

Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

EQUIPMENT UNDER TEST :

APPARECCHIO IN PROVA :

DERIVED MODELS :

MODELLI DERIVATI :

REFERENCE STANDARDS :

NORME DI RIFERIMENTO :

TRANSMITTER

ERONE series DS433

Mod. SETDS39433E4

ERONE series DS433

Mod. SETDS39433E2

FCC 47CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** *ELPRO INNOTEK S.r.l.*
Ente / Società:
- **Mr.:** *DALLE CARBONARE*
Sig.:
- **Address:** *VIA PIAVE, 23 – 31020 S.PIETRO DI FELETTO (TV) - ITALY*
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Telefono : *Fax :* *e-mail*

Site of test execution: Via Campagna, 92 - 22020 Gaggino Faloppio (CO) - Italy
Località esecuzione prove:

Date of test samples receipt: 10/02/05 **Date of start test:** 11/02/05
Data ricevimento campioni: *Data inizio prove:*

Date of end test: 07/03/05
Data fine prove:

Witness to the test:
Presenti alle prove:

Signature of the engineers:
Firma esecutore prove:

Signature of the Laboratory Director:
Firma Direttore Laboratori:

Nobody / Nessuno


.....
R. Radice


.....
R. Furfari

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:	ERONE
Equipment :	TRANSMITTER
Model name or No. :	Series DS433
Code:	SETDS39433E4
Serial number :	Not present
FCC ID :	PWJDS433
Country of manufacturer:	ITALY

1.2 Technical data for equipment

Supply voltage:	Internal Alkaline Battery 12V 23A
Current consumption:	25mA
Typical usage :	Remote controls of garage door opener, switch of car alarms, residential antitheft devices and generally building management systems.
Transmitter Operation	Conform with section 15.231 (a)(1) Transmitter cease transmission immediately after being released.
EUT single or system:	Single
EUT dimensions :	88 x 47 x 17 mm.

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1.3 *Technical data for Transmitter*

FCC class:	Intentional Radiators
Working Frequency for TX :	433,92 MHz
Frequency Range of Operation for TX :	433,050 ÷ 433,790 MHz
Antenna type for TX :	Integrated Antenna
TX module type :	AM/ASK

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1.4 Modifications incorporated in E.U.T.

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

- It has been modified value of these components:

$R3=56K\Omega$, $R5=18K\Omega$, $R6=82\Omega$.

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 Alkaline battery 12V 23A	Battery support
4	Signals ports	Line not present	*****
<i>Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.</i>			

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 garage door opener, switch of car alarms, residential antitheft devices and generally building management systems.; 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.

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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 B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (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

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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)

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4.2 Emission limits

For transmitter use in according with §15.231 for intentional radiator operated within the frequency band 260-470 MHz

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)
433,92	10996,68	1099,668

For Transmitter use in according with §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.

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5. TEST RESULTS

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

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber (3 meters)
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI
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 = $(k=2) \pm 3.5$ 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 :	Alkaline battery 12V	12 V dc

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

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SCAN TABLE : “Radiated Emission”

Unit: dB μ V/m

Detector : Mode:

Curve1: Max Peak 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

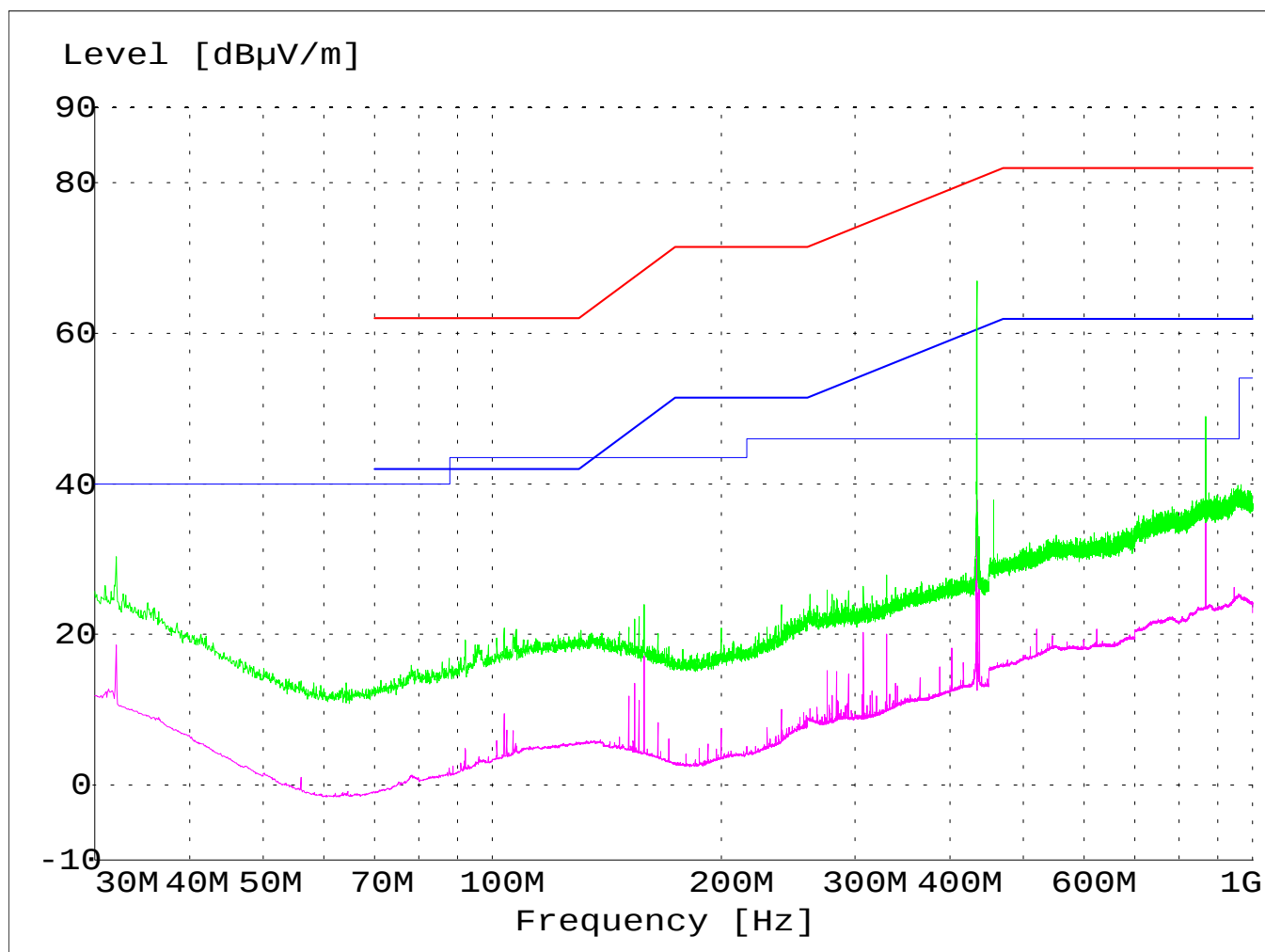
Curve 2: On

Stop Mark: On

Stop Message: On

Text: Connect antenna

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RESULTS

Frequency	Remark	Limits	Measured PK level	Antenna Polarisation
MHz		dBμV/m	dBμV/m	--
433.920000	Fundamental	80.82	66.98	HORIZONTAL
867.840000	Spurious	60.80	48.94	HORIZONTAL

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

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber (3 meters)
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI
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 :	Alkaline battery 12V	12 V dc

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

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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

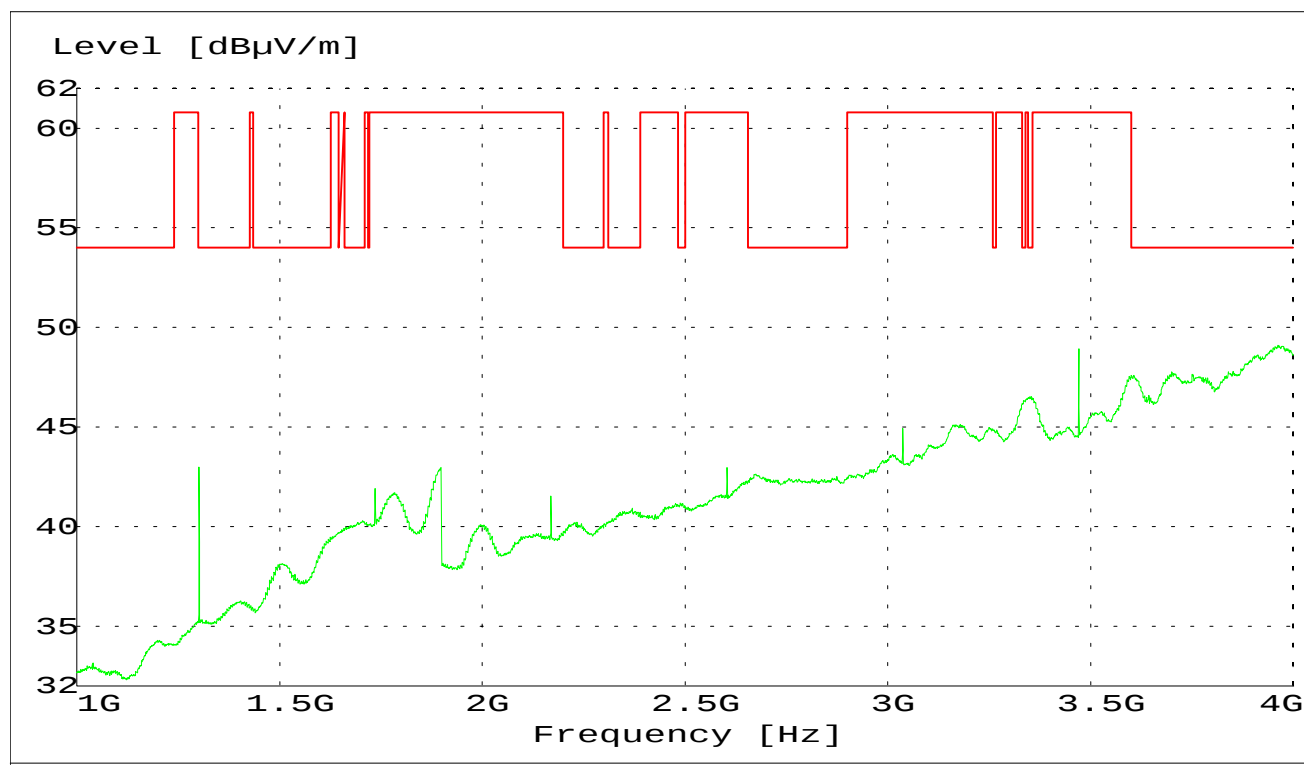
Curve 2: Off

Stop Mark: On

Stop Message: On

Text: Connect antenna

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In Range 4000 ÷ 5000 MHz has not been detected any spurious emission.

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 dBμV/m

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

Detector trace - Average

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**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**

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Frequency stability measurements

Temperature (°C)	Measured RF Frequency (Hz)
-30.0	433884505.6
-20.0	433899204.7
-10.0	433910406.4
0.0	433913205.5
+10.0	433920101.8
+20.0	433920205.6
+30.0	433921605.4
+40.0	433923051.7
+50.0	433923705.5

Min. value (Hz)	433884505.6
Max. value (Hz)	433923705.5
Frequency deviation (Hz) [$f_H - f_L$]	39199.9

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

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** Spectrum Analyzer Rohde & Schwarz mod. FSP
Programmable DC power supply HP mod. 6653A
- **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 :	Alkaline battery 12V	12 V dc

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

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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} : 12 V dc	433,7046	433,9202	434,1358
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: 431,2 kHz				

LIMITS	
	Permitted operating frequency range
<i>Normal test conditions</i>	Nominal frequency ± 0,25% = 1084,8 kHz

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6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	Trasmettitore 433.92MHz dip 9 vie ternario 4 canali – document 0300-05 Date: 04/01/01 Rev.A (sheet 12 of Technical Construction File)
PART LIST	4 channel transmitter (sheet 16 of Technical Construction File)

6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
TECHNICAL FEATURES	Transmitter DS433 – SETDS39433E2/E4
TECHNICAL CONSTRUCTION FILE	TCF-067 Date : 04/02/2003 Rev.0

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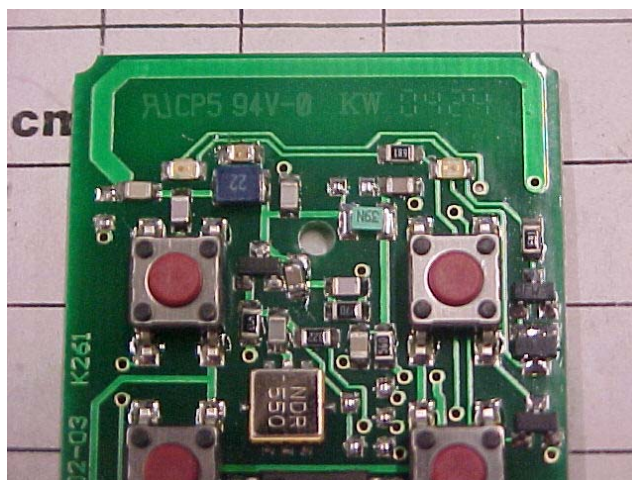
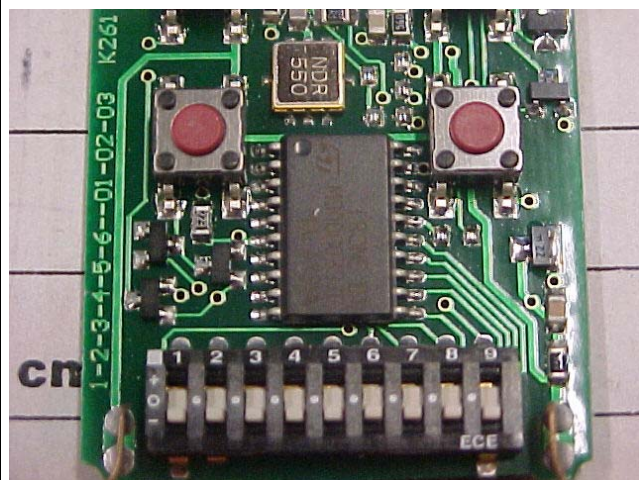
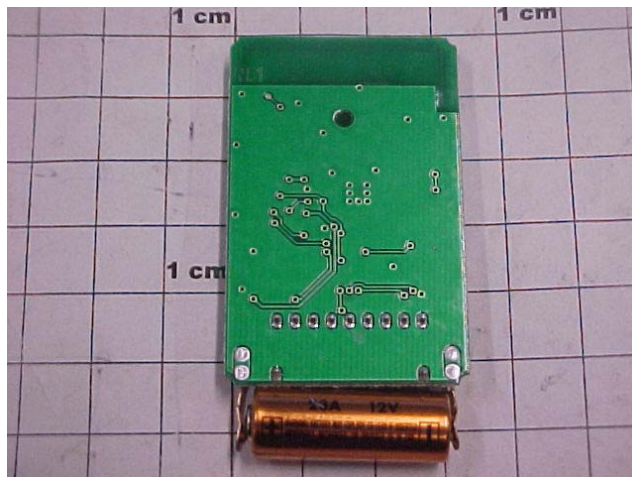
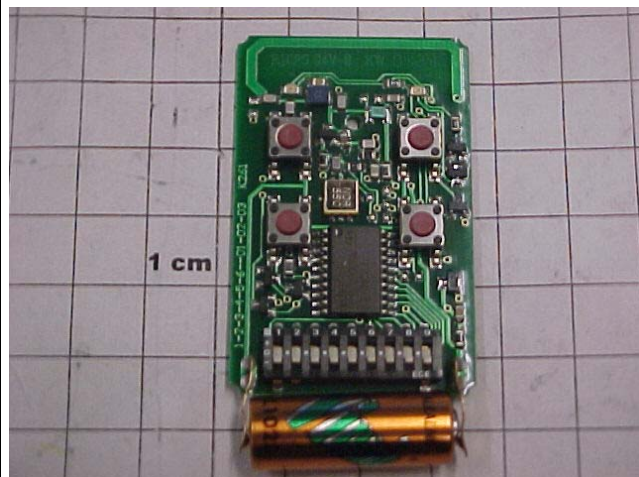
6.3 Photographic documentation

PHOTO N° 1 – E.U.T. IDENTIFICATION



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PHOTO N° 2 – INTERNAL VIEW



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PHOTO N° 3 – SET-UP FOR RADIATED EMISSION TEST



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7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS

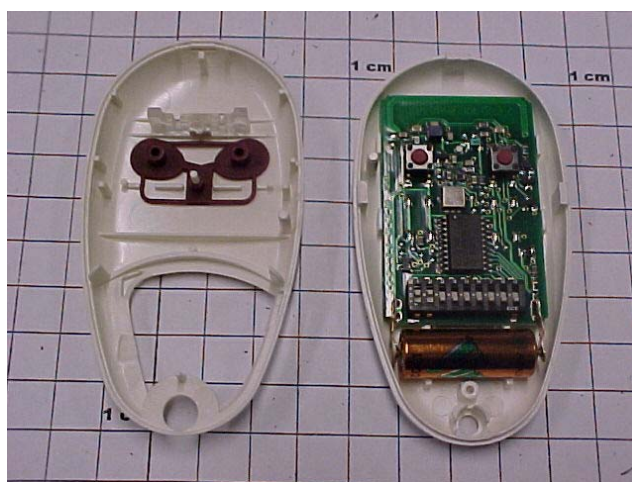
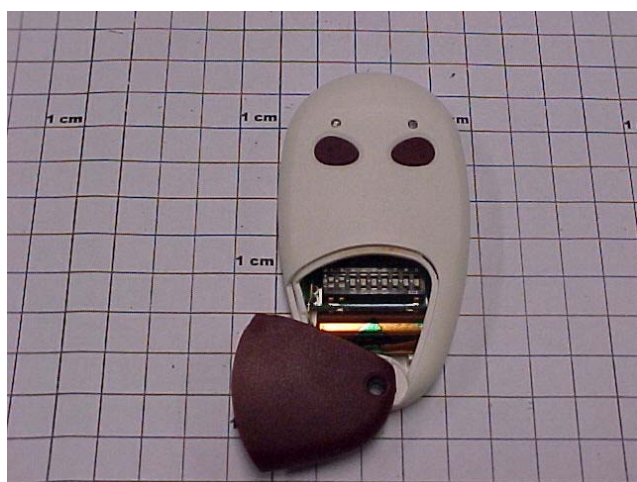
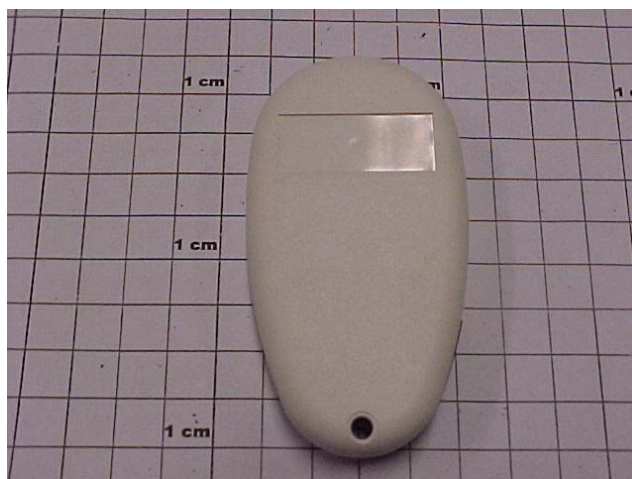
EQUIPMENT under ANALYSIS :		BRAND NAME
BASIC MODEL	TRANSMITTER ERONE series DS433 Mod. SETDS39433E4	ERONE
DERIVED MODELS	TRANSMITTER ERONE series DS433 Mod. SETDS39433E2	

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

1.	Wiring diagram	Trasmittitore 433.92MHz dip 9 vie ternario 4 canali – document 0300-05 Date: 04/01/01 Rev.A (sheet 12 of Technical Construction File)
2.	Mounting plain	4 channel transmitter (sheet 13 and 14 of Technical Construction File)
3.	PCB layout	4 channel transmitter (sheet 17 and 18 of Technical Construction File)
4.	Part list	4 channel transmitter (sheet 16 of Technical Construction File)
5.	Photographic documentation	See next page
6.	Client declaration	None

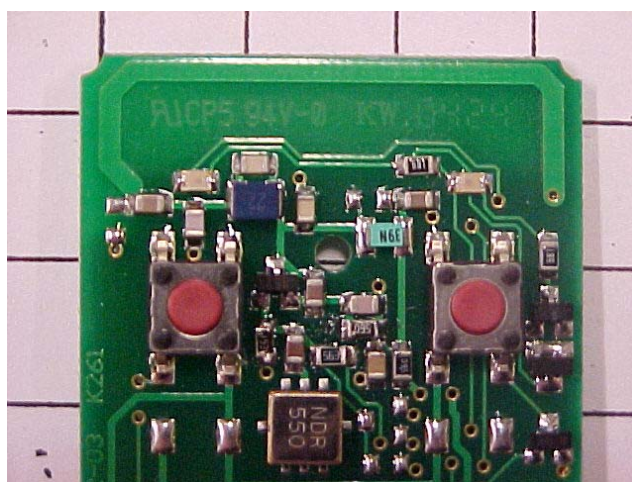
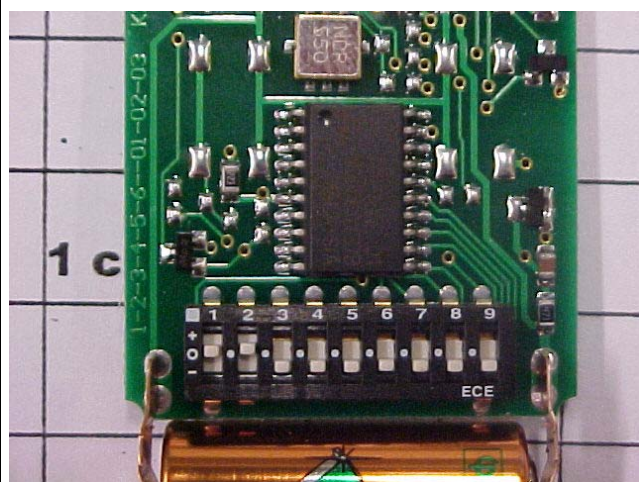
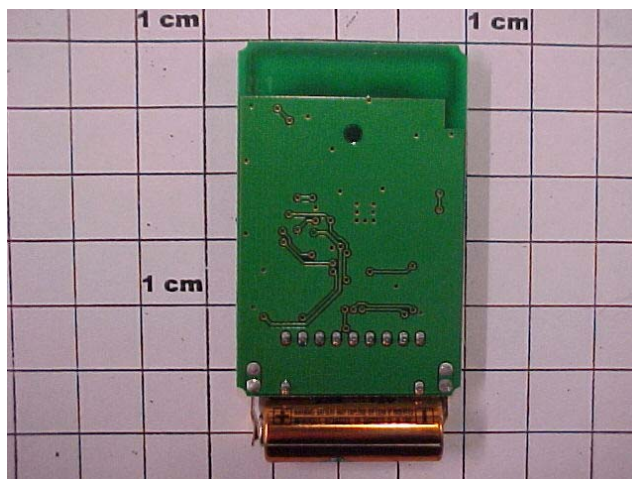
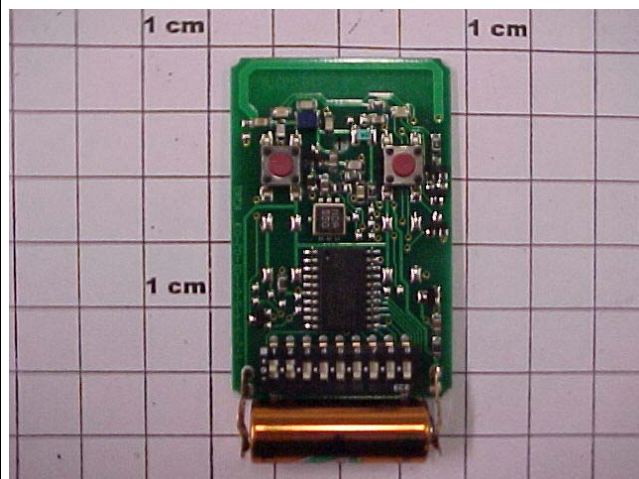
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PHOTO N° 4 – DERIVED MODEL IDENTIFICATION



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PHOTO N° 5 – DERIVED MODEL INTERNAL VIEW



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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 DS433 SETDS39433E4 has a frontal plastic cover with four push buttons; the DS433 Mod. SETDS39433E2 has a frontal plastic cover with two push buttons.

On these basis, Prima Ricerca & Sviluppo considers the basic model more critical to the derived model, 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 model.