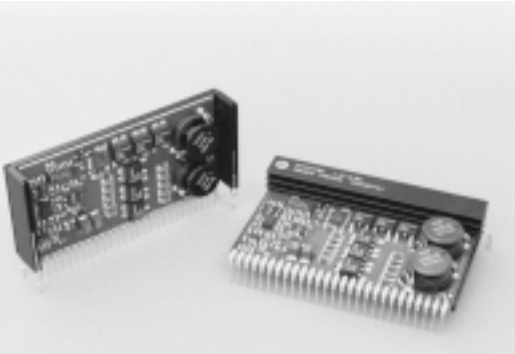


### Description

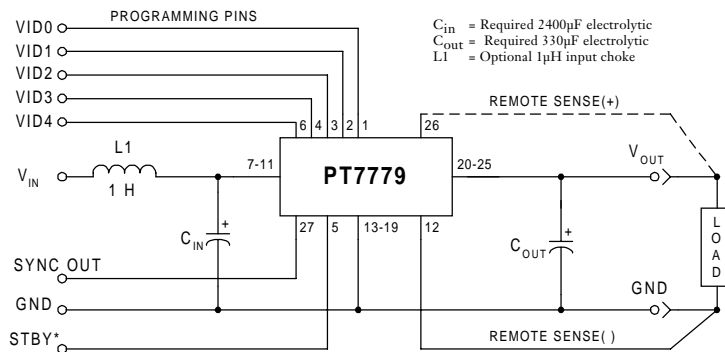
The PT7779 is a high-output 32A Integrated Switching Regulator (ISR), housed in a 27-pin SIP package. The PT7779 is the next generation of the industry benchmark PT7771. The PT7779 includes short circuit protection and requires only 330µF of output capacitance for proper operation.

The 32A output capability allows the easy integration of the latest

high-speed, µPs, ASICs, DSPs into existing 5V systems. For additional current, the PT7779 is designed to operate with up to two PT7741 32A compatible current boosters. The output voltage is programmable from 1.3V to 3.5V using a 5-bit input, that is compatible with Intel's Pentium® II Processors. A differential remote sense compensates for any voltage drop between the ISR and load.



### Standard Application



### Pin-Out Information

Pin	Function	Pin	Function
1	VID0	15	GND
2	VID1	16	GND
3	VID2	17	GND
4	VID3	18	GND
5	STBY* - Stand-by	19	GND
6	VID4	20	V <sub>OUT</sub>
7	V <sub>IN</sub>	21	V <sub>OUT</sub>
8	V <sub>IN</sub>	22	V <sub>OUT</sub>
9	V <sub>IN</sub>	23	V <sub>OUT</sub>
10	V <sub>IN</sub>	24	V <sub>OUT</sub>
11	V <sub>IN</sub>	25	V <sub>OUT</sub>
12	Remote Sense Gnd (3)	26	Remote Sense V <sub>OUT</sub>
13	GND	27	Sync Out
14	GND		

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

### Specifications

Characteristics (T <sub>a</sub> = 25°C unless noted)	Symbols	Conditions	PT7779			
			Min	Typ	Max	Units
Output Current	I <sub>o</sub>	T <sub>a</sub> = +60°C, 200 LFM, pkg N T <sub>a</sub> = +25°C, natural convection	0.1 (1)	—	31 32	A
Input Voltage Range	V <sub>in</sub>	0.1A ≤ I <sub>o</sub> ≤ 32A	4.5	—	5.5	V
Output Voltage Tolerance	ΔV <sub>o</sub>	V <sub>in</sub> = +5V, I <sub>o</sub> = 32A -40°C ≤ T <sub>a</sub> ≤ +85°C	V <sub>o</sub> -0.03	—	V <sub>o</sub> +0.03	V
Line Regulation	Reg <sub>line</sub>	4.5V ≤ V <sub>in</sub> ≤ 5.5V, I <sub>o</sub> = 32A	—	±10	—	mV
Load Regulation	Reg <sub>load</sub>	V <sub>in</sub> = +5V, 0.1 ≤ I <sub>o</sub> ≤ 32A	—	±10	—	mV
V <sub>o</sub> Ripple/Noise pk-pk	V <sub>n</sub>	V <sub>in</sub> = +5V, I <sub>o</sub> = 32A	—	50	—	mV
Transient Response with C <sub>out</sub> = 330µF	t <sub>tr</sub>	I <sub>o</sub> step between 16A and 32A	—	100	—	µSec
	V <sub>os</sub>	V <sub>o</sub> over/undershoot	—	200	—	mV
Efficiency	η	V <sub>in</sub> = +5V, I <sub>o</sub> = 20A, V <sub>o</sub> = 3.3V	—	90	—	%
Switching Frequency	f <sub>o</sub>	4.5V ≤ V <sub>in</sub> ≤ 5.5V 0.1A ≤ I <sub>o</sub> ≤ 32A	300	350	400	kHz
Absolute Maximum Operating Temperature Range	T <sub>a</sub>	Over V <sub>in</sub> Range	-40	—	+85 (2)	°C
Storage Temperature	T <sub>s</sub>	—	-40	—	+125	°C
Mechanical Vibration		Per Mil-STD-883D, Method 2007.2, 20-20,000Hz, Soldered in a PC board	—	10/15	—	G's
Weight	—	Vertical/Horizontal	—	53/66	—	grams

- Notes:** (1) ISR will operate down to no load with reduced specifications.  
(2) Consult the Safe Operating Area curves, or contact the factory for the appropriate derating.  
(3) If the remote sense ground is not used, pin 12 must be connected to pin 13 for optimum output voltage accuracy.

**External Capacitors:** The PT7779 requires a minimum output capacitance of 330µF for proper operation. The PT7779 also requires an input capacitance of 2400µF, which must be rated for a minimum of 2.0Arms of ripple current. For transient or dynamic load applications, additional capacitance may be required. For further information, see the accompanying application note on capacitor selection for this product.

**Input Filter:** An input filter inductor is optional for most applications. The input inductor must be sized to handle 32ADC with a typical value of 1µH.

### Features

- +5V Input
- 32A Output (64A with PT7741 Booster)
- 5-bit Programmable: 1.3V to 3.5V
- High Efficiency
- Short Circuit Protection
- 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

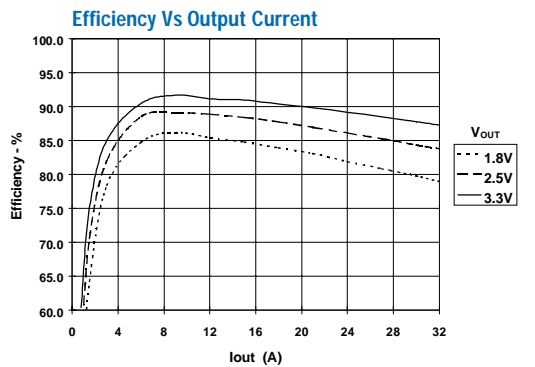
**PT7779□** = 1.3 to 3.5 Volts  
 For dimensions and PC board layout, see Package Style 1020 and 1030

### PT Series Suffix (PT1234X)

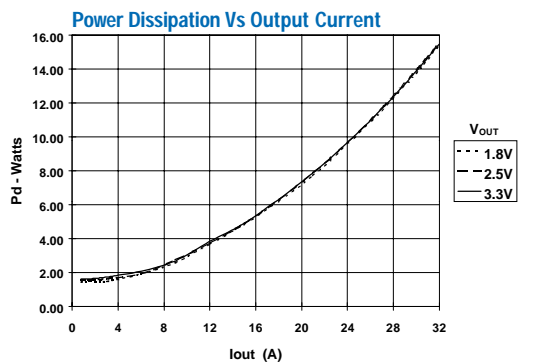
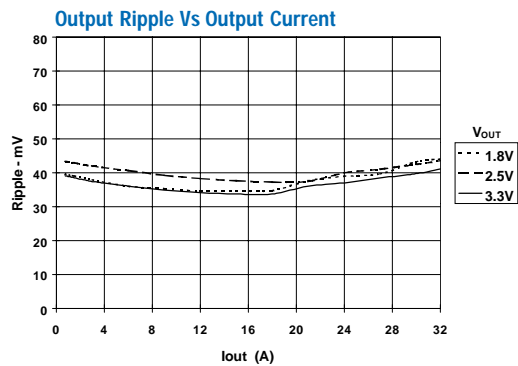
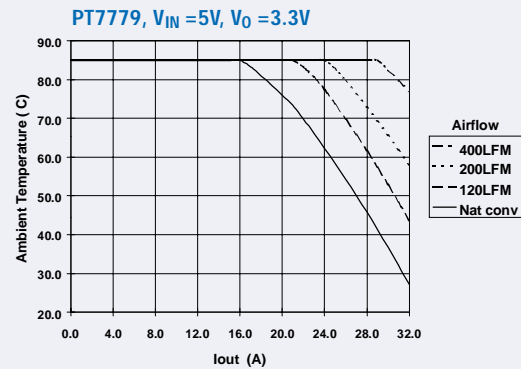
Case/Pin Configuration	
Vertical Through-Hole	N
Horizontal Through-Hole	A
Horizontal Surface Mount	C

## TYPICAL CHARACTERISTICS

### Performance Characteristics, $V_{in} = 5V$ (See Note A)



### Safe Operating Area Curves (See Note B)



**Note A:** Characteristic data has been developed from actual products tested at 25°C. This data is considered typical for the regulator.

**Note B:** Safe Operating Area curves represent conditions at which internal components are at or below manufacturer's rated operating temperatures.

## Capacitor Recommendations for the PT7775/8/9 Regulators and PT7740/1 Current Boosters

### Input Capacitors

The recommended input capacitance is determined by 2.0 ampere minimum ripple current rating and 1500µF minimum capacitance. Capacitors listed below must be rated for a minimum of 2x the input voltage with +5V operation. Ripple current and  $\leq 100\text{m}\Omega$  Equivalent Series Resistance (ESR) values are the major considerations along with temperature when selecting the proper capacitor.

### Output Capacitors

The minimum required output capacitance is 330µF with a maximum ESR less than or equal to 100mΩ. Failure to observe this requirement may lead to regulator instability or oscillation. Electrolytic capacitors have poor ripple performance at frequencies greater than 400kHz, but excellent low frequency transient response. Above the ripple frequency ceramic decoupling capacitors are necessary to improve the transient response and reduce any microprocessor high frequency noise components apparent during higher current excursions. Preferred low ESR type capacitor part numbers are identified in the Table 1 below.

### Tantalum Characteristics

Tantalum capacitors with a minimum 10V rating are recommended on the output bus, but only the AVX TPS Series, Sprague 594/595 Series, or Kemet T495/T510 Series. The AVX TPS Series, Sprague Series or Kemet Series capacitors are specified over other types due to their higher surge current, excellent power dissipation and ripple current ratings. As an example, the TAJ Series by AVX is not recommended. This series exhibits considerably higher ESR, reduced power dissipation and lower ripple current capability. The TAJ Series is a less reliable compared to the TPS series when determining power dissipation capability.

### Capacitor Table

Table 1 identifies the characteristics of capacitors from a number of vendors with acceptable ESR and ripple current (rms) ratings. The suggested minimum quantities per regulator for both the input and output buses are identified.

*This is not an extensive capacitor list. The table below is a selection guide for input and output capacitors. Other capacitor vendors are available with comparable RMS ripple current rating and ESR (Equivalent Series Resistance at 100kHz). These critical parameters are necessary to insure both optimum regulator performance and long capacitor life.*

Table 1 Capacitors Characteristic Data

Capacitor Vendor/ Series	Capacitor Characteristics					Quantity		Vendor Number
	Working Voltage	Value(µF)	(ESR) Equivalent Series Resistance	105°C Maximum Ripple Current(Irms)	Physical Size(mm)	Input Bus	Output Bus	
Panasonic FC Surface Mtg	16V	3300	0.028Ω	2490mA	18x21.5	1	1	EEVFC1C333N EEVFC1V331LQ
	35V	330	0.065Ω	1205mA	12.5x16.5			
FA Radial	10V	680	0.090Ω	755mA	10x12.5	2	1	EEUFA1A681 EEUFA1C122S
	16V	1200	0.038Ω	1690mA	16x15			
United Chemi -Con LFVSeries	25V	330	0.084Ω	825mA	10x16	2	1	LXV25VB331M10X16LL LXV16VB222M16X20LL LXV16VB471M10X16LL
	16V	2200	0.038Ω	1630mA	16x20			
	16V	470	0.084Ω	825mA	10x16			
Nichicon PL Series PM Series	10V	680	0.085Ω	795mA	10x15	2	1	UPL1A681MPH6 UPL1A272MHH6 UPL1E331MPH6
	10V	2700	0.035Ω	1740mA	16x20			
	25V	330	0.095Ω	750mA	10x15			
Oscon SS SV	10V	330	0.025Ω/7=0.006Ω	>9800mA	10x10.5	7	N/R (Note)	10SS330M 10SV330M(Sufvace Mtg)
	10V	330	0.020Ω/7=0.005Ω	>9800mA	10.3x12.6			
AVX Tantalum TPS- Series	10V	330	0.100/7=15Ω	3500mA	7.3Lx	7	1	TPSV337M010R0100 TPSV337M010R0060
	10V	330	0.060/7Ω	1826mA	4.3Wx 4.1H			
Sprague Tantalum 595D/594D	10V	330	0.045W/7=0.011Ω	>4500mA	7.3L x 5.7W x	7	1	594D337X0010R2T Surface Mount 595D687X0010R2T
	10V	680	0.090Ω/4	>1660mA	4.0H			
Kemet Tantalum T510/T495 Series	10V	330	0.035Ω/5=0.007Ω	2000mA	4.3Wx7.3L x4.0H	7	1	T510X337M010AS  T495X227M010AS Surface Mount
	10V	220	0.070Ω/2=0.035Ω	>2000mA				
Sanyo Poscap TPB	10V	220	0.040Ω	3000mA	7.2L x 4.3W x 3.1H	2	2	10TPB220M Surface Mount

Note: (N/R) is not recommended for this application, extremely low Equivalent Series Resistance (ESR)