, 5150-5350 MHz, and 5470-5895 MHz bands

[5] **RSS-Gen, Issue 5 Amendment 2 (2021-02)** General Requirements for Compliance of Radio Apparatus

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in [1]. However, the measurement uncertainty is calculated and shown in this test report.

Tested by

Signature

Written by:

Signature

Reviewed and
approved by:

Signature

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1 Identification

1.1 Applicant

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Applicant represented during the test by the following person:	--

1.2 Manufacturer

Name:	Fronius International GmbH
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Country:	Austria
Name for contact purposes:	Mr. Jan HERNDLER
Phone:	+43-7242-241-0
eMail address:	herndler.jan@fronius.com
Manufacturer represented during the test by the following person:	--

1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by Deutsche Akkreditierungsstelle GmbH (DAkKS) according to DIN EN ISO/IEC 17025:2018. The accreditation is only valid for the scope of accreditation listed in the annex of the certificate D-PL-17186-01-00. FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	Steering unit for welding inverters
Model name: *	Einschub TPS/i Touch G3
Model number: *	43,0001,1785
Order number: *	-
FCC ID: *	QKWMCU3
IC certification number: *	12270A-MCU3
PMN: *	Einschub TPS/i Touch G3
HVIN: *	V0.3B
FVIN: *	N/A

* Declared by the applicant

	EUT number
	1
Serial number: *	N/A (MCU 3 Radio Sample 4)
PCB identifier: *	MCU3
Hardware version: *	V0.3B
Software version: *	V4.3.10

* Declared by the applicant

Two EUTs were used for the tests. In the overview (chapter 4) is shown which EUT was used for each test case.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General EUT data			
Power supply EUT: *	DC		
Supply voltage EUT: *	$U_{nom} = 24 \text{ V}_{DC}$	$U_{min} = 21.6 \text{ V}_{DC}$	$U_{max} = 26.4 \text{ V}_{DC}$
Temperature range: *	-20 °C to +65 °C		
Lowest / highest internal clock frequency: *	20 kHz / 2480 MHz		

* Declared by the applicant

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
DC mains	Customized	4 mm laboratory plug	$\geq 1 \text{ m}$	No
Ethernet *	HSD	RJ45	$\geq 1 \text{ m}$	Yes (CAT6)
Speednet *	HSD	RJ45	-	Yes (CAT6)
USB *	USB-A	-	-	Yes

* Declared by the applicant

RFID part	
Operating frequency: *	13.56 MHz
Number of channels: *	N/A
Type of modulation: *	ISO 14443A/B, ISO15693, ISO18092, NFCIP-2
Data rate: *	106-848 kbps
Antenna type: *	PCB antenna
Antenna connector: *	PCB connector

Bluetooth® low energy frequencies			
Channel 00	2402 MHz	Channel 01	2404 MHz
Channel 02	2406 MHz	Channel 03	2408 MHz
...	...	...	...
...	...	...	...
Channel 18	2438 MHz	Channel 19	2440 MHz
...	...	...	...
...	...	...	...
Channel 36	2474 MHz	Channel 37	2476 MHz
Channel 38	2478 MHz	Channel 39	2480 MHz

Bluetooth® low energy radio mode			
Fulfills radio specification: *1	Bluetooth® low energy (BLE) 5.3		
Radio module: *1	muRata LBEE5PL2DL		
Antenna type: *2	Dipole antenna		
Antenna name: *2	TAOGLAS FXP831.07.0100C		
Antenna gain: *2	Peak: 3.28 dBi		
Antenna connector: *2	U.FL		
Supply voltage radio module: *1	$U_{nom} = 3.3 V_{DC}$	$U_{min} = 3.14 V_{DC}$	$U_{max} = 3.46 V_{DC}$
Type of modulation: *1	BLE (1 Mbps PHY)	GFSK	
	BLE (2 Mbps PHY)	GFSK	
	BLE (500 kbps coded PHY)	GFSK	
	BLE (125 kbps coded PHY)	GFSK	
Operating frequency range: *1	BLE (1 Mbps PHY)	2402 – 2480 MHz	
	BLE (2 Mbps PHY)	2402 – 2480 MHz	
	BLE (500 kbps coded PHY)	2402 – 2480 MHz	
	BLE (125 kbps coded PHY)	2402 – 2480 MHz	
Number of channels: *1	BLE (1 Mbps PHY)	40 (2 MHz channel spacing)	
	BLE (2 Mbps PHY)	40 (2 MHz channel spacing)	
	BLE (500 kbps coded PHY)	40 (2 MHz channel spacing)	
	BLE (125 kbps coded PHY)	40 (2 MHz channel spacing)	

*1 based on the data sheet "Type 2DL Wi-Fi® + Bluetooth® Module"

*2 based on the antenna data sheet "SPE-11-8-026-K" by TAOGLAS provided by the applicant

1.5.1 Ancillary Equipment / Equipment used for testing

Equipment used for testing	
AC adapter *1	UE36LCP1-240150SPA
Test notebook *2	Fujitsu Lifebook U759

*2 Provided by the laboratory

*1 Provided by the applicant

1.6 Dates

Date of receipt of test sample:	02.12.2024
Start of test:	27.03.2025
End of test:	28.03.2025

2 Operational States

2.1 Description of function of the EUT

The EUT is a steering unit for welding inverters.
 Bluetooth® LE is used for data communication.
 WLAN is used for data communication.
 NFC is used for access control.

2.1.1 Operation modes

A ethernet connection to the test notebook was established and the test modes were set in a terminal session.

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate	Power setting
1	Bluetooth® LE	2480	39	GFSK	1 Mbps	"0x04 (4 dBm)"
	IEEE 802.11 b mode	2412	1	BPSK	1 Mbps	"15 dBm"
	NFC	13.56	-	CW	--	default

3 Additional Information

The EUT was not labeled as required by FCC / IC.

This test report contains the simultaneous transmission of WLAN / BTLE / NFC only.

The technology specific test cases are documented in test reports:

F240004E8 NFC
 F240004E9 BTLE
 F240004E10 WLAN

Wanted signals and their harmonics are not scope of this report

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-247 [4] RSS-Gen [5]	Tested EUT	Status
Maximum unwanted emissions	0.009 – 26500 *1 2	15.247 (d) 15.205 (a) 15.209 (a)	8.9 [5]	1	Passed *1 2

*1: Only the worst-case data rate based on the pretests were tested

*2 As declared by the applicant the highest radio frequency is 2.480 GHz.

Therefore, the radiated emission measurement must be carried out up to 10th of the highest radio clock frequency in this case 26.5 GHz.

5 Results

5.1 Test setups

5.1.1 Radiated: 9 kHz to 30 MHz

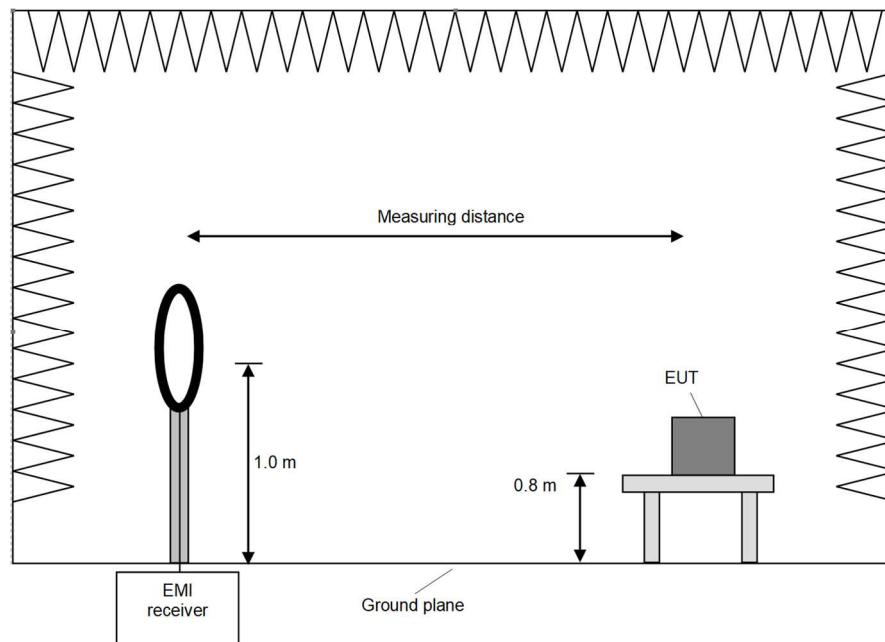
5.1.1.1 Preliminary measurement 9 kHz to 30 MHz

In the first stage a preliminary measurement is performed in a semi-anechoic chamber at a measuring distance of 3 meters. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance with [1].

The frequency range 9 kHz to 30 MHz is monitored with an EMI receiver while the system and its cables are manipulated to find out the configuration with the maximum emission levels if applicable. The EMI receiver is set to MAX hold mode. The EUT and the measuring antenna are rotated around their vertical axis to find the maximum emission levels.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure is used:

- 1) Monitor the frequency range with the measuring antenna facing the EUT and an EUT / turntable azimuth of 0 °.
- 2) Manipulate the system cables to produce the maximum levels of emissions.
- 3) Rotate the EUT by 360 ° to maximize the detected signals.
- 4) Measure the frequencies of the highest detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency values.
- 5) If the EUT is portable or ceiling mounted, repeat steps 1 to 4 with other orientations (x, y, z) of the EUT.
- 6) Rotate the measuring antenna and repeat steps 1 to 5.

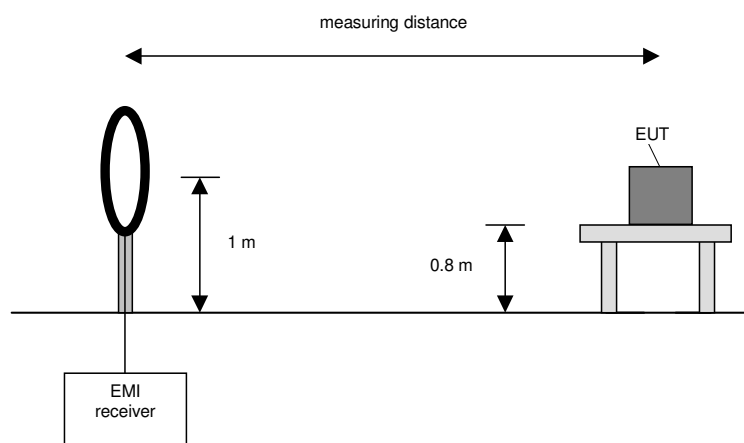
5.1.1.2 Final measurement 9 kHz to 30 MHz

In the second stage a final measurement is performed on an open area test site with no conducting ground plane at a measuring distance of 3 m, 10 m, or 30 m. If the standard requires larger measuring distances for a given frequency, the results are extrapolated according to section 15.31 (f) (2) [2]. The final measurement is performed with an EMI receiver set to Quasi-Peak detector, except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an Average detector is used according section 15.209 (d) [2].

At the frequencies, which were detected during the preliminary measurements, the final measurement is performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum level value is found.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth	Measuring time
9 kHz to 150 kHz	200 Hz	1 s
150 kHz to 30 MHz	9 kHz	1 s



Procedure final measurement:

The following procedure is used:

- 1) Monitor the selected frequencies from the preliminary measurement with the measuring antenna facing the EUT and an EUT azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals.
- 3) Rotate the measuring antenna and repeat steps 1 to 2 until the maximum value is found and note it.
- 4) If the EUT is portable or ceiling mounted, repeat steps 1 to 3 with other orientations (x, y, z) of the EUT.

5.1.2 Radiated: 30 MHz to 1 GHz

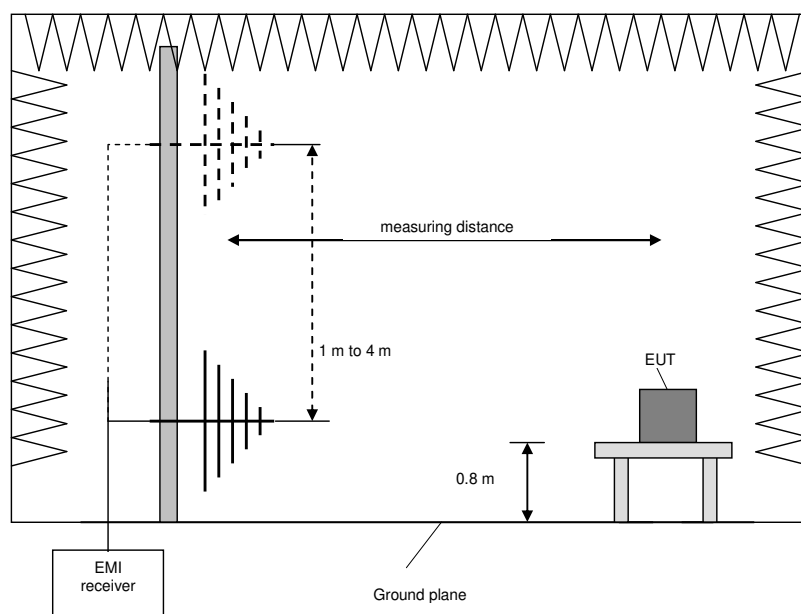
5.1.2.1 Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane at a measuring distance of 3 meters. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance with [1].

During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI receiver is set to the following values:

Test	Frequency range	Step-size	Resolution bandwidth	Measuring time	Detector
Preliminary measurement	30 MHz to 1 GHz	30 kHz	120 kHz	-	Peak Average
Frequency peak search	± 120 kHz	10 kHz	120 kHz	1 s	Peak
Final measurement	30 MHz to 1 GHz	-	120 kHz	1 s	QuasiPeak



Procedure preliminary measurement:

The following procedure is used:

- 1) Set the measuring antenna to 1 m height.
- 2) Monitor the frequency range at horizontal polarization of the measuring antenna and an EUT / turntable azimuth of 0 °.
- 3) Rotate the EUT by 360° to maximize the detected signals.
- 4) Repeat steps 2 to 3 with the vertical polarization of the measuring antenna.
- 5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
- 6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

- 1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
- 2) The software determines the exact peak frequencies by doing a partial scan with reduced step size of the pre-scan of the selected peaks.
- 3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x, y, z) for the final test.
- 4) The worst-case measuring antenna height is found via varying the height by ± 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The worst-case turntable position is found via varying the turntable azimuth by $\pm 30^\circ$ from the value obtained in the preliminary measurement while monitoring the emission level.
- 6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
- 7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

5.1.3 Radiated: 1 GHz to 26.5 GHz

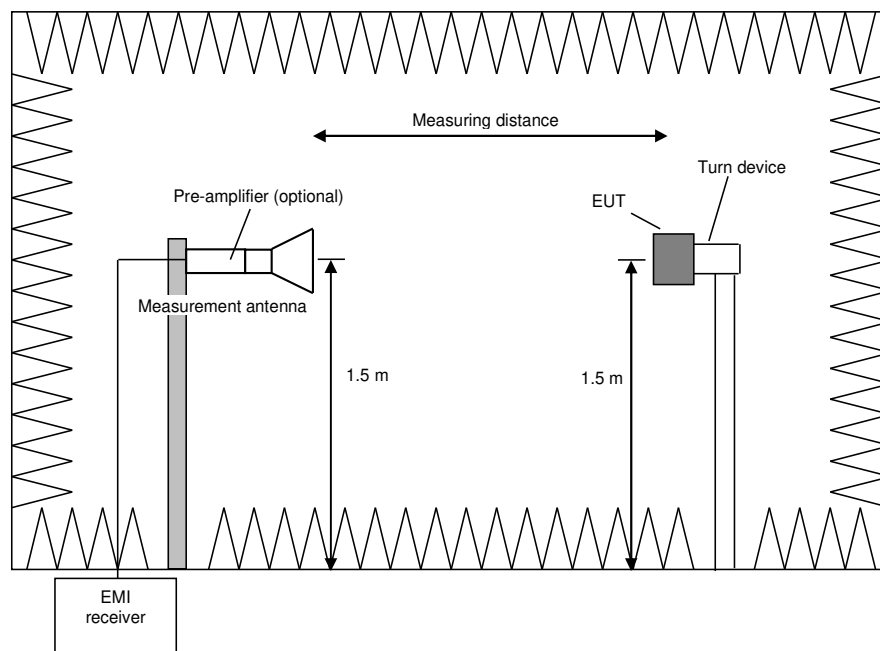
5.1.3.1 Preliminary and final measurement 1 GHz to 26.5 GHz

The preliminary and final measurements are performed in a fully anechoic chamber at a measuring distance of 3 meters. Table-top devices are set up on a non-conducting turn device at the height of 1.5 m. The setup of the equipment under test is in accordance with [1].

During the tests the EUT is rotated in the range of 0 ° to 360 ° and the measuring antenna is set to horizontal and vertical polarization to find the maximum level of emissions. After these steps, the measurement is repeated after reorientating the EUT in 30 ° steps. Alternatively, a test setup with a height scan from 1 m to 4 m and the EUT in nominal position at a height of 1.5 m is used.

The resolution bandwidth of the EMI receiver is set to the following values:

Test	Frequency range	Step-size	Resolution bandwidth	Measuring time	Detector
Preliminary measurement	1 GHz – 26.5 GHz	250 kHz	1 MHz	-	Peak Average
Final measurement	1 GHz – 26.5 GHz	-	1 MHz	100 ms	Peak Average



Procedure preliminary measurement:

The following procedure is used:

- 1) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
- 2) Rotate the EUT by 360° to maximize the detected signals.
- 3) Repeat steps 1 to 2 with the vertical polarisation of the measuring antenna.
- 4) Repeat steps 1 to 3 with the EUT reorientated by an angle of 30° (60°, 90°, 120° and 150°), according to 6.6.5.4 in [1].
- 5) The highest values for each frequency are saved by the software, including the measuring antenna polarization, the turntable azimuth and the turn device elevation for that value.

Procedure final measurement:

The following procedure is used:

- 1) Set the turntable and the turn device to the position which leads to the highest emission for the first frequency identified in the preliminary measurements.
- 2) Set the measurement antenna to the polarisation which leads to the highest emission for the first frequency identified in the preliminary measurements.
- 3) Set the spectrum analyser to EMI mode with Peak and Average detector activated.
- 4) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The final measurement is performed at the worst-case turntable azimuth.
- 6) Repeat steps 1 to 5 for each frequency detected during the preliminary measurements.

5.2 Radiated emissions

5.2.1 Test setup (Maximum unwanted emissions)

Test setup (Maximum unwanted emissions)			
Used	Setup	See sub-clause	Comment
☒	Radiated: 9 kHz to 30 MHz 30 MHz to 1 GHz 1 GHz to 40 GHz	5.1.1 5.1.2 5.1.3	-
☐	Conducted: Antenna port	---	-

5.2.2 Test method (Maximum unwanted emissions)

☒ Test method (radiated) see sub-clause 5.1.1 to 5.1.3 as described herein

5.2.3 Test results (Maximum unwanted emissions)

5.2.3.1 Test results preliminary measurement 9 kHz to 30 MHz

Ambient temperature:	22 °C	Date:	27 – 28.03.2025
Relative humidity:	35 %	Tested by:	P. NEUFELD

Position of EUT: For tests for f between 9 kHz to 30 MHz, the EUT was set-up on a table with a height of 80 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report.

Test record: The measurement value was already corrected by 40 dB/decade as described in 47 CFR 15.31(f)(2) regarding to the measurement distance as requested in 47 CFR 15.209(a)

Remark: Wanted signals and harmonics are not scope of this report

Calculations:

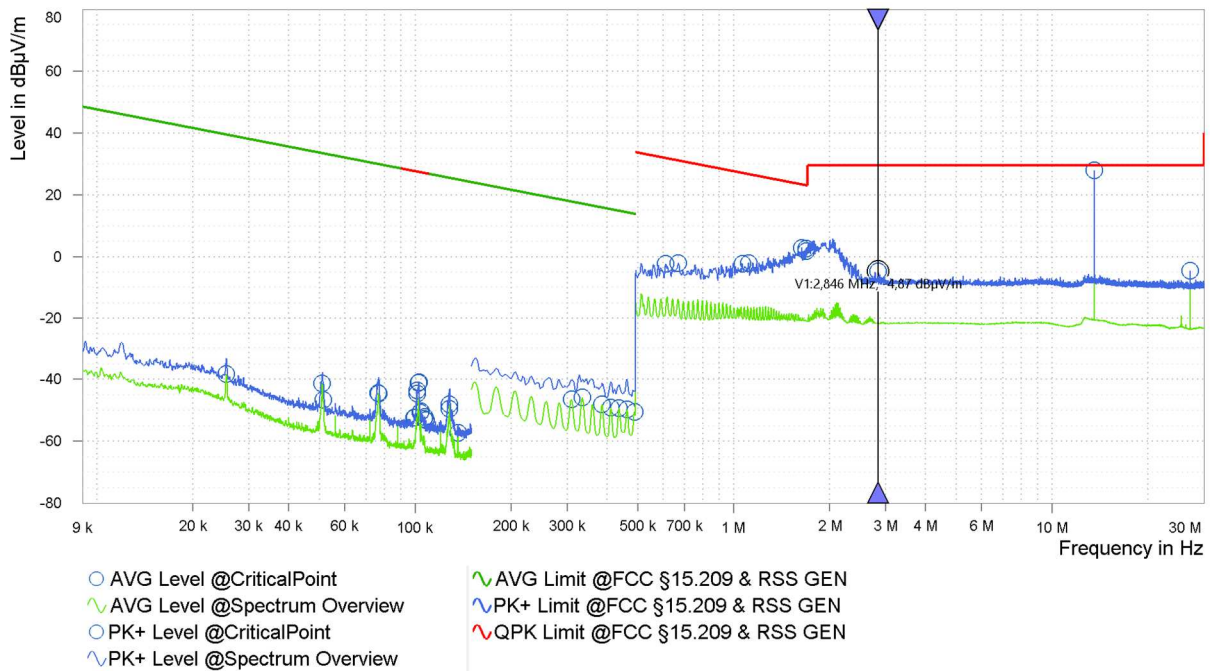
Result @ norm. dist. [dBμV/m] = Reading [dBμV] + AF [dB/m] + Distance corr. fact. [dB]

Result @ norm. dist. [dBμA/m] = Result @ norm. dist. [dBμV/m] – 20 x log₁₀ (377 Ω)

Margin [dB] = Limit [dB(μV|μA)/m] - Result [dB(μV|μA)/m]

Worst case plot:

Spurious emissions from 9 kHz to 30 MHz (operation mode 1):



Test equipment (please refer to chapter 7 for details)

3 - 5, 7 - 9, 11, 18

5.2.3.2 Test results (30 MHz – 1 GHz)

Ambient temperature:	22 °C
Relative humidity:	35 %

Date:	27. – 28.03.2025
Tested by:	P. NEUFELD

Position of EUT: For tests for f between 30 MHz to 1 GHz, the EUT was set-up on a table with a height of 80 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report.

Test record: Plots for each frequency range are submitted below.

Remark: -

Calculations:

Result [dBμV/m] = Reading [dBμV] + Correction [dB/m]

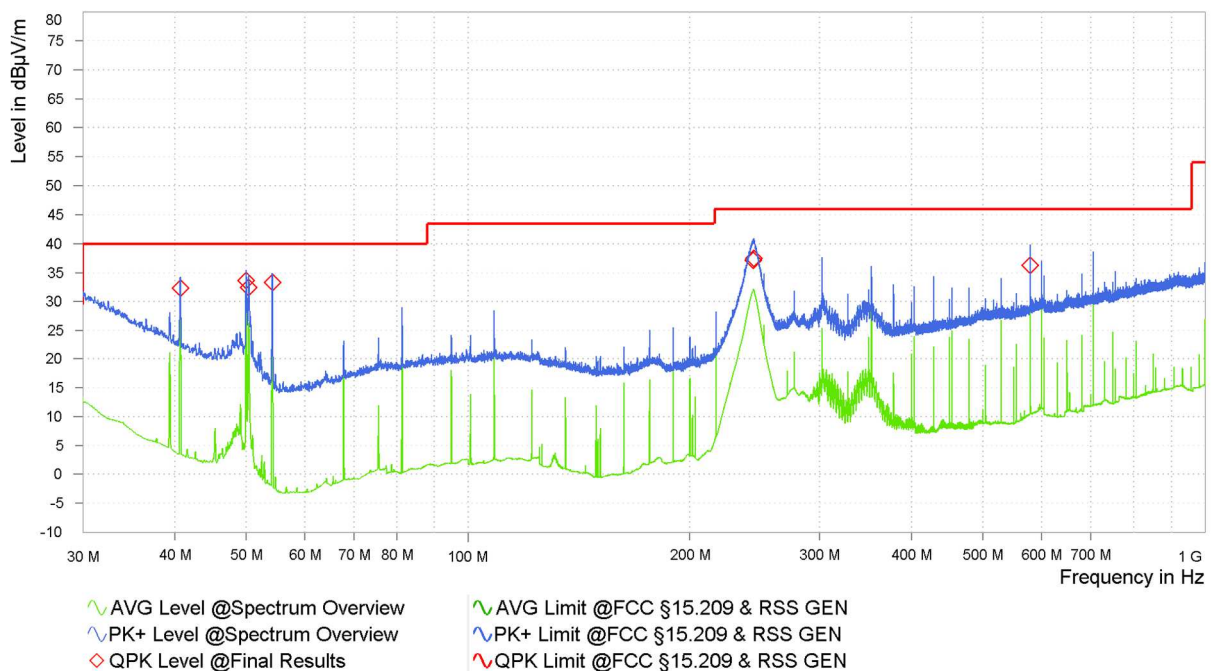
Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

Margin [dB] = Limit [dBμV/m] - Result [dBμV/m]

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with “◇” are the measured results of the standard subsequent measurement in a semi-anechoic chamber.

Worst case plot:

Spurious emissions from 30 MHz to 1 GHz (operation mode 1):



Result tables:

Operation mode 1:

Frequency [MHz]	QPK Level [dBμV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB/m]	Polarization	Azimuth [deg]	Antenna Height [m]
40.69	32.31	40.0	7.69	19.85	V	92	1.00
49.99	33.59	40.0	6.41	13.76	V	6	1.00
50.41	32.48	40.0	7.52	13.54	V	-24	1.00
54.25	33.35	40.0	6.65	12.16	V	332	1.15
243.64	37.11	46.0	8.89	17.00	H	190	1.00
244.09	37.43	46.0	8.57	17.00	H	195	1.01
579.61	36.20	46.0	9.80	25.47	V	277	1.00

Test result: Passed

Test equipment (please refer to chapter 7 for details)
3 - 9, 12 – 13, 18

5.2.3.3 Test results (radiated 1 GHz to 40 GHz)

Ambient temperature:	22 °C
Relative humidity:	35 %

Date:	27. – 28.03.2025
Tested by:	P. NEUFELD

Position of EUT: For tests for f between 1 GHz and the 10th harmonic, the EUT was set-up on a positioner device with a height of 150 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report.

Test record: Plots for each frequency range are submitted below.

Remark:

Calculation:

Max Peak [dBμV/m] = Reading [dBμV] + Correction [dB/m]

Average [dBμV/m] = Reading [dBμV] + Correction [dB/m]

Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB] + DCCF* [dB]
* (if applicable – only for Average values, that are fundamental related)

Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

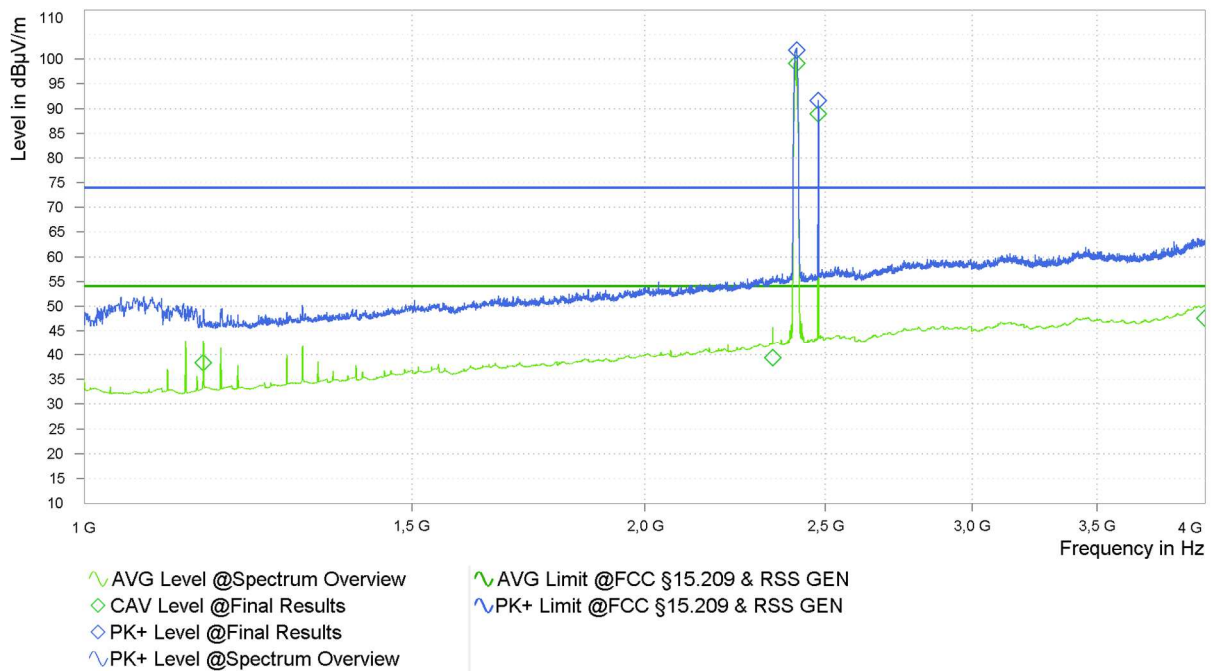
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.

The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◊" are frequency points for the final average detector measurement.

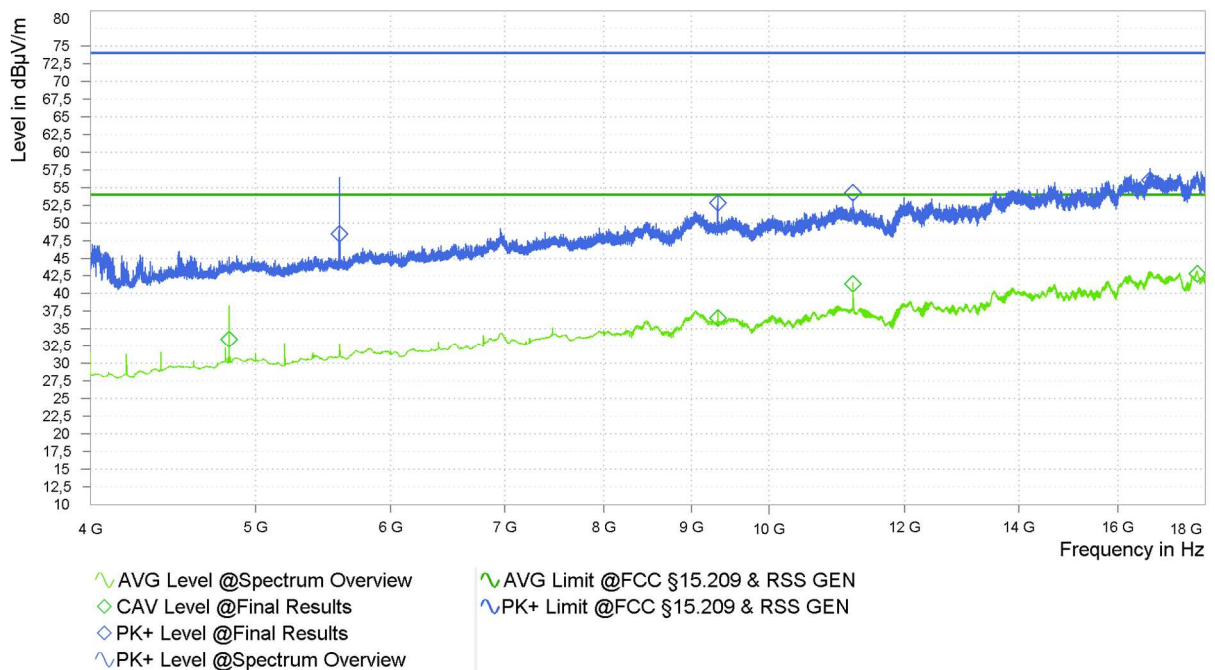
The measurement results are presented on the following pages.

Worst case plots:

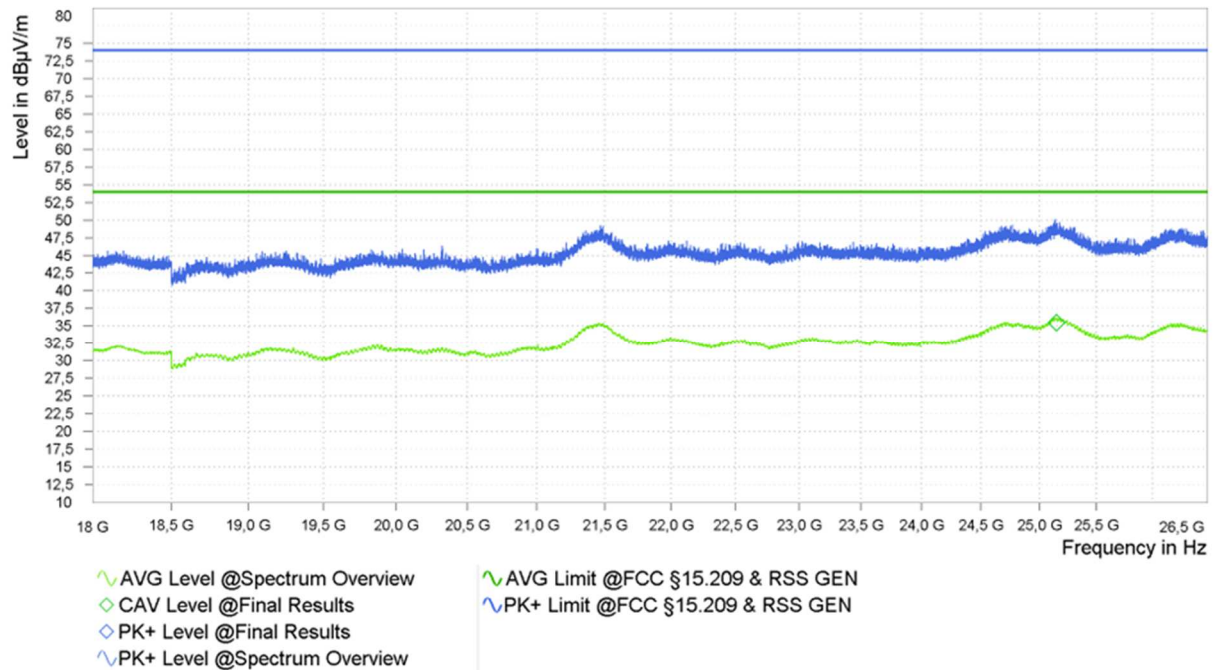
Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



Spurious emissions from 4 GHz to 18 GHz (operation mode 7):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 1):



The result tables are presented on the following.

Result tables:

Operation mode 1:

Frequency [MHz]	MaxPeak [dB(μ V/m)]	Average [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Pol [H/V]	Azimuth [deg]	Elevation [deg]	Correction [dB/m]
No relevant emissions detected, all emissions are covered by relevant test reports or are more than 20 dB below the limit								

Test result: Passed

Test equipment (please refer to chapter 7 for details)
2 - 10, 14 – 18

6 Measurement Uncertainties

Conducted measurements		
Measurement method	Standard used for calculating measurement uncertainty	Expanded measurement uncertainty (95 %) U_{lab}
Frequency error	ETSI TR 100 028	4.5×10^{-8}
Bandwidth measurements	-	9.0×10^{-8}
Conducted emissions using a spectrum analyzer		
< 3.6 GHz	ETSI TR 100 028	2.3 dB
3.6 – 8 GHz	ETSI TR 100 028	2.8 dB
8 – 22 GHz	ETSI TR 100 028	3.2 dB
22 – 40 GHz	ETSI TR 100 028	3.6 dB
Power measurements		
Power meter	ETSI TR 100 028	0.9 dB
Conducted emissions from 150 kHz to 30 MHz with LISN		
	CISPR 16-4-2	2.8 dB

Radiated measurements		
Frequency error		
(Semi-) Anechoic chamber	ETSI TR 100 028	4.5×10^{-8}
OATS	ETSI TR 100 028	4.5×10^{-8}
Test fixture	ETSI TR 100 028	4.5×10^{-8}
Bandwidth measurements		
(Semi-) Anechoic chamber	-	9.0×10^{-8}
OATS	-	9.0×10^{-8}
Test fixture	-	9.1×10^{-8}
Radiated field strength M20		
CBL6112B @ 3 m 30 MHz – 1 GHz	CISPR 16-4-2	5.3 dB
R&S HL050 @ 3 m		
1 – 6 GHz	CISPR 16-4-2	5.1 dB
6 – 18 GHz	CISPR 16-4-2	5.4 dB
Flann Standard Gain Horns 12 – 40 GHz	-	5.9 dB
Radiated field strength M276		
R&S HL562E @ 3 m 30 MHz – 1 GHz	CISPR 16-4-2	4.8 dB
R&S HL050 @ 3 m	-	
1 – 6 GHz	CISPR 16-4-2	5.1 dB
6 – 18 GHz	CISPR 16-4-2	5.4 dB
Flann Standard Gain Horns 12 – 40 GHz	-	5.9 dB
OATS		
Field strength measurements below 30 MHz on OATS without ground plane	-	4.4 dB

7 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
2	Log.-per. antenna	HL050	Rohde & Schwarz	100908	482977	22.09.2022	09.2025
3	EMC test software	Elektra V5.05.00	Rohde & Schwarz	-	483755	Calibration not necessary	
4	RF switch matrix	OSP220	Rohde & Schwarz	101391	482976	Calibration not necessary	
5	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
6	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
7	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
8	Semi anechoic chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
9	EMI test receiver	ESW44	Rohde & Schwarz	101828	482979	21.02.2024	02.2026
10	Positioner	TG1.5-10kg	Maturo	110/2648.01	483042	Calibration not necessary	
11	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	21.02.2024	02.2026
12	Attenuator 6 dB	WA2-6	Weinschel	8254	410119	Calibration not necessary	
13	Ultralog antenna	HL562E	Rohde & Schwarz	101079	482978	24.04.2024	04.2027
14	Low noise amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	20.02.2024	02.2026
15	Low noise amplifier 18 GHz - 26.5 GHz	LNA-30-18002650-20-10P	Narda-Miteq	2110911	482969	19.02.2024	02.2026
16	Standard gain horn 18 GHz - 26 GHz	20240-20	Flann	266399	483026	Calibration not necessary	
17	High-pass filter	WHKX4.0/18G-8SS	Wainwright	1	480587	Calibration not necessary	
18	AC power supply	AC6803A AC Quelle 2000VA	Keysight	JPVJ002509	482350	Calibration not necessary	

8 Test site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA	ANSI C63.4-2014 ANSI C63.4a-2017	01.03.2023	28.02.2026
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	28.02.2023	27.02.2026

9 Report History

Report Number	Date	Comment
F241004E11	09.05.2025	Initial Test Report
F241004E11, 2 nd version	01.10.2025	p.2: References [1] and [4] corrected
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10 List of Annexes

Annex A

Test Setup Photos

7 pages

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