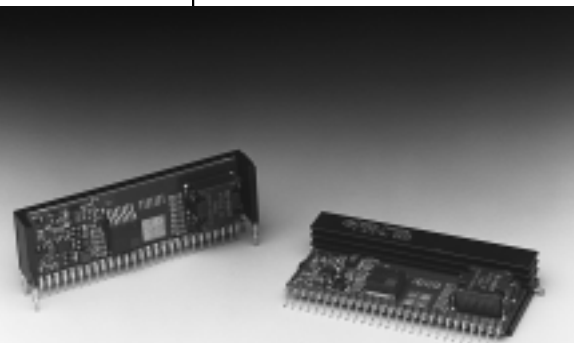


PT7600 Series

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

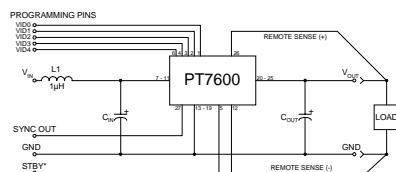
The PT7600 is a new series of high-performance, 10 Amp Integrated Switching

Regulators (ISRs) housed in a 27-pin SIP package. The 10A capability allows easy integration of the latest high-speed, low-voltage μ P's 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.

1200 μ F of output capacitance are required for proper operation.

Standard Application



C_{in} = Required 1200 μ F electrolytic
 C_{out} = Required 1200 μ F electrolytic
 $L1$ = Optional 1 μ H 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 ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	PT7600 SERIES			
			Min	Typ	Max	Units
Output Current	I_o	$T_a = +60^\circ\text{C}$, 200 LFM, pkg N $T_a = +25^\circ\text{C}$, natural convection	0.1*	—	10	A
Input Voltage Range	V_{in}	$0.1\text{A} \leq I_o \leq 10\text{A}$	4.5**	—	5.5	V
Output Voltage Tolerance	ΔV_o	$V_{in} = +5\text{V}$, $I_o = 10\text{A}$ $0^\circ\text{C} \leq T_a \leq +55^\circ\text{C}$	$V_o - 0.03$	—	$V_o + 0.03$	V
Line Regulation	Reg_{line}	$4.5\text{V} \leq V_{in} \leq 5.5\text{V}$, $I_o = 10\text{A}$	—	± 10	—	mV
Load Regulation	Reg_{load}	$V_{in} = +5\text{V}$, $0.1 \leq I_o \leq 10\text{A}$	—	± 10	—	mV
V_o Ripple/Noise pk-pk	V_n	$V_{in} = +5\text{V}$, $I_o = 10\text{A}$	—	50	—	mV
Transient Response with $C_{out} = 1200\mu\text{F}$	t_{tr} V_{os}	I_o step between 5A and 10A V_o over/undershoot	—	100 200	—	μSec mV
Efficiency	η	$V_{in} = +5\text{V}$, $I_o = 10\text{A}$	$V_o = 3.3\text{V}$ $V_o = 2.9\text{V}$ $V_o = 2.5\text{V}$ $V_o = 1.8\text{V}$ $V_o = 1.5\text{V}$	— 80 78 75 69 65	— — — — —	% % % % %
Switching Frequency	f_o	$4.5\text{V} \leq V_{in} \leq 5.5\text{V}$ $0.1\text{A} \leq I_o \leq 10\text{A}$	650	700	750	kHz
Absolute Maximum Operating Temperature Range	T_a		0	—	+85	$^\circ\text{C}$
Recommended Operating Temperature Range	T_a	Forced Air Flow = 200 LFM Over V_{in} and I_o Ranges	0	—	+65***	$^\circ\text{C}$
Storage Temperature	T_s		-40	—	+125	$^\circ\text{C}$
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 $V_{out} + 1.2\text{V}$, whichever is greater.

*** See SOA curves.

Output Capacitors: The PT7600 series requires a minimum output capacitance of 1200 μ F for proper operation. Do not use Oscon type capacitors. The maximum allowable output capacitance is 7,500 μ F. 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 1 μ H. 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.

PT7600 Series

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.)

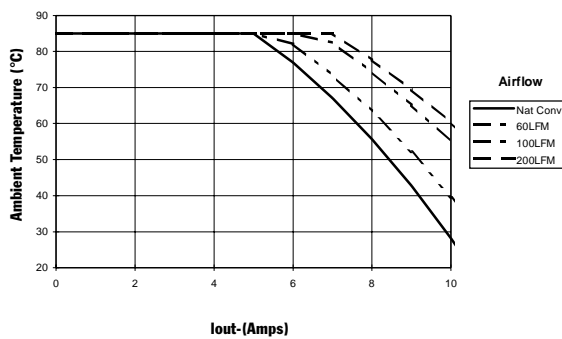
PT Series Suffix (PT1234X)

Case/Pin Configuration

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

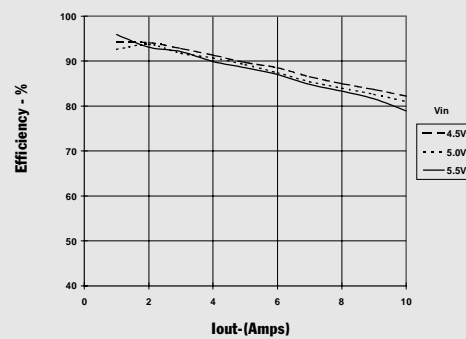
CHARACTERISTIC DATA

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

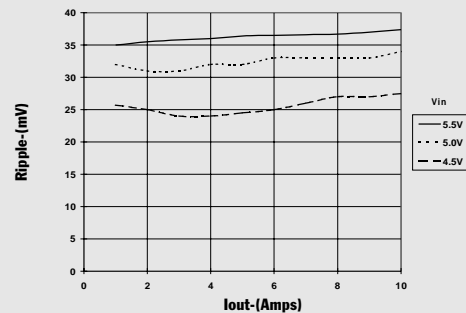


PT7601, 3.3 VDC (See Note 1)

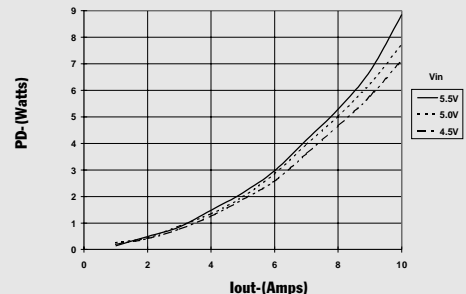
Efficiency vs Output Current



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⁾
PT7601A	NRND	SIP MOD ULE	EHA	27	8	TBD	Call TI	Level-1-215C-UNLIM
PT7601C	NRND	SIP MOD ULE	EHC	27	8	TBD	Call TI	Level-1-215C-UNLIM
PT7601N	NRND	SIP MOD ULE	EHD	27	10	TBD	Call TI	Level-1-215C-UNLIM

⁽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.

OBSELETE: 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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