

OBSOLETE - PART DISCONTINUED

Description

The DIODES™ AH1804 is a micropower Omnipolar Hall effect switch IC with a single output driver with internal pull up and pull down capability. Designed for portable and battery powered equipment such as cellular phones and portable PCs, the average supply current is only 12µA at 3.3V. To support battery powered equipment, the AH1804 can operate over the supply range of 2.5V to 3.6V and uses a hibernating clocking system to minimize the power consumption.

The output is activated with either a north or south pole of sufficient strength. When the magnetic flux density (B) is larger than operate point (Bop), the output will be turned on (pulled low) and held until B is lower than release point (Brp).

The AH1804 is available in SC59 and small low profile X1-DFN1216-4 packages.

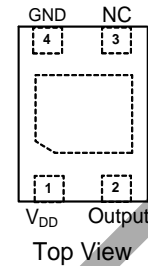
Features

- Omnipolar Operation (North or South Pole)
- Low Supply Voltage 2.5V to 3.6V
- Micropower Operation
- No External Pull up Resistors Required
- Chopper Stabilized Design
 - Superior Temperature Stability
 - Extremely Low Switch-Point Drift
 - Insensitive to Physical Stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- Small Low Profile X1-DFN1216-4 and SC59 Packages
- ESD (HBM) > 5kV
- **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](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

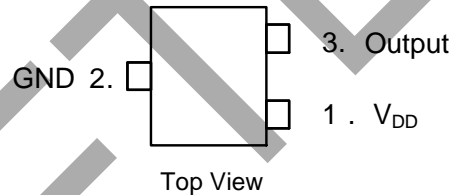
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- 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

X1-DFN1216-4



SC59

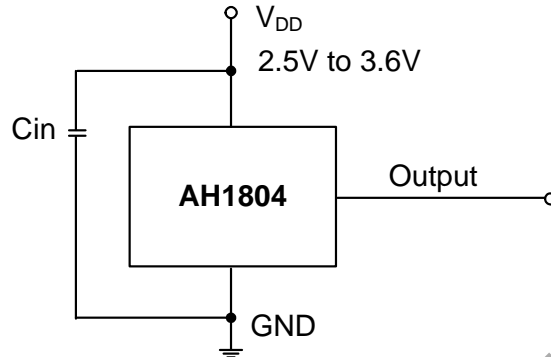


Applications

- Cover switches in clam-shell and slide cellular phones
- Cover switches in portable PCs, tablets and PDAs
- Display screen open/close detect in digital camcorders
- Contact-less switch in portable battery powered consumer and industrial products

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Typical Application Circuit



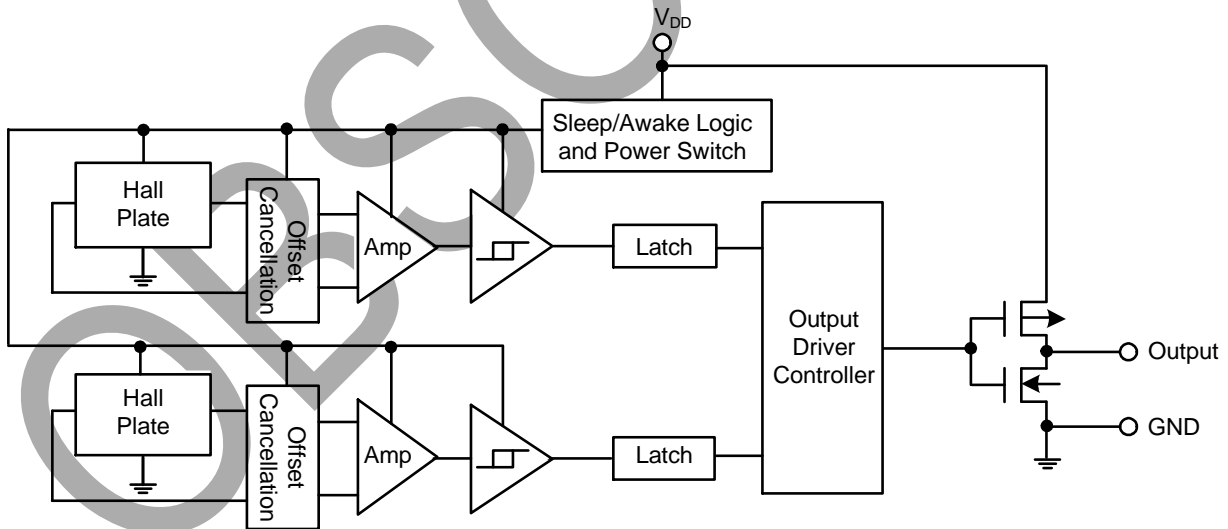
Note: Cin is for power stabilization and to strengthen the noise immunity, C = 100nF or higher must be used.

Pin Descriptions

| Pin Name | P/I/O | Description |
|-----------------|-------|------------------------|
| V _{DD} | P/I | Power Supply Input |
| GND | P/I | Ground |
| Output | O | Output Pin |
| NC | NC | No Connection (Note 4) |

Note: 4. NC is "No Connection" which is not connected internally. This pin can be left open or tied to ground.

Functional Block Diagram



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

| Symbol | Characteristics | Values | Unit |
|---------------------|------------------------------|--------------|------------------|
| V_{DD} | Supply Voltage (Note 6) | 5.0 | V |
| $V_{DD\text{ rev}}$ | Reverse Supply Voltage | -0.3 | V |
| B | Magnetic Flux Density | Unlimited | |
| T_S | Storage Temperature Range | -65 to +150 | $^\circ\text{C}$ |
| P_D | Package Power Dissipation | X1-DFN1216-4 | 230 |
| | | SC59 | 270 |
| 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 of 5V is a transient stress rating and is not meant as functional operating conditions. It is not recommended to operate the device at the absolute maximum rated conditions for any period of time.

Recommended Operating Conditions ($T_A = +25^\circ\text{C}$)

| Symbol | Characteristics | Conditions | Rating | Unit |
|----------|-----------------------------|------------------------------------|------------|------------------|
| V_{DD} | Supply Voltage | $C_{IN} = 0.1\mu\text{F}$ (Note 7) | 2.5 to 3.6 | V |
| T_A | Operating Temperature Range | Operating | -40 to +85 | $^\circ\text{C}$ |

- Note: 7. Decoupling capacitor $C_{IN} = 100\text{nF}$ or higher must be used for full 2.5V to 3.6V supply range.

Electrical Characteristics ($T_A = +25^\circ\text{C}$, $V_{DD} = 3.3\text{V}$, unless otherwise specified.)

| Symbol | Characteristics | Conditions | Min | Typ. | Max | Unit |
|---------------|---------------------------|-------------------------|--------------|--------------|-----|---------------|
| V_{OL} | Output Low Voltage (On) | $I_{OUT} = 1\text{mA}$ | — | 0.1 | 0.2 | V |
| V_{OH} | Output High Voltage (Off) | $I_{OUT} = -1\text{mA}$ | $V_{DD}-0.2$ | $V_{DD}-0.1$ | — | V |
| $I_{dd(en)}$ | Supply Current | Chip Enable | — | 4 | — | mA |
| $I_{dd(dis)}$ | | Chip Disable | — | 8 | — | μA |
| $I_{dd(ave)}$ | | Average Supply Current | — | 12 | — | μA |
| t_{wake} | Awake Time | (Note 8) | — | 50 | 100 | μs |
| t_{period} | Period | (Note 8) | — | 50 | 100 | ms |
| D.C. | Duty Cycle | — | — | 0.1 | — | % |

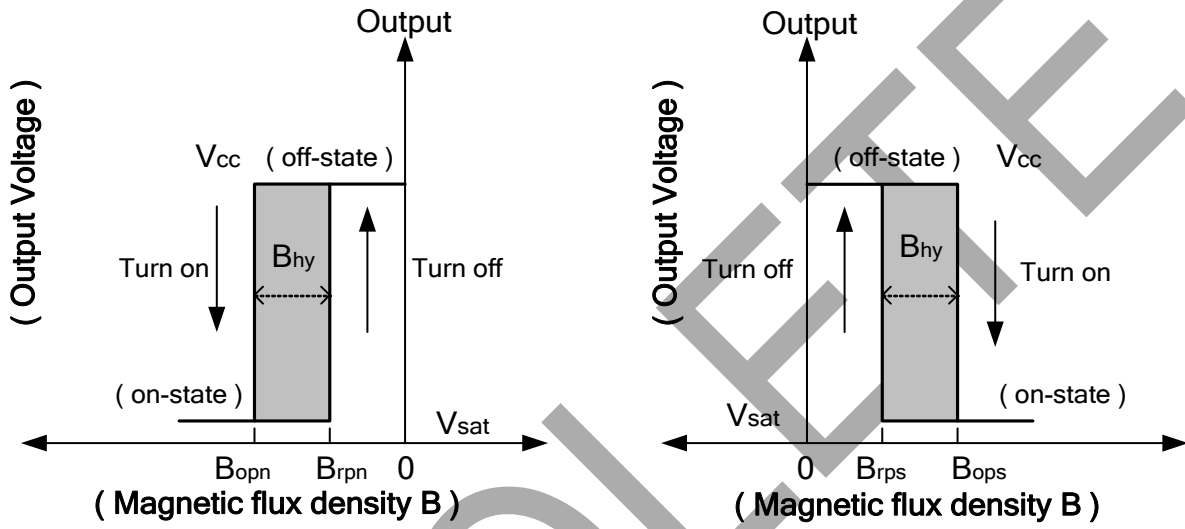
- Note: 8. When power is initially on, the operating V_{DD} (2.5V to 3.6V) must be applied to be guaranteed for the output sampling. The output state is valid after the second operating phase (typical 100ms).

Magnetic Characteristics ($T_A = +25^\circ\text{C}$, $V_{DD} = 3.3\text{V}$, Note 9)

(1mT = 10 Gauss)

| Symbol | Characteristics | Min | Typ. | Max | Unit |
|---------------------------------|-----------------|-----|------|-----|-------|
| Bops (South Pole to Brand Side) | Operation Point | 20 | 40 | 60 | Gauss |
| Bopn (North Pole to Brand Side) | | -60 | -40 | -20 | |
| Brps (South Pole to Brand Side) | Release Point | 15 | 32 | — | |
| Brpn (North Pole to Brand Side) | | — | -32 | -15 | |
| Bhy ($ B_{opx} - B_{rpx} $) | Hysteresis | — | 8 | — | |

Note: 9. The magnetic characteristics may vary with operating temperature and after soldering.

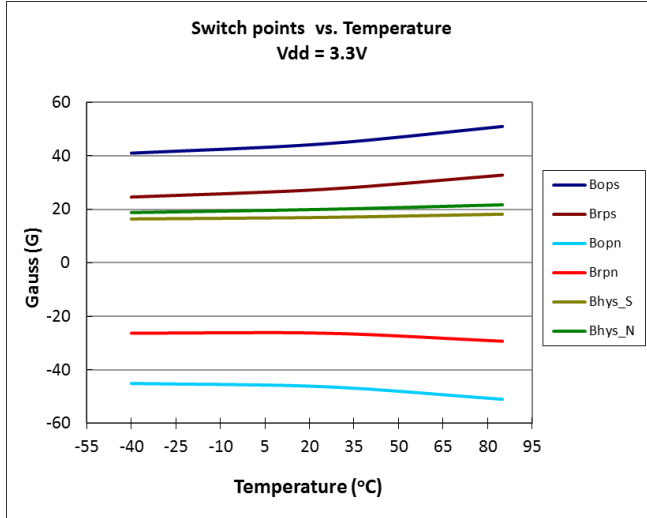


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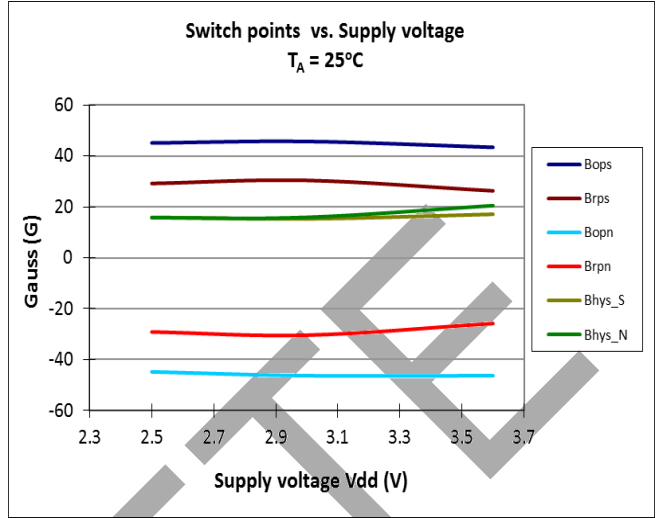
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Typical Characteristics

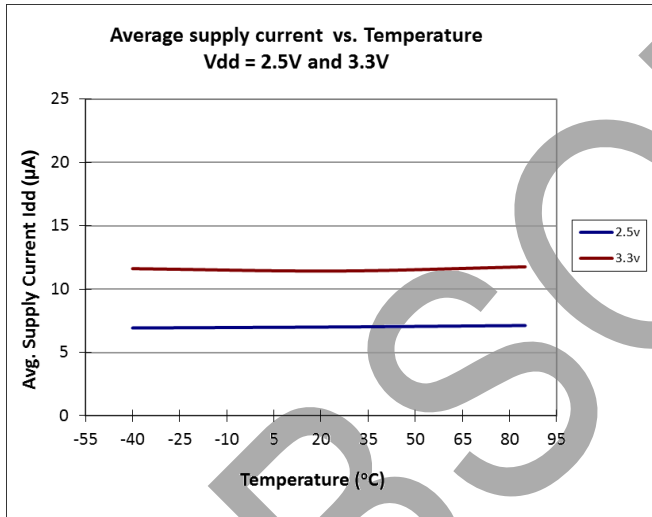
Typical Switch Point Bop and Brp vs. Temperature



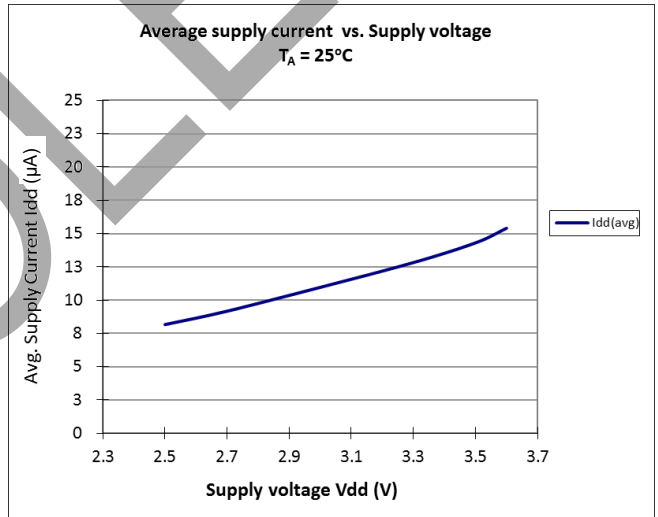
Typical Switch Points Bop and Brp vs. Supply Voltage



Average Supply Current vs. Temperature

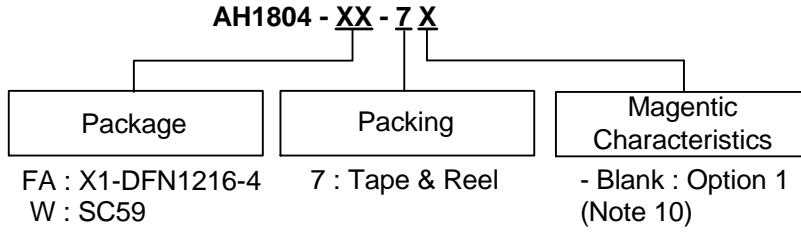


Average Supply Current vs. Supply Voltage



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Ordering Information

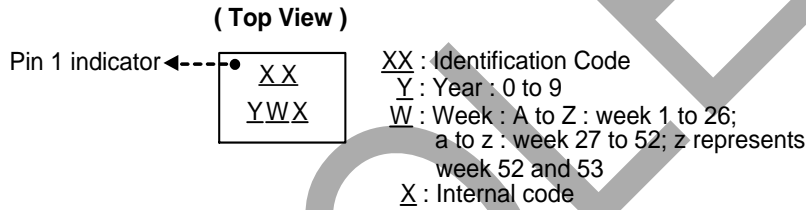


| Part Number | Part Number Suffix | Package Code | Package (Note 11) | Magnetic Characteristics (Note 10) | Packing | |
|-------------|--------------------|--------------|-------------------|------------------------------------|---------|----------------|
| | | | | | Qty. | Carrier |
| AH1804-FA-7 | -7 | FA | X1-DFN1216-4 | -Blank | 3000 | 7" Tape & Reel |
| AH1804-W-7 | -7 | W | SC59 | -Blank | 3000 | 7" Tape & Reel |

Notes: 10. Please refer to the *Magnetic Characteristics* table.
 11. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

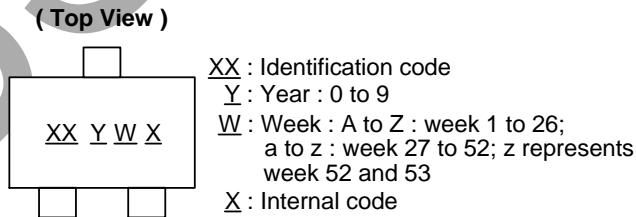
Marking Information

(1) X1-DFN1216-4



| Part Number | Package | Identification Code |
|-------------|--------------|---------------------|
| AH1804-FA-7 | X1-DFN1216-4 | KJ |

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



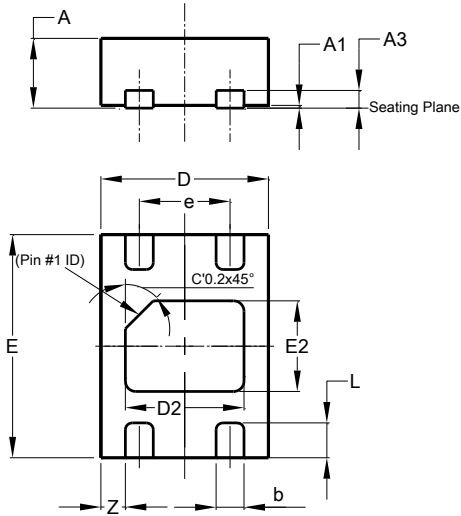
| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH1804-W-7 | SC59 | WJ |

Package Outline Dimensions

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

(1) Package Type: X1-DFN1216-4

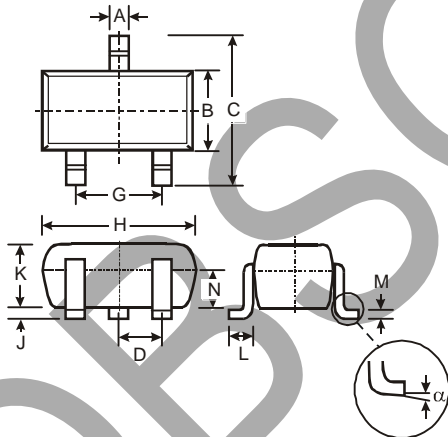
X1-DFN1216-4



| X1-DFN1216-4 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.47 | 0.53 | 0.50 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | -- | -- | 0.13 |
| b | 0.15 | 0.25 | 0.20 |
| D | 1.15 | 1.25 | 1.20 |
| D2 | 0.75 | 0.95 | 0.85 |
| E | 1.55 | 1.65 | 1.60 |
| E2 | 0.55 | 0.75 | 0.65 |
| e | - | - | 0.65 |
| L | 0.20 | 0.30 | 0.25 |
| Z | - | - | 0.175 |
| All Dimensions in mm | | | |

(2) Package Type: SC59 (commonly known as SOT23 in Asia)

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 | | | |

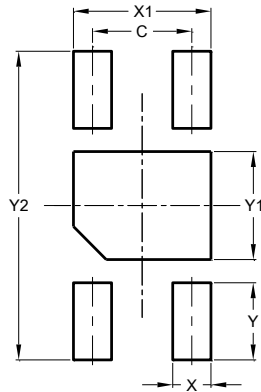
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Suggested Pad Layout

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

(1) Package Type: X1-DFN1216-4

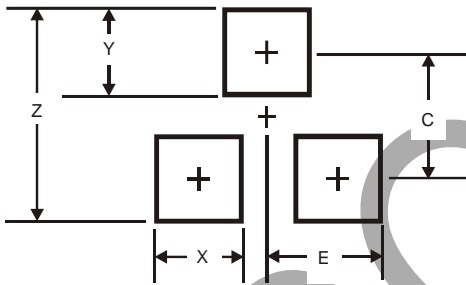
X1-DFN1216-4



| X1-DFN1216-4 | |
|--------------|---------------|
| Dimensions | Value (in mm) |
| C | 0.65 |
| X | 0.25 |
| X1 | 0.90 |
| Y | 0.50 |
| Y1 | 0.70 |
| Y2 | 2.00 |

(2) Package Type: SC59

SC59



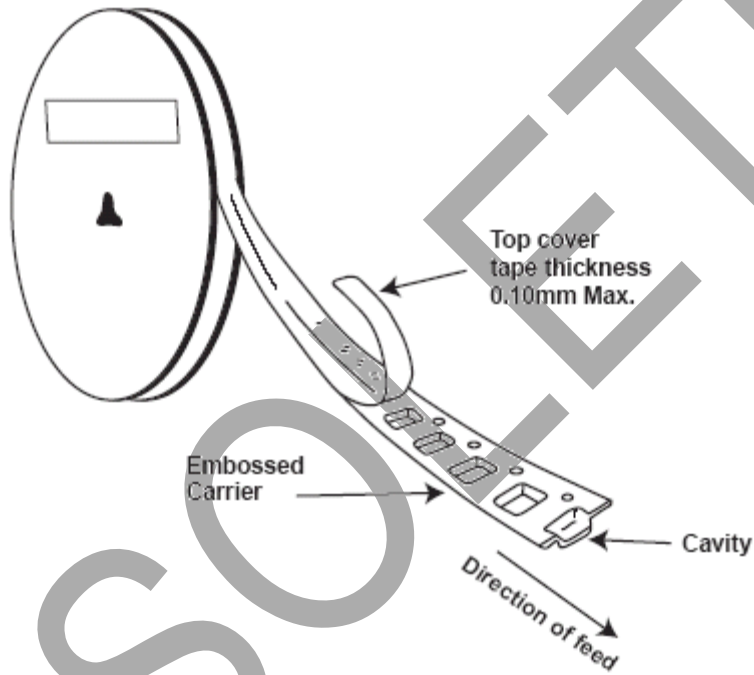
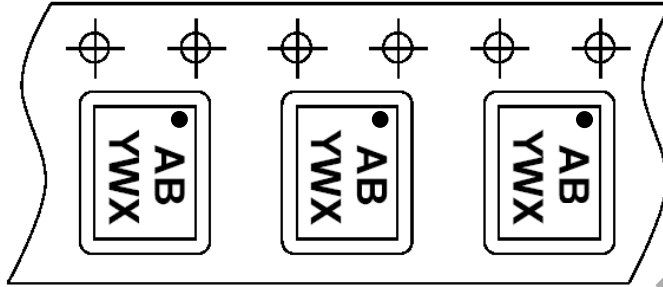
| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 3.4 |
| X | 0.8 |
| Y | 1.0 |
| C | 2.4 |
| E | 1.35 |

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Taping Orientation (Note 12)

X1-DFN1216-4



Note: 12. The taping orientation of the other package type can be found on our website at <https://www.diodes.com/assets/Packaging-Support-Docs/ap02007.pdf>.

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