

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 :

REMOTE CONTROL - DC RECEIVER UNIT
Type R302 Model 654D Configuration L01

DERIVED MODELS:
APPARECCHI DERIVATI :

Type R302 Model 654D Configuration L02

REFERENCE STANDARDS :
NORME DI RIFERIMENTO :

FCC 47 CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** *AUTEC S.r.l.*
Ente / Società:
- **Mr.:** *BIANCHIN STEFANO*
Sig.:
- **Address:** *VIA POMAROLI, 65 - 36030 CALDOGNO (VI) - ITALY*
Indirizzo:
- **Tel. :** ++39 0444 901000 • **Telefax** ++39 0444 901080 • **E-mail:** sbianchin@autec.it
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:** 31/06/04
Data ricevimento campioni: *Data inizio prove:*

Date of end test: 02/06/04
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.

Reproduction of this EMC-Test Report in whole or in part is prohibited without the written authorization of the Laboratory Director

La riproduzione di questo Rapporto in modo parziale o totale è PROIBITO senza l'autorizzazione scritta della Direzione del Laboratorio

0. CONTENTS

	Page	Rev	Date
0. CONTENTS	2	0	08/09/04
1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)	3	0	08/09/04
1.1 Identification	3	0	08/09/04
1.2 Technical data	3	0	08/09/04
1.3 Receiver technical data	3	0	08/09/04
1.4 Modifications incorporated in E.U.T.	3	0	08/09/04
1.5 Ports identification	4	0	08/09/04
1.6 Auxiliary equipment	4	0	08/09/04
2. TEST CONDITIONS	5	0	08/09/04
2.1 Operating test modes and test conditions	5	0	08/09/04
2.2 Test overview	5	0	08/09/04
3. REFERENCE STANDARD FOR PERFORMED TESTS	6	0	08/09/04
4. Summary of test results	7	0	08/09/04
4.1 Emission tests	7	0	08/09/04
5. TEST RESULTS	8	0	08/09/04
6. EUT TECHNICAL DOCUMENTATION	17	0	08/09/04
6.1 Wiring diagrams	17	0	08/09/04
6.2 Technical manual	17	0	08/09/04
6.3 Photographic documentation	18	0	08/09/04
7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS	20	0	08/09/04

1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name: AUTEC

Equipment : DC receiver unit

Model name or No. : Type R302
Model 654D

Configuration L01 (E16 receiver unit with master board E16B10DC)

Configuration L02 (E16 receiver unit with master board E16B10DC and stylus antenna)

Serial number : prototype

FCC ID : OQA-R302654D

Country of manufacturer: ITALY

1.2 Technical data

FCC class: Unintentional radiators, Class B

Supply voltage: 8...30 Vdc

Type of receiver : superetherodyne

Maximum internal frequency generated by EUT : 44 MHz

Input Power / Current : External DC power source

Typical usage : Portable radio remote control used to command Industrial machines

EUT single or system: Single

EUT dimensions : 200 x 120 x 90 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	Line not present	*****
3	DC power input/output ports	8 - 30 Vdc from external supply source Cable length not specified.	Terminals
4	Signals ports	N° 10 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	<i>Receiver active</i>

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.

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

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

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

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

² For the configuration with external antenna we have considered that the worst case is the EUT with internal antenna because the same configuration of this apparatus has been just verified in a other test session cfr. EMC.TR.04.190, related to a similar apparatus code R202 453D B01 and B02

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 = $(k=2) \pm 3.5$ 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 :		12 Vdc

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

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

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

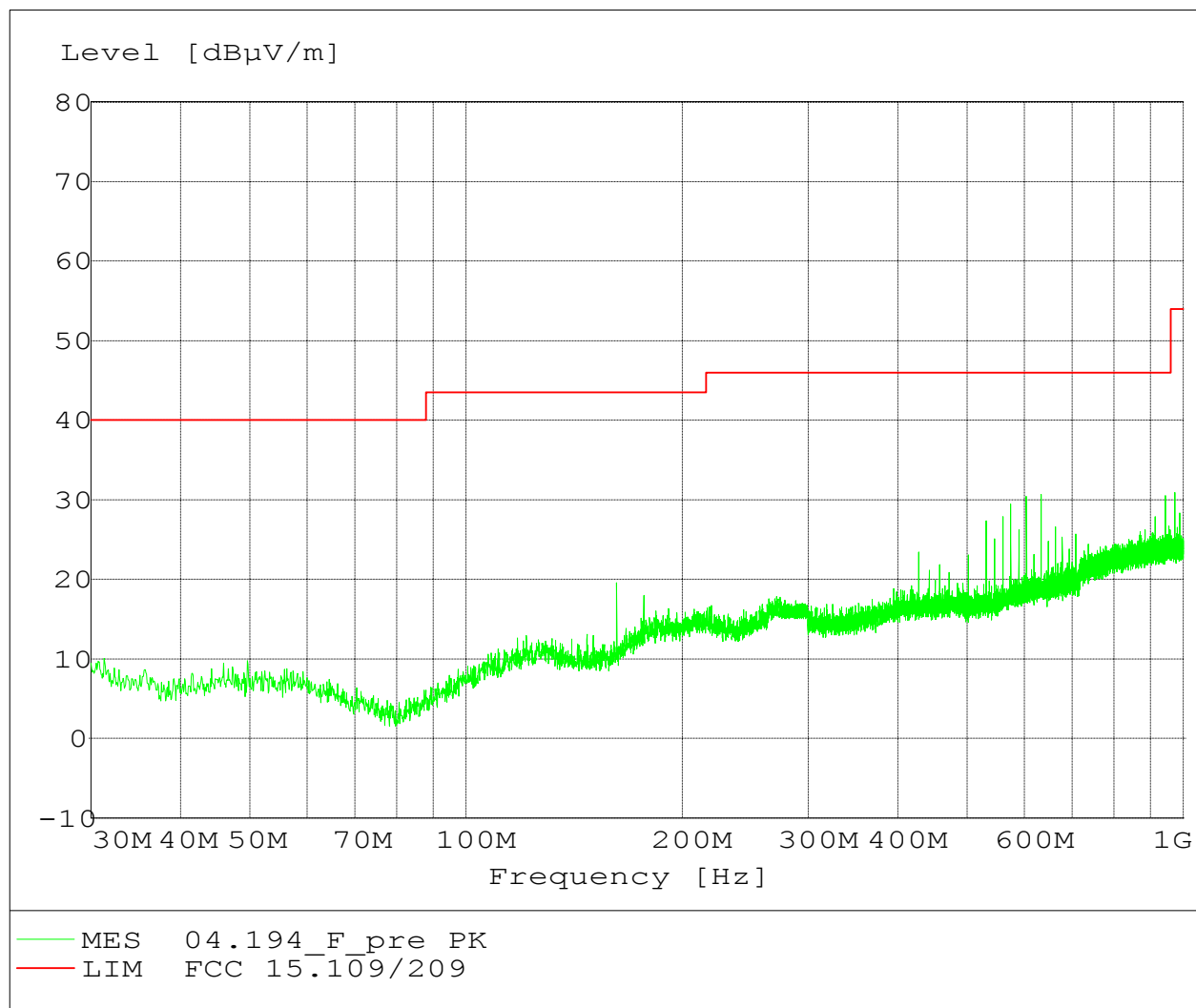
Stop Mark: On

Stop Message: On

Text: Connect antenna

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

Configuration L01 - with internal 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. ESMI
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 with a generic AC/DC adapter	98 Vac $\pm$ 3%

OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: Within the limits**

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

SCAN TABLE : Voltage Mains

Unit : dBμV

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

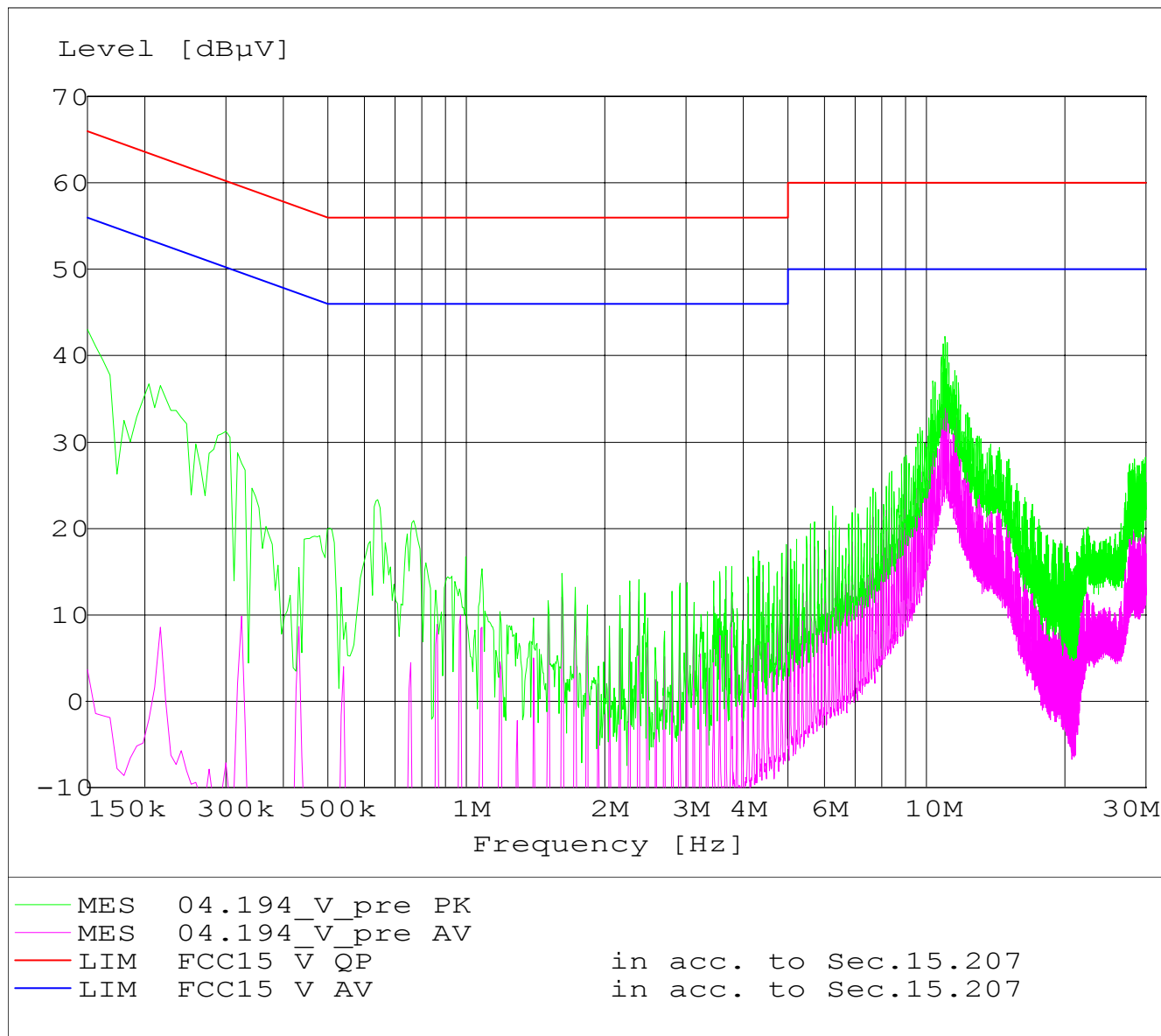
Start Frequency :	150.0 kHz		
Stop Frequency :	30.0 MHz	IF Bandwidth :	9 kHz
Measure Time :	10.0 ms	Step size :	6 kHz

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

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

Curve 1 :	On	Repetition :	Single
Curve 2 :	On	Stop Mark :	On
		Stop Message :	On
		Stop Message :	Connect EUT

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



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

**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 :	8-30 Vdc	12 Vdc

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

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

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 $\equiv$ 30 pW)		
Measurement Uncertainty : +/- 3 dB		

<i>LIMITS</i>
2.0 nW

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

6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	Doc. No. SC000203.dsn File name : board B10DC-Z.* Issue date: 2004-04-05 Rev. 3 Sheet no. 1 Doc. No. SC000260.dsn File name : E16S receiver module Issue date: 2003-06-03 Rev. 0 Sheet no. 2 Doc. No. SC000222.dsn File name : Address key for E16/E16S Issue date: 2004-03-01 Rev. 1 Sheet no. 1
PART LIST	Ref. file : R302654D_bill.pdf Issue date: 2004-06-29 Sheet no. 1

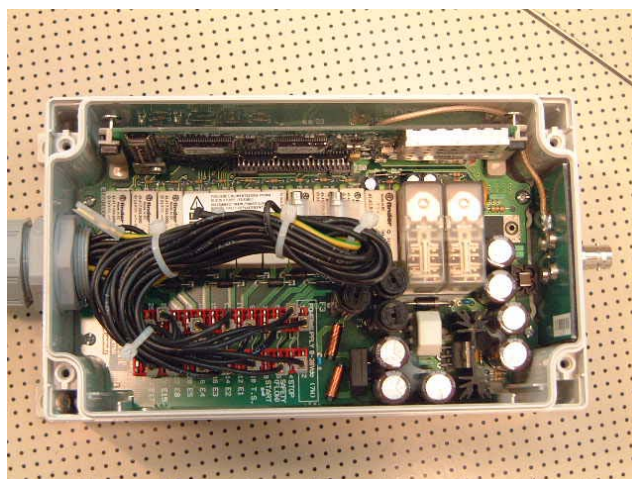
6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
AC RECEIVER UNIT USER'S MANUAL	LIE&LDA0 sheet no. 20

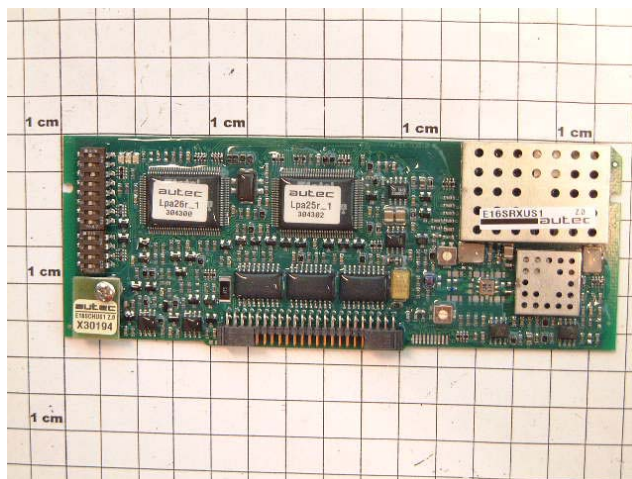
Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel.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

6.3 Photographic documentation

PHOTO No. 1 – EQUIPMENT UNDER TEST IDENTIFICATION



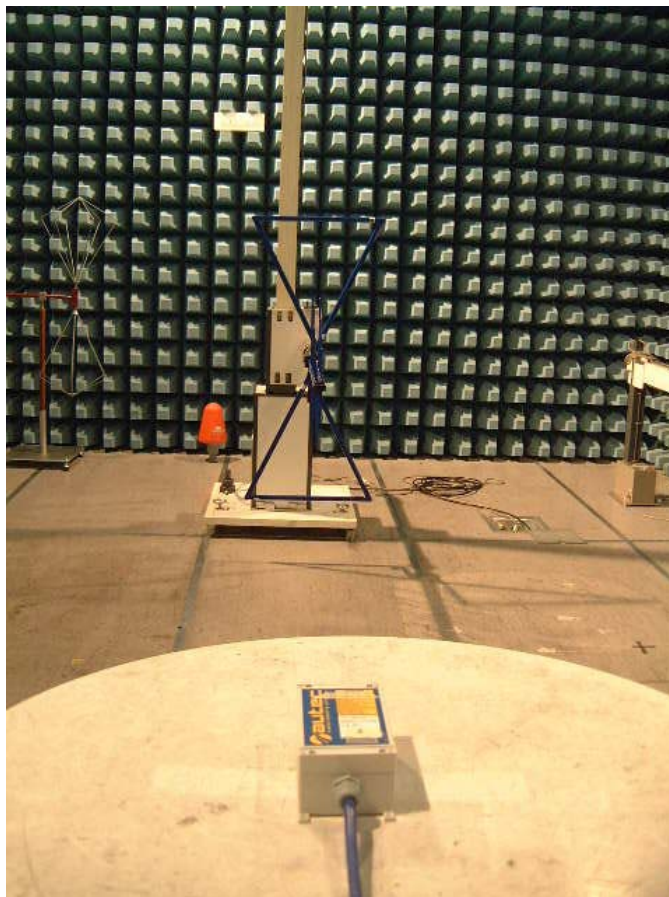
DEDICATED ANTENNA



RECEIVER MODULE

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

PHOTO NO. 2 - TEST SETUP



CONFIGURATION L01

7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS

EQUIPMENT under ANALYSIS :		BRAND NAME
BASIC MODEL	REMOTE CONTROL AC RECEIVER UNIT Type R302 Model 654D Configuration L01	AUTEC Srl
DERIVED MODELS	Configuration L02	

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. 2 Configurations which differ each other for the used extension interface (card) and for the used antenna:
 - ◆ Configuration L01 for internal antenna
 - ◆ Configuration L02 for external stylus antenna

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.