

SEMI G73-0997 (Reapproved 1104) TEST METHOD FOR PULL STRENGTH FOR WIRE BONDING

This test method was technically approved by the Global Assembly & Packaging Committee and is the direct responsibility of the Japanese Packaging Committee. Current edition approved by the Japanese Regional Standards Committee on July 23, 2004. Initially available at www.semi.org September 2004; to be published November 2004. Originally published in 1997.

1 Purpose

1.1 This standard defines the pull strength test method for wire bonding.

2 Scope

2.1 This standard defines the destructive pull strength test method and its criterion for evaluating pull strength of wire bonds connecting two points, connected by using ball bonding technique.

2.2 This standard can be applied to measure wires whose diameter is less than 100 microns.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards

3.1 *Military Standard*¹

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

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

4 Terminology

4.1 *Definitions*

4.1.1 *hook* — L or similar-shaped tool for hooking a wire for pull test.

5 Apparatus

5.1 *Pull Tester or equivalent equipment*

5.1.1 Enough stroke to break a wire.

5.1.2 *Accuracy* — Within $\pm 0.5\%$ to the full scale of load cell.

5.1.3 *Pull Speed* — Constant speed.

5.1.4 *Hooks* — Between 25–100 microns in diameter.

NOTE 1: Hook must be made of material strong enough to break wire while testing but not with a small diameter so as to cut through the wire.

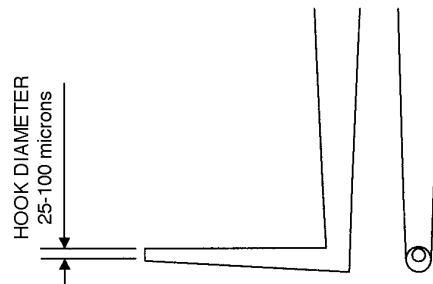


Figure 1
Hook Diameter

5.1.5 Calibration of equipment must be simple enough so that users can calibrate it easily. Instructions for calibration should be described in equipment manual.

6 Sampling

6.1 Measure at least 30 points from at least 2 devices. From each side of the devices, select the same number of wires randomly.

7 Calibration and Standardization

7.1 *Calibration Method*

7.1.1 Calibration of equipment should be done using official and traceable weights.

7.1.2 Display the weight and verify whether the results are within the equipment's accuracy.

7.1.3 Repeat the measurement using other weights to verify repeatability and linearity of the calibration.

7.2 *Interval of Calibration*

7.2.1 Calibrate at regular intervals at least once a year.

7.2.2 Calibration must be able to be done just before testing when necessary or specifically instructed.

¹ United States Military Standards, Available through the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099, USA. Telephone: 215.697.3321

8 Procedure

8.1 Fix samples using a clumper or adhesive, so that the sample will not float, without applying excessive stress to the wire.

8.2 Set pull speed to 0.5 mm/sec while measuring.

8.3 Insert the hook under the bonded wire between the top of the first bonding and the center of the loop.

NOTE 2: Select hook position accordingly to package, wiring condition, and wire diameter.

NOTE 3: Place the hook perpendicular to wiring direction if there is no specific instruction.

NOTE 4: Do not measure damaged or deformed wire.

8.4 Pull the hook perpendicular to die/substrate.

8.5 Record the force that breaks the wire as the pull strength.

8.6 Repeat the measurement on another wire.

NOTE 5: Do not change the position while testing the same samples.

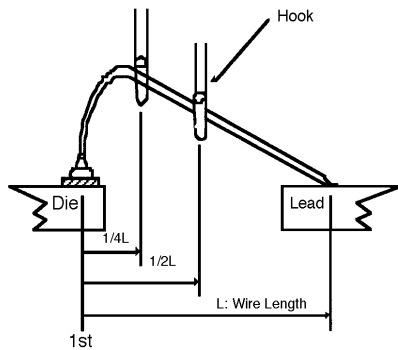


Figure 2
Hook Position

9 Report

9.1 Report of the pull test must contain the following information.

9.2 Pull Strength

9.3 **Breaking Mode** — Choose the closest position from Figure 3 below and represent the broken position by number or alphabet in the figure.

9.3.1 Breaking Mode (Report in number or alphabet)

- 1,A: The first bond
- 2,B: The first bond neck
- 3,C: Loop
- 4,D: The second bond neck

- 5,E: The second bond

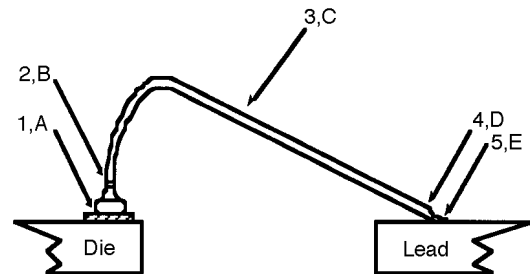


Figure 3
Breaking Mode

9.4 Hook Position

9.5 **Rejection** — Criterion of each semiconductor manufacturer to each product. Refer to “Minimum Strength” of the attached MIL-STD-883D.

10 Related Documents

10.1 SEAJ Document ²

SEAJ Technical Term Dictionary, 3rd Edition

10.2 JEITA Standard ³

JEITA ED4703 — In-Line Evaluation Methods and Structural Analysis Methods for Semiconductor Devices

10.3 IEC Standard ⁴

IEC 749 — Semiconductor Devices: Mechanical and Climatic Test Methods

² Semiconductor Equipment Association of Japan, 4F Grand Maison Shinjuku Gyoen., 1-7-10 Shinjuku Shinjuku-ku, Tokyo 160-0022 Japan, 03(3353)7651 Fax 03(3353)7970, <http://www.seaj.or.jp/english/index.htm>.

³ Electronic Industries Association of Japan, Available through: Japan Electronics and Information Technology Industries Association, 3rd Fl., Mitsui Sumitomo Kaijo Bldg. Annex 11, Kanda Surugadai 3-chome, Chiyoda-ku, Tokyo 101-0062, Japan, <http://www.jeita.or.jp/eiaj/english/>

⁴ International Electrotechnical Commission, 3 rue de Varembe, CH-1211, Geneva 20, Switzerland, Phone: 41 22 919 02 11, Fax: 41 22 919 03 00, E-mail: IEC Central Office, <http://www.iec.ch/>