EMIF04-MMC02F2

IPAD™

4 line EMI filter including ESD protection

Main product characteristics

Where EMI filtering in ESD sensitive equipment is required:

- Multimedia card 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 multimedia card 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 15kV.

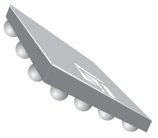
Benefits

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Lead free package
- Very low PCB space consumption: 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 following standards

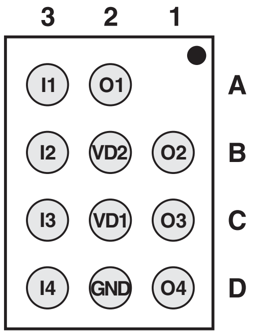
EC 61000-4-2 Level 4

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



Flip-Chip
(11 bumps)

Pin configuration (bump side)



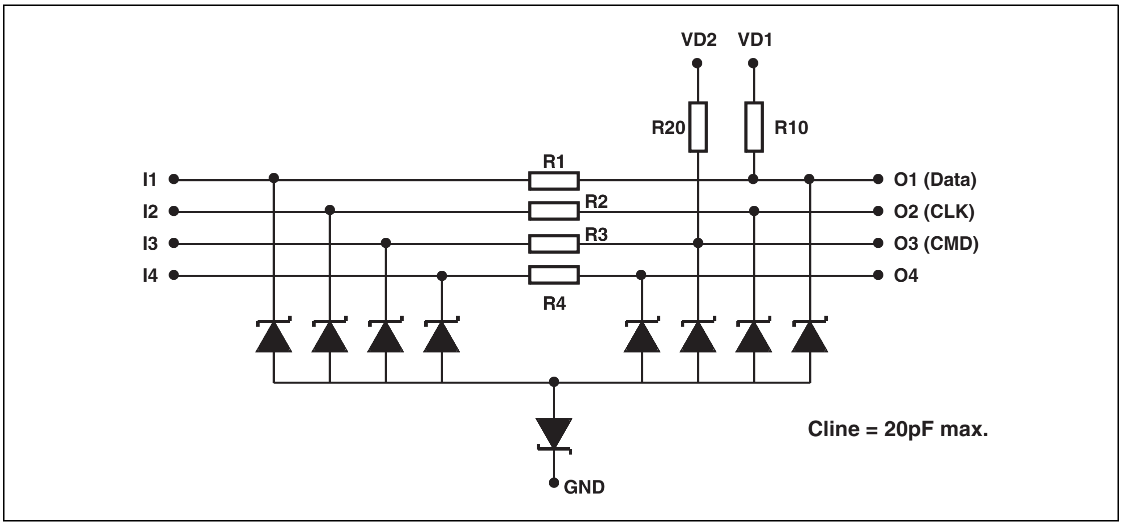
Order Code

Part number	Marking
EMIF04-MMC02F2	FH

TM: IPAD is a trademark of STMicroelectronics

1 Characteristics

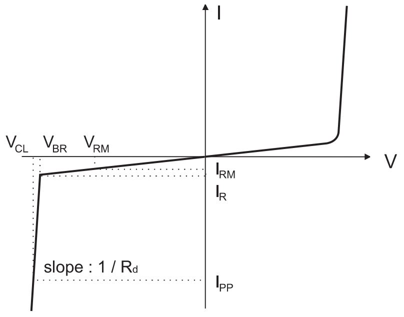
1.1 Configuration



1.2 Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter and test conditions	Value	Unit
P_R	DC power per resistor	70	mW
T_j	Junction temperature	125	°C
T_{op}	Operating temperature range	-40 to + 85	°C
T_{stg}	Storage temperature range	-55 to +150	°C

1.3 Electrical characteristics

Symbol	Parameter	
V_{BR}	Breakdown voltage	
I_{RM}	Leakage current @ VRM	
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 mA	6			V
I_{RM}	V_{RM} = 3 V		0.1	0.5	µA
C_{line}	@ 0V			20	pF
R_1,R_2,R_3,R_4	Tolerance ± 5%		47		Ω
R_{10}	Tolerance ± 5%		13		kΩ
R_{20}	Tolerance ± 5%		56		kΩ

Figure 1. S21 (dB) attenuation measurement and Aplac simulation

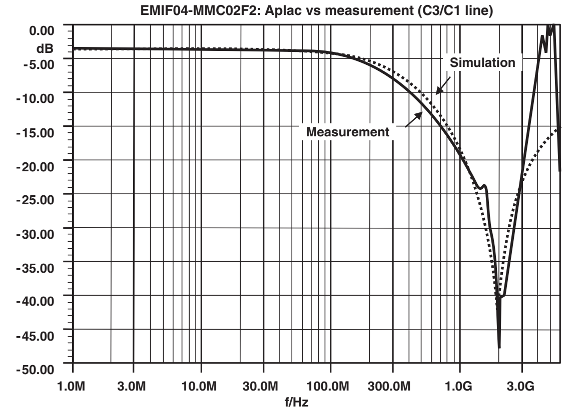


Figure 2. Cross talk measurements

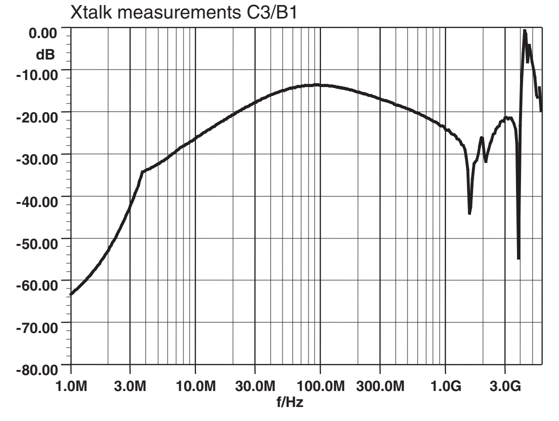


Figure 3. ESD response to IEC61000-4-2 (+15kV contact discharge) on one input V(in) and one output V(out)

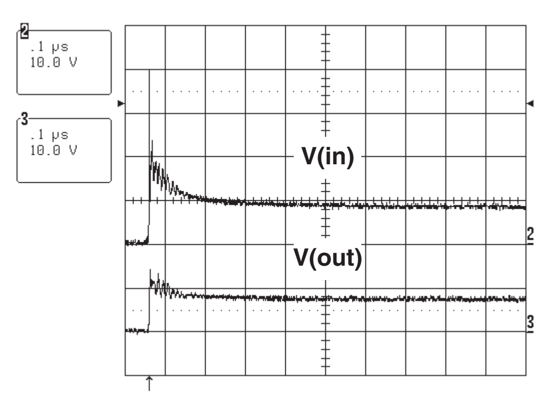


Figure 4. ESD response to IEC61000-4-2 (-15kV contact discharge) on one input V(in) and one output V(out)

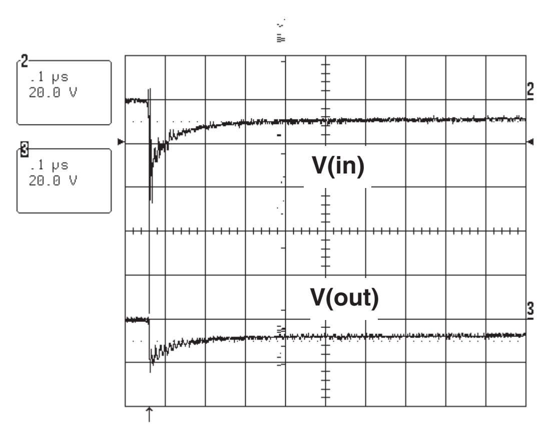
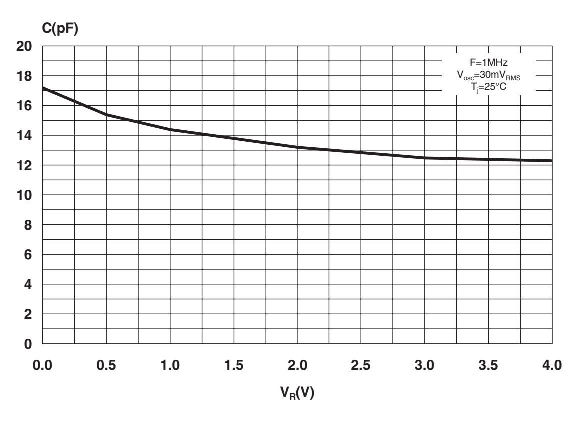
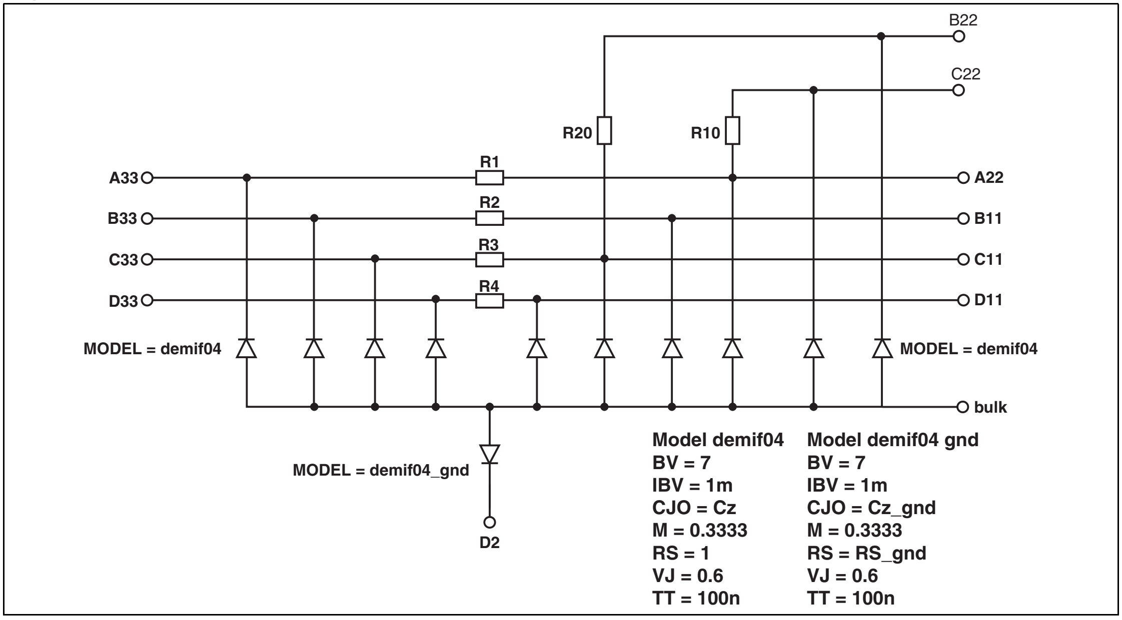


Figure 5. Junction capacitance versus reverse applied voltage typical values



2 Aplac Model

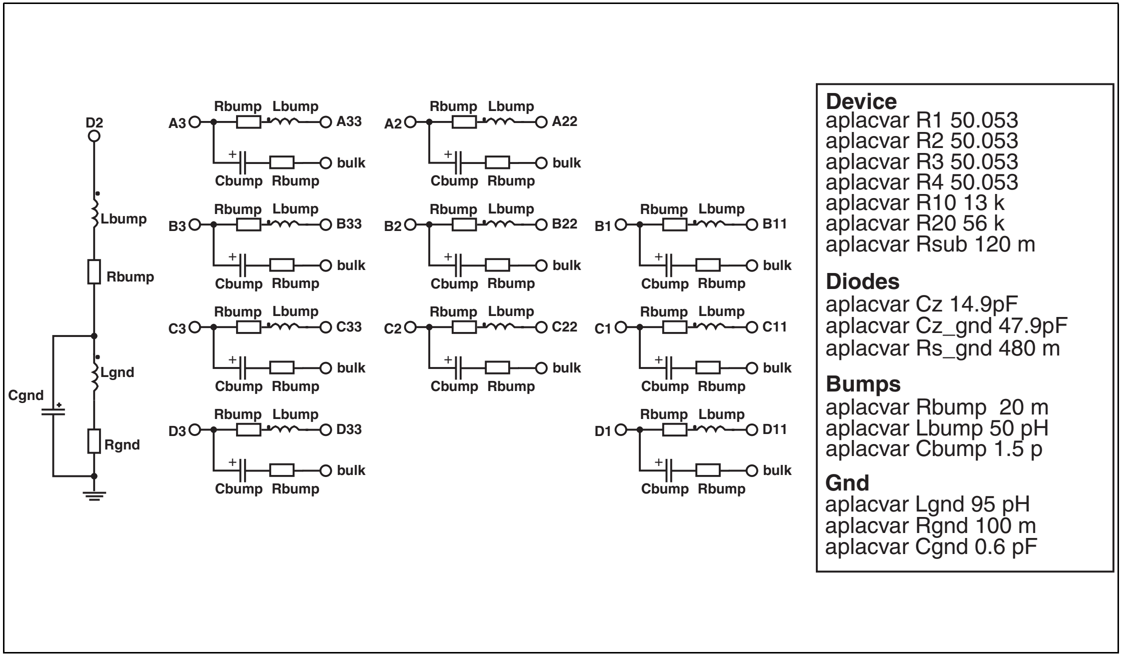
Figure 6. Device structure



Model demif04
BV = 7
IBV = 1m
CJO = Cz
M = 0.3333
RS = 1
VJ = 0.6
TT = 100n

Model demif04 gnd
BV = 7
IBV = 1m
CJO = Cz_gnd
M = 0.3333
RS = RS_gnd
VJ = 0.6
TT = 100n

Figure 7. Aplac model connections



Device
aplacvar R1 50.053
aplacvar R2 50.053
aplacvar R3 50.053
aplacvar R4 50.053
aplacvar R10 13 k
aplacvar R20 56 k
aplacvar Rsub 120 m

Diodes
aplacvar Cz 14.9pF
aplacvar Cz_gnd 47.9pF
aplacvar Rs_gnd 480 m

Bumps
aplacvar Rbump 20 m
aplacvar Lbump 50 pH
aplacvar Cbump 1.5 p

Gnd
aplacvar Lgnd 95 pH
aplacvar Rgnd 100 m
aplacvar Cgnd 0.6 pF

3 Ordering information scheme

EMIF yy - xxx zz Fx

EMI Filter

Number of lines

Information
x = resistance value (Ohms)
z = capacitance value / 10(pF)
or
3 letters = application
2 digits = version

Package
F = Flip-Chip
x = 1: 500µm, Bump = 315µm
= 2: Leadfree Pitch = 500µm, Bump = 315µm
= 3: Leadfree Pitch = 400µm, Bump = 250µm

4 Package information

Figure 8. Mechanical data

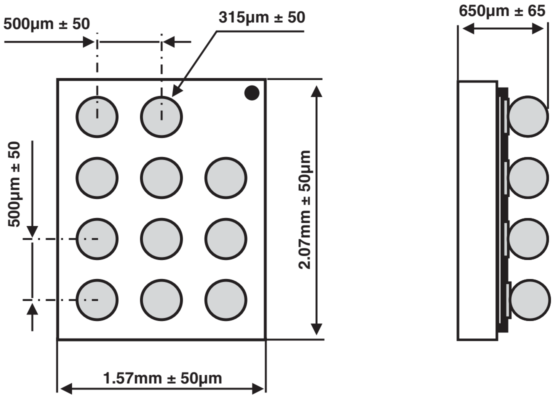


Figure 9. Foot print recommendations

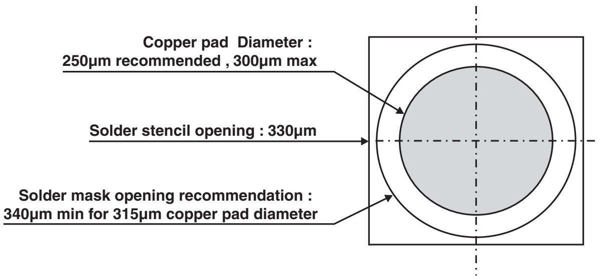


Figure 10. Marking

Dot, ST logo
xx = marking
z = manufacturing location
yww = datecode
(y = year
ww = week)

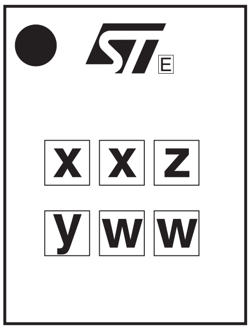
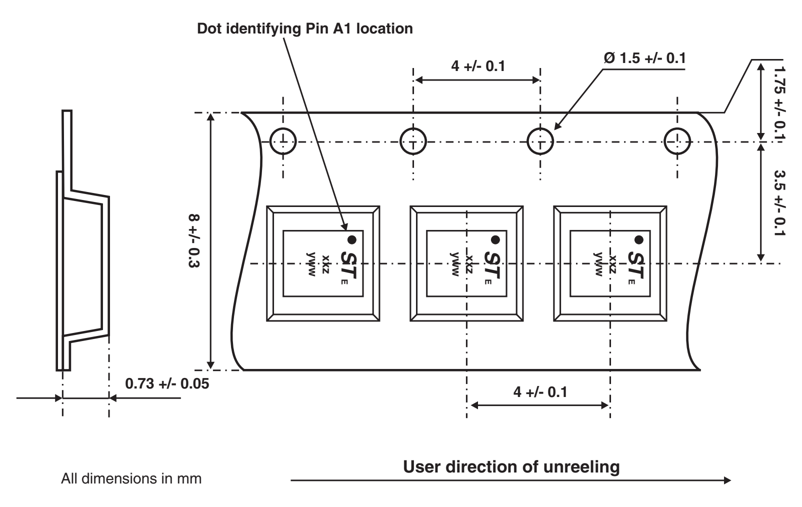


Figure 11. Flip-Chip tape and reel specification



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.

Note: More packing informations are available in the application note
AN1235: “Flip-Chip: Package description and recommendations for use”
AN1751: "EMI Filters: Recommendations and measurements"

5 Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
EMIF04-MMC02F2	FH	Flip-Chip	4.5 mg	5000	Tape and Reel (7”)

6 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