

TEST REPORT

Electromagnetic Compatibility

Report Reference No. : 412212-4TRFEMC

Date of issue : 2021-06-01

Test Report Verdict : PASS

Testing Laboratory..... : **Nemko S.p.A.**

Address..... : Via Del Carroccio, 4

City : 20853 Biassono (MB)

Country : Italy

Testing location..... : Described at clause 1.4

Customer name..... : **Eurotech Spa**

Customer information..... : Via Fratelli Solari, 3/A – 33020 Amaro (UD) – Italy

Reference standards..... : FCC CFR 47 Part 15 Subpart B

Standard application : Full application

Equipment under test : **Multi-service IoT Edge Gateway**

Trademark(s) :  **EUROTECH**

Manufacturer..... : Eurotech Spa
Via Fratelli Solari, 3/A – 33020 Amaro (UD) – Italy

Model/Type reference : Described at clause 4.1

Test performed by..... : S. Tessa



Report approved by..... : P. Barbieri



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1. GENERAL INFORMATION

1.1 Project history

Report number	Modification to the report / comments	Date
412212-4TRFEMC	First release	2021-06-01
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1.2 Symbol used in the report

☒	: The crossed square indicates that the listed condition, standard or equipment is applicable for this report.
☐	: The empty square indicates that the listed condition, standard or equipment is not applicable for this report.
NP (Not performed)	: Test case not performed according to customer request
N (Not applicable)	: Test case does not apply to the test object
P (Pass)	: Test object does meet the requirement
F (Fail)	: Test object does not meet the requirement
☐ Comma (,) / ☒ Dot (.)	: Symbol used as decimal separator throughout this report
Asterisk (*)	: Symbol not used throughout this report
EUT	: Equipment Under Test
The results contained in this report reflect the results for this particular model(s) and serial number(s) and apply to the sample(s) as received. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.	

1.3 Date of sample(s) reception and tests

Date of receipt of test sample(s)	2021-05-13
Testing start date	2021-05-14
Testing termination date	2021-05-25

1.4 Testing location

The tests have been performed in the place indicated below:

☒ Nemko premises location: Nemko S.p.A.
 Via Del Carroccio, 4
 20853 Biassono (MB) - Italy
 FCC site number: 682159

☐ Other location: --
 --
 --

1.5 Environmental conditions

The tests were carried out in the ranges of environmental conditions specified below:

Ambient temperature: 18-33 °C ¹

Relative Humidity: 25-70 % ²

Atmospheric pressure: 860-1060 hPa

Notes:
¹ For luminaire, temperature during tests was verified to be within 18 ÷ 30 °C
² During ESD test, humidity was verified to be within 30 ÷ 60 %

The following instruments are used to monitor the environmental conditions:

Equipment	Trademark	Model	Serial No.
Thermo-hygrometer	Testo	175-H2	20012380/305
Thermo-hygrometer	Testo	175-H2	38203337/703
Barometer	Castle	GPB 3300	072015

1.6 Measurement uncertainty and assessment of conformity

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002. The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 10m Chamber	Antenna distance 3 m, 10 m 0.009 ÷ 200 MHz	5.0 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m 6 ÷ 18 GHz	5.5 dB	(1)
	Antenna distance 1 m, 3 m 18 ÷ 40 GHz	7.2 dB	(1)
Radiated Disturbance with large loop antenna system (LLAS)	0.009 ÷ 30 MHz	3.3 dB	(1)
Conducted Disturbance	0.02 ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	150 kHz ÷ 30 MHz with current probe	2.9 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2 %	(1)
	1 kHz ÷ 40 GHz	10 ⁻⁶	(1)
Electromagnetic fields (EMF)	Magnetic, Electric and Electromagnetic fields: 0 Hz ÷ 40 GHz	25 %	(1)
Electrical quantities (voltage, current, resistance)	AC/DC Voltage 10 mV ÷ 1000 V 0÷100 kHz AC/DC Current 0.1 mA ÷ 400 A 0÷1 kHz Resistance 100 mΩ ÷ 10 MΩ	2.5 %	(1)
NOTES: (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 % (2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard (3) The reported expanded uncertainty of measurement is related to the stimulus quantity			

1.7 Instruments calibration table

Instrument cited in the report and not listed in this paragraph are not subject to calibration. The calibration is valid up to the last day of the due date month.

Description	Manufacturer	Model	Identifier	Cal Date	Due Date
EMI Receiver	Rohde & Schwarz	ESW44	101620	2020-09	2021-09
EMI Receiver	Rohde & Schwarz	ESU8	100202	2020-08	2021-08
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2018-07	2021-07
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2018-09	2021-09
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2018-09	2021-09
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STPL 9148-123	2018-07	2021-07
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2020-04	2023-04
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2021-04	2022-04
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2021-01	2022-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2021-04	2022-04
Semi-anechoic chamber	Nemko S.p.a.	10m semi-anechoic chamber	530	2019-09	2021-09
Common Mode Absorption Device	Schwarzbeck Mess-Elektronik	CMAD1614	00041	2021-05	2022-05
LISN	Rohde & Schwarz	ESH2-Z5	881 362/006	2021-03	2022-03
LISN	Rohde & Schwarz	ESH2-Z5	872 460/041	2020-08	2021-08
V-network	Rohde & Schwarz	ESH3-Z5	840 731/004	2020-08	2021-08
Oscilloscope	Agilent	54846A	MY40000254	2020-11	2022-11
Multimeter	Rohde & Schwarz	HMC8012	101577	2020-05	2021-05
Barometer	Castle	GBP 3300	072015	2021-04	2022-04
Data logger con diagnosi in campo	Testo	175-H2	20012380/305	2020-12	2022-12
Data logger con diagnosi in campo	Testo	175-H2	38203337/703	2020-12	2022-12
Attenuator	Aeroflex / Weinschel	2	CC8577	2020-07	2021-07

2. PRODUCT STANDARDS, TEST METHODS AND TECHNICAL PROCEDURES

2.1 Standard(s) applied

The following standard(s) were applied:

FCC CFR 47 Part 15 Subpart B

Code of Federal Regulations – Title 47 – Part 15 Radio Frequency Devices – Subpart B
Unintentional radiation

2.2 Test method(s) applied

The following documents are referred to in the standard(s) in such a way that some or all of their content constitutes requirements for the standard itself.

ANSI C63.4 (2014)

American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2.3 Nemko technical procedures

WM L0177: General routines for using instruments at Nemko

WM L1002: Measurement Uncertainty - Policy and Statement

WM L0077: General procedure for conducting EMC tests

3. SUMMARY OF TEST RESULTS AND VERDICTS

3.1 Measurement of electromagnetic disturbances emitted by the equipment under test

Emission Tests		
Requirement / test	Method Standard	Verdict
Part §15.107 – Conducted emission	ANSI C63.4	P
Part §15.109 – Radiated emission	ANSI C63.4	P
Notes:		

4. EQUIPMENT UNDER TEST

4.1 EUT Identification

Short description of the EUT

The ReliaGATE 10-14 is a Multi-service IoT Gateway that has been designed to deliver LTE and 2G/3G connectivity to industrial and lightly rugged applications. Based on the NXP i.MX 8M Mini Cortex-A53 quad core processor, with up to 4GB of RAM, up to 64GB of eMMC and a user-accessible microSD slot, the ReliaGATE 10-14 is a low power gateway suitable for demanding use cases: it supports a 9 to 30V power supply with transient protection, Display Port video output, two protected and isolated RS-232/422/RS-485 serial ports, two noise and surge protected USB ports, six optoisolated digital and two isolated analog interfaces. The ReliaGATE 10-14 features a wide range of connectivity capabilities: it integrates a carrier certified LTE Cat 1 cellular modem with dual SIM support, Wi-Fi, Bluetooth 5/BLE, and two Gigabit Ethernet ports; an optional internal GNSS provides precise geolocation capabilities. Expansion options allow adding extra features with side modules, such as the LoRa LPWAN Gateway unit, or the DAQ unit that provides analog input and more DI/O ports.

Copy of marking plate(s) (if present)



Sample ID	4122120002 (Number assigned by Nemko Spa)
Model/Type	Regate-10-14-35
Ratings	12 V DC or 24 V DC nominal
	9 to 30 V DC from dedicated adapter or external DC power source
Equipment installation	Wall mounted
Accessories and detachable parts included ..	Antennas and AC/DC adapter
Test performed.....	All tests were performed on this sample
Software and/or firmware information	Linux operating system 4.19.35-imx_4.19.35_1.0.0+ge4452f4
Product variants not tested	-

4.2 EUT Power Supply

Used ¹	N° ²	Type	Supply Voltage	Phases N°	Supplementary Information
☒	1	AC	120 V / 60 Hz	L+N	without external earth connection

Notes:

¹ The crossed square indicates that the supply voltage is used in at least one test.

² This number will be used all over the report to identify the supply voltage(s) used for each test.

4.3 EUT Information declared by the Customer ¹

Information	Declaration
EUT highest frequency ²	WIFI:5150–5850 MHz bands
Environment intended use.....	Domestic / Residential
Equipment classification ³	Class B

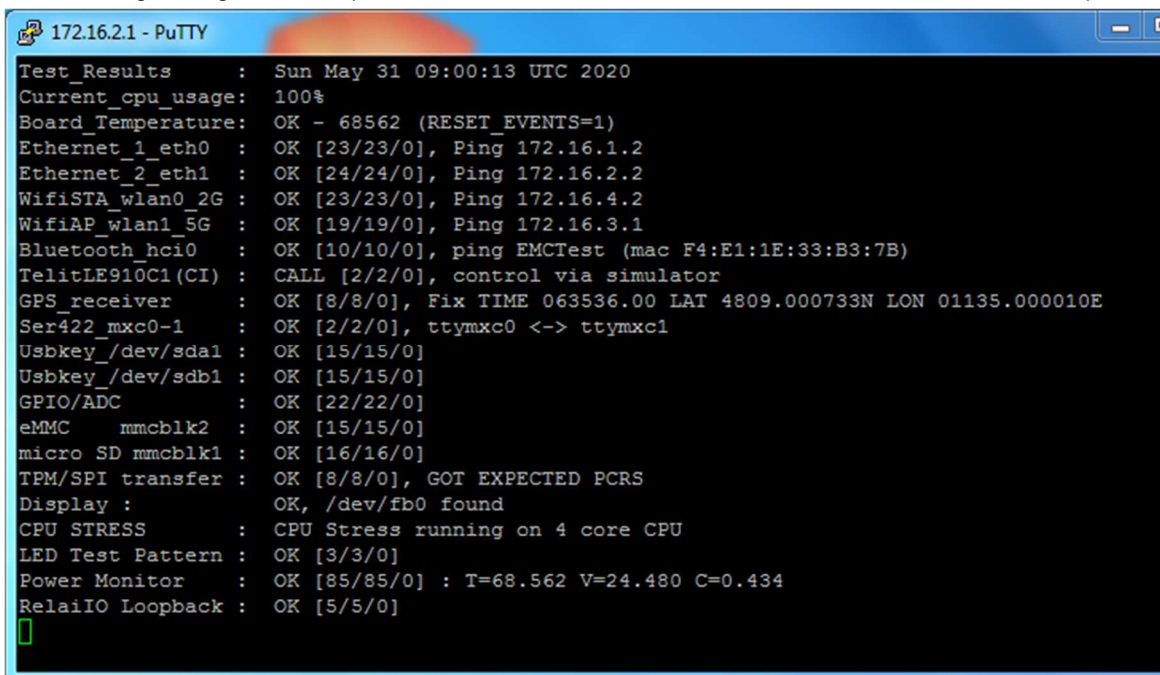
Notes:

¹ Nemko S.p.A. declines all responsibility for the information above declared by the customer that may influence the validity of the results contained in this test report.

² For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

³ Equipment class and category definitions are specified in the standard used.

4.4 EUT Operation Modes

N°	Description
1	Test mode linked to another gateway and to a radio communication tester. The following software was running during the tests (for radiated emission test the radio modules were switched off): 

Notes:

4.5 EUT Configuration Modes

The EUT was configured to measure its highest possible radiation level. The test modes selected are according to EUT instruction manual.

N°	Description
1	UUT ReGATE-10-14 Display Port DP 172.16.1.1 Eth0 172.16.2.1 Eth1 (2.4G STA) 172.16.3.2 (5G AP) 172.16.4.1 WiFi/BT LTE1 LTE2 GPS USB1 USB2 Serial header Serial loopback cable 3-way POWER 24V ACDC I/O header BAT1 12V ReliaIO-10-12 BAT2 12V ReliaIO AUX PCB 24V ACDC 172.16.1.2 172.16.2.2 172.16.3.1 (AP 2.4G) 172.16.4.2 (STA 5GHz) TS – Regate-10-12 Ethernet switch 172.16.2.3 PC
Notes:	

4.6 EUT Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	AC MAINS	AC	☐	☐	Direct plug-in
2	PWR IN	DC	☒	☐	Three wires cable (+, - and KEY)
3	ETH 0	TP	☒	☒	Standard cable with RJ 45 connector
4	ETH 1	TP	☒	☒	Standard cable with RJ 45 connector
5	DISPLAY PORT	I/O	☒	☒	Standard cable with DP connector
6	USB 1	I/O	☐	☐	For USB storage key
7	USB 2	I/O	☐	☐	For USB storage key
8	DIGITAL I/O	I/O	☒	☒	Eight wires cable
9	COM 0/1	I/O	☒	☒	Five wires cable
10	DIGITAL I/O (J2)	I/O	☒	☒	Twelve wires cable
11	ANALOG IN (J3)	I/O	☒	☒	Five wires cable
12	DIGITAL IN (J3)	I/O	☒	☒	Seven wires cable
13	WI-FI / BT	ANT	☐	☒	SMA direct plug-in to antenna
14	CELL MAIN	ANT	☐	☒	Coaxial cable
15	GPS	ANT	☐	☒	SMA direct plug-in to antenna
16	CELL DIV	ANT	☐	☒	SMA direct plug-in to antenna

*Note:

AC = AC Power Port
DC = DC Power Port
N/E = Non-Electrical

I/O = Signal/Control Input or Output Port
TP = Telecommunication Port
ANT = Antenna Port

4.7 EUT and Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Wi-Fi/BT antenna	Linx Technologies	ANT-DB1-RAF-RPS	—
EUT	GNSS antenna	2J-ANTENNA	2J4301MPGF	—
EUT	Cellular antenna	2J-ANTENNA	2JW0124	—
EUT	Power supply	Sunny	SYS1541-2424 EUROTECH PN 690130007SL	
EUT	Expansion unit	Eurotech Spa	RELIAIO-10-12	—
AE	USB Flash Drive	Kingston	DTSE9H/8GB	—
AE	LCD Panel	AOC	G2260VWQ6	—
AE	Gateway	Eurotech Spa	REGATE 10-12	—
AE	Switch	Netgear	GS305v3	—
AE	Notebook	Packard bell	—	—

Notes:
¹ Use
EUT - Equipment Under Test SIM - Simulator (Not Subjected to Test)
AE - Auxiliary/Associated Equipment (Not Subjected to Test)

4.8 EUT Electric/Block Diagram

Not applicable

4.9 Information about radio module(s)

Radio module 1	
Description	Information
Identification:	Model: WE866C6 Trademark: Telit
Frequency band (MHz):	BT/BLE, WiFi 2.4 GHz, WiFi 5 GHz
Modulation type:	-
Antenna information:	External antenna
Other information:	-
Notes:	

Radio module 2	
Description	Information
Identification:	Model: LE910C1-NF Trademark: Telit
Frequency band (MHz):	GSM, UTRA, E-UTRA
Modulation type:	-
Antenna information:	External antenna
Other information:	
Notes:	

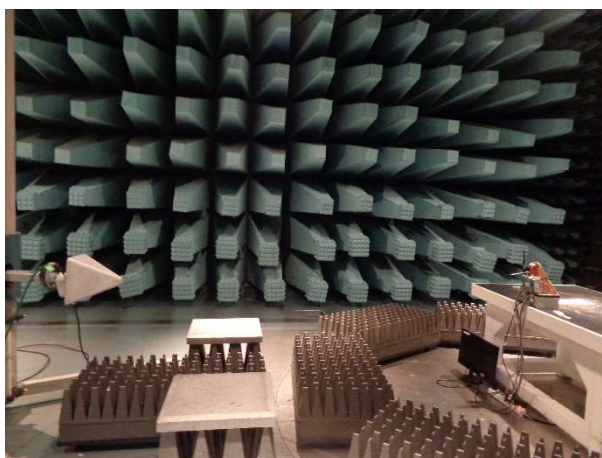
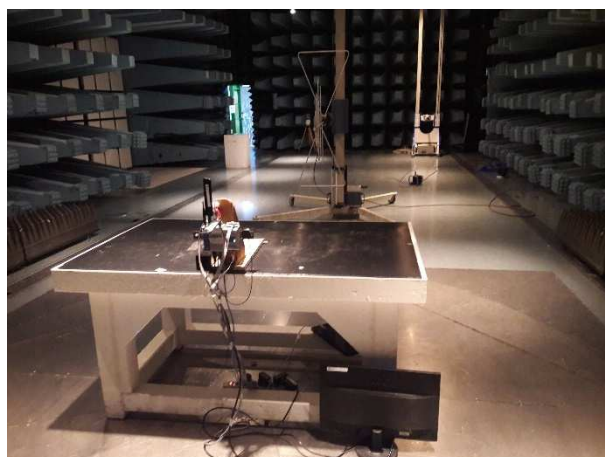
5 TEST RESULTS

5.1 Radiated Emission

5.1.1 Test result

Verdict:	☒ P ☐ F ☐ N ¹ ☐ NP
Frequency range:	30 MHz – 40000 MHz ²
Test site:	Semi anechoic chamber
Measurement distance:	3 m or 10 m ³
Notes: ¹ If marked, the test is not applicable for the EUT. ² For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation. ³ Test was performed at 10 m measurement distance for class A EUT in the frequency range from 30 to 1000 MHz; test was performed at 3 m measurement distance in all other cases.	

5.1.2 Photo documentation of the test set-up



5.1.3 Test method

Method standard is reported at par. 3.1. Measurements were made on a semi anechoic chamber. Preliminary measurements were performed at an antenna to EUT separation distance of 3 or 10 meters with the receive antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Receiver reading P_R , reported in tables at clause 5.1.6, was achieved adjusting the input signal P_{IN} by a correction factor CF , to take into account of the insertion loss due to cables and attenuators, the antenna factor, the external preamplifier gain. This correction factor was pre-inserted in the firmware of the receiver and was applied by the instrument during the test. The relationship between P_R and P_{IN} , expressed in dB, is:

$$P_R = P_{IN} + CF$$

5.1.4 Limits for enclosure

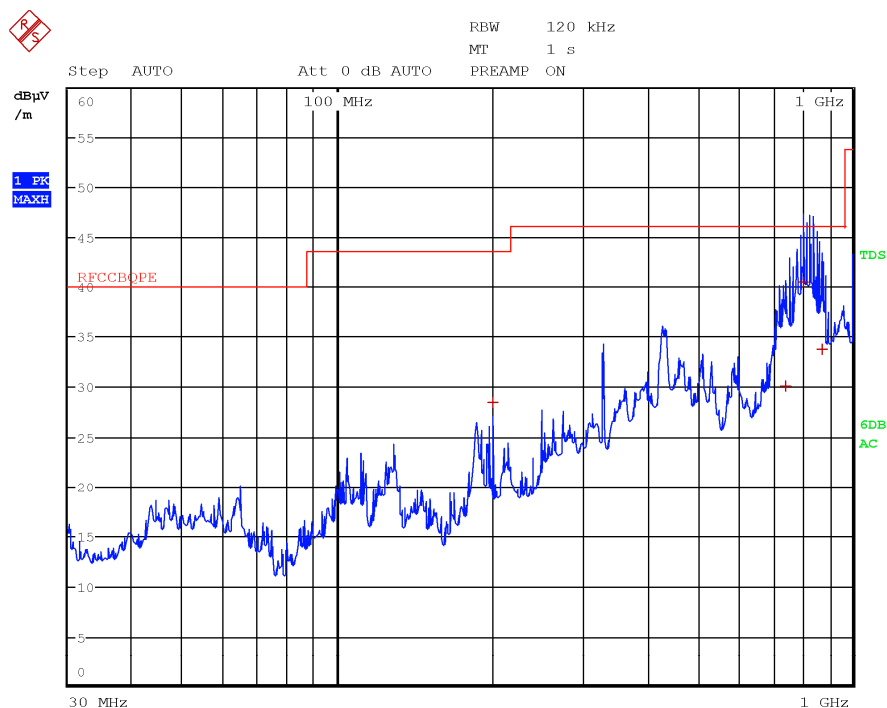
Radiated emission ¹				
Frequency (MHz)	Limit for Class A EUT		Limit for Class B EUT	
	μV/m	dBμV/m	μV/m	dBμV/m
30 to 88	90	39.0	100	40.0
88 to 216	150	43.5	150	43.5
216 to 960	210	46.4	200	46.0
960 to 1000	300 ²	49.5 ²	500 ²	54.0 ²
Above 1000 ³	1000 ²	60.0 ²	500 ²	54.0 ²
Notes: ¹ For frequency range between 30 to 1000 MHz Quasi-Peak detector is used. For frequency range above 1000 MHz Average and Peak detector are used. ² Above 1000 MHz, the limit reported refers to measurement s performed with Average detector. For measurements performed with Peak detector the limit is 20 dB greater. ³ For Class A radiated emission above 1 GHz, a measurement distance of 3 m can be used, with the limits increased by 10 dB.				

5.1.5 Test equipment used¹

Used ²	Description	Manufacturer	Model	Identifier
☒	SAC	Nemko Spa	10m SAC	530
☒	EMI receiver	Rohde & Schwarz	ESW44	101620
☐	EMI receiver	R&S	ESU8	100202
☒	Common mode absorption device	Schwarzbeck	CMAD1614	00041
☒	Antenna	Schwarzbeck	VULB9162	VULB9162-025
☐	Antenna	Schwarzbeck	VULB9168	VULB9168-242
☒	Antenna	Schwarzbeck	STLP9148	STLP9148-123
☐	Antenna	Schwarzbeck	STLP9148	STLP9148-152
☒	Antenna	RF Spin	DRH40	061106A40
☐	Preamplifier	Schwarzbeck	BBV9718	BBV9718-137
☒	Preamplifier	Schwarzbeck	BBV9718C	00121
☒	Preamplifier	Sage	STB-1834034030-	18490-01
☒	Controller for turntable and antenna mast	Maturo	FCU3.0	10041
☒	Tilt antenna mast	Maturo	TAM4.0-E	10042
☒	Turntable 4.5 t	Maturo	TT4.0-5T	2.527
Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests.				

5.1.7 Test protocol

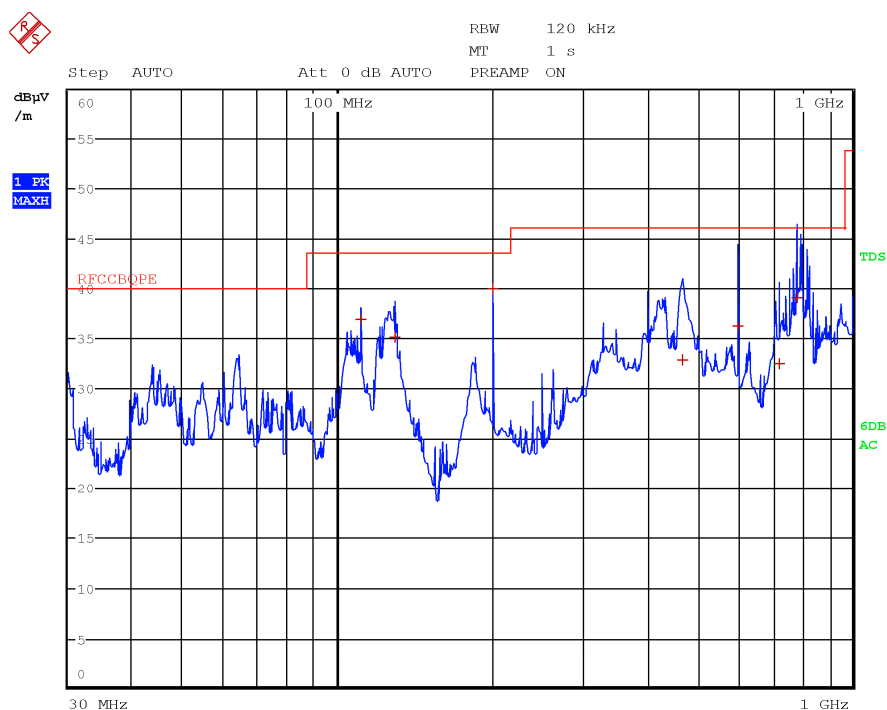
Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Horizontal	1	1	1	Frequency range: 30 MHz to 1 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



Date: 18.MAY.2021 17:30:44

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
200.0000	28.5	43.5	-15.0	QP
744.1600	30.1	46.0	-15.9	QP
804.1600	40.5	46.0	-5.5	QP
876.2000	33.8	46.0	-12.2	QP

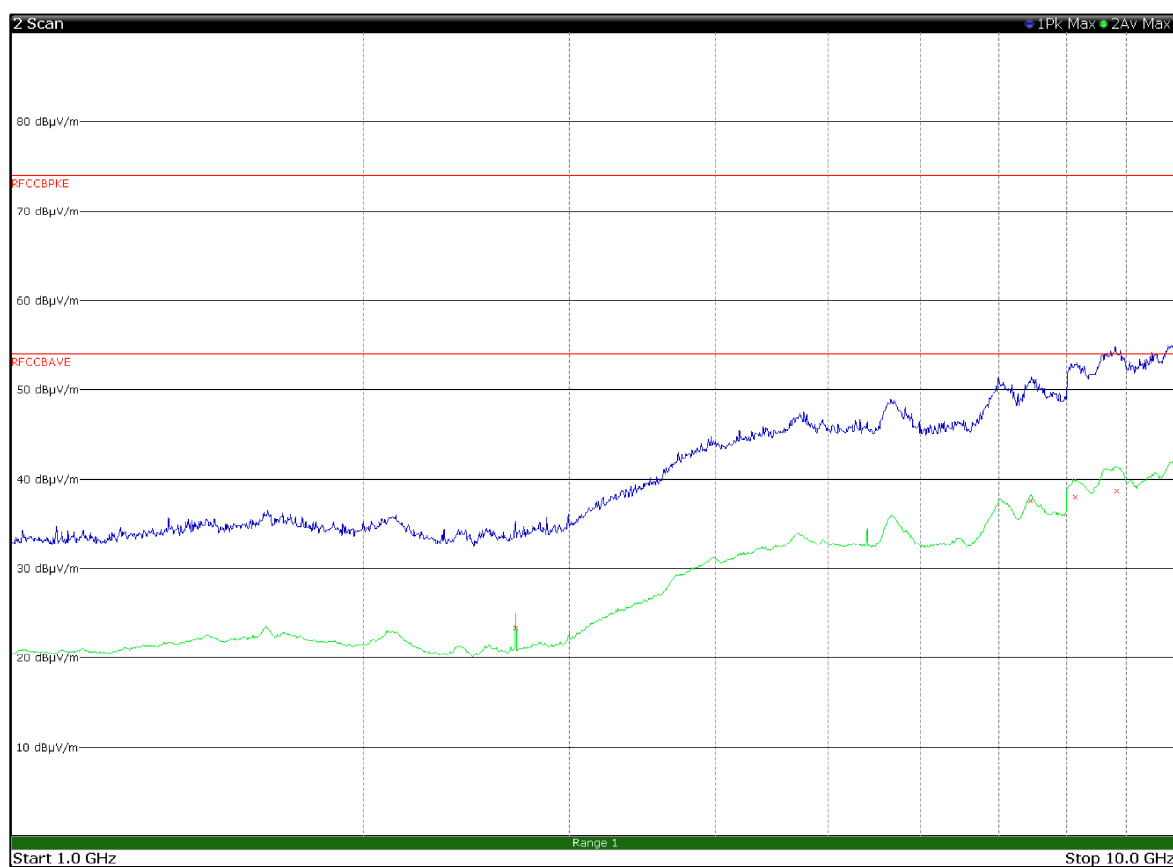
Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Vertical	1	1	1	Frequency range: 30 MHz to 1 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



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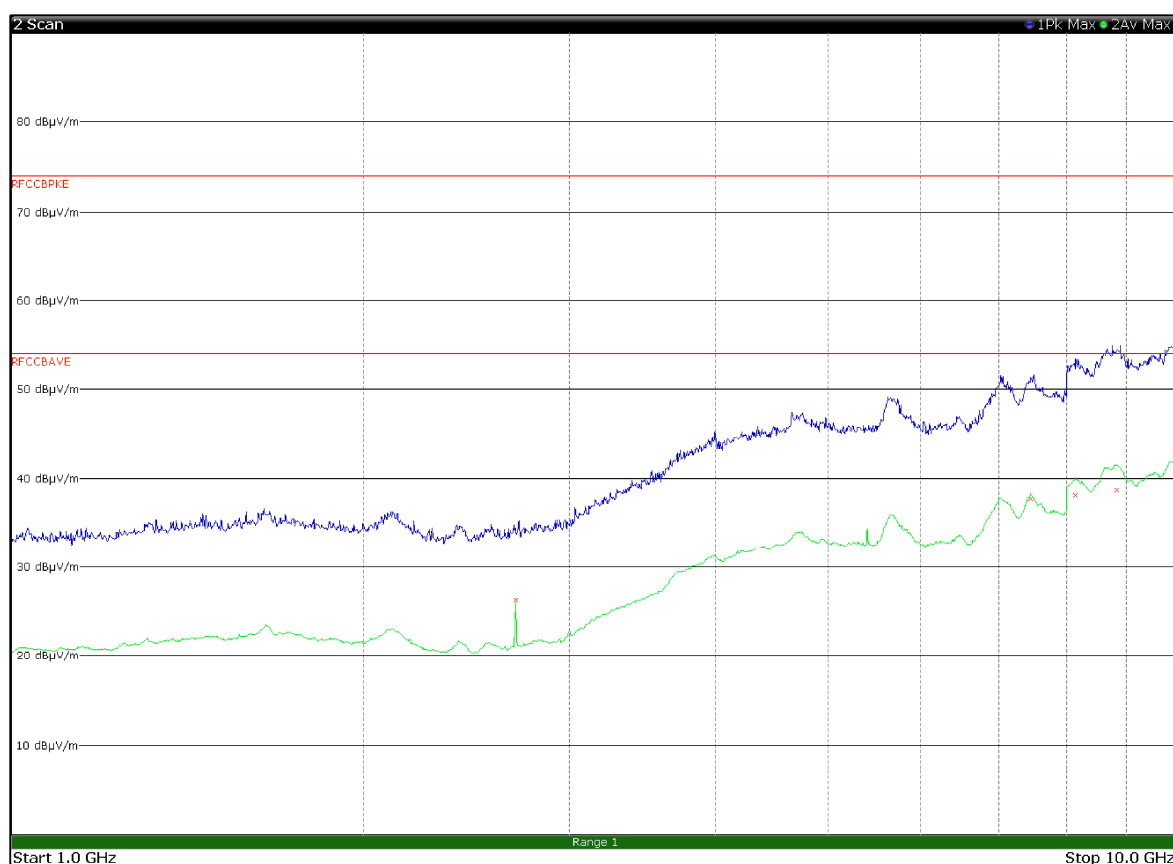
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
110.8800	37.1	43.5	-6.4	QP
129.2000	35.2	43.5	-8.3	QP
200.0000	40.1	43.5	-3.4	QP
467.5200	32.9	46.0	-13.1	QP
600.0400	36.3	46.0	-9.7	QP
720.0800	32.6	46.0	-13.4	QP
780.2000	39.2	46.0	-6.8	QP

Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Horizontal	1	1	1	Frequency range: 1 GHz to 10 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



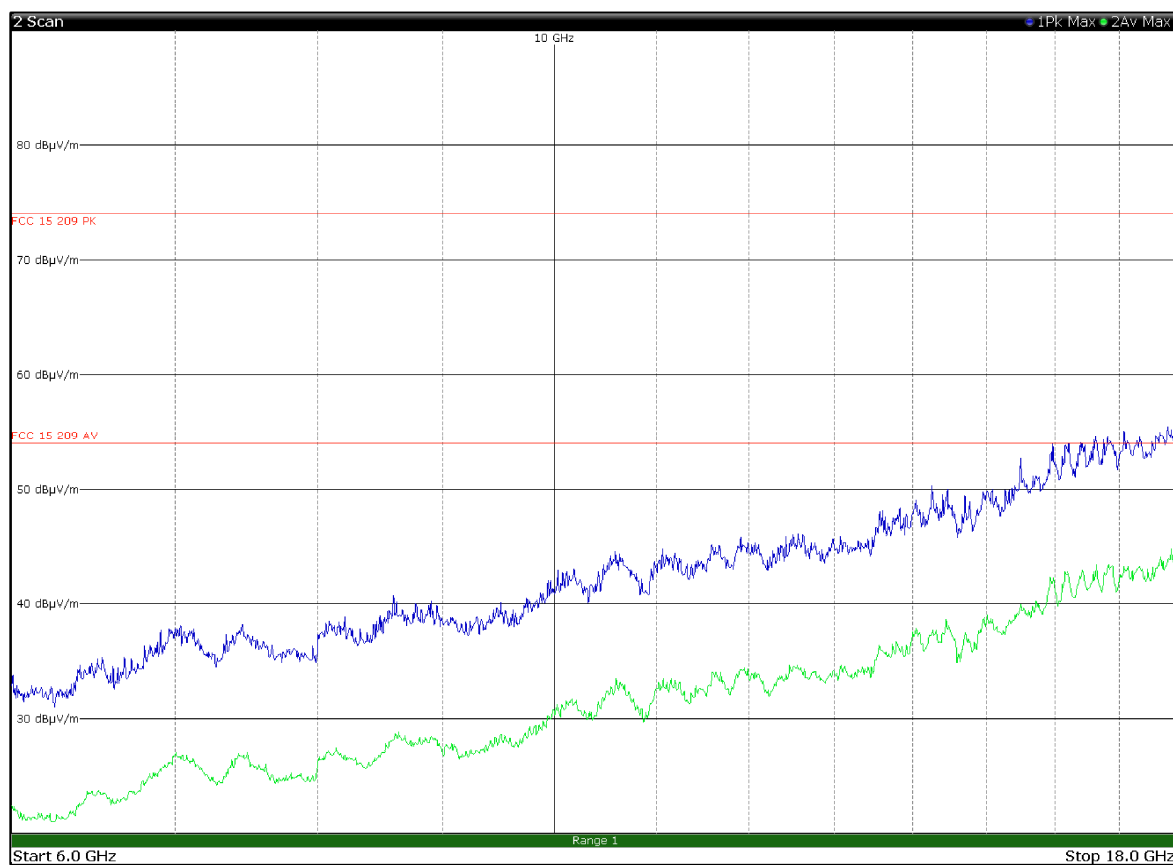
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
2700.0000	23.4	54.0	-30.6	Av
7448.2500	37.7	54.0	-16.3	Av
8141.7500	38.1	54.0	-15.9	Av
8820.7500	38.7	54.0	-15.3	Av
9982.0000	40.8	54.0	-13.2	Av

Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Vertical	1	1	1	Frequency range: 1 GHz to 10 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					

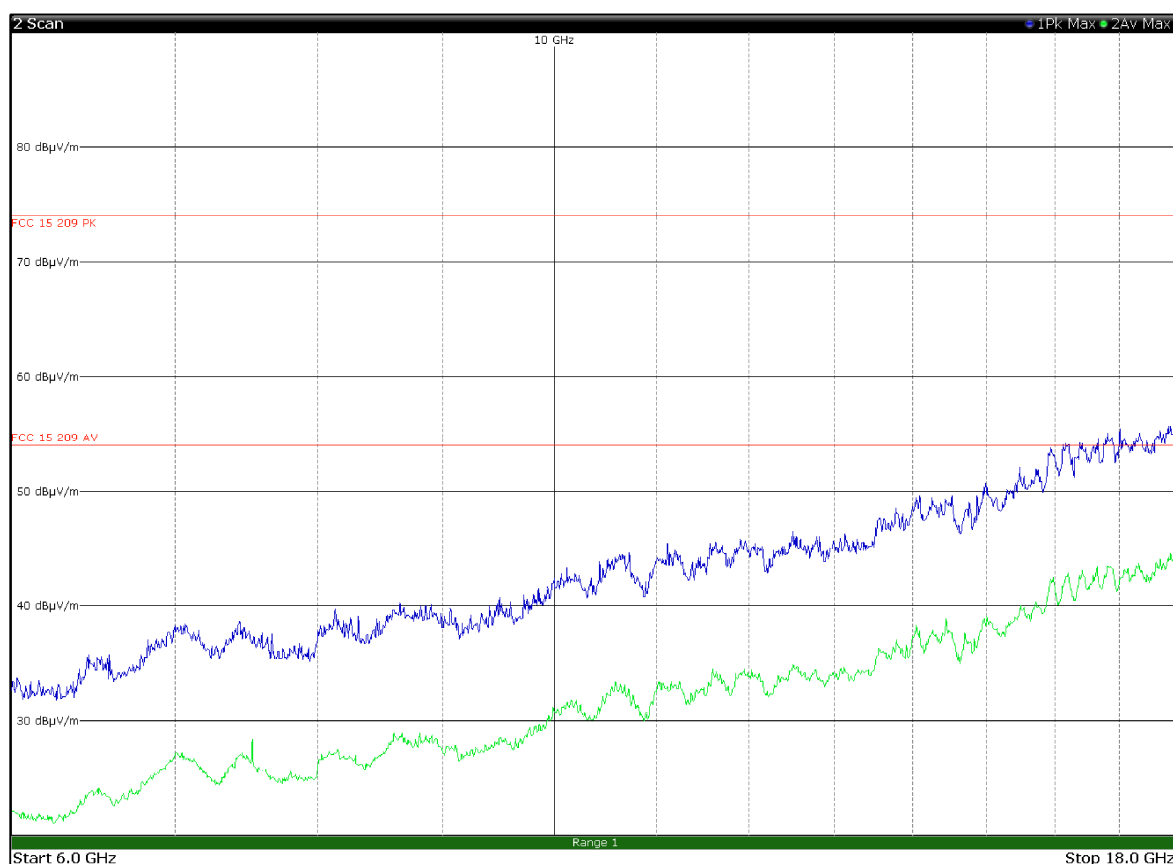


Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
2700.0000	26.3	54.0	-27.7	Av
7445.7500	37.7	54.0	-16.3	Av
8141.2500	38.1	54.0	-15.9	Av
8821.0000	38.8	54.0	-15.2	Av
9981.2500	40.9	54.0	-13.1	Av

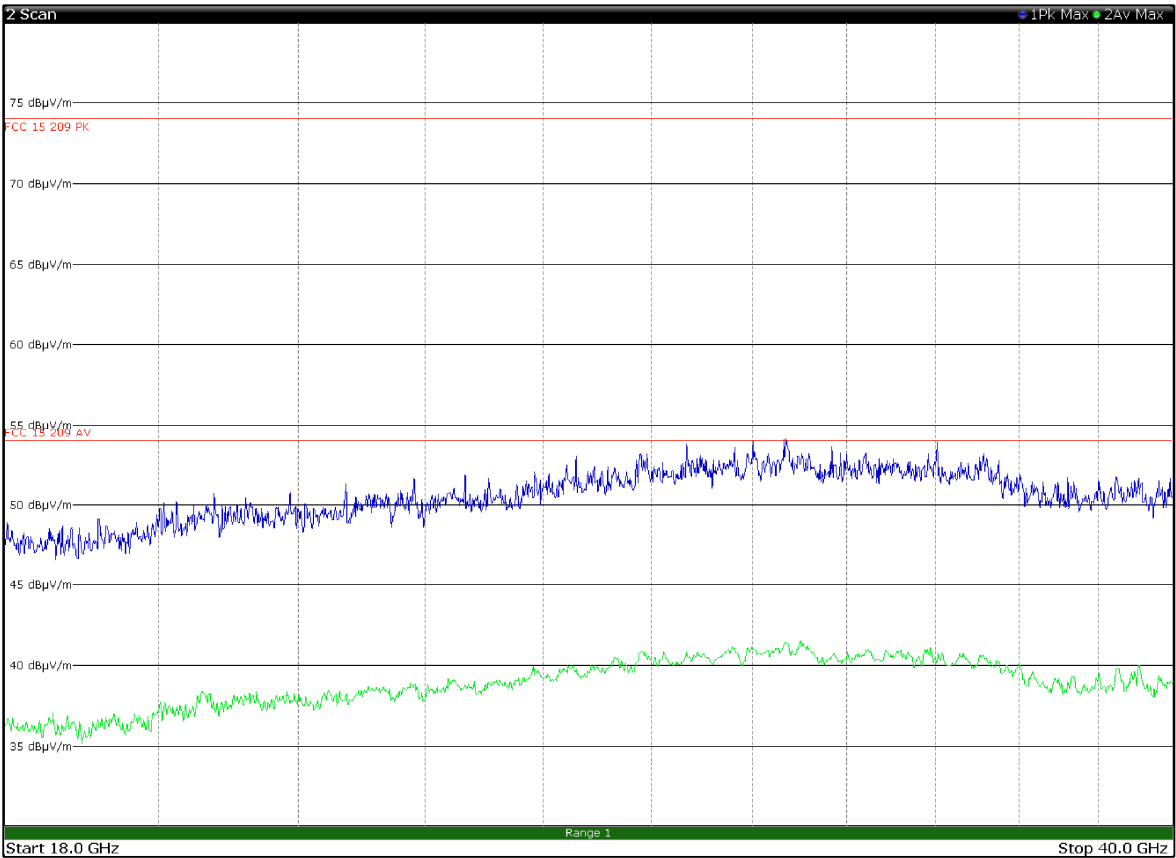
Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Horizontal	1	1	1	Frequency range: 6 GHz to 18 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



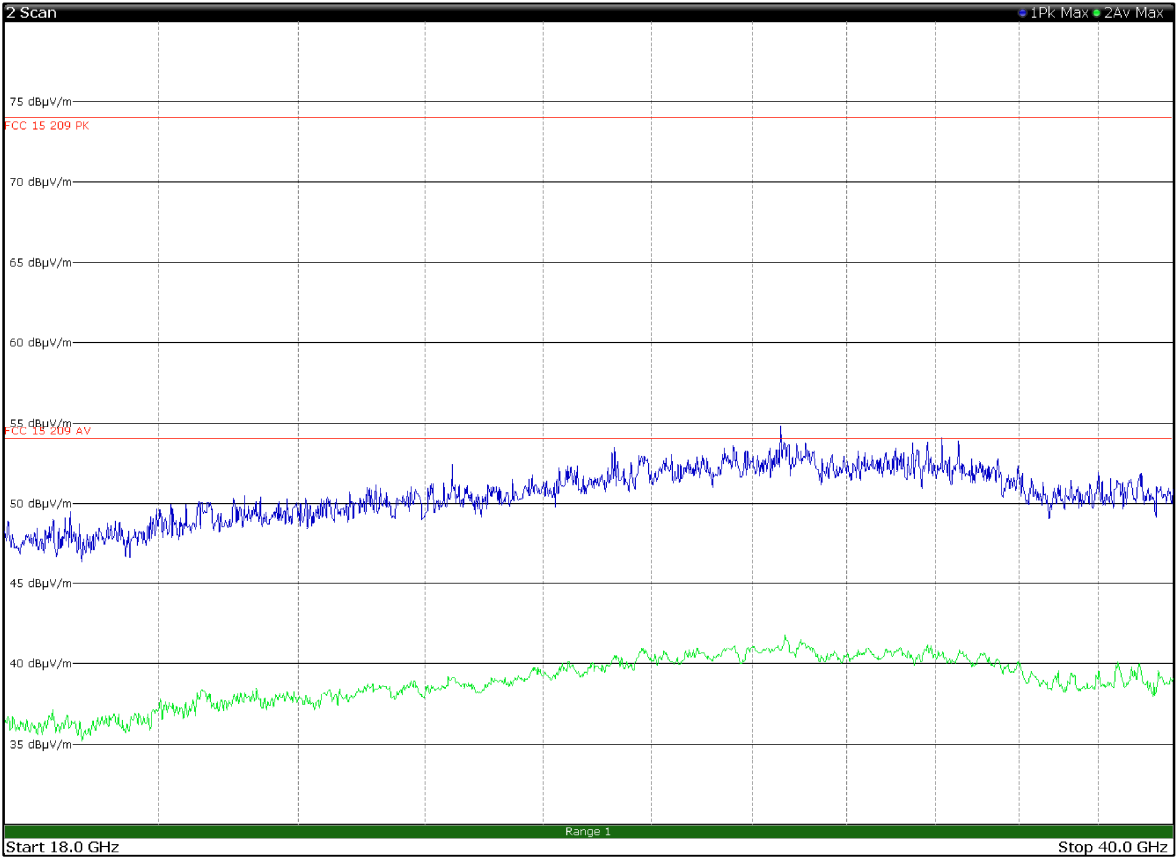
Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Vertical	1	1	1	Frequency range: 6 GHz to 18 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Horizontal	1	1	1	Frequency range: 18 GHz to 40 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					



Antenna Polarization	Supply Voltage ¹	Test Mode		Remarks	Verdict
		Operation ²	Configuration ³		
Vertical	1	1	1	Frequency range: 18 GHz to 40 GHz	P
Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes					

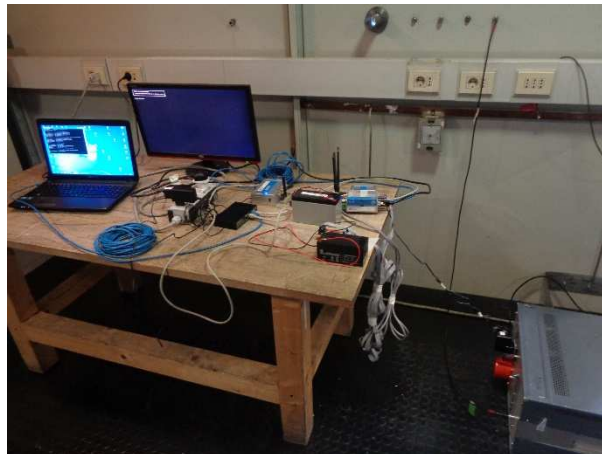


5.2 Conducted emission

5.2.1 Test result

Verdict for AC mains port ² :	☒ P ☐ F ☐ N ¹ ☐ NP
Frequency range:	0.15 MHz – 30 MHz
Kind of test site:	Shielded room
Notes: ¹ If marked, the test is not applicable for the EUT, according to 15.107 (c)(1) or (d). ² If applicable, KDB 174176D01 criterion was used for devices powered from a computer or any other external power source via a USB connection.	

5.2.2 Photo documentation of the test set-up



5.2.3 Test method

Method standard is reported at par. 3.1. Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

Receiver reading P_R , reported in tables at clause 5.2.6, was achieved adjusting the input signal P_{IN} by a correction factor CF , to take into account of the insertion loss due to LISN and cables. This correction factor was pre-inserted in the firmware of the receiver and was applied by the instrument during the test. The relationship between P_R and P_{IN} , expressed in dB, is:

$$P_R = P_{IN} + CF$$

5.2.4 Limits

Conducted emissions from AC mains power ports				
Frequency (MHz)	Quasi-Peak limit (dBμV)		Average limit (dBμV)	
	Class B	Class A	Class B	Class A
0.15 to 0.50	66 to 56 ¹	79	56 to 46 ¹	66
0.50 to 5	56	73	46	60
5 to 30	60	73	50	60

Notes:
¹ The limit level in dBμV decreases linearly with the logarithm of frequency

5.2.5 Test equipment used¹

Used ²	Description	Manufacturer	Model	Identifier
☒	EMI receiver	R&S	ESU8	100202
☐	EMI receiver	Rohde & Schwarz	ESW44	101620
☒	Attenuator	Aeroflex / Weinschel	2	CC8577
☐	LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041
☒	LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	881 362/006
☐	LISN 9 kHz ÷ 30 MHz	R&S	ESH3-Z5	840 731/004
☒	Shielded room	Siemens	Conducted emission test room	1862

Notes:
¹ See clause 1.7 for calibration information.
² If crossed, the instrument was used during tests.

5.2.6 Test protocol

Test Port		Supply Voltage ²	Test Mode		Remarks	Verdict
EUT ¹	Line		Operation ³	Configuration ⁴		
1	L	1	1	1		P

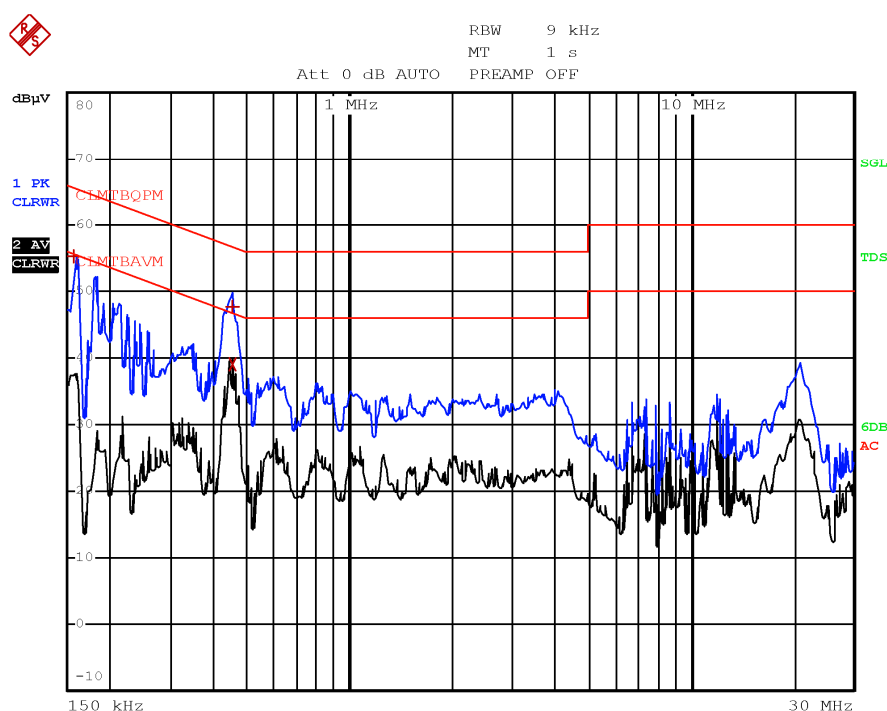
Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes



Date: 17.MAY.2021 15:52:05

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
0.1580	55.3	65.6	-10.2	QP
0.4500	47.9	56.9	-9.0	QP
0.4500	39.1	46.9	-7.8	Av

Test Port		Supply Voltage ²	Test Mode		Remarks	Verdict
EUT ¹	Line		Operation ³	Configuration ⁴		
1	N	1	1	1		P

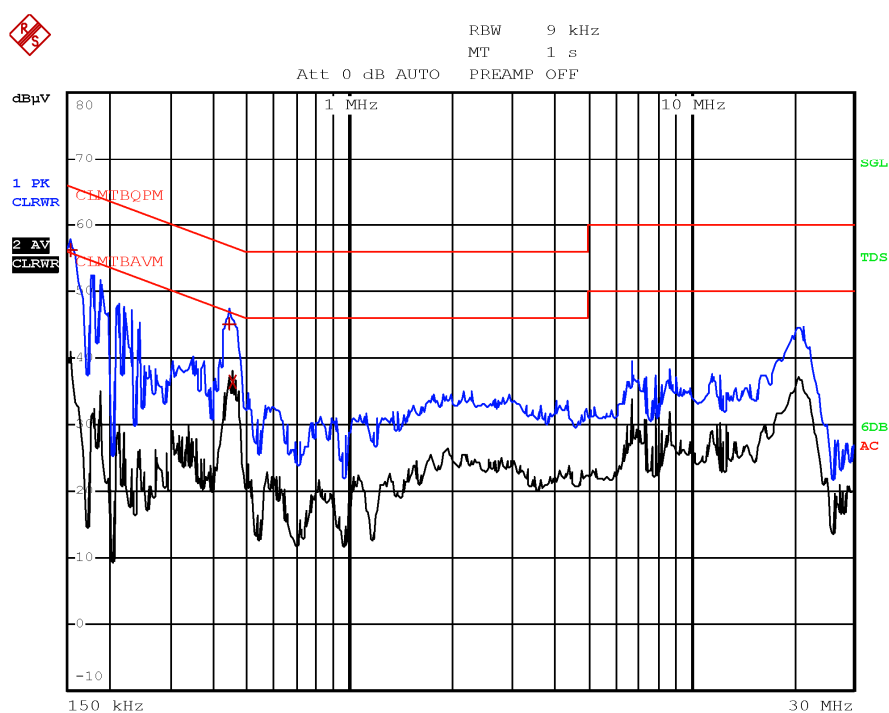
Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes



Date: 17.MAY.2021 15:49:17

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
0.1540	56.3	65.8	-9.4	QP
0.4420	45.2	57.0	-11.9	QP
0.4500	36.5	46.9	-10.4	Av

6 EUT PHOTOS





End of report