SK6512S High Voltage, Low Power LDO

DESCRIPTION

The SK6512S is a high voltage, low power consumption and high performance LDO. The family uses an advanced CMOS process and a PMOSFET pass device to achieve fast start-up, with high output voltage accuracy. The SK6512S is stable with a 1.0 µF ~ 10 µF ceramic output capacitor, and uses a precision voltage reference and feedback loop to achieve a worst-case accuracy of 2% over all load, line, process, and temperature variations.

FEATURES

- Wide Input Voltage Range: up to 36 V
- Output Current: 200 mA
- Standard Fixed Output Voltage Options: 1.8 V, 2.5 V, 3.0 V, 3.3 V, 3.6 V, and 5.0 V
- Other Output Voltage Options Available on Request
- Low IQ: 1.5 µA
- Low Dropout Voltage
- Short current protection: 100 mA
- Excellent Load / Line Transient Response
- Line Regulation: 0.01 %/V typical
- Package: DFN1×1-4, SOT23-3, SOT23-5, SOT89-3

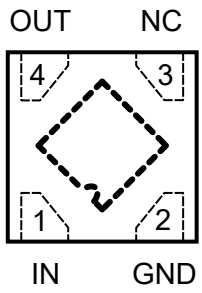
ORDER INFORMATION

Model	Package	Ordering Number	Packing Option
SK6512S	DFN1×1-4	SK6512SD4-XX	Tape and Reel, 10000
	SOT23-3	SK6512SS3-XX	Tape and Reel, 3000
	SOT23-5	SK6512SS5-XX	Tape and Reel, 3000
	SOT89-3 (L-Type)	SK6512ST3A-XX	Tape and Reel, 1000
	SOT89-3	SK6512ST3B-XX	Tape and Reel, 1000

*XX: When expressed as 18, the output voltage is 1.8 V; when expressed as 30 the output voltage is 3.0 V.

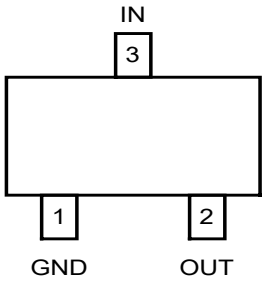
PIN CONFIGURATION(TOP VIEW)

SK6512SD4-XX



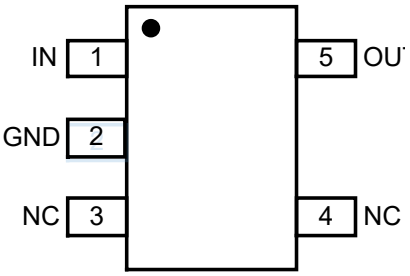
DFN1×1-4

SK6512SS3-XX



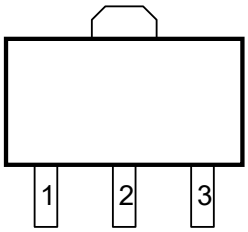
SOT23-3

SK6512SS5-XX



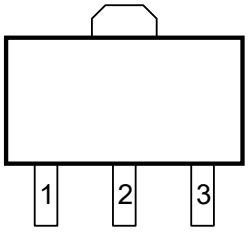
SOT23-5

SK6512ST3A-XX



SOT89-3(L-Type)

SK6512ST3B-XX

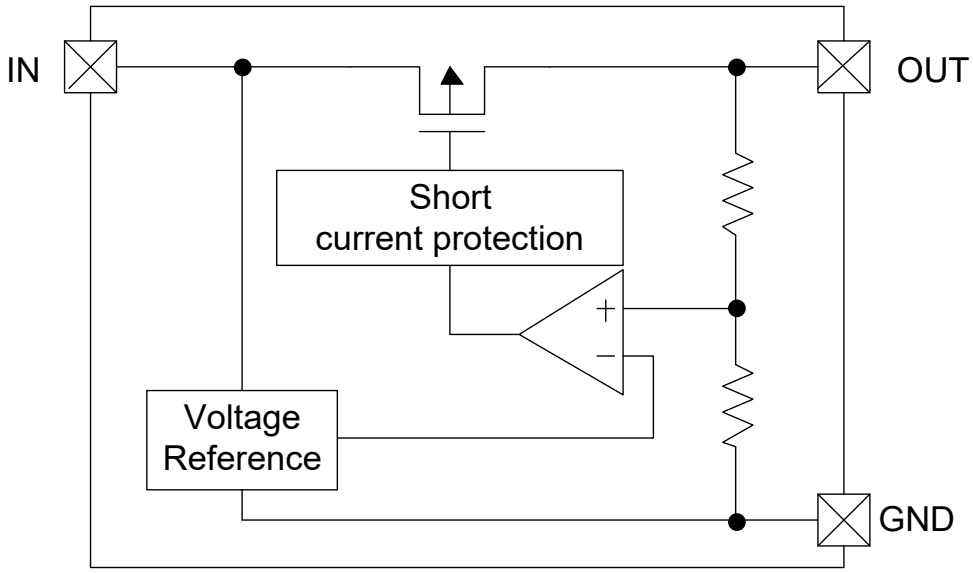


SOT89-3

PIN DESCRIPTIONS

Pin					Symbol	Description
DFN1×1-4	SOT23-3	SOT23-5	SOT89-3 (L-Type)	SOT89-3		
1	3	1	3	2	IN	Supply input pin. Must be closely decoupled to GND with a 1 μF or greater ceramic capacitor.
2	1	2	2	1	GND	Ground.
3		3, 4			NC	No connection.
4	2	5	1	3	OUT	Output pin. Bypass a 1 μF or greater ceramic capacitor from this pin to ground.

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

Input Capacitor

A 1 μF – 10 μF ceramic capacitor is recommended to connect between V_{IN} and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both V_{IN} and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is from 1 μF to 10 μF, Equivalent Series Resistance (ESR) is from 5 mΩ to 100 mΩ, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot / overshoot. Place output capacitor as close as possible to OUT and GND pins.

Low Quiescent Current

The SK6512S, consuming only 1.5 μA for all input range or output loading. provides great power saving in portable and low power applications.

Short Current Limit Protection

When output current at the OUT pin is higher than current limit threshold or the OUT pin is short-circuit to GND, the short current limit protection will be triggered and clamp the output current to approximately 100 mA to prevent over-current and to protect the regulator from damage due to overheating.

ABSOLUTE MAXIIMUM RATINGS

Parameter	Rating		Unit
IN pin to GND pin	-0.3 to 40		V
OUT pin to GND pin	-0.3 to 6		V
Thermal Resistance (Junction to Ambient)	SOT23-3	360	℃/W
	SOT23-5	250	
	DFN1×1-4	180	
	SOT89-3	135	
Operating Junction Temperature	-40 to 125		℃
Storage Temperature	-65 to 150		℃
Lead Temperature (Soldering, 10 sec)	300		℃
ESD (HBM mode)	ESDA/JEDEC JS-001-2017		±2000V

ELECTRICAL CHARACTERISTICS

V_{IN} = V_{OUT} + 2 V, T_A = 25°, C_{IN} = 10 μf, C_{OUT} = 10 μf unless otherwise noted.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Operation Range	V_{IN}				36	V
Dropout Voltage	V_{DROP}	V_{OUT} = 5 V, I_{OUT} = 150 mA		720		mV
		V_{OUT} = 5 V, I_{OUT} = 100 mA		420		
		V_{OUT} = 3.3 V, I_{OUT} = 150 mA		820		
		V_{OUT} = 3.3 V, I_{OUT} = 100 mA		520		
DC Supply Quiescent Current	I_Q			1.5	3	μA
Regulated Output Voltage	V_{OUT}	I_{OUT} = 1 mA	V_{OUT} × 0.98		V_{OUT} × 1.02	V
Output Voltage Line Regulation	Reg_{LINE}	V_{IN} = V_{OUT} + 1 V to 30 V, I_{OUT} = 10 mA (ΔV_{OUT} / ΔV_{IN} / V_{OUT})		0.01	0.04	%/V
Output Voltage Load Regulation	Reg_{LOAD}	I_{OUT} from 1 mA to 150 mA V_{IN} = V_{OUT} + 2 V		5	20	mV
		I_{OUT} from 1 mA to 150 mA V_{IN} = 10 V		25	60	mV
Maximum Output Current	I_{OUT}	V_{IN} = V_{OUT} + 1 V	200			mA
Short Current Protection	I_{SHORT}	OUT short to GND		100		mA
Output Noise	e_N	10 Hz to 100 kHz, I_{OUT} = 30 mA		90		μV_{RMS}

TYPICAL PERFORMANCE CHARACTERISTICS

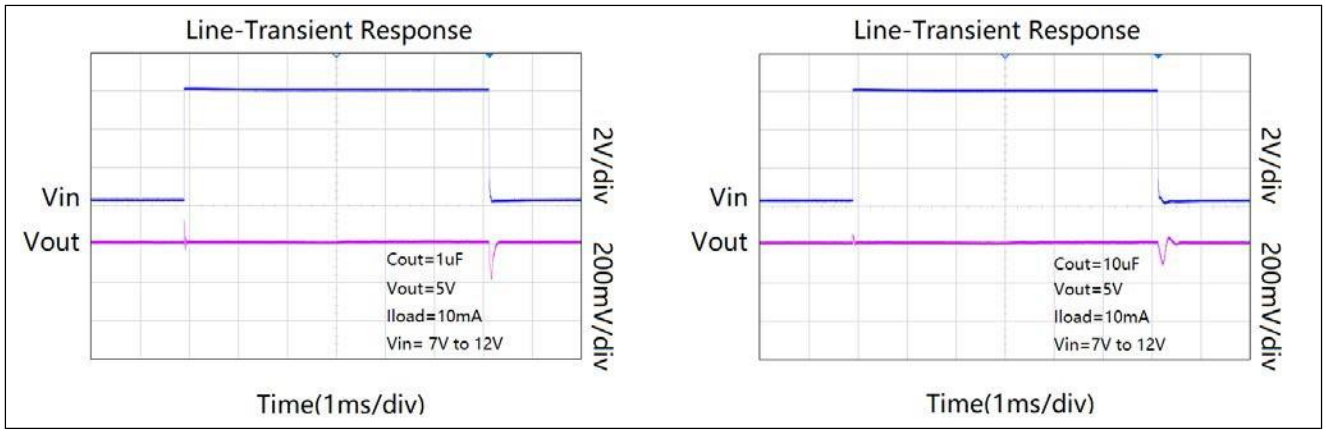


Fig1. Line-Transient Response

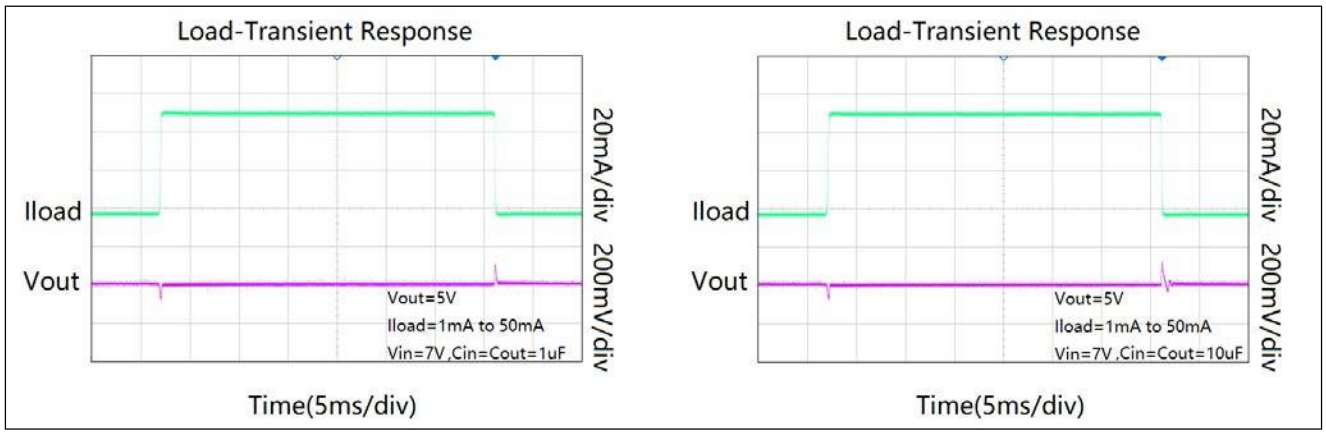


Fig2. Load-Transient Response

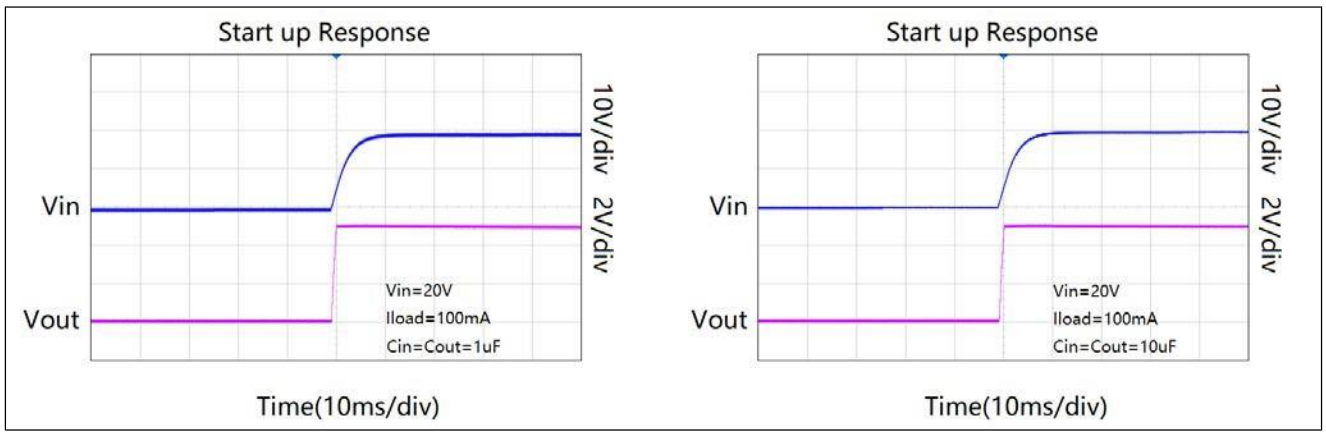
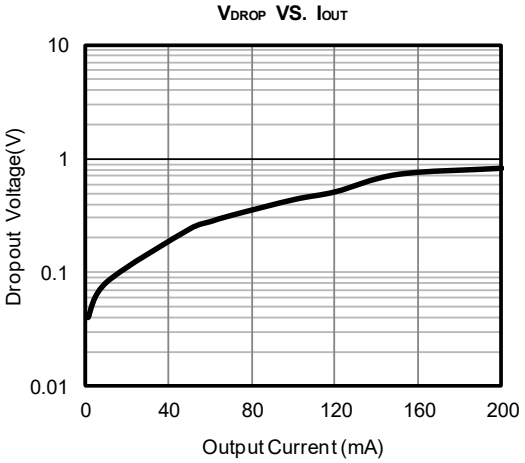


Fig3. Start up Response



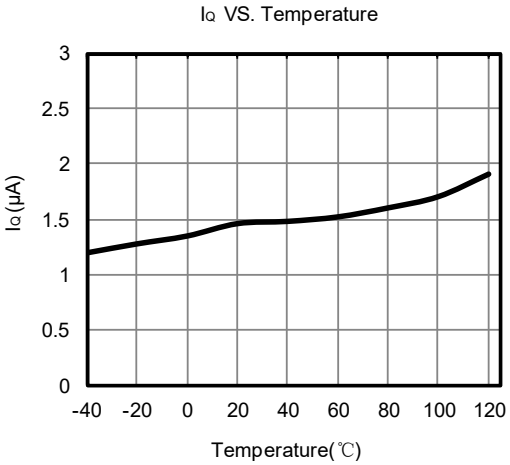
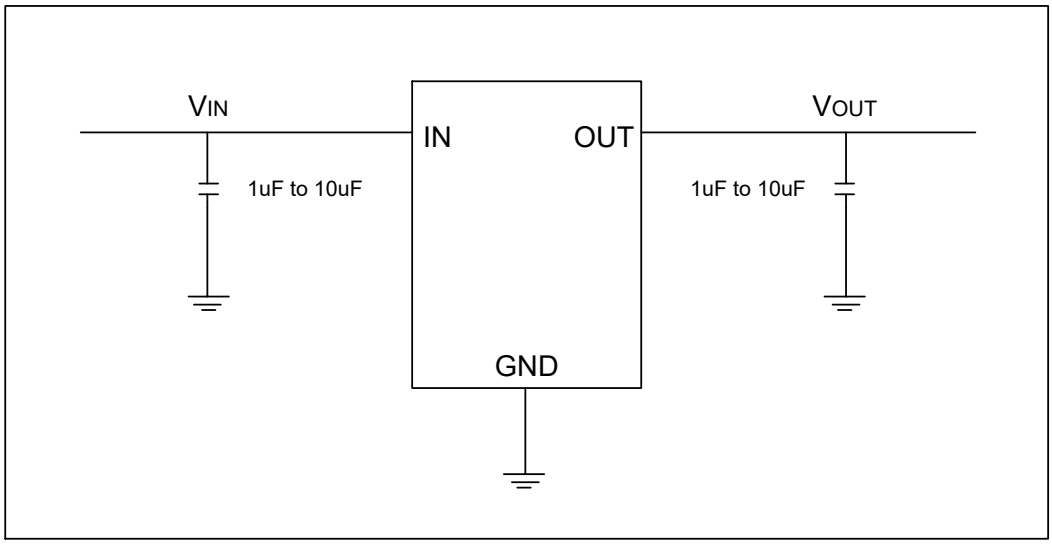


Fig4. Dropout Voltage VS Output Current

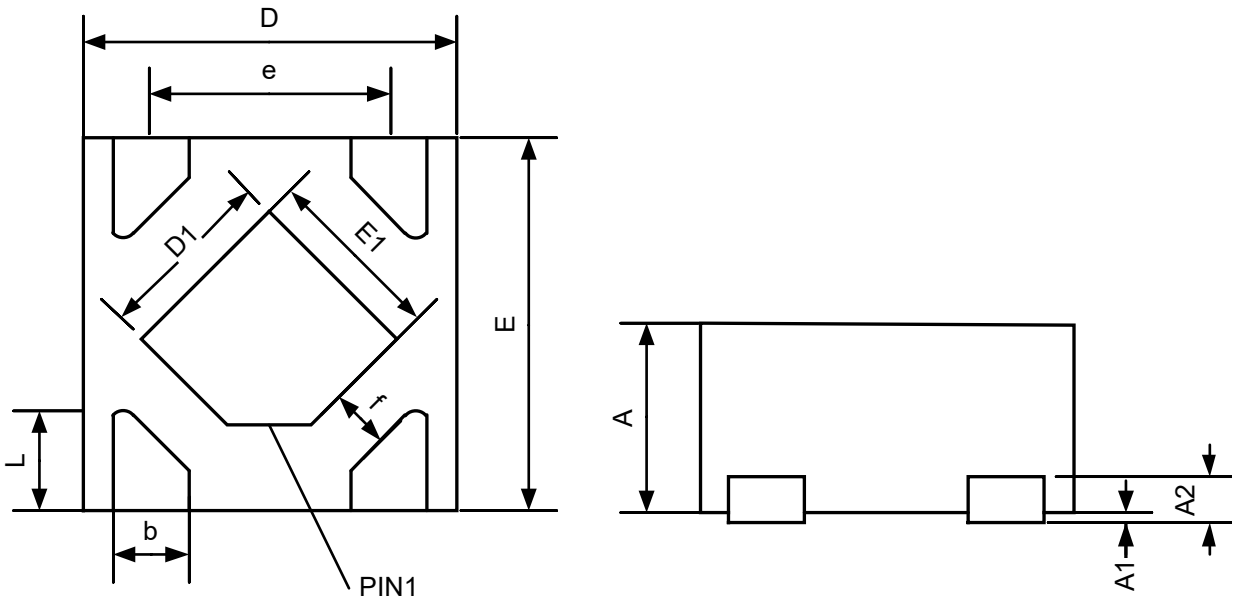
Fig5. DC Supply Quiescent Current VS Temperature

APPLICATION CIRCUITS



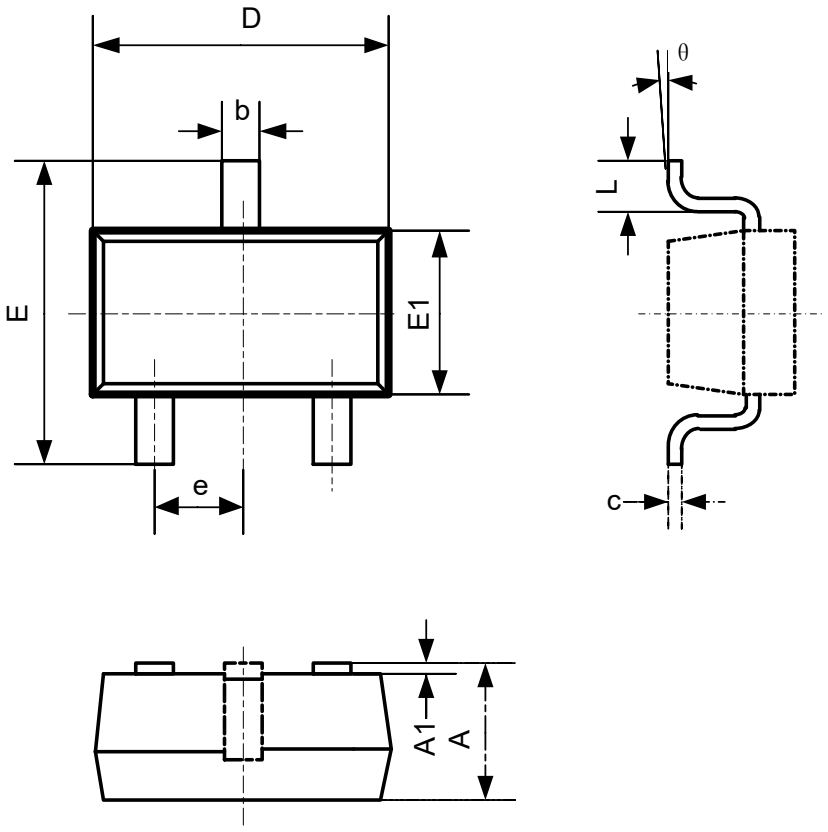
PACKAGE OUTLINE

DFN1×1-4



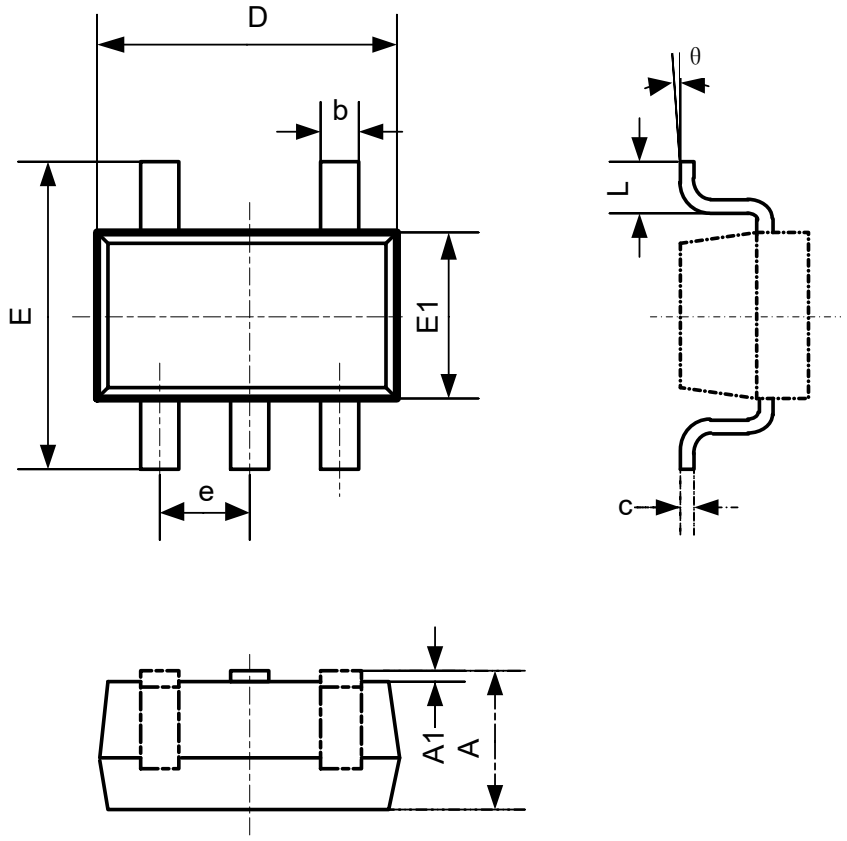
Symbol	Dimensions In Millimeters	
	Min	Max
A	0.45	0.55
A1	0.00	0.05
A2	0.125REF	
b	0.15	0.25
D	0.95	1.05
D1	0.38	0.58
E	0.95	1.05
E1	0.38	0.58
e	0.65BSC	
L	0.15	0.35

SOT23-3



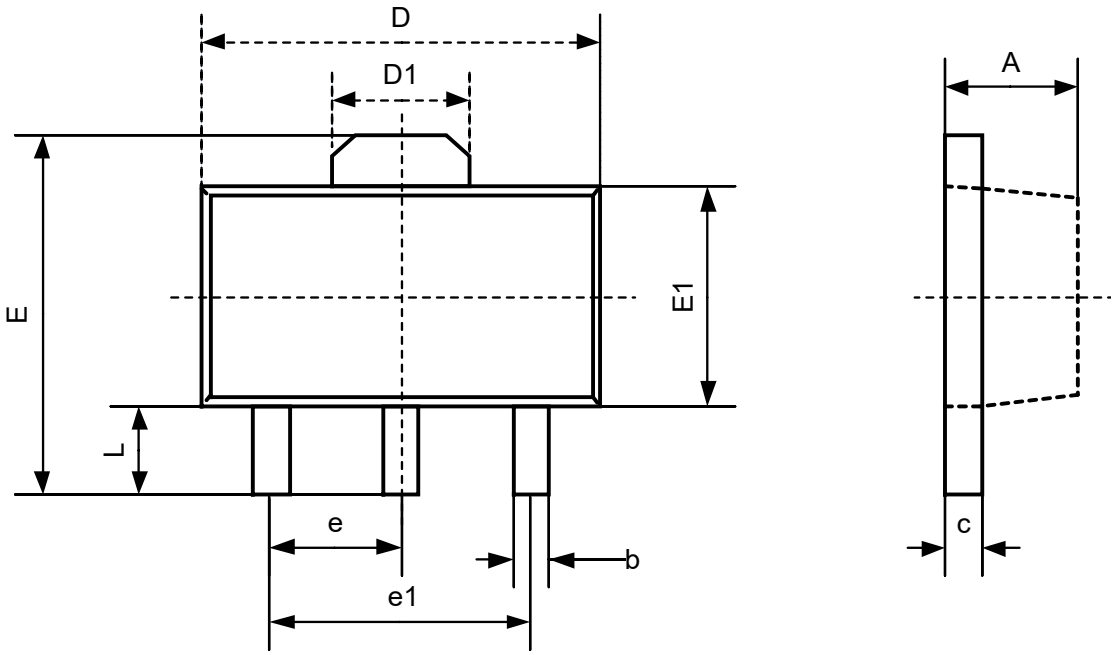
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.25
A1	0.00	0.10
b	0.30	0.40
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95BSC	
L	0.30	0.60
θ	0°	8°

SOT23-5



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.25
A1	0.00	0.10
b	0.35	0.50
c	0.08	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.60	1.70
e	0.95BSC	
L	0.30	0.60
θ	0°	8°

SOT89-3



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.40	1.60
b	0.32	0.52
c	0.35	0.44
D	4.40	4.60
D1	1.55BSC	
E	3.94	4.25
E1	2.30	2.60
e	1.50BSC	
e1	3.00BSC	
L	0.90	1.20
θ	0°	8°