



**THE DATASHEET OF  
AH173-PL-A-B**



**INTERNAL PULL-UP HALL EFFECT LATCH FOR HIGH TEMPERATURE**

**Description**

AH173 is a single-digital-output Hall-Effect latch sensor with pull-up resistor for high temperature operation. The device includes an on-chip Hall voltage generator for magnetic sensing, an amplifier to amplify Hall voltage, a comparator to provide switching hysteresis for noise rejection, and an output driver with a pull-up resistor (R<sub>pu</sub>). An internal band-gap regulator provides a temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

When the magnetic flux density (**B**) is larger than operate point (**B<sub>op</sub>**), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below Br<sub>p</sub>. When **B** is less than Br<sub>p</sub>, the output is switched off.

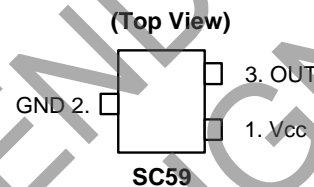
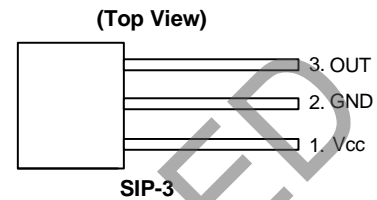
The AH173 is available in SIP-3 and SC59 packages.

**Features**

- Bipolar Hall-Effect Latch Sensor
- 3V to 20V DC Operating Voltage
- Built-in Pull-up Resistor
- 25mA Output Sink Current
- Operating Temperature: -40°C to +125°C
- SIP-3 and SC59 Packages (SC59 is Commonly Known as SOT23 in Asia)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

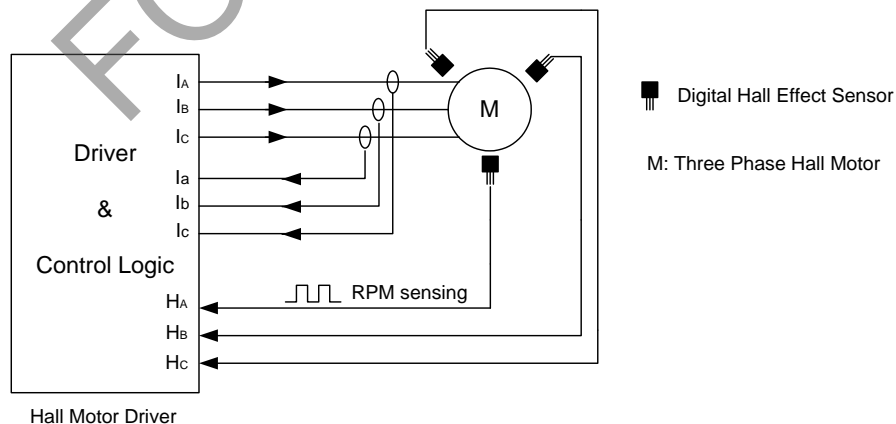
**Pin Assignments**



**Applications**

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection

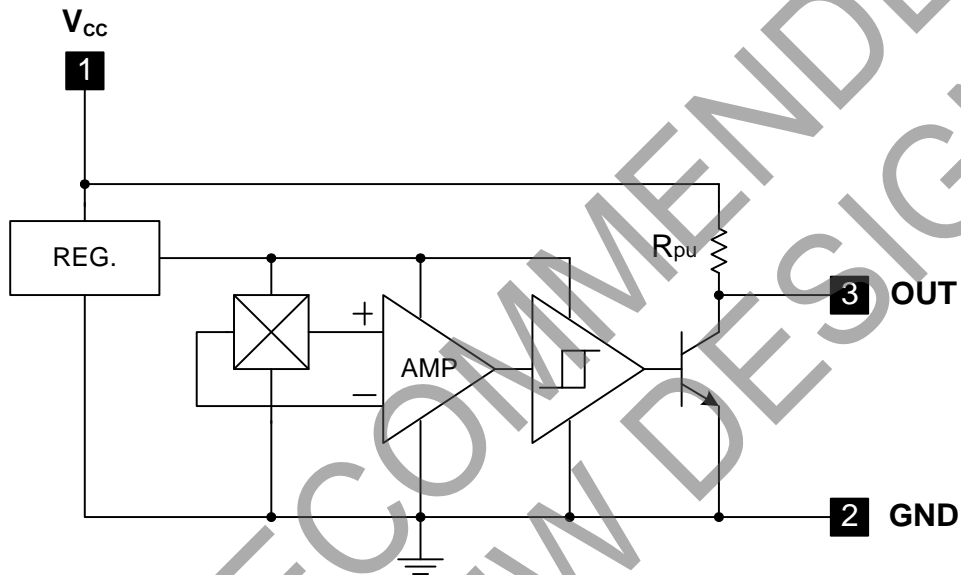
**Typical Applications Circuit**



### Pin Descriptions

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

### Functional Block Diagram



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

Symbol	Characteristics	Values	Unit	
V <sub>CC</sub>	Supply Voltage	20	V	
V <sub>OUT (Off)</sub>	Output "Off" Voltage	20	V	
I <sub>O (Sink)</sub>	Output "On" Current	25	mA	
T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C	
T <sub>J</sub>	Maximum Junction Temperature	+150	°C	
P <sub>D</sub>	Power Dissipation	SIP-3	550	mW
		SC59	230	mW

### Recommended Operating Conditions

Symbol	Characteristic	Conditions	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	Operating	3	20	V
T <sub>A</sub>	Operating Ambient Temperature	Operating	-40	+125	°C

### Electrical Characteristics (T<sub>A</sub> = +25°C)

Symbol	Characteristics	Conditions	Min	Typ	Max	Unit
V <sub>OUT (SAT)</sub>	Output Saturation Voltage	V <sub>CC</sub> = 12V, OUT "ON" I <sub>O</sub> = 10mA	-	300	400	mV
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = 12V, OUT "OFF"	-	3.5	6	mA
R <sub>pu</sub>	Internal Pull-up Resistor	-	7	10	13	KΩ
V <sub>d</sub>	Dropout Voltage	V <sub>d</sub> = V <sub>CC</sub> - V <sub>CE</sub>	-	-	0.3	V

### Magnetic Characteristics (T<sub>A</sub> = +25°C, V<sub>CC</sub> = 12V, unless otherwise specified, Note 4)

(1mT = 10 Gauss)

#### A Grade

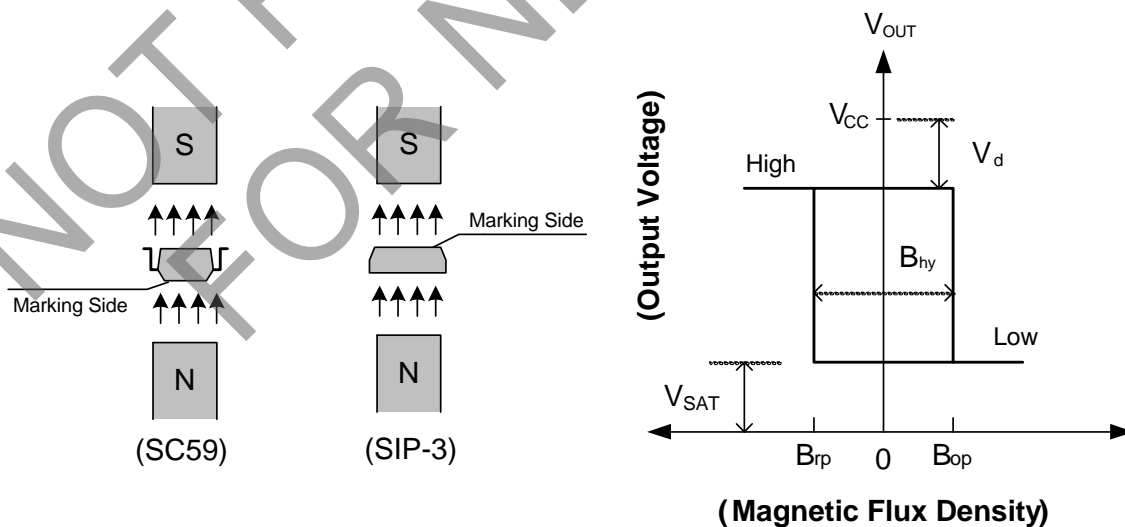
Symbol	Parameter	Min	Typ	Max	Unit
B <sub>ops</sub> (South Pole to Brand Side)	Operation Point	15	-	60	Gauss
B <sub>rps</sub> (South Pole to Brand Side)	Release Point	-60	-	-15	Gauss
B <sub>hy</sub> ( B <sub>opx</sub>  - B <sub>rpx</sub>  )	Hysteresis	-	80	-	Gauss

#### B Grade

Symbol	Parameter	Min	Typ	Max	Unit
B <sub>ops</sub> (South Pole to Brand Side)	Operation Point	5	-	80	Gauss
B <sub>rps</sub> (South Pole to Brand Side)	Release Point	-80	-	-5	Gauss
B <sub>hy</sub> ( B <sub>opx</sub>  - B <sub>rpx</sub>  )	Hysteresis	-	80	-	Gauss

Notes: 4. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

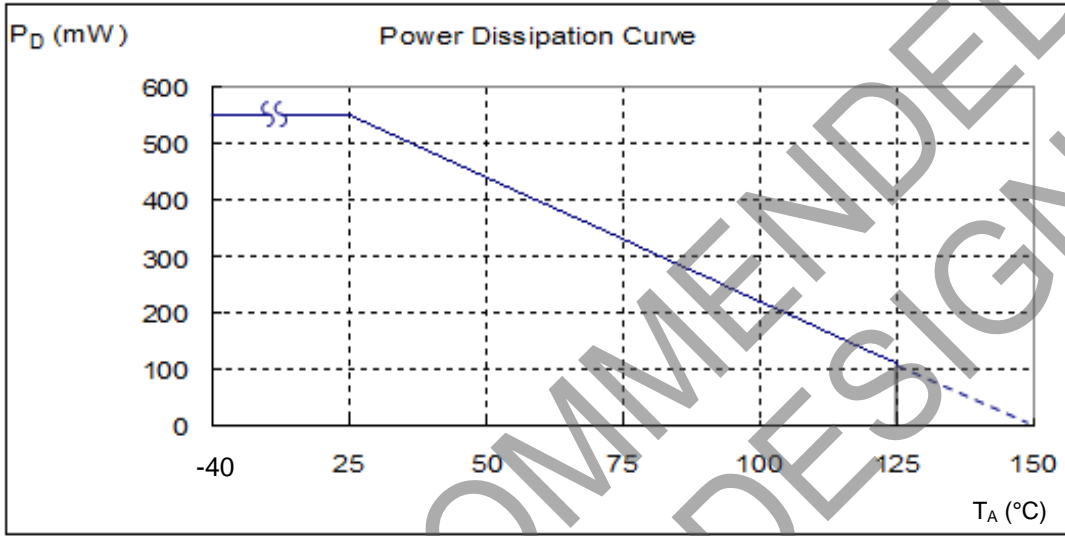
### Operating Characteristics



**Performance Characteristics**

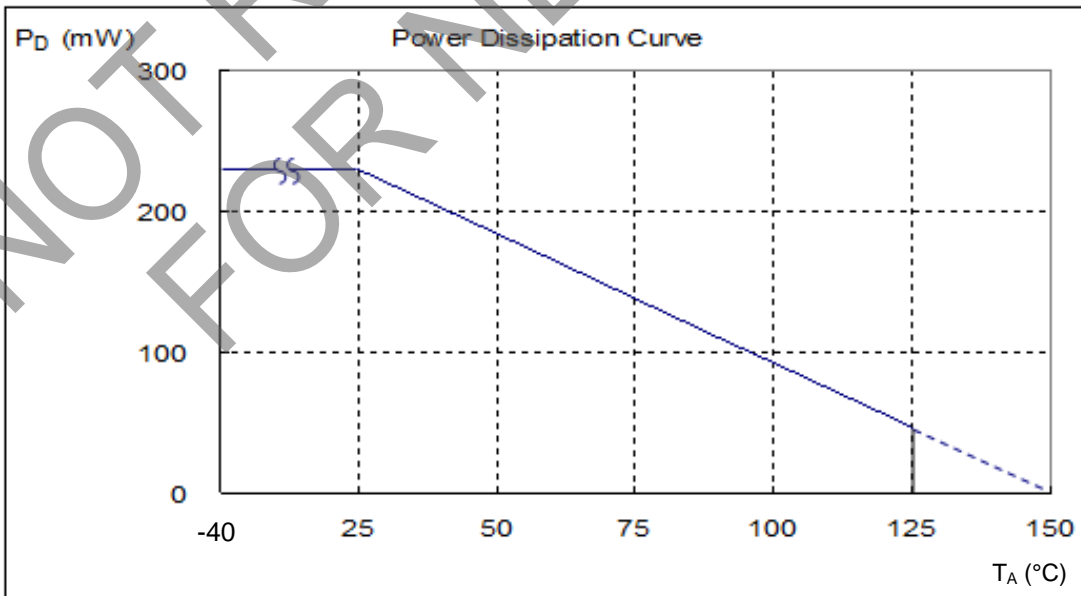
(1) SIP-3

$T_A$ (°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

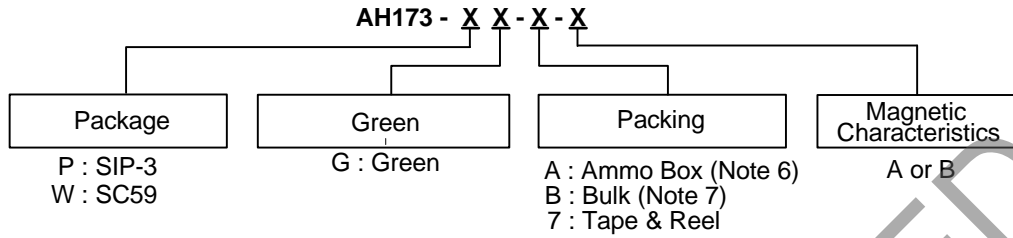


(2) SC59 (Commonly Known as SOT23 in Asia)

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



## Ordering Information



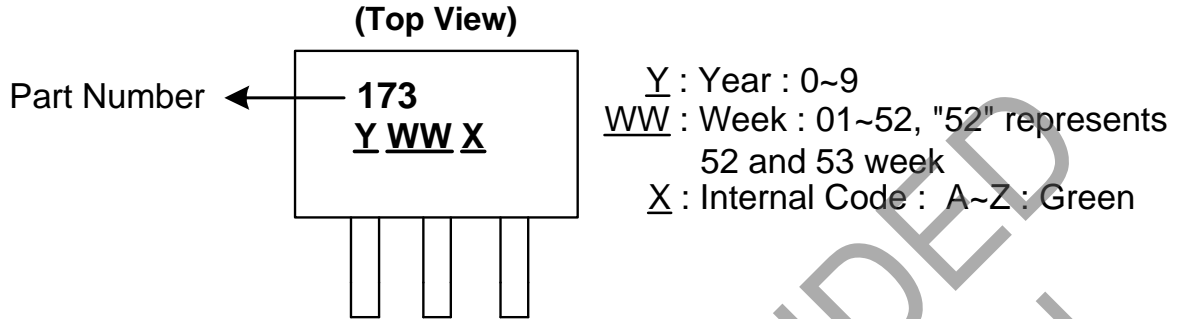
Part Number	Status (Note 8)	Package Code	Packaging (Note 5)	Bulk		7" Tape and Reel		Ammo Box	
				Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH173-PG-A-A	NRND	P	SIP-3	NA	NA	NA	NA	4000/Box	-A
AH173-PG-A-B	NRND	P	SIP-3	NA	NA	NA	NA	4000/Box	-A
AH173-PG-B-A	NRND	P	SIP-3	1000	-B	NA	NA	NA	NA
AH173-PG-B-B	NRND	P	SIP-3	1000	-B	NA	NA	NA	NA
AH173-WG-7-A	NRND	W	SC59	NA	NA	3000/Tape & Reel	-7	NA	NA
AH173-WG-7-B	NRND	W	SC59	NA	NA	3000/Tape & Reel	-7	NA	NA

- Notes:
- 5. Pad layout as shown on Diodes Incorporated's suggested pad layout document, which can be found on our website at <http://www.diodes.com/package-outlines.html>.
  - 6. Ammo Box is for SIP-3 Spread Lead.
  - 7. Bulk is for SIP-3 Straight Lead.
  - 8: NRND = Not Recommended for New Design

NOT RECOMMENDED FOR NEW DESIGN

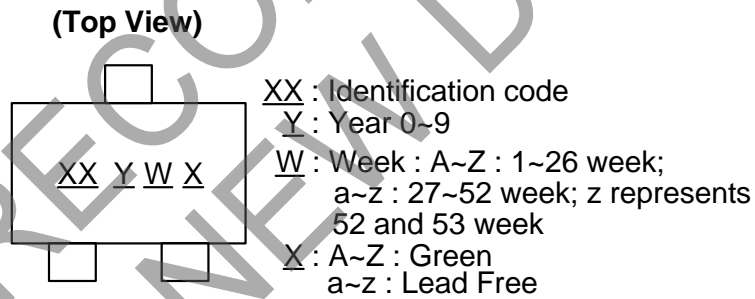
**Marking Information**

(1) Package Type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)



Part Number	Package	Identification Code
AH173	SIP-3 (Ammo Pack)	173
AH173	SIP-3 (Bulk Pack)	173

(2) Package Type: SC59 (Commonly Known as SOT23 in Asia)

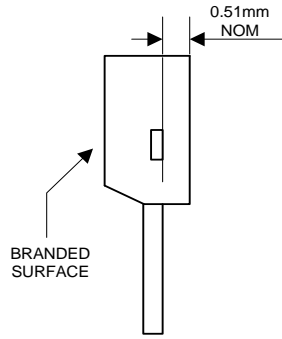


Part Number	Package	Identification Code
AH173	SC59	J3

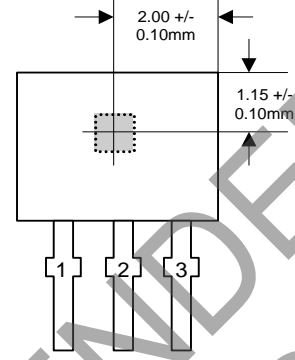
**Package Outline Dimensions** (All Dimensions in mm)

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**(1) Package Type: SIP-3 (Bulk Pack)**

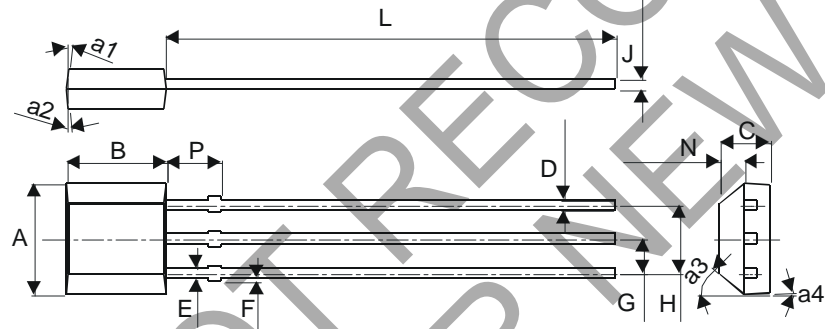


Active Area Depth



Sensor Location

**Package Dimension**

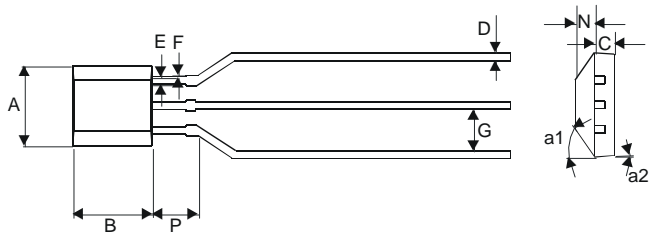


SIP-3 (Bulk Pack)		
Dim	Min	Max
A	3.9	4.3
a1	5° Typ	
a2	5° Typ	
a3	45° Typ	
a4	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.33	0.432
E	0.40	0.508
F	0	0.2
G	1.24	1.30
H	2.51	2.57
J	0.35	0.43
L	14.0	15.0
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

**Package Outline Dimensions** (Continued)

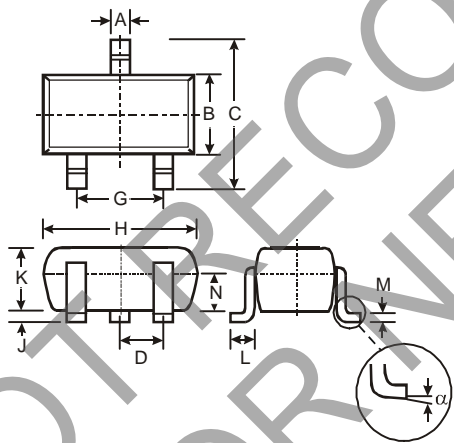
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**(2) Package Type: SIP-3 (Ammo Pack)**

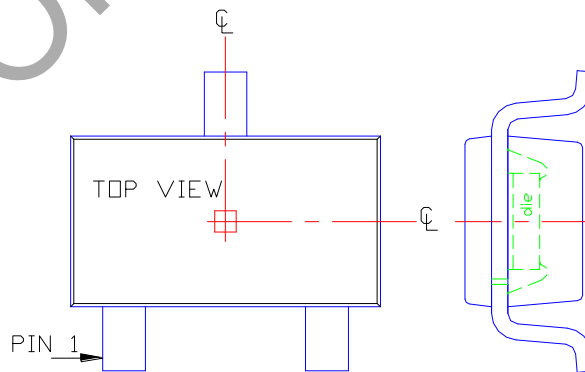


SIP-3 (Ammo Pack)		
Dim	Min	Max
A	3.9	4.3
a1	45° Typ	
a2	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.35	0.41
E	0.43	0.48
F	0	0.2
G	2.4	2.9
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

**(3) SC59 (Commonly Known as SOT23 in Asia)**



SC59			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

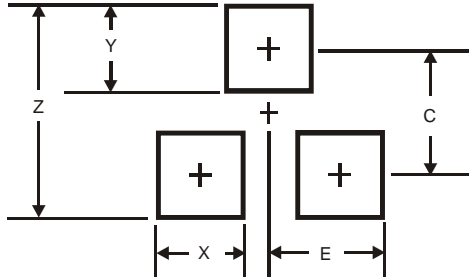


CL = Package Center Line

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### (1) Package Type: SC59 (Commonly Known as SOT23 in Asia)



Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

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