

HIGH FREQUENCY PLANAR TRANSFORMERS

Industrial Grade



- ⊗ 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 | |
| | | | | | | | | | | |
| R8301NL | 4T | 4T | 4T | A1 | 153 | 0.45 | 17.5 | 17.5 | 7 | 8.6 |
| R8302NL | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | 7 | 8.6 |
| R8303NL | 5T | 5T | | | 240 | 0.55 | 20 | 20 | 7 | 8.6 |
| R8304NL | 5T | 6T | | | 290 | 0.60 | 20 | 25 | 7 | 8.6 |
| R8305NL | 6T | 6T | | | 345 | 0.65 | 25 | 25 | 7 | 8.6 |
| R8306NL | 4T | 4T | 1T & 1T | A2 | 153 | 0.45 | 17.5 | 17.5 | .875 & .875 | 8.6 |
| R8307NL | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | .875 & .875 | 8.6 |
| R8308NL | 5T | 5T | | | 240 | 0.55 | 20 | 20 | .875 & .875 | 8.6 |
| R8309NL | 5T | 6T | | | 290 | 0.60 | 20 | 25 | .875 & .875 | 8.6 |
| R8310NL | 6T | 6T | | | 345 | 0.65 | 25 | 25 | .875 & .875 | 8.6 |
| R8311NL | 4T | 4T | 2T & 1T | A3 | 153 | 0.45 | 17.5 | 17.5 | 1.75 & 1.75 | 8.6 |
| R8312NL | 4T | 5T | | | 194 | 0.45 | 17.5 | 20 | 1.75 & 1.75 | 8.6 |
| R8313NL | 5T | 5T | | | 240 | 0.50 | 20 | 20 | 1.75 & 1.75 | 8.6 |
| R8314NL | 5T | 6T | | | 290 | 0.50 | 20 | 25 | 1.75 & 1.75 | 9.7 |
| R8315NL | 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. R8301NLT)

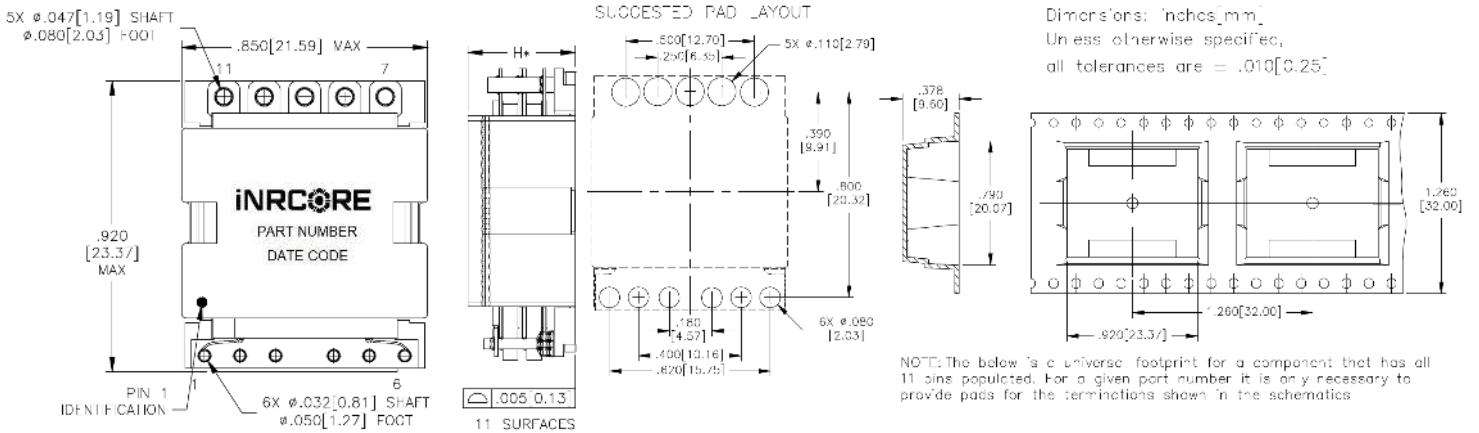


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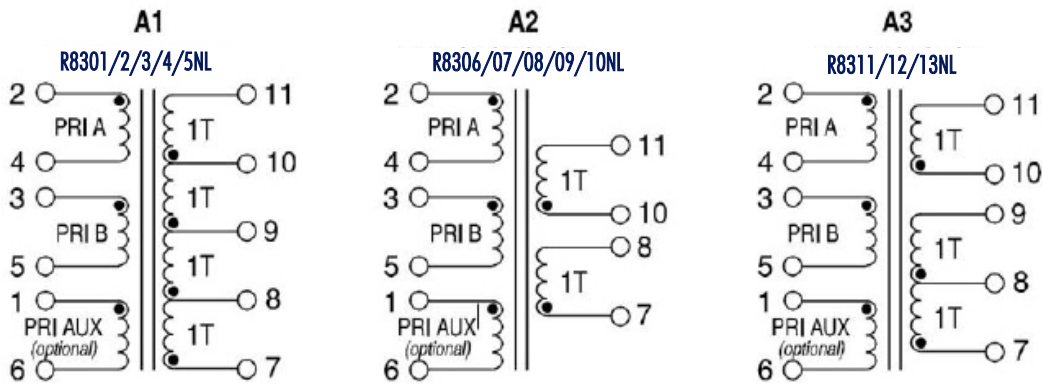
Industrial Grade



Mechanics



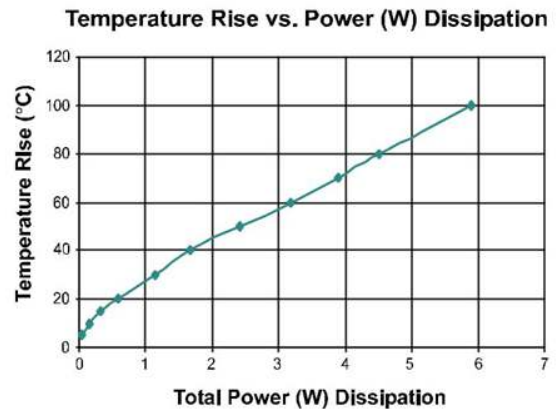
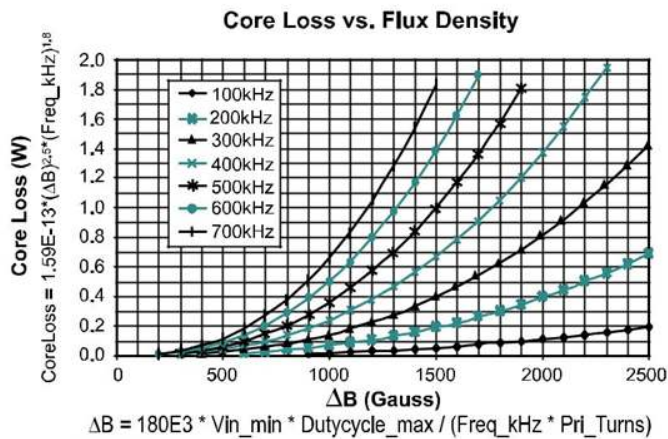
Electrical Schematics



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.



R83XX NL Transformer Winding Configuration Matrix

The following is a matrix of the winding configurations that are possible with the iNRCORE R83XXNL 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.

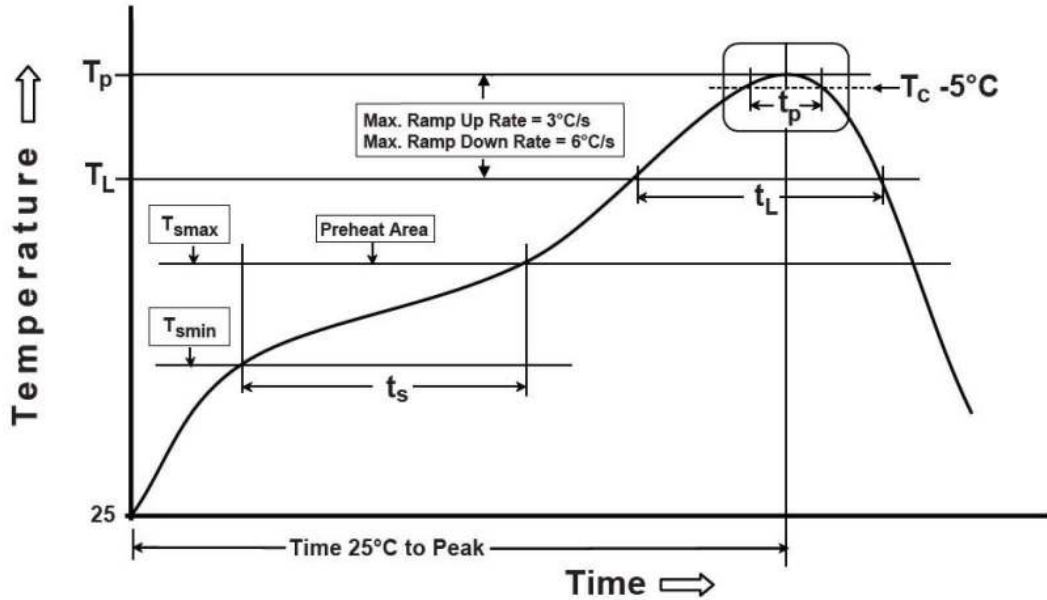
| High Efficiency Double Interleaved Designs | | | | | | | | | | | | | |
|--|----------------|---------|--------------------|----------|---------|---------|----------------|---------|---------|---------|--------------|---------|---------|
| | | | SECONDARY WINDINGS | | | | | | | | | | |
| | | | Single Winding | | | | Tapped Winding | | | | Dual Winding | | |
| | | | Turns | DCR (mΩ) | 1T | 2T | 3T | 4T | 1:1 | 1:2 | 1:3 | 2:2 | 1T & 1T |
| PRIMARY WINDINGS | Single Winding | 4T | 10 | R8306NL | R8306NL | R8311NL | R8301NL | R8306NL | R8311NL | R8301NL | R8301NL | R8306NL | R8311NL |
| | | 5T | 12.5 | R8308NL | R8308NL | R8313NL | R8303NL | R8308NL | R8313NL | R8303NL | R8303NL | R8308NL | R8313NL |
| | | 6T | 15 | R8310NL | R8310NL | R8315NL | R8305NL | R8310NL | R8315NL | R8305NL | R8305NL | R8310NL | R8315NL |
| | | 8T | 40 | R8306NL | R8306NL | R8311NL | R8301NL | R8306NL | R8311NL | R8301NL | R8301NL | R8306NL | R8311NL |
| | | 9T | 45 | R8307NL | R8307NL | R8312NL | R8302NL | R8307NL | R8312NL | R8302NL | R8302NL | R8307NL | R8312NL |
| | | 10T | 50 | R8308NL | R8308NL | R8313NL | R8303NL | R8308NL | R8313NL | R8303NL | R8303NL | R8308NL | R8313NL |
| | | 11T | 55 | R8309NL | R8309NL | R8314NL | R8304NL | R8309NL | R8314NL | R8304NL | R8304NL | R8309NL | R8314NL |
| | | 12T | 60 | R8310NL | R8310NL | R8315NL | R8305NL | R8310NL | R8315NL | R8305NL | R8305NL | R8310NL | R8315NL |
| | Dual Winding | 4T & 4T | 20/20 | R8306NL | R8306NL | R8311NL | R8301NL | R8306NL | R8311NL | R8301NL | R8301NL | R8306NL | R8311NL |
| | | 4T & 5T | 20/25 | R8307NL | R8307NL | R8312NL | R8302NL | R8307NL | R8312NL | R8302NL | R8302NL | R8307NL | R8312NL |
| | | 5T & 5T | 25/25 | R8308NL | R8308NL | R8313NL | R8303NL | R8308NL | R8313NL | R8303NL | R8303NL | R8308NL | R8313NL |
| | | 5T & 6T | 25/30 | R8309NL | R8309NL | R8314NL | R8304NL | R8309NL | R8314NL | R8304NL | R8304NL | R8309NL | R8314NL |
| | | 6T & 6T | 30/30 | R8310NL | R8310NL | R8315NL | R8305NL | R8310NL | R8315NL | R8305NL | R8305NL | R8310NL | R8315NL |

NOTES:

- The primary inductance for any configuration can be calculated as: $\text{Primary Inductance } (\mu\text{H Min}) = 2.4 * (\text{Primary Turns})^2$
- The above base part numbers (R83XXNL) are available from stock.
- 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: **R8301GNL**).
The nominal inductance with a gap can be calculated as: $\text{Primary Inductance } (\mu\text{H Nominal}) = 0.69 (\text{Primary Turns})^2$
- 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 R8301NL, use the part number **R8301.004NL**. To add a 16T aux. winding, use the part number **R8301.016NL**.
- Optional Tape & Reel packaging can be ordered by adding a "T" suffix to the complete part number (i.e. R8301NL becomes **R8301NLT** for no AUX- R8301.009NL becomes **R8301.009NLT** for 9T AUX).



Non-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) |
|--------------------|--------------------|---------------|-------------------|--------------|--------------|------------------|------------------------------------|--------------------------------------|---|
| 150 | 200 | 217 | 245 | 60-120 | 60-150 | 30 | 3°C/s MAX | 6°C/s MAX | 480 |

Notes:

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

For More Information

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