



## ST13007FP

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- HIGH VOLTAGE CAPABILITY
- NPN TRANSISTOR
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125 °C
- LARGE RBSOA

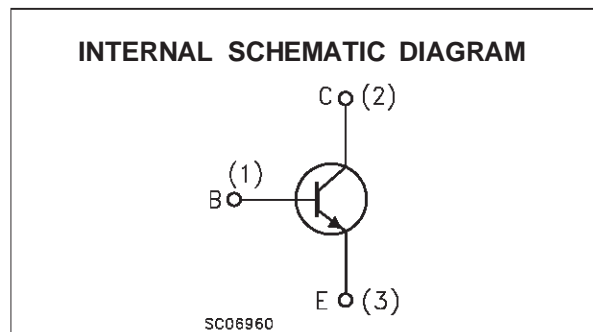
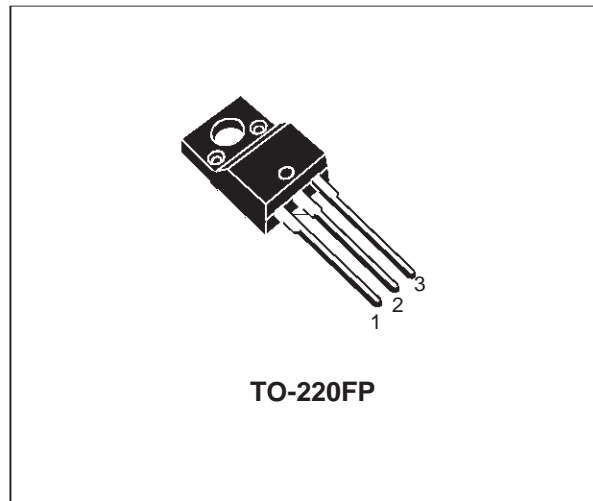
### APPLICATIONS

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

### DESCRIPTION

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability.

They use a Cellular Emitter structure to enhance switching speeds.



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                      | Value      | Unit |
|-----------|--|------------|------|
| $V_{CEV}$ | Collector-Emitter Voltage ( $V_{BE} = -1.5V$ ) | 700        | V    |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )        | 400        | V    |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )             | 9          | V    |
| $I_C$     | Collector Current                              | 8          | A    |
| $I_{CM}$  | Collector Peak Current                         | 16         | A    |
| $I_B$     | Base Current                                   | 4          | A    |
| $I_{BM}$  | Base Peak Current                              | 8          | A    |
| $P_{tot}$ | Total Dissipation at $T_c \leq 25^\circ C$     | 36         | W    |
| $T_{stg}$ | Storage Temperature                            | -65 to 150 | °C   |
| $T_j$     | Max. Operating Junction Temperature            | 150        | °C   |

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## THERMAL DATA

|                       |                                  |     |      |      |
|-----------------------|----------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 3.47 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

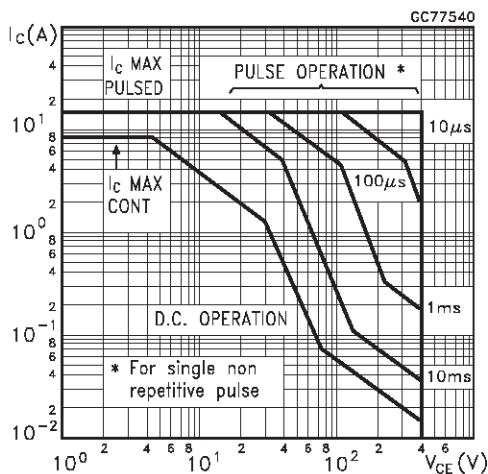
## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| 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> = rated V <sub>CEV</sub><br>V <sub>CE</sub> = rated V <sub>CEV</sub> T <sub>c</sub> = 100 °C   |               |            | 1<br>5            | mA<br>mA         |
| I <sub>EBO</sub>                 | Emitter Cut-off Current (I <sub>C</sub> = 0)        | V <sub>EB</sub> = 9 V  |               |            | 1                 | mA               |
| V <sub>CEO(sus)*</sub>           | Collector-Emitter Sustaining Voltage                | I <sub>C</sub> = 10 mA   | 400           |            |                   | V                |
| V <sub>CE(sat)*</sub>            | Collector-Emitter Saturation Voltage                | I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1 A<br>I <sub>C</sub> = 8 A I <sub>B</sub> = 2 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1 A T <sub>c</sub> = 100 °C |               |            | 1<br>2<br>3<br>3  | V<br>V<br>V<br>V |
| V <sub>BE(sat)*</sub>            | Base-Emitter Saturation Voltage                     | I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1 A T <sub>c</sub> = 100 °C  |               |            | 1.2<br>1.6<br>1.5 | V<br>V<br>V      |
| h <sub>FE*</sub>                 | DC Current Gain                                     | I <sub>C</sub> = 2 A V <sub>CE</sub> = 5 V<br>Group A<br>Group B<br>I <sub>C</sub> = 5 A V <sub>CE</sub> = 5 V   | 15<br>26<br>5 |            | 28<br>40<br>30    |                  |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD<br>Storage Time<br>Fall Time         | I <sub>C</sub> = 5 A V <sub>CL</sub> = 250 V<br>I <sub>B1</sub> = 1 A I <sub>B2</sub> = -2 A<br>L = 200 μH   |               | 1.6<br>60  | 2.5<br>110        | ms<br>ns         |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD<br>Storage Time<br>Fall Time         | I <sub>C</sub> = 5 A V <sub>CL</sub> = 250 V<br>I <sub>B1</sub> = 1 A I <sub>B2</sub> = -2 A<br>L = 200 μH T <sub>c</sub> = 125 °C   |               | 2.3<br>110 |                   | μs<br>ns         |

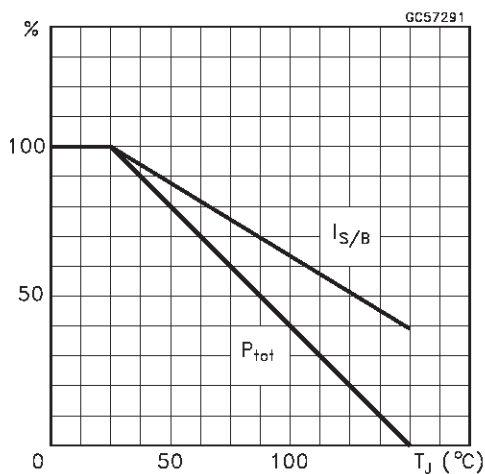
\* Pulsed: Pulse duration = 300 μs, duty cycle 2 %

Note : Product is pre-selected in DC current gain (GROUP A and GROUP B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

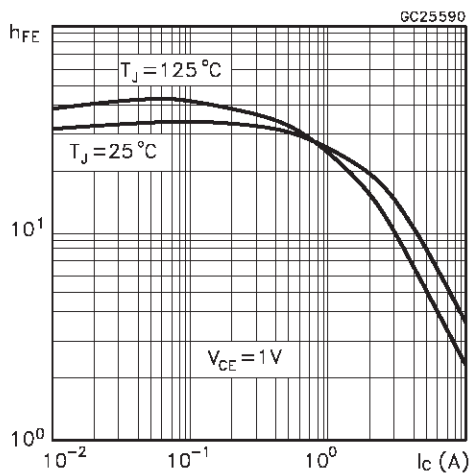
Safe Operating Areas



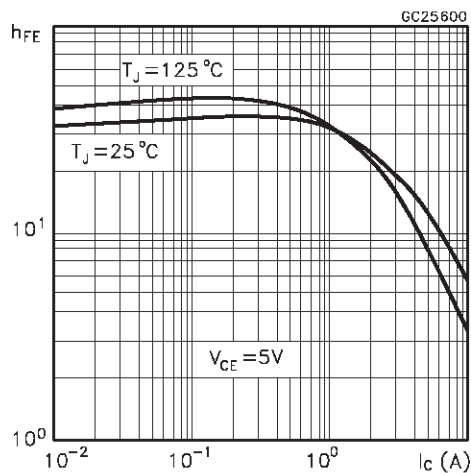
Derating Curve



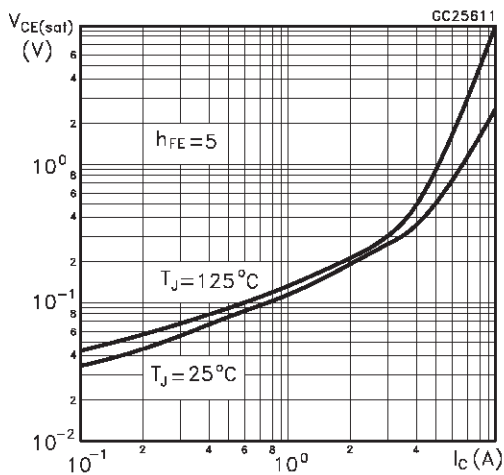
DC Current Gain



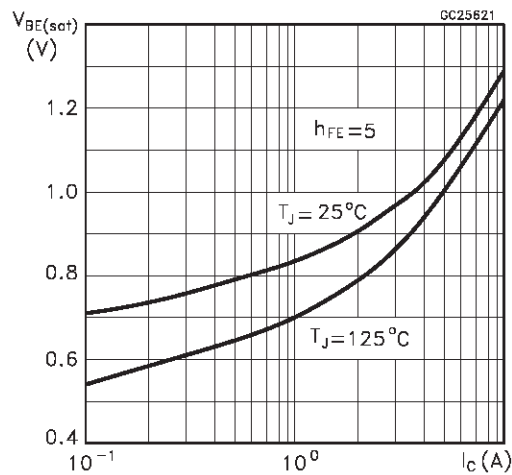
DC Current Gain



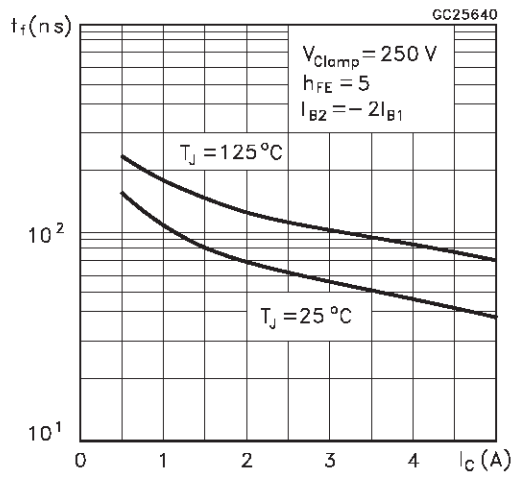
Collector Emitter Saturation Voltage



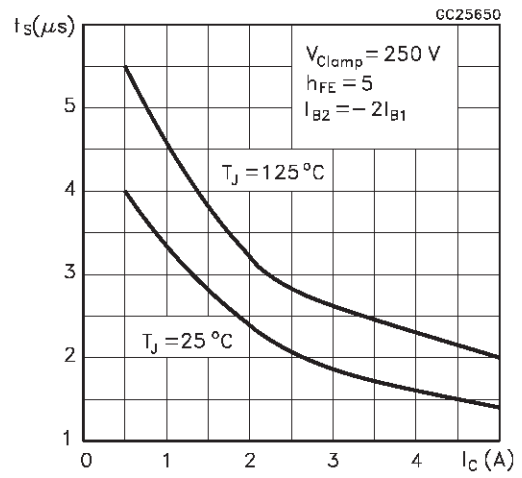
Base Emitter Saturation Voltage



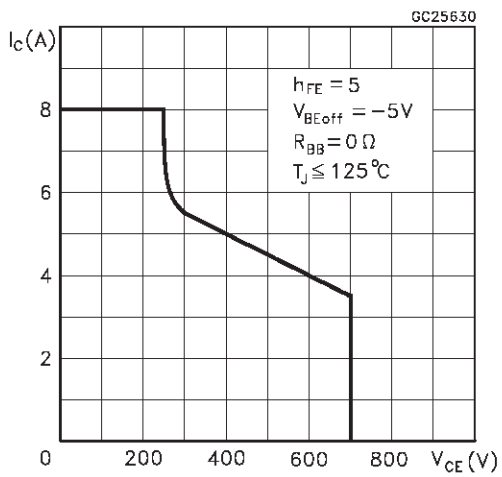
Inductive Fall Time



Inductive Storage Time

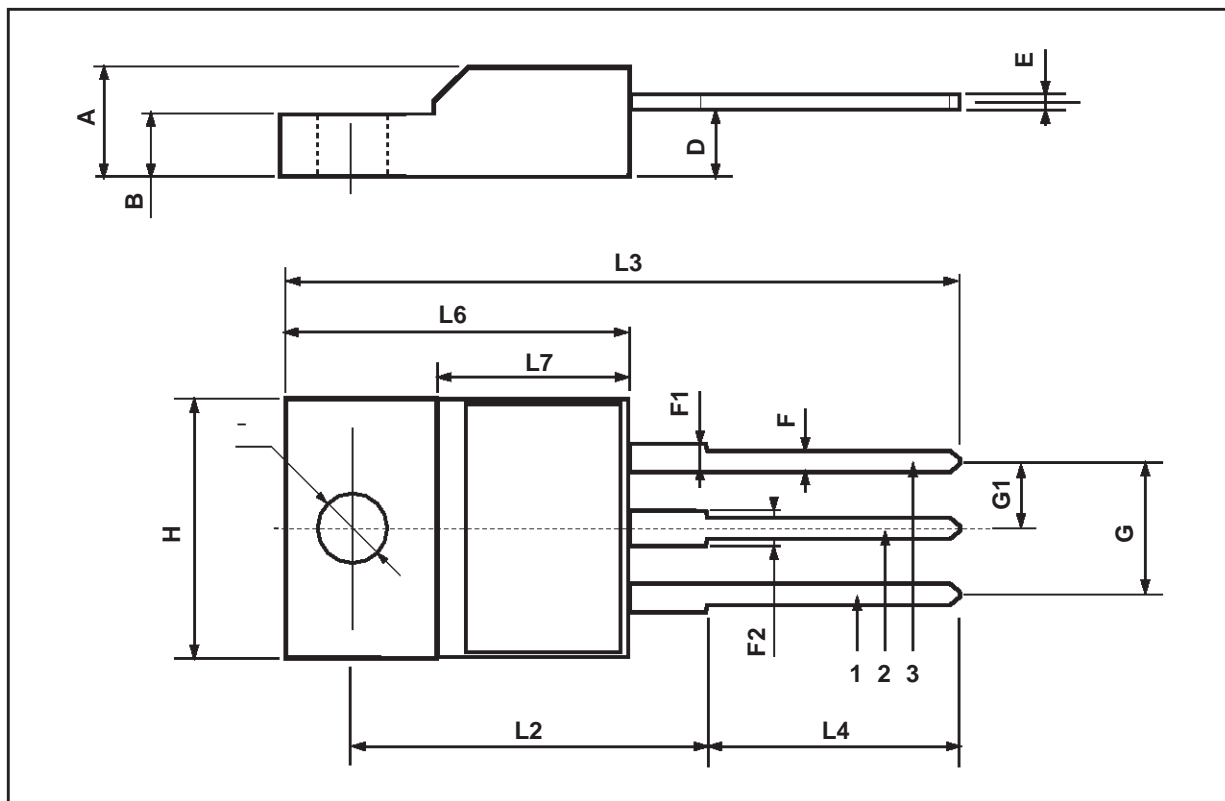


Reverse Biased SOA



## TO-220FP MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 4.4  |      | 4.6  | 0.173 |       | 0.181 |
| B    | 2.5  |      | 2.7  | 0.098 |       | 0.106 |
| D    | 2.5  |      | 2.75 | 0.098 |       | 0.108 |
| E    | 0.45 |      | 0.7  | 0.017 |       | 0.027 |
| F    | 0.75 |      | 1    | 0.030 |       | 0.039 |
| F1   | 1.15 |      | 1.7  | 0.045 |       | 0.067 |
| F2   | 1.15 |      | 1.7  | 0.045 |       | 0.067 |
| G    | 4.95 |      | 5.2  | 0.195 |       | 0.204 |
| G1   | 2.4  |      | 2.7  | 0.094 |       | 0.106 |
| H    | 10   |      | 10.4 | 0.393 |       | 0.409 |
| L2   |      | 16   |      |       | 0.630 |       |
| L3   | 28.6 |      | 30.6 | 1.126 |       | 1.204 |
| L4   | 9.8  |      | 10.6 | 0.385 |       | 0.417 |
| L6   | 15.9 |      | 16.4 | 0.626 |       | 0.645 |
| L7   | 9    |      | 9.3  | 0.354 |       | 0.366 |
| Ø    | 3    |      | 3.2  | 0.118 |       | 0.126 |



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