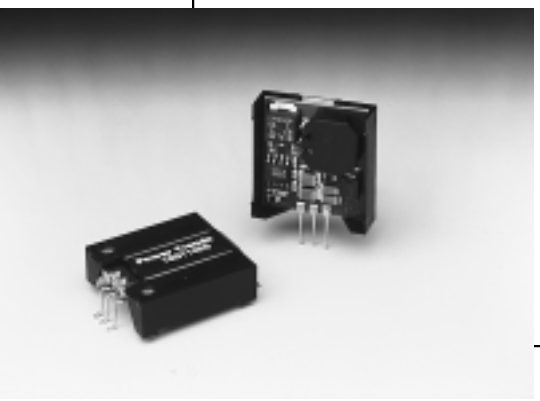
78ST100 Series

1.5 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR

Revised 6/30/98

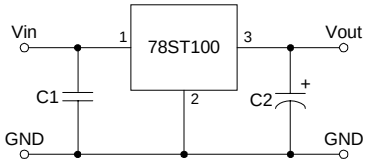


- Very Small Footprint
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Fast Transient Response
- Wide Input Range

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.

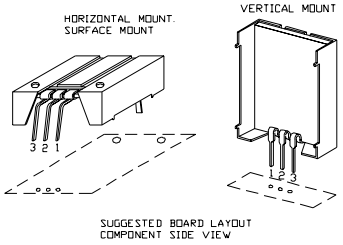
Standard Application



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

Pin-Out Information

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



Pkg Style 500

Ordering Information

78ST1 XX Y C

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	
65 = 6.5 Volts	
07 = 7.0 Volts	
08 = 8.0 Volts	
09 = 9.0 Volts	
12 = 12.0 Volts	

Specifications

Characteristics (T_a = 25°C unless noted)	Symbols	Conditions	78ST100 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	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_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

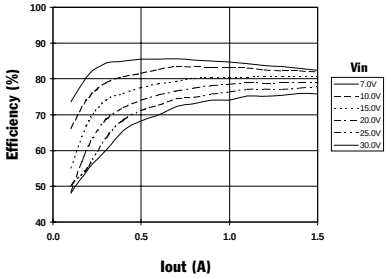
*ISR will operate down to no load with reduced specifications. **See Thermal Derating chart.

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

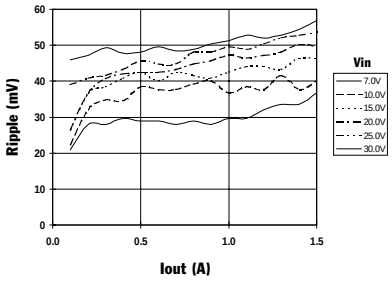
Power Trends, Inc. 27715 Diehl Road, Warrenville, IL 60555 **(800) 531-5782** Fax: (630) 393-6902 **http://www.powertrends.com**

78ST133_ 3.3 VDC (See Note 1)

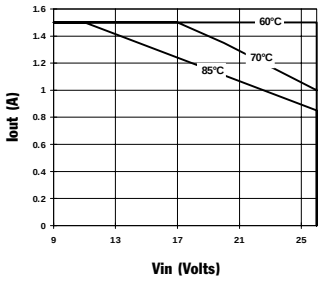
Efficiency vs Output Current



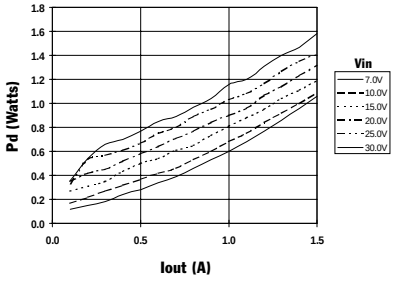
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

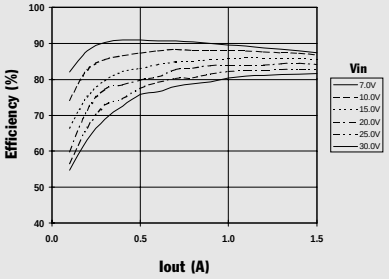


Power Dissipation vs Output Current

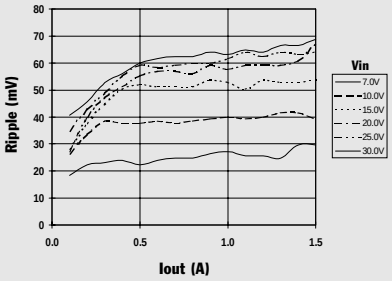


78ST105_ 5.0 VDC (See Note 1)

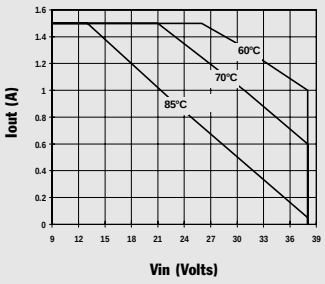
Efficiency vs Output Current



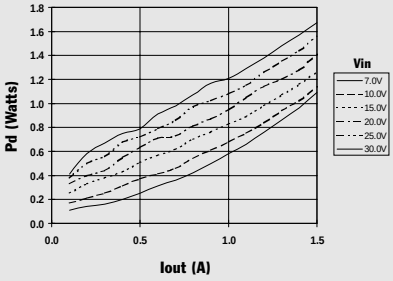
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)

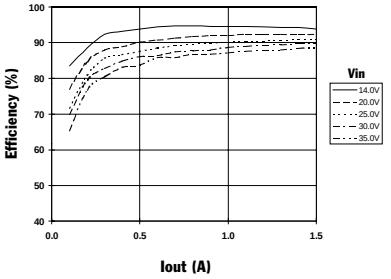


Power Dissipation vs Output Current

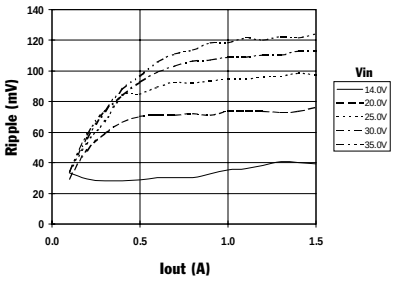


78ST112_ 12.0 VDC (See Note 1)

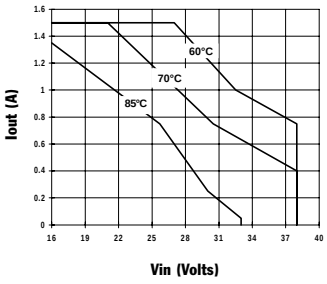
Efficiency vs Output Current



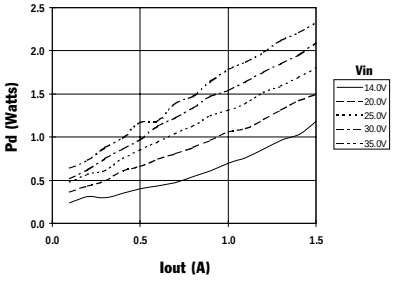
Ripple vs Output Current



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.)*

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
78ST105SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST107HC	OBSOLETE	SIP MODULE	EFA	3		TBD	Call TI	Call TI	-40 to 85		
78ST107SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST107SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST107VC	OBSOLETE	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		
78ST108HC	OBSOLETE	SIP MODULE	EFA	3		TBD	Call TI	Call TI	-40 to 85		
78ST108SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST108SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST108VC	OBSOLETE	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		
78ST109SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST109TC	OBSOLETE	SIP MODULE	EFT	3		TBD	Call TI	Call TI	-40 to 85		
78ST112SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST112TC	OBSOLETE	SIP MODULE	EFT	3		TBD	Call TI	Call TI	-40 to 85		
78ST133SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST136SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST136SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST136VC	OBSOLETE	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		
78ST151HC	OBSOLETE	SIP MODULE	EFA	3		TBD	Call TI	Call TI	-40 to 85		
78ST151SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST151SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST151VC	OBSOLETE	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		
78ST165SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78ST165VC	NRND	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		

(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), Pb-Free (RoHS Exempt), 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.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
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.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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