

# SMT Power Inductors

Shielded Drum Core - P1166NL Series



- Height: 3.8mm Max
- Footprint: 7.5mm x 7.5mm Max
- Current Rating: up to 5.5A
- Inductance Range: .44μH to 750μH

## Electrical Specifications @ 25°C - Operating Temperature -40°C to +130°C

Part <sup>2,3</sup> Number	Inductance @ 0A <sub>DC</sub> (μH ±20%)	Inductance @ I <sub>rated</sub> (μH) MIN	I <sub>rated</sub> <sup>5</sup> (A <sub>DC</sub> )	DCR (mΩ)		Saturation <sup>6</sup> Current -25% (A)	Heating <sup>7</sup> Current +40°C (A)	Core Loss <sup>8</sup> Factor (K2)	SRF (MHz)
				TYP	MAX				
P1166.681NL **	0.68*	0.44	5.5	5.0	6.0	5.9	5.5	380	>40
P1166.102NL	1.00*	0.65	4.9	6.2	7.5	5.2	4.9	440	>40
P1166.162NL	1.60*	1.0	4.0	7.8	11	4.0	4.4	570	>40
P1166.302NL	3.00*	2.0	2.8	19	23	3.0	2.8	780	>40
P1166.482NL	4.80*	3.1	2.4	25	31	2.4	2.5	990	>40
P1166.682NL	6.80*	4.4	2.1	32	40	2.1	2.2	1200	38
P1166.103NL	10	7.5	1.6	58	70	1.8	1.6	1400	29
P1166.123NL **	12	9.0	1.5	62	78	1.7	1.5	1500	25
P1166.153NL **	15	11.3	1.4	74	92	1.5	1.4	1700	22
P1166.183NL **	18	13.5	1.2	100	124	1.4	1.2	1800	21
P1166.223NL	22	16.5	1.2	106	126	1.2	1.2	2000	20
P1166.273NL **	27	20.3	1.0	146	180	1.1	1.0	2300	17
P1166.333NL **	33	24.8	0.94	167	205	1.0	0.94	2400	15
P1166.393NL **	39	29.3	0.86	183	211	0.86	0.90	2700	13
P1166.473NL	47	35.3	0.83	206	260	0.83	0.85	2900	12
P1166.563NL **	56	42.0	0.73	271	340	0.73	0.74	3300	11
P1166.683NL **	68	51.0	0.67	303	370	0.67	0.70	3600	9.5
P1166.823NL **	82	61.5	0.60	411	500	0.61	0.60	4000	8.0
P1166.104NL	100	75.0	0.56	464	580	0.56	0.57	4300	7.5
P1166.124NL **	120	90.0	0.53	528	645	0.55	0.53	4700	7.0
P1166.154NL	150	113	0.46	695	860	0.46	0.46	5300	6.3
P1166.184NL **	180	135	0.39	992	1190	0.42	0.39	5800	5.6
P1166.224NL	220	165	0.35	1210	1480	0.37	0.35	6400	5.1
P1166.274NL **	270	203	0.32	1407	1750	0.32	0.33	7100	4.6
P1166.334NL	330	248	0.31	1580	1880	0.31	0.31	7800	4.1
P1166.394NL **	390	293	0.26	2178	2600	0.29	0.26	8500	3.9
P1166.474NL **	470	353	0.25	2400	2910	0.26	0.25	9500	3.6
P1166.564NL **	560	420	0.23	2705	3400	0.23	0.23	10000	3.1
P1166.684NL **	680	510	0.20	3658	4450	0.21	0.20	11000	2.7
P1166.824NL	820	615	0.17	5021	6200	0.20	0.17	13000	2.5
P1166.105NL	1000	750	0.15	6720	8000	0.16	0.15	14000	1.3

\* Inductance is at 0A<sub>DC</sub> tolerance on indicated part numbers is ±30%; tolerance is ±20% on all other parts.

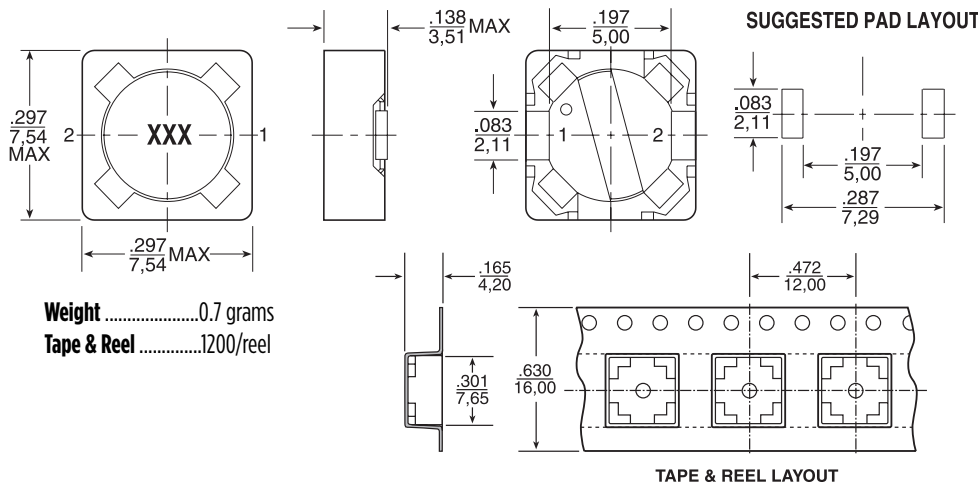
\*\* Contact Pulse for availability

**NOTES FROM TABLE:** (See page 43)

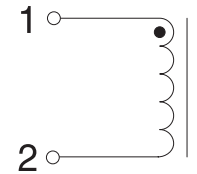
## Mechanical

## Schematic

P1166.XXXNL



Weight .....0.7 grams  
Tape & Reel .....1200/reel



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

Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

### Notes from Tables: (pages 27 - 42)

1. Unless otherwise specified, all testing is made at 100kHz, 0.1VAC.
2. Optional Tape & Reel packaging can be ordered by adding a "T" suffix to the part number (i.e P1166.102NL becomes P1166.102NLT). Pulse complies with industry standard Tape and Tape & Reel specification EIA481.
3. The "NL" suffix indicates an RoHS-compliant part number. Non-NL suffixed parts are not necessarily RoHS compliant, but are electrically and mechanically equivalent to NL versions. If a part number does not have the "NL" version, but an RoHS compliant version is required, please contact Pulse for availability.
4. Temperature of the component (ambient plus temperature rise) must be within specified operating temperature range.
5. The rated current (I<sub>rated</sub>) as listed is either the saturation current or the heating current depending on which value is lower.
6. The saturation current, I<sub>sat</sub>, is the current at which the component inductance drops by the indicated percentage (typical) at an ambient temperature of 25C. This current is determined by placing the component in the specified ambient environment and applying a short duration pulse current (to eliminate self-heating effects) to the component.
7. The heating current, I<sub>dc</sub>, is the DC current required to raise the component temperature by the indicated delta (approximately). The heating current is determined by mounting the component on a typical PCB and applying current for 30 minutes. The temperature is measured by placing the thermocouple on top of the unit under test.

7. In high volt\*time (Et) or ripple current applications, additional heating in the component can occur due to core losses in the inductor which may necessitate derating the current in order to limit the temperature rise of the component. In order to determine the approximate total loss (or temperature rise) for a given application, both copper losses and core losses should be taken into account.

### Estimated Temperature Rise:

$$\text{Trise} = [\text{Total loss (mW)} / K0]^{.833} \quad (^\circ\text{C})$$

$$\text{Total Loss} = \text{Copper loss} + \text{Core loss (mW)}$$

$$\text{Copper loss} = I_{\text{RMS}}^2 \times \text{DCR (Typical)} \text{ (mW)}$$

$$I_{\text{rms}} = [I_{\text{dc}}^2 + \Delta I^2 / 12]^{1/2} \text{ (A)}$$

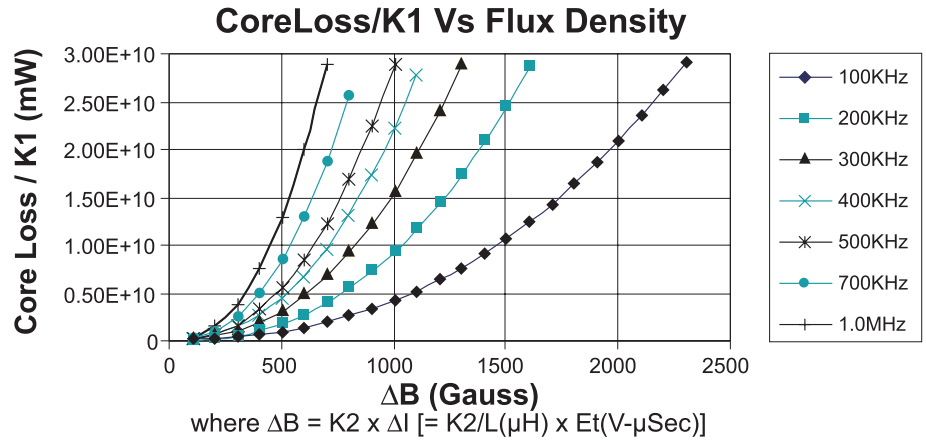
$$\text{Core loss} = K1 \times f \text{ (kHz)}^{1.25} \times \text{Bac (Ga)}^{2.38} \text{ (mW)}$$

$$\text{Bac (peak to peak flux density)} = K2 \times \Delta I \text{ (Ga)} \\ [= K2/L \text{ (\mu H)} \times \text{Et (V-\mu Sec)} \text{ (Ga)}]$$

where f varies between 25kHz and 1MHz, and Bac is less than 2500 Gauss.

K2 is a core size and winding dependent value and is given for each p/n in the proceeding datasheets. K0 & K1 are platform and material dependant constants and are given in the table below for each platform.

Part No.	Trise Factor (K0)	Core Loss Factor (K1)
PG0085/86	2.3	5.29E-10
PG0087	5.8	15.2E-10
PG0040/41	0.8	2.80E-10
P1174	0.8	6.47E-10
PF0601	4.6	14.0E-10
PF0464	3.6	24.7E-10
PF0465	3.6	33.4E-10
P1166	1.9	29.6E-10
P1167	2.1	42.2E-10
PF0560NL	5.5	136E-10
P1168/69	4.8	184E-10
P1170/71	4.3	201E-10
P1172/73	5.6	411E-10
PF0552NL	8.3	201E-10
PF0553NL	7.1	411E-10



Take note that the component's temperature rise varies depending on the system condition. It is suggested that the component be tested at the system level, to verify the temperature rise of the component during system operation.

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