



## S2000AF

High voltage NPN power transistor for standard definition CRT display

### Features

- State-of-the-art technology:
  - Diffused collector “Enhanced generation”
- Stable performances versus operating temperature variation
- Low base-drive requirement
- Tigh  $h_{FE}$  range at operating collector current
- High ruggedness
- Fully insulated power package U.L. compliant

### Applications

- Horizontal deflection output for CRT TV
- Switch mode power supplies for CRT TV

### Description

The S2000AF is manufactured using diffused collector in planar technology adopting new and enhanced high voltage structure for updated performance to the horizontal deflection stage.

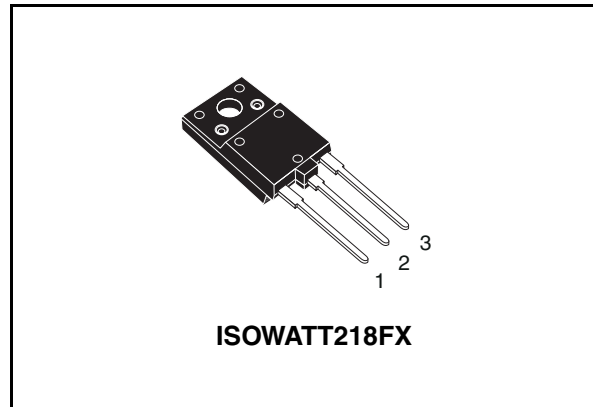


Figure 1. Internal schematic diagram

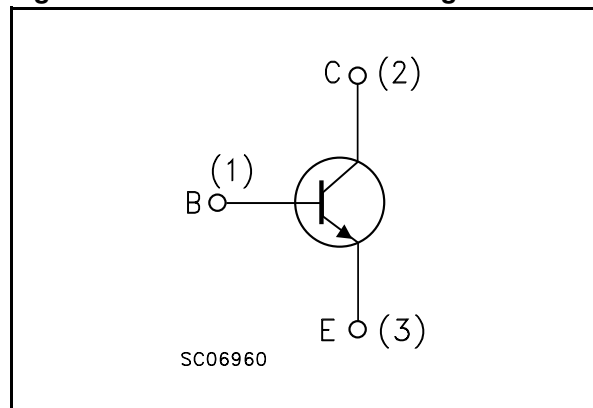


Table 1. Device summary

Order code	Marking	Package	Packaging
S2000AF	S2000AF	ISOWATT218FX	Tube

# Content

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# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	1500	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	700	V
$V_{EBO}$	Collector-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	8	A
$I_{CM}$	Collector peak current ( $t_P < 5\text{ms}$ )	15	A
$I_B$	Base current	4	A
$P_{TOT}$	Total dissipation at $T_C = 25^\circ\text{C}$	50	W
$V_{ins}$	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 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	2.5	°C/W

## 2 Electrical characteristics

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

**Table 4. 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 ( $I_{\text{C}} = 0$ )	$I_{\text{C}} = 100\text{mA}$	700			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 4.5\text{A}$ $I_{\text{B}} = 2\text{A}$ $I_{\text{C}} = 4.5\text{A}$ $I_{\text{B}} = 1\text{A}$			1 5	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 4.5\text{A}$ $I_{\text{B}} = 1\text{A}$			1.2	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1\text{A}$ $V_{\text{CE}} = 5\text{V}$ $I_{\text{C}} = 4.5\text{A}$ $V_{\text{CE}} = 5\text{V}$	10 4.5		30 9	
$t_{\text{s}}$ $t_{\text{f}}$	Inductive load Storage time Fall time	$I_{\text{C}} = 4.5\text{A}$ $I_{\text{B(on)}} = 0.5\text{A}$ $V_{\text{BE(off)}} = -2.7\text{V}$ $f_{\text{h}} = 16\text{KHz}$ $L_{\text{BB(off)}} = 4.5\mu\text{H}$		2.5 0.2		$\mu\text{s}$ $\mu\text{s}$

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

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

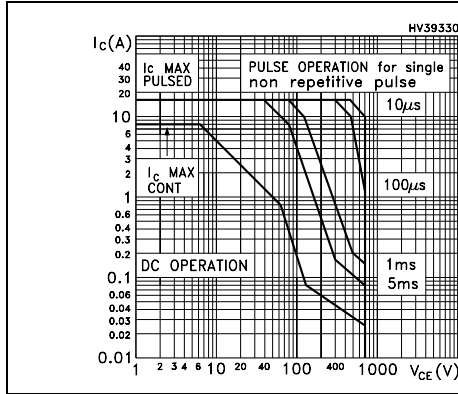


Figure 3. Derating curve

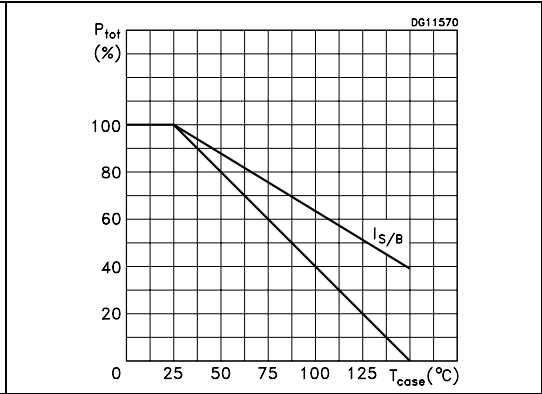


Figure 4. DC current gain

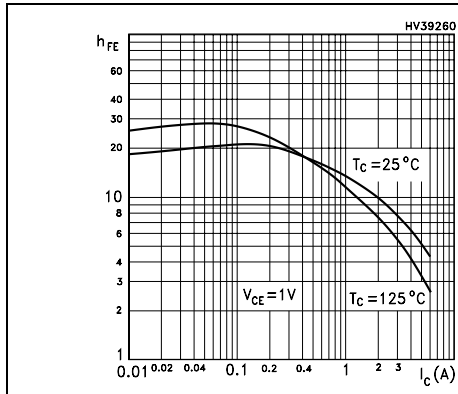


Figure 5. DC current gain

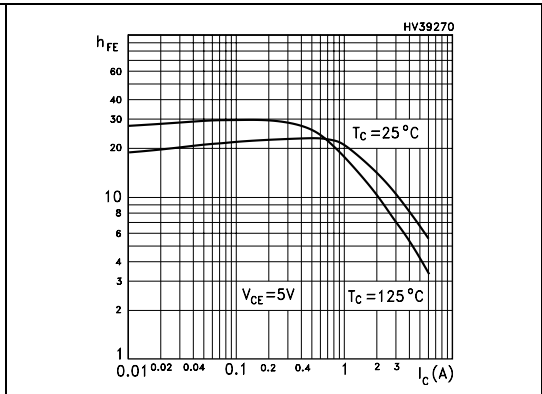


Figure 6. Collector-emitter saturation voltage

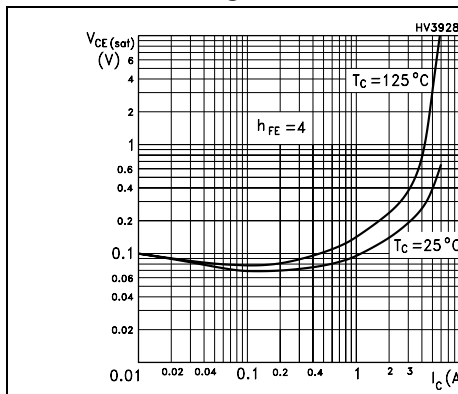


Figure 7. Base-emitter saturation voltage

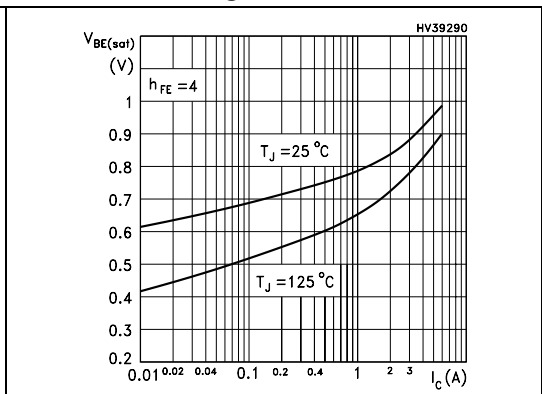
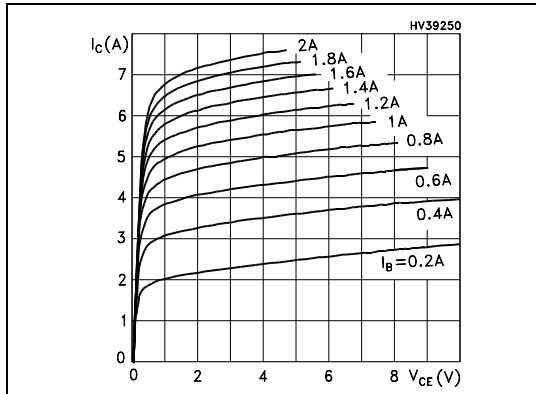


Figure 8. Output characteristics



## 2.2 Test circuits

Figure 9. Power losses and inductive load switching

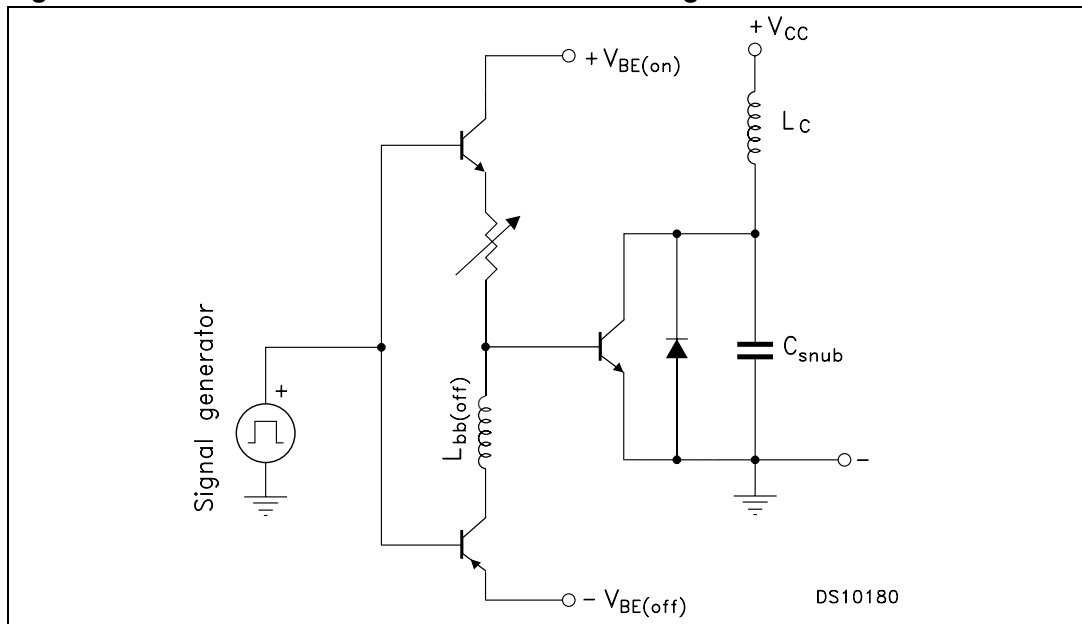
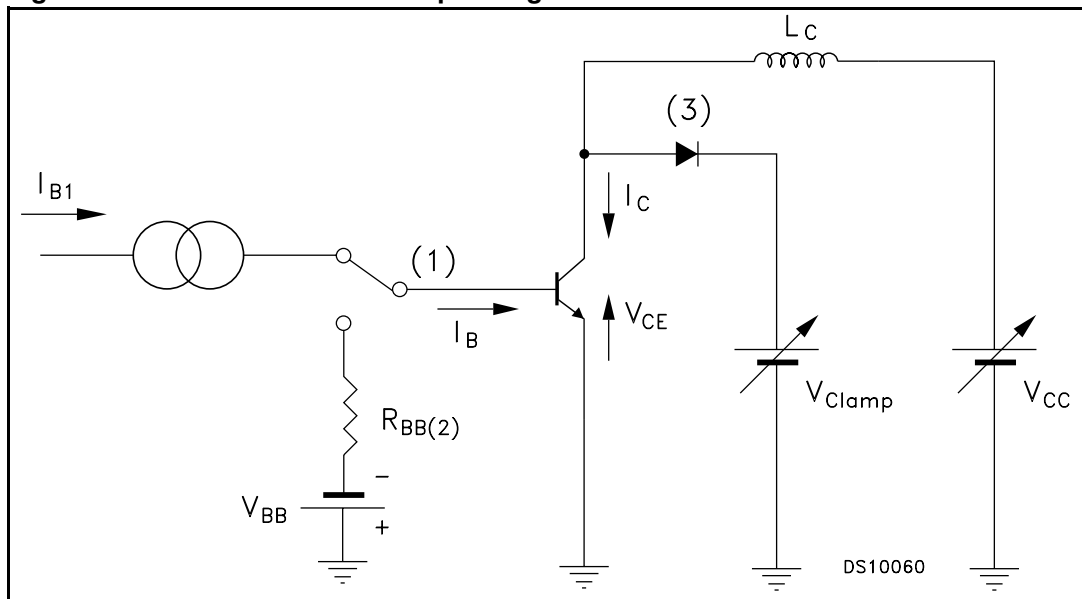


Figure 10. Reverse biased safe operating area



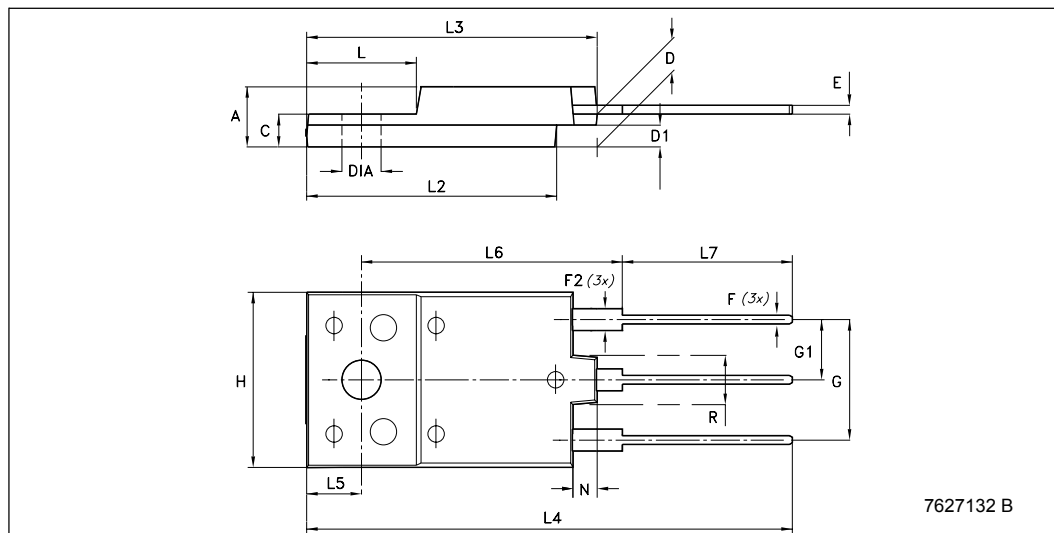
### 3 Package mechanical data

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 5. Document revision history**

Date	Revision	Changes
02-Mar-2007	1	Initial release.
14-Aug-2007	2	Complete document, added all curves ( <a href="#">2.1: Electrical characteristics (curves)</a> )

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