



# BDW93CFP BDW94CFP

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

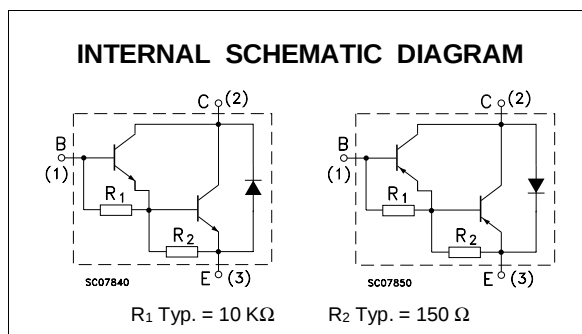
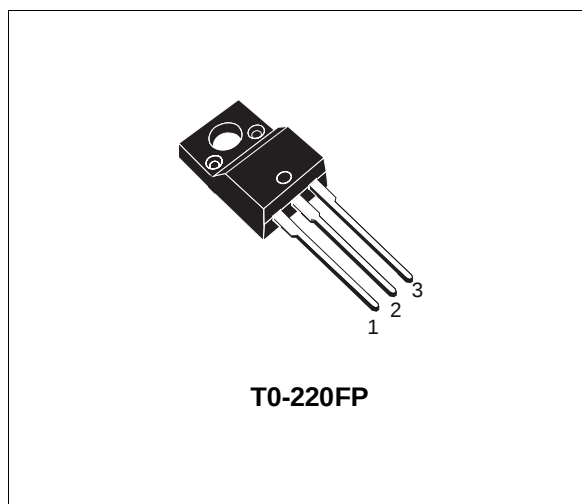
- STMicroelectronics PREFERRED SALESTYPES
- MONOLITHIC DARLINGTON CONFIGURATION
- COMPLEMENTARY PNP - NPN DEVICES
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE
- FULLY MOLDED INSULATED PACKAGE
- 2000 V DC INSULATION (U.L. COMPLIANT)

### APPLICATIONS

- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

### DESCRIPTION

The BDW93CFP is a silicon Epitaxial-Base NPN transistor in monolithic Darlington configuration mounted in TO-220FP fully molded insulated package. It is intended for use in power linear and switching applications. The complementary PNP type is the BDW94CFP.



### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                      | NPN | Value      | Unit |
|------------------|------------------------------------------------|-----|------------|------|
|                  |                                                | PNP | BDW94CFP   |      |
| V <sub>CBO</sub> | Collector-Base Voltage (I <sub>E</sub> = 0)    |     | 100        | V    |
| V <sub>CEO</sub> | Collector-Emitter Voltage (I <sub>B</sub> = 0) |     | 100        | V    |
| I <sub>C</sub>   | Collector Current                              |     | 12         | A    |
| I <sub>CM</sub>  | Collector Peak Current                         |     | 15         | A    |
| I <sub>B</sub>   | Base Current                                   |     | 0.2        | A    |
| P <sub>tot</sub> | Total Dissipation at T <sub>c</sub> ≤ 25 °C    |     | 33         | 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.

## THERMAL DATA

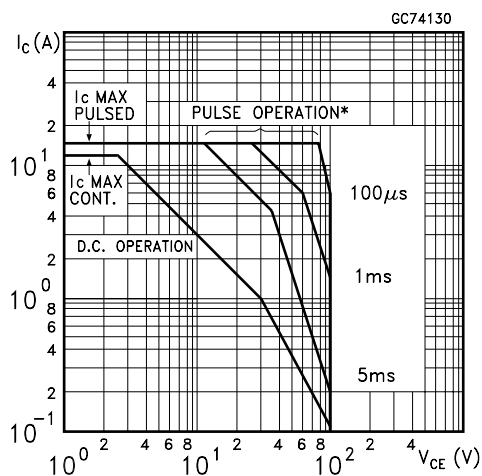
|                       |                                  |     |     |      |
|-----------------------|----------------------------------|-----|-----|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 3.8 | °C/W |
|-----------------------|----------------------------------|-----|-----|------|

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)            | V <sub>CB</sub> = 100 V<br>V <sub>CB</sub> = 100 V      T <sub>case</sub> = 150 °C                                                                 |                    |            | 100<br>5 | μA<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                                                                                                                              |                    |            | 2        | mA       |
| V <sub>CEO(sus)</sub> * | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 100 mA                                                                                                                            | 100                |            |          | V        |
| V <sub>CE(sat)</sub> *  | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 5 A<br>I <sub>C</sub> = 10 A      I <sub>B</sub> = 20 mA<br>I <sub>B</sub> = 100 mA                                               |                    |            | 2<br>3   | V<br>V   |
| V <sub>BE(sat)</sub> *  | Base-Emitter Saturation Voltage                           | I <sub>C</sub> = 5 A<br>I <sub>C</sub> = 10 A      I <sub>B</sub> = 20 mA<br>I <sub>B</sub> = 100 mA                                               |                    |            | 2.5<br>4 | V<br>V   |
| h <sub>FE</sub> *       | DC Current Gain                                           | I <sub>C</sub> = 3 A<br>I <sub>C</sub> = 5 A<br>I <sub>C</sub> = 10 A      V <sub>CE</sub> = 3 V<br>V <sub>CE</sub> = 3 V<br>V <sub>CE</sub> = 3 V | 1000<br>750<br>100 |            | 20000    |          |
| V <sub>F</sub> *        | Parallel-diode Forward Voltage                            | I <sub>F</sub> = 5 A<br>I <sub>F</sub> = 10 A                                                                                                      |                    | 1.3<br>1.8 | 2<br>4   | V<br>V   |
| h <sub>fe</sub>         | Small Signal Current Gain                                 | I <sub>C</sub> = 1 A<br>f = 1 MHz      V <sub>CE</sub> = 10 V                                                                                      | 20                 |            |          |          |

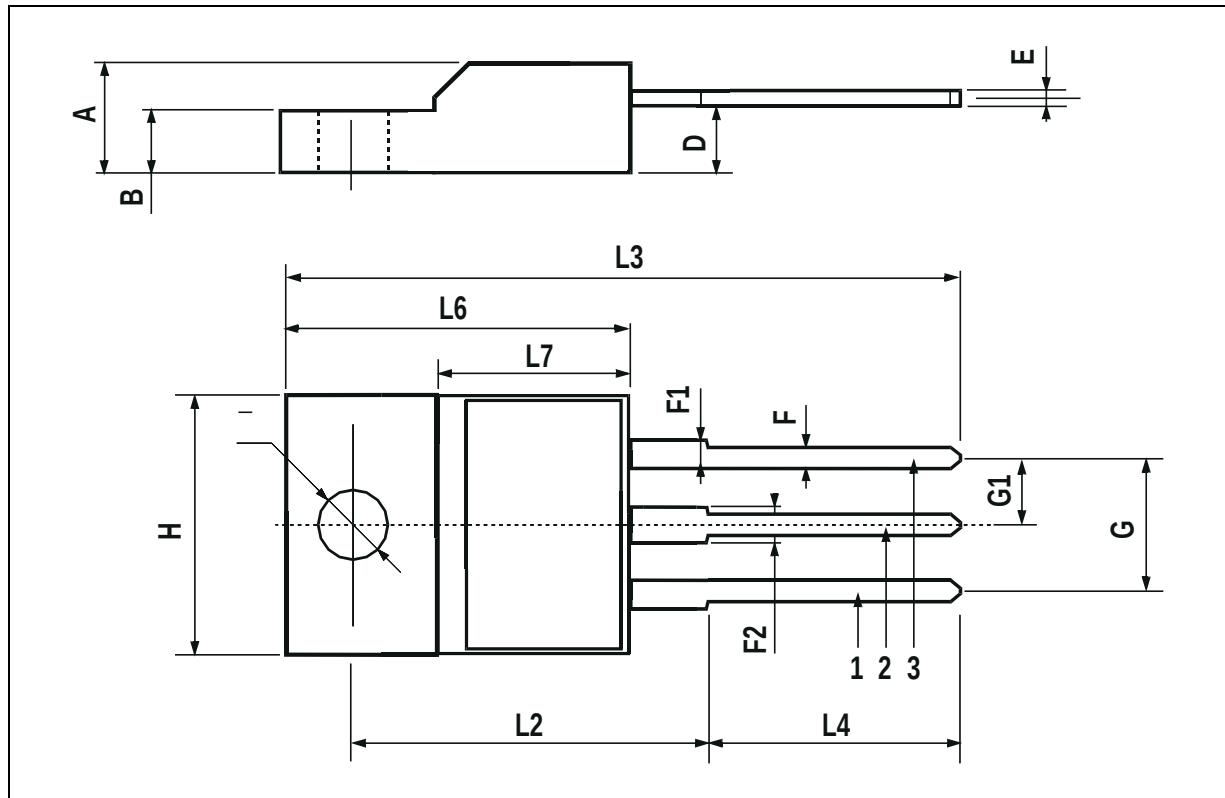
\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %  
For PNP types voltage and current values are negative.

## Safe Operating Area



## 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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