C28SOI_IO_BUMP_6U1X2T8XLB
User Manual

Contains BUMP cells
designed in 28 nm FDSOI technology

Overview

The C28SOI_IO_BUMP_6U1X2T8XLB library contains BUMP cells intended for all CMOS028 FDSOI libraries, where flip-chip strategy is required for high pin count.
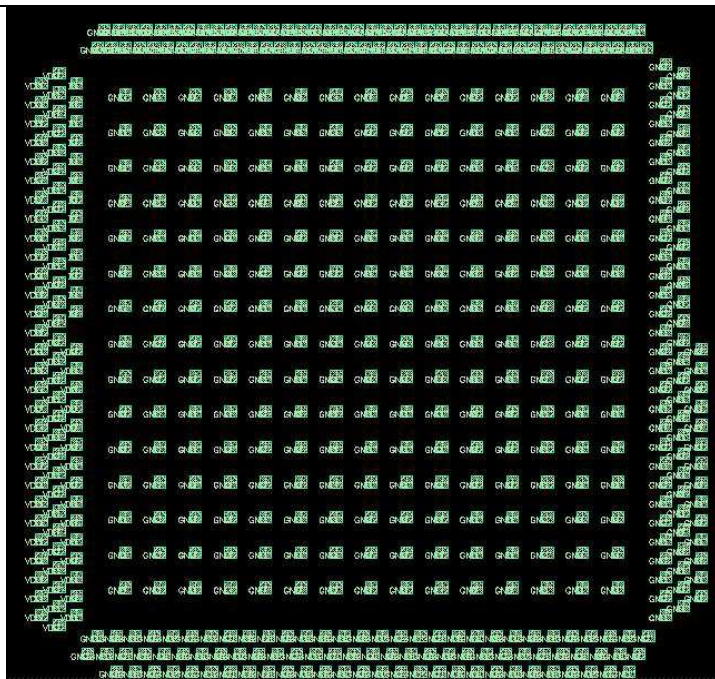
Features

- Uses standard process option.

- Available with three classes of BUMP cells.

- Metallization option support as per the product package.

Applications

- Used to provide flip-chip strategy to an IO library for high pin count.

Figure 1 : Example of Bumps placement

1.   Quick References

The document uses the following convention to indicate logic levels:

- *L indicates logic low.*
- *H indicates logic high.*
- *X indicates don't care state.*
- *Z indicates high impedance state.*
- *'-' (Hyphen) indicates 'No activity'.*

- ** suffixed in library name indicates multiple metallization options.*
- *** suffixed in cell name indicates multiple packages / configurations.*

1.1   Metal Stacking Convention

The metallization option supported by this library can be referred from its product package. The following is the convention that can be used to decode the segment in the library name:

- 7 metal option (5U1X2T8XLB) known as 5002 refers as follows:

    - 5U1X refers to the first 5 levels with 1X pitch (thin) metal.

    - 2T8X refers to 2 levels with 8X (thick) metal in oxide.

    - LB is the Alucap.

- 8 metal option (6U1X2T8XLB) known as 6002 refers as follows:

    - 6U1X refers to the first 6 levels with 1X pitch (thin) metal in ultra-low K.

    - 2T8X refers to 2 levels with 8X (thick) metal in oxide.

    - LB is the Alucap.

- 10 metal option (6U1X2U2X2T8XLB) known as 6202 refers as follows:

    - 6U1X refers to the first 6 levels with 1X pitch (thin) metal in ultra-low K.

    - 2U2X refers to the next 2 levels with 2X pitch (thin) metal in ultra-low K.

    - 2T8X refers to 2 levels with 8X (thick) metal in oxide.

    - LB is the Alucap

1.2   Reference Documentation

For details on the following topics:

- Power Sequencing Recommendation in IOs

- Specifications and Analysis of Overshoots and Undershoots

- SSN Application Notes

- ESD qualification

- Latch-up qualification

- Maturity information

- RDL recommended rules

    – ST users, refer to the IO Reference catalog

      (http://ccds.st.com/cps/sections/library/io/io_reference_catalog/downloadFile/file/IO_Helpdesk_Solutions.pdf).

    – Non-ST users, contact Customer Support personnel

2. Functional Specifications

Table 1 :   **Cell List**

Cell Name	Description
CLASS_FC44S_6U1x2T8x_LB	
BUMP_FC44S_72X72_GND	Core ground BUMP
BUMP_FC44S_72X72_VDD	Core power BUMP
BUMP_FC44S_72X72_SIGNAL	Signal BUMP
CLASS_FC61A_6U1x2T8x_LB	
BUMP_FC61A_96X96_GND	Core ground BUMP
BUMP_FC61A_96X96_VDD	Core power BUMP
BUMP_FC61A_96X96_SIGNAL	Signal BUMP
CLASS_FC52A_6U1x2T8x_LB	
BUMP_FC52A_90X90_GND	Core ground BUMP
BUMP_FC52A_90X90_VDD	Core power BUMP
BUMP_FC52A_90X90_SIGNAL	Signal BUMP

> *The "ALLCELLS" cells are not considered as part of the deliverable. These cells are specifically for QA check and hence subject to change, without prior notice.*

2.1.1 Cell Information

Table 2 :   Cell Information

Parameter	Dimensions[1]	Unit
CLASS_FC44S_6U1x2T8x_LB		
Alucap dimensions	72.3 x 72.3	µm x µm
Nitride opening	44.5 x 44.5	µm x µm
CLASS_FC61A_6U1x2T8x_LB		
Alucap dimensions	96.7 x 96.7	µm x µm
Nitride opening	61.1 x 61.1	µm x µm
CLASS_FC52A_6U1x2T8x_LB		
Alucap dimensions	90 x 90	µm x µm
Nitride opening	52.2 x 52.2	µm x µm

[1]   Dimensions before shrink.

2.1.2 Functional Diagram

The three pad classes of BUMPs can be further divided into different types with respect to the type of function performed by the cells, as mentioned in the following sections:

2.1.3 Signal BUMPs

Signal BUMPs are used to connect any signal, except core power and ground. These BUMPs should be connected via the redistribution layer to the Alucap pin available in the layout view of the IO cells.

Figure 2 : Signal BUMP
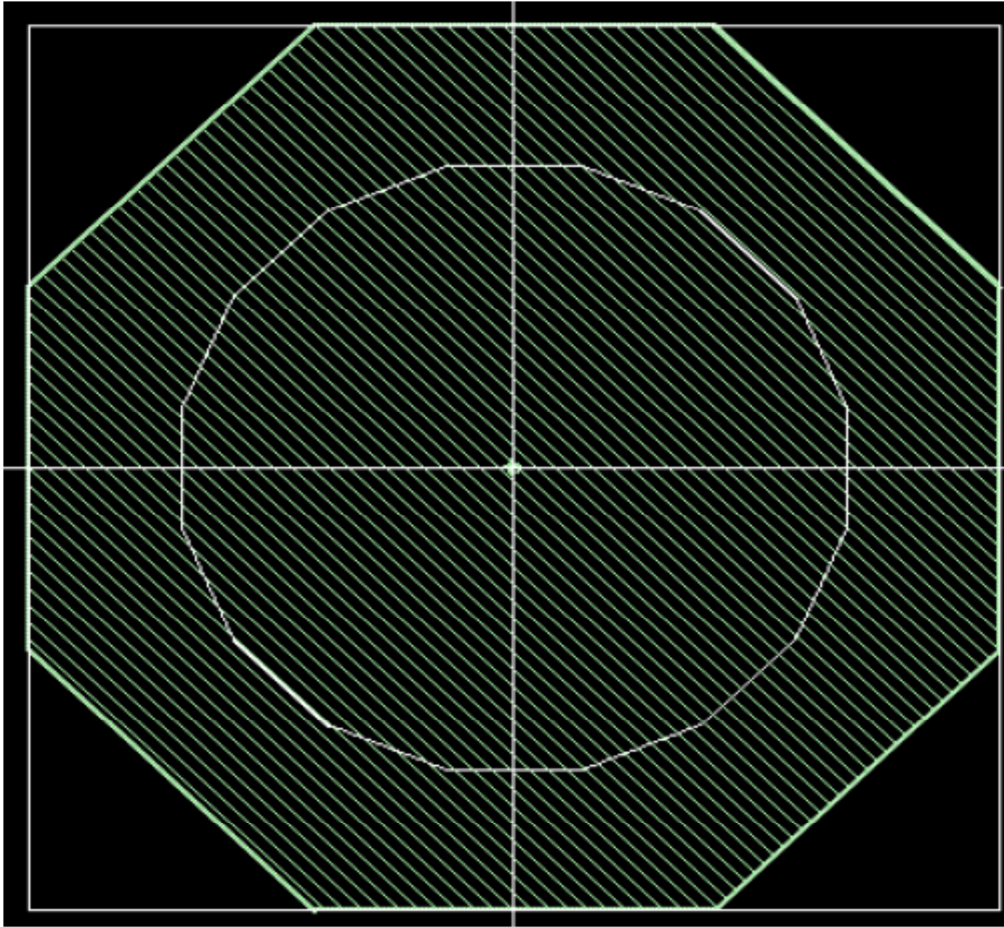
| ⛔ | *BUMP usage and redistribution flow are dependent on the package design and design flow, which are not described in this document.* |

2.1.4 Core Power and Ground BUMPs

Core power and ground BUMPs are used for connecting VDD and GND to the power and ground grid. All other supplies and signals need to have signal BUMPs and the IOs need to be placed in an IO section (IO ring or IO cluster).

Figure 3 : Core Power or Ground BUMP
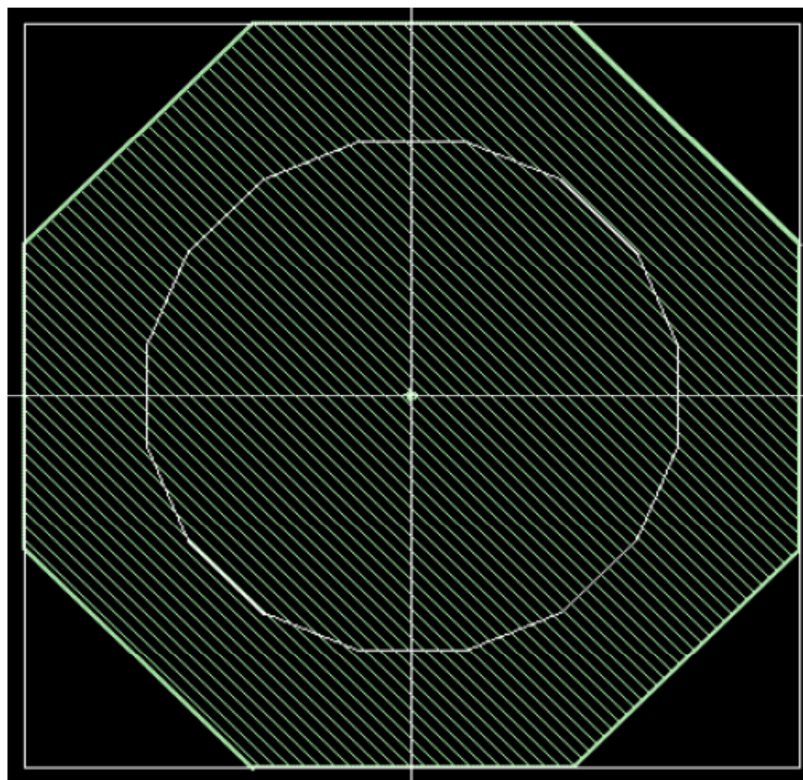
Core power and core ground BUMPs are not plugged to the power grid. The following points should be noted:

- *Either connects it in Alucap (LB) like signal BUMP.*
- *Or add VV vias (outside LV nitride opening), with a review for each implementation with dedicated pad owners.*

2.2   IO Topology

The C28SOI_IO_BUMP_6U1X2T8XLB library does not need any library to be instantiated along with it in an IO ring.

2.2.1   Pad Class Offer

The C28SOI_IO_BUMP_6U1X2T8XLB library has the following three pad classes:

- ■   CLASS_FC44S_6U1x2T8x_LB.
- ■   CLASS_FC61A_6U1x2T8x_LB.
- ■   CLASS_FC52A_6U1x2T8x_LB.

2.2.2   Pad-pitch Offer

As routing on the package may dictate the BUMP pitch, it is mandatory to do package design and die layout in parallel.

3.   Electrical Specifications

Current capacity depends on placement of BUMP and assembly rules.

4. Contact Information

ST users, login to **HELPDESK**. (http://col2.cro.st.com/helpdesk) for submitting queries or support requests.

Non-ST users, contact Customer Support personnel.

Appendix A: Cell Naming Convention

Table 3 :   Naming Convention for BUMP Cells

Segment Name	Description
Cell type	Refers to the type of cell. The value of this component is BUMP.
1st suffix	Refers to pad class, which indicates the type of configuration too. It can have one of the following values: – FC44S: Alucap BUMP with 44.5 µm wide nitride opening, for staggered placement. – FC61A: Alucap BUMP with 61.1 µm wide nitride opening, for staggered placement. – FC52A: Alucap BUMP with 52.2 µm wide nitride opening, for staggered placement.
2nd suffix	Refers to the Alucap dimension. It can have the following values: – 72 µm x 72 µm. – 96 µm x 96 µm. – 90 µm x 90 µm.
3rd suffix	Refers to the BUMP cell. It can have the following values: – VDD: Core power BUMP. – GND: Core ground BUMP. – SIGNAL: Signal BUMP.

Table 4 :   Naming Convention for BUMP_FC44S_72X72_VDD Cell

Segment Name	Segment Value	Description
Cell type	BUMP	BUMP cell
1st suffix	FC44S	PAD class
2nd suffix	72X72	Alucap dimension
3rd suffix	VDD	Core power BUMP

Appendix B: Document Revision History

Table 5 :   Document Revision History

Date	Document Version	Comments
14-Nov-2014	1.0	First release

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