

Image credit: Ventec

IPC-TM-650-2.4.54 promises accurate values for reliable material selection

## Reliable PCB-Material Selection

There are many test methods available to compare or test the thermal properties of different materials. These methods, however, often don't offer a reliable reference for certain substrates. The IPC-TM-650-2.4.54 test method favored by Ventec, on the other hand, precisely measures the thermal conductivity of substrates.

**T**hermal performance data of certain materials does not always accurately reflect the true thermal conductivity of the substrate being tested. It is not uncommon for the values achieved by copper to be included in the evaluation. As a result, certain high-frequency laminate suppliers report highly favorable test results. For this and many other reasons it is advisable to consult the material supplier when developing new thermally sensitive designs.

As a global provider of high-frequency laminates, Ventec is regularly confronted with customers relying on supplier datasheets to compare technical values. After all, engineers need to examine the specifications of several suppliers in order to evaluate performance and make an informed material choice.

They are interested in the performance as a whole, rather than just that of the dielectric itself. The most accurate measurement method for dielectrics only accounts for the dielectric itself (like ISO), leaving

out the loss that occurs in the transition areas, e.g., from Cu to dielectric or Al to dielectric. In most cases 30-40% of the thermal performance is lost in those areas, which will definitely impact the final application.

For ASTM-5470, the error tolerance increases with dielectric performance

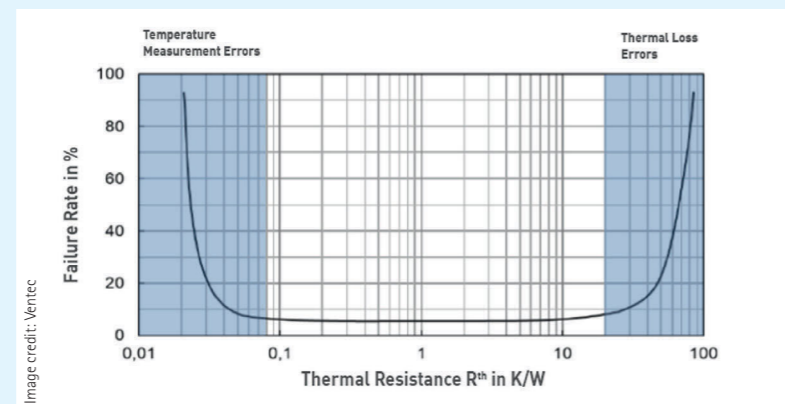


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Thus, using ASTM standard 5470 as a reference seems to be a very wise choice. However, as a function of the dielectric performance, the failure tolerance increases. Therefore, the test procedure can only be applied if approximate values are enough.

Serious suppliers using the ASTM standard provide a thermal conductivity/thermal resistor range, show the possible measurement failure rate, or use other methods that are more accurate.

Even a 10% accuracy, which is used in some TDSs is not possible. Everything considered, it will be more in a range of +/- 50%.

A measurement method is available on the market which does not allow such an interpretation range (ISO), but it does not provide a clear picture of the complete stackup that is used in the application. On the other hand, there is a method (ASTM) that considers the application, but leaves some room for misinterpretation, as a lot of test parameters are not clearly defined.

The new IPC-TM-650-2.4.54, which was released in January 2023 at the IPC APEX Expo in San Diego, now takes all of this into account.

Samples that were tested using this method in three different labs reveal a variation of just 1%!

As such it is a test method that can provide engineers with far more reliable and accurate values, than ever before. No doubt it may be painful for some suppliers and manufacturers, since manipulating the data to make their product more attractive than that of the competition isn't possible. Moreover, it would eliminate possible field failures resulting from the wrong choice of material.



### CONTACT

Robert Art has over 30 years' professional experience in electronics and printed circuit board materials. Robert joined Ventec in 2017 as area sales manager for Central and Eastern Europe. In his current role at Ventec, Robert is now responsible for business development activities in Europe for the company's range of materials including its IMS product lines to help Ventec further develop its leadership position for high-reliability thermal management solutions.

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### COMPANY PROFILE



Ventec International Group is a Taiwan Stock Exchange listed global supplier of advanced base materials for the PCB industry worldwide, with manufacturing and distribution facilities throughout Asia, Europe, and the US. Ventec's range of laminates & prepregs include signal integrity/high-speed digital, RF/Analog & high-performance IMS material technology, and an advanced range of thermal management solutions designed for specialized use in industries including automotive, communication, aerospace, and defense. All are manufactured by Ventec using strict quality-controlled processes that are certified to AS9100 Revision D, IATF 16949:2016 and ISO 9001:2015, and are backed by a fully controlled and managed global supply chain, sales- and technical support network.

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