PT78ST100 Series

1.5 Amp Positive Step-Down Integrated Switching Regulator

Power Trends Products from Texas Instruments

SLTS059A

(Revised 6/30/2000)

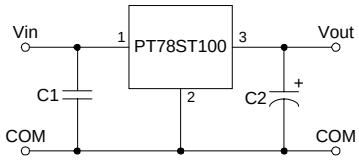
- Very Small Footprint
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Fast Transient Response
- Wide Input Range

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.

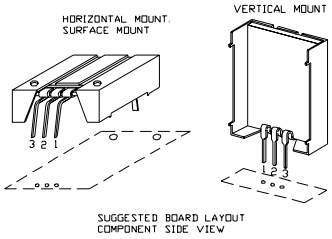
Standard Application



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

33 = 3.3 Volts
36 = 3.6 Volts
05 = 5.0 Volts
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

Package Suffix

V = Vertical Mount
S = Surface Mount
H = Horizontal Mount

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

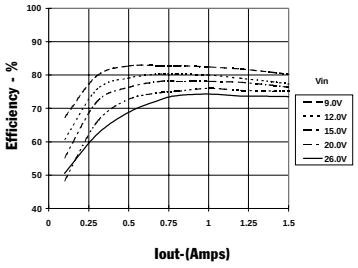
*ISR will operate down to no load with reduced specifications. **See Thermal Derating chart.

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

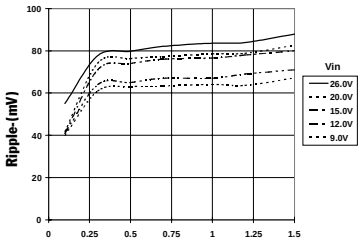
Typical Characteristics

PT78ST133, 3.3 VDC (See Note 1)

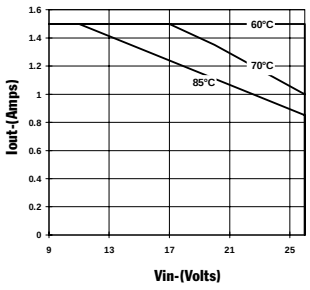
Efficiency vs Output Current



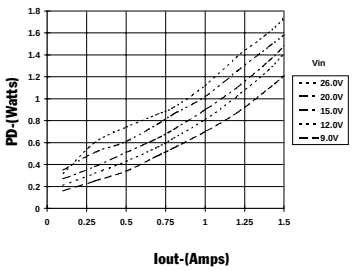
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

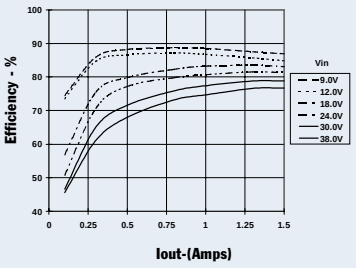


Power Dissipation vs Output Current

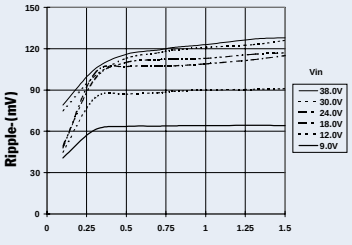


PT78ST105, 5.0 VDC (See Note 1)

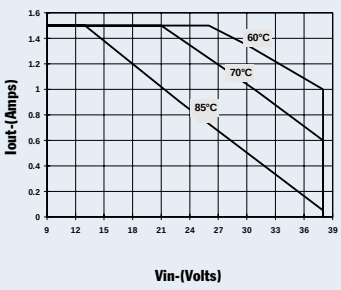
Efficiency vs Output Current



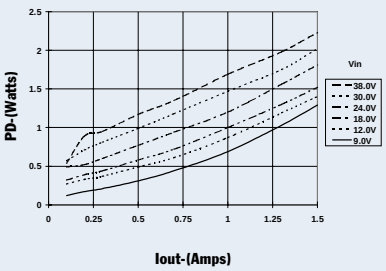
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

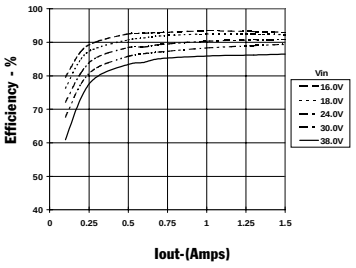


Power Dissipation vs Output Current

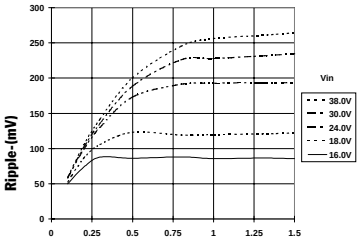


PT78ST112, 12.0 VDC (See Note 1)

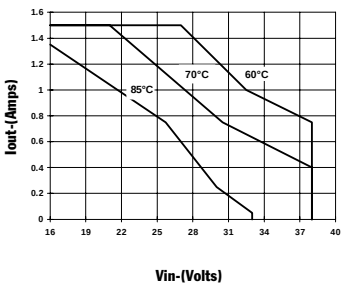
Efficiency vs Output Current



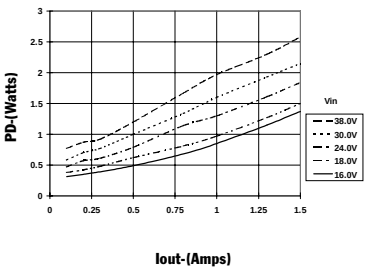
Ripple vs Output Current



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.)*

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 semiconductor 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 semiconductor 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, warranty or endorsement thereof.

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 semiconductor 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 semiconductor 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, warranty or endorsement thereof.