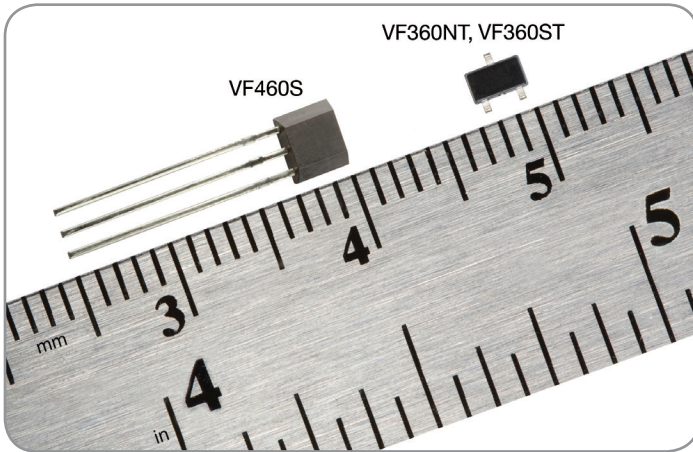


# High Sensitivity Latching Digital Hall-effect Sensor ICs: VF360NT, VF360ST, VF460S

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Issue B

Datasheet



## DESCRIPTION

The VF360NT, VF360ST, and VF460S High Sensitivity Latching Digital Hall-Effect Sensor ICs are small, sensitive and versatile devices that are operated by the magnetic field from a permanent magnet or an electromagnet. They are designed to respond to alternating North and South poles. The VF360NT is turned ON by a North pole, while the VF360ST and VF460S are turned ON by a South pole. This sensor IC does not use chopper stabilization on the Hall element, providing a clean output signal and a faster latch response time when compared to competitive high sensitivity Hall-effect latching sensor ICs which do use chopper stabilization.

## VALUE TO CUSTOMERS

- AEC-Q100 qualification provides enhanced reliability and quality of electronic components. Components meeting these specifications are often suitable for use in harsh automotive environments without the customer's need for additional component-level qualification testing.
- Designed to provide reliable, consistent performance and a fast response time, enhancing efficiency in brushless dc motor (BLDC) applications
- Designed to provide a wide supply voltage range and no chopper delay, allowing for potential use in a variety of applications
- Designed to provide a clean output signal without the customer having to include additional circuitry to achieve noise suppression due to chopper stabilization

## DIFFERENTIATION

Honeywell's VF360NT, VF360ST, and VF460S AEC-Q100-qualified latching sensor ICs offer better performance than many competitive sensor ICs that employ chopper stabilization techniques.

- **Response time:** Honeywell's device provides a fast response time, enabling efficiency in BLDC motors.
- **No noise generation:** Honeywell's device utilizes a resistor-capacitor (RC) circuit to enable noise suppression required for chopper stabilized sensors.

## FEATURES

- Qualified to the AEC-Q100 standard for potential use in automotive applications
- Fastest response time in its class (1.5  $\mu$ s)
- Operate from 30 Gauss typical at 25 °C [77 °F] and 55 Gauss maximum over the full -40 °C to 150 °C [-40 °F to 302 °F] temperature range
- Latching magnetics
- Repeatable magnetics (no jitter)
- No additional electronic noise generated by sensor
- Non-chopper-stabilized design
- VF360NT and VF360ST subminiature SOT-23 surface mount package supplied on tape and reel (3000 units per reel)
- VF460S flat TO-92-style package (1000 units per bag)
- 3 Vdc to 24 Vdc
- Built-in reverse polarity protection
- RoHS-compliant material

## POTENTIAL TRANSPORTATION APPLICATIONS

- BLDC motor commutation for automotive applications: Air input flap to engine, convertible roof position, electronic parking brakes, electronic window lifts and anti-pinch power window systems, HVAC blowers, headlights, power doors, mirrors and tail gates, seat motors, steering, windshield washers and wipers
- Speed and RPM sensing: Motors and fans; tachometer and counter pickup
- Flow rate sensing

## PORTFOLIO

The VF360NT, VF360ST, and VF460S join Honeywell's family of latching digital Hall-effect sensor ICs including:

- SS360NT, SS360ST, SS360ST-10K, SS460S, SS460S-T2 High sensitivity latching digital Hall-effect sensor ICs
- SS360PT, SS460P, SS460P-T2 High sensitivity latching digital Hall-effect sensor ICs with built-in pull-up resistor
- SS361CT, SS461C High sensitivity latching digital Hall-effect sensor ICs
- SS361RT, SS461R Latching Hall-effect digital sensor ICs
- SS400 Series unipolar/bipolar/latching Hall-effect digital sensor ICs
- SS41, SS51T Series bipolar Hall-effect digital sensor ICs
- SS42R Series Latching Hall-effect digital sensor ICs with dual active high/active low complementary outputs
- VF526DT Latching dual Hall-effect digital sensor IC with speed and direction outputs

# High Sensitivity Latching Digital Hall-effect Sensor ICs: VF360NT, VF360ST, VF460S

**Table 1. Performance Specifications**

(At  $V_s = 3.0\text{ Vdc}$  to  $24.0\text{ Vdc}$ ,  $20\text{ mA}$  load,  $T_A = -40\text{ °C}$  to  $150\text{ °C}$  [ $-40\text{ °F}$  to  $302\text{ °F}$ ] except where otherwise specified.)

Characteristic	Condition	Min.	Typ.	Max.	Unit
Supply voltage: VF360NT, VF360ST VF360NT, VF360ST VF460S	-40 °C to 125 °C [-40 °F to 257 °F] 150 °C [302 °F] —	3.0 3.0 3.0	— — —	24.0 12.0 24.0	Vdc
Supply current	$V_{\text{supply}} = 3.0\text{ Vdc}$ at 25 °C [77 °F] —	— —	3.5 —	6.0 8.0	mA
Output current	—	—	—	20.0	mA
$V_{\text{sat}}$	Gauss > 55	—	—	0.6	V
Output leakage current	Gauss > -55	—	—	10.0	µA
Rise/fall time	25 °C [77 °F]	—	—	1.5	µs
Thermal resistance: VF360NT, VF360ST VF460S	single layer, single sided PCB —	— —	303 233	— —	°C/W
Magnetic characteristics: operate (Bop) operate (Bop) release (Brp) release (Brp) differential	25 °C [77 °F] — 25 °C [77 °F] — —	15 5 -45 -55 40	30 30 -30 -30 60	45 55 -15 -5 80	Gauss
Operating temperature	—	-40 [-40]	—	150 [302]	°C [°F]
Storage temperature: VF360NT, VF360ST VF460S	— —	-40 [-40] -40 [-40]	— —	150 [302] 165 [239]	°C [°F]
ESD (Human Body Model)	per JEDEC JS-001, Class H3A/3A	-4	—	+4	kV
Soldering temperature and time: VF360NT, VF360ST VF460S	infrared reflow: peak temperatures not to exceed 245 °C [473 °F] for 10 s max. PCB wave soldering: 250 °C to 260 °C [482 °F to 500 °F] for 3 s max.				

## NOTICE

These Hall-effect 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 after supply voltage has reached 3 V (VF460S) or 5 V (VF360NT, VF360ST) for the output voltage to stabilize.

## 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 limits, the switch must be placed in a uniform magnetic field.



**Table 2. Absolute Maximum Specifications**

Characteristic	Min.	Typ.	Max.	Unit
Supply voltage	-26.0	—	26.0	V
Applied output voltage	-0.5	—	26.0	V
Output current	—	—	20.0	mA
Magnetic flux	—	—	no limit	Gauss

## NOTICE

Absolute maximum ratings are the extreme limits the device will momentarily withstand without damage to the device. Electrical and mechanical characteristics are not guaranteed if the rated voltage and/or currents are exceeded, nor will the device necessarily operate at absolute maximum ratings.

# High Sensitivity Latching Digital Hall-effect Sensor ICs: VF360NT, VF360ST, VF460S

Figure 1. Sensor IC Block Diagram

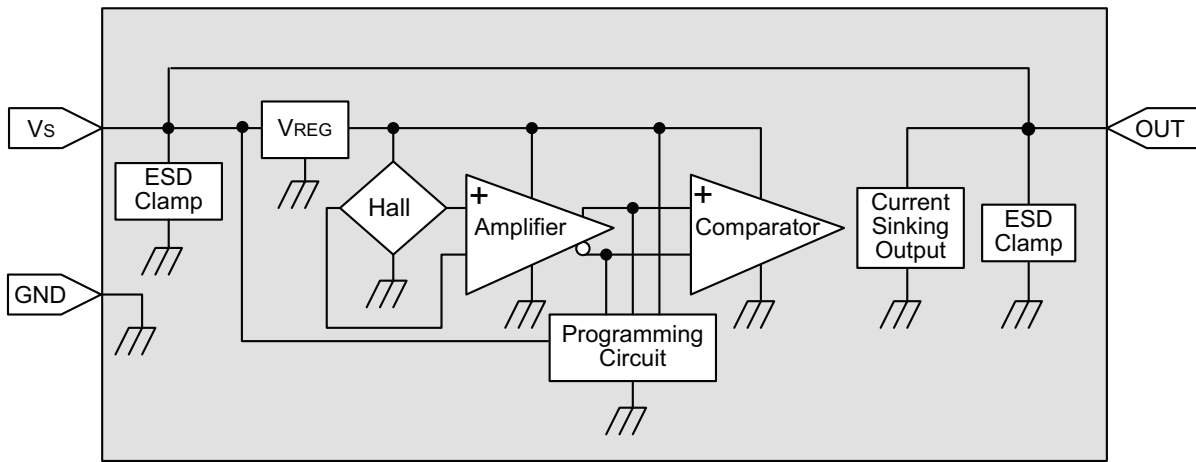


Figure 2. Typical Magnetic Characteristics vs Ambient Temperature at Supply Voltages

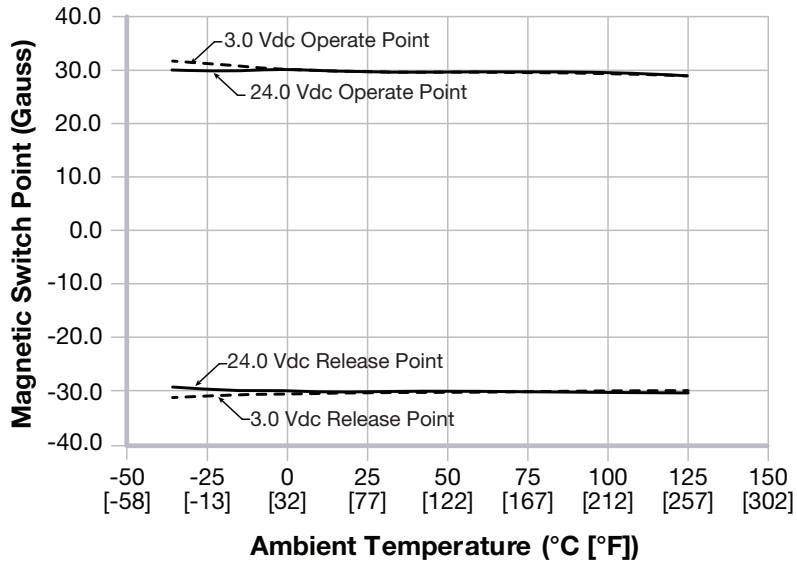
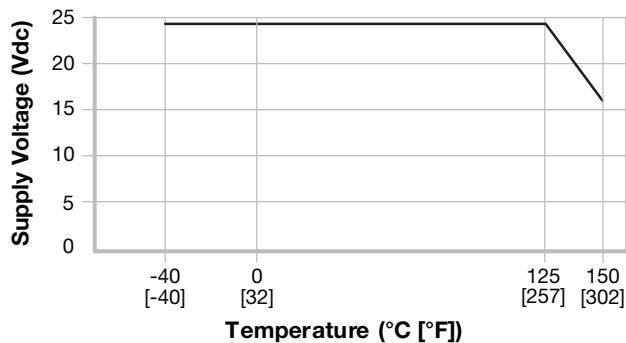


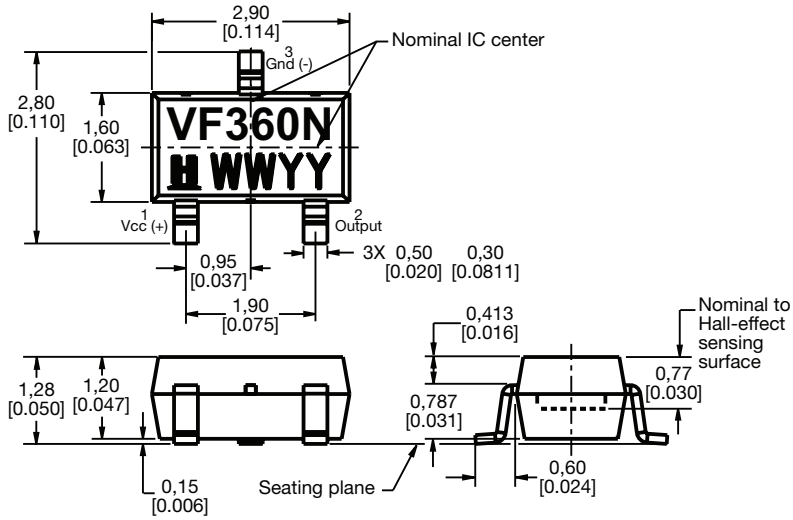
Figure 3. VF360NT, VF360ST Rated Supply Voltage vs Temperature



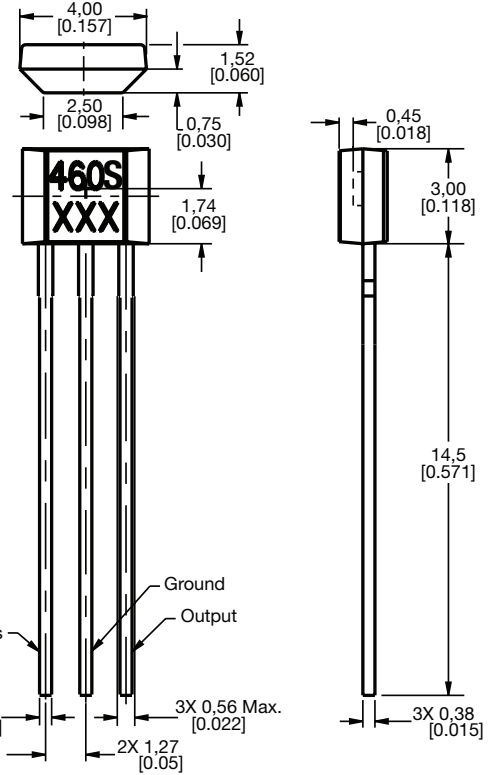
# High Sensitivity Latching Digital Hall-effect Sensor ICs: VF360NT, VF360ST, VF460S

Figure 4. Sensor IC, Tape and Reel Mounting Dimensions (For reference only. mm/in)

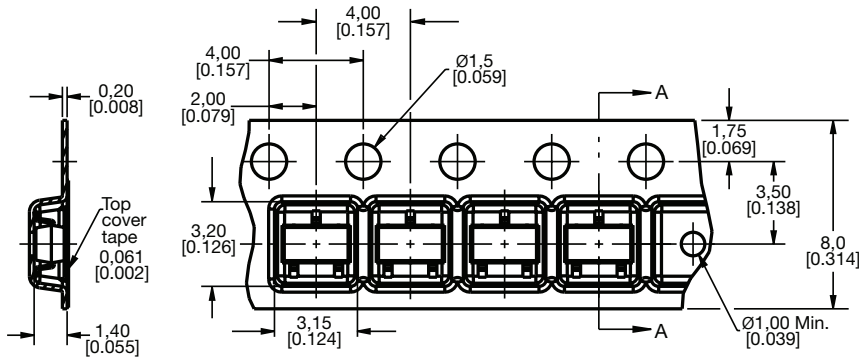
## VF360NT, VF360ST Sensor IC



## VF460S Sensor IC

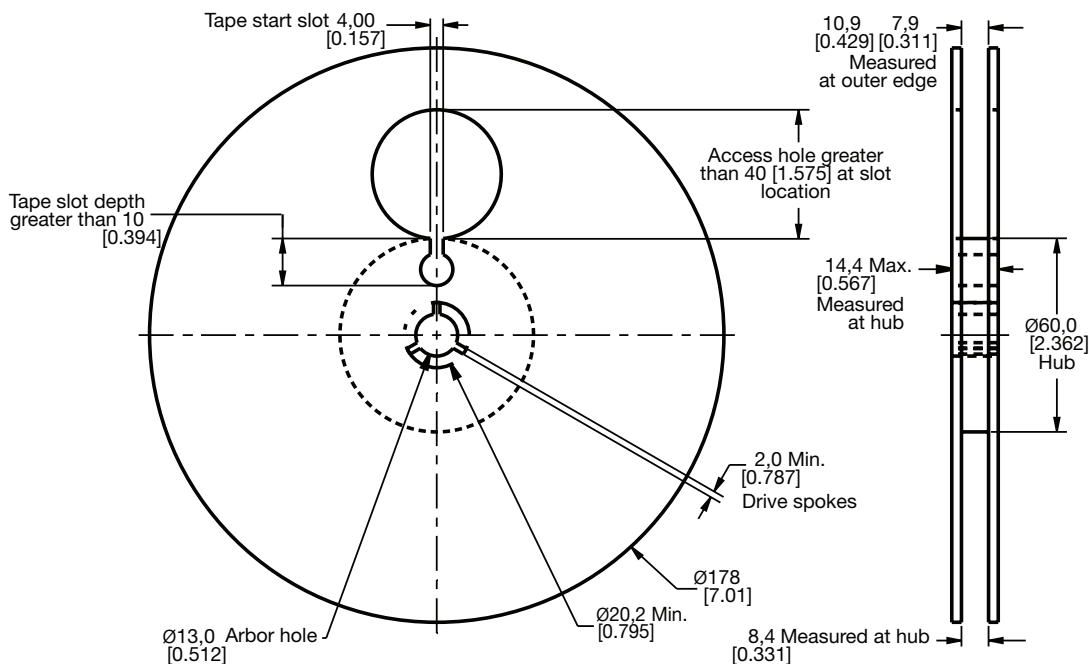


## VF360NT, VF360ST Tape



Section A-A

## VF360NT, VF360ST Reel



# High Sensitivity Latching Digital Hall-effect Sensor ICs: VF360NT, VF360ST, VF460S

Figure 5. Magnetic Activation

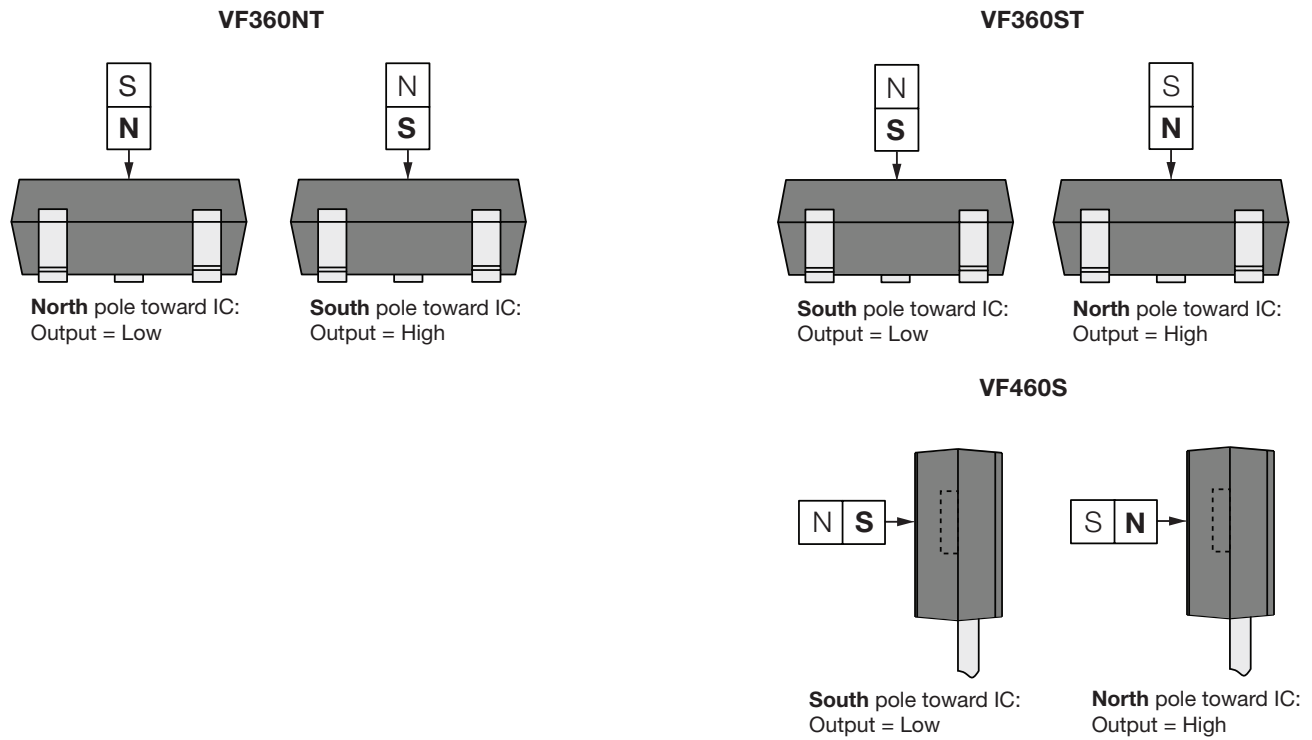


Table 3. Order Guide

Catalog Listing	Description	
VF360NT	High sensitivity latching, digital Hall-effect sensor IC with built-in pull-up resistor, North pole activated, SOT-23 package, tape and reel packaging (3000 units per reel)	
VF360ST	High sensitivity latching, digital Hall-effect sensor IC with built-in pull-up resistor, South pole activated, SOT-23 package, tape and reel packaging (3000 units per reel)	
VF460S	High sensitivity latching, digital Hall-effect sensor IC with built-in pull-up resistor, South pole activated, flat TO-92- style package, straight leads, bulk packaging (1000 units per bag)	

## ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product line guide
- Product range guide
- Product installation instructions
- Application notes:
  - Product application note
  - Magnetic Position Sensing in Brushless DC Electric Motors
- Technical note:
  - Achieving High Sensitivity and Magnetic Stability without the Use of Chopper Stabilization in Latching Hall-Effect Sensors for Brushless DC Motor Applications

## Find out more

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors.

For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office.

To learn more about Honeywell Sensing and Productivity Solutions' products, call **+1-815-235-6847** or **1-800-537-6945**, visit **[sensing.honeywell.com](http://sensing.honeywell.com)**, or e-mail inquiries to **[info.sc@honeywell.com](mailto:info.sc@honeywell.com)**

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## **⚠ 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.**

## **⚠ WARNING** **MISUSE OF DOCUMENTATION**

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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

## Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective.

**The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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