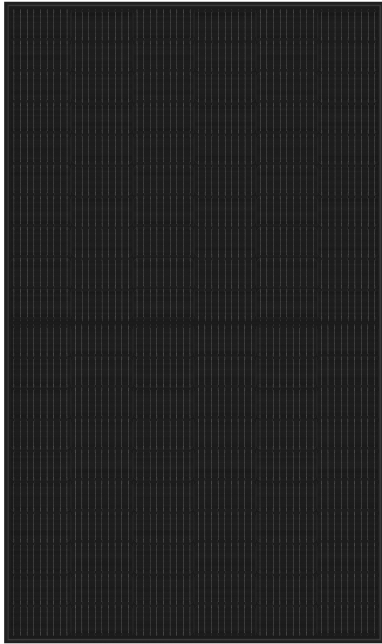


PERC Half Cut Mono Crystalline Solar Module  
ESM 435/440/445/450/455H



# RALOS

AURINKOVOIMALAT



Excellent module efficiency up to: 20.90%



IP68 junction box for long-term weather endurance



Heavy snow load up to 5400 Pa, wind load up to 3600 Pa



PID: Selected material and stringent quality system ensure PID free

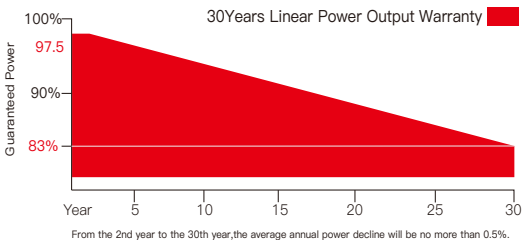


Applicable to harsh environment of deserts, farmlands and seashores



Much lower risk of Hot Spot

## CERTIFICATE



## WARRANTY



Linear power output warranty  
-12 years minimum 92% power output  
-30 years minimum 83% power output



Product warranty on materials and workmanship  
According to the applicable Ralos Limited Warranty Statement

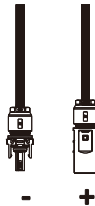
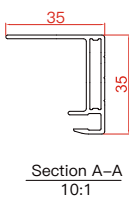
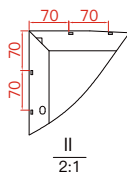
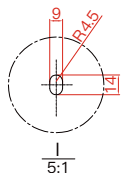
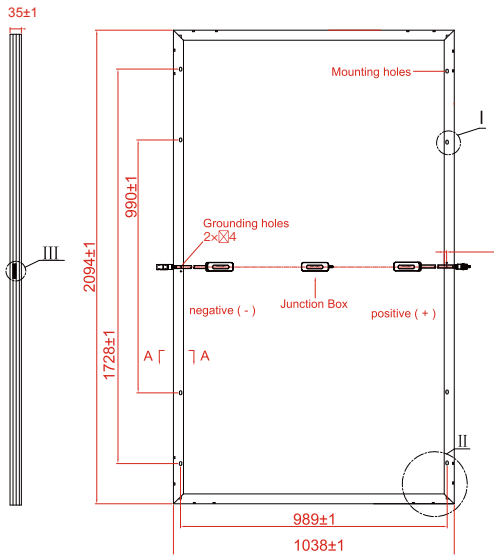
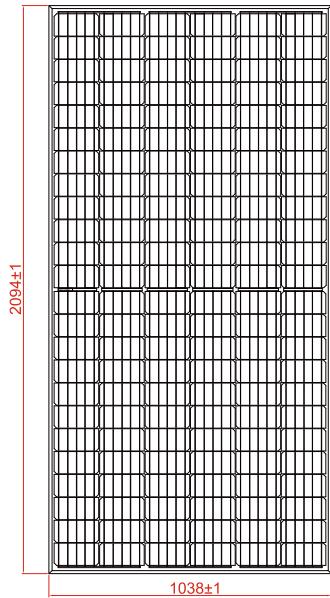
Ralos Eco Oy

Pellavantori 1 LH 1  
33100 Tampere

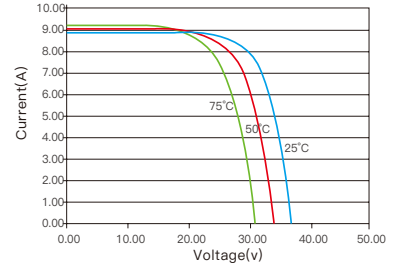
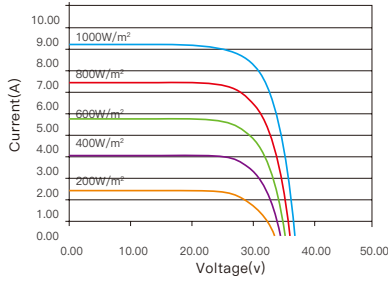
020 155 2222  
Y: 2853297-3

info@ralos.fi  
www.ralos.eco

EN



### IV CURVE



ELECTRICAL SPECIFICATION	Unit	ESM-435H	ESM-440H	ESM-445H	ESM-450H	ESM-455H
Maximum Power (Pmax)	W	435	440	445	450	455
Module Efficiency	%	20.00	20.20	20.50	20.70	20.90
Open Circuit Voltage (Voc)	V	48.70	48.90	49.10	49.30	49.50
Short Circuit Current (Isc)	A	11.39	11.46	11.53	11.60	11.66
Maximum Power Voltage (Vmp)	V	40.89	41.10	41.30	41.50	41.70
Maximum Power Current (Imp)	A	10.64	10.71	10.77	10.84	10.91
Maximum System Voltage	V	ICE 1500VDC/UL1500(VDC)				
Maximum Series Fuse Rating	A	20				

ELECTRICAL DATA@NOCT	ESM-435H	ESM-440H	ESM-445H	ESM-450H	ESM-455H
Pmax[W]	324.9	328.6	332.3	336.1	339.8
Vmp[V]	38.10	38.30	38.50	38.60	38.80
Imp [A]	8.53	8.59	8.64	8.70	8.75
Voc[V]	45.70	45.80	46.00	46.20	46.40
Isc[A]	9.21	9.27	9.33	9.38	9.43

NOCT:Irradiance:800W/m<sup>2</sup>, Ambient Temperature:20°C,Air Mass:1.5,Wind Speed:1m/s

MECHANICAL SPECIFICATIONS	
Solar Cell Type	Mono Crystalline 166x166mm
Number of Cells	144pcs (24x6)
Module Size	2094*1038*35mm
Weight	23.5kg
Glass	3.2mm tempered glass
Back Sheet	Black
Frame	Anodized aluminum alloy, black
Junction Box	IP68
Quantity of Diodes	3pcs
Cable	4.0mm <sup>2</sup> , 1100mm
Connector	MC4 Compatible
Wind/Snow Load	3600pa/5400pa

TEMPERATURE CHARACTERISTIC	
NMOT (Nominal Module Operating Temperature)	41°C (±3°C)
Temperature Coefficient of P <sub>MAX</sub>	- 0.36%/°C
Temperature Coefficient of U <sub>OC</sub>	- 0.26%/°C
Temperature Coefficient of I <sub>SC</sub>	0.04%/°C

PACKAGING CONFIGURATION	
Modules per box:	30 pieces
Number per 20GP:	225 pieces
Modules per 40' HQ:	660 pieces

MAXIMUM RATINGS	
Operational Temperature	-40 to +85°C
Maximum System Voltage	1500V DC(IEC) 1500V DC (UL)
Max Series Fuse Rating	20A
Snow Load	5400 Pa (3600 Pa)
Wind Load	3600 Pa (1600 Pa)

\*design load with safety factor 1.5  
(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)