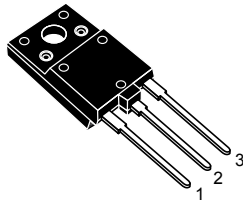
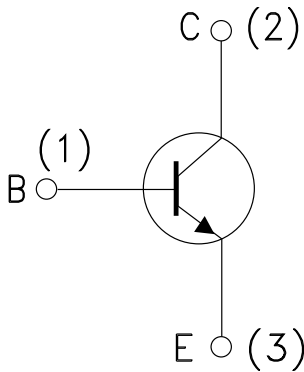


## High voltage fast-switching NPN Power transistor



TO-3PF



SC06960



### 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 UL compliant
- In compliance with the 2002/93/EC European directive

### Application

- 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 (EHVS1).

#### Product status link

[ST1510FX](#)

#### Product summary

<b>Order code</b>	ST1510FX
<b>Marking</b>	1510FX
<b>Package</b>	TO-3PF
<b>Packing</b>	Tube

# 1 Electrical ratings

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

**Table 1. Electrical characteristics**

Symbol	Parameter	Value	Unit
$V_{\text{CES}}$	Collector-emitter voltage ( $V_{\text{BE}} = 0 \text{ V}$ )	1500	V
$V_{\text{CEO}}$	Collector-emitter voltage ( $I_{\text{B}} = 0 \text{ A}$ )	750	V
$V_{\text{EBO}}$	Collector-base voltage ( $I_{\text{C}} = 0 \text{ A}$ )	9	V
$I_{\text{C}}$	Collector current	12	A
$I_{\text{CM}}$	Collector peak current ( $t_{\text{p}} < 5 \text{ ms}$ )	20	A
$I_{\text{B}}$	Base current	6	A
$P_{\text{TOT}}$	Total power dissipation at $T_{\text{c}} = 25^{\circ}\text{C}$	62	W
$V_{\text{isol}}$	Insulation withstand voltage (RMS) from all three leads to external heat sink	2.5	kV
$T_{\text{stg}}$	Storage temperature	-65 to 150	°C
$T_{\text{J}}$	Max. operating junction temperature	150	

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{\text{thj-case}}$	Thermal resistance junction-case	2	°C/W
$R_{\text{thj-amb}}$	Thermal resistance junction-ambient	50	°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	$V_{\text{CE}} = 1500 \text{ V}$ $V_{\text{BE}} = 0 \text{ V}$			0.2	mA
		$V_{\text{CE}} = 1500 \text{ V } T_{\text{C}} = 125^{\circ}\text{C}$ $V_{\text{BE}} = 0 \text{ V }^{(1)}$			2	
$I_{\text{EBO}}$	Emitter cut-off current	$V_{\text{EB}} = 9 \text{ V}$ $I_{\text{C}} = 0 \text{ A}$			1	mA
$V_{\text{CEO(sus)}}^{(2)}$	Collector-emitter sustaining voltage	$I_{\text{C}} = 100 \text{ mA}$ $I_{\text{B}} = 0 \text{ A}$	750			V
$V_{\text{CE(sat)}}^{(2)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 6 \text{ A } I_{\text{B}} = 1.5 \text{ A}$			2	V
$V_{\text{BE(sat)}}^{(2)}$	Base-emitter saturation voltage	$I_{\text{C}} = 6 \text{ A } I_{\text{B}} = 1.5 \text{ A}$			1.1	V
$h_{\text{FE}}^{(2)}$	DC current gain	$I_{\text{C}} = 1 \text{ A } V_{\text{CE}} = 5 \text{ V}$	15	28		
		$I_{\text{C}} = 6 \text{ A } V_{\text{CE}} = 5 \text{ V}$	6.5		9.5	
		$I_{\text{C}} = 7 \text{ A } V_{\text{CE}} = 1 \text{ V}$		5.5		
	Inductive load	$I_{\text{C}} = 6 \text{ A}, I_{\text{B(on)}} = 1.2 \text{ A},$ $I_{\text{B(off)}} = -2.4 \text{ A}, L = 500 \mu\text{H},$				$\mu\text{s}$
$t_{\text{s}}$	Storage time			2		
$t_{\text{f}}$	Fall time	$V_{\text{clamp}} = 350 \text{ V}$			0.2	

1. Defined by design, not subject to production test.

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

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

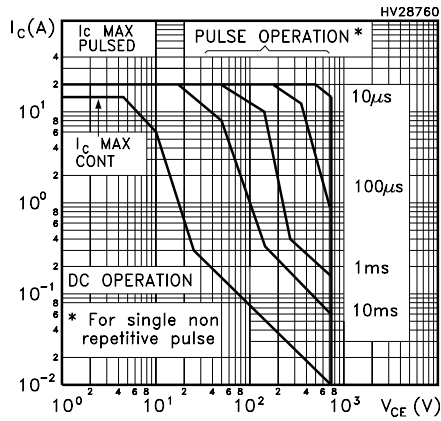


Figure 2. Derating curve

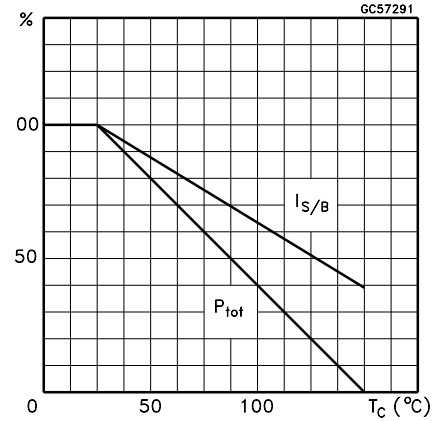


Figure 3. Output characteristics

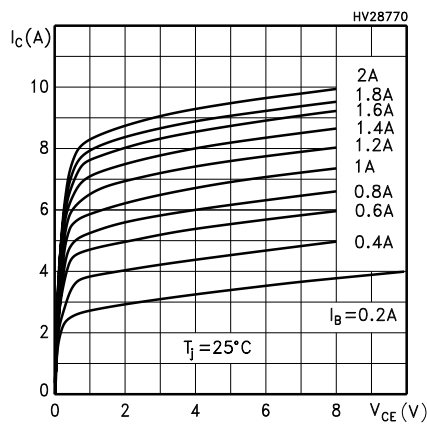


Figure 4. Reverse biased SOA

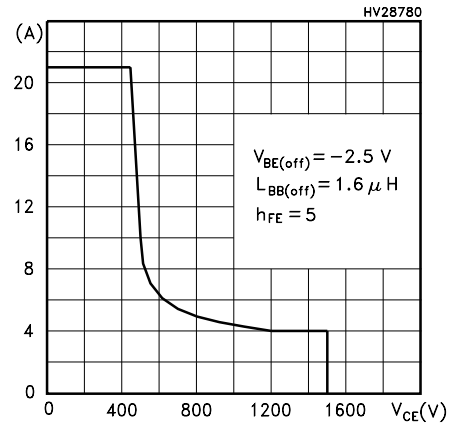


Figure 5. DC current gain at  $V_{CE} = 1\text{ V}$

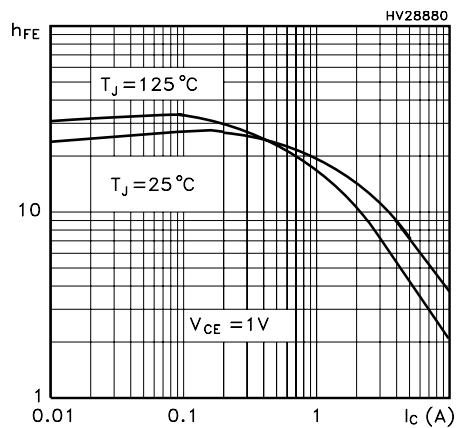


Figure 6. DC current gain at  $V_{CE} = 5\text{ V}$

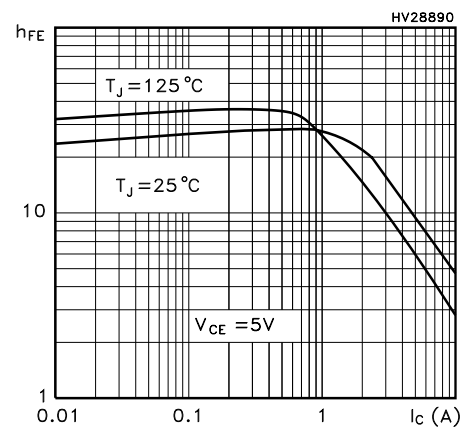


Figure 7. Collector emitter saturation voltage

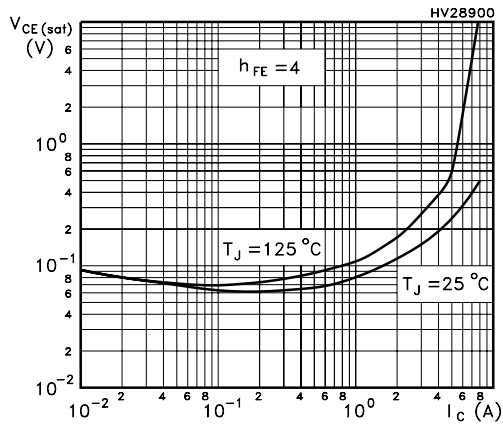
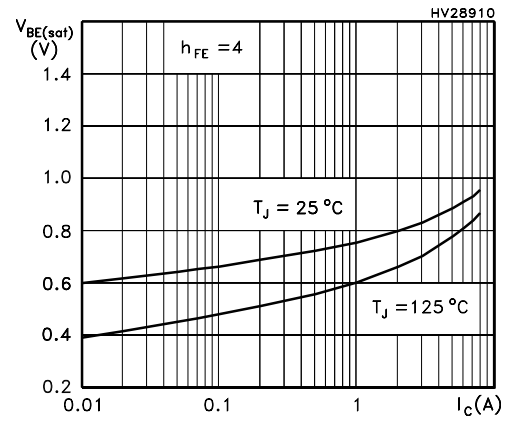


Figure 8. Base emitter saturation voltage



### 3 Test circuits

Figure 9. Power losses and inductive load switching

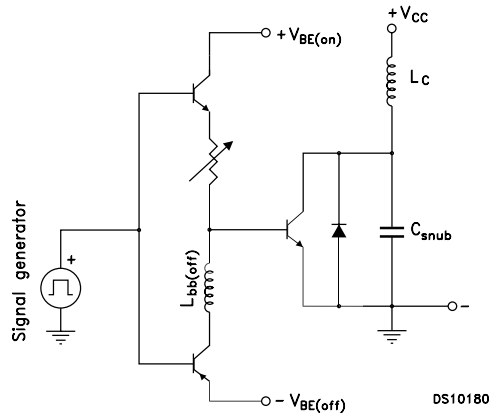
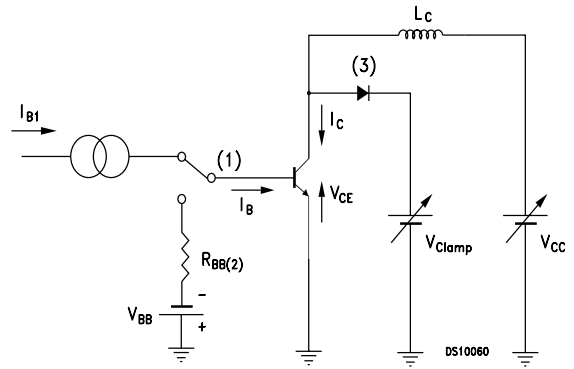


Figure 10. Reverse biased safe operating area

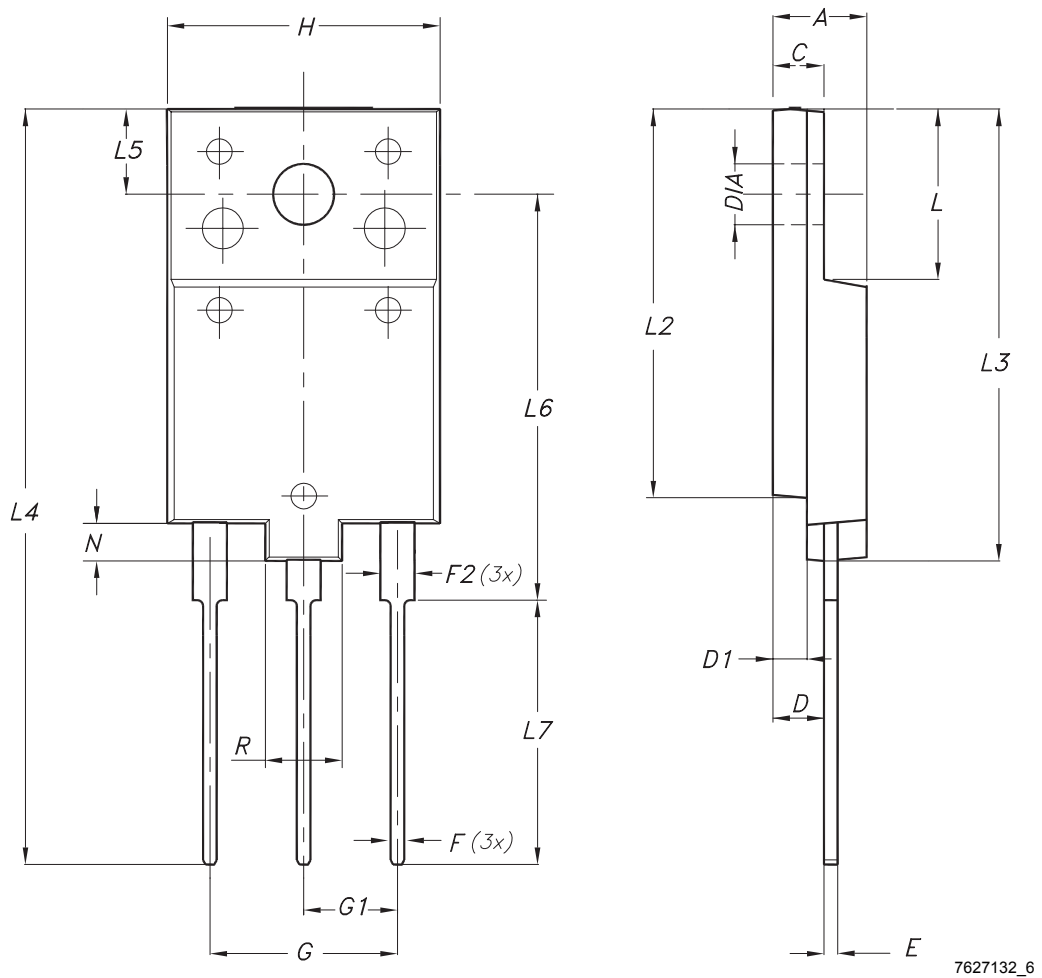


## 4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 4.1 TO-3PF package information

Figure 11. TO-3PF package outline



7627132\_6

**Table 4. TO-3PF 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	9.80	10.00	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		15.00
N	1.80		2.20
R	3.80		4.20
Dia	3.40		3.80



## Revision history

**Table 5. Document revision history**

Date	Version	Changes
02-Nov-2005	1	Initial release.
23-Feb-2007	2	Order code and parameters on Table1 has been change.
12-Nov-2020	3	Updated <a href="#">Section 4 Package information</a> . Minor text changes.

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