

Test Report

Report Number:

F241826E5

Equipment under Test (EUT):

cVEND touch

Applicant:

Feig Electronic GmbH

Manufacturer:

Feig Electronic GmbH



Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

- [1] **ANSI C63.4:2014** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] **FCC 47 CFR Part 2:** General Rules and Regulations
- [3] **FCC 47 CFR Part 15:** Radio Frequency Devices (Subpart B)
- [4] **ICES-003 Issue 7: (October 2020)** Spectrum Management and Telecommunications. Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus) —Limits and Methods of Measurement

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 clause 10.2.8.2 of ANSI C63.4 (2014). However, the measurement uncertainty is calculated and shown in this test report.

Tested and written
by:

Signature

Reviewed and
approved by:

Signature

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The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

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1 Identification

1.1 Applicant

Name:	Feig Electronic GmbH
Address:	Industriestraße 1a, 35781 Weilburg
Country:	Germany
Name for contact purposes:	Mr. Johannes KLEIN
Phone:	06471-3109-0
eMail address:	info@feig.de
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Feig Electronic GmbH
Address:	Industriestraße 1a, 35781 Weilburg
Country:	Germany
Name for contact purposes:	Mr. Johannes KLEIN
Phone:	06471-3109-0
eMail address:	info@feig.de
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: *	Contactless payment terminal
Model name: *	cVEND touch
Model number: *	n.a.
Order number: *	n.a.
FCC ID: *	PJMCVT
IC certification number: *	6633A-CVT
PMN: *	cVEND touch
HVIN: *	cVEND touch
FVIN: *	feclr 03.02.00

	EUT number		
	1	2	3
Serial number: *	1817F481	-	-
PCB identifier: *	FE1182/FE1183/ FE1188	-	-
Hardware version: *	1.0	-	-
Software version: *	tD03.03.00-00.05-2-2	-	-

* Declared by the applicant

One EUT was used for all tests.

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			
Power supply EUT: *	DC by external power supply		
Supply voltage EUT: *	$U_{nom} = 24 V_{DC}$	$U_{min} = 12 V_{DC}$	$U_{max} = 42 V_{DC}$
Temperature range: *	-30 °C to +70 °C		
Lowest / highest internal frequency: *	32.768 kHz / 50 MHz		

* Declared by the applicant

RFID part	
Operating frequency: *	13.56 MHz
Number of channels: *	1
Type of modulation: *	ASK
Data rate: *	106 kBit/s
Duty cycle: *	~100%
Antenna type: *	Integrated loop antenna
Antenna connector: *	/

* Declared by the applicant

Cellular part			
Manufacturer: *	Quectel		
Model name: *	EG916Q-GL		
Power supply module: *	DC by host		
Supply voltage module: *	$U_{nom} = 3.8 V$	$U_{min} = 3.3 V$	$U_{max} = 4.3 V$
Serial Number: *	P1Y24GB23000997		
IMEI: *	868531060166613		
Hardware version: *	EG916QGLLC-N03-SNNSA		
Firmware version: *	EG916QGLLGR01A04M04		
Supported bands: *	LTE FDD: Band 1, 2, 3 , 4, 5, 7, 8 , 12, 13, 18, 19, 20 , 25, 26, 28, 66** LTE TDD: Band 34, 38, 39, 40, 41**		
Max. output power: *	Class 3 (23 dBm)		
Antenna type: *	4G/5G/Dual Wide Band Puck Antenna		
Antenna connector: *	MMCX		
Antenna gain: *	Max. 5.5 dBi		

* Declared by the applicant

** Not all bands are used in the end application.

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
LAN 1	RJ45	RJ45	2 m	Yes
LAN 2	RJ45	RJ45	2 m	Yes
Power / MDB	Molex Mini Fit 39-28-1063	Molex Mini Fit 39-01-2060	Power >3 m MDB ≤3 m	No
SCR	JST ZH B6B-ZR	JST ZH ZHR-6	≤3 m	No
COM 0	Molex Micro Fit 43045-0412	Molex Micro Fit 43025-0400	≤3 m	No
USB OTG	Molex Micro Fit 43045-0612	Molex Micro Fit 43025- 0600	≤3 m	Yes
AUX	Molex Micro Fit 43650-0615	Molex Micro Fit 43645- 0600	≤3 m	No

Equipment used for testing	
Laptop PC *2	Lenovo Think Pad 200t
NFC Card *1	ISO 14443A Mifare DESFire ID-1

*1 Provided by the applicant

*2 Provided by the laboratory

Ancillary equipment	
cVEND EXT.LTE-A *1	LTE Modem Extension Board
cVEND SHCR-A *1	Secure Hybrid Card Reader

*1 Provided by the applicant

1.6 Dates

Date of receipt of test sample:	03.03.2025
Start of test:	10.03.2025
End of test:	24.03.2025

2 Operational States

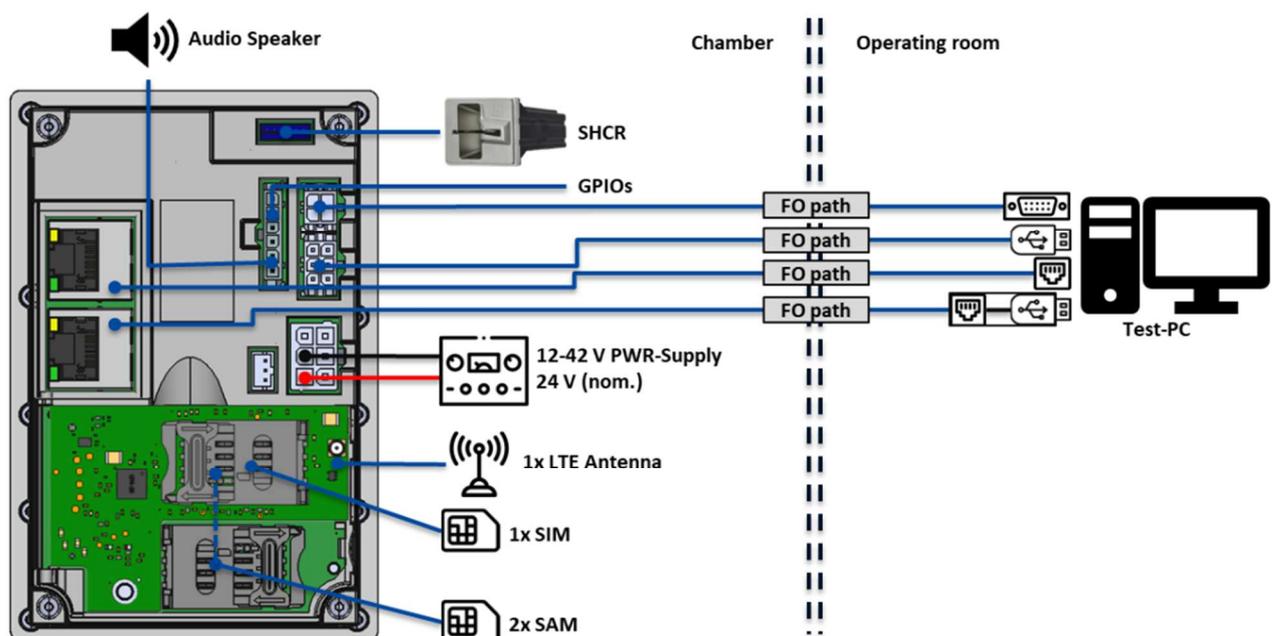
Description of function of the EUT:

The EUT is a contactless payment terminal with pin entry. The near field communication between the EUT and the contactless card is operating at 13.56 MHz. All tests were carried out with a modified test sample that contains an additional LTE module. This additional LTE module is not part of the EUT and is also considered here in the test to enable future integration.

The following states were defined as the operating conditions:

The EUT was supplied by 24 V DC during all tests. The EUT was connected to the test PC via two USB, one RS232 and one Ethernet interface. A PowerShell script is executed on the test PC, which ensures maximum activity of the EUT and its interfaces. Additionally the RFID reader of the EUT was set to operating mode. The LTE module was set to RRC idle mode.

The system was setup as follows:



3 Additional Information

Additional LTE Module

To fulfil the conducted emission test, a dummy load as described below was used, according to KDB 174176 (06/2015):

The following components were used / changed by the applicant to create suitable dummy load in lieu of the antenna:

The antenna is disconnected and resistors instead of the capacitive matching network of the NFC fronted are used, to create an equivalent "correct nominal impedance".

4 Overview

Conducted emissions FCC 47 CFR Part 15 section 15.107 (a), (b) [3] ICES-003 Issue 7 section 3.2.1[4]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
AC supply line Class B	0.15 to 0.5 MHz	66 to 56 dB(μ V) QP*	ANSI C63.4	1	Passed
	0.5 to 5 MHz	56 to 46 dB(μ V) AV*			
	5 to 30 MHz	56 dB(μ V) QP 46 dB(μ V) AV 60 dB(μ V) QP 50 dB(μ V) AV			
*: Decreases with the logarithm of the frequency					

Radiated emissions FCC 47 CFR Part 15 section 15.109 (a) [3]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
Radiated Emission Class B	30 to 88 MHz	40.0 dB(μ V/m) QP at 3 m	ANSI C63.4	1	Passed
	88 to 216 MHz	43.5 dB(μ V/m) QP at 3 m			
	216 to 960 MHz	46.0 dB(μ V/m) QP at 3 m			
	960 to 1000 MHz	54.0 dB(μ V/m) QP at 3 m			
	above 1000 MHz	54.0 dB(μ V/m) AV at 3 m and 74.0 dB(μ V/m) PK at 3 m			

Radiated emissions ICES-003 Issue 7 section 3.2.2 [4]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
Radiated Emission Class B	30 to 88 MHz	40.0 dB(μ V/m) QP at 3 m	ANSI C63.4	1	Passed
	88 to 216 MHz	43.5 dB(μ V/m) QP at 3 m			
	216 to 230 MHz	46.0 dB(μ V/m) QP at 3 m			
	230 to 960 MHz	47.0 dB(μ V/m) QP at 3 m			
	960 to 1000 MHz	54.0 dB(μ V/m) QP at 3 m			
	above 1000 MHz	54 dB(μ V/m) AV at 3 m and 74 dB(μ V/m) PK at 3 m			

Remark: As declared by the applicant the highest internal clock frequency is 2.69 GHz.
Therefore the radiated emission measurement must be carried out up to 5th of the highest internal clock frequency up to 13.45 GHz, in this case the measurement was carried out up to 18 GHz.

The EUT was classified by the applicant as CLASS B equipment.

5 Results

5.1 Test setups

5.1.1 Radiated: 30 MHz to 1 GHz

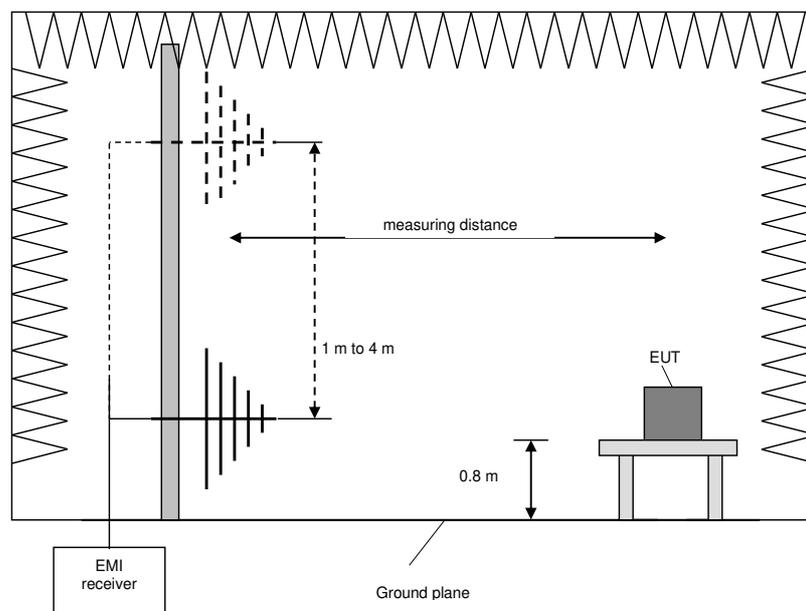
5.1.1.1 Preliminary and final measurement 30 MHz to 1 GHz

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 +/- 30° 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.

5.1.2 Radiated: 1 GHz to 18 GHz

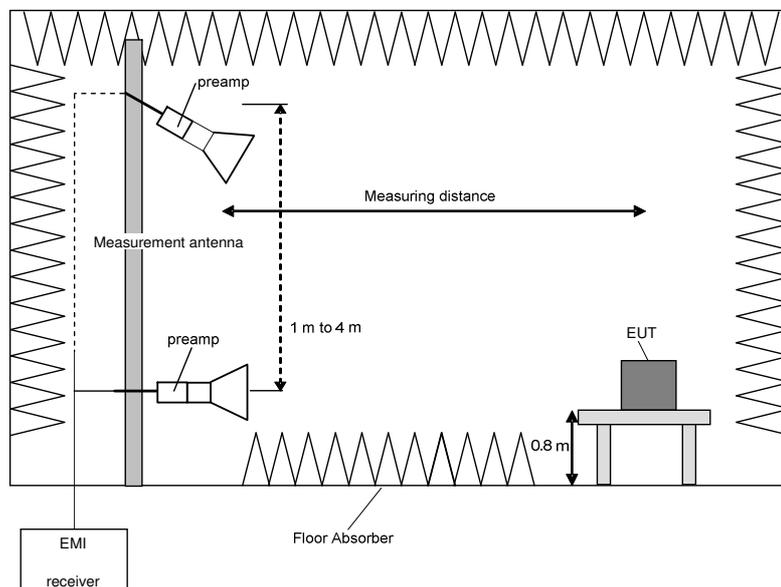
5.1.2.1 Preliminary and final measurement 1 to 18 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber at a measuring distance of 3 meters, with floor absorbers between EUT and measuring antenna. 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. While changing the height, the measuring antenna gets tilted so that it is always aiming at the EUT.

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 - 18 GHz	250 kHz	1 MHz	-	Peak Average
Frequency peak search	+ / - 1 MHz	50 kHz	1 MHz	100 ms	Peak
Final measurement	1 - 18 GHz	-	1 MHz	100 ms	Peak Average



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:

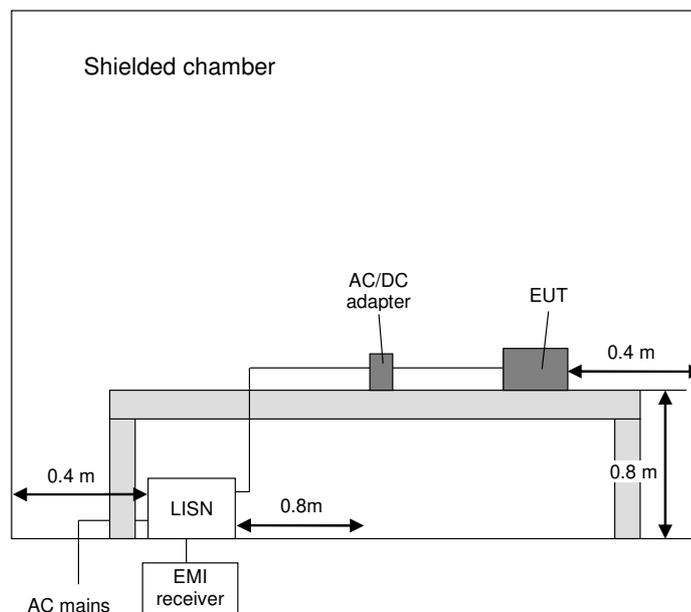
- 1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
- 2) The software determines the exact peak frequencies by doing a partial scan with reduced step size of the pre-scan of the selected peaks.
- 3) If the EUT is portable or ceiling mounted, find the worst-case 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 +/- 30° 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 Conducted: AC power line

The test is carried out in a shielded chamber. 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 above the ground plane. Floor-standing devices are placed directly on the ground plane. In case of DC powered equipment, which is not exclusively powered by a battery, it is connected to the LISN via a suitable AC/DC adaptor. The setup of the equipment under test is in accordance with [1].

The frequency range 150 kHz to 30 MHz is measured with an EMI receiver set to MAX hold mode with Peak and Average detectors and a resolution bandwidth of 9 kHz. A scan is carried out on the phase and neutral line of the AC mains network. If emissions less than 10 dB below the appropriate limit are detected, these emissions are measured with an Average and Quasi-Peak detector on all lines.

Frequency range	Resolution bandwidth	Measuring time
150 kHz to 30 MHz	9 kHz	5 s



5.2 Radiated emissions

5.2.1 Test setup (Maximum unwanted emissions)

Test setup (Maximum unwanted emissions)			
Used	Setup	See sub-clause	Comment
<input checked="" type="checkbox"/>	Radiated: 30 MHz to 1 GHz / 1 GHz to 18 GHz	5.1.1 / 5.1.2	-

5.2.2 Test method (Maximum unwanted emissions)

Test method (radiated) see sub-clause 5.1.1 / 5.1.2 as described herein

5.2.3 Test results (Maximum unwanted emissions)

5.2.3.1 Test results (30 MHz – 1 GHz)

Ambient temperature:	22 °C
Relative humidity:	20 %

Date:	10.03.2025
Tested by:	M. DINTER

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: The EUT was measured in its normal installation orientation.

Calculations:

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

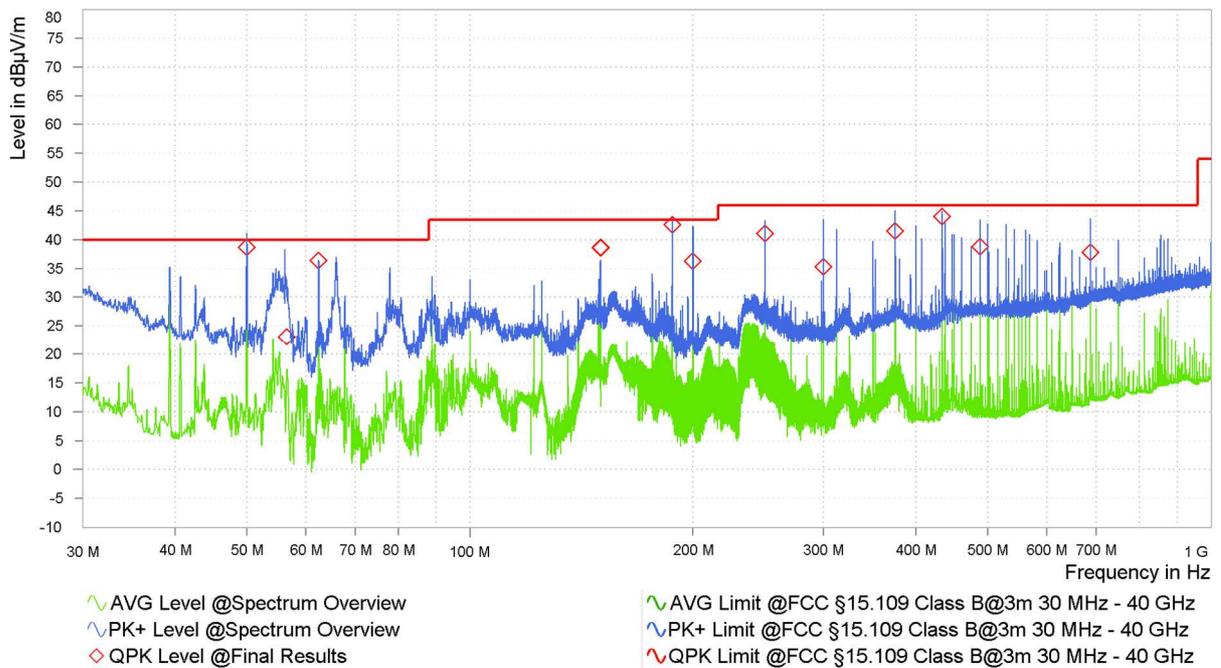
Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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:



Result tables:

Results according to FCC 47 CFR Part 15 section 15.109 (a), (b) [3]

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Height [cm]	Azimuth [deg]	Pol. (H/V)
50.010	38.7	40.0	1.3	24.9	13.8	100	328	V
56.550	23.0	40.0	17.0	11.0	12.0	263	212	V
62.490	36.3	40.0	3.7	23.4	12.9	156	26	V
150.000	38.6	43.5	4.9	23.3	15.3	212	277	H
187.500	42.6	43.5	0.9	27.6	15.0	160	267	H
199.980	36.2	43.5	7.3	20.8	15.4	114	238	H
249.990	41.1	46.0	4.9	23.9	17.2	106	114	H
300.000	35.3	46.0	10.7	16.4	18.9	132	257	V
375.000	41.5	46.0	4.5	20.6	20.9	145	328	V
433.890	44.0	46.0	2.0	21.7	22.3	108	357	V
488.130	38.8	46.0	7.2	14.9	23.9	105	97	V
687.510	37.8	46.0	8.2	11.0	26.8	119	234	V

Results according to ICES-003 Issue 7 section 3.2.2 [4]

Frequency [MHz]	Result (QP) [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Readings [dB μ V]	Correction [dB/m]	Height [cm]	Azimuth [deg]	Pol. (H/V)
50.010	38.7	40.0	1.3	24.9	13.75	100	328	V
56.550	23.0	40.0	17.0	11.0	11.99	263	212	V
62.490	36.3	40.0	3.7	23.4	12.86	156	26	V
150.000	38.6	43.5	4.9	23.3	15.28	212	277	H
187.500	42.6	43.5	0.9	27.6	15.03	160	267	H
199.980	36.2	43.5	7.3	20.8	15.44	114	238	H
249.990	41.1	47.0	5.9	23.9	17.15	106	114	H
300.000	35.3	47.0	11.7	16.4	18.87	132	257	V
375.000	41.5	47.0	5.5	20.6	20.94	145	328	V
433.890	44.0	47.0	3.0	21.7	22.32	108	357	V
488.130	38.8	47.0	8.2	14.9	23.90	105	97	V
687.510	37.8	47.0	9.2	11.0	26.78	119	234	V

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1 - 9

5.2.3.2 Test results (radiated 1 to 18 GHz)

Ambient temperature:	22 °C
Relative humidity:	19 %

Date:	11.03.2025
Tested by:	M. DINTER

Position of EUT: For tests for f between 1 GHz and the 5th harmonic, 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: The EUT was measured in its normal installation orientation.

Calculation:

Max Peak [dB μ V/m] = Reading [dB μ V] + Correction [dB/m]

Average [dB μ V/m] = Reading [dB μ V] + 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)

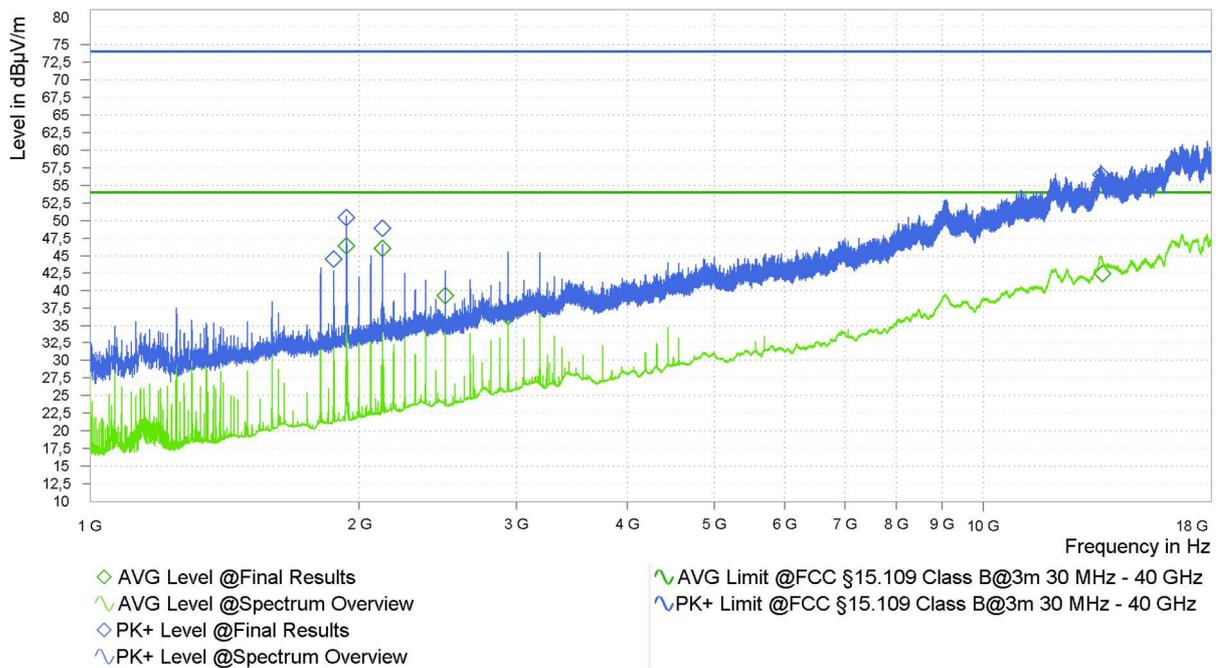
Margin [dB] = Limit [dB μ V/m] – Max Peak | Average [dB μ V/m]

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.

Worst case plots:

Spurious emissions from 1 GHz to 18 GHz:



Result tables:

Frequency [MHz]	MaxPeak [dB(µV/m)]	Average [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB(µV/m)]	Height [cm]	Pol [H/V]	Azimuth [deg]	Corr. [dB]
1875.000	44.5	---	74.0	29.5	124	H	330	-4.6
1937.500	50.4	---	74.0	23.6	144	V	81	-4.3
1937.500	---	46.4	54.0	7.6	153	V	82	-4.3
2125.000	48.9	---	74.0	25.1	151	H	251	-3.0
2125.000	---	46.1	54.0	7.9	149	H	252	-3.0
2500.000	---	39.3	54.0	14.7	121	H	231	-1.0
2937.500	---	36.4	54.0	17.6	107	H	346	1.4
13570.250	56.5	---	74.0	17.5	303	H	271	23.1
13610.500	---	42.5	74.0	29.5	302	H	234	22.7

Test result: Passed

Test equipment (please refer to chapter 7 for details)
3 - 11

5.3 AC power-line conducted emissions

5.3.1 Test setup (Conducted emissions on power supply lines)

Test setup (Conducted emissions on power supply lines)			
Used	Setup	See sub-clause	Comment
<input checked="" type="checkbox"/>	Conducted: AC power line	5.1.3	-
<input type="checkbox"/>	Not applicable, because ...	-	-

5.3.2 Test method (Conducted emissions on power supply lines)

Test setup (Conducted emissions on power supply lines)				
Used	Clause [1]	Name of method	Sub-clause	Comment
<input checked="" type="checkbox"/>	7.3; 11.5; 11.8	Tabletop equipment testing	5.1.3	The EUT is DC supplied, therefore an AC / DC adaptor has to be used.
<input type="checkbox"/>	7.3; 11.6; 11.8	Floor-standing equipment testing	-	-

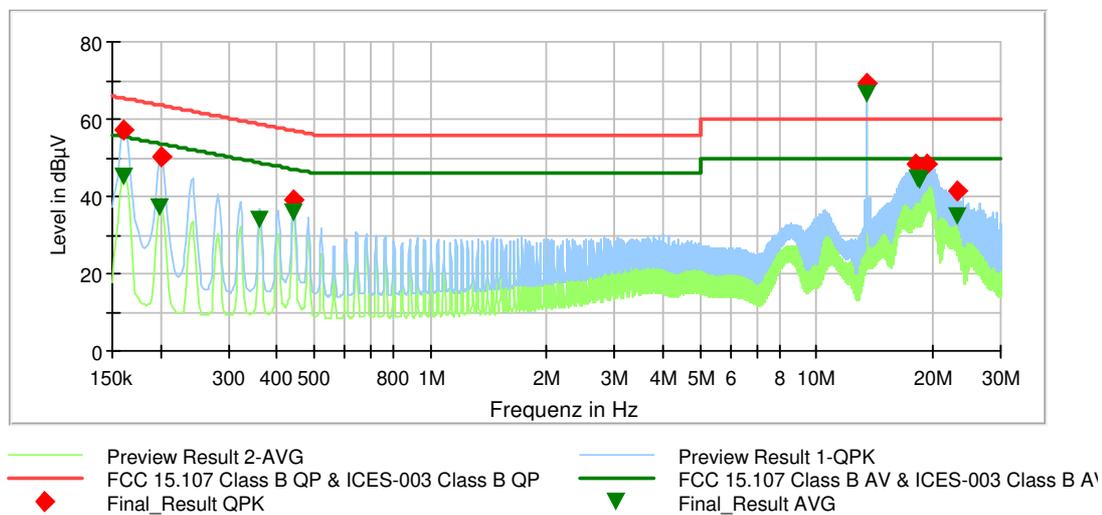
The AC power adaptor provided by the applicant was used for the tests:
Phoenix Contact MINI-PS-100-240AC/24DC/1.3.
The power adaptor itself was supplied by 120V_{AC} 60Hz.

5.3.3 Test results (Conducted emissions on power supply lines)

Ambient temperature:	°C
Relative humidity:	%

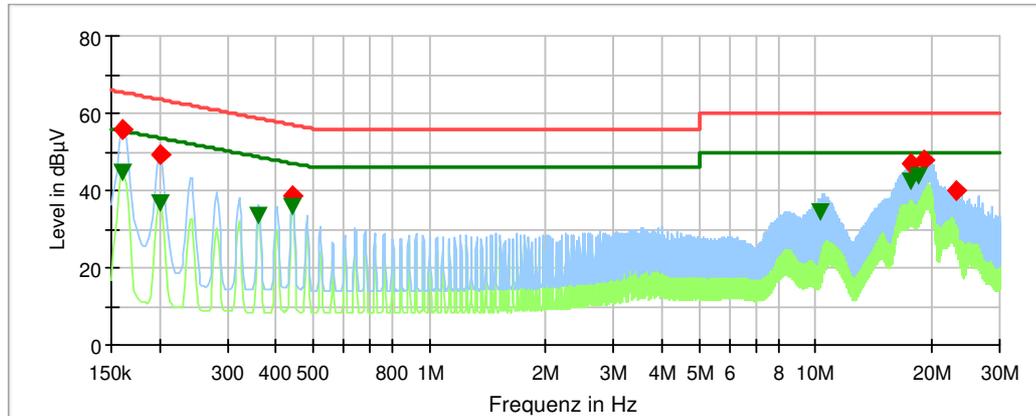
Date:	24.03.2025
Tested by:	M. DINTER

The curves in the diagrams below only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by ◆ and the average measured points by ▼.



Test plot for conducted emissions on power supply lines with antenna.

Frequency [MHz]	QuasiPeak [dB(µV)]	Average [dB(µV)]	Limit [dB(µV)]	Margin [dB]	Line	PE	Corr. [dB]
0.161250	---	45.3	55.4	10.1	L1	GND	19.9
0.161250	57.2	---	65.4	8.3	L1	GND	19.9
0.199500	---	37.1	53.6	16.5	L1	GND	19.8
0.201750	50.4	---	63.5	13.2	L1	GND	19.8
0.361500	---	33.9	48.7	14.8	N	GND	19.7
0.442500	---	35.9	47.0	11.1	L1	GND	19.7
0.442500	39.2	---	57.0	17.9	L1	FLO	19.7
13.560000	69.5	---	60.0	-9.5	L1	GND	20.3
13.560000	---	66.4	50.0	-16.4	L1	GND	20.3
18.181500	48.6	---	60.0	11.4	L1	GND	20.3
18.300750	---	44.4	50.0	5.6	L1	GND	20.3
18.541500	---	44.4	50.0	5.6	L1	GND	20.3
19.347000	48.3	---	60.0	11.7	L1	GND	20.4
23.129250	---	35.0	50.0	15.0	L1	GND	20.3
23.129250	41.5	---	60.0	18.5	L1	GND	20.3



— Preview Result 2-AVG
— FCC 15.107 Class B QP & ICES-003 Class B QP
— Preview Result 1-QPK
— FCC 15.107 Class B AV & ICES-003 Class B A'
◆ Final_Result QPK
▼ Final_Result AVG

Test plot for conducted emissions on power supply lines with dummy load.

Frequency [MHz]	QuasiPeak [dB(µV)]	Average [dB(µV)]	Limit [dB(µV)]	Margin [dB]	Line	PE	Corr. [dB]
0.161250	---	44.4	55.4	11.0	L1	GND	19.9
0.161250	56.0	---	65.4	9.4	L1	GND	19.9
0.201750	49.1	---	63.5	14.4	L1	GND	19.8
0.201750	---	36.8	53.5	16.7	L1	GND	19.8
0.361500	---	33.5	48.7	15.2	N	FLO	19.7
0.442500	38.7	---	57.0	18.3	N	GND	19.7
0.442500	---	35.7	47.0	11.3	L1	FLO	19.7
10.248000	---	34.2	50.0	15.8	N	FLO	20.3
17.643750	---	42.1	50.0	7.9	L1	FLO	20.3
17.646000	47.0	---	60.0	13.0	L1	GND	20.3
18.487500	---	43.5	50.0	6.5	L1	FLO	20.3
19.209750	48.0	---	60.0	12.0	L1	GND	20.3
23.070750	39.8	---	60.0	20.2	L1	GND	20.3

Test result: Passed

Test equipment (please refer to chapter 7 for details)
12 - 18

6 Measurement Uncertainties

Conducted measurements		
Measurement method	Standard used for calculating measurement uncertainty	Expanded measurement uncertainty (95 %) U_{lab}
Conducted emissions from 150 kHz to 30 MHz with LISN	CISPR 16-4-2	2.8 dB

Radiated measurements		
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 18 – 40 GHz	-	5.9 dB

7 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Attenuator 6 dB	WA2-6	Weinschel	8254	410119	Calibration not necessary	
2	Ultralog antenna	HL562E	Rohde & Schwarz	101079	482978	24.04.2024	04.2027
3	EMC test software	Elektra V5.10.00	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	Antennasupport	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 receiver / Spectrum analyser	ESW44	Rohde & Schwarz	101828	482979	21.02.2024	02.2026
10	Log.-Per. antenna 850 MHz - 26.5 GHz	HL050	Rohde & Schwarz	100908	482977	22.09.2022	09.2025
11	Low Noise Amplifier 10 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	20.02.2024	02.2026
12	V-LISN	NSLK8128RC	Schwarzbeck	0412	483186	28.02.2024	02.2026
13	Shielded chamber M155	SK3	Albatross Projects		482786	Calibration not necessary	
14	Software	EMC32 Ver. 10.60.20	Rohde & Schwarz	100619	483182	Calibration not necessary	
15	EMI Receiver / Spectrum Analyser	ESR7	Rohde & Schwarz	101939	482558	21.02.2024	02.2026
16	SPS_EMV	Software	Spitzenberger & Spies	A7078 B22 M1	480114	Calibration not necessary	
17	EMC test system	EMC D 30000 / PAS	Spitzenberger & Spies	A4507 00/1 1110	481301	Calibration not necessary	
18	Control unit	SyCore 1k4	Spitzenberger & Spies	A4507 12/0 1110	481302	21.11.2022	05.2025

8 Test site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Shielded chamber M155	482784	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	14.11.2022	13.11.2025
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
F241826E5	29.04.2025	Initial Test Report
-	-	-
-	-	-

10 List of Annexes

Annex A	Test Setup Photos	3 pages
Annex B	EUT External Photos	5 pages
Annex C	EUT Internal Photos	8 pages

----- end of test report -----