

SEMI G16-88

SPECIFICATION FOR DIMENSIONS AND TOLERANCES USED TO MANUFACTURE PLASTIC CHIP CARRIER TOOLING

This Standard was technically approved by the Assembly & Packaging Global Technical Committee.

NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Preface

1.1 This Document is a guideline for the ordering of tooling required to mold and form plastic chip carriers. It is to be used by packaging engineers, mold manufacturers and end of line tool makers as the basis for defining the limits of manufacturing tolerances.

2 Applicable Documents

2.1 Related information may be found in:

MIL-STD-100¹ — Engineering Drawing Practices

ANSI Y14.5² — Dimensioning and Tolerancing

JEDEC Publication No. 95³ — Outline for Semiconductor Devices

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

3 Selected Definitions — Production Criteria Tolerance Limits

3.1 *mismatch and offset* — defined with respect to package only. All statements will be equally applicable in two axes. All mismatch and offset measurements are made after molding and prior to trimming.

3.1.1 *cavity to frame offset* — will be measured prior to any trimming operation. Offset will be defined as the difference in bottom cavity position with respect to a leadframe datum. The offset measurement will exclude leadframe tolerances. (See Figure 1.)

3.1.2 *top to bottom cavity mismatch* — characterized by the fact that the top and bottom cavities in the mold are not aligned properly, causing a mismatch condition. The measurement shall be stated as the difference in the top cavity position relative to the bottom cavity position. (See Figure 2.)

3.2 Molded Protrusions

3.2.1 *parting line protrusions* — those plastic excesses which remain as a normal characteristic after normal molding, deflashing, trimming, and singulation. (See Figure 6.)

3.2.2 *top or bottom protrusions* — those plastic excesses (includes ejector pin ‘crowns’), which remain as a normal characteristic extending from the smooth surface of the molded package.

3.3 *variations in lead location* — defined with respect to a 90° angle from the top or bottom of the smooth surface of the molded package as viewed on the end or side projections. (See Figure 6.)

3.4 *lead shoulder protrusions and intrusions* — any variations in straightness along the defined shoulder width caused by dambar removal. (See Figure 6.)

3.5 *package warpage* — any non-linear dimensional change from the mold cavity characteristic, usually caused by incorrect package design or molding practices. (See Figure 3.)

¹ United States Military Standards, Available through the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099, USA; Telephone: +1.215.697.3321.

² American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: +1.212.642.4900, Fax: +1.212.398.0023, <http://www.ansi.org>

³ Joint Electron Device Engineering Council, 3103 North 10th Street, Suite 240-S, Arlington, VA 22201, USA; Telephone: +1.703.907.7560, Fax: +1.703.907.7583, <http://www.jedec.org>

3.6 *shoulder bend location* — measured from the outermost point of the shoulder bend radius. (See Figure 4.)

3.7 *lead co-planarity* — defined as the vertical lead position with respect to a reference plane measured after forming. (See Figure 5.)

4 Ordering Information

4.1 Purchase orders for tooling for plastic molded quad semiconductor packages furnished to this Specification shall include the following items:

4.1.1 A package tooling outline drawing showing all required dimensions listed in § 5. Package surface finish should be included.

4.1.2 A list of any tolerance limits which will differ from those detailed in § 6.

4.1.3 The type of tooling steel required.

4.1.4 The type of leadframe material to be used.

4.1.5 The type of plastic to be molded (if proprietary, a statement of its shrinkage characteristics).

4.1.6 Sampling plan for compliance to § 7.

4.1.7 The number of spare parts or expendable parts desired.

4.1.8 The type of molding press to be used, including power requirements.

4.1.9 Applicable leadframe drawing, including all dimensions.

5 Dimensions

5.1 Drawing must show dimensions for the following items, if applicable:

1. Package length
2. Package width
3. Top cavity thickness
4. Bottom cavity thickness
5. Frame thickness
6. Ejector top locations from cavity center line
7. Ejector bottom locations from cavity center line
8. Ejector size (top and bottom)
9. Ejector depth (top and bottom, draft angle top side, bottom side, and end)
10. End notch shape, depth, width, length
11. Pin 1 ID location from package center
12. Pin 1 ID shape and size
13. Corner radius or sides
14. Corner radius or ends
15. Lead spread (nominal)
16. Shoulder bend location
17. Shoulder width

6 Product Criteria Dimensional Tolerance Limits for PCCs

6.1 In recognizing that every manufacturing process is subject to variation, the following list details the acceptable limit of this variation: