

■ Features

- 3.5V to 20V DC operation voltage
- Temperature compensation
- Wide operating voltage range
- Open-Collector pre-driver
- 25mA maximum sinking output current.
- Reverse Polarity Protection

■ Applications

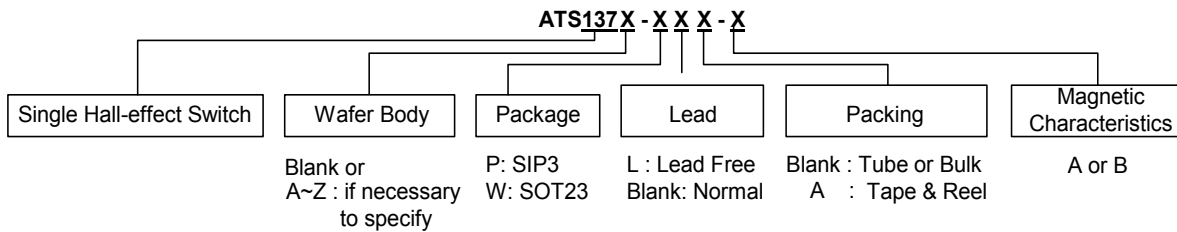
- VCD/DVD loader, CD/DVD ROM
- Cover detector
- Speed measurement
- Home appliances
- Home safety

■ General Description

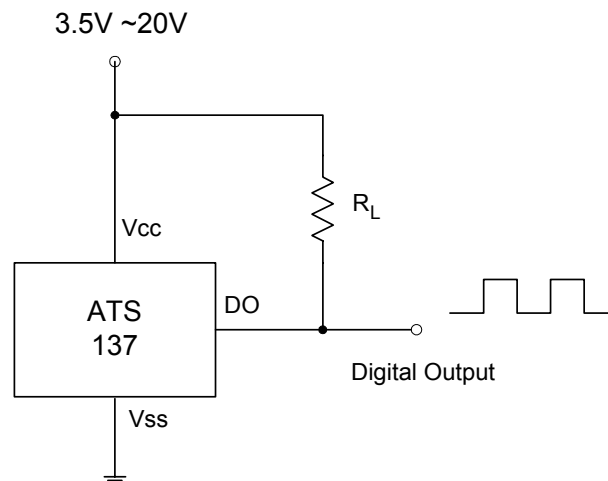
ATS137 is an switched Hall-Effect IC which is for contactless switching applications. The device includes an on-chip Hall voltage generator for magnetic sensing, an amplifier that amplifies the Hall voltage, a schmitt trigger to provide switching hysteresis for noise rejection, and an open-collector output. The bandgap regulator allows a wide operating voltage range.

ATS137 is rated for operating temperature range from -20°C to 85°C and voltage range from 3.5V to 20V.

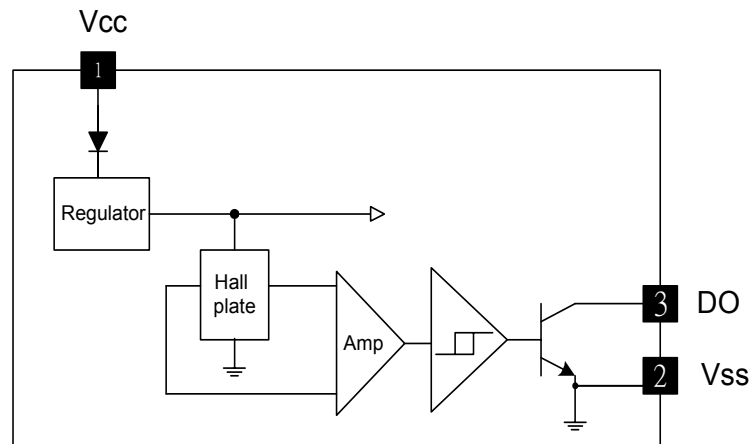
■ Ordering Information



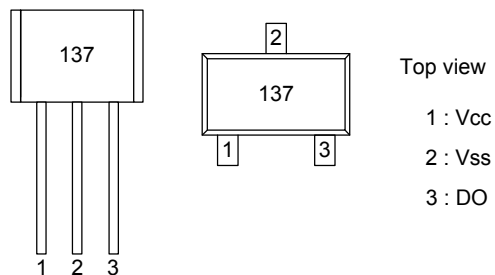
■ Typical Circuit



■ Functional Block Diagrams



■ Pin Descriptions



| Name | P/I/O | Pin # | Description |
|------|-------|-------|-----------------------|
| Vcc | P | 1 | Positive Power Supply |
| Vss | P | 2 | Ground |
| DO | O | 3 | Digital Output |

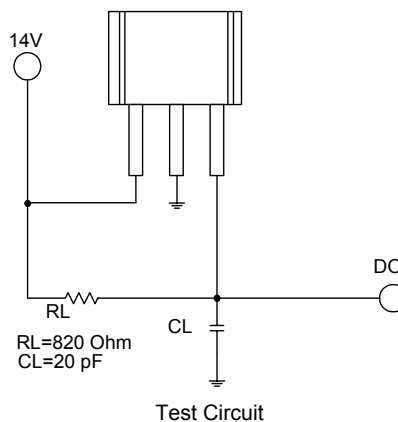
■ Absolute Maximum Ratings (at Ta=25°C)

| Characteristics | | Symbol | Values | Unit |
|------------------------------|------------|------------------|-----------|------|
| Supply voltage | | V _{CC} | 20 | V |
| Reverse Vcc Polarity Voltage | | V _{RCC} | -20 | V |
| Magnetic flux density | | B | Unlimited | |
| Output OFF Voltage | | V _{ce} | 30 | V |
| Output "on" current | Continuous | I _c | 25 | mA |
| Operating temperature | | T _a | -20~+85 | °C |
| Storage temperature | | T _s | -65~+150 | °C |
| Maximum Junction Temp. | | T _j | 175 | °C |
| Package Power Dissipation | SIP-3L | P _d | 400 | mW |
| | SOT23-3L | | 200 | mW |

■ Electrical Characteristics (Ta=+ 25°C)

| Characteristic | Symbol | Test Conditions | Min | Typ | Max | Units |
|---------------------------|----------------------|---|-----|------|-----|-------|
| Supply voltage | V _{cc} | — | 3.5 | - | 20 | V |
| Output saturation voltage | V _{ce(sat)} | V _{cc} =14V, I _c =20mA | - | 300 | 700 | mV |
| Output leakage current | I _{cex} | V _{ce} =14V, V _{cc} =14V | - | <0.1 | 10 | uA |
| Supply current | I _{cc} | V _{cc} =20V, Output Open | - | 5 | 10 | mA |
| Output rise time | t _r | V _{cc} =14V, R _L =820Ω, CL=20pF | - | 0.3 | 1.5 | us |
| Output falling time | t _f | V _{cc} =14V, R _L =820Ω, CL=20pF | - | 0.3 | 1.5 | us |

■ Test Circuit



■ Magnetic Characteristics (Ta=25°C)

(1mT=10Gauss)

A grade

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---------------|------------------|------|------|------|-------|
| Operate Point | B _{op} | - | - | 100 | Gauss |
| Release point | B _{rp} | 10 | - | - | Gauss |
| Hysteresis | B _{hys} | - | 80 | - | Gauss |

B grade

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---------------|------------------|------|------|------|-------|
| Operate Point | B _{op} | - | - | 130 | Gauss |
| Release point | B _{rp} | 10 | - | - | Gauss |
| Hysteresis | B _{hys} | - | 80 | - | Gauss |

■ Application Information

-Operating principle

ATS137 is a three pins Hall Effect switch IC which can turn magnetic flux variety to digital output signal. In other words, it is an interface from magnetic system to electrical one by Hall effect. The illustrations are shown in Fig.1.

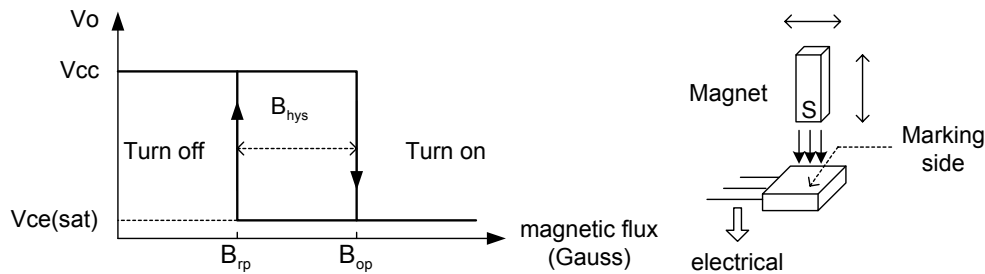


Fig.1 Hall-effect switch

Output driver is open-collector topology and maximum sink current (I_{sink}) is 25mA. The illustrated circuit is shown as Fig.2.

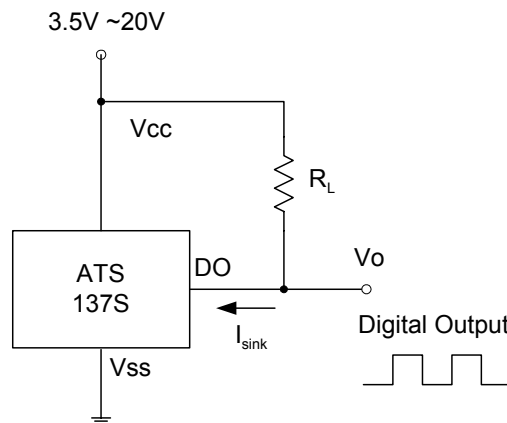


Fig.2 Application circuit

■ Application Information (Continued)

V_o will turn on (low) if the S magnetic flux larger than operation point (Bop), and turns off whenever the magnetic flux is removed and lower than release point (Brp). The related waveforms are shown in Fig.3.

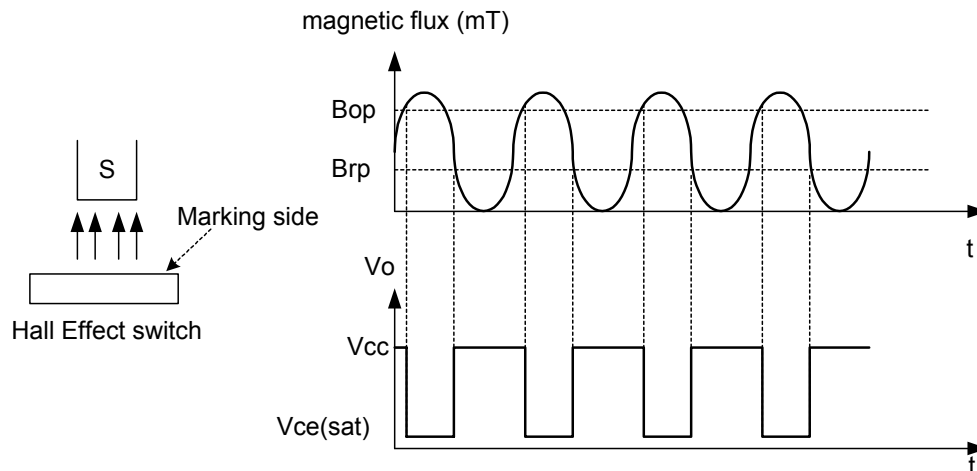


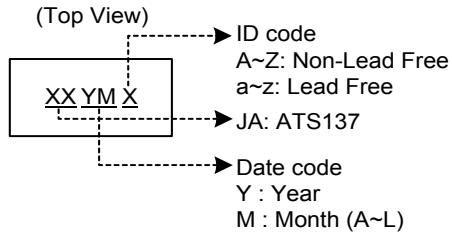
Fig.3 V_o and magnetic flux variety

The major applications are for contactless switching and shown as follows:

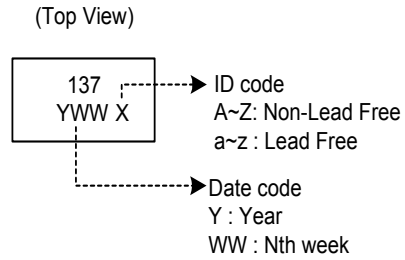
- VCD/DVD loader, CD/DVD ROM: Detect if the tray is opened or closed
- Cover detector (open/close): Cellular phone cover detector, Refrigerator door detector, Microwave oven door sensor... etc
- Home safety: instead of reed relay to detect the situation of door/window.
- Due to contactless and without mechanical contact point, its reliability and life cycle are much longer than reed relay. In addition, its switching speed is much faster than mechanical devices.

■ Marking Information

(1) SOT23

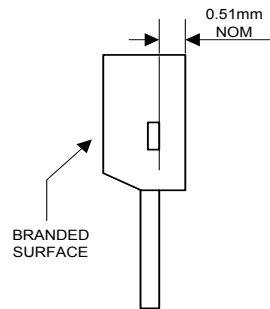


(2) SIP3

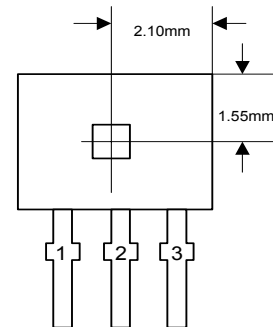


■ Package Information

(1) Package Type: SIP-3L

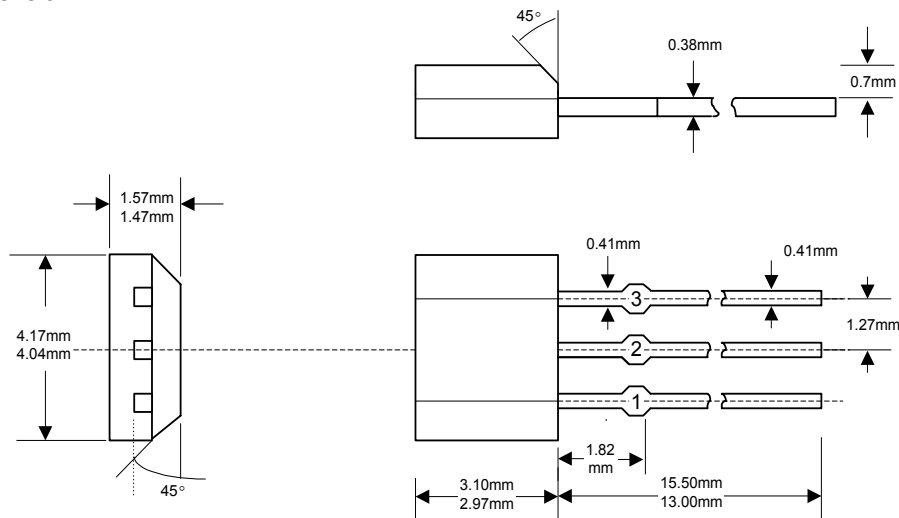


Active Area Depth



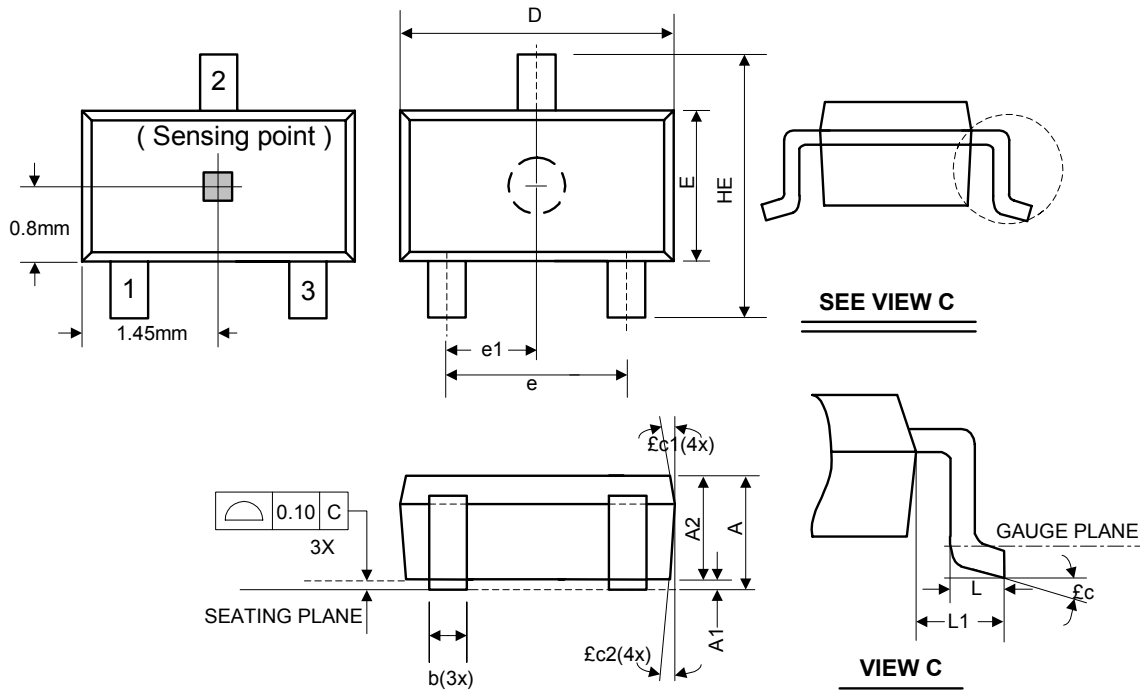
Sensor Location

Package Dimension



■ Package Information (Continued)

(2)Package Type: SOT23-3L



| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|--------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 1.05 | - | 1.35 | 0.041 | - | 0.053 |
| A1 | 0.05 | - | 0.15 | 0.002 | - | 0.006 |
| A2 | 1.00 | 1.10 | 1.20 | 0.039 | 0.043 | 0.047 |
| b | 0.25 | - | 0.50 | 0.010 | - | 0.020 |
| C | 0.08 | - | 0.20 | 0.003 | - | 0.008 |
| D | 2.70 | 2.90 | 3.00 | 0.106 | 0.114 | 0.118 |
| E | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| HE | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| L | 0.30 | - | 0.55 | 0.012 | - | 0.022 |
| L1 | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |
| e | 1.80 | 1.90 | 2.00 | 0.071 | 0.075 | 0.079 |
| e1 | 0.85 | 0.95 | 1.05 | 0.033 | 0.037 | 0.041 |
| θ | 0° | 5° | 10° | 0° | 5° | 10° |
| θ1 | 3° | 5° | 7° | 3° | 5° | 7° |
| θ2 | 6° | 8° | 10° | 6° | 8° | 10° |