Lead-free Green

JLR1117E Series

1.0A Low Drop-out Linear Regulators

Description

JLR1117E 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. As a result, signal integrity of sensitive analog circuitry in adopting systems are preserved. With protection function (thermal shut-down, current limiting) built in and the inclusion of trimmed band-gap reference, JLR1117E delivers highly accurate (±1%) output voltages at either 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.

Features and Benefits

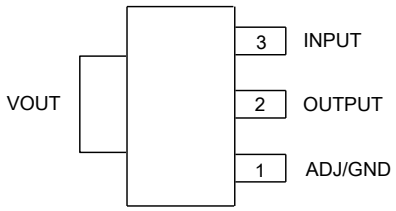
- Accurate (V_{OUT} tolerance = ±1%) and low-noise (PSRR = 70dB typical); RMS O/P Noise = 0.003% of V_{OUT}) output at 3.3V, 5.0V
- Drop-out voltage (I_{OUT} = 1A) at 1.1V typical
- Outstanding line regulation (I_{OUT} = 30A) at 0.001%/V typical and load regulation (I_{OUT} = 1A) at 0.2%/A typical
- Stable operation over wide range (-40 ~ 125ºC) of T_J with MLCC capacitors (1.0μF / 1.0μF) of low ESR values (≤ 1.5Ω) close to input & output pins
- Built-in current limiting and thermal shut-down protection
- Lead-free package assembled with 'green' molding compound

Applications

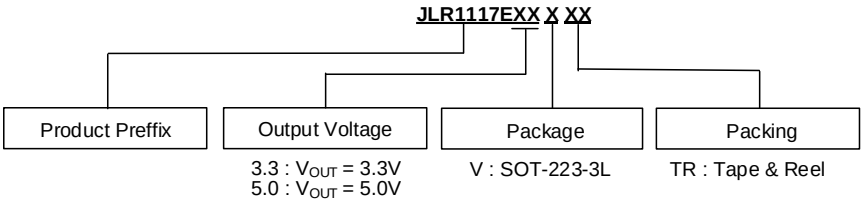
- Voltage regulation
- Mainboards for FPTVs, PC Monitors, Digital Signage Displays. Set Top Boxes, Network / Communication Switches / Routers
- Motherboards for Industrial PCs, Slot Machines, Arcade Game Consoles, Smart Meters

Pin Assignment

Top View
(SOT-223-3L)



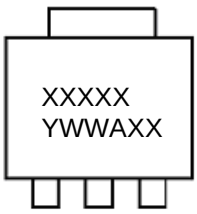
Ordering Information



Product Name	Package	Marking	MSL	T_J (ºC)	Media	Quantity (pcs)
JLR1117E3.3VTR	SOT-223-3L	GH27G	3	-40 ~ 125	13" T&R	4000
JLR1117E5.0VTR	SOT-223-3L	GH18H	3	-40 ~ 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

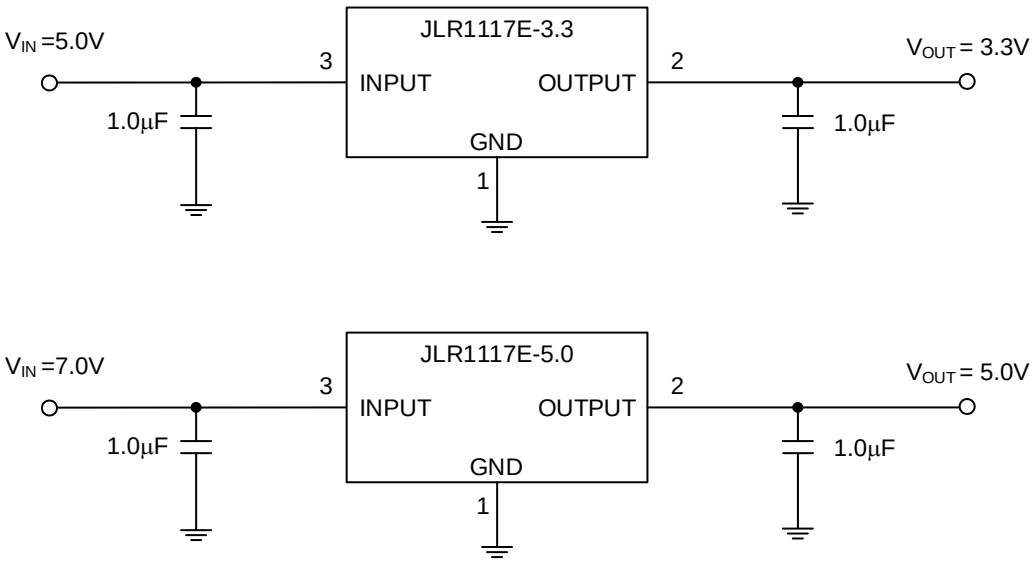


Fig. 1: Application Circuits

Notes: The JLR1117E is designed to work well with MLCC capacitors of low ESR. While input and output capacitors with values of ≥ 1.0μF are recommended, ESR of the output capacitor must be < 1.5Ω. Whenever a capacitor is populated near pin 2 (OUTPUT) of JLR1117E and in parallel to the output capacitor, its capacitance must be < 0.68μF. In the case that this capacitor is as small as 0.1μF, it must be positioned ≥ 5mm away from pin 2.

Absolute Maximum Ratings *1

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	16	V
T_J	Operating Junction Temperature	155	ºC
T_{LEAD}	Lead Temperature (soldering, 10s)	260	ºC
T_{STG}	Storage Temperature Range	-65 ~ 150	ºC
θ_{JA}	Thermal Resistance (junction-to-ambient) *2	125	ºC / W
HBM	ESD (Human Body Model)	2000	V
MM	ESD (Machine Model)	200	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 200mm^2 (16mm x 12.5mm) 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	–	13	V
T_J	Operating Junction Temperature Range	-40	125	ºC

Electrical Characteristics

Conditions [$V_{IN} = V_{OUT} + 1.5V$; $C_{IN} = 1.0\mu F$ (ceramic); $C_{OUT} = 1.0\mu F$ (ceramic); $T_A = 25°C$] apply to the following measurement unless otherwise specified. Numbers in *italic* & bold are valid over -40ºC ≤ T_J ≤ 125ºC.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage (fixed output voltage versions)	for V_{OUT} = 3.3V / 5.0V V_{OUT} +1.5V ≤ V_{IN} ≤ 12V I_{OUT} = 10mA		99% x V_{OUT} ***98% x V_{OUT}***	V_{OUT} V_{OUT}	101% x V_{OUT} ***102% x V_{OUT}***	V
I_{OLIMIT}	Output Current Limit	1.5V ≤ V_{IN} - V_{OUT}		1.0	1.3	–	A
V_{REF}	Reference Voltage	V_{OUT} + 1.5V ≤ V_{IN} ≤ 12V I_{OUT} = 10mA		1.238 ***1.225***	1.250 1.250	1.262 ***1.275***	V
V_{DROP}	Drop-out Voltage	I_{OUT} = 1A		–	1.1	1.3	V
ΔV_{R_LINE}	Line Regulation	1.5V ≤ V_{IN} - V_{OUT} ≤ 10V I_{OUT} = 30mA		–	0.001	0.040	%
ΔV_{R_LOAD}	Load Regulation	V_{IN} = V_{OUT} + 1.5V 1mA ≤ I_{OUT} ≤ 1A		–	0.2	0.6	%
I_Q	Quiescent Current	for Fixed V_{OUT} I_{OUT} = 0		–	3.5	6.0	mA
-	Minimum Load Current	for Adjustable V_{OUT} 1.5V ≤ V_{IN} - V_{OUT} ≤ 10V		–	2.0	5.0	mA
I_{ADJ}	Adjustable Pin Current	–		–	45	90	µA
ΔI_{ADJ}	Adjustable Pin Current Change	1.5V ≤ V_{IN} - V_{OUT} ≤ 10V		–	0.2	5.0	µA
$(\Delta V_{OUT} / V_{OUT}) / \Delta T$	Output Voltage Temp. Coefficient	I_{OUT} = 30mA		–	0.33	–	% / ºC
PSRR	Power Supply Rejection Ratio	Ripple 1.0 V_{PP} V_{IN} = V_{OUT} + 2V I_{OUT} = 100mA	F = 120Hz F = 1kHz	– –	70 70	– –	dB
NOISE	RMS Output Noise (% of V_{OUT})	10Hz ≤ F ≤ 10kHz		–	0.003	–	%
T_{TSD}	Thermal Shut-down Temperature			–	150	–	ºC
T_{TSD_HYS}	Thermal Shut-down Hysteresis			–	20	–	ºC
θ_{JC}	Thermal Resist. (junction-to-case)			–	30	–	ºC / W

Performance Characteristics

Fig. 2: Line Regulation vs. Junction Temperature

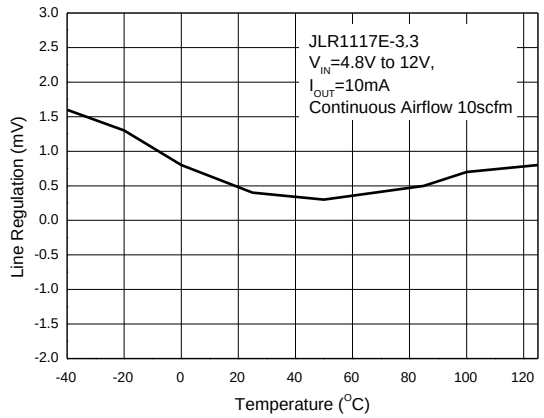


Fig. 3: Load Regulation vs. Junction Temperature

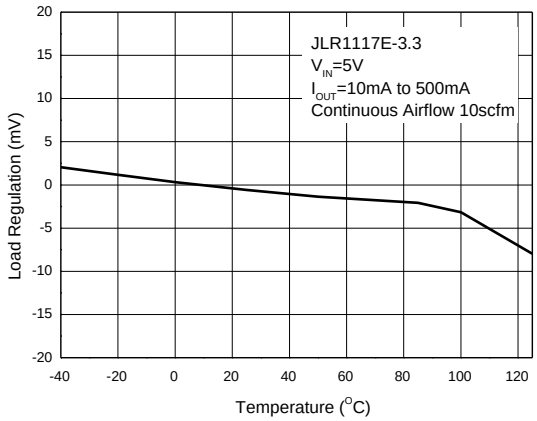


Fig. 4: Reference Voltage vs. Junction Temperature

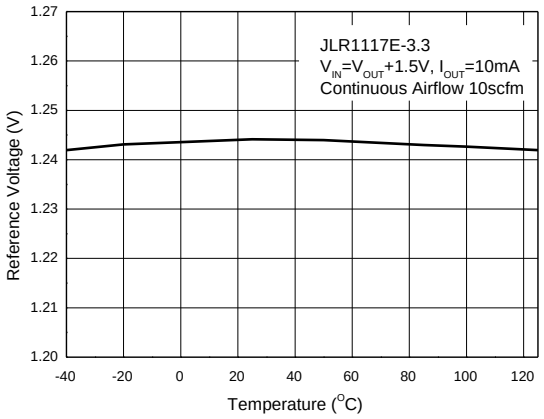


Fig. 5: Output Voltage vs. Junction Temperature

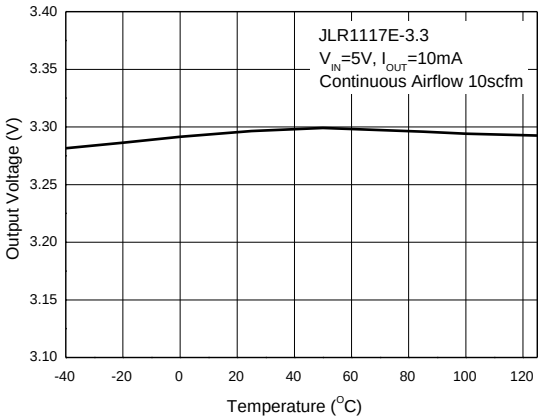


Fig. 6: Minimum Load Current vs. Junction Temperature

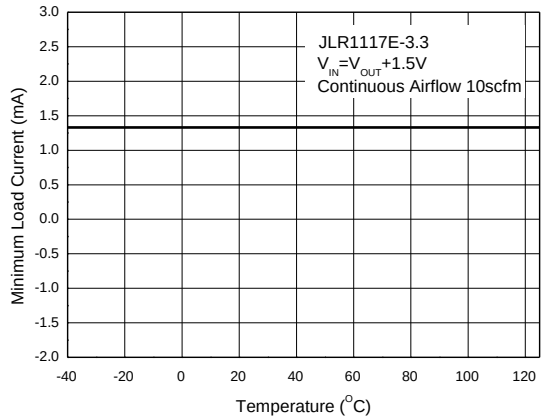
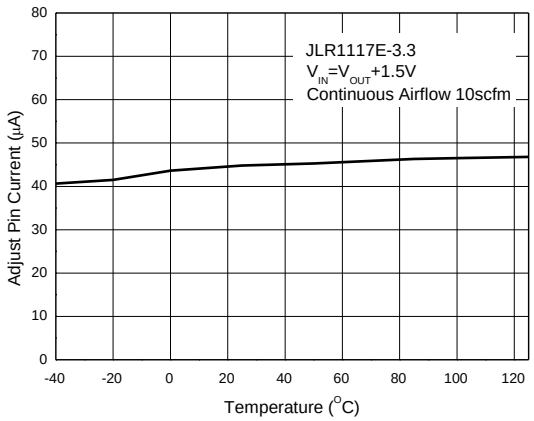


Fig. 7: Adjust Pin Current vs. Junction Temperature



Performance Characteristics (continued)

Fig. 8: Drop-out Voltage vs. Output Current

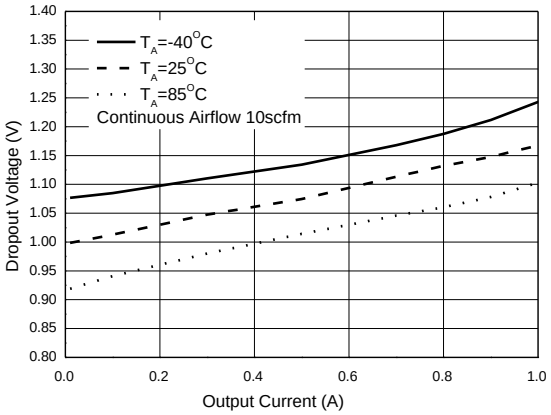


Fig. 9: Drop-out Voltage vs. Junction Temperature

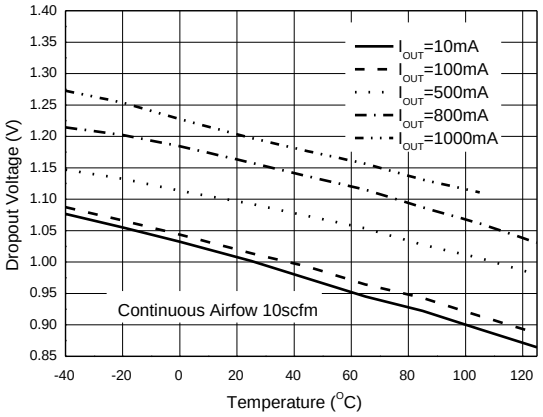


Fig. 10: Output Voltage vs. Output Current

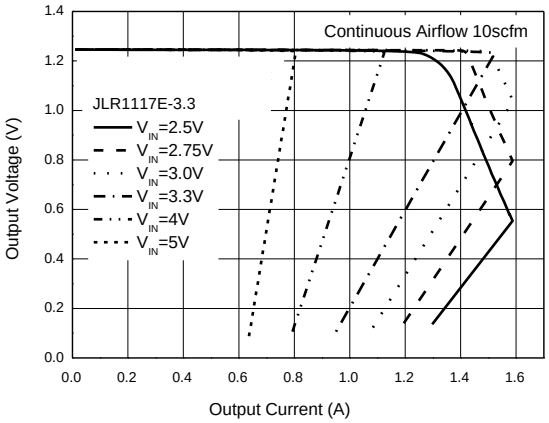


Fig. 11: PSRR vs. Frequency

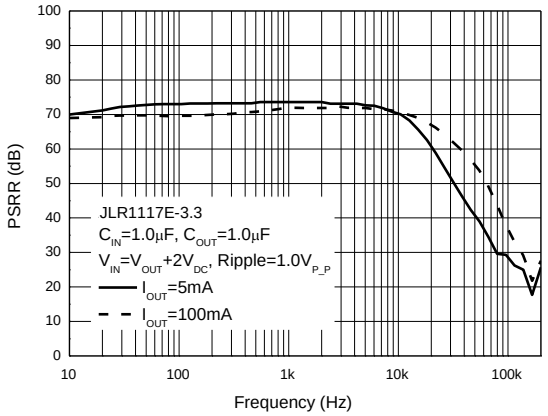


Fig. 12: Current Limit (I_{OLIMIT}) vs. Junction Temperature

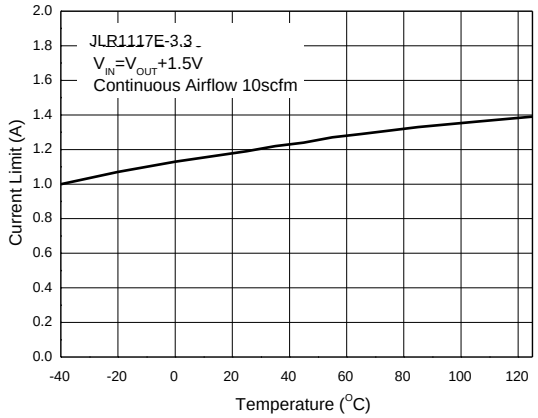
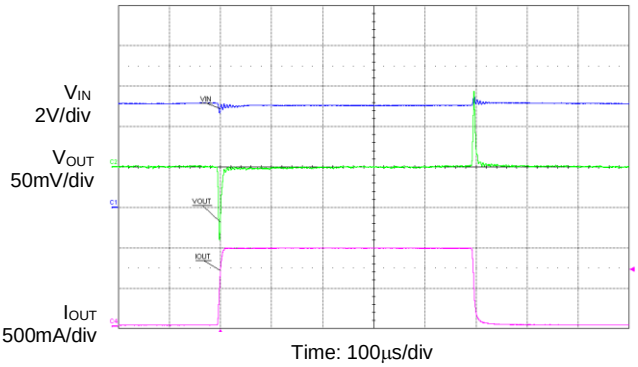


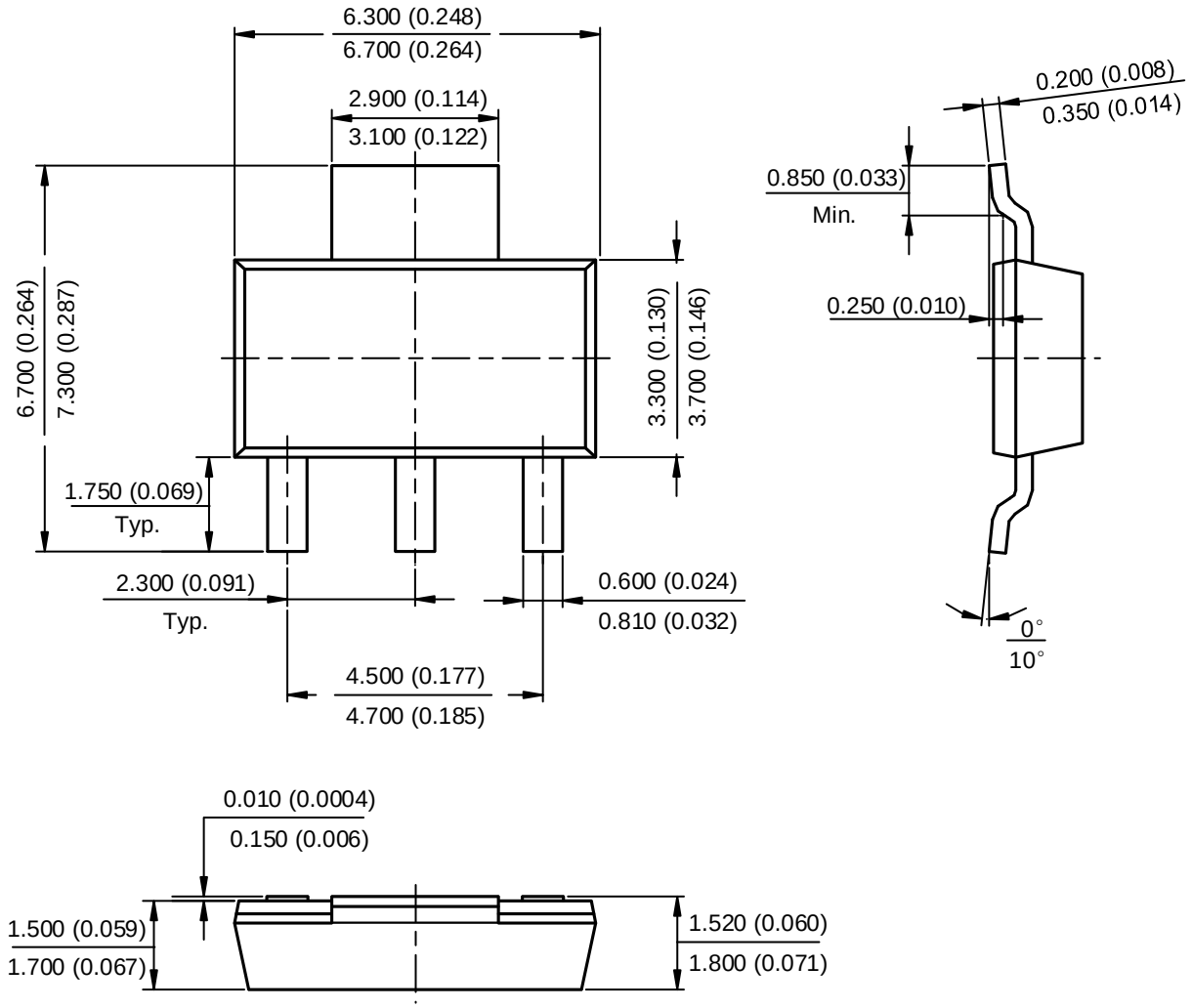
Fig. 13: Load Transient Response

(V_{IN} = 5V, V_{OUT} = 3.3V, C_{IN} = 1.0µF C_{OUT} = 1.0µF)



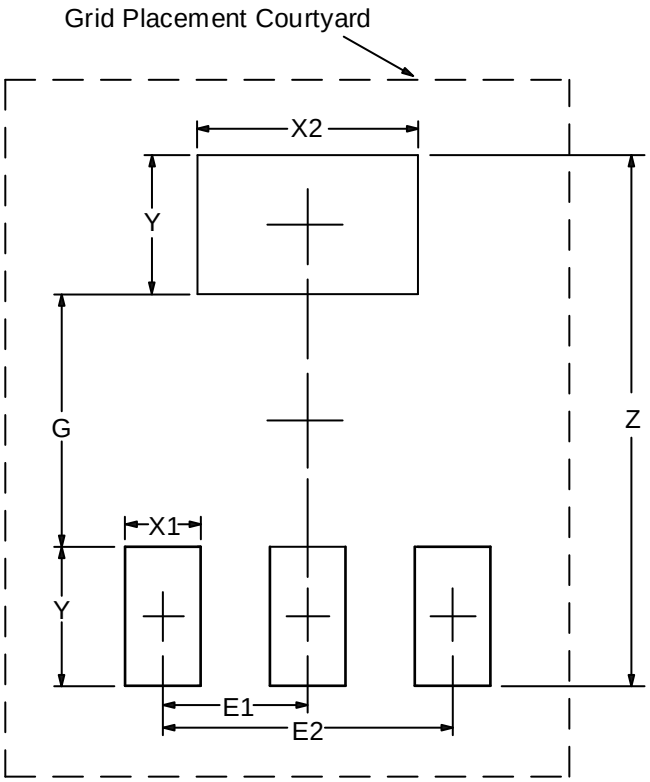
Package Outline (all measurement in mm & inch)

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