



# 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

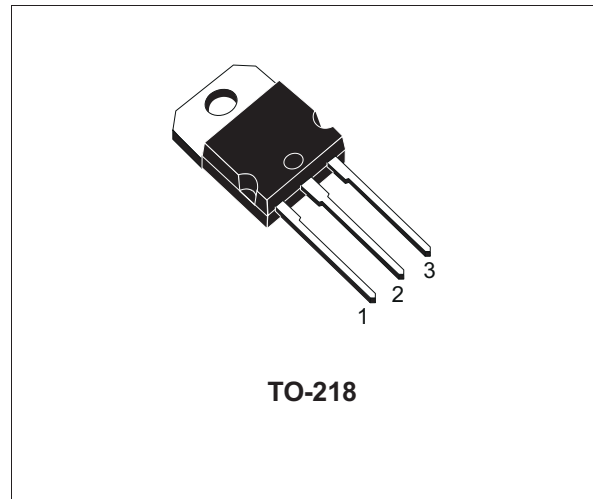
### APPLICATIONS

- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

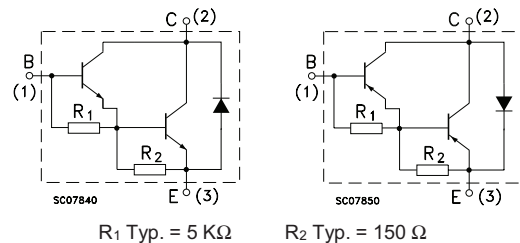
### DESCRIPTION

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.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                      | Value |            |        |        | Unit |
|------------------|------------------------------------------------|-------|------------|--------|--------|------|
|                  |                                                | NPN   | TIP140     | TIP141 | TIP142 |      |
| V <sub>CBO</sub> | Collector-Base Voltage (I <sub>E</sub> = 0)    | 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 <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 1 | °C/W |
|-----------------------|----------------------------------|-----|---|------|

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

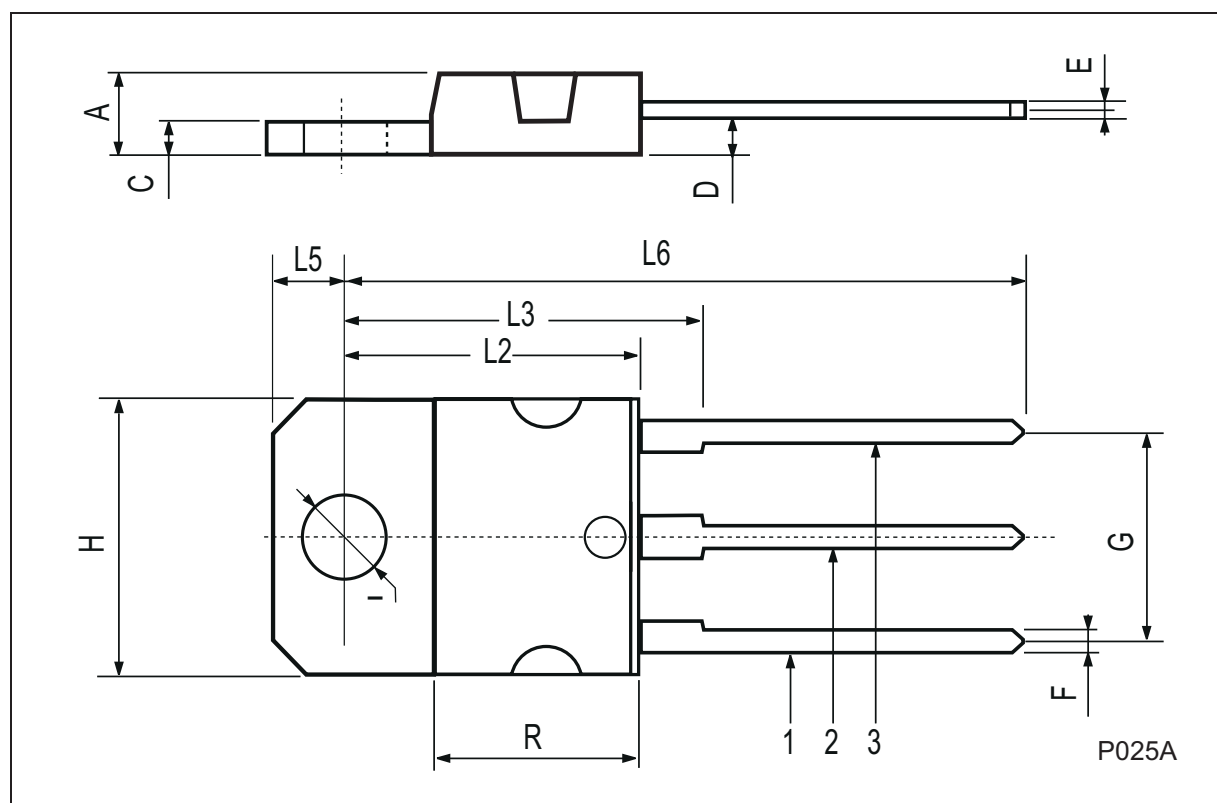
| Symbol                              | Parameter                                                 | Test Conditions                                                                                                                               | Min.            | Typ.     | Max.        | Unit           |
|-------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|-------------|----------------|
| I <sub>CBO</sub>                    | Collector Cut-off Current (I <sub>E</sub> = 0)            | for <b>TIP140/145</b> V <sub>CB</sub> = 60 V<br>for <b>TIP141/146</b> V <sub>CB</sub> = 80 V<br>for <b>TIP142/147</b> V <sub>CB</sub> = 100 V |                 |          | 1<br>1<br>1 | mA<br>mA<br>mA |
| I <sub>CEO</sub>                    | Collector Cut-off Current (I <sub>B</sub> = 0)            | for <b>TIP140/145</b> V <sub>CE</sub> = 30 V<br>for <b>TIP141/146</b> V <sub>CE</sub> = 40 V<br>for <b>TIP142/147</b> V <sub>CE</sub> = 50 V  |                 |          | 2<br>2<br>2 | mA<br>mA<br>mA |
| I <sub>EBO</sub>                    | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                                                                         |                 |          | 2           | mA             |
| V <sub>CEO(sus)</sub> *             | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 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 <sub>CE(sat)</sub> *              | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 5 A I <sub>B</sub> = 10 mA<br>I <sub>C</sub> = 10 A I <sub>B</sub> = 40 mA                                                   |                 |          | 2<br>3      | V<br>V         |
| V <sub>BE(on)</sub> *               | Base-Emitter Voltage                                      | I <sub>C</sub> = 10 A V <sub>CE</sub> = 4 V                                                                                                   |                 |          | 3           | V              |
| h <sub>FE</sub> *                   | DC Current Gain                                           | I <sub>C</sub> = 5 A V <sub>CE</sub> = 4 V<br>I <sub>C</sub> = 10 A V <sub>CE</sub> = 4 V                                                     | 1000<br>500     |          |             |                |
| t <sub>on</sub><br>t <sub>off</sub> | RESISTIVE LOAD<br>Turn-on Time<br>Turn-off Time           | I <sub>C</sub> = 10 A I <sub>B1</sub> = 40 mA<br>I <sub>B2</sub> = -40 mA R <sub>L</sub> = 3 Ω                                                |                 | 0.9<br>4 |             | μs<br>μs       |

For PNP types voltage and current values are negative.

\* Pulsed: Pulse duration = 300 μs, 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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