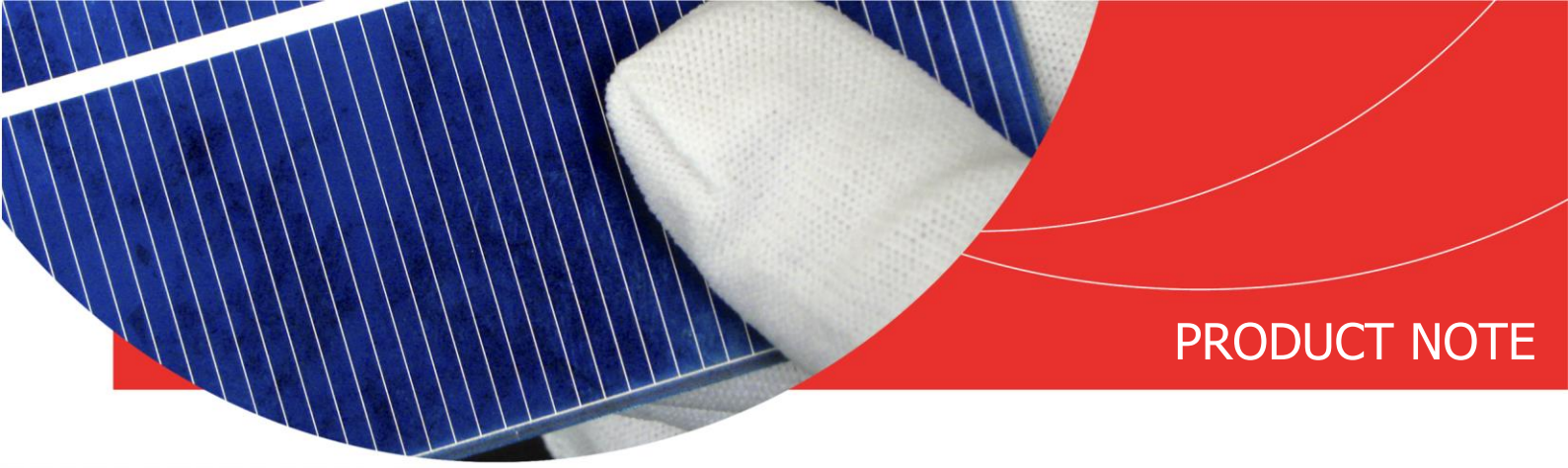


PRODUCT NOTE

ETA-SiCAM: Inline Gap-Distance Control of Si-Melt and Heat Shields in Silicon Crystal Pullers

Protected by Patent

Producing high quality Si-wafers for monocrystalline solar cells or electronic semiconductor devices is a complex process with critical thermodynamic parameters. A common technique to stabilize the thermodynamic conditions in Cz crystal pullers is using a heat shield around the growing ingot. Especially in the region of the transition of the liquid Silicon melt to the solid ingot, very stable conditions are necessary to guarantee highest crystal quality and therefore highest quality end products.

The thermodynamic conditions in the critical transition area from the liquid to the solid Silicon are strongly influenced by the gap distance of the heat shield and the hot Silicon melt. This gap distance will change during the grow process of the ingot and has to be readjusted. Therefore it is essential to measure and control this distance accurately and reliable.

Measurement of Gap Distance

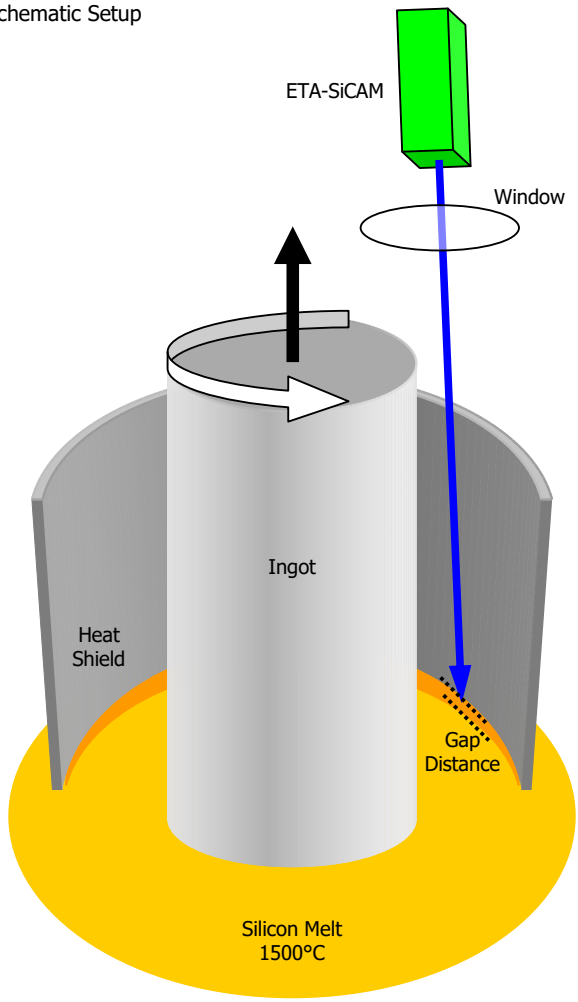
NXT offers new, unique and patent applied equipment to measure the exact gap distance between a hot silicon melt and the lower edge of heat shield in a crystal puller.

Highlights of ETA-SiCAM:

Gap-Measurement in Crystal Pullers:

- **High accuracy (<0.5mm)**
- **Measurement range: 3-30mm gap**
- **Fast measurement (up to 5 Hertz)**
- **Data logging**
- **Trend data**
- **Line interface**
- **New patent applied optical design**

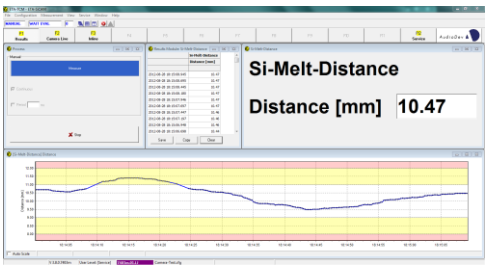
Schematic Setup



Schematic setup of the measurement layout: detection of exact gap distance between Si-Melt and heat shield

General Setup and Screenshot:

***ETA-SiCAM**: Picture of the compact ETA-SiCAM measurement head.*



***Screenshot**: Actual gap distance and trend graphic*

This is NXT GmbH

NXT is a world leader in comprehensive quality assurance solutions for specialized industries. We offer high-precision analyzers, proactive customer support and training, and Test-Centers around the world.

For different industries, our ETA™, Helios and Xelas instrument families are perfect tools for protecting quality and production efficiency. With a large installed base of testers worldwide, NXT has achieved recognition as a perfect and reliable partner for optical measurements solutions.

For producers of solar cells, OLEDs, optical medias, flat panel displays, precision optics, automotive glass, consumer packaging and other thin film applications, our solutions provide comprehensive, non-destructive quality assurance that is both time- and cost-efficient.

Our headquarter is located in Heinsberg, Germany, with subsidiaries in Sweden, USA, China and Taiwan, plus a service and support network of agents worldwide. In 2016 NXT GmbH was renamed from the formerly well known AudioDev GmbH, also known as ETA-Optik GmbH before 2007.

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