



**THE DATASHEET OF
EMIF02-SPK01F**



2-line IPAD™, EMI filter and ESD protection

Features

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Very low PCB space consuming:
1.07 mm x 1.47 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reducing of parasitic elements through integration and wafer level packaging

Complies with the following standards:

- IEC 61000-4-2 level 4, on output pins:
 - 15 kV (air discharge)
 - 8 kV (contact discharge)
- IEC 61000-4-2 Level 1, on input pins:
 - 2 kV (air discharge)
 - 2 kV (contact discharge)
- MIL STD 883E - Method 3015-6 Class 3

Applications

Where EMI filtering in ESD sensitive equipment is required:

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

Description

The EMIF02-SPK01 is a highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interferences. The EMIF02 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.

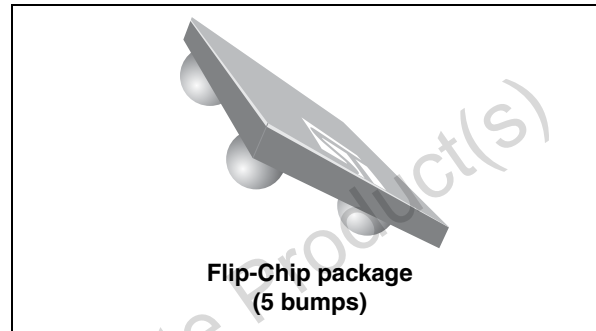


Figure 1. Pin configuration (bump side)

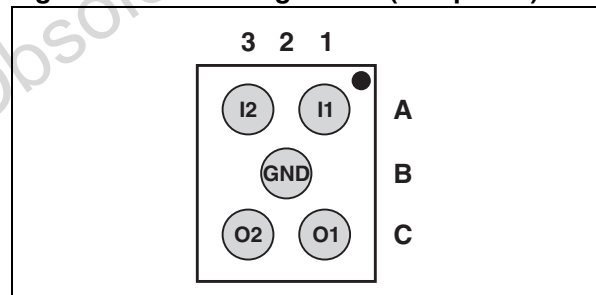
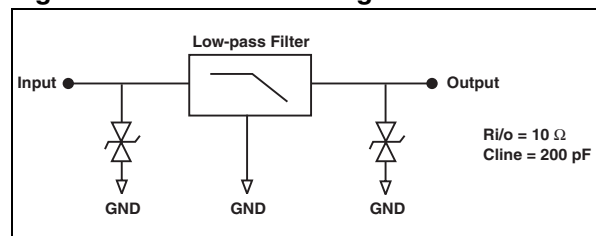


Figure 2. Basic cell configuration



TM: IPAD is a trademark of STMicroelectronics.

1 Electrical characteristics

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

Symbol	Parameter	Value	Unit
T_j	Maximum junction temperature	125	$^{\circ}\text{C}$
T_{op}	Operating temperature range	-40 to +85	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-55 to +150	$^{\circ}\text{C}$

Figure 3. Electrical characteristics (definitions)

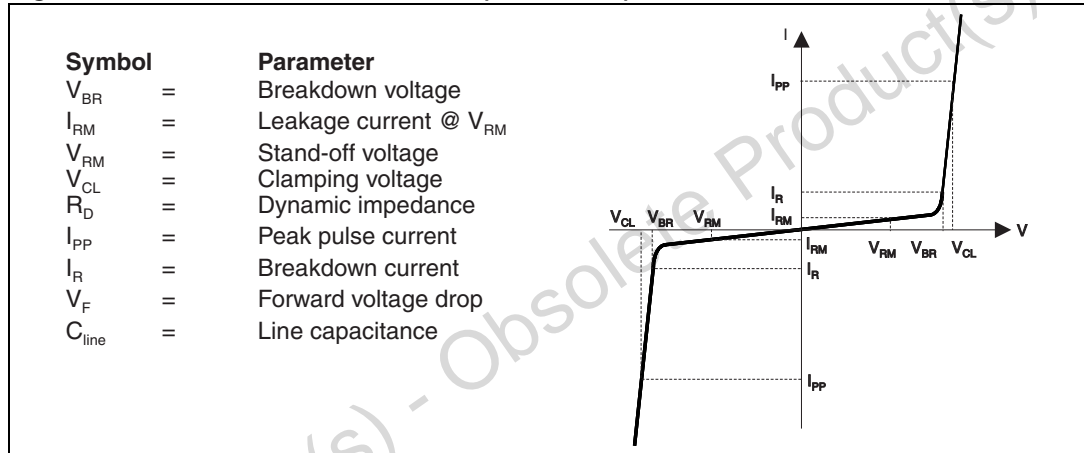


Table 2. Electrical characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Symbol	Test condition	Min.	Typ.	Max.	Unit
V_{BR}	$I_R = 1\text{ mA}$	6	8		V
I_{RM}	$V_{RM} = 3\text{ V per line}$			500	nA
$R_{I/O}$	Tolerance $\pm 20\%$		10		Ω
C_{line}	$V_R = 0\text{ V}$		200		pF

Figure 4. S21 (dB) attenuation measurements **Figure 5. Analog crosstalk measurements and Aplac simulation**

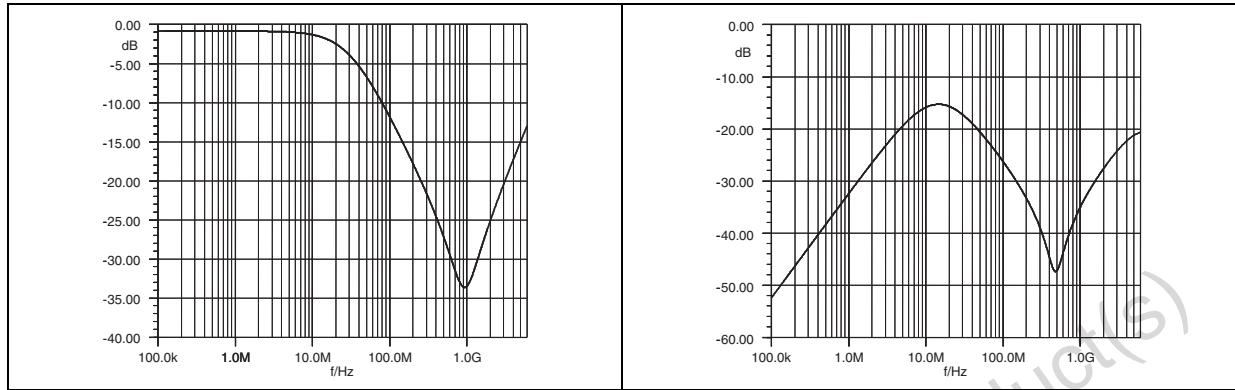


Figure 6. ESD response to IEC 61000-4-2 (+15kV air discharge) on one input $V_{(in)}$ and one output $V_{(out)}$ **Figure 7. ESD response to IEC 61000-4-2 (-15kV air discharge) on one input $V_{(in)}$ and one output $V_{(out)}$**

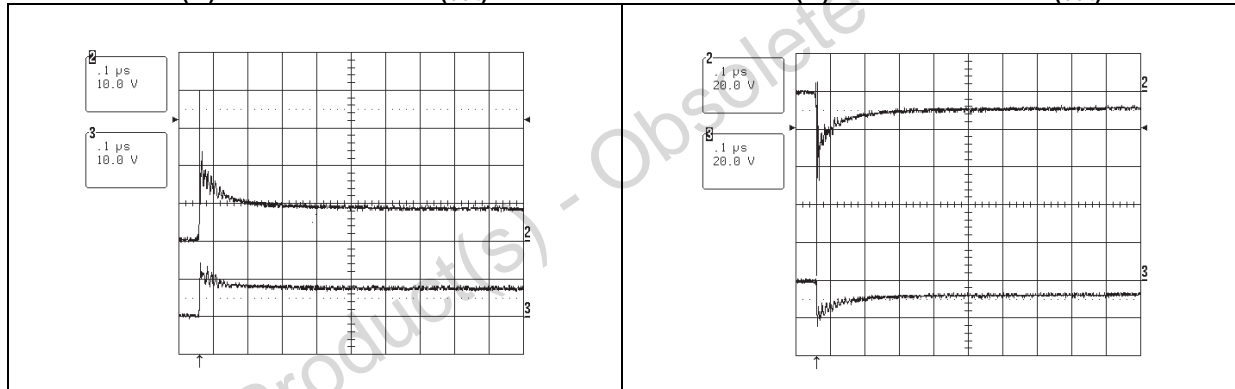


Figure 8. Line capacitance versus applied voltage

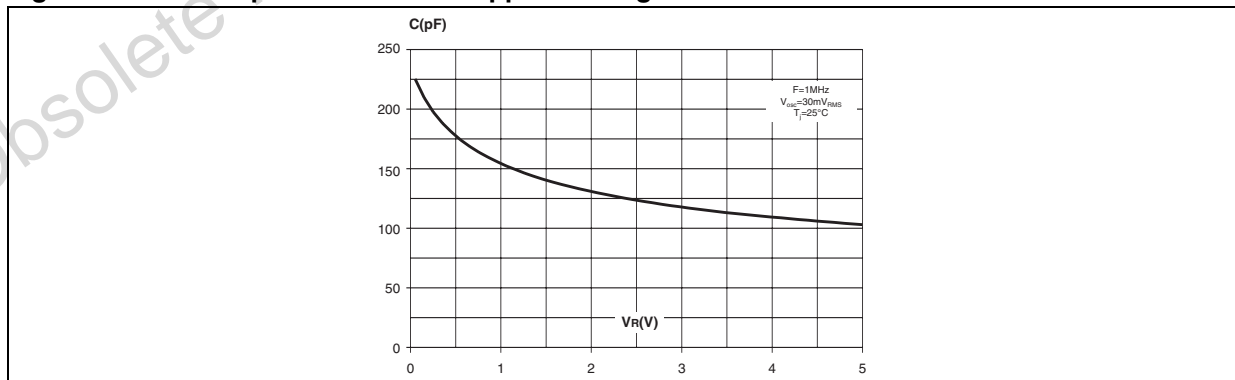


Figure 9. Aplac mode

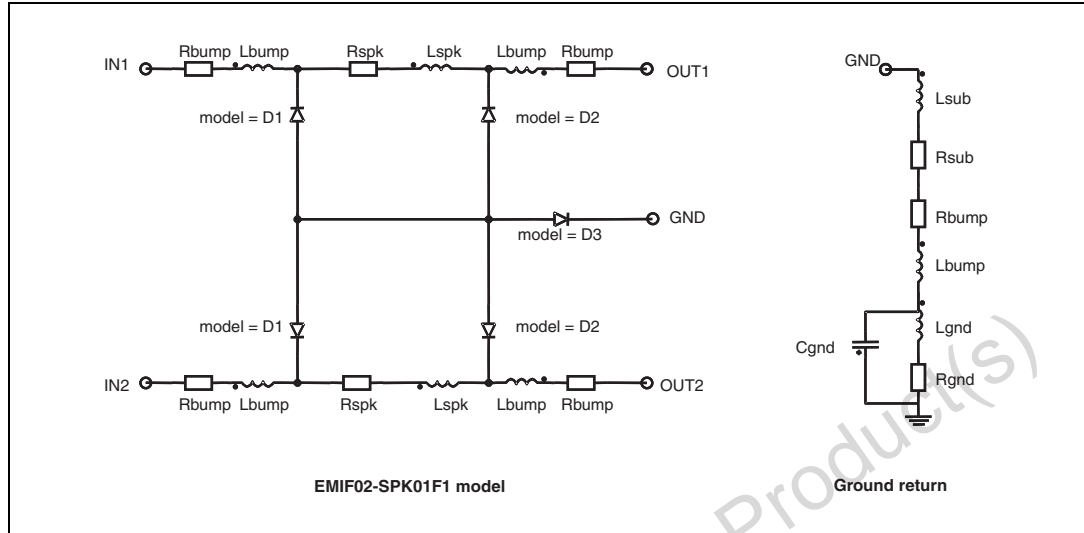
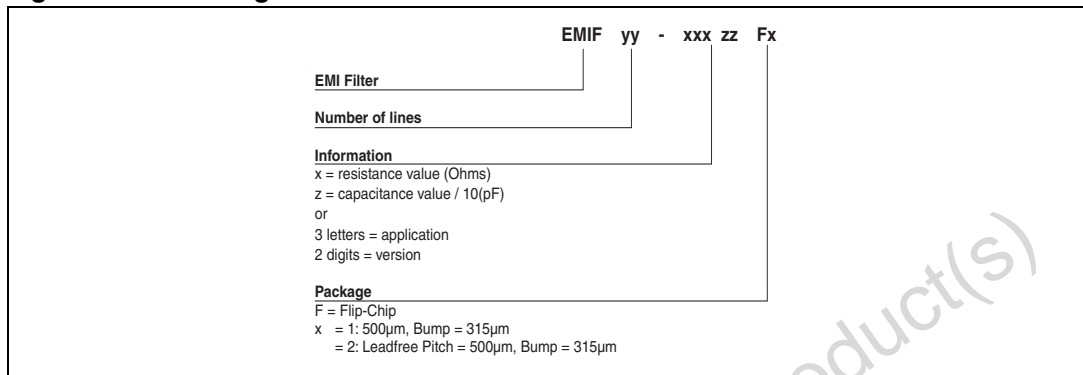


Figure 10. Aplac parameters

Model D1	Model D3	Model D2	
CJO=Cdiode1	CJO=Cdiode3	CJO=Cdiode2	aplacvar Ls 1nH
BV=7	BV=7	BV=7	aplacvar Rs 150m
IBV=1u	IBV=1u	IBV=1u	aplacvar Rspk 10
IKF=1000	IKF=1000	IKF=1000	aplacvar Lspk 10p
IS=10f	IS=10f	IS=10f	aplacvar Cdiode1 234pF
ISR=100p	ISR=100p	ISR=100p	aplacvar Cdiode2 3.5ppF
N=1	N=1	N=1	aplacvar Cdiode3 1nF
M=0.3333	M=0.3333	M=0.3333	aplacvar Lbump 50pH
RS=0.7	RS=0.12	RS=0.3	aplacvar Rbump 10m
VJ=0.6	VJ=0.6	VJ=0.6	aplacvar Rsub 0.5m
TT=50n	TT=50n	TT=50n	aplacvar Lsub 10pH
			aplacvar Rgnd 1m
			aplacvar Lgnd 50pH
			aplacvar Cgnd 0.15pF

2 Ordering information

Figure 11. Ordering information scheme



3 Packaging information

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 12. Flip-Chip dimensions

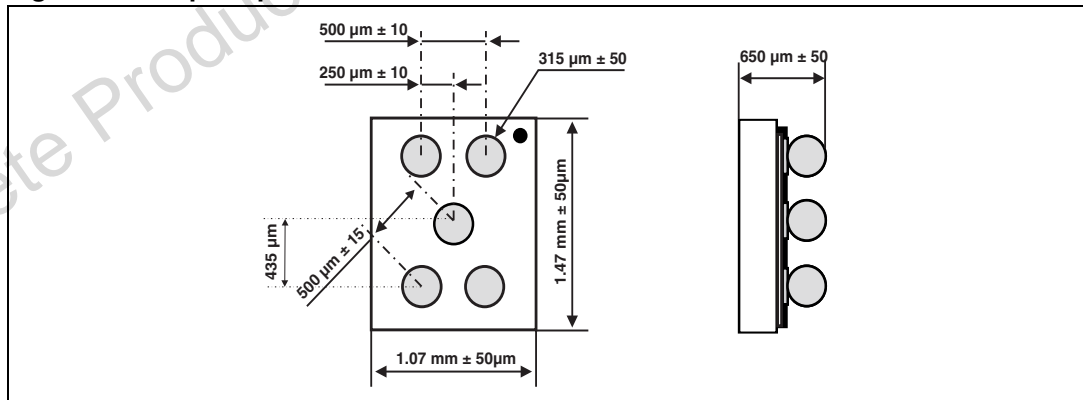


Figure 13. Footprint

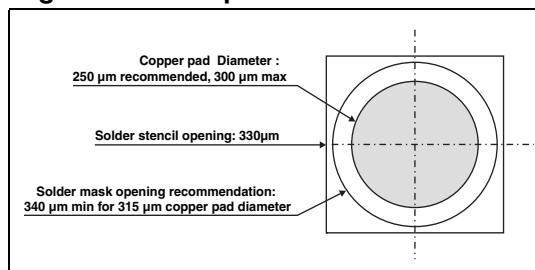


Figure 14. Marking

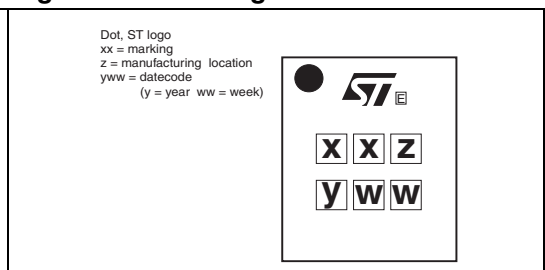
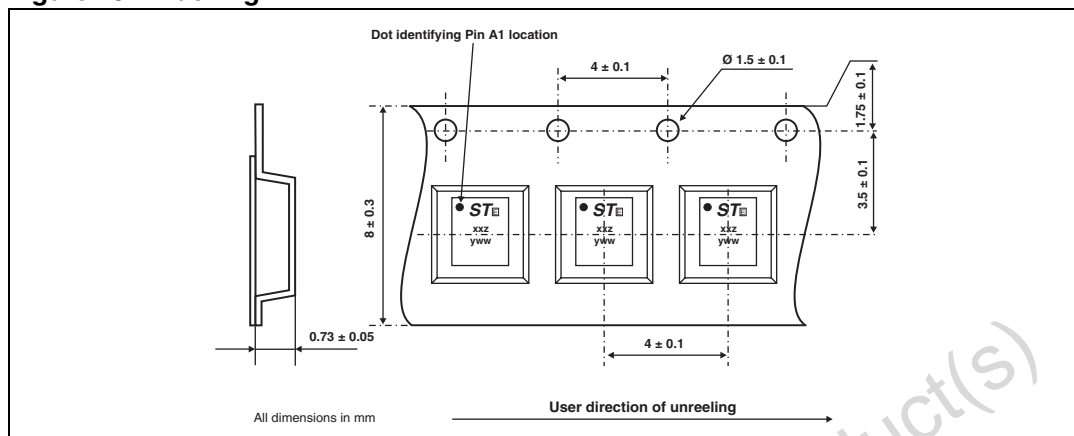


Figure 15. Packing



4 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-SPK01F2	FX	Flip Chip	2.1 mg	5000	Tape and reel (7")

Note: More packing information is available in the applications note:
 AN1235: "Flip-Chip: package description and recommendations for use"
 AN 1751: "EMI filters: Recommendations and measurements"

5 Revision history

Table 4. Document revision history

Date	Revision	Changes
14-Oct-2006	1	Initial release.
08-Sep-2011	2	Updated Figure 12 and Figure 13 .

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 TWO AUTHORIZED ST REPRESENTATIVES, 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.

© 2011 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

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View EMIF02-SPK01F on WIN SOURCE](#)
- ⊖ [STMicroelectronics Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management