DESCRIPTION

The A6154 series is a set of low power high voltage regulators implemented in CMOS technology. It can operate from 2.5V to 36V. Which can provide 150mA output current. The device allows input voltage as high as 36V.

The A6154 series is available in several fixed 3.0V, 3.3V, 3.6V and 5.0V output voltage. CMOS technology ensures low dropout voltage and ultralow quiescent current.

The A6154 is available in SOT-23, SOT-23S, SOT-25 and SOT89-3 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOT-23 SPQ: 3,000pcs/Reel	E3	A6154E3R-XX
		A6154E3VR-XX
SOT-23S SPQ: 3,000pcs/Reel	E3S	A6154E3SR-XX
		A6154E3SVR-XX
SOT-25 SPQ: 3,000pcs/Reel	E5	A6154E5R-XX
		A6154E5VR-XX
SOT89-3 SPQ: 1,000pcs/Reel	K3	A6154K3R-XXZ
		A6154K3VR-XXZ
Note	XX: Output Voltage 33=3.3V, 50=5.0V Z: Pin Type A or B V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

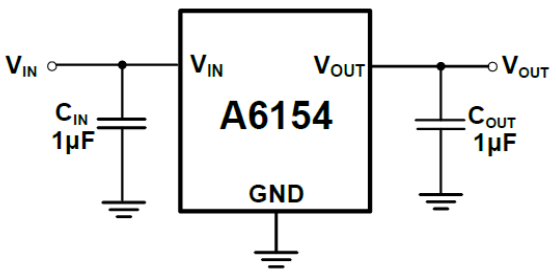
FEATURES

- Ultralow Quiescent Current IQ:
  2.5μA Typical at Light Loads
  5μA Maximum at Light Loads
- 150mA Nominal Output Current
- High Input Voltage (up to 36V)
- Fixed 3.0V、3.3V、3.6V and 5.0V Output Voltage
- Operating Temperature Range:
  -40°C to +85°C
- Available in SOT-23, SOT-23S, SOT-25 and SOT89-3 packages

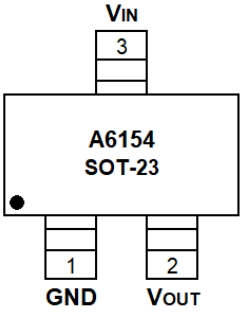
APPLICATION

- Audio/Video Equipment
- Communication Equipment
- Battery-Powered Equipment
- Automotive Head Unit
- Laptop, Palmtops, Notebook Computers

TYPICAL APPLICATION

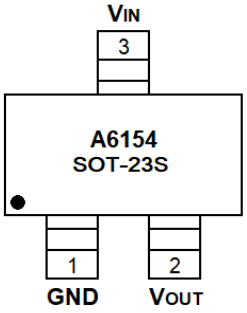


PIN DESCRIPTION



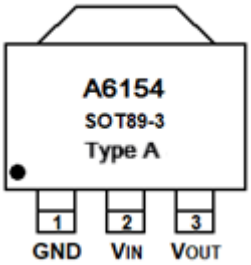
SOT-23, E3

Top View



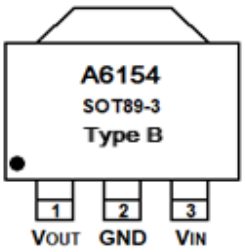
SOT-23S, E3S

Top View



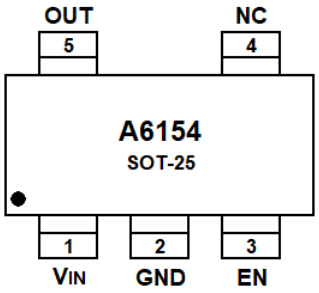
SOT89-3, K3

Top View



SOT89-3, K3

Top View



SOT-25, E5

Top View

Pin #					Symbol	Function
SOT-23	SOT-23S	SOT89-3		SOT-25		
		A	B			
1	1	1	2	2	GND	Ground
2	2	3	1	5	V_{OUT}	Regulator Output. Recommended output capacitor range:1μF to 10μF.
3	2	2	3	1	V_{IN}	Regulator Input. Up to 36V input voltage. At least 1μF supply bypass capacitor is recommended.
-	-	-	-	3	EN	Enable pin. Drive EN greater than $V_{EN(H)}$ to turn on the regulator. Drive EN less than $V_{EN(L)}$ to put the LDO into shutdown mode.
-	-	-	-	4	NC	Not connect

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) (1)

V_{IN}, Input Voltage		-0.3V ~ 45V
V_{EN}, Enable Input Voltage		-0.3V ~ V_{IN}
T_J, Junction Temperature		-40°C~150°C
P_D, Continuous Power Dissipation (2)		Internally Limited
T_{STG}, Storage Temperature		-65°C~150°C
ESD Ratings		
V_{ESD}, Electrostatic discharge	Human-body model (HBM)	±1000
	Machine model (MM)	±100

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE:

(1) All voltages are with respect to the GND pin.

(2) Internal thermal shutdown circuitry protects the device from permanent damage.

RECOMMENDED WORK CONDITIONS

over operating free-air temperature range (unless otherwise noted) *

Parameter	Symbol	Min	Max	Unit
Input Supply Voltage	V_{IN}	2.5	36	V
Enable voltage	V_{EN}	0	36	V
Operating Temperature	T_A	-40	+85	°C

*All voltages are with respect to the GND pin.

ELECTRICAL CHARACTERISTICS

V_{IN} = V_{OUT} + 2V, C_{IN} = C_{OUT} = 1μF, V_{OUT} = 3.3V, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	V_{OUT} = 3.3V		2.5 (1)	-	36	V
Output Voltage Accuracy		I_{OUT} = 0.1mA		-2.5	0	2.5	%
		I_{OUT} = 1mA, Class A		-1.0	0	1.0	%
Ground Pin Current		No load	V_{IN}= V_{OUT}+ 2V	-	2.5	5	μA
			V_{IN}= 36V	-	5.0	8	
		I_{OUT} = 50mA		-	2.5	-	
Maximum Output Current (2)				150	-	-	mA
Dropout Voltage (3)	V_{DROP}	I_{OUT} = 500mA		-	1200	1800	mV
Line Regulation	ΔV_{OUT} / $\Delta V_{IN} \times V_{OUT}$	V_{IN} = V_{OUT} + 2V to 36V, I_{OUT} = 1mA		-	0.001	0.012	%/V
Load Regulation	ΔV_{OUT}	V_{IN} =V_{OUT}+2V, I_{OUT} = 1mA to150mA		-	11	20	mV
Power Supply Rejection Ratio	PSRR	V_{OUT} = 3.3V, I_{OUT} = 10mA	f = 217Hz	-	57	-	dB
			f = 1KHz	-	54	-	
Output Voltage Temperature Coefficient (4)	ΔV_{OUT} / $\Delta T_A \times V_{OUT}$	I_{OUT} = 1mA -40°C to +85°C		-	70	-	ppm/°C
THERMAL PROTECTION							
Thermal Shutdown Temperature	T_{SHDN}			-	120	-	°C
SHUTDOWN							
EN Voltage Range	V_{EN}	-40°C to +85°C		-0.3	-	V_{IN}+0.3	V
EN Input Threshold	V_{IH}	V_{IN} = V_{OUT}+ 2Vto 36V -40°C to +85°C		1.1	-	-	V
	V_{IL}	V_{IN} = V_{OUT}+ 2Vto 36V -40°C to +85°C		-	-	0.4	
EN Input Bias Current	I_{BH}	EN=36V		-	0.01	1	μA
	I_{BL}	EN=0V, -40°C to +85°C		-	0.01	1	
Shutdown Supply Current	$I_{Q(SHDN)}$	EN=0V, -40°C to +85°C		-	1.0	2	μA
Start-Up Time (5)	t_{STR}	C_{OUT} = 1μF, No Load		-	230	-	μs

V_{IN} = V_{OUT} + 2V, C_{IN} = C_{OUT} = 1μF, V_{OUT} = 5.0V, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	V_{OUT} = 5.0V		2.5(3)	-	36	V
Output Voltage Accuracy		I_{OUT} = 0.1mA		-2.5	0	2.5	%
		I_{OUT} = 1mA, Class A		-1.0	0	1.0	%
Ground Pin Current		No load	V_{IN}= V_{OUT}+ 2V	-	2.5	5	μA
			V_{IN}= 36V	-	5.0	8	
		I_{OUT} = 50mA		-	2.5	-	
Maximum Output Current (2)				150	-	-	mA
Dropout Voltage (3)	V_{DROP}	I_{OUT} = 150mA		-	1000	1600	mV
Line Regulation	ΔV_{OUT} / $\Delta V_{IN} \times V_{OUT}$	V_{IN} = V_{OUT} + 2V to 36V, I_{OUT} = 1mA		-	0.001	0.012	%/V
Load Regulation	ΔV_{OUT}	V_{IN} =V_{OUT}+2V, I_{OUT} = 1mA to150mA		-	11	20	mV
Power Supply Rejection Ratio	PSRR	V_{OUT} = 5.0V, I_{OUT} = 10mA	f = 217Hz	-	57	-	dB
			f = 1KHz	-	54	-	
Output Voltage Temperature Coefficient (4)	ΔV_{OUT} / $\Delta T_A \times V_{OUT}$	I_{OUT} = 1mA -40°C to +85°C		-	70	-	ppm/°C
THERMAL PROTECTION							
Thermal Shutdown Temperature	T_{SHDN}			-	120	-	℃
SHUTDOWN							
EN Voltage Range	V_{EN}	-40°C to +85°C		-0.3	-	V_{IN}+0.3	V
EN Input Threshold	V_{IH}	V_{IN} = V_{OUT}+ 2Vto 36V -40°C to +85°C		1.1	-	-	V
	V_{IL}	V_{IN} = V_{OUT}+ 2Vto 36V -40°C to +85°C		-	-	0.4	
EN Input Bias Current	I_{BH}	EN=36V		-	0.01	1	μA
	I_{BL}	EN=0V, -40°C to +85°C		-	0.01	1	
Shutdown Supply Current	$I_{Q(SHDN)}$	EN=0V, -40°C to +85°C		-	1.0	2	μA
Start-Up Time (5)	t_{STR}	C_{OUT} = 1μF, No Load		-	230	-	μs

NOTE:

(1) V_{IN} = $V_{OUT\ (NOMINAL)}$ or 2.5V, whichever is greater.

(2) Maximum output current is affected by the PCB layout, size of metal trace, the thermal conduction path between metal layers, ambient temperature and the other environment factors of system. Attention should be paid to the dropout voltage when V_{IN} < V_{OUT} + V_{DROP}.

(3) The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} is 100mV below the value of V_{OUT} for V_{IN} = $V_{OUT\ (NOMINAL)}$ + 2V.

(4) Output voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.

(5) Time needed for V_{OUT} to reach 90% of final value.

TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 5.3V, V_{OUT} = 3.3V, C_{IN} = C_{OUT} = 1μF, T_A = 25°C, unless otherwise noted.

Fig 1. Line-Transient Response

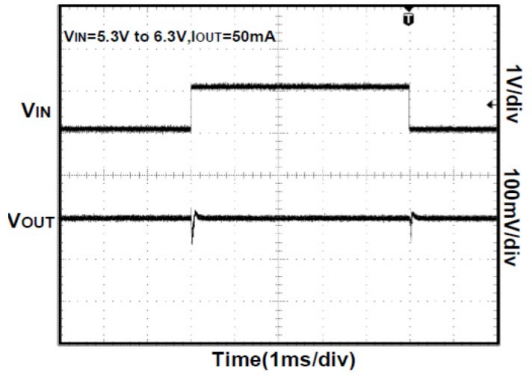


Fig 2. Load-Transient Response

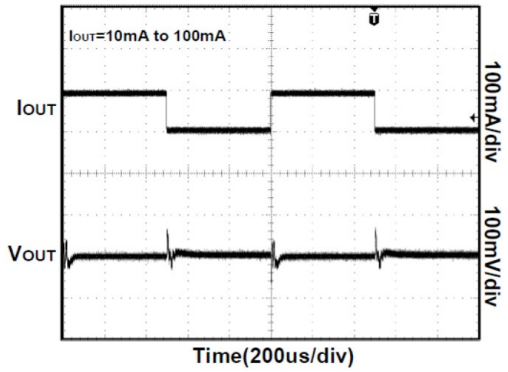


Fig 3. Power-Up/Power-Down Output Waveform

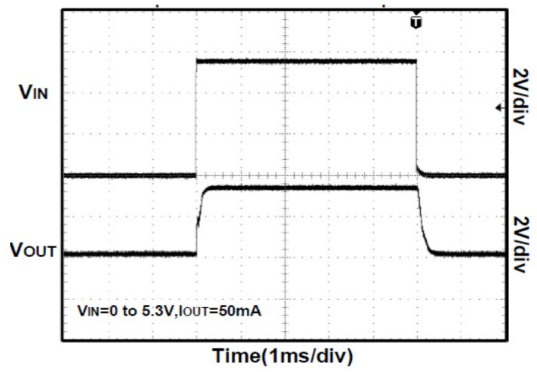


Fig 4. Output Short Waveform

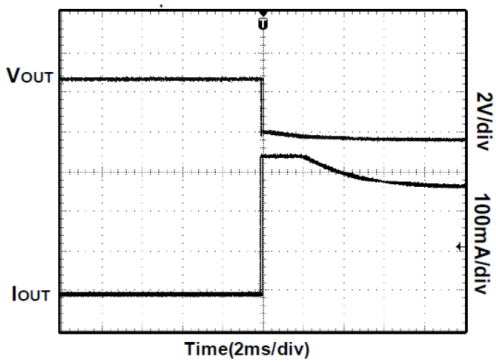


Fig 5. Dropout Voltage vs. Temperature

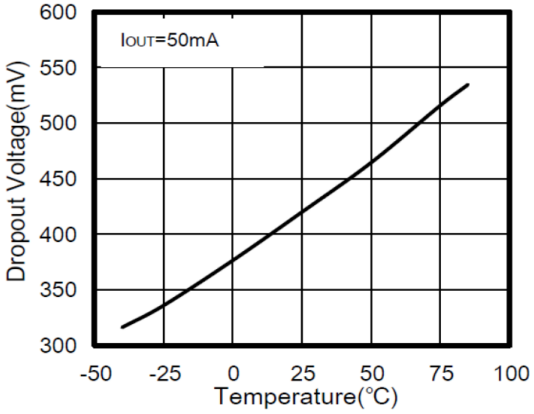


Fig 6. Dropout Voltage vs. Output Current

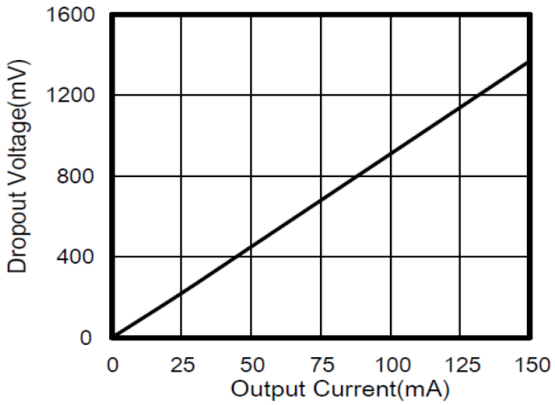


Fig 7. Ground Pin Current vs. Input Voltage

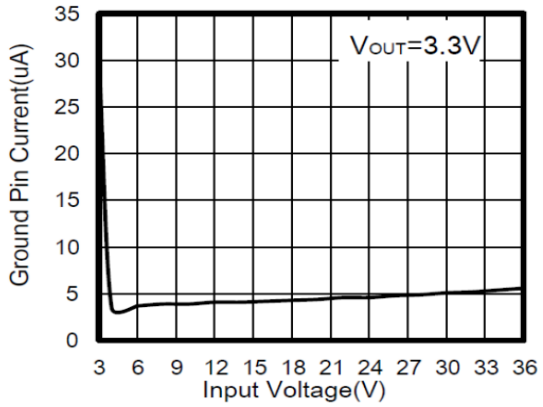


Fig 8. Ground Pin Current vs. Load Current

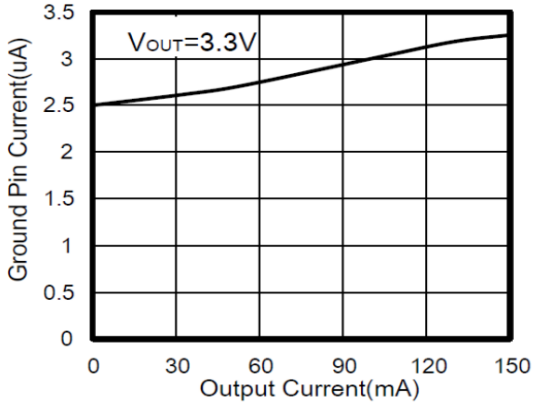


Fig 9. Line Regulation

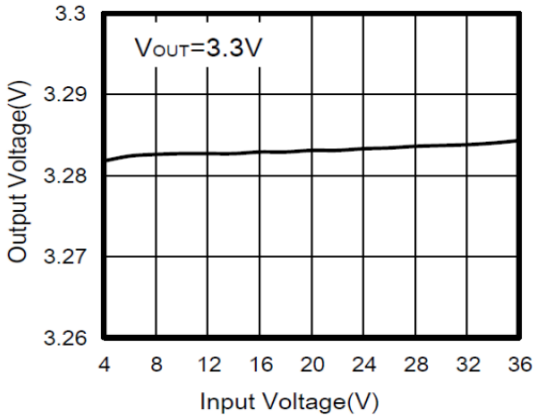
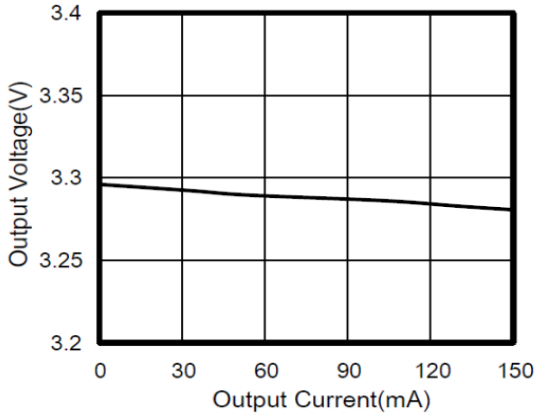
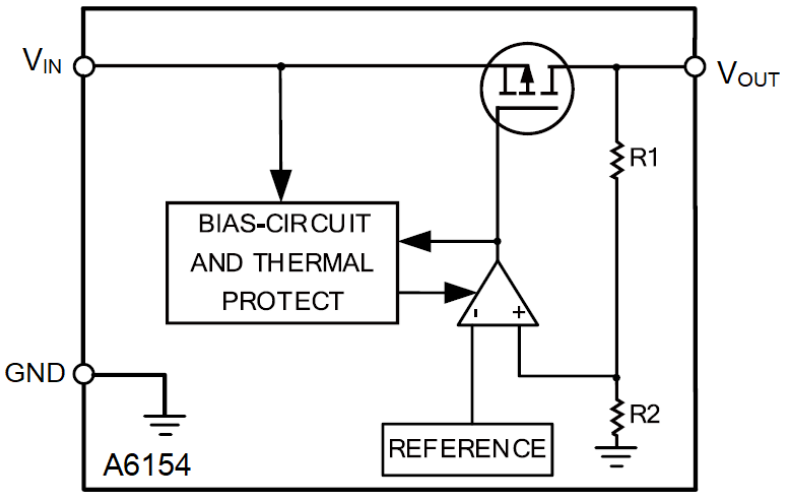


Fig 10. Load Regulation (V_{OUT}=3.3V)



BLOCK DIAGRAM



DETAILED INFORMATION

Overview

The A6154 low-dropout regulators (LDO) consumes only 2.5 μA of quiescent current at light load and delivers excellent line and load transient performance. These characteristics, combined with low noise and good PSRR with low dropout voltage, make this device ideal for portable consumer applications.

Thermal Considerations

When the junction temperature is too high, the thermal protection circuitry sends a signal to the control logic that will shut down the IC. The IC will restart when the temperature has sufficiently cooled down. The maximum power dissipation is dependent on the thermal resistance of the case and the circuit board, the temperature difference between the die junction and the ambient air, and the rate of air flow. The GND pin must be connected to the ground plane for proper dissipation.

Operation with V_{IN} Lower Than 2.5V

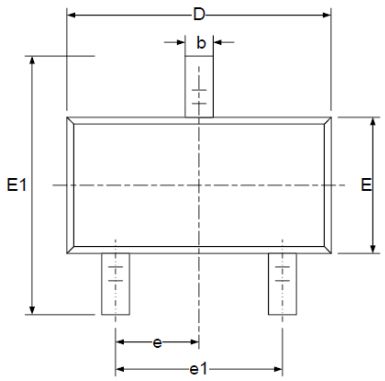
The device normally operates with input voltages above 2.5V. At input voltages below the 2.5V, the device does not operate.

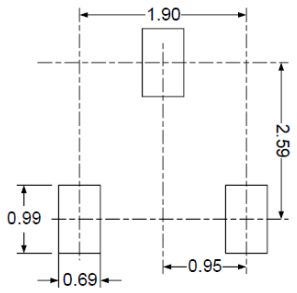
Operation with V_{IN} Larger Than 2.5V

When V_{IN} is greater than 2.5V, if V_{IN} is also higher than the output set value plus the device dropout voltage, V_{OUT} is equal to the set value. Otherwise, V_{OUT} is equal to V_{IN} minus the dropout voltage.

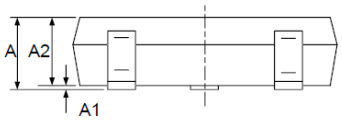
PACKAGE INFORMATION

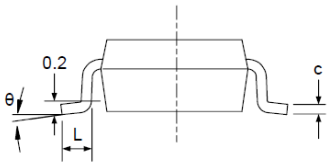
Dimension in SOT-23 (Unit: mm)





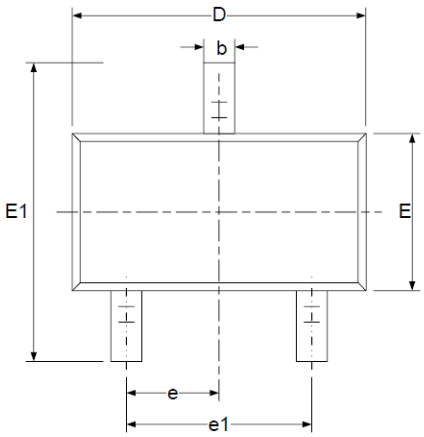
RECOMMENDED LAND PATTERN (Unit: mm)

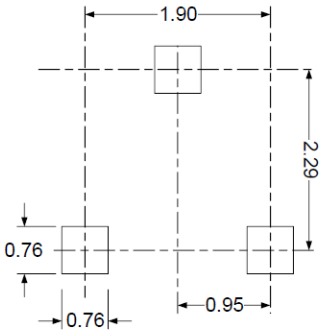




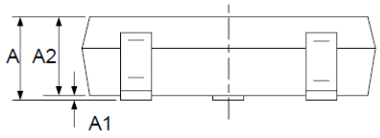
Symbol	Min.	Max.
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

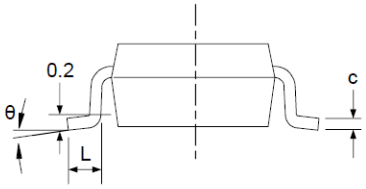
Dimension in SOT-23S (Unit: mm)





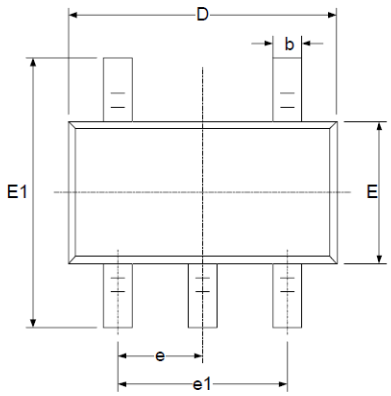
RECOMMENDED LAND PATTERN (Unit: mm)

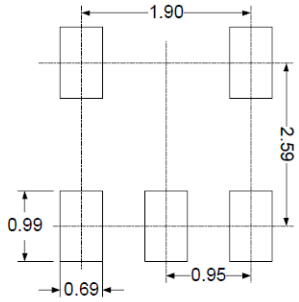




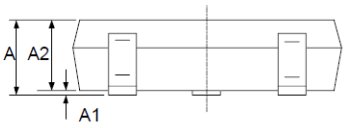
Symbol	Min.	Max.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.500
θ	0°	8°

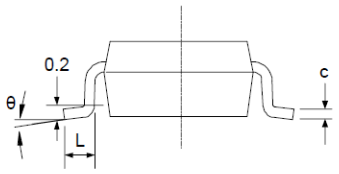
Dimension in SOT-25 (Unit: mm)





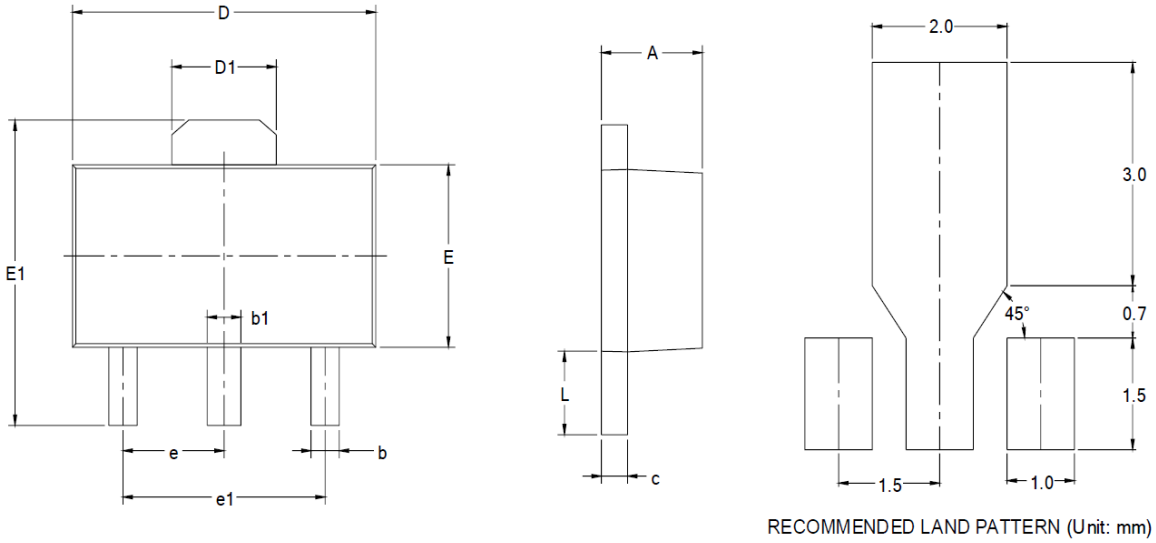
RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

Dimension in SOT89-3 (Unit: mm)



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Min	Max
A	1.400	1.600
b	0.320	0.520
b1	0.400	0.580
c	0.350	0.440
D	4.400	4.600
D1	1.550 REF	
E	2.300	2.600
E1	3.940	4.250
e	1.500 BSC	
e1	3.000 BSC	
L	0.900	1.200

IMPORTANT NOTICE

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