THE DATASHEET OF

PT78ST109H

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PT78ST100 Series

1.5 Amp Positive Step-Down Integrated Switching Regulator

Power Trends Products from Texas Instruments

SLTS059A

(Revised 6/30/2000)

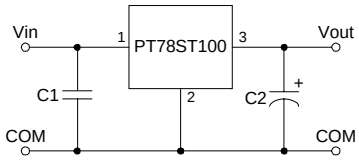
- Very Small Footprint
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Fast Transient Response
- Wide Input Range

The PT78ST100 is a series of wide-input range, 3-terminal regulators.

These ISRs have a maximum output current of 1.5 Amps and an output voltage that is laser trimmed to a variety of industry standard voltages.

These 78 series regulators have excellent line and load regulation with internal short- circuit and over-temperature protection, and are offered in a variety of standard output voltages. These ISRs are very flexible and may be used in a wide variety of applications.

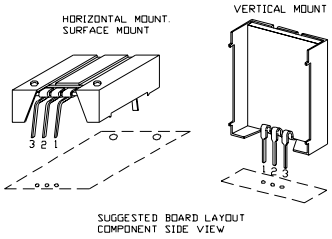
Standard Application



C1 = Optional 1µF ceramic
C2 = Required 100µF electrolytic

Pin-Out Information

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



Pkg Style 500

Ordering Information

PT78ST1 XX Y

Output Voltage	Package Suffix
33 = 3.3 Volts	**V** = Vertical Mount
36 = 3.6 Volts	**S** = Surface Mount
05 = 5.0 Volts	**H** = Horizontal Mount
51 = 5.1 Volts	
53 = 5.25 Volts	
06 = 6.0 Volts	
65 = 6.5 Volts	
07 = 7.0 Volts	
08 = 8.0 Volts	
09 = 9.0 Volts	
10 = 10.0 Volts	
12 = 12.0 Volts	
14 = 13.9 Volts	
15 = 15.0 Volts	

Specifications

Characteristics (T_a = 25°C unless noted)	Symbols	Conditions	PT78ST100 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range	0.1*	—	1.5	A
Short Circuit Current	I_{sc}	V_{in} = V_{in} min	—	3.5	—	Apk
Input Voltage Range	V_{in}	0.1 ≤ I_o ≤ 1.5A V_o= 3.3V V_o= 5V V_o= 12V	9 9 16	— — —	26 38 38	V V V
Output Voltage Tolerance	ΔV_o	Over V_{in} range, I_o=1.5A T_a = 0°C to +60°C	—	±1.0	±2.0	$\%V_o$
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.2	±0.4	$\%V_o$
Load Regulation	Reg_{load}	0.1 ≤ I_o ≤ 1.5A	—	±0.1	±0.2	$\%V_o$
V_o Ripple/Noise	V_n	V_{in}= 9V, I_o= 1.5A V_o= 5V V_{in}= 16V, I_o= 1.5A V_o= 12V	—	65 90	—	mV_{pp} mV_{pp}
Transient Response (with 100µF output cap)	t_{tr}	50% load change V_o over/undershoot	— —	100 5	— —	µSec $\%V_o$
Efficiency	η	V_{in}= 10V, I_o= 1A V_o= 3.3V V_{in}= 10V, I_o= 1A V_o= 5V V_{in}= 17V, I_o= 1A V_o= 12V	— — —	80 85 90	— — —	% % %
Switching Frequency	f_o	Over V_{in} range, I_o=1.5A	600	650	700	kHz
Absolute Maximum Operating Temperature Range	T_a	—	-40	—	+85	°C
Recommended Operating Temperature Range	T_a	Free Air Convection, (40-60LFM) At V_{in}= 24V, I_o=1.0A	-40	—	+80**	°C
Thermal Resistance	θ_{ja}	Free Air Convection, (40-60LFM)	—	45	—	°C/W
Storage Temperature	T_s	—	-40	—	+125	°C
Mechanical Shock	—	Per Mil-STD-883D, Method 2002.3	—	500	—	G's
Mechanical Vibration	—	Per Mil-STD-883D, Method 2007.2, 20-2000 Hz, soldered in a PC board	—	5	—	G's
Weight	—	—	—	6.5	—	grams

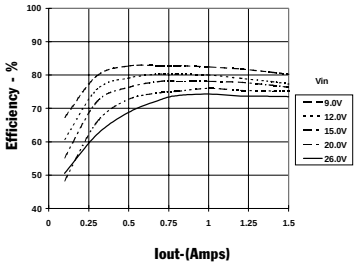
*ISR will operate down to no load with reduced specifications. **See Thermal Derating chart.

Note: *The PT78ST100 Series requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications.*

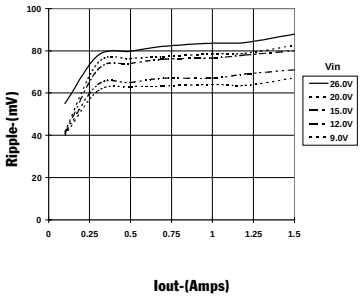
Typical Characteristics

PT78ST133, 3.3 VDC (See Note 1)

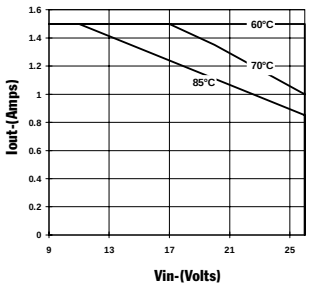
Efficiency vs Output Current



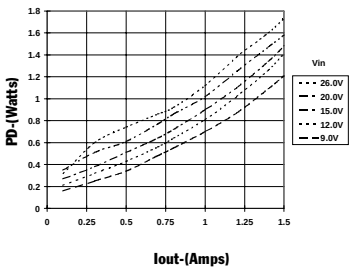
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

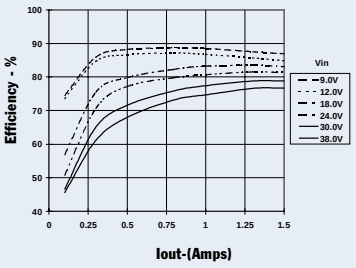


Power Dissipation vs Output Current

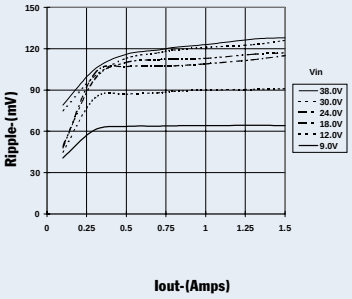


PT78ST105, 5.0 VDC (See Note 1)

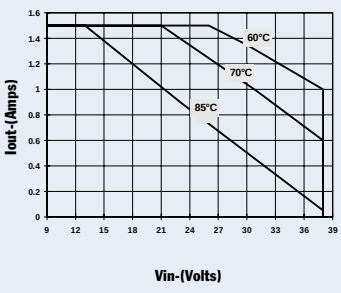
Efficiency vs Output Current



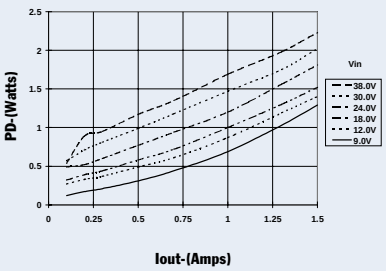
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

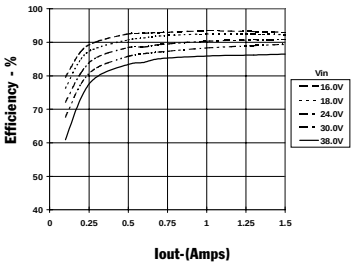


Power Dissipation vs Output Current

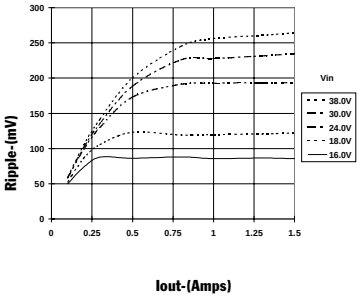


PT78ST112, 12.0 VDC (See Note 1)

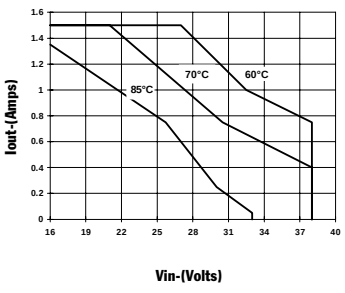
Efficiency vs Output Current



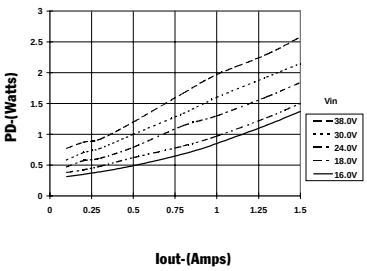
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)



Power Dissipation vs Output Current



Note 1: *All data listed in the above graphs, except for derating data, has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.*
Note 2: *Thermal derating graphs are developed in free air convection cooling of 40-60 LFM. (See Thermal Application Notes.)*

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