



# EMIF06-HMC01F2

6-line IPAD™, EMI filter including ESD protection

## Features

- 6-line low-pass-filter
- High efficiency in EMI filtering
- Very low PCB space occupation: < 4.4 mm<sup>2</sup>
- Lead-free package
- 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 external pins
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883E - Method 3015-6 Class 3

## Applications

- High speed MultiMediaCard

## Description

The EMIF06-HMC01F2 is a highly integrated array designed to suppress EMI / RFI noise for high speed MultiMediaCard port filtering. The EMIF06-HMC01F2 Flip Chip packaging means the package size is equal to the die size.

Additionally, this filter includes ESD protection circuitry which prevents damage to the application when subjected to ESD surges up to 15 kV.

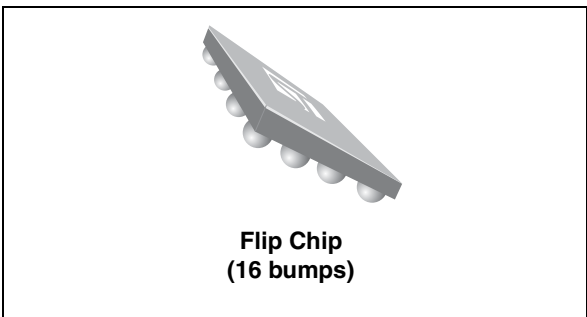


Figure 1. Pin layout (bump side)

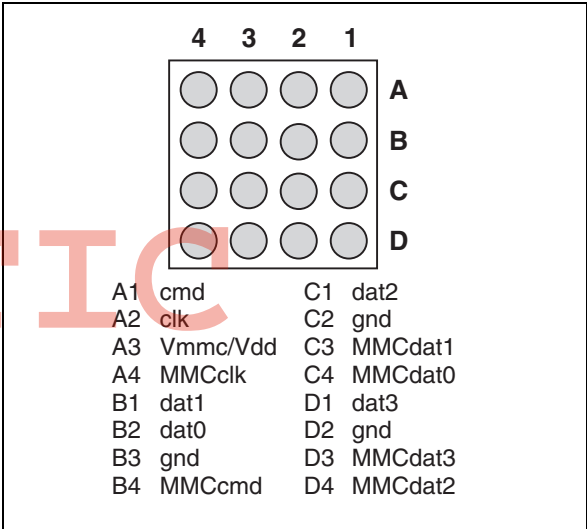
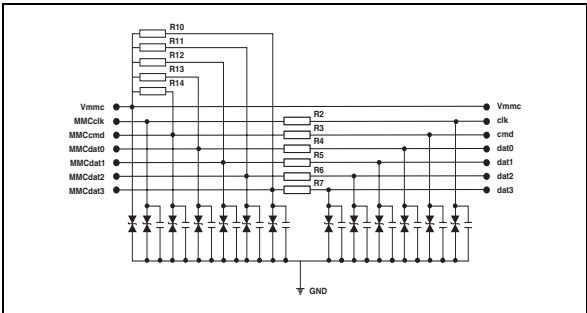


Figure 2. Basic cell configuration



TM: IPAD is a trademark of STMicroelectronics.

# 1 Characteristics

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

Symbol	Parameter and test conditions	Value	Unit
$V_{PP}$	<b>Internal pins (A4, B4, C3, C4, D3, D4):</b>		
	ESD discharge IEC61000-4-2, air discharge	2	kV
	ESD discharge IEC61000-4-2, contact discharge	2	
	<b>External pins (A1, A2, A3, B1, B2, C1, D1):</b>		
ESD discharge IEC61000-4-2, air discharge	15		
	ESD discharge IEC61000-4-2, contact discharge	8	
$T_j$	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	$^{\circ}\text{C}$

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

Symbol	Parameters					
$V_{BR}$	Breakdown voltage					
$I_{RM}$	Leakage current @ $V_{RM}$					
$V_{RM}$	Stand-off voltage					
$C_{line}$	Input capacitance per line					
Symbol	Test conditions	Tolernace	Min	Typ	Max	Unit
$V_{BR}$	$I_R = 1\text{ mA}$		14			V
$I_{RM}$	$V_{RM} = 3\text{ V}$				0.1	$\mu\text{A}$
$C_{line}$	@ 0V				20	pF
$R_2, R_3, R_4, R_5, R_6, R_7$	$I = 50\text{ mA}$	$\pm 20\%$		50		$\Omega$
$R_{10}, R_{11}, R_{12}, R_{13}$	$I = 50\text{ }\mu\text{A}$	$\pm 30\%$		75		k $\Omega$
$R_{14}$	$I = 200\text{ }\mu\text{A}$	$\pm 30\%$		7		k $\Omega$

Figure 3. S21 (dB) attenuation measurement      Figure 4. Analog crosstalk measurement

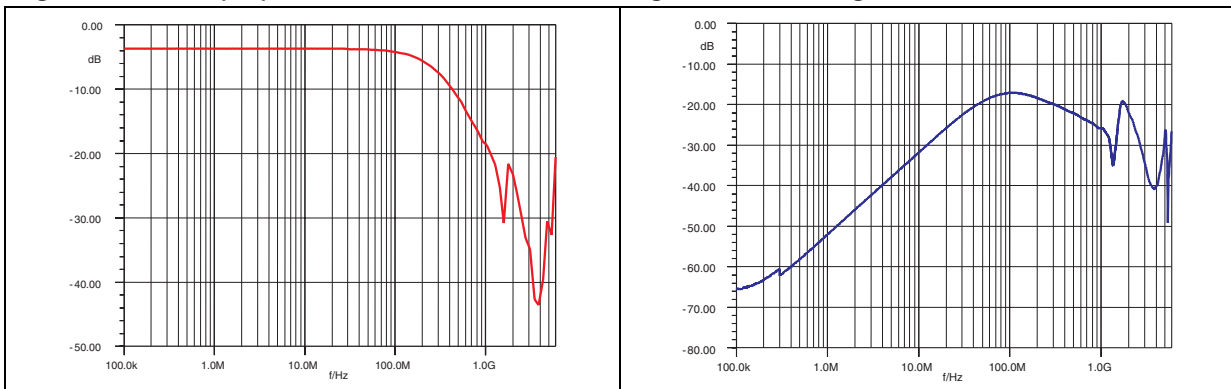


Figure 5. ESD response to IEC 61000-4-2 (+15kV air discharge) on one input (V<sub>in</sub>) and on one output (V<sub>out</sub>)      Figure 6. ESD response to IEC 61000-4-2 (-15kV air discharge) on one input (V<sub>in</sub>) and on one output (V<sub>out</sub>)

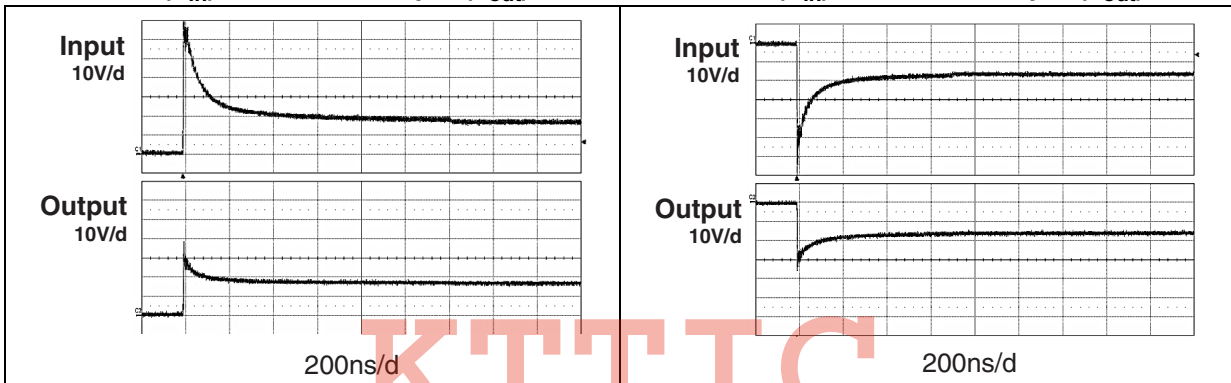
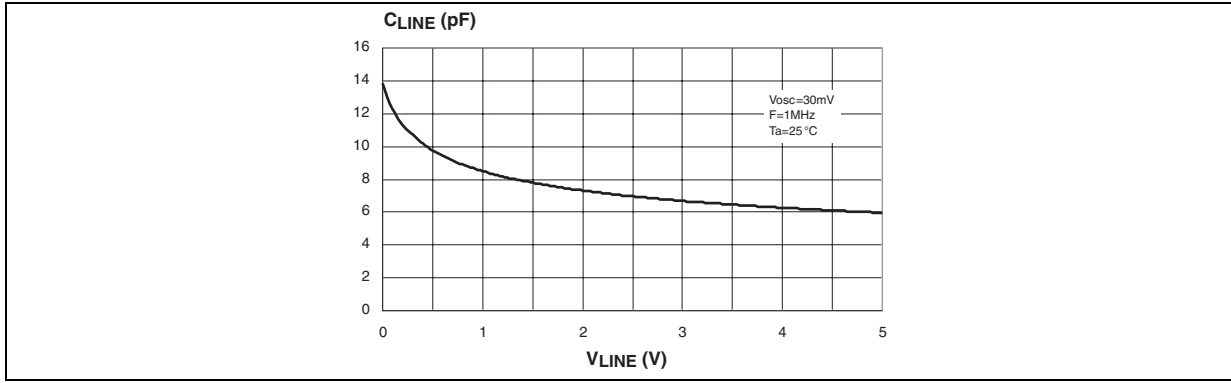


Figure 7. Junction capacitance versus reverse voltage applied (typical values)



## 2 Application information

Figure 8. Aplac model device structure

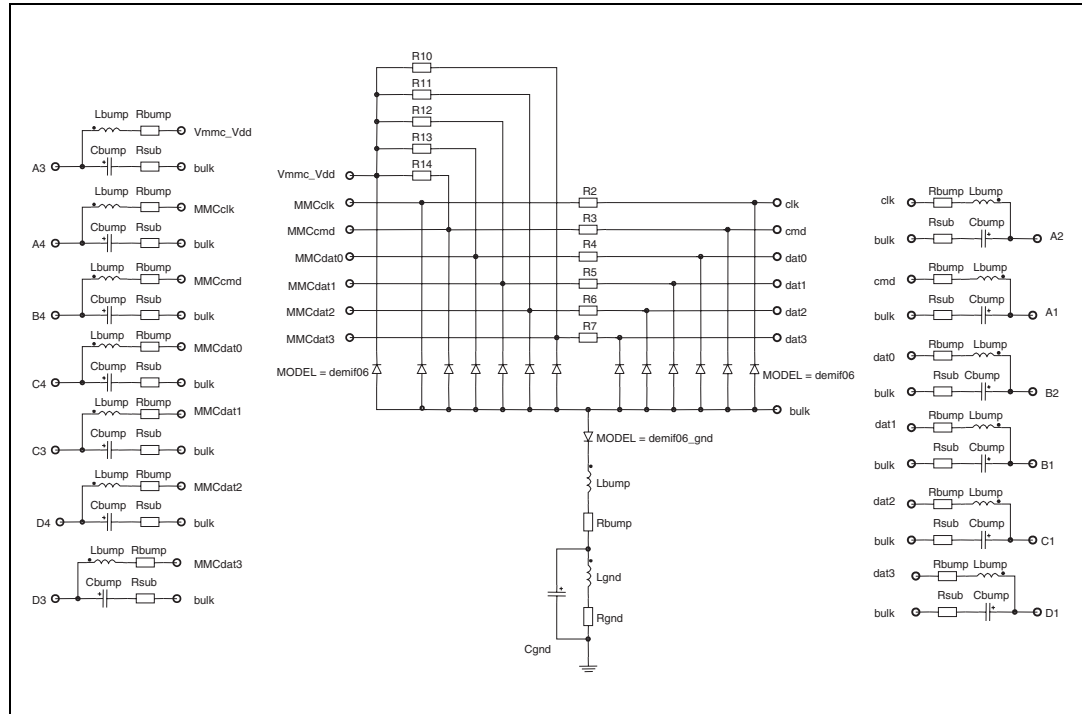
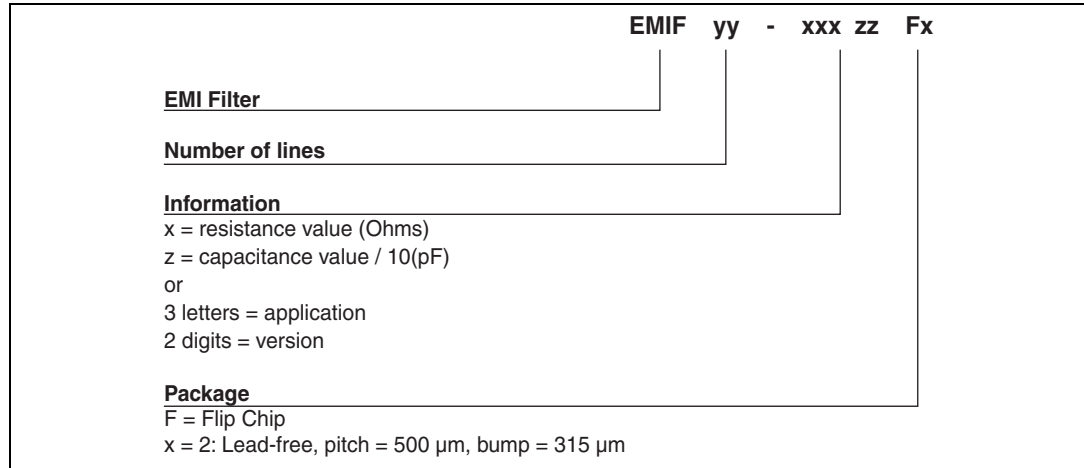


Figure 9. Aplac parameters

Variables	Variables	demif06_gnd	demif06
R2 50	Cz 11pF	BV=14	BV=14
R3 50	Cz_gnd 45pF	IBV=1m	IBV=1m
R4 50	RS_gnd 480m	CJO=Cz_gnd	CJO=Cz
R5 50	Ls 950pH	M=0.31	M=0.31
R6 50	Rs 150m	RS=RS_gnd	RS=1
R7 50	Rbump 100m	VJ=0.6	VJ=0.6
R10 75k	Lbump 50pH	TT=100n	TT=100n
R11 75k	Cbump 0.15pF		
R12 75k	Lgnd 50pH		
R13 75k	Rgnd 100m		
R14 7k	Cgnd 0.15pF		
Rsub 100m			

### 3 Ordering information scheme

Figure 10. 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](http://www.st.com).

Figure 11. Package dimensions

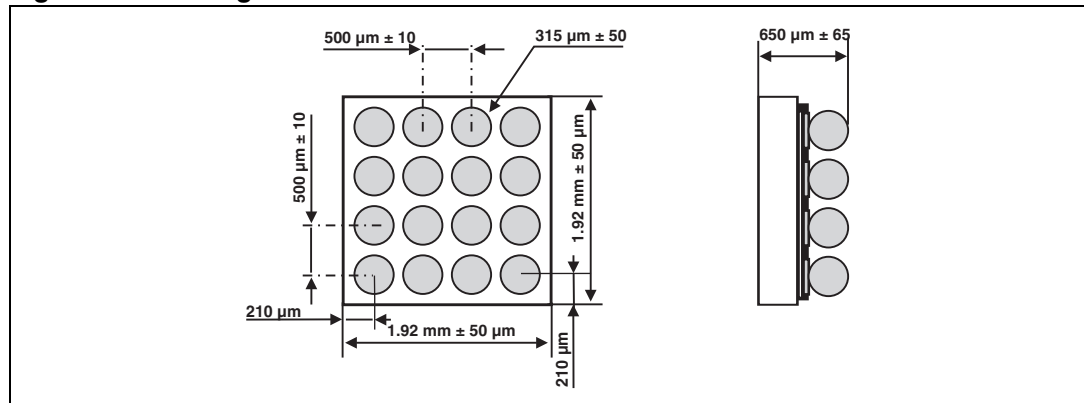


Figure 12. Footprint

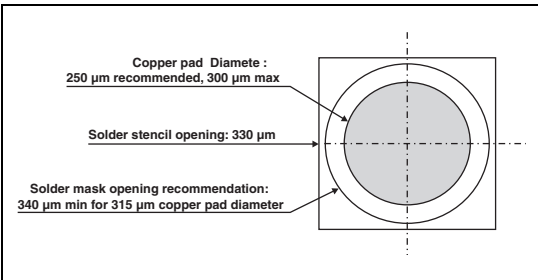


Figure 13. Marking

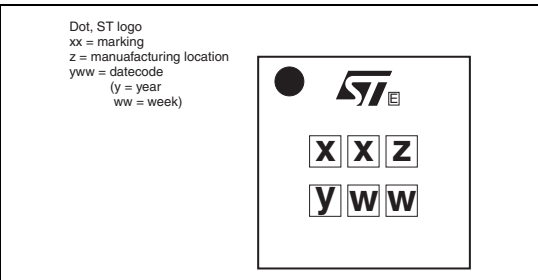
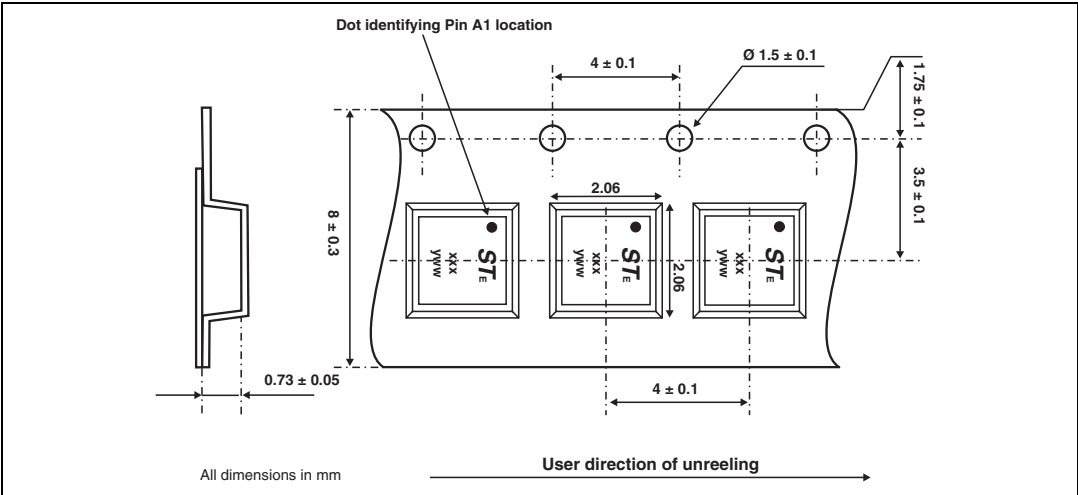


Figure 14. Flip Chip tape and reel specification



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

## 5 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF06-HMC01F2	GH	Flip Chip	5.3 mg	5000	Tape and reel 7"

## 6 Revision history

Table 4. Document revision history

Date	Revision	Changes
25-Jan-2005	1	Initial release.
28-Apr-2008	2	Updated ECOPACK statement. Updated <a href="#">Figure 10</a> , <a href="#">Figure 11</a> , <a href="#">Figure 12</a> , <a href="#">Figure 13</a> and <a href="#">Figure 14</a> . Reformatted to current standards.

# KTTIC

**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 REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, 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](http://www.st.com)