



Test report issued under the responsibility of:
Laboratory EMITECH ILE DE FRANCE

EMC TEST REPORT

ETSI EN 301489-1 V2.2.3 : 2019

ETSI EN 301489-19 V2.2.1 : 2019

ETSI EN 301489-52 V1.1.0 : 2016

EN 62479 : 2010

Company: **RAPID.SPACE INTERNATIONAL**

Address.....: 17 RUE PACHE
75011 PARIS
FRANCE

Test item description: **Open Radio Station**

Trade Mark: ORS

Manufacturer: RapidSpace

Model/Type reference.....: ORS

Ratings.....: 24-50Vdc

Testing Laboratory: **Laboratory EMITECH ILE DE FRANCE**

Address.....: 30-32, avenue des 3 Peuples 78180 Montigny-le-Bretonneux
FRANCE

Report Reference No......: **RCE-EMIESS21A192RAP-1-A (00)**

Test procedure: CE Marking

Diffusion.....: Mr. GAMBIER

Applicant's name: RAPID.SPACE INTERNATIONAL

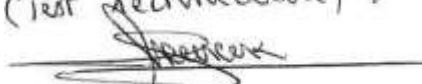
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Approved by (+ signature): *F. Chepeneux*
(Test technician)


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REPORT INDEX:

1. GENERAL INFORMATIONS	3
2. REFERENCE DOCUMENTS	4
3. EQUIPMENT TECHNICAL DESCRIPTION	5
3.1. TEST CONDITIONS	5
3.2. EUT OVERVIEW	6
3.3. EUT MARKING PLATE	7
3.4. EUT MECHANICAL AND ELECTRICAL DESIGN	8
3.5. EUT INPUT/OUTPUT PORTS	8
3.6. EMC ENVIRONMENT AND PERFORMANCE CRITERIA	11
3.7. EUT ELECTROMAGNETIC FIELD HUMAN EXPOSURE SPECIFICATIONS	13
4. RESULT SUMMARY	14
5. MEASUREMENT UNCERTAINTY	15
6. TEST CONDITIONS AND RESULTS	16
6.1. CONDUCTED CURRENT EMISSION (MEASUREMENT)	16
6.2. ELECTROSTATIC DISCHARGES IMMUNITY	20
6.3. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY	26
6.4. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY	37
6.5. SURGE IMMUNITY	39
6.6. CONDUCTED DISTURBANCES INDUCED BY RADIO-FREQUENCY FIELDS IMMUNITY	41
6.7. MEASUREMENT OF ELECTROMAGNETIC FIELD IN COMPARAISON OF REFERENCE LEVEL(S)	43

1. GENERAL INFORMATIONS

This document submits the results of Electromagnetic Compatibility tests and ElectroMagnetic Field (EMF) human exposure tests performed on the equipment **Open Radio Station ORS** (denominated hereafter E.U.T.: equipment under test) according to documents listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:					
Testing Location : Laboratory EMITECH ILE DE FRANCE Address : 30-32, avenue des 3 Peuples 78180 Montigny-le-Bretonneux FRANCE Test procedure. : CE Marking Tested by : C.A.ROBERT / G. BAKARY-GANDO Test supervisor : None Dates of performance of tests : The 12/04/21 ; The 11/05/21					
APPLICANT'S GENERAL INFORMATIONS:					
Company name : RAPID.SPACE INTERNATIONAL Company address. : 17 RUE PACHE 75011 PARIS France FRANCE Persons present during the tests : Mr. OUVRARD and Mr. GAMBIER Responsible. : Mr. GAMBIER					
GENERAL REMARKS:					
The information in italics is declared by the manufacturer and is under his responsibility The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report the decimal separator is point.					
POSSIBLE TEST CASE VERDICTS:					
Test case does not apply to the test object. : N/A Test case not performed..... : N/P Test object does meet the requirement..... : P (Pass) Test object does not meet the requirement.. : F (Fail)					
DEFINITIONS AND ABBREVIATIONS:					
E.U.T.	Equipement under test	AE	Ancillary equipment	Pk	Peak detector
RBW	Resolution bandwidth	VBW	Video bandwidth	QP	Quasi-peak detector
OATS	Open area test site	FAR	Full anechoic room	Av	Average detector
VP	Vertical Polarization	HP	Horizontal Polarization	RMS	Root Mean Square
RF	Radio frequency	NTR	Nothing to report	N/C	Not communicated

2. REFERENCE DOCUMENTS

NORMATIVE REFERENCES:

The following referenced documents are necessary for the application of the present test report.

ETSI EN 301489-1 V2.2.3 : 2019

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301489-19 V2.2.1 : 2019

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Electromagnetic Compatibility (EMC) standard for radio equipment and services.
Part 19: Specific condition for Receive Only mobile Earth Stations (ROMES) operating in the 1.5 GHz band providing data communications.

ETSI EN 301489-52 V1.1.0 : 2016

Electromagnetic Compatibility (EMC) Standard for radio equipment and services ;
Part 52: Specific conditions for Cellular Communication Mobile and Portable (UE) radio and ancillary equipment ; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

EN 62479 : 2010

Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing.

Test item description.	: <i>Open Radio Station</i>
Model/Type reference.....	: <i>ORS</i>
Trade Mark.	: <i>ORS</i>
Serial number (S/N).....	: <i>Box n°1 : 93000432009080006 / Box n°2 : 93000432009080003</i>
Part number (P/N).	: <i>ORS-TDD-BAND39</i>
Software version.....	: <i>2020-09-14</i>
Firmware version.	: <i>2020-09-14</i>
Type of sample.....	: <i>Pre-serial</i>
Functions.....	: <i>The ORS is a 4G/5G LTE (Long Term Evolution) base station.</i>
Manufacturer name.	: <i>RapidSpace</i>
Address.....	: <i>17 RUE PACHE</i> <i>75011 PARIS FRANCE</i>

3.2. EUT Overview



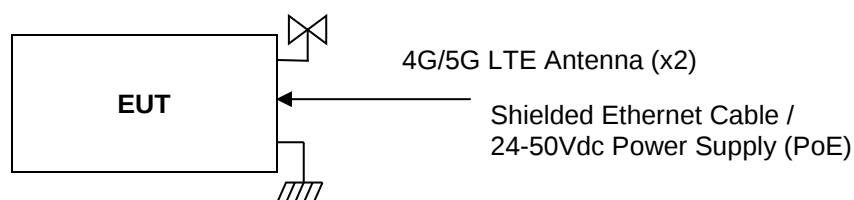
3.3. EUT Marking Plate



3.4. EUT Mechanical and Electrical Design

Power supply. : *Not communicated*
Power supply range. : *24-50Vdc*
Power type. : *PoE (DC)*
Power (W). : *50 max*
Nominal current (A). : *Not communicated*
Dimensions (L x W x H) (mm). : *170 x 105 x 250*
Weight (kg). : *2.2*
Temperature range (°C). : *-25 to +55*
Ground bounding strap. : *Yes*

3.5. EUT Input/Output ports



(AE)



(AE)



3.6. EMC Environment and Performance Criteria

According to manufacturer's declarations :

Electromagnetic environment..... : *Industrial*
 Professionnal use ? : *Yes*
 Typical mounting : *Box to be hung on a wall*
 Internal frequencies : *1.2MHz*

a) EUT OPERATION MODES:	
MODE #	DESCRIPTION
1	The EUT is powered up and all its functions are operating.
b) EUT CONTROL PROCEDURES USED DURING IMMUNITY TESTS:	
<i>Visual check of the UE connection to the ORS and of the data transfer.</i>	
c) PERFORMANCE CRITERIA OF THE EN 301 489-X STANDARD	
For further details of performance criteria please refers to the applicable relevant part of EN 301 489-X series dealing with the particular type of radio equipment and in accordance with the reference document(s) listed in §2 of this test report. Clause 6 of the ETSI EN 301 489-1 standard: Clause 6: Performance criteria The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests. For the purpose of the present document four categories of performance criteria apply: • performance criteria for continuous phenomena applied to transmitters (criteria A); • performance criteria for transient phenomena applied to transmitters (criteria B); • performance criteria for continuous phenomena applied to receivers (criteria A); • performance criteria for transient phenomena applied to receivers (criteria B). Normally, the performance criteria depend on the type of radio equipment. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment. More specific and product-related performance criteria for a dedicated type of radio equipment may be found in the part of EN 301 489 series [i.13] dealing with the particular type of radio equipment. Clause 6.1: Performance criteria for continuous phenomena applied to transmitters and receivers (Criteria A) If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply. During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.	

Clause 6.2:**Performance criteria for transient phenomena applied to transmitters and receivers (Criteria B)**

If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply.

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended.

In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Clause 6.3: Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

Clause 6.4: Performance criteria for ancillary equipment tested on a stand alone basis

If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

Permissible loss of performance (continuous phenomenon):

Standard Criteria

Permissible loss of performance (transient phenomenon):

Standard Criteria

3.7. EUT Electromagnetic Field Human Exposure Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
Environmental profile : <i>Industry</i>	
Typical installation : <i>Box to be hung on a wall</i>	
Internal frequencies : <i>1.2MHz</i>	
EUT OPERATION MODES:	
MODE #	DESCRIPTION
1	The EUT is powered up and all its functions are operating.
GENERAL REMARKS ON EVALUATION OF HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS	
Equipment which meets the limits for general public exposure (recommendation 1999/519/EC) will automatically meet the limits for workers without further testing. Equipment which meets the limits for workers (directive 2013/35/UE) will not necessarily meet the limits for the general public and, unless intended only for workers' use when at work, equipment shall also be tested against general public limits. Equipment intended only for use by workers when at work shall have this condition clearly identified in the user instructions. This use condition shall be identified in the test report. All intended operating conditions as well as the reasonably foreseeable conditions of human exposure from the equipment shall be taken into account in the evaluation. The reasonably foreseeable conditions of exposure should be based on realistic exposure and/or installation parameters representative of all readily-predictable human and system behaviour such as the duration of exposure, time varying of transmitted power, simultaneously operated frequency bands and time averaging as defined in normative limits.	

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Harmonics current emission	-	-	N/A
Measurement of voltage fluctuation and flicker	-	-	N/A
Conducted current emission (measurement)			EN 55032 : 2015 / AMD11 : 2020
- Box n°1 - Ethernet Cable (PoE)	Class B	-	Average measure needed.
- Box n°1 - Ethernet Cable (PoE) (AV)	Class B	PASS	
Measurement of radiated disturbances	-	-	N/A. To be validated according to the applicable radio standards.
Electrostatic discharges immunity			EN 61000-4-2 : 2009
- Box n°2 - INDIRECT 4kV (VERT.)	Criterion B	PASS	
- Box n°2 - INDIRECT 4kV (HORIZ.)	Criterion B	PASS	
- Box n°2 - DIRECT 4kV	Criterion B	PASS	
- Box n°2 - AIR 2kV	Criterion B	PASS	
- Box n°2 - AIR 4kV	Criterion B	PASS	
- Box n°2 - AIR 8kV	Criterion B	PASS	
Radiated, radio-frequency, electromagnetic field immunity			EN 61000-4-3 : 2006 / AMD1 : 2008 / AMD2 : 2010
- Box n°2 - Front side - 80MHz - 6GHz	Criterion A	PASS	
- Box n°2 - Left side - 80MHz - 6GHz	Criterion A	PASS	
- Box n°2 - Lower side - 80MHz - 6GHz	Criterion A	PASS	
Electrical fast transient/burst immunity			EN 61000-4-4 : 2012
- Box n°1 - Ethernet Cable (PoE) at ± 0.5 kV	Criterion B	PASS	
Surge immunity			EN 61000-4-5 : 2014 / AMD1 : 2017
- Box n°2 - Ethernet Cable (PoE)	Criterion B	PASS	
Conducted disturbances induced by radio-frequency fields immunity			EN 61000-4-6 : 2014
- Box n°1 - Ethernet Cable (PoE)	Criterion A	PASS	
Voltage dips and short interruptions immunity	-	-	N/A
Transient and surge in a vehicular environment immunity	-	-	N/A
Measurement of electromagnetic field in comparaison of reference level(s)			EN 62479 : 2010
- Box n°2 - DC	400G	PASS	
- Box n°2 - 1Hz - 400kHz	2.3 μ T	PASS	
- Box n°2 - 100kHz - 6GHz	27.5V/m	PASS	

Sample subject to the test **comply** for tests done with the requirements of the reference documents listed in §2 of this test report and, where applicable, with deviations specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the results.

5. MEASUREMENT UNCERTAINTY

Uncertainties values presented below are required by standards:

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	STANDARD UNCERTAINTY
Conducted emission		
Harmonics current 61000-3-2/3-12	± 5.0 %	± 5.00 %
Harmonics current 61000-3-12 (with probe)	± 5.9 %	/
Voltage fluctuation and flicker 61000-3-3/3-11	± 7.5 %	± 8.00 %
(Artificial Mains Network) 3kHz – 9kHz	± 3.8 dB	/
(Artificial Mains Network) 9kHz – 150kHz	± 3.6 dB	± 3.8 dB
(Artificial Mains Network) 150kHz – 30MHz	± 3.4 dB	± 3.4 dB
(Voltage probe) 9kHz – 30MHz	± 2.9 dB	± 2.9 dB
(Asymmetric Artificial Network) 150kHz – 30MHz	± 3.5 dB	± 5.0 dB
(Current measurement) 150kHz – 30MHz	± 2.9 dB	± 2.9 dB
(Capacitive Voltage Probe) 150kHz – 30MHz	± 3.6 dB	± 4.0 dB
(Discontinuous) 150kHz – 30MHz	± 3.4 dB	± 3.4 dB
(Van Veen) 9kHz – 30MHz	± 3.3 dB	± 3.3 dB
(Coupling Decoupling Network) 30MHz – 300MHz	± 3.5 dB	± 3.8 dB
(Splitter) 30MHz – 2.15GHz	± 3.4 dB	/
Disturbance power		
30MHz – 300MHz	± 4.4 dB	± 4.5 dB
Radiated emission		
(magnetic field) 9kHz – 30MHz	± 2.7 dB	/
(electric field in the OATS/SAC) 30MHz – 1GHz	± 5.2 dB	± 6.3 dB
(electric field in the FAR) 30MHz – 1GHz	± 5.2 dB	± 5.3 dB
(electric field in the FAR) 1GHz - 6GHz	± 5.2 dB	± 5.2 dB
(electric field in the FAR) 6GHz - 18GHz	± 5.5 dB	± 5.5 dB
(electric field in the FAR) 18GHz - 40GHz	± 5.7 dB	/

For the calcul of expanded uncertainty, the confidence interval is 95 % (k=2).

OATS: Open Area Test Site
SAC: Semi Anechoic Chamber
FAR: Fully Anechoic Room

6. TEST CONDITIONS AND RESULTS

6.1. Conducted current emission (measurement)

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 55032 : 2015 / AMD11 : 2020
General test setup: EUT is set on an insulating support at 40 cm above the ground reference plane. All tested telecommunications lines (if applicable) were connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines were made at the output of the AAN. Where an AAN was not appropriate or available, measurements were made using a Capacitive Voltage Probe and/or a Current probe. Additional ground terminals (if any) are connected to earth terminal of the AMN.	

TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Box n°1 - Ethernet Cable (PoE)	150kHz-30MHz	Class B	EMI4384	-
Box n°1 - Ethernet Cable (PoE) (AV)	150kHz-30MHz	Class B	EMI4385	PASS

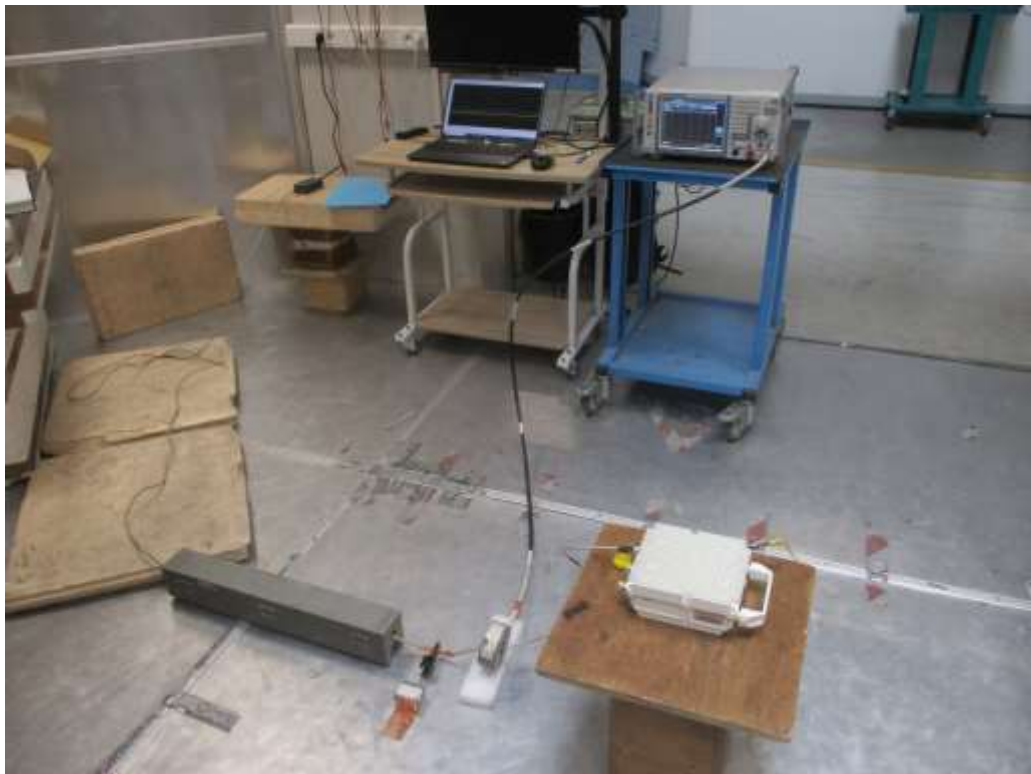
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	25.5 °C
Relative Humidity	30 to 60 %	35.1 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: No		
Supplementary information: Test carried out with a category 5 shielded Ethernet cable supplied by Emitech.		

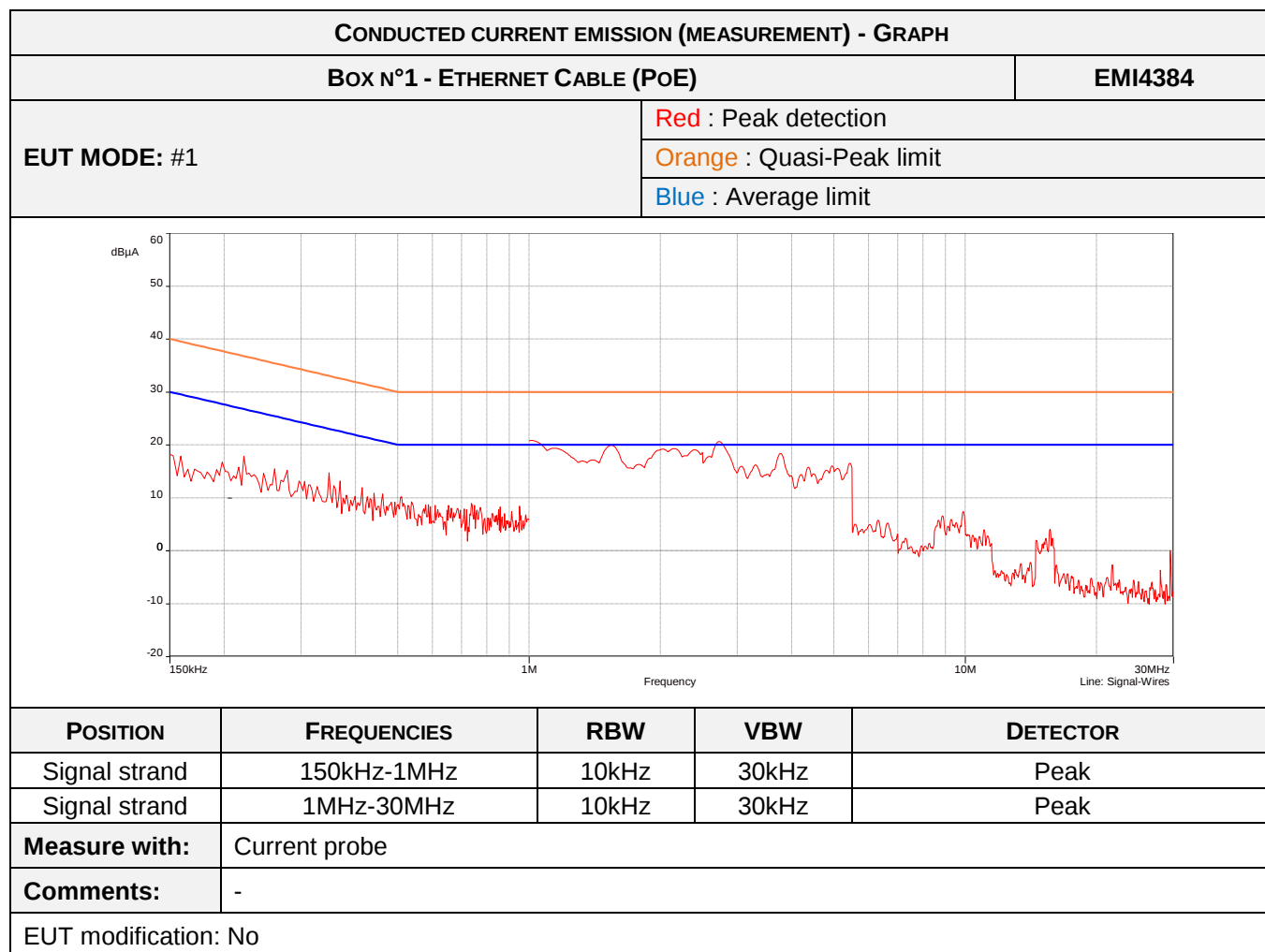
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Absorption clamp	Rohde & Schwarz	MDS21	5288	01/07/2020	01/09/2024
Cable	/	N-2m	2814	09/04/2020	09/06/2022
Measurement clamp	FCC	F-51	3080	17/09/2019	17/11/2021
Receiver	Rohde & Schwarz	ESR7	14768	17/02/2021	17/04/2022
Resistor	Emitech	150 Ohms	4497	06/11/2019	06/01/2022
Software	Nexio	-	0000		
Test enclosure	Emitech	HC1	14875		

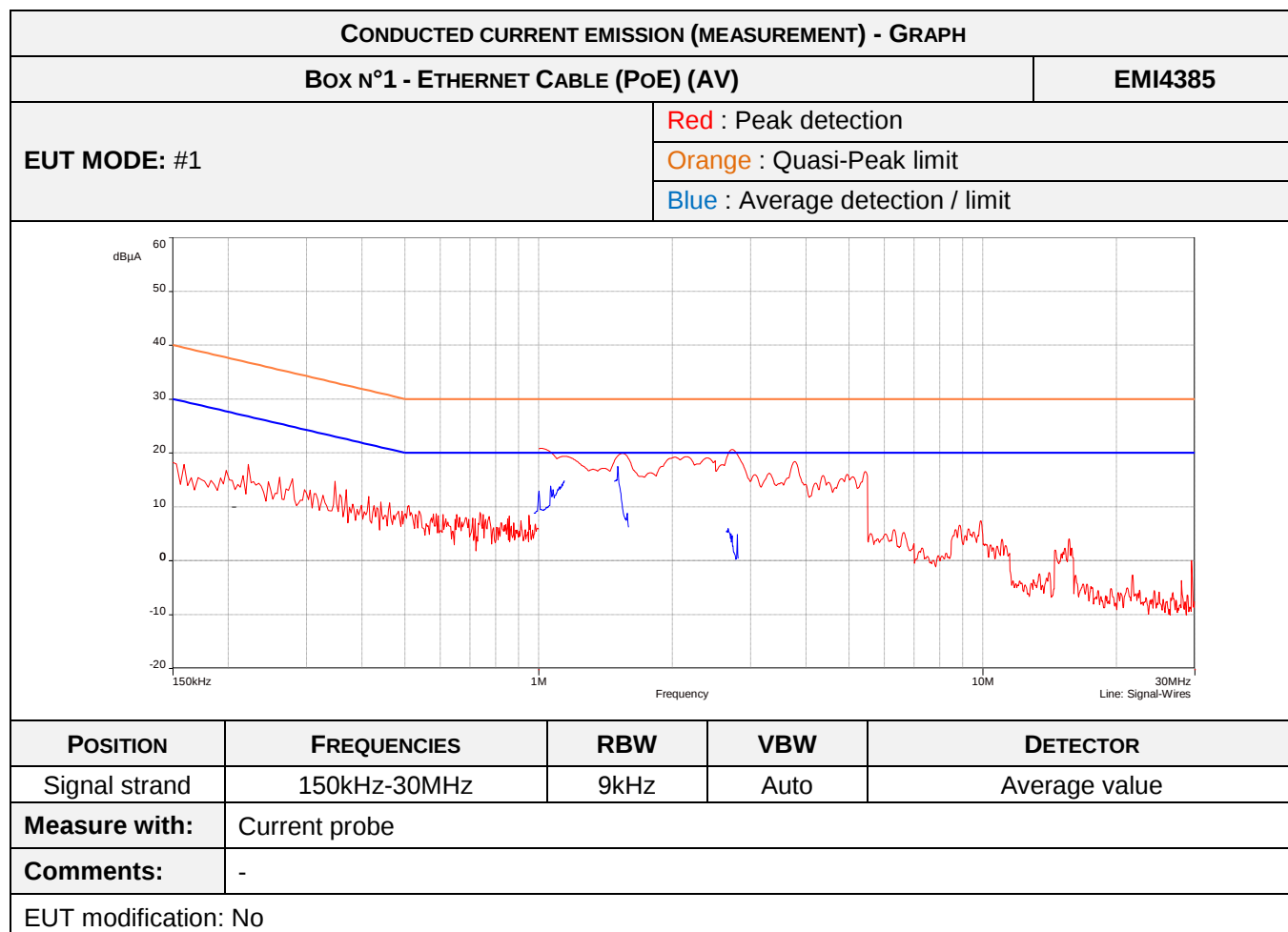
BAT-EMC software version: V3.18.0.19

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TEST SETUP PHOTOS







6.2. Electrostatic discharges immunity

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 61000-4-2 : 2009
General test setup: The test is intended to demonstrate the immunity of equipment subjected to static electricity discharges from operators directly and to adjacent objects. The table top equipment under test is placed on a wooden table, 80 cm high, standing on the ground reference plane. An horizontal coupling plane (HCP), 1.6 x 0.8 m, is placed on the table. The EUT and the cables are isolated from the coupling plane by an insulating support 0.5 mm thick. The vertical coupling plane (VCP) of dimensions 0.5 m x 0.5 m is placed parallel to, and positioned at a distance of 0.1 m from, the EUT.	

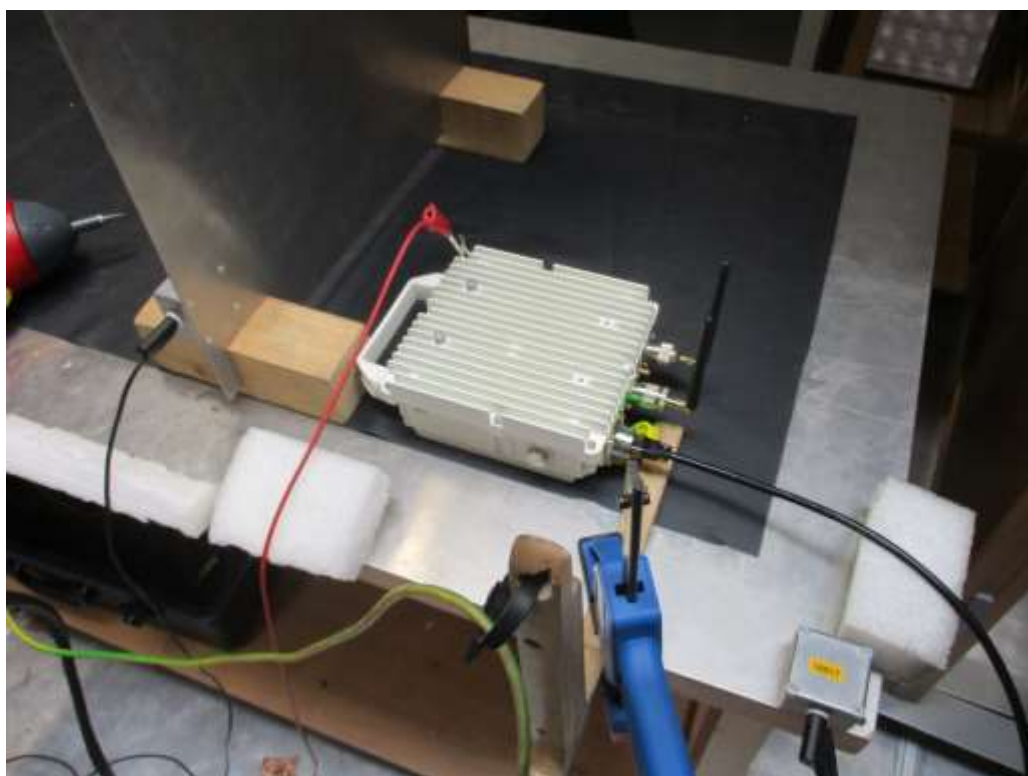
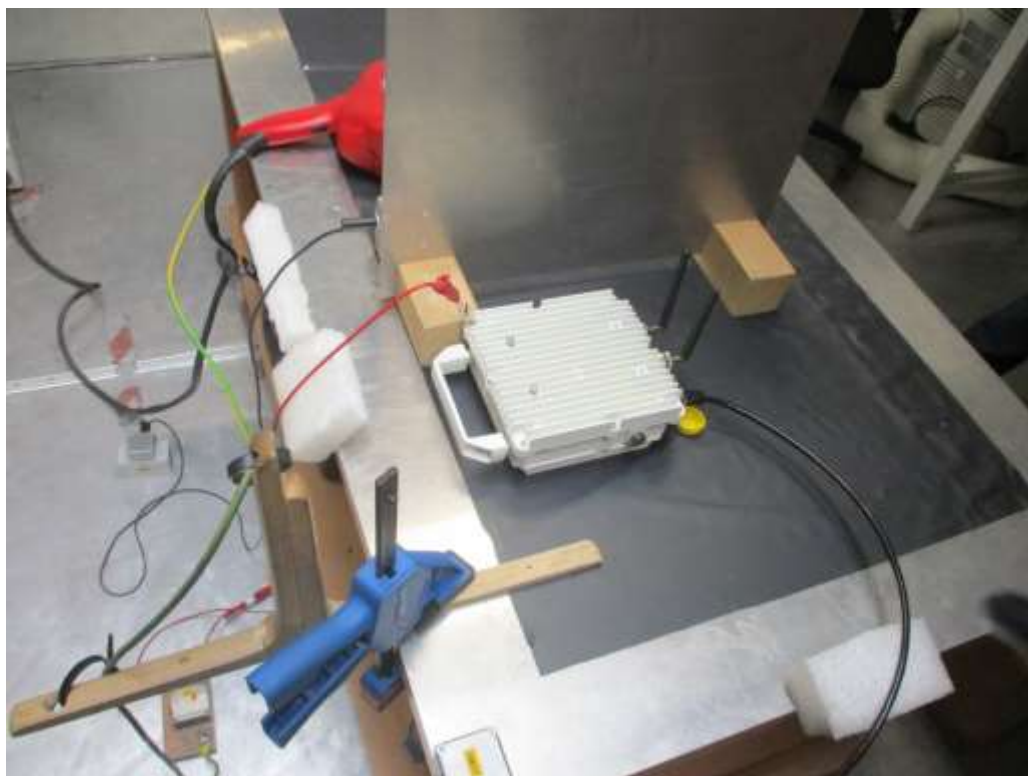
TEST SEQUENCE	EUT MODE	CRITERIA	RESULT TAB.	VERDICT
Box n°2 - INDIRECT 4kV (HORIZ.)	#1	B	IMU4332	PASS
Box n°2 - INDIRECT 4kV (VERT.)	#1	B	IMU4333	PASS
Box n°2 - DIRECT 4kV	#1	B	IMU4334	PASS
Box n°2 - AIR 2kV	#1	B	IMU4335	PASS
Box n°2 - AIR 4kV	#1	B	IMU4336	PASS
Box n°2 - AIR 8kV	#1	B	IMU4337	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	24.8 °C
Relative Humidity	30 to 60 %	35 %
Atmospheric pressure	860 to 1060 hPa	1010 hPa
Test method deviation: No		
Supplementary information: -		

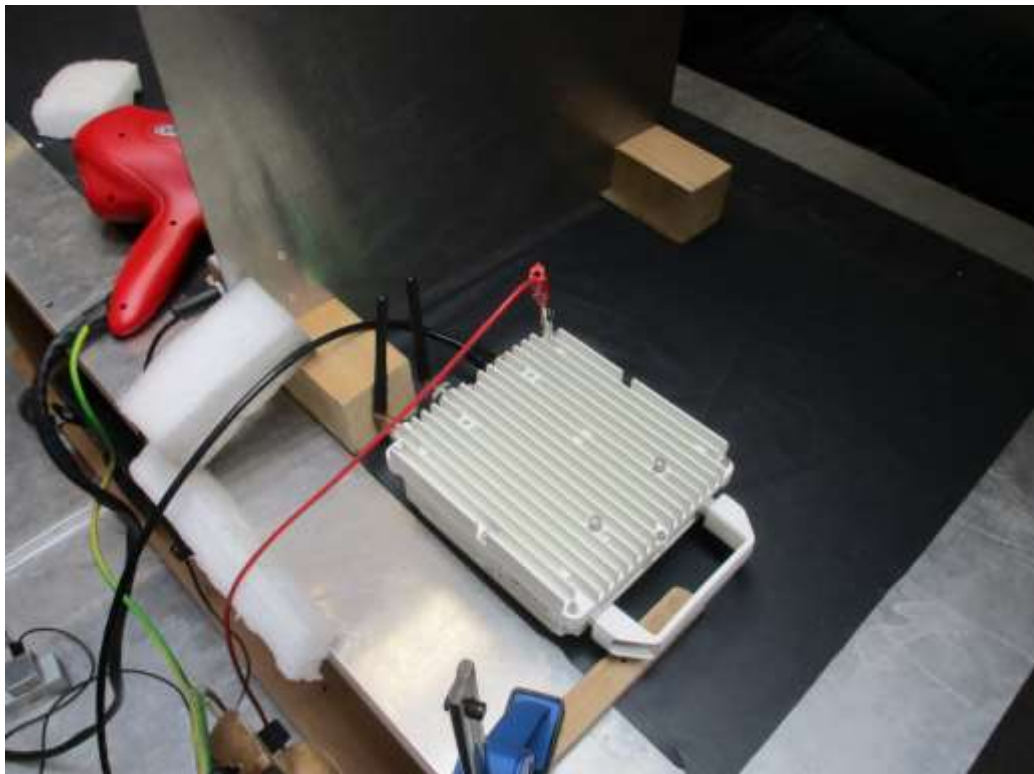
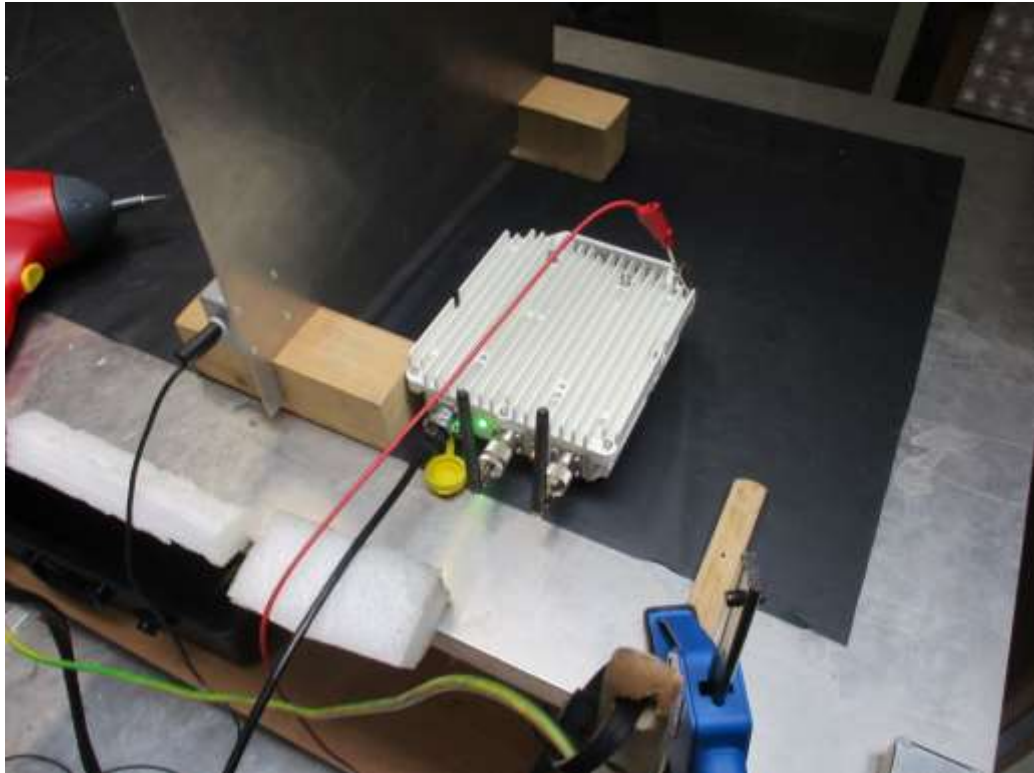
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
ESD Generator	Teseq AG	NSG 437	9379	08/03/2021	08/05/2023
Resistor	Emitech	470 kohms	16615		
Resistor	Emitech	470 kohms	16616		
Resistor	Emitech	470 kohms	16617		
Resistor	Emitech	470 kohms	16618		
Test enclosure	Emitech	HC1	14875		

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TEST SETUP PHOTOS



TEST SETUP PHOTOS



TEST SETUP PHOTOS – (● DIRECT DISCHARGES) (● AIR DISCHARGES)



ELECTROSTATIC DISCHARGES IMMUNITY - TABULATED RESULTS			
INDIRECT DISCHARGES – (HCP)			IMU4332
EUT Mode: #1		Coupling Mode:	Horizontal
		Discharges per locations:	10 per polarity
		Repetition:	1s
Criteria:	B		
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT
Front Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Back Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Left Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Right Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
EUT modification: No			

INDIRECT DISCHARGES – (VCP)			IMU4333
EUT Mode: #1		Coupling Mode:	Vertical
		Discharges per locations:	10 per polarity
		Repetition:	1s
Criteria:	B		
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT
Front Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Back Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Left Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
Right Side	4kV	+	N.T.R.
	4kV	-	N.T.R.
EUT modification: No			

DIRECT DISCHARGES			IMU4334
EUT Mode: #1		Coupling Mode:	Direct
		Discharges per locations:	10 per polarity
		Repetition:	1s
Criteria:	B		
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT
Red points	4kV	+	N.T.R.
	4kV	-	N.T.R.
EUT modification: No			

AIR DISCHARGES				IMU4335
EUT Mode: #1			Coupling Mode:	Air
			Discharges per locations:	10 per polarity
			Repetition:	1s
Criteria:	B			
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT	
Green points	2kV	+	N.T.R.	
	2kV	-	N.T.R.	
EUT modification: No				

AIR DISCHARGES				IMU4336
EUT Mode: #1			Coupling Mode:	Air
			Discharges per locations:	10 per polarity
			Repetition:	1s
Criteria:	B			
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT	
Green points	4kV	+	N.T.R.	
	4kV	-	N.T.R.	
EUT modification: No				

AIR DISCHARGES				IMU4337
EUT Mode: #1			Coupling Mode:	Air
			Discharges per locations:	10 per polarity
			Repetition:	1s
Criteria:	B			
DISCHARGE LOCATION	TEST LEVEL	POLARITY	RESULT	
Green points	8kV	+	N.T.R.	
	8kV	-	N.T.R.	
EUT modification: No				

6.3. Radiated, radio-frequency, electromagnetic field immunity

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 61000-4-3 : 2006 / AMD1 : 2008 / AMD2 : 2010
General test setup: The test allows estimating of the radiated immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 80MHz to 6GHz. The interference is applied on the enclosure of the equipment by using transmitting antennas. The test is performed on 3 sides (See photographs hereafter). EUT is set on an insulating support at 80 cm above the ground reference plane, in such a way that the side submitted to the test be located in homogeneous zone (1.5m x 1.5m) of the previously calibrated field. In compliance with the calibration, some anechoic panels are placed on the ground and antennas used are placed according to the calibration.	

TESTED CONFIGURATION	EUT MODE	CRITERIA	RESULT TAB.	VERDICT
Box n°2 - Front side - 80MHz - 6GHz	#1	A	IMU4389	PASS
Box n°2 - Left side - 80MHz - 6GHz	#1	A	IMU4391	PASS
Box n°2 - Lower side - 80MHz - 6GHz	#1	A	IMU4390	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	19.6 °C
Relative Humidity	30 to 60 %	35.4 %
Atmospheric pressure	N/A	1011 hPa
Test method deviation: Standard requires a test on 4 sides. However, a 3 sides test can be sufficient to respect essential requirements of the European Directive.		
Supplementary information: -		

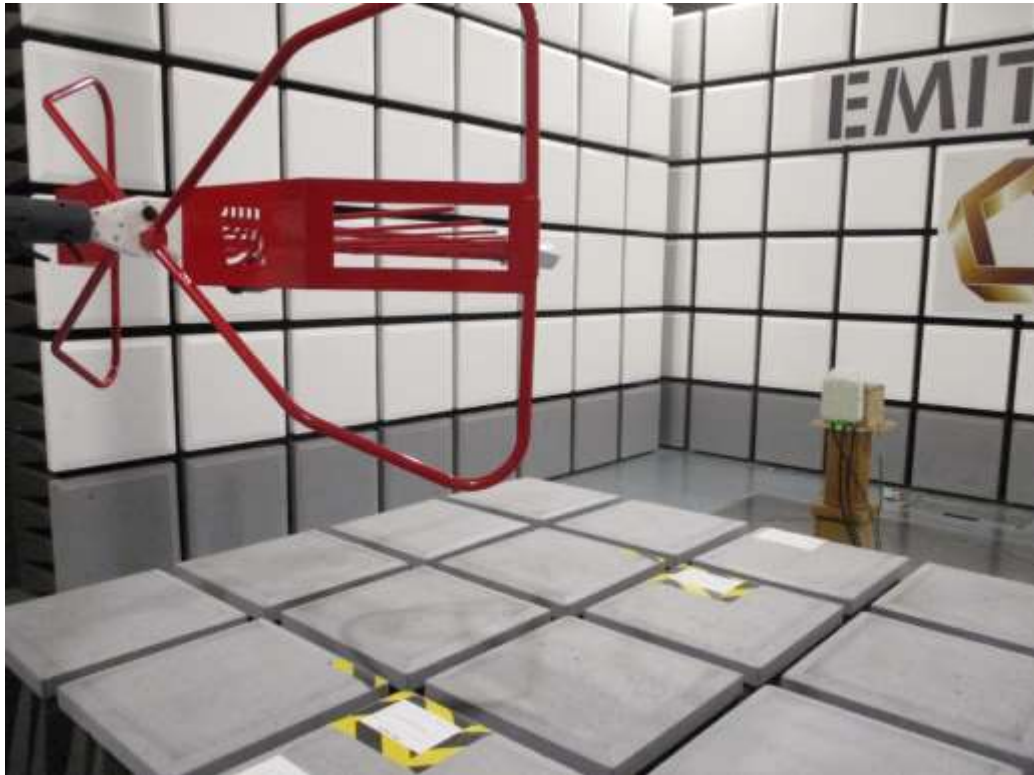
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
1 input Power meter	Agilent Technologies	N1911A (V AI.03.02)	5379	31/12/2019	28/02/2022
Amplifier	Amplifier Research	100W1000B	4374	14/01/2021	14/03/2024
Amplifier	TMD	PTC6343	7787	08/01/2019	08/03/2022
Amplifier	Amplifier Research	100S1G4	9174	02/05/2018	02/07/2021
Antenna	Amplifier Research	AT4002A	4526		
Antenna	ETS lindgren	3117	16002	06/11/2018	06/01/2022
Antenna	ETS lindgren	3142E	16025	17/01/2019	17/03/2022
Cable	/	N-2m	2799	09/04/2020	09/06/2022
Cable	Sucoflex	N-3m	12924	09/04/2020	09/06/2022
Cable	Sucoflex	7/16-5m	12939	09/02/2021	09/04/2023
Cable	Huber + Suhner	7/16-N-10m	17264	03/06/2020	03/08/2022
Coupler	CMC	440175	0930	18/01/2021	18/03/2023
Coupler	Werlatone	C6187	3107	11/02/2020	11/04/2022
Coupler	TMD	2.5-8GHz 50dB	7788	08/01/2019	08/03/2022

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Power probe	Agilent Technologies	E9304A	5380	31/12/2019	28/02/2022
Shielded enclosure	Comtest	SAC 3m	14803	09/01/2019	09/03/2022
Software	Nexio	-	0000		
Synthesizer	Rohde & Schwarz	SMB100A	12817	22/01/2021	22/03/2024

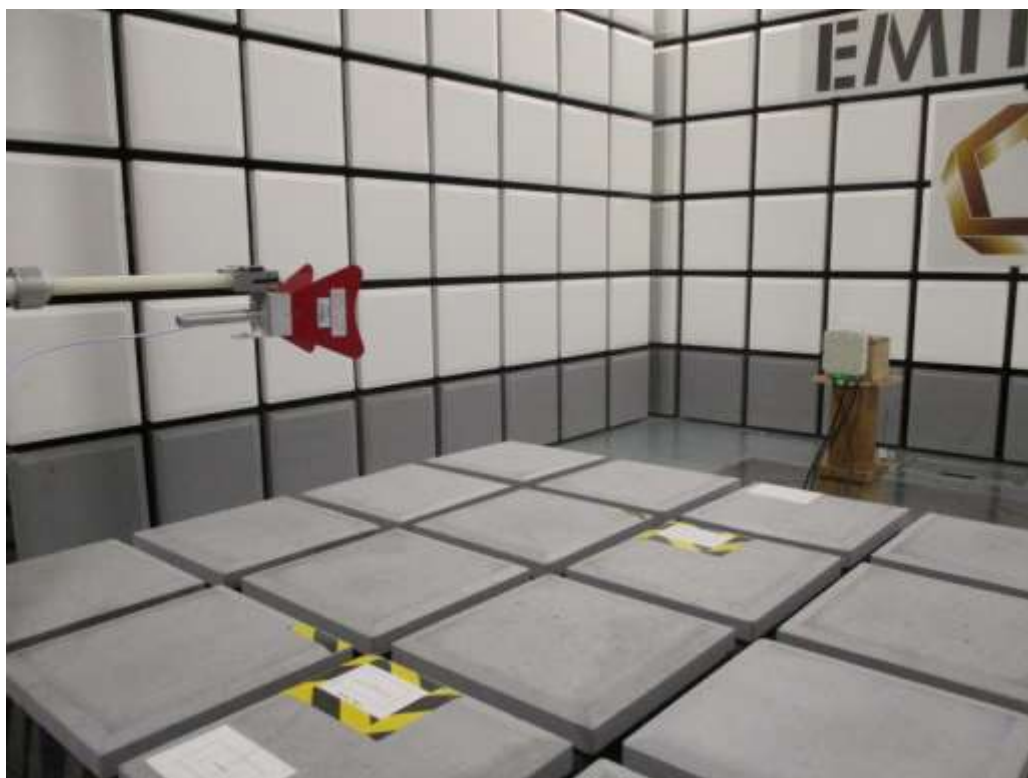
BAT-EMC software version: V3.18.0.19

Blank cells = Permanent validity

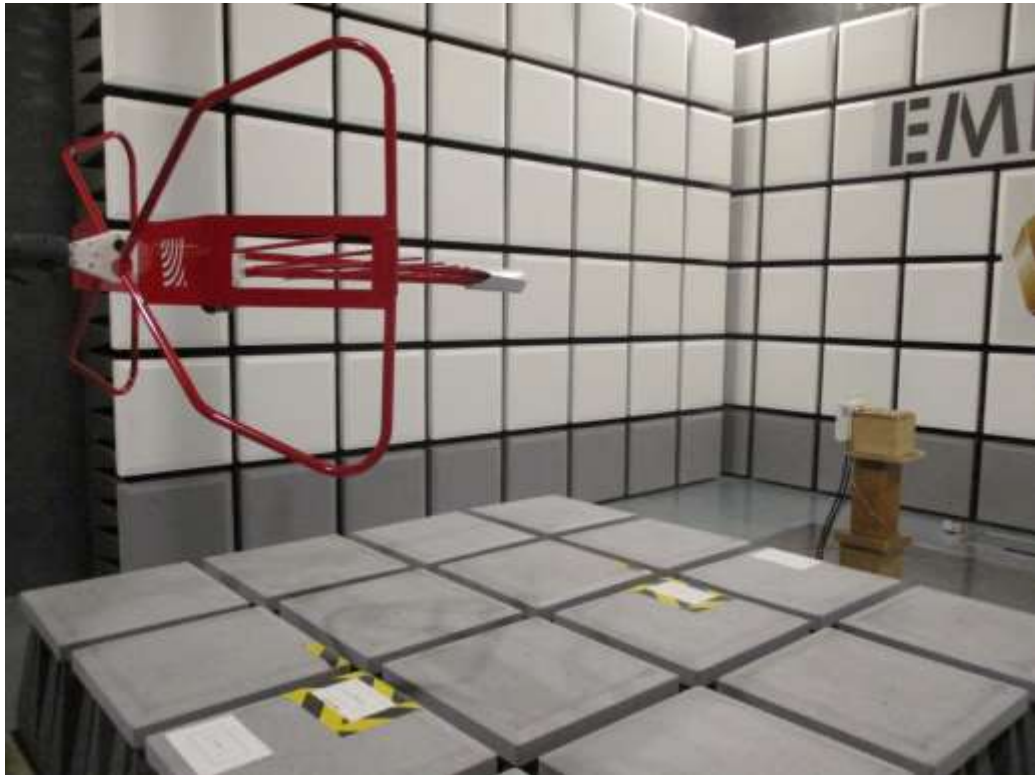
TEST SETUP PHOTOS - FRONT SIDE - 80MHz - 6GHz



TEST SETUP PHOTOS - FRONT SIDE - 80MHz - 6GHz



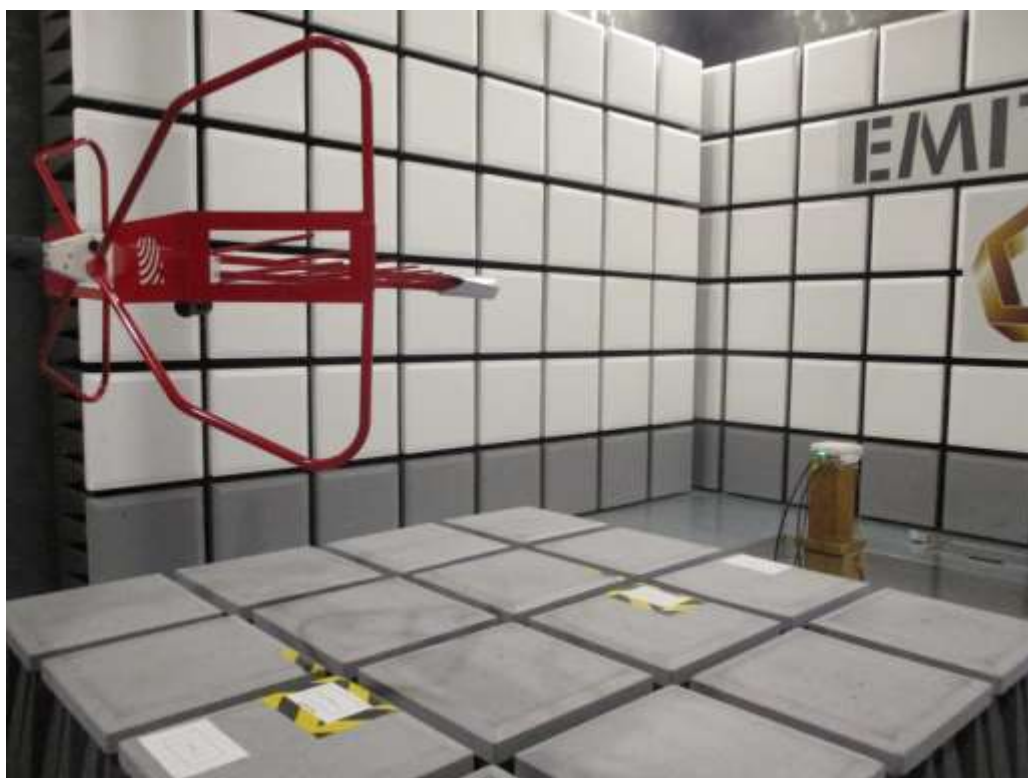
TEST SETUP PHOTOS - LEFT SIDE - 80MHz - 6GHz



TEST SETUP PHOTOS - LEFT SIDE - 80MHz - 6GHz



TEST SETUP PHOTOS - LOWER SIDE - 80MHz - 6GHz



TEST SETUP PHOTOS - LOWER SIDE - 80MHz - 6GHz



RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY					
BOX N°2 - FRONT SIDE - 80MHZ - 6GHZ					IMU4389
EUT Mode: #1					
Criteria:		A			
FREQUENCIES	POSITION	LEVEL	STEP	MODULATION	CALIBRATION
80MHZ-1GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Vertical	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Vertical	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
80MHZ-1GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Horizontal	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Horizontal	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
1GHZ-2.7GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
1GHZ-2.7GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
2.7GHZ-6GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
2.7GHZ-6GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
Results:		N.T.R.			
EUT modification: No					

RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY					
BOX N°2 - LEFT SIDE - 80MHZ - 6GHZ					IMU4391
EUT Mode: #1					
Criteria:		A			
FREQUENCIES	POSITION	LEVEL	STEP	MODULATION	CALIBRATION
80MHZ-1GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Vertical	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Vertical	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
80MHZ-1GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Horizontal	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Horizontal	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
1GHZ-2.7GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
1GHZ-2.7GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
2.7GHZ-6GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
2.7GHZ-6GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
Results:		N.T.R.			
EUT modification: No					

RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY					
Box N°2 - LOWER SIDE - 80MHZ - 6GHZ					IMU4390
EUT Mode: #1					
Criteria:		A			
FREQUENCIES	POSITION	LEVEL	STEP	MODULATION	CALIBRATION
80MHZ-1GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Vertical	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Vertical	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
80MHZ-1GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
104MHZ 136MHZ 165MHZ 200MHZ 260MHZ 330MHZ 430MHZ 560MHZ 715MHZ	Horizontal	3 V/m	0Pts	CW; 50ms AM (80%, 1kHz); 10000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
920MHZ	Horizontal	3 V/m	0Pts	CW; 50ms PM (4.6ms, 577µs); 2000ms	CAGE3-PV&PH-(80M-1G)- 2.5M-36V/m-02.20 h=1.55m
1GHZ-2.7GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
1GHZ-2.7GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(1-2.7G)- 3.2M-36V/m-02.20 h=1.3m (ANT4526)
2.7GHZ-6GHZ	Vertical	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
2.7GHZ-6GHZ	Horizontal	3 V/m	1%	CW; 50ms AM (80%, 1kHz); 2000ms	CAGE3-PV&PH-(2.7-6G)- 2.6M-36V/m-02.20 h=1.3m (ANT16002)
Results:		N.T.R.			
EUT modification: No					

6.4. Electrical fast transient/burst immunity

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 61000-4-4 : 2012
General test setup: Equipment under test is placed on an insulated support at 10 cm high, above the ground reference plane. The ground plane extends 1-meter minimum beyond all sides of the system under test. Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). In the case of I/O lines, these were tested in a Capacitive Coupling Clamp. One of each unique interface was tested for a period of at least 1 minute per polarity.	

TEST SEQUENCE	EUT MODE	CRITERIA	RESULT TAB.	VERDICT
Box n°1 - Ethernet Cable (PoE)	#1	B	IMU4339	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	25.5 °C
Relative Humidity	10 to 90 %	35.1 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Cable	Emitech	BNC-1,1m	12380	06/01/2020	06/03/2022
Coupling clamp	Haefely	CEI	10522	06/01/2020	06/03/2022
Test enclosure	Emitech	HC1	14875		
Transient generator	Teseq AG	NSG 3040 (V 02.20)	9437	30/06/2020	30/08/2021

Blank cells = Permanent validity

TEST SETUP PHOTO



ELECTRICAL FAST TRANSIENT/BURST IMMUNITY - TABULATED RESULTS

BOX N°1 - ETHERNET CABLE (PoE)

IMU4339

EUT Mode: #1

Coupling Mode:

Coupling clamp

Repetition Frequency:

5kHz

Duration:

1min per polarity

Criteria:

B

TEST LEVEL

POLARITY

RESULT

0.5kV

+

N.T.R.

0.5kV

-

N.T.R.

EUT modification: No

6.5. Surge immunity

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 61000-4-5 : 2014 / AMD1 : 2017
General test setup: Equipment under test is placed on an insulated support at 10 cm high, above the ground reference plane. The test voltage was increased from the lowest indicated level up to the maximum level. Each surge was applied 60 seconds or less after the previous surge. EUT that do not have a surge protection device in the primary power circuit, may be tested only at maximum levels.	

TEST SEQUENCE	EUT MODE	CRITERIA	RESULT TAB.	VERDICT
Box n°2 - Ethernet Cable (PoE)	#1	B	IMU4357	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	24.8 °C
Relative Humidity	10 to 90 %	34.7 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Generator	Teseq AG	NSG 3040 (V 02.20)	9437	30/06/2020	30/08/2021
Test enclosure	Emitech	HC1	14875		

Blank cells = Permanent validity

TEST SETUP PHOTO



SURGE IMMUNITY - TABULATED RESULTS

BOX N°2 - ETHERNET CABLE (PoE)

IMU4357

EUT Mode: #1

Coupling Mode:

Direct

Wave Form

1.2μs/50μs

Number of pulses:

5 per polarity

Criteria:

B

COMMON MODE

TEST LEVEL	COUPLING	RESULT
+ 0.5kV/1kV	Direct	N.T.R.
- 0.5kV/1kV	Direct	N.T.R.

EUT modification: No

6.6. Conducted disturbances induced by radio-frequency fields immunity

Reference standard:	ETSI EN 301489-1 V2.2.3 : 2019 ETSI EN 301489-19 V2.2.1 : 2019 ETSI EN 301489-52 V1.1.0 : 2016
Test method:	EN 61000-4-6 : 2014
General test setup: Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test. The EUT was located 10 cm above the reference ground plane and any associated I/O cables attached to the EUT were located between 30 mm and 50 mm above the ground plane. The indicated field was pre-calibrated prior to placement of the system under test.	

TESTED CONFIGURATION	EUT MODE	CRITERIA	RESULT TAB.	VERDICT
Box n°1 - Ethernet Cable (PoE)	#1	A	IMU4386	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	25.5 °C
Relative Humidity	10 to 60 %	35.1 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
1 input Power meter	Rohde & Schwarz	NRVD	16093	01/03/2021	01/05/2023
Amplifier	Prâna	IEMF 20K	16177	10/04/2019	10/06/2022
Attenuator	Delta Ohm	9212060	3356	14/07/2018	14/09/2021
Cable	/	N-0.5m S ampli-BB-2/2	6006	21/04/2020	21/06/2022
Cable	Sucoflex	N-3m	12927	26/02/2021	26/04/2023
Cable	C&C	N-1m	16497	03/02/2021	03/04/2023
Cable	C&C	BNC-0.5m	16505	03/02/2021	03/04/2023
CDN	Teseq	CDN ST08A	11779	12/04/2021	12/06/2023
CDN	Teseq	CDN-M116	11784	12/04/2021	12/06/2023
Coupler	Werlatone	C6047R-10	17428	28/10/2020	28/12/2022
Power probe	Rohde & Schwarz	URV5-Z2	16094	01/03/2021	01/05/2023
Software	Nexio	-	0000		
Synthesizer	Rohde & Schwarz	SMX	3166	24/01/2020	24/03/2023
Test enclosure	Emitech	HC1	14875		

BAT-EMC software version: V3.18.0.19

Blank cells = Permanent validity

CONDUCTED DISTURBANCES INDUCED BY RADIO-FREQUENCY FIELDS IMMUNITY				
BOX N°1 - ETHERNET CABLE (PoE)				IMU4386
EUT Mode: #1				
Criteria:	A			50Ω on: M1
FREQUENCIES	LEVEL	STEP	MODULATION	CALIBRATION
150kHz-80MHz	3 Vrms	1%	CW; 50ms AM (80%, 1kHz); 2000ms	ST08A (11779/2020)
Results:	N.T.R.			
EUT modification: No				

6.7. Measurement of electromagnetic field in comparison of reference level(s)

Reference standard:	EN 62479 : 2010
Test method:	EN 62479 : 2010
Test description: The test is intended to measure the electromagnetic field around the equipment in order to verify the reference level. EUT is set on an insulating support at 80 cm above the ground reference plane. A pre measurement is done in peak mode in order to identify the location which presents the highest field level. Then, a measurement is carried out in « RMS » mode during 6 minutes on that location.	

TEST	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Box n°2 - DC	#1	400G	EMI4387	PASS
Box n°2 - 1Hz - 400kHz	#1	2.3μT	EMI4246	PASS
Box n°2 - 100kHz - 6GHz	#1	27.5V/m	EMI4247	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	N/A	24.8 °C
Relative Humidity	N/A	35.3 %
Atmospheric pressure	N/A	1010 hPa
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Field probe	Narda	EF0691	8348	30/10/2020	30/12/2022
Fieldmeter	Maschek	ESM-100	4189	06/07/2020	06/09/2022
Fieldmeter	Narda	NBM-520	5808		
Gaussmeter	Bell	5180	6059	10/06/2020	10/08/2022
Test enclosure	Emitech	HC1	14875		

Blank cells = Permanent validity

LIMITS: TABLE 2 OF RECOMMENDATION 1999/519/EC			
FREQUENCY BANDS	E (V/m)	H (A/m)	B (μT)
0 – 1 Hz	-	32 000	40 000
1 – 8 Hz	10 000	32 000 - 500	40 000 – 625
8 – 25 Hz	10 000	500 - 160	625 – 200
0.025 – 0.8 kHz	10 000 – 312.5	160 - 5	200 – 6.25
0.8 – 3 kHz	312.5 – 83.3	5	6.25
3 – 150 kHz	87	5	6.25
0.15 – 1 MHz	87	4.8 – 0.73	6.13 – 0.92
1 – 10 MHz	87 – 27.5	0.73 – 0.073	0.92 – 0.092
10 – 400 MHz	28	0.073	0.092
400 – 2000 MHz	27.5 – 61.5	0.074 – 0.16	0.092 – 0.205
2 – 300 GHz	61	0.16	0.20

MEASUREMENT OF ELECTROMAGNETIC FIELD IN COMPARAISON OF REFERENCE LEVEL(S) - TABULATED RESULTS				
TEST CASE / FREQUENCY BANDS	TEST DISTANCE	LEVEL	LIMIT	RESULT TAB.
DC	5cm	1.6G	400G	EMI4387
1Hz - 400kHz	5cm	117nT	2.3μT	EMI4246
100kHz - 6GHz	20cm	2.5V/m	27.5V/m	EMI4247

End of test report