SLOVENSKI STANDARD
oSIST prEN IEC 61189-2-801:2022

01-januar-2022

Preskusne metode za električne materiale, tiskana vezja in druge povezovalne strukture in sestave - 2-801. del: Test toplotne prevodnosti za osnovne materiale

Test methods for electrical materials, printed board and other interconnection structures and assemblies - Part 2-801: Thermal conductivity test for base materials

Méthodes d'essai pour les matériaux électriques, les cartes imprimées et autres structures d'interconnexion et ensembles - Partie 2-801: Essai de conductivité thermique pour matériaux de base

Ta slovenski standard je istoveten z: **prEN IEC 61189-2-801:2021**

ICS:

31.180	Tiskana vezja (TIV) in tiskane plošče	Printed circuits and boards

oSIST prEN IEC 61189-2-801:2022 **en**

IEC

91/1757/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 91 : ELECTRONICS ASSEMBLY TECHNOLOGY	
SECRETARIAT: Japan	SECRETARY: Mr Masahide Okamoto
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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TITLE:

Test methods for electrical materials, printed board and other interconnection structures and assemblies - Part 2-801: Thermal conductivity test for base materials

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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32 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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71 committee TC91

72 The text of this International Standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

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74 Full information on the voting for the approval of this International Standard can be found in the report
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TEST METHODS FOR ELECTRICAL MATERIALS, PRINTED BOARD AND OTHER INTERCONNECTION STRUCTURES AND ASSEMBLIES –

Part 2-801: Thermal Conductivity Test for Base Materials

1 Scope

This International Standard specifies a test method to be followed for Thermal Performance via carbon ink heating. The method employs a screened-on pattern of carbon ink used to determine the thermal performance of a dielectric layer on a metal base plate.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, no terms or definitions are listed. ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Applicability and Use of Data

This method may be used on any smooth, rigid metal clad laminate providing that the metal base has a thickness of 1.02 mm. The best results are achieved by using a machinable, 1.57 mm thick piece of aluminium alloy. Soft metal or metal with a rough surface is not suitable for this test method.

5 Test Specimens

5.1 Number

Five specimens shall be prepared, unless an alternative number has been specified.

5.2 Form

Specimens shall be 25.4 mm x 25.4 mm and have dielectric applied to a single side of the 1.57 mm metal base. Specimens shall include 2 strips of copper that measure 2.5 mm x 20 mm, with a 5mm spacing between the two. See Figure 1 for the required specimen dimensions.

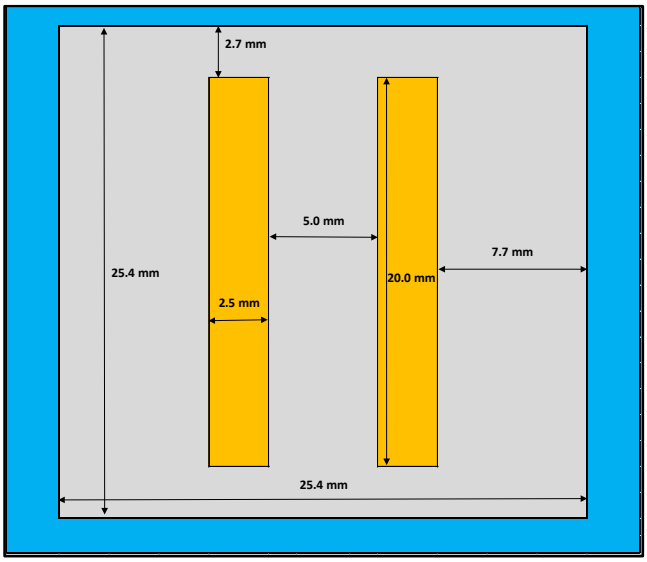

Figure 1 – Specimen Dimensions

A centralised hole shall be drilled in the 1.57mm aluminium substrate. The location of the hole shall be such that it is equidistant between the two copper electrodes and terminates at the midpoint, as demonstrated in Figure 2.

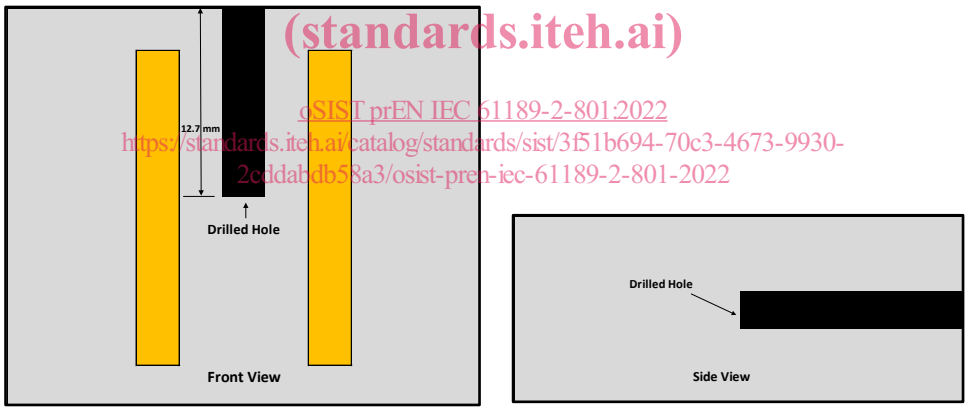

Figure 2 – Location of 0.55 mm hole

5.3 Preparation of the Test Specimen

a) Deposit a 12mm x 5mm rectangle of carbon ink on the dielectric surface, using a rubber squeegee and a 195-mesh screen that has a 12mm x 5mm aperture.
b) Locate the carbon ink printing such that it is perpendicular to the length of the copper electrodes and is central to the specimen surface.
c) Ensure that the screen and specimen are secured such that there will be no movement during the printing of the carbon ink.
d) For printing the carbon ink, apply the ink to one of the narrow edges of the rectangle and then use the rubber squeegee to spread the paste along the length of the rectangle in the screen, in a single motion. A small amount of downward force should be applied when moving the squeegee from one side of the frame to the other.

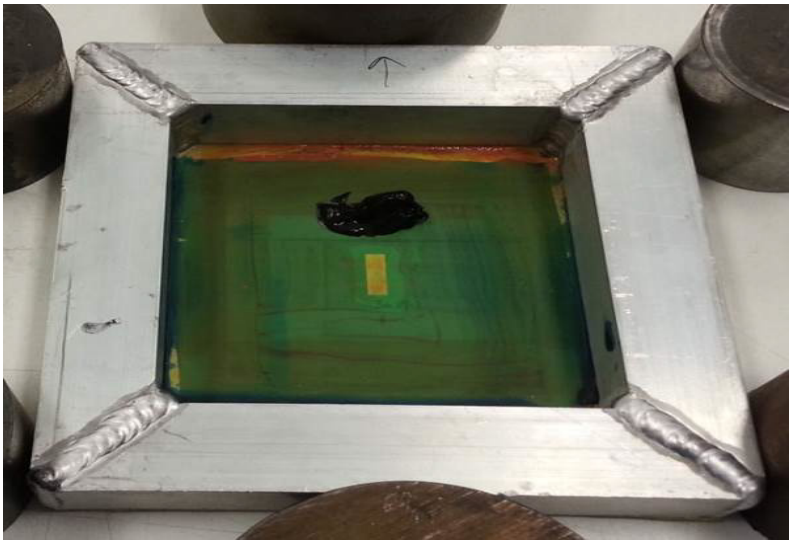

Figure 3 – Example of Carbon Ink Deposited on a Screen Prior to Printing

e) Bring the squeegee back in the reverse direction, still with a small amount of force being applied, to ensure an even coating of the carbon ink is left on the surface of the sample.
f) Remove the screen from the sample with care, so as not to touch the wet ink or for any smearing to occur.

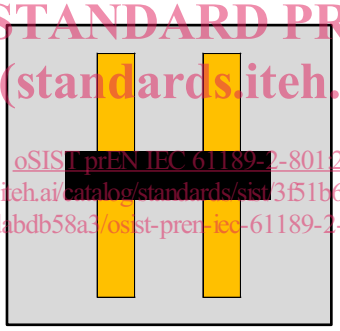

Figure 4 – Specimen after First Screen Printing

g) Have an oven pre-warmed to 125°C and place the specimen(s) into it for a period of 20 minutes.
h) Start by using methyl ethyl ketone (MEK) to clean the mesh screen, which should then be followed with propan-2-ol (IPA).
i) After twenty minutes have elapsed, remove the specimens from the oven and allow them to cool. Once cooled to room temperature, apply a second layer of carbon ink by repeating steps d) through h). The second layer shall be applied directly to the first layer.
j) Once the specimens have been allowed to cool, use a multi-meter to measure the resistance between the two copper electrodes.
k) Any specimen that does not have measured resistance value of 40±15 ohms shall be discarded.
l) Prepare the hot plate by setting it to a temperature of 225°C.
m) Deposit sufficient solder paste onto the base of two test pins. One pin should be placed onto each copper electrode, position them at the ends that are closest to the thermocouple hole.
n) When required, excess corrosion should be removed from the copper electrodes using a small volume of flux.
o) Using the hot plate, reflow the solder paste applied to the test pins. This is best achieved by locating the test pins on the hottest part of the hot plate.
p) Once reflow has occurred, carefully take the specimen off the hot plate, making sure not to disturb the test pin. The specimen should now be allowed to cool.

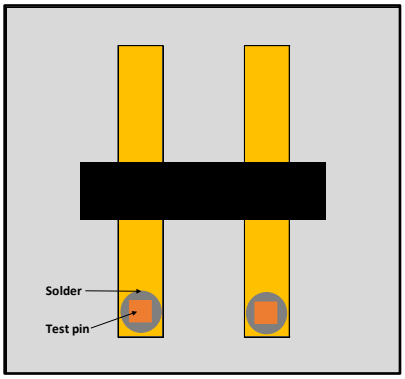

Figure 5 – Finished Specimen

q) Steps j) and k) shall now be repeated.

6 Materials and Equipment

a) Microdrill with a 0.55 mm drill bit
b) 195-mesh screen with a 12 mm x 5 mm aperture in a frame 101.6 mm x 101.6mm
c) Carbon Ink with a resistance of approximately 100 ohm/sq (ECM CI-2002 or equivalent)
d) Hard Rubber (70 Shore A) squeegee for screen printing
e) Polyimide tape, 12.5 mm or 25.4 mm wide
f) Forced air oven.
g) Methyl ethyl ketone (MEK)
h) Propan-2-Ol (IPA)
i) A digital multi-meter
j) Hot Plate capable of achieving at least 250°C
k) Solder Paste
l) Mill-Max SMD Test-point pins (P/N 1508-0-57-15-00-00-03-0, or equivalent)
m) NI Compact DAQ chassis with NI 9219 in slot 1 and NI 9211 in slot two with wire T-type mini connectors or equivalent
n) Computer with DAQ Software Installed or equivalent.
o) Arduino Uno with ZTP sensor conversion software or equivalent.
p) Sorensen DLM-600 80-7.5 Programmable Power Supply with GPIB interface or equivalent
q) NI USB GPIB Interface or equivalent
r) Thermal Grease (Dow Corning 340, Bergquist TIC 1000A or equivalent)
s) Wooden tongue depressors
t) Infinite Heat Sink Fixture with a pneumatic cylinder ram
u) Fluid Heater Unit
v) Thermocouple Probe – Type T (Omega P/N TMQSS-020U-6) or equivalent.
w) Fluid Chiller Unit
x) GE ZTP-135SR sensor and bridge with amplifying electronics or equivalent.
y) Black microhook connector with 2 attached wires.
z) Red microhook connector with 2 attached wires.
aa) Buehler wet sander or equivalent
bb) Permanent marker, black, extra-fine tip

7 Procedure

7.1 Pre-Conditioning

Samples should be conditioned at 23°C ± 2°C, 50% RH for 24 hrs prior to testing, where possible, and unless otherwise specified.