

EMIF02-MIC07F3

EMI filter and ESD protection

Features

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI/ESD protection
- Lead-free package
- Very thin package
- 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 external pins B1 and C1):
 - ±15 kV (air discharge)
 - <u>+8 kV (contact discharge)</u>
- IEC 61000-4-2 level 1 (on external pins):
 - <u>+</u>2 kV (air discharge)
 - <u>+</u>2 kV (contact discharge)

Applications

Where EMI filtering in ESD sensitive equipment is required:

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

Description

The EMIF02-MIC07F3 chip is a highly integrated audio filter device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interference.

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

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1 Characteristics





Acc_Det pin connection

The Acc_Det pin (accessory detection) is an input pin for the audio pre-amplifier chip which detects the voltage of the microphone line MIC2P in case the user presses the on-hook/off-hook button on the headset. When the user selects off-hook using the headset button, the MIC2P is shorted to MIC2N which is grounded. If your design does not support the Acc_Det feature, the Acc_Det pin must be left open (not connected).

| Table 1. | Absolute ratings (limiting values) |
|----------|------------------------------------|
|----------|------------------------------------|

| Symbol | Parameter and test conditions | Value | Unit |
|------------------|--|-------------------|------|
| V _{PP} | Pins B1 and C1, ESD discharge IEC 61000-4-2, level 4: air discharge contact discharge Pins A2, A3, B3, C3, ESD discharge IEC 61000-4-2, level 1 air discharge contact discharge | 15 8 2 2 | kV |
| PD | Power dissipation at $T_{amb} = 25 \ ^{\circ}C$ | 60 | mW |
| T _{op} | Operating temperature range | - 40 to + 85 | °C |
| T _{stg} | Storage temperature range | - 55 to + 150 | °C |



| Symbol | | Parameter | |
|-----------------|---|-----------------------------------|---|
| V _{BR} | = | Breakdown voltage | |
| V _{CL} | = | Clamping voltage | |
| IRM | = | Leakage current @ V _{BM} | |
| V _{BM} | = | Stand-off voltage | |
| I _F | = | Forward current | V _{BR} V _{RM} I _{RM} |
| I _{PP} | = | Peak pulse current | IR VRM VBR V |
| I _R | = | Breakdown current | TK . |
| V _F | = | Forward voltage drop | |
| R _d | = | Dynamic impedance | |
| αŤ | = | Voltage temperature | |

| Figure 3. | Electrical characteristics (definitions) | |
|-----------|--|--|
|-----------|--|--|

| Symbol | Test conditions | | Тур. | Max. | Unit |
|-----------------------------------|---|------|------|------|------|
| V _{BR} | I _R = 1 mA | 7 | | | V |
| I _{RM} | V _{RM} = 3 V per line | | 50 | 200 | nA |
| R ₁₁ | | 1900 | 2000 | 2100 | |
| R ₁₂ | | 800 | 1000 | 1200 | Ω |
| R ₂₁ , R ₂₂ | | 1760 | 2200 | 2640 | 52 |
| R ₃₁ | | 20 | 25 | 30 | |
| C ₁₁ , C ₁₂ | $V_{\text{line}} = 0 \text{ V}, V_{\text{osc}} = 30 \text{ mV}, \text{F} = 1 \text{ MHz}$ | 0.66 | 0.83 | 1 | |
| C_{21}, C_{22} | (measured under zero light conditions and with | 1 | 1.25 | 1.5 | nF |
| C_{31}, C_{32} | bumps B2 and C2 connected together) | 7 | 8.75 | 10.5 | |

Table 2. Electrical characteristics - values ($T_{amb} = 25 \text{ °C}$)

Table 3.Dynamics characteristics $(T_{amb} = 25^{\circ} C)^{(1)}$

| Symbol | Condition | Max. Value | Unit |
|--------|--|------------|------|
| Ripple | Between 5 Khz and 20 kHz | 2 | dB |
| THD+N | -21dBV fully differential between MICn and MICp 1kHz | 0.009 | % |

1. Dynamics characteristics are guaranteed by design and not production tested





Figure 4. Attenuation versus frequency





Figure 6. Analog crosstalk measurement

Figure 7. ESD response to IEC 61000-4-2 on one input $V_{(in)}$ and on one output



Figure 8. ESD response to IEC 61000-4-2 on I one input $V_{(in)}$ and on one output $V_{(out)}$



Figure 9. Line capacitance versus applied voltage (C11)





2 Ordering information scheme



| 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 | | | |
| $x = 3$: lead-free, pitch = 400 μ m | | | |



3 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: <u>www.st.com</u>. ECOPACK[®] is an ST trademark.





Figure 12. Footprint recommendations Figure 13. Marking







Figure 14. Flip-Chip tape and reel specification

4 Ordering information

Table 4.Ordering information

| Order code | Marking | ng Package Weight | | Base qty | Delivery mode |
|----------------|---------|-------------------|--------|----------|------------------|
| EMIF02-MIC07F3 | JE | Flip Chip | 1.8 mg | 5000 | Tape and reel 7" |

Note:

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

5 Revision history

Table 5.Document revision history

| Date | Revision | Changes | |
|-------------|----------|---|--|
| 16-Mar-2010 | 1 | Initial release. | |
| 12-Oct-2010 | 2 | Added Table 3. | |
| 23-Sep-2011 | 3 | Added Acc_Det pin connection on page 2. | |



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