

## Low drop power Schottky rectifier

### Main product characteristics

|             |         |
|-------------|---------|
| $I_{F(AV)}$ | 2 A     |
| $V_{RRM}$   | 25 V    |
| $T_j$ (max) | 150° C  |
| $V_F$ (max) | 0.375 V |

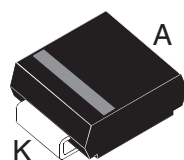
### Features and benefits

- Very low forward voltage drop for less power dissipation
- Optimized conduction/reverse losses trade-off which means the highest efficiency in the applications
- Avalanche capability specified

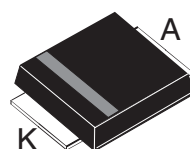
### Description

Single Schottky rectifier suited to switched mode power supplies and high frequency DC to DC converters.

Packaged in SMB, SMB flat for thermal resistance characteristic improvement, this device is especially intended for use in parallel with MOSFETs in synchronous rectification.



**SMB  
STPS2L25U**



**SMB flat  
STPS2L25UF**

**Table 1. Absolute ratings (limiting values)**

| Symbol      | Parameter                                     |          |                                                     | Value        | Unit |
|-------------|-----------------------------------------------|----------|-----------------------------------------------------|--------------|------|
| $V_{RRM}$   | Repetitive peak reverse voltage               |          |                                                     | 25           | V    |
| $I_{F(AV)}$ | Average forward current                       | SMB      | $T_L = 125^\circ \text{C} \quad \delta = 0.5$       | 2            | A    |
|             |                                               | SMB flat | $T_L = 135^\circ \text{C} \quad \delta = 0.5$       |              |      |
| $I_{FSM}$   | Surge non repetitive forward current          |          | $t_p = 10 \text{ ms sinusoidal}$                    | 75           | A    |
| $P_{ARM}$   | Repetitive peak avalanche power               |          | $t_p = 1 \mu\text{s} \quad T_j = 25^\circ \text{C}$ | 1500         | W    |
| $T_{stg}$   | Storage temperature range                     |          |                                                     | -65 to + 150 | °C   |
| $T_j$       | Operating junction temperature <sup>(1)</sup> |          |                                                     | 150          | °C   |

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

# 1 Characteristics

**Table 2. Thermal resistance**

| Symbol        | Parameter        |          | Value | Unit |
|---------------|------------------|----------|-------|------|
| $R_{th(j-l)}$ | Junction to lead | SMB      | 25    | °C/W |
|               |                  | SMB flat | 15    |      |

**Table 3. Static electrical characteristics**

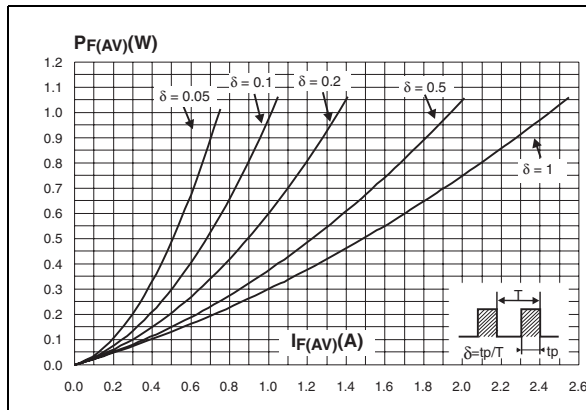
| Symbol      | Parameter               | Test Conditions            |                     | Min. | Typ.  | Max.  | Unit          |
|-------------|-------------------------|----------------------------|---------------------|------|-------|-------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_J = 25^\circ \text{C}$  | $V_R = V_{RRM}$     |      |       | 90    | $\mu\text{A}$ |
|             |                         | $T_J = 125^\circ \text{C}$ |                     |      | 15    | 30    | mA            |
| $V_F^{(1)}$ | Forward voltage drop    | $T_J = 25^\circ \text{C}$  | $I_F = 2 \text{ A}$ |      |       | 0.45  | V             |
|             |                         | $T_J = 125^\circ \text{C}$ |                     |      | 0.325 | 0.375 |               |
|             |                         | $T_J = 25^\circ \text{C}$  | $I_F = 4 \text{ A}$ |      |       | 0.53  |               |
|             |                         | $T_J = 125^\circ \text{C}$ |                     |      | 0.43  | 0.51  |               |

1. Pulse test:  $t_p = 380 \mu\text{s}$ ,  $\delta < 2\%$

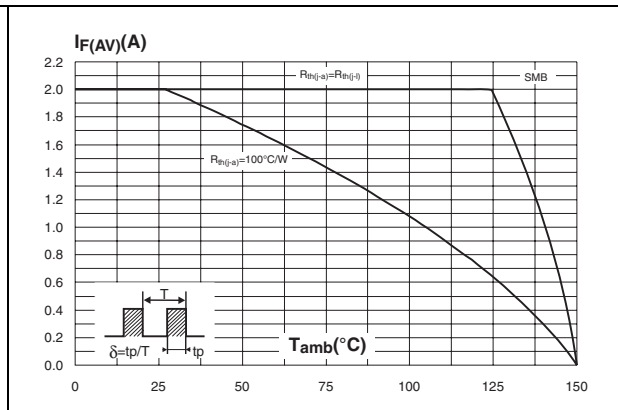
To evaluate the maximum conduction losses, use the following equation:

$$P = 0.24 \times I_{F(AV)} + 0.068 I_{F(RMS)}^2$$

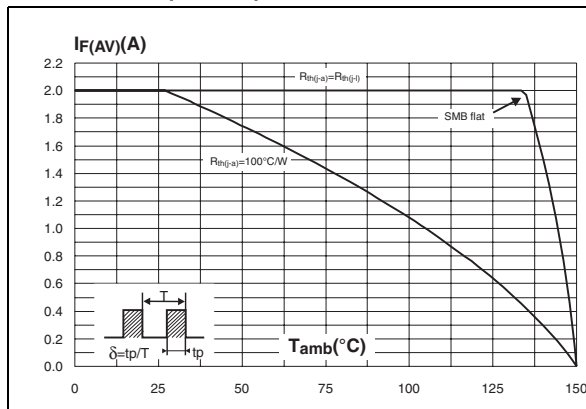
**Figure 1. Average forward power dissipation versus average forward current**



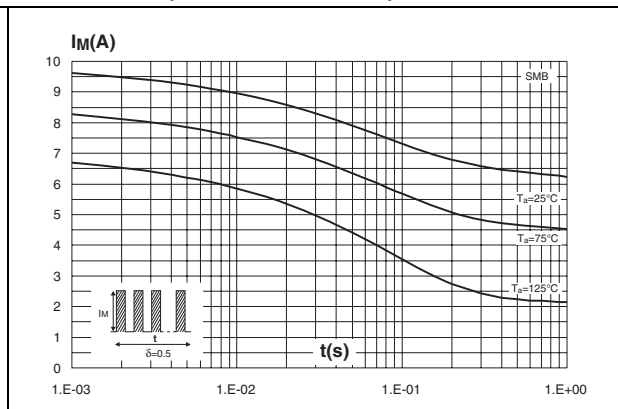
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ ) SMB**



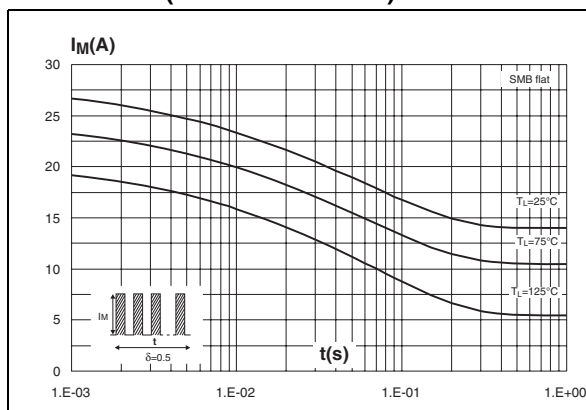
**Figure 3. Average forward current versus ambient temperature ( $\delta = 0.5$ ) SMB flat**



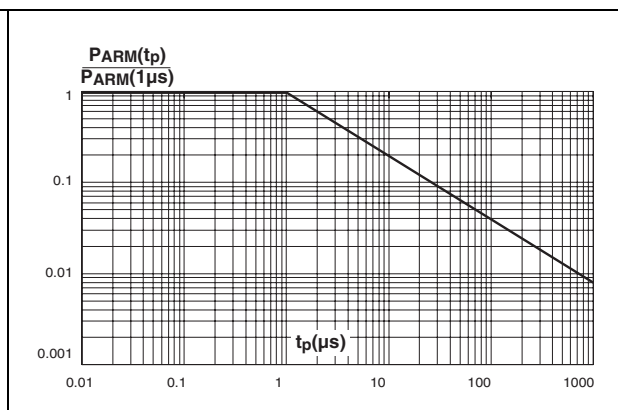
**Figure 4. Non repetitive surge peak forward current versus overload duration (maximum values) SMB**



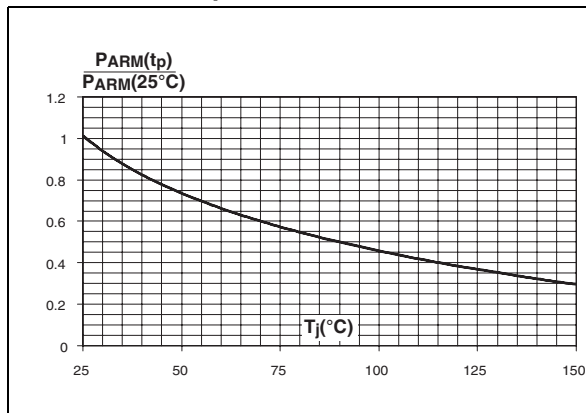
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values) SMB flat**



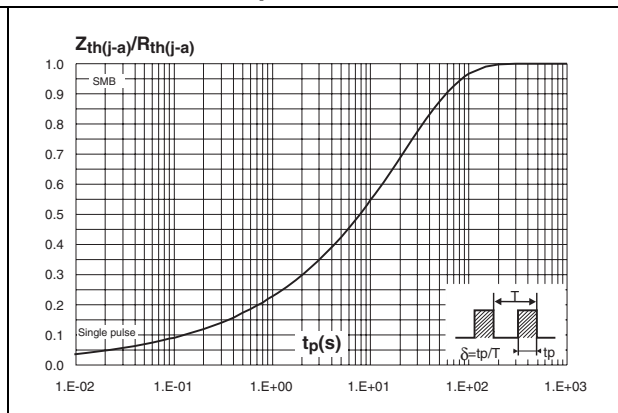
**Figure 6. Normalized avalanche power derating versus pulse duration**



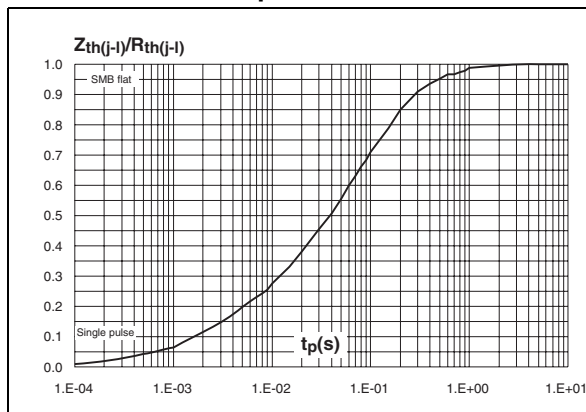
**Figure 7. Normalized avalanche power derating versus junction temperature**



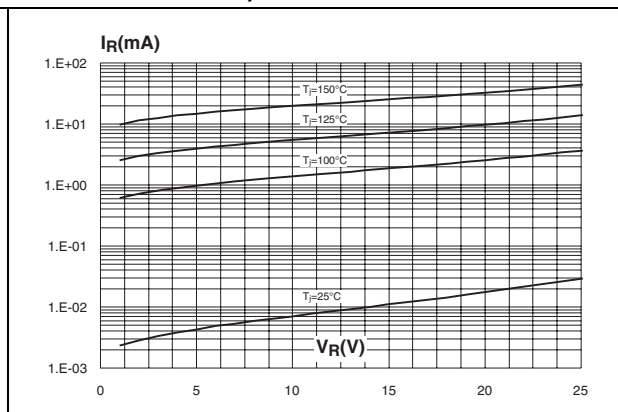
**Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration - SMB**



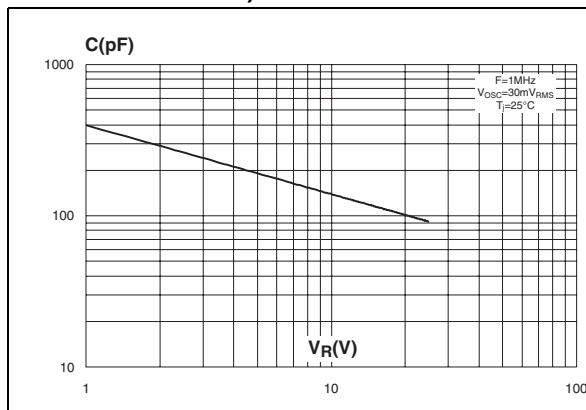
**Figure 9. Relative variation of thermal impedance junction to lead versus pulse duration - SMB flat**



**Figure 10. Reverse leakage current versus reverse voltage applied (typical values)**



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 12. Forward voltage drop versus forward current (typical values)**

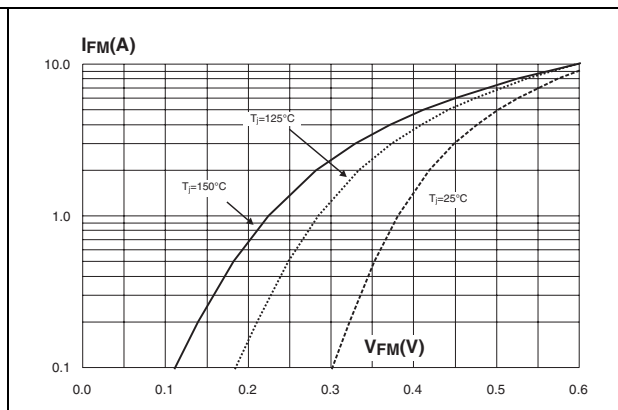


Figure 13. Forward voltage drop versus forward current (maximum values, high level)

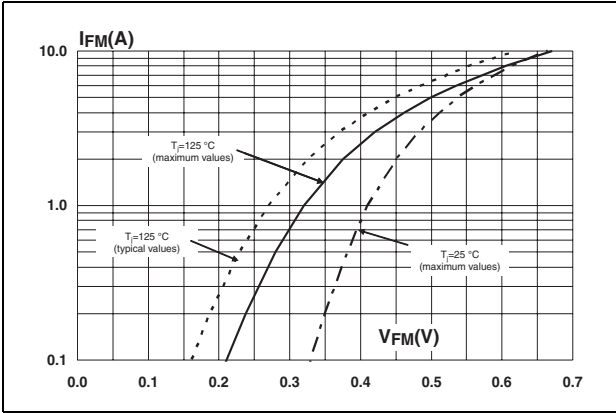


Figure 14. Forward voltage drop versus forward current (maximum values, low level)

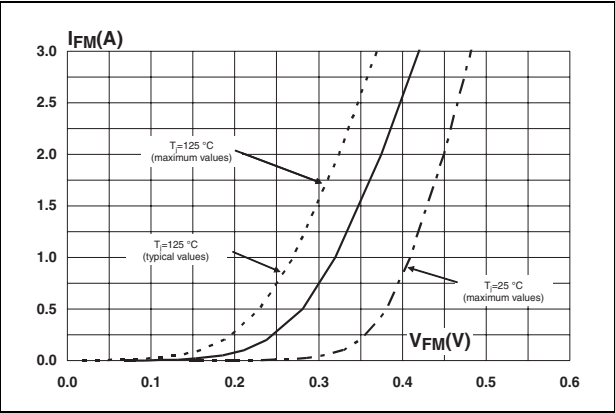
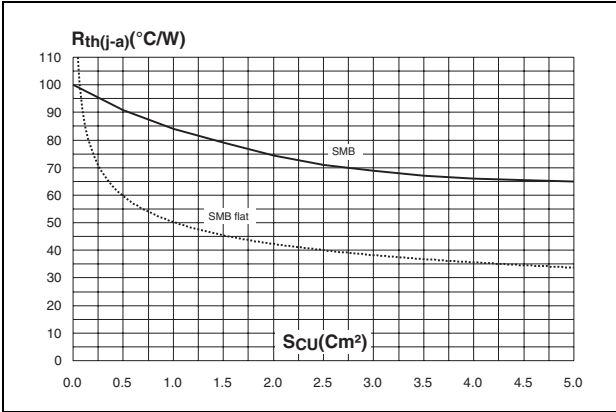


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed board FR4,  $e_{CU}=35\mu\text{m}$ )



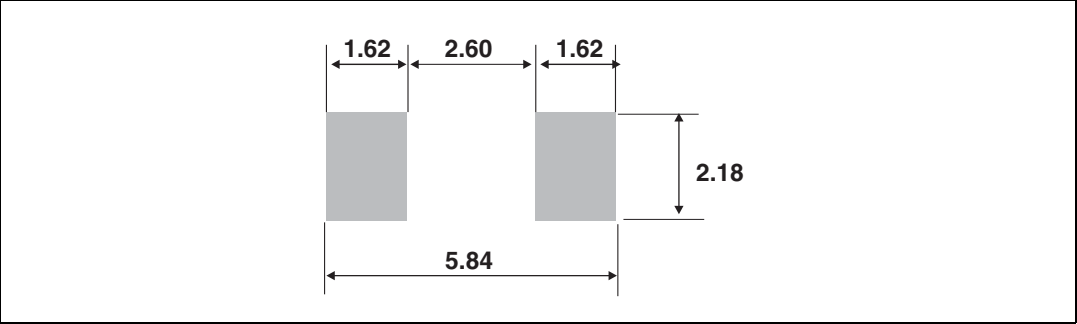
2 Package information

- Epoxy meets UL94, V0

Table 4. SMB dimensions

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.096 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 1.95        | 2.20 | 0.077  | 0.087 |
| c    | 0.15        | 0.40 | 0.006  | 0.016 |
| E    | 5.10        | 5.60 | 0.201  | 0.220 |
| E1   | 4.05        | 4.60 | 0.159  | 0.181 |
| D    | 3.30        | 3.95 | 0.130  | 0.156 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

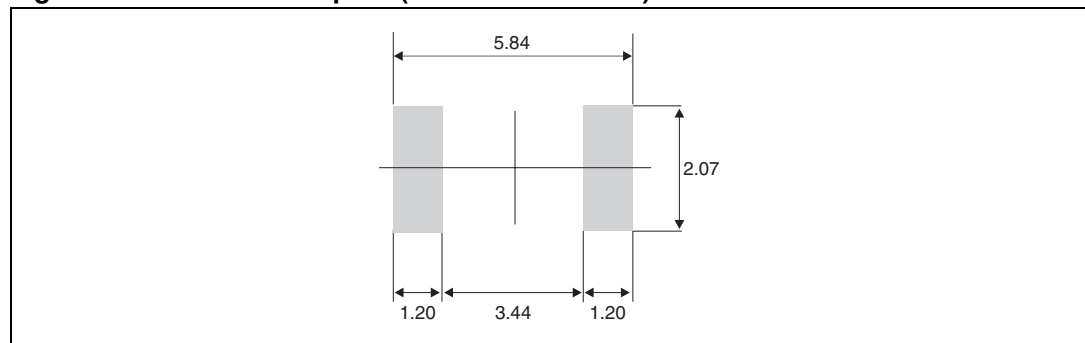
Figure 16. SMB footprint (dimensions in mm)



**Table 5. SMB Flat dimensions**

| Ref.             | Dimensions  |      |      |        |       |       |
|------------------|-------------|------|------|--------|-------|-------|
|                  | Millimeters |      |      | Inches |       |       |
|                  | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A                | 0.90        |      | 1.10 | 0.035  |       | 0.043 |
| b <sup>(1)</sup> | 1.95        |      | 2.20 | 0.077  |       | 0.087 |
| c <sup>(1)</sup> | 0.15        |      | 0.40 | 0.006  |       | 0.016 |
| D                | 3.30        |      | 3.95 | 0.130  |       | 0.156 |
| E                | 5.10        |      | 5.60 | 0.200  |       | 0.220 |
| E1               | 4.05        |      | 4.60 | 0.189  |       | 0.181 |
| L                | 0.75        |      | 1.50 | 0.029  |       | 0.059 |
| L1               |             | 0.40 |      |        | 0.016 |       |
| L2               |             | 0.60 |      |        | 0.024 |       |

1. Applies to plated leads

**Figure 17. SMB Flat footprint (dimensions in mm)**

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).

### 3 Ordering information

| Ordering type | Marking | Package  | Weight  | Base qty | Delivery mode |
|---------------|---------|----------|---------|----------|---------------|
| STPS2L25U     | G23     | SMB      | 0.107 g | 2500     | Tape and reel |
| STPS2L25UF    | FG23    | SMB flat | 0.50 g  | 5000     | Tape and reel |

### 4 Revision history

| Date        | Revision | Changes                                                                           |
|-------------|----------|-----------------------------------------------------------------------------------|
| July 2003   | 4A       | Last update                                                                       |
| 08-Feb-2007 | 5        | Reformatted to current standard. Added ECOPACK statement. Added SMB flat package. |



**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.

© 2007 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)