

Isolation Power Transformers

Toroid Platform SMD PH9384.XXXNL and PM2185.XXXNL



- Ⓢ Push Pull Converter Transformer
- Ⓢ 4KVrms Isolation (550Vrms Continuous)
- Ⓢ Reinforced Insulation (IEC62368-1), UL 60950-1 Certified
- Ⓢ 8mm Creepage
- Ⓢ **Patented:** US Pat 9,646,755

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) ($\text{pF} \text{ MAX}$)	DCR (1-3) ($\Omega \text{ MAX}$)	DCR (4-6) ($\Omega \text{ MAX}$)	MAX (1-3) ¹ (V- $\mu\text{sec} \text{ Max}$)	Turns Ratio (1:3) (6:4)	Isolated Voltage (Vrms)
Commerical	Automotive ³								
PH9384.011NL	PM2185.011NL	538	0.8	20	0.30	0.40	24	1CT : 1CT	4000
PH9384.012NL	PM2185.012NL	538	0.6	30	0.33	0.65	24	1CT : 2CT	
PH9384.021NL	PM2185.021NL	538	1.6	15	0.30	0.25	24	2CT : 1CT	
PH9384.034NL	PM2185.034NL	680	0.6	30	0.35	0.52	27	3CT : 4CT	
PH9384.035NL	PM2185.035NL	680	0.7	30	0.35	0.65	27	3CT : 5CT	
PH9384.038NL	PM2185.038NL	538	0.7	30	0.40	0.90	27	3CT : 8CT	
PH9384.043NL	PM2185.043NL	538	0.8	20	0.30	0.30	24	4CT : 3CT	
PH9384.083NL	PM2185.083NL	538	2.0	15	0.30	0.22	24	8CT : 3CT	
PH9384.089NL	PM2185.089NL	538	0.6	30	0.30	0.42	24	8CT : 9CT	

Notes:

- The ET Max is calculated to limit the core loss and temperature rise at 200KHz based on a bipolar flux swing of 210mT Peak. This value needs to be derated for higher frequencies using the temperature rise calculation to remain with operating temperature range.
- A. To calculate total copper loss (W), use the following formula:

$$\text{Copper Loss (W)} = \text{Irms_Primary}^2 * \text{DCR_Primary} + \text{Irms_Secondary}^2 * \text{DCR_Secondary}$$
 B. To calculate total core loss (W), use the following formula:

$$\text{Core Loss (W)} = 2.31E-11 * (\text{Frequency in kHz})^{1.68} * (210 * [\text{ET/ET Max}])^{2.55}$$
 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:

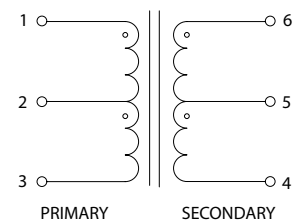
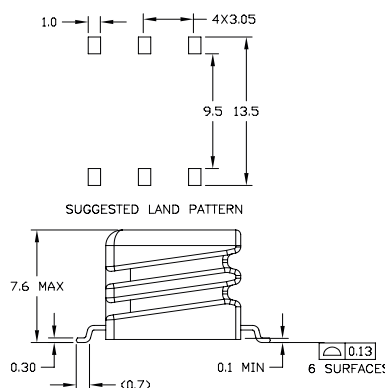
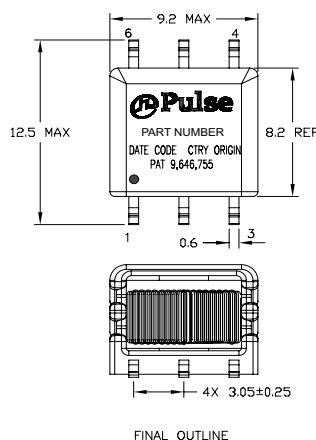
$$\text{Temperature Rise (}^\circ\text{C)} = 130 * (\text{Core Loss(W)} + \text{Copper Loss (W)})$$

- 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 PM2185.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.
- Optional Tape & Reel packing can be ordered by adding a "T" suffix to the part number (i.e. PH9384.012NL becomes PH9384.012NLT). Pulse complies to industry standard tape and reel specification EIA481.
- The "NL" suffix indicates an RoHS-compliant part number.

Mechanical

Schematic

PH9384.XXXNL and PM2185.XXXNL

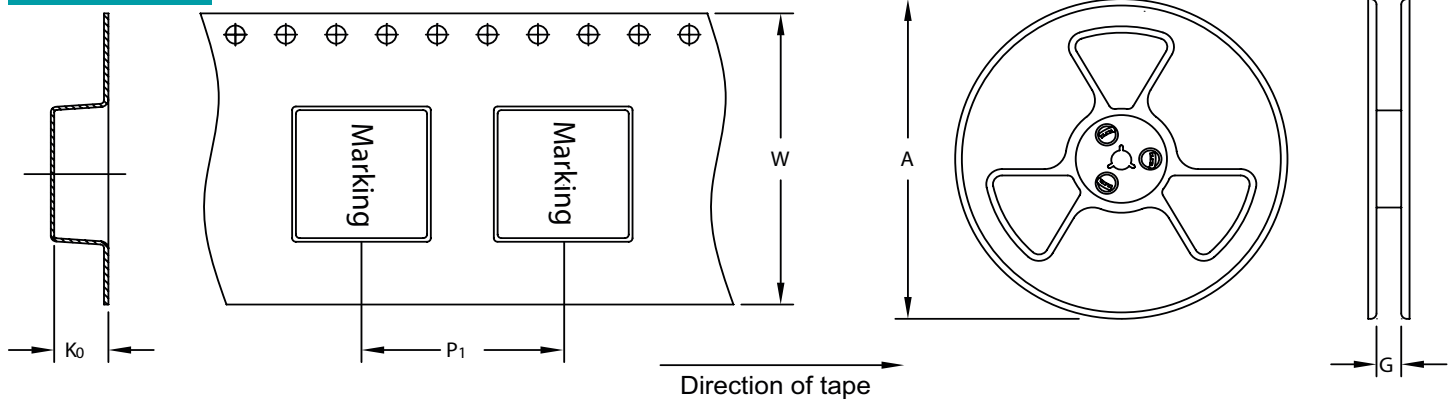


Weight0.85grams
 Tape & Reel400/reel
 Tray55/tray
 Dimensions: mm
 Unless otherwise specified,
 all tolerances are: ±0.25

Isolation Power Transformers

Toroid Platform SMD PH9384.XXXNL and PM2185.XXXNL

TAPE & REEL INFO



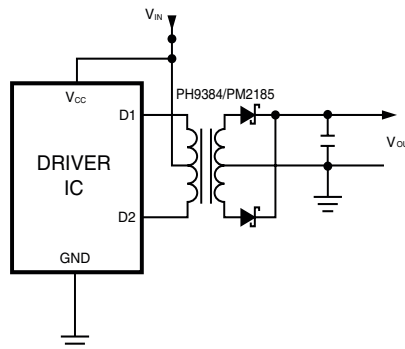
SURFACE MOUNTING TYPE, REEL/TAPE LIST

PART NUMBER	REEL SIZE (mm)		TAPE SIZE (mm)			QTY
	A	G	P ₁	W	K ₀	PCS/REEL
PH9384.XXXNL/PM2185.XXXNL	Ø330	24.4	16	24	8.2	400

APPLICATION

PH9384NL 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 3W) 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. PH9384.034NL has been certified by UL to comply with UL60950-1 2 edition with reinforced insulation for a working voltage up to 300Vac. 7mm creepage and 3000Vrms isolation voltage is guaranteed to meet this requirement. The remainder of the PH9384.XXXNL series was not included in the UL certification but are fully compliant with the requirements for reinforced insulation. Based on VDE approval of FIW wire under IEC60317-0-7, IEC60317-36 and IEC60851-5:2008, IEC62368-1 accepts the current construction of the PH9384/PM2185 series as fulfilling the requirements of reinforced insulation for a working voltage up to 300Vac/420Vpeak.

MAXIM is a registered trademark of Maxim Integrated Products.

For More Information:

Americas - prodinfo_power_americas@pulseelectronics.com | Europe - prodinfo_power_emea@pulseelectronics.com | Asia - prodinfo_power_asia@pulseelectronics.com

Performance warranty of products offered on this data sheet is limited to the parameters specified. Data is subject to change without notice. Other brand and product names mentioned herein may be trademarks or registered trademarks of their respective owners. © Copyright, 2022. Pulse Electronics, Inc. All rights reserved.