PRODUCT/PROCESS CHANGE NOTIFICATION

PCN AMS-AAS/13/8195
Dated 29 Oct 2013

TDA2822D Wafer diameter and assembly and test changes

Table 1. Change Implementation Schedule

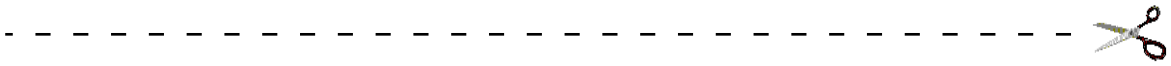
Forecasted implementation date for change	15-Nov-2013
Forecasted availability date of samples for customer	15-Nov-2013
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	15-Nov-2013
Estimated date of changed product first shipment	27-Jan-2014

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	TDA2822D
Type of change	Waferfab process change, Package assembly location change, Package assembly material change, Testing location change, Test program / platform change
Reason for change	Wafer fab and assembly process optimization and Halogen content
Description of the change	1) wafer diameter change from 5" to 6".- (2) assembly and final testing plant transfer from Muar to Shenzhen.- (3) Package materials change. --Note: with the agreement of the customer, the changed parts can be delivered even in advance in respect of the scheduled date.
Change Product Identification	Ecolevel upgrade to "G" , assy traceability code "GK"
Manufacturing Location(s)	

Table 3. List of Attachments

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt	**PCN AMS-AAS/13/8195**
Please sign and return to STMicroelectronics Sales Office	**Dated 29 Oct 2013**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

.....

.....

.....

.....

.....

.....

.....

.....

DOCUMENT APPROVAL

Name	Function
Ferri, Simone	Marketing Manager
Onetti, Andrea Mario	Product Manager
Speroni, Ernesto Fabrizio	Q.A. Manager

TDA2822D Wafer diameter and assembly and test changes

WHAT

1) As part of the running program to convert to 6” wafers the silicon lines diffused on the bipolar processes in the Ang Mo Kio plant, the wafer diameter for the product TDA2822D, (diffused on LABT process) will be changed from 5” to 6”.

2) For the TDA2822D (housed in SO8 package) also the following changes regarding the assembly and test will be done:
   2.1) Transfer of the assembly and final test from ST Muar (Malaysia) to ST Shenzhen (PRC).
   2.2) Change of bonding wires material from GOLD to COPPER
   2.3) Implementation of ECOPAK2 “green” molding compound (change from Nitto MP8000 H4-2A to Sumitomo EME G700K)
   2.4) Die attach glue (change from Hitachi EN4900 to Ablebond 8601S-25)
   2.5) A Super High Density frame (SHD) will be implemented.

WHY

1) To rationalize the wafer production capacity.
2) To improve the supply chain and to have a lower impact on the ambient.

HOW

The bipolar LABT diffusion process family is qualified and running in volumes on 6” wafers.
The qualification has been done through test vehicles belonging to the same process family (namely KSAD for the wafer diameter change and LA05 for the assembly changes).
The alignment of electrical parameters of the TDA2822 will be monitored as well.

Note: with the agreement of the customer, the changed parts can be delivered even in advance in respect of the scheduled date.

Internal Reliability Evaluation Report

Qualify AMK5 versus **AMJ9 6"**
[LABT100 Technology]
T.V: KSADAAW - LD1117SC-R *SOT223*

General Information	
Product Line	KSADAAW
Product Description	Adj semi ld postive 800mA
P/N	LD1117SC-R
Product Group	APM
Product division	IPC
Package	SOT223
Silicon Process technology	BIPOLAR >6 um
Production mask set rev.	NKSADA6

Locations	
Wafer fab	*AMJ9 6"*
Assembly plant	*NANTONG FUJITSU CHINA*
Reliability Lab	*Catania*
Reliability assessment	*Pass*

DOCUMENT INFORMATION

Version	Date	Pages	Prepared by	Approved by	Comment
1.0	08-July-2011	9	Alfio Rao	Giuseppe Giacopello	First issue

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.
This report does not imply for STMicroelectronics expressly or implicitly any contractual obligations other than as set forth in STMicroelectronics general terms and conditions of Sale. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics.

TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS 3
2 GLOSSARY 3
3 RELIABILITY EVALUATION OVERVIEW 3
3.1 OBJECTIVES 3
3.2 CONCLUSION 3
4 DEVICE CHARACTERISTICS 4
4.1 DEVICE DESCRIPTION 4
4.2 CONSTRUCTION NOTE 5
5 TESTS RESULTS SUMMARY 6
5.1 TEST VEHICLE 6
5.2 TEST PLAN AND RESULTS SUMMARY 6
6 ANNEXES 7
6.1 DEVICE DETAILS 7
6.2 TESTS DESCRIPTION 9

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

LABT100 Bipolar Technology diffused in AMJ9 6" (Transferring project).

TV: KSADAAW – LD1117SC assembled in SOT223.

Shared qualification

3.2 Conclusion

Qualification Plan requirements have been fulfilled without exception. It is stressed that reliability tests have shown that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

Features

Low dropout voltage:
– 1.15 V typ. @ I_{OUT} = 1 A, 25 ℃
Very low quiescent current:
– 5 mA typ. @ 25 ℃
Output current up to 1 A
Fixed output voltage of:
– 1.2 V, 1.8 V, 2.5 V, 3.3 V
Adjustable version availability (V_{REL} = 1.25 V)
Internal current and thermal limit
Only 10 µF for stability
Available in ± 2 % (at 25 ℃) and 4 % in full temperature range
High supply voltage rejection:
– 80 dB typ. (at 25 ℃)
Temperature range: 0 ℃ to 125 ℃

SOT-223

Description

The LD1117Axx is a low drop voltage regulator able to provide up to 1 A of output current, available even in adjustable version (V_{REF} = 1.25V). Concerning fixed versions, are offered the following output voltages: 1.2 V, 1.8 V, 2.5 V and 3.3 V. The device is supplied in: SOT-223, DPAK and TO-220. Surface mount packages optimize the thermal characteristics even offering a relevant space saving effect. High efficiency is assured by NPN pass transistor. Only a very common 10 µF minimum capacitor is needed for stability. Only chip trimming allows the regulator to reach a very tight output voltage tolerance, within ± 2 % at 25 ℃.

4.2 Construction note

	P/N: LD1117SC-R
Wafer/Die fab. information	
Wafer fab manufacturing location	AMJ9 6"
Technology	LABT
Process family	BT/B
Die finishing back side	Cr/Ni/Au
Die size	1.990X1.860mm2
Bond pad metallization layers	AlSi
Passivation type	SiN (nitride)
Wafer Testing (EWS) information	
Electrical testing manufacturing location	APPE (Singapore)
Assembly information	
Assembly site	NANTONG FUJITSU CHINA
Package description	SOT223
Molding compound	SUMITOMO EMEG600F
Frame material	Copper 118x93
Die attach process	Glue
Die attach material	ABLESTICK 8352L
Die pad size	146X200, 146X410, 146X360, 167X167
Wires bonding materials/diameters	Au 1.5 mils
Lead finishing process	Matte Tin Plating
Final testing information	
Testing location	NANTONG FUJITSU CHINA
Tester	QT200
Test program	KSX2FAAD.CTS

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

P/N: LD1117SC-R

Lot #	Diffusion Lot	Assy Lot	Technical Code	Package	Product Line	Data Code
1	W047K34	GF113030	FMLL*KSADAAW	*SOT223*	KSADAAW	'113

5.2 Test plan and results summary

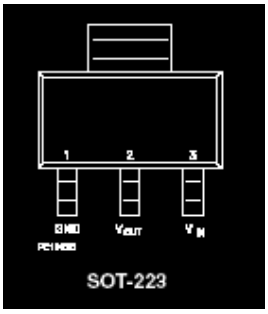
P/N: LD1117SC-R

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS Lot 1	Note
Die Oriented Tests							
HTOL	N	JESD22 A-108	Tj = 125°C, BIAS= 15V	77	168 h	0/77	
					500 h	0/77	
					1000 h	0/77	
HTSL	N	JESD22 A-103	Ta = 150°C	45	168 h	0/45	
					500 h	0/45	
					1000 h	0/45	
Package Oriented Tests							
PC		JESD22 A-113	Drying 24 H @ 125°C Store 168h @ Ta= 85°C Rh= 85 % Over Reflow @ Tpeak= 260°C 3 times	250	Final	Pass	
AC	Y	JESD22 A-102	Pa= 2Atm / Ta= 121°C	77	168 h	0/77	
TC	Y	JESD22 A-104	Ta = -65°C to 150°C	77	100 cy	0/77	
					200 cy	0/77	
					500 cy	0/77	
THB	Y	JESD22 A-101	Ta= 85℃, RH = 85%, BIAS= 12V	77	168 h	0/77	
					500 h	0/77	
					1000 h	0/77	

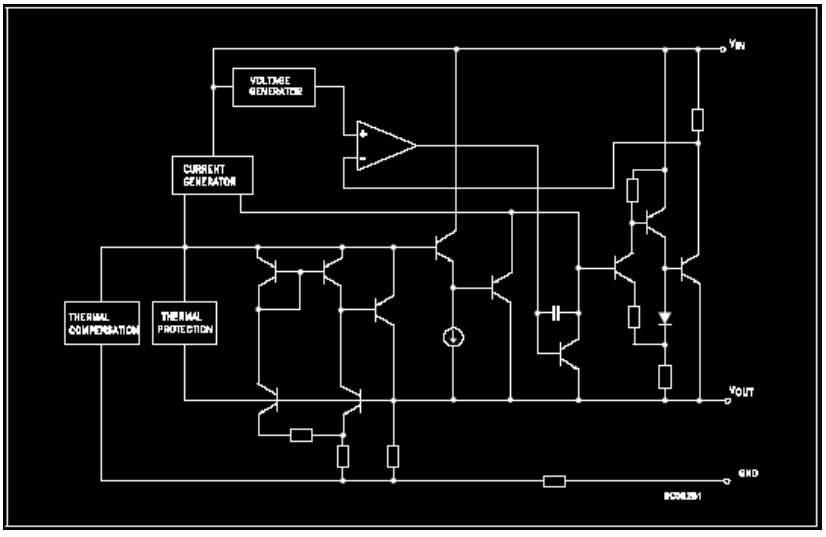
6 ANNEXES

6.1 Device details

6.1.1 Pin connection



6.1.2 Block diagram



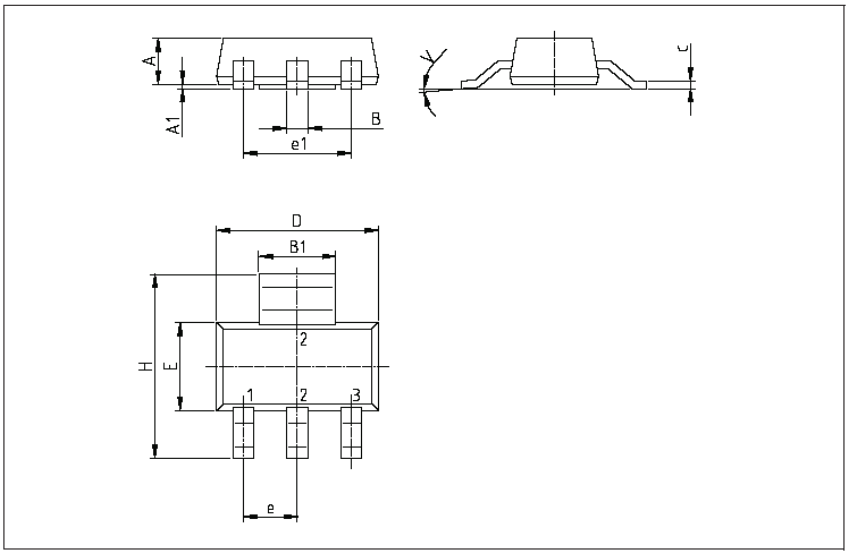
6.1.3 Bonding diagram

8319707

6.1.4 Package outline/Mechanical data

SOT-223 mechanical data

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.8			70.9
A1	0.02		0.1	0.8		3.9
B	0.6	0.7	0.85	23.6	27.6	33.5
B1	2.9	3	3.15	114.2	118.1	124.0
c	0.24	0.26	0.35	9.4	10.2	13.8
D	6.3	6.5	6.7	248.0	255.9	263.8
e		2.3			90.6	
e1		4.6			181.1	
E	3.3	3.5	3.7	129.9	137.8	145.7
H	6.7	7	7.3	263.8	275.7	287.5
V			10°			10°



6.2 Tests Description

Test name	Description	Purpose
Die Oriented		
HTOL High Temperature Operating Life	The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition.	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
Package Oriented		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
AC Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.

External Reliability Evaluation Report

Qualification type: Halogen free material set for SO8 in ST Shenzhen for MSH

PCN# APM-MSH/11/6575

General Information	
Product Line :	UW23, LA05
Product Description :	RS Transceiver, Positive voltage regulators
Commercial Product :	ST3485ECDR, L78L05ACD
Product division/BU :	MSH , IPC
Package :	SO8
Technology process :	BCD3S,BIP (>6UM)
Jedec MSL :	MSL 1

Locations	
Wafer fab location	Ang Mo Kio 6 (Singapore)
EWS plant location	ST Singapore
Assembly plant location	ST Shenzhen (China)
Final test plant location:	ST Shenzhen (China)

DOCUMENT APPROVAL LIST

NAME	FUNCTION	DATE	VISA
JM Bugnard	QA MSH Grenoble	23/06/2011	

1 RELIABILITY and qualification evaluation overview

1.1 Objectives

Aim of this report is to present the results of the reliability evaluations performed on ST3485ECDR and L78L05ACD test vehicles to qualify Halogen free material (ecopack 2) set for SO8 package produced in ST Shenzhen for MSH (Mems, Sensor and High performance analog).

1.2 Conclusion

All results are inside ST specification and the plan to achieve qualification exercise is described in below sections.
All results are within ST specification and production authorized.

2 DEVICES TRACEABILITY

2.1 Devices description

The ST3485E is ±15 kV ESD protected, 3.3 V low power transceiver for RS-485 and RS-422 communications. The device contains one driver and one receiver in half duplex configuration.
The ST3485E transmits and receives at a guaranteed data rate of at least 12 Mbps.

The L78Lxx series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current.
They are intended as fixed voltage regulators in a wide range of applications including local or oncard regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators. The L78Lxx series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement

2.2 Wafer fabrication information

	TV1	TV2
Line	UW23	LA05
Sales Type	ST3485ECDR	L78L05ACD
FE process	BCD3S	BIP (>6UM)
Package	SO8	SO8
Die size (µm)	1950x2720	1130x1270 um
Metallization	AlSi	AlSi
Passivation	P_VAPOX / NITRIDE	SiN
Back side	Lapped silicon	Lapped silicon

2.3 Assembly information

	Current process	**Modified process**
Assembly location	ST Shenzhen (China)	ST Shenzhen (China)
Die attach	Hitachi 4900ST10	ABLEBOND 8601S-25
Wire	Gold 1 mils	Copper 1 mils
Leadframe	Copper C194	Copper C194
Molding compound	Nitto MP8000	Sumitomo G700K
Lead finishing	NiPdAu	NiThPdAgAu

3 Reliability Tests results

3.1 Test vehicle

Lot#	Process/ Package	Product Line	Comments
1	BCD3S / SO8	UW23	
2	Bipolar / SO8	LA05	IPC division
3	Bipolar / SO8	LA05	IPC division
4	Bipolar / SO8	LA05	IPC division

Detailed results in below chapter will refer to P/N

3.2 Test plan and results summary

Tests	Conditions	Step	TV1	TV2	TV3	TV4
		Line	UW23	LA05		
Report reference				GK0290GLZS	GK0290GLZR	GK0290GLZQ
Die oriented tests						
HTOL	Tj = 125℃, bias= +30V			Tj=125	Tj=125	
		168h				0/77
		500h				0/77
		1000h				0/77
HTSL	Ta=150℃ JESD22 A-103	168h	0/45	0/45	0/45	0/45
		500h	0/45	0/45	0/45	0/45
		1000h	0/45	0/45	0/45	0/45
Package oriented tests						
PC	Drying 24 H @ 125℃ Store 168 H @ Ta=85℃ Rh=85% Oven Reflow @ Tpeak=260℃ 3 times		0/270	0/77	0/77	0/77
THB	Ta=85C RH=85% Vs=nominal JESD22 A-101	168h	0/77	0/77	0/77	
		1000h	0/77	0/77	0/77	
AC	Ta=121C P=2atm JESD22 A-102	168h	0/77	0/77	0/77	0/77
TMC	Ta=-65/+150C JESD22 A-104	100cy	0/77	0/77	0/77	0/77
		200cy	0/77	0/77	0/77	0/77
		500cy	0/77	0/77	0/77	0/77

4 Annexes

4.1 Tests Description

Test name	Description	Purpose
Die Oriented		
HTOL High Temperature Operative Life	The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition.	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress voiding.
Package Oriented		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
AC **autoclave**	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC **Temperature Cycling**	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB **Temperature Humidity Bias**	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.

5 Construction analysis

5.1 Ball Shear

TV1: UW23

Spec Limit	21.4 g	Spec	7184768
Equipment	Dage	Performed by	IPC
Supplier/model	SERIES 4000	Method	Destructive

DATA	52.63	60.15	56.36	57.45	56.89	60.35	65.32	62.56	51.23	54.23
	62.36	59.26	66.32	60.78	59.36	56.79	63.63	60.57	55.46	52.31
Mean	58.70									
Max	66.32									
Min	51.23									
Range	15.09									
Std Dev	4.27									
Cpk	2.91									

REMARKS All data within ST spec range.

5.2 Bond Pull

TV1: UW23

Spec Limit	4 g	Spec	7184768
Equipment	Dage	Performed by	IPC
Supplier/model	SERIES 4000	Method	Destructive

DATA	11.25	13.20	12.54	13.62	15.42	10.56	14.78	14.25	14.63	12.03
	12.56	14.23	13.02	12.89	11.98	13.32	12.17	13.06	14.32	12.58
Mean	13.12									
Max	15.42									
Min	10.56									
Range	4.86									
Std Dev	1.24									
Cpk	2.46									

REMARKS All data within ST spec range.

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.

RESTRICTIONS OF USE AND CONFIDENTIALITY OBLIGATIONS:

THIS DOCUMENT AND ITS ANNEXES CONTAIN ST PROPRIETARY AND CONFIDENTIAL INFORMATION. THE DISCLOSURE, DISTRIBUTION, PUBLICATION OF WHATSOEVER NATURE OR USE FOR ANY OTHER PURPOSE THAN PROVIDED IN THIS DOCUMENT OF ANY INFORMATION CONTAINED IN THIS DOCUMENT AND ITS ANNEXES IS SUBMITTED TO ST PRIOR EXPRESS AUTHORIZATION. ANY UNAUTHORIZED REVIEW, USE, DISCLOSURE OR DISTRIBUTION OF SUCH INFORMATION IS EXPRESSLY PROHIBITED.

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

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