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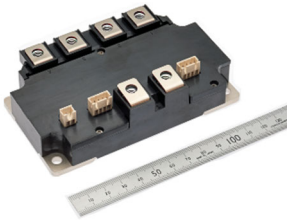
Mitsubishi Electric to Launch Second-generation Full-SiC Power Modules for Industrial Use

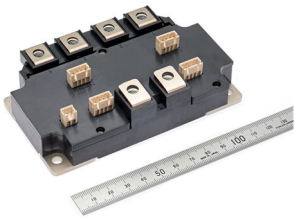
Will contribute to more efficient, smaller and lighter power-electronics equipment

TOKYO, September 15, 2020 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today its coming launch of second-generation full-SiC (silicon carbide) power modules featuring a newly developed SiC chip for industrial use. The low power loss characteristics and high carrier frequency operation[1] of the SiC-MOSFET (metal oxide semiconductor field-effect transistor) and SiC-SBD (schottky barrier diode) chips in the modules are expected to facilitate the development of more efficient, smaller and lighter weight power equipment in various industrial fields. Sales will start in January, 2021.

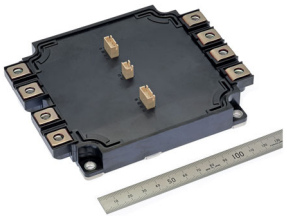
[1] Frequency that determines the ON/OFF timing of the switching element in an inverter circuit



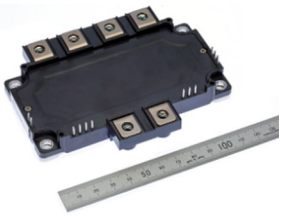
1200V/600A, 800A 2 in 1
1700V/300A 2 in 1, chopper
RTC circuit embedded



1200V/300A, 400A 4 in 1
RTC circuit embedded



1200V/1200A 2 in 1
RTC circuit embedded



1200V/400A 4 in 1
1200V/800A 2 in 1

Product Features

1) Will facilitate more power-efficient, smaller and lighter industrial equipment

- Junction field-effect transistor (JFET) doping technology[2] reduces on-resistance by about 15% compared to that of conventional SiC products[3].
- Reducing mirror capacitance[4] enables fast switching and reduces switching loss.
- Built-in SiC-MOSFET and SiC-SBD help to reduce power loss by approximately 70% compared to that of Mitsubishi Electric's conventional Si-IGBT modules.
- Power loss reduction and high carrier frequency operation will facilitate development of smaller and lighter external components, such as reactors and coolers.

[2] Increases device density by increasing impurity density in JFET area
[3] Mitsubishi Electric's first-generation SiC modules (with same rating) for industrial use
[4] Stray capacitance between gate and drain existing in MOSFET structure (C_{rss}) that affects switching time

2) Real time control (RTC) circuit balances short-circuit performance and low on-resistance

- Safe short-circuit performance and low on-resistance characteristics achieved with RTC circuit[5] to block excessive current during short circuits.
- In the event of a short circuit, safely blocks excessive current from an external protection circuit by monitoring short-circuit detection signal.

[5] Except FMF400BX-24B and FMF800DX-24B models

3) Optimized internal chip layout for improved heat dissipation

- Decentralized and optimized placement of SiC-MOSFET and SiC-SBD chips inside modules help to improve heat dissipation, thereby allowing the use of smaller, or fanless, coolers.

Main Specifications

Model	Rated voltage	Rated current	Circuit structure	RTC circuit	Size W×D (mm)	Release date
FMF400BX-24B	1200V	400A	4 in 1	No	122×79.6	January, 2021 or later
FMF800DX-24B		800A	2 in 1	No		
FMF300BXZ-24B		300A	4 in 1	Yes		
FMF400BXZ-24B		400A		Yes		
FMF600DXZ-24B		600A	2 in 1	Yes		
FMF800DXZ-24B		800A		Yes		
FMF1200DXZ-24B		1200A		Yes	122×152	
FMF300DXZ-34B	1700V	300A	2 in 1	Yes	122×79.6	
FMF300E3XZ-34B		300A	Chopper	Yes		

In the face of growing demands for greater energy savings and environmental awareness, SiC power semiconductors have been attracting increasing attention for their potential to significantly reduce power loss. Mitsubishi Electric has been developing module products equipped with SiC chips since 2010.

Environmental Awareness

These products are compliant with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) directive 2011/65/EU and 2015/863/EU.

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About Mitsubishi Electric Corporation

With nearly 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 corporate statement, “Changes for the Better,” and environmental statement, “Eco Changes.” The company recorded a revenue of 4,462.5 billion yen (U.S.$ 40.9 billion*) in the fiscal year ended March 31, 2020. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥109=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2020