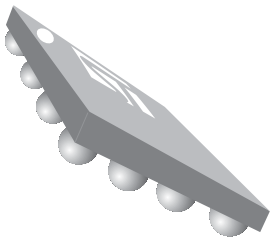
# EMIF06-USD05F3

## 6-line EMI filter and ESD protection for SD card, mini-SD card and micro-SD card interfaces



**Flip Chip**
**(15 bumps)**

**Datasheet – production data**

## Features

- EMI low-pass filter
- 104 MHz clock frequency compatible with SDR50 mode (SD3.0)
- High attenuation level of -30 dB at 900 MHz
- Lead-free package

### Complies with the following standards:

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

## Applications

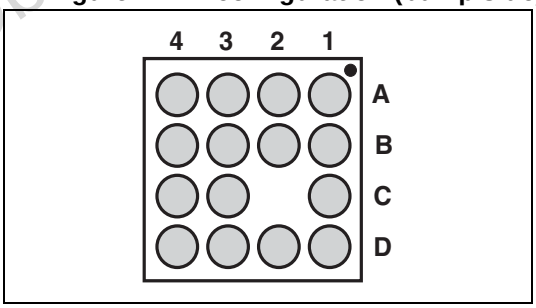
Where EMI filtering in ESD sensitive equipment is required:

- Features phones, smartphones, phablets and communication systems
- Tablets, multimedia players like MP3, camcorders

## Description

The EMIF06-USD05F3 is a 6-line EMI filter dedicated to SD, mini-SD and micro-SD card applications. It provides an efficient attenuation at 900 MHz to reduce or suppress the antenna de-sense. This filter includes ESD protection circuitry, which prevents damage to the protected device when inserting the card. Pull-up resistors are not integrated inside the chip, hence the EMIF06-USD05F3 gives the flexibility to customers to use controllers with embedded resistance. This 6-line IPAD ™ is packaged into a flip-chip solution, saving PCB space.

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






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

# 1 Characteristics

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

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{PP}$ | ESD discharge IEC 61000-4-2, level 4<br>Air discharge card side<br>Contact discharge card side<br>Air discharge IC side<br>Contact discharge IC side | <br>15<br>8<br>2<br>2 | kV |
| $T_j$ | Maximum junction temperature | 125 | °C |
| $T_{op}$ | Operating temperature range | - 30 to + 85 | °C |
| $T_{stg}$ | Storage temperature range | - 55 to + 150 | °C |

**Figure 2. Electrical characteristics (definitions)**

Symbol Parameter
$V_{BR}$ = Breakdown voltage
$V_{RM}$ = Stand-off voltage
$I_{RM}$ = Leakage current at $V_{RM}$
$C_{line}$ = Line capacitance

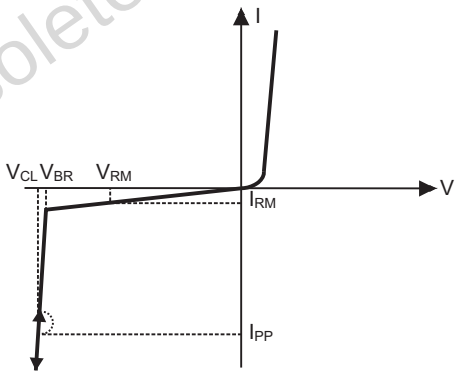



**Table 2. Electrical characteristics (values, $T_{amb}$ = 25 °C)**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{BR}$ | Breakdown voltage | $I_R$ = 1 mA | 6 | | | V |
| $I_{RM}$ | Leakage current at $V_{RM}$ | $V_{RM}$ = 3 V | | | 100 | nA |
| $R_{line}$ | Serial line resistor | | 32 | 40 | 48 | Ω |
| $C_{line}$ | Total line capacitance | $V_{BIAS}$ = 2.4 V | | 11 | 14 | pF |
| $F_c$ | -3dB cut-off frequency | $Z_{source}$ = $Z_{load}$ = 50 Ω | | 300 | | MHz |
| $S_{21}$ | Attenuation | F = 900 MHz | -25 | -30 | | dB |

**Table 3. Pin configuration**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| A1 | dat0 | C1 | cmd |
| A2 | dat1 | C2 | |
| A3 | SDdat1 | C3 | GND |
| A4 | SDdat0 | C4 | SDcmd |
| B1 | clk | D1 | dat3 |
| B2 | $V_{cc}$ | D2 | dat2 |
| B3 | GND | D3 | SDdat2 |
| B4 | SDclk | D4 | SDdat3 |

**Figure 3. Functional schematic**

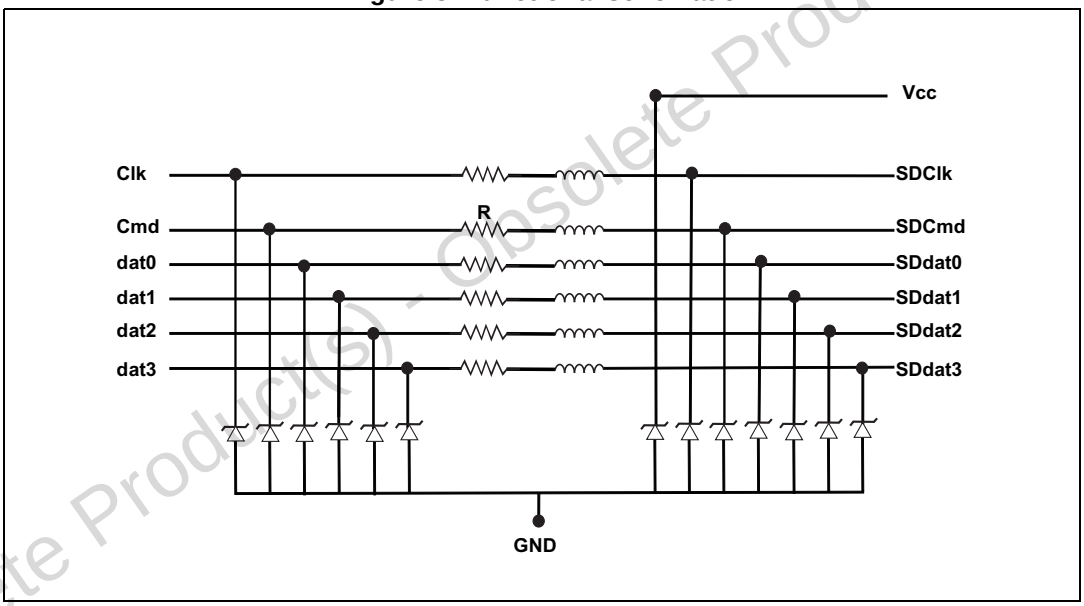


**Figure 4. Attenuation versus frequency**

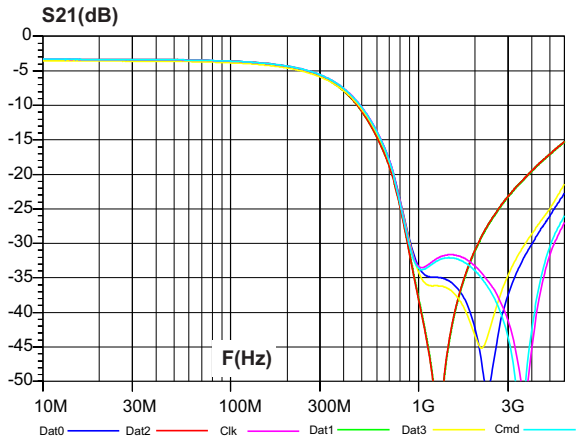



**Figure 5. Line capacitance versus applied voltage**

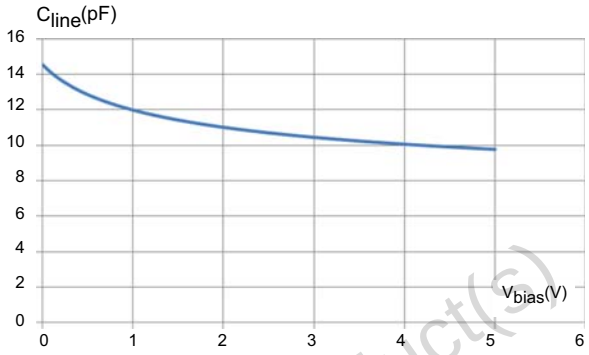



**Figure 6. Analog crosstalk versus frequency**

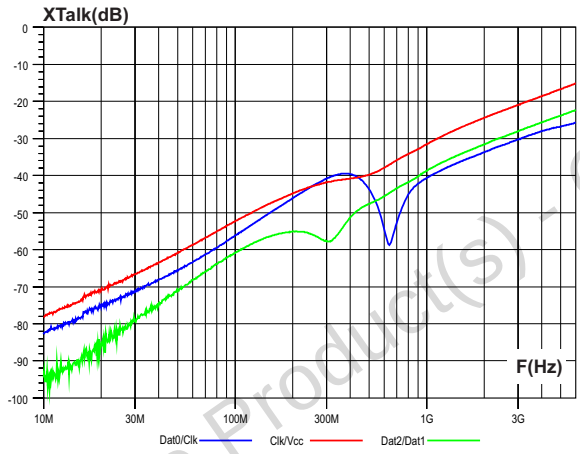



**Figure 7. Digital crosstalk measurements**

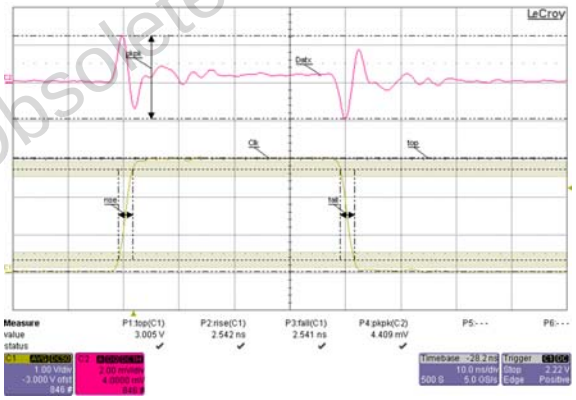



**Figure 8. ESD response to IEC 61000-4-2 (+8 kV contact discharge)**

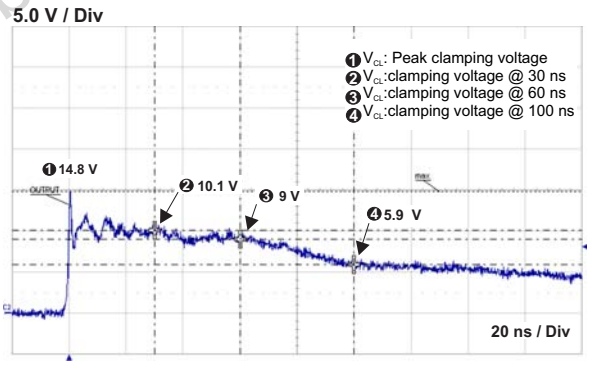
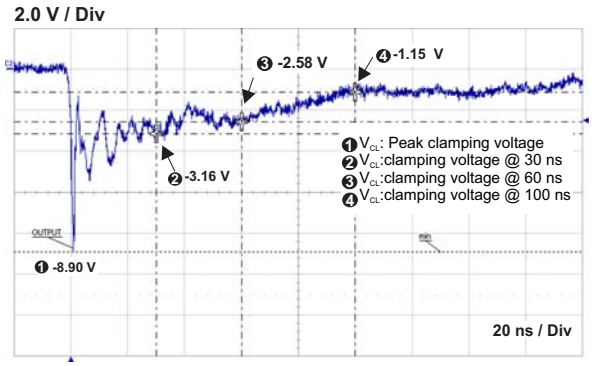



**Figure 9. ESD response to IEC 61000-4-2 (-8 kV contact discharge)**



# 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.* ECOPACK® is an ST trademark.

**Figure 10. Package dimensions**

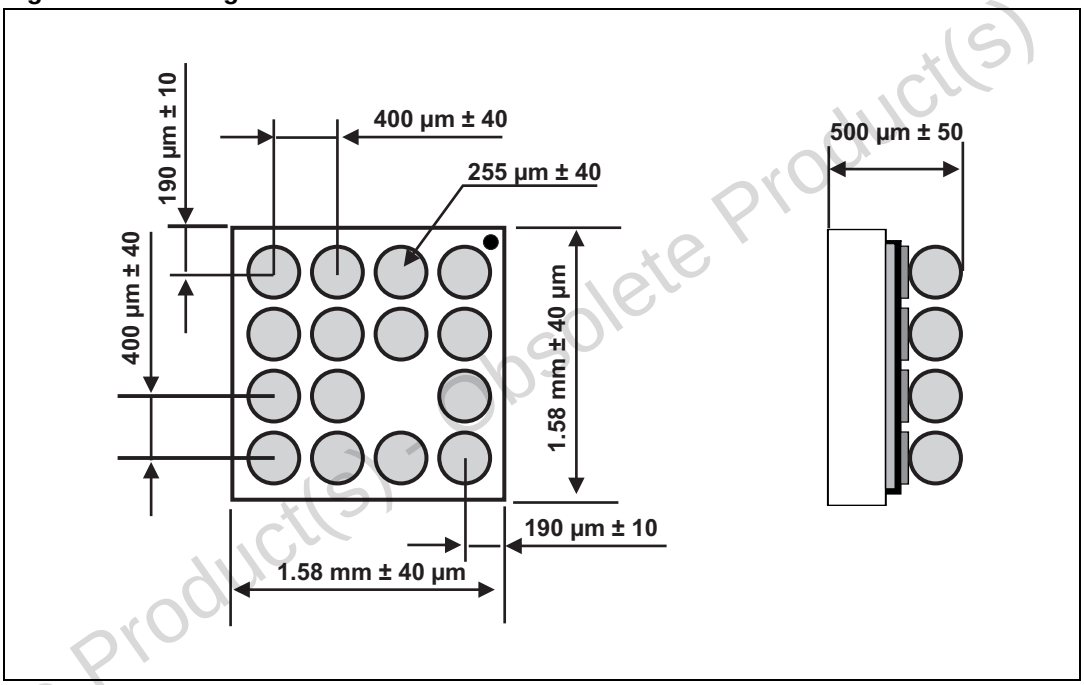





**Figure 11. Footprint**

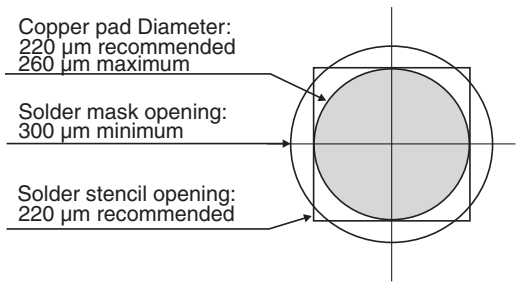



**Figure 12. Marking**

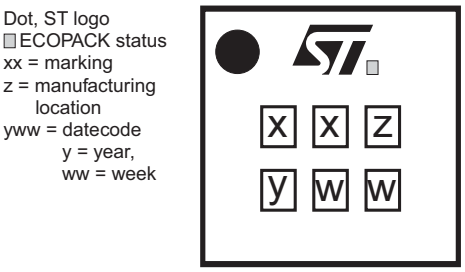
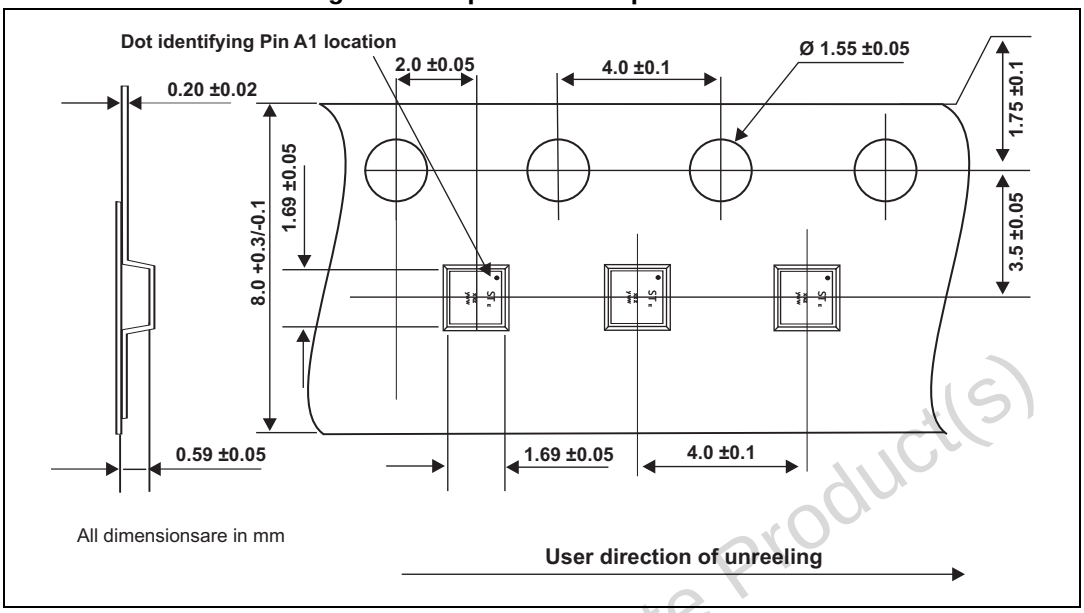


**Figure 13. Tape and reel specification**




*Note: More information is available in the STMicroelectronics Application notes:*
*AN2348: "Flip Chip: Package description and recommendations for use"*
*AN1751: "EMI Filters: Recommendations and measurements"*

# 3 Ordering information

**Figure 14. Ordering information scheme**

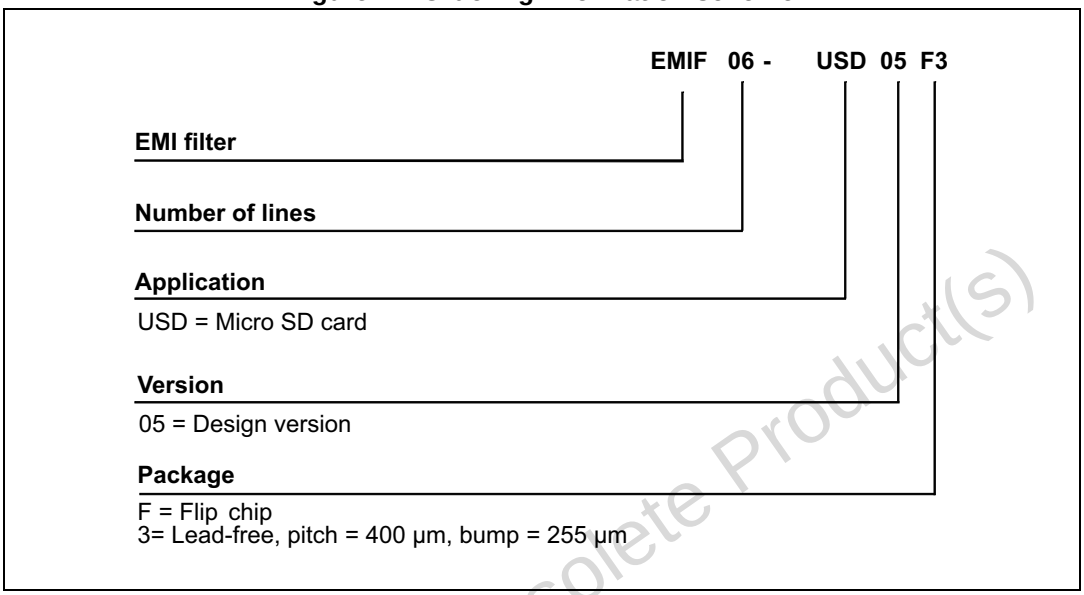



**Table 4. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| EMIF06-USD05F3 | KT | Flip Chip | 2.6 mg | 5000 | Tape and reel 7” |

# 4 Revision history

**Table 5. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 25-Apr-2014 | 1 | First issue. |

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