PRIMA
RICERCA & SVILUPPO

RAPPORTO DI PROVA / *TEST REPORT*

Rif./*Ref*.No. MPETR_150385-1	**Data / D*ate*:14/10/2015**	Pagine / *Pages* **: 13**
Scopo delle prove /*Test object :*	Prove di tipo in accordo a / *Type test acccording to* **FCC Cfr 47 part 2 - §2.1091, part 1 - §1.1310** **IC RSS-102 Issue 5**	
Richiedente / *Applicant* **:**	DMD COMPUTERS s.r.l. Via Monviso 14 I-10090 Villarbasse (TO) – ITALY Phone +39 011 9528282, Fax +39 011 9528402	
Persona di riferimento / *Applicant's referee :*	Mr. Moreno Freguglia (mfreguglia@dmd.it)	
Marchio commerciale / *Trade mark* **:**	DMD	
Fabbricante / *Manufacturer :*	DMD COMPUTERS s.r.l.	
Prodotto / *Product :*	**Telematics platform for localization and data acquisition**	
Modello / *Model* **:**	**TELEMACO/RC2015/ERMETE**	
Data ricevimento campioni / *Date of test samples receipt*:	08/04/2015	
Campioni verificati / *No. of tested samples*	1	
Data verifiche / *Testing date* :	08/04/2015; 11/05/2015	
Sito di prova / *Testing site :*	Prima Ricerca & Sviluppo Via Campagna-92 I-22020 FALOPPIO (CO)	
Esito delle valutazioni / *Assessment results :*	**CONFORME / COMPLIANT**	
Verifiche effettuate da / *Verifications carried out by :*	Enrico BANFI Tecnico Laboratorio EMC e RADIO/ *EMC and RADIO Laboratory Engineer*	Banfi Enrico
Approvato / *Approved by* **:**	Giacomo ARMELLINI Responsabile Laboratorio EMC e RADIO/ *EMC and RADIO Laboratory Manager*	Giacomo Armellini

I risultati delle prove riportati nel presente rapporto di prova si riferiscono solo ai campioni esaminati./*The test results reported in this test report shall refer only to the samples tested*

Questo Report non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Laboratorio / *This report may not be partially reproduced, except with the prior written permission of the issuing Laboratory*

CONTENUTO / TABLE OF CONTENTS

0 RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
MPETR_150385-0	Original Release	05/08/2015
MPETR_150385-1	Editorial Change	14/10/2015

1 TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 EUT Identification

DESCRIPTION :	Telematics platform for localization and data acquisition
TRADEMARK:	DMD COMPUTERS s.r.l.
MODEL:	TELEMACO/RC2015/ERMETE
S/N:	Not present
MANUFACTURER:	DMD COMPUTERS s.r.l.
COUNTRY OF MANUFACTURER:	Italy

MODULE MANUFACTURER (1):	BlueGiga Technologies Inc.
DESCRIPTION	Bluetooth Smart ready HCI
MODULE NAME (1)	BT111
FCC ID (1)	QOQBT111
MAX CONDUCTED OUTPUT POWER	7.2dBm @ 2441MHz
ANTENNA TYPE (1):	MaxStream. mod. A24-HASM-450 Gain 0 dBi

MODULE MANUFACTURER (2):	BlueGiga Technologies Inc.
DESCRIPTION	IEEE 802.11b/g/n Wi-Fi module
MODULE NAME (2):	WF111
FCC ID (2)	QOQWF111
MAX CONDUCTED OUTPUT POWER	19.15dBm @ 2412MHz
ANTENNA TYPE:	Jiashan Jinchang Electron CO.,LTD Model: JCE056 Gain 0 dBi

MODULE MANUFACTURER (3):	CINTERION
DESCRIPTION	GSM/GPRS/EDGE/CDMA/UMTS/HSPA Module
MODULE NAME (3):	PXS8
FCC ID (3)	QIPPXS8
MAX CONDUCTED OUTPUT POWER	33.8dBm @ 850 MHz 30.5dBm @ 1900MHz
ANTENNA TYPE:	Jiashan Jinchang Electron CO.,LTD Model: JCE056 Gain 2 dBi

1.2 EUT technical data

POWER SOURCE	External power source (tipically automotive battery)
POWER SUPPLY NOMINAL VOLTAGE	12/24V⎓
NOMINAL POWER / ABSORBED CURRENT	<2A
EUT DIMENSIONS :	See Photographic documentation
EUT STANDING:	Veichle

1.3 EUT modification

- None

1.4 Ports identification

<table>
<tr><th colspan="2">Port</th><th>Description</th><th>Connector</th><th>Max cable length</th></tr>
<tr><td>1</td><td>Enclosure</td><td>Plastic</td><td>-</td><td>-</td></tr>
<tr><td>2</td><td>AC mains input/output ports</td><td>Port not present</td><td>-</td><td>-</td></tr>
<tr><td>3</td><td>DC mains input/output ports</td><td>12/24 V dc</td><td>Modello</td><td>-</td></tr>
<tr><td>4</td><td>Signals / Control Ports</td><td colspan="3">automotive connector MULTILOCK double section
<table>
<tr><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th></tr>
<tr><td>1A</td><td>GND_RF</td><td>2A</td><td>LAN_RX-</td><td>3A</td><td>GND</td><td>4A</td><td>WU_IN1</td></tr>
<tr><td>1B</td><td>GND</td><td>2B</td><td>LAN_RX+</td><td>3B</td><td>RS232c_RI</td><td>4B</td><td>DIG_IO8</td></tr>
<tr><td>1C</td><td>CAN4H</td><td>2C</td><td>LAN_TX-</td><td>3C</td><td>RS232c_DCD</td><td>4C</td><td>DIG_IO7</td></tr>
<tr><td>1D</td><td>CAN4L</td><td>2D</td><td>LAN_TX+</td><td>3D</td><td>RS232c_CTS</td><td>4D</td><td>DIG_IO6</td></tr>
<tr><td>1E</td><td>CAN3H</td><td>2E</td><td>USB_GND</td><td>3E</td><td>RS232c_RX</td><td>4E</td><td>DIG_IO5</td></tr>
<tr><td>1F</td><td>CAN3L</td><td>2F</td><td>USB_DM</td><td>3F</td><td>RS232c_DTR</td><td>4F</td><td>DIG_IO4</td></tr>
<tr><td>1G</td><td>CAN1L</td><td>2G</td><td>USB_DP</td><td>3G</td><td>RS232c_RTS</td><td>4G</td><td>DIG_IO3</td></tr>
<tr><td>1H</td><td>CAN1H</td><td>2H</td><td>USB_VCC</td><td>3H</td><td>RS232c_TX</td><td>4H</td><td>DIG_IO2</td></tr>
<tr><td>1J</td><td>CAN2H</td><td>2J</td><td>RS485_N</td><td>3J</td><td>RS232c_DSR</td><td>4J</td><td>DIG_IO1</td></tr>
<tr><td>1K</td><td>CAN2L</td><td>2K</td><td>RS485_P</td><td>3K</td><td>GND</td><td>4K</td><td>GND</td></tr>
<tr><td>1L</td><td>MIC_GND</td><td>2L</td><td>DIG-OUT2</td><td>3L</td><td>WU_IN2</td><td>4L</td><td>WU_IN3</td></tr>
<tr><td>1M</td><td>MIC_IN</td><td>2M</td><td>DIG-OUT1</td><td>3M</td><td>PWR</td><td>4M</td><td>PWR_GND</td></tr>
</table>
<table>
<tr><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th></tr>
<tr><td>1A</td><td>EXP_1</td><td>2A</td><td>EXP_9</td><td>3A</td><td>RS232r_TX</td><td>4A</td><td>CAN5L</td></tr>
<tr><td>1B</td><td>EXP_2</td><td>2B</td><td>EXP_10</td><td>3B</td><td>RS232r_RX</td><td>4B</td><td>CAN5H</td></tr>
<tr><td>1C</td><td>EXP_3</td><td>2C</td><td>EXP_11</td><td>3C</td><td>GND</td><td>4C</td><td>CAN6L</td></tr>
<tr><td>1D</td><td>EXP_4</td><td>2D</td><td>EXP_12</td><td>3D</td><td>K1</td><td>4D</td><td>CAN6H</td></tr>
<tr><td>1E</td><td>EXP_5</td><td>2E</td><td>EXP_13</td><td>3E</td><td>K2</td><td>4E</td><td>CANBH</td></tr>
<tr><td>1F</td><td>EXP_6</td><td>2F</td><td>EXP_14</td><td>3F</td><td>K3</td><td>4F</td><td>CANBL</td></tr>
<tr><td>1G</td><td>EXP_7</td><td>2G</td><td>EXP_15</td><td>3G</td><td>EXP_17</td><td>4G</td><td>GND</td></tr>
<tr><td>1H</td><td>EXP_8</td><td>2H</td><td>EXP_16</td><td>3H</td><td>EXP_18</td><td>4H</td><td>TACHO</td></tr>
</table>
SMA connector for GPS antenna
SMA-R antenna WiFi
SMA antenna for GSM
SMA-R BT antenna</td></tr>
<tr><td>5</td><td>Telecommunication port</td><td>Port not present</td><td>-</td><td>-</td></tr>
<tr><td colspan="5">Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.</td></tr>
</table>

2 REFERENCE STANDARDS

CODE OF FEDERAL REGULATIONS	
Title 47 Part 1 Subpart I § 1.1310	Procedures Implementing the National Environmental Policy Act of 1969. Radiofrequency radiation exposure limits.
Title 47 Part 2 Subpart J § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
ANSI C63.4	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
IC RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

3 MEASUREMENTS AND CALCULATION RESULTS

3.1 Calculation Method

Far Field Power flux Calculation model.

This model is applicable in the far-field region and over-estimates in the radiating near-field region.

The far-field calculations are accurate when the distance, r, from an antenna of length D to a point of investigation is greater than

$$r = \frac{2D^2}{\lambda}$$

The Power Flux is

$$S = \frac{PG}{4\pi r^2} \quad \text{or equivalent} \quad S = \frac{EIRP}{4\pi r^2}$$

where

P = input power of the antenna

G = antenna gain relative to an isotropic antenna

r = distance from the antenna to the point of investigation.

EIRP = Effective Isotropic Radiated Power

3.2 Limits

Tab. 1 of CFR Title 47 Part 1 Subpart I § 1.1310

Table 1—Limits for **M**aximum **P**ermissible **E**xposure (**MPE**)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Note to Table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC – RSS-102 Issue 5 par. 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

IC – RSS-102 Issue 5 par. 4 RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (W/m^2)	Averaging time (minutes)
0.003-10	83	90	-	Instantaneous
0.1-10	-	$0.73/f$	-	6
1.1-10	$87/f^{0.5}$	-	-	6
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.

* Power density limit is applicable at frequencies greater than 100 MHz

3.3 Measurements

TX Freq. (MHz)	Peak Power at Antenna Connector (dBm)	Duty Cycle correction (dB)	Average Power at antenna connector	Antenna Gain (dBi)	EIRP (W)
2441 (BT)	7.20	0	7.20	0	0.0052
2412 (WiFi)	19.15	0	19.15	0	0.0822
824.2 (GSM 850)	33.80	-3 (Note 1)	30.80	2	1.905
1850.2 (PCS 1900)	30.50	-3 (Note 1)	27.50	2	0.891

3.4 RF Exposure - Exemption Limits Evaluation according to IC – RSS-102 Issue 5

TX Freq. (MHz)	EIRP (W)	IC Exemption Limit – EIRP (W)	EVALUATION
2441 (BT)	0.0052	2.706	BELOW THE THRESHOLD LIMIT
2412 (WiFi)	0.0822	2.684	BELOW THE THRESHOLD LIMIT
824.2 (GSM 850)	1.905	1.288	ABOVE THE THRESHOLD LIMIT
1850.2 (PCS 1900)	0.891	2.239	BELOW THE THRESHOLD LIMIT

RESULT: RF exposure evaluation is required

3.5 RF Exposure Evaluation

TX Freq. (MHz)	EIRP (W)	Evaluation distance [1] (m)	Power density at evaluation distance (W/m^2)	FCC Power density Limit (W/m^2)	IC Power density Limit (W/m^2)	RESULT
2441 (BT)	0.0052	0.20	0.010	10.00	5.41	WITHIN THE LIMIT
2412 (WiFi)	0.0822	0.50	0.026	10.00	5.37	WITHIN THE LIMIT
824.2 (GSM 850)	1.905	0.50	0.606	5.49	2.57	WITHIN THE LIMIT
1850.2 (PCS 1900)	0.891	0.50	0.284	10.00	4.47	WITHIN THE LIMIT

Note: [1] Minimum installation distance of the antenna from the human body

3.6 RF Exposure Evaluation for multiradio equipment capable of simultaneous transmissions

MAXIMUM PERMISSIBLE EXPOSURE (MPE) EVALUATION for MULTIRADIO EQUIPMENT CAPABLE OF SIMULTANEOUS TRANSMISSIONS

S: Power Density; L: Power Density Limit

In case of simultaneous transmissions:

$$\sum_{i=1}^{n} \frac{Si}{Li} < 1$$

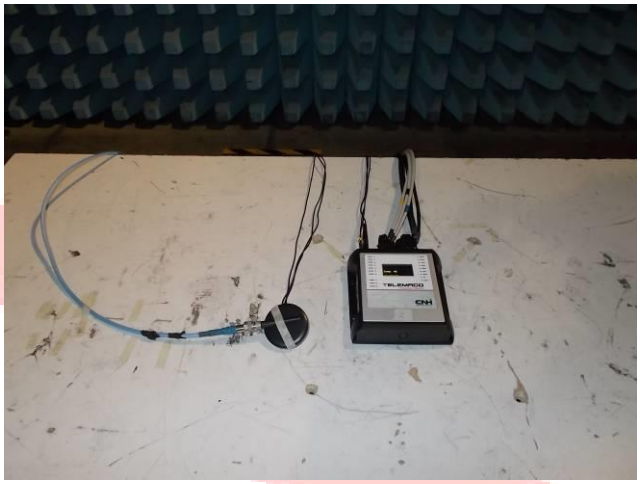
1) Simultaneous transmissions of GSM (850) + Wi-Fi + BT (Worst case limit: IC)

$$\frac{0.010}{5.41} + \frac{0.026}{5.37} + \frac{0.606}{2.57} = 0.242 < 1$$

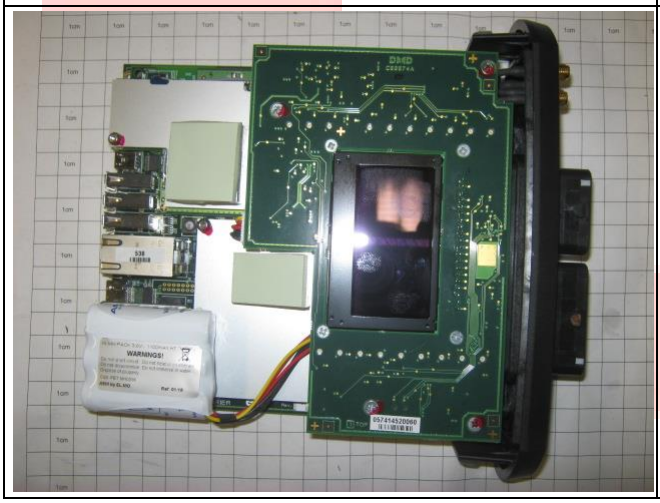
2) Simultaneous transmissions of GSM (1900) + Wi-Fi + BT

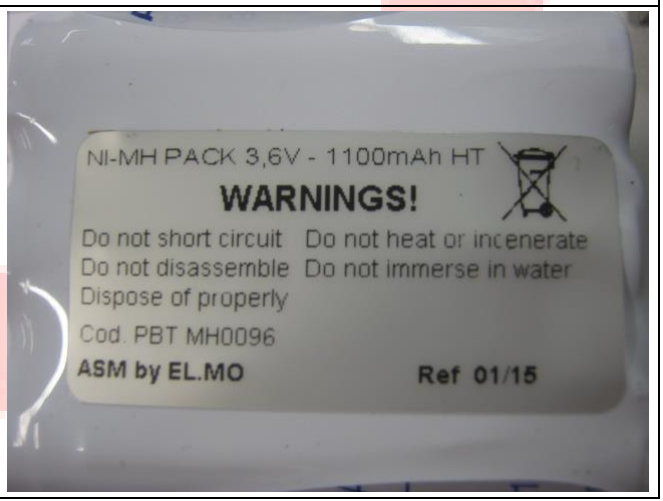
$$\frac{0.010}{5.41} + \frac{0.026}{5.37} + \frac{0.284}{4.47} = 0.113 < 1$$

PHOTO N° 1 – EUT IDENTIFICATION




TELEMACO
CNH




NI-MH PACK 3,6V - 1100mAh HT
WARNINGS!
Do not short circuit
Do not heat or incenerate
Do not disassemble
Do not immerse in water
Dispose of properly
Cod. PBT MH0096
ASM by EL.MO
Ref 01/15