



General Description

The MIC39100-xxWS-TR family of a linear voltage linear regulators developed utilizing BM unique BiCMOS technology featured low quiescent current (90uA), low dropout voltage, high output voltage accuracy. The space-efficient SOT-223 package is attractive for "Pocket" and "HandHeld" applications.

Output voltages are set at the factory and trimmed to 1.5% accuracy. Voltages from 1.8V to 5.0V are available.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

The MIC39100-xxWS-TR is stable with an output capacitance of 10 μ F or greater.

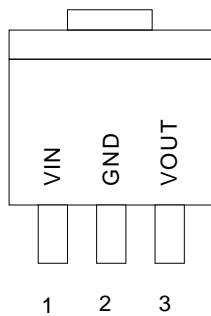
Features

- ◆ Very Low Dropout Voltage , <800mV when 0.8A
- ◆ Low Current Consumption: Typ. 90uA
- ◆ High Accuracy Output Voltage: +/- 1.5%
- ◆ Guaranteed 0.8A (if $V_{IN}-V_{OUT}<1700mV$ in SOT223)
- ◆ Output up to 0.3A if down 12V to +5V in SOT223
- ◆ Compact Package: SOT-223
- ◆ Factory Pre-set Output Voltages
- ◆ Short Circuit Current Fold-Back
- ◆ Low Temperature Coefficient

Applications

- ◆ Battery-powered devices
- ◆ Personal communication devices
- ◆ Home electric/electronic appliances
- ◆ PC peripherals , hard-disk

PIN Configuration



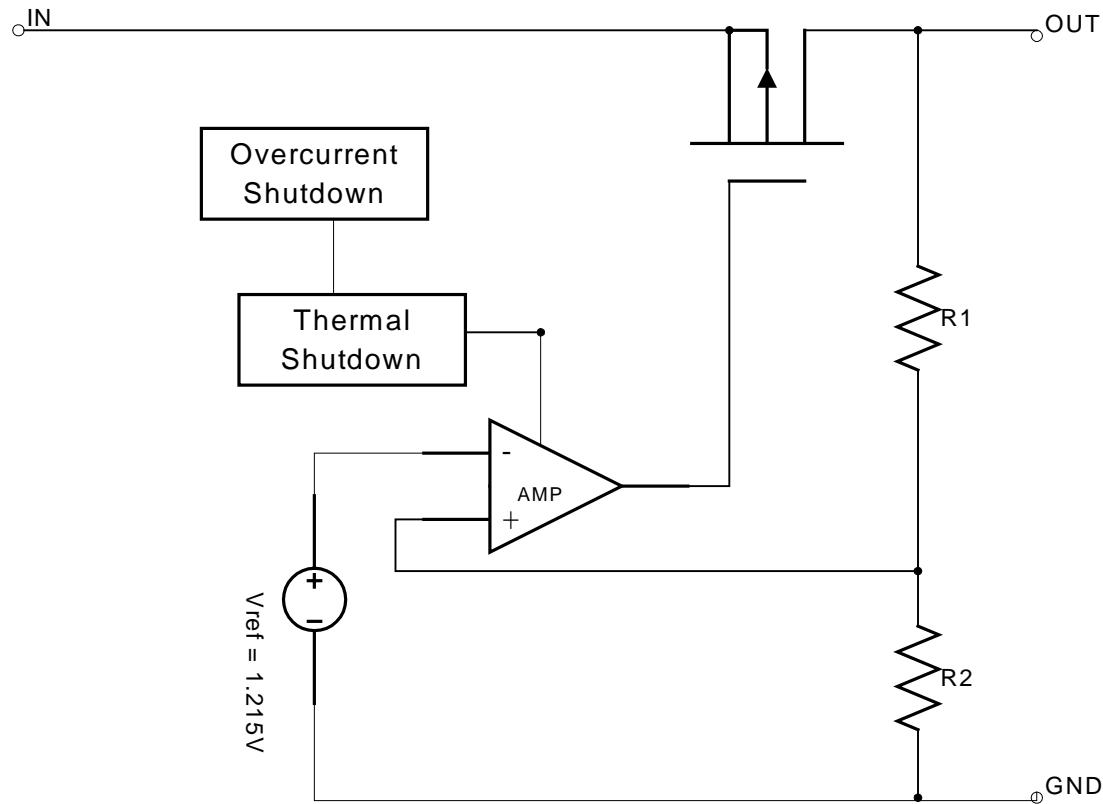
Order Information

Orderable Device	Package	Output Voltage	Packing Option
MIC39100-xxWS-TR	SOT-223	2.5V,2.8V,3.0V,3.3V,5.0V	1000/Reel

Note: xx is 2.5,2.8,3.0,3.3,5.0



Block Diagram



Absolute Maximum Ratings

Description	Symbol	Value Range	Unit
Input Voltage	V _{IN}	+18	V
Output Current	I _{out}	1.2	A
Output Voltage	V _{out}	GND-0.3 to V _{IN} +0.3	V
ESD Classification		B	



Operating Ratings

Description	Symbol	Value Range	Unit
Supply Voltage	V_{IN}	+2 to +16	V
Ambient Temperature Range	T_A	-40 to +85	°C
Junction Temperature Range	T_J	-40 to +125	°C

Thermal Information

Parameter	Maximum	Unit
Thermal Resistance (Θ_{jc})	160	°C/W
Internal Power Dissipation (P_D) ($\Delta T = 100^\circ\text{C}$)	625	mW
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (10 Sec)	300	°C

*With Junction sink capable of twice times of Θ_{jc}

Caution: Stress above the listed absolute rating may cause permanent damage to the device.

Electrical Characteristics

$T_A = +25^\circ\text{C}$; unless otherwise noted

Parameter	Symbol	Test Conditions	MIC39100-xxWS-TR			Unit
			Min.	Typ.	Max.	
Input Voltage	V_{IN}		+2		+18	V
Output Voltage Accuracy	V_{OUT}	$I_O = 1\text{mA}$ to 1.5A	-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	$V_{OUT}=V_{O(NOM)}-4\%$,	$I_{out}=0.8\text{A}$	700		mV
			$I_{out}=600\text{mA}$			
			$I_{out}=100\text{mA}$		200	
Output Current	I_O	$V_{OUT} > 1.5\text{V}$		800		mA
Current Limit	I_{LIM}	$V_{OUT} > 1.5\text{V}$		1200		mA
Short Circuit Current	I_{SC}	$V_{OUT} < 0.4\text{V}$		750	1200	mA
Quiescent Current	I_Q	$I_O = 0\text{mA}$		90		uA
Ground Pin Current	I_{GND}	$I_O = 1\text{mA}$ to 1A		90		uA
Line Regulation	REG_{LINE}	$I_{OUT}=5\text{mA}$	$V_{OUT} \leq 4.0\text{V}$		1.5	%
			$V_{OUT} > 4.0\text{V}$		2	%
Load Regulation	REG_{LOAD}	$I_O = 0 \sim 0.8\text{A}$		0.2	1.5	%
Over Temperature Shutdown	OTS				150	°C
Over Temperature Hysteresis	OTH				30	°C
V_{OUT} Temperature Coefficient	TC				30	ppm/°C
Power Supply Reject	PSRR	$I_O = 100\text{mA}$ $C_O=22\mu\text{F}$ ceramic	$f=1\text{kHz}$		72	dB
			$f=10\text{kHz}$		60	
			$f=100\text{kHz}$		45	
Output Voltage Noise	eN	$f=10\text{Hz}$ to 100kHz $I_O = 10\text{mA}$	$C_O=22\mu\text{F}$		30	μVrms
			$C_O=47\mu\text{F}$		20	

Note 1. $V_{IN(MIN)} = V_{OUT} + V_{DROPOUT}$



Detailed Description

The MIC39100-xxWS-TR family of BiCMOS regulators contain a pass transistor, voltage reference, error amplifier, over-current protection, thermal shutdown, and short circuit protection.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, short output protection, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 1.2A. During thermal shutdown the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The MIC39100-xxWS-TR behaves like a current source when the load reaches 1.2A. However, if the load impedance drops below 0.3Ω, the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75Ω.

External Capacitor

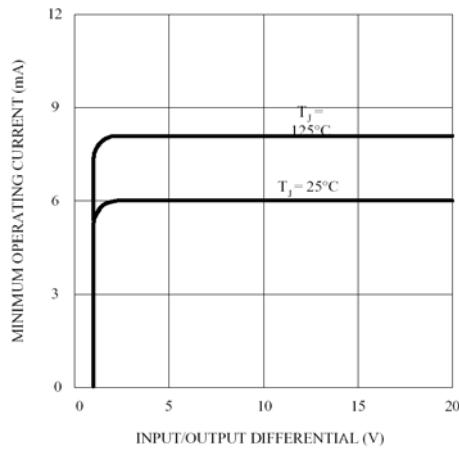
The MIC39100-xxWS-TR is stable with an output capacitor to ground of 22µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1µF ceramic capacitor with a 22µF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize VIN. The input capacitor should be larger than 22µF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A “quiet” ground termination is desirable.

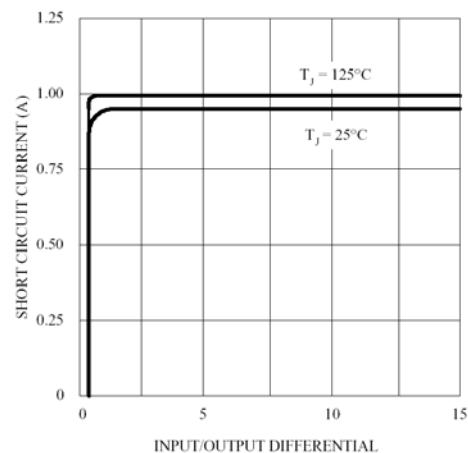


Typical Electrical Characteristics

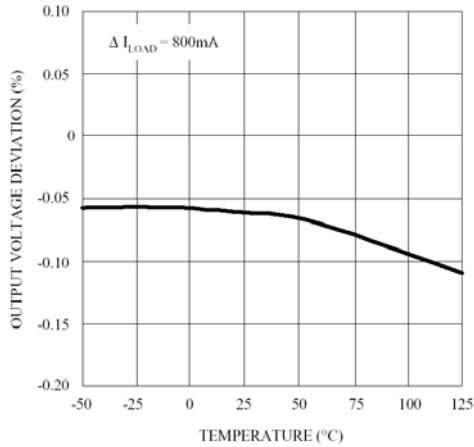
Minimum Operating Current



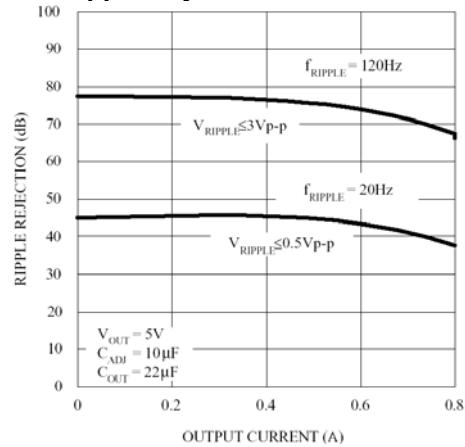
Short-Circuit Current



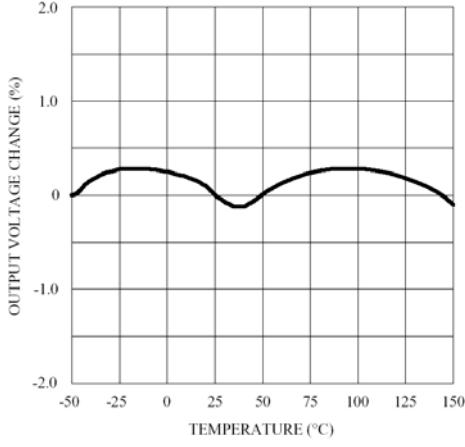
Load Regulation



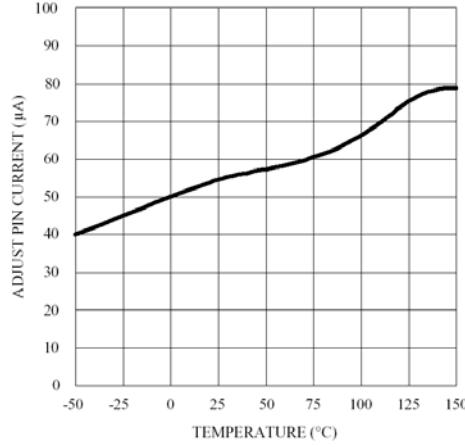
Ripple Rejection vs. Current



Temperature Stability



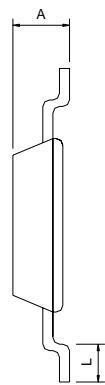
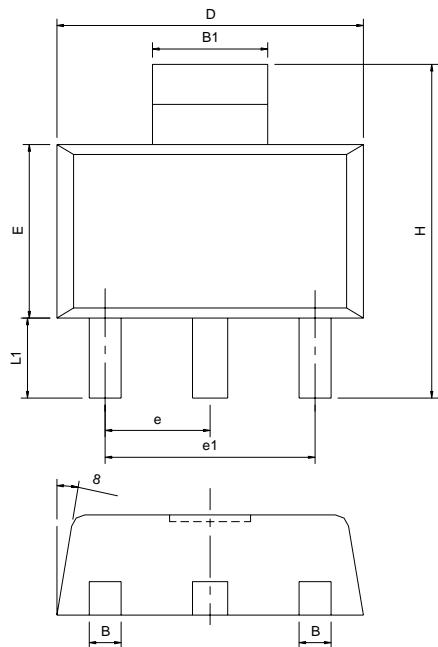
GND Pin Current





Package Dimension

SOT-223 (M223)



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	---	1.60	0.0591	---	0.0709
B	0.60	---	0.838	0.0238	---	0.033
B1	2.895	---	3.15	0.114	---	0.124
D	6.299	---	6.706	0.248	---	0.284
E	3.30	---	3.708	0.1299	---	0.146
e	---	2.3088C	---	---	0.0988C	---
e1	---	4.8088C	---	---	0.1888C	---
H	6.70	---	7.30	0.2638	---	0.2874
L	---	0.91MIN	---	---	0.036MIN	---
L1	---	2.00MAX	---	---	0.079MAX	---
0	---	---	13°	---	---	13°



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