

Contents

1      **Absolute maximum ratings** ..... 3

2      **Electrical characteristics** ..... 4

      2.1    Typical characteristic (curves) ..... 6

      2.2    Test circuit ..... 8

3      **Package mechanical data** ..... 9

4      **Revision history** ..... 11



# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

| Symbol           | Parameter                                      | Value      |                 |                 |       | Unit |
|------------------|------------------------------------------------|------------|-----------------|-----------------|-------|------|
|                  |                                                | NPN        | BD677<br>BD677A | BD679<br>BD679A | BD681 |      |
|                  |                                                | PNP        | BD678<br>BD678A | BD680<br>BD680A | BD682 |      |
| V <sub>CBO</sub> | Collector-base voltage (I <sub>E</sub> = 0)    | 60         | 80              | 100             | V     |      |
| V <sub>CEO</sub> | Collector-emitter voltage (I <sub>B</sub> = 0) |            |                 |                 |       |      |
| V <sub>EBO</sub> | Emitte-base voltage (I <sub>C</sub> = 0)       | 5          |                 |                 | V     |      |
| I <sub>C</sub>   | Collector current                              | 4          |                 |                 | A     |      |
| I <sub>CM</sub>  | Collector peak current                         | 6          |                 |                 | A     |      |
| I <sub>B</sub>   | Base current                                   | 0.1        |                 |                 | A     |      |
| P <sub>TOT</sub> | Total dissipation at T <sub>case</sub> = 25°C  | 40         |                 |                 | W     |      |
| T <sub>stg</sub> | Storage temperature                            | -65 to 150 |                 |                 | °C    |      |
| T <sub>J</sub>   | Max. operating junction temperature            | 150        |                 |                 | °C    |      |

*Note: For PNP types voltage and current values are negative*

## 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 |
|-----------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------|------|----------|------|
| $I_{\text{CEO}}$            | Collector cut-off current<br>( $I_{\text{B}} = 0$ )            | $V_{\text{CE}} = \text{half rated } V_{\text{CEO}}$                                                                                      |      |      | 0.5      | mA   |
| $I_{\text{CBO}}$            | Collector cut-off current<br>( $I_{\text{E}} = 0$ )            | $V_{\text{CE}} = \text{rated } V_{\text{CBO}}$<br>$V_{\text{CE}} = \text{rated } V_{\text{CBO}}$<br>$T_{\text{C}} = 100^{\circ}\text{C}$ |      |      | 0.2<br>2 | mA   |
| $I_{\text{EBO}}$            | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )              | $V_{\text{EB}} = 5 \text{ V}$                                                                                                            |      |      | 2        | mA   |
| $V_{\text{CEO(sus)}}^{(1)}$ | Collector-emitter<br>sustaining voltage ( $I_{\text{B}} = 0$ ) | for BD677, BD677A,<br>BD678, BD678A<br>$I_{\text{C}} = 50 \text{ mA}$                                                                    | 60   |      |          | V    |
|                             |                                                                | for BD679, BD679A,<br>BD680, BD680A<br>$I_{\text{C}} = 50 \text{ mA}$                                                                    | 80   |      |          |      |
|                             |                                                                | for BD681, BD682<br>$I_{\text{C}} = 50 \text{ mA}$                                                                                       | 100  |      |          |      |
| $V_{\text{CE(sat)}}^{(1)}$  | Collector-emitter saturation<br>voltage                        | for BD677, BD678,<br>BD679, BD680, BD681,<br>BD682<br>$I_{\text{C}} = 1.5 \text{ A}$ $I_{\text{B}} = 30 \text{ mA}$                      |      |      | 2.5      | V    |
|                             |                                                                | for BD677A, BD678A,<br>BD679A, BD680A<br>$I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 40 \text{ mA}$                                     |      |      | 2.8      |      |
| $V_{\text{BE}}^{(1)}$       | Base-emitter voltage                                           | for BD677, BD678,<br>BD679, BD680, BD681,<br>BD682<br>$I_{\text{C}} = 1.5 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$                       |      |      | 2.5      | V    |
|                             |                                                                | for BD677A, BD678A,<br>BD679A, BD680A<br>$I_{\text{C}} = 2 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$                                      |      |      |          |      |

**Table 3. Electrical characteristics (continued)**

| Symbol         | Parameter       | Test conditions                                                                                  | Min. | Typ. | Max. | Unit |
|----------------|-----------------|--------------------------------------------------------------------------------------------------|------|------|------|------|
| $h_{FE}^{(1)}$ | DC current gain | for BD677, BD678,<br>BD679, BD680, BD681,<br>BD682<br>$I_C = 1.5\text{ A}$ $V_{CE} = 3\text{ V}$ | 750  |      |      |      |
|                |                 | for BD677A, BD678A,<br>BD679A, BD680A<br>$I_C = 2\text{ A}$ $V_{CE} = 3\text{ V}$                |      |      |      |      |

1. Pulsed duration = 300 ms, duty cycle  $\geq 1.5\%$ .

**Note:** For PNP types voltage e current values are negative.

2.1 Typical characteristic (curves)

Figure 2. DC current gain (NPN)

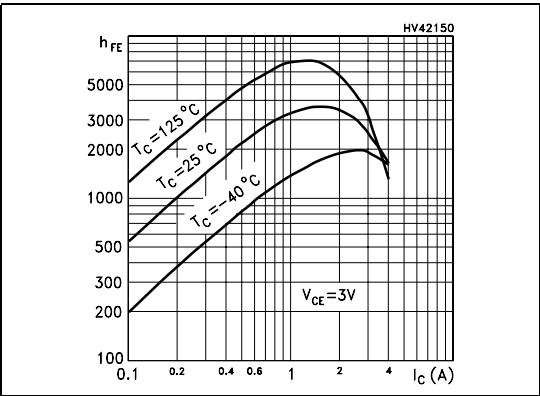


Figure 3. DC current gain (PNP)

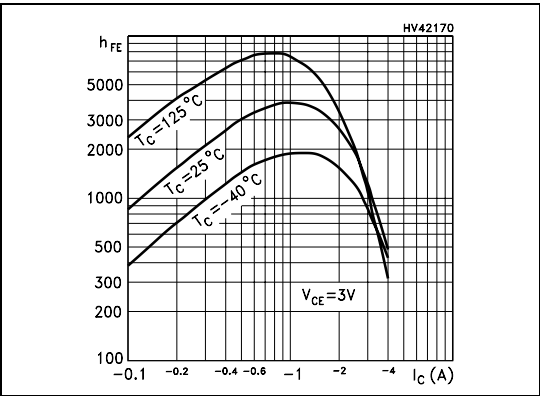


Figure 4. DC current gain (NPN)

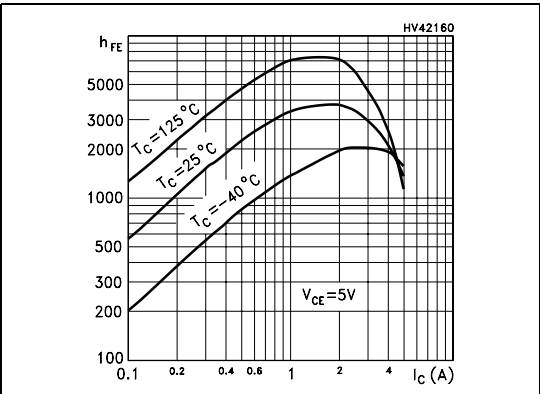


Figure 5. DC current gain (PNP)

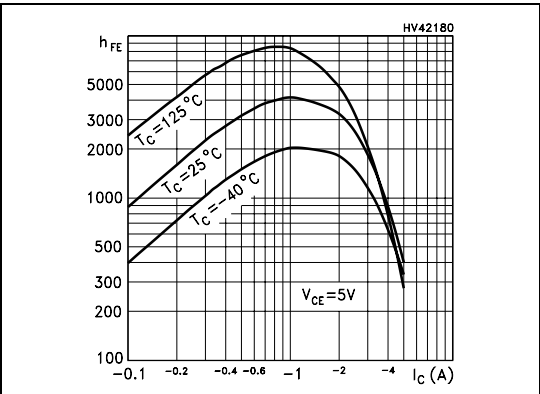


Figure 6. Collector-emitter saturation voltage (NPN)

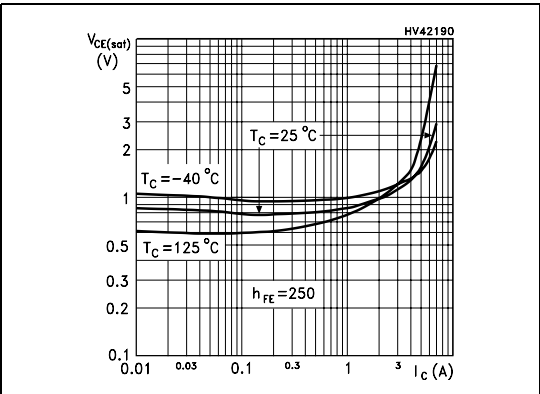


Figure 7. Collector-emitter saturation voltage (PNP)

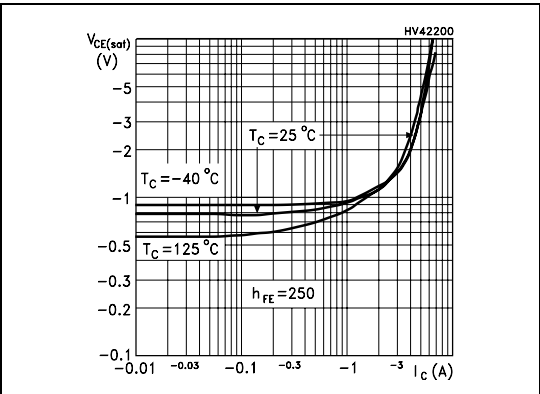


Figure 8. Base-emitter saturation voltage (NPN)

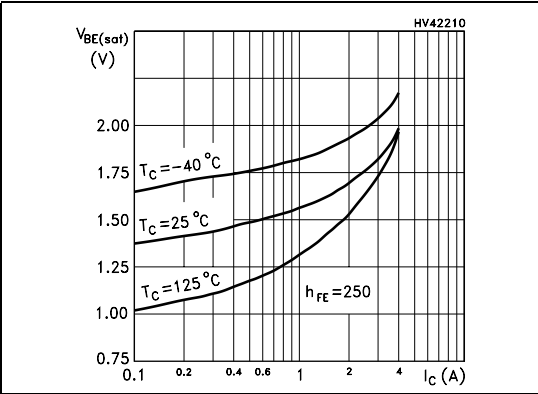


Figure 9. Base-emitter saturation voltage (PNP)

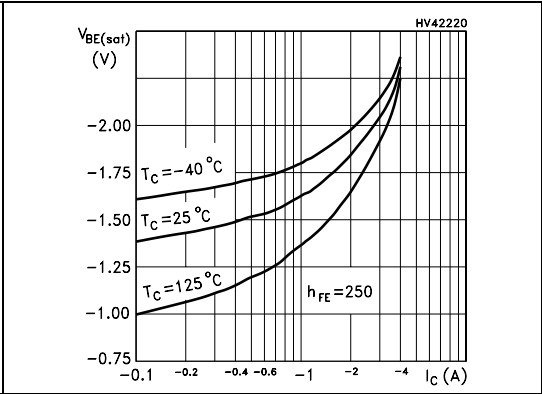


Figure 10. Base-emitter voltage (NPN)

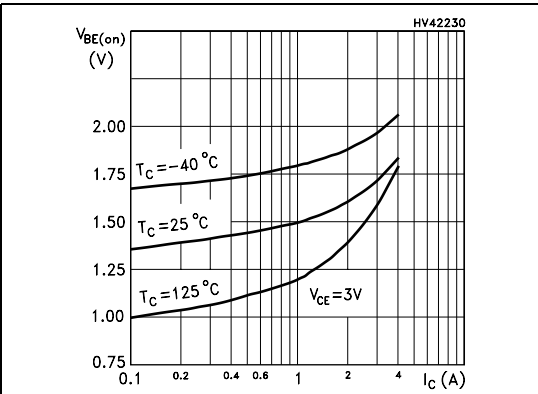


Figure 11. Base-emitter voltage (PNP)

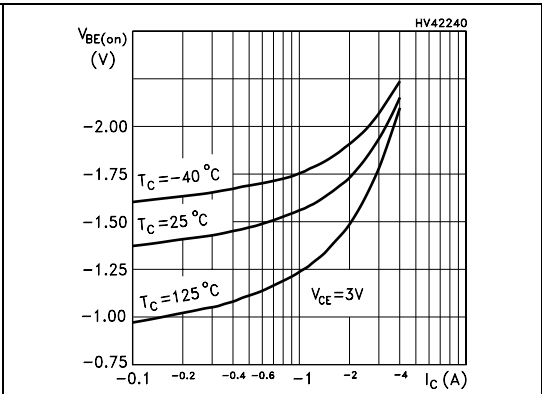


Figure 12. Resistive load switching time (NPN, on)

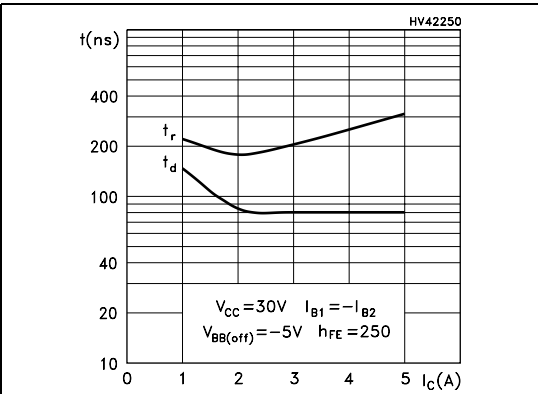
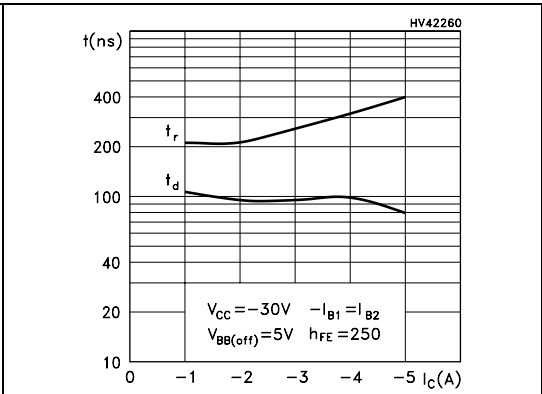


Figure 13. Resistive load switching time (PNP, on)

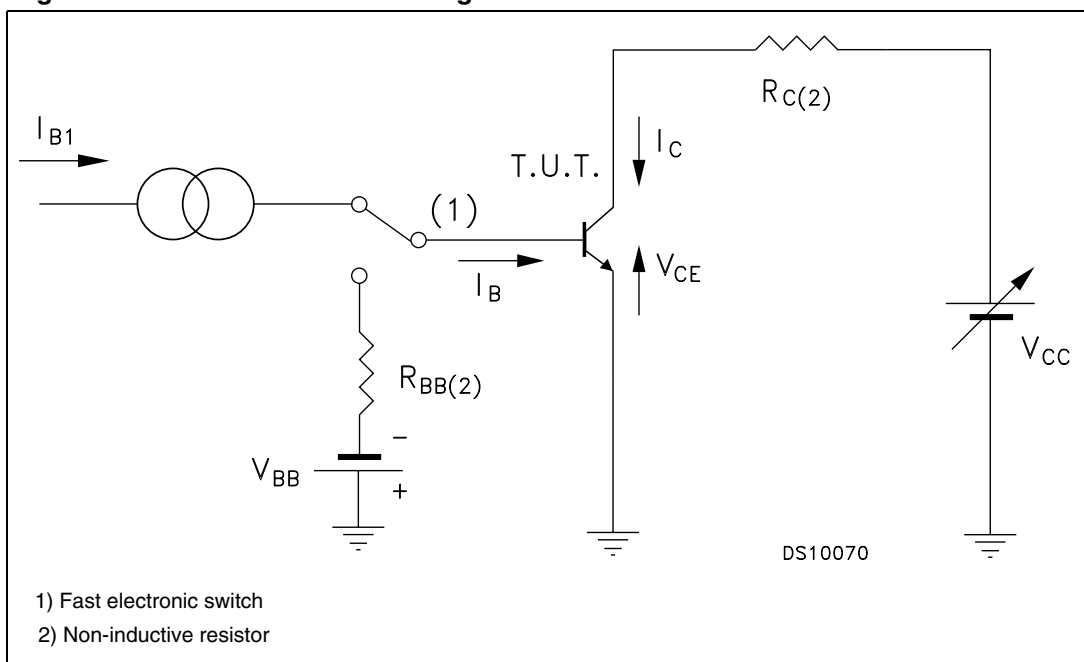


The figure contains two graphs, one for the HV42270 comparator (left) and one for the HV42280 comparator (right). Both graphs plot time in nanoseconds (ns) on the y-axis against collector current  $I_c$  in Amperes (A) on the x-axis. The y-axis is logarithmic, with major ticks at 100, 200, 400, 1000, 2000, and 4000. The x-axis is linear, ranging from 0 to 5 A.

**Left Graph (HV42270):** The y-axis is labeled  $t$ (ns). Two curves are shown:  $t_s$  (storage time) and  $t_f$  (fall time).  $t_s$  starts at approximately 2500 ns at  $I_c = 1$  A, peaks at about 3500 ns around  $I_c = 2$  A, and then decreases to about 1500 ns at  $I_c = 5$  A.  $t_f$  starts at approximately 300 ns at  $I_c = 1$  A and increases to about 1000 ns at  $I_c = 5$  A. The graph includes the following parameters:  $V_{CC} = 30V$ ,  $I_{B1} = -I_{B2}$ ,  $V_{BB(off)} = -5V$ , and  $h_{FE} = 250$ .

**Right Graph (HV42280):** The y-axis is labeled  $t$ (ns). Two curves are shown:  $t_s$  (storage time) and  $t_f$  (fall time).  $t_s$  starts at approximately 1200 ns at  $I_c = -1$  A, remains relatively flat until  $I_c = -2$  A, and then decreases to about 200 ns at  $I_c = -5$  A.  $t_f$  starts at approximately 500 ns at  $I_c = -1$  A and increases to about 700 ns at  $I_c = -5$  A. The graph includes the following parameters:  $V_{CC} = -30V$ ,  $-I_{B1} = I_{B2}$ ,  $V_{BB(off)} = 5V$ , and  $h_{FE} = 250$ .

**Figure 16. Resistive load switching test circuit**



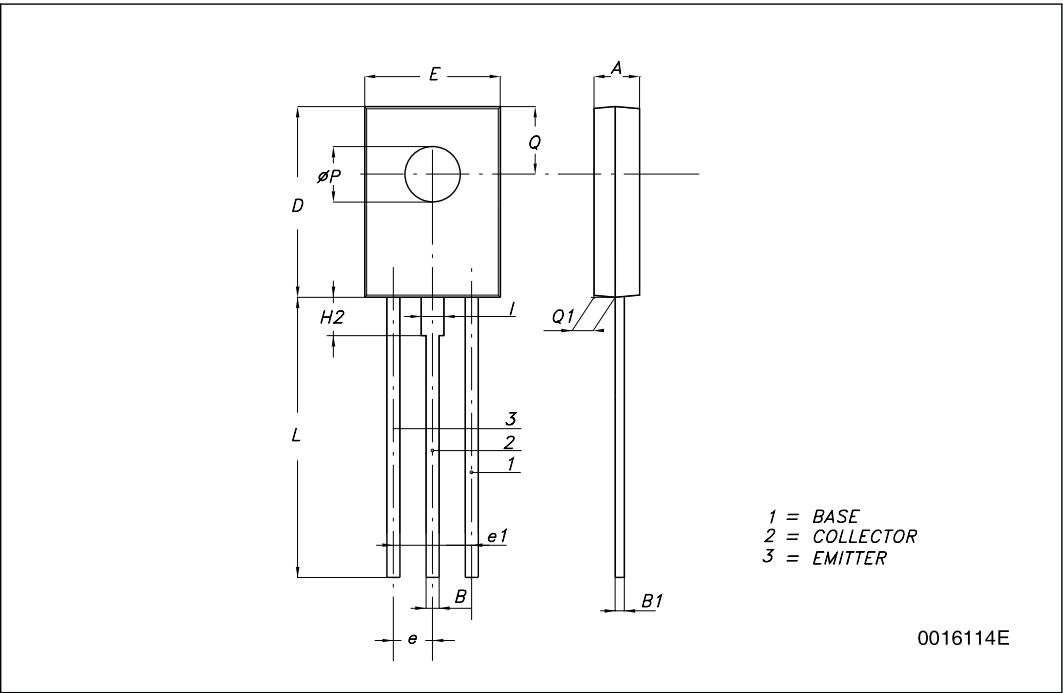
**Note:** For PNP types voltage e current values are negative.

### 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](http://www.st.com)

SOT-32 (TO-126) MECHANICAL DATA

| DIM. | mm.  |      |       |
|------|------|------|-------|
|      | MIN. | TYP  | MAX.  |
| A    | 2.4  |      | 2.9   |
| B    | 0.64 |      | 0.88  |
| B1   | 0.39 |      | 0.63  |
| D    | 10.5 |      | 11.05 |
| E    | 7.4  |      | 7.8   |
| e    | 2.04 | 2.29 | 2.54  |
| e1   | 4.07 | 4.58 | 5.08  |
| L    | 15.3 |      | 16    |
| P    | 2.9  |      | 3.2   |
| Q    |      | 3.8  |       |
| Q1   | 1    |      | 1.52  |
| H2   |      | 2.15 |       |
| I    |      | 1.27 |       |



## 4 Revision history

**Table 4. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                                    |
|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21-Jun-2004 | 4        |                                                                                                                                                                                                                                            |
| 14-Jan-2008 | 5        | <ol style="list-style-type: none"><li>1. Technology change from epybase to planar.</li><li>2. Updated <a href="#">Section 2.1: Typical characteristic (curves) on page 6</a></li><li>3. Content reworked to improve readability.</li></ol> |

**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 AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, 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. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

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.

© 2008 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](http://www.st.com)