

4 Channel EMI Filter Network

Features

- 4 EMI filter lines per device
- Filters attenuate to -30dB at 3GHz
- CSP package minimizes cross-talk
- 9-bump $2.485\text{mm} \times 0.985\text{mm}$ Chip Scale Package (CSP), 0.5mm pitch
- 0.30mm Eutectic solder bumps
- Ultra small footprint suitable for portable devices
- Lead-free version available

Applications

- EMI filtering for RF sections of wireless devices
- Cellular phones
- Cordless phones
- Internet appliances
- PDAs
- Laptop computers

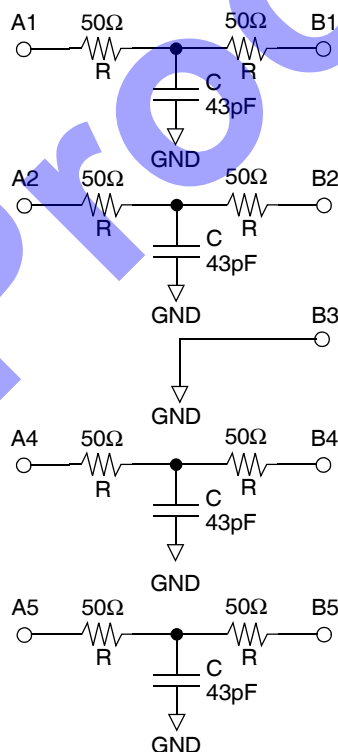
Product Description

The CSPRC032A is a 4-channel low pass EMI filter (R-C-R configuration) in a Chip Scale Package (CSP). Many portable applications require the attenuation of signals in the $800\text{-}3000\text{ MHz}$ band. California Micro Devices' unique thin film technology provides a minimum of -25dB of attenuation over this frequency band.

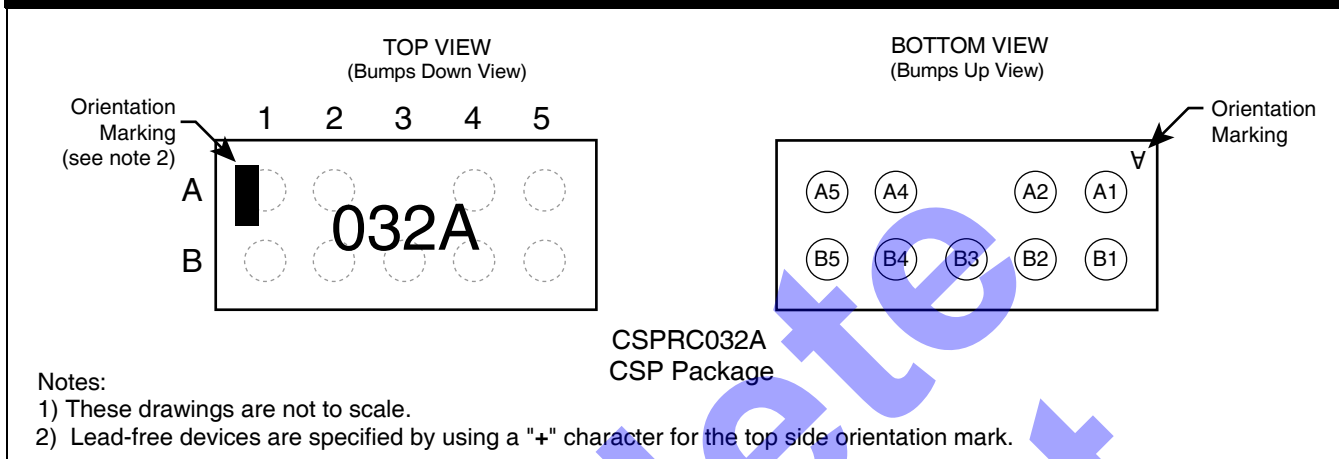
The bump size and pitch of these filters are selected such that the device can be placed directly on an FR4 printed circuit board using conventional assembly techniques. The pin-out for the device features a signal 'flow through' design, allowing optimal signal routing. The solder bump contacts are a $63/37\text{ Sn/Pb}$ alloy (Sn/Ag/Cu for lead-free finish) and are 0.30 mm in diameter.

The CSPRC032A is available in a space-saving, low-profile Chip Scale Package with optional lead-free finishing.

Electrical Schematic



PACKAGE / PINOUT DIAGRAMS



Ordering Information

PART NUMBERING INFORMATION

| Bumps | Package | Standard Finish | | Lead-free Finish ² | |
|-------|---------|-----------------------------------|--------------|-----------------------------------|--------------|
| | | Ordering Part Number ¹ | Part Marking | Ordering Part Number ¹ | Part Marking |
| 9 | CSP | CSPRC032A | 032A | CSPRC032AG | 032A |

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Note 2: Lead-free devices are specified by using a "+" character for the top side orientation mark.

Specifications

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | RATING | UNITS |
|---------------------------|-------------|-------|
| Storage Temperature Range | -55 to +150 | °C |
| Power Rating per Resistor | 25 | mW |

STANDARD OPERATING CONDITIONS

| PARAMETER | RATING | UNITS |
|-----------------------------|------------|-------|
| Operating Temperature Range | -40 to +85 | °C |

ELECTRICAL OPERATING CHARACTERISTICS(NOTE 1)

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|------------|--|---------------------------|-----|----------|-----------|------------------|
| I_{LEAK} | Leakage Current, An or Bn to GND | $V_{IN}=6.0V$ | | | 1 | μA |
| R | Resistance | | 45 | 50 | 55 | Ω |
| C | Capacitance | | 34 | 43 | 52 | pF |
| TOL_R | Resistor Absolute Tolerance | $R = 50\Omega$ | | | ± 10 | % |
| TOL_C | Capacitor Absolute Tolerance | $C=43pF$ | | | ± 20 | % |
| TCR | Temperature Coefficient of Resistance | Note 2 | | | ± 150 | ppm/ $^{\circ}C$ |
| TCC | Temperature Coefficient of Capacitance | Note 2 | | | ± 500 | ppm/ $^{\circ}C$ |
| F_C | Filter Cutoff Frequency $Z_{SOURCE}=0\Omega$ $Z_{LOAD}=\infty$ $Z_{SOURCE}=50\Omega$ $Z_{LOAD}=50\Omega$ | $R=50\Omega$, $C=43pF$; | | 74 82 | | MHz MHz |

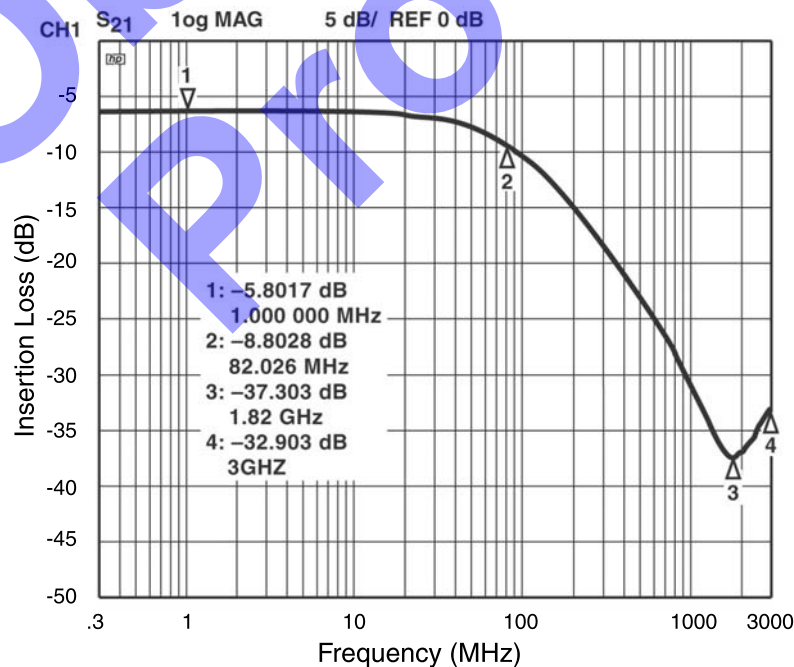
Note 1: Electrical Operating Characteristics are guaranteed over the Operating Temperature Range unless otherwise specified.

Note 2: Parameters guaranteed by design or characterization.

Filter Performance

CSPRC032 Filter Typical Measured Frequency Response (S21) Measurement

The measurement is done with 50 Ω -source and 50 Ω -load impedance using a HP8753C Network Analyzer with a HP85047A S-parameter Test Set.



Application Information

Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by California Micro Devices.

| PRINTED CIRCUIT BOARD RECOMMENDATIONS | |
|--|------------------------------|
| PARAMETER | VALUE |
| Pad Size on PCB | 0.275mm |
| Pad Shape | Round |
| Pad Definition | Non-Solder Mask defined pads |
| Solder Mask Opening | 0.325mm Round |
| Solder Stencil Thickness | 0.125 - 0.150mm |
| Solder Stencil Aperture Opening (laser cut, 5% tapered walls) | 0.330mm Round |
| Solder Flux Ratio | 50/50 by volume |
| Solder Paste Type | No Clean |
| Pad Protective Finish | OSP (Entek Cu Plus 106A) |
| Tolerance — Edge To Corner Ball | $\pm 50\mu\text{m}$ |
| Solder Ball Side Coplanarity | $\pm 20\mu\text{m}$ |
| Maximum Dwell Time Above Liquidous | 60 seconds |
| Maximum Soldering Temperature for Eutectic Devices using Eutectic Solder Paste | 240°C |
| Maximum Soldering Temperature for Lead-free Devices using Lead-free Solder Paste | 260°C |

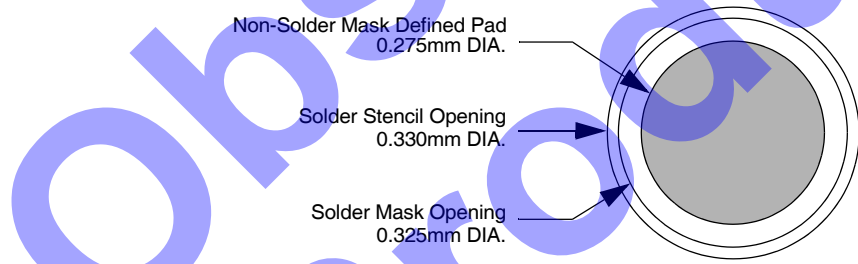


Figure 1. Recommended Non-Solder Mask Defined Pad Illustration

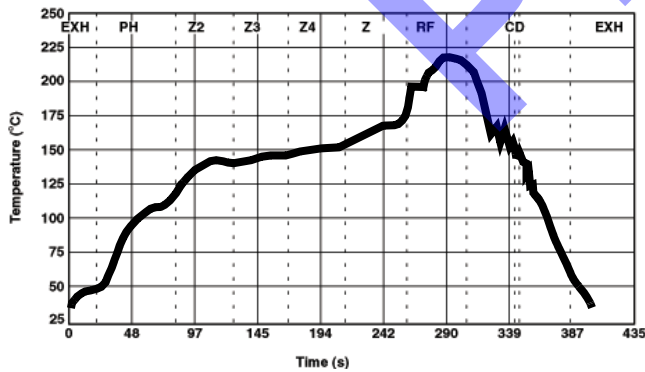


Figure 2. Eutectic (SnPb) Solder Ball Reflow Profile

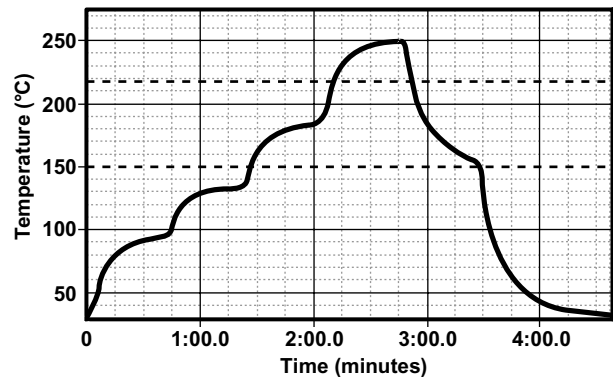


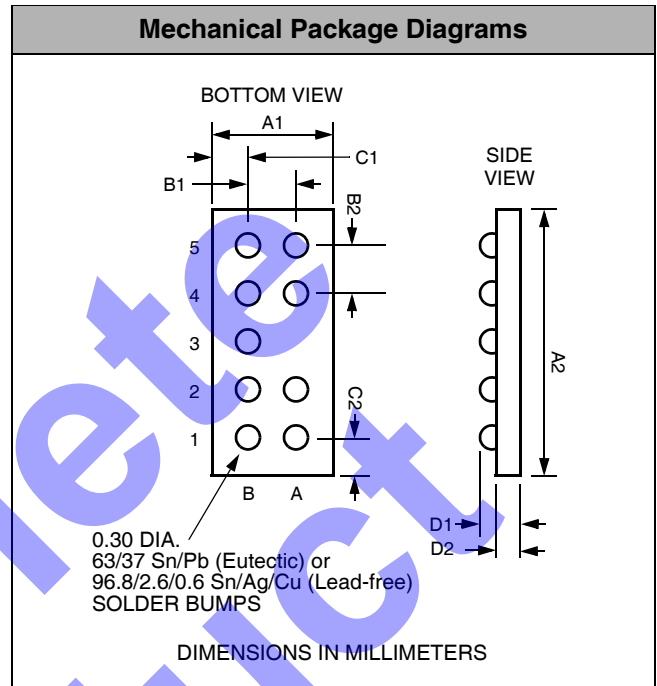
Figure 3. Lead-free (SnAgCu) Solder Ball Reflow Profile

Mechanical Details

CSP Mechanical Specifications

The CSPRC032A is offered in a custom Chip Scale Package (CSP). Dimensions are presented below. For complete information on CMD's Chip Scale Packaging, see the California Micro Devices CSP Package Information document.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|--------|--------|--------|--------|--------|
| Package | Custom CSP | | | | | |
| Bumps | 9 | | | | | |
| Dim | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A1 | 0.940 | 0.985 | 1.030 | 0.0370 | 0.0388 | 0.0406 |
| A2 | 2.440 | 2.485 | 2.530 | 0.0961 | 0.0978 | 0.0996 |
| B1 | 0.495 | 0.500 | 0.505 | 0.0195 | 0.0197 | 0.0199 |
| B2 | 0.495 | 0.500 | 0.505 | 0.0195 | 0.0197 | 0.0199 |
| C1 | 0.1925 | 0.2425 | 0.2925 | 0.0076 | 0.0095 | 0.0115 |
| C2 | 0.1925 | 0.2425 | 0.2925 | 0.0076 | 0.0095 | 0.0115 |
| D1 | 0.561 | 0.605 | 0.649 | 0.0221 | 0.0238 | 0.0256 |
| D2 | 0.355 | 0.380 | 0.405 | 0.0140 | 0.0150 | 0.0160 |
| # per tape and reel | 3500 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



Package Dimensions for CSPRC032A 9-bump Chip Scale Package

CSP Tape and Reel Specifications

| PART NUMBER | PKG. SIZE (mm) | POCKET SIZE (mm) $B_0 \times A_0 \times K_0$ | TAPE WIDTH W | REEL DIA. | QTY PER REEL | P_0 | P_1 |
|-------------|-----------------------|---|-----------------|------------|--------------|-------|-------|
| CSPRC032A | 2.485 X 0.985 X 0.605 | 2.62 X 1.12 X 0.762 | 8mm | 178mm (7") | 3500 | 4mm | 4mm |

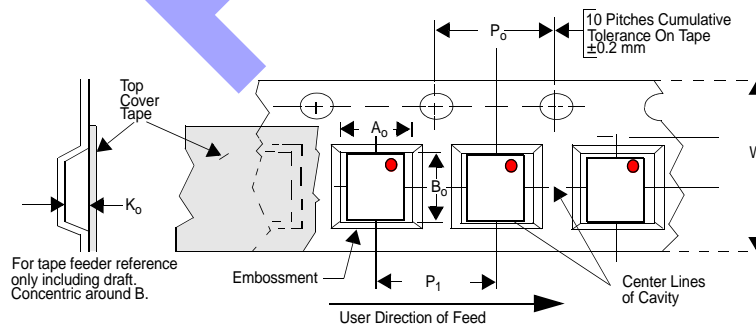


Figure 4. Tape and Reel Mechanical Data