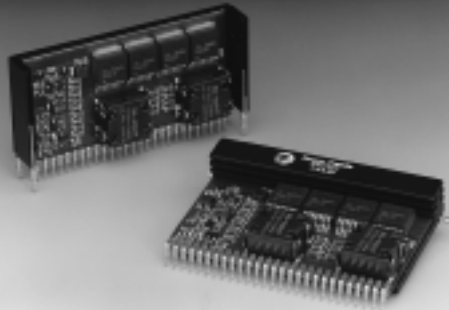# PT7777 Series

**32 AMP HIGH-PERFORMANCE
"SLEDGE HAMMER" PROGRAMMABLE ISR**
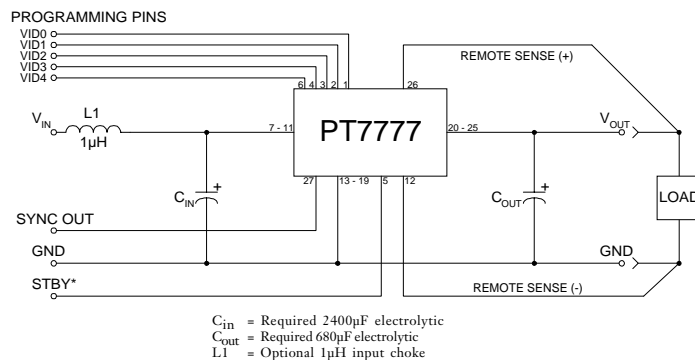
Revised 7/31/98

The PT7777 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 PT7777 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.

680µF of output capacitance is required for proper operation.

Standard Application

PROGRAMMING PINS

C_{in} = Required 2400µF electrolytic
C_{out} = Required 680µF 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	PT7777 SERIES Min	Typ	Max	Units
Output Current	I_o	T$_a$ = +60°C, 200 LFM, pkg N T$_a$ = +25°C, natural convection	0.1 [1] 0.1 [1]	— —	32 26	A A
Input Voltage Range	V_{in}	0.1A ≤ I$_o$ ≤ 32A	4.5 [2]	—	5.5	V
Output Voltage Tolerance	ΔV_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$_{out}$ = 680µF	t_{tr} V_{os}	I$_o$ step between 16A and 32A V$_o$ over/undershoot	— —	100 200	— —	µSec 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 PT7777 series requires a minimum output capacitance of 680µF 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.*

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

PT7777☐ = 1.3 to 3.5 Volts

For dimensions and PC board layout, see Package Style 1020 and 1030
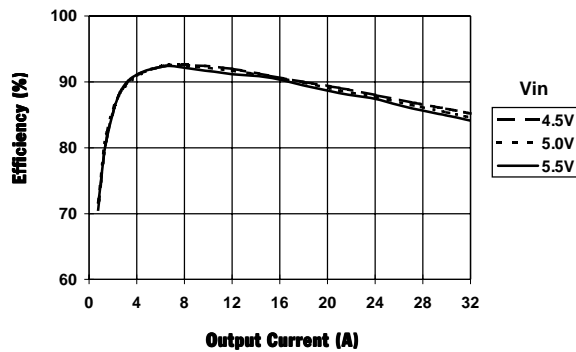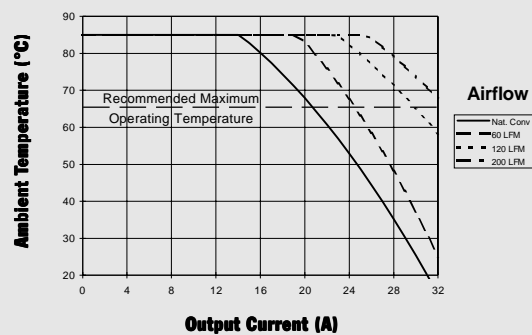
PT Series Suffix (PT1234X)

Case/Pin Configuration

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

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

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

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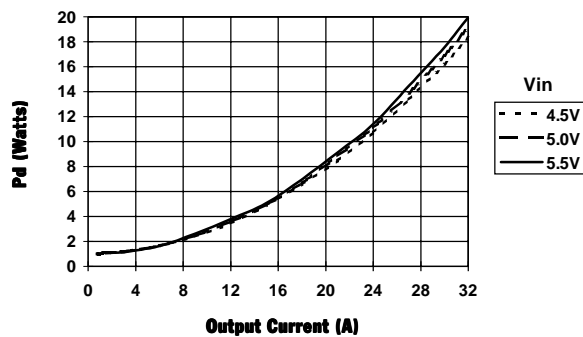
Output Ripple vs Output Current (@Vout=+3.3V)

Vin
- - 4.5V
— 5.0V
— 5.5V

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.
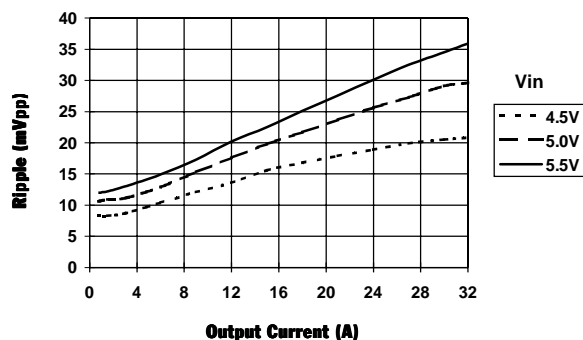
IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.