



# TIP102 TIP105 TIP107

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

- STMicroelectronics PREFERRED SALESTYPES
- COMPLEMENTARY PNP - NPN DEVICES
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

### APPLICATIONS

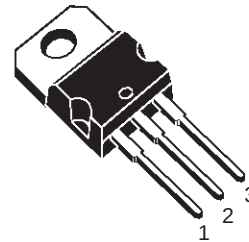
- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

### DESCRIPTION

The TIP102 is a silicon Epitaxial-Base NPN power transistor in monolithic Darlington configuration mounted in TO-220 plastic package. It is intended for use in power linear and switching applications.

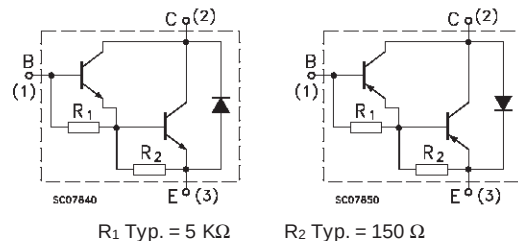
The complementary PNP type is TIP107.

Also TIP105 is a PNP type.



TO-220

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                       | Value      |        | Unit       |
|-----------|-------------------------------------------------|------------|--------|------------|
|           |                                                 | NPN        | TIP102 |            |
|           |                                                 | PNP        | TIP105 | TIP107     |
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )            | 60         | 100    | V          |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )         | 60         | 100    | V          |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )              | 5          |        | V          |
| $I_C$     | Collector Current                               | 8          |        | A          |
| $I_{CM}$  | Collector Peak Current                          | 15         |        | A          |
| $I_B$     | Base Current                                    | 1          |        | A          |
| $P_{tot}$ | Total Dissipation at $T_{case} \leq 25^\circ C$ | 80         |        | W          |
|           | $T_{amb} \leq 25^\circ C$                       | 2          |        | W          |
| $T_{stg}$ | Storage Temperature                             | -65 to 150 |        | $^\circ C$ |
| $T_j$     | Max. Operating Junction Temperature             | 150        |        | $^\circ C$ |

\* For PNP types voltage and current values are negative.

TIP102 / TIP105 / TIP107

THERMAL DATA

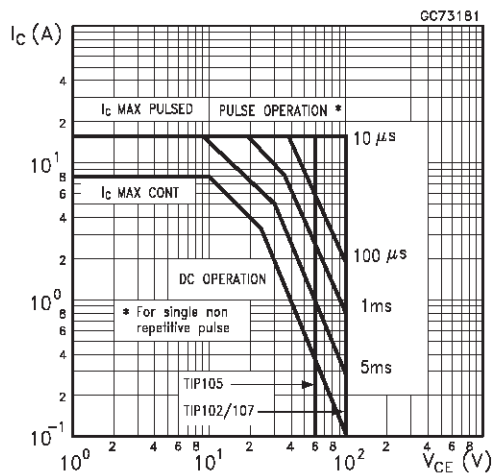
|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 1.56 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |

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

| Symbol                  | Parameter                                                 | Test Conditions                                                                              | Min.        | Typ. | Max.     | Unit     |
|-------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------|------|----------|----------|
| I <sub>CEO</sub>        | Collector Cut-off Current (I <sub>B</sub> = 0)            | for <b>TIP105</b> V <sub>CE</sub> = 30 V<br>for <b>TIP102/TIP107</b> V <sub>CE</sub> = 50 V  |             |      | 50<br>50 | μA<br>μA |
| I <sub>CBO</sub>        | Collector Cut-off Current (I <sub>E</sub> = 0)            | for <b>TIP105</b> V <sub>CB</sub> = 60 V<br>for <b>TIP102/TIP107</b> V <sub>CB</sub> = 100 V |             |      | 50<br>50 | μA<br>μA |
| I <sub>EBO</sub>        | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                        |             |      | 8        | mA       |
| V <sub>CEO(sus)</sub> * | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 30 mA<br>for <b>TIP105</b><br>for <b>TIP102/TIP107</b>                      | 60<br>100   |      |          | V<br>V   |
| V <sub>CE(sat)</sub> *  | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 3 A I <sub>B</sub> = 6 mA<br>I <sub>C</sub> = 8 A I <sub>B</sub> = 80 mA    |             |      | 2<br>2.5 | V<br>V   |
| V <sub>BE</sub> *       | Base-Emitter Voltage                                      | I <sub>C</sub> = 8 A V <sub>CE</sub> = 4 V                                                   |             |      | 2.8      | V        |
| h <sub>FE</sub> *       | DC Current Gain                                           | I <sub>C</sub> = 3 A V <sub>CE</sub> = 4 V<br>I <sub>C</sub> = 8 A V <sub>CE</sub> = 4 V     | 1000<br>200 |      | 20000    |          |
| V <sub>F</sub> *        | Forward Voltage of Commutation Diode (I <sub>B</sub> = 0) | I <sub>F</sub> = - I <sub>C</sub> = 10 A                                                     |             |      | 2.8      | V        |

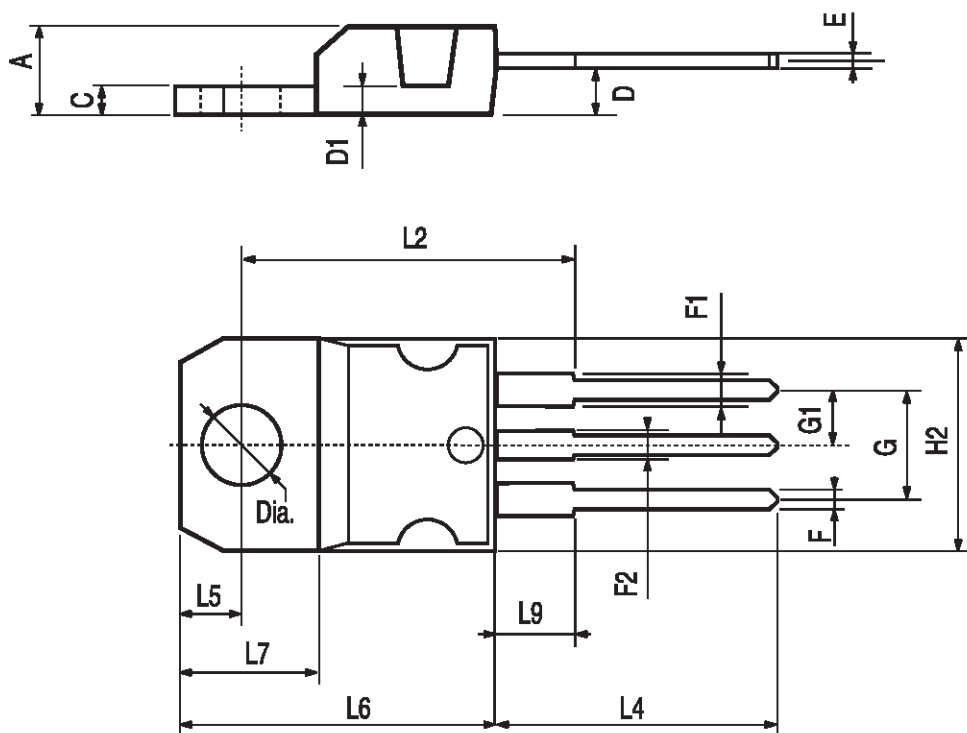
\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %  
For PNP types voltage and current values are negative.

Safe Operating Area



## TO-220 MECHANICAL DATA

| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| D1   |       | 1.27 |       |       | 0.050 |       |
| E    | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| L2   |       | 16.4 |       |       | 0.645 |       |
| L4   | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65  |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



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