EMIF02-USB01F2

2-line IPAD™, EMI filter including ESD protection

Features

- 2-line low-pass filter + ESD protection
- High efficiency in EMI filtering
- Lead-free package
- Very low PCB space occupation: < 2.5 mm^2
- Very thin package: 0.65 mm
- High efficiency in ESD suppression (IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

Complies with the following standards

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

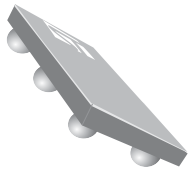
Application

- ESD protection and EMI filtering for USB port

Description

The EMIF02-USB01F2 is a highly integrated array designed to suppress EMI / RFI noise for USB port filtering. The EMIF02-USB01F2 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 protected device when subjected to ESD surges up to 15 kV.



Flip Chip
(8 bumps)

Figure 1. Pin configuration (bump side view)

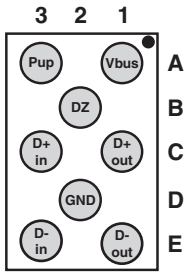
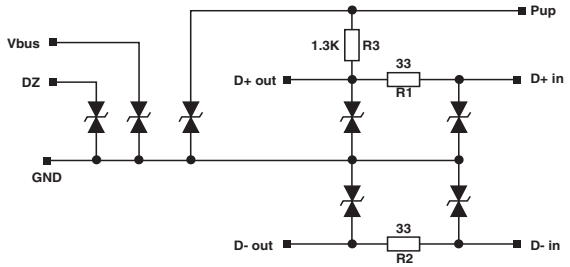


Figure 2. Schematic



TM: IPAD is a trademark of STMicroelectronics.

1 Characteristics

Table 1. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter	Value	Unit
T_j	Junction temperature	125	°C
T_{op}	Operating temperature range	-40 to +85	°C
T_{stg}	Storage temperature range	-55 to 150	°C

Figure 3. Electrical characteristics - definitions

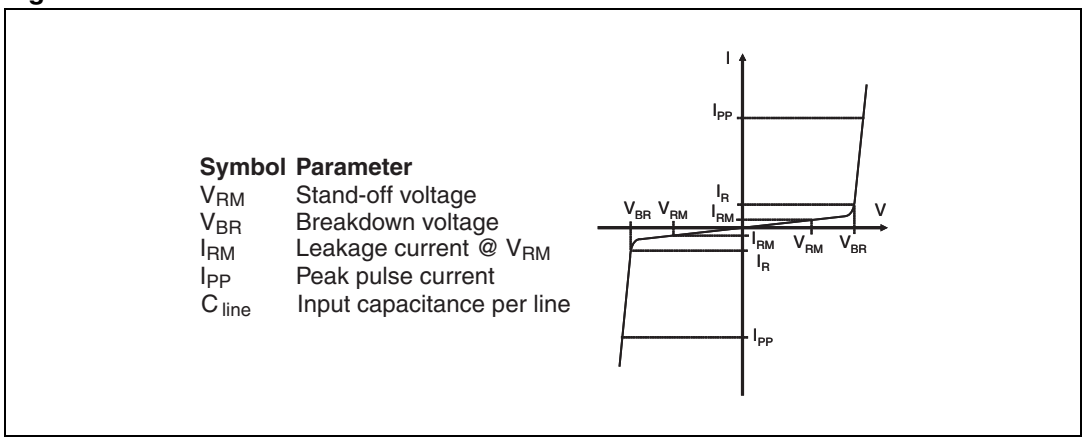


Table 2. Electrical characteristics - values (T_{amb} = 25 °C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	6	-	-	V
I_{RM}	V_{RM} = 3 V	-	-	0.5	µA
C_{line}	@ 0 V	-	40	45	pF
R_1, R_2	Tolerance ± 5 %	-	33	-	Ω
R_3	Tolerance ± 5 %	-	1.30	-	kΩ

Figure 4. S21 (dB) attenuation measurement

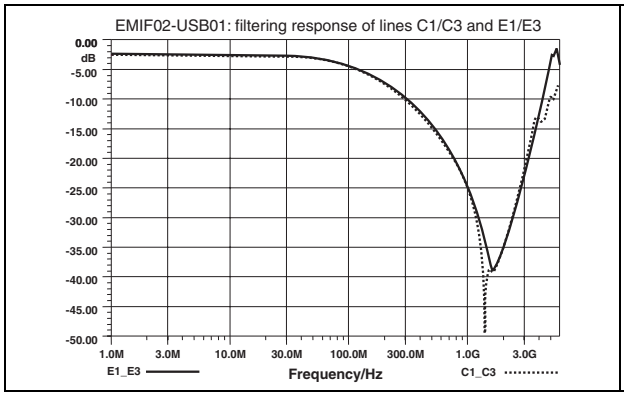


Figure 5. Analog crosstalk measurements

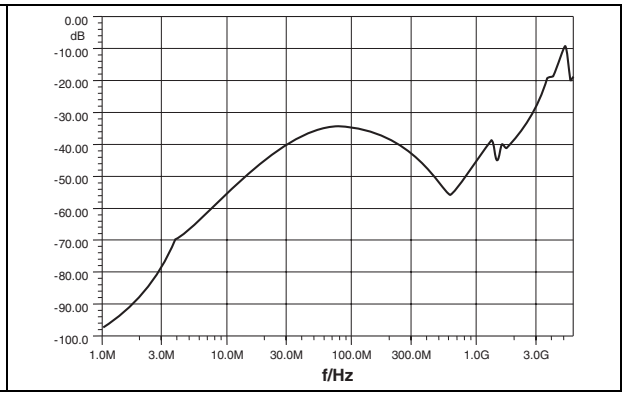


Figure 6. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input (Vin) and one output (Vout)

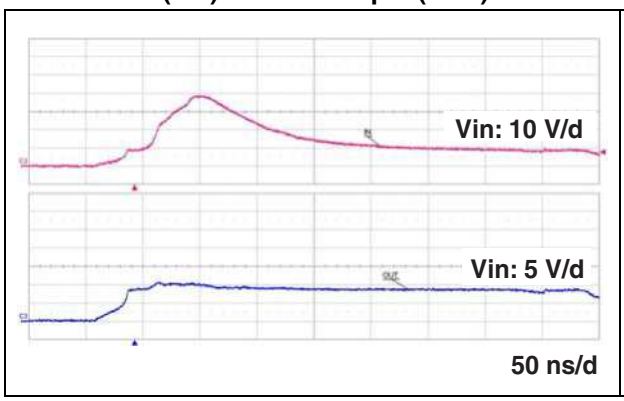


Figure 7. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input (Vin) and on one output (Vout)

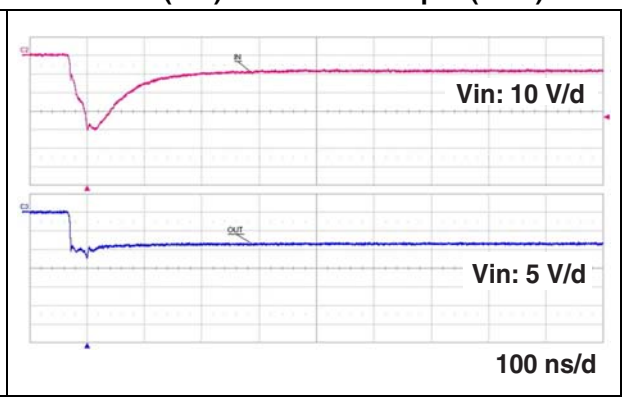
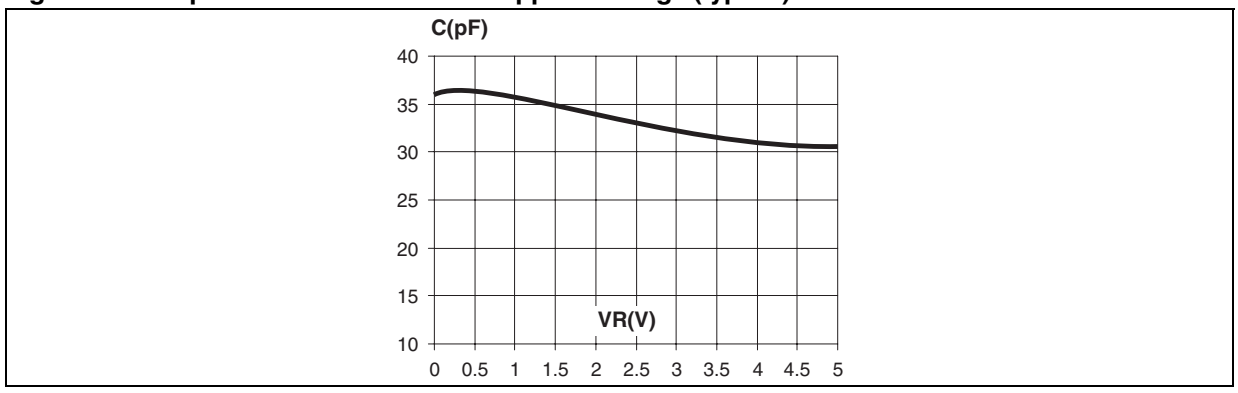


Figure 8. Capacitance versus reverse applied voltage (typical)



2 Application information

Figure 9. Aplac model (resistors, diodes and bumps and ground connections)

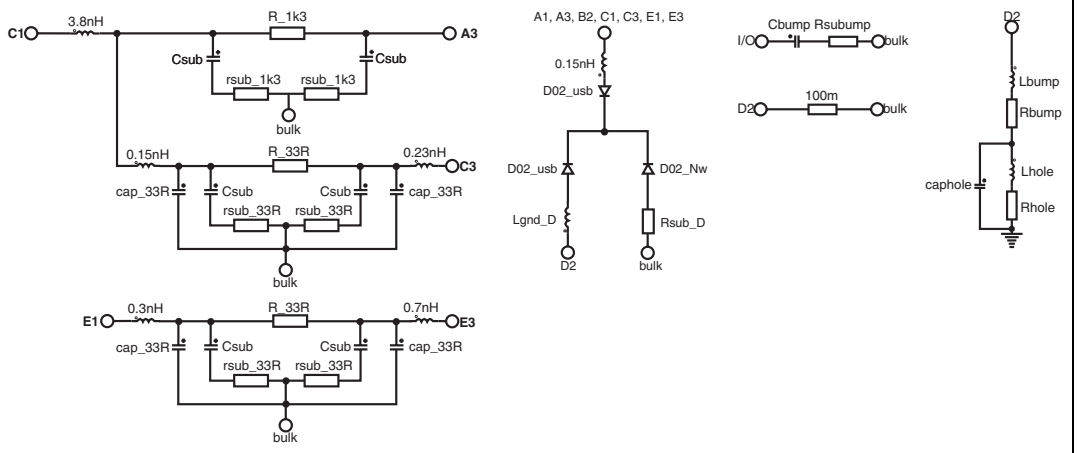


Figure 10. Aplac model parameters

R_33R 33.9
cap_33R 1.2pF

R_1k3 1.3k

Cz29pF
Rsub_D 100

Csub0.3pF
Rsub_33R 15
Rsub_1k3 50

lhole10pH
Rhole400m
Caphole0.4pF
Lgnd_D 150pH

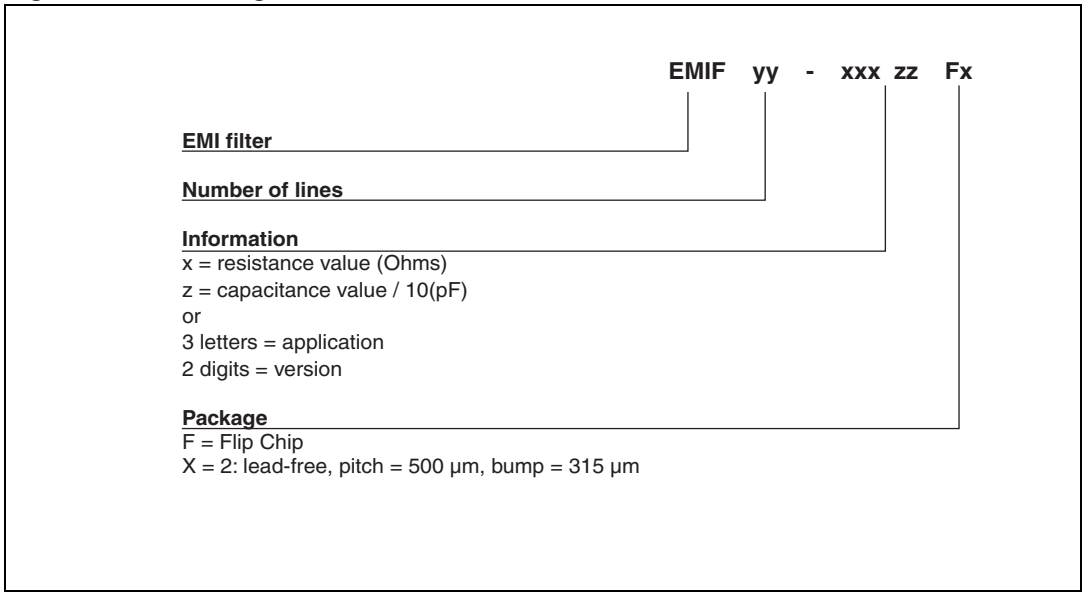
Lbump50pH
Rbump50m
Cbump1.5pF
Rsubump150

Model D02_Nw
BV=100
IBV=1m
CJO=6.8p
M=0.3333
RS=2
VJ=0.6
TT=100n

Model D02_usb
BV=16
IBV=1m
CJO=Cz
M=0.3333
RS=2
VJ=0.6
TT=100n

3 Ordering information scheme

Figure 11. Ordering information scheme



4 Package 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. Package dimensions

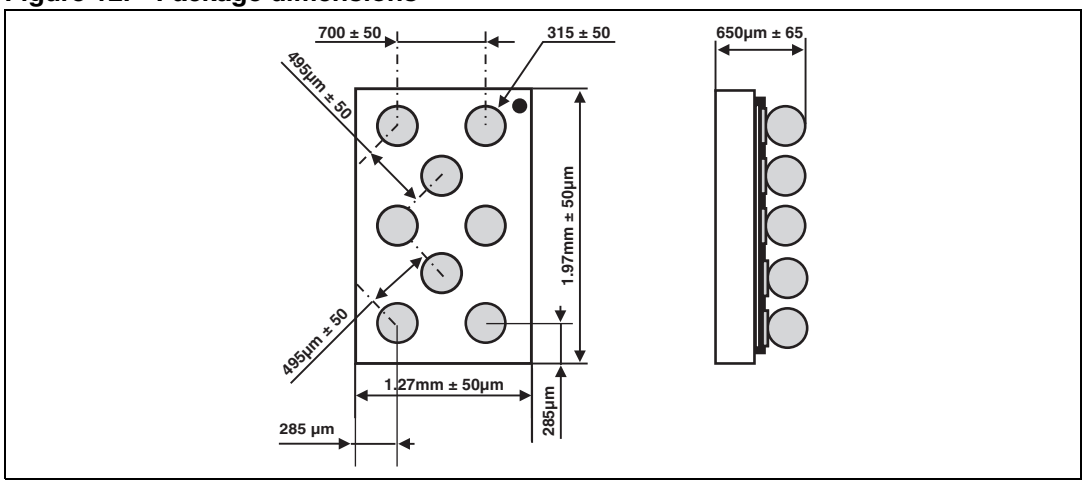


Figure 13. Footprint

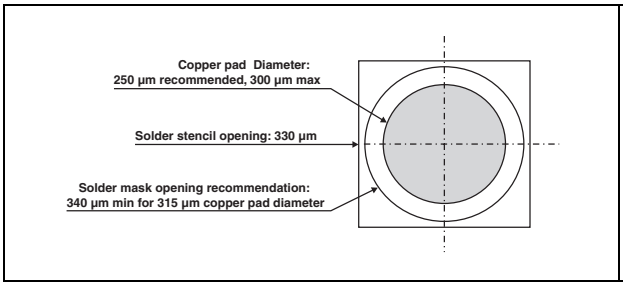


Figure 14. Marking

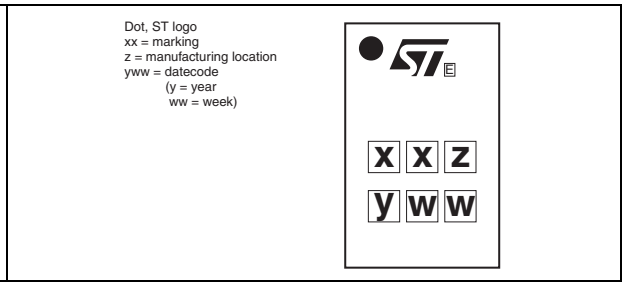
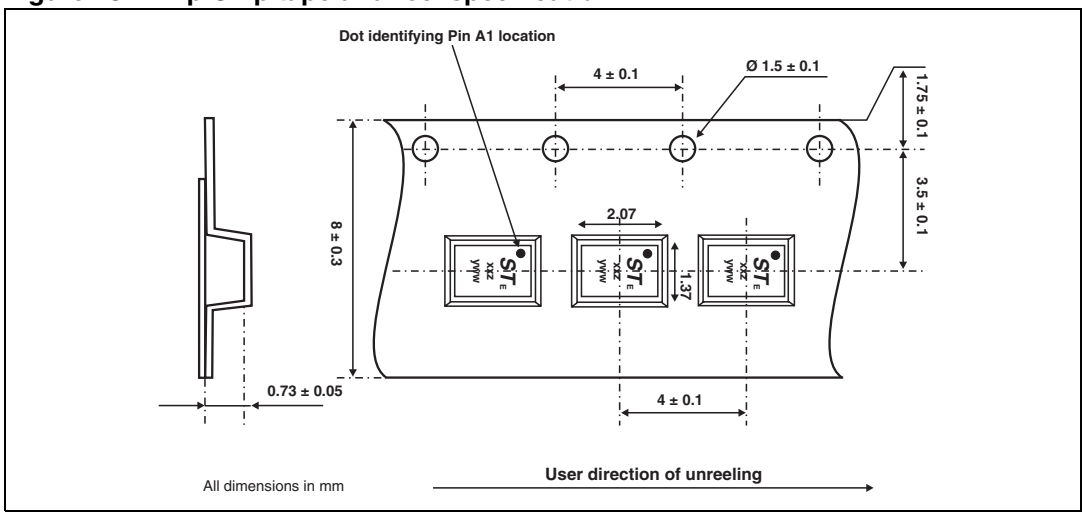


Figure 15. Flip Chip tape and reel specification



5 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-USB01F2	FF	Flip Chip	3.35 mg	5000	Tape and reel 7”

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

6 Revision history

Table 4. Document revision history

Date	Revision	Changes
26-Oct-2004	1	Initial release.
16-Apr-2007	2	Updated ECOPACK statement. Updated *Figure 11*, *Figure 12* and *Figure 15.* Reformatted to current standards.
29-Apr-2008	3	Typographical errors corrected.
18-Sep-2009	4	Updated ESD graphic in *Figure 6* and *Figure 7*.

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