High Frequency Planar Transformers

PA09XXNL Series (up to 250W)

- ***Power Rating:*** *up to 250W*
- ***Height:*** *9.1mm to 10.4mm Max*
- ***Footprint:*** *29.5mm x 26.7mm Max*
- ***Frequency Range:*** *200kHz to 700kHz*
- ***Isolation (Primary to Secondary):*** *1750V_{DC}*

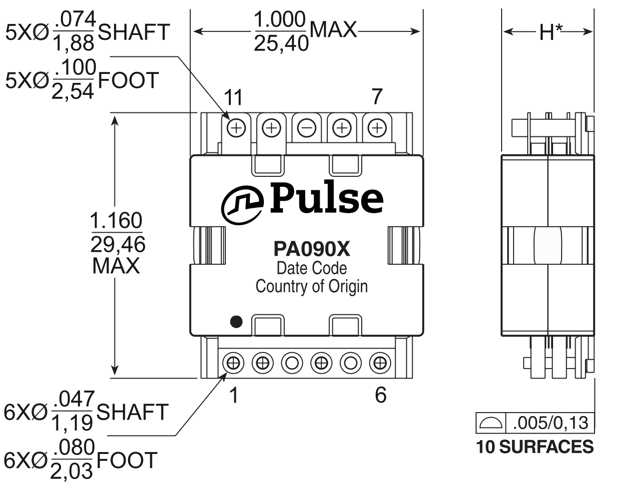
Electrical Specifications @ 25°C - Operating Temperature -40°C to +125°C										
Part Number	**Turns Ratio**		**Schematic**	**Primary[1] Inductance** (µH MIN)	**Leakage[2] Inductance** (µH MAX)	**DCR** (mΩ MAX)				**Maximum Height** (mm)
	Primary A	**Secondary**				**Primary A**	**Primary B**	**Primary Aux.**	**Secondary**	
Double Interleave Designs (Higher Efficiency, Lower DCR and Lower Leakage)										
PA0901NL	4T & 4T	4T (1T:1T:1T:1T)	A1	216	0.3	13	13	-	4.5	10.2
PA0903NL	5T & 5T (w/5T aux)			340	0.3	15	15	235		
PA0905NL	6T & 6T (w/2T aux)			480	0.3	21	21	78		
PA0907NL	7T & 7T (w/3T aux)			660	0.3	50	50	100		
PA0909NL	8T & 8T			860	0.3	60	60	-		
PA0908NL	4T & 4T	1T & 1T	A2	216	0.3	13	13	-	0.56 & 0.56	10.2
PA0910NL	5T & 5T (w/5T aux)			340	0.3	15	15	235		
PA0912NL	6T & 6T (w/2T aux)			480	0.3	21	21	78		
PA0914NL	7T & 7T (w/3T aux)			660	0.3	50	50	100		
Single Interleave Designs (Lower Cost)										
PA0930NL	4T	4T (1T:1T:1T:1T)	B1	54	0.3	13	-	-		
PA0931NL	5T (w/5T aux)			85	0.3	15	-	470		
PA0934NL	4T	7T & 7T	B2	54	0.3	13	-	-	40 & 40	9.1
PA0935NL	5T (w/5T aux)			85	0.3	15	-	470		
PA0936NL	6T (w/2T aux)			120	0.3	21	-	156		
PA0937NL	7T (w/3T aux)			165	0.3	50	-	200		
PA0947NL	8T			215	0.3	60	-	-		
PA0943NL	5T (w/5T aux)	2T & 1T	B3	85	0.3	15	-	470	1.8 & 0.6	9.1

Notes:

1. Inductance is measured, where applicable, with both primary windings connected in series (2 to 5, with 3 and 4 shorted).
2. Leakage inductance is measured with both primary windings connected in series (where applicable) with all other windings shorted.

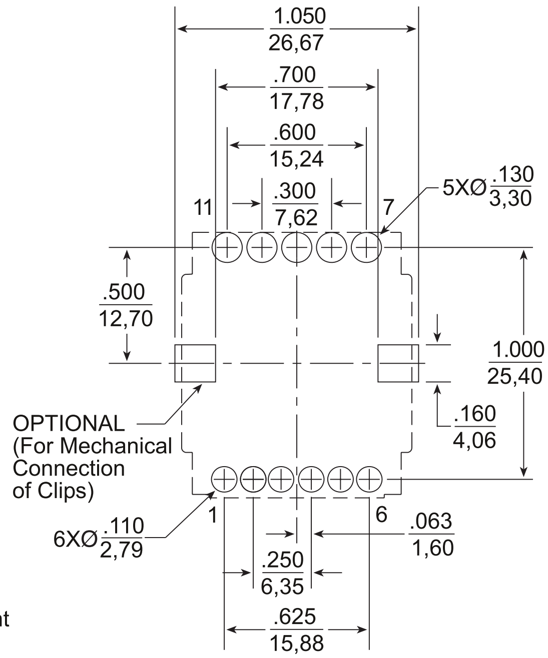
Mechanical

PA090X



*H - Maximum Height (see table above)

SUGGESTED PAD LAYOUT



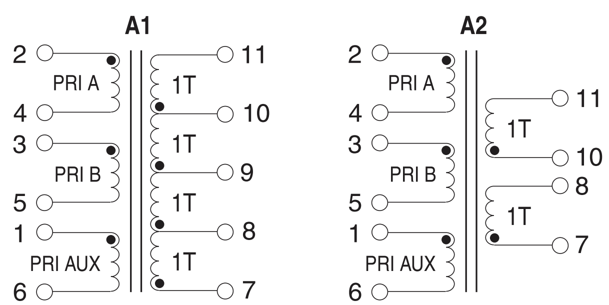
Weight 19.8grams
Tray 30/tray
Dimensions: $\frac{\text{Inches}}{\text{mm}}$
Unless otherwise specified,
all tolerances are: $\pm\frac{0.010}{0,25}$

NOTES: The above is a universal footprint for a component that has all 11 pins populated. For a given part number, it is only necessary to provide pads for the terminations shown in the schematic below.

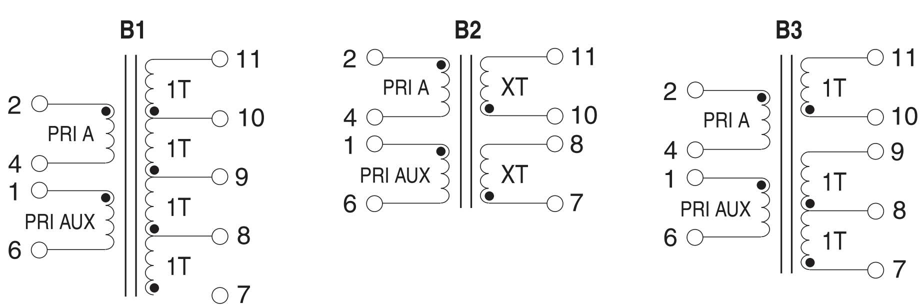
Schematics

PA090X

— DOUBLE INTERLEAVE SCHEMATICS —



— SINGLE INTERLEAVE SCHEMATICS —



PA09XX Transformer Winding Configuration Matrix

The following is a matrix of the winding configurations that are possible with the Pulse PA09XX Planar Transformer Platform. The package is typically capable of handling between 150-250W of power depending on the application, ambient conditions and available cooling. Once a configuration is selected, the formulae and charts can be used to determine the approximate power dissipation and temperature rise of the component in a given application.

High Efficiency Double Interleaved Designs

				SECONDARY WINDINGS						
				Single Winding			Tapped Winding			Dual Winding
		Turns		1T	2T	4T	1:1	1:3	2:2	1T & 1T
			DCR (mΩ)	0.28	1.12	4.5	1.12	4.5	4.5	1.12
PRIMARY WINDINGS	Single Winding	4T	5	PA0908	PA0908	PA0901	PA0908	PA0901	PA0901	PA0908
		5T	7.5	PA0910	PA0910	PA0903	PA0910	PA0903	PA0903	PA0910
		6T	12	PA0912	PA0912	PA0905	PA0912	PA0905	PA0905	PA0912
		7T	30	PA0914	PA0914	PA0907	PA0914	PA0907	PA0907	PA0914
		8T	20	PA0908	PA0908	PA0901	PA0908	PA0901	PA0901	PA0908
		10T	30	PA0910	PA0910	PA0903	PA0910	PA0903	PA0903	PA0910
		12T	48	PA0912	PA0912	PA0905	PA0912	PA0905	PA0905	PA0912
		14T	120	PA0914	PA0914	PA0907	PA0914	PA0907	PA0907	PA0914
		16T	140	PA0916	PA0916	PA0909	PA0916	PA0909	PA0909	PA0916
	Dual Winding	4T/4T	20	PA0908	PA0908	PA0901	PA0908	PA0901	PA0901	PA0908
		4T/5T	30	PA0910	PA0910	PA0903	PA0910	PA0903	PA0903	PA0910
		5T/5T	48	PA0912	PA0912	PA0905	PA0912	PA0905	PA0905	PA0912
		5T/6T	120	PA0914	PA0914	PA0907	PA0914	PA0907	PA0907	PA0914
		6T/6T	140	-	-	PA0909	-	PA0909	PA0909	-

Lower Cost Single Interleaved Designs

				SECONDARY WINDINGS								
				Single Winding			Tapped Winding				Dual Winding	
		Turns		3T	4T	7T	1:2	1:3	2:2	7:7	1T & 2T	7T & 7T
			DCR (mΩ)	3.4	4.5	20	3.4	4.5	4.5	80	4.5	80
PRIMARY WINDINGS	Single Winding	4T	10	-	PA0930	PA0934	-	PA0930	PA0930	PA0934	-	PA0934
		5T	15	PA0943	PA0931	PA0935	PA0943	PA0931	PA0931	PA0935	PA0943	PA0935
		6T	24	-	-	PA0936	-	-	-	PA0936	-	PA0936
		7T	60	-	-	PA0937	-	-	-	PA0937	-	PA0937
		8T	70	-	-	PA0947	-	-	-	PA0947	PA0947	PA0947

Notes:

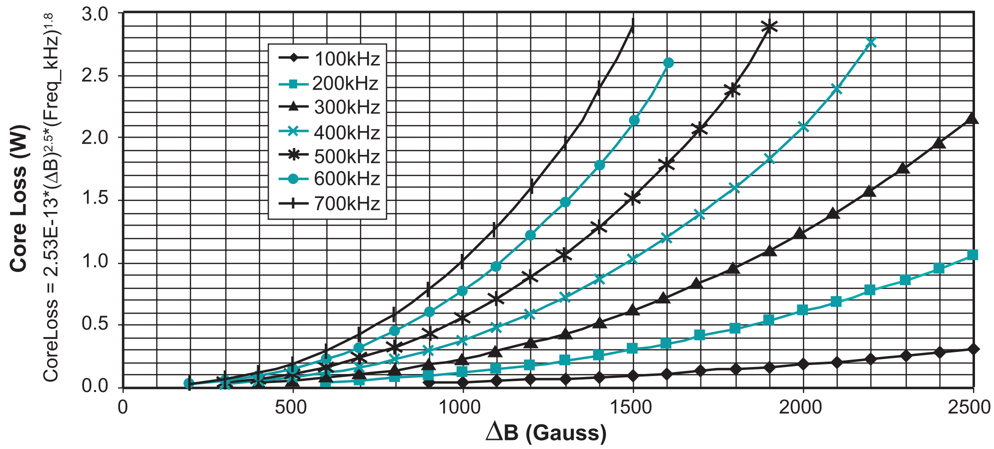
1. The primary inductance for any configuration can be calculated as:
   Primary Inductance (µH MIN) = 3.4 * (Primary_Turns)2
2. The above base part numbers (**PA09XXNL**) are available from stock.
3. It is possible to add a small gap to the transformer. Gapped transformers are non-standard and can be made available upon request, but are not typically available from stock. To request a gapped version of the transformer, add a suffix "G" to the base number (i.e. PA0901GNL). The nominal inductance with the a gap can be calculated as:
   Primary Inductance (µH nominal) = 2.2 * (Primary Turns)

Notes from Tables:

1. The above transformers have been tested and approved by Pulse's IC partners and are cited in the appropriate datasheet or evaluation board documentation at these companies. To determine which IC and IC companies are matched with the above transformers, please refer To the IC cross reference on the Pulse web page.

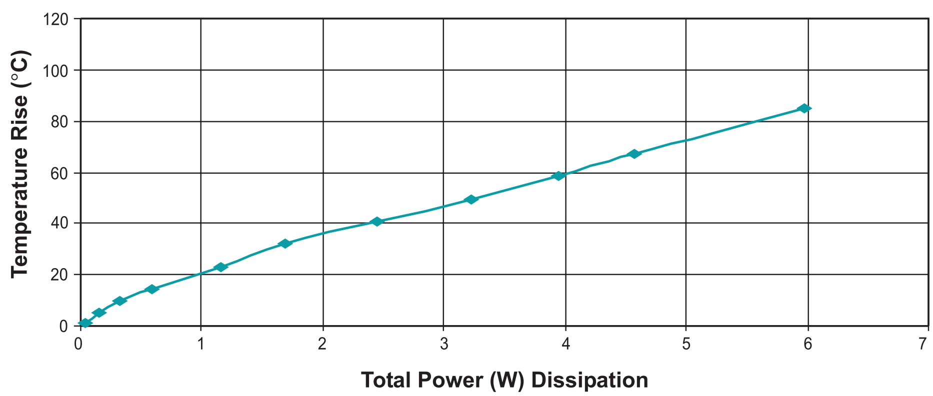
2. To determine if the transformer is suitable for your application, it is necessary to ensure that the temperature rise of the component (ambient plus temperature rise) does not exceed its operating temperature. To determine the approximate temperature rise of the transformer, refer to the graphs below.

Core Loss vs. Flux Density



ΔB = 120E3 * Vin_min * Dutycycle_max / (Freq_kHz * Pri_Turns)

Temperature Rise vs. Power (W) Dissipation



Total Power Dissipation (W) = .001 * (DCRprimary * IRMS_primary^2 + DCRsecondary * IRMS_secondary^2) + Core Loss (W)

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