

3-line IPAD™ EMI filter including ESD protection

Features

- EMI symmetrical (I/O) low-pass filter
- high efficiency in EMI filtering
- lead-free coated package
- very low PCB space occupation:
 - 1.42 mm x 1.42 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 following standards:

- IEC 61000-4-2 level 4 on external and V_{CC} pins:
 - 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:

- SIM Interface (subscriber identify module)
- UIM Interface (universal identify module)

Description

The EMIF03-SIM02C2 is a highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interference. The EMIF03 Flip-Chip packaging means the package size is equal to the die size.

This filter includes an ESD protection circuitry which protects the application from damage when subjected to ESD surges up to 15 kV.

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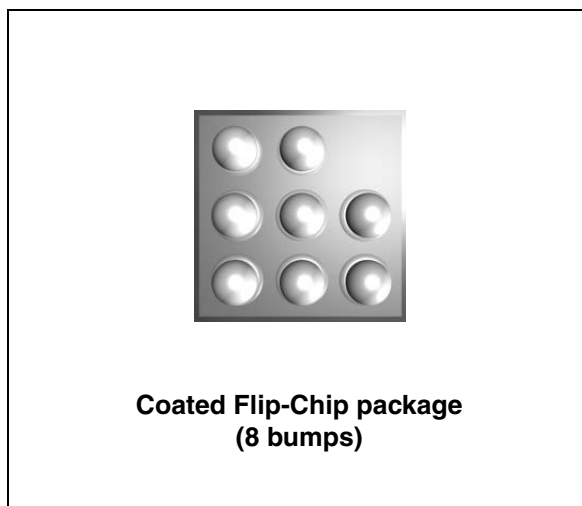
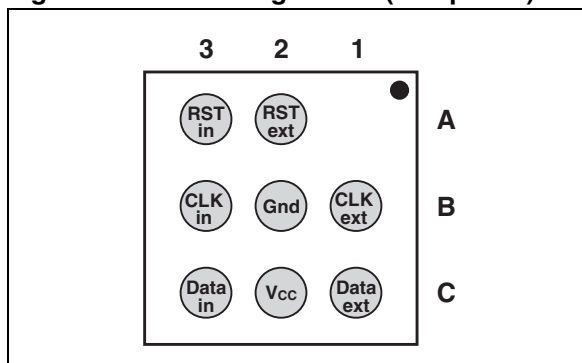


Figure 1. Pin configuration (bump side)



1 Characteristics

Figure 2. Basic cell configuration

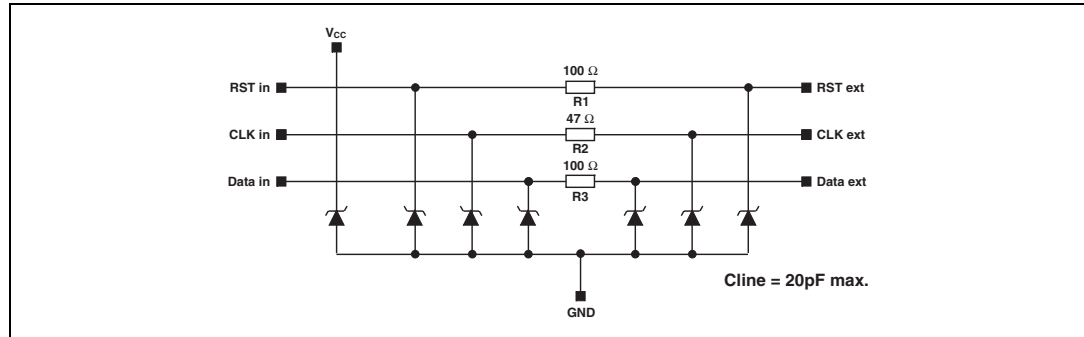


Table 1. Absolute ratings (limiting values)

| Symbol | Parameter | Value | Unit |
|---|---|-------------|------|
| V_{PP} | Internal pins (A3, B3, C3): | | |
| | ESD discharge IEC61000-4-2, air discharge | 2 | kV |
| | ESD discharge IEC61000-4-2, contact discharge | 2 | |
| | External pins (A2, B1, C2, C1): | | |
| ESD discharge IEC61000-4-2, air discharge | 15 | | |
| | ESD discharge IEC61000-4-2, contact discharge | 8 | |
| 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 |

Figure 3. Electrical characteristics (definitions)

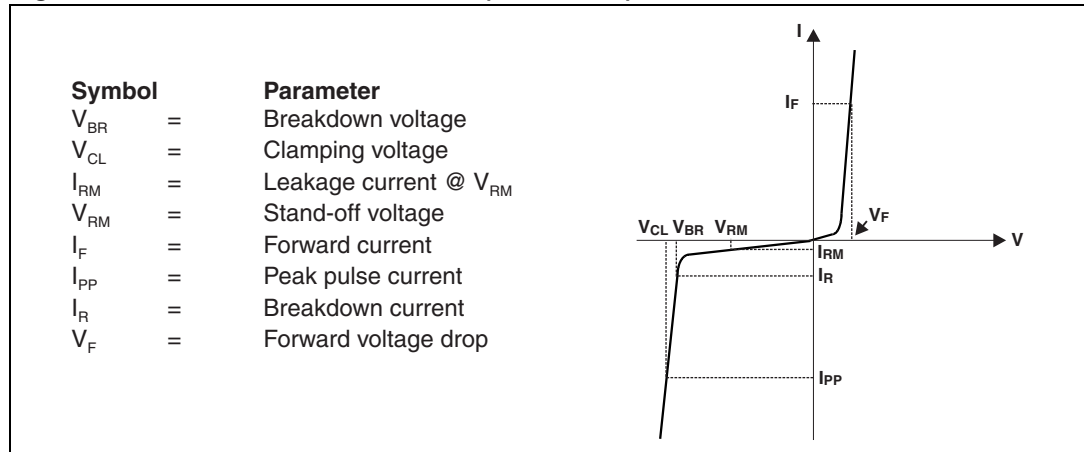


Table 2. Electrical characteristics, parameter values

| Symbol | Test conditions | Min | Typ | Max | Unit |
|------------|------------------------|-----|-----|-----|---------------|
| V_{BR} | $I_R = 1 \text{ mA}$ | 6 | | 20 | V |
| I_{RM} | $V_{RM} = 3 \text{ V}$ | | | 0.2 | μA |
| R_d | | | 1.5 | | Ω |
| R_1, R_3 | Tolerance $\pm 20\%$ | | 100 | | |
| R_2 | Tolerance $\pm 20\%$ | | 47 | | |
| C_{line} | $V_R = 0 \text{ V}$ | | | 20 | pF |

Figure 4. S21 (dB) attenuation measurement (A2-A3 line) **Figure 5. S21 (dB) attenuation measurement (B1-B3 line)**

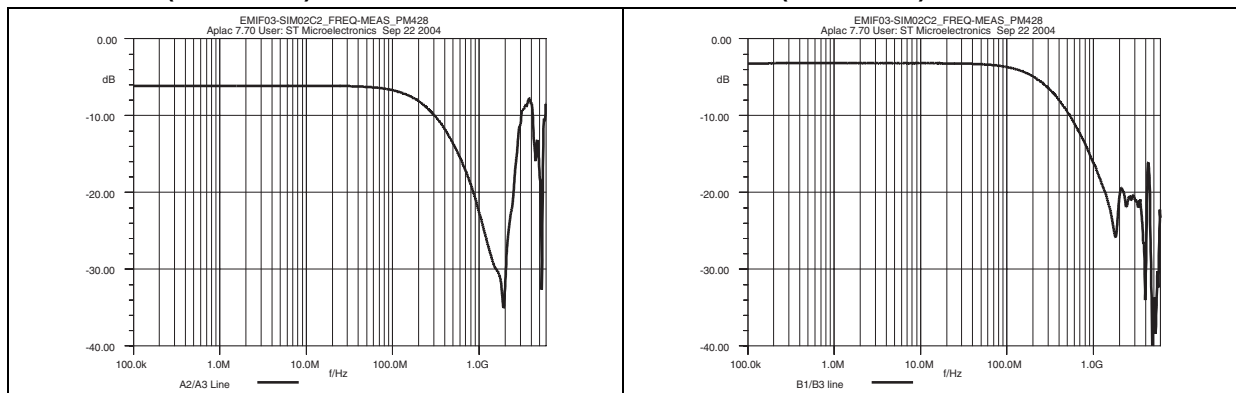


Figure 6. S21 (dB) attenuation measurement (C1-C3 line) **Figure 7. Analog crosstalk measurements**

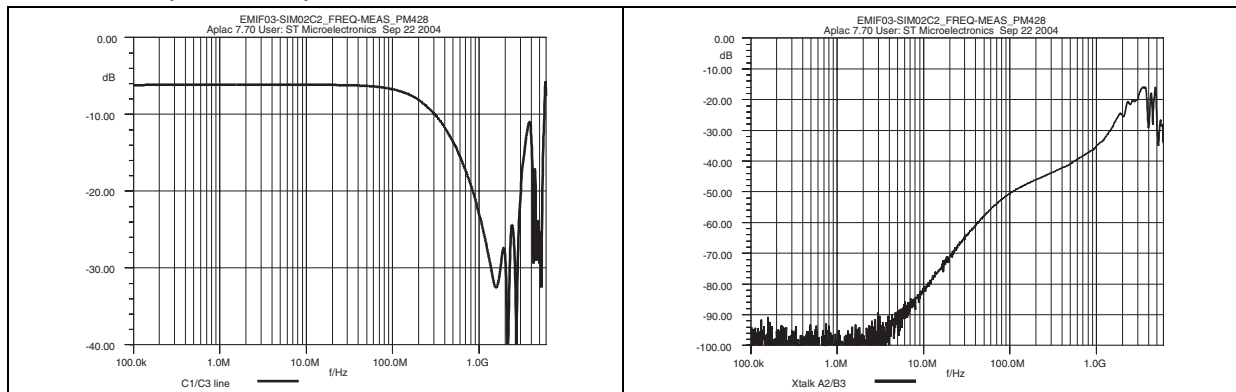


Figure 8. Voltages when IEC 61000-4-2 (+15 kV air discharge) applied to external pin

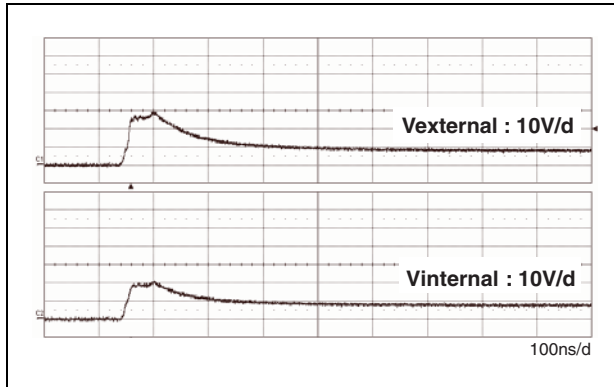


Figure 9. Voltages when IEC 61000-4-2 (-15 kV air discharge) applied to external pin

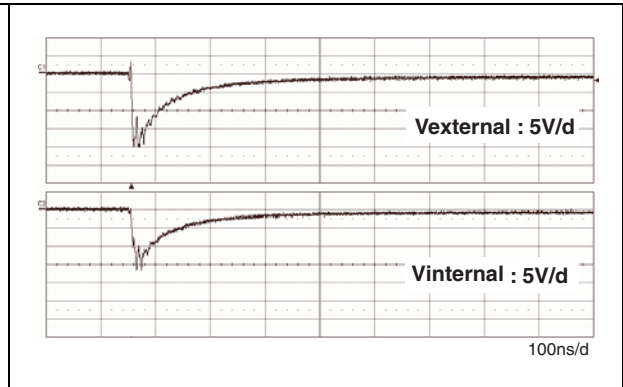


Figure 10. Line capacitance versus reverse applied voltage (typical)

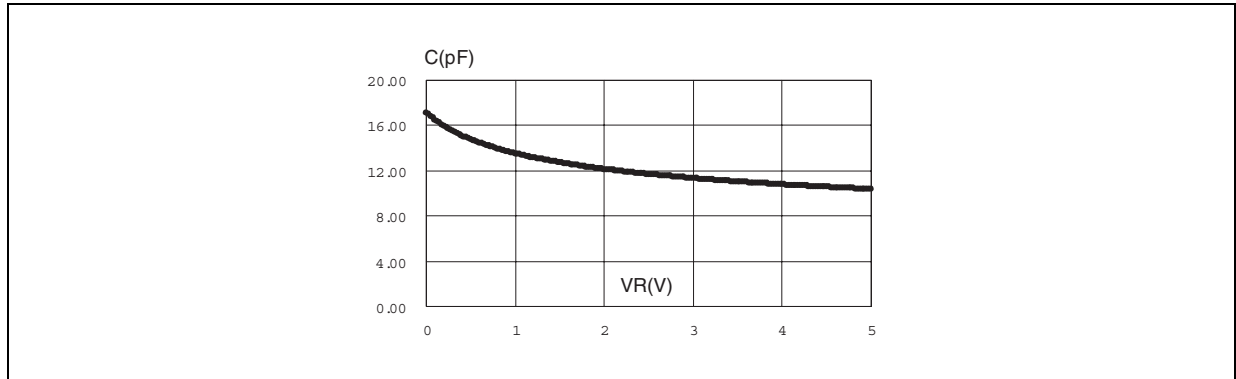


Figure 11. Aplac model

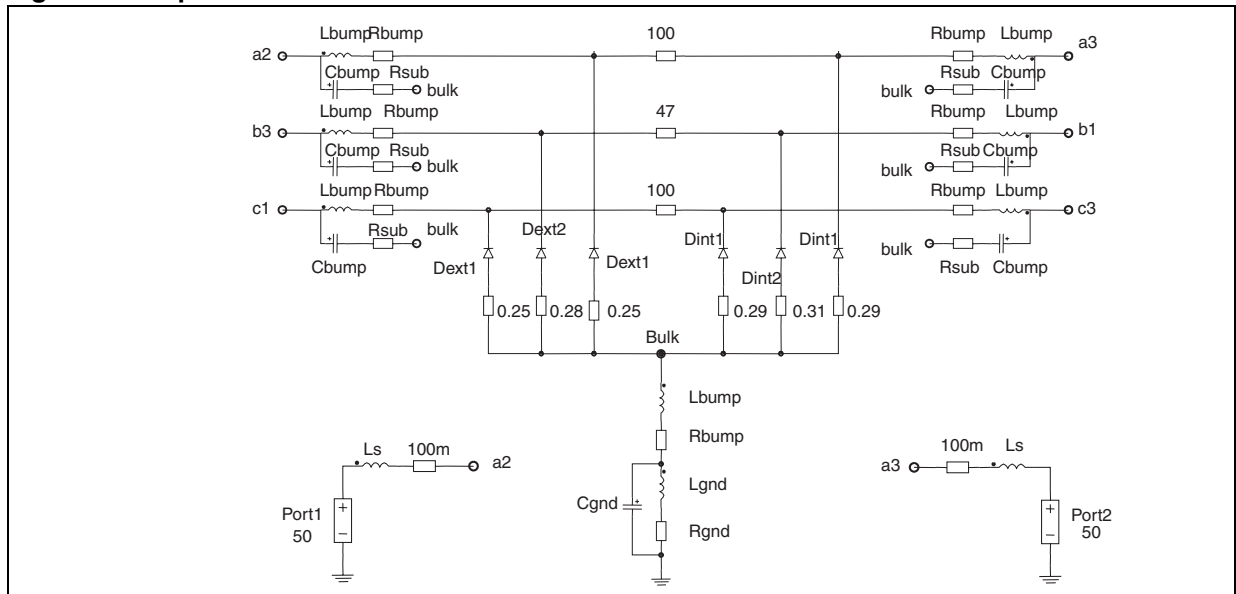
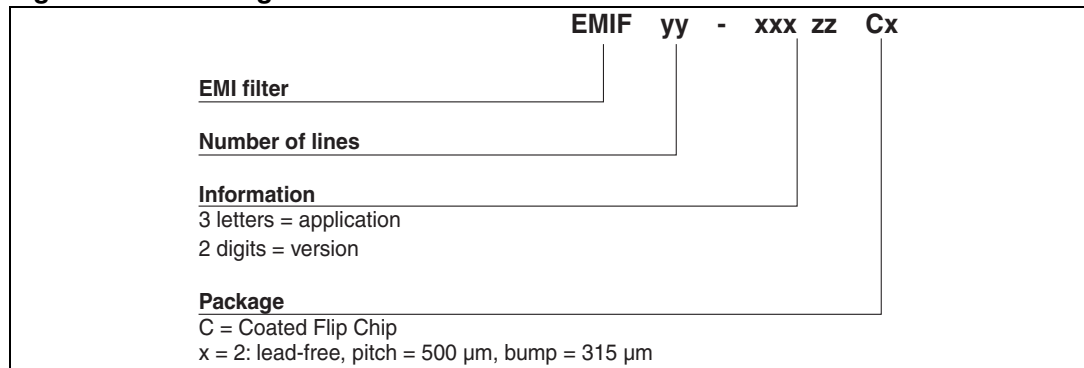


Figure 12. Aplac parameters

| | | | | |
|--------------|--------------------|--------------------|--------------------|--------------------|
| Ls 950pH | | | | |
| Rs 150m | <u>Model Dint1</u> | <u>Model Dext1</u> | <u>Model Dint2</u> | <u>Model Dext2</u> |
| Cext1 15pF | BV=15 | BV=15 | BV=15 | BV=15 |
| Cint1 4.5pF | CJO=Cint1 | CJO=Cext1 | CJO=Cint2 | CJO=Cext2 |
| Cext2 14pF | IBV=1u | IBV=1u | IBV=1u | IBV=1u |
| Cint2 4pF | IKF=1000 | IKF=1000 | IKF=1000 | IKF=1000 |
| Rbump 20m | IS=10f | IS=10f | IS=10f | IS=10f |
| Lbump 50pH | ISR=100p | ISR=100p | ISR=100p | ISR=100p |
| Cbump 0.15pF | N=1 | N=1 | N=1 | N=1 |
| Rgnd 500m | M=0.3333 | M=0.3333 | M=0.3333 | M=0.3333 |
| Lgnd 50pH | RS=0.001m | RS=0.001m | RS=0.001m | RS=0.001m |
| Cgnd 0.15pF | VJ=0.6 | VJ=0.6 | VJ=0.6 | VJ=0.6 |
| Rsub 100m | TT=50n | TT=50n | TT=50n | TT=50n |

2 Ordering information scheme

Figure 13. Ordering information scheme



3 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 14. Flip-Chip dimensions

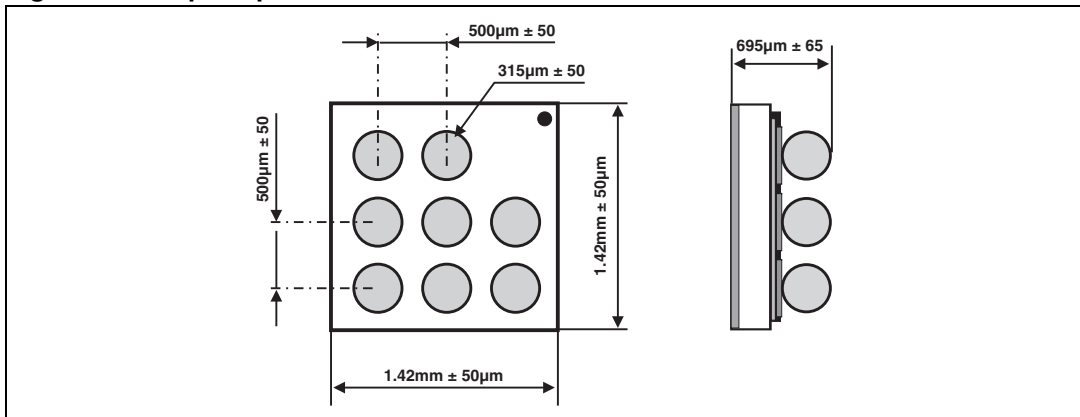


Figure 15. Marking

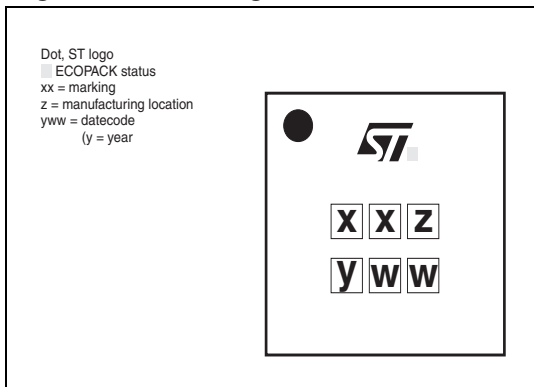
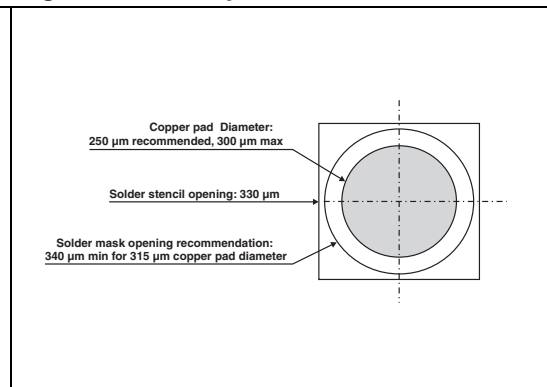


Figure 16. Footprint recommendation



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