

# SEMI G19-0997 SPECIFICATION FOR DIP LEADFRAMES PRODUCED BY ETCHING

## 1 Preface

This specification is a guideline for production of DIP leadframes for plastic molded semiconductor packages produced by the etching process. It is a design guideline for packaging engineers, etchers, and mold manufacturers and has been developed to meet the requirements of automatic bonders.

## 2 Applicable Documents

### 2.1 SEMI Standards

*SEMI G18* — Specification for Integrated Circuit Leadframe Material Used in the Production of Etched Leadframes

*SEMI G10* — Standard Method for Mechanical Measurement of Plastic Package Leadframes

### 2.2 Other Document

PCM1 D-300<sup>1</sup> — Standard Specification

## 3 Selected Definitions

*burrs and protrusions* — Fragments of excess material, either horizontal or vertical, attached to the lead frame.

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

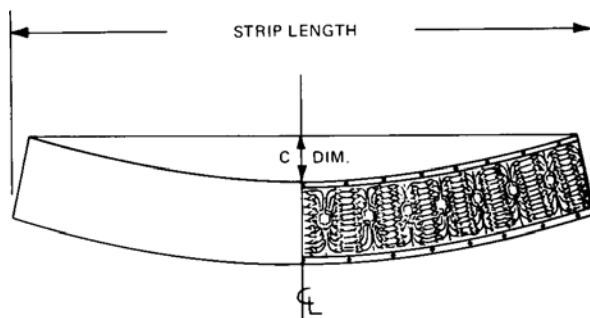


**Figure 1**  
**Camber**

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

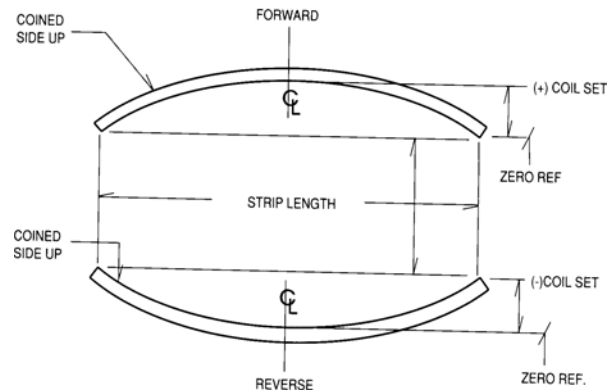


**Figure 2**  
**Coil Set**

*compensation* — Changes made in the dimensions on the master artwork other than those specified on the engineering artwork that allow for the process variables (i.e., etch factor, undercut).

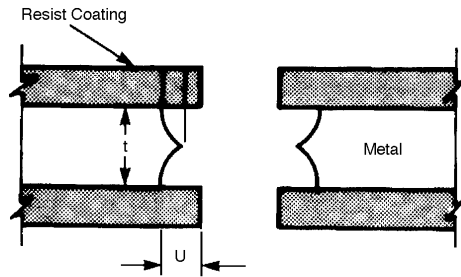
*crossbow* — Transverse bowing of the leadframe (see Figure 3).

(enter graphic when available)

**Figure 3**  
**Crossbow**

*etch factor* — The ratio of etched depth to the lateral etch or undercut (see Figure 4).

<sup>1</sup> Photochemical Machining Institute, 4113 Barberry, Lafayette Hills, PA 19444



When:  $E = \text{Etch Factor (Etching both sides)}$   
 $t = \text{Metal Thickness}$   
 $U = \text{Lateral Etch or Undercut}$   
 Then:  $E = \frac{5 \times t}{U}$

**Figure 4**  
Undercut and Etch Factor

*functional area* — The die attach pad and wire bond (lead tip) area.

*lateral etch or undercut* — The allowable bevelled edge caused by the leadframe etchant attacking the metal laterally as well as vertically (see Figure 5).

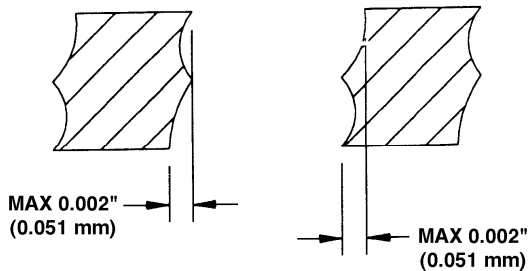


**Figure 5**  
Overetching

*lead twist* — Angular rotation of the bond fingers (see Figure 6).

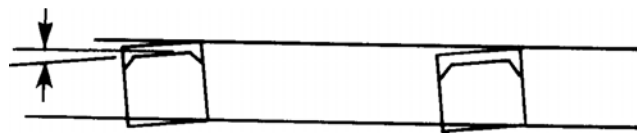


**Figure 6**  
Lead Twist

*offset alignment accuracy* — The top to bottom alignment accuracy of the etched leadframe operation (see Figure 7).

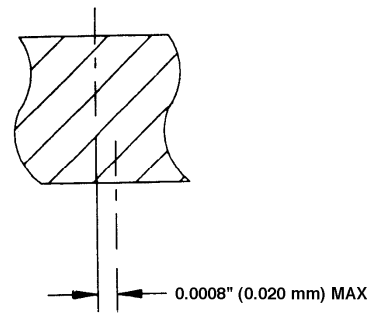


**Figure 7**  
Etched Offset

*pits* — Shallow surface depressions or craters in the leadframe material (see Figure 8).

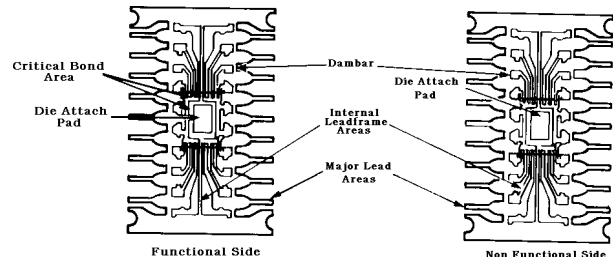


**Figure 8**  
Pits

*resist breakdown* — Etching under the edges of the resist causing more than a standard undercut.

*undercut* — Bevelled edge caused by the etchant attacking the metal laterally as well as vertically (see Figure 4).

#### 4 Ordering Information

Purchase orders for leadframes for plastic molded semiconductor packages furnished to this specification shall include the following items:

1. Drawing number and revision level
2. Material
3. Number of leads
4. Material certification
5. Number of units/strip
6. Plating requirements
7. Packaging and marking (see Section 8)