



# EMIF06-10006F2

IPAD™

## 6 line EMI filter and ESD protection

### Main product characteristics

Where EMI filtering in ESD sensitive equipment is required:

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

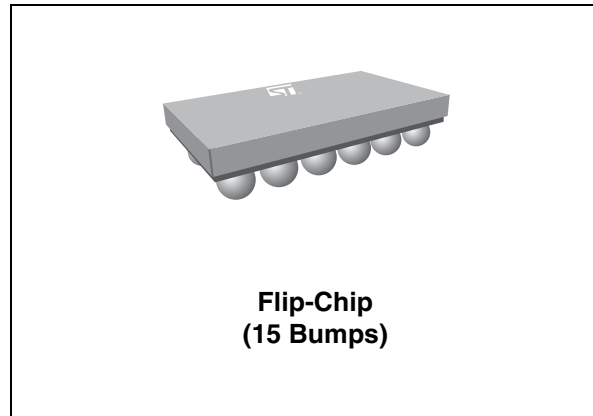
### Description

The EMIF06-10006F2 is a highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interference. The EMIF06 Flip-Chip packaging means the package size is equal to the die size.

This filter includes an ESD protection circuitry which prevents damage to the application when subjected to ESD surges up to 15 kV. This device includes 6 EMIF filters.

### Benefits

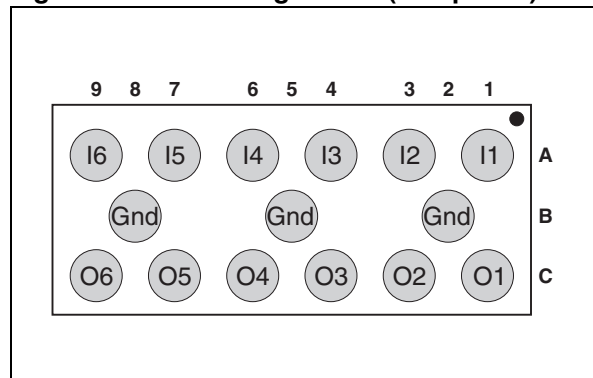
- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Lead free package
- Very low PCB space consumption  
2.92 mm x 1.29 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression  
(IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging



### Order code

Part Number	Marking
EMIF06-10006F2	FT

Figure 1. Pin configuration (bump side)



### Complies with the following standards:

IEC 61000-4-2 level 4:

15 kV (air discharge)

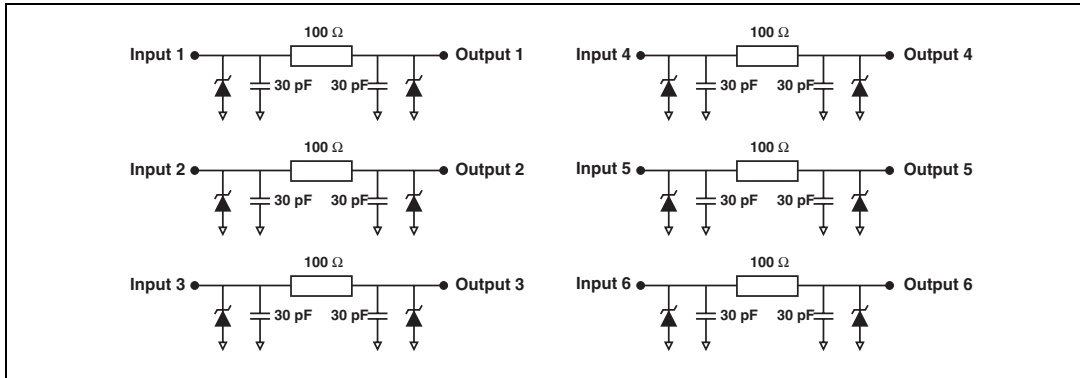
8 kV (contact discharge)

MIL STD 883E - Method 3015-6 Class 3: 30 kV

TM: IPAD is a trademark of STMicroelectronics

# 1 Characteristics

**Figure 2. Basic cell configuration**



**Table 1. Absolute Ratings (limiting values)**

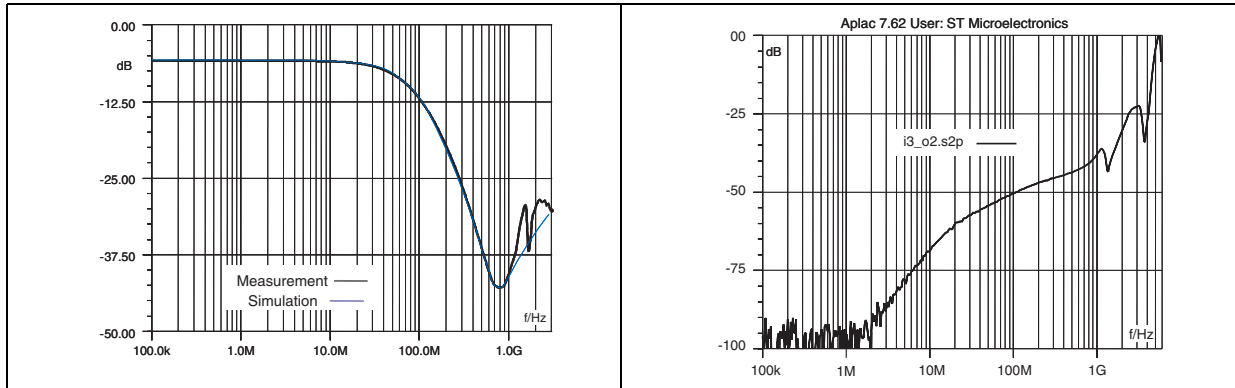
Symbol	Parameter and test conditions	Value	Unit
$P_R$	DC power per resistance	0.1	W
$P_T$	Total DC power per package	0.6	W
$T_j$	Maximum junction temperature	125	°C
$T_{op}$	Operating temperature range	- 40 to + 85	°C
$T_{stg}$	Storage temperature range	125	°C

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

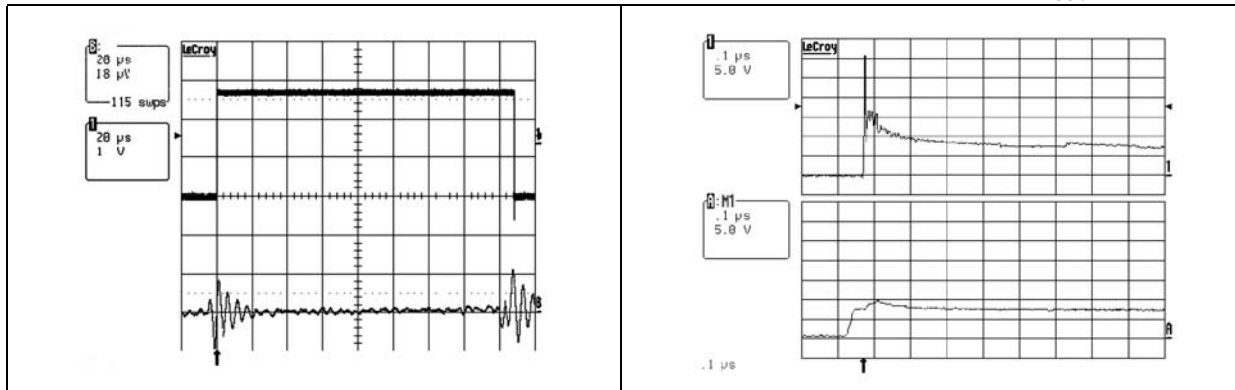
Symbol	Parameter
$V_{BR}$	Breakdown voltage
$I_{RM}$	Leakage current @ $V_{RM}$
$V_{RM}$	Stand-off voltage
$V_{CL}$	Clamping voltage
$R_d$	Dynamic impedance
$I_{PP}$	Peak pulse current
$R_{I/O}$	Series resistance between Input and output
$C_{line}$	Capacitance per line

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{BR}$	$I_R = 1\text{ mA}$	5.5	7	9	V
$I_{RM}$	$V_{RM} = 3.3\text{ V per line}$			500	nA
$R_{I/O}$	$I = 10\text{ mA}$	80	100	120	Ω
$C_{line}$	$V_R = 2.5\text{ V}, F = 1\text{ MHz}, 30\text{ mV (on filter cells)}$	50	60	70	pF

**Figure 3. S21 (db) attenuation measurements** **Figure 4. Analog crosstalk measurements and Aplac simulation**



**Figure 5. Digital crosstalk measurements** **Figure 6. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input (V<sub>in</sub>) and one output (V<sub>out</sub>)**



**Figure 7. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input (V<sub>in</sub>) and one output (V<sub>out</sub>)** **Figure 8. Line capacitance versus applied voltage for filter**

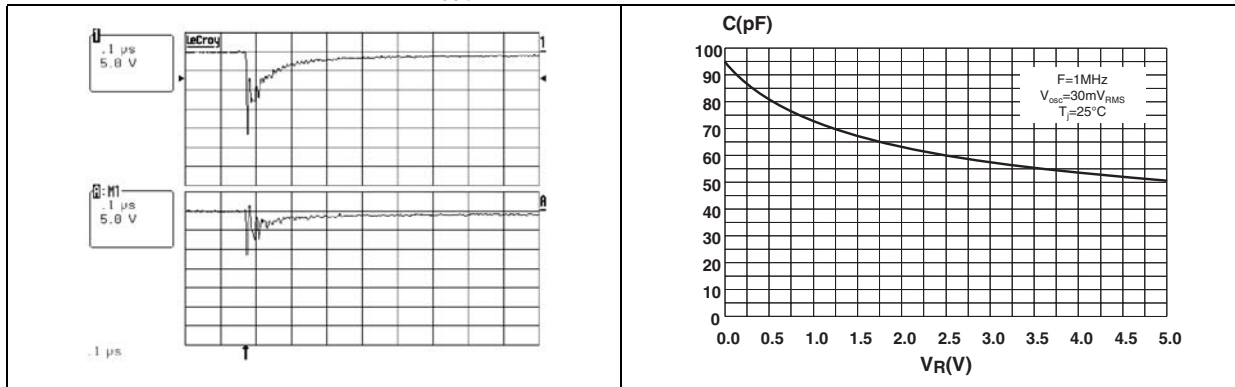


Figure 9. Aplac model

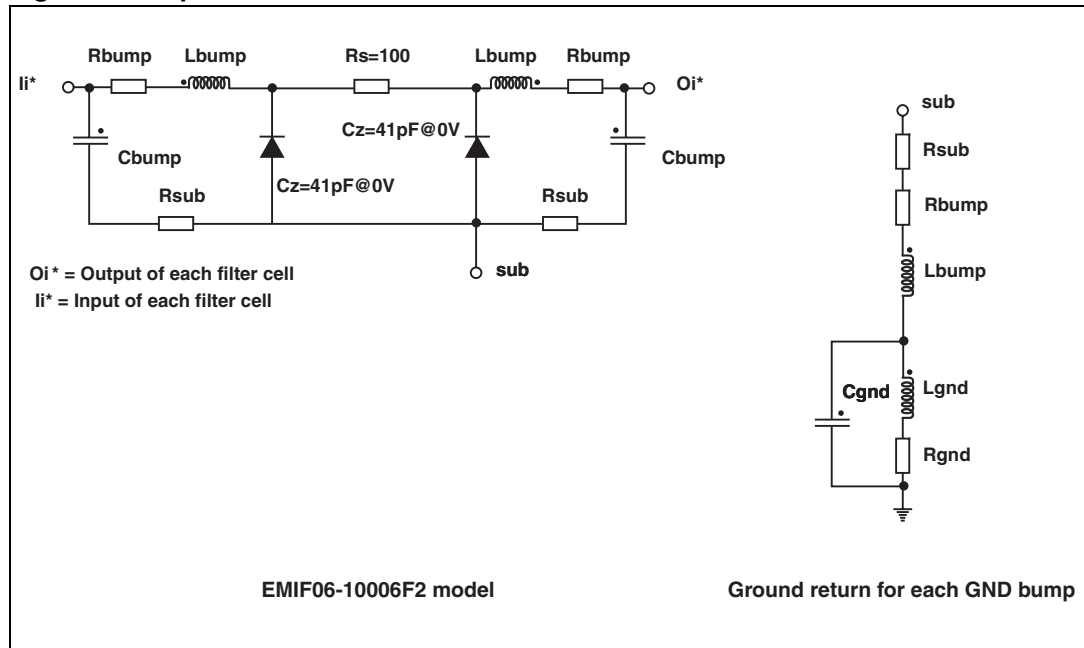
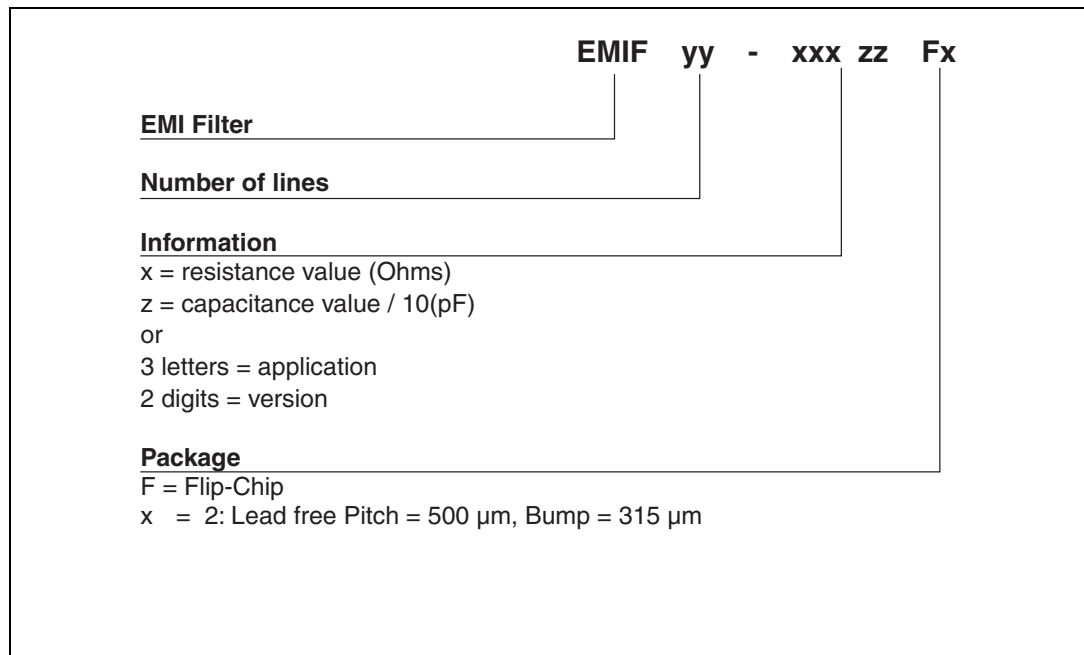


Figure 10. Figure 10: Aplac parameters

aplacvar RS	100Ω
aplacvar Cz	41 pF
aplacvar Lbump	50 pH
aplacvar Rbump	20 m
aplacvar Cbump	1.2 pF
aplacvar Rsub	100 m
aplacvar Rgnd	100 m
aplacvar Lgnd	100 pH
aplacvar Cgnd	0.15 pF

## 2 Ordering Information Scheme



### 3 Package information

Figure 11. Flip-Chip Package dimensions

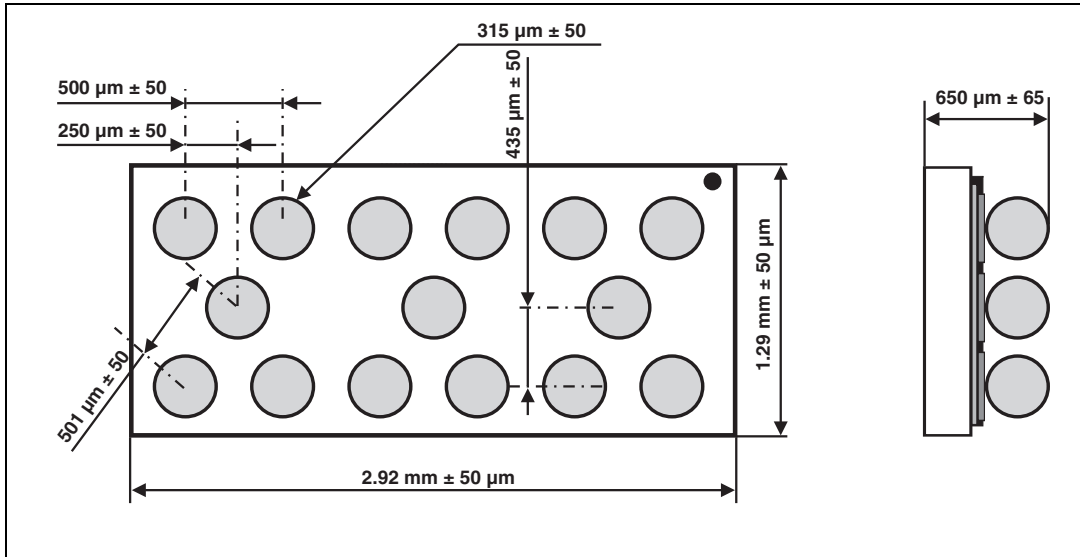


Figure 12. Foot print recommendations Figure 13. Marking

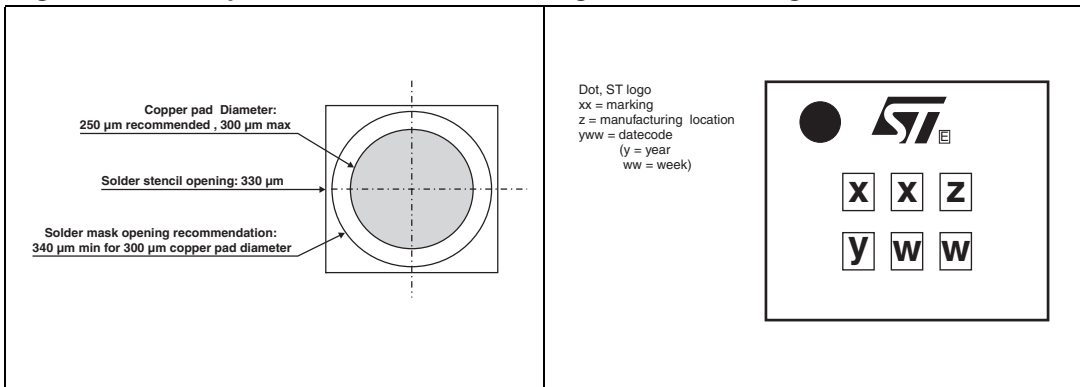
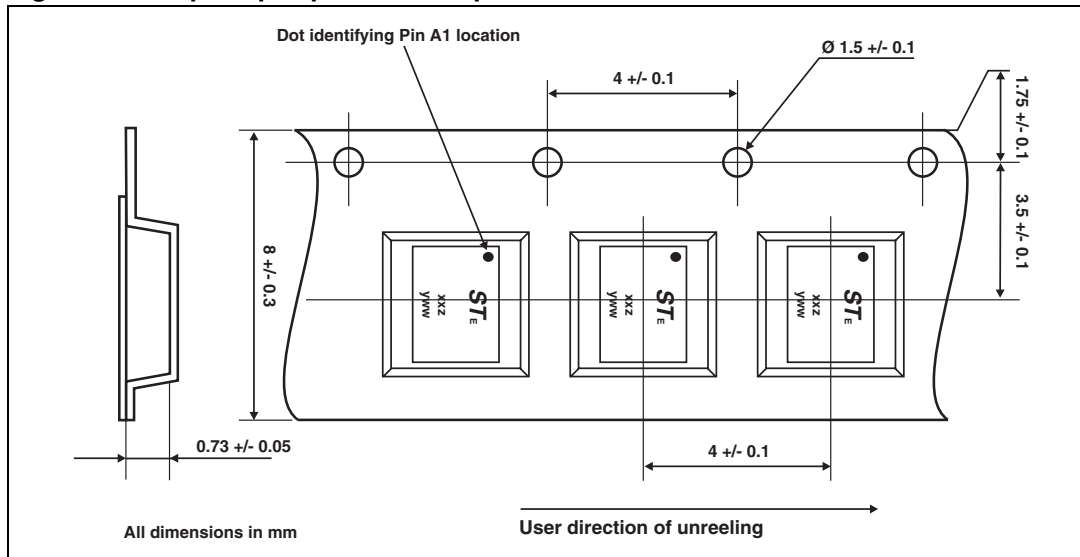


Figure 14. Flip-Chip Tape and reel specification



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 package and 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](http://www.st.com).

**Note:** *Note: More packing information is available in the application notes:*  
 AN1235: "Flip-Chip: Package description and recommendations for use"  
 AN1751: "EMI Filters: Recommendations and measurements"

## 4 Ordering Information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF06-10006F2	FT	Flip-Chip	5.4 mg	5000	Tape and reel 7"

## 5 Revision History

Date	Revision	Description of Changes
Sep-2004	1	First issue
19-Nov-2004	2	Figure 2 on page 2: Basic cell configuration corrected for I/O5 and I/O6.
11-Apr-2006	3	Reformatted to current standard. Marking corrected in ordering information.
17-Nov-2006	4	Ordering code in ordering information corrected.



**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.

© 2006 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](http://www.st.com)