



# TIP140/141/142 TIP145/146/147

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

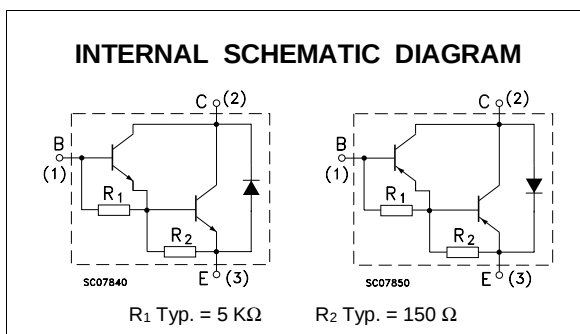
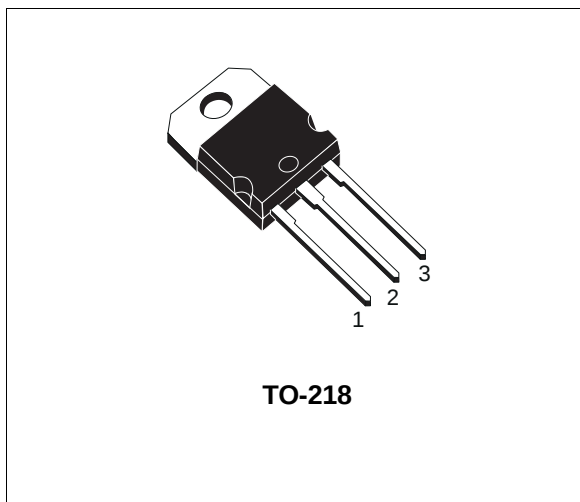
- TIP141, TIP142, TIP145 AND TIP147 ARE STMicroelectronics PREFERRED SALESTYPES
- COMPLEMENTARY PNP - NPN DEVICES
- MONOLITHIC DARLINGTON CONFIGURATION
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

### APPLICATIONS

- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

### DESCRIPTION

The TIP140, TIP141 and TIP142 are silicon Epitaxial-Base NPN power transistors in monolithic Darlington configuration, mounted in TO-218 plastic package. They are intended for use in power linear and switching applications. The complementary PNP types are TIP145, TIP146 and TIP147 respectively.



### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                      | Value |            |        |        | Unit |
|------------------|------------------------------------------------|-------|------------|--------|--------|------|
|                  |                                                | NPN   | TIP140     | TIP141 | TIP142 |      |
|                  |                                                | PNP   | TIP145     | TIP146 | TIP147 |      |
| V <sub>CBO</sub> | Collector-Base Voltage (I <sub>E</sub> = 0)    |       | 60         | 80     | 100    | V    |
| V <sub>CEO</sub> | Collector-Emitter Voltage (I <sub>B</sub> = 0) |       | 60         | 80     | 100    | V    |
| V <sub>EBO</sub> | Emitter-Base Voltage (I <sub>C</sub> = 0)      |       | 5          |        |        | V    |
| I <sub>C</sub>   | Collector Current                              |       | 10         |        |        | A    |
| I <sub>CM</sub>  | Collector Peak Current                         |       | 20         |        |        | A    |
| I <sub>B</sub>   | Base Current                                   |       | 0.5        |        |        | A    |
| P <sub>tot</sub> | Total Dissipation at T <sub>case</sub> ≤ 25 °C |       | 125        |        |        | W    |
| T <sub>stg</sub> | Storage Temperature                            |       | -65 to 150 |        |        | °C   |
| T <sub>j</sub>   | Max. Operating Junction Temperature            |       | 150        |        |        | °C   |

For PNP types voltage and current values are negative.

## TIP140 / TIP141 / TIP142 / TIP145 / TIP146 / TIP147

### THERMAL DATA

|                |                                  |     |   |               |
|----------------|----------------------------------|-----|---|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case | Max | 1 | $^{\circ}C/W$ |
|----------------|----------------------------------|-----|---|---------------|

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

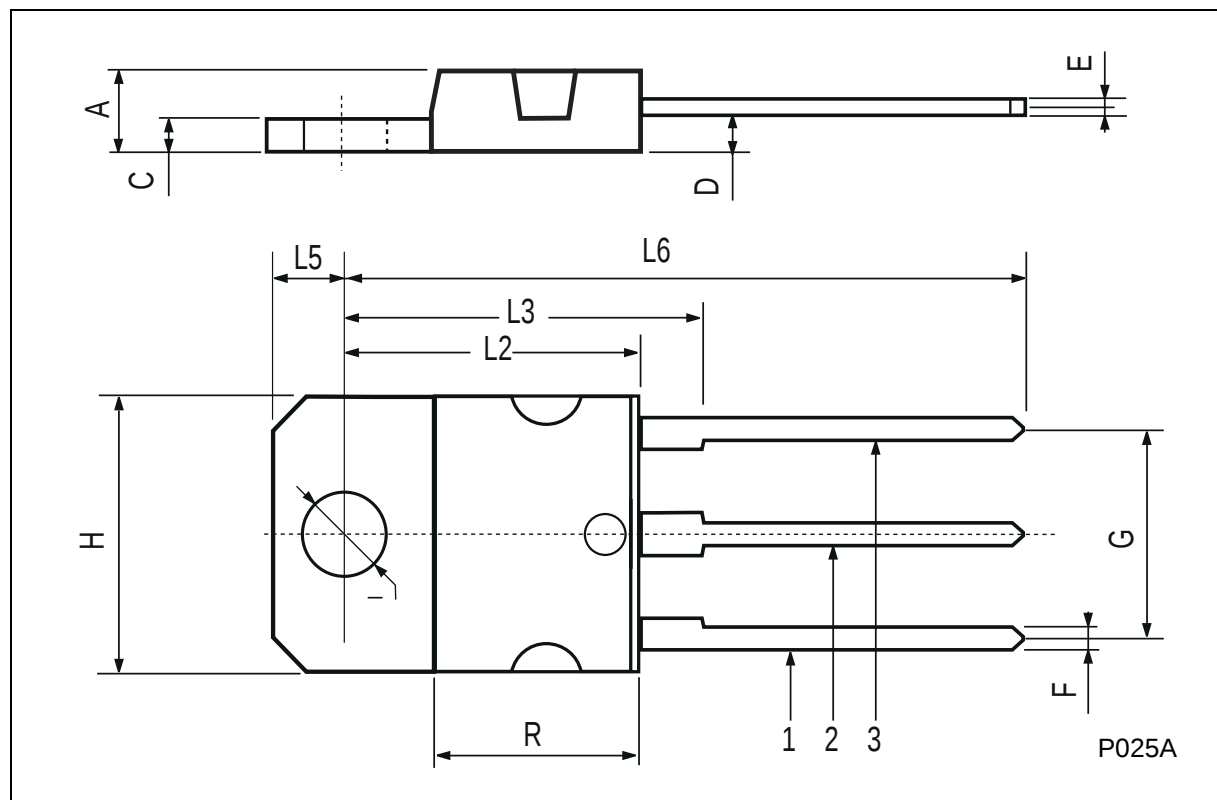
| Symbol                | Parameter                                          | Test Conditions                                                                                                          | Min.            | Typ.     | Max.        | Unit               |
|-----------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------|----------|-------------|--------------------|
| $I_{CBO}$             | Collector Cut-off Current ( $I_E = 0$ )            | for <b>TIP140/145</b> $V_{CB} = 60 V$<br>for <b>TIP141/146</b> $V_{CB} = 80 V$<br>for <b>TIP142/147</b> $V_{CB} = 100 V$ |                 |          | 1<br>1<br>1 | mA<br>mA<br>mA     |
| $I_{CEO}$             | Collector Cut-off Current ( $I_B = 0$ )            | for <b>TIP140/145</b> $V_{CE} = 30 V$<br>for <b>TIP141/146</b> $V_{CE} = 40 V$<br>for <b>TIP142/147</b> $V_{CE} = 50 V$  |                 |          | 2<br>2<br>2 | mA<br>mA<br>mA     |
| $I_{EBO}$             | Emitter Cut-off Current ( $I_C = 0$ )              | $V_{EB} = 5 V$                                                                                                           |                 |          | 2           | mA                 |
| $V_{CEO(sus)}^*$      | Collector-Emitter Sustaining Voltage ( $I_B = 0$ ) | $I_C = 30 mA$<br>for <b>TIP140/145</b><br>for <b>TIP141/146</b><br>for <b>TIP142/147</b>                                 | 60<br>80<br>100 |          |             | V<br>V<br>V        |
| $V_{CE(sat)}^*$       | Collector-Emitter Saturation Voltage               | $I_C = 5 A$ $I_B = 10 mA$<br>$I_C = 10 A$ $I_B = 40 mA$                                                                  |                 |          | 2<br>3      | V<br>V             |
| $V_{BE(on)}^*$        | Base-Emitter Voltage                               | $I_C = 10 A$ $V_{CE} = 4 V$                                                                                              |                 |          | 3           | V                  |
| $h_{FE}^*$            | DC Current Gain                                    | $I_C = 5 A$ $V_{CE} = 4 V$<br>$I_C = 10 A$ $V_{CE} = 4 V$                                                                | 1000<br>500     |          |             |                    |
| $t_{on}$<br>$t_{off}$ | RESISTIVE LOAD<br>Turn-on Time<br>Turn-off Time    | $I_C = 10 A$ $I_{B1} = 40 mA$<br>$I_{B2} = -40 mA$ $R_L = 3 \Omega$                                                      |                 | 0.9<br>4 |             | $\mu s$<br>$\mu s$ |

For PNP types voltage and current values are negative.

\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %

## TO-218 (SOT-93) MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 4.7  |      | 4.9  | 0.185 |       | 0.193 |
| C    | 1.17 |      | 1.37 | 0.046 |       | 0.054 |
| D    |      | 2.5  |      |       | 0.098 |       |
| E    | 0.5  |      | 0.78 | 0.019 |       | 0.030 |
| F    | 1.1  |      | 1.3  | 0.043 |       | 0.051 |
| G    | 10.8 |      | 11.1 | 0.425 |       | 0.437 |
| H    | 14.7 |      | 15.2 | 0.578 |       | 0.598 |
| L2   | –    |      | 16.2 | –     |       | 0.637 |
| L3   |      | 18   |      |       | 0.708 |       |
| L5   | 3.95 |      | 4.15 | 0.155 |       | 0.163 |
| L6   |      | 31   |      |       | 1.220 |       |
| R    | –    |      | 12.2 | –     |       | 0.480 |
| Ø    | 4    |      | 4.1  | 0.157 |       | 0.161 |



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