


## RAPPORTO DI PROVA / TEST REPORT

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Scopo delle prove / Test object :	Prove di tipo in accordo alla Norma armonizzata / Type test according to Harmonized standards <b>EN 301 489-1 V2.1.1; EN 301 489-17 V3.1.1</b>	
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Marchio commerciale / Trademark :	 <b>RELOC</b> DESIGN & INTEGRATION	
Fabbricante / Manufacturer :	RELOC S.r.l.	
Prodotto / Product :	Wi-Fi Pmod Adapter based on ATWINC15x0 module	
Modello / Model :	<b>PMOD.WM1A (PMOD-WM1A-ATWINC15X0)</b>	
Data ricevimento campioni / Test samples receipt date	19/06/2017	
Campioni verificati / No. of tested samples	1	
Data verifiche / Testing date :	19-20/06/2017	
Sito di prova / Testing site :	Prima Ricerca & Sviluppo Via Campagna - 92 I - 22020 FALOPPIO CO	
Esito delle valutazioni / Assessment results :	<b>CONFORME / COMPLIANT</b>	
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## 0 RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
EMCTR_171301-0	Original Release	23/06/2017

## 1 TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

### 1.1 EUT Identification

DESCRIPTION	Wi-Fi Pmod Adapter based on ATWINC15x0 module
MODEL	PMOD.WM1A (PMOD-WM1A-ATWINC15X0)
TRADEMARK	R17P06R1D0A
S/N	 <b>RELOC</b> DESIGN & INTEGRATION
MANUFACTURER	RELOC s.r.l.
COUNTRY OF MANUFACTURER	Italy
SINGLE UNIT OR SYSTEM	Single

## 1.2 EUT Technical Information

<b>POWER SOURCE</b>	DC power
<b>NOMINAL VOLTAGE</b>	3.0V to 4.2V
<b>NOMINAL POWER</b>	Data not provided
<b>DIMENSIONS</b>	See photography documentation

## 1.3 EUT ports identification

This section contains descriptions of all ports, the length and the type of the cable provided by manufacturer needed for the tests. Moreover it is specified if the ports are ever or optionally connected.

	<b>Port</b>	<b>Description</b>	<b>Connection</b>	<b>Notes</b>
<input checked="" type="checkbox"/>	Enclosure	Plastic	Screw	---
<input type="checkbox"/>	AC Power input	Port not present	---	---
<input type="checkbox"/>	DC Power input	3.0V to 4.2V	---	---
<input type="checkbox"/>	Signal/control port	Port not present	---	---
<input type="checkbox"/>	Telecomm. port	Port not present	---	---

## 1.4 Modifications incorporated in E.U.T.

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

- None

## 1.5 Auxiliary equipment

- The RELOC PMOD.WM1A device provides attached host boards with Wi-Fi access through the Microchip® ATWINC15x0-MR210 Wi-Fi™ radio module. Users can communicate with the IEEE 802.11b/g/n compliant chip through SPI and achieve data rates up to 72 Mbps.

## 1.6 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
Exchange messages with a router	Continuous Wi-Fi communication

## 1.7 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.
Continuous Wi-Fi communication	NO CHANGE OF STATUS	operator	PRS Camera and operator	All immunity test

## 1.8 Performance criteria acc. to EN 301 489-1

### Performance criteria for continuous phenomena applied to transmitters and receivers

If no further details are given in the relevant part of ETSI 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 equipment 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 equipment 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 equipment if used as intended.

### Performance criteria for transient phenomena applied to transmitters and receivers

If no further details are given in the relevant part of ETSI EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For all other ports the following applies:

- After the test, the equipment 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 equipment 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 equipment if used as intended.

### 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, in these cases 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.

### 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, in these cases 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.

## 1.9 Performance criteria acc. to EN 301489-17

### General performance criteria

The performance criteria are:

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

The equipment shall meet the minimum performance criteria as specified in the following clauses.

### Performance table

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.  
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.



### **Performance criteria for Continuous phenomena applied to Transmitters (CT)**

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Transient phenomena applied to Transmitters (TT)**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Continuous phenomena applied to Receivers (CR)**

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Transient phenomena applied to Receivers (TR)**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.



## 2 REFERENCE STANDARDS

### REFERENCE EUROPEAN STANDARDS:

EN 301 489-1 V2.1.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
EN 301 489-17 V3.1.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

## 3 OPERATING TEST MODES AND 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 Wi-Fi communication

## 4 SUMMARY OF TEST RESULTS

### 4.1 Emission tests

Port	Test	Reference standard	Operating condition <sup>1</sup>	Results
Enclosure	Radiated emission 30MHz – 1GHz	EN 301 489-1		Not Applicable <sup>2</sup>
AC power port	Harmonic current emissions	EN 61000-3-2:		Not Applicable <sup>3</sup>
	Voltage fluctuations and flicker	EN 61000-3-3		
	Conducted emission	EN 301 489-1		
Input and output DC power ports	Conducted emission	EN 301 489-1		Not Applicable <sup>3</sup>
Telecommunications port	Conducted emission	EN 301 489-1		Not Applicable <sup>3</sup>

<sup>1</sup>Ref. Tab. of Section 2

<sup>2</sup> This test is not applicable for ancillary equipment incorporated in the radio equipment, or for ancillary equipment intended to be measured in combination with the radio equipment. In these cases the requirements of the relevant product standard for the effective use of the radio spectrum shall apply.

<sup>3</sup>Port not present

## 4.2 Immunity tests

Port	Phenomena	Reference standard	Operating condition <sup>1</sup>	Result
Enclosure	RF electromagnetic field	EN 301 489-3 EN 301 489-17	#1	Compliant
	Electrostatic Discharge		Not Applicable <sup>3</sup>	
AC power ports	Fast transients	EN 301 489-3 EN 301 489-17	Not Applicable <sup>2</sup>	
	RF common mode			
	Surge			
	Voltage Dips / Interruptions			
DC power ports	Fast transients	EN 301 489-3 EN 301 489-17	Not Applicable <sup>2</sup>	
	RF common mode			
	Surge			
I/O signal/ control ports (including functionalearth lines)	Fast transients	EN 301 489-3 EN 301 489-17	Not Applicable <sup>2</sup>	
	RF common mode			
	Surge			
Telecommunication port	Fast transients	EN 301 489-3 EN 301 489-17	Not Applicable <sup>2</sup>	
	RF common mode			
	Surge			

<sup>1</sup>Ref. Tab. of Section 2

<sup>2</sup>Port not present

<sup>3</sup>Electronic board only

## 5 TEST RESULTS

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IMMUNITY TO RADIATED RF ELECTROMAGNETIC FIELD .....13  
IMMUNITY TO ELECTROSTATIC DISCHARGE (ESD) .....Errore. Il segnalibro non è definito.



**TEST  
1.**

**IMMUNITY TO RADIATED RF ELECTROMAGNETIC FIELD**

- **TEST SETUP:** Acc. to reference documents
- **TEST LOCATION:** Semi-anechoic chamber (CISPR 16-1 :1993)  
Siemens+Matsushita type B84117-D6019-T232  
Measure distance 3 meters
- **TEST EQUIPMENT USED FOR TEST:**

RF Signal generator	R&S mod. SMB 100A	9kHz - 6GHz
RF Amplifiers	AR 250L 250W	150kHz - 220MHz
	AR100W 100W	220MHz - 1000MHz
	25S1G4	800MHz-4200MHz
Directional Coupler	AR-DC2500	10 kHz – 220 MHz
	AR-DC6180	80 – 1000 MHz
	AR-DC7144A	0,8 – 4,2 GHz
Transmitting antenna	FSA mod. S13014/1	80MHz - 1GHz
	Electro Metrics mod. 6961	1GHz - 18GHz
Software	EMC32S	
- **TESTED PORT:** Enclosure
- **FREQUENCYRANGE:** 80 MHz - 6000MHz
- **SCAN DATA:** 1s - 1% log.
- **IMMUNITY LEVEL:** 3V/m 80% AM (1kHz) (80-6000MHz) EN 301 489-1
- **PERFORMANCE CRITERION** A
- **MEASUREMENT UNCERTAINTY:** Level of confidence = 95% Degree of freedom = 10  
Coverage factor  $k_p = 2,28$  Combined uncertainty = 10,5 %

TEST CONDITIONS			MEASURED
• Ambient temperature :	15 - 35 °C		24 ±3 °C
• Ambient humidity :	25 - 75 %rH		40 ± 5 %rH
• Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 ± 50 mbar
• Voltage :			12Vdc

**OPERATING CONDITION (Rif. Section. 2) : #1**

**RESULT: COMPLIANT**

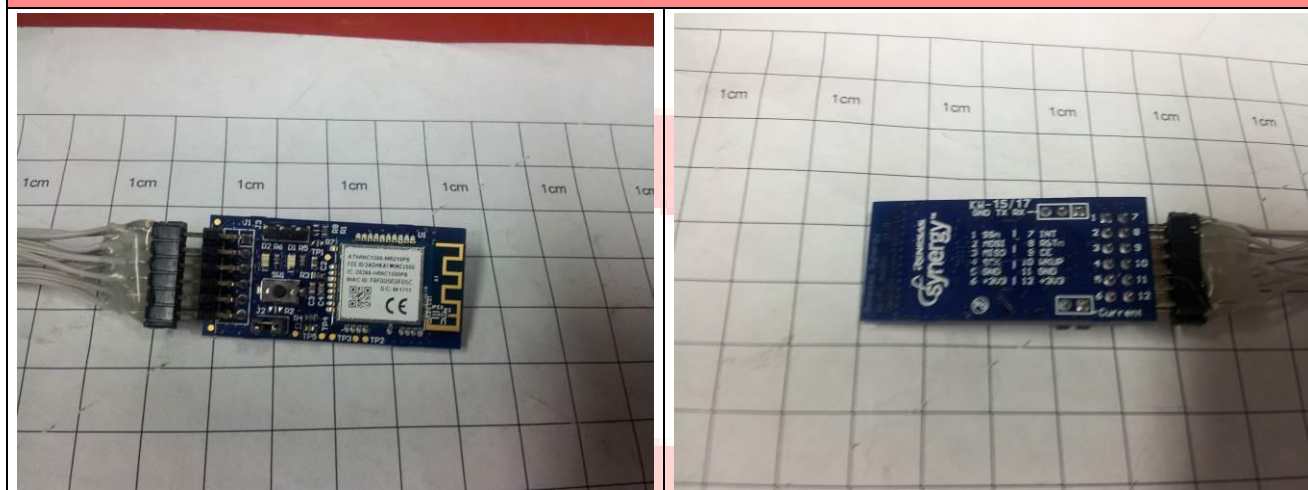
## TEST RESULTS

AM, 80% 1kHz (80-6000MHz) 3V/m

POLAR.	VERTICAL				HORIZONTAL				
PORT	WITHIN THE LIMIT		OUT OF LIMIT		WITHIN THE LIMIT		OUT OF LIMIT		NOTES
	CT	CR	CT	CR	CT	CR	CT	CR	EN 301489
ENCLOSURE front side	√				√				No performance degradation on both operating condition
ENCLOSURE left side	√				√				No performance degradation on both operating condition
ENCLOSURE right side	√				√				No performance degradation on both operating condition
ENCLOSURE rear side	√				√				No performance degradation on both operating condition

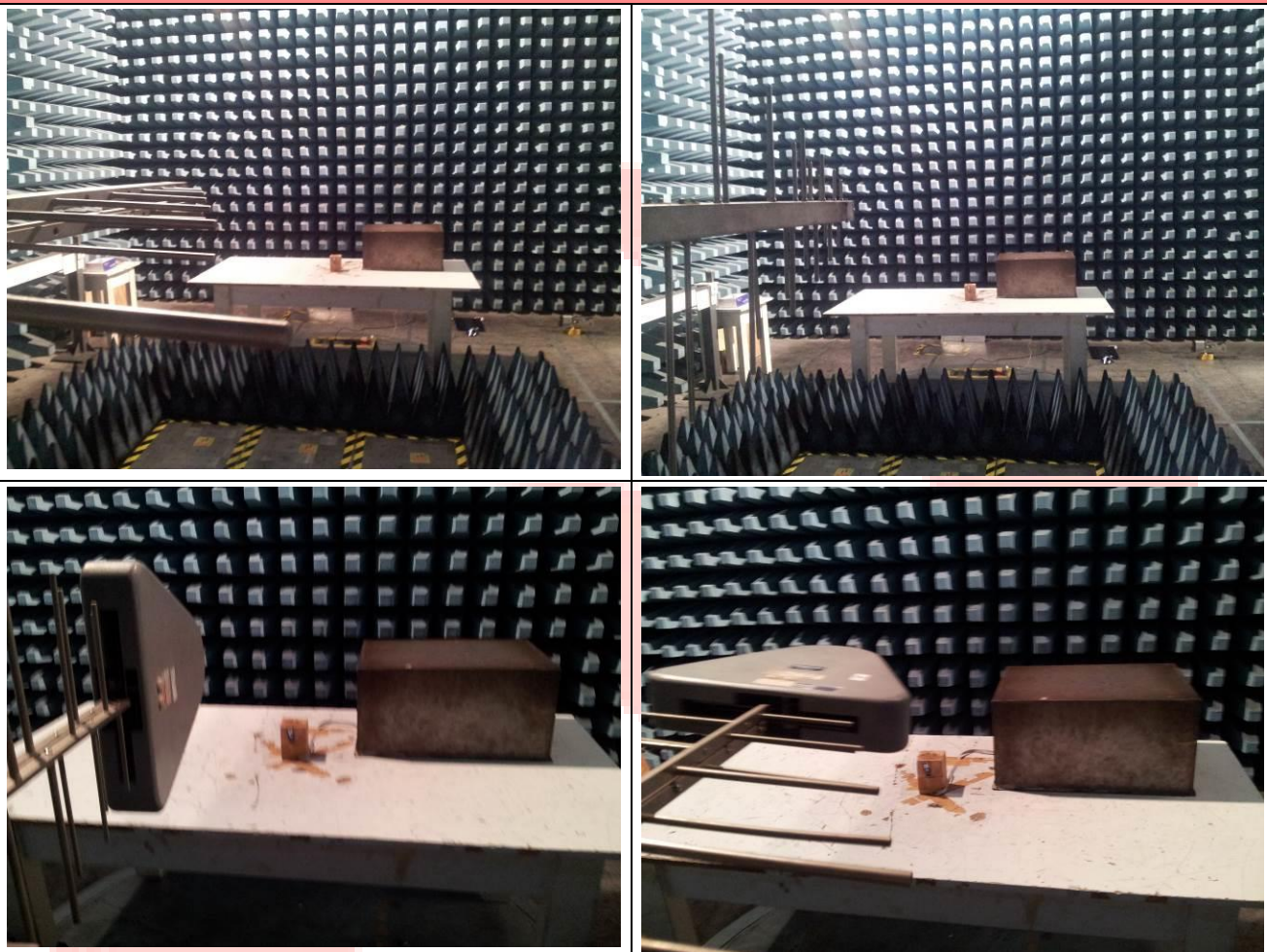
## 6 PHOTOGRAPHIC DOCUMENTATION

PHOTO 1 – EUT IDENTIFICATON





**PHOTO N° 2 – RADIATED IMMUNITY SETUP**



**PHOTO 3 – AUXILIARY EQUIPMENT IDENTIFICATION**

