

Test Report

Report Number:

F190546E3 2nd Version

Equipment under Test (EUT):

Controlunit PILOT

Applicant:

Fronius International GmbH

Manufacturer:

Fronius International GmbH



Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

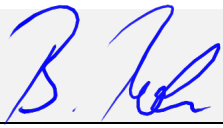
References

- [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

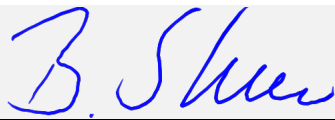
The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

Tested and written
by:


Signature

Bernward Rohde
09.09.2024

Reviewed and
approved by:


Signature

Bernd STEINER
09.09.2024

This test report is only valid in its original form.

Any reproduction of its contents in extracts without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

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.

Contents:	Page
1 Identification.....	5
1.1 Applicant.....	5
1.2 Manufacturer.....	5
1.3 Test Laboratory.....	5
1.4 EUT (Equipment under Test).....	6
1.5 Technical Data of Equipment.....	7
1.6 Dates	7
2 Operational States	8
2.1 The following states were defined as the operating conditions	9
3 Additional Information	9
4 Overview.....	10
5 Results.....	11
5.1 Conducted emissions on power supply lines.....	11
5.2 Radiated emissions	14
6 Test Equipment used for Tests	26
7 Test site Validation.....	27
8 Report History.....	27
9 List of Annexes	27

1 Identification

1.1 Applicant

Name:	Fronius International GmbH
Address:	Günter-Fronius-Straße 1, 4600 Wels
Country:	Austria
Name for contact purposes:	Mr. Jan HERNDLER
Phone:	+43 72 42 241 – 26 48
Fax:	+43 72 42 241 - 0
eMail address:	herndler.jan@fronius.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Fronius International GmbH
Address:	Günter-Fronius-Straße 1, 4600 Wels
Country:	Austria
Name for contact purposes:	Mr. Jan HERNDLER
Phone:	+43 72 42 241 – 26 48
Fax:	+43 72 42 241 - 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: *	Control and steering unit for solar inverters
Model name: *	Controlunit PILOT
Model number: *	43,0001,3553
Order number: *	-
FCC ID: *	QKWPILOT1
IC certification number: *	12279A-PILOT1
PMN: *	Controlunit Pilot
HVIN: *	V0.5D
FVIN: *	V0.0.64.12

	EUT number		
	1	2	3
Serial number: *	091010 0015	-	-
PCB identifier: *	0.5D	-	-

* Declared by the applicant

One EUT was used for all tests.

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

1.5 Technical Data of Equipment

Power Supply	DC					
Supply voltage	U _{nom} =	12.0 V DC	U _{min} =	11.2 V DC	U _{max} =	13.2 V DC

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Power connection cable	Customized	DC plug 4mm	3 m	No
2 x Ethernet	RJ45	RJ 45	5 m	Yes
RS485	Customized	Not connected	3 m	No
DC / IO 16 pin	Customized 16 pol plug	Not connected	3 m	No
IN / OUT 4 pin	Customized 4 pol plug	Not connected	3 m	Yes

Equipment used for all tests	
Laptop PC:*	Fujitsu Lifebook S751 (PM No. 201036)
Power supply* ²	KOSH POWER, Model No. CE200A0120V1500
Ethernet switch with fibre optic port*	FL SWITCH SFN 7GT/SX, Phoenix Contact (order no. 2891518)

* provided by the laboratory

** provided by the applicant

1.6 Dates

Date of receipt of test sample:	03.06.2019
Start of test:	07.06.2019
End of test:	14.06.2019

2.1 The following states were defined as the operating conditions

2.1.1 Conducted tests

For the conducted test (see 5.1) the EUT was supplied via a KOSH POWER, Model No. CE200A0120V1500 power supply with 12 V DC, as provided by the applicant. The power supply itself was supplied with 120V AC / 60 Hz. During the tests the above mentioned cables were connected. Fping was used to generate traffic on the two connected Ethernet lines as well as on the WiFi. The other cables were connected, but no communication connection was established.

2.1.2 Radiated tests

For the radiated test (see 5.2) the EUT was supplied via a laboratory power supply with 12 V DC. During the tests the above mentioned cables were connected. Fping was used to generate traffic on the two connected Ethernet lines as well as on the WiFi. The other cables were connected, but no communication connection was established.

3 Additional Information

The tests were done with a sample with the possibility to switch the firmware.
As declared by the applicant this is not possible with the “official” samples.

The EUT was not labeled with the final label.

4 Overview

Conducted emissions FCC 47 CFR Part 15 section 15.107 (b) [3] / ICES-003 Issue 7 section 3.2.1 [4]					
Application	Frequency range	Limits	Reference standard	Remark	Status
AC supply line	0.15 to 0.5 MHz 0.5 to 30 MHz	79 dB μ V (QP) 66 dB μ V (AV) 73 dB μ V (QP) 60 dB μ V (AV)	ANSI C63.4	Class A	-
AC supply line	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dB μ V (QP)* 56 to 46 dB μ V (AV)* 56 dB μ V (QP) 46 dB μ V (AV) 60 dB μ V (QP) 50 dB μ V (AV)	ANSI C63.4	Class B	Passed
*: Decreases with the logarithm of the frequency					
Radiated emissions FCC 47 CFR Part 15 section 15.109 (b) [3] / ICES-003 Issue 7 section 3.2.2 [4]					
Application	Frequency range	Limits	Reference standard	Remark	Status
Radiated Emission	30 to 88 MHz 88 to 216 MHz 216 to 230 MHz 230 to 960 MHz 960 to 1000 MHz above 1000 MHz	30.0 dB μ V /m QP at 3 m 33.1 dB μ V /m QP at 3 m 35.6 dB μ V /m QP at 3 m 37.0 dB μ V /m QP at 3 m 43.5 dB μ V /m QP at 3 m 49.5 dB μ V /m AV at 3 m and 69.5 dB μ V /m PK at 3 m	ANSI C63.4	Class A	-
Radiated Emission	30 to 88 MHz 88 to 216 MHz 216 to 230 MHz 230 to 960 MHz 960 to 1000 MHz above 1000 MHz	40.0 dB μ V/m QP at 3 m 43.5 dB μ V/m QP at 3 m 46.0 dB μ V/m QP at 3 m 47.0 dB μ V/m QP at 3 m 54.0 dB μ V/m QP at 3 m 54.0 dB μ V/m AV at 3 m and 74.0 dB μ V/m PK at 3 m	ANSI C63.4	Class B	Passed

Remark: As declared by the applicant the highest internal clock frequency is 2.462 GHz.
Therefore the radiated emission measurement must be carried out up to 5th of the highest internal clock frequency in this case 12.5 GHz.

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

5 Results

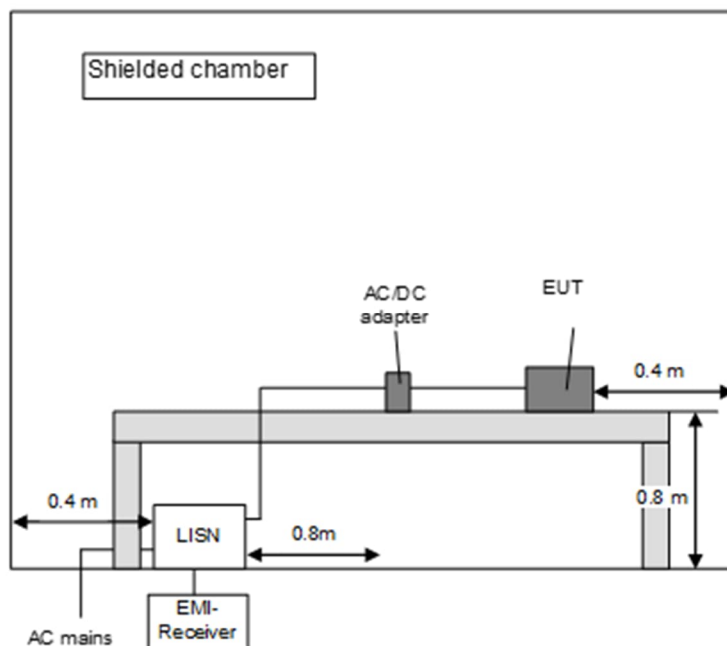
5.1 Conducted emissions on power supply lines

5.1.1 Test method

This test will be carried out in a shielded chamber. Table top devices will 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 will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriate limit, this emission will be measured with the average and quasi-peak detector on all lines.

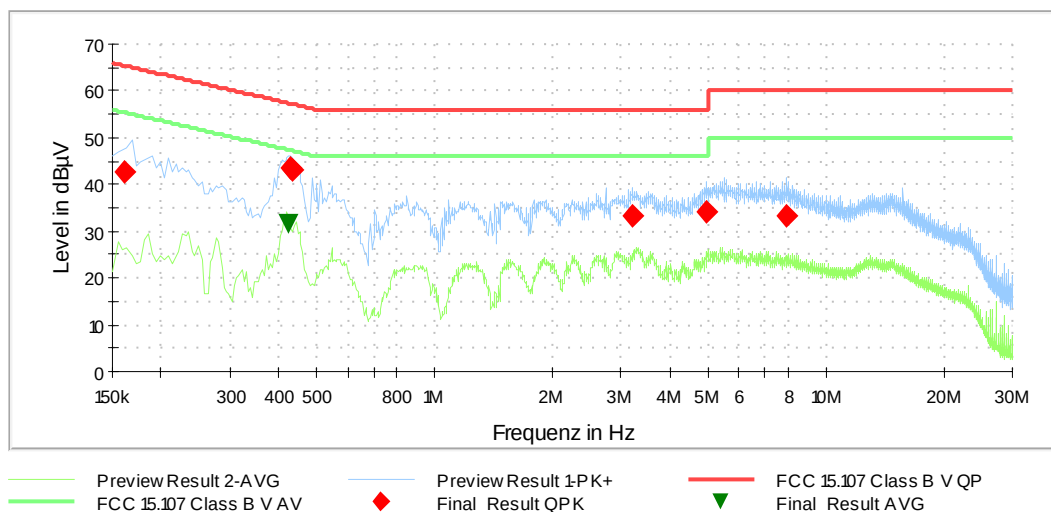
Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



5.1.3 Test results (Conducted emissions on power supply lines)

Test description:	Conducted emission measurement
EUT:	Controlunit PILOT
Manufacturer:	Fronius International
Operating conditions:	WLAN and Ethernet active power supply powered with 120 V AC / 60 Hz
Test site:	Shielded room M4
Operator:	M.DINTER
Date of test	06.06.2019

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 ▼.



Results 150 kHz – 30 MHz									
Frequency [MHz]	QuasiPeak [dBμV]	Average [dBμV]	Limit [dBμV]	Margin [dB]	Meas. Time [ms]	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.161700	42.81	---	65.38	22.57	5000.0	9.000	N	FLO	9.8
0.422700	---	31.38	47.39	16.02	5000.0	9.000	L1	FLO	9.9
0.428100	43.34	---	57.29	13.95	5000.0	9.000	L1	FLO	9.9
0.433500	42.96	---	57.19	14.22	5000.0	9.000	L1	GND	9.9
3.212700	33.36	---	56.00	22.64	5000.0	9.000	L1	FLO	10.2
4.925400	34.04	---	56.00	21.96	5000.0	9.000	L1	GND	10.3
7.962000	33.46	---	60.00	26.54	5000.0	9.000	L1	GND	10.5
Measurement uncertainty					+ / - 2.76 dB				

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 5

5.2 Radiated emissions

5.2.1 Test method

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 30 MHz to 1 GHz.
- A final measurement carried out on an open area test site with reflecting ground plane and various antenna heights in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a various antenna height of 100 to 250 cm at a distance of 1.90 m to the EUT position in the frequency range 1 GHz to 40 GHz.
- A final measurement carried out in a fully anechoic chamber and various antenna height of 100 to 250 cm at a distance of 1.90 m to the EUT position in the frequency range 1 GHz to 40 GHz.

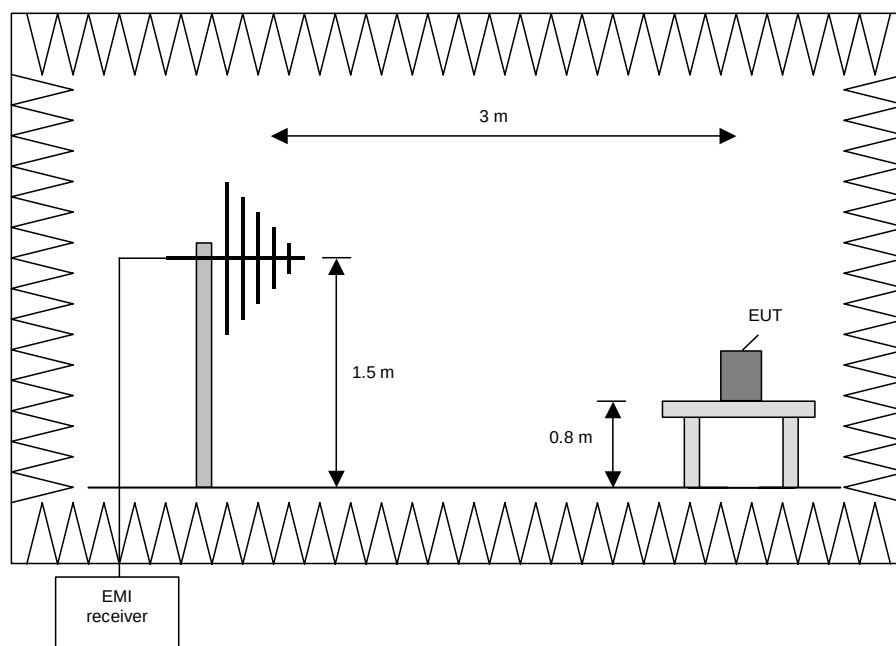
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Table top devices will 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 will be placed directly on the turntable/ground plane. The setup of the Equipment under test will be in accordance to [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 120 kHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 1 GHz.

The following procedure will be used:

Monitor the frequency range at horizontal polarization and a EUT azimuth of 0 °.

Manipulate the system cables within the range to produce the maximum level of emission.

Rotate the EUT by 360 ° to maximize the detected signals.

Make a hardcopy of the spectrum.

Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

Repeat 1) to 4) with the other orthogonal axes of the EUT if handheld equipment.

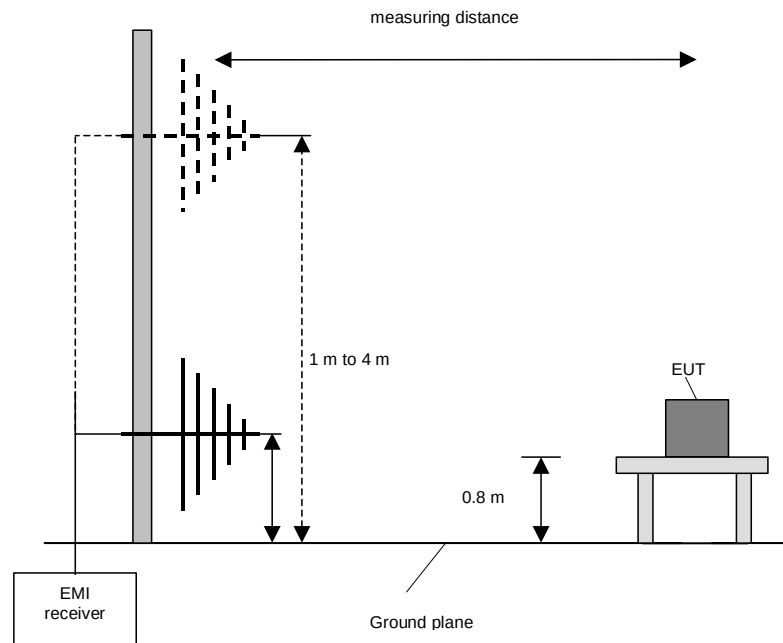
Repeat 1) to 5) with the vertical polarization of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be 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 will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.

Move the antenna from 1 m to 4 m and note the maximum value at each frequency.

Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.

Repeat 1) to 3) for the other orthogonal antenna polarization.

Move the antenna and the turntable to the position where the maximum value is detected.

Measure while moving the antenna slowly +/- 1 m.

Set the antenna to the position where the maximum value is found.

Measure while moving the turntable +/- 45 °.

Set the turntable to the azimuth where the maximum value is found.

Measure with Final detector (QP and AV) and note the value.

Repeat 5) to 10) for each frequency.

Repeat 1) to 11) for each orthogonal axes of the EUT if handheld equipment.

Preliminary and final measurement (1 GHz to 40 GHz)

This measurement will be performed in a fully anechoic chamber. Floor-standing devices will be placed directly on the turntable/ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.4 [1].

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth (preliminary)	Resolution bandwidth (final)
1 GHz to 40 GHz	1 MHz	1 MHz

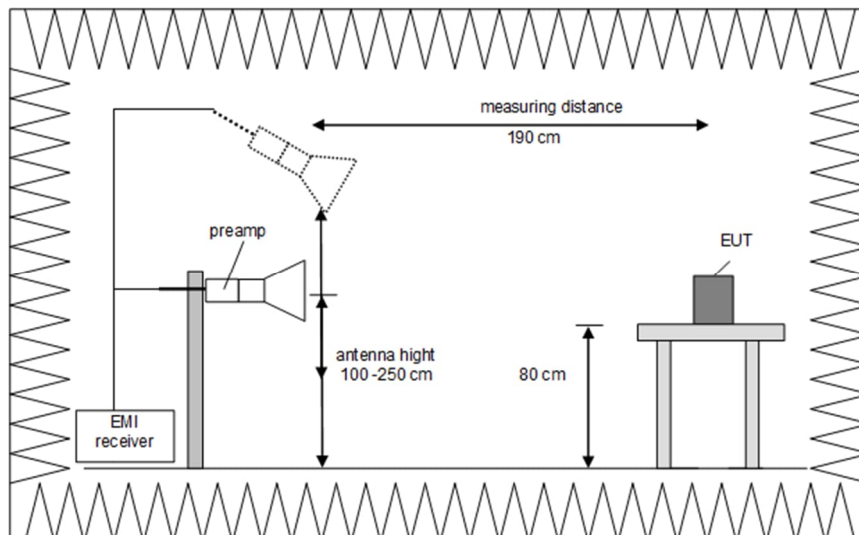
Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna in a measuring distance of 1.9 m.

The antenna high was varied from 100 cm up to 250 cm.

The EUT was turned around 360 ° at each antenna high and polarisation and the maximum values were stored by the EMC 32 software.

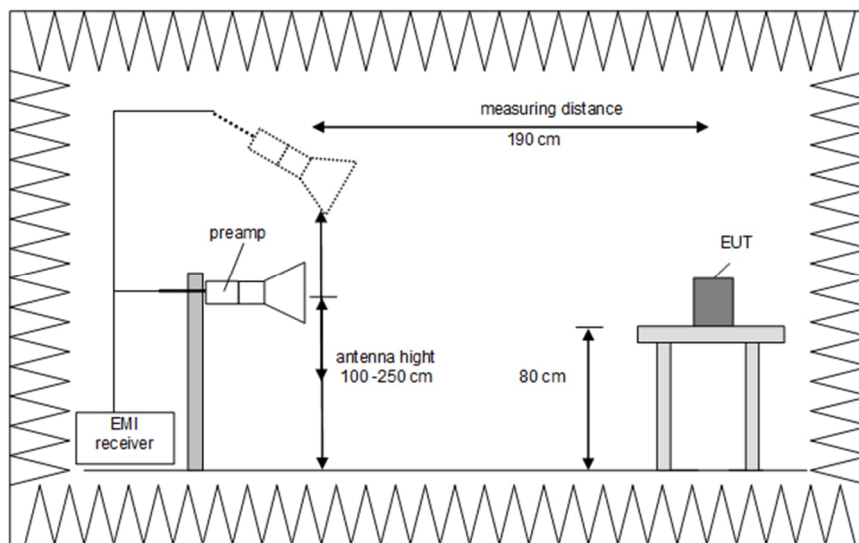
After storing the maximum plot the antenna was set to the position where the maximum value for each emission was found for the final measurement.



Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used antenna. The antenna high was varied from 100 cm up to 250 cm depending where the maximum was found during the preliminary measurement in a measuring distance of 1.9 m.

The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.



Procedure of measurement:

The measurements were performed in the frequency range 1 to 40 GHz.

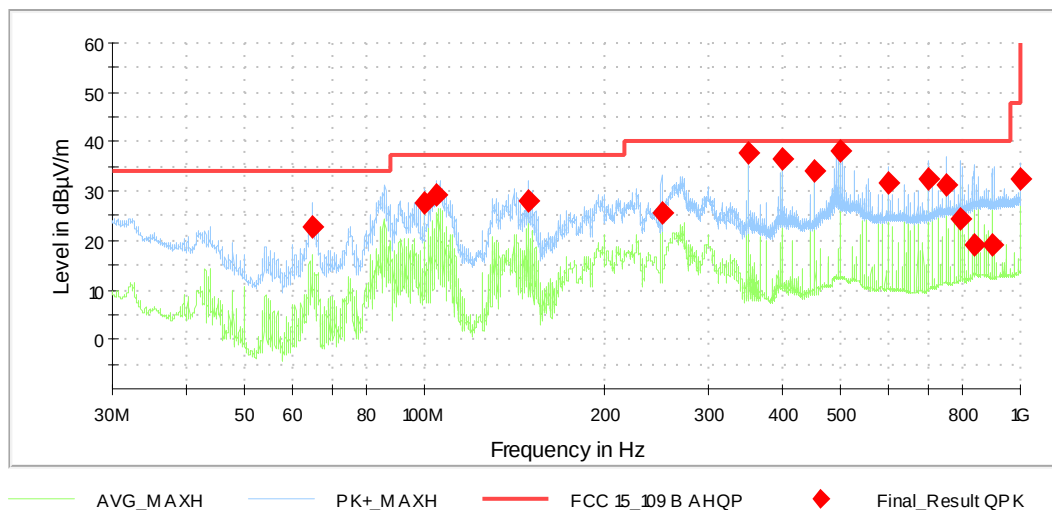
The following procedure will be used by software EMC32 assisted:

- 1) Monitor the frequency range at horizontal and vertical polarisation and turn the EUT 360°.
- 2) Change the antenna high and repeat 1) with 100, 125, 150, 175, 200, 225 and 250 cm high and an elevation pointing towards the EUT.
- 3) The EUT was turned around 360 ° at each antenna high and polarisation and the maximum values were stored by the EMC 32 software.
- 4) After storing the maximum plot the antenna was set to the position where the maximum value for each emission was found for the final measurement.
- 5) Start the single measurement mode in the EMC 32 software and do the final measurement at each frequency with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission. Take the scan table for the final measurement with the correct resolution bandwidth, measure time, detector and save the maximum values manually in the EMC 32.
- 6) Repeat steps 1) to 5) for the next antenna spot if the EUT is larger than the antenna beam width.

Step 1) to 4) are defined as preliminary measurement.

5.2.2 Results preliminary measurement 30 MHz to 1 GHz

Test description: Radiated emission measurement
 EUT: Controlunit PILOT
 Manufacturer: Fronius International
 Operating conditions: WiFi and Ethernet active
 Test site: Phoenix TESTLAB GmbH, FAR M20
 Operator: B. ROHDE
 Comment: 12 V DC
 Date of test: 07.06.2019



The following frequencies were found during the preliminary radiated emission test:

Frequency (MHz)	
64.770	500.010
99.990	600.000
104.730	699.990
150.000	750.000
249.990	792.000
350.010	838.260
399.990	900.480
450.000	1000.000

These frequencies have to be measured with in a final measurement.

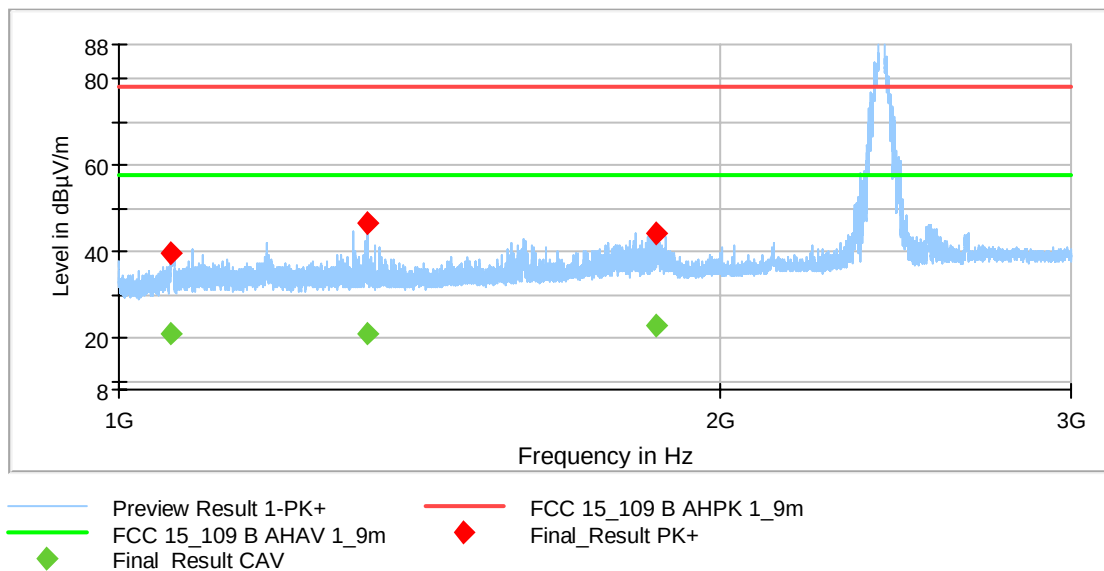
Test equipment (please refer to chapter 6 for details)

6 - 12

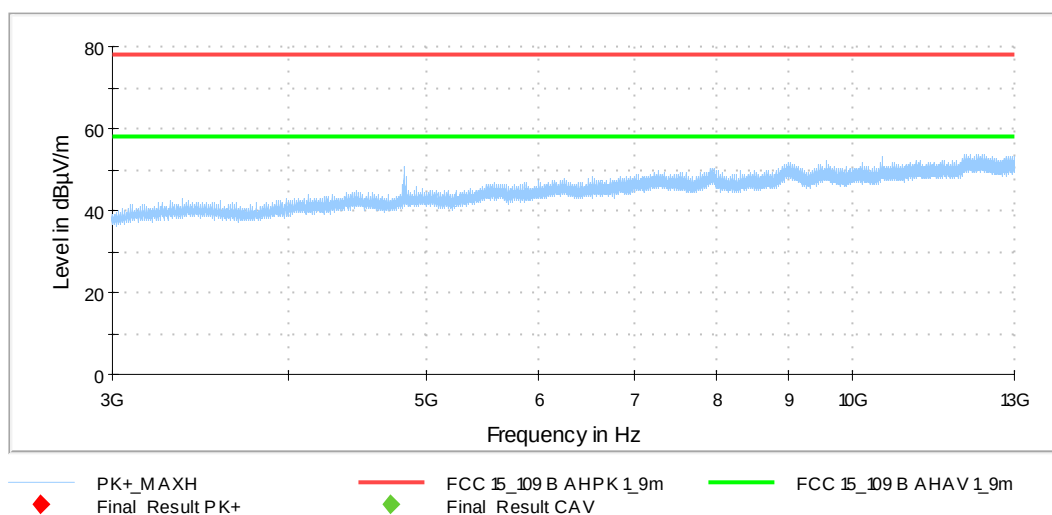
5.2.3 Results preliminary measurement above 1 GHz

Test description:	Radiated emission measurement
EUT:	Controlunit PILOT
Manufacturer:	Fronius International
Operating conditions:	WiFi and Ethernet active
Test site:	Phoenix TESTLAB GmbH, FAR M20
Operator:	B. ROHDE
Comment:	12 V DC
Date of test	07.06.2019

Preliminary result plot in the frequency range 1 - 3 GHz



Preliminary result plot in the frequency range 3 -13 GHz



The following frequencies were found during the preliminary radiated emission test:

Frequency (MHz)
1062.325
1330.850
1857.275

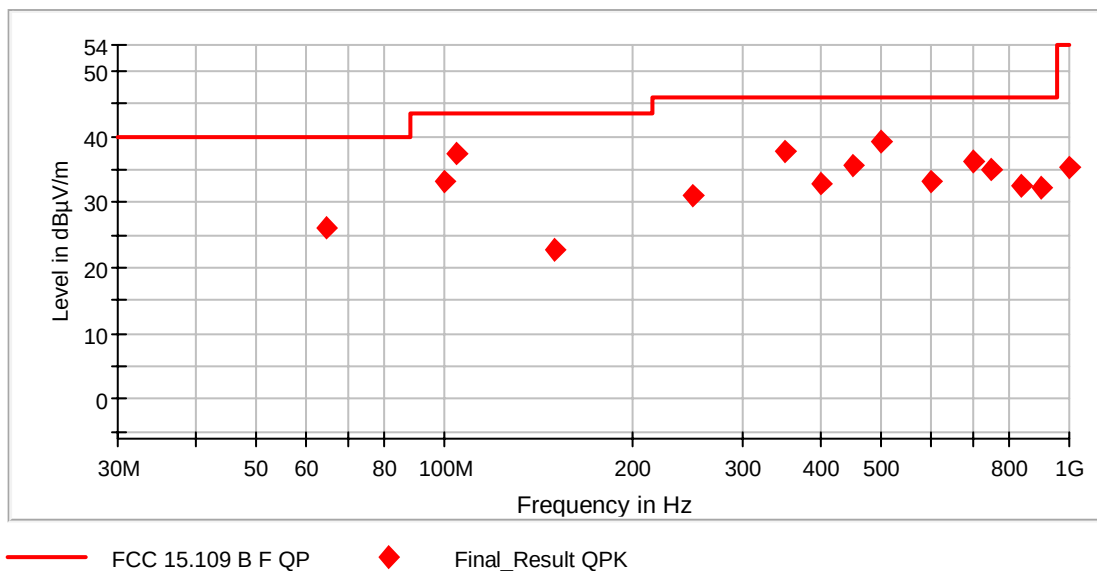
These frequencies have to be measured with in a final measurement.
The emissions @ 2.4 – 2.5 GHz is the wanted signal and is therefore not rated.

Test equipment (please refer to chapter 6 for details)
7 – 12, 13 - 15

5.2.4 Result final measurement from 30 MHz to 1 GHz

Test description:	Radiated emission measurement
EUT:	Controlunit PILOT
Manufacturer:	Fronius International
Operating conditions:	WiFi and Ethernet active
Test site:	Phoenix TESTLAB GmbH, OATS M6
Operator:	M. Dinter
Date of test	14.06.2019

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 on the open area test site.



The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

FCC part 15.109 class B Results

Results 30 MHz - 1 GHz									
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
64.77	26.1	40.0	13.91	1000	120	204	H	219	12.8
99.99	33.2	43.5	10.32	1000	120	386	V	8	17.3
104.73	37.6	43.5	5.92	1000	120	400	V	320	17.5
150.00	22.8	43.5	20.73	1000	120	250	V	264	19.1
249.99	31.2	46.0	14.84	1000	120	178	H	39	20.8
350.01	37.7	46.0	8.35	1000	120	167	V	112	23.5
399.99	32.9	46.0	13.13	1000	120	178	V	151	25.2
450.00	35.6	46.0	10.41	1000	120	100	H	169	26.4
500.01	39.3	46.0	6.71	1000	120	100	V	160	27.5
600.00	33.1	46.0	12.93	1000	120	103	H	232	29.8
699.99	36.2	46.0	9.84	1000	120	114	V	146	31.1
750.00	34.9	46.0	11.08	1000	120	197	V	114	32.7
838.26	32.6	46.0	13.39	1000	120	363	V	55	34
900.48	32.2	46.0	13.80	1000	120	119	V	48	34.1
1000.00	35.3	54.0	18.72	1000	120	202	V	217	35.8
Measurement uncertainty				+ / - 5.38					

ICES-003 class B Results

Results 30 MHz - 1 GHz									
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
64.77	26.1	40.0	13.9	1000	120	204	H	219	12.8
99.99	33.2	43.5	10.3	1000	120	386	V	8	17.3
104.73	37.6	43.5	5.9	1000	120	400	V	320	17.5
150.00	22.8	43.5	20.7	1000	120	250	V	264	19.1
249.99	31.2	47.0	15.8	1000	120	178	H	39	20.8
350.01	37.7	47.0	9.4	1000	120	167	V	112	23.5
399.99	32.9	47.0	14.1	1000	120	178	V	151	25.2
450.00	35.6	47.0	11.4	1000	120	100	H	169	26.4
500.01	39.3	47.0	7.7	1000	120	100	V	160	27.5
600.00	33.1	47.0	13.9	1000	120	103	H	232	29.8
699.99	36.2	47.0	10.8	1000	120	114	V	146	31.1
750.00	34.9	47.0	12.1	1000	120	197	V	114	32.7
838.26	32.6	47.0	14.4	1000	120	363	V	55	34
900.48	32.2	47.0	14.8	1000	120	119	V	48	34.1
1000.00	35.3	54.0	18.7	1000	120	202	V	217	35.8
Measurement uncertainty				+ / - 5.38					

Test: Passed

The correction factor was calculated as follows.

$\text{Corr. (dB)} = \text{cable attenuation (dB)} + 6 \text{ dB attenuator (dB)} + \text{antenna factor (dB)}$

Therefore the reading can be calculated as follows:

$\text{Reading (dB}\mu\text{V/m)} = \text{result QuasiPeak (dB}\mu\text{V/m)} - \text{Corr. (dB)}$

Test equipment (please refer to chapter 6 for details)
--

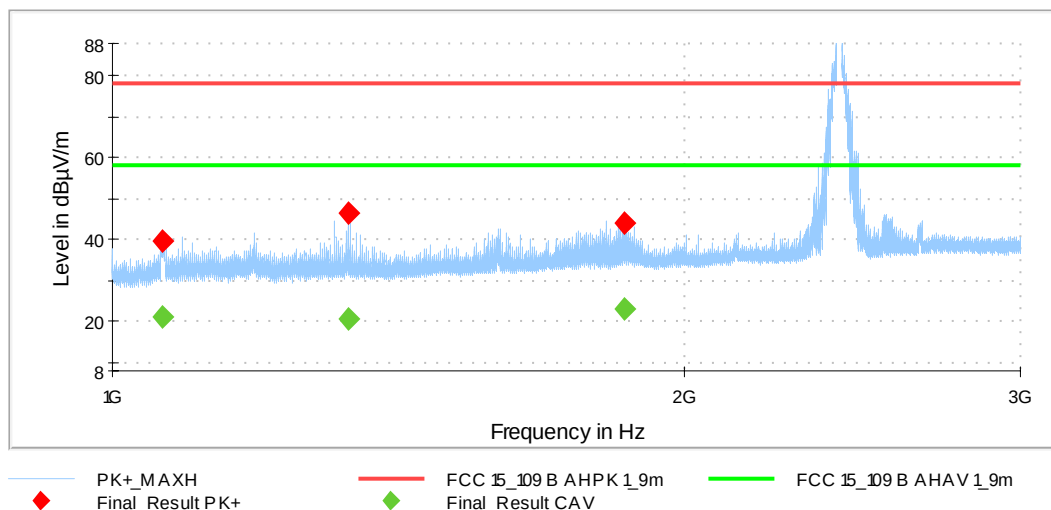
3, 5, 16 - 20

5.2.5 Result final measurement above 1 GHz

Test description:	Radiated emission measurement
EUT:	Controlunit PILOT
Manufacturer:	Fronius International
Operating conditions:	WiFi and Ethernet active
Test site:	FAR M20
Operator:	B. ROHDE
Date of test	07.06.2019

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

Final result plot in the frequency range 1 - 3 GHz



No final measurement was conducted in the frequency range 3 – 13 GHz, so no final plot could be provided. The Emission at 2.4 GHz is the wanted WLAN signal and is therefore not rated.

The results of the standard subsequent measurement above 1 GHz in an anechoic chamber are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Results FCC part 15.109 class B // ICES-003 class B

Results 1 – 12 GHz							
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m) PK/AV	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
1062.325	39.54	---	78.00	38.46	V	58.0	-17
1062.325	---	21.09	58.00	36.91	V	58.0	-17
1330.850	---	20.80	58.00	37.20	H	38.0	-15
1330.850	46.48	---	78.00	31.52	H	38.0	-15
1857.275	44.23	---	78.00	33.77	V	18.0	-12
1857.275	---	23.02	58.00	34.98	V	18.0	-12
Measurement uncertainty				+ / - 5.1			

The correction factor was calculated as follows.

Corr. (dB/m) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB/m)

Therefore the reading can be calculated as follows:

Reading (dBμV/m) = result Peak or Average (dBμV) - Corr. (dB/m)

Remark*: The measurement was carried out at a distance from 1.9 m instead of 3 m.
Therefore 4 dB were added to the 3 m limit according FCC part 15.109 Class B devices.
Limits extrapolated from 3 m distance to 1.9 m distance by 20 dB /decade

Test result: Passed

Test equipment (please refer to chapter 6 for details)
7 – 12, 13 - 15

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Transient Filter Limiter	CFL 9206A	Teseq GmbH	38268	481982	14.03.2018	03.2020
2	Artificial Mains Network	NSLK8128	Schwarzbeck	8128161	480138	13.03.2018	03.2020
3	Software	EMC32	Rohde & Schwarz	100061	481022	Calibration not necessary	
4	Shielded chamber M4	B83117-S1-X158	Siemens	190075	480088	Calibration not necessary	
5	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	28.02.2018	02.2020
6	Antenna (Bilog)	CBL6112B	Schaffner EMV GmbH (-Chase)	2688	480328	19.06.2017	06.2020
7	EMI Receiver / Spectrum Analyser	ESW44	Rohde & Schwarz	101635	482467	29.03.2018	03.2020
8	Turntable	DS420 HE	Deisel	420/620/00	480315	Calibration not necessary	
9	Antenna support	AS620P	Deisel	620/375	480325	Calibration not necessary	
10	Multiple Control Unit	MCU	Maturo GmbH	MCU/043/971107	480832	Calibration not necessary	
11	Software	WMS32	Rohde & Schwarz		481800	Calibration not necessary	
12	RF-Cable No. 36	Sucoflex 106B	Suhner	500213/6B	482325	Calibration not necessary	
13	Antenna (Log.Per.)	HL050	Rohde & Schwarz	100438	481170	09.10.2017	10.2020
14	Preamplifier 100 MHz - 16 GHz	AFS6-00101600-23-10P-6-R	Narda MITEQ	2011215	482333	10.07.2018	07.2020
15	High pass Filter	WHKX10-2296-2800-18000-80SS	Wainwright Instruments GmbH	SN1	482709	Calibration not necessary	
16	Open area test site M6	Freifeld M6	Phoenix Contact	-	480085	Calibration not necessary	
17	Antenna support	MA240-0	Inn-Co GmbH	MA240-0/030/6600603	480086	Calibration not necessary	
18	Turntable	DS412	Deisel	412/316	480087	Calibration not necessary	
19	Controller	HD100	Deisel	100/349	480139	Calibration not necessary	
20	Antenna (Bilog)	CBL6111D	Schaffner Elektrottest GmbH / Teseq GmbH	25761	480894	19.10.2017	10.2020

7 Test site Validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
OATS M6	480085	30 – 1000 MHz	NSA	ANSI C63.4-2014	25.10.2018	24.10.2020
Fully anechoic chamber M20	480303	1 -18 GHz	SVSWR	CISPR 16-1-4 Amd. 1	13.07.2018	12.07.2020
Shielded chamber M4	480088	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	06.11.2018	05.11.2020

8 Report History

Report Number	Date	Comment
F190546E3	24.10.2019	Initial Test Report
F190546E3 2 nd Version	09.09.2024	-Changed Accreditation symbol on page 1 -Changed signature layout to digital signature on page 3 -Changed References to ICES-003 I7 on pages 3 and 10 -Changed EUT information from contains FCC/IC ID to FCC/IC ID on page 6 -added separate table for radiated emissions acc. to ICES-003 with new 3m limit on page 22
-	-	-

9 List of Annexes

Annex A Test Setup Photos

5 pages