

General Description

The MB1117 is a low dropout three-terminal regulator with a dropout of 1.2V at 1A output current.

The MB1117 has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within $\pm 1\%$. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature

The MB1117 is available in 1.8V, 2.5V and 3.3V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set the output voltage with two external resistors.

The MB1117 is available in the industry-standard SOT-223 and SOT-89 power package.

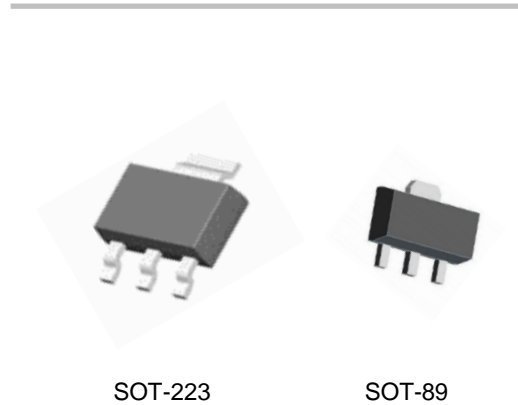


Figure 1: Package Type of MB1117

Features

- Low Dropout Voltage: 1.2V at 1A Output Current
- Output Noise from 10Hz to 10KHz: 0.003%
- PSRR at $I_{OUT}=300mA$ and $f=120Hz$: 70dB
- Output Voltage Accuracy: $\pm 1\%$
- On-chip Thermal Shutdown
- Maximum Quiescent Current: $I_{QMAX}=6mA$
- Operation Junction Temperature: -20 to $85^{\circ}C$

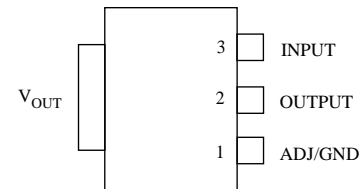


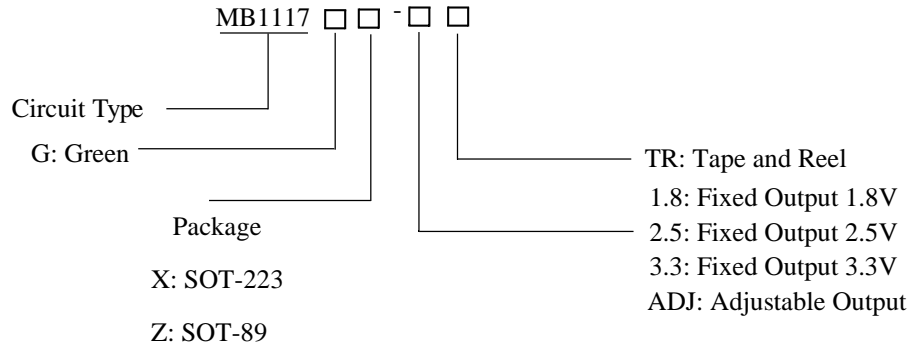
Figure 2: Pin Configuration of MB1117

Applications

- USB Device
- Add-on Card
- DVD Player
- PC Motherboard



Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-223	-20 to 85°C	MB1117GX-1.8TR	1718	Tape & Reel
		MB1117GX-2.5TR	1725	Tape & Reel
		MB1117GX-3.3TR	1733	Tape & Reel
		MB1117GX-ADJTR	17AD	Tape & Reel
SOT-89	-20 to 85°C	MB1117GZ-3.3TR	1733	Tape & Reel

Pin Description

Pin No.	SOT-223 / SOT-89	
	Name	Function
1	ADJ/GND	Adjustable / Ground
2	V _{OUT}	Output Voltage
3	V _{IN}	Input Voltage

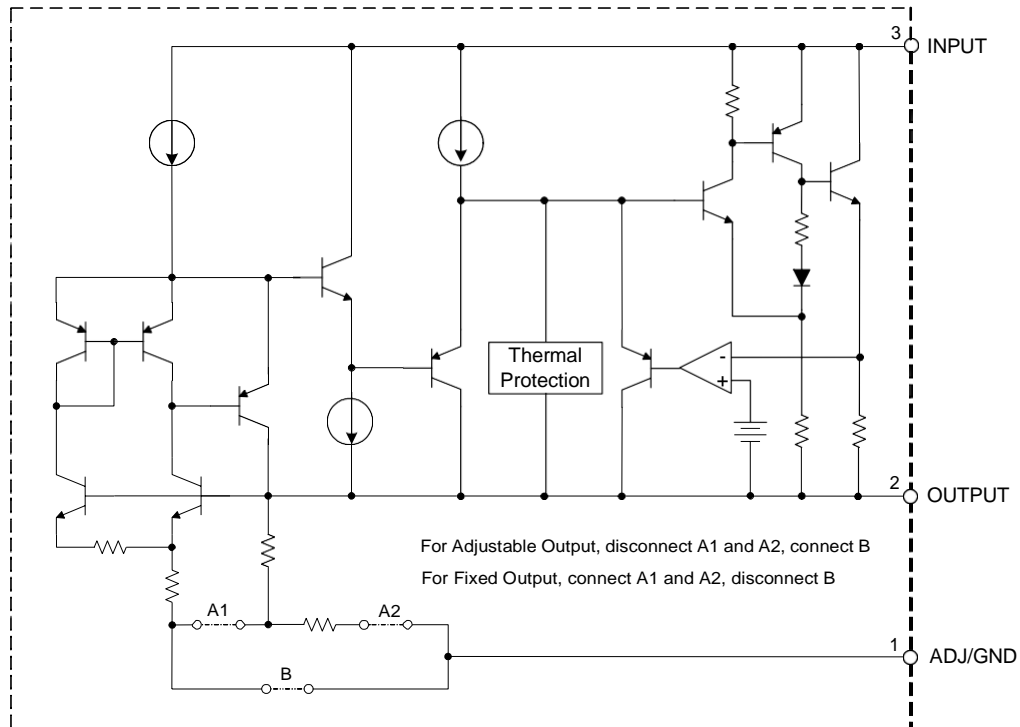
Functional Block Diagram


Figure 3. Functional Block Diagram of MB1117

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	18	V
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260	°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.



Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}		12	V
Operating Junction Temperature Range	T_J	-20	85	°C

Electrical Characteristics

MB1117-1.8V Electrical Characteristics

Operating Conditions: $V_{IN}=3.8V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		1.782	1.8	1.818	V
		$10mA \leq I_{OUT} \leq 1A$, $3.8V \leq V_{IN} \leq 10V$	1.764	1.8	1.836	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		°C
Thermal Shutdown Hysteresis				16		°C

**Electrical Characteristics (Continued)****MB1117-2.5V Electrical Characteristics**

Operating Conditions: $V_{IN}=4.5V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		2.475	2.5	2.525	V
		$10mA \leq I_{OUT} \leq 1A$, $4.5V \leq V_{IN} \leq 10V$	2.455	2.5	2.545	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}C$
Thermal Shutdown Hysteresis				16		$^{\circ}C$

**Electrical Characteristics (Continued)****MB1117-3.3V Electrical Characteristics**

Operating Conditions: $V_{IN}=5.3V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		3.267	3.3	3.333	V
		$10mA \leq I_{OUT} \leq 1A$, $5.3V \leq V_{IN} \leq 10V$	3.235	3.3	3.365	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}C$
Thermal Shutdown Hysteresis				16		$^{\circ}C$

**Electrical Characteristics (Continued)****MB1117-ADJ Electrical Characteristics**

Operating Conditions: $V_{IN}=V_{OUT}+2V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}		1.238	1.250	1.262	V
		$10mA \leq I_{OUT} \leq 1A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$	1.225	1.250	1.270	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.001	0.1	%
					0.2	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		0.1	0.4	%
					0.5	
Dropout Voltage	V_{DROP}	$\Delta V_{REF}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Adjust Pin Current				60	120	μA
Adjust Pin Current Change		$1.5V \leq (V_{IN} - V_{OUT}) \leq 10V$, $10mA \leq I_{OUT} \leq 1A$		0.2	5	μA
Minimum Load Current		$1.5V \leq (V_{IN} - V_{OUT}) \leq 10V$		1.7	5	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN} - V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}C$
Thermal Shutdown Hysteresis				16		$^{\circ}C$



Typical Performance Characteristics

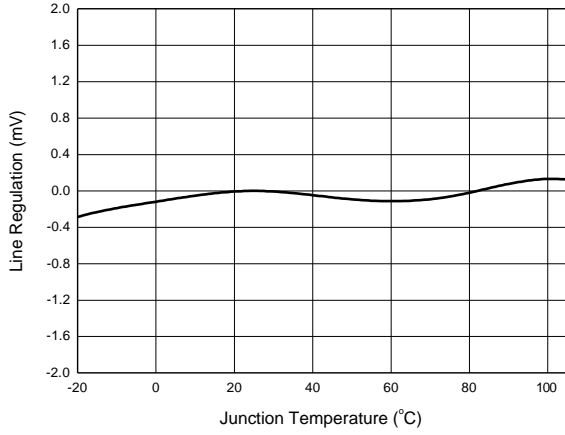


Figure 4. Line Regulation vs. Junction Temperature

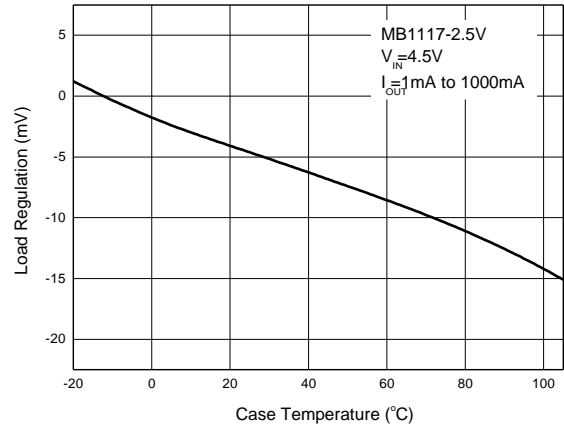


Figure 5. Load Regulation vs. Case Temperature

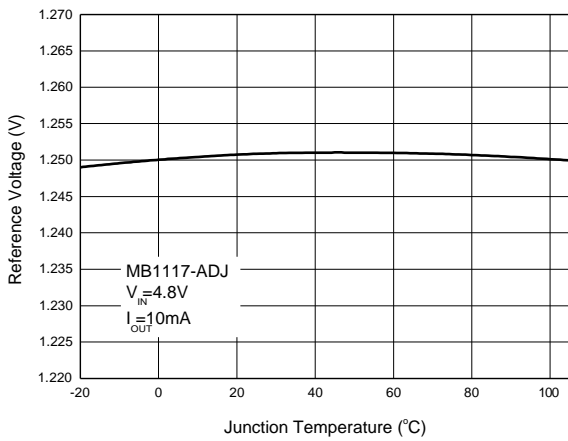


Figure 6. Reference Voltage vs. Junction Temperature

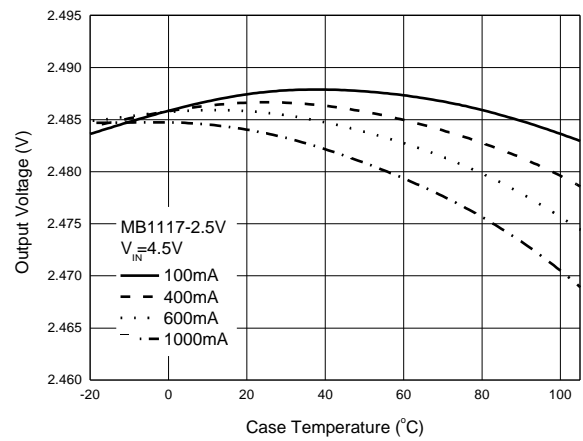


Figure 7. Output Voltage vs. Case Temperature



Typical Performance Characteristics (Continued)

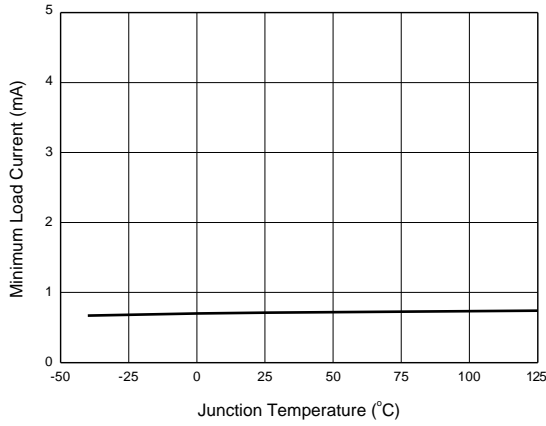


Figure 8. Minimum Load Current vs. Junction Temperature

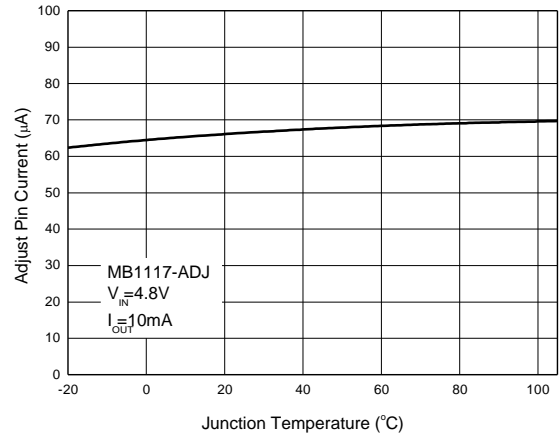


Figure 9. Adjust Pin Current vs. Junction Temperature

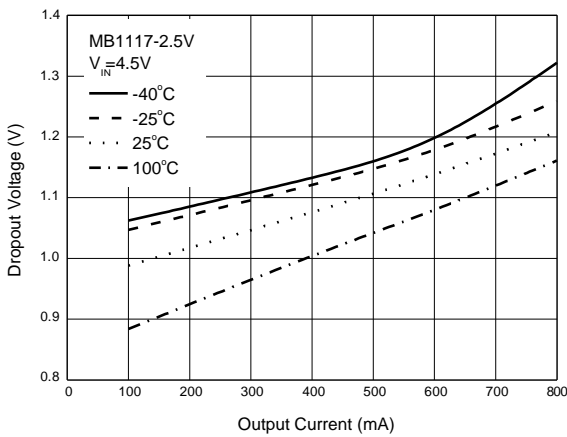


Figure 10. Dropout Voltage vs. Output Current

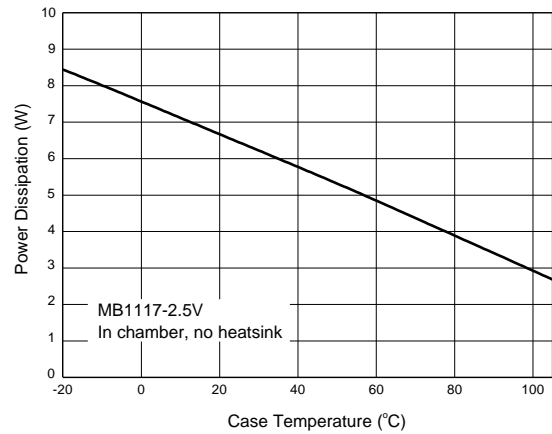


Figure 11. Power Dissipation vs. Case Temperature



Typical Performance Characteristics (Continued)

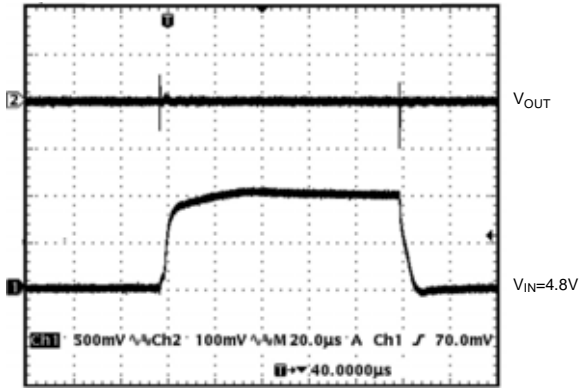


Figure 12. Line Transient Response

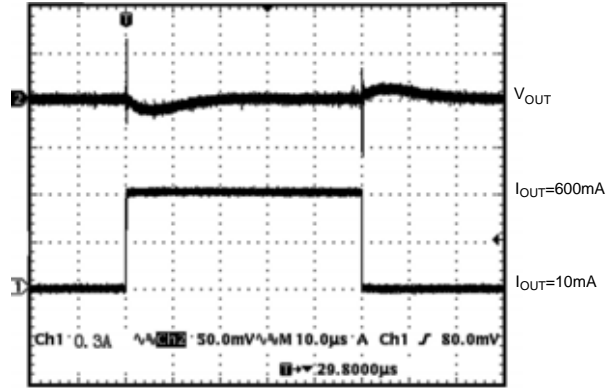


Figure 13. Load Transient Response

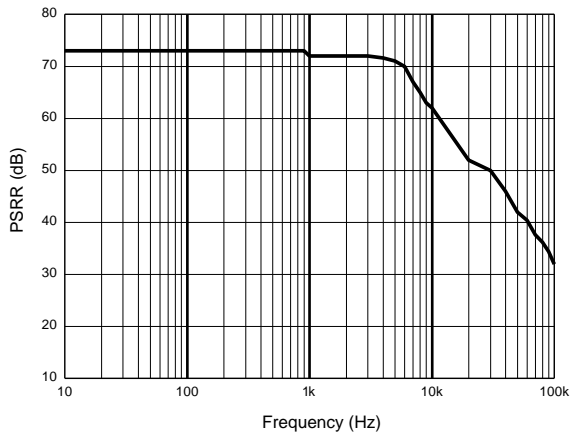


Figure 14. PSRR vs. Frequency

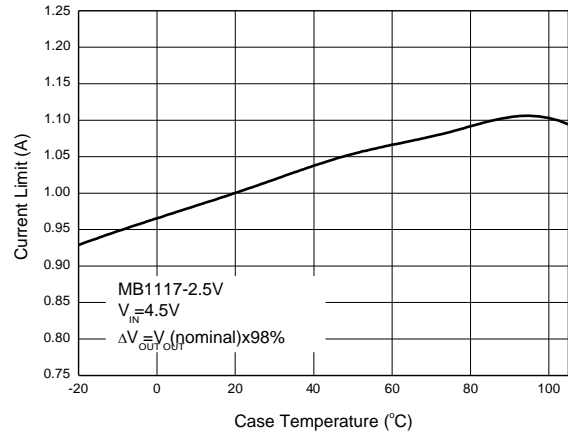


Figure 15. Current Limit vs. Case Temperature



Typical Performance Characteristics (Continued)

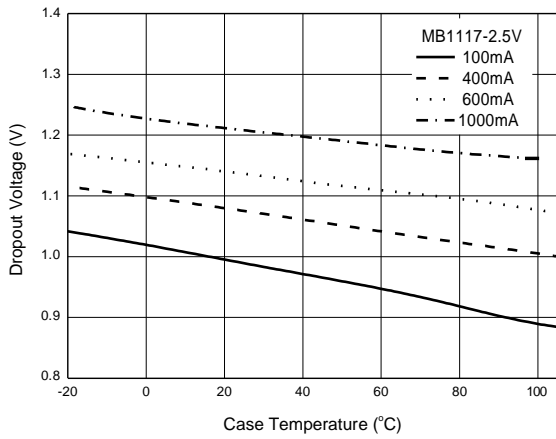


Figure 16. Dropout Voltage vs. Case Temperature

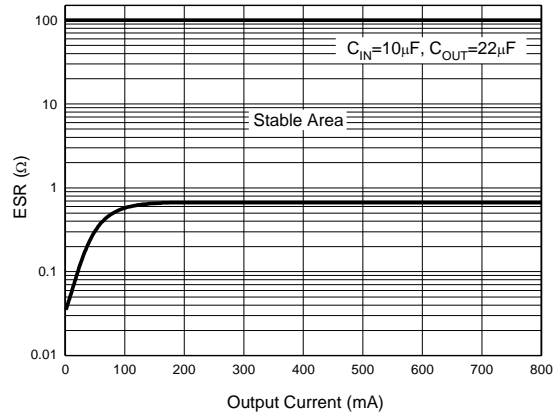


Figure 17. ESR vs. Output Current

Typical Application

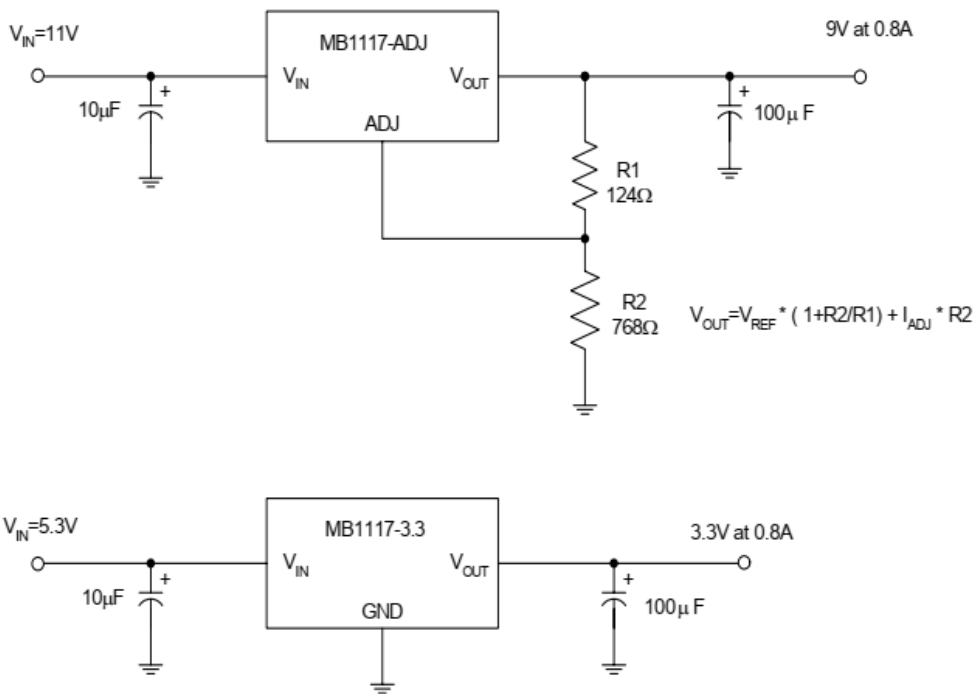


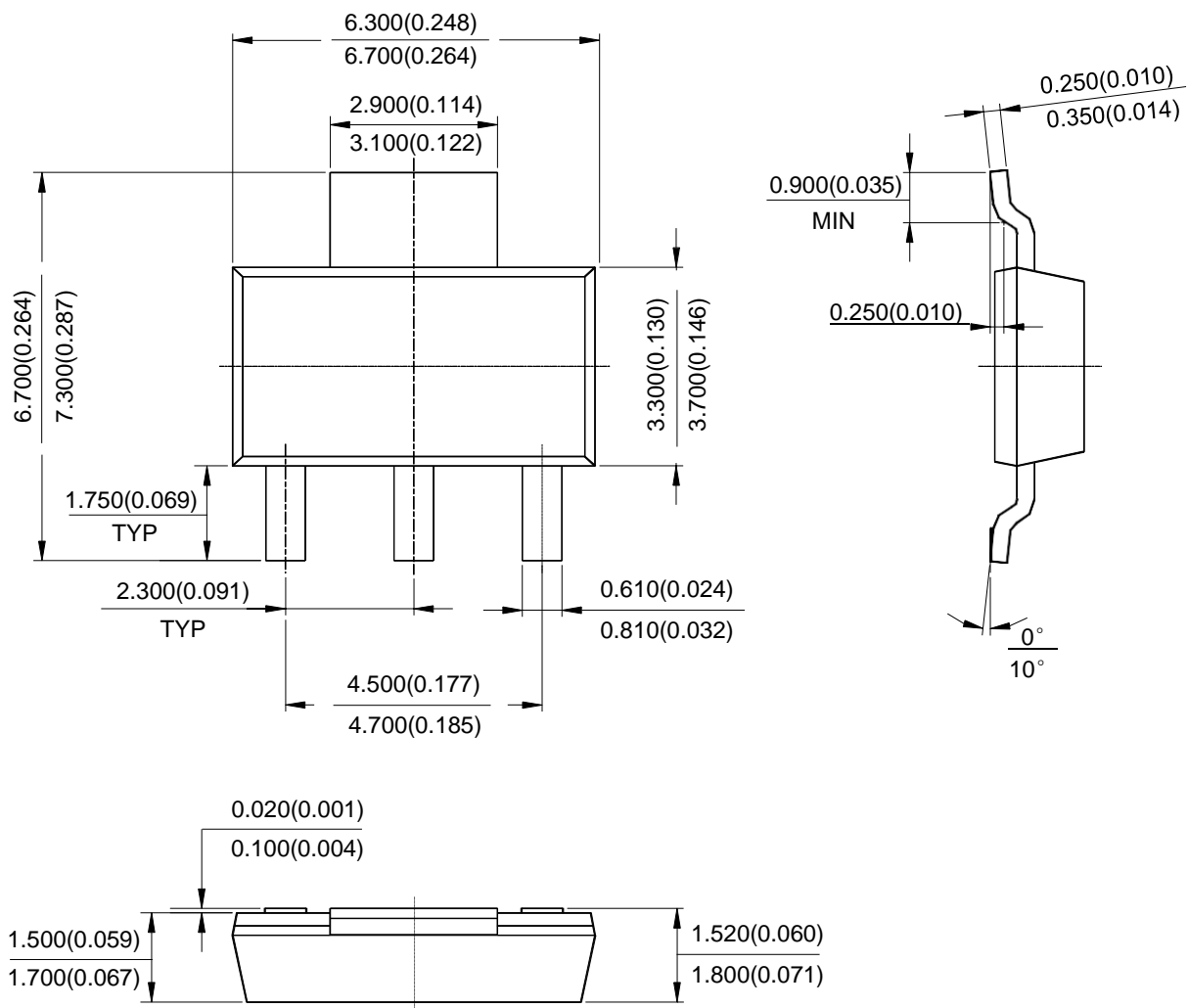
Figure 18. Typical Applications of MB1117



Mechanical Dimensions

SOT-223

Unit: mm(inch)

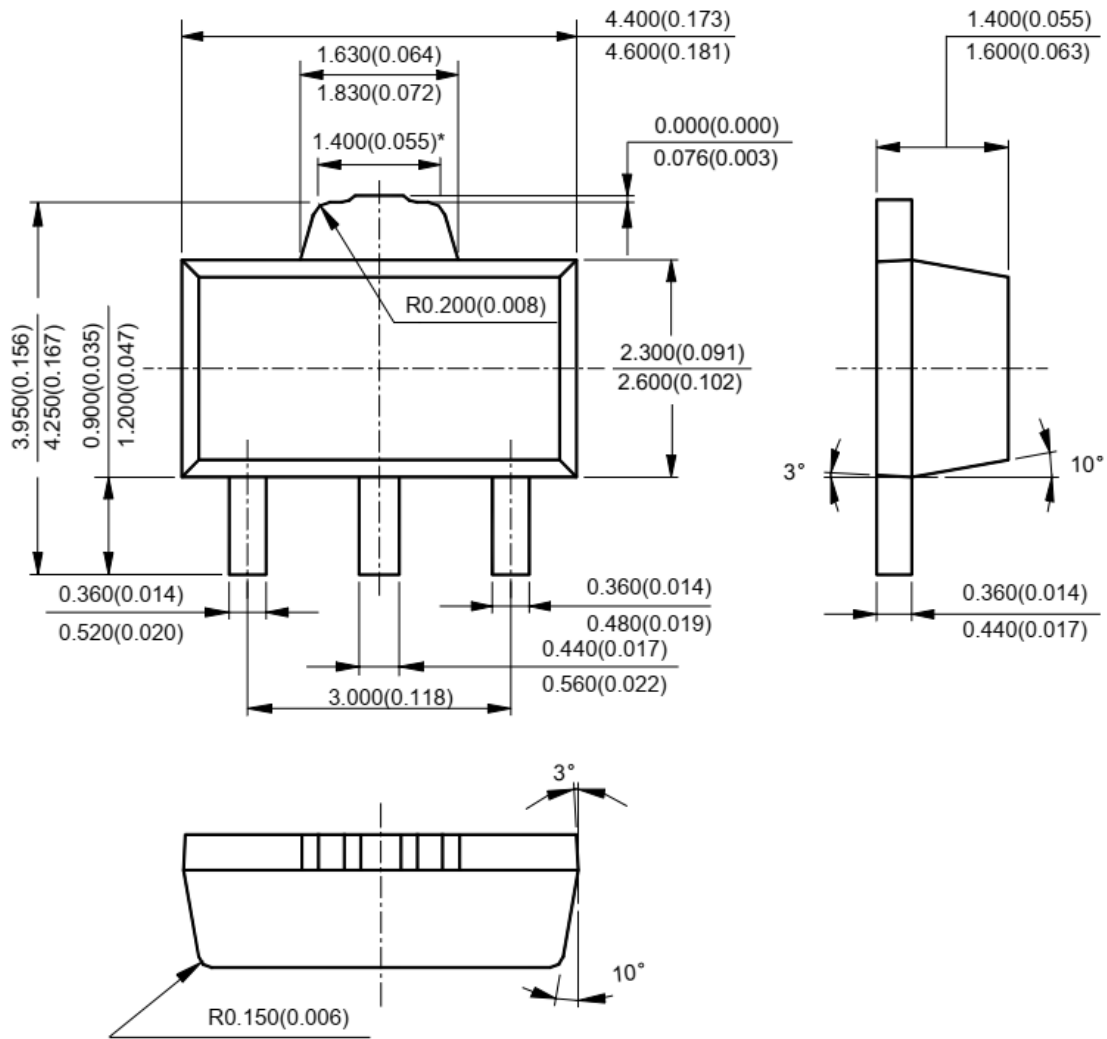




Mechanical Dimensions (Continued)

SOT-89

Unit: mm(inch)



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