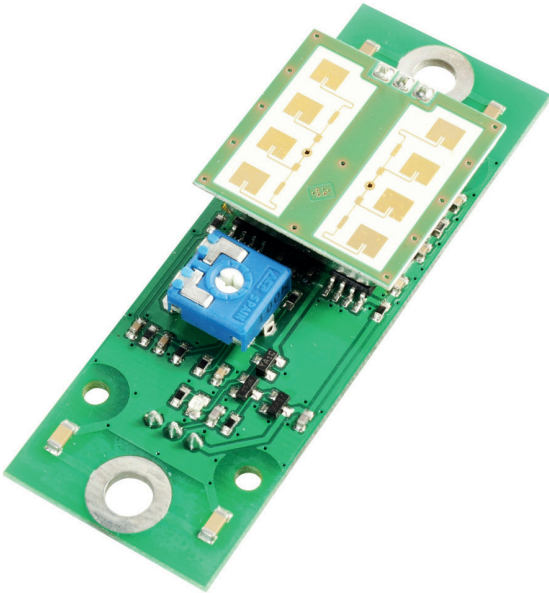


# OPERATION MANUAL



## Radar based motion detector module

### Description



### Characteristic features

- Innovative Radar operating principle: High sensitivity on slightest movement
- Covered, invisible mounting possible
- Safe against vandalism
- Adjustable sensitivity
- Universal open collector output
- LED switch status display

### Typical areas of application

- Automatic illumination control
- 12 V operation, automotive systems, camping vehicles
- Hygiene switch for sanitary rooms
- Alarm and safety systems
- Presence alarm, building instrumentation
- OEM applications

### Technical data

Radar movement alarm unit	
Voltage supply	8 ... 15 V DC
Operating current	30 mA
Coverage	4 m to 15 m
Signal bandwidth	6 ... 600 Hz
Opening angle	Horizontal 80° Vertical 32°
Sending frequency	24.0 ... 24.25 GHz
Output power	Type 16 dbm (EIRP)
Output	Open collector switch output with free wheeling diode, connected active against ground
max. load Open Collector	90 mA
Application temperature	-20 ... +60 °C
Ambient humidity	0 ... 90% RH Dew formation not allowed
Dimensions	73 x 26 x 16 mm
CE-conformance	2014/30/EU
EMV-noise emission	EN 61000-6-3:2011
EMV-noise withstanding	EN 61000-6-1:2007
Ordering No.	RAD-MOD
Rights reserved for change in technical data due to technological advancements!	

### Description

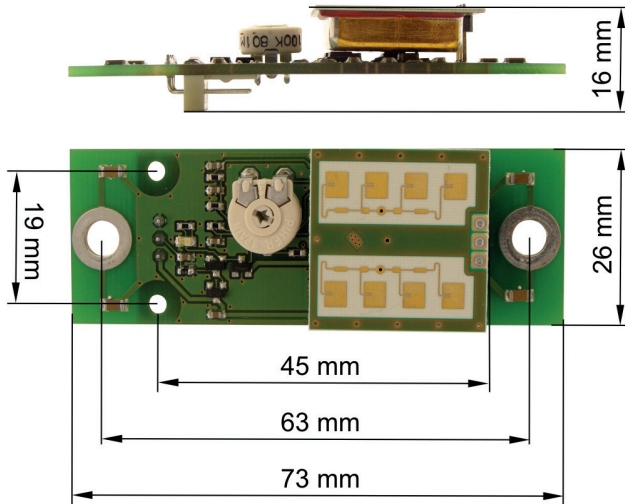
The motion detector module should fulfil majority of the requirements which are meant for door openers, alarm and safety systems, control of machines, sanitary rooms and up to games and sport devices. The module is suitable for a wide variety of applications, in which movement or presence has to be registered and based on this, the switching process is to be affected. Unlike the passive infrared motion alarm unit, which only registers objects at a temperature difference with respect to the background, the radar motion alarm unit responds to all movements in the direction of the sensor. With this, the movement sensitivity is extremely high, even smallest movements nearly up to the stand still state are recognized, because of which the modules are also very well suitable for presence alarm units. The sensitivity can be adjusted for a wide range over a potentiometer. With this, the module can be tuned as per the respective application. Radar motion alarm unit works through many materials, e.g. plastics, hence vandalism safe, hidden installation is possible. As the operating voltage is 8 ... 15 V, which is stabilised on the module, the unit is also suitable for battery operation in automotive applications or for living stock vans. The open collector transistor output connects against ground on recognizing movement. Because of the integrated free wheeling diode against VCC, the module can directly trigger relays and is also compatible to CMOS or TTL logic levels. The electronics module without housing is intended for assembly into customized devices. As such, for moderate delivery quantities, customized adaptations or special variants are possible.

# OPERATION MANUAL



## Radar based motion detector module

### Drawing



### Operation

The radar module comprises of a highly integrated radar sensor with sending and receiving part as well as a push-pull mixer. Careful circuit layout and selection of suitable components lead to the fact that the module complies with the requirements of European ETSI standard and possesses a generally valid CE permission.

Radar motion alarm units work as per the Doppler principle: the electromagnetic waves in the microwave range are reflected from the object and superimposed over a sending signal by a mixer in the module. Therefore, the frequency of signal originating at the mixer output is proportional to the speed: 44 Hz corresponding to a movement speed of approx. 1 km/h. The amplitude of the signal is an outcome of the size of the object and its distance to the sensor.

The signal voltage at output of the mixer is still very low, in the maximum order of approx. 300  $\mu$ V. A subsequent amplifier with defined bandwidth brings the signal to a useful level, which is then evaluated over a window comparator.

While PIR sensors react very insensitively to movements in straight direction, the radar sensor shows its highest sensitivity here. On the other hand, radar sensors are more insensitive to circular movements around the sensor, while the PIR sensors clearly possesses the highest sensitivity here. Therefore, in modern safety related applications, the PIR sensors and radar sensors are effectively combined.

### Application notes

**Caution!** Because of its construction, the radar sensor is ESD-sensitive and should only be touched in unassembled condition with relevant safety measures. The proximity of fluorescent lamps can lead to incorrect triggering. Hence, the module should not be installed in direct proximity of fluorescent lamps.

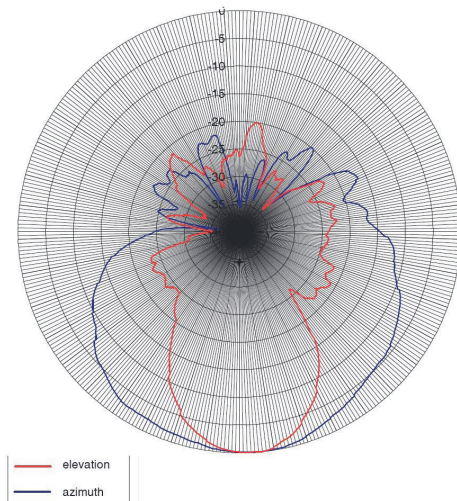
### Settings

The sensitivity of the module to movement events is adjustable over the potentiometer "SENSITIVITY". Turning it in the clockwise direction increases sensitivity.

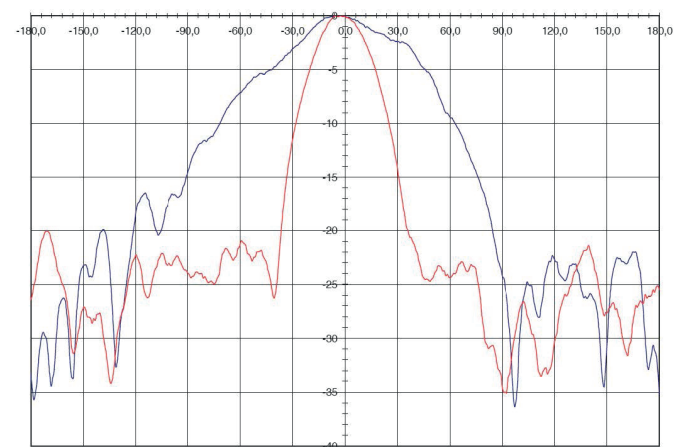
### Connection layout

Pin	Colour	Description	Function
1	Black	GND	Ground, Reference potential
2	Brown	OUT	Open Collector output
4	Red	VCC	Operating voltage 8 ... 15V

### Radiation pattern



Richtdiagramm / radiation pattern



### Attention

Please avoid extreme mechanical and inappropriate exposure.

The device/product is not suitable for potential explosive areas and medical-technical applications.

