

## Voltage Detectors , ME2803 Series

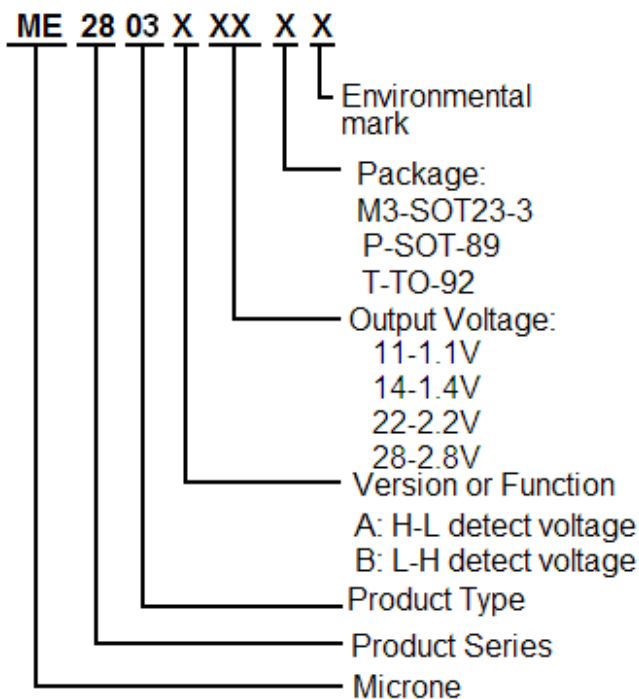
### General Description

**ME2803 Series** are highly precise, low power consumption voltage detectors, manufactured using CMOS technologies. Detect voltage is extremely accurate with minimal temperature drift. CMOS output configurations are available.

### Features

- Highly accuracy:  $\pm 1\%$  ( $-V_{DET}=2.2V$  以上)
- Low power consumption:  
TYP 0.7 $\mu$ A ( $V_{IN}=3.5V, -V_{DET}=2.2V$ )
- Detect voltage range: 1.0V~6.5V in 0.1V increments
- Operating voltage range: 0.7V~7V
- Detect voltage temperature characteristics:  
TYP $\pm 100$ ppm/ $^{\circ}$ C
- Output configuration: CMOS

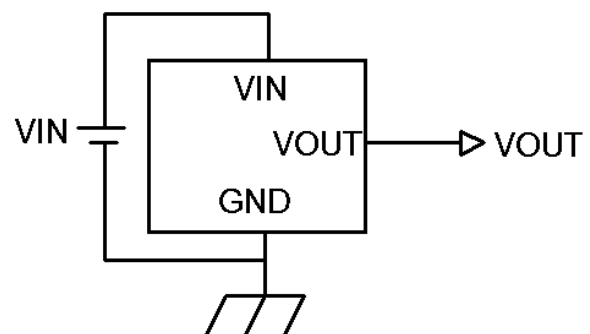
### Selection Guide



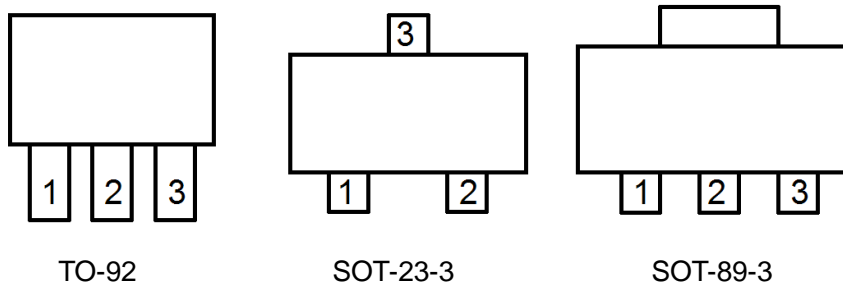
### Typical Application

- Microprocessor reset circuitry
- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection

### Typical Application Circuit



## Pin Configuration

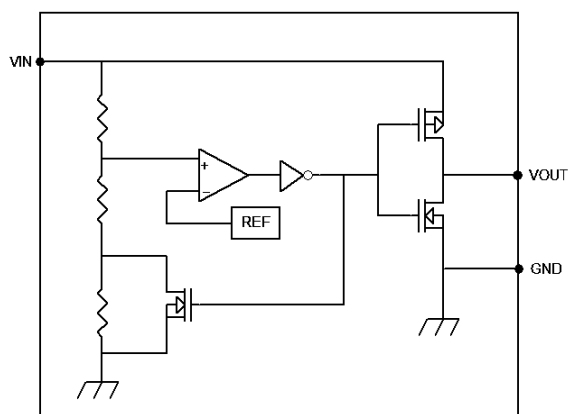


## Pin Assignment

ME2803XX

| Pin Number |          |       | Pin Name | Functions      |
|------------|----------|-------|----------|----------------|
| SOT-23-3   | SOT-89-3 | TO-92 |          |                |
| 2          | 3        | 3     | GND      | Ground         |
| 1          | 1        | 1     | VOUT     | Output Voltage |
| 3          | 2        | 2     | VIN      | Input Voltage  |

## Block Diagram



## Absolute Maximum Ratings

| PARAMETER                          | SYMBOL       | RATINGS    | UNITS                 |
|------------------------------------|--------------|------------|-----------------------|
| $V_{IN}$ Input Voltage             | $V_{IN}$     | 8          | V                     |
| Output Current                     | $I_{OUT}$    | 50         | mA                    |
| Output Voltage                     | CMOS         | $V_{OUT}$  | GND-0.3~ $V_{IN}+0.3$ |
| Continuous Total Power Dissipation | SOT-23-3     | $P_d$      | 300                   |
|                                    | SOT-89-3     |            | 500                   |
|                                    | TO-92        |            | 500                   |
| Operating Ambient Temperature      | $T_{Opr}$    | -40~+85    | °C                    |
| Storage Temperature                | $T_{stg}$    | -40~+125   | °C                    |
| Soldering temperature and time     | $T_{solder}$ | 260°C, 10s |                       |
| ESD                                | MM           | 400        | V                     |
|                                    | HBM          | 4000       | V                     |

## Electrical Characteristics

( $-V_{DET}(S)=1.0V$  to  $6.5V\pm 1\%$ ,  $T_a=25^{\circ}C$ , unless otherwise noted)

| Parameter                   | Symbol  | Conditions                                   | Min.                      | Typ       | Max.                      | Units            |
|-----------------------------|---|--|---------------------------|-----------|---------------------------|------------------|
| Detect Voltage              | -VDET   | $-V_{DET}(S) \leq 2.2V$                      | $-V_{DET}(S) \times 0.98$ | -VDET(S)  | $-V_{DET}(S) \times 1.02$ | V                |
|                             |   | $-V_{DET}(S) > 2.2V$                         | $-V_{DET}(S) \times 0.99$ | -VDET(S)  | $-V_{DET}(S) \times 1.01$ |                  |
| Hysteresis Range            | VHYS  | -  | 0.03                      | 0.06      | 0.1                       | V                |
| Supply Current              | ISS   | VIN=2V (1.0V-1.5V)                           | -                         | 0.7       | 1                         | uA               |
|                             |   | VIN =3.5V (1.6V-2.5V)                        | -                         | 0.7       | 1                         |                  |
|                             |   | VIN=4.5V (2.6V-3.9V)                         | -                         | 1.2       | 2                         |                  |
|                             |   | VIN =6V (4.0V-5.6V)                          | -                         | 1.1       | 2                         |                  |
|                             |   | VIN=7V (5.7V-6.5V)                           | -                         | 1         | 2                         |                  |
| Output Current              | Iout N-ch   | VDS=0.5V VIN =0.7V                           | 0.01                      | 0.14      | --                        | mA               |
|                             | Iout P-ch   | VDS=0.5V VIN =7V                             | 1.7                       | 3.4       | --                        | mA               |
| Operating voltage           | VIN   | -  | 0.7                       | -         | 7                         | V                |
| Responding time             | tpLH  |  |                           |           | 60                        | us               |
| Temperature characteristics | $\frac{\Delta -V_{DET}}{\Delta T_a \bullet -V_{DET}}$ | $\Delta T_a = -40^{\circ}C \sim 85^{\circ}C$ | -                         | $\pm 100$ | $\pm 350$                 | ppm/ $^{\circ}C$ |

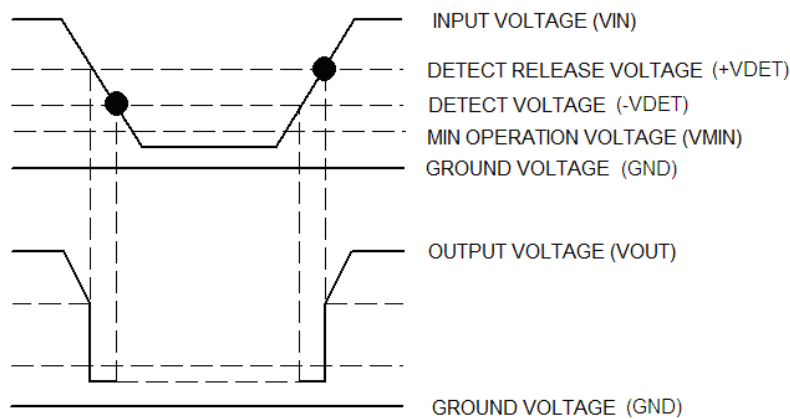
- Note:
- 1、-VDET(S) : Specified Detection Voltage value
  - 2、-VDET : Actual Detection Voltage value
  - 3、Release Voltage:  $+V_{DET}=-V_{DET}+V_{HYS}$

## Functional Description:

- 1、 When input voltage ( $V_{IN}$ ) rises above detect voltage ( $-V_{DET}$ ), output voltage ( $V_{OUT}$ ) will be equal to  $V_{IN}$ .
- 2、 When input voltage ( $V_{IN}$ ) falls below detect voltage ( $-V_{DET}$ ), output voltage ( $V_{OUT}$ ) will be equal to the ground voltage (GND) level.
- 3、 When input voltage ( $V_{IN}$ ) falls to a level below that of the minimum operating voltage ( $V_{MIN}$ ), output will become unstable. In this condition,  $V_{IN}$  will equal the pulled-up output (should output be pulled-up.)
- 4、 When input voltage ( $V_{IN}$ ) rises above the ground voltage (GND) level, output will be unstable at levels below the minimum operating voltage ( $V_{MIN}$ ). Between the  $V_{MIN}$  and detect release voltage ( $+V_{DET}$ ) levels, the ground voltage (GND) level will be maintained.
- 5、 When input voltage ( $V_{IN}$ ) rises above detect release voltage ( $+V_{DET}$ ), output voltage ( $V_{OUT}$ ) will be equal to  $V_{IN}$ .
- 6、 The difference between  $+V_{DET}$  and  $-V_{DET}$  represents the hysteresis range.

## Timing Chart:

ME2803XX:



## Directions for use:

- 1、 Please use this IC within the stated maximum ratings. Operation beyond these limits may cause degrading or permanent damage to the device.
- 2、 When a resistor is connected between the  $V_{IN}$  pin and the input with CMOS output configurations, oscillation may occur as a result of voltage drops at  $R_{IN}$  if load current ( $I_{OUT}$ ) exists. (refer to the Oscillation Description(1) below)
- 3、 When a resistor is connected between the  $V_{IN}$  pin and the input with CMOS output configurations, oscillation may occur as a result of through current at the time of voltage release even if load current ( $I_{OUT}$ ) does not exist. (refer to the Oscillation Description(2) below)
- 4、 With a resistor connected between the  $V_{IN}$  and the input, detect and release voltage will rise as a result of the IC's supply current flowing through the  $V_{IN}$  pin.
- 5、 In order to stabilize the IC's operations, please ensure that  $V_{IN}$  pin's input frequency's rise and fall times are more than several  $\mu\text{Sec}/V$ .

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## Oscillation Description:

### 1、 Output current oscillation with the CMOS output configuration

When the voltage applied at IN rises, release operations commence and the detector's output voltage increase. Load current ( $I_{OUT}$ ) will flow at  $R_L$ . Because a voltage drop ( $R_{IN} * I_{OUT}$ ) is produced at the  $R_{IN}$  resistor, located between the input (IN) and the  $V_{IN}$  pin. The load current will flow via the IC's pin. The voltage drop will also lead to a fall in the voltage level at the  $V_{IN}$  pin. When the  $V_{IN}$  pin voltage level falls below the detect voltage level, detect operations will commence. Following detect operations, load current flow will cease and since voltage drop at  $R_{IN}$  will disappear, the voltage level at the  $V_{IN}$  pin will rise and release operations will begin over again. Oscillation may occur with this "release-detect-release" repetition. Further, this condition will also appear via means of a similar mechanism during detect operations.

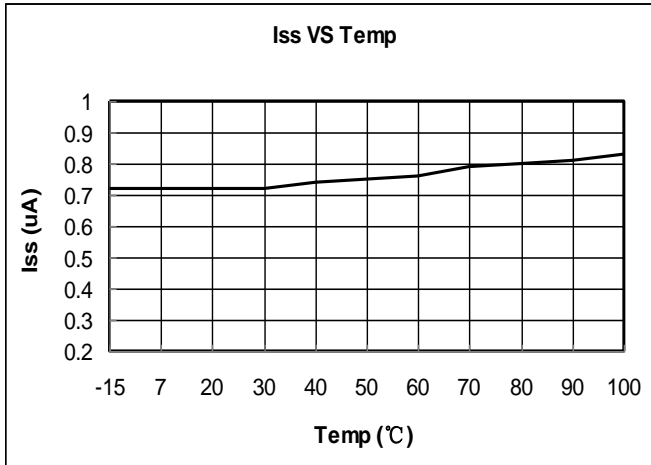
### 2、 Oscillation as a result of through current

Since the ME2803 series are CMOS IC's, through current will flow when the IC's internal circuit switching operates (during release and detect operations). Consequently, oscillation is liable to occur as a result of drops in voltage at the through current's resistor ( $R_{IN}$ ) during release voltage operations.(refer to diagram 2) since hysteresis exists during detect operations, oscillation is unlikely to occur.

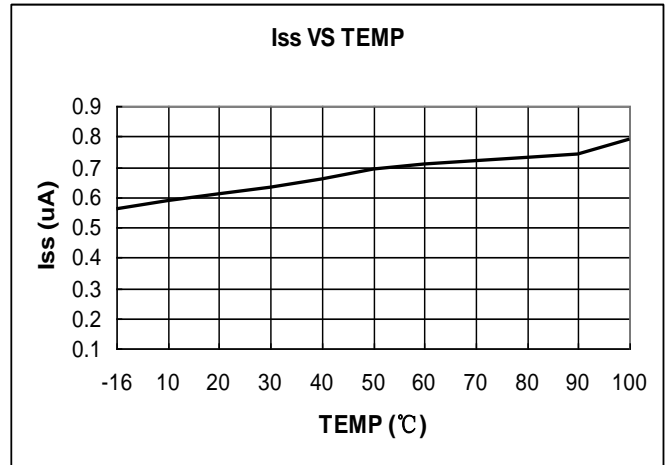
## Type Characteristics

### 1、 SUPPLY CURRENT VS. AMBIENT TEMPERATURE

VIN=2V,-VDET=1.1V

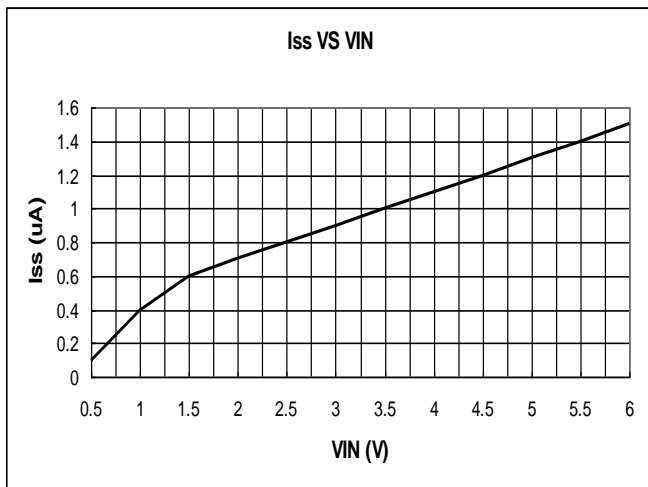


VIN=3V,-VDET=2.2V

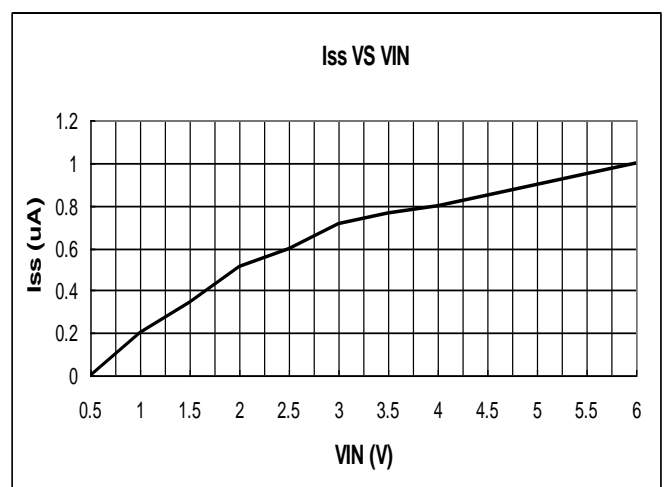


### 2、 SUPPLY CURRENT VS. INPUT VOLTAGE

-VDET=1.1V ( T=25°C )

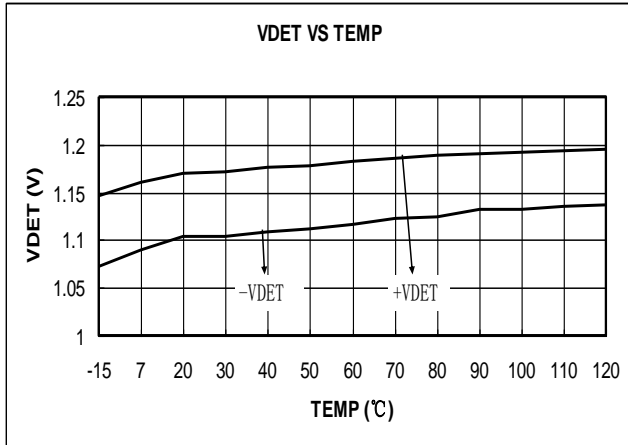


-VDET=2.2V ( T=25°C )

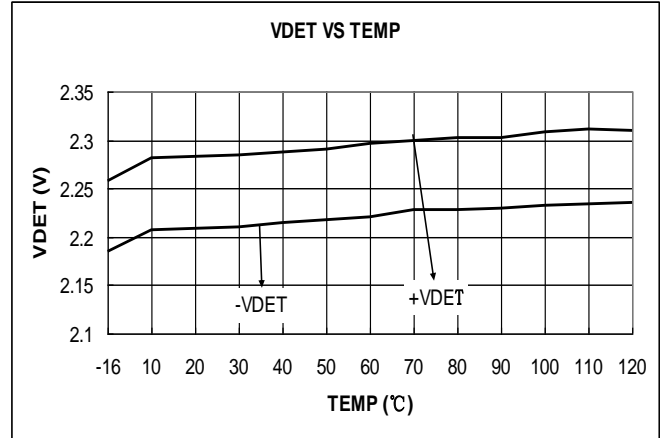


**3、DETECT,RELEASE VOLTAGE VS. AMBIENT TEMPERATURE**

**-VDET=1.1V**

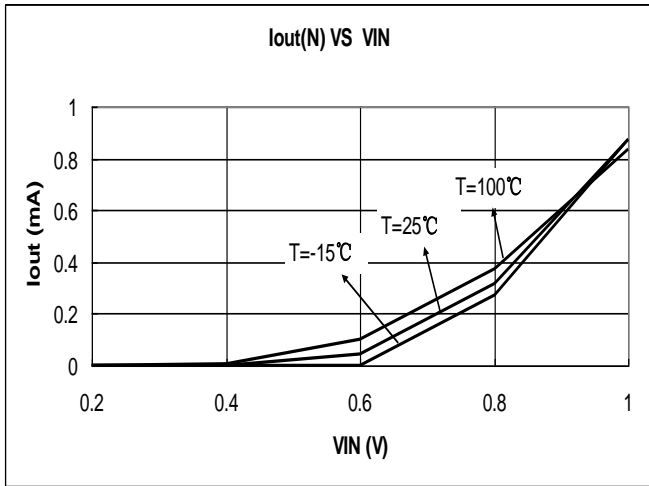


**-VDET=2.2V**

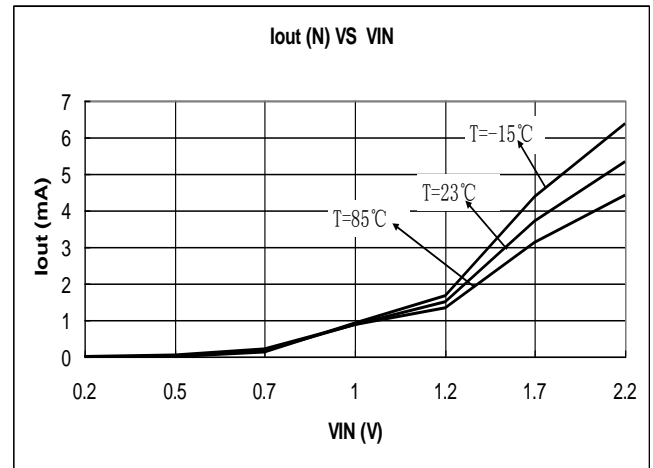


**4、N-ch OUTPUT CURRENT VS. INPUT VOLTAGE**

**VDS=0.5V -VDET=1.1V**

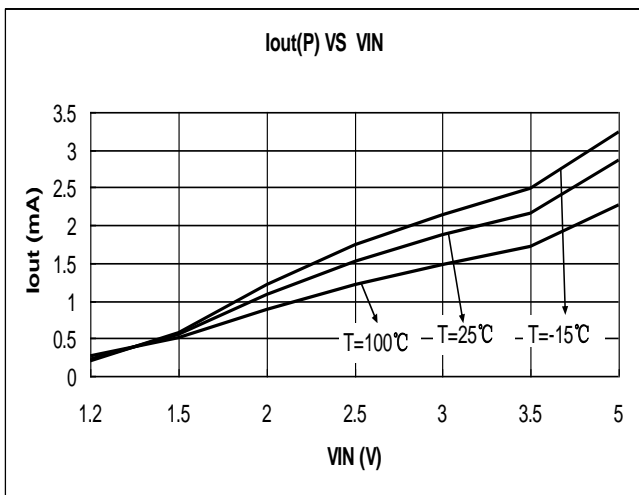


**VDS=0.5V -VDET=2.2V**

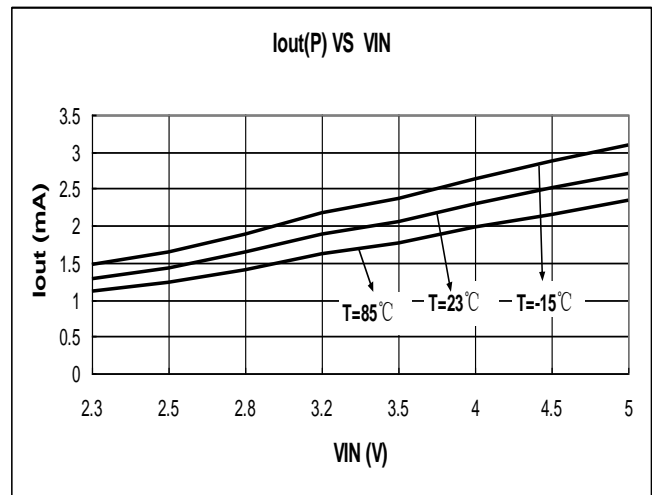


**5、P-ch OUTPUT CURRENT VS. INPUT VOLTAGE**

**VDS=0.5V -VDET=1.1V**

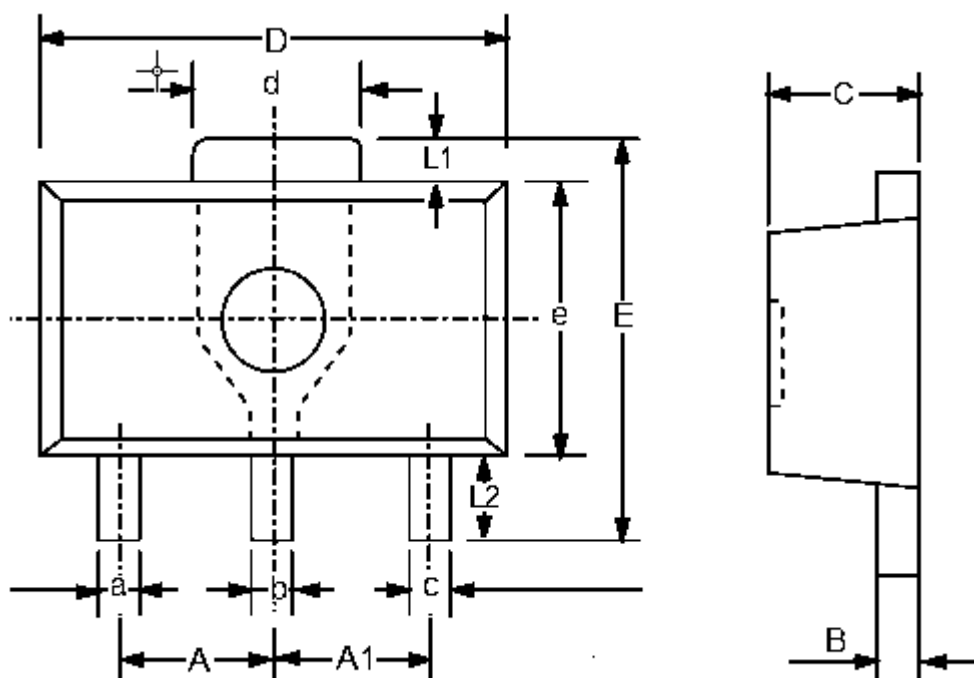


**VDS=0.5V -VDET=2.2V**



Package Information

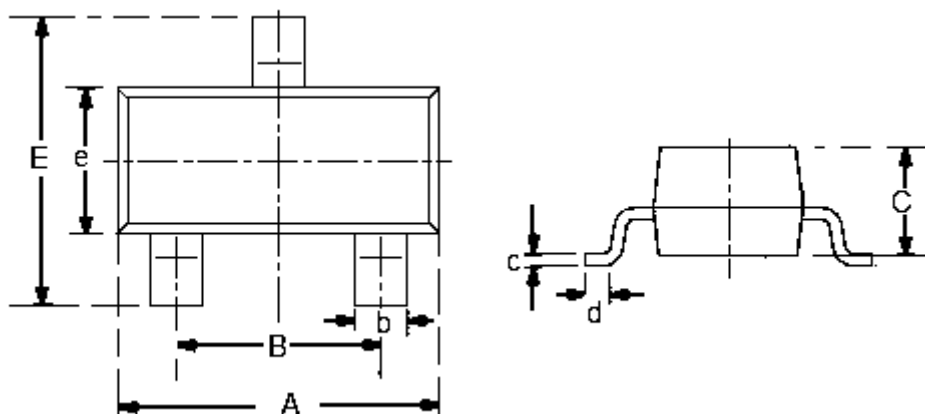
-SOT-89-3



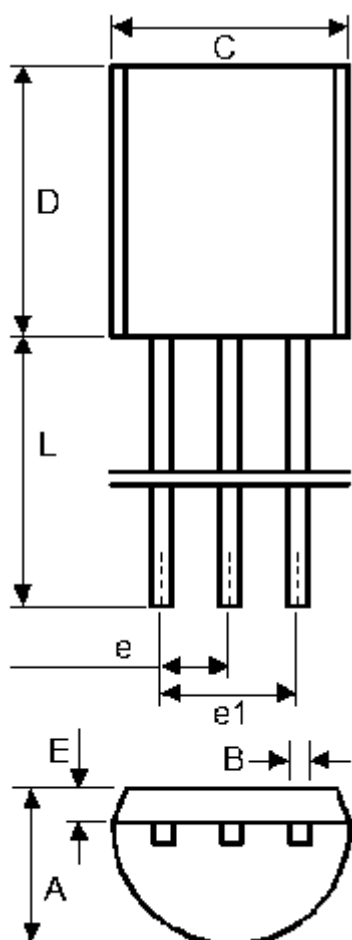
| DIM | Millimeters |      | Inches |        |
|-----|-------------|------|--------|--------|
|     | Min         | Max  | Min    | Max    |
| A   | 1.4         | 1.6  | 0.0551 | 0.0630 |
| A1  | 1.4         | 1.6  | 0.0551 | 0.0630 |
| a   | 0.36        | 0.48 | 0.0142 | 0.0189 |
| b   | 0.41        | 0.53 | 0.0161 | 0.0209 |
| c   | 0.36        | 0.48 | 0.0142 | 0.0189 |
| d   | 1.4         | 1.75 | 0.0551 | 0.0689 |
| B   | 0.38        | 0.43 | 0.015  | 0.0169 |
| C   | 1.4         | 1.6  | 0.0551 | 0.0630 |
| D   | 4.4         | 4.6  | 0.1732 | 0.181  |
| E   | -           | 4.25 | -      | 0.1673 |
| e   | 2.4         | 2.6  | 0.0945 | 0.1023 |
| L1  | 0.4         | -    | 0.0157 | -      |
| L2  | 0.8         | -    | 0.0315 | -      |



• SOT-23-3



| DIM | Millimeters |      | Inches |        |
|-----|-------------|------|--------|--------|
|     | Min         | Max  | Min    | Max    |
| A   | 2.7         | 3.1  | 0.1063 | 0.122  |
| B   | 1.7         | 2.1  | 0.0669 | 0.0827 |
| b   | 0.35        | 0.5  | 0.0138 | 0.0197 |
| C   | 1.0         | 1.2  | 0.0394 | 0.0472 |
| c   | 0.1         | 0.25 | 0.0039 | 0.0098 |
| d   | 0.2         | -    | 0.0079 | -      |
| E   | 2.6         | 3.0  | 0.1023 | 0.1181 |
| e   | 1.5         | 1.8  | 0.059  | 0.0708 |



|    | Min  | Max  | Min     | Max    |
|----|------|------|---------|--------|
| A  | 3.4  | 3.8  | 0.13386 | 0.1496 |
| B  | 0.3  | 0.5  | 0.0118  | 0.0197 |
| C  | 4.4  | 4.8  | 0.1732  | 0.189  |
| D  | 4.4  | 4.8  | 0.1732  | 0.189  |
| E  | 0.9  | 1.5  | 0.0354  | 0.059  |
| e  | 1.17 | 1.37 | 0.046   | 0.0539 |
| e1 | 2.39 | 2.69 | 0.094   | 0.1059 |
| L  | 12   | 16   | 0.4724  | 0.6299 |

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