



STEVAL-TDR030V1

RF power amplifier based on the LET9060S for 2-way radio and general wireless services

Data brief

Features

- Excellent thermal stability
- Frequency: 760-870 MHz
- Supply voltage: 32 V
- Output power: 100 W
- Gain: 14 dB min
- Efficiency: 45% min
- Stability: load V_{SWR} 5:1 minimum
- BeO free amplifier
- RoHS compliant

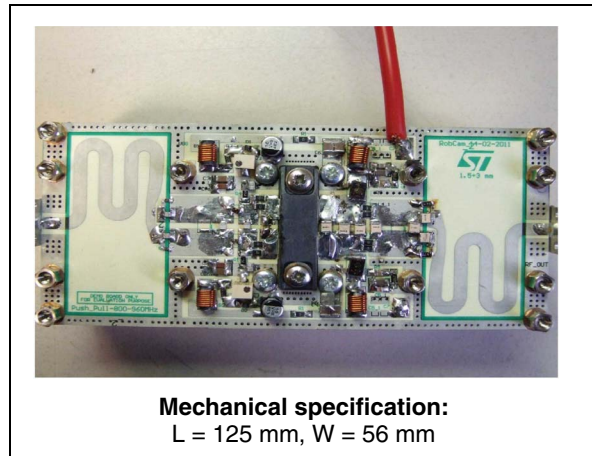
Description

The STEVAL-TDR030V1 demonstration board is designed for 2-way radio BTS and general wireless services at 28 V to 32 V. It uses two LET9060S LDMOS transistors.

The demonstration board is a push-pull class AB power amplifier which uses a lumped L-C input/output network type on balanced microstrip lines.

A proper planar balun embedded on the PCB (patent pending) allows management of balanced versus unbalanced input/output signals.

For additional information regarding the LET9060S please refer to the device datasheet, available at www.st.com.



Mechanical specification:
L = 125 mm, W = 56 mm

Table 1. Device summary

Part number
STEVAL-TDR030V1

Contents

1	Electrical characteristics	3
2	Schematic diagram	4
3	PCB layout	5
4	Typical performance	8
5	Board photo	9
6	Revision history	10

1 Electrical characteristics

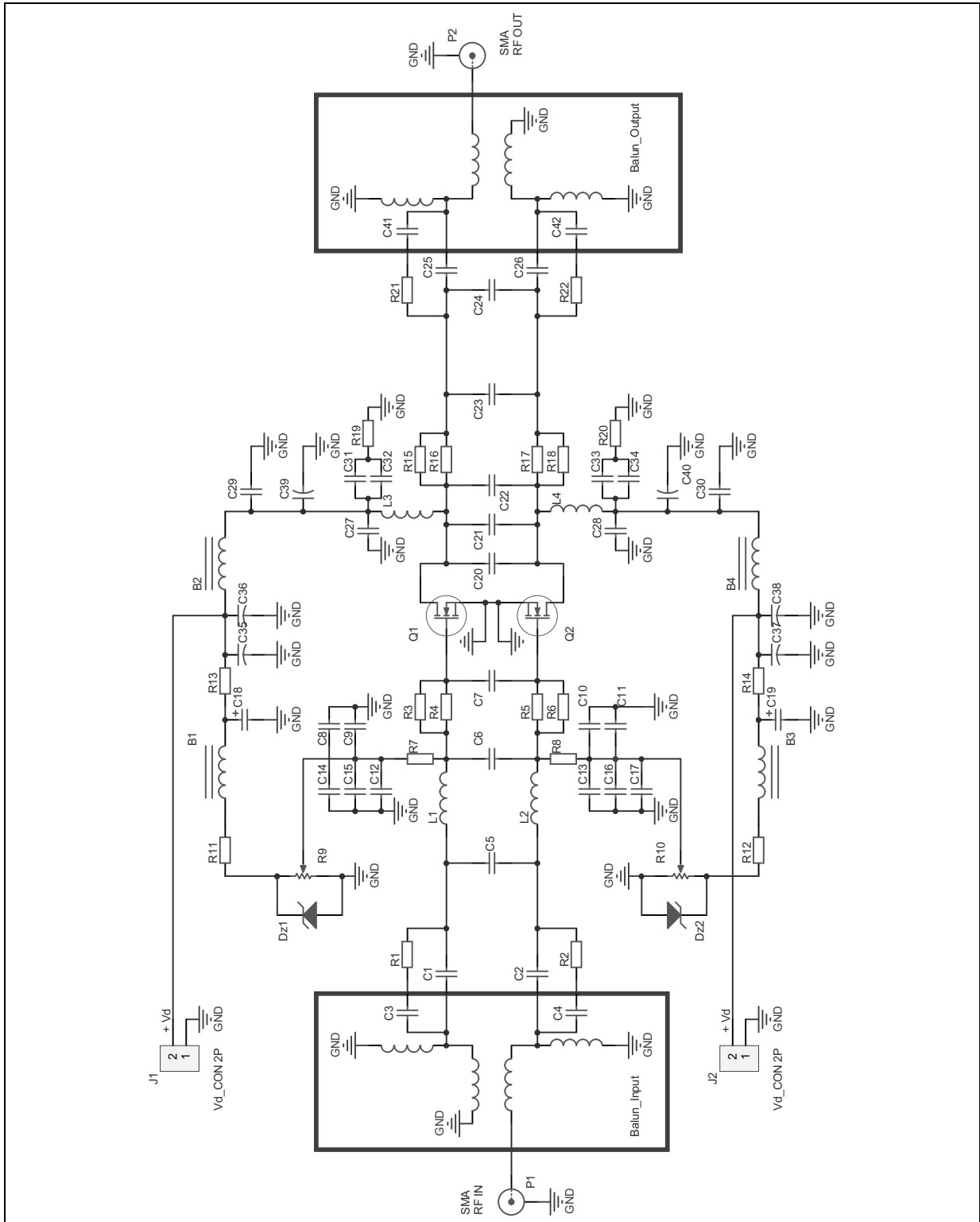
$T_A = +25\text{ °C}$, $V_{DD} = 32\text{ V}$, $I_{dq} = 400\text{ mA}$

Table 2. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	760		870	MHz
P_{OUT}	$P_{IN} = 4\text{ W}$	100			W
Gain	@ $P_{OUT} = 100\text{ W}$	14			dB
IMD3	$P_{OUT} = 80\text{ W PEP}$		-30		dBc
Stability spurious	Load mismatch all phases 5:1 minimum VSWR			-60	dBc
η	@ $P_{OUT} = 100\text{ W}$	45			%

2 Schematic diagram

Figure 1. STEVAL-TDR030V1 circuit schematic



3 PCB layout

Figure 2. Board layout

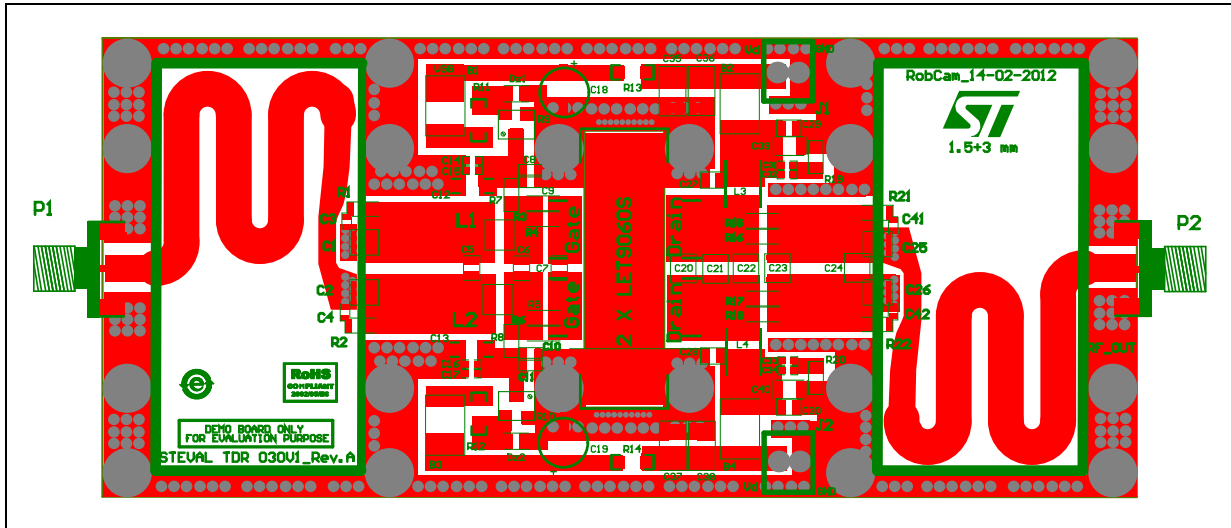


Table 3. Component list

Component ID	Description	Value	Case size	Manufacturer	Part code
B1,B2,B3,B4	Ferrite Bead	700 n	SMT	Korin	ASC050847D-700N
R1,R2	Resistor	47 W	603	Tyco Electronics	CRG0603F47R
R3,R4,R5,R6,R13,R14,R15,R16,R17,R18	Resistor	0 W	1206	NEOHM	5-1622002-0
R7,R8	Resistor	15 W	1206	Bourns-E24	CR1206-FX-15R0
R9,R10	Potentiometer	10 kW		Murata	MURPVG5A502 C01R00
R11,R12	Resistor	2700 W	1206	Bourns-E24	CR1206-FX-272
R19,R20	Resistor	27 W	1206	Bourns-E24	CR1206-FX-27R0
R21,R22	Resistor	47 W	1206-2W	EMC Technology	81-8004B-47-5F
C1,C2	Capacitor	39 pF	SMT	ATC	ATC800A390JT
C3,C4,C41,C42	Capacitor	470 pF	603	Murata	GRM1885C1H47 1JA01
C5 ⁽¹⁾	Capacitor	3.3 pF	505-C0G	Murata	ERF1DM5C1H3 R3CD01B
C6 ^{(1),(2)}	Capacitor	7 pF	505-C0G	Murata	ERF1DM5C1H7 R0DD01B
C7	Capacitor	15 pF	SMT	ATC	ATC800A150JT

Table 3. Component list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
C8,C9,C10,C11(1),(2),(3)	Capacitor	100 pF	505-C0G	Murata	ERF1DM5C1H101JD01B
C12,C13	Capacitor	10uF-16V	SMT	Murata	GRM31MF51C106ZA12
C14,C15,C16,C17,C31,C32,C33,C34	Capacitor	22 nF	603	Murata	GRM188R71H223KA01
C18,C19	Capacitor	10uF/35V	SMT	Panasonic	EEEHD1V100AR
C20	Capacitor	0.7pF	SMT	ATC	ATC100B0R7BW500X
C21	Capacitor	1 pF	SMT	ATC	ATC100B1R0CW500X
C22	Capacitor	6.8 pF	SMT	ATC	ATC100B6R8CW500X
C23	Capacitor	1.5 pF	SMT	ATC	ATC100B1R5CW500X
C24	Capacitor	1.2 pF	SMT	ATC	ATC100B1R2CW500X
C25,C26	Capacitor	27 pF	SMT	ATC	ATC100B270KW500X
C27,C28,C29,C30	Capacitor	100 pF	SMT	ATC	ATC800A101JT
C35,C36,C37,C38	Capacitor	10uF-35V	SMT	Murata	GRM32ER7YA106KA12
C39,C40	Capacitor	4.7uF-50V	SMT	Murata	GRM31CR71H475KA12
L1,L2	Inductor	1.65nH	906	Coilcraft	0906-2KLB
L3,L4	Inductor	27nH	1812	Coilcraft	1812SMS-27NJLB
D1,D2	Zener diode	5.1 V	SOD110	Philips	BZX284C5V1
Vdd_2P_J1,J2	Connector DC	2 ways	2.54mm	Phoenix Contact	1725656
P1_P2	RF connector	SMA_Female	Flange Screw mount	Radiall	R124.510.000W
Q1-Q2	LDMOS	LET9060S	PowerSO-10RF	ST	LET9060S
Board	ROGER 4350B, two layers, Tk=60 mils, 1 OZ Cu on TOP-Bottom layers, Finit. Metal Chem. Tin-HAL LF; Total Tk=1.6mm max, TOP screen printing comp.				
Copper carrier	Mechanical plate --STEVAL-TDR 030V1				PPGPC001 - Rev A
Cap	Cap POS10RF -- STEVAL-TDR 030V1				PPGPC002 - Rev A

Table 3. Component list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
8 threaded spacers M3 X 5	Richco HTSBC-M3-5-5-2C				RS: 105-8167
2 screws M2 x 10	M2 X10 T.C. - To insert on cap				
4 screws M3 X6	M3 x 6 T. C. hex skt csk head screw				
4 screws M2 X6	M2 x 6 T. C. for IN/OUT connectors				

1. If out of production, use ATC 800A3R3BT
2. If out of production, use ATC 800A8R2CT
3. If out of production, use ATC 800A101JT

Note: BOM does not include heatsink

4 Typical performance

Figure 3. P_{out} vs frequency response @ 32 V

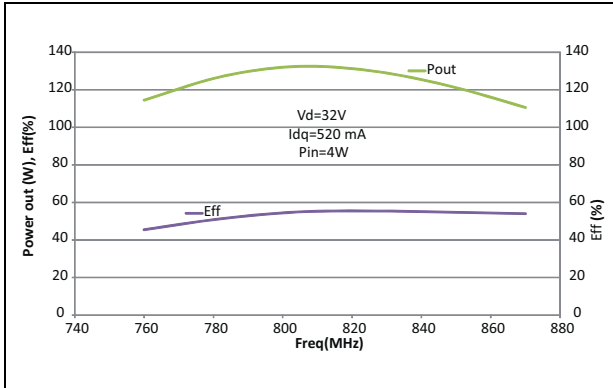


Figure 4. P_{out} vs frequency response @ 28 V

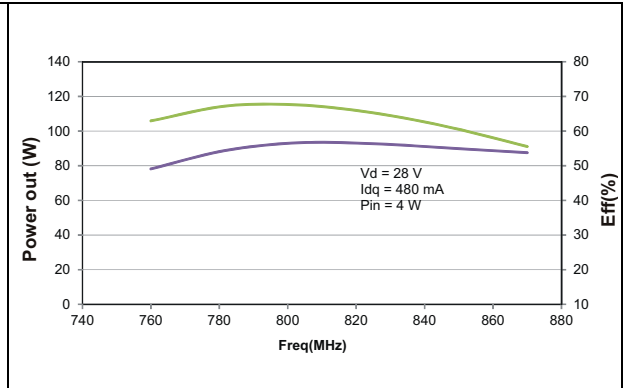


Figure 5. Gain vs P_{out}

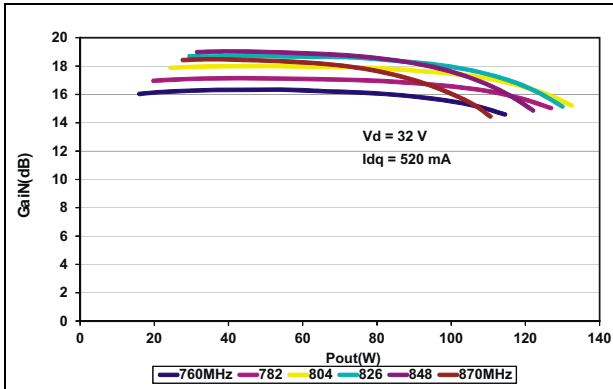


Figure 6. Eff vs output power

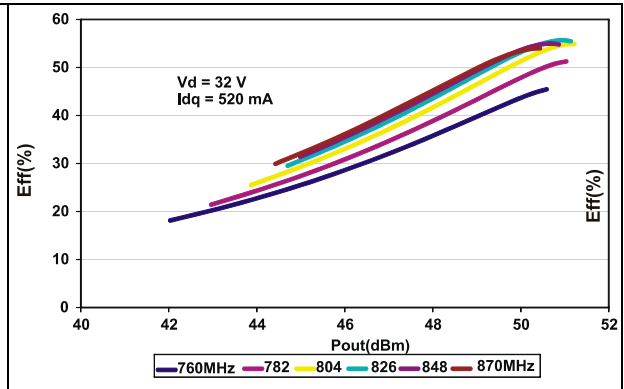


Figure 7. Input return loss response vs freq

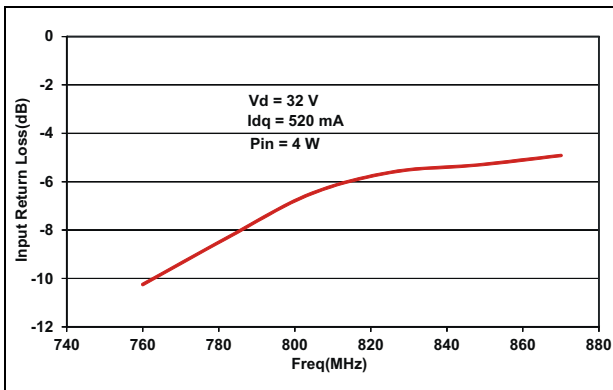
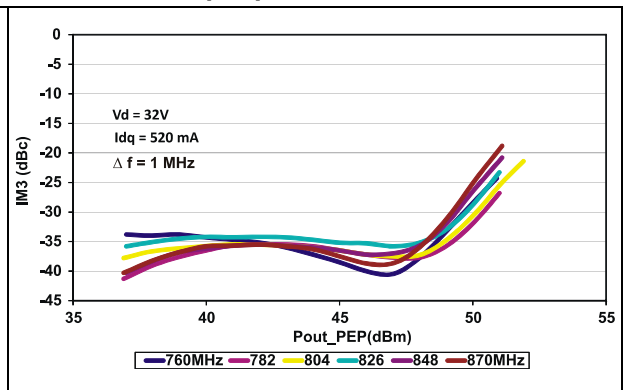
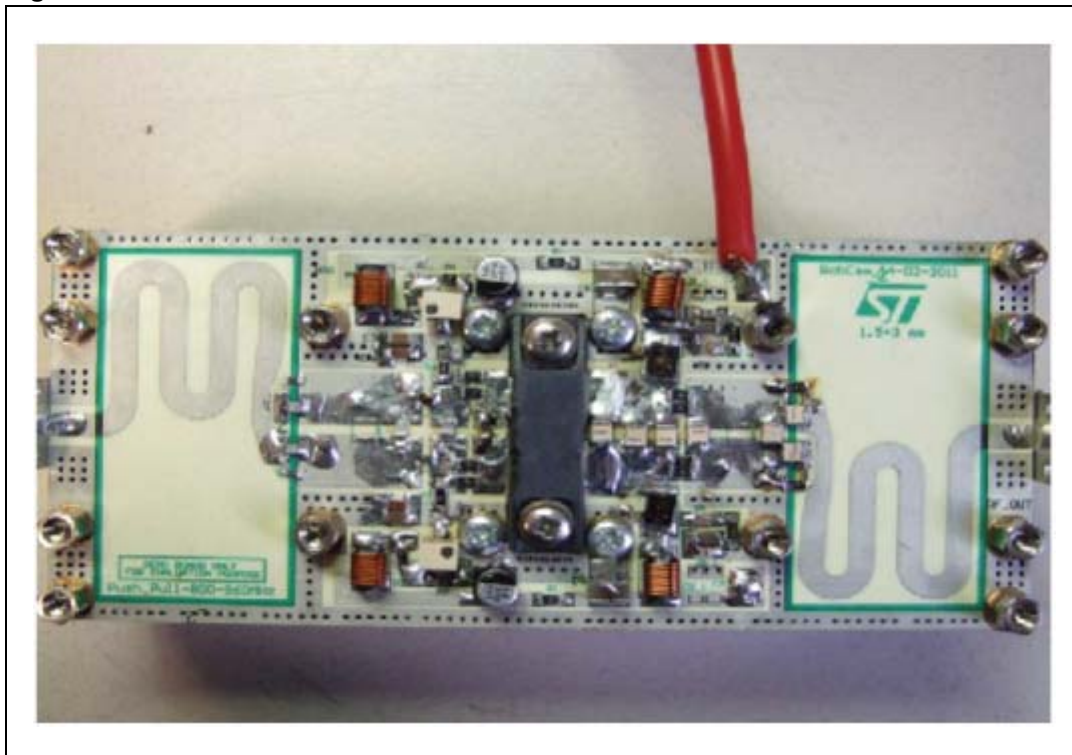


Figure 8. Intermodulation distortion vs output power



5 Board photo

Figure 9. STEVAL-TDR030V1 demonstration board



6 Revision history

Table 4. Document revision history

Date	Revision	Changes
11-Feb-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.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, 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.

© 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

