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Mitsubishi Electric to Launch Two New XB Series HVIGBT Modules

For highly efficient, reliable inverter systems in railcars and large industrial equipment



4.5kV/1200A XB Series HVIGBT Module (from left: standard-isolation and high-isolation modules)

TOKYO, December 2, 2025 – [Mitsubishi Electric Corporation](https://www.mitsubishielectric.com) (TOKYO: 6503) announced today that it will launch new standard-isolation (6.0kVrms) and high-isolation (10.2kVrms) modules in its 4.5kV/1,200A XB Series of high-voltage insulated-gate bipolar transistors (HVIGBTs) on December 9. These new high-capacity power semiconductors achieve high moisture resistance for more efficient and reliable inverters used in large industrial equipment, such as railcars, operating in diverse environments including outdoors. Mitsubishi Electric will exhibit the new modules at the 40th Nepcon Japan R&D and Manufacturing show in Tokyo from January 21 to 23, 2026, as well as other exhibitions in North America, Europe, China, India and additional locations.

The new modules use IGBT elements that incorporate Mitsubishi Electric's proprietary relaxed field of cathode (RFC) diode and carrier-stored trench-gate bipolar transistor (CSTBT¹) structure. New structures for electric field relaxation² and surface charge control³ enabled Mitsubishi Electric to reduce the chip's termination region size by about 30% while also achieving about 20 times⁴ greater moisture resistance than existing products. In addition, the module reduces total switching loss by approximately 5%⁵ compared to previous models, and

¹ Proprietary IGBT structure utilizing the carrier storage effect.

² Proprietary structure with optimally arranged p-type semiconductor regions that gradually widen the spacing.

³ Proprietary structure where the semi-insulating film is in direct contact with the semiconductor region, ensuring stable charge dissipation.

⁴ Results of the condensation resistance verification test for XB Series and existing H Series products with a voltage rating of 3.3kV (Termination design is identical at 3.3kV and 4.5kV).

⁵ Comparison with legacy CM1200HC-90R in terms of $E_{on}+E_{off}+E_{rec}$ at $T_j=125^{\circ}\text{C}$, $V_{CC}=2,800\text{V}$, and $I_C=1,200\text{A}$.

reverse-recovery safe-operating area (RRSOA) tolerance is about 2.5 times⁶ greater than that of compared to previous models.

As a result of improving the efficiency and reliability of inverters in large industrial equipment operating in environments where conditions can vary, such as outdoors, the modules will contribute to carbon neutrality.

Product Features

1) Improved moisture resistance for stable inverter operation

- A new electric field relaxation structure and surface charge control structure in the chip termination region reduce the chip's termination region size and significantly improve moisture resistance to ensure stable inverter operation in high-humidity environments.

2) More efficient and reliable inverters

- IGBT elements incorporating the proprietary RFC diode and CSTBT structure reduce total switching loss to realize more efficient inverters.
- The proprietary RFC diode expands RRSOA tolerance to improve inverter reliability by preventing damage from reverse-recovery current⁷ and reverse voltage⁸ during switching.

3) Dimensional compatibility with existing products simplifies inverter design

- By maintaining the same external dimensions as existing products⁹ for easy replacement, the new module simplifies and shortens the process of designing new inverters.

Main Specifications

Series	New product (Standard-isolation type)	Legacy products (Standard-isolation type)	
	XB Series	R Series	H Series
Type	CM1200HC-90XB	CM1200HC-90R	CM900HC-90H
Voltage rating	4.5kV	4.5kV	
Current rating	1,200A	1,200A	900A
Isolation voltage	6.0kVrms	6.0kVrms	
Connection	Single	Single	
Dimensions (WxDxH)	140x190x38mm	140x190x38mm	
Price	By individual quotation	By individual quotation	
Sample shipment	December 9, 2025	October 1, 2008	April 1, 2006

⁶ Comparison with legacy CM1200HC-90R in terms of P_{rr} , which is the product of V_{CE} and I_{rr} in the RRSOA.

⁷ Temporary reverse current that occurs when switching a diode from forward to reverse direction.

⁸ Reverse voltage applied to a diode.

⁹ Comparison with legacy H Series 4.5kV/900A product and R Series 4.5kV/1,200A product.

Series	New product (High-isolation type)	Legacy products (High-isolation type)	
	XB Series	R Series	H Series
Type	CM1200HG-90XB	CM1200HG-90R	CM900HG-90H
Voltage rating	4.5kV	4.5kV	
Current rating	1,200A	1,200A	900A
Isolation voltage	10.2kVrms	10.2kVrms	
Connection	Single	Single	
Dimensions (WxDxH)	140x190x48mm	140x190x48mm	
Price	By individual quotation	By individual quotation	
Sample shipment	December 9, 2025	October 1, 2008	September 1, 2006

XB Series Lineup

	Existing product	New product		Existing product
Type	CM1500HC-66XB	CM1200HC-90XB	CM1200HG-90XB	CM750HG-130XB
Voltage rating	3.3kV	4.5kV		6.5kV
Current rating	1,500A	1,200A		750A
Isolation voltage	6.0kVrms	6.0kVrms	10.2kVrms	10.2kVrms
Sample shipment	May 1, 2025	December 9, 2025		November 28, 2025

Power semiconductors that efficiently convert electricity are increasingly in demand as key devices contributing to decarbonization. Power semiconductor modules for large industrial equipment are used in inverters and other power-conversion devices within power-related systems, including railcar drive systems, power supplies and DC power transmitters. These modules must also offer robust moisture resistance for stable operation in harsh environments where temperature and humidity fluctuate widely, such as outdoors. Chips used in power semiconductors are divided into an active region that converts and outputs power and a termination region that stabilizes voltage. In high-humidity environments, a chip structure with a wide termination region is required to prevent voltage degradation due to moisture. However, this results in a tradeoff because the active region must be correspondingly narrower, making it difficult to achieve both high power and low-loss performance as well as moisture resistance.

Website

<https://www.MitsubishiElectric.com/semiconductors/powerdevices/>

“CSTBT” is a trademark of Mitsubishi Electric Corporation.

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About Mitsubishi Electric Corporation

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its “Changes for the Better.” The company recorded a revenue of 5,521.7 billion yen (U.S.\$ 36.8 billion*) in the fiscal year ended March 31, 2025. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥150=U.S.\$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2025