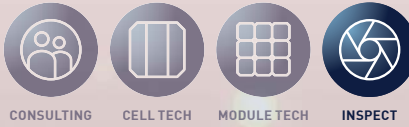


GP PRINT-Q FS/RS .CAM

INLINE OPTICAL INSPECTION SYSTEM FOR PRINT QUALITY INSPECTION AND PROCESS CONTROL

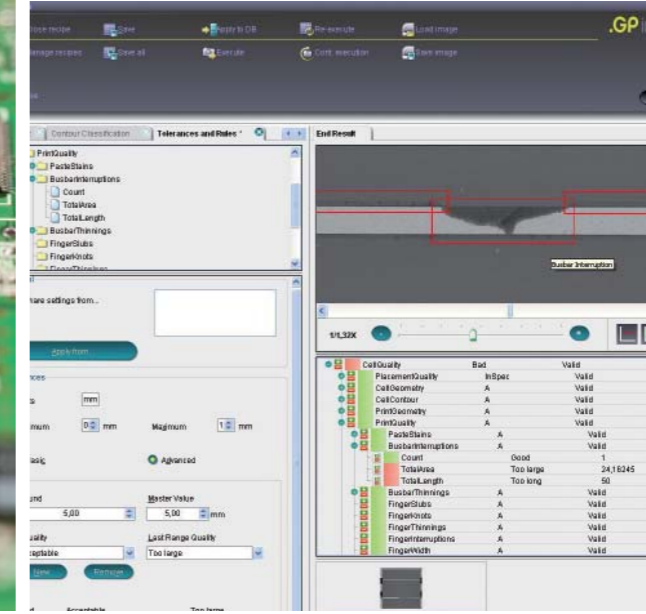
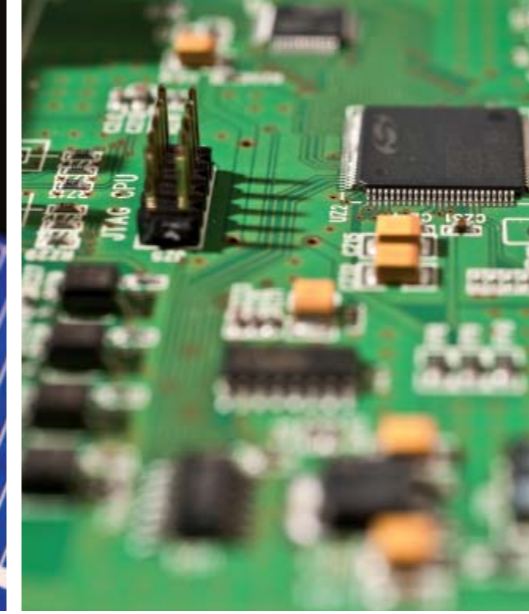


CONSULTING CELL TECH MODULE TECH INSPECT



WAFER > TEXTURE > DIFFUSION > EDGE ISOLATION > AR COATING > GRID > FINAL CLASSIFICATION





GP PRINT-Q FS/RS .CAM

PASTE STAINS AND FINGER INTERRUPTIONS—LEAVE THESE DEFECTS TO THOSE THAT DO NOT USE OUR OPTICAL PRINT INSPECTION!

SITUATION

Contact formation in silicon solar cell production is usually done by screen printing. Metal paste is pressed through apatterned screen, dried, and fired to sinter the metal to the silicon and form a good contact with low resistance between silicon and metal. The screens used for printing need to be checked, cleaned, and replaced regularly to ensure constant printing quality, and new paste has to be supplied in regular intervals.

DESCRIPTION

The GP PRINT-Q inspects the optical quality of the print on each solar cell, thus monitoring the process and giving direct feedback to the operator. Drifting process values caused by screen wear-out or a lack of paste are reliably identified even before the human eye can register, and can be rectified immediately by an operator intervention – often before the quality drops below the acceptance limit.

The GP PRINT-Q system architecture is the result of our long-term experience with solar cell processing and metrology, and valuable input from our customers. Software and hardware are designed to meet the requirements for gigawatt factories and large turn key suppliers. With Central Recipe Tool and “copy exact”, achieving identical inspection performance in all systems becomes easier than it was ever before.

SYSTEM FEATURES

The proprietary illumination unit ensures highest homogeneity and isotropy of the light, leading to maximum reliability and highest accuracy while eliminating the effect of grain boundaries in multicrystalline silicon. Models for front and back side print inspection and a wide range of camera models are available for all inspection tasks.

FUNCTIONALITY	
Samples to be measured	<ul style="list-style-type: none"> > Mono- and multicrystalline solar cells > Square or pseudo square > Textured or untextured
Wafer sizes	100 ... 156 mm
Measured features	Edge lengths, rectangularity, diagonals, chamfer lengths and angle, intrusion length and depth, V-breaks, chipping, print positions, print defects, finger widths, surface defects
Limiting factors	Position tolerance 3 mm
Minimum cycle time	1 s

The image is analyzed by fast and stable algorithms, and results of all inspection tasks are written to a database, where they are then used for result classification. The result classification model based on database queries allows to freely define inspection and classification criteria – even classification branches can be defined based on preliminary classification results.

THE GP PRINT-Q HARDWARE ON A GLANCE

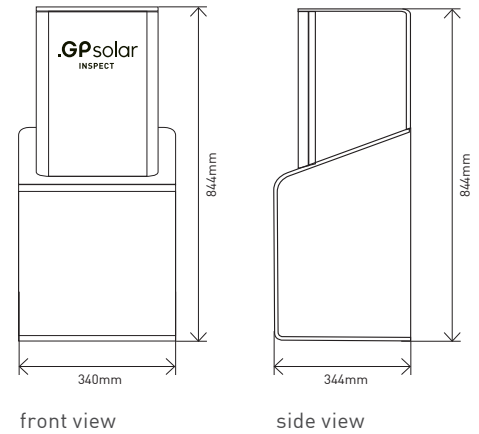
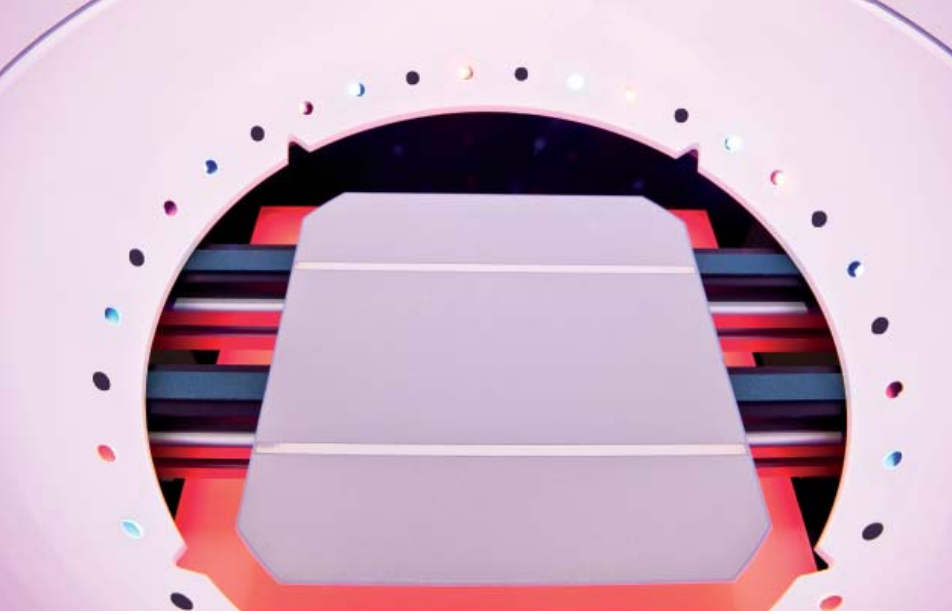
- > .Cam Matrix camera housing with optimized design for best maintenance access
- > Customized back light solutions for full edge inspection in most transport systems
- > Advanced camera holder
- > 19” Industrial controller PC with optimized air flow for high performance and reliability
- > Integrated UPS and RAID on demand
- > Separate 19” power rack for 12V/24V supply

SYSTEM SPECIFICATION	
Machine interface (automation)	<ul style="list-style-type: none"> > Parallel I/O > Parallel I/O (combined with RS232 for WaferID info) > Profibus
Data interface (to factory network or automation)	XML via TCP/IP
Controller PC	<ul style="list-style-type: none"> >19” industrial PC models with 4 HU >Optional integrated UPS and RAID
Power Module	Optional 19” module for 24V power supply (illumination and camera)
System dimensions (W x H x D)	340 mm x 844 mm x 344 mm

SOFTWARE ON A GLANCE

- > Modular software packages, structured in functional tasks - choose between full service or full control
- > Central recipe management and „copy exact”
- > Classification based on fast database access - virtually no limits in classification
- > Classification on a database - test changes offline before going online in production
- > Intuitive graphical user interface
- > Automated calibration routines and self verification
- > Wide range of protocols for automation handshake and MES connectivity

GP PRINT-Q FS .CAM / FRONT SIDE FUNCTIONALITY	
Camera	<ul style="list-style-type: none"> > 4M / Matrix > Optional 11M / Matrix > Optional 22M / Matrix
Minimum defect size	80 µm / 60 µm / 40 µm
Stand Still time	180 ms / 180 ms / 180 ms
GP PRINT-Q RS .CAM / REAR SIDE FUNCTIONALITY	
Camera	<ul style="list-style-type: none"> > 1M / Matrix > Optional 4M / Matrix
Minimum defect size	160 µm / 80 µm
Stand Still time	50 ms / 100 ms



TOPIC	DESCRIPTION
04.11.0006	GP PRINT-Q FS .Cam inspection module for front side print inspection 4MP matrix camera for STOP measurement, 19" controller PC, GP Com Card PIO, GP basic line software package (automation control, statistics functions and classification follow- ing predefined recipes)
04.11.0009	GP PRINT-Q RS .Cam inspection module for back side print inspection 1MP matrix camera for STOP measurement, 19" controller PC, GP Com Card PIO, GP basic line software package (automation control, statistics functions and classification follow- ing predefined recipes)
CAMERA OPTIONS	
04.11.0200	4M matrix camera upgrade for back side print inspection
04.11.0201	11M matrix camera upgrade for front side print inspection
04.11.0205	22M matrix camera upgrade for front side print inspection
CONTROLLER PC AND HARDWARE OPTIONS	
04.11.0309	GP Com Card Profibus
04.11.0304	19" TFT for GP Vision System
04.11.0305	GP 19" Power Rack 12V/24V
04.11.0306	UPS system (integrated in controller PC)
04.11.0307	RAID-system, hot-plug harddrive (integrated in controller PC)
SOFTWARE OPTIONS	
04.11.0402	GP Soft View Tool .net. Visualize results and status of any system anywhere
04.11.0403	GP Calibration Set Vision with calibration mask. Configure, check, verify and calibrate your GP PRINT-Q
04.11.0408	GP Central Recipe Tool .net. Distribute recipes from one system to the other ("copy exact")

Note: some of the mentioned features are optional. All technical details are subject to change without prior notice.
Only technical specifications in quotations and duty books are binding.

GP Solar GmbH Phone + 49.7531.282 484-0
Turmstrasse 22 Fax + 49.7531.282 484-10
78467 Konstanz info@gpsolar.de
Germany www.gpsolar.de