

## PNP SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/357

### DEVICES

|                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|
| <b>2N3634</b>   | <b>2N3635</b>   | <b>2N3636</b>   | <b>2N3637</b>   |
| <b>2N3634L</b>  | <b>2N3635L</b>  | <b>2N3636L</b>  | <b>2N3637L</b>  |
| <b>2N3634UB</b> | <b>2N3635UB</b> | <b>2N3636UB</b> | <b>2N3637UB</b> |

### LEVELS

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

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

| Parameters / Test Conditions                   | Symbol                          | 2N3634*     | 2N3636* | Unit             |
|--|---------------------------------|-------------|---------|------------------|
|  |                                 | 2N3635*     | 2N3637* |                  |
| Collector-Emitter Voltage                      | $V_{CEO}$                       | 140         | 175     | Vdc              |
| Collector-Base Voltage                         | $V_{CBO}$                       | 140         | 175     | Vdc              |
| Emitter-Base Voltage                           | $V_{EBO}$                       | 5.0         | 5.0     | Vdc              |
| Collector Current                              | $I_C$                           | 1.0         | 1.0     | Adc              |
| Total Power Dissipation                        | @ $T_A = +25^\circ\text{C}$     | 1.0         |         | W                |
|  | @ $T_C = +25^\circ\text{C}$     | 5.0         |         | W                |
|  | UB: @ $T_C = +25^\circ\text{C}$ | 1.5         |         | 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.

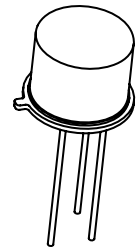
\*\* Consult 19500/357 for De-Rating curves.

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

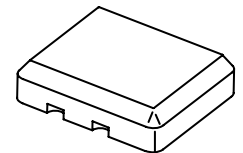
| Parameters / Test Conditions                                 | Symbol        | Min.           | Max.            | Unit             |
|--|---------------|----------------|-----------------|------------------|
| <b>OFF CHARACTERISTICS</b>                                   |               |                |                 |                  |
| Collector-Emitter Breakdown Voltage<br>$I_C = 10\text{mAdc}$ | $V_{(BR)CEO}$ | 140            |                 | Vdc              |
| 2N3634, 2N3635<br>2N3636, 2N3637                             |               | 175            |                 |                  |
| Collector-Base Cutoff Current<br>$V_{CB} = 100\text{Vdc}$    | $I_{CBO}$     |                | 100             | $\eta\text{Adc}$ |
| $V_{CB} = 140\text{Vdc}$                                     |               | 2N3634, 2N3635 | 10              | $\mu\text{Adc}$  |
| $V_{CB} = 175\text{Vdc}$                                     |               | 2N3636, 2N3637 | 10              | $\mu\text{Adc}$  |
| Emitter-Base Cutoff Current<br>$V_{EB} = 3.0\text{Vdc}$      | $I_{EBO}$     |                | 50              | $\eta\text{Adc}$ |
| $V_{EB} = 5.0\text{Vdc}$                                     |               | 10             | $\mu\text{Adc}$ |                  |
| Collector-Emitter cutoff Current<br>$V_{CE} = 100\text{Vdc}$ | $I_{CEO}$     |                | 10              | $\mu\text{Adc}$  |



**TO-5\***  
 2N3634L, 2N3635L  
 2N3636L, 2N3637L



**TO-39\* (TO-205AD)**  
 2N3634, 2N3635  
 2N3636, 2N3637



**3 PIN**  
 2N3634UB, 2N3635UB  
 2N3636UB, 2N3637UB

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

| Parameters / Test Conditions   | Symbol   | Min.     | Max.   | Unit               |
|--|--|----------|--|--------------------|
| <b>ON CHARACTERISTICS <sup>(1)</sup></b>   |  |          |  |                    |
| Forward-Current Transfer Ratio<br>$I_C = 0.1\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 1.0\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 10\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 50\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 150\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br><br>$I_C = 0.1\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 1.0\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 10\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 50\text{mA dc}$ , $V_{CE} = 10\text{V dc}$<br>$I_C = 150\text{mA dc}$ , $V_{CE} = 10\text{V dc}$ | 2N3634, 2N3636<br><br><br><br><br><br><br><br>2N3635, 2N3637 | $h_{FE}$ | 25<br>45<br>50<br>50<br>30<br><br>55<br>90<br>100<br>100<br>60 | 150<br><br><br>300 |
| Collector-Emitter Saturation Voltage<br>$I_C = 10\text{mA dc}$ , $I_B = 1.0\text{mA dc}$<br>$I_C = 50\text{mA dc}$ , $I_B = 5.0\text{mA dc}$   | $V_{CE(sat)}$  |          | 0.3<br>0.6   | Vdc                |
| Base-Emitter Saturation Voltage<br>$I_C = 10\text{mA dc}$ , $I_B = 1.0\text{mA dc}$<br>$I_C = 50\text{mA dc}$ , $I_B = 5.0\text{mA dc}$  | $V_{BE(sat)}$  | 0.65     | 0.8<br>0.9   | Vdc                |

## DYNAMIC CHARACTERISTICS

| Parameters / Test Conditions  | Symbol     | Min.  | Max.              | Unit          |
|---|------------|---|-------------------|---------------|
| Forward Current Transfer Ratio<br>$I_C = 30\text{mA dc}$ , $V_{CE} = 30\text{V dc}$ , $f = 100\text{MHz}$             | $ h_{fe} $ | 1.5<br>2.0  | 8.0<br>8.5        |               |
| Forward Current Transfer Ratio<br>$I_C = 10\text{mA dc}$ , $V_{CE} = 10\text{V dc}$ , $f = 1.0\text{kHz}$             | $h_{fe}$   | 40<br>80  | 160<br>320        |               |
| Small-Signal Short-Circuit Input Impedance<br>$I_C = 10\text{mA dc}$ , $V_{CE} = 10\text{V dc}$ , $f = 1.0\text{kHz}$ | $h_{ie}$   | 100<br>200  | 600<br>1200       | $\Omega$      |
| Small-Signal Open-Circuit Input Impedance<br>$I_C = 10\text{mA dc}$ , $V_{CE} = 10\text{V dc}$ , $f = 1.0\text{kHz}$  | $h_{oe}$   |   | 200               | $\mu\text{s}$ |
| Output Capacitance<br>$V_{CB} = 20\text{V dc}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                | $C_{obo}$  |   | 10                | pF            |
| Input Capacitance<br>$V_{EB} = 1.0\text{V dc}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                | $C_{ibo}$  |   | 75                | pF            |
| Noise Figure<br>$V_{CE} = 10\text{V dc}$ , $I_C = 0.5\text{mA dc}$ , $R_g = 1.0\text{k}\Omega$                        | NF         | $f = 100\text{Hz}$<br>$f = 1.0\text{kHz}$<br>$f = 10\text{kHz}$ | 5.0<br>3.0<br>3.0 | dB            |

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



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# TECHNICAL DATA SHEET

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## SAFE OPERATING AREA

### DC Tests

$T_C = 25^\circ\text{C}$ , 1 Cycle,  $t = 1.0\text{s}$

#### Test 1

$V_{CE} = 100\text{Vdc}$ ,  $I_C = 30\text{mA}$

2N3634, 2N3635

$V_{CE} = 130\text{Vdc}$ ,  $I_C = 20\text{mA}$

2N3636, 2N3637

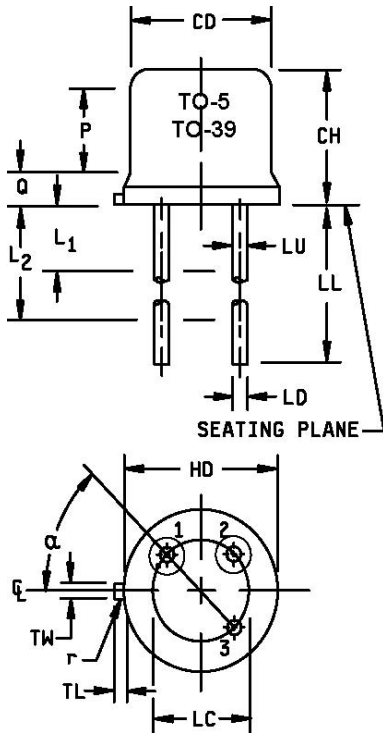
#### Test 2

$V_{CE} = 50\text{Vdc}$ ,  $I_C = 95\text{mA}$

#### Test 3

$V_{CE} = 5.0\text{Vdc}$ ,  $I_C = 1.0\text{A}$

## PACKAGE DIMENSIONS



| Ltr            | Dimensions             |      |             |       | Notes |
|----------------|------------------------|------|-------------|-------|-------|
|                | Inches                 |      | Millimeters |       |       |
|                | Min                    | Max  | Min         | Max   |       |
| CD             | .305                   | .335 | 7.75        | 8.51  |       |
| CH             | .240                   | .260 | 6.10        | 6.60  |       |
| HD             | .335                   | .370 | 8.51        | 9.40  |       |
| LC             | .200 TYP               |      | 5.08 TYP    |       | 7     |
| LD             | .016                   | .021 | 0.41        | 0.53  | 6     |
| LL             | See notes 7, 9, and 10 |      |             |       |       |
| 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        |       | 5     |
| Q              |                        | .050 |             | 1.27  |       |
| r              |                        | .010 |             | 0.254 | 8     |
| TL             | .029                   | .045 | 0.74        | 1.14  | 4     |
| TW             | .028                   | .034 | 0.71        | 0.86  | 3     |
| α              | 45° TP                 |      | 45° TP      |       | 6     |
| Term 1         | Emitter                |      |             |       |       |
| Term 2         | Base                   |      |             |       |       |
| Term 3         | Collector              |      |             |       |       |

### NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Beyond r maximum, TW must be held to a minimum length of .021 inch (0.53 mm).
- TL measured from maximum HD.
- CD shall not vary more than ±.010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 - .055 inch (1.37 - 1.40 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at a maximum material condition (MMC) relative to the tab at MMC. The device may be measured by direct methods or by gauge and gauging procedure.
- LU applies between L<sub>1</sub> and L<sub>2</sub>. LD applies between L<sub>2</sub> and L minimum. Diameter is uncontrolled in L<sub>1</sub> and beyond LL minimum.
- r (radius) applies to both inside corners of tab.
- For transistor types 2N3634 through 2N3637, LL is .500 inch (12.70 mm) minimum, and .750 inch (19.05 mm) maximum (TO-39).
- For transistor types 2N3634L through 2N3637L, LL is 1.500 inches (38.10 mm) minimum, and 1.750 inches (44.45 mm) maximum (TO-5).
- In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

**FIGURE 1:** Physical dimensions (TO-5 and TO-39)



**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
4. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology

| Ltr             | Dimensions |      |             |      | Notes |
|-----------------|------------|------|-------------|------|-------|
|                 | Inches     |      | Millimeters |      |       |
|                 | Min        | Max  | Min         | Max  |       |
| BH              | .046       | .056 | 1.17        | 1.42 |       |
| BL              | .115       | .128 | 2.92        | 3.25 |       |
| BW              | .085       | .108 | 2.16        | 2.74 |       |
| CL              |            | .128 |             | 3.25 |       |
| CW              |            | .108 |             | 2.74 |       |
| LL <sub>1</sub> | .022       | .038 | 0.56        | 0.96 |       |
| LL <sub>2</sub> | .017       | .035 | 0.43        | 0.89 |       |
| LS <sub>1</sub> | .036       | .040 | 0.91        | 1.02 |       |
| LS <sub>2</sub> | .071       | .079 | 1.81        | 2.01 |       |
| LW              | .016       | .024 | 0.41        | 0.61 |       |
| r               |            | .008 |             | .203 |       |
| r <sub>1</sub>  |            | .012 |             | .305 |       |
| r <sub>2</sub>  |            | .022 |             | .559 |       |

**FIGURE 2:** Physical dimensions, surface mount 2N3634UB through 2N3637UB (UB version).