

SEMI G47-88

SPECIFICATION FOR PLASTIC MOLDED QUAD FLAT PACK LEADFRAMES

1 Preface

This specification defines the acceptance criteria for leadframes designed for assembly of JEDEC registered publication 95 standard outlines for "Plastic Quad Flat Pack 0.025" lead spacing (gull wing) packages". It is a design guideline for packaging engineers, leadframe stampers and etchers, mold and trim/form tooling manufacturers. It has been developed to meet the requirements of assemblers using automatic and manual equipment.

2 Applicable Documents

2.1 SEMI Specifications

SEMI G4 — Specification, Integrated Circuit Leadframe Materials in the Production of Stamped Frames

SEMI G18 — Specification, Integrated Circuit Leadframe Materials Used in the Production of Etched Frames

SEMI G10 — Standard Method, Mechanical Measurement for Plastic Package Leadframes

SEMI G21 — Specification, Plating Integrated Circuit Leadframes

2.2 ANSI Specification¹

Y 14.5M-1982 — Dimensioning and Tolerancing

2.3 JEDEC Specification²

Registration 95 — Plastic Quad Flat Pack, 0.025" Lead Spacing (Gull Wing)

2.4 Military Specification³

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes

3 Selected Definitions

burr — a fragment of excess material either horizontal or vertical attached to the leadframe.

camber — curvature of the leadframe strip edge (see Figure 1).

coil set — Longitudinal bowing of the leadframe (see Figure 2).

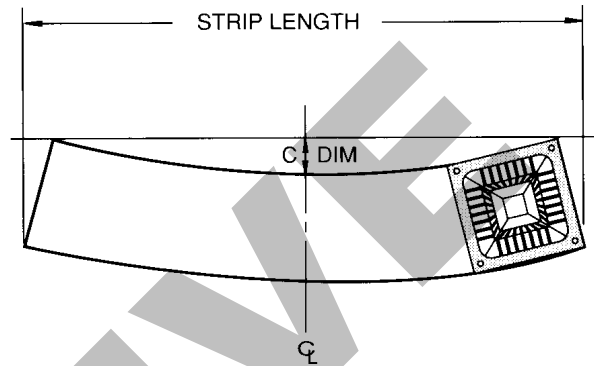


Figure 1
Camber

coined area — that area at the tip end of the bond fingers coined to produce a flattened area for functional use (see Figure 3).

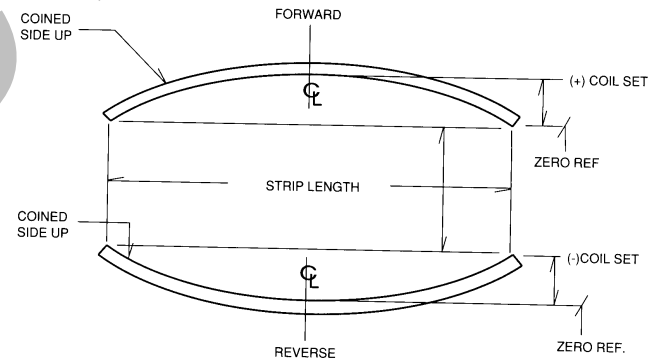


Figure 2
Coil Set

crossbow — transverse bowing of the leadframe (see Figure 4).

lead twist — angular rotation of bonding fingers (see Figure 5).

pits — shallow surface depressions or craters in the leadframe material.

true position circle — that circle with its center positioned at the center of the coined lead defines the design position of the lead tip.

¹ ANSI, 1430 Broadway, New York, NY 10018

² Military Standards, Naval Publications and Form Center, 5801 Tabor Ave., Philadelphia, PA 19120

³ JEDEC, 2001 Eye Street, N.W., Washington, D.C. 20006

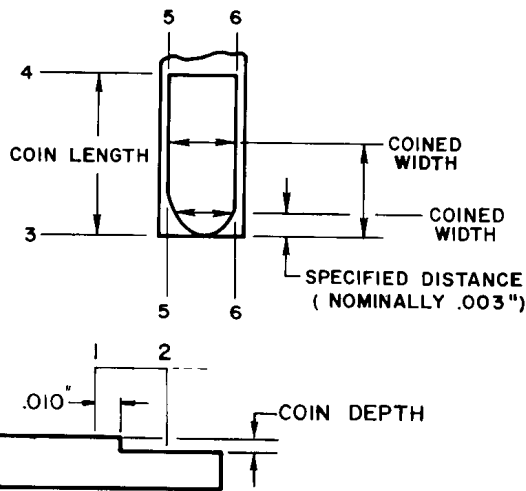


Figure 3
Coined Area

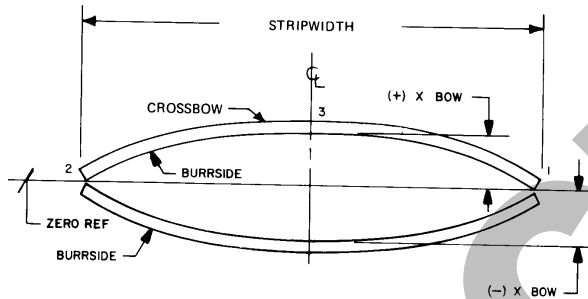


Figure 4
Crossbow



Figure 5
Lead Twist

4 Ordering Information

Purchasing orders for leadframes for plastic molded quad flat pack packages furnished to this specification shall include the following items:

- 4.1 Drawing no. and revision level.
- 4.2 Material, alloy specification.
- 4.3 Lead count, and confirming no. of units per strip.
- 4.4 Requirement for material certification.
- 4.5 Leadframe plating specifications.

5 Dimensions

5.1 Tables 1, 2, 3, and 4.

5.2 Reference Figures 6 and 7 and Details A and B.

6 Defect Limits and Parameters (to measure, see SEMI G10, Standard Method for Mechanical Measurement for Plastic Package Leadframes)

6.1 Lead Tip Width

6.1.1 *Minimum Lead Tip Width* — Shall be as agreed to between supplier and purchaser.

6.1.2 *Minimum Flat Wire Bonding Area* — 80% of nominal lead width and 0.025" (0.635 mm) in length.

6.2 Coining and Metal Clearance

6.2.1 *Coined Depth* — 0.0005" (0.013 mm) minimum to 30% material thickness maximum (stamped frames only).

6.2.2 Dimensions shown on drawings are before coining.

6.2.3 *Maximum Coining Bulge* — (Stamped frame only) shall not exceed 0.002" (0.051 mm) per edge and shall be governed by metal to metal clearance requirements (lead to lead and lead to pad).

6.2.4 *Metal-to-Metal Clearance* — Shall be as agreed to between supplier and purchaser.

6.3 *Lead Twist* — Shall not exceed 3.5 or 0.0006" (0.015 mm) per 0.001" (0.254 mm) of lead width.

6.4 *Burrs* — Shall be firmly attached and able to withstand a probe force of 10 grams. All burrs vertical and horizontal in any location shall not exceed 0.001" (0.0254 mm).

6.5 *Die Pad Tilt and Flatness* — (See SEMI G10 for measurement method.)

6.5.1 *Tilt* — 0.001" (0.025 mm) maximum per 0.100" (2.54 mm) of length or width in the undepressed state, and 0.002" (0.051 mm) maximum per 0.160" (4.06 mm) of length or width in the depressed state, when measuring corner to corner; overall maximum not to exceed a total of 0.006" (0.152 mm).

6.5.2 *Flatness* — 0.0002" (0.005 mm) per 0.100" (2.54 mm) pad length when measuring from the center to the average of four corners. The corners are defined at 0.005" (0.127 mm) from each edge.

6.6 Pits and Slug Marks

6.6.1 Within the functional area and on external leads, no slug marks and pits shall exceed 0.0003" (0.008

mm) in depth and 0.0005" (0.0013 mm) in length (see SEMI G4).

6.6.2 They shall not affect lead strength and shall not exceed 0.001" (0.0254 mm) in depth and 0.002" (0.051 mm) in length in non-functional areas.

6.7 Material thickness for both alloy 42 and copper alloys is 0.006" (0.152 mm), ± 0.00015 " (0.0038 mm) for all lead counts.

NOTE — The material thickness tolerance dimension listed in Section 6.7 is currently under committee review and is expected to be revised to ± 0.0002 ".

6.8 *Internal Position Tolerance* — The centerline of all leadframe features must be within T.P.T. 0.002" (0.051 mm) relative to center line of pilot holes on rail.

6.9 *Progression*

6.9.1 Single progression of one frame is T.P.T. 0.002" (0.051 mm).

6.9.2 Accumulated progression tolerance over the strip length (measured from pitch line tooling hole to pitch line tooling hole, across the strip length minus two units) is within T.P.T. of 0.004" (0.102 mm).

6.10 *Strip Cut Off Location* — Shall be within T.P.T. 0.006" (0.154 mm) of nominal strip length.

6.11 *Strip Width Tolerance* — T.P.T. 0.004" (0.102 mm) for copper and alloy 42 materials.

6.12 *Camber* — Shall not exceed 0.002" (0.051 mm) over nominal strip length.

6.13 *Coil Set* — Maximum of 0.020" (0.508 mm) over the nominal strip length. This does not include material thickness.

6.14 *Cross Bow* — Shall not exceed the following dimensions:

<i>No. of Leads</i>	<i>Maximum Cross Bow</i>
52—100	0.006" (1.52 mm)
132—164	0.010" (0.254 mm)
196—244	0.012" (0.305 mm)

7 Sampling

Sampling will be determined between supplier and purchaser.

8 Packaging and Marking

8.1 *Packaging* — Leadframes must be packaged in containers designed and constructed to prevent damage and contamination.

8.2 *Marking* — The outer containers shall be clearly marked identifying the user stock number, user purchase order number, drawing number, and vendor lot numbers within the carton.