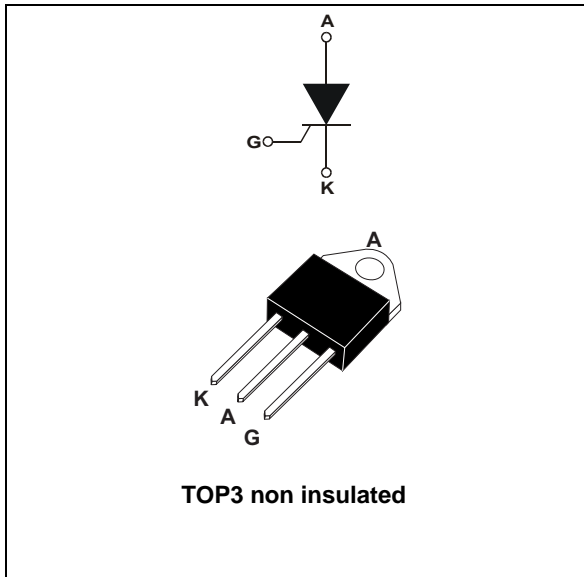


## 50 A – 1200 V non insulated SCR thyristor

Datasheet - production data



### Description

Available in non insulated TOP3 high power package, the BTW69-1200N is suitable for applications where power switching and power dissipation are critical, such as by-pass switch, controlled AC rectifier bridge, in solid state relay, battery charger, uninterruptible power supply, welding equipment and motor driver applications.

Based on a clip assembly technology, the BTW69-1200N offers a superior performance in surge current handling and thermal cooling capabilities.

Table 1. Device summary

Symbol	Value
$I_{T(RMS)}$	50 A
$V_{DRM}/V_{RRM}$	1200 V
$I_{GT}$	50 mA

### Features

- On-state rms current: 50 A
- Blocking voltage: 1200 V
- Gate current: 50 mA

### Applications

- Solid state relay
- Battery charging system
- Uninterruptible power supply
- Variable speed motor drive
- Industrial welding systems
- By pass AC switch

# 1 Characteristics

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

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state current rms (180° conduction angle)		$T_c = 102\text{ °C}$	50	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		$T_c = 102\text{ °C}$	31	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	763	A
		$t_p = 10\text{ ms}$		700	
$I^2t$	$I^2t$ Value	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	2450	A <sup>2</sup> s
$di/dt$	Critical rate of rise of on-state current Gate supply: $I_G = 100\text{ mA}$ , $di_G/dt = 1\text{ A}/\mu\text{s}$			100	A/ $\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 125\text{ °C}$	8	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C
$V_{GM}$	Maximum peak reverse gate voltage			5	V

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

Symbol	Test conditions		Value	Unit		
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$	MIN.	8	mA		
		MAX.	50			
$V_{GT}$		MAX.	1.3	V		
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ °C}$	MIN.	0.2	V	
$I_H$	$I_T = 500\text{ mA}$ , gate open		MAX.	100	mA	
$I_L$	$I_G = 1.2 \times I_{GT}$		TYP.	125	mA	
$t_{gt}$	$I_T = 50\text{ A}$ , $V_D = V_{DRM}$ , $I_G = 200\text{ mA}$ , $di_G/dt = 0.2\text{ A}/\mu\text{s}$		TYP.	2	$\mu\text{s}$	
$dV/dt$	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ °C}$	MIN.	1000	V/ $\mu\text{s}$	
$t_q$	$V_D = 800\text{ V}$ , $I_{TM} = 50\text{ A}$ , $V_R = 75\text{ V}$ , $t_p = 100\text{ }\mu\text{s}$ , $dI_{TM}/dt = 30\text{ A}/\mu\text{s}$ , $dV_D/dt = 20\text{ V}/\mu\text{s}$	$T_j = 125\text{ °C}$	TYP.	100	$\mu\text{s}$	
$V_{TM}$	$I_{TM} = 100\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ °C}$	MAX.	1.6	V	
$V_{t0}$	Threshold voltage		$T_j = 125\text{ °C}$	MAX.	0.9	V
$R_D$	Dynamic resistance		$T_j = 125\text{ °C}$	MAX.	8.5	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_D = V_{DRM}$ $V_R = V_{RRM}$	$T_j = 25\text{ °C}$	MAX.	10	$\mu\text{A}$	
		$T_j = 125\text{ °C}$		5	mA	

Table 4. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (DC, typ.)	0.45	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	50	°C/W

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

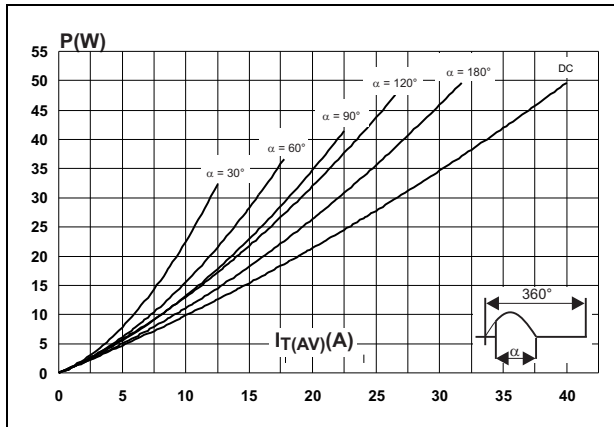


Figure 2. Correlation between maximum average power dissipation and maximum allowable temperatures

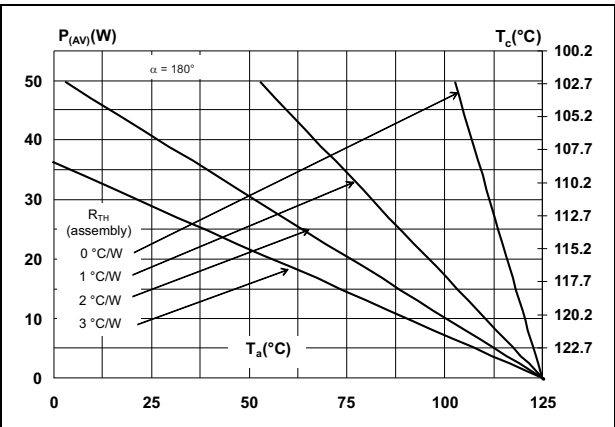


Figure 3. Average and DC on-state current versus case temperature

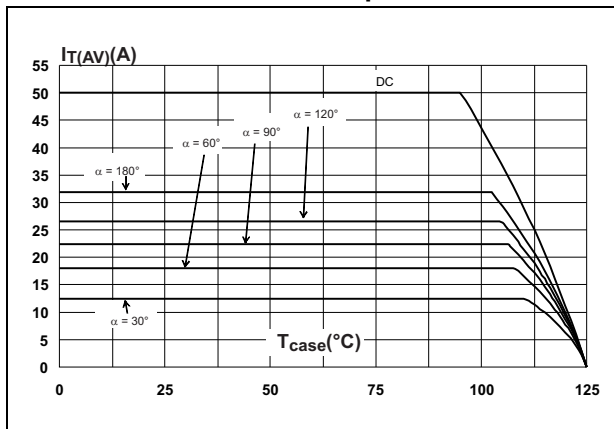


Figure 4. Average and DC on-state current versus ambient temperature

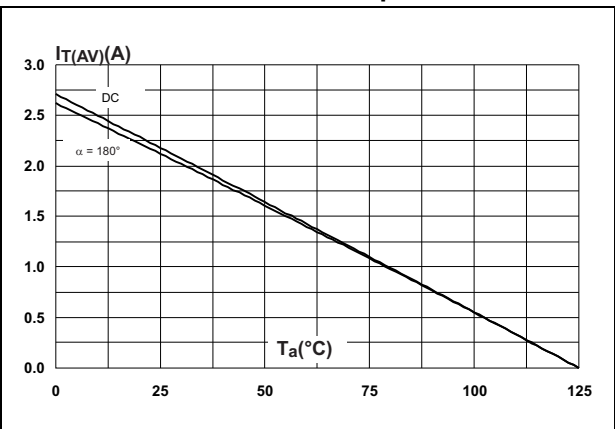


Figure 5. Relative variation of thermal impedance versus pulse duration

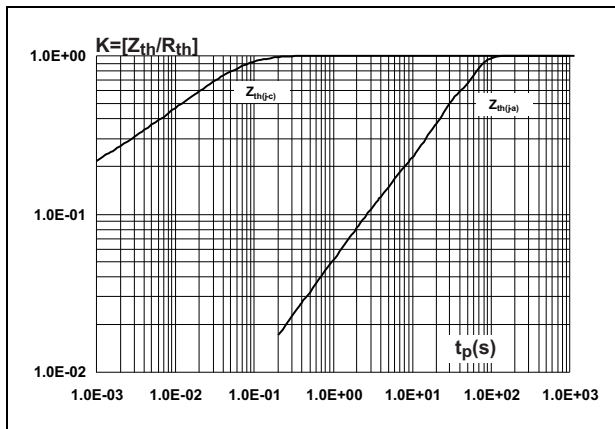


Figure 6. Relative variation of gate trigger current and gate trigger voltage versus junction temperature (typical value)

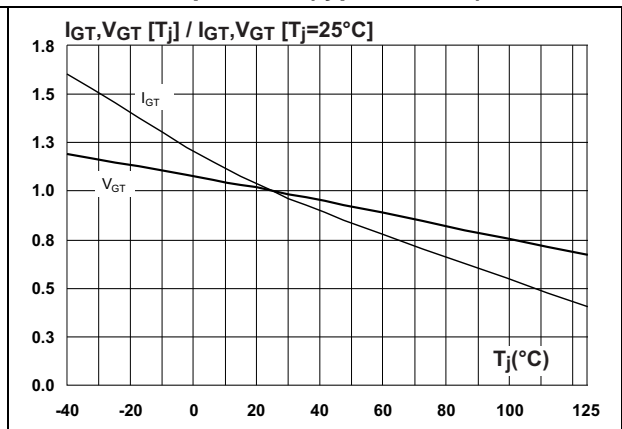


Figure 7. Relative variation of holding, and latching currents versus junction temperature (typical values)

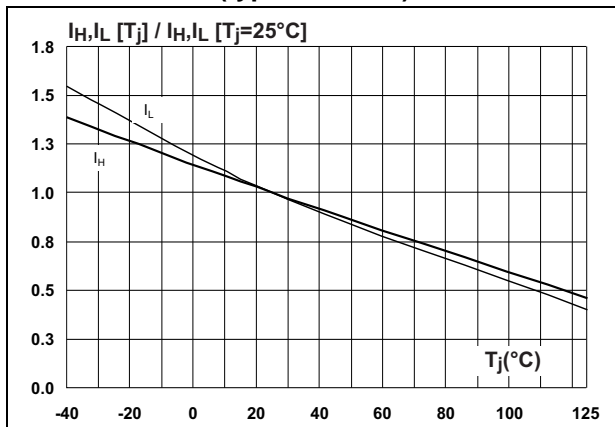


Figure 8. Surge peak on-state current versus number of cycles

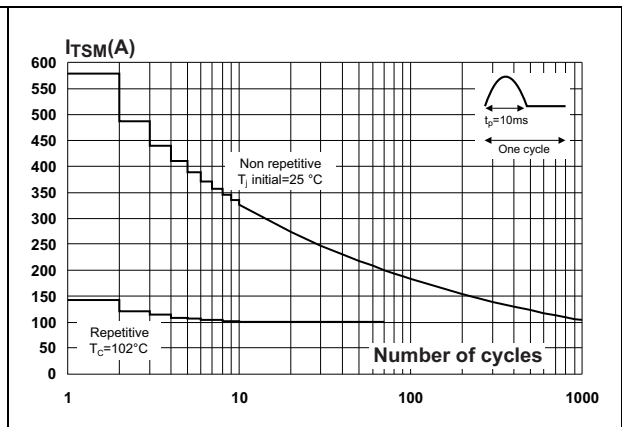


Figure 9. Non repetitive surge peak on-state current and corresponding value of I²t versus sinusoidal pulse

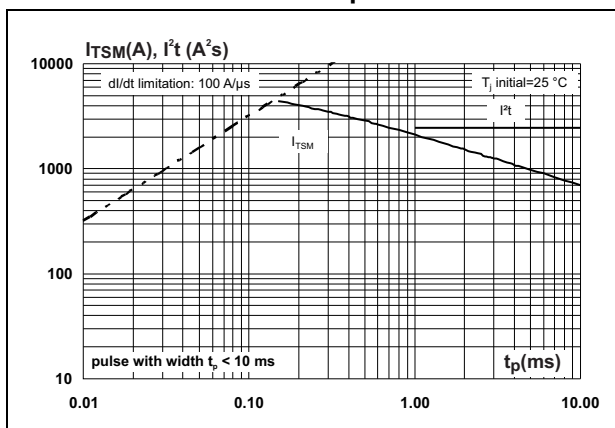


Figure 10. On-state characteristics (maximum values)

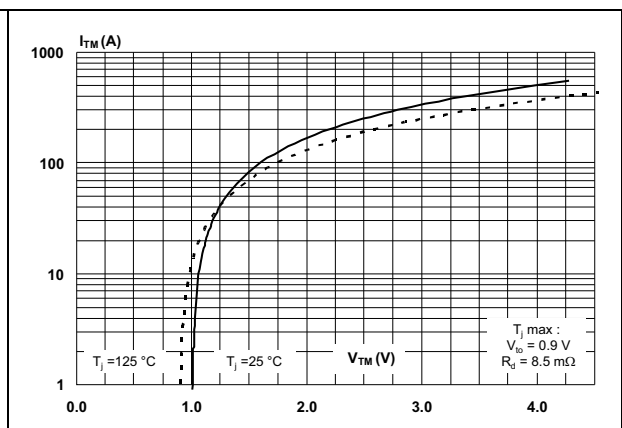
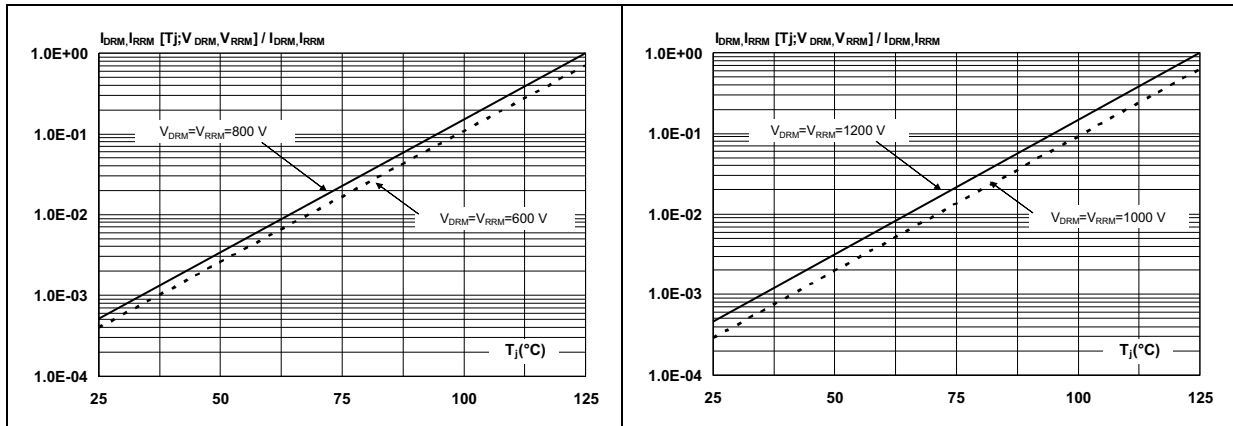


Figure 11. Relative variation of leakage current versus junction temperature for different values of blocking voltage (600 and 800 V)

Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (1000 and 1200 V)



## 2 Package information

- Epoxy meets UL94,V0
- Lead-free packages
- Cooling method: by conduction (C)
- Recommended torque value: 0.9 to 1.2 N·m

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

Figure 13. TOP3 dimension definitions

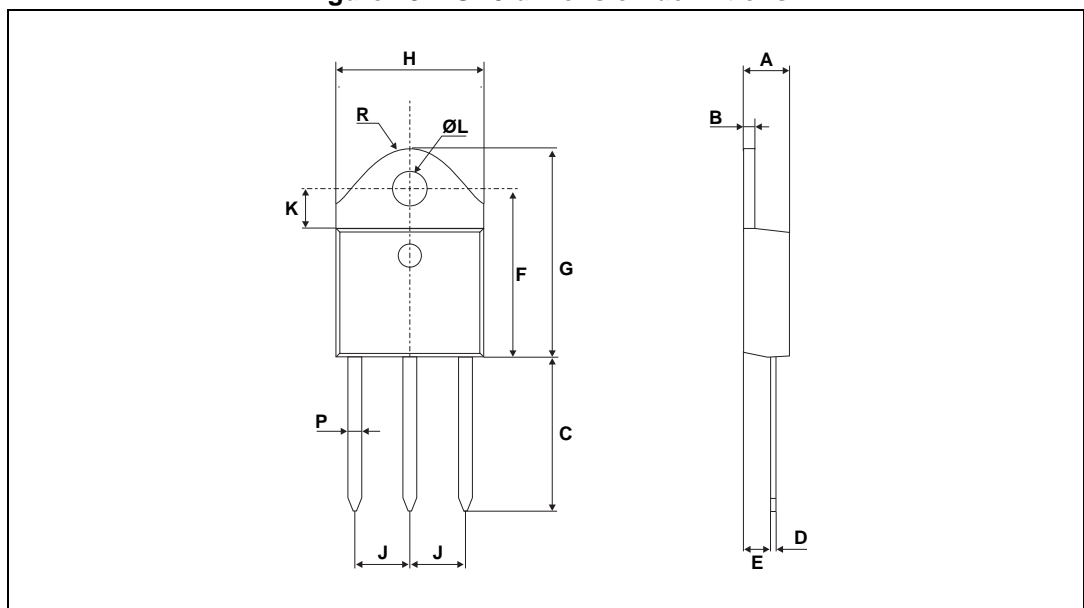


Table 5. TOP3 dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	1.45	1.55	0.057	0.061
C	14.35	15.60	0.565	0.614
D	0.5	0.7	0.020	0.028
E	2.7	2.9	0.106	0.114
F	15.8	16.5	0.622	0.650
G	20.4	21.1	0.815	0.831
H	15.1	15.5	0.594	0.610
J	5.4	5.65	0.213	0.222
K	3.4	3.65	0.134	0.144
ØL	4.08	4.17	0.161	0.164
P	1.20	1.40	0.047	0.055
R	4.60 typ.		0.181 typ.	

### 3 Ordering information

Figure 14. Ordering information scheme

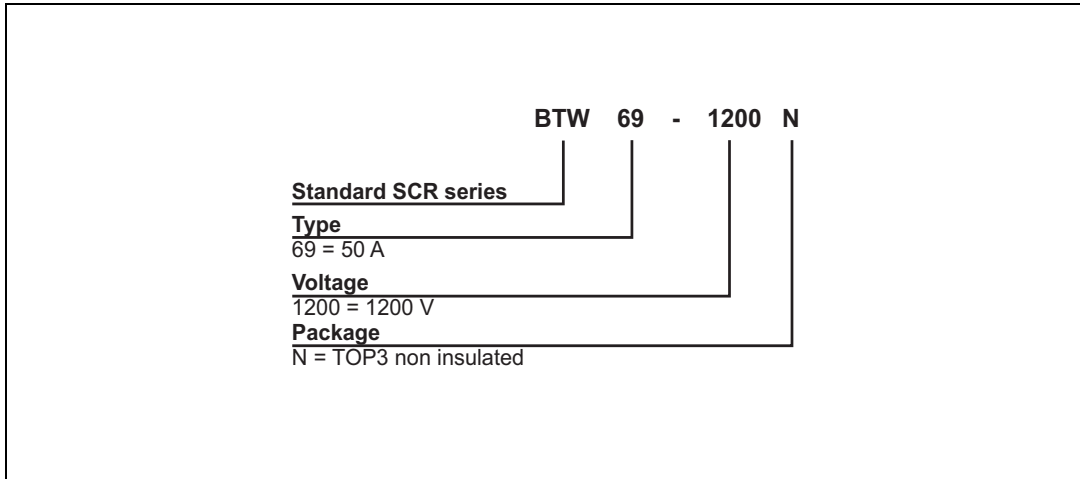


Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
BTW69-1200N	BTW691200N	TOP3	4.55 g	30	Tube

### 4 Revision history

Table 7. Document revision history

Date	Revision	Changes
14-Jun-2013	1	Initial release.



**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.**

**ST PRODUCTS ARE NOT AUTHORIZED FOR USE IN WEAPONS. NOR ARE ST PRODUCTS DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.**

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.

© 2013 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)

