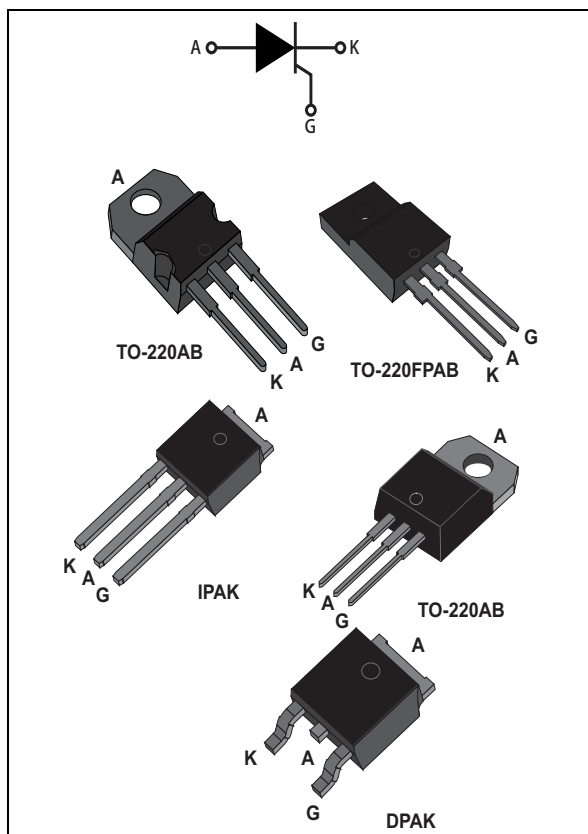




Description

Available either in sensitive (TS8) or standard (TN8 / TYN) gate triggering levels, the 8 A SCR series is suitable to fit all modes of control found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.

Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space.

Table 1. Device summary

Order code	Voltage (x00) V_{DRM}/V_{RRM}		Sensitivity I_{GT}	Package
	600 V	800 V		
TS820-600B	X		0.2 mA	DPAK
TS820-600H	X		0.2 mA	IPAK
TS820-600T	X		0.2 mA	TO-220AB
TS820-600FP	X		0.2 mA	TO-220FPAB
TN805-600B	X		5 mA	DPAK
TN815-x00B	X	X	15 mA	DPAK
TYN608RG	X		15 mA	TO-220AB

Features

- On-state rms current, $I_{T(RMS)}$ 8 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 and 800 V
- Triggering gate current, I_{GT} 0.2 to 15 mA

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value		Unit	
			TN805 TN815 TS820	TYN608		
I _{T(RMS)}	On-state rms current (180° conduction angle)	T _C = 110 °C	8		A	
		T0-220FPAB, T _C = 91 °C				
I _{T(AV)}	Average on-state current (180° conduction angle)	T _C = 110 °C	5		A	
		T0-220FPAB, T _C = 91 °C				
I _{TSM}	Non repetitive surge peak on-state current	t _p = 8.3 ms	T _j = 25 °C	73	100	A
		t _p = 10 ms		70	95	
I ² t	I ² t value for fusing	t _p = 10 ms	T _j = 25 °C	24.5	45	A ² S
dI/dt	Critical rate of rise of on-state current I _G = 2 x I _{GT} , t _r ≤ 100 ns	F = 60 Hz	T _j = 125 °C	50		A/μs
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 125 °C	4		A
P _{G(AV)}	Average gate power dissipation		T _j = 125 °C	1		W
T _{stg} T _j	Storage junction temperature range Operating junction temperature range		- 40 to + 150 - 40 to + 125		°C	
V _{RM}	Maximum peak reverse gate voltage (for TN8x5 and TYN608 only)			5		V

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

Symbol	Test conditions		TS820	Unit	
I _{GT}	V _D = 12 V, R _L = 140 Ω		MAX.	200	μA
V _{GT}			MAX.	0.8	V
V _{GD}	V _D = V _{DRM} , R _L = 3.3 kΩ, R _{GK} = 220 Ω	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 = 65% V _{DRM} , R _{GK} = 220 Ω	T _j = 125 °C	MIN.	5	V/μs
V _{TM}	I _{TM} = 16 A, t _p = 380 μs	T _j = 25 °C	MAX.	1.6	V
V _{t0}	Threshold voltage	T _j = 125 °C	MAX.	0.85	V
R _d	Dynamic resistance	T _j = 125 °C	MAX.	46	mΩ
I _{DRM} I _{RRM}	V _{DRM} = V _{RRM} , R _{GK} = 220 Ω	T _j = 25 °C	MAX.	5	μA
		T _j = 125 °C		1	mA

Table 4. Standard electrical characteristics ($T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Symbol	Test conditions		TN805	TN815	TYN608	Unit	
I _{GT}	V _D = 12 V, R _L = 33 Ω		MIN.	0.5	2	2	mA
			MAX.	5	15	15	
V _{GT}			MAX.	1.3			V
V _{GD}	V _D = V _{DRM} , R _L = 3.3 kΩ	T _j = 125 °C	MIN.	0.2			V
I _H	I _T = 100 mA , gate open		MAX.	25	40	30	mA
I _L	I _G = 1.2 I _{GT}		MAX.	30	50	70	mA
dV/dt	V _D = 67% V _{DRM} , gate open	T _j =125 °C	MIN.	50	150	150	V/μs
V _{TM}	I _{TM} = 16 A t _p = 380 μs	T _j = 25 °C	MAX.	1.6			V
V _{t0}	Threshold voltage	T _j = 125 °C	MAX.	0.85			V
R _d	Dynamic resistance	T _j = 125 °C	MAX.	46			mΩ
I _{DRM} I _{RRM}	V _{DRM} = V _{RRM}	T _j = 25 °C	MAX.	5			μA
		T _j = 125 °C		2			mA

Table 5. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	DPAK, IPAK, TO-220AB	1.3	$^{\circ}\text{C/W}$
		TO-220FPAB	4.6	
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)} = 0.5\text{ cm}^2$ DPAK	70	$^{\circ}\text{C/W}$
		IPAK	100	
		TO-220AB, TO-220FPAB	60	

1. S = Copper surface under tab

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

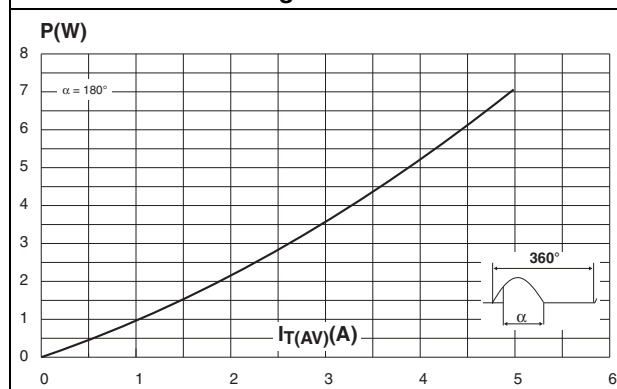


Figure 2. Average and DC on-state current versus case temperature

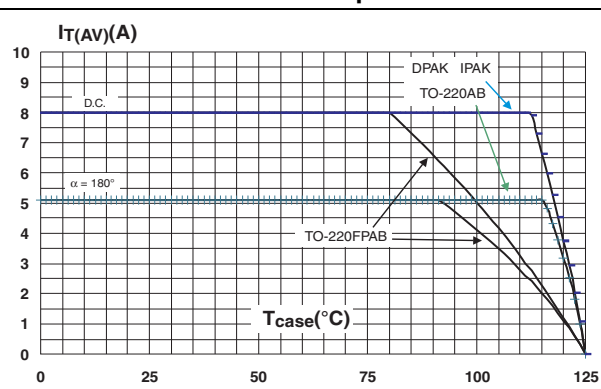


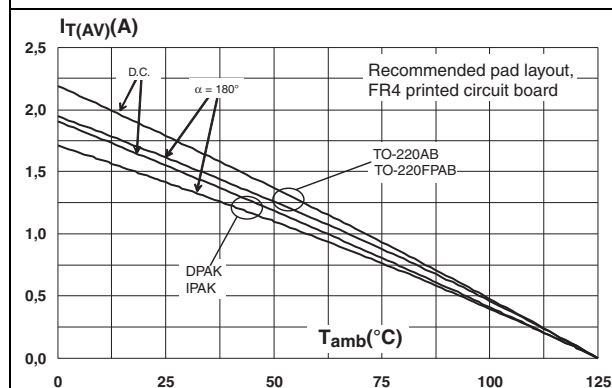
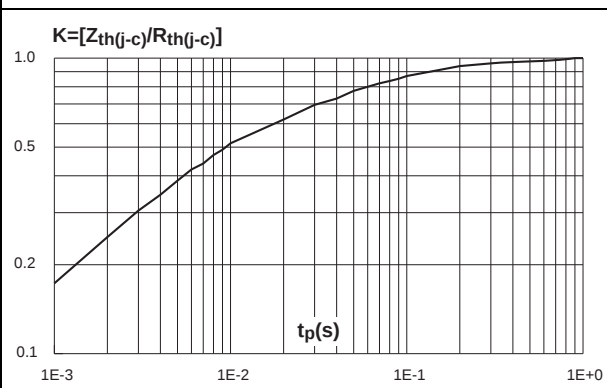
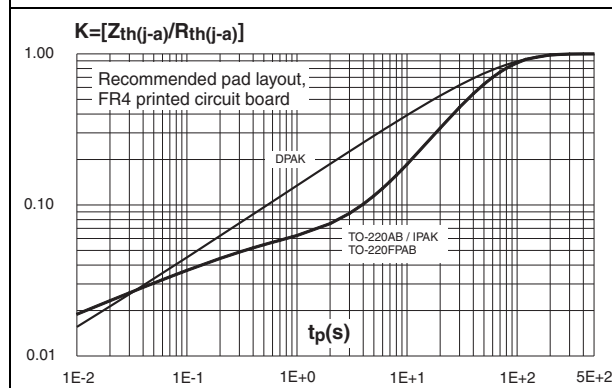
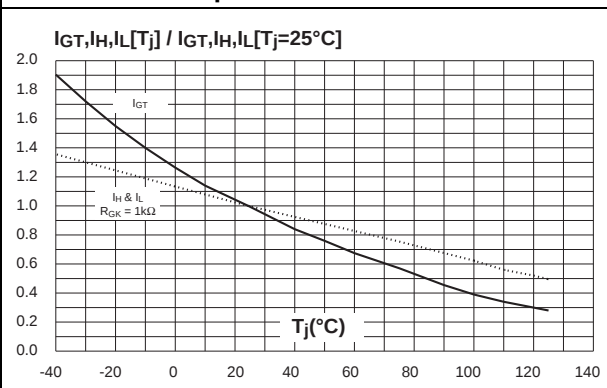
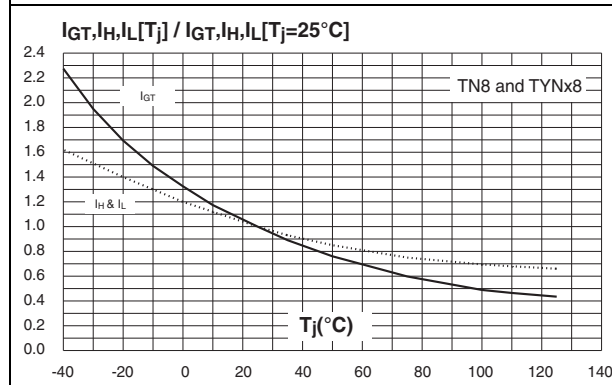
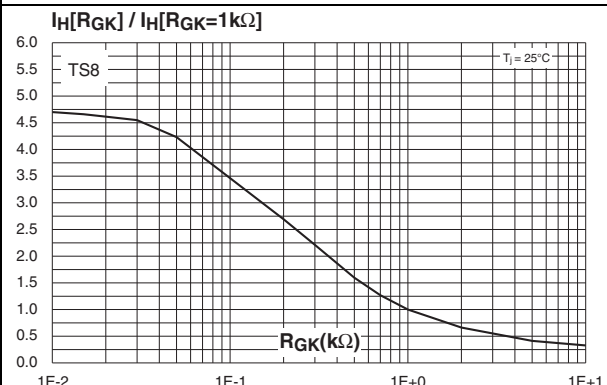
Figure 3. Average and DC on-state current versus ambient temperature**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration****Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration****Figure 6. Relative variation of gate trigger current and holding current versus junction temperature for TS820****Figure 7. Relative variation of gate trigger and holding current versus junction temperature****Figure 8. Relative variation of holding current versus gate-cathode resistance (typical values)**

Figure 9. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS820

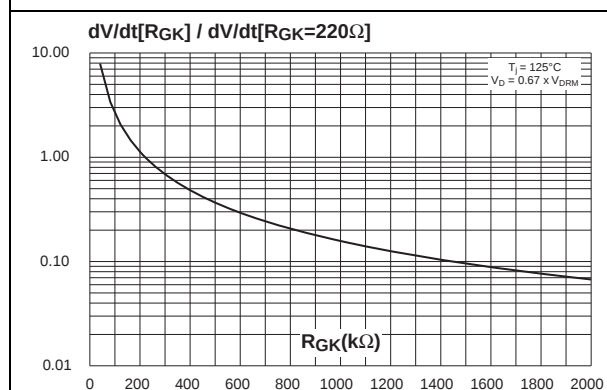


Figure 10. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS820

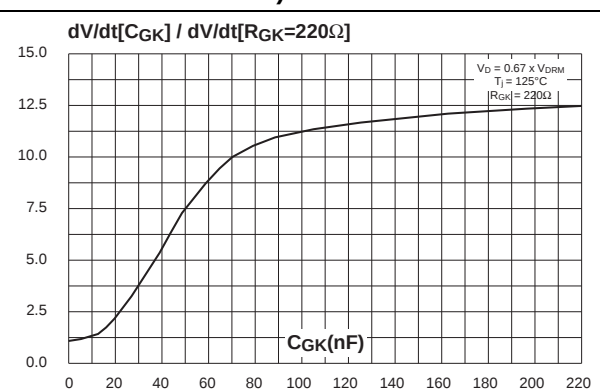


Figure 11. Surge peak on-state current versus number of cycles

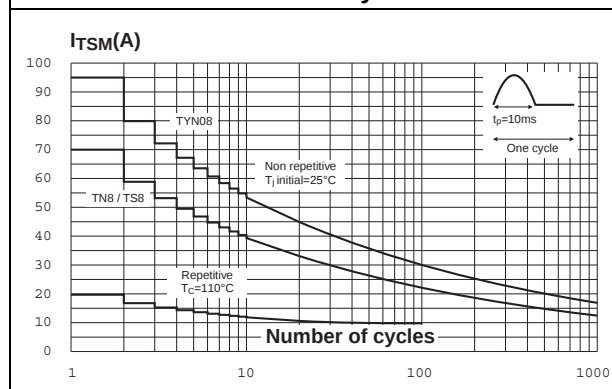


Figure 12. Non-repetitive surge peak on-state current and corresponding values of I²t

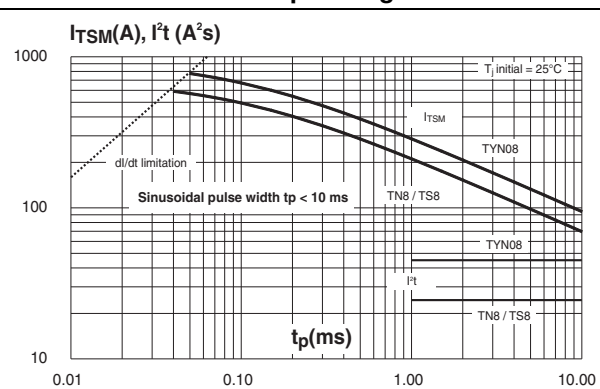


Figure 13. On-state characteristics (maximum values)

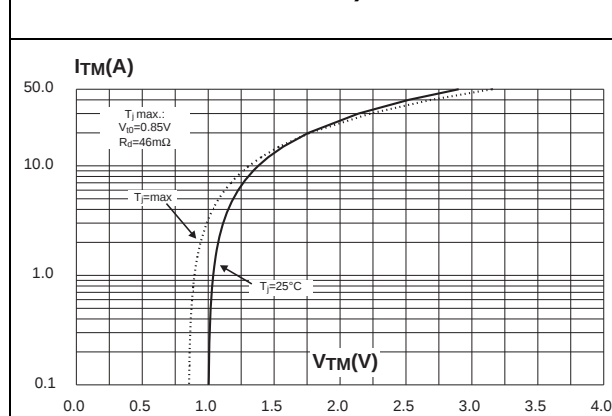
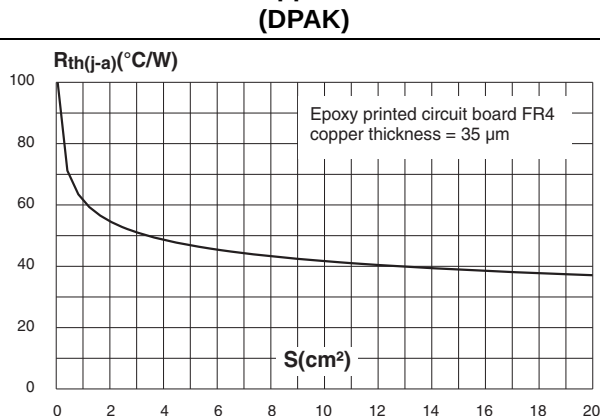


Figure 14. Thermal resistance junction to ambient versus copper surface under tab (DPAK)

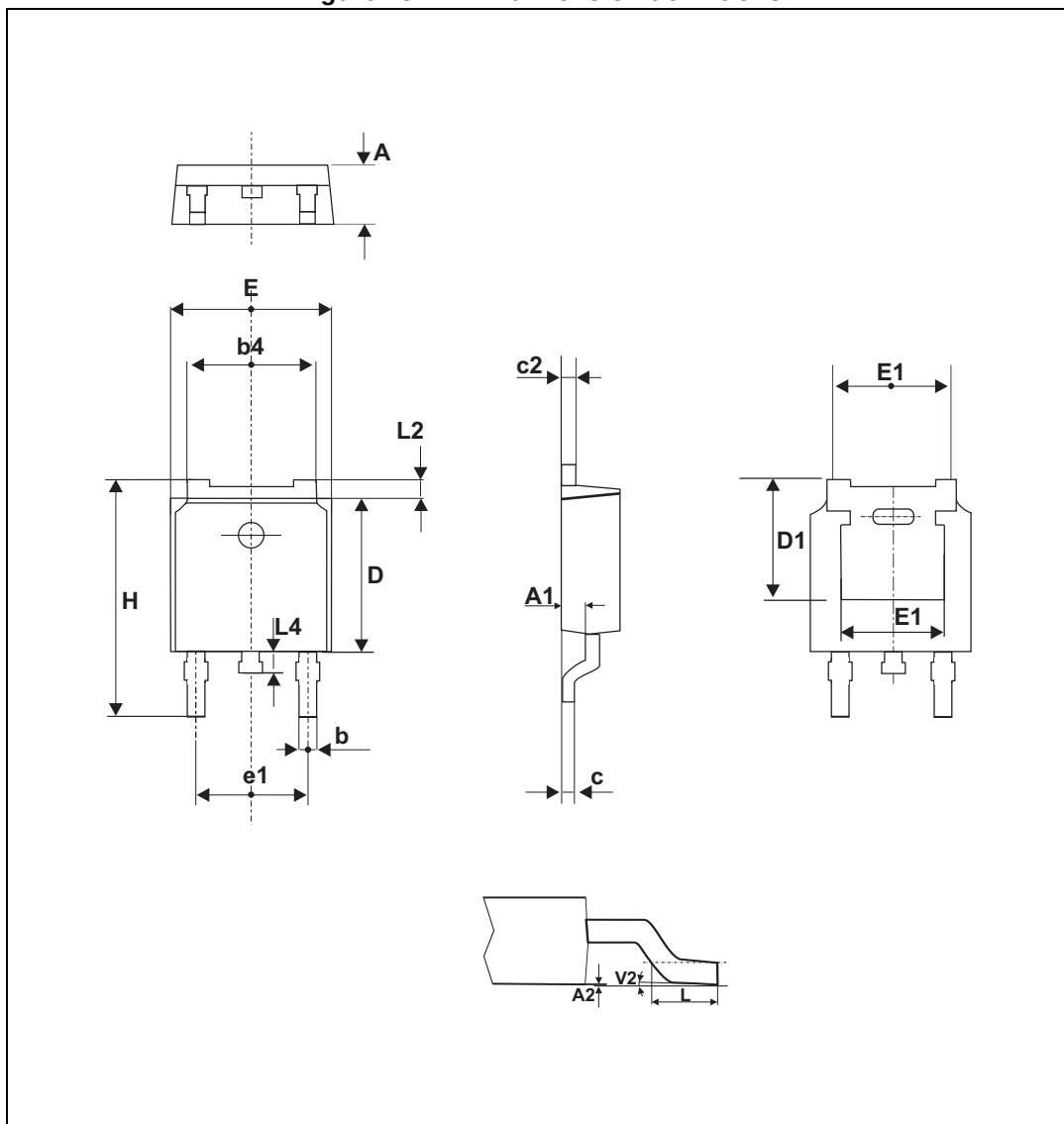


2 Package information

- Epoxy meets UL94, V0
- Lead-free packages
- Recommended torque: 0.4 to 0.6 N·m

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.

Figure 15. DPAK dimension definitions



Note: *this package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

Table 6. DPAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	5.10			0.201		
E	6.35		6.73	0.250		0.264
E1		4.32			0.170	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		1.78	0.039		0.070
L2			1.27			0.05
L4	0.60		1.02	0.023		0.040
V2	0°		8°	0°		8°

Figure 16. Footprint (dimensions in mm)

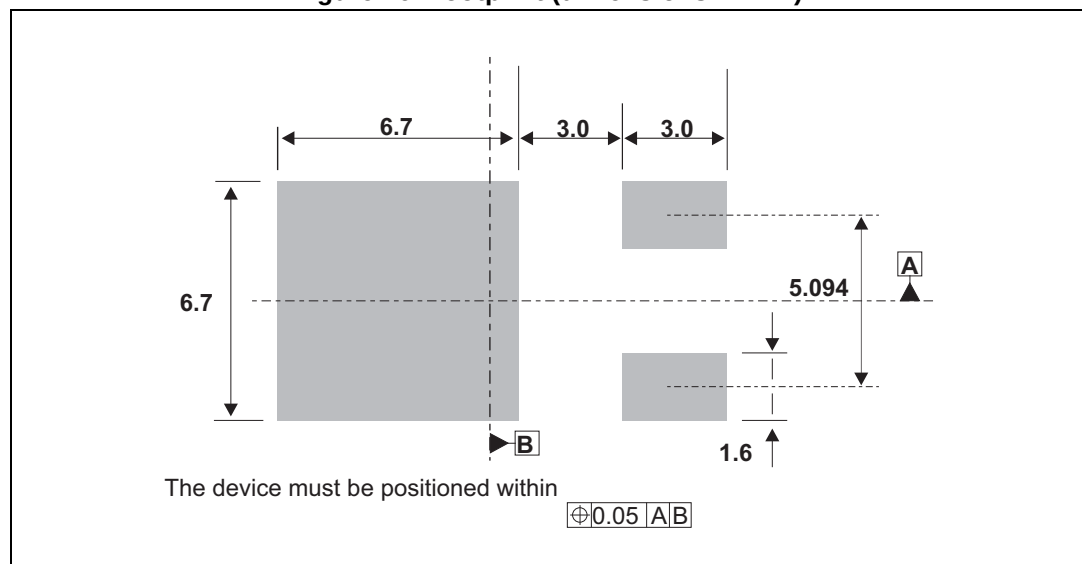
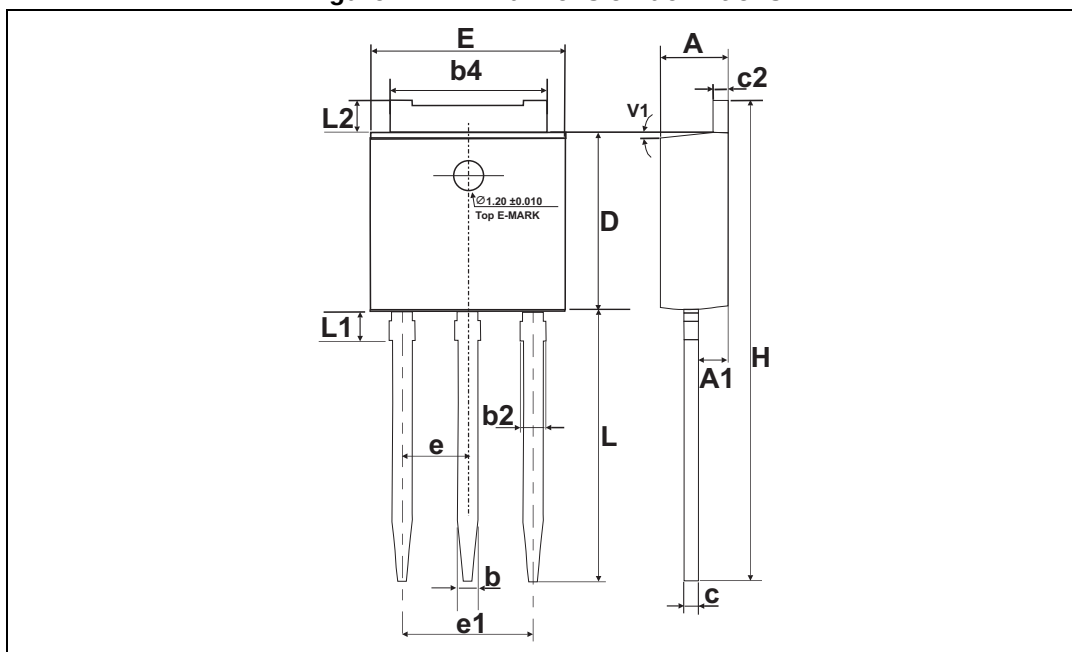


Figure 17. IPAK dimension definitions



Note: this package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7. IPAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
b	0.64		0.90	0.025		0.035
b2			0.95			0.037
b4	5.20		5.43	0.204		0.213
c	0.45		0.60	0.017		0.023
c2	0.46		0.60	0.018		0.023
D	6		6.20	0.236		0.244
E	6.40		6.70	0.252		0.263
e		2.28			0.090	
e1	4.40		4.60	0.173		0.181
H		16.10			0.634	
L	9		9.60	0.354		0.377
L1	0.8		1.20	0.031		0.047

Table 7. IPAK dimension values

L2		0.80	1.25		0.031	0.049
V1		10°			10°	

Figure 18. TO-220AB dimension definitions

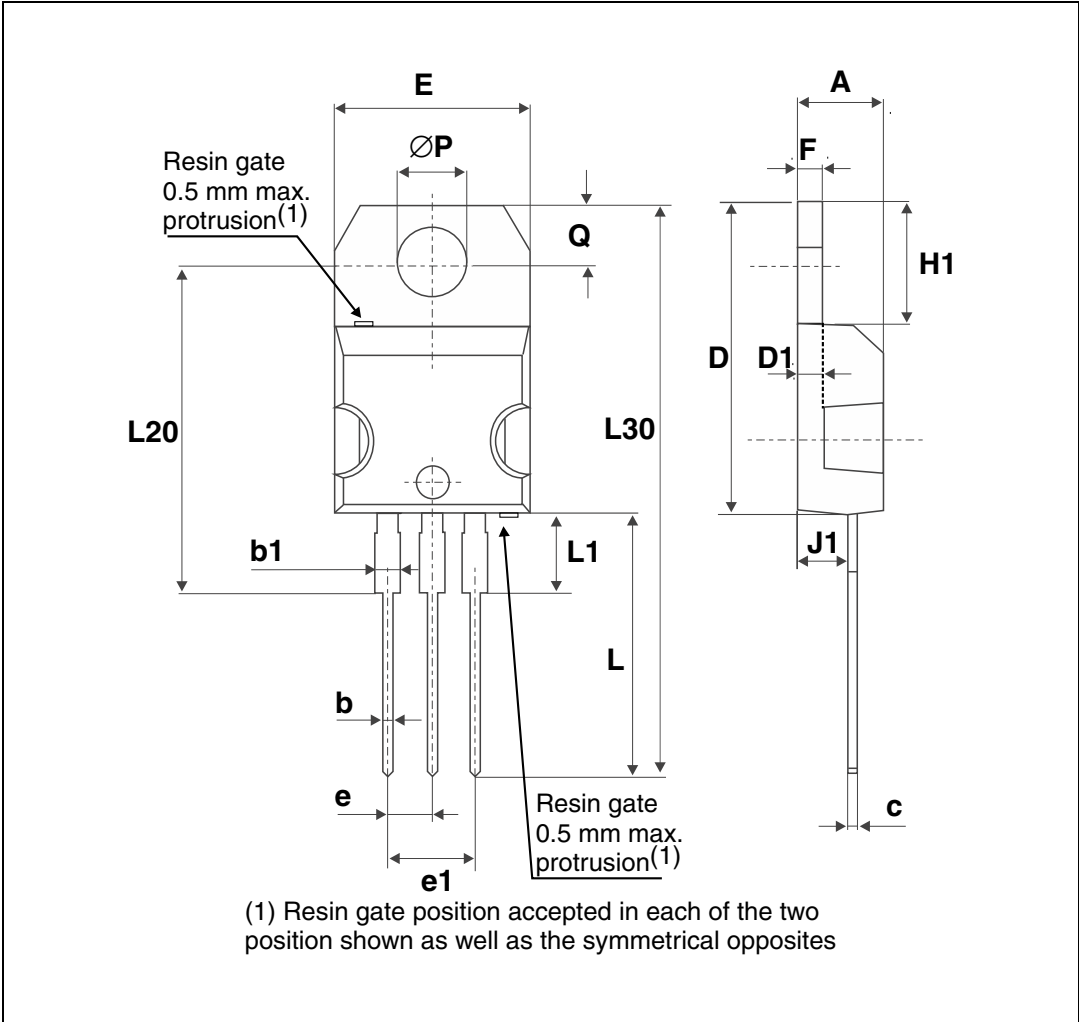


Table 8. TO-220AB dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64 typ.	
L30	28.90 typ.		1.13 typ.	
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Figure 19. TO-220AB (NIns. & Ins. 20-up) dimension definitions

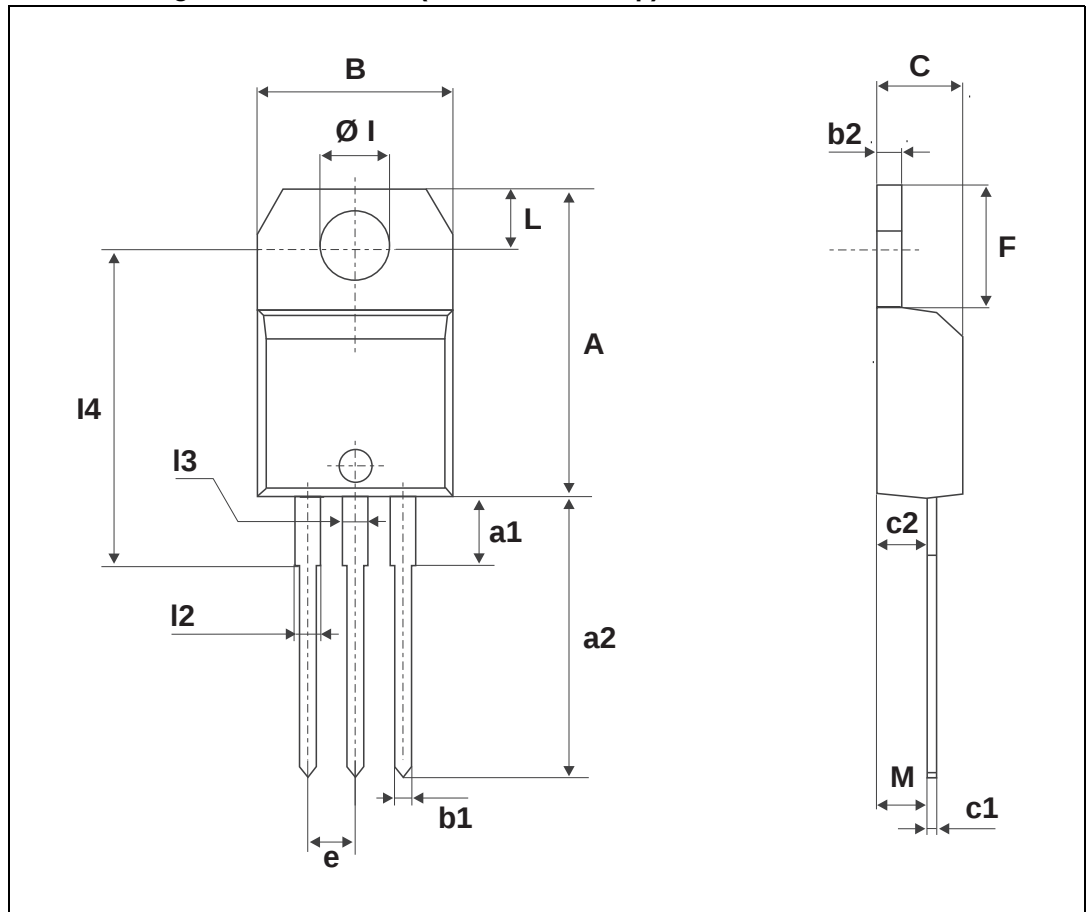


Table 9. TO-220AB (NIns. & Ins. 20-up) dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
Øl	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

Figure 20. TO-220FPAB dimension definitions

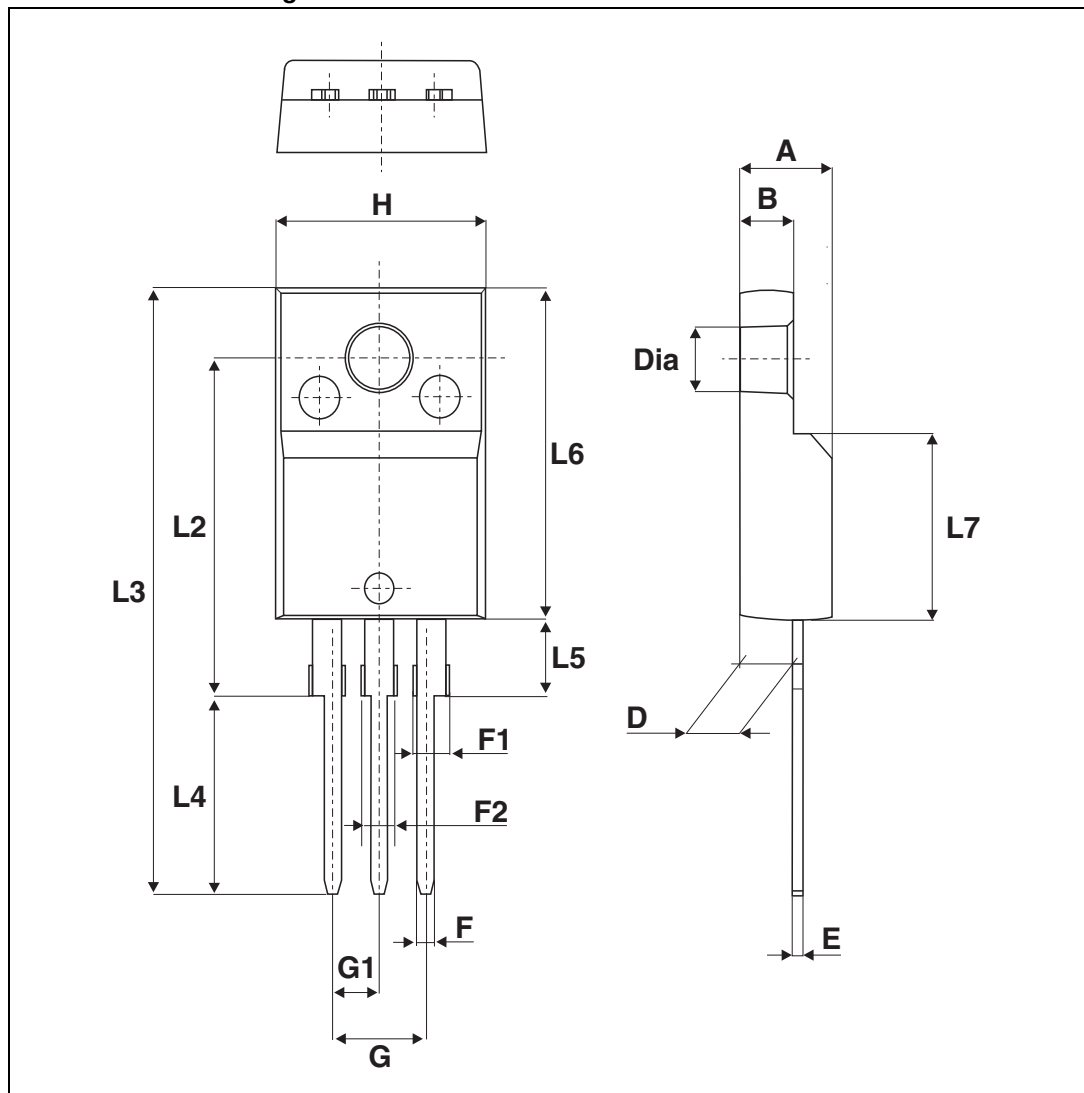


Table 10. TO-220FPAB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.018		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.70	0.045		0.067
F2	1.15		1.70	0.045		0.067
G	4.95		5.20	0.195		0.205
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.63	
L3	28.6		30.6	1.126		1.205
L4	9.8		10.6	0.386		0.417
L5	2.9		3.6	0.114		0.142
L6	15.9		16.4	0.626		0.646
L7	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

3 Ordering information

Figure 21. TN8 series

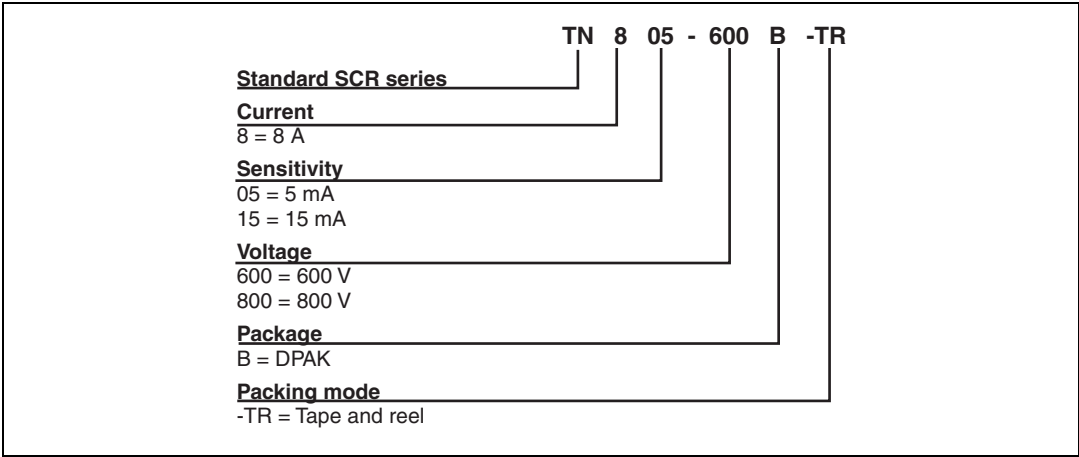


Figure 22. TS8 series

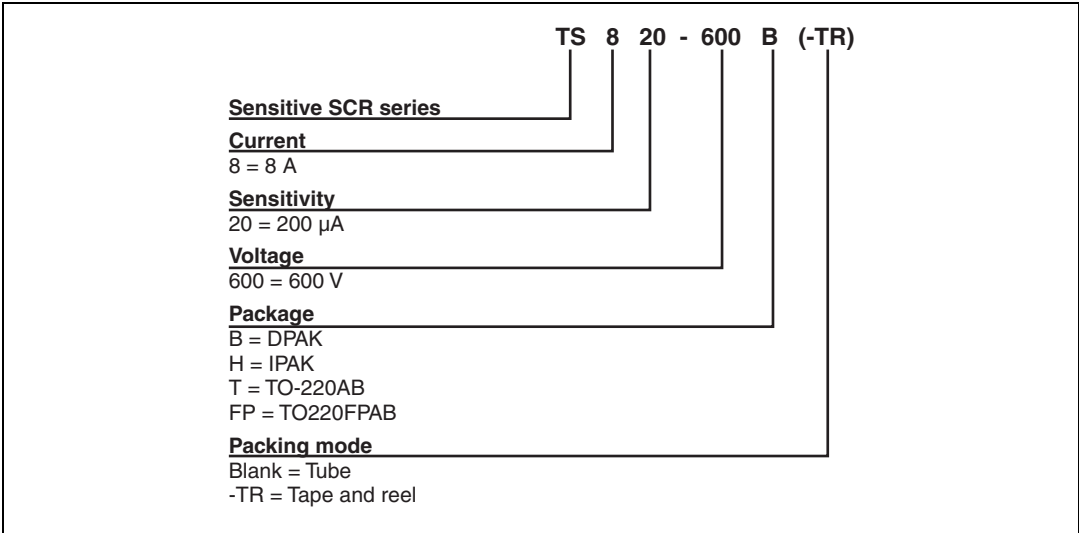


Figure 23. TYNx08 series

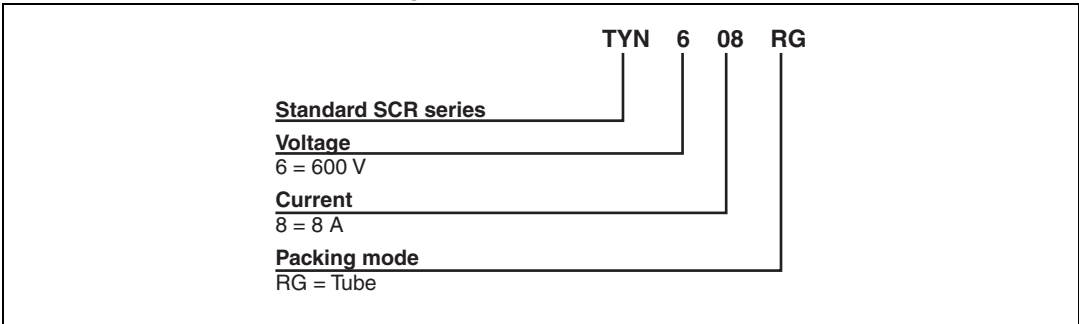


Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
TN805-600B-TR	TN805600	DPAK	0.3 g	2500	Tape and reel
TN815-600B-TR	TN815600	DPAK	0.3 g	2500	Tape and reel
TN815-800B-TR	TN815800	DPAK	0.3 g	2500	Tape and reel
TS820-600B	TS820600	DPAK	0.3 g	75	Tube
TS820-600B-TR	TS820600	DPAK	0.3 g	2500	Tape and reel
TS820-600H	TS820600	IPAK	0.4 g	75	Tube
TS820-600T	TS820600T	TO-220AB	2.3 g	50	Tube
TS820-600FP	TS820600	TO-220FPAB	2.0 g	50	Tube
TYN608RG	TYN608	TO-220AB	2.3 g	50	Tube

4 Revision history

Table 12. Document revision history

Date	Revision	Changes
Apr-2002	4A	Last update.
13-Feb-2006	5	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
22-Jan-2010	6	Alpha definition updated in Figure 1 . Thermal resistance, junction to case, updated in Table 5 .
10-Oct-2011	7	Added TO-220FPAB package. Removed 700 V and 1000 V products.
14-May-2014	8	Updated DPAK and IPAK package information and reformatted to current standard.

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 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.

© 2014 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

