

Product Summary

The GPL6388 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 GPL6388 series can deliver 150mA output current and allow an input voltage as high as 50V. The series are very suitable for the battery-powered equipments, such as RF applications and other systems requiring a quiet voltage source.

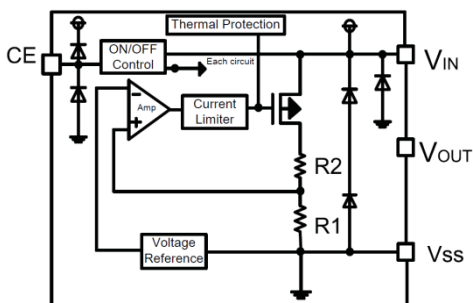
Features

- Low Quiescent Current: 3 μ A
- Operating Voltage Range: 2.5V~50V
- Output Current: 150mA
- Low Dropout Voltage:
500mV@50mA($V_{OUT}=3.3V$)
- Output Voltage: 1.2~ 12.0V
- High Accuracy: $\pm 2\%/\pm 1\%$ (Typ.)
- High Power Supply Rejection Ratio:
80dB@1kHz
- Low Output Noise:
27x $V_{OUT}\mu V_{RMS}$ (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



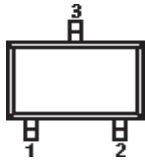
Order Information

GPL6388V①②

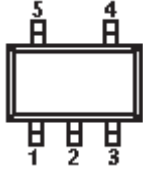
Designator	Description
①	Output Voltage e.g. 3.3V=33
②	Package: SOT-23-3L=K3 SOT-23-5L=K5 SOT-89-3L=KE SOT-89-5L=KT SOT-223=DT

Pin Configuration

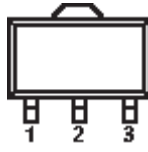
SOT-23-3L



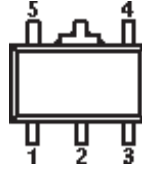
SOT-23-5L



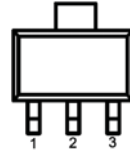
SOT-89-3L



SOT-89-5L



SOT-223



PIN NUMBER			PIN NAME	FUNCTION
SOT-23-3L	SOT-89-3L	SOT223		
1	1	1	V _{SS}	Ground
2	3	3	V _{OUT}	Output
3	2	2	V _{IN}	Power input

SOT-23-5L

PIN NUMBER	SYMBOL	FUNCTION
1	V _{IN}	Power Input Pin
2	V _{SS}	Ground
3	CE	Chip Enable Pin
4	NC	No Connection
5	V _{OUT}	Output Pin

SOT-89-5L

PIN NUMBER		SYMBOL	FUNCTION
1	5	V _{OUT}	Output Pin
2	2	V _{SS}	Ground
3	4	NC	No Connection
4	3	CE	Chip Enable Pin
5	1	V _{IN}	Power Input Pin

Absolute Maximum Ratings¹⁾ ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage ⁽²⁾		V_{IN}	-0.3~65	V
Output Voltage ⁽²⁾		V_{OUT}	-0.3~15	V
CE Pin Voltage ⁽²⁾		V_{CE}	-0.3~ $V_{IN}+0.3$	V
Output Current		I_{OUT}	400	mA
Power Dissipation	SOT-23-3L/5L	P_D	400	mW
	SOT-89-3L/5L		600	mW
	SOT-223		800	mW
Operating Junction Temperature Range		T_j	-40~125	$^{\circ}\text{C}$
Storage Temperature		T_{stg}	-40~125	$^{\circ}\text{C}$
Lead Temperature(Soldering, 10 sec)		T_{solder}	260	$^{\circ}\text{C}$
ESD rating ⁽³⁾	Human Body Model-(HBM)		2	kV
	Machine Model- (MM)		200	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 may affect device reliability.

(2) All voltages are with respect to network ground terminal.

(3) ESD testing is performed according to the respective JESD22 JEDEC standard. The human body model is a 100 pF capacitor discharged through a 1.5k Ω resistor into each pin. The machine model is a 200pF capacitor discharged directly into each pin.

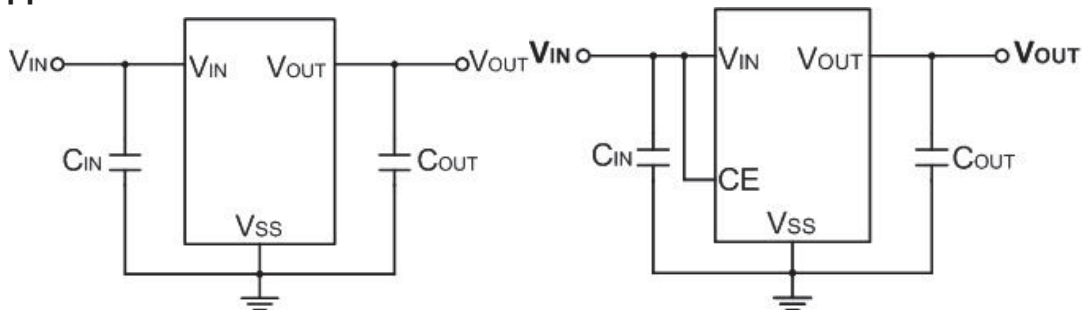
Recommended Operating Conditions

PARAMETER	MIN.	NOM.	MAX.	UNITS
Supply voltage at V_{IN}	2.5		50	V
Operating junction temperature range, T_j	-40		125	$^{\circ}\text{C}$
Operating free air temperature range, T_A	-40		85	$^{\circ}\text{C}$

Electrical Characteristics ($V_{IN}=V_{OUT}+2V$, $C_{IN}=C_{OUT}=1\mu F$, $T_A=25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Input Voltage	V_{IN}		2.5	—	50	V	
Output Voltage Range	V_{OUT}		1.2	—	12	V	
DC Output Accuracy		$I_{OUT}=1mA$	-2	—	2	%	
			-1	—	1	%	
Dropout Voltage	V_{dif}	$I_{OUT}=50mA, V_{OUT}=3.3V$	—	500	—	mV	
Supply Current	I_{SS}	$I_{OUT}=0A$	$V_{OUT}\leq 5.0V$	—	3	6	μA
			$V_{OUT}>5.0V$		5	10	μA
Standby Current	I_{STBY}	$CE = V_{SS}$		0.1	0.5	μA	
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	$I_{OUT}=10mA$ $V_{OUT}+1V \leq V_{IN} \leq 18V$	—	0.01	0.3	%/V	
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+1V$, $1mA \leq I_{OUT} \leq 100mA$	—	10	—	mV	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	$I_{OUT}=10mA$, $-40^\circ C < T_A < 125^\circ C$		50		ppm	
Output Current Limit	I_{LIM}	$V_{OUT}=0.5 \times V_{OUT(Normal)}$, $V_{IN}=5V$	150	250		mA	
Short Current	I_{SHORT}	$V_{OUT}=V_{SS}$	—	20	—	mA	
Power Supply Rejection Ratio	PSRR	$I_{OUT}=50mA$	100Hz		75		dB
			1kHz	—	80	—	
			10kHz	—	60	—	
			100kHz	—	45	—	
Output Noise Voltage	V_{ON}	BW=10Hz to 100kHz	—	$27 \times V_{OUT}$	—	μV_{RMS}	
Thermal Shutdown Temperature	T_{SD}	—	—	170	—	$^\circ C$	
Thermal Shutdown Hysteresis	ΔT_{SD}	—	—	20	—	$^\circ C$	
CE "High" Voltage	$V_{CE"H"}$		1.5		V_{IN}	V	
CE "Low" Voltage	$V_{CE"L"}$				0.3	V	

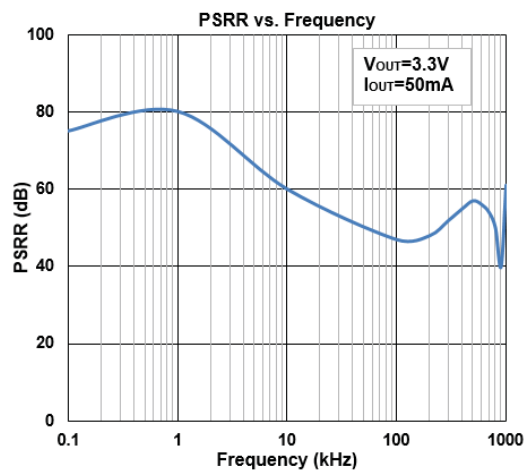
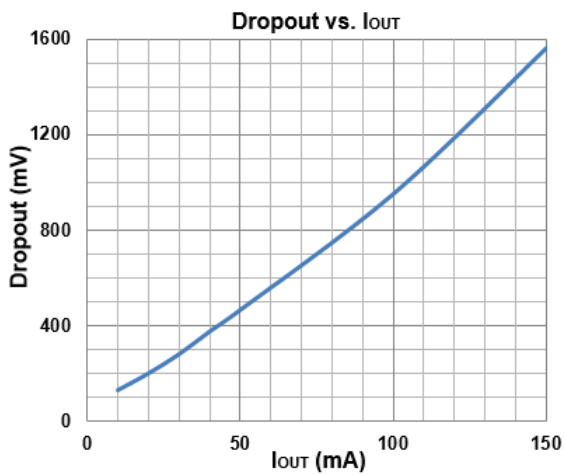
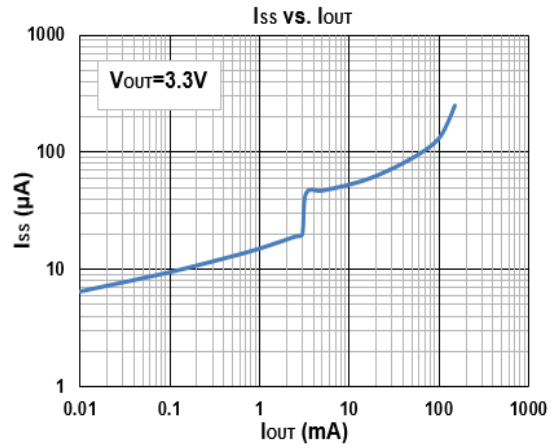
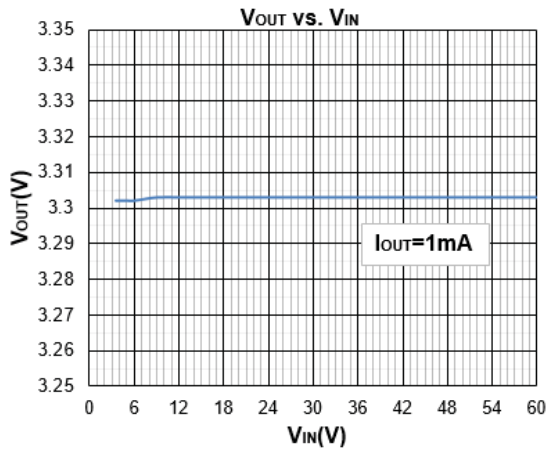
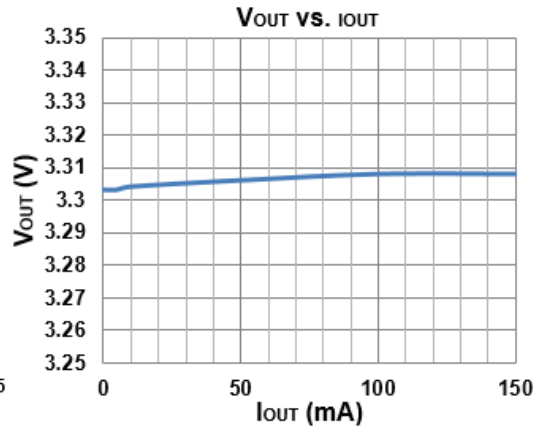
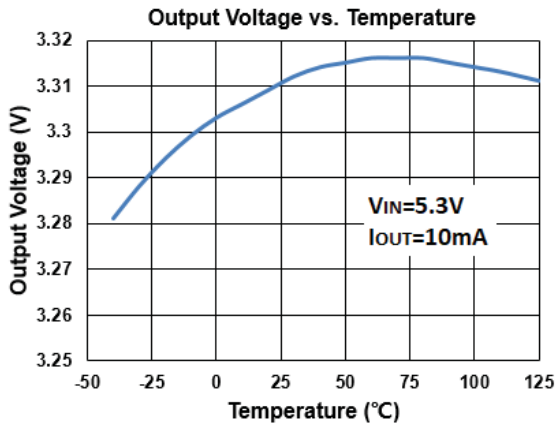
Typical Application Circuit



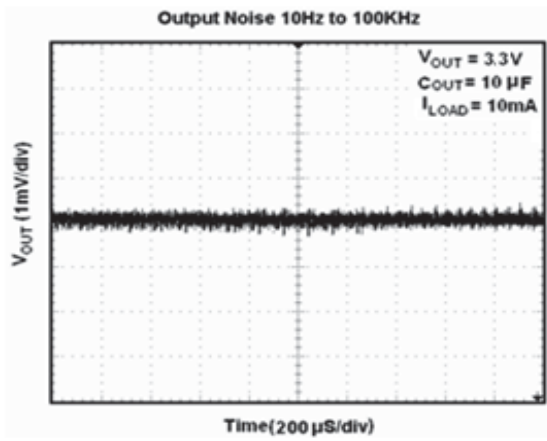
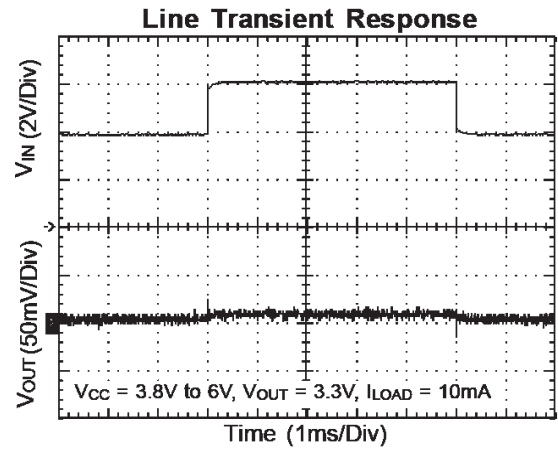
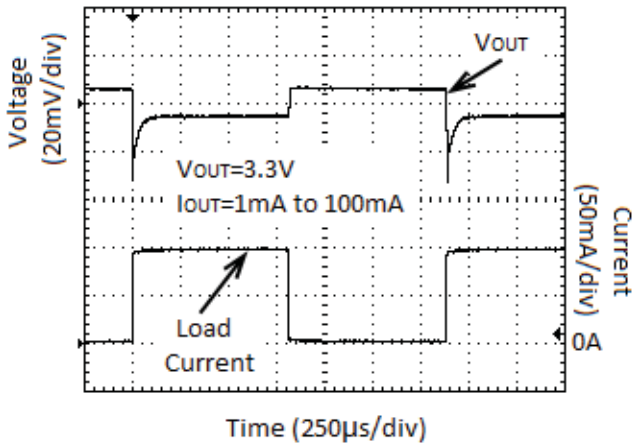
External Components List

Symbol	Description
C_{IN}	1.0 μF or more
C_{OUT}	1.0 μF or more, 10 μF is recommended

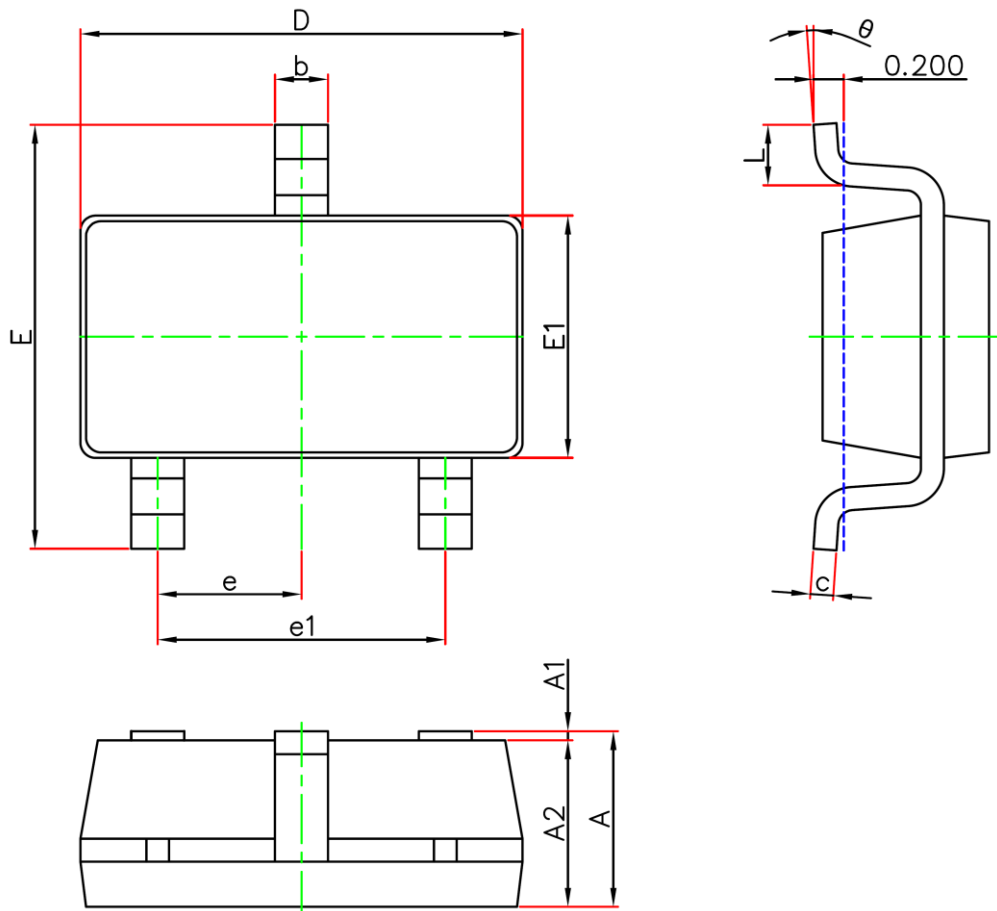
Typical Performance Characteristics



Typical Performance Characteristics

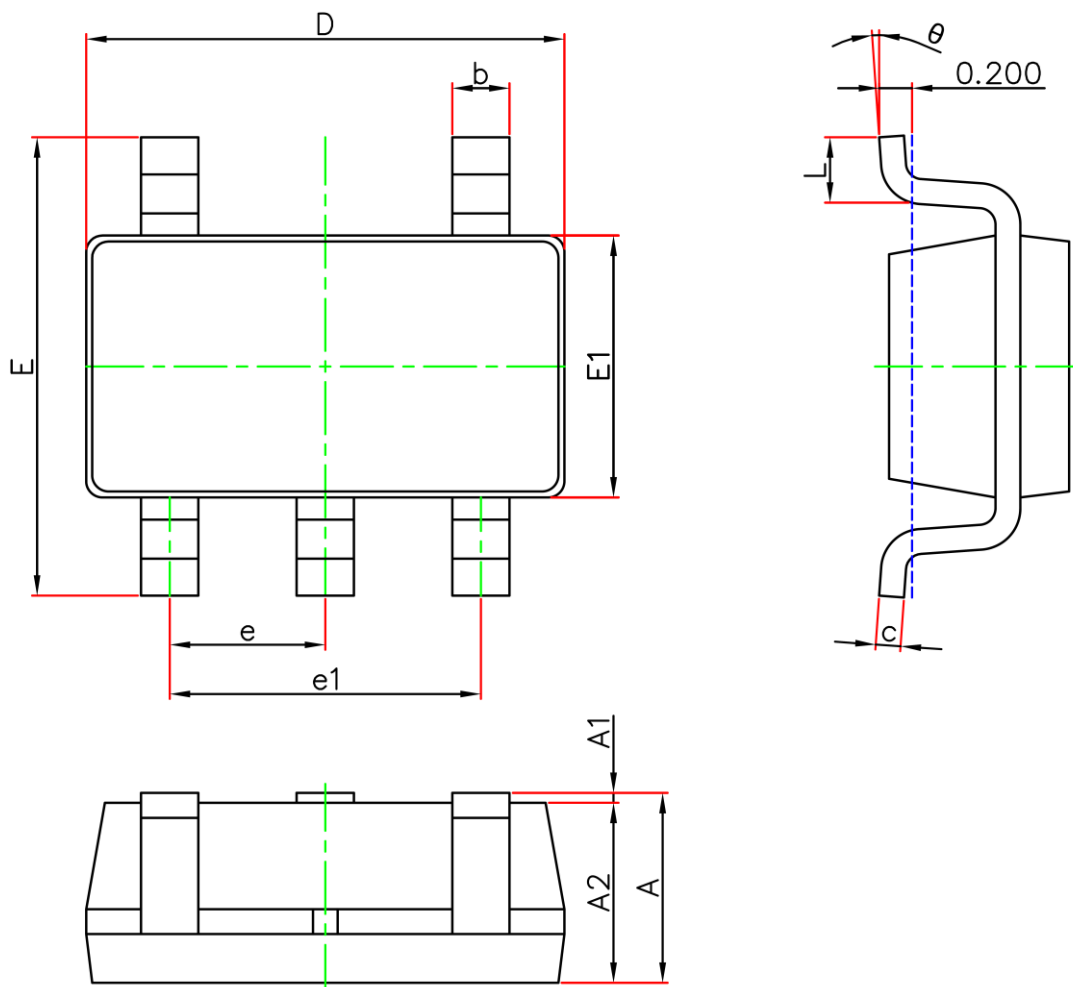


SOT-23-3L Package Outline Dimensions



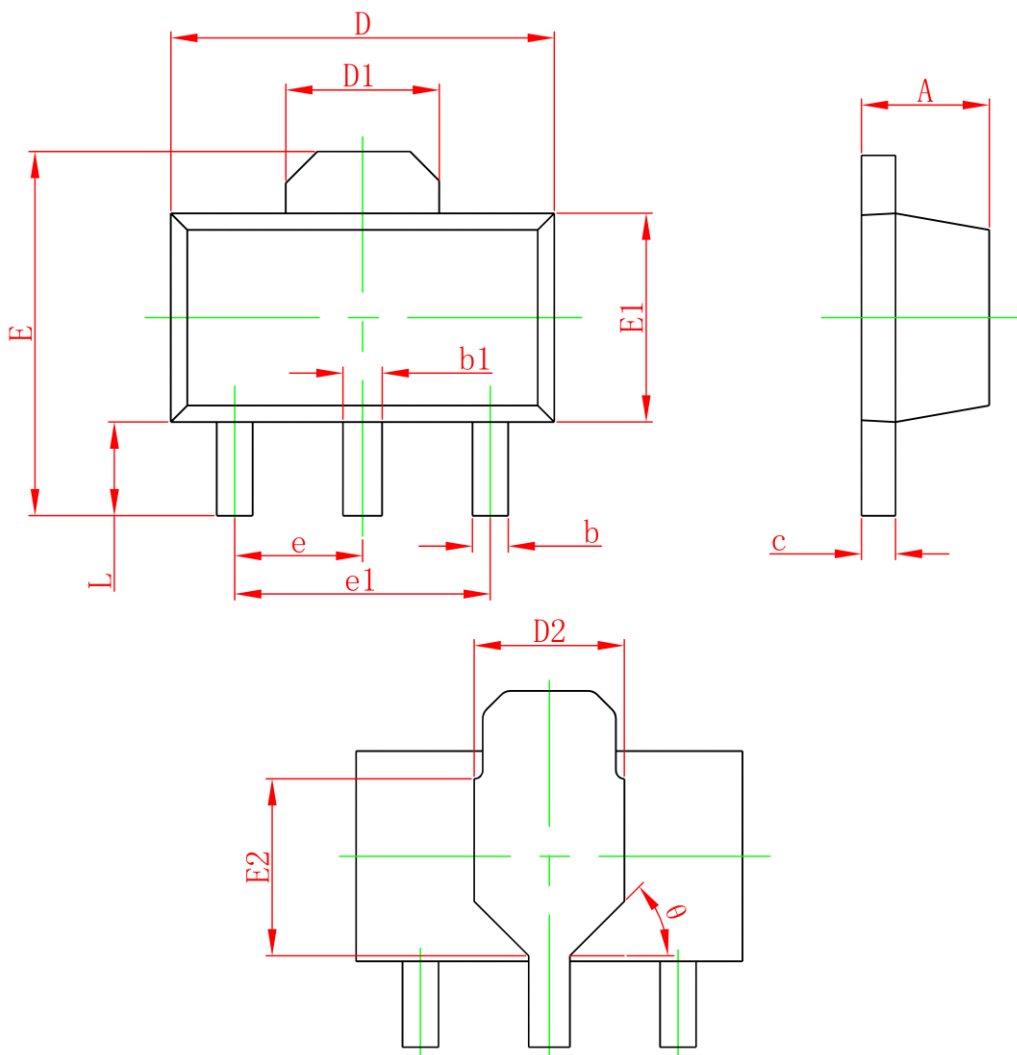
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0	0.150	0.000	0.006
A2	1.050	1.250	0.041	0.049
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950TYP		0.037TYP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



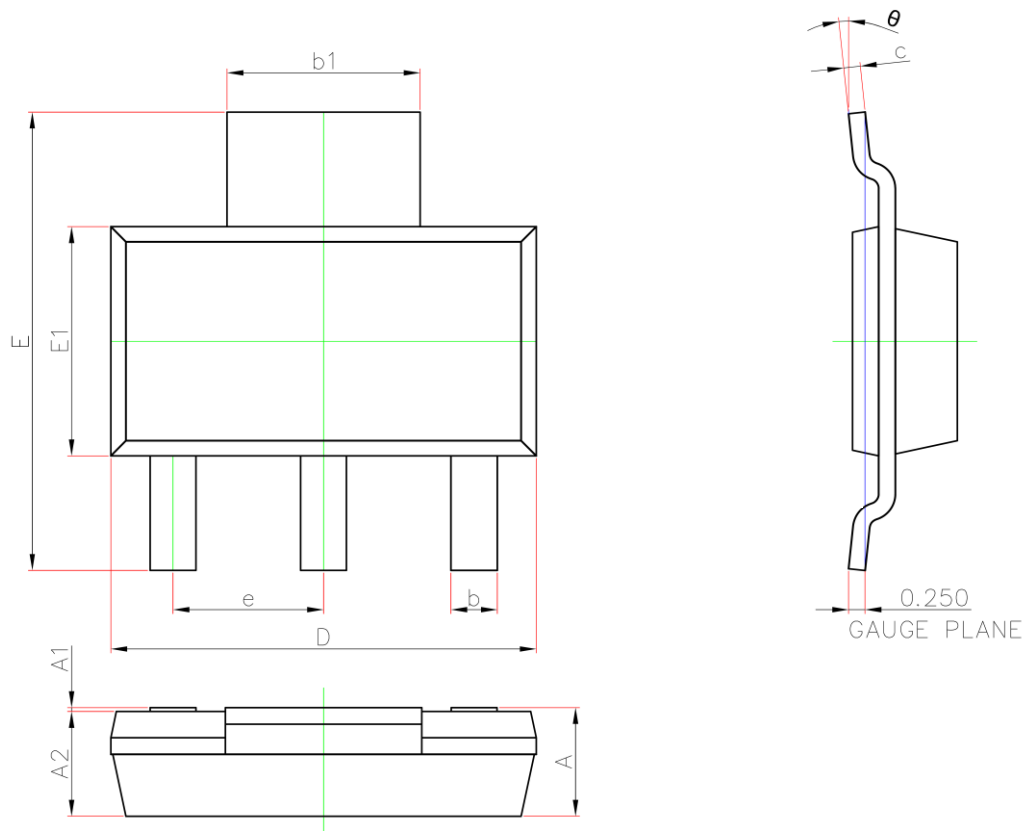
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0	0.150	0.000	0.006
A2	1.050	1.250	0.041	0.049
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950TYP		0.037TYP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



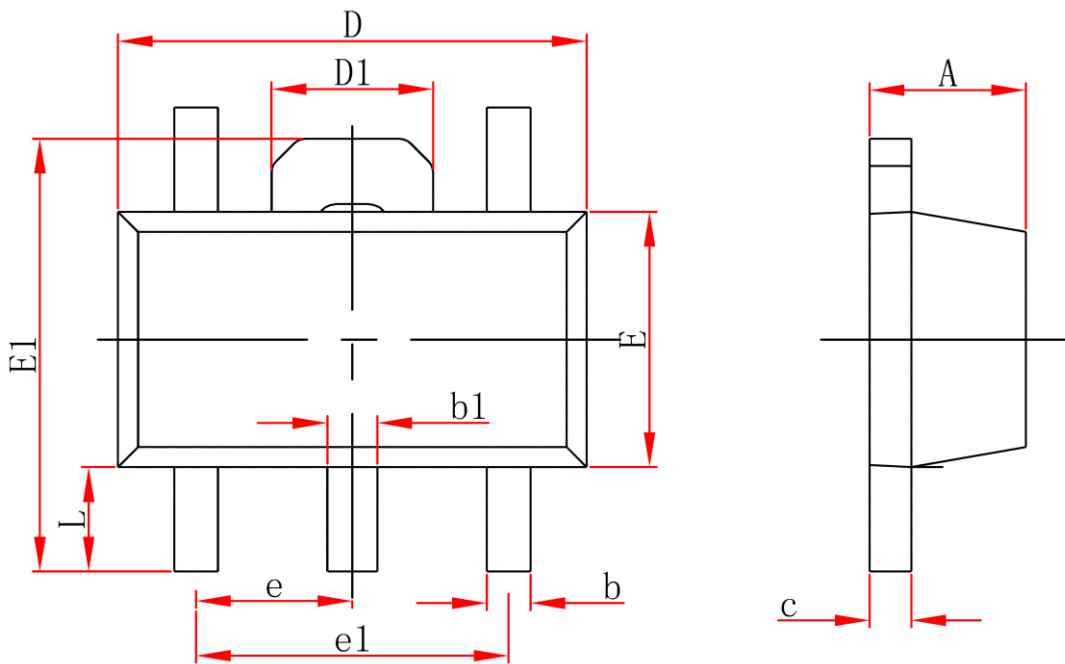
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.380	0.580	0.015	0.023
c	0.350	0.500	0.014	0.020
D	4.400	4.600	0.173	0.181
D1	1.650REF		0.065REF	
D2	1.650	1.850	0.065	0.073
E	3.900	4.400	0.154	0.173
E1	2.300	2.600	0.091	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-223 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.800MAX		0.071MAX	
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.600	0.840	0.024	0.033
b1	2.900	3.100	0.114	0.122
c	0.200	0.400	0.008	0.016
D	6.100	6.700	0.240	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300BSC		0.091BSC	
θ	0°	10°	0°	10°

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