

100mA, 4 μ A Quiescent Current CMOS LDO Regulator

General Description

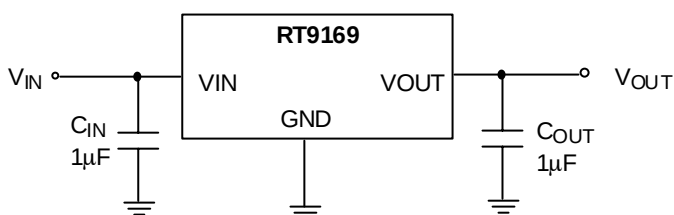
The RT9169 series are 100mA ultra-low quiescent current CMOS low dropout (LDO) regulator designed for battery-powered equipments. The output voltages range from 1.2V to 5V with 0.1V per step.

The other features include 4 μ A ultra-low quiescent, low dropout voltage, high output accuracy, current limiting protection, and high ripple rejection ratio.

Ordering Information

RT9169-□□□□	Package type
ZL : TO-92 L Type	
ZT : TO-92 T Type	
X : SOT-89	
V : SOT-23	
CB : SOT-25	
Operating temperature range	
C: Commercial standard	
Output voltage	
12 : 1.2V	
13 : 1.3V	
:	
49 : 4.9V	
50 : 5.0V	

Typical Application Circuit



Marking Information

For marking information, contact our sales representative directly or through a RichTek distributor located in your area, otherwise visit our website for detail.

Features

- Ultra-Low Quiescent Current: 4 μ A
- Low Dropout: 450mV at 100mA
- Wide Operating Voltage Ranges: 2V~6V
- Current Limiting Protection
- Only 1 μ F Output Capacitor Required for Stability
- High Power Supply Rejection Ratio

Applications

- Battery-Powered Equipment
- Palmtops, Notebook Computers
- Hand-held Instruments
- PCMCIA Cards

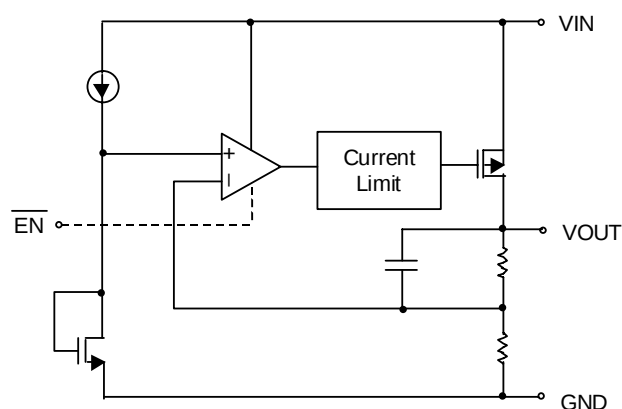
Pin Configurations

Part Number	Pin Configurations
RT9169-□□CZL (Plastic TO-92)	TOP VIEW 1. VIN 2. GND 3. VOUT
RT9169-□□CZT (Plastic TO-92)	TOP VIEW 1. VOUT 2. VIN 3. GND
RT9169-□□CX (Plastic SOT-89)	TOP VIEW 1. GND 2. VIN (TAB) 3. VOUT
RT9169-□□CV (Plastic SOT-23)	TOP VIEW 1. VOUT 2. GND 3. VIN
RT9169-□□CB (Plastic SOT-25)	TOP VIEW 1. VIN 2. GND 3. EN 4. NC 5. VOUT

Pin Description

Pin Name	Pin Function
VIN	Power Input
VOUT	Output Voltage
GND	Ground
EN	Chip Enable Control Input

Function Block Diagram



Absolute Maximum Ratings

- Input Voltage 7V
- Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$
 - TO-92 0.6W
 - SOT-89 0.5W
 - SOT-23 0.25W
 - SOT-25 0.25W
- Operating Junction Temperature Range -40°C to 125°C
- Storage Range -65°C to 150°C
- Package Thermal Resistance
 - TO-92, θ_{JA} 160°C/W
 - SOT-89, θ_{JC} 100°C/W
 - SOT-89, θ_{JA} 180°C/W
 - SOT-23, θ_{JA} 250°C/W
 - SOT-25, θ_{JA} 250°C/W

Electrical Characteristics

($V_{IN} = 5.5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

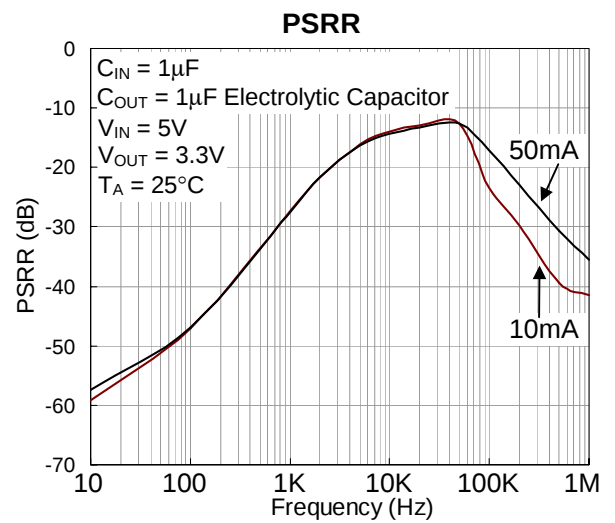
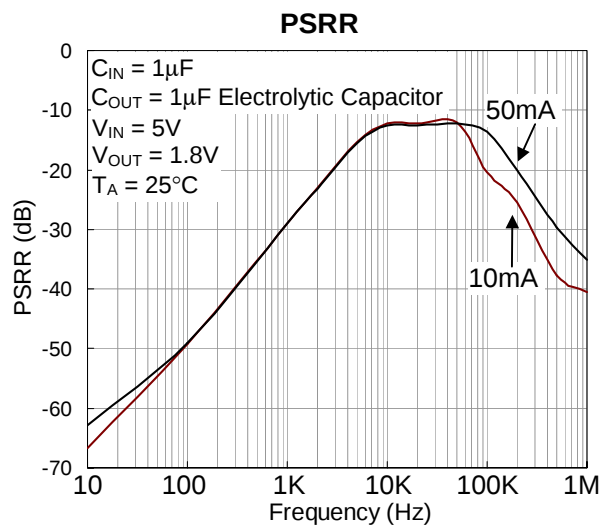
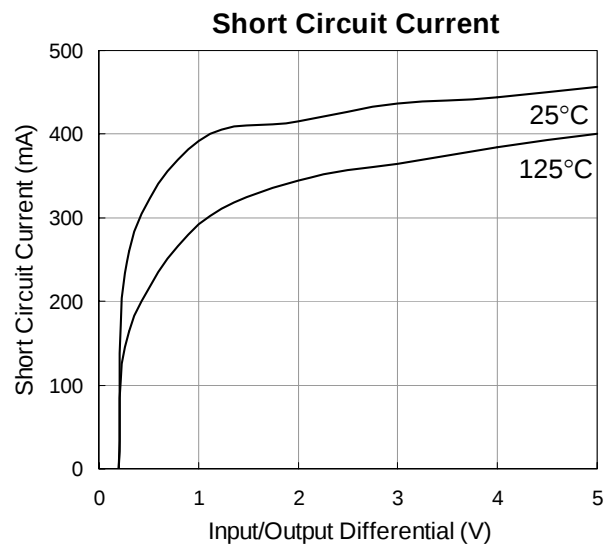
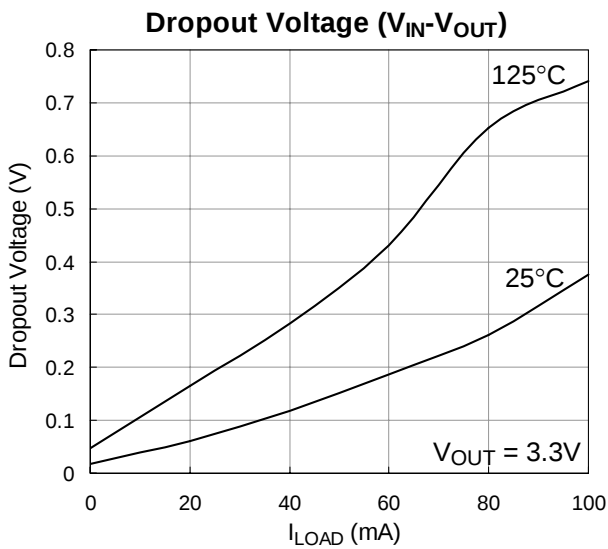
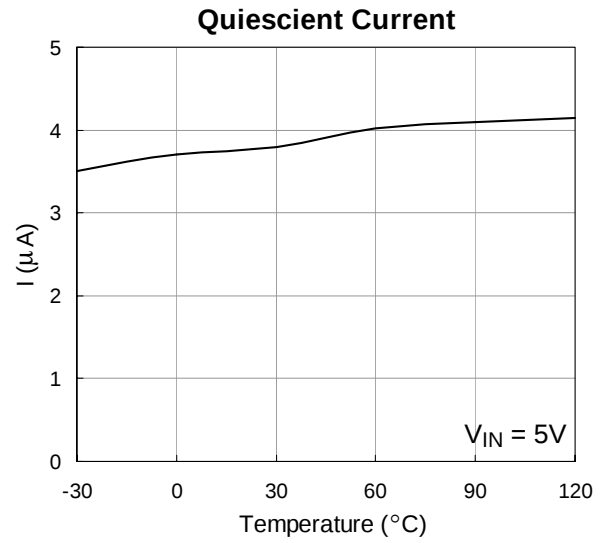
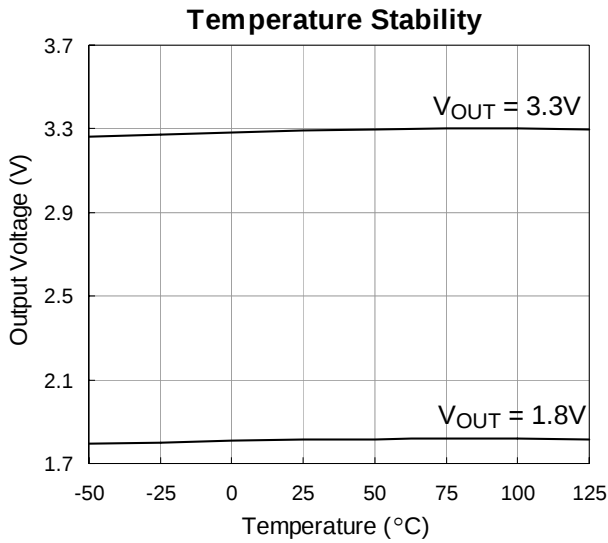
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage Range	V_{IN}		2	--	6	V
Output Voltage Accuracy	ΔV_{OUT}	$I_L = 1mA$	-2	--	+2	%
Maximum Output Current	I_{MAX}	$V_{IN} = V_{OUT} + 0.6V$, $V_{IN} \geq 3.6V$	100	--	--	mA
Current Limit	I_{LIMIT}	$I_L = 100mA$	150	250	--	mA
GND Pin Current	I_G	No Load	--	4	7	μA
		$I_{OUT} = 100mA$		4	10	μA
Dropout Voltage	V_{DROP}	$I_{OUT} = 1mA$, $V_{IN} \geq 3.6V$	--	4	10	mV
		$I_{OUT} = 50mA$, $V_{IN} \geq 3.6V$	--	200	300	
		$I_{OUT} = 100mA$, $V_{IN} \geq 3.6V$	--	450	600	
Line Regulation	ΔV_{LINE}	$V_{IN} = (V_{OUT} + 0.3V)$ to $6V$, $V_{IN} \geq 3.6V$, $I_{OUT} = 1mA$	-0.2	--	+0.2	%/V
Load Regulation	ΔV_{LOAD}	$I_{LOAD} = 0mA$ to $100mA$	--	0.01	0.04	%/mA
Output Noise	e_{NO}	BW = 100Hz to 50KHz $C_{OUT} = 10\mu F$	--	250	--	μV
Ripple Rejection	PSRR	F = 1KHz, $C_{OUT} = 1\mu F$	--	30	--	dB
Standby Current	RT9169-CB	$\overline{EN} = V_{IN}$	--	0.1	1	μA
$\overline{EN}$ Threshold			0.6	1	2	V
Thermal Shutdown Protection			125	--	--	$^\circ C$

Application Information

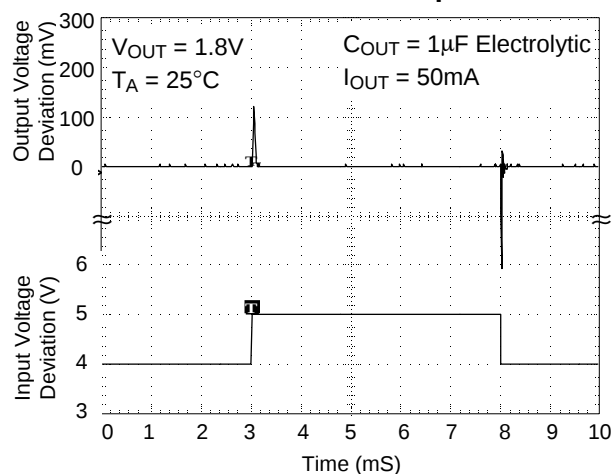
A $1\mu F$ (or larger) capacitor is recommended between V_{OUT} and GND for stability. The part may oscillate without the capacitor. Any type of capacitor can be used, but not Aluminum electrolytes when operating below $-25^\circ C$. The capacitance may be increased without limit.

A $1\mu F$ capacitor (or larger) should be placed between V_{IN} to GND.

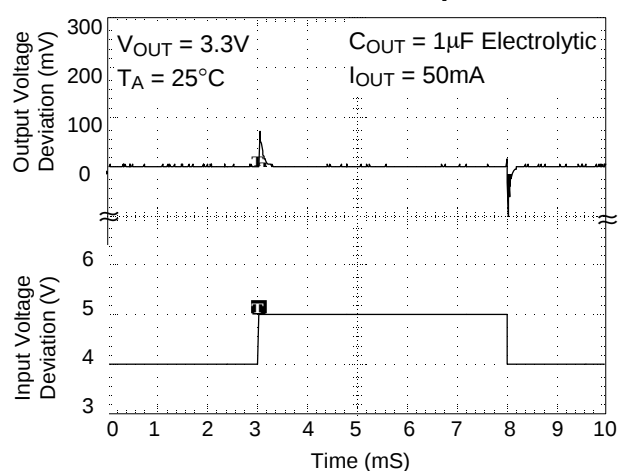
Typical Operating Characteristics



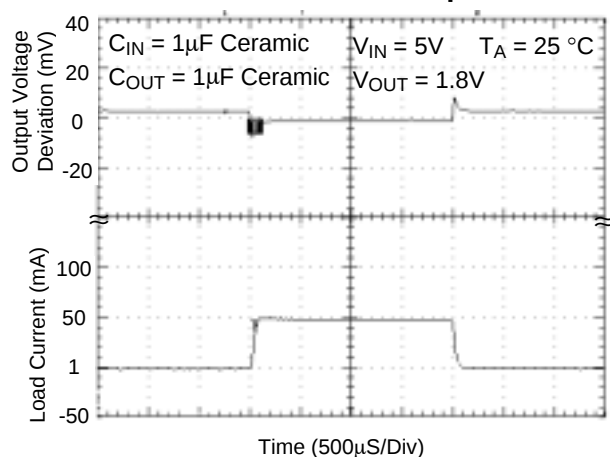
Line Transient Response



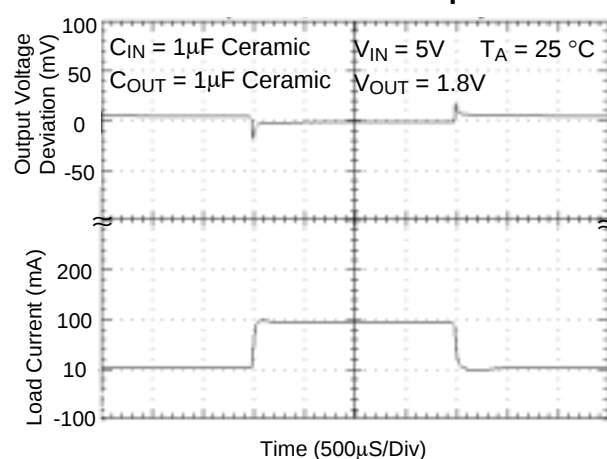
Line Transient Response



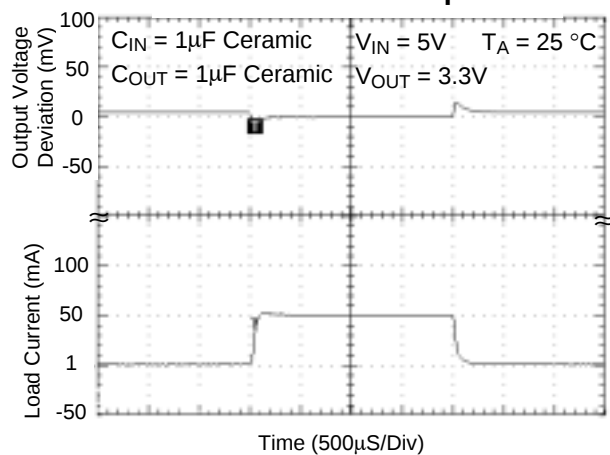
Load Transient Response



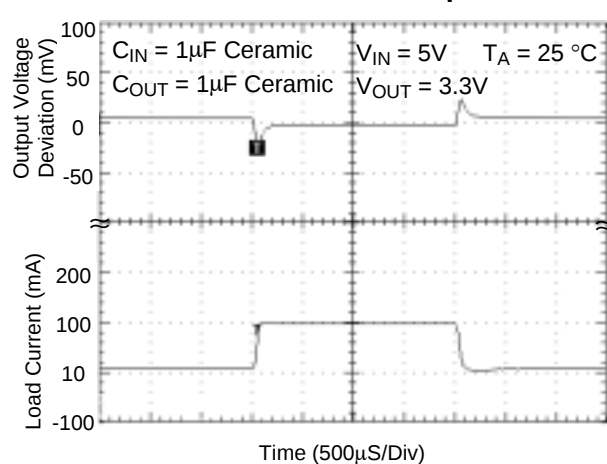
Load Transient Response



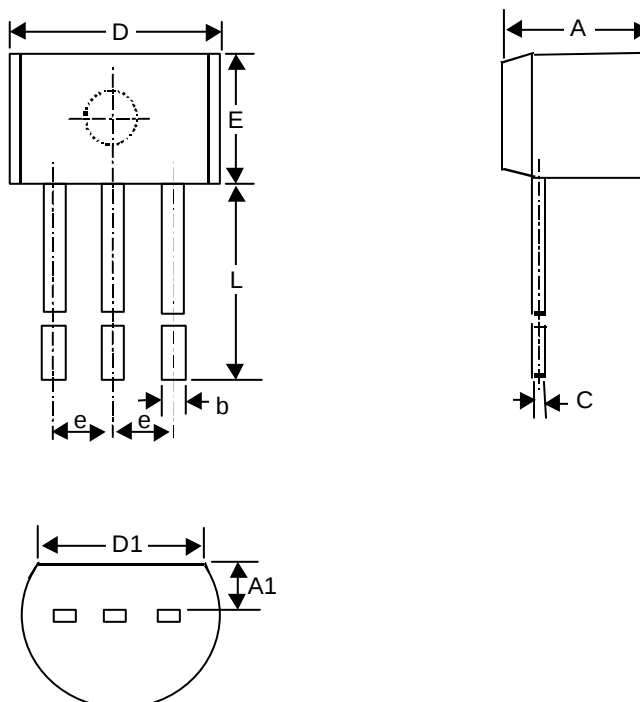
Load Transient Response



Load Transient Response

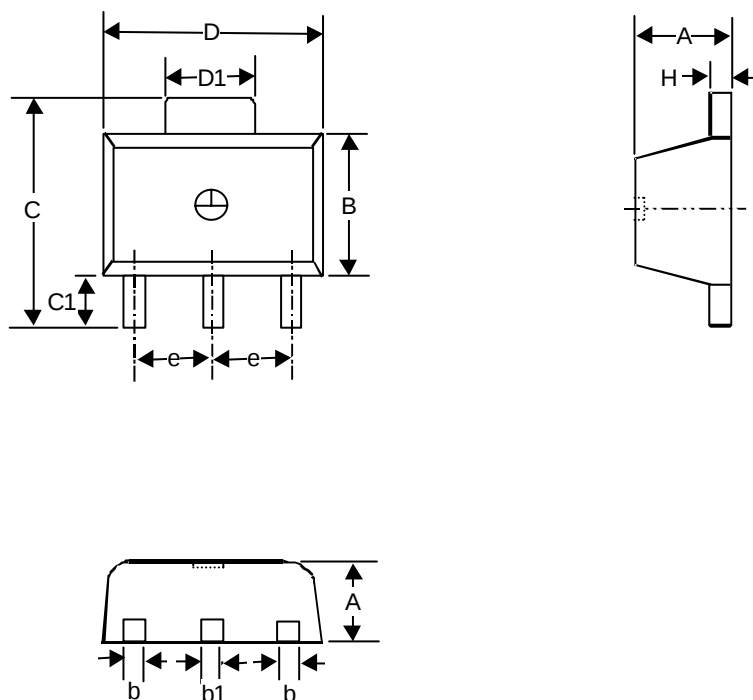


Package Information



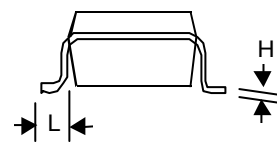
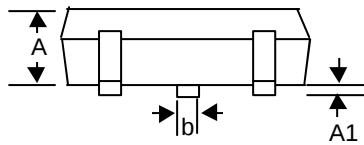
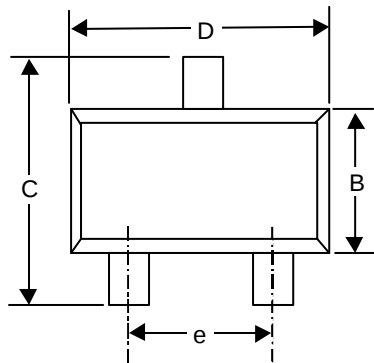
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.175	4.191	0.125	0.165
A1	1.143	1.372	0.045	0.054
b	0.406	0.533	0.016	0.021
C	0.406	0.533	0.016	0.021
D	4.445	5.207	0.175	0.205
D1	3.429	--	0.135	--
E	4.318	5.334	0.170	0.210
e	1.143	1.397	0.045	0.055
L	12.700	--	0.500	--

3-Lead TO-92 Package



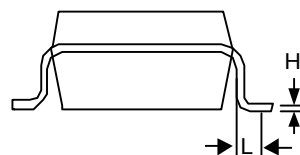
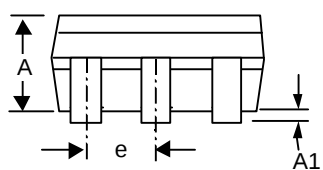
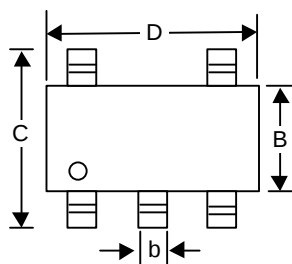
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.397	1.600	0.055	0.063
b	0.356	0.483	0.014	0.019
B	2.388	2.591	0.094	0.102
b1	0.406	0.533	0.016	0.021
C	--	4.242	--	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.355	0.432	0.014	0.017

3-Lead SOT-89 Surface Mount



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	--	0.152	--	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.508	0.014	0.020
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	1.803	2.007	0.071	0.079
H	0.102	0.254	0.004	0.010
L	0.356	0.610	0.014	0.024

SOT-23 Plastic Surface Mount



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.559	0.014	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.102	0.254	0.004	0.010
L	0.356	0.610	0.014	0.024

SOT- 25 Surface Mount Package

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