

Sensitive high immunity SCRs up to 0.8 A

Features

- $I_{T(RMS)}$ up to 0.8 A
- V_{DRM}/V_{RRM} 400 and 600 V
- I_{GT} from 0.5 to 25 μ A

Description

Thanks to highly sensitive triggering levels, the P011xx SCR series is suitable for all applications where available gate current is limited, such as ground fault circuit interruptors, pilot circuits in solid state relays, standby mode power supplies, smoke and alarm detectors.

Available in through-hole or surface-mount packages, the voltage capability of this series has been upgraded since its introduction and is now available up to 600 V.

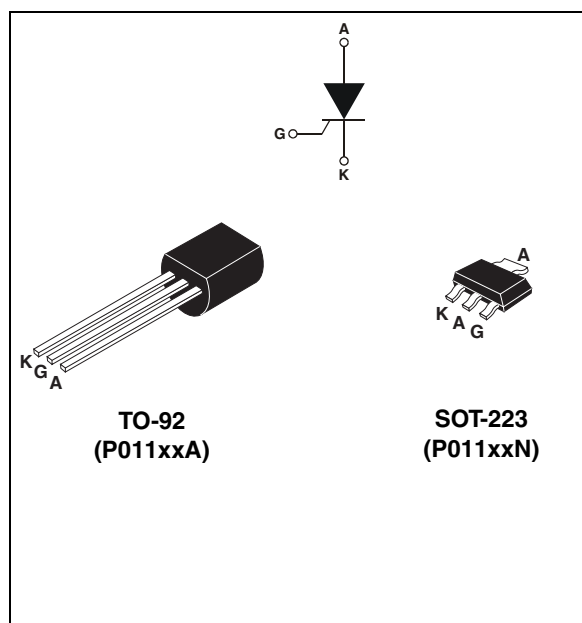


Table 1. Device summary

Order code	Voltage		Sensitivity		Package
	400 V	600 V	Min.	Max.	
P0111DA 1AA3	X		4 μ A	25 μ A	TO-92
P0111DA 5AL3	X		4 μ A	25 μ A	TO-92
P0111DN 5AA4	X		4 μ A	25 μ A	SOT-223
P0111MA 1AA3		X	4 μ A	25 μ A	TO-92
P0111MA2AL3 ⁽¹⁾		X	4 μ A	25 μ A	TO-92
P0111MN 5AA4		X	4 μ A	25 μ A	SOT-223
P0115DA 1AA3	X		15 μ A	50 μ A	TO-92
P0115DA 5AL3	X		15 μ A	50 μ A	TO-92
P0118DA 1AA3	X		0.5 μ A	5 μ A	TO-92
P0118DA 5AL3	X		0.5 μ A	5 μ A	TO-92
P0118DN 5AA4	X		0.5 μ A	5 μ A	SOT-223
P0118MA 2AL3		X	0.5 μ A	5 μ A	TO-92
P0118MA 5AL3		X	0.5 μ A	5 μ A	TO-92

1. This order code has no space.

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)	TO-92	$T_I = 55\text{ °C}$	0.8	A
		SOT-223	$T_{amb} = 70\text{ °C}$		
$I_{T(AV)}$	Average on-state current (180° conduction angle)	TO-92	$T_I = 55\text{ °C}$	0.5	A
		SOT-223	$T_{amb} = 70\text{ °C}$		
I_{TSM}	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	8	A
		$t_p = 10\text{ ms}$		7	
I^2t	I^2t Value for fusing	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	0.24	A^2s
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$	$F = 60\text{ Hz}$	$T_j = 125\text{ °C}$	50	$A/\mu s$
I_{GM}	Peak gate current	$t_p = 20\text{ }\mu s$	$T_j = 125\text{ °C}$	1	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	0.1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	$^{\circ}C$

Table 3. Electrical characteristics ($T_j = 25\text{ °C}$, unless otherwise specified)

Symbol	Test conditions			P0111	P0115	P0118	Unit	
I _{GT}	V _D = 12 V R _L = 140 Ω			Min.	4	15	0.5	μA
				Max.	25	50	5	
V _{GT}				Max.	0.8			V
V _{GD}	V _D = V _{DRM} R _L = 3.3 kΩ R _{GK} = 1 kΩ	T _j = 125 °C		Min.	0.1			V
V _{RG}	I _{RG} = 10 μA			Min.	8			V
I _H	I _T = 50 mA R _{GK} = 1 kΩ			Max.	5			mA
I _L	I _G = 1 mA R _{GK} = 1 kΩ			Max.	6			mA
dV/dt	V _D = 67 % V _{DRM} R _{GK} = 1 kΩ	T _j = 125 °C		Min.	80	75	75	V/μs
V _{TM}	I _{TM} = 1.6 A tp = 380 μs	T _j = 25 °C		Max.	1.95			V
V _{t0}	Threshold voltage		T _j = 125 °C	Max.	0.95			V
R _d	Dynamic resistance		T _j = 125 °C	Max.	600			mΩ
I _{DRM} I _{RRM}	V _{DRM} = V _{RRM} = 400 V R _{GK} = 1 kΩ		T _j = 25 °C	Max.	1			μA
	V _{DRM} = V _{RRM} = 600 V R _{GK} = 1 kΩ				10			
	V _{DRM} = V _{RRM} R _{GK} = 1 kΩ		T _j = 125 °C		100			

Table 4. Thermal resistance

Symbol	Parameter		Maximum	Unit
$R_{th(j-a)}$	Junction to case (DC)	TO-92	80	$^{\circ}\text{C}/\text{W}$
$R_{th(j-t)}$	Junction to tab (DC)	SOT-223	30	$^{\circ}\text{C}/\text{W}$
$R_{th(j-a)}$	Junction to ambient (DC)	TO-92	150	$^{\circ}\text{C}/\text{W}$
		$S^{(1)} = 5 \text{ cm}^2$ SOT-223	60	

1. S = Copper surface under tab.

Figure 1. Maximum average power dissipation versus average on-state current

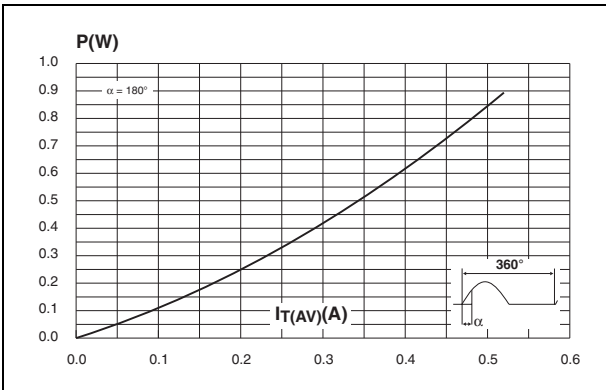


Figure 2. Average and DC on-state current versus lead temperature

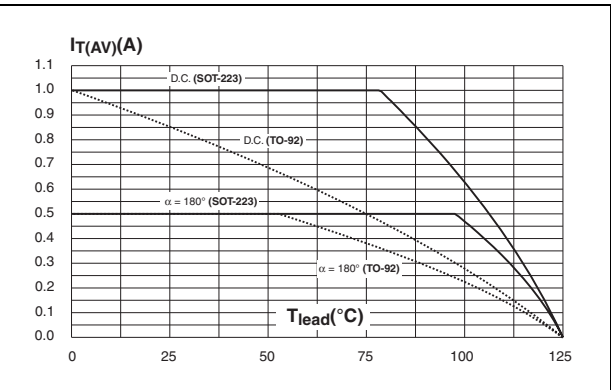


Figure 3. Average and DC on-state current versus ambient temperature

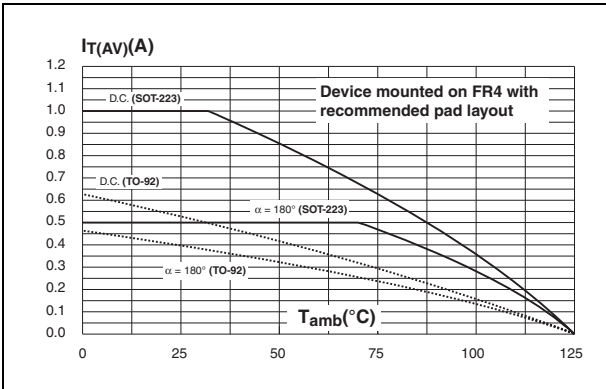


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration

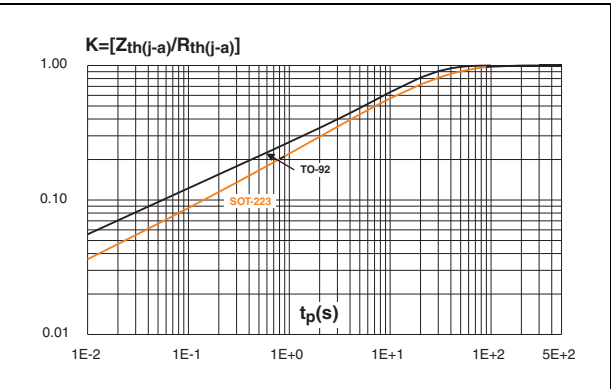


Figure 5. Relative variation of gate trigger, holding and latching current versus junction temperature

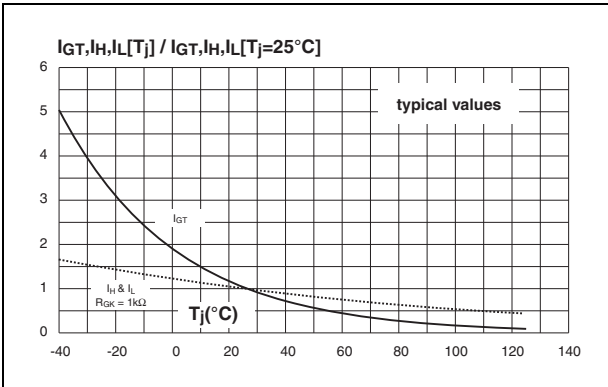


Figure 6. Relative variation of holding current versus gate-cathode resistance (typical values)

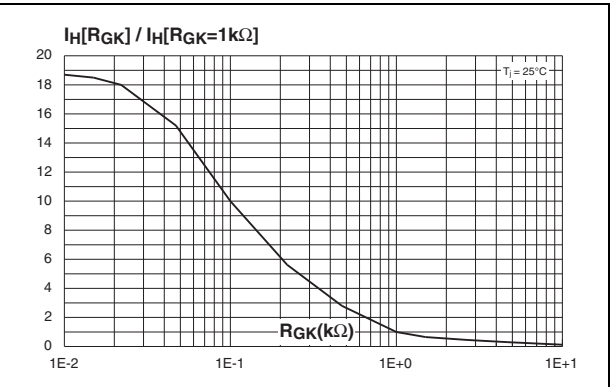


Figure 7. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values).

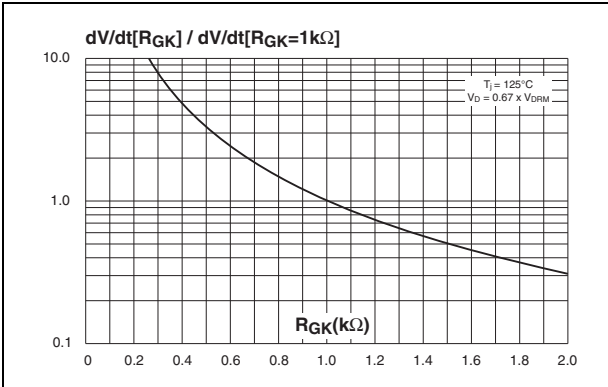


Figure 8. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

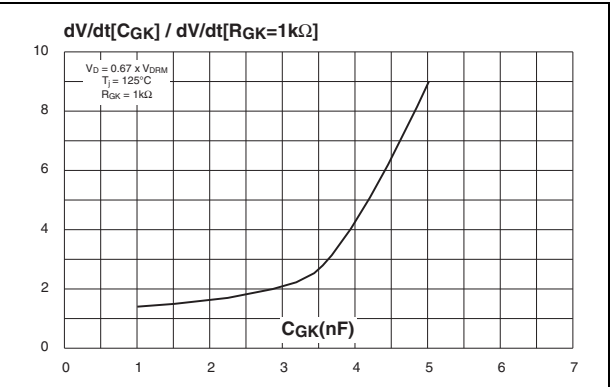


Figure 9. Surge peak on-state current versus number of cycles

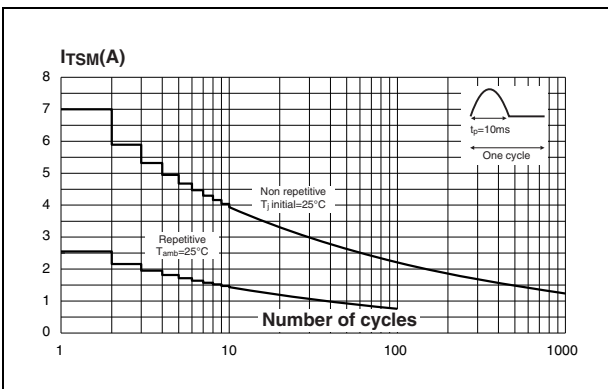


Figure 10. Non-repetitive surge peak on-state current and corresponding value of I^2t

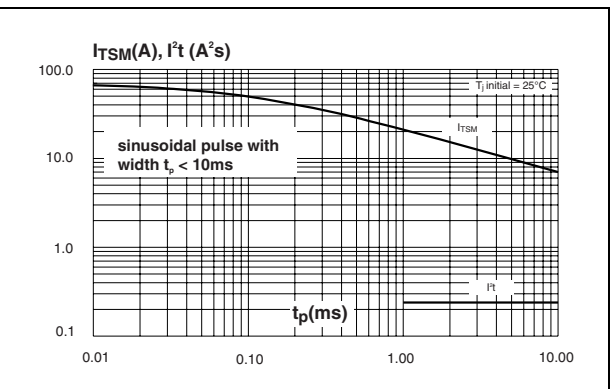


Figure 11. On-state characteristics (maximum values)

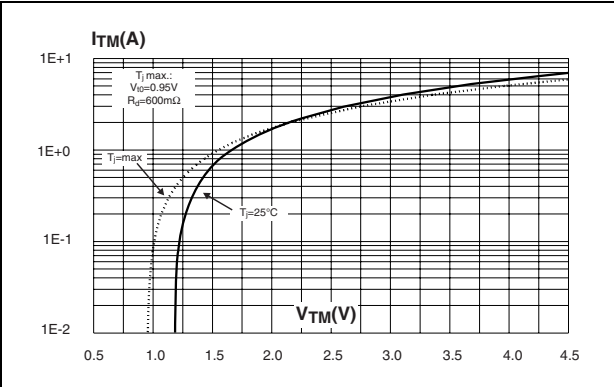
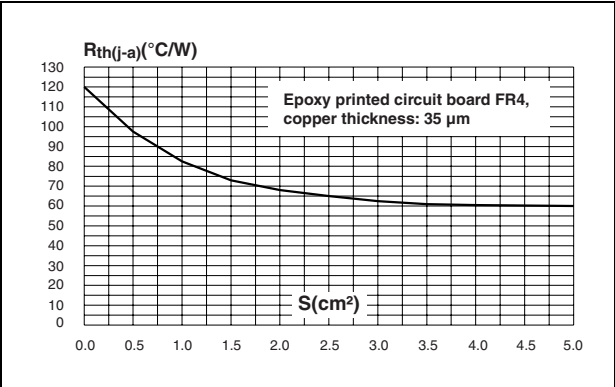
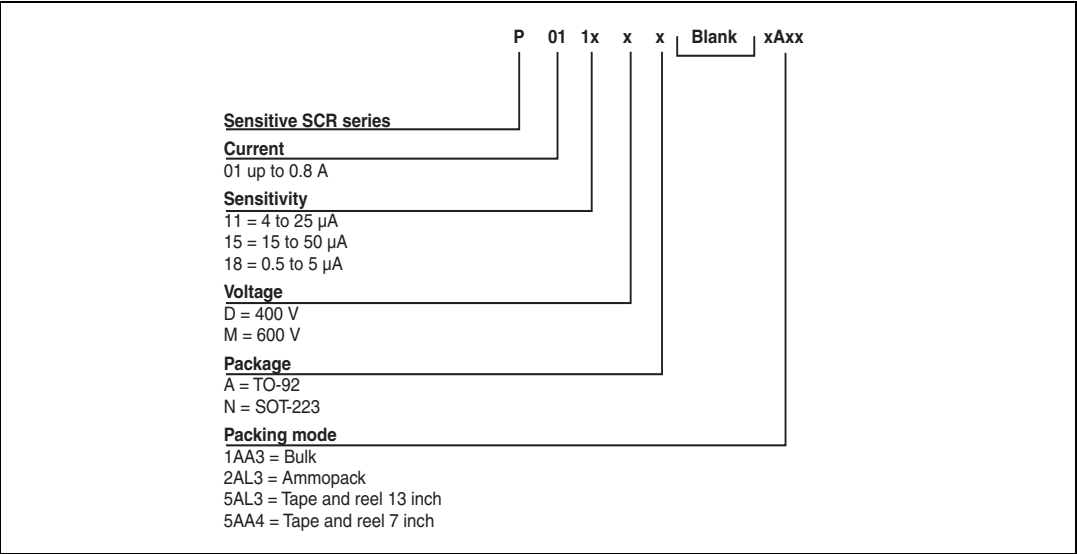


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Ordering information scheme

Figure 13. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0

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. ECOPACK® is an ST trademark.

Table 5. 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

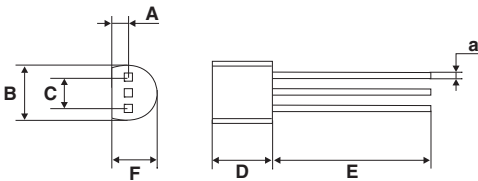
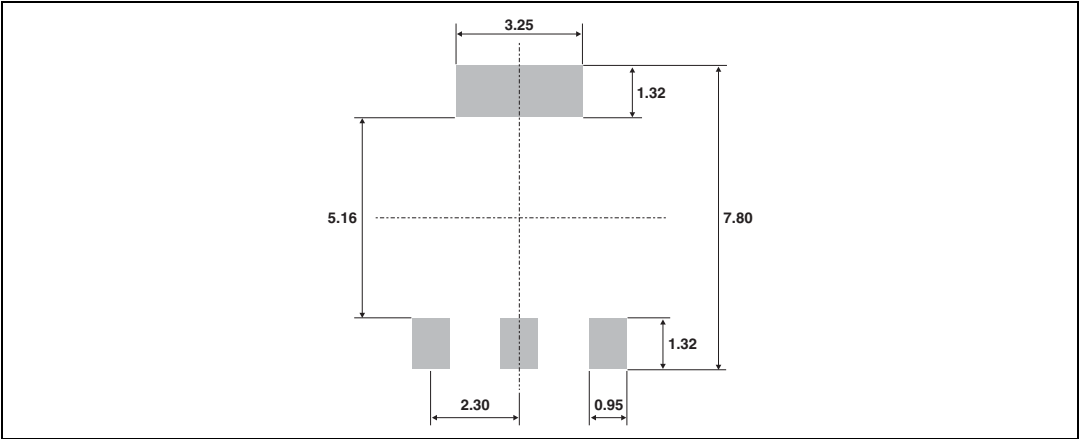


Table 6. SOT-223 dimensions

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 14. Footprint (dimensions in mm)



4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Packing mode
P0111DA 1AA3	P0111 DA	TO-92	0.2 g	2500	BAG
P0111DA 5AL3	P0111 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0111DN 5AA4	P1D	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0111MA 1AA3	P0111 MA	TO-92	0.2 g	2500	Bag
P0111MA2AL3 ⁽¹⁾	P0111 MA	TO-92	0.2 g	2000	Ammopack
P0111MN 5AA4	P1M	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0115DA 1AA3	P0115 DA	TO-92	0.2 g	2500	Bag
P0115DA 5AL3	P0115 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0118DA 1AA3	P0118 DA	TO-92	0.2 g	2500	Bag
P0118DA 5AL3	P0118 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0118DN 5AA4	P8D	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0118MA 2AL3	P0118 MA	TO-92	0.2 g	2000	Ammopack
P0118MA 5AL3	P0118 MA	TO-92	0.2 g	2000	Tape and reel 13 inch

1. This order code has no space.

5 Revision history

Table 8. Document revision history

Date	Revision	Description of changes
26-Jan-2009	1	First issue.

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 - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com