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# AEAT-601B
## Incremental Magnetic Encoder

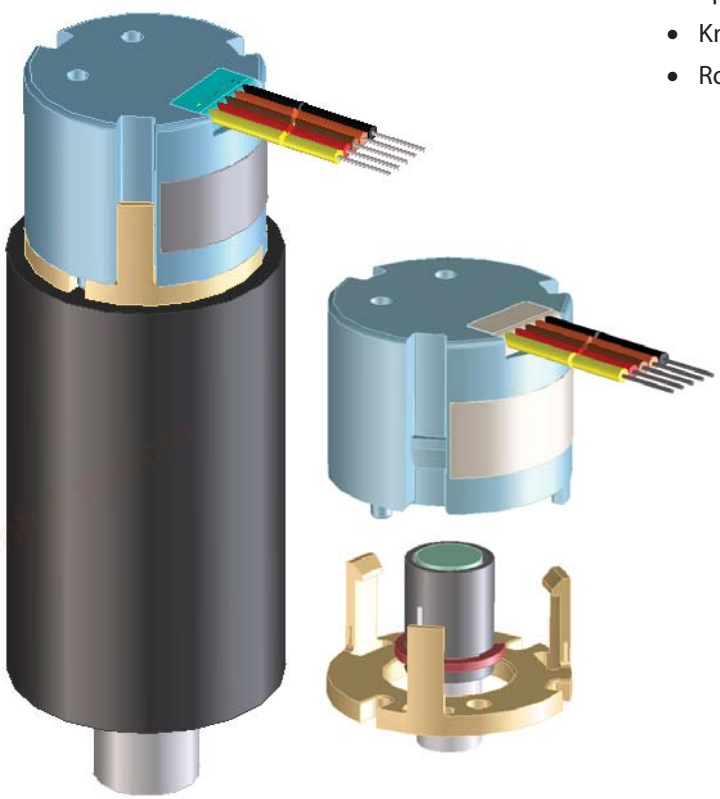
## Data Sheet



### Description

Avago Technologies' Incremental Magnetic Encoder provides an integrated solution for angular detection within a complete 360° rotation. The use of magnetic technology for motion control and sensing activities eliminates mechancial contact and enables this device to be free from mechanical wear and tear. Three-channel output provides an additional index channel for every full rotation or revolution of 360°. An additional advantage is that the encoders upper rotational speed limit is typically only limited by the application's bearing speed.

### Exploded View



### Features

- Resolution of 256 counts per revolution (CPR)
- Contactless sensing technology
- Wide temperature range from -40° to 125°C
- 3-channel output
- Single 5V supply
- Easy assembly and no signal adjustment required
- Direct connectivity through cable output
- RoHS compliant

### Applications

- Speed detection
- Knob control
- Rotary encoders

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### Table 1. Absolute Maximum Ratings [1, 2]

| Parameter | Symbol | Limits | Units |
|---|---|---|---|
| DC Supply Voltage at pin $V_{DD}$ = 5V | $V_{DD}$ | -0.3 to + 7 | V |
| Input Voltage | $V_i$ | -0.3 to $V_{DD}$+0.3 | V |
| Storage Temperature | $T_{stg}$ | -40 to 125 | °C |

Notes:
1. Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.
2. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### Table 2. Recommended Operating Condition

| Parameters | Symbols | Values | Units | Notes |
|---|---|---|---|---|
| DC Supply Voltage at pin $V_{DD}$ = 5V | $V_{DD}$ | +4.5 / +5.5 | V | |
| Operating Temperature | $T_{amb}$ | 40/125 | °C | |
| Rotational Speed : | Mechanical (max) | 12000 | RPM | |
| | Electrical (max) | 7000 | RPM | |

Notes:
1. Under recommended mounting and tolerance, and mechanical shaft play, the incremental encoder's quadrature output (quater cycle phase shift between Channel-A and Channel-B) is always maintained. The dynamic performance of the encoder output are depicted in the figures under Encoding Characteristic.
2. The magnetic incremental output has a fixed hysteresis of 0.7 degrees for all different CPR options (equivalent to 2 quadrature counts at 256 CPR or 0.5 quadrature count at 64 CPR).
3. The quadrature decoding of both the Channel-A and Channel-B would ensure that the incremental counts are maintained even when there is transition noise due to fluctuation of the magnetic field strength.

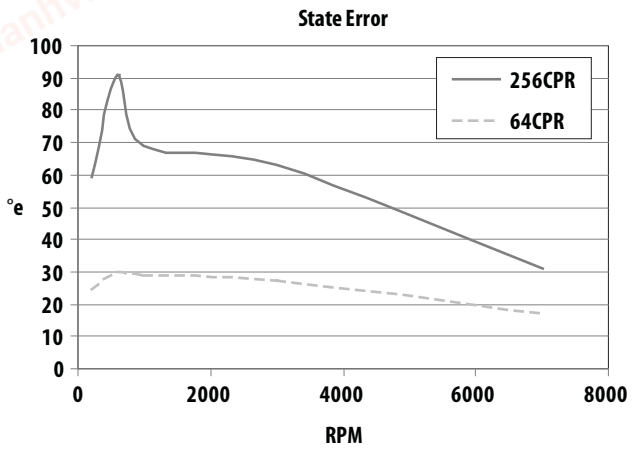
### Table 3. DC Characteristics

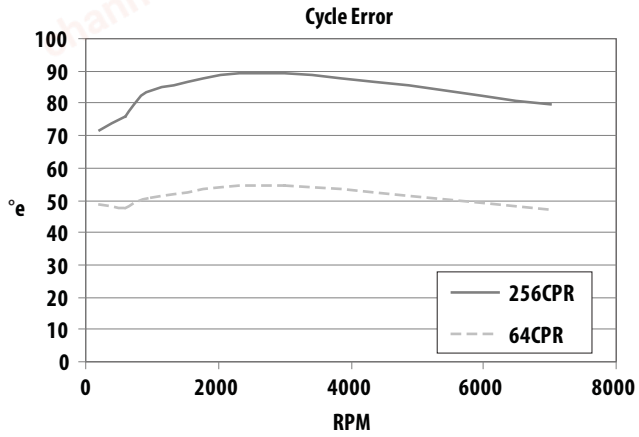
DC Characteristics over Recommended Operating Range, typical at 25 °C

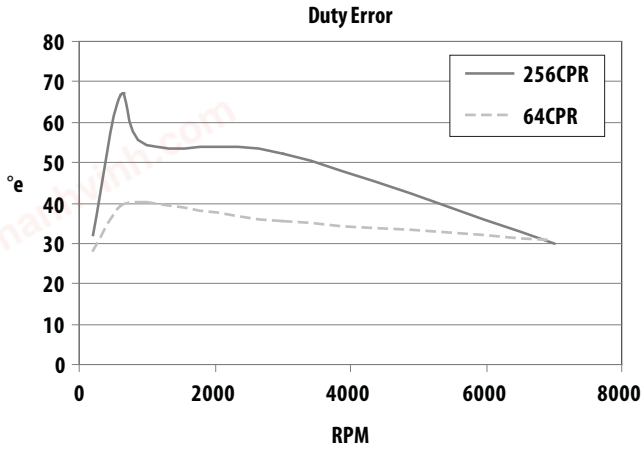
| | | | Values | | | | |
|---|---|---|---|---|---|---|---|
| Parameter | Symbol | Condition | Min | Typ. | Max | Units | Notes |
| $V_{DD}$ Supply Current | $I_{DD}$ | | | 16 | 20 | mA | |
| Output High Voltage | $V_{OH}$ | | $V_{DD}$-0.5 | | | V | |
| Output Low Voltage | $V_{OL}$ | | | | VSS+0.4 | V | |
| Output Current | $I_O$ | | | | 4 | mA | $V_{DD}$ pin = 4.5V |

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## AEAT-601B Performance Characteristics




### Table 4. Encoding Characteristics

Encoding Characteristics over Recommended Operating Range, typical at 25 °C over speed range.

| Parameter | Symbol | Typ. | Units |
|---|---|---|---|
| Index Pulse Width | Po | 150 | °e |

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## Package Dimensions

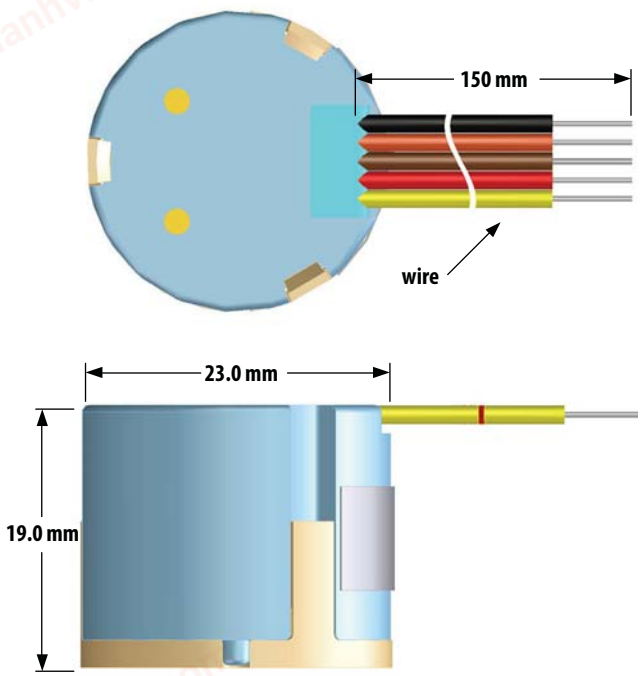
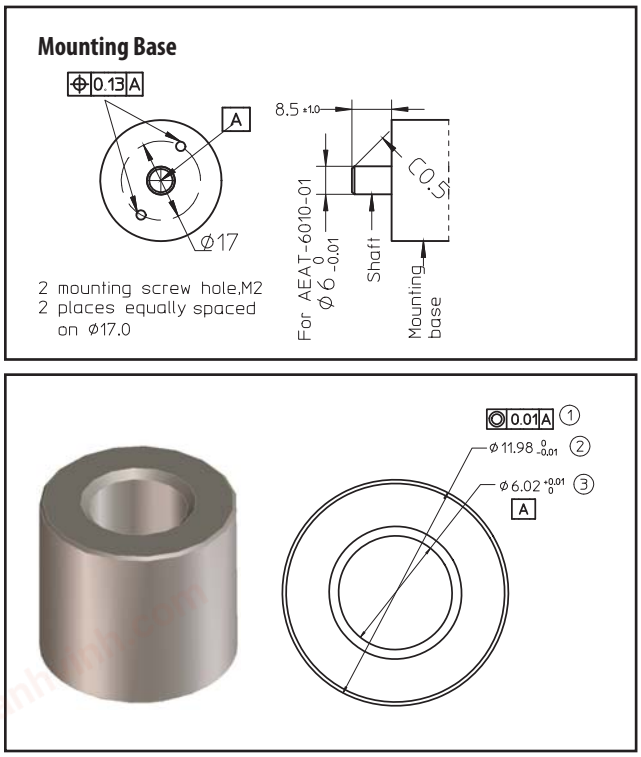



Figure 1. Package and recommended mounting dimension

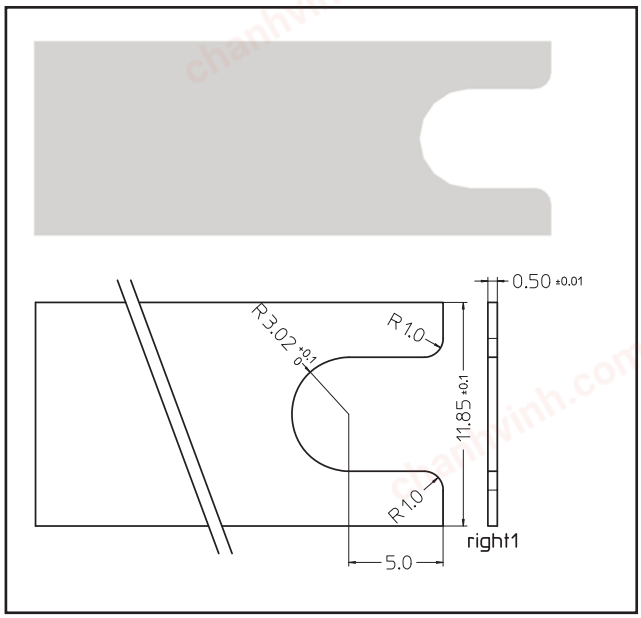
## Mounting Consideration

| # | Parameter | Unit | Values |
|---|---|---|---|
| 1 | Maximum Shaft Axial Play | mm * | ± 0.08 |
| 2 | Maximum Shaft TIR | mm * | 0.05 |
| 3 | Maximum Mechanical Speed | RPM | 12,000 |
| 4 | Shaft Diameter | mm | 6 +0 / -0.01 |
| 5 | Moment Inertia | g-cm2 | 0.104 |
| 6 | Shaft Length | mm | 8.5 ± 1.0 |
| 7 | Mounting Screw Size | mm | M2 x 0.4 x 8 (socket head cap screw, head Ø3.8 ± 0.18mm) |
| 8 | Recommended screw torque | lb.inch | 0.6 |
| 9 | Encoder base plate thickness | mm | 2 |
| 10 | Bolt Circle | mm * | ± 0.13 |

* Recommended to follow these limits for optimum performance




Optional - Centering Jig
(Refer to Application Note for details)

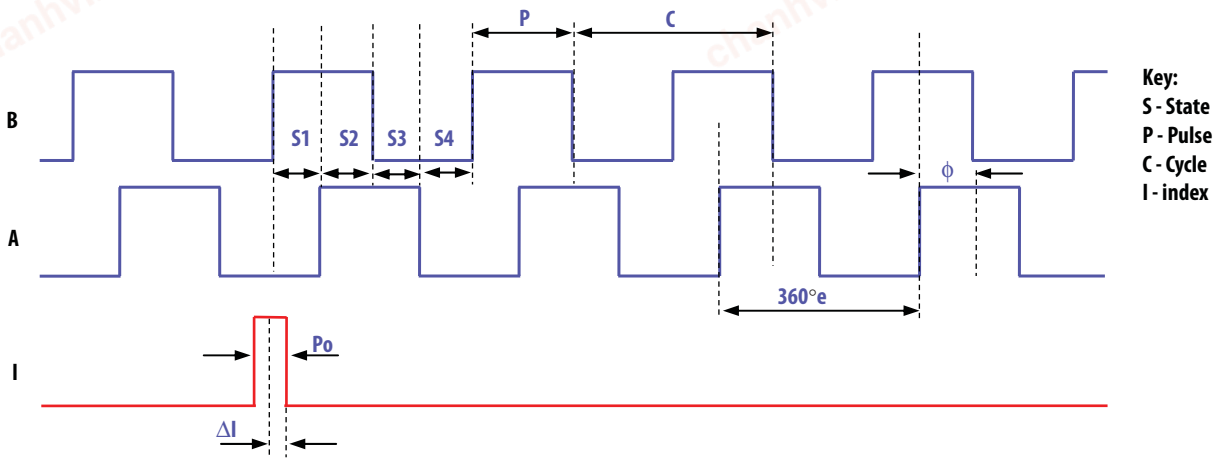



Optional - Base Gap Setting Plate
(Refer to Application Note for details)

Figure 2. Accessories - HEDS-8934, A set of optional centering and gap setting jigs (available for purchase separately)

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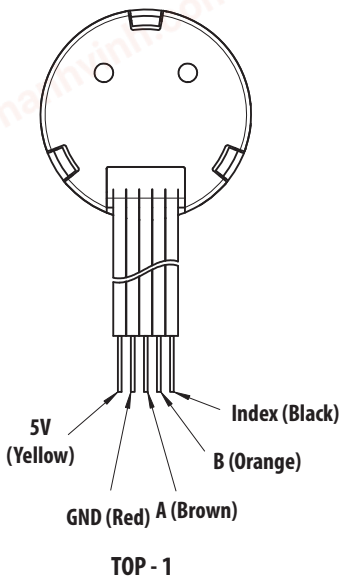
## Output Waveform

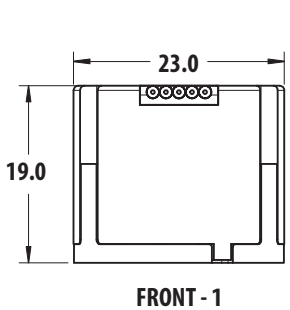


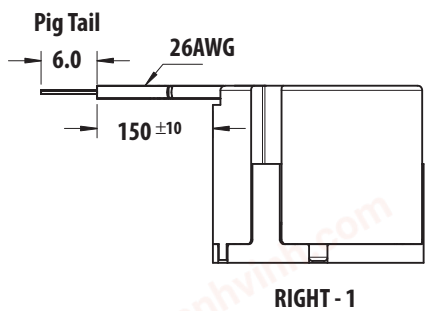

Note: Channel-B leads Channel-A at 90 °e at clockwise direction (top view of the encoder) and Channel-A leads Channel-B at 90 °e at anti-clockwise direction.

**Figure 3. Incremental output waveform**

## Electrical Connections




| Pin | Symbol | Color |
|---|---|---|
| 1 | 5V | Yellow |
| 2 | Gnd | Red |
| 3 | Ch A | Brown |
| 4 | Ch B | Orange |
| 5 | Index | Black |

**Figure 4. Electrical Connections**

## Ordering Information:

| | |
|---|---|
| AEAT-601B-F06 | 256CPR, 3 Channel Incremental, 6mm Hub Size |
| HEDS-8934 | Alignment tools set |

Note: Resolution options of 32,64 and 128CPR is also available.
Contact factory for these options.

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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