BD927-14E
Low-Voltage Digital Switch for Medical Devices

Key Features

- Low Voltage Operation to 0.9 V
- Low Power Consumption
- Digital Switch Output
- Precise Detection of Low Magnetic Fields
- Ultraminiature Package

Description

BD927-14E Series sensors are Giant Magnetoresistive (GMR) Digital Switch devices designed to run at low voltages and low currents. The devices are manufactured with NVE's patented spintronic GMR technology for unmatched miniaturization, sensitivity, precision, and low power.

The output is configured as a magnetic "switch" where the output turns on when the magnetic field is applied, and turns off when the field is removed. The part is available in NVE's new ULLGA leadless package measuring just 1.1 mm x 1.1 mm x 0.4 mm.

The BD927-14E parts are ideal for single battery-powered implantable medical devices. The applied magnetic field can be of either polarity, and the part typically consumes less than 20 microwatts at 0.9 V. The magnetic operate point is extremely stable over supply voltage and temperature variations. The output is current-sinking, and can sink up to 100 microamps.

The product consists of an approximately 0.6 mm x 0.6 mm die containing a GMR sensor element and CMOS signal processing circuitry to convert the analog sensor element output to a digital output. The plastic package is ultra-small, ultra-low profile, surface mount, lead-free, and RoHS compliant. Bare die are also available for extremely space-critical applications.

Versions of this part with different magnetic characteristics are available. Please contact NVE for details.

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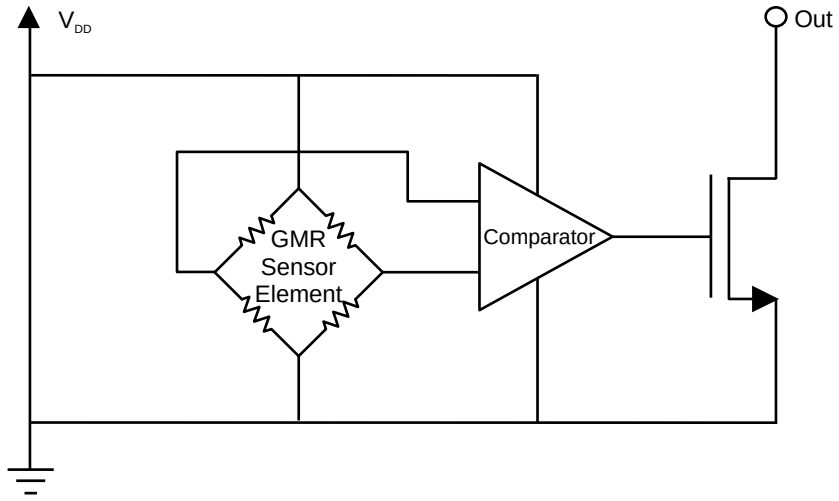
Functional Block Diagram

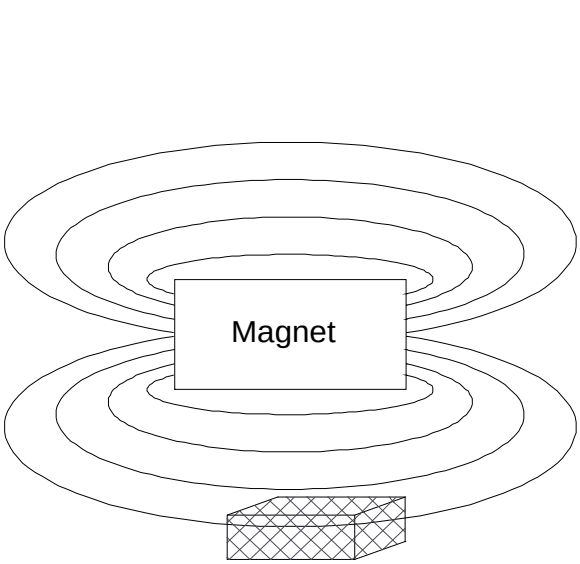


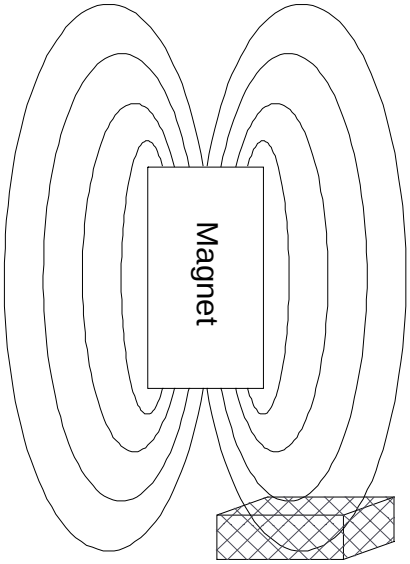
Operation

The direction of magnetic field sensitivity is planar to the package. As the field varies in intensity, the digital output will turn on and off. The user must provide a pull-up resistor on the output terminal.

Sensor Activation With a Permanent Magnet

The diagrams below show two permanent magnet orientations that will activate the sensor in the direction of sensitivity (planar to the package):





Electrical and Magnetic Specifications

(specifications valid over all operating voltage and temperature ranges):

Parameter	Min.	Typ.	Max.	Units
Magnetic Operate Point	11	15	19	|Oersteds|[1]
Magnetic Release Point	4.5			|Oersteds|[1]
Hysteresis	0.25		6.5	|Oersteds|[1]
Operating Voltage (V_{DD})[3]	0.9	1.25	2.4	Volts
Quiescent Current at 0.9 V		15	35	µA
Quiescent Current at 1.4 V		35	55	µA
Quiescent Current at 2.4 V		75	110	µA
Output Drive Current	100			µA
V_{OL} at 100 µA Output Drive Current (V_{DD} = 1.25 V)		0.05	0.20	Volts
Output Leakage Current			0.5	µA
Frequency Response		100		kHz
Temperature Range of Operation[3]	−40		85	°C

Absolute Maximum Ratings

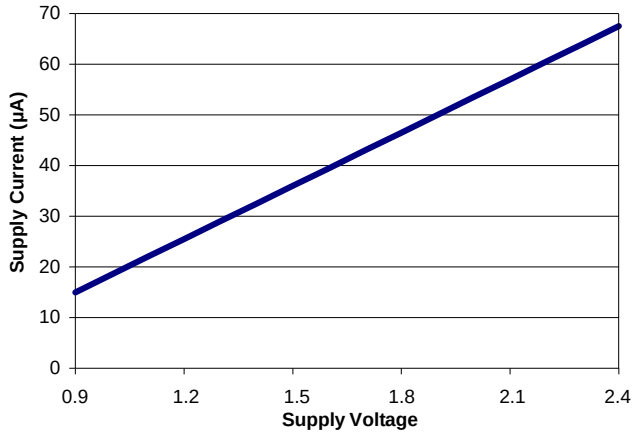
Parameter	Rating	Units
Applied Magnetic Field	Unlimited[2]	|Oersteds|
Supply Voltage	5.5	Volts
Output Off Voltage	5.5	Volts
Output Current	200	µA
Maximum Junction Temperature	+170	°C
Storage Temperature	−65 to +170	°C

Notes:

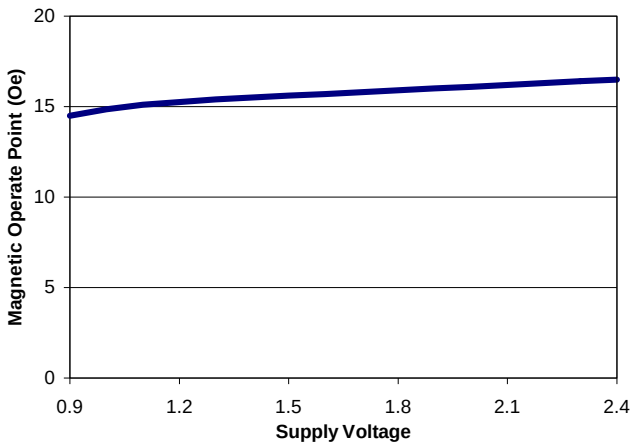
1. 1 Oe (Oersted) = 1 Gauss in air = 0.1 mT
2. Large magnetic fields WILL NOT damage NVE GMR sensors
3. Operation from −20°C to −40°C at supply voltages less than 1.0 V may not meet specifications.

Typical Performance Characteristics

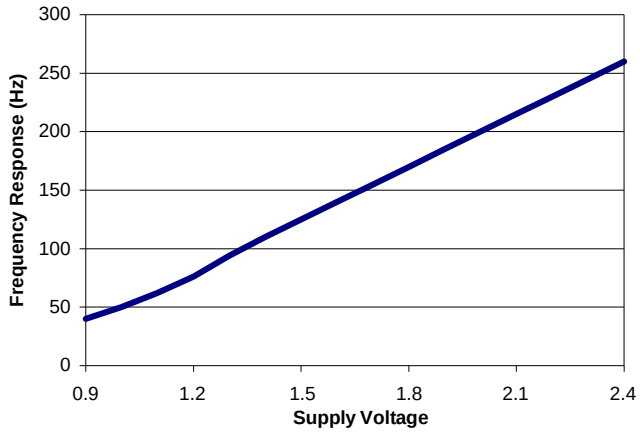
Supply Current vs. Supply Voltage, 25˚C



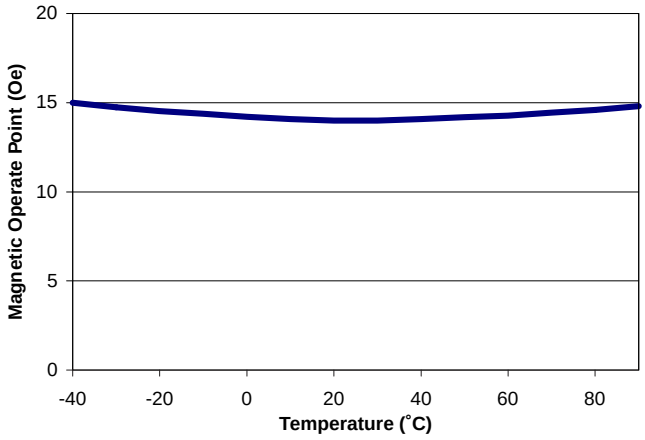
Magnetic Operate Point vs. Voltage Supply, 25˚C



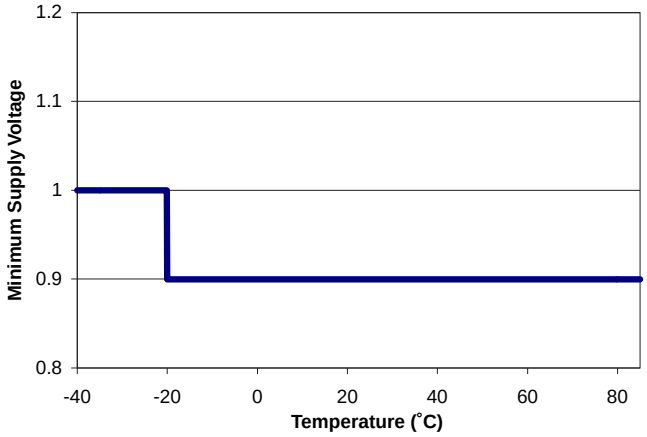
Frequency Response vs. Supply Voltage, 25˚C



Magnetic Operate Point vs. Temperature, 1.15V



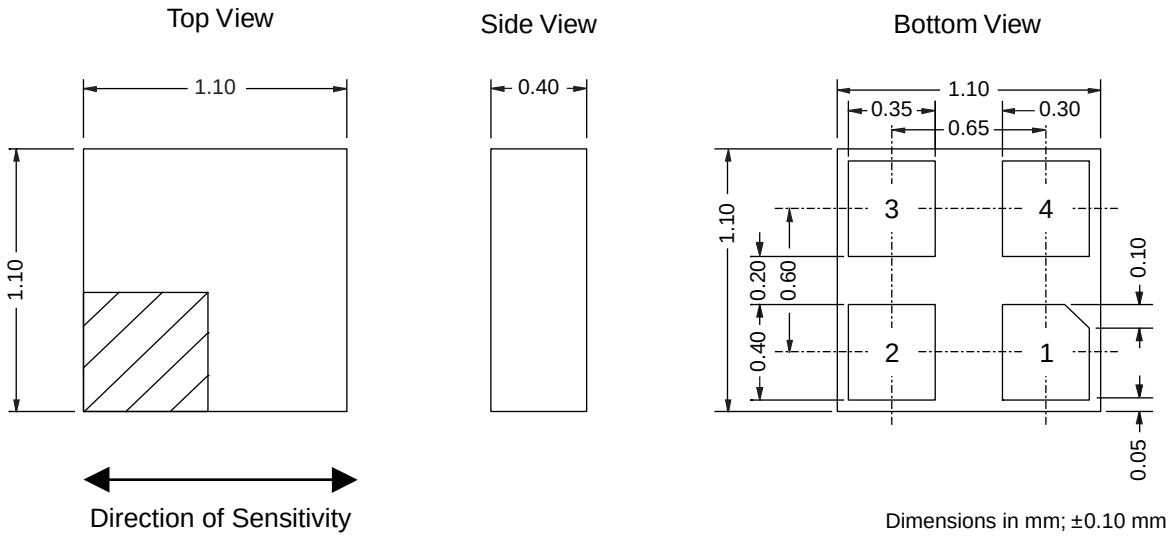
Supply Voltage vs. Temperature Derating Curve



Package Drawings, Dimensions, and Specifications:

4-Lead ULLGA Package

1.1 mm x 1.1 mm x 0.40 mm; Lead Pitch 0.65 mm



Pinout:

Pin 1	No Connect
Pin 2	V_{DD}
Pin 3	Out
Pin 4	Ground

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