

SEMI G36-88

SPECIFICATION FOR DIMENSIONS AND TOLERANCES USED TO MANUFACTURE PLASTIC MOLDED HIGH DENSITY TAB QUAD SEMICONDUCTOR PACKAGE TOOLING

1 Preface

This document is for the ordering of tooling required to mold and form plastic high density TAB quad semiconductor packages. It is to be used by packaging engineers, mold manufacturers, and end-of-line toolmakers as the basis for defining the limits of manufacturing tolerances.

2 Applicable Documents

2.1 ANSI Specification¹

Y14.5 — Dimensioning and Tolerancing

2.2 JEDEC Specification²

Pub No.95 — JEDEC Registered and Standard Outline and Standard Outline for Semiconductor Devices

2.3 Military Specification³

MIL-STD-100 — Engineering Drawing Practices

3 Selected Definitions — Product Criteria Tolerance Limits

mismatch and offset — defined with respect to package only. All statements will be equally applicable in two (2) axes. All mismatch and offset measurements are made after molding and prior to trimming.

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 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 1).

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

parting line protrusions — those plastic excesses which remain as a normal characteristic after normal molding, deflashing, trimming, and singulation (see Figure 4).

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

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 4).

lead shoulder intrusions and protrusions — any variations in straightness along the defined shoulder essentially caused by dambar removal (see Figure 4).

lead position overlay (footprint) — (See Figure 5.)

shoulder bend location — measured from the outermost point of the shoulder bend radius (see Figure 6).

lead co-planarity — defined as the vertical lead position with respect to a reference plane measured after forming. The reference plane is defined by the three lowest leads from the bottom of the package (see Figure 6).

4 Ordering Information

4.1 Purchase orders for tooling for plastic molded high density TAB semiconductor packages furnished to this specification shall include the following items:

1. A package tooling outline drawing showing all required dimensions listed in Section 5. Package surface finish to be included.
2. A list of any tolerance limits which differ from those in Section 6.
3. The type of tooling steel required.
4. The type of leadframe material and temper to be used.
5. The type of plastic to be molded (if proprietary, a statement of its shrinkage characteristics) and molding temperature.
6. Sampling plan shall be determined between vendor and purchaser.
7. The number of spare parts or expendable parts desired.

1 ANSI, 1430 Broadway, New York, NY 10018

2 JEDEC, 2001 Eye Street N.W., Washington, D.C. 20006

3 Military Standards, Naval Publications and Form Center, 5801 Tabor Avenue, Philadelphia, PA 19120

8. Molding press to be used.
9. Electrical power available for heating.
10. 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. Top ejector pin locations from datum lines
7. Bottom ejector pin locations from datum lines
8. Ejector pin sizes (top and bottom)
9. Ejector depth (top and bottom, draft angle top and bottom side)
10. Pin 1 ID location from package center
11. Pin 1 ID shape and size
12. All applicable package radii
13. Draft angles (top and bottom)
14. Package parting line location
15. Shoulder bend location

6 Product Criteria

6.1 Dimensional tolerance limits for high density TAB products (see Section 3).

6.1.1 Recognizing that every manufacturing process is subject to variation, the following list details the acceptable limit of this variation:

28-328 LEAD

OVERLAP/OFFSET	
Cavity Overlap (See Figure 1)	0.002" (maximum)
Cavity Mismatch (See Figure 1)	0.002" (maximum)

CAVITY TO FRAME OFFSET	
(See Figure 2) (not including leadframe tolerances)	0.002" (maximum)

PACKAGE WARPAGE	
Warp factor (See Figure 3)	2.5 to a max. of 0.003"

PROTRUSIONS & INTRUSIONS	
(See Figure 4) Parting line	0.005" (maximum)
Gating	0.005" (maximum)
Top or bottom ejector pin	0.002" (maximum)

VARIATIONS IN LEAD POSITION	
(See Figure 4)	0.003" (maximum)

LEAD COPLANARITY	
(See Figure 6)	0.002" (maximum)

DAMBAR TRIMMING INTRUSIONS/PROTRUSIONS	
Intrusions (See Figure 6)	0.002" (maximum)
Protrusions (See Figure 4) (shall not decrease gap more than 20%)	0.003" (maximum)

7 Packaging

Tooling must be packed in containers designed and constructed to prevent damage and/or contamination.