Ultra Low Power LDO

DESCRIPTION

The SUM3578 family of low-dropout (LDO), low-power linear regulators offers very high power supply rejection ratio (PSRR) while maintaining very low 2.1 μA ground current, suitable for RF applications. The family uses an advanced CMOS process and a PMOSFET pass device to achieve fast start-up, very low noise, excellent transient response, and excellent PSRR performance. The SUM3578 is stable with a 1.0 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. It is offered in DFN1.0×1.0-4, SOT23-3, SOT23-5 and SOT89-3(L-Type) packages.

FEATURES

- Operating Voltage Range: 2.1 V ~ 10 V
- Standard Fixed Output Voltage Options : 1.2 V, 1.5 V, 1.8 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V, 3.6 V
- Ultra-low power consumption: 2.1 μA
- Low Dropout Voltage: 75 mV@50 mA/3.3 V
- Output Current: 400 mA
- Output Accuracy: ±2%
- Excellent transient response
- Integrated current limiting protection.
- Integrated short circuit protection.
- Integrated over-temperature protection
- Soft start function
- Package: DFN1.0×1.0-4, SOT23-3, SOT23-5, SOT89-3(L-Type)

APPLICATIONS

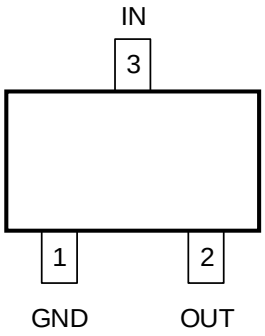
- Smart bracelet, watch and other wearable products.
- Microcontroller product application
- Battery-Powered Devices

ORDER INFORMATION

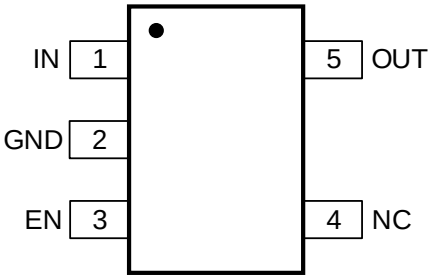
Model	Package	Ordering Number	Packing Option
SUM3578	SOT23-3	SUM3578-XXKA3	Tape and Reel, 3000
	SOT23-5	SUM3578-XXKA5	Tape and Reel, 3000
	DFN1.0 × 1.0-4	SUM3578-XXYB	Tape and Reel, 10000
	SOT89-3(L-Type)	SUM3578-XXPL	Tape and Reel, 1000

*XX: When expressed as 33, the output voltage is 3.3 V.

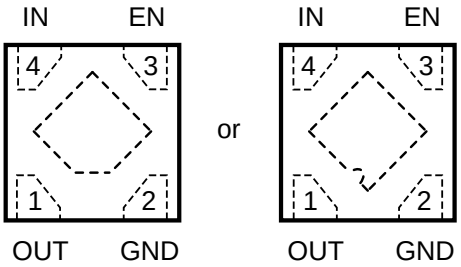
PIN CONFIGURATION



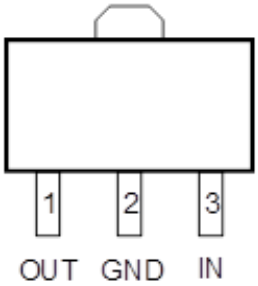
SOT23-3



SOT23-5



DFN1.0 × 1.0-4

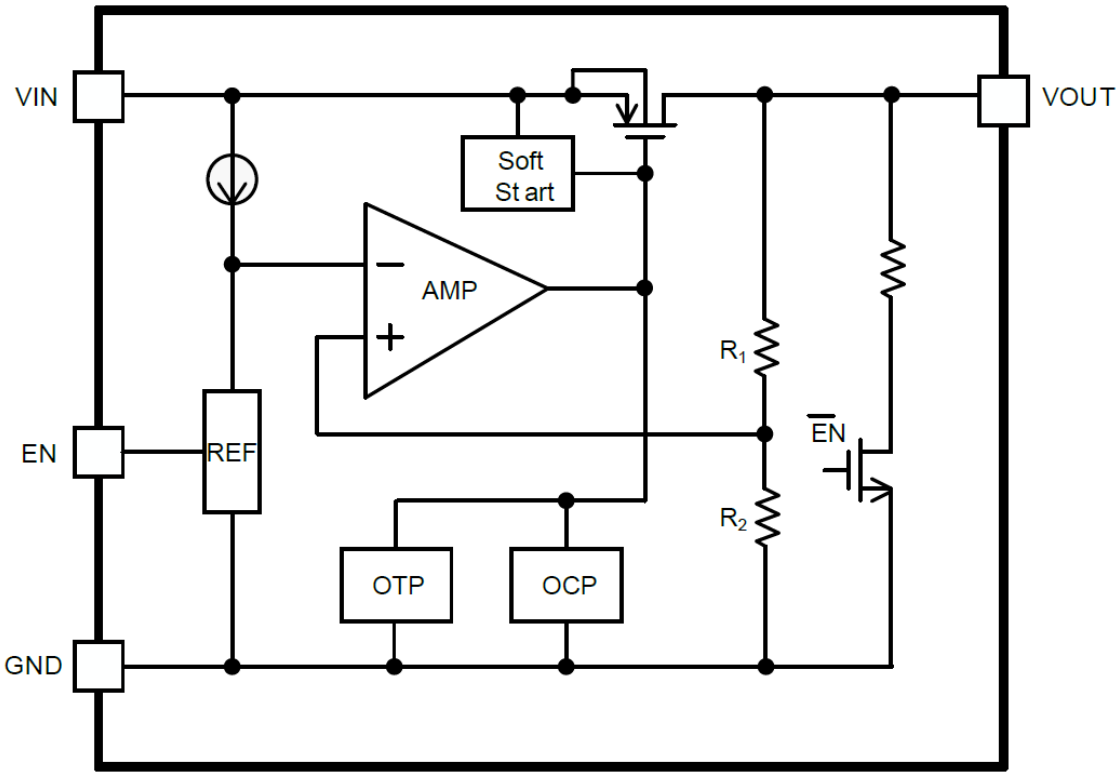


SOT89-3 (L-Type)

PIN FUNCTION

Pin No.				Pin Name	Pin Function
SOT23-5	SOT23-3	DFN1.0 x 1.0-4	SOT89-3 (L-Type)		
1	3	4	3	IN	Supply input pin.
2	1	2	2	GND	Ground.
3		3		EN	Enable control input.
4				NC	No connection.
5	2	1	1	OUT	Output pin.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (1)

Parameter		Rating	Unit
IN Voltage		-0.3 ~ 12	V
EN Voltage		-0.3 ~ 12	V
V_{OUT} Pin Voltage		-0.3 ~ V_{IN}+ 0.3	V
Package Thermal Resistance (2)	SOT23-3	360	℃ /W
	SOT23-5	250	
	DFN1.0 x 1.0-4	280	
	SOT89-3 (L-Type)	135	
Operating Ambient Temperature		-40 ~ 85	℃
Junction Temperature		-40 ~ 150	℃
Storage Temperature		-65 ~ +150	℃
Lead Temperature (Soldering, 10 sec)		260	℃
ESD Susceptibility, Human-body model (per ANSI/ESDA/JEDEC JS-001)		±4000	V

NOTE:

(1) 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.

(2) This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking.

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.

ELECTRIAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

Symbol	Description	Test conditions		Min.	Typ.	Max.	Unit
V_{IN}	Input voltage			2.1		10	V
I_Q	Quiescent Current	$V_{IN} \geqslant V_{OUT}$+1 V			2.1	3	μA
V_{OUT}	Output voltage	$V_{IN} \geqslant V_{OUT}$+1 V		-2		+2	%
I_{OUT_MAX}	Output current				400		mA
V_{DROP}	Dropout Voltage	I_{OUT} = 50 mA	$V_{OUT} \leq$ 2 V		160		mV
			2 V < $V_{OUT} \leq$ 3 V		120		mV
			3 V < $V_{OUT} \leq$ 5 V		75		mV
ΔV_{OUT}	Load Regulation	1 mA ≤ I_{OUT} ≤ 100 mA			0.2	1	%
$\Delta V_{OUT}/ \Delta V_{IN}$	Line Regulation	I_{OUT} = 1 mA, V_{IN}=(V_{OUT}+0.5 V) to 5.5 V			0.1		mV/V
I_{LIMIT}	Current limiting protection				450		mA
I_{SHORT}	Short circuit protection	Output short circuit current to ground			0		mA
PSRR	PSRR	I_{OUT} = 50 mA, f= 1 KHz			76		dB
T_{SHDN}	Over Temperature Protection				130		°C
T_{SHDNR}	Over Temperature Recovery				105		°C

Note: The above PSRR and T_{SHDN} parameters are not 100% fully tested, but are guaranteed by design and characteristics.

TYPICAL PERFORMANCE CHARACTERISTIC

(C_{IN} = C_{OUT}= 1 µF, T_A = 25°C unless otherwise noted)

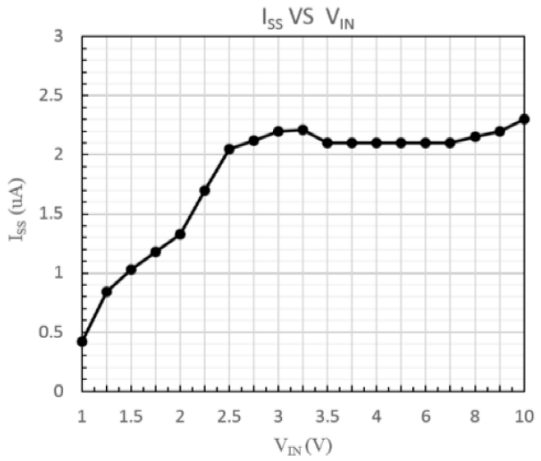


FIG.1 I_{SS} vs V_{IN}(Vout=3.3V，0mA)

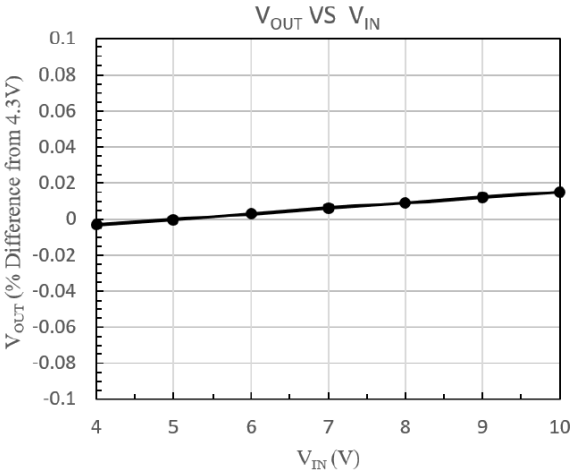


FIG.2 V_{OUT} vs V_{IN}(I_{OUT}=10mA)

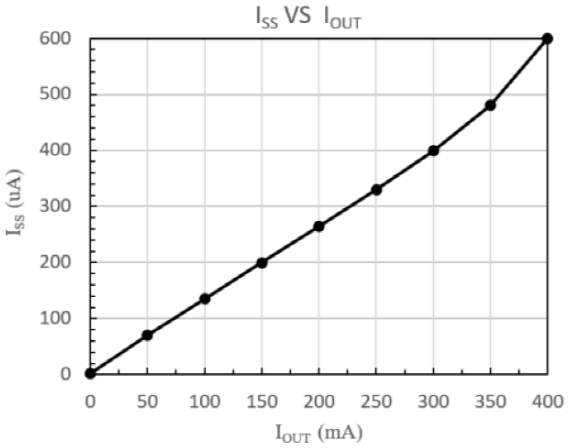


FIG.3 I_{SS} vs I_{OUT} (V_{IN}=4.3V)

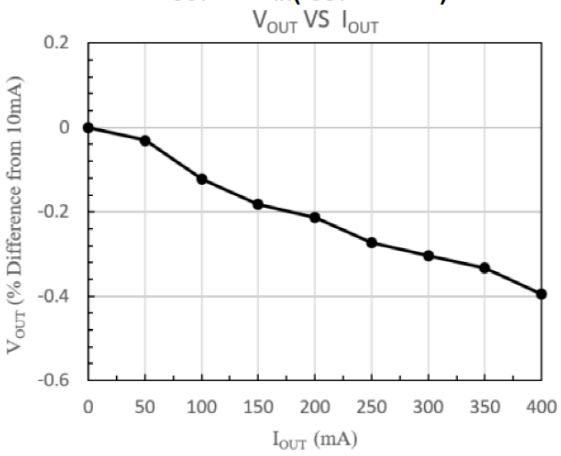


FIG.4 V_{OUT} vs I_{OUT} (V_{IN}=4.3V)

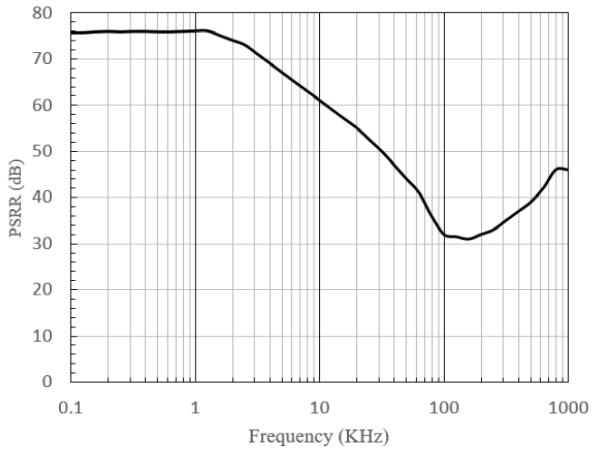


FIG.5 PSRR vs Frequency (V_{IN}=5V+1V_{P-P} I_{OUT}=50mA)

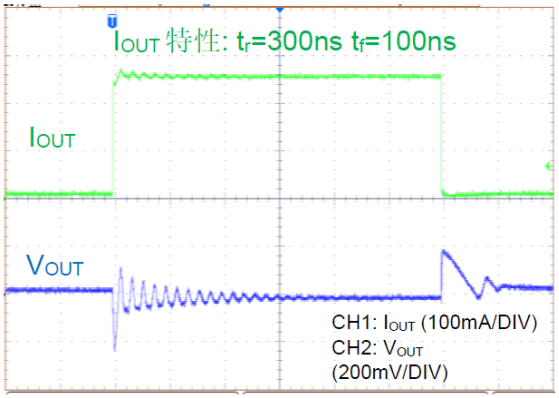


FIG.6 Load Transient Response

TYPICAL PERFORMANCE CHARACTERISTIC

(C_{IN} = C_{OUT}= 1 μF, T_A = 25°C unless otherwise noted)

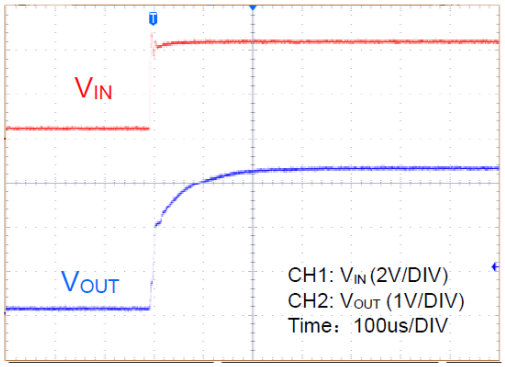


FIG.7 POWER ON (I_{OUT}=0mA, 0V~4.3V)

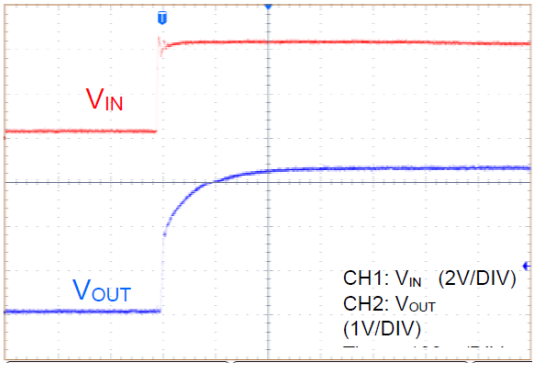
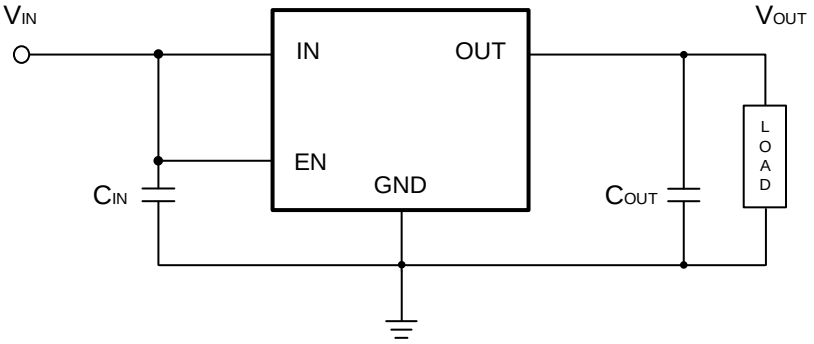


FIG.8 POWER ON (I_{OUT}=150mA, 0V~4.3V)

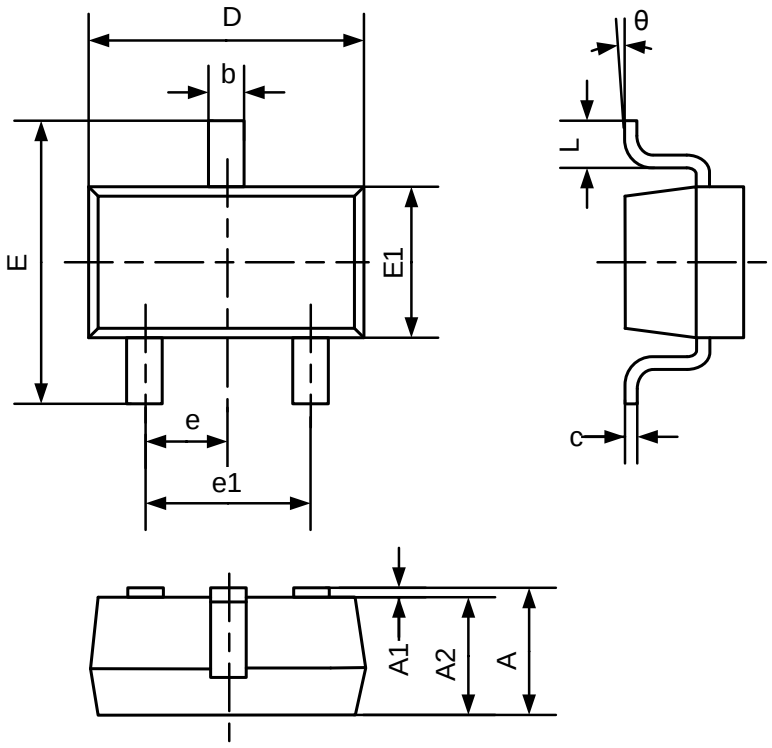
APPLACATION CIRCUITS



Component Symbol	Type	Range	Unit
C_{IN}	1	1~10	μF
C_{OUT}	1	1~10	μF

PACKAGE DIMENSION

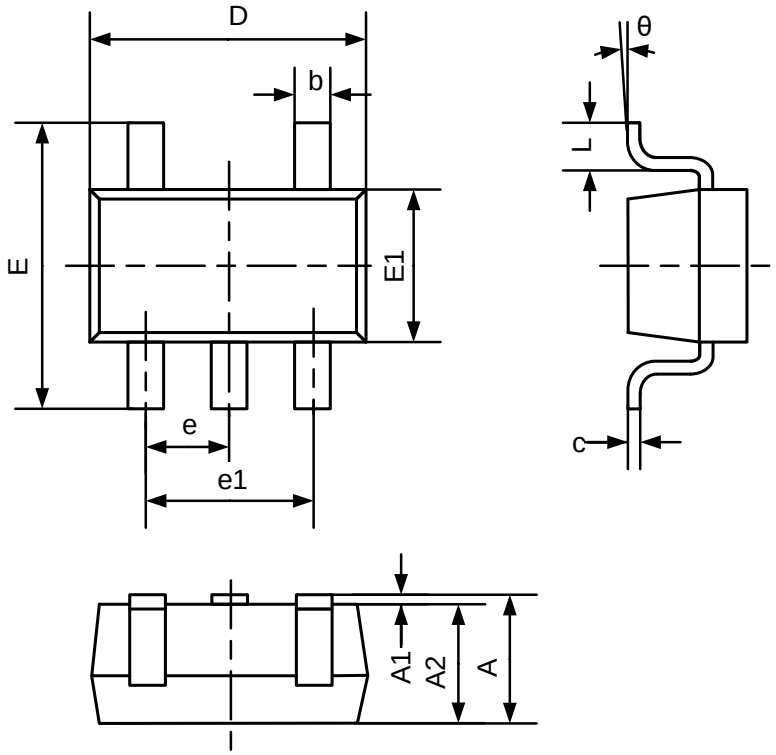
SOT23-3



Symbol	Dimensions In Millimeters	
	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
A2	1.000	1.150
b	0.300	0.400
c	0.100	0.200
D	2.820	3.020
E	2.650	2.950
E1	1.500	1.700
e	0.950BSC	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

PACKAGE DIMENSION

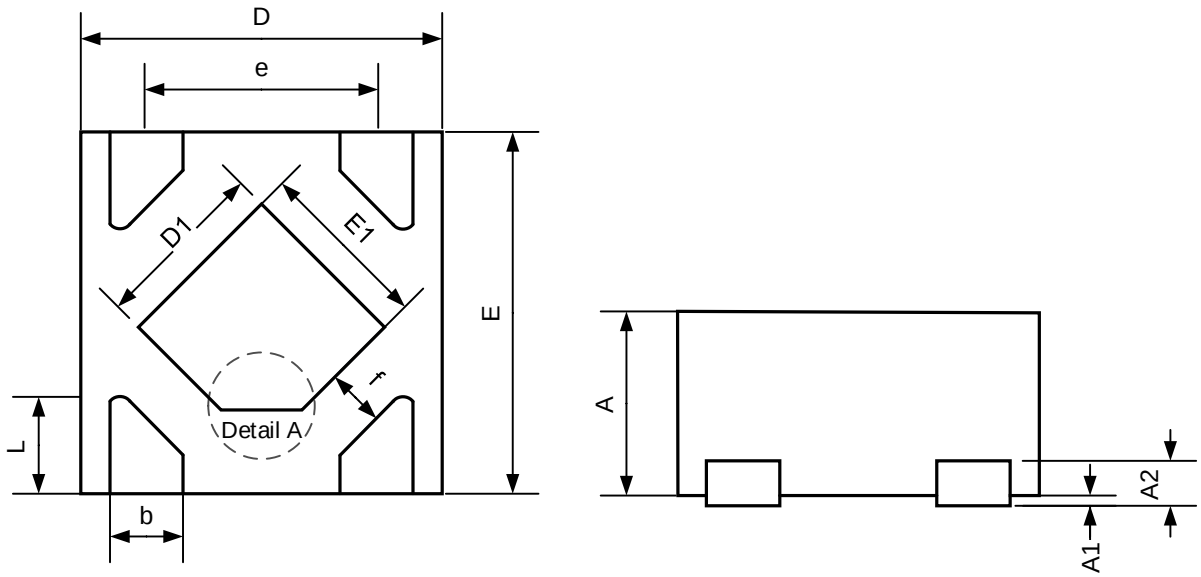
SOT23-5



Symbol	Dimensions In Millimeters	
	MIN	MAX
A	0.700	1.250
A1	0.000	0.100
A2	0.700	1.150
b	0.350	0.500
c	0.080	0.200
D	2.820	3.020
E	2.650	2.950
E1	1.500	1.700
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

PACKAGE DIMENSION

DFN1.0 × 1.0-4



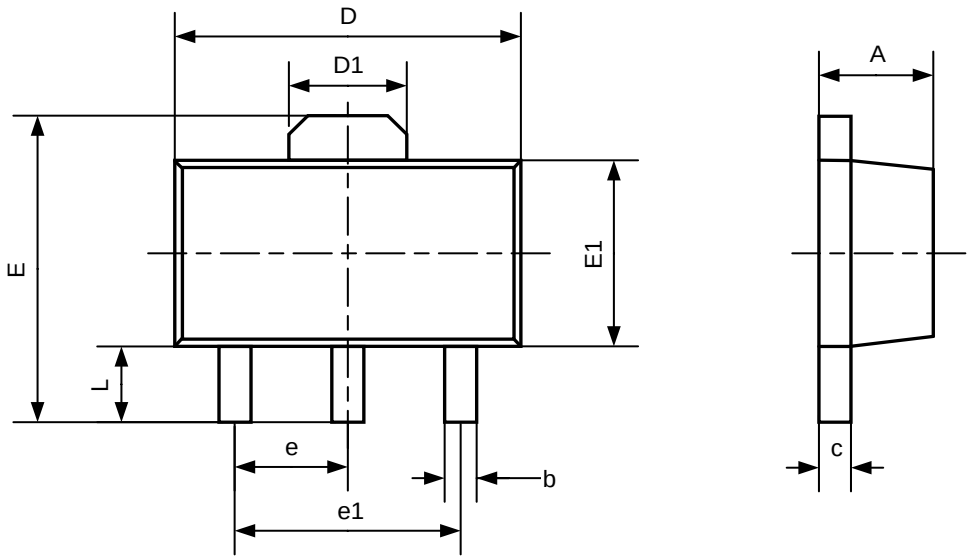
Detail A:

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

PACKAGE DIMENSION

SOT89-3



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