PT5100 Series

1-A Positive Step-down Integrated Switching Regulator

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
PT5109☐	=	+5.6 Volts
PT5110☐	=	+9.0 Volts
PT5111☐	=	+10.0 Volts
PT5112☐	=	+8.0 Volts

PT Series Suffix (PT1234*x*)

Case/Pin Configuration	Order Suffix	Package Code
Vertical	N	(EAD)
Horizontal	A	(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)

Package (EAD)

PT5100

POWER TRENDS

1 2 3
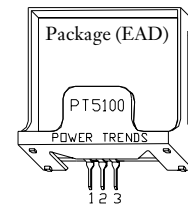
Pin-Out Information

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

Standard Application

$+V_{IN}$ — 1 — PT5100 — 3 — $+V_{OUT}$

C_1 1µF

2

C_2 100µF

LOAD

COM

COM
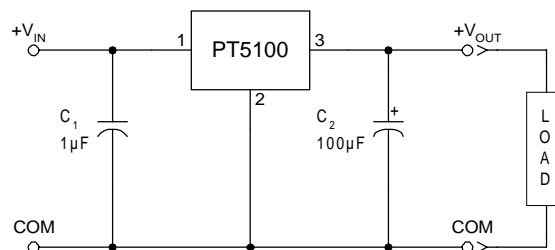
C_1 = Optional 1µF ceramic capacitor
C_2 = Required 100µF electrolytic

TEXAS INSTRUMENTS

PT5100 Series

1-A Positive Step-down
Integrated Switching Regulator

Specifications (Unless otherwise stated, T_a =25°C, V_{in} =V_{in}min, C_{out} =100μF, and I_o =$I_o$max)

Characteristic	Symbol	Conditions		PT5100 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range		0.1 [1]	—	1.0	A
Input Voltage Range	V_{in}	Over I_o Range	V_o=3.3V	9	—	26	
			V_o=5.0V	9	—	38	VDC
			V_o>5.0V	V_o+4	—	38	
Set Point Voltage Tolerance	$V_o$tol			—	±1	±2	%V_o
Temperature Variation	Reg_{temp}	0° ≤T_a ≤ +60°C, I_o =$I_o$min		—	±0.5	—	%V_o
Line Regulation	Reg_{line}	Over V_{in} range		—	±5	±10	mV
Load Regulation	Reg_{load}	Over I_o range		—	±5	±10	mV
Total Output Voltage Variation	ΔV_otot	Includes set-point, line, load, 0° ≤T_a ≤ +60°C		—	±1.5	±3	%V_o
Efficiency	η		V_o = 15V	—	95	—	
			V_o = 12V	—	94	—	
			V_o = 10V	—	92	—	%
			V_o =5.0V	—	90	—	
			V_o =3.3V	—	82	—	
V_o Ripple (pk-pk)	V_r	20MHz bandwidth		—	2	—	%V_o
Transient Response	t_{tr}	1A/μs load step, 50% to 100% $I_o$max		—	100	200	μs
	ΔV_{tr}	V_o over/undershoot		—	±5.0	—	%V_o
Current Limit	I_{lim}	ΔV_o = −1%		1.2	2.6	—	A
Switching Frequency	f_s	Over V_{in} range	V_o≥5.0V	500	650	800	kHz
			V_o≤3.3V	575	725	875	
External Output Capacitance	C_{out}			100	—	—	μF
Operating Temperature Range	T_a	Over V_{in} range		–40 [2]	—	+85 [3]	°C
Thermal Resistance	θ_{ja}	Free-air convection (40-60LFM)	V_o=3.3V	—	45	—	
			V_o =5.0V	—	50	—	°C/W
			V_o ≥12V	—	60	—	
Storage Temperature	T_s	—		–40	—	+125	°C
Reliability	MTBF	Per Bellcore TR-332 50% stress, T_a =40°C, ground benign		11.3	—	—	10^6 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		—	4.5	—	grams
		Suffixes L & M		—	6.5	—	
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_2.*
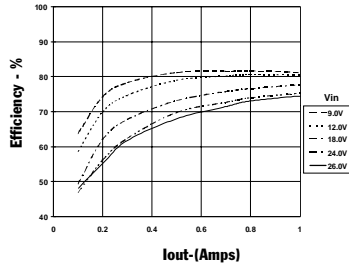(3) *See Thermal Derating curves.*
(4) *The tab pins on the 5-pin mount package types (suffixes L & M) must be soldered. For more information see the applicable package outline drawing.*
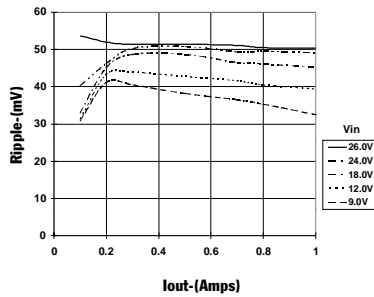
TEXAS INSTRUMENTS

Typical Characteristics

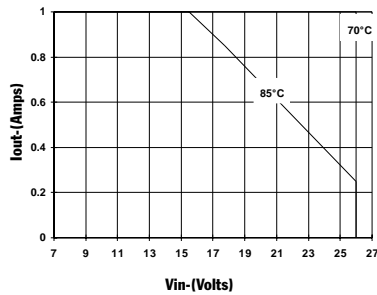## PT5103, 3.3 VDC (See Note A)
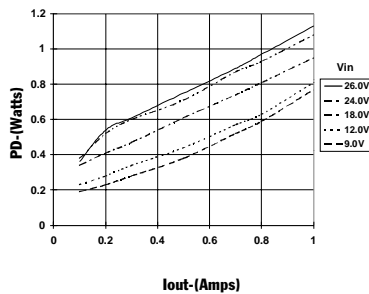
Efficiency vs Output Current

Ripple vs Output Current

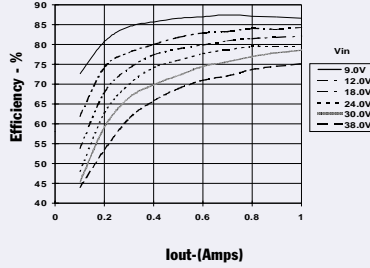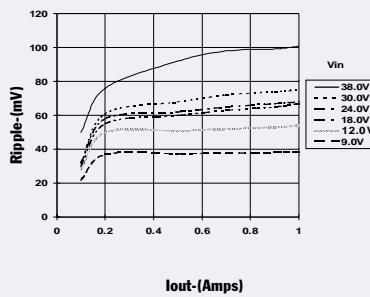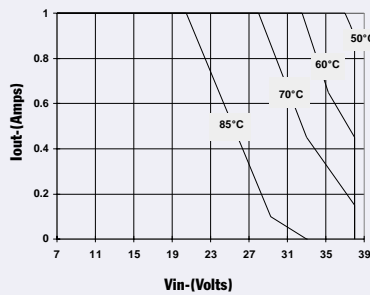### Thermal Derating (T$_a$) (See Note B)

Power Dissipation vs Output Current

PT5101, 5.0 VDC (See Note A)

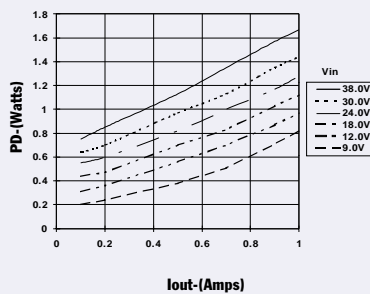### Efficiency vs Output Current

Ripple vs Output Current

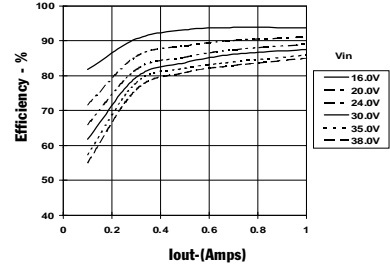### Thermal Derating (T$_a$) (See Note B)

Power Dissipation vs Output Current

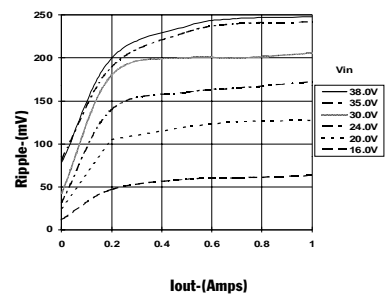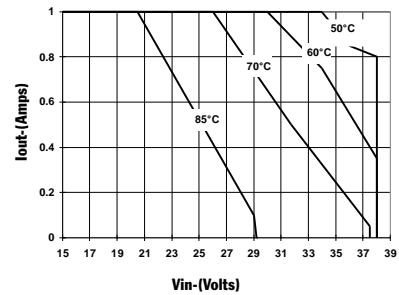## PT5102, 12.0 VDC (See Note A)
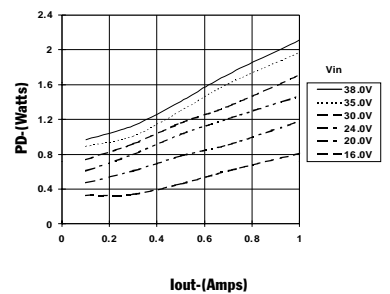
Efficiency vs Output Current

Ripple vs Output Current

Thermal Derating (T$_a$) (See Note B)

Power Dissipation vs Output Current

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.*

TEXAS INSTRUMENTS

PACKAGING INFORMATION

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

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

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.

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