High sensitivity and selectivity 433.92 MHz superheterodyne receiver RF in AM with integrated HCS decoding. HCS decoding uses Microchip's KEELOQ code variation technology. HCS and KEELOQ are trademarks of Microchip.

Monostable, bistable mode and the presence of open collector outputs, make it ideal as a control element in applications such as burglar alarms, gate openers, and generally, in functions where channel coding is required. The transmitter code is stored by self-learning (see specifications). The module is compatible with AUREL transmitters: HCS-TX-1/2/3 (OVO), TX1/2/3-HCS-433 (HCS), TX-2/4/6 M-HCS, TX-12 CH, TX4-RP-HCS.

Main Features

- **RF Sensitivity -110dBm**
- **16 Storable Transmitters**
- **28 bit Serial Identification Code**
- **32 bit Hopping Code**
- **2^{32} Combinations**
- **Self Learning**
- **Bistable/Monostable programming**
- **Erase Memory**

Specifications

Absolute maximum ratings

	Min.	Typ.	Max.	Unit
Supply Voltage VDD	3	5	5.25	V
Operating temperature	-20		85	°C

Table 1: Absolute maximum ratings

DC Characteristics

	Min.	Typ.	Max.	Unit
Current consumption		3.6	4	mA
Current open collector			100	mA
Output low logic level [1]			0.2VDD	V
Output high logic level [1]	0.8VDD		Vcc	V

Table 2: DC Characteristics

Note 1: Sensitivity obtained by 100% modulated RF generator, fig 1

RF Characteristics

|	Min.	Typ.	Max.	Unit
Frequency		433.92		MHz
Sensitivity RF [2]		-110		dBm
RF band pass at -3dB		600		KHz
Interference Rejection Fc ± 10MHz		-120		dB
Square wave output	0.1	2.5	3.0	KHz
I.F. bandwidth at -3dB		420		KHz
B.F bandwidth measured with modulating square wave	0.020	1	2	KHz
Output digital filter		200		us
RF spurious antenna measured on 50Ω at antenna pin			-60	dBm
Power-on time		4		ms

Table 3: RF Characteristics

Note 2: Values obtained with maximum load of 10kΩ

The stated technical specifications, were obtained using the following test system:
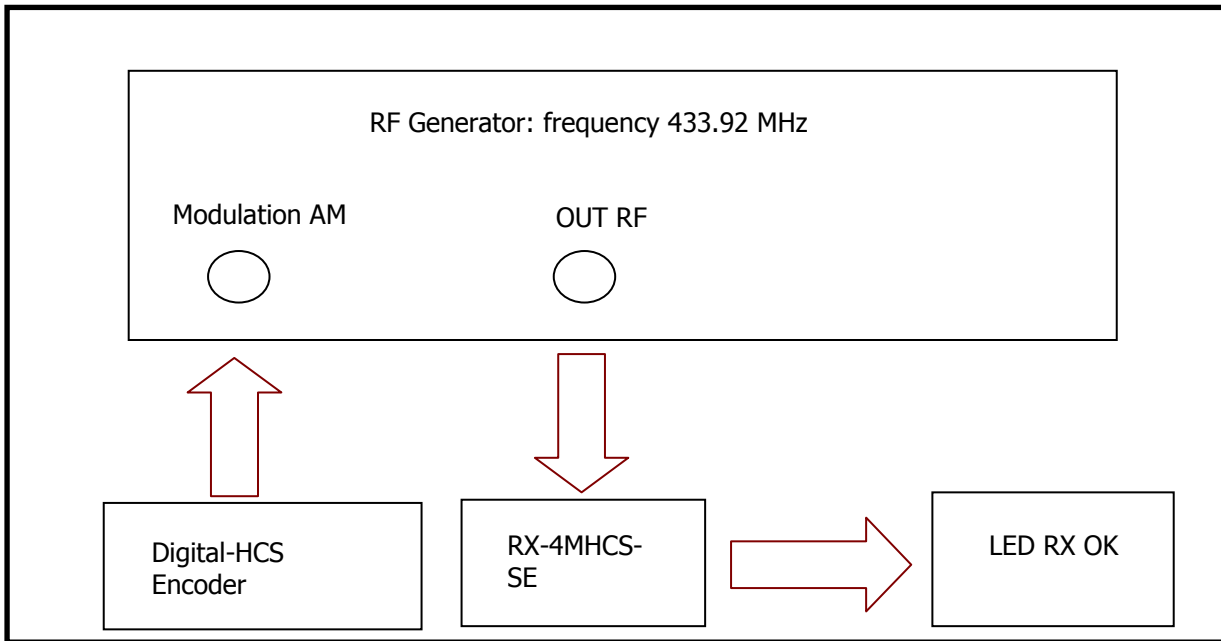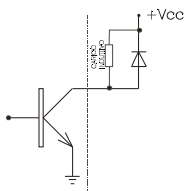

Fig. 1 – Sensitivity measurement scheme

Pinout and mechanical measurements
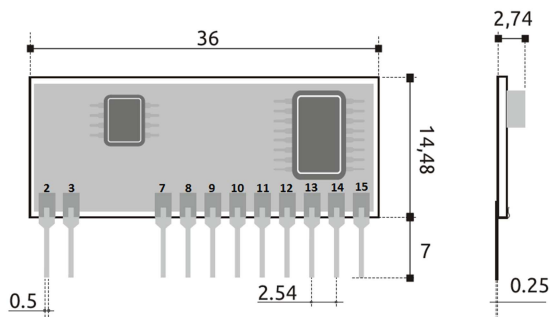
1) Not present	12) CH3
2) GND	13) CH4
3) Antenna	14) LED
4) Not present	15) +VDD
5) Not present	
6) Not present	
7) GND	
8) Not utilized	
9) Puls Learn	
10) CH1	
11) CH2	

Open collector output stage | External load

Pin Number	Name	Description
1	N.C	Not present
2	GND	GND Connection
3	Antenna	Antenna connection, impedance 50Ω
4	N.C	Not present
5	N.C	Not present
6	N.C	Non present
7	GND	GND connection
8	TP	Service test-point
9	Puls Learn	Self-learning button. It allows to enter in the programming mode. Connected to ground.
10	CH1	Open Collector Ouput
11	CH2	Open Collector Ouput
12	CH3	Open Collector Ouput
13	CH4	Open Collector Ouput
14	LED	Programming status led. Cathode connected
15	VDD	Power connection. Filtered.

Table 4: Pinout Description

Employment and connections

The module's supply voltage must be applied to the pin 15. Possible variation: 3-5 Volt. Pin 9 is a digital input and if connected to GND, it allows the management of radio controls and open-collector outputs. A button or the output of a microcontroller can be connected. Pin 14 is an open collector output, connected to the anode of the LED-DIODE, it displays the feed-back of programming operations (output current is internally limited to about 20 mA by a 180 ohm resistor). Connect the antenna to pin 3, using a piece of wire 17cm long.

Each output of the RX-4MHCS-SE is internally driven by a transistor in open collector configuration, capable of carrying a maximum current of 100 mA. The inactive state is with the transistor in interdiction, while the active state is with the transistor in saturation state at GND. Outputs can be programmed to operate in monostable or bistable mode, each independently.

In the monostable operating mode, the output is active for as long as the relative key in the transmitter is pressed, releasing the key the output switches to the inactive state.

In bistable mode, the output changes state each time the key is pressed (from inactive to active and vice versa). The two operating modes are independent: it is possible to program some outputs for monostable operation and others for bistable operation.

If an inductive load (e.g. a relay) is connected to the output, it is necessary to prevent voltage transients with a free-wheeling diode placed in parallel to the inductive load. The anode of the diode should be connected towards the output of the module.

RX-4MHCS-SE modules are sold by default with eeprom memory erased, for the operation of the receiver it will be necessary to memorize in the RX-4MHCS-SE module the transmission code of the relative transmitter.

Only transmitters with Keeloq coding and Manufacturer Code Aurel will be recognized by the receiver RX 4MHCS. Transmitters without parameters or with a different Manufacturer Code will not be recognized by the receiver.

For reasonable quantity request, other RX-4MHCS-SE models are available to receive custom codes.

Programming

Self learning procedure

Press and release the programming button to enter the learning phase. The LED will blink rapidly for 10 seconds: during this time, operating near to RX 4MHCS, the pressure of any key of the transmitter will be learned by the receiver. The successful programming of the RX 4M-HCS is indicated by the LED with a steady light, after which it turn off.

NOTE: the self-learning of a one, two, three or four channels transmitter can be performed indifferently through the pressure of any key, since the micro manages the standard bit sequence for the assignment of each channel as reported below:

Solo attivo S0 = pin 10 = Ch1
Solo attivo S1 = pin 11 = Ch2
Solo attivo S2 = pin 12 = Ch3
Solo attivo S3 = pin 13 = Ch4

Bistable programming

To get the bistable output, press and release the programming button, connected to the pin 9.
The LED starts blinking quickly for 10 seconds. Press the programming button again during this time. The LED changes from blinking to steady light. In the next 10 seconds, when the reference LED is steady, it is possible to press the button related to the channel you want to change in bistable mode. The receiver indicates the correct programming of the bistable mode with three LED flashes.
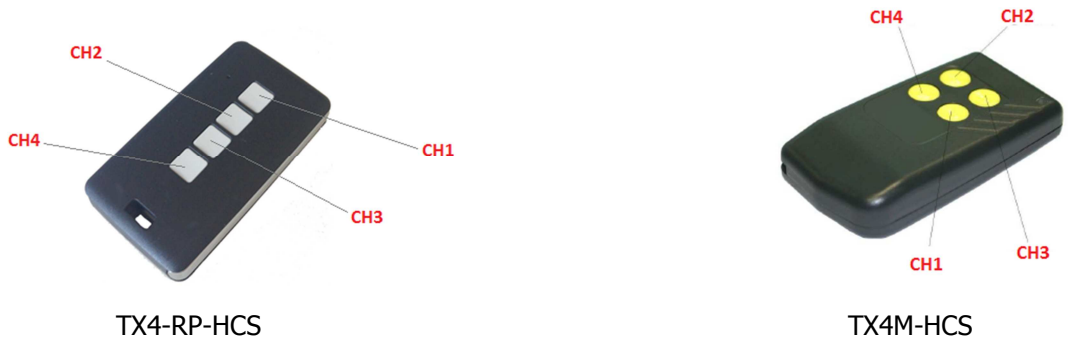
To return the monostable operating mode, repeat the above procedure; in this case, correct programming is indicated by two LED flashes.

Switching the output mode from bistable to monostable can only be done after the receiver has learnt the transmitter.

Memory erasing procedure

To clear the memory of the RX-4MHCS-SE, press and release the button connected to pin 9 after which the LED starts blinking. Press again the button keeping it pressed for about 5 seconds and in any case until the led stops flashing, then release the button and check the 5 flashes of the led indicating the successful cancellation.

After reset, no HCS-encoded transmitters will be recognized, and all outputs will be set to the monostable mode of operation.

Technical features are subject to change without notice. AUREL S.p.A. does not assume responsibilities for any damages caused by the device's misuse.

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Aurel TX key numbering

TX4-RP-HCS

TX4M-HCS

CH1 button 1, sets high the S0 bit of the Keeloq encoding
CH2 button 2, sets high the S1 bit of the Keeloq encoding
CH3 button 3, sets high the S2 bit of the Keeloq encoding
CH4 button 4, sets high the S3 bit of the Keeloq encoding

Device use

In order to achieve the performance detailed in the technical specifications and to comply with the operating conditions that characterize the Certification, the receiver must be mounted on a printed circuit board taking into account the following:

Power Supply:
- The receiver must be powered (+3÷5Vdc) from a safety extra low voltage source protected against short circuits.
- Decoupling, near the receiver, with a ceramic capacitor with a minimum capacitance of 100 nF.

Ground:
- It must surround the soldering area of the receiver. The circuit must be double-sided, with through connections on the ground planes approximately every 15mm (see fig.2).
- It must be sufficiently sized in the antenna connection area, in case the radiating stylus is applied there (recommended area of about 50 mm radius).

The circuit must be made double-sided. The ground plane must surround the soldering area of the receiver. Refer to the AUREL receiver manual for more information.
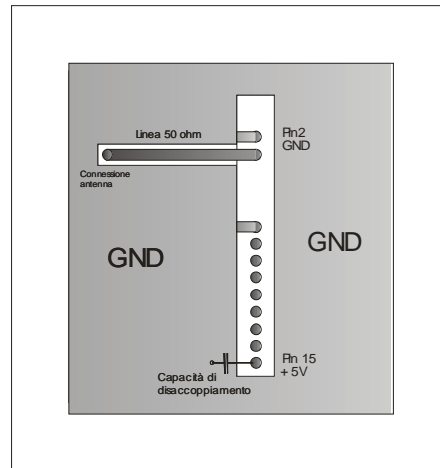

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Fig. 2 – Recommended layout RX-4MHCS-SE host board

Line 50 Ohm:
- It must be as short as possible.
- 1.8 mm wide for 1mm thick FR4 printed circuit and 2.9 mm wide for 1.6 mm thick FR4 printed circuit. Must be spaced 2 mm from the ground on the same side.
- On the opposite side, there must be a ground loop area.

Antenna connection:
- It can be used as direct connection point for radiant stylus.
- It can be used to connect the internal conductor of a coaxial cable to 50. Make sure the braid is soldered to ground at a nearby location.

Antenna:
- A stylus, 17cm long and approximately 1mm diameter, made of brass or copper wire, must be connected to the RF input of the Receiver.
- The body of the antenna must be kept as straight as possible and must be free from other circuits or metallic bodies (recommended 5 cm minimum distance).
- It can be used horizontally or vertically, as long as the connection point between antenna and receiver input is surrounded by a good ground plane.

N.B: As an alternative to the above mentioned antenna, it is possible to use the stylus model of Aurel production (see relevant datasheet and Application Notes).
The use of other models strongly different, do not guarantee the passing of CE approvals.

Other components:

- Keep the receiver separated from other circuits components (more than 5mm).
- Keep any microprocessors and their clock circuits especially clear and shielded.
- Do not install components around the 50Ω line for at least a 5 mm distance.
- If the Antenna Connection is used to directly connect the radiating stylus, maintain at least 5 cm of free area radius. If it is used to connect coaxial cable, 5 mm is sufficient.

Normative Reference

RX-4MHCS-SE receiver is compliant with the European set of rules **EN 300 220-2** e **EN 301 489-3.**
The usage of the module is foreseen inside enclosures that guarantee the **EN 61000-4-2** normative not directly applicable to the module itself.

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