GPL6331 Series

18V Low Current Consumption
300mA CMOS Voltage Regulator

Introduction

The GPL6331 series are a group of positive voltage regulators manufactured by CMOS technologies with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small. The GPL6331 series can deliver 300mA output current and allow an input voltage as high as 18V. The series are very suitable for the battery-powered equipment, such as RF applications and other systems requiring a quiet voltage source.

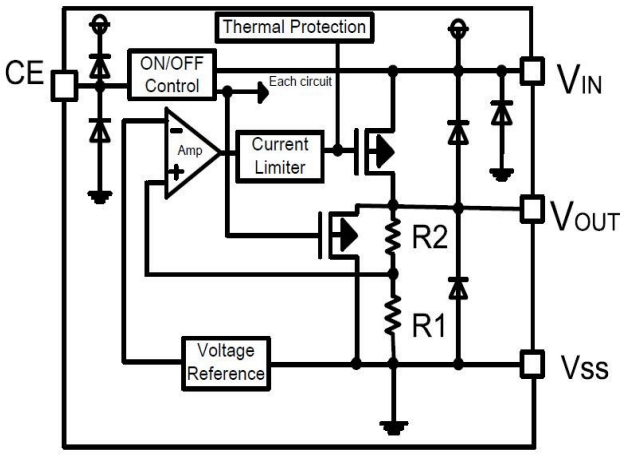
Features

- Low Quiescent Current: 2μA
- Operating Voltage Range: 2.5V～18V
- Output Current: 300mA
- Low Dropout Voltage: 160mV@100mA (VOUT=5V)
- Output Voltage: 1.2~ 5.0V
- High Accuracy: ±2%/±1%（Typ.）
- High Power Supply Rejection Ratio: 65dB@1kHz
- Low Output Noise:27xV_{OUT}μV_{RMS} (10Hz~100kHz)
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection
- Over-Temperature Protection

Applications

- Cordless Phones
- Radio control systems
- Laptop, Palmtops and PDAs
- Single-lens reflex DSC
- PC peripherals with memory
- Wireless Communication Equipment
- Portable Audio Video Equipment
- Car Navigation Systems
- LAN Cards
- Ultra-Low Power Microcontrollers

Block Diagram



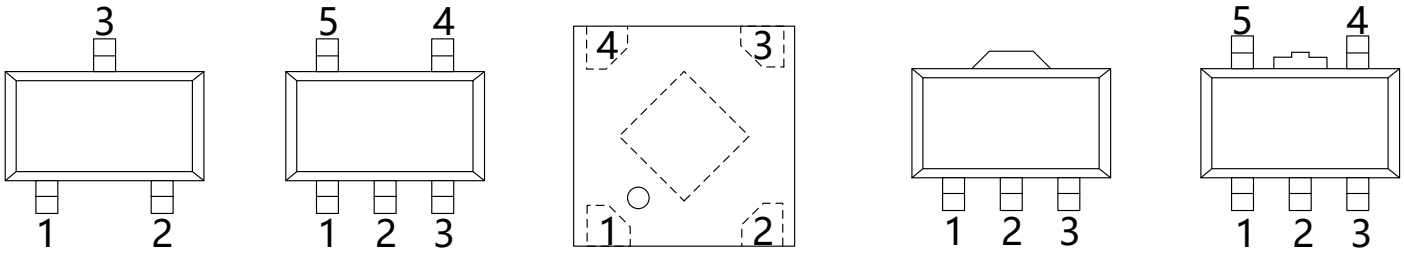
Order Information

GPL6331①②③④

Designator	Symbol	Description
①②③	Integer	Output Voltage e.g.1.8V=①:V, ②:1,③:8
④	K3	Package:SOT-23-3L
	K5	Package:SOT-23-5L
	KE	Package:SOT-89-3L
	KT	Package:SOT-89-5L
	H1	Package:DFN1*1-4L

Pin Configuration

SOT-23-3L **SOT-23-5L** **DFN1*1-4** **SOT-89-3L** **SOT-89-5**



SOT-23-3L & SOT-89-3L

Pin Number		Pin Name	Function
SOT-23-3L	SOT-89-3L		
1	1	V_{SS}	Ground
2	3	V_{OUT}	Output
3	2	V_{IN}	Power input

SOT-23-5L & SOT-89-5L

Pin Number		Pin Name	Function
SOT-23-5L	SOT-89-5L		
1	5	V_{IN}	Power Input Pin
2	2	V_{SS}	Ground
3	4	CE	Chip Enable Pin
4	3	NC	No Connection
5	1	V_{OUT}	Output Pin

DFN1*1-4

Pin Number	Pin Name	Function
1	V_{IN}	Power Input Pin
2	V_{SS}	Ground
3	CE	Chip Enable Pin
4	V_{OUT}	Output Pin

Absolute Maximum Ratings[1] (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Ratings	Units
Input Voltage[2]	V_{IN}	-0.3~24	V
Output Voltage[2]	V_{OUT}	-0.3~10	V
CE Pin Voltage	V_{CE}	-0.3~24	V
Output Current	I_{OUT}	300	mA
Power Dissipation	P_D	0.4	W
Operating Junction Temperature Range[3]	T_j	-40~125	°C
Storage Temperature	T_{stg}	-40~125	°C
Lead Temperature(Soldering, 10 sec)	T_{solder}	260	°C
ESD rating[4]	Human Body Model -(HBM)	8	kV
	Machine Model- (MM)	400	V

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 under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.
2) All voltages are with respect to network ground terminal.
3) This GPL6331 includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed 125°C when over temperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.
4) ESD testing is performed according to the respective JESD22 JEDEC standard.The human body model is a 100 pF capacitor discharged through a 1.5kΩ resistor into each pin. Themachine model is a 200pF capacitor discharged directly into each pin.

Electrical Characteristics

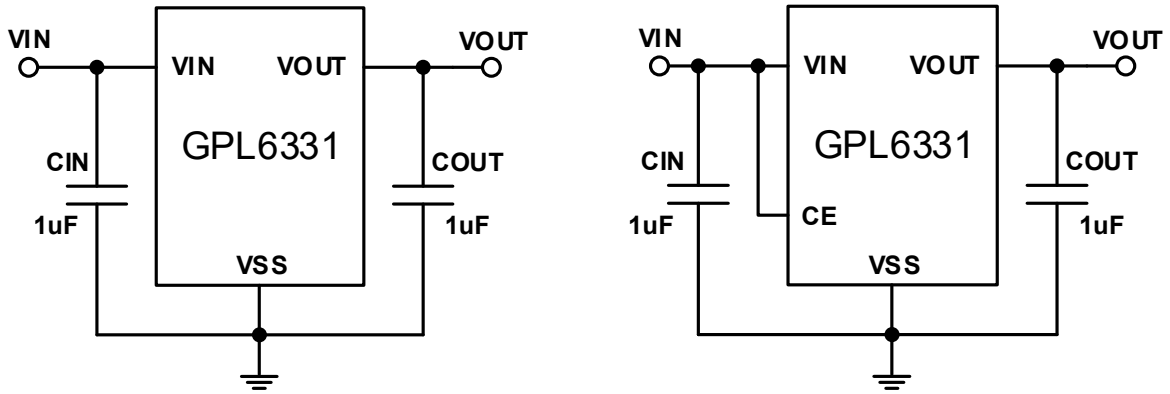
GPL6331 Series (V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF, T_A=25℃, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.[5]	Max.	Units
Input Voltage	V_{IN}			2.5		18	V
Output Voltage Range	V_{OUT}			1.2		5	V
DC Output Accuracy		I_{OUT}=1mA		-2		2	%
				-1		1	%
Dropout Voltage	V_{dif}[6]	I_{OUT} =100mA,V_{OUT}=5V			160		mV
Supply Current	I_{SS}	I_{OUT}=0A			2	5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT} =10mA V_{OUT} +1V≤V_{IN}≤18V			0.01	0.3	%/V
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1V, 1mA≤I_{OUT}≤100mA			10		mV
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	I_{OUT}=10mA, -40°C<T_A<125°C			50		ppm
Output Current Limit	I_{LIM}	V_{OUT}= 0.5 x $V_{OUT(Normal)}$, V_{IN} = 7V		350	500		mA
Short Current	I_{SHORT}	V_{OUT} =V_{SS}			25		mA
Power Supply Rejection Ratio	PSRR	I_{OUT}=50mA	100Hz		80		dB
			1kHz		65		
			10kHz		50		
			100kHz		45		
Output Noise Voltage	V_{ON}	BW=10Hz to 100kHz			27 x V_{OUT}		μV_{RMS}
Thermal Shutdown Temperature	T_{SD}				150		°C
Thermal Shutdown Hysteresis	$\triangle T_{SD}$				20		°C
Standby Current	I_{STBY}	CE = V_{SS}				0.2	μA
CE "High" Voltage	V_{CE}"H"			1.5		V_{IN}	V
CE "Low" Voltage	V_{CE}"L"					0.3	V
CE "High" Current	I_{CE}"H"	V_{CE}="High"				0.2	μA

5) Typical numbers are at 25°C and represent the most likely norm.

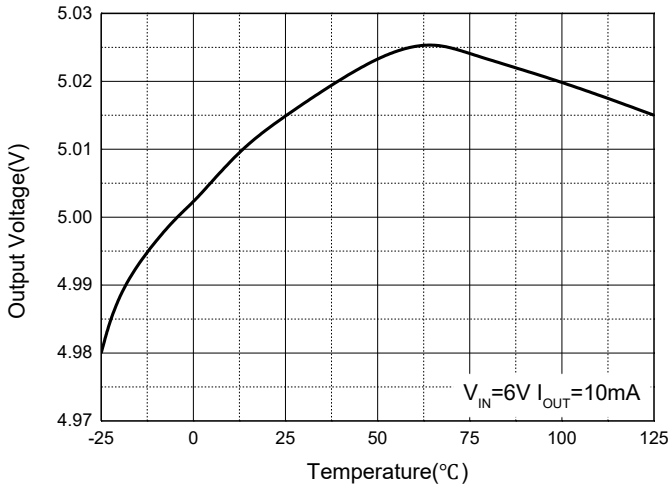
6) V_{dif}: The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of V_{OUT} (E).

Typical Application Circuit

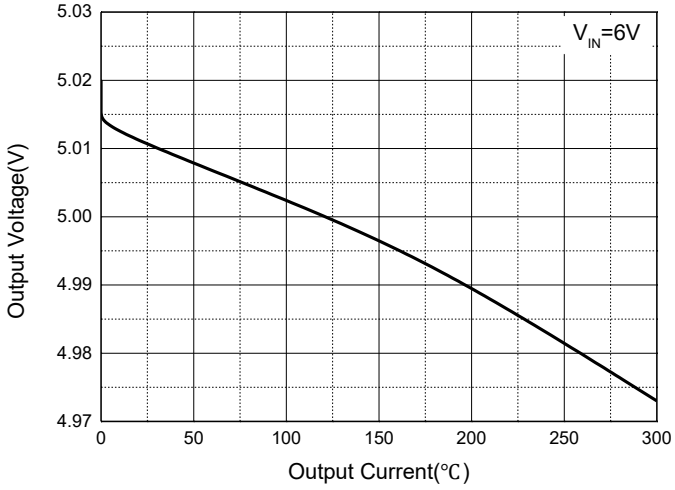


Typical Performance Characteristics

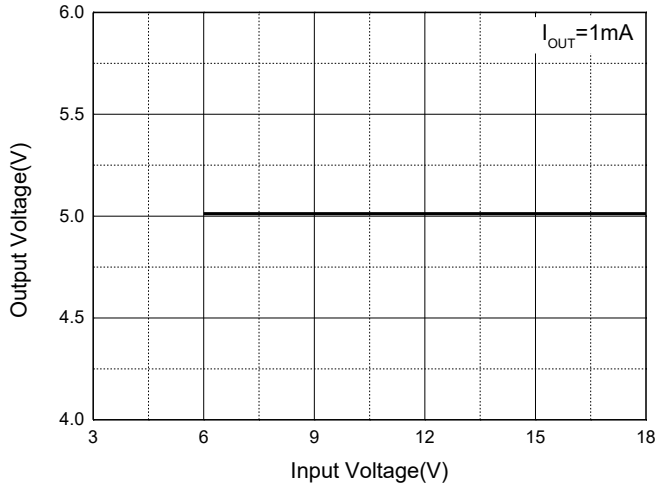
Output Voltage vs. Temperature



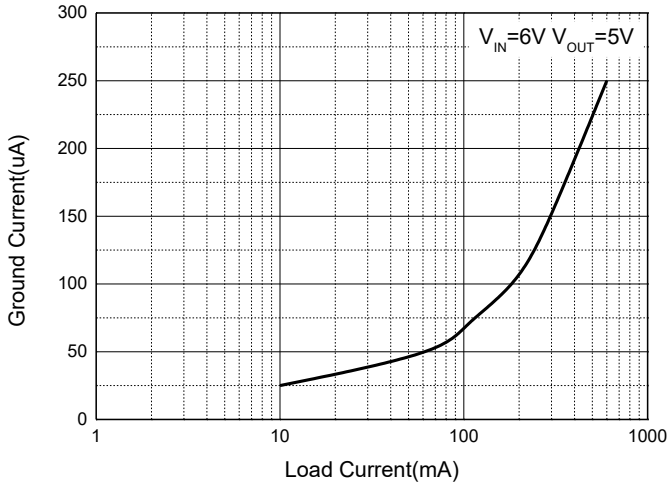
Output Voltage vs. Output Current



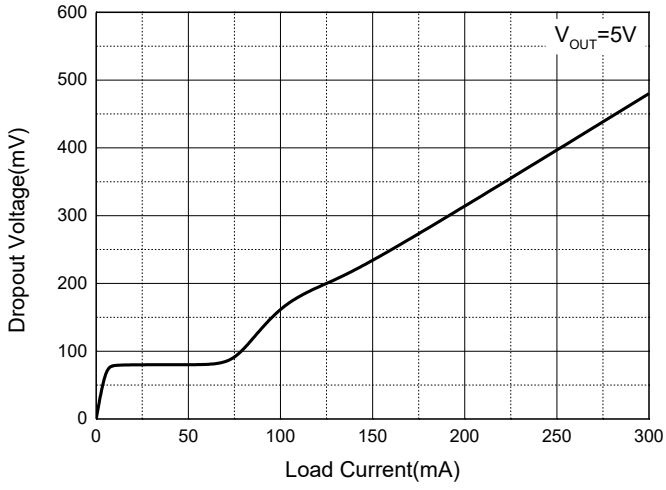
Output Voltage vs. Input Voltage



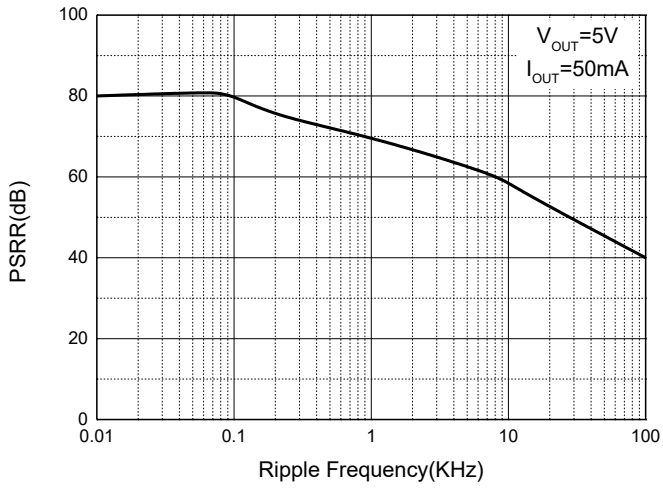
Ground Current VS. Load Current



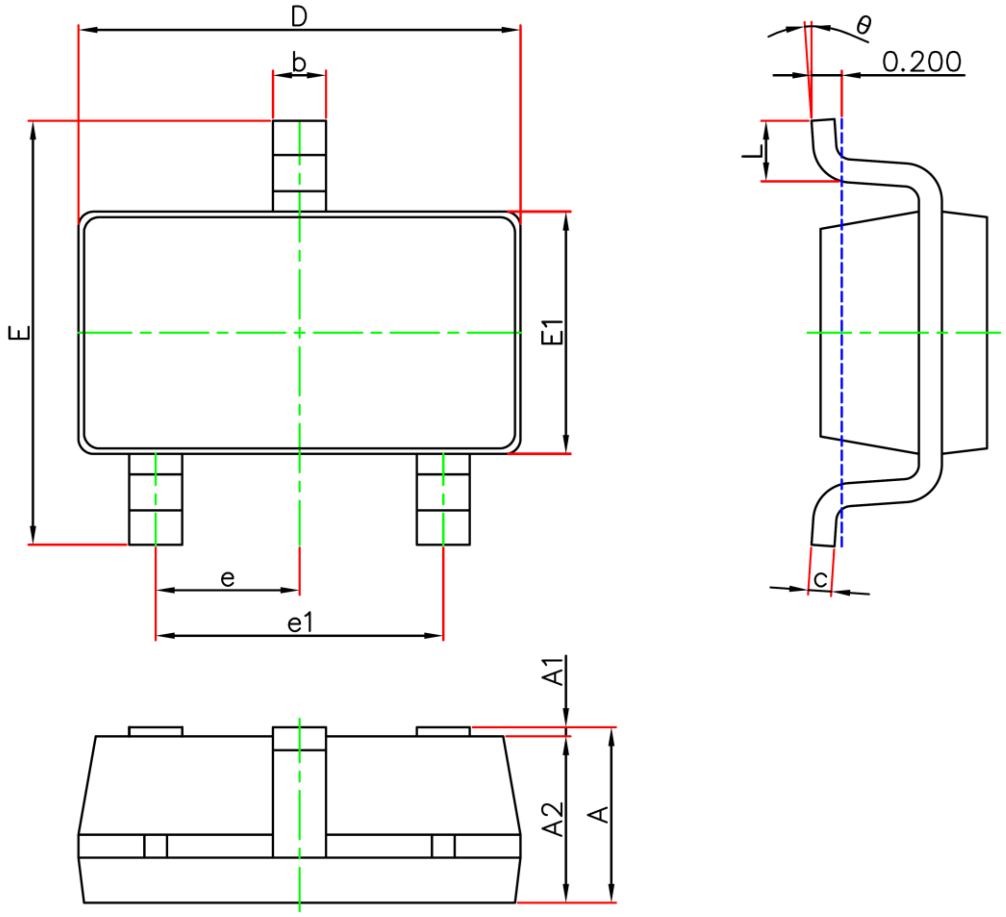
Dropout Voltage vs. Load Current



PSRR vs. Frequency(Vin=6V+aV_{P-P}AC)

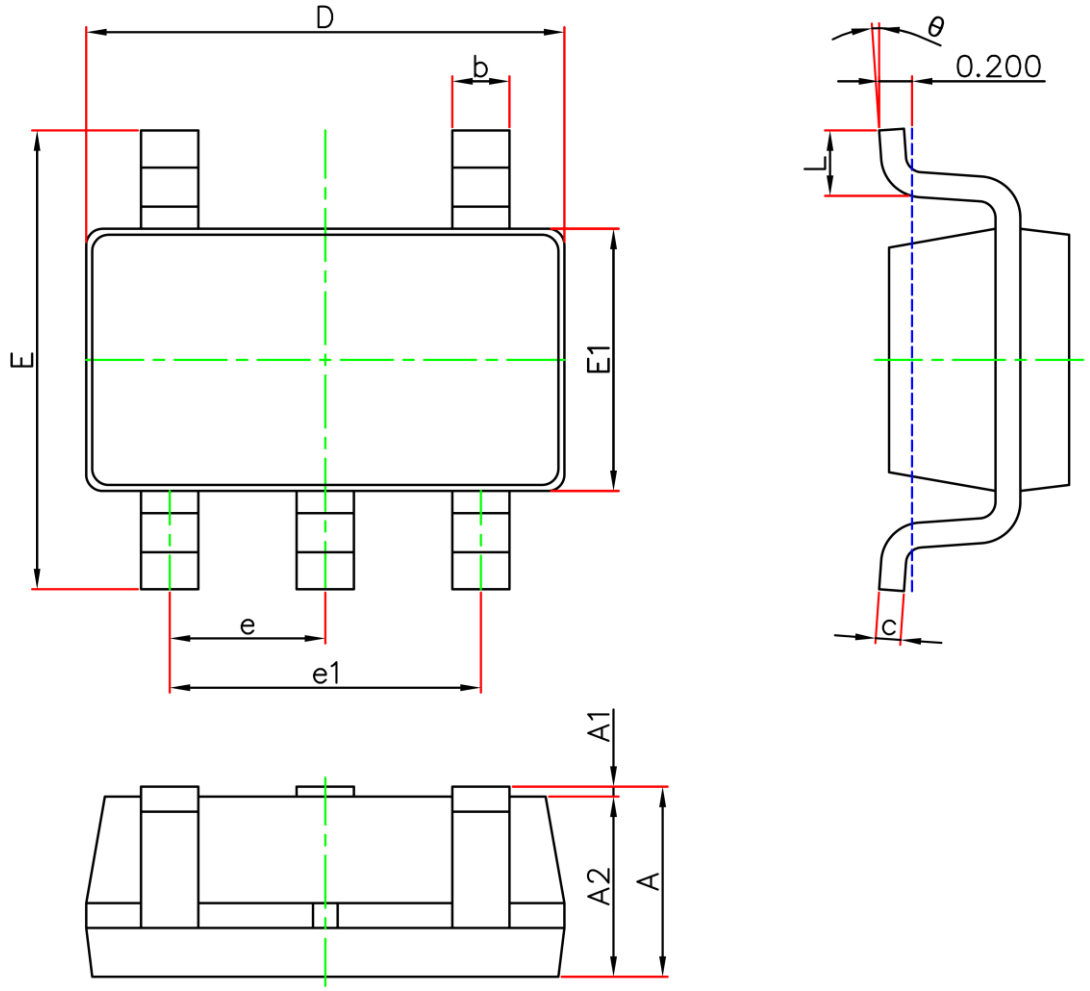


SOT-23-3L Package Outline Dimensions



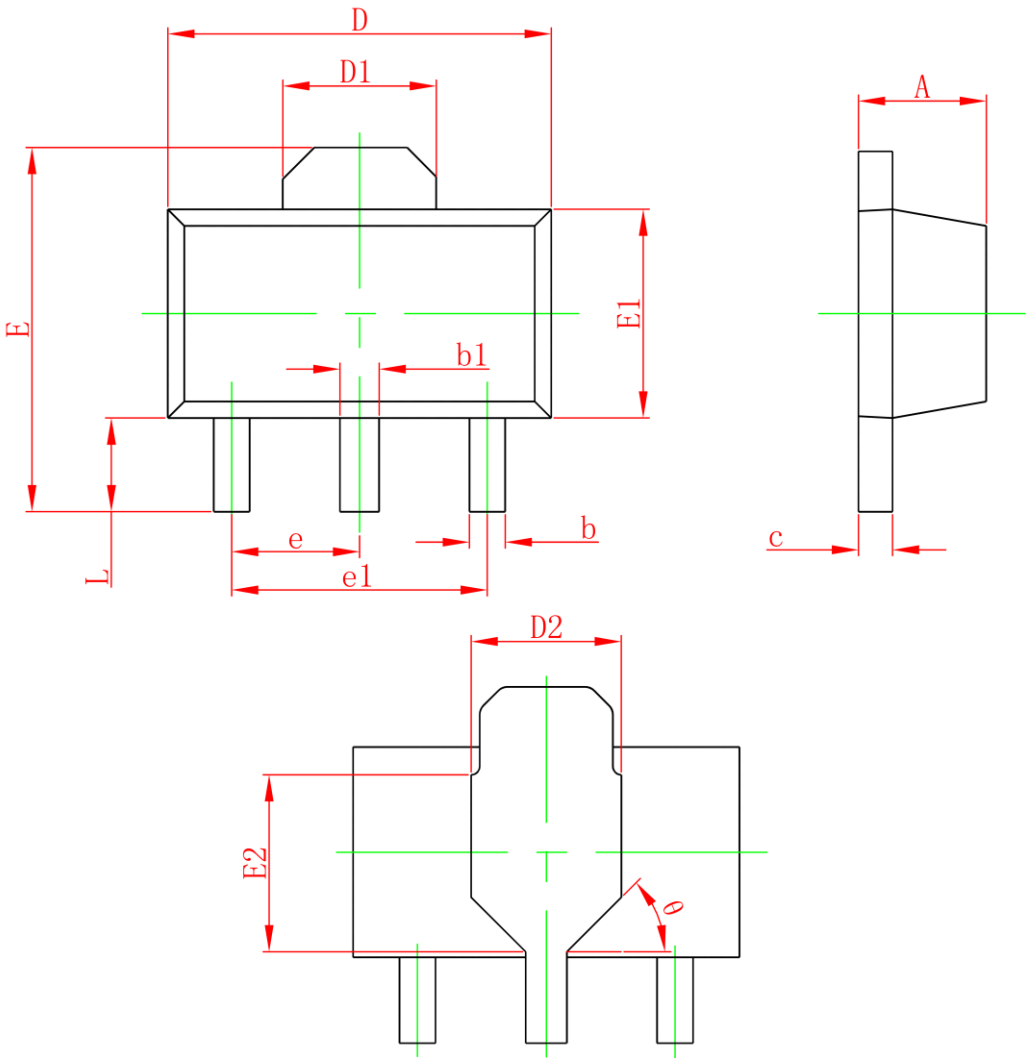
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0	0.150	0.000	0.006
A2	1.050	1.250	0.041	0.049
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-23-5L Package Outline Dimensions



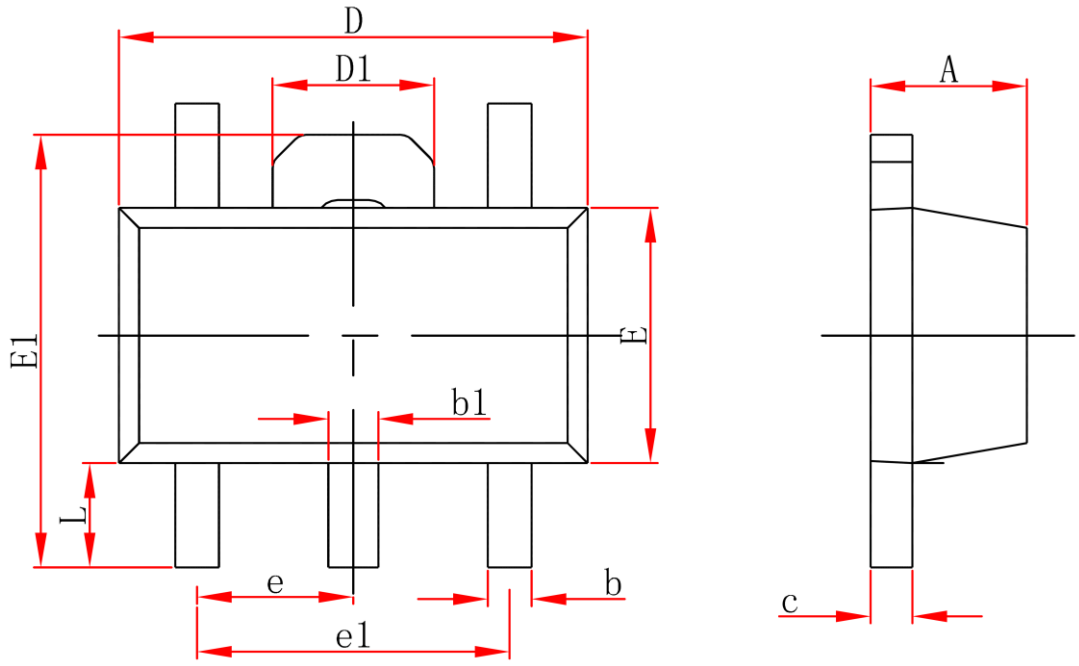
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0	0.150	0.000	0.006
A2	1.050	1.250	0.041	0.049
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-89-3L Package Outline Dimensions



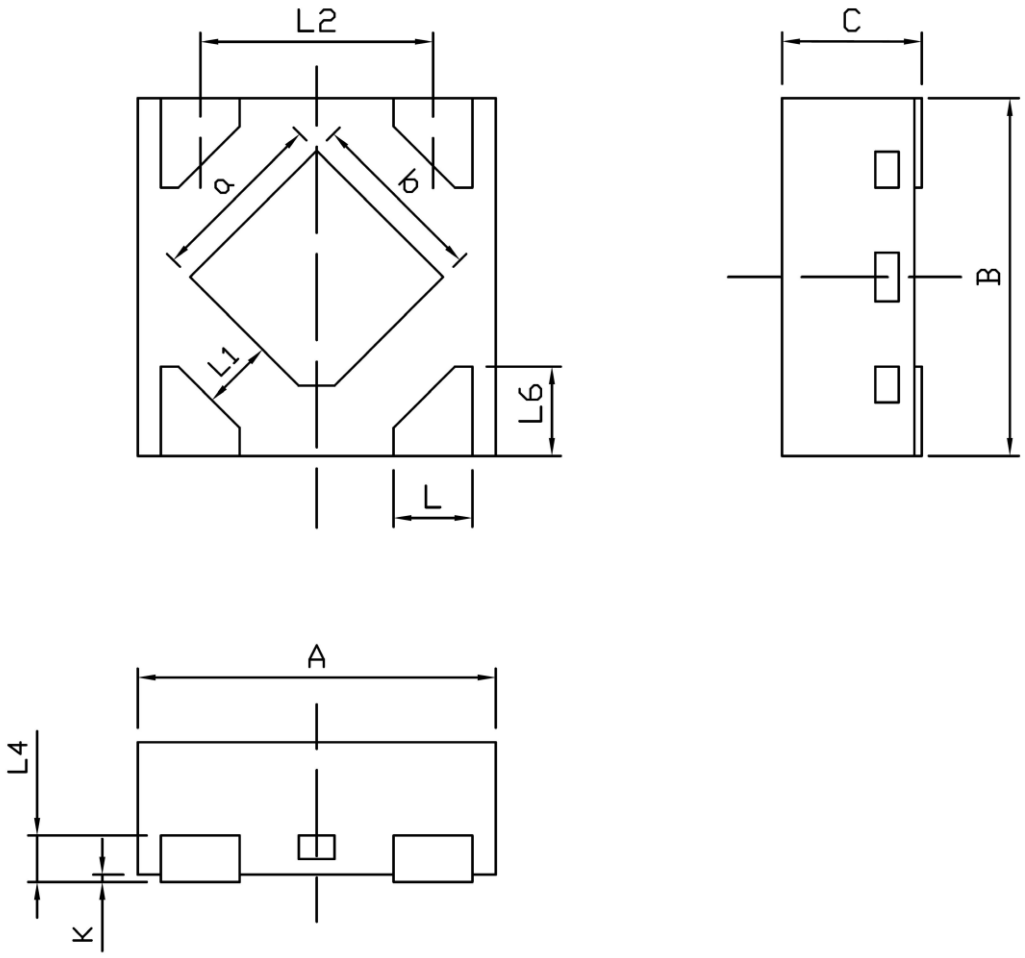
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.380	0.580	0.015	0.023
c	0.350	0.500	0.014	0.020
D	4.400	4.600	0.173	0.181
D1	1.650REF		0.065REF	
D2	1.650	1.850	0.065	0.073
E	3.900	4.400	0.154	0.173
E1	2.300	2.600	0.091	0.102
E2	1.900REF		0.075REF	
e	1.500TYP		0.059TYP	
e1	3.000TYP		0.118TYP	
L	0.900	1.200	0.035	0.047
θ	45°		45°	

SOT-89-5L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.380	0.580	0.015	0.023
c	0.350	0.500	0.014	0.020
D	4.400	4.600	0.173	0.181
D1	1.650REF		0.065REF	
E	2.300	2.600	0.091	0.102
E1	3.900	4.400	0.154	0.173
e	1.500TYP		0.059TYP	
e1	3.000TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

DFN1*1-4L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.950	1.050	0.037	0.041
B	0.950	1.050	0.037	0.041
C	0.340	0.400	0.013	0.016
L	0.150	0.250	0.006	0.010
L1	0.150MIN		0.006MIN	
L2	0.650BSC		0.026BSC	
L4	0.127REF		0.005REF	
L6	0.200	0.300	0.008	0.012
K	0.000	0.050	0.000	0.002
a	0.380	0.580	0.015	0.023
b	0.380	0.580	0.015	0.023