HPBC 2.0 vs ABC *Back-Contact Technology Comparison Brief · April 2026*

Couleenergy · *All figures refer to commercially available modules (2025/26). Click footnote links [1]–[8] for primary sources.*

PARAMETER	LONGi · HPBC 2.0 *Hi-MO X10 · N-type · Hybrid Passivated Back Contact* ▪ Interdigitated rear contacts + built-in soft-breakdown shading optimizer ▪ TaiRay wafer (thicker, lower micro-crack risk) · 0BB zero-busbar structure ▪ Pioneered by LONGi · scaled to GW-level mass production	AIKO · ABC *ABC Infinite 72-cell · N-type · All Back Contact* ▪ Zero front metallisation — 100 % light-receiving front surface ▪ Cell-gap-free precision overlap soldering (INFINITE series) ▪ Silver-free metallisation option · pioneered by AIKO	EDGE
Cell Efficiency *mass prod.*	**26.6% cell · 24.8% module** [1] *Hi-MO X10; world-record module: 25.4% (Fraunhofer ISE)* [2]	**27.3% cell · ≥25.2% module** [3] *ABC INFINITE; TaiyangNews #1 mass-prod. efficiency since Mar 2023*	**ABC** *advantage*
Module Peak Power *commercial 2025/26*	**Up to 670 W** [1] *72-cell; ~30 W above comparable TOPCon*	**Up to 680–685 W** [4] *72-cell; 1.6 % more active area via cell-gap-free overlap soldering*	**ABC** *advantage*
Temp. Coefficient *Pmax / °C*	**–0.26 %/°C** [1] *+0.03 pp better than TOPCon (–0.29 %/°C)*	**–0.26 %/°C** [4] *Confirmed WFES 2026; identical to HPBC 2.0*	**Tie**
Shade Performance *partial shading vs TOPCon*	**Up to –70 % power loss** [6] *Soft-breakdown optimizer; CPVT: 10.15 % loss vs 36.48 % TOPCon (50 % cell shaded); TÜV Rheinland A+* [6]	**+30 % more output vs TOPCon** *Full cell shaded scenario; TÜV NORD certified; field pilots: +5–50 % depending on shading pattern*	**HPBC 2.0** *advantage*
Bifaciality *rear-side gain*	**Up to 75 %** *0BB structure; upgraded from HPBC 1.0 generation*	**Up to 80 %** [4] *WFES 2026 upgrade progression: 40 % → 75 % → 80 %*	**ABC** *advantage*
Year-1 Degradation *LID / LETID, N-type*	**≤1 %** [1] *N-type; no LID/LeTID; first to earn TÜV SÜD PID-p cert. (PPP 58234A:2025)* [5]	**≤1 %** *N-type; no LID/LeTID; silver-free contacts reduce mechanical stress*	**Tie**
Annual Degradation *Years 2 onward*	**0.35 %/yr** [7] *88.85 % output retention at Year 30 (official LONGi warranty)*	**0.35 %/yr** [8] *90.6 % at Year 25; 0.35 %/yr from Year 2 (official AIKO warranty)*	**Tie**
Low-Light Performance *overcast / dawn / dusk*	**Superior vs TOPCon** *Multi-layer AR film; 12 % short-wave reflectivity reduction; rear-contact frees full front surface*	**Good** *Grid-free front: 100 % active front area; no front-metallisation optical losses*	**HPBC 2.0** *advantage*
Manufacturing *complexity vs TOPCon*	**Moderate** *Compatible PERC-derived lines; GW-scale mass production achieved (~50 GW target 2025)*	**High** *Precision rear-side alignment; proprietary process; higher CapEx*	**HPBC 2.0** *advantage*
EU Certifications	**IEC 61215 / IEC 61730** *TÜV SÜD PID-p (PPP 58234A:2025) — industry first; TÜV Rheinland anti-shading A+* [5] [6]	**IEC 61215 / IEC 61730** *UL 790 Fire Class A; EUPD Top Brand PV Italy 2026; PVEL 2025 Top Performer*	**Tie**
US Certifications	**UL 61730 listed** *Hi-MO X10 available in US market*	**UL 790 Fire Class A** [4] *World-first module-level fire risk prevention cert.*	**Tie**
Aesthetics *front surface*	**All-black / frameless** *Grid-free front; clean uniform look; 0BB zero-busbar on front & back*	**Pure-black seamless** *Zero metallisation; cell-gap-free overlap soldering (INFINITE series)*	**Tie**

Choose HPBC 2.0 when…

- **Partial shade is a primary concern**
  Soft-breakdown optimizer cuts shading losses up to 70 % vs TOPCon; CPVT + TÜV Rheinland certified.
- **Low-light yield is a priority**
  Multi-layer AR film; 12 % reflectivity reduction; superior overcast / dawn / dusk output.
- **Manufacturing cost matters**
  Moderate CapEx; PERC-compatible lines; GW-scale production achieved.

Choose ABC when…

- **Maximum peak power is the goal**
  680–685 W vs 670 W; 1.6 % more active area from cell-gap-free overlap soldering.
- **Highest cell efficiency is required**
  ABC INFINITE: 27.3 % cell / ≥25.2 % module — global #1 mass-production efficiency.
- **Premium aesthetics are non-negotiable**
  Zero front metallisation + cell-gap-free overlap = the most seamless all-black module.

Both technologies share…

- Same temperature coefficient: –0.26 %/°C
  0.03 pp better than TOPCon; identical hot-climate performance.
- Same annual degradation: 0.35 %/yr
  1 % max Year 1; identical linear decay from Year 2 onward.
- N-type silicon: no LID / LeTID
  Both immune to light-induced degradation unlike p-type PERC.

[1] LONGi Hi-MO X10 launch, Oct 2024
[2] Fraunhofer ISE module efficiency record cert., Oct 2024
[3] AIKO Solar — About Us (mass-prod. efficiency, 2026)
[4] AIKO ABC Infinite WFES 2026 press release
[5] LONGi — TÜV SÜD PID-p certification (PPP 58234A:2025), May 2025
[6] LONGi — TÜV Rheinland anti-shading cert. & CPVT data, Oct 2025
[7] LONGi Hi-MO X10 — Official Limited Warranty document
[8] AIKO Gen 3 ABC 60-cell — Australia launch, Mar 2026