



# EMIF10-COM01C2

IPAD™

## EMI Filter including ESD protection

### Main product characteristics

EMI filtering and ESD protection for:

- Computers and printers
- Communication systems
- Mobile phones

### Description

The EMIF10-COM01C2 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 damage to the application when subjected to ESD surges up to 15 kV.

### Benefits

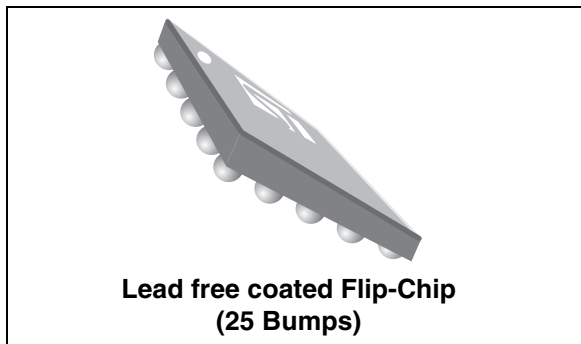
- EMI symmetrical (I/O) low-pass filter
- Coating resin on flat side
- Very low PCB space consuming: < 6 mm<sup>2</sup>
- Very thin package: 0.65 mm
- High efficiency in ESD suppression on both input and output pins
- High reliability offered by monolithic integration
- Lead free package

### Complies with the following standards:

IEC 61000-4-2 level 4

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

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### Order code

Part Number	Marking
EMIF10-COM01C2	FE

Figure 1. Pin configuration (Bump side)

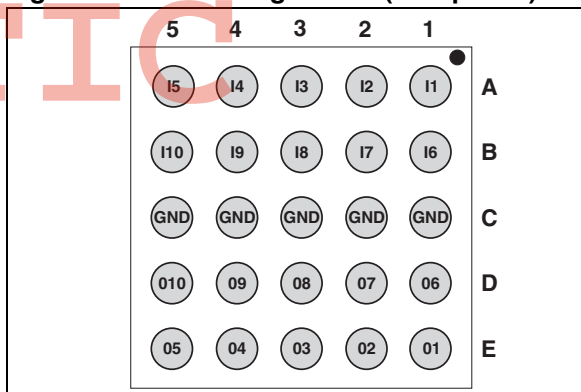
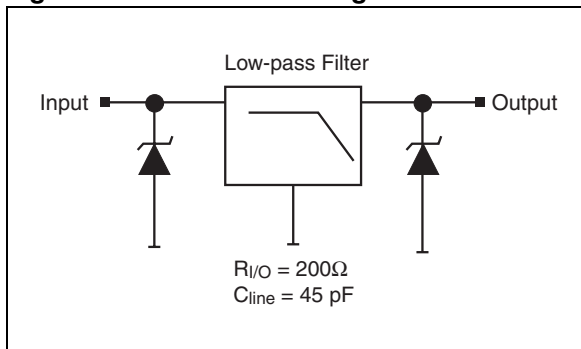


Figure 2. Basic cell configuration



# 1 Characteristics

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

Symbol	Parameter and test conditions	Value	Unit
$V_{PP}$	ESD discharge IEC61000-4-2, air discharge	15	kV
	ESD discharge IEC61000-4-2, contact discharge	8	
$T_j$	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	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
$R_{I/O}$	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	8	10	V
$I_{RM}$	$V_{RM} = 3\text{ V per line}$			500	nA
$R_d$	$I_{PP} = 10\text{ A}, t_p = 2.5\text{ }\mu\text{s}$		1		$\Omega$
$R_{I/O}$		180	200	220	$\Omega$
$C_{line}$	At 0 V bias		45	50	pF
$t_{LH}$	$V_{input} = 2.8\text{ V}$ $R_{load} = 100\text{ k}\Omega$			25	ns

Figure 3. S21(db) attenuation measurement<sup>(1)</sup>

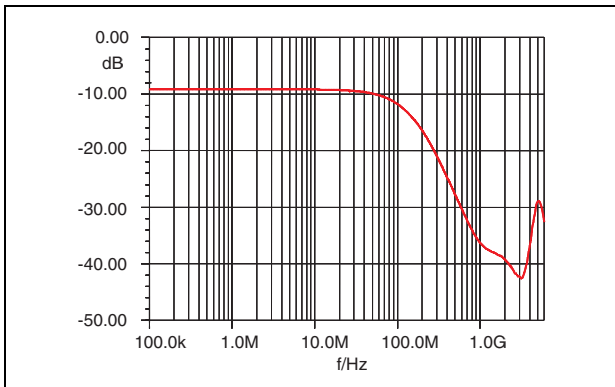
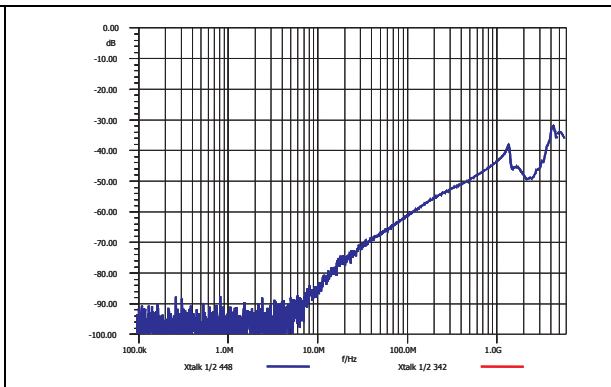


Figure 4. Analog crosstalk



1. Spikes at high frequencies are induced by the PCB layout

Figure 5. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one input ( $V_{in}$ ) and on one output ( $V_{out}$ )

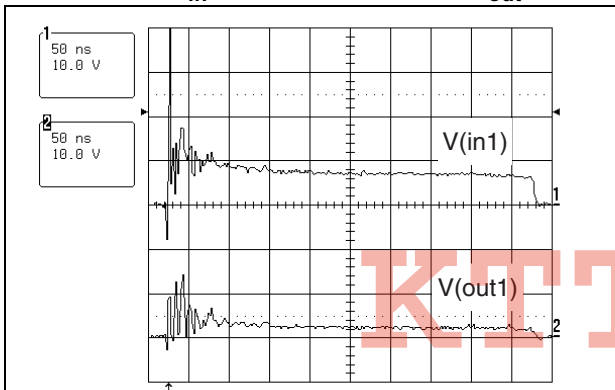


Figure 6. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one input ( $V_{in}$ ) and on one output ( $V_{out}$ )

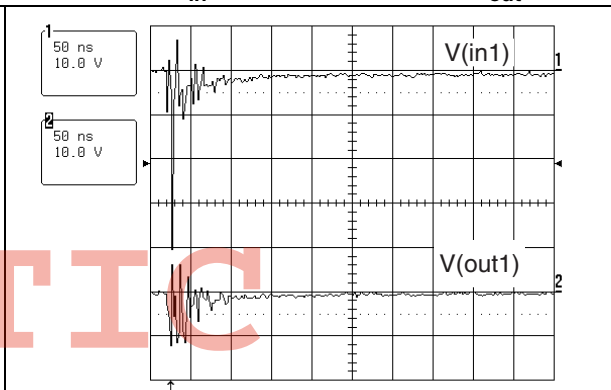
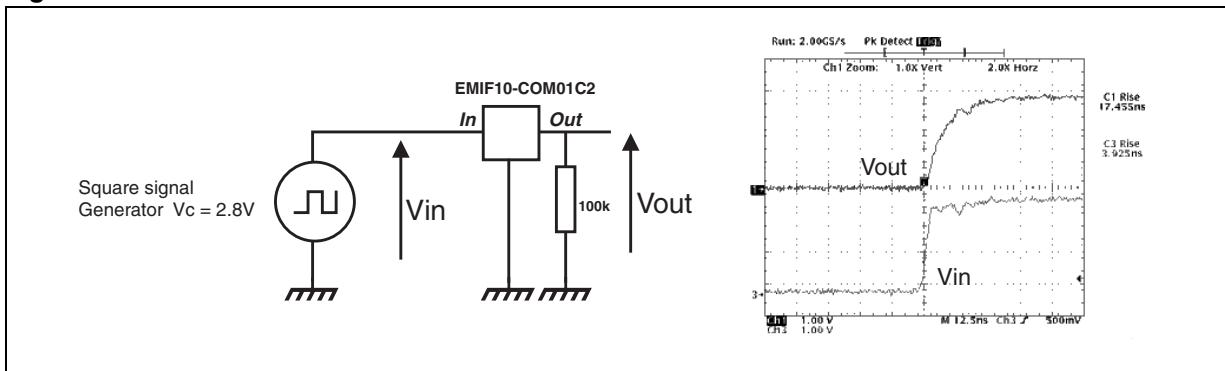
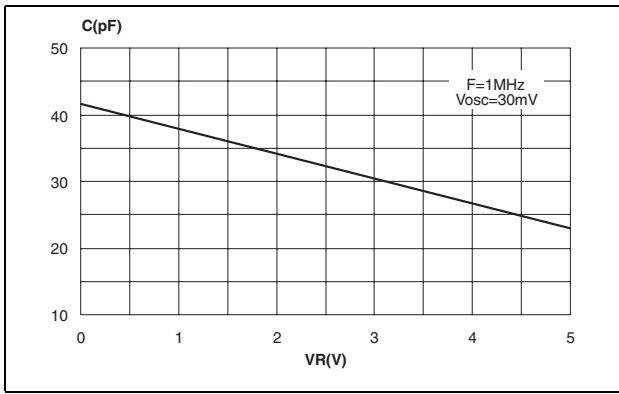


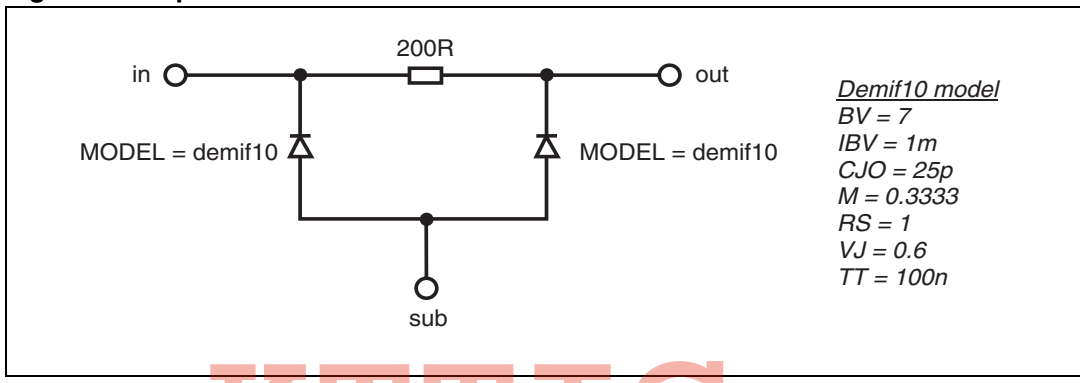
Figure 7. Rise time measurement



**Figure 8. Capacitance versus reverse applied voltage**



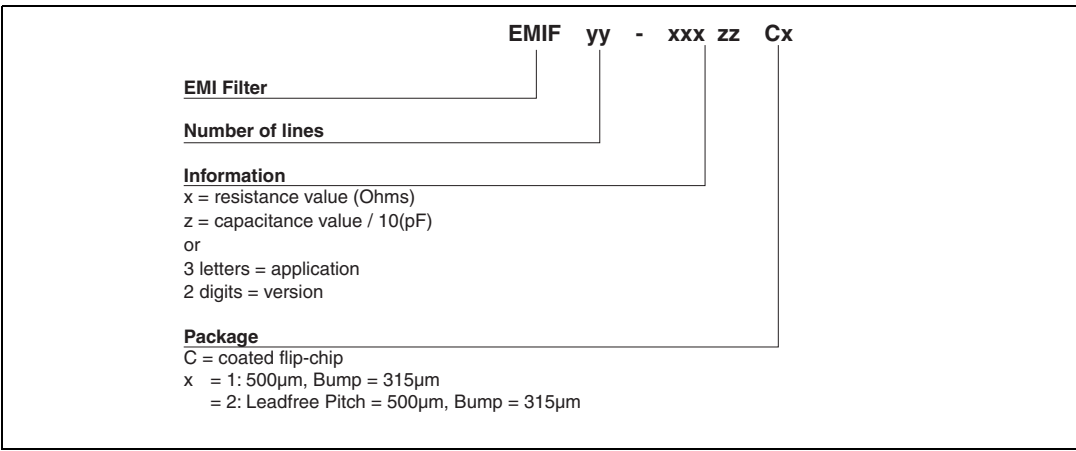
**Figure 9. Aplac model**



### 1.1 PCB grounding recommendations

In order to ensure a good efficiency in terms of ESD protection and filtering behavior, we recommend to implement microvias (100 µm 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 µm 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.

## 2 Ordering Information Scheme



## 3 Package information

Figure 10. Flip-Chip package dimensions

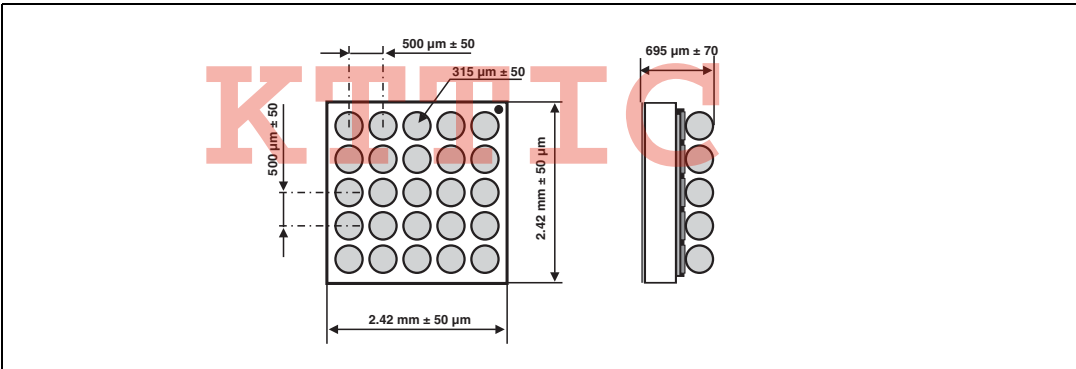


Figure 11. Foot print recommendations      Figure 12. Marking

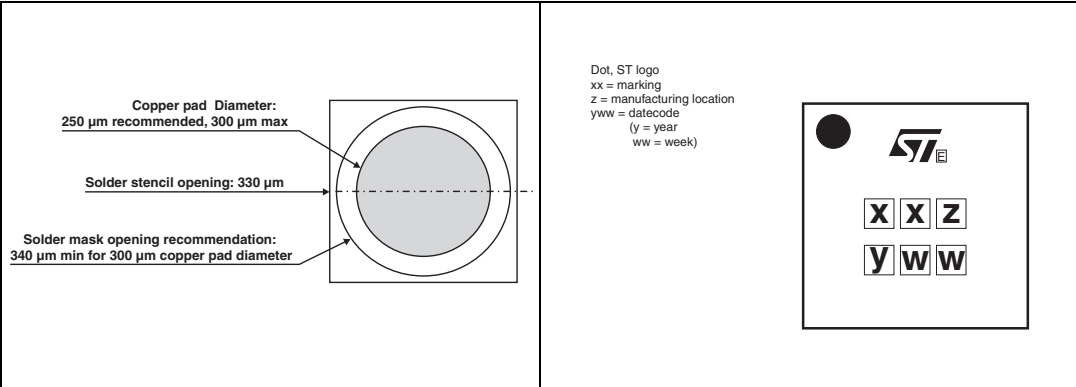
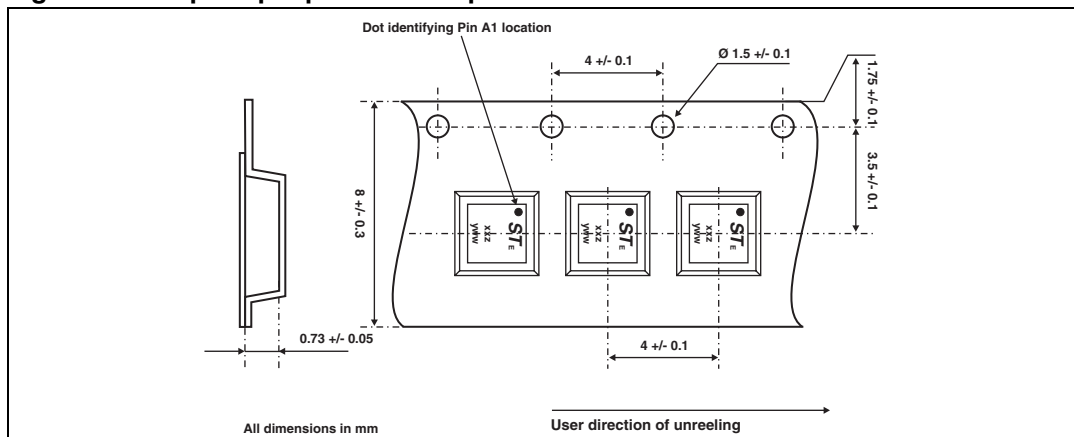


Figure 13. Flip-Chip tape and reel specification



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 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](http://www.st.com).

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

## 4 Ordering information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF10-COM01C2	FE	Flip-Chip	8.3 mg	5000	Tape and reel

## 5 Revision history

Date	Revision	Description of Changes
12-Jul-2005	1	First issue.
12-Aug-2005	2	Lead free added in Benefits on page 1. ECOPACK statement added on page 6.
27-Jan-2006	3	Improved graphics to show coating. Updated attenuation measurement graphic (Figure 3). Weight corrected.
04-Apr-2006	4	Reformatted to current standard. Pin identification in Figure 1 updated.

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