

2-line IPAD™, EMI filter including ESD protection

Features

- EMI symmetrical (I/O) low-pass filter
- High efficiency EMI filtering
- Lead-free package
- Very low PCB space consumption: 0.9 mm²
- Very thin package: 0.60 mm
- High efficiency ESD suppression
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

Complies with the following standards

- IEC61000-4-2 level 4 on external pins:
 - 15 kV (air discharge)
 - 8 kV (contact discharge)
- IEC61000-4-2 level 1 on internal pins:
 - 2 kV (air discharge)
 - 2 kV (contact discharge)

Applications

Where EMI filtering in ESD sensitive equipment is required:

- Mobile phones and communication systems
- Computers, printers and MCU Boards

Description

The EMIF02-MIC02F3 is a highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interference.

This filter includes ESD protection circuitry, which prevents damage to the protected device when subjected to ESD surges up to 15 kV.

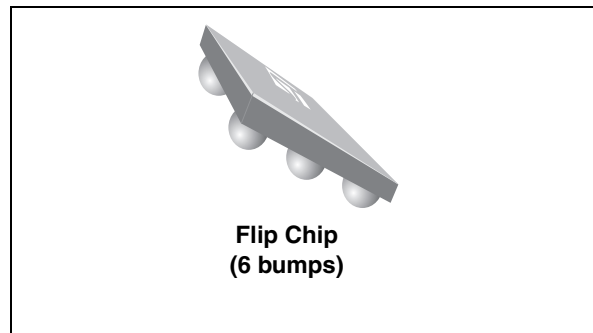


Figure 1. Pin layout (bump side)

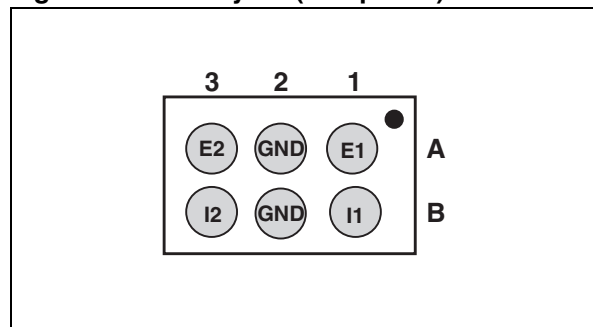
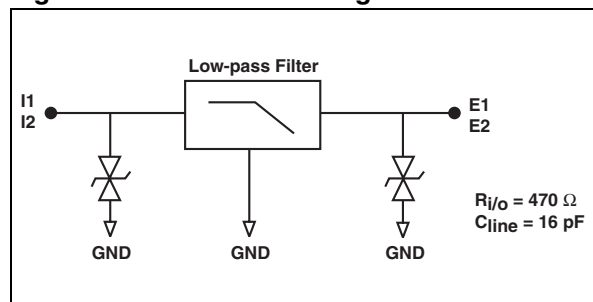


Figure 2. Basic cell configuration



TM: IPAD is a trademark of STMicroelectronics.

1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit
V_{PP}	External pins (A1, A3):		
	ESD discharge IEC61000-4-2, air discharge	15	
	ESD discharge IEC61000-4-2, contact discharge	8	
	Internal pins (B1, B3):		
	ESD discharge IEC61000-4-2, air discharge	2	
	ESD discharge IEC61000-4-2, contact discharge	2	
T_j	Junction temperature	125	°C
T_{op}	Operating temperature range	-40 to + 85	°C
T_{stg}	Storage temperature range	-55 to 150	°C

Table 2. Electrical characteristics ($T_{amb} = 25\text{ °C}$)

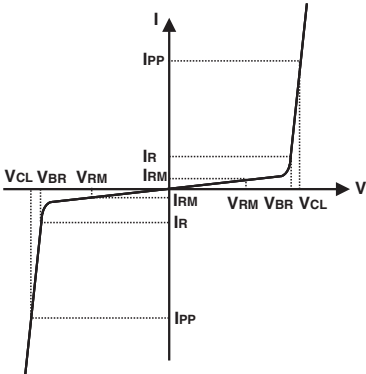
Symbol	Parameters					
V_{BR}	Breakdown voltage					
I_{RM}	Leakage current @ V_{RM}					
V_{RM}	Stand-off voltage					
V_{CL}	Clamping voltage					
R_d	Dynamic impedance					
I_{PP}	Peak pulse current					
$R_{I/O}$	Series resistance between Input & Output					
C_{line}	Input capacitance per line					
Symbol	Test conditions	Min	Typ	Max	Unit	
V_{BR}	$I_R = 1\text{ mA}$	14	16		V	
I_{RM}	$V_{RM} = 12\text{ V per line}$			200	nA	
$R_{I/O}$	Tolerance $\pm 10\%$		470		Ω	
C_{line}	$V_{line} = 0\text{V}$, $V_{OSC} = 30\text{ mV}$, $F = 1\text{ MHz}$, (measured under zero light conditions)		16	20	pF	

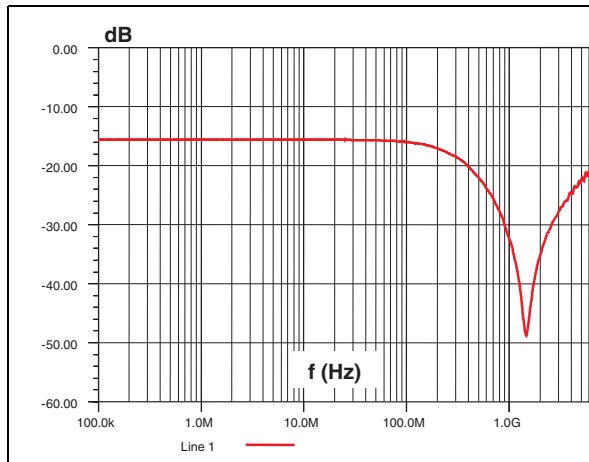
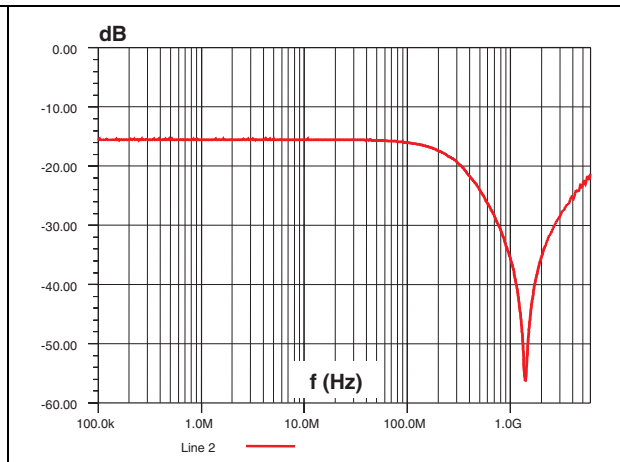
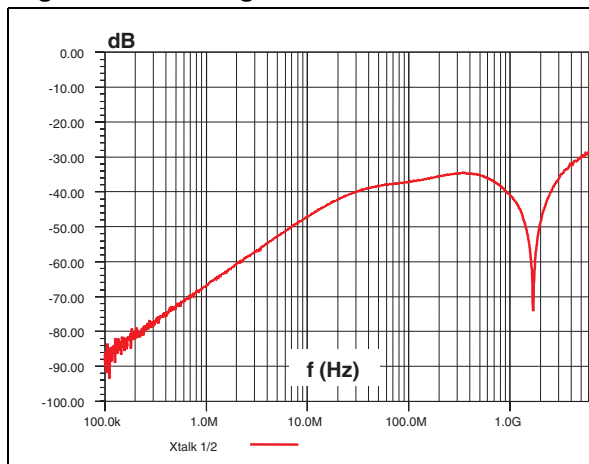
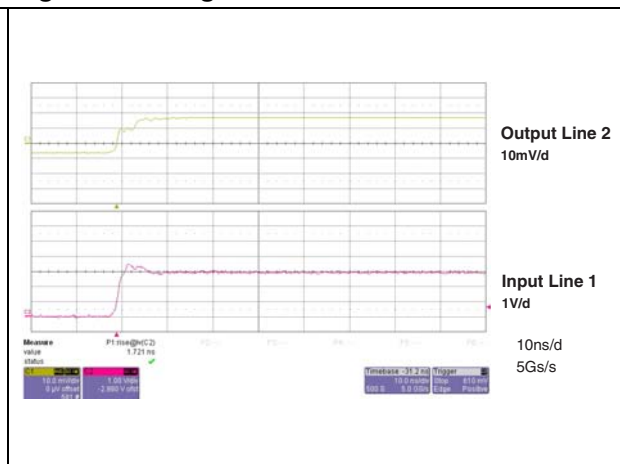
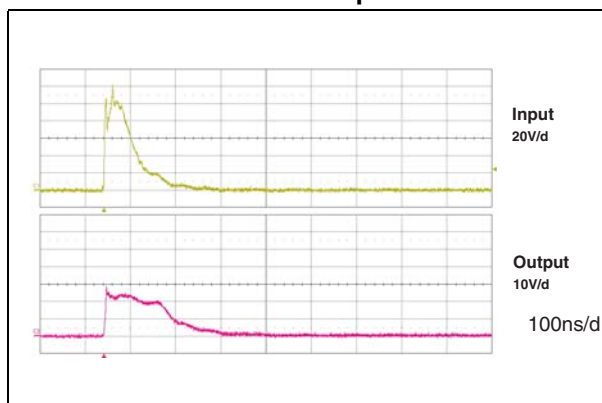
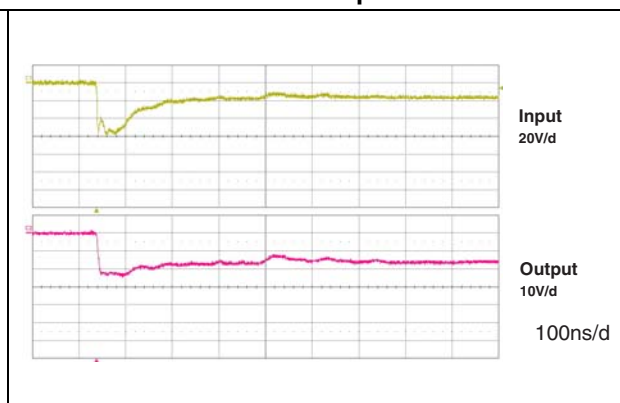
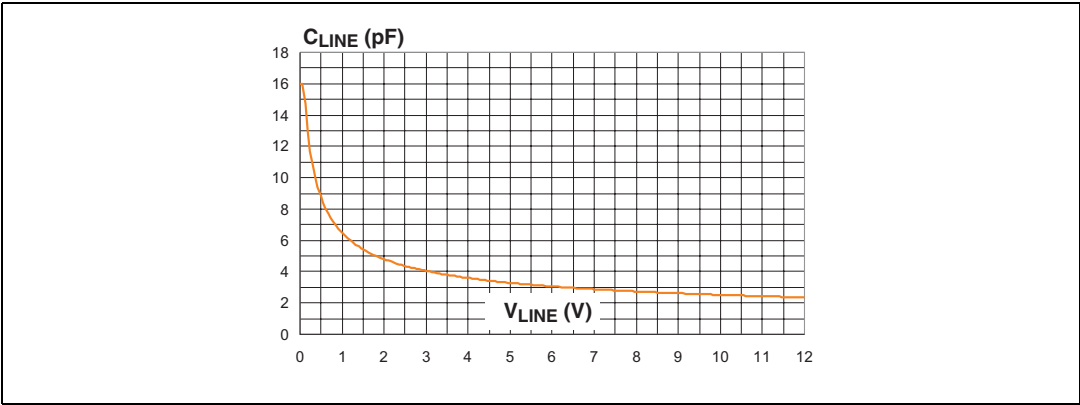
Figure 3. S21 (dB) attenuation measurement (Line 1)**Figure 4. S21 (dB) attenuation measurement (Line 2)****Figure 5. Analog crosstalk measurement****Figure 6. Digital crosstalk measurement****Figure 7. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input and on one output****Figure 8. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input and on one output**

Figure 9. Line capacitance versus applied voltage



2 Application information

Figure 10. Aplac model

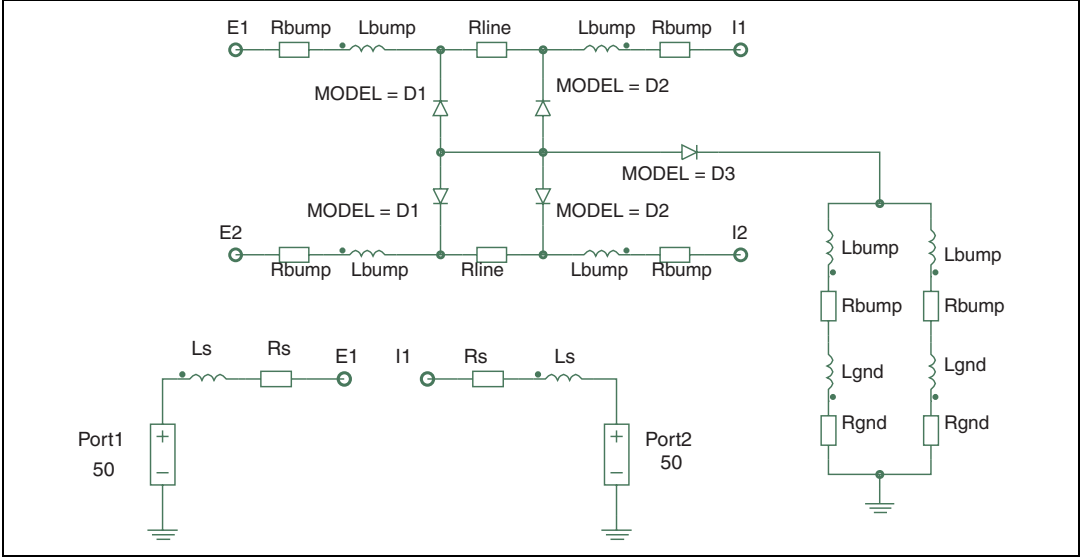
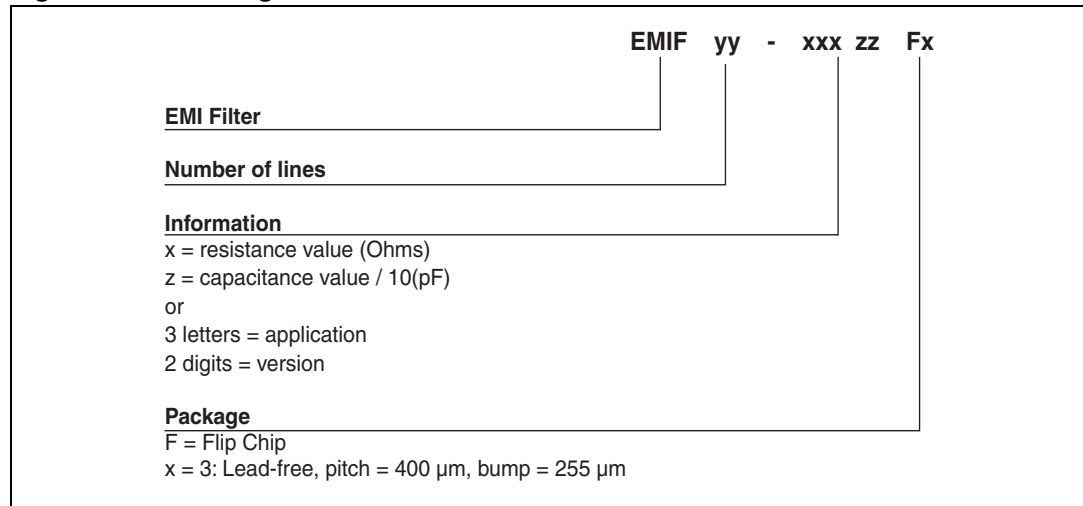


Figure 11. Aplac parameters

Variables	Diode D1	Diode D2	Diode D3
aplacvar Rline 490	BV=7	BV=7	BV=7
aplacvar C_d1 11p	CJO=c_d1	CJO=c_d2	CJO=c_d3
aplacvar C_d2 5p	IBV=1u	IBV=1u	IBV=1u
aplacvar C_d3 240p	IKF=1000	IKF=1000	IKF=1000
aplacvar L 2pH	IS=10f	IS=10f	IS=10f
aplacvar Ls 950pH	ISR=100p	ISR=100p	ISR=100p
aplacvar Rs 150m	N=1	N=1	N=1
aplacvar Lbump 50pH	M=0.3333	M=0.3333	M=0.3333
aplacvar Rbump 20m	RS=0.85	RS=0.85	RS=0.47
aplacvar Lgnd 80pH	VJ=0.6	VJ=0.6	VJ=0.6
aplacvar Rgnd 100m	TT=50n	TT=50n	TT=50n

3 Ordering information scheme

Figure 12. Ordering information scheme



4 Package information

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at www.st.com.

Figure 13. Package dimensions

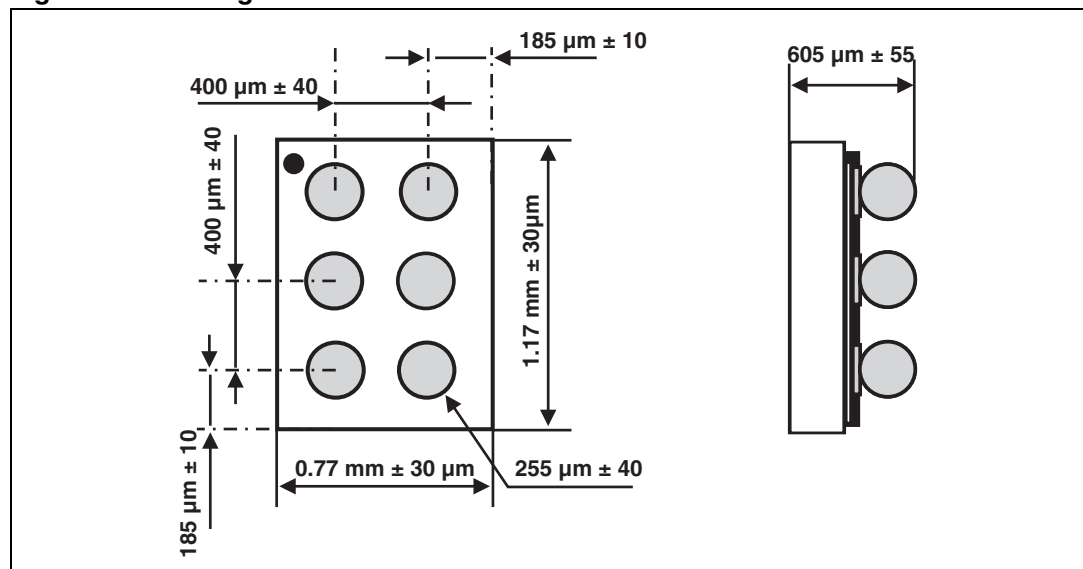


Figure 14. Footprint

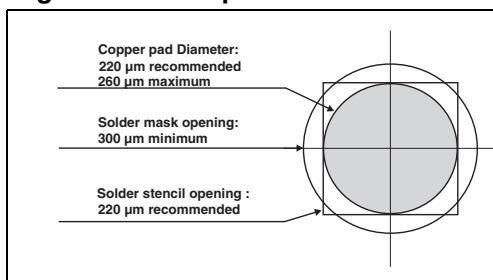


Figure 15. Marking

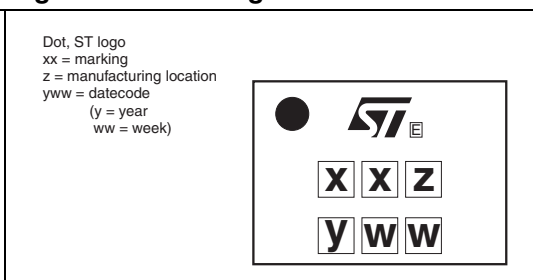
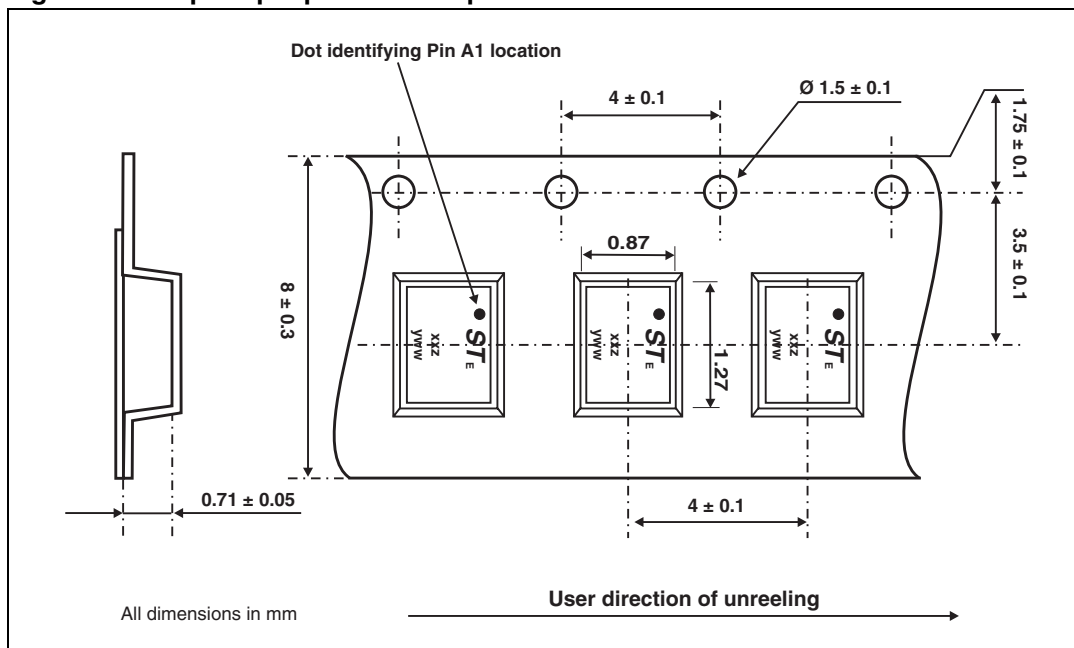


Figure 16. Flip Chip tape and reel specifications



Note:

More information is available in the application notes:

AN2348: “STMicroelectronics 400 micro-metre Flip Chip: Package description and recommendation for use”

AN1751: EMI Filters: Recommendations and measurements

5 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Base qty	Delivery mode
EMIF02-MIC02F3	HB	Flip Chip	5000	Tape and reel (7")

6 Revision history

Table 4. Document revision history

Date	Revision	Changes
17-Jan-2006	1	Initial release.
28-Apr-2008	2	Updated ECOPACK statement. Updated Figure 12 , Figure 13 and Figure 16 . Reformatted to current standards.

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 AN AUTHORIZED ST REPRESENTATIVE, 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.

© 2008 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 - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com