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EQUIPMENT UNDER TEST : **REMOTE CONTROLLED SWIVEL LIGHT BEAM**
APPARECCHIO IN PROVA :

Mod. FM1

REFERENCE STANDARDS :
NORME DI RIFERIMENTO :

FCC 47CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** *Ente / Società':* *MARCO S.p.A.*
- **Mr.:** *Sig.:* *Dr. MATTEO CIAVARELLA*
- **Address:** *Indirizzo:* *VIA MAMELI, 28 – 25014 CASTENEDOLO (BS) - ITALY*
- **Tel.** : *Telefono :* *++39 030/21341*
- **Telefax:** *Fax :* *++39 030/2134300*
- **E-mail:** *e-mail* *matteo.ciavarella@marco.it*

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

Date of test samples receipt: **14/10/03**
Data ricevimento campioni:

Date of start test: **14/10/03**
Data inizio prove:

Date of end test: **11/05/04**
Data fine prove:

Witness to the test:
Presenti alle prove:

Nobody / Nessuno
.....

Signature of the engineers:
Firma esecutore prove:

R. Radice
.....

Signature of the Laboratory Director:
Firma Direttore Laboratori:

R. Furfari
.....

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0. CONTENTS

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1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name:	MARCO S.p.A.
Customer:	SIRENA S.p.A.
Equipment :	REMOTE CONTROLLED SWIVEL LIGHT BEAM
Model name or No. :	FM1
Serial number :	Not present
FCC ID :	R8M-FM
Country of manufacturer:	ITALY

1.2 Technical data

FCC class:	Unintentional radiators, Class B
Type of receiver	Super eterodine
Maximum internal frequency generate by EUT	4 MHz
Supply voltage:	12÷24 Vdc
Input Power / Current :	12 Vdc: 7,5 Ampere 24 Vdc: 3,8 Ampere
Bulb :	H1 100W
Typical usage :	FM1 is a REMOTE CONTROLLED SWIVEL LIGHT BEAM for marine use, waterproof and completely submersible.
EUT single or system:	Single
EUT dimensions :	Ø 190 x h 252
Weight :	2,8 Kg.
Operating Temperature :	-30°C + 50°C.

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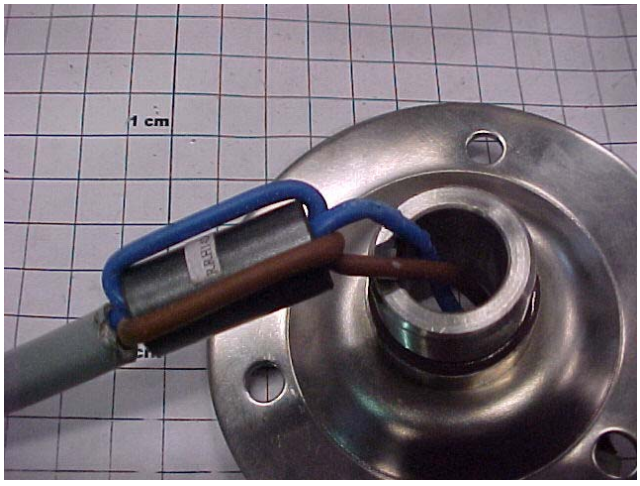
1.3 Receiver technical data

MIPOT	
• Working Frequency :	433,92 MHz
• Frequency Range of Operation :	433,05 ÷ 434,79 MHz
• Antenna type :	dedicated
• Modulation :	ASK

1.4 Modifications incorporated in E.U.T.

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

- A RICHCO ferrite (code RRH142-070-285) has been inserted on DC power cable with 1 loop (see next photos)



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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	Stainless steel base and ring with 3/4 BSP mount and stainless steel support foot with cable connection. High mechanical and temperature resistant polycarbonate light cover.	By screws
2	AC power input/output ports	Not present	**********
3	DC power input/output ports	12÷24 Vdc from external supply – Cable length not specified.	Terminals
4	Signals ports	Not present	**********
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

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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 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 – Light and motor ON*

2.2 Test overview

Sample tested is the main model of a complete set of 433,92 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 remote control for swivel light beam.

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3. REFERENCE STANDARD FOR PERFORMED TESTS

Reference standard :	*Title :*
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

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4. SUMMARY OF TEST RESULTS

4.1 Emission tests

	Port	Phenomena	Basic standard	Operating condition[1]	Result
1	Enclosure	Radiated emission	FCC Part 15	#1	Within the limit
2	AC mains Input ports	RF Disturbance voltage: • continuous	FCC Part 15	Not applicable[2]	

[1] Ref. Tab. of Section 2

[2] Applicable only to AC Mains Power Supply.

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5. TEST RESULTS

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TEST 1.

RADIATED EMISSION 30 - 1000 MHZ

REFERENCE DOCUMENT FCC PART 15 subpart B

- **TEST LOCATION:** Semi-anechoic chamber
- **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 15.109 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		23 ± 3 °C
Ambient humidity :	25 - 75 %rH		43 ± 5 %rH
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 ± 50 mbar
Voltage :	12÷24 Vdc		13,5 Vdc

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

RESULT: WITHIN THE LIMIT

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SCAN TABLE : "Radiated Emission"

Unit:	dBμV/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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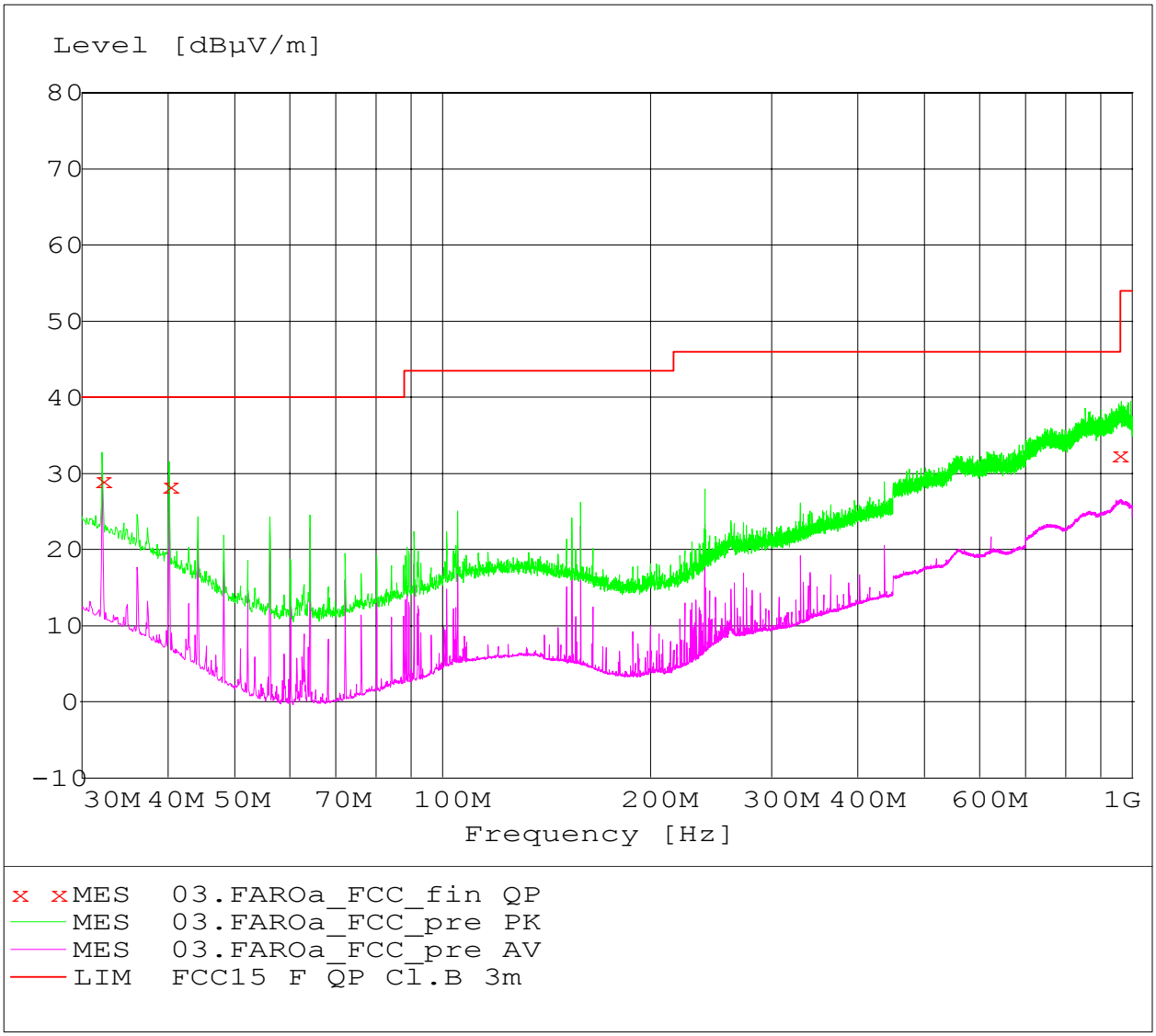

FINAL TEST - QUASI-PEAK

Frequency	Level	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dBµV/m	dB	cm	deg	
32.080000	29.10	40.00	10.90	100.0	314.00	VERTICAL
40.160000	28.30	40.00	11.70	170.0	323.00	VERTICAL

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6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	Document reference (n., edition, date, ...)
WIRING DIAGRAM	See enclosed document
PART LIST	See enclosed document

6.2 Technical manual

	Document reference (n., edition, date, ...)
SEARCH LIGHT FM1 DIRECTIONS FOR USE	IT-1 5902 – 24/03/03

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6.3 Photographic documentation

PHOTO N° 1 – E.U.T. IDENTIFICATION

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PHOTO N° 2 – E.U.T. IDENTIFICATION

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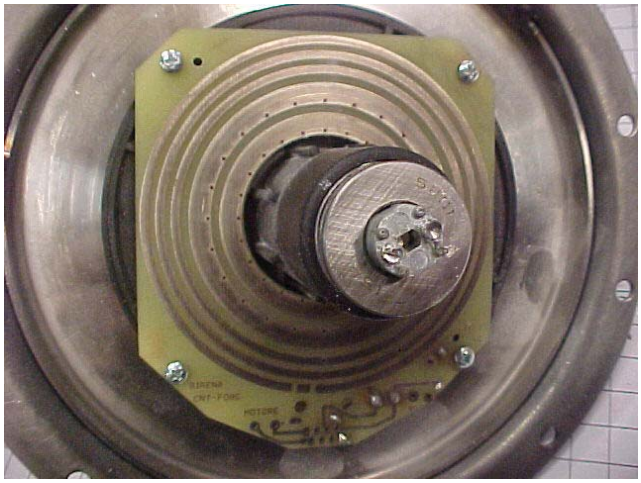
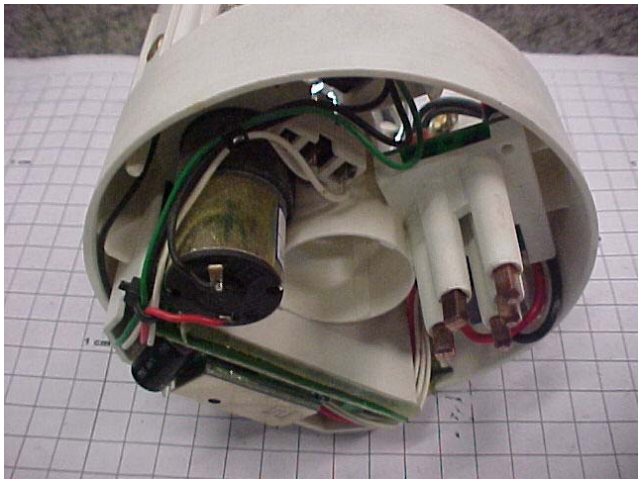
PHOTO N° 3 – INTERNAL VIEW





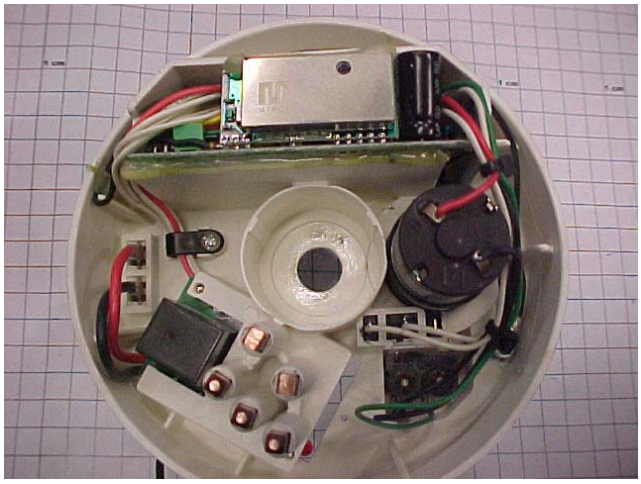


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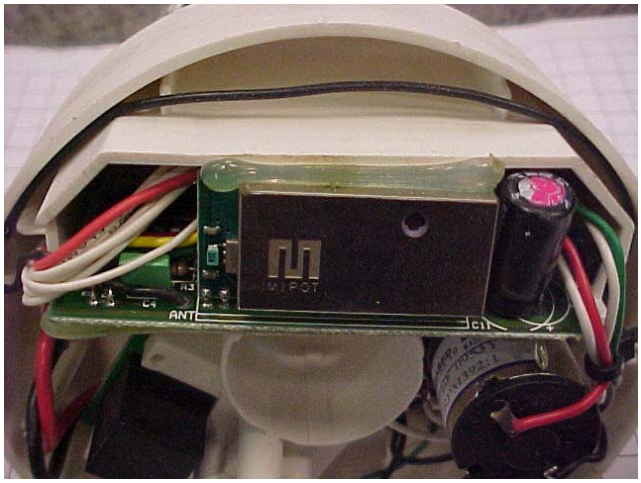
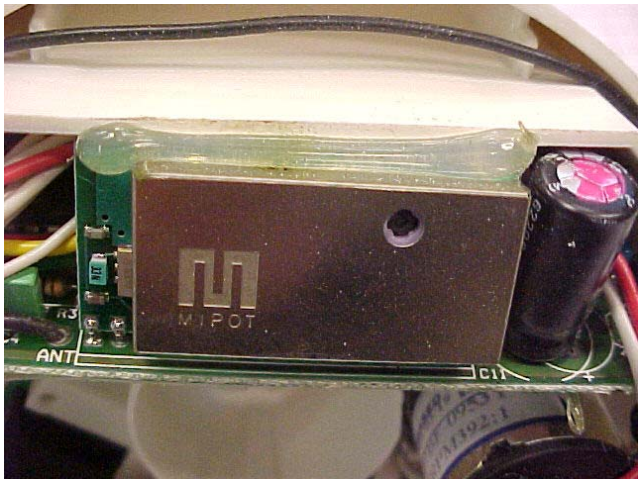
PHOTO N° 4 – INTERNAL VIEW: RECEIVER MODULE AND ANTENNA





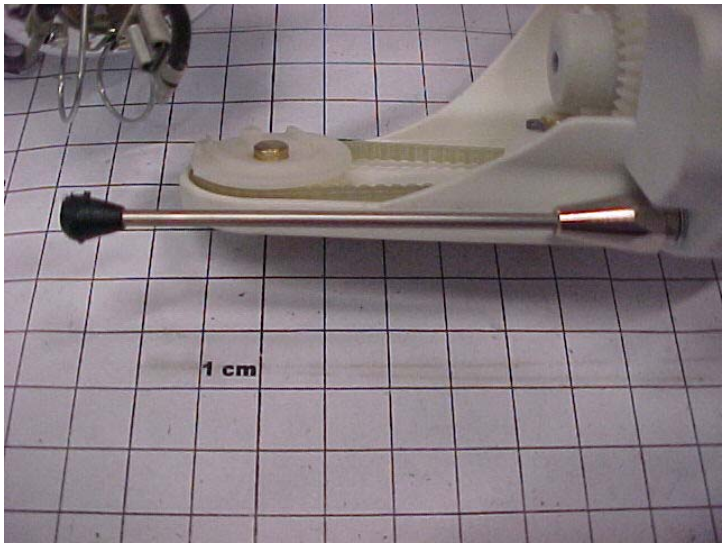


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PHOTO N° 5 – SET-UP FOR EMISSION RADIATED TEST