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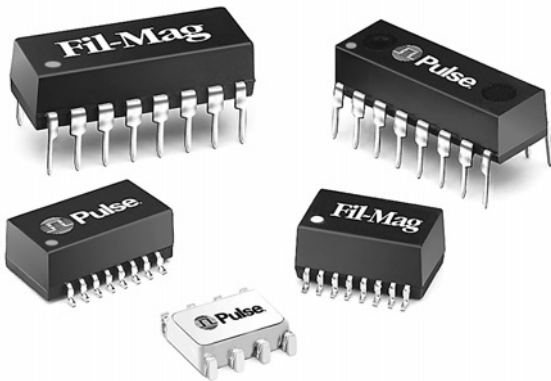
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# ISOLATION TRANSFORMERS FOR 10BASE-T

For Adapter Cards, MAUs, Hubs,  
and Motherboard Applications



- Designed to meet or exceed IEEE 802.3, 10Base-T specifications
- Available with common mode chokes for EMI suppression
- Surface mount, IC grade, transfer-molded package withstands 235°C peak temperature profile
- Through hole, auto-insertable, 16-pin DIP package

## Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

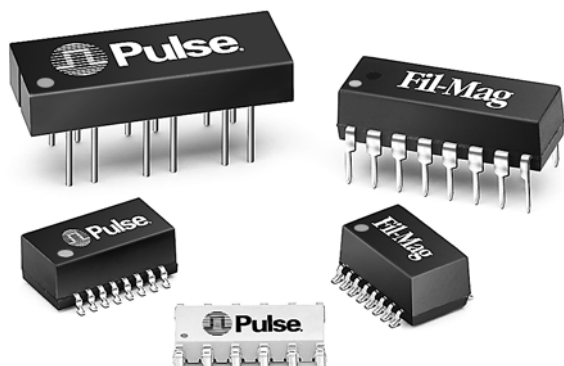
| Part Number                | Turns Ratio (±5%) |          | Primary Pins       | Common Mode Choke | Sine Wave Inductance OCL <sup>1</sup> (μH MIN) | Interwinding Capacitance C <sub>ww</sub> <sup>1</sup> (pF MAX) | Leakage Inductance L <sub>L</sub> <sup>1</sup> (μH MAX) | DCR (Ω MAX) | Hi-Pot (Vrms) | Schem.    | Mech.     |
|----------------------------|-------------------|----------|--------------------|-------------------|------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|-------------|---------------|-----------|-----------|
|                            | Transmit          | Receive  |                    |                   |                                                |                                                                |                                                         |             |               |           |           |
| SURFACE MOUNT <sup>2</sup> |                   |          |                    |                   |                                                |                                                                |                                                         |             |               | pages 6-7 | pages 8-9 |
| PE-65454                   | 1:1.414           | 1:1      | 3-4/1-2            |                   | 140                                            | 12                                                             | 0.2                                                     | 0.4         | 2000          | T1        | SMT2      |
| E5017                      | 1CT:1CT           | 1CT:1CT  | 1-3/6-8            | X                 | 200                                            | 10                                                             | 0.25                                                    | 1.0         | 1500          | T6        | SMT4      |
| PE-65726                   | 1CT:1CT           | 1CT:1CT  | 1-3/6-8            |                   | 200                                            | 10                                                             | 0.2                                                     | 0.3         | 2000          | T4        | SMT4      |
| 23Z114SM                   | 1CT:1CT           | 1CT:1CT  | 1-3/6-8            |                   | 200                                            | 12                                                             | 0.3                                                     | 0.3         | 2000          | T4        | SMT5      |
| PE-68048                   | 1CT: 1.414CT      | 1CT:1CT  | 6-8/1-3            | X                 | 110                                            | 15                                                             | 0.4                                                     | 1.0         | 1500          | T5        | SMT4      |
| PE-65745                   | 1CT: 1.414CT      | 1CT:1CT  | 6-8/1-3            |                   | 140                                            | 12                                                             | 0.2                                                     | 0.3         | 2000          | T4        | SMT4      |
| 23Z128SM                   | 1CT:1.414CT       | 1CT:1CT  | 6-8/1-3            |                   | 200                                            | 15                                                             | 0.5                                                     | 0.4         | 2000          | T4        | SMT5      |
| E2023                      | 1CT: 2.5CT        | 1CT: 1CT | 6-8/1-3            | X                 | 200                                            | 15                                                             | 0.5                                                     | 0.4         | 2000          | T10       | SMT4      |
| E4005                      | 1CT: 2.5CT        | 1CT: 1CT | 6-8/1-3            | X                 | 200                                            | 10                                                             | 0.4                                                     | 0.5         | 1500          | T10       | SMT4      |
| EX2024 <sup>3</sup>        | 1CT: 2.5CT        | 1CT:1CT  | 6-8/1-3            | X                 | 350                                            | 30                                                             | 0.8                                                     | 0.6         | 2000          | T10       | SMT4      |
| 23Z356SM                   | 1CT:1.414CT       | 1CT:1CT  | 6-8/1-3            | X                 | 200                                            | 12                                                             | 0.5                                                     | 0.6         | 2000          | T7        | SMT5      |
| 23Z435SM                   | 2CT:1CT           | 1CT:1CT  | 1-3/6-8            |                   | 100                                            | 10                                                             | 0.4                                                     | 0.5         | 2000          | T4        | SMT5      |
| PE-68052                   | 2CT:1CT           | 1CT:1CT  | 1-3/6-8            | X                 | 140                                            | 12                                                             | 0.3                                                     | 1.0         | 1500          | T6        | SMT4      |
| E4001                      | 1CT:2CT           | 1CT:1CT  | 6-8/1-3            | X                 | 112                                            | 8                                                              | 0.3                                                     | 0.8         | 3000          | T5        | SMT4      |
| PE-68041                   | 1CT:2CT           | 1CT:1CT  | 6-8/1-3            |                   | 112                                            | 8                                                              | 0.3                                                     | 0.5         | 1500          | T4        | SMT4      |
| 23Z467SM                   | 1CT:2CT           | 1CT:1CT  | 6-8/1-3            | X                 | 140                                            | 12                                                             | 0.2                                                     | 0.6         | 2000          | T7        | SMT5      |
| PE-68023                   | 1CT:2CT           | 1CT:1CT  | 1-3/6-8            | X                 | 200                                            | 12                                                             | 0.3                                                     | 1.0         | 1500          | T6        | SMT4      |
| PE-68042                   | 2.828CT:1         | 1:1      | 2-4/7-9            |                   | 200                                            | 14                                                             | 1                                                       | 0.5         | 1500          | T9        | SMT1      |
| PE-68810                   | —                 | 1:1 (4X) | 1-2/3-4            |                   | 140                                            | 12                                                             | 0.2                                                     | 0.4         | 2000          | T3        | SMT4      |
| PE-68820                   | 1:1.414 (4X)      | —        | 1-2/3-4<br>5-6/7-8 |                   | 140                                            | 12                                                             | 0.2                                                     | 0.4         | 2000          | T3        | SMT4      |
| THROUGH HOLE               |                   |          |                    |                   |                                                |                                                                |                                                         |             |               | pages 6-7 | page 10   |
| 23Z435                     | 2CT:1CT           | 1CT:1CT  | 1-3/6-8            |                   | 80                                             | 10                                                             | 0.4                                                     | 0.5         | 2000          | T4        | TH3       |
| 23Z128                     | 1CT: 2CT          | 1CT:1CT  | 6-8/1-3            |                   | 140                                            | 15                                                             | 0.5                                                     | 0.4         | 2000          | T4        | TH3       |
| PE-65263                   | 1CT:1CT           | 1CT:1CT  | 1-3/6-8            |                   | 200                                            | 15                                                             | 0.25                                                    | 0.3         | 2000          | T4        | TH4       |

### NOTES:

- OCL, C<sub>ww</sub> and L<sub>L</sub> are measured at 20 mVrms, 100 kHz.
- To order Tape & Reel packaging for surface mount parts, add the suffix "T" to the part number. Example: PE-65454T. The "T" will appear on all paper work, but will not be marked on parts.
- Part numbers denoted "EX" are extended temperature parts -40°C to 85°C, electrical specifications @ 25°C.

# ISOLATION TRANSFORMERS FOR ETHERNET

## AUI Transformers



- Low leakage inductance and coupling capacitance for faster rise times
- Small form factor, 50 mil lead spacing
- Through hole, auto-insertable, 16-pin DIP package

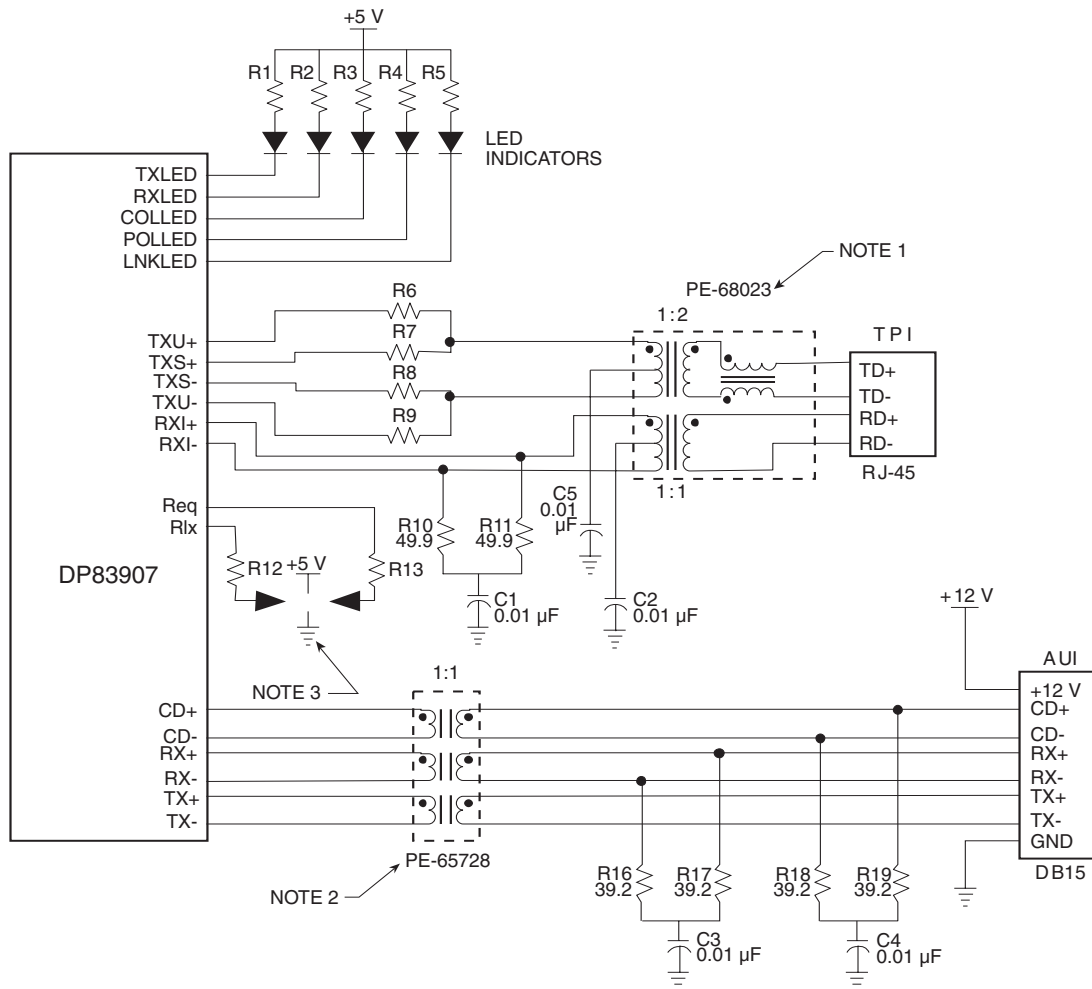
### Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

| Part Number                | Turns Ratio (±5%) | Primary Pins | Primary Sine Wave OCL <sup>1</sup> (μH ±20%) | Primary ET-Constant (V-μs MIN) | Rise Time <sup>2</sup> (ns MAX) | Interwinding Capacitance C <sub>ww</sub> <sup>1</sup> (pF MAX) | Leakage Inductance L <sub>L</sub> <sup>1</sup> (μH MAX) | DCR (Ω MAX) | Schem.    | Mech.     | Hipot (Vrms) |
|----------------------------|-------------------|--------------|----------------------------------------------|--------------------------------|---------------------------------|----------------------------------------------------------------|---------------------------------------------------------|-------------|-----------|-----------|--------------|
| SURFACE MOUNT <sup>3</sup> |                   |              |                                              |                                |                                 |                                                                |                                                         |             | pages 6-7 | pages 8-9 |              |
| E6002                      | 1:1               | 1-2/4-5/7-8  | 40 (MIN)                                     | 2.1                            | 3.0                             | 8                                                              | 0.20                                                    | 0.25        | T2        | SMT4      | 2000         |
| PE-65723                   | 1:1               | 1-2/4-5/7-8  | 75                                           | 1.8                            | 3.0                             | 8                                                              | 0.20                                                    | 0.30        | T2        | SMT4      | 2000         |
| PE-68801                   | 1:1               | 1-2/3-4/5-6  | 75                                           | 1.8                            | 3.0                             | 12                                                             | 0.20                                                    | 0.30        | T8        | SMT3      | 2000         |
| 23Z90SM                    | 1:1               | 1-2/4-5/7-8  | 75                                           | 2.4                            | 3.0                             | 10                                                             | 0.20                                                    | 0.20        | T2        | SMT5      | 2000         |
| PE-65728                   | 1:1               | 1-2/4-5/7-8  | 100                                          | 1.8                            | 3.0                             | 9                                                              | 0.20                                                    | 0.30        | T2        | SMT4      | 2000         |
| 23Z91SM                    | 1:1               | 1-2/4-5/7-8  | 100                                          | 2.4                            | 3.0                             | 10                                                             | 0.20                                                    | 0.30        | T2        | SMT5      | 2000         |
| PE-65727                   | 1:1               | 1-2/4-5/7-8  | 150                                          | 1.2                            | 3.0                             | 12                                                             | 0.20                                                    | 0.30        | T2        | SMT4      | 2000         |
| PE-65733                   | 1:1               | 1-2/4-5/7-8  | 350                                          | 2.6                            | 3.5                             | 16                                                             | 0.30                                                    | 0.35        | T2        | SMT4      | 2000         |
| 23Z108SM                   | 1:1               | 1-2/4-5/7-8  | 350                                          | 2.5                            | 3.5                             | 16                                                             | 0.30                                                    | 0.35        | T2        | SMT5      | 2000         |
| THROUGH HOLE               |                   |              |                                              |                                |                                 |                                                                |                                                         |             | pages 6-7 | page 10   |              |
| PE-64102                   | 1:1               | 1-2/4-5/7-8  | 75                                           | 2.1                            | 3.0                             | 10                                                             | 0.20                                                    | 0.20        | T2        | TH4       | 500          |
| PE-64107                   | 1:1               | 1-2/4-5/7-8  | 75                                           | 2.4                            | 3.5                             | 10                                                             | 0.25                                                    | 0.30        | T2        | TH2       | 2000         |
| PE-64502                   | 1:1               | 1-2/4-5/7-8  | 75                                           | 2.1                            | 3.0                             | 10                                                             | 0.20                                                    | 0.20        | T2        | TH4       | 2000         |
| PE-64103                   | 1:1               | 1-2/4-5/7-8  | 100                                          | 2.1                            | 3.0                             | 10                                                             | 0.20                                                    | 0.30        | T2        | TH4       | 500          |
| PE-64108                   | 1:1               | 1-2/4-5/7-8  | 100                                          | 2.1                            | 3.5                             | 10                                                             | 0.25                                                    | 0.40        | T2        | TH2       | 2000         |
| PE-64503                   | 1:1               | 1-2/4-5/7-8  | 100                                          | 2.1                            | 3.0                             | 10                                                             | 0.20                                                    | 0.30        | T2        | TH4       | 2000         |
| PE-64104                   | 1:1               | 1-2/4-5/7-8  | 150                                          | 2.1                            | 3.5                             | 12                                                             | 0.20                                                    | 0.30        | T2        | TH4       | 500          |
| PE-64109                   | 1:1               | 1-2/4-5/7-8  | 150                                          | 3.0                            | 3.0                             | 15                                                             | 0.20                                                    | 0.45        | T2        | TH2       | 2000         |

#### NOTES:

- OCL, C<sub>ww</sub> and L<sub>L</sub> are measured at 20 mVrms, 100 kHz.
- Rise time is measured in 75 Ω systems.
- To order Tape & Reel packaging for surface mount parts, add the suffix "T" to the part number.  
Example: PE-65723T. The "T" will appear on all paper work, but will not be marked on parts.

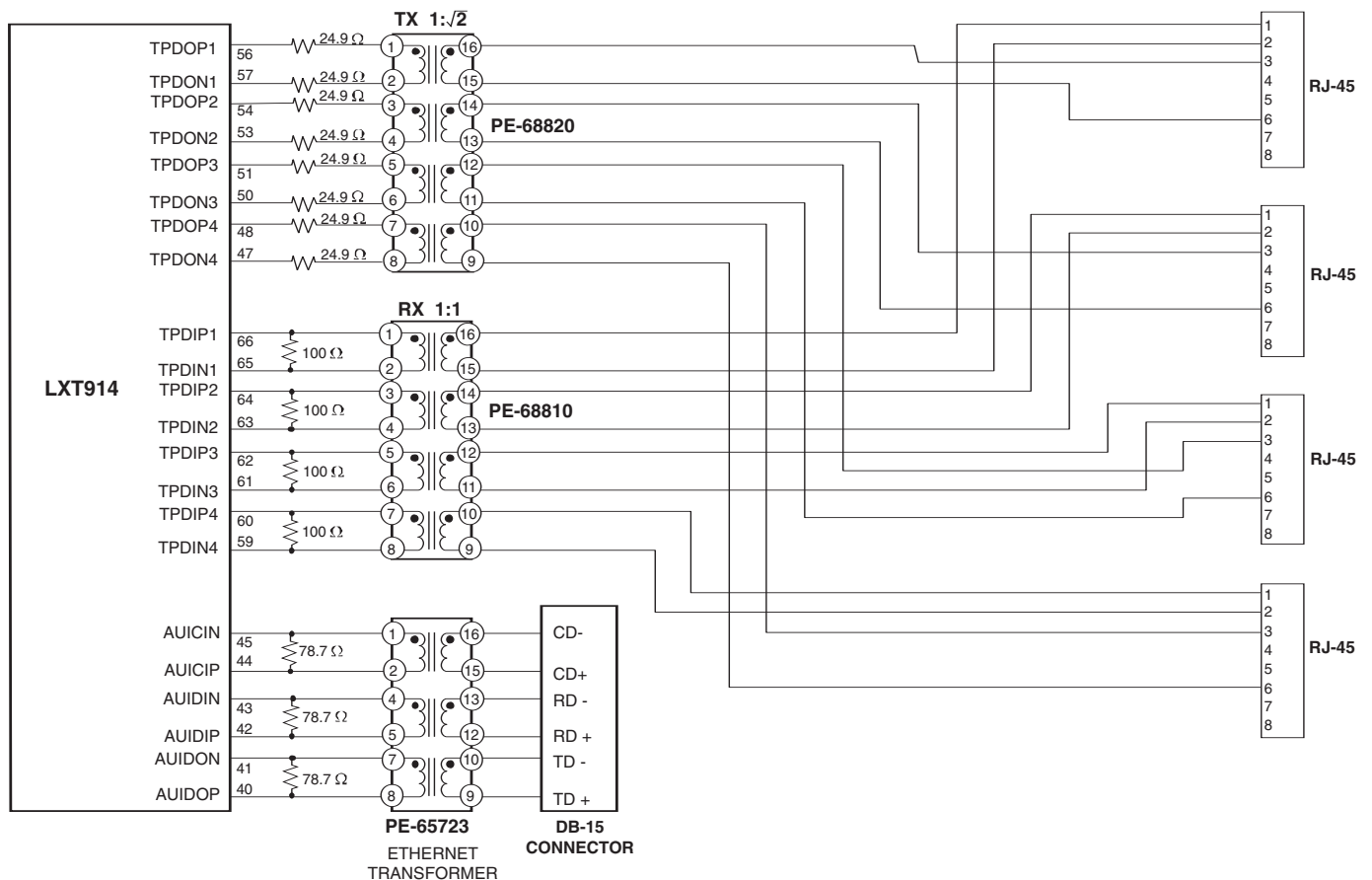
## Typical Application Circuit



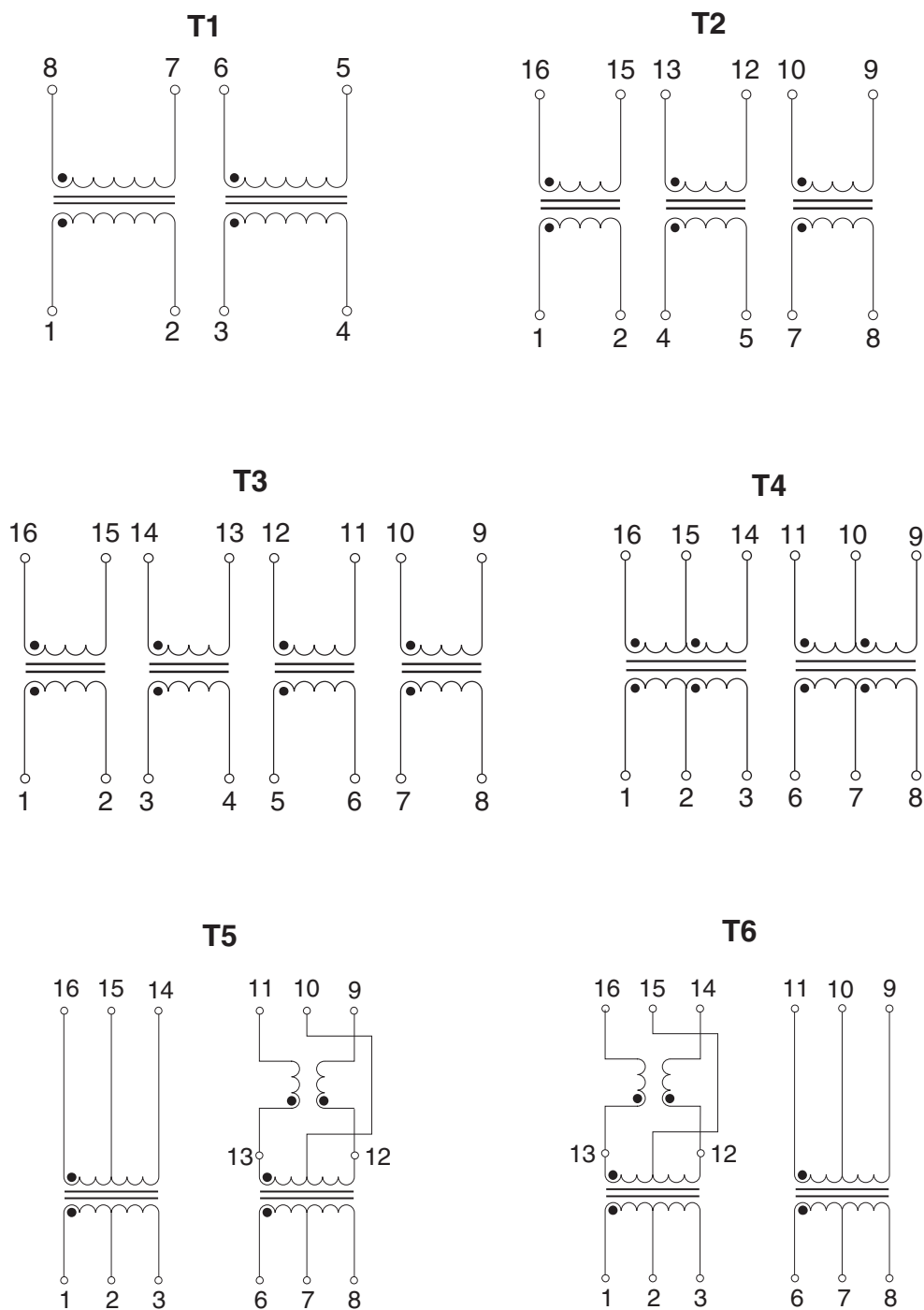
### NOTES:

- Connections at pins 12 and 13 apply to PE-68023 only. These are test points. **Do not ground.**
- For specific information, see pages 2 and 3 in this catalog.
- For specific connection, refer to National's Application Notes.

## Typical 10Base-T Application Circuit

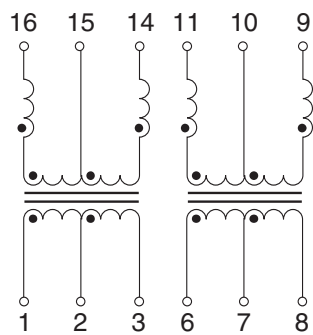


## Schematics

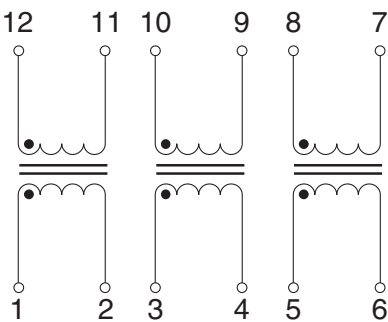


Schematics (continued)

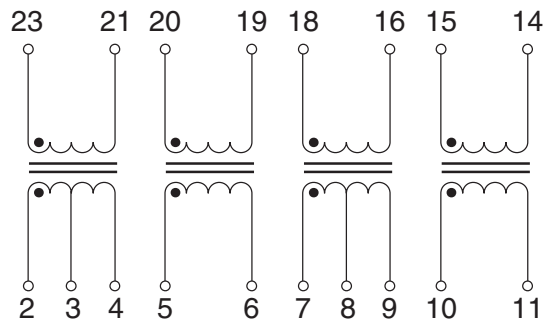
T7



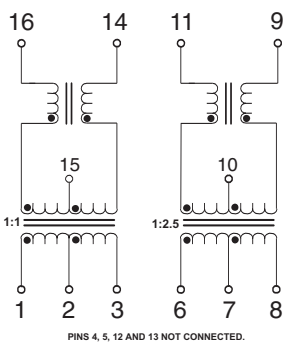
T8



T9



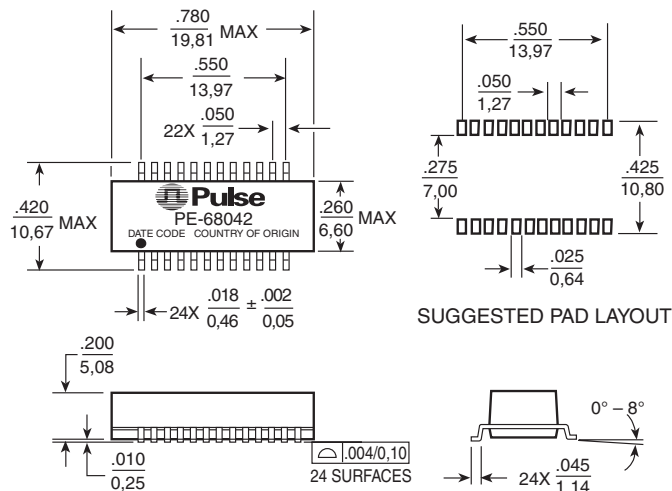
T10





## Surface Mount Mechanicals

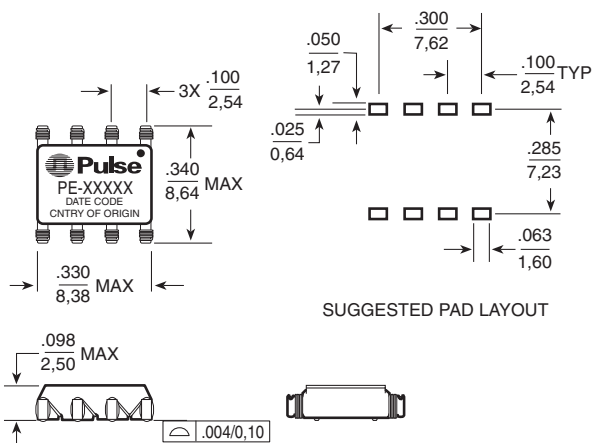
### SMT1



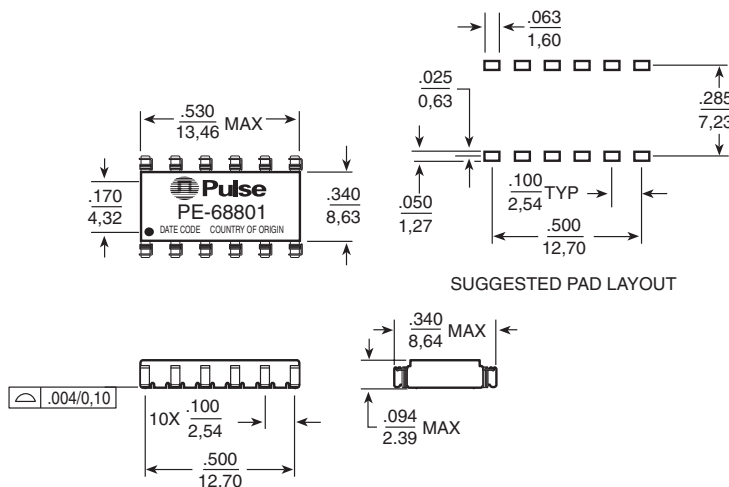
**Dimensions:**  $\frac{\text{Inches}}{\text{mm}}$   
 Unless otherwise specified,  
 all tolerances are  $\pm .010$   
 0,25

**Weight** ..... 1.15 grams  
**Tube** ..... .25/tube  
**Tape & Reel** ..... .350/reel

### SMT2



### SMT3



**Weight** ..... 0.22 grams  
**Tube** ..... .60/tube  
**Tape & Reel** ..... .1500/reel

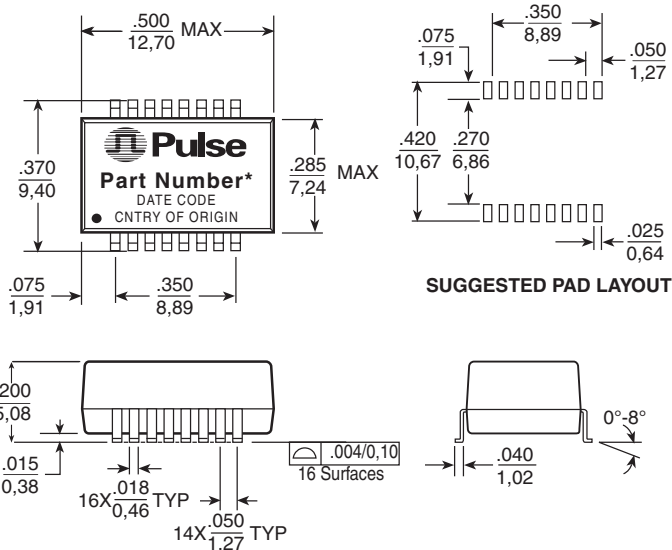
**Dimensions:**  $\frac{\text{Inches}}{\text{mm}}$  Unless otherwise specified, all tolerances are  $\pm .010$   
 0,25

**Weight** ..... 0.28 grams  
**Tube** ..... .35/tube  
**Tape & Reel** ..... .1500/reel




**Surface Mount Mechanicals (continued)**
**SMT4**

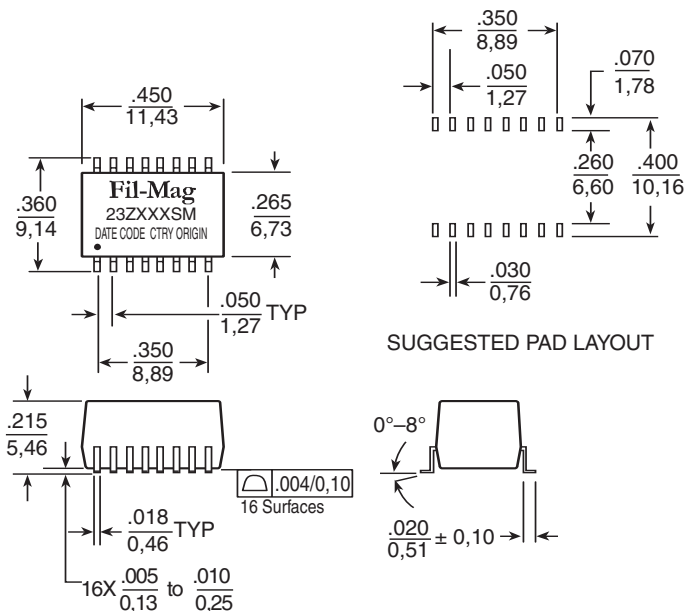
\*PE-6XXXX, EXXX, EX2XXX


**Dimensions:**  $\frac{\text{Inches}}{\text{mm}}$ 

 Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$ 
**Weight** ..... 0.82 grams

**Tube** ..... .40/tube

**Tape & Reel** ..... .900/reel

**SMT5**

**Dimensions:**  $\frac{\text{Inches}}{\text{mm}}$ 

 Unless otherwise specified, all tolerances are  $\pm \frac{.005}{0,13}$ 
**Weight** ..... 0.85 grams

**Tube** ..... .50/tube

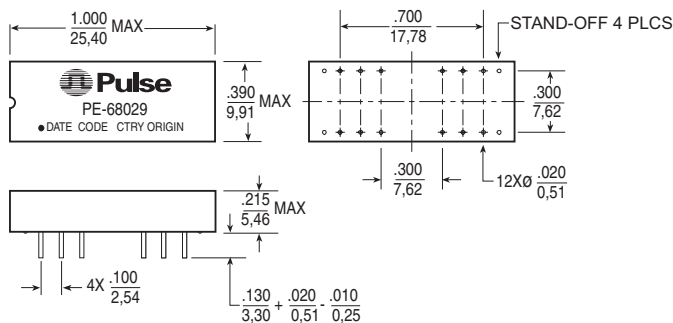
**Tape & Reel** ..... .750/reel

# ISOLATION TRANSFORMERS



## Through Hole Mechanicals

### TH1



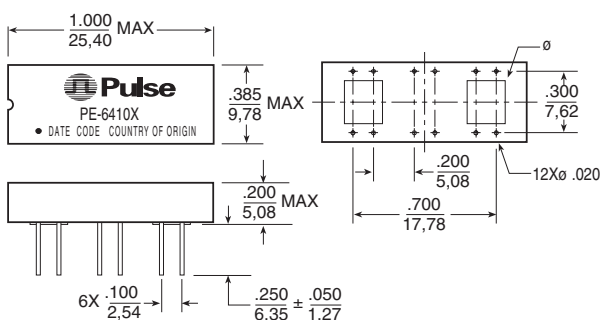
Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

Weight ..... 2.17 grams

Tube ..... .20/tube

### TH2



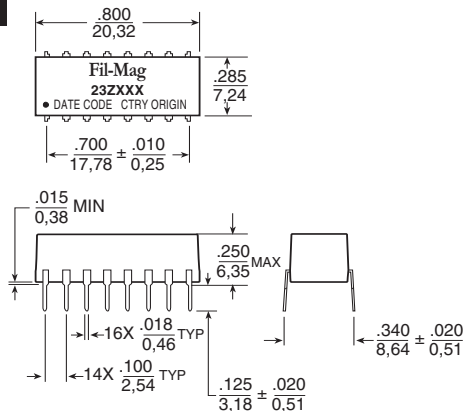
Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

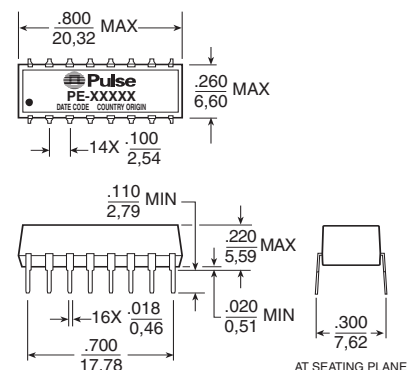
Weight ..... 2.18 grams

Tube ..... .20/tube

### TH3



### TH4



Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified, all tolerances are  $\pm \frac{.005}{0,13}$

Weight ..... 1.7 grams

Tube ..... .28/tube

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$  Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

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