

EQUIPMENT UNDER TEST :

APPARECCHIO IN PROVA :

TRANSMITTER PMR4

DERIVED MODELS :

MODELLI DERIVATI :

PMR2

REFERENCE STANDARDS :

NORME DI RIFERIMENTO :

FCC 47CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** V2 ELETTRONICA S.p.A.
Ente / Società:
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Sig.:
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Telefono : *Fax :* *e-mail*

Site of test execution:

Località esecuzione prove:

Via Campagna, 92 - 22020 Gaggino Faloppio (CO) - Italy

Date of test samples receipt:

Data ricevimento campioni:

10/10/03

Date of start test:

Data inizio prove:

13/10/03

Date of end test:

Data fine prove:

14/10/03

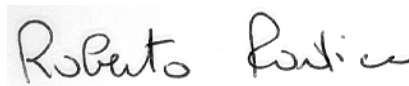
Witness to the test:

Presenti alle prove:

Nobody / Nessuno

Signature of the engineers:

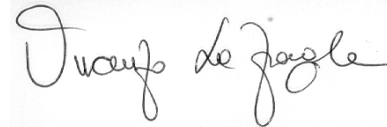
Firma esecutore prove:



R. Radice

Signature of the Laboratory Director:

Firma Direttore Laboratori:



V. La Fragola

The test results recorded in this Test Report are exclusively referred to the tested samples.

I risultati del presente rapporto di prova si riferiscono esclusivamente al campione sottoposto a prova.

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1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name:	V2 ELETTRONICA S.p.A.
Equipment :	TRANSMITTER
Model name or No. :	PMR4
Serial number :	Not present
FCC ID :	RSK-V2-PMR4
Country of manufacturer:	ITALY

1.2 Technical data

FCC class:	Intentional Radiators
Supply voltage:	Internal Lithium Battery (n°2 x 3V)
Input Power / Current :	11 mA
Typical usage :	Remote controls of vehicular gates, rolling shutters or rolling curtains
EUT single or system:	Single
EUT dimensions :	6,9 x 6,9 x 1,8 cm.

1.3 Transmitter technical data

TRANSMITTER

- Working Frequency : 433,92 MHz
- Frequency Range of Operation : 433,05 ÷ 434,79 MHz
- Rated power : 1,26 μ W
- Antenna type : integral
- Modulation : OOK

1.4 Modifications incorporated in E.U.T.

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

- None

1.5 Ports identification

This section contains descriptions of all signal ports and AC/DC power input/output 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.

Port		Description	Connection
1	Enclosure	Plastic surface	By pressure
2	AC power input/output ports	Line not present	*****
3	DC power input/output ports	Internal Lithium battery 2 x 3V	Battery support
4	Signals ports	Line not present	*****

Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.

1.6 Auxiliary equipment

No auxiliary equipment

2. TEST CONDITIONS

2.1 Operating test modes and test conditions

The equipment has been tested according to the operative conditions described in the user/installation manual provided by the manufacturer and by following reference standards :

Reference Standard:

- FCC Part 15, Subpart C, Section 15.231

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" of all technical sheets of the tests (see Section 4)

Operating condition	Description
#1	<i>Continuous transmission of bit stream.</i>

2.2 Test overview

Sample tested is the main model of a complete set of 433,92 MHz RF transmitters (see also Section 7).

The appliance is classified as "*intentional radiator*" in conformity to FCC Part 15 Sub. A §15.201, and it is subject to "*Certification*" procedure.

The application is mainly used as remote control for automatic gate and door openers, activated pushing its buttons; the deactivation of RF signal happens releasing the command pressure.

It is possible to declare that the appliance it is subject to additional requirements stated in §15.231.

3. REFERENCE STANDARD FOR PERFORMED TESTS

<i>Reference standard :</i>	<i>Title :</i>
FCC Part 15 part A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)
FCC Part 15 part C	Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)
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

4. SUMMARY OF TEST RESULTS

4.1 Tests

Port		Phenomena	Operating condition ¹	Result
1	Enclosure	Radiated emission	#1	Within the limit
		Frequency stability	#1	Within the limit
2	AC mains Input ports	RF Disturbance voltage: • continuous	Not applicable ²	
		Bandwidth of emission	Not applicable ²	
3	DC Power supply and Battery	Bandwidth of emission	#1	Within the limit

¹ Ref. Tab. of Section 2

² Not applicable: port not present in acc. To §15.207 (d)

4.2 Emission limits

Acc. to §15.231 (b) the field strength of emission from intentional radiator with periodic operation in the band 40.66-40.70 MHz and above 70 MHz are as follows:

Frequency (MHz)	Field Strength of fundamental at a distance of 3m (μ V/m)	Field Strength of spurious emission at a distance of 3m (μ V/m)
40,66 – 40,70	2250	225
70 – 130	1250	125
130 - 174	1250 – 3750 (linear interpolations)	125 – 375 (linear interpolations)
174 – 260	3750	375
260 – 470	3750 – 12500 (linear interpolations)	375 – 1250 (linear interpolations)
Above 470	12500	1250

According to §15.209 all the other emission of the appliance shall not exceed the following levels:

Frequency (MHz)	Field Strength at a distance of 3m (μ V/m)
30 - 88	100 **
88 – 216	150 **
216 – 960	200 **
Above 960	500

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

5. TEST RESULTS

TX – RADIATED FIELD 30 - 1000 MHZ	11
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**TEST
1.****TX – RADIATED FIELD 30 - 1000 MHZ****REFERENCE
DOCUMENT**

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI
Biconical Antenna Rohde & Schwarz Mod. HK116
Log-periodic Antenna Rohde & Schwarz Mod. HL223
Chase Antenna Mod. CBL 6111 A
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.209 & 15.231 of reference document
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
Total uncertainty = (k=2) ± 3.5 dB

TEST CONDITIONS:		MEASURED
Ambient temperature :	15 - 35 °C	24 $\pm$ 3 °C
Ambient humidity :	25 - 75 %rH	40 $\pm$ 5 %rH
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	950 $\pm$ 50 mbar
Voltage :	Lithium battery 2 x 3V	6 Vdc

OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: WITHIN THE LIMIT**

SCAN TABLE : "Radiated Emission"

Unit: dB μ V/m

Curve1: Detector : Max Peak Mode: ClearWrite
Curve2: Avg ClearWrite

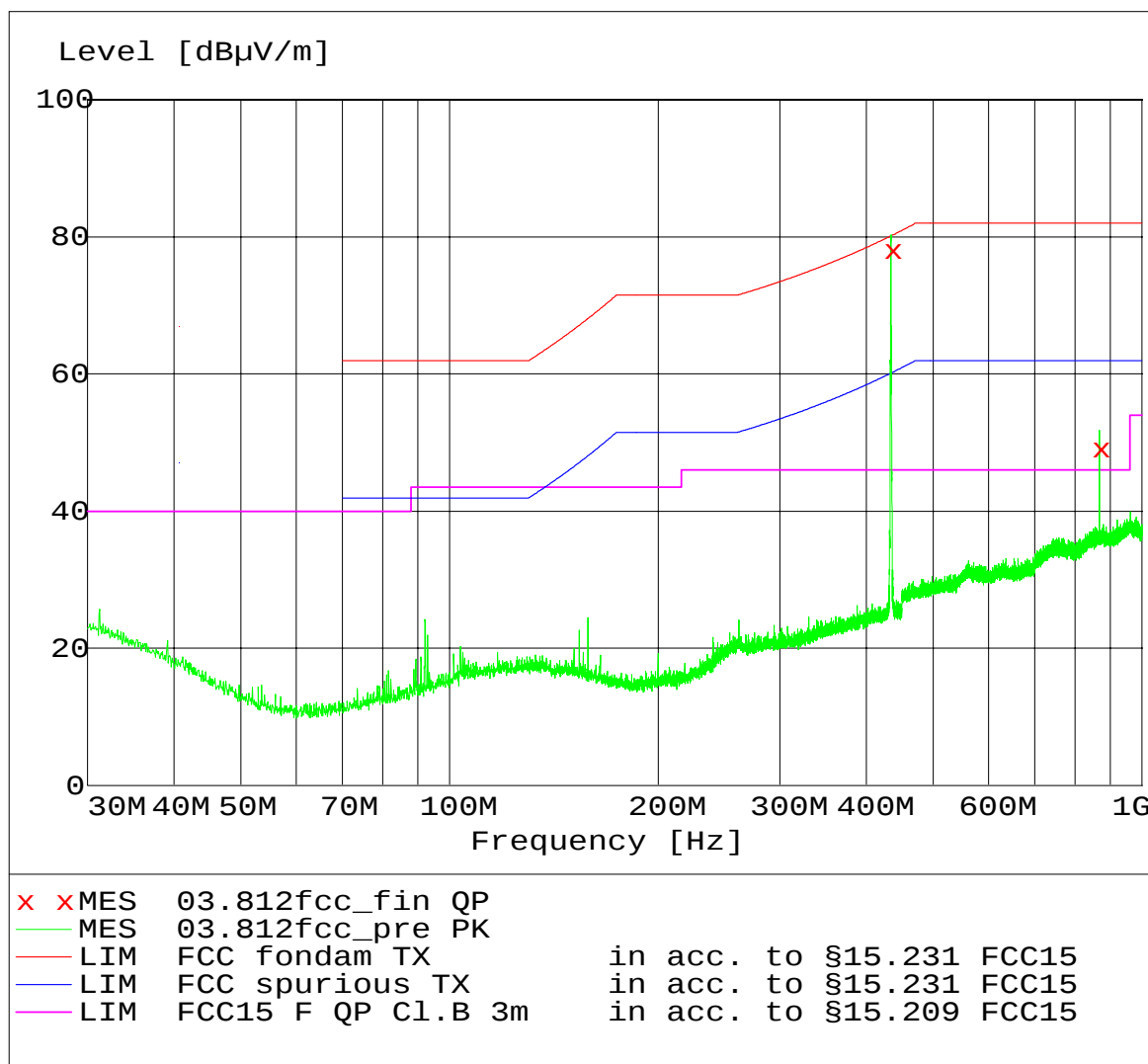
Subrange:

Start Frequency: 30.0 MHz Step Size: 80 kHz
Stop Frequency: 1000.0 MHz
Measure Time: 0.01 sec.
IF Bandwidth: 120 kHz

Receiver: ESXI Probe Transducer: CHASE_6111_PRC
Signal Path: Path 4 System Transducer: RFin2-CP1/X11
Scan Mode: Lin Add. Transducer: W71.01
Tracking Gen.: Off
Input: 2 DC

Preamplifier: 10 dB Demodulation: FM Broad
RF att.: Coupled Volume: 0.0%
Ref. Level: -50 dBm Squelch: --
Min. RF att.: 0 dBm Option: None
Autorange: On

Curve 1: On Repetition: Single
Curve 2: On Stop Mark: On
Stop Message: On
Text: Connect antenna



RESULTS

Frequency	Remark	Limits	Measured QP level	Measured level - Antenna Polarisation
MHz		dB μ V/m	dB μ V/m	--
433.920000	Fundamental	80.79	78.00	VERTICAL
867.840000	Spurious	61.94	49.00	HORIZONTAL

**TEST
2.****TX – SPURIOUS EMISSION 1000 - 5000 MHZ****REFERENCE
DOCUMENT**

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI
Double Ridged Guide Antenna Electro-metrics mod. EM-6961
Log-periodica Broadband Antenna mod. HL025
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.209 of reference document
- **FREQUENCY BAND :** Fundamental Frequency to 10th harmonics acc. to §15.33 (a)
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
Total uncertainty = (k=2) ± 3.5 dB

TEST CONDITIONS:		MEASURED
Ambient temperature :	15 - 35 °C	24 $\pm$ 3 °C
Ambient humidity :	25 - 75 %rH	40 $\pm$ 5 %rH
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	950 $\pm$ 50 mbar
Voltage :	Lithium battery 2 x 3V	6 Vdc

OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: WITHIN THE LIMIT**

SCAN TABLE : "Radiated Emission"

Unit: dB μ V/m

Detector : Mode:
Curve1: Max Peak ClearWrite
Curve2: -- ClearWrite

Subrange:

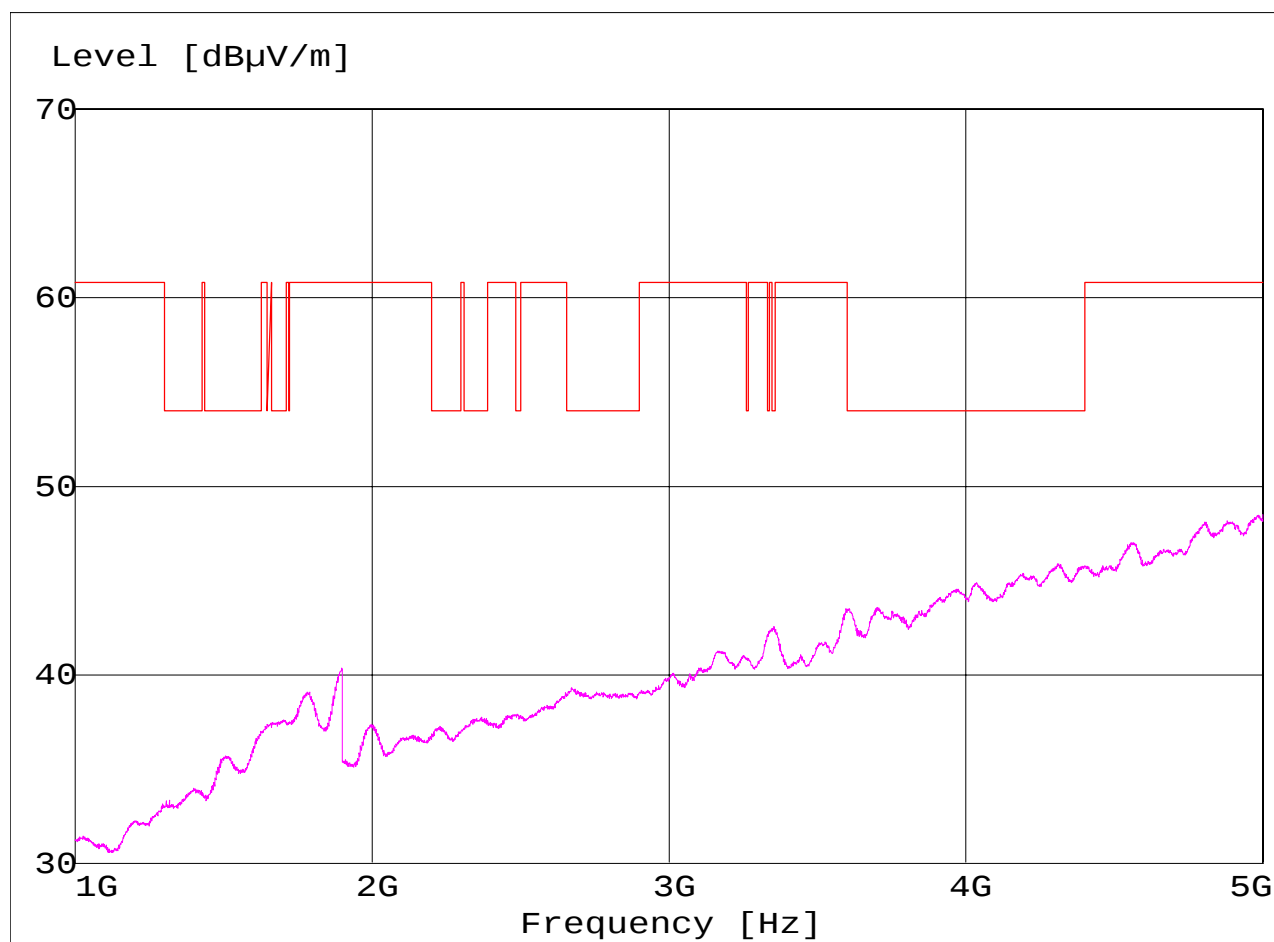
Start Frequency:	1000.0 MHz	Step Size:	kHz
Stop Frequency:	5000.0 MHz	Probe Transducer:	HL025
Measure Time:	0.01 sec.		
IF Bandwidth:	1000 kHz		
Receiver:	ESXI		
Signal Path:	Path 4	System Transducer:	RFin2-CP1/X11
Scan Mode:	Lin	Add. Transducer:	W71.01
Tracking Gen.:	Off		
Input:	2 DC		
Preamplifier:	10 dB	Demodulation:	FM Broad
RF att.:	Coupled	Volume:	0.0%
Ref. Level:	-50 dBm	Squelch:	--
Min. RF att.:	0 dBm	Option:	None
Autorange:	On		
Curve 1:	On	Repetition:	Single
Curve 2:	Off	Stop Mark:	On
		Stop Message:	On
		Text:	Connect antenna

Limit in acc. to provisions of §15.231 for frequencies above 470 MHz related to field strength of spurious emissions.

With a average detector used for measuring the spurious emissions level the limit is 60.80 dB μ V/m

In addition to the limits over mentioned, in according to Section 15.205 for restricted bands, the limit applied is 54 dB μ V/m

Detector trace - Average



**TEST
3.****TX – FREQUENCY STABILITY****REFERENCE
DOCUMENT**

FCC PART 15 sub 2 §2.1055

- **TEST LOCATION:** Climatic chamber
- **TEST EQUIPMENT USED FOR TEST:** Climatic chamber Mazzali mod. Climatest M1574
Spectrum Analyzer Rohde & Schwarz mod. FSP
Programmable DC power supply HP mod. 6653A
- **TESTED PORT:** Enclosure

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 :	12 Vdc	12 Vdc

OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: WITHIN THE LIMIT**

Frequency stability measurements

Temperature (°C)	Measured RF Frequency (Hz)
-30.0	433944582.9
-20.0	433952804.7
-10.0	433966421.4
0.0	433968413.5
10.0	433960214.8
20.0	433955310.1
30.0	433950839.6
40.0	433943752.7
50.0	433935445.5

Min. value (Hz)	433968413.5
Max. value (Hz)	433935445.5
Frequency deviation (Hz) [$f_H - f_L$]	3296.8

**TEST
4.****TX – RANGE OF MODULATION BANDWIDTH****REFERENCE
DOCUMENT**

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Hewlett Packard Mod. 8542E
- **TESTED PORT:** AC Mains, DC Port and Battery
- **EMISSION LIMITS:** Acc. to Section 15.231 of reference document

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 :	Lithium battery 2 x 3V	6 Vdc

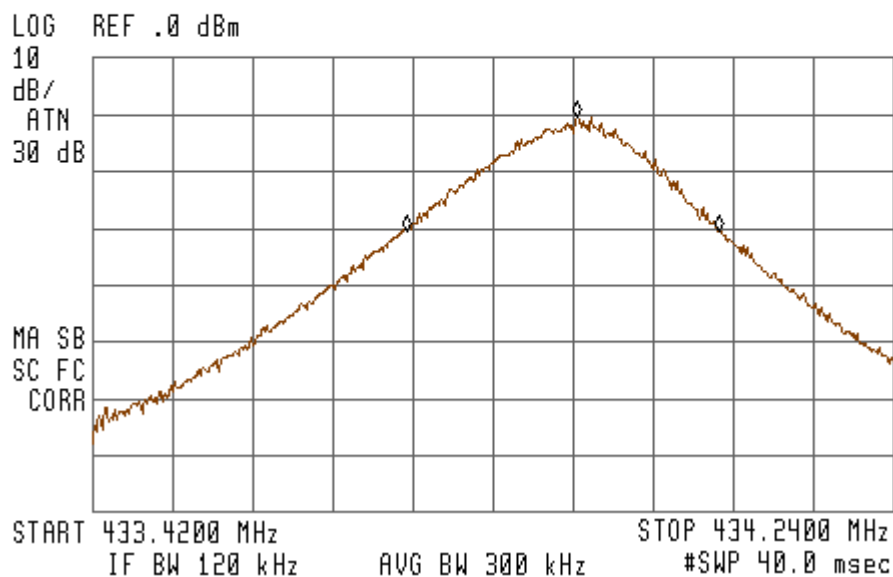
OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: WITHIN THE LIMIT**

MEASUREMENT RESULTS

TEST CONDITIONS		Occupied frequency range (at 20 dB point)		
		f_L [MHz]	F_C [MHz]	f_H [MHz]
T _{amb} : + 24 °C	V _{nom} : 6 Vdc	433,9079	433,9469	433,9715
Incertezza di misura / Measurement Uncertainty : ± 0.1 Hz				
Legenda / Abbreviations : f _L : Lowest frequency at 20dB point F _C : Central frequency f _H : Highest frequency at 20dB point				
Bandwidth at 20dB points: 63,6 kHz				



ACTV DET: PEAK
MEAS DET: PEAK QP AVG



LIMITS	
	Permitted operating frequency range
Normal test conditions	Nominal frequency $\pm 0,25\%$ = 1084,8 kHz

6. EUT TECHNICAL DOCUMENTATION**6.1 Wiring diagrams**

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	PMR4_RG40_CF11100 CF11100 04/02/2003
PART LIST	PMR4_RG40 CF11100

6.2 Technical manual

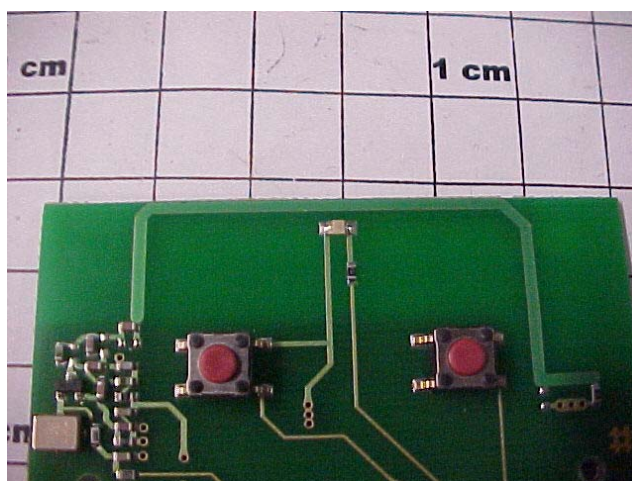
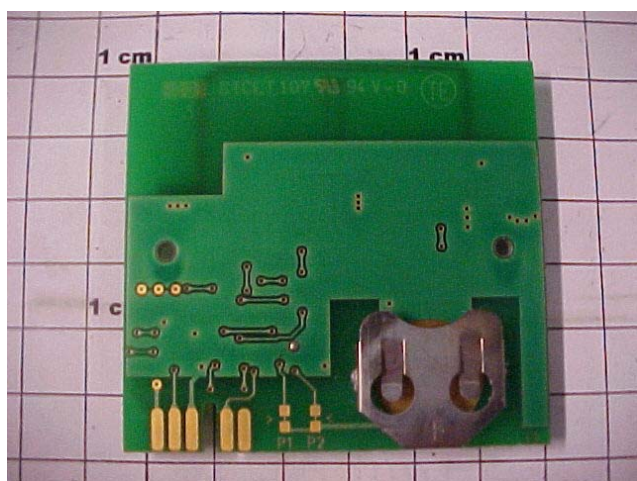
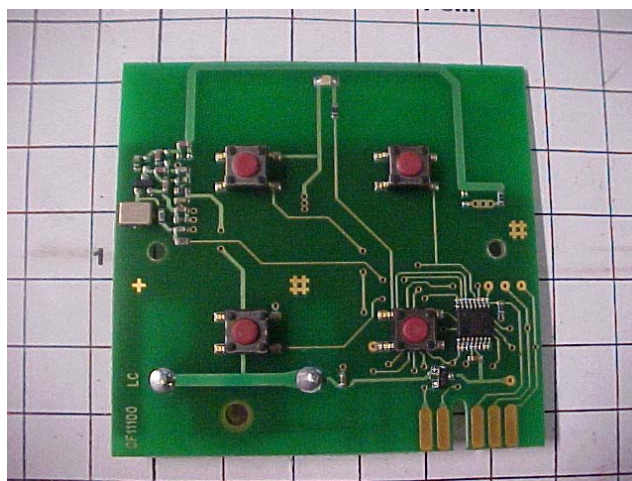
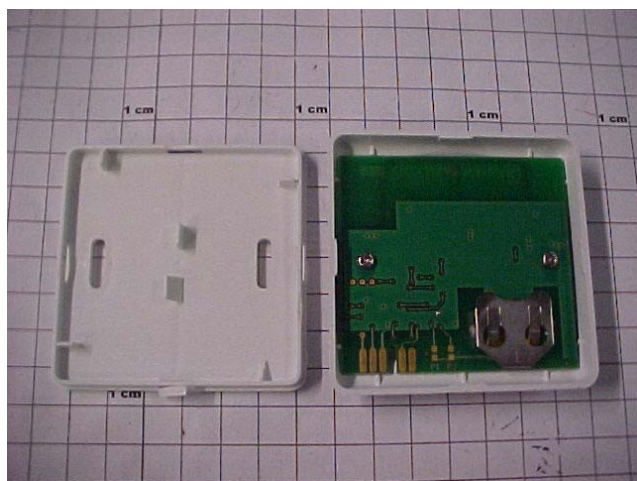
	<i>Document reference (n., edition, date, ...)</i>
TECHNICAL FEATURES	129 – Ed. 26/05/2003
TECHNICAL CONSTRUCTION FILE	Doc. 02, 09/09/2003

6.3 Photographic documentation

PHOTO N° 1 – E.U.T. IDENTIFICATION



PHOTO N° 2 – INTERNAL VIEW



7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS

EQUIPMENT under ANALYSIS :		BRAND NAME
BASIC MODEL	TRANSMITTER PMR4	V2 ELETTRONICA
DERIVED MODELS	PMR2	

Prima Ricerca & Sviluppo, just on the basis of the following technical documents :

1.	Wiring diagram	• PMR4_RG40_CF11100 CF11100 04/02/2003
2.	Mounting plain	• PMR4_RG40_CF11100
3.	PCB layout	• no documentation
4.	Part list	• PMR4_RG40 CF11100
5.	Photographic documentation	• no documentation
6.	Client declaration	• ANALYSIS OF DERIVED PRODUCT (Point 3 of Technical Construction File)

States as follows :

- ◆ the basic model and the derived models have the same plastic case.
- ◆ the basic model and the derived models have the same wiring diagram.
- ◆ The different between basic model and derived models are:

The PMR4 has a frontal plastic cover with four push buttons; the PMR2 has a frontal plastic cover with two push buttons.

On these basis, Prima Ricerca & Sviluppo considers the basic model more critical to the derived models, from the EMC point of view.

Therefore, all the measures performed on the basic model and carried in this test report, are completely extendable to the derived models.
