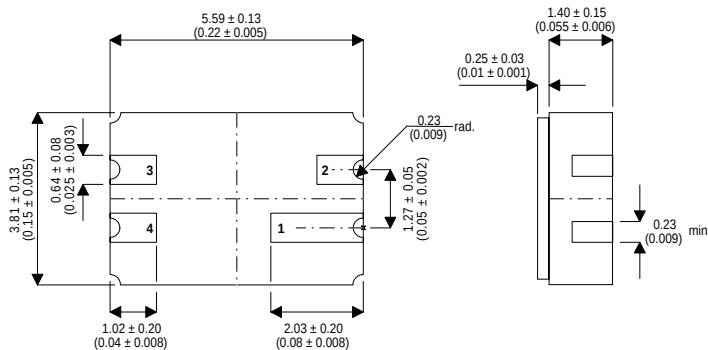


# HIGH VOLTAGE, MEDIUM POWER, NPN TRANSISTOR IN A HERMETICALLY SEALED CERAMIC SURFACE MOUNT PACKAGE FOR HIGH RELIABILITY APPLICATIONS

## MECHANICAL DATA Dimensions in mm (inches)



## LCC3 PACKAGE Underside View

PAD 1 – Collector      PAD 3 – Emitter  
PAD 2 – N/C      PAD 4 – Base

## FEATURES

- SILICON PLANAR EPITAXIAL NPN TRANSISTOR
- HERMETIC CERAMIC SURFACE MOUNT PACKAGE
- CECC SCREENING OPTIONS
- SPACE QUALITY LEVELS OPTIONS
- HIGH VOLTAGE

## APPLICATIONS:

Hermetically sealed surface mount version of the popular 2N3501 for high reliability / space applications requiring small size and low weight devices.

## ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25°C unless otherwise stated)

|                  |                                                  |              |
|------------------|--------------------------------------------------|--------------|
| V <sub>CBO</sub> | Collector – Base Voltage                         | 150V         |
| V <sub>CEO</sub> | Collector – Emitter Voltage (I <sub>B</sub> = 0) | 150V         |
| V <sub>EBO</sub> | Emitter – Base Voltage (I <sub>B</sub> = 0)      | 6V           |
| I <sub>C</sub>   | Collector Current                                | 300mA        |
| P <sub>D</sub>   | Total Device Dissipation T <sub>A</sub> = 25 °C  | 500mW        |
| P <sub>D</sub>   | Derate above 25°C                                | 2.85mW / °C  |
| T <sub>stg</sub> | Storage Temperature                              | –65 to 200°C |
| R <sub>ja</sub>  | Thermal Resistance Junction to Ambient           | 350°C/W      |

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

| Parameter                    |                                                   | Test Conditions           |                                              | Min. | Typ. | Max. | Unit              |
|------------------------------|---------------------------------------------------|---------------------------|----------------------------------------------|------|------|------|-------------------|
| OFF CHARACTERISTICS          |                                                   |                           |                                              |      |      |      |                   |
| V <sub>(BR)CEO</sub>         | Collector-Emitter Breakdown Voltage <sup>1</sup>  | I <sub>C</sub> = 10mA     | I <sub>B</sub> = 0                           | 150  |      |      | V                 |
| V <sub>(BR)CBO</sub>         | Collector-Base Breakdown Voltage                  | I <sub>C</sub> = 10μA     | I <sub>E</sub> = 0                           | 150  |      |      |                   |
| V <sub>(BR)EBO</sub>         | Emitter-Base Breakdown Voltage                    | I <sub>E</sub> = 10μA     | I <sub>C</sub> = 0                           | 6    |      |      |                   |
| I <sub>CBO</sub>             | Collector Cutoff Current                          | V <sub>CB</sub> = 75V     | I <sub>E</sub> = 0                           |      |      | 0.05 | μA                |
|                              |                                                   | V <sub>CB</sub> = 75V     | I <sub>E</sub> = 0<br>T <sub>A</sub> = 150°C |      |      | 50   |                   |
| I <sub>EBO</sub>             | Emitter Cutoff Current                            | V <sub>EB(off)</sub> = 4V | I <sub>C</sub> = 0                           |      |      |      | nA                |
| ON CHARACTERISTICS           |                                                   |                           |                                              |      |      |      |                   |
| h <sub>FE</sub>              | DC Current Gain                                   | I <sub>C</sub> = 0.1mA    | V <sub>CE</sub> = 10V                        | 35   |      |      | —                 |
|                              |                                                   | I <sub>C</sub> = 1mA      | V <sub>CE</sub> = 10V                        | 50   |      |      |                   |
|                              |                                                   | I <sub>C</sub> = 10mA     | V <sub>CE</sub> = 10V <sup>1</sup>           | 75   |      |      |                   |
|                              |                                                   | I <sub>C</sub> = 150mA    | V <sub>CE</sub> = 10V <sup>1</sup>           | 100  |      | 300  |                   |
|                              |                                                   | I <sub>C</sub> = 300mA    | V <sub>CE</sub> = 10V <sup>1</sup>           | 20   |      |      |                   |
| V <sub>CE(SAT)</sub>         | Collector-Emitter Saturation Voltage <sup>1</sup> | I <sub>C</sub> = 10mA     | I <sub>B</sub> = 1mA                         |      |      | 0.2  | V                 |
|                              |                                                   | I <sub>C</sub> = 50mA     | I <sub>B</sub> = 5mA                         |      |      | 0.25 |                   |
|                              |                                                   | I <sub>C</sub> = 150mA    | I <sub>B</sub> = 15mA                        |      |      | 0.4  |                   |
| V <sub>BE(SAT)</sub>         | Base-Emitter Saturation Voltage <sup>1</sup>      | I <sub>C</sub> = 10mA     | I <sub>B</sub> = 1mA                         |      |      | 0.8  | V                 |
|                              |                                                   | I <sub>C</sub> = 50mA     | I <sub>B</sub> = 5mA                         |      |      | 0.9  |                   |
|                              |                                                   | I <sub>C</sub> = 150mA    | I <sub>B</sub> = 15mA                        |      |      | 1.2  |                   |
| SMALL SIGNAL CHARACTERISTICS |                                                   |                           |                                              |      |      |      |                   |
| f <sub>T</sub>               | Current-Gain–Bandwidth Product <sup>2</sup>       | V <sub>CE</sub> = 20V     | I <sub>C</sub> = 20mA<br>f = 100MHz          | 150  |      |      | MHz               |
| C <sub>obo</sub>             | Output Capacitance                                | V <sub>CB</sub> = 10V     | I <sub>E</sub> = 0<br>f = 1MHz               |      |      | 8    | pF                |
| C <sub>ibo</sub>             | Input Capacitance                                 | V <sub>EB</sub> = 0.5V    | I <sub>C</sub> = 0<br>f = 1MHz               |      |      | 80   |                   |
| h <sub>ie</sub>              | Input Impedance                                   | V <sub>CE</sub> = 10V     | I <sub>C</sub> = 10mA<br>f = 1KHz            | 0.25 |      | 1.25 | Ω                 |
| h <sub>re</sub>              | Voltage Feedback Ratio                            | V <sub>CE</sub> = 10V     | I <sub>C</sub> = 10mA<br>f = 1KHz            |      |      | 4    | x10 <sup>-4</sup> |
| h <sub>fe</sub>              | Small-Signal Current Gain                         | V <sub>CE</sub> = 10V     | I <sub>C</sub> = 10mA<br>f = 1KHz            |      |      | 375  | —                 |
| h <sub>oe</sub>              | Output Admittance                                 | V <sub>CE</sub> = 10V     | I <sub>C</sub> = 10mA<br>f = 1KHz            |      |      | 200  | Ω                 |

## ELECTRICAL CHARACTERISTICS Continued ( $T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter                        | Test Conditions                                                                                         | Min. | Typ. | Max. | Unit |
|----------------------------------|---------------------------------------------------------------------------------------------------------|------|------|------|------|
| <b>SWITCHING CHARACTERISTICS</b> |                                                                                                         |      |      |      |      |
| $t_d$ Delay Time                 | $I_C = 150\text{mA}$ $I_{B1} = 15\text{mA}$<br>$V_{CC} = 100\text{V}$ $V_{EB(\text{off})} = -2\text{V}$ |      | 20   |      | ns   |
| $t_r$ Rise Time                  | $I_C = 150\text{mA}$ $I_{B1} = 15\text{mA}$<br>$V_{CC} = 100\text{V}$ $V_{EB(\text{off})} = -2\text{V}$ |      | 35   |      |      |
| $t_s$ Storage Time               | $I_C = 150\text{mA}$ $V_{CC} = 100\text{V}$<br>$I_{B1} = I_{B2} = 15\text{mA}$                          |      | 800  |      |      |
| $t_f$ Fall Time                  | $I_C = 150\text{mA}$ $V_{CC} = 100\text{V}$<br>$I_{B1} = I_{B2} = 15\text{mA}$                          |      | 80   |      |      |

- 1) Pulse test : Pulse Width < 300 $\mu\text{s}$  ,Duty Cycle < 2%
- 2)  $f_t$  is defined as the frequency at which  $|h_{fe}|.f_{\text{test}}$