



MD2103DFH

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 U.L. compliant
- Integrated free wheeling diode

Description

The MD2103DFH 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.

Applications

- Horizontal deflection output for TV

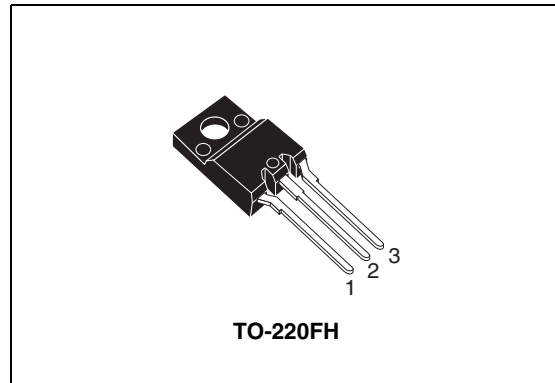


Figure 1. Internal schematic diagram

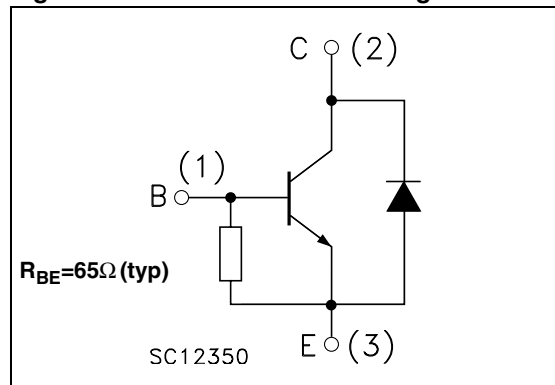


Table 1. Device summary

Order code	Marking	Package	Packing
MD2103DFH	MD2103DFH	TO-220FH	Tube

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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}	Emitter-base voltage ($I_C = 0$)	7	V
I_C	Collector current	6	A
I_{CM}	Collector peak current ($t_P < 5\text{ms}$)	9	A
I_B	Base current	3	A
P_{tot}	Total dissipation at $T_C \leq 25^\circ\text{C}$	38	W
V_{INS}	Insulation withstand voltage (RMS) from all three leads to external heatsink	2500	V
T_{stg}	Storage temperature	-65 to 150	$^\circ\text{C}$
T_J	Max. operating junction temperature	150	$^\circ\text{C}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	3.3	$^\circ\text{C/W}$

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_{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_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{V}$	50		125	mA
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = 700\text{mA}$		11		V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 3\text{A}$ $I_{\text{B}} = 0.75\text{A}$			1.8	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 3\text{A}$ $I_{\text{B}} = 0.75\text{A}$			1.5	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1\text{A}$ $V_{\text{CE}} = 5\text{V}$ $I_{\text{C}} = 3\text{A}$ $V_{\text{CE}} = 1\text{V}$ $I_{\text{C}} = 3\text{A}$ $V_{\text{CE}} = 5\text{V}$	6.5	17 6	9.5	
t_{s} t_{f}	Inductive load Storage time Fall time	$I_{\text{C}} = 3\text{A}$ $f_{\text{h}} = 16\text{kHz}$ $I_{\text{B(on)}} = 0.5\text{A}$ $V_{\text{BE(off)}} = -2.7\text{V}$ $L_{\text{BB(off)}} = 6.3\mu\text{H}$ (see Figure 12)		3.8 0.25		μs μs
V_{F}	Diode forward voltage	$I_{\text{F}} = 3\text{A}$			2	V

Note (1) Pulsed duration = 300 μs , duty cycle $\leq 5\%$

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

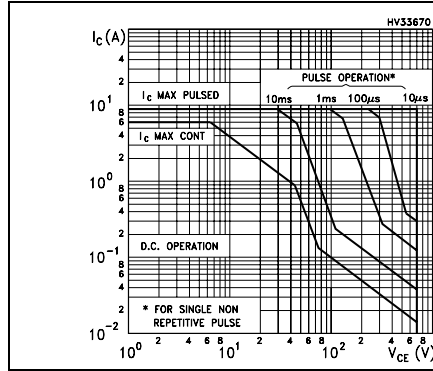


Figure 3. Derating curve

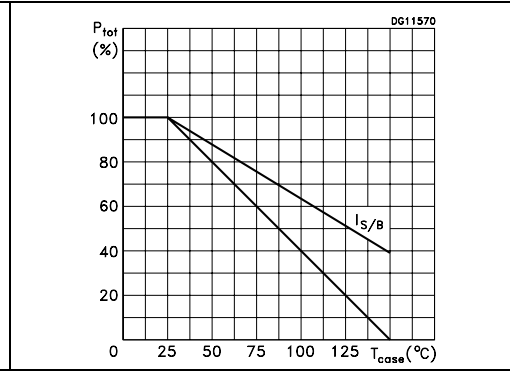


Figure 4. Output characteristics

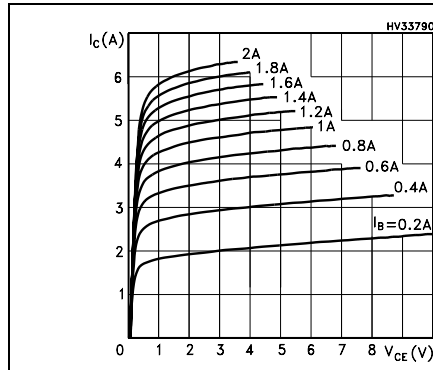


Figure 5. Reverse biased SOA

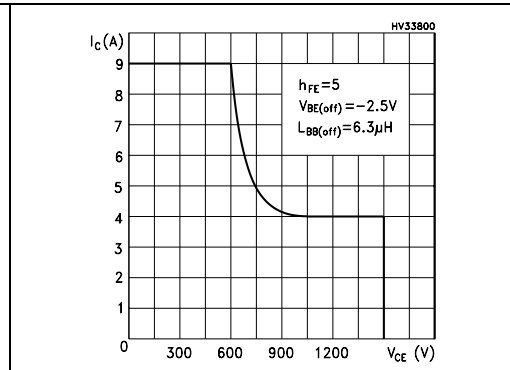


Figure 6. DC current gain

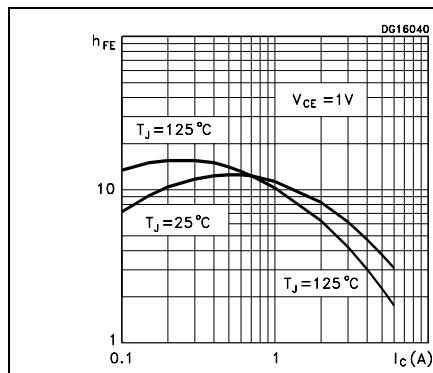


Figure 7. DC current gain

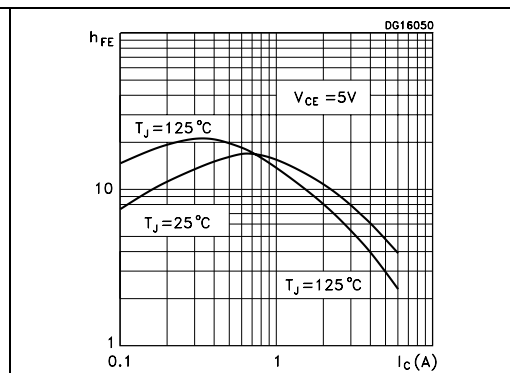


Figure 8. Collector-emitter saturation voltage

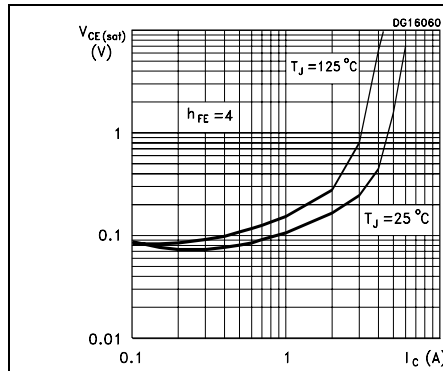


Figure 9. Base-emitter saturation voltage

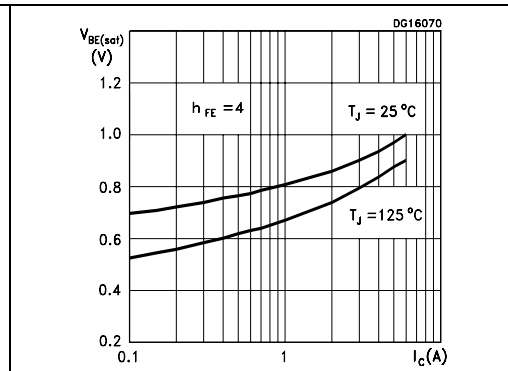


Figure 10. Power losses

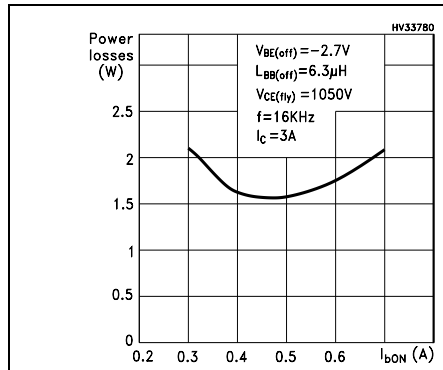
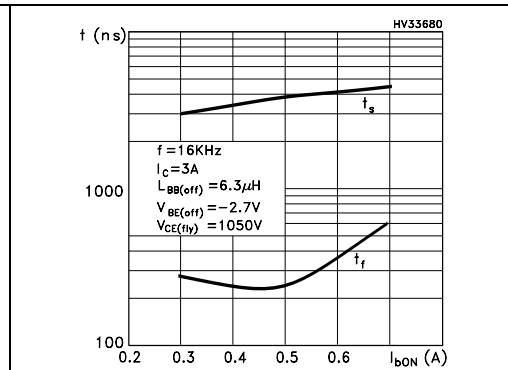
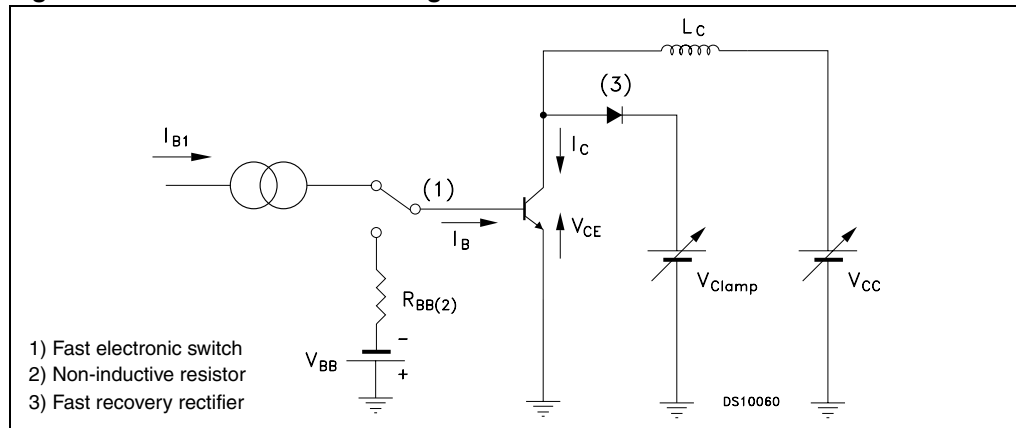


Figure 11. Inductive load switching time



2.2 Test circuits

Figure 12. Inductive load switching test circuit

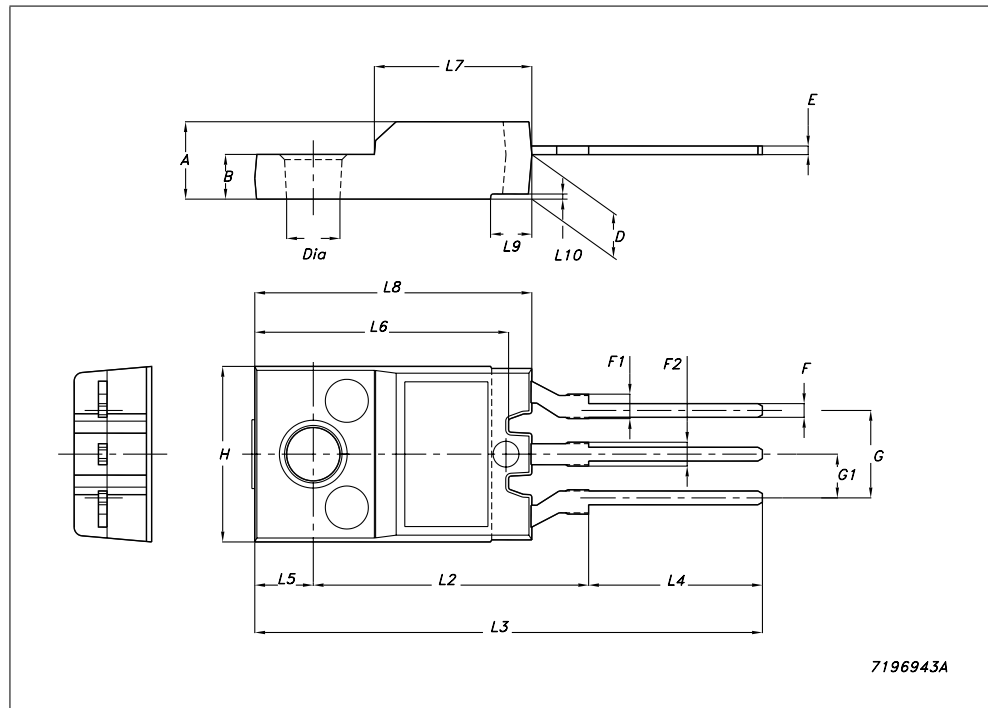


3 Package mechanical data

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-220FH (fully plastic high voltage) mechanical data

Dim	mm		
	Min	Typ	Max
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.3		1.8
F2	1.3		1.8
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5		3.4	
L6	15.9		16.4
L7	9		9.3
L8	14.5		15
L9		2.4	
L10		0.3	
Dia	3		3.2



4 Revision history

Table 4. Revision history

Date	Revision	Changes
25-Jul-2006	1	First release
11-Jul-2007	2	Updated mechanical data

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