

EQUIPMENT UNDER TEST :
 APPARECCHIO IN PROVA :

RAIL MOUNTED RECEIVER
 Type R102 Model 251D Configuration QB7

DERIVED MODELS:
 APPARECCHI DERIVATI :

Type R102 Model 251D
 Configuration Q01-Q09, QA6, QA8, QB4, QB6, QB8,
 QC4, QD6, QE6, QF6

REFERENCE STANDARDS :
 NORME DI RIFERIMENTO :

FCC 47 CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** AUTECH S.r.l.
 Ente / Società:
- **Mr.:** BIANCHIN STEFANO
 Sig.:
- **Address:** VIA POMAROLI, 65 - 36030 CALDOGNO (VI) - 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: 26/05/04 **Date of start test:** 26/05/04
Data ricevimento campioni: *Data inizio prove:*

Date of end test: 06/07/04
Data fine prove:

Witness to the test:
 Presenti alle prove:

Nobody / Nessuno

Signature of the engineers:
 Firma esecutore prove:



.....
 F. Barbierato

Signature of the Laboratory Director:
 Firma Direttore Laboratori:



.....
 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: AUTEC
Equipment : Rail mounted receiver
Model name or No. : Type R102
Model 251D
Configuration QB7 (receiver unit for DIN guides with E16RIQ07 and E16RIR4A card)
Serial number : prototype
FCC ID : OQA-R102251D
Country of manufacturer: ITALY

1.2 Technical data

FCC class: Unintentional radiators, Class B
Supply voltage: 10-30 Vac or 10-30 Vdc
Type of receiver : superetherodyne
Maximum internal frequency generated by EUT : 44 MHz
Input Power / Current : External AC or DC power source
Typical usage : Fixed radio remote control used to command Industrial machines
EUT single or system: Single
EUT dimensions : 160 x 110 x 65 mm

1.3 Receiver technical data

- Working Frequency : 915 MHz
- Frequency Range of Operation : 902 – 928 MHz

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 4 screws
2	AC power input/output ports	10-30 Vac from external supply source (in alternative to DC power) Cable length not specified.	Terminals
3	DC power input/output ports	10-30 Vdc from external supply source (in alternative to AC power) Cable length not specified.	Terminals
4	Signals ports	N° 14 N.O. Outputs. - Cable length not specified.	Terminals

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 B

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	Receiver active

2.2 Test overview

Sample tested is the main model of a complete set of 915 MHz RF receiver (see also Section 7).

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

The application is mainly used as Industrial machines radio remote control; the RF signal when the apparatus is switch-on is continuously present.

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 (Unintentional 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 Emission tests

Port	Phenomena	Basic standard	Operating condition ¹	Result
1 Enclosure	Radiated emission	FCC Part 15 § 15 109	#1	Within the limit ²
2 AC mains Input ports	RF Disturbance voltage: • continuous	FCC Part 15 § 15 107	#1	Within the limit
3 Antenna terminals	Antenna power conduction limits for receivers	FCC Part 15 §15 111	#1	Within the limit

¹ Ref. Tab. of Section 2

5. TEST RESULTS

RADIATED EMISSION 30 - 1000 MHZ	9
EMISSION OF MAINS TERMINAL DISTURBANCE VOLTAGE	12
ANTENNA POWER CONDUCTION LIMITS FOR RECEIVERS	15

**TEST
1.**

RADIATED EMISSION 30 - 1000 MHZ

**REFERENCE
DOCUMENT**

FCC PART 15 subpart B

- **TEST LOCATION:** Semi-anechoic chamber (3 meter)
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESML
Chase Antenna Mod. CBL 6111 A
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.109 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 :	12 Vac	12 Vac \pm 3%

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

RESULT: WITHIN THE LIMIT

SCAN TABLE : “Radiated Emission”

Unit: dB μ V/m

Detector : Mode:

Curve1: MaxPeak ClearWrite

Curve2: -- ClearWrite

Subrange1:

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: Off

Stop Mark: On

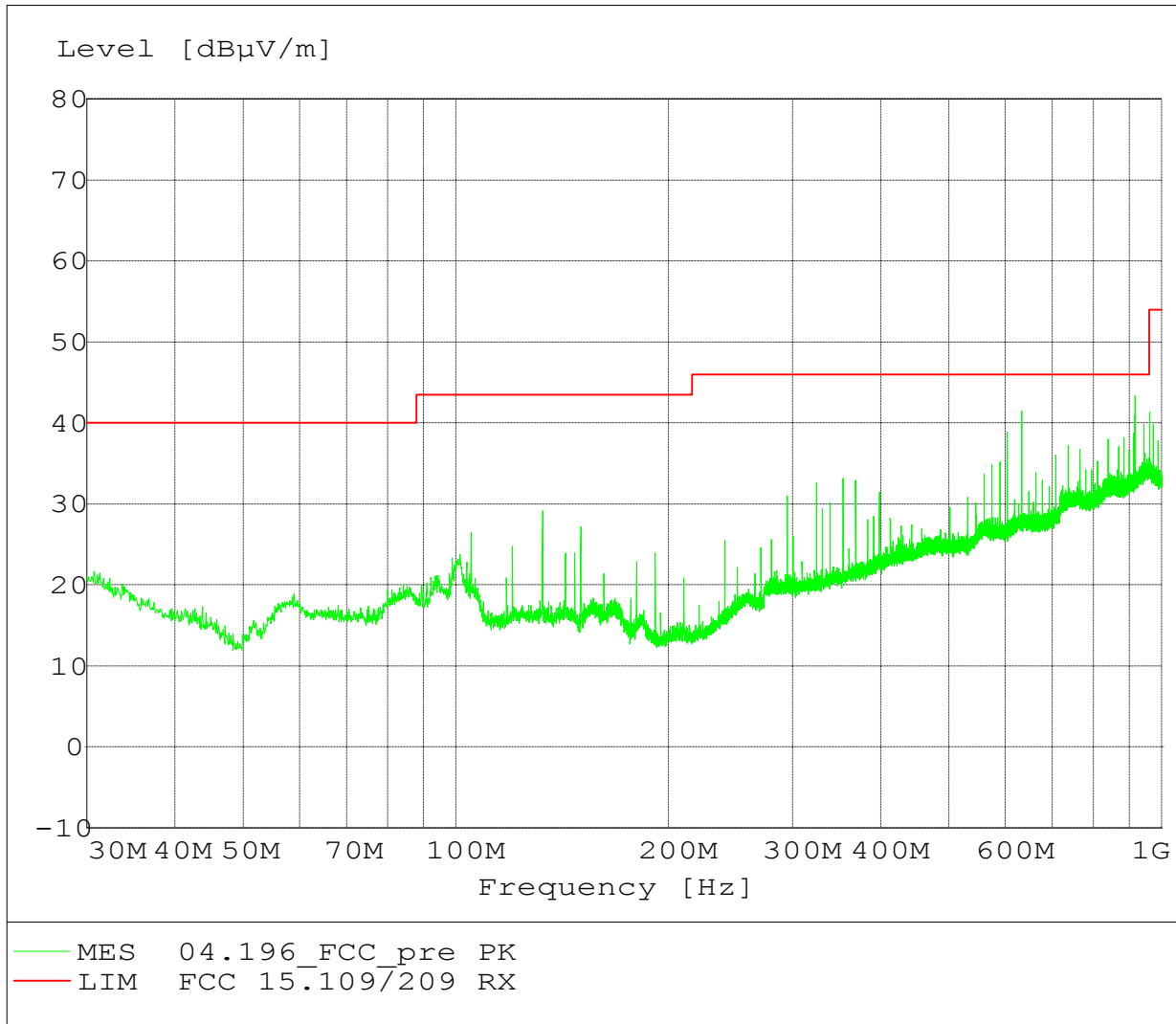
Stop Message: On

Text: Connect antenna



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Configuration QB7 - external antenna



**TEST
2.**

EMISSION OF MAINS TERMINAL DISTURBANCE VOLTAGE

REFERENCE DOCUMENT FCC PART 15 subpart B

- **TEST LOCATION:** Semianechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESML
Artificial Network Rohde & Schwarz Mod. ESH3-Z5

- **TESTED PORT:** AC mains
- **FREQUENCY RANGE:** 0.15 - 30 MHz
- **EMISSION LIMITS:** Acc. to reference document 15.107
- **MEASUREMENT UNCERTAINTY:** Total uncertainty (k=2) ± 2.5 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 : 110Vac	98 Vac \pm 3%

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

RESULT: Within the limits

SCAN TABLE : Voltage Mains

Unit : dB μ V

	<u>Detector :</u>	<u>Mode :</u>
Curve 1:	MaxPeak	ClearWrite
Curve 2:	Average	ClearWrite

Start Frequency :	150.0 kHz		
Stop Frequency :	30.0 MHz	IF Bandwidth :	9 kHz
Measure Time :	10.0 ms	Step size :	6 kHz

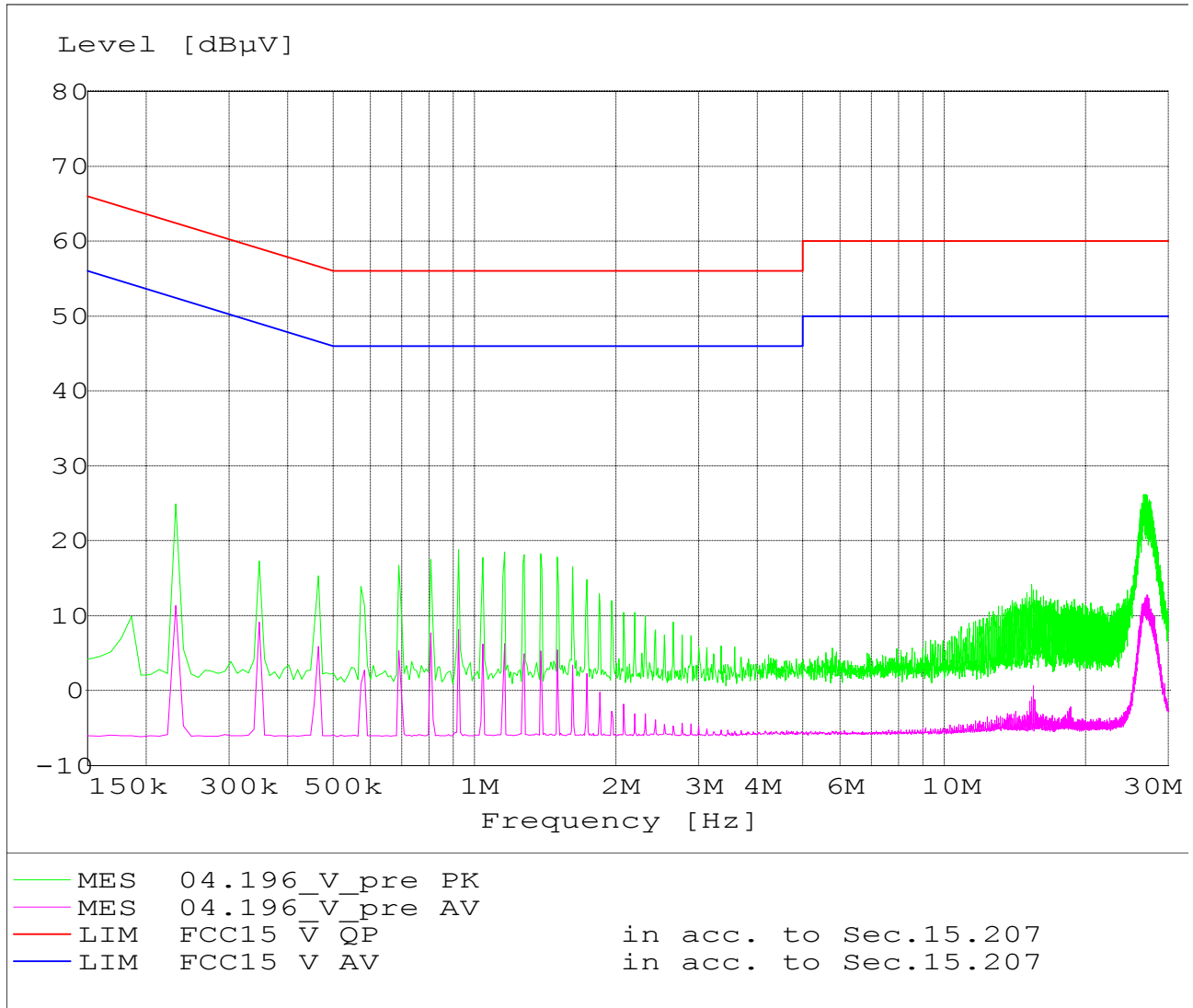
Receiver :	<i>ESMI</i>	Transducer :	<i>ESH3-Z5_PRC</i>
Signal Path :	<i>Path 3</i>	System Transducer :	<i>Rfin1-CP2/X11</i>
Meas. Mode :	<i>Lin</i>	Add. Transd. 1 :	<i>W71.03</i>
Tracking Generator :	<i>Off</i>	Add. Transd. 2 :	<i>None</i>
Input :	<i>1AC</i>	Add. Transd. 3 :	<i>None</i>

Preamplifier :	<i>10 dB</i>	Demodulation :	<i>FM Broad</i>
RF Att. :	<i>Coupled</i>	Volume :	<i>0 %</i>
Ref. Level :	<i>-10 dBm</i>	Squelch :	<i>--</i>
Min. RF Att. :	<i>0 dB</i>	Option :	<i>None</i>
IF Att. :	<i>0 dB</i>		
Autorange :	<i>On</i>		

Curve 1 :	<i>On</i>	Repetition :	<i>Single</i>
Curve 2 :	<i>On</i>	Stop Mark :	<i>On</i>
		Stop Message :	<i>On</i>
		Stop Message :	<i>Connect EUT</i>



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The EUT is powered by a generic AC/DC adapter 110Vac / 12 Vdc

**TEST
3.**

ANTENNA POWER CONDUCTION LIMITS FOR RECEIVERS

**REFERENCE
DOCUMENT**

FCC PART 15 subpart B

- **TEST SETUP:** Shielded room
- **TEST LOCATION:** Radio test area
- **TEST EQUIPMENT USED FOR TEST:**
 - Spectrum Analyzer Rohde&Schwarz mod. FSP
 - RF Signal generator Rohde&Schwarz mod. SME03
 - DC – 18 GHz Attenuator SUHNER mod. 6803.17.B

TEST CONDITIONS:		MEASURED
Ambient temperature :	23°C ± 5°C	24 °C
Ambient humidity :	25 - 75 %rH	45%
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	960 mbar
Voltage :	12 Vdc	12,0 ± 0,5 Vdc

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

RESULT: WITHIN THE LIMIT

MEASUREMENT RESULTS

<i>Antenna power conduction level</i>		
f [MHz]	Bandwidth (kHz)	Level [nW]
30-200	120	⊖
200-1000	120	⊖
⊖ = No signal above noise level (-75 dBm ≡ 30 pW)		
Measurement Uncertainty : +/- 3 dB		

LIMITS
2.0 nW

6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	<p>Doc. No. SC000213.dsn File name : E16EQ06A-Z.0 Issue date: 2002-02-19 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000188.dsn File name : E16RIR2A-K Issue date: 2000-10-31 Sheet no. 1</p> <p>Doc. No. SC000193.dsn File name : E16RIREA-Z.0 Issue date: 2001-03-16 Sheet no. 1</p> <p>Doc. No. SC000185.dsn File name : E16RIV1A-Z.* Issue date: 2000-11-13 Sheet no. 1</p> <p>Doc. No. SC000187.dsn File name : E16RIV4A-K Issue date: 2000-10-31 Sheet no. 1</p> <p>Doc. No. SC000215.dsn File name : E16RIV15-Z.0 Issue date: 2002-04-16 Sheet no. 1</p> <p>Doc. No. SC000260.dsn File name : E16S receiver module Issue date: 2003-06-03 Rev. 0 Sheet no. 2</p> <p>Doc. No. SC000222.dsn File name : Address key for E16/E16S Issue date: 2004-03-01 Rev. 1 Sheet no. 1</p>



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	<p>Doc. No. SC000208.dsn File name : LK E16RIQ01-Z.0 Issue date: 2002-01-21 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000209.dsn File name : VEGA T16 E16RIQ02-Z.0 Issue date: 2002-01-21 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000210.dsn File name : VEGA E T16, C22/S22 Issue date: 2002-01-21 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000211.dsn File name : SIRIO E C16/T16, C22/T22/K22 Issue date: 2002-05-24 Rev. 1 Sheet no. 1</p> <p>Doc. No. SC000212.dsn File name : KIT COMMAND TRANSMISSION Issue date: 2002-01-21 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000216.dsn File name : hardware key Issue date: 2002-03-27 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000220.dsn File name : hardware key for SIRIO E Issue date: 2002-05-16 Rev. 0 Sheet no. 1</p> <p>Doc. No. SC000207.dsn File name : mother board E16 Issue date: 2004-03-01 Rev. 1 Sheet no. 1</p>
PART LIST	Ref. file : R102251D_bill.pdf Issue date: 2004-06-29 Sheet no. 1

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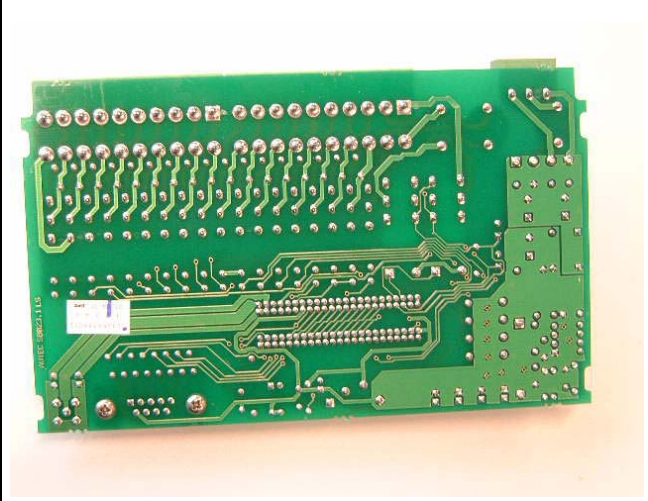
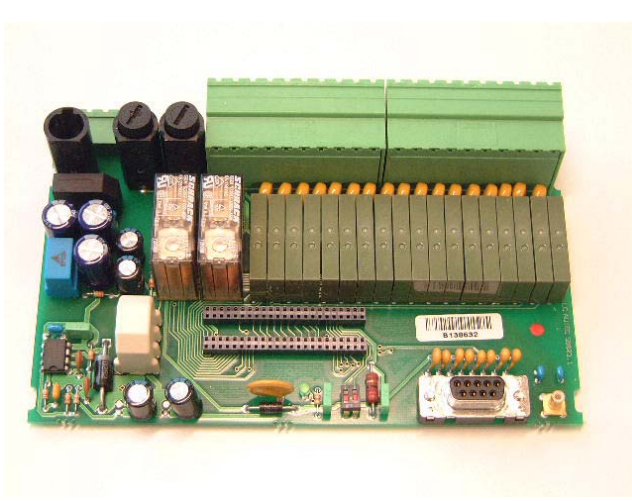
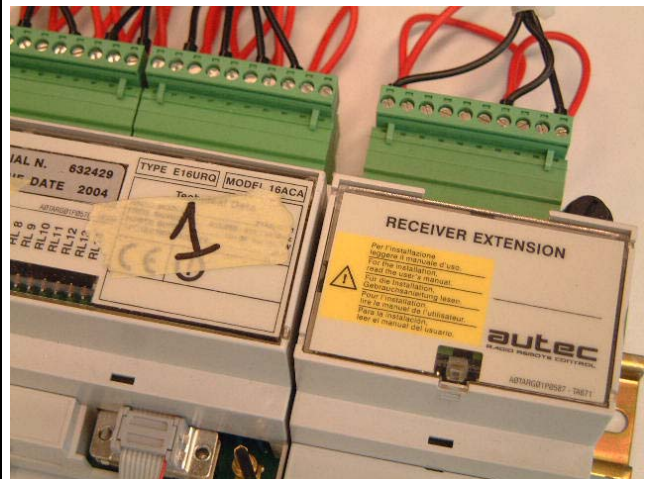
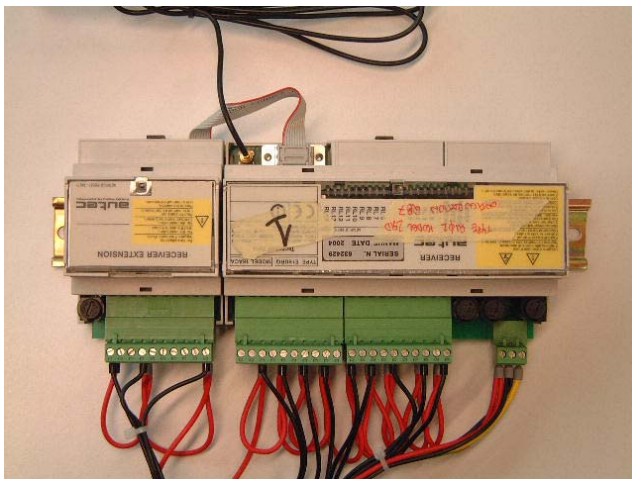
6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
RAIL MOUNTED RECEIVER	LIE&LQA0
USER'S MANUAL	sheet no. 20

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6.3 Photographic documentation

PHOTO No. 1 – EQUIPMENT UNDER TEST IDENTIFICATION





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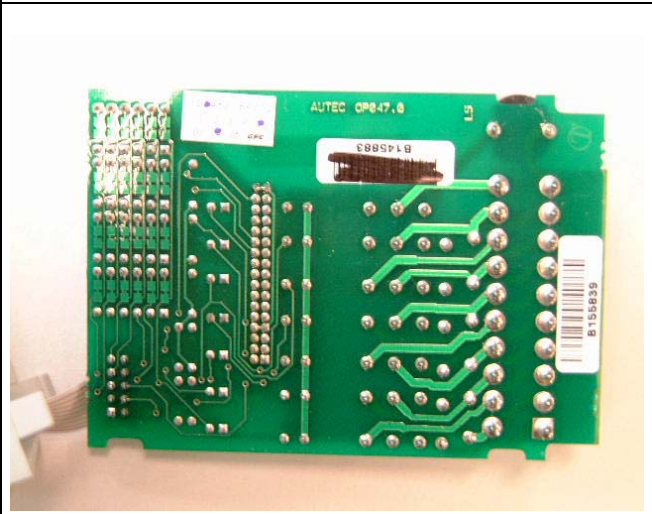
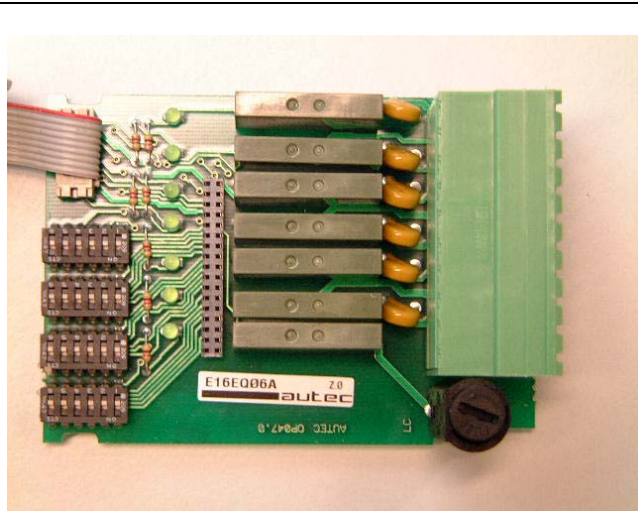
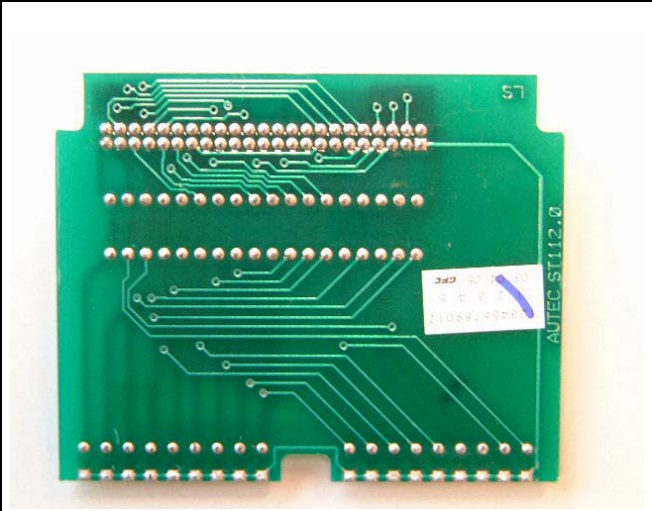
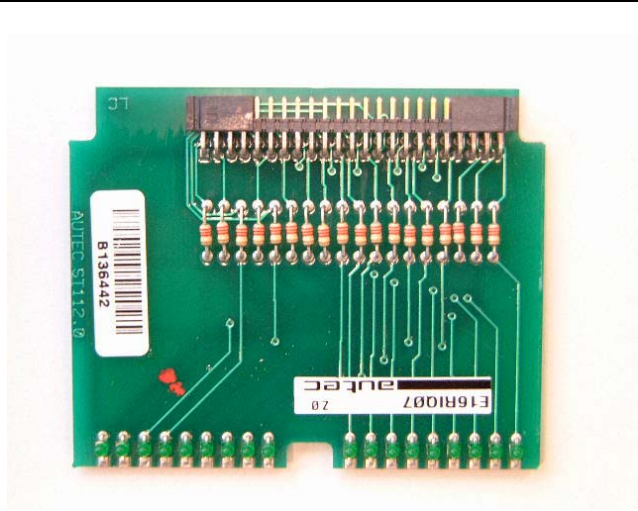
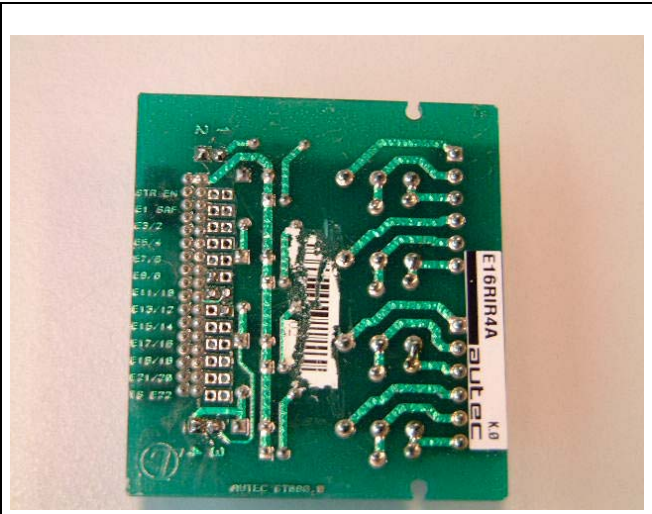
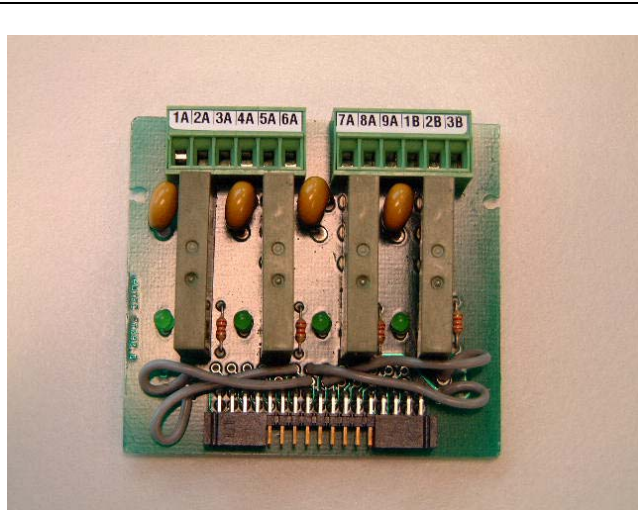
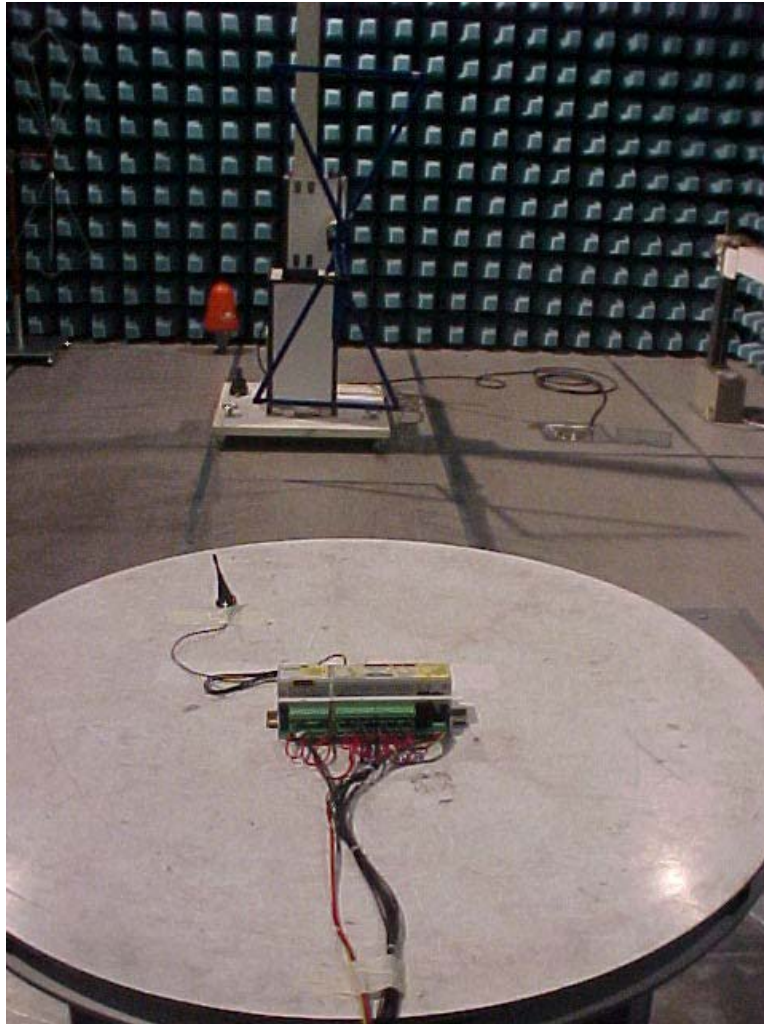


PHOTO NO. 2 - TEST SETUP



7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS

EQUIPMENT under ANALYSIS :		BRAND NAME
BASIC MODEL	<p>REMOTE CONTROL AC RECEIVER UNIT</p> <p>Type R102 Model 251D</p> <p>Configuration QB7 receiving unit for DIN guides with E16RIQ07 and E16RIR4A card</p>	AUTEC Srl
DERIVED MODELS	<p>Type R102 Model 251D</p> <p>Configuration</p> <p>Q01-Q09, QA6, QA8, QB4, QB6, QB8, QC4, QD6, QE6, QF6</p>	

Prima Ricerca & Sviluppo, just on the basis of the technical documents insert in folders called “Schematic diagrams”, “Block diagrams” and “Bill of materials” 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 Radio Receiver Module code E16SRXUS1
- ◆ the basic model and the derived models have the same Antenna
- ◆ There are No. 18 Configurations which differ each other for the used extension analogue interface card type :
 - ◆ Configuration Q01 : receiver unit for DIN guides with E16RIQ01
 - ◆ Configuration Q02 : receiver unit for DIN guides with E16RIQ02
 - ◆ Configuration Q03 : receiver unit for DIN guides with E16RIQ03
 - ◆ Configuration Q04 : receiver unit for DIN guides with E16RIQ04
 - ◆ Configuration Q05 : receiver unit for DIN guides with E16RIQ05
 - ◆ Configuration Q06 : receiver unit for DIN guides with E16RIQ06
 - ◆ Configuration Q07 : receiver unit for DIN guides with E16RIQ07
 - ◆ Configuration Q08 : receiver unit for DIN guides with E16RIQ08
 - ◆ Configuration Q09 : receiver unit for DIN guides with E16RIQ09

- ◆ Configuration QA6 : receiver unit for DIN guides with E16RIQ06 and E16RIV1A card
- ◆ Configuration QA8 : receiver unit for DIN guides with E16RIQ08 and E16RIV1A card
- ◆ Configuration QB4 : receiver unit for DIN guides with E16RIQ04 and E16RIR4A card
- ◆ Configuration QB6 : receiver unit for DIN guides with E16RIQ06 and E16RIR4A card
- ◆ Configuration QB8 : receiver unit for DIN guides with E16RIQ08 and E16RIR4A card
- ◆ Configuration QC4 : receiver unit for DIN guides with E16RIQ04 and E16RIR2A card
- ◆ Configuration QD6 : receiver unit for DIN guides with E16RIQ06 and E16RIREA card
- ◆ Configuration QE6 : receiver unit for DIN guides with E16RIQ06 and E16RIREB card
- ◆ Configuration QF6 : receiver unit for DIN guides with E16RIQ06 and E16RIV15 card

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.