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ELECTRICAL SAFETY
LASER SPECTROSCOPY
ENVIRONMENTAL PHYSIC

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ISO 9001:2008
SINCERT

G.S.D. Srl PISA - Italy	***Test Report n. 12951-B-FCC***	Rev. 00

Applicant	**Tecnomotor S.p.A.** Via Moruzzi, 3/A Italy43122 Parma (PR)
Mailing	**Tecnomotor S.p.A.** Via Moruzzi, 3/A 43122 Parma (PR) Italy
Attention of	Ing. Ronnie Guasti Email: ronnie.guasti@tecnomotor.it Tel: +39 0521 398 261; Fax: +39 0521 607 586
Equipment	**TPM**
FCC Rules	Rule Part 15, Subpart C - Intentional Radiators
Testing Laboratory	**G.S.D. S.r.l.** Via Marmiceto, 8 - 56121 Ospedaletto Pisa (PI) Italy
FCC listed	Id nr. 424037

Gentlemen:
The device also contains a broadband receiver operating in the range 315-915MHz.
Does the client also want certification of this receiver under part 15B.

Location and Date of Issue	Pisa, 30th July 2012

G.S.D. s.r.l.
Via Marmiceto, 8
56121 OSPEDALETTO - PISA
Tel. 050.984254 - Fax 050.984262
P. IVA 01343950505
www.gsd.it

SENIOR TEST ENGINEER
Francesco Barbierato

QUALITY MANAGER
David Pelliccia

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G.S.D. Srl **PISA - Italy**	***Test Report n. 12951-B-FCC***	Rev. 00

Model	**TPM**
To	**Federal Communications Commission**
FCC Rules	**47 CFR (2010)** **Rule Part 15, Subpart B - Unintentional Radiators** **Class B Limits**
At the request of	**Tecnomotor S.p.A.** Via Moruzzi, 3/A Italy43122 Parma (PR)
Mailing	**Tecnomotor S.p.A.** Via Moruzzi, 3/A 43122 Parma (PR) Italy
Attention of	Ing. Ronnie Guasti Email: ronnie.guasti@tecnomotor.it Tel: +39 0521 398 261; Fax: +39 0521 607 586
Testing Laboratory	**G.S.D. S.r.l.** Via Marmiceto, 8 - 56121 Ospedaletto Pisa (PI) Italy Tel/Fax +39 050 984254 / +39 050 984262 e-mail: info@gsd.it
Date	Pisa, 30th July 2012

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The applicant has been cautioned as to the following:

15.21 Information to User.

The User's Manual or Instruction Manual for an unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories.
However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.
Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment.
The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Testimonial and Statement of Certification

This is to certify that:

1. That the application was prepared either by, or under the direct supervision of, the undersigned.

2. That the technical data supplied with the application was taken under my direction and supervision.

3. That the data was obtained on representative units, randomly selected.

4. That, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

INDEX

1. MANUFACTURER AND EUT IDENTIFICATION[1]

Applicant	Tecnomotor S.p.A. Via Moruzzi, 3/A Italy43122 Parma (PR)
Manufacturer	Tecnomotor S.p.A. Via Moruzzi, 3/A 43122 Parma (PR) Italy
EUT Category	Unintentional Radiator (broadband receiver 315-915 MHz)
Test Item Name	TPM
Date of reception	30th July 2012
Sampling	Random from production
Test Item Description	Tyre Monitor Sensor
Power	12Vdc by internal battery pack 7.4V DC 1300mAh internal battery pack 11.1V DC 800mAh internal battery pack (as alternative)
Max. internal frequency	12 MHz (quarz of µP)
Other frequencies	125 kHz inductive low power transponder (RX+TX), see Test Report 12951-A-FCC

[1] A detailed documentation is preserved in the internal fascicle.

2. REFERENCE STANDARDS

Tests and measurements are performed accordingly to the reference standards given in the table below:

TEST	***STANDARD***
DC Power line Conducted Emissions	FCC Rules and Regulations, 47 CFR (2010) Part 15.107 – Sub part B
Radiated Emissions	FCC Rules and Regulations, 47 CFR (2010) Part 15.109 – Sub part B

3. TEST GENERALITY

Sub-part C: Intentional radiator

Test and Measurement Data
All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2 and the following individual Parts: 15.207, 15.209; Intentional Radiators

Standard Test Conditions and Engineering Practices
Except as noted herein, the following conditions and procedures were observed during the testing:
In accordance with ANSI C63.4-2004, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.
Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures.
All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.
Measurement results, unless otherwise noted, are worst-case measurements.

Summary of Test Results

TEST	***STANDARD***	***RESULT***
DC Power line Conducted Emissions	FCC Rules and Regulations, Title 47 (2010) Part 15, Section 15.107, Sub part B	*N/A (*)*
Radiated emissions	FCC Rules and Regulations, Title 47 (2010) Part 15, Section 15.109, Sub part B	*Pass (**)*

(*) Conducted emissions not required for battery powered devices.

(**) Radiated emissions performed until 10th harmonic of the highly extreme frequency of the broadband receiver equal to 9150 MHz. See Graphics performed until 10GHz.

The results refer only to the sampled EUT and under the specified conditions.

4. DC POWERLINE CONDUCTED EMISSIONS

Equipment shall meet the limits below when using a CISPR16 quasi-peak and average detector receivers.

FCC, §15.107

FREQUENCY RANGE (MHz)	*QUASI-PEAK LIMIT* [dB (μV)]	*AVERAGE LIMIT* [dB (μV)]
0.15 ÷ 0.50	66 ÷ 56(*)	56 ÷ 46(*)
0.50 ÷ 5	56	46
5 ÷ 30	60	50

(*) *Limit decreasing linearly with logarithm of frequency*

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	HP	HP8546A	01/2013
EMI Receiver Filter Section	HP	HP85460A	01/2013
Screened Room	GSD	CSC01	01/2013
Transient Limiter	HP	11947A	01/2013
LISN	GSD	GSDA01	01/2013

Test procedure: CE22R01

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a spectrum analyzer by a transient limiter. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits

Test method

Test method was in accordance with the reference standard.
EUT modes of operations were tested in order to achieve the maximum level of emission.

Results

Not applicable.
Used around a vehicle powered by internal battery pack.
Conducted emissions not required for battery powered devices.

5. RADIATED EMISSIONS

In the following table you can find the limits established by the reference standard:

FCC, § 15.109 Radiated emission limits (except for Class A digital device)

DISTANCE *(m)*	***FREQUENCY RANGE*** *(MHz)*	***QUASI-PEAK LIMITS*** *[dB (μV/m)]*	***AVERAGE LIMITS*** *[dB (μV/m)]*
3	30 ÷ 88	40	--
3	88 ÷ 216	43,5	--
3	216 ÷ 960	46	--
3	Above 960	54	--
3	Above 960	--	54

Test Equipment

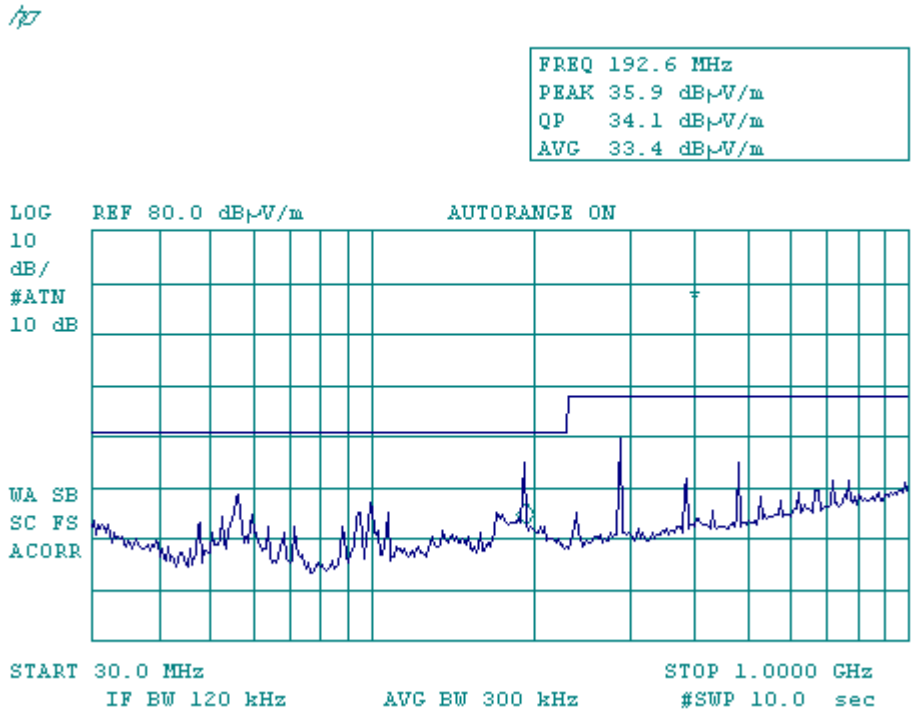
EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	HP	HP8546A	01/2013
EMI Receiver Filter Section	HP	HP85460A	01/2013
Anechoic Chamber	Comtest	CSA01	01/2013
Loop Antenna (9kHz-30MHz)	R&S	HFH2-Z2	01/2013
Spectrum Analyzer	Agilent	E4440A	01/2013
RF preselector	Agilent	N9039A	01/2013
Bilog Antenna (30-1000 MHz)	Schaffner	CBL6112B	01/2013
Horn Antenna 1-18 GHz)	EMCO	3115	01/2013
Controller	Deisel	HD100	01/2013
Turn Table	Deisel	MA240	01/2013

Test procedure: RE22R02
The EUT was tested in an Semianechoic room set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and raised from 1 to 4 meters to ensure the TX signal levels were maximized. All emissions from 9 kHz until 1 GHz were examined.

Notes
Azimuth position EUT-Antenna corresponding to 0° identifies the rotating table orientation (TT) in which the instrument to be tested shows the front part turned towards the antenna. Positive grades individuate clockwise rotations of TT when this one is observed from the top. For negative degrees, TT rotation is anticlockwise.
Antenna height respect to the mass plane is conventionally individuated with: MA=XXX where XXX indicates the height (always positive for h>100) expressed in cm.

Results and conclusions
In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.

Job Number	12951-B-FCC
Test Name	Radiated Emissions FCC 15.109
EUT Name	TPM



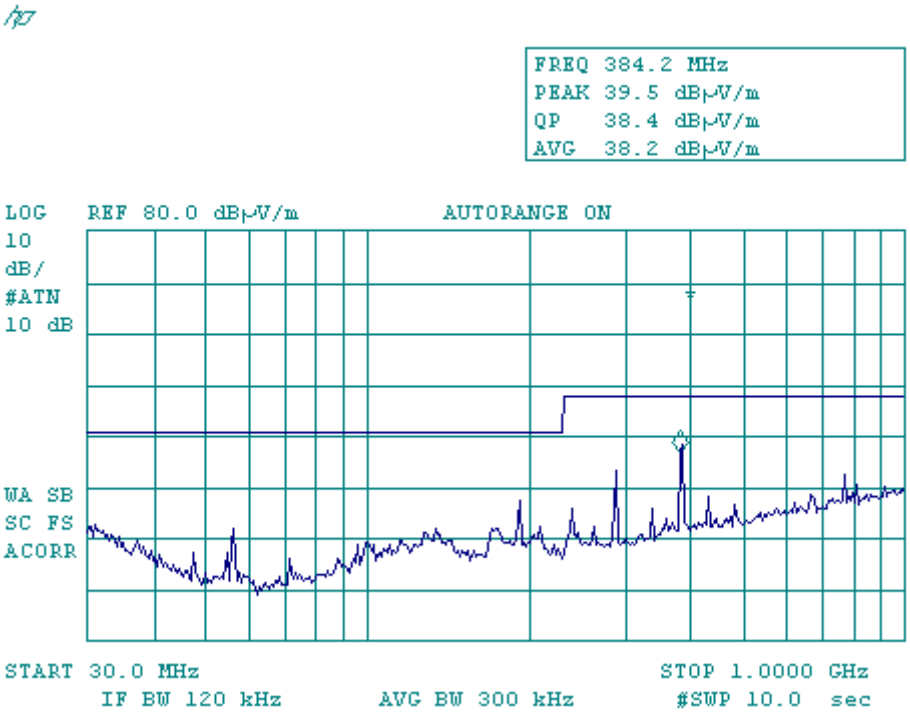
Notes:
Vertical Polarization
MAST: 100 – 400 cm
TT: 0°, 90°, 180° and 270°
EUT power: 12 Vdc (external battery source)
EUT operating mode: ready to use, RX operates. ECU cable connected. (no 12 Vdc in the cable, simulated communication only)

Fig. 1
Record of the measurement of radiated emissions.
Envelope of the maximum disturbance determined in the frequency range 30 – 1000 MHz.

Table of final test measurements

Frequency range (MHz)	Measured level (QP)	Limit (QP) at 3m	Test Result
30.0 – 88.0	< 30 dBµV/m	40,0 dBµV/m	Within the limit
88.0 – 192.0	< 22 dBµV/m	43,5 dBµV/m	Within the limit
192.6	34,1 dBµV/m	43,5 dBµV/m	Within the limit
193.0 – 216.0	< 36 dBµV/m	43,5 dBµV/m	Within the limit
216.0 – 960.0	< 37,6 dBµV/m	46,0 dBµV/m	Within the limit
960.0 – 1’000.0	< 30 dBµV/m	54,0 dBµV/m	Within the limit

Job Number	12951-B-FCC
Test Name	Radiated Emissions FCC 15.109
EUT Name	TPM



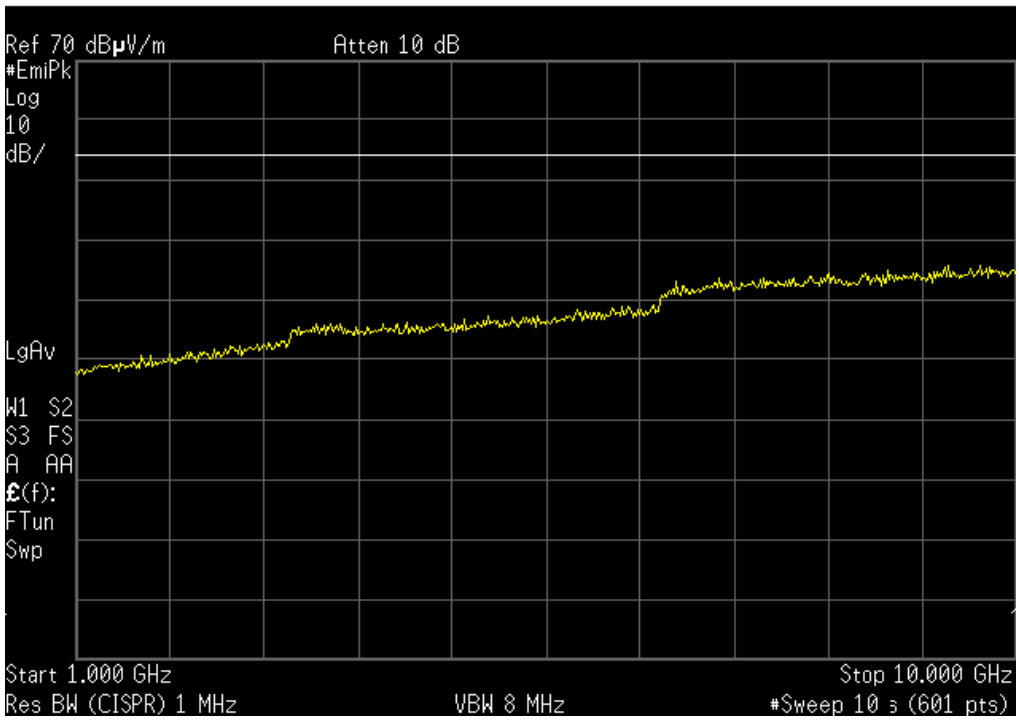
Notes:
Horizontal Polarization
MAST: 100 – 400 cm
TT: 0°, 90°, 180° and 270°
EUT power: 12 Vdc (external battery source)
EUT operating mode: ready to use, RX operates. ECU cable connected. (no 12 Vdc in the cable, simulated communication only)

Fig. 2
Record of the measurement of radiated emissions.
Envelope of the maximum disturbance determined in the frequency range 30 – 1000 MHz.

Table of final test measurements

Frequency range (MHz)	Measured level (QP)	Limit (QP) at 3m	Test Result
30.0 – 88.0	< 20 dBµV/m	40,0 dBµV/m	Within the limit
88.0 – 216.0	< 20 dBµV/m	43,5 dBµV/m	Within the limit
216.0 – 384.0	< 30 dBµV/m	46,0 dBµV/m	Within the limit
384.2	38,4 dBµV/m	46,0 dBµV/m	Within the limit
385.0 – 960.0	< 32 dBµV/m	46,0 dBµV/m	Within the limit
960.0 – 1’000.0	< 29 dBµV/m	54,0 dBµV/m	Within the limit

Job Number	12951-B-FCC
Test Name	Radiated Emissions FCC 15.109
EUT Name	TPM



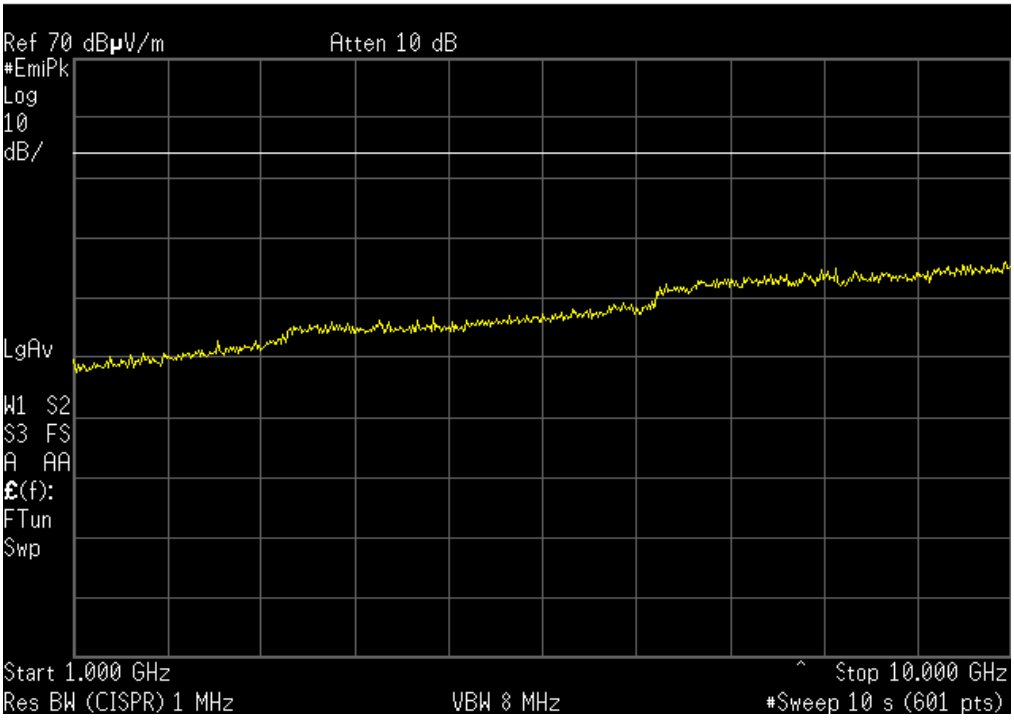
Notes:
Horizontal Polarization
MAST: 100 – 400 cm
TT: 0°, 90°, 180° and 270°
EUT power: 12 Vdc (external battery source)
EUT operating mode: ready to use, RX operates. ECU cable connected. (no 12 Vdc in the cable, simulated communication only)

Fig. 3
Record of the measurement of radiated emissions.
Envelope of the maximum disturbance determined in the frequency range 1 – 10 GHz.

Table of final test measurements

Frequency range (MHz)	**Measured level (PK)**	**Limit (AVG) at 3m**	**Test Result**
1’000 – 2’300	< 25 dBµV/m	54,0 dBµV/m	Within the limit
2’300 – 6’200	< 30 dBµV/m	54,0 dBµV/m	Within the limit
6’200 – 10’000	< 36 dBµV/m	54,0 dBµV/m	Within the limit

Job Number	12951-B-FCC
Test Name	Radiated Emissions FCC 15.109
EUT Name	TPM



Notes:
Vertical Polarization
MAST: 100 – 400 cm
TT: 0°, 90°, 180° and 270°
EUT power: 12 Vdc (external battery source)
EUT operating mode: ready to use, RX operates. ECU cable connected. (no 12 Vdc in the cable, simulated communication only)

Fig. 4
Record of the measurement of radiated emissions.
Envelope of the maximum disturbance determined in the frequency range 1 – 10 GHz.

Table of final test measurements

Frequency range (MHz)	Measured level (PK)	Limit (AVG) at 3m	Test Result
1’000 – 2’300	< 25 dBµV/m	54,0 dBµV/m	Within the limit
2’300 – 6’200	< 30 dBµV/m	54,0 dBµV/m	Within the limit
6’200 – 10’000	< 36 dBµV/m	54,0 dBµV/m	Within the limit

6. PHOTOGRAPHIC SECTION

Fig. 5 Radiated emission test set-up

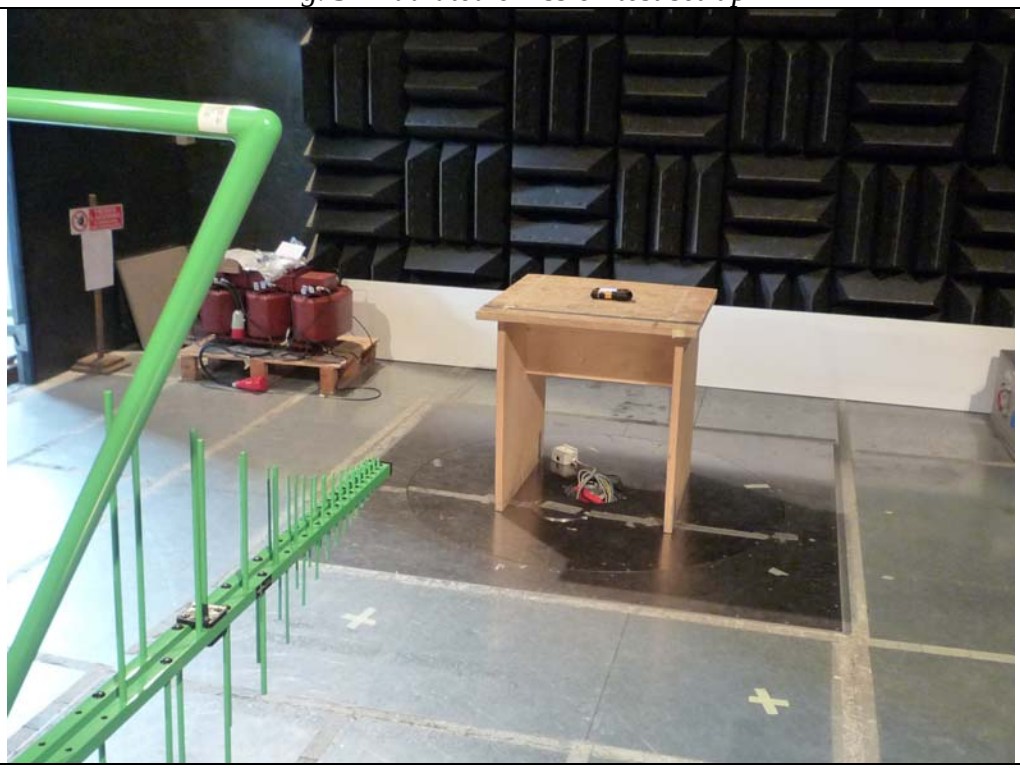
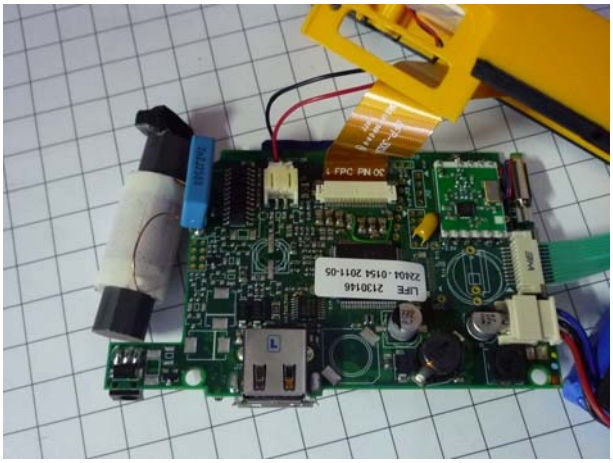


Fig. 6 Radiated emission test set-up

Fig. 7 EUT identification – external view

Fig. 8 EUT identification – internal view



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