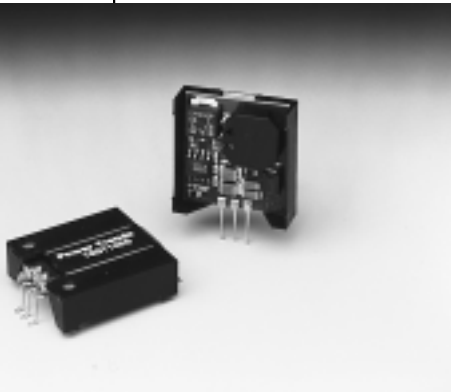


78ST100 Series

1.5 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR

Revised 6/30/98

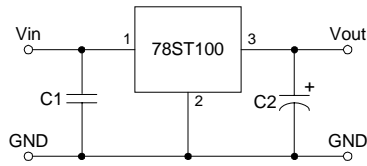


- Very Small Footprint
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Fast Transient Response
- Wide Input Range

The 78ST100 is a series of wide input voltage, 3-terminal Integrated Switching Regulators (ISRs). These ISRs have a maximum output current of 1.5A 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, are very flexible, and may be used in a wide variety of applications.

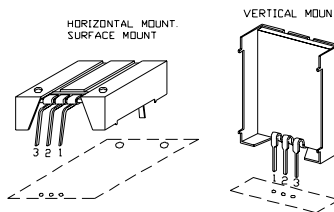
Standard Application



C1 = Optional 1 μ F ceramic
C2 = Required 100 μ F electrolytic

Pin-Out Information

Pin	Function
1	V _{in}
2	GND
3	V _{out}



SUGGESTED BOARD LAYOUT
COMPONENT SIDE VIEW

Pkg Style 500

Ordering Information

78ST1 XX Y C

Output Voltage

- 33 = 3.3 Volts
- 36 = 3.6 Volts
- 05 = 5.0 Volts
- 51 = 5.1 Volts
- 65 = 6.5 Volts
- 07 = 7.0 Volts
- 08 = 8.0 Volts
- 09 = 9.0 Volts
- 12 = 12.0 Volts

Package Suffix

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

Specifications

Characteristics (T _a = 25°C unless noted)	Symbols	Conditions	78ST100 SERIES			Units
			Min	Typ	Max	
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	7 7 14.5	—	26 30 30	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 _{in} = 16V, I _o = 1.5A V _o = 5V V _o = 12V	—	65 90	—	mV _{pp} mV _{pp}
Transient Response (with 100 μ F output cap)	t _{tr}	50% load change V _o over/undershoot	—	100 5	—	μ Sec %V _o
Efficiency	η	V _{in} = 10V, I _o = 1A V _{in} = 10V, I _o = 1A V _{in} = 17V, I _o = 1A V _o = 3.3V V _o = 5V 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.

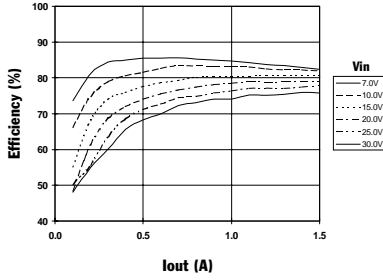
Note: The 78ST100 Series requires a 100 μ F electrolytic or tantalum output capacitor for proper operation in all applications.

78ST100 Series

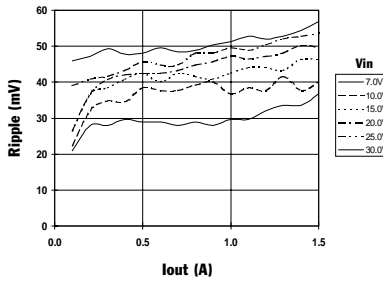
CHARACTERISTIC DATA

78ST133_ 3.3 VDC (See Note 1)

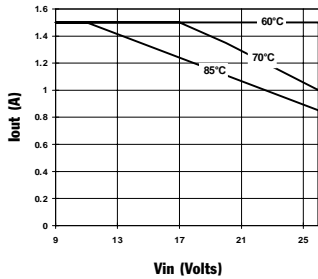
Efficiency vs Output Current



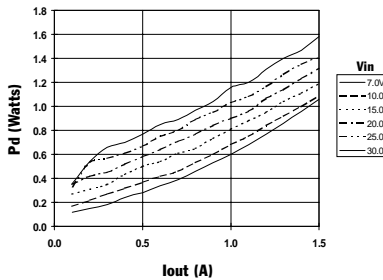
Ripple vs Output Current



Thermal Derating (Ta) (See Note 2)

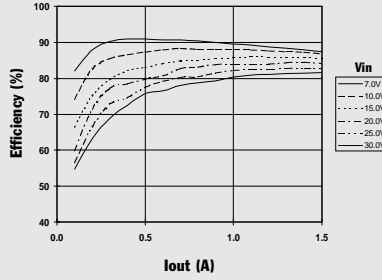


Power Dissipation vs Output Current

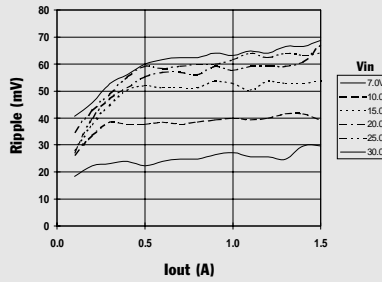


78ST105_ 5.0 VDC (See Note 1)

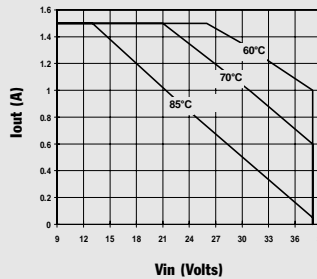
Efficiency vs Output Current



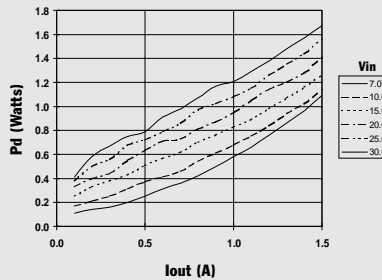
Ripple vs Output Current



Thermal Derating (Ta) (See Note 2)

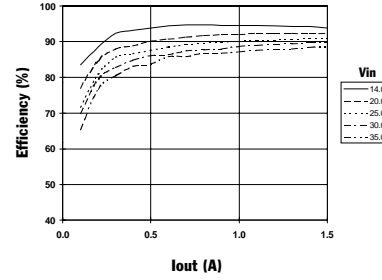


Power Dissipation vs Output Current

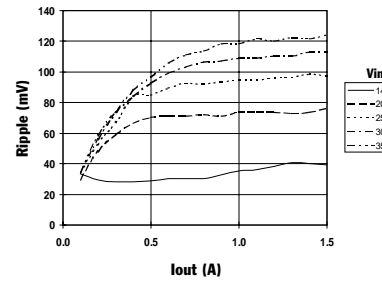


78ST112_ 12.0 VDC (See Note 1)

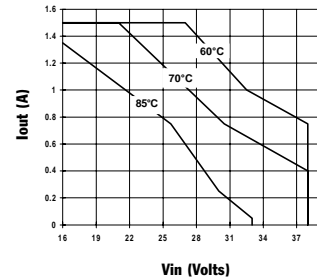
Efficiency vs Output Current



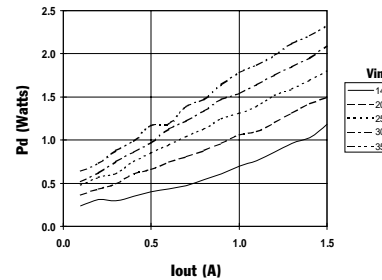
Ripple vs Output Current



Thermal Derating (Ta) (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 acknowledgement, 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.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

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.