TONGWEI SOLAR CELL DATASHEET

M210CBPERCBP Monocrystalline 210 12BB Bifacial Solar Cell

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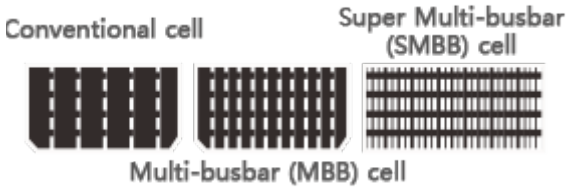
Tongwei has established 3 national first-class PV technology R&D centers and set up scientific research and technology teams led by industry experts, and is working to deepen the industry-university-research cooperation with universities and research institutes at home and abroad. Tongwei focuses on the cutting-edge technologies and independently developed first 1GW 210mm TNC mass production line and first large-size advanced metalization test line in the industry, and has been developing pilot test lines for new cells and mainstream module technologies. Tongwei has been injecting vitality into the industry development through continuous innovation.

Tongwei PV Technology System focused on the R&D and mass production of new technologies and new products (such as TNC and HJT) to further enhance the R&D and development of cross-generation and cutting-edge technologies in the industry (including HBC, perovskite, laminated cells/modules, PV+energy storage and other technologies). In the future, Tongwei will continue to consolidate our strengths of technological innovation, further enhance our overall competitiveness. While providing efficient and high-quality products for upstream and downstream partners, Tongwei will also contribute to the development of green energy and build a sustainable new ecology of the PV industry



Multi-busbar - reduced strings increase output, dense wires reduce losses

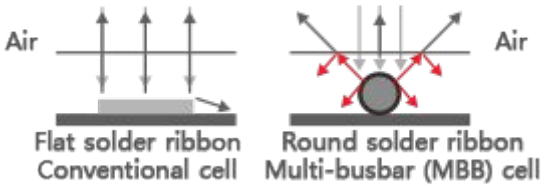
The grid lines are densely distributed, and the stress is uniform with SMBB design, Significantly reduce BOM cost, and the output power is 1-2W higher than that of MBB

Half-cell cut - reduce flow and loss

Current density is reduced by 1/2, internat power loss is reduced to 1/4 of conventional modules, and the rated output power is increased by 5-10w

Shading, not compromising energy Up-down symmetrical parallel module design, effectively reduce current mismatch due to shading. The power output is increased by 50%

Lossless Cutting Lossless laser cutting technology, no mechanical damage, smooth cutting surface without burrs. Low cell cracking risks, micro-cracking is reduced by more than 50%



New Solder Ribbon Adopt round-shaped solder ribbon, low shading area, Multiple reflections of incident light, power increased by 1-2W

High-Density Encapsulation Technology The 210 Series adopts advanced high-density encapsulation technology to ensure the perfect balance of efficiency and reliability. Module efficiency increased by more than 0.15%

Technical data and design

Dimensions	210mm*210mm± 0.25mm	TkVoltage：-0.36 %/K
Thickness	180±20μm	TkCurrent：+0.07%/K
Front(-)	12*0.06±0.04mmbusbar (silver), 174±15 fingers Blue (dark blue) color antireflective film (silicon nitride composite film	TkPower：-0.38%/K
Back(+)	Back electrode width (silver) 1.4 ±0.5mm, back surface covered by fingers 150 fingers on the back, anti-broken grid design	Rsh≥35Ω，Irev2≤0.5A

Light intensity reliability

Intensity(W/m²)	1000	900	800	600	400
Uoc	1.000	0.996	0.991	0.988	0.962
Isc	1.000	0.903	0.803	0.602	0.403

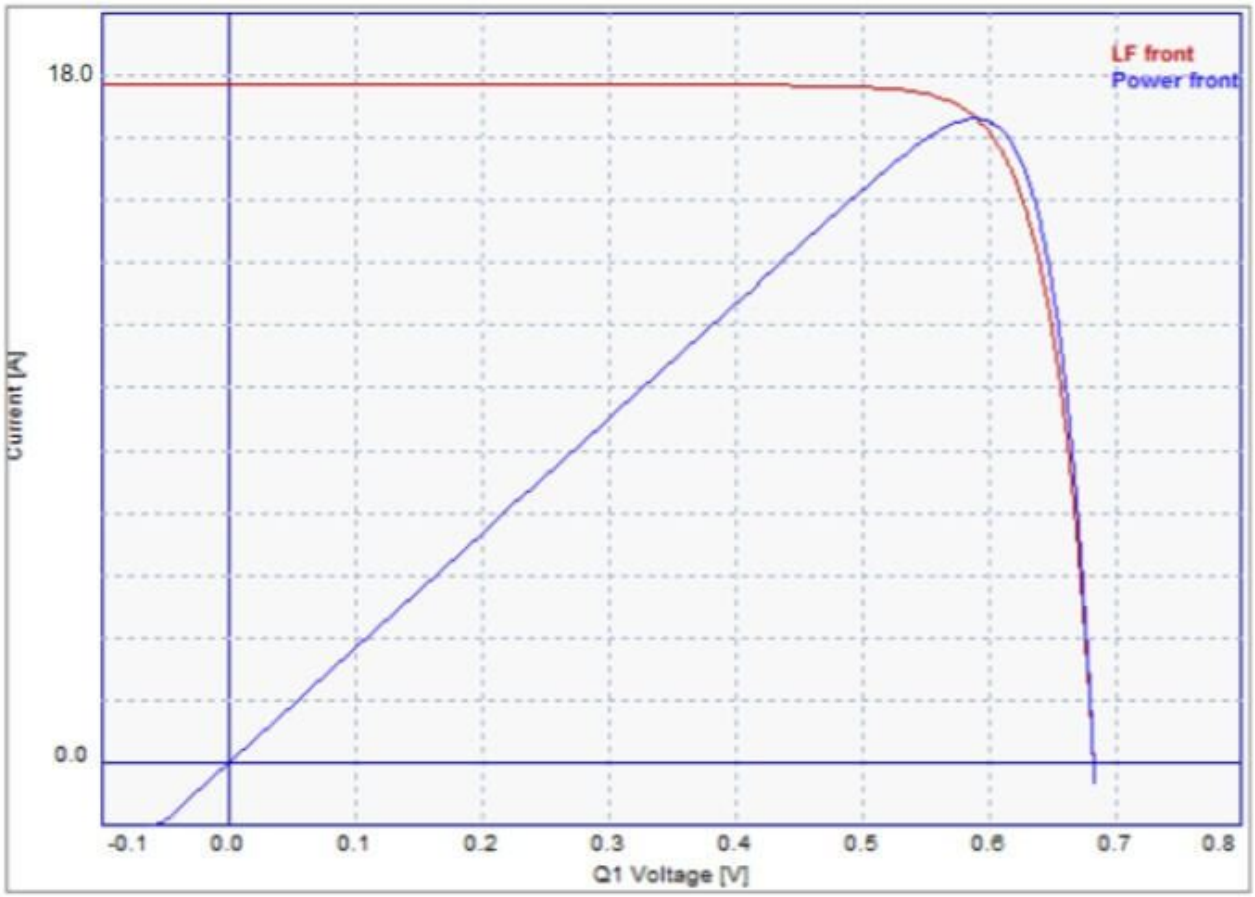
* Taking the Voc(Isc) tested at 1000W/m2 as the standard, test the decrease of Voc (Isc) with the light intensity.

Solderability

Minimum peeling strength ≥1.1N/mm

Results may vary depending on electrode, welding method, and conditions.

IV curve



Front electrical performance distribution

Efficiency code	Efficiency Eff(%)	Maximum output power Pmpp(W)	Maximum output voltage Umpp(V)	Maximum output current Impp(A)	Open-circuit voltage Uoc(V)	Short-circuit current Isc(A)	Fill factor FF(%)
TW-210M-231	23.1	10.18	0.590	17.261	0.690	18.186	81.15
TW-210M-230	23.0	10.14	0.589	17.216	0.689	18.166	81.01
TW-210M-229	22.9	10.10	0.587	17.206	0.688	18.140	80.93
TW-210M-228	22.8	10.05	0.586	17.151	0.687	18.125	80.71
TW-210M-227	22.7	10.01	0.584	17.140	0.686	18.108	80.58
TW-210M-226	22.6	9.97	0.583	17.101	0.685	18.088	80.46
TW-210M-225	22.5	9.92	0.581	17.074	0.685	18.062	80.18
TW-210M-224	22.4	9.88	0.579	17.064	0.684	18.049	80.02
TW-210M-223	22.3	9.83	0.577	17.036	0.682	18.030	79.94
TW-210M-222	22.2	9.79	0.575	17.026	0.681	18.016	79.79
TW-210M-221	22.1	9.75	0.574	16.986	0.680	17.995	79.68

Standard test conditions:1000W/m², AM1.5, 25℃
The above technical parameters are subject to technical changes and tests, and TW Solar reserves the right of final interpretation.

Back electrical performance distribution

Efficiency code	Efficiency Eff(%)	Maximum output power Pmpp(W)	Maximum output voltage Umpp(V)	Maximum output current Impp(A)	Open-circuit voltage Uoc(V)	Short-circuit current Isc(A)
TW-210M-16.0	>16	7.06	0.582	12.130	0.677	13.361
TW-210M-15.7	15.5-16	6.92	0.579	11.952	0.675	13.352
TW-210M-15.2	>15-15.5	6.70	0.572	11.713	0.673	13.244
TW-210M-14.8	<15	6.53	0.565	11.558	0.672	13.124

Standard test conditions:1000W/m², AM1.5, 25℃
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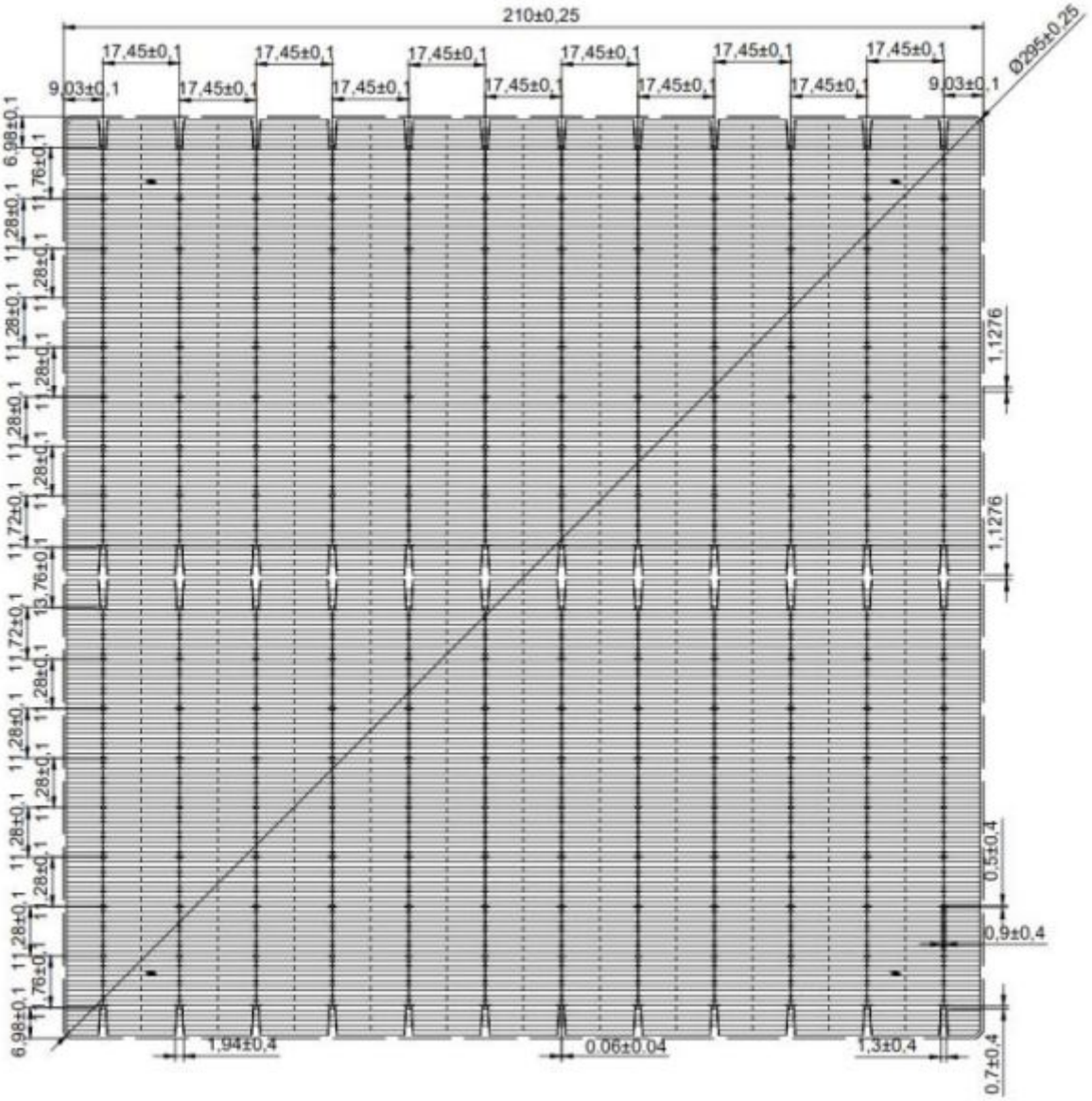
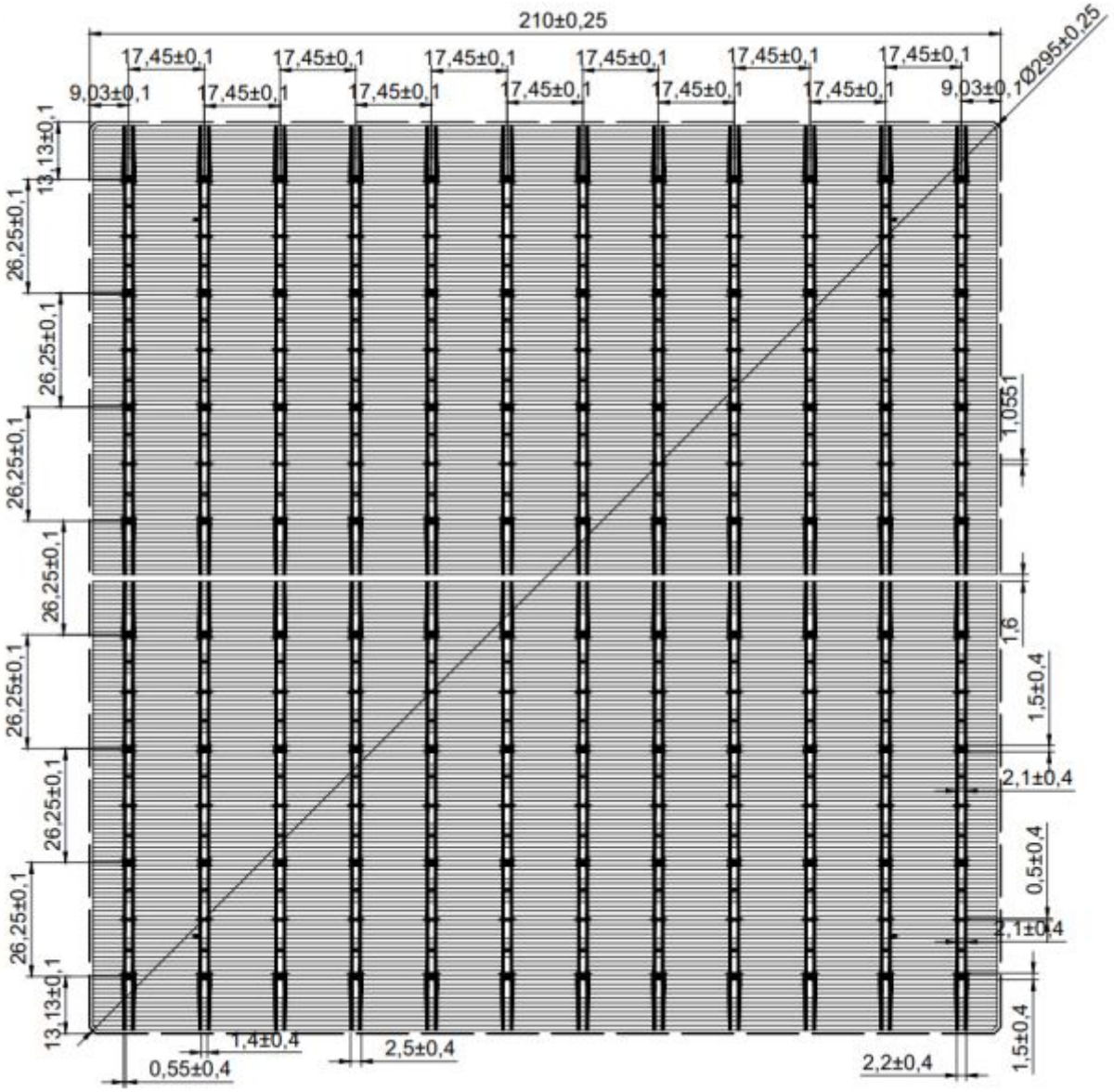

210±0,25
17,45±0,1
9,03±0,1
Ø295±0,25
6,98±0,1
11,76±0,1
11,28±0,1
11,72±0,1
11,26±0,1
1,1276
0,5±0,4
0,9±0,4
0,7±0,4
1,94±0,4
0,06±0,04
1,3±0,4


210±0,25
17,45±0,1
9,03±0,1
Ø295±0,25
13,13±0,1
26,25±0,1
1,055
1,6
1,5±0,4
2,1±0,4
0,5±0,4
0,55±0,4
1,4±0,4
2,5±0,4
2,2±0,4