

## 4 Channel EMI Filter Network

### Features

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

### Applications

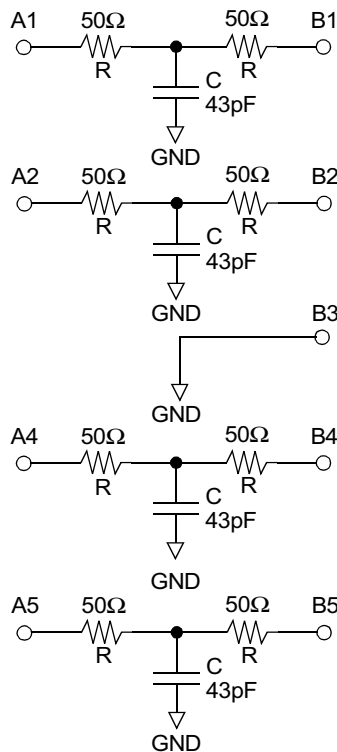
- EMI filtering for RF sections of wireless devices
- Cellular phones
- Cordless phones
- Internet appliances
- PDAs
- Laptop computers

### 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  $-25\text{dB}$  of attenuation over this frequency band.

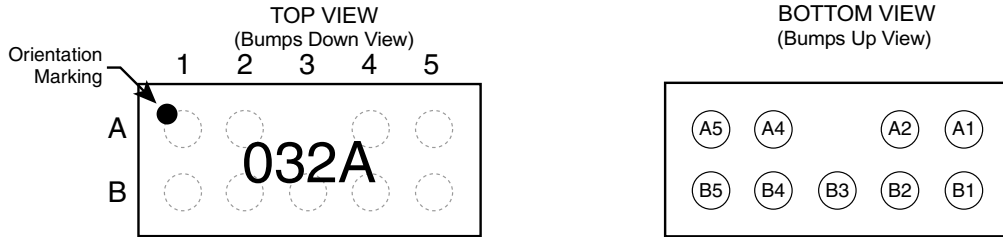
The bump size and pitch of these filters are selected such that the device can be placed directly on a FR4 printed circuit board using conventional assembly techniques. The pin-out for the device features a signal 'flow through' design, allowing optimal signal routing. The solder bump contacts are a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

### Electrical Schematic





**PACKAGE / PINOUT DIAGRAMS**



CSPRC032A  
CSP Package

Note: These drawings are not to scale.

**Ordering Information**

**PART NUMBERING INFORMATION**

Bumps	Package	Ordering Part Number <sup>1</sup>	Part Marking
9	CSP	CSPRC032A	032A

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

**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

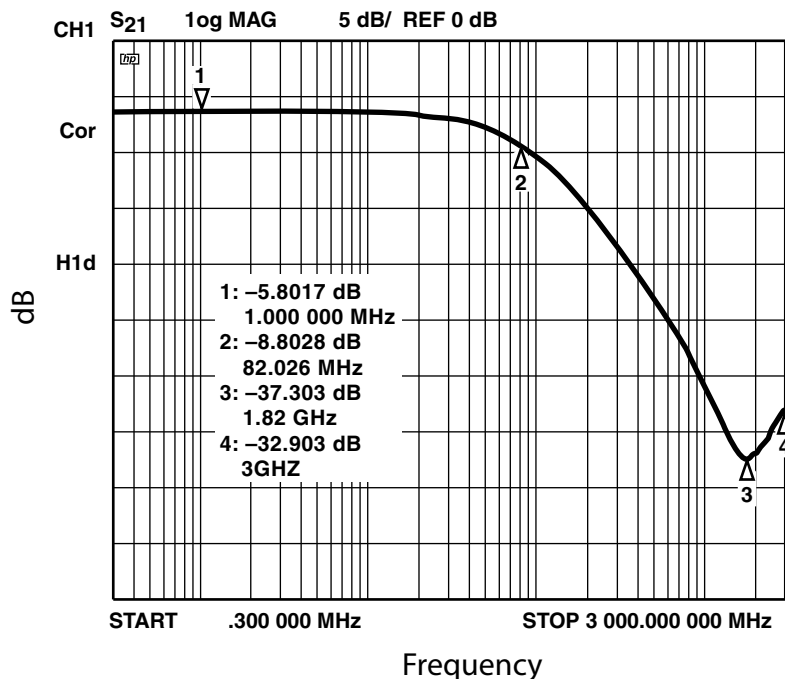
<b>ELECTRICAL OPERATING CHARACTERISTICS<sup>1</sup></b>						
<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNITS</b>
$I_{LEAK}$	Leakage Current, An or Bn to GND	$V_{IN}=6.0V$			1	$\mu A$
$TOL_R$	Resistor Absolute Tolerance	$R = 50\Omega$			$\pm 10$	%
$TOL_C$	Capacitor Absolute Tolerance	$C=43pF$			$\pm 20$	%
TCR	Temperature Coefficient of Resistance				$\pm 150$	ppm/ $^{\circ}C$
TCC	Temperature Coefficient of Capacitance				$\pm 500$	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 74		MHz MHz

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

## Filter Performance

### CSPRC032 Filter Typical Measured Frequency Response (S21) Measurement

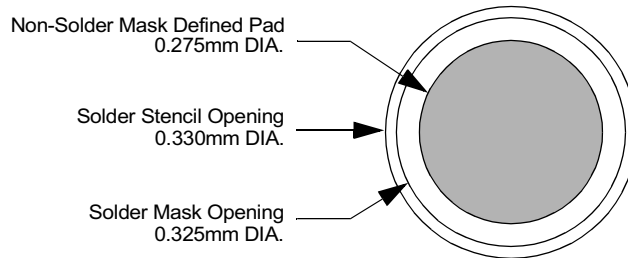
The measurement is done with 50 $\Omega$ -source and 50 $\Omega$ -load impedance using a HP8753C Network Analyzer with a HP85047A S-parameter Test Set.



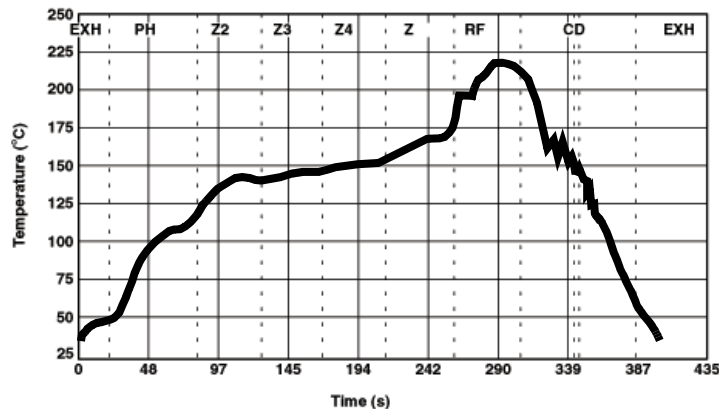
**Application Information**

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

<b>PRINTED CIRCUIT BOARD RECOMMENDATIONS</b>	
<b>PARAMETER</b>	<b>VALUE</b>
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	0.150mm
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	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous (183°C)	60 seconds
Soldering Maximum Temperature	240°C



**Figure 1. Recommended Non-Solder Mask Defined Pad Illustration**



**Figure 2. Solder Reflow Profile**

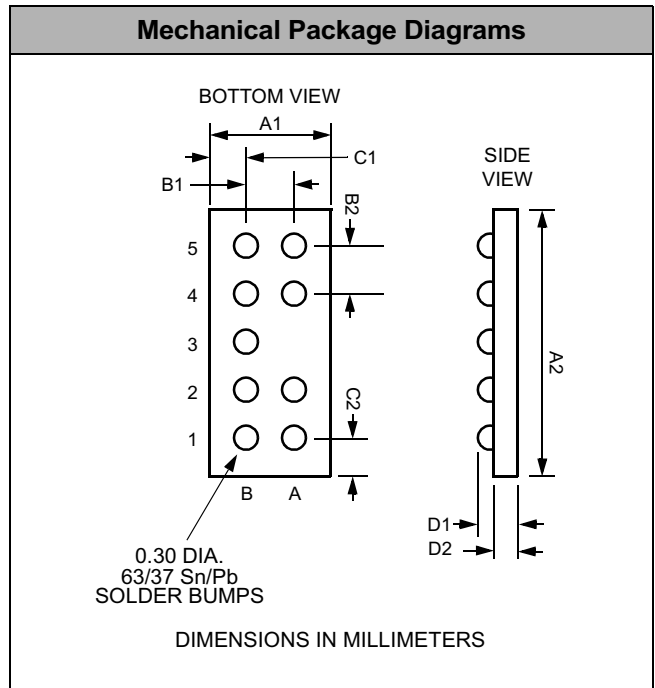
**Mechanical Details**

The CSPRC032A devices are packaged in custom Chip Scale Packages (CSP).

**CSPRC032A 9-bump CSP Mechanical Specifications**

The CSPRC032A devices are packaged in a 9-bump custom Chip Scale Package (CSP). Dimensions are presented below.

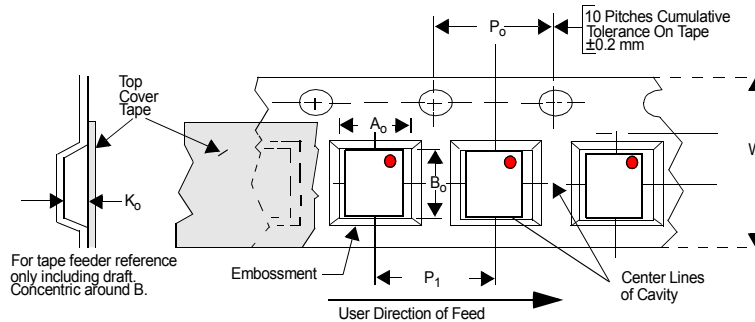
PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	9					
Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A1	0.940	0.985	1.030	0.0370	0.0388	0.0406
A2	2.440	2.485	2.530	0.0961	0.0978	0.0996
B1	0.495	0.500	0.505	0.0195	0.0197	0.0199
B2	0.495	0.500	0.505	0.0195	0.0197	0.0199
C1	0.1925	0.2425	0.2925	0.0076	0.0095	0.0115
C2	0.1925	0.2425	0.2925	0.0076	0.0095	0.0115
D1	0.562	0.606	0.650	0.0221	0.0239	0.0256
D2	0.356	0.381	0.406	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 <sub>0</sub> X A <sub>0</sub> X K <sub>0</sub>	TAPE WIDTH W	REEL DIA.	QTY PER REEL	P <sub>0</sub>	P <sub>1</sub>
CSPRC032A	2.485 X 0.985 X 0.606	2.62 X 1.12 X 0.762	8mm	178mm (7")	3500	4mm	4mm



**Figure 3. Tape and Reel Mechanical Data**