

Quality of PV modules and smart solutions to  
avoid hot spots increasing the performance

*Solar*  
**Jinko**

**PVSEC 2015**

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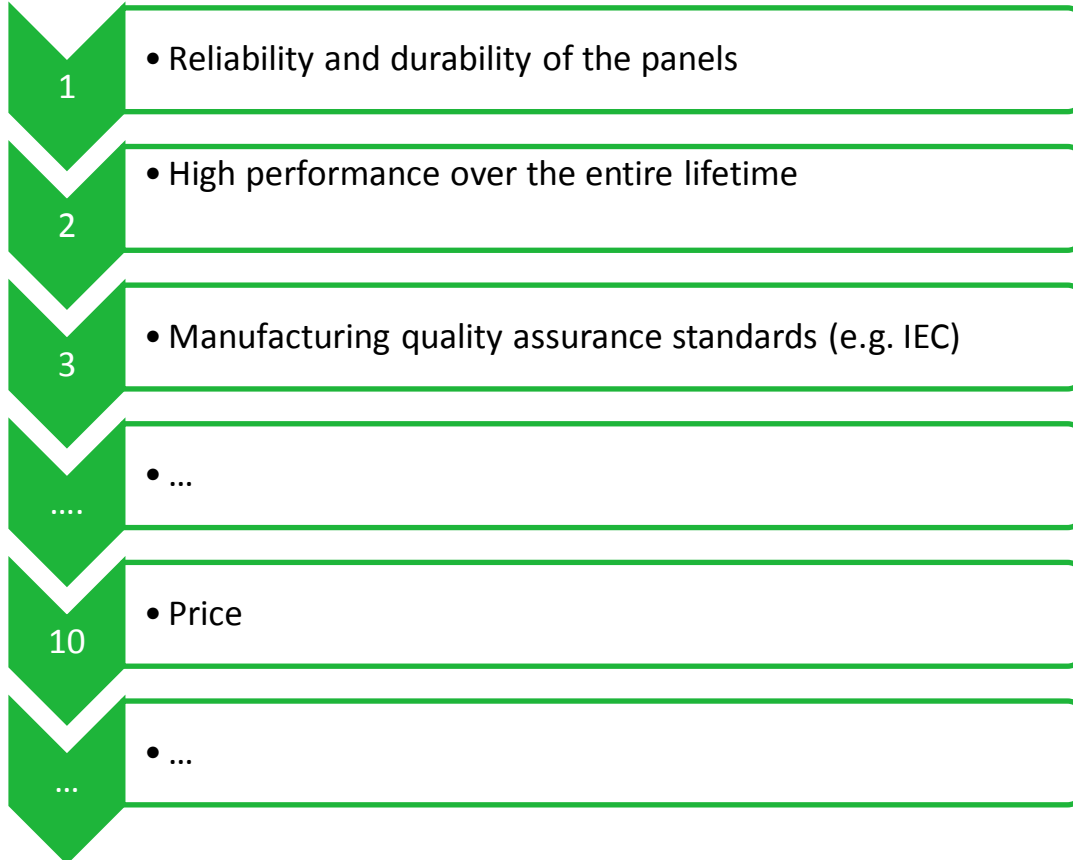
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# QUALITY IN PV MODULES

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# MAIN FACTORS TO MAKE A DECISION



# CERTIFICATION AND QUALITY CONTROL

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BOM (BILL OF MATERIAL)

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CDF (CONSTRUCTIONAL DATA FORM)

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QUALITY CONTROL. MORE THAN 40 CONTROL POINTS AND TESTS BEYOND STANDARDS

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CERTIFICATES FOR SPECIFIC APPLICATIONS

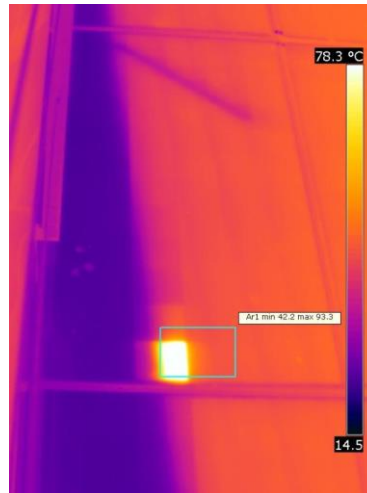
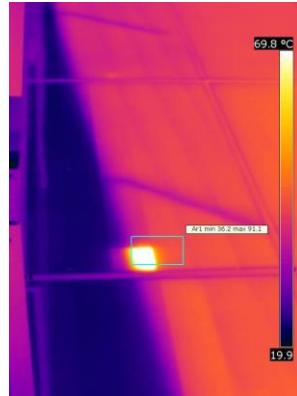
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- COMPANY AND PROCESS
- PRODUCT
- H&S
- SPECIAL FEATURES

TEST	IEC	UL	PVEL*	Units
THERMAL CYCLING	200	200	800	hours
DAMP HEAT	1000	None	4000	hours
HUMIDITY FREEZE	10	5	40	hours
UV EXPOSURE	15	None	90	kWh
DYNAMIC MECHANICAL LOAD	**	None	1000***	Cycles
PID	<a href="#">96h@65C-85%RH</a> <a href="#">168h@25C</a> 600/1000h @85C-85%RH			

\*All of them finishing with diode test  
 \*\* IEC68782 Ed1 will be available in 3 months  
 \*\*\* and thermal cycling and humidity freeze



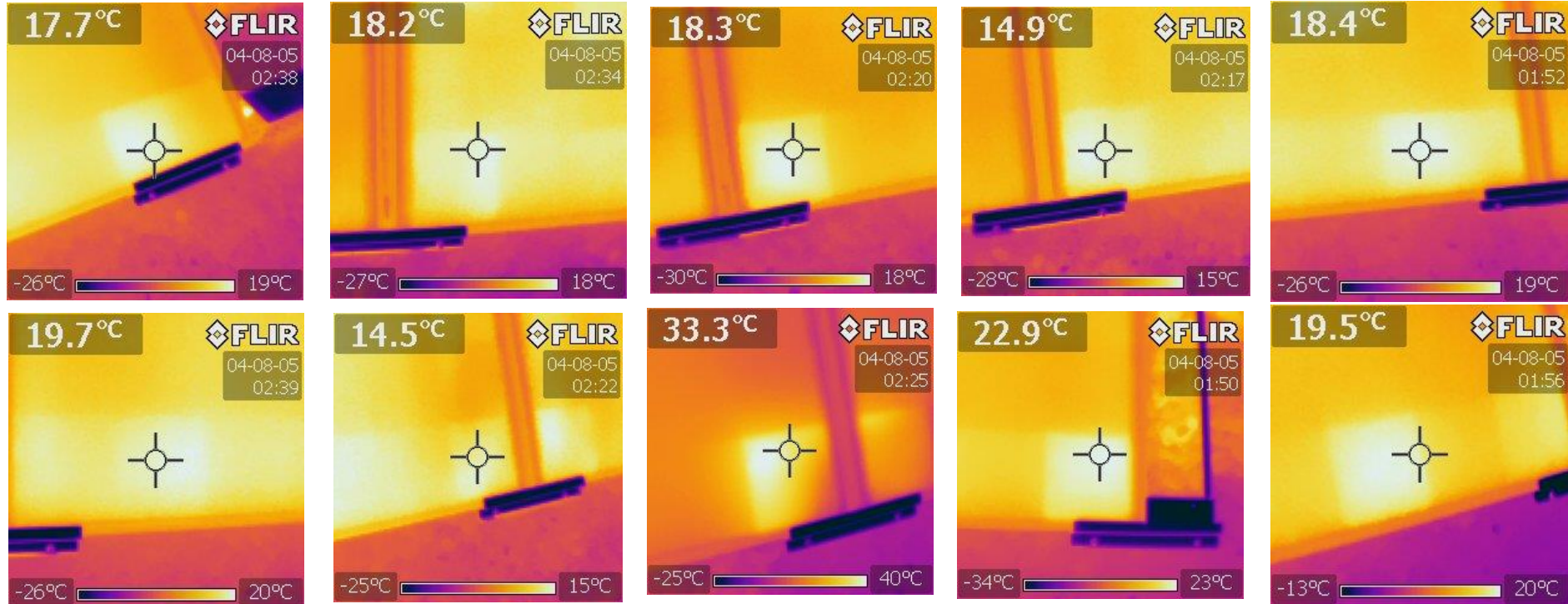
# HOT SPOTS

CRITICAL  
TEMPERATURE



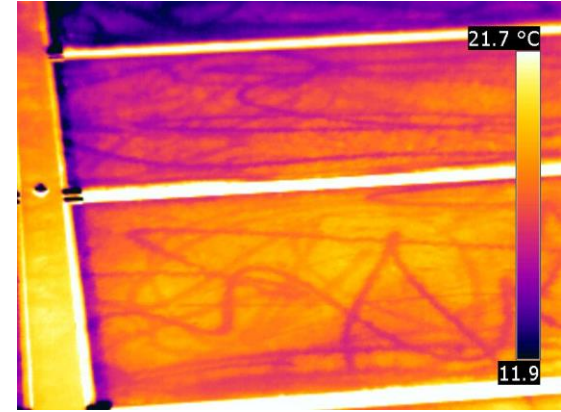
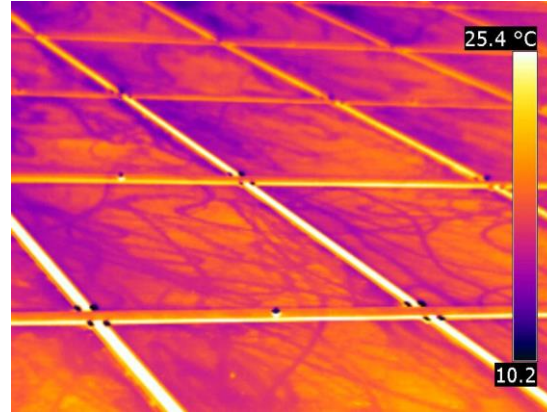
LONG-TERM  
DURABILITY  
ISSUE

## SYSTEMATIC THERMAL PATTERN DUE TO THE FIXING CLAMP

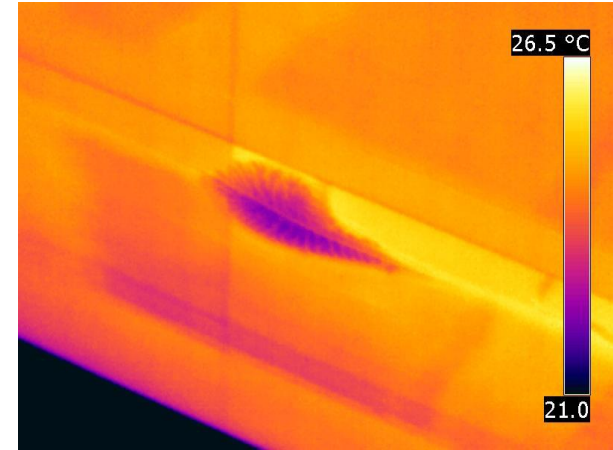
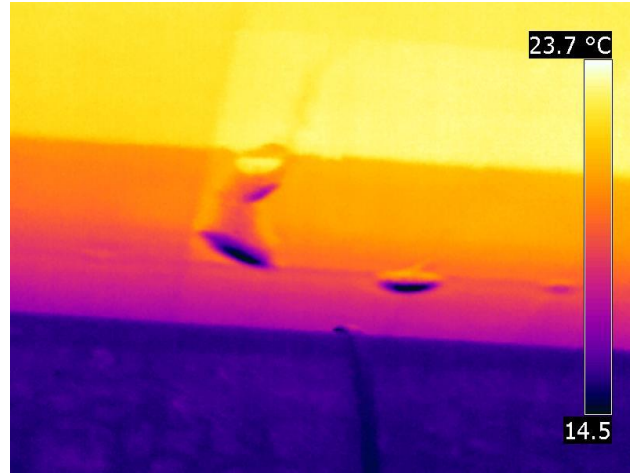




NON  
UNIFORM  
CLEANING  
WITH  
WATER-  
JET



# DELAMINATION



BUBBLES AND  
DELAMINATED  
AREAS HAVE  
DIFFERENT  
HEAT CAPACITY



DIFFERENT  
TEMPERATURE

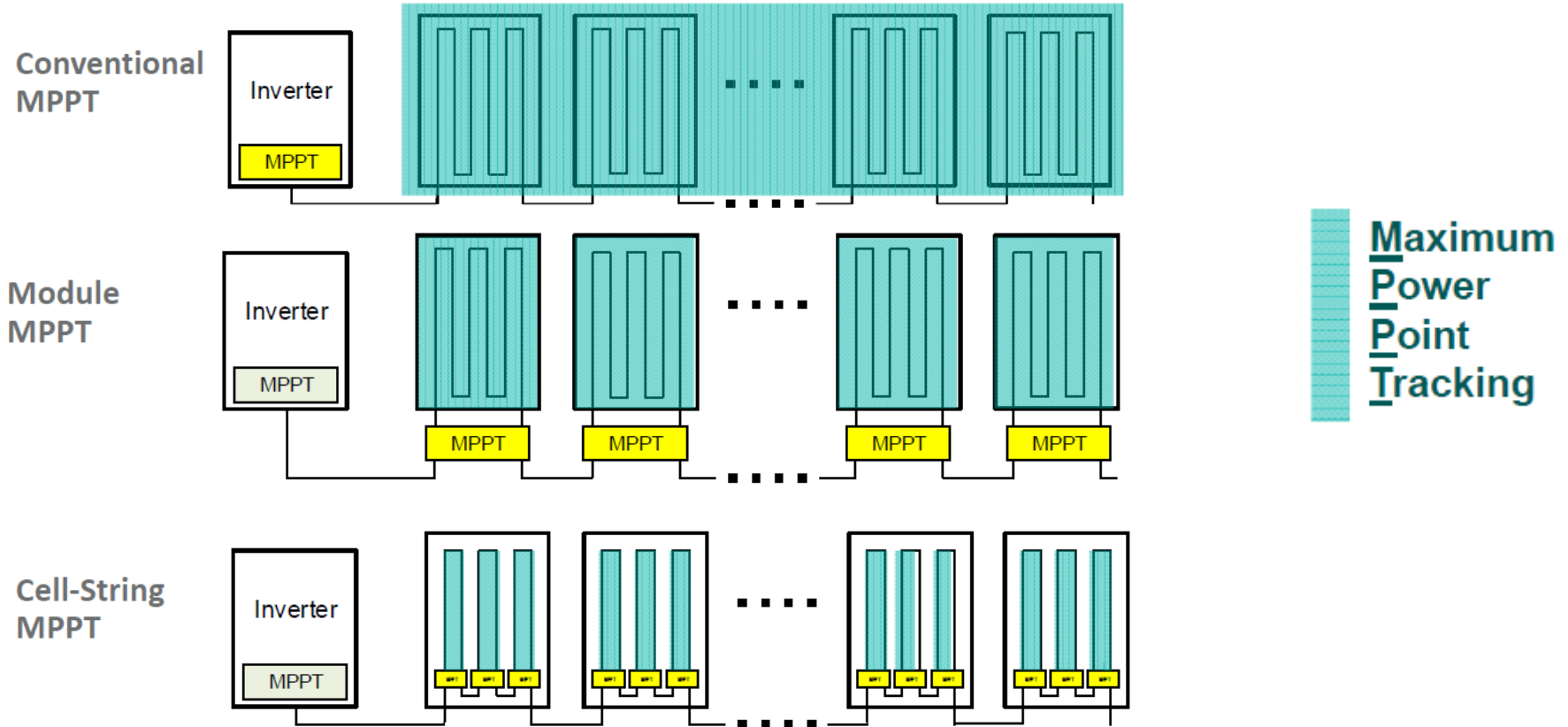


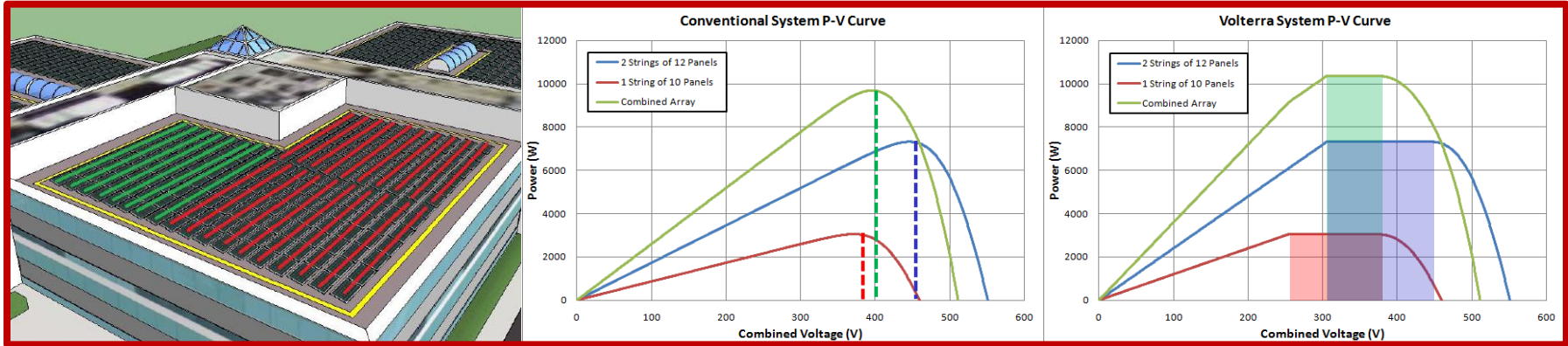
# SMART SOLUTIONS INCREASING THE YIELD ENLARGING THE MODULE LIFETIME

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# Jinko Maximized Evolution

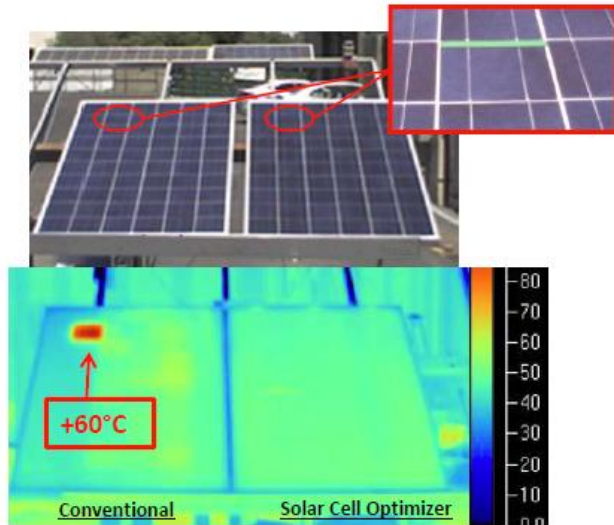




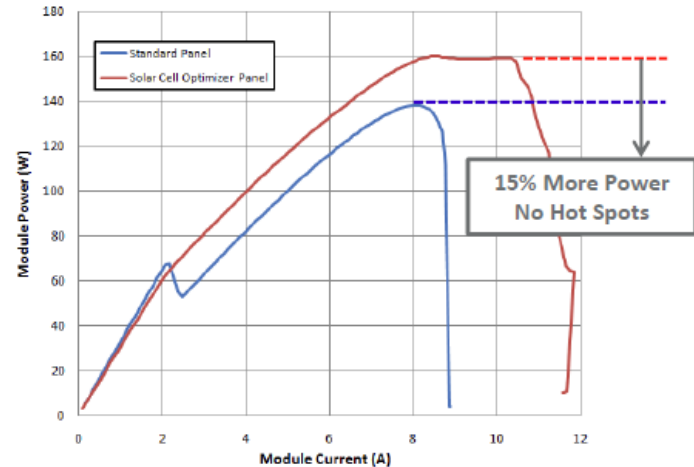
- Conventional strings have single MPP points. Combining strings of unequal length results in all strings operating off their maximum power point
- Solar cell optimizer panels exhibit an MPP “region”, strings of different lengths can be combined with no performance penalty
- Reduce LCOE by installing more panels and using central inverters on challenging rooftop designs

## Jinko Maximized Hot spot free

### Standard IEC Hot Spot Testing



### Panel Output Power



### Output Power versus String Current

- Optimizes weak cells instead of bypassing
- **Eliminates Hot Spots** and associated failure mechanisms → Improves panel reliability
- Increases energy output and helps **reduce O&M costs**

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*Building Your Trust in Solar*