

## 2-line IPAD™, EMI filter including ESD protection

### Features

- 2-line symmetrical low-pass filter
- Lead-free package
- High-density capacitor
- High-efficiency EMI filtering
- Very small PCB footprint: 1.42 mm x 1.92 mm
- Very thin package: 0.65 mm
- High-efficiency ESD suppression (IEC 61000-4-2 level 4)
- High reliability offered by monolithic integration

### Complies with the standards:

- IEC61000-4-2 Level 4 on inputs and outputs
  - 15 kV (air discharge)
  - 8 kV (contact discharge)

### Application

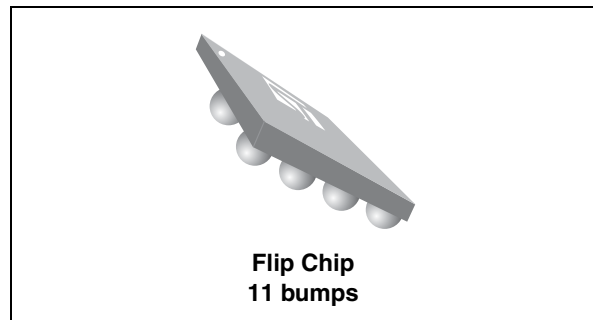
- Mobile phones (differential microphone filtering and ESD protection).

### Description

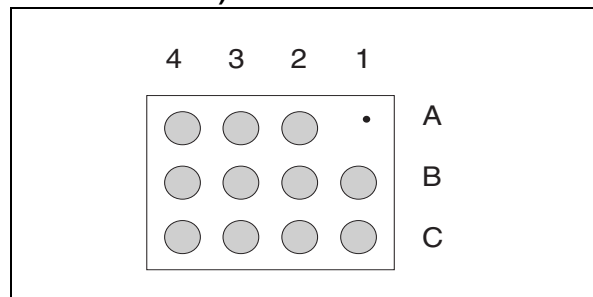
The EMIF02-MIC01F2 is a highly integrated device designed to suppress EMI / RFI noise for microphone line filtering.

The EMIF02-MIC01F2 Flip Chip packaging means the package size is equal to the die size. This is why the EMIF02-MIC01F2 is a very small device.

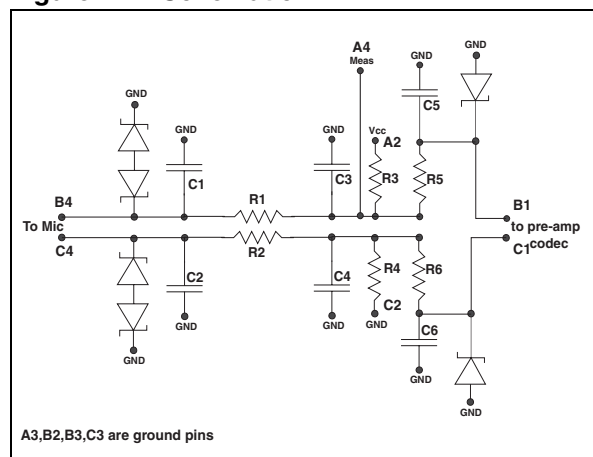
Additionally, the filter includes an ESD protection circuit to prevent damage to the protected device when subjected to ESD surges up to 15 kV.



**Figure 1. Pin configuration (bump side view)**



**Figure 2. Schematic**



**TM:** IPAD is a trademark of STMicroelectronics.

# 1 Electrical characteristics

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

Symbol	Parameter	Value	Unit
$V_{PP}$	ESD IEC 61000-4-2, input and output pins - air discharge	15	kV
	ESD IEC 61000-4-2, in put and output pins - 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				
$I_R$					
Symbol	Test condition	Min	Typ	Max	Unit
$V_{BR}$	$I_R = 1\text{ mA per line}$	14		18	V
$I_{RM}$	$V_{RM} = 3\text{ V per line}$			0.5	$\mu\text{A}$
C1, C2, C3 C4, C5, C6	$V_{LINE} = 0\text{ V}, V_{OSC} = 30\text{ mV}, F = 1\text{ MHz}$	0.8	1.0	1.2	nF
R1, R2	Tolerance $\pm 5\%$		50		$\Omega$
R3, R4	Tolerance $\pm 5\%$		1.00		k $\Omega$
R5, R6	Tolerance $\pm 5\%$		2.20		k $\Omega$

Figure 3. Filter response

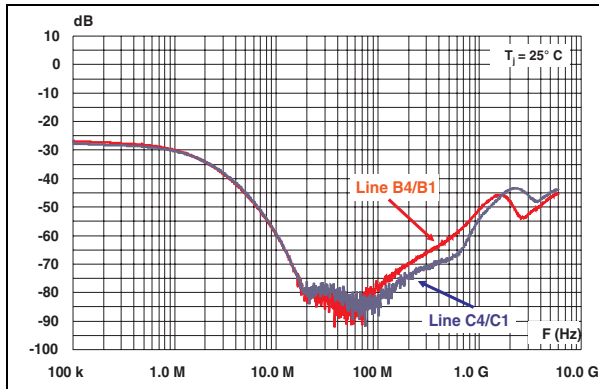


Figure 4. Analog crosstalk

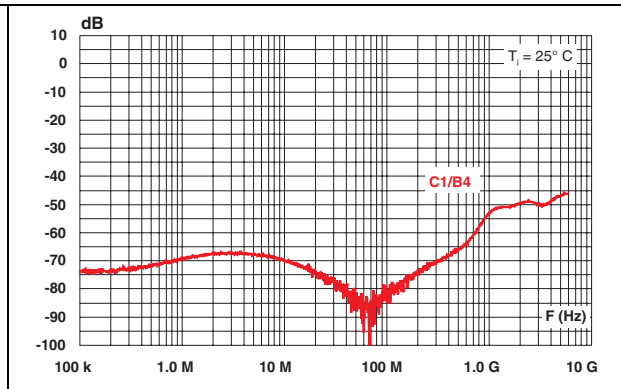


Figure 5. ESD response to IEC 61000-4-2 (+15 kV air discharge) on output (V<sub>OUT</sub>)

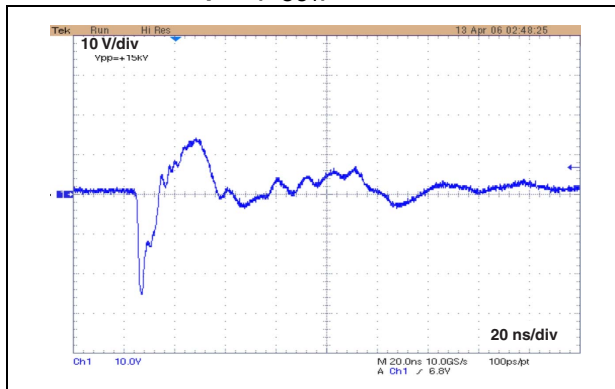
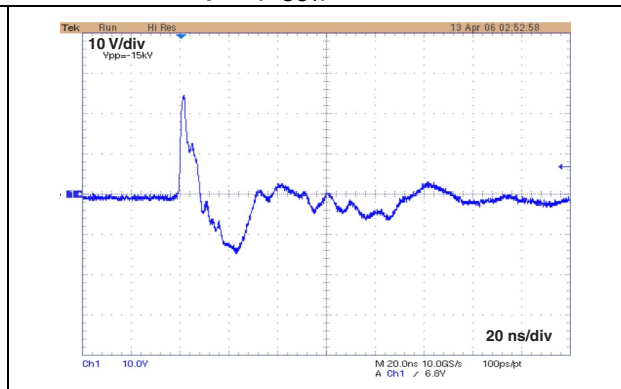
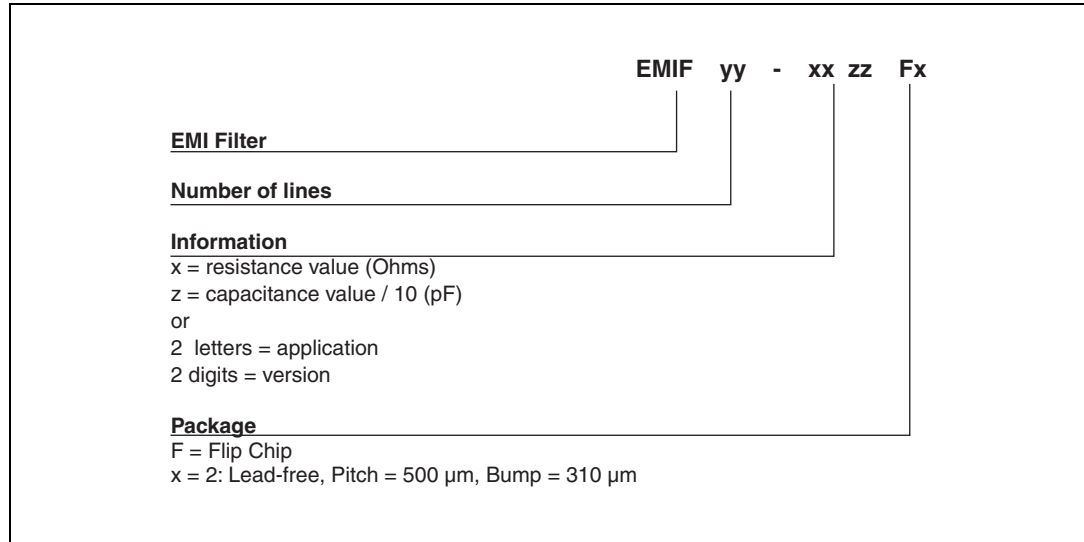


Figure 6. ESD response to IEC 61000-4-2 (-15 kV air discharge) on output (V<sub>OUT</sub>)



## 2 Ordering information scheme

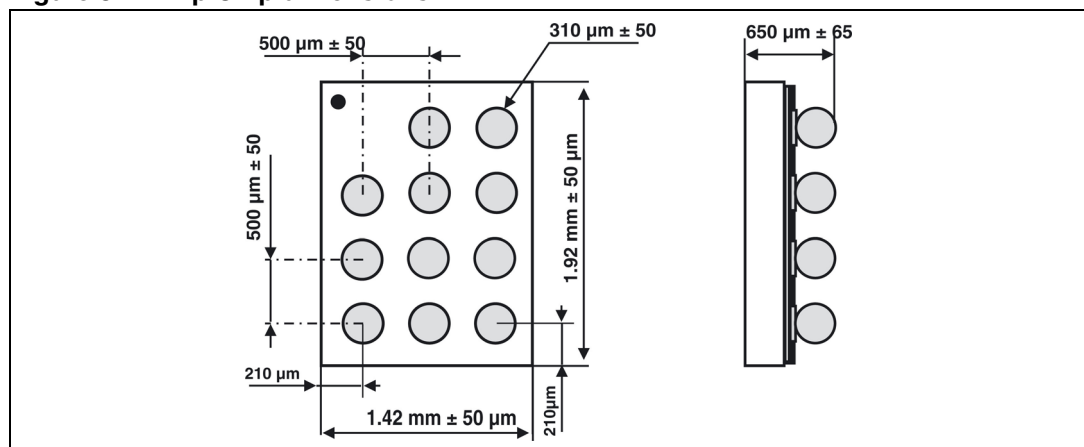
Figure 7. Ordering information scheme



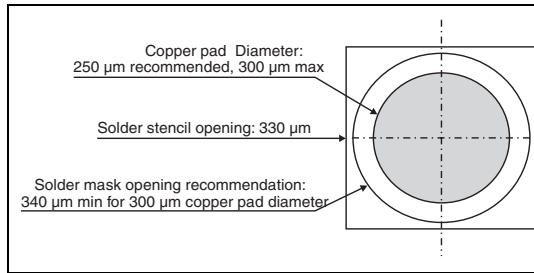
## 3 Package information

In order to meet environmental requirements, ST offers these devices in ECOPACK<sup>®</sup> 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).

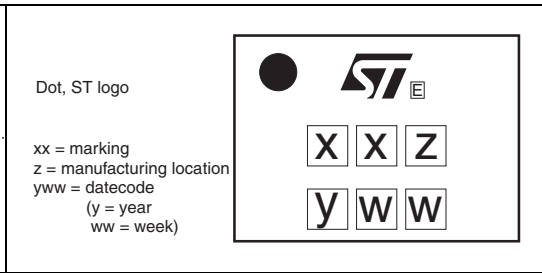
Figure 8. Flip Chip dimensions



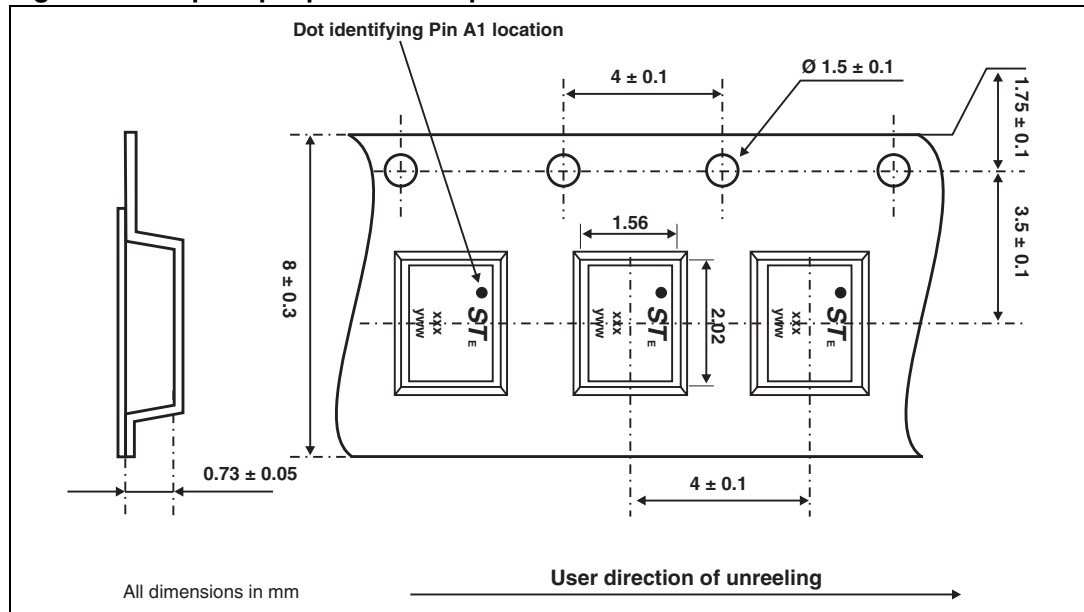
**Figure 9. Footprint**



**Figure 10. Marking**



**Figure 11. Flip Chip tape and reel specification**



## 4 Ordering information

**Table 3. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-MIC01F2	GB	Flip Chip	3.8 mg	5000	Tape and reel (7")

Note: More packing information is available in the application notes:  
 AN1235: "Flip Chip: package description and recommendations for use"  
 AN 1751: "EMI filters: Recommendations and measurements"

## 5 Revision history

**Table 4. Document revision history**

Date	Revision	Changes
Sep-2004	3	Previous issue.
09-Feb-2006	4	Added ECOPACK statement. Updated graphics to current standards.
06-Oct-2006	5	Reformatted to current standards. Updated characteristic curves, removed Aplac information and updated tape and reel pocket dimensions.
17-Apr-2008	6	Updated ECOPACK statement. Updated <a href="#">Figure 7</a> , <a href="#">Figure 8</a> and <a href="#">Figure 11</a> . Reformatted to current standards.

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