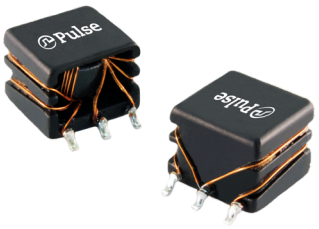
Isolation Power Transformers

Toroid Platform SMD PH9384.XXXNL and PM2185.XXXNL



- *Push Pull Converter Transformer*
- *4KVrms Isolation (550Vrms Continuous)*
- *Sidecar Package*
- *UL Approved*
- ***Patented:*** *US Pat 9,646,755*

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

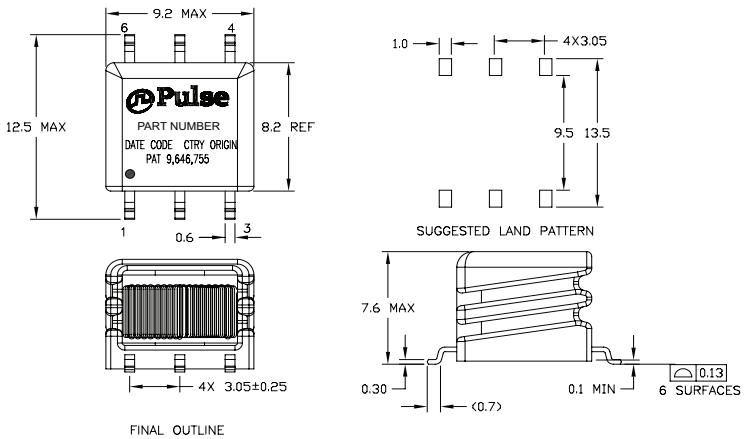
Part Number		Inductance (1-3) (µH ±35%)	Leakage Inductance (1-3) with (4-6) shorted (µH MAX)	Capacitance (1, 2, 3) to (4, 5, 6) (pF MAX)	DCR (1-3) (Ω MAX)	DCR (4-6) (Ω MAX)	MAX (1-3)[1] (V-µsec Max)	Turns Ratio (1:3) (6:4)	Isolated Voltage (Vrms)
Commerical	Automotive[7]								
PH9384.011NL	PM2185.011NL	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:

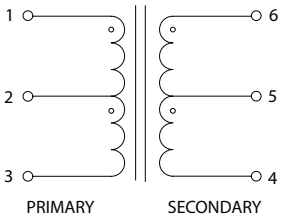
1. The ET Max is calculated to limit the core loss and temperature rise at 200KHz based on a bipolar flux swing of 130mT Peak.
2. For Push-Pull topology, where the voltage is applied across half the primary winding turns, the ET needs to be derated by 50% for the same flux swing.
3. The applied ET may need to be further derated for higher frequencies based on the temperature rise which results from the core and copper losses
   A. To calculate total copper loss (W), use the following formula:
   Copper Loss (W) = $Irms\_Primary^2 * DCR\_Primary + Irms\_Secondary^2 * DCR\_Secondary$
   B. To calculate total core loss (W), use the following formula:
   Core Loss (W) = $2.72E\text{-}12 * (Frequency\ in\ kHz)^{2.43} * (130 * [ET/ET\ Max])^{2.5}$
   Where ET is the applied Volt Second, ET Max is the rated Volt Second for 130mT flux swing
   C. To calculate temperature rise, use the following formula:
   Temperature Rise (°C) = 154 * (Core Loss(W) + Copper Loss (W))
4. The AEC-Q200 temperature and humidity operational life testing was completed using a dielectric strength test of 4000Vdc.
5. Optional Tape & Reel packing can be ordered by adding a "**T**" suffix to the part number (i.e. PH9384.012NL becomes PH9384.012NL**T**). Pulse complies to industry standard tape and reel specification EIA481.
6. The "NL" suffix indicates an RoHS-compliant part number.
7. The PM2185.XXXNL part numbers are AEC-Q200 and IATF16949 certified. The mechanical dimensions are 100% tested in production but do not necessarily meet aproduct capability index (Cpk) >1.33 and therefore may not strictly conform to PPAP.

Mechanical

PH9384.XXXNL and PM2185.XXXNL



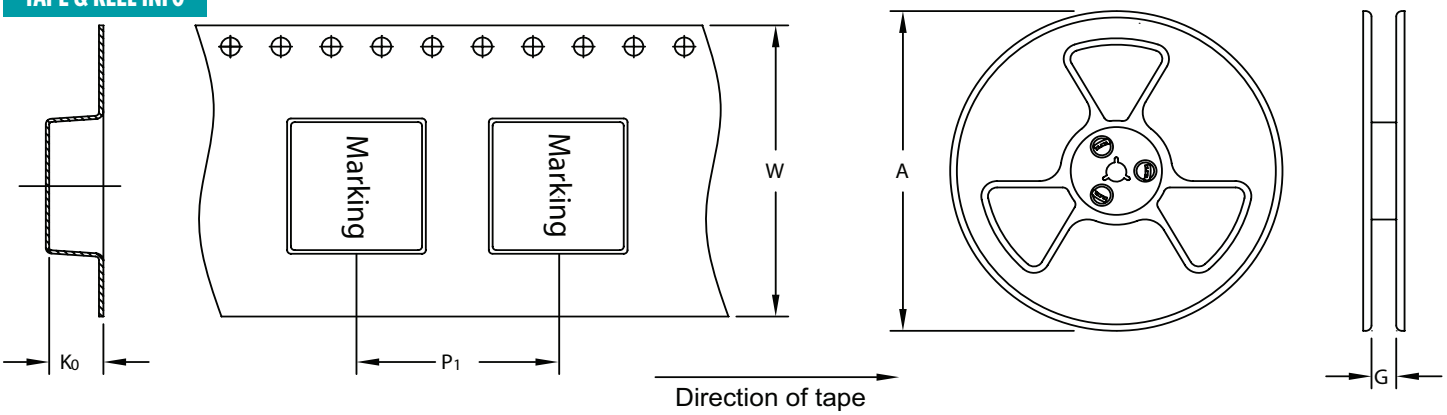
Schematic



Weight 0.85grams
Tape & Reel 400/reel
Tray 55/tray

Dimensions: mm
Unless otherwise specified,
all tolerances are: ±0.25

TAPE & REEL INFO

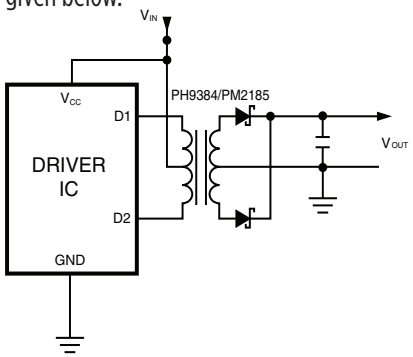


SURFACE MOUNTING TYPE, REEL/TAPE LIST						
PART NUMBER	REEL SIZE (mm)		TAPE SIZE (mm)			QTY
	A	G	P_1	W	K_0	PCS/REEL
PH9384.XXXNLT/PM2185.XXXNLT	Ø330	24.4	16	24	8.2	400

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 4000Vrms Isolation (550Vrms continuous) capability is in excess of this and applies to applications where just function insulation/galvanic isolation are required. The remainder of the PH9384.XXXNL series was not included in the UL certification but are fully complaint with the requirements for reinforced insulation.

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