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# EMIF01-SMIC01F2

## 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 consumtion
- 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

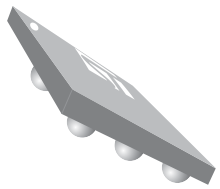
- Single ended microphone in mobile phones and portable devices

## 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 appication when subjected to ESD surges up to 15 kV.



**Flip Chip**
**(8 bumps)**

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

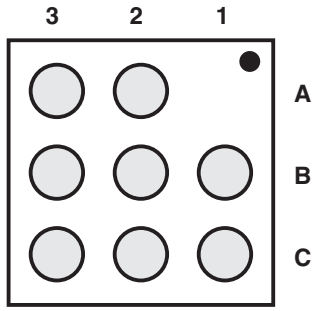
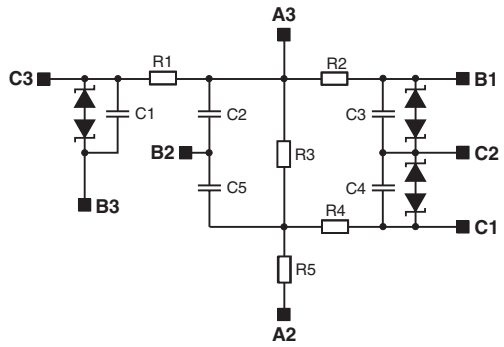



**Figure 2. Schematic**




TM: IPAD is a trademark of STMicroelectronics

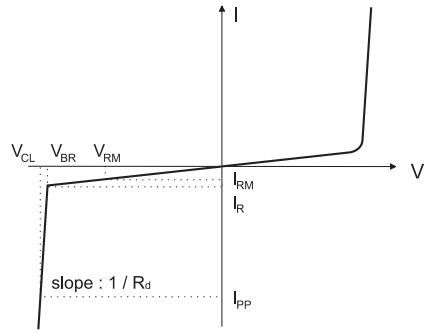
# 1 Characteristics

**Table 1. Absolute maximum matings ($T_{amb}$ = 25 °C)**

| Symbol | Parameter and test conditions | Value | Unit |
|---|---|---|---|
| $V_{PP}$ | Output lines (C3)<br>ESD discharge IEC61000-4-2, air discharge<br>ESD discharge IEC61000-4-2, contact discharge<br><br>Input lines (A3, A2, B1, C1)<br>ESD discharge IEC61000-4-2, air discharge<br>ESD discharge IEC61000-4-2, contact discharg | <br>15<br>8<br><br><br>2<br>2 | kV |
| $T_j$ | Maximum junction temperature | 125 | °C |
| $T_{op}$ | Operating temperature range | - 40 to + 85 | °C |
| $T_{stg}$ | Storage temperature range | - 55 to + 150 | °C |

**Table 2. 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 |




| Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{BR}$ | $I_R$ = 1 mA | 14 | | | V |
| $I_{RM}$ | $V_{RM}$ = 3 V per line | | | 0.5 | µA |
| $C_1$, $C_2$, $C_3$, $C_4$, | $V_{LINE}$ = 0 V, $V_{OSC}$ = 30 mV, F = 1 MHz, Tolerance ± 20% | | 1 | | nF |
| $C_5$ | $V_{LINE}$ = 0 V, $V_{OSC}$ = 30 mV, F = 1 MHz, Tolerance ± 20% | | 150 | | pF |
| $R_1$, $R_5$ | Tolerance ± 5% | | 50 | | Ω |
| $R_2$, $R_3$, $R_4$ | Tolerance ± 5% | | 2.2 | | kΩ |

**Figure 3. Filtering measurements**

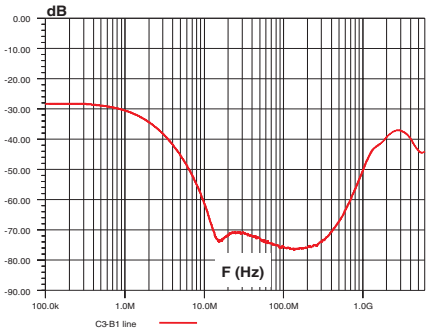



**Figure 4. ESD response to IEC 61000-4-2 (+15 kV air discharge) on one output line**

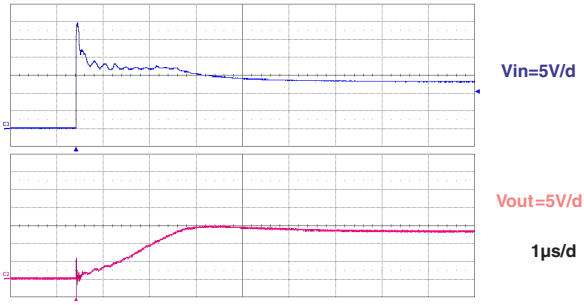
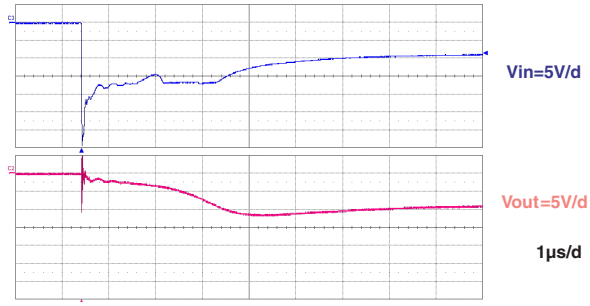



**Figure 5. ESD response to IEC 61000-4-2 (-15 kV air discharge) on one output line**




# 2 Ordering information scheme

**Figure 6. Ordering information scheme**

**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 = 2: Lead-free, pitch = 500 µm, bump = 310 µm

# 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*.

**Figure 7. Flip Chip dimensions**

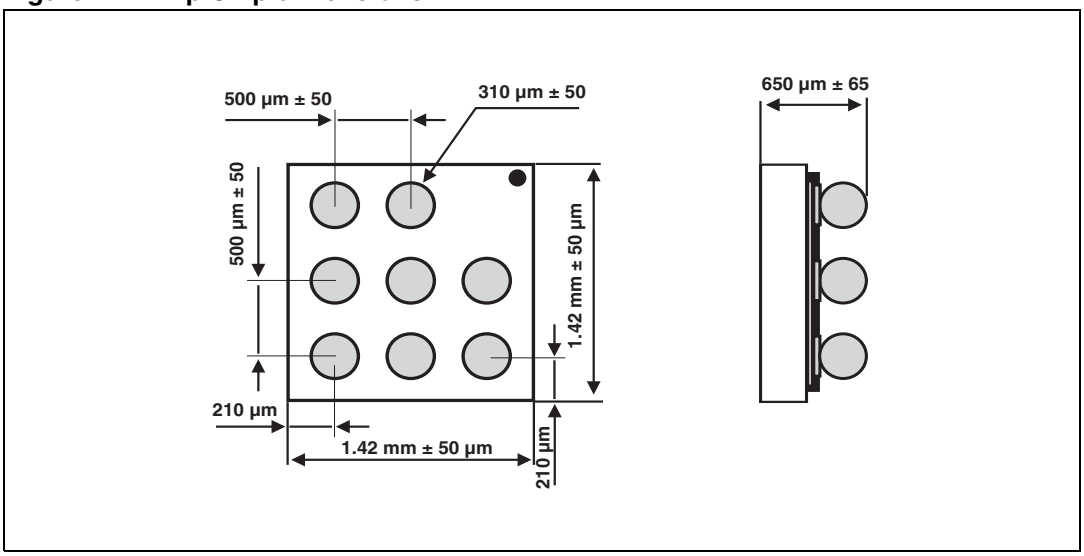



**Figure 8. Flip Chip footprint**

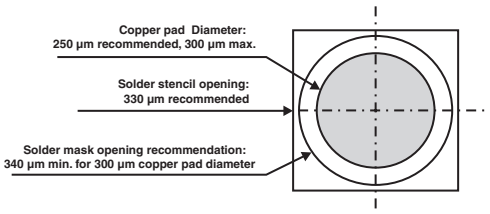



**Figure 9. Marking**

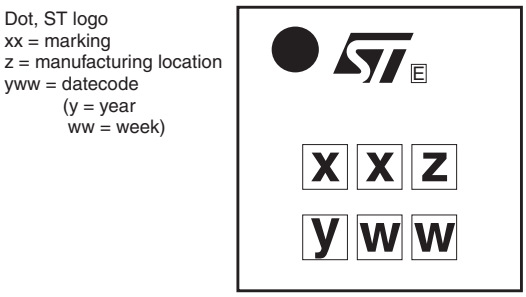
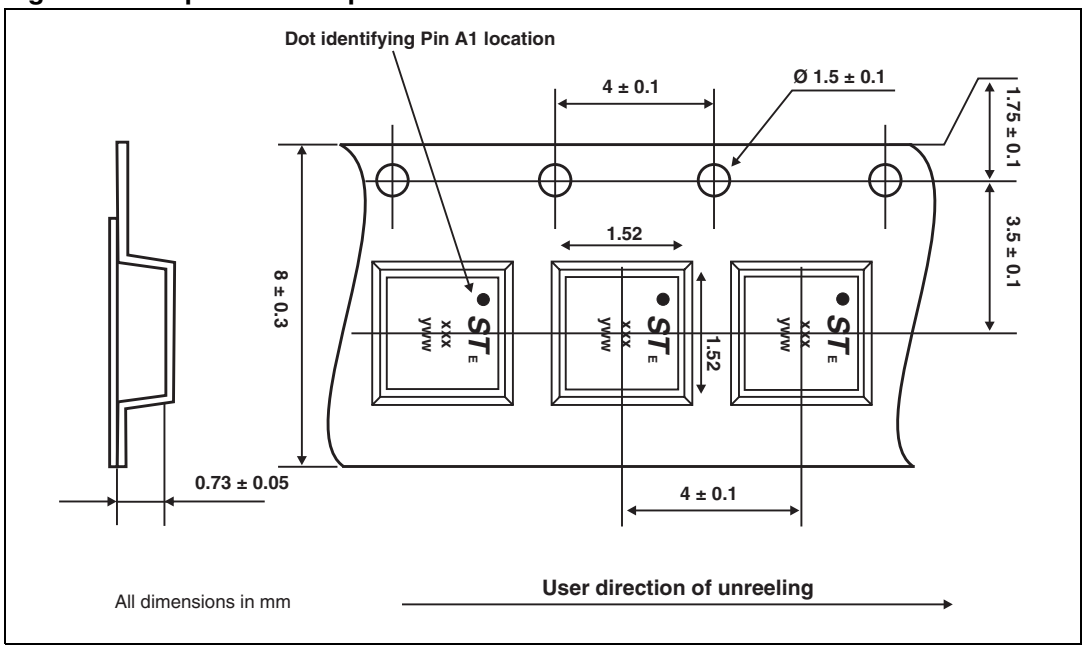


**Figure 10. Tape and reel specification**




*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. $C_1$, $C_2$, $C_3$, $C_4$ from 0.85 nF to 1 nF, and $C_5$ from 140 pF to 150 pF. Updated ECOPACK statement. Updated *Figure 7*, and *Figure 10*. Reformatted to current standards. |

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