# MT6315 Series

## *High Voltage Omni-polar MR Switch Sensor*

MagnTek

### Feature

- MR+CMOS monolithic structure
- High sensitivity
  $B_{OP}$=± 22Gauss, $B_{RP}$=± 19Gauss
- Wide operating supply voltage range
  3~26V
- Wide operating temperature range
  -40~125°C
- High operation frequency:10KHz
- Internal 100KΩ pull-up resistor
- RoHs compliant 2011/65/EU

### Application:

- Position Detection
- Proximity Detection
- Speed Detection

## Product Description

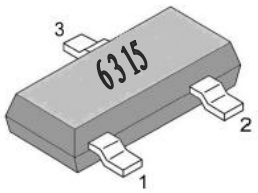
The MT6315 is a monolithic IC with built-in MR magneto-resistive element and CMOS switch. The IC internally includes a MR bridge, a voltage regulator for operation with supply voltage from 3.0V to 26V, a sleep/awake logic for timing control, small signal amplifier and Schmitt trigger comparator with dynamic offset cancellation , and an open drain output with internal 100KΩ pull-up resistor.

When combined with a magnet, it becomes a non-contact switch with wide operation voltage range, high sensitivity and reliability. A horizontal magnetic field parallel to the electrode of the package can be detected by an arbitrary polarity.

The MT6315 is ideal for use to gather speed and detect position, particularly suited for applications that require accurate duty cycle or accurate edge detection such as position detection in air cylinders.

## Pin definition

| Name | Number | Description |
|---|---|---|
| VDD | 1 | Power Supply |
| OUT | 2 | Output Signal |
| GND | 3 | Ground |

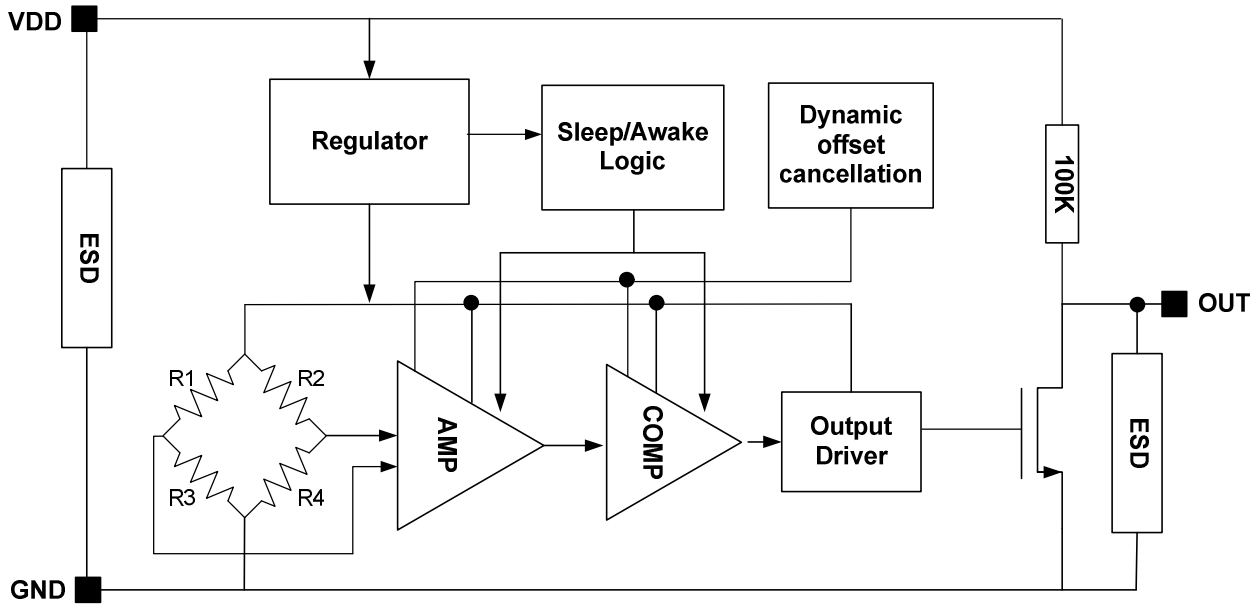



## Family members

| Part Number | Description |
|---|---|
| MT6315ET | SOT-23(thin outline) package ,tape and reel packaging(3000pcs/bag) |

The MT6315ET is provided in a SOT23 (thin outline) package that is RoHS compliant

## Block Diagram




# Function Description

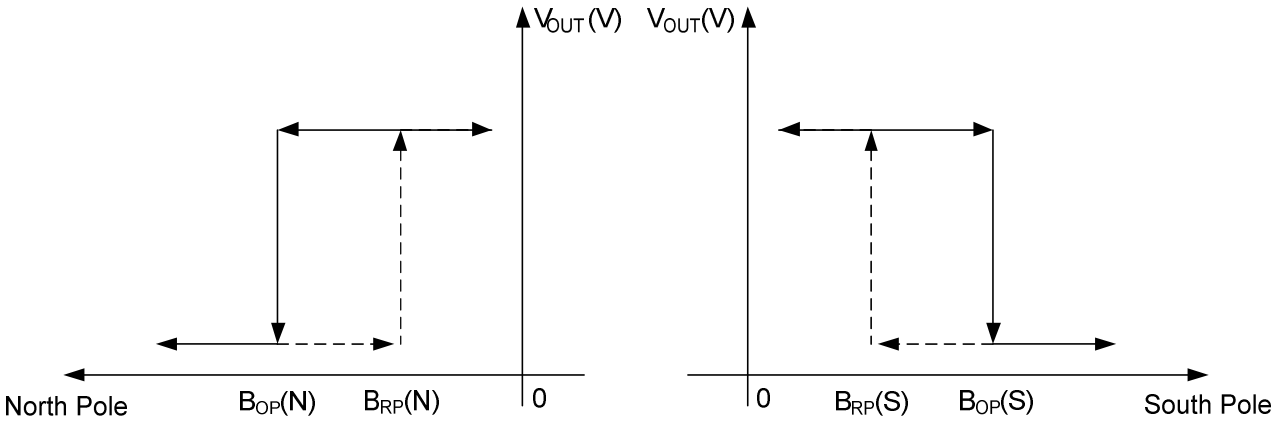
## Definition of magnetic parameters

$B_{OP}$: Operating point, magnetic flux density that turns the output driver ON( $V_{OUT}$=Low)

$B_{RP}$: Release point, magnetic flux density that turns the output driver OFF( $V_{OUT}$=High)

$B_{HYST}$: Hysteresis window, $|B_{OP}-B_{RP}|$

## Definition of Switching Function





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## Absolute Maximum Rating

Absolute maximum ratings are limiting values to be applied individually, and beyond which the serviceability of the circuit may be impaired .Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

Absolute maximum ratings: all voltages listed are referenced to GND

| Symbol | Parameters | Min | Max | Units |
|---|---|---|---|---|
| $V_{DD}$ | Supply Voltage | -0.5 | 30 | V |
| $I_{OUT}$ | Continuous Output Current | - | 35 | mA |
| $V_{OUT}$ | Output Voltage | -0.5 | 30 | V |
| B | Magnetic flux | - | 3000 | Gauss |
| $T_A$ | Operating Temperature Range | -40 | +125 | °C |
| $T_S$ | Storage Temperature Range | -50 | +150 | °C |

## Electrical Characteristics

At $T_A$=-40°C to 125°C, $V_{DD}$=3.0V to 26V (Unless otherwise specified)

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $V_{DD}$ | Supply voltage | | 3.0 | - | 26 | V |
| $I_{DD}$ | Supply current | $V_{DD}$=12V | - | 0.45 | 0.6 | mA |
| $V_{SON}$ | Output saturation voltage | $I_{OUT}$=25mA, $\|B\|>\|B_{OP}\|$ | - | - | 0.4 | V |
| $I_{OFF}$ | Output leakage current | $V_{OUT}$=26V, $\|B\|<\|B_{RP}\|$ | - | - | 1.0 | uA |
| Fsw | Maximum switching frequency | | 10 | - | - | KHz |
| $R_{TH}$ | SOT-23package thermal resistance | | - | 301 | - | °C/W |
| ESD | Electro-Static Discharge | HBM:AEC-Q100-002 | ±4000 | | | V |
| | | MM:AEC-Q100-003 | ±500 | | | V |

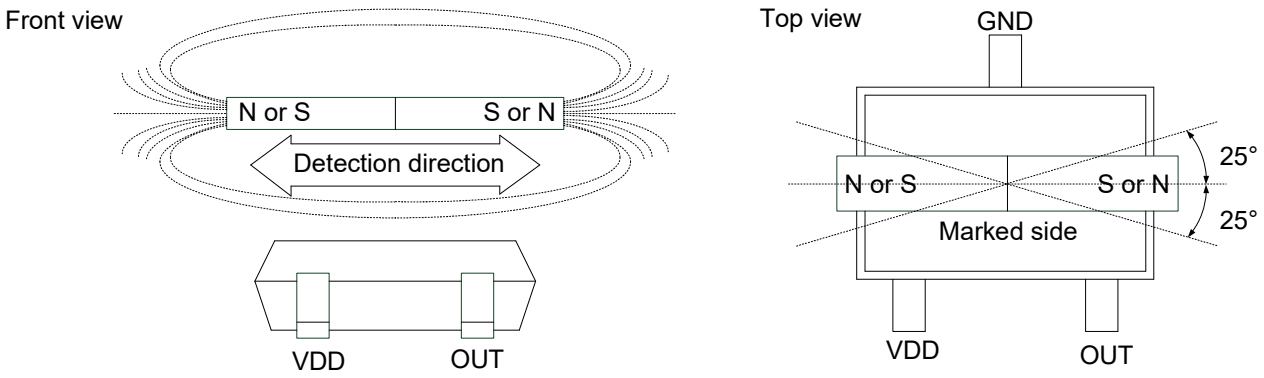
## Magnetic Characteristics

At $V_{DD}$=3.0V to 26V

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $B_{OP}$ | Magnetic operating point | At $T_A$=25°C | ±13 | ±22 | ±29 | Gauss |
| $B_{RP}$ | Magnetic release point | At $T_A$=25°C | ±10 | ±19 | ±26 | Gauss |
| $B_{HYST}$ | Hysteresis window | At $T_A$=25°C | 1 | 3 | 7 | Gauss |

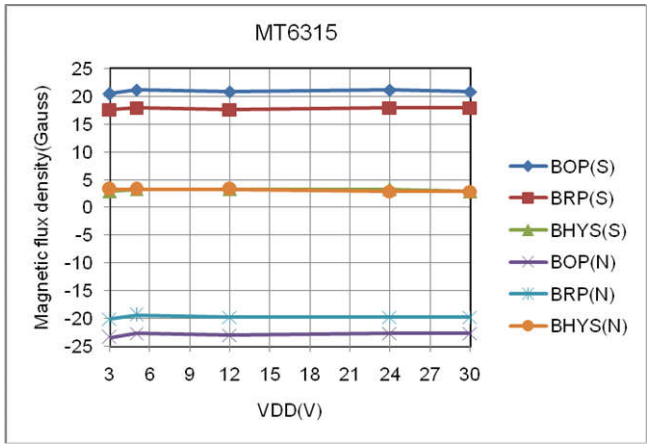

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## Drawing Illustrating Detectable Magnetic Field

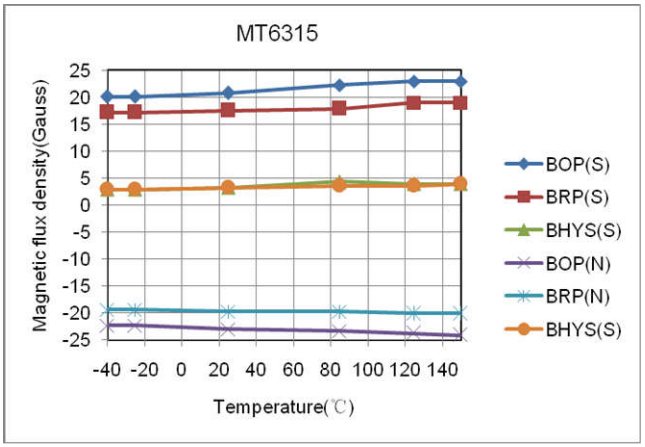



# Characteristic Performance

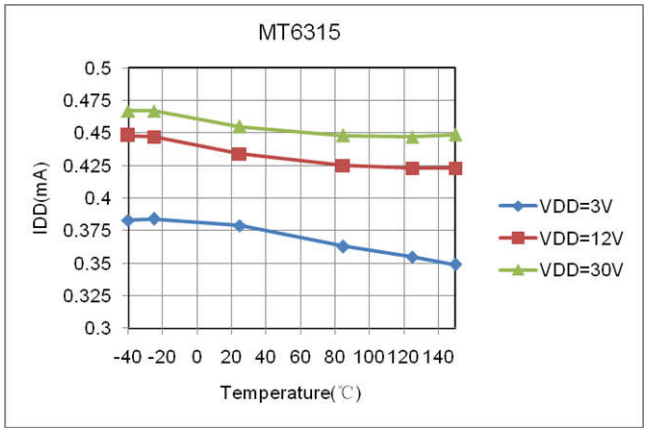
**Magnetic Characteristics versus Supply Voltage ($T_A$=25°C)**




**Magnetic Characteristics versus Temperature ($V_{DD}$=12V)**




**Average Supply Current versus Temperature**

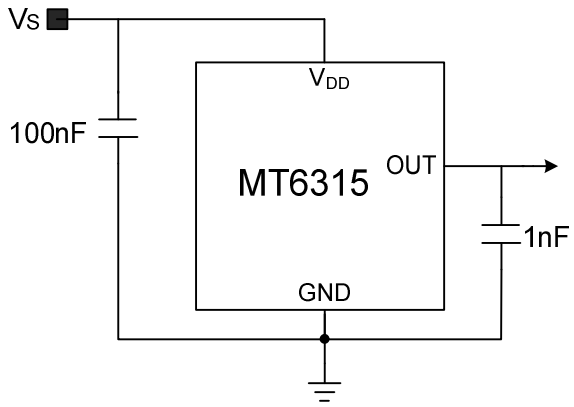




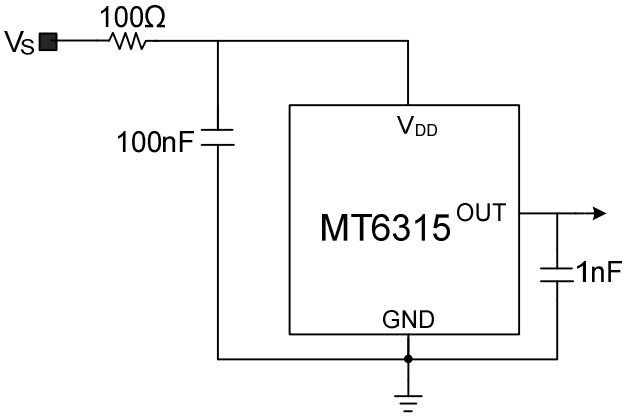
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# Application Information

## Application Circuit

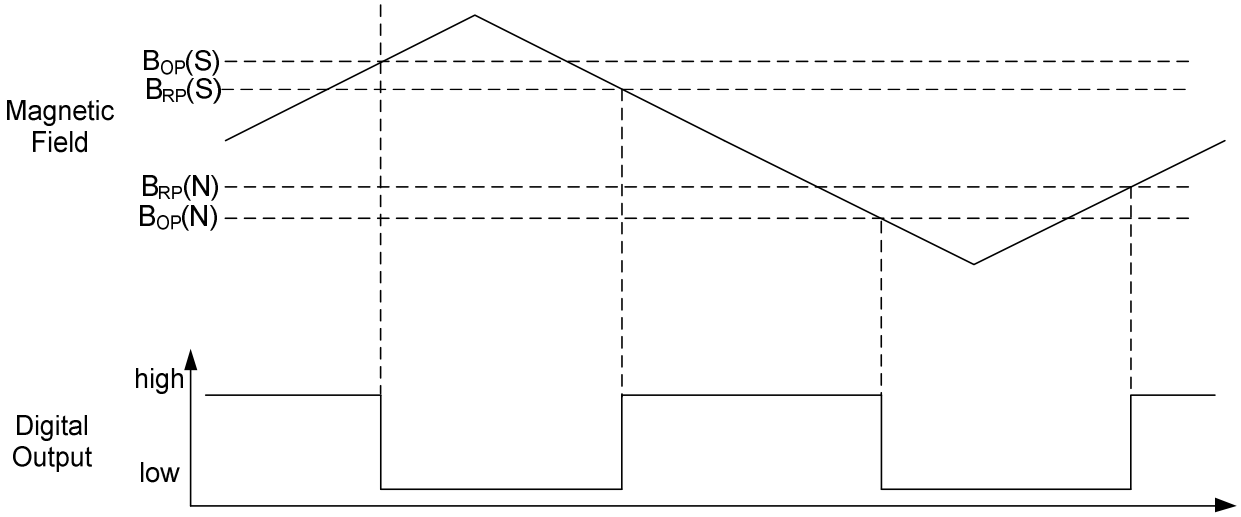



Typical application




High voltage (≥18V), noisy and harsh environment application

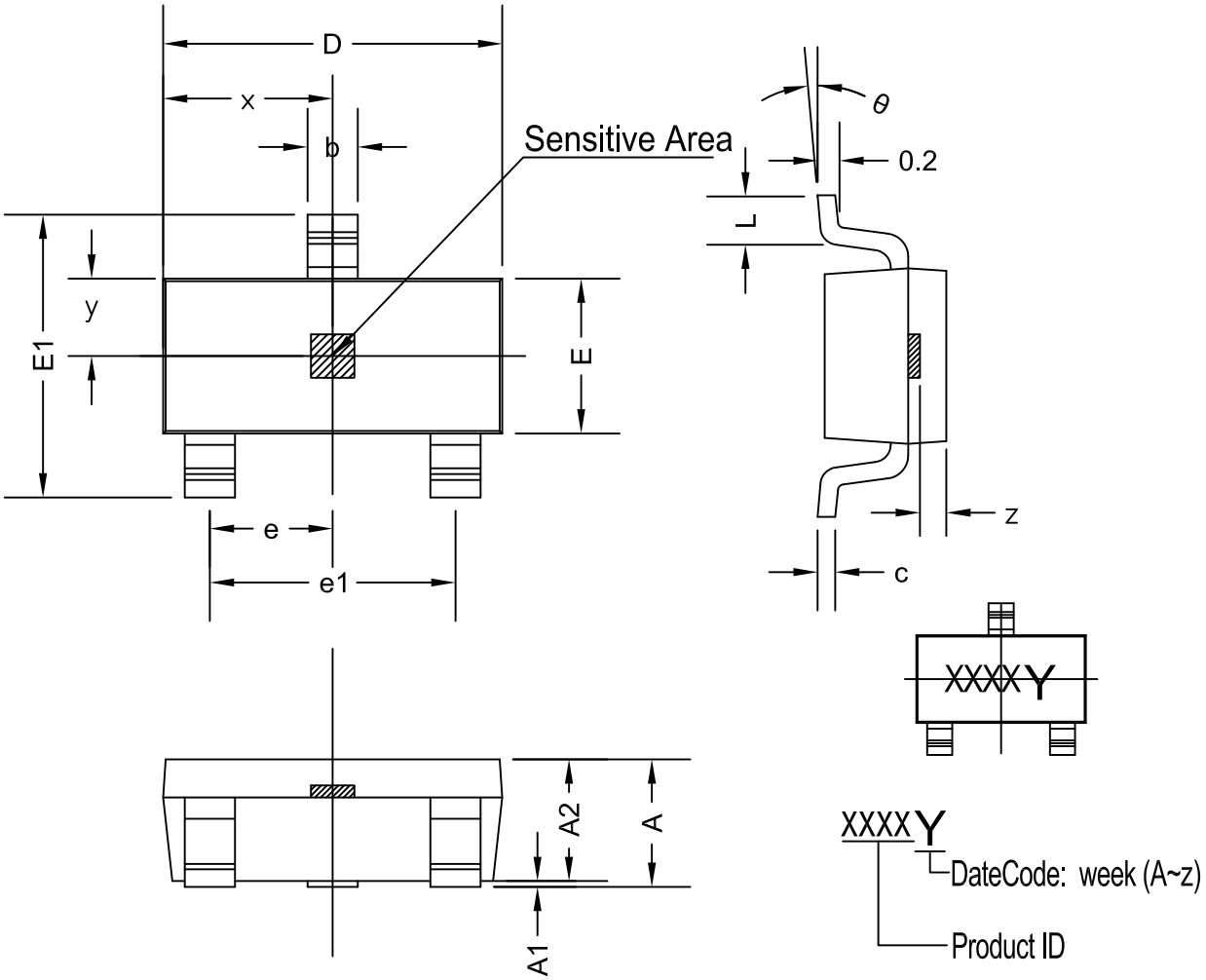
## Operating Waveform





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## PACKAGE DESIGNATOR
## (MT6315ET)SOT-23(thin outline)




| Symbol | Dimensions in Millimeters | | Dimensions in Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0. 080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550REF | | 0.022REF | |
| x | 1.460TYP | | 0.057TYP | |
| y | 0.650TYP | | 0.026 TYP | |
| z | 0.500TYP | | 0.020TYP | |
| θ | 0° | 8° | 0° | 8° |


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