



Features

- 60A Output Current
- Multi-Phase Topology
- +5V Input
- 5-bit Programmable:
1.3V to 3.5V
1.075V to 1.850V
- High Efficiency
- Differential Remote Sense
- Short Circuit Protection
- Output Tracking Feature
- Over-Temp Shutdown
- Power Good & OV Flag
- Low-Profile Package
- Solderable Copper Case
- “Current Booster”
Compatible

Ordering Information

PT8001□ = 1.3 to 3.5 Volts
PT8002□ = 1.075 to 1.850 Volts

PT Series Suffix (PT1234X)

Case/Pin Configuration

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

For dimensions and PC board layout, see
Package Styles 1600, 1610 and 1615

Description

The PT8000 series is a 60 A high-performance, Integrated Switching Regulator (ISR) housed in a single low-profile 44-pin SIP package. Operating from an input voltage of +5V, the PT8000 series offers a state-of-the-art “Plug-in Power” solution for highly-integrated digital systems that demand high power supply currents at low voltages.

The output voltage from these modules is programmable over a preset range via a 5-bit input. The PT8001 may be set from 1.3V to 3.5V, which is compatible with Intel’s Pentium Pro® μ -processors. The output voltage of the PT8002 is programmable from 1.075V to 1.85V.

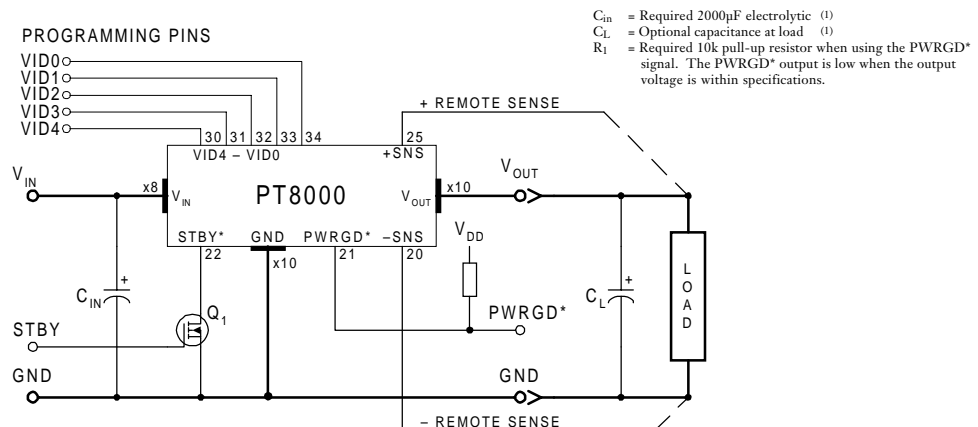
The PT8000 series incorporates many features to facilitate system

integration. Output short-circuit protection and over-temperature shutdown enables these modules to survive any load fault. Two self-diagnostic signals, “Power Good” (PWRGD*) and “Over-Voltage Flag” (OVF*) are provided. And a unique tracking feature allows the output to be synchronized to a master ramp voltage during power-up.

Other features include a standby input, and a differential remote sense to compensate for voltage drop between the ISR and load.

A low ESR capacitance of 2000 μ F is required at the input for proper operation.

Standard Application



Pin-Out Information

Pin	Function	PinFunction
1	V _{out}	16 GND
2	V _{in}	17 GND
3	V _{in}	18 GND
4	GND	19 V _{out}
5	GND	20 Remote Sense Gnd
6	V _{in}	21 PWRGD*
7	V _{in}	22 STBY*
8	V _{out}	23 OVF*
9	V _{out}	24 Track
10	V _{out}	25 Remote Sense V _{out}
11	Synch 1	26 V _{out}
12	Synch 2	27 GND
13	Synch 3	28 GND
14	Synch 4	29 GND
15	Do Not Connect	30 VID4

For STBY* pin; Open = output enabled
Gnd = output disabled.

PinFunction
31 VID3
32 VID2
33 VID1
34 VID0
35 V _{out}
36 V _{out}
37 V _{out}
38 V _{in}
39 V _{in}
40 GND
41 GND
42 V _{in}
43 V _{in}
44 V _{out}

Programming Information

PT8001						PT8002	
VID3	VID2	VID1	VID0	VID4=1 Vo	VID4=0 Vo	VID4=1 Vo	VID4=0 Vo
1	1	1	1	2.0V	1.30V	1.075V	1.475V
1	1	1	0	2.1V	1.35V	1.100V	1.500V
1	1	0	1	2.2V	1.40V	1.125V	1.525V
1	1	0	0	2.3V	1.45V	1.150V	1.550V
1	0	1	1	2.4V	1.50V	1.175V	1.575V
1	0	1	0	2.5V	1.55V	1.200V	1.600V
1	0	0	1	2.6V	1.60V	1.225V	1.625V
1	0	0	0	2.7V	1.65V	1.250V	1.650V
0	1	1	1	2.8V	1.70V	1.275V	1.675V
0	1	1	0	2.9V	1.75V	1.300V	1.700V
0	1	0	1	3.0V	1.80V	1.325V	1.725V
0	1	0	0	3.1V	1.85V	1.350V	1.750V
0	0	1	1	3.2V	1.90V	1.375V	1.775V
0	0	1	0	3.3V	1.95V	1.400V	1.800V
0	0	0	1	3.4V	2.00V	1.425V	1.825V
0	0	0	0	3.5V	2.05V	1.450V	1.850V

Logic 0 = Pin 20 potential (remote sense gnd)

Logic 1 = Open circuit (no pull-up resistors)

VID3 and VID4 may not be changed while the unit is operating.

Specifications

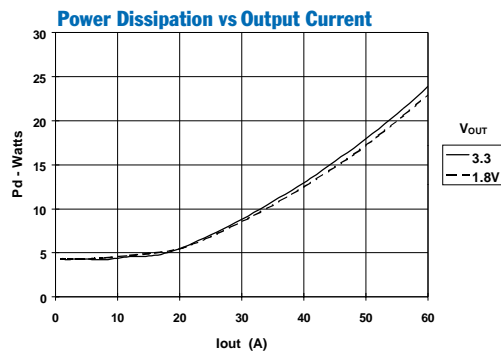
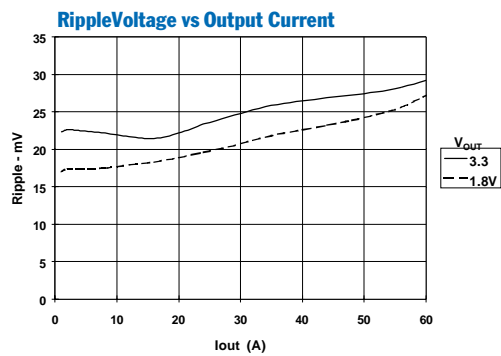
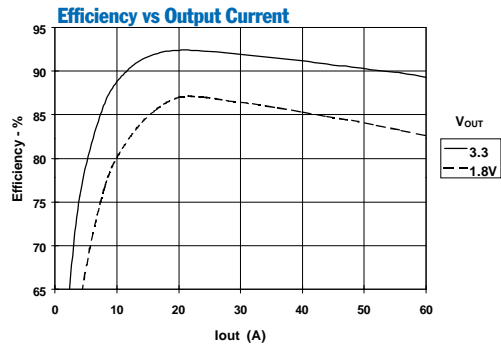
Characteristics (T _a = 25°C unless noted)	Symbols	Conditions	PT8000 SERIES			
			Min	Typ	Max	Units
Output Current	I _o	T _a = +50°C, 400 LFM, pkg N T _a = +25°C, natural convection	0.1 (1) 0.1 (1)	—	60 (2) 30 (2)	A
Input Voltage Range	V _{in}	0.1A ≤ I _o ≤ 60A	4.5	—	5.5	V
Output Voltage Tolerance	ΔV _o	Over V _{in} range, I _o = I _o max 0°C ≤ T _a ≤ +60°C	V _o -0.03	—	V _o +0.03	V
Line Regulation	Reg _{line}	Over V _{in} range, I _o = I _{max}	—	±1.0	±10	mV
Load Regulation	Reg _{load}	V _{in} = 5V, 0.1 ≤ I _o ≤ I _o max	—	±1.0	±10	mV
V _o Ripple/Noise pk-pk	V _n	V _{in} = 5V, I _o = 60A	—	50	—	mV
Transient Response (no external capacitance)	t _{tr} V _{os}	I _o step from 30A to 60A in 6μs V _o over/undershoot	— —	50 100	— —	μs mV
Efficiency	η	V _{in} = +5V, I _o = 30A, V _o = 3.3V V _o = 1.8V	— —	92 86	— —	%
Switching Frequency	f _o	Over V _{in} and I _o ranges	1.3	—	1.5	MHz
STBY* (pin 22)	Off On		0 Note (2)	—	0.8	V
PWRGD* (pin 21)	On Off	85% < V _{out} < 115% of VID set point V _{out} < 85%, or V _{out} > 125% of VID set point	— —	500 500	— —	Ω kΩ
OVF* (pin 23)	On Off	V _{out} > 125% of VID set point V _{out} < 115% of VID set point	— —	500 500	— —	Ω kΩ
Over-temperature Shutdown Point	OTP	Case temperature -Auto reset	—	105	—	°C
Absolute Maximum Operating Temperature Range	T _a	—	-40	—	+85 (3)	°C
Storage Temperature	T _s	—	-40	—	+125	°C
Weight	—	Vertical/Horizontal	—	110	—	grams

Notes: (1) The ISR will operate down to no load with reduced specifications.

(2) Specified as "Open-Circuit." Either an "open-collector" bipolar transistor, or "open-drain" MOSFET is recommended for controlling this input.

(3) See Safe Operating Area curves or contact the factory to determine the appropriate derating.

Input Filter: To facilitate the high output fast transient performance, a high quality 2,000μF input capacitor(s) is required for the PT8000 series. Use either tantalum or Oscon® type capacitors with a maximum ESR (equivalent series resistance) of 20mΩ.

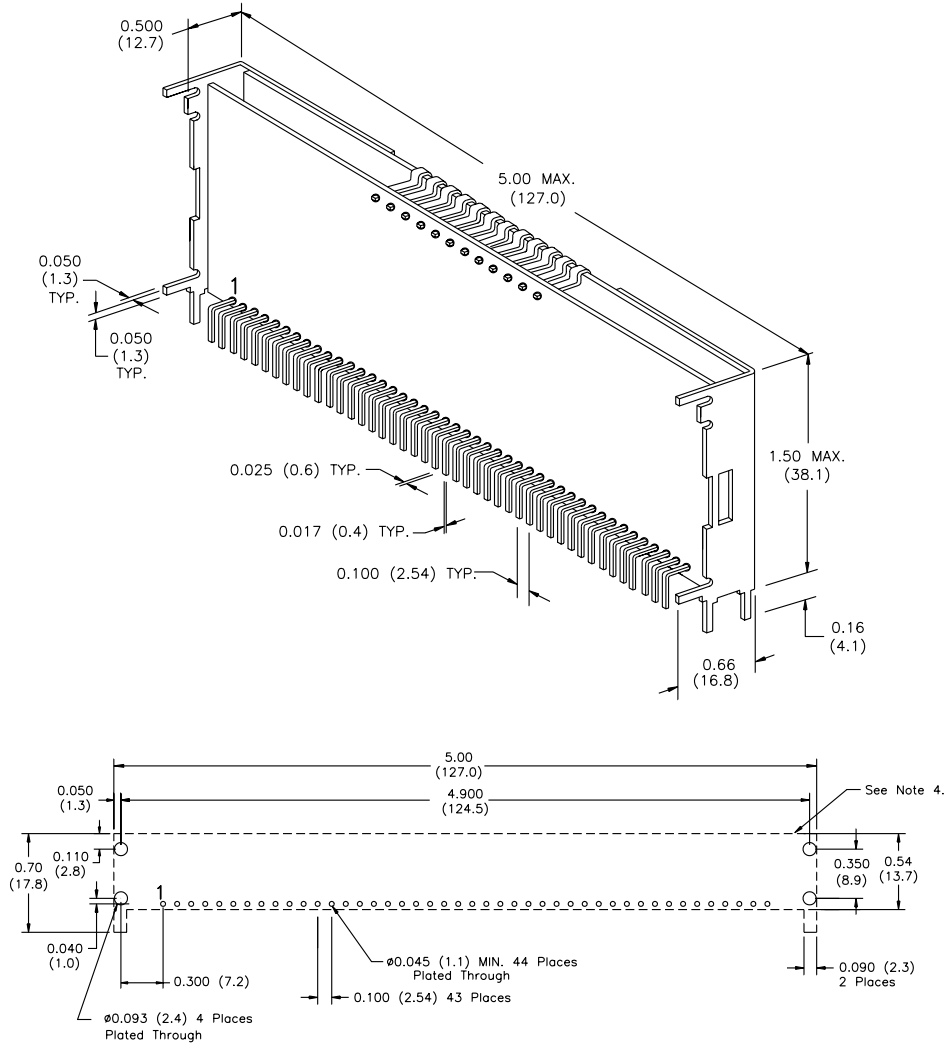
Performance Characteristics, $V_{in} = 5.0V$ (See Note A)

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.

PACKAGE INFORMATION AND DIMENSIONS

Vertical Through-Hole Mount (Suffix N)



PC Layout

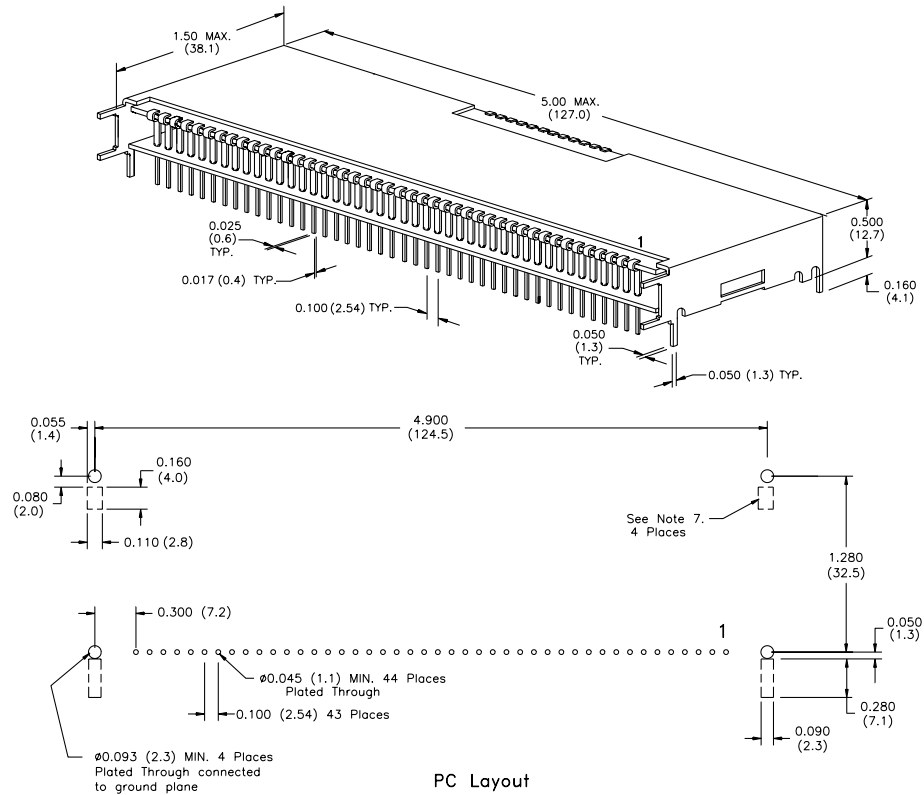
Notes: (Rev. A)

- 1: All dimensions are in inches (mm).
- 2: 2 place decimals are ± 0.030 (± 0.8 mm).
- 3: 3 place decimals are ± 0.010 (± 0.3 mm).
- 4: Recommended mechanical keep out area (dotted line).

**Power Trends proprietary package design.
All rights reserved. Patent pending.**

PACKAGE INFORMATION AND DIMENSIONS

Horizontal Through-Hole Mount (Suffix A)

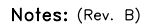


Notes: (Rev. A)

- 1: All dimensions are in inches (mm).
- 2: 2 place decimals are ± 0.030 (± 0.8 mm).
- 3: 3 place decimals are ± 0.010 (± 0.3 mm).
- 4: Recommended mechanical keep out area (dotted lines).

**Power Trends proprietary package design.
All rights reserved. Patent pending.**

Horizontal Surface Mount (Suffix C)



- 
- TEXAS INSTRUMENTS

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Customers are responsible for their applications using TI components.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, license, warranty or endorsement thereof.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations and notices. Representation or reproduction of this information with alteration voids all warranties provided for an associated TI product or service, is an unfair and deceptive business practice, and TI is not responsible nor liable for any such use.

Resale of TI's products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service, is an unfair and deceptive business practice, and TI is not responsible nor liable for any such use.

Also see: Standard Terms and Conditions of Sale for Semiconductor Products. www.ti.com/sc/docs/stdterms.htm

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265