

# EMIF10-COM01C1

# EMI FILTER INCLUDING ESD PROTECTION

IPAD™

#### MAIN PRODUCT CHARACTERISTICS

EMI filtering and ESD protection for:

- Computers and printers
- Communication systems
- Mobile phones

#### **DESCRIPTION**

The EMIF10-COM01C1 is a highly integrated device designed to suppress EMI / RFI noise in all systems subjected to electromagnetic interferences. The EMIF10 Flip-Chip packaging means the package size is equal to the die size.

Additionally, this filter includes an ESD protection circuitry which prevents the protected device from destruction when subjected to ESD surges up to 15 kV.

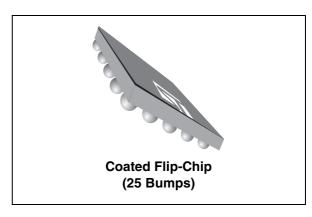
#### **BENEFITS**

- EMI symmetrical (I/O) low-pass filter
- Coating resin on back side
- Very low PCB space consuming: < 7mm<sup>2</sup>
- Very thin package: 0.65 mm
- High efficiency in ESD suppression on both input & output pins
- High reliability offered by monolithic integration

#### **COMPLIES WITH THE FOLLOWING STANDARDS:**

IEC61000-4-2 level 4

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



**Table 1: Order Code** 

Part Number	Marking	
EMIF010-COM01C1	FE	

Figure 1: Pin Configuration (Ball side)

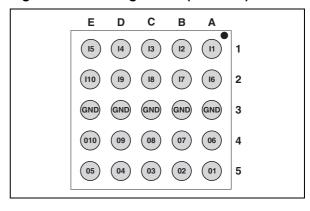
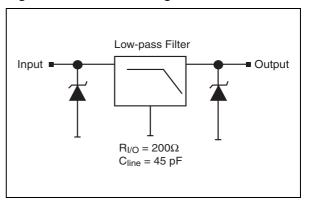


Figure 2: Basic cell configuration



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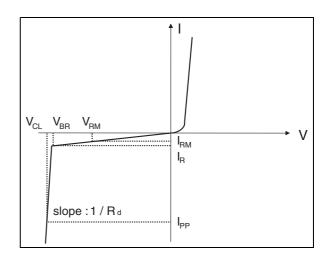
# EMIF10-COM01C1

**Table 2: Absolute Ratings**  $(T_{amb} = 25^{\circ}C)$ 

Symbol	Parameter and test conditions	Value	Unit
V <sub>PP</sub>	ESD discharge IEC61000-4-2, air discharge ESD discharge IEC61000-4-2, contact discharge	15 8	kV
Tj	Junction temperature	125	°C
T <sub>op</sub>	Operating temperature range	- 40 to + 85	°C
T <sub>stg</sub>	Storage temperature range	- 55 to + 150	°C

Table 3: Electrical Characteristics ( $T_{amb} = 25^{\circ}C$ )

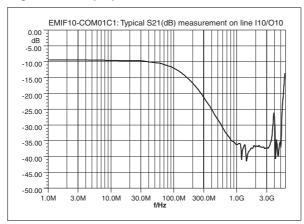
Symbol	Parameter		
V <sub>BR</sub>	Breakdown voltage		
I <sub>RM</sub>	Leakage current @ V <sub>RM</sub>		
V <sub>RM</sub>	Stand-off voltage		
V <sub>CL</sub>	Clamping voltage		
R <sub>d</sub>	Dynamic impedance		
I <sub>PP</sub>	Peak pulse current		
R <sub>I/O</sub>	Series resistance between Input & Output		
C <sub>line</sub>	Input capacitance per line		



Symbol	Test conditions	Min.	Тур.	Max.	Unit
$V_{BR}$	I <sub>R</sub> = 1 mA	6	8	10	V
I <sub>RM</sub>	V <sub>RM</sub> = 3V per line			500	nA
$R_d$	$I_{PP} = 10A, t_p = 2.5 \mu s$		1		Ω
R <sub>I/O</sub>		180	200	220	Ω
C <sub>line</sub>	At 0V bias		45	50	pF
t <sub>LH</sub>	Vinput = 2.8V Rload = 100kΩ			25	ns

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Figure 3: S21(db) attenuation measurement



Note: Spikes at high frequencies are induced by the PCB layout

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

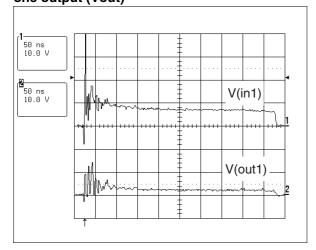


Figure 7: Rise time measurement

Figure 4: Analog crosstalk

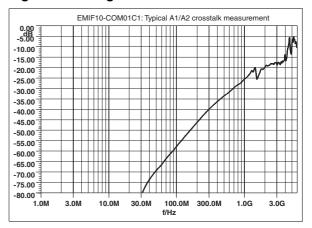
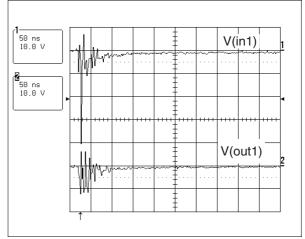


Figure 6: ESD response to IEC61000-4-2 (-15kV air discharge) on one input V(in) and on one output (Vout)



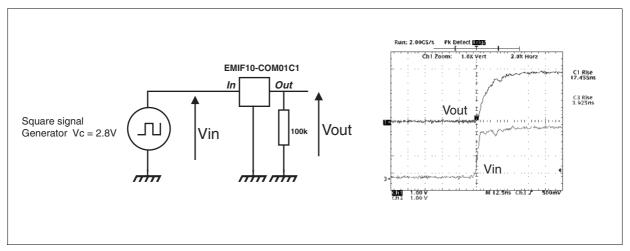


Figure 8: Capacitance versus reverse applied voltage

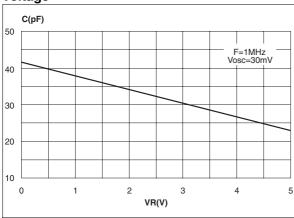
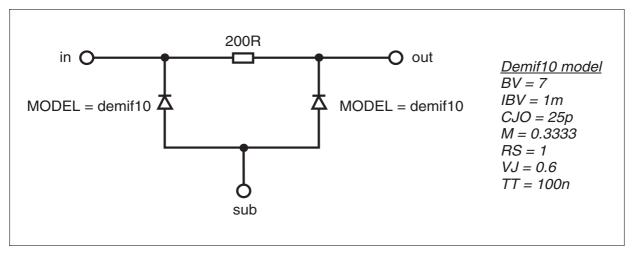


Figure 9: Aplac model



## PCB grounding recommendations

In order to ensure a good efficiency in terms of ESD protection and filtering behavior, we recommend to implement microvias (100  $\mu$ m dia.) between the GND bumps and the GND layer. GND bumps can be connected together in PCB layer 1, and in addition, if possible, use through hole vias (200  $\mu$ m dia.) in both sides of filter to improve contact to GND (layer). This layout will minimize the distance to the ground and thus parasitic inductances. In addition, we recommend to have GND plane wherever possible.

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Figure 10: Ordering Information Scheme

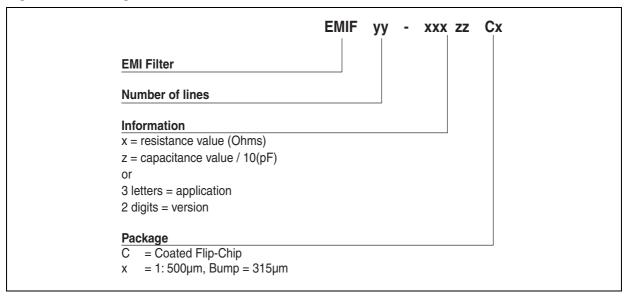


Figure 11: FLIP-CHIP Package Mechanical Data

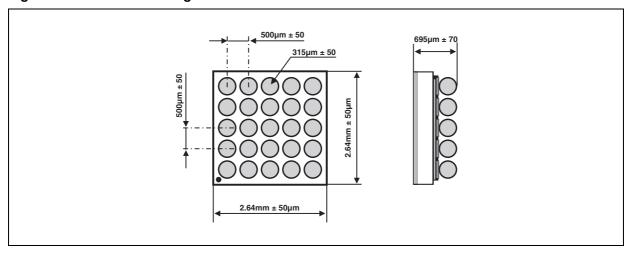


Figure 12: Foot print recommendations

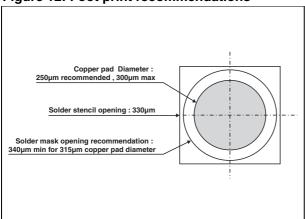


Figure 13: Marking

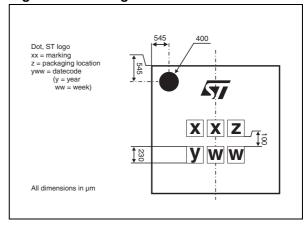
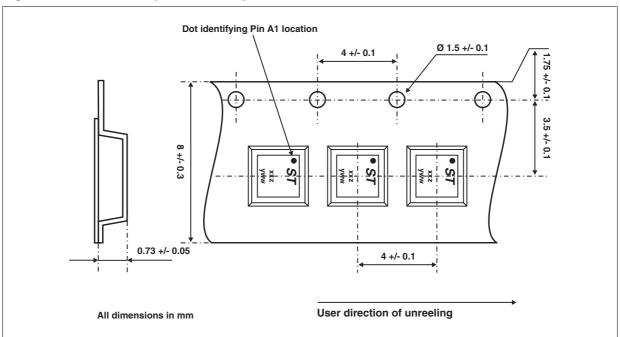


Figure 14: FLIP-CHIP Tape and Reel Specification



**Table 4: Ordering Information** 

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF10-COM01C1	FE	Flip-Chip	10.3 mg	5000	Tape & reel

Note: More informations are available in the application notes:

AN1235: "Flip-Chip: Package description and recommendations for use" AN1751: "EMI Filters: Recommendations and measurements"

**Table 5: Revision History** 

Date	Revision	Description of Changes
01-Mar-2005	1	First issue.

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