Designation: F1663 – 15

Standard Test Method for Determining the Capacitance of a Membrane Switch or Printed Electronic Device[1]

This standard is issued under the fixed designation F1663; 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 covers the determination of capacitance(s) of a membrane switch or printed electronic device.

1.2 *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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 *Definitions:*

2.1.1 *membrane switch*—a momentary switching device in which at least one contact is on, or made of, a flexible substrate.

2.1.2 *test points*—two preselected mutually insulated locations on switch assembly.

3. Significance and Use

3.1 Capacitance testing is useful for design verification, quality control of materials, and workmanship.

3.2 High capacitance may interfere with the reliable performance of interface electronics.

3.3 Specific areas of testing are, but not limited to:

3.3.1 Conductor/dielectric/conductor crossing point,

3.3.2 Close proximity of conductors, and

3.3.3 Any other conductive surface such as shielding or metal backing panel.

4. Interferences

4.1 The following parameters may affect the results of this test:

4.1.1 Humidity,

4.1.2 Contamination,

4.1.3 Barometric pressure, and

4.1.4 Temperature.

5. Apparatus

5.1 *Electronic Test Instrument* , for measuring very small capacitance (pico-farad range).

6. Procedure

6.1 *Pretest Setup:*

6.1.1 Suspend the switch specimen in air or otherwise isolate it from any interfering affects.

6.1.2 Attach to the capacitance measuring instrument any necessary leads, probes or connectors required to connect the membrane switch assembly or printed electronic device for measurement. Place test leads as close to test points as possible without physical connection. (This will reduce any variations due to lead positioning).

6.1.3 Record the capacitance reading indicated on the instrument to equal capacitance (C_i) (this is the capacitance of the test setup).

6.2 *In-Process Test:*

6.2.1 Connect test leads to the test points.

6.2.2 Record the capacitance reading indicated on the instrument to equal total capacitance (C_t) (this is the total capacitance of the switch and device.

7. Calculation

7.1 Calculate the capacitance of the switch specimen as follows:

$$\text{Capacitance } (C_s) = C_t - C_i$$

8. Report

8.1 Report the following information:

8.1.1 Temperature,

8.1.2 Humidity,

8.1.3 Barometric pressure,

8.1.4 Date of test,

8.1.5 Part number or description of the switch specimen, or both,

8.1.6 Conductive path(s) tested and the connection points used.

8.1.7 Capacitance, (C_i),

8.1.8 Total capacitance, (C_t),

[1] This test method is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.18 on Printed Electronics.

Current edition approved June 1, 2015. Published July 2015. Originally approved in 1995. Last previous edition approved in 2009 as F1663-09. DOI: 10.1520/F1663-15.

8.1.9 Capacitance of the switch specimen, (C_s),

8.1.10 Detailed description of isolation setup used, (including lead length, connection type, and sensitivity range), and

8.1.11 Detailed description of test equipment.

9. Precision and Bias

9.1 *Precision*—It is not possible to specify the precision of the procedure in Test Method F1663 for measuring capacitance because inter-laboratory studies have proven inconclusive due to insufficient participating laboratories with the appropriate equipment.

9.2 *Bias*—No information can be presented on the bias of the procedure in Test Method F1663 for measuring capacitance because no standard sample is available for this industry.

10. Keywords

10.1 capacitance; membrane switch or printed electronic device