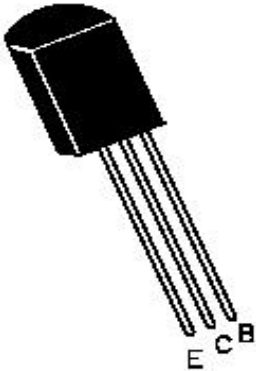


## EPITAXIAL PLANAR SILICON TRANSISTORS

**CSB764 PNP**  
**CSD863 NPN**

**TO-92L**  
**Plastic Package**



Voltage Regulator, Relay Lamp Driver Electrical Equipment Applications

### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ )

| DESCRIPTION                 | SYMBOL    | VALUE        | UNITS            |
|-----------------------------|-----------|--------------|------------------|
| Collector Base Voltage      | $V_{CBO}$ | 60           | V                |
| Collector Emitter Voltage   | $V_{CEO}$ | 50           | V                |
| Emitter Base Voltage        | $V_{EBO}$ | 5.0          | V                |
| Collector Current           | $I_C$     | 1.0          | A                |
| Peak Collector Current      | $I_{CP}$  | 2.0          | A                |
| Collector Power Dissipation | $P_C$     | 0.9          | W                |
| Junction Temperature        | $T_j$     | 150          | $^\circ\text{C}$ |
| Storage Temperature         | $T_{stg}$ | - 55 to +150 | $^\circ\text{C}$ |

### ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ unless specified otherwise)

| DESCRIPTION                          | SYMBOL        | TEST CONDITION  | MIN | TYP | MAX        | UNITS         |
|--------------------------------------|---------------|---|-----|-----|------------|---------------|
| Collector Base Voltage               | $V_{CBO}$     | $I_C=10\mu\text{A}, I_E=0$                                      | 60  |     |            | V             |
| Collector Emitter Voltage            | $V_{CEO}$     | $I_C=1\text{mA}, I_B=0$   | 50  |     |            | V             |
| Emitter Base Voltage                 | $V_{EBO}$     | $I_E=10\mu\text{A}, I_C=0$                                      | 5.0 |     |            | V             |
| Collector Cut Off Current            | $I_{CBO}$     | $V_{CB}=50\text{V}, I_E=0$                                      |     |     | 1.0        | $\mu\text{A}$ |
| Emitter Cut Off Current              | $I_{EBO}$     | $V_{EB}=4\text{V}, I_C=0$                                       |     |     | 1.0        | $\mu\text{A}$ |
| DC Current Gain                      | $*h_{FE}$     | $I_C=50\text{mA}, V_{CE}=2\text{V}$                             | 60  |     | 320        |               |
|                                      | $h_{FE}$      | $I_C=1\text{A}, V_{CE}=2\text{V}$                               | 30  |     |            |               |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=500\text{mA}, I_B=50\text{mA}$<br><b>NPN</b><br><b>PNP</b> |     |     | 0.5<br>0.7 | V<br>V        |
| Base Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=500\text{mA}, I_B=50\text{mA}$                             |     |     | 1.2        | V             |

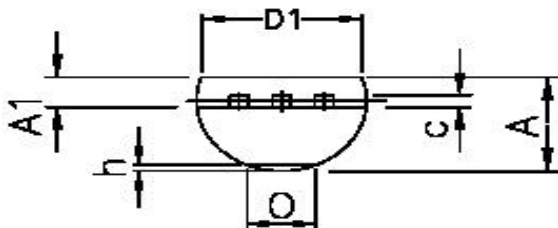
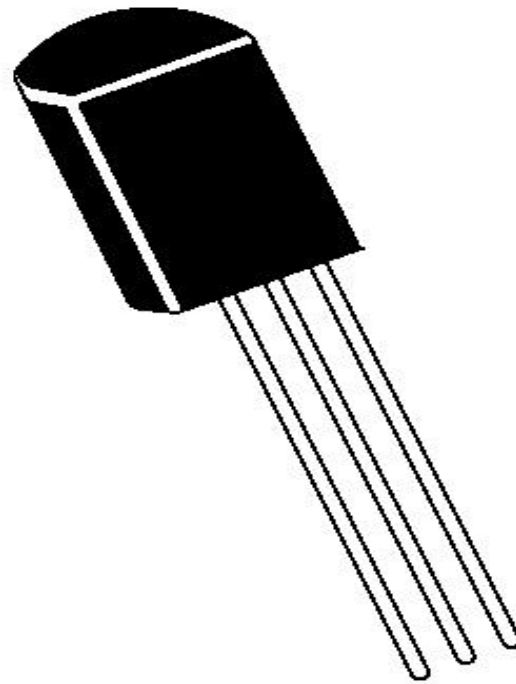
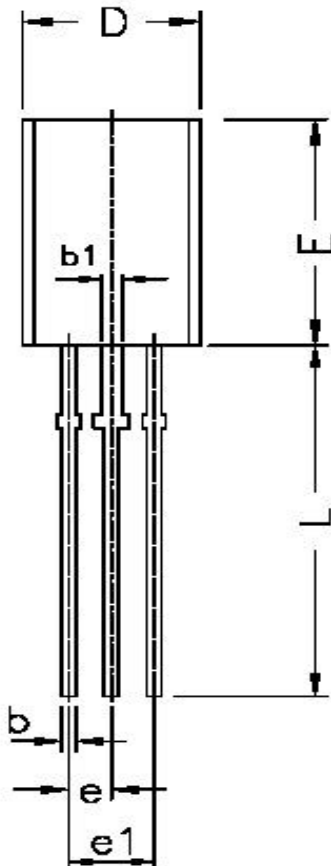
### DYNAMIC CHARACTERISTICS

|                      |          |   |                |          |
|----------------------|----------|---|----------------|----------|
| Transition Frequency | $f_T$    | $V_{CE}=10\text{V}, I_C=50\text{mA}$                                  | TYP150         | MHz      |
| Output Capacitance   | $C_{ob}$ | $V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$<br><b>NPN</b><br><b>PNP</b> | TYP12<br>TYP20 | pF<br>pF |

| CLASSIFICATION | D        | E         | F         |
|----------------|----------|-----------|-----------|
| $*h_{FE}$      | 60 - 120 | 100 - 200 | 160 - 320 |

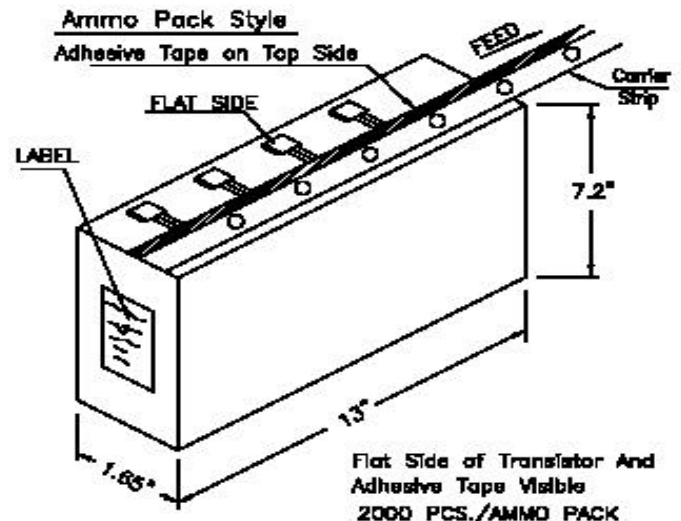
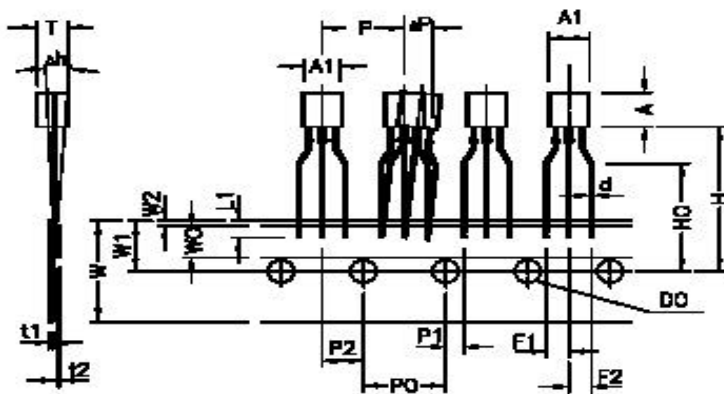
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PACKAGE TO-92L



| DIM | MIN        | MAX    |
|-----|------------|--------|
| A   | 3.700      | 4.100  |
| A1  | 1.280      | 1.580  |
| b   | 0.350      | 0.550  |
| b1  | 0.600      | 0.800  |
| c   | 0.350      | 0.450  |
| D   | 4.700      | 5.100  |
| D1  | 4.000      | —      |
| E   | 7.800      | 8.200  |
| e   | 1.270 TYP. |        |
| e1  | 2.440      | 2.640  |
| L   | 13.600     | 14.200 |
| O   | —          | 1.600  |
| h   | 0.000      | 0.300  |

## TO-92L TRANSISTOR ON TAPE AND AMMO PACK



| ITEM                                 | SYMBOL | VALUE & TOLERANCE |
|--------------------------------------|--------|-------------------|
| BODY WIDTH                           | A1     | 4.9 ±0.2          |
| BODY HEIGHT                          | A      | 8.0 ±0.2          |
| BODY THICKNESS                       | T      | 3.9 ±0.2          |
| LEAD WIRE DIAMETER                   | d      | 0.45 ±0.05        |
| PITCH OF COMPONENT                   | F      | 12.7 ±0.3         |
| FEED HOLE PITCH                      | P0     | 12.7 ±0.2         |
| HOLE CENTER TO COMPONENT CENTER      | P2     | 6.35 ±0.3         |
| LEAD TO LEAD DISTANCE                | F1, F2 | 2.5 ±0.3          |
| COMPONENT ALIGNMENT, F-R             | Δh     | 0 ±1.0            |
| TYPE WIDTH                           | W      | 18.0 +1.0, -0.5   |
| HOLE DOWN TAPE WIDTH                 | W0     | 6.0 ±0.5          |
| HOLE POSITION                        | W1     | 9.0 ±0.5          |
| HOLE DOWN TAPE POSITION              | W2     | 1.0 MAX.          |
| HEIGHT OF COMPONENT FROM TAPE CENTER | H      | 19.0 +2.0, -0     |
| LEAD WIRE CLINCH HEIGHT              | H0     | 16.0 ±0.5         |
| LEAD WIRE (TAPE PORTION)             | L1     | 2.5 MIN           |
| FEED HOLE DIAMETER                   | D0     | 4.0 ±0.2          |
| TAPED LEAD THICKNESS                 | t1     | 0.4 ±0.05         |
| CARRIER TAPE THICKNESS               | t2     | 0.2 ±0.05         |
| POSITION OF HOLE                     | P1     | 3.85 ±0.3         |
| COMPONENT ALIGNMENT                  | ΔP     | 0 ±1.0            |

**NOTES:-**

1. MAXIMUM ALIGNMENT DEVIATION BETWEEN LEADS NOT TO BE GREATER THAN 0.2 mm
2. MAXIMUM NON-CUMULATIVE VARIATION BETWEEN TAPE FEED HOLES SHALL NOT EXCEED 1 mm IN 20 PITCHES.
3. HOLDDOWN TAPE NOT TO EXCEED BEYOND THE EDGE(S) OF CARRIER TAPE AND THERE SHALL BE NO EXPOSURE OF ADHESIVE.
4. NO MORE THAN 3 CONSECUTIVE MISSING COMPONENTS IS PERMITTED.
5. A TAPE TRAILER, HAVING AT LEAST THREE FEED HOLES IS REQUIRED AFTER THE LAST COMPONENT.
6. SPIKES SHALL NOT INTERFERE WITH THE SPROCKET FEED HOLES.

**Component Disposal Instructions**

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

**Disclaimer**

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

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