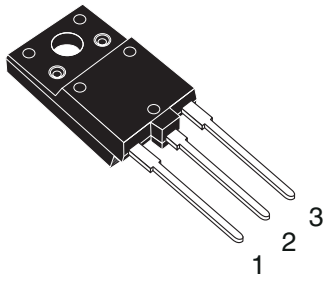
MD2009DFX

High voltage NPN power transistor for CRT TV

Features

- State-of-the-art technology:
  - diffused collector “enhanced generation”
- Stable performance versus operating temperature variation
- Low base drive requirement
- Tight h_{FE} range at operating collector current
- Fully isolated power package UL compliant
- Integrated free wheeling diode



TO-3PF

Application

- Horizontal deflection output for CRT TV

Description

The MD2009DFX 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.

Figure 1. Internal schematic diagram

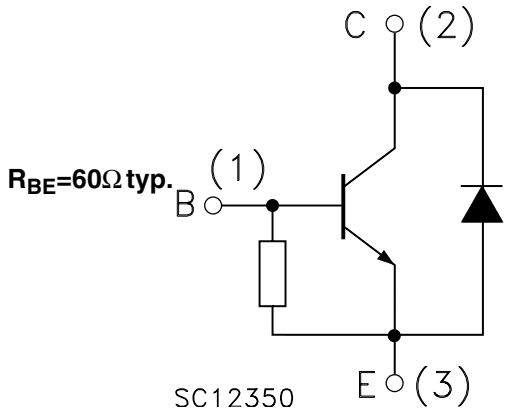


Table 1. Device summary

Order code	Marking	Package	Packaging
MD2009DFX	MD2009DFX	TO-3PF	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

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}	Base-emitter voltage (I_C = 0)	7	V
I_C	Collector current	10	A
I_{CM}	Collector peak current (t_P < 5ms)	16	A
I_B	Base current	6	A
P_{TOT}	Total dissipation at T_c = 25°C	58	W
V_{ISO}	Isolation 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
$R_{thj\text{-}case}$	Thermal resistance junction-case max	2.15	°C/W

2 Electrical characteristics

(T_{case} =25°C unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} = 1500V V_{CE} = 1500V, T_c= 125°C			0.2 2	mA mA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 5V	40		120	mA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 700mA	10			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 5.5A , I_B = 1.4A			2.8	V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 5.5A , I_B = 1.4A			1.3	V
h_{FE} (1)	DC current gain	I_C = 1A, V_{CE} = 5V I_C = 5.5A, V_{CE} = 1V I_C = 5.5A , V_{CE} = 5V	 5	18 4.7	 7	
V_F (1)	Diode forward voltage	I_F= 5.5 A			1.6	V
 t_s t_f	Inductive load Storage time Fall time	I_C = 5A, f_h = 16KHz $I_{B(on)}$ = 1.5A, $V_{BE(off)}$ = -2.7V $L_{BB(off)}$ = 6.2µH		 4.5 0.3	 6 0.6	 µs µs

1. Pulse test: pulse duration ≤300 µs, duty cycle ≤2%.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

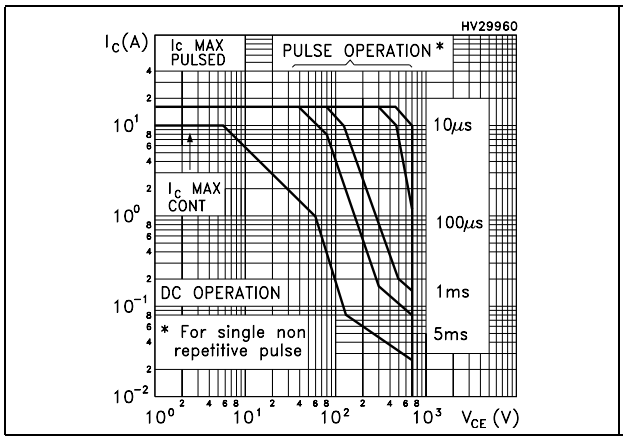


Figure 3. Derating curve

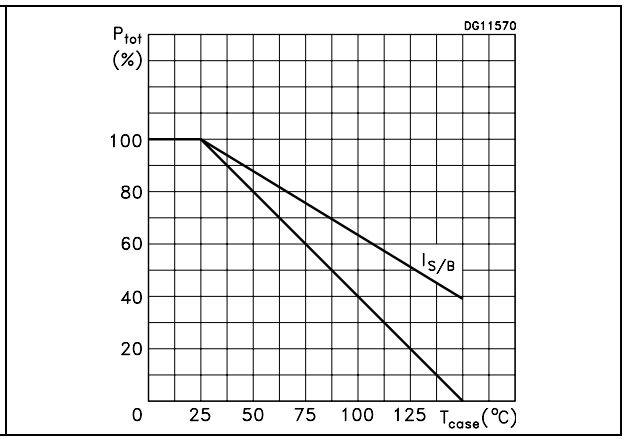


Figure 4. Output characterisics

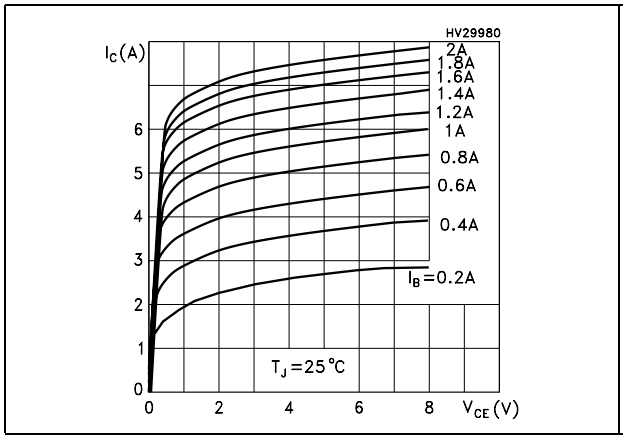


Figure 5. Reverse biased SOA

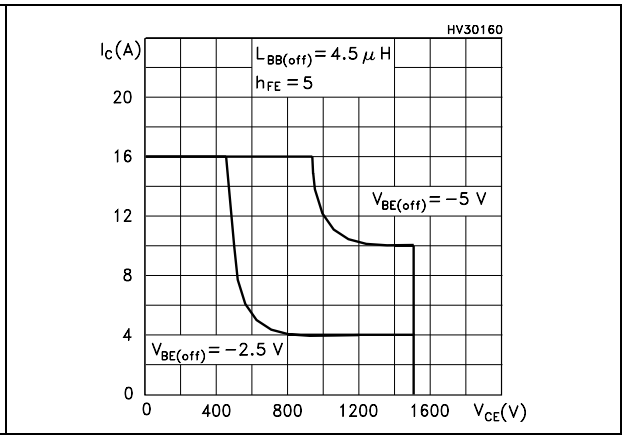


Figure 6. DC current gain (V_{CE} = 1 V)

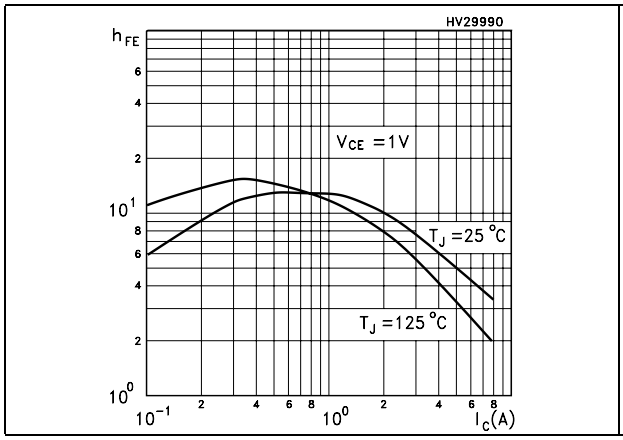


Figure 7. DC current gain (V_{CE} = 5 V)

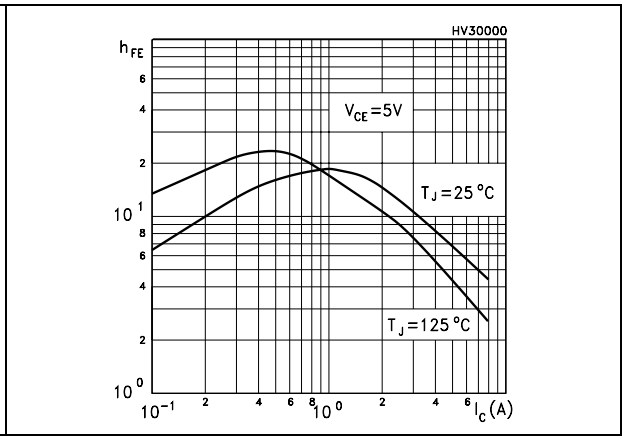


Figure 8. Collector-emitter saturation voltage

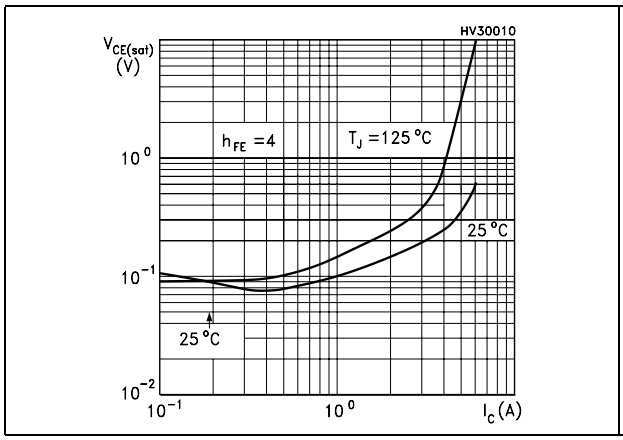


Figure 9. Base-emitter saturation voltage

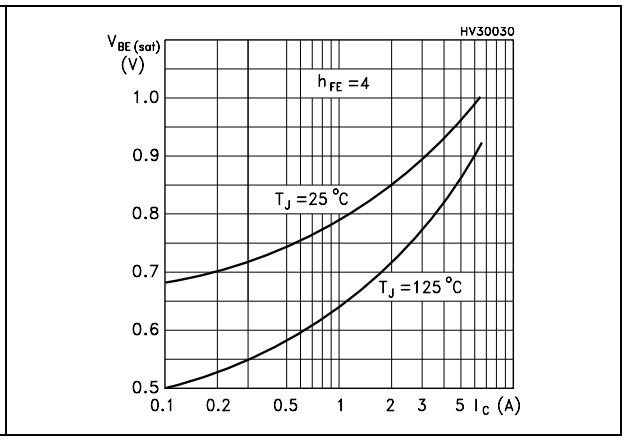


Figure 10. Power losses

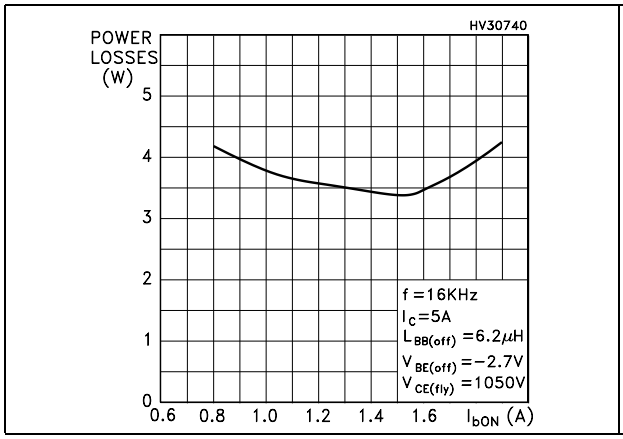
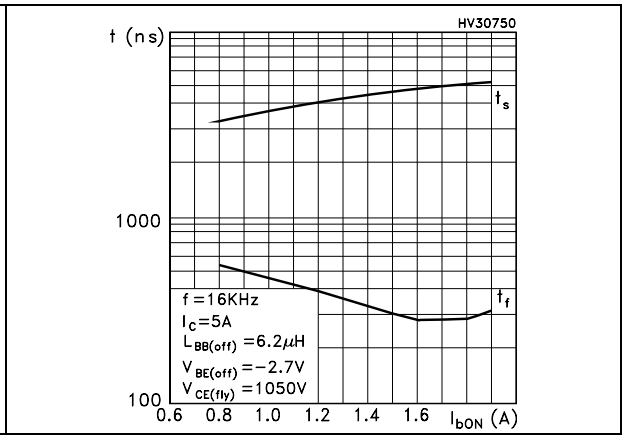


Figure 11. Inductive load switching time



3 Test circuits

Figure 12. Power losses and inductive load switching test circuit

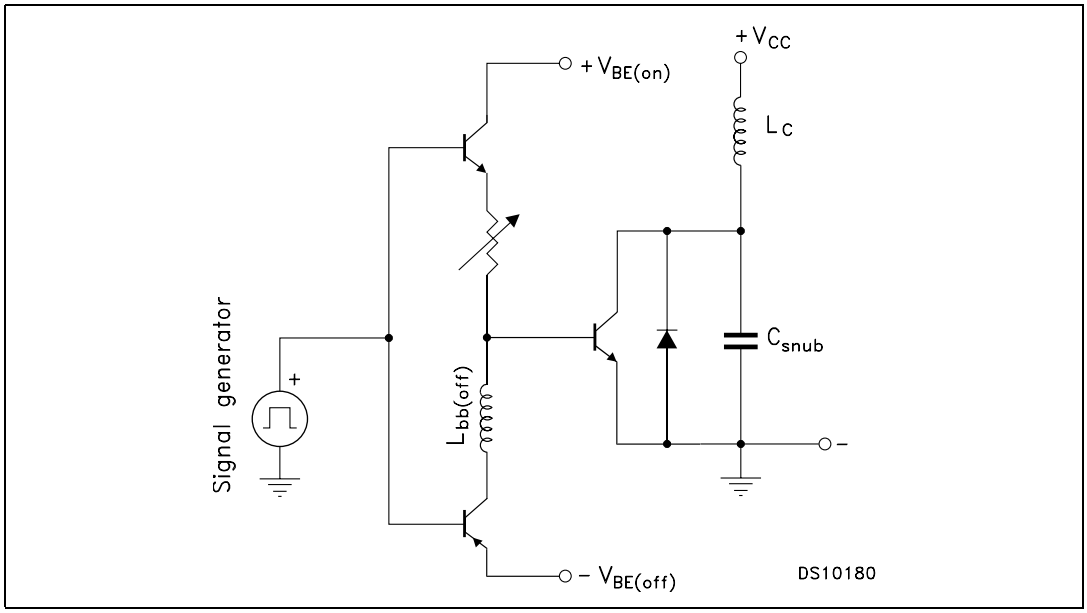
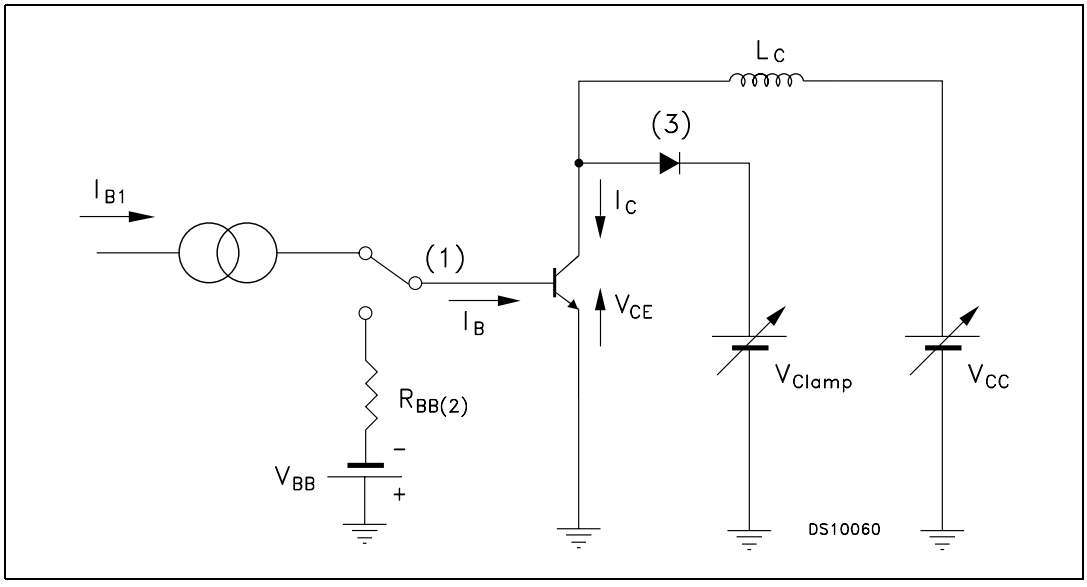


Figure 13. Reverse biased safe operating area test circuit



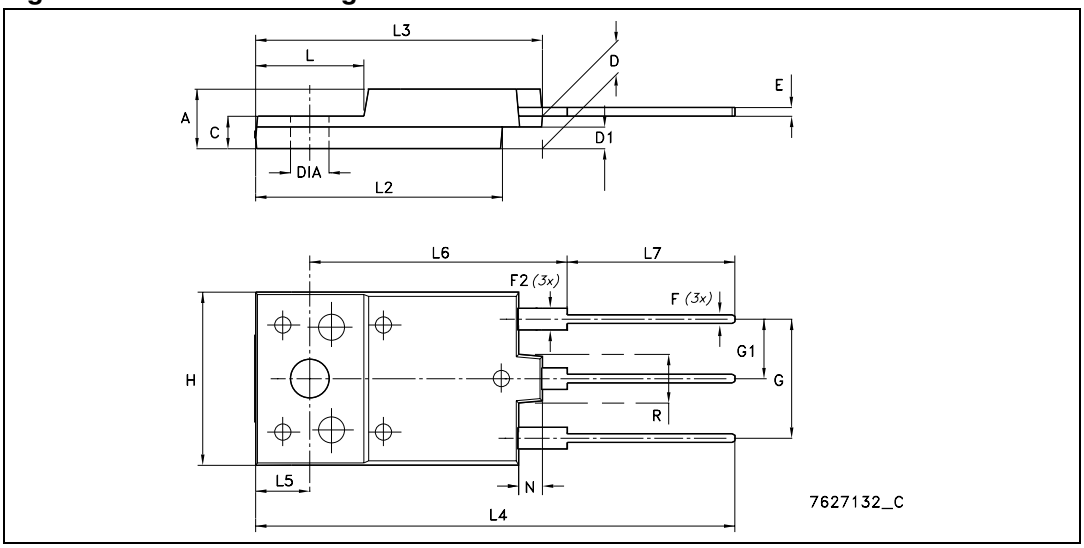
4 Package mechanical data

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. ECOPACK is an ST trademark.

Table 5. TO-3PF package 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	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

Figure 14. TO-3PF drawing



5 Revision history

Table 6. Document revision history

Date	Revision	Changes
27-Feb-2006	1	First release
28-Mar-2006	2	New curves 9 and 10 inserted
22-May-2006	3	Values changed on *Table 2* and *Table 4*
20-Oct-2006	4	New hFE limits shown on *Table 4*
10-Aug-2009	5	Update mechanical data Document reformatted, no content change

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