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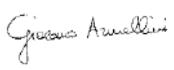
Rapporto di prova / Test report

Rif./Ref.No. 0141_21_EMCTR-0	Data / Date: 06/03/2021	Pagine / Pages: 35
Scopo delle prove / *Test object:*	Prove di tipo in accordo alle Norme armonizzate / *Type test according to Harmonized standards* **EN 61326-1:2013**	
Richiedente / *Applicant:*	**Wireless Sensor Networks s.r.l.** Via L. Manara, 31 20900 Monza (MB)	
Persona di riferimento / *Applicant's reference:*	Matteo Crescini	
Marchio commerciale / *Trade mark*:	Wireless Sensor Networks	
Fabbricante / *Manufacturer*:	Wireless Sensor Networks s.r.l.	
Prodotto / *Product*:	**PRESSURE SENSOR**	
Modello testato/ *Tested model:*	**WEBTANK**	
Data ricevimento campioni / *Test samples receipt date*	04-05/03/2021	
Campioni verificati / *No. of tested samples*	1	
Data verifiche / *Testing date*:	06/03/2021	
Sito di prova / *Testing site*:	RadioMotive s.r.l. Via Tevere 63 22073 Fino Mornasco (CO) - ITALY	
Esito delle valutazioni / *Assessment results*:	**CONFORME / COMPLIANT**	
Verifiche effettuate da / *Verifications carried out by:*	Ing. Giacomo ARMELLINI	
Approvato da / *Approved by:*	Ing. Enrico BANFI	

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0 Release Control Record

Test Report Number	Reason of Change	Date of Issue
0141_21_EMCTR-0	Original release	06/03/2021

1 Equipment under test (EUT)

1.1 EUT Identification

Description	PRESSURE SENSOR
Model name or No.	WEBTANK
Part number / Serial No.	C21001
Manufacturer	Wireless Sensor Networks s.r.l.
Country of manufacturer	ITALY
Label	

1.2 Port identification

Port	Description	Type	Cable Length (m)	Type of connector
P1	Enclosure port	Plastic	---	screw
P2	AC power port	230V 50Hz	>3m	plug
P3	DC power port	Port not present	---	---
P4	I/O signal/ control ports (including functional earth lines)	Sensor signal	<2m	wired
P5	I/O signal/ control ports connected directly to power supply network	Port not present	---	---
P6	Wired Network ports	Port not present	---	---

1.3 EUT classification

EQUIPMENT CATEGORY	
☒	Electrical measurement and test equipment
☐	Electrical control equipment
☐	Electrical laboratory equipment
INTENDED OPERATING EM ENVIRONMENT	
☐	Residential, commercial and light-industrial locations
☒	Industrial locations
☐	Controlled electromagnetic laboratories or test and measurement areas
EMISSION CLASS (rif. EN 55011)	
☒	A
☐	B

1.4 Additional information related to testing

Intended Installation:	☒ Wall Mounted ☐ Table Top ☐ Handheld ☐ Floor standing ☐ Wall
Power Supply Requirement(s):	230V 50Hz

1.5 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test:

- **Added wurth ferrite 742 711 11 on internal power supply cable (2 loop of the wire around the ferrite core)**

1.6 Auxiliary equipment

- None

1.7 Primary functions of the EUT

The following table describes the primary functions and the representative parameter of the equipment under test according the manufacturer specifications:

Primary function	Representative parameter
Pressure Sensor	Measured Pressure

1.8 Performance of equipment under test

With reference to the above specified primary functions, the following table defines the acceptable level of the performance or permissible loss of function and the observation mode for each representative parameter of the equipment under test according to the technical instructions by the manufacturer.

Representative parameter	Acceptable level of performance	Observation mode		
		Acquisition	Test equipment	Test n.
Measured Pressure	Tolerance of ±50% as declared by the manufacturer	Operator	Visual inspection	All immunity test

1.9 Performance criteria

6.4.1 General

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

6.4.2 Performance criterion A

The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

6.4.3 Performance criterion B

The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

EXAMPLE 1 A data transfer is controlled/checked by parity check or by other means. In the case of malfunctioning, such as caused by a lightning strike, the data transfer will be repeated automatically. The reduced data transfer rate at this time is acceptable.

EXAMPLE 2 During testing, an analogue function value may deviate. After the test, the deviation vanishes.

EXAMPLE 3 In the case of a monitor used only for man-machine monitoring, it is acceptable that some degradation takes place for a short time, such as flashes during the burst application.

EXAMPLE 4 An intended change of the operating state is allowed if self-recoverable.

6.4.4 Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

EXAMPLE 1 In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator.

EXAMPLE 2 After a programme interruption caused by a disturbance, the processor functions of the equipment stops at a defined position and is not left in a "crashed state". The operator's decision prompts may be necessary.

EXAMPLE 3 The test results in an opening of an over-current protection device that is replaced or reset by the operator.

2 Applications of test specifications

2.1 Immunity Test according to EN 61326-1

Table 1 – Immunity test requirements for equipment intended to be used in a basic electromagnetic environment

Port	Phenomenon	Basic standard	Test value	Performance criterion
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact discharge 8 kV air discharge	B B
	Electromagnetic field	IEC 61000-4-3	3 V/m (80 MHz to 1 GHz) 3 V/m (1,4 GHz to 2 GHz) 1 V/m (2,0 GHz to 2,7 GHz)	A A A
	Power frequency magnetic field	IEC 61000-4-8	3 A/m (50 Hz, 60 Hz) [1]	A
AC power (including protective earth)	Voltage dip	IEC 61000-4-11	0 % during half cycle 0 % during 1 cycle 70 % during 25/30 [e] cycles	B B C
	Short interruptions	IEC 61000-4-11	0 % during 250/300 [e] cycles	C
	Burst	IEC 61000-4-4	1 kV (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	0,5 kV [a]/1 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
DC power [g, a] (including protective earth)	Burst	IEC 61000-4-4	1 kV(5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	0,5 kV [a]/1 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
I/O signal/control (including functional earth)	Burst	IEC 61000-4-4	0,5 kV [a](5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	1 kV [b, c]	B
	Conducted RF	IEC 61000-4-6	3 V [d] (150 kHz to 80 MHz)	A
I/O signal/control connected directly to mains supply	Burst	IEC 61000-4-4	1 kV(5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	0,5 kV [a]/1 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A

[a] Line to line.
[b] Line to ground.
[c] Only in the case of long-distance lines (see 3.10).
[d] Only in the case of lines >3 m.
[e] For example "25/30 cycles" means "25 cycles for 50 Hz test" or "30 cycles for 60 Hz test".
[f] Only to magnetically sensitive equipment. CRT display interference is allowed above 1 A/m.
[g] DC connections between parts of equipment/system which are not connected to a d.c. distribution network are treated as I/O signal/control ports.

Table 2 – Immunity test requirements for equipment intended to be used in an industrial electromagnetic environment

Port	Phenomenon	Basic standard	Test value	Performance criterion
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact discharge 8 kV air discharge	B B
	Electromagnetic field	IEC 61000-4-3	10 V/m (80 MHz to 1 GHz) 3 V/m (1,4 GHz to 2 GHz) 1 V/m (2,0 GHz to 2,7 GHz)	A A A
	Power frequency magnetic field	IEC 61000-4-8	30 A/m (50 Hz, 60 Hz) [e]	A
AC power (including protective earth)	Voltage dip	IEC 61000-4-11	0 % during 1 cycle 40 % during 10/12 [g] cycles 70 % during 25/30 [g] cycles	B C C
	Short interruptions	IEC 61000-4-11	0 % during 250/300 [g] cycles	C
	Burst	IEC 61000-4-4	2 kV(5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	1 kV [a]/2 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V [f] (150 kHz to 80 MHz)	A
DC power [f] (including protective earth)	Burst	IEC 61000-4-4	2 kV (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	1 kV [a]/2 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V [f] (150 kHz to 80 MHz)	A
I/O signal/ control (including functional earth)	Burst	IEC 61000-4-4	1 kV (5/50 ns, 5 kHz) [d]	B
	Surge	IEC 61000-4-5	1 kV [b, c]	B
	Conducted RF	IEC 61000-4-6	3 V [d, f] (150 kHz to 80 MHz)	A
I/O signal/ control connected directly to mains supply	Burst	IEC 61000-4-4	2 kV (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	1 kV [a]/2 kV [b]	B
	Conducted RF	IEC 61000-4-6	3 V [f] (150 kHz to 80 MHz)	A

[a] Line to line.
[b] Line to ground.
[c] Only in the case of long-distance lines (see 3.10).
[d] Only in the case of lines > 3 m.
[e] Only to magnetically sensitive equipment. CRT display interference is allowed above 1 A/m.
[f] DC connections between parts of equipment/system which are not connected to a d.c. distribution network are treated as I/O signal/control ports.
[g] For example "25/30 cycles" means "25 cycles for 50 Hz test" or "30 cycles for 60 Hz test".

Table 3 – Immunity test requirements for equipment intended to be used in a controlled electromagnetic environment

Port	Phenomenon	Basic standard	Test value	Performance criterion
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact discharge 8 kV air discharge	B B
	Electromagnetic field	IEC 61000-4-3	1 V/m (80 MHz to 1 GHz) 1 V/m (1,4 GHz to 2 GHz) 1 V/m (2,0 GHz to 2,7 GHz)	A A A
AC power (including protective earth)	Voltage dip	IEC 61000-4-11	0 % during half cycle	B
	Burst	IEC 61000-4-4	1 kV (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	0,5 kV [a]/1 kV [b]	B
	Conducted RF	IEC 61000-4-6	1 V (150 kHz to 80 MHz)	A
DC power [b, d] (including protective earth)	Burst	IEC 61000-4-4	1 kV (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	Not required	-
	Conducted RF	IEC 61000-4-6	1 V (150 kHz to 80 MHz)	A
I/O signal/ control (including functional earth)	Burst	IEC 61000-4-4	0,5 kV [c] (5/50 ns, 5 kHz)	B
	Surge	IEC 61000-4-5	Not required	-
	Conducted RF	IEC 61000-4-6	1 V [c] (150 kHz to 80 MHz)	A

[a] Line to line.
[b] Line to ground.
[c] Only in the case of lines >3 m.
[d] DC connections between parts of equipment/system which are not connected to a d.c. distribution network are treated as I/O signal/control ports.

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2.2 Emissions Test according to EN 61326-1

7.2 Emission limits

The equipment shall be classified and respective information shall be provided per the applicable group and class as specified within CISPR 11:2009, Clause 5. Equipment classification and choice of respective limits shall be determined after taking into account the intended environment and emission requirement in the areas of use.

For Class A equipment, the limits, the measuring methods and the provisions given in CISPR 11 apply.

For Class B equipment, the limits, the measuring methods and the provisions given in CISPR 11, IEC 61000-3-2 (or IEC 61000-3-12) and IEC 61000-3-3 (or IEC 61000-3-11) apply.

For equipment using frequencies in the ISM bands, see CISPR 11.

2.3 Deviations from Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above, nor from the requirements defined in the basic standards called up within it.

3 Test specifications

REFERENCE EUROPEAN STANDARDS	
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General requirements

4 Operating test modes and test conditions

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item “Operating condition of the equipment under test”.

Operating condition	Description
#1	CONTINUOUS PRESSURE MEASUREMENT

5 Summary of test results

5.1 Emission tests

Port		Test	Reference standard	Operating condition	Results
P1	Enclosure	Radiated emission	CISPR 11	#1	Within the limits
P2	AC power port	Harmonic current emissions	IEC 61000-3-2	#1	Within the limits
		Voltage fluctuations flicker	IEC 61000-3-3	#1	Within the limits
		Conducted emission	CISPR 11 CISPR 22	#1	Within the limits

5.2 Immunity tests

Port		Phenomena	Reference standard	Operating condition	Result
1	Enclosure	RF electromagnetic field	EN 61000-4-3	#1	COMPLIANT
		Electrostatic Discharge (ESD)	EN 61000-4-2	#1	COMPLIANT
		Power frequency magnetic field	EN 61000-4-8	---	Not Applicable [1]
2	AC MAINS ports	Fast transients	EN 61000-4-4	#1	COMPLIANT
		RF common mode	EN 61000-4-6	#1	COMPLIANT
		Surge	EN 61000-4-5	#1	COMPLIANT
		Voltage Dips / Interruptions	EN 61000-4-11	#1	COMPLIANT
3	Input and output DC POWER ports	Fast transients	EN 61000-4-4	---	Not Applicable [2]
		RF common mode	EN 61000-4-6		
		Surge	EN 61000-4-5		
4	I/O signal/ control ports (including functional earth lines)	Fast transients	EN 61000-4-4	---	Not Applicable [2]
		RF common mode	EN 61000-4-6		
		Surge	EN 61000-4-5		
5	I/O signal/ control ports connected directly to power supply network	Fast transients	EN 61000-4-4	---	Not Applicable [2]
		RF common mode	EN 61000-4-6		
		Surge	EN 61000-4-5		
6	Wired Network Ports	Fast transients	EN 61000-4-4	---	Not Applicable [2]
		RF common mode	EN 61000-4-6		

[1] The EUT doesn't contain significant elements that are susceptible to magnetic fields
2 Port not present

TEST 1

Voltage Disturbances

Reference Document: CISPR 11; CISPR 22

Test Setup:	In acc. to ref. doc.
Test Location:	RadioMotive s.r.l.
Test Equipment used for test:	EMC.023 LISN R&S ESH2-Z5 EMC.018 EMI RECEIVER R&S ESW8
Measurement Uncertainty	2,681dB

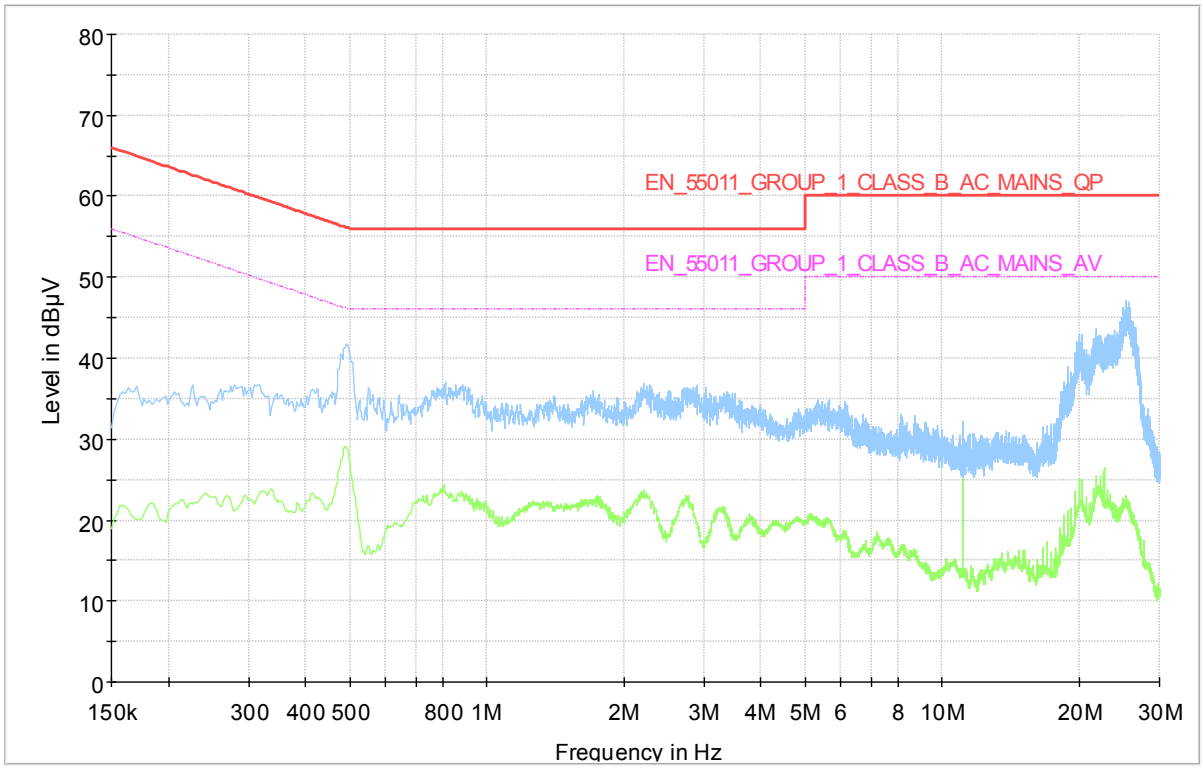
Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

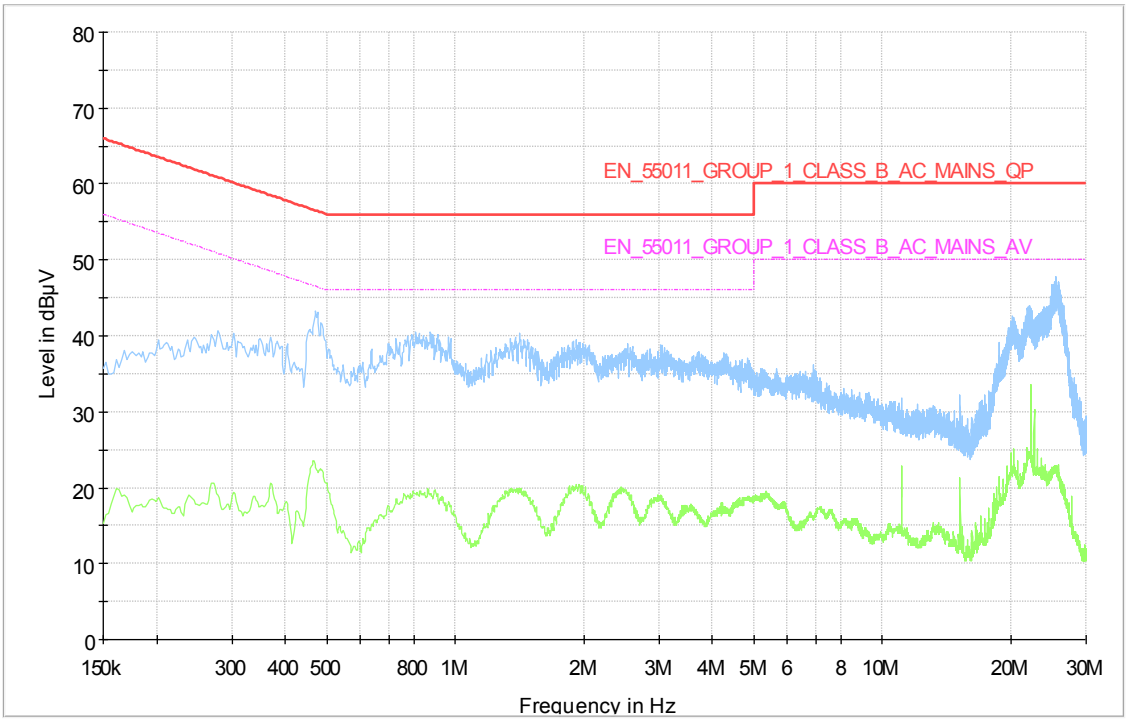
Test results: WITHIN THE LIMITS

NOTE: EUT is a class A equipment but conducted emissions respects also class B limits

LINE: PHASE (L1)



LINE: NEUTRAL (N)



TEST 2

Radiated electromagnetic disturbances

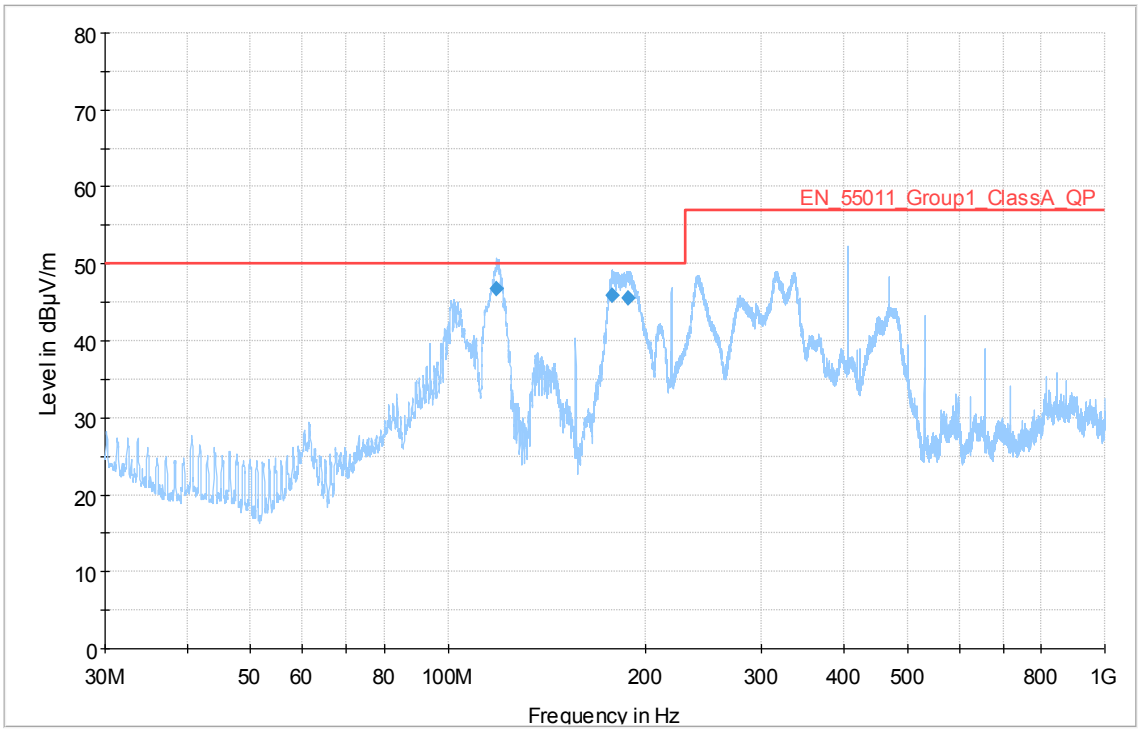
Reference Document: CISPR 11

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: EMC.048 Antenna AAronia mod. Bicolog 30100E
EMC.037 Miteq Preamplifier
EMC.018 EMI RECEIVER R&S ESW8
Measurement Uncertainty 4,82dB

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %Rh	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: **WITHIN THE LIMITS**



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
118.530000	46.81	50.00	3.19	155.0	H	180.0
177.510000	45.82	50.00	4.18	155.0	H	180.0
187.680000	45.53	50.00	4.47	155.0	H	180.0

TEST 3

Harmonics Current Emissions

Reference Document: IEC 61000-3-2

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: EMC.060 Digital Power Analyzer DPA 500N
EMC.059 Power Supply Zenone GTS300GL

Measurement Uncertainty 2,681dB

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V ~ 50Hz

Operating Condition (Rif. Section 4): #1

Test results: WITHIN THE LIMITS

Measure Results

Standard Specific Results for IEC 61000-3-2 (Edition 5)

Standard Group:	Industry
Standard Name:	IEC 61000-3-2 (Edition 5)
	Limits for harmonic current emissions (equipment input current < 16 A per phase)
Device Under Test:	PASS
Power Source:	PASS
Connection Type:	L - N
Classification:	Class A
Appli. of Limits:	less than or equal to 150 % (Without POHC Enhancement)

Current limits are disabled because rated power is less than 75W.

Check Harmonics 2..40	
First detected harmonic order > 150 %	
Line 1:	None
Harmonics orders > 150 %	
Line 1:	None
Harmonics orders with average > 100 %	
Line 1:	None

Measured values	
Fundamental Current	
Line 1:	0,024 A
Active input Power	
Line 1:	5,4 W *
Circuit power factor	
Line 1:	0,387 *

* *Absolute value.*

For equipment with a total rated power < 75W limits are not defined in the standard.

TEST 4

Limit Voltage Fluctuations and Flicker Emissions

Reference Document: IEC 61000-3-3

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: Digital Power Analyzer DPA 500N
Elettrotes TPS/M
Measurement Uncertainty 2,681dB

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V ~ 50Hz

Operating Condition (Rif. Section 4): #1

Test results: WITHIN THE LIMITS

Flicker Results

Standard Specific Results for IEC 61000-3-3 (Edition 3)

Standard Group:	Industry
Standard Name:	IEC 61000-3-3 (Edition 3) Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
Test Condition:	General Test Conditions
Analysis Status:	PASS

Flicker Measurements Settings

Main line:	230V, 50Hz
Flicker Meter:	230V / 50Hz
Flicker Impedance:	Zref
Observation Time:	1 × 10 min
Measurements done:	1

Flicker Measurements

	P_{lt}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	0,012	0,028	0	0,246	0
Limits:	0,65	1	3,3	4	0,5
Results:	PASS	PASS	PASS	PASS	PASS

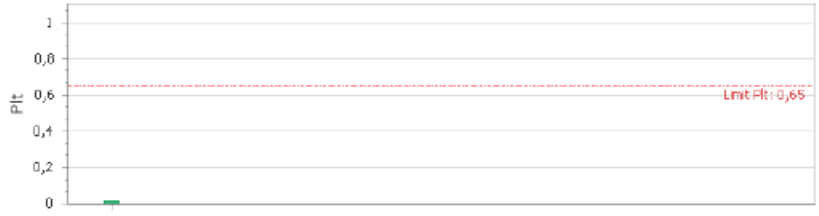
Pst Data

Flicker (Line 1)

Meas. No.	P0,1	P1s	P3s	P10s	P50s	Pst	dc [%]	dmax [%]	Tmax [s]
1	0	0	0	0,001	0,005	0,028	0	0,246	0

Short-term Flicker Severity (Pst) (Line 1)

Long-term Flicker Severity (Plt) (Line 1)



TEST 5

Immunity to Electrostatic Discharge

Reference Document: IEC 61000-4-2

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: EMC.009 EMtest ESD Generator - DITO
Measurement Uncertainty VOLTAGE DISCHARGE 3.69%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: Compliant

CONTACT DISCHARGE (for conductive surfaces)

- Level: ±4 kV
- Number of discharge: 10 positive, 10 negative
- Repetition rate: 1Hz

TEST RESULTS		PERFORMANCE CRITERIA			RESULT
Discharge point	Pol.	COMPLIANT		NOT COMPLIANT	
		A	B	C	
Metallic plate on upper side	+ -	10 10	---	---	No performance degradation

N: No discharge occurs

AIR DISCHARGE (for not conductive surfaces)

- Level : ±8 kV
- Number of discharge: 10 positive, 10 negative
- Repetition rate: 1Hz

TEST RESULTS		PERFORMANCE CRITERIA			RESULT
Discharge point	Pol.	COMPLIANT		NOT COMPLIANT	
		A	B	C	
Enclosure all sides	+ -	N N			No performance degradation

N: No discharge occurs

Indirect DISCHARGE to VCP

- Level : ±4 kV
- Number of discharge: 10 positive, 10 negative
- Repetition rate: 1Hz

TEST RESULTS		PERFORMANCE CRITERIA			RESULT
Discharge point	Pol.	COMPLIANT		NOT COMPLIANT	
		A	B	C	
VCP to Enclosure sides	+ -	N N			No performance degradation

Indirect DISCHARGE to hCP

- Level : ±4 kV
- Number of discharge: 10 positive, 10 negative
- Repetition rate: 1Hz

TEST RESULTS		PERFORMANCE CRITERIA			RESULT
Discharge point	Pol.	COMPLIANT		NOT COMPLIANT	
		A	B	C	
VCP to Enclosure bottom side	+ -	N N			No performance degradation

TEST 6

Immunity to Radiated RF Electromagnetic Fields

Reference Document: IEC 61000-4-3

Test Setup: In acc. to ref. doc.

Test Location: RadioMotive s.r.l.

Test Equipment used for test:
EMC.013 Signal Generator – HP 8673D
EMC.033 RF Amplifier KALMUS 7200LC-/1-70-826-001
EMC.035 RF Amplifier BONN BLMA 1060-30
EMC.025 Power Meter Agilent E4419B
EMC.026 Power Sensor E4412A
EMC.027 Power Sensor E4412A
EMC.030 Antenna Log Periodic PROTEL ARL70F2500XZ
EMC.028 Antenna Horn RF-SPIN DRH18-EX

Measurement Uncertainty Level 23.15%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50 Hz

Operating Condition (Rif. Section 4): #1

Test results: COMPLIANT

TEST RESULTS

80-2700 MHz AM, 80% 1kHz, 10V/m

POLAR.	VERTICAL			HORIZONTAL			RESULT
PORT	COMPLIANT	NOT COMPLIANT		COMPLIANT	NOT COMPLIANT		
	A	B	C	A	B	C	
ENCLOSURE front side	√			√			No performance degradation
ENCLOSURE rear side	√			√			
ENCLOSURE right side	√			√			
ENCLOSURE left side	√			√			

TEST 7

Immunity to Fast Transients (Bursts)

Reference Document: IEC 61000-4-4

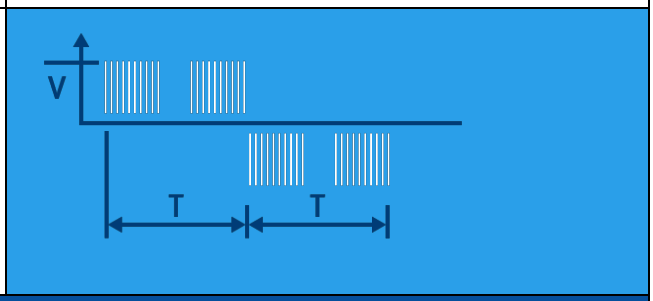
Test Setup:	In acc. to ref. doc.
Test Location:	RadioMotive s.r.l.
Test Equipment used for test:	EMC.010 Burst generator EMTest compact NX5 bsp-1-300-16
Measurement Uncertainty	VOLTAGE 3.82%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: COMPLIANT

AC MAINS

Test Parameters	Values
Voltage (V)	1000 V
Polarity (Pol)	Alternate
Repetition frequency (f)	5 kHz
Burst duration (td)	15 ms
Burst period (tr)	300 ms
Duration (T)	60 s
Coupling (Cpl)	L, N, PE, L+N, L+PE, N+PE, L+N+PE
Phase synchronization (Sync)	Off
Graphic representation of burst	
Test Results	
Result	PASS
Note	No performance degradation

TEST 8

Immunity to Surge

Reference Document: IEC 61000-4-5

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: EMC.010 Surge generator EMTest compact NX5 bsp-1-300-16
Measurement Uncertainty Voltage 7.33%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: COMPLIANT

TEST RESULTS

AC MAINS

TEST	COUPLING MODE	TEST VOLTAGE	TEST FREQUENCY	NUMBER OF PULSES	PHASE ANGLE (φ)
1	L1 - PE (COMMON MODE)	+/-2kV	1pul./min.	5	0°, 90°, 180°, 270°
2	N - PE (COMMON MODE)	+/-2kV	1pul./min.	5	0°, 90°, 180°, 270°
3	L1 - N (DIFF. MODE)	+/-1kV	1pul./min.	5	0°, 90°, 180°, 270°

RESULT	Performance Criteria			NOTES
	COMPLIANT		NOT COMPLIANT	
	A	B	C	
TEST 1	✓			No performance degradation
TEST 2	✓			No performance degradation
TEST 3	✓			No performance degradation

TEST 9

Immunity to Radio-Frequency common mode disturbances

Reference Document: IEC 61000-4-6

Test Setup: In acc. to ref. doc.
Test Location: RadioMotive s.r.l.
Test Equipment used for test: EMC.011 Test system Teseq NSG 4070B-80
EMC.006 CDN Teseq M016
Measurement Uncertainty 1.55%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: COMPLIANT

TEST RESULTS

AM 80% 1kHz 3V

PORT n.		PERFORMANCE CRITERIA			RESULT
		COMPLIANT	NOT COMPLIANT		
		A	B	C	
P2	AC power ports	✓			No performance degradation
P3	DC power ports	---			Not applicable: port not present
P4	I/O signal/ control (including functional earth)	---			Not applicable: Cable length <3m
P5	I/O signal/ control connected directly to mains supply	---			Not applicable: port not present

TEST 10

Immunity to Voltage Dips / Short Interruptions

Reference Document: EN 61000-4-11

Test Setup: In acc. to ref. doc.

Test Location: RadioMotive s.r.l.

Test Equipment used for test: EMC.010 Power fail generator EMTest compact NX5 bsp-1-300-16

Measurement Uncertainty Voltage 3.86%

Test conditions:	Measured
Ambient temperature: 23°C ±5°C	24 °C
Ambient humidity: 25 – 75 %rH	45 %
Pressure: 85 – 106 kPa – (860 mbar – 1060 mbar)	960 mbar
Voltage	230V 50Hz

Operating Condition (Rif. Section 4): #1

Test results: COMPLIANT

TEST RESULTS

Voltage Dips

TEST LEVEL			COMPLIANT		NOT COMPLIANT	RESULT
% res.	cycles	φ (°)	A	B	C	
0 %	1	0° 90° 180° 270°	✓ ✓ ✓ ✓			No performance degradation

TEST LEVEL			COMPLIANT		NOT COMPLIANT	RESULT
% res.	cycles	φ (°)	A	B	C	
40 %	10	0° 90° 180° 270°	✓ ✓ ✓ ✓			No performance degradation

TEST LEVEL			COMPLIANT		NOT COMPLIANT	RESULT
% res.	cycles	φ (°)	A	B	C	
70 %	25	0° 90° 180° 270°	✓ ✓ ✓ ✓			No performance degradation

Voltage interruption

TEST LEVEL			COMPLIANT			NOT COMPLIANT	RESULT
% res.	cycles	φ (°)	A	B	C		
0 %	250	0° 90° 180° 270°			✓ ✓ ✓ ✓		EUT shutdown. Automatic restart of operating cycle

6 Photographic documentation

PHOTO 1 – EUT IDENTIFICATION

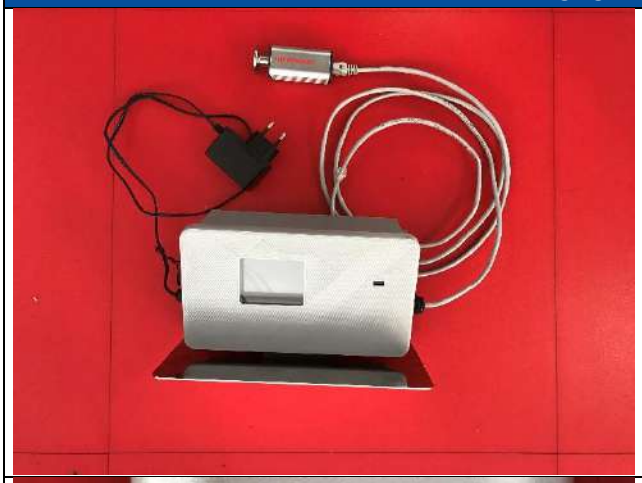


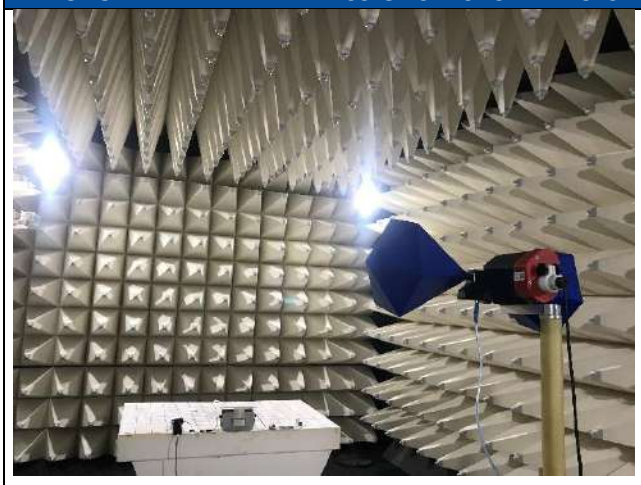
PHOTO 2 – RADIATED EMISSIONS DISTURBANCES	PHOTO 3 – CONDUCTED EMISSIONS DISTURBANCES
	

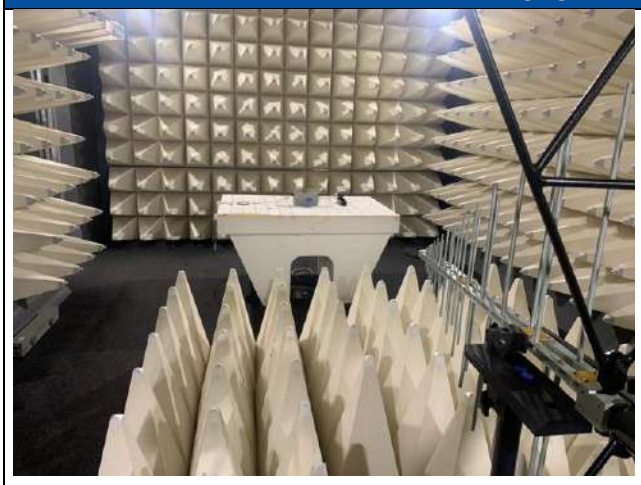
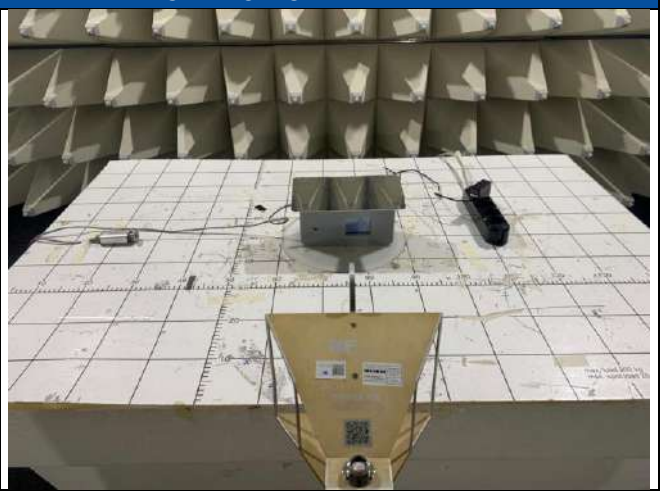
PHOTO 4 – RADIATED IMMUNITY SETUP	
	

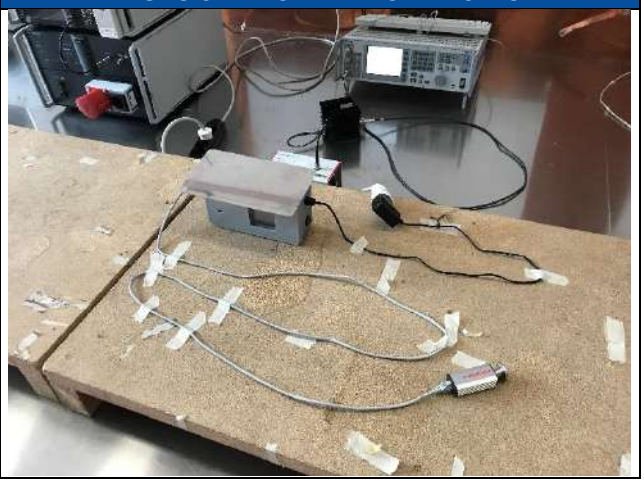
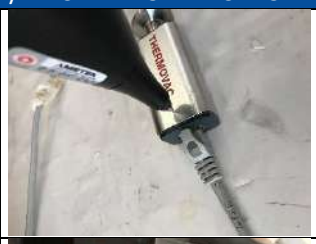
PHOTO 5 – BURST/SURGE/DIPS IMMUNITY SETUP	PHOTO 6 – RF CM IMMUNITY SETUP
	

PHOTO 7 – BURST/SURGE/DIPS IMMUNITY SETUP			
			
			
			

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