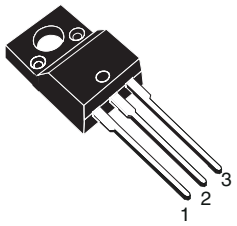
MD2103DFP

High voltage NPN power transistor for standard definition CRT display

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 insulated power package UL compliant
- Integrated free wheeling diode



TO-220FP

Applications

- Horizontal deflection output for TV

Description

The MD2103DFP is manufactured using diffused collector in planar technology adopting new and enhanced high voltage structure. The new MD product series show improved silicon efficiency briging updated performance to the horizontal deflection stage.

Figure 1. Internal schematic diagram

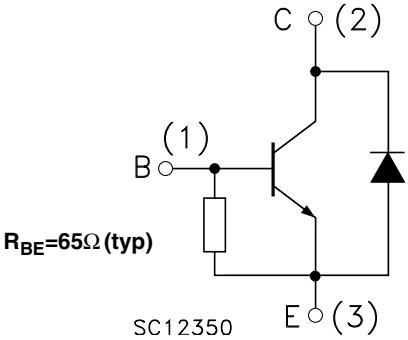


Table 1. Device summary

Order code	Marking	Package	Packing
MD2103DFP	MD2103DFP	TO-220FP	Tube

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}	Emitter-base voltage (I_C =0)	7	V
I_C	Collector current	6	A
I_{CM}	Collector peak current (t_P < 5ms)	9	A
I_B	Base current	3	A
P_{tot}	Total dissipation at $T_c \leq 25°C$	38	W
V_{INS}	Insulation withstand voltage (RMS) from all three leads to external heatsink	1500	V
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case max	3.3	°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	50		125	mA
$V_{(BR)EBO}$	Emitter-base brakdown voltage (I_C = 0)	I_E = 700mA		11		V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 3A I_B =0.75A			1.8	V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 3A I_B =0.75A			1.5	V
h_{FE} (1)	DC current gain	I_C = 1A V_{CE} =5V I_C = 3A V_{CE} =1V I_C = 3A V_{CE} =5V	 6.5	17 6 	 9.5	
 t_s t_f	Inductive load Storage time Fall time	I_C =3A f_h =16kHz $I_{B(on)}$ =0.5A $V_{BE(off)}$ =-2.7V $L_{BB(off)}$ =6.3µH (see *Figure 12*)		 3.8 0.25		 µs µs
V_F	Diode forward voltage	I_F = 3A			2	V

Note: Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

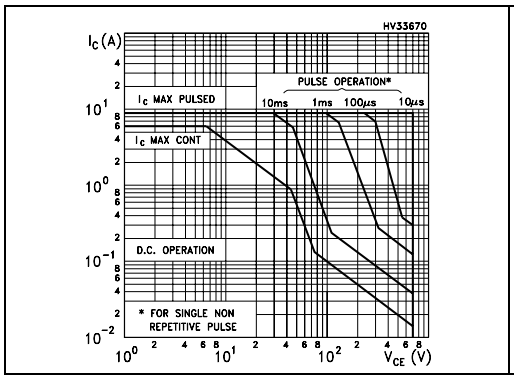


Figure 3. Derating curve

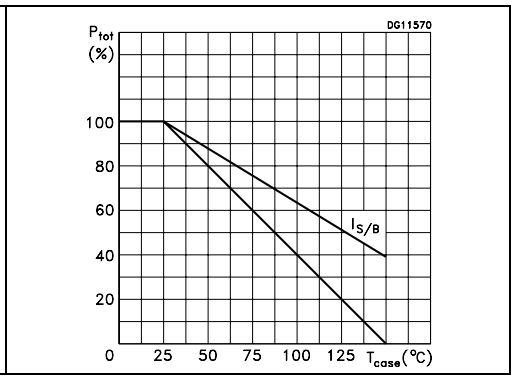


Figure 4. Output characteristics

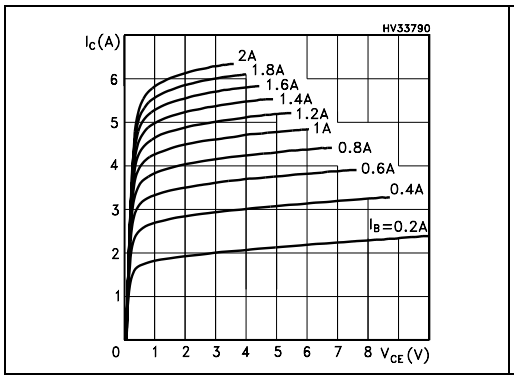


Figure 5. Reverse biased SOA

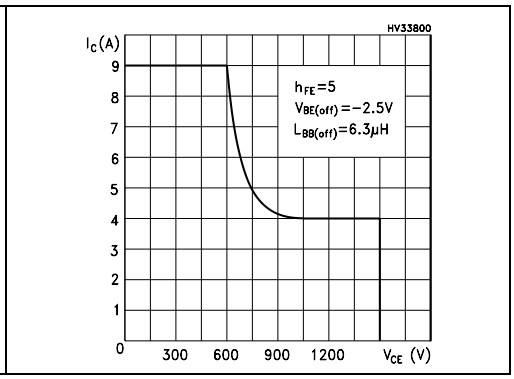


Figure 6. DC current gain

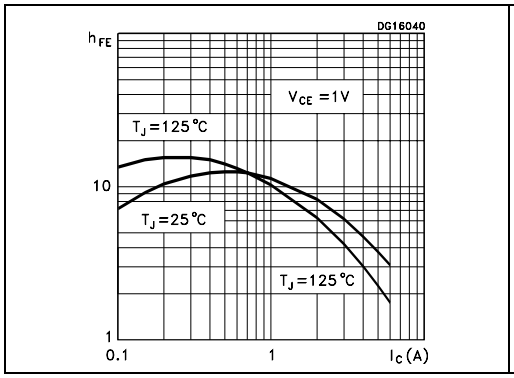


Figure 7. DC current gain

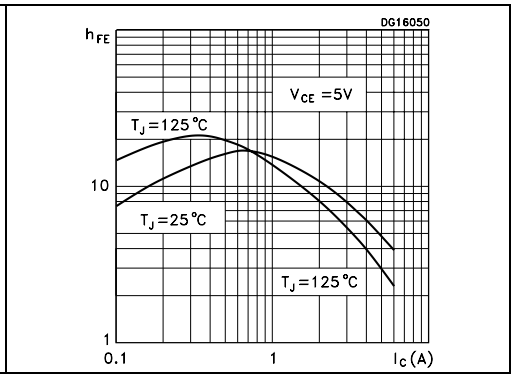


Figure 8. Collector-emitter saturation voltage

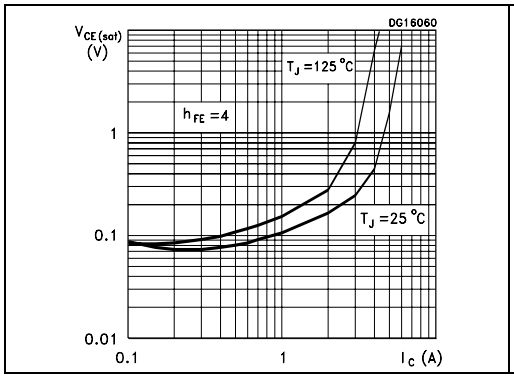


Figure 9. Base-emitter saturation voltage

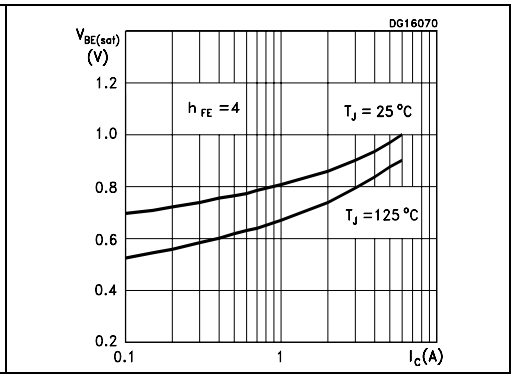


Figure 10. Power losses

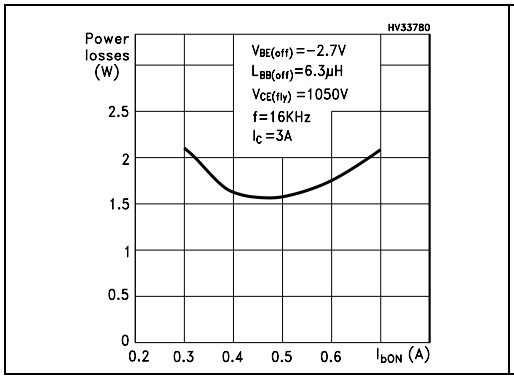
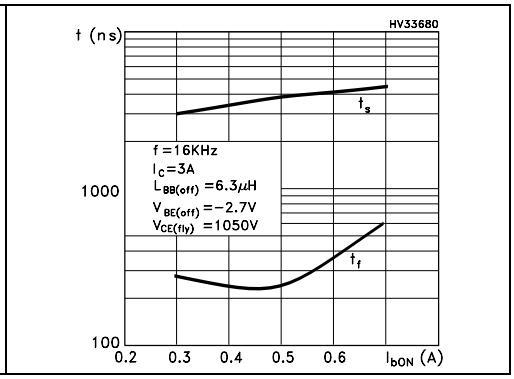
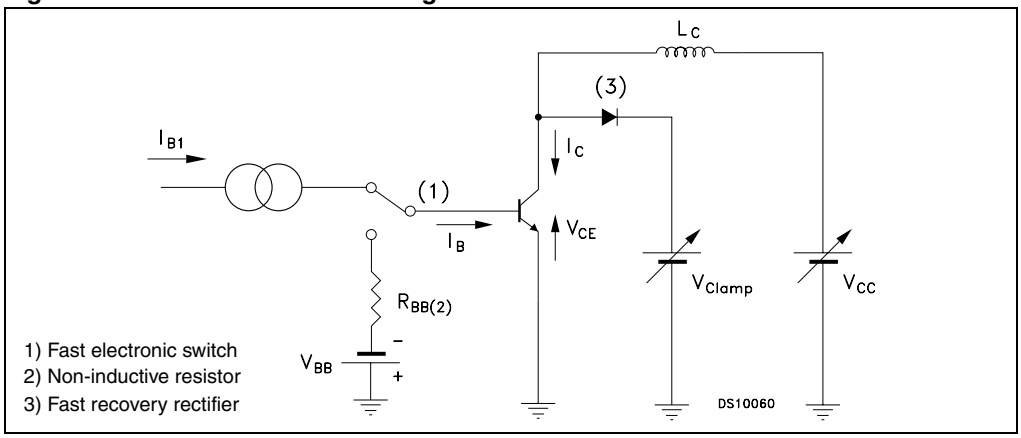


Figure 11. Inductive load switching time



2.2 Test circuits

Figure 12. Inductive load switching test circuit

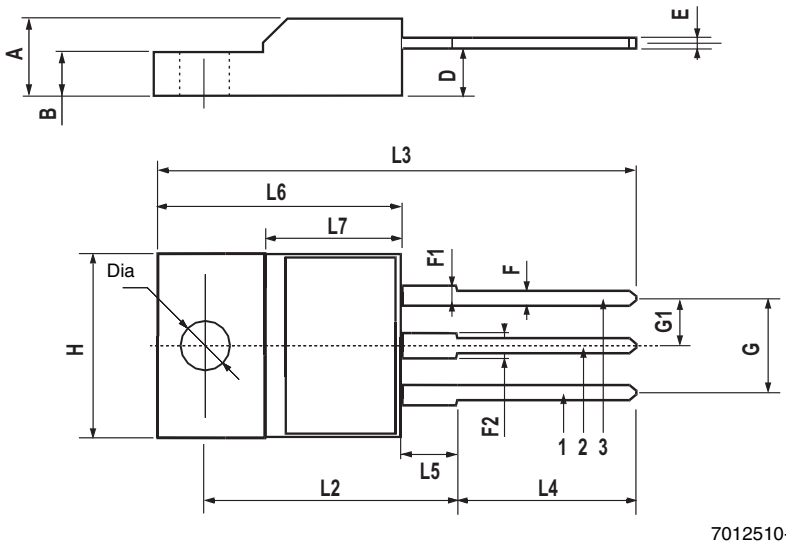


3 Package mechanical data

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

TO-220FP mechanical data

Dim.	mm.			inch		
	Min.	Typ	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1.00	0.030		0.039
F1	1.15		1.50	0.045		0.067
F2	1.15		1.50	0.045		0.067
G	4.95		5.20	0.195		0.204
G1	2.40		2.70	0.094		0.106
H	10		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.80		10.60	0.385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.90		16.40	0.626		0.645
L7	9		9.30	0.354		0.366
Dia	3		3.2	0.118		0.126



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
27-May-2008	1	First release

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