EMIF02-SPK01F2

IPAD™

2 LINE EMI FILTER AND ESD PROTECTION

MAIN PRODUCT CHARACTERISTICS:

Where EMI filtering in ESD sensitive equipment is required :

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

DESCRIPTION

The EMIF02-SPK01 is a highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interferences. The EMIF02 Flip-Chip packaging means the package size is equal to the die size.
This filter includes an ESD protection circuitry which prevents damage to the application when subjected to ESD surges up 15 kV.

BENEFITS

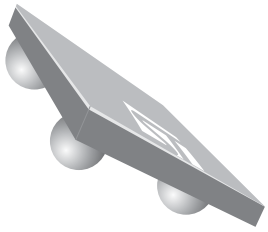
- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Very low PCB space consuming: 1.07 mm x 1.47 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reducing of parasitic elements through integration & wafer level packaging

COMPLIES WITH THE FOLLOWING STANDARDS:

IEC 61000-4-2

Level 4 on input pins 15 kV (air discharge)
8 kV (contact discharge)
Level 1 on output pins 2 kV (air discharge)
2 kV (contact discharge)

MIL STD 883E -Method 3015-6 Class 3



Flip-Chip
(5 Bumps)

Table 1: Order Code

Part Number	Marking
EMIF02-SPK01F2	FX

Figure 1: Pin Configuration (bump side)

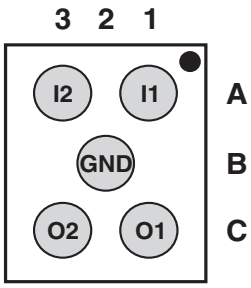
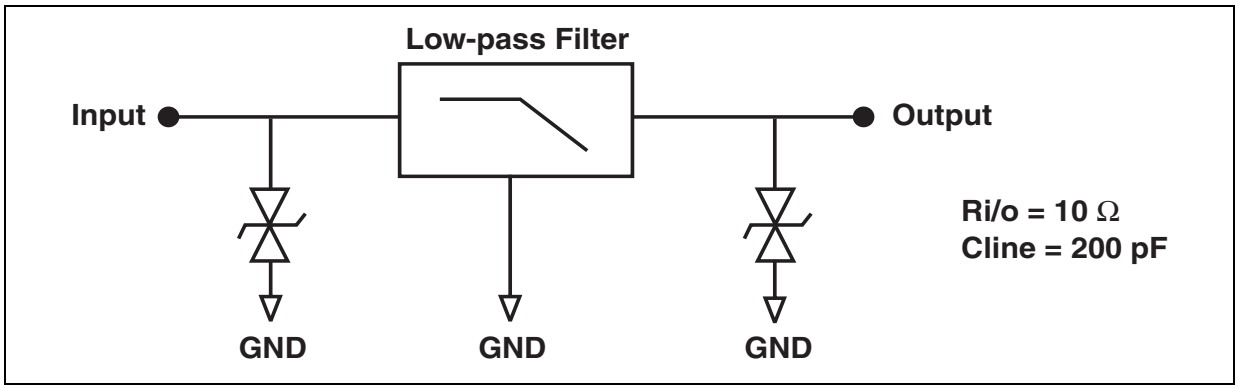


Figure 2: Basic Cell Configuration



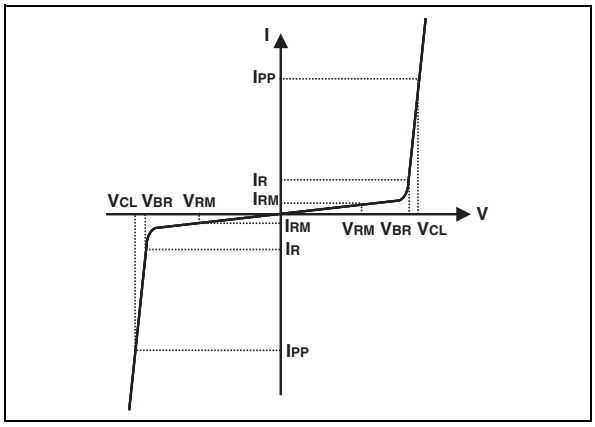
TM: IPAD is a trademark of STMicroelectronics.

Table 2: 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 50	°C

Table 3: Electrical Characteristics (T_{amb} = 25 °C)

Symbol	Parameter
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 & Output
C_{line}	Input capacitance per line



Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	6	8		V
I_{RM}	V_{RM} = 3 V per line			500	nA
$R_{I/O}$	Tolerance ± 20 %		10		Ω
C_{line}	V_R = 0 V		200		pF

Figure 3: S21 (dB) attenuation measurements and Aplac simulation

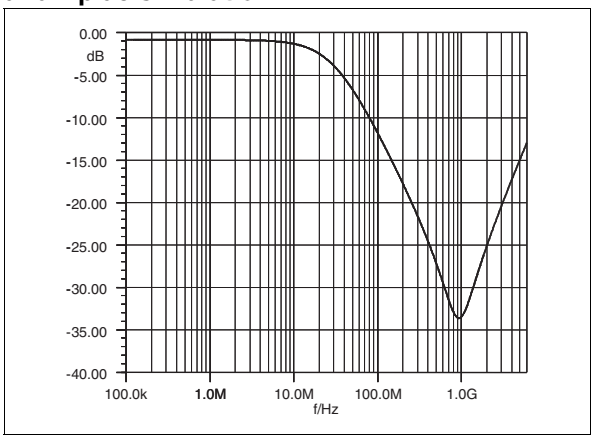


Figure 4: Analog crosstalk measurements

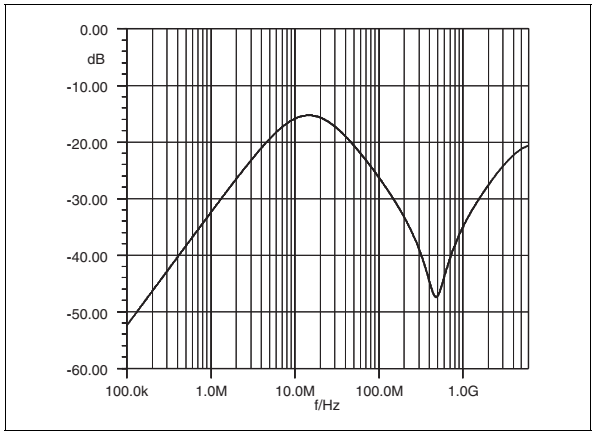


Figure 5: ESD response to IEC61000-4-2 (+ 15kV air discharge) on one input V(in) and one output V(out)

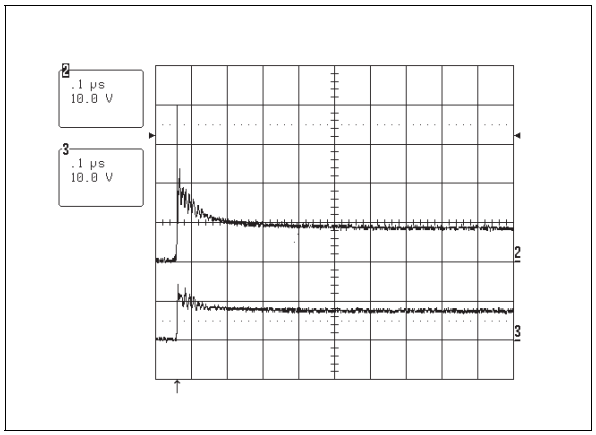


Figure 6: ESD response to IEC61000-4-2 (15kV air discharge) on one input V(in) and one output V(out)

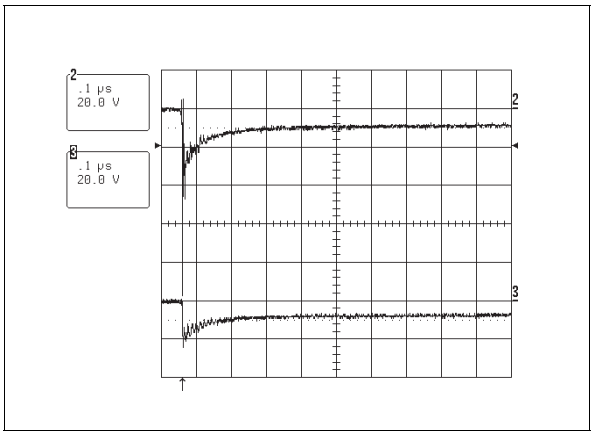


Figure 7: Line capacitance versus applied voltage

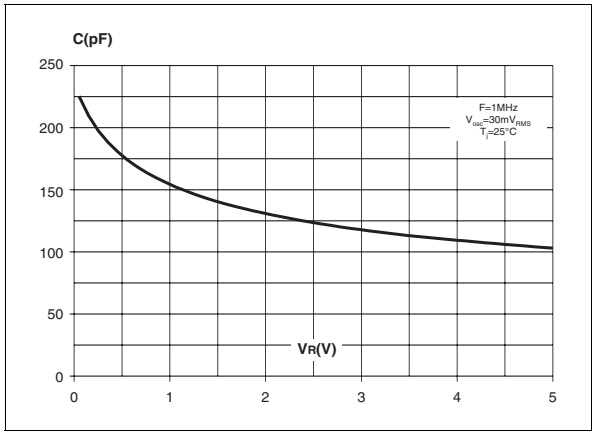
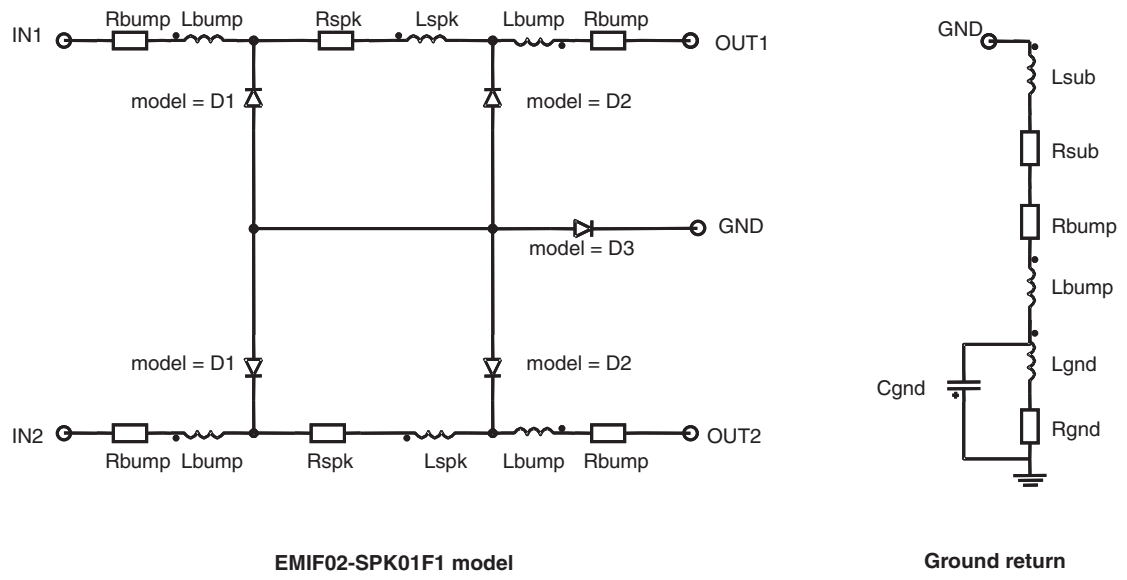


Figure 8: Aplac model



EMIF02-SPK01F1 model

Ground return

Figure 9: Aplac parameters

Model D1	Model D3	Model D2	aplacvar Ls 1nH
CJO=Cdiode1	CJO=Cdiode3	CJO=Cdiode2	aplacvar Rs 150m
BV=7	BV=7	BV=7	aplacvar Rspk 10
IBV=1u	IBV=1u	IBV=1u	aplacvar Lspk 10p
IKF=1000	IKF=1000	IKF=1000	aplacvar Cdiode1 234pF
IS=10f	IS=10f	IS=10f	aplacvar Cdiode2 3.5ppF
ISR=100p	ISR=100p	ISR=100p	aplacvar Cdiode3 1nF
N=1	N=1	N=1	aplacvar Lbump 50pH
M=0.3333	M=0.3333	M=0.3333	aplacvar Rbump 10m
RS=0.7	RS=0.12	RS=0.3	aplacvar Rsub 0.5m
VJ=0.6	VJ=0.6	VJ=0.6	aplacvar Lsub 10pH
TT=50n	TT=50n	TT=50n	aplacvar Rgnd 1m
			aplacvar Lgnd 50pH
			aplacvar Cgnd 0.15pF

Figure 10: Order code

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

Figure 11: FLIP-CHIP Package Mechanical Data

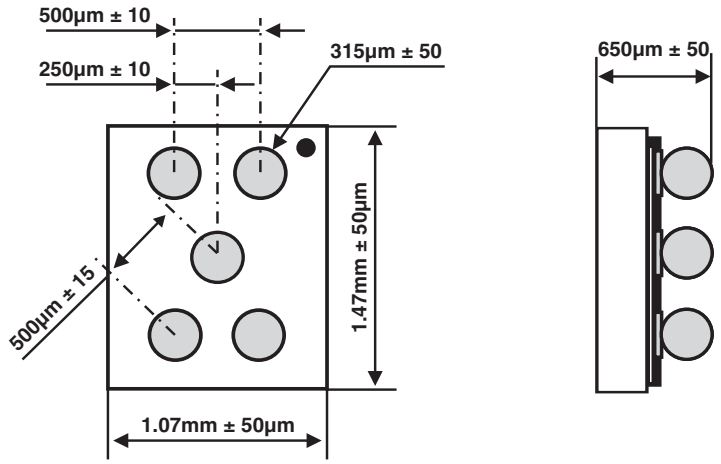


Figure 12: Foot print recommendations

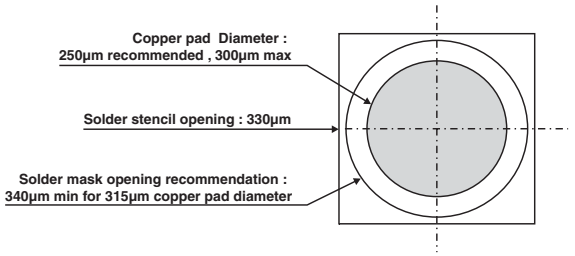


Figure 13: Marking

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

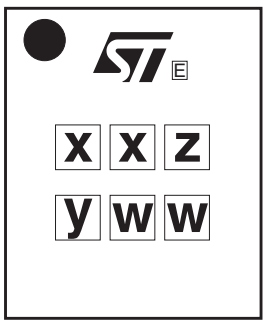
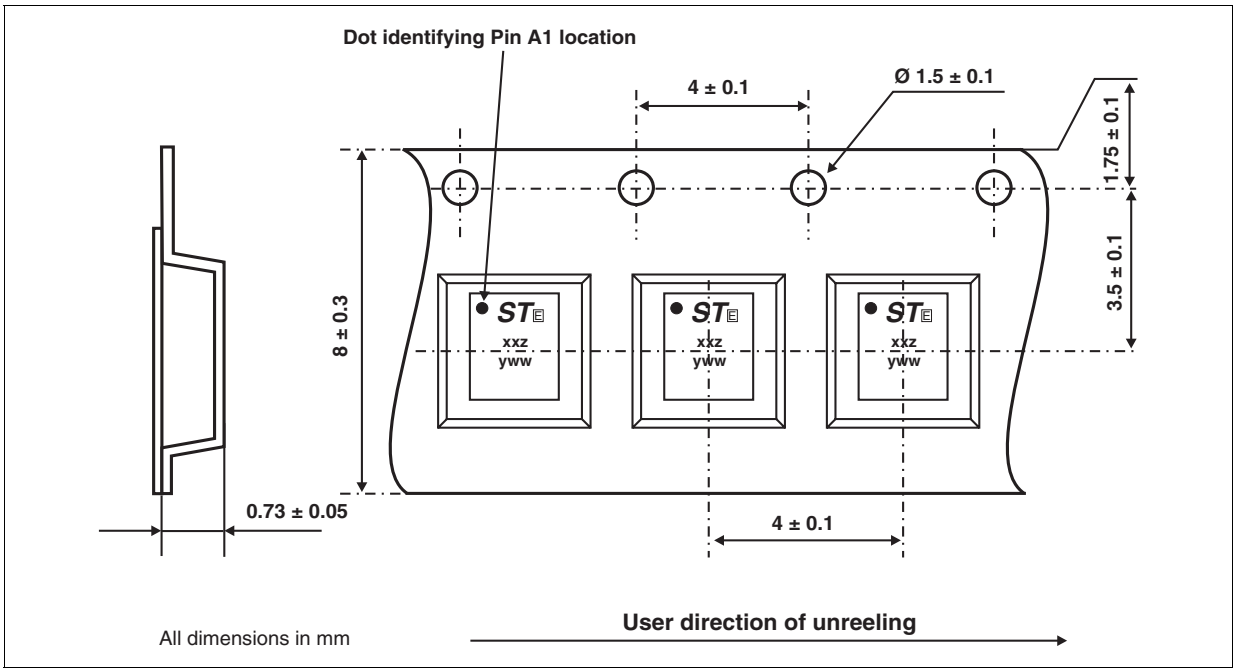


Figure 14: FLIP-CHIP Tape and Reel Specification



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.

Table 4: Ordering Information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-SPK01F2	FX	Flip-Chip	2.1 mg	5000	Tape & reel (7”)

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

Table 5: Revision History

Date	Revision	Description of Changes
14-Oct-2004	1	First issue