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 outputc apacitance of 10 µF orgreater.

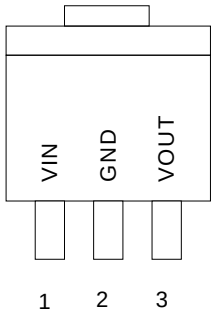
Features

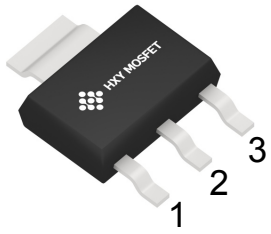
- Very Low Dropout Voltage , <800mV when 0.8A
- Low Current Consumption: Typ. 90uA
- High Accuracy Output Voltage: +/- 1.5%
- Guaranteed 0.8A (if Vin-Vout<1700mV in SOT223)
- Output up to 0.3A if down 12V to +5V in SOT223
- Compact Package: SOT-223
- Factory Pre-set Output Voltages
- Short Circuit Current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

Applications

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

PIN Configuration



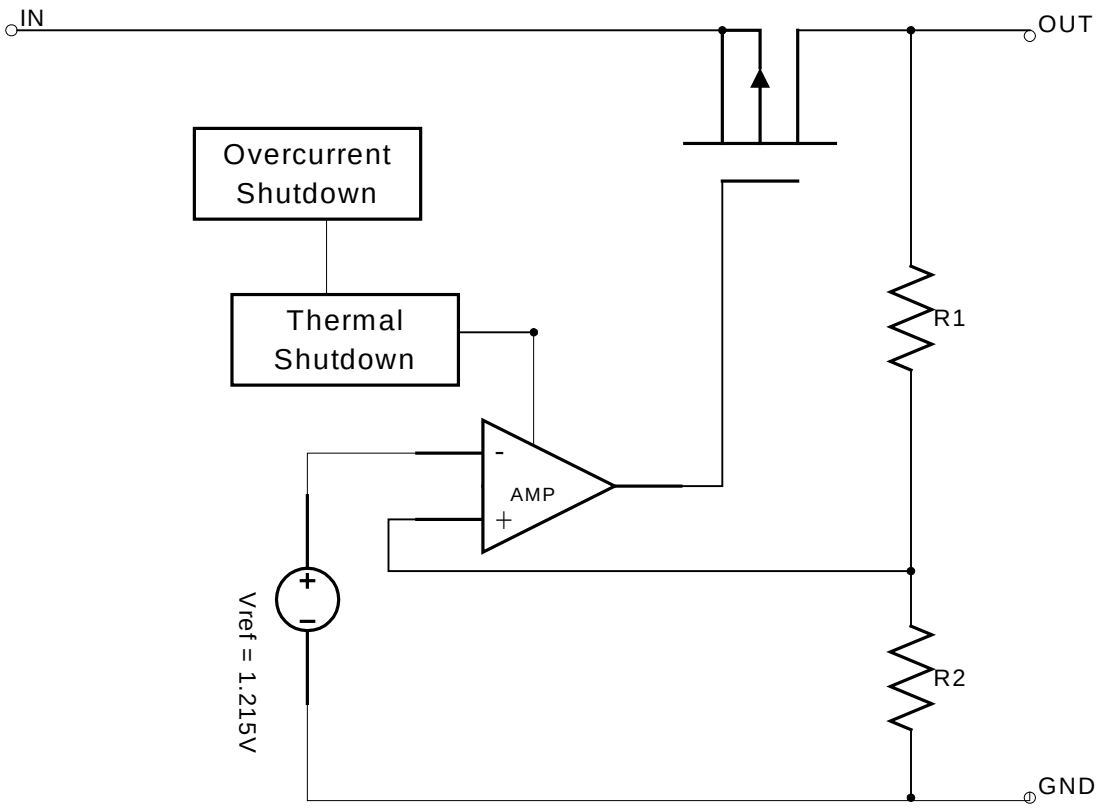


Order Information

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

Bkock Diagram



Absolute Maximum Ratings

Description	Symbol	Value Range	Unit
Input Voltage	V_{IN}	+18	V
Output Current	Iout	1.2	A
Output Voltage	Vout	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	℃
Junction Temperature Range	T_J	-40 to +125	℃

Thermal Information

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

*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℃; unless otherwise noted

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

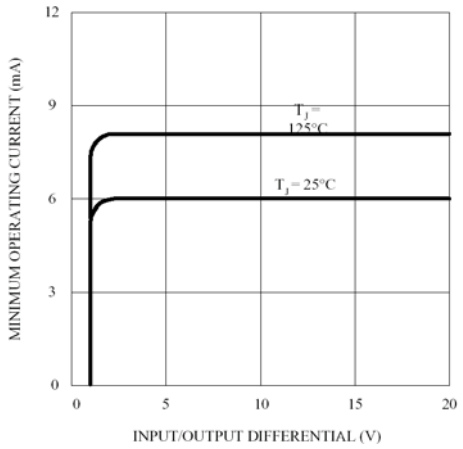
External Capacitor

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.

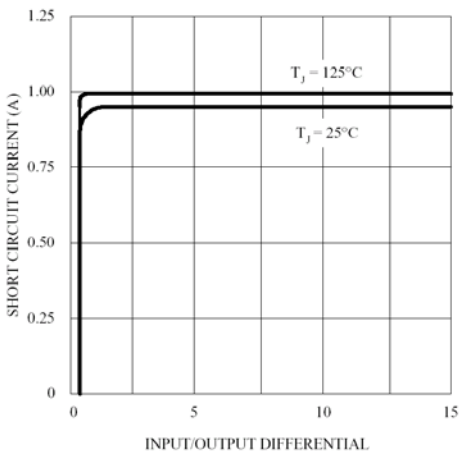
A second capacitor is recommended between the input and ground to stabilize VIN. The input capacitor should be larger than 22µF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A “quiet” ground termination is desirable.

Typical Electrical Characteristics

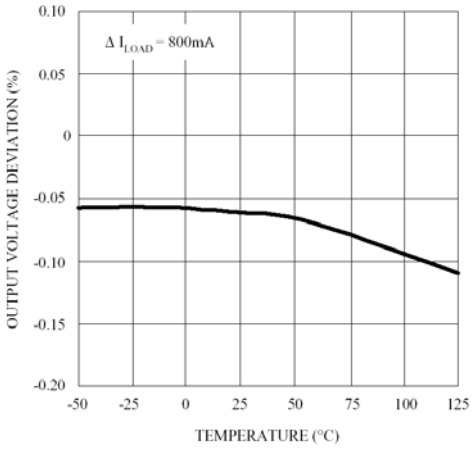
Minimum Operating Current



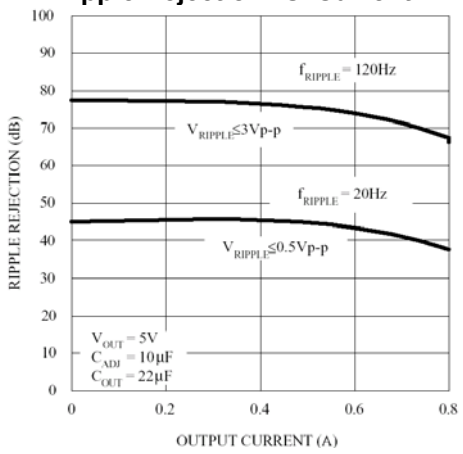
Short-Circuit Current



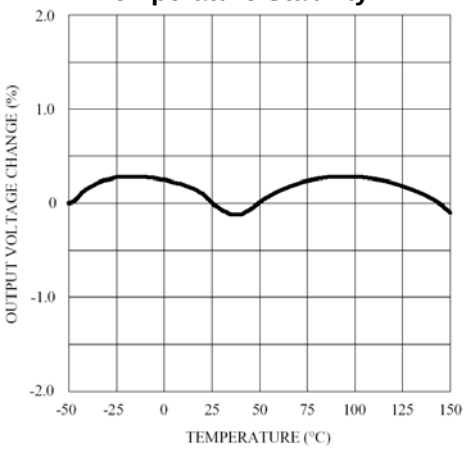
Load Regulation



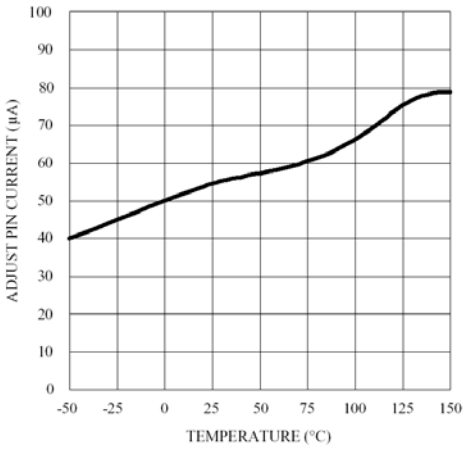
Ripple Rejection vs. Current



Temperature Stability

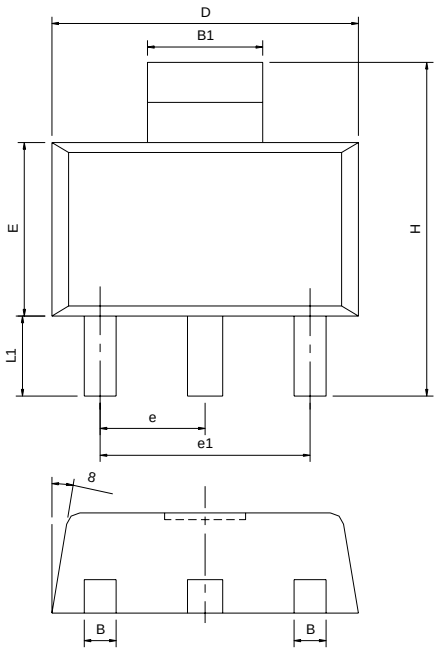


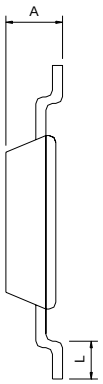
GND Pin Current



Package Dimension

SOT-223 (M223)





SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	---	1.80	0.0591	---	0.0709
B	0.60	---	0.838	0.0236	---	0.033
B1	2.895	---	3.15	0.114	---	0.124
D	6.299	---	6.706	0.248	---	0.264
E	3.30	---	3.708	0.1299	---	0.146
e	---	2.30BSC	---	---	0.090SC	---
e1	---	4.60BSC	---	---	0.181BSC	---
H	6.70	---	7.30	0.2638	---	0.2874
L	---	0.91MIN	---	---	0.036MIN	---
L1	---	2.00MAX	---	---	0.0787MAX	---
θ	---	---	13°	---	---	13°

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