

# Voltage Detector

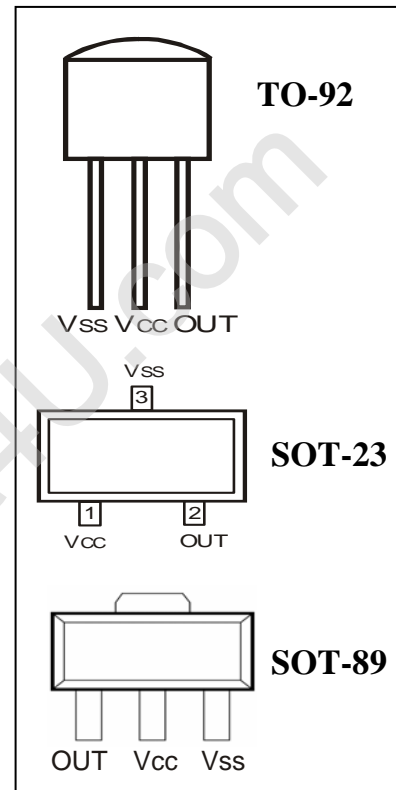
**BT75Axx**

## FUNCTIONS

- Detecting against error operations at the power ON/OFF
- Resetting function for low voltage microprocessor
- Checking low battery
- Active Low
- CMOS or open drain output (mask option)
- Tolerance  $\pm 2\%$

## FEATURES

- Low Power Consumption
- Low Temperature Coefficient
- Built-in Voltage Reference
- Comparator Hysteresis
- TO-92, SOT-23 packages are available



## GENERAL DESCRIPTION

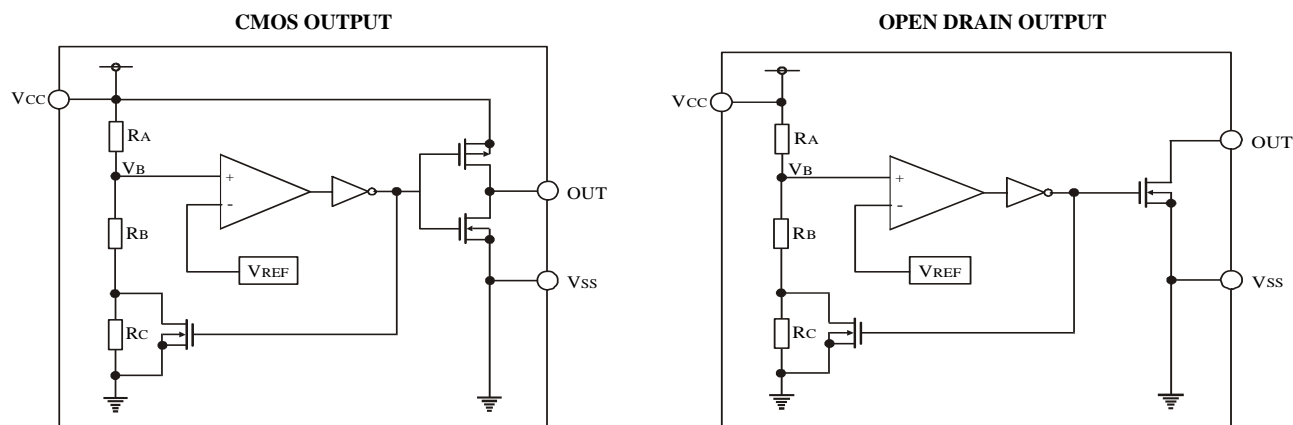
The BT75Axx series are the voltage detectors, consist of a high-precision voltage reference, a comparator with precise thresholds and built-in hysteresis and an output driver.

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	-0.3 ~ +8.0	V
Operating Temperature	T <sub>opr</sub>	-10 ~ +70	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +125	°C
Output Current	I <sub>O</sub>	30	mA

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$		1.2		5.5	V
Detecting Voltage	$V_{DET}$		2.16	2.20	2.24	V
			2.35	2.40	2.45	
			2.50	2.55	2.60	
			2.65	2.70	2.75	
			2.74	2.80	2.86	
			3.23	3.30	3.37	
			3.82	3.90	3.98	
			4.12	4.20	4.28	
			4.61	4.70	4.79	
4.90	5.00	5.10				
Supply Current	$I_{CC}$	$V_{CC} = 5.0\text{V}$ , No Load		8	15	$\mu\text{A}$
Low Output Voltage	$V_{OL}$	$V_{CC} = V_{DET} - 0.2\text{V}$ , $I_{OL} = 0.1\text{mA}$		0.1	0.3	V
High Output Voltage	$V_{OH}$	$V_{CC} = V_{DET} + 0.2\text{V}$ , $I_{OH} = 0.1\text{mA}$	$V_{CC} - 0.3\text{V}$			V
Hysteresis Voltage	$V_{HYS}$			2.0		%
Detective Voltage Temperature Coefficient	$\frac{\Delta V_{DET}}{\Delta T \times V_{DET}}$	$-10^\circ\text{C} < T_A < 70^\circ\text{C}$		$\pm 0.02$		%/ $^\circ\text{C}$

**BLOCK DIAGRAM**

**FUNCTIONAL DESCRIPTION**

The BT75Axx series is the set of voltage detectors equipped with a high stability voltage reference which is connected to the negative input of a comparator - denoted as  $V_{REF}$  in block diagram.

When the voltage drop to the positive input of the comparator ( $V_B$ ) is high than  $V_{REF}$ ,  $V_{OUT}$  goes high.

If  $V_{CC}$  is decreased so that  $V_B$  falls to a value less than  $V_{REF}$ , the comparator output inverts from high to low,  $V_{OUT}$  goes low.

The device has hysteresis to prevent the circuit from oscillation when  $V_B \approx V_{REF}$ .

If  $V_{CC}$  falls below the minimum operating voltage, the output becomes undefined.

The detectable voltage is defined as:

$$V_{DET}(-) = \frac{RA+RB+RC}{RB+RC} \times V_{REF}$$

The release voltage is defined as:

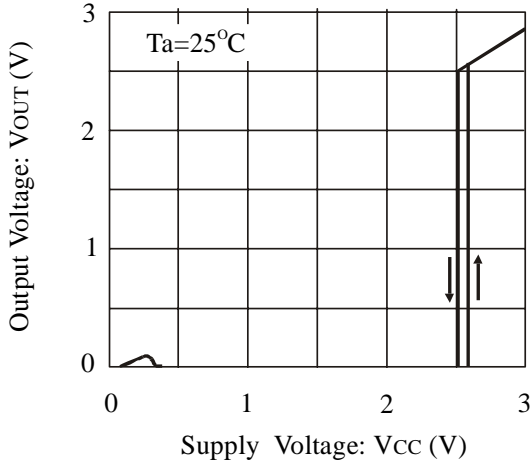
$$V_{DET}(+) = \frac{RA+RB}{RB} \times V_{REF}$$

The hysteresis width is:

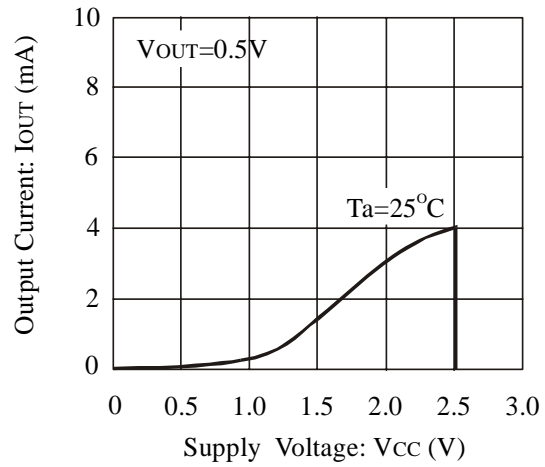
$$V_{HYS} = V_{DET}(+) - V_{DET}(-)$$

ELECTRICAL CHARACTERISTICS

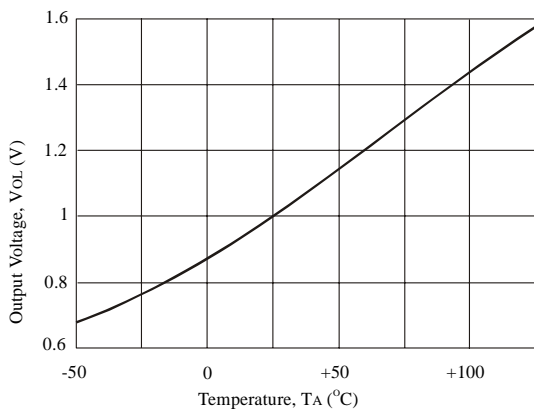
1. OUTPUT VOLTAGE vs. SUPPLY VOLTAGE  
BT75A25



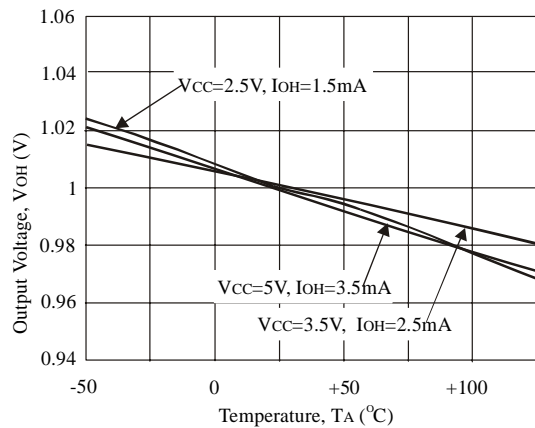
2. OUTPUT LOW CURRENT vs. SUPPLY VOLTAGE  
BT75A25



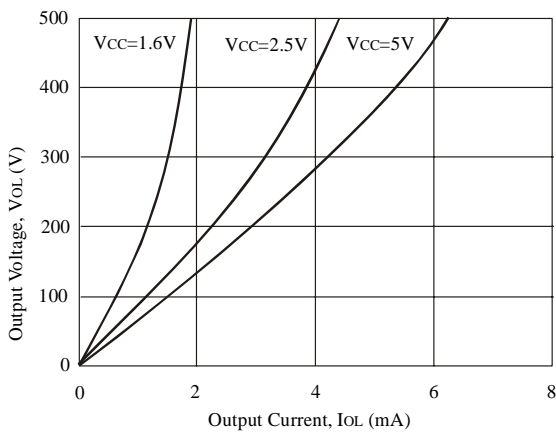
3. NORMALIZED  $V_{OL}$  vs. TEMPERATURE



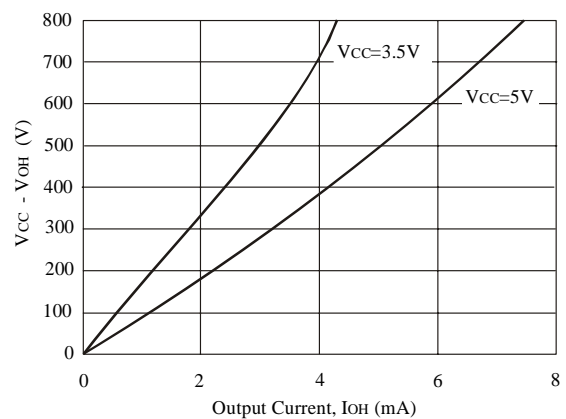
NORMALIZED  $V_{OH}$  vs. TEMPERATURE



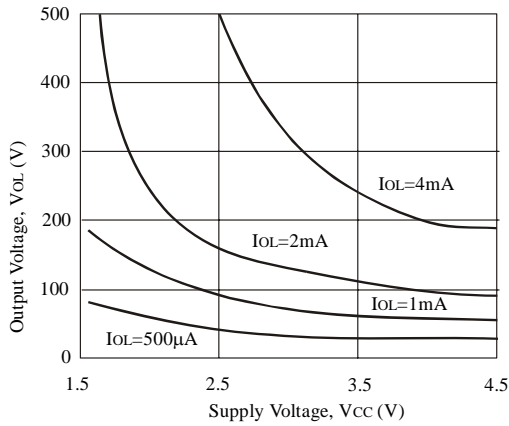
4.  $V_{OL}$  vs. OUTPUT CURRENT



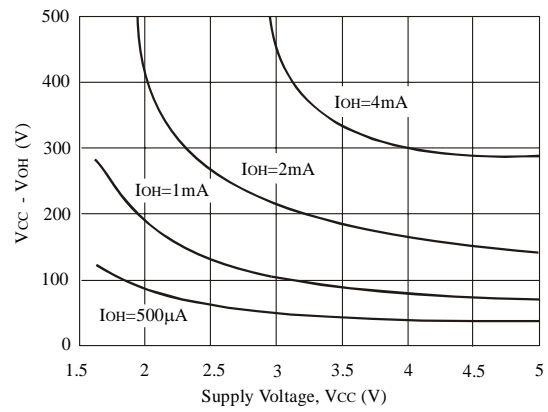
$V_{CC} - V_{OH}$  vs. OUTPUT CURRENT



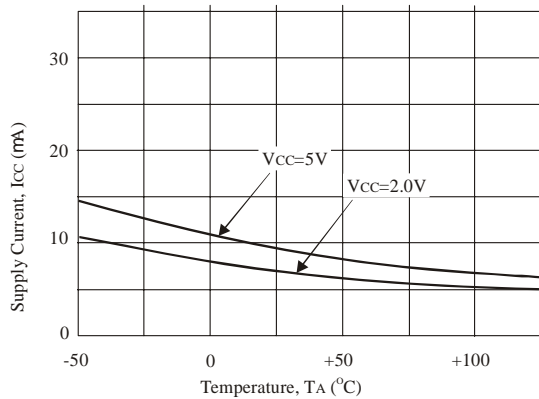
5.  $V_{OL}$  vs. SUPPLY VOLTAGE



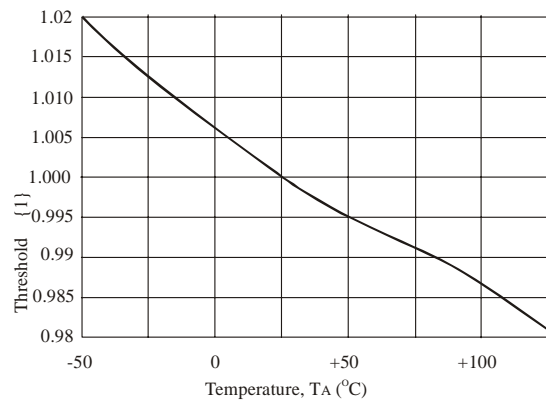
$V_{CC} - V_{OH}$  vs. SUPPLY VOLTAGE



6. SUPPLY CURRENT vs. TEMPERATURE



NORMALIZED THRESHOLD vs. TEMPERATURE



ORDERING INFORMATION

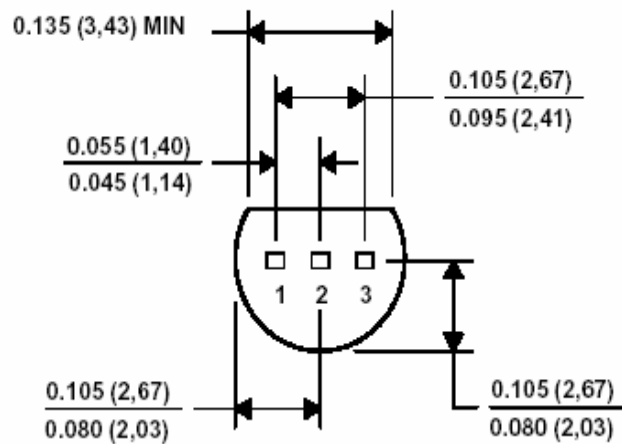
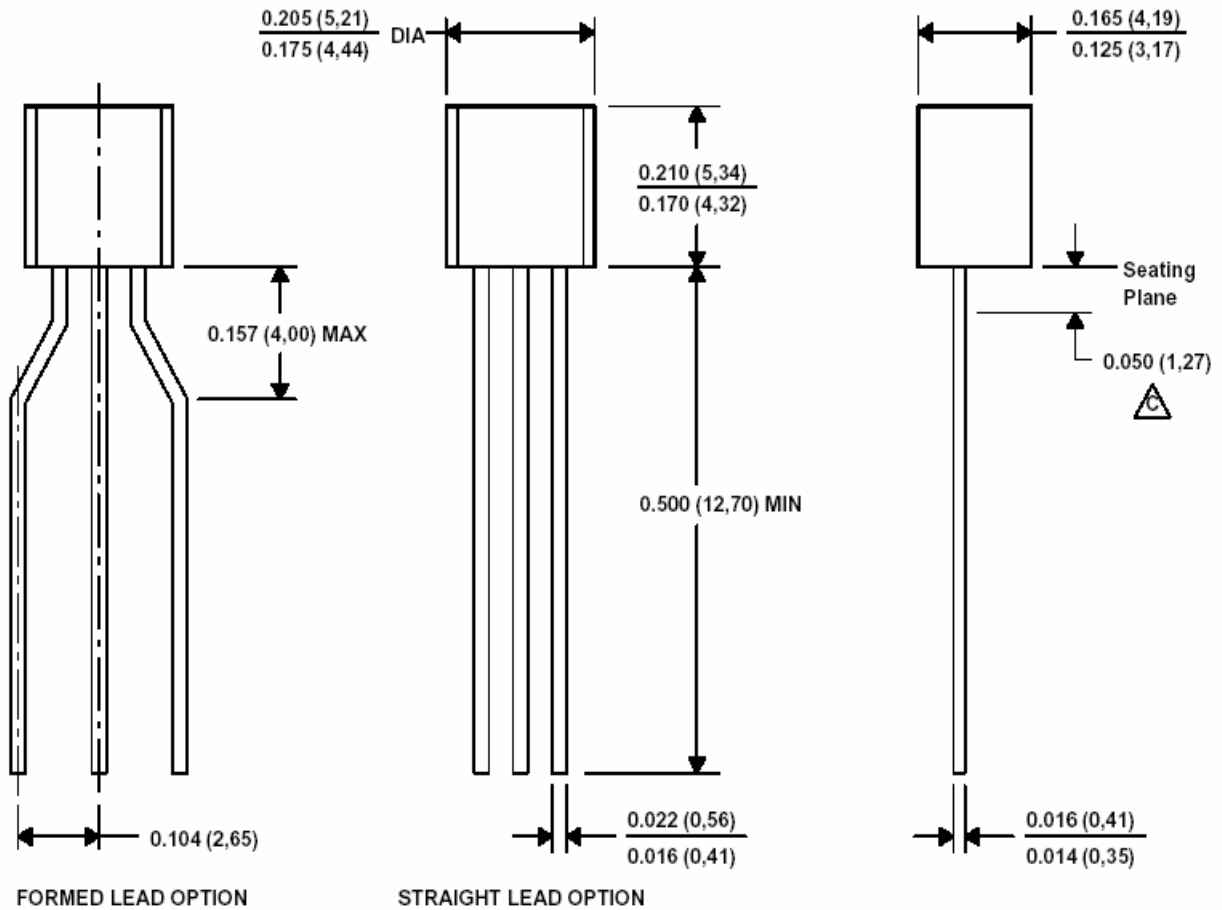
**BT75A XX XX**

- 22 -> 2.20V
- 24 -> 2.40V
- 25 -> 2.55V
- .
- .
- 42 -> 4.20V
- 47 -> 4.70V
- 50 -> 5.00V

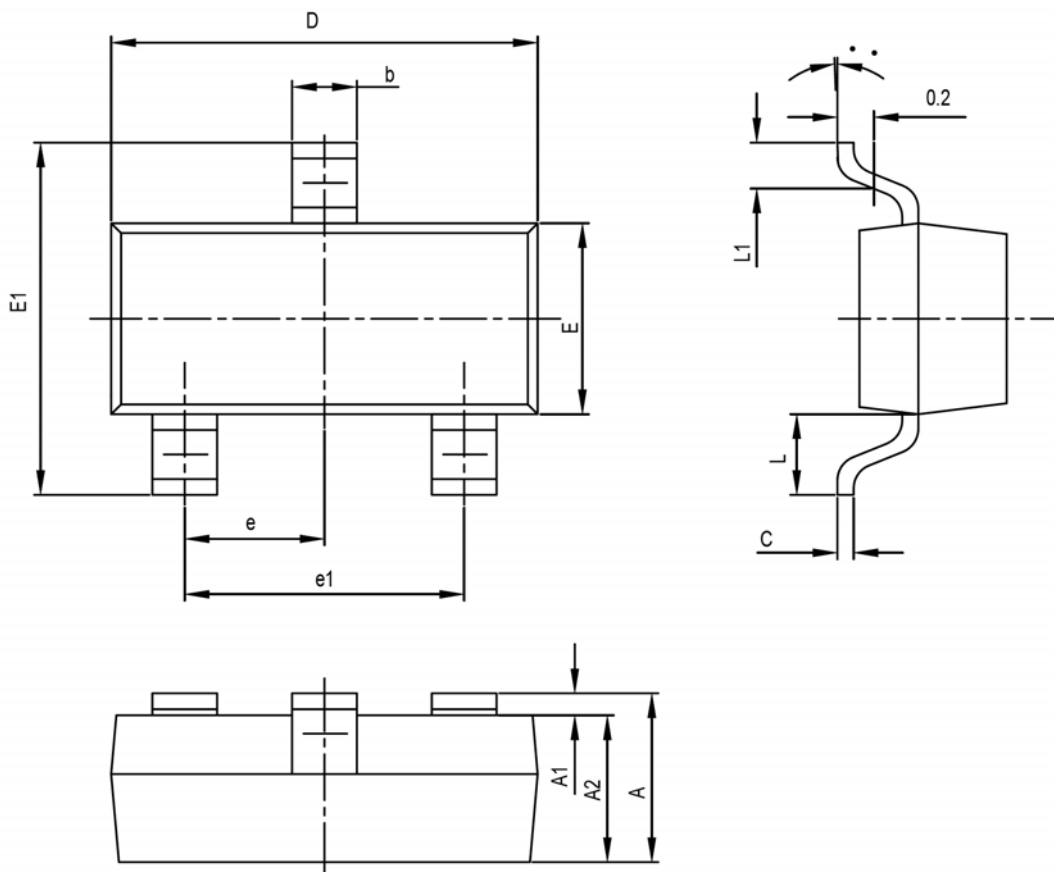
- LS = TO-92 Straight (Bulk)
- LF = TO-92 Form (Taping)
- ST = SOT-23 (Taping)
- PT = SOT-23 (Taping)

PACKAGE DIMENSIONS

TO-92

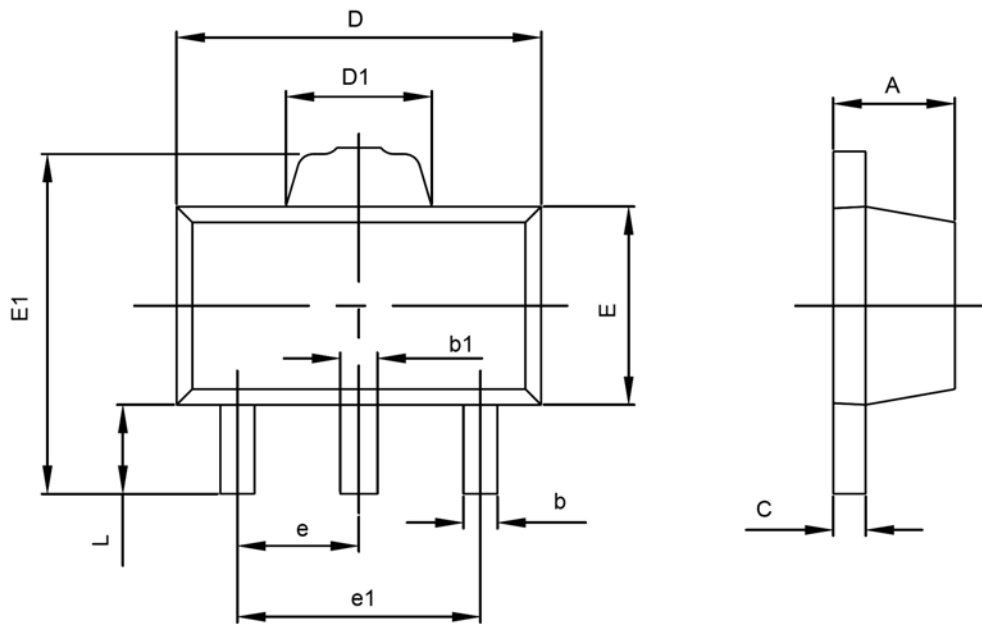


SOT-23 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950TPY		0.037TPY	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
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	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500TYP		0.060TYP	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043