

### GENERAL DESCRIPTION

The PT5110 is a low-dropout voltage regulator designed for portable applications that require both low noise performance and board space. The PT5110's is ideal for battery powered systems for delivering low dropout voltage and low quiescent current.

The device can be used for mobile phones and similar battery powered wireless applications. It provides up to 400mA, from a 2.5V to 8V input. The PT5110 consumes less than 0.1 $\mu$ A in shutdown mode. The PT5110 is available in SOT23-3 and SOT89-3 packages. Selected performances are specified for -40°C to +85°C temperature range. Nine output voltage levels are available from 1.5V through 5.0V.

### FEATURES

- 400mA maximum output current
- 2.5V to 8V operating range
- < 1 $\mu$ A quiescent current at shutdown mode
- Thermal shutdown and short-circuit current limit
- SOT23-3 and SOT89-3 packages

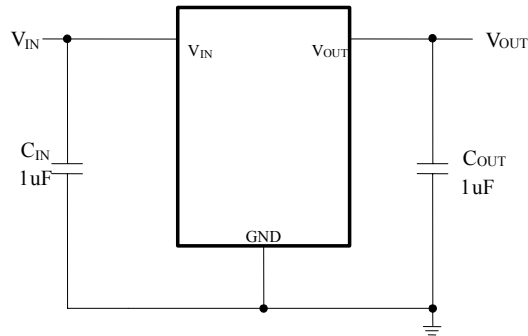
### APPLICATIONS

- Battery powered devices
- Cordless telephones
- WLAN and bluetooth appliances
- PDAs/MP3

### ORDERING INFORMATION

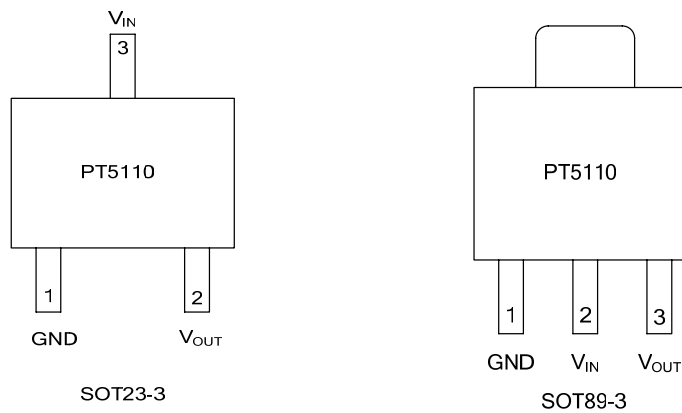
Package	Temperature Range	(Output Voltage V)	Part Number	Transport Media
SOT23-3	-40°C~85°C	1.5	PT5110E23C-15	Tape and reel 3000 units
		1.8	PT5110E23C-18	
		2.5	PT5110E23C-25	
		2.8	PT5110E23C-28	
		3.0	PT5110E23C-30	
		3.3	PT5110E23C-33	
		3.6	PT5110E23C-36	
		4.0	PT5110E23C-40	
		5.0	PT5110E23C-50	
SOT89-3	-40°C~85°C	1.5	PT5110E89C-15	Tape and reel 1000 units
		1.8	PT5110E89C-18	
		2.5	PT5110E89C-25	
		2.8	PT5110E89C-28	
		3.0	PT5110E89C-30	
		3.3	PT5110E89C-33	
		3.6	PT5110E89C-36	
		4.0	PT5110E89C-40	
		5.0	PT5110E89C-50	

### TYPICAL APPLICATIONS



$C_{OUT}$  : Recommended ceramic capacitor

### PIN ASSIGNMENT



### PIN DESCRIPTIONS

SYMBOL	SOT23-3	SOT89-3	DESCRIPTION
$V_{IN}$	3	2	Input of LDO
GND	1	1	Ground
$V_{OUT}$	2	3	Output of LDO

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	VALUE	UNIT
V <sub>IN</sub> Range	-0.3~10.0V	V
V <sub>OUT</sub> Range	-0.3~(V <sub>IN</sub> +0.3)< 10.0V	V
V <sub>EN</sub> Range	-0.3~10.0V	V
Junction Temp.	150	°C
Storage Temp.	-65~150	°C
Lead Temp. (Note2)	235	°C
ESD Rating, HBM	2	KV

### RECOMMENDED OPERATING RANGE

PARAMETER	VALUE	UNIT
V <sub>IN</sub> Range	-0.3~8	V
Thermal Resistance, $\theta_{JA}$	SOT23-3	220
	SOT89-3	52
Maximum Power Dissipation (Note 3)	SOT23-3	0.25
	SOT89-3	0.5
Operation Temp.	-40~85	°C

### ELECTRICAL CHARACTERISTICS

Unless otherwise specified: V<sub>IN</sub> = V<sub>OUT(nom)</sub> + 1V, V<sub>EN</sub> = V<sub>IN</sub>, C<sub>IN</sub> = 1 uF, I<sub>OUT</sub> = 1mA, C<sub>OUT</sub> = 1 uF, T<sub>A</sub> = +25°C. Limits appearing in **boldface type** apply over the entire junction temperature range for operation, -40°C to +85°C. (Note 4) (Note5)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
V <sub>IN</sub>	Input Voltage Range	I <sub>out</sub> ≤ 400mA	2.5		8	V	
V <sub>OUT</sub>	Output Voltage		1.5		5	V	
V <sub>OA</sub>	Output Voltage Accuracy	I <sub>out</sub> =1mA	-2		2	%	
I <sub>DD</sub>	Supply Current	I <sub>out</sub> =0mA		7		μA	
V <sub>DROPOUT</sub>	Dropout Voltage	I <sub>out</sub> =400mA V <sub>OUT</sub> = V <sub>O(NOM)</sub> -2.0%	V <sub>OUT</sub> = 1.5V			2000	mV
			V <sub>OUT</sub> = 1.8V			1320	
			V <sub>OUT</sub> = 2.5V			540	
		I <sub>out</sub> =400mA V <sub>OUT</sub> = V <sub>O(NOM)</sub> -2.0%	V <sub>OUT</sub> = 2.8V			540	
			V <sub>OUT</sub> = 3.0V			400	
			V <sub>OUT</sub> = 3.3V			400	
			V <sub>OUT</sub> = 3.6V			400	
			V <sub>OUT</sub> = 4.0V			400	
			V <sub>OUT</sub> = 5.0V			400	

### ELECTRICAL CHARACTERISTICS (Continued)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
PSRR	Ripple Rejection	$V_{IN}=V_{OUT}+1V$ with Vp-Pac200mV, $I_{OUT}=100mA$ $C_{OUT}=1\mu F$	100Hz	40		dB
			1KHz	40		
TC	Temperature-Drift Coefficient	$I_{out}=30mA$ $-40^{\circ}C < T_{opr} < 85^{\circ}C$		200		ppm/ °C
REG <sub>LINE</sub>	Line Regulation	$I_{out}=40mA$ $V_{IN}=V_{out}+1V$ to 6V		0.02	0.5	%
I <sub>rev</sub>	Output Reverse Current	Vin pin is floating, Vout =1.5~5V		5	10	μA
REG <sub>LOAD</sub>	Load Regulation	$I_{out}=1mA$ to 200mA		40	100	mV
I <sub>LIM</sub>	Peak Current Limit	$V_{IN}=V_{OUT(T)}+1V, V_{EN}=V_{IN},$ $(V_{OUT}<2V)=(V_{IN}=V_{OUT(T)}+2.0V)$	500	600		mA
	ESR Resistance range of output Ceramic capacitors		0.01		3	Ω
	Output Capacitor range		1		10	μF
OTS	Over Shutdown Temp			150		°C
OTH	Over Hysterisis Temp			30		°C

**Note 1:** The Absolute Maximum power dissipation depends on the ambient temperature and can be calculated using the formula:  $P_D = (T_J - T_A) / \theta_{JA}$ , where  $T_J$  is the junction temperature,  $T_A$  is the ambient temperature, and  $\theta_{JA}$  is the junction-to-ambient thermal resistance.

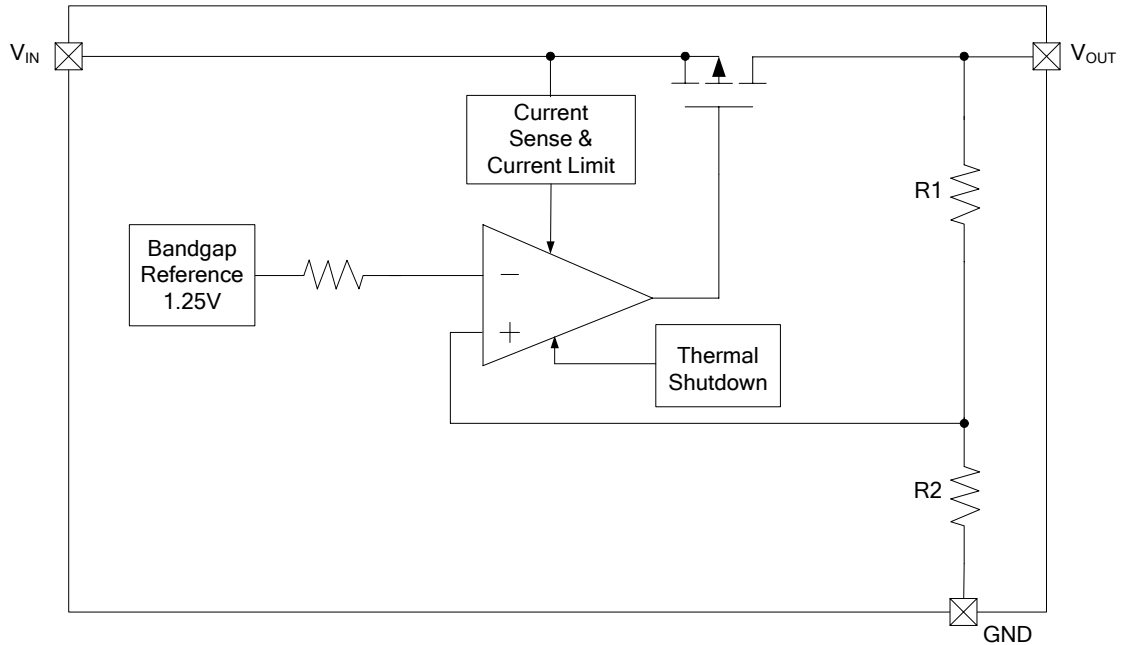
**Note 2:** Additional information on lead temperature and pad temperature may be obtained by contacting CR PowTech

**Note 3:** Like the Absolute Maximum power dissipation, the maximum power dissipation for operation depends on the ambient temperature.

**Note 4:** The target output voltage, which is labeled  $V_{OUT(nom)}$ , is the desired voltage option.

**Note 5:** All limits are guaranteed. All electrical characteristics having room-temperature limits are tested during production with  $T_J = 25^{\circ}C$  or correlated using Statistical Quality Control (SQC) methods. All hot and cold limits are guaranteed by correlating the electrical characteristics to process and temperature variations and applying statistical process control.

### SIMPLIFIED BLOCK DIAGRAM

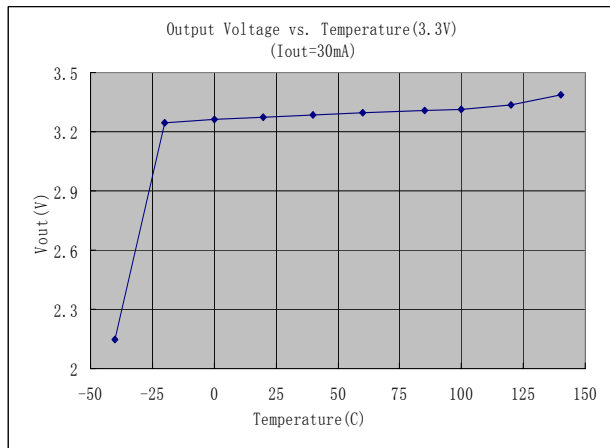
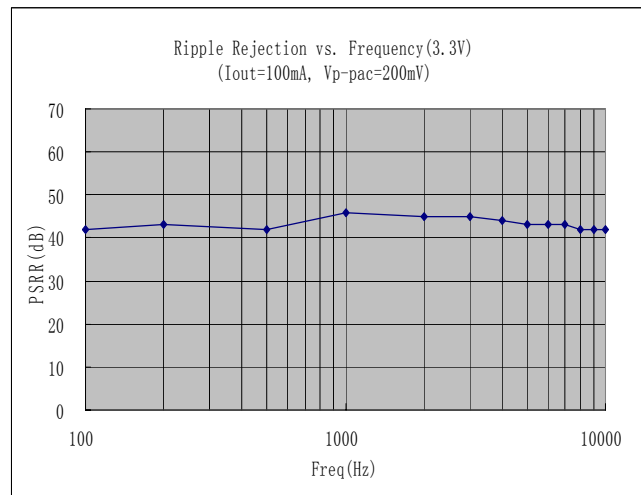
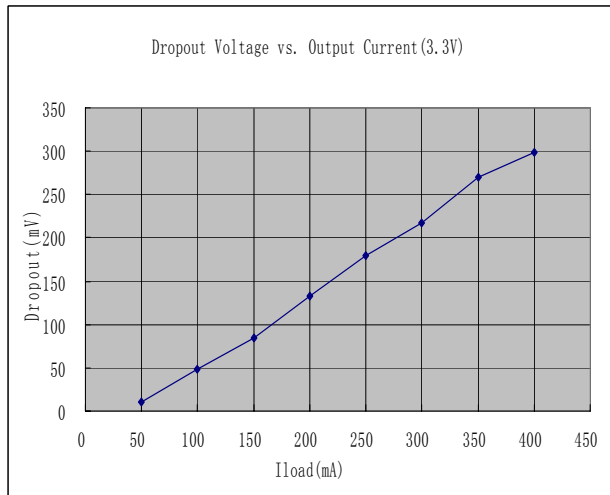
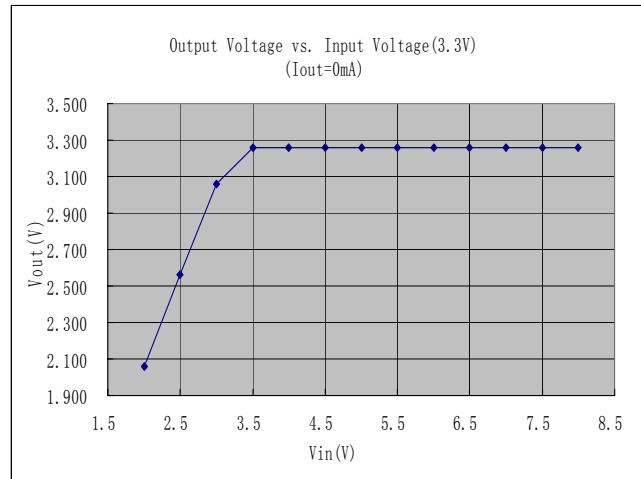
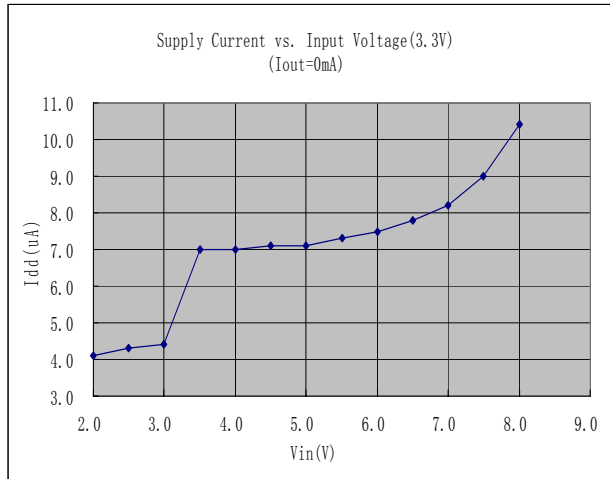


**Figure1. Graph the PT5110 major functional blocks**

In Figure 1, the block of Bandgap Reference provides the reference voltage of the LDO. The op amp block is used as the error amplifier of the LDO by compare the reference with the output feedback voltages. Its output controls the gate of a large PMOS driver and hereby adjusts the output voltage. The resistor  $R_1$  and  $R_2$  form a voltage divider to provide the feedback voltage. The Current Sense & Limit block senses the LDO output current and limits the output current from being too high. This is mostly a short circuit protection feature.

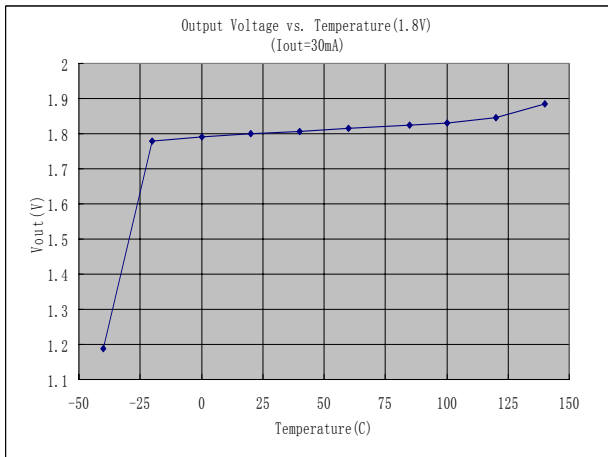
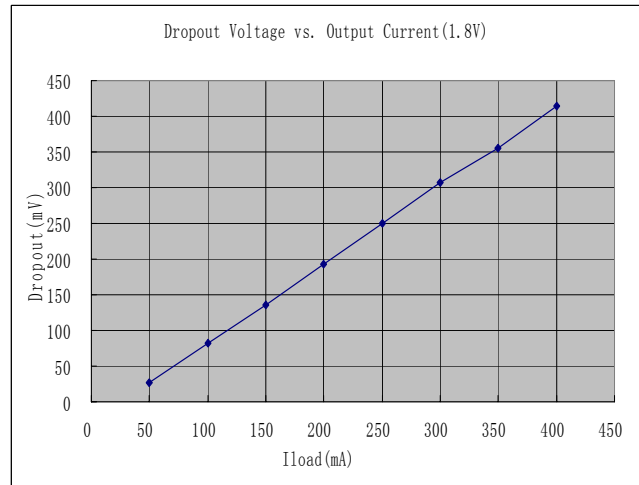
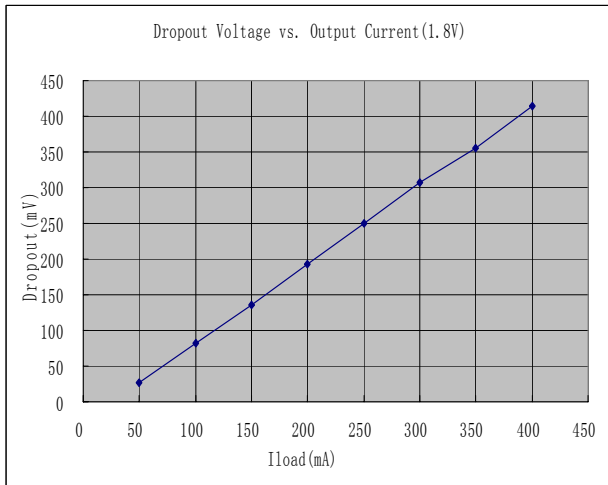
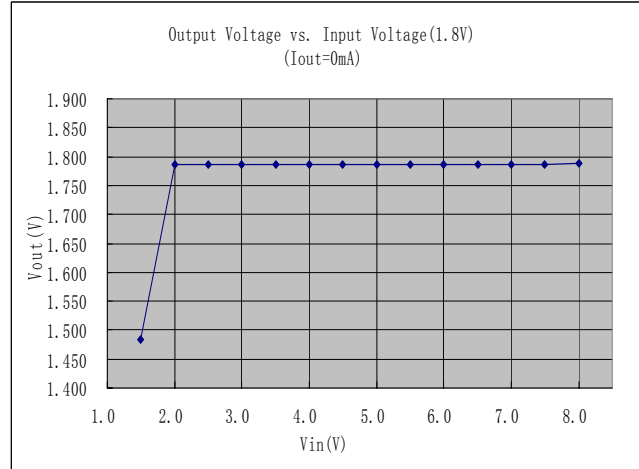
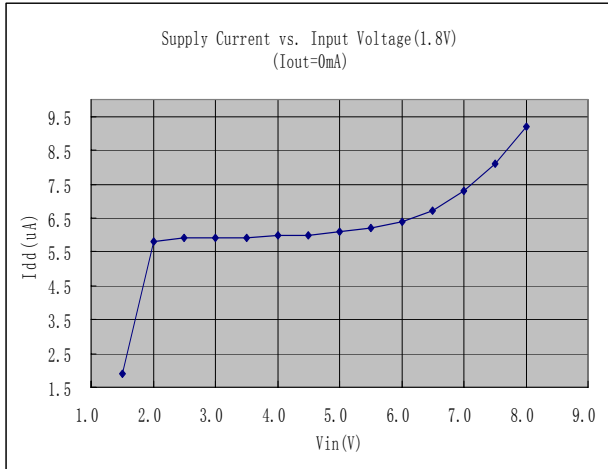
### TYPICAL PERFORMANCE CHARACTERISTICS

Unless otherwise specified:  $V_{IN} = V_{OUT(nom)} + 1V$ ,  $V_{EN1} = V_{EN2} = V_{IN}$ ,  $C_{IN} = C_{OUT1} = C_{OUT2} = 1 \mu F$  (Ceramic Capacitor),  $T_A = +25^\circ C$ .



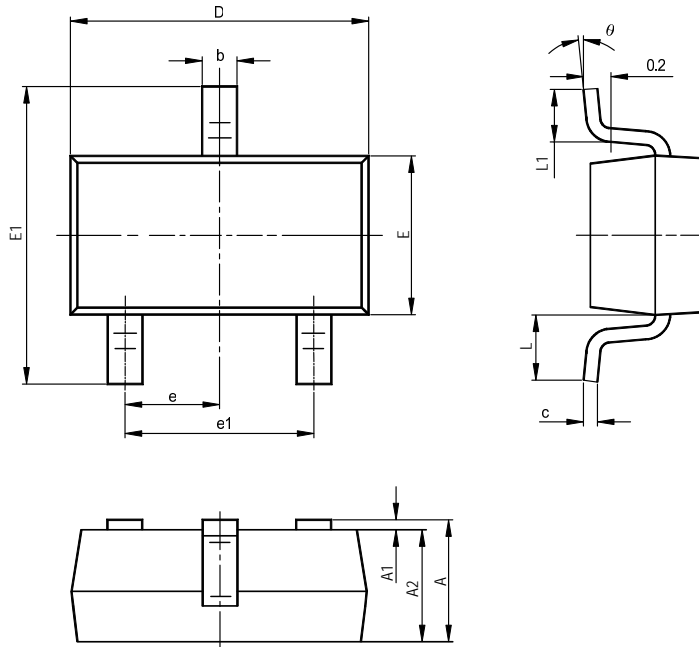
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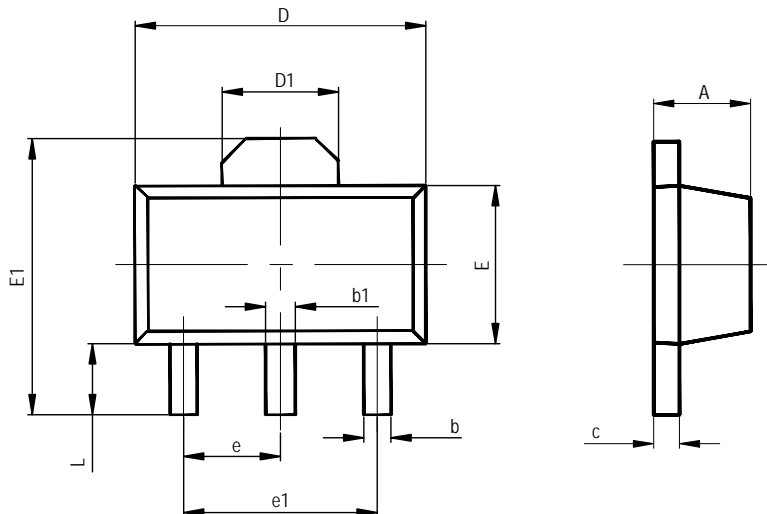
PACKAGE INFORMATION

SOT23-3



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



**PACKAGE INFORMATION**
**SOT89-3**


SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047