

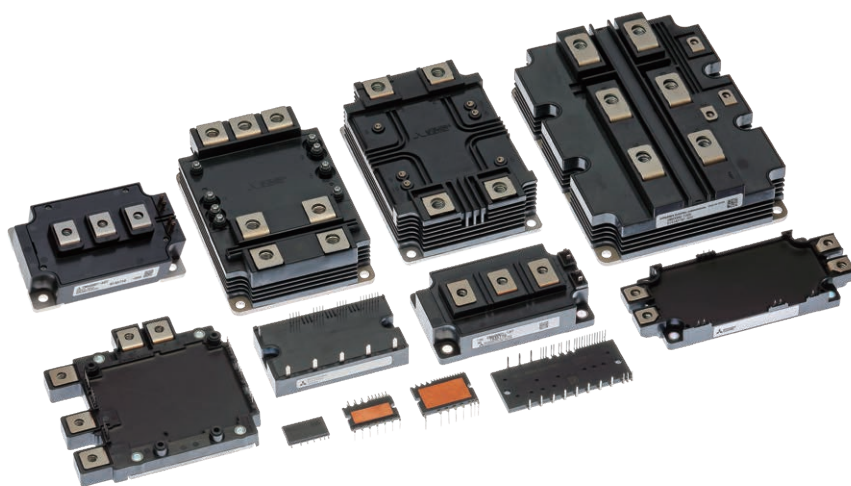
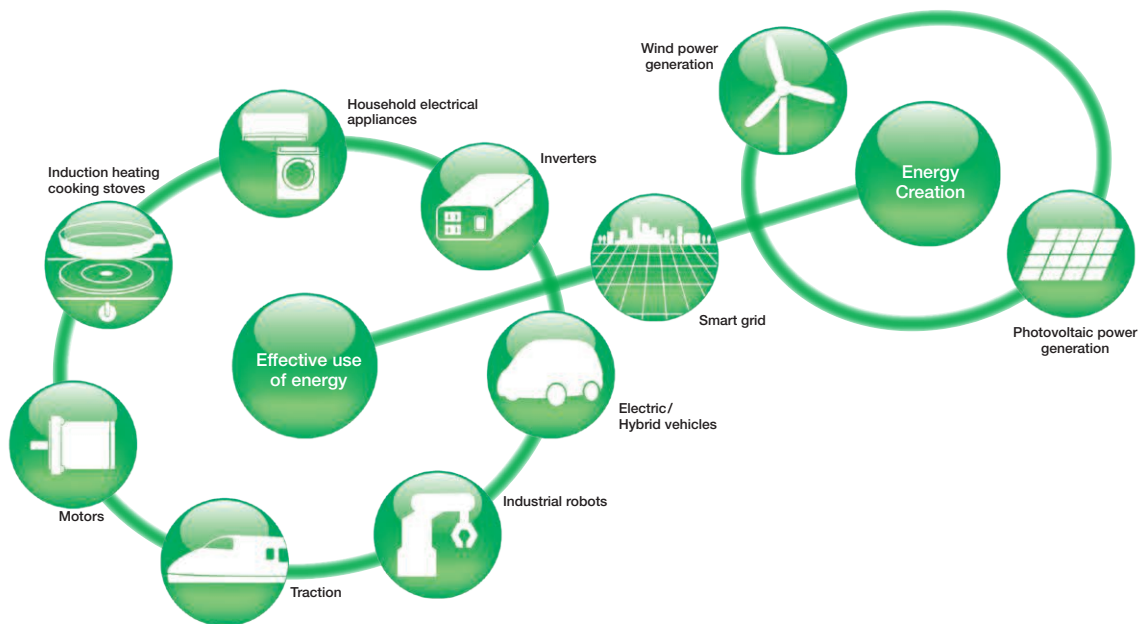
POWER DEVICES

# POWER DEVICES



# Innovative Power Devices for a Sustainable Future

Mitsubishi Electric power modules are at the forefront of the latest energy innovations that seek to solve global environmental issues while creating a more affluent and comfortable society for all. Some of these innovations are photovoltaic (PV) and wind power generation from renewable energy sources, smart grids realizing efficient supply of power, hybrid/electric vehicles (HVs/EVs) that take the next step in reducing carbon emissions and fuel consumption, and home appliances that achieve ground-breaking energy savings. Whether in appliances, railcars, EVs or industrial systems, our power modules are key elements in changing the way energy is used.



# Index

Product	Page	Connection				Rated voltage	Rated current	Main Application
		IGBT Module	Intelligent Power Module	MOSFET Module	Diode Module			
SiC Power Modules	5-12	✓ (Hybrid)	✓	✓	✓	600V	15A-30A	 Home Appliance Industrial equipment Traction
						1200V	75A-1200A	
						1700V	300A-1200A	
						3300V	185A-800A	
SOIPM	13		✓			600V	2A	 Home Appliance
DIIPM	13-18		✓			600V	5A-75A	 Home Appliance
						1200V	5A-100A	
IPM	19-22		✓			600V	75A	 Industrial equipment
						650V	50A-450A	
						1200V	25A-450A	
IGBT Modules	23-32	✓				600V	200A-600A	 Industrial equipment
						650V	50A-600A	
						1200V	35A-1400A	
						1700V	75A-1200A	
						2000V	200A-1200A	
HVIGBT Modules	33-36	✓				1700V	600A-2400A	 Traction High Power
						3300V	400A-1800A	
						4500V	450A-1500A	
						6500V	600A-1000A	
HVDIODE Modules	37-38					3300V	600A-1200A	 Traction High Power
						4500V	450A-1500A	
						6500V	300A-1000A	
MOSFET Modules	39			✓		75V	100A-300A	 Industrial equipment
						100V		
						150V		
Power Modules for xEV*1	40-41	✓				650V	600A-700A	 xEV

\*1 EV: Electric Vehicle

\*2 SOIPM, DIIPM, SLIMDIP, DIIPM+, DIPPFC and CSTBT are trademarks of Mitsubishi Electric

# Development of Mitsubishi Electric SiC Power Devices and Power Electronics Equipment Incorporating Them

Mitsubishi Electric began developing SiC as a new material in the early 1990s. Pursuing special characteristics, we succeeded in developing various elemental technologies.

In 2010, we commercialized the first air conditioner in the world equipped with a SiC power device.

Furthermore, substantial energy-saving effects have been achieved for traction and FA machinery.

We will continue to provide competitive SiC power modules with advanced development and achievements from now on.

## 2010

January 2010  
Developed large-capacity power module equipped with SiC diode



October 2010  
Launched "Kirigamine" inverter air conditioner



## 2011

January 2011  
Verified highest power conversion efficiency\*1 for solar power generation system power conditioner (domestic industry)\*2

October 2011  
Commercialized SiC inverter for use in railcars



## 2014

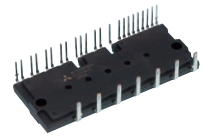
February 2014  
Developed EV motor drive system with built-in SiC inverter



May 2014  
Began shipping samples of hybrid SiC power modules for high-frequency switching applications



November 2014  
Launched Large Hybrid SiC DIPIPM™ for PV Applications



## Early 1990s

Developed new material, silicon-carbide (SiC) power semiconductor, maintaining a lead over other companies

## 2000s

Developed various elemental technologies

## 2006

January 2006  
Successfully developed SiC inverter for driving motor rated at 3.7kW

## 2009

February 2009  
Verified 11kW SiC inverter, world's highest value\*1 with approx. 70% reduction in power loss



November 2009  
Verified 20kW SiC inverter, world's highest value\*1 with approx. 90% reduction in power loss



## 2012

March 2012  
Developed motor system with built-in SiC inverter



September 2012  
Verified built-in main circuit system for railcars



July 2012  
Began shipping samples of hybrid SiC power modules



December 2012  
Launched CNC drive unit equipped with SiC power module



## 2013

February 2013  
Developed SiC for application in elevator control systems

March 2013  
Delivered auxiliary power supply systems for railcars



# Contributing to the realization of a low-carbon society and more affluent lifestyles

## 2017

### March 2017 Launched SiC-SBD



March 2017  
Develops World's smallest SiC Inverter for HEVs.



September 2017  
Develops SiC Power Device with Record Power Efficiency

December 2017  
Mitsubishi Electric and the University of Tokyo Quantify Factors for Reducing SiC Power Semiconductor Resistance by Two-Thirds

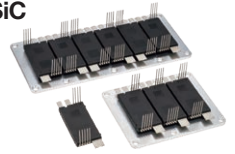
## 2018

January 2018  
New 6.5kV Full-SiC Power Semiconductor Module Achieves World's Highest Power Density

December 2018  
Mitsubishi Electric and the University of Tokyo Reveal New Mechanism for Enhancing Reliability of SiC Power Semiconductor Devices

## 2024

### March 2024 J3-Series Full-SiC Power Modules Began shipping samples



## 2021

### January 2021 Launched Second-generation Full-SiC Power Modules



## 2020

### November 2020 Launched 4-terminal SiC-MOSFETs



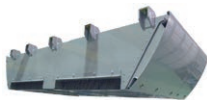
### July 2020 Launched SiC-MOSFET



July 2020  
Develops Accurate Circuit Simulation Technology for SiC-MOSFETs

## 2015

January 2015  
Launched power conditioner for PV equipped with full SiC-IPM\*2



June 2015  
Railcar traction system with full SiC power modules installed in Shinkansen bullet trains

## 2019

### June 2019 Began shipping samples of 1200V SiC-SBD

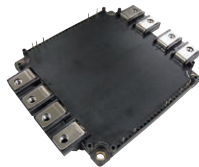


February 2019  
Develops Super Compact Power Unit for Hybrid Electric Vehicle

September 2019  
Trench-type SiC-MOSFET with unique electric-field-limiting structure developed



February 2013  
Developed technologies to increase capacities of SiC power modules



### May 2013 Launched SiC power modules



December 2013  
Launched railcar traction inverter with full SiC power module



## 2016

### April 2016 Launched Super mini Full SiC DIPIPM



May 2016  
Launched room air conditioners with full SiC DIPIPM in Japan



October 2016  
Launched package air conditioners with full SiC DIPIPM in Japan



\* The year and month listed are based on press releases or information released during the product launch month in Japan.

\*1 Researched in press releases by Mitsubishi Electric. \*2 Mitsubishi Electric solar-power generation system discontinued on March 31, 2020.



## Lineup of SiC Power Modules

Application	Product name	Model	Rating		Connection	States	Page	
			Voltages[V]	Current[A]				
Industrial equipment	Full SiC Power Modules	FMF300BXZ-24B	1200	300	4 in1	Commercially available	7	
		FMF400BX-24B		400			6	
		FMF400BXZ-24B		400			7	
		RMF400DU-24B		400	2 in1(Diode)		6	
		FMF400DY-24B		400	2 in1		7	
		FMF600DXZA-24B		600			6	
		FMF600DXE-24BN		600			6	
		FMF800DX-24B		800			7	
		FMF800DXZA-24B		800			7	
		FMF1200DXZ-24B		1200			7	
		FMF300DXZ-34B		1700	300		2 in1(Chopper)	6
		FMF300E3XZ-34B			300			
	FMF600DXE-34BN	600	2 in1					
	Full SiC-IPM	PMF75CGA120	1200	75	6 in1		7	
		PMF75CGAL120						
Hybrid SiC Power Modules for High-frequency Switching Applications	CMH100DY-24NFH	1200	100	2 in1	8			
	CMH150DY-24NFH		150					
	CMH200DU-24NFH		200					
	CMH300DU-24NFH		300					
	CMH400DU-24NFH		400					
	CMH600DU-24NFH		600					
	CMH400HC6-24NFM		400	1 in1				
Traction inverter HVDC system	Full SiC Power Modules	FMF185DC-66A	3300	185	2 in1			
		FMF375DC-66A		375				
		FMF750DC-66A		750				
		FMF750DC-66A-1		750				
		FMF800DC-66BEW		800				
	Hybrid SiC Power Modules	CMH600DC-66X		3300		600		
		CMH1200DC-34S		1700		1200		
Home appliances	Full SiC Super mini DIIPM	PSF15S92F6-A6	600	15	6 in1	9		
		PSF25S92F6-A6		25				
	Full SiC Super mini DIPPFM	PSF30L92A6-A	600	30	2 Phase interleaved PFC	10		



## New Products



### NX-type Full-SiC Power Modules for Industrial Equipment FMF600DXE-24BN/FMF600DXE-34BN Commercially available

**Will contribute to more efficient, smaller and lighter industrial equipment by reducing internal inductance and incorporating an SiC chip**

#### ■ Features

- Electrode structure optimized to achieve internal inductance of 9nH, 47% lower than that of the existing module\*
- NX-type package compatibility allows new module to easily replace current version
- Power loss reduced approx. 70% compared to the conventional product\*

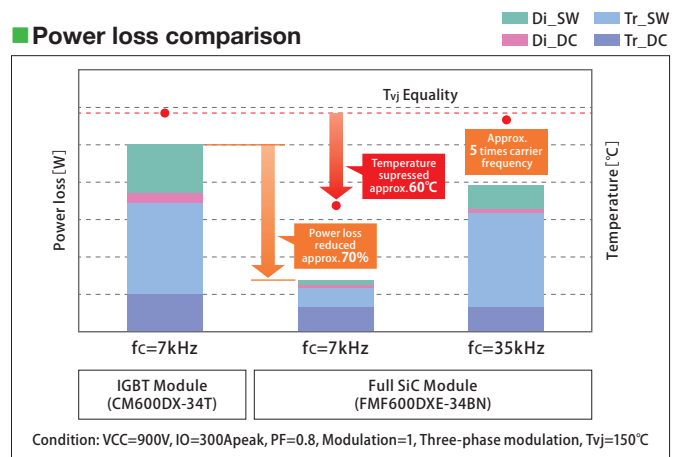
\* Comparison with the same rated value of the conventional 7th Gen. IGBT modules

#### ■ Product lineup

Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMF600DXE-24BN	1200V	600A	2 in 1	62x152mm
FMF600DXE-34BN	1700V			



#### ■ Power loss comparison



### Full-SiC Power Modules for Industrial Equipment Commercially available

**Contributes to reducing size/weight of industrial-use inverters**

#### ■ Features

- Power loss reduced approx. 70% compared to the conventional product\*
- Low-inductance package(92.3mm x 121.7mm) adopted to deliver full SiC performance
- Package compatible with the conventional product(62mm x 108mm, 28mm terminal pitch)
- Contributes to increasing the output current and downsizing peripheral components by low power loss characteristics of SiC

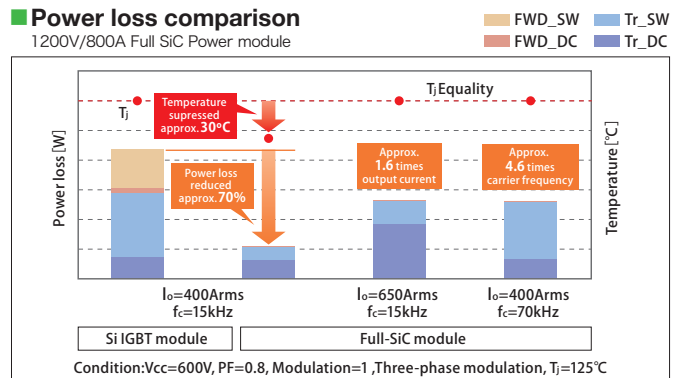
\* Comparison with the same rated value of the conventional 7th Gen. IGBT modules



#### ■ Product lineup

Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMF400BX-24B	1200V	400A	4 in 1	92.3x121.7mm
RMF400DU-24B			2in1(Diode)	80x110mm
FMF400DY-24B			2 in 1	62x108mm
FMF800DX-24B		800A		92.3x121.7mm

#### ■ Power loss comparison





## Full-SiC Power Modules for Industrial Equipment (built-in short-circuit protection function)

Commercially available

Contributes to enhancing the performance of industrial-use inverters thanks to built-in protection function for short circuit

### Features

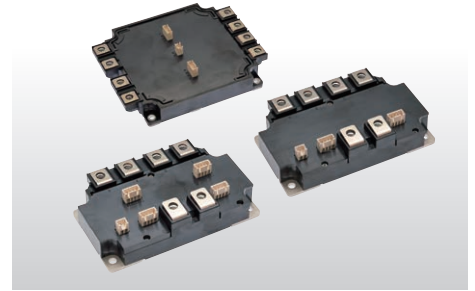
- By using short circuit monitoring circuit in the module it is possible to transfer a short circuit detection signal to the system side
- Power loss reduced approx.80% compared to the conventional product\*
- Low- inductance package adopted to deliver full SiC performance

\*Comparison with the same rated value of the conventional 7th Gen. IGBT modules

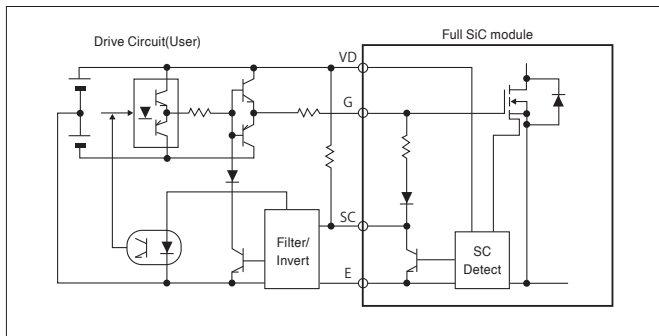
### Product lineup

Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMF300BXZ-24B	1200V	300A	4 in 1	79.6x122mm
FMF400BXZ-24B		400A	4 in 1	
FMF600DXZA-24B*		600A	2 in 1	
FMF800DXZA-24B*		800A	2 in 1	
FMF1200DXZ-24B	1700V	1200A	2 in 1	152x122mm
FMF300DXZ-34B		300A	2 in 1	79.6x122mm
FMF300E3XZ-34B		300A	2 in 1(Chopper)	

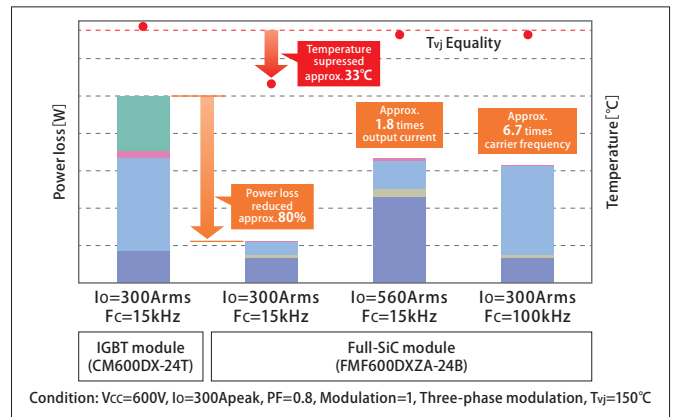
★New Product



### Protection circuit diagram



### Power loss comparison



## 1200V/75A Full SiC-IPM for Industrial Equipment PMF75CGA120/PMF75CGAL120

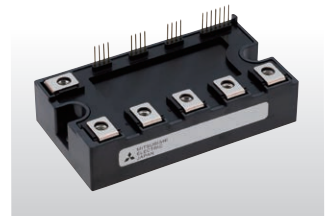
Commercially available

SiC chips(MOSFET and Schottky Barrier Diode) incorporated in an IPM with a built-in drive circuit and protection functions Power loss reduction of approx.70% contributes to improving the performance of industrial equipment

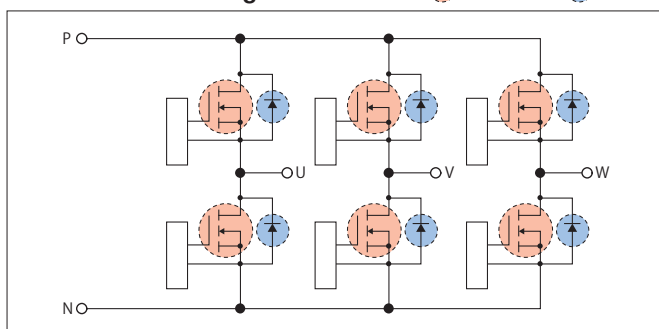
### Features

- Realized high performance and low power loss by 2nd. generation SiC-MOSFET and SiC-SBD with current sense and temperature sense
- External size is reduced approx.30% with the conventional Silicon IPM products\* of the same rating.
- Available to drive it by the equivalent I/F and power supply circuit with the Silicon IPM products.

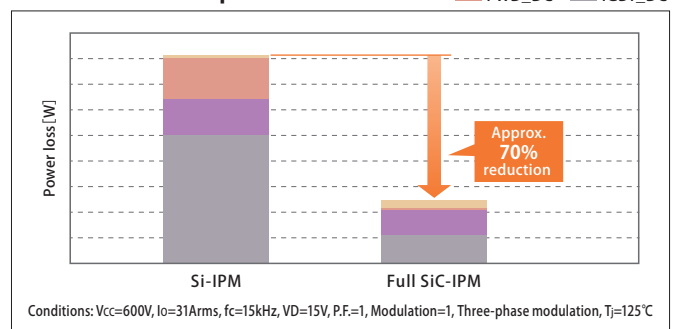
\* Conventional product: Mitsubishi Electric G1 Series PM75CG1B120



### Internal circuit diagram



### Power loss comparison







## Hybrid SiC Power Modules for High-frequency Switching Applications

Commercially available

For optimal operation of power electronics devices that conduct high-frequency switching

### Features

- Power loss reduction of approx. 40% contributes to higher efficiency, smaller size and weight reduction of total system
- Suppresses surge voltage by reducing internal inductance
- Package compatible with the conventional product\*

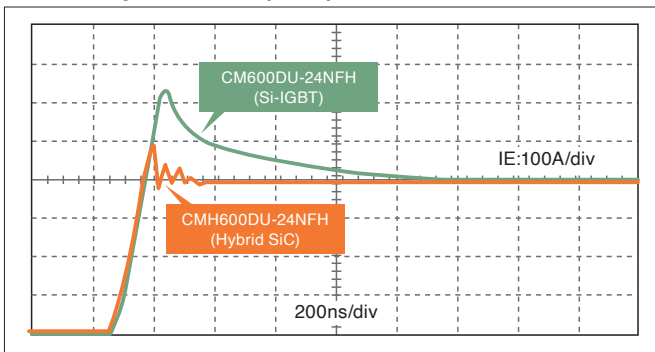
\* Conventional product: Mitsubishi Electric NFH Series IGBT Modules

### Product lineup

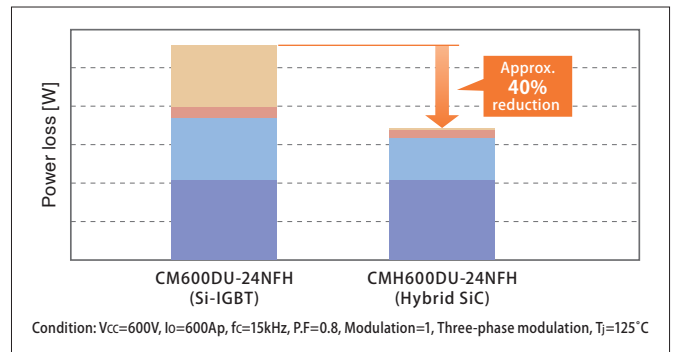
Applications	Model	Rated voltage	Rated current	Circuit configuration	External size (D x W)
Industrial equipment	CMH100DY-24NFH	1200V	100A	2 in 1	48x94mm
	CMH150DY-24NFH		150A		48x94mm
	CMH200DU-24NFH		200A		62x108mm
	CMH300DU-24NFH		300A		62x108mm
	CMH400DU-24NFH		400A		80x110mm
	CMH600DU-24NFH		600A		80x110mm
	CMH400HC6-24NFM		400A	1 in 1	62x108mm



### Recovery waveform (FWD)



### Power loss comparison



## 3300V Full/SBD-embedded/Hybrid SiC Power Modules for Traction Inverters and HVDC system

FMF185DC-66A / FMF375DC-66A / FMF800DC-66BEW

FMF750DC-66A / FMF750DC-66A-1 / CMH600DC-66X

Commercially available

Contributes to energy saving and downsizing for inverters in traction motors, DC-power transmitters, large industrial machinery

### Features

#### [Full SiC]

- Suitable chip set combination for high speed switching
- Reduced power loss compared to the conventional products\*
- Low inductance package maximize SiC performance

#### [SBD-embedded SiC]

- Adoption of SBD embedded SiC MOSFET have reduced switching losses compared to the conventional Full SiC

\* Si product: Mitsubishi Electric HVIGBT, CM600DA-66X

### Product lineup

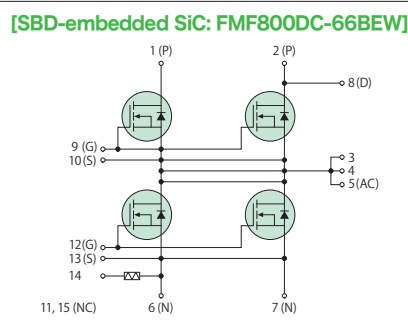
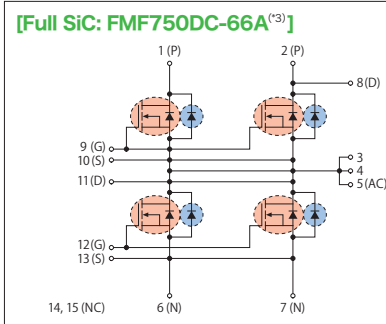
	Model	Rated Voltage	Rated Current	Circuit configuration	External size (D x W)
Full SiC	FMF185DC-66A	3300V	185A	2 in 1	100x140mm
	FMF375DC-66A		375A		
	FMF750DC-66A		750A		
	FMF750DC-66A-1 (*1)		750A		
SBD-embedded SiC-MOSFET	FMF800DC-66BEW(*1,2)		800A		
Hybrid SiC	CMH600DC-66X		600A		

\*: New product  
(\*1) Thermistor-equipped  
(\*2) This product falls under item number 2 (4113 of Appended Table 1 of the Export Trade Control Order.



### Internal circuit diagram

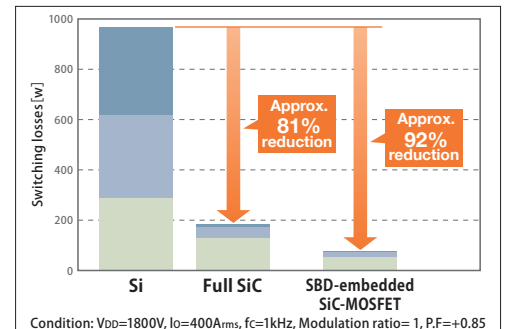
●:SiC-MOSFET ●:SiC-SBD ●:SBD-embedded SiC



(\*3) Please refer to the data sheet for other model.

### Power loss comparison

Comparison of power loss (switching loss) in inverter operation.



# SiC Power Modules



## 1700V/1200A Hybrid SiC Power Modules for Traction Inverters CMH1200DC-34S Commercially available

High-power/low-loss/highly reliable modules appropriate for use in traction inverters

### ■ Features

- Power loss reduced approximately 30% compared to the conventional product\*
- Highly reliable design appropriate for use in traction
- Package compatible with the conventional product\*

\* Conventional product: Mitsubishi Electric Power Module CM1200DC-34N

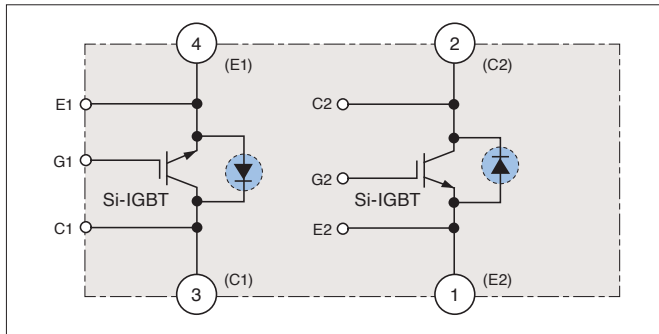
### ■ Main specifications

Module	Max.operating temperature	150°C	
	Isolation voltage	4000Vrms	
Si-IGBT @150°C	Collector-emitter saturation voltage	2.3V	
	Switching loss 850V/1200V	turn-on	140mJ
		turn-off	390mJ
SiC-SBD @150°C	Emitter-collector voltage	2.3V	
	Capacitive charge	9.0μC	



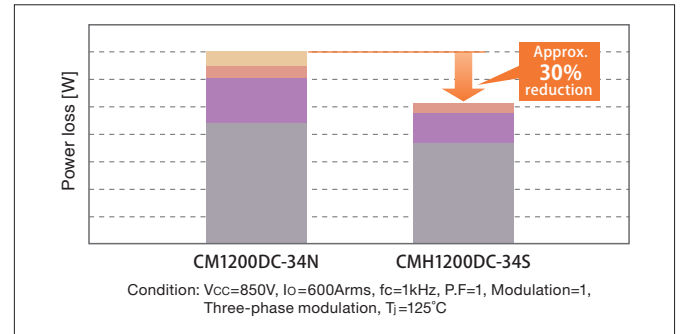
### ■ Internal circuit diagram

:SiC-SBD



### ■ Power loss comparison

■ FWD\_SW ■ IGBT\_SW  
■ FWD\_DC ■ IGBT\_DC



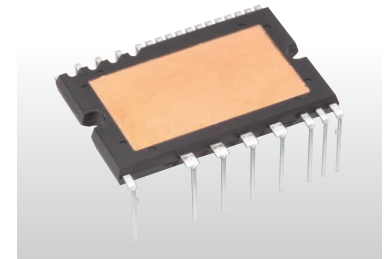
## 600V/15A,25A Full SiC Super mini DIIPM™ for Home Appliances PSF15S92F6-A6/PSF25S92F6-A6 Commercially available

Contributes to extremely high power-efficiency in air conditioners, and easily applicable to industrial equipment

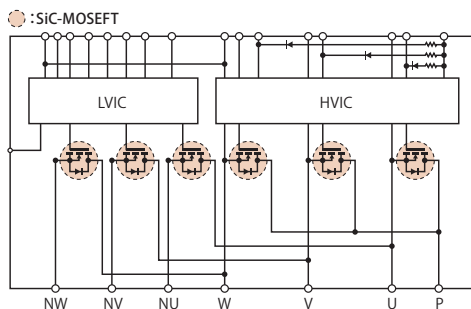
### ■ Features

- SiC-MOSFET achieves reduction in ON resistance, power loss reduced approx. 70% compared to conventional product\*
- Construct low-noise system by reducing recovery current
- Numerous built-in functions: Bootstrap diode for power supply to drive P-side, temperature information output, etc.
- Unnecessary minus-bias gate drive circuit using original high  $V_{th}$  SiC-MOSFET technology
- As package and pin layout compatibility with conventional products\* is ensured, simply replace with this product to improve performance

\*Conventional product: Mitsubishi Electric Super mini DIIPM Series

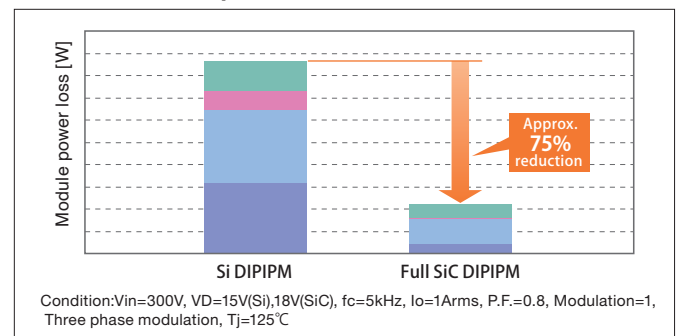


### ■ Internal block diagram



### ■ Power loss comparison

■ Di\_SW ■ Tr\_SW  
■ Di\_DC ■ Tr\_DC



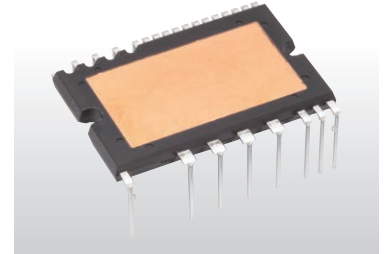


## Full SiC Super mini DIPPFCTM for Home Appliances PSF30L92A6-A Commercially available

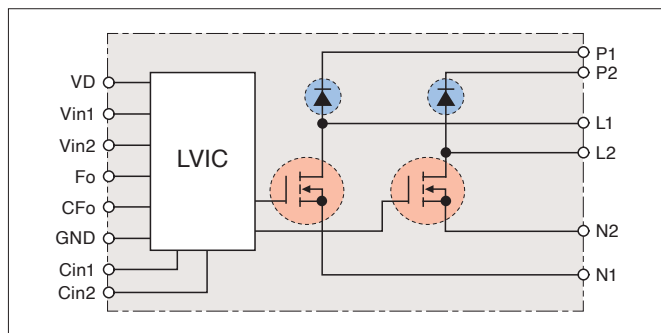
Utilizing SiC enables high-frequency switching and contributes to reducing the size of peripheral components

### ■ Features

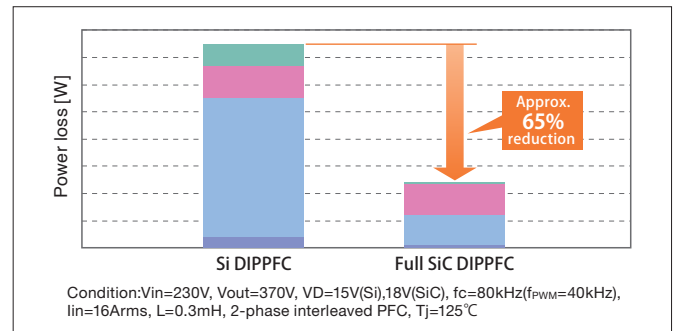
- Incorporating SiC chip in the Super mini package widely used in home appliances
- The SiC chip allows high-frequency switching (up to 40kHz) and contributes to downsizing the reactor, heat sink and other peripheral components
- Adopts the same package as the Super mini DIPIM to eliminate the need for a spacer between the inverter and heat sink, and to facilitate its implementation



### ■ Internal block diagram (PSF30L92A6-A)



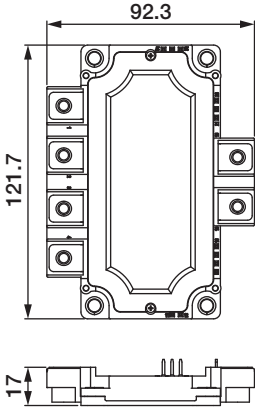
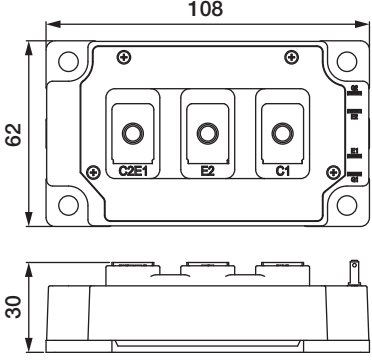
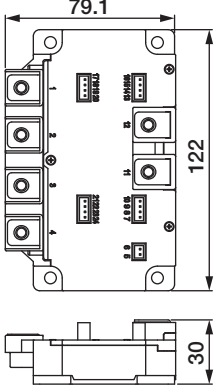
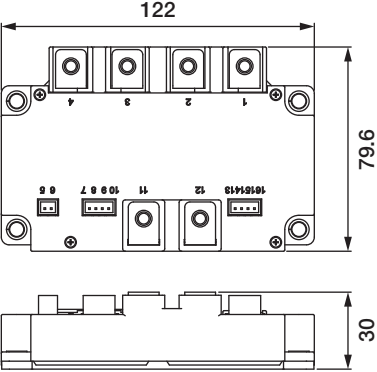
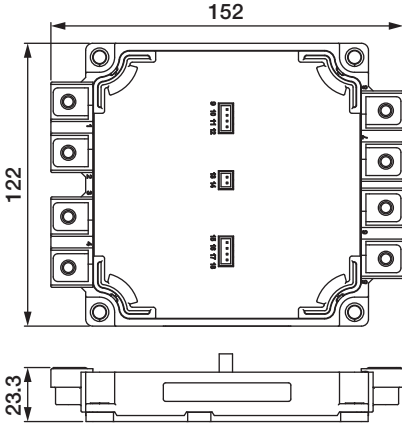
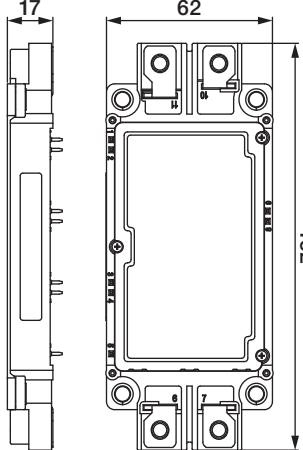
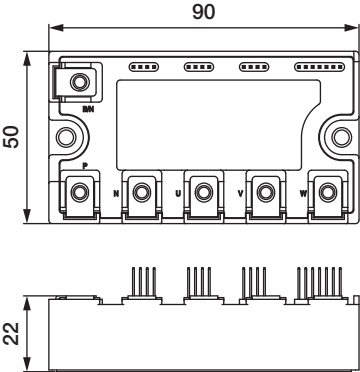
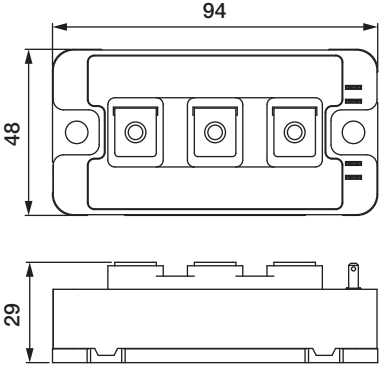
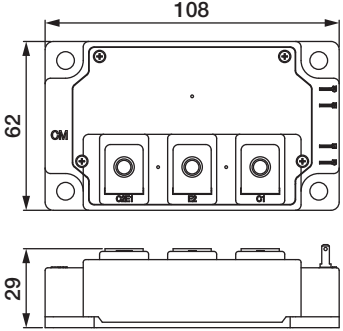
### ■ Power loss comparison



# SiC Power Modules

## Outline Drawing of SiC Power Modules

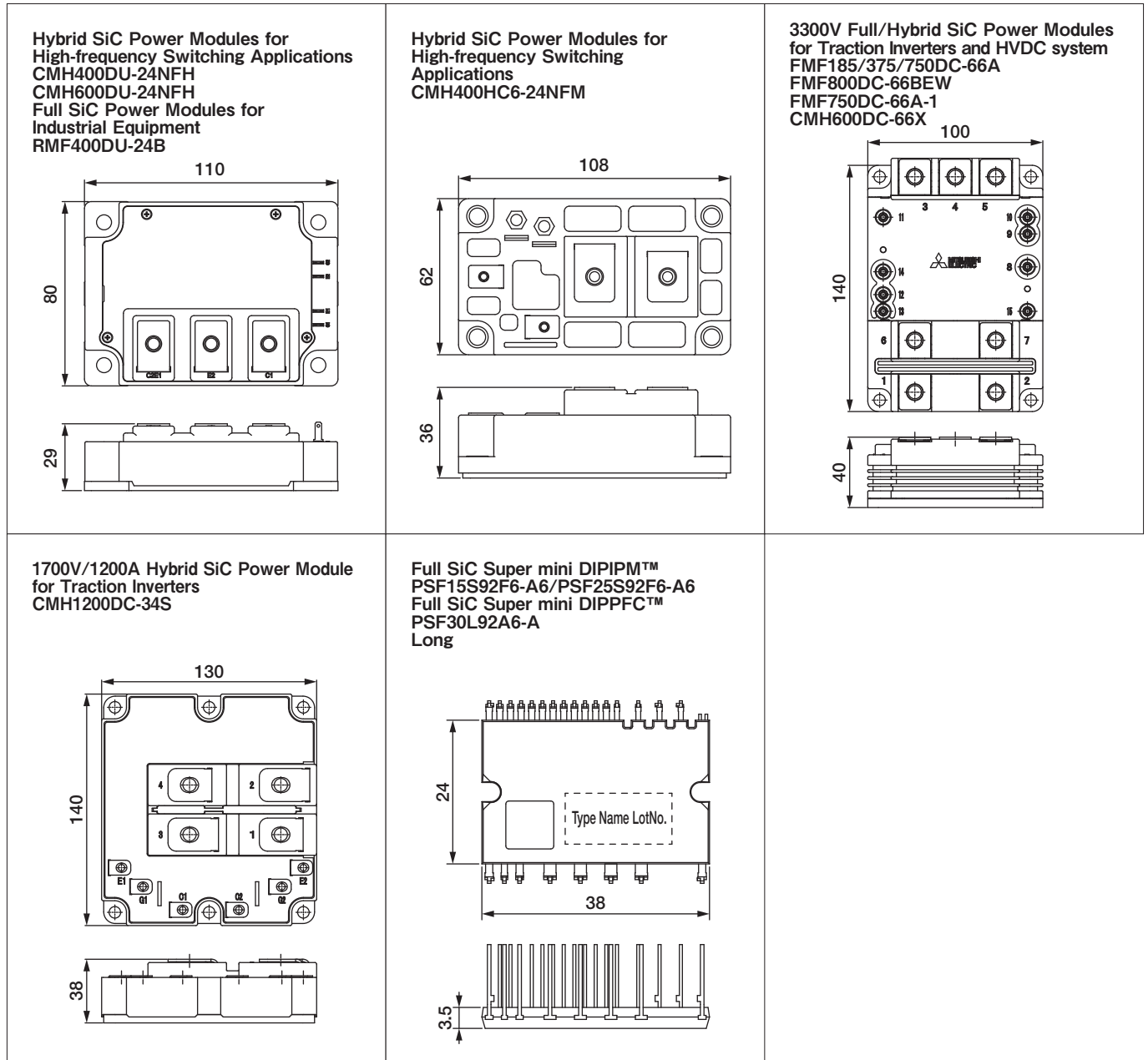
Unit:mm

<p>Full SiC Power Modules for Industrial Equipment FMF400BX-24B, FMF800DX-24B</p> 	<p>Full SiC Power Modules for Industrial Equipment FMF400DY-24B</p> 	<p>Full SiC Power Modules for Industrial Equipment FMF300BXZ-24B FMF400BXZ-24B</p> 
<p>Full SiC Power Modules for Industrial Equipment FMF600DXZA-24B/FMF800DXZA-24B FMF300DXZ-34B/FMF300E3XZ-34B</p> 	<p>Full SiC Power Modules for Industrial Equipment FMF1200DXZ-24B</p> 	<p>Full SiC power Modules for Industrial Equipment FMF600DXE-24BN FMF600DXE-34BN</p> 
<p>Full SiC IPM for Industrial Equipment PMF75CGA120 PMF75CGAL120</p> 	<p>Hybrid SiC Power Modules for High-frequency Switching Applications CMH100DY-24NFH CMH150DY-24NFH</p> 	<p>Hybrid SiC Power Modules for High-frequency Switching Applications CMH200DU-24NFH CMH300DU-24NFH</p> 








# SiC Power Modules

## Outline Drawing of SiC Power Modules

Unit:mm


















## Package, Main Application

Package		Main application
SOIPM		Fan motor
SLIMDIP		Air conditioner/Fan motor/Washing machine/Refrigerator
Super mini		Air conditioner/Washing machine/Servo/Robot
Mini		Air conditioner/Motion control
Large		Commercial air conditioner/Motion control
DIIPM+		Commercial air conditioner/Motion control
Large DIIPM+		Commercial air conditioner/Motion control

Data sheet here

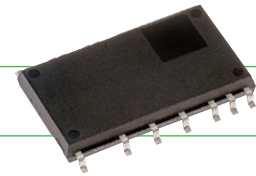


## Rated Lineup

		Rated current											
		2A	5A	10A	15A	20A	25A	30A	35A	40A	50A	75A	100A
Rated voltage	600V												
	1200V												



## Featured Products



### Surface mount package IPM SOIPM

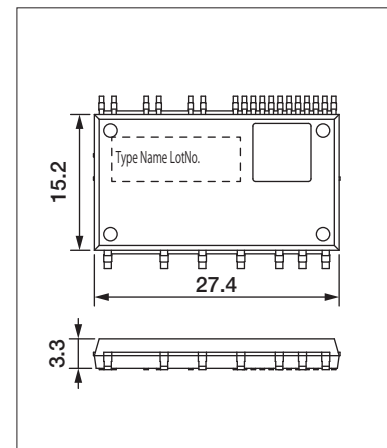
**A small surface mount package IPM enables easy system design by enough insulation distance and protection function for fan and low-power motor drive applications**

#### <Main Features>

- Optimal pin layout realizes easier PCB wiring design and enables smaller PCB size
- Insulation distance between pins ensured, realizing easier board mounting without coating process
- Newly integrated interlock function in addition to conventional protection features for robust operation
- Installing RC-IGBT<sup>\*1</sup> simultaneously realizes compact package and low loss performance can go together
- Bootstrap diode is integrated for the P-side drive power supply like conventional DIIPM series, reducing the number of peripheral external parts

\*1 Reverse-conducting IGBT

### Outline Drawing



### SOIPM

Type name	Rated voltage	Rated current	Chips	Protection	Shape
SP2SK	600V	2A	RC-IGBT, HVIC, LVIC, BSD	UV, SC, OT VOT, IL	Surface mount package

[Term] UV : Power supply Under Voltage protection  
 SC : Short Circuit protection  
 OT : Over Temperature protection  
 VOT : Analog Temperature Output  
 IL : Inter Lock





## Featured Products

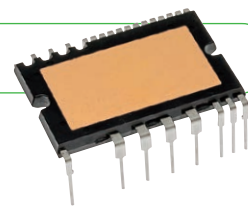
New design with expanded operating temperature range and lower noise contributes to easier system design and reduction in system cost

### Super Mini DIIPM Ver.7

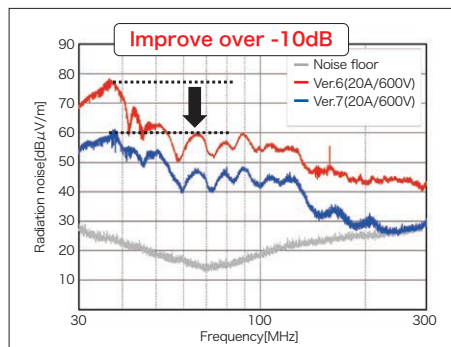
<Main Features>

- New low-noise 7th-generation CSTBT\*1 incorporated, keeping same efficiency as DIIPM Ver.6 Series. System cost reduction for noise suppression parts achieved.
- Maximum junction temperature range expanded to 175°C, supporting instantaneous overcurrent capability at overload operation
- Wider terminal base shape contributes to improved terminal strength and suppresses increase in temperature
- High compatibility for terminal layout, easy to replace from the conventional series

\*1 CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect



### Radiation noise



## Featured Products

Expanded line up for SLIMDIP series contributes system cost down for home appliances and fan drive application.

### SLIMDIP™

SLIMDIP-S, SLIMDIP-M, SLIMDIP-L, SLIMDIP-W, SLIMDIP-X, SLIMDIP-Z

<Main Features>

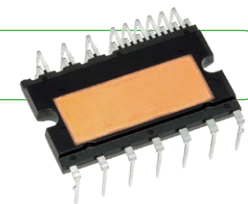
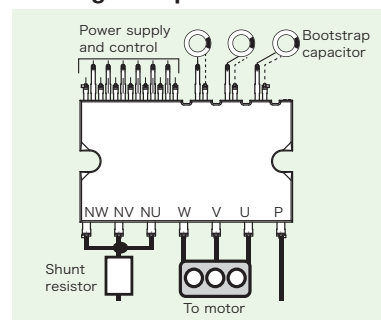
- RC-IGBT\*1 incorporated, reducing package size 30% compared to Super mini DIIPM
- Maximum case temperature expanded to 115°C, increasing the operating temperature range and leading to easier system design
- Additional terminals for floating supply and built-in bootstrap diodes simplify PCB wiring pattern
- Both  $V_{OT}^2$  and  $OT^3$  functions integrated for temperature protection
- Expanded lineup accommodates wide-ranging inverter capacities

\*1 Reverse conducting IGBT \*2  $V_{OT}$ : Analog Temperature Output \*3  $OT$ : Over Temperature protection

### Product lineup

Type name	Main application
SLIMDIP-S	Fan, refrigerator
SLIMDIP-M	Fan, washing machine
SLIMDIP-L	Air conditioner
SLIMDIP-W	Washing machine, Fan
SLIMDIP-X	Air conditioner
SLIMDIP-Z	Air conditioner

### Wiring example

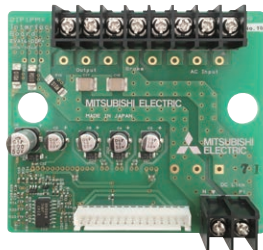


## Customer Support

EVA Series evaluation boards for each DIIPM Series to support system design



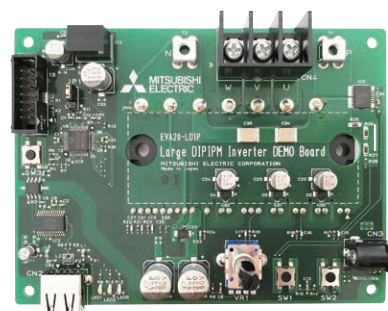
For Super mini DIIPM  
EVA11-SDIP



For DIIPM+  
EVA14-DIP+



For SOPIM  
EVA18-SOP



For Large DIIPM Series  
(Microcomputer-embedded demonstration board)  
EVA20-LDIP

\* For further information, please contact sales office.

## Series Matrix of 600V DIIPM

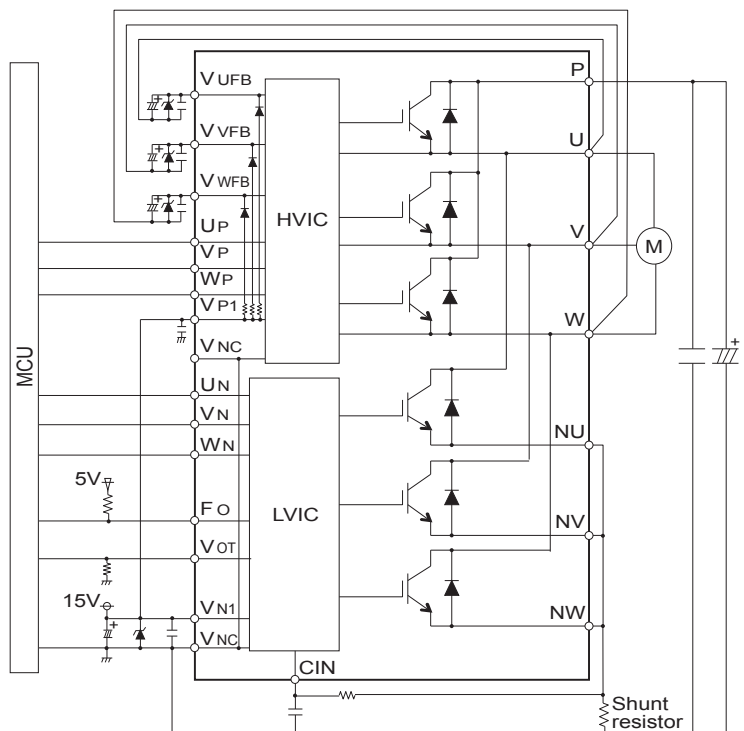
V <sub>CES</sub>		600V					
Series	SLIMDIP	Super mini		Mini		Large	DIIPM+
		Ver.7	Ver.6	Ver.7	—	Ver.6	CIB/CI
5A	SLIMDIP-S		PSS05S92F6-AG PSS05S92E6-AG		PSS05S51F6		
10A	SLIMDIP-M		PSS10S92F6-AG PSS10S92E6-AG		PSS10S51F6		
15A	SLIMDIP-L SLIMDIP-W	PSS15S93F6-AG PSS15S93E6-AG	PSS15S92F6-AG PSS15S92E6-AG		PSS15S51F6		
20A	SLIMDIP-X	PSS20S93F6-AG PSS20S93E6-AG	PSS20S92F6-AG PSS20S92E6-AG	PSS20S73F6	PSS20S51F6 PSS20S71F6		
30A	SLIMDIP-Z★	PSS30S93F6-AG PSS30S93E6-AG	PSS30S92F6-AG PSS30S92E6-AG	PSS30S73F6	PSS30S71F6		
35A			PSS35S92F6-AG PSS35S92E6-AG				
40A		PSS40S93F6-AG PSS40S93E6-AG					
50A				PSS50S73F6	PSS50S71F6	PSS50SA2F6	PSS50MC1F6 PSS50NC1F6*5
75A						PSS75SA2F6	
Chip		RC-IGBT	CSTBT	CSTBT	CSTBT	CSTBT	CSTBT
Protective Function	UV	P-side/N-side	P-side/N-side	P-side/N-side	P-side/N-side	P-side/N-side	P-side/ N-side/ Brake
	SC	N-side	N-side	N-side	N-side	N-side	N-side
	OT	N-side	N-side*1	N-side*1	—	—	—
	V <sub>OT</sub>	N-side	N-side*1	N-side*1	N-side	N-side	N-side
Specifications	Active input	High(3/5V)	High(3/5V)	High(3/5V)	High(3/5V)	High(3/5V)	High(5V)
	Emitter pin of N-side	Open	Open	Open	Open	Open	Open
	Fault output	N-side(UV,SC,OT)	N-side (UV,SC,OT)	N-side(UV,SC,OT)	N-side (UV,SC)	N-side (UV,SC)	N-side (UV,SC)
	Insulation voltage	2000Vrms*2	1500Vrms*2	1500Vrms*2	2500Vrms	2500Vrms	2500Vrms
	Insulation structure	Insulation sheet	Insulation sheet	Insulation sheet	Insulation sheet	Molding resin*4/Insulation sheet	Insulation sheet
	RoHS directive*6	Compliant	Compliant	Compliant	Compliant	Compliant*3	Compliant
	Pin type*7	Control side of Zigzag (Normal, Short)	Long	Long	Short	Control side of Zigzag, Short	—

★: New product

- [Notes] \* 1 : PSSxxS9xE6 has OT function, PSSxxS9xF6 has V<sub>OT</sub> function  
 \* 2 : AC60Hz,1minute.Corresponds to isolation voltage 2500Vrms in the case the convex-shaped heat sink  
 \* 3 : High melting point solder (Lead Over 85%) is used for chip soldering of PSSxxS51F6 only.  
 \* 4 : Molding resin insulation for PSSxxS51F6/-C  
 \* 5 : PSS50NC1F6 is not included brake.  
 \* 6 : RoHS directive (2011/65/EU and (EU) 2015/863)  
 \* 7 : Refer the datasheet of each product for more detail

- [Term] CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect  
 RC-IGBT: Reverse conducting IGBT  
 HVIC: High Voltage IC  
 LVIC: Low Voltage IC  
 UV: Power supply Under Voltage protection  
 OT: Over Temperature protection  
 V<sub>OT</sub>: Analog Temperature Output  
 RoHS: Restriction of the use of certain Hazardous Substances in electrical and electronic equipment  
 CIB: Converter Inverter Brake,  
 CI: Converter Inverter

## Application circuit of super mini DIIPM



## Series Matrix of 1200V DIIPM

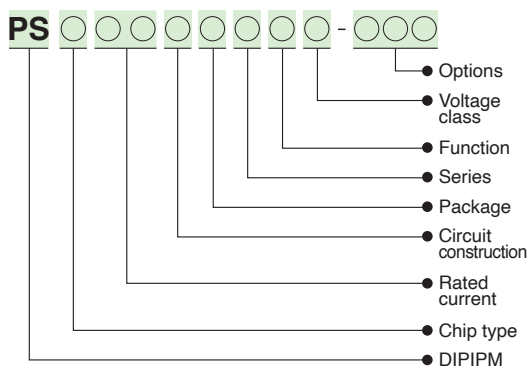
V <sub>CES</sub>		1200V				
I <sub>c</sub>	Series	Mini		Large	DIIPM+	Large DIIPM+
		Ver.7	—	Ver.6	CIB/CI	CI
5A	PSS05S73FT	PSS05S72FT	PSS05SA2FT	PSS05MC1FT PSS05NC1FT*1		
10A	PSS10S73FT	PSS10S72FT	PSS10SA2FT	PSS10MC1FT PSS10NC1FT*1		
15A	PSS15S73FT		PSS15SA2FT	PSS15MC1FT PSS15NC1FT*1		
25A	PSS25S73FT		PSS25SA2FT	PSS25MC1FT PSS25NC1FT*1		
35A			PSS35SA2FT	PSS35MC1FT PSS35NC1FT*1	PSS35NE1CT*	
50A			PSS50SA2FT		PSS50NE1CT	
75A			PSS75SA2FT		PSS75NE1CT	
100A					PSS100NE1CT	
Chip		CSTBT	CSTBT	CSTBT	CSTBT	CSTBT
Protective Function	UV	P-side/N-side	P-side/N-side	P-side/N-side	P-side/N-side/Brake	P-side/N-side
	SC	N-side	N-side	N-side	N-side	N-side
	OT	—	—	—	—	—
	V <sub>OT</sub>	N-side	N-side	N-side	N-side	N-side
Specifications	Active input	High(5V)	High(5V)	High(5V)	High(5V)	High(3/5V)
	Emitter pin of N-side	Open	Open	Open	Open	Open
	Fault output	N-side (UV,SC)	N-side (UV,SC)	N-side (UV,SC)	N-side (UV,SC)	N-side (UV,SC)
	Insulation voltage	2500Vrms	2500Vrms	2500Vrms	2500Vrms	2500Vrms
	Insulation structure	Insulation sheet	Insulation sheet	Insulation sheet	Insulation sheet	Insulation sheet
	RoHS directive*2	Compliant	Compliant	Compliant	Compliant	Compliant
	Pin type	—	—	—	—	—

★: New Product

- [Notes] \* 1: PSS\*\*NC1FT is not included brake  
 \* 2: RoHS directive (2011/65/EU and (EU) 2015/863)

- [Term] CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect  
 UV: Supply Under Voltage protection  
 OT: Over Temperature protection  
 SC: Short Circuit protection  
 V<sub>OT</sub>: Analog Temperature Output  
 RoHS: Restriction of the use of certain Hazardous Substances in electrical and electronic equipment  
 CIB: Converter Inverter Brake  
 CI: Converter Inverter

## Type Name Definition of DIIPM



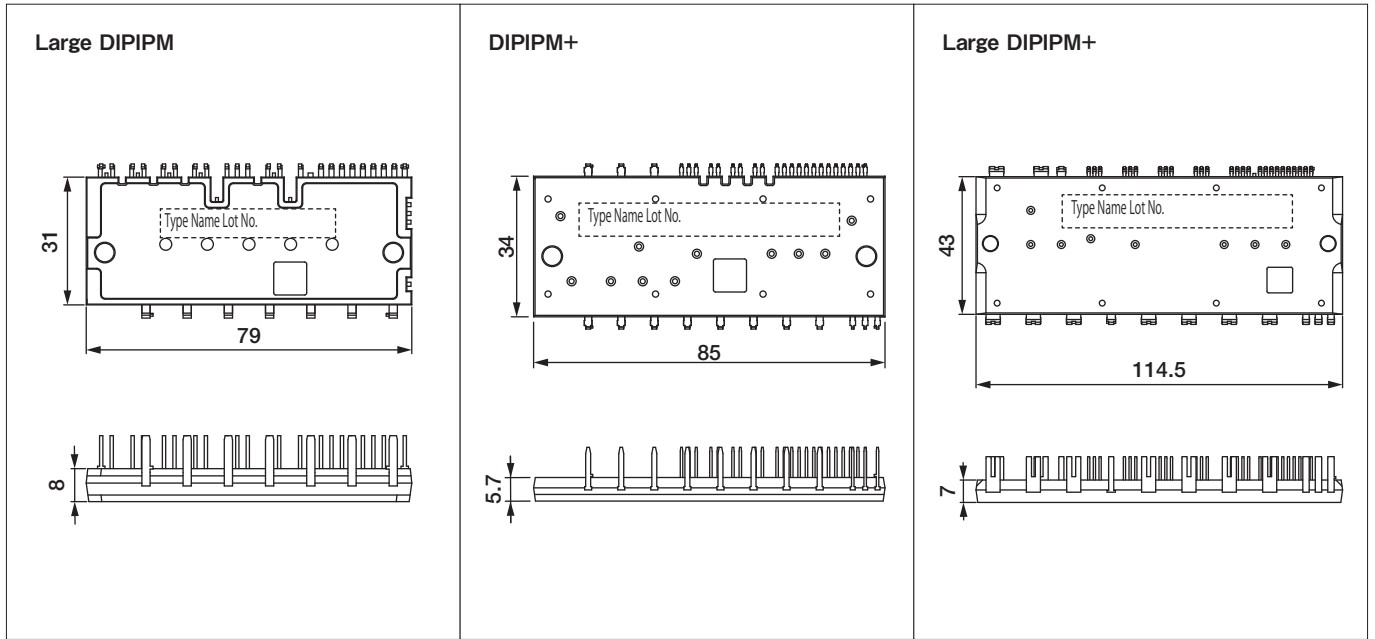
■ Outline Drawing of DIIPM

Unit:mm



<p><b>SLIMDIP Normal</b></p> <p>Top view dimensions: 18.8 (height), 32.8 (width). Side view dimension: 3.6 (height). Label: Type Name LotNo.</p>	<p><b>SLIMDIP Short</b></p> <p>Top view dimensions: 18.8 (height), 32.8 (width). Side view dimension: 3.6 (height). Label: Type Name LotNo.</p>	
<p><b>Super mini DIIPM Ver.6 Long</b></p> <p>Top view dimensions: 24 (height), 38 (width). Side view dimension: 3.5 (height). Label: Type Name LotNo.</p>	<p><b>Super mini DIIPM Ver.7 Long</b></p> <p>Top view dimensions: 24 (height), 38 (width). Side view dimension: 3.5 (height). Label: Type Name LotNo.</p>	
<p><b>Mini DIIPM (PSSxxS51F6)</b></p> <p>Top view dimensions: 30.5 (height), 49 (width). Side view dimension: 5 (height). Label: Type Name Lot No.</p>	<p><b>Mini DIIPM(PSSxxS51F6) Control side of Zigzag</b></p> <p>Top view dimensions: 30.5 (height), 49 (width). Side view dimension: 5 (height). Label: Type Name Lot No.</p>	<p><b>Mini DIIPM (PSSxxS7xF6) 1200V Mini DIIPM Ver.7 1200V Mini DIIPM</b></p> <p>Top view dimensions: 31 (height), 52.5 (width). Side view dimension: 5.6 (height). Label: Type Name Lot No.</p>

## ■ Outline Drawing of DIIPM

Unit:mm
















## Series, Main Application

Series	Main Application
G1 	Motion control/Renewable energy/Power supply
V1 	

Data sheet here



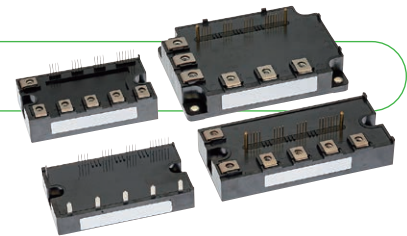
## Rated Lineup

		Rated current												
		25A	35A	50A	75A	100A	150A	200A	300A	400A	450A	500A	600A	800A
Rated voltage	600V													
	650V													
	1200V													



## Featured Products

Loaded with built-in functions, contributing to inverters with enhanced energy savings



### G1 Series IPM with 7th-generation IGBT

#### <Main Features>

- Power loss has been reduced with the introduction of the 7th-generation IGBT produced using CSTBT<sup>TM1</sup> and a diode incorporating a RFC<sup>2</sup> structure that contributes to reducing the power consumed in inverters
- The new resin-insulated metal baseplate, originally introduced in 7th-generation IGBT modules, eliminates the solder-attached section, increasing the thermal cycle lifetime and improving inverter reliability
- In addition to the built-in functions of the previous product,<sup>3</sup> automatic switching speed control, and error detection function contribute to lowering inverter loss and shortening design time

\*1 CSTBT: Mitsubishi Electric's unique IGBT that utilizes the carrier cumulative effect

\*2 RFC: Relaxed field cathode

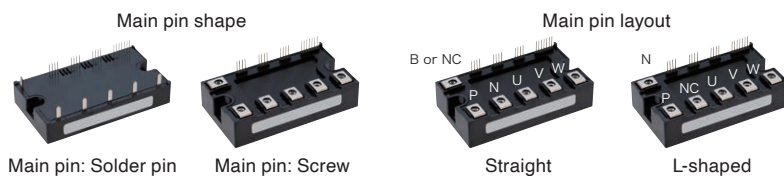
\*3 Conventional product: IPM L1-Series

Built-in functions: Supply Undervoltage lock protection (UV), Short-circuit protection (SC), Over-temperature protection (OT)

#### ■ "A" package main pin shape and layout

For the "A" package 6-in-1 (CG1A) main pin shape, select either solder pin or screw type

For the pin layout, select either straight or L-shaped





# Lineup of IPM

■ Matrix of IPM 650V/600V (No.: Number of outline drawing, see page 22)


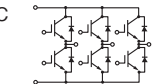
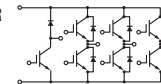
VcES		650V						
Series		G1 Series		V1 Series				
Ic			Connection	No.				
50A		PM50CG1A065	C	06				
		PM50RG1A065	R	06				
		PM50CG1B065	C	04				
		PM50RG1B065	R	04				
		PM50CG1AL065	C	06				
		PM50CG1AP065	C	03				
		PM50CG1APL065	C	03				
		PM50RG1AP065	R	03				
75A		PM75CG1A065	C	06				
		PM75RG1A065	R	06				
		PM75CG1B065	C	04				
		PM75RG1B065	R	04				
		PM75CG1AL065	C	06				
		PM75CG1AP065	C	03				
		PM75CG1APL065	C	03				
		PM75RG1AP065	R	03				
100A		PM100CG1A065	C	06				
		PM100CG1B065	C	04				
		PM100RG1B065	R	04				
		PM100CG1AL065	C	06				
		PM100CG1AP065	C	03				
		PM100CG1APL065	C	03				
150A		PM150CG1B065	C	04				
		PM150RG1B065	R	04				
200A		PM200CG1B065	C	04				
		PM200RG1B065	R	04				
		PM200CG1C065	C	05				
		PM200RG1C065	R	05				
300A		PM300CG1C065	C	05				
	PM300RG1C065	R	05					
400A					PM400DV1A060	D	01	
450A		PM450CG1C065	C	05				
		PM450RG1C065	R	05				
600A					PM600DV1A060	D	01	
800A					PM800DV1B060	D	02	
IGBT chip		CSTBT*1 Built-in emitter sensor Built-in temperature sensor			CSTBT*1 Built-in emitter sensor Built-in temperature sensor			
	Fault output	UV	P-side/N-side			P-side/N-side		
		OT	P-side/N-side			P-side/N-side		
		SC	P-side/N-side			P-side/N-side		
	Identification	P-side/N-side			-			
RoHS directive*2	Compliant			Compliant				
Compatibility	-			V Series				
Connection	D	B4	B5	C	R			

[Notes] \*1: Full-gate CSTBT™  
\*2: RoHS directive (2011/65/EU and (EU) 2015/863)

[Term] CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect  
UV: Power supply Under Voltage protection  
SC: Short Circuit protection  
OT: Over Temperature protection  
RoHS: Restriction of hazardous substances in electrical and electronic equipment

# Lineup of IPM

## Matrix of IPM 1200V (No.: Number of outline drawing, see page 22)

V <sub>CEs</sub>		1200V					
Series	G1 Series		Connection	No.	V1 Series	Connection	No.
I <sub>c</sub>							
25A	PM25CG1A120		C	06			
	PM25CG1B120		C	04			
	PM25RG1A120		R	06			
	PM25RG1B120		R	04			
	PM25CG1AL120		C	06			
	PM25CG1AP120		C	03			
	PM25CG1APL120		C	03			
	PM25RG1AP120		R	03			
35A	PM35CG1A120		C	06			
	PM35CG1B120		C	04			
	PM35RG1A120		R	06			
	PM35RG1B120		R	04			
	PM35CG1AL120		C	06			
	PM35CG1AP120		C	03			
	PM35CG1APL120		C	03			
	PM35RG1AP120		R	03			
50A	PM50CG1A120		C	06			
	PM50CG1B120		C	04			
	PM50RG1B120		R	04			
	PM50CG1AL120		C	06			
	PM50CG1AP120		C	03			
	PM50CG1APL120		C	03			
75A	PM75CG1B120		C	04			
	PM75RG1B120		R	04			
100A	PM100CG1B120		C	04			
	PM100CG1C120		C	05			
	PM100RG1B120		R	04			
	PM100RG1C120		R	05			
150A	PM150CG1C120		C	05			
	PM150RG1C120		R	05			
200A	PM200CG1C120		C	05	PM200DV1A120	D	01
	PM200RG1C120		R	05			
300A					PM300DV1A120	D	01
450A					PM450DV1A120	D	01
IGBT chip	CSTBT*1 Built-in current sensor Built-in temperature sensor				CSTBT*1 Built-in current sensor Built-in temperature sensor		
Fault output	UV	P-side/N-side			P-side/N-side		
	OT	P-side/N-side			P-side/N-side		
	SC	P-side/N-side			P-side/N-side		
Identification	P-side/N-side				—		
RoHS directive*2	Compliant				Compliant		
Compatibility	—				V Series		
Connection							

[Notes] \*1: Full-gate CSTBT™  
\*2: RoHS directive (2011/65/EU and (EU) 2015/863)

[Term] CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect  
UV: Power supply Under Voltage protection  
SC: Short Circuit protection  
OT: Over Temperature protection  
RoHS: Restriction of the use of certain Hazardous Substances in electrical and electronic equipment

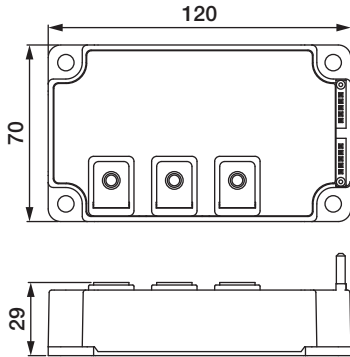
# Lineup of IPM

## Outline Drawing of IPM

Unit:mm

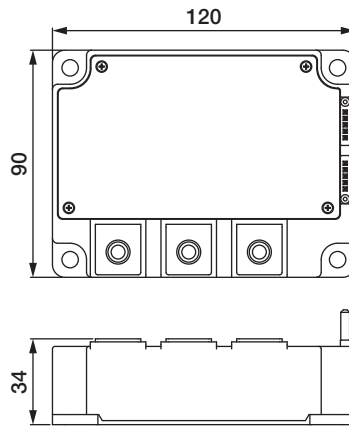
**01**

PM400,600DV1A060  
PM200,300,450DV1A120



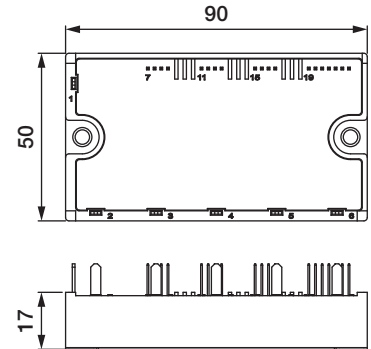
**02**

PM800DV1B060



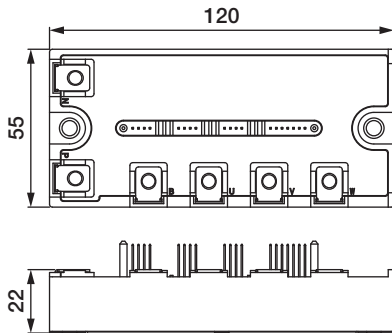
**03**

PM50,75,100CG1AP/CG1APL065  
PM50,75RG1AP065  
PM25,35,50CG1AP/CG1APL120  
PM25,35RG1AP120



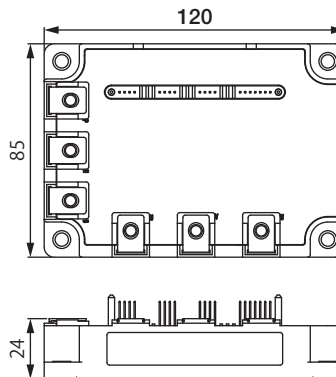
**04**

PM50,75,100,150,200CG1B/  
RG1B065  
PM25,35,50,75,100CG1B/  
RG1B120



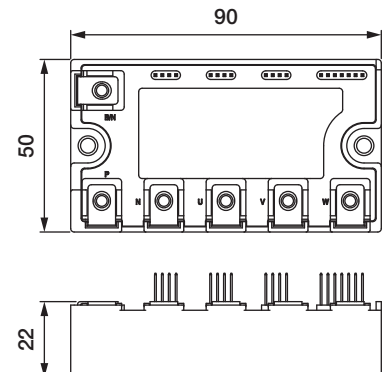
**05**

PM200,300,450CG1C/  
RG1C065  
PM100,150,200CG1C/  
RG1C120








**06**

PM50,75,100CG1A/CG1AL065  
PM50,75RG1A065  
PM25,35,50CG1A/CG1AL120  
PM25,35RG1A120



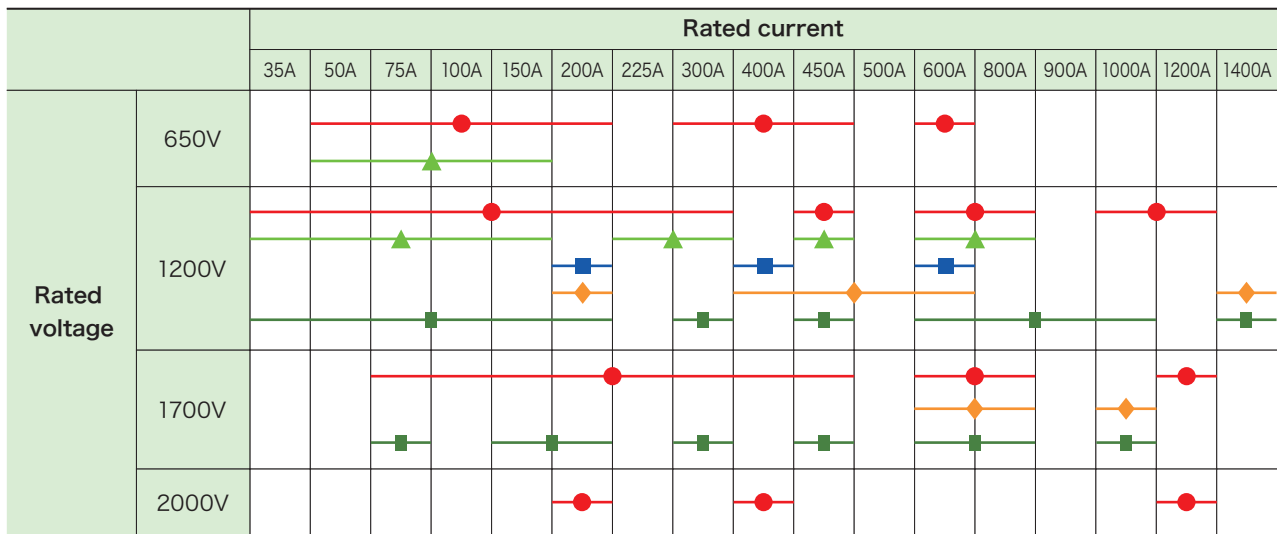
## Series, Main Application

Series		Main Application
T		Motion control/Renewable energy /Power supply
T1		
TH		
For 3-level Inverters		
S		

Data sheet here



## Rated Lineup



## New Products

Industrial IGBT module with new standard package "LV100" for high power density inverter

IGBT module T-series (LV100 for industrial)

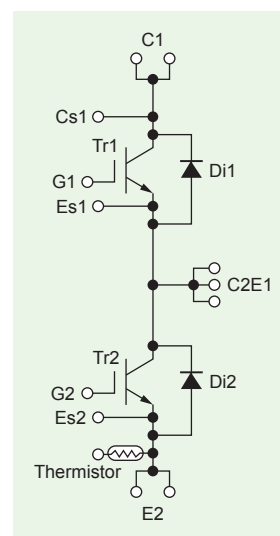
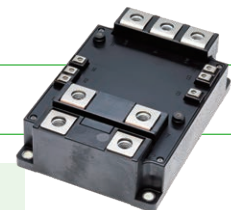
IGBT module 2in1 type

■ Lineup

1200A/2000V  
800A/1700V, 800A/1700V(with enhanced FWD), 1200A/1700V  
800A/1200V, 1200A/1200V

〈Main Features〉

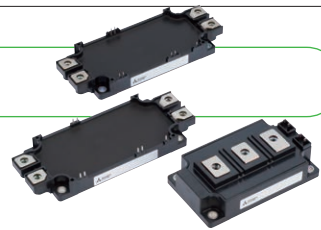
- Next generation high capacity standard package for industrial use
- Improved ease of use by applying low impedance package
- Reducing the switching loss and optimal for the applications that are used in 1 to 5KHz
- Isolation voltage 4kV





## Featured Products

New lineup contributes to simple design downsizing, energy-savings of industrial inverters.



### IGBT Module T/T1-Series

#### <Main Features>

- New modules equipped with three-phase converter, inverter, and brake circuit(CIB), contributes to simplifying design for inverter systems
- CIB modules contribute to compact inverter systems by reducing package size by 36% compared to the Mitsubishi Electric's existing module.(CIB)
- Power loss has been reduced with the introduction of the 7th-generation IGBT produced using CSTBT<sup>2</sup> and a diode incorporating a relaxed field of cathode (RFC) structure
- The new structure introduced eliminates the solder-attached section, increasing the thermal cycle lifetime, which contributes to improving the reliability of inverters
- The introduction of press-fit pins and PC-TIM<sup>1</sup> contribute to simplifying the assembly process for inverters

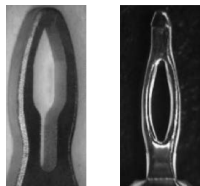
\*1 PC-TIM: Phase change - thermal interface material

\*2 CSTBT: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect

#### ◆ Press-fit terminal support (NX)

- Possible to select the control pin shape (soldered terminals/press-fit terminals)
- Solder attachment process eliminated

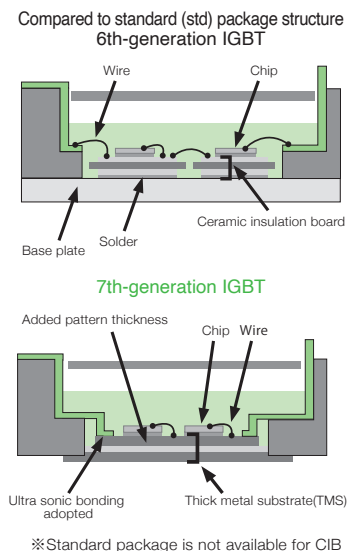
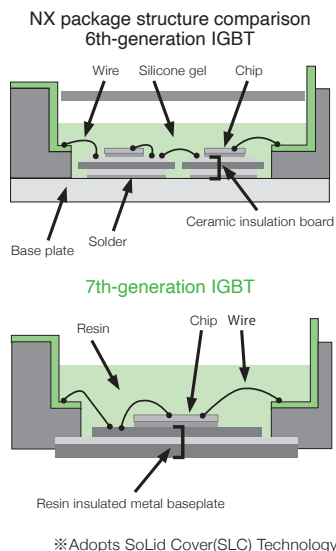
#### ■ Press-fit pin



① Main pin

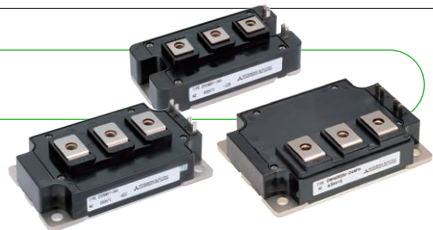
② Signal pin

#### ■ New structure realizes improved reliability (improved thermal cycle lifetime)



## Featured Products

Low switching loss contributes to efficiency improvement of industrial inverters during high-frequency operation.



### TH-series IGBT Modules with 7th-generation IGBT for High-frequency switching applications

#### <Main Features>

- A chip optimized for high-frequency applications  $f_c$  target 20-60kHz
- High-speed specifications reduce power consumption during high-frequency switching. The loss is reduced by about 30% compared to general specifications\*1
- Lineup of 1200V 200A to 600A (2 types of packages are available for 400A)

\*1: 7th-generation T series with general specifications

#### ■ Package



48 x 94mm  
1200V/200A  
•CM200DY-24TH



62 x 108mm  
1200V/400A  
•CM400DY-24TH



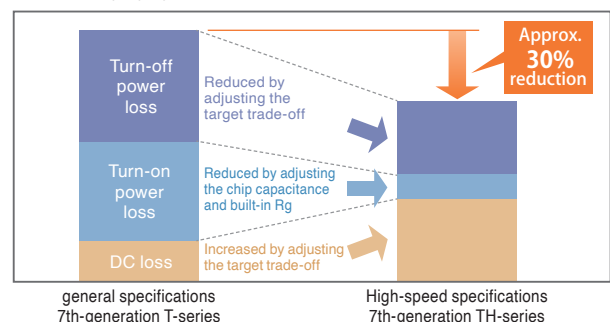
80 x 110mm  
1200V/400A,600A  
•CM400DU-24TH  
•CM600DU-24TH

#### ■ Product lineup

Type name	Rated Voltage	Rated Current	Connection	External size (D x W)
CM200DY-24TH	1200V	200A	2 in 1	48.0 x 94.0mm
CM400DY-24TH		400A		62.0 x 108.0mm
CM400DU-24TH		600A		80.0 x 110.0mm
CM600DU-24TH				

#### ■ Power loss comparison

Note: Example properties of TH-series IGBT( $f_c=30$ kHz)



# Lineup of IGBT Modules

Matrix of IGBT Modules 650V/600V (No.: Number of outline drawing, see page 28 to 32)

RoHS directive (2011/65/EU, (EU)2015/863) compliant

Series Ic	650V						600V		
	T/T1-Series NX Type	Connection	No.	T-Series std Type	Connection	No.	NFH-Series	Connection	No.
50A	CM50MXUB-13T	M	32						
	CM50MXUB-13T1	M	32						
	CM50MXUBP-13T	M	36						
	CM50MXUBP-13T1	M	36						
75A	CM75MXUB-13T	M	32						
	CM75MXUB-13T1	M	32						
	CM75MXUBP-13T	M	36						
	CM75MXUBP-13T1	M	36						
100A	CM100TX-13T	T	24	CM100DY-13T	D	19			
	CM100TXP-13T	T	27						
	CM100MXUB-13T	M	32						
	CM100MXUB-13T1	M	32						
	CM100MXUBP-13T	M	36						
	CM100MXUBP-13T1	M	36						
	CM100MXUD-13T	M	34						
	CM100MXUD-13T1	M	34						
	CM100MXUDP-13T	M	38						
	CM100MXUDP-13T1	M	38						
150A	CM150TX-13T	T	24	CM150DY-13T	D	19			
	CM150TXP-13T	T	27						
	CM150RX-13T	R	25						
	CM150RXP-13T	R	28						
	CM150MXUD-13T	M	34						
	CM150MXUD-13T1	M	34						
	CM150MXUDP-13T	M	38						
	CM150MXUDP-13T1	M	38						
200A	CM200TX-13T	T	24	CM200DY-13T	D	19	CM200DU-12NFH	D	11
	CM200TXP-13T	T	27						
	CM200RX-13T	R	25						
	CM200RXP-13T	R	28						
300A	CM300DX-13T	D	17	CM300DY-13T	D	20	CM300DU-12NFH	D	12
	CM300DXP-13T	D	29						
400A				CM400DY-13T	D	20	CM400DU-12NFH	D	12
450A	CM450DX-13T	D	17						
	CM450DXP-13T	D	29						
600A	CM600DX-13T	D	17	CM600DY-13T	D	21	CM600DU-12NFH	D	13
	CM600DXP-13T	D	29						
Connection	D		T		R		M		

Matrix of Power Modules for 3-level Inverter (No.: Number of outline drawing, see page 28 to 32)

RoHS directive (2011/65/EU, (EU)2015/863) compliant

V <sub>CE</sub> /V <sub>RRM</sub>	1200 V IGBT Module			1700 V IGBT Module			1200 V Diode Module			1700 V Diode Module		
	T/S-Series std Type	Connection	No.	S-Series std Type	Connection	No.	S-Series std Type	Connection	No.	S-Series std Type	Connection	No.
200A	CM200ST-24T★	S	40									
400A	CM400ST-24T★	S	40									
	CM400C1Y-24S	C1	09									
450A	CM450C1Y-24T	C1	21									
500A	CM500C2Y-24S	C2	26									
600A	CM600C1Y-24T	C1	21	CM600HA-34S	H	26				RM600DY-34S	D	22
800A				CM800HA-34S	H	26				RM800DY-34S	D	22
1000A				CM1000HA-34S	H	26						
1400A	CM1400HA-24S	H	26				RM1400HA-24S	H	26			
Connection	IGBT module			Diode module			H			D		

\* Connection of diode module and IGBT module are different.

★: New product



# Lineup of IGBT Modules

■ Matrix of IGBT Modules 1200V (No.: Number of Outline Drawing, see page 28 to 32)

RoHS directive (2011/65/EU, (EU)2015/863) compliant

V <sub>CEs</sub>		1200V															
Series	I <sub>c</sub>	T-Series LV100 Type		T/T1-Series NX Type		T-Series std Type		TH-Series		S-Series NX Type		S-Series std Type		S-Series MPD Type			
		Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.		
35A				CM35MXUA-24T	M 31						CM35MXA-24S	M 03					
				CM35MXUA-24T1	M 31												
				CM35MXUAP-24T	M 35												
				CM35MXUAP-24T1	M 35												
50A				CM50MXUA-24T	M 31						CM50MXA-24S	M 03					
				CM50MXUA-24T1	M 31												
				CM50MXUAP-24T	M 35												
				CM50MXUAP-24T1	M 35												
75A				CM75MXUB-24T	M 32						CM75TX-24S	T 04					
				CM75MXUB-24T1	M 32						CM75RX-24S	R 01					
				CM75MXUBP-24T	M 36						CM75MXA-24S	M 03					
				CM75MXUBP-24T1	M 36												
				CM75MXUC-24T	M 33												
				CM75MXUC-24T1	M 33												
				CM75MXUCP-24T	M 37												
				CM75MXUCP-24T1	M 37												
100A				CM100TX-24T	T 24												
				CM100TXP-24T	T 27												
				CM100RX-24T	R 25						CM100MXA-24S	M 03					
				CM100RXP-24T	R 28												
				CM100MXUC-24T	M 33	CM100DY-24T	D 19										
				CM100MXUC-24T1	M 33												
				CM100MXUCP-24T	M 37												
				CM100MXUCP-24T1	M 37												
150A				CM150TX-24T	T 24												
				CM150TXP-24T	T 27												
				CM150RX-24T	R 25						CM150DX-24S	D 02					
				CM150RXP-24T	R 28						CM150EXS-24S	E 16					
				CM150MXUD-24T	M 34	CM150DY-24T	D 19										
				CM150MXUD-24T1	M 34												
				CM150MXUDP-24T	M 38												
				CM150MXUDP-24T1	M 38												
200A				CM200TX-24T	T 24						CM200DX-24S	D 02					
				CM200TXP-24T	T 27						CM200RXL-24S	R 15					
						CM200DY-24T	D 20	CM200DY-24TH	D 06		CM200EXS-24S	E 16					
225A				CM225DX-24T	D 17												
				CM225DX-24T1	D 17												
				CM225DXP-24T	D 29												
				CM225DXP-24T1	D 29												
300A				CM300DX-24T	D 17						CM300EXS-24S	E 16	CM300DY-24S	D 07			
				CM300DX-24T1	D 17												
				CM300DXP-24T	D 29												
				CM300DXP-24T1	D 29												
400A								CM400DY-24TH	D 08								
								CM400DU-24TH	D 13								
450A				CM450DX-24T	D 17								CM450DY-24S	D 09			
				CM450DX-24T1	D 17												
				CM450DXP-24T	D 29												
				CM450DXP-24T1	D 29												
600A				CM600DX-24T	D 17												
				CM600DX-24T1	D 17												
				CM600DXP-24T	D 29						CM600DXL-24S	D 05	CM600DY-24S	D 09			
				CM600DXP-24T1	D 29												
800A	CM800DW-24T	D	39	CM800DX-24T1	D 17								CM800DY-24S	D 10			
				CM800DXP-24T1	D 29												
900A														CM900DUC-24S	D 14		
1000A				CM1000DX-24T	D 18						CM1000DXL-24S	D 05					
				CM1000DXP-24T	D 30												
1200A	CM1200DW-24T	D	39														
1400A													CM1400HA-24S	H 26	CM1400DUC-24S	D 14	
Connection	H	D	T	R	M	E	E3										



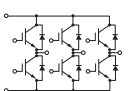
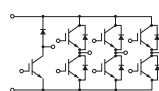
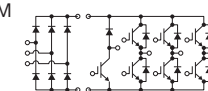

\* 1: A-Series have model name ending with A, NF-Series have model name ending with NF/NFH

\* 2: std Type have model name "CM\*\*DY/HA-24S, MPD Type have model name "CM\*\*DUC-24S"

# Lineup of IGBT Modules


## Matrix of IGBT Modules 1700V (No.: Number of Outline Drawing, see page 28 to 32)

RoHS directive (2011/65/EU, (EU)2015/863) compliant

V <sub>CEs</sub>		1700V											
Series I <sub>c</sub>	T-Series LV100 Type			T-Series NX Type			T-Series std Type			S-Series std Type			
	Connection	No.		Connection	No.		Connection	No.		Connection	No.		
75A							CM75DY-34T	D	19				
100A				CM100TX-34T CM100TXP-34T	T T	24 27	CM100DY-34T	D	19				
150A				CM150TX-34T CM150TXP-34T	T T	24 27	CM150DY-34T	D	20				
200A							CM200DY-34T	D	20				
225A				CM225DX-34T CM225DXP-34T	D D	17 29							
300A				CM300DX-34T CM300DXP-34T	D D	17 29	CM300DY-34T	D	21				
400A							CM400DY-34T	D	21				
450A				CM450DX-34T CM450DXP-34T	D D	17 29							
500A													
600A				CM600DX-34T CM600DXP-34T	D D	17 29				CM600HA-34S	H	26	
800A	CM800DW-34T CM800DW-34TA	D D	39 39							CM800HA-34S	H	26	
1000A										CM1000HA-34S	H	26	
1200A	CM1200DW-34T	D	39										
Connection	H 	D 	T 	R 	M 	E 							

## Matrix of IGBT Modules 2000V (No.: Number of Outline Drawing, see page 28 to 32)

RoHS directive (2011/65/EU, (EU)2015/863) compliant

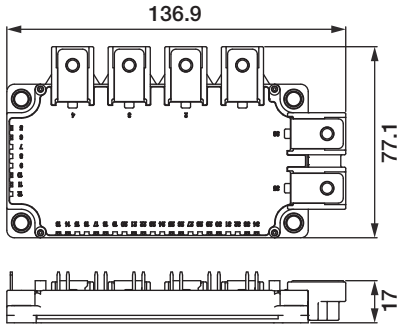
V <sub>CEs</sub>		2000V					
Series I <sub>c</sub>	T-Series LV100 Type			T-Series std Type			
	Connection	No.		Connection	No.		
200A				CM200DY-40TA	D	21	
400A				CM400DY-40T CM400DY-40TA	D D	23 21	
1200A	CM1200DW-40T	D	39				
Connection	D 						

# Lineup of IGBT Modules

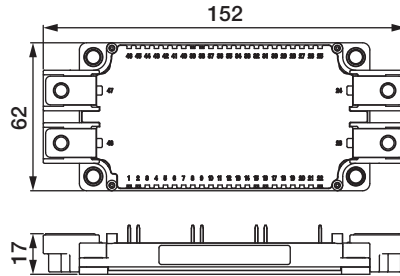
## Outline Drawing of IGBT Modules

Unit:mm

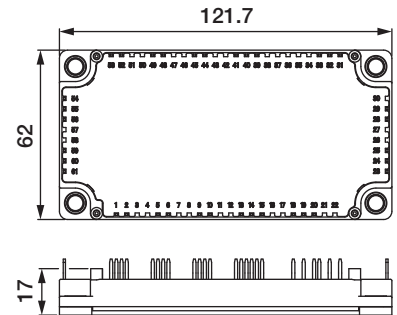
**01** CM75RX-24S



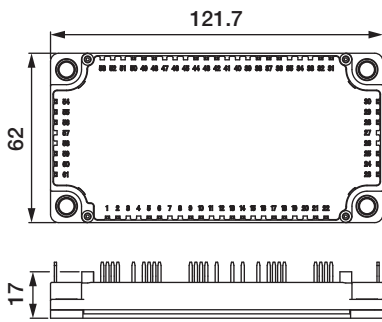
**02** CM150,200DX-24S



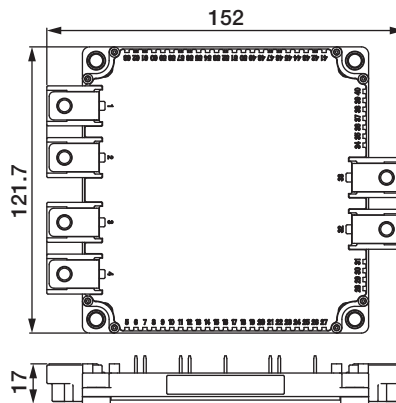
**03** CM35,50,75,100MXA-24S



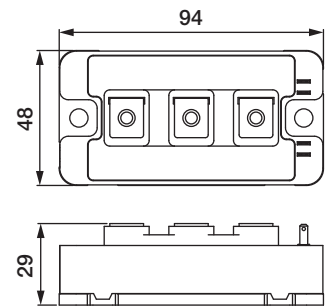
**04** CM75TX-24S



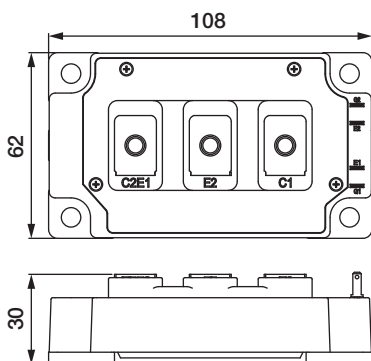
**05** CM600,1000DXL-24S



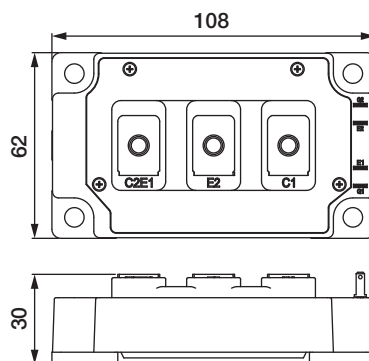
**06** CM200DY-24TH



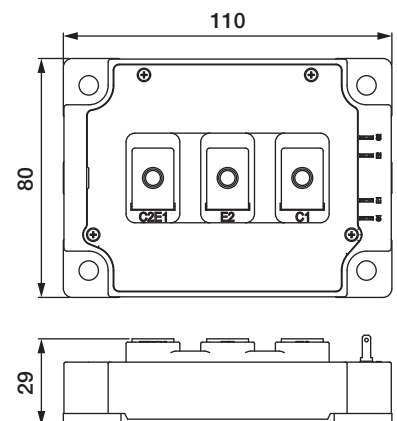
**07** CM300DY-24S



**08** CM400DY-24TH



**09** CM400C1Y-24S  
CM450DY-24S  
CM600DY-24S



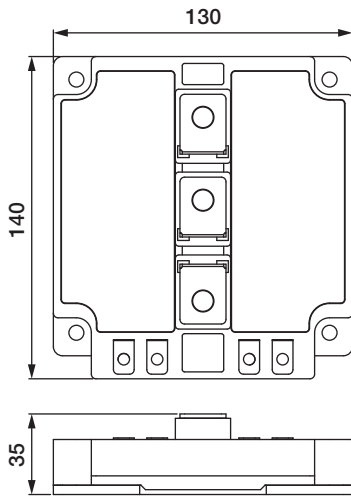
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

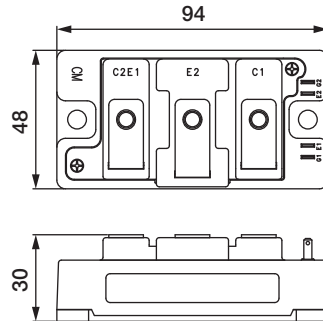
10

CM800DY-24S



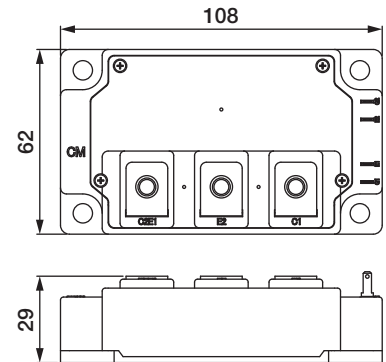
11

CM200DU-12NFH



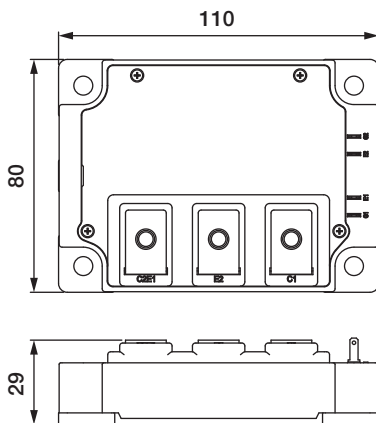
12

CM300,400DU-12NFH



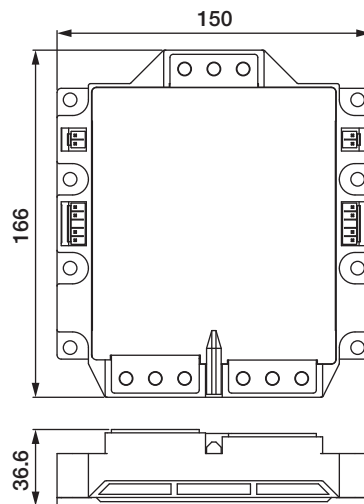
13

CM600DU-12NFH  
CM400,600DU-24TH



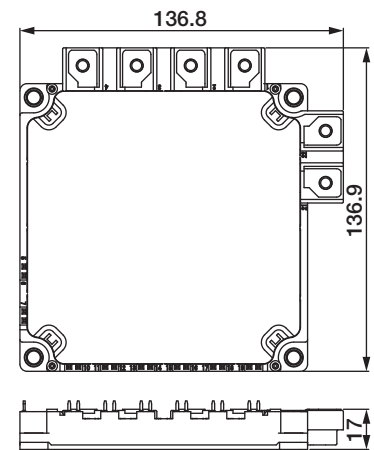
14

CM900,1400DUC-24S



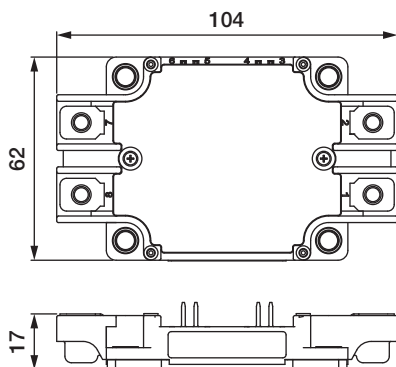
15

CM200RXL-24S



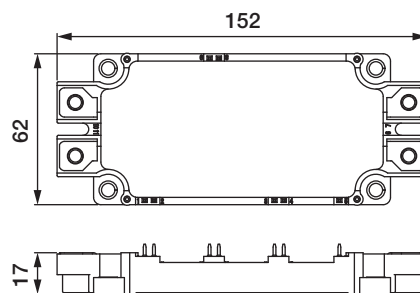
16

CM150EXS-24S  
CM200EXS-24S  
CM300EXS-24S



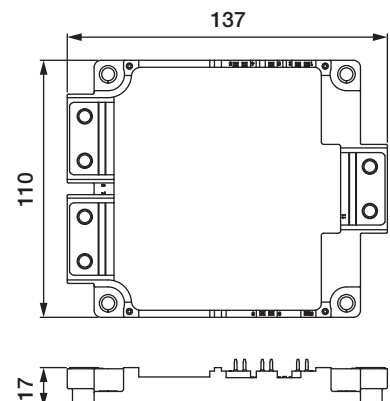
17

CM300,450,600DX-13T  
CM225,300,450,600DX-24T  
CM225,300,450,600,800DX-24T1  
CM225,300,450DX,600DX-34T



18

CM1000DX-24T



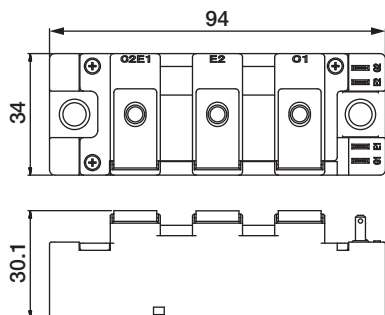
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

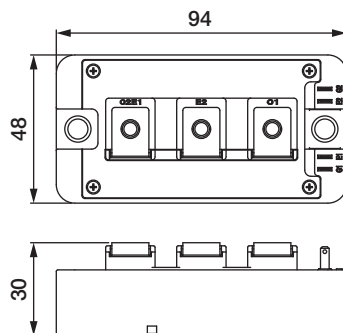
19

CM100,150,200DY-13T  
CM100,150DY-24T  
CM75,100DY-34T



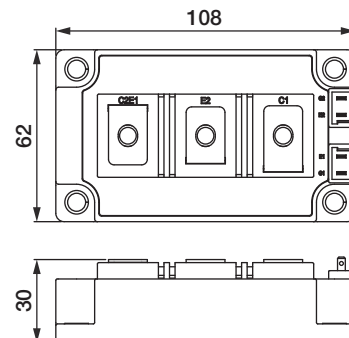
20

CM300,400DY-13T  
CM200,300DY-24T  
CM150,200DY-34T



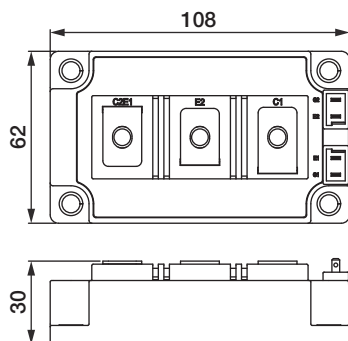
21

CM600DY-13T  
CM450,600DY-24T  
CM450,600C1Y-24T  
CM300,400DY-34T  
CM200DY-40TA  
CM400DY-40TA



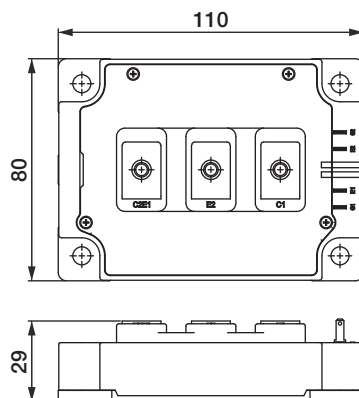
22

RM600,800DY-34S



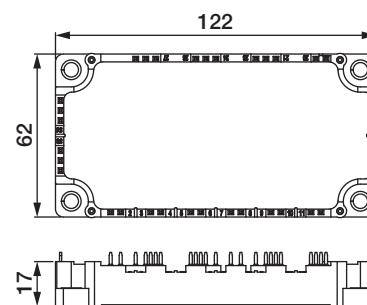
23

CM400DY-40T



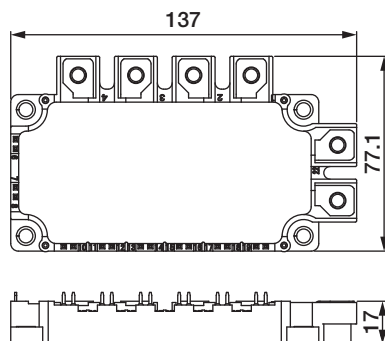
24

CM100,150,200TX-13T  
CM100,150,200TX-24T  
CM100,150TX-34T



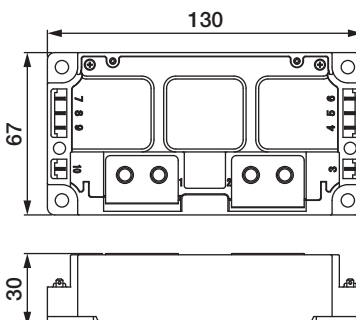
25

CM150,200RX-13T  
CM100,150RX-24T



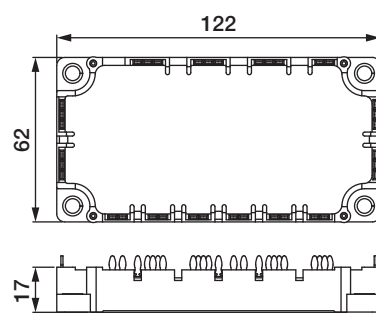
26

CM500C2Y-24S  
CM1400HA-24S  
CM600,800,1000HA-34S  
RM1400HA-24S



27

CM100,150,200XP-13T  
CM100,150,200XP-24T  
CM100,150TXP-34T



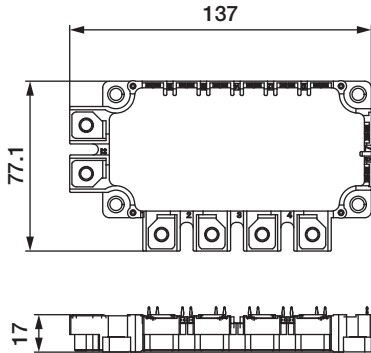
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

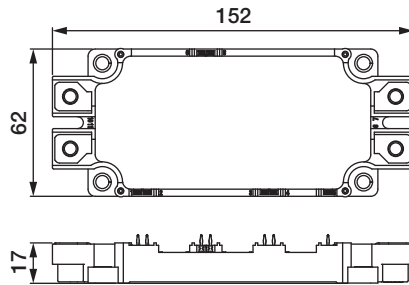
**28**

CM150,200RXP-13T  
CM100,150RXP-24T



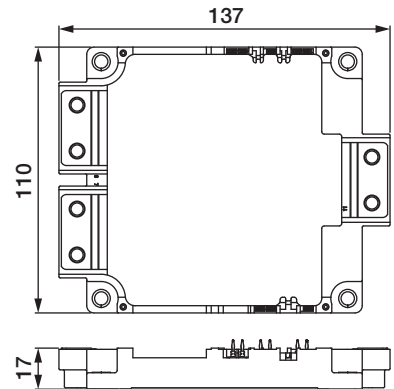
**29**

CM300,450,600DXP-13T  
CM225,300,450,600DXP-24T  
CM225,300,450,600,800DXP-24T1  
CM225,300,450,600DXP-34T



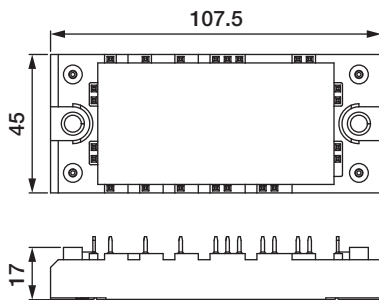
**30**

CM1000DXP-24T



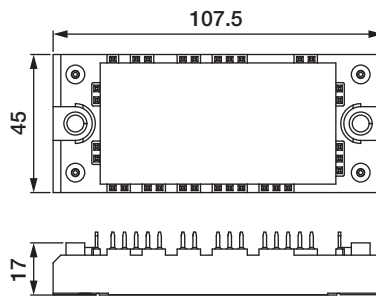
**31**

CM35,50MXUA-24T/24T1



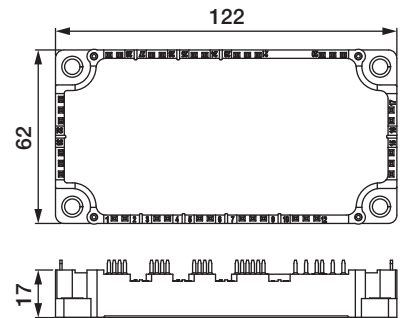
**32**

CM50,75,100MXUB-13T/13T1  
CM75MXUB-24T/24T1



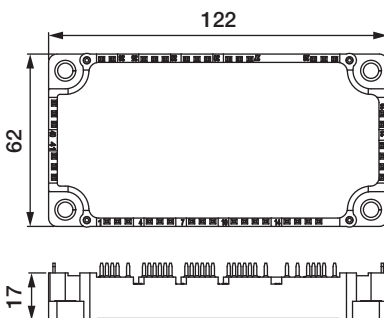
**33**

CM75,100MXUC-24T/24T1



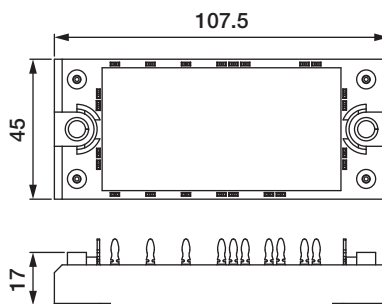
**34**

CM100/150MXUD-13T/T1  
CM150MXUD-24T/T1



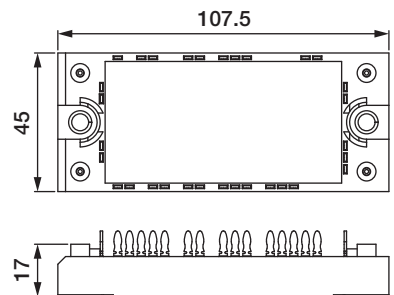
**35**

CM35/50MXUAP-24T/T1



**36**

CM50/75/100MXUBP-13T/T1  
CM75MXUBP-24T/T1



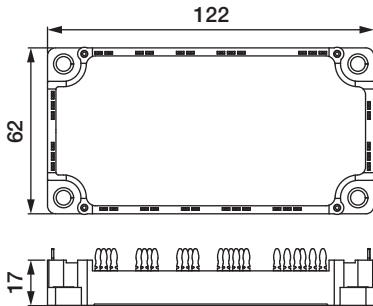
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

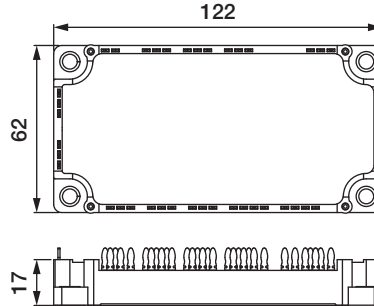
**37**

CM75/100MXUCP-24T/T1



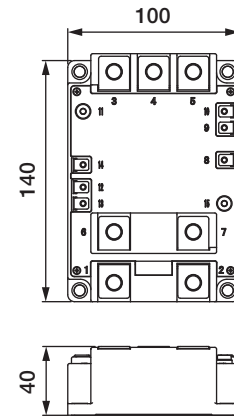
**38**

CM100/150MXUDP-13T/T1  
CM150MXUDP-24T/T1



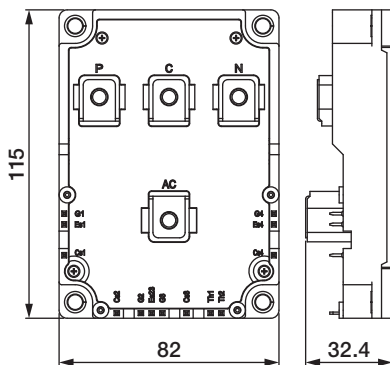
**39**

CM800,1200DW-24T  
CM800,1200DW-34T  
CM800DW-34TA  
CM1200DW-40T








**40**

CM200,400ST-24T





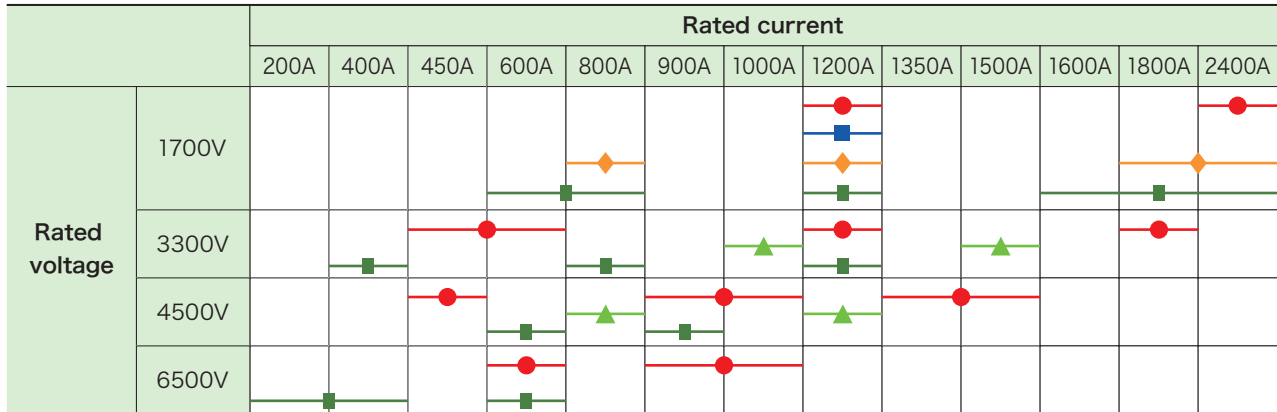
## Package, Main Application

Series	Main Application
X 	Traction/Power transmission/Motion control
R 	
S 	
N 	
H 	

Data sheet here



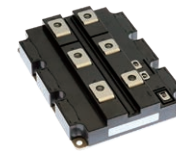
## Rated Lineup



## New Products

### X Series HVIGBT Modules std type

Existing compatible package: standard type contributes to smaller, higher-capacity inverter systems by expanding lineup







<Main Features>

- Power loss reduced by incorporating 7th-generation IGBT and RFC<sup>\*1</sup> diode
- Compared to the existing CM900HC-90H and CM1350HC-90X, the new models' rated output currents are 50% greater but external dimensions are the same.
- Compared to existing CM900HC-90H, new CM900HC-90X, etc. are 33% smaller but achieve the same voltage and current ratings.
- Optimal package internal structure realizes improved heat dissipation, humidity resistance and flame retardance, increasing product life

\*1 RFC : Relaxed field of cathode

### Product lineup

std type	1.7kV	3.3kV	4.5kV	6.5kV
 	2400A	1200A	900A 1000A	600A
 	2400A	1200A 1800A	900A 1350A 1500A	600A 900A 1000A

### X Series HVIGBT Modules dual type

New common frame package: dual type class-leading current density contributes to increased power output in inverter systems





<Main Features>

- Power loss reduced by incorporating 7th-generation IGBT and RFC<sup>\*1</sup> diode
- Industry's highest 3.3kV/600A Si module power density of 8.57A/cm<sup>2</sup><sup>\*2</sup> contributes to increased power output and efficiency
- Terminal layout optimized for easy paralleling and flexible inverter configurations and capacities
- New package structure offers extra reliability

\*2 As of Dec. 17, 2020 based on Mitsubishi Electric research

### Product lineup

LV100	1.7kV	3.3kV	HV100	3.3kV	4.5kV
	1200A	450A 600A		450A 600A	450A

# Lineup of HVIGBT Modules

## Series Matrix of HVIGBT (No.: Number of Outline Drawing, see page 36)

Ic	V <sub>CEs</sub>		1700V												3300V											
	X-Series			S-Series N-Series			H-Series			X-Series			R-Series			H-Series										
	Connection	Type	No.	Connection	Type	No.	Connection	Type	No.	Connection	Type	No.	Connection	Type	No.	Connection	Type	No.								
400A																		CM400HG-66H	H	G	-	06				
450A																		CM450DA-66X	D2	A	07					
																		CM450DE-66X	D2	E	08					
																		CM400HG-66X**	D2	H	09					
600A																		CM600DA-66X	D2	A	07					
																		CM600DE-66X	D2	E	08					
																		CM600E1A-66X	D2	A	07					
800A																		CM800DZB-34N	D1	C2	-					
																		CM800DZ-34H	D1	C2	-					
1000A																		CM1000HC-66R	H	C1	-					
																		CM1000E4C-66R	E4	C1	-					
1200A	CM1200DA-34X	D2	A	07	CM1200HCB-34N	H	C2	-	CM1200HC-34H	H	C2	-	CM1200HC-66X	H	C1	02		CM1200DC-34N	D1	C2	-					
					CM1200DC-34N	H	D1	C2	-				CM1200HCB-66X	H	C1	03		CM1200DC-34S	D1	C2	-					
					CM1200E4C-34N	E4	C2	-				CM1200E4C-66X**	E4	C1	03		CMH1200DC-34S	D1	C2	01						
					CM1200HC-34N	H	C2	-																		
1500A																		CM1500HC-66R	H	C1	-					
1600A																		CM1600HC-34H	H	C2	-					
1800A																		CM1800HC-34N	H	C2	-					
					CM1800HCB-34N	H	C2	-	CM1800HC-34H	H	C2	-	CM1800HC-66X	H	C1	03										
													CM1800HG-66X	H	G	04										
2400A	CM2400HC-34X	H	C1	02	CM2400HC-34N	H	C2	-	CM2400HC-34H	H	C2	03														
	CM2400HCB-34X	H	C1	03	CM2400HCB-34N	H	C2	-																		
Connection																										

[Type]

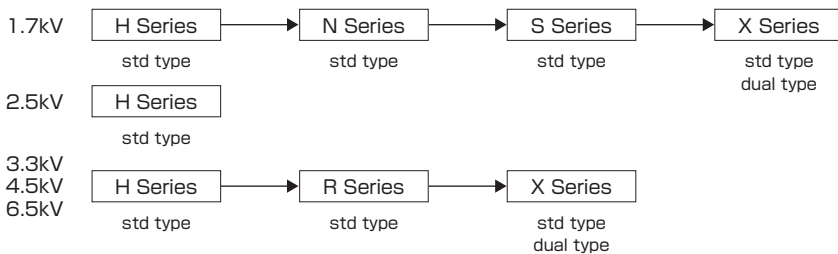
- A: Al base plate 6kV Isolation
- B1: Cu base plate / 6kV Isolation
- B2: Cu base plate / 4kV Isolation
- C1: AlSiC base plate / 6kV Isolation
- C2: AlSiC base plate / 4kV Isolation
- G: AlSiC base plate 10kV Isolation
- E: Al base plate 10kV Isolation

The outline drawing is written the figure of principal part numbers that have a common dimension.

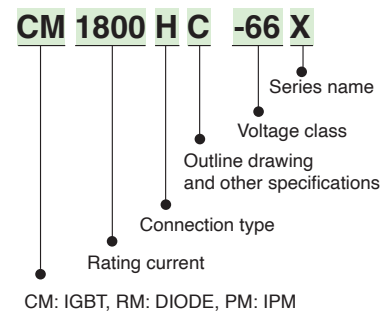
★★: Under development

**Non-recommended** : Please contact to the sales offices.

## Evolution of HVIGBT Module Series



## Type Name Definition of IGBT Modules



# Lineup of HVIGBT Modules

## Series Matrix of HVIGBT (No.: Number of Outline Drawing, see page 36)

I <sub>c</sub> \ V <sub>CES</sub>	4500V												6500V										
	X-Series				R-Series				H-Series				X-Series				H-Series						
	Connection	Type	No.		Connection	Type	No.		Connection	Type	No.		Connection	Type	No.		Connection	Type	No.				
200A																				CM200HG-130H	H	G	-
400A																				CM400HG-130H	H	G	-
																				CM400E2G-130H	E2	G	-
																				CM400E4G-130H	E4	G	-
450A	CM450DE-90X★	D2	E	08																			
600A										CM600HG-90H	H	G	05	CM600HG-130X	H	G	05	CM600HG-130H	H	G			
800A					CM800HC-90R	H	C1	02															
					CM800HG-90R	H	G	05															
900A	CM900HC-90X CM900HG-90X CM900E2G-90X	H H E2	C1 G G	02 05 04						CM900HC-90H CM900HG-90H	H H	C1 G	- -	CM900HG-130X	H	G	04						
1000A	CM1000HG-90X	H	G	05										CM1000HG-130XA	H	G	04						
1200A					CM1200HC-90RA CM1200HG-90R	H H	C1 G	- -															
1350A	CM1350HC-90X CM1350HG-90X	H H	C1 G	03 04																			
1500A	CM1500HC-90XA CM1500HG-90X	H H	C1 G	03 04																			
Connection																							

[Type]

A: Al base plate 6kV Isolation  
 B1: Cu base plate / 6kV Isolation  
 B2: Cu base plate / 4kV Isolation  
 C1: AlSiC base plate / 6kV Isolation  
 C2: AlSiC base plate / 4kV Isolation  
 G: AlSiC base plate 10kV Isolation  
 E: Al base plate 10kV Isolation

The outline drawing is written the figure of principal part numbers that have a common dimension.

★: New product

**Non-recommended**: Please contact to the sales offices.

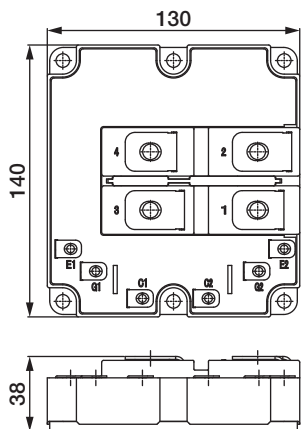
# Lineup of HVIGBT Modules

## Outline Drawing of HVIGBT Modules

Unit:mm

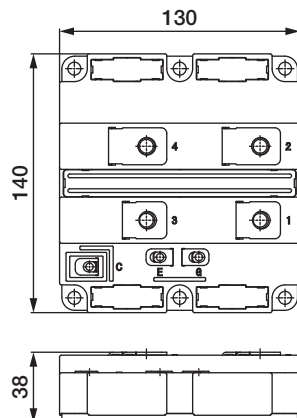
01

CMH1200DC-34S  
CM600DY/E2Y-34H



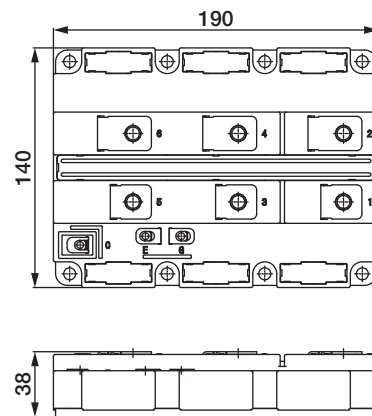
02

CM2400HC-34X  
CM1200HC-66X  
CM900HC-90X  
etc.



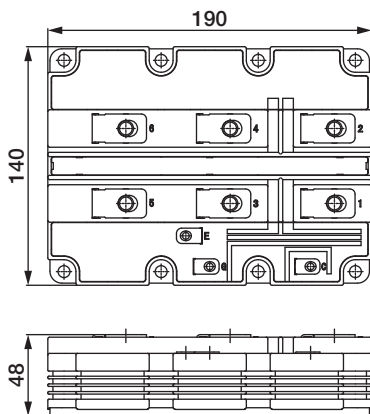
03

CM2400HCB-34X, CM1200HCB-66X,  
CM1800HC-66X, CM1350HC-90X,  
CM1500HC-90XA  
etc.



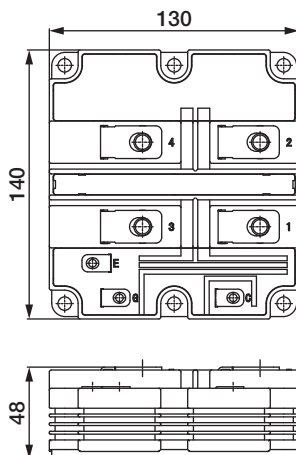
04

CM1800HG-66X, CM900E2G-90X  
CM1350HG-90X, CM1500HG-90X  
CM900HG-130X, CM1000HG-130XA  
etc.



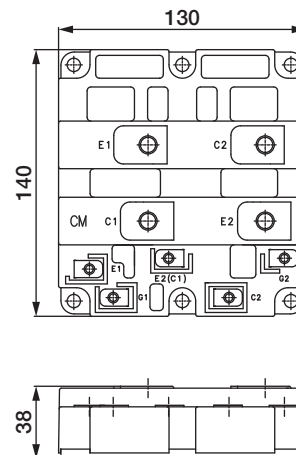
05

CM900, 1000HG-90X  
CM800HG-90R  
CM600HG-90H/130X



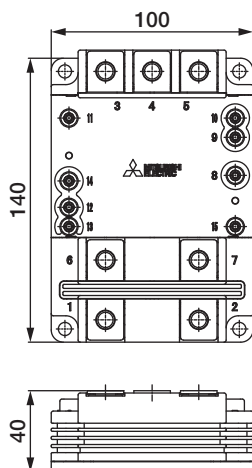
06

CM400DY-66H



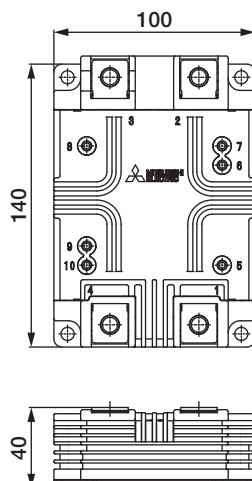
07

CM1200DA-34X  
CM450DA-66X, CM600DA-66X,  
CM600E1A-66X



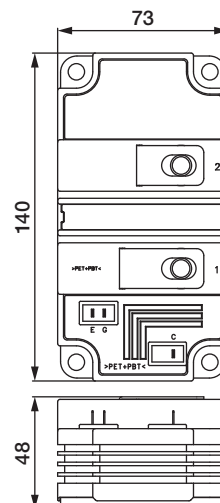
08

CM450DE-66X, CM600DE-66X  
CM450DE-90X




09

CM400HG-66X



## Series, Main Application

Series	Main Application
HV DIODE Modules 	Traction/Power transmission/Motion control

Data sheet here



## Rated Lineup

		Rated current											
		300A	400A	450A	600A	750A	800A	900A	1000A	1200A	1500A	1800A	
Rated voltage	1700V												
	3300V												
	4500V												
	6500V												

## Series Matrix of HV DIODE Modules (No.: Number of outline drawing, see page 38)

V <sub>PRM</sub> I <sub>F</sub>	1700V				3300V				4500V				6500V			
	Connection	Type	No.		Connection	Type	No.		Connection	Type	No.		Connection	Type	No.	
300A													RM300DG-130X	D	G	10
400A					RM400DG-66S RM400DY-66S	D D	G B	- -								
450A									RM450DG-90X	D	G	10	RM450DG-130X	D	G	10
600A					RM600DY-66S RM600DC-66X	D D	B C	- 11					RM600DG-130S RM600DG-130X	D D	G G	10 10
750A									RM750DC-90X**	D	C	11				
800A									RM800DG-90F	D	G	10				
900A									RM900HC-90S RM900DB-90S RM900DG-90X	H D D	C B G	- 11 10				
1000A					RM1000DC-66F	D	C	-					RM1000DG-130XA	D	G	10
1200A	RM1200DB-34S	D	B	-	RM1200DG-66S RM1200HE-66S RM1200DB-66S RM1200DC-66X RM1200DG-66X	D H D D D	G C B C G	- - - 11 10	RM1200DG-90F	D	G	10				
1500A					RM1500HE-66F RM1500DC-66F	H D	C C	- -	RM1500DG-90X	D	G	10				
1800A	RM1800HE-34S	H	C	-												



[Type]

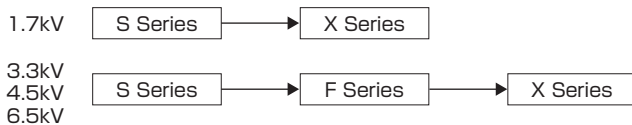
B: Cu base plate 6kV Isolation  
C: AISiC base plate 6kV Isolation  
G: AISiC base plate 10kV Isolation

★★: Under development

The outline drawing is written the figure of principal part numbers that have a common dimension.

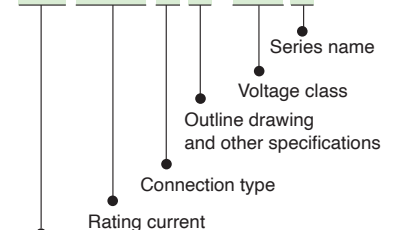
**Non-recommended** : Please contact to the sales offices.

## Evolution of HV DIODE Module Series



## Type Name Definition of IGBT Modules

**RM 1200 D G -66 X**



CM: IGBT, RM: DIODE, PM: IPM

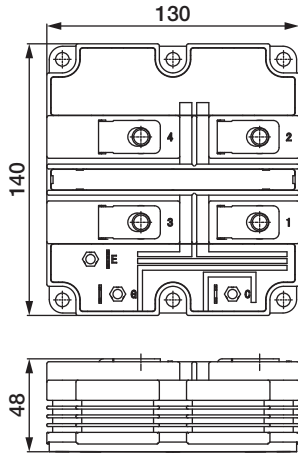
# Lineup of HVDIODE Modules

## Outline Drawing of HVDIODE Modules

Unit:mm

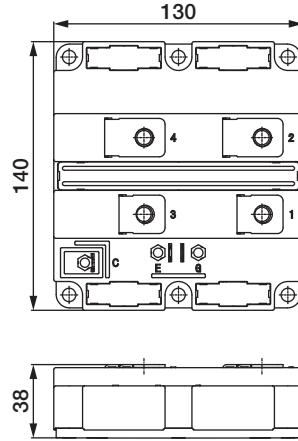
10

RM1200DG-66X  
RM450/900/1500DG-90X  
RM300/450/600DG-130X  
RM1000DG-130XA  
etc.



11

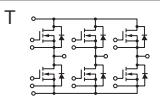
RM600DC-66X, RM1200DC-66X  
RM750DC-90X  
RM1000/1500DC-66F  
RM400/600DY-66S  
RM1200DB-66S, RM900DB-90S



# Lineup of MOSFET Modules

## Series Matrix of MOSFET Modules

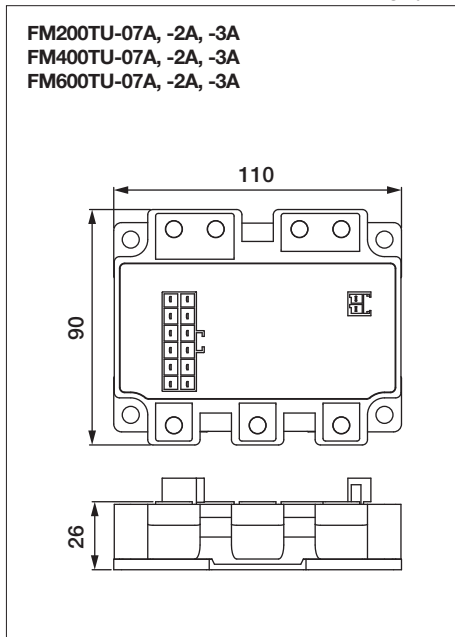
RoHS directive (2011/65/EU, (EU)2015/863) compliant

$V_{DS}$ $I_D$	75V		100V		150V	
		Connection		Connection		Connection
100A	FM200TU-07A	T	FM200TU-2A	T	FM200TU-3A	T
200A	FM400TU-07A	T	FM400TU-2A	T	FM400TU-3A	T
300A	FM600TU-07A	T	FM600TU-2A	T	FM600TU-3A	T
Connection						

## Outline Drawing of MOSFET Modules

Unit: mm

[Data sheet here](#)





# Power Modules for xEV

## Series, Main Application

Series	Main Application
J1	xEV

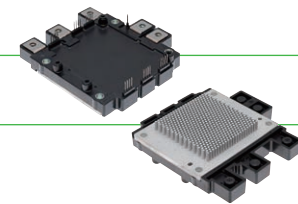
## Rated Lineup

		Rated current	
		600A	700A
Rated voltage	650V	●	

\* 700A product has an optional specification with an insert nut embedded in the board mounting boss. Please contact us if necessary.



## Featured Products



Package with 6-in-1 connection and integrated water-cooled fin contributes to more compact, high-power

### J1 Series power Modules for xEV

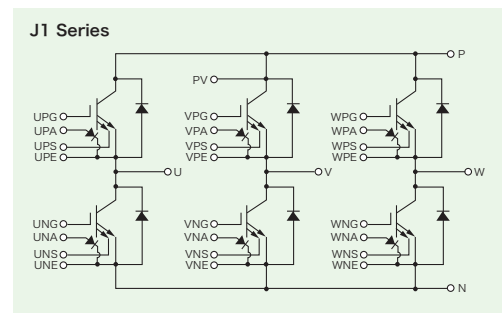
CT600C1A060-A, CT700CJ1A060-A

#### <Main Features>

- Integrated direct water-cooling structure with cooling fins and 6-in-1 connection contribute to more compact inverters for xEV
- Direct lead bonding (DLB) structure ensures high reliability
- Loss further reduced by incorporating 7th-generation IGBT built with a CSTBT™ structure
- On-chip current sensor that enables high-speed current-cutoff protection is installed
- Completely lead-free, confirms to RoHS directive (2011/65/EU)
- Suitable for a variety of electric and hybrid vehicle inverters

\*CSTBT: Mitsubishi Electric's unique IGBT that utilizes the carrier cumulative effect.

### Block Diagram



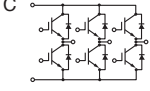
### Features

#### Common

- Long power/temperature cycle life
- High-precision on-chip temperature sensor
- High traceability in managing materials/components for each product throughout the entire production process
- Package structure compliant with the End-of-Life-Vehicles Directive, regulations relating to substances of environmental concern

# Power Modules for xEV

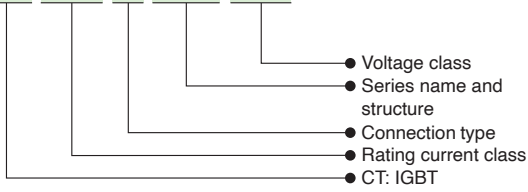
## Matrix of 650V Power Modules

V <sub>CES</sub>	650V		
Series	J1 Series		
I <sub>c</sub>	Power Module with pin fin	Connection	No.
600A	CT600CJ1A060-A	C	01
700A	CT700CJ1A060-A	C	01
Connection			

\* 700A product has an optional specification with an insert nut embedded in the board mounting boss. Please contact us if necessary.

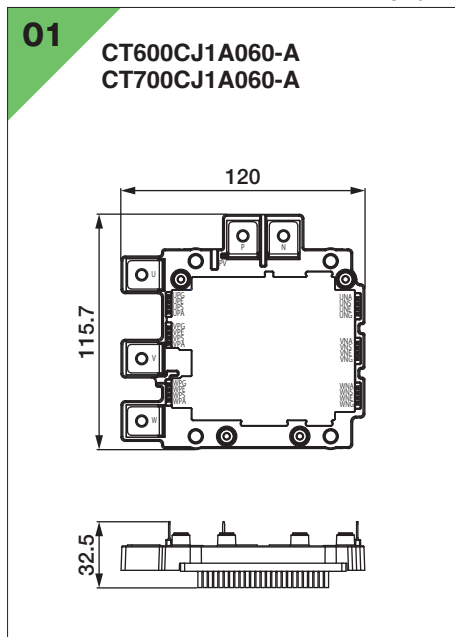
## Type Name Definition of Power Modules for xEV

**CT 600 C J1A 060**



## Outline Drawing of Power Modules for xEV

Unit:mm





## Mitsubishi Electric Power Devices Website

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



### Keep safety first in your circuit designs!

- Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

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