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ELECTROMAGNETIC COMPATIBILITY
ELECTRICAL SAFETY
LASER SPECTROSCOPY
ENVIRONMENTAL PHYSIC



Organizzazione con Sistema
di Gestione certificato
Company with Management
System certified
ISO 9001:2008



G.S.D. Srl PISA - Italy	Test Report n. 12951-A-FCC	Rev. 00		
Applicant	Tecnomotor S.p.A. Via Moruzzi, 3/A Italy 43122 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: Certification of the inductive transponder at 125 kHz is required under part 15C (tests according to 15.209).				
Location and Date of Issue	Pisa, 30 th July 2012			
G.S.D. s.r.l. Via Marmiceto, 8 56121 OSPEALETTO - 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-A-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, 30 th 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		
<p>SENIOR TEST ENGINEER Francesco Barbierato </p> <p>QUALITY MANAGER David Pelliccia </p>		

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.

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1. MANUFACTURER AND EUT IDENTIFICATION¹

Applicant Tecnomotor S.p.A.
Via Moruzzi, 3/A Italy 43122 Parma (PR)

Manufacturer Tecnomotor S.p.A.
Via Moruzzi, 3/A 43122 Parma (PR) Italy

EUT Category Intentional Radiator (inductive transponder 125kHz)

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 μ P)

Other frequencies 315-915 MHz RF broad-band receiver (RX only),
See Test Report 12951-B-FCC

¹ A detailed documentation is preserved in the internal fascicle.

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2. REFERENCE STANDARDS

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

TEST	STANDARD
<i>DC Power line Conducted Emissions</i>	FCC Rules and Regulations, 47 CFR (2010) Part 15.207 – Sub part C
<i>Radiated Emissions</i>	FCC Rules and Regulations, 47 CFR (2010) Part 15.209 – Sub part C

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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
<i>DC Power line Conducted Emissions</i>	FCC Rules and Regulations, Title 47 (2010) Part 15, Section 15.207, Sub part C	<i>N/A (*)</i>
<i>Radiated emissions</i>	FCC Rules and Regulations, Title 47 (2010) Part 15, Section 15.209, Sub part C	<i>Pass</i>

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

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, §15.207

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, § 15.209 Radiated emission limits; general requirements

DISTANCE (m)	FREQUENCY RANGE (MHz)	QUASI-PEAK LIMITS [dB (μV/m)]	AVERAGE LIMITS [dB (μV/m)]
300	0.009-0.490	48,5 to 13,8	--
30	0.490-1.705	33,8 to 23,0	--
30	1.705-30.0	30	--
3	30 ÷ 88	40	--
3	88 ÷ 216	43,5	--
3	216 ÷ 960	46	--
3	960 ÷ 1000	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	R&S	HFH2-Z2	01/2013
Bilog Antenna	Schaffner	CBL6112B	01/2013
Horn Antenna	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

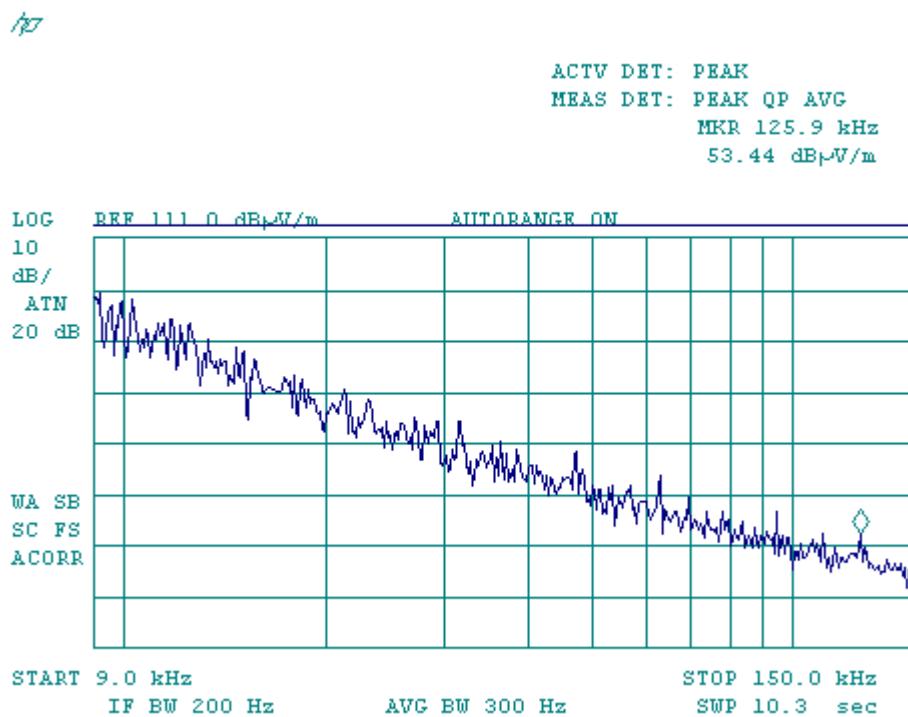
In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.

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Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Vertical Polarization (Loop antenna)

MAST: 100 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

EUT operating mode: LF transmission at 125 kHz operates.

Fig.1
Record of the measurement of radiated emissions.
Envelope of the maximum disturbance determined in the frequency range 9 – 150 kHz.

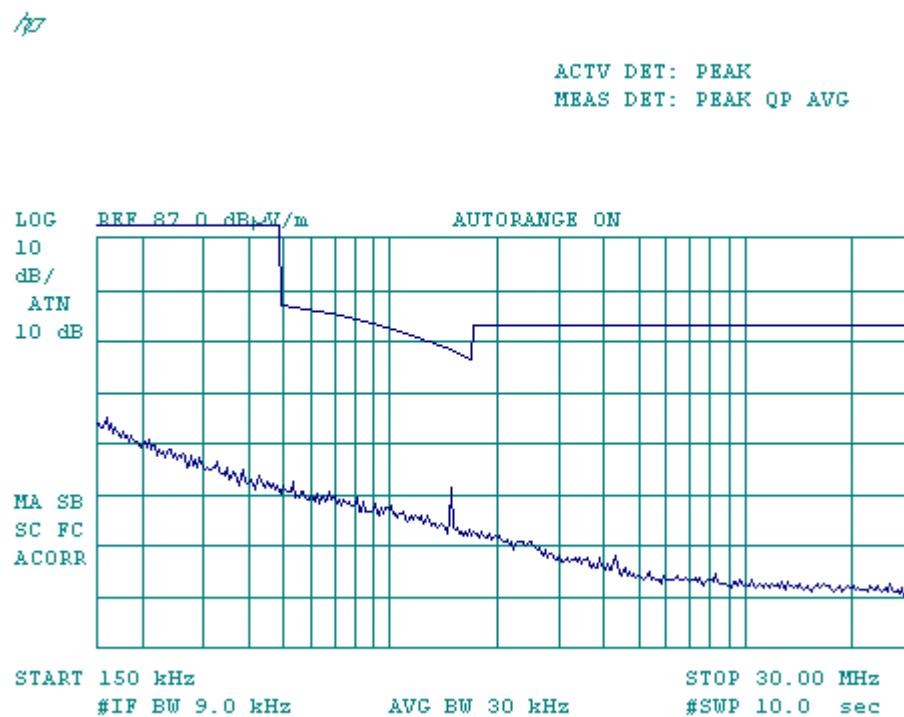
This measurement was performed at 3 m of distance.

The envelope measured with +PK detector, in this condition was closed to the noise level of the semi-anechoic room.

Table of final test measurements

Frequency range (kHz)	Measured level (QP)	Limit (QP) adj. for 3m	Test Result
9.0 - 20	< 77 dB μ V/m	88,5 to 81,6 dB μ V/m	Within the limit
20 - 70	< 57 dB μ V/m	88,5 to 81,6 dB μ V/m	Within the limit
70 – 124	< 60 dB μ V/m	88,5 to 81,6 dB μ V/m	Within the limit
125.9	52.44 dB μ V/m	dB μ V/m	Within the limit
130 – 150	< 50 dB μ V/m	65,3 to 64,0 dB μ V/m	Within the limit

Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Vertical Polarization (Loop antenna)

MAST: 100 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

EUT operating mode: LF transmission at 125 kHz operates.

Fig.2

Record of the measurement of radiated emissions.

Envelope of the maximum disturbance determined in the frequency range 0.15 – 30 MHz.

This measurement was performed at 3 m of distance.

The envelope measured with +PK detector, in this condition was closed to the noise level of the semi-anechoic room.

Table of final test measurements

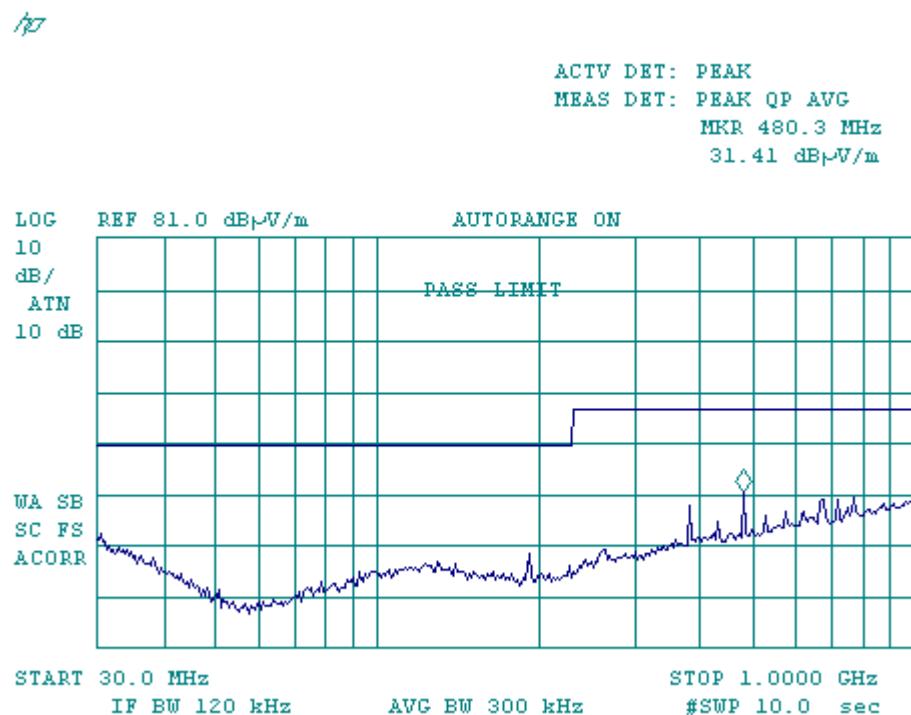
Frequency range (kHz)	Measured level (QP)	Limit (QP) adj. for 3m	Test Result
150.0 – 200.0	< 47 dB μ V/m	64,0 to 61,6 dB μ V/m	Within the limit
200.0 – 490.0	< 27 dB μ V/m	61,6 to 53,8 dB μ V/m	Within the limit
490.0 – 700.0	< 24 dB μ V/m	33,8 to 30,7 dB μ V/m	Within the limit
700.0 – 1'500.0	< 15 dB μ V/m	30,7 to 24,1 dB μ V/m	Within the limit
1'503.6	21.23 dB μ V/m	24,1 dB μ V/m	Within the limit
1'550 – 1'705	< 11 dB μ V/m	49,5 dB μ V/m	Within the limit
1'700 – 30'000	< 9 dB μ V/m	49,5 dB μ V/m	Within the limit

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Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Vertical Polarization

MAST: 100 – 400 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

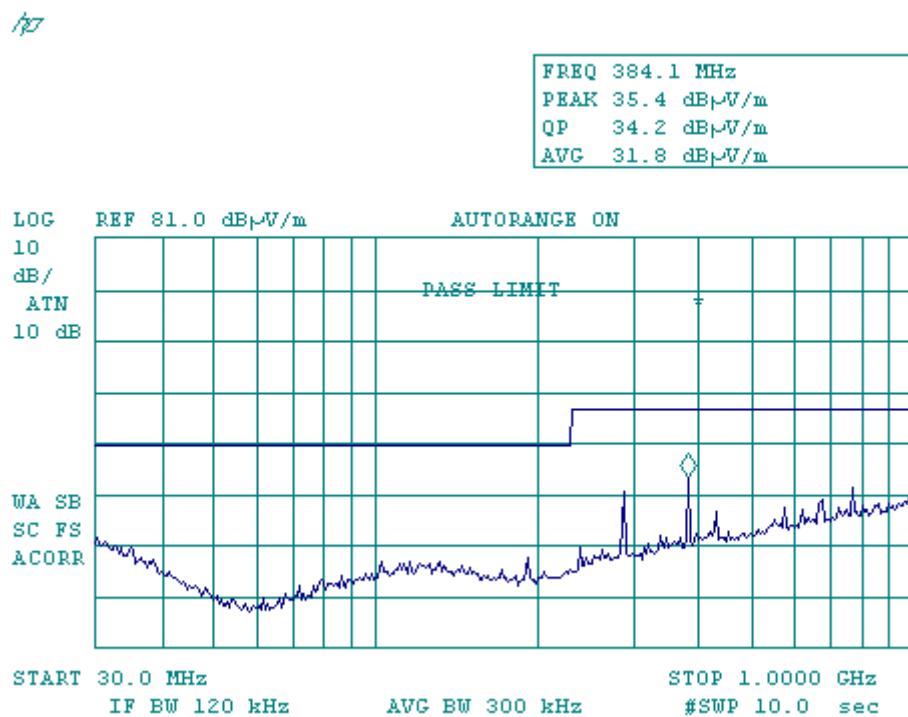
EUT operating mode: ready to use, RX operates. No other external cable connected.

Fig.3
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	< 22 dB μ V/m	40,0 dB μ V/m	Within the limit
88.0 – 216.0	< 22 dB μ V/m	43,5 dB μ V/m	Within the limit
216.0 – 960.0	< 30 dB μ V/m	46,0 dB μ V/m	Within the limit
960.0 – 1'000.0	< 30 dB μ V/m	54,0 dB μ V/m	Within the limit

Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Horizontal Polarization

MAST: 100 – 400 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

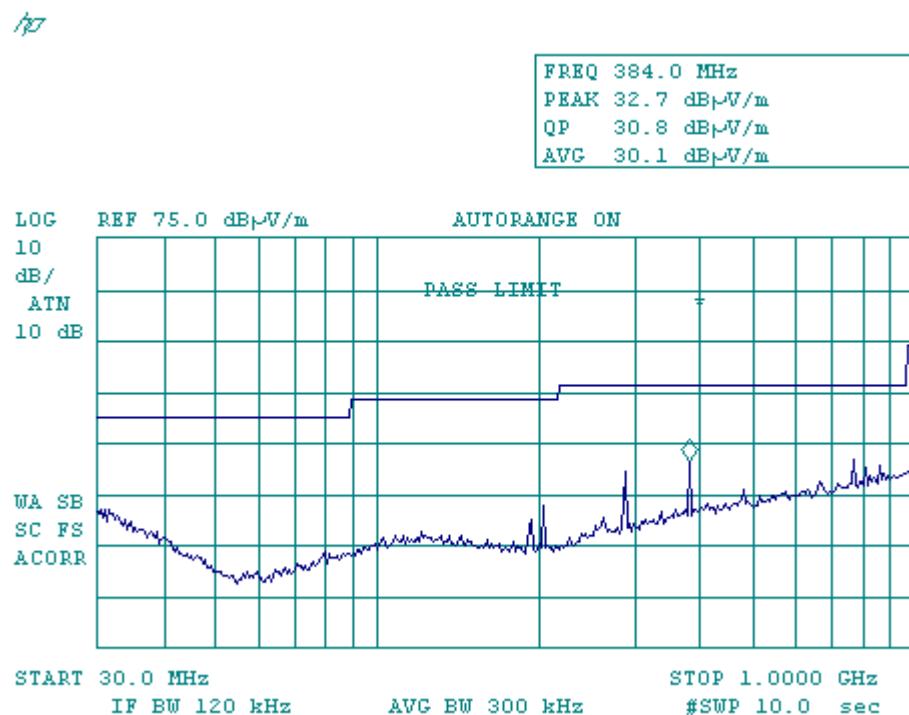
EUT operating mode: ready to use, RX operates. No other external cable connected.

Fig.4
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	< 22 dB μ V/m	40,0 dB μ V/m	Within the limit
88.0 – 216.0	< 22 dB μ V/m	43,5 dB μ V/m	Within the limit
216.0 – 384.0	< 32 dB μ V/m	46,0 dB μ V/m	Within the limit
384.1	34,2 dB μ V/m	46,0 dB μ V/m	Within the limit
385.0 – 960.0	< 32 dB μ V/m	46,0 dB μ V/m	Within the limit
960.0 – 1'000.0	< 30 dB μ V/m	54,0 dB μ V/m	Within the limit

Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Vertical Polarization

MAST: 100 – 400 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

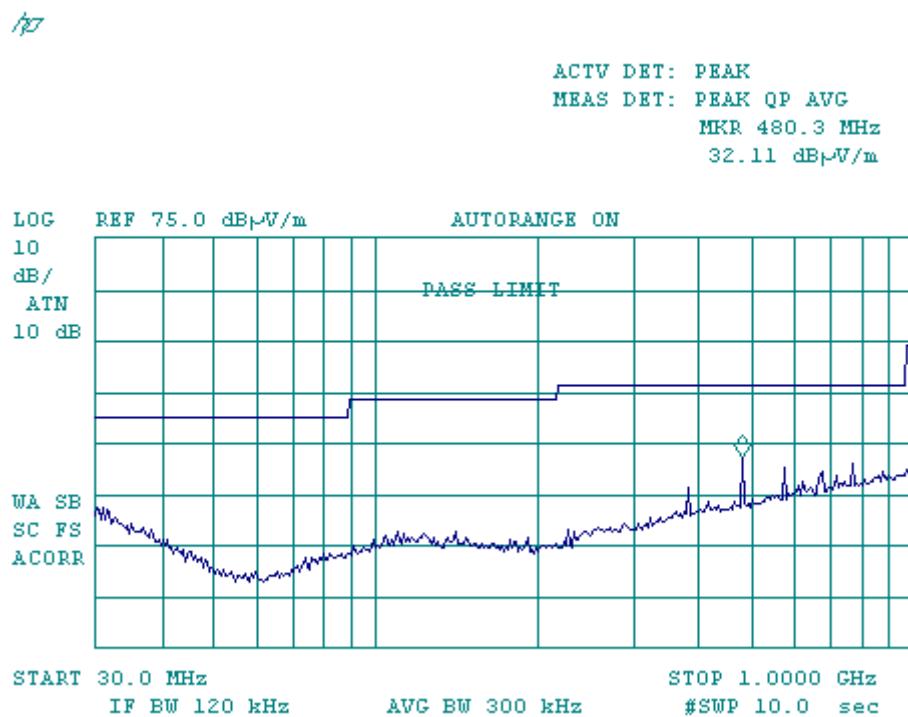
EUT operating mode: ready to use, LF transponder at 125 kHz operates

Fig. 5
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	< 19 dBμV/m	40,0 dBμV/m	Within the limit
88.0 – 216.0	< 16 dBμV/m	43,5 dBμV/m	Within the limit
216.0 – 383.0	< 30 dBμV/m	46,0 dBμV/m	Within the limit
384.0	30,8 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	< 30 dBμV/m	54,0 dBμV/m	Within the limit

Job Number 12951-A-FCC
 Test Name Radiated Emissions FCC 15.209
 EUT Name TPM



Notes:

Horizontal Polarization

MAST: 100 – 400 cm

TT: 0°, 90°, 180° and 270°

EUT power: internal battery pack

EUT operating mode: ready to use, LF transponder at 125 kHz operates

Fig. 6
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	< 19 dB μ V/m	40,0 dB μ V/m	Within the limit
88.0 – 216.0	< 16 dB μ V/m	43,5 dB μ V/m	Within the limit
216.0 – 480.0	< 30 dB μ V/m	46,0 dB μ V/m	Within the limit
480.3	30,8 dB μ V/m	46,0 dB μ V/m	Within the limit
481.0 – 960.0	< 32 dB μ V/m	46,0 dB μ V/m	Within the limit
960.0 – 1'000.0	< 30 dB μ V/m	54,0 dB μ V/m	Within the limit

6. PHOTOGRAPHIC SECTION



Fig. 7 Radiated emission test set-up



Fig. 8 Radiated emission test set-up

Fig. 9 EUT identification – external view

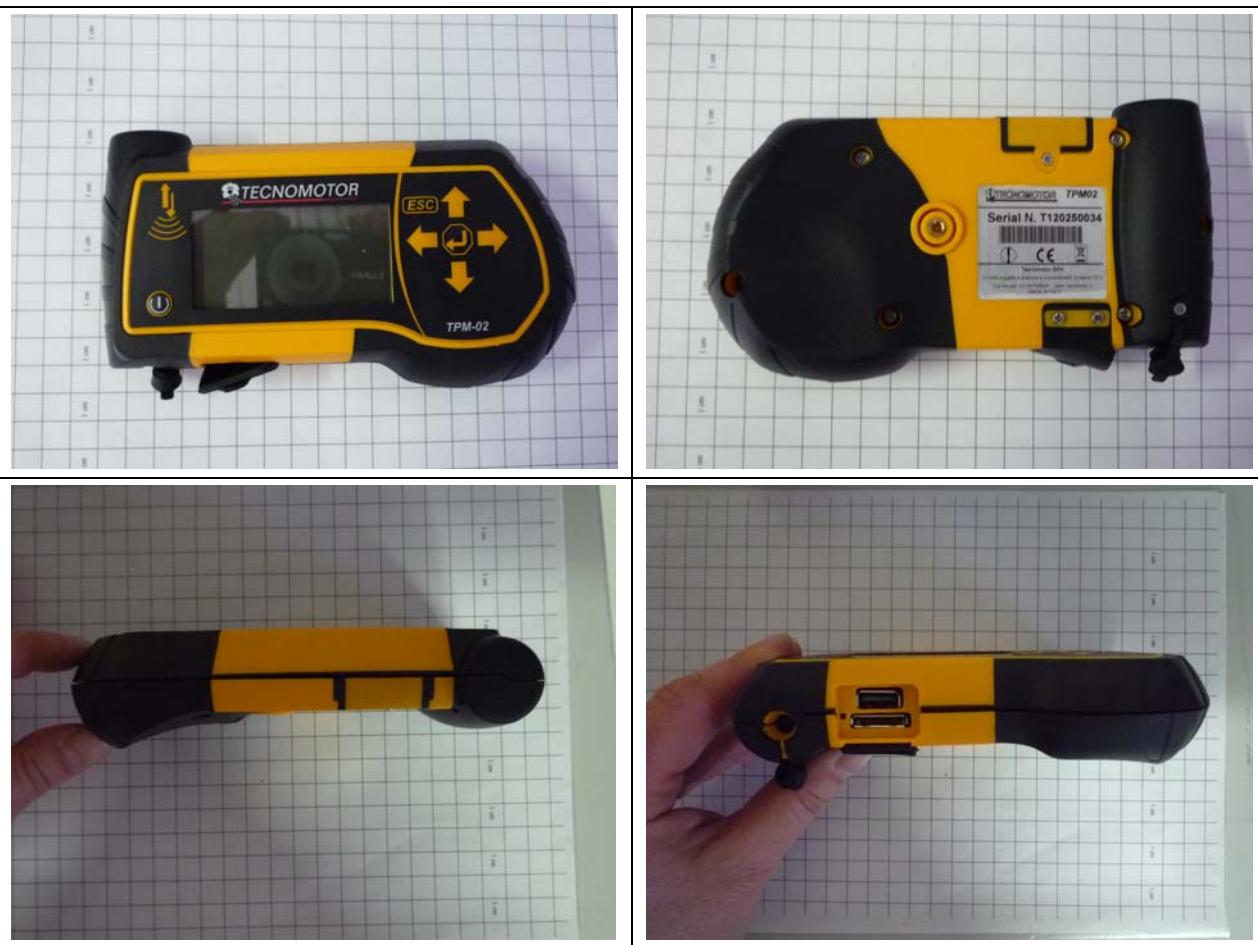


Fig. 10 EUT identification – internal view



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