



**THE DATASHEET OF  
ATS137-WG-7-B**



---

## 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
- Lead Free Package: SIP-3L and SC59-3L (Commonly known as SOT23 in Asia)
- SIP-3L and SC59-3L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish / RoHS Compliant (Note 1)

---

## General Description

---

ATS137 is a 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.

---

## Applications

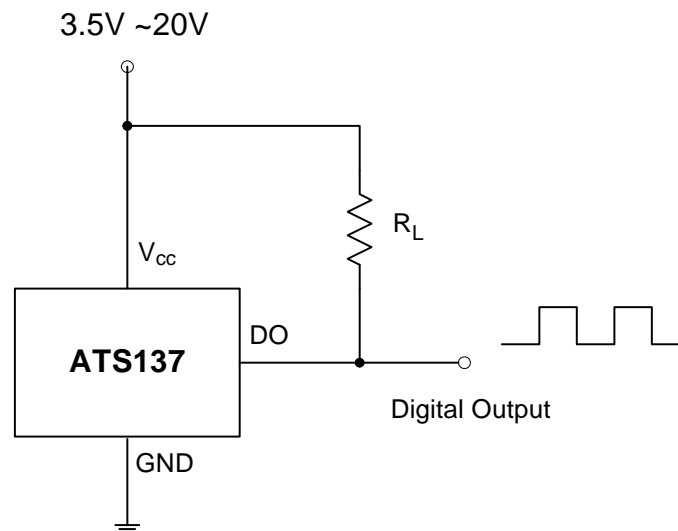
---

- VCD/DVD Loader, CD/DVD ROM
- Cover Detector
- Speed Measurement
- Home Appliances
- Home Safety

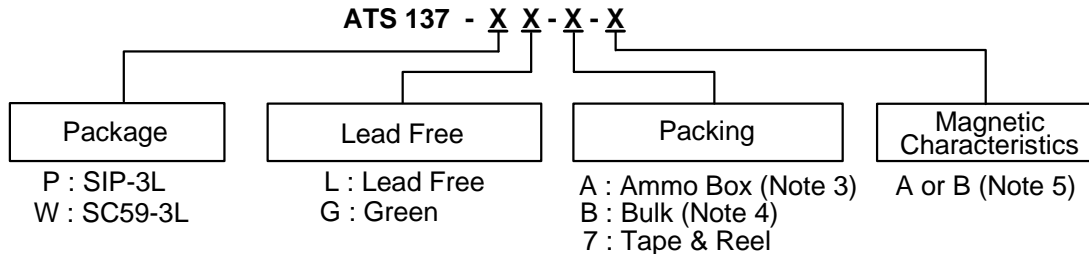
---

## Typical Application Circuit

---



### Ordering Information



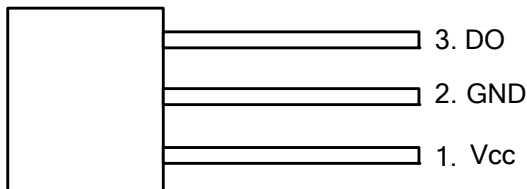
Device	Package Code	Packaging (Note 2)	Bulk		7" Tape and Reel		Ammo Box		Magnetic Characteristics (Note 5)
			Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix	
ATS137-PL-A-A	P	SIP-3L	NA	NA	NA	NA	4000/Box	-A	A
ATS137-PL-A-B	P	SIP-3L	NA	NA	NA	NA	4000/Box	-A	B
ATS137-PL-B-A	P	SIP-3L	1000	-B	NA	NA	NA	NA	A
ATS137-PL-B-B	P	SIP-3L	1000	-B	NA	NA	NA	NA	B
ATS137-PG-A-A	P	SIP-3L	NA	NA	NA	NA	4000/Box	-A	A
ATS137-PG-A-B	P	SIP-3L	NA	NA	NA	NA	4000/Box	-A	B
ATS137-PG-B-A	P	SIP-3L	1000	-B	NA	NA	NA	NA	A
ATS137-PG-B-B	P	SIP-3L	1000	-B	NA	NA	NA	NA	B
ATS137-WL-7-A	W	SC59-3L	NA	NA	3000/Tape & Reel	-7	NA	NA	A
ATS137-WG-7-A	W	SC59-3L	NA	NA	3000/Tape & Reel	-7	NA	NA	A

- Notes:
1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html)
  2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  3. Ammo Box is for SIP-3L Spread Lead.
  4. Bulk is for SIP-3L Straight Lead.
  5. Please refer the Magnetic Characteristics table, B is available in SIP-3L package only.

### Pin Assignment

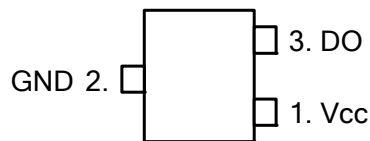
(1) SIP-3L

( Top View )



(2) SC59-3L

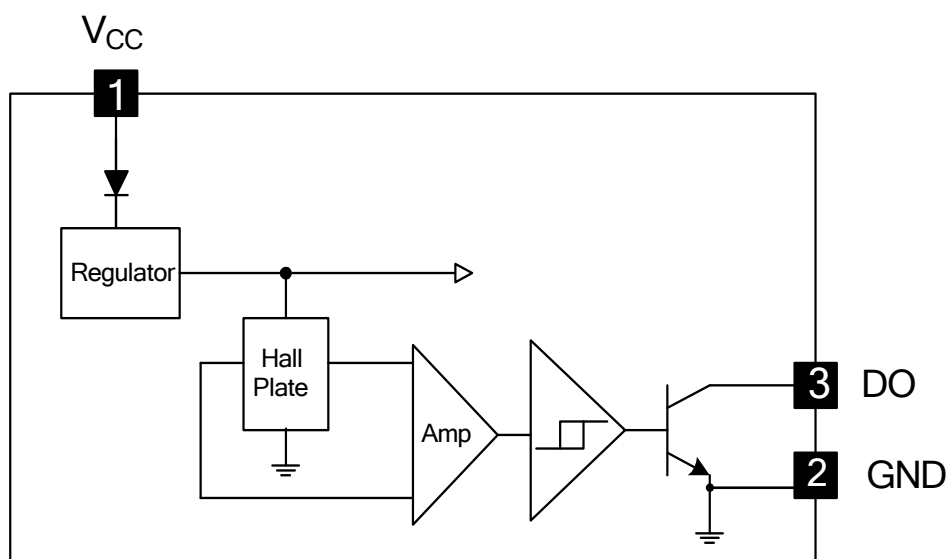
( Top View )



### Pin Descriptions

Pin Name	Pin #	Description
V <sub>CC</sub>	1	Positive Power Supply
GND	2	Ground
DO	3	Digital Output

### Functional Block Diagrams



### Absolute Maximum Ratings (T<sub>A</sub> = 25°C)

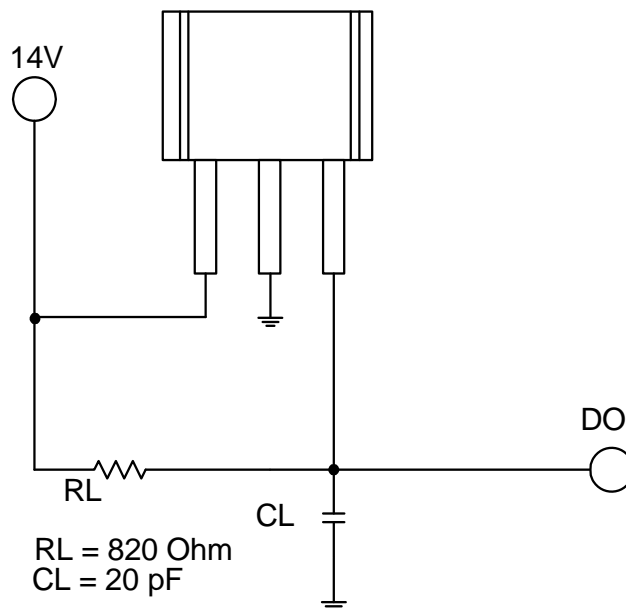
Symbol	Characteristics		Values	Unit
V <sub>CC</sub>	Supply Voltage		20	V
V <sub>RCC</sub>	Reverse V <sub>CC</sub> Polarity Voltage		-20	V
B	Magnetic Flux Density		Unlimited	
V <sub>ce</sub>	Output "OFF" Voltage		30	V
I <sub>C</sub>	Output "ON" Current	Continuous	25	mA
T <sub>ST</sub>	Storage Temperature		-65~+150	°C
T <sub>J(MAX)</sub>	Maximum Junction Temperature		150	°C
P <sub>D</sub>	Package Power Dissipation	SIP-3L	550	mW
		SC59-3L	230	mW

**Recommended Operating Conditions**

Symbol	Characteristic	Conditions	Min	Max	Unit
$V_{CC}$	Supply Voltage	Operating	3.5	20	V
$T_A$	Operating Ambient Temperature	Operating	-20	85	°C

**Electrical Characteristics** ( $T_A = +25^\circ\text{C}$ )

Symbol	Characteristic	Test Conditions	Min	Typ.	Max	Unit
$V_{ce(SAT)}$	Output Saturation Voltage	$V_{CC} = 14\text{V}, I_{CC} = 20\text{mA}$	-	300	700	mV
$I_{ceX}$	Output Leakage Current	$V_{ce} = 14\text{V}, V_{CC} = 14\text{V}$	-	<0.1	10	uA
$I_{CC}$	Supply Current	$V_{CC} = 20\text{V}, \text{Output Open}$	-	5	10	mA
$t_r$	Output Rise Time	$V_{CC} = 14\text{V}, R_L = 820\Omega,$ $CL = 20\text{pF}$	-	0.3	1.5	us
$t_f$	Output Falling Time	$V_{CC} = 14\text{V}, R_L = 820\Omega,$ $CL = 20\text{pF}$	-	0.3	1.5	us

**Test Circuit**

**Test Circuit**

**Magnetic Characteristics** ( $T_A = 25^\circ\text{C}$ , Note 7)

(1mT = 10 Gauss)

**A grade**

Symbol	Parameter	Min	Typ.	Max	Unit
Bops(south pole to brand side)	Operation Point	-	-	100	Gauss
Brps(south pole to brand side)	Release Point	10	-	-	Gauss
$B_{hy}( B_{opx} - B_{rpx} )$	Hysteresis	-	80	-	Gauss

**B grade (for SIP-3L only)**

Symbol	Parameter	Min	Typ.	Max	Unit
Bops(south pole to brand side)	Operation Point	-	-	130	Gauss
Brps(south pole to brand side)	Release Point	10	-	-	Gauss
$B_{hy}( B_{opx} - B_{rpx} )$	Hysteresis	-	80	-	Gauss

Notes: 7. Magnetic characteristics are for design information, which will vary with supply voltage, operating temperature and after soldering.

**Application Information**

Operating principle:

ATS137 is a three-pin 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 an electrical one by Hall effect. The illustrations are shown in Fig.1.

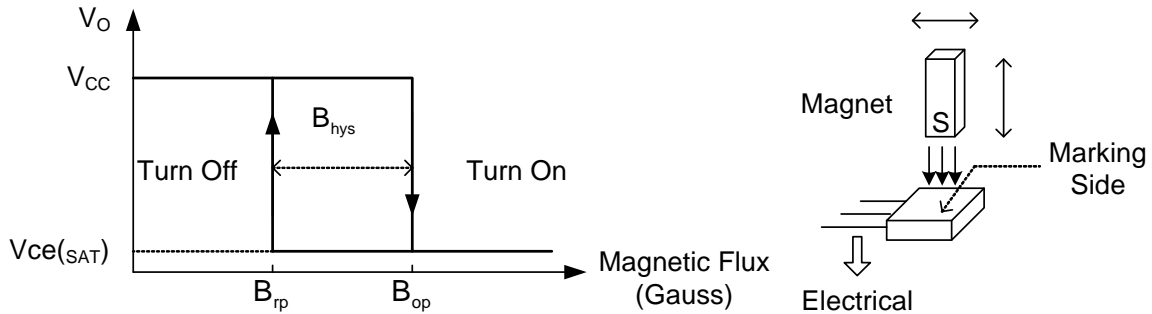


Fig.1 Hall-Effect Switch

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

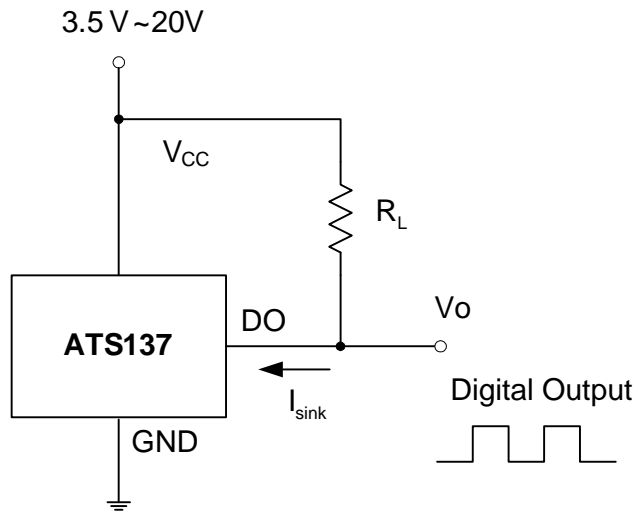


Fig.2 Application Circuit

**Application Information (Continued)**

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

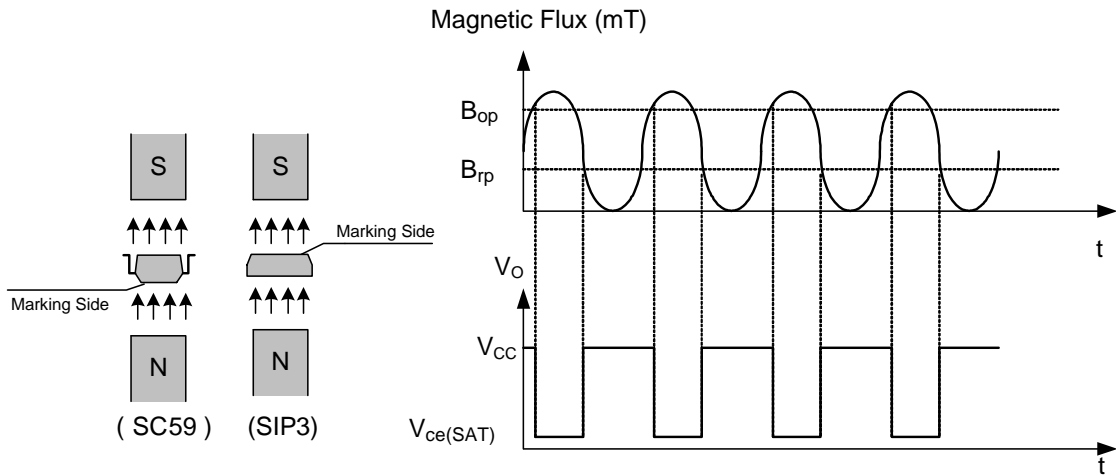


Fig.3  $V_o$  and Magnetic Flux Variety

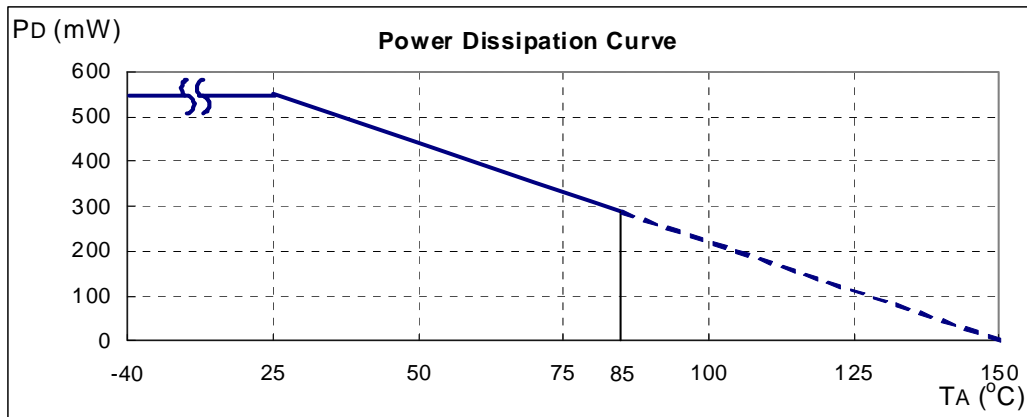
The major applications are for contactless switching and shown as follows:

- 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.

**Performance Characteristics**

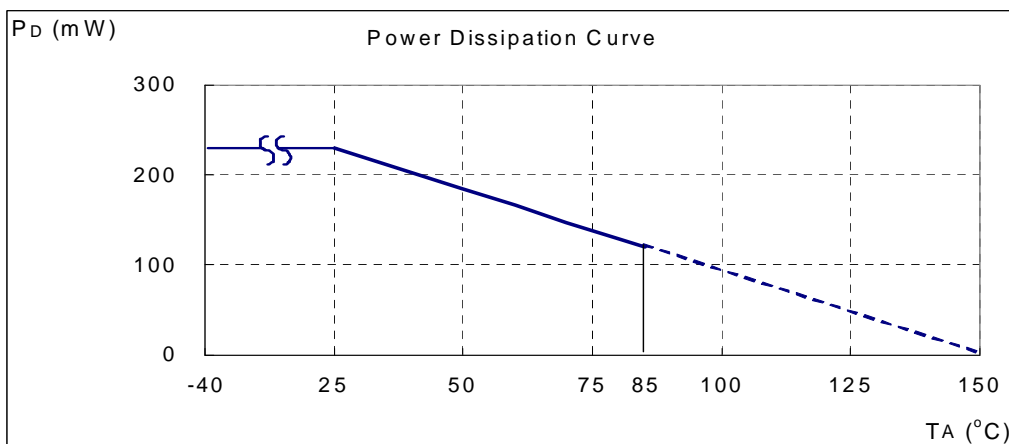
**(1) SIP-3L**

<b>T<sub>A</sub> (°C)</b>	<b>25</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>85</b>	<b>90</b>	<b>95</b>	<b>100</b>
P <sub>D</sub> (mW)	550	440	396	352	308	286	264	242	220
<b>T<sub>A</sub> (°C)</b>	<b>105</b>	<b>110</b>	<b>115</b>	<b>120</b>	<b>125</b>	<b>130</b>	<b>135</b>	<b>140</b>	<b>150</b>
P <sub>D</sub> (mW)	198	176	154	132	110	88	66	44	0



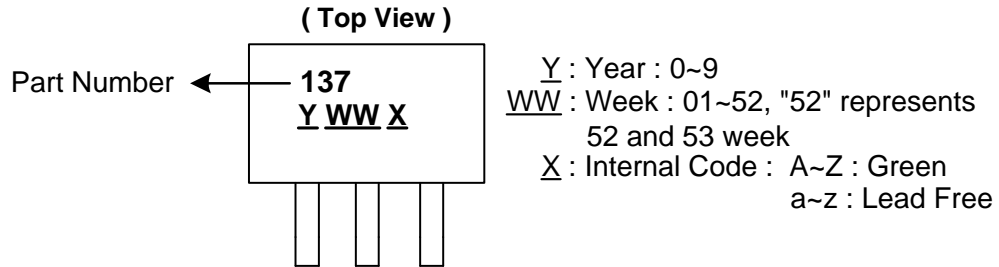
**(2) SC59-3L (commonly known as SOT23 in Asia)**

<b>T<sub>A</sub> (°C)</b>	<b>25</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>85</b>	<b>90</b>	<b>100</b>	<b>110</b>	<b>120</b>	<b>125</b>	<b>130</b>	<b>140</b>	<b>150</b>
P <sub>D</sub> (mW)	230	184	166	147	129	120	110	92	74	55	46	37	18	0

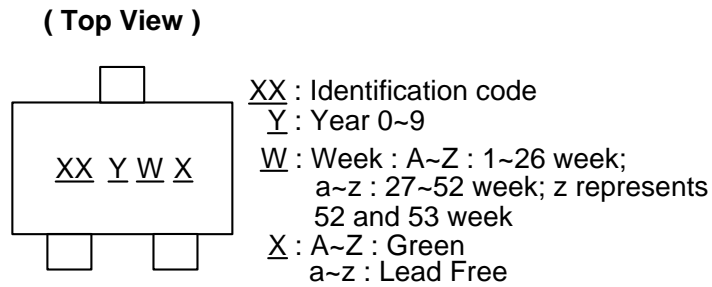


**Marking Information**

(1) SIP-3L



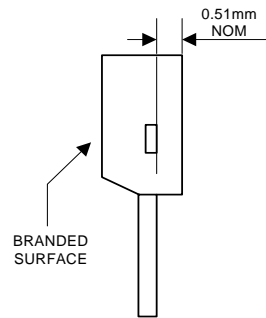
(2) SC59-3L (Commonly known as SOT23 in Asia)



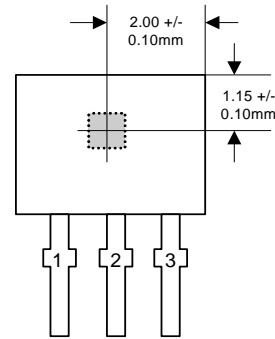
Part Number	Package	Identification Code
ATS137	SC59-3L	JA

**Package Information** (All Dimensions in mm)

(1) Package Type: SIP-3L for Bulk pack

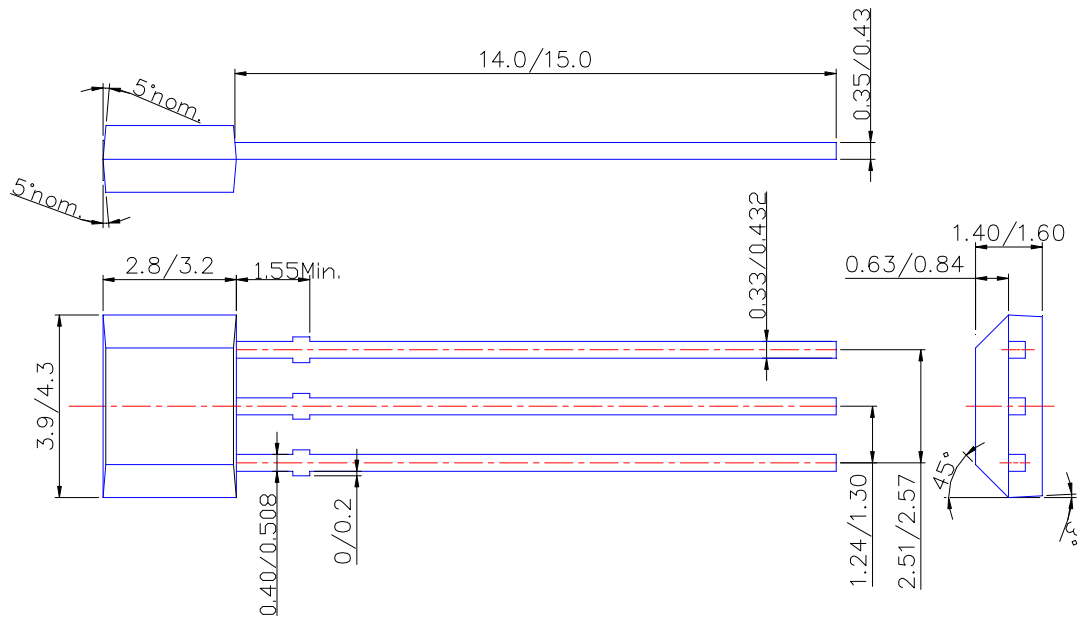


Active Area Depth



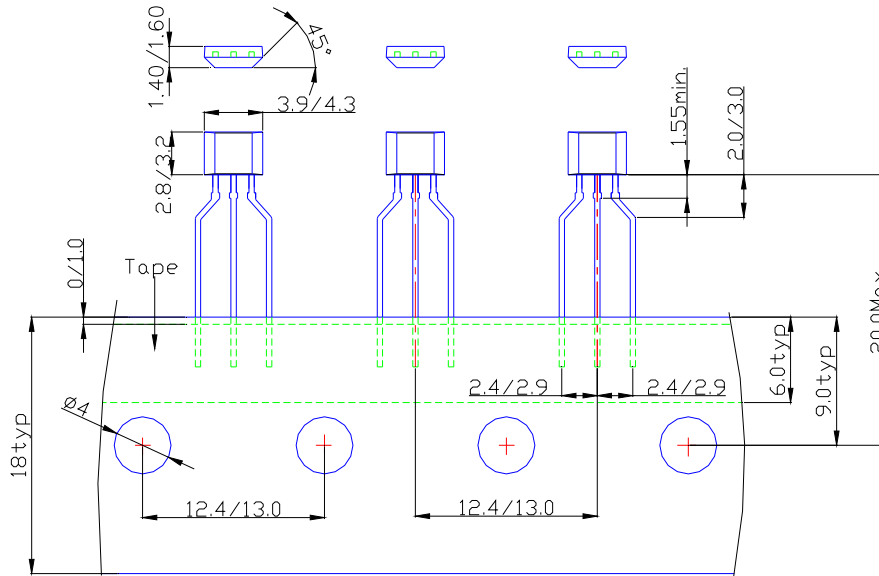
Sensor Location

**Package Dimension**

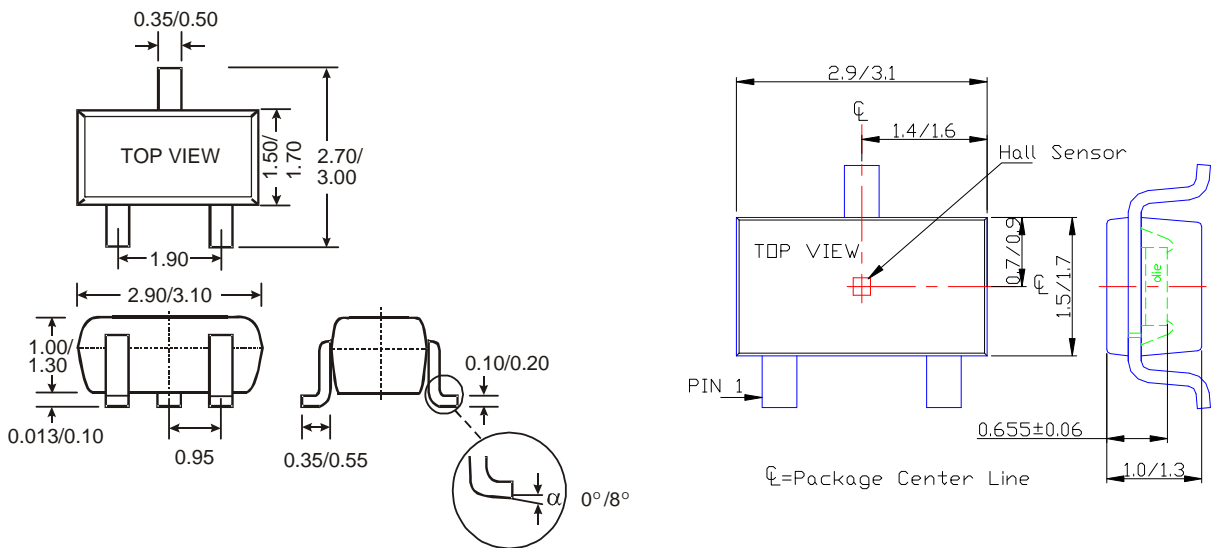


**Package Information (Continued)**

**(2) Package Type: SIP-3L for Ammo pack**



**(3) SC59-3L (Commonly known as SOT23 in Asia)**



**IMPORTANT NOTICE**

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

**LIFE SUPPORT**

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2010, Diodes Incorporated

[www.diodes.com](http://www.diodes.com)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View ATS137-WG-7-B on WIN SOURCE](#)
- ⊖ [Diodes Incorporated Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management