

Chip Scale Package (CSP) Series Termination Array

Features

- 8 or 16 isolated high-frequency series termination resistors in a single package
- 16-bump and 32-bump Chip Scale Packages (CSP)
- CSP package minimizes cross-talk
- Ultra small foot print packages suitable for portable devices
- 1% and 5% tolerance components standard
- Extremely low bump inductance (25pH typical)
- Ceramic substrate
- 0.35mm Eutectic solder bumps, 0.65mm pitch

Applications

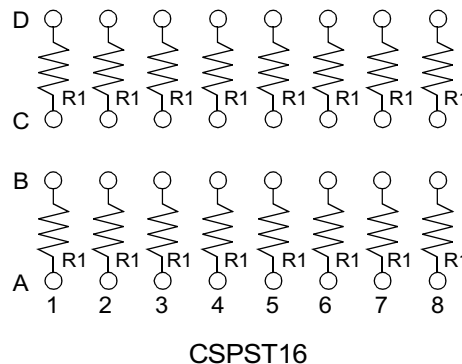
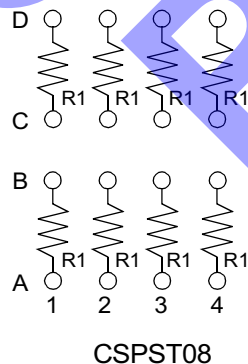
- Series resistive bus termination
- Servers
- High speed computing systems
- Notebook PCs
- Handheld devices
- Mobile telephones
- Digital cameras and camcorders

Product Description

The CSPST is a high performance Integrated Passive Device (IPD) which provides series terminations suitable for use in high speed bus applications. Eight (8) or sixteen series termination versions are provided. These resistors provide excellent high frequency performance in excess of 3GHz and are manufactured to an absolute tolerance as low as $\pm 1\%$.

The Chip Scale Package provides an ultra small footprint for this device and provides minimal parasitics compared to conventional packaging. Typical bump inductance is less than 25pH. The large solder bumps and ceramic substrate allow for standard attachment to laminate printed circuit boards without the use of underfill.

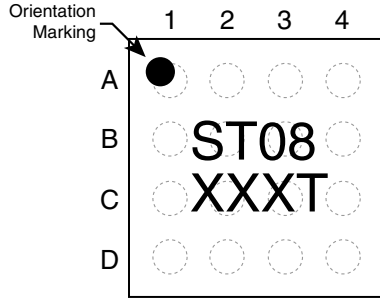
Electrical Schematics



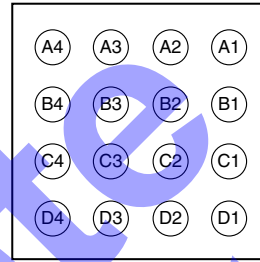


PACKAGE / PINOUT DIAGRAMS

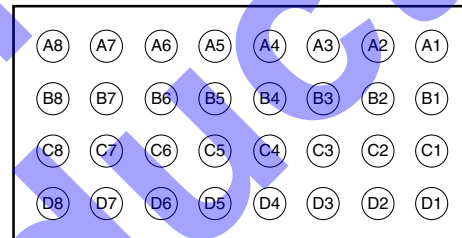
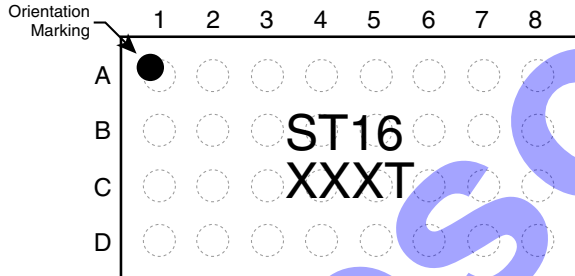
TOP VIEW
(Bumps Down View)



BOTTOM VIEW
(Bumps Up View)



CSPST08
CSP Package



CSPST16
CSP Package

Note: These drawings are not to scale.

Ordering Information (cont'd)

PART NUMBERING INFORMATION				
R1 Value (Ω)	Package	Terminations	Ordering Part Number¹	Part Marking
22	CSP	8	CSPST08-220F	ST08 220T
22	CSP	8	CSPST08-220J	ST08 220T
33	CSP	8	CSPST08-330F	ST08 330T
33	CSP	8	CSPST08-330J	ST08 330T
39	CSP	8	CSPST08-390F	ST08 390T
39	CSP	8	CSPST08-390J	ST08 390T
47	CSP	8	CSPST08-470F	ST08 470T
47	CSP	8	CSPST08-470J	ST08 470T
51	CSP	8	CSPST08-510F	ST08 510T
51	CSP	8	CSPST08-510J	ST08 510T
56	CSP	8	CSPST08-560F	ST08 560T
56	CSP	8	CSPST08-560J	ST08 560T
22	CSP	16	CSPST16-220F	ST16 220T
22	CSP	16	CSPST16-220J	ST16 220T
33	CSP	16	CSPST16-330F	ST16 330T
33	CSP	16	CSPST16-330J	ST16 330T
39	CSP	16	CSPST16-390F	ST16 390T
39	CSP	16	CSPST16-390J	ST16 390T
47	CSP	16	CSPST16-470F	ST16 470T
47	CSP	16	CSPST16-470J	ST16 470T
51	CSP	16	CSPST16-510F	ST16 510T
51	CSP	16	CSPST16-510J	ST16 510T
56	CSP	16	CSPST16-560F	ST16 560T
56	CSP	16	CSPST16-560J	ST16 560T

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



Specifications

ABSOLUTE MAXIMUM RATINGS		
PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	°C
Power Rating per Resistor	100	mW

STANDARD OPERATING CONDITIONS		
PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	°C

STANDARD ELECTRICAL OPERATING CHARACTERISTICS ¹						
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
TOL _R	Resistor Absolute Tolerance					
	"F" Tolerance Devices				±1	%
	"J" Tolerance Devices				±5	%
TC _R	Temperature Coefficient of Resistance				±150	ppm/°C

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

Application Information

Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of the characteristics of Chip Scale Packages offered by California Micro Devices and guidelines for their use in systems.

PRINTED CIRCUIT BOARD RECOMMENDATIONS	
PARAMETER	VALUE
Pad Size on PCB	0.300mm
Pad Shape	Round
Pad Definition	Non-Solder Mask defined pads
Solder Mask Opening	0.350mm
Solder Stencil Thickness	0.152mm
Solder Stencil Aperture Opening	0.360mm square
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

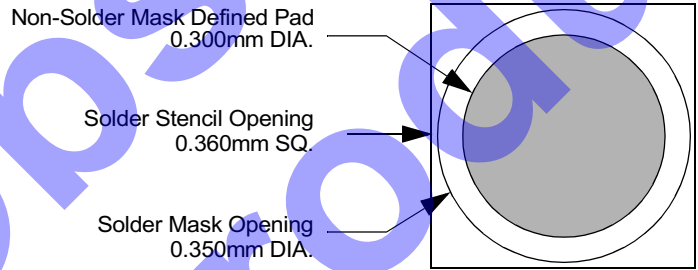


Figure 1. Recommended Non-Solder Mask Defined Pad Illustration

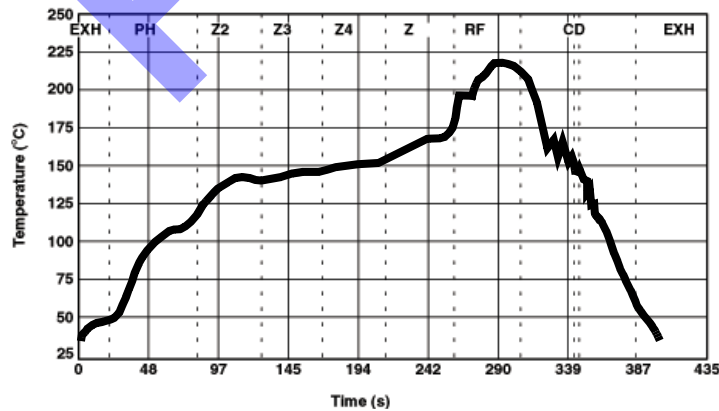


Figure 2. Solder Reflow Profile

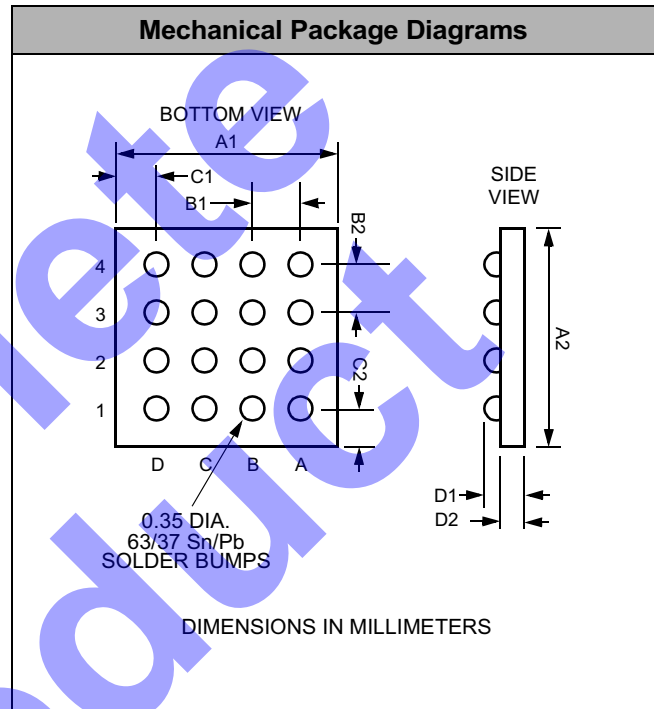
Mechanical Details

The CSPST devices are packaged in custom 16-bump and 32-bump Chip Scale Packages (CSP).

CSPST 20-bump CSP Mechanical Specifications

The CSPST devices are packaged in a 20-bump custom Chip Scale Package (CSP). Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	20					
Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A1	2.352	2.397	2.442	0.0926	0.0944	0.0961
A2	2.352	2.397	2.442	0.0926	0.0944	0.0961
B1	0.645	0.650	0.655	0.0254	0.0256	0.0258
B2	0.645	0.650	0.655	0.0254	0.0256	0.0258
C1	0.1734	0.2234	0.2734	0.0068	0.0088	0.0108
C2	0.1734	0.2234	0.2734	0.0068	0.0088	0.0108
D1	0.600	0.644	0.687	0.0236	0.0253	0.0271
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 CSPST 20-bump Chip Scale Package

CSP Tape and Reel Specifications

BASE NUMBER	PKG. SIZE (mm)	POCKET SIZE (mm) B ₀ X A ₀ X K ₀	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P ₀	P ₁
CSPST08	2.40 X 2.40 X 0.644	2.54 X 2.54 X 0.762	8mm	178mm (7")	3500	4mm	4mm

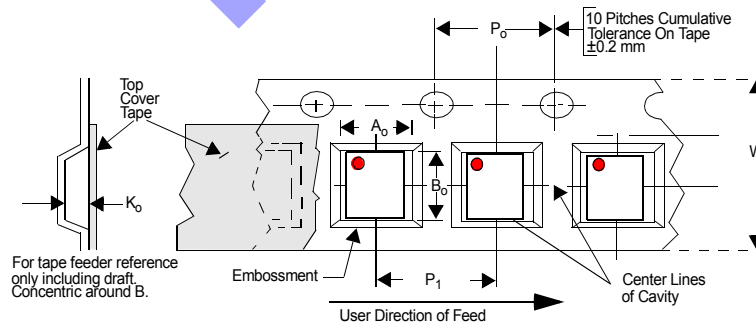


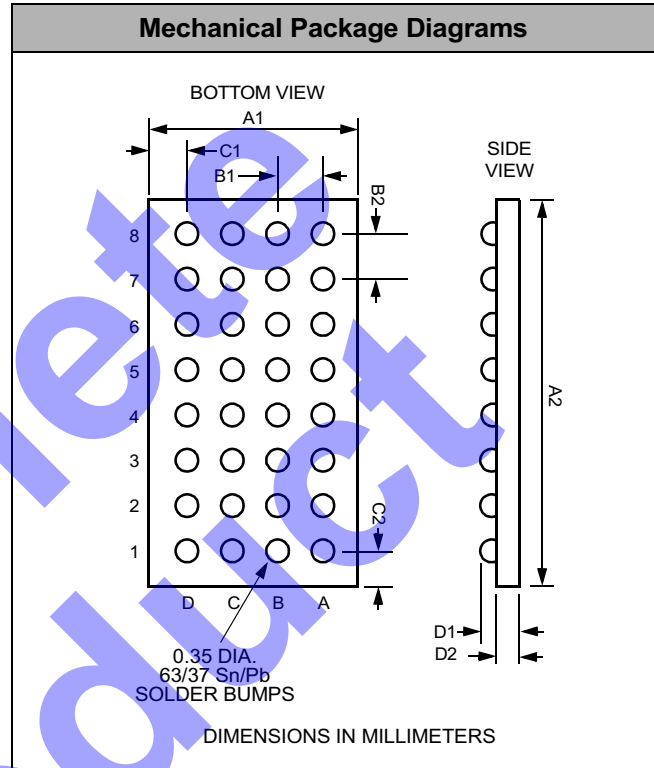
Figure 3. Tape and Reel Mechanical Data

Mechanical Details (cont'd)

CSPST 32-bump CSP Mechanical Specifications

The CSPST devices are packaged in a 32-bump custom Chip Scale Package (CSP). Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	32					
Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A1	2.352	2.397	2.442	0.0926	0.0944	0.0961
A2	4.952	4.997	5.042	0.1950	0.1967	0.1985
B1	0.645	0.650	0.655	0.0254	0.0256	0.0258
B2	0.645	0.650	0.655	0.0254	0.0256	0.0258
C1	0.1734	0.2234	0.2734	0.0068	0.0088	0.0108
C2	0.1734	0.2234	0.2734	0.0068	0.0088	0.0108
D1	0.600	0.644	0.687	0.0236	0.0253	0.0271
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 CSPST 32-bump Chip Scale Package

CSP Tape and Reel Specifications

BASE NUMBER	PKG. SIZE (mm)	POCKET SIZE (mm) B ₀ X A ₀ X K ₀	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P ₀	P ₁
CSPST16	5.00 X 2.40 X 0.644	5.28 X 2.67 X 0.838	8mm	178mm (7")	3500	4mm	4mm

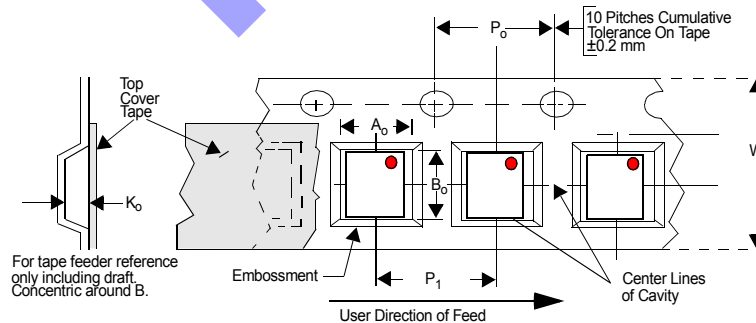


Figure 4. Tape and Reel Mechanical Data