



MD1803DFH

High voltage NPN Power transistor for standard definition CRT display

Features

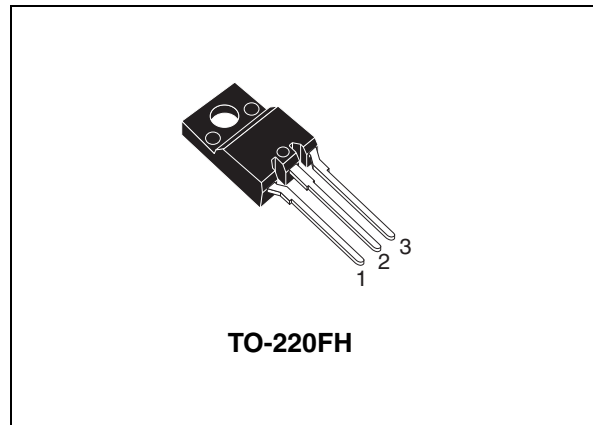
- State-of-the-art technology:
 - Diffused collector “enhanced generation”
- More stable performance versus operating temperature variation
- Low base drive requirement
- Tighter h_{FE} range at operating collector current
- Fully insulated power package u.l. compliant
- Creepage distance path > 4mm
- Integrated free wheeling diode
- In compliance with the 2002/93/ec european directive

Applications

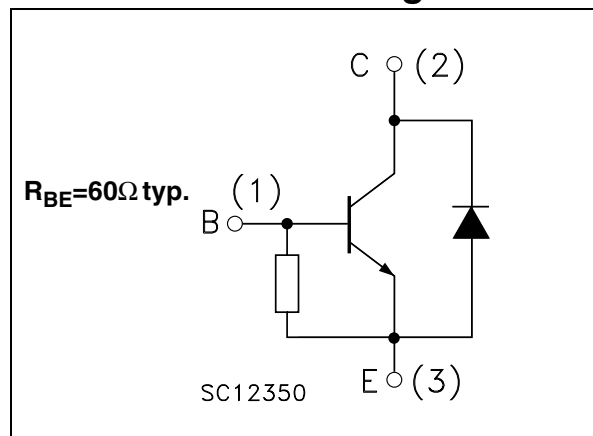
- Horizontal deflection output for TV

Description

The MD1803DFH 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.



Internal schematic diagram



Order codes

| Part number | Marking | Package | Packing |
|-------------|-----------|----------|---------|
| MD1803DFH | MD1803DFH | TO-220FH | 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} | Emitter-base voltage ($I_C = 0$) | 7 | V |
| I_C | Collector current | 10 | A |
| I_{CM} | Collector peak current ($t_p < 5\text{ms}$) | 15 | A |
| I_B | Base current | 5 | A |
| P_{TOT} | Total dissipation at $T_c = 25^\circ\text{C}$ | 40 | W |
| V_{isol} | 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 3.125 | °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 ($I_C = 0$) | $V_{EB} = 5V$ | 40 | | 120 | mA |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage ($I_C = 0$) | $I_E = 700\text{ mA}$ | 7 | | | V |
| $V_{CE(sat)}$ <i>Note 1</i> | Collector-emitter saturation voltage | $I_C = 5\text{ A}$ $I_B = 1.25\text{ A}$ | | | 2 | V |
| $V_{BE(sat)}$ <i>Note 1</i> | Base-emitter saturation voltage | $I_C = 5\text{ A}$ $I_B = 1.25\text{ A}$ | | | 1.2 | V |
| h_{FE} <i>Note 1</i> | DC current gain | $I_C = 1\text{ A}$ $V_{CE} = 5\text{ V}$ | | 18 | | |
| | | $I_C = 5\text{ A}$ $V_{CE} = 1\text{ V}$ | | 5 | | |
| | | $I_C = 5\text{ A}$ $V_{CE} = 5\text{ V}$ | 5 | | 8 | |
| V_f | Diode forward voltage | $I_F = 5\text{ A}$ | | | 1.6 | V |
| t_s t_f | Inductive load | $I_C = 4\text{ A}$ $f_h = 16\text{ KHz}$ | | | | |
| | Storage time | $I_{B(on)} = 0.6\text{ A}$ $V_{BE(off)} = -2.7\text{ V}$ | | 2.5 | 3 | μs |
| | Fall time | $L_{BB(off)} = 4.5\mu\text{H}$ | | 0.3 | 0.6 | μs |

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

2.1 Electrical characteristics (curve)

Figure 1. Safe operating area

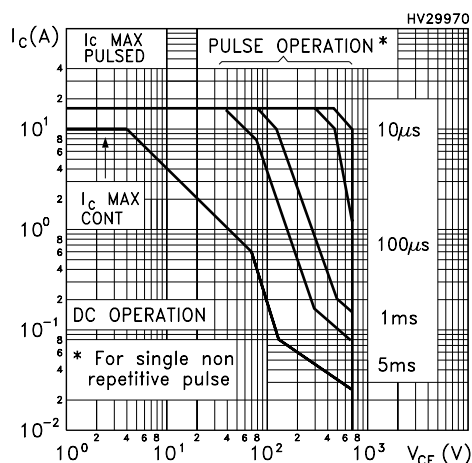


Figure 2. Derating curve

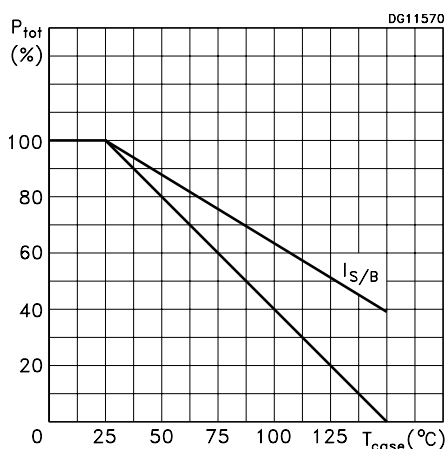


Figure 3. Output characteristics

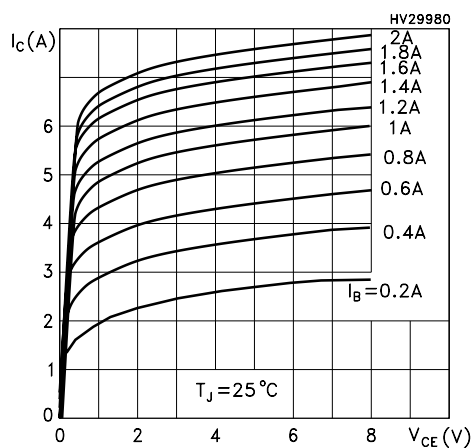


Figure 4. Reverse biased SOA

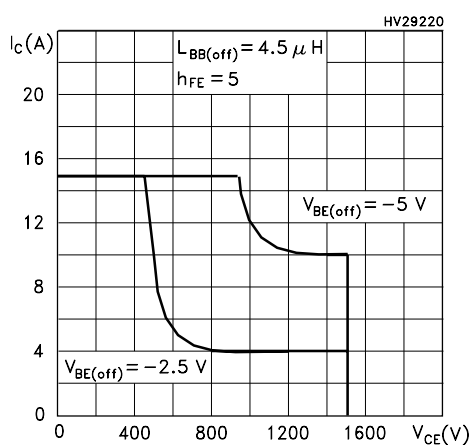


Figure 5. DC current gain

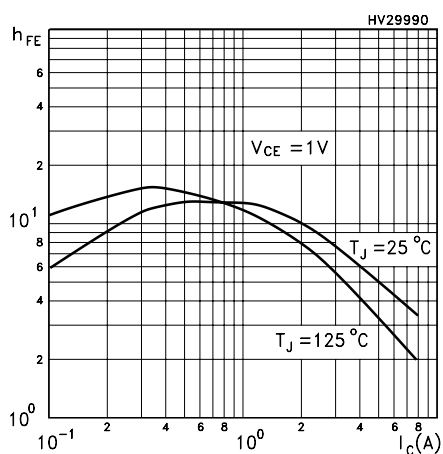


Figure 6. DC current gain

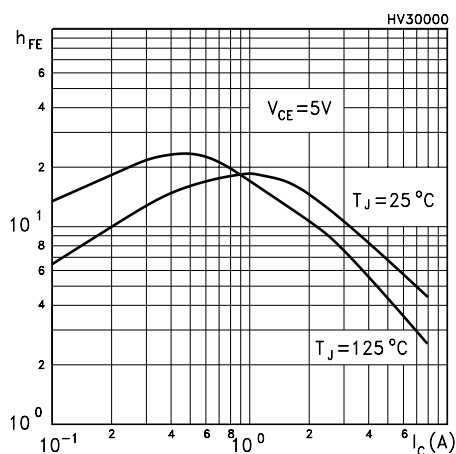


Figure 7. Collector-emitter saturation voltage Figure 8. Base-emitter saturation voltage

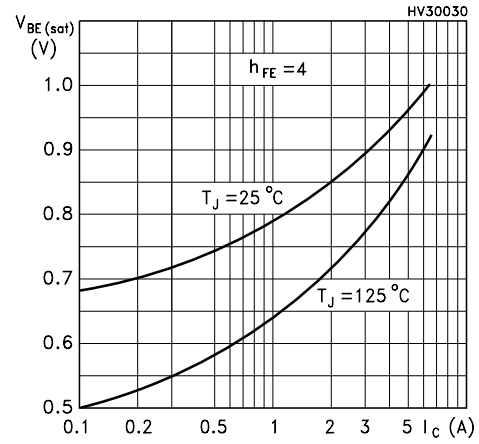
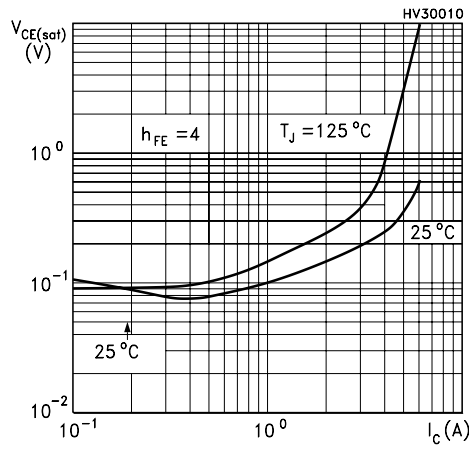


Figure 9. Power losses

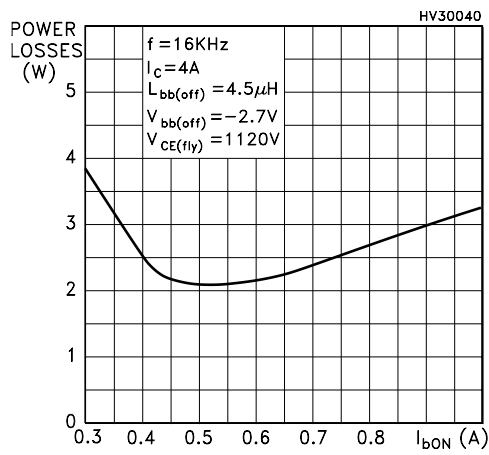
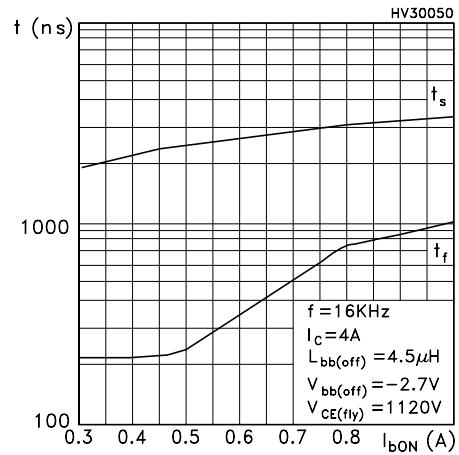


Figure 10. Inductive load switching time



2.2 Test circuit

Figure 11. Power losses and inductive load switching test circuit

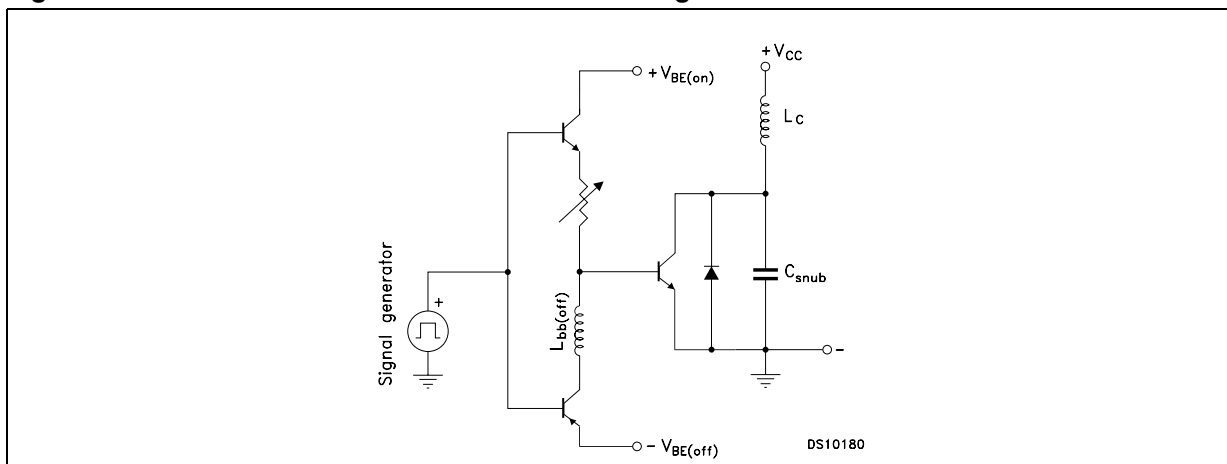
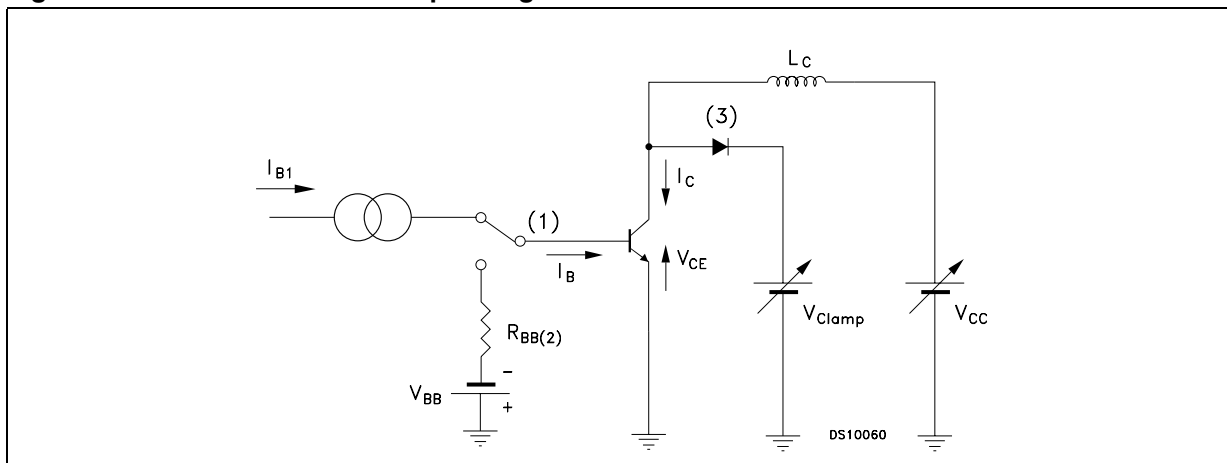


Figure 12. Reverse biased safe operating area test circuit

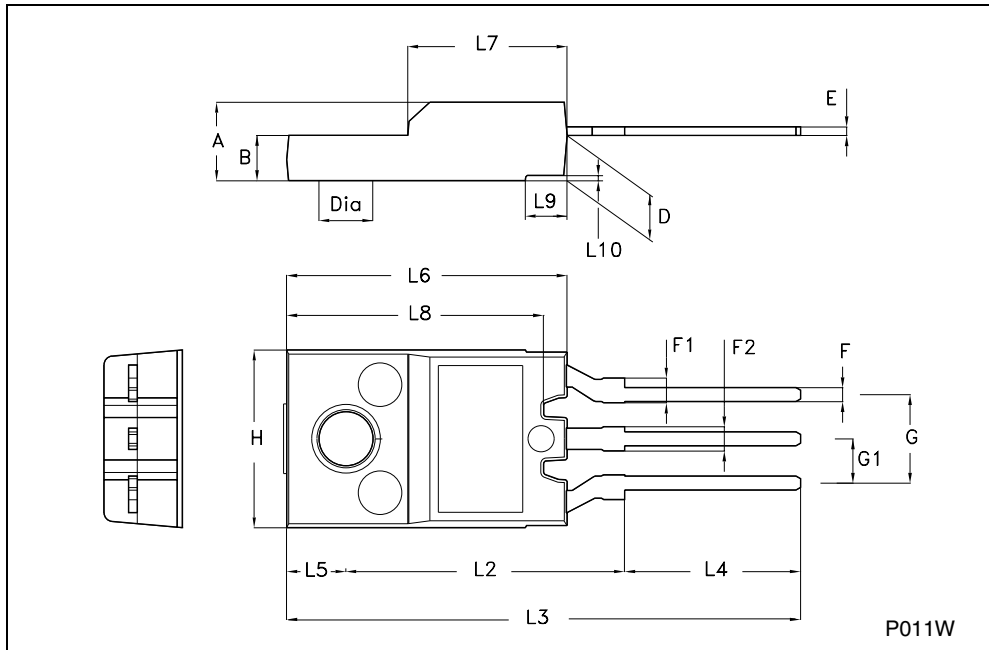


3 Package mechanical data

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 | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 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 | | 0.7 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.3 | | 1.8 | 0.051 | | 0.070 |
| F2 | 1.3 | | 1.8 | 0.051 | | 0.070 |
| G | 4.95 | | 5.2 | 0.195 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10 | | 10.4 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L5 | | 3.4 | | | 0.134 | |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| L8 | 14.5 | | 15 | 0.570 | | 0.590 |
| L9 | | 2.4 | | | 0.094 | |



4 Revision history

Table 4. Revision history

| Date | Revision | Changes |
|-------------|-----------------|--|
| 18-Oct-2005 | 1 | First release |
| 15-Feb-2006 | 2 | New template, complete version with curves |
| 08-May-2006 | 3 | Typo mistake on table1 |

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZE REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS, WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2006 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com