

# Newborn with Shingled module Technology

ECO-395-415M-60SBF



**15 YEARS**  
PRODUCT MATERIAL &  
WORKMANSHIP

**30 YEARS 82.05%**  
LINEAR PERFORMANCE  
WARRANTY

INNOVATIONAL  
SHINGLED  
MODULE  
TECHNOLOGY

REDUCE SHADOW  
LOSS UP TO **35%**  
COMPARING WITH  
CONVENTIONAL  
HALF CUT MODULE

REDUCE  
INTERNAL  
MISMATCH  
LOSS

PASSED THREE  
TIMES IEC  
**STANDARD TEST**

PASSED HAIL  
TEST (ICE BALL  
SIZE : d=45mm)

# ECO DELTA High Efficiency Mono SHINGLED MODULE



## ECO-395-415M-60SBF

ELECTRICAL DATA @ STC		ECO-395M-60 SBF	ECO-400M-60 SBF	ECO-405M-60 SBF	ECO-410M-60 SBF	ECO-415M-60 SBF
Peak Power(Pmax)	(W)	395	400	405	410	415
Maximum Power Voltage (Vmp)	(V)	38.50	38.60	38.70	38.80	38.90
Maximum Power Current(Imp)	(A)	10.26	10.36	10.47	10.57	10.67
Open-circuit Voltage (Voc)	(V)	46.30	46.40	46.50	46.60	46.70
Short-circuit Current(Isc)	(A)	10.92	10.97	11.02	11.07	11.12
Module Efficiency (%)		20.20	20.40	20.70	20.90	21.20
Operating Temperature		-40°C~+85°C				
Maximum System Voltage		□ 1500V				
Maximum Series Fuse Rating		20A				
Power Tolerance		0~5W				

\*STC (Standard Test Condition): Irradiance 1000W/ m<sup>2</sup>, Module Temperature 25°C, AM 1.5  
 \*Performance deviation of Voc [V], Isc [A], Vm [V] and Im [A] : ±3%

ELECTRICAL DATA @ NMOT		ECO-395M-60 SBF	ECO-400M-60 SBF	ECO-405M-60 SBF	ECO-410M-60 SBF	ECO-415M-60 SBF
Peak Power(Pmax)	(W)	297	301	305	309	312
MPP Voltage (Vmp)	(V)	36.70	36.80	36.90	37.00	37.10
MPP Current(Imp)	(A)	8.10	8.18	8.27	8.35	8.43
Open Circuit Voltage (Voc)	(V)	44.10	44.20	44.30	44.40	44.50
Short Circuit Current(Isc)	(A)	8.81	8.85	8.89	8.93	8.97

\*Under Nominal Module Operating Temperature (NMOT), Irradiance of 800W/ m<sup>2</sup>, Spectrum AM 1.5, Ambient Temperature 20°C, Wind Speed 1m/s

### TEMPERATURE CHARACTERISTICS

Temperature coefficient of Pmax	-0.34%
Temperature coefficient of Voc	-0.27%
Temperature coefficient of Isc	0.04%
NMOT	42±2°C

### MECHANICAL DATA

Cell Type	Mono, 166 cut
Cell Arrangement	340pcs
Dimension (L×W×H)	1719 x 1140 x 30 mm
Weight	21kg
Front Cover	3.2mm Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68, 2 Bypass Diodes
Cable Type	4mm <sup>2</sup>
Length of Cable	1200mm
Connector	PV Connector

### OPTIONAL

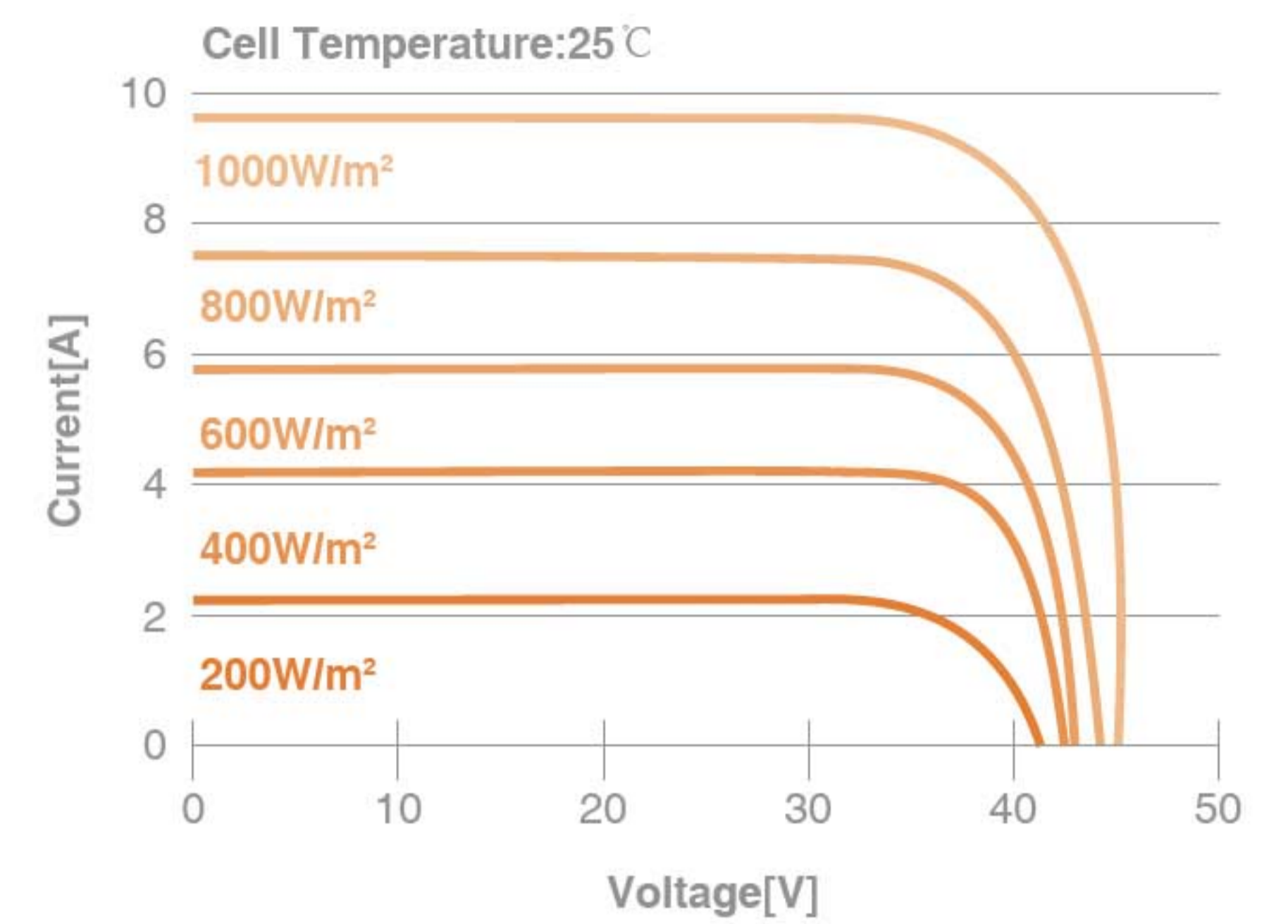
Frame	<input type="checkbox"/> Black
Backsheet	<input type="checkbox"/> Black
Connector	<input type="checkbox"/> Original MC4
Cable	<input type="checkbox"/> Customized
Junction Box	<input type="checkbox"/> IP68

### PACKING MANNER

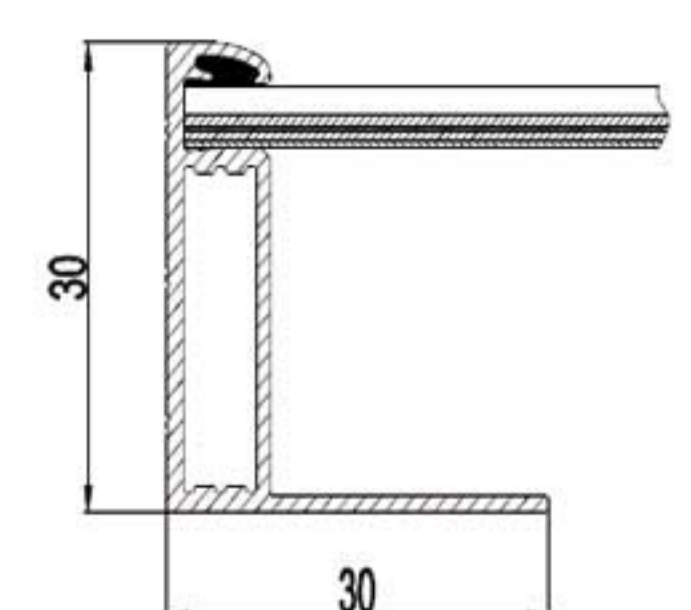
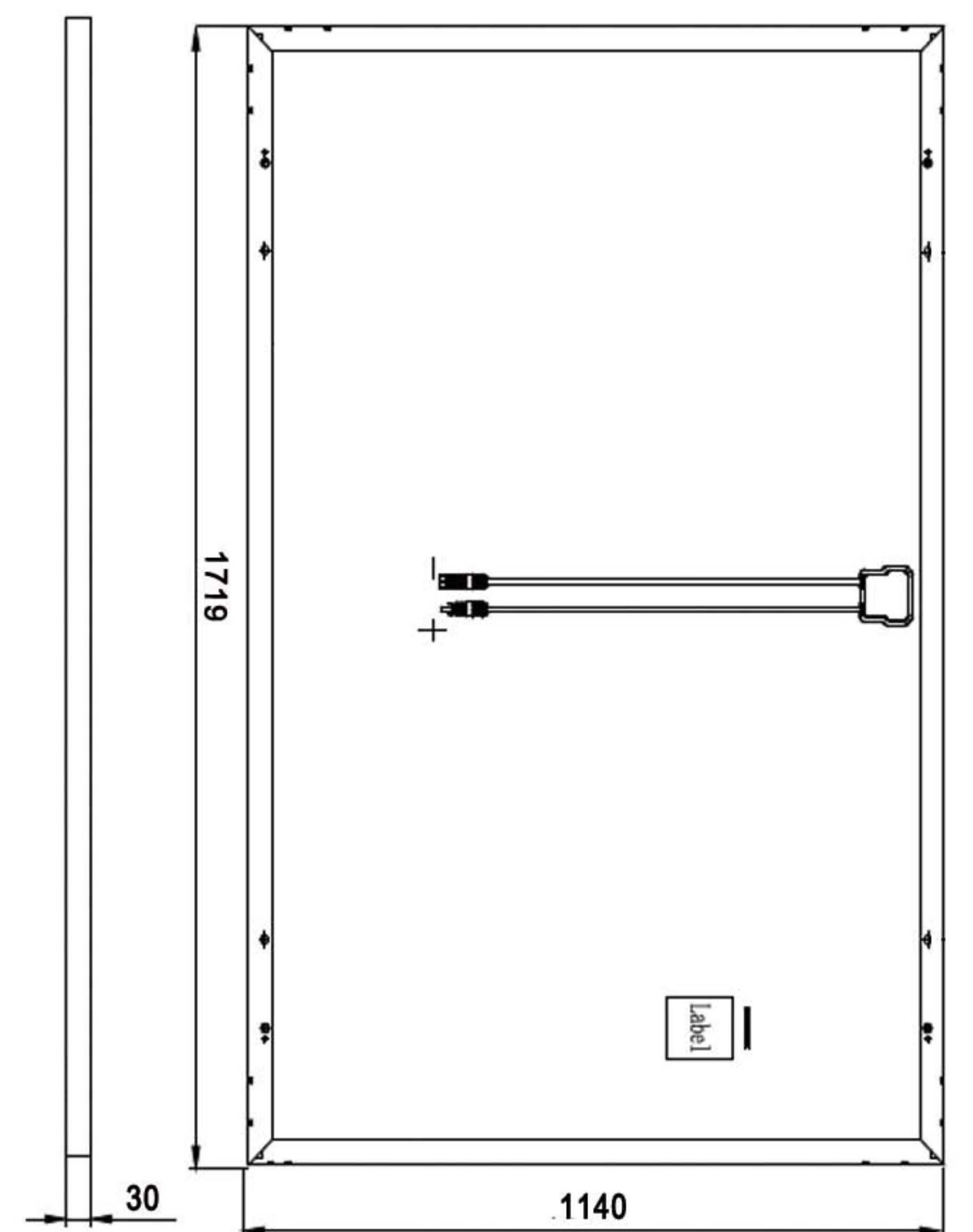
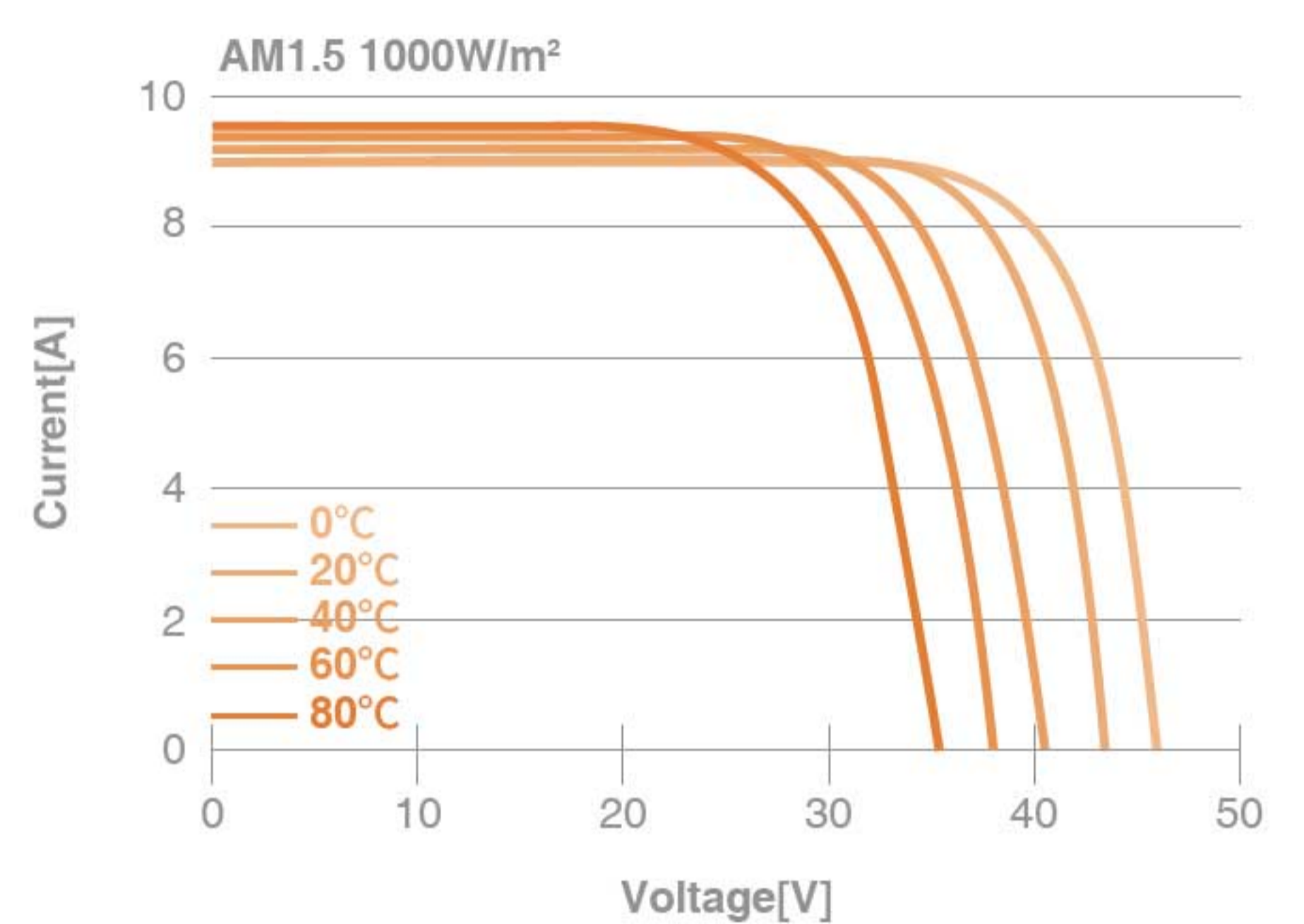
Packing Type	40'HQ
Piece/Pallet	36
Piece/Container	936

\*The specification and key features described in this datasheet may deviate slightly and are not guaranteed. Due to ongoing innovation, R&D enhancement, ECO DELTA POWER CO., LTD Reserves the right to make any adjustment to the information described herein at any time without notice. Please always obtain the most recent version of the datasheet which shall be duly incorporated into the binding contract made by the parties governing all transactions related to the purchase and sale of the products described herein.

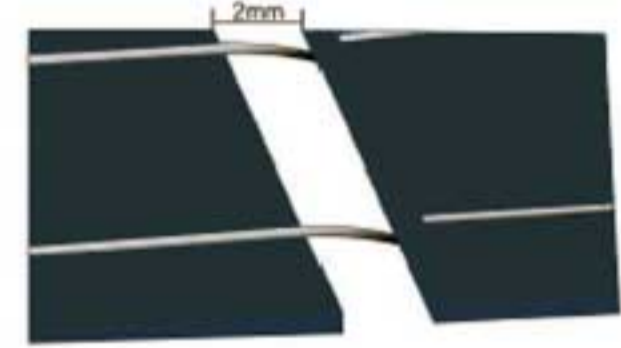
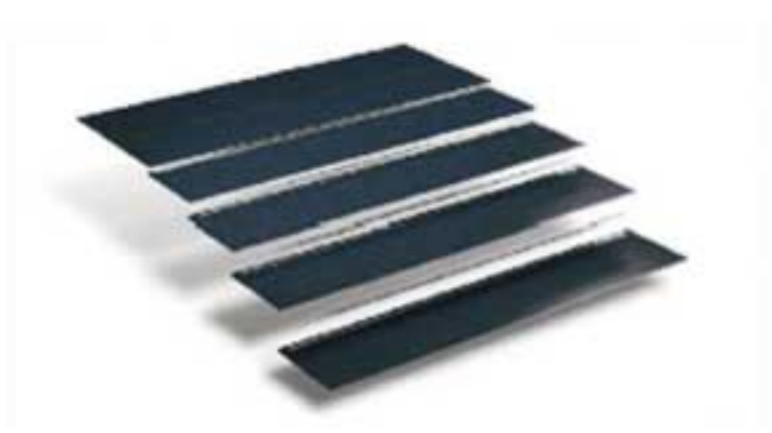
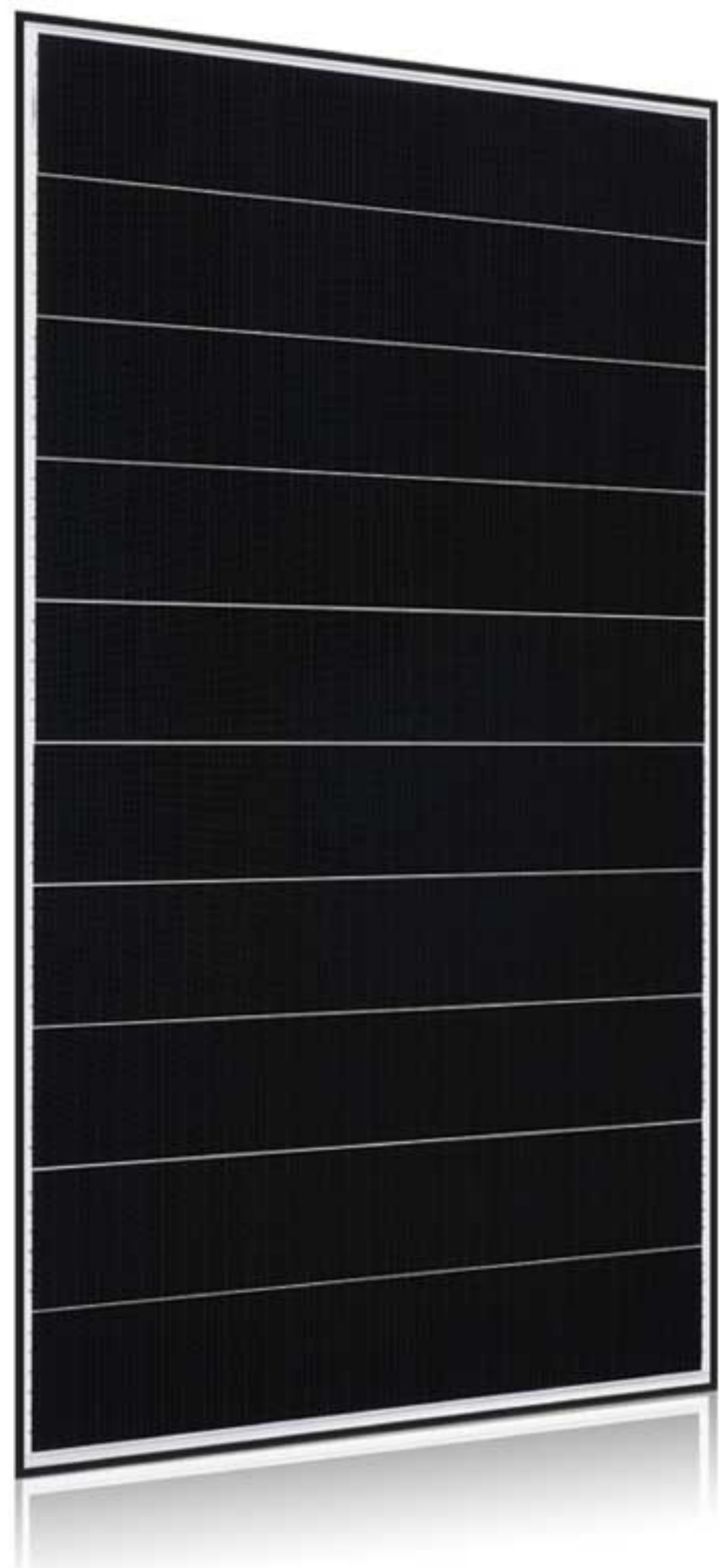
### Current-Voltage Curve under different irradiance



### Current-Voltage Curve under different working temperatures



## ECO DELTA High Efficiency Mono SHINGLED MODULE



9A-->1.8A

Shingled modules use ECA instead of solder ribbon and reduce cracking among cells during production and it can also improve greatly the reliability in outdoors.

Adhesive cures at 150 °C, lower thermal stress. Conventional welding, High temperature soldering >250 °C

### Technical features of shingled module



#### Lower String Current

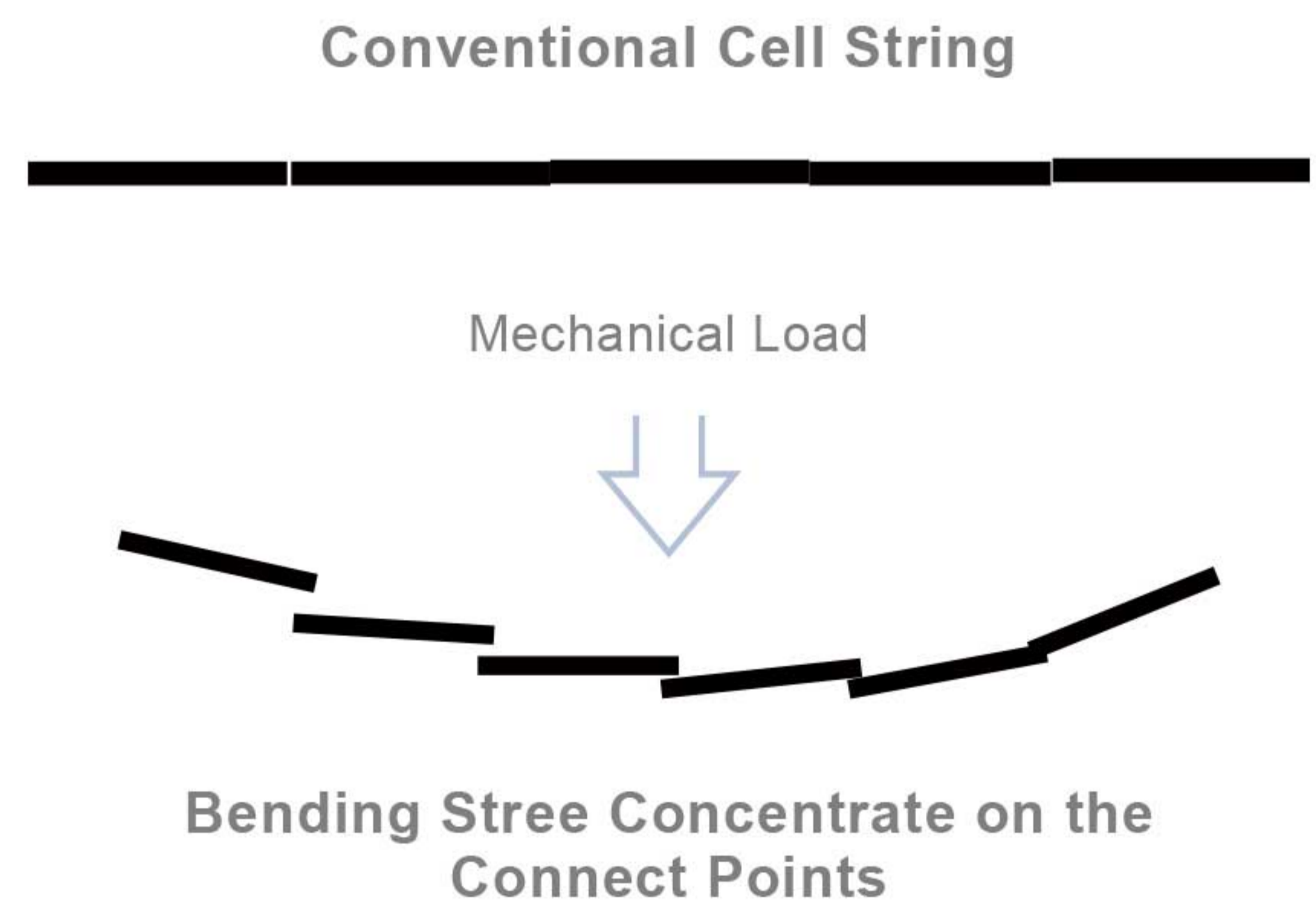
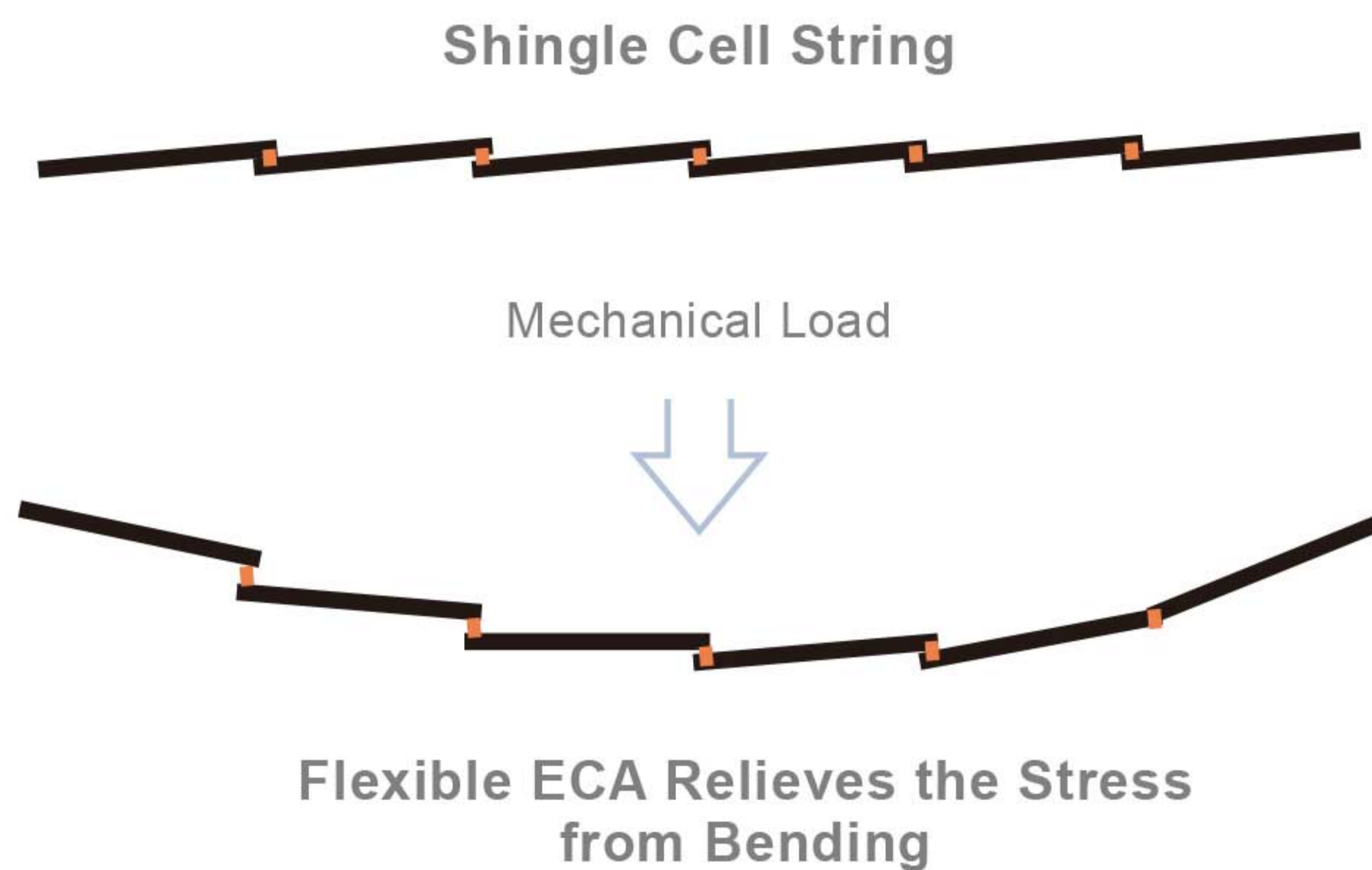
Isc of a full cell is ~9A, and the 1/5 shingle has an Isc of (~1.8A)



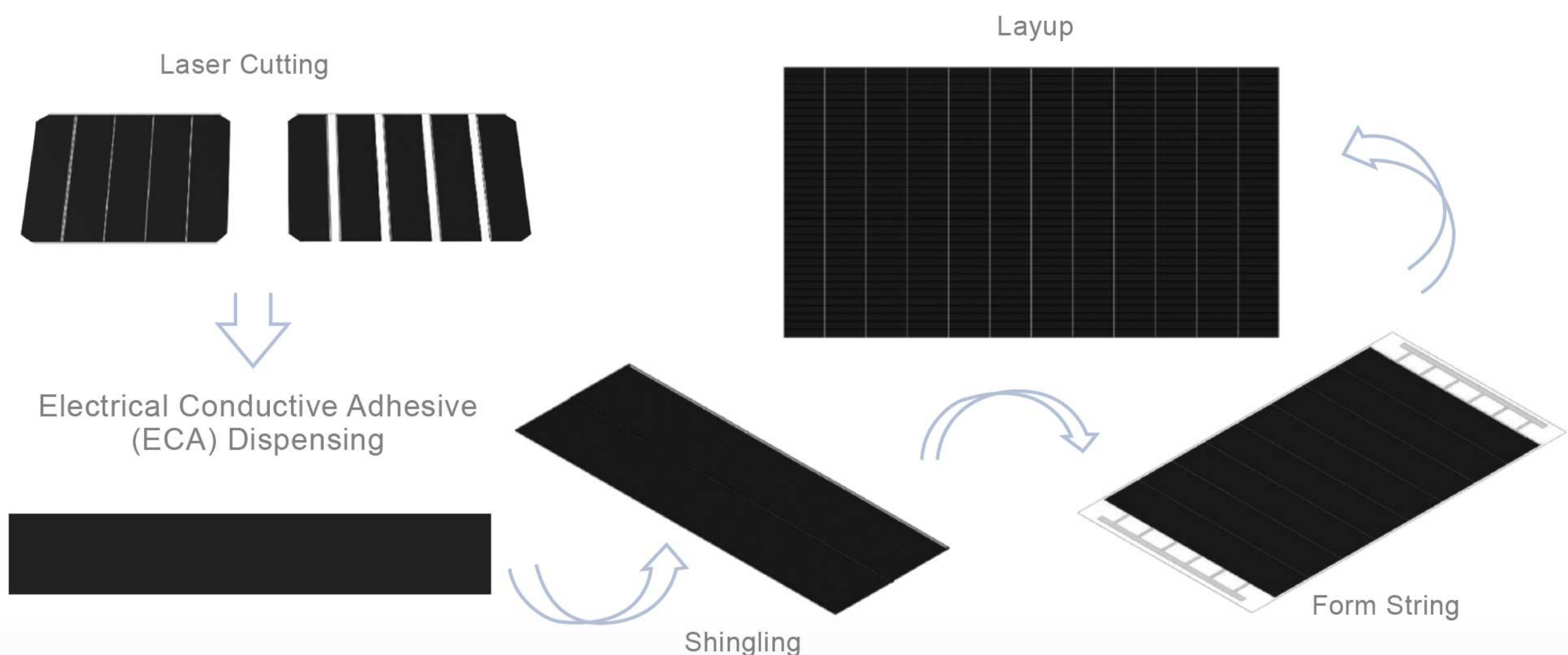
#### Lower Operating Temperature

Lower string current results in lower cell operating temperature (-5 °C)

### Technical features of shingled module (under load)



### Shingled Module process



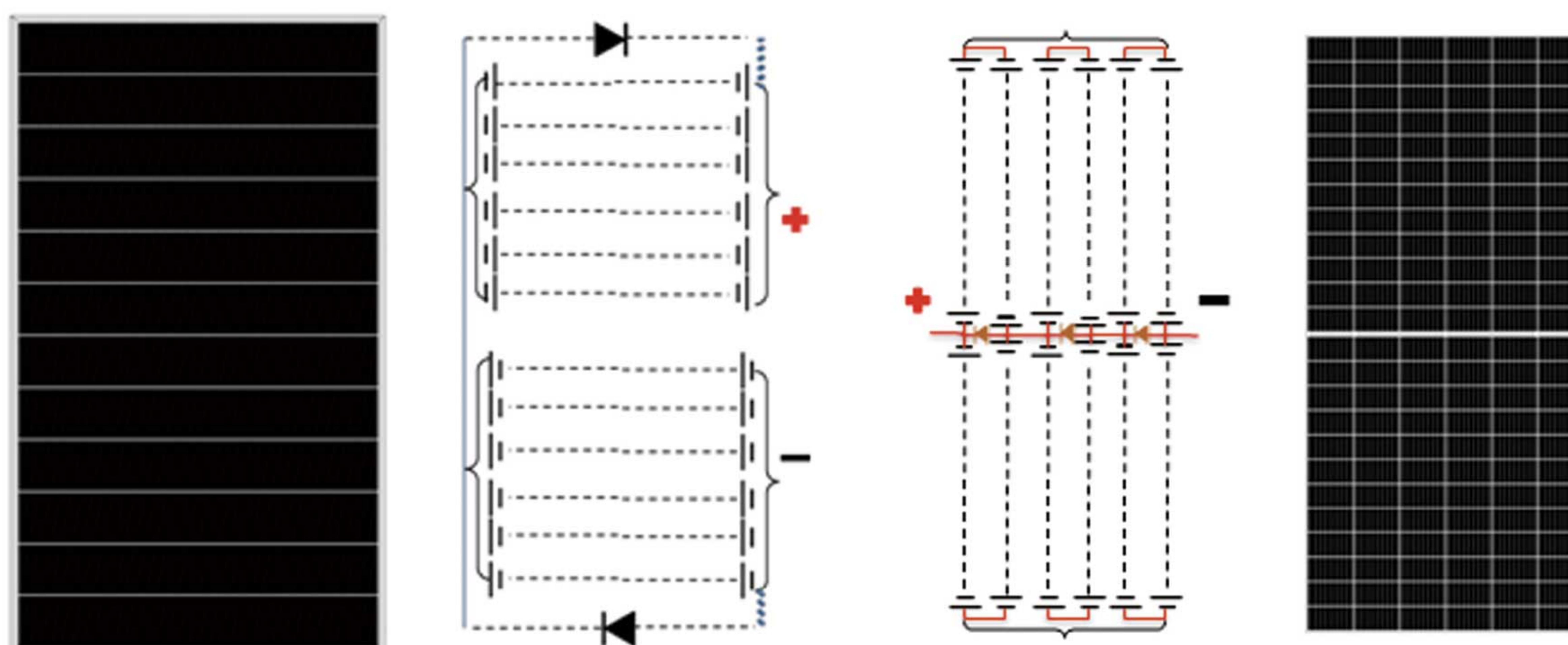
## ECO DELTA High Efficiency Mono SHINGLED MODULE

**ECO DELTA Shingled Module is designed to live in a very harsh environ-  
Passed 3 X IEC standard test**



	IEC CERTIFICATION	VDE QUALITY TESTED	ECO DELTA QUALITY PROGRAM
<b>Test frequency</b>	once, only for initial certification	continuous sampling quarterly monitoring	continuous sampling and monitoring
<b>UV</b>	15km/m <sup>2</sup>	*	45kWh/m <sup>2</sup>
<b>Humidity test (DH)</b>	1000h	1500h	3000h
<b>Humidity-frost test (HF)</b>	10cycles	10cycles	30cycles
<b>Hot-Spot test</b>	*	*	100% of cell production
<b>EL Test</b>	only certification module	100% of module production	100% high-resolution EL inspection
<b>PID Test</b>	-	-	Monitoring of weekly production

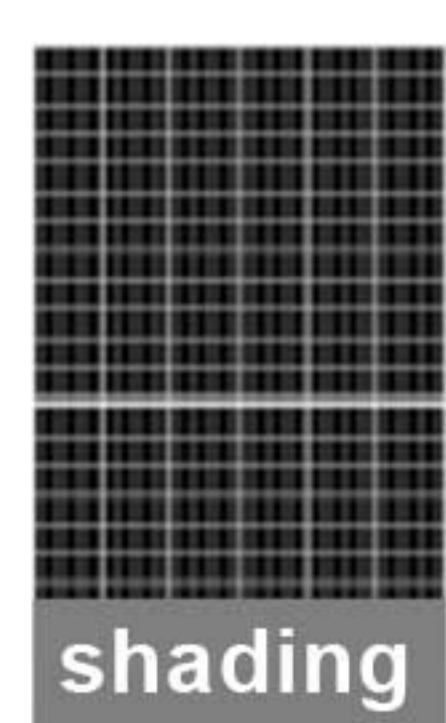
### Optimized electrical circuit--all parallel connection



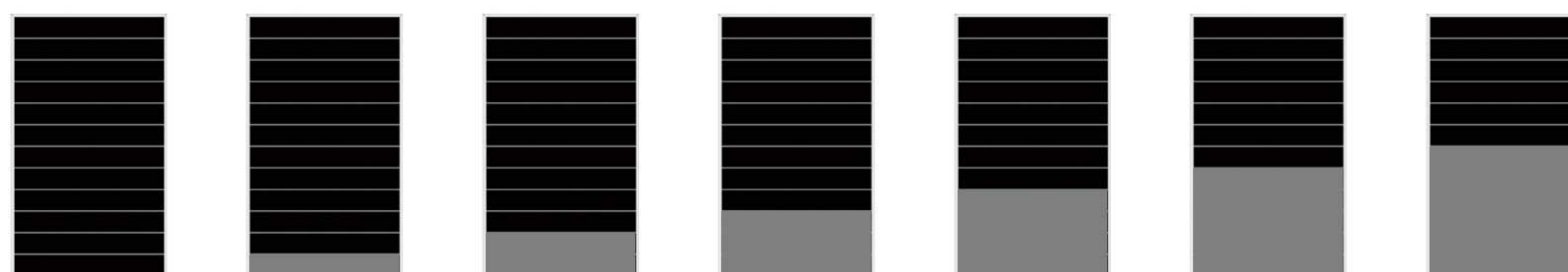
### Shingled module Vs Half-Cut module - Less Influences from Shadows

Case Study

When the panels are installed in portrait orientation, shingled modules have the best output under horizontal shading!  
Half-cut module is covered and stop modules from working, while shingled module still has power generation.



Stop Working



NO. of Shaded rows	None	1 Row	2 Row	3 Row	4 Row	5 Row	6 Row
<b>Current(A)</b>	10.665	9.082	7.313	5.504	10.614	10.612	10.609
<b>Max.Power(W)</b>	400.5	348.0	258.1	216.2	192.4	191.5	191.4