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## EMIF07-LCD02F3

### 7-line IPAD™, EMI filter and ESD protection for LCD and cameras

#### Features

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Lead-free package
- Very low PCB space occupation:  
1.94 mm x 1.54 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

#### Complies with the following standards

- IEC 61000-4-2 level 4 on inputs and outputs:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G - Method 3015-7 Class 3

#### Applications

Where EMI filtering in ESD sensitive equipment is required:

- LCD for mobile phones
- Computers and printers
- Communication systems
- MCU boards

#### Description

The EMIF07-LCD02F3 is a 7-line highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interference. The EMIF07 Flip Chip package means the package size is equal to the die size.

This filter includes ESD protection circuitry, which prevents damage to the protected device when subjected to ESD surges up 15 kV.

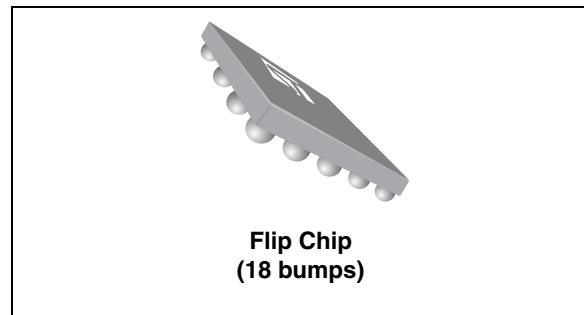


Figure 1. Pin layout (bump side)

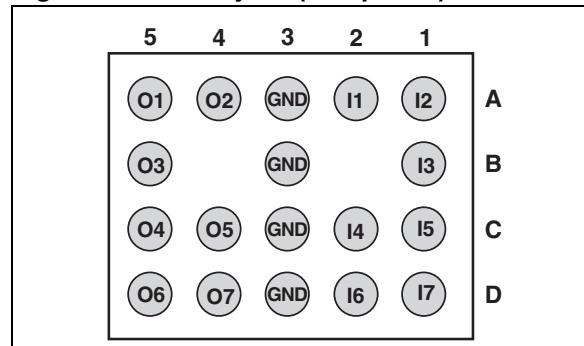
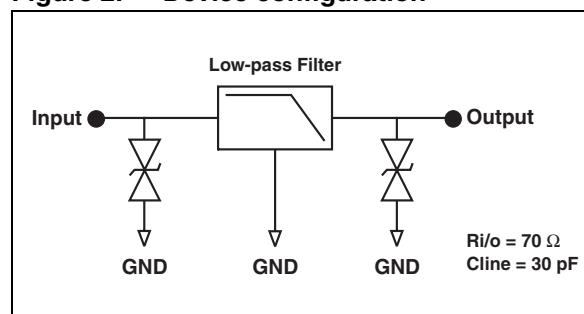


Figure 2. Device configuration



TM: IPAD is a trademark of STMicroelectronics.

## Characteristics

## EMIF07-LCD02F3

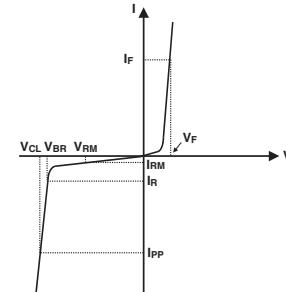
# 1 Characteristics

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

| Symbol    | Parameter and test conditions | Value      | Unit        |
|-----------|-------------------------------|------------|-------------|
| $T_j$     | Maximum junction temperature  | 125        | $^{\circ}C$ |
| $T_{op}$  | Operating temperature range   | -40 to +85 | $^{\circ}C$ |
| $T_{stg}$ | Storage temperature range     | -55 to 150 | $^{\circ}C$ |

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

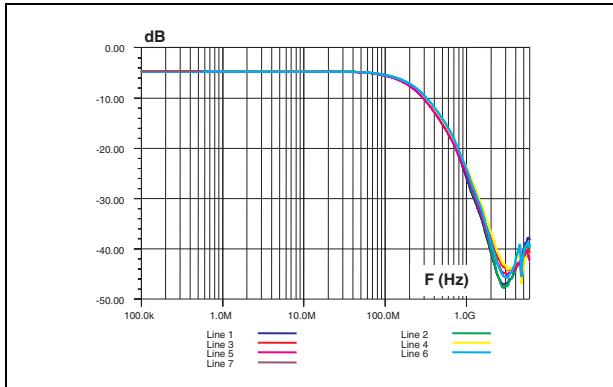
| Symbol     | Parameters                                       |     |     |     |          |  |
|------------|--|-----|-----|-----|----------|--|
| $V_{BR}$   | Breakdown voltage                                |     |     |     |          |  |
| $I_{RM}$   | Leakage current @ $V_{RM}$                       |     |     |     |          |  |
| $V_{RM}$   | Stand-off voltage                                |     |     |     |          |  |
| $V_{CL}$   | Clamping voltage                                 |     |     |     |          |  |
| $I_{PP}$   | Peak pulse current                               |     |     |     |          |  |
| $R_{I/O}$  | Series resistance between input and output       |     |     |     |          |  |
| $C_{line}$ | Input capacitance per line                       |     |     |     |          |  |
| Symbol     | Test conditions                                  | Min | Typ | Max | Unit     |  |
| $V_{BR}$   | $I_R = 1$ mA                                     | 6   | 8   | 10  | V        |  |
| $I_{RM}$   | $V_{RM} = 3$ V                                   |     | 50  | 200 | nA       |  |
| $R_2$      | Tolerance $\pm 20\%$                             |     | 70  |     | $\Omega$ |  |
| $C_{line}$ | $V_{line} = 0$ V, $V_{OSC} = 30$ mV, $F = 1$ MHz |     |     | 30  | pF       |  |



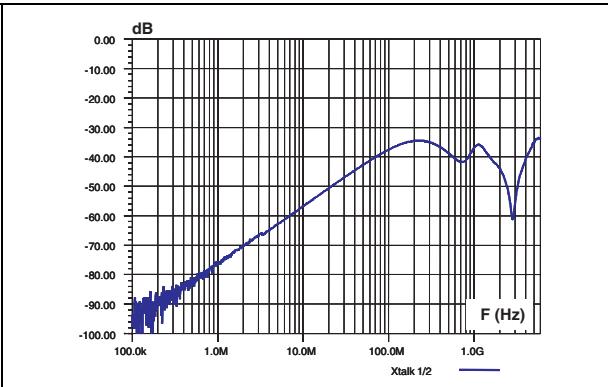
## EMIF07-LCD02F3

## Characteristics

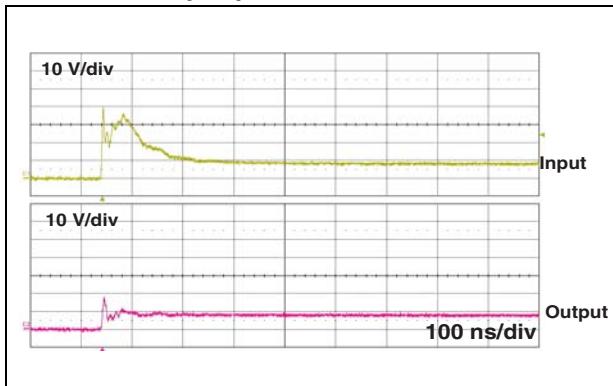
**Figure 3. Attenuation measurement and Aplac simulation**



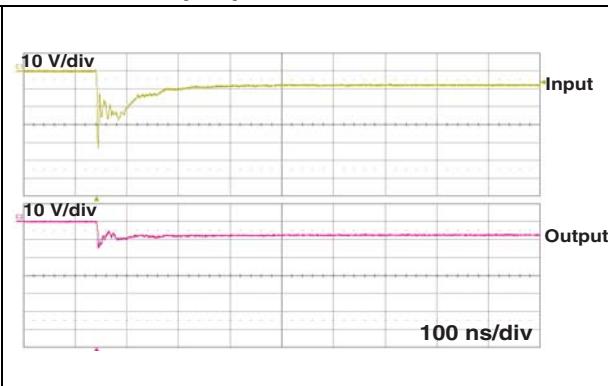
**Figure 4. Analog cross talk measurement**



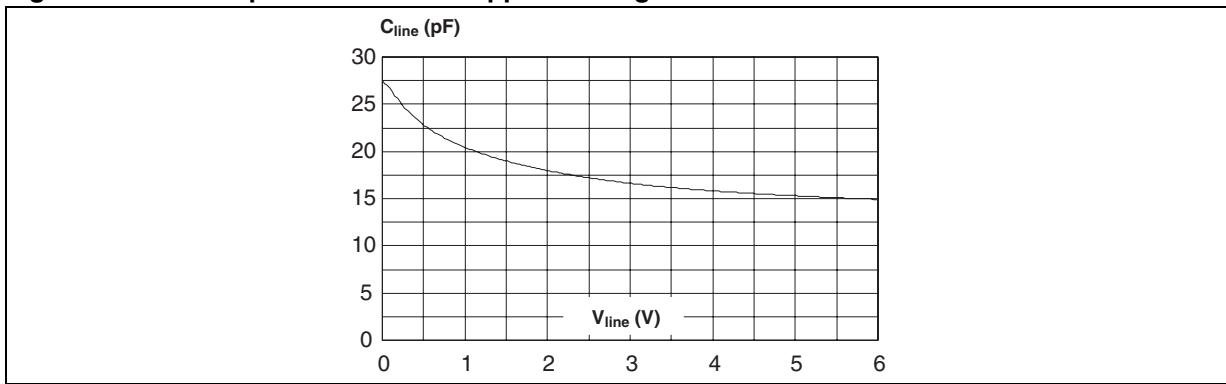
**Figure 5. Voltages when IEC 61000-4-2 (+15 kV air discharge) applied to input pin**



**Figure 6. Voltages when IEC 61000-4-2 (-15 kV air discharge) applied to input pin**



**Figure 7. Line capacitance versus applied voltage**

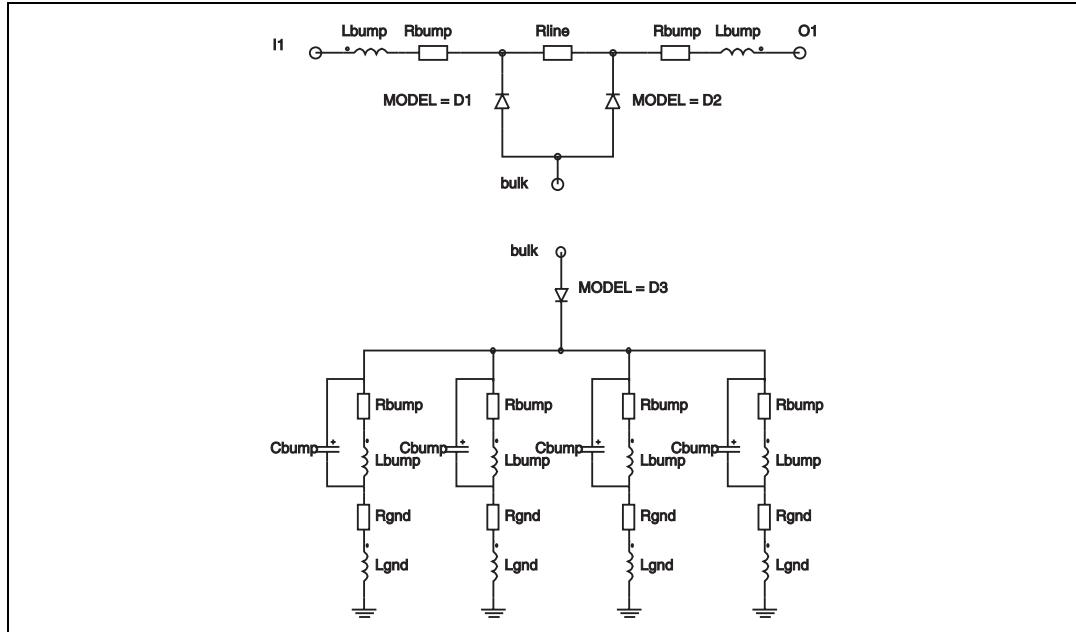


## Application information

## EMIF07-LCD02F3

## 2 Application information

**Figure 8. Aplac model**



**Figure 9. Aplac parameters**

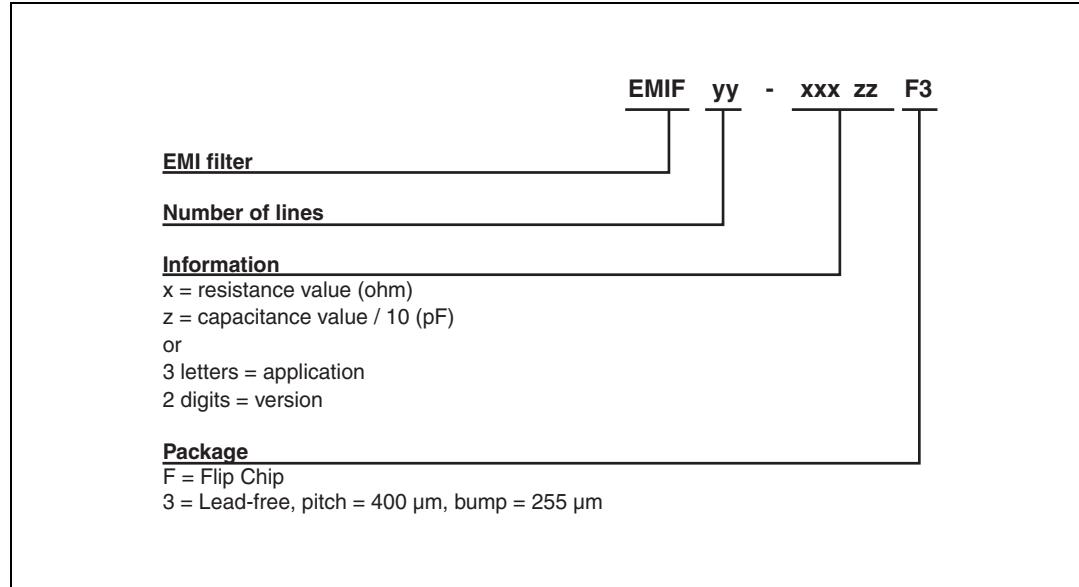
| aplacvar Rline 70   | Diode D1 | Diode D2 | Diode D3 |
|---------------------|----------|----------|----------|
| aplacvar C_d1 15p   | BV=7     | BV=7     | BV=7     |
| aplacvar C_d2 15p   | IBV=1m   | IBV=1m   | IBV=1m   |
| aplacvar C_d3 600p  | CJO=C_d1 | CJO=C_d2 | CJO=C_d3 |
| aplacvar Ls 950pH   | M=0.28   | M=0.28   | M=0.28   |
| aplacvar Rs 150m    | RS=0.1   | RS=0.1   | RS=0.01  |
| aplacvar Lbump 50pH | VJ=0.6   | VJ=0.6   | VJ=0.6   |
| aplacvar Rbump 20m  | TT=100n  | TT=100n  | TT=100n  |
| aplacvar Cbump 150f |          |          |          |
| aplacvar Lgnd 50pH  |          |          |          |
| aplacvar Rgnd 100m  |          |          |          |
| aplacvar Rsub 10m   |          |          |          |

## EMIF07-LCD02F3

## Ordering information scheme

### 3 Ordering information scheme

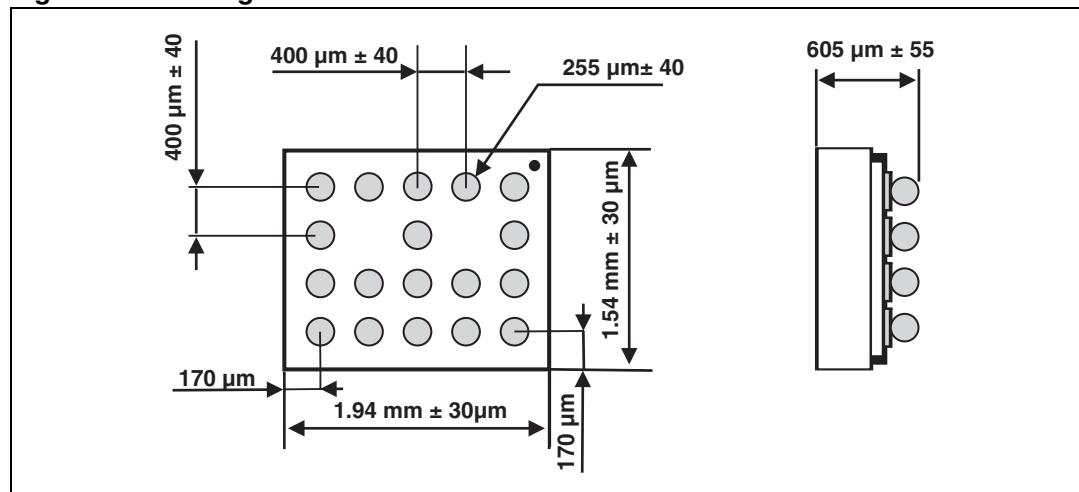
Figure 10. Ordering information scheme



### 4 Package information

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.

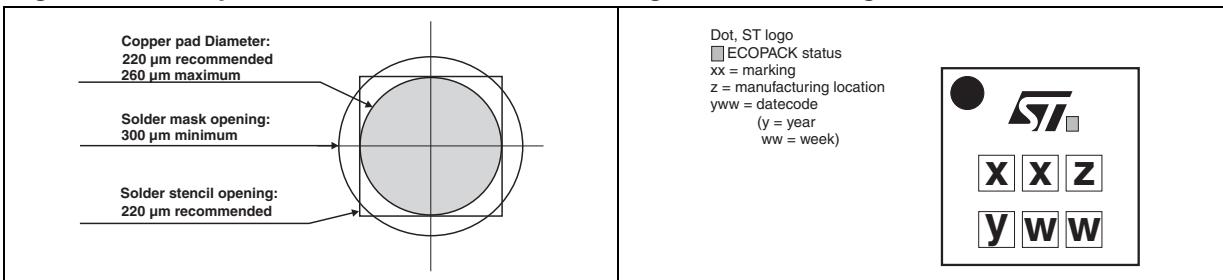
Figure 11. Package dimensions



## Ordering information

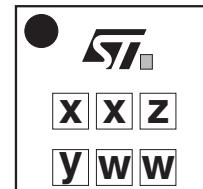
**EMIF07-LCD02F3**

**Figure 12. Footprint**

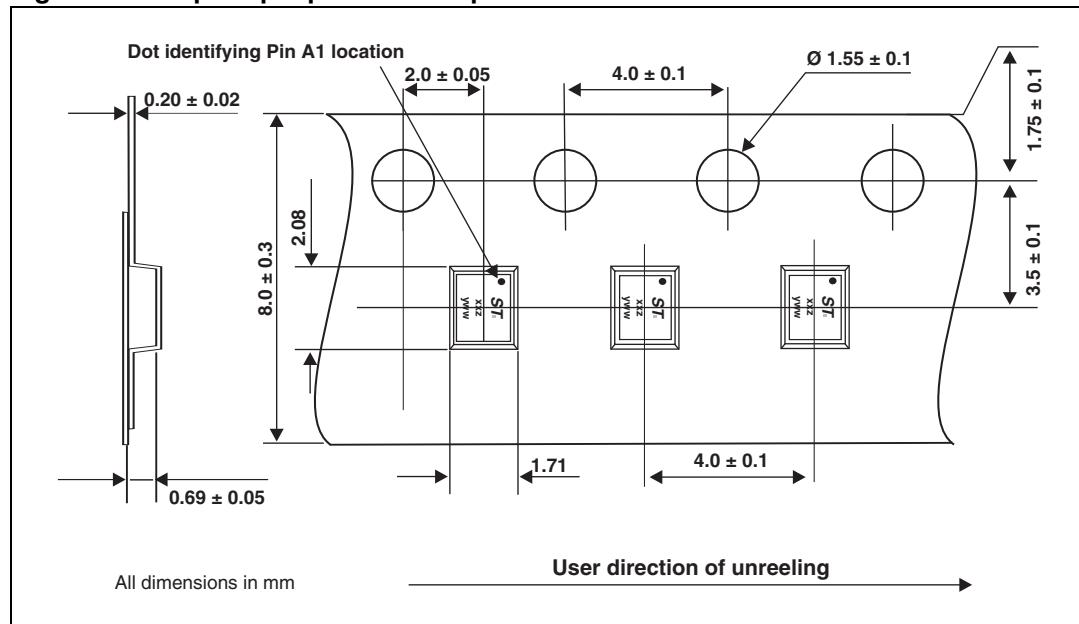


**Figure 13. Marking**

Dot, ST logo  
 ECOPACK status  
 xx = marking  
 z = manufacturing location  
 yww = datecode  
 (y = year  
 ww = week)



**Figure 14. Flip Chip tape and reel specification**



Note:

More information is available in the application notes:

AN2348: "STMicroelectronics 400 micro-metre Flip Chip : Package description and recommendation for use"

AN1751: "EMI filters: Recommendations and measurements"

## 5

## Ordering information

**Table 3. Ordering information**

| Order code     | Marking | Package   | Weight | Base qty | Delivery mode    |
|----------------|---------|-----------|--------|----------|------------------|
| EMIF07-LCD02F3 | GX      | Flip Chip | 3.9 mg | 5000     | Tape and reel 7" |

## 6 Revision history

**Table 4. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 12-Sep-2005 | 1        | First issue.  |
| 28-Apr-2008 | 2        | Updated ECOPACK statement. Updated <i>Figure 10</i> , <i>Figure 11</i> and <i>Figure 14</i> . Reformatted to current standards. |
| 19-Feb-2010 | 3        | Updated die size in <i>Figure 11</i> .  |

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