

# Isolation Power Transformers

Toroid Platform SMD PH9085.XXXNL and PM2180.XXXNL



- ④ Push Pull Converter Transformer
- ④ Functional insulation for isolated power supply driver
- ④ 2.5KVrms isolation (380Vrms continuous)

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

Part Number		Inductance (1-3) ( $\mu\text{H} \pm 35\%$ )	Leakage Inductance (1-3) with (4-6) shorted ( $\mu\text{H} \text{ MAX}$ )	Capacitance (1, 2, 3) to (4, 5, 6) (pF MAX)	DCR (1-3) ( $\Omega \text{ MAX}$ )	DCR (4-6) ( $\Omega \text{ MAX}$ )	ET MAX (1-3) <sup>1</sup> (V- $\mu\text{sec} \text{ Max}$ )	Turns Ratio (1:3) (6:4)	Isolated Voltage <sup>2</sup> (Vrms)
Commerical	Automotive <sup>6</sup>								
PH9085.011NL	PM2180.011NL	1020	0.8	30	0.60	0.65	22	1CT : 1CT	2500
PH9085.012NL	PM2180.012NL	1020	0.6	40	0.85	1.60	22	1CT : 2CT	
PH9085.021NL	PM2180.021NL	1160	1.6	20	0.60	0.35	23.6	2CT : 1CT	
PH9085.034NL	PM2180.034NL	1020	0.6	40	0.60	0.75	22	3CT : 4CT	
PH9085.035NL	PM2180.035NL	1020	0.6	40	0.80	1.20	22	3CT : 5CT	
PH9085.038NL	PM2180.038NL	1020	0.7	40	0.85	2.00	22	3CT : 8CT	
PH9085.043NL	PM2180.043NL	1160	0.8	30	0.60	0.50	23.6	4CT : 3CT	
PH9085.083NL	PM2180.083NL	1160	2.0	15	0.60	0.30	23.6	8CT : 3CT	
PH9085.089NL	PM2180.089NL	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:  

$$\text{Copper Loss (W)} = \text{I}_{\text{rms\_Primary}}^2 * \text{DCR\_Primary} + \text{I}_{\text{rms\_Secondary}}^2 * \text{DCR\_Secondary}$$
    - To calculate total core loss (W), use the following formula:  

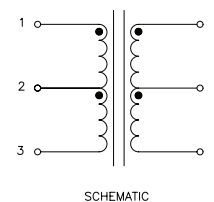
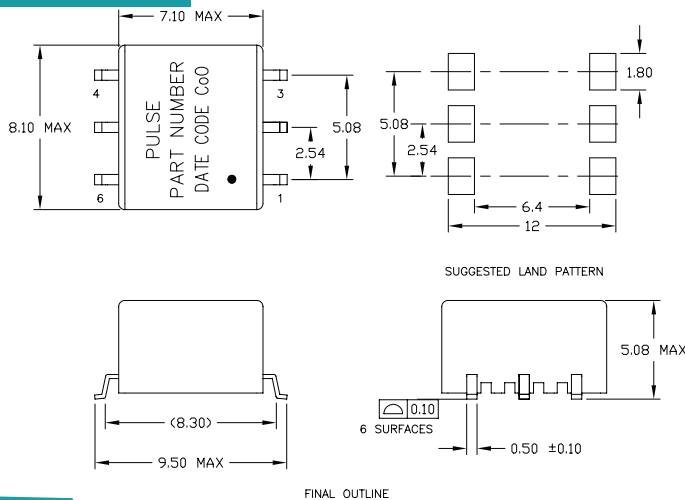
$$\text{Core Loss (W)} = 7.70\text{E-13} * (\text{Frequency in kHz})^{2.43} * (210 * [\text{ET}/\text{ET Max}])^{2.5}$$
 Where ET is the applied Volt Second, ET Max is the rated Volt Second for 210mT flux swing
  - To calculate temperature rise, use the following formula: Temperature Rise ( $^{\circ}\text{C}$ )  

$$= 340 * (\text{Core Loss (W)} + \text{Copper Loss (W)})$$
  - The AEC-Q200 temperature and humidity operational life testing was completed using a dielectric strength test of 2750Vdc.
  - Continuous isolation voltage confirmed by 125 $^{\circ}\text{C}$ /1000hrs accelerated aging with the bias voltage applied between primary and secondary windings.
  - The PM2180.XXXNL part numbers are AEC-Q200 and IATF16949 certified. The mechanical dimensions are 100% tested in production but do not necessarily meet a product capability index (Cpk) >1.33 and therefore may not strictly conform to PPAP.

## Mechanical

## Schematic

### PH9085.XXXNL and PM2185.XXXNL

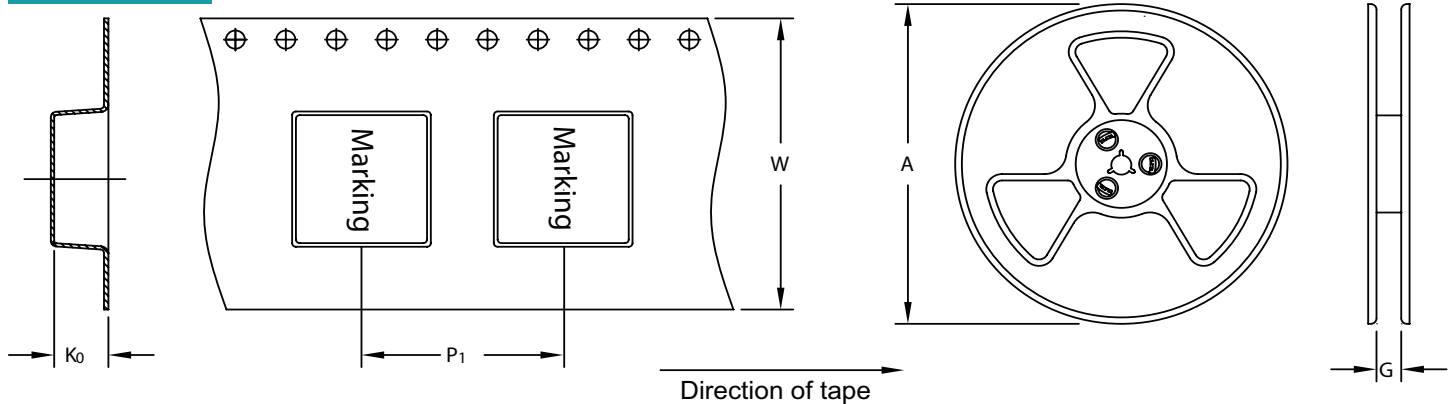


Weight .....0.365grams  
 Tape & Reel .....700/reel  
 Tray .....55/tray  
**Dimensions: mm**  
 Unless otherwise specified,  
 all tolerances are  $\pm 0.25$

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## TAPE & REEL INFO



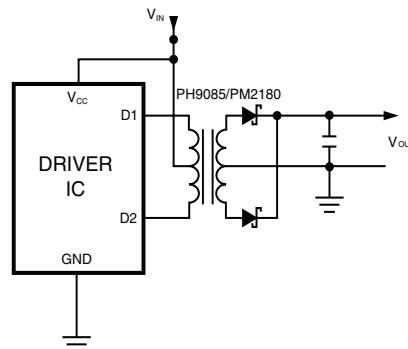
### SURFACE MOUNTING TYPE, REEL/TAPE LIST

PART NUMBER	REEL SIZE (mm)		TAPE SIZE (mm)			QTY
	A	G	P <sub>1</sub>	W	K <sub>0</sub>	PCS/REEL
PH9085.XXXNL/PM2180.XXXNL	Ø330	16.4	12	16	6.6	700

## 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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