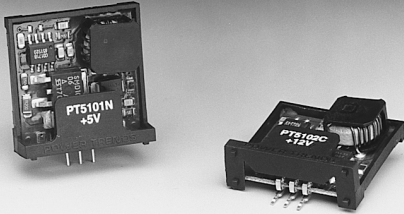
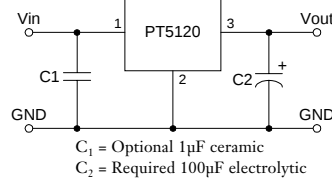


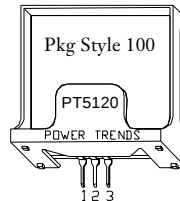
**PT5120 Series****1 AMP LOW VOLTAGE INPUT  
INTEGRATED SWITCHING REGULATOR****SLTS080**  
(Revised 6/4/98)

- Low Voltage Input (7V)
- 85% Efficiency
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Laser-Trimmed Output Voltage

The PT5120 series is a low voltage input (typically 7V) version of Power Trends' easy-to-use, 1A positive step-down, 3-terminal Integrated Switching Regulators (ISRs). These ISRs are designed with premium low-threshold FETs for those power regulation applications requiring very low input/output voltage differentials such as battery powered equipment.

**Standard Application****Pin-Out Information**

| Pin | Function  |
|-----|-----------|
| 1   | $V_{in}$  |
| 2   | GND       |
| 3   | $V_{out}$ |

**Ordering Information**

**PT5121**□ = + 5 Volts  
**PT5123**□ = + 3.3 Volts

**PT Series Suffix (PT1234X)****Case/Pin Configuration**

|                          |          |
|--------------------------|----------|
| Vertical Through-Hole    | <b>N</b> |
| Horizontal Through-Hole  | <b>A</b> |
| Horizontal Surface Mount | <b>C</b> |

**Specifications**

| Characteristics<br>( $T_a = 25^\circ\text{C}$ unless noted) | Symbols              | Conditions                                                                                                                         | PT5120 SERIES |            |                | Units                      |
|-------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|----------------|----------------------------|
|                                                             |                      |                                                                                                                                    | Min           | Typ        | Max            |                            |
| Output Current                                              | $I_o$                | Over $V_{in}$ range                                                                                                                | 0.1*          | —          | 1.0            | A                          |
| Short Circuit Current                                       | $I_{sc}$             | $V_{in} = V_{in \text{ min}}$                                                                                                      | —             | 3.5        | —              | Apk                        |
| Input Voltage Range                                         | $V_{in}$             | $0.1 \leq I_o \leq 1.0 \text{ A}$<br>$V_o = 3.3\text{V}$<br>$V_o = 5\text{V}$                                                      | 7<br>7        | —          | 26<br>38       | V<br>V                     |
| Output Voltage Tolerance                                    | $\Delta V_o$         | Over $V_{in}$ Range, $I_o = 1.0 \text{ A}$<br>$T_a = 0^\circ\text{C}$ to $+60^\circ\text{C}$                                       | —             | $\pm 1.5$  | $\pm 3.0$      | % $V_o$                    |
| Line Regulation                                             | $\text{Reg}_{line}$  | Over $V_{in}$ range                                                                                                                | —             | $\pm 0.5$  | $\pm 1.0$      | % $V_o$                    |
| Load Regulation                                             | $\text{Reg}_{load}$  | $0.1 \leq I_o \leq 1.0 \text{ A}$                                                                                                  | —             | $\pm 0.5$  | $\pm 1.0$      | % $V_o$                    |
| $V_o$ Ripple/Noise                                          | $V_n$                | $V_{in} = V_{in \text{ min}}$ , $I_o = 1.0 \text{ A}$                                                                              | —             | $\pm 2$    | —              | % $V_o$                    |
| Transient Response with $C_o = 100\mu\text{F}$              | $t_{tr}$<br>$V_{os}$ | 25% load change<br>$V_o$ over/undershoot                                                                                           | —<br>—        | 100<br>5.0 | 200<br>—       | $\mu\text{Sec}$<br>% $V_o$ |
| Efficiency                                                  | $\eta$               | $V_{in} = 9\text{V}$ , $I_o = 0.5\text{A}$ , $V_o = 3.3\text{V}$<br>$V_{in} = 9\text{V}$ , $I_o = 0.5\text{A}$ , $V_o = 5\text{V}$ | —<br>—        | 82<br>85   | —<br>—         | %<br>%                     |
| Switching Frequency                                         | $f_o$                | Over $V_{in}$ and $I_o$ ranges, $V_o = 3.3\text{V}$<br>$V_o = 5\text{V}$                                                           | 575<br>500    | 725<br>650 | 875<br>800     | kHz                        |
| Absolute Maximum Operating Temperature Range                | $T_a$                |                                                                                                                                    | -20           | —          | +85            | $^\circ\text{C}$           |
| Recommended Operating Temperature Range                     | $T_a$                | Free Air Convection, (40-60LFM)<br>$V_o = 3.3\text{V}$<br>$V_o = 5\text{V}$                                                        | -20<br>-20    | —<br>—     | +80**<br>+80** | $^\circ\text{C}$           |
| Thermal Resistance                                          | $\theta_{ja}$        | Free Air Convection (40-60LFM)<br>$V_o = 3.3\text{V}$<br>$V_o = 5\text{V}$                                                         | —<br>—        | 45<br>50   | —<br>—         | $^\circ\text{C/W}$         |
| Storage Temperature                                         | $T_s$                |                                                                                                                                    | -40           | —          | +125           | $^\circ\text{C}$           |
| Mechanical Shock                                            |                      | Per Mil-STD-883D, Method 2002.3<br>1 msec, Half Sine, mounted to a fixture                                                         | —             | 500        | —              | G's                        |
| Mechanical Vibration                                        |                      | Per Mil-STD-883D, Method 2007.2<br>20-2000 Hz, Soldered in a PC board                                                              | —             | 5          | —              | G's                        |
| Weight                                                      |                      |                                                                                                                                    | —             | 4.5        | —              | grams                      |

\* ISR will operate down to no load with reduced specifications.

\*\*See Thermal Derating chart.

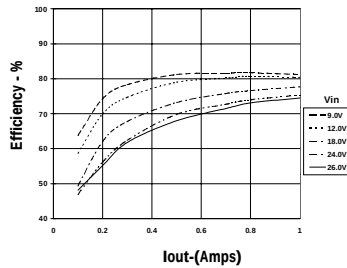
**Note:** The PT5120 Series requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications.

# CHARACTERISTIC DATA

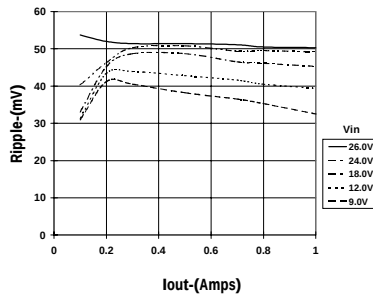
## PT5120 Series

### PT5123, 3.3 VDC (See Note 1)

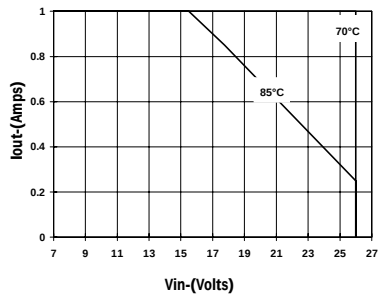
#### Efficiency vs Output Current



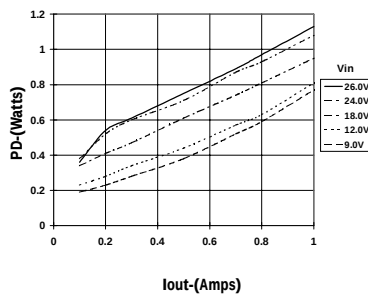
#### Ripple vs Output Current



#### Thermal Derating ( $T_a$ ) (See Note 2)

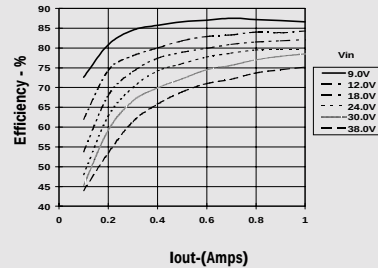


#### Power Dissipation vs Output Current

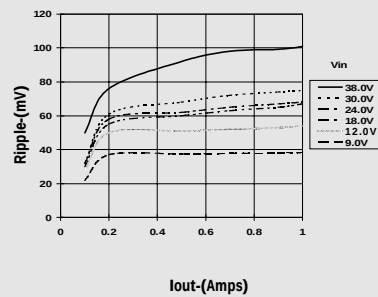


### PT5121, 5.0 VDC (See Note 1)

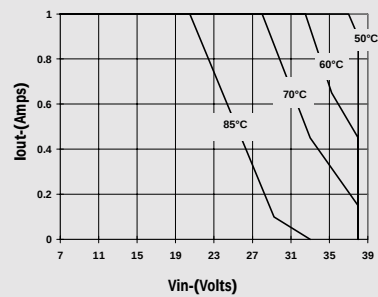
#### Efficiency vs Output Current



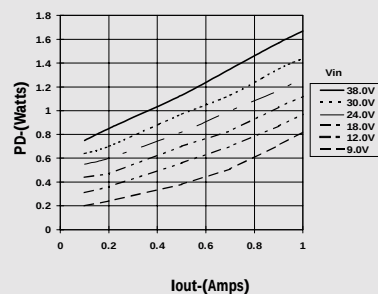
#### Ripple vs Output Current



#### Thermal Derating ( $T_a$ ) (See Note 2)



#### Power Dissipation vs Output Current



Note 1: All data listed in the above graphs, except for derating data, has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.

Note 2: Thermal derating graphs are developed in free air convection cooling of 40-60 LFM. (See Thermal Application Notes.)

**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| PT5121C          | NRND                  | SIP MOD ULE  | EAC             | 3    | 35          | Pb-Free (RoHS)          | Call TI          | Level-1-215C-UNLIM           |
| PT5121CT         | NRND                  | SIP MOD ULE  | EAC             | 3    |             | TBD                     | Call TI          | Call TI                      |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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