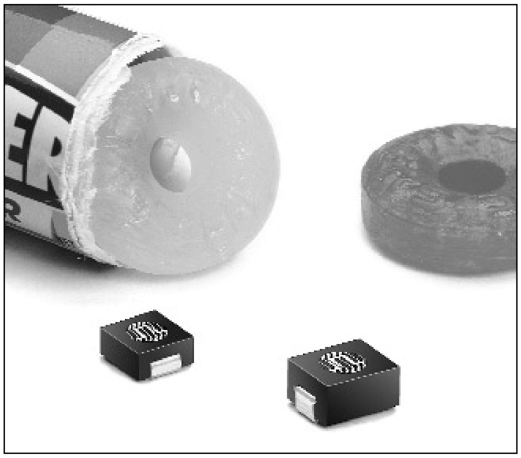
SMT POWER INDUCTORS

For Use with Volterra's Chipset



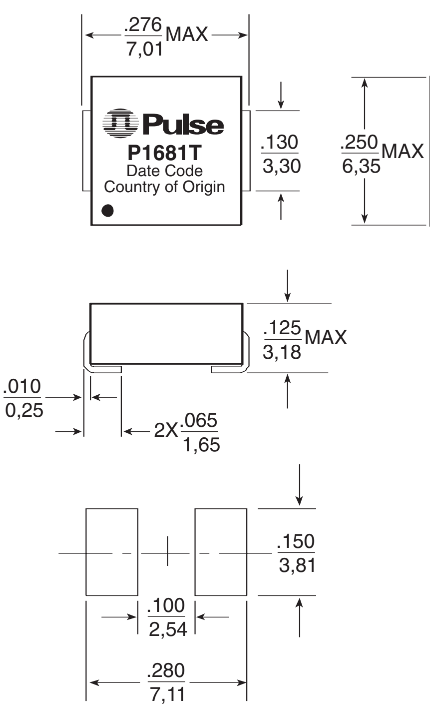
- **Two package sizes**
- **Height:** .125" and .177" Max
- **Footprint:** .276" x .250" and .340" x .250" Max
- **Current Range:** up to 15 Arms
- **Typical Energy Storage Density:** 1450 μJ/in^3
- **Frequency Range:** 300 kHz to 2 MHz

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

Part Number	Inductance @Irated (nH ± 20%)	Irated[1] (ADC)	DCR (mΩ)		Inductance @0ADC (nH ± 20%)	Saturation Current[2] (A)			Heating Current[3] (A)	Trise Factor K0[4] (cm^2)	Core Loss[4]	
			Typical	Max		-40°C	25°C	125°C			Factor K1	Factor K2
P1681T	95	15	.31	.39	100	18.2	18	16.2	15	1.0032	.00319	.07381
P2005T	142.5	15	.45	.56	150	18.2	18	16.2	15	2.2458	.00638	.05961
P2004T	190	15	.45	.56	200	17	16.8	15.12	15	2.2458	.00638	.07949

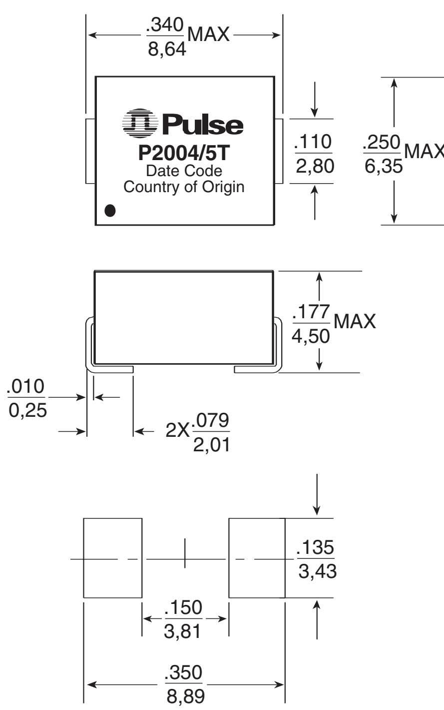
Mechanicals

P1681T (Volta 1)



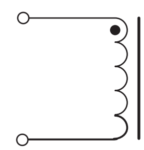
SUGGESTED PAD LAYOUT

P2004T/P2005T (Volta 2)



SUGGESTED PAD LAYOUT

Schematic



	P1681T	P2004T & P2005T
Weight	0.464 grams	0.945 grams
Tape & Reel	1500/reel	1000/reel

Dimensions: Inches / mm

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

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Notes from Tables

1. The rated current as listed is either the saturation current or the heating current depending on which value is lower.
2. The saturation current is the current which causes the inductance to drop by 10% at the stated ambient temperatures (-40°C, 25°C, 125°C). 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.
3. The heating current is the dc current which causes the temperature of the part to increase by approximately 30°C. This current is determined by mounting the component on a PCB with .25" wide, 3 oz. equivalent copper traces, and applying the current to the device for 30 minutes.
4. In high volt*time applications, additional heating in the component can occur due to core losses in the inductor which may neccessitate derating the current in order to limit the temperature rise of the component. In order to determine the approximate total losses (or temperature rise) for a given application both copper losses and core losses should be taken into account.

Estimated Temperature Rise:

$$\mathbf{Trise} = \left[\frac{Coreloss\ (mW) + DCRloss\ (mW)}{K0}\right]^{.833} \quad (°C)$$

$$\mathbf{Coreloss} = K1 * \left(Fsw(kHz)\right)^{1.6688} * (K2 * dI)^{2.17}\ (mW)$$

$$\mathbf{DCRloss} = Irms^2 * DCR(m\Omega)\ \ (mW)$$

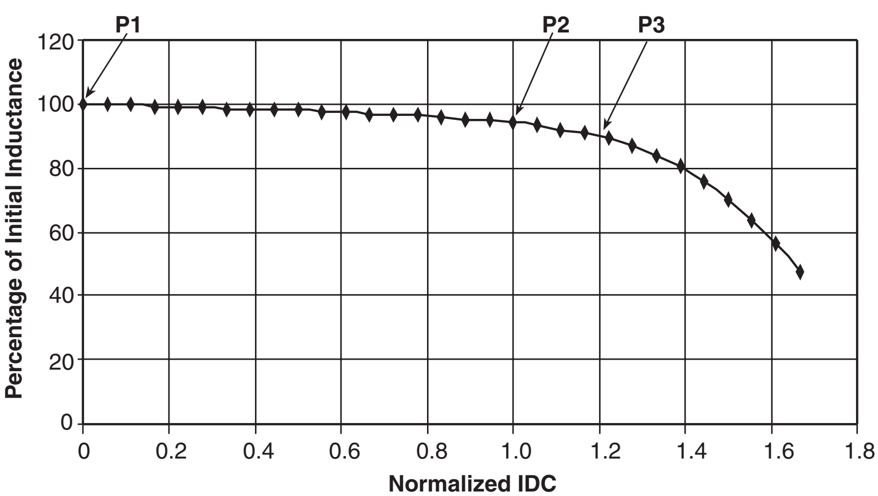
$$\mathbf{Irms} = \left[IDC^2 + \left[\frac{dI}{2}\right]^2\right]^{1/2} \ (Arms)$$

$\mathbf{Fsw(kHz)}$ = switching frequency (kHz)

$\mathbf{dI}$ = delta I across the component (A)

The temperature of the component (ambient temperature + temperature rise) should be within the listed operating temperature range.

Inductance vs Current Characteristics



P1 - Initial Inductance, Lo (.1Vrms, 1MHz, 0ADC, 25C)
P2 - Inductance (typically 95% Lo) at Rated IDC.
P3 - Inductance (typically 90% Lo) at Ipk.

Normalized Inductance