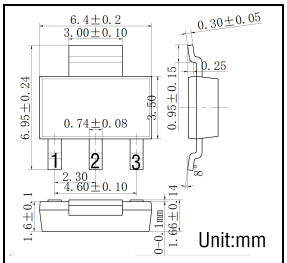
SOT-223 LOW DROPOUT LINEAR REGULATOR

AMS1117-3.3



1. ADJ/GND
2. OUTPUT
3. INPUT

Features

- Low Dropout Voltage: 1.15V at 1A Output Current
- Trimmed Current Limit
- On-chip Thermal Shutdown
- Three-terminal Adjustable or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V
- Operation Junction Temperature: -40 to 125°C

Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video Player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage		20	V
T_J	Maximum Junction Temperature		150	°C
T_S	Storage Temperature	-65	150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)		300	°C
ESD	ESD (Machine Model)		600	V

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

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage		15	V
T_J	Operating Junction Temperature Range	-40	125	°C

Functional Block Diagram

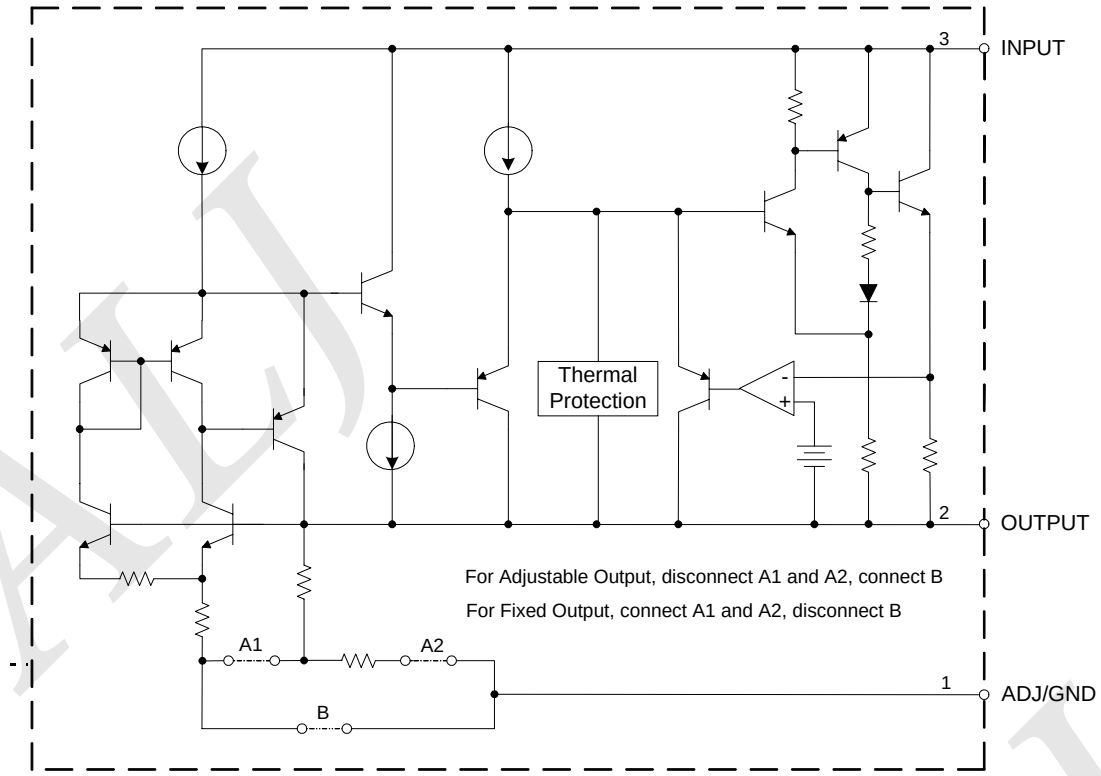


Figure 1. Functional Block Diagram of LJ1117

LJ1117-ADJ Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	I_{OUT} = 10mA, V_{IN}-V_{OUT} = 2V 10mA≤ I_{OUT} ≤ 1A, 1.4V≤ V_{IN}-V_{OUT} ≤ 8V, P≤ Maximum Power Dissipation	1.238 1.225	1.250 1.250	1.262 1.270	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		0.035	0.2	%
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤ 1A		0.2	0.4	%
	Dropout Voltage	ΔV_{REF} = 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{REF} = 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{REF} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Adjust Pin Current			60	120	μA
	Adjust Pin Current Change	1.4V≤ V_{IN}-V_{OUT} ≤ 10V, 10mA ≤ I_{OUT} ≤ 1A		0.2	5	μA
	Minimum Load Current (ADJ)	1.5V≤ V_{IN}-V_{OUT} ≤ 10V (ADJ only)		1.7	5	mA
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-1.2V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.2V 10mA ≤ I_{OUT} ≤ 1A, 3.0V≤ V_{IN}≤ 10V	1.176 1.152	1.2 1.2	1.224 1.248	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-1.5V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.5V 10mA ≤ I_{OUT} ≤ 1A, 3.0V≤ V_{IN}≤ 10V	1.485 1.470	1.5 1.5	1.515 1.530	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-1.8V Electrical Characteristics

Operating Conditions: V_{IN}≤10V, T_J =25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.8V 10mA ≤ I_{OUT}≤ 1A, 3.2V≤ V_{IN} ≤ 10V	1.782 1.746	1.8 1.8	1.818 1.854	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-2.85V Electrical Characteristics

Operating Conditions: V_{IN}≤10V, T_J =25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 4.85V 10mA ≤ I_{OUT} ≤ 1A, 4.25V≤ V_{IN}≤ 10V	2.822 2.793	2.85 2.85	2.878 2.907	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤1A		1	10	mV
	Dropout Voltage	ΔV_{REF} = 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{REF} = 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{REF} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-2.5V Electrical Characteristics

Operating Conditions: V_{IN}≤10V, T_J =25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 4.5V 10mA ≤ I_{OUT}≤ 1A, 3.9V≤ V_{IN} ≤ 10V	2.475 2.450	2.5 2.5	2.525 2.550	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-3.3V Electrical Characteristics

Operating Conditions: V_{IN}≤10V, T_J =25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 5.0V 10mA ≤ I_{OUT}≤ 1A, 4.75V≤ V_{IN} ≤ 10V	3.267 3.235	3.3 3.3	3.333 3.365	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

LJ1117-5.0V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 7.0V 10mA ≤ I_{OUT} ≤ 1A, 6.5V ≤ V_{IN} ≤ 12V	4.950 4.900	5.0 5.0	5.050 5.100	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V ≤ V_{IN}-V_{OUT} ≤ 10V		1	10	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA ≤ I_{OUT} ≤ 1A		1	15	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	50			dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
θ_{JC}	Thermal Resistance, Junction to Case			15		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

Typical Performance Characteristics

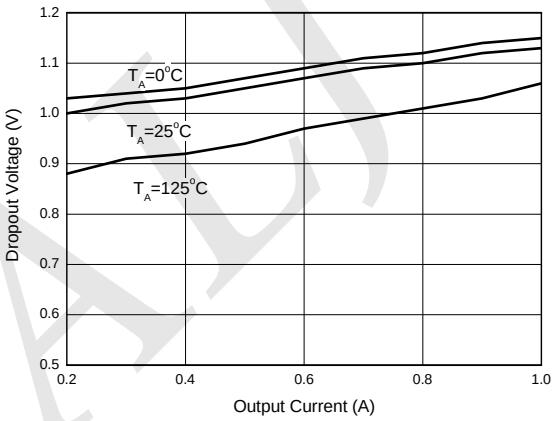


Figure 2` Dropout Voltage vs. Output Current

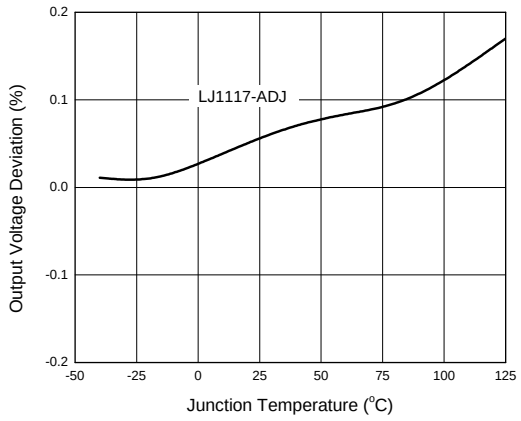


Figure 3. Load Regulation vs. Junction Temperature

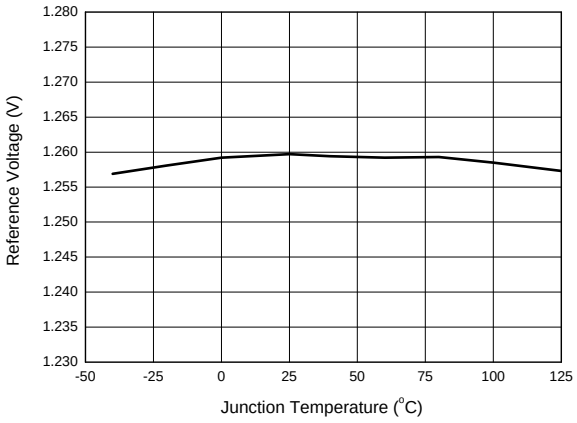


Figure 4. Reference Voltage vs. Junction Temperature

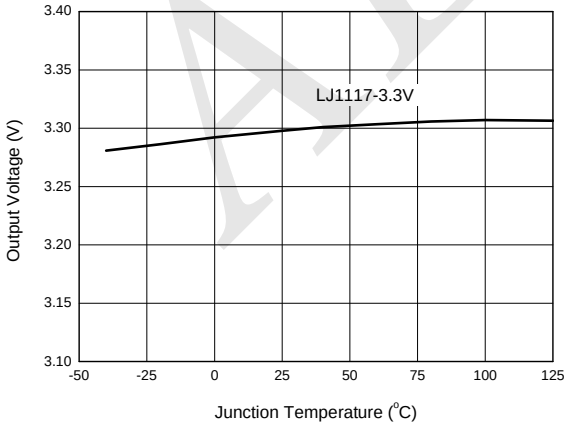


Figure 5. Output Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

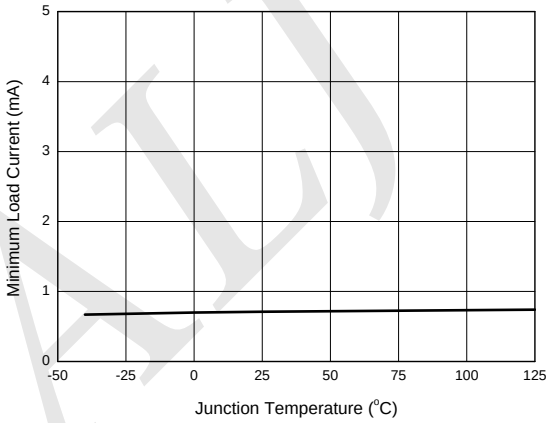


Figure 6. Minimum Load Current vs. Junction Temperature

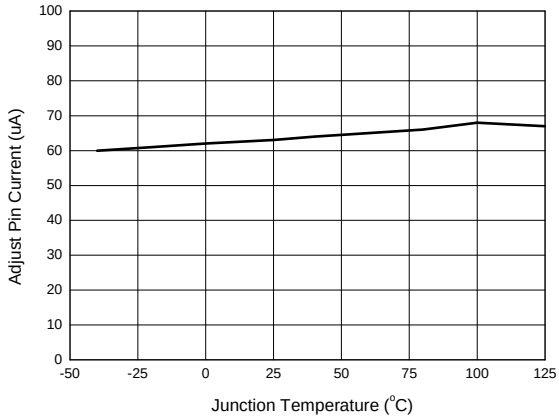


Figure 7. Adjust Pin Current vs. Temperature

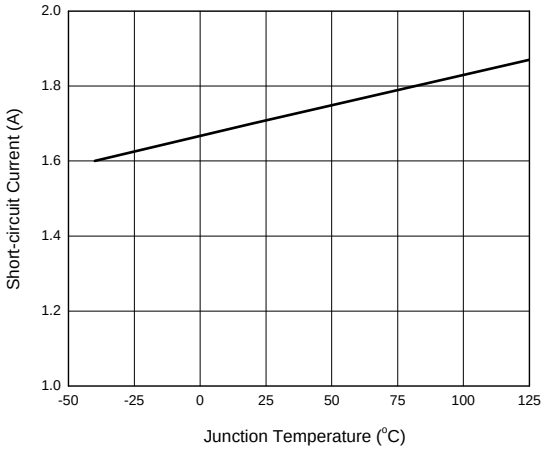


Figure 8. Short-Circuit Curr ent vs. Junction Temperature

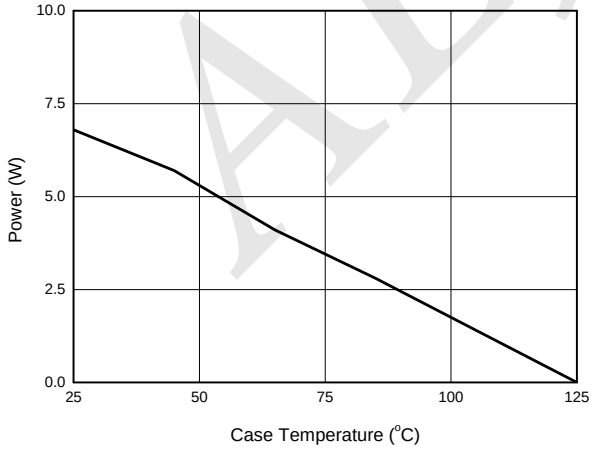


Figure 9. Maximum Power Dissipation

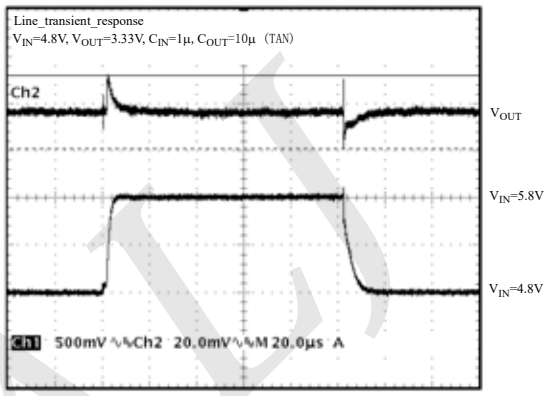


Figure 10. Line Transient Response

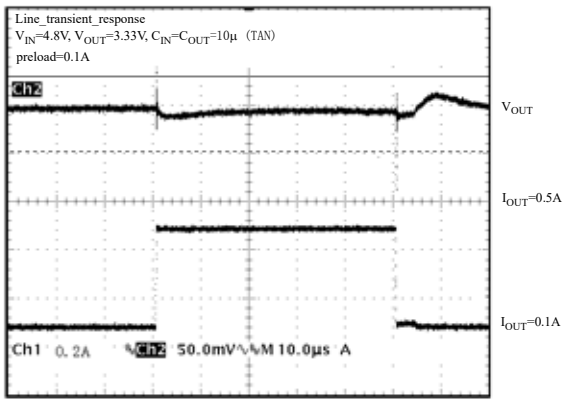


Figure 11. Load Transient Response

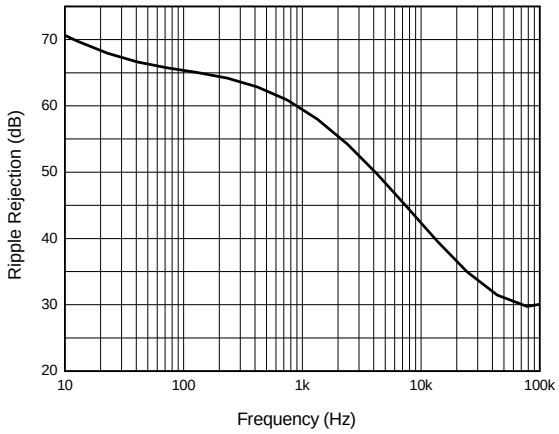


Figure 12. Ripple Rejection vs. Frequency

Typical Applications

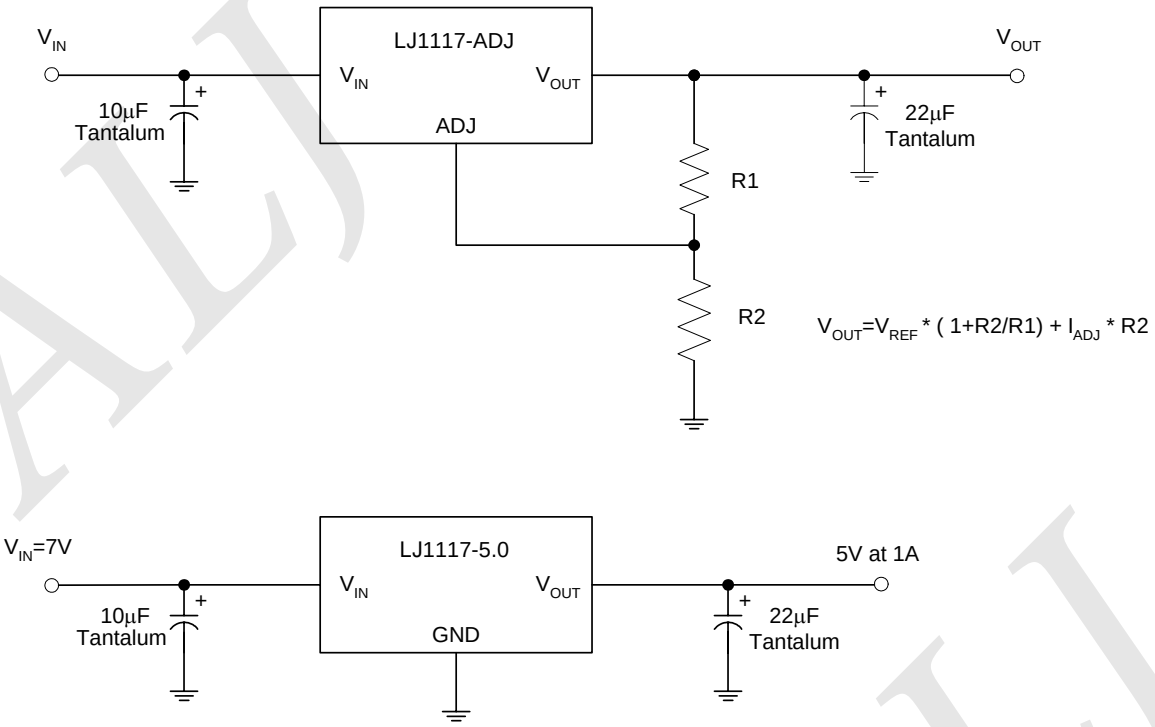


Figure 13. Typical Applications of LJ1117

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