

## Single line IPAD™, EMI filter including ESD protection

### Features

- High density capacitor
- 1 line low-pass-filter
- Lead-free package
- High efficiency in EMI filtering
- Very low PCB space consumption
- Very thin package: 0.65 mm
- High efficiency in ESD suppression (IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration
- High density capacitor technology

### Complies with the following standards

- IEC 61000-4-2 level 4, on output pins
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- IEC 61000-4-2 Level 1, on input pins
  - 2 kV (air and contact discharge)

### Application

- Single ended microphone in mobile phones and portable devices

### Description

The EMIF01-SMIC01F2 is a highly integrated device designed to suppress EMI/RFI noise for microphone line filtering.

The EMIF01-SMIC01F2 Flip Chip packaging means the package size is equal to the die size. That is why EMIF01-SMIC01F2 is a very small device.

Additionally, this filter includes ESD protection circuitry which prevents damage to the application when subjected to ESD surges up to 15 kV.

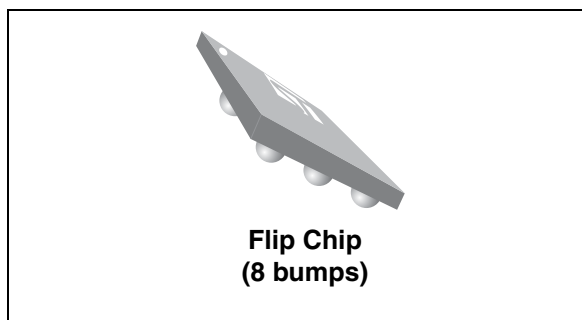


Figure 1. Pin configuration (bump side)

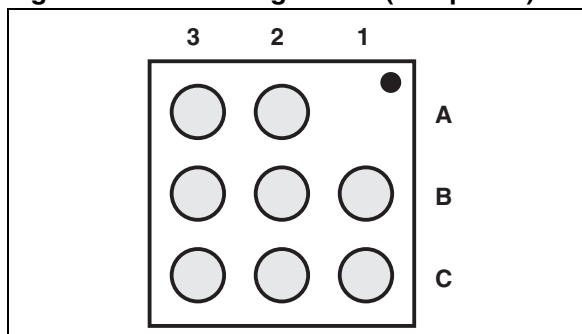
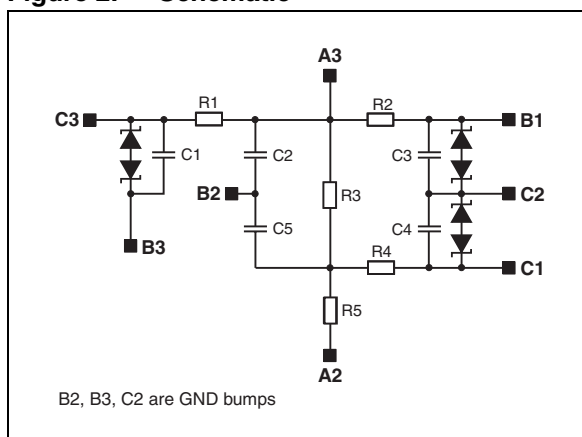


Figure 2. Schematic



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# 1 Characteristics

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

Symbol	Parameter and test conditions	Value	Unit
$V_{PP}$	Output lines (C3) ESD discharge IEC61000-4-2, air discharge	15	kV
	ESD discharge IEC61000-4-2, contact discharge	8	
	Input lines (A3, A2, B1, C1) ESD discharge IEC61000-4-2, air discharge	2	
	ESD discharge IEC61000-4-2, contact discharge	2	
$T_j$	Maximum 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				
Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{BR}$	$I_R = 1\text{ mA}$	14			V
$I_{RM}$	$V_{RM} = 3\text{ V per line}$			0.5	$\mu\text{A}$
$C_1, C_2, C_3, C_4,$	$V_{LINE} = 0\text{ V}, V_{OSC} = 30\text{ mV}, F = 1\text{ MHz},$ Tolerance $\pm 20\%$		1		nF
$C_5$	$V_{LINE} = 0\text{ V}, V_{OSC} = 30\text{ mV}, F = 1\text{ MHz},$ Tolerance $\pm 20\%$		150		pF
$R_1, R_5$	Tolerance $\pm 5\%$		50		$\Omega$
$R_2, R_3, R_4$	Tolerance $\pm 5\%$		2.2		k $\Omega$

Figure 3. Filtering measurements

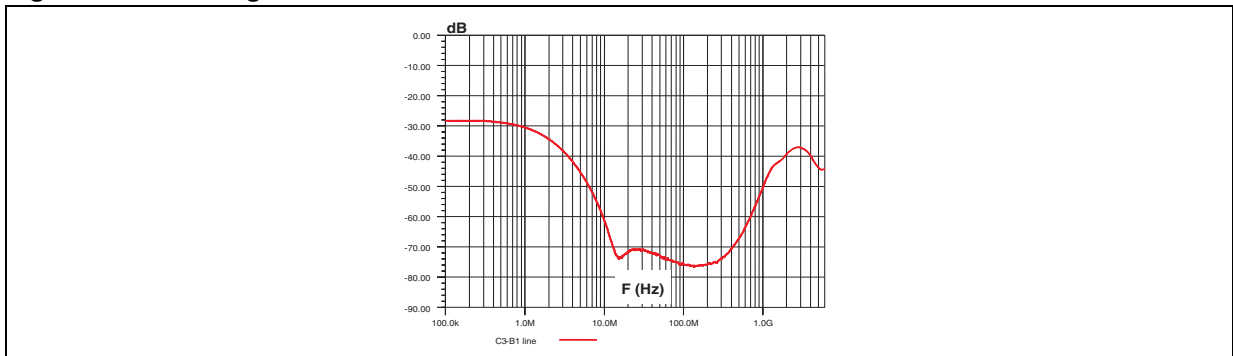


Figure 4. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one output line

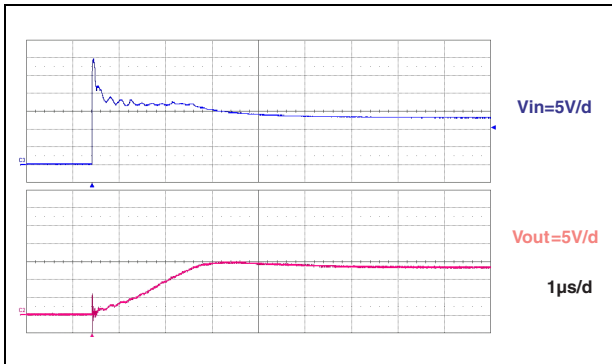
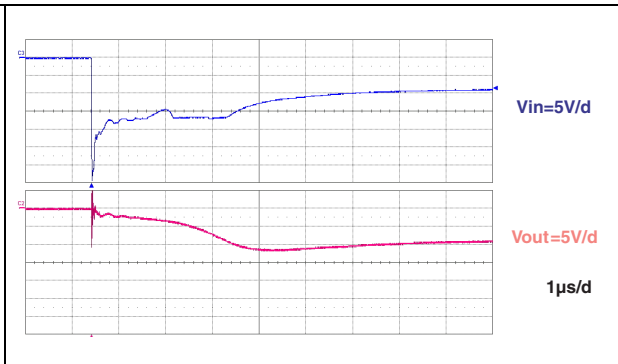
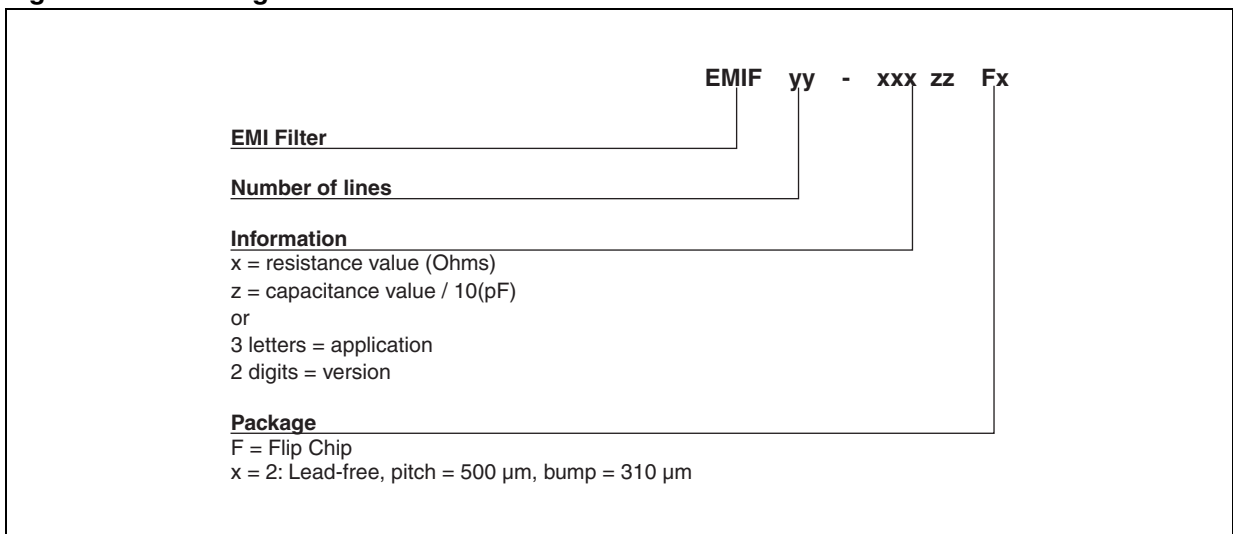


Figure 5. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one output line



## 2 Ordering information scheme

Figure 6. Ordering information scheme



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

Figure 7. Flip Chip dimensions

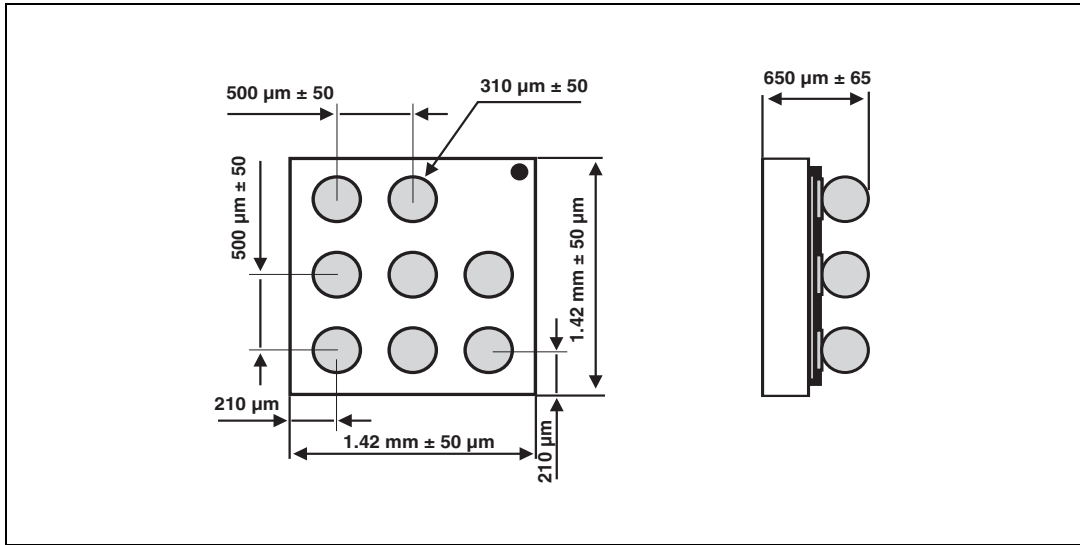


Figure 8. Flip Chip footprint

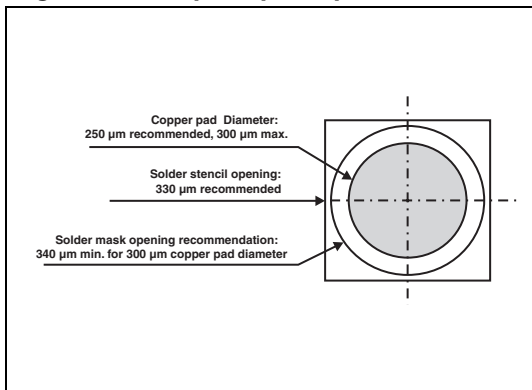


Figure 9. Marking

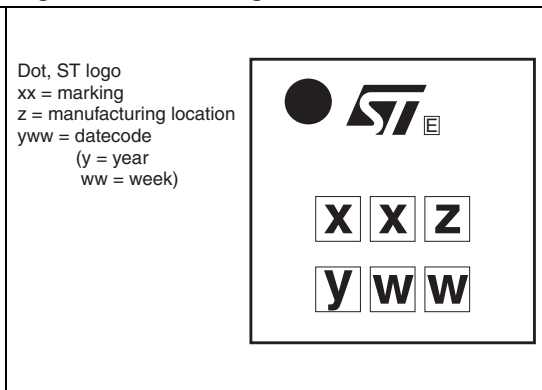
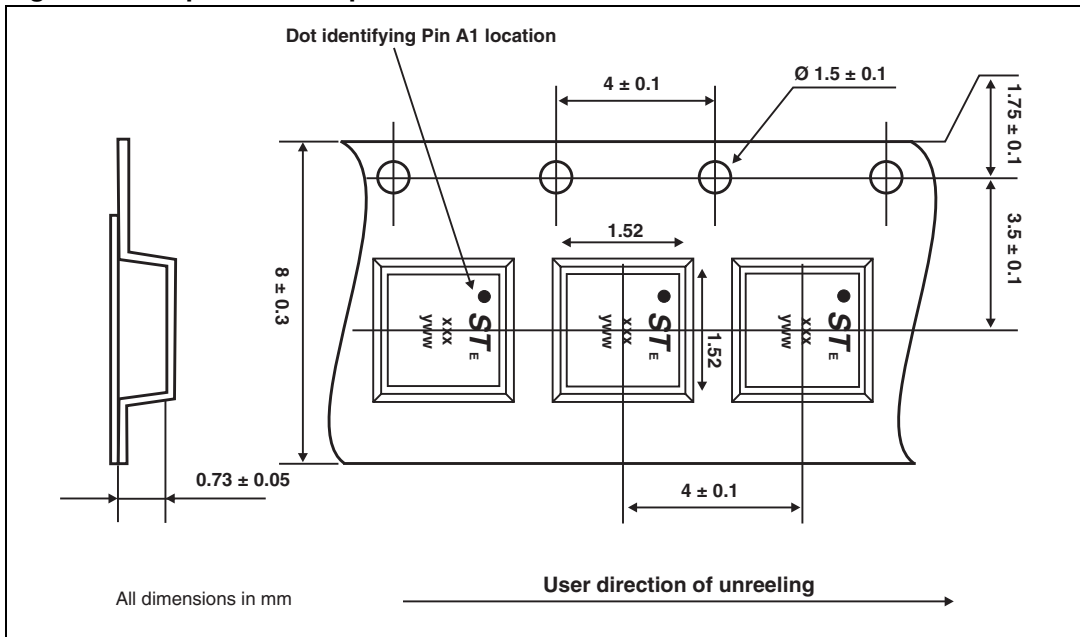


Figure 10. Tape and reel specification



Note: More packing information is available in the application notes:  
 AN1235: "Flip Chip: Package description and recommendations for use"  
 AN1751: "EMI Filters: Recommendations and measurements"

## 4 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF01-SMIC01F2	GA	Flip Chip	2.8 mg	5000	Tape and reel 7"

## 5 Revision history

Table 4. Document revision history

Date	Revision	Changes
03-Oct-2006	1	Initial release
24-Apr-2008	2	Updated values of capacitors in Table 2. C <sub>1</sub> , C <sub>2</sub> , C <sub>3</sub> , C <sub>4</sub> from 0.85 nF to 1 nF, and C <sub>5</sub> from 140 pF to 150 pF. Updated ECOPACK statement. Updated <a href="#">Figure 7</a> , and <a href="#">Figure 10</a> . Reformatted to current standards.

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