Designation: B885 – 09 (Reapproved 2015)

Standard Test Method for Presence of Foreign Matter on Printed Wiring Board Contacts[1]

This standard is issued under the fixed designation B885; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method defines a resistance probing test for detecting the presence of foreign matter on Printed Wiring Board (PWB) contacts or fingers that adversely affects electrical performance. This test method is defined specifically for such fingers coated with gold. Application of this test method to other types of electrical contacts or to fingers coated with other materials may be possible and desirable but may require some changes in fixturing, procedures, or failure criteria.

1.2 Practice B667 describes another contact resistance probe method that has more general application to electrical contacts of various materials and shapes. Practice B667 should be used for more fundamental studies. This test method provides a fast inspection method for printed wiring board fingers.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar will all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B539 Test Methods for Measuring Resistance of Electrical Connections (Static Contacts)

B542 Terminology Relating to Electrical Contacts and Their Use

B667 Practice for Construction and Use of a Probe for Measuring Electrical Contact Resistance

3. Terminology

3.1 *Definitions*—Terms used in this test method related to electrical contacts are defined in accordance with Terminology B542.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *edgecard connector, n*—an electrical connector designed to connect physically and electrically with a compatible PWB equipped with gold fingers.

3.2.2 *printed wiring board (PWB) contacts, PWB fingers, n*—areas near the edge of a printed wiring board coated with gold and designed to function as electrical contacts when the board is plugged into a compatible edgecard connector.

4. Summary of Test Method

4.1 Two closely spaced electrodes are brought into contact with a single PWB finger in such a manner that they contact the surface with a minimum of wipe. A fixture loads each electrode to apply a force in the range of 0.5 to 0.7 N to the surface of the finger. Two electrical leads attached to each electrode are used to make a four–wire resistance measurement to detect elevated resistance indicative of the presence of a film or other contaminant on the finger.

5. Significance and Use

5.1 This test method provides a way to detect contamination on printed wiring board fingers that affects the electrical performance of such fingers. Such contamination may arise during PWB manufacture, circuit assembly, or service life and may include solder mask, solder flux, hardened lubricants, dust, or other materials. This test method provides a nondestructive method of inspecting such fingers at any point in the life of the product including after original manufacture, after assembly of circuit components to the PWB, and after time in service such as when returned for repair. Because this test method uses two probes to finger contacts in series, it provides a sensitive test for contaminants that may increase electrical resistance when the fingers are plugged into an edgecard

[1] This test method is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.11 on Electrical Contact Test Methods.

Current edition approved May 1, 2015. Published May 2015. Originally approved in 1997. Last previous edition approved in 2009 as B885 – 09. DOI: 10.1520/B0885-09R15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

connector that typically makes contact to the finger through only one contact to finger interface.

5.2 Practice B667 describes a more general procedure for measuring contact resistance of any solid material in practically any geometrical form. The method in Practice B667 should be used for general studies and fundamental studies of electrical contact materials.

6. Apparatus

6.1 *Four-Wire mΩ Meter,* with a resolution of 0.0001 Ω or better, capable of performing dry circuit resistance measurements in accordance with Test Methods B539, Test Method C.

6.2 *Two Gold-Tipped Electrodes (Probes),* with a radius not less than 3.0 mm at the tips. Each electrode shall have two wires attached. One wire, the voltage lead, shall be attached within 2 mm of the tip end. The other wire, the current lead, shall be attached at any convenient location that is at least 0.5 mm farther away from the tip than the attachment point of the voltage lead.

6.3 *Fixture,* to hold the PWB securely while it is being probed and a fixture to hold the two electrodes, such that the distance between the centers of the electrodes is 2.0 to 2.5 mm and both electrodes will be centered roughly on a single PWB finger. Fig. 1 shows an example of a suitable fixture. Other fixtures that provide the same capability may be used. Locate this fixture to minimize shock and vibration reaching the probes. Placement on a foam pad on a bench top has been found suitable.

6.4 *Two Springs,* one for each electrode, having a spring constant and a pretension that will apply a load in the range of 0.5 to 0.7 N when the electrode is brought to rest on the finger being tested. Other mechanisms that achieve the same result are acceptable.

6.5 *Mechanism,* that will move the electrode fixture from an open position to the closed position on the finger in such a manner that the electrodes meet the surface of the contact with a minimum of wipe.

6.6 *Lens Tissue,* for cleaning the electrodes.

6.7 *Beakers,* 100-mL size, two required.

6.8 *Hot Plate,* suitable for warming two breakers.

6.9 *Thermometer,* calibrated in °C over the range of 0 to 100 °C.

6.10 *Compressed Air,* at 100 to 200 kPa above atmospheric pressure (15 to 25 psig) or a handheld can of compressed gas with nozzle designed for use as a dust removal tool, commonly referred to as a "duster."

7. Reagents and Materials

7.1 *Isopropyl Alcohol (IPA), Pure Chemical Grade.*

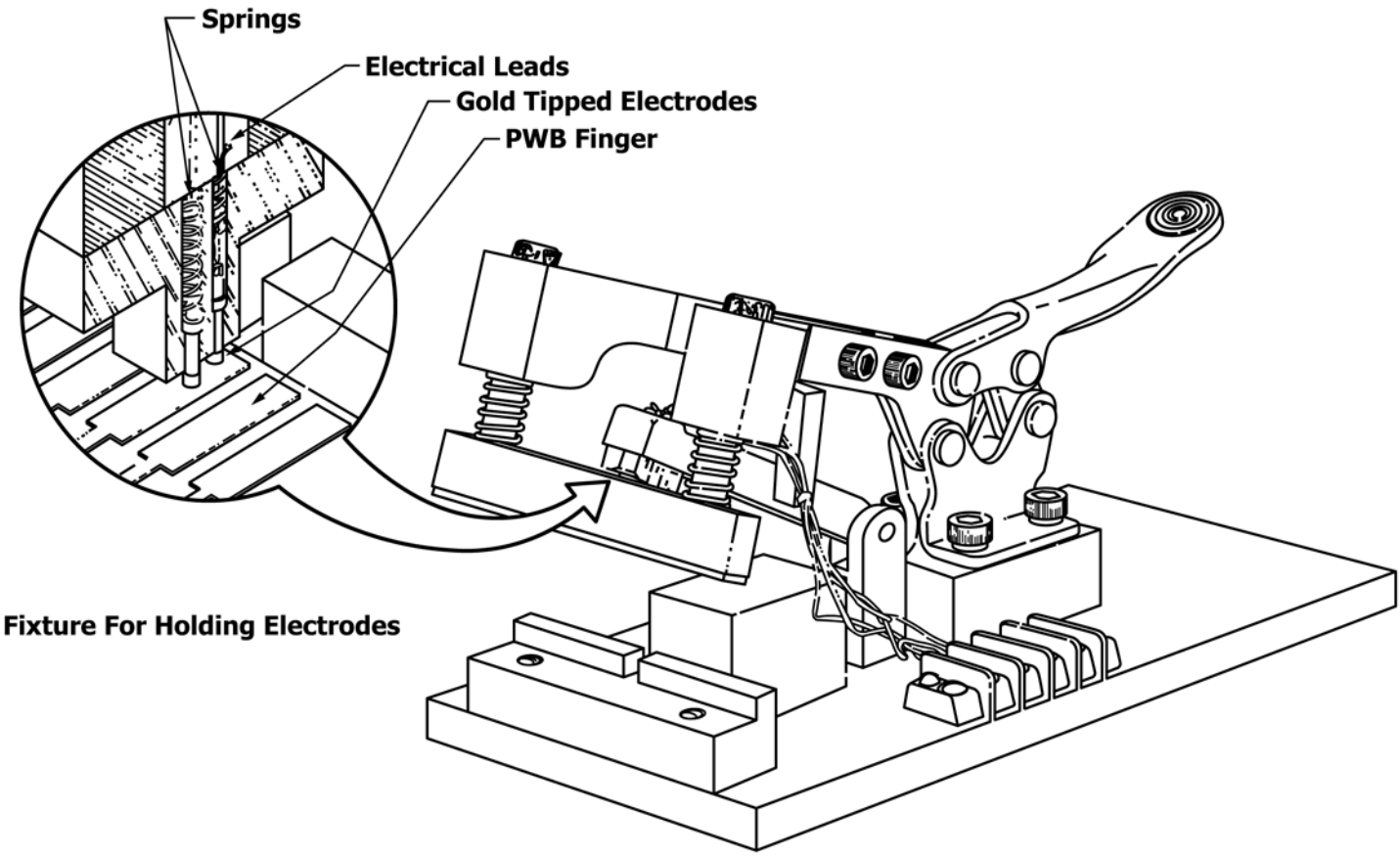

FIG. 1 Resistance Probe

7.2 A gold–coated calibration coupon covered with a minimum of 2.0 µm of gold electrodeposit on the surface to be used in testing and verifying the cleanliness of the probes. Special care should be taken with the coupon to ensure and preserve the cleanliness of the gold surface, including avoiding touching the gold surface with anything other than the test probes.

8. Test Procedure

8.1 Clean the gold–plated calibration coupon within 8 h prior to performing measurements, by dipping it into a beaker of isopropyl alcohol at 50°C for 1 min. and then into a second beaker with isopropyl alcohol at 50°C for 1 min.

8.2 Connect probe connections to the milliohmeter using four-wire connections and set the milliohmeter for dry circuit conditions.

8.3 Both before and after each PWB is probed, probe the gold–plated calibration coupon once. If this reading is greater than 4 mΩ, clean the electrodes by wiping with clean lens tissue and measure resistance again, repeating the process until the reading is 4 mΩ or below.

8.4 Blow dust and particles off of the fingers using clean compressed air or handheld compressed gas duster.

8.5 Probe each finger on the PWB on the board once according to the following steps and record the resistance value for each finger. Repeat 8.6 – 8.9 for each finger.

8.6 Align the finger that is to be probed under the electrodes and clamp down.

8.7 Bring the probe down onto the finger such that the electrodes contact the surface of the finger with a minimum of wipe. As discussed in Section 6, the load on each electrode shall be in the range of 0.5 to 0.7 N.

8.8 Record the initial reading, taken within 2 s of the electrodes contacting the finger. The electrodes gradually may penetrate films or other contamination on the surface, and as they do, the measured resistance will decrease. It is important, therefore, to obtain and record the initial reading.

8.9 If the reading exceeds 10 mΩ, wipe the probe tips with clean lens tissue.

9. Interpretation of Results

9.1 The fingers on the PWB are free of significant contamination if the results satisfy both of the following conditions:

9.1.1 No finger has resistance greater than 50 mΩ, and

9.1.2 Not more than one finger has a resistance greater than 10 mΩ.

10. Report

10.1 Report the following information:

10.1.1 Test laboratory identification.

10.1.2 Test operator.

10.1.3 Date of test.

10.1.4 Identification of apparatus used.

10.1.5 Identification of parts tested.

10.1.6 Test results, including number of fingers probed, number exceeding predetermined resistance levels, and pass or fail conclusions as appropriate.

10.1.7 Deviations, if any, from documented test method.

10.1.8 Any observations that the test operator feels are relevant.

10.1.9 Any failure analysis performed on boards tested.

11. Precision and Bias

11.1 No statement is made about either the precision or bias of this test method for measuring presence of foreign matter on printed wiring board contacts since the result merely states whether there is conformance to the criteria for success specified in the procedure.

12. Keywords

12.1 contact resistance; contamination; edgecard connector; printed wiring board fingers