

TFHSU enhanced film testing

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TFSHU - Thin Film Sample Holder Unit

The TFSHU is a sophisticated test fixture for electrical testing of thin film materials. The innovative concept is proven now for several years in the market.

During the last years, we continuously improved and added new features to the basic concept.

This basic concept consists of a contacting system and heating unit that is integrated into the sample holder. It allows an electrical testing of thin film materials under different temperatures. These investigations are essential for the development of actuator or sensor materials for most of the applications.

The basic system can be upgraded with several functions, like a microscope camera system for contacting small electrodes, a Laser system for measurements of Mems structures or thick films, HV options and much more.

Therefore, the TSFHU is one of the most flexible sample holders for thin film testing on the market.





New Features

TFSHU pyro

Peltier heating and cooling system for automated measurement of pyro coefficient

TFSHU HV extension

Excitation voltages up to 10kV can be applied to the sample depending on used amplifier

Large signal e31, ls

Inverse method using Kanno/ Muralt method

TFSHU poling

Positioner that can be equipped with wedge for poling of multiple contacts

aixDUST

Extension to characterize MLCCs



Larger Ranges for your Measurements

The basic TFSHU can be equipped with several options depending on customers demands. Thus it is possible to enlarge the temperature range or voltage range of the system. All options can be combined as well.

HT / Kryo Extension

The high temperature option and kryo options cover a temperature range from -100°C to 500°C. Besides the implementation of advanced heating and cooling systems, it was necessary to design suitable probing systems that withstand high temperatures. These new positioner systems are made by aixACCT.

Aside from standard measurements, the kryo version allows also sophisticated pyro testing due to the high temperature range and the high dynamic heating and cooling rates.



Additionally, the positioners can be equipped with a HV-extension that allows operations up to 10kV*. It can be either used with typical tungsten needles for contacting small electrode structures or with the special spring loaded contact used for contacting and piezoelectric measurement of non-reflecting electrodes (typically thick films etc.).

* An HV-amplifier is necessary to provide HV-ranges.











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One Sample Holder - A Multitude of Possibilities

e₃₁ extension indirect effect

The TFSHU for thin films and mems characterization was extended with a mounting fixture for diced thin film cantilever.

It is based on considerations of Kanno and Muralt*. Contrary to the direct method, the sample will be fixed only at one end and an electrical field will be applied to the piezoelectric active material.

This allows the measurement of the $e_{31,f}$ using the indirect method. This large signal excitation is related to actuator applications. Furthermore, the setup allows the investigation of temperature and/or fatigue dependency.

*I. Kanno et al. / Sensors and Actuators A 107 (2003) 68-74, M.-A. Dubios and P. Muralt, Sens. Actuators 77, 106 (1999)





Peltier - poling

For customers that are especially interested in poling studies of their materials or on device level, we equipped the system with a peltier cooling and heating system. This ensures an easy handling with excellent performance. The cost effective solution does not need LN cooling and allows a flexible testing independent from facility requirements. Combined with the advanced positioning system, the wedge support allows, in combination with our switch matrix or μ C-Modules, a parallel testing of samples.

Of course the system can also be used for pyro electric measurements within the temperature range.

aixDUST - sample sizes in µm range

The aixDUST extension (Dielectric Universal Sample Tester) is the newest of multiple available extensions for the TFSHU. With the aixDUST, it is possible to contact and characterize MLCCs with sample sizes down to metric 0402 (400 μ m x 200 μ m). With an additional positioner, even displacement measurements are possible.

The aixDUST can be used at any temperature range the TFSHU is capable of.











Specification

Basic

TFSHU

Maximum sample voltage: 500 V Max. sample deflection: approx. 400 μm (sample dependent) Temperature range: RT to 200°C Heating rate: 100°C/min

Possible measurements: fatigue, thermo, leakage, dynamic hysteresis, pyro etc.

TFSHU peltier for poling

Maximum sample voltage: 500 V Max. sample deflection: approx. 400 μm (sample dependent) Temperature range: 5°C to 160°C Heating rate: 100°C/min Cooling rate: 90°C /min Parallel contacting with wedge Combined with switch matrix or μC-Module

Possible measurements: Pyro, fatigue, thermo, leakage, dynamic hysteresis, etc.



Extensions

TFSHU HV and HT

Maximum sample voltage: 10000 V Max. operating temperature: -100°C to 500°C

Temperature option HT

Temperature range: RT to 500°C Temperature rate: 100°C/min

Temperature option Kryo

Temperature range: -100°C to 500°C Heating rate: max. 100°C/min*

* Cooling rate depends on external influences

TFSHU enhanced e31

Maximum sample voltage: 500 V Max. sample deflection: approx. 400 µm (sample dependent) Temperature range: RT to 200°C

With Laser : Resolution: 0,3nm Accuracy displacement: 5nm sigma over mean

Possible measurements: e_{31} indirect, fatigue, thermo, leakage, dynamic hysteresis, etc





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