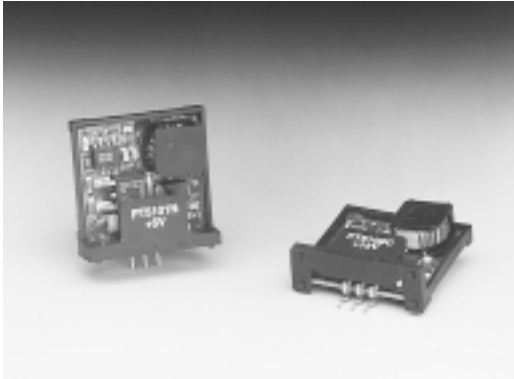




**THE DATASHEET OF  
PT5101J**





### 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.

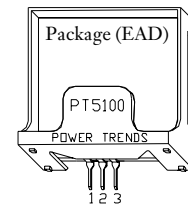
### Ordering Information

<b>PT5101</b> □	= +5.0 Volts
<b>PT5102</b> □	= +12.0 Volts
<b>PT5103</b> □	= +3.3 Volts
<b>PT5105</b> □	= +6.5 Volts
<b>PT5107</b> □	= +15.0 Volts
<b>PT5109</b> □	= +5.6 Volts
<b>PT5110</b> □	= +9.0 Volts
<b>PT5111</b> □	= +10.0 Volts
<b>PT5112</b> □	= +8.0 Volts

### PT Series Suffix (PT1234x)

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

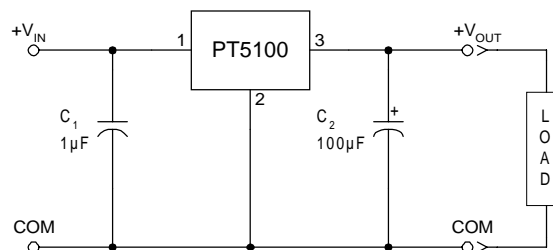
(Reference the applicable package code drawing for the dimensions and PC board layout)



### Pin-Out Information

Pin	Function
1	V <sub>in</sub>
2	GND
3	V <sub>out</sub>

### Standard Application



C<sub>1</sub> = Optional 1µF ceramic capacitor  
C<sub>2</sub> = Required 100µF electrolytic

# PT5100 Series

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

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

Characteristic	Symbol	Conditions	PT5100 SERIES			Units	
			Min	Typ	Max		
Output Current	$I_o$	Over $V_{in}$ range	0.1 <sup>(1)</sup>	—	1.0	A	
Input Voltage Range	$V_{in}$	Over $I_o$ Range	$V_o = 3.3\text{V}$	9	—	26	VDC
			$V_o = 5.0\text{V}$	9	—	38	
			$V_o > 5.0\text{V}$	$V_o + 4$	—	38	
Set Point Voltage Tolerance	$V_o\text{tol}$		—	$\pm 1$	$\pm 2$	$\%V_o$	
Temperature Variation	$\text{Reg}_{\text{temp}}$	$0^\circ \leq T_a \leq +60^\circ\text{C}$ , $I_o = I_{o\text{min}}$	—	$\pm 0.5$	—	$\%V_o$	
Line Regulation	$\text{Reg}_{\text{line}}$	Over $V_{in}$ range	—	$\pm 5$	$\pm 10$	mV	
Load Regulation	$\text{Reg}_{\text{load}}$	Over $I_o$ range	—	$\pm 5$	$\pm 10$	mV	
Total Output Voltage Variation	$\Delta V_{o\text{tot}}$	Includes set-point, line, load, $0^\circ \leq T_a \leq +60^\circ\text{C}$	—	$\pm 1.5$	$\pm 3$	$\%V_o$	
Efficiency	$\eta$		$V_o = 15\text{V}$	—	95	—	%
			$V_o = 12\text{V}$	—	94	—	
			$V_o = 10\text{V}$	—	92	—	
			$V_o = 5.0\text{V}$	—	90	—	
			$V_o = 3.3\text{V}$	—	82	—	
$V_o$ Ripple (pk-pk)	$V_r$	20MHz bandwidth	—	2	—	$\%V_o$	
Transient Response	$t_{tr}$	1A/ $\mu\text{s}$ load step, 50% to 100% $I_{o\text{max}}$	—	100	200	$\mu\text{s}$	
	$\Delta V_{tr}$	$V_o$ over/undershoot	—	$\pm 5.0$	—	$\%V_o$	
Current Limit	$I_{\text{lim}}$	$\Delta V_o = -1\%$	1.2	2.6	—	A	
Switching Frequency	$f_s$	Over $V_{in}$ range	$V_o \geq 5.0\text{V}$	500	650	800	kHz
			$V_o \leq 3.3\text{V}$	575	725	875	
External Output Capacitance	$C_{out}$		100	—	—	$\mu\text{F}$	
Operating Temperature Range	$T_a$	Over $V_{in}$ range	$-40$ <sup>(2)</sup>	—	$+85$ <sup>(3)</sup>	$^\circ\text{C}$	
Thermal Resistance	$\theta_{ja}$	Free-air convection (40-60LFM)	$V_o = 3.3\text{V}$	—	45	—	$^\circ\text{C}/\text{W}$
			$V_o = 5.0\text{V}$	—	50	—	
			$V_o \geq 12\text{V}$	—	60	—	
Storage Temperature	$T_s$	—	$-40$	—	$+125$	$^\circ\text{C}$	
Reliability	MTBF	Per Bellcore TR-332 50% stress, $T_a = 40^\circ\text{C}$ , 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 <sup>(4)</sup>	—	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  $0^\circ\text{C}$ , use a tantalum type capacitor for  $C_2$ .

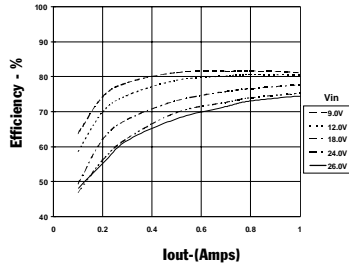
(3) See Thermal Derating curves.

(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.

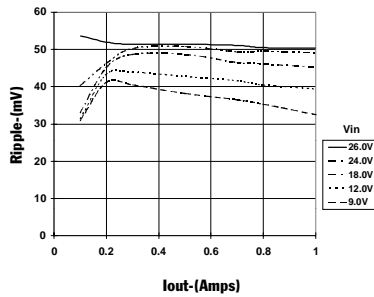
1-A Positive Step-down  
Integrated Switching Regulator

**PT5103, 3.3 VDC** (See Note A)

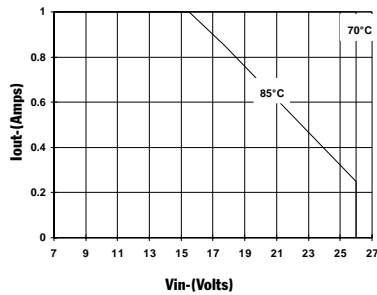
Efficiency vs Output Current



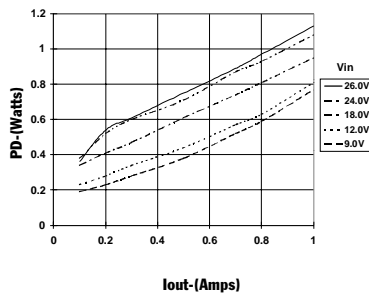
Ripple vs Output Current



Thermal Derating ( $T_A$ ) (See Note B)

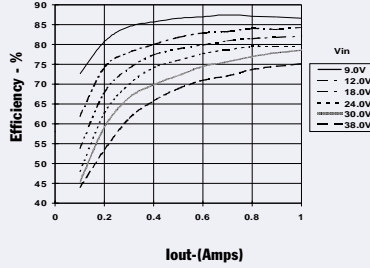


Power Dissipation vs Output Current

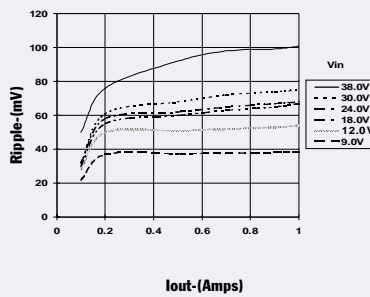


**PT5101, 5.0 VDC** (See Note A)

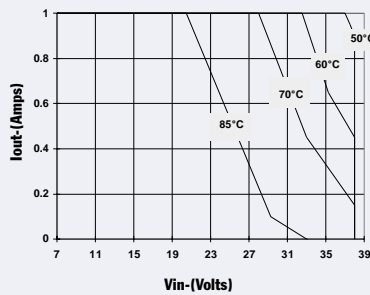
Efficiency vs Output Current



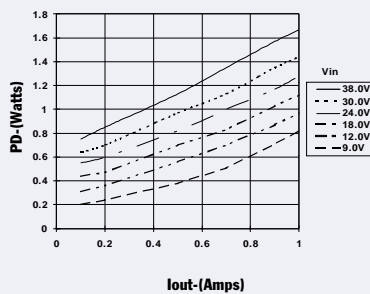
Ripple vs Output Current



Thermal Derating ( $T_A$ ) (See Note B)

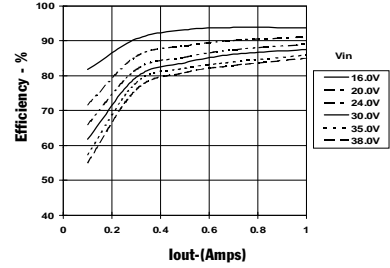


Power Dissipation vs Output Current

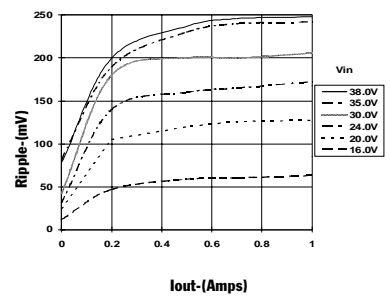


**PT5102, 12.0 VDC** (See Note A)

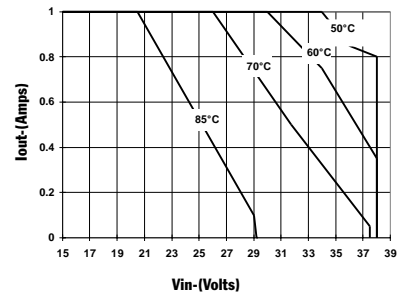
Efficiency vs Output Current



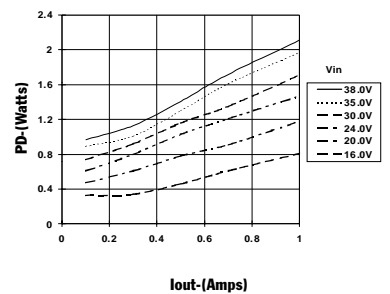
Ripple vs Output Current



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.

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