

SEMI G20-96

SPECIFICATION FOR LEAD FINISHES FOR PLASTIC PACKAGES (ACTIVE DEVICES ONLY)

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 Purpose

1.1 This Specification defines lead finishes for plastic packages (e.g., single-in-line, dual-in-line, quad-in-line) utilizing leadframes with SEMI specified leadframe materials.

2 Scope

2.1 This Specification defines the composition, properties, and limits and refers to the appropriate tests for utility.

3 Referenced Documents

3.1 Unless otherwise specified, the following standards and specifications, with appropriate issue letter at time of order entry, form a part of this Specification to the extent, and for the purpose, specified herein.

3.2 SEMI Standards and Safety Guidelines

SEMI G4 — Specification for Integrated Circuit Leadframe Materials Used in the Production of Stamped Leadframes

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

SEMI G55 — Test Method Measurement of Silver Plating Brightness

SEMI G56 — Test Method Measurement of Silver Plating Thickness

3.3 ASTM Standards¹

ASTM B487 — Measuring Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section

ASTM B545 — Standard Specification for Electrodeposited Coatings of Tin

ASTM B567 — Measurement of Coating Thickness by the Beta Backscatter Principle

ASTM B568 — Measurement of Coating Thickness by X-Ray Spectrometry

ASTM E10 — Standard Test Method for Brinell Hardness for Metallic Materials

ASTM E384 — Standard Test Methods for Microhardness of Materials

ASTM E571 — Adhesion of Metallic Coatings

3.4 Federal Specifications²

QQ-S-365 — Silver Plating, Electrodeposited, General Requirements for

QQ-S-571 — Solder, Tin Alloy: Tin Lead Alloy, and Lead Alloy

3.5 Military Specifications²

MIL-G-45204 — Gold Plating, Electrodeposited

MIL-P-81728 — Plating, Tin Lead, Electrodeposited

MIL-STD-883 — Test Methods and Procedures for Microelectronics

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, <http://www.astm.org>

² 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.

4 Application

4.1 Table 1 lists recommended finishes for copper and nickel/iron alloys.

4.1.1 Silver is approved as a lead finish for all alloys but only for internal processing. When shipped to a customer, silver must be removed and replaced by tin lead.

4.1.2 Gold plate is usable in socketed applications as well as in soldered applications. Hardness, grain size, and other properties shall be specified on the procurement drawing.

4.1.3 Solder, as used in this specification, refers to tin lead as 63/37 or 60/40 unless otherwise specified and agreed upon between user and supplier, and stated on procurement drawings.

4.1.4 'Tinning' is a generic term (primarily used in user industries) and means hot solder dip (near 60/40 tin lead) and not an application of tin.

4.2 Composition, limits, mechanical and physical properties, and dimensions and tolerances for leadframes are stated in SEMI G4 and SEMI G18.

4.3 Lead finish details are stated in § 5.

5 Lead Finish

5.1 Tin Electroplate

5.1.1 *Composition* — The tin shall not be less than 99.8% pure tin and shall not contain more than 0.1% carbon. The deposit is Type I as defined in MIL-T-10727.

Table 1 Alloys

	<i>Finish Iron Alloys</i>	<i>Finish Copper Alloys</i>
Tin MIL-T-10727		
Tin (over base metal)	X	X
Acceptable Undercoats		
1. Copper	X	X
2. Nickel	X	X
Tin Lead (Sn/Pb)		
MIL-P-81728		
Tin Lead (over base metal)	X	X
Sn/Pb		
Acceptable Undercoats		
1. Copper	X	X
2. Nickel	X	X
Solder Dip (Sn/Pb)		
QQ-S-571		
Solder Dip (over base metal)	X	X
Acceptable Undercoats		
1. Copper	X	X
2. Nickel	X	X
3. Silver	X	X
Gold MIL-G-45204		
Gold (over base metal)		X