

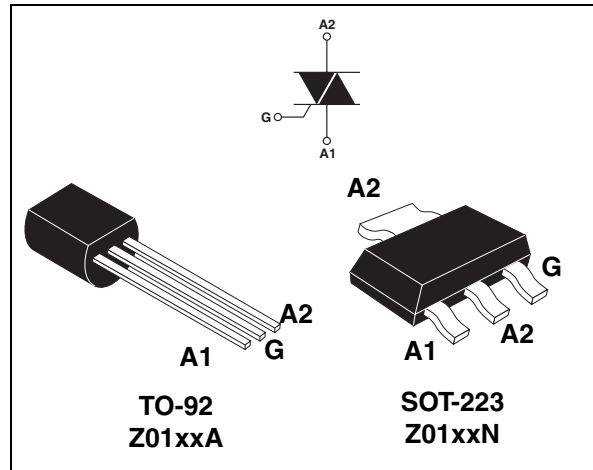
### Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	1	A
$V_{DRM}/V_{RRM}$	600 to 800	V
$I_{GT} (Q_1)$	3 to 25	mA

### Description

The Z01 series is suitable for general purpose AC switching applications. They can be found in applications such as home appliances (electrovalve, pump, door lock, small lamp control), fan speed controllers,...

Different gate current sensitivities are available, allowing optimized performances when controlled directly from microcontrollers.



### Order Codes

Part Number	Marking
Z01xxA	See <a href="#">Ordering information on page 7</a>
Z01xxN	

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit	
$I_{T(RMS)}$	RMS on-state current (full sine wave)	SOT-223 $T_{tab} = 90^{\circ} C$	1	A
		TO-92 $T_L = 50^{\circ} C$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^{\circ} C$ )	F = 50 Hz t = 20 ms	8	A
		F = 60 Hz t = 16.7 ms		
$I^2t$	$I^2t$ Value for fusing	$t_p = 10$ ms	0.35	$A^2s$
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100$ ns	F = 120 Hz $T_j = 125^{\circ} C$	20	A/ $\mu s$
$I_{GM}$	Peak gate current	$t_p = 20$ $\mu s$ $T_j = 125^{\circ} C$	1	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^{\circ} C$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range		- 40 to + 150 - 40 to + 125	$^{\circ} C$

# 1 Characteristics

**Table 2. Electrical characteristics** ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Test Conditions	Quadrant		Z01				Unit
				03	07	09	10	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 30\ \Omega$	I - II - III	MAX	3	5	10	25	mA
		IV		5	7	10	25	
$V_{GT}$		ALL	MAX	1.3				V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\ \text{k}\Omega$ $T_j = 125^\circ\text{C}$	ALL	MIN	0.2				V
$I_H^{(2)}$	$I_T = 50\ \text{mA}$		MX.	7	10	10	25	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III - IV	MAX	7	10	15	25	mA
		II		15	20	25	50	
$dV/dt^{(2)}$	$V_D = 67\% V_{DRM}$ gate open $T_j = 110^\circ\text{C}$		MIN	10	20	50	100	V/ $\mu\text{s}$
$(dI/dt)_c^{(2)}$	$(dI/dt)_c = 0.44\ \text{A/ms}$ $T_j = 110^\circ\text{C}$		MIN	0.5	1	2	5	V/ $\mu\text{s}$

1. minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

2. for both polarities of A2 referenced to A1.

**Table 3. Static characteristics**

Symbol	Test Conditions			Value	Unit	
$V_{TM}^{(1)}$	$I_{TM} = 1.4\ \text{A}$	$t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.	1.56	V
$V_{to}^{(1)}$	Threshold voltage		$T_j = 125^\circ\text{C}$	MAX.	0.95	V
$R_d^{(1)}$	Dynamic resistance		$T_j = 125^\circ\text{C}$	MAX.	400	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$		$T_j = 25^\circ\text{C}$	MAX.	5	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		0.5	mA

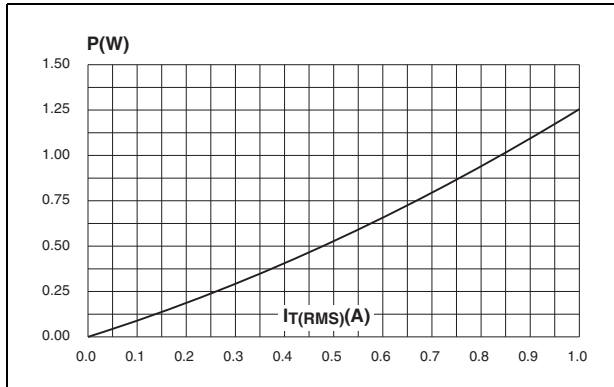
1. for both polarities of A2 referenced to A1.

**Table 4. Thermal resistances**

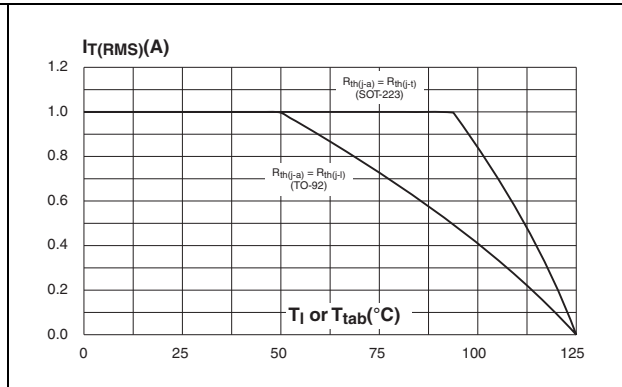
Symbol	Parameter		Value	Unit
$R_{th(j-t)}$	Junction to tab (AC)	SOT-223	25	$^\circ\text{C/W}$
$R_{th(j-l)}$	Junction to lead (AC)	TO-92	60	
$R_{th(j-a)}$	Junction to ambient	$S^{(1)} = 5\ \text{cm}^2$ SOT-223	60	$^\circ\text{C/W}$
		TO-92	150	

1. S = Copper surface under tab.

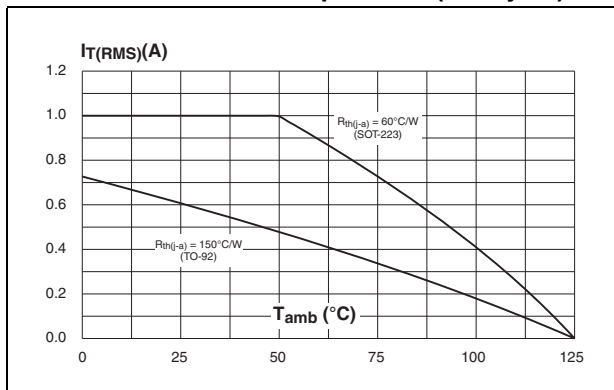
**Figure 1. Maximum power dissipation versus RMS on-state current (full cycle)**



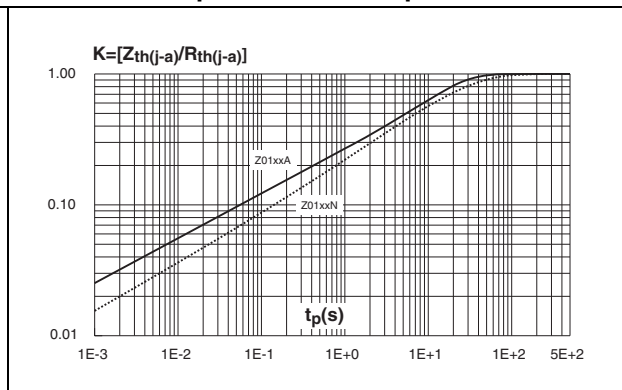
**Figure 2. RMS on-state current versus lead (TO-92) or tab (SOT-223) temperature (full cycle)**



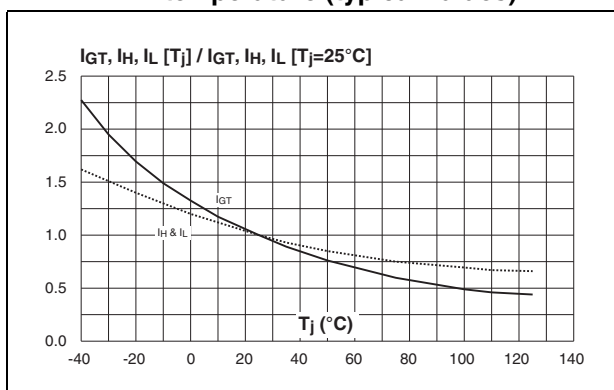
**Figure 3. RMS on-state current versus ambient temperature (full cycle)**



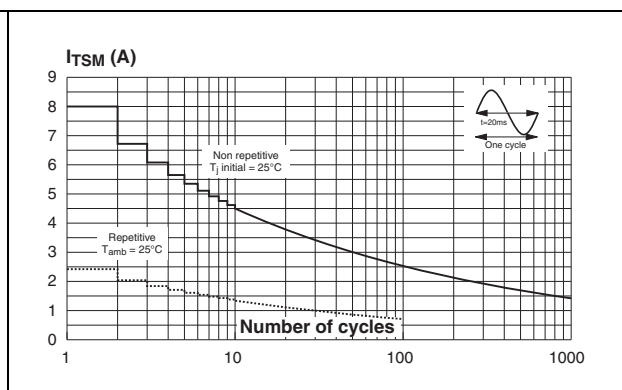
**Figure 4. Relative variation of thermal impedance versus pulse duration**



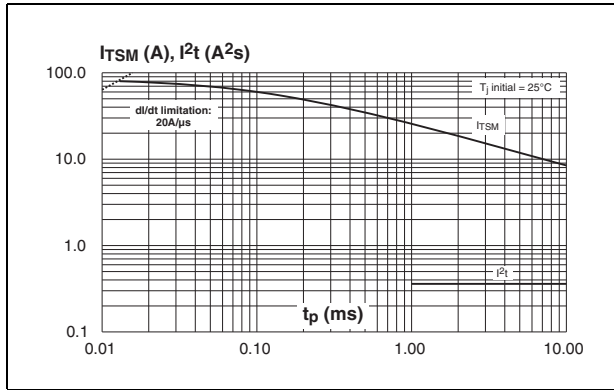
**Figure 5. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**



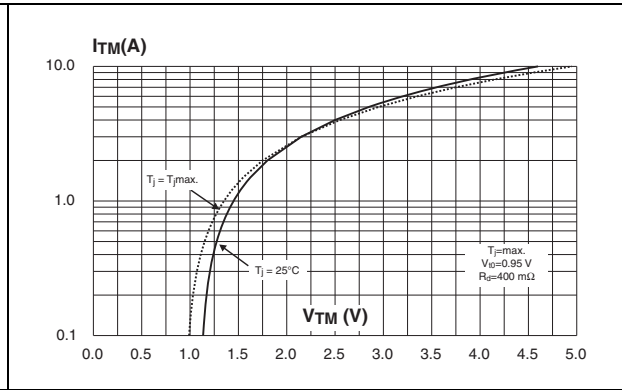
**Figure 6. Surge peak on-state current versus number of cycles**



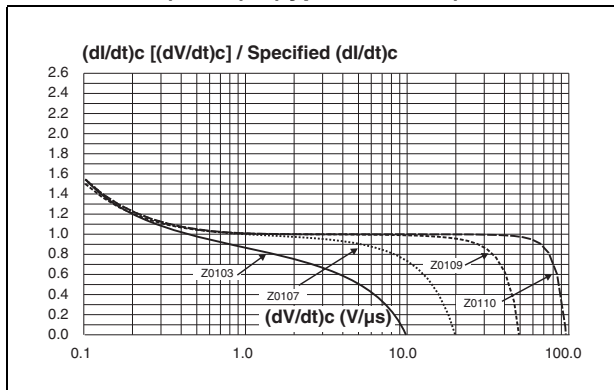
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms and corresponding value of  $I^2t$**



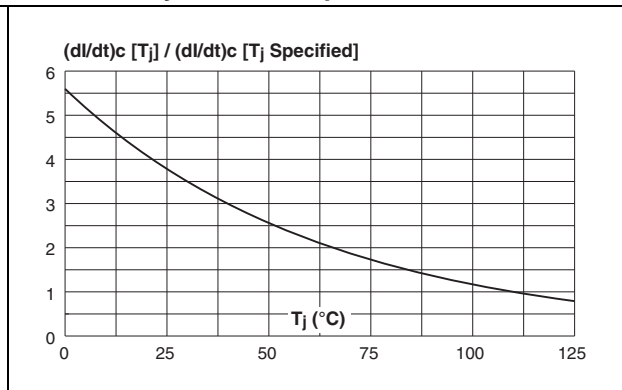
**Figure 8. On-state characteristics (maximum values)**



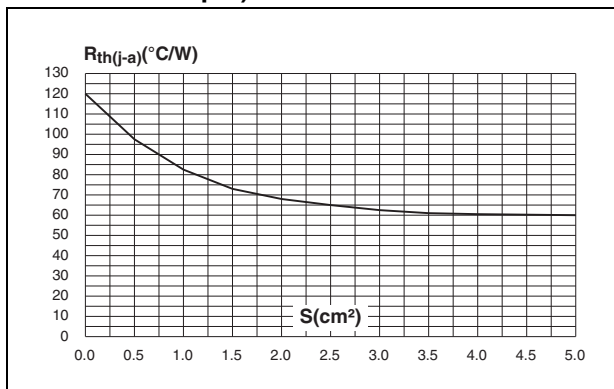
**Figure 9. Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values)**



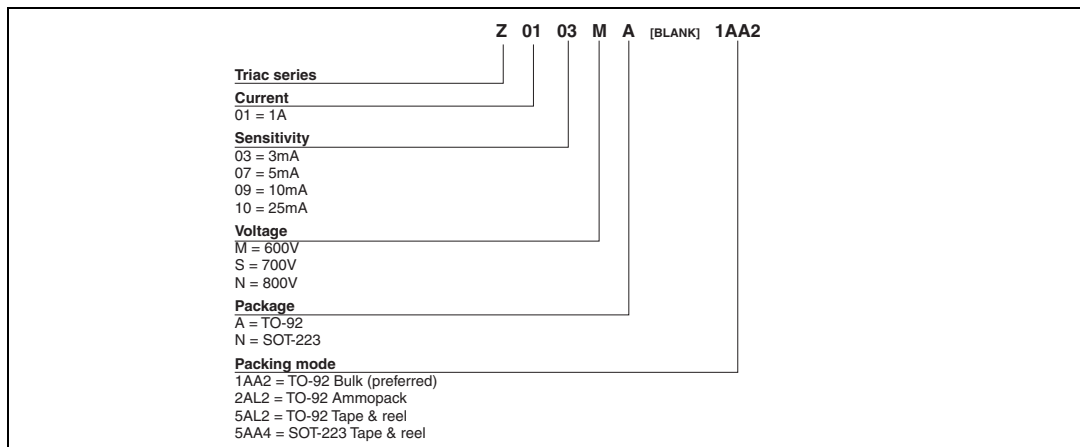
**Figure 10. Relative variation of critical rate of decrease of main current versus junction temperature**



**Figure 11. SOT-223 Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35  $\mu$ m)**



## 2 Ordering information scheme



**Table 5. Product Selector**

Part Number	Voltage			Sensitivity	Type	Package
	600 V	700 V	800 V			
Z0103MA	X			3 mA	Standard	TO-92
Z0103MN	X			3 mA	Standard	SOT-223
Z0103SA		X		3 mA	Standard	TO-92
Z0103SN		X		3 mA	Standard	SOT-223
Z0103NA			X	3 mA	Standard	TO-92
Z0103NN			X	3 mA	Standard	SOT-223
Z0107MA	X			5 mA	Standard	TO-92
Z0107MN	X			5 mA	Standard	SOT-223
Z0107SA		X		5 mA	Standard	TO-92
Z0107SN		X		5 mA	Standard	SOT-223
Z0107NA			X	5 mA	Standard	TO-92
Z0107NN			X	5 mA	Standard	SOT-223
Z0109MA	X			10 mA	Standard	TO-92
Z0109MN	X			10 mA	Standard	SOT-223
Z0109SA		X		10 mA	Standard	TO-92
Z0109SN		X		10 mA	Standard	SOT-223
Z0109NA			X	10 mA	Standard	TO-92
Z0109NN			X	10 mA	Standard	SOT-223
Z0110MA	X			25 mA	Standard	TO-92
Z0110MN	X			25 mA	Standard	SOT-223
Z0110SA		X		25 mA	Standard	TO-92
Z0110SN		X		25 mA	Standard	SOT-223
Z0110NA			X	25 mA	Standard	TO-92
Z0110NN			X	25 mA	Standard	SOT-223

### 3 Packaging information

Table 6. SOT-223 Dimensions

REF.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.80			0.071
A1		0.02			0.001	
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.3			0.090	
e1		4.6			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V	10° max					

Figure 12. SOT-223 Footprint dimensions (in millimeters)

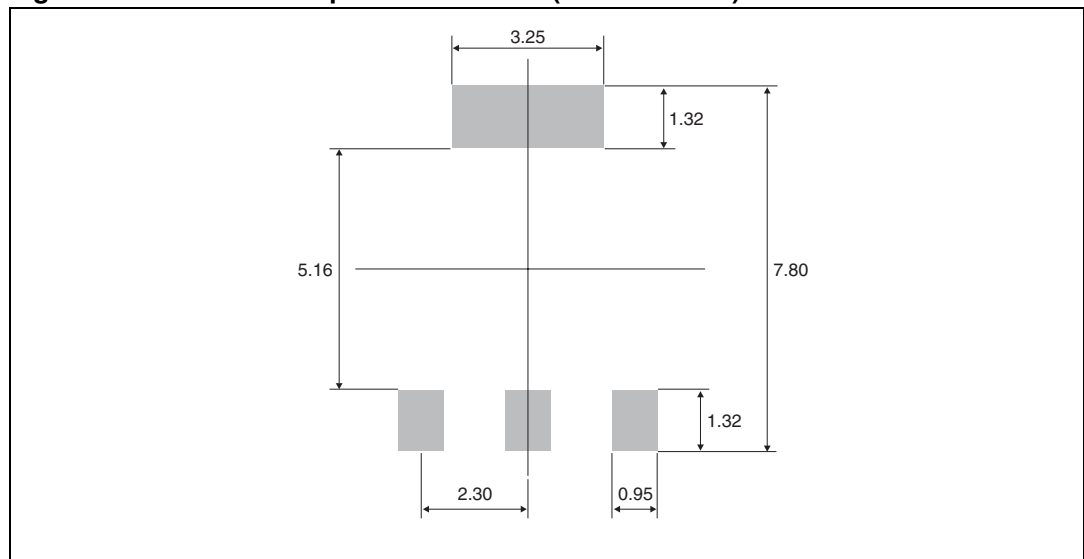


Table 7. TO-92 Dimensions

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		1.35			0.053	
B			4.70			0.185
C		2.54			0.100	
D	4.40			0.173		
E	12.70			0.500		
F			3.70			0.146
a			0.50			0.019

## 4 Ordering information

Ordering type <sup>(1)</sup>	Marking <sup>(1)</sup>	Package	Weight	Base quantity	Delivery mode
Z01xyA 1AA2	Z01xyA	TO-92	0.2 g	2500	Bulk
Z01xyA 2AL2	Z01xyA	TO-92	0.2 g	2000	Ammopack
Z01xyA 5AL2	Z01xyA	TO-92	0.2 g	2000	Tape and reel
Z0103yN 5AA4	Z3y	SOT-223	0.12 g	1000	Tape and reel
Z0107yN 5AA4	Z7y	SOT-223	0.12 g	1000	Tape and reel
Z0109yN 5AA4	Z9y	SOT-223	0.12 g	1000	Tape and reel

1. xx = sensitivity, y = voltage

## 5 Revision History

Date	Revision	Description of Changes
Oct-2001	4	Last update.
10-Feb-2005	5	Package: TO-92 tape and reel delivery mode 5AL2 added.
09-May-2005	6	Table 4 on page 2: typo. mistake corrected 1. (dV/dt) <sub>c</sub> instead of (dI/dt) <sub>c</sub> 2. V/μs unit instead of A/ms
21-Apr-2006	7	Reformatted to current standard. Table 2 on page 2: Typo corrected. Values for I <sub>GT</sub> split into two separate rows.
10-Oct-2006	8	Table 2: modified test conditions for (dV/dt) <sub>c</sub> . Changed “ambient” to “lead or tab” in Figure 2.



**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.

© 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](http://www.st.com)

