High Voltage, Low Power LDO

DESCRIPTION

The SUM3558 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 SUM3558 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: 150 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: 2 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

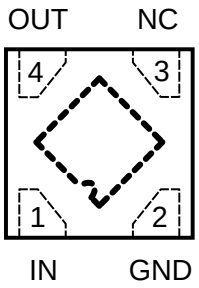
ORDER INFORMATION

Model	Package	Ordering Number	Packing Option
SUM3558	DFN1×1-4	SUM3558-XXYB	Tape and Reel, 10000
	SOT23-3	SUM3558-XXKA3	Tape and Reel, 3000
	SOT23-5	SUM3558-XXKA5	Tape and Reel, 3000
	SOT89-3	SUM3558-XXP	Tape and Reel, 1000
	SOT89-3 (L-Type)	SUM3558-XXPL	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.

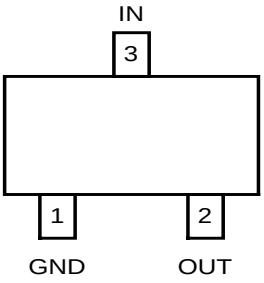
PIN CONFIGURATION(TOP VIEW)

SUM3558-XXYB



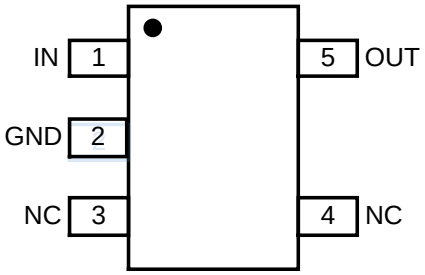
DFN1×1-4

SUM3558-XXKA3



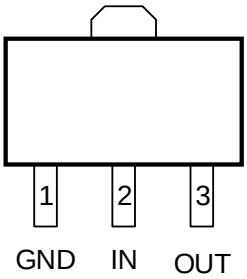
SOT23-3

SUM3558-XXKA5



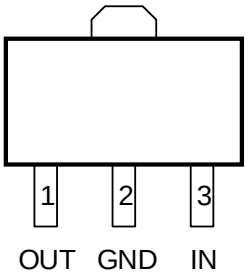
SOT23-5

SUM3558-XXP



SOT89-3

SUM3558-XXP**L**

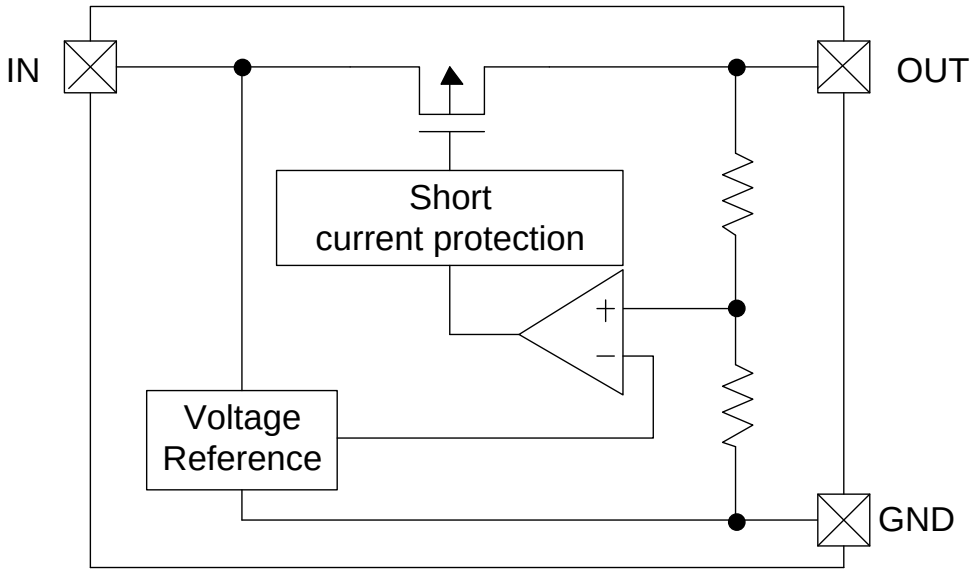


SOT89-3 (L-Type)

PIN DESCRIPTIONS

Pin					Symbol	Description
DFN1×1-4	SOT23-3	SOT23-5	SOT89-3	SOT89-3 (L-Type)		
1	3	1	2	3	IN	Supply input pin. Must be closely decoupled to GND with a 1 μF or greater ceramic capacitor.
2	1	2	1	2	GND	Ground.
3		3, 4			NC	No connection.
4	2	5	3	1	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 SUM3558, consuming only 2 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.

RECOMMENDED OPERATING CONDITIONS

Parameter	Rating	Unit
Operating Temperature Range	-40 to +85	℃

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	280	
	SOT89-3	135	
Junction Temperature	150		℃
Storage Temperature	-65 to 150		℃
Lead Temperature (Soldering, 10 sec)	300		℃
ESD (HBM mode) SDA/JEDEC JS-001-2017E	±3000		V

NOTE:

Stresses beyond 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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD if you don’t pay attention to ESD protection. SUMSEMI recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications. SUMSEMI reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SUMSEMI sales office to get the latest datasheet.

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} = 3.3 V, I_{OUT} = 50 mA	320	390	450	mV
		V_{OUT} = 3.3 V, I_{OUT} = 100 mA	600	750	900	
DC Supply Quiescent Current	I_Q			2	5	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} + 2 V		150		mA
Short Current Protection	I_{SHORT}	OUT short to GND		100		mA
Power Supply Rejection Ratio	PSRR	f = 1 kHz, C_{OUT} = 1 µF I_{OUT} = 10 mA,		60		dB
		f = 10 kHz, C_{OUT} = 1µF I_{OUT} = 10 mA,		45		
Output Noise	e_N	10 Hz to 100 kHz, I_{OUT} = 30 mA		90		μV_{RMS}

TYPICAL PERFORMANCE CHARACTERISTICS

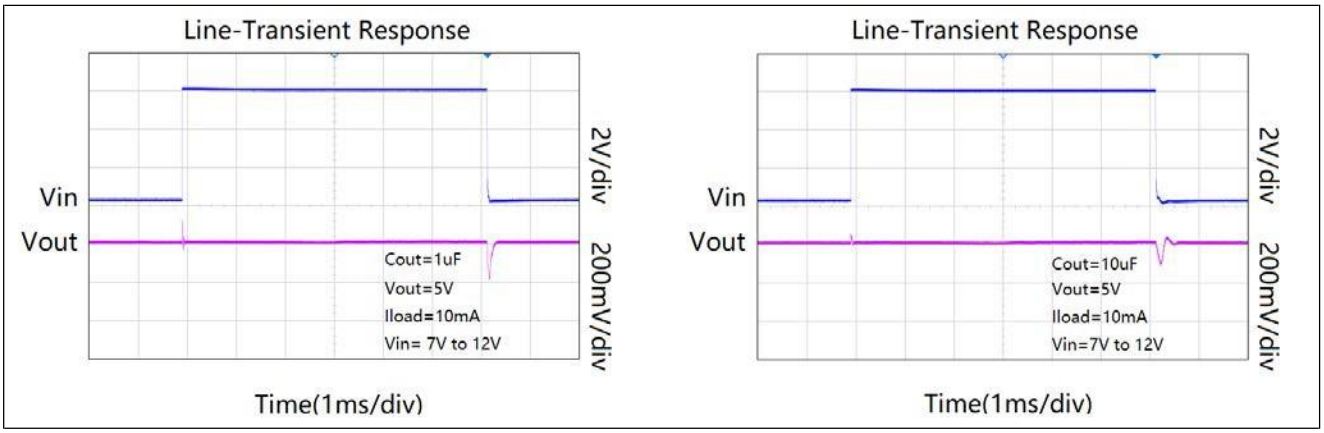


Fig1. Line-Transient Response

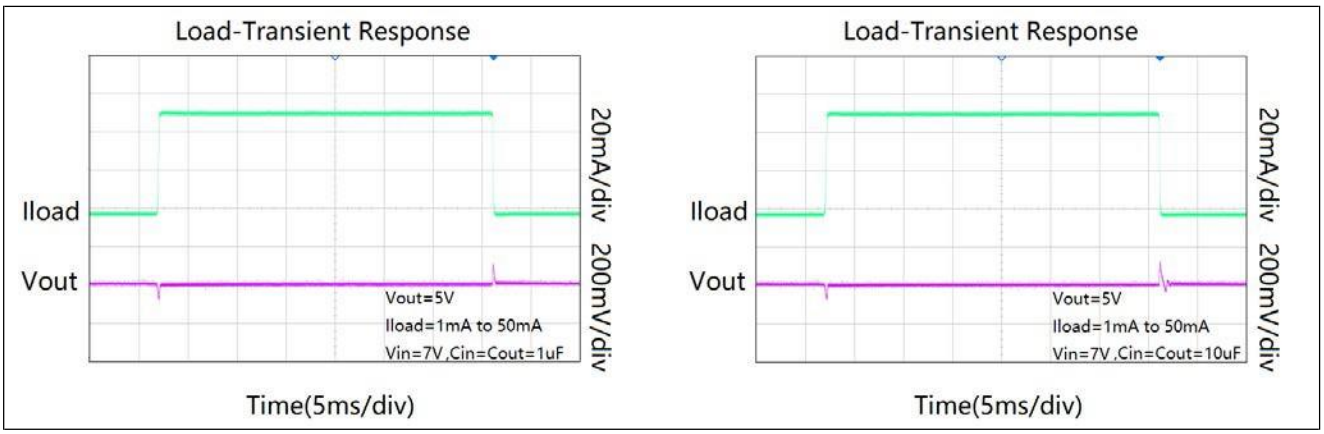


Fig2. Load-Transient Response

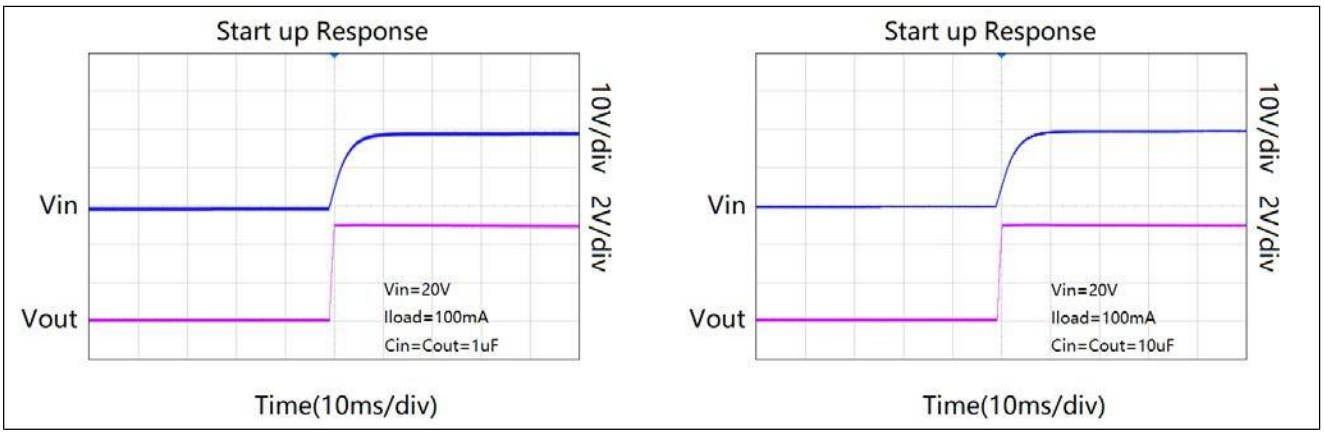


Fig3. Start up Response

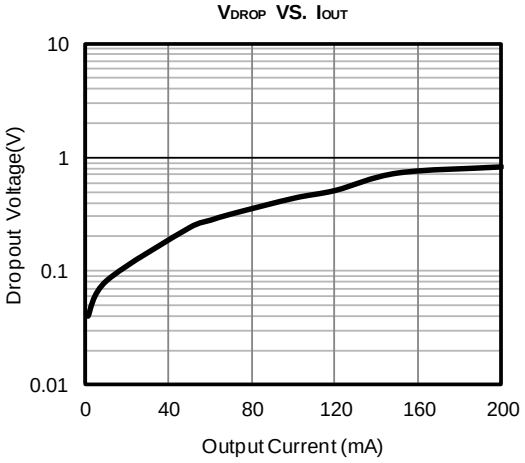


Fig4. Dropout Voltage VS Output Current

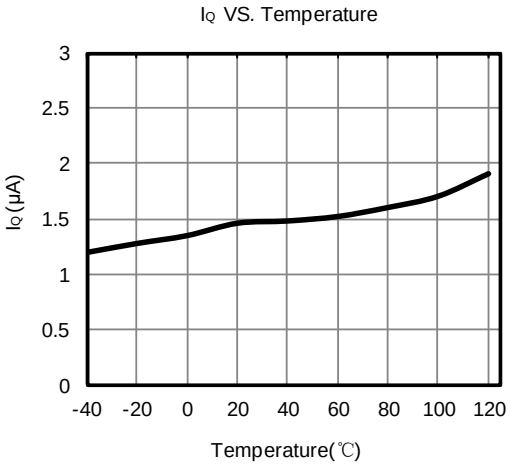
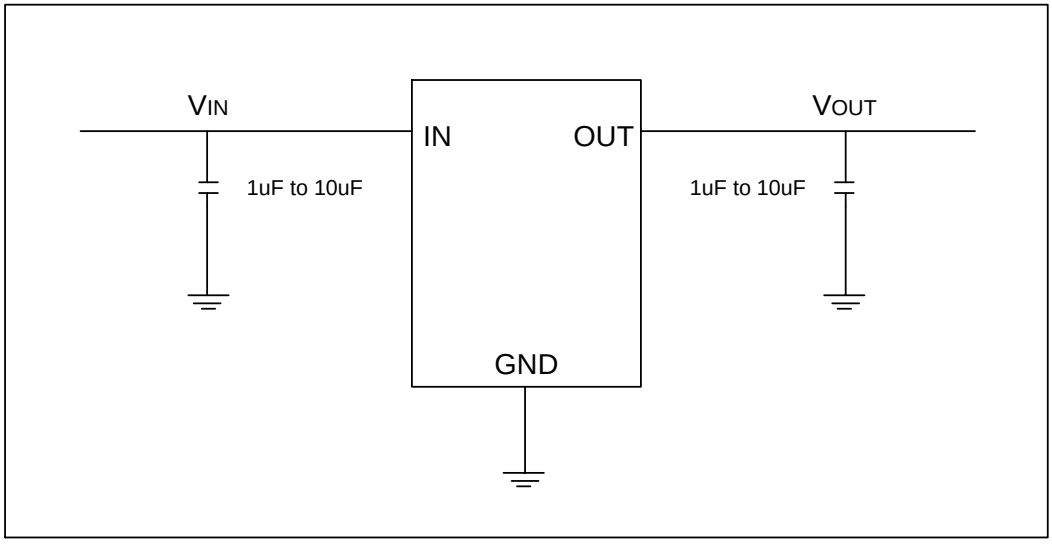


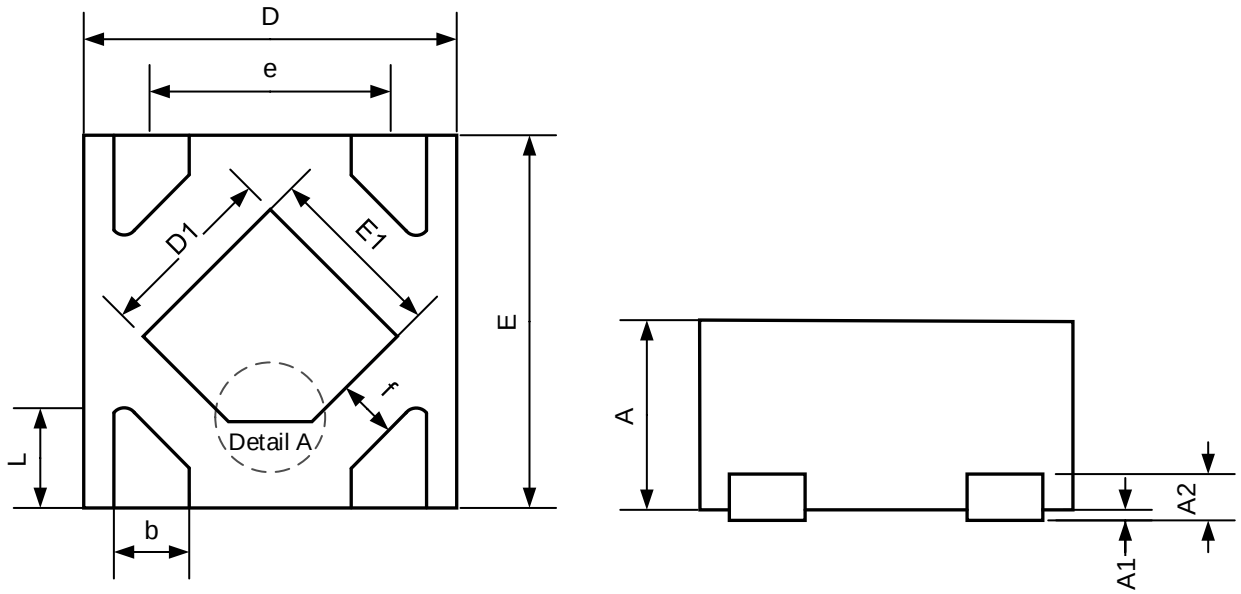
Fig5. DC Supply Quiescent Current VS Temperature

APPLICATION CIRCUITS



PACKAGE OUTLINE

DFN1×1-4

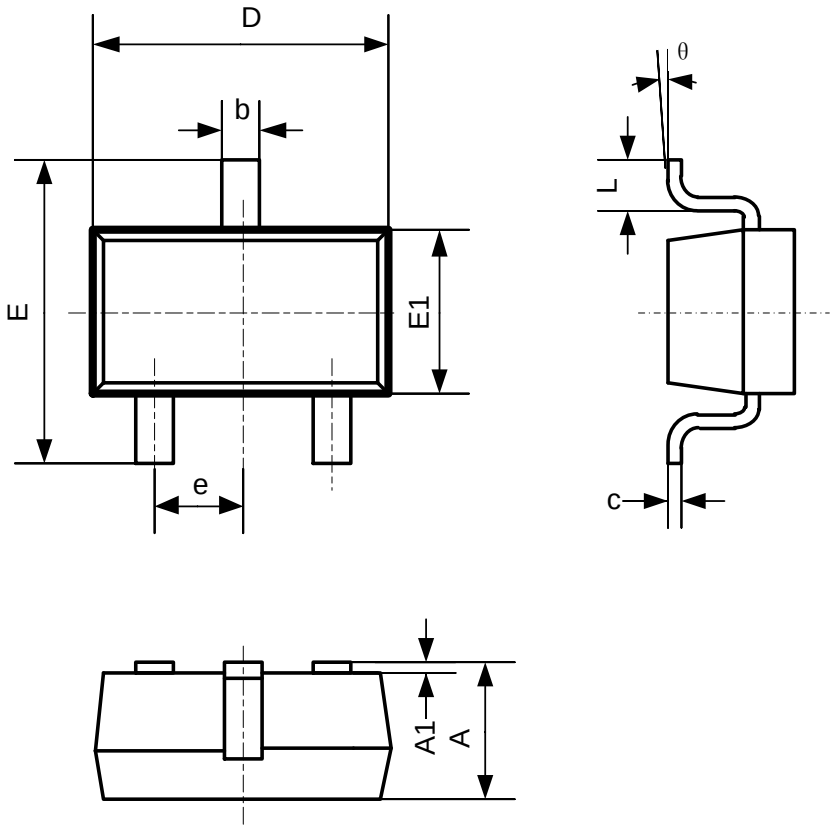


Detail A:

Note: Detail A has two kinds of shapes

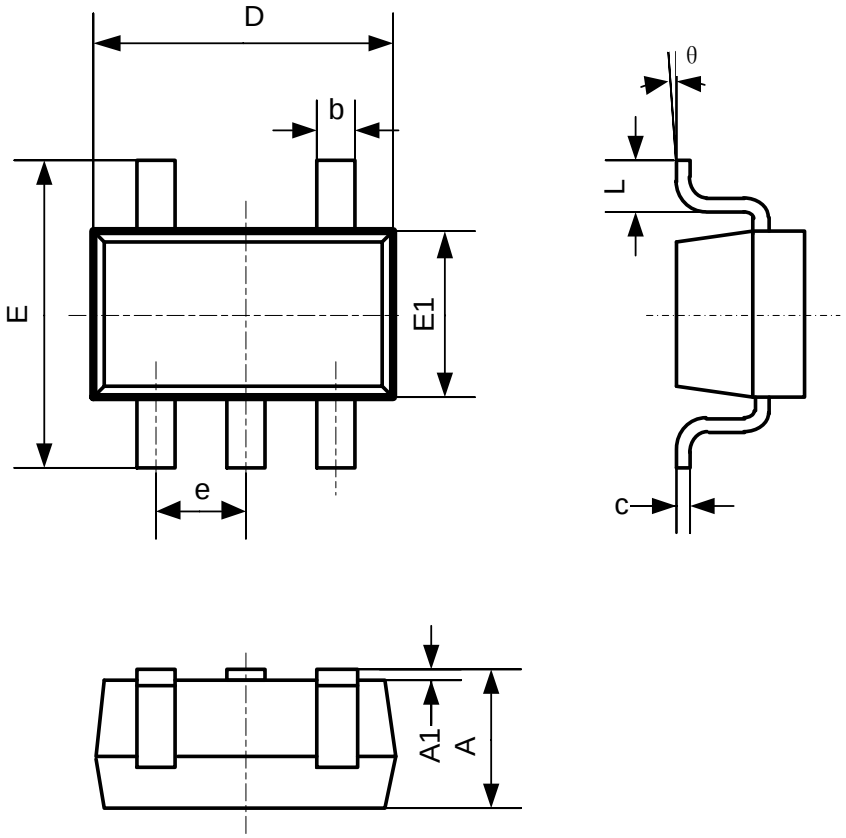
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.400	0.500	0.550
A1	0.000	0.025	0.050
A2	0.125 REF		
D	0.950	1.000	1.050
D1	0.380	0.480	0.580
E	0.950	1.000	1.050
E1	0.380	0.480	0.580
b	0.150	0.200	0.250
e	0.650 BSC		
f	0.190	0.195	0.200
L	0.150	0.250	0.350

SOT23-3



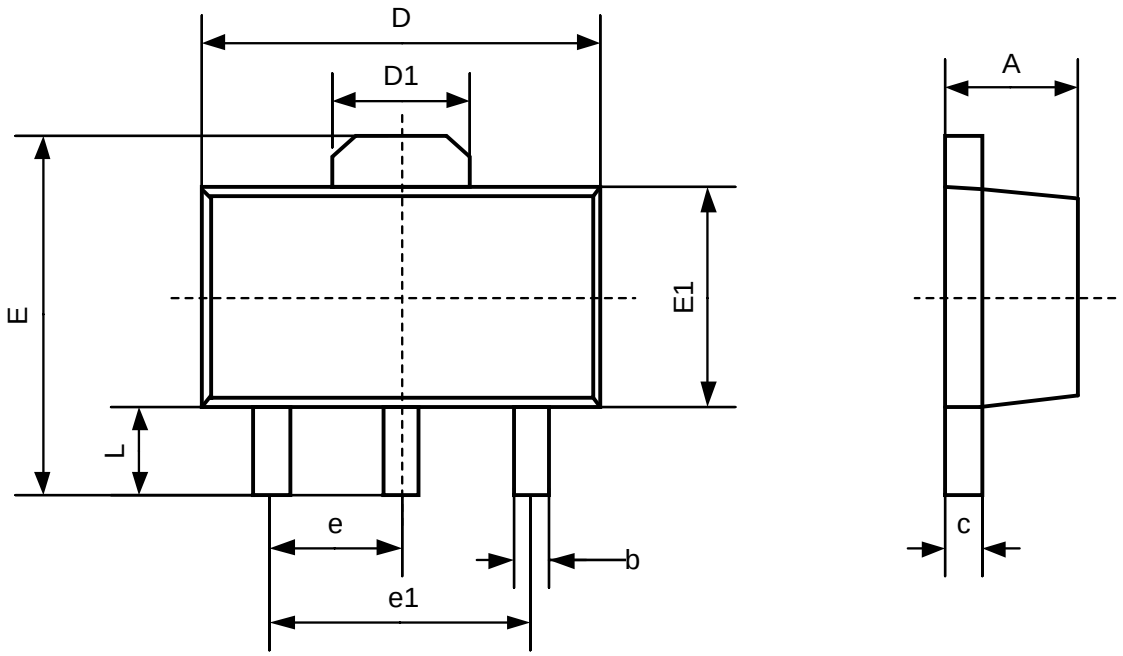
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.25
A1	0.00	0.10
b	0.30	0.40
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95BSC	
L	0.30	0.60
θ	0°	8°

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°

V 2.1