



Description

JLR117C Series are linear regulators with 1A output current, 1.1V typical drop-out voltage, either fixed or adjustable output voltage.

Outstanding PSRR performance (70dB typical) enable the generation of clean power for precision applications and the signal integrity of sensitive analog circuitry in adopting systems to be preserved. With protection function (thermal shut-down, current limiting) built in and the inclusion of trimmed band-gap reference, JLR117C delivers accurate ($\pm 1\%$) output voltage at fixed values of 3.3V and 5.0V or adjustable values ($V_{REF} = 1.25V$ typical).

All devices are manufactured free of halogen / lead / antimony and fully RoHS compliant. Packages offered include SOT-223-3L.

Applications

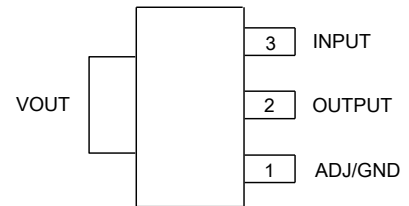
- Voltage regulation
- Mainboards for FPTVs, PC Monitors, Digital Signage Displays, Set Top Boxes, Network / Communication Switches / Routers
- Motherboards for Industrial PCs, Slot Machines, Arcade Game Consoles, Smart Meters

Features and Benefits

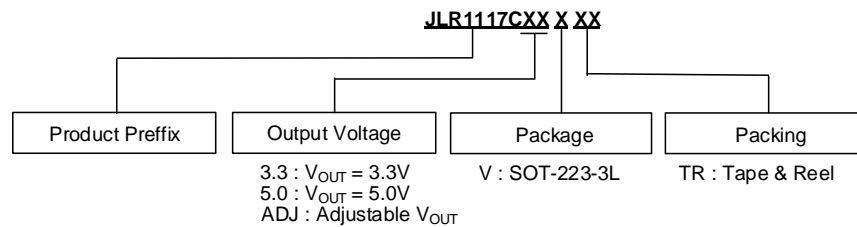
- Accurate (V_{OUT} tolerance = $\pm 1\%$) and low-noise (PSRR = 70dB typical; RMS O/P Noise = 0.003% of V_{OUT}) output at 3.3V, 5.0V, adjustable ($V_{REF} = 1.25V$)
- Drop-out voltage ($I_{OUT} = 0.8A$) at 1.2V typical
- Line regulation at 0.001% typ. and load regulation at 0.2% max.
- Stable operation over wide temperature range ($T_J = -20 \sim 125^\circ C$) MLCC capacitors (10 μF / 22 μF) of low ESR values ($\leq 20\Omega$) close to the input & output pins
- Built-in current limiting (1.35A typical) and thermal shut-down protection
- Lead-free package assembled with 'green' molding compound

Pin Assignment

Top View
(SOT-223-3L)



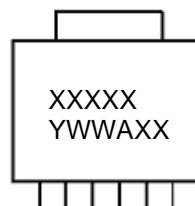
Ordering Information



Product Name	Package	Marking	MSL	T _J (°C)	Media	Quantity (pcs)
JLR117C3.3VTR	SOT-223-3L	HBH	3	-20 ~ 125	13" T&R	4000
JLR117C5.0VTR	SOT-223-3L	HBE	3	-20 ~ 125	13" T&R	4000
JLR117CADJVTR	SOT-223-3L	HBI	3	-20 ~ 125	13" T&R	4000

Marking Information

Top View



First Line: Marking (see Ordering Information)

Second Line: Date Code

Y: Year

WW: Work Week for Molding

A: Code for Assembly & Test Site

XX: 7th & 8th Digits of Batch Number

Typical Application Circuit

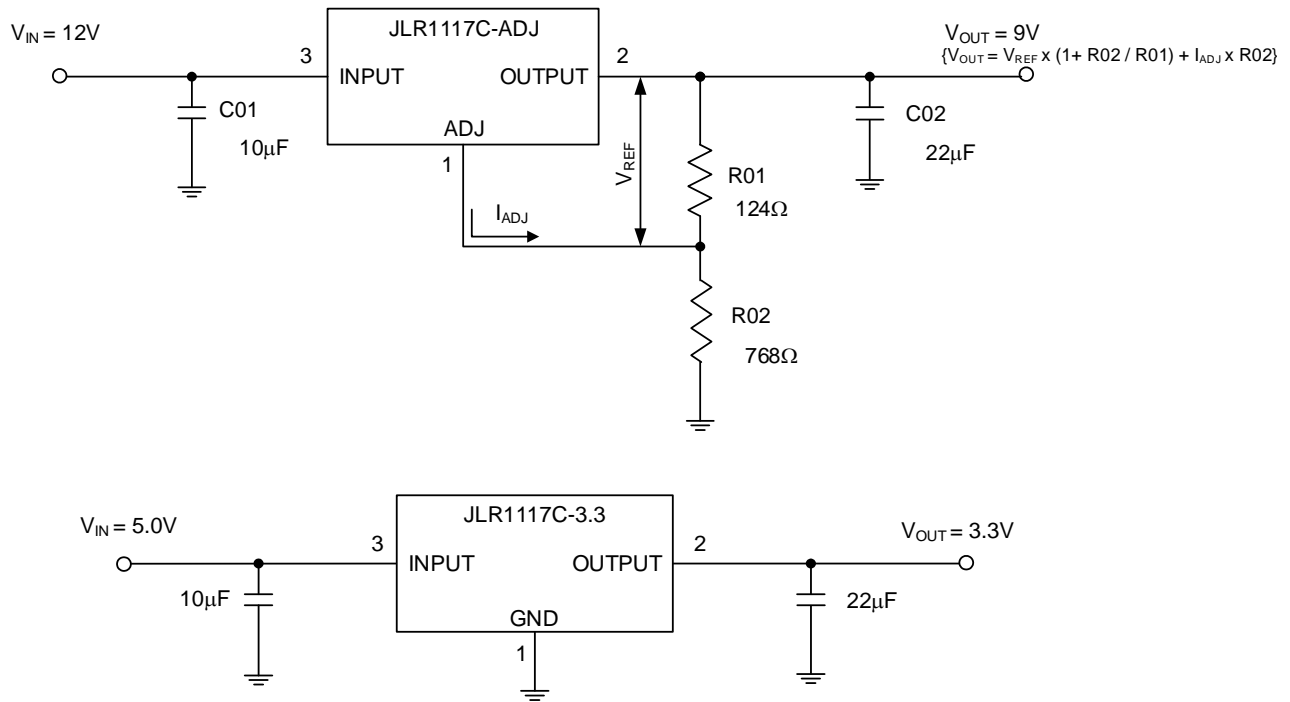


Fig. 1: Application Circuits

Notes: The JLR1117C is designed to work well with MLCC capacitors of low ESR. To ensure stable operation at the output, the output capacitor used in the respective application circuits shall have the following characteristics: 1) capacitance $\geq 10\mu\text{F}$; 2) ESR $< 20\Omega$.

Diagram of Function Blocks

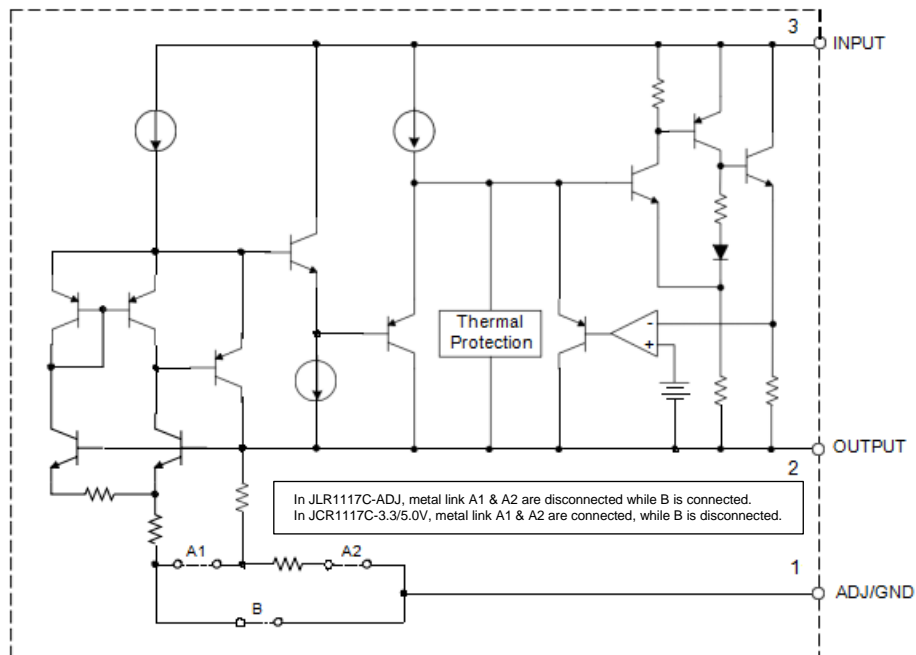


Fig. 2: Function Blocks

**Absolute Maximum Ratings** *1

Symbol	Parameter	Rating	Unit
V _{IN}	Input Voltage	18	V
T _J	Operating Junction Temperature	155	°C
T _{LEAD}	Lead Temperature (soldering, 10s)	260	°C
T _{STG}	Storage Temperature Range	-65 ~ 150	°C
θ _{JA}	Thermal Resistance w/o Heat Sink (junction-to-ambient)	125	°C / W
θ _{JA}	Thermal Resistance w/ Heat Sink (junction-to-ambient) *2	100	°C / W
HBM	ESD (Human Body Model)	4000	V

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

*2: The device is soldered to 100mm² (10mm x 10mm) copper (top-side solder mask) of 2oz on 2-layer FR-4 p.c.b. with eight via holes (0.5mm diameter)

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V _{IN}	Input Voltage	–	15	V
T _J	Operating Junction Temperature Range	-20	125	°C

Electrical Characteristics: JLR117C-ADJ

Conditions [V_{IN} = V_{OUT} + 2.0V; I_{OUT} = 10mA; T_A = 25°C; P ≤ Maximum Power Dissipation] apply unless otherwise specified. Numbers in *italic* & bold are valid over -20°C ≤ T_J ≤ 125°C.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{REF}	Reference Voltage	1.5V ≤ V _{IN} - V _{OUT} ≤ 10V	1.238	1.250	1.262	V
			1.225	1.250	1.270	
I _{OLIMIT}	Output Current Limit	–	1.00	1.35	–	A
V _{DROP}	Drop-out Voltage	ΔV _{REF} = 1%; I _{OUT} = 0.8A	–	1.2	1.3	V
ΔV _{R_LINE}	Line Regulation	1.5V ≤ V _{IN} - V _{OUT} ≤ 10V	–	0.001	0.100	% / V
			–	–	0.200	
ΔV _{R_LOAD}	Load Regulation	–	–	0.4	1.0	% / V
-	Minimum Load Current	1.5V ≤ V _{IN} - V _{OUT} ≤ 10V	–	1.7	5.0	mA
I _{ADJ}	Adjustable Pin Current	–	–	60	120	μA
ΔI _{ADJ}	Adjustable Pin Current Change	1.5V ≤ V _{IN} - V _{OUT} ≤ 10V	–	0.2	5.0	μA
PSRR	Power Supply Rejection Ratio	F = 120Hz; C _{OUT} = 22μF (V _{IN} - V _{OUT}) = 3V; I _{OUT} = 300mA	–	70	–	dB
(ΔV _{OUT} / V _{OUT}) / ΔT	Output Voltage Temp. Coefficient	–	–	0.5	–	% / °C
NOISE	RMS Output Noise (% of V _{OUT})	10Hz ≤ F ≤ 10kHz; T _A = 25°C	–	0.003	–	%
T _{TSD}	Thermal Shut-down Temperature	–	–	150	–	°C
T _{TSD_HYS}	Thermal Shut-down Hysteresis	–	–	16	–	°C
θ _{JC}	Thermal Resist. (junction-to-case)	–	–	30	–	°C / W

**Electrical Characteristics: JLR117C-3.3**

Conditions [$V_{IN} = V_{OUT} + 2.0V$; $I_{OUT} = 10mA$; $T_A = 25^\circ C$; $P \leq$ Maximum Power Dissipation] apply unless otherwise specified. Numbers in *italic* & bold are valid over $-20^\circ C \leq T_J \leq 125^\circ C$.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	3.267	3.300	3.333	V
			3.235	3.300	3.365	
I_{OLIMIT}	Output Current Limit	–	1.00	1.35	–	A
V_{DROP}	Drop-out Voltage	$\Delta V_{OUT} = 1\%$; $I_{OUT} = 0.8A$	–	1.2	1.3	V
ΔV_{R_LINE}	Line Regulation	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	–	0.5	6.0	mV
			–	–	10.0	
ΔV_{R_LOAD}	Load Regulation	–	–	2.0	15.0	mV
I_Q	Quiescent Current	$I_{OUT} = 0A$	–	4.0	6.0	mA
PSRR	Power Supply Rejection Ratio	$F = 120Hz$; $C_{OUT} = 22\mu F$ $(V_{IN} - V_{OUT}) = 3V$; $I_{OUT} = 300mA$	–	70	–	dB
$(\Delta V_{OUT} / V_{OUT}) / \Delta T$	Output Voltage Temp. Coefficient	–	–	0.5	–	% / °C
NOISE	RMS Output Noise (% of V_{OUT})	$10Hz \leq F \leq 10kHz$; $T_A = 25^\circ C$	–	0.003	–	%
T_{TSD}	Thermal Shut-down Temperature	–	–	150	–	°C
T_{TSD_HYS}	Thermal Shut-down Hysteresis	–	–	16	–	°C
θ_{JC}	Thermal Resist. (junction-to-case)	–	–	30	–	°C / W

Electrical Characteristics: JLR117C-5.0

Conditions [$V_{IN} \leq 10V$; $I_{OUT} = 10mA$; $T_A = 25^\circ C$; $P \leq$ Maximum Power Dissipation] apply unless otherwise specified. Numbers in *italic* & bold are valid over $-20^\circ C \leq T_J \leq 125^\circ C$.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	4.950	5.000	5.050	V
			4.900	5.000	5.100	
I_{OLIMIT}	Output Current Limit	–	1.00	1.35	–	A
V_{DROP}	Drop-out Voltage	$\Delta V_{OUT} = 1\%$; $I_{OUT} = 0.8A$	–	1.2	1.3	V
ΔV_{R_LINE}	Line Regulation	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	–	0.5	6.0	mV
			–	–	10.0	
ΔV_{R_LOAD}	Load Regulation	–	–	2.0	15.0	mV
I_Q	Quiescent Current	$I_{OUT} = 0A$	–	4.0	6.0	mA
PSRR	Power Supply Rejection Ratio	$F = 120Hz$; $C_{OUT} = 22\mu F$ $(V_{IN} - V_{OUT}) = 3V$; $I_{OUT} = 300mA$	–	70	–	dB
$(\Delta V_{OUT} / V_{OUT}) / \Delta T$	Output Voltage Temp. Coefficient	–	–	0.5	–	% / °C
NOISE	RMS Output Noise (% of V_{OUT})	$10Hz \leq F \leq 10kHz$; $T_A = 25^\circ C$	–	0.003	–	%
T_{TSD}	Thermal Shut-down Temperature	–	–	150	–	°C
T_{TSD_HYS}	Thermal Shut-down Hysteresis	–	–	16	–	°C
θ_{JC}	Thermal Resist. (junction-to-case)	–	–	30	–	°C / W



Lead-free Green

Performance Characteristics

Fig. 3: Line Regulation vs. Junction Temperature

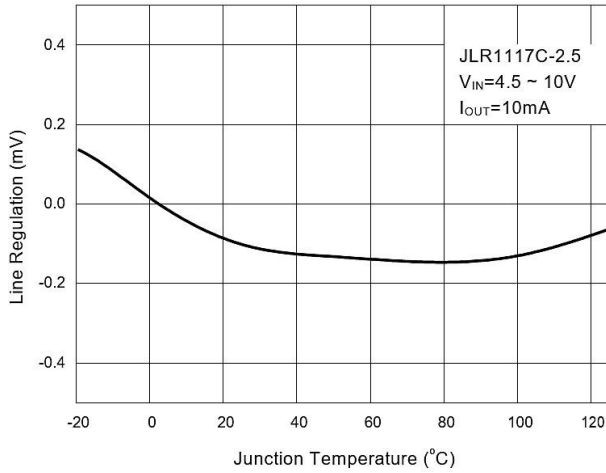


Fig. 4: Load Regulation vs. Junction Temperature

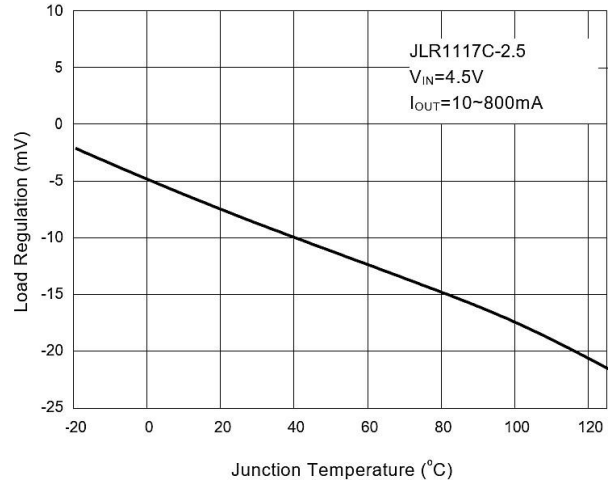


Fig. 5: Reference Voltage vs. Junction Temperature

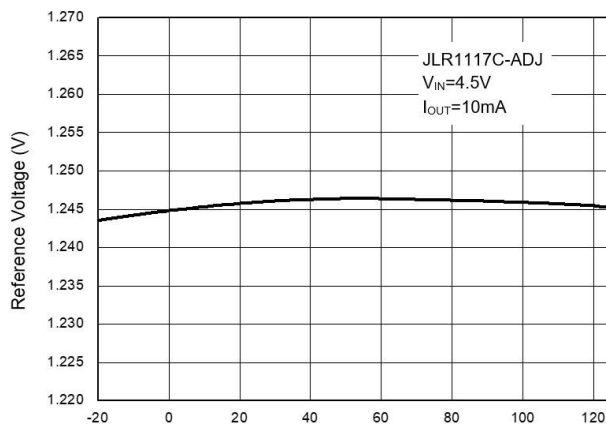


Fig. 6: Output Voltage vs. Junction Temperature

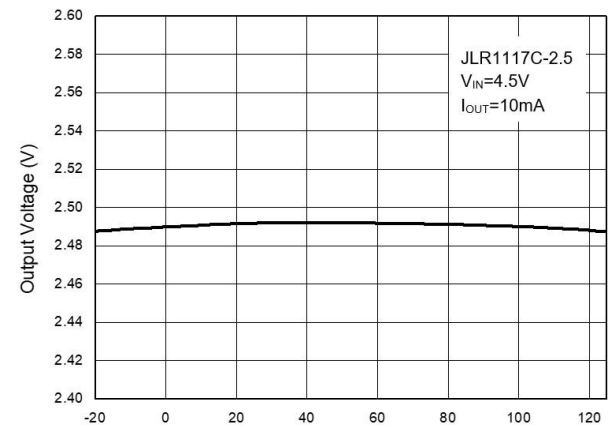


Fig. 7: Minimum Load Current vs. Junction Temperature

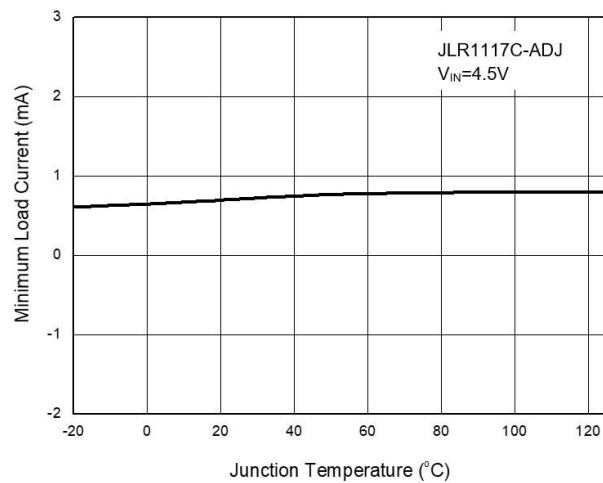
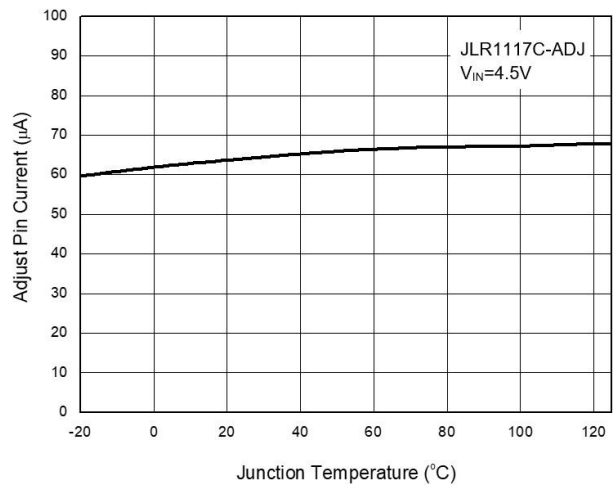


Fig. 8: Adjust Pin Current vs. Junction Temperature





Performance Characteristics (continued)

Fig. 9: Drop-out Voltage vs. Output Current

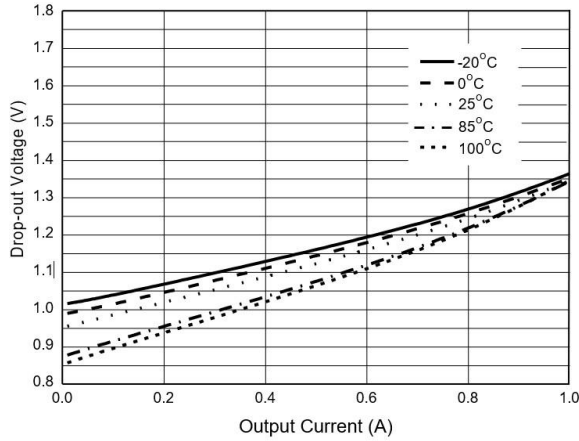


Fig. 10: Power Dissipation vs. Case Temperature

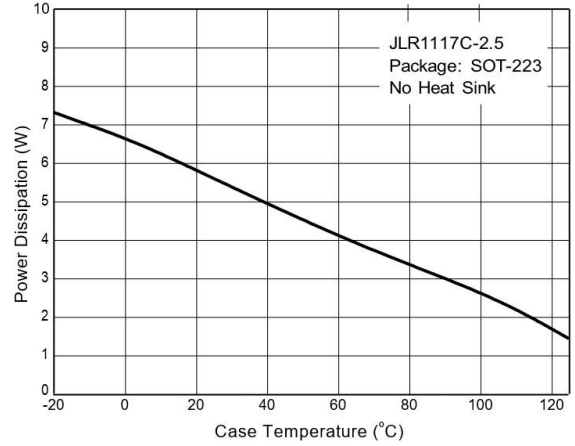


Fig. 11: Line Transient Response

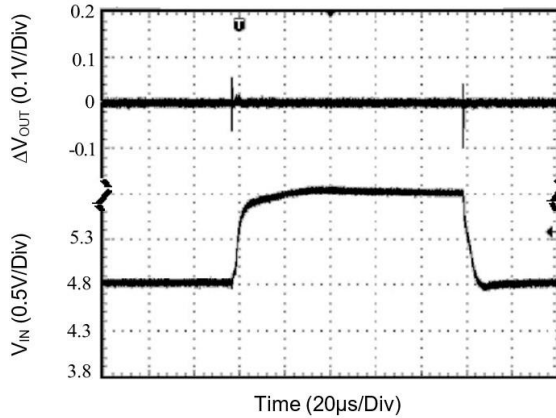


Fig. 12: Load Transient Response

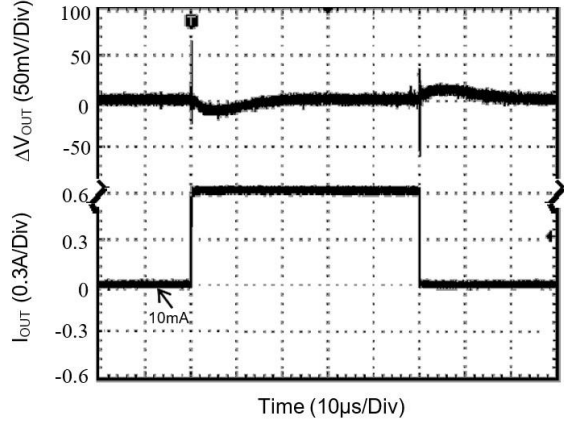


Fig. 13: PSRR vs. Frequency

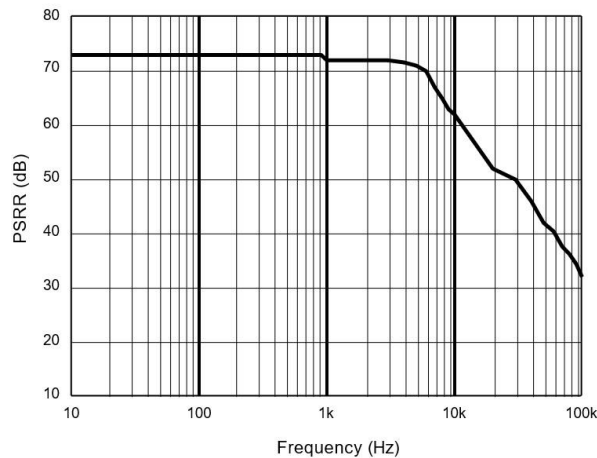
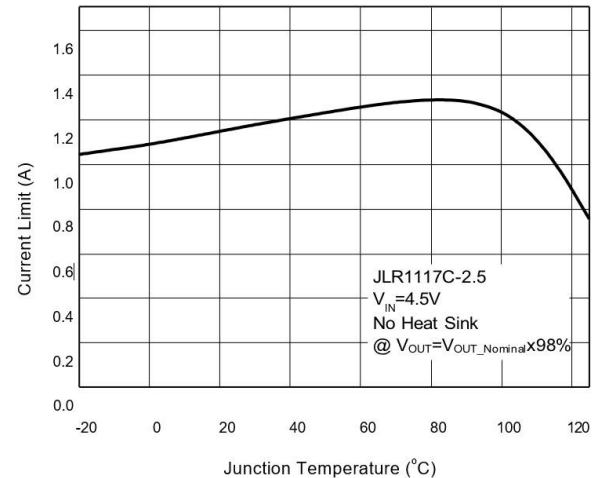


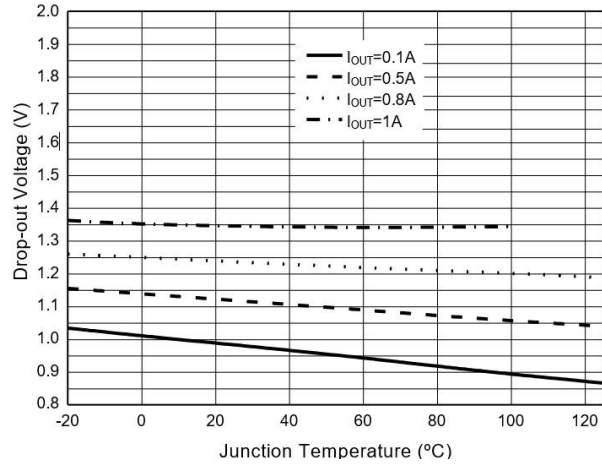
Fig. 14: Current Limit vs. Junction Temperature





Performance Characteristics (continued)

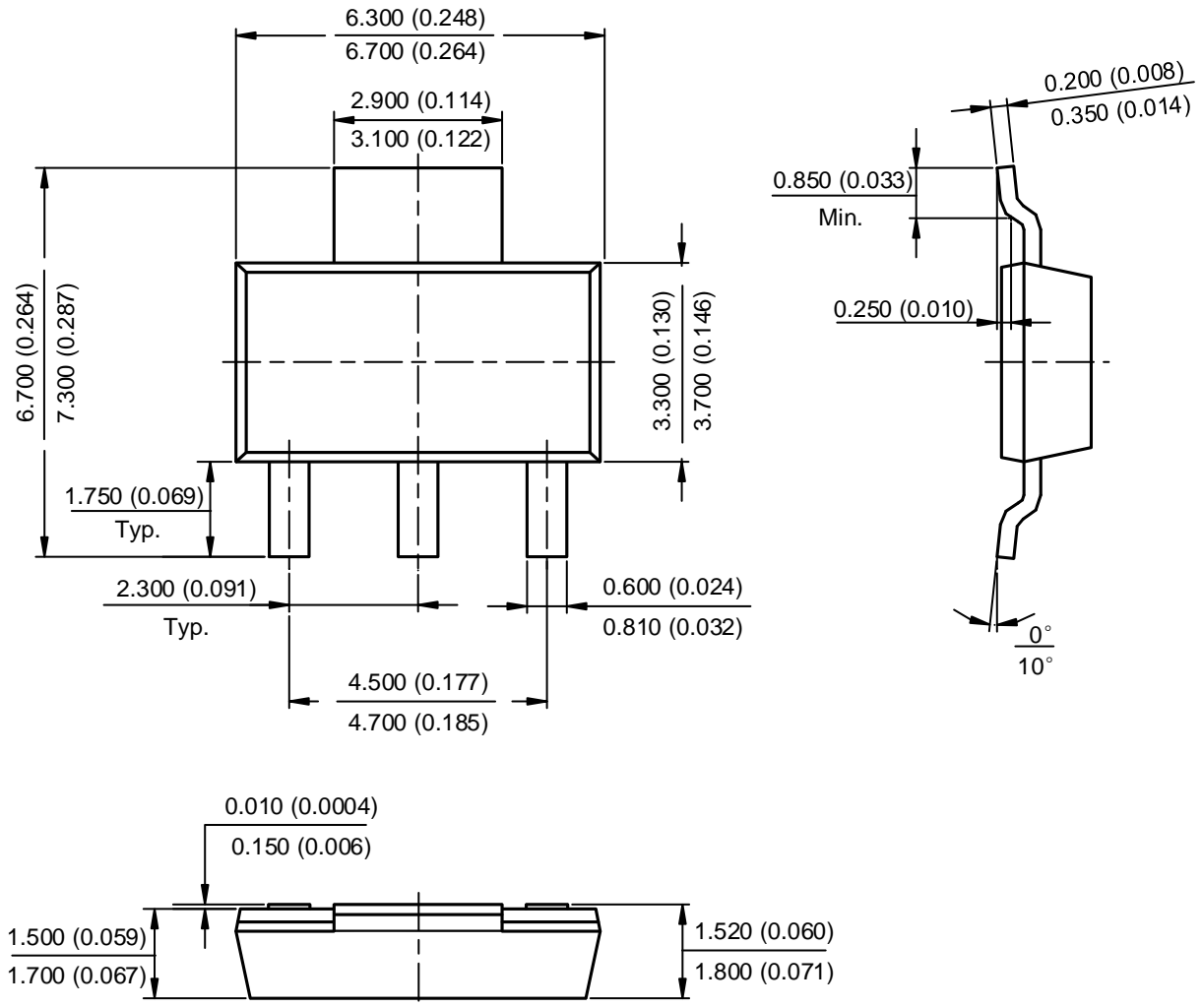
Fig. 15: Drop-out Voltage vs. Junction Temperature





Package Outline (all measurement in mm & inch)

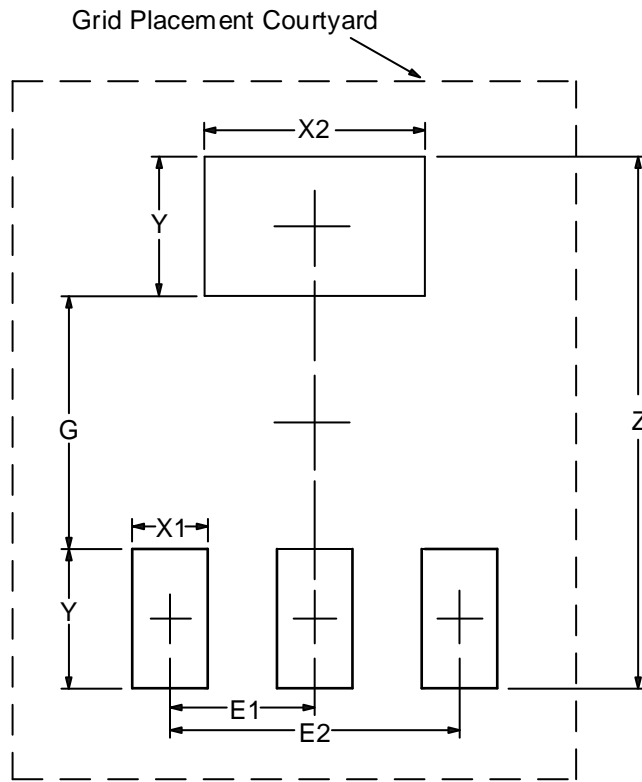
Package Type: SOT-223-3L





Suggested Pad Layout (all measurement in mm & inch)

Package Type: SOT-223-3L



Measurement	Z (mm) / (inch)	G (mm) / (inch)	X1 (mm) / (inch)	X2 (mm) / (inch)	Y (mm) / (inch)	E1 (mm) / (inch)	E2 (mm) / (inch)
Value	8.400 / 0.331	4.000 / 0.157	1.200 / 0.047	3.500 / 0.138	2.200 / 0.087	2.300 / 0.091	4.600 / 0.181