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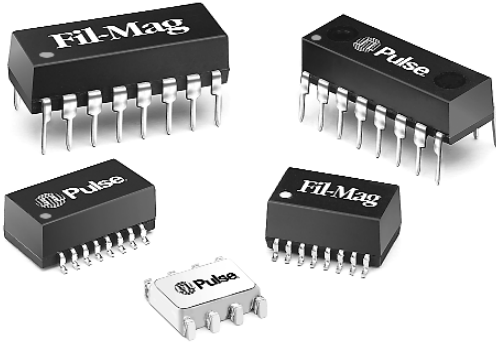
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# ISOLATION TRANSFORMERS FOR 10BASE-T

## For Adapter Cards, MAUs, Hubs, and Motherboard Applications



- ⊕ For RoHS part add suffix **NL**<sup>4</sup>
- ⊕ RoHS “**NL**” peak solder rating 260°C, non-RoHS peak solder rating 235°C
- ⊕ Meets IEEE 802.3 specification
- ⊕ Available with common mode chokes for EMI suppression
- ⊕ Through hole, auto-insertable, 16-pin DIP package

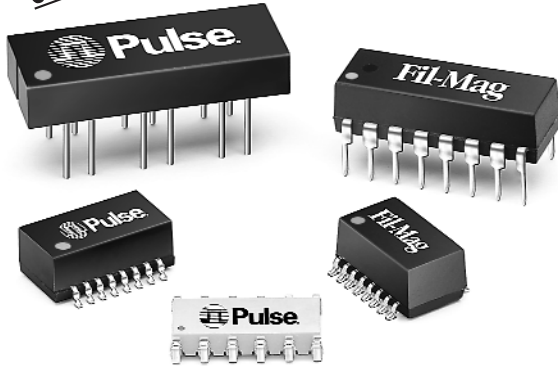
### Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

Part Number	RoHS <sup>4</sup>	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)	Hipot (Vrms)	Schem.	Mech.	
		Transmit	Receive										
<b>SURFACE MOUNT<sup>2</sup></b>												pages 6-7	pages 8-9
23Z114SM	5, 6c	1CT:1CT	1CT:1CT	1-3/6-8		200	12	0.3	0.3	2000	T4	SMT5	
23Z128SM	5, 6c	1CT:1.414CT	1CT:1CT	6-8/1-3		200	15	0.5	0.4	2000	T4	SMT5	
23Z356SM	5, 6c	1CT:1.414CT	1CT:1CT	6-8/1-3	X	200	12	0.5	0.6	2000	T7	SMT5	
23Z435SM	5, 6c	2CT:1CT	1CT:1CT	1-3/6-8		100	10	0.4	0.5	2000	T4	SMT5	
23Z467SM	5, 6c	1CT:2CT	1CT:1CT	6-8/1-3	X	140	12	0.2	0.6	2000	T7	SMT5	
E2023	NL <sup>6a</sup>	1CT: 2.5CT	1CT: 1CT	6-8/1-3	X	200	15	0.5	0.4	2000	T10	SMT4	
E4001	5, 6c	1CT:2CT	1CT:1CT	6-8/1-3	X	112	8	0.3	0.8	3000	T5	SMT4	
E4005	5, 6c	1CT: 2.5CT	1CT: 1CT	6-8/1-3	X	200	10	0.4	0.5	1500	T10	SMT4	
E5017	5, 6c	1CT:1CT	1CT:1CT	1-3/6-8	X	200	10	0.25	1.0	1500	T6	SMT4	
EX2024 <sup>3</sup>	5, 6a	1CT: 2.5CT	1CT:1CT	6-8/1-3	X	350	30	0.8	0.6	2000	T10	SMT4	
PE-65454	5, 6a	1:1.414	1:1	3-4/1-2		140	12	0.2	0.4	2000	T1	SMT2	
PE-65726	5, 6c	1CT:1CT	1CT:1CT	1-3/6-8		200	10	0.2	0.3	2000	T4	SMT4	
PE-65745	5, 6c	1CT: 1.414CT	1CT:1CT	6-8/1-3		140	12	0.2	0.3	2000	T4	SMT4	
PE-68023	5, 6c	1CT:2CT	1CT:1CT	1-3/6-8	X	200	12	0.3	1.0	1500	T6	SMT4	
PE-68041	5, 6c	1CT:2CT	1CT:1CT	6-8/1-3		112	8	0.3	0.5	1500	T4	SMT4	
PE-68042	5, 6c	2.828CT:1	1:1	2-4/7-9		200	14	1	0.5	1500	T9	SMT1	
PE-68048	5, 6c	1CT: 1.414CT	1CT:1CT	6-8/1-3	X	110	15	0.4	1.0	1500	T5	SMT4	
PE-68052	5, 6c	2CT:1CT	1CT:1CT	1-3/6-8	X	140	12	0.3	1.0	1500	T6	SMT4	
PE-68810	5, 6c	—	1:1 (4X)	1-2/3-4		140	12	0.2	0.4	2000	T3	SMT4	
PE-68820	5, 6c	1:1.414 (4X)	—	1-2/3-4 5-6/7-8		140	12	0.2	0.4	2000	T3	SMT4	
<b>THROUGH HOLE</b>												pages 6-7	page 10
23Z128	5, 6a	1CT: 2CT	1CT:1CT	6-8/1-3		140	15	0.5	0.4	2000	T4	TH3	
23Z435	5, 6a	2CT:1CT	1CT:1CT	1-3/6-8		80	10	0.4	0.5	2000	T4	TH3	
PE-65263	5, 6a	1CT:1CT	1CT:1CT	1-3/6-8		200	15	0.25	0.3	2000	T4	TH4	

#### NOTES:

1. OCL, C<sub>ww</sub> and L<sub>L</sub> are measured at 20 mVrms, 100 kHz.
2. For Tape & Reel packaging, add a suffix “T” to the end of the part number when ordering. e.g. E2023T.
3. Part numbers denoted “EX” are extended temperature parts -40°C to 85°C, electrical specifications @ 25°C.
4. Add suffix **NL** for RoHS compliant parts, e.g: E2023 changes to E2023**NL** or E2023**NLT** (for Tape & Reel).
5. Contact Pulse for RoHS compliant part availability.
6. MSL=Moisture Sensitivity Level a=1 b=2 c=3 d=4 e=5.

# ISOLATION TRANSFORMERS FOR ETHERNET AUI Transformers



- ⊕ For RoHS part add suffix **NL**<sup>4</sup>
- ⊕ RoHS “NL” peak solder rating 260°C, non-RoHS peak solder rating 235°C
- ⊕ 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

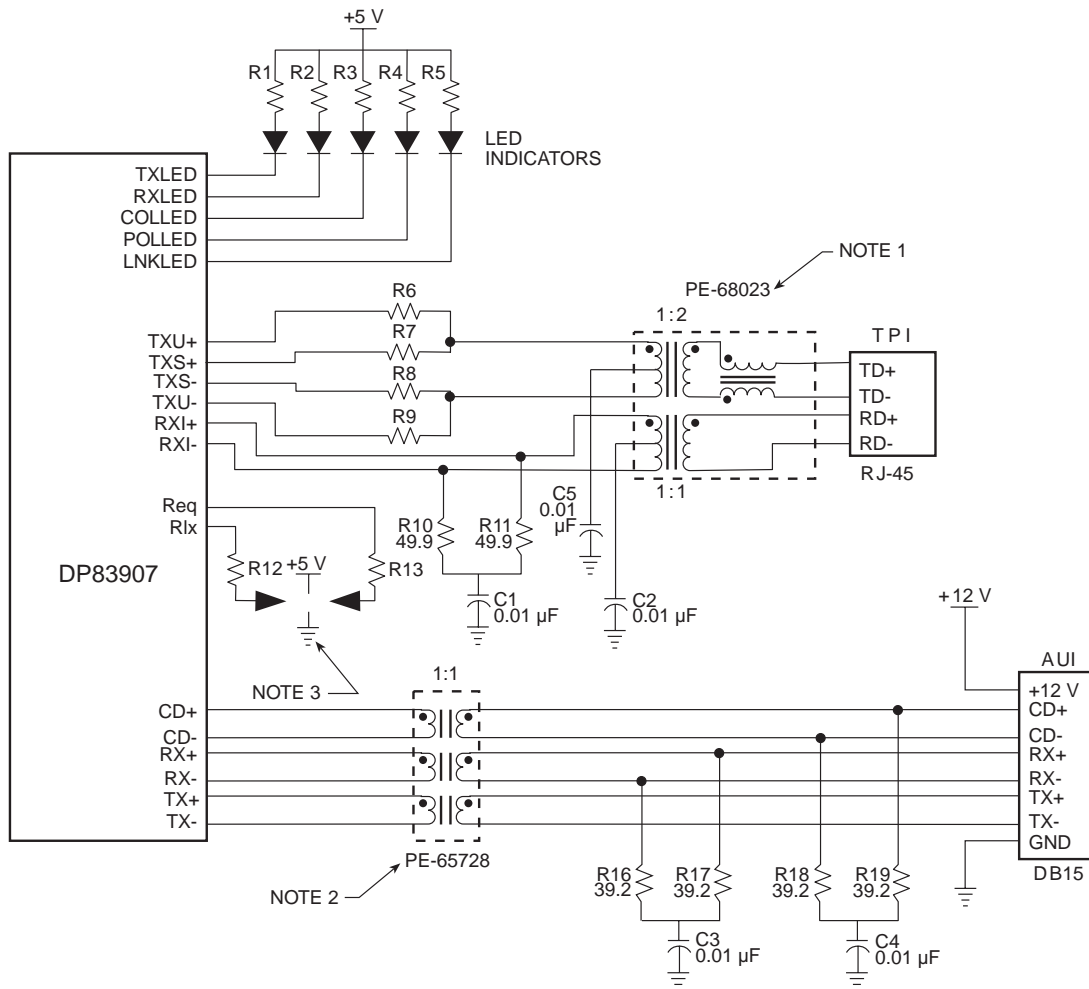
## Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

Part <sup>3</sup> Number	RoHS <sup>4</sup>	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)
<b>SURFACE MOUNT<sup>3</sup></b>										pages 6-7 pages 8-9		
23Z90SM	5, 6c	1:1	1-2/4-5/7-8	75	2.4	3.0	10	0.20	0.20	T2	SMT5	2000
23Z91SM	5, 6c	1:1	1-2/4-5/7-8	100	2.4	3.0	10	0.20	0.30	T2	SMT5	2000
23Z108SM	5, 6c	1:1	1-2/4-5/7-8	350	2.5	3.5	16	0.30	0.35	T2	SMT5	2000
E6002	5, 6c	1:1	1-2/4-5/7-8	40 (MIN)	2.1	3.0	8	0.20	0.25	T2	SMT4	2000
PE-65723	5, 6c	1:1	1-2/4-5/7-8	75	1.8	3.0	8	0.20	0.30	T2	SMT4	2000
PE-65727	5, 6c	1:1	1-2/4-5/7-8	150	1.2	3.0	12	0.20	0.30	T2	SMT4	2000
PE-65728	5, 6c	1:1	1-2/4-5/7-8	100	1.8	3.0	9	0.20	0.30	T2	SMT4	2000
PE-68801	5, 6c	1:1	1-2/3-4/5-6	75	1.8	3.0	12	0.20	0.30	T8	SMT3	2000
<b>THROUGH HOLE</b>										pages 6-7 page 10		
PE-64102	5, 6a	1:1	1-2/4-5/7-8	75	2.1	3.0	10	0.20	0.20	T2	TH4	500
PE-64103	5, 6a	1:1	1-2/4-5/7-8	100	2.1	3.0	10	0.20	0.30	T2	TH4	500
PE-64104	5, 6a	1:1	1-2/4-5/7-8	150	2.1	3.5	12	0.20	0.30	T2	TH4	500
PE-64107	5, 6a	1:1	1-2/4-5/7-8	75	2.4	3.5	10	0.25	0.30	T2	TH2	2000
PE-64108	5, 6a	1:1	1-2/4-5/7-8	100	2.1	3.5	10	0.25	0.40	T2	TH2	2000
PE-64109	5, 6a	1:1	1-2/4-5/7-8	150	3.0	3.0	15	0.20	0.45	T2	TH2	2000
PE-64502	5, 6a	1:1	1-2/4-5/7-8	75	2.1	3.0	10	0.20	0.20	T2	TH4	2000
PE-64503	5, 6a	1:1	1-2/4-5/7-8	100	2.1	3.0	10	0.20	0.30	T2	TH4	2000

### NOTES:

1. OCL, C<sub>ww</sub> and L<sub>L</sub> are measured at 20 mVrms, 100 kHz.
2. Rise time is measured in 75 Ω systems.
3. For Tape & Reel packaging, add a suffix “T” to the end of the part number when ordering. e.g. PE-65723T.
4. Add suffix **NL** for RoHS compliant parts, e.g: 23Z91SM changes to 23Z91SMNL or 23Z91SMNLT (for Tape & Reel).
5. Contact Pulse for RoHS compliant part availability.
6. MSL=Moisture Sensitivity Level a=1 b=2 c=3 d=4 e=5.

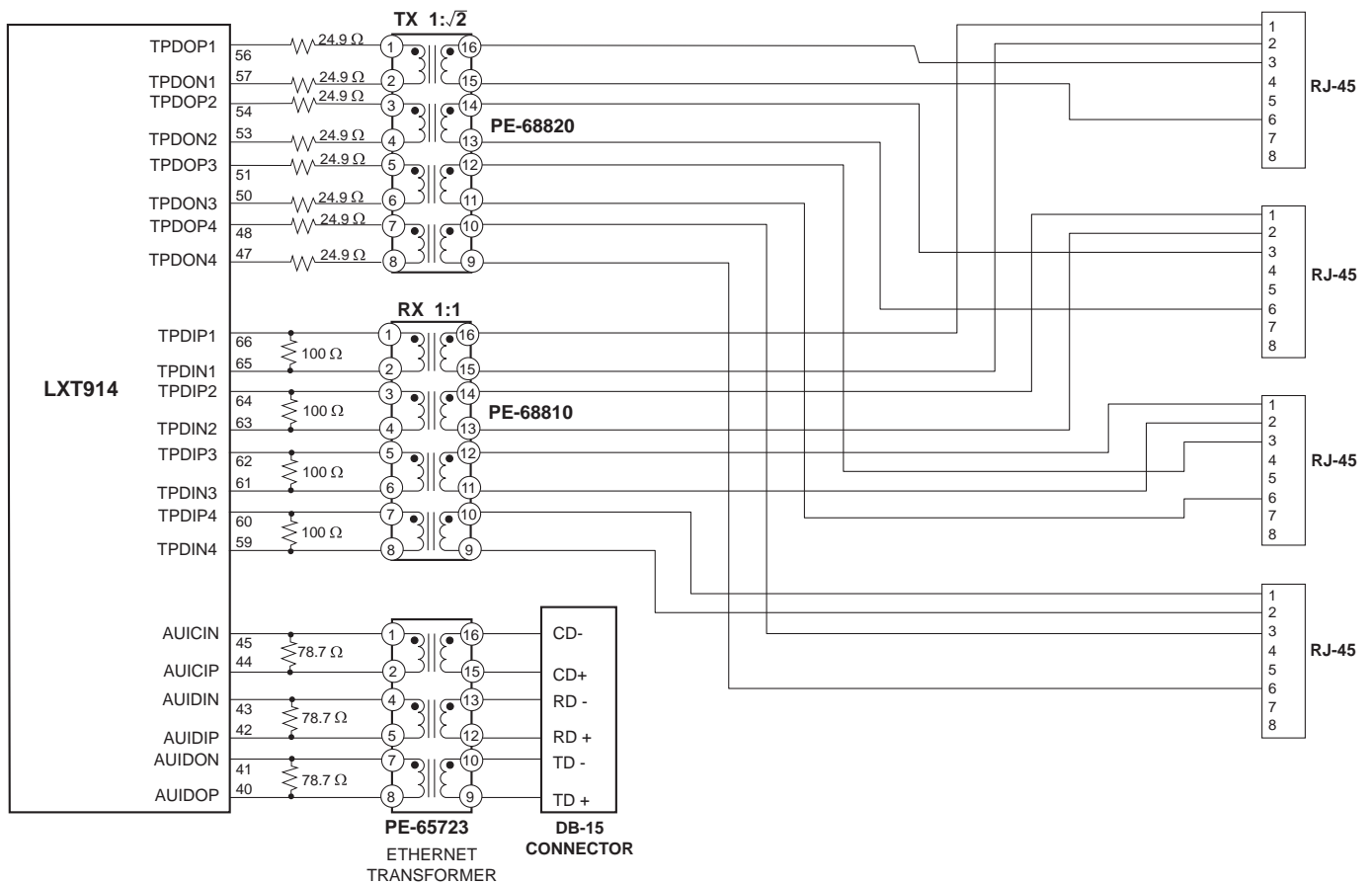
## Typical Application Circuit



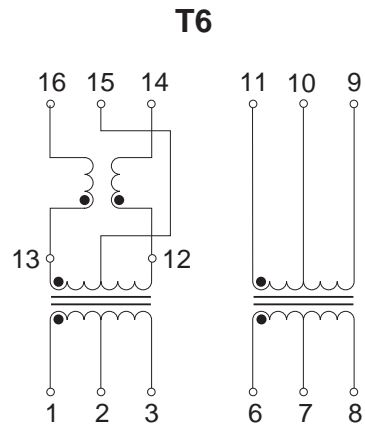
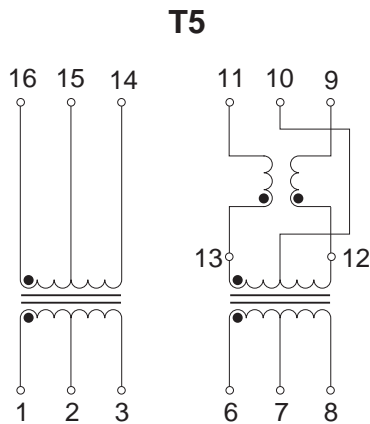
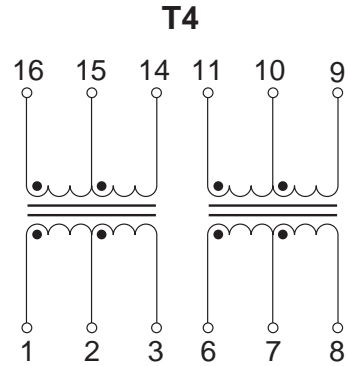
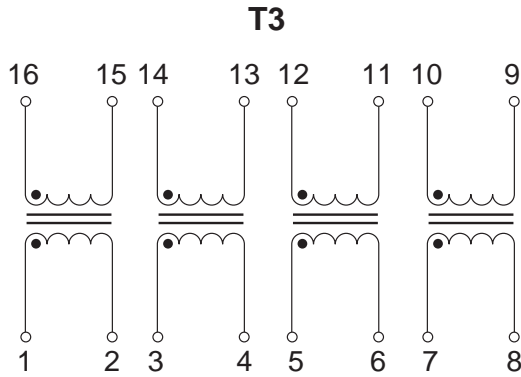
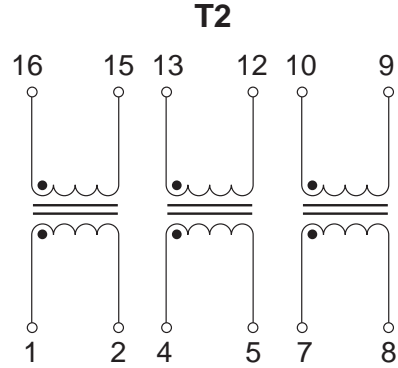
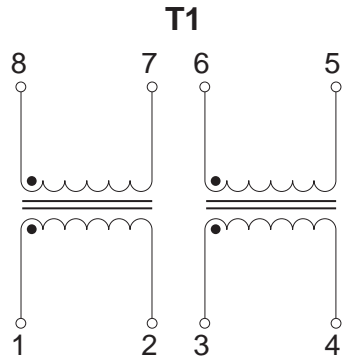
**NOTES:**

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

## Typical 10Base-T Application Circuit

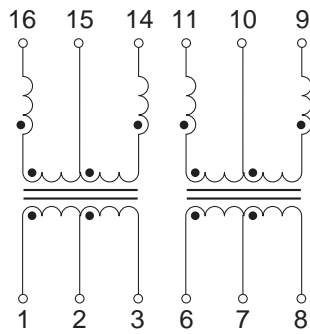


## Schematics

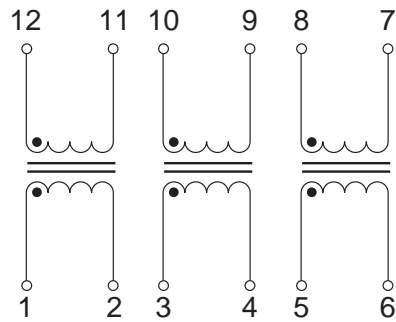


## Schematics (continued)

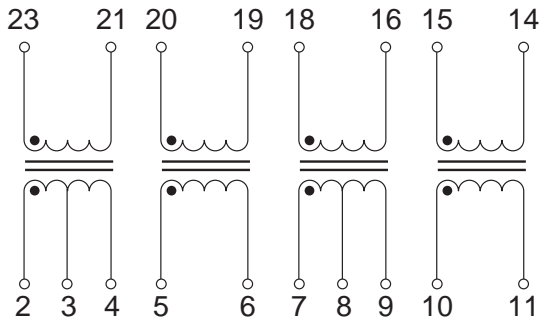
**T7**



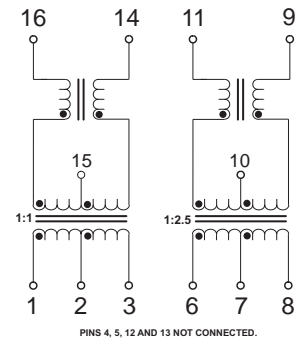
**T8**



**T9**

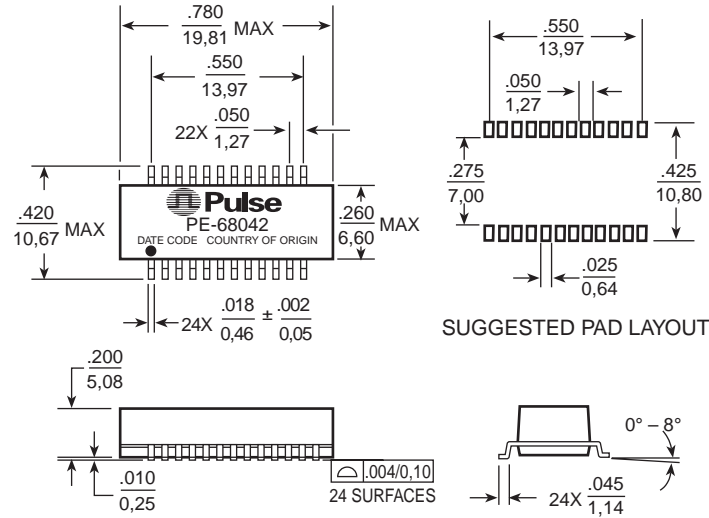


**T10**



## Surface Mount Mechanicals

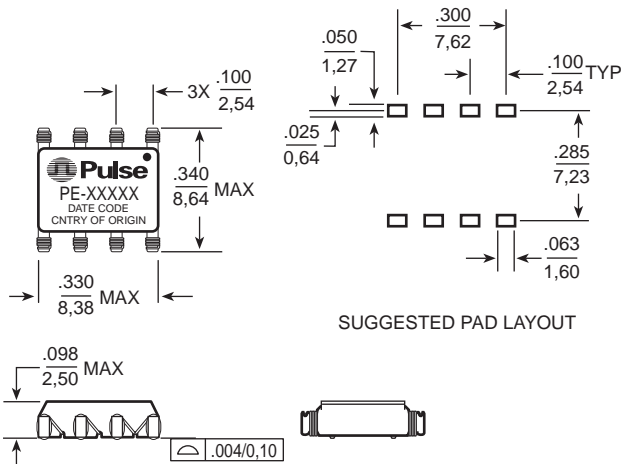
### SMT1



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

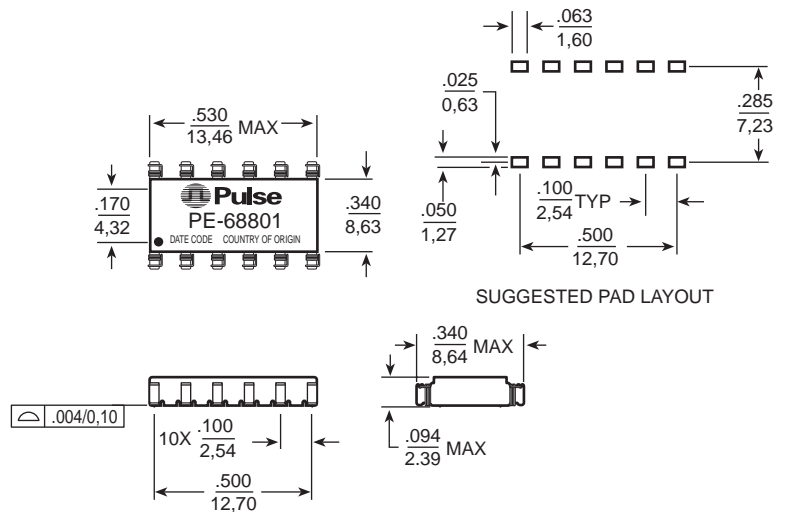
**Weight** .....1.15 grams  
**Tube** ..... .25/tube  
**Tape & Reel** ..... .350/reel

### SMT2



SUGGESTED PAD LAYOUT

### SMT3



SUGGESTED PAD LAYOUT

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

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

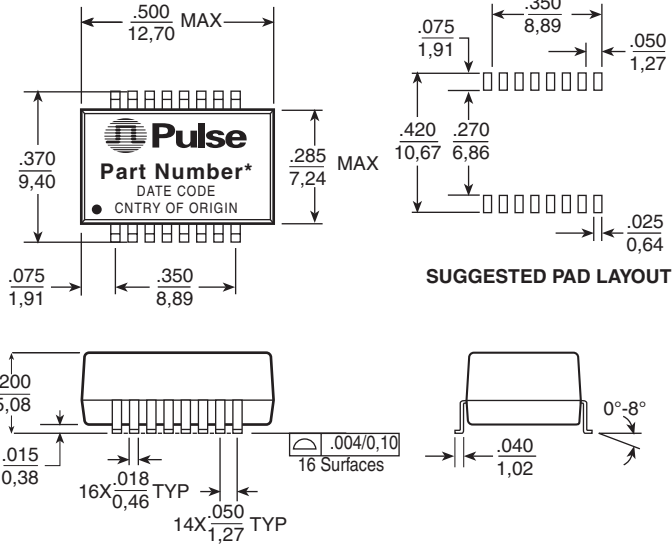
**Weight** .....0.28 grams  
**Tube** ..... .35/tube  
**Tape & Reel** ..... .1500/reel



## Surface Mount Mechanicals (continued)

### SMT4

\*PE-6XXXX, EXXX, EX2XXX



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

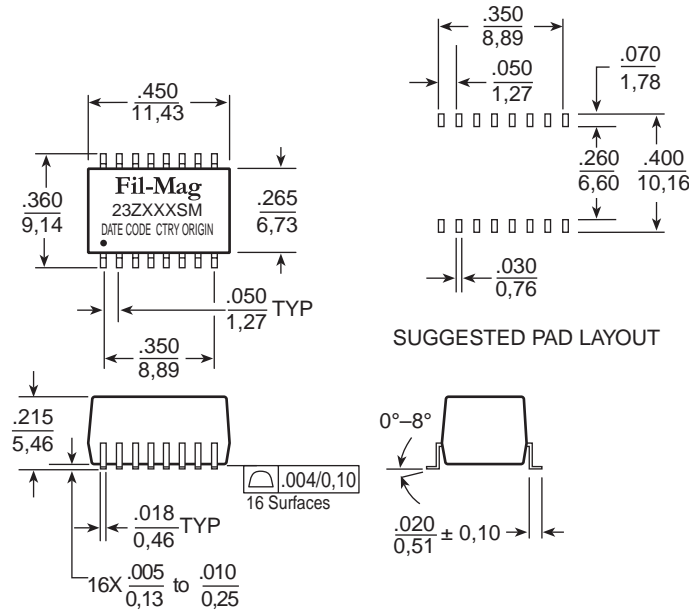
Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

Weight ..... .082 grams

Tube ..... .40/tube

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

### SMT5



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

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

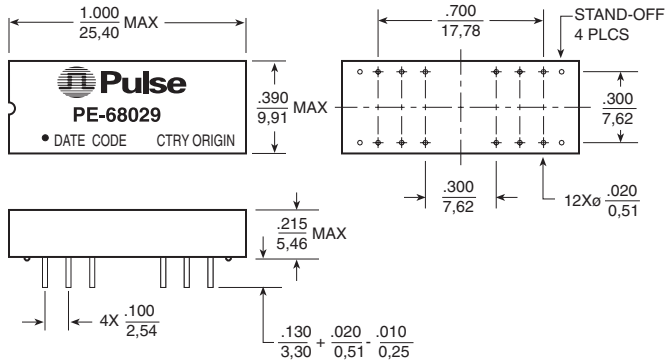
Weight ..... .085 grams

Tube ..... .50/tube

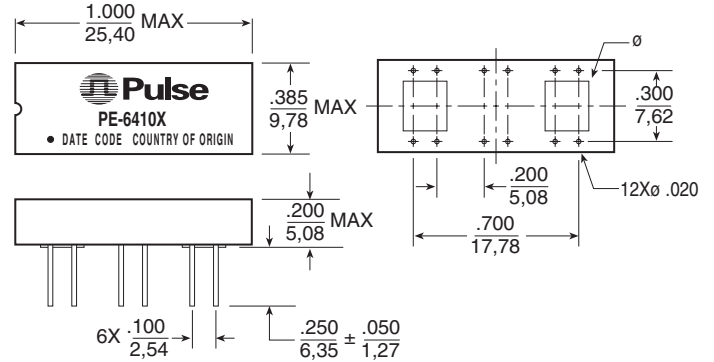
Tape & Reel ..... .750/reel

## Through Hole Mechanicals

### TH1



### TH2

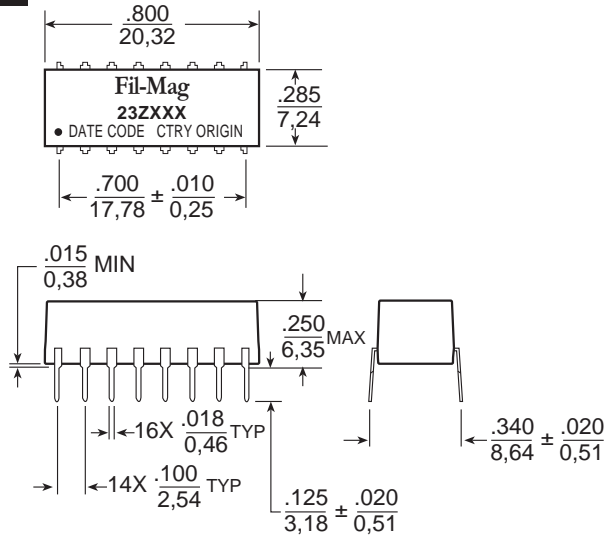


Weight ..... 2.17 grams  
 Tube ..... .20/tube

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$  Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0.25}$

Weight ..... 2.18 grams  
 Tube ..... .20/tube

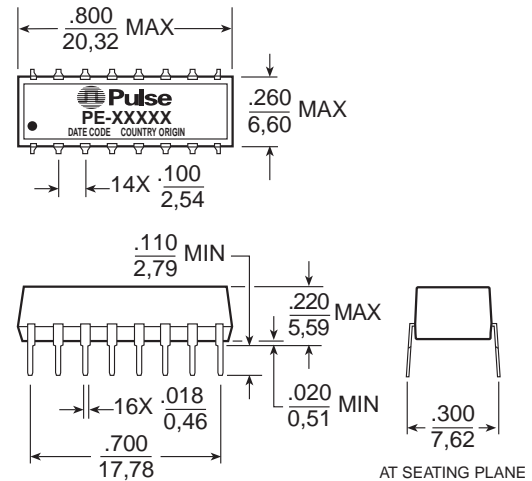
### TH3



Weight ..... 1.7 grams  
 Tube ..... .28/tube

Dimensions:  $\frac{\text{Inches}}{\text{mm}}$   
 Unless otherwise specified, all tolerances are  $\pm \frac{.005}{0.13}$

### TH4



Dimensions:  $\frac{\text{Inches}}{\text{mm}}$   
 Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0.25}$

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