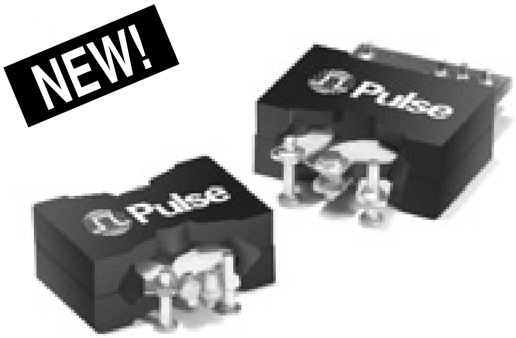
SMT PLANAR TRANSFORMER AND PLANAR INDUCTOR

For use with Linear Technology's LT1681 and LTC1698

A TECHNITROL COMPANY



PLANAR TRANSFORMER – PA0191

- **Power Rating:** 60-100W
- **Height:** 8.3 mm Max
- **Footprint:** 27.7 mm x 21.8 mm Max

PLANAR INDUCTOR – P1977

- **Energy Storage:** 420 μJ (2.1 μH/20A)
- **Height:** 8.3 mm Max
- **Footprint:** 21.7 mm x 20.3 mm Max

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

Part Number	Power Rating [1]	Turns Ratio (with 7T Pri. Aux.)	Primary Secondary Isolation	Primary Inductance (μH MIN)	Leakage Inductance (μH MAX)	DCR Primary (mΩ MAX)	DCR Primary Aux. (mΩ MAX)	DCR Secondary (mΩ MAX)
PA0191	60-100 W	9:2	1500 Vdc Basic	100	1.5	85	800	2.5

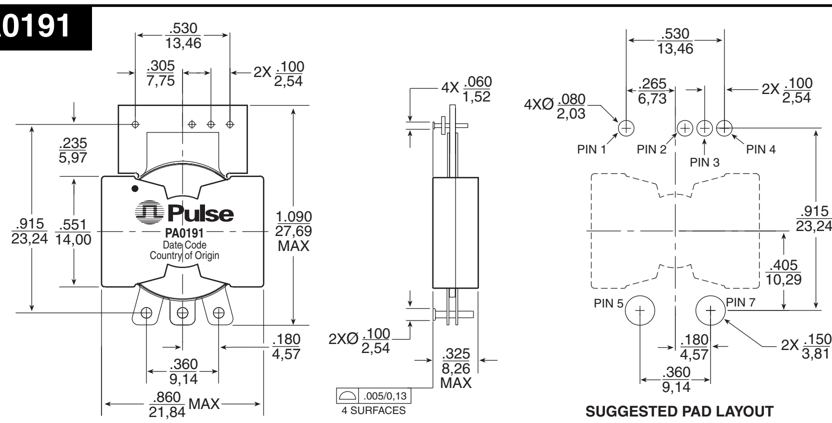
Electrical Specifications @ 25°C — Operating Temperature -40°C to 125°C

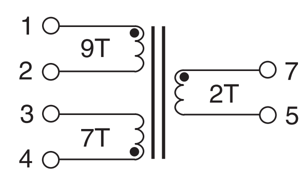
Part Number	Inductance @Irated (μH ±5%)	Irated [2] (A_{DC})	DCR (mΩ) TYP	DCR (mΩ) MAX	Inductance @ 0 ADC (μH ±5%)	Saturation Current [3] (A) @ 25°C	Saturation Current [3] (A) @ 125°C	Heating Current [4] (A)
P1977	2.1	20	1.00	1.25	2.1	27.0	22.5	31

Mechanicals

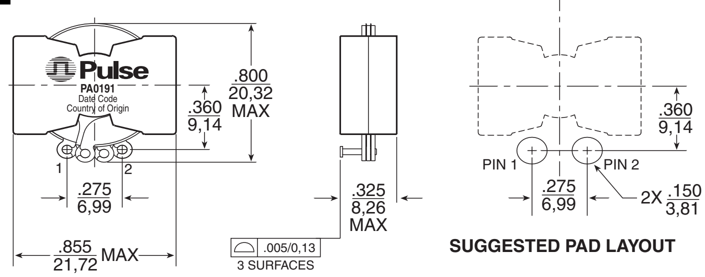
Schematics

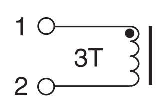
PA0191





P1977





	PA0191	P1977
Weight	11.0 grams	10.8 grams
Tape & Reel	150/reel	150/reel
Tray	55/tray	48/tray

Dimensions: Inches / mm

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

SMT PLANAR TRANSFORMER AND INDUCTOR

For use with Linear Technology's LT1681 and LTC1698

Notes from Tables

For PA0191: Basic Insulated Planar Transformer

1. To determine if the transformer is suitable for your application it is necessary to ensure that the temperature rise of the component (ambient plus temp. rise) does not exceed its operating temperature. To determine the temperature rise of the component it is necessary to calculate the total power losses (copper and core) in the application.

   Total Copper Losses

   CopperTotal (W) = sum of the losses in each winding

   The losses in each winding can be calculated by:

   CopperWindingX (W) = .001 * DCR(mΩ) * (Irms^2)

   Core Losses

   To calculate the core loss, use the following formula:

   CoreLoss (W) = 2.5E-8 * (Freq kHz)$^{1.7}$ * (ΔB/2000)$^{2.5}$

   where:

   ΔB/2000 = 1.01 * (Voltage Min * Dutycycle Max/Freq kHz)

   Temperature Rise

   TempRise (°C) = .603 * CopperTotal (W) * (50.6 * CoreLoss (W)/CopperTotal (W) + 88.1)

For P1977: Planar Inductor

2. The rated current as listed is either the saturation current or the heating current depending on which value is lower.
3. The saturation current is the current which causes the inductance to drop by 10% at the stated ambient temperatures (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.
4. The heating current is the dc current which causes the temperature of the part to increase by approximately 40°C. This current is determined by mounting the component on a PCB with a .25" wide (2 ounce equivalent copper traces) and applying the current to the device for 30 minutes.
5. 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 and core losses should be taken into account.

   Total Copper Losses

   CopperTotal (W) = .001* DCR(mΩ) * (Irms^2)

   where:

   Irms = (IDC^2 + (ΔI/2)^2)$^{.5}$

   Core Losses

   To calculate the core loss, use the following formula:

   CoreLoss (W) = 2.5E-8 * (Freq kHz)$^{1.7}$ * (.0635 * ΔI)$^{2.5}$

   Temperature Rise

   TempRise (°C) = .603 * CopperTotal (W) * (50.6 * CoreLoss (W)/CopperTotal (W) + 88.1)

APPLICATION NOTES

The **PA0191** transformer and **P1977** inductor were designed for use with Linear Technology's LT1681 and LTC1698 IC's and are featured in Linear Technology's Design note 261 which details the solution for a low cost, discrete component alternative to telecom power modules.

The **PA0191** transformer and **P1977** inductor were designed for (but not limited to) the following application:

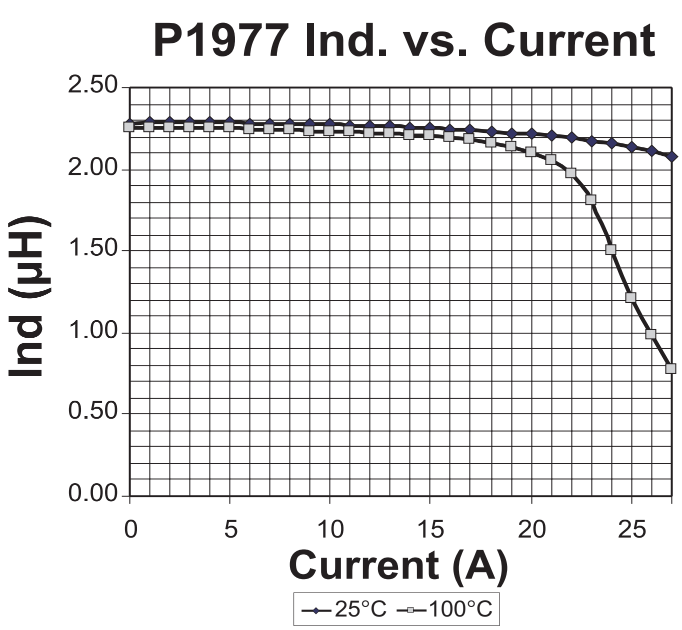
Topology – Two-switch forward

Frequency – 230 kHz

Pri./Sec. Isolation – Basic Insulation (1500 Vdc)

Input Voltage – 36-72 v telecom input

Output Voltage(s) – 3.3 v / 20 A output (with an auxilary primary side control winding - 12 v/100 mA)



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