

# 78SR100 Series

## 1.5 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR

Revised 6/30/98

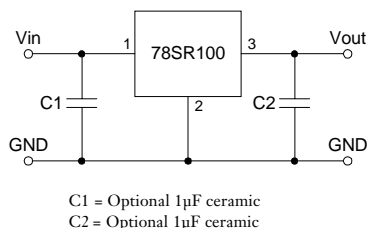


- Very Small Footprint
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short-Circuit Protection
- Over-Temperature Protection
- Wide Input Range

The 78SR100 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.

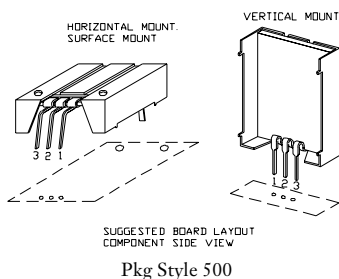
These 78 series regulators have excellent line and load regulation with internal short-circuit and over-temperature protection, are very flexible, and may be used in a wide variety of applications.

### Standard Application



### Pin-Out Information

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



### Ordering Information

78SR1 XX Y C

#### Output Voltage

- 05 = 5.0 Volts
- 53 = 5.25 Volts
- 06 = 6.0 Volts
- 74 = 7.15 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 <sub>a</sub> = 25°C unless noted)	Symbols	Conditions	78SR100 SERIES			
			Min	Typ	Max	Units
Output Current	I <sub>o</sub>	Over V <sub>in</sub> range	0.1*	—	1.5	A
Short Circuit Current	I <sub>sc</sub>	V <sub>in</sub> = V <sub>in min</sub>	—	3.5	—	Apk
Input Voltage Range	V <sub>in</sub>	0.1 ≤ I <sub>o</sub> ≤ 1.5A V <sub>o</sub> = 5V V <sub>o</sub> = 12V	7 14.5	—	30 30	V V
Output Voltage Tolerance	ΔV <sub>o</sub>	Over V <sub>in</sub> range, I <sub>o</sub> = 1.5A T <sub>a</sub> = 0°C to +60°C	—	±1.0	±2.0	%V <sub>o</sub>
Line Regulation	Reg <sub>line</sub>	Over V <sub>in</sub> range	—	±0.2	±0.4	%V <sub>o</sub>
Load Regulation	Reg <sub>load</sub>	0.1 ≤ I <sub>o</sub> ≤ 1.5A	—	±0.1	±0.2	%V <sub>o</sub>
V <sub>o</sub> Ripple/Noise	V <sub>n</sub>	V <sub>in</sub> = 9V, I <sub>o</sub> = 1.5A V <sub>in</sub> = 16V, I <sub>o</sub> = 1.5A V <sub>o</sub> = 5V V <sub>o</sub> = 12V	—	50 80	—	mV <sub>pp</sub> mV <sub>pp</sub>
Transient Response	t <sub>tr</sub>	50% load change V <sub>o</sub> over/undershoot	— —	100 30	— —	µSec %V <sub>o</sub>
Efficiency	η	V <sub>in</sub> = 10V, I <sub>o</sub> = 1A V <sub>in</sub> = 17V, I <sub>o</sub> = 1A V <sub>o</sub> = 5V V <sub>o</sub> = 12V	— —	85 90	— —	% %
Switching Frequency	f <sub>o</sub>	Over V <sub>in</sub> range, I <sub>o</sub> = 1.5A	600	650	700	kHz
Absolute Maximum Operating Temperature Range	T <sub>a</sub>	—	-40	—	+85	°C
Recommended Operating Temperature Range	T <sub>a</sub>	Free Air Convection, (40-60LFM) At V <sub>in</sub> = 24V, I <sub>o</sub> = 1.0A	-40	—	+80**	°C
Thermal Resistance	θ <sub>ja</sub>	Free Air Convection, (40-60LFM)	—	45	—	°C/W
Storage Temperature	T <sub>s</sub>	—	-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.

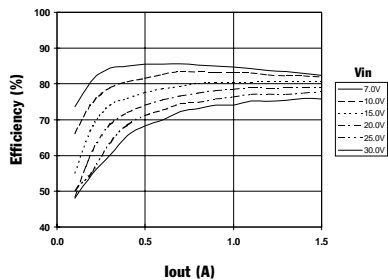
\*\*See Thermal Derating chart.

# 78SR100 Series

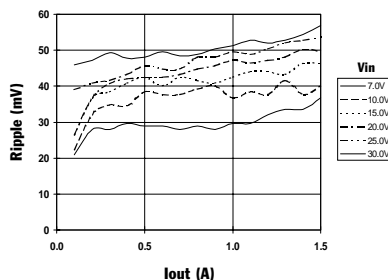
## CHARACTERISTIC DATA

**78SR133\_ 3.3 VDC** (See Note 1)

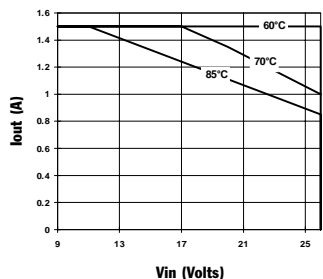
**Efficiency vs Output Current**



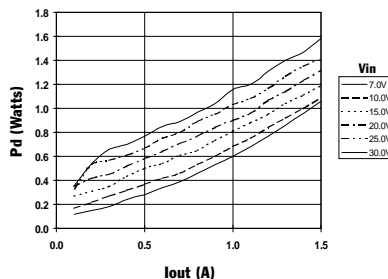
**Ripple vs Output Current**



**Thermal Derating (Ta)** (See Note 2)

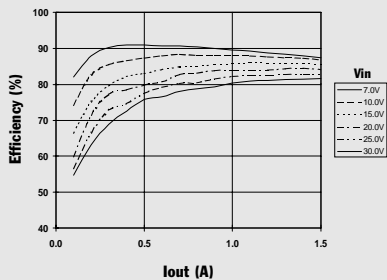


**Power Dissipation vs Output Current**

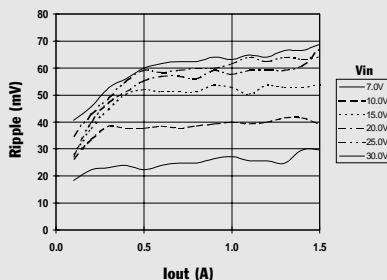


**78SR105\_ 5.0 VDC** (See Note 1)

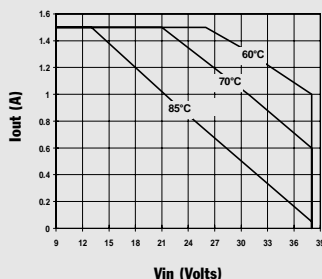
**Efficiency vs Output Current**



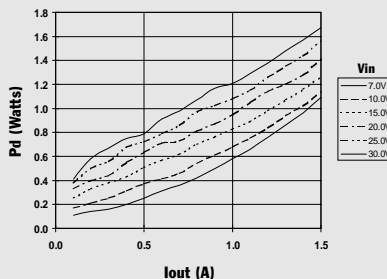
**Ripple vs Output Current**



**Thermal Derating (Ta)** (See Note 2)

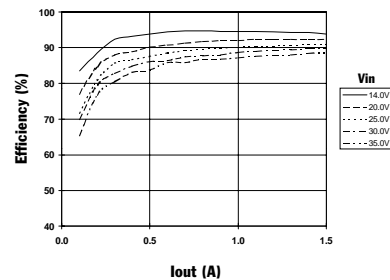


**Power Dissipation vs Output Current**

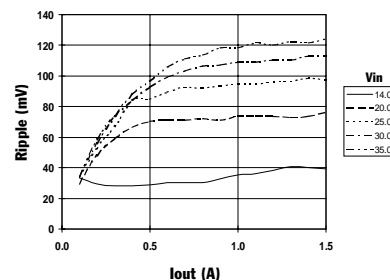


**78SR112\_ 12.0 VDC** (See Note 1)

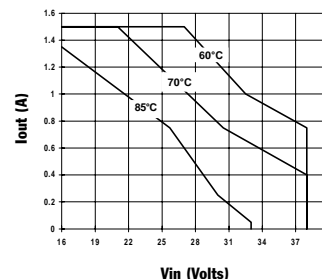
**Efficiency vs Output Current**



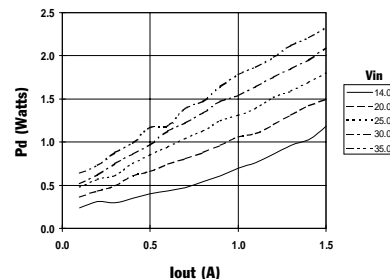
**Ripple vs Output Current**



**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.)

**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
78SR105SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR106SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR108SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR109SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR109SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR110SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR110SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR110VC	OBSOLETE	SIP MODULE	EFD	3		TBD	Call TI	Call TI	-40 to 85		
78SR112SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR114SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR114SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR114WC	OBSOLETE	SIP MODULE	EFW	3		TBD	Call TI	Call TI	-40 to 85		
78SR115SC	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR115SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR153SCT	OBSOLETE	SIP MODULE	EFC	3		TBD	Call TI	Call TI	-40 to 85		
78SR153TC	OBSOLETE	SIP MODULE	EFT	3		TBD	Call TI	Call TI	-40 to 85		
78SR174SCT	OBSOLETE	SIP MODULE	EFC	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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