

# Isolation Power Transformers

Toroid Platform SMD



- Push Pull Converter Transformer
- Functional insulation for isolated power supply driver
- 2.5KVrms isolation (380Vrms continuous)

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

| Part Number  | Inductance (1-3)<br>( $\mu\text{H} \pm 35\%$ ) | Leakage Inductance (1-3) with (4-6) shorted<br>( $\mu\text{H} \text{ MAX}$ ) | Capacitance (1, 2, 3) to (4, 5, 6)<br>(pF MAX) | DCR (1-3)<br>( $\Omega \text{ MAX}$ ) | DCR (4-6)<br>( $\Omega \text{ MAX}$ ) | ET MAX (1-3) <sup>1</sup><br>(V- $\mu\text{sec} \text{ Max}$ ) | Turns Ratio (1:3) (6:4) | Isolated Voltage <sup>2</sup><br>(Vrms) |
|--------------|------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------------------------------|-------------------------|-----------------------------------------|
| PH9085.011NL | 1020                                           | 0.8                                                                          | 30                                             | 0.60                                  | 0.65                                  | 22                                                             | 1CT : 1CT               | 2500                                    |
| PH9085.012NL | 1020                                           | 0.6                                                                          | 40                                             | 0.85                                  | 1.60                                  | 22                                                             | 1CT : 2CT               |                                         |
| PH9085.021NL | 1160                                           | 1.6                                                                          | 20                                             | 0.60                                  | 0.35                                  | 23.6                                                           | 2CT : 1CT               |                                         |
| PH9085.034NL | 1020                                           | 0.6                                                                          | 40                                             | 0.60                                  | 0.75                                  | 22                                                             | 3CT : 4CT               |                                         |
| PH9085.035NL | 1020                                           | 0.6                                                                          | 40                                             | 0.80                                  | 1.20                                  | 22                                                             | 3CT : 5CT               |                                         |
| PH9085.038NL | 1020                                           | 0.7                                                                          | 40                                             | 0.85                                  | 2.00                                  | 22                                                             | 3CT : 8CT               |                                         |
| PH9085.043NL | 1160                                           | 0.8                                                                          | 30                                             | 0.60                                  | 0.50                                  | 23.6                                                           | 4CT : 3CT               |                                         |
| PH9085.083NL | 1160                                           | 2.0                                                                          | 15                                             | 0.60                                  | 0.30                                  | 23.6                                                           | 8CT : 3CT               |                                         |
| PH9085.089NL | 1160                                           | 0.6                                                                          | 40                                             | 0.60                                  | 0.70                                  | 23.6                                                           | 8CT : 9CT               |                                         |

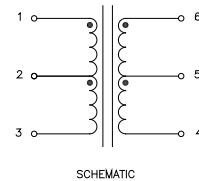
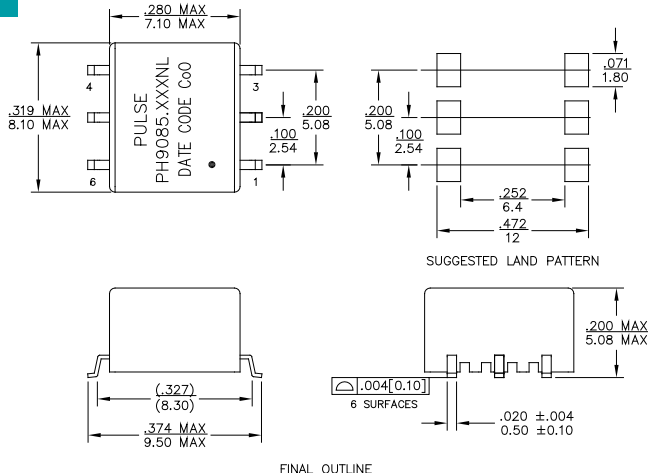
### Notes:

- The ET Max is calculated to limit the core loss and temperature rise at 100kHz based on a bipolar flux swing of 210mT Peak.
- For Push-Pull topology, where the voltage is applied across half the primary winding turns, the ET needs to be derated by 50% for the same flux swing.
- The applied ET may need to be further derated for higher frequencies based on the temperature rise which results from the core and copper losses
  - To calculate total copper loss (W), use the following formula:  
Copper Loss (W) =  $I_{rms\_Primary}^2 * DCR\_Primary + I_{rms\_Secondary}^2 * DCR\_Secondary$
  - To calculate total core loss (W), use the following formula:  
Core Loss (W) =  $7.70E-13 * (\text{Frequency in kHz})^{2.45} * (210 * [ET/ET \text{ Max}])^{2.5}$   
Where ET is the applied Volt Second, ET Max is the rated Volt Second for 210mT flux swing
- C. To calculate temperature rise, use the following formula: Temperature Rise ( $^{\circ}\text{C}$ ) =  $340 * (\text{Core Loss (W)} + \text{Copper Loss (W)})$
- The AEC-Q200 temperature and humidity operational life testing was completed using a dielectric strength test of 2750Vdc.
- Continuous isolation voltage confirmed by 125°C/1000hrs accelerated aging with the bias voltage applied between primary and secondary windings.

## Mechanical

## Schematic

### PH9085.XXXNL



Weight .....0.365grams  
Tape & Reel .....700/reel  
Tray .....55/tray

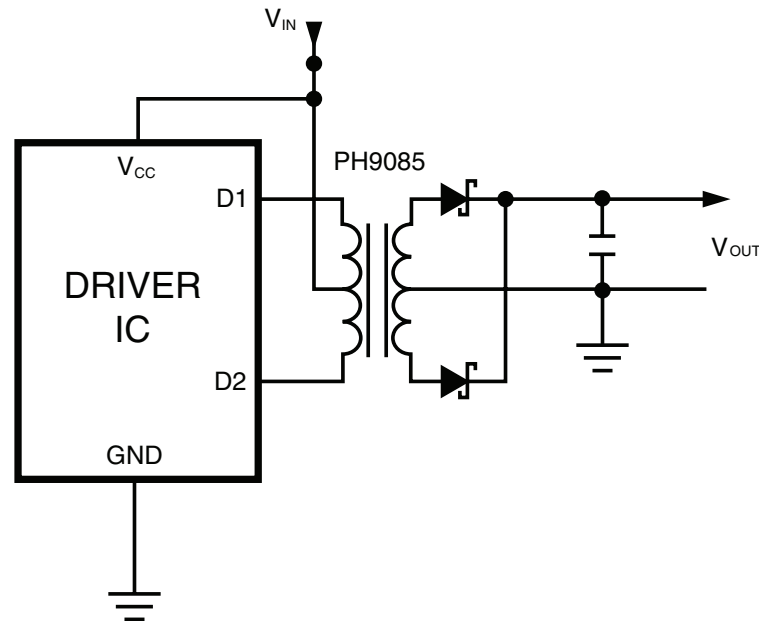
Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified,  
all tolerances are  $\pm \frac{.010}{0.25}$

## Application

PH9085.XXXNL is a series of high isolation power supply transformer drivers. Intended to operate in a fixed duty cycle Push Pull topology, it is a part of a low cost solution for delivering lower power (up to 2W) from a low voltage source. A typical implementation would be an isolated RS-485/RS-232 power supply driver circuit, the design is compatible with the MAXIM™ MAX253 IC.

A schematic diagram for the Push Pull converter topology is given below.



For a fixed 50% duty cycle mode of operation, the output voltage is simply determined by the input voltage and turns ratio. So, with the available turns ratios, a variety of output voltages can be selected.

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