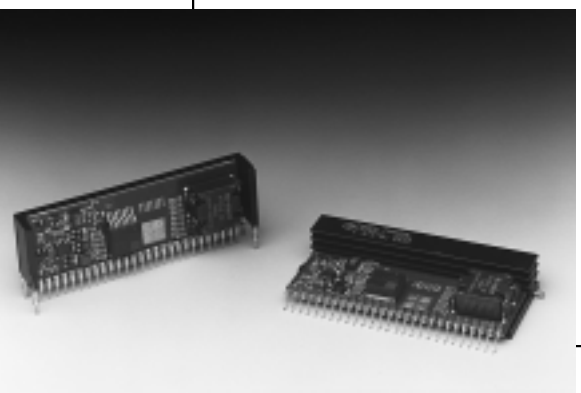
PT7600 Series

10 AMP PROGRAMMABLE INTEGRATED SWITCHING REGULATOR

Revised 5/15/98



Features

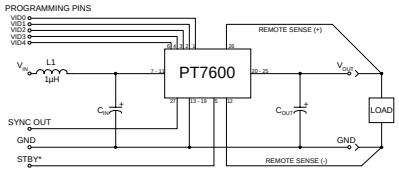
- Single-Device: +5V input
- 5-bit Programmable:
  1.3V to 3.5V@10A
- High Efficiency
- Input Voltage Range:
  4.5V to 5.5V
- Differential Remote Sense
- 27-pin SIP Package

The PT7600 is a new series of high-performance, 10 Amp Integrated Switching Regulators (ISRs) housed in a 27-pin SIP package. The 10A capability allows easy integration of the latest high-speed, low-voltage µPs and bus drivers into existing 5V systems.

The output voltage of the PT7600 is easily programmed with a 5 bit input compatible with Intel's Pentium® II Processor from 1.3V to 3.5V. A differential remote sense is also provided which automatically compensates for any voltage drop from the ISR to the load.

1200µF of output capacitance are required for proper operation.

Standard Application



C_{in} = Required 1200µF electrolytic
C_{out} = Required 1200µF electrolytic
L1 = Optional 1µH input choke

Pin-Out Information

Pin	Function	Pin	Function	Pin	Function
1	VID0	10	V_{in}	19	GND
2	VID1	11	V_{in}	20	V_{out}
3	VID2	12	Remote Sense Gnd	21	V_{out}
4	VID3	13	GND	22	V_{out}
5	STBY* - Stand-by	14	GND	23	V_{out}
6	VID4	15	GND	24	V_{out}
7	V_{in}	16	GND	25	V_{out}
8	V_{in}	17	GND	26	Remote Sense V_{out}
9	V_{in}	18	GND	27	Do not connect

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

Specifications

Characteristics (T_a = 25°C unless noted)	Symbols	Conditions	PT7600 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* 0.1*	— —	10 10	A A
Input Voltage Range	V_{in}	$0.1A \le I_o \le 10A$	4.5**	—	5.5	V
Output Voltage Tolerance	ΔV_o	V_{in} = +5V, I_o = 10A $0°C \le T_a \le +55°C$	V_o-0.03	—	V_o+0.03	V
Line Regulation	Reg_{line}	$4.5V \le V_{in} \le 5.5V$, I_o = 10A	—	±10	—	mV
Load Regulation	Reg_{load}	V_{in} = +5V, $0.1 \le I_o \le 10A$	—	±10	—	mV
V_o Ripple/Noise pk-pk	V_n	V_{in} = +5V, I_o = 10A	—	50	—	mV
Transient Response with C_{out} = 1200µF	t_{tr} V_{os}	I_o step between 5A and 10A V_o over/undershoot	— —	100 200	— —	µSec mV
Efficiency	η	V_{in} = +5V, I_o = 10A V_o = 3.3V V_o = 2.9V V_o = 2.5V V_o = 1.8V V_o = 1.5V	— — — — —	80 78 75 69 65	— — — — —	% % % % %
Switching Frequency	f_o	$4.5V \le V_{in} \le 5.5V$ $0.1A \le I_o \le 10A$	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
Mechanical Shock		Per Mil-STD-883D, Method 2002.3 1 msec, Half Sine, mounted to a fixture	—	500	—	G's
Mechanical Vibration		Per Mil-STD-883D, Method 2007.2, 20-2000 Hz, Soldered in a PC board	—	10	—	G's
Weight	—	Vertical/Horizontal	—	31/41	—	grams

* ISR-will operate down to no load with reduced specifications. Please note that this product is not short-circuit protected.
** The minimum input voltage is 4.5V or V_{out}+1.2V, whichever is greater.
*** See SOA curves.

Output Capacitors: *The PT7600 series requires a minimum output capacitance of 1200µF for proper operation. Do not use Oscon type capacitors. The maximum allowable output capacitance is 7,500µF. See Capacitor Application Note.*

Input Filter: *An input filter is optional for most applications. The input inductor must be sized to handle 10ADC with a typical value of 1µH. The input capacitance must be rated for a minimum of 1.0 Arms of ripple current. For transient or dynamic load applications, additional capacitance may be required.*

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 (remote sense gnd) potential
Logic 1 = Open circuit (no pull-up resistors)

Ordering Information

PT7601❑ = 1.3 to 3.5 Volts

(For dimensions and PC board layout, see Package Styles 800 & 810.)

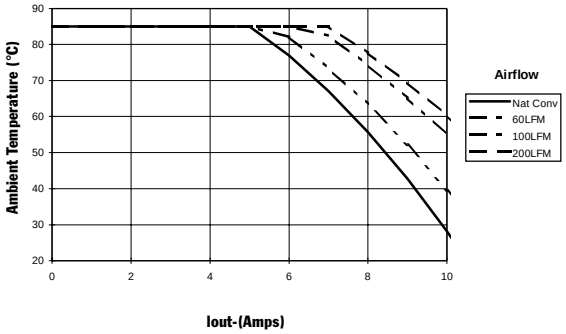
PT Series Suffix (PT1234X)

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

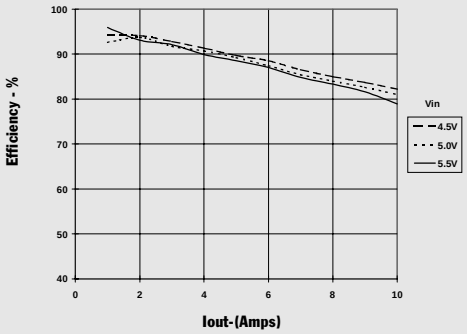
CHARACTERISTIC DATA

PT7601, 3.3 VDC See Note 1)

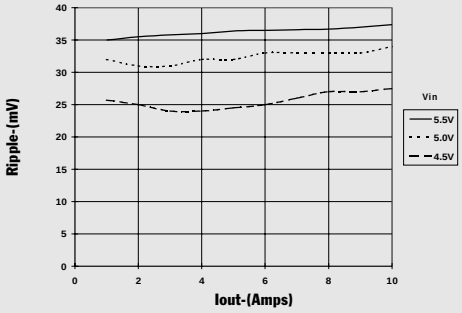
Safe Operating Area Curve (@V_{in}=+5V)



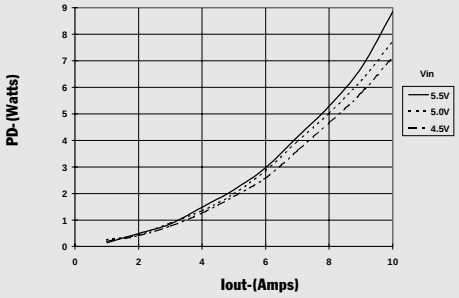
Efficiency vs Output Current



Ripple vs Output Current



Power Dissipation vs Output Current



Note 1: *SOA 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	MSL Peak Temp (3)	Samples (Requires Login)
PT7601A	NRND	SIP MODULE	EHA	27	8	TBD	Call TI	Level-1-215C-UNLIM	Samples Not Available
PT7601N	NRND	SIP MODULE	EHD	27		TBD	Call TI	Call TI	Samples Not Available

(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.

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