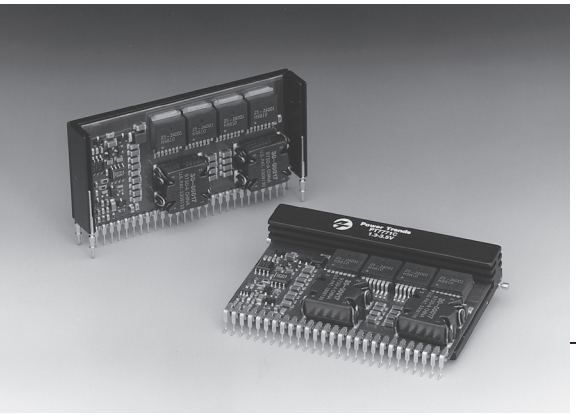
32 Amp "Sledge Hammer" Programmable ISR

SLTS054A

(Revised 6/30/2000)



The PT7771 is a high-output Integrated Switching Regulator (ISR) housed in a 27-pin SIP package. The PT7771 operates off a standard 5V bus to provide a 32 amp low-voltage power source for the industry's latest high-speed µPs, ASICs, DSPs.

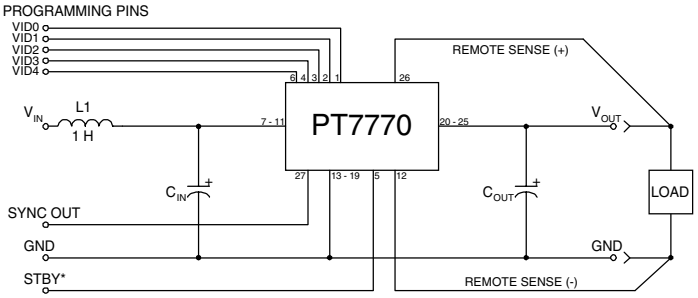
The PT7771 has been designed to work in parallel with one or more of the PT7746 -32A current boosters to increase the load current capability in increments of 32A.

The output voltage is programmable from 1.3V to 3.5V via a 5-bit input, compatible with Intel's Pentium® Pro Processor. A differential remote sense is also provided to compensate for voltage drop between the ISR and load.

An output capacitance of 2400µF is required for proper operation.

Note that this product does not include short circuit protection.

Standard Application



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

Pin-Out Information

Pin	Function
1	VID0
2	VID1
3	VID2
4	VID3
5	STBY*- Stand-by
6	VID4
7	V_{in}
8	V_{in}
9	V_{in}
10	V_{in}
11	V_{in}
12	Remote Sense Gnd
13	GND

Pin	Function
14	GND
15	GND
16	GND
17	GND
18	GND
19	GND
20	V_{out}
21	V_{out}
22	V_{out}
23	V_{out}
24	V_{out}
25	V_{out}
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	PT7771 Min	PT7771 Typ	PT7771 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} = 2400µF	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	Over V_{in} Range	0	—	+85 (3)	°C
Storage Temperature	T_s	—	-40	—	+125	°C
Weight	—	Vertical/Horizontal	—	53/66	—	grams

Notes: *(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.
(3) Consult the SOA curves or contact the factory for the appropriate derating.

Output Capacitors: *The PT7771 regulator 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.*

PT7771—5V

32 Amp "Sledge Hammer" Programmable ISR

Features

- +5V input
- 5-bit Programmable: 1.3V to 3.5V@32A
- High Efficiency
- Differential Remote Sense
- Parallelable with PT7746 32A "Current Booster"
- 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

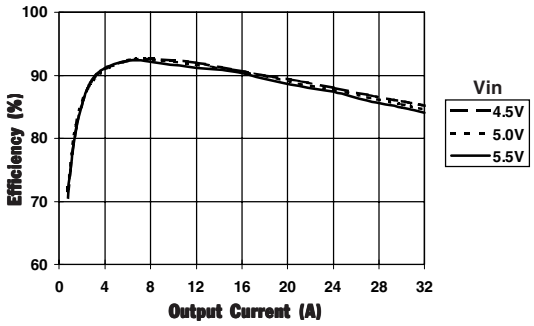
PT Series Suffix (PT1234X)

Case/Pin Configuration	
Vertical Through-Hole	**N**
Horizontal Through-Hole	**A**
Horizontal Surface Mount	**C**

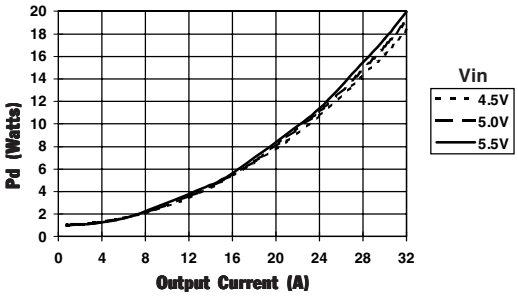
TYPICAL CHARACTERISTICS

PT7771 @V_{in} =+5V, V_{out} =3.3V (See Note A)

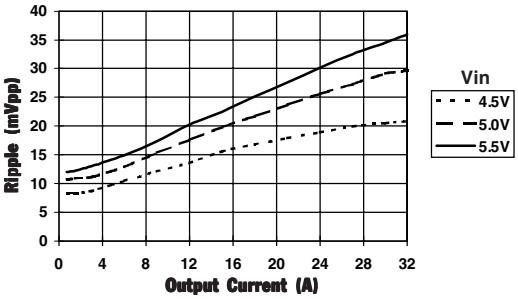
Efficiency vs Output Current



Power Dissipation vs Output Current

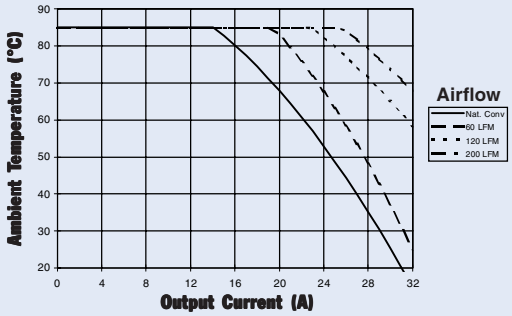


Output Ripple vs Output Current



Safe Operating Area Curves (See Note B)

PT7771 @V_{in} =+5V, V_{out} =3.3V, Pkg N



Note A: *All characteristic data in the above graphs has been developed from actual products tested at 25°C. This data is considered typical for the ISR.*
Note B: *OA curves represent operating conditions at which internal components are at or below manufacturer's maximum rated operating temperatures.*

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PT7771N1	OBSOLETE	SIP MODULE	EJD	27		TBD	Call TI	Call TI			

(1) 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.

(2) 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)

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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