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Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

EQUIPMENT UNDER TEST : *APPARECCHIO IN PROVA :*	**RADIO MOTOR CONTROL**
TYPE : *MODELLO :*	**TX: TRS435120.0US**
DERIVED MODEL: *MODELLO DERIVATO*	**TX: TRS435400.0US; TRS43540M.0US; TRS435200.0US**
REFERENCE STANDARDS : *NORME DI RIFERIMENTO :*	**47 CFR Part 15C – Intentional Radiators**

CUSTOMER:

RICHIEDENTE:

- Dept. / Firm : *Ente / Società':* CARDIN ELETTRONICA S.p.A.
- Mr.: *Sig.:* CINTI
- Address: *Indirizzo:* VIA RAFFAELLO, 36 – 31020 S. VENDEMIANO (TV) - ITALY
- Tel. : *Telefono :* +39 0438.404011
- Telefax *Fax :* +39 0438.401831
- **E-mail:** d.cinti@cardin.it

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

Date of test samples receipt: *Data ricevimento campioni:* **14/03/2008**

Date of start test: *Data inizio prove:* **14/03/2008**

Date of end test: *Data fine prove:* **14/03/2008**

Witness to the test: Presenti alle prove:	**Tested by:** Testato da:	**Approved by:** Approvato da:
Nobody / Nessuno		
.....	.....	.....
	Massimo Maltempi	Giovanni Molteni

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1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Manufacturer :	CARDIN ELETTRONICA S.p.A.
Model name or No. :	TX: TRS435120.0US
Derived model name or No.:	TX: TRS435400.0US; TRS435200.0US: The derived model have a radio control with reduced number of TX function TRS43540M.0US: model for wall installation
Part number / Serial No.:	Not present
Country of manufacturer:	Italy
FCC ID :	LH8TX-S435

1.2 Technical data

FCC class:	Intentional radiators,
Supply voltage:	TX: 12Vdc internal Akaline battery type GP23A
Maximum internal frequency generated by EUT	433,92 MHz
Typical usage :	Programmable system for access control system.
EUT single or system:	System
EUT dimensions :	See photographic documentation
Antenna :	Integral
Modulation :	FSK
Current consumption:	25mA
Range in free space :	0.1 ÷ 15mt

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1.3 Modifications incorporated in E.U.T.

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

- None

1.4 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	Pressure
2	AC power input/output ports	---	-----
3	DC power input/output ports	12Vdc	GP23A battery
4	Signals ports	Line 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.			

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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 C, Section §15.203, §15.205, §15.207, §15.209, §15.231

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	*Continuous transmission*

2.2 Test overview

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

The application is mainly used for access control systems.

It is possible to declare that the appliance it is subject to additional requirements stated in §15.203, §15.205, §15.207, §15.209, §15.231

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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 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

Requirements	CFR Section	Test result
Antenna Requirements	15.203	Within the limit
Radiated Spurious Emission	15.209, 15.205(b)	Within the limit
Conducted Emission	15.207	Not applicable: The EUT is battery powered
Periodic Operation Characteristics	15.231(a)	Within the limit
Field Strength Limits (Fundamental)	15.231(b)	Within the limit
20 dB Bandwidth	15.231(c)	Within the limit

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5. TEST RESULTS

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TEST 1.

ANTENNA REQUIREMENT

REFERENCE DOCUMENT

FCC CFR47,PART 15 subpart C

- ***REGULATION:***

15.203 an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

- ***RESULT:***

Antenna is a trace on the PCB.

The EUT is complied with this section.

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TEST 2.

RADIATED SPURIUS EMISSION AND FIELD STRENGTH LIMITS (FUNDAMENTAL)

REFERENCE DOCUMENT

FCC CFR47,PART 15 subpart C
ANSI C 63.4

- **TEST LOCATION:** Semi-anechoic chamber Siemens mod. B83117-D6019-T232
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI (9kHz-26GHz)
  Bilog antenna Chase mod. CBL6111A (30-1000MHz)
  Log-periodica Broadband Antenna mod. HL025 (1-18 GHz)

- **TESTED PORT:** Enclosure
- **FREQUENCY RANGE:** 30 MHz ÷ 4,4 GHz
- **TEST DISTANCE:** 3 m
- **RESULATION BANDWIDTH:** 120 kHz (30 MHz ÷1 GHz)
  1 MHz (1GHz ÷ 4,4GHz)
- **EMISSION LIMITS:** Acc. to Section 15.231(b) , 15.205, 15.209
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
  Total uncertainty = (k=2) ± 3.5 dB

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		12.0 Vdc

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

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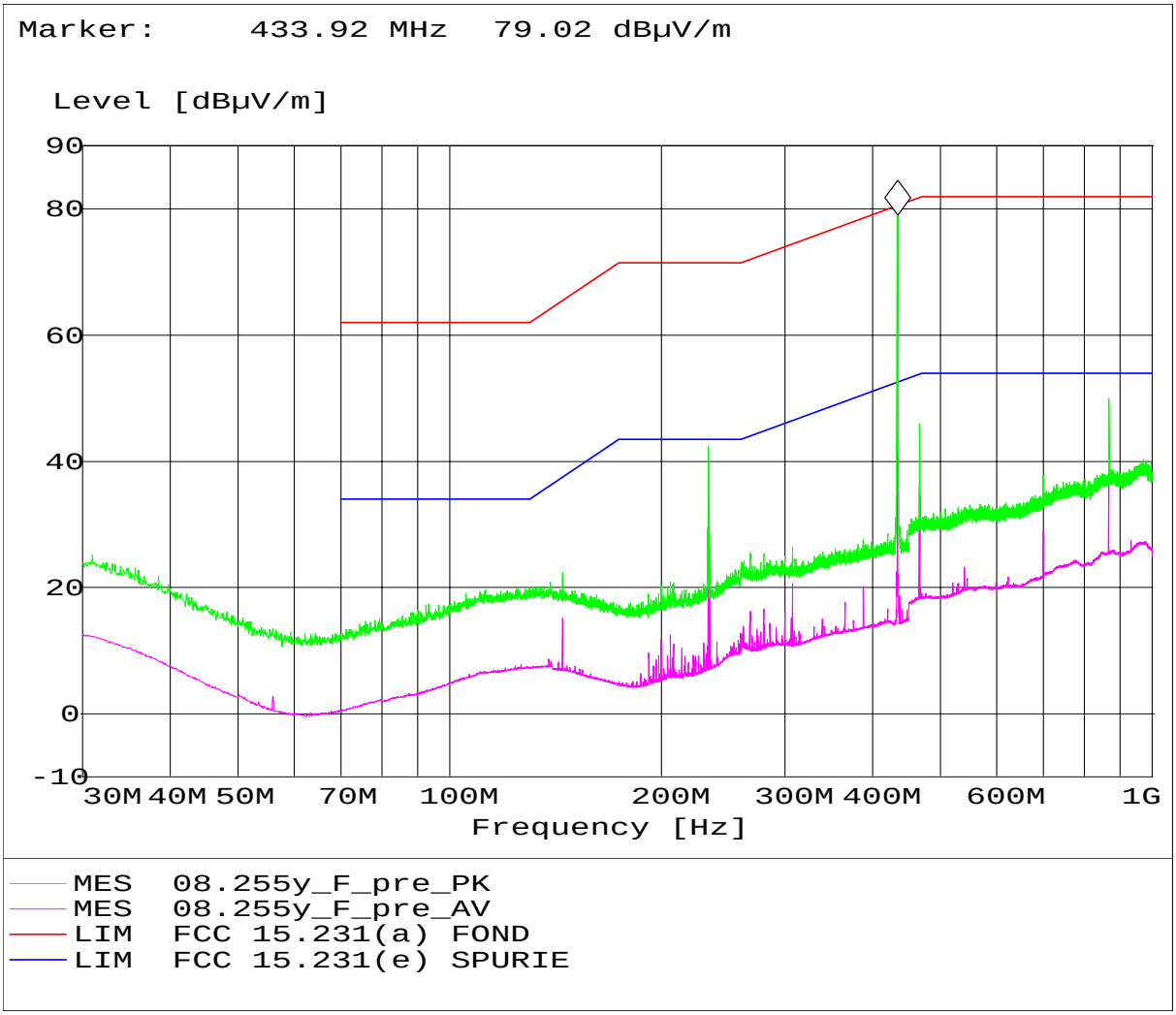
Reference 15.231:



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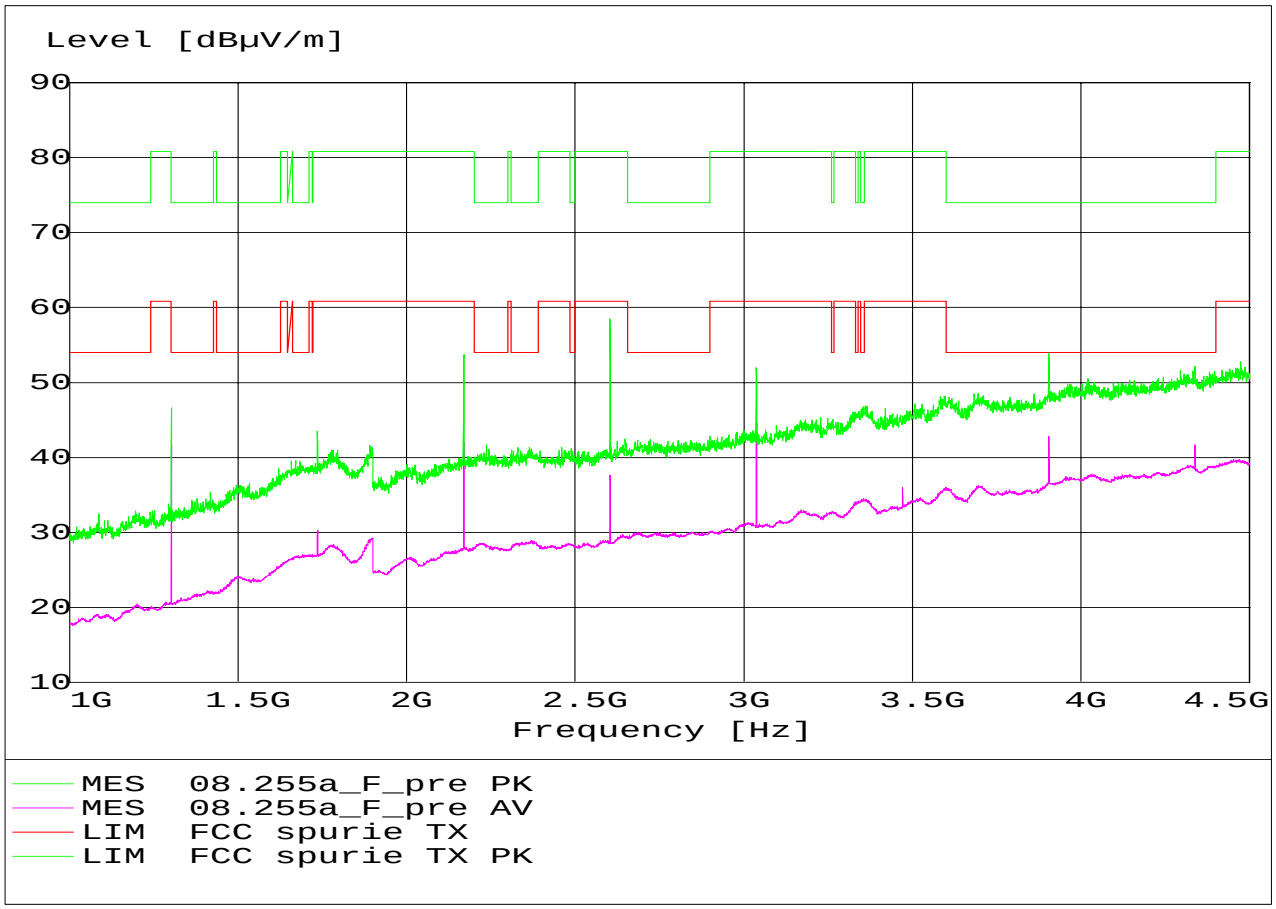

Reference 15.205 (Restricted bands of operation):

No	*Emission Frequency*	*Level*	*Limit*	*Margin*	*Polarization*
1	233,240 MHz	42,4dBµV/m	43.52 dBµV/m	1,12dB	Horizontal

- ***RESULT:***

The EUT is complied with this section.

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TEST 3.

CONDUCTED EMISSION TESTS

REFERENCE DOCUMENT

FCC CFR47,PART 15 subpart C

ANSI C 63.4

- ***REGULATION:***

15.207(a) For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

15.207(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

- ***RESULT:***

Not applicable.

The EUT is battery powered only.

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TEST 4.

PERIODIC OPERATION CHARACTERISTICS

REFERENCE DOCUMENT

FCC CFR47,PART 15 subpart C

- ***REGULATION:***

15.231(a) The provisions of this Section are restricted to periodic operation within the band 40.66 - 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. The prohibition against data transmission does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.

- ***RESULT:***

The EUT is complied with this section.

- ***REGULATION:***

15.231(a1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

- ***RESULT:***

Transmitter ceases immediately after being released. *The EUT is complied with this section.*

- ***REGULATION:***

15.231(a2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

- ***RESULT:***

The EUT does not have automatic transmission.

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- ***REGULATION:***

15.231(a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

- ***RESULT:***

The EUT does not employ periodic transmission.

- ***REGULATION:***

15.231(a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
.

- ***RESULT:***

Not applicable to the EUT

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TEST 5.

BANDWIDTH

REFERENCE DOCUMENT

FCC CFR47,PART 15 subpart C
ANSI C63.4

- **TEST LOCATION:** Semi-anechoic chamber Siemens mod. B83117-D6019-T232
- **TEST EQUIPMENT USED FOR TEST:** Spectrum Analyzer Rohde & Schwarz Mod. FSP (9kHz-40GHz)

- **TESTED PORT:** Enclosure

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		12.0 Vdc

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

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- ***REGULATION:***

15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

- ***LIMIT:***

The 20 dB bandwidth limit = 0.0025 x 433.92 MHz = 1084,8 kHz

- ***RESULT:***

The measured 20 dB bandwidth is : 8,260 kHz

The EUT is complied with this section.

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6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	Document reference (n., edition, date, ...)
WIRING DIAGRAM	----------
PART LIST	----------

6.2 Technical manual

	Document reference (n., edition, date, ...)
TCF	----------

7. LIST OF INSTRUMENTS USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL N.	CAL. DUE
EMI RECEIVER	ROHDE & SCHWARZ	ESMI	835862/016+ 838325/007	Oct.2008
RF SEMI-ANECHOIC CHAMBER (CSSA)	SIEMENS	B83117-D6019-T232	003-005-134/94C	aug.2008
BILOG ANTENNA	CHASE	CBL6111A	1798	jul.2009
LOG PERIODIC ANTENNA BROAD BAND 1-18 GHz	ROHDE & SCHWARZ	HL025	350380/007	Dec.2009
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSP40	100038	Dec.2008
SOFTWARE	ROHDE & SCHWARZ	ESK V1.60	--	--
DIGITAL OSCILLOSCOPE	TEKTRONIX	TDS 680B	B010130	may.2008
THERMOIGROMETER	SALMOIRAGHI	1750-2/Q	324505	jen.2009
PROGRAMMABLE DC POWER SUPPLY	HEWLETT PACKARD	6623A	3448A04501	sep.2008

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8. PHOTOGRAPHIC DOCUMENTATION

PHOTO N° 1 – EQUIPMENT UNDER TEST IDENTIFICATION

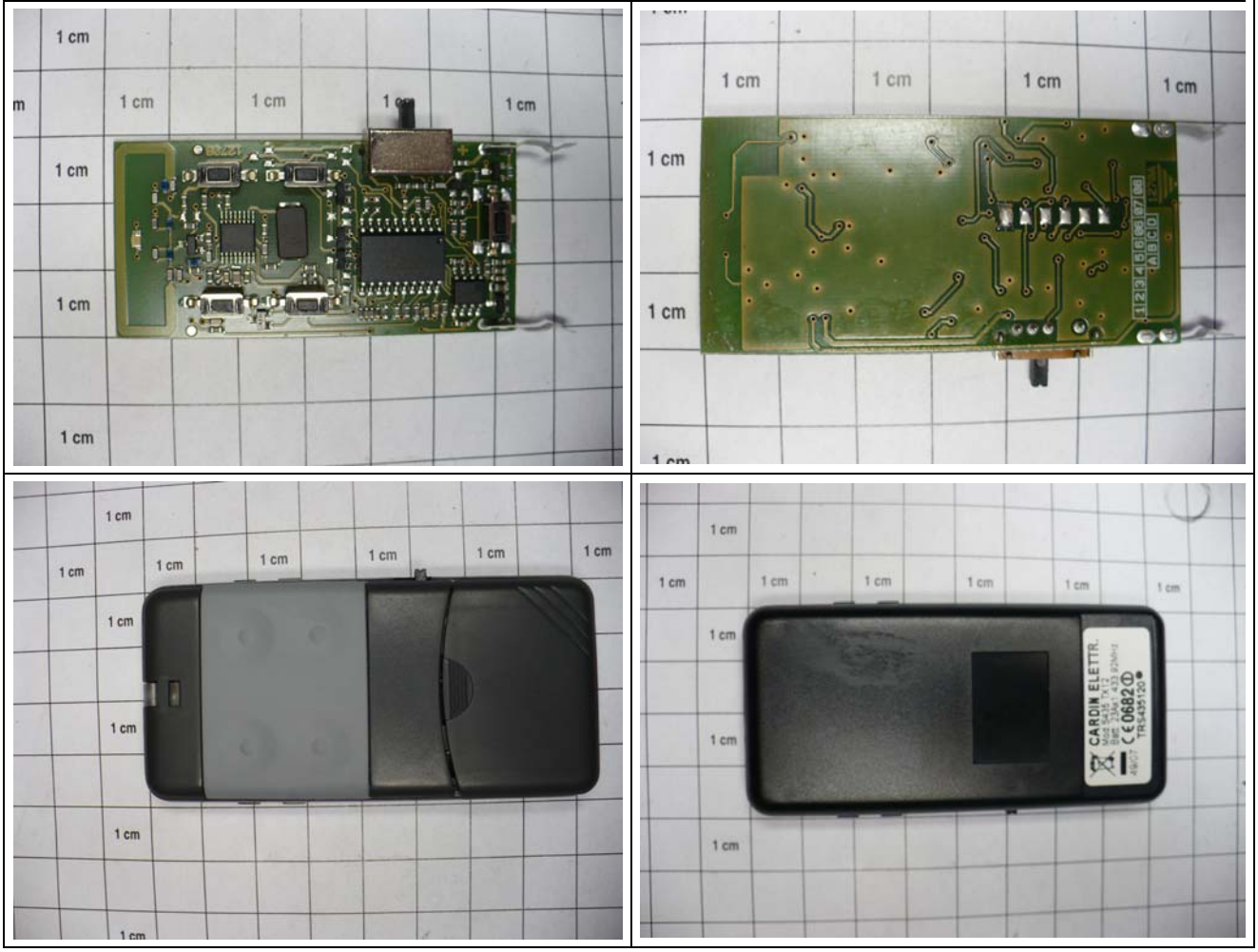

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PHOTO N° 2 – SET-UP FOR EMISSION RADIATED TEST