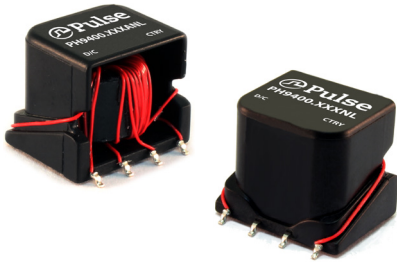


# High Isolation Gate Drive Transformers

PH9400.XXXNL and PH9400.XXXANL - SMT



- Basic and Reinforced Insulation
- Patent Pending Sidecar package with 12mm creepage
- Up to 5000Vrms gate to drive isolation
- 600Vrms continuous isolation between windings

## Electrical Specifications @ 25°C - Operating Temperature -40°C to +125°C

Part Number	Turns Ratio	ET (V * μsec MAX)	Core Loss Factor K1	Primary Inductance (1-4) (mH +/-35%)	Leakage Inductance Drive to Gate (μH MAX)	Parasitic Capacitance Drive to Gate (pF MAX)	DCR Drive (1-4) (Ω MAX)	DCR Gates (5-6) (7-8) (Ω MAX)	Hi-Pot	
									Drive-Gate (Vrms)	Gate-Gate (Vrms)
<b>PH9400.XXXNL - Basic Insulation</b>										
PH9400.111NL	1:1:1	315	0.67	4.5	5.0	60	1.8	2.5	4000	1500
PH9400.566NL	5:6:6	315	0.67	4.5	3.5	60	1.8	3.0	4000	1500
PH9400.122NL	1:2:2	250	0.84	2.88	3.5	60	1.5	4.2	4000	1500
PH9400.655NL	6:5:5	375	0.56	6.48	5.3	60	2.2	2.5	4000	1500
PH9400.211NL	2:1:1	375	0.56	6.48	8.0	60	2.2	1.6	4000	1500
<b>PH9400.XXXANL - Reinforced Insulation</b>										
PH9400.111ANL	1:1:1	160	1.32	1.21	2.5	45	0.9	0.9	5000	2000
PH9400.566ANL	5:6:6	155	1.36	1.12	3.0	45	0.9	1.0	5000	2000
PH9400.233ANL	2:3:3	125	1.68	0.72	2.0	45	0.7	1.0	5000	2000
PH9400.655ANL	6:5:5	185	1.14	1.62	3.0	45	1.0	0.9	5000	2000
PH9400.211ANL	2:1:1	185	1.14	1.62	3.5	45	1.0	0.55	5000	2000

- Notes:**
- The max ET is calculated to limit the core loss and temperature rise at 100kHz based on a bipolar flux swing of 2100Ga Peak. This value needs to be derated for higher frequencies using the temperature rise calculation.
  - The temperature rise of the component is calculated based on the total core loss and copper loss:
    - To calculate total copper loss (W), use the following formula:  
Copper Loss (W) =  $I_{rms}^2 * (DCR\_Drive + (\# \text{ of Gates}) * DCR\_Gates)$
    - To calculate total core loss (W), use the following formula:  
Copper Loss (W) =  $5.1E-10 * (\text{Frequency in kHz})^{1.42} * (K1 * ET)^{2.5}$   
Where  $ET = (V * \text{Duty Cycle}) / \text{Frequency}$
    - To calculate temperature rise, use the following formula:  
Temperature Rise (C) =  $71 * (\text{Core Loss(W)} + \text{Copper Loss (W)})$
  - Continuous isolation voltage confirmed by 125°C/1000hrs accelerated aging with the bias voltage applied between gate and drive windings.
  - ANL versions, which use triple insulated wire on both the drive and gate windings, are compliant with IEC 60950, IEC 61558, IEC 61010 & IEC 60601 for reinforced insulation. NL versions, which use triple insulated wire on just the drive winding, comply with basic insulation requirements.
  - 12mm package creepage distance satisfies IEC60950-1 & IEC61558-1/-2-16 reinforced insulation requirements for working voltage to 600Vrms max, OVC II, Pollution Degree 2 and altitude up to 2000m.
  - Unless otherwise specified, all testing is made at 100kHz, 0.1V<sub>AC</sub>.
  - Optional Tape & Reel packaging can be ordered by adding a "T" suffix to the part number (i.e. PH9400.111NL becomes PH9400.111NLT). Pulse complies to industry standard tape and reel specification EIA481.

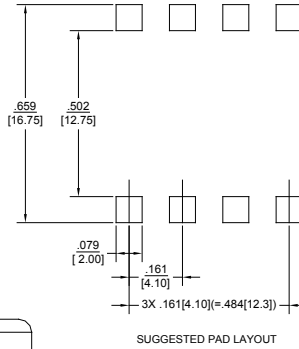
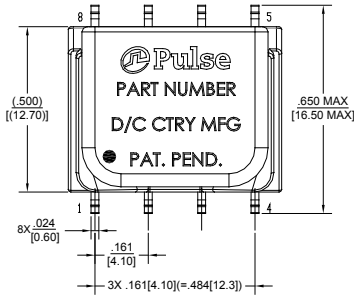
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PH9400.XXXNL and PH9400.XXXANL - SMT

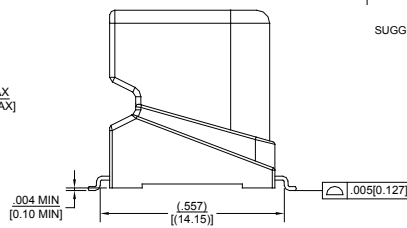
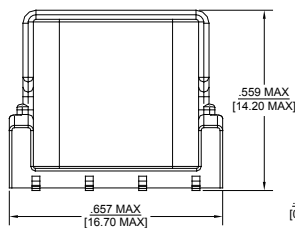
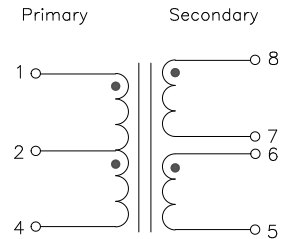
## Mechanicals

## Schematics

### PH9400.XXXNL and PH9400.XXXANL



PH9400.XXXNL/PH9400.XXXANL



**Weight** .....2.5 grams  
**Tape & Reel** .....150/Reel  
**Tray** .....80/tray

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

## For More Information

### Pulse Worldwide Headquarters

12220 World Trade Drive  
 San Diego, CA 92128  
 U.S.A.

Tel: 858 674 8100  
 Fax: 858 674 8262

### Pulse Europe

Pulse Electronics GmbH  
 Am Rottland 12  
 58540 Meinerzhagen  
 Germany

Tel: 49 2354 777 100  
 Fax: 49 2354 777 168

### Pulse China Headquarters

B402, Shenzhen Academy of  
 Aerospace Technology Bldg.  
 10th Kejian Road  
 High-Tech Zone  
 Nanshan District  
 Shenzhen, PR China 518057

Tel: 86 755 33966678  
 Fax: 86 755 33966700

### Pulse North China

Room 2704/2705  
 Super Ocean Finance Ctr.  
 2067 Yan An Road West  
 Shanghai 200336  
 China

Tel: 86 21 62787060  
 Fax: 86 2162786973

### Pulse South Asia

135 Joo Seng Road  
 #03-02  
 PM Industrial Bldg.  
 Singapore 368363

Tel: 65 6287 8998  
 Fax: 65 6287 8998

### Pulse North Asia

3F, No. 198  
 Zhongyuan Road  
 Zhongli City  
 Taoyuan County 320  
 Taiwan R. O. C.

Tel: 886 3 4356768  
 Fax: 886 3 4356823 (Pulse)  
 Fax: 886 3 4356820 (FRE)

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