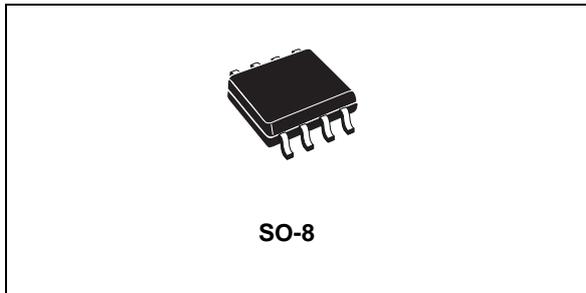


Very low drop voltage regulators with inhibit

Datasheet - production data



Description

The LK115 is a series of very low drop voltage regulators, available in SO-8 package.

The very low drop voltage (0.2 V) and very low quiescent current (0.01 μA in OFF mode, 280 μA in ON mode) make it particularly suitable for low noise, low power applications and especially in battery-powered systems.

Both active high and active low shutdown logic control are available (pin 2 and 3). This means that when the device is used as a local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption.

It only requires a 2.2 μF capacitor for stability saving space and costs.

Features

- Very low-dropout voltage (0.2 V typ.)
- Very low quiescent current (typ. 0.01 μA in OFF mode, 280 μA in ON mode)
- Output current up to 100 mA
- Two logic-controlled electronic shutdowns
- Output voltages of 3.0; 3.3; 5.0 V
- Internal current and thermal limit
- A 2.2 μF capacitor for stability
- V_{OUT} tolerance $\pm 3\%$ at 25 $^{\circ}\text{C}$
- Supply voltage rejection: 80 dB (typ.)
- Temperature range: -40 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$

Table 1. Device summary

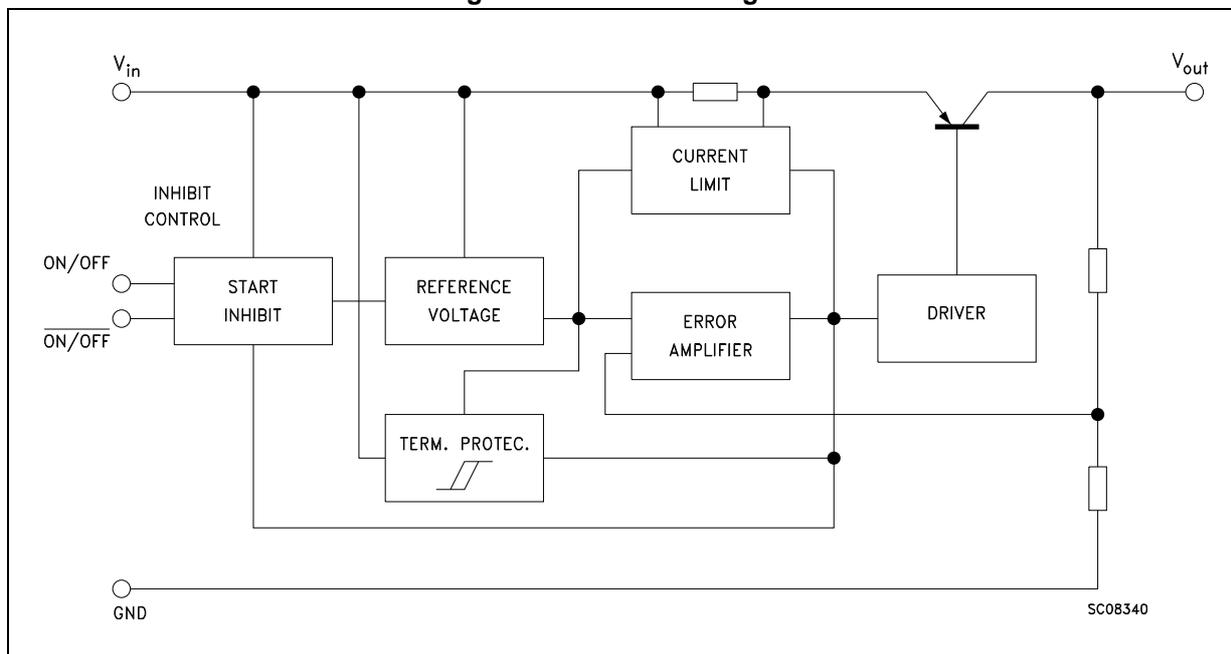
Order codes	Output voltages
LK115D33-TR	3.3 V
LK115D50-TR	5 V

Contents

1	Diagram	3
2	Pin configuration	4
3	Maximum ratings	5
4	Test circuits	6
5	Electrical characteristics	7
6	Package mechanical data	9
7	Packaging mechanical data	11
8	Revision history	13

1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connection (top view)

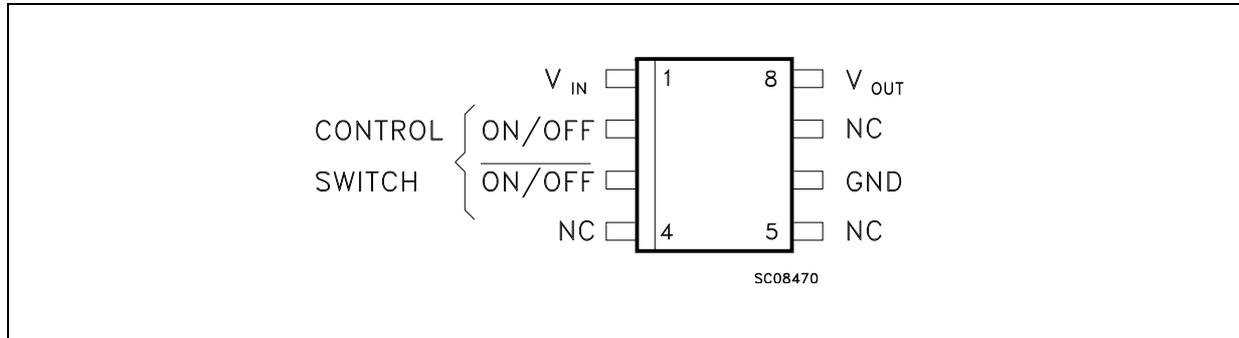


Table 2. Truth table

$\overline{\text{ON/OFF}}$ (pin 2)	$\overline{\text{ON/OFF}}$ (pin 3)	Status
H	L	ON
H	H	OFF
L	L	OFF
L	H	Not allowed

Note: Logic levels are those defined in the electrical characteristics.

3 Maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	20	V
I_O	Output current	Internally limited	
P_{TOT}	Power dissipation	Internally limited	
T_{STG}	Storage temperature range	-40 to 150	°C
T_{OP}	Operating junction temperature range	-40 to 125	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

4 Test circuits

Figure 3. Supply current (ON mode)

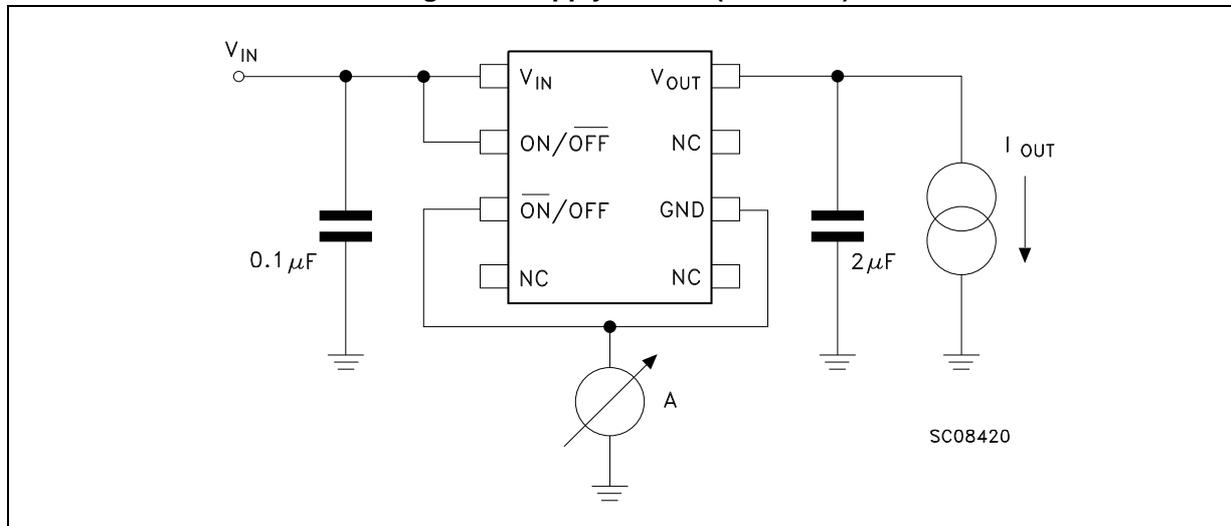
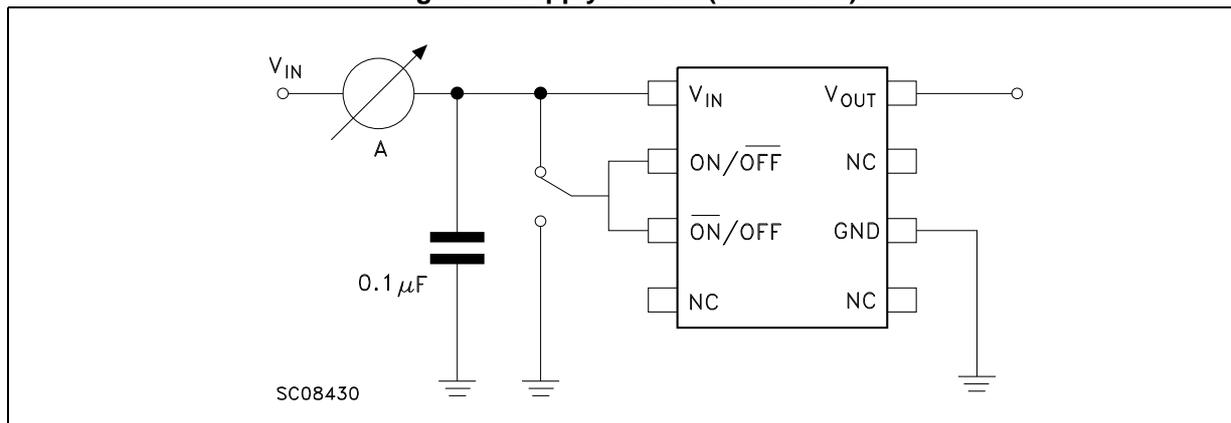


Figure 4. Supply current (OFF mode)



Note: The switch emulates two possibilities to set the regulator in OFF mode.

5 Electrical characteristics

(Refer to test circuits, $T_J = 25\text{ °C}$, $C_I = 0.1\text{ }\mu\text{F}$, $C_O = 2.2\text{ }\mu\text{F}$ unless otherwise specified)

Table 4. LK115D33 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 5.3\text{ V}$	3.2	3.3	3.4	V
		$I_O = 10\text{ mA}$, $V_I = 5.3\text{ V}$, $T_a = -40\text{ to }125\text{ °C}$	3.135		3.465	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output current limit		120	200		mA
ΔV_O	Line regulation	$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 0.5\text{ mA}$		2	10	mV
ΔV_O	Load regulation	$V_I = 4.3\text{ V}$, $I_O = 0.5\text{ to }100\text{ mA}$		4	20	mV
I_d	Quiescent current (ON mode)	$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 0$		0.28	0.5	mA
		$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 100\text{ mA}$		1.5	3	
	(OFF mode)	$V_I = 4.3\text{ to }20\text{ V}$		0.01	2	μA
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$ $V_I = 5.3\text{ V} \pm 1\text{ V}$	$f = 120\text{ Hz}$		79	dB
			$f = 1\text{ kHz}$		74	
			$f = 10\text{ kHz}$		57	
eN	Output noise voltage (RMS)	$B = 10\text{ Hz to }100\text{ kHz}$		72.6		μV
V_d	Dropout voltage	$I_O = 60\text{ mA}$		0.17		V
V_{Hlc}	ON/ $\overline{\text{OFF}}$ control (pin 2)	Pin 3 to GND, OFF	0		0.5	V
		Pin 3 to GND, ON	2.4		V_{in}	
V_{Llc}	$\overline{\text{ON}}$ /OFF control (pin 3)	Pin 2 to V_{in} , OFF	$V_{in}-0.2$		V_{in}	V
		Pin 2 to V_{in} , ON	0		$V_{in}-2.4$	
C_O	Output bypass capacitance	$\text{ESR} = 0.5\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

(Refer to test circuits, $T_J = 25\text{ °C}$, $C_I = 0.1\text{ }\mu\text{F}$, $C_O = 2.2\text{ }\mu\text{F}$ unless otherwise specified)

Table 5. LK115D50 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$	4.85	5	5.15	V
		$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$, $T_a = -40\text{ to }125\text{ °C}$	4.75		5.25	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output current limit		120	200		mA
ΔV_O	Line regulation	$V_I = 6\text{ to }20\text{ V}$, $I_O = 0.5\text{ mA}$		3	15	mV
ΔV_O	Load regulation	$V_I = 6\text{ V}$, $I_O = 0.5\text{ to }100\text{ mA}$		4	20	mV
I_d	Quiescent current (ON mode)	$V_I = 6\text{ to }20\text{ V}$, $I_O = 0$		0.28	0.5	mA
		$V_I = 6\text{ to }20\text{ V}$, $I_O = 100\text{ mA}$		1.5	3	
	(OFF mode)	$V_I = 6\text{ to }20\text{ V}$		0.01	2	μA
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$ $V_I = 7\text{ V} \pm 1\text{ V}$	$f = 120\text{ Hz}$		75	dB
			$f = 1\text{ kHz}$		70	
			$f = 10\text{ kHz}$		55	
eN	Output noise voltage (RMS)	$B = 10\text{ Hz to }100\text{ kHz}$		110		μV
V_d	Dropout voltage	$I_O = 60\text{ mA}$		0.17		V
V_{Hlc}	ON/ $\overline{\text{OFF}}$ control (pin 2)	Pin 3 to GND, OFF	0		0.5	V
		Pin 3 to GND, ON	2.4		V_{in}	
V_{Llc}	$\overline{\text{ON}}$ /OFF control (pin 3)	Pin 2 to V_{in} , OFF	$V_{in}-0.2$		V_{in}	V
		Pin 2 to V_{in} , ON	0		$V_{in}-2.4$	
C_O	Output bypass capacitance	$\text{ESR} = 0.5\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

6 Package mechanical data

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 5. SO-8 drawings

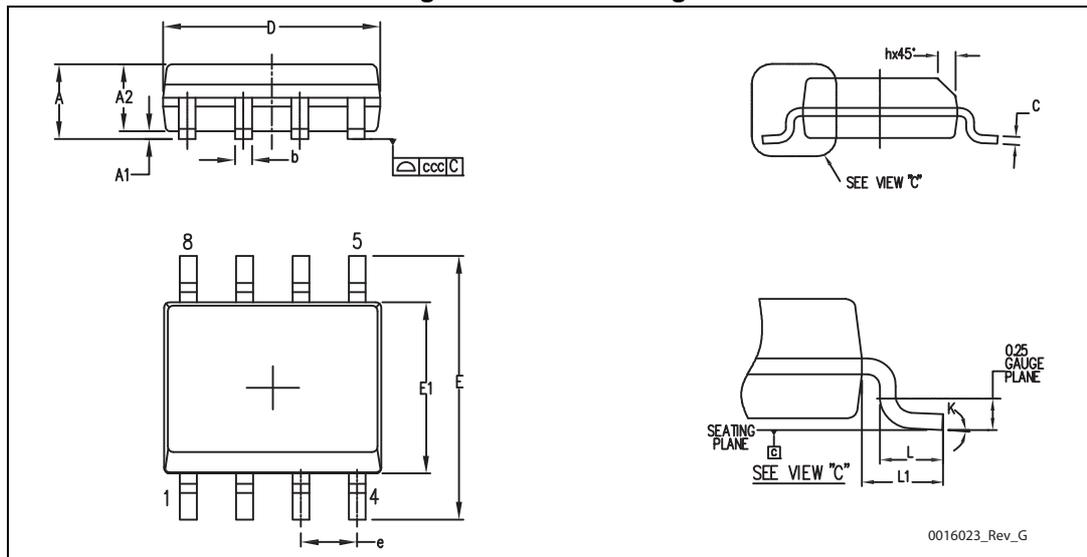


Table 6. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.28		0.48
c	0.17		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
k	0°		8°
ccc			0.10

7 Packaging mechanical data

Figure 6. SO-8 tape and reel dimensions

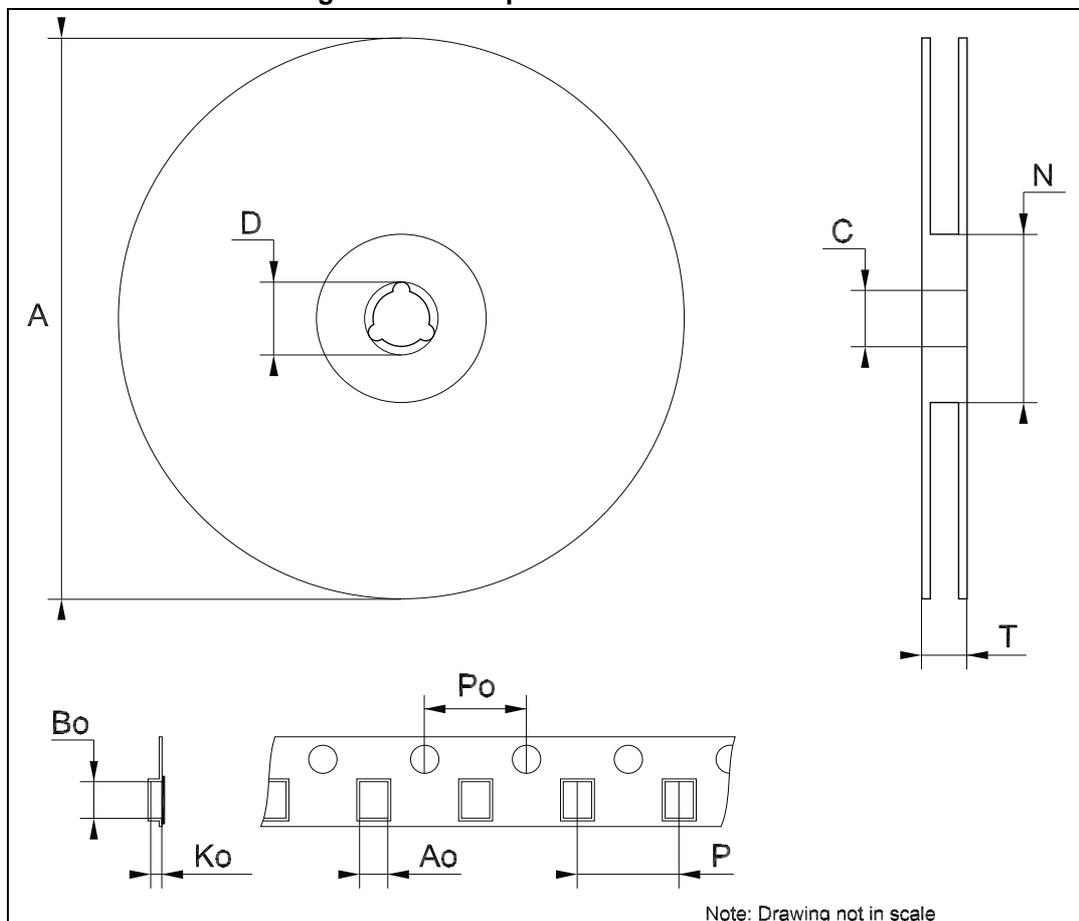


Table 7. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

8 Revision history

Table 8. Document revision history

Date	Revision	Changes
07-Jun-2006	3	Order codes updated.
07-Jul-2008	4	Added Table 1 on page 1 .
31-Jan-2014	5	Changed the LK115xx30, LK115xx33, LK115xx50 to LK115. Updated the description in cover page. Updated Section 5: Electrical characteristics , Section 6: Package mechanical data . Added Section 7: Packaging mechanical data . Minor text changes.

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