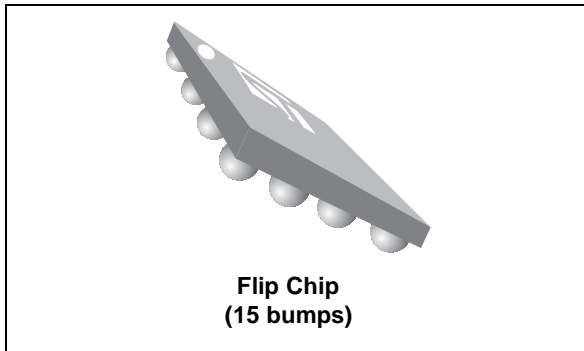


6-line EMI filter and ESD protection for SD card, mini-SD card and micro-SD card interfaces



[Datasheet – production data](#)

Description

The EMIF06-USD05F3 is a 6-line EMI filter dedicated to SD, mini-SD and micro-SD card applications. It provides an efficient attenuation at 900 MHz to reduce or suppress the antenna de-sense. This filter includes ESD protection circuitry, which prevents damage to the protected device when inserting the card. Pull-up resistors are not integrated inside the chip, hence the EMIF06-USD05F3 gives the flexibility to customers to use controllers with embedded resistance. This 6-line IPAD™ is packaged into a flip-chip solution, saving PCB space.

Features

- EMI low-pass filter
- 104 MHz clock frequency compatible with SDR50 mode (SD3.0)
- High attenuation level of -30 dB at 900 MHz
- Lead-free package

Complies with the following standards:

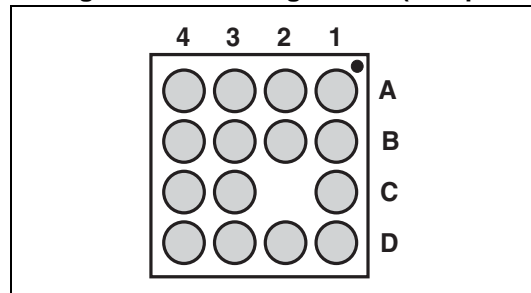
- IEC 61000-4-2 level 4:
 - ±15 kV (air discharge)
 - ±8 kV (contact discharge)

Applications

Where EMI filtering in ESD sensitive equipment is required:

- Feature phones, smartphones, phablets and communication systems
- Tablets, multimedia players like MP3, camcorders

Figure 1. Pin configuration (bump side)



TM: IPAD is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ °C}$)

Symbol	Parameter	Value	Unit
V_{PP}	ESD discharge IEC 61000-4-2, level 4		
	Air discharge card side	15	kV
	Contact discharge card side	8	
	Air discharge IC side	2	
Contact discharge IC side	2		
T_j	Maximum junction temperature	125	°C
T_{op}	Operating temperature range	- 30 to + 85	°C
T_{stg}	Storage temperature range	- 55 to + 150	°C

Figure 2. Electrical characteristics (definitions)

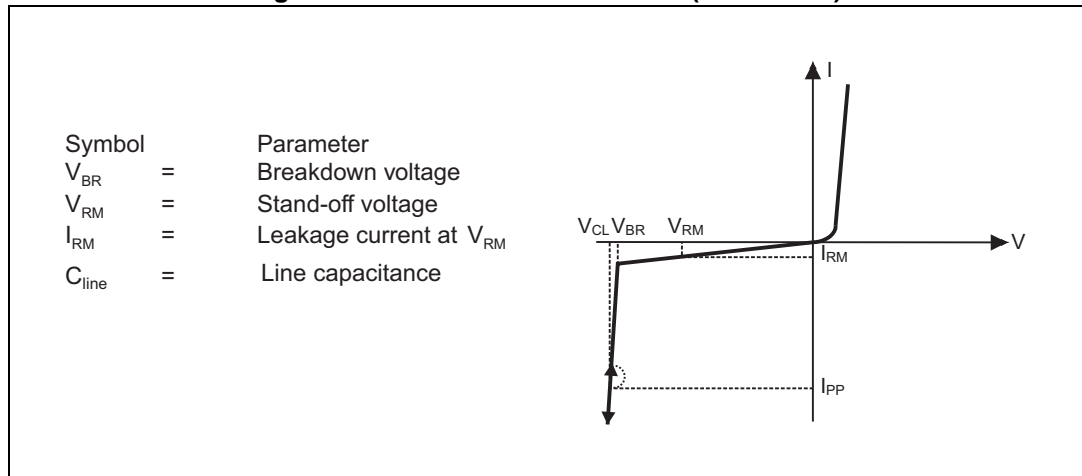


Table 2. Electrical characteristics (values, $T_{amb} = 25\text{ °C}$)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	Breakdown voltage	$I_R = 1\text{ mA}$	6			V
I_{RM}	Leakage current at V_{RM}	$V_{RM} = 3\text{ V}$			100	nA
R_{line}	Serial line resistor		32	40	48	Ω
C_{line}	Total line capacitance	$V_{BIAS} = 2.4\text{ V}$		11	14	pF
F_c	-3dB cut-off frequency	$Z_{source} = Z_{load} = 50\ \Omega$		300		MHz
S_{21}	Attenuation	$F = 900\text{ MHz}$	-25	-30		dB

Table 3. Pin configuration

Pin	Signal	Pin	Signal
A1	dat0	C1	cmd
A2	dat1	C2	
A3	SDdat1	C3	GND
A4	SDdat0	C4	SDcmd
B1	clk	D1	dat3
B2	V _{cc}	D2	dat2
B3	GND	D3	SDdat2
B4	SDclk	D4	SDdat3

Figure 3. Functional schematic

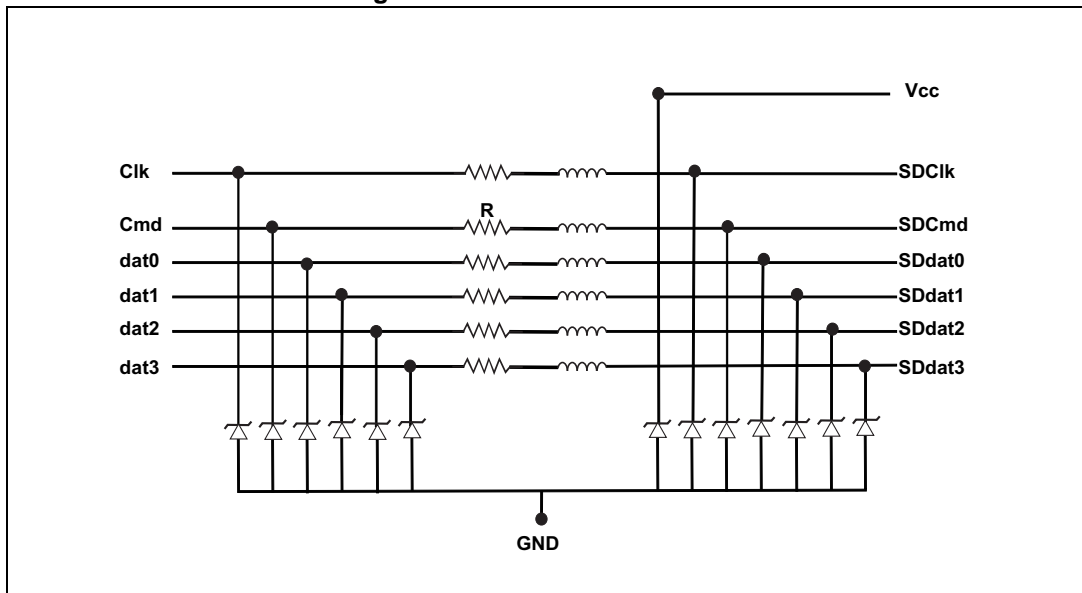


Figure 4. Attenuation versus frequency

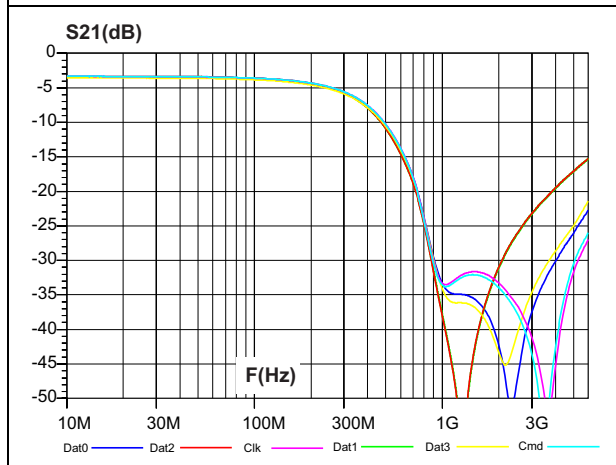


Figure 5. Line capacitance versus applied voltage

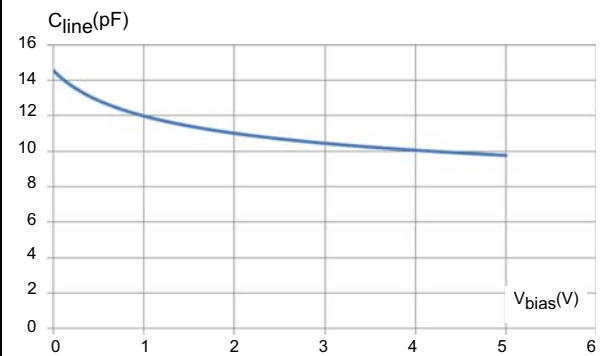


Figure 6. Analog crosstalk versus frequency

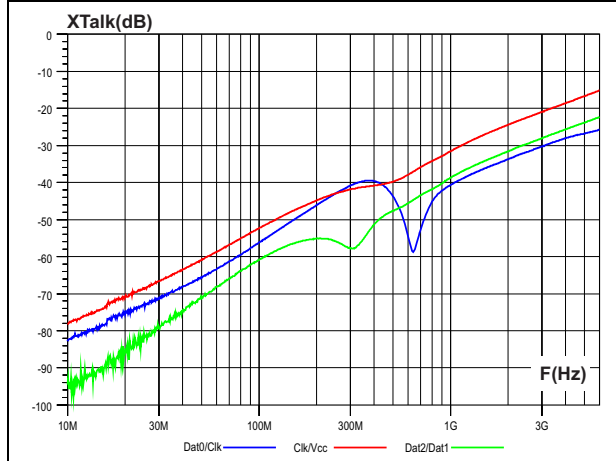


Figure 7. Digital crosstalk measurements

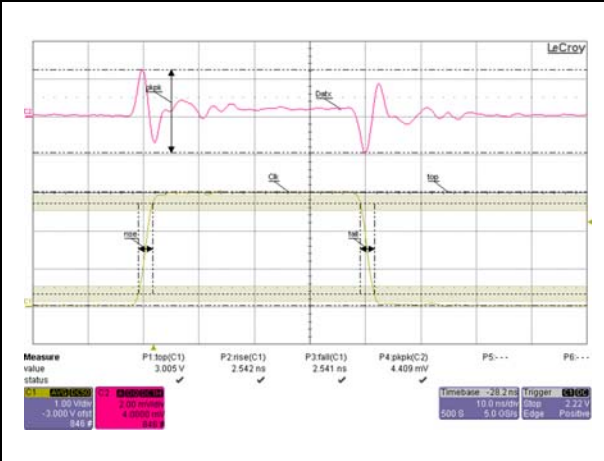


Figure 8. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

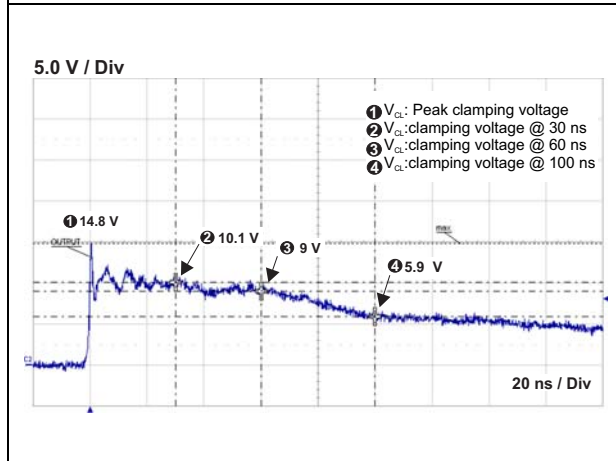
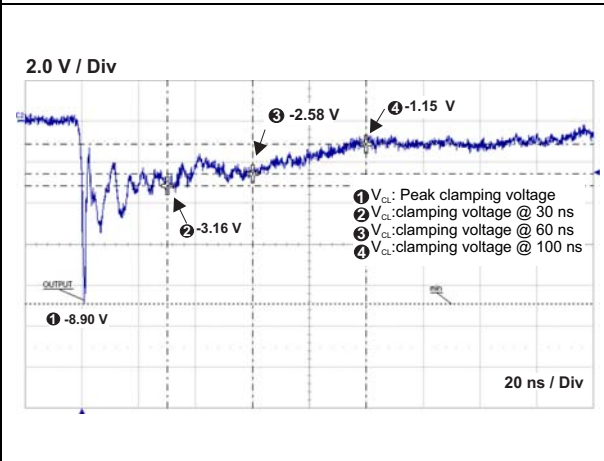


Figure 9. ESD response to IEC 61000-4-2 (-8 kV contact discharge)



2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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 10. Package dimensions

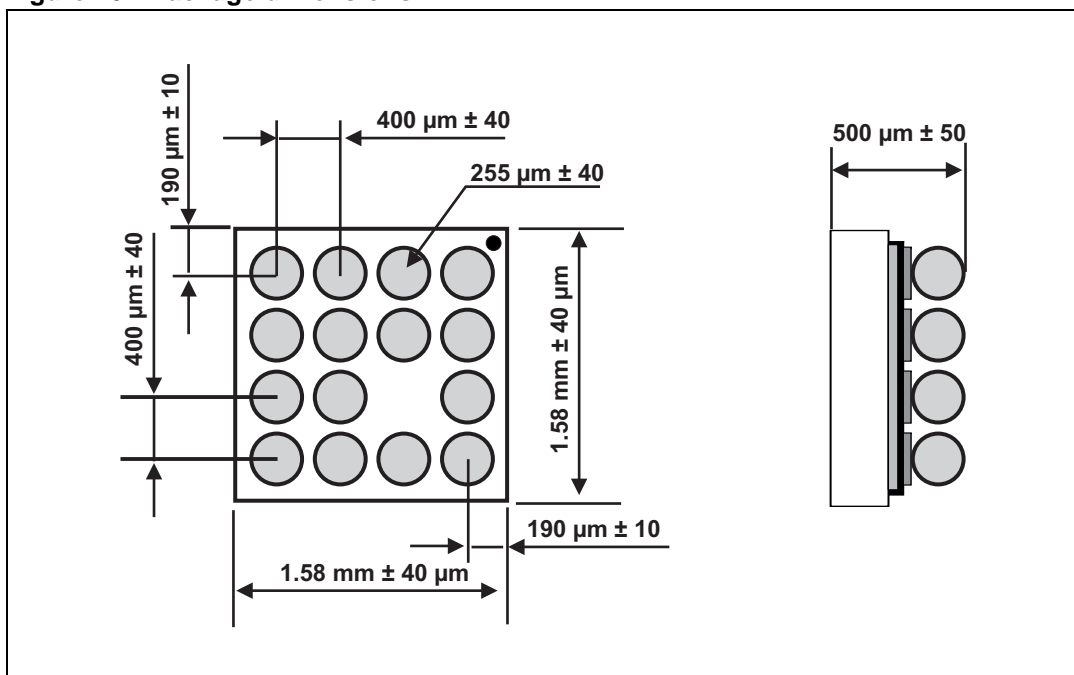


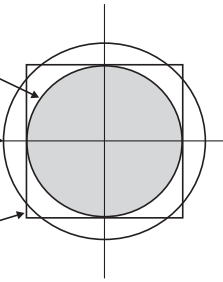
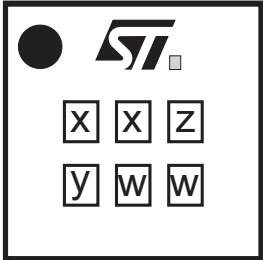
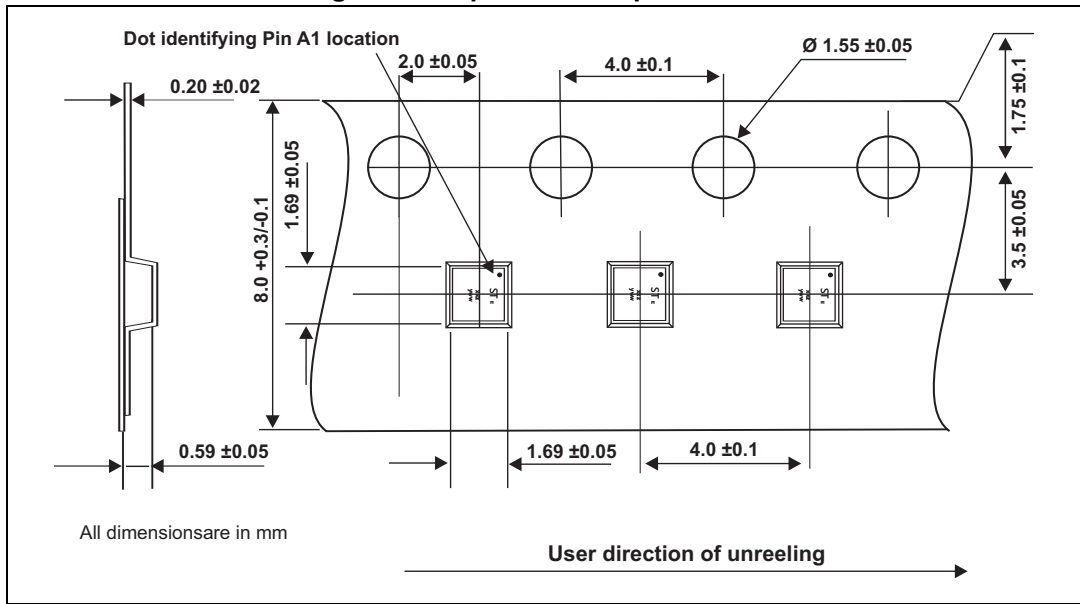
Figure 11. Footprint	Figure 12. Marking
<p>Copper pad Diameter: 220 μm recommended 260 μm maximum</p> <p>Solder mask opening: 300 μm minimum</p> <p>Solder stencil opening: 220 μm recommended</p> 	<p>Dot, ST logo <input type="checkbox"/> ECOPACK status xx = marking z = manufacturing location yww = datecode y = year, ww = week</p> 

Figure 13. Tape and reel specification



Note: More information is available in the STMicroelectronics Application notes:
 AN2348: "Flip Chip: Package description and recommendations for use"
 AN1751: "EMI Filters: Recommendations and measurements"

3 Ordering information

Figure 14. Ordering information scheme

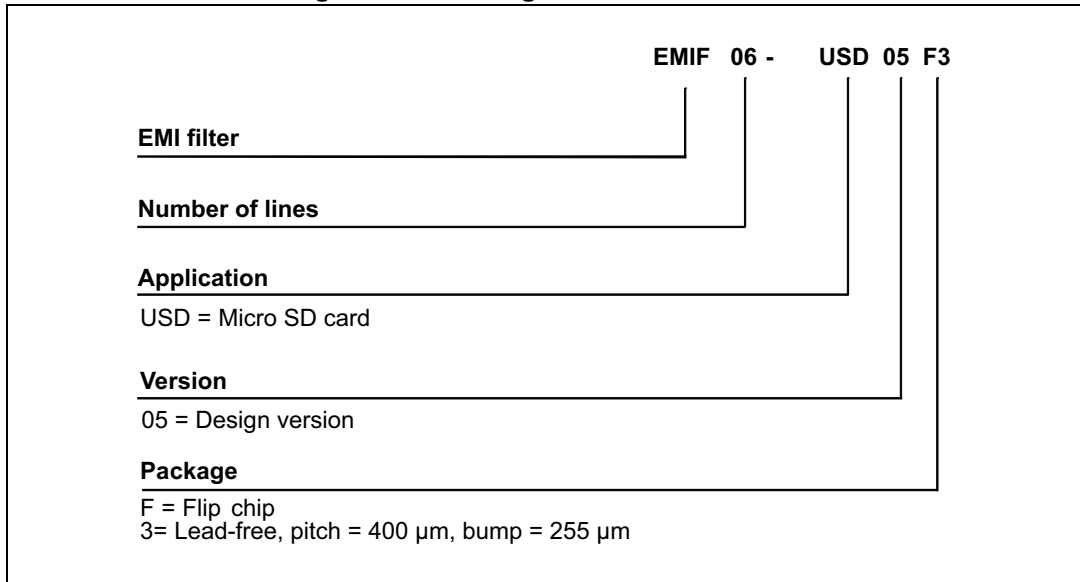


Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF06-USD05F3	KT	Flip Chip	2.6 mg	5000	Tape and reel 7"

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
25-Apr-2014	1	First issue.

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