

# TEST REPORT

*Rapporto di prova*

EMC N° 051226

EUT: Insulation monitoring  
Model: HRI-R40  
Serial N°: production prototype

Applicant: Contrel Elettronica s.r.l.  
*Cliente* Via S.Fereolo 9  
20075 Lodi, Italy

Manufacturer: the same  
*Fabbricante*

Date of receipt: 2-12-2005  
*Data ricevimento*

Date of test: 2, 7-12-2005  
*Data prove*

Test facility site: Via L. da Vinci, 92, Caravaggio (BG), Italy  
*Sede laboratorio*

Reference standard: EN 61326 (EN 61326-1:1998 + A1:1999)  
*Norme di riferimento*

Test result: **COMPLIED**  
*Esito delle prove:* *Conforme*

This test report consists of 20 pages Attachment included.

*Questo rapporto di prova consiste 20 di compresi gli allegati*

Caravaggio, 21/12/2005

Approvals engineer

*Il responsabile*

Alessandro dr. Algeri

This test report shall not be reproduced except in full without written consent of ABE SpA.  
*Il presente documento non può essere riprodotto parzialmente senza l'autorizzazione scritta della ABE SpA*

This test report refers only to tested samples.

*Il rapporto si riferisce esclusivamente al campione sottoposto a prove.*

---

## CONTENTS

<b>1.EUT DESCRIPTION.....</b>	<b>3</b>
<b>2.TESTS LIST IN CHRONOLOGICAL ORDER.....</b>	<b>4</b>
<b>3.GENERAL TEST CONDITIONS.....</b>	<b>4</b>
<b>4.SUMMARY OF TESTS RESULTS.....</b>	<b>5</b>
<b>5.RADIATED EMISSION.....</b>	<b>8</b>
<b>6.CONDUCTED EMISSIONS.....</b>	<b>9</b>
<b>7.RADIO-FREQUENCY COMMON MODE.....</b>	<b>10</b>
<b>8.RADIATED IMMUNITY.....</b>	<b>11</b>
<b>9.ELECTROSTATIC DISCHARGE.....</b>	<b>12</b>
<b>10.FAST TRANSIENTS.....</b>	<b>13</b>
<b>11.SURGE.....</b>	<b>14</b>
<b>12.VOLTAGE DIPS AND SHORT INTERRUPTIONS.....</b>	<b>15</b>
<b>13.EUT PICTURES.....</b>	<b>16</b>
<b>2.ATTACHMENT LIST.....</b>	<b>17</b>

## 1. EUT description

Insulation monitoring for power lines in medical rooms.

Manufacturer reference documentation for EUT:

<i>Document</i>	<i>Rev</i>	<i>date</i>
Manuale istruzioni	IM 830-I v0.91	2005

### **1.1.EUT configuration and operating conditions**

Powered at 230V ac, if not differently specified.

Connected to remote control PR4, according to scheme in reference document.

Radiated emission and immunity tests performed with N°2 control PR4 connected.

Power line and monitored line are bridged: so during all conducted immunity tests the signal injected on AC is also driven all over the other lines.

Screen of the PR4 cable connected to ground.

The EUT mounts on board ferrites to AC outputs and to panel PR4 cables.

During immunity test monitoring leds and display status: verified non change of status from "NO TRIP" to "TRIP" and/or opposite.

## 2. Tests list in chronological order

Date	Tests
2-12-2005	Conducted emission
2-12-2005	Radiated emission
2-12-2005	Radiated RF fields
7-12-2005	Conducted RF
	Short interruption
	Bursts
	Surge
	Electrostatic discharge ESD

## 3. General test conditions

### 1.2. Environmental conditions

Date	Temperature	Humidity rel.	Atmospheric pressure
2/12/05	16 ± 2 °C	40 ± 1 %	1018 ± 2 hPa
7/12/05	15 ± 2 °C	47 ± 1 %	1020 ± 2 hPa

### 1.3. Test equipment

Our laboratory is part of ABE Elettronica SpA, certified ISO 9001 for project and production of RF telecommunication instruments.

Test equipment undergoes a general program of control/calibration and can be referenced directly or indirectly to national or international instruments or standards.

Quality policy and certificate is available at: <http://www.abe.it/qualita-e.php>

### 1.4. Test method

Test method is the one described in the product standard.

In this test report is specified the method selected when the standard allows more than one choice.

This test report is written following EN17025 (art.5.10.3.).

## 4. Summary of tests results

Reference standard: EN 61326 (EN 61326-1:1998 + A1:1999)

Following EN 61326 standard the EUT is classified for these tests:

- **Class B** apparatus, for emission tests.
- Immunity test requirements for equipment intended for use in industrial location (Tab. A.1). EUT is considered for continuous unmonitored operation and immunity are evaluated according to Tab.2, 2nd column.

### Table abbreviations

**C** = The EUT complies with the test specification limit

**NC** = The EUT does not comply with the test specification limit

**NA** = Test not applicable

PORT	PHENOMENA	PERFORMANCE CRITERION	BASIC STANDARD	RESULT
enclosure	radiated emission	-	EN 55022	C
AC mains	conducted emissions	-	EN 55022	C
AC mains	harmonic currents emissions	-	EN 61000-3-2	NA <sup>3)</sup>
AC mains	voltage fluctuations and flicker	-	EN 61000-3-3	NA <sup>4)</sup>
enclosure	Radio-frequency amplitude modulated electromagnetic field	A	EN 61000-4-3	C
AC mains	Radio-frequency common mode	A	EN 61000-4-6	C
control line	Radio-frequency common mode	A	EN 61000-4-6	C <sup>1)</sup>

AC mains	Bursts	A	EN 61000-4-4	C
control line	Bursts	A	EN 61000-4-4	C <sup>1)</sup>
control line	Surge	A	EN 61000-4-5	C <sup>1)</sup>
AC mains	Surge	A	EN 61000-4-5	C
enclosure	Electrostatic discharge	A	EN 61000-4-2	C
AC mains	Voltage dips and short interruptions	A	EN 61000-4-11	C

**C** = The EUT complies with the test specification limit

**NC** = The EUT does not comply with the test specification limit

**NA** = Test not applicable

**Table note**

- 1) Line can be > 3m long.
- 2) Harmonics current < 5mA, no limit applicable.
- 3) EUT is unlikely to produce voltage fluctuations, test is not made.

---

### **1.5. Performance criteria**

**A:** The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

**B:** The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

**C:** Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

## 5. Radiated emission

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 55022 (1999)+A1+A2

### *Test equipment*

- Spectrum analyzer 2712 Tektronix (with EMC option) Nr. 13023260
- Biconical antenna EM-6912 Electro-Metrics (30-200 MHz) Nr. 517
- Attenuator 6 dB 11W RADIALL Nr. R415706000
- Log-per antenna EM-6950 Electro-Metrics (200-1000 MHz) Nr. 717

### *Test site*

- Anechoic room (7,5 x 4,0 x 4,1 m)

Comtest, TDK

*Transmission Loss* measurements in 30MHz- 18GHz frequency region according to EN 50147-2 (1996), performed by Accredited Test Laboratory Austrian Research Centre Seibersdorf, with Report N° EMV-H 21/96.

### *Acceptance limits*

Limits: Class B

Frequency (MHz)	Limit at 10 m QP (dBuV/m)
30 MHz to 230 MHz	30
230 MHz to 1000 MHz	37

### *Test method*

Test distance: 3 m

Correction factors: -10db for measurement distance at 3 m and +6dB for attenuation in fully Anechoic chamber (art.10.2.1 EN55022)

Antenna polarization: horizontal and vertical

Vertical scan: no vertical scan is performed in fully anechoic chamber

### *Test result*

The EUT **does comply** with the test specification limit (see Attachment A).

### *Remarks*

Graphs report Peak detector measurement.



## 6. Conducted emissions

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 55022 (1999)+A1+A2

### *Test equipment*

- Spectrum analyzer 2712 Tektronix
- LISN EM-7820 Electro-Metrics
- Transient limiter EM-7600 Electro-Metrics
- Test site: Shielded room

Nr. 13023260  
Nr. 2703  
Nr. 304  
Comtest

### *Acceptance limits*

Limits: Class B

Frequency (MHz)	QP Limit (dBuV)	Average Limit (dBuV)
0,150 to 0,5	da 66 a 56	da 56 a 46
0,5 to 5	56	46
5 to 30	60	50

### *Test method*

Conducted emissions have been measured on mains supply by LISN.

### *Test result*

The EUT **does comply** with the test specification limit (see Attachment B).

### *Remarks*

Graphs report Peak detector measurement.  
Short line is for QP detector.

## 7. Radio-frequency common mode

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-6 (1995)+A1

### *Test equipment*

- |   |                |
|---|----------------|
| ● RF amplifier 225LC Kalmus                       | Nr. 7344B-1    |
| ● Signal generator HP 8648/B                      | Nr. 3443U00370 |
| ● CDN FCC-801-M3-16 Fischer Custom Communications | Nr. 214        |
| ● Attenuator 6 dB 11W RADIALL                     | Nr. R415706000 |

### *Test method*

The RF signal was injected by coupling-decoupling network (CDN) into:

- AC mains

Frequency range: 0.15 to 80 MHz, 1% step, 1,5s per step.

Test level (unmodulated): 10V<sub>rms</sub>

Modulation: 1kHz, 80% AM

### *Test result*

The EUT **does comply** with performance criterion A.

### *Remarks*

EN 61326 test level is limited at 3 V/m.

## 8. Radiated immunity

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-3 (1995)

### *Test equipment*

- Signal generator HP 8648/B
  - RF amplifier 225LC Kalmus
  - Logarithmic Antenna RKB 80-230MHz
  - RF amplifier 711FC Kalmus
  - Logarithmic Antenna RKB 200-1000MHz
  - EM Radiation monitor EMR 20 Wandel&Goltermann
- Nr. 3443U00370  
Nr. 7344B-1  
Nr. 0069  
Nr. 7344A-1  
Nr. 0070  
Nr. BN2244/20 C-0107

### *Test site*

Anechoic room (7,5 x 4,0 x 4,1 m)

Comtest, TDK

*Field uniformity* measurements in 30MHz-18GHz frequency region according to Report, performed by Accredited Test Laboratory Austrian Research Centre Seibersdorf, with Report N° EMV-H 21/96.

### *Test method*

Frequency range: 80 to 1000 MHz

Frequency step: 1%, 3 s per step.

Field strength (unmodulated): 10 V/m

Modulation: 1kHz, 80% AM

Antenna polarization: horizontal and vertical

### *Test result*

The EUT **does comply** with performance criterion A.

### *Remarks*

/

## 9. Electrostatic discharge

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-2 (1996) +A1:1998+A2:2001

### Test equipment

- Electrostatic discharge generator ESD 30 EM TEST                      Nr. 1095-55
- Horizontal and vertical coupling planes

### Test method

At least 10 discharges for both polarizations, according to the following table

Discharge point	Discharge type	Level	Criteria verified
Horizontal plane	contact	6 kV	A
Vertical plane	contact	6 kV	A
Enclosure (LCD display)	air*	8 kV	A

\*Only on non conductive surface, according to art.5 basic standard.

### Test result

The EUT **does comply** with performance criterion A.

### Remarks

/

## 10. Fast transients

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-4 (1996)

### *Test equipment*

- Fast transients generator UCS 500 EM TEST Nr. 1195-13
- Capacitive coupling clamp HFK Nr. 1195-04

### *Test method*

The electrical fast transients were coupled into:

1. AC mains, by capacitive coupling network included in the generator.  
Peak voltage: 2 kV, L-PE and N-PE
2. Cable to remote control PR4, by capacitive clamp.  
Peak voltage: 1 kV
3. PE, by capacitive coupling network included in the generator.  
Peak voltage: 1 kV,

Tr/Th: 5/50 ns

Rep. frequency: 5kHz

Polarity: +/-

Test duration: 1 minute

### *Test result*

The EUT **does comply** with performance criterion A.

### *Remarks*

/

## 11.Surge

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-5(1995)

### *Test equipment*

● Surge generator UCS 500 EM TEST

Nr. 1195-13

### *Test method*

Surge pulses were coupled into AC mains supply. With coupling-decoupling network included in surge generator.

N° 10 impulses at alternate polarity alternata, at zero-crossing (0°), at maximum positive (90°) and negative (270°) voltages.

Peak voltage:

- Common mode (L-PE, N-PE): 2 kV,
- Differential mode (L-N): 1 kV,

Tr/Th: 1,2 / 5,0  $\mu$ s(8/20  $\mu$ s)

### *Test result*

The EUT **does comply** with performance criterion A.

### *Remarks*

/

## 12.Voltage dips and short interruptions

*Reference standard:* EN 61326 (EN 61326-1:1998 + A1:1999)

*Basic standard:* EN 61000-4-11 (1994)

### *Test equipment*

- Generator UCS 500 EM TEST Nr. 1195-13
- Stabilized voltage variator Ing. Brignolo Nr.30527

### *Test method*

Phenomena	Reduction in % U	Periods ms	Performance criterion requested	Performance criterion verified
Voltage dips	100	0,5	B	A
Voltage dips	60	10	C	C

U is the nominal EUT voltage.

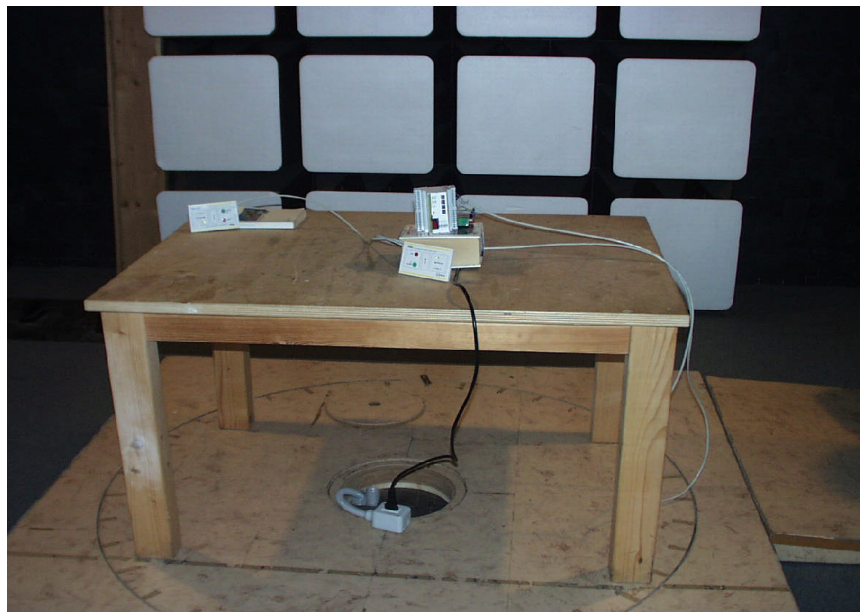
### *Test result*

The EUT **does comply** with the requested performance criteria.

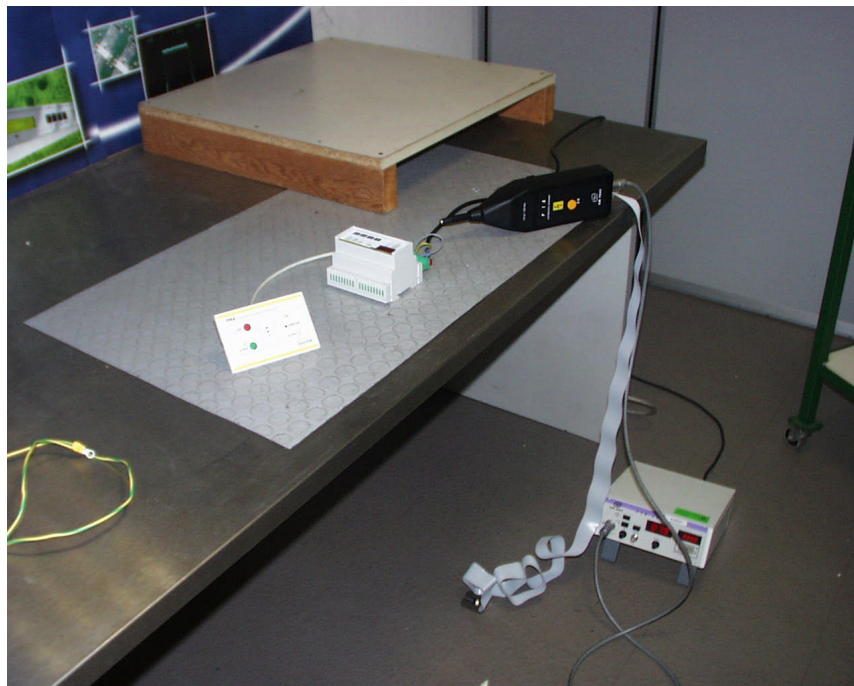
### *Remarks*

/

## 13.EUT Pictures



*Illustrazione 1: EUT inside chamber with N°2 control panels PR4*



*Illustrazione 2: EUT at ESD test table*

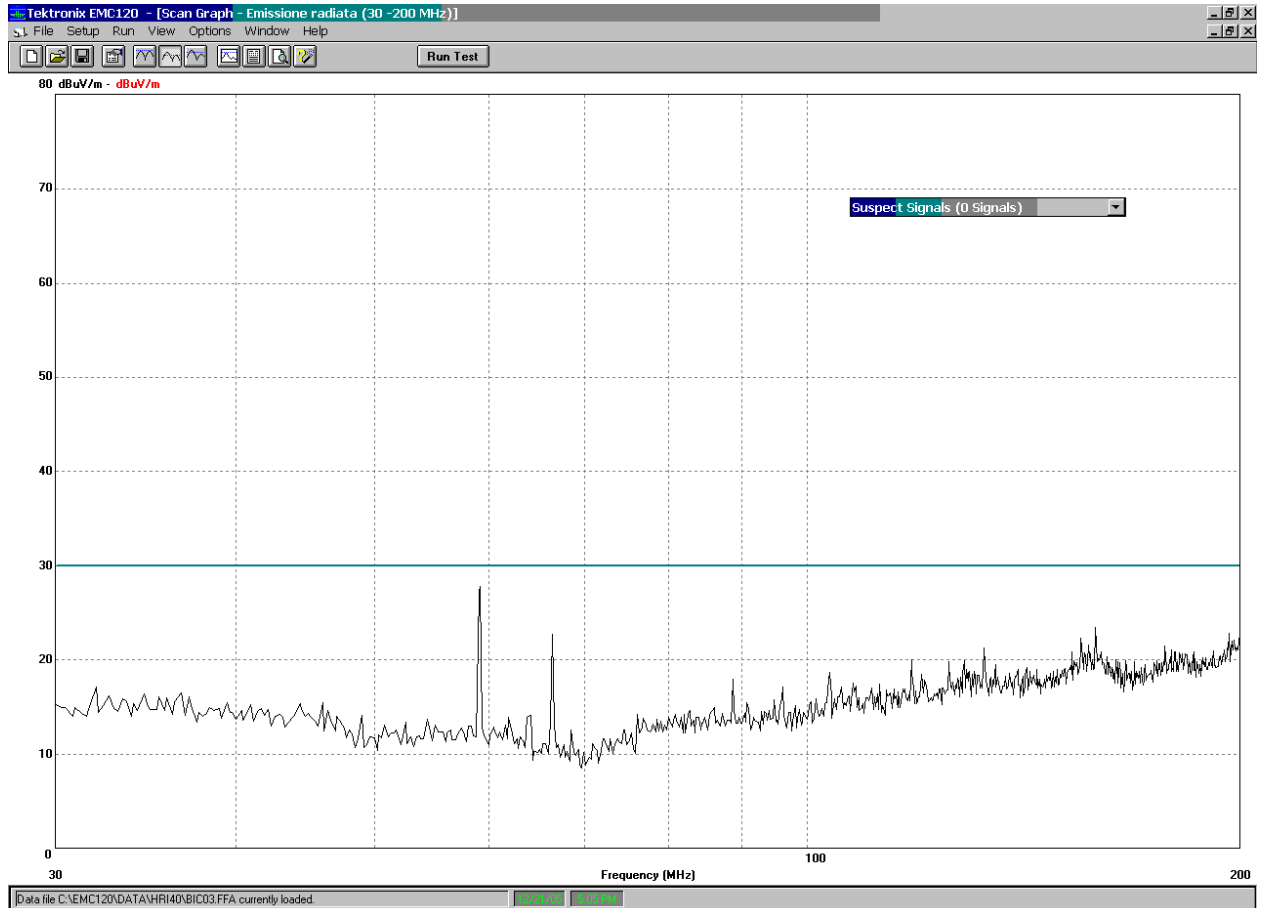


## 2. Attachment list

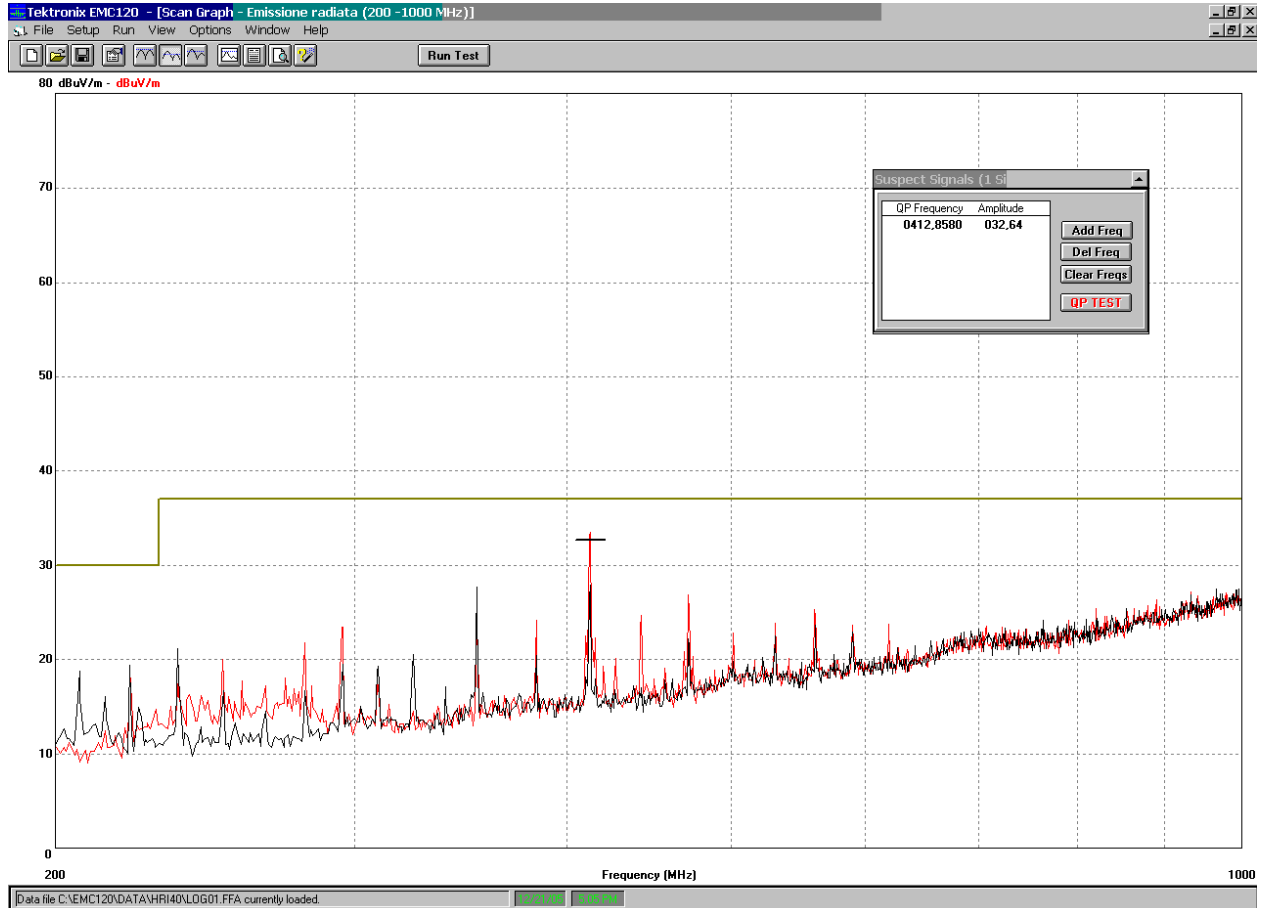
Attachment A	Radiated emission graphs
	A.1 Band 30-200 MHz
	A.2 Band 200–1000 Mhz Black line for Horizontal polarization Red line for vertical polarization
Attachment B	Conducted emission graphs
	B.1 AC power

pdf copy

## Attachment A.1



**Attachment A.2**



## Attachment B.1

