ATS137

SINGLE HALL EFFECT SWITCH

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 Finish/RoHS Compliant for Lead Free products (Note 1)
- Package: SIP-3L, SC59-3L
- Green Package: SC59-3L

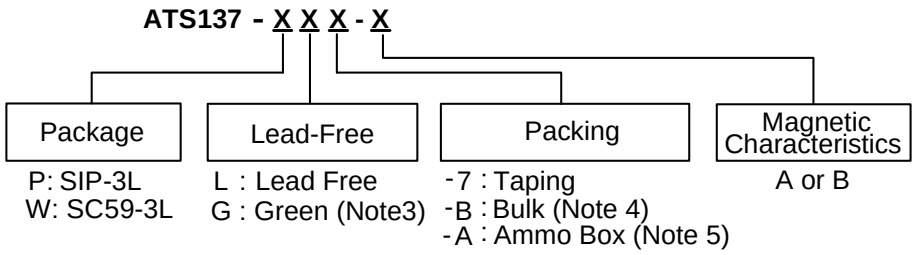
General Description

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

Ordering Information

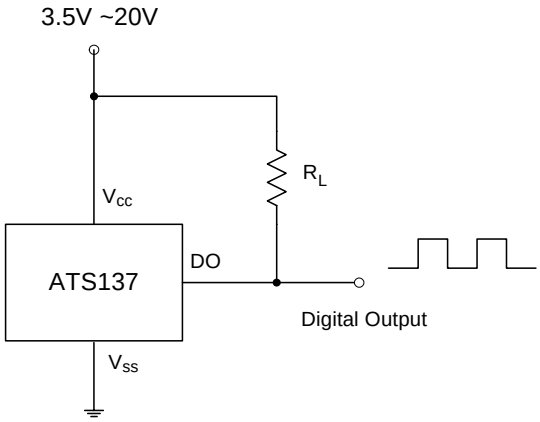


Note: 1. RoHS revision 13.2.2003. Glass and High Temperature Solder Exemptions Applied, see *EU Directive Annex Notes 5 and 7*.

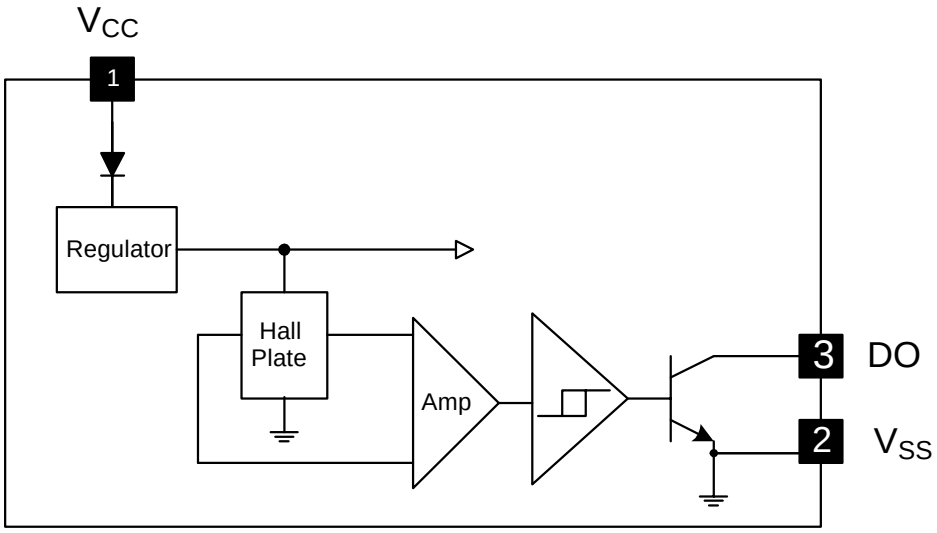
Device	Package Code	Packaging (Note 2)	Tube/Bulk		7" Tape and Reel		Ammo Box	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix
ATS137-P	P	SIP-3L	1000	-B	NA	NA	4000/Box	-A
ATS137-W	W	SC59-3L	NA	NA	3000/Tape & Reel	-7	NA	NA

Note: 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. Green is only available for SC59-3L
4. Bulk is for SIP-3 Straight Lead.
5. Ammo Box is for SIP-3 Spread Lead.

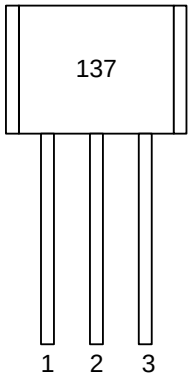
Typical Circuit



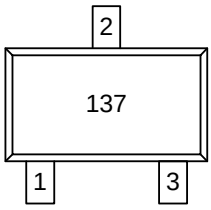
Functional Block Diagrams



Pin Descriptions



SIP-3L



SC59-3L

Top view

1 : Vcc

2 : Vss

3 : DO

Name	P/I/O	Pin #	Description
V_{CC}	P	1	Positive Power Supply
V_{SS}	P	2	Ground
DO	O	3	Digital Output

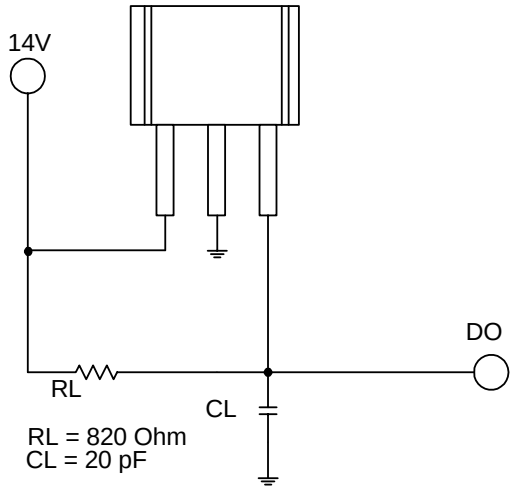
Absolute Maximum Ratings ($T_A = 25^oC$)

Characteristics		Symbol	Values	Unit
Supply Voltage		V_{CC}	20	V
Reverse V_{CC} 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 Temperature		T_j	150	°C
Package Power Dissipation	SIP-3L	P_D	550	mW
	SC59-3L		230	mW

Electrical Characteristics (T_A = + 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_{CC} = 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	tr	V_{CC} = 14V, RL = 820Ω, CL = 20pF	-	0.3	1.5	us
Output Falling Time	tf	V_{CC} = 14V, RL = 820Ω, CL = 20pF	-	0.3	1.5	us

Test Circuit



Test Circuit

Magnetic Characteristics (T_A = 25°C)

(1mT = 10 Gauss)

A grade

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operation Point	Bop	-	-	100	Gauss
Release Point	Brp	10	-	-	Gauss
Hysteresis	Bhys	-	80	-	Gauss

B grade (for SIP-3L only)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operation Point	Bop	-	-	130	Gauss
Release Point	Brp	10	-	-	Gauss
Hysteresis	Bhys	-	80	-	Gauss

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.

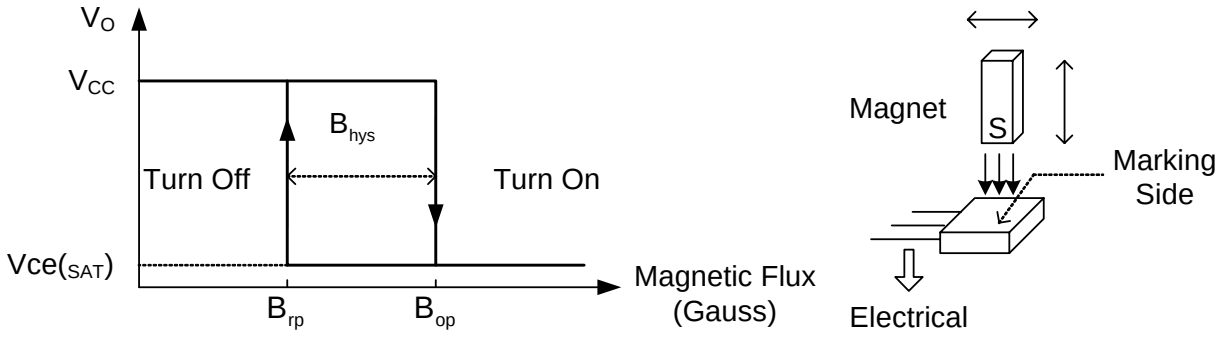


Fig.1 Hall-Effect Switch

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

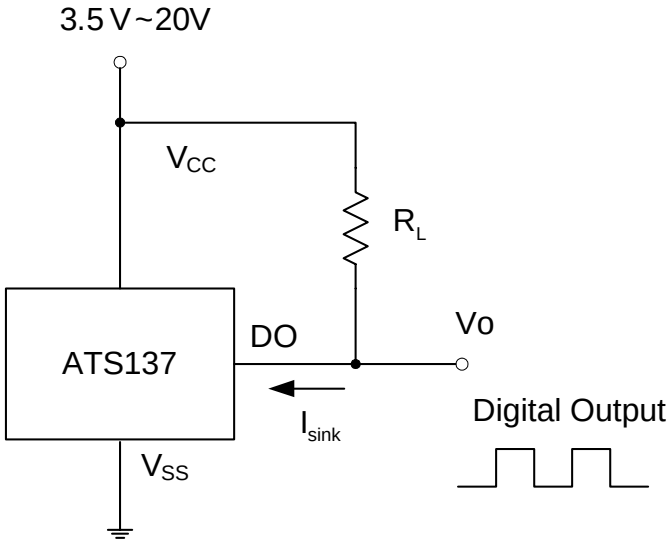


Fig.2 Application Circuit

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.

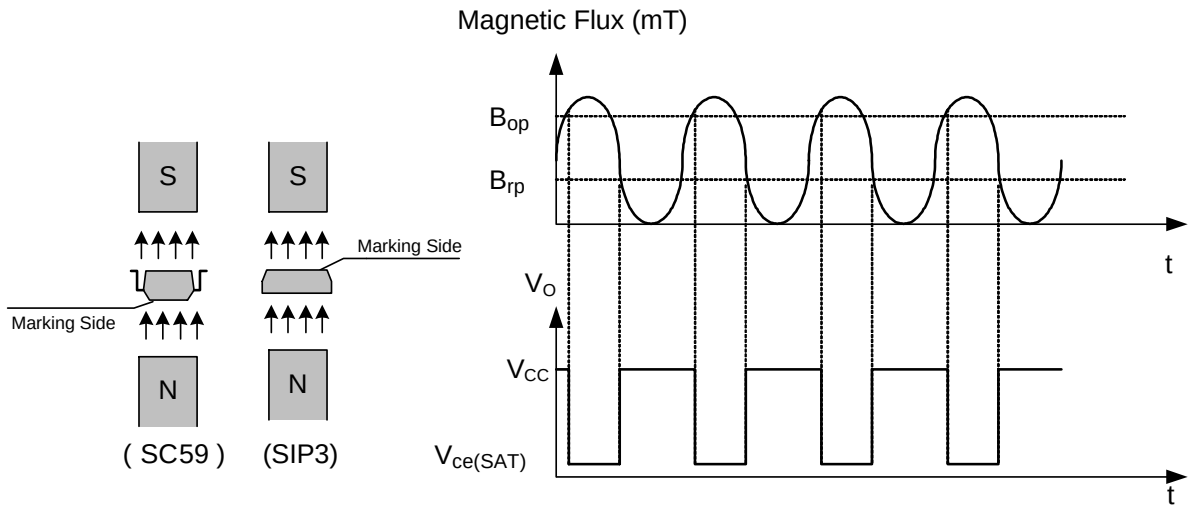


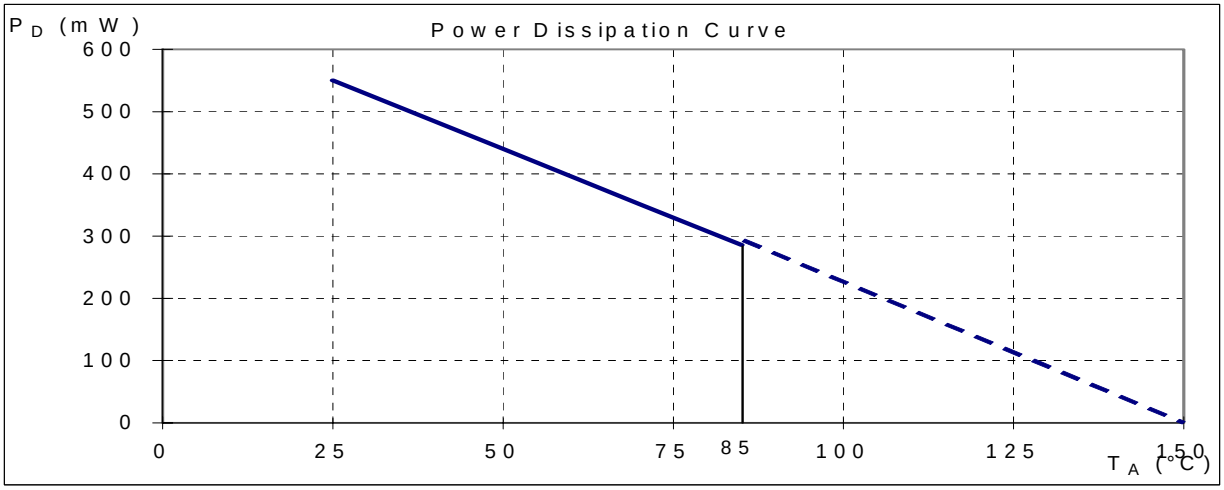
Fig.3 V_O and Magnetic Flux Variety

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.

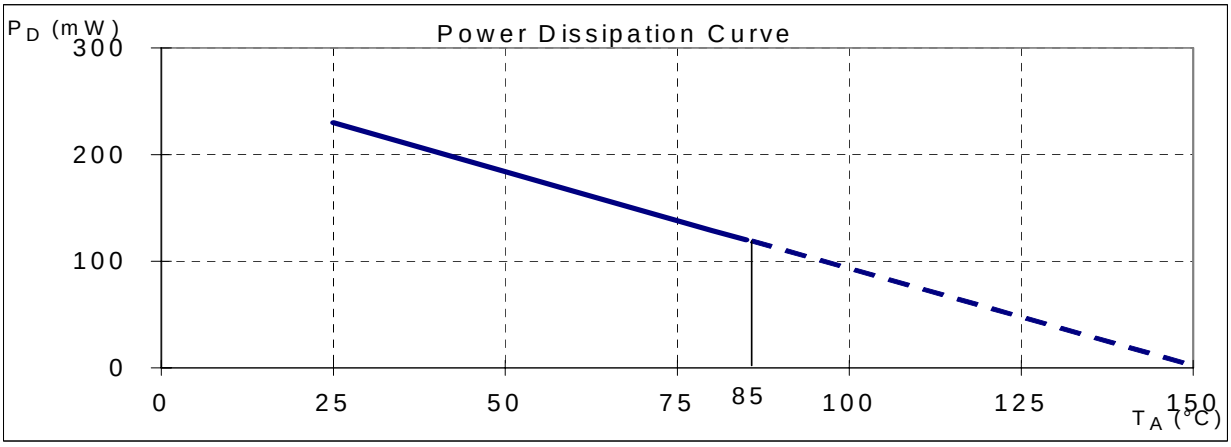
Performance Characteristics (SIP-3L)

T_A (°C)	25	50	60	70	80	85	90	95	100
P_D (mW)	550	440	396	352	308	286	264	242	220
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**150**
P_D (mW)	198	176	154	132	110	88	66	44	0



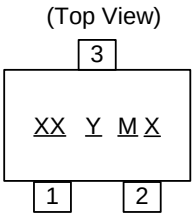
Performance Characteristics (SC59-3L)

T_a (°C)	25	50	60	70	80	85	90	100	110	120	125	130	140	150
P_d (mW)	230	184	166	147	129	120	110	92	74	55	46	37	18	0



Marking Information

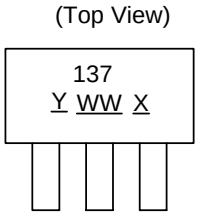
(1) SC59-3L



XX : JA: ATS137
Y : Year 0~9
M : Month A~L
X : Internal code a~z: Lead Free
A~Z: Green

Part Number	Package	Identification Code
ATS137	SC59-3L	JA

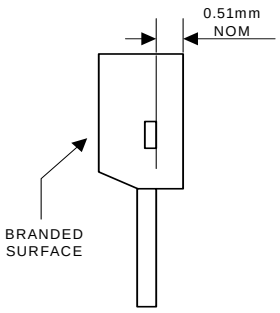
(2) SIP-3L



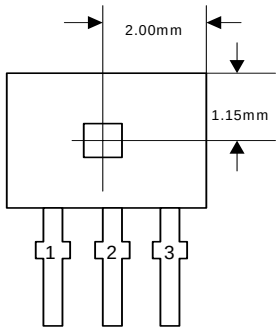
Y : Year 0~9
WW : Nth Week 01-52
X : Internal code
a~z: Lead Free

Package Information (unit: mm)

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



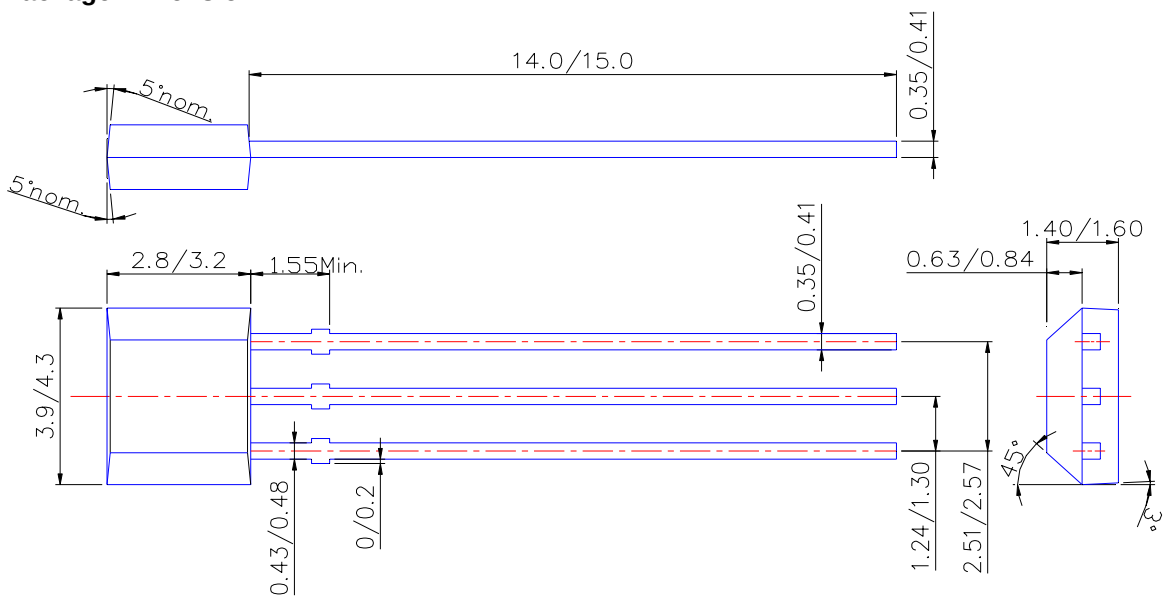
Active Area Depth



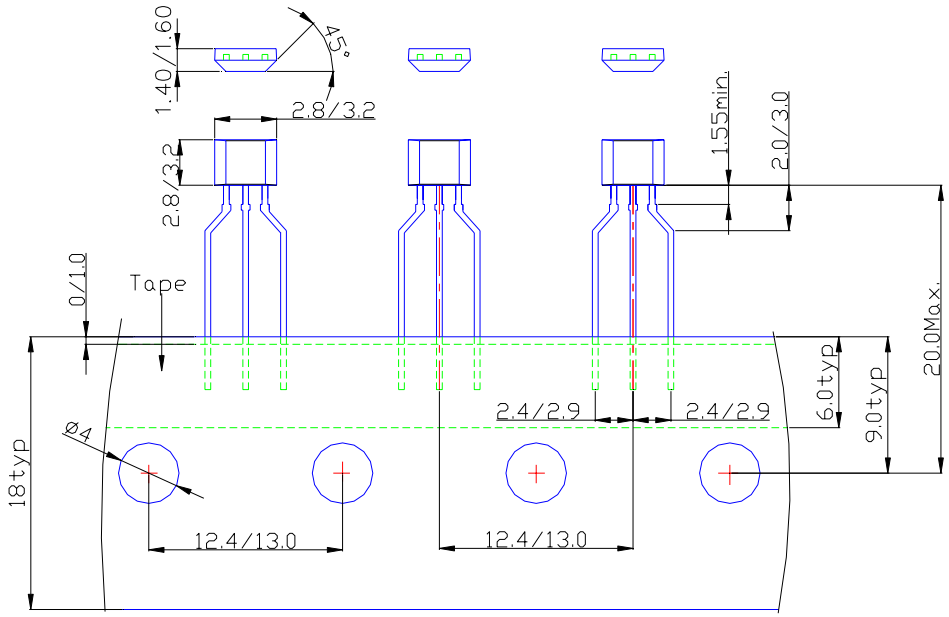
Sensor Location

Package Information (Continued)

Package Dimension

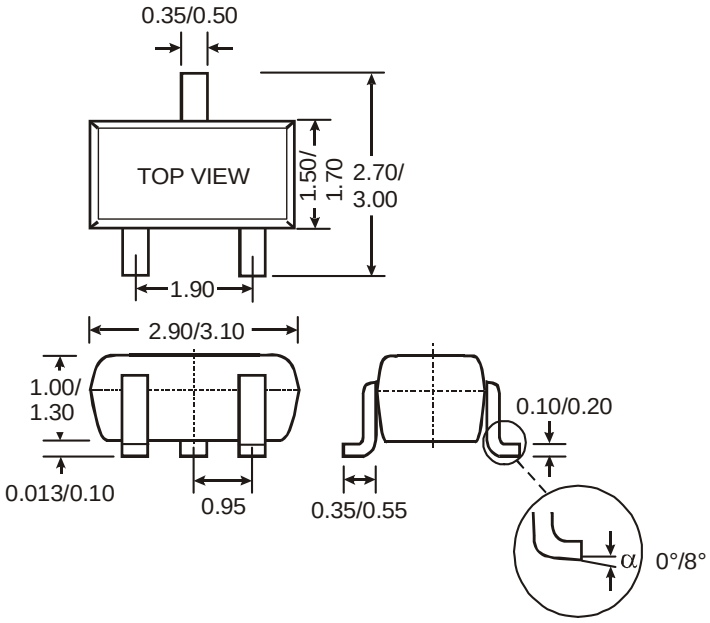


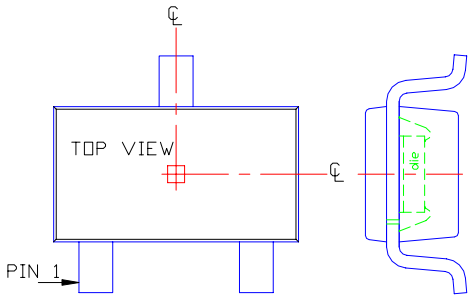
(2) Package Type: SIP-3L for Ammo pack



Package Information (Continued)

(3) Package Type: SC59-3L





Sensor Location