

1 Description

The RedRock™ RR121 Series is a digital logic sensor ideal for use in medical, industrial, automotive, and consumer applications. Based on patented Tunneling Magnetoresistance (TMR) technology with seamless CMOS integration, the RR121 offers multiple configurations of several parameters to enable applications like proximity sensing, rotary sensing, and level detection.

The RR121 features available operate sensitivities from 9 G (0.9 mT) to 100 G (10 mT), and either omnipolar, unipolar, or bipolar magnetic field response. It has the world's lowest average current drain (190 nA) for an active magnetic sensor, as well as operating frequencies up to 333 kHz and high operating temperature ranges from -40°C up to 125°C.

Device Information

| Part Number | Package | Body Size (mm) |
|-------------|----------|------------------|
| RR121 TMR | SOT-23-3 | 2.9 x 1.6 x 1.2 |
| | LGA-4 | 1.4 x 1.4 x 0.45 |

Device Packages



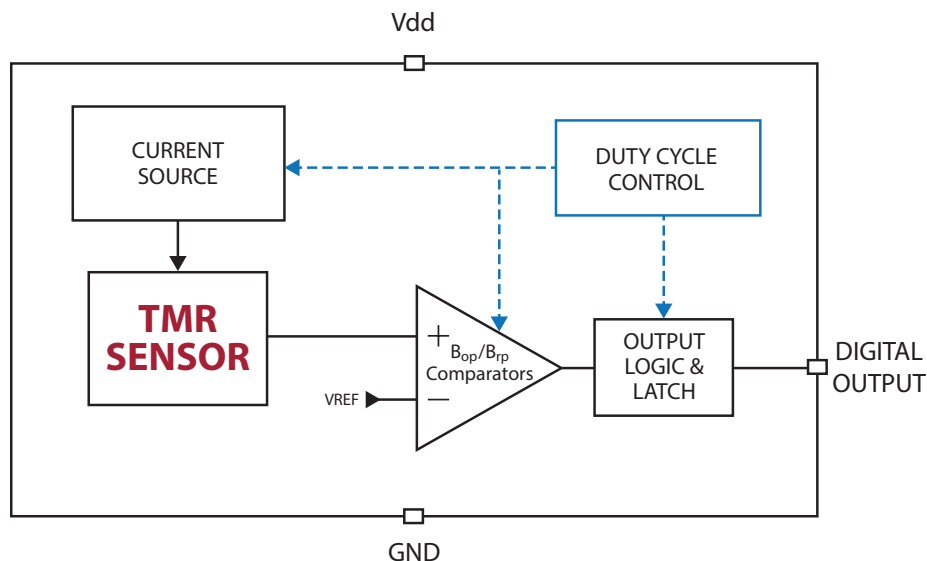
2 Features

- ▶ Configurable operate sensitivity from 5 G to 100 G
- ▶ Ultra-Low Hysteresis Available
- ▶ Lowest Average Current < 190 nA
- ▶ Omnipolar, Unipolar, and Bipolar Latching Responses Available
- ▶ Operating Frequencies up to 333 kHz
- ▶ Temperature Rated up to 125°C
- ▶ RoHS & REACH Compliant

3 Applications

- ▶ Proximity Detection
- ▶ Rotary Sensing
- ▶ Fluid Level Detection
- ▶ Door & Lid Closure Detection
- ▶ Utility Meters
- ▶ Portable Medical Devices
- ▶ Motor Controllers
- ▶ Consumer Electronics
- ▶ Wake-Up μ Processor

Functional Block Diagram



4 Specifications

4.1 Absolute Environmental Ratings

| Parameters | Units | Min | Typ | Max |
|--|-------|-----|-----|------|
| Operating Temperature | °C | -40 | | 125 |
| Storage Temperature | °C | -55 | | 150 |
| Maximum Junction Temperature | °C | | | 150 |
| Soldering Temperature (3 cycles, 1 min.) | °C | | | 260 |
| ESD Level (HBM) | V | | | 4000 |

4.2 Electrical Characteristics¹

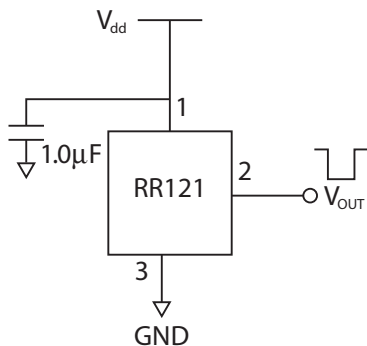
| Parameters | Units | Min | Typ | Max |
|---|-------|-----|--------------|-----|
| Supply Voltage (V_{dd}) | V | 2.7 | 3.0 | 3.6 |
| Output Voltage (High) ² (V_{outh}) | V | | 90% V_{dd} | |
| Output Voltage (Low) ² (V_{outl}) | V | | 10% V_{dd} | |

Notes:μ

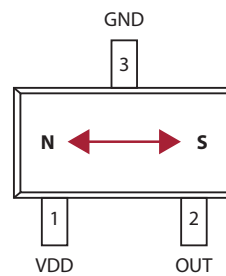
1. Unless otherwise specific, all characteristics as measured at 25°C
2. See "Magnetic Field vs. Output Status" (at right) for more details.

5 Application Information

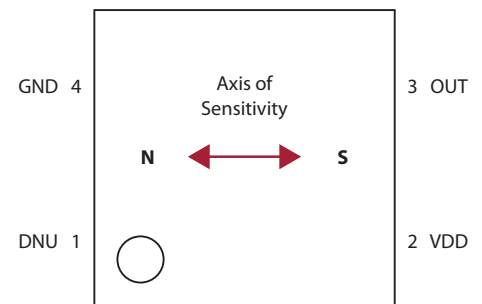
5.1 Application Circuit



5.2 Axis of Sensitivity



SOT-23 Package



LGA Package

RR121 Output Application Circuit

The output voltage on the RR121 is active low, meaning that while a sufficiently strong magnetic field is present, the output voltage is low. The output voltage can be connected to a digital I/O pin on a microcontroller. A decoupling capacitor between the supply voltage and ground is required with placement close to the magnetic sensor. A typical capacitor value of 1.0 μF will suffice.

6 Part Selection and Ordering Information

6.1 Part Selection Table

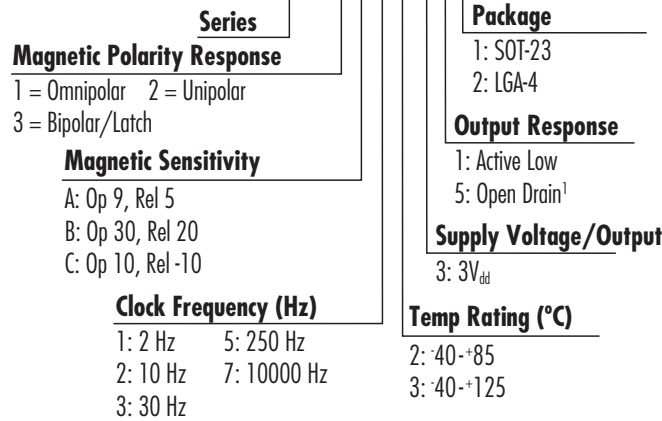
| Part Number | Magnetic Polarity Response | Operate Sensitivity (G) | Release Sensitivity (G) | Frequency (Hz) | I _{avg} (uA) | Temp. Rating (°C) | Supply Voltage (V _{dd}) | Output Response | Package |
|----------------|----------------------------|-------------------------|-------------------------|----------------|-----------------------|-------------------|-----------------------------------|-----------------|----------|
| RR121-1B13-312 | Omnipolar | 30 | 20 | 2 | 0.20 | -40 - +125 | 3 | Active Low | LGA-4 |
| RR121-1B13-311 | Omnipolar | 30 | 20 | 2 | 0.20 | -40 - +125 | 3 | Active Low | SOT-23-3 |
| RR121-1B53-311 | Omnipolar | 30 | 20 | 250 | 1.44 | -40 - +125 | 3 | Active Low | SOT-23-3 |
| RR121-1A23-311 | Omnipolar | 9 | 5 | 10 | 0.24 | -40 - +125 | 3 | Active Low | SOT-23-3 |
| RR121-3C53-311 | Bipolar | 10 | -10 | 250 | 1.44 | -40 - +125 | 3 | Active Low | SOT-23-3 |

Note:

- Custom options available for Sensitivity, Frequency, Temperature Rating, Supply Voltage, Output Response & more. Please contact redrock@cotorelay.com for more details.

6.2 Device Nomenclature

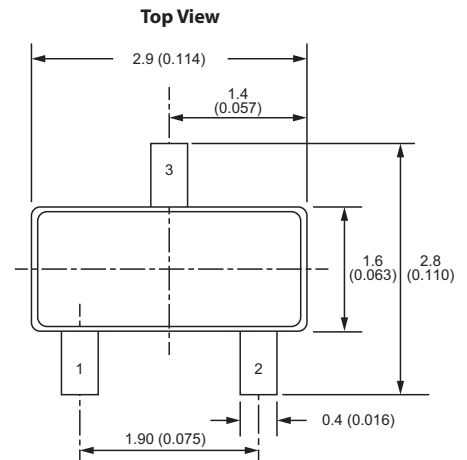
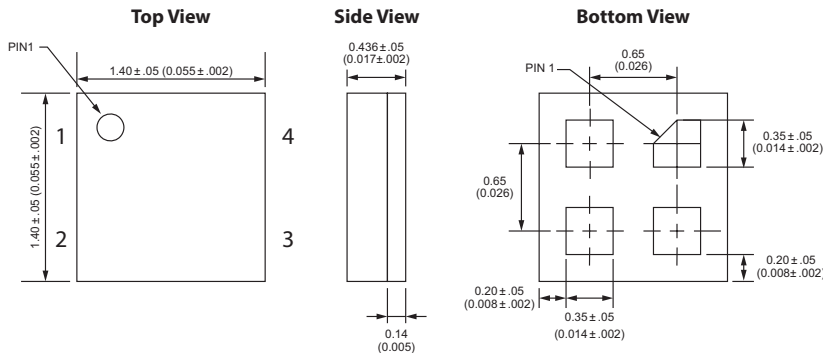
Ordering Information

RR121-X X X X-Y 1 Y


7 Dimensions *Millimeters (Inches)*

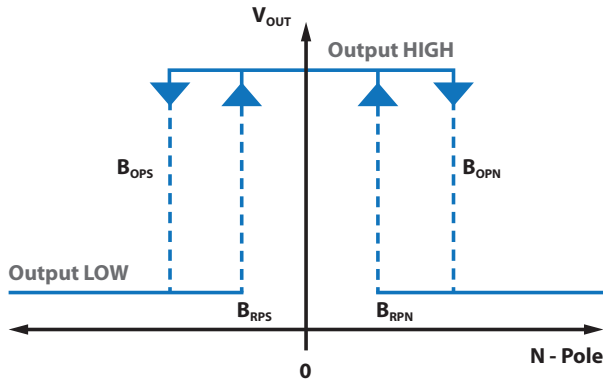
LGA-4 Package

SOT-23-3 Package

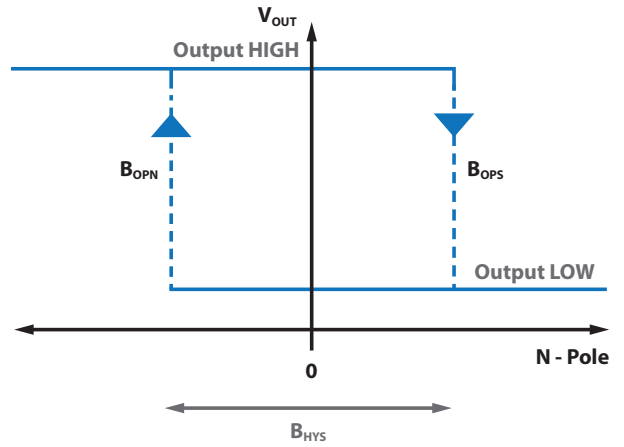


8 Magnetic Flux Response Diagrams

8.1 Omnipolar Magnetic Flux Response (Active Low Option)



8.2 Bipolar Magnetic Flux Response (Active Low Option)



9 Performance Graphs

9.1 Magnetic Operate & Release Sensitivity vs. Supply Voltage

