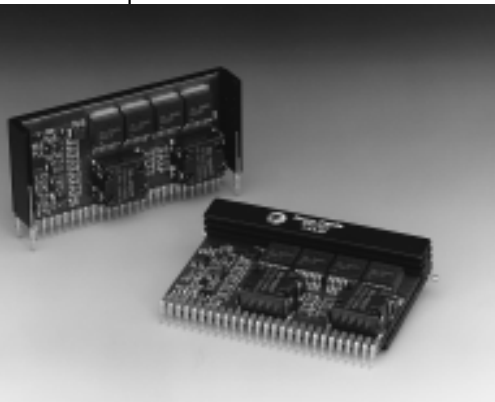# PT7770 Series

**32 AMP HIGH-PERFORMANCE "SLEDGE HAMMER" PROGRAMMABLE ISR**
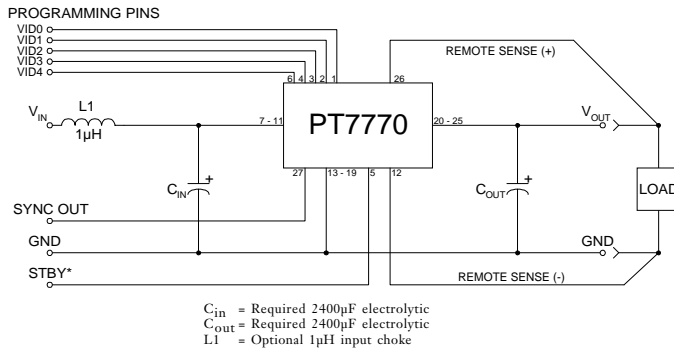
**Revised 5/15/98**

The PT7770 is a new series of high-performance, 32 Amp Integrated Switching Regulators (ISRs) housed in a 27-pin SIP package. The 32A capability allows easy integration of the latest high-speed, low-voltage µPs, ASICs, DSPs, and bus drivers into existing 5V systems.

The output voltage of the PT7770 can be easily programmed from 1.3V to 3.5V with a 5 bit input compatible with Intel's Pentium® Pro Processor. A differential remote sense is also provided which automatically compensates for any voltage drop from the ISR to the load.

2400µF of output capacitance are required for proper operation.

## Standard Application



$C_{in}$ = Required 2400µF electrolytic
$C_{out}$ = Required 2400µF electrolytic
L1 = Optional 1µH input choke

## Pin-Out Information

| Pin | Function | Pin | Function |
|---|---|---|---|
| 1 | VID0 | 14 | GND |
| 2 | VID1 | 15 | GND |
| 3 | VID2 | 16 | GND |
| 4 | VID3 | 17 | GND |
| 5 | STBY*- Stand-by | 18 | GND |
| 6 | VID4 | 19 | GND |
| 7 | $V_{in}$ | 20 | $V_{out}$ |
| 8 | $V_{in}$ | 21 | $V_{out}$ |
| 9 | $V_{in}$ | 22 | $V_{out}$ |
| 10 | $V_{in}$ | 23 | $V_{out}$ |
| 11 | $V_{in}$ | 24 | $V_{out}$ |
| 12 | Remote Sense Gnd | 25 | $V_{out}$ |
| 13 | GND | 26 | Remote Sense $V_{out}$ |
|  |  | 27 | Sync Out |

For STBY* pin; open = output enabled; ground = output disabled.

## Specifications

| Characteristics ($T_a$ = 25°C unless noted) | Symbols | Conditions | PT7770 SERIES Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Output Current | $I_o$ | $T_a$ = +60°C, 200 LFM, pkg N | 0.1 [1] | — | 32 | A |
|  |  | $T_a$ = +25°C, natural convection | 0.1 [1] | — | 26 | A |
| Input Voltage Range | $V_{in}$ | 0.1A ≤ $I_o$ ≤ 32A | 4.5 [2] | — | 5.5 | V |
| Output Voltage Tolerance | $\Delta V_o$ | $V_{in}$ = +5V, $I_o$ = 32A / 0°C ≤ $T_a$ ≤ +55°C | $V_o$-0.03 | — | $V_o$+0.03 | V |
| Line Regulation | $Reg_{line}$ | 4.5V ≤ $V_{in}$ ≤ 5.5V, $I_o$ = 32A | — | ±10 | — | mV |
| Load Regulation | $Reg_{load}$ | $V_{in}$ = +5V, 0.1 ≤ $I_o$ ≤ 32A | — | ±10 | — | mV |
| $V_o$ Ripple/Noise pk-pk | $V_n$ | $V_{in}$ = +5V, $I_o$ = 32A | — | 50 | — | mV |
| Transient Response with $C_{out}$ = 2400µF | $t_{tr}$ | $I_o$ step between 16A and 32A | — | 100 | — | µSec |
|  | $V_{os}$ | $V_o$ over/undershoot | — | 200 | — | mV |
| Efficiency | η | $V_{in}$ = +5V, $I_o$ = 20A, $V_o$ = 3.3V | — | 90 | — | % |
| Switching Frequency | $f_o$ | 4.5V ≤ $V_{in}$ ≤ 5.5V / 0.1A ≤ $I_o$ ≤ 32A | 650 | 700 | 750 | kHz |
| Absolute Maximum Operating Temperature Range | $T_a$ | — | 0 | — | +85 | °C |
| Recommended Operating Temperature Range | $T_a$ | Forced Air Flow = 200 LFM Over $V_{in}$ and $I_o$ Ranges | 0 | — | +65 | °C |
| Storage Temperature | $T_s$ | — | -40 | — | +125 | °C |
| Weight | — | Vertical/Horizontal | — | 53/66 | — | grams |

(1) ISR-will operate down to no load with reduced specifications. Please note that this product is not short-circuit protected.

(2) The minimum input voltage is 4.5V or $V_{out}$+1.2V, whichever is greater.

**Output Capacitors:** *The PT7770 series requires a minimum output capacitance of 2400µF for proper operation. Do not use Oscon type capacitors. The maximum allowable output capacitance is 30,000µF.*

**Input Filter:** *An input filter is optional for most applications. The input inductor must be sized to handle 32ADC with a typical value of 1µH. The input capacitance must be rated for a minimum of 2.6Arms of ripple current. For transient or dynamic load applications, additional capacitance may be required.*

**5V Bus Products**

**D A T A   S H E E T S**

## Features
- +5V input
- 5-bit Programmable:
  1.3V to 3.5V@32A
- High Efficiency
- Input Voltage Range:
  4.5V to 5.5V
- Differential Remote
  Sense
- 27-pin SIP Package

## Programming Information

| VID3 | VID2 | VID1 | VID0 | VID4=1 Vout | VID4=0 Vout |
|------|------|------|------|------|------|
| 1 | 1 | 1 | 1 | 2.0V | 1.30V |
| 1 | 1 | 1 | 0 | 2.1V | 1.35V |
| 1 | 1 | 0 | 1 | 2.2V | 1.40V |
| 1 | 1 | 0 | 0 | 2.3V | 1.45V |
| 1 | 0 | 1 | 1 | 2.4V | 1.50V |
| 1 | 0 | 1 | 0 | 2.5V | 1.55V |
| 1 | 0 | 0 | 1 | 2.6V | 1.60V |
| 1 | 0 | 0 | 0 | 2.7V | 1.65V |
| 0 | 1 | 1 | 1 | 2.8V | 1.70V |
| 0 | 1 | 1 | 0 | 2.9V | 1.75V |
| 0 | 1 | 0 | 1 | 3.0V | 1.80V |
| 0 | 1 | 0 | 0 | 3.1V | 1.85V |
| 0 | 0 | 1 | 1 | 3.2V | 1.90V |
| 0 | 0 | 1 | 0 | 3.3V | 1.95V |
| 0 | 0 | 0 | 1 | 3.4V | 2.00V |
| 0 | 0 | 0 | 0 | 3.5V | 2.05V |

Logic 0 = Pin 12 potential (remote sense gnd)
Logic 1 = Open circuit (no pull-up resistors)
VID3 and VID4 may not be changed while the unit
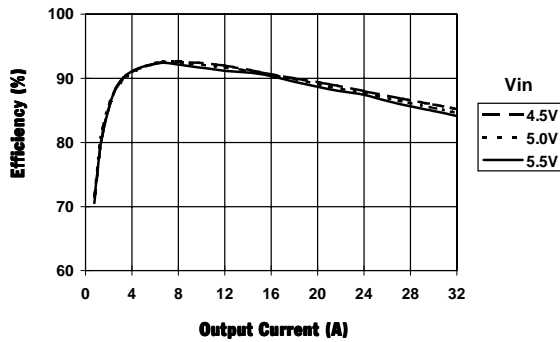is operating.

## Ordering Information
**PT7771☐** = 1.3 to 3.5 Volts
*For dimensions and PC board layout,
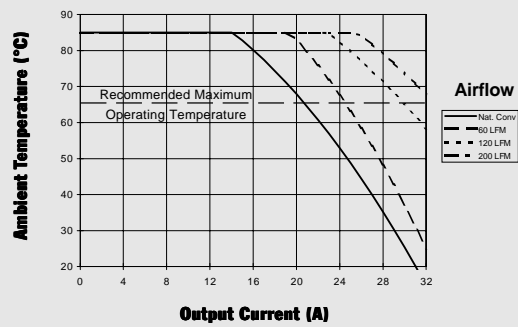see Package Style 1020 and 1030*

### PT Series Suffix (PT1234X)

**Case/Pin
Configuration**

| | |
|---|---|
| Vertical   Through-Hole | **N** |
| Horizontal   Through-Hole | **A** |
| Horizontal   Surface Mount | **C** |

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## C H A R A C T E R I S T I C   D A T A

### Efficiency vs Output Current (@Vout=+3.3V)



Vin
- ─── 4.5V
- ∙∙∙∙ 5.0V
- ─── 5.5V

### Safe Operating Area (@Vin=+5V, Vout=+3.3V, Pkg N)



Recommended Maximum
Operating Temperature

Airflow
- ─── Nat. Conv
- ─── 60 LFM
- ─── 120 LFM
- ─── 200 LFM
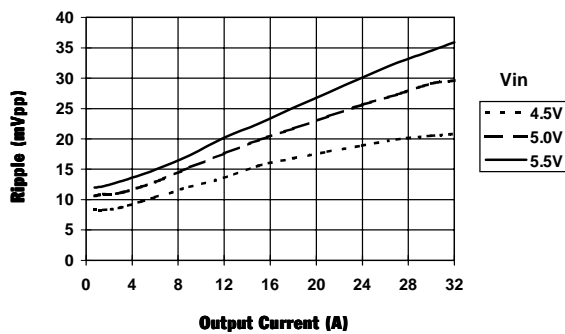
Note: SOA curves represent operating conditions at
which internal components are at or below manufacturer's
maximum rated operating temperatures.

### Power Dissipation vs Output Current (@Vout=+3.3V)



Vin
- ∙∙∙∙ 4.5V
- ─── 5.0V
- ─── 5.5V
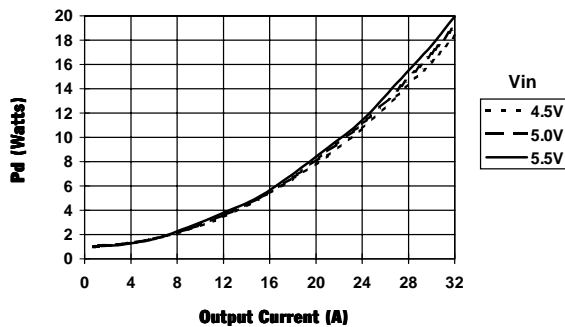
### Output Ripple vs Output Current (@Vout=+3.3V)



Vin
- ∙∙∙∙ 4.5V
- ─── 5.0V
- ─── 5.5V

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**3**

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