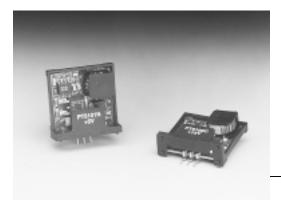
1-A Positive Step-down Integrated Switching Regulator

(Revised 11/8/2001)



### **Features**

- 90%+ Efficiency
- Internal Short-Circuit Protection
- Pin-Compatible with 3-Terminal Linear Regulators
- Laser-Trimmed Output Voltage
- Over-Temperature Protection
- Small Footprint
- Wide Input Range
- 5-Pin Mount Option (Suffixes L & M)

### **Description**

The PT5100 modules are a series of economical, easy-to-use 1-A positive step-down, Integrated Switching Regulators (ISRs). These ISRs are compatible with most TO-220 style linear regulators, and when employed as a linear replacement, provide significant benefits in both efficiency and power dissipation. They are recommended for use in a wide variety of on-board power regulation applications. These include computer, data storage, industrial controls, and battery powered equipment. Modules are laser-trimmed for optimal output voltage accuracy, and exhibit excellent line and load regulation. The PT5100 also features output current limiting and thermal shutdown protection.

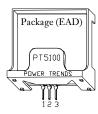
# **Ordering Information**

PT5101□ = +5.0 Volts PT5102□ = +12.0 Volts PT5103□ = +3.3 Volts PT5105□ = +6.5 Volts PT5107□ = +15.0 Volts PT5110□ = +5.6 Volts PT5111□ = +9.0 Volts PT5111□ = +10.0 Volts PT5112□ = +8.0 Volts

### PT Series Suffix (PT1234x)

Case/Pin Configuration	Order Suffix	Package Code
Vertical	N	(EAD)
Horizontal	Α	(EAA)
SMD	C	(EAC)
Horizontal, 2-pin Tab	M	(EAM)
SMD, 2-Pin Tab	L	(EAL)

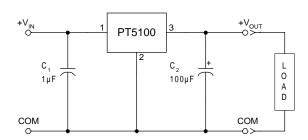
(Reference the applicable package code drawing for the dimensions and PC board layout)



### Pin-Out Information

Pin	Function
1	$V_{in}$
2	GND
3	$V_{out}$

### **Standard Application**



 $C_1$  = Optional 1 $\mu F$  ceramic capacitor  $C_2$  = Required 100 $\mu F$  electrolytic



# PT5100 Series

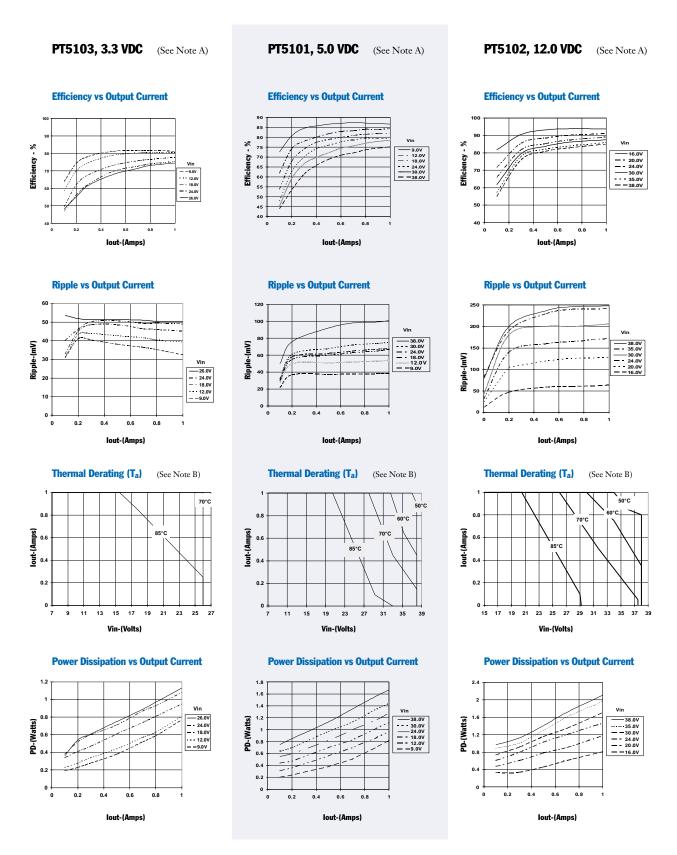
### 1-A Positive Step-down **Integrated Switching Regulator**

 $\textbf{Specifications} \hspace{0.2cm} \text{(Unless otherwise stated, $T_a=25^{\circ}$C, $V_{in}=V_{in}$min, $C_{out}=100\mu$F, and $I_o=I_o$max)} \\$ 

				PT5100 SERIES			
Characteristic	Symbol	Conditions	Min	Тур	Max	Units	
Output Current	$I_{o}$	Over V <sub>in</sub> range	0.1(1)	_	1.0	A	
Input Voltage Range	V <sub>in</sub>	$\begin{array}{c} \text{Over I}_{o}  \text{Range} & V_{o} = \\ V_{o} = \\ V_{o} > \end{array}$	5.0V 9		26 38 38	VDC	
Set Point Voltage Tolerance	Votol		_	±1	±2	$%V_{o}$	
Temperature Variation	Reg <sub>temp</sub>	$0^{\circ} \le \Gamma_a \le +60^{\circ}\text{C}$ , $I_o = I_o \text{min}$	_	±0.5	_	$%V_{o}$	
Line Regulation	Regline	Over V <sub>in</sub> range	_	±5	±10	mV	
Load Regulation	Regload	Over I <sub>o</sub> range	_	±5	±10	mV	
Total Output Voltage Variation	$\Delta V_{o}$ tot	Includes set-point, line, load, $0^{\circ} \le \Gamma_a \le +60^{\circ}C$	_	±1.5	±3	$%V_{o}$	
Efficiency	η	$\begin{array}{c} V_o = \\ V_o = \end{array}$	12V — 10V — 5.0V —	95 94 92 90 82		%	
V <sub>o</sub> Ripple (pk-pk)	$V_{r}$	20MHz bandwidth	_	2	_	$%V_{o}$	
Transient Response	t <sub>tr</sub>	1A/μs load step, 50% to 100% I <sub>o</sub> max	_	100	200	μs	
	$\Delta V_{tr}$	V <sub>o</sub> over/undershoot	_	±5.0	_	$%V_{o}$	
Current Limit	$I_{ m lim}$	$\Delta V_o = -1\%$	1.2	2.6	_	A	
Switching Frequency	$f_{s}$	Over $V_{in}$ range $V_o \ge 1$	5.0V 500 3.3V 575	650 725	800 875	kHz	
External Output Capacitance	Cout		100		_	μF	
Operating Temperature Range	$T_a$	Over V <sub>in</sub> range	-40 (2)		+85 (3)	°C	
Thermal Resistance	$\theta_{\mathrm{j}a}$	Free-air convection (40-60LFM) $ \begin{array}{c} V_o = \\ V_o = \\ V_o \geq \end{array} $	5.0V —	45 50 60	_ _ _	°C/W	
Storage Temperature	$T_s$	_	-40	_	+125	°C	
Reliability	MTBF	Per Bellcore TR-332 50% stress, T <sub>a</sub> =40°C, ground benign	11.3	_	_	106 Hrs	
Mechanical Shock	_	Per Mil-Std-883D, method 2002.3, 1mS, half-sine, mounted to a fixture	_	500	_	G's	
Mechanical Vibration	_	Per Mil-Std-883D, Method 2007.2 20-2000Hz, soldered in PC board		5 (4)	_	G's	
Weight	_	Suffixes N, A, & C Suffixes L & M		4.5 6.5		grams	
Flammability	_	Materials meet UL 94V-0					

- Notes: (1) The ISR will operate at no load with reduced specifications.
  (2) For operation below 0°C, use a tantalum type capacitor for C<sub>2</sub>.
  (3) See Thermal Derating curves.
  (4) The tab pins on the 5-pin mount package types (suffixes L & M) must be soldered. For more information see the applicable package outline drawing.

1-A Positive Step-down Integrated Switching Regulator



Note A: Characteristic data has been developed from actual products tested at 25°C. This data is considered typical data for the Converter. Note B: Thermal derating graphs are developed in free-air convection cooling, which corresponds to approximately 40–60LFM of airflow.





# **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
PT5101A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5101C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5101CT	ACTIVE	SIP MOD ULE	EAC	3	200	TBD	Call TI	Level-1-215C-UNLIM
PT5101G	ACTIVE	SIP MOD ULE	EAG	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5101H	ACTIVE	SIP MOD ULE	EAH	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5101J	ACTIVE	SIP MOD ULE	EAJ	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5101L	ACTIVE	SIP MOD ULE	EAL	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5101M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5101N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5101S	ACTIVE	SIP MOD ULE	EAF	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5101U	ACTIVE	SIP MOD ULE	EAU	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5102A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5102C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5102CT	ACTIVE	SIP MOD ULE	EAC	3	200	TBD	Call TI	Level-1-215C-UNLIM
PT5102H	ACTIVE	SIP MOD ULE	EAH	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5102J	ACTIVE	SIP MOD ULE	EAJ	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5102M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5102N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5102S	ACTIVE	SIP MOD ULE	EAF	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5103A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5103C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5103H	ACTIVE	SIP MOD ULE	EAH	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5103J	ACTIVE	SIP MOD ULE	EAJ	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5103L	ACTIVE	SIP MOD ULE	EAL	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5103M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM





om 13-Oct-2005

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
PT5103N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5105A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5105C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5105L	ACTIVE	SIP MOD ULE	EAL	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5105N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5107A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5107C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5107J	ACTIVE	SIP MOD ULE	EAJ	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5107M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5107N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5109A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5109C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5109M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5109N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5110A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5110C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5110N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5110S	ACTIVE	SIP MOD ULE	EAF	3	16	TBD	Call TI	Level-1-215C-UNLIM
PT5111A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5111C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5111M	ACTIVE	SIP MOD ULE	EAM	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5111N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5112A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5112C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5112L	ACTIVE	SIP MOD ULE	EAL	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5112N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM



# PACKAGE OPTION ADDENDUM

13-Oct-2005

(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) 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.

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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

### **IMPORTANT NOTICE**

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI 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 and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments

Post Office Box 655303 Dallas, Texas 75265

Copyright © 2005, Texas Instruments Incorporated