

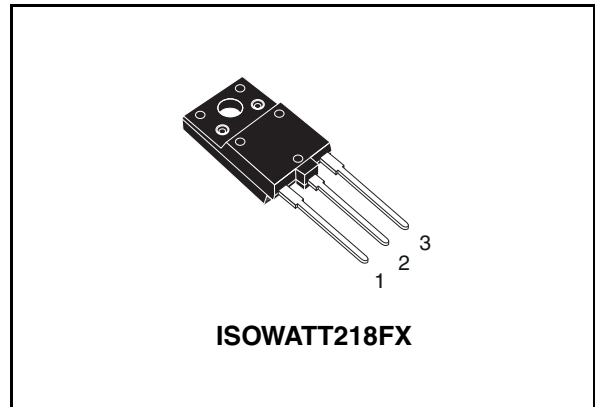


## ST1510FX

High voltage fast-switching  
NPN Power transistor

### General features

- State-of-the-art technology:
  - Diffused collector “Enhanced generation” EHVS1
- More stable performances versus operating temperature variation
- Low base-drive requirements
- Tighter  $h_{FE}$  range at operating collector current
- Fully insulated power package U.L. compliant
- In compliance with the 2002/93/EC European directive



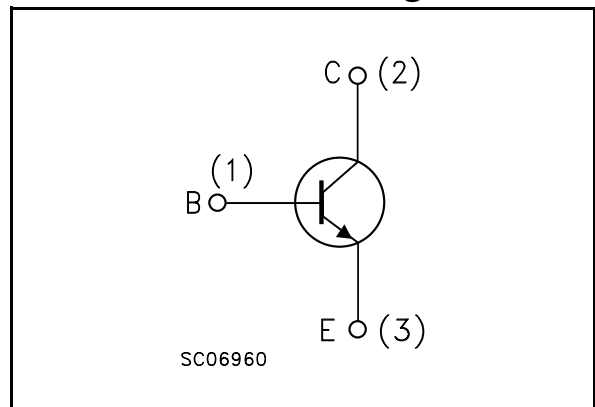
### Applications

- Electronic ballast for fluorescent lighting
- Switch mode power supplies

### Description

The device is manufactured using Diffused Collector in Planar technology adopting new and enhanced high voltage structure 1 (E.H.V.S.1).

### Internal schematic diagram



### Order codes

| Part number | Marking | Package      | Packing |
|-------------|---------|--------------|---------|
| ST1510FX    | 1510FX  | ISOWATT218FX | Tube    |

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# 1 Electrical ratings

**Table 1. Absolute maximum rating**

| Symbol     | Parameter                                                                    | Value      | Unit             |
|------------|------------------------------------------------------------------------------|------------|------------------|
| $V_{CES}$  | Collector-emitter voltage ( $V_{BE} = 0$ )                                   | 1500       | V                |
| $V_{CEO}$  | Collector-emitter voltage ( $I_B = 0$ )                                      | 750        | V                |
| $V_{EBO}$  | Collector-base voltage ( $I_C = 0$ )                                         | 9          | V                |
| $I_C$      | Collector current                                                            | 12         | A                |
| $I_{CM}$   | Collector peak current ( $t_P < 5\text{ms}$ )                                | 20         | A                |
| $I_B$      | Base current                                                                 | 6          | A                |
| $P_{TOT}$  | Total dissipation at $T_C = 25^\circ\text{C}$                                | 62         | W                |
| $V_{isol}$ | Insulation withstand voltage (RMS) from all three leads to external heatsink | 2500       | V                |
| $T_{stg}$  | Storage temperature                                                          | -65 to 150 | $^\circ\text{C}$ |
| $T_J$      | Max. operating junction temperature                                          | 150        |                  |

**Table 2. Thermal data**

| Symbol         | Parameter                            | Value | Unit               |
|----------------|--------------------------------------|-------|--------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 2     | $^\circ\text{C/W}$ |

## 2 Electrical characteristics

( $T_{\text{case}} = 25^{\circ}\text{C}$  unless otherwise specified)

**Table 3. Electrical characteristics**

| Symbol                           | Parameter                                                         | Test conditions                                                                                                                                                            | Min.      | Typ.      | Max.     | Unit                           |
|----------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|----------|--------------------------------|
| $I_{\text{CES}}$                 | Collector cut-off current<br>( $V_{\text{BE}} = 0$ )              | $V_{\text{CE}} = 1500\text{V}$<br>$V_{\text{CE}} = 1500\text{V}$ $T_{\text{C}} = 125^{\circ}\text{C}$                                                                      |           |           | 0.2<br>2 | mA<br>mA                       |
| $I_{\text{EBO}}$                 | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )                 | $V_{\text{EB}} = 9\text{V}$                                                                                                                                                |           |           | 1        | mA                             |
| $V_{\text{CEO(sus)}}^{(1)}$      | Collector-emitter<br>sustaining voltage<br>( $I_{\text{B}} = 0$ ) | $I_{\text{C}} = 100\text{mA}$                                                                                                                                              | 750       |           |          | V                              |
| $V_{\text{CE(sat)}}^{(1)}$       | Collector-emitter<br>saturation voltage                           | $I_{\text{C}} = 6\text{A}$ $I_{\text{B}} = 1.5\text{A}$                                                                                                                    |           |           | 2        | V                              |
| $V_{\text{BE(sat)}}^{(1)}$       | Base-emitter saturation<br>voltage                                | $I_{\text{C}} = 6\text{A}$ $I_{\text{B}} = 1.5\text{A}$                                                                                                                    |           |           | 1.1      | V                              |
| $h_{\text{FE}}^{(1)}$            | DC current gain                                                   | $I_{\text{C}} = 1\text{A}$ $V_{\text{CE}} = 5\text{V}$<br>$I_{\text{C}} = 6\text{A}$ $V_{\text{CE}} = 5\text{V}$<br>$I_{\text{C}} = 7\text{A}$ $V_{\text{CE}} = 1\text{V}$ | 15<br>6.5 | 28<br>5.5 | 9.5      |                                |
| $t_{\text{s}}$<br>$t_{\text{f}}$ | Inductive load<br>Storage time<br>Fall time                       | $I_{\text{C}} = 6\text{A}$ $I_{\text{B(on)}} = 1.2\text{A}$<br>$I_{\text{B(off)}} = -2.4\text{A}$ $L = 500\mu\text{H}$<br>$V_{\text{clamp}} = 350\text{V}$                 |           | 2<br>0.2  |          | $\mu\text{s}$<br>$\mu\text{s}$ |

1. Pulsed: Pulse duration = 300 ms, duty cycle 1.5%

2.1 Electrical characteristics (curve)

Figure 1. Safe operating area

Figure 2. Derating curve

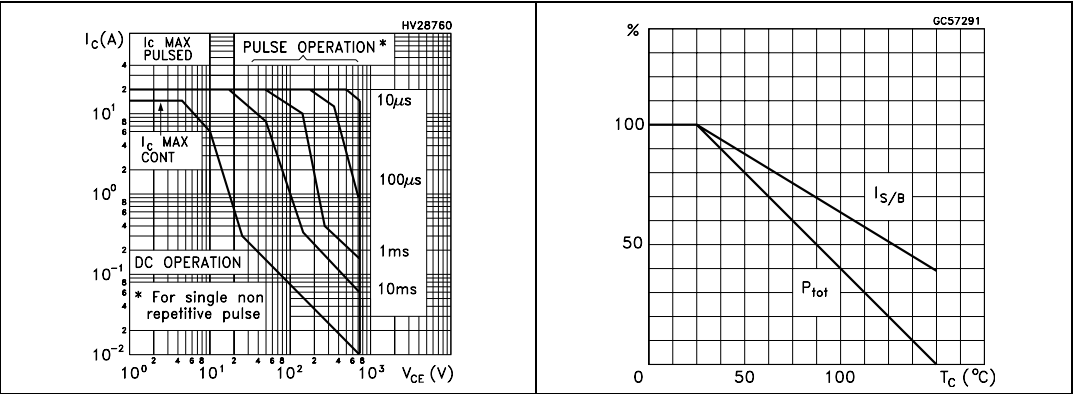


Figure 3. Output characteristics

Figure 4. Reverse biased SOA

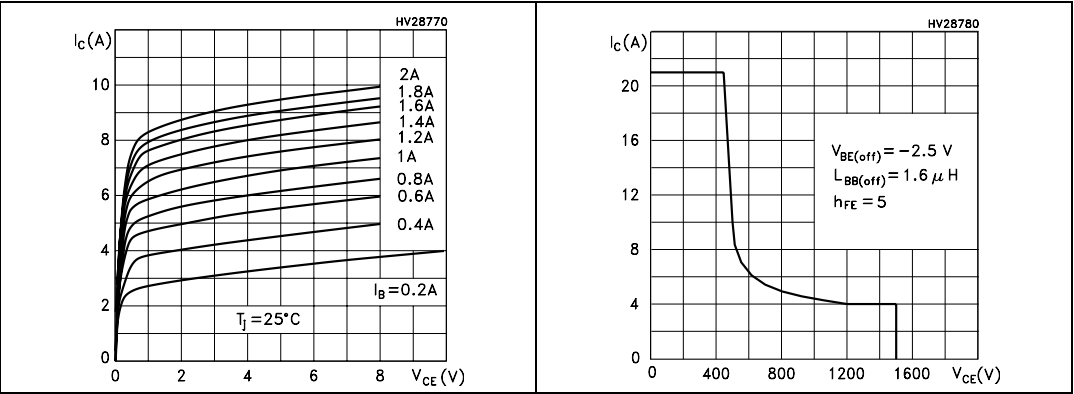
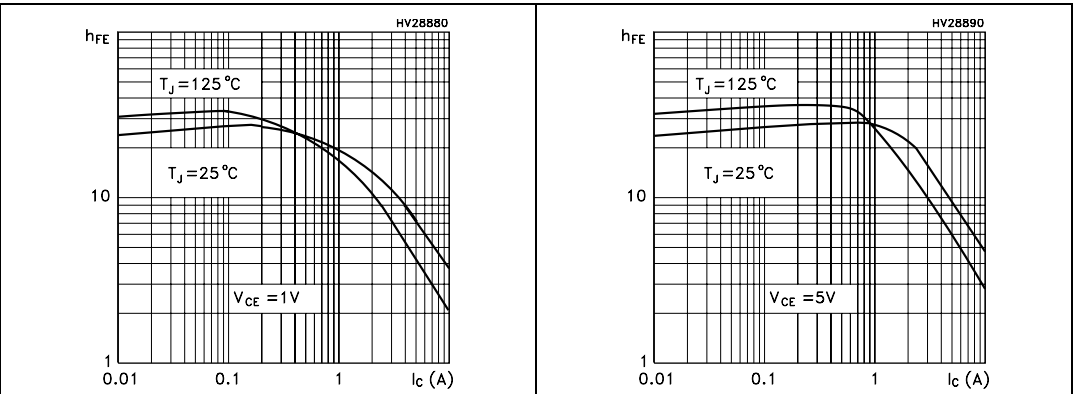
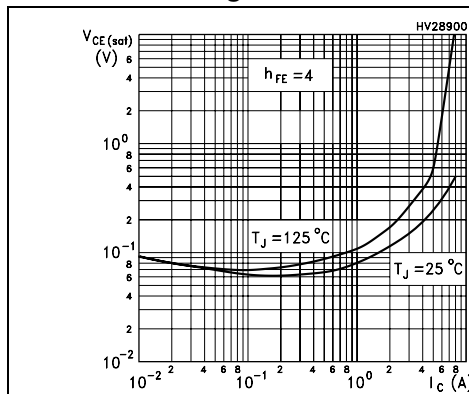


Figure 5. DC current gain @ V<sub>CE</sub>=1V

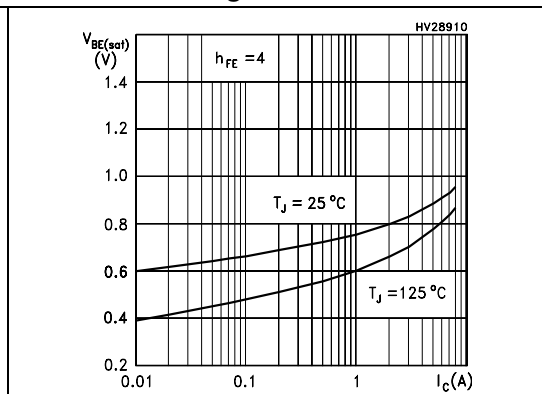
Figure 6. DC current gain @ V<sub>CE</sub>=5V



**Figure 7. Collector emitter saturation voltage**

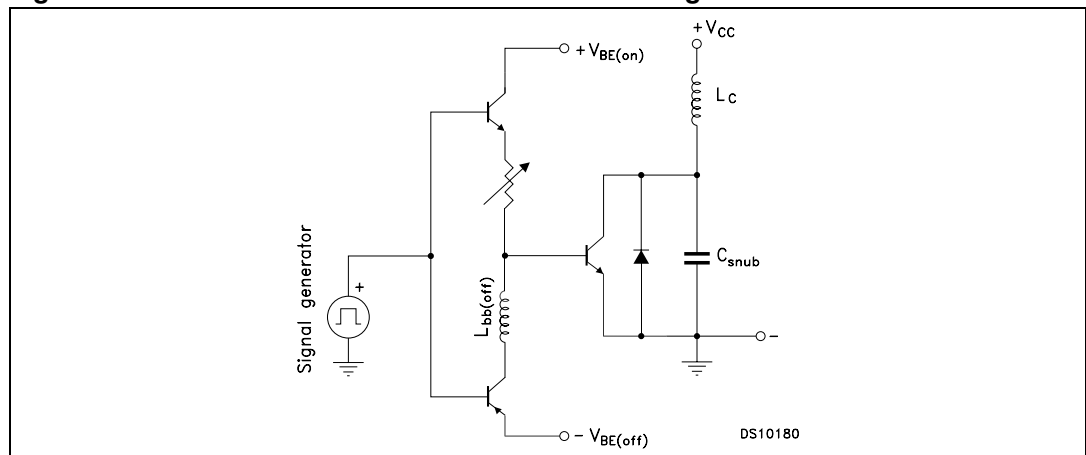


**Figure 8. Base emitter saturation voltage**

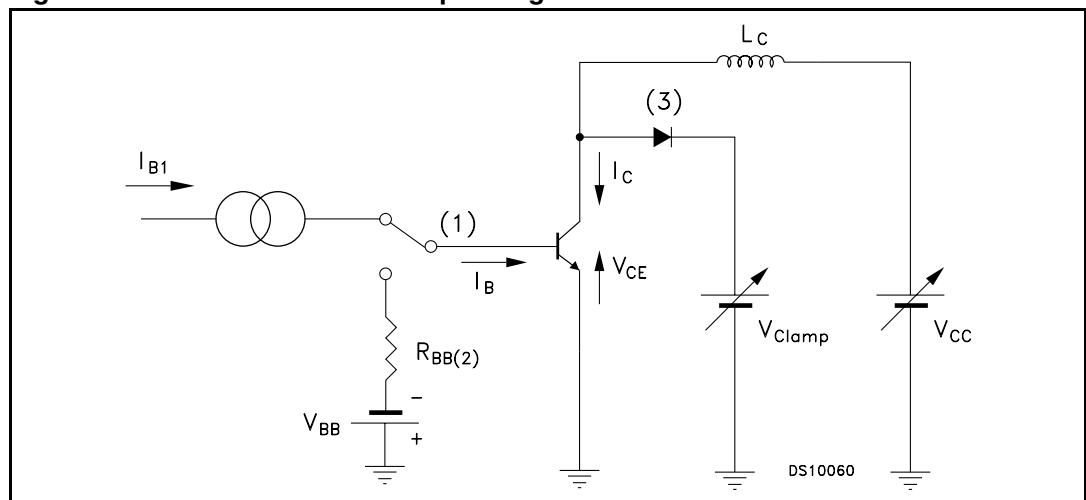


## 2.2 Test circuits

**Figure 9. Power losses and inductive load switching**



**Figure 10. Reverse biased safe operating area**

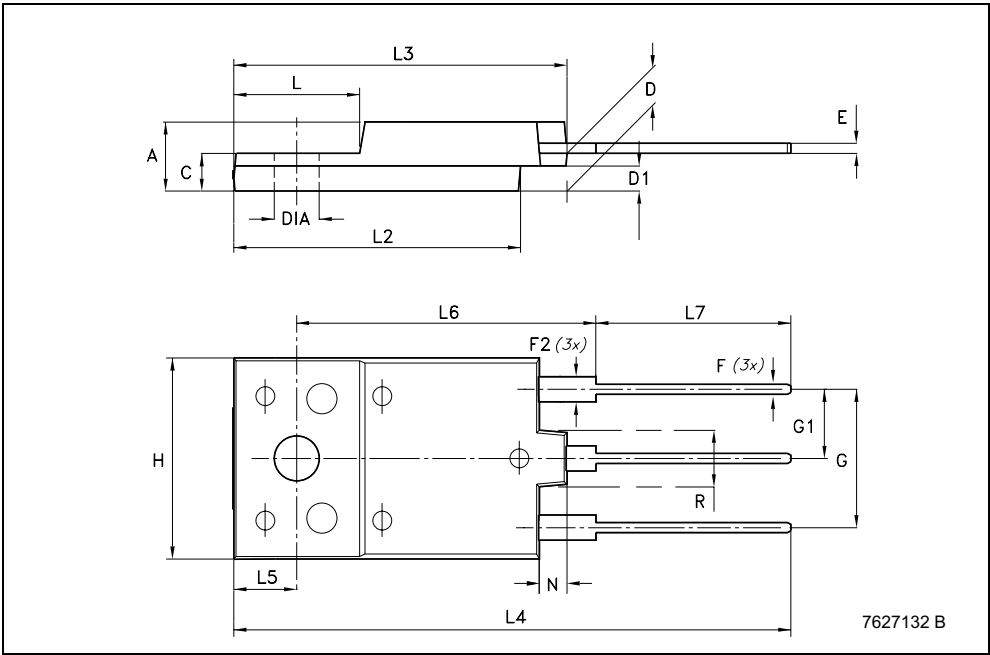


### 3      **Package mechanical data**

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

ISOWATT218FX MECHANICAL DATA

| DIM. | mm.   |      |       |
|------|-------|------|-------|
|      | MIN.  | TYP  | MAX.  |
| A    | 5.30  |      | 5.70  |
| C    | 2.80  |      | 3.20  |
| D    | 3.10  |      | 3.50  |
| D1   | 1.80  |      | 2.20  |
| E    | 0.80  |      | 1.10  |
| F    | 0.65  |      | 0.95  |
| F2   | 1.80  |      | 2.20  |
| G    | 10.30 |      | 11.50 |
| G1   |       | 5.45 |       |
| H    | 15.30 |      | 15.70 |
| L    | 9     |      | 10.20 |
| L2   | 22.80 |      | 23.20 |
| L3   | 26.30 |      | 26.70 |
| L4   | 43.20 |      | 44.40 |
| L5   | 4.30  |      | 4.70  |
| L6   | 24.30 |      | 24.70 |
| L7   | 14.60 |      | 15    |
| N    | 1.80  |      | 2.20  |
| R    | 3.80  |      | 4.20  |
| Dia  | 3.40  |      | 3.80  |



## 4 Revision history

**Table 4. Revision history**

| Date        | Revision | Changes                                                              |
|-------------|----------|----------------------------------------------------------------------|
| 02-Nov-2005 | 1        | Initial release.                                                     |
| 23-Feb-2007 | 2        | Order code and parameters on <a href="#">Table 1</a> has been change |

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