Honeywell

# Installation Instructions for the **Magnetoresistive Sensor ICs Nanopower Series**

***50094459***
*Issue C*

**Table 1A. Electrical Specifications (Vs = 1.65 V to 5.5 V, Ta = -40 °C to 85 °C [-40 °F to 185 °F], Typ. at 1.8 V, 25 °C [77 °F] unless otherwise specified.)**

| Characteristic | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Supply voltage (Vs) | Vs reference to ground | 1.65 | 1.8 | 5.5 | V |
| Awake current:<br>SM351LT<br>SM353LT | — | —<br>0.3 | 1<br>0.8 | 5<br>5 | mA |
| Awake time | — | — | 15 | — | µs |
| Sleep current | —<br>Vs = 1.65 V<br>Vs = 1.8 V<br>Vs = 5.5 Vdc | —<br>—<br>—<br>— | 0.2<br>0.16<br>0.2<br>2.6 | 8<br>0.8<br>1<br>8 | µA |
| Sleep time | — | 30 | 100 | 180 | ms |
| Average current:<br>SM351LT<br>SM353LT | 0.015% duty cycle, typ. | —<br>— | 360<br>310 | 6640<br>6350 | nA |
| Output voltage:<br>low ($V_{OL}$)<br>high ($V_{OH}$) | load current = 100 µA | 0<br>Vs - 0.15 | 0.03<br>Vs - 0.03 | 0.15<br>Vs | V |

## NOTICE

These magnetoresistive sensor ICs may have an initial output in either the ON or OFF state if powered up with an applied magnetic field in the differential zone (applied magnetic field >Brp and <Bop). Honeywell recommends allowing 10 µs for output voltage to stabilize after supply voltage has reached its final rated value.

**Table 1B. Electrical Specifications (Vs = 1.8 V, Ta = 25 °C [77 °F].)**

| Characteristic | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Awake current:<br>SM351LT<br>SM353LT | — | —<br>— | 1<br>0.8 | 1.12<br>0.87 | mA |
| Awake time | — | — | 15 | — | µs |
| Sleep current | — | — | 0.2 | 0.59 | µA |
| Sleep time | — | 90 | 100 | 120 | ms |
| Average current:<br>SM351LT<br>SM353LT | 0.015% duty cycle, typ. | —<br>— | 350<br>350 | 620<br>600 | nA |

## NOTICE

The sensor will turn LOW when the magnetic field is present and switch to HIGH when the field is removed. The sensor will latch and hold the state during the sleep “mode”.

**Table 2. Magnetic Specifications (Vs = 1.65 V to 5.5 V, Ta = -40 °C to 85 °C [-40 °F to 185 °F]**

| Characteristic | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| SM351LT: | | | | |
| operate (positive) | 3 | 7 | 11 | Gauss |
| release (positive) | 2 | 5 | — | |
| hysteresis | * | 2 | — | |
| SM353LT: | | | | |
| operate (positive) | 6 | 14 | 20 | Gauss |
| release (positive) | 3 | 10 | — | |
| hysteresis | * | 4 | — | |

*At 1.65 V and -40 °C, the hysteresis can reach 0.1 Gauss.

## NOTICE

The magnetic field strength (Gauss) required to cause the switch to change state (operate and release) will be as specified in the magnetic characteristics. To test the switch against the specified magnetic characteristics, the switch must be placed in a uniform magnetic field.

**Table 3. Absolute Maximum Ratings**

| Characteristic | Condition | Min. | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Operating temperature | ambient | -40 [-40] | — | 85 [185] | °C [°F] |
| Soldering temperature | ambient applied for <10 s | — | — | 265 [509] | °C [°F] |
| Supply voltage (Vs) | — | -0.5 | — | 6 | V |
| Output (load) current | — | — | — | 5 | mA |

## NOTICE

Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate at absolute maximum ratings.

**CAUTION**
ELECTROSTATIC SENSITIVE DEVICES
DO NOT OPEN OR HANDLE EXCEPT AT A STATIC FREE WORKSTATION

ESD SENSITIVITY: CLASS 2

**Figure 1. Block/Electrical Diagram**

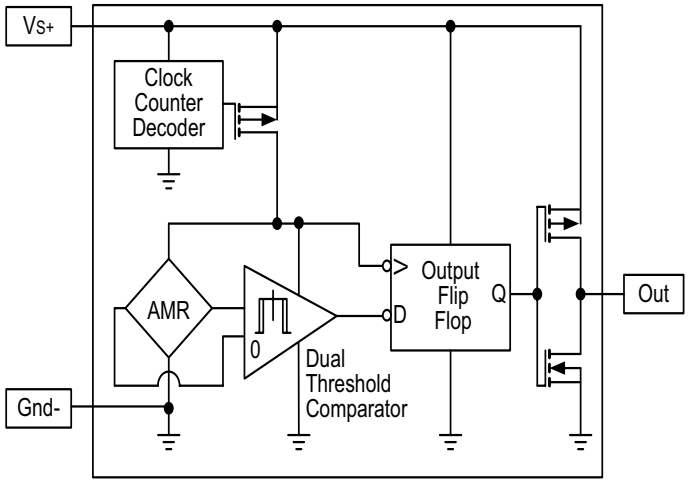
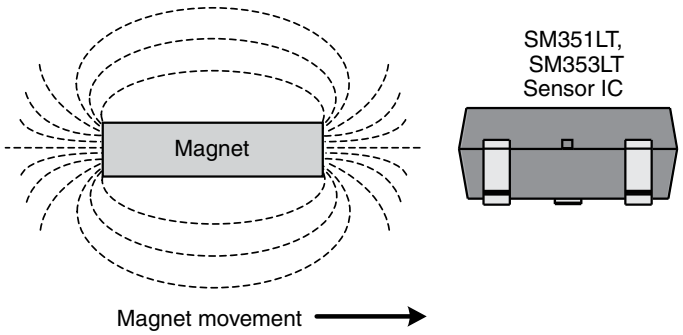


**Figure 2. Alignment of the Magnet to the Omnipolar Magnetoresistive Sensor IC**

**Ideal alignment: The magnet is aligned in the same plane as the sensor IC.**

The magnetic flux lines stay horizontal as the magnet approaches the sensor IC (see Figure 2.A).

**Figure 2.A**

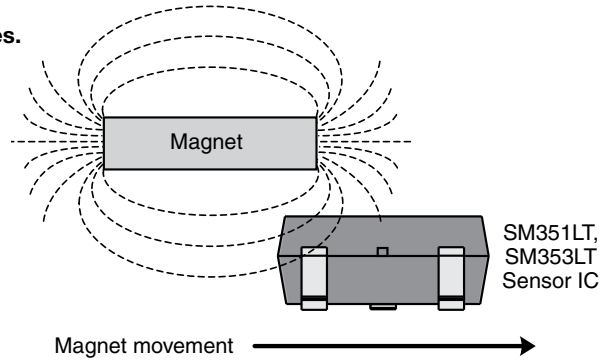



**Offset alignment: The magnet is not aligned in the same plane as the sensor IC.**

**Figure 2.B**

**Parallel magnet approach to the sensor IC may cause dead zones.**

Dead zones may occur when the majority of the magnet's magnetic flux lines become vertical as it approaches the sensor IC, turning the sensor IC to ON, then OFF, then ON (see Figure 2.B).




**Perpendicular magnet approach to the sensor IC eliminates possible dead zones.**

The sensor IC detects the approaching magnet's horizontal magnetic flux lines, turning the sensor IC to ON. The sensor IC stays ON as the magnet continues to approach. When the magnet is located directly over the sensor IC, all magnetic flux lines are now horizontal (see Figure 2.C). Note: This alignment decreases the magnetic flux strength at the sensor IC.

**Figure 2.C**

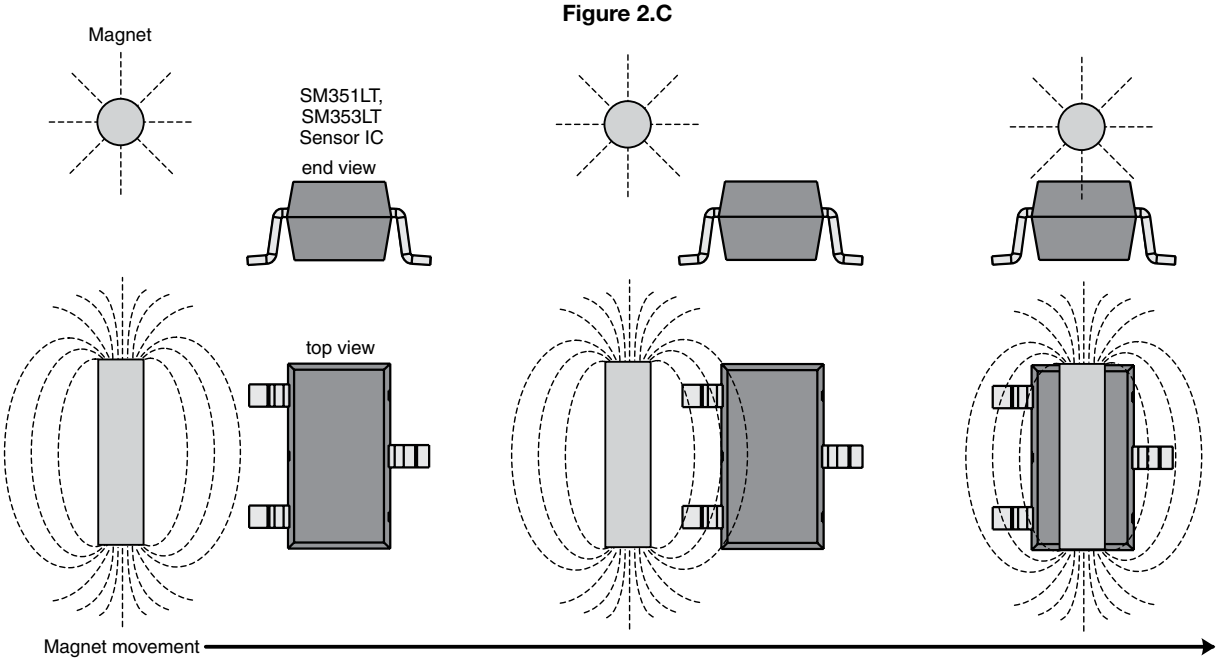
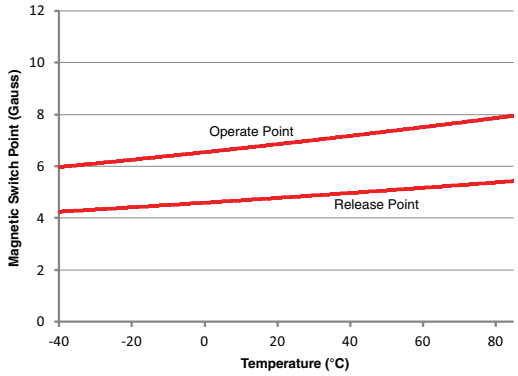
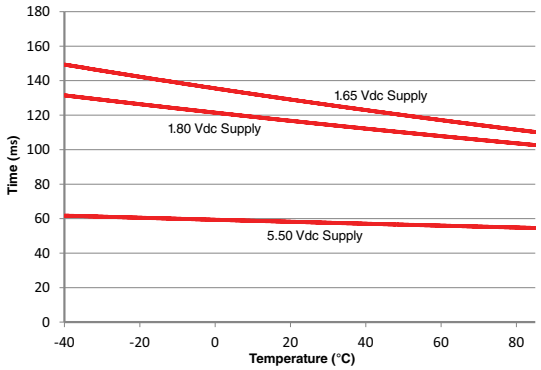


**Figure 3. SM351LT Typical Performance Characteristics**

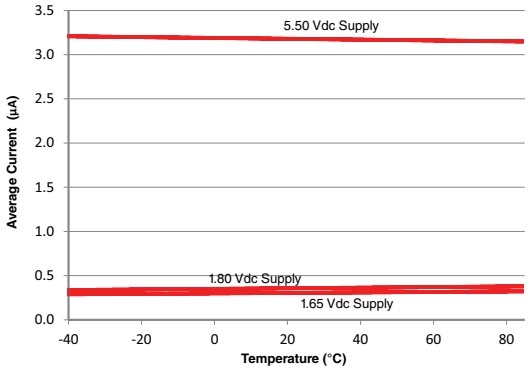
### Magnetic Performance vs Temperature




### Period vs Temperature




### Average Current vs Temperature




### Active Mode Time vs Temperature

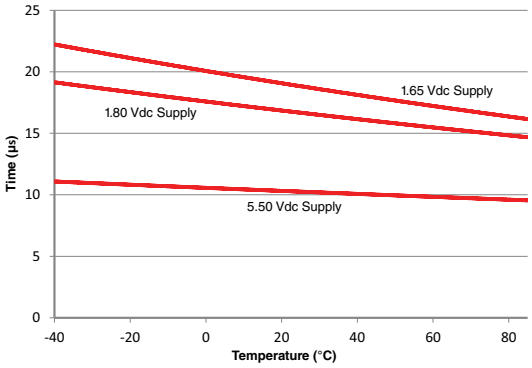
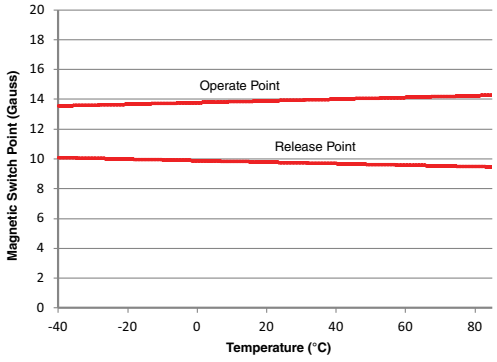
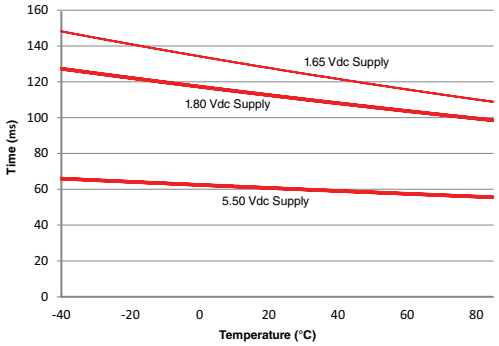



**Figure 4. SM353LT Typical Performance Characteristics**

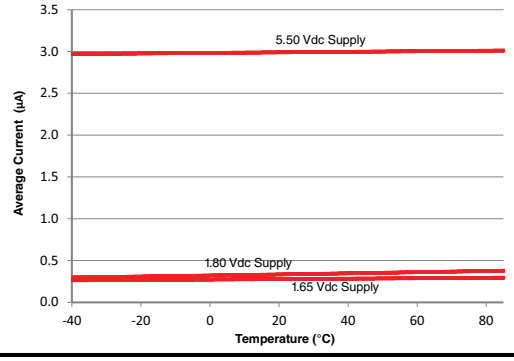
### Magnetic Performance vs Temperature




### Period vs Temperature




### Average Current vs Temperature




### Active Mode Time vs Temperature

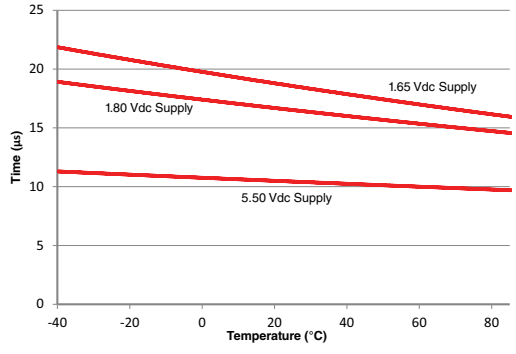
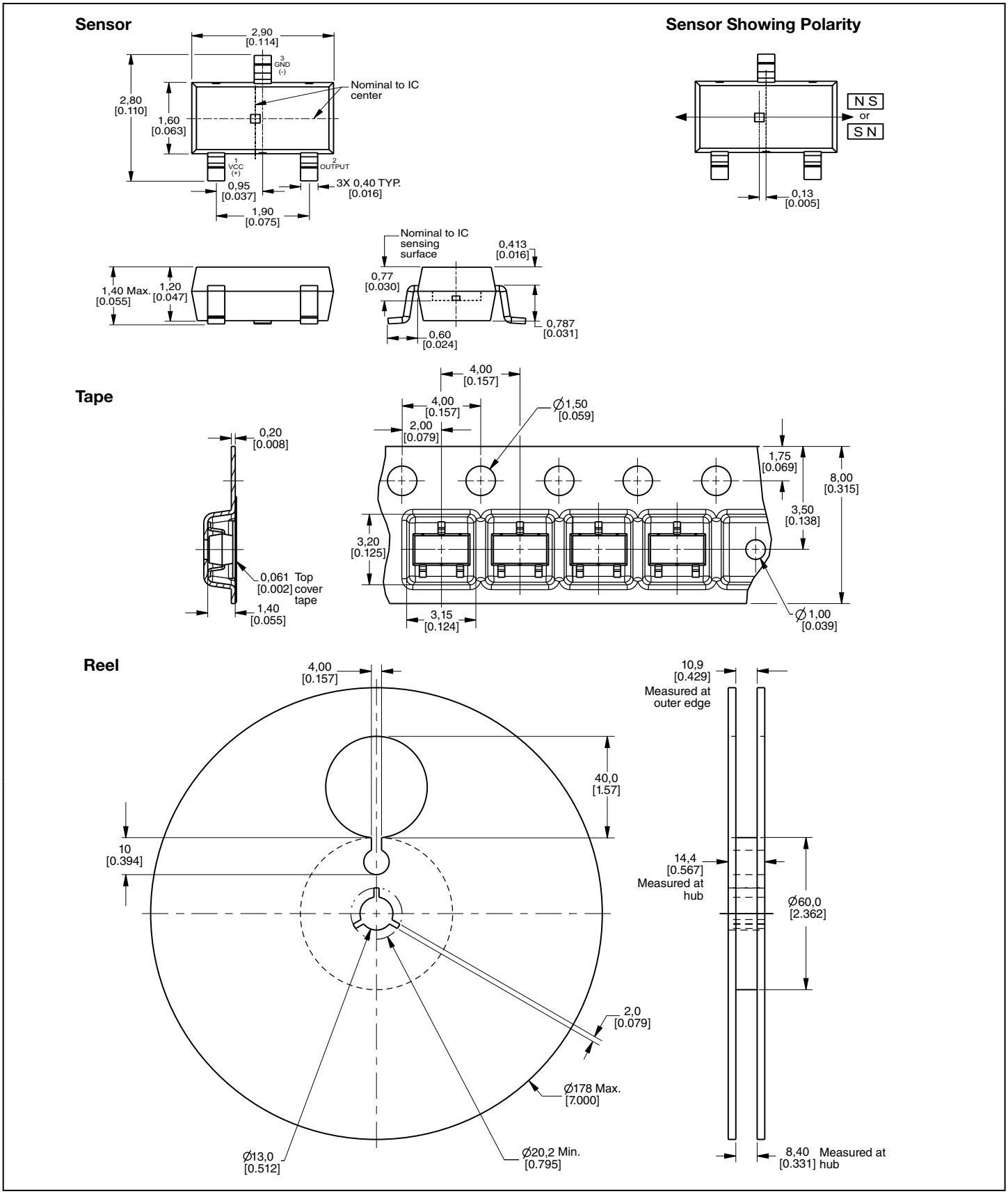


**Figure 5. Mounting and Tape/Reel Dimensions (For reference only. mm/[in].)**



# Magnetoresistive Sensor ICs
# Nanopower Series

*Issue C*

***50094459***

**⚠ WARNING**

**PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

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