

## NPN SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/395

### DEVICES

**2N3735**                      **2N3735L**  
**2N3737**                      **2N3737UB**

**LEVELS**  
**JAN**  
**JANTX**  
**JANTXV**  
**JANS**

### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ unless otherwise noted)

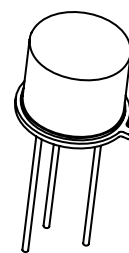
| Parameters / Test Conditions                           | Symbol         | Min.                       | Unit             |
|--|----------------|----------------------------|------------------|
| Collector-Emitter Voltage                              | $V_{CEO}$      | 40                         | Vdc              |
| Collector-Base Voltage                                 | $V_{CBO}$      | 75                         | Vdc              |
| Emitter-Base Voltage                                   | $V_{EBO}$      | 5                          | Vdc              |
| Collector Current                                      | $I_C$          | 1.5                        | Adc              |
| Total Power Dissipation<br>@ $T_A = +25^\circ\text{C}$ | $P_T$          | 2N3735, 2N3735L<br>1.0 (1) | W                |
|  |                | 2N3737<br>0.5 (3)          | W                |
|  |                | 2N3737UB<br>0.5 (5)        | W                |
| Total Power Dissipation<br>@ $T_C = +25^\circ\text{C}$ | $P_T$          | 2N3735, 2N3735L<br>2.9 (2) | W                |
|  |                | 2N3737<br>1.9 (4)          | W                |
|  |                | 2N3737UB<br>N/A            | W                |
| Operating & Storage Junction Temperature Range         | $T_J, T_{stg}$ | -65 to +200                | $^\circ\text{C}$ |

\* Electrical characteristics for "L" suffix devices are identical to the "non L" corresponding devices.

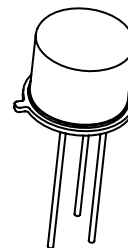
- (1) Derate linearly at 5.71 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$
- (2) Derate linearly at 16.6 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$
- (3) Derate linearly at 2.86 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$
- (4) Derate linearly at 11.3 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$
- (5) Derate linearly at 3.07 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$
- (6)  $T_A = +55^\circ\text{C}$  for UB on printed circuit board (PCB). PCB = FR4 .0625 inch (1.59MM) 1 - layer 1 oz Cu, horizontal, still air, pads (UB) = .034 inch (0.86 mm) x .048 inch (1.2 mm),  $R_{\theta JA}$  with a defined thermal resistance condition included is measured at  $P_T = 500\text{mW}$ .

### ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

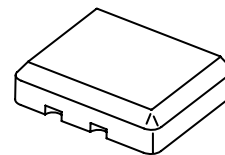
| Parameters / Test Conditions   | Symbol        | Min. | Max.      | Unit                                |
|--|---------------|------|-----------|-------------------------------------|
| <b>OFF CHARACTERISTICS</b>   |               |      |           |                                     |
| Collector-Emitter Breakdown Voltage<br>$I_C = 10\text{mAdc}$                       | $V_{(BR)CEO}$ | 40   |           | Vdc                                 |
| Collector-Base Cutoff Current<br>$V_{CB} = 75\text{Vdc}$<br>$V_{CB} = 30\text{Vd}$ | $I_{CBO}$     |      | 10<br>250 | $\mu\text{Adc}$<br>$\eta\text{Adc}$ |



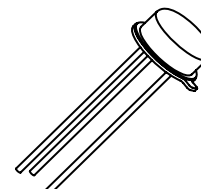
**TO-5\***  
**2N3735L**



**TO-39\* (TO-205AD)**  
**2N3735**



**3 PIN**  
**2N3737UB**



**TO-46 (TO-206AB)**  
**2N3737**

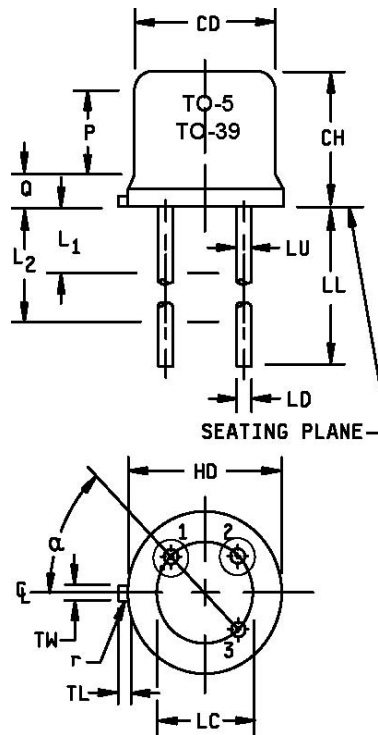
## ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

| Parameters / Test Conditions   | Symbol        | Min.                       | Max.                     | Unit                    |
|--|---------------|----------------------------|--------------------------|-------------------------|
| <b>OFF CHARACTERISTICS</b>   |               |                            |                          |                         |
| Collector- Emitter Cutoff Current<br>$V_{CE} = 30\text{Vdc}$ , $V_{EB} = 2.0\text{Vdc}$<br>$V_{CE} = 30\text{Vdc}$ , $V_{EB} = 2.0\text{Vdc}$ $T_A = +150^\circ\text{C}$   | $I_{CEX}$     |                            | 200<br>250               | nAdc<br>$\mu\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 5.0\text{Vdc}$<br>$V_{EB} = 4.0\text{Vdc}$  | $I_{EBO}$     |                            | 10<br>100                | $\mu\text{Adc}$<br>nAdc |
| <b>ON CHARACTERISTICS <sup>(1)</sup></b>   |               |                            |                          |                         |
| Forward-Current Transfer Ratio<br>$I_C = 10\text{mAdc}$ , $V_{CE} = 1.0\text{Vdc}$<br>$I_C = 150\text{mAdc}$ , $V_{CE} = 1.0\text{Vdc}$<br>$I_C = 500\text{mAdc}$ , $V_{CE} = 1.0\text{Vdc}$<br>$I_C = 1.0\text{Adc}$ , $V_{CE} = 1.5\text{Vdc}$<br>$I_C = 1.5\text{Adc}$ , $V_{CE} = 5.0\text{Vdc}$ | $h_{FE}$      | 35<br>40<br>40<br>20<br>20 | 150<br>80                |                         |
| Collector-Emitter Saturation Voltage<br>$I_C = 10\text{mAdc}$ , $I_B = 1.0\text{mAdc}$<br>$I_C = 150\text{mAdc}$ , $I_B = 15.0\text{mAdc}$<br>$I_C = 500\text{mAdc}$ , $I_B = 50.0\text{mAdc}$<br>$I_C = 1.0\text{Adc}$ , $I_B = 100\text{mAdc}$   | $V_{CE(sat)}$ |                            | 0.2<br>0.3<br>0.5<br>0.9 | Vdc                     |
| Base-Emitter Saturation Voltage<br>$I_C = 10\text{mAdc}$ , $I_B = 1.0\text{mAdc}$<br>$I_C = 150\text{mAdc}$ , $I_B = 15.0\text{mAdc}$<br>$I_C = 500\text{mAdc}$ , $I_B = 50.0\text{mAdc}$<br>$I_C = 1.0\text{Adc}$ , $I_B = 100\text{mAdc}$  | $V_{BE(sat)}$ |                            | 0.8<br>1.0<br>1.2<br>1.4 | Vdc                     |

## DYNAMIC CHARACTERISTICS

|   |            |     |     |                |
|---|------------|-----|-----|----------------|
| Forward Current Transfer Ratio<br>$I_C = 50\text{mAdc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 100\text{MHz}$               | $ h_{fe} $ | 2.5 | 6.0 |                |
| Delay Response<br>$I_C = 1.0\text{Adc}$ , $V_{BE} = 2\text{Vdc}$ , $I_{B2} = 100\text{mA}$<br>$V_{CC} = 30\text{Vdc}$ | $t_d$      |     | 8   | $\eta\text{s}$ |
| Turn-Off Time<br>$I_C = 1.0\text{Adc}$ , $I_{B1} = I_{B2} = 100\text{mAdc}$ , $V_{CC} = 30\text{Vdc}$                 | $t_{off}$  |     | 60  | $\eta\text{s}$ |
| Rise Time<br>$I_C = 1.0\text{Adc}$ , $V_{BE} = 2\text{Vdc}$ , $V_{CC} = 30\text{Vdc}$                                 | $t_r$      |     | 40  | $\eta\text{s}$ |
| Output Capacitance<br>$V_{CB} = 10\text{Vdc}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                 | $C_{obo}$  |     | 9   | pF             |
| Input Capacitance<br>$V_{EB} = 0.5\text{Vdc}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                 | $C_{ibo}$  |     | 80  | pF             |

(1) Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

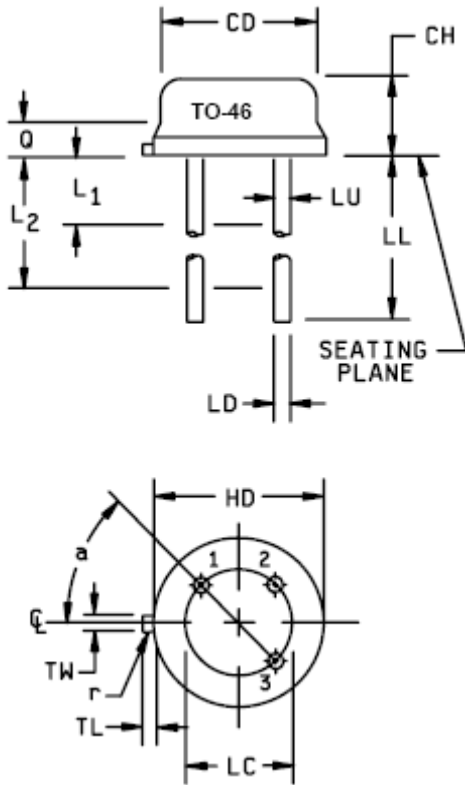
**PACKAGE DIMENSIONS**

**2N3735 Dimensions TO-39**
**2N3735L Dimensions TO-5**

| Ltr            | Dimensions |      |             |       | Notes |
|----------------|------------|------|-------------|-------|-------|
|                | Inches     |      | Millimeters |       |       |
|                | Min        | Max  | Min         | Max   |       |
| CD             | .305       | .355 | 7.75        | 9.02  |       |
| CH             | .240       | .260 | 6.10        | 6.60  |       |
| HD             | .355       | .370 | 9.02        | 9.40  |       |
| LC             | .200 TP    |      | 5.08 TP     |       | 6     |
| LD             | .016       | .021 | 0.41        | 0.53  | 7     |
| LL             | .500       | .750 | 12.70       | 19.05 | 7     |
| LU             | .016       | .019 | 0.41        | 0.48  | 7     |
| L <sub>1</sub> |            | .050 |             | 1.27  | 7     |
| L <sub>2</sub> | .250       |      | 6.35        |       | 7     |
| P              | .100       |      | 2.54        |       |       |
| TL             | .029       | .045 | 0.74        | 1.14  | 3     |
| TW             | .028       | .034 | 0.71        | 0.86  | 9     |
| Q              |            | .040 |             | 1.02  | 4     |
| r              |            | .010 |             | 0.25  | 10    |
| α              | 45° TP     |      | 45° TP      |       | 6     |

| Ltr            | Dimensions |       |             |       | Notes |
|----------------|------------|-------|-------------|-------|-------|
|                | Inches     |       | Millimeters |       |       |
|                | Min        | Max   | Min         | Max   |       |
| CD             | .305       | .355  | 7.75        | 9.02  |       |
| CH             | .240       | .260  | 6.10        | 6.60  |       |
| HD             | .355       | .370  | 9.02        | 9.40  |       |
| LC             | .200 TP    |       | 5.08 TP     |       | 6     |
| LD             | .016       | .021  | 0.41        | 0.53  | 7     |
| LL             | 1.500      | 1.750 | 38.10       | 44.45 | 7     |
| LU             | .016       | .019  | 0.41        | 0.48  | 7     |
| L <sub>1</sub> |            | .050  |             | 1.27  | 7     |
| L <sub>2</sub> | .250       |       | 6.35        |       | 7     |
| P              | .100       |       | 2.54        |       |       |
| TL             | .029       | .045  | 0.74        | 1.14  | 3     |
| TW             | .028       | .034  | 0.71        | 0.86  | 9     |
| Q              |            | .040  |             | 1.02  | 4     |
| R              |            | .010  |             | 0.25  | 10    |
| α              | 45° TP     |       | 45° TP      |       | 6     |

**FIGURE 1: Physical dimensions – TO-39, TO-5**

## PACKAGE DIMENSIONS



| Ltr            | Dimensions |       |             |       | Notes |
|----------------|------------|-------|-------------|-------|-------|
|                | Inches     |       | Millimeters |       |       |
|                | Min        | Max   | Min         | Max   |       |
| CD             | .178       | .195  | 4.52        | 4.95  |       |
| CH             | .065       | .085  | 1.65        | 2.16  |       |
| HD             | .209       | .230  | 5.31        | 5.84  |       |
| LC             | .100 TP    |       | 2.54 TP     |       | 5     |
| LD             | .016       | .021  | 0.41        | 0.53  |       |
| LL             | .500       | 1.750 | 12.70       | 44.45 | 6     |
| LU             | .016       | .019  | 0.41        | 0.48  | 6     |
| L <sub>1</sub> |            | .050  |             | 1.27  | 6     |
| L <sub>2</sub> | .250       |       | 6.35        |       | 6     |
| Q              |            | .040  |             | 1.02  | 3     |
| TL             | .028       | .048  | 0.71        | 1.22  | 8     |
| TW             | .036       | .046  | 0.91        | 1.17  | 4     |
| r              |            | .010  |             | 0.25  | 9     |
| $\alpha$       | 45° TP     |       | 45° TP      |       | 5     |

### NOTES:

- 1 Dimensions are in inches.
- 2 Millimeters are given for general information only.
- 3 Symbol TL is measured from HD maximum.
- 4 Details of outline in this zone are optional.
- 5 Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of TP relative to tab. Device may be measured by direct methods or by gauge.
- 6 Symbol LU applies between L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum.
- 7 Lead number three is electrically connected to case.
- 8 Beyond r maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
- 9 Symbol r applied to both inside corners of tab.
- 10 In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.
- 11 Lead 1 is emitter, lead 2 is base, and lead 3 is collector.

**FIGURE 2:** Physical dimensions – TO-46 2N3737