

X Series: High-Voltage IGBT Modules

Industrial-Leading Power and Operating Temperature Range

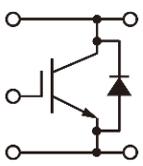
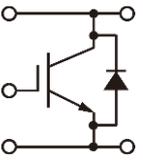
High-power modules are essential for power systems that require large capacity, high reliability and maximum efficiency. Mitsubishi Electric's first HVIGBT module, which was commercialized in 1997, enabled the development of larger capacity and smaller sized high-voltage converter systems. The X-Series HVIGBT modules feature 7th-generation insulated gate bipolar transistors (IGBT) and relaxed field of cathode (RFC) diodes.



Besides state-of-the-art chip technology, the new X Series offers two packages. A small 130 mm package allows compact converter design and a 190 mm package is compatible to the previous H and R Series. As key technologies the X Series provides a 1.5-times higher current rating than H Series and, as world's first for the 6.5 kV class, 150°C maximal junction temperature.

Product Advantages

- ❑ Power loss reduced by incorporating 7th-generation IGBT and RFC diode
- ❑ Current rating increased by 50 % compared to conventional package
- ❑ Latest package technology enhances power cycle lifetime
- ❑ Package compatible to previous H and R series for simplified design and easy replacement
- ❑ 150 °C maximal operation temperature

Circuit	Circuit Diagram	Package Size	1700 V	3300 V	4500 V	6500 V
1in1		130mm x 140mm		CM1200HC-66X 1200 A	CM900HG-90X 900 A	CM600HG-130X 600 A
1in1		190mm x 140mm		CM1800HC-66X CM1800HG-66X 1800 A	CM1350HG-90X 1350 A	CM900HG-130X 900 A
					CM1500HC-90XA 1500 A	CM1000HG-130XA 1000 A



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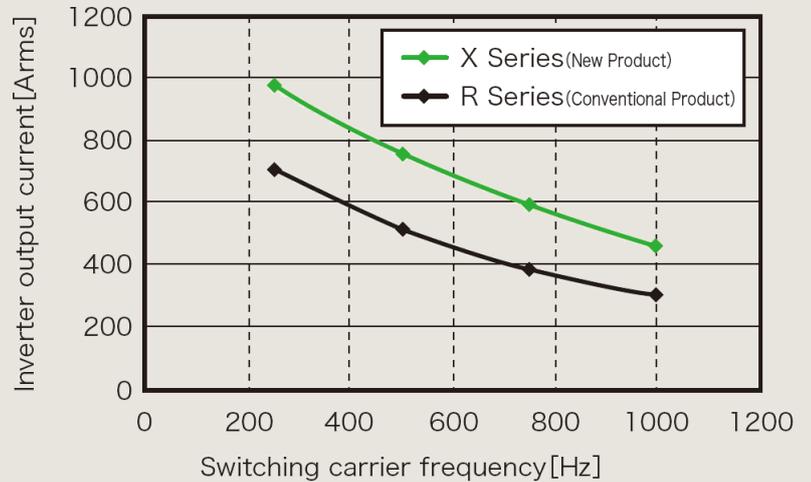
Chip Technology

The 7th-generation IGBT with carrier-store effect and RFC diode reduce the power loss by about 20 %. This leads to either a higher output power or a more compact converter through higher switching frequency. Moreover, the optimized edge termination structure LNFLR (Linearly-Narrowed Field Limiting Ring) allows an increased active chip area of 28 % compared to previous product. Furthermore, as first in the world, Mitsubishi Electric achieves 150 °C junction temperature for the 6.5 kV class.

Package Technology

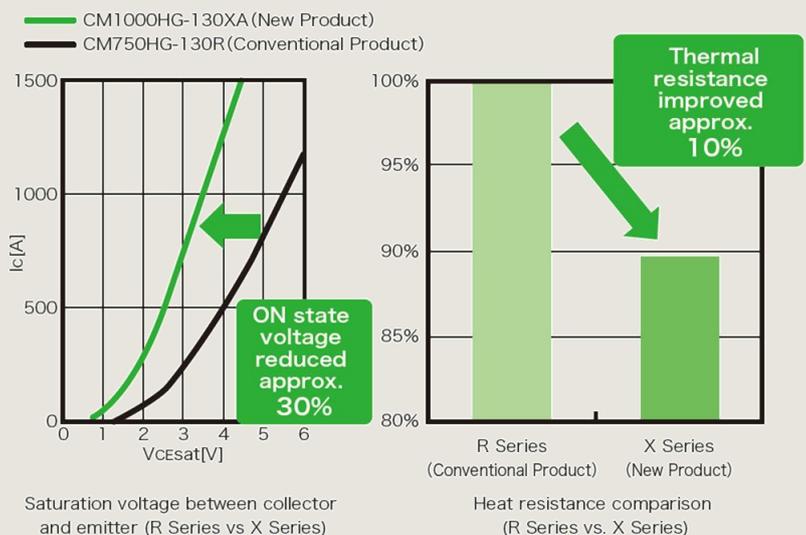
The X Series offers two different package sizes. A compact 130 mm x 140 mm package allows compact converter design. Furthermore, another larger package with a footprint of 190 mm x 140 mm is compatible with the previous H and R Series. For this package, the current rating can be increase by 50 % compared to the previous series. This is achieved through the improved chip technology and a reduction of the thermal resistance by approximately 10 % compared to the R Series. Moreover, the power cycle lifetime is improved by an optimized wire bonding approach and improved packaging technology.

Condition: $T_j=125^{\circ}\text{C}$, $V_{cc}=3600\text{V}$, $P.F=0.85$, $f_o=50\text{Hz}$, $T_f=80^{\circ}\text{C}$



Compared to previous product*, active chip area is increased 28% by optimizing edge termination.

* CM750HG-130R



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