

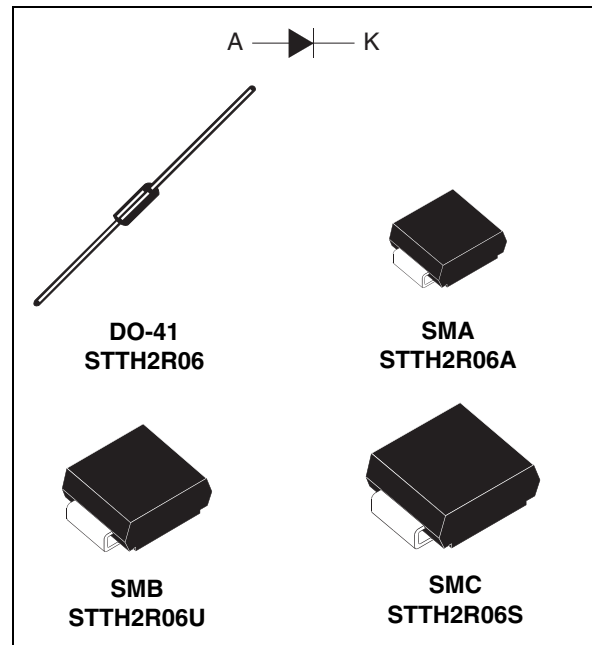
## High efficiency ultrafast diode

### Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

### Description

The STTH2R06 uses ST Turbo 2 600 V planar Pt doping technology. It is specially suited for switching mode base drive and transistor circuits. Packaged in axial, SMA, SMB and SMC, this device is intended for use in high frequency inverters, free wheeling and polarity protection.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 A
$V_{RRM}$	600 V
$T_j$	175 °C
$V_F(\text{typ})$	1.0 V
$t_{rr}(\text{typ})$	35 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		600	V	
$I_{F(RMS)}$	Forward rms current		7	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	DO-41	$T_L = 70\text{ }^\circ\text{C}$	2	A
		SMA	$T_L = 85\text{ }^\circ\text{C}$		
		SMB	$T_L = 100\text{ }^\circ\text{C}$		
		SMC	$T_L = 115\text{ }^\circ\text{C}$		
$I_{FSM}$	Surge non repetitive forward current	DO-41	$t_p = 10\text{ms}$ sinusoidal	40	A
		SMA / SMB / SMC		30	
$T_{stg}$	Storage temperature range		-65 to + 175	$^\circ\text{C}$	
$T_j$	Operating junction temperature range		-40 to + 175	$^\circ\text{C}$	

**Table 3. Thermal resistance**

Symbol	Parameter		Maximum	Unit
$R_{th(j-l)}$	Junction to lead	DO-41 L = 5 mm	35	$^\circ\text{C/W}$
		SMA	30	
		SMB	25	
		SMC	20	

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	$V_R = V_{RRM}$	-	-	2	$\mu\text{A}$
		$T_j = 150\text{ }^\circ\text{C}$		-	12	85	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 2\text{ A}$	-	-	1.7	V
		$T_j = 150\text{ }^\circ\text{C}$		-	1.0	1.25	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

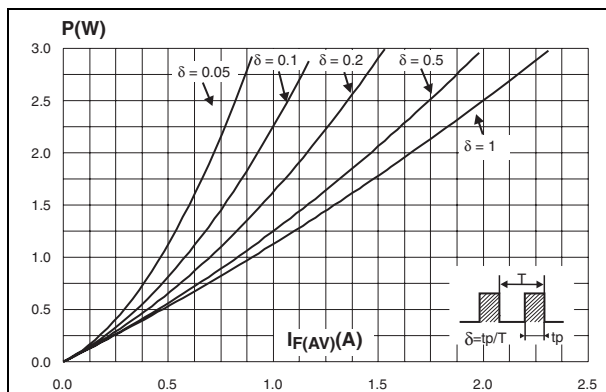
To evaluate the maximum conduction losses use the following equation:

$$P = 1 \times I_{F(AV)} + 0.125 I_{F(RMS)}^2$$

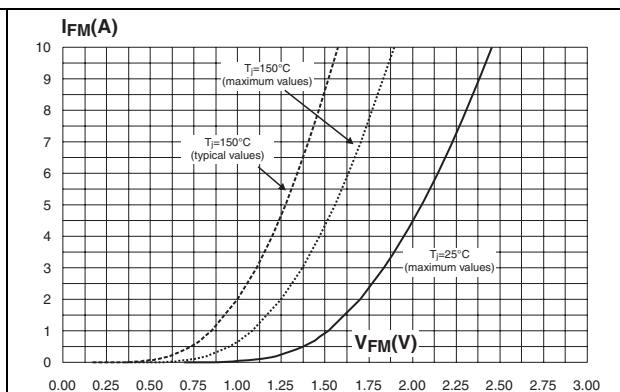
**Table 5. Dynamic electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$	-	-	30	ns
			$I_F = 1\text{ A}, \frac{dI_F}{dt} = -50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	35	50	
$t_{fr}$	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 2\text{ A}, \frac{dI_F}{dt} = 100\text{ A}/\mu\text{s}$	-	-	100	ns
$V_{FP}$	Forward recovery voltage			-	-	10	V

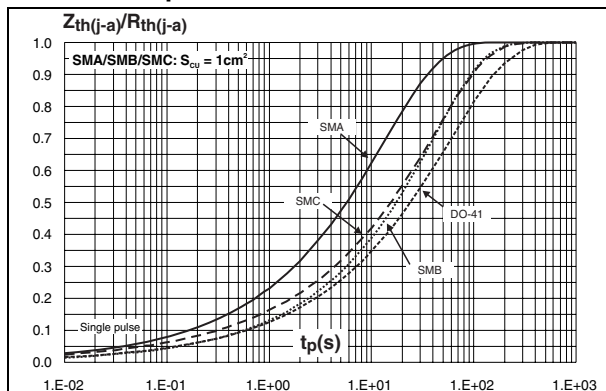
**Figure 1. Conduction losses versus average forward current**



**Figure 2. Forward voltage drop versus forward current**



**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



**Figure 4. Peak reverse recovery current versus dI\_F/dt (typical values)**

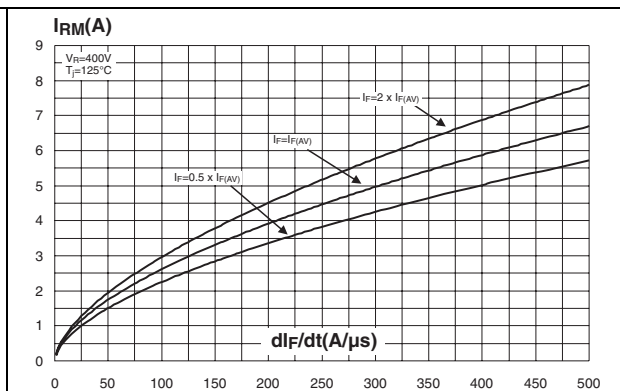


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)

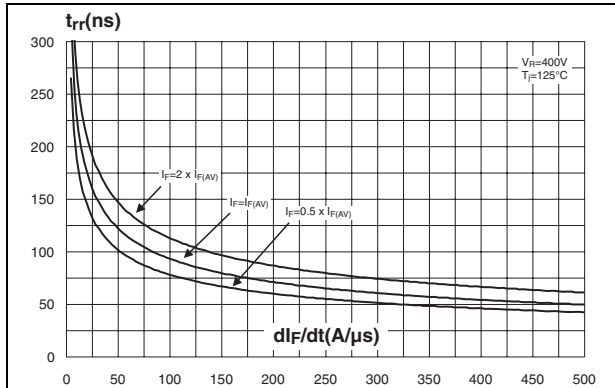


Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)

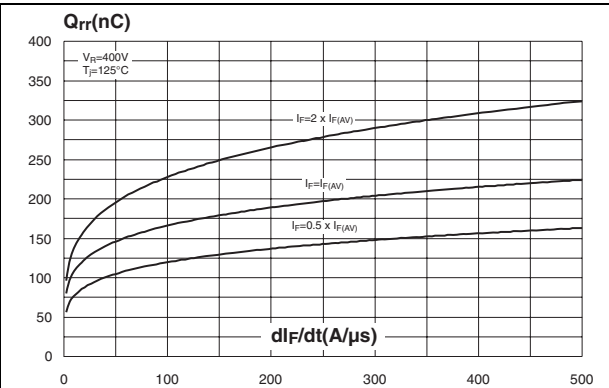


Figure 7. Relative variations of dynamic parameters versus junction temperature

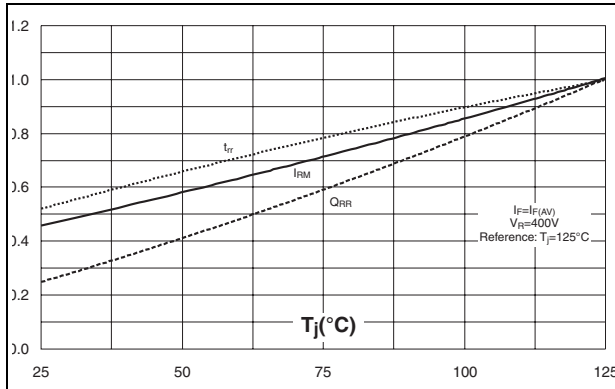


Figure 8. Transient peak forward voltage versus  $di_F/dt$  (typical values)

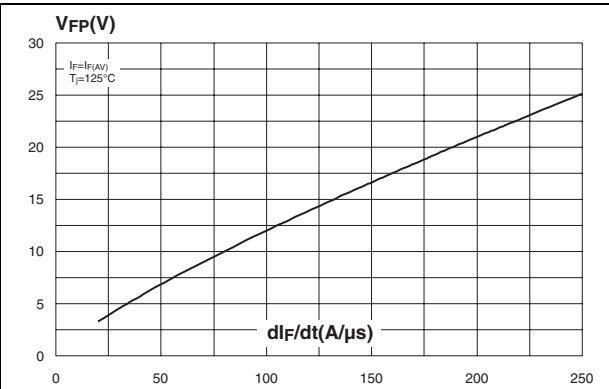


Figure 9. Forward recovery time versus  $di_F/dt$  (typical values)

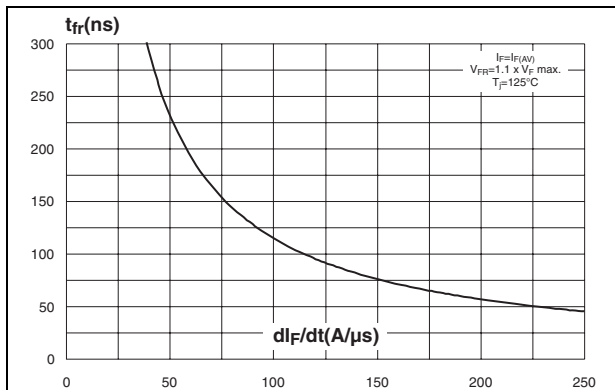


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

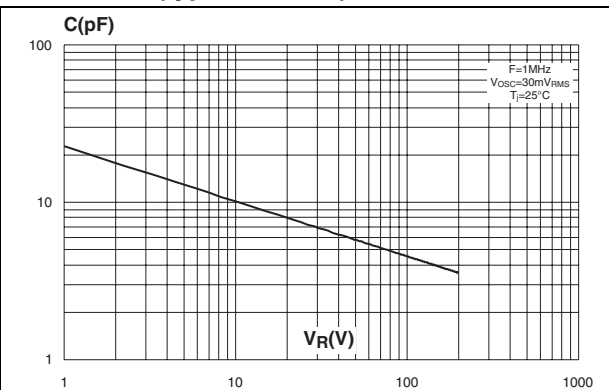


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead

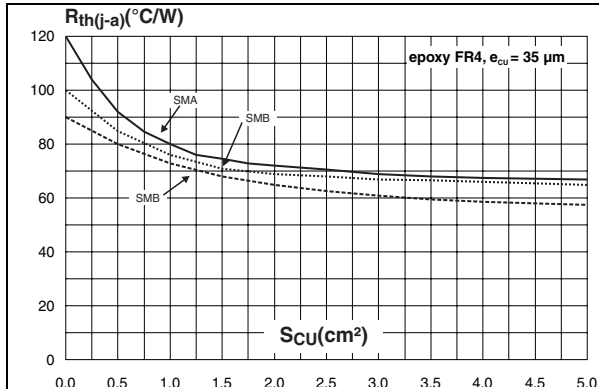
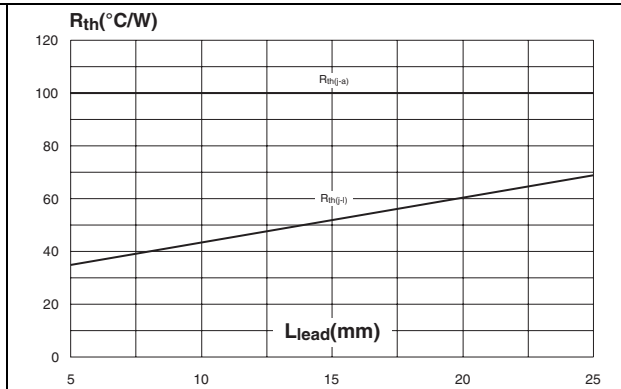


Figure 12. Thermal resistance versus lead length (DO-41)



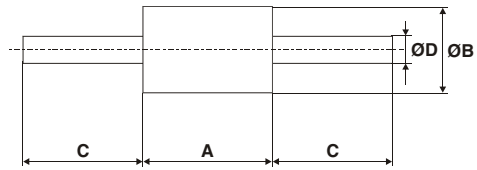
## 2 Package information

- Epoxy meets UL 94, V0
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Table 6. DO-41 (plastic) dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.07	5.20	0.160	0.205
B	2.04	2.71	0.080	0.107
C	25.4		1	
D	0.71	0.86	0.028	0.034



**Table 7. SMA dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

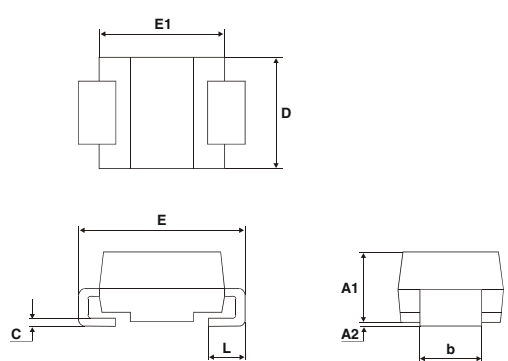


Figure 13. Footprint (dimensions in mm)

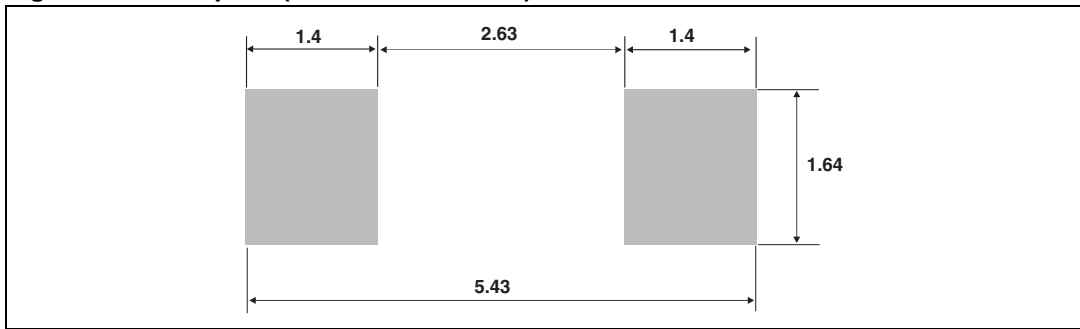
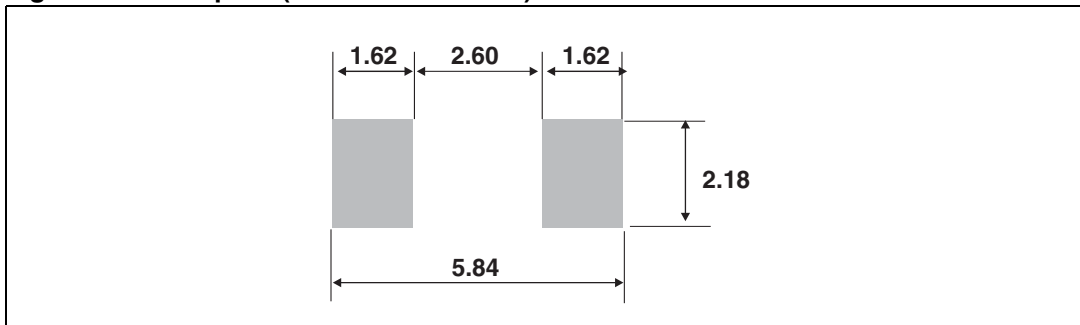


Table 8. SMB dimensions

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
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 14. Footprint (dimensions in mm)

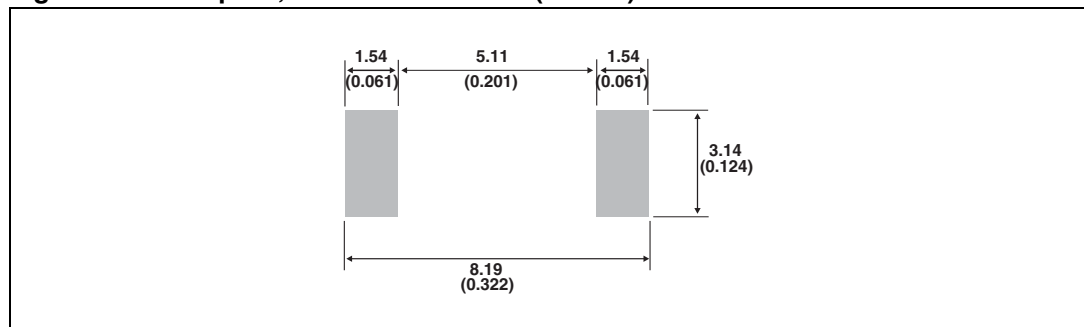


**Table 9. SMC dimensions**

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 <sup>(1)</sup>	2.90	3.20	0.114	0.126
c <sup>(1)</sup>	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

**Figure 15. Footprint, dimensions in mm (inches)**





### 3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH2R06	STTH2R06	DO-41	0.34 g	2000	Ammopack
STTH2R06RL	STTH2R06	DO-41	0.34 g	5000	Tape and reel
STTH2R06A	R6A	SMA	0.068 g	5000	Tape and reel
STTH2R06U	R6U	SMB	0.11 g	2500	Tape and reel
STTH2R06S	R62	SMC	0.243 g	2500	Tape and reel

### 4 Revision history

Table 11. Document revision history

Date	Revision	Changes
07-Sep-2004	1	First issue
1-Jun-2005	2	SMC package addition.
30-Sep-2009	3	Updated <a href="#">Table 6</a> package dimensions.
04-Dec-2009	4	Updated <a href="#">Table 9</a> package dimensions.

**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.

© 2009 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

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