



Ultra-Small Package High-Precision Voltage Detector

■ General Description

The LN61C series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of $\pm 2.0\%$. Two output forms, Nch open-drain and CMOS output, are available. Ultra-low current consumption and miniature package lineup can meet demand from the portable device applications.

■ Features

- Ultra-low current consumption 0.8 μA typ. ($V_{\text{in}}=1.5\text{V}$)
- High-precision detection voltage $\pm 2.0\%$
- Operating voltage range 0.7 V to 8.0 V
- Detection voltage 1.0V to 6.0 V (0.1 V step)
- Output form Nch open-drain output (Active Low) or CMOS output (Active Low)

■ Ordering Information

LN61C ①②③④⑤⑥⑦

■ Applications

- Battery checkers
- Power failure detectors
- Power monitor for portable equipments such as pagers, calculators, electronic notebooks and remote controllers.
- Constant voltage power monitor for cameras, video equipments and communication devices.
- Power monitor for microcomputers and reset for CPUs.

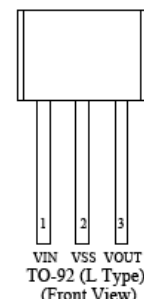
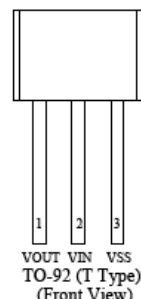
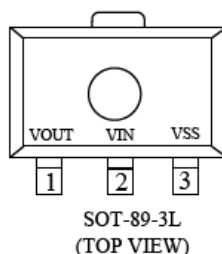
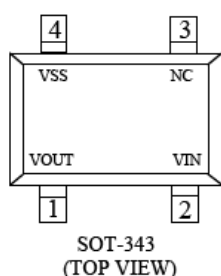
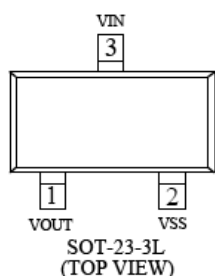
■ Package

- SOT-23-3L
- SOT-343
- SOT-89-3L
- TO-92

Designator	Description	Designator	Description
①	Output Configuration: C=CMOS N=N-ch open drain	⑥	Package Type: M=SOT-23-3L P=SOT-89-3L N=SOT-343 T=TO-92(Standard) L=TO-92(Custom pin configuration)
②③	Detect Voltage Eg: 10=1.0V 38=3.8V		⑦
④	Output Delay 0=No delay		
⑤	Detect Accuracy: 2=with±2%		



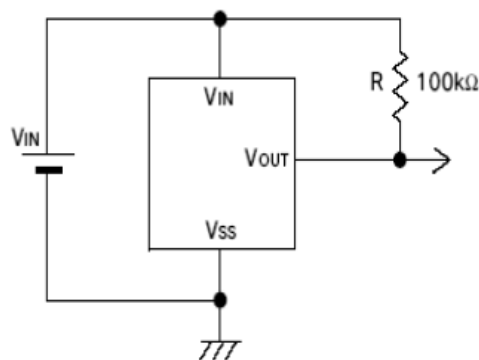
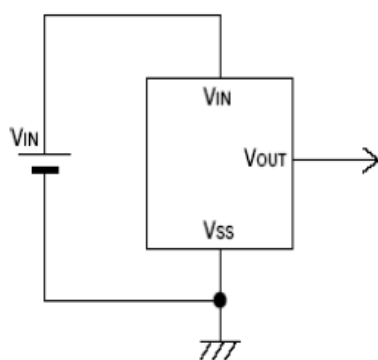
Pin Configurations



Pin Assignment

Pin No.					Pin name	Pin description
SOT-23-3L	SOT-89-3L	TO-92 (T)	TO-92 (L)	SOT-343		
3	2	2	1	2	VIN	Voltage input pin
2	3	3	2	4	VSS	GND pin
1	1	1	3	1	VOUT	output pin
-	-	-	-	3	NC	No connection

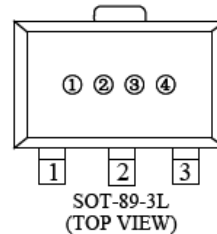
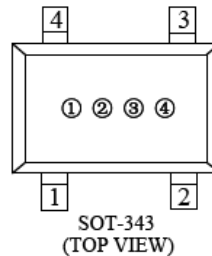
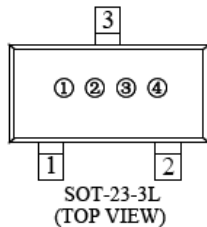
Typical Application Circuit





■ Marking Rule

- SOT-23-3L, SOT-89-3L, SOT-343



- ① Represents the product name

Symbol	Product Description
C	LN61C◆◆◆◆◆◆◆◆

- ② Represents the Output configuration and detect voltage range

Designator	Output Configuration	Voltage Range (V)
A	CMOS	0.1~3.0
B	CMOS	3.1~6.0
N	OPEN DRAIN	0.1~3.0
P	OPEN DRAIN	3.1~6.0

- ③ Represents the detect voltage

Designator	Detect Voltage (V)			
0	-	3.1	-	3.15
1	-	3.2	-	3.25
2	-	3.3	-	3.35
3	-	3.4	-	3.45
4	-	3.5	-	3.55
5	-	3.6	-	3.65
6	-	3.7	-	3.75
7	-	3.8	-	3.85
8	0.9	3.9	0.95	3.95
9	1.0	4	1.05	4.05
A	1.1	4.1	1.15	4.15
B	1.2	4.2	1.25	4.25
C	1.3	4.3	1.35	4.35
D	1.4	4.4	1.45	4.45
E	1.5	4.5	1.55	4.55

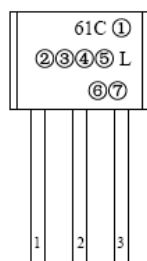
Designator	Detect Voltage (V)			
F	1.6	4.6	1.65	4.65
H	1.7	4.7	1.75	4.75
K	1.8	4.8	1.85	4.85
L	1.9	4.9	1.95	4.95
M	2	5	2.05	5.05
N	2.1	5.1	2.15	5.15
P	2.2	5.2	2.25	5.25
R	2.3	5.3	2.35	5.35
S	2.4	5.4	2.45	5.45
T	2.5	5.5	2.55	5.55
U	2.6	5.6	2.65	5.65
V	2.7	5.7	2.75	5.75
X	2.8	5.8	2.85	5.85
Y	2.9	5.9	2.95	5.95
Z	3	6	3.05	6.05

- ③ Based on internal standards

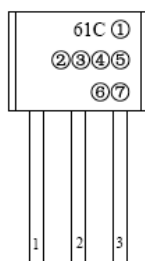
0~9, A~Z repeated G, I, J, O, Q, W are excepted)



• TO-92



TO-92 (L Type)
(Front View)



TO-92 (T Type)
(Front View)

① Represents the output configuration

Designator	Output Configuration
C	CMOS
T	N-ch open drain

②③ Represents the detect voltage

Designator		Detect Voltage (V)	Product Name
②	③		
2	4	2.4	LN61C*24****
3	0	3.0	LN61C*30****

④ Represents the output delay

Designator	Output Delay
0	No Delay

⑤ represents the detect voltage accuracy

Designator	Output Accuracy
1	Within $\pm 1\%$
2	Within $\pm 2\%$

⑥ Represents a least significant digit of the produced year

Designator	Produced Year	Product Name
1	2001	LN61C*****1*
2	2002	LN61C*****2*

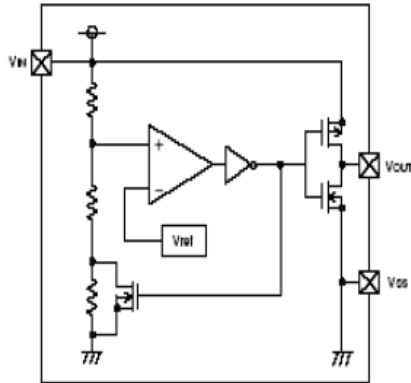
⑦ Denotes the production lot number

0~9, A~Z repeated (G, I, J, O, Q, W excepted)

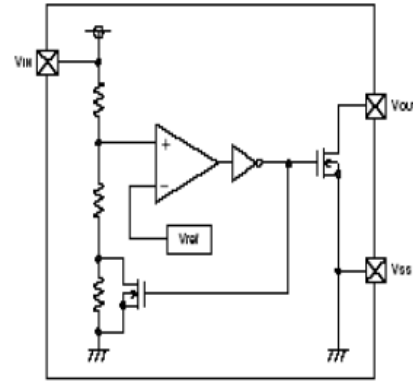


■ Function Block Diagram

(1) CMOS Output Products



(2) Nch Open-drain Output Products



■ Absolute Maximum Ratings

Ta=25℃

Item		Symbol	Absolute maximum ratings	unit
Power supply voltage		Vin	8	V
Output current		Iout	50	mA
Output voltage	CMOS	Vout	Vss-0.3~Vin+0.3	V
	N-ch		Vss-0.3~8	
Power dissipation	SOT-23-3L	Pd	150	mW
	SOT-89-3L		500	
	SOT-343		150	
	TO-92		300	
Operating ambient temperature		Topr	-40~+85	℃

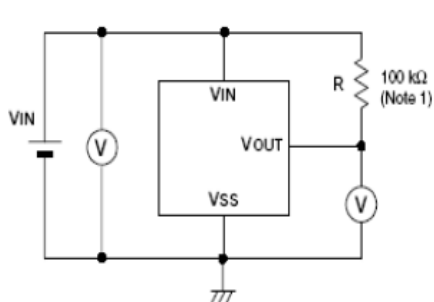


Electrical Characteristics

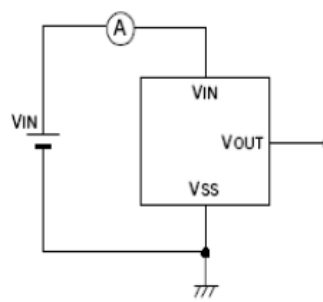
(VDF (T) = 1.0 to 6.0V $\pm 2\%$ Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test Circuit
Detection voltage	VDF		VDF x0.98	VDF	VDF x1.02	V	1
Release voltage	VHYS		VDF x0.02	VDF x0.05	VDF x0.08	V	1
Current consumption	Iss	Vin=1.0V		0.7	2.2	μA	2
		=1.5V		0.8	2.4		
		=2.0V		0.9	2.8		
		=3.0V		1.0	3.1		
		=4.0V		1.1	3.3		
		=5.0V		1.2	3.7		
Operating voltage	Vin	VDF=1.0~6.0V	0.7		8	V	1
Output current	Iout	Nch Vds=0.5V	Vin=1.0V	1.0	2.2	mA	3
			Vin=1.5V	2.0	5.7		
			Vin=2.0V	3.0	7.7		
			Vin=3.0V	5.0	10.1		
			Vin=4.0V	6.0	11.5		
			Vin=5.0V	7.0	13.0		
		Pch vds=2.1 vin=8.0		-10	-2		4
Temperature coefficient		-40~+85°C		± 100		ppm/°C	

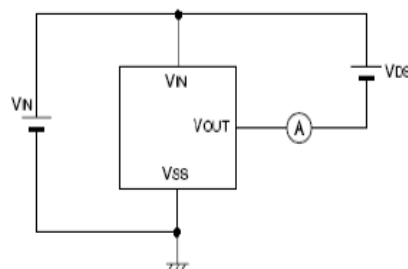
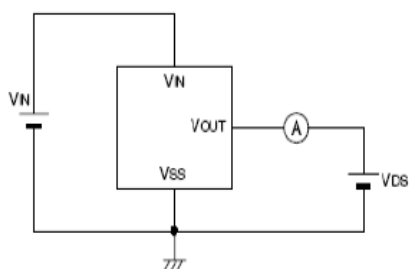
Test Circuit



circuit 1

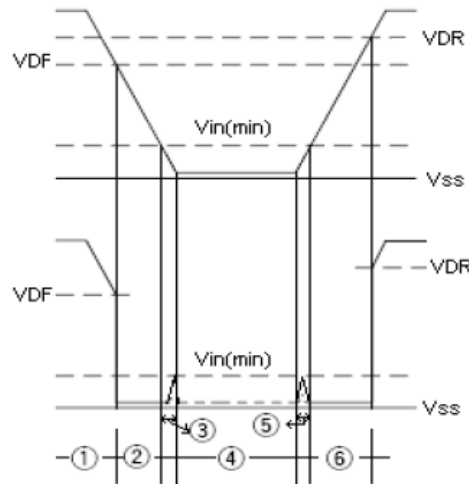


circuit 2





■ Timing Chart

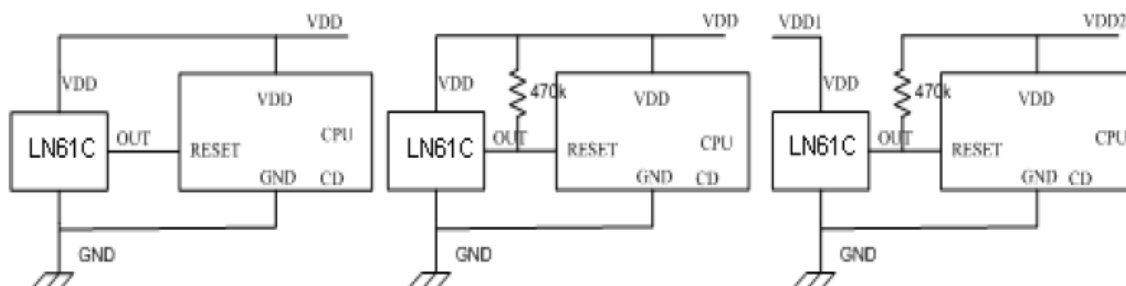


■ Operation

- 1-1. When the power supply voltage (V_{DD}) is higher than the release voltage (V_{DF}), the Nch transistor is OFF and the Pch transistor is ON to provide V_{DD} (high) at the output.
- 1-2. When the power supply voltage (V_{DD}) is lower than the release voltage (V_{DF}), the Nch transistor is ON and the Pch transistor is OFF to provide V_{SS} (low) at the output.
- 1-3. When the V_{DD} falls below the minimum operating voltage, the output becomes undefined, or goes to the V_{DD} when the output is pulled up to the V_{DD} .
- 1-4. The V_{SS} level appears when the V_{DD} is V_{SS} level.
- 1-5. The V_{SS} level appears when the V_{DD} rises above the minimum operating voltage. The V_{SS} level still appears even when the V_{DD} surpasses $-V_{DF}$, as long as it does not exceed the release voltage $+V_{DF}$.
- 1-6. When the V_{DD} rises above $+V_{DF}$ the Nch transistor becomes OFF and the Pch transistor becomes ON to provide V_{DD} level at the output.

■ Application Circuit Examples

● Microcomputer Reset Circuits



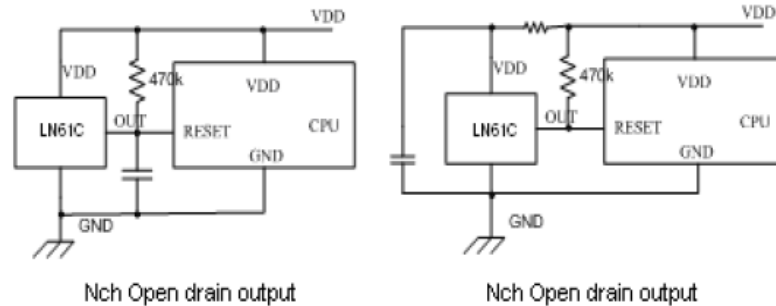
The Same supply voltage with CPU
(CMOS output)

The same supply voltage with CPU
(Nch Open drain output)

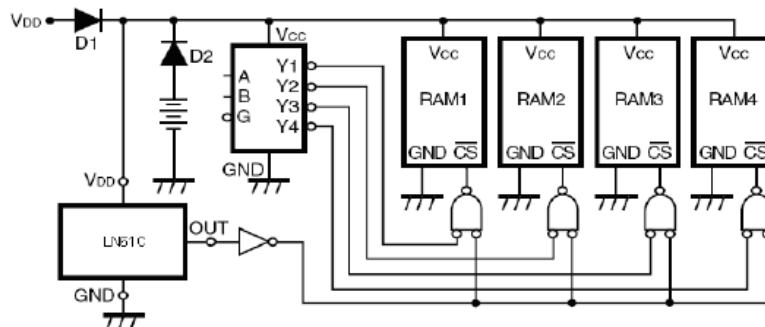
The different supply voltage with CPU
(Nch Open drain output)



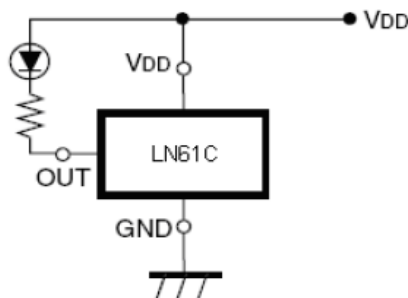
- Power-on Reset Circuit



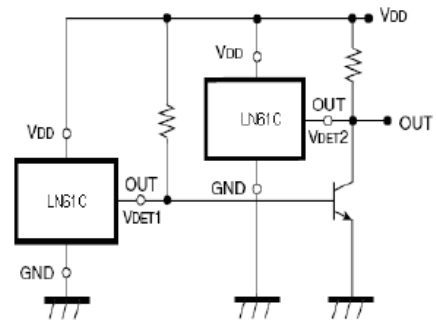
- Memory back-up circuit



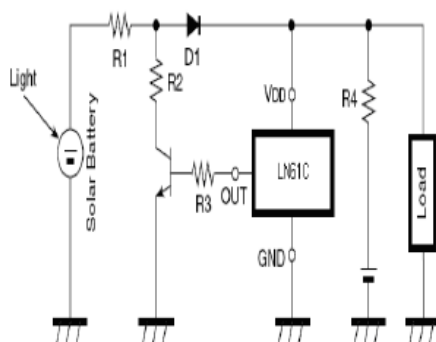
- Power failure detectors



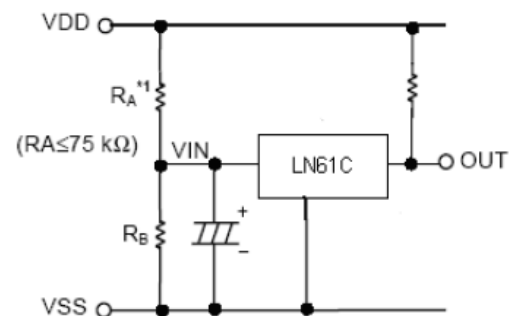
- Window Comparator Circuit



- Overcharge protect circuit



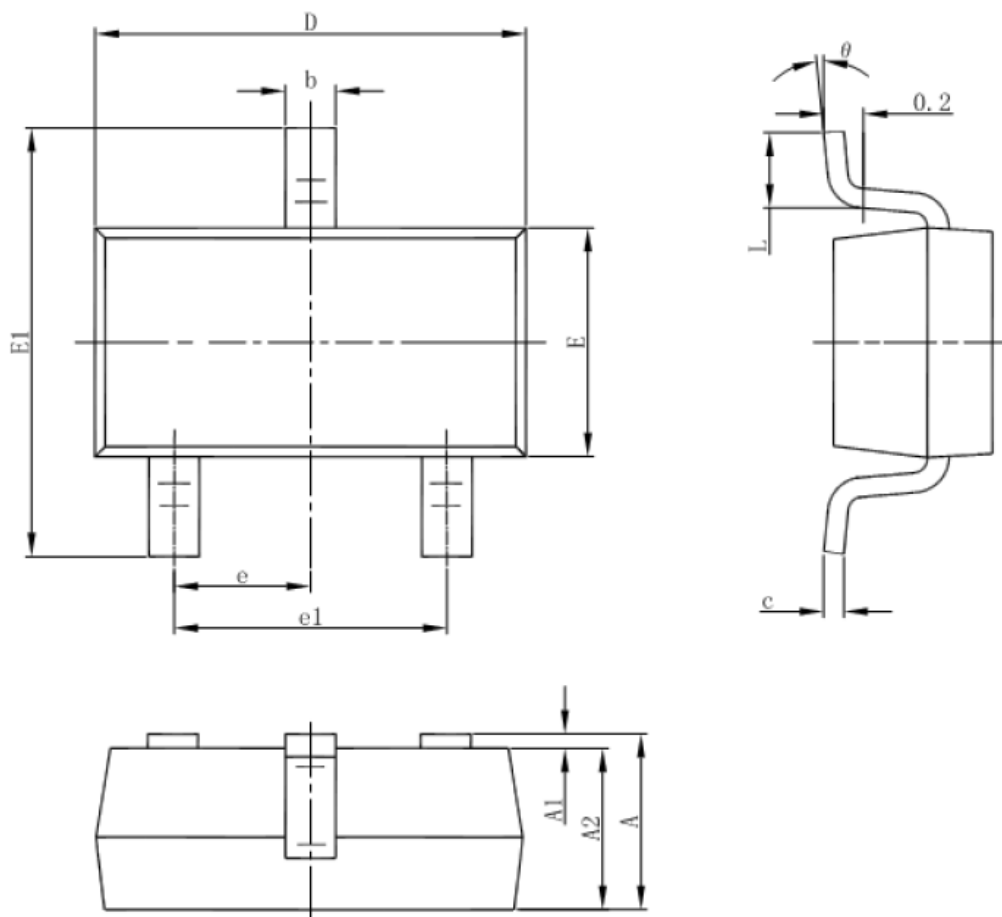
- Detector Adjustable Circuit





■ Package

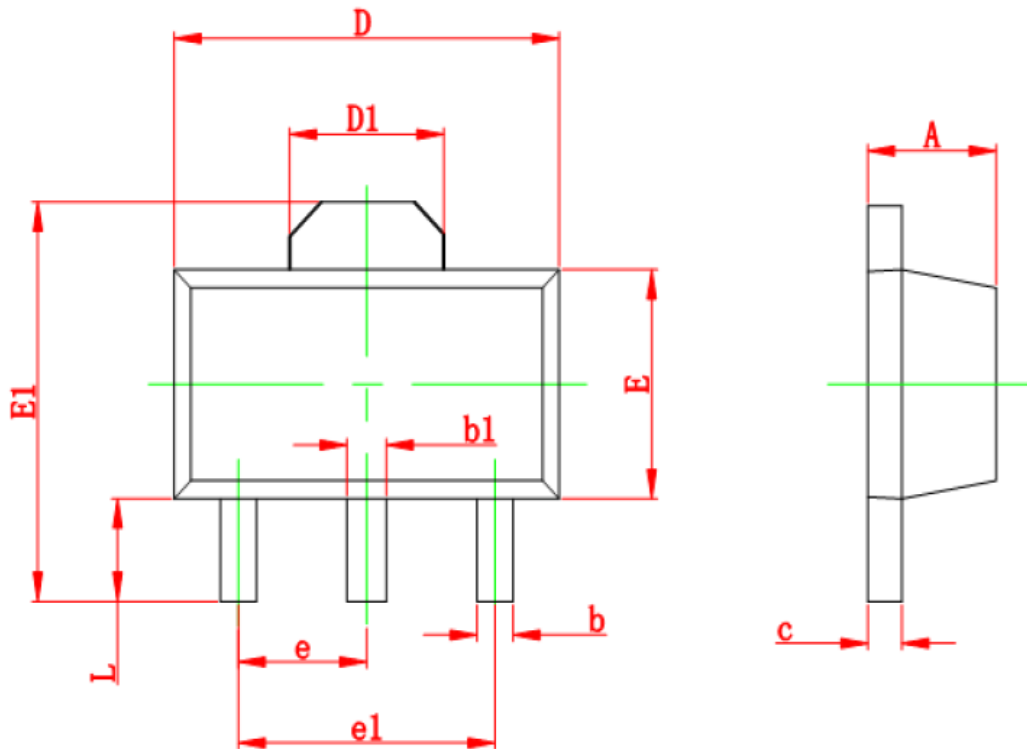
- SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In 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	0.500	0.012	0.020
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	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



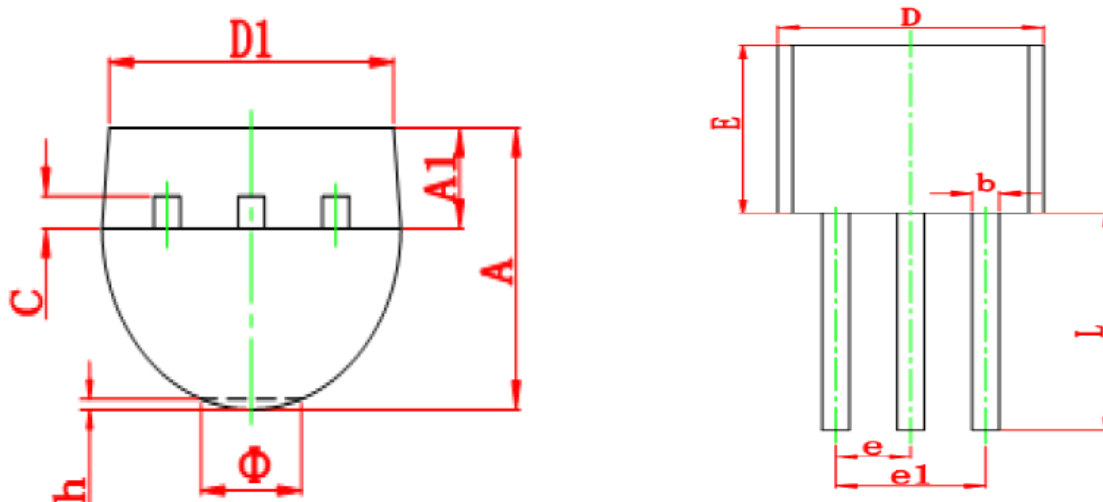
- SOT-89-3L



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	0.197
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		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047



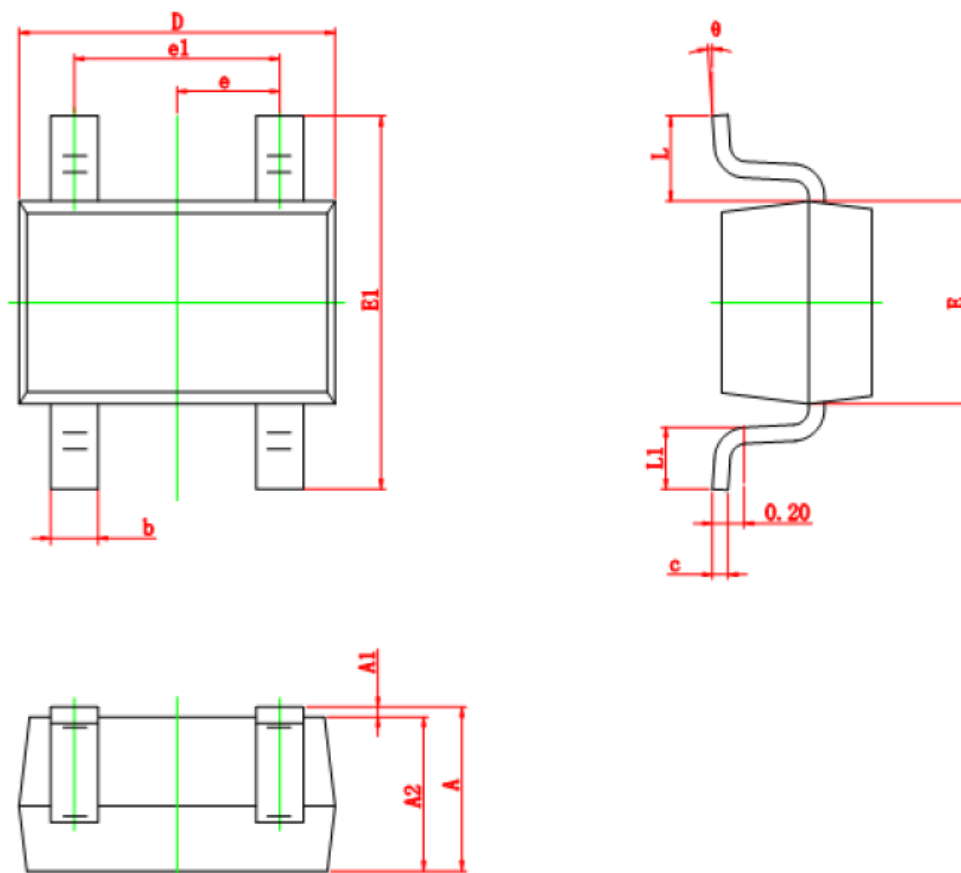
- T0-92



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015



• SOT-343



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	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°