

4-line IPAD™, EMI filter including ESD protection

Features

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Lead-free package
- Very low PCB space occupation:
1.57 mm x 2.07 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

Complies with the standards:

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

Application

Where EMI filtering in ESD sensitive equipment is required:

- MultiMediaCard for mobile phones, personal digital assistant, digital camera, MP3 players...

Description

The EMIF04-MMC02 is a highly integrated device designed to suppress EMI/RFI noise for a MultiMediaCard port. The EMIF04 Flip Chip packaging means the package size is equal to the die size.

This filter includes ESD protection circuitry, which prevents damage to the application when it is subjected to ESD surges up to 15 kV.

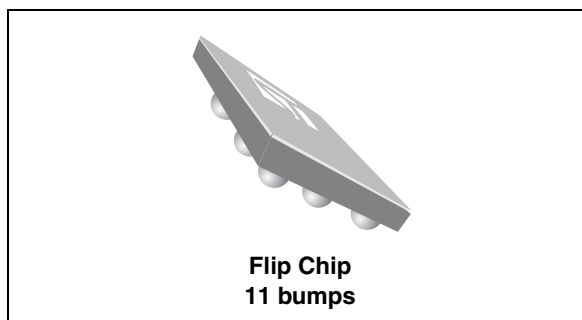


Figure 1. Pin layout (bump side)

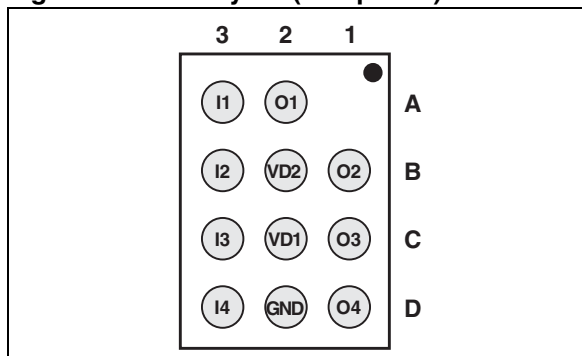
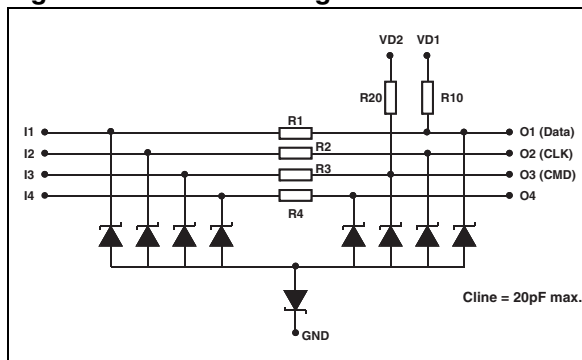


Figure 2. Device configuration



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1 Electrical characteristics

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

Symbol	Parameter	Value	Unit
P_R	DC power per resistor	70	mW
T_j	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				
V_{CL}	Clamping voltage				
R_d	Dynamic impedance				
I_{PP}	Peak pulse current				
$R_{I/O}$	Series resistance between input and output				
C_{line}	Input capacitance per line				
Symbol	Test conditions	Min	Typ	Max	Unit
V_{BR}	$I_R = 1\text{ mA}$	6			V
I_{RM}	$V_{RM} = 3\text{ V}$		0.1	0.5	μA
C_{line}	@ 0 V			20	pF
R_1, R_2, R_3, R_4	Tolerance $\pm 5\%$		47		Ω
R_{10}	Tolerance $\pm 5\%$		13		k Ω
R_{20}	Tolerance $\pm 5\%$		56		k Ω

Figure 3. S21 (dB) attenuation measurement and Aplac simulation

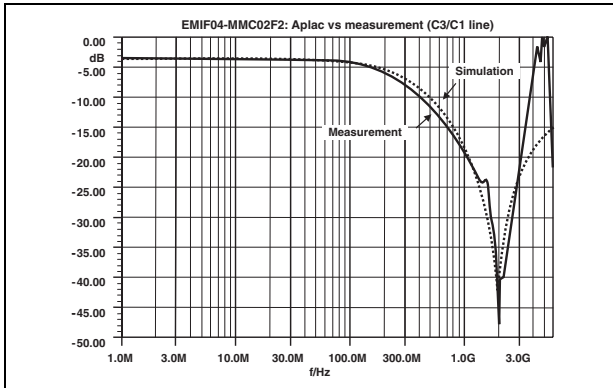


Figure 4. Cross talk measurement

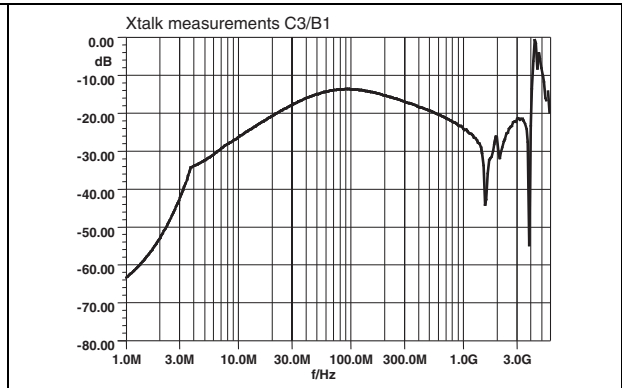


Figure 5. ESD response to IEC 61000-4-2 (+15kV contact discharge) on one input (Vin) and one output (Vout)

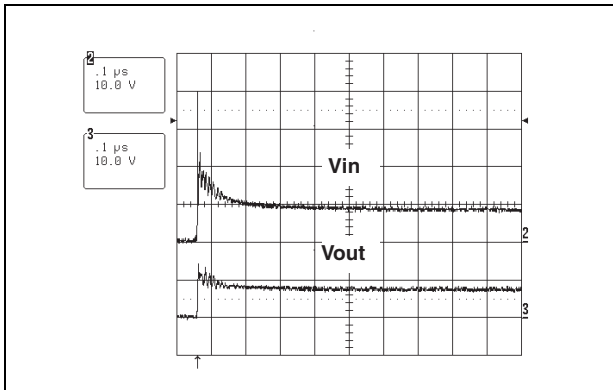


Figure 6. ESD response to IEC 61000-4-2 (-15kV contact discharge) on one input (Vin) and one output (Vout)

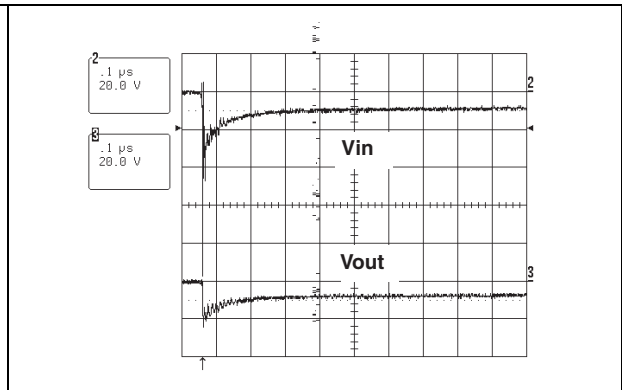
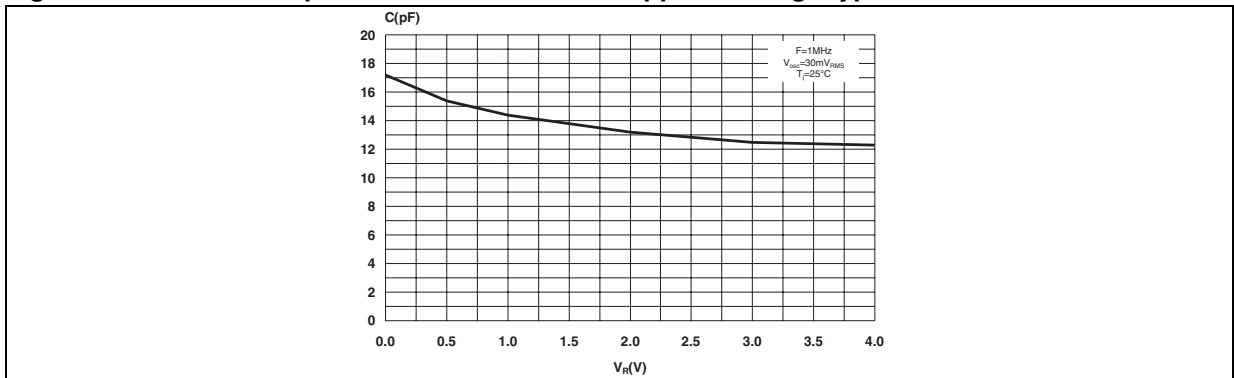


Figure 7. Junction capacitance versus reverse applied voltage typical values



2 Application information

Figure 8. Device structure

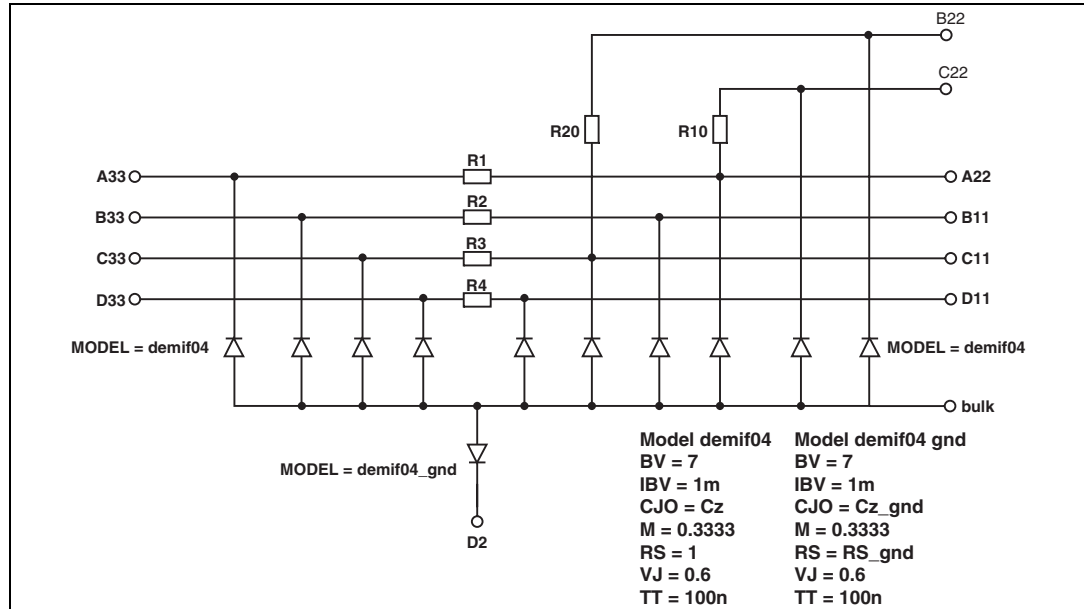
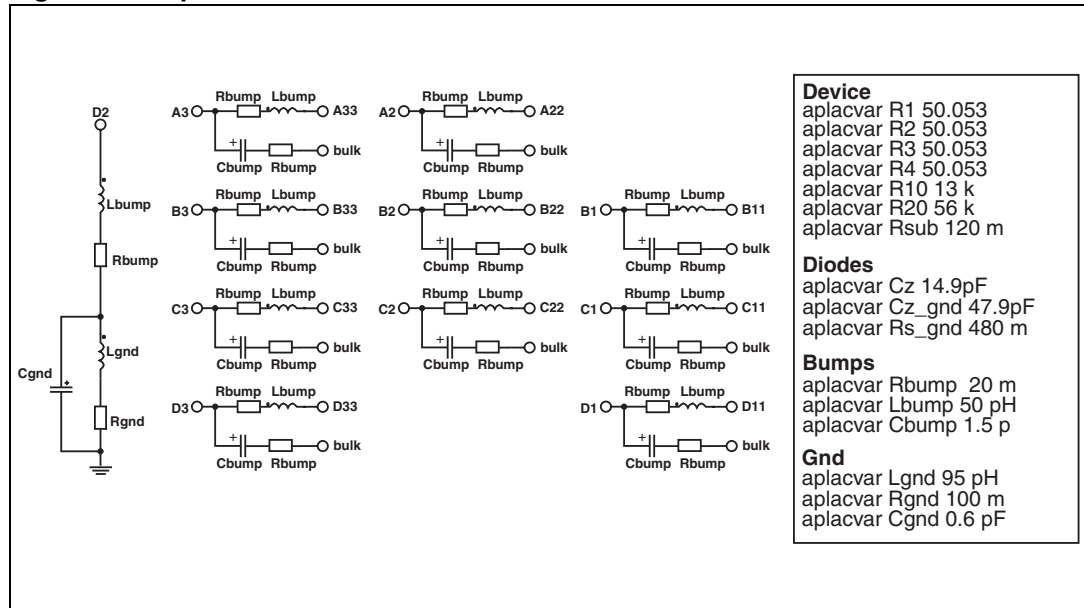
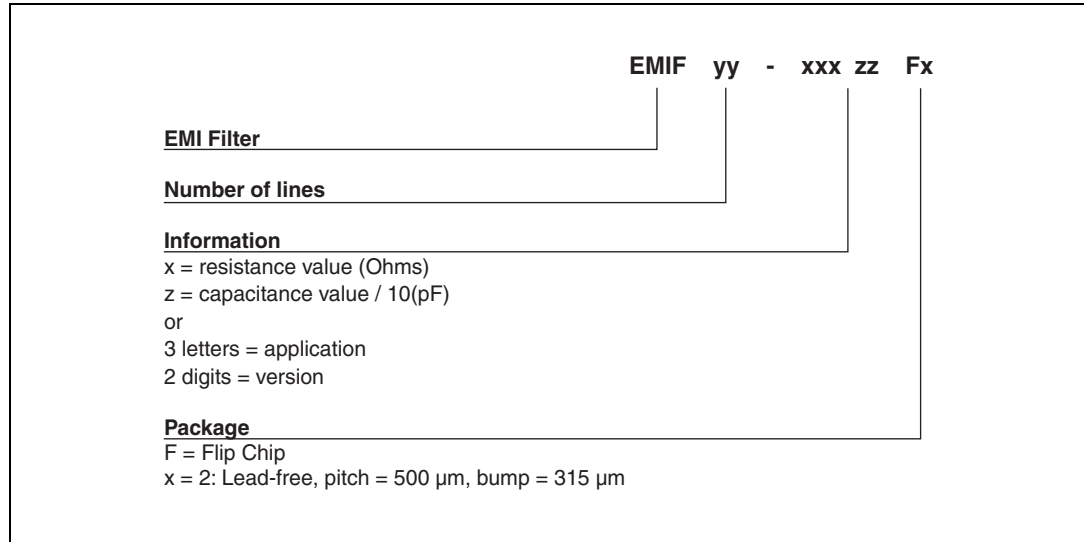


Figure 9. Aplac model connections



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.

Figure 11. Flip Chip dimensions

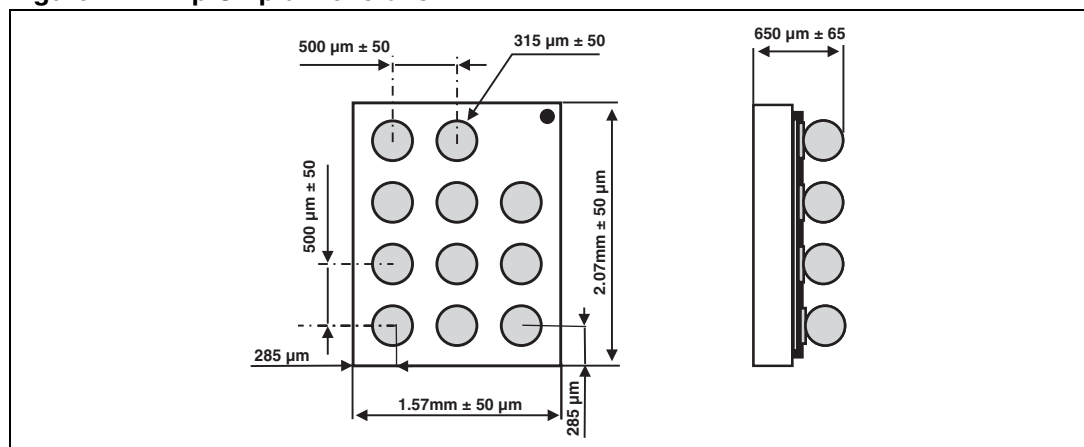


Figure 12. Footprint

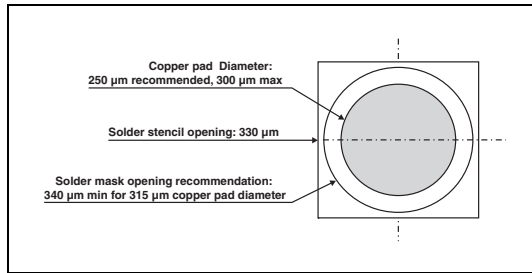


Figure 13. Marking

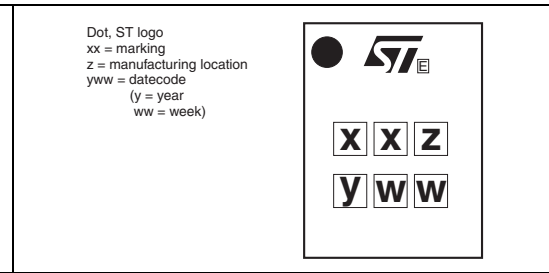
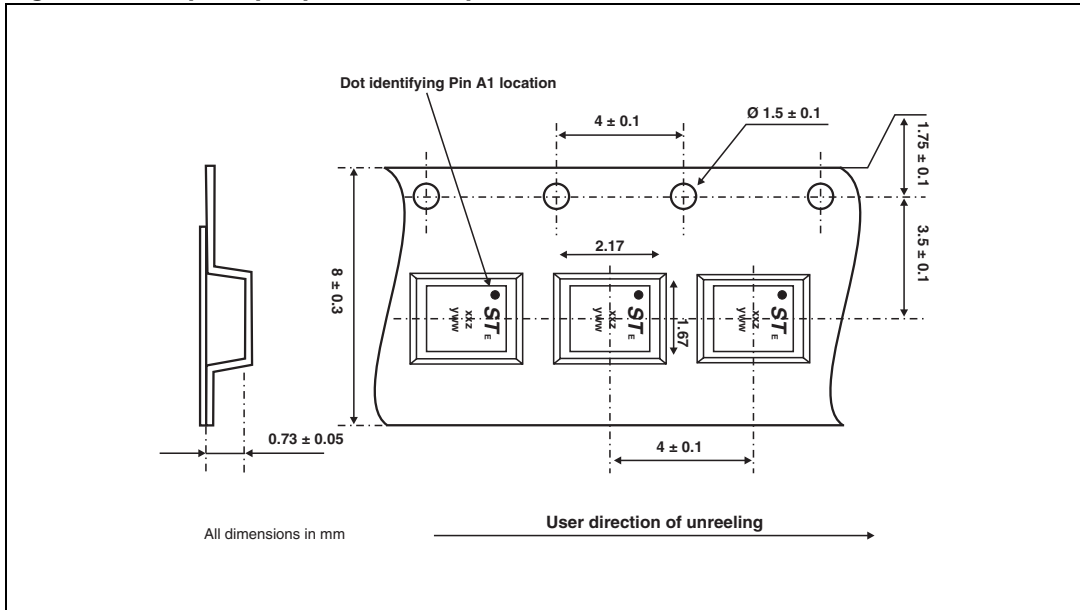


Figure 14. Flip Chip tape and reel specification



5 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF04-MMC02F2	FH	Flip Chip	4.5 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"

6 Revision history

Table 4. Document revision history

Date	Revision	Changes
14-Oct-2004	1	First issue
06-Apr-2005	2	Minor layout update. No content change.
25-Aug-2005	3	Reformatted to current standard, Aplac model updated in section 2.
28-Apr-2008	4	Updated ECOPACK statement. Updated Figure 10 , Figure 11 and Figure 14 . Reformatted to current standards.

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