High Isolation Power Transformers

EP7 Platform SMD - PH9185.XXXNL and PM2190.XXXNL

Pulse
a YAGEO company

ROHS COMPLIANT · AEC-Q200 · IATF 16949 · MSL

- *Push Pull Transformer*
- *Reinforced insulation for isolated power supply driver*
- *8mm creepage and clearance*
- *5KVrms isolation (Up to 1000Vpk rated voltage)[6]*
- *UL and TUV certified*

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

Part Number		Inductance (1-3) (µH ±45%)	Leakage Inductance (µH MAX)	DCR (1-3) (Ω MAX)	DCR (4-6) (Ω MAX)	ET MAX (1-3)[1] (V-µsec MAX)	CAP (pF MAX)	Turns Ratio (1:3) (6:4)	Isolated Voltage[4] (Vrms)
Commercial	Automotive[8]								
PH9185.011NL	PM2190.011NL	750	1.2	0.50	0.55	66	10.0	1CT : 1CT	5000
PH9185.012NL	PM2190.012NL	450	0.9	0.40	0.80	52	10.0	1CT : 2CT	
PH9185.013NL	PM2190.013NL	200	0.6	0.35	0.95	36	8.0	1CT : 3CT	
PH9185.021NL	PM2190.021NL	1800	3.0	0.75	0.45	100	10.0	2CT : 1CT	
PH9185.034NL	PM2190.034NL	750	1.2	0.50	0.75	66	10.0	3CT : 4CT	
PH9185.038NL	PM2190.038NL	310	0.9	0.44	1.00	44	8.0	3CT : 8CT	
PH9185.043NL	PM2190.043NL	1260	1.5	0.70	0.56	89	12.0	4CT : 3CT	
PH9185.083NL	PM2190.083NL	2350	6.0	0.90	0.40	110	8.0	8CT : 3CT	

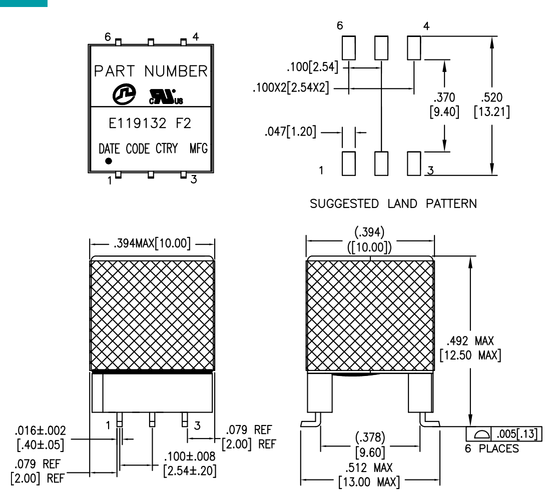
Notes:

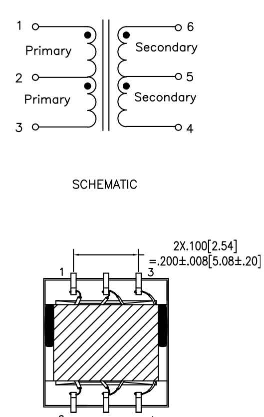
1. The ET Max is calculated to limit the core loss and temperature rise at 100KHz based on a bipolar flux swing of 180mT Peak.
2. For Push-Pull topology, where the voltage is applied across half the primary winding turns, the ET needs to be derated by 50% for the same flux swing.
3. The applied ET may 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) = $8.73\text{-}11 * (\text{Frequency in kHz})^{1.67} * (180 * [ET/ET\ Max])^{2.53}$
      Where ET is the applied Volt Second, ET Max is the rated Volt Second for 180mT flex swing
   C. To calculate temperature rise, use the following formula: Temperature Rise (°C) = 140 * (Core Loss(W) + Copper Loss (W))
4. The AEC-Q200 temperature and humidity operational life testing was completed using a dielectric strength test of 5000Vdc.
5. Creepage and clearance is in accordance with IEC 61558-1 and IEC61558-2-16 for reinforced insulation to a working voltage of 400Vrms (for basic insulation to a working voltage of 800Vrms) based on material group III, pollution degree 2, OVC II and 5000m altitude.The PM2190.XXXNL part numbers are AEC-Q200 and IATF16949 certified.
6. Rated voltage is based on a positive partial discharge test (discharge < 10pC) for the profile shown in page 3, in accordance with IEC60664 for basic insulation. In an application which requires a reinforced insulation barrier, a rated voltage of 880Vpk is defined and confirmed by partial discharge testing.

Mechanical

Schematic

PH9185.XXXNL/PM2190.XXXNL



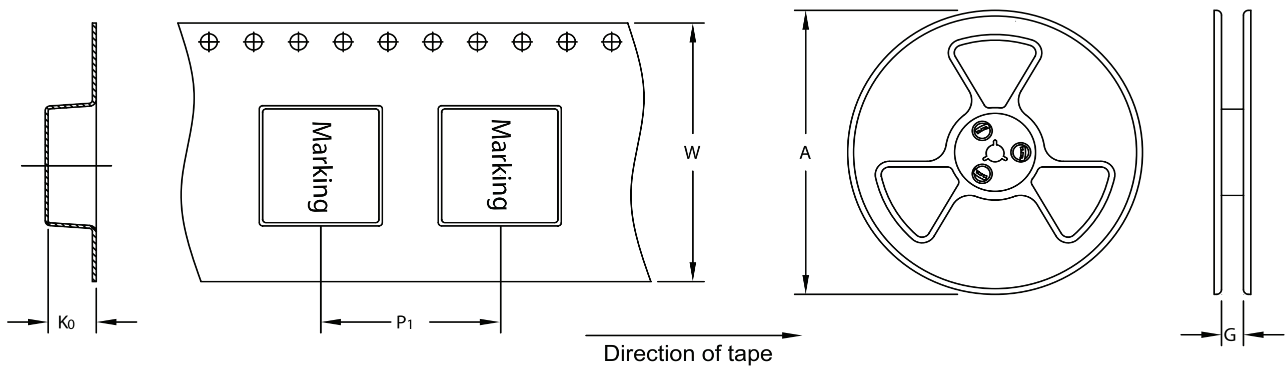


Weight 2.6grams
Tape & Reel 150/reel
Tray 80/tray

Dimensions: Inches / mm

Unless otherwise specified, all tolerances are ± .010 / 0,25

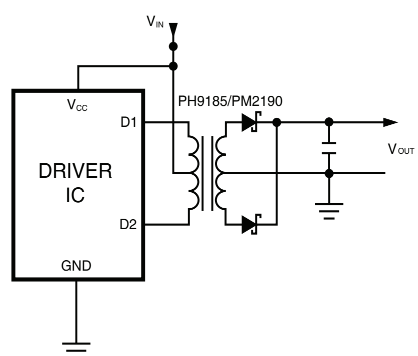
TAPE & REEL INFO



SURFACE MOUNTING TYPE, REEL/TAPE LIST						
PART NUMBER	REEL SIZE (mm)		TAPE SIZE (mm)			QTY
	A	G	P_1	W	K_0	PCS/REEL
PH9185.XXXNLT/PM2190.XXXNLT	Ø330	32.4	24	32	12.8	150

APPLICATION

PH9185.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 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.
This transformer design has been certified by UL to comply with UL60950-1 2nd edition, and CAN/CSA C22.2 NO. 60950-1-07 2nd edition; and by TUV to comply with EN61558-1 and EN61558-2-16 with reinforced insulation for a working voltage up to 400Vac 8mm creepage and 5000Vrms isolation voltage is guaranteed to meet this requirement. The design also complies with the Pulse's class F insulation system. PH9185.013NL was not included in the original UL/TUV certification but is complaint. Cost reduced versions without UL/TUV certification available, please contact Pulse Electronics for more information.
MAXIM is a registered trademark of Maxim Integrated Products.

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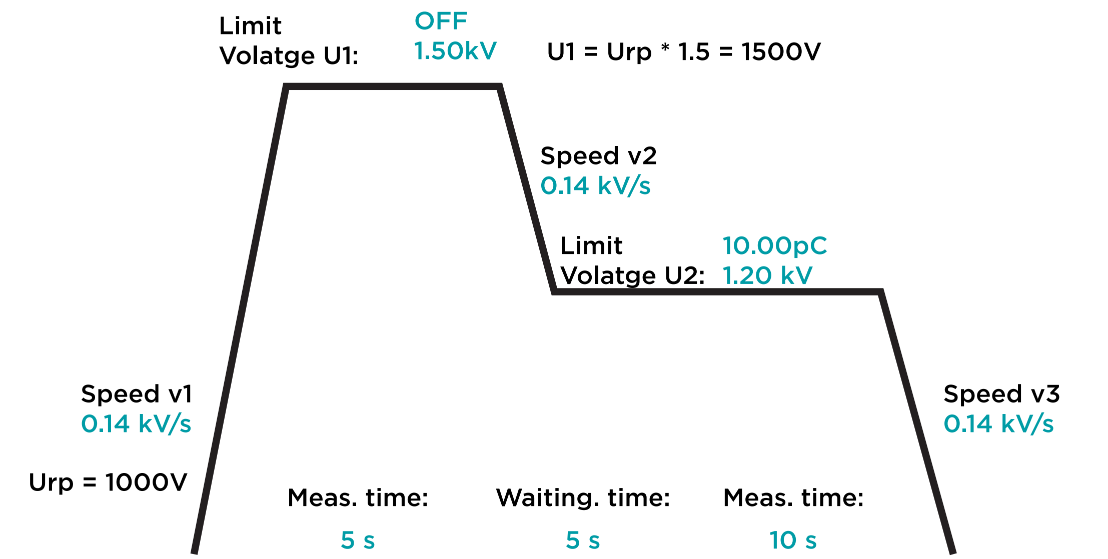
Test Procedure Setting

Basic Insulation - Partaial Discharge Test Passed

PD - MV no.2

U inc.:	U ext.:	Limit:	Range:
yes	yes	10 pC	AUTO

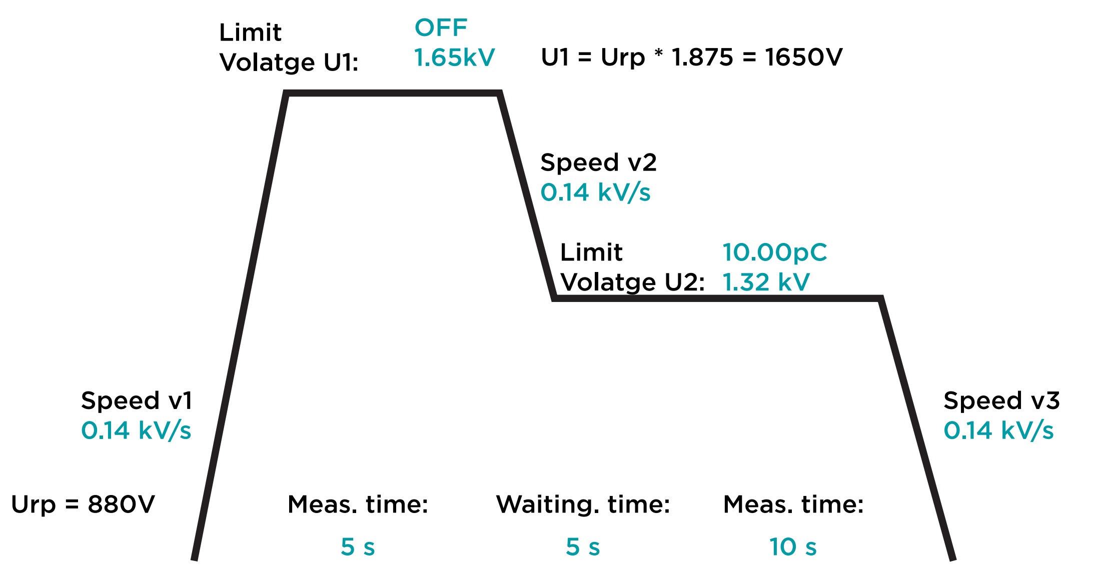


Test Procedure Setting

Reinforced Insulation - Partaial Discharge Test Passed

PD - MV no.2

U inc.:	U ext.:	Limit:	Range:
yes	yes	10 pC	AUTO



For More Information:

Americas - prodinfo_power_americas@yageo.com | **Europe -** prodinfo_power_emea@yageo.com | **Asia -** prodinfo_power_asia@yageo.com

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