

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

Datasheet – production data

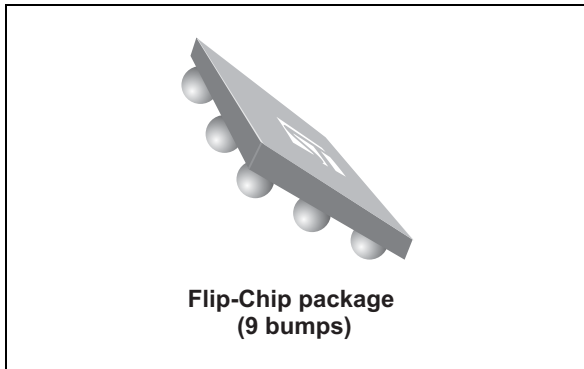


Figure 1. Pin configuration (bump side)

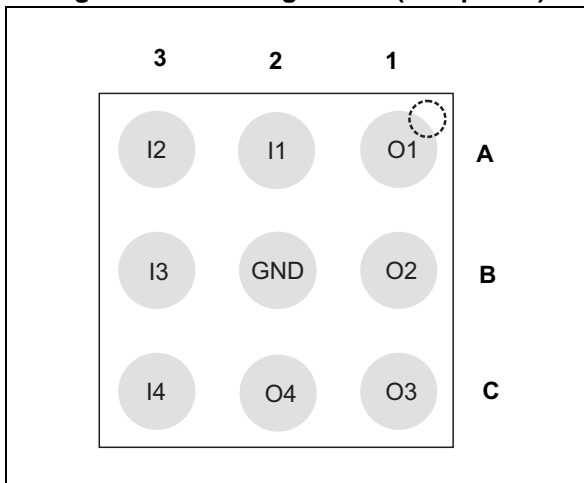
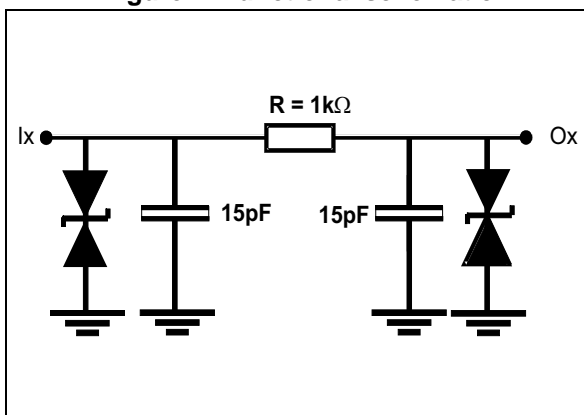


Figure 2. Functional schematic



### Features

- 4-line EMI symmetrical (I/O) low-pass filter
- High efficiency in ESD suppression on input pins (IEC 61000-4-2 level 4)
- Very low PCB space consumption
- Very thin package
- High efficiency in EMI filtering
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging
- Lead-free package

### Complies with the following standards:

- IEC 61000-4-2 level 4
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)

### Application

Where EMI filtering in ESD sensitive equipment is required:

- Mobile phones and communication systems
- Computers, printers and MCU boards

### Description

The EMIF04-1K030F3 chip is a highly integrated device designed to suppress EMI/RFI noise for interface line filtering.

The EMIF04-1K030F3 is 4-line, ultra compact, high attenuation filter available in 0.4 mm pitch WLCSP package. Additionally, this filter includes ESD protection circuitry, which prevents damage to the protected device when subjected to ESD surges up to 20 kV.

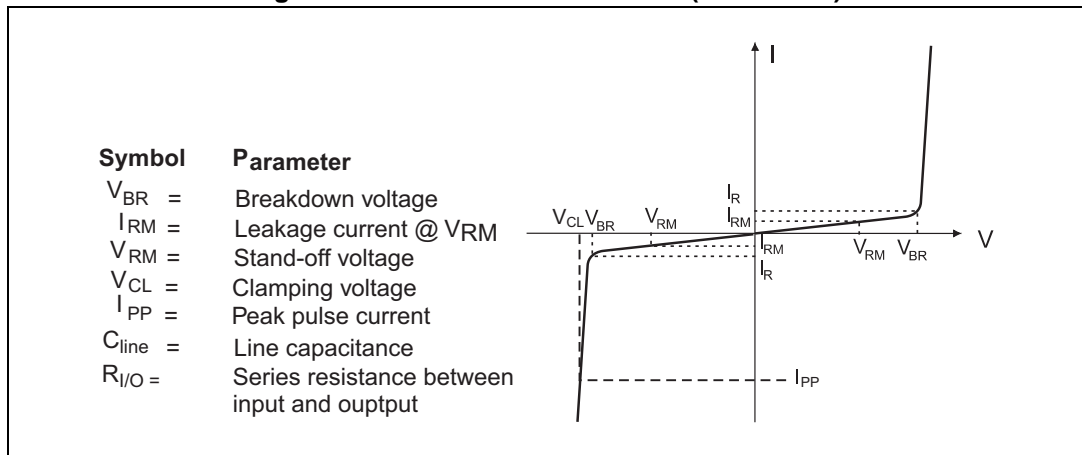
TM: IPAD is a trademark of STMicroelectronics.

# 1 Characteristics

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

| Symbol    | Parameter                             | Value        | Unit               |
|-----------|---------------------------------------|--------------|--------------------|
| $V_{PP}$  | ESD discharge IEC 61000-4-2, level 4: |              |                    |
|           | Air discharge                         | 30           | kV                 |
|           | Contact discharge                     | 20           |                    |
| $T_j$     | 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 | $^{\circ}\text{C}$ |

**Figure 3. Electrical characteristics (definitions)**



**Table 2. Electrical characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

| Symbol     | Test conditions   | Min. | Typ. | Max. | Unit       |
|------------|---|------|------|------|------------|
| $I_{RM}$   | $V_{RM} = 5\text{ V}$ per line  |      |      | 300  | nA         |
| $V_{BR}$   | $I_R = 1\text{ mA}$   | 6    |      |      | V          |
| $R_{I/O}$  |   |      | 1    |      | k $\Omega$ |
| $C_{line}$ | $V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$ |      | 24   | 30   | pF         |

Figure 4. Attenuation versus frequency

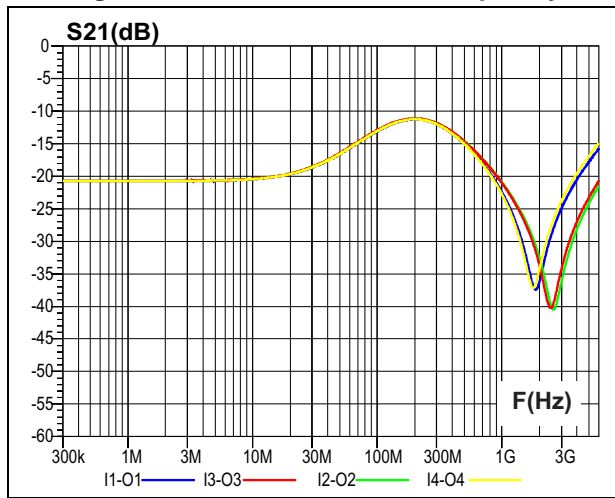


Figure 5. Analog crosstalk versus frequency

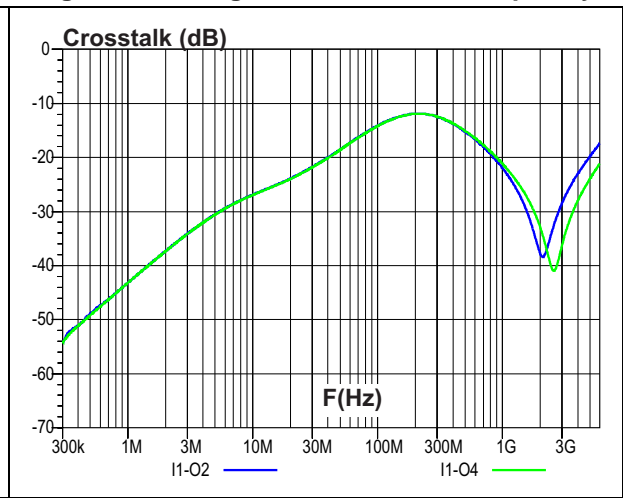


Figure 6. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

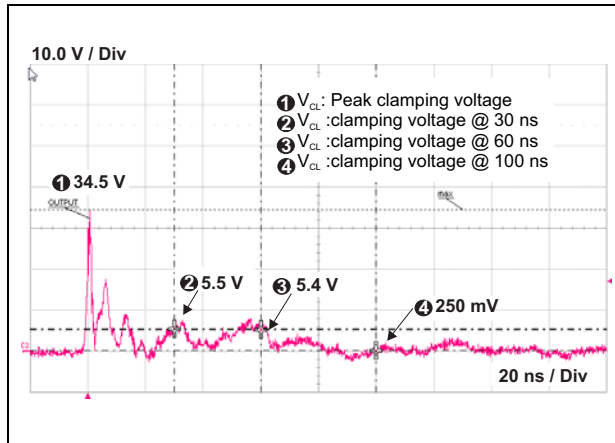


Figure 7. ESD response to IEC 61000-4-2 (-8 kV contact discharge)

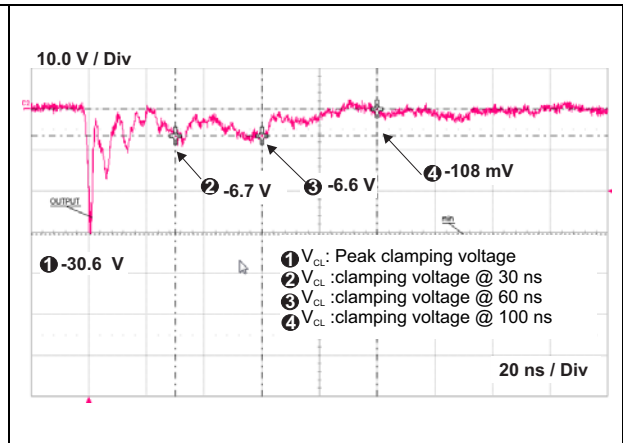


Figure 8. Digital crosstalk

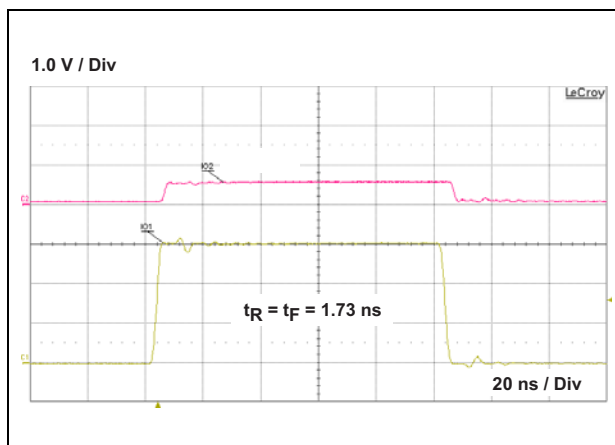


Figure 9. Clamping voltage versus peak pulse current (typical values)

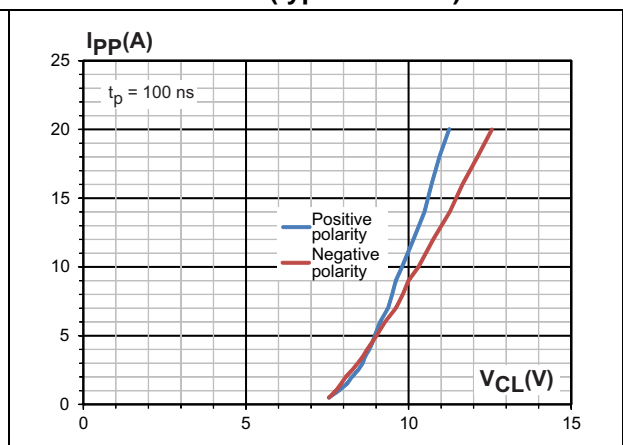
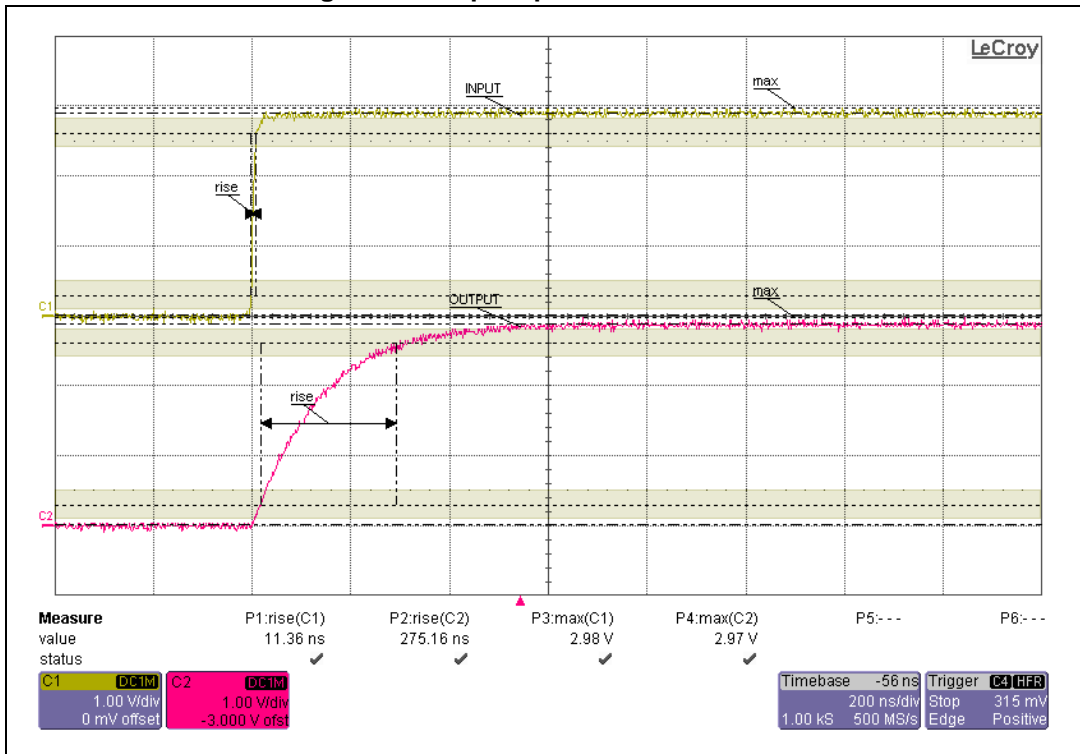


Figure 10. Step response measurement



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

Figure 11. Flip-Chip package dimensions

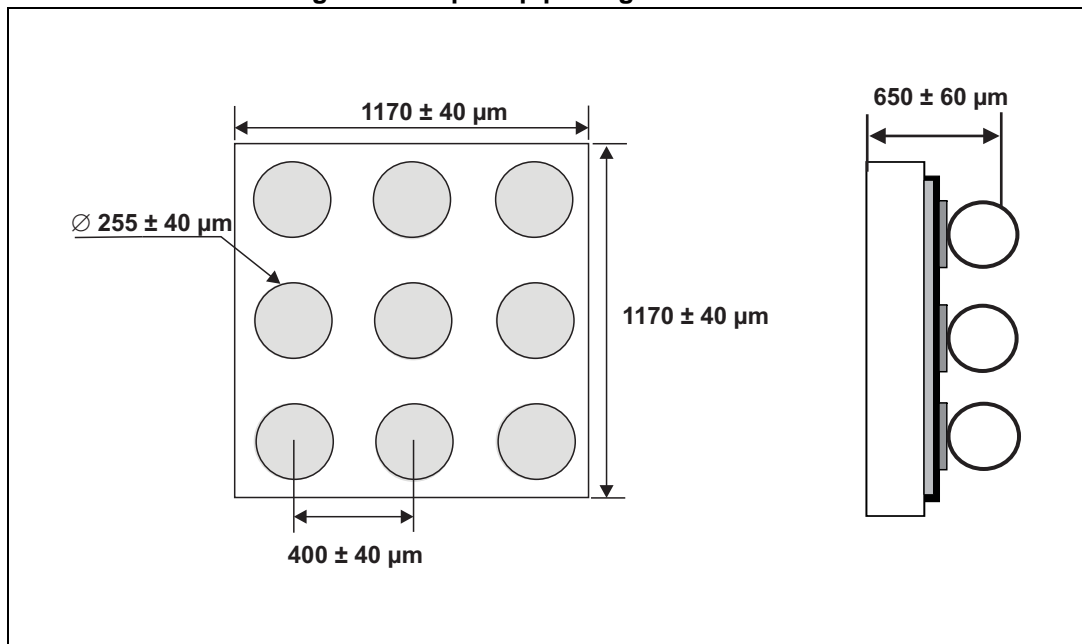


Figure 12. Footprint recommendations

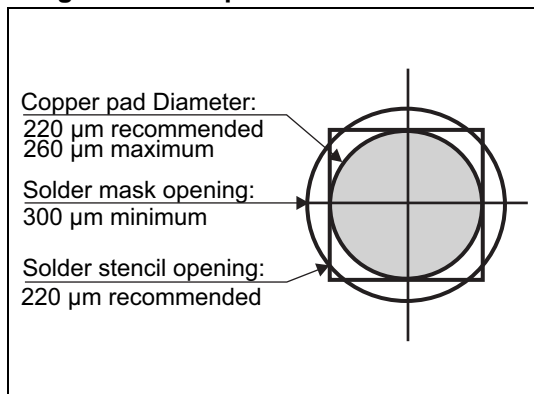


Figure 13. Marking

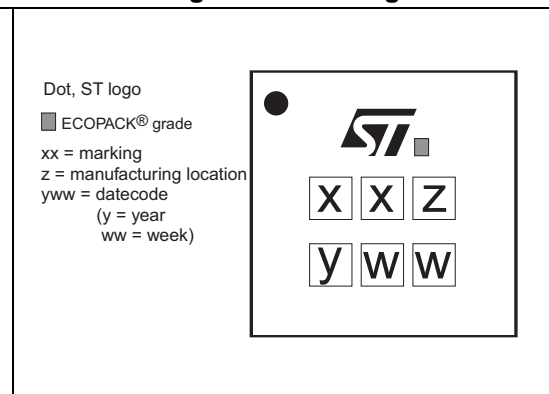
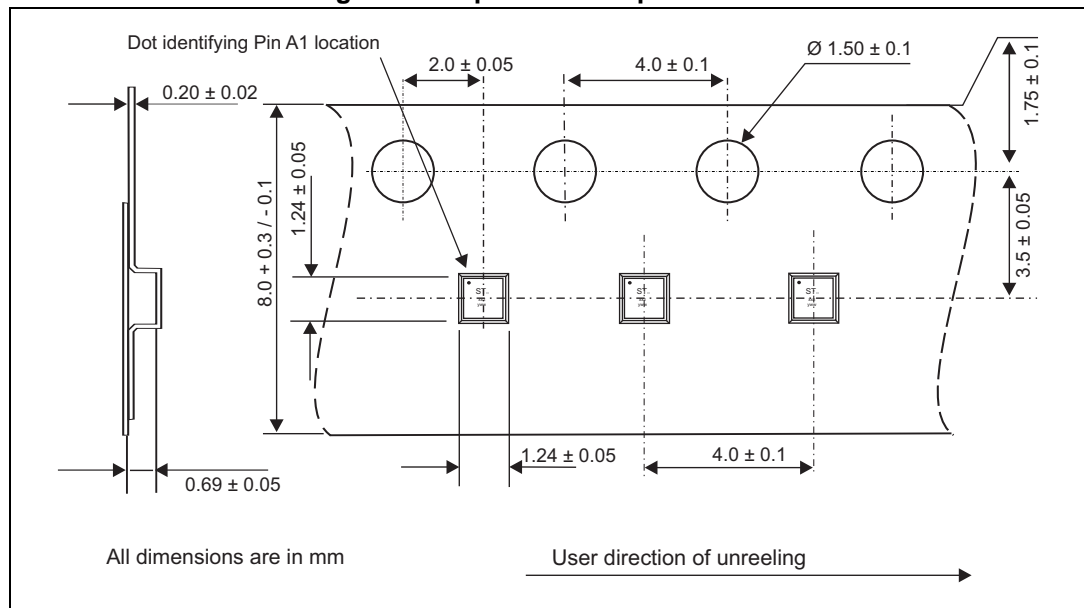


Figure 14. Tape and reel specification



Note: More information is available in the application notes:  
 AN2348, "IPAD™ 400 μm Flip Chip: package description and recommendations for use"  
 AN1751, "EMI filters: recommendations and measurements"

### 3 Ordering information

Figure 15. Ordering information scheme

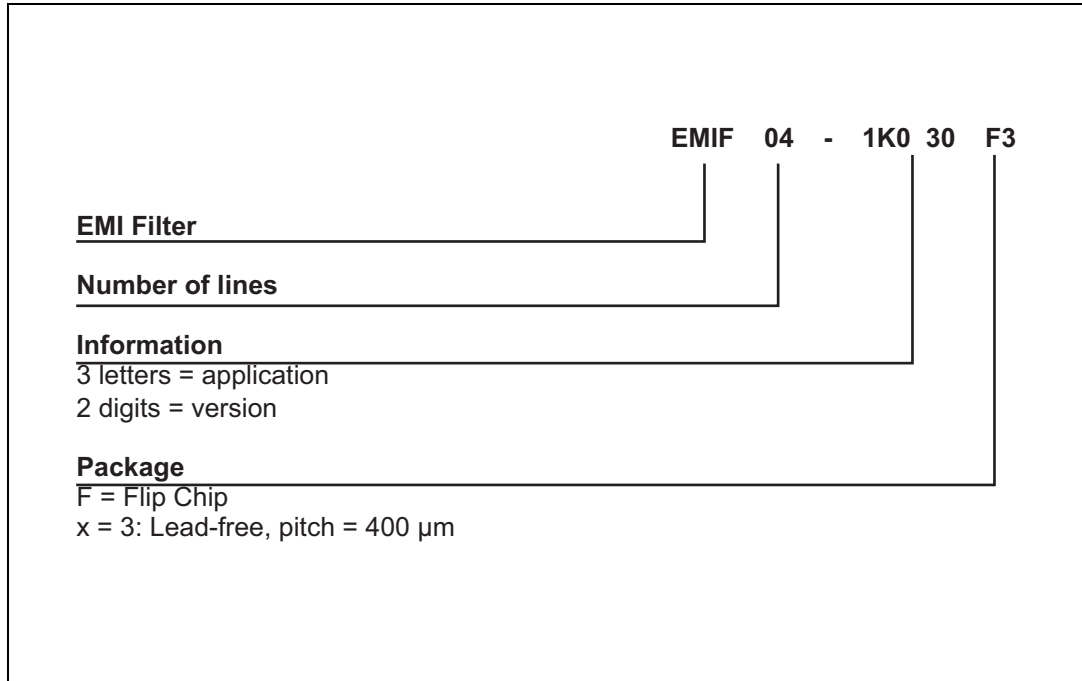


Table 3. Ordering information

| Order code     | Marking | Package   | Weight  | Base qty | Delivery mode      |
|----------------|---------|-----------|---------|----------|--------------------|
| EMIF04-1K030F3 | LC      | Flip Chip | 1.72 mg | 5000     | Tape and reel (7") |

### 4 Revision history

Table 4. Document revision history

| Date        | Revision | Changes         |
|-------------|----------|-----------------|
| 05-Aug-2013 | 1        | Initial release |

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