

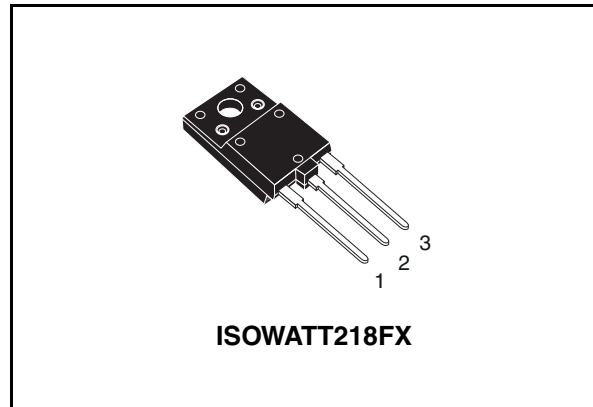


# ST1510FX

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



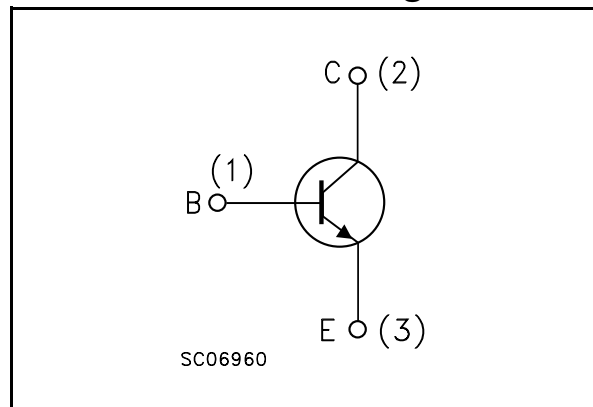
## Applications

- 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

## Contents

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

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

## 2.1 Electrical characteristics (curve)

Figure 1. Safe operating area

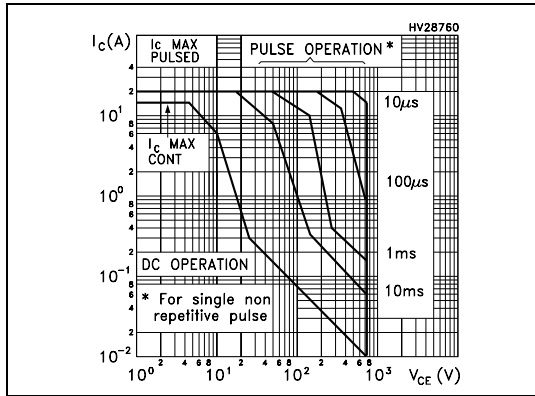


Figure 2. Derating curve

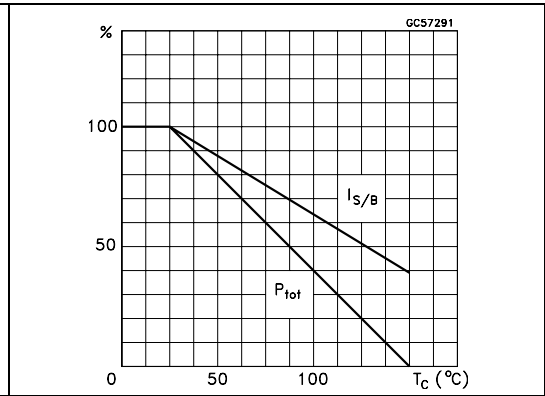


Figure 3. Output characteristics

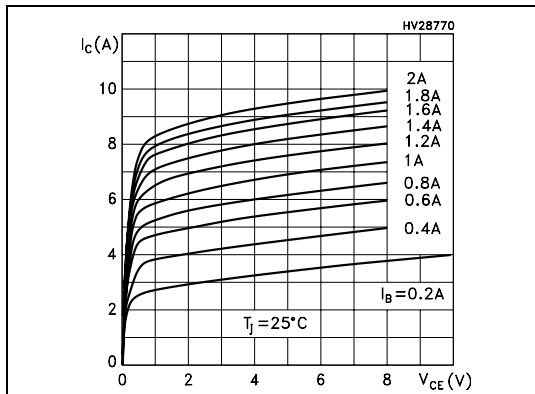


Figure 4. Reverse biased SOA

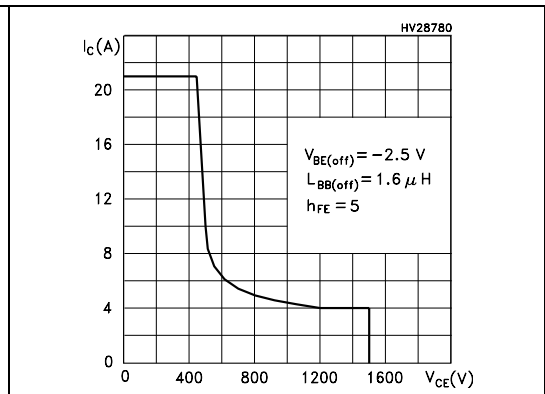


Figure 5. DC current gain @  $V_{CE}=1V$

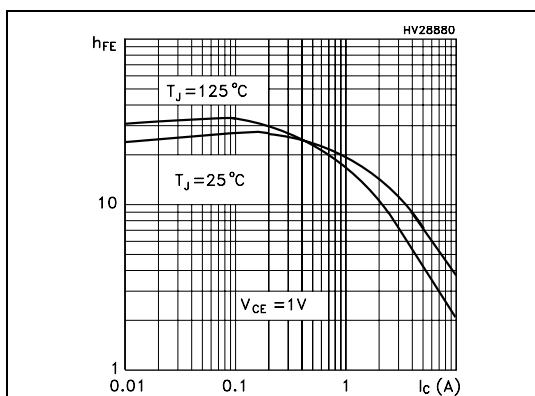
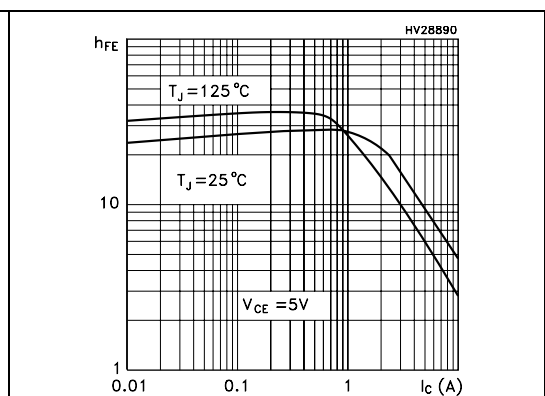
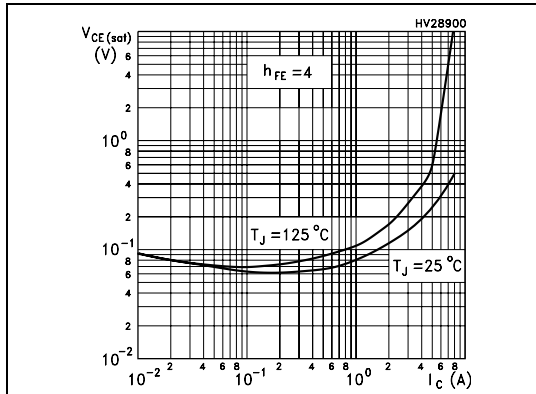


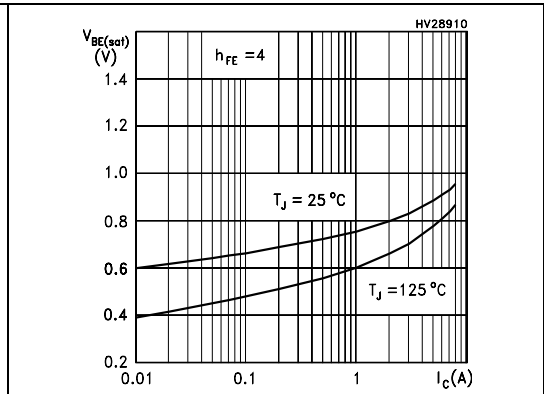
Figure 6. DC current gain @  $V_{CE}=5V$



**Figure 7. Collector emitter saturation voltage**

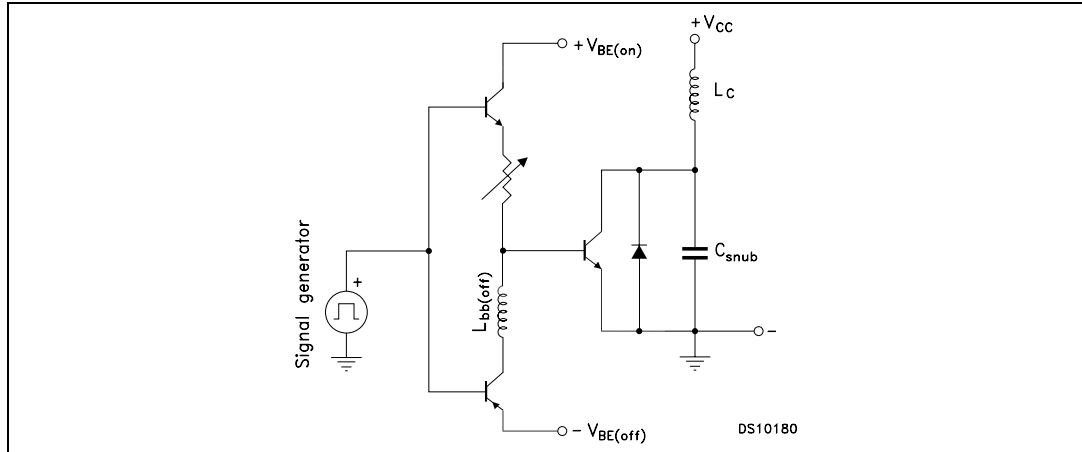


**Figure 8. Base emitter saturation voltage**

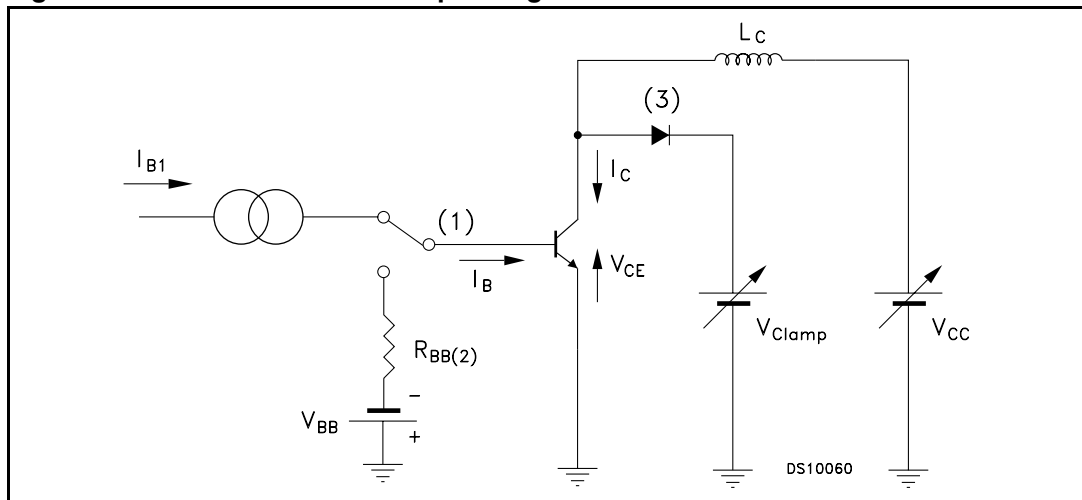


## 2.2 Test circuits

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



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

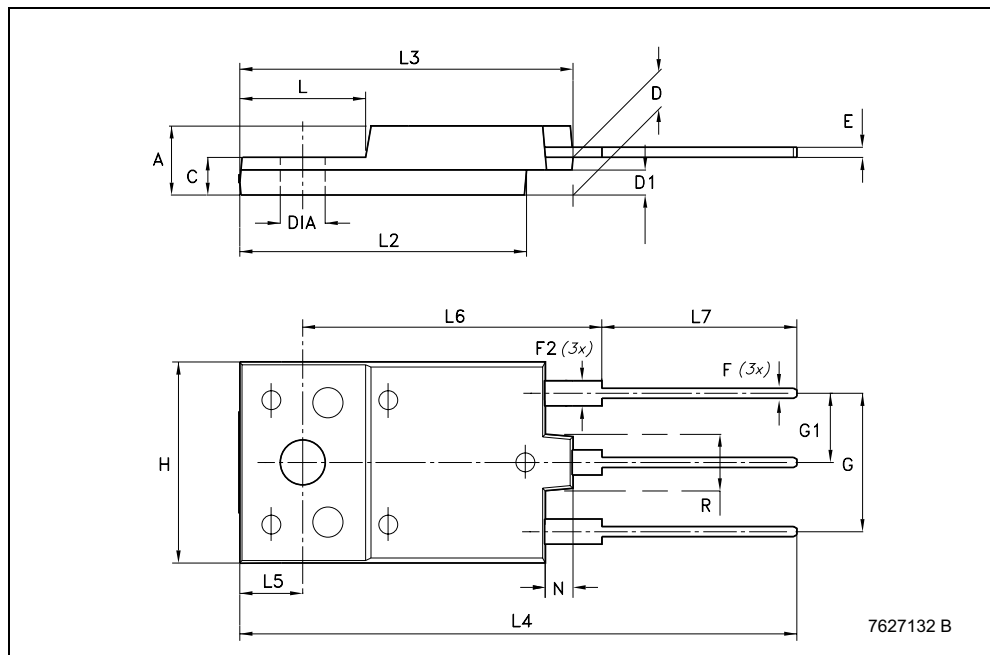


### 3 Package mechanical data

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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