

Description

The AH374 is an integrated Hall-Effect latched sensor designed for electronic commutation of brush-less DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and open-drain output. 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_{OP}), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below B_{RP}. When B is less than B_{RP}, the output is switched off.

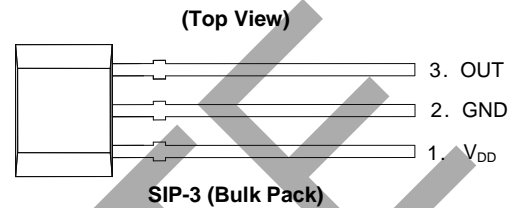
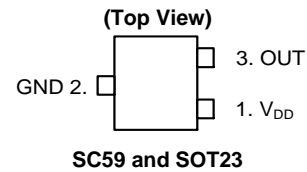
The AH374 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 and SOT23 packages.

Features

- Bipolar Hall Effect Latch Operation
- 2.2V to 20V Operating Range
- Open-Drain Pre-Driver
- 25mA Output Sink Capability
- -40°C to +125°C Operating Temperature
- Industry Standard SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 and SOT23 Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](#) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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.

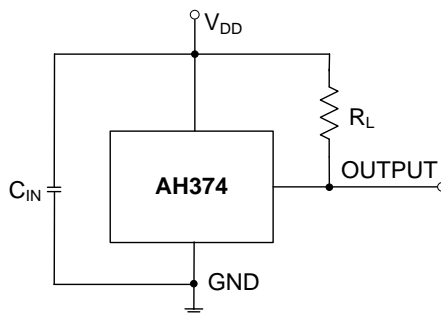
Pin Assignments



Applications

- Brush-less DC motors
- Brush-less DC fans
- Revolution counting
- Speed measurements

Typical Application Circuits



Typical AH374 Circuit

Note: 4. C_{IN} is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF to 100nF. R_L is the pullup resistor, the recommended resistance is 10kΩ to 100kΩ.

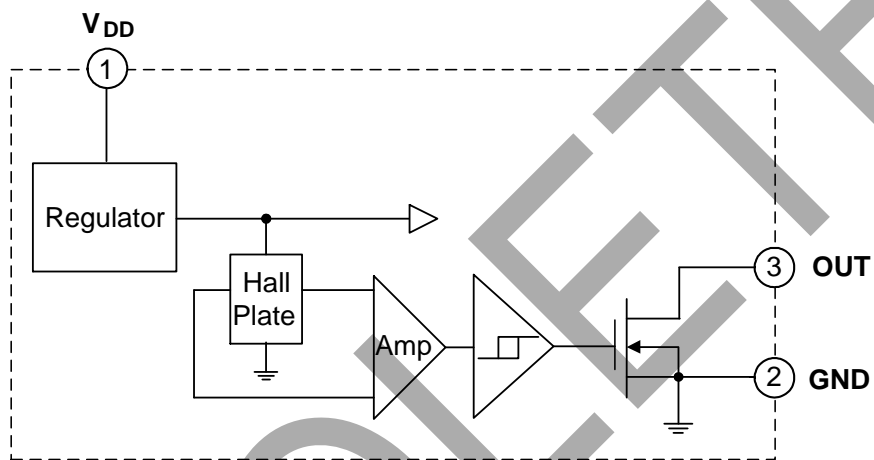
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Pin Descriptions

Packages: SC59, SOT23, SIP-3 (Ammo Pack) and SIP-3 (Bulk Pack)

Pin Number	Pin Name	Function
1	V _{DD}	Power Supply Input
2	GND	Ground
3	OUT	Output

Functional Block Diagram



Absolute Maximum Ratings (Note 5) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Characteristic	Value	Unit	
V_{DD}	Supply Voltage (Note 6)	28	V	
V_{OUT} (Off)	Output “Off” Voltage	28	V	
I_O (Sink)	Output “On” Current (Sink)	25	mA	
B	Magnetic Flux Density	Unlimited		
P_D	Package Power Dissipation	SIP-3 (Ammo Pack)	550	mW
		SIP-3 (Bulk Pack)		
		SC59 and SOT23	230	mW
T_S	Storage Temperature Range	-65 to +150	$^\circ\text{C}$	
T_J	Maximum Junction Temperature	+150	$^\circ\text{C}$	

- Notes:
- Stresses greater than those listed under *Absolute Maximum Ratings* can cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods can affect device reliability.
 - The absolute maximum V_{DD} of 28V is a transient stress rating and is not meant as a functional operating condition. It is not recommended to operate the device at the absolute maximum rated conditions for any period of time.

Recommended Operating Conditions (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Characteristic	Condition	Rating	Unit
V_{DD}	Supply Voltage (Note 7)	Operating	2.2 to 20	V
T_A	Operating Temperature Range	Operating	-40 to +125	$^\circ\text{C}$

- Note: 7. The output of IC will be switched after the supply voltage is over 2.2V, but the magnetic characteristics will not be normal until the supply is over 2.5V.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, $V_{DD} = 12\text{V}$, unless otherwise specified.)

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
V_{OUT}	Output On Voltage	$I_{OUT} = 20\text{mA}$	—	300	400	mV
I_{DD}	Supply Current	$B < B_{RP}$	—	2	4	mA
I_{OFF}	Output Leakage Current	Output Off	—	< 0.1	10	μA

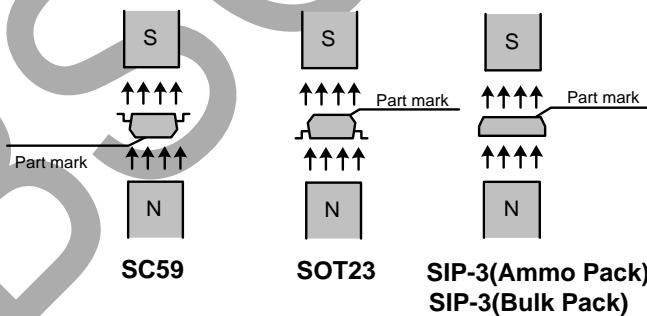
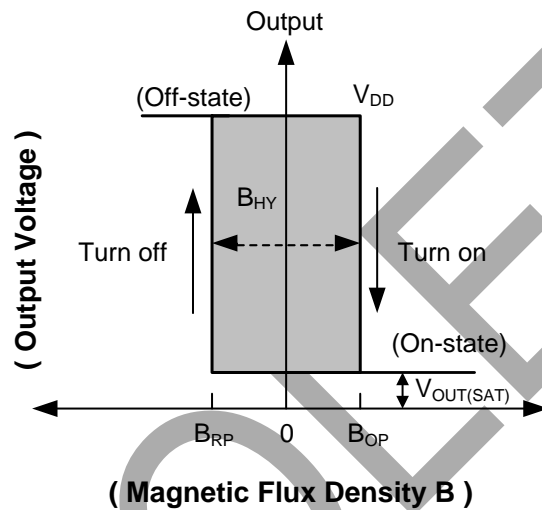
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Magnetic Characteristics (Note 8) (@ $T_A = +25^\circ\text{C}$, $V_{DD} = 2.5\text{V}$ to 20V , unless otherwise specified.)

(1mT = 10 Gauss)

Symbol	Characteristic	Min	Typ	Max	Unit
B_{OP} (South pole to part marking side for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SOT23 package; South pole to the non-part marking side for SC59 package. See diagram below)	Operation Point	5	30	60	Gauss
B_{RP} (North pole to part marking side for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SOT23 package; North pole to the non-part marking side for SC59 package. See diagram below)	Release Point	-60	-30	-5	
B_{HY} ($ B_{OPX} - B_{RPX} $)	Hysteresis	—	60	—	

Note: 8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

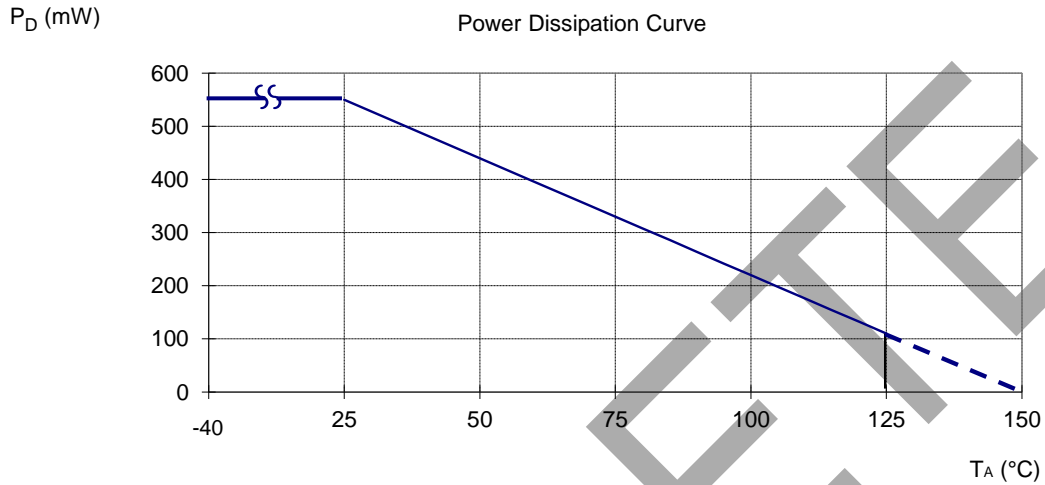


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Thermal Performance Characteristics

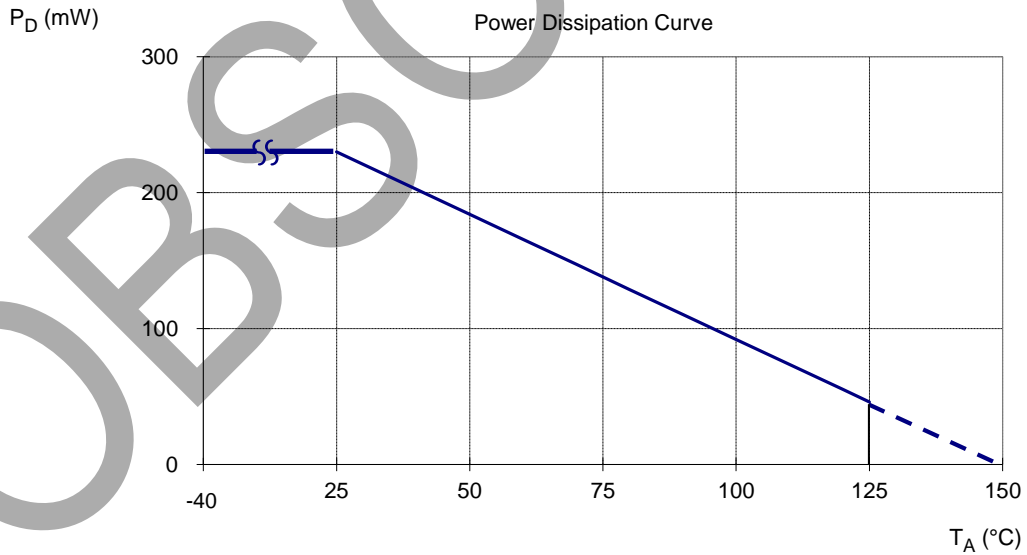
(1) Package Type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

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



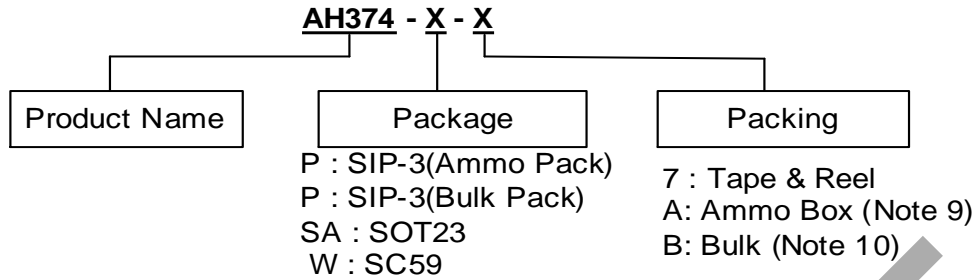
(2) Package Type: SC59 and SOT23

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



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Ordering Information

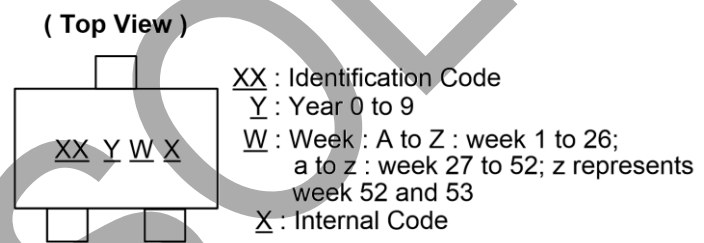


Part Number	Part Number Suffix	Package Code	Package	Packing	
				Qty.	Carrier
AH374-P-A	-A	P	SIP-3 (Ammo Pack)	4000	Box
AH374-P-B	-B	P	SIP-3 (Bulk Pack)	1000	—
AH374-SA-7	-7	SA	SOT23	3000	Tape & Reel
AH374-W-7	-7	W	SC59	3000	Tape & Reel

Notes: 9. Ammo Box is for SIP-3 (Ammo Pack) Spread Lead.
10. Bulk is for SIP-3 (Bulk Pack) Straight Lead.

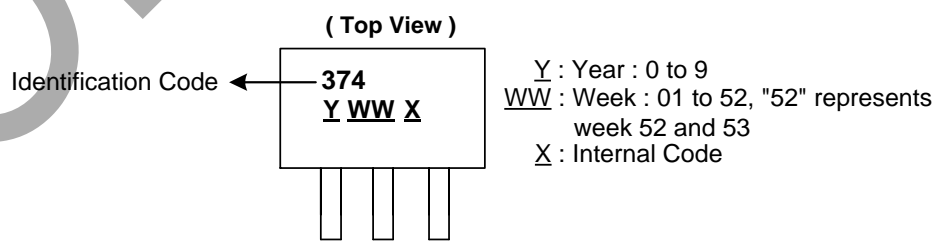
Marking Information

(1) Package Type: SC59 and SOT23



Part Number	Package	Identification Code
AH374-W-7	SC59	XJ
AH374-SA-7	SOT23	YJ

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

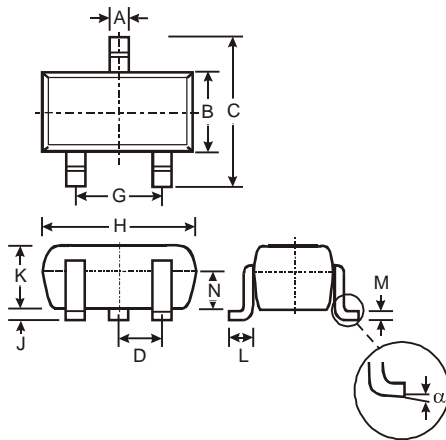


Part Number	Package	Identification Code
AH374-P-A	SIP-3 (Ammo Pack)	374
AH374-P-B	SIP-3 (Bulk Pack)	374

Package Outline Dimensions (All dimensions in mm.)

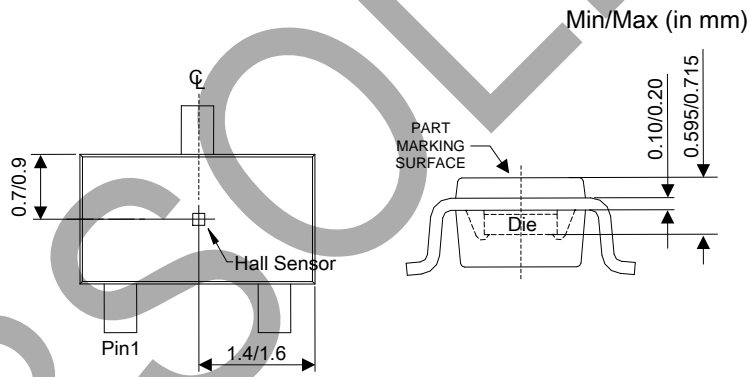
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SC59



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



Sensor Location

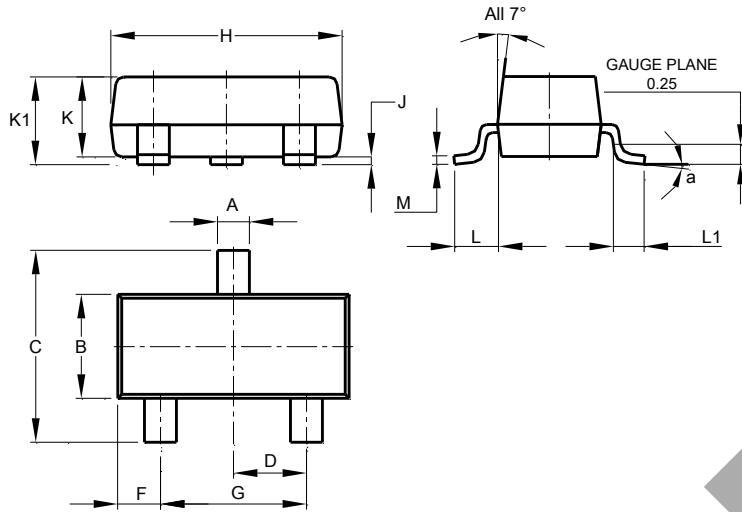
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Package Outline Dimensions (All dimensions in mm.) (continued)

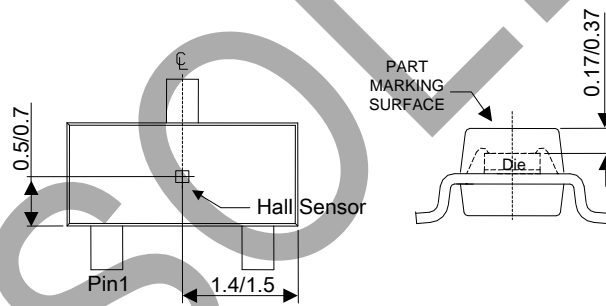
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(2) Package Type: SOT23



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--

All Dimensions in mm



Sensor Location

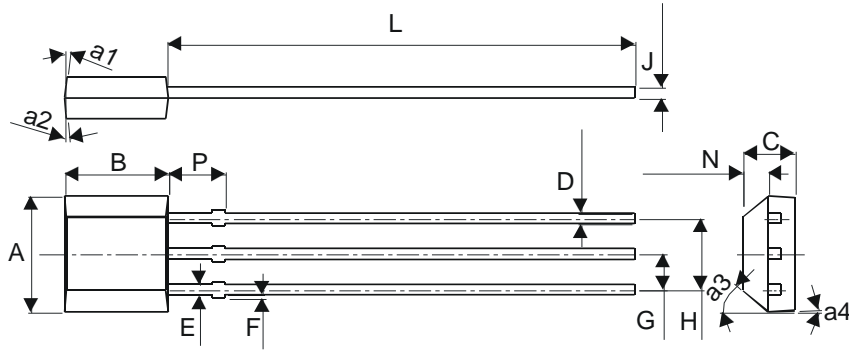
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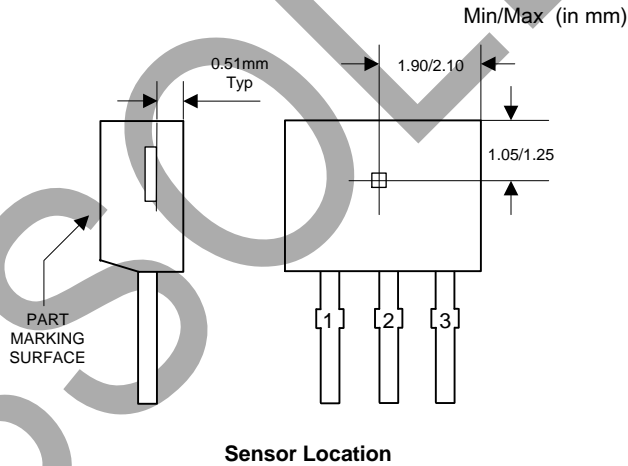
Package Outline Dimensions (All dimensions in mm.) (continued)

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

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



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		



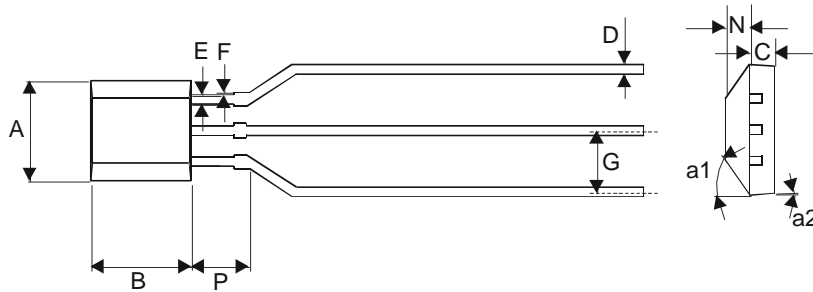
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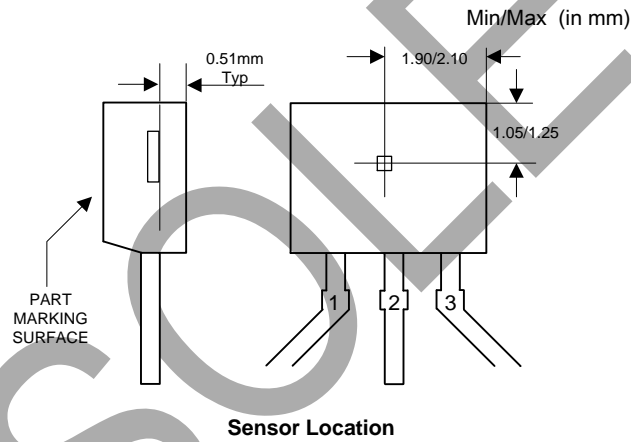
Package Outline Dimensions (All dimensions in mm.) (continued)

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

(4) 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		



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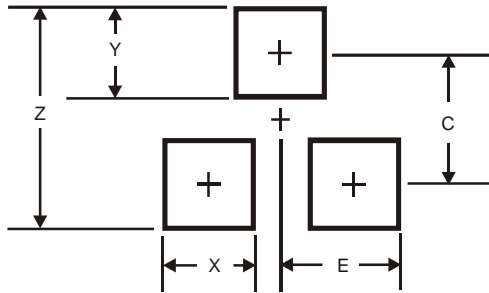
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Suggested Pad Layout

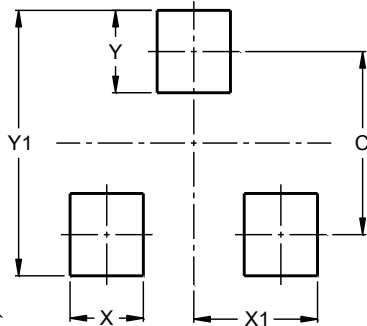
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SC59



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

(2) Package Type: SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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