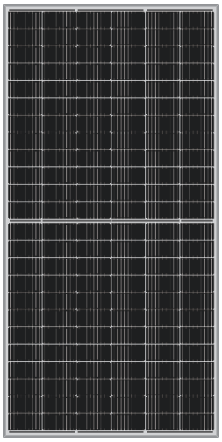


Picture shown may not reflect actual configuration

PVC520-540 MB03HE Monocrystalline Bifacial dual glass Half-cut Photovoltaic Module

The monocrystalline bifacial dual glass half-cut PV (photovoltaic) modules feature high efficiency low light induced degradation (LID) Mono PERC (passivated emitter rear cell) technology and provide excellent front side performance under low temperature or low light environment at high levels of reliability. The module rear side provides additional energy power output.

Features

Proven Energy Yield
- 20.3% to 21.1% efficiency
- -0/+5W positive power tolerance

Excellent Performance in Low Irradiance
- Outstanding power output in low irradiance conditions such as dawn, dust, and cloudy days.
- Reduced resistive loss with lower operating current.
- Higher energy yield with lower operating temperature.
- Reduced hot spot risk with optimized electrical design.

Anti-PID
- Anti-PID (Potential-induced degradation) techniques for processing solar cells and encapsulation of modules applied.

Adaptability to Harsh Environments
- Excellent anti-salt mist and anti-ammonia capability; adaptable to harsh environments such as seaside and farms.

Robust Frame
- Robust module construction enables installed module to withstand 5400 Pa front side static loading and 25 mm hail impact at 23 m/s.

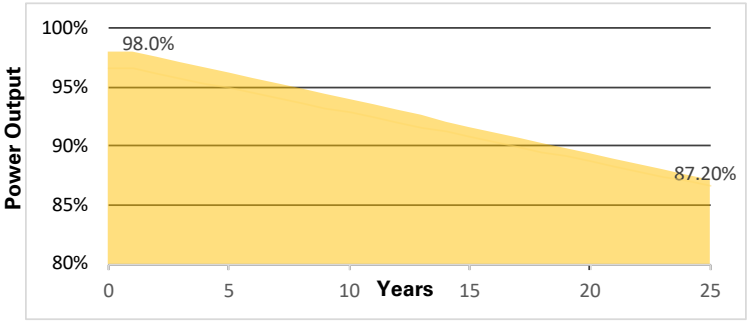
Built with Higher Quality Material
- Cat® PV modules are highly durable, providing higher reliability and more confidence in long term performance.
- The bill of materials (BOM) for modules manufactured for Caterpillar have been qualified by independent labs through extended durability tests that are significantly more stringent than normal IEC/UL certification requirements as shown below:

DURABILITY TEST CYCLE			
Accelerated Tests	**Competitor products***	**Cat Product**	**Cat Advantage**
Damp Heat	1000 hrs.	2000 hrs.	2x testing hrs.
Thermal Cycling	200 cycles	600 cycles	3x testing cycles
PID (85°C/85RH)	96 hrs.	192 hrs.	2x testing hrs.
Mechanical load**	Static	Dynamic + Thermal Cycle + Humidity Freeze	Much less cell breakage and power loss
LID	Not required	60-100 kWh/m²	Validation of early hour performance
LeTID	Not required	Pass proprietary test	Validation of long term PERC performance
Salt mist	Not required	Pass IEC test	Validated for use in harsh environment
Ammonia	Not required	Pass IEC test	
Dust and Sand	Not required	Pass IEC test	

* Certified to minimum IEC/UL standards
** Dynamic Mechanical Load Test: The only mechanical test in IEC 61215 is a static mechanical load test that is performed after the accelerated stress tests.
LeTID – light and elevated temperature degradation.

Module Warranty

• 10-year warranty for materials and processing
• 25-year warranty for linear power output. Produces more than 98% power in the first year, then declining by 0.45% per year, ending at 87.2% power after 25 years.



Worldwide Product Support

• Cat® dealers have over 1,800 dealer branch stores operating in over 200 countries.
• Your local Cat dealer provides extensive pre-sale and post-sale support, including design consultation, service contracts, and all maintenance agreement.

Tests

• IEC 61215
• IEC 61730 Class C according to UL790
• UL 61730, Type 3 fire rating
• IEC 61701, Salt mist corrosion test
• IEC 62716, Ammonia corrosion test
• IEC 60068, Dust and Sand test
• ISO 9001:2008: ISO Quality Management System
• ISO 14001:2004: ISO Environment Management System
• TS62941: Guideline for module design qualification and type approval
• OHSAS 18001: 2007 Occupational Health and Safety

Certifications (pending)

• Available listing: TUV SUD, CSA, CE

CE

MODULE RATING† FRONT		*Test uncertainty for P_{MAX} : ± 3%*									
Model‡	**PVC**	**520 MB03HE**		**525 MB03HE**		**530 MB03HE**		**535 MB03HE**		**540 MB03HE**	
Test Conditions		STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Nominal Power (-0/+5W)	P_{MPP} (W)	520	388.3	525	392.1	530	395.8	535	399.5	540	403.3
Voltage at P_{MAX}	V_{MPP} (V)	41.1	38.3	41.2	38.4	41.4	38.6	41.5	38.7	41.7	38.8
Current at P_{MAX}	I_{MPP} (A)	12.67	10.15	12.75	10.21	12.82	10.27	12.90	10.33	12.97	10.39
Open Circuit Voltage (± 3%)	V_{OC} (V)	48.9	45.8	49.1	45.9	49.2	46.0	49.4	46.2	49.5	46.3
Short Circuit Current (± 3%)	I_{SC} (A)	13.57	10.97	13.65	11.03	13.71	11.08	13.78	11.14	13.85	11.19
Module Efficiency	%	20.3		20.5		20.7		20.9		21.1	
Maximum System Voltage	V_{SYS} (V)	DC 1500 V									
Maximum Series Fuse	I_{CF} (A)	30A									
Standard Test Conditions	STC	Irradiance 1000W/m2, Spectra AM 1.5, cell temperature 25°C									
Nominal Operating Cell Temp.	NOCT	Irradiance 800W/m2, 20°C air temperature, Spectra AM 1.5, 1m/s wind speed.									

TEMPERATURE CHARACTERISTICS	(STC)	
Module Operating Temp. Range	(°C)	-40 to +85
Temperature Coefficient of P_{MPP}	$T_K(P_{MPP})$	-0.350%/°C
Temperature Coefficient of V_{OC}	$T_K(V_{OC})$	-0.284%/°C
Temperature Coefficient of I_{SC}	$T_K(I_{SC})$	+0.050%/°C

MECHANICAL LOADS	
Front Side Max Static Load	5400 Pa
Rear Side Max Static Load	2400 Pa
Hailstone Test	25 mm hailstone at 23 m/s

† Listed ratings are dependent on project time frames and may not all be available. Contact your local Cat dealer to confirm module rating availability.

‡ Models and ratings are subject to change without notice and may vary by territory.

Module Back Side Albedo

(reference front)		*PVC520 MB03HE*					*PVC525 MB03HE*					*PVC530 MB03HE*					*PVC535 MB03HE*				
% P_{MPP} Gain		5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Back Side	P_{MPP} (W)	**546**	**572**	**598**	**624**	**650**	**551**	**578**	**604**	**630**	**656**	**557**	**583**	**610**	**636**	**663**	**562**	**583**	**610**	**636**	**663**
	V_{MPP} (V)											41.4	41.4	41.5	41.5	41.5					
	I_{MPP} (A)											13.46	14.10	14.74	15.38	16.02					
	V_{OC} (V)											49.2	49.2	49.3	49.3	49.3					
	I_{SC} (A)											14.40	15.08	15.77	16.46	17.14					

(reference front)		*PVC540 MB03HE*				
% P_{MPP} Gain		5%	10%	15%	20%	25%
Back Side	P_{MPP} (W)	**567**	**594**	**621**	**648**	**675**
	V_{MPP} (V)					
	I_{MPP} (A)					
	V_{OC} (V)					
	I_{SC} (A)					

MECHANICAL DETAILS

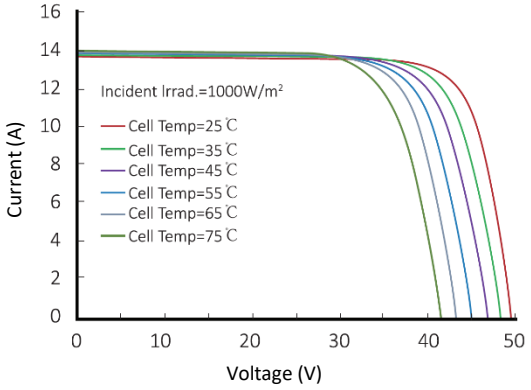
Cell Type	Monocrystaline, 144 cells per panel
Junction Box	IP68, three diodes
Leadwire	(included), 4 mm^2
Connectors††	Stäubli MC4 EVO2, LONGi PV-LR5
Application Safety Class	Class II (per IEC 61140)
Dual Glass	2.0 mm coated tempered
Frame Material	Anodized Aluminum

DIMENSION DETAILS

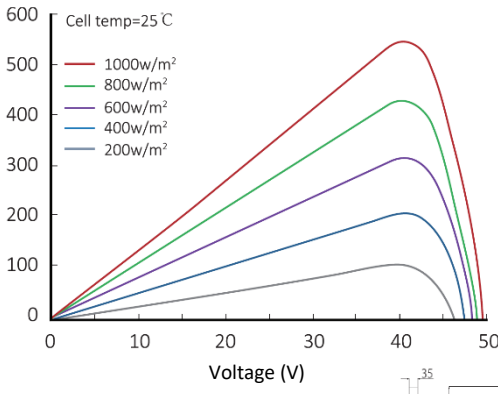
Length	2256 mm	(82.4 in)
Width	1133 mm	(40.9 in)
Thickness	35 mm	(1.4 in)
Weight	32.3 kg	(71.2 lbs.)
Packaging Information:		
Modules per pallet	31 per pallet	
Modules per container	620 per 40' High Cube	

I-V Curve *(reference: PVC530 MB03HE)*

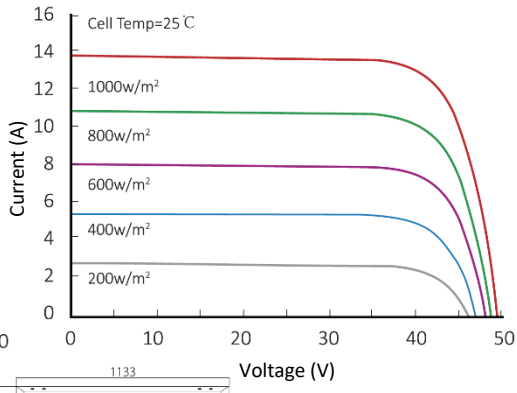
Current-Voltage Curve

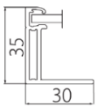


Power-Voltage Curve

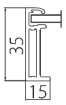


Current-Voltage Curve

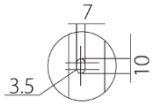




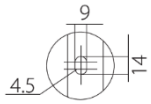
A-A



B-B



C

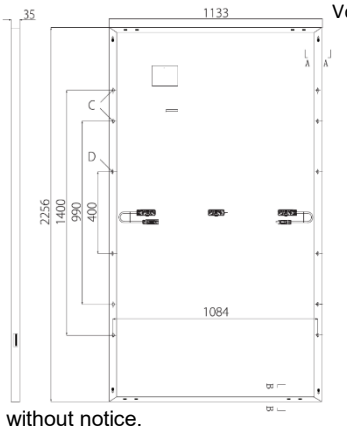


D

Units: mm
Tolerance:
Length: ± 2 mm
Width: ± 2 mm
Height: ± 1 mm
Pitch-row: ± 1 mm

††

Country of Manufacture:
China
Vietnam
Malaysia



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