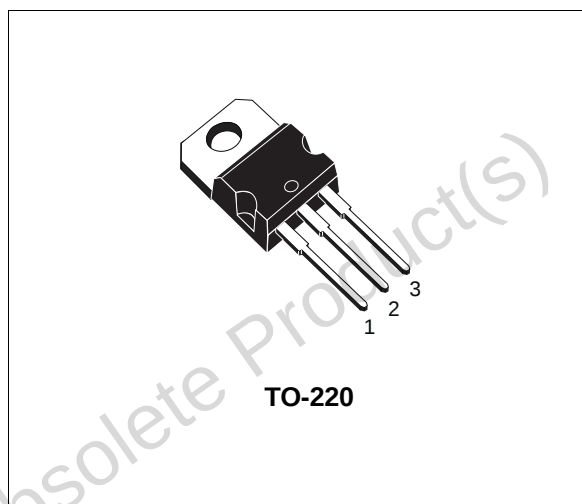


## SILICON NPN POWER DARLINGTON TRANSISTOR

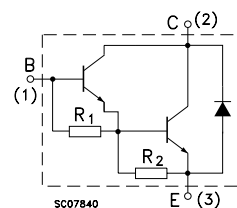
- STMicroelectronics PREFERRED SALESTYPE
- NPN DARLINGTON
- HIGH CURRENT CAPABILITY
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

### DESCRIPTION

The device is a silicon Epitaxial-Base NPN power transistor in monolithic Darlington configuration mounted in Jedec TO-220 plastic package. It is intended for use in low and medium frequency power applications.



### INTERNAL SCHEMATIC DIAGRAM



R<sub>1</sub> Typ. = 10 KΩ R<sub>2</sub> Typ. = 160 Ω

### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                           | Value      | Unit |
|------------------|-----------------------------------------------------|------------|------|
| V <sub>CBO</sub> | Collector-Base Voltage (I <sub>B</sub> = 0)         | 80         | V    |
| V <sub>CEV</sub> | Collector-Emitter Voltage (V <sub>BE</sub> = -1.5V) | 80         | V    |
| V <sub>CER</sub> | Collector-Emitter Voltage (R <sub>BE</sub> ≤ 100Ω)  | 80         | V    |
| V <sub>CEO</sub> | Collector-Emitter Voltage (I <sub>B</sub> = 0)      | 80         | 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                              | 15         | A    |
| I <sub>B</sub>   | Base Current                                        | 0.25       | A    |
| P <sub>tot</sub> | Total Dissipation at T <sub>c</sub> ≤ 25 °C         | 65         | W    |
| T <sub>stg</sub> | Storage Temperature                                 | -65 to 150 | °C   |
| T <sub>j</sub>   | Max. Operating Junction Temperature                 | 150        | °C   |

## THERMAL DATA

|                       |                                  |     |      |      |
|-----------------------|----------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 1.92 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

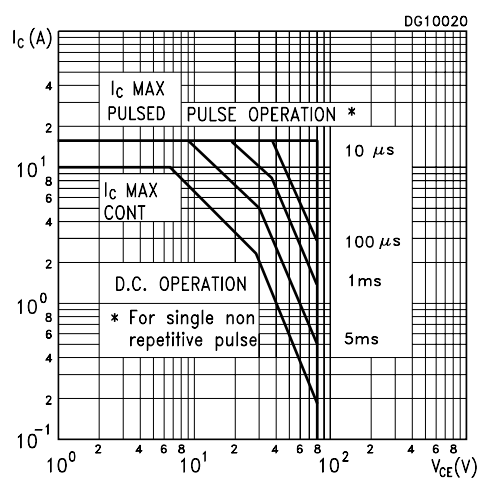
ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol                 | Parameter                                                 | Test Conditions                                                                                                                  | Min.        | Typ. | Max.       | Unit     |
|------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------|------|------------|----------|
| I <sub>CEV</sub>       | Collector Cut-off Current (V <sub>BE</sub> = -1.5V)       | V <sub>CE</sub> = 80 V<br>V <sub>CE</sub> = 80 V      T <sub>C</sub> = 125 °C                                                    |             |      | 0.3<br>3   | mA<br>mA |
| I <sub>CEO</sub>       | Collector Cut-off Current (I <sub>B</sub> = 0)            | V <sub>CE</sub> = 80 V                                                                                                           |             |      | 1          | mA       |
| I <sub>EBO</sub>       | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                                                            |             |      | 5          | mA       |
| V <sub>CEO(sus)*</sub> | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 200 mA                                                                                                          | 80          |      |            | V        |
| V <sub>CER(sus)*</sub> | Collector-Emitter Sustaining Voltage                      | I <sub>C</sub> = 200 mA      R <sub>BE</sub> = 100 Ω                                                                             | 80          |      |            | V        |
| V <sub>CEV(sus)*</sub> | Collector-Emitter Sustaining Voltage                      | I <sub>C</sub> = 200 mA      V <sub>BE</sub> = -1.5V                                                                             | 80          |      |            | 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> = 100 mA                           |             |      | 2<br>3     | V<br>V   |
| V <sub>BE*</sub>       | Base-Emitter Voltage                                      | I <sub>C</sub> = 5 A      V <sub>CE</sub> = 3 V<br>I <sub>C</sub> = 10 A      V <sub>CE</sub> = 3 V                              |             |      | 2.8<br>4.5 | V<br>V   |
| h <sub>FE*</sub>       | DC Current Gain                                           | I <sub>C</sub> = 5 A      V <sub>CE</sub> = 3 V<br>I <sub>C</sub> = 10 A      V <sub>CE</sub> = 3 V                              | 1000<br>100 |      | 20000      |          |
| h <sub>fe</sub>        | Small Signal Current Gain                                 | I <sub>C</sub> = 1 A      V <sub>CE</sub> = 10 V      f = 1MHz<br>I <sub>C</sub> = 1 A      V <sub>CE</sub> = 10 V      f = 1KHz | 20<br>1000  |      |            |          |
| V <sub>F*</sub>        | Parallel-diode Forward Voltage                            | I <sub>F</sub> = 10 A                                                                                                            |             |      | 4          | V        |
| C <sub>CBO</sub>       | Collector Base Capacitance                                | I <sub>E</sub> = 0      V <sub>CB</sub> = 10 V      f = 1MHz                                                                     |             |      | 200        | pF       |
| I <sub>s/b**</sub>     | Second Breakdown Collector Current                        | V <sub>CE</sub> = 25 V                                                                                                           | 2.6         |      |            | A        |
| E <sub>s/b</sub>       | Second Breakdown Energy                                   | L = 12 mH      R <sub>BE</sub> = 100 Ω<br>V <sub>BE</sub> = -1.5 V      I <sub>C</sub> = 4.5 A                                   | 120         |      |            | mJ       |

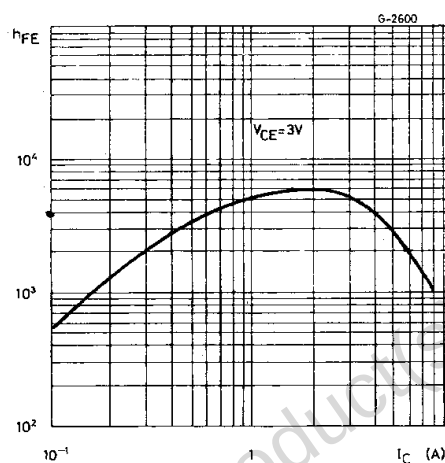
\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

\*\* Pulsed: Pulse duration = 100ms non repetitive pulse.

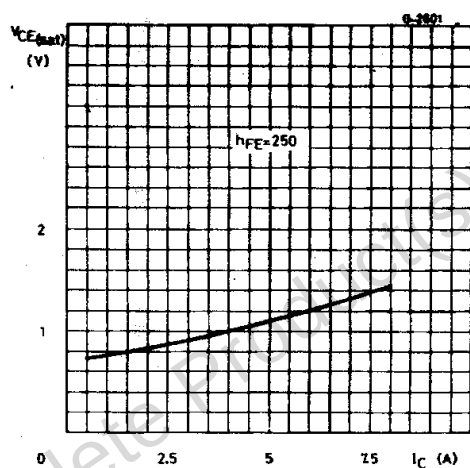
## Safe Operating Area



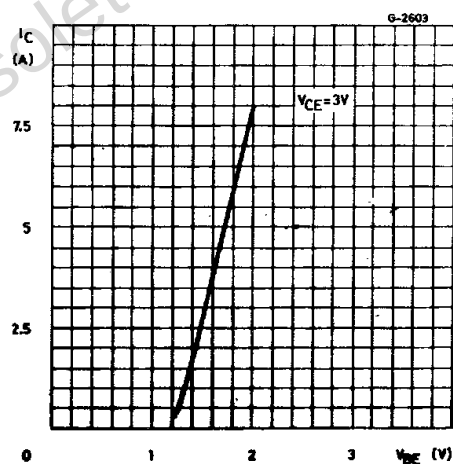
## DC Current Gain



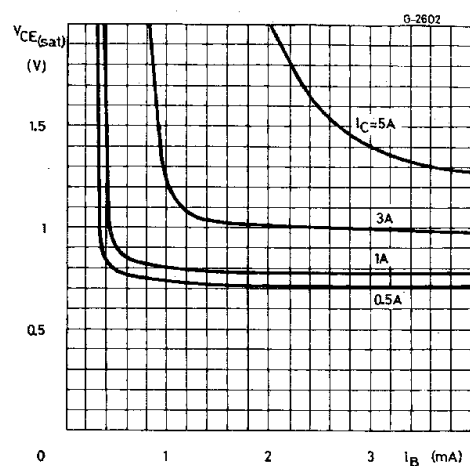
## Collector Emitter Saturation Voltage



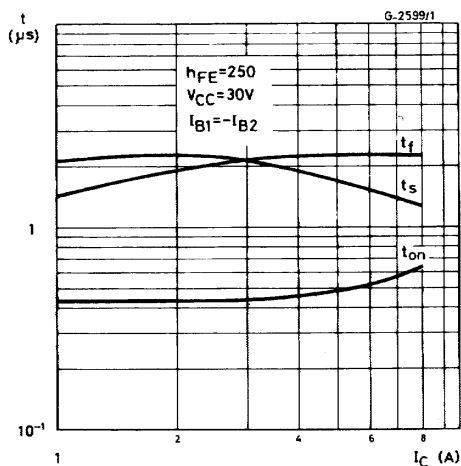
## DC Transconductance



## Collector Emitter Saturation Voltage

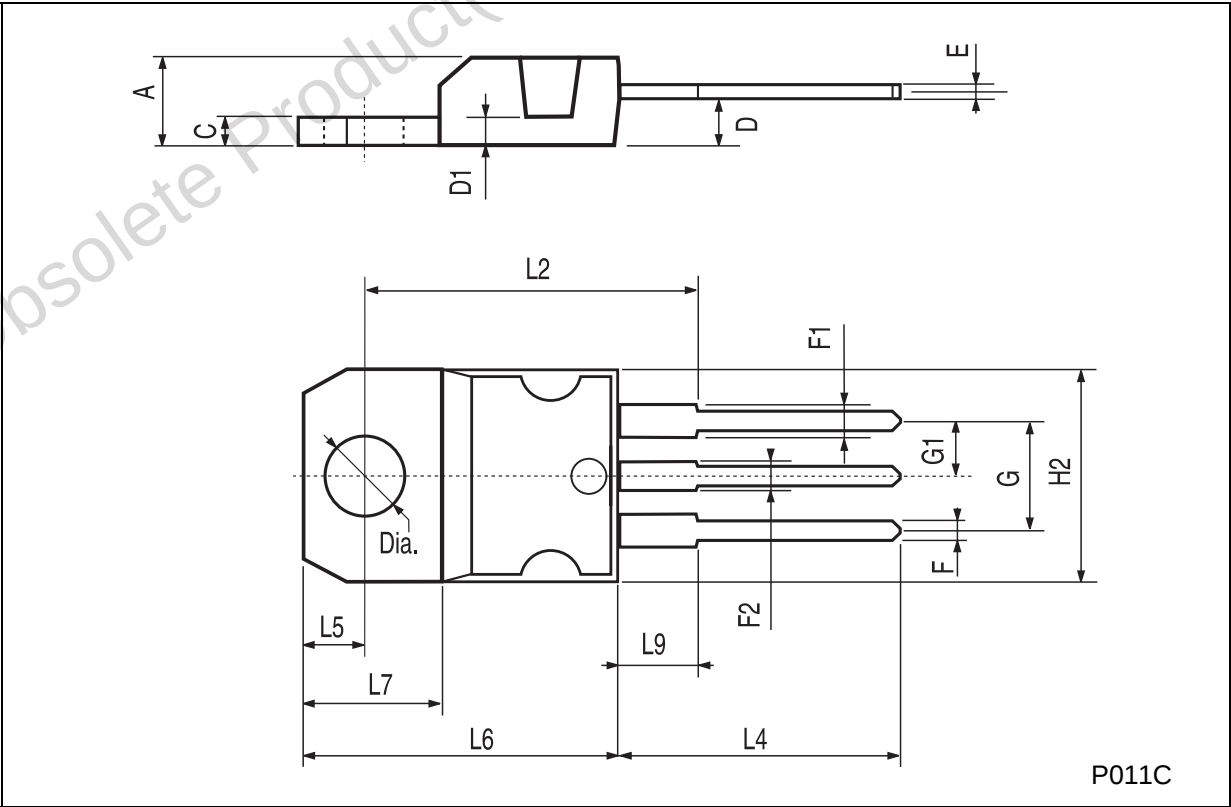


## Saturated Switching Characteristics



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 |



Obsolete Product(s) - Obsolete Product(s)

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2000 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco -  
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[2N6388](#)