

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 : TRANSMITTER at 433.92 MHz
APPARECCHIO IN PROVA :

Model: SETR2641AM2

REFERENCE STANDARDS : FCC 47CFR Part 15
NORME DI RIFERIMENTO :

CUSTOMER:
RICHIEDENTE:

- **Dept. / Firm :** ELPRO INNOTEK S.P.A.
Ente / Società':
 - **Mr.:** ING. G. MASSIMO DALLE CARBONARE
Sig.ra.:
 - **Address:** VIA PIAVE, 23 – 31020 S. PIETRO DI FELETTO (TV) - ITALY
Indirizzo:
- Tel. :** +39 0438.450879 **Telefax:** +39 0438.455628 • **E-mail:** d.carbonare@erone.com
Telefono : *Fax :*
-

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

Date of test samples receipt: 05/04/2005 **Date of start test:** 08/04/2005
Data ricevimento campioni: *Data inizio prove:*

Date of end test: 08/04/2005
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

.....

.....
Luca Casiraghi

.....
Roberto 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 E.U.T. identification

Brand name: ERONE
Manufacturer : ELPRO INNOTEK S.P.A.
Model name or No. : SETR2641AM2
Part number / Serial No.: Not present
Country of manufacturer: ITALY

1.2 E.U.T. classification

R&TTE category : Transmitter 433,92 MHz in AM/ASK
Supply voltage: 6 Vdc by two internal battery type Lithium CR2016
Input Power / Current : 13 mA
Single or Multiple Unit : Single
EUT Dimensions : 61 x 36 x 16 mm
Indoor / outdoor cables No cables

1.3 Modifications incorporated in E.U.T.

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

- None

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1.4 Ports identification

This section contains descriptions of all signal ports and AC/DC power input/output ports, the maximum 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	Maximum length	Connection	Ancillaries / Modules / Support Equipment
1	Enclosure	Plastic case	----	By screws	----
2	AC power input/output ports	Not present	*****	*****	None
3	DC power input/output ports	6 Vdc by internal power supply	> 3 meter	Bipolar Connector	None
4	Signals Ports	Not present	*****	*****	None
Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.					

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1.5 Operating test modes and test Conditions

EUT was tested under the Standard operating conditions and normal loads indicated in the reference standards applied and in directions for use supplied by the manufacturer. In particular, the equipment shall be tested under normal test conditions contained in the relevant product and basic standard or in the information accompanying the equipment.

Table 1: Each operating condition adopted for the execution of the test (setting of the controls and/or mode(s) of operation) has been identified by an indicator (#.):

<i>Operating condition (#)</i>	<i>Description of the mode of operation</i>
(#1)	Transmission mode

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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 15.209 and 15.249

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)

<i>Operating condition</i>	<i>Description</i>
<i>#1</i>	<i>Continuous transmission</i>

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

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4 SUMMARY OF TEST RESULTS

4.1 EMISSION TESTS

Port		Phenomena	Operating condition ¹	Result
1	Enclosure	Radiated emission	#1	Within the limit
		Frequency stability	Not applicable	
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

4.2 Emission limits

Acc. to §15.231 for intentional radiator operated within the frequency 925 MHz

Frequency (MHz)	Field Strength of fundamental at a distance of 3m	Field Strength of spurious emission at a distance of 3m (μ V/m)
433.92	80.79 dBμV/m	60.79 dBμV/m

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.

¹ Ref. Tab. of Section 2

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

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5 TEST RESULTS

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**TEST
1.**

TX – RADIATED FIELD 30 - 1000 MHZ

REFERENCE
DOCUMENT

FCC47CFR Part 15

- **TEST SETUP:** According to reference standard
 - **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
Log-periodic Antenna Rohde & Schwarz Mod. HL025
-
- **TESTED PORT:** Enclosure
 - **FREQUENCY RANGE:** 30 - 1000 MHz
 - **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 :			6 Vdc (internal battery)

OPERATING CONDITION (Rif. Section. 2) : #1

RESULT: WITHIN THE LIMIT

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SCAN TABLE : “Radiated Emission”

Unit: dB μ V/m

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

Subrange:

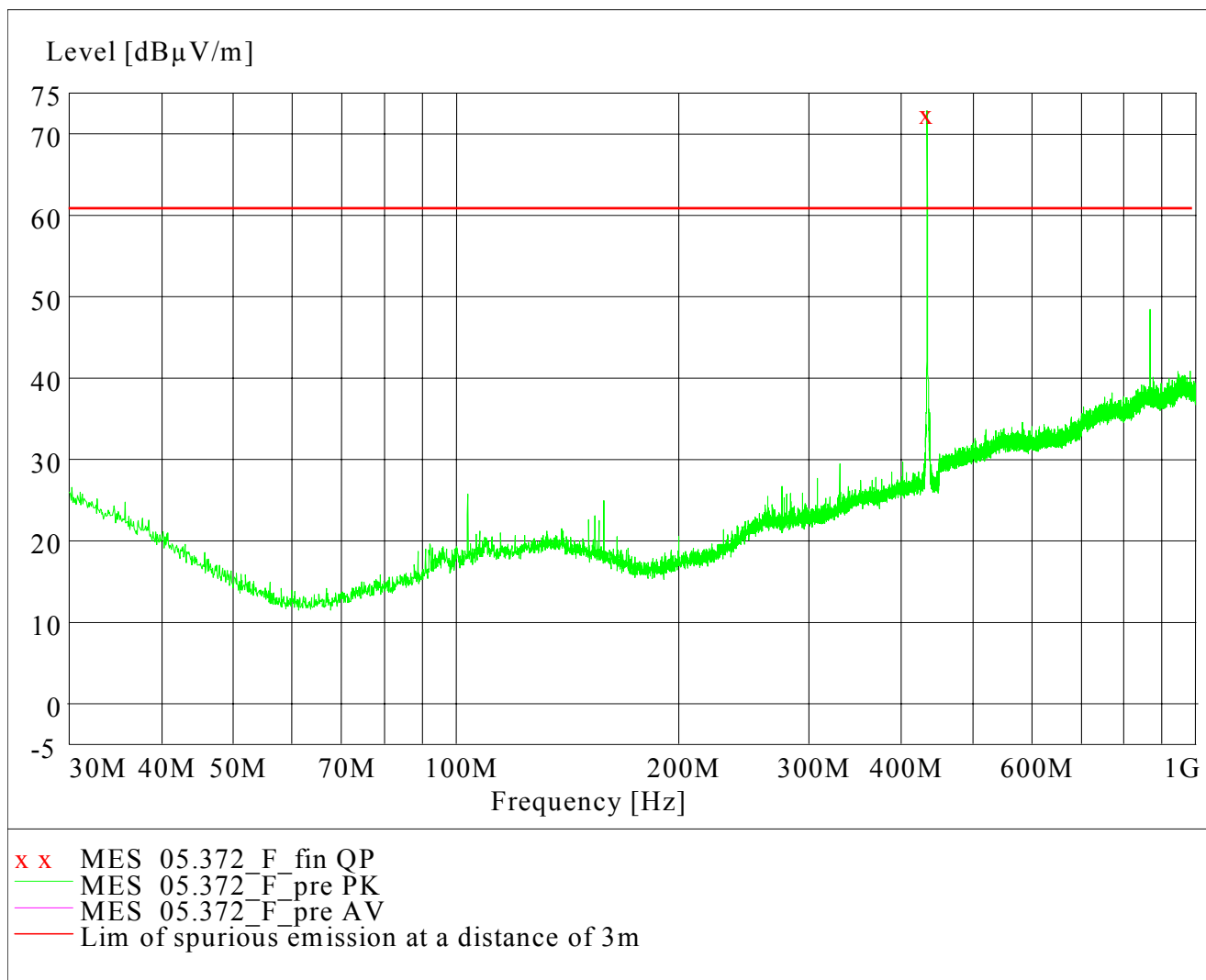
Start Frequency:	30.0 MHz	Step Size:	80 kHz
Stop Frequency:	1000.0 MHz	IF Bandwidth:	120 kHz
Measure Time:	10 ms		

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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Frequency	Field Strength of fundamental at a distance of 3m	Field Strength of spurious emission at a distance of 3m (μ V/m)
433.92 MHz	80.79 dB μ V/m	60.79 dB μ V/m

MEASUREMENT RESULT – QUASI PEAK detector

Frequency	Level	Limit	Height	Azimuth	Polarisation
MHz	dB μ V/m	dB μ V/m	cm	deg	
433.920000	72.80	80.79	174.0	112.00	HORIZONTAL

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**TEST
2.**

TX – SPURIOUS EMISSION 1 - 5 GHz

REFERENCE
DOCUMENT

FCC PART 15 subpart C

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** Spectrum Analyzer Rohde & Schwarz Mod. FSP (9kHz-40GHz)
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 :	internal lithium battery	6.0 Vdc

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	
 <u>Subrange:</u>			
Start Frequency:	1000.0 MHz	Step Size:	600 kHz
Stop Frequency:	10000.0 MHz	Probe Transducer:	HL025
Measure Time:	100 ms		
IF Bandwidth:	1 MHz		
Receiver:	FSP		
Signal Path:	Path 4	System Transducer:	RFin2-CP1/X11
Scan Mode:	Lin	Add. Transducer:	W71.01
Tracking Gen.:	Off		
Input:	1		
Preamplifier:	0 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

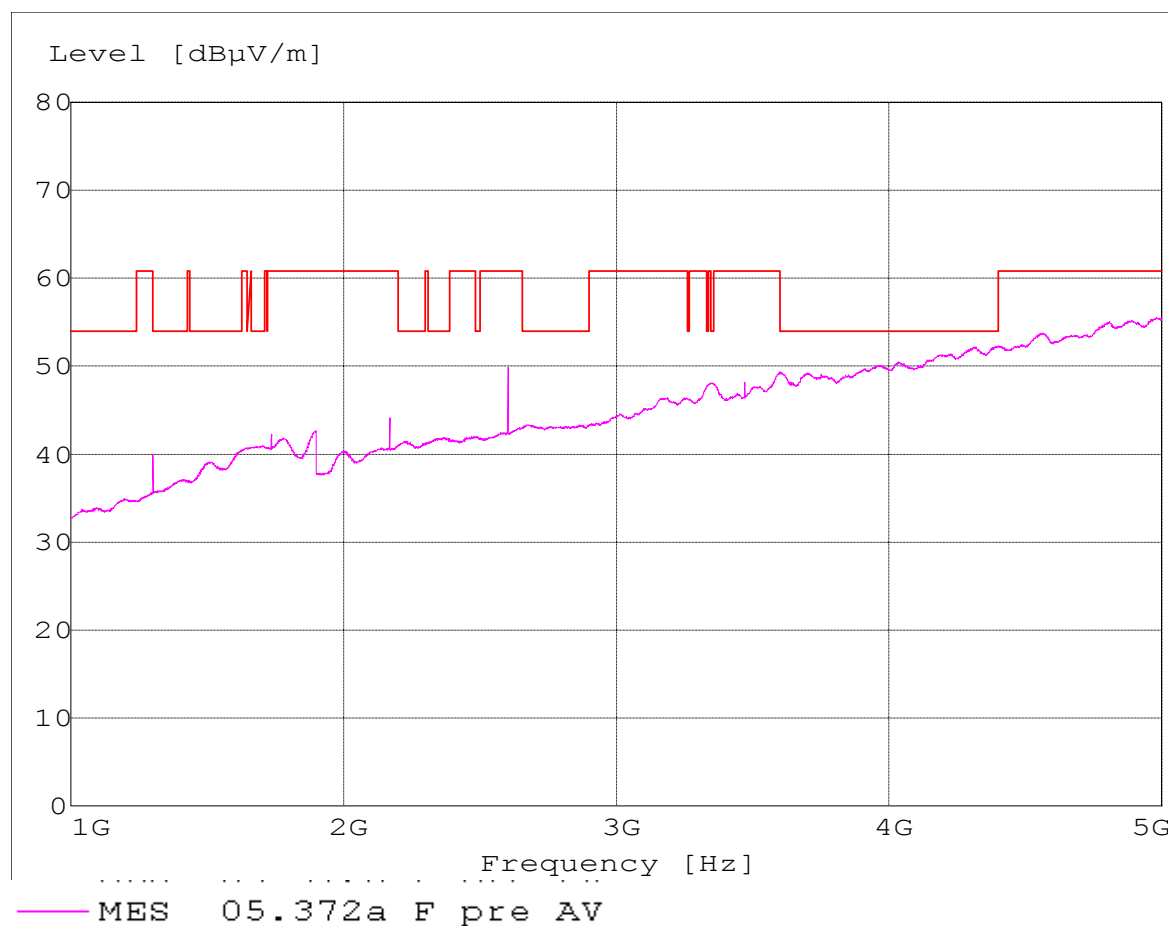
	dB μ V/m	
	Detector :	Mode:
Curve1:	MaxPeak	ClearWrite
Curve2:	Average	ClearWrite

Subrange1:

Start Frequency:	1 GHz	Step Size:	600 kHz
Stop Frequency:	5 GHz	IF Bandwidth:	1 MHz
Measure Time:	0.01 sec.		
Receiver:	ESXI	Probe Transducer:	HL025
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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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



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**TEST
3.**

TX – RANGE OF MODULATION BANDWIDTH

REFERENCE
DOCUMENT

FCC PART 15 subpart C

- **TEST LOCATION:** Control room
- **TEST EQUIPMENT USED FOR TEST:** Spectrum Analyzer Rohde & Schwarz Mod. FSP
- **TESTED PORT:** DC Port and Battery
- **EMISSION LIMITS:** Acc. to Section 15.215 c) 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 :	internal lithium battery	6.0 Vdc

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} : 6.0 Vdc	433,9119	433.9255	433.9539
Bandwidth =		42 kHz		
Incertezza di misura / Measurement Uncertainty : ± 0.1 kHz				
Legenda / Abbreviations : f _L : Lowest frequency at 20dB point F _C : Central frequency f _H : Highest frequency at 20dB point				

LIMITS
Permitted operating frequency range
- For device operating above 70 MHz and below 900 MHz = 0.25% of the center frequency - For device operating above 900 MHz = 0.5% of the center frequency

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6 EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
<i>WIRING DIAGRAM</i>	TCF-086 Date: 26/04/2005 Rev.0
<i>PART LIST</i>	TCF-086 Date: 26/04/2005 Rev.0
<i>TECHNICAL CONSTRUCTION FILE</i>	TCF-086 Date: 26/04/2005 Rev.0

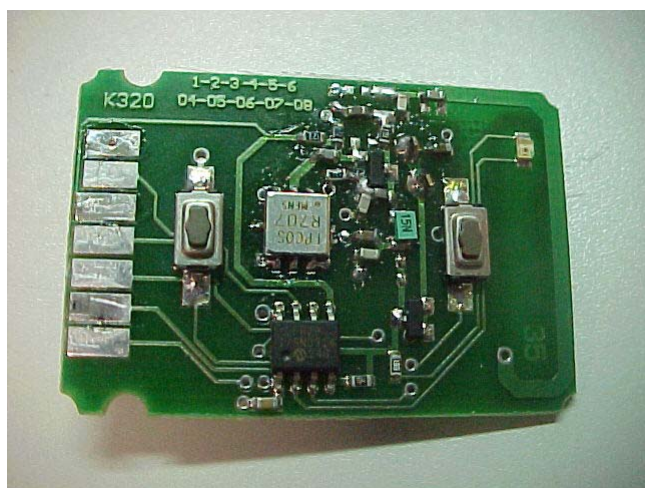
6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
<i>TECHNICAL MANUAL</i>	TCF-086 Date: 26/04/2005 Rev.0

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6.3 Photographic documentation

PHOTO N°1 – E.U.T. IDENTIFICATION



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PHOTO N°2 – SET-UP EMISSION TESTS

