EMIF02-USB05C2

IPAD™

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

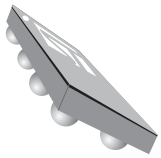
- 2 x EMI low-pass filter + 2 line ESD protection
- 1.5 kΩ pull-up included
- High efficiency in EMI filtering
- Lead free coated package
- Very low PCB space consumption: 1.92 mm x 0.92 mm
- Very thin package: 0.69 mm
- High reliability offered by monolithic integration
- High reduction of parasitic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

Complies with following standards:

IEC 61000-4-2

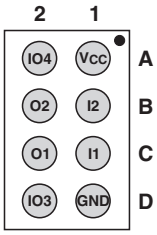
level 4 — 15 kV (air discharge), 8 kV (contact discharge)

MIL STD 883G - Method 3015-7 Class 3

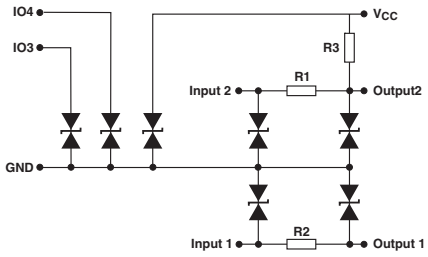


Coated Flip-Chip (8 Bumps)

Pin configuration (bump side)



Functional diagram



Order code

Part Number	Marking
EMIF02-USB05C2	GV

TM: IPAD is a trademark of STMicroelectronics

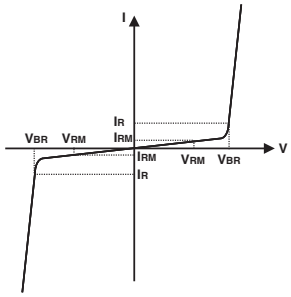
1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter and test conditions	Value	Unit
T_j	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}
V_{RM}	Stand-off voltage
C_{line}	Input capacitance per line



Symbol	Test conditions	Tolerance	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA		6		9	V
I_{RM}	V_{RM} = 5 V per line				1	µA
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	Serial resistance matching			1		%

Figure 1. S21 (dB) attenuation measurement

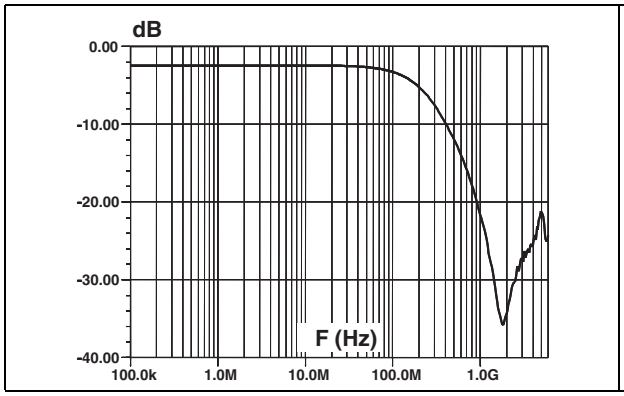


Figure 2. Analog crosstalk measurements

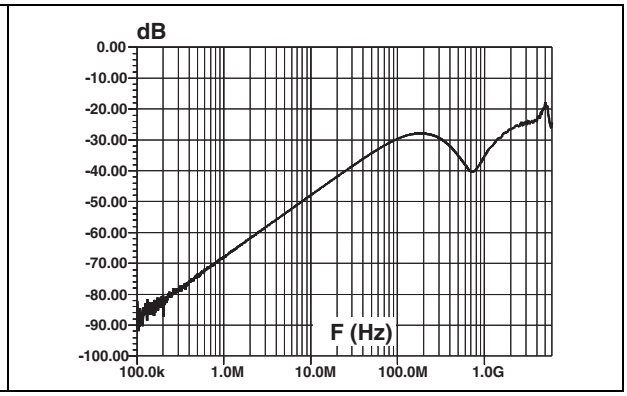


Figure 3. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input (Vin) and on one output (Vout)

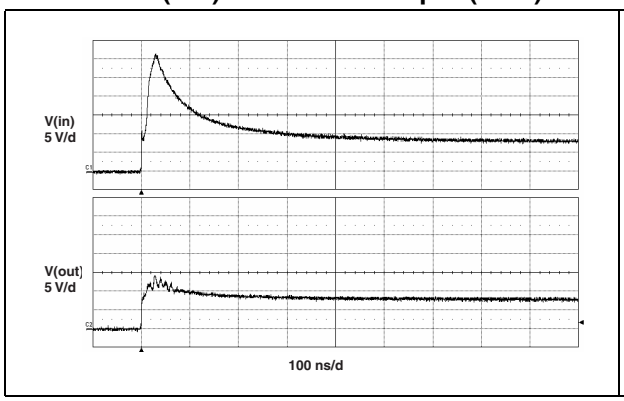


Figure 4. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input (Vin) and on one output (Vout)

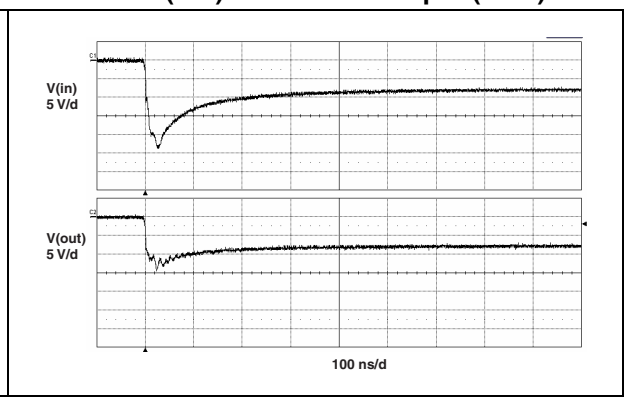


Figure 5. Junction capacitance versus reverse voltage applied

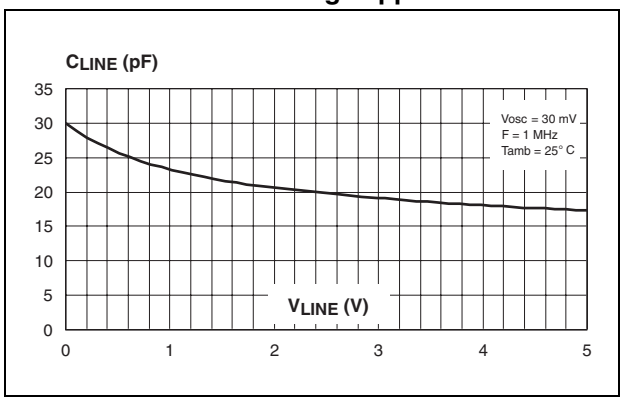


Figure 6. Aplac model device structure

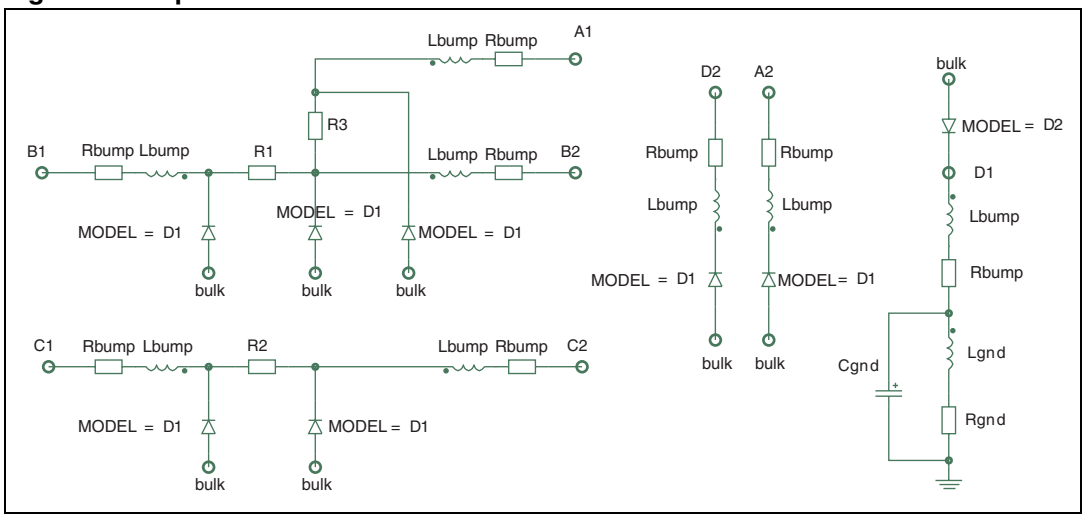


Figure 7. Aplac model parameters

```
aplacvar R1 33
aplacvar R2 33
aplacvar R3 1.5k
aplacvar Cz_D1 15pF
aplacvar Rs_D1 1
aplacvar Cz_D2 300pF
aplacvar Rs_D2 0.3
aplacvar Lgnd 100pH
aplacvar Rgnd 100m
aplacvar Cgnd 0.4pF
aplacvar Lbump 50pH
aplacvar Rbump 20m
```

Diode D1	Diode D2
BV=7	BV=7
IBV=1m	IBV=1m
CJO=Cz_d1	CJO=Cz_d2
M=0.3333	M=0.3333
RS=Rs_d1	RS=Rs_d2
VJ=0.6	VJ=0.6
TT=100n	TT=100n

2 Ordering information scheme

EMIF yy - xxx zz Cx

EMI Filter

Number of lines

Information
3 letters = application
2 digits = version

Package
C = Coated Flip-Chip
x = 2: Leadfree Pitch = 500 µm, Bump = 315 µm

3 Package information

Figure 8. Flip-Chip package dimensions

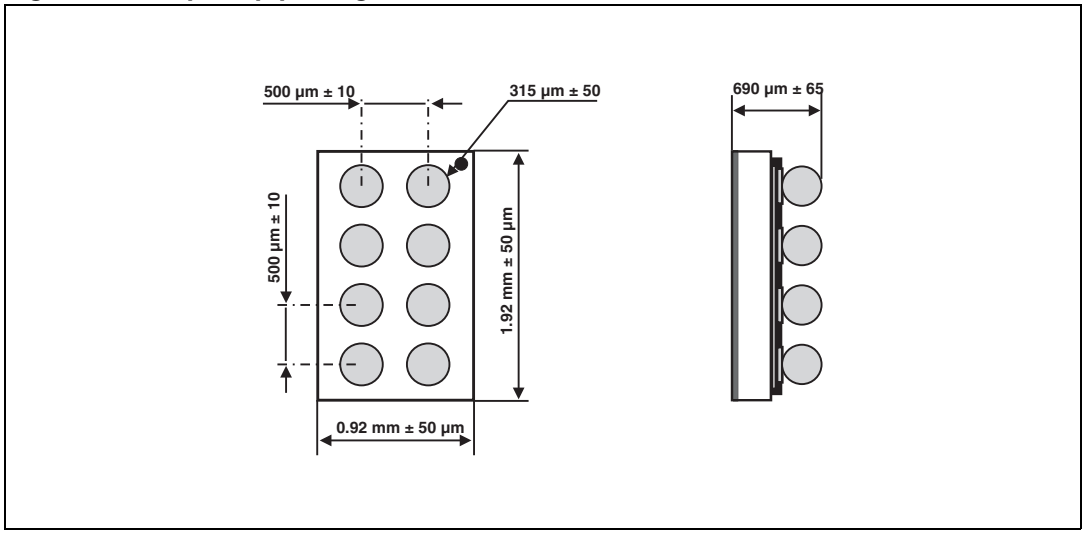


Figure 9. Foot print recomendations

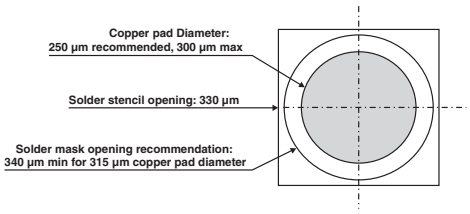


Figure 10. Marking

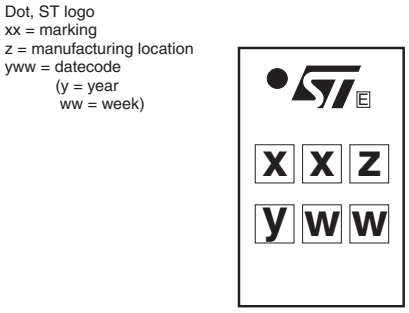
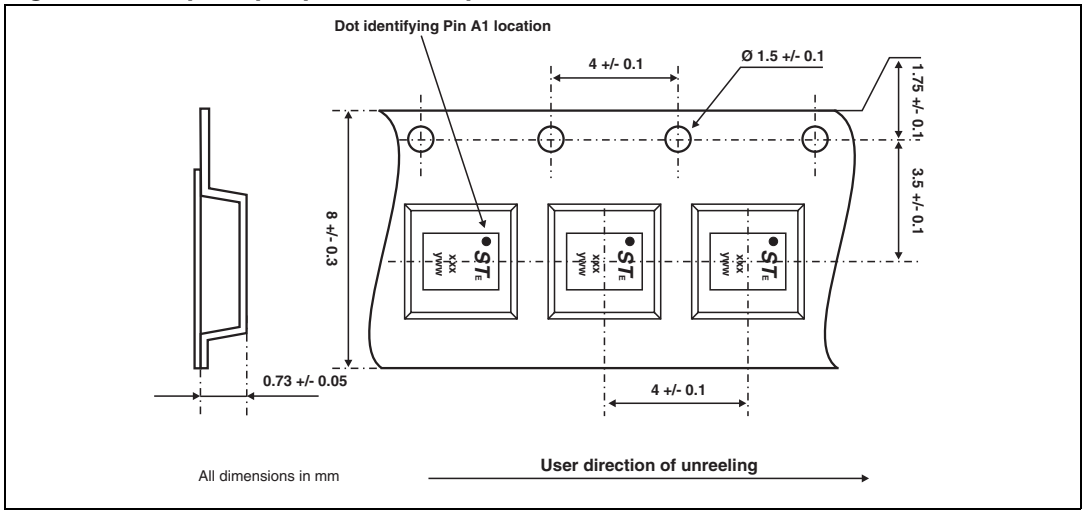


Figure 11. Flip-Chip tape and reel specification



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.

4 Ordering information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-USB05C2	GV	Flip-Chip	2.7 mg	5000	Tape and reel 7"

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.

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