



**THE DATASHEET OF
AH180-PL-A**



Description

AH180 is a micro-power Omnipolar Hall-Effect switch designed for portable and battery powered equipment such as cellular phones, PDAs and portable PCs. Based on two Hall-Effect plates and a chopper stabilized architecture the AH180 provides a reliable solution over the whole operating range. To support portable and battery powered equipment the design has been optimized to operate over the supply range of 2.5V to 5.5V and consumes only 24uW with a supply of 3V.

The single open-drain output switches on with either a north or south pole of sufficient strength. When the magnetic flux density (**B**) is larger than operate point (**Bop**), output is switched on (Output pin is pulled low). The output is turned off when **B** becomes lower than the release point (**Brp**). The output will remain off when there is no magnetic field.

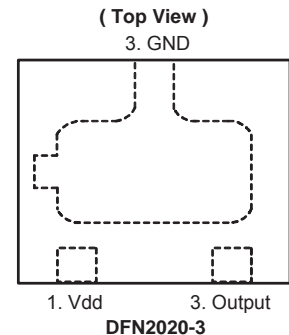
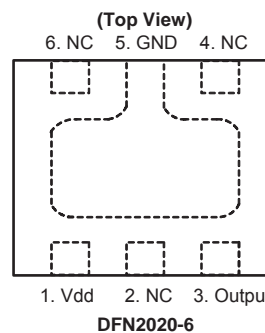
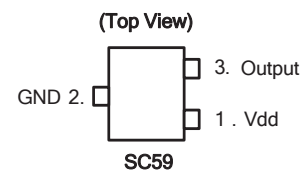
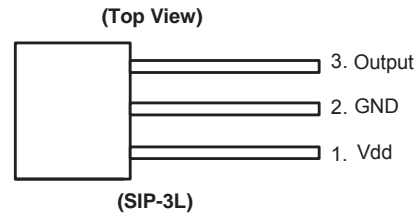
The AH180 is available in SIP-3L, SC59, DFN2020-3, and DFN2020-6 packages.

Features

- Omnipolar (north or south pole) operation
- Micropower operation
- Single open drain output
- 2.5V to 5.5V operating voltage
- Chopper stabilized design provides
 - Superior temperature stability
 - Minimal switch-point drift
 - Enhanced immunity to stress
- Good RF noise immunity
- -40°C to 85°C operating temperature
- ESD (HBM) > 5KV for DFN2020-6, DFN2020-3
> 6KV for SIP-3L and SC59
- SIP-3L, SC59 (commonly known as SOT23 in Asia)
DFN2020-6, DFN2020-3 packages
- Green Molding Compound (No Br, Sb) (Note 1)

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.

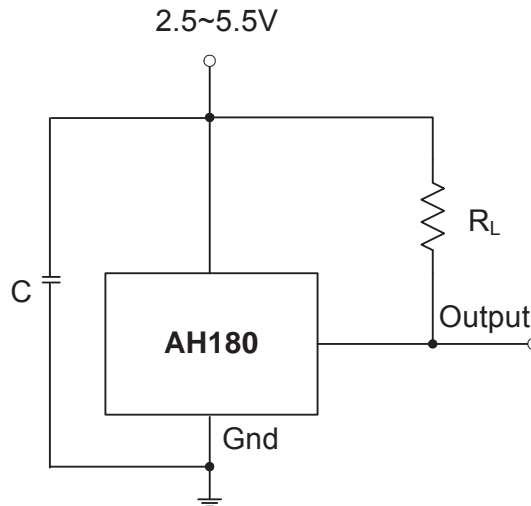
Pin Assignments



Applications

- Cover switch in clam-shell cellular phones
- Cover switch in Notebook PC/PDA
- Contact-less switch in consumer products

Typical Application Circuit

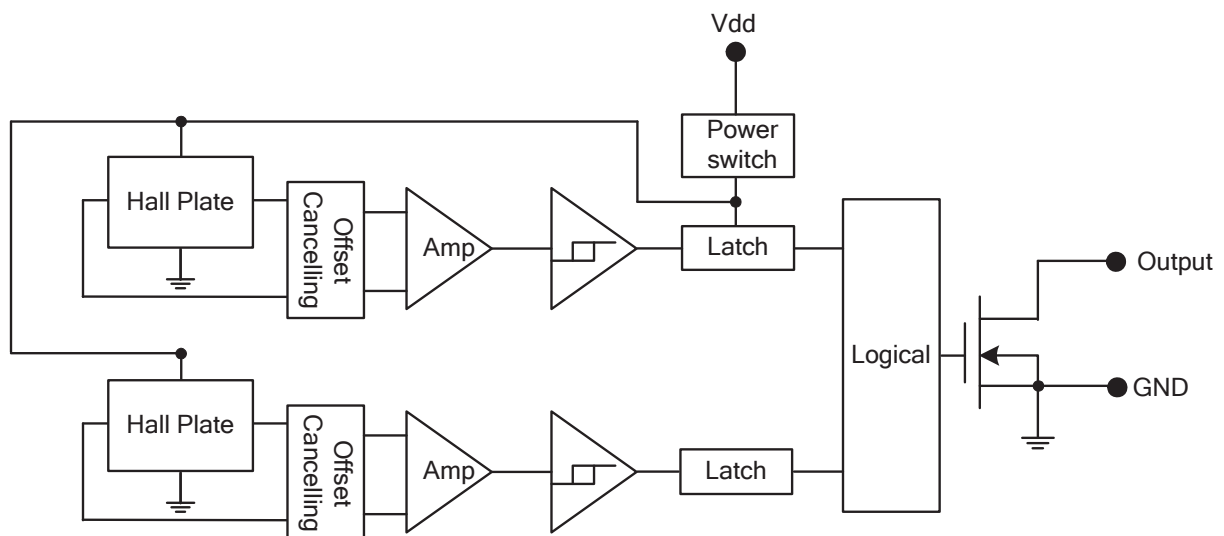


Note: C is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF~100nF.
RL is the pull-up resistor, the recommended resistance is 10Kohm~100Kohm.

Pin Descriptions

| Pin Name | P/I/O | Description |
|----------|-------|--------------------|
| Vdd | P/I | Power Supply Input |
| GND | P/I | Ground |
| Output | O | Output Pin |
| NC | NC | No Connected |

Functional Block Diagram



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

| Symbol | Characteristics | Values | Unit | |
|----------------|------------------------------|----------------------------------|------------------|----|
| Vdd | Supply voltage | 7 | V | |
| B | Magnetic flux density | Unlimited | | |
| Ts | Storage Temperature Range | -65 to +150 | $^\circ\text{C}$ | |
| P _D | Package Power Dissipation | SIP-3L | 550 | mW |
| | | SC59-3L/ DFN2020-6/ DFN2020-3 | 230 | mW |
| T _J | Maximum Junction Temperature | 150 | $^\circ\text{C}$ | |

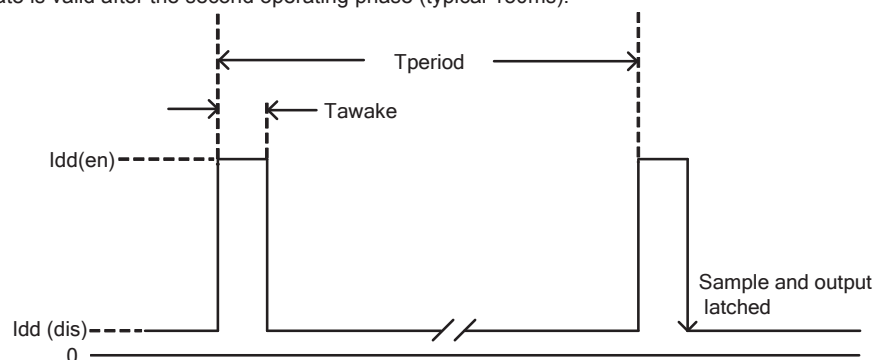
Recommended Operating Conditions

| Symbol | Parameter | Conditions | Min | Max | Unit |
|----------------|-------------------------------|------------|-----|-----|------------------|
| Vdd | Supply Voltage | Operating | 2.5 | 5.5 | V |
| T _A | Operating Ambient Temperature | Operating | -40 | 85 | $^\circ\text{C}$ |

Electrical Characteristics ($T_A = 25^\circ\text{C}$, Vdd = 3V; unless otherwise specified)

| Symbol | Characteristic | Conditions | Min | Typ. | Max | Unit |
|----------------------|------------------------|--|-----|------|-----|---------------|
| Vout | Output On Voltage | I _{out} = 1mA | — | 0.1 | 0.3 | V |
| I _{off} | Output Leakage Current | Vout = 5.5V, Output off | — | <0.1 | 1 | μA |
| I _{dd(en)} | Supply Current | Chip enable, $T_A = 25^\circ\text{C}$, Vdd = 3V | — | 3 | 6 | mA |
| I _{dd(en)} | | Chip enable, $T_A = -40\sim 85^\circ\text{C}$, Vdd = 2.5~5.5V | — | 3 | 9 | mA |
| I _{dd(dis)} | | Chip disable, $T_A = 25^\circ\text{C}$, Vdd = 3V | — | 5 | 10 | μA |
| I _{dd(dis)} | | Chip disable, $T_A = -40\sim 85^\circ\text{C}$, Vdd = 2.5~5.5V | — | 5 | 15 | μA |
| I _{dd(avg)} | | Average supply current, $T_A = 25^\circ\text{C}$, Vdd = 3V | — | 8 | 16 | μA |
| I _{dd(avg)} | | Average supply current, $T_A = -40\sim 85^\circ\text{C}$, Vdd = 2.5~5.5V | — | 8 | 24 | μA |
| T _{awake} | Awake Time | (Note 2) | — | 75 | 125 | μs |
| T _{period} | Period | (Note 2) | — | 75 | 125 | ms |
| D.C. | Duty Cycle | | — | 0.1 | — | % |

Notes: 2. When power is initially turned on, Vdd must be within its correct operating range (2.5V to 5.5V) to guarantee the output sampling. The output state is valid after the second operating phase (typical 150ms).



Magnetic Characteristics ($T_A = 25\text{ }^\circ\text{C}$, $V_{dd} = 3\text{V}$, Note 3, 4)

Option 1:

(1mT=10 Gauss)

| Symbol | Parameter | Min | Typ. | Max | Unit |
|--------------------------------|-----------------|-----|------|-----|-------|
| Bops(south pole to brand side) | Operation Point | - | 40 | 60 | Gauss |
| Bopn(north pole to brand side) | | -60 | -40 | - | |
| Brps(south pole to brand side) | Release Point | 10 | 30 | - | |
| Brpn(north pole to brand side) | | - | -30 | -10 | |
| Bhy(Bopx - Brpx) | Hysteresis | - | 15 | - | |

Option 2:

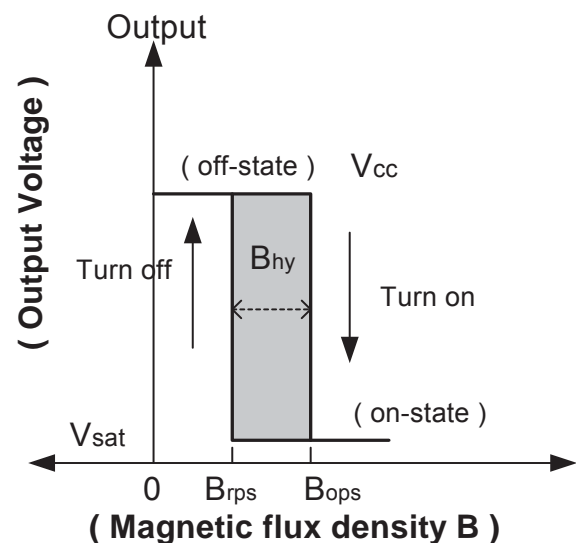
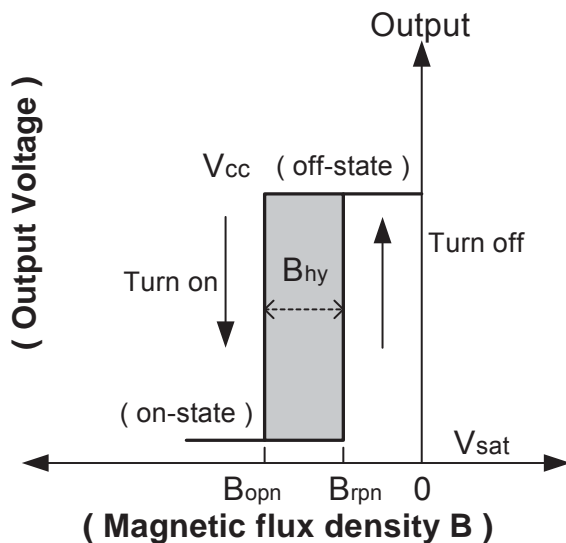
(1mT=10 Gauss)

| Symbol | Parameter | Min | Typ. | Max | Unit |
|--------------------------------|-----------------|-----|------|-----|-------|
| Bops(south pole to brand side) | Operation Point | - | 40 | 60 | Gauss |
| Bopn(north pole to brand side) | | -60 | -40 | - | |
| Brps(south pole to brand side) | Release Point | 20 | 30 | - | |
| Brpn(north pole to brand side) | | - | -30 | -20 | |
| Bhy(Bopx - Brpx) | Hysteresis | - | 15 | - | |

Notes: 3. Typical data is at $T_A = 25\text{ }^\circ\text{C}$, $V_{dd} = 3\text{V}$, and for design information only.

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

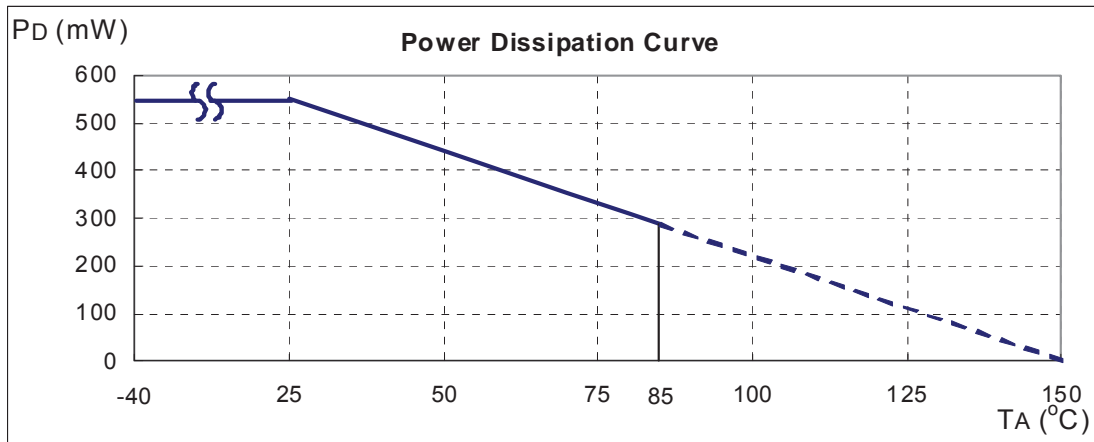
Operating Characteristics



Performance Characteristics

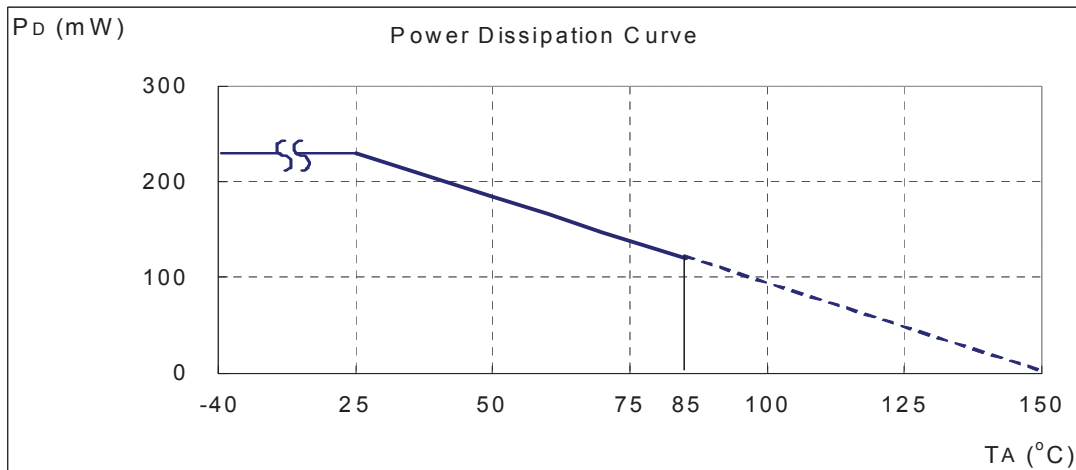
(1) SIP-3L

| | | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 |

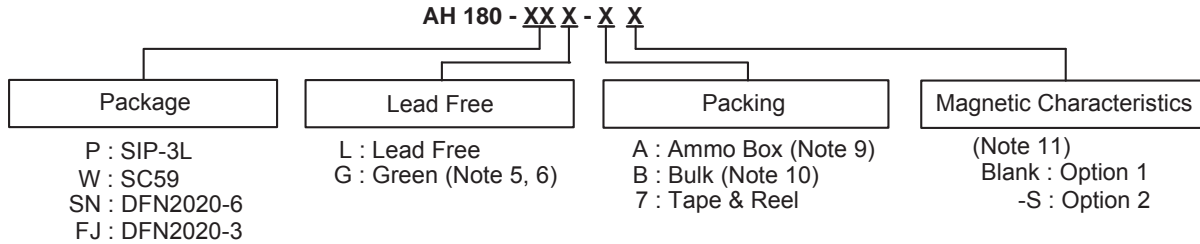


(2) SC59 (commonly known as SOT23 in Asia), DFN2020-6 and DFN2020-3

| | | | | | | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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

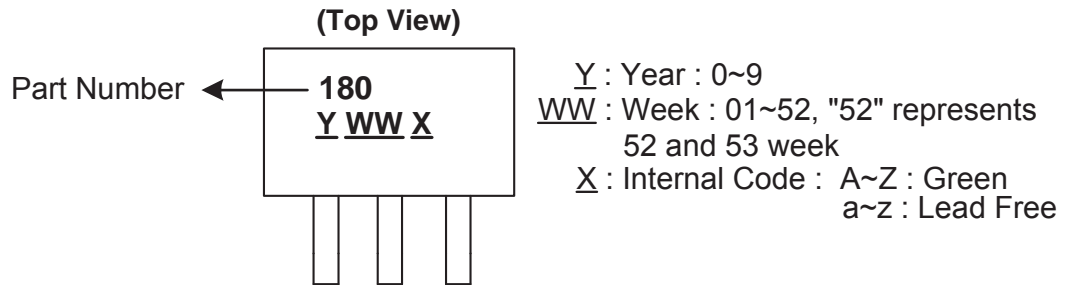


| Device | Package Code | Packaging (Note 7, 8) | Bulk | | 7" Tape and Reel | | Ammo Box | | Magnetic Characteristics (Note 11) |
|--------------|--------------|-----------------------|----------|--------------------|------------------|--------------------|----------|--------------------|------------------------------------|
| | | | Quantity | Part Number Suffix | Quantity | Part Number Suffix | Quantity | Part Number Suffix | |
| AH180-PL-B | P | SIP-3L | 1000 | -B | NA | NA | NA | NA | Blank |
| AH180-PL-A | P | SIP-3L | NA | NA | NA | NA | -A | 4000/Box | Blank |
| AH180-PG-B | P | SIP-3L | 1000 | -B | NA | NA | NA | NA | Blank |
| AH180-PG-A | P | SIP-3L | NA | NA | NA | NA | -A | 4000/Box | Blank |
| AH180-PL-B-S | P | SIP-3L | 1000 | -B | NA | NA | NA | NA | S |
| AH180-PL-A-S | P | SIP-3L | NA | NA | NA | NA | -A | 4000/Box | S |
| AH180-PG-B-S | P | SIP-3L | 1000 | -B | NA | NA | NA | NA | S |
| AH180-PG-A-S | P | SIP-3L | NA | NA | NA | NA | -A | 4000/Box | S |
| AH180-WG-7 | W | SC59 | NA | NA | 3000/Tape & Reel | -7 | NA | NA | Blank |
| AH180-SNG-7 | SN | DFN2020-6 | NA | NA | 3000/Tape & Reel | -7 | NA | NA | Blank |
| AH180-FJG-7 | FJ | DFN2020-3 | NA | NA | 3000/Tape & Reel | -7 | NA | NA | Blank |

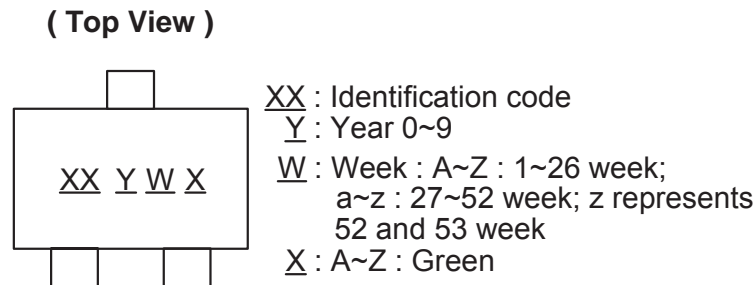
- Notes:
5. SC59, DFN2020-6 and DFN2020-3 are available in "Green" product only.
 6. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.
 7. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 8. Reverse taping as shown on Diodes Inc. Surface Mount (SMD) Packaging document AP02007, which can be found on our website <http://www.diodes.com/datasheets/ap02007.pdf>.
 9. Ammo Box is for SIP-3L Spread Lead.
 10. Bulk is for SIP-3L Straight Lead.
 11. Please refer the Magnetic Characteristics table, option 2 is available in SIP-3L package only.

Marking Information

(1) SIP-3L

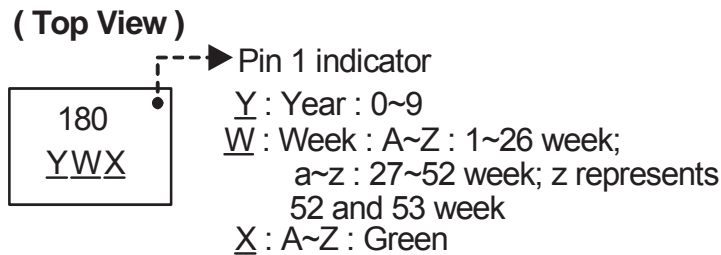


(2) SC59 (commonly known as SOT23 in Asia)



| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH180 | SC59 | K0 |

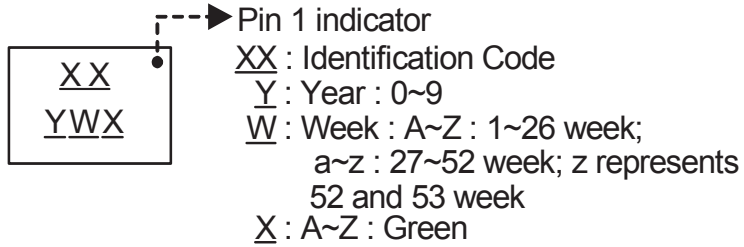
(3) DFN2020-6



Marking Information (Continued)

(4) DFN2020-3

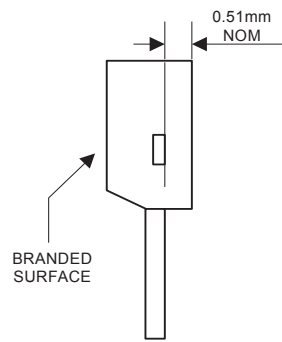
(Top View)



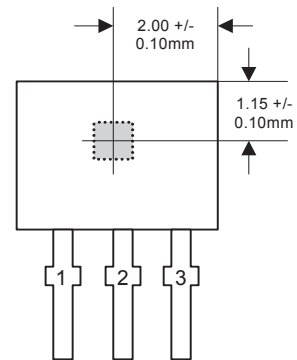
| Part Number | Package | Identification Code |
|-------------|-----------|---------------------|
| AH180 | DFN2020-3 | K0 |

Package Outline Dimensions (All Dimensions in mm)

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

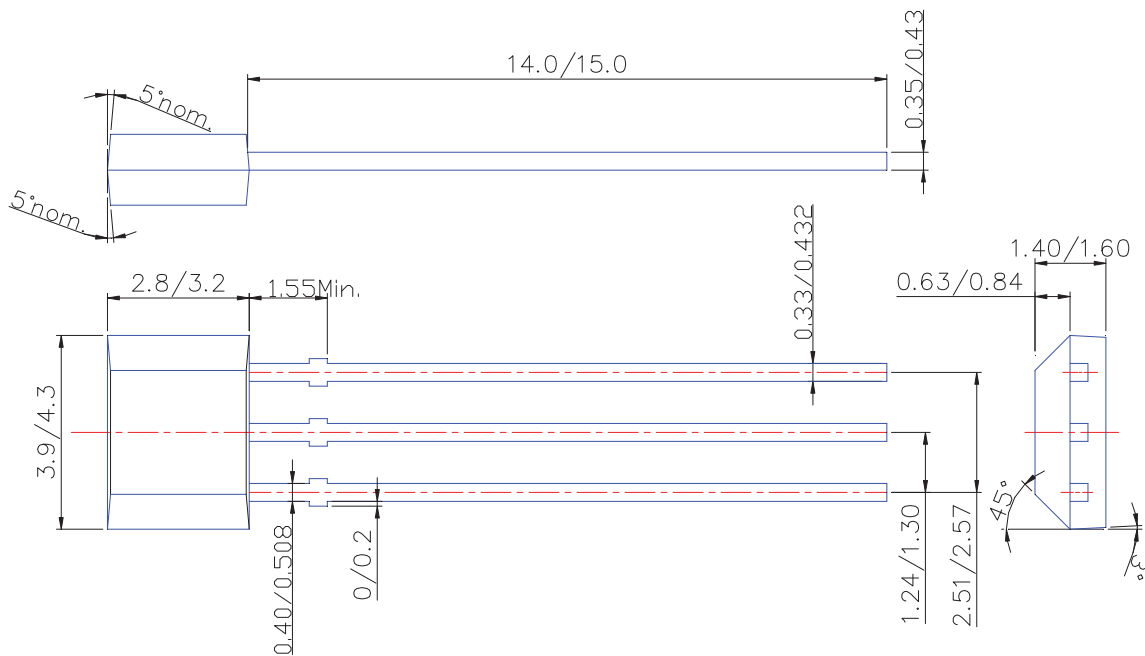


Active Area Depth



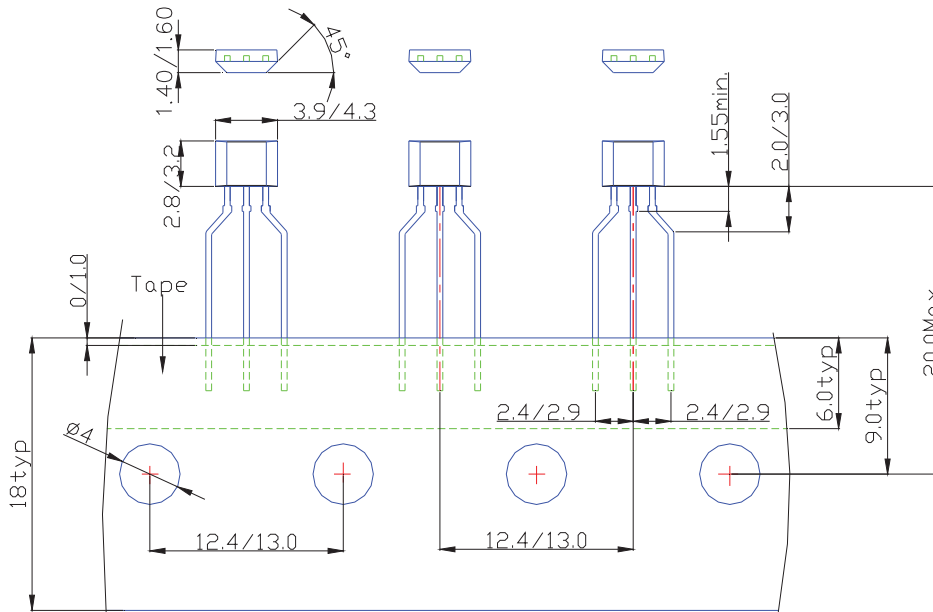
Sensor Location

Package Dimension

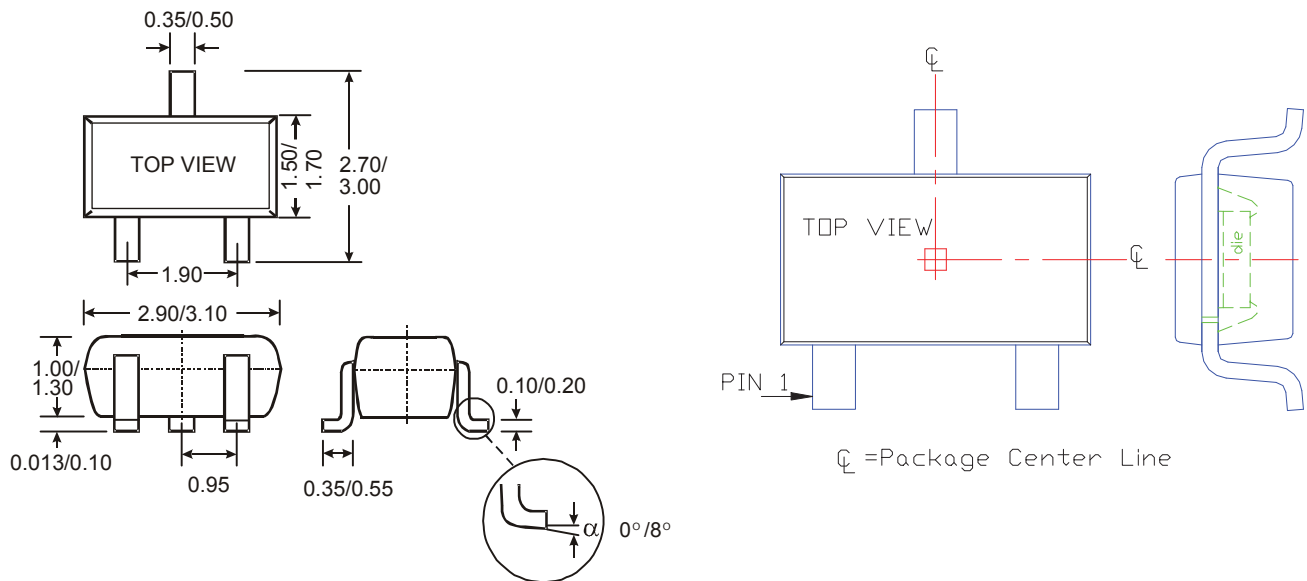


Package Outline Dimensions (Continued)

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

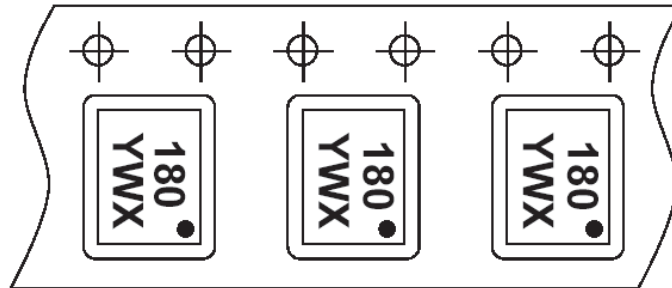


(3) SC59 (Commonly known as SOT23 in Asia)

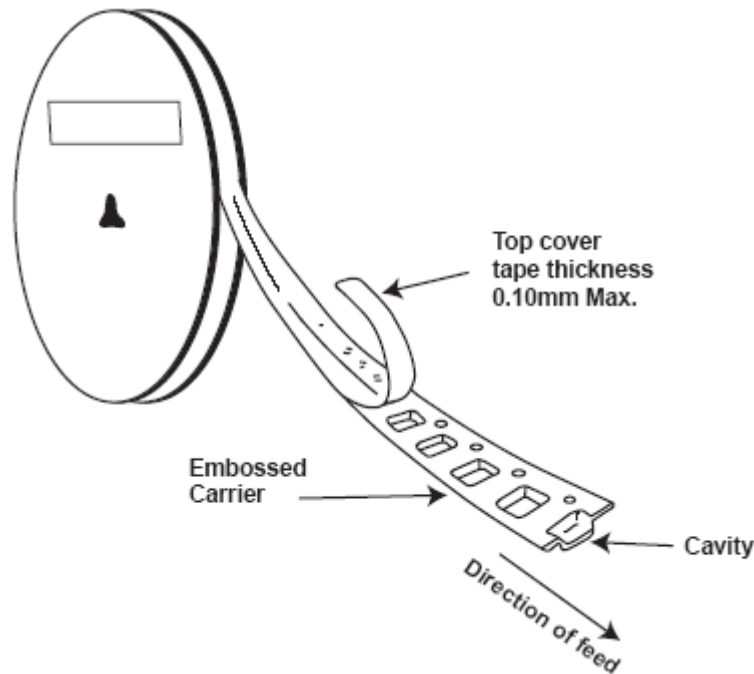
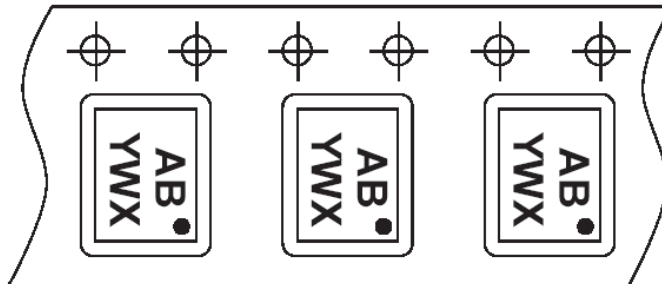


Taping Orientation (Note 12)

(1) DFN2020-6



(2) DFN2020-3



Notes: 12. The taping orientation of the other package type can be found on our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

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