

## 1. Introduction

DF6 series of microwave motion sensor modules are K-Band Bi-static DRO Doppler transceiver front-end module. These modules are designed for speed detection with direction of motion recognition, traffic applications and other innovative ideas.

The module consists of Dielectric Resonator Oscillator (DRO), balanced mixers, and patch antenna, built-in LNA for high sensitivity and a pre-amplifier (see Figure A).

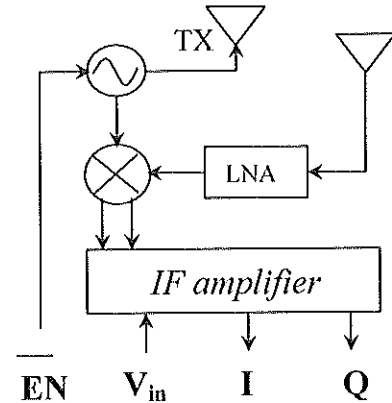


Figure A: Block Diagram

## 2. User interface and mounting

6-way 2.54 mm pin header is used for user interface and the four mounting holes of M2 self-tap screw or M2 with nut, size are as shown in Figure 2

Pin definition

- 1:  $\overline{\text{ENABLE}}$
- 2:  $V_{in}$
- 3: GROUND
- 4: I
- 5: Q
- 6: NOT IN USE

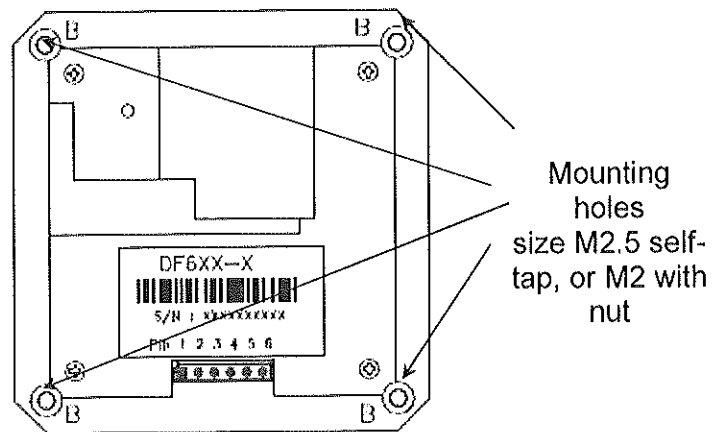


Figure 2: Pin definition and mounting holes

### 3. Power Supply

The minimum input voltage is 2.6 V and the maximum is 5.5 V. As there is a built-in voltage regulation in DF6 series sensor module, fluctuation in the power supply will not affect the performance of the module.

### 4. Using ENABLE (pin 1)

When this pin is driven LOW (GND), this will activate the DRO and hence transmit the signal. On the other hand, when it is driven HIGH (typically +5V), the DRO will be de-activated. This feature can be used to reduce power consumption by introducing pulse to this pin.

### 5. Radiation Pattern

The module to be mounted with the antenna patches facing to the desired detection zone. The user may vary the orientation of the module to get the best coverage. The radiation patterns of the antenna and their 3dB beamwidth are shown in below diagram.

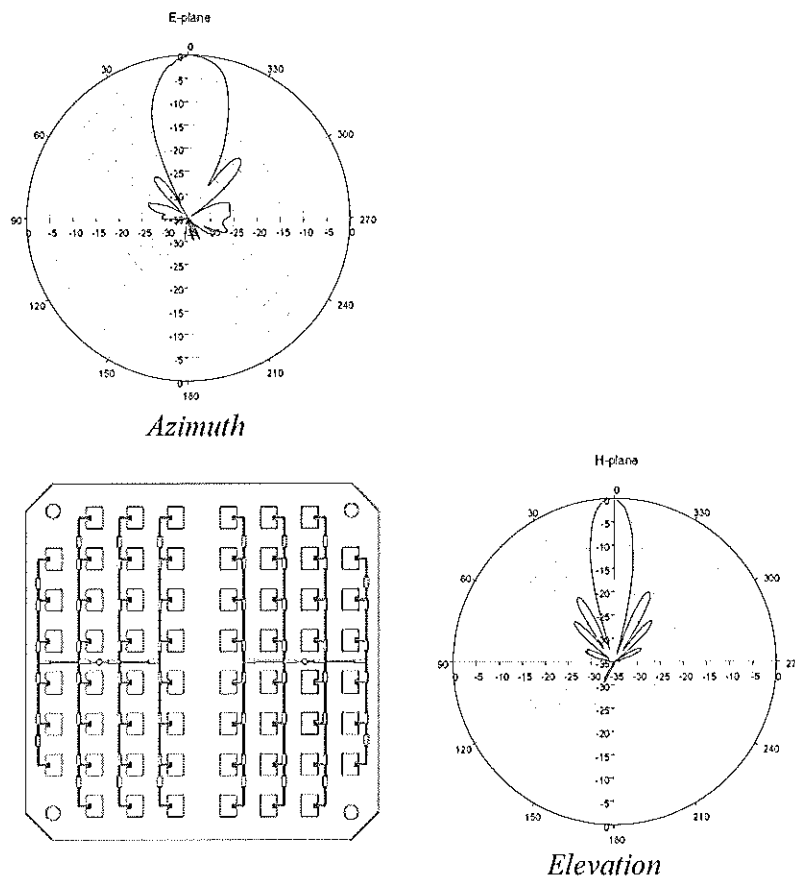


Figure 3: Beam pattern of DF6 series

## 6. Output Signals

**Doppler shift** - Doppler-shift signals of ideally 90° phase difference between them appears at I & Q channels when movement is detected. These signals are pre-amplified by built-in IF amplifiers for better sensitivity and better isolation. The magnitude of the Doppler Shift after these amplifications is typically within 1V peak to peak. Frequency of Doppler shift is proportional to velocity of motion.

The magnitude of RF signal received by the Doppler-based transceiver depends on the detection distance and the Radar Cross Section (RCS) of the detected objects.

The lagging/leading phase difference between I and Q signals provides information on the direction of motion (whether approaching or receding)

## 8. Radiation Safety

Microwave radiation from the module is well below established safety standards for general public environment, like ANSI C95.1-1991 of USA and NRPB-G11 of United Kingdom.

## 9. Handling

The module has been fully tested to specifications. Opening, tightening or loosening the chassis may result in performance deterioration.

The module is an electrostatic sensitive device (ESD). Precautions shall be observed for handling and assembly.

## 10. Product Support

Please contact our product support engineers in the factory for technical assistance whenever necessary.

### ***Product Support (Microwave Sensors)***

***Tel: (65) 521 7948***

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This device complies with part 15 of FCC Rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications to ST Electronics equipment not expressly approved by ST Electronics could void the user authority to operate the equipment.