

## NPN TIP110-111-112

### SILICON DARLINGTON POWER TRANSISTORS

NPN epitaxial-base transistors in a monolithic Darlington circuit and housed in a TO-220 envelope.

They are designed for general purpose amplifier and low-speed switching applications.

PNP complements are TIP115-116-117

Compliance to RoHS•

#### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Ratings                   |                    | Value  | Unit        |                    |
|-----------|---------------------------|--------------------|--------|-------------|--------------------|
| $V_{CBO}$ | Collector-Base Voltage    |                    | TIP110 | 60          | V                  |
|           |                           |                    | TIP111 | 80          |                    |
|           |                           |                    | TIP112 | 100         |                    |
| $V_{CEO}$ | Collector-Emitter Voltage |                    | TIP110 | 60          | V                  |
|           |                           |                    | TIP111 | 80          |                    |
|           |                           |                    | TIP112 | 100         |                    |
| $V_{EBO}$ | Emitter-Base Voltage      |                    | TIP110 | 5           | V                  |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $I_C$     | Collector Current         |                    | TIP110 | 2           | A                  |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $I_{CM}$  | Collector Peak Current    |                    | TIP110 | 4           | A                  |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $I_B$     | Base Current              |                    | TIP110 | 50          | mA                 |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $P_T$     | Power Dissipation         | @ $T_c < 25^\circ$ | TIP110 | 50          | Watts              |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
|           |                           | @ $T_a < 25^\circ$ | TIP110 | 2           |                    |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $T_J$     | Junction Temperature      |                    | TIP110 | 150         | $^{\circ}\text{C}$ |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |
| $T_s$     | Storage Temperature range |                    | TIP110 | -65 to +150 |                    |
|           |                           |                    | TIP111 |             |                    |
|           |                           |                    | TIP112 |             |                    |

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### THERMAL CHARACTERISTICS

| Symbol         | Ratings               |        | Value | Unit |
|----------------|-----------------------|--------|-------|------|
| $R_{thJ-case}$ | From junction-case    | TIP110 | 2.5   | °C/W |
|                |                       | TIP111 |       |      |
|                |                       | TIP112 |       |      |
| $R_{thJ-amb}$  | From junction-ambient | TIP110 | 62.5  | °C/W |
|                |                       | TIP111 |       |      |
|                |                       | TIP112 |       |      |

### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

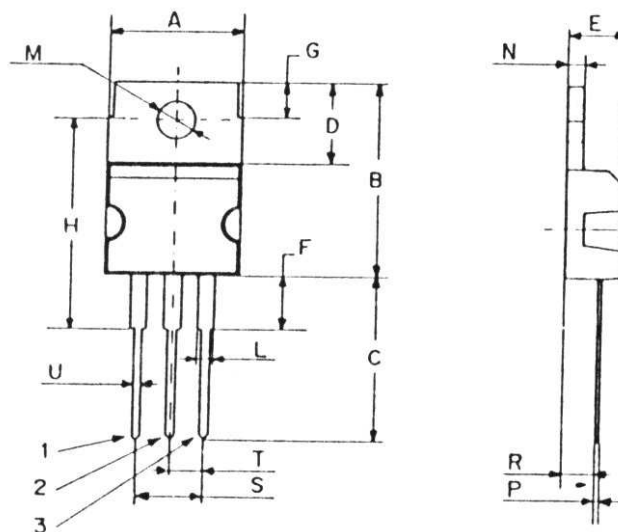
| Symbol        | Ratings                                  | Test Condition(s)                         | Min    | Typ  | Max | Unit |
|---------------|------------------------------------------|-------------------------------------------|--------|------|-----|------|
| $I_{CBO}$     | Collector Cutoff Current                 | $I_E = 0, V_{CB} = V_{CBOmax}$            | -      | -    | 1   | mA   |
|               |                                          |                                           |        |      |     |      |
|               |                                          |                                           |        |      |     |      |
| $I_{CEO}$     | Collector Cutoff Current                 | $I_E = 0, V_{CE} = 1/2 V_{CEOmax}$        | -      | -    | 2   | mA   |
|               |                                          |                                           |        |      |     |      |
|               |                                          |                                           |        |      |     |      |
| $I_{EBO}$     | Emitter Cutoff Current                   | $V_{EB} = 5 V, I_C = 0$                   | -      | -    | 2   | mA   |
|               |                                          |                                           |        |      |     |      |
|               |                                          |                                           |        |      |     |      |
| $V_{CEO}$     | Collector-Emitter Breakdown Voltage (*)  | $I_C = 30 mA, I_B = 0$                    | TIP110 | 60   | -   | V    |
|               |                                          |                                           | TIP111 | 80   | -   |      |
|               |                                          |                                           | TIP112 | 100  | -   |      |
| $V_{CE(SAT)}$ | Collector-Emitter saturation Voltage (*) | $I_C = 2 A, I_B = 8 mA$                   | TIP110 | -    | -   | 2.5  |
|               |                                          |                                           | TIP111 |      |     |      |
|               |                                          |                                           | TIP112 |      |     |      |
| $V_{BE(on)}$  | Base-Emitter Voltage (*)                 | $I_C = 2 A, V_{CE} = 4 V$                 | TIP110 | -    | -   | 2.8  |
|               |                                          |                                           | TIP111 |      |     |      |
|               |                                          |                                           | TIP112 |      |     |      |
| $h_{FE}$      | DC Current Gain (*)                      | $V_{CE} = 4 V, I_C = 1 A$                 | TIP110 | 1000 | -   | -    |
|               |                                          |                                           | TIP111 |      |     |      |
|               |                                          |                                           | TIP112 |      |     |      |
|               |                                          | $V_{CE} = 4 V, I_C = 2 A$                 | TIP110 | 500  | -   | -    |
|               |                                          |                                           | TIP111 |      |     |      |
|               |                                          |                                           | TIP112 |      |     |      |
| $C_{OB}$      | Output Capacitance                       | $I_E = 0, V_{CB} = 10 V$<br>$f = 0.1 MHz$ | TIP110 | -    | -   | 100  |
|               |                                          |                                           | TIP111 |      |     |      |
|               |                                          |                                           | TIP112 |      |     |      |

(\*) Pulse Width  $\approx 300 \mu s$ , Duty Cycle  $\angle 2.0\%$

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### MECHANICAL DATA CASE TO-220

| DIMENSIONS (mm) |       |       |
|-----------------|-------|-------|
|                 | Min.  | Max.  |
| A               | 9,90  | 10,30 |
| B               | 15,65 | 15,90 |
| C               | 13,20 | 13,40 |
| D               | 6,45  | 6,65  |
| E               | 4,30  | 4,50  |
| F               | 2,70  | 3,15  |
| G               | 2,60  | 3,00  |
| H               | 15,75 | 17,15 |
| L               | 1,15  | 1,40  |
| M               | 3,50  | 3,70  |
| N               | -     | 1,37  |
| P               | 0,46  | 0,55  |
| R               | 2,50  | 2,70  |
| S               | 4,98  | 5,08  |
| T               | 2,49  | 2,54  |
| U               | 0,70  | 0,90  |



|         |           |
|---------|-----------|
| Pin 1 : | Base      |
| Pin 2 : | Collector |
| Pin 3 : | Emitter   |
| Case :  | Collector |

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