

**FOR IMMEDIATE RELEASE**

**No. 3786**

*Customer Inquiries*

*Media Inquiries*

Semiconductor & Device Marketing Div.A  
Mitsubishi Electric Corporation

Public Relations Division  
Mitsubishi Electric Corporation

[www.MitsubishiElectric.com/semiconductors/](http://www.MitsubishiElectric.com/semiconductors/)

[prd.gnews@nk.MitsubishiElectric.co.jp](mailto:prd.gnews@nk.MitsubishiElectric.co.jp)  
[www.MitsubishiElectric.com/news/](http://www.MitsubishiElectric.com/news/)

## **Mitsubishi Electric to Ship Samples of XB Series HVIGBT Module**

*Designed for highly efficient and powerful inverter systems in railway vehicles and other large industrial equipment*



XB Series HVIGBT Module (3.3kV/1500A Type)

**TOKYO, April 8, 2025 April 11, 2025** – [Mitsubishi Electric Corporation](https://www.mitsubishielectric.com) (TOKYO: 6503) announced today that it will begin shipping samples of its new XB Series high-voltage insulated-gate bipolar transistor (HVIGBT) module, a 3.3k-volt, 1500A high-capacity power semiconductor for large industrial equipment such as railway vehicles, on May 1. By adopting proprietary diode and insulated gate bipolar transistor (IGBT) elements, as well as a unique chip termination structure, the module's improved moisture resistance will help to improve the efficiency and reliability of inverters for large industrial equipment operating in diverse environments. Mitsubishi Electric will exhibit the XB Series HVIGBT module at Power Conversion Intelligent Motion (PCIM) Expo & Conference 2025 in Nuremberg, Germany from May 6 to 8.

The new 3.3kV/1500A XB Series HVIGBT module uses IGBT elements incorporating Mitsubishi Electric's proprietary relaxed field of cathode (RFC) diode and carrier-stored trench-gate bipolar transistor (CSTBT<sup>1</sup>) structure. In particular, the module reduces total switching loss by approximately 15%<sup>2</sup> compared to previous models, contributing to higher efficiency in inverters. It also expands tolerance in the reverse-recovery safe-operating area (RRSOA) by about 25%<sup>3</sup> compared to previous models, further enhancing inverter reliability.

<sup>1</sup> Proprietary IGBT structure utilizing the carrier storage effect.

<sup>2</sup> Comparison of the existing CM1500HC-66R and the new product in terms of  $E_{on} + E_{off} + E_{rec}$  at  $T_j=150^{\circ}C$ ,  $V_{CC}=1800V$ , and  $I_C=1500A$ .

<sup>3</sup> Comparison of the existing CM1500HC-66R and the new product in terms of  $P_{rr}$ , which is the product of  $V_{CE}$  and  $I_{rr}$  in the RRSOA.

In addition, by using a new electric field relaxation structure<sup>4</sup> and a surface charge control structure<sup>5</sup> in the chip's termination area, Mitsubishi Electric has reduced the area's size by about 30% while achieving about 20 times<sup>6</sup> greater moisture resistance than existing products, contributing to more stable operation of inverters used in high-humidity environments. By further improving the efficiency and reliability of inverters for large industrial equipment operating in various environments, the module is expected to contribute to efforts to achieve carbon neutrality.

### **Product Features**

#### **1) *Proprietary RFC diode and IGBT elements and CSTBT structure for more efficient, reliable inverters***

- IGBT elements featuring Mitsubishi Electric's proprietary RFC diode and CSTBT structure reduce total switching loss by about 15%<sup>2</sup> compared to existing products, contributing to more efficient inverters.
- The company's proprietary RFC diode expands RRSOA tolerance by about 25%<sup>3</sup> compared to previous products, improving inverter reliability by preventing damage from reverse-recovery current<sup>7</sup> and reverse voltage<sup>8</sup> during switching.

#### **2) *Proprietary chip termination structure improves moisture resistance for stable inverter operation***

- A new electric field relaxation structure and surface charge control structure in the chip termination region have reduced the termination area by about 30% and improved moisture resistance by a factor of 20<sup>6</sup> compared to existing products, ensuring stable inverter operation in high-humidity environments.

#### **3) *Dimensional compatibility with existing products simplifies inverter design***

- By maintaining the same external dimensions as existing products<sup>9</sup> for easy replacement, the new module simplifies and shortens the process of designing new inverters.

### **Main Specifications**

| Series             | New XB Series  | Existing products  |                         |
|--------------------|--|--|-------------------------|
|                    |  | R-Series   | H-Series                |
| Type               | CM1500HC-66XB  | CM1500HC-66R   | CM1200HC-66H            |
| Voltage rating     | 3.3kV  | 3.3kV  |                         |
| Current rating     | 1500A  | 1500A  | 1200A                   |
| Isolation voltage  | 6.0kVrms   | 6.0kVrms   |                         |
| Connection         | Single   | Single   |                         |
| Dimensions (WxDxH) | <del>140x130x38mm</del><br>(Corrected due to an error)<br>140x190x38mm | <del>140x130x38mm</del><br>(Corrected due to an error)<br>140x190x38mm |                         |
| Price              | By individual quotation  | By individual quotation  | By individual quotation |
| Sample shipments   | May 1, 2025  | June 1, 2008   | October 1, 1999         |

<sup>4</sup> Proprietary structure with optimally arranged p-type semiconductor regions that gradually widen the spacing.

<sup>5</sup> Proprietary structure where the semi-insulating film is in direct contact with the semiconductor region, ensuring stable charge dissipation.

<sup>6</sup> Results of the condensation resistance verification test for XB Series and existing H-Series products with a voltage rating of 3.3kV and a current rating of 1200A.

<sup>7</sup> Temporary reverse current that occurs when switching a diode from forward to reverse direction.

<sup>8</sup> Reverse voltage applied to a diode.

<sup>9</sup> Comparison with existing H-Series 3.3kV/1200A products and R-Series 3.3kV/1500A products.

Power semiconductors that efficiently convert electricity are increasingly being used for decarbonization. Power semiconductor modules for large industrial equipment are used in power-conversion devices such as inverters in power-related systems, including railway traction systems, power supplies and DC power transmitters. Power semiconductor modules that achieve increasingly higher power and efficiency for large industrial equipment are in demand for improved power conversion efficiency leading to decarbonization. Such modules must also offer robust moisture resistance for stable operation in harsh environments where temperature and humidity fluctuate widely, including 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 wider termination region is required to prevent voltage degradation due to moisture. However, this results in a tradeoff, because widening the termination region results in a narrower active region, making it difficult to achieve both high power and low-loss performance as well as moisture resistance in power semiconductor chips.

### **Website**

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

*“CSTBT” is a trademark of Mitsubishi Electric Corporation.*

###

### **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 5,257.9 billion yen (U.S.\$ 34.8 billion\*) in the fiscal year ended March 31, 2024. For more information, please visit [www.MitsubishiElectric.com](http://www.MitsubishiElectric.com)

\*U.S. dollar amounts are translated from yen at the rate of ¥151=U.S.\$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2024