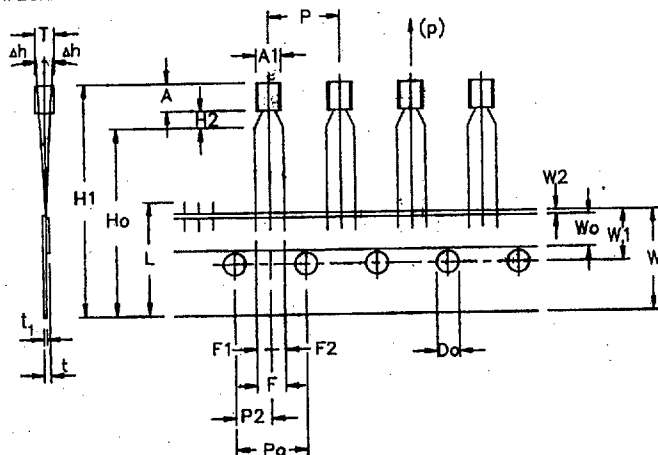


# TO-92 Plastic Package Transistors (NPN)

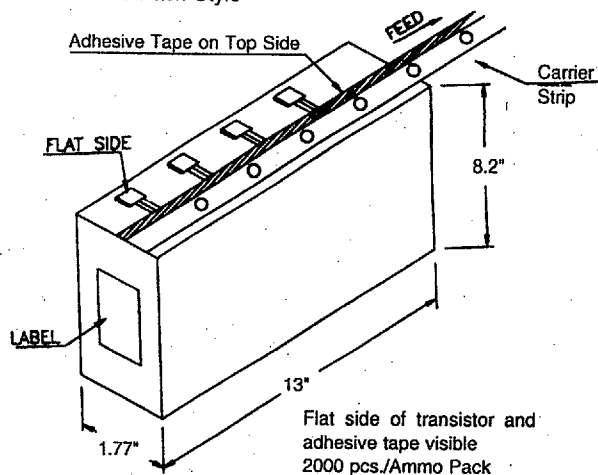
CDIL

| Maximum Ratings |                             |                             |                             |                                |                    | Electrical Characteristics (Ta=25°C, Unless Otherwise Specified) |                                         |                              |                                           |                                                        |           |                                     |         |                                 |                                               |                                 |    |                                 |     |                                         |                              |                            |              |                             |                 |  |         |
|-----------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|--------------------|------------------------------------------------------------------|-----------------------------------------|------------------------------|-------------------------------------------|--------------------------------------------------------|-----------|-------------------------------------|---------|---------------------------------|-----------------------------------------------|---------------------------------|----|---------------------------------|-----|-----------------------------------------|------------------------------|----------------------------|--------------|-----------------------------|-----------------|--|---------|
| Type No.        | V <sub>CB0</sub> (V)<br>Min | V <sub>CEO</sub> (V)<br>Min | V <sub>EBO</sub> (V)<br>Min | P <sub>D</sub> (W)<br>@Tc=25°C | I <sub>C</sub> (A) | I <sub>CB0</sub> (μA)<br>Max                                     | V <sub>CB</sub> (V)<br>@ I <sub>C</sub> | I <sub>CES</sub> (μA)<br>Max | V <sub>CE</sub> (V)<br>@ I <sub>CES</sub> | h <sub>FE</sub> @ I <sub>C</sub> & V <sub>CE</sub> (V) |           | V <sub>CE(SAT)</sub> (V)<br>Max Min |         | V <sub>BE(SAT)</sub> (V)<br>Max | I <sub>C</sub> (mA)<br>@ V <sub>BE(SAT)</sub> | C <sub>ob</sub> (pF)<br>Typ Max |    | f <sub>i</sub> (MHz)<br>Min Typ |     | I <sub>C</sub> (mA)<br>@ f <sub>i</sub> | t <sub>off</sub> (ns)<br>Max | N <sub>F</sub> (dB)<br>Max | @ Freq (MHz) | C <sub>re</sub> (pF)<br>Max | CDIL Case Style |  |         |
| BF496           | 30                          | 20                          | 3                           | 0.3                            | 0.02               | 0.5                                                              | 20                                      |                              |                                           | 15 5                                                   | 2 12      | 10 7                                |         |                                 |                                               |                                 |    |                                 |     | 550                                     | 2                            |                            |              |                             |                 |  | TO-92   |
| BF959           | 30                          | 20                          | 3                           | 0.625                          | 0.1                | 0.1                                                              | 20                                      |                              |                                           | 35 40                                                  | 5 20      | 10 10                               | 1       |                                 | 1                                             | 30                              |    |                                 |     | 700                                     | 20                           |                            |              |                             | 0.7             |  | TO-92-2 |
| BSY95A          | 20                          | 15                          | 5                           | 0.625                          | 0.2                | 0.05                                                             | 16                                      |                              |                                           | 30 50                                                  | 200 200   | 1 10                                | 0.4 0.4 | 0.35                            | 0.67                                          | 0.87 10                         |    | 6                               |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92   |
| CC337           | 50                          | 45                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 100                                                 | 500 600   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC337-16        | 50                          | 45                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 100                                                 | 500 250   | 1 1000                              | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC337-25        | 50                          | 45                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 160                                                 | 500 400   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC338           | 25                          | 25                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 100                                                 | 500 600   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC338-16        | 30                          | 25                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 100                                                 | 500 250   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC338-25        | 30                          | 25                          | 5                           | 0.625                          | 0.8                | 0.1                                                              | 20                                      |                              |                                           | 40 160                                                 | 500 400   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CC338-40        | 30                          | 25                          | 5                           | 0.625                          | 0.5                | 0.1                                                              | 20                                      |                              |                                           | 40 250                                                 | 500 600   | 1 100                               | 1 1     | 0.7                             |                                               | 500                             | 5  |                                 |     | 200                                     | 10                           |                            |              |                             |                 |  | TO-92-1 |
| CD50            | 500                         | 400                         | 5                           | 0.625                          | 0.3                |                                                                  |                                         | 0.5                          | 400                                       | 30                                                     | 150       | 100                                 | 10      | 1                               |                                               | 100                             |    |                                 |     |                                         |                              |                            |              |                             |                 |  | TO-92-1 |
| CD635           | 45                          | 45                          | 5                           | 0.8                            | 0.5                | 0.1                                                              | 30                                      |                              |                                           | 25 40 25                                               | 5 250 500 | 2 2 2                               | 0.5     |                                 |                                               | 500                             | 7  |                                 |     | 200                                     | 50                           |                            |              |                             |                 |  | TO-92-4 |
| CD637           | 60                          | 60                          | 5                           | 0.8                            | 0.5                | 0.1                                                              | 30                                      |                              |                                           | 25 40 25                                               | 5 160 500 | 2 2 2                               | 0.5     |                                 |                                               | 500                             | 7  |                                 |     | 200                                     | 50                           |                            |              |                             |                 |  | TO-92-4 |
| CD639           | 80                          | 80                          | 5                           | 0.8                            | 0.5                | 0.1                                                              | 30                                      |                              |                                           | 25 40 25                                               | 5 160 500 | 2 2 2                               | 0.5     |                                 |                                               | 500                             | 7  |                                 |     | 200                                     | 50                           |                            |              |                             |                 |  | TO-92-4 |
| CD965           | 40                          | 20                          | 7                           |                                | 5                  | 0.1                                                              | 10                                      |                              |                                           | 180 150                                                | 600 2000  | 2 2                                 | 1.35    |                                 |                                               | 3                               | 50 |                                 |     | 150                                     | 50                           |                            |              |                             |                 |  | TO-92-1 |
| CD965P          | 40                          | 20                          | 7                           |                                | 5                  | 0.1                                                              | 10                                      |                              |                                           | 180 150                                                | 270 2000  | 2 2                                 | 1.35    |                                 |                                               | 3                               | 50 |                                 |     | 150                                     | 50                           |                            |              |                             |                 |  | TO-92-1 |
| CD965Q          | 40                          | 20                          | 7                           |                                | 5                  | 0.1                                                              | 10                                      |                              |                                           | 230 150                                                | 380 2000  | 2 2                                 | 1.35    |                                 |                                               | 3                               | 50 |                                 |     | 150                                     | 50                           |                            |              |                             |                 |  | TO-92-1 |
| CD965R          | 40                          | 20                          | 7                           |                                | 5                  | 0.1                                                              | 10                                      |                              |                                           | 340 150                                                | 600 2000  | 2 2                                 | 1.35    |                                 |                                               | 3                               | 50 |                                 |     | 150                                     | 50                           |                            |              |                             |                 |  | TO-92-1 |
| CD2383          | 160                         | 160                         | 6                           | 0.7                            | 1                  | 1                                                                | 150                                     |                              |                                           | 60                                                     | 320       | 200                                 | 5       | 1.5                             |                                               | 500                             | 20 | 20                              | 100 |                                         | 200                          |                            |              |                             |                 |  | TO-92-1 |
| CD2383O         | 160                         | 160                         | 6                           | 0.7                            | 1                  | 1                                                                | 150                                     |                              |                                           | 100                                                    | 200       | 200                                 | 5       | 1.5                             |                                               | 500                             | 20 | 20                              | 100 |                                         | 200                          |                            |              |                             |                 |  | TO-92-1 |
| CD2383R         | 160                         | 160                         | 6                           | 0.7                            | 1                  | 1                                                                | 150                                     |                              |                                           | 60                                                     | 120       | 200                                 | 5       | 1.5                             |                                               | 500                             | 20 | 20                              | 100 |                                         | 200                          |                            |              |                             |                 |  | TO-92-1 |

## MECHANICAL DATA



## Ammo Pack Style



| Item                                    | Symbol | Specification |      |       |              | Remarks                                                                            |
|-----------------------------------------|--------|---------------|------|-------|--------------|------------------------------------------------------------------------------------|
|                                         |        | Min.          | Nom. | Max.  | Tol.         |                                                                                    |
| Body Width                              | A1     | 4.0           |      | 4.8   |              | Cumulative Pitch Error<br>1.0 mm/20 Pitch<br>To be measured at<br>bottom of Clinch |
| Body Height                             | A      | 4.8           |      | 5.2   |              |                                                                                    |
| Body Thickness                          | T      | 3.9           |      | 4.2   |              |                                                                                    |
| Pitch of Component                      | P      |               | 12.7 |       | ±1           |                                                                                    |
| Feed Hole Pitch                         | Po     |               | 12.7 |       | ±0.3         |                                                                                    |
| Feed Hole Centre to<br>Component Centre | P2     |               | 6.35 |       | ±0.4         | At Top of Body                                                                     |
| Distance between Outer<br>Leads         | F      |               | 5.08 |       | ±0.6         |                                                                                    |
| Component Alignment                     | Δh     |               | 0    | 1     | -0.2         |                                                                                    |
| Tape Width                              | W      |               | 18   |       | ±0.5         |                                                                                    |
| Hold-Down Tape Width                    | Wo     |               | 6    |       | ±0.2         |                                                                                    |
| Hole Position                           | W1     |               | 9    |       | ±0.7         | t <sub>1</sub> 0.3-0.6                                                             |
| Hold-Down Tape Position                 | W2     |               | 0.5  |       | ±0.2         |                                                                                    |
| Lead Wire Clinch Height                 | Ho     |               | 16   |       | ±0.5         |                                                                                    |
| Component Height                        | H1     |               |      | 32.25 |              |                                                                                    |
| Length of Snipped leads                 | L      |               |      | 11.0  |              |                                                                                    |
| Feed Hole Diameter                      | Do     |               | 4    |       | ±0.2         |                                                                                    |
| Total Tape Thickness                    | t      |               |      | 1.2   |              |                                                                                    |
| Lead-to-Lead Distance                   | F1,F2  |               | 2.54 |       | +0.4<br>-0.1 |                                                                                    |
| Clinch Height                           | H2     |               |      | 3     |              |                                                                                    |
| Pull-out Force                          | (p)    | 6N            |      |       |              |                                                                                    |

Dimensions in m.m.

## Notes:

- Maximum alignment deviation between leads not to be greater than 0.2 mm.
- Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches
- Hold-down tape not to exceed beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
- No more than 3 consecutive missing components permitted.
- A tape trailer, having at least three feed holes is required after the last component.
- Splices shall not interfere with the sprocket feed holes.