

Newborn with Shingled module Technology

ECO-470-480M-78SA



15 YEARS
PRODUCT MATERIAL &
WORKMANSHIP
25 YEARS 84.8%
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-470-480M-78SA

ELECTRICAL DATA @ STC

		ECO-470M-78SA	ECO-475M-78SA	ECO-480M-78SA
Peak Power(Pmax)	(W)	470	475	480
Maximum Power Voltage (Vmp)	(V)	40.90	41.00	41.10
Maximum Power Current(Imp)	(A)	11.49	11.59	11.68
Open-circuit Voltage (Voc)	(V)	49.40	49.50	49.60
Short-circuit Current(Isc)	(A)	12.07	12.12	12.17
Module Efficiency	(%)	20.90	21.20	21.40
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/ m², Module Temperature 25°C, AM 1.5
 *Performance deviation of Voc [V], Isc [A], Vm [V] and Im [A] : ±3%

ELECTRICAL DATA @ NMOT

		ECO-470M-78SA	ECO-475M-78SA	ECO-480M-78SA
Peak Power(Pmax)	(W)	354	358	362
MPP Voltage (Vmp)	(V)	39.00	39.10	39.20
MPP Current(Imp)	(A)	9.08	9.15	9.22
Open Circuit Voltage (Voc)	(V)	47.10	47.20	47.30
Short Circuit Current(Isc)	(A)	9.72	9.76	9.80

*Under Nominal Module Operating Temperature (NMOT), Irradiance of 800W/ m², 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	43±2°C

MECHANICAL DATA

Cell Type	Mono, 158.75*31.75mm cut 1/5
Cell Arrangement	432pcs (1/5, 158.75)
Dimension (L×W×H)	1969 x 1140 x 35 mm
Weight	24.5kg
Front Cover	3.2mm Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68, 2 Bypass Diodes
Cable Type	4mm ²
Length of Cable	1200mm
Connector	PV Connector

OPTIONAL

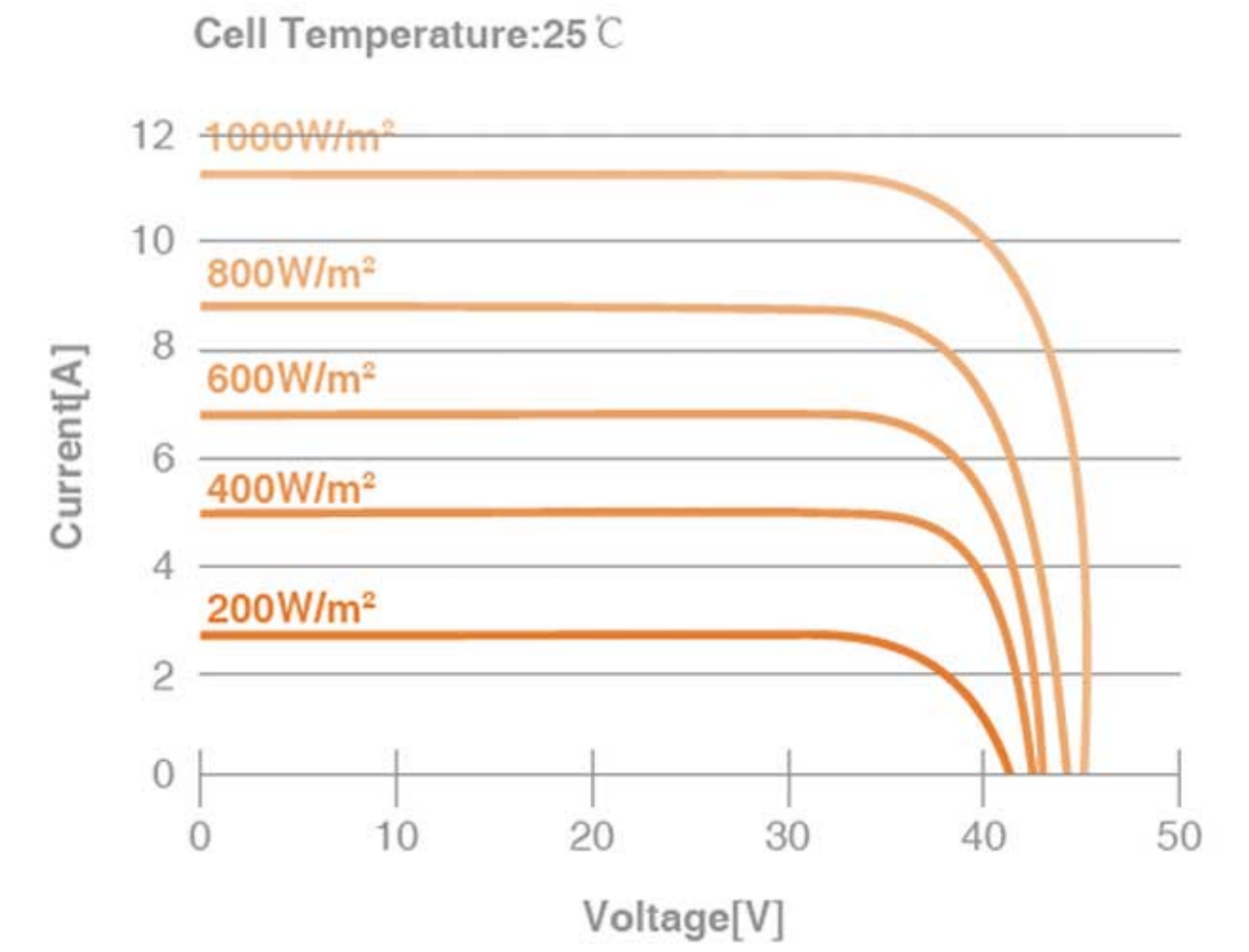
Frame	□Black
Backsheet	□Black
Connector	□Original MC4
Cable	□Customized
Junction Box	□Customized

PACKING MANNER

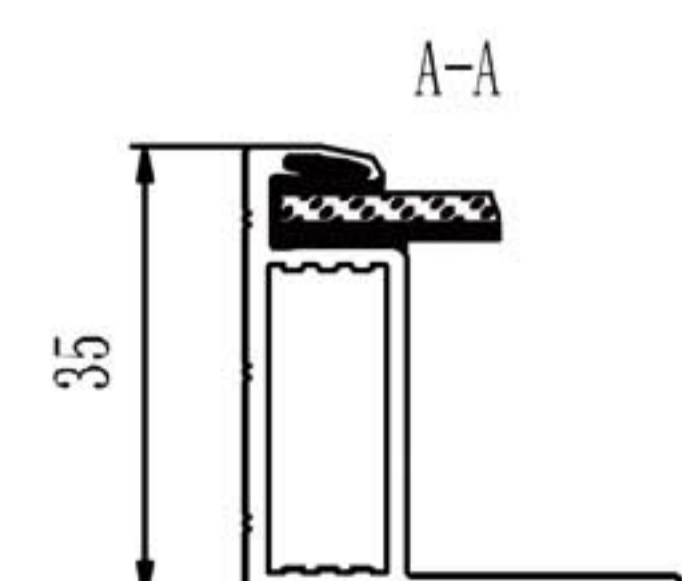
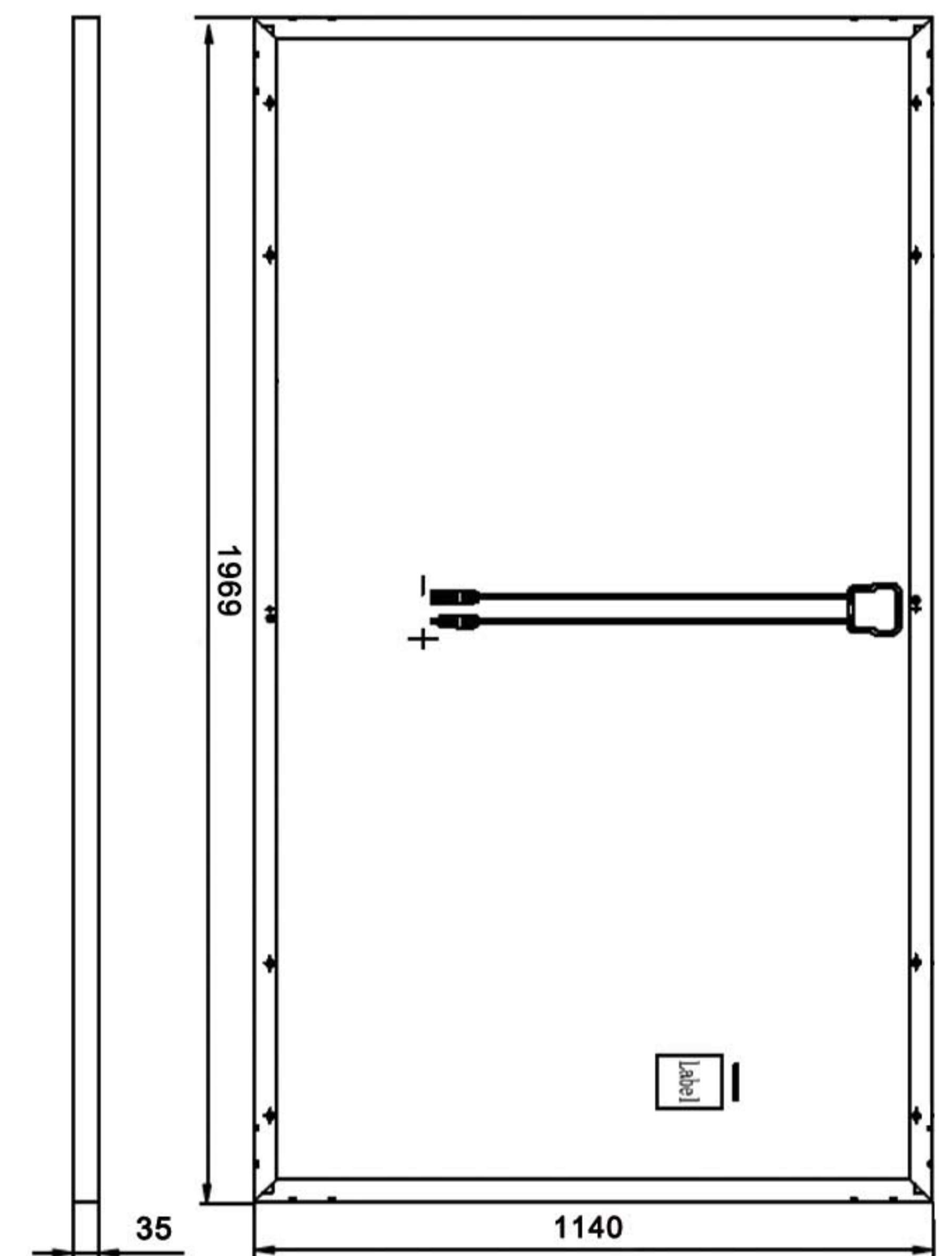
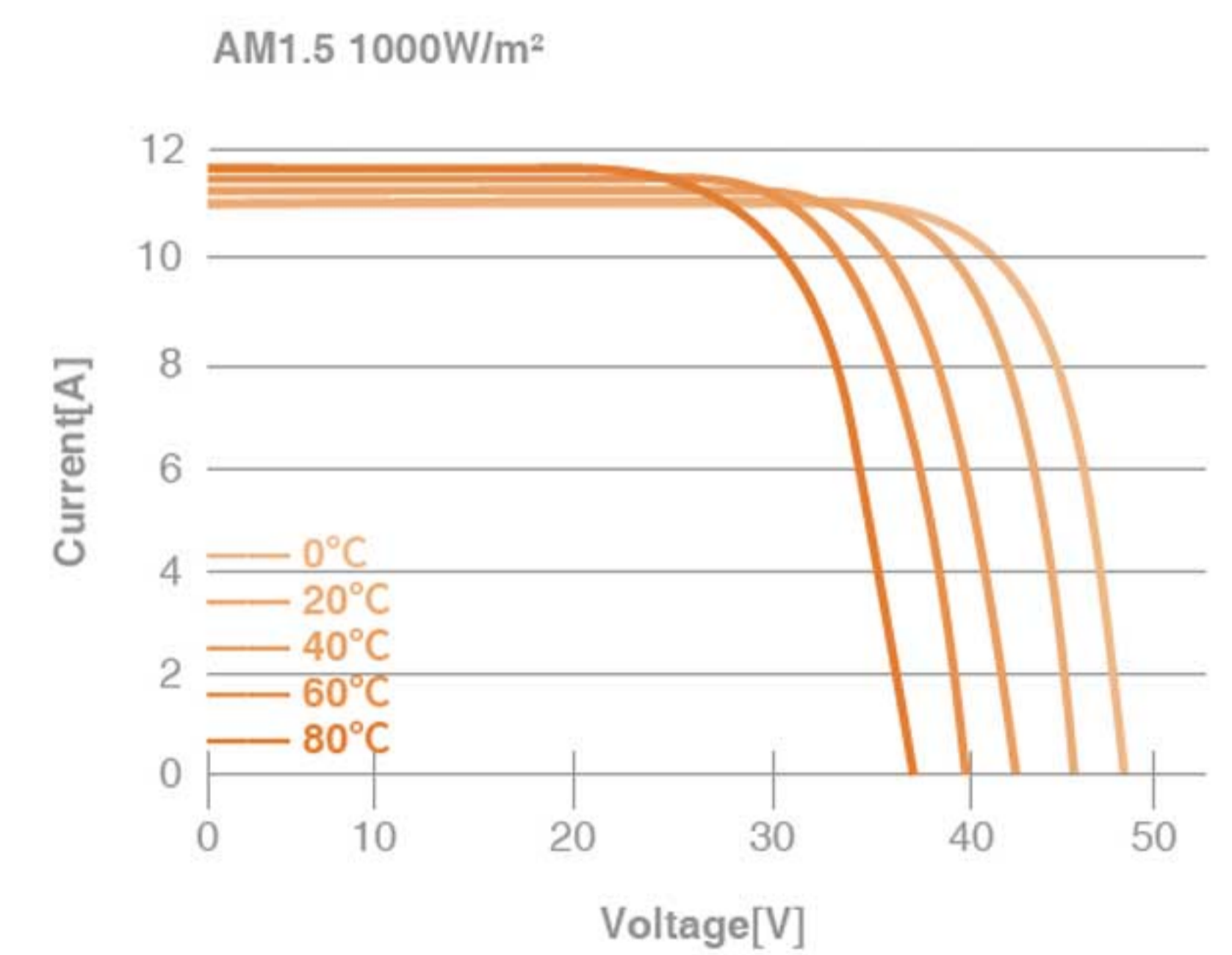
Packing Type	40'HQ
Piece/Pallet	30
Piece/Container	660

*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.

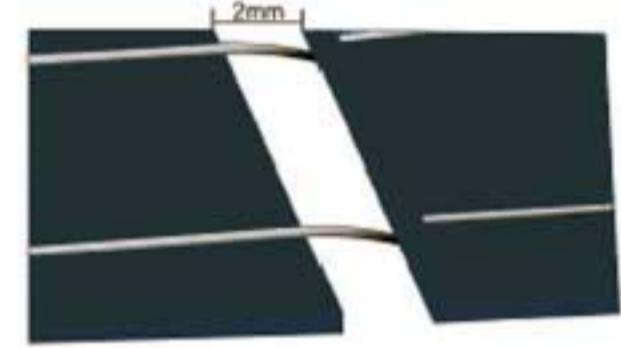
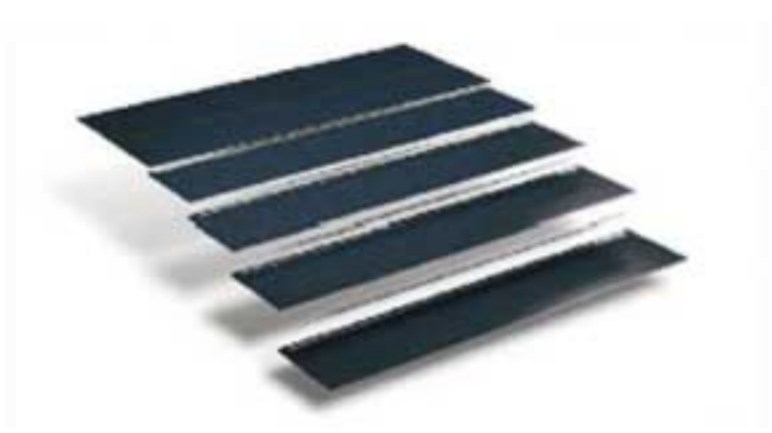
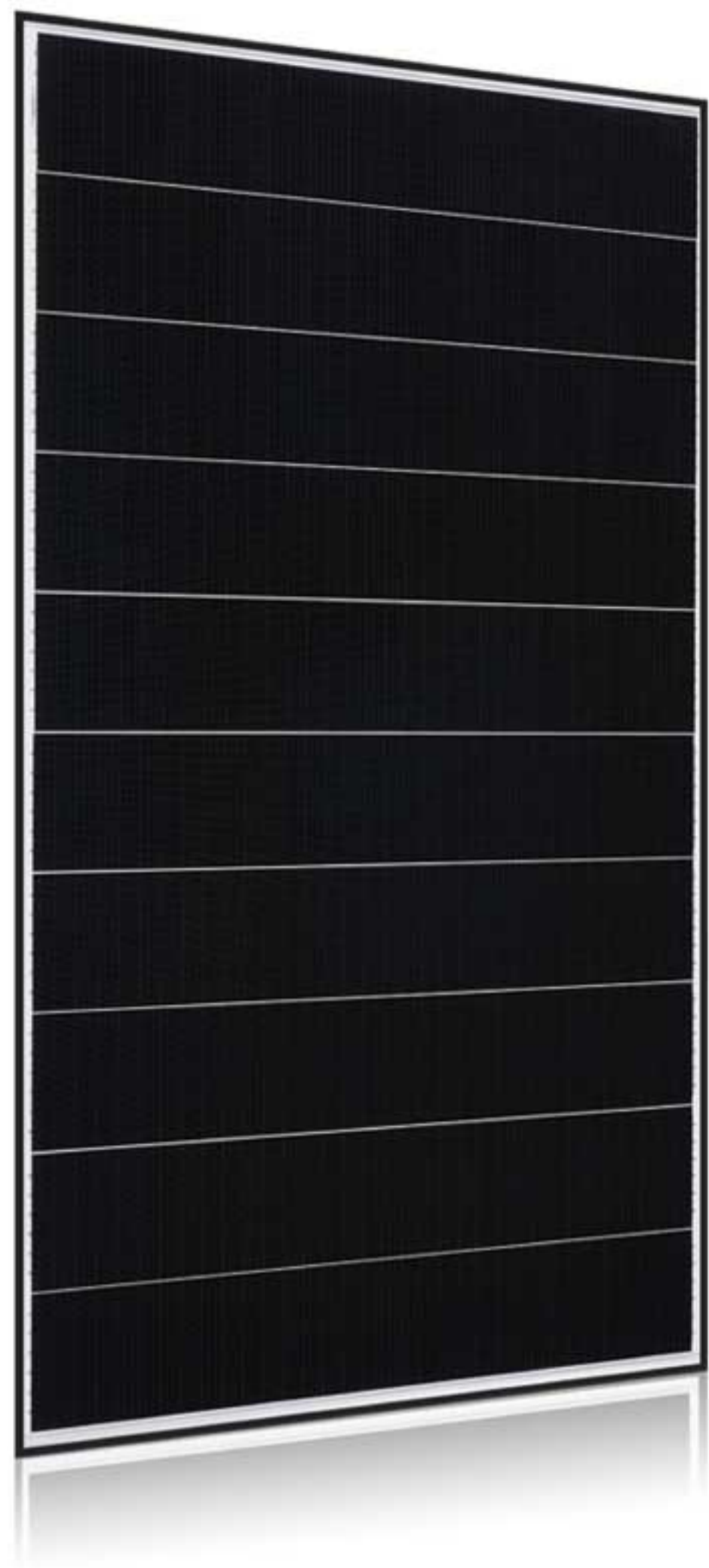
Current-Voltage Curve under different irradiance



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

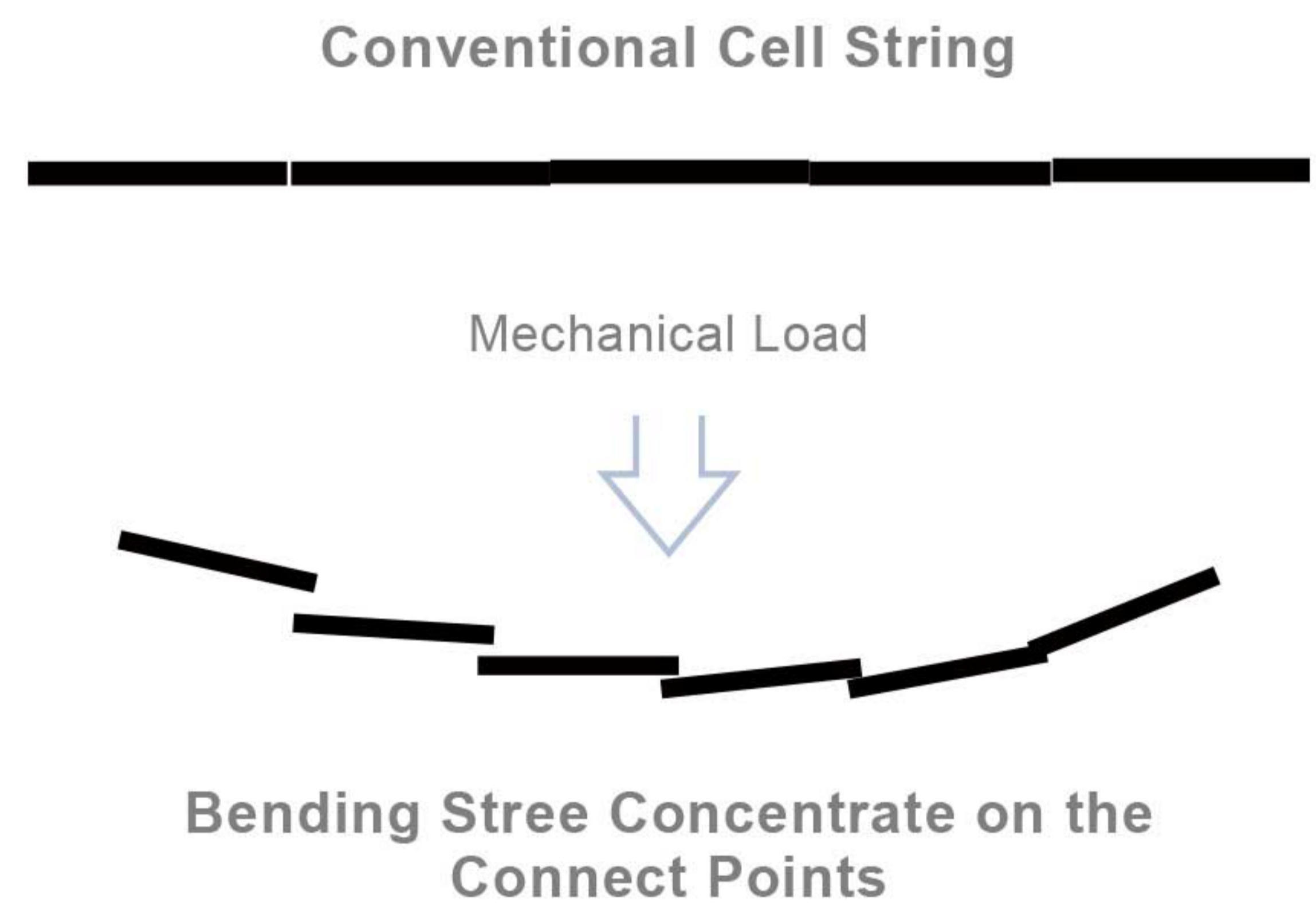
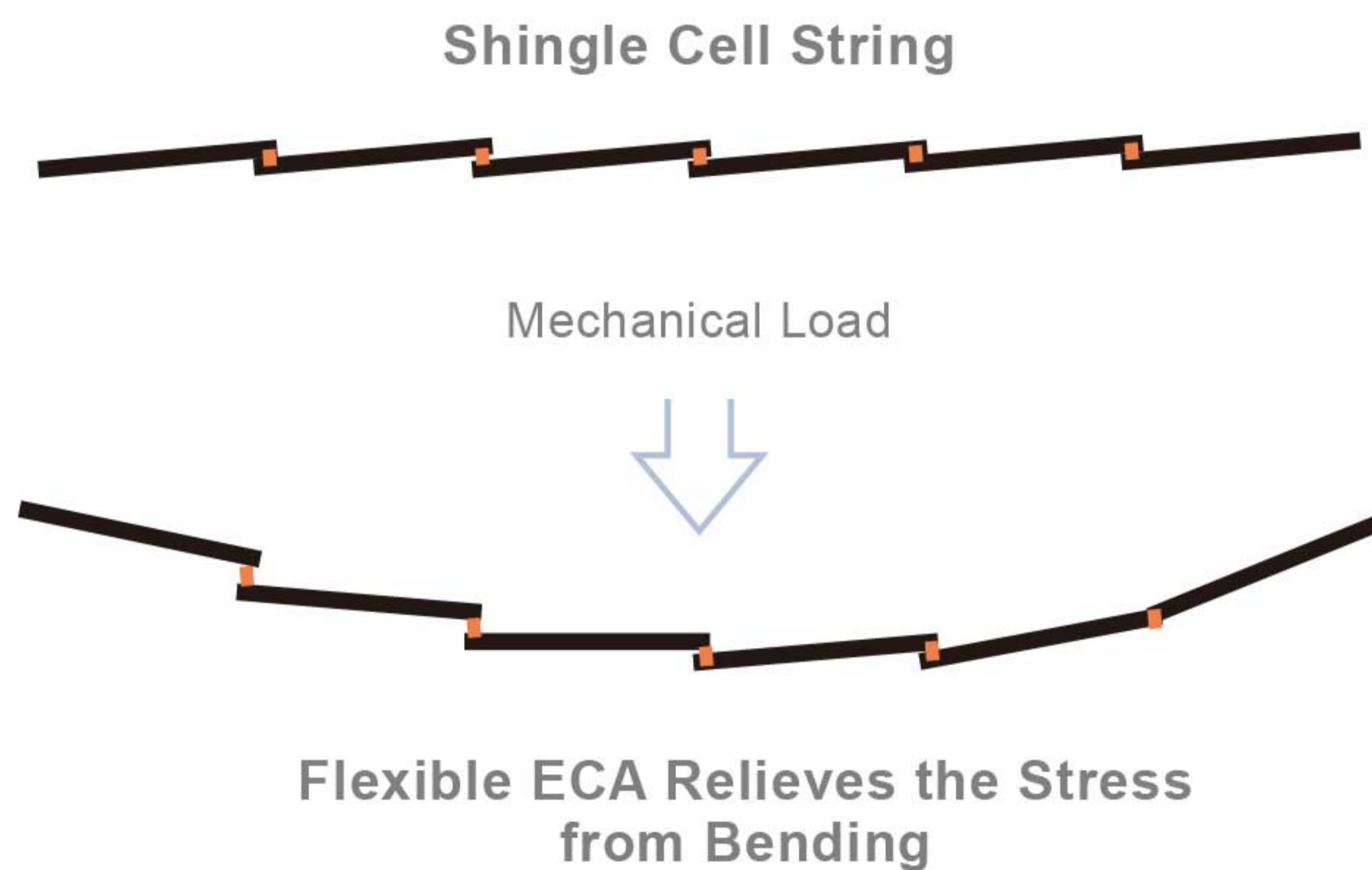
Isc of a full cell is ~9A, and the 1/5 shingle has an Isc of (~1.8A)



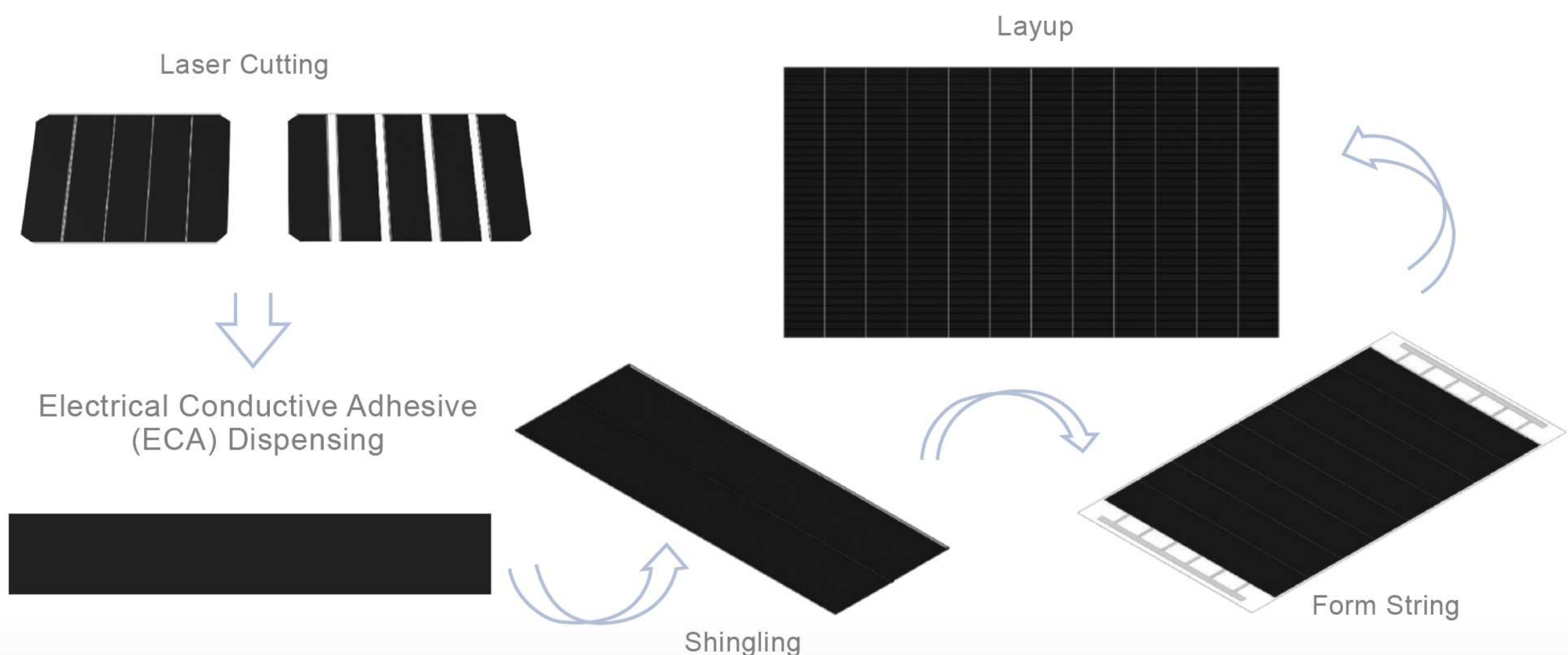
Lower Operating Temperature

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

Technical features of shingled module (under load)



Shingled Module process



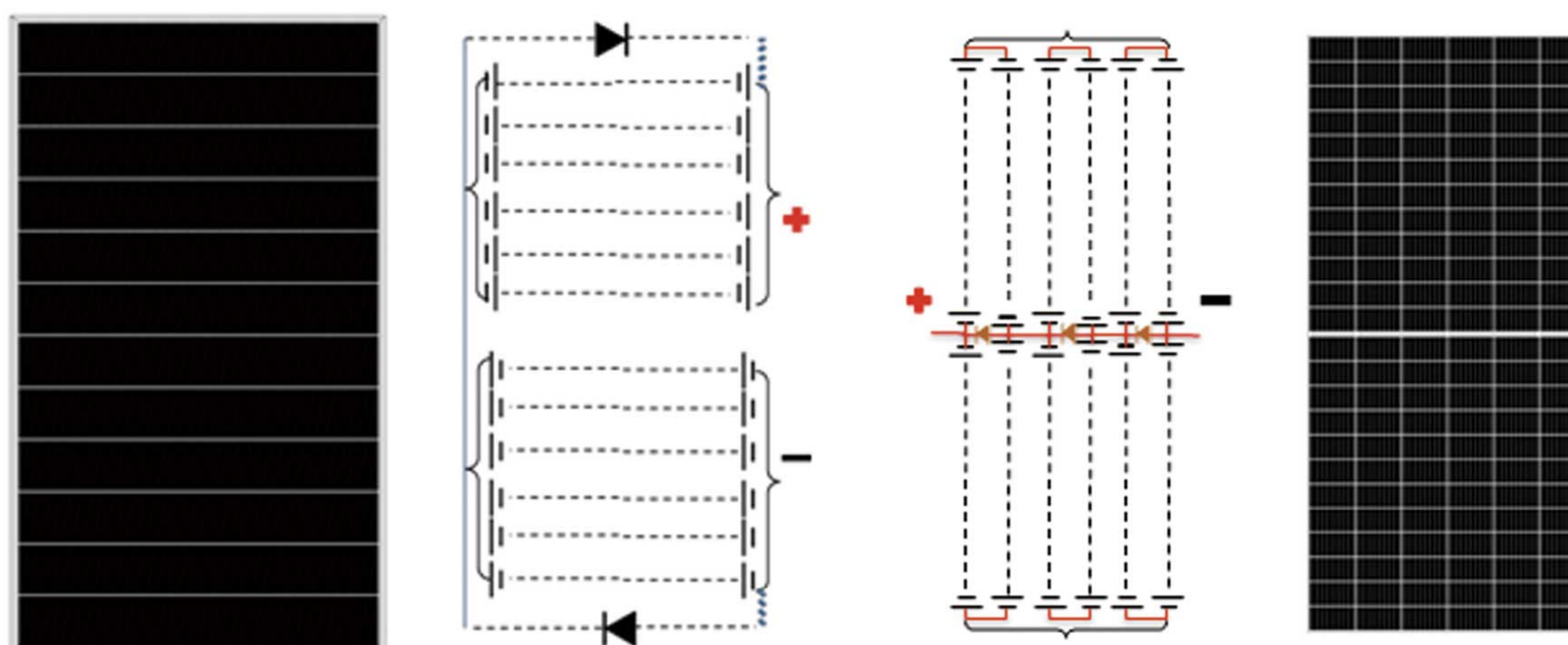
ECO DELTA High Efficiency Mono SHINGLED MODULE

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

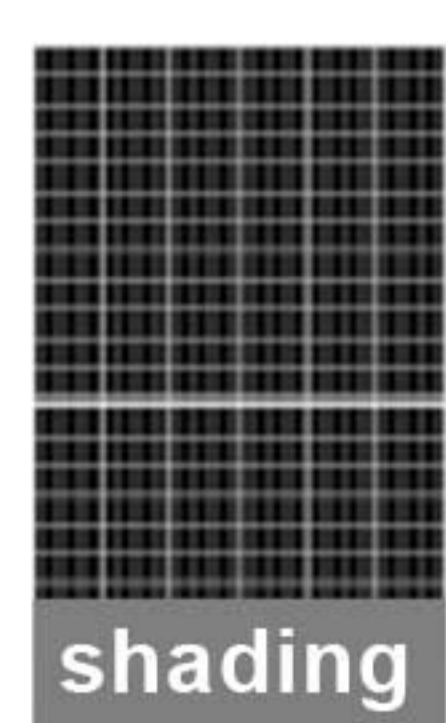
Optimized electrical circuit--all parallel connection



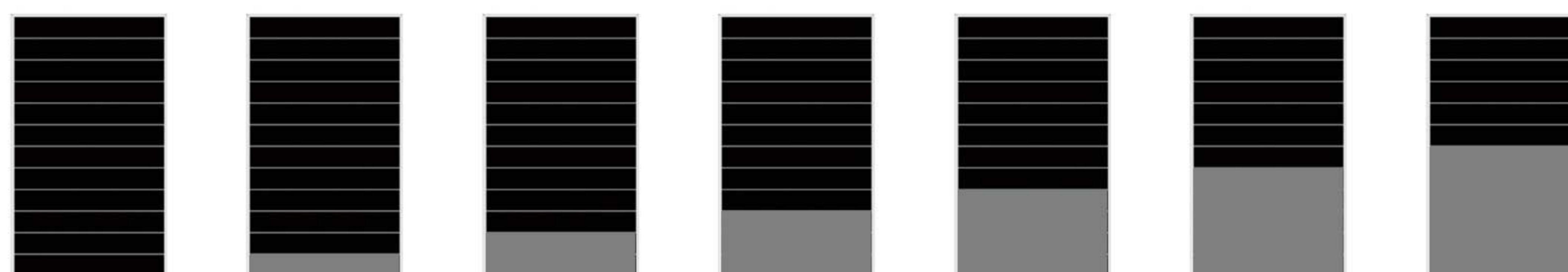
Shingled module Vs Half-Cut module - Less Influences from Shadows

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
Current(A)	10.665	9.082	7.313	5.504	10.614	10.612	10.609
Max.Power(W)	400.5	348.0	258.1	216.2	192.4	191.5	191.4