Power Over Ethernet (PoE)/PD
Configurable flyback transformer

Product features
- Versatile design allows multiple output variations
- Flyback topology, 250 kHz switching frequency
- Input range from 29.5 V to 60.0 V
- 1500 Vac isolation between primary and secondary
- Three power levels: 4, 7 and 13 watts
- Low leakage inductance
- 11.0 V @ 0.10 A feedback winding
- Ferrite core material

Applications
- For IEEE 802.3af-compliant Power-over-Ethernet applications
- UPS, VoIP phone, Wireless LAN access point, Bluetooth access point, Network camera, Building access systems
- Retail point-of-information systems
- Vending and gaming machines

Environmental data
- Storage temperature range (component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant

Eaton
Powering Business Worldwide
## Product specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Watts</th>
<th>Inductance (µH)</th>
<th>Output</th>
<th>DCR/Pri (Ω)</th>
<th>DCR/Sec (Ω)</th>
<th>Leakage Inductance (µH) typ.</th>
<th>Pri Current Pk (Adc)</th>
<th>Turn Ratio</th>
<th>Schematic</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE4X02x3.3-R</td>
<td>4</td>
<td>200</td>
<td>(3x3.0/0.45A)</td>
<td>0.500</td>
<td>0.07</td>
<td>2.75</td>
<td>0.65</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE4X02x5.0-R</td>
<td>4</td>
<td>200</td>
<td>(3x5.0/0.30A)</td>
<td>0.500</td>
<td>0.27</td>
<td>2.50</td>
<td>0.65</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE4X02x12-R</td>
<td>4</td>
<td>200</td>
<td>(2x12.0/0.20A)</td>
<td>0.500</td>
<td>0.740</td>
<td>1.40</td>
<td>0.65</td>
<td>1:0.52</td>
<td>2</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE7X03x3.3-R</td>
<td>7</td>
<td>100</td>
<td>(3x3.0/0.75A)</td>
<td>0.275</td>
<td>0.03</td>
<td>1.00</td>
<td>1.00</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE7X03x5.0-R</td>
<td>7</td>
<td>100</td>
<td>(3x5.0/0.50A)</td>
<td>0.275</td>
<td>0.095</td>
<td>1.00</td>
<td>1.00</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE7X02x12-R</td>
<td>7</td>
<td>100</td>
<td>(2x12.0/0.30A)</td>
<td>0.275</td>
<td>0.250</td>
<td>1.00</td>
<td>1.00</td>
<td>1:0.52</td>
<td>2</td>
<td>Size 1</td>
</tr>
<tr>
<td>PoE13X3x3.3-R</td>
<td>13</td>
<td>100</td>
<td>(3x3.0/0.15A)</td>
<td>0.250</td>
<td>0.032</td>
<td>1.50</td>
<td>1.60</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 2</td>
</tr>
<tr>
<td>PoE13X3x5.0-R</td>
<td>13</td>
<td>100</td>
<td>(3x5.0/0.09A)</td>
<td>0.250</td>
<td>0.075</td>
<td>1.20</td>
<td>1.60</td>
<td>1:0.52</td>
<td>1</td>
<td>Size 2</td>
</tr>
<tr>
<td>PoE13X2x12-R</td>
<td>13</td>
<td>100</td>
<td>(2x12.0/0.06A)</td>
<td>0.250</td>
<td>0.280</td>
<td>1.00</td>
<td>1.70</td>
<td>1:0.52</td>
<td>2</td>
<td>Size 2</td>
</tr>
<tr>
<td>PoE13X3VERS-R</td>
<td>13</td>
<td>100</td>
<td>V1:<a href="mailto:7.0V@0.1A">7.0V@0.1A</a>, V2:(1)<a href="mailto:x3.3V@0.1A">x3.3V@0.1A</a>, V3:<a href="mailto:1.8V@1.1A">1.8V@1.1A</a></td>
<td>0.250</td>
<td>0.03</td>
<td>1.00</td>
<td>1.70</td>
<td>1:0.52</td>
<td>3</td>
<td>Size 2</td>
</tr>
<tr>
<td>PoE13X2VERS-R</td>
<td>13</td>
<td>100</td>
<td>V1:<a href="mailto:5.0V@0.16A">5.0V@0.16A</a>, V2:<a href="mailto:3.3V@0.16A">3.3V@0.16A</a></td>
<td>0.250</td>
<td>0.038</td>
<td>1.20</td>
<td>1.70</td>
<td>1:0.52</td>
<td>2</td>
<td>Size 2</td>
</tr>
</tbody>
</table>

1) Leakage Inductance 200 kHz, 0.01 Vrms, 0.0 Adc
2) Feedback DCR 1.0 Ω maximum @ +20 °C

### Dimensions - mm

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 1</td>
<td>17.1</td>
<td>16.0</td>
<td>22.3</td>
<td>0.7</td>
<td>8.4</td>
<td>3.0</td>
<td>0.1</td>
<td>0.4</td>
<td>14.49</td>
<td>1.79</td>
<td>3.43</td>
<td>16.88</td>
<td>23.74</td>
<td>2.54</td>
<td>0.75</td>
</tr>
<tr>
<td>Size 2</td>
<td>18.0</td>
<td>18.0</td>
<td>24.6</td>
<td>0.7</td>
<td>10.0</td>
<td>3.3</td>
<td>0.1</td>
<td>0.4</td>
<td>14.25</td>
<td>1.75</td>
<td>3.43</td>
<td>19.14</td>
<td>26.0</td>
<td>2.5</td>
<td>0.75</td>
</tr>
</tbody>
</table>

1) Tolerances A - H are ± 0.25 mm unless specified otherwise.
2) Tolerances I - O are ± 0.10 mm unless specified otherwise.

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### Schematics

**Schematic 1**

```
1, 3, 5, 10, 12
   Primary
     Output
```

**Schematic 2**

```
1, 3, 5, 9, 10, 12
   Primary
     Output
```

**Schematic 3**

```
1, 3, 5, 7, 9, 10, 12
   Primary
     Output
```

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Do not route traces or vias underneath the transformer.

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**Technical Data 4316**
**Effective July 2017**

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Configurable flyback transformer

Packaging information - mm

PoE 4 and 7 Watt

- Parts packaged on 13" Diameter reel, 200 parts per reel.

PoE 13 Watt

- Parts packaged on 13" Diameter reel, 140 parts per reel.

SECTION A-A

PoE 4 and 7 Watt

1.5D Ax 1.0W + 0.1 W + 0.0 W
- 0.15 W
1.0W

Pin #1 Indicator

Kc

SECTION A-A

0.75R

PoE 13 Watt

1.5D Ax 1.0W + 0.1 W + 0.0 W
- 0.15 W
1.0W

Kc

SECTION A-A

0.75R

PoE 4 and 7 Watt

A= 22.5 W
B= 6.7 W
C= 2.0 W
K1= 3.7 W

PoE 13 Watt

A= 18.22 mm
B= 24.8 mm
K= 10.3 mm
Solder Reflow Profile

![Solder Reflow Profile diagram]

**Reference JDEC J-STD-020**

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Standard SnPb Solder</th>
<th>Lead (Pb) Free Solder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat and Soak</td>
<td>100°C</td>
<td>150°C</td>
</tr>
<tr>
<td>• Temperature min. (T_{Smin})</td>
<td>150°C</td>
<td>200°C</td>
</tr>
<tr>
<td>• Temperature max. (T_{Smax})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Time (T_{Smin} to T_{Smax}) (t_s)</td>
<td>60-120 Seconds</td>
<td>60-120 Seconds</td>
</tr>
<tr>
<td>Average ramp up rate T_{Smax} to T_D</td>
<td>3°C/ Second Max.</td>
<td>3°C/ Second Max.</td>
</tr>
<tr>
<td>Liquidous temperature (T_L)</td>
<td>183°C</td>
<td>217°C</td>
</tr>
<tr>
<td>Time at liquidous (t_L)</td>
<td>60-150 Seconds</td>
<td>60-150 Seconds</td>
</tr>
<tr>
<td>Peak package body temperature (T_P)*</td>
<td>Table 1</td>
<td>Table 2</td>
</tr>
<tr>
<td>Time (t_P)** within 5 °C of the specified classification temperature (T_D)</td>
<td>20 Seconds**</td>
<td>30 Seconds**</td>
</tr>
<tr>
<td>Average ramp-down rate T_D to T_{Smax}</td>
<td>6°C/ Second Max.</td>
<td>6°C/ Second Max.</td>
</tr>
<tr>
<td>Time 25°C to Peak Temperature</td>
<td>6 Minutes Max.</td>
<td>8 Minutes Max.</td>
</tr>
</tbody>
</table>

* Tolerance for peak profile temperature (T_D) is defined as a supplier minimum and a user maximum.

** Tolerance for time at peak profile temperature (t_P) is defined as a supplier minimum and a user maximum.

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**Table 1 - Standard SnPb Solder (T_D)**

<table>
<thead>
<tr>
<th>Package Thickness</th>
<th>Volume &gt;350</th>
<th>Volume &lt;350</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5mm</td>
<td>235°C</td>
<td>220°C</td>
</tr>
<tr>
<td>≥2.5mm</td>
<td>220°C</td>
<td>220°C</td>
</tr>
</tbody>
</table>

**Table 2 - Lead (Pb) Free Solder (T_D)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.6mm</td>
<td>260°C</td>
<td>260°C</td>
<td>260°C</td>
</tr>
<tr>
<td>1.6 - 2.5mm</td>
<td>260°C</td>
<td>250°C</td>
<td>245°C</td>
</tr>
<tr>
<td>&gt;2.5mm</td>
<td>250°C</td>
<td>245°C</td>
<td>245°C</td>
</tr>
</tbody>
</table>

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