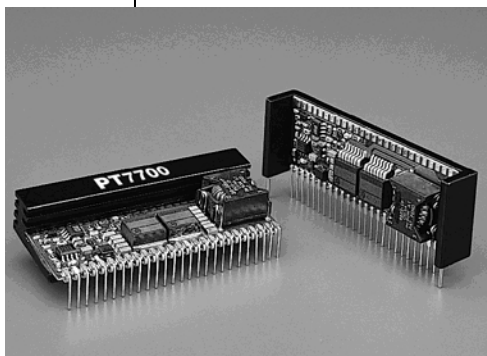


# PT7700 Series

**15 AMP HIGH-PERFORMANCE  
"BIG HAMMER" PROGRAMMABLE ISR**

**SLTS077**  
Revised 5/31/00



The PT7700 is a new series of high-performance, 15 Amp Integrated Switching Regulators (ISRs) housed in a 27-pin SIP package. The 15A capability allows easy integration of the latest high-speed, low-voltage  $\mu$ Ps and bus drivers into existing 5V systems.

The PT7700 series has been designed to work in parallel with one or more of the PT7749 - 15A current boosters for increased  $I_{out}$  in increments of 15A.

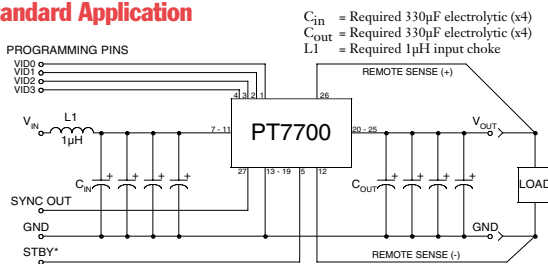
Two products are offered in the series with different output voltage ranges that are easily programmed with a 4 bit input compatible with Intel's Pentium® Pro Processor. A differential remote sense is also provided which automatically compensates for any voltage drop from the ISR to the load.

An input filter and 1200 $\mu$ F of output capacitance are required for proper operation.

## Features

- Single-Device: +5V input
- 4-bit Programmable:  
2V to 3.5V@15A or  
1.3V to 2V @ 15A output
- High Efficiency
- Input Voltage Range:  
4.5V to 5.5V
- Differential Remote Sense
- 27-pin SIP Package:  
V = 1.0"(H) x 3"(L) x 0.55"(W)  
H = 0.55"(H) x 3"(L) x 1.5"(W)
- Parallelable with PT7749  
15A "Current Boosters"

## Standard Application



## Pin-Out Information

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

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

## Ordering Information

PT7701□ = 2 to 3.5 Volts  
PT7702□ = 1.3 to 2 Volts

□ = Vertical through-hole  
□ = Horizontal through-hole  
□ = Horizontal surface-mount

## Programming Information

VID3	VID2	VID1	VID0	PT7701 V <sub>out</sub>	PT7702 V <sub>out</sub>
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

Note: Logic 0 = Pin 12 (remote sense gnd) potential  
Logic 1 = Open circuit (no pull-up resistors)

## Specifications

Characteristics (T <sub>A</sub> = 25°C unless noted)	Symbols	Conditions	PT7700 SERIES			
			Min	Typ	Max	Units
Output Current	I <sub>o</sub>	4.5V ≤ V <sub>in</sub> ≤ 5.5V	0.1 <sup>(1)</sup>	—	15 <sup>(2)</sup>	ADC
Input Voltage Range	V <sub>in</sub>	0.1A ≤ I <sub>o</sub> ≤ 15A	4.5 <sup>(3)</sup>	—	5.5	VDC
Static Voltage Tolerance	V <sub>o</sub>	V <sub>in</sub> = +5V, I <sub>o</sub> = 15A 0°C ≤ T <sub>A</sub> ≤ +55°C	V <sub>o</sub> -0.05	—	V <sub>o</sub> +0.05	VDC
Line Regulation	Reg <sub>line</sub>	4.5V ≤ V <sub>in</sub> ≤ 5.5V, I <sub>o</sub> = 15A	—	±10	—	mV
Load Regulation	Reg <sub>load</sub>	V <sub>in</sub> = +5V, 0.1 ≤ I <sub>o</sub> ≤ 15A	—	±10	—	mV
V <sub>o</sub> Ripple/Noise pk-pk	V <sub>n</sub>	V <sub>in</sub> = +5V, I <sub>o</sub> = 15A	—	50	—	mV
Transient Response with C <sub>out</sub> = 1200µF	t <sub>tr</sub> V <sub>os</sub>	I <sub>o</sub> step between 7.5A and 15A V <sub>o</sub> over/undershoot	—	100 200	—	µSec mV
Efficiency	η	V <sub>in</sub> = +5V, I <sub>o</sub> = 10A	V <sub>o</sub> = 3.3V V <sub>o</sub> = 2.9V V <sub>o</sub> = 2.5V V <sub>o</sub> = 1.8V V <sub>o</sub> = 1.5V	— 89 87 85 79 77	— — — — —	% % % % %
Switching Frequency	f <sub>o</sub>	4.5V ≤ V <sub>in</sub> ≤ 5.5V 0.1A ≤ I <sub>o</sub> ≤ 15A	650	700	750	kHz
Operating Temperature	T <sub>a</sub>	Forced Air Flow = 200 LFM Over V <sub>in</sub> and I <sub>o</sub> Ranges	0	—	+55	°C
Storage Temperature	T <sub>s</sub>	—	-40	—	+125	°C
Weight	—	—	—	TBD	—	grams
Relative Humidity	—	Non-condensing	0	—	95	%

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

(2) The PT7700 series can be easily paralleled with one or more of the PT7749 slave modules to provide increased output current in increments of 15A. Please contact Power Trends for the appropriate application note.

(3) The minimum input voltage is 4.5V or V<sub>out</sub>+1.2V, whichever is greater.

**Output Capacitors:** The PT7700 series requires a minimum output capacitance of 1200µF for proper operation. To reduce ESR, Power Trends recommends using four 330µF electrolytic capacitors in parallel.

**Input Filter:** An input filter is required for all applications. The input inductor must be sized to handle 15ADC with a typical value of 1µH. The input capacitance must be rated for 14Arms of ripple current. Power Trends recommends using four Sanyo OSCON style capacitors with a 3.5Arms ripple current rating in parallel (p/n 6SA330M).

**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>
PT7701A	NRND	SIP MOD ULE	EHA	27	8	TBD	Call TI	Level-1-215C-UNLIM
PT7701N	NRND	SIP MOD ULE	EHD	27	10	TBD	Call TI	Level-1-215C-UNLIM
PT7702C	NRND	SIP MOD ULE	EHC	27	8	TBD	Call TI	Level-1-215C-UNLIM

<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.

**OBSELETE:** 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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