



**Telecommunications & Telematics
for Transports Lab.**

TEST REPORT

Ref. No. ARSK00076/e

Date: 2010-04-15

Measurements performed in accordance with:

EN 301 489-3 V1.4.1:2002: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz "

PRODUCT	: RADIOCONTROL
TESTED MODEL	: DUAL BAND
MANUFACTURER	: MICRO DEVICE S.r.l. – Via Bellini, 31/33 –I- 20095 Cusano Milanino (MI)
APPLICANT / ASSEMBLY PLANT	: MICRO DEVICE S.r.l. – Via Bellini, 31/33 –I- 20095 Cusano Milanino (MI)
TRADEMARK	: MICRO DEVICE; YACHT CONTROLLER
RATING	: TX: 3 x 1,5 V Alkaline battery; RX: DC 12÷24 V
OTHER INFORMATION	Sample received on : 2010-03-31 (sample sent by applicant) No. of B.E.M. (IMQ ref.) : 53669 & 53784 Testing dates : 2010-03-26÷2010-04-01 Samples tested No. : 1 Testing Laboratory : IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano Testing site : Viale Lombardia, 20 – I-20021 Bollate

Tested by : R. Radice	Signature:	Date : 2010-04-15
Checked by: R. Colombo (Lab. deputy)	Signature:	Date : 2010-04-15

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2010-04-15	Test Results and Evaluation Report

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1 TEST SPECIFICATIONS, METHODS & PROCEDURES

According to: **EN 301 489-3 V1.4.1:2002** "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services;

Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz"

The standard EN 301 489-3 V1.4.1:2002 makes reference to **EN 301 489-1 (V1.8.1:2008)** "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements", which makes reference to the following Standards:

1.1 EMISSION TESTS

Product family standard	Date	Title
EN 61000-3-2	2006	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3 A1	1995 2001	Electromagnetic compatibility (EMC) Part 3: Limits Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A.
EN 55022	2006	Limits and methods of measurement of radio interference characteristics of information technology equipment.

1.2 IMMUNITY TESTS

Basic Standard	Date	Title
EN 61000-4-2	2001	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity tests - Basic EMC Publication
EN 61000-4-3	2006	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	2004	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 4: Electrical fast transient/burst immunity tests - Basic EMC Publication
EN 61000-4-5	2006	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 5: Surge immunity test
EN 61000-4-6	2005	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 6: Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-11	2004	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 11: Voltage dips, short interruptions and voltage variations immunity tests

1.3 ENVIRONMENTAL CONDITIONS

TEST CONDITIONS	MEASURED
Ambient Temperature	20 ÷ 25 °C
Relative Humidity	50 ÷ 60 %
Atmospheric Pressure	900 ÷ 1000 mbar

1.4 TEST CONDITIONS

1.4.1 General

In acc. to clause 4.1 of EN 301 489-3 V1.4.1:2002 and to clause 4 of EN 301 489-1 V1.8.1 (2008-04).

1.4.2 Arrangements for test signals

In acc. to clause 4.2 of EN 301 489-3 V1.4.1:2002 and to clause 4.2 of EN 301 489-1 V1.8.1 (2008-04).

1.4.3 Exclusion band

In acc. to clause 4.3 of EN 301 489-3 V1.4.1:2002 and to clause 4.3 of EN 301 489-1 V1.8.1 (2008-04).

The frequencies on which Short Range Devices (SRD) are intended to operate, shall be excluded from the conducted and radiated RF immunity tests.

The frequencies on which the SRD transmitters are intended to operate shall be excluded from conducted and radiated emission measurements when performed in transmit mode of operation.

There shall be no frequency exclusion band applied to emission measurements of SRD receivers, and/or associated ancillary equipment.

TRANSMITTER

- For transmitter operating, or intended to operate, in a channelized frequency band, the exclusion band is three times the maximum occupied bandwidth allowed for that service, centred around the operating frequency
- For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of intended operating frequency band.

RECEIVER

Operating Receiver Frequency f_o	EMC Exclusion band for SRD equipment		
	Receiver Class 1	Receiver Class 2	Receiver Class 3
< 300 kHz	$f_o \pm 200$ kHz	$f_o \pm 300$ kHz	$f_o \pm 200$ kHz
300 kHz to < 30 MHz	$f_o \pm 2$ MHz	$f_o \pm 3$ MHz	$f_o \pm 5$ MHz
30 MHz to < 1 GHz	$f_o \pm 10$ MHz, or $\pm 2\% \times f_o$, whichever is greater	$f_o \pm 15$ MHz, or $\pm 5\% \times f_o$, whichever is greater	$f_o \pm 15$ MHz, or $\pm 10\% \times f_o$, whichever is greater
1 GHz to < 2 GHz	$f_o \pm 75$ MHz	$f_o \pm 100$ MHz	$f_o \pm 300$ MHz

1.4.4 Narrow band responses of receivers

The provision of EN 301 489-1 V1.8.1 (2008-04) clause 4.4, shall apply.

1.4.5 Normal test modulation

In acc. to clause 4.5 of EN 301 489-3 V1.4.1:2002.

1.5 PERFORMANCE ASSESSMENT

In acc. to clause 5.1 of EN 301 489-3 V1.4.1:2002 and to clause 5 of EN 301 489-1 V1.8.1 (2008-04).

1.6 PERFORMANCE CRITERIA

The equipment shall meet the performance criteria as specified in sub-clauses 6.2 and 6.3 of EN 301 489-3 V1.4.1 (2002-08), for the appropriate class of SRD equipment.

In acc. to sub-clause 6.1 of EN 301 489-3 V1.4.1 (2002-08), the product family of SRD is divided into three classes of equipment, as shown below:

Class of SRD equipment	Risk assessment of receiver performance
1	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person)
2	Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply be overcome by other means
3	Standard reliable SRD communication media; e.g. inconvenience to persons, which can simply be overcome by other means (e.g. manual)

In acc. to sub-clause 6.2 of EN 301 489-3 V1.4.1 (2002-08), the performance criteria for the different classes of SRD equipment in combination with the different equipment types during and after immunity test are specified in this clause below:

- performance criteria **A** for immunity test with phenomena of a continuous nature
- performance criteria **B** for immunity test with phenomena of a transient nature
- performance criteria **C** for immunity test with power interruptions exceeding a certain time

The equipment shall meet the minimum performance criteria as specified in the following clause:

Performance criteria table

CRITERIA	DURING TEST	AFTER TEST
Class 1 SRD equipment		
A	Operate as intended No loss of function For equipment type II the minimum performance shall be 12 dB SINAD No unintentional responses	Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Class 2 SRD equipment		
A	Operate as intended No loss of function For equipment type II the minimum performance shall be 6 dB SINAD No unintentional responses	Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Class 3 SRD equipment		
A and B	May be loss of function (one or more) No unintentional responses	Operate as intended, for equipment type II the communication link may be lost, but shall be recoverable by user No degradation of performance Lost functions shall be self-recoverable

Performance criteria for Continuous phenomena applied to Transmitters (CT)

For equipment of type I or II including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply. For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Performance criteria for Transient phenomena applied to Transmitters (TT)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2. For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Performance criteria for Continuous phenomena applied to Receivers (CR)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply. For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Performance criteria for Transient phenomena applied to Receivers (TR)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2. For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

2 SUMMARY OF TEST RESULTS

2.1 Emission tests

Phenomenon	Application	Operating condition	Result	Test details
Radiated emission	Enclosure of ancillary equipment and applicable for stand alone testing		Not applicable ¹	
Conducted emission	AC power input/output port		Not applicable ²	
	DC Power supply /Signal		Not applicable ³	
	Telecommunication port		Not applicable ²	
Harmonic current emissions	AC mains input port		Not applicable ²	
Voltage fluctuations and flicker	AC mains input port		Not applicable ²	

REMARK: Detail of the result are showed on the next pages.
Test uncertainties are in accordance with document IO-80-U01.

¹ Applicable only to stand-alone testing; for this equipment, the IMQ Laboratory has been executed Radiated Emission Test according to the most appropriate Standard (EN 60945) – See test Report “ARSK00078” and Spurious Emission Test according EN 300 220-1 (see test Report “ARSK00076/r” – Issue date 2010/04/15)

² Port not present

³ How declared by client , cable length < 3m.

2.2 Immunity tests

Phenomenon	Coupling port	Operating condition	Result	Test details
RF electromagnetic field (0.08 ÷ 1 GHz)	Enclosure	#1 #2	Complies	1
RF electromagnetic field (1.4 ÷ 2.7 GHz)	Enclosure	#1 #2	Complies	1
Electrostatic discharge	Enclosure	#1 #2	Complies	2
Fast transients common mode	AC power	Not applicable ¹		
	DC power			
	Power supply/Signal			
	Telecommunication			
RF common mode 0,15 MHz to 80 MHz	AC power	Not applicable ²		
	DC power	Not applicable ³		
	Power supply/Signal	Not applicable ³		
	Telecommunication	Not applicable ²		
Transients and surges	DC power input (for 12÷24V power supply vehicular equipment)	#2	Complies	3
Voltage dips and interruptions	AC mains power input	Not applicable ²		
Surges, line to line and line to ground	AC mains power input	Not applicable ²		
	Telecommunication	Not applicable ²		

REMARK: Detail of the result are showed on the next pages.

Test uncertainties are in accordance with document IO-80-U01.

¹ Not applicable to Radio and ancillary equipment for vehicular use

² Port not present

³ How declared by client , cable length < 3m.

3

EQUIPMENT UNDER TEST DETAILS

3.1 EUT IDENTIFICATION

The EUT is composed by the following modules	:	Radiocontrol, composed by: <ul style="list-style-type: none"> • Portable unit, with internal Radio transmitter module AUR.EL at 433,92 MHz mod. TX-4M10HA & transmitter module AUR.EL at 868,30 MHz mod. TX-8LAVSA05 ▪ Fixed unit, with internal Radio receiver module AUR.EL at 433,92 MHz RX-AM4SF & receiver module AUR.EL at 868,30 MHz mod. RX-AM8SF
Transmitter power class	:	<ul style="list-style-type: none"> ▪ 8 (max. 10mW) for 433,92 MHz ▪ 9 (max. 25mW) for 868,30 MHz
Receiver class	:	<ul style="list-style-type: none"> ▪ 2; Function critical SRD communication media; i.e. when a failure to operate correctly causes loss of function but does not constitute a safety hazard.
EUT type (Cab radio, general purpose radio, operational radio)	:	<ul style="list-style-type: none"> ▪ General purpose radio
EUT classification (fixed / vehicular use / portable use)	:	<ul style="list-style-type: none"> ▪ Nautical use (vehicular use)
EUT single or system	:	<ul style="list-style-type: none"> ▪ System
Power Supply	:	<ul style="list-style-type: none"> ▪ TX unit: alkaline battery 3 x 1,5 V ▪ RX unit: 12÷24 V
Consumption	:	<ul style="list-style-type: none"> ▪ TX unit: 45mA in transmission ▪ RX unit: max 2W
EUT standing	:	<ul style="list-style-type: none"> ▪ TX unit: portable ▪ RX unit: on yacht and boat
Dimension of EUT (W x H x D):	:	<ul style="list-style-type: none"> ▪ TX unit: 70 x 123 x 43 mm. ▪ RX unit: 175 x 170 x 130 mm.

3.2 RADIO MODULE TECHNICAL DATA

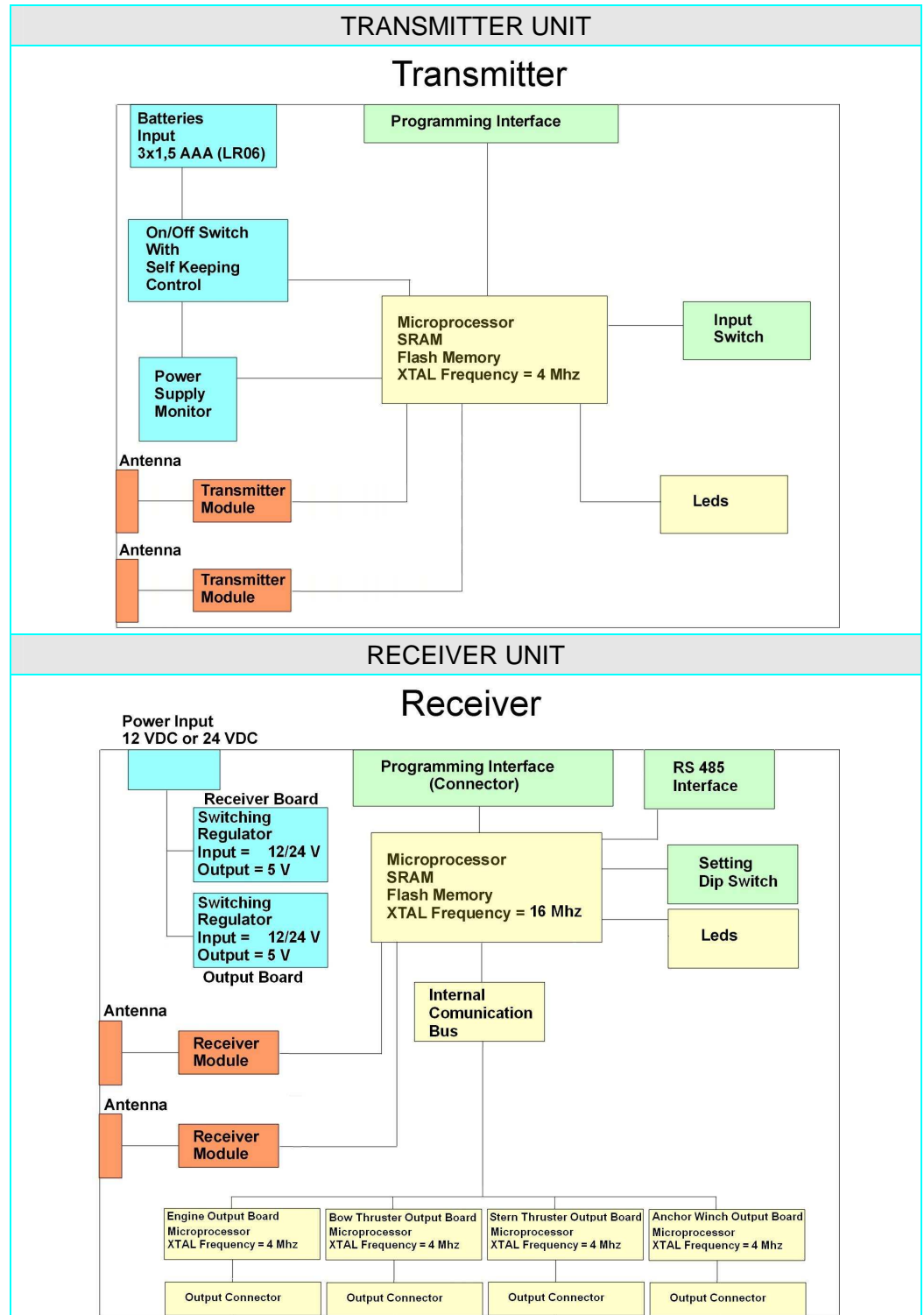
433,92 MHz TRANSMITTER Parameters	Value
Supply Voltage :	▪ 2,5÷3,3 V (typ. 3 V)
Consumption :	▪ Max. 25mA
Modulation type :	▪ OOK
Number of channels :	▪ Wideband
Operating frequency :	▪ 433,92 MHz
Assigned frequency band :	▪ 433,05÷434,79 MHz
Power :	▪ < 10 mW
Antenna :	▪ Integrated helical Antenna
Extreme operating conditions :	▪ Declared -20°÷+80°C

433,92 MHz RECEIVER Parameters	Value
Supply Voltage :	▪ 4,75÷5,25 V (typ. 5 V)
Number of RF channels :	▪ Wideband
Receiving frequency :	▪ 433,92 MHz
Assigned frequency band :	▪ 433,05÷434,79 MHz
Sensitivity :	▪ Declared -109 dBm
Antenna :	▪ Integrated Antenna (wire < 17cm.)
Extreme operating conditions :	▪ Declared -20°÷+80°C

868,30 MHz TRANSMITTER Parameters	Value
Supply Voltage :	▪ 2,7÷5 V (typ. 3 V)
Consumption :	▪ Max. 50mA (at 5V)
Modulation type :	▪ OOK
Number of channels :	▪ Wideband
Operating frequency :	▪ 868,30 MHz
Assigned frequency band :	▪ 868,00÷868,60 MHz
Power :	▪ < 25 mW
Antenna :	▪ Integrated Antenna (wire < 10cm.)
Extreme operating conditions :	▪ Declared -20°÷+80°C

868,30 MHz RECEIVER Parameters	Value
Supply Voltage :	▪ 4,5÷5,5 V (typ. 5 V)
Number of RF channels :	▪ Wideband
Receiving frequency :	▪ 868,30 MHz
Assigned frequency band :	▪ 868,00÷868,60 MHz
Sensitivity :	▪ Declared -108 dBm
Antenna :	▪ Integrated Antenna (wire < 17cm.)
Extreme operating conditions :	▪ Declared -20°÷+80°C

3.3 FLOW CHART



3.4 AUXILIARY EQUIPMENT

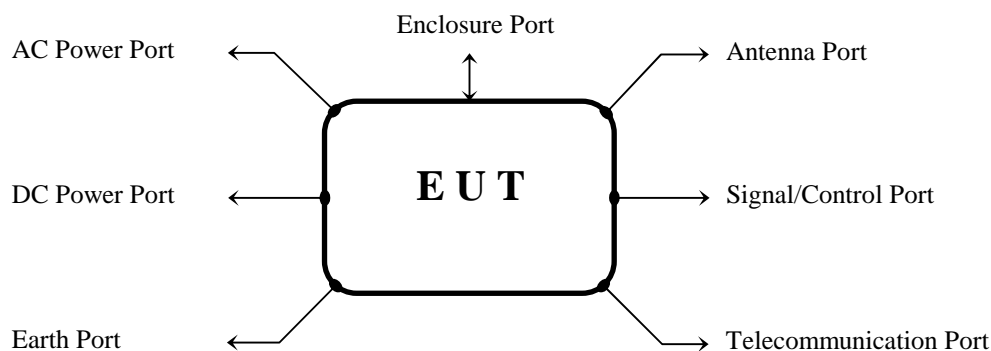
Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

- None

3.5 TESTED SAMPLES

SAMPLE Nr.	S/N
1	/

3.6 PORTS IDENTIFICATION



No.	Port	Description	Maximum length	Ref. Document
1	Enclosure	Plastic enclosure	----	/
2	DC power input/output port	TX: N°3 Internal batteries 1,5V type AAA (LR03) RX: external supply 12÷24 V dc	---- < 3 m.	/
3	AC mains power input/output port	Port not present	----	/
4	Power supply / Signal	N°5 Outputs command	< 3 m.	/
5	Telecommunication ports	Port not present	----	/
6	Antenna port	Integrated Antenna	< 17cm.	/
7	Earth port	Port not present	----	/

3.7 DESCRIPTION OF SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

- None.

3.8 EUT PERFORMANCE ASSESSMENT

In acc. to clause 5.1 of EN 301 489-3 V1.4.1: 2002 and to clause 5.1 of EN 301 489-1 V1.8.1 (2008-04).

3.9 OPERATING TEST CONDITIONS

Ref.	Description
#1	Tx operating at 433,92 & 868,30 MHz at same time (continuous transmission of bit stream)
#2	Rx operating at 433,92 & 868,30 MHz at same time (continuous reception mode) – N°1 Output active

4 EMC TEST DATA

TEST No. 1	Title "Immunity to radiated electromagnetic energy."	Ref. Standard
		EN 61000-4-3
TEST REQUIREMENTS	TEST PROCEDURE	EN 61000-4-3 par. 8
	TEST FACILITY USED	Anechoic chamber
	FREQUENCY RANGE	<input checked="" type="checkbox"/> 80 – 1000 MHz <input checked="" type="checkbox"/> 1400 – 2700 MHz
	POSITION OF THE RADIATING ANTENNAS	3 m (80 – 1000 MHz) 1 m (1400 – 2700 MHz)
	TEST LEVEL	<input checked="" type="checkbox"/> 3 V/m _{rms} unmodulated <input type="checkbox"/> 10 V/m _{rms} unmodulated
	MODULATING FREQUENCY	1 kHz (sinusoidal signal)
	MODULATION TYPE	AM, 80%
	FREQUENCY SWEEP AND STEP SIZE	LOG 1 %
	DWELL TIME	2 sec
	Note: none	

TEST RESULTS

TEST DATA	PORT UNDER TEST	OPERATING CONDITION (rif. 3.9)	COUPLING METHOD	PERFORMANCE CRITERIA	RESULT
	Enclosure	#1 #2	Antenna	In acc. to sub-clause. 9.2.3 of ETSI EN 301 489-1	Complies

The parameters monitored during the test and the relative permitted value, are the following:

Performance parameters	Values measured during tests	Permitted values during immunity tests	Result
Communication link between TX and RX	No loss of communication – Output active		Pass

EXCLUSION BAND FOR WIDE BAND TRANSMITTER

Test 80÷1000 MHz; exclusion band in Radio Link mode (according to par. 1.4.3 of this report, with $f_0=433,92$ MHz): **430,44÷437,40MHz**

Test 80÷1000 MHz; exclusion band in Radio Link mode (according to par. 1.4.3 of this report, with $f_0=868,30$ MHz): **867,10÷869,50MHz**

EXCLUSION BAND FOR CLASS 2 RECEIVER

Test 80÷1000 MHz; exclusion band in Radio Link mode (according to par. 1.4.3 of this report, with $f_0=433,92$ MHz): **412,224÷455,616MHz**

Test 80÷1000 MHz; exclusion band in Radio Link mode (according to par. 1.4.3 of this report, with $f_0=868,30$ MHz): **824,885÷911,715MHz**

TEST No. 2	Title		Ref. Standard
	“Immunity to Electro Static Discharge (ESD)”		EN 61000-4-2
TEST REQUIREMENTS	TEST PROCEDURE	EN 61000-4-2	
	IMMUNITY LEVEL	±4 kV (direct and indirect contact) ±8 kV (direct air)	
	DISCHARGE IMPEDANCE	330 ohm / 150 pF	
	EUT POSITIONING	<input type="checkbox"/> table-top <input checked="" type="checkbox"/> floor-standing	
	NUMBER OF SINGLE DISCHARGES	≥ 10 positive and 10 negative at the selected points	
	REPETITION RATE	≤ 1 / sec	
	GENERATOR TRIGGER	Internal	
	NOTES	---	

▪ **COUPLING MODE: DIRECT AIR (FOR NOT CONDUCTIVE SURFACES)**

TEST DATA	DISCHARGE POINT	OPERATING CONDITION (rif. 3.9)	TEST LEVEL	ESD POLAR.	PERFORMANCE CRITERIA	RESULT
	Transmitter – All sides	#1	<input type="checkbox"/> 4 kV	POS	In acc. to sub-clause. 9.3.3 of ETSI EN 301 489-1	Complies
			<input checked="" type="checkbox"/> 8 kV	NEG		Complies
	<input type="checkbox"/> 15 kV	NEG	Complies			
	Transmitter - Push buttons and led	#1	<input type="checkbox"/> 4 kV	POS		Complies
			<input checked="" type="checkbox"/> 8 kV	NEG	Complies	
<input type="checkbox"/> 15 kV						

N.B.: How declared by client, no electrostatic discharge has been applied on RX unit; after installation, no points or surfaces are accessible to personnel during normal usage (according to par. 8.3.1 of Standard EN 61000-4-2) – It has been applied only indirect discharge on RX unit.

▪ **COUPLING MODE: DIRECT CONTACT (FOR CONDUCTIVE SURFACES)**

TEST DATA	DISCHARGE POINT	OPERATING CONDITION (rif. 3.9)	TEST LEVEL	ESD POLAR.	PERFORMANCE CRITERIA	RESULT
	NO SELECTED POINT					

▪ **COUPLING MODE: INDIRECT TO VERTICAL & HORIZONTAL PLANE UNDER THE EUT (Sub clause 8.3.2.1 & 8.3.2.2)**

TEST DATA	DISCHARGE POINT	OPERATING CONDITION (rif. 3.9)	TEST LEVEL	ESD POLAR.	PERFORMANCE CRITERIA	RESULT
	Vertical plane on TX & RX unit	#1 #2	<input checked="" type="checkbox"/> 4 kV	POS	In acc. to sub-clause. 9.3.3 of ETSI EN 301 489-1	Complies
			<input type="checkbox"/> 8 kV	NEG		Complies
			<input type="checkbox"/> 15 kV			
Horizontal plane: not applicable						

The parameters monitored during the test and the relative permitted value, are the following:

Performance parameters	Values measured during tests	Permitted values during immunity tests	Result
Communication link between TX and RX	No loss of communication – Output active		Pass

TEST No. 3	Title "Immunity to transient disturbance conducted"		Ref. Standard
			ISO 7637-2:2004
TEST REQUIREMENTS	TEST SET-UP	According to ISO 7637-2	
	TEST METHOD & PROCEDURE	According to ISO 7637-2	
	TEST LEVEL	See next table (According to sub-clause 9.6.2.1 of Standard EN 301 489-1 V1.8.1)	
	TEST SUPPLY VOLTAGE (FOR 12 V EQUIPMENT)	<ul style="list-style-type: none"> Ua: 13.5 V dc Ub: 12.0 V dc 	
	TEST SUPPLY VOLTAGE (FOR 24 V EQUIPMENT)	<ul style="list-style-type: none"> Ua: 27.5 V dc Ub: 24.0 V dc 	
	NOTES	---	

TEST LEVEL AND FUNCTIONAL STATUS DESCRIPTION

PULSE TYPE	TEST LEVEL	Functional status for systems	
		Criteria for transmitter	Criteria for receiver
1	III	B	B
2a/2b	III	B	B
3a/3b	III	A	A
4	III	B	B

The parameters monitored during the test and the relative permitted value, are the following:

Performance parameters	Values measured during tests	Permitted values during immunity tests	Result
Communication link between TX and RX	Criteria A: No loss of communication – Output active Criteria B: Loss of communication during EMC immunity exposure – Self-recover after EMC immunity exposure.		See next tables

TEST RESULT (12 V SYSTEM)

Test Pulse	Test Level, U_s (V)	No. of Pulses or Test time	Burst Cycle / Pulse repetition time	Observed Functional status	Result
2b	+ 10	10 pulses	0,5 s	B	Complies
4	- 6	10 pulses	10 s	A	Complies

TEST RESULT (24 V SYSTEM)

Test Pulse	Test Level, U_s (V)	No. of Pulses or Test time	Burst Cycle / Pulse repetition time	Observed Functional status	Result
1	- 450	10 pulses	2 s	B	Complies
2a	+ 37	10 pulses	2 s	A	Complies
2b	+ 20	10 pulses	2 s	B	Complies
3a	- 150	20 min	90 ms	A	Complies
3b	+ 150	20 min	90 ms	A	Complies
4	- 12	10 pulses	2 s	A	Complies

Observed Functional status B: during event, no communication link between RX and TX; self-recover after every pulse.

5 ADDITIONAL TECHNICAL INFORMATION

5.1 ELECTROMAGNETICALLY RELEVANT COMPONENTS:

Components	No.	Manufacturer	Type – Technical data
Radio Transmitter	1	Aur.el	TX-4M10HA
Radio Transmitter	1	Aur.el	TX-8LAVSA05
Radio Receiver	1	Aur.el	RX-AM4SF
Radio Receiver	1	Aur.el	RX-AM8SF

5.2 RFI SUPPRESSION DEVICES:

Components	N°	Manufacturer	Type – Technical data
Emi Suppression Filter For DC	1	Murata	BNX002-01

5.3 EMI PROTECTION DEVICES:

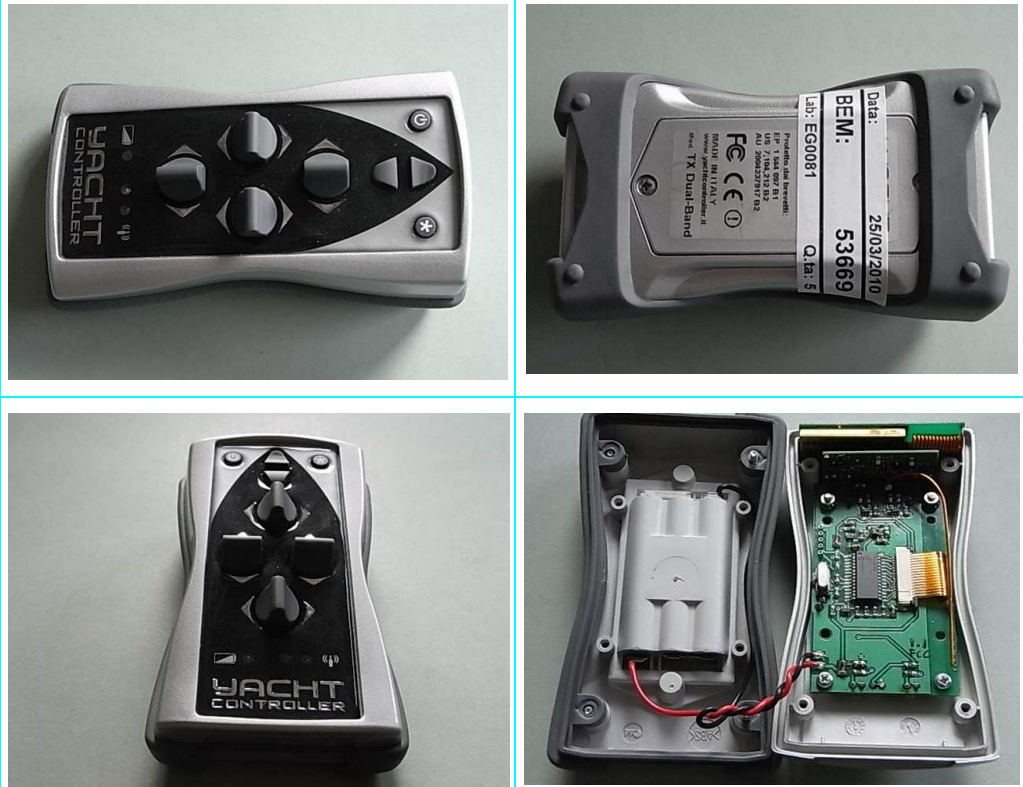
Components	N°	Manufacturer	Type – Technical data
Varistor	1	/	CT1210K25G

6 TECHNICAL DOCUMENTATION

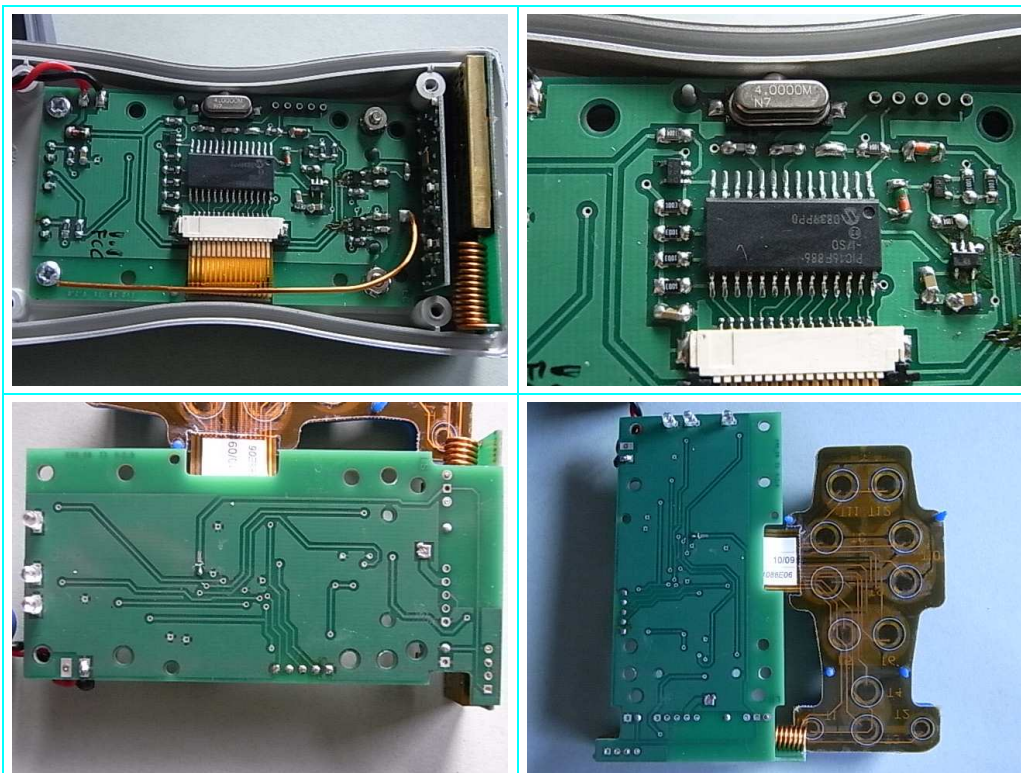
DOCUMENT	REFERENCE
Manuale Installatore	I-EVODB-Inst
Manuale utilizzatore	I-EVODB-Uti
Wiring Diagrams	<p>TX_EVO_DUAL_BAND – Rev. 2.0</p> <p>CPU_RX per EVO e DIVO Versione 2 – Rev. 3.1</p> <p>ADP_RX_EVO-DB – Rev. 1.0</p> <p>Modulo di comando di uscita eliche e verricello per YC_EVO – Rev. 3</p> <p>Scheda base per ricevitore YC per EVO e DIVO – Rev. 2.1</p> <p>MODULO_OUT_MOTORI_EVO_3W – Rev. 1.0</p>
Bills of materials	<p>TX_EVO_DUAL_BAND – Rev. 2.0 – June 08, 2009</p> <p>CPU_RX per EVO e DIVO Versione 2 – Rev. 3.1 – December 02, 2009</p> <p>ADP_RX_EVO-DB – Rev. 1.0 – May 25, 2009</p> <p>Modulo di comando di uscita eliche e verricello per YC_EVO – Rev. 3 – December 02, 2009</p> <p>Scheda base per ricevitore YC per EVO e DIVO – Rev. 2.1 – June 04, 2009</p> <p>MODULO_OUT_MOTORI_EVO_3W – Rev. 1.0 – May 28, 2009</p>

7 PHOTOGRAPHIC DOCUMENTATION

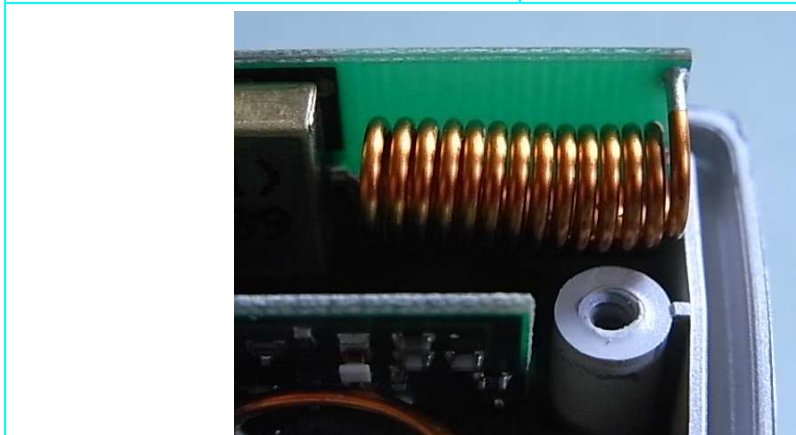
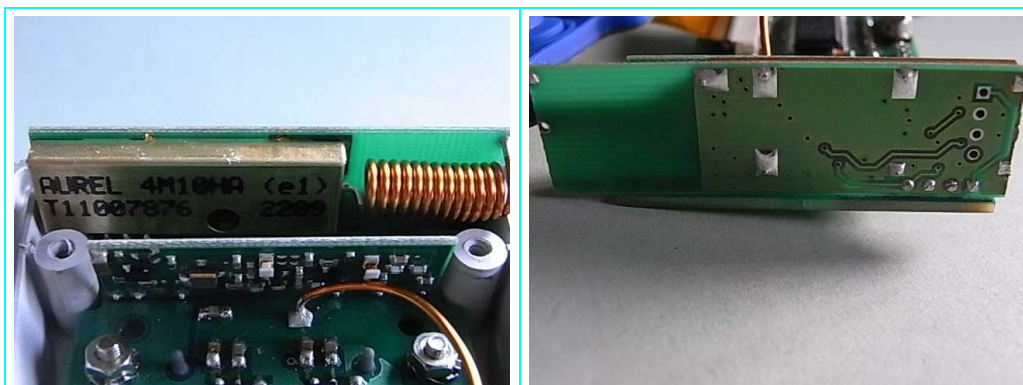
7.1 EUT IDENTIFICATION



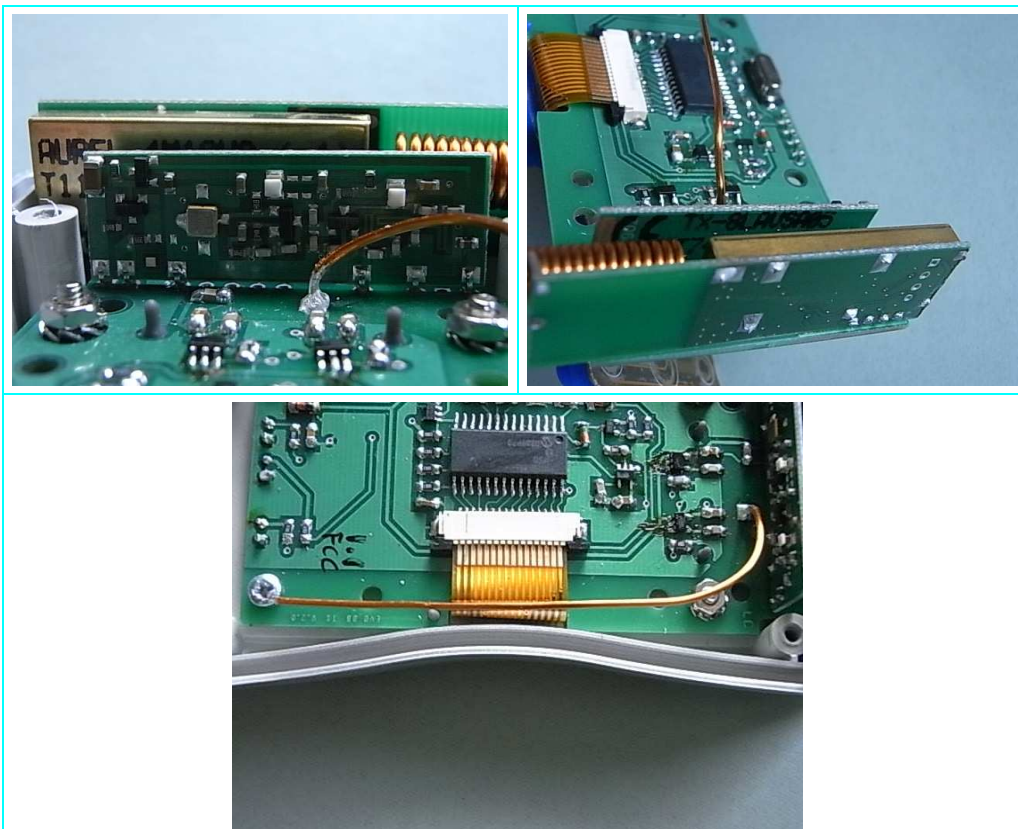
A. Equipment under test: transmitter unit



B. Internal view



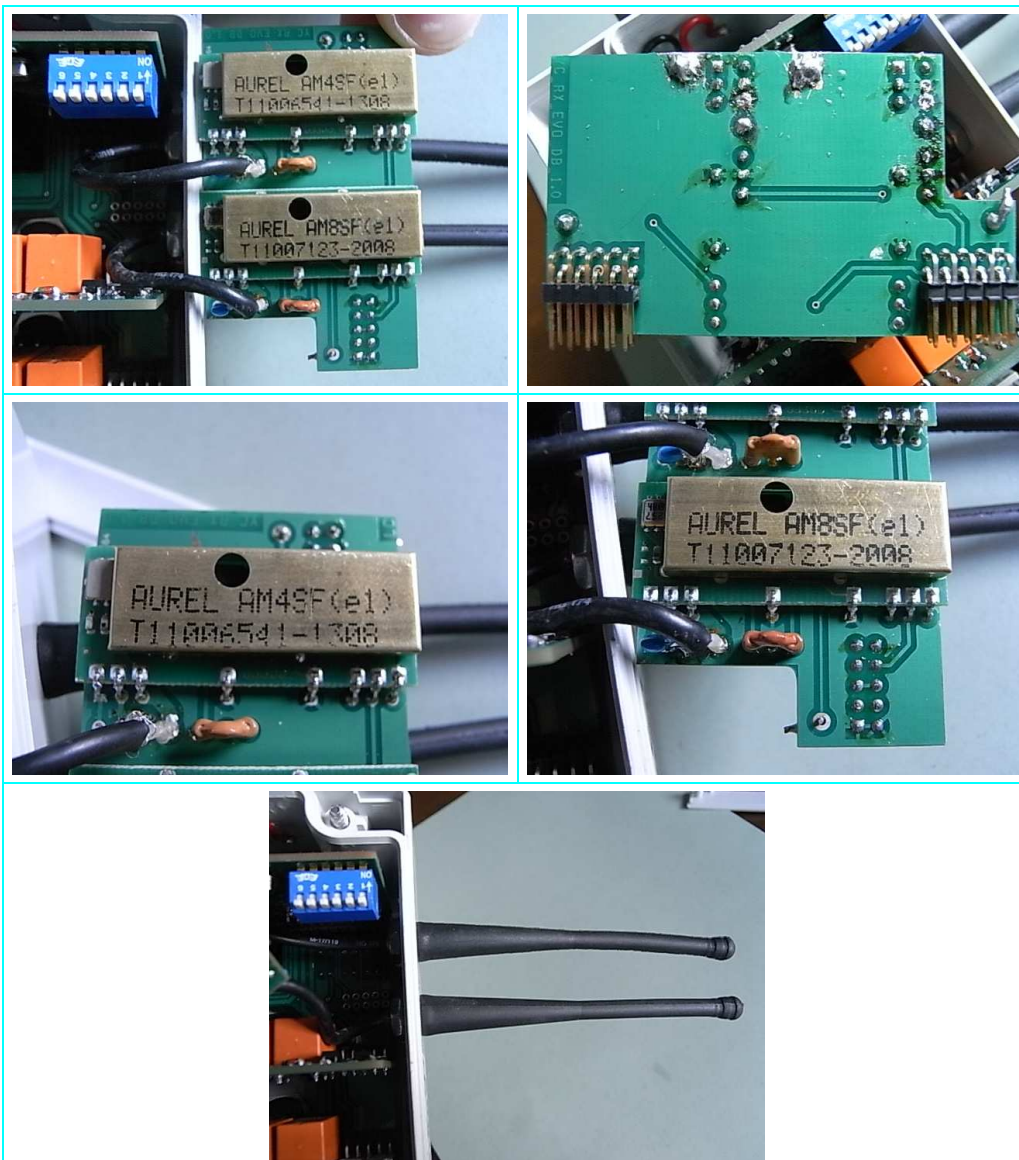
C. 433,92 MHz RF module and antenna



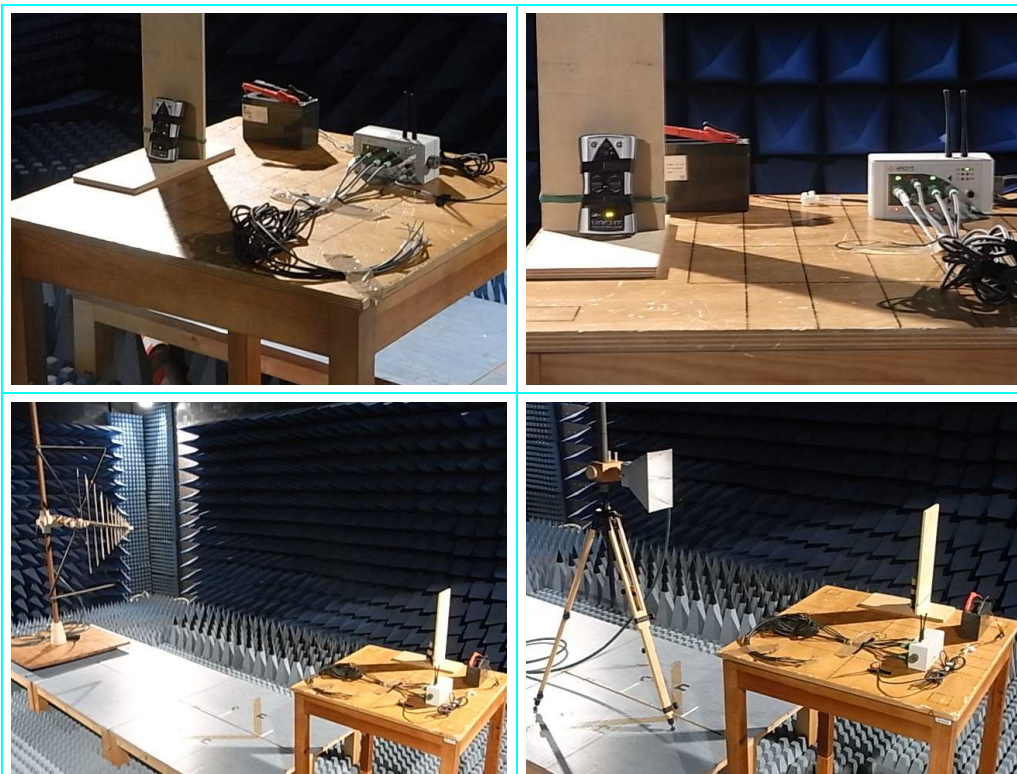
D. 868,30 MHz RF module and antenna



E. Equipment under test: receiver unit



F. 433,92 & 868,30 MHz Receiver modules and antenna



G. Set-up immunity radiated test

8 MEASUREMENT AND TEST EQUIPMENT INSTRUMENTATION

INSTRUMENTS	MANUFACTURER	MODEL	IMQ S/N	Ref. TEST
RF generator	Rohde & Schwarz	SMG	S-00562	1
RF generator	Rohde & Schwarz	SMR	S-03707	1
RF amplifier	Amplifier Research	100W1000M1A	S-02389	1
RF amplifier	Amplifier Research	60S1G3	S-04261	1
Directional coupler	AR	DC6180	S-03509	1
Directional coupler	AR	DC7144A	S-04182	1
Power Sensor	Rohde & Schwarz	NRP-Z91	S-04706	1
Power Sensor	Rohde & Schwarz	NRP-Z91	S-04707	1
Antenna	ARA	LPE-2520/1	S-03511	1
Ridged horn antenna	Schwarzbeck	BBHA9120D	S-03464	1
Shielded anechoic chamber	SIDT EUROPE	/	P-02386	1
ESD generator	Schaffner	NSG 435	S-04325	2
Transient generator	EM Test	UCS 200-M	S-03471	3
Pulses generator	EM Test	VDS 200	S-03473	3
Shielded chamber	SIDT EUROPE	/	P-02391	3