

SEMI G64-1118 (Reapproved 1123) SPECIFICATION FOR FULL-PLATED INTEGRATED CIRCUIT LEADFRAMES (Au, Ag, Cu, Ni, Pd/Ni, Pd)

This Standard was technically approved by the 3D Packaging and Integration Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on October 3, 2023. Available at www.semiviews.org and www.semi.org in November 2023; originally published in 1996; previously published November 2018.

NOTICE: The section symbol (§) is used to reference a numbered section, paragraph, or header and all subordinate paragraphs, headers, and embedded material (i.e., EXCEPTIONs, lists) therein. The paragraph symbol (§) is used to reference a particular numbered paragraph and embedded material therein. When duplicated (i.e., §§ and §§) the symbols are used to reference more than one section or paragraph, respectively.

NOTICE: Paragraphs entitled ‘NOTE:’ are not an official part of this Standard or Safety Guideline and are not intended to modify or supersede the official Standard or Safety Guideline. These have been supplied by the global technical committee to enhance the usage of the Standard or Safety Guideline.

1 Purpose

1.1 This Specification is intended as a guideline for evaluating plating layer characteristics required by users of full-plated leadframes for plastic semiconductor packages.

1.2 *Background* — Full-plated leadframes have received attention in recent years as a possible solution to challenges and restrictions resulting from the effects of Pb on the environment, package reliability improvement due to the P.P.F. process, lead coplanarity on fine-pitched leadframes, and lead bridges with solder plating.

2 Scope

2.1 The specification and test procedures detailed in this Standard apply to full-plated leadframes.

2.2 *Units* — SI units are used in this Standard.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI G52 — Test Method for Measurement of Ionic Contamination on Semiconductor Leadframes

3.2 ISO® Standards¹

ISO 9227 — Corrosion Tests in Artificial Atmospheres – Salt Spray Tests

3.3 JSA Standards²

JIS C 0053 — Solderability Testing by the Wetting Balance Method

3.4 United States Federal Standards³

QQ-N-290 — Nickel Plating: Electrodeposited

¹ International Organization for Standardization, ISO Central Secretariat, Chemin de Blandonnet 8, CP 401-1214 Vernier, Geneva, Switzerland; Telephone: +41.22.749.01.11, Fax: +41.22.733.34.30, <http://www.iso.org>. ISO trademark is owned by International Organization for Standardization.

² JSA Group, Mita MT Bldg., 3-13-12 Mita, Minato-ku, Tokyo, 108-0073, Japan; Telephone: +81.50.1741.7520, Fax: +81.3.4231.8650, <http://www.jsa.or.jp>.

³ United States Federal Standards, available as freely downloadable PDF files from the ASSIST Quick Search website at <http://quicksearch.dla.mil>.

QQ-S-365 — Silver Plating: Electrodeposited – General Requirements

QQ-S-571 — Solder, Electronic

3.5 United States Military Standards⁴

MIL-C-14550 — Copper Plating, Electrodeposited

MIL-F-14256 — Flux, Soldering, Liquid, Paste Flux, Solder Paste, and Solder Paste Flux

MIL-G-45204 — Gold Plating, Electrodeposited

MIL-STD-883D — Test Methods and Procedures for Microelectronics (Method 2003.7, Solderability)

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

4 Terminology

4.1 Definitions

4.1.1 *finish plating* — final plating layer whose electrodeposits fulfill the main purpose of the required characteristic.

4.1.2 *solderability* — an index of the wettability and coverage with solder of lead surface.

4.1.3 *underplating* — plating layers that complete the required characteristics of the final plating layer and lies between the base material and final plating layer.

5 Ordering Information

5.1 Priority

5.1.1 To avoid confusion, the order of precedence when ordering leadframes shall be as follows:

1. Purchase Order (agreed between user and supplier),
2. This Specification,
3. Referenced Standards and Documents.

6 Requirements

6.1 Materials

6.1.1 *Base Material* — Cu alloys or Fe/Ni alloys.

6.1.2 *Plating Material* — Underplating and Finish plating are shown in Table 1.

Table 1 Underplating and Finish Plating

<i>Finish Plating</i>	<i>Underplating</i>	<i>Base Material</i>	
		<i>Cu-Alloys</i>	<i>Fe, Ni-Alloys</i>
Au (MIL-G-45204)	-	N/A	X
	Ni	X	X
Ag (QQ-S-365)	-	X	N/A
	Cu	X	X
Cu (MIL-C-14550)	-	X	X
	Ni	X	X
Ni (QQ-N-290)	-	X	X
	Cu	X	X

⁴ United States Military Standards, available as freely downloadable PDF files from the ASSIST Quick Search website at <http://quicksearch.dla.mil>.