



## MD2310FX

High voltage NPN Power transistor for standard definition CRT display

### Features

- State-of-the-art technology:
  - diffused collector “enhanced generation”
- More stable performance versus operating temperature variation
- Low base drive requirement
- Tighter  $h_{FE}$  range at operating collector current
- Fully insulated power package u.l. compliant
- In compliance with the 2002/93/EC european directive

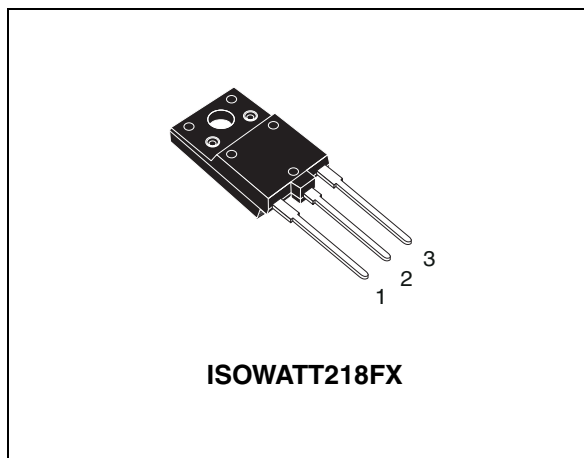
### Applications

- Horizontal deflection output for monitor and real flat tv

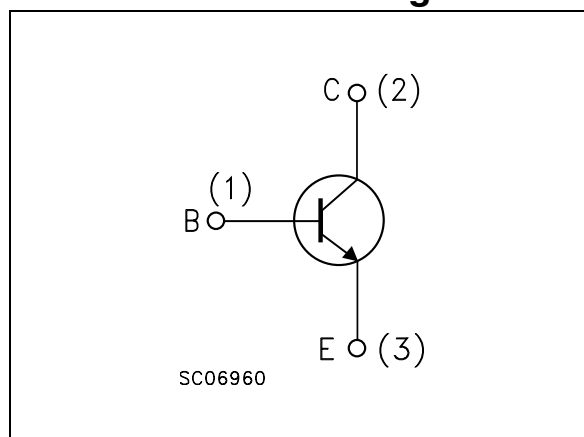
### Description

The MD2310FX is manufactured using Diffused Collector in Planar Technology adopting new and enhanced high voltage structure. The new MD product series show improved silicon efficiency bringing updated performance to the Horizontal Deflection stage.

### Order codes



### Internal Schematic Diagram



Part number	Marking	Package	Packing
MD2310FX	MD2310FX	ISOWATT218FX	TUBE

# 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 ( $I_B = 0$ )	700	V
$V_{EBO}$	Collector-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	14	A
$I_{CM}$	Collector peak current ( $t_p < 5\text{ms}$ )	21	A
$I_B$	Base current	7	A
$P_{TOT}$	Total dissipation at $T_c = 25^\circ\text{C}$	62	W
$V_{inso}$	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		

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case Max	2	°C/W

## 2 Electrical characteristics

( $T_{CASE} = 25^{\circ}C$ ; unless otherwise specified)

**Table 3. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CES}$	Collector cut-off current ( $V_{BE} = 0$ )	$V_{CE} = 1500V$			0.2	mA
		$V_{CE} = 1500V$ $T_C = 125^{\circ}C$			2	mA
$I_{EBO}$	Emitter cut-off current ( $I_C = 0$ )	$V_{EB} = 9V$			1	mA
$V_{CEO(sus)}$	Collector-emitter sustaining voltage ( $I_C = 0$ )	$I_C = 100$ mA	700			V
$V_{CE(sat)}$ <i>Note 1</i>	Collector-emitter saturation voltage	$I_C = 7$ A $I_B = 1.75$ A			2.5	V
$V_{BE(sat)}$ <i>Note 1</i>	Base-emitter saturation voltage	$I_C = 7$ A $I_B = 1.75$ A			1.1	V
$h_{FE}$ <i>Note 1</i>	DC current gain	$I_C = 1$ A $V_{CE} = 5$ V		28		
		$I_C = 7$ A $V_{CE} = 1$ V		5.5		
		$I_C = 7$ A $V_{CE} = 5$ V	6		8.5	
$t_s$ $t_f$	INDUCTIVE LOAD	$I_C = 6$ A $f_h = 64$ KHz				
	Storage time	$I_{B(on)} = 0.9$ A $V_{BE(off)} = -2.7$ V		2.3	2.8	$\mu$ s
	Fall time	$L_{BB(off)} = 1.6$ $\mu$ H		0.12	0.25	$\mu$ s

1 Pulsed duration = 300  $\mu$ s, duty cycle  $\leq 1.5\%$ .

## 2.1 Typical characteristics

Figure 1. Safe operating area

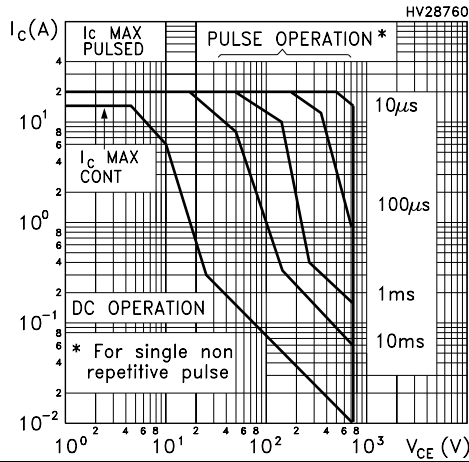


Figure 3. Output characteristics

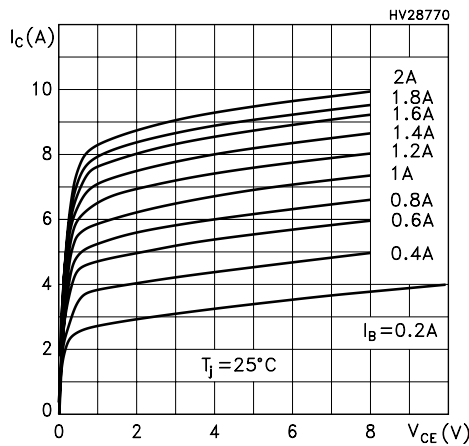


Figure 5. DC current gain

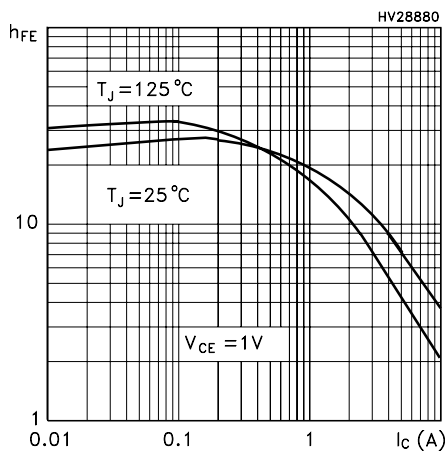


Figure 2. Derating curve

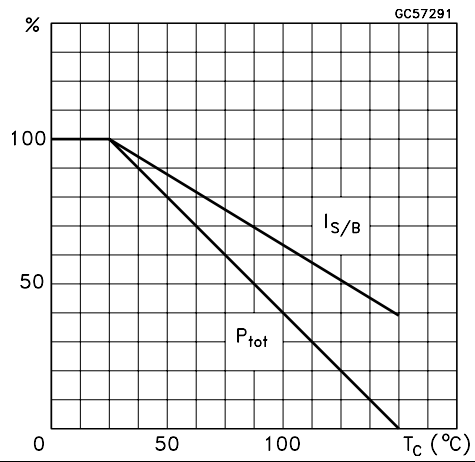


Figure 4. Reverse biased SOA

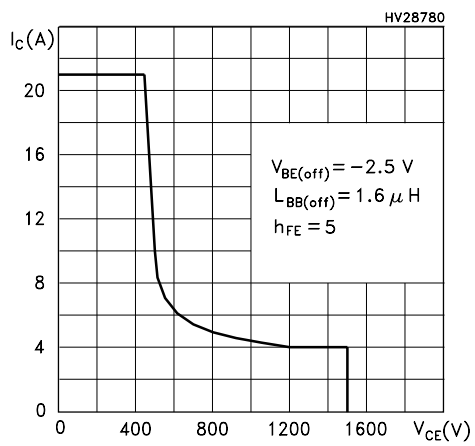


Figure 6. DC current gain

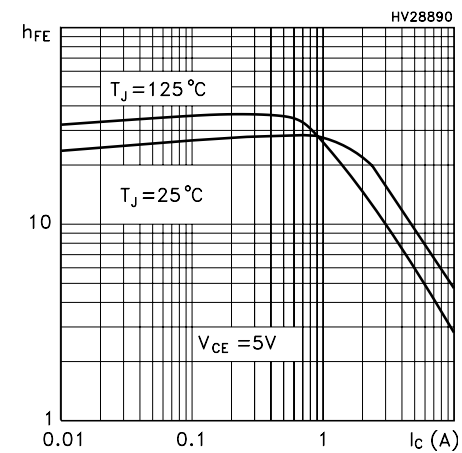


Figure 7. Collector-emitter saturation voltage Figure 8. Base-emitter saturation voltage

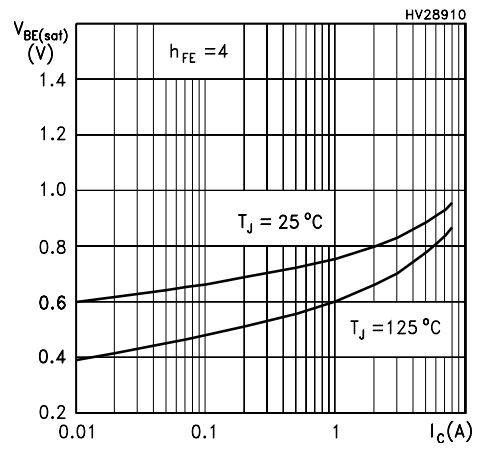
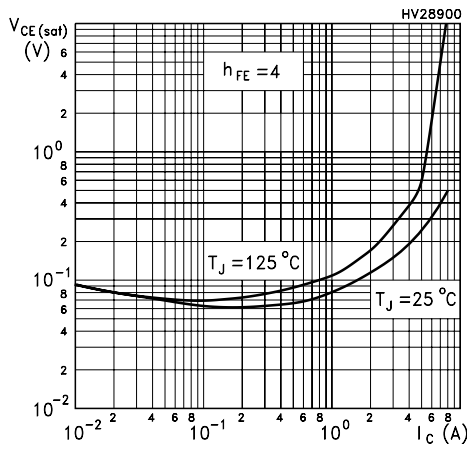
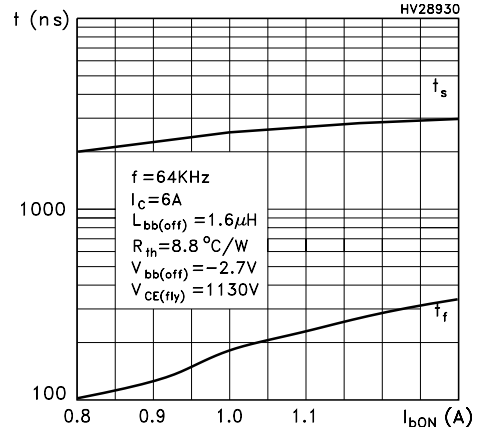
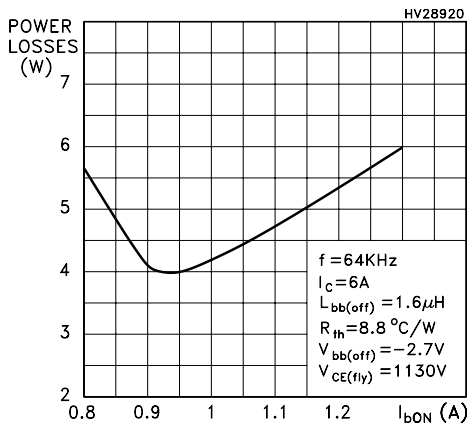


Figure 9. Power losses

Figure 10. Inductive load switching time



### 3 Test circuits

Figure 11. Power losses and inductive load switching test circuit

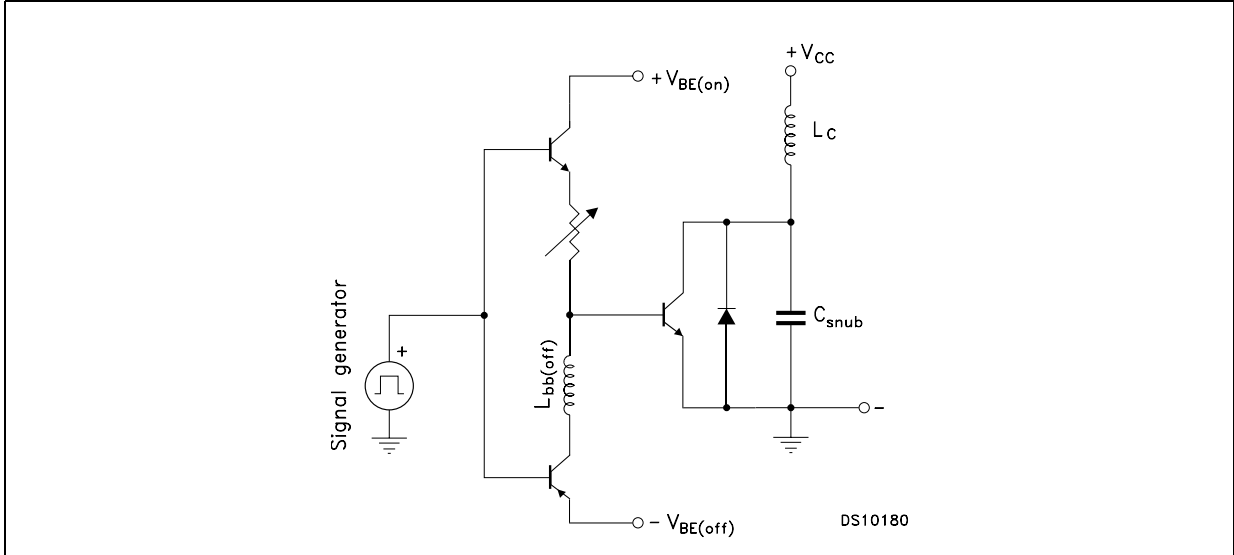
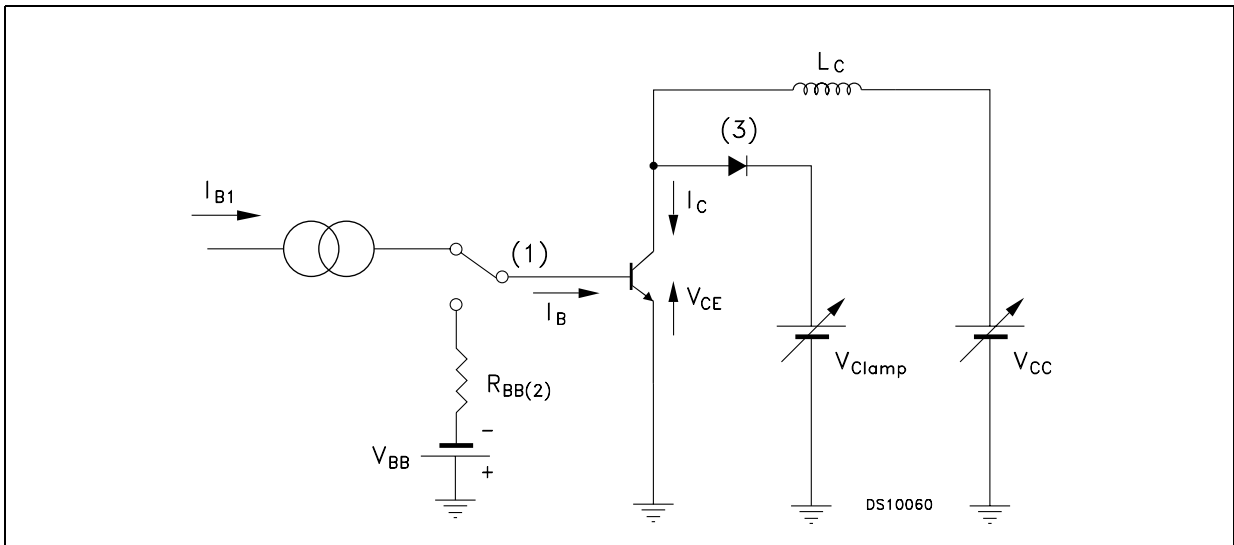


Figure 12. Reverse biased safe operating area test circuit

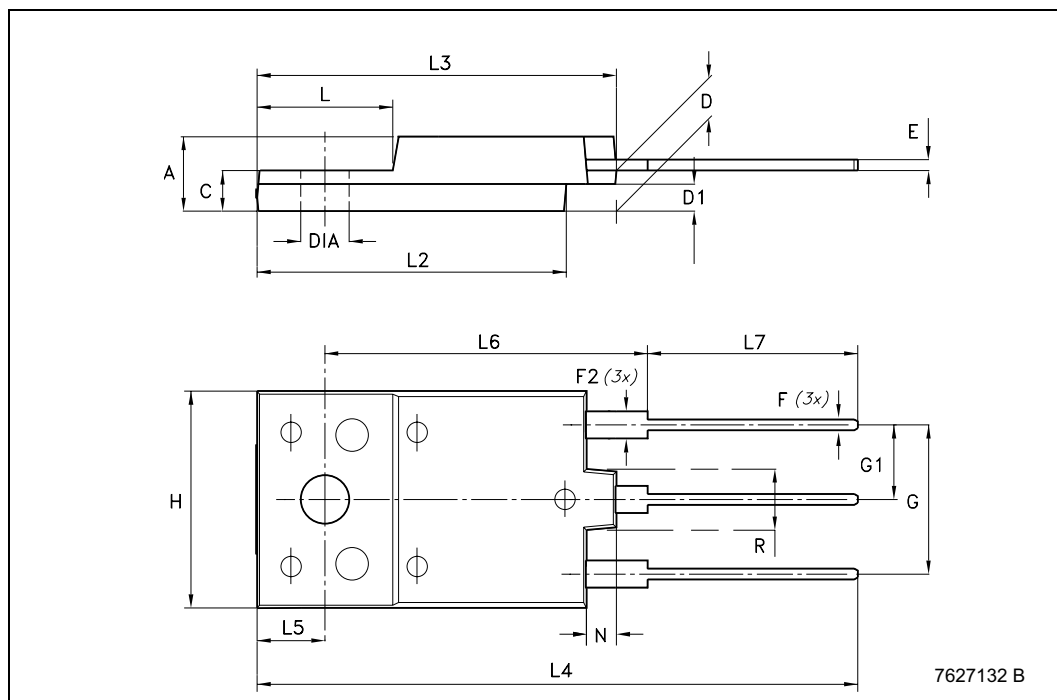


## 4 Package mechanical data

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





## 5 Revision history

Table 4. Revision history

Date	Revision	Changes
18-Oct-2005	1	First release
25-Nov-2005	2	Complete datasheet
15-Dec-2005	3	Legal page inserted
29-Sep-2006	4	New $h_{FE}$ limit

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