

EMIF02-USB05C2

2 line EMF filter including ESD protection

Main application

When EMI filtering is ESD sensitive equipment is required:

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

Description

The EMIF02-USB05C2 is a highly integrated array designed to suppress EMI / RFI noise for USB port filtering. The EMIF02-USB05C2 Flip-Chip packaging means the package size is equal to the die size.

Additionally, this low-pass filter includes an ESD protection circuitry to prevent damage to the application when subjected to ESD surges up to 15 kV.

This device is designed to be fully compatible with USB standards.

Benefits

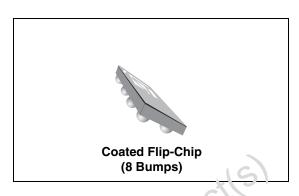
- 2 x EMI low-pass filter + 2 line ESD protection
- 1.5 k Ω pull-up included
- High efficiency in EMI filtering
- Lead free coated package
- Very low PCB space consumption: 1.92 mm x 0.92 n m
- Very thin package: 0.69 mm
- High reliability offered by monolithic integration
- [dign reduction of parasitic elements through ntegration and wafer level packaging
- USB full speed (12 Mbps), OTG compliant

Complies with following standards:

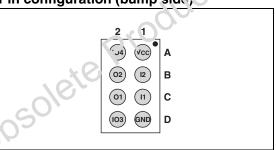
IEC 61000-4-2

level 4 15 kV (air discharge) 8 kV (contact discharge)

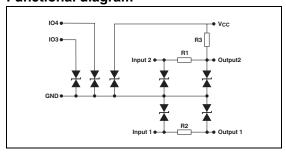
MIL STD 883G - Method 3015-7 Class 3



Pin configuration (bump side,



Functional diagram



Order code

Part Number	Marking
EMIF02-USB05C2	GV

TM: IPAD is a trademark of STMicroelectronics

November 2006 Rev 2 1/7

Characteristics EMIF02-USB05C2

1 Characteristics

 Table 1.
 Absolute ratings (limiting values)

Symbol	Parameter and test conditions	Value	Unit
Tj	Maximum 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 (Tamb = 25° C)

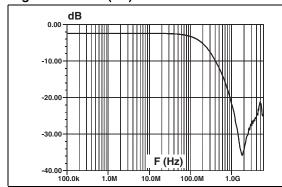
Symbol	Parameter	' ↑ /
V_{BR}	Breakdown voltage	
I _{RM}	Leakage current @ V _{RM}	VBR VRM IRM IRM VRM VBR
V _{RM}	Stand-off voltage	
C _{line}	Input capacitance per line	

	Symbol	Test conditions	Tolerance	Min.	Тур.	Max.	Unit
	V _{BR}	I _R = 1 mA	76,	6		9	V
	I _{RM}	V _{RM} = 5 V per line	² O,			1	μΑ
	R ₁ , R ₂	I = 10 mA	± 5%		33		Ω
	R ₃	I = 1 mA	± 5%		1.5		kΩ
	C _{line}	@ 0 V			30		pF
	Matching	Matching Serial resistance matching			1		%
Obsole	ste Prod						

2/7

EMIF02-USB05C2 Characteristics

Figure 1. S21 (dB) attenuation measurement Figure 2. Analog crosstalk measurements



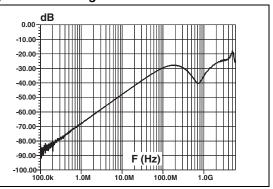
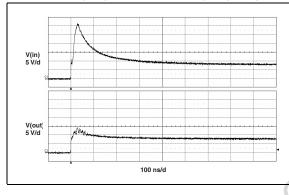


Figure 3. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input (Vin) and on one output (Vout)

Figure 4. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input (Vin) and on one output (Vout)



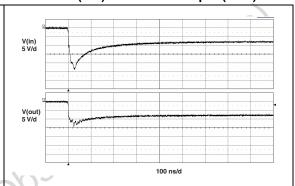
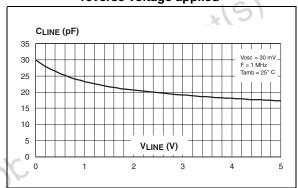


Figure 5. Junction capacitance versus reverse voltage applied



3/7

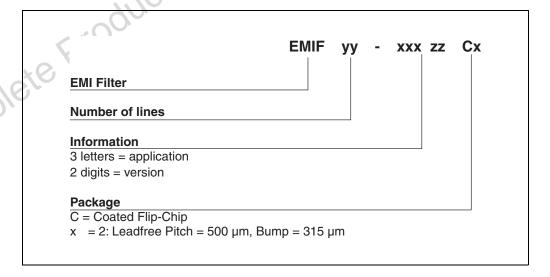
Lbump Rbump D2 R3 MODEL = D2 Rbump Lbump R1 Lbump Rbump B2 Rbump D1 Lbump Lbump MODEL = D1 Lbump MODEL = D1 MODEL = D1 **b**ulk **b**ulk Rbump MODEL = D1 太 bulk Rbump Lbump R2 Lbump Rbump C2 Lgnd bulk bulk Cgnd Rgnd MODEL = D1 ☆ MODEL = D1 **b**ulk

Figure 6. Aplac model device structure

Figure 7. Aplac model parameters

Diode D1 BV=7 Diode D2 aplacvar R1 33 BV=7 aplacvar R2 33 IBV=1m IBV=1m aplacvar R3 1.5k CJO=Cz d1 CJO=Cz d2 aplacvar Cz_D1 15pF M=0.3333 M=0.3333 aplacvar Rs_D1 1 RS=Rs_d1 RS=Rs_d2 aplacvar Cz_D2 300pF aplacvar Rs_D2 0.3 VJ=0.6 VJ=0.6 TT=100n TT=100n aplacvar Lgnd 100pH aplacvar Rgnd 100m aplacvar Cgnd 0.4pF aplacvar Lbump 50pH aplacvar Rbump 20m

2 Ordering information scheme



577

3 Package information

Figure 8. Flip-Chip package dimensions

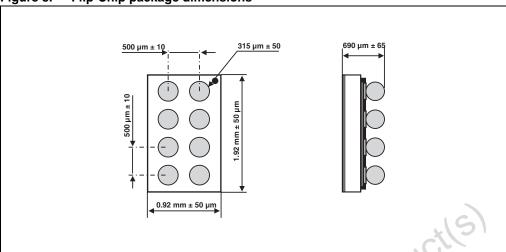


Figure 9. Foot print recomendations Figure 10. Marking

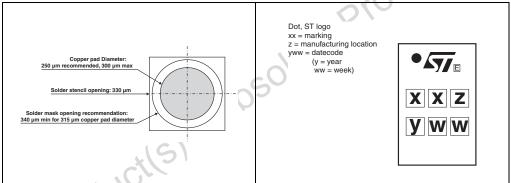
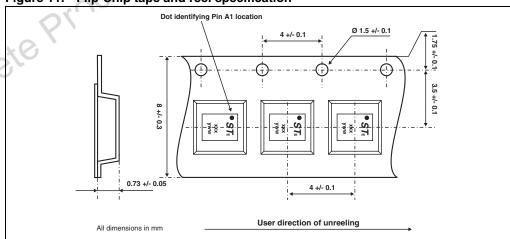


Figure 11. Flip-Chip tape and reel specification



577

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"

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.

Ordering information 4

Ordering code	e Markin	g Package	Weight	Base qty	Delivery mode
EMIF02-USB05	C2 GV	Flip-Chip	2.7 mg	5000	Tape and reel 7"
Revision	history		10,40	Prod	More
Date	Revision		Cha	inges	
	_				

5 **Revision history**

	Date	Revision	Changes		
	14-Mar-2005	1	Initial release.		
	13-Nov-2006	2	Reformatted to current standards. Modified functional diagram on page 1 to show connections. Updated Aplac model information.		
Obsolete Product(s)					

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

7/7