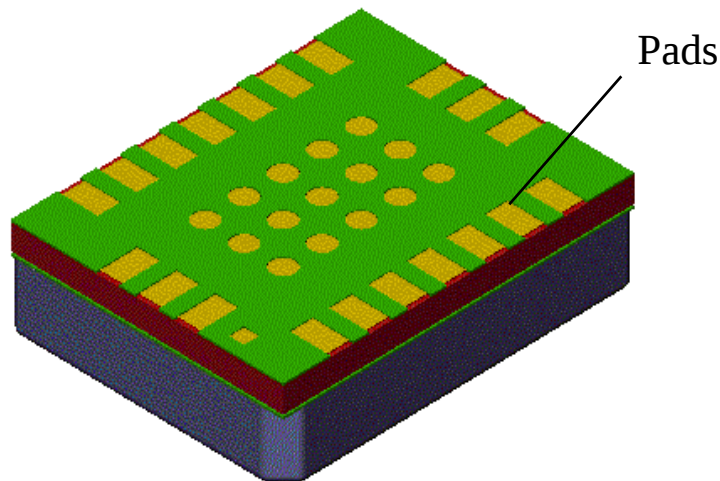
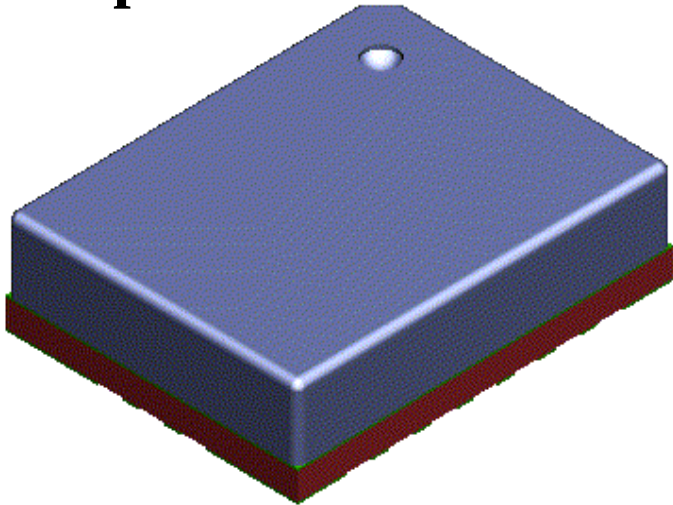




# Packaging/CSP

# Substrate CSP

**Top View**



**Bottom View**

- 68% Board Area Reduction (vs. TSSOP 20)
  - Only 25% larger than die
- Standard SMT Process
- JEDEC Registration:
  - 3 Registrations Completed (16/24/28L)
  - Reg # M0-208
- First Package: 24 lead, 0.5 mm pitch
  - Delivering 150K/mo from SC pilot line
- Availability
  - Customer Samples : CSP16, CSP28...
  - Pre -production CSP24
  - 8,16,20,24,28,48,64,81,100,144 + ..

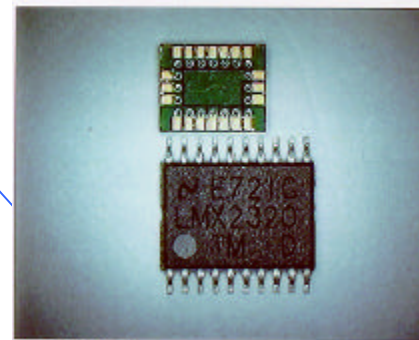
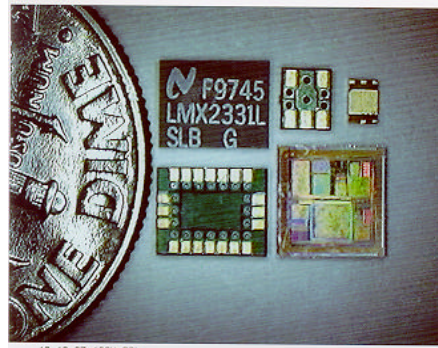
# CSP Packaging Acceptance

- Products available: **LMX2330L/31L/32L/36L, LMX2324**
- All new products will be available in CSP
- Demand is growing with many design wins already recorded
- Largest CDMA manufacture in the world is purchasing product in Chip Scale
- Japanese manufacturers are driving the requirement for Chip Scale Packaging in the market

# CSP Packaging

- Samples available(now) for LMX2330L/31L/32L/36L, LMX2324
- Package suffix “SLB” (LMX2330L**SLB**X)
- Package option for future products
  - Available on existing products based on demand
- Qualification in process (CSP24)
  - Expected completion mid November
  - CSP16/28 to be qual'd by extension (similarity)

(TSSOP 20 vs CSP 20)



# 16/20/24/28L CSP

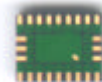
Package size comparison of  
NSC TSSOP and CSP



16L



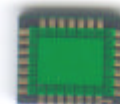
20L



24L

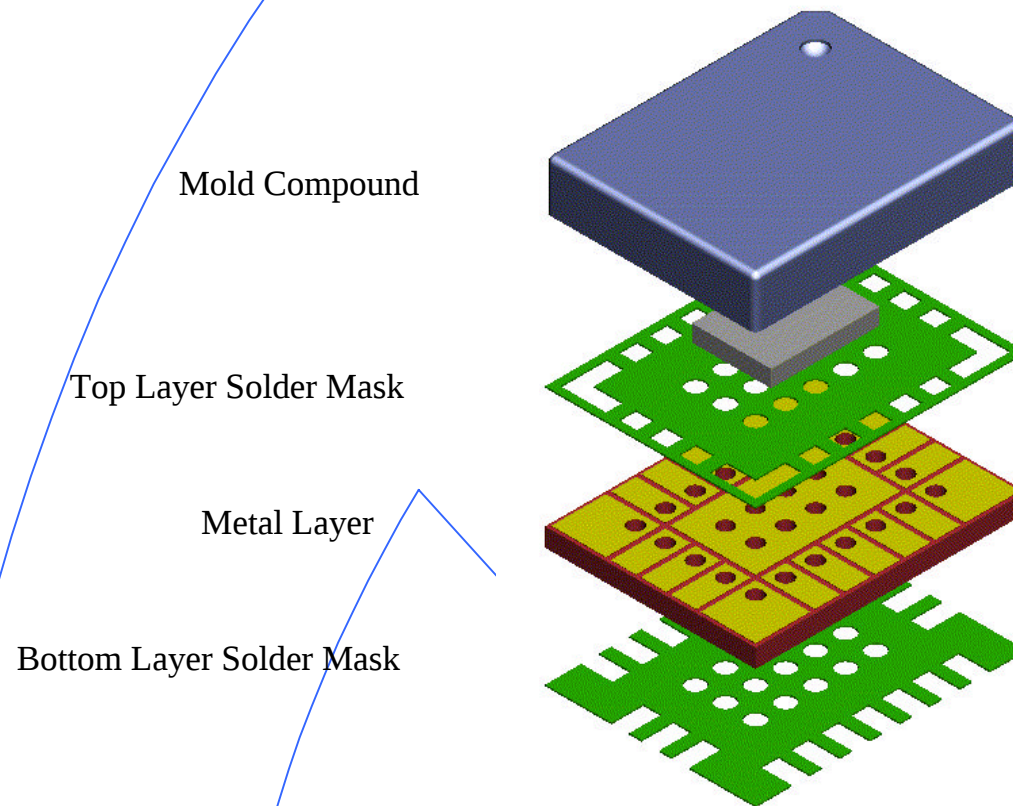


28L



## 20ld Laminate CSP

### Construction



## 2nd Generation - Dual Low Power PLLs

- |                   |       |               |
|-------------------|-------|---------------|
| ■ <b>LMX2330L</b> | 4.8mA | 2.5GHz/510MHz |
| ■ <b>LMX2331L</b> | 4.0mA | 2.0GHz/510MHz |
| ■ <b>LMX2332L</b> | 3.0mA | 1.2GHz/510MHz |
| ■ <b>LMX2335L</b> | 4.0mA | 1.1GHz/1.1GHz |
| ■ <b>LMX2336L</b> | 5.0mA | 2.0GHz/1.1GHz |
- Upgrade to the LMX233xL Family (60% reduction in power)
    - Pinout, functions and programming the same as the LMX233xA

- 
- Best Phase Noise
  - Vcc Range 2.7V to 5.5V
  - Fastlock
  - 20 pin TSSOP & CSP (LMX2335L SO16/TSSOP 16)
  - Power Down (1uA @ 3V typ.)

# Substrate CSP

## General Q&A

- What is the substrate material?
  - BT Resin with Taiyo PSR4000-AUS5 solder mask
- What is the pad material? Plating thickness?
  - 15 um Cu, 5 um Ni and .5 um Au plating.
- How thick is the resist around the pad?
  - 45 +/- 15 um
- What is the package size tolerance?
  - Pad to package edge should be within +/- .05mm
  - Package body size tolerance is +/- .1 mm
- Package flatness? (Required +/- 0.05mm)
  - No problem with +/- .05 mm
- Suggested pad size and soldering on PCB
  - Recommend using .5 mm x .3 mm pad size for PCB with metal pad defined structure and 6 mils stencil for solder screen printing.

# Substrate CSP General Q&A

(continued)

- Should the PCB mother board be designed with tented via hole around the CSP solder pad?
  - Yes. It is preferred that the solder pad via holes for the mother board be tented if they are close (eg < 1mm) to the solder pads. However, if the via holes are far away (eg > 1mm), then tenting is probably not necessary.
- What is the suggested reflow conditions?
  - Same as standard IR reflow profile used by all SMT components.

|                        |                      |
|------------------------|----------------------|
| Ramp up:               | 2 deg.C/sec          |
| Dwell Time > 183C:     | 75 sec               |
| Solder Temp:           | 215 C (max. @ 240 C) |
| Dwell Time @ Max Temp: | 5 sec                |
| Ramp Down:             | 2 deg.C/sec          |

# Substrate CSP General Q&A

(continued)

■ What desoldering tool is available for CSP?

The desoldering tool is the same as that used for any package type including TSSOP.

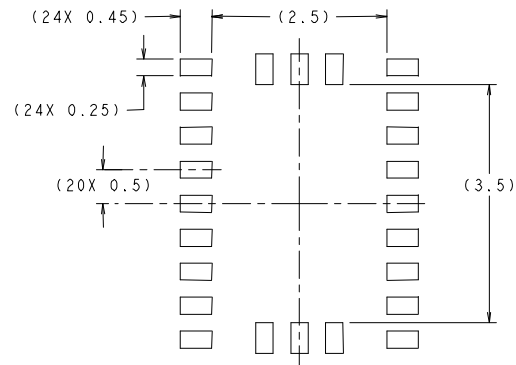
The manufacture of the desoldering tool is PRB LINE (Zephyrtronics). The model is DSZT3 SYSTEM. The complete system cost is about \$ 2000.

Contact Person: John F. Dwinell Jr. (Sales Engineer)

Phone #: (818) 783-7487

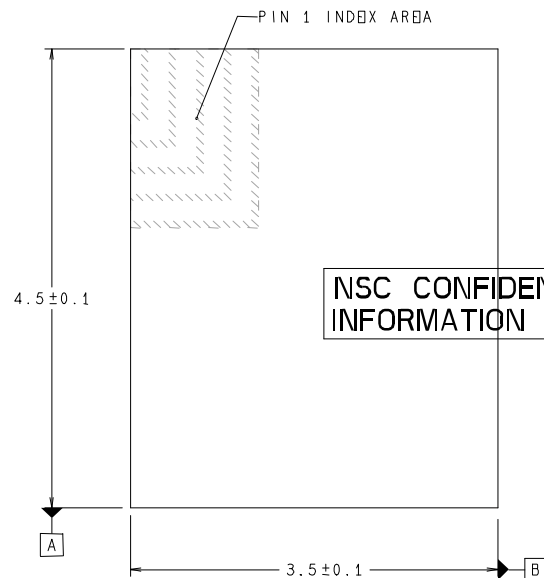
Address: P.O. Box 176 Whitewater, WI 53190

Email: [info@prbline.com](mailto:info@prbline.com)

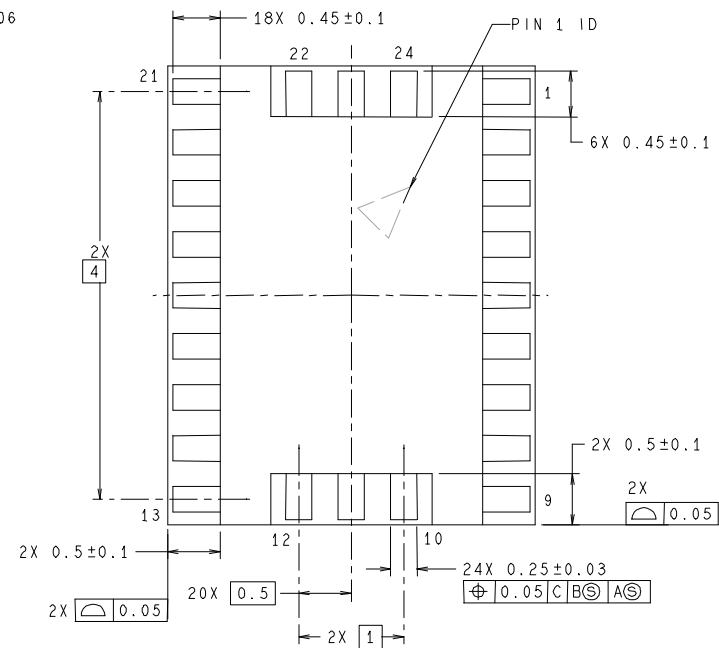
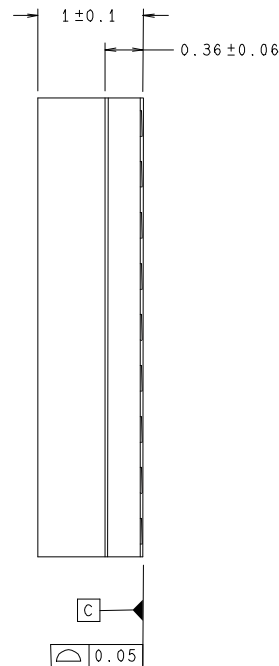


DIMENSIONS ARE IN MILLIMETERS

**RECOMMENDED LAND PATTERN**  
1:1 RATIO WITH PACKAGE SOLDER PADS



**NSC CONFIDENTIAL  
INFORMATION ONLY**



NOTES: UNLESS OTHERWISE SPECIFIED.

1. MATERIAL: BT RESIN CCL-HL832 WITH TAIYO PSR4000 AUS5 SOLDER MASK.
2. PLATING: Cu 15 TO 20 MICROMETERS  
Ni 5.0 MICROMETERS MINIMUM  
Au 0.5 MICROMETERS MINIMUM
3. REFERENCE JSDC BALLOT PROPOSAL 11-11-506, VARIATION ECU-1, DATED JAN 1998 (CUSTOM SOLDER PADS FOR FUJITSU).

| REVISIONS |                                                                 |        |            |          |
|-----------|-----------------------------------------------------------------|--------|------------|----------|
| LTR       | DESCRIPTION                                                     | B.C.N. | DATE       | BY/APP'D |
| A         | RELEASE TO DOCUMENT CONTROL                                     | 11957  | 03/19/1998 | TL/AP    |
| B         | REVISED METAL & SOLDERMASK LAYERS:<br>PKG THICKNESS WAS 0.9-1.1 | -      | 06/11/1998 | TL/      |

| APPROVALS                    |            | DATE       | National Semiconductor                            |      |                |     |
|------------------------------|------------|------------|---------------------------------------------------|------|----------------|-----|
| DRAWN                        | T. LEQUANG | 03/19/1998 | 2900 Semiconductor dr, Santa Clara, CA 95052-8090 |      |                |     |
| DTG. CHK.                    |            |            | CSP, PLASTIC, LAMINATED,                          |      |                |     |
| ENGR. CHK.                   |            |            | 3.5 X 4.5 X 1.0 mm BODY,                          |      |                |     |
|                              |            |            | 24 L, 0.5mm PITCH                                 |      |                |     |
| <br>PROJECTION<br>INCH<br>MM |            |            | SCALE                                             | SIZE | DRAWING NUMBER | REV |
|                              |            |            | N/A                                               | C    | (SC)MKT-SLB24A | B   |
| DO NOT SCALE DRAWING         |            |            | SHEET 1 of 1                                      |      |                |     |