

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 :

**Base Station of Radio-controlled firing device for
pyrotechnic application
FIREMASTER III MILLENIUM
Unit TX 2000A**

REFERENCE STANDARDS :
NORME DI RIFERIMENTO :

FCC 47 CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** *PARENTE S.r.l.*
Ente / Società':
- **Mr.:** *Sig. CIZZA*
Sig.:
- **Address:** *VIA OBERDAN, 105 – 45037 – MELARA (RV) - ITALY*
Indirizzo:
- **Tel. :** *++39 0425 89035* • **Telefax** *++39 0425 89640* • **E-mail:**
Telefono : *Fax :* *e-mail*

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

Date of test samples receipt: *20/09/04* **Date of start test:** *21/09/04*
Data ricevimento campioni: *Data inizio prove:*

Date of end test: *25/10/04*
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

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1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name:	PARENTE
Equipment :	Base Station of Radio-controlled firing device for pyrotechnic application
Model name or No. :	TX 2000A
Serial number :	11030006
FCC ID :	SLO-FIREMASTER3T
Country of manufacturer:	ITALY

1.2 Technical data for equipment

Supply voltage:	Sealed lead-acid accumulator with gel type electrolyte, 12V 5.6A/h
Typical usage :	Portable radio remote control used for pyrotechnic application
EUT single or system:	Single
EUT dimensions :	46 x 36 x 15,3 cm.

1.3 Technical data for Transceiver – Transmitter part

FCC class:	Intentional Radiators
Working Frequency for TX :	40,685 MHz
Frequency Range of Operation for TX :	40,66 – 40,70 MHz
Antenna type for TX :	Dedicated Antenna
TX module type :	NBFM (narrowband frequency modulation)

1.4 Technical data for Transceiver – Receiver part

FCC class:	Unintentional Radiators, Class B
RX module type :	FM superheterodyne, quartz-controlled
RF receiver frequency :	40.665 MHz
Maximum internal frequency generated by EUT :	CPU clock 10 MHz
Receiver Sensitivity:	0.15µV/m for 20db S/N
Antenna type :	Dedicated Antenna

1.5 Modifications incorporated in E.U.T.

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

- None

1.6 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	Metallic surface	By screws
2	AC power input/output ports	Line not present	*****
3	DC power input/output ports	Customer battery pack Pb 12V 5,7Ah	Internal 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>			

1.7 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 and C

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>In stand-by mode (receiver ready to use)</i>
#2	<i>In transmission mode</i>

2.2 Test overview

The transceiver is classified as “*intentional radiator*” in conformity to FCC Part 15 Sub. C, §15.201, §15.231 and it is subject to “*Certification*” procedure.

The application is mainly used as Radio-controlled firing device for pyrotechnic application.

The receiver part is classified as “*unintentional radiator*” in conformity to FCC Part 15 Sub. B, §15.109, §15.107 and it is subject to “*Verification*” procedure.

The application is mainly used as pyrotechnical application radio remote control; the RF signal when the apparatus is switch-on is not 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 (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 receiver use in according with §15.209 all the emission of the appliance shall not exceed the following levels:

Frequency (MHz)	Field Strength at a distance of 3m ($\mu\text{V/m}$)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

For transmitter use in according with §15.231 for intentional radiator operated within the frequency band 40,66-40,70 MHz

Frequency (MHz)	Field Strength of fundamental at a distance of 3m ($\mu\text{V/m}$)	Field Strength of spurious emission at a distance of 3m ($\mu\text{V/m}$)
40,66 - 40,70	2250	225

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 ($\mu\text{V/m}$)
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.

5. TEST RESULTS

TX – RADIATED FIELD 30 - 1000 MHZ	11
TX – FREQUENCY STABILITY	15
TX – RANGE OF MODULATION BANDWIDTH	17

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

FCC PART 15 subpart B and 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	26,2 $\pm$ 3 °C
Ambient humidity :	25 - 75 %rH	49 $\pm$ 5 %rH
Pressure :	85 - 106 kPa (860 mbar - 1060 mbar)	950 $\pm$ 50 mbar
Voltage :	customer battery pack	12 Vdc

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

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

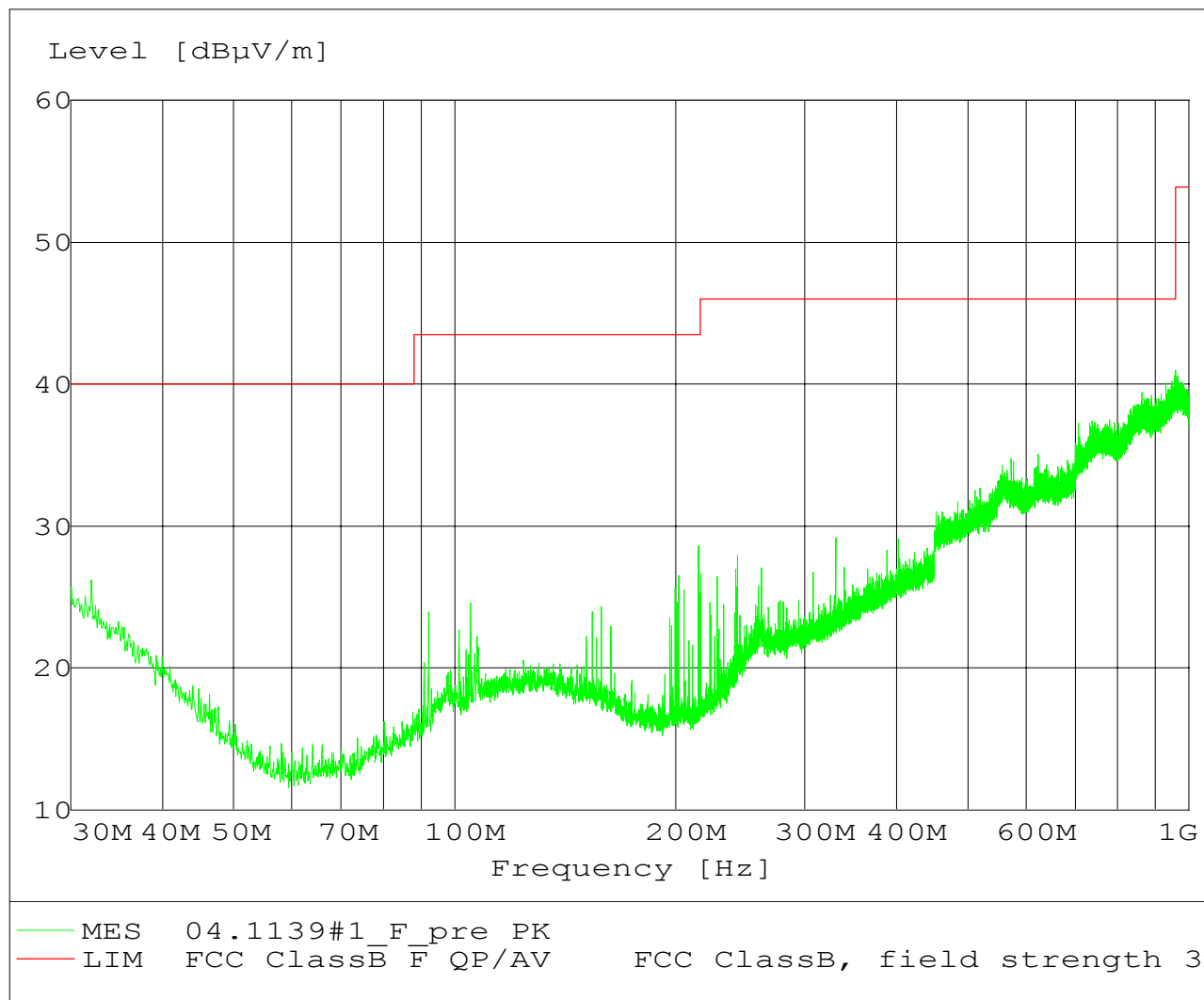
Stop Message: On

Text: Connect antenna

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Operating condition : #1

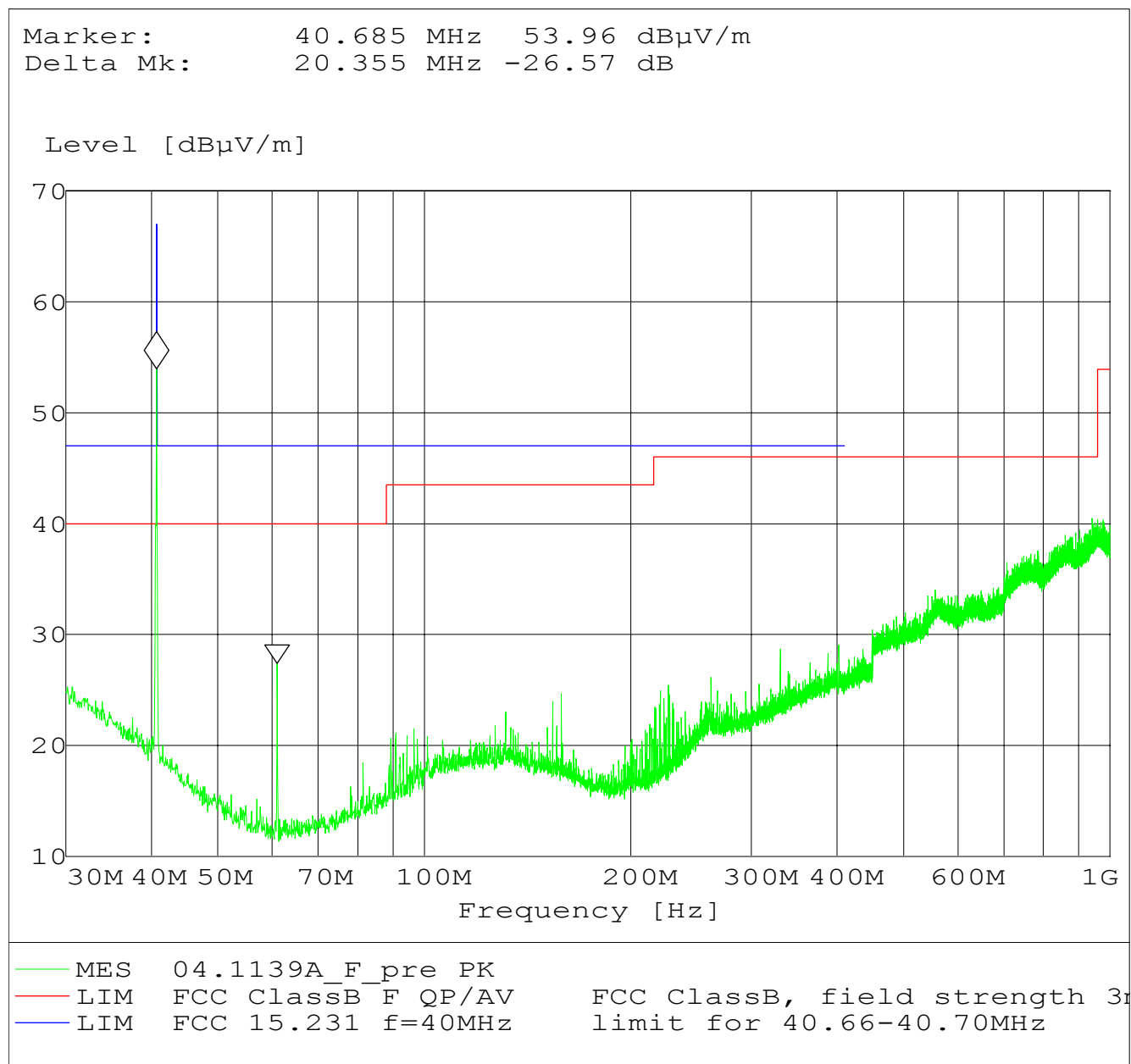
In stand-by mode (receiver ready to use)



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Operating condition : #2

in transmission mode



Detector	Fundamental frequency	measured Level
+PK	40.685 MHz	53.96 dB μ V/m

For a fundamental frequency in according with the Section 15.33 is not necessary verify the spurious other 1 GHz.

**TEST
2.****TX – FREQUENCY STABILITY****REFERENCE
DOCUMENT**

FCC PART 15 sub C §15.231

- **TEST LOCATION:** Climatic chamber
- **TEST EQUIPMENT USED FOR TEST:** Climatic chamber Mazzali mod. Climatest M1574
Spectrum Analyzer Rohde & Schwarz mod. FSP
- **TESTED PORT:** Enclosure

TEST CONDITIONS:		MEASURED
Ambient temperature :	15 - 35 °C	25 ± 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**

Frequency stability measurements

Temperature (°C)	Measured RF Frequency (Hz)
-20.0	40684064
-10.0	40684056
0.0	40684054
10.0	40684030
20.0	40684014
25.0	40683998
30.0	40683998
40.0	40683974
50.0	40683982
55.0	40683998

Reference value (Hz)	40685000
Min. value (Hz)	40683974
Max. value (Hz)	40684064
Max frequency deviation (Hz)	1,026
Max frequency deviation (%)	0,00252

LIMIT
frequency tolerance = 0,01%
frequency band = 40,66 – 40,70 MHz

**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:** AC Mains, 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 battery pack	12 Vdc

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

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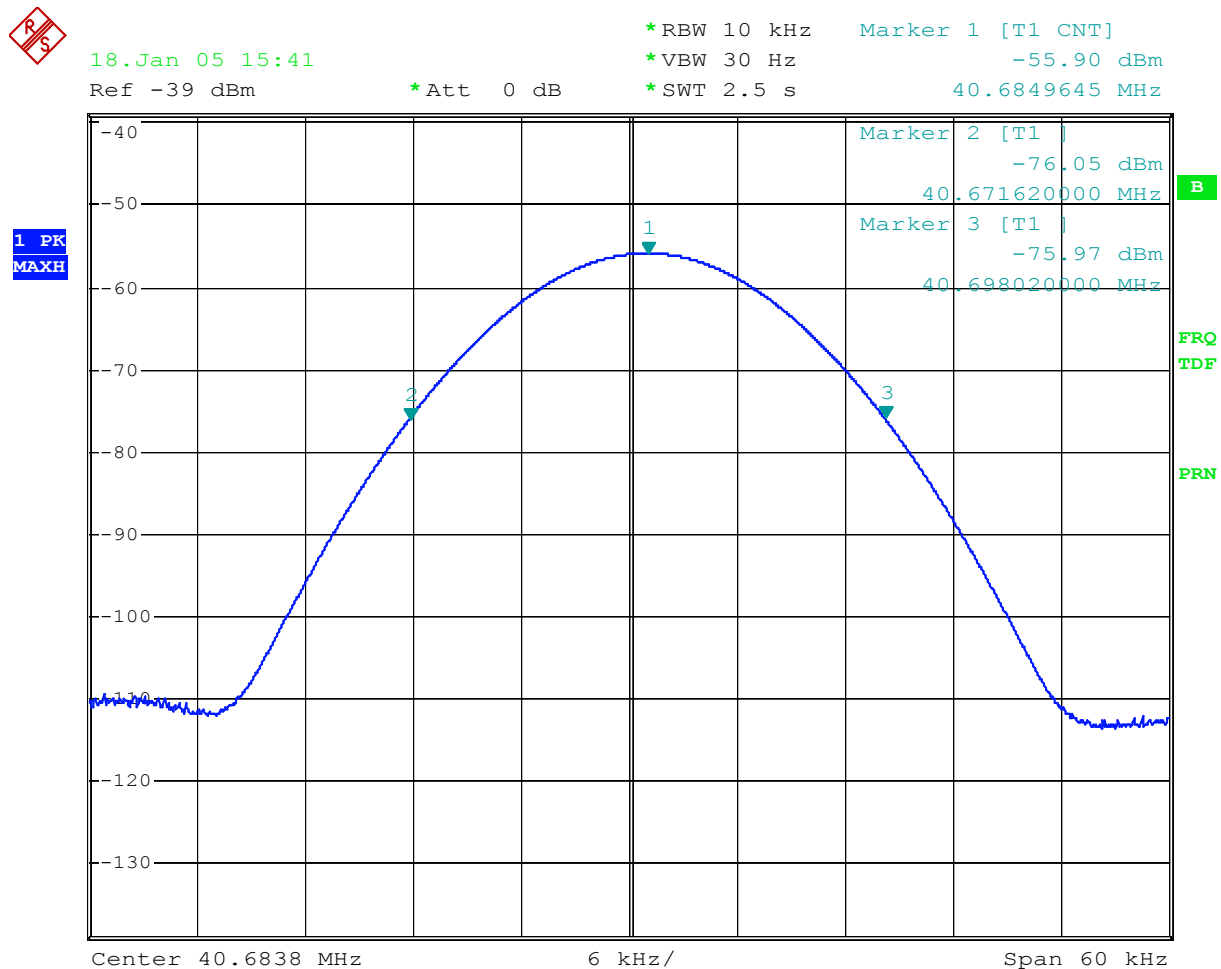
MEASUREMENT RESULTS

TEST CONDITIONS		Occupied frequency range (at 20 dB point)		
		f _L [MHz]	F _C [MHz]	f _H [MHz]
T _{amb} : + 24 °C	V _{nom} : 12 Vdc	40.67162	----	40.69802
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
40.66 – 40.70 MHz

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Plot of modulation bandwidth



Date: 18.JAN.2005 15:41:51

6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	File name : Firemaster3T_Schem Sheet no. 25
PART LIST	FIREMASTER III rev.B File name : FIREMASTER3T_Bom Sheet no. 10

6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
SYSTEM FIREMASTER III <i>"Millennium"</i> RADIO-CONTROLLED SYSTEM FOR REMOTE SHOOTING OF PYROTECHNIC SHOWS	File name : Firemaste3T_UserMan (no other reference) Sheet no. 76

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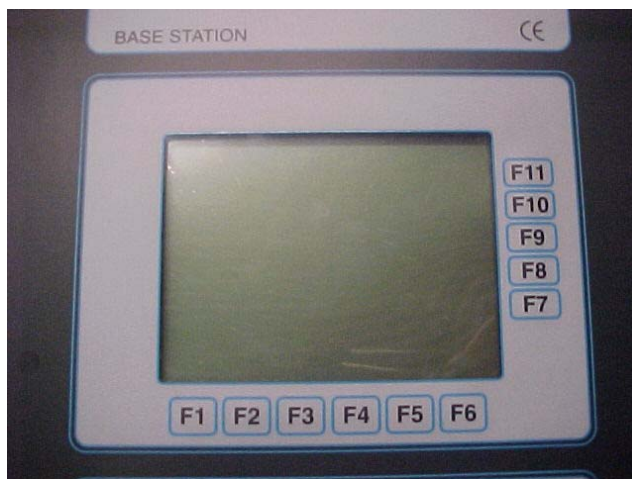
6.3 Photographic documentation

PHOTO N° 1 – EQUIPMENT UNDER TEST IDENTIFICATION



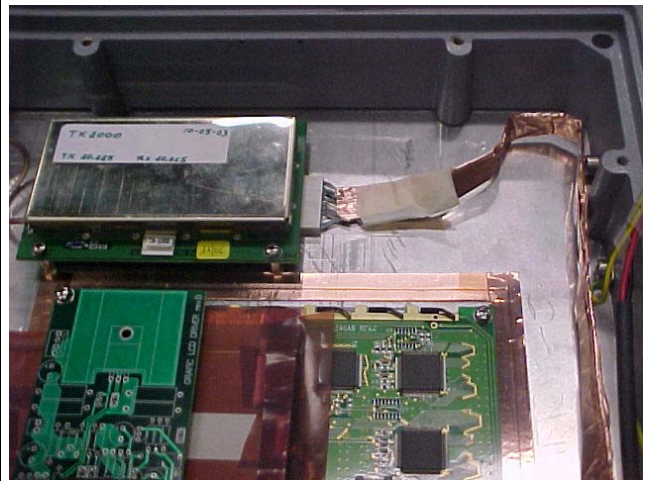
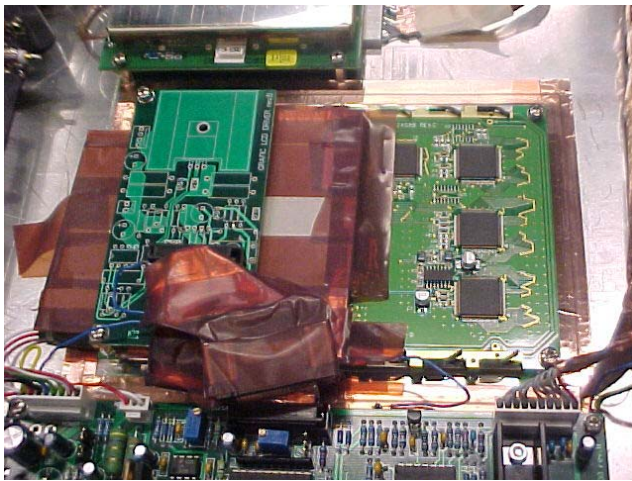
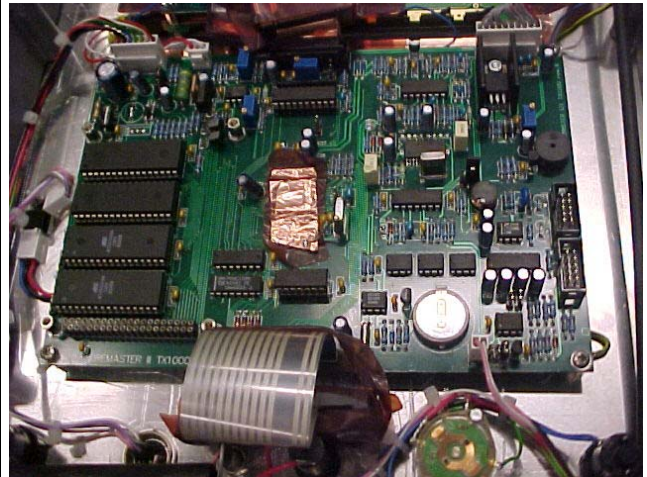
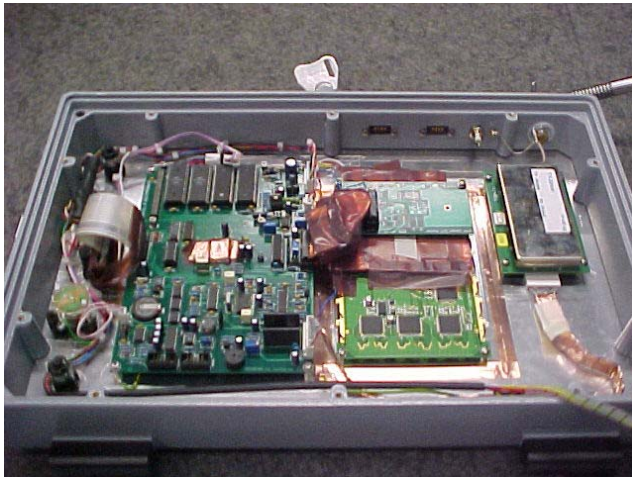
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PHOTO N° 2 – EQUIPMENT UNDER TEST IDENTIFICATION



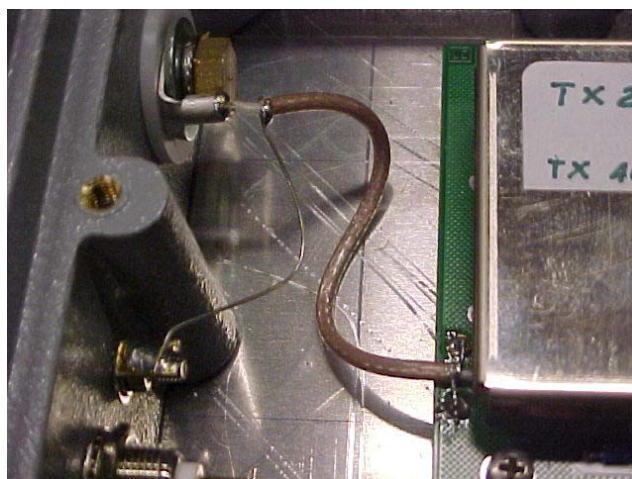
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PHOTO N° 3 – EQUIPMENT UNDER TEST IDENTIFICATION



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PHOTO N° 4 – EQUIPMENT UNDER TEST IDENTIFICATION



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PHOTO N° 5 – BATTERY CHARGER UNDER EQUIPMENT UNDER TEST



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PHOTO N° 2 – SET-UP FOR EMISSION RADIATED TEST

