

HIGH – FREQUENCY PLANAR TRANSFORMERS

Ruggedized



PL103XX Series

- ⊗ Power Rating up to 140 W
- ⊗ Height: 8.6mm to 9.7mm Max
- ⊗ Footprint: 23.4mm x 21.6mm Max
- ⊗ Frequency Range: 200kHz to 700kHz
- ⊗ Isolation (Primary to Secondary & Core): 1750V_{DC}
- ⊗ Moisture Sensitivity Level: 1

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

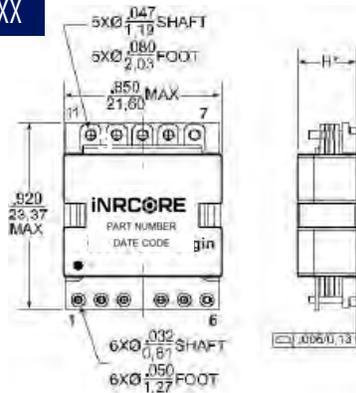
| Part 3,4 Number: | Turns Ratio | | Secondary | Schematic | Primary 1 Inductance (μ H MIN) | Leakage Inductance (μ H MAX) | DCR (m Ω MAX) | | | Maximum Height (mm) |
|---------------------|-------------|-----------|-----------|-----------|-------------------------------------------|-----------------------------------------|-------------------------|--------------|-------------|---------------------------|
| | Primary A | Primary B | | | | | Primary A | Primary B | Secondary | |
| | | | | | | | | | | |
| PL10301 | 4T | 5T | 4T | A1 | 153 | 0.45 | 17.5 | 17.5 | 7 | 8.6 |
| PL10302 | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | 7 | 8.6 |
| PL10303 | 5T | 5T | | | 240 | 0.55 | 20 | 20 | 7 | 8.6 |
| PL10304 | 5T | 6T | | | 290 | 0.60 | 20 | 25 | 7 | 8.6 |
| PL10305 | 6T | 6T | | | 345 | 0.65 | 25 | 25 | 7 | 8.6 |
| PL10306 | 4T | 4T | 1T & 1T | A2 | 153 | 0.45 | 17.5 | 17.5 | .875 & .875 | 8.6 |
| PL10307 | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | .875 & .875 | 8.6 |
| PL10308 | 5T | 5T | | | 240 | 0.55 | 20 | 20 | .875 & .875 | 8.6 |
| PL10309 | 5T | 6T | | | 290 | 0.60 | 20 | 25 | .875 & .875 | 8.6 |
| PL10310 | 6T | 6T | | | 345 | 0.65 | 25 | 25 | 1.75 & 1.75 | 8.6 |
| PL10311 | 4T | 4T | 2T & 1T | A3 | 153 | 0.45 | 17.5 | 17.5 | 1.75 & 1.75 | 8.6 |
| PL10312 | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | 1.75 & 1.75 | 8.6 |
| PL10313 | 5T | 5T | | | 240 | 0.45 | 20 | 20 | 1.75 & 1.75 | 8.6 |
| PL10314 | 5T | 6T | | | 290 | 0.50 | 20 | 25 | 1.75 & 1.75 | 9.7 |
| PL10315 | 6T | 6T | | | 345 | 0.55 | 25 | 25 | 1.75 & 1.75 | 9.7 |

- Notes:
1. Inductance is measured where applicable, with north primary windings connected in series (2 to 5, with 3 and 4 shorted).
 2. Leakage inductance is measured on windings (2-5) with (3-4) and (7, 8, 9, 10, 11) shorted.
 3. Optional Tape & Reel packaging can be ordered by adding a "T" suffix at the end of the part number (i.e. **PL10301T**).
 4. Parts can be ordered Non-Lead by adding "NL" to the part number (i.e. **PL10303NL**).

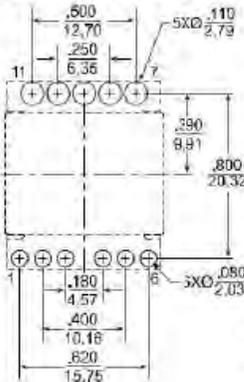


Mechanicals

PL103XX



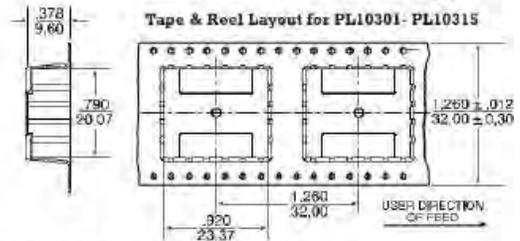
SUGGESTED PAD LAYOUT



Dimensions: $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified, all tolerances are: $\pm \frac{.010}{0.25}$

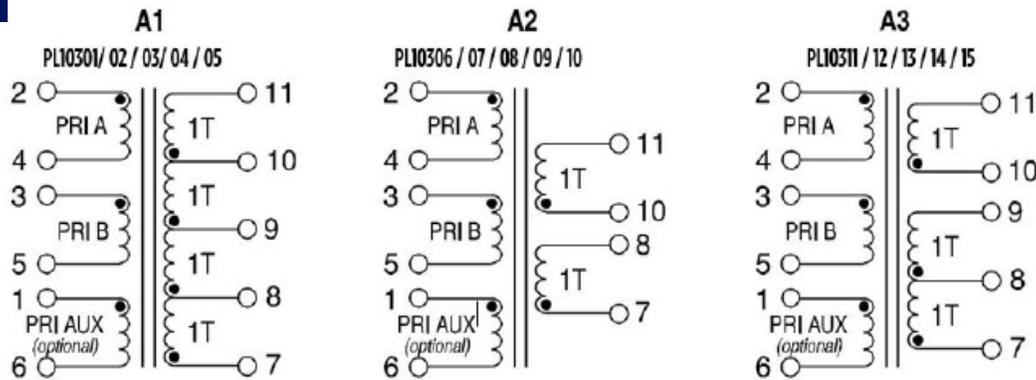
Tape & Reel Layout for PL10301 - PL10315



NOTE: The above is a universal footprint for a component that has all 11 pins populated. For a given number, it is only necessary to provide pads for the termination shown in the schematics.

Electrical Schematics

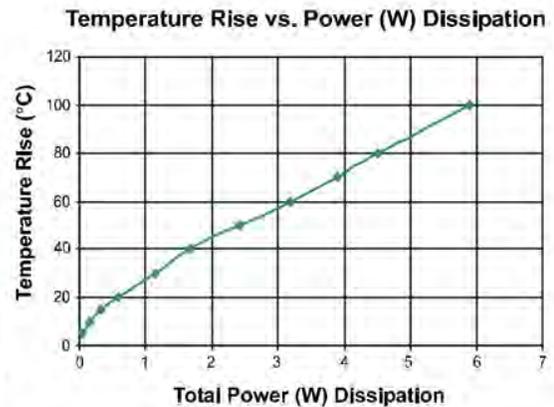
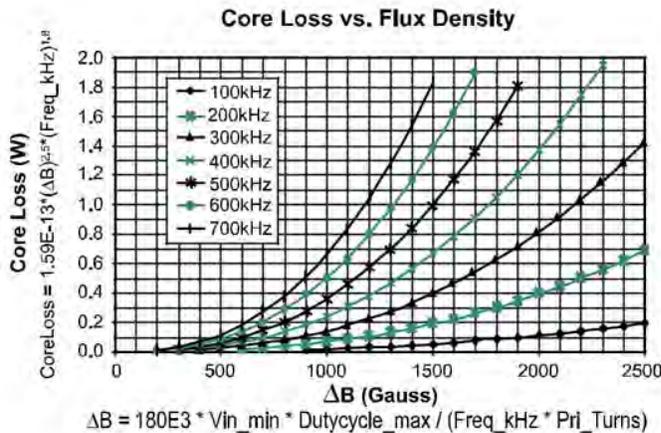
PL103XX



Notes:

1. The above transformers have been tested and approved by iNRCORE's IC partners and are cited in the appropriate datasheet or evaluation board documentation at these companies. See Spy glass transformer matrix on the next page for the other winding configuration that can be made available.

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.



PL103XX Transformer Winding Configuration Matrix

The following is a matrix of the winding configurations that are possible with the iNRCORE PL103XX Planar Transformer platform. The package is typically capable of handling between 80-140w of power depending on the application, ambient conditions 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.

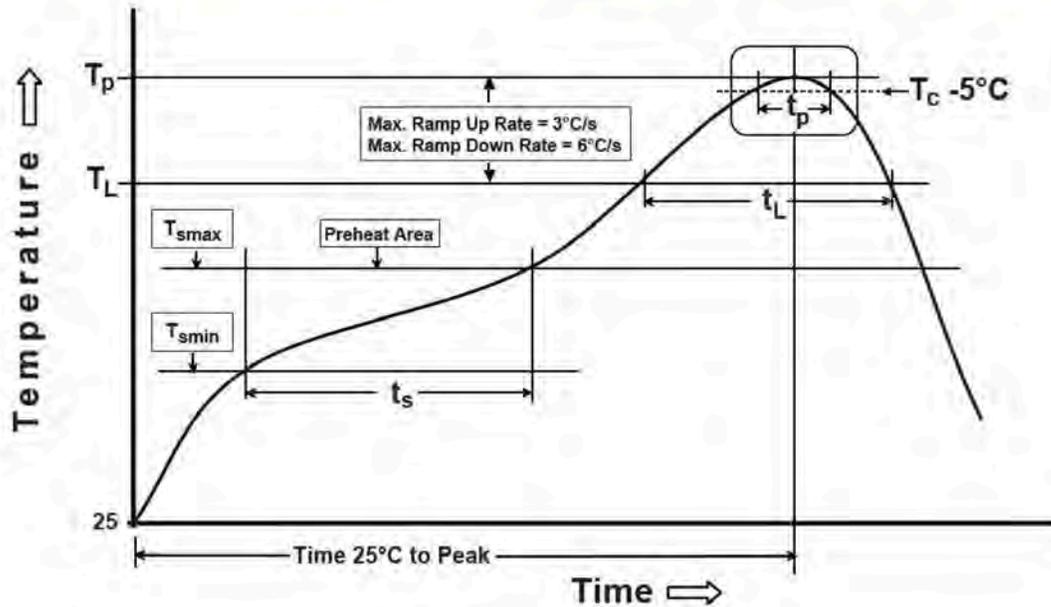
| | | SECONDARY WINDINGS | | | | | | | | | | | |
|------------------|----------------|--------------------|----------------|---------|---------|---------|----------------|---------|---------|---------|--------------|---------|---------|
| | | Turns | Single Winding | | | | Tapped Winding | | | | Dual Winding | | |
| | | | DCR (mΩ) | 1T | 2T | 3T | 4T | 1:1 | 1:2 | 1:3 | 2:2 | 1T & 1T | 1T & 2T |
| | | | 0.44 | 1.3 | 3.5 | 7 | 1.3 | 3.5 | 7 | 7 | 1.3 | 3.5 | |
| PRIMARY WINDINGS | Single Winding | 4T | 10 | PL10306 | PL10306 | PL10311 | PL10301 | PL10306 | PL10311 | PL10301 | PL10301 | PL10306 | PL10311 |
| | | 5T | 12.5 | PL10308 | PL10308 | PL10313 | PL10303 | PL10308 | PL10313 | PL10303 | PL10303 | PL10308 | PL10313 |
| | | 6T | 15 | PL10310 | PL10310 | PL10315 | PL10305 | PL10310 | PL10315 | PL10305 | PL10305 | PL10310 | PL10315 |
| | | 8T | 40 | PL10306 | PL10306 | PL10311 | PL10301 | PL10306 | PL10311 | PL10301 | PL10301 | PL10306 | PL10311 |
| | | 9T | 45 | PL10307 | PL10307 | PL10312 | PL10302 | PL10307 | PL10312 | PL10302 | PL10302 | PL10307 | PL10312 |
| | | 10T | 50 | PL10308 | PL10308 | PL10313 | PL10303 | PL10308 | PL10313 | PL10303 | PL10303 | PL10308 | PL10313 |
| | | 11T | 55 | PL10309 | PL10309 | PL10314 | PL10304 | PL10309 | PL10314 | PL10304 | PL10304 | PL10309 | PL10314 |
| | | 12T | 60 | PL10310 | PL10310 | PL10315 | PL10305 | PL10310 | PL10315 | PL10305 | PL10305 | PL10310 | PL10315 |
| | Dual Winding | 4T/4T | 20/20 | PL10306 | PL10306 | PL10311 | PL10301 | PL10306 | PL10311 | PL10301 | PL10301 | PL10306 | PL10311 |
| | | 4T/5T | 20/25 | PL10307 | PL10307 | PL10312 | PL10302 | PL10307 | PL10312 | PL10302 | PL10302 | PL10307 | PL10312 |
| | | 5T/5T | 25/25 | PL10308 | PL10308 | PL10313 | PL10303 | PL10308 | PL10313 | PL10303 | PL10303 | PL10308 | PL10313 |
| | | 5T/6T | 25/30 | PL10309 | PL10309 | PL10314 | PL10304 | PL10309 | PL10314 | PL10304 | PL10304 | PL10309 | PL10314 |
| | | 6T/6T | 30/30 | PL10310 | PL10310 | PL10315 | PL10305 | PL10310 | PL10315 | PL10305 | PL10305 | PL10310 | PL10315 |

NOTES:

1. The primary inductance for any configuration can be calculated as: $\text{Primary Inductance } (\mu\text{H Min}) = 2.4 * (\text{Primary Turns})^2$
2. The above base part numbers (PL103XX) 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 (ie: **PL10301G** or **PL10301GNL**). The nominal inductance with a gap can be calculated as: $\text{Primary Inductance } (\mu\text{H Nominal}) = 0.69 * (\text{Primary Turns})^2$
4. It is possible to add a primary side aux. winding to any of the above configurations as shown in the schematics. Transformers with primary size aux. windings are non-standard and can be made available upon request, but are not typically available from stock. The primary aux. winding can be between 2 and 16 turns. To add a primary aux. winding to a given base, use the extension .OXX. For example, to add a 4T aux. winding to the base part number PL10301NL, use the part number **PL10301.004NL**. To add a 16T aux. winding, use the part number **PL10301.016NL**.
5. Optional Tape & Reel packaging can be ordered by adding a "T" suffix to the complete part number (i.e. PL10301 becomes **PL10301T** for no AUX- PL10301.009 becomes **PL10301.009NLT** for 9T AUX).



Tin/Lead Recommended Reflow Profile (Based on J-STD-020D)



| T_{SMIN} (°C) | T_{SMAX} (°C) | T_L (°C) | T_P (°C MAX) | t_S (s) | t_L (s) | t_P (s MAX) | Ramp-up rate (T_L to T_P) | Ramp-down rate (T_P to T_L) | Time 25°C to peak temperature (s MAX) |
|--------------------|--------------------|---------------|-------------------|--------------|--------------|------------------|------------------------------------|--------------------------------------|---------------------------------------------|
| 100 | 150 | 183 | 235 | 60-120 | 60-150 | 20 | 3°C/s MAX | 6°C/s MAX | 360 |

Notes:

1. All temperatures measured on the package leads.
2. Maximum times of reflow cycle: 2.

For More Information

iNRCORE, LLC
311 Sinclair Road Bristol,
PA 19007-6812 U.S.A
Tel: + 1.215.781.6400
Fax: +1.215.7816430

Global Sales Representatives and Locations:
<http://www.inrcore.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, 2020. iNRCORE, LLC. All rights reserved.



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[iNRCORE:](#)

[PL10301](#) [PL10301T](#) [PL10302](#) [PL10302T](#) [PL10303](#) [PL10303T](#) [PL10304](#) [PL10304T](#) [PL10305](#) [PL10305T](#)
[PL10306](#) [PL10306T](#) [PL10307](#) [PL10307T](#) [PL10308](#) [PL10308T](#) [PL10309](#) [PL10309T](#) [PL10310](#) [PL10310T](#) [PL10311](#)
[PL10311T](#) [PL10312](#) [PL10312T](#) [PL10313](#) [PL10313T](#) [PL10314](#) [PL10314T](#) [PL10315](#) [PL10315T](#)