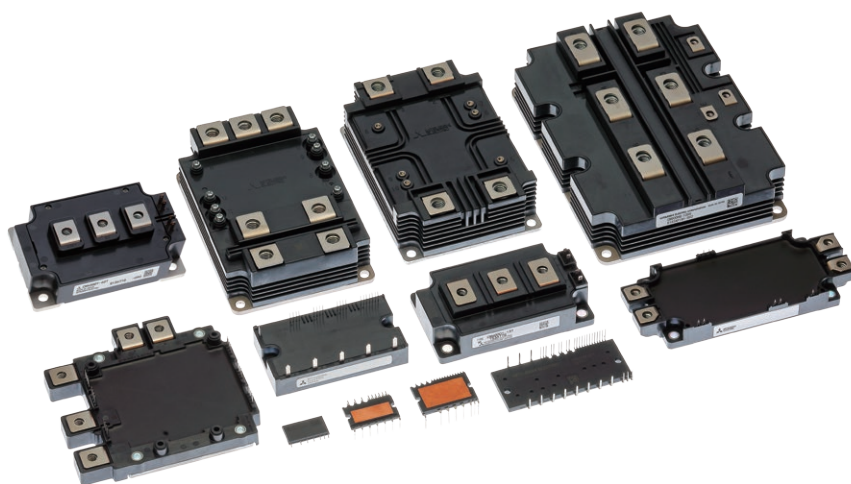
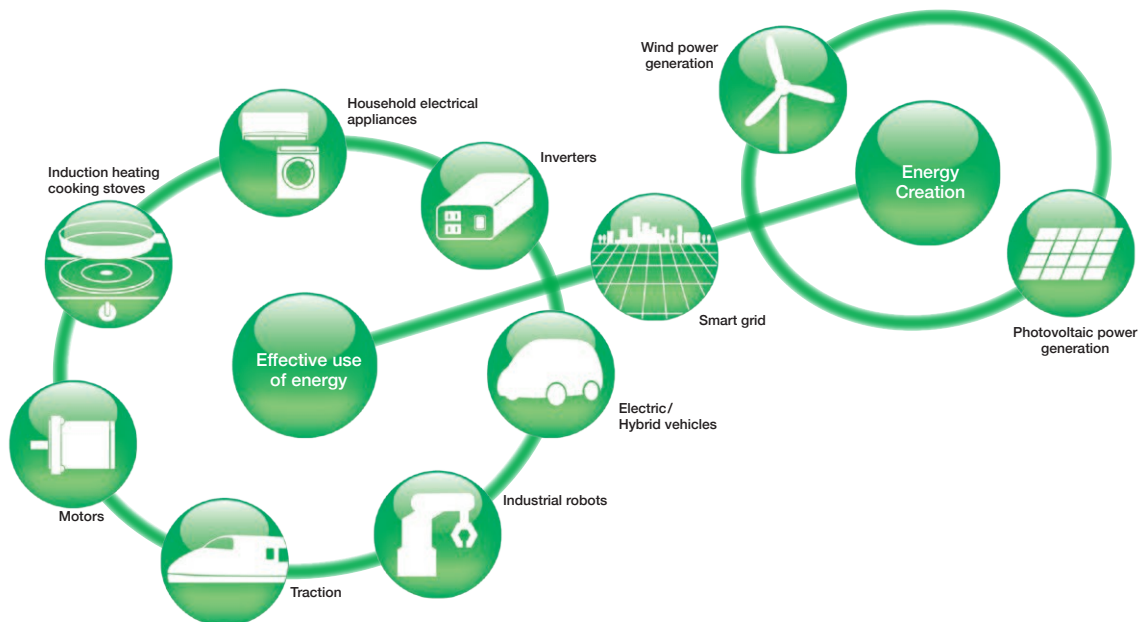




POWER DEVICES

# 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	Discrete Diode	Discrete MOSFET				
SiC Power Modules	5-11	✓ (Hybrid)	✓	✓	✓	✓			600V	15A-30A	 Home Appliance Industrial equipment Traction
									1200V	75A-1200A	
									1700V	300A,1200A	
									3300V	185A-750A	
SOIPM	12		✓						600V	2A	 Home Appliance
DIIPM	12-17		✓						600V	5A-75A	 Home Appliance
									1200V	5A-100A	
IPM	18-21		✓						600V	75A	 Industrial equipment
									650V	50A-450A	
									1200V	25A-450A	
IGBT Modules	22-31	✓							600V	200A-600A	 Industrial equipment
									650V	50A-600A	
									1200V	35A-1400A	
									1700V	75A-1200A	
									2000V	200A-1200A	
HVIGBT Modules	32-34	✓							1700V	600A-2400A	 Traction High Power
									3300V	400A-1800A	
									4500V	450A-1500A	
									6500V	600A-1000A	
HVDIODE Modules	35-36								3300V	600A-1200A	 Traction High Power
									4500V	450A-1500A	
									6500V	300A-1000A	
MOSFET Modules	37			✓					75V	100A-300A	 Industrial equipment
									100V		
									150V		
Power Modules for xEV*1	38-39	✓							650V	300A-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

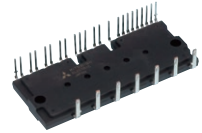
February 2014  
Developed EV motor drive system with built-in SiC inverter



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

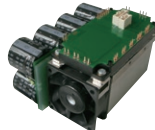
Developed various elemental technologies

## 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

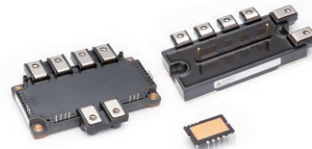
March 2012  
Developed motor system with built-in SiC inverter



September 2012  
Verified built-in main circuit system for railcars



July 2012  
Began shipping samples of hybrid SiC



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



Development of these modules and applications has been partially supported by Japan's Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO).

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

# 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

## 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

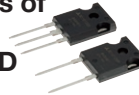
January 2015  
Launched power conditioner for PV equipped with full SiC-IPM\*2



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

## 2016

### April 2016 Launched Super mini Full SiC DIPIPM



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



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



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



\*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	4in1	Commercially available	6
		FMF400BX-24B		400			
		FMF400BXZ-24B		400			
		RMF400DU-24B		400	2in1(Diode)		
		FMF400DY-24B		400	2in1		
		FMF600DXZ-24B		600			
		FMF800DX-24B		800			
		FMF800DXZ-24B		800			
		FMF1200DXZ-24B		1200			
		FMF300DXZ-34B		1700	300		
	FMF300E3XZ-34B	300					
	Full SiC-IPM	PMF75CGA120	1200	75	6in1	Under development	
		PMF75CGAL120					
Hybrid SiC Power Modules for High-frequency Switching Applications	CMH100DY-24NFH	1200	100	2in1	Commercially available	7	
	CMH150DY-24NFH						150
	CMH200DU-24NFH						200
	CMH300DU-24NFH						300
	CMH400DU-24NFH						400
	CMH600DU-24NFH						600
	CMH400HC6-24NFM			400			1in1
Traction inverter HVDC system	Full SiC Power Modules	FMF185DC-66A	3300	185	2in1	Commercially available	8
		FMF375DC-66A		375			
		FMF750DC-66A		750			
		FMF750DC-66A-1		750			
	Hybrid SiC Power Modules	CMH600DC-66X	3300	600			
		CMH1200DC-34S	1700	1200			
Home appliances	Ful SiC Super mini DIPIPM	PSF15S92F6-A6	600	15	6in1		9
		PSF25S92F6-A6		25			
	Ful SiC Super mini DIPPFM	PSF30L92A6-A	600	30			

# SiC Power Modules



## 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

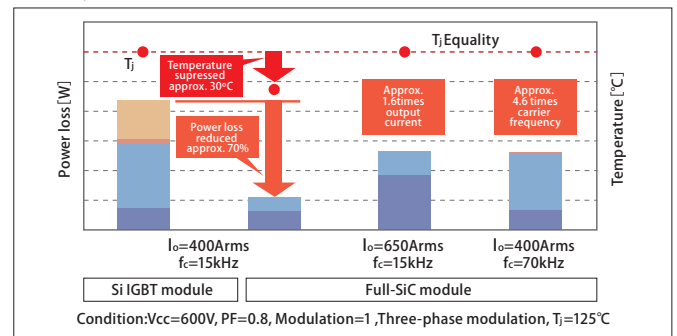
Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMF400BX-24B	1200V	400A	4 in 1	92.3x121.7mm
RMF400DU-24B			2in1(Diode)	80x110mm
FMF400DY-24B			2 in 1	62x108mm
FMF800DX-24B				92.3x121.7mm
		800A		



#### ■ Power loss comparison

1200V/800A Full SiC Power module

FWD\_SW Tr\_SW  
FWD\_DC Tr\_DC



## 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

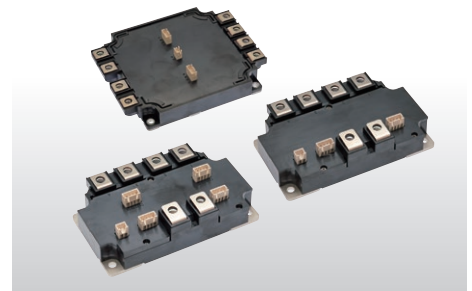
#### ■ Features

- 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. 70% compared to the conventional product\*
- Low- inductance package adopted to deliver full SiC performance

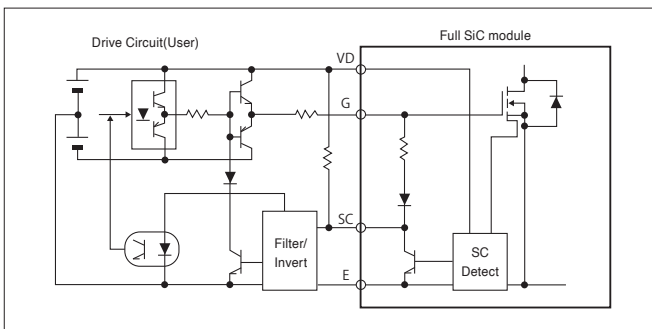
\*Comparison with the same rated value of the conventional 7th Gen. IGBT modules

#### ■ 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	
FMF600DXZ-24B		600A	2 in 1	
FMF800DXZ-24B		800A	2 in 1	
FMF1200DXZ-24B	1200A	2 in 1	152x122mm	
FMF300DXZ-34B	1700V	300A	2 in 1	79.6x122mm
FMF300E3XZ-34B		300A	2 in 1(Chopper)	



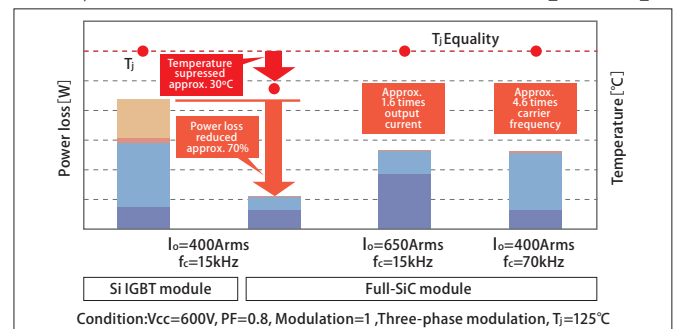
#### ■ Protection circuit diagram



#### ■ Power loss comparison

1200V/800A Full SiC Power module

FWD\_SW Tr\_SW  
FWD\_DC Tr\_DC





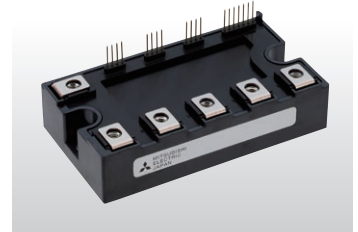
## 1200V/75A Full SiC-IPM for Industrial Equipment PMF75CGA120/PMF75CGAL120 Under development

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

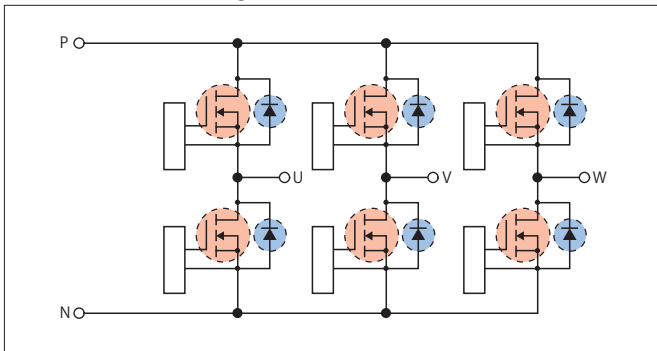
- Realized high performance and low power loss by 2nd. generation SiC-MOSFET and SiC-SBD with current sense and temperature sense
- External size is reduced approx.30% with the conventional Silicon IPM products\* of the same rating.
- Available to drive it by the equivalent I/F and power supply circuit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

\* Conventional product: Mitsubishi Electric G1 Series PM75CG1B120



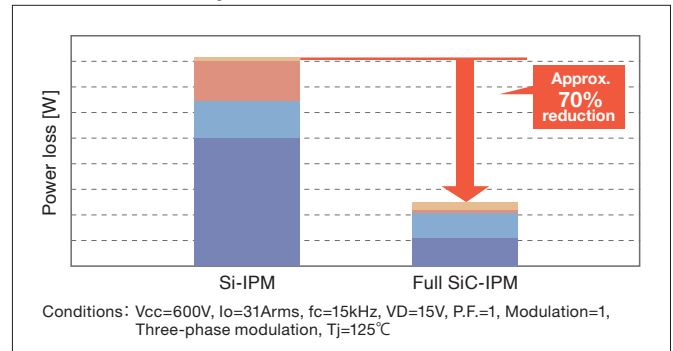
### ■ Internal circuit diagram

● :SiC-MOSFET ● : SiC-SBD



### ■ Power loss comparison

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



## 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\*

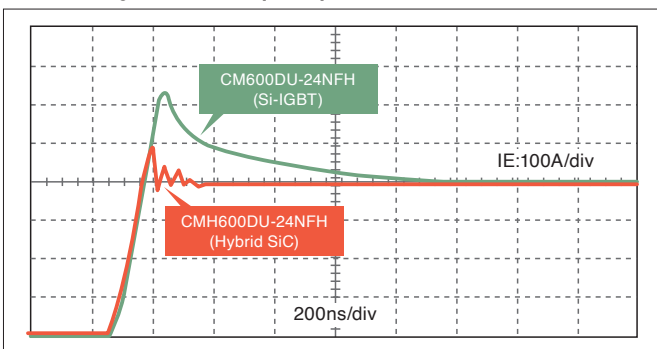
\* Conventional product: Mitsubishi Electric NFH Series IGBT Modules

### ■ 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

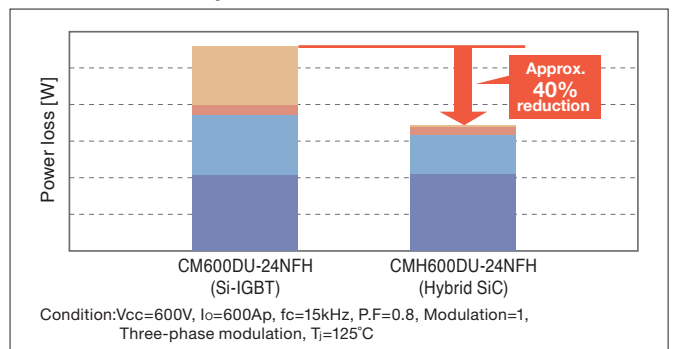


### ■ Recovery waveform (FWD)



### ■ Power loss comparison

■ FWD\_SW ■ Tr\_SW  
■ FWD\_DC ■ Tr\_DC





# SiC Power Modules



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

FMF185DC-66A / FMF375DC-66A  
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

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

\* Si product: Mitsubishi Electric HVIGBT, CM600DC-66X

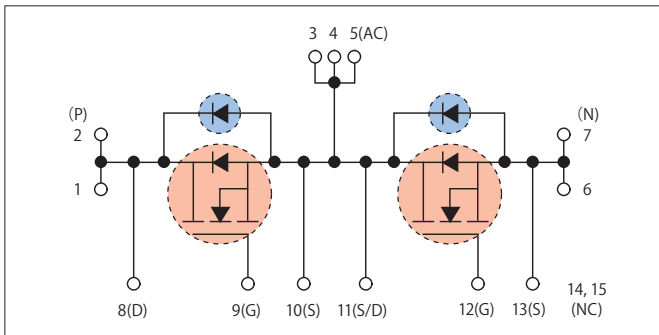
### Product lineup

	Model	Rated Voltage	Rated Current	Circuit configuration	External size (D x W)
Full SiC	FMF185DC-66A*	3300V	185A	2 in 1	100 x 140 mm
	FMF375DC-66A		375A		
	FMF750DC-66A		750A		
	FMF750DC-66A-1(*)		750A		
Hybrid SiC	CMH600DC-66X		600A		

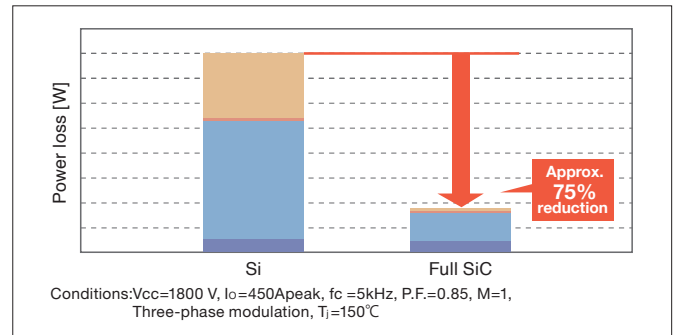
(\*) Thermistor-equipped ★ New Product



### Internal circuit diagram (e.g. Full SiC)



### Power loss comparison



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



## 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\*

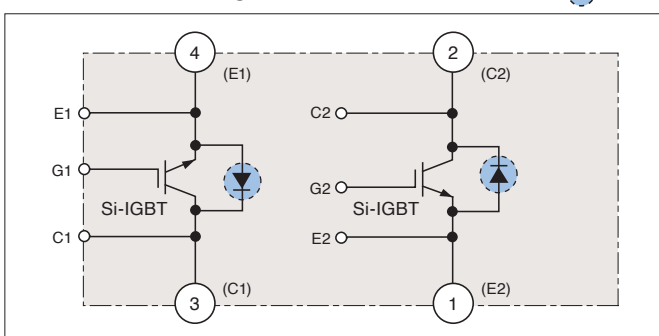
\* Conventional product: Mitsubishi Electric Power Module CM1200DC-34N

### Main specifications

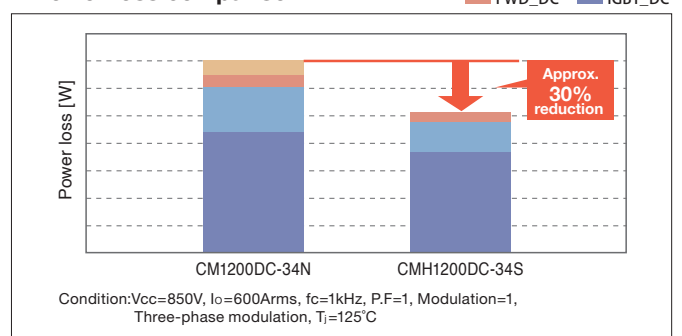
Module	Max. operating temperature		150°C
		Isolation voltage	
Si-IGBT @ 150°C	Collector-emitter saturation voltage		2.3V
	Switching loss 850V/1200V	turn-on	140mJ
		turn-off	390mJ
SiC-SBD @ 150°C	Emitter-collector voltage		2.3V
	Capacitive charge		9.0μC



### Internal circuit diagram



### Power loss comparison



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



## 600V/15A,25A Full SiC Super mini DIIPM™ for Home Appliances

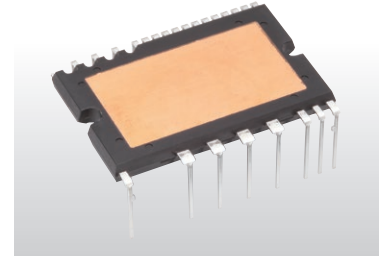
PSF15S92F6-A6/PSF25S92F6-A6 Commercially available

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

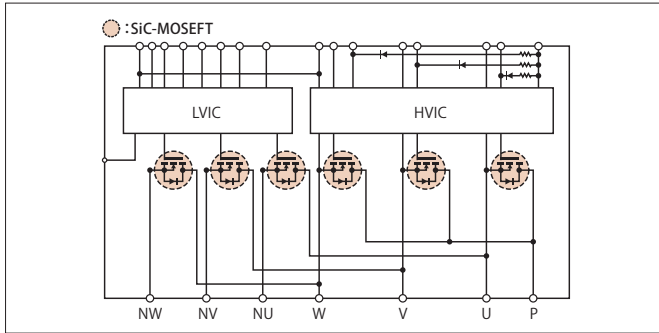
### ■ Features

- 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 Vth SiC-MOSFET technology
- As package and pin layout compatibility with conventional products\* is ensured, simply replace with this product to improve performance

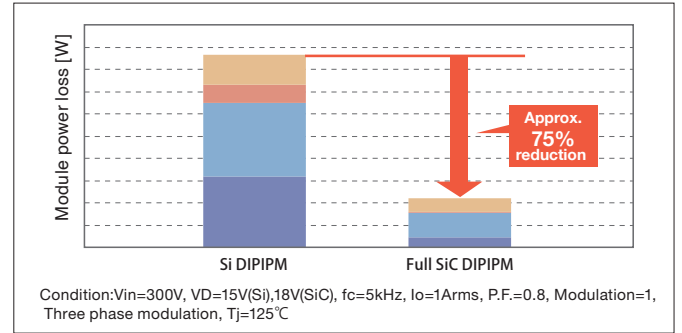
\*Conventional product: Mitsubishi Electric Super mini DIIPM Series



### ■ Internal block diagram



### ■ Power loss comparison



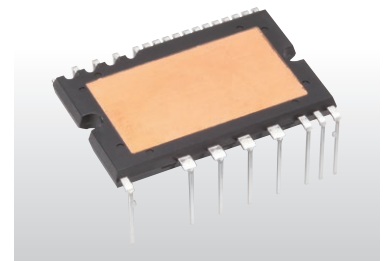
## Full SiC Super mini DIPPFCTM for Home Appliances

PSF30L92A6-A Commercially available

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

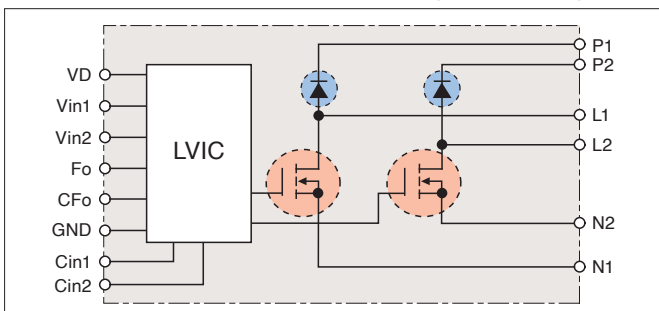
### ■ Features

- 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 DIIPM to eliminate the need for a spacer between the inverter and heat sink, and to facilitate its implementation

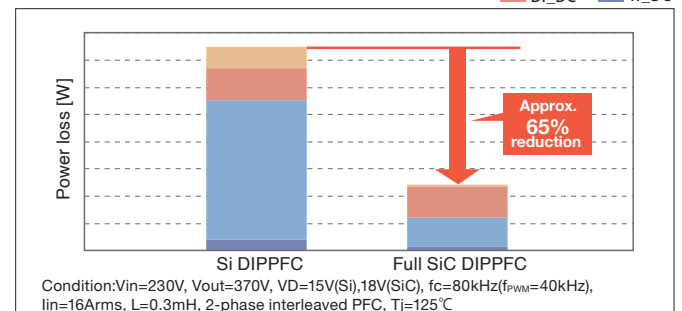


### ■ Internal block diagram (PSF30L92A6-A)

● SiC-MOSFET ● SiC-SBD



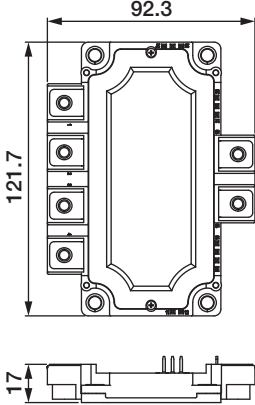
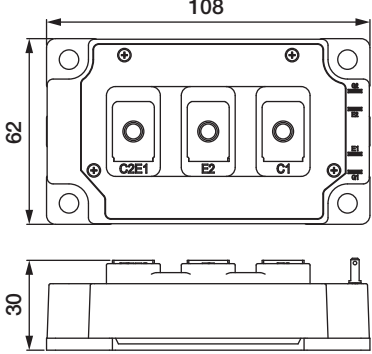
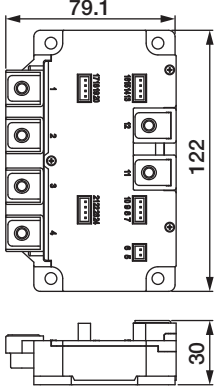
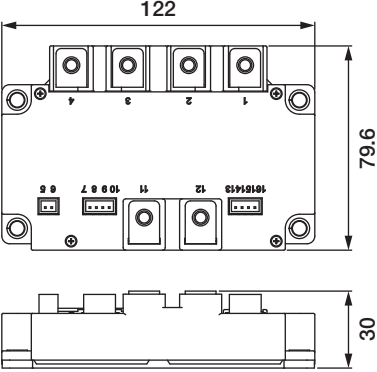
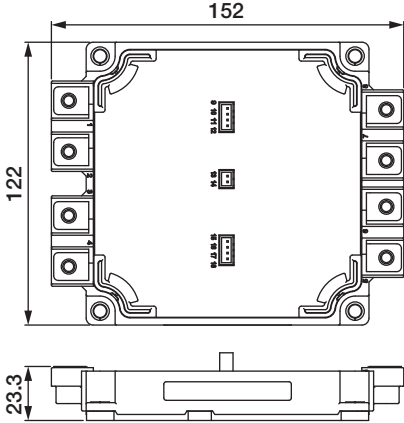
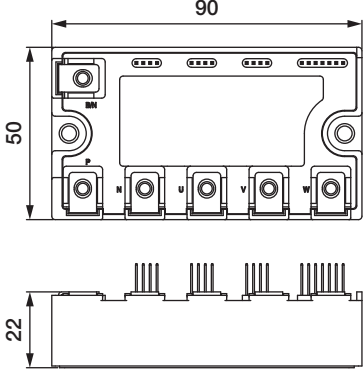
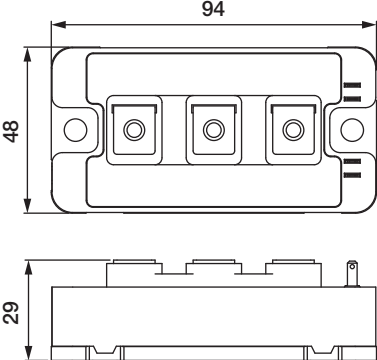
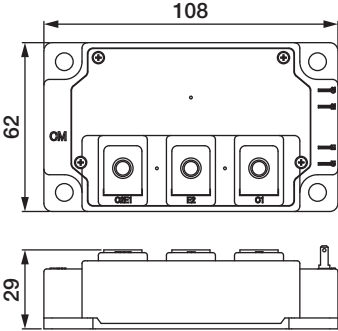
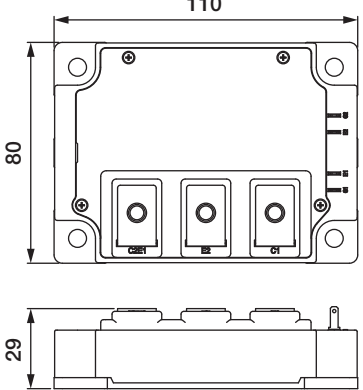
### ■ Power loss comparison



# SiC Power Modules

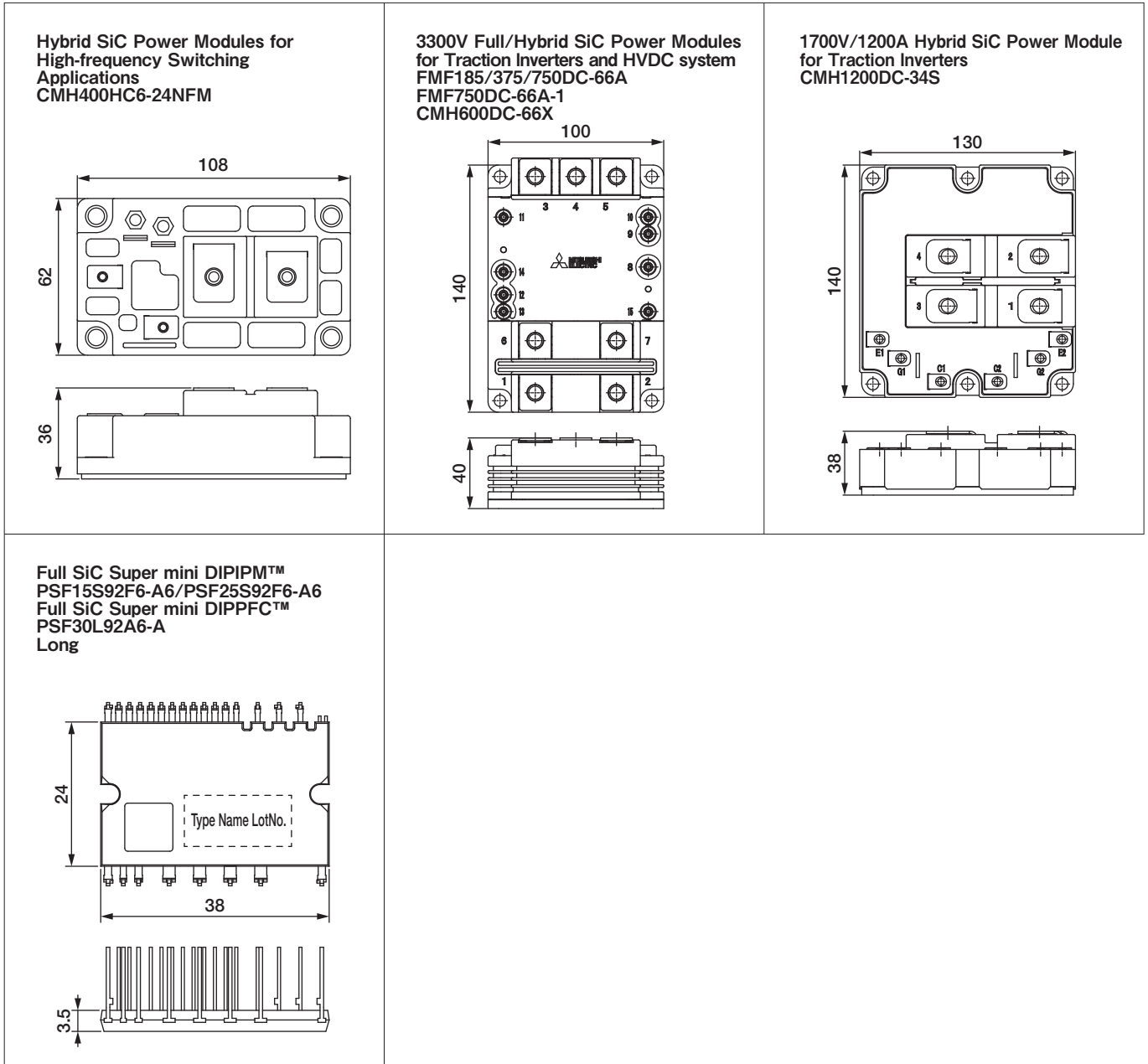
## Outline Drawing of SiC Power Modules

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 FMF600DXZ-24B/FMF800DXZ-24B FMF300DXZ-34B/FMF300E3XZ-34B</p> 	<p>Full SiC Power Modules for Industrial Equipment FMF1200DXZ-24B</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> 	<p>Hybrid SiC Power Modules for High-frequency Switching Applications CMH400DU-24NFH CMH600DU-24NFH Full SiC Power Modules for Industrial Equipment RMF400DU-24B</p> 

## 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

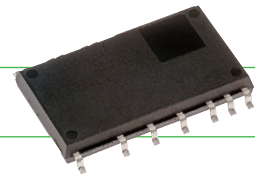


## Rated Lineup

		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

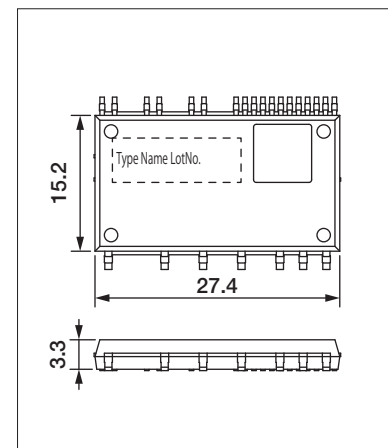
**A small surface mount package IPM enables easy system design by enough insulation distance and protection function for fan and low-power motor drive applications**

#### <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 Vor, IL	Surface mount package

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



## Featured Products

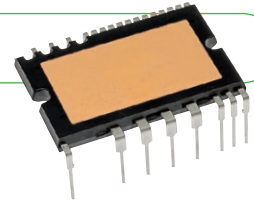
New design with expanded operating temperature range and lower noise contributes to easier system design and reduction in system cost

### Super Mini DIIPM Ver.7

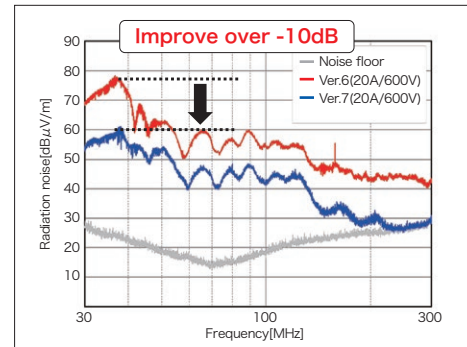
<Main Features>

- 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>

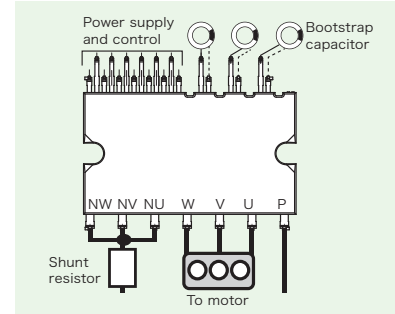
- RC-IGBT\*1 incorporated, reducing package size 30% compared to Super mini DIIPM
- Maximum case temperature expanded to 115°C, increasing the operating temperature range and leading to easier system design temperature range and leading to easier system design
- Additional terminals for floating supply 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

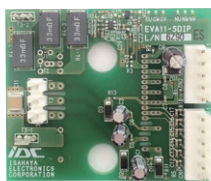
Type name	Main application
SLIMDIP-S	Fan, refrigerator
SLIMDIP-M	Fan, washing machine
SLIMDIP-L	Air conditioner
SLIMDIP-W	Washing machine, Fan
SLIMDIP-X	Air conditioner
SLIMDIP-Z	Air conditioner

### Wiring example

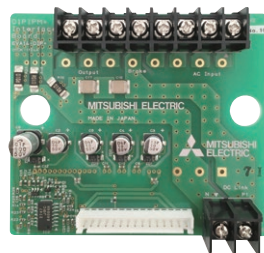


## Customer Support

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



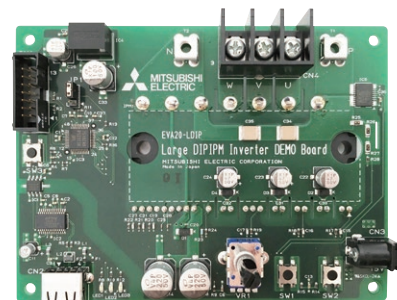
For Super mini DIIPM  
EVA11-SDIP



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.

# Lineup of DIIPM™

## Series Matrix of 600V DIIPM

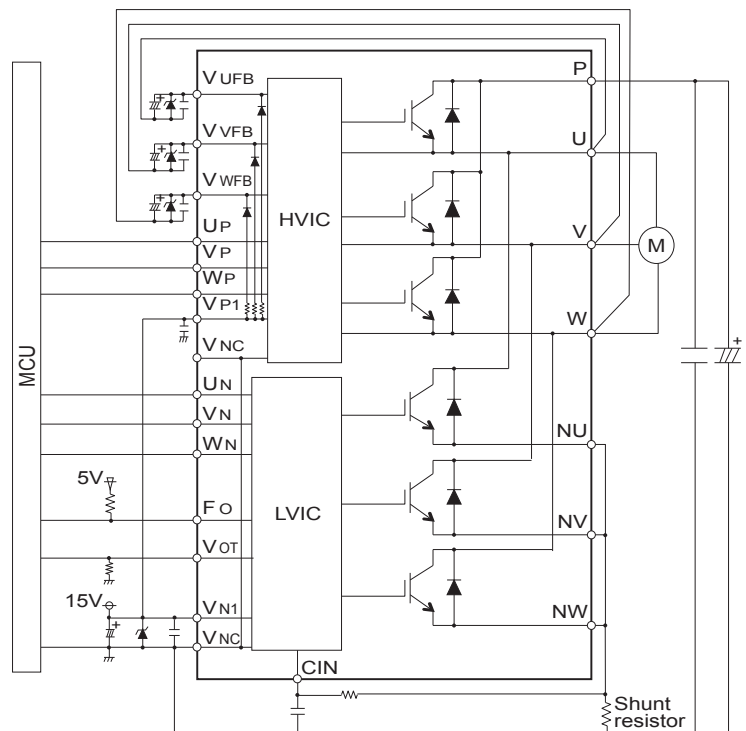
V <sub>CES</sub>		600V						
I <sub>c</sub>	Series	SLIMDIP	Super mini		Mini		Large	DIIPM+
			Ver.7	Ver.6	Ver.7	—	Ver.6	CIB/CI
5A	SLIMDIP-S			PSS05S92F6-AG PSS05S92E6-AG		PSS05S51F6		
10A	SLIMDIP-M			PSS10S92F6-AG PSS10S92E6-AG		PSS10S51F6		
15A	SLIMDIP-L SLIMDIP-W	PSS15S93F6-AG PSS15S93E6-AG	PSS15S92F6-AG 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	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	P-side/ N-side/ Brake
	SC	N-side	N-side	N-side	N-side	N-side	N-side with sense	N-side
	OT	N-side	N-side*1	N-side*1	—	—	—	—
	VOT	N-side	N-side*1	N-side*1	N-side	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(3/5V)	High(5V)
	Emitter pin of N-side	Open	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)	N-side (UV,SC)
	Insulation voltage	2000Vrms*2	1500Vrms*2	1500Vrms*2	2500Vrms	2500Vrms	2500Vrms	2500Vrms
	Insulation structure	Insulation sheet	Insulation sheet	Insulation sheet	Insulation sheet	Molding resin*4/Insulation sheet	Insulation sheet	Insulation sheet
	RoHS directive*6	Compliant	Compliant	Compliant	Compliant	Compliant*3	Compliant	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  
 UV: Power 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

## Application circuit of super mini DIIPM



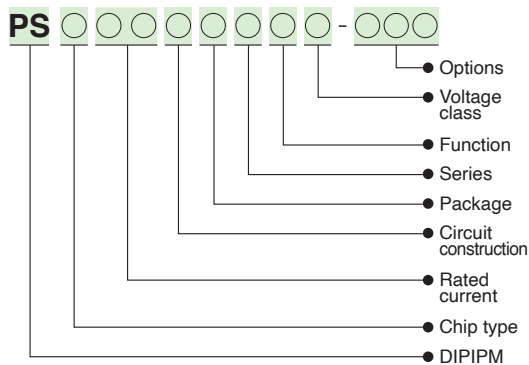
## Series Matrix of 1200V DIIPM

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		
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	—	—	—	—	—

[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  
 VOT: 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





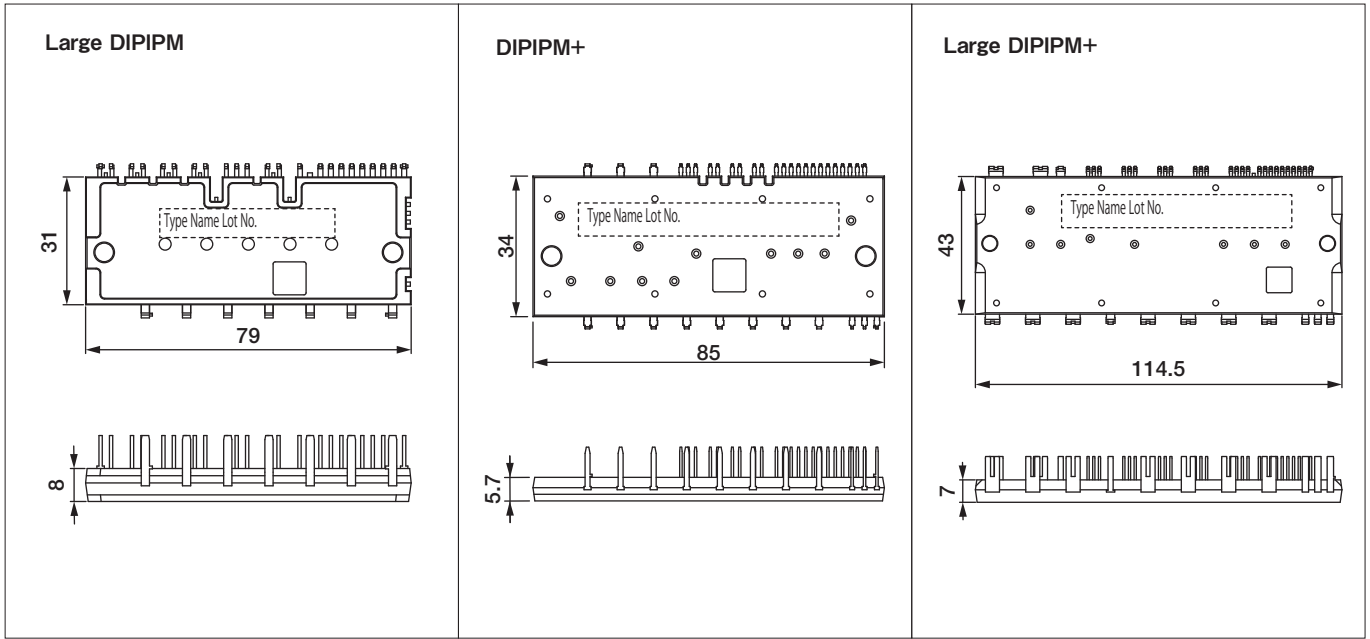
■ Outline Drawing of DIIPM

Unit:mm



<p><b>SLIMDIP Normal</b></p>	<p><b>SLIMDIP Short</b></p>	
<p><b>Super mini DIIPM Ver.6 Long</b></p>	<p><b>Super mini DIIPM Ver.7 Long</b></p>	
<p><b>Mini DIIPM (PSSxxS51F6)</b></p>	<p><b>Mini DIIPM(PSSxxS51F6) Control side of Zigzag</b></p>	<p><b>Mini DIIPM (PSSxxS7xF6) 1200V Mini DIIPM Ver.7 1200V Mini DIIPM</b></p>

## ■ Outline Drawing of DIIPM

Unit:mm













## Series , Main Application

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

Data sheet here



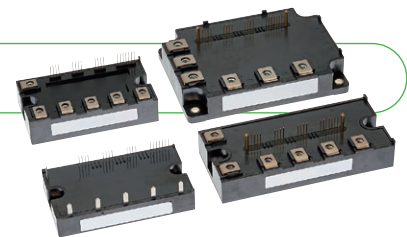
## Rated Lineup

		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

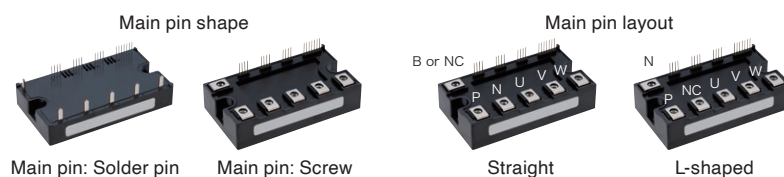
\*3 Conventional product: IPM L1-Series

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 21)


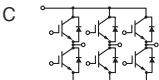
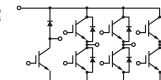
Vces		650V					
Ic	Series	G1 Series		V1 Series		Connection	No.
50A		PM50CG1A065	C	06			
		PM50RG1A065	R	06			
		PM50CG1B065	C	04			
		PM50RG1B065	R	04			
		PM50CG1AL065	C	06			
		PM50CG1AP065	C	03			
		PM50CG1APL065	C	03			
75A		PM75CG1A065	C	06			
		PM75RG1A065	R	06			
		PM75CG1B065	C	04			
		PM75RG1B065	R	04			
		PM75CG1AL065	C	06			
		PM75CG1AP065	C	03			
		PM75CG1APL065	C	03			
100A		PM100CG1A065	C	06			
		PM100CG1B065	C	04			
		PM100RG1B065	R	04			
		PM100CG1AL065	C	06			
		PM100CG1AP065	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			
400A		PM300RG1C065	R	05			
450A		PM450CG1C065	C	05			
450A		PM450RG1C065	R	05			
600A					PM400DV1A060	D	01
800A					PM600DV1A060	D	01
					PM800DV1B060	D	02
IGBT chip		CSTBT*1 Emitter sensor installed Temperature sensor installed			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*3	Compliant			Compliant			
Compatibility	-			V Series			
Connection							

[Notes] \*1: Full-gate CSTBT™ \*2: PCM (Plugged Cell Merged) CSTBT™  
\*3: RoHS directive (2011/65/EU and (EU) 2015/863)

[Term] 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 21)

V <sub>CEs</sub>		1200V					
I <sub>c</sub>	Series	G1 Series		V1 Series			
			Connection	No.		Connection	No.
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 Emitter sensor installed Temperature sensor installed			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 <sup>4)</sup>		Compliant			Compliant		
Compatibility		—			V Series		
Connection		  					

[Notes] \* 1: Full-gate CSTBT™ \* 2: PCM (Plugged Cell Merged) CSTBT™  
\* 3: 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

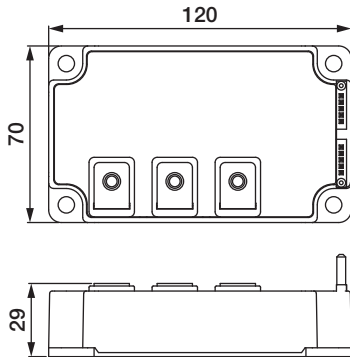
# Lineup of IPM

## Outline Drawing of IPM

Unit:mm

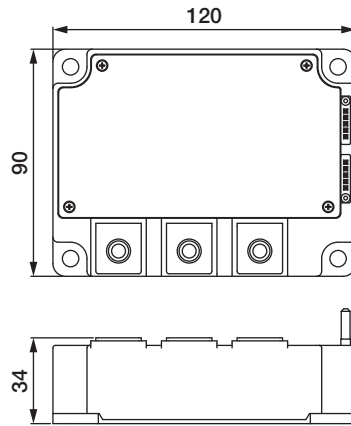
**01**

PM400,600DV1A060  
PM200,300,450DV1A120



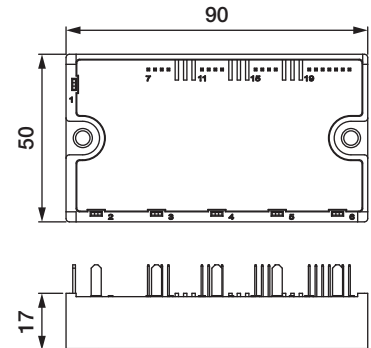
**02**

PM800DV1B060



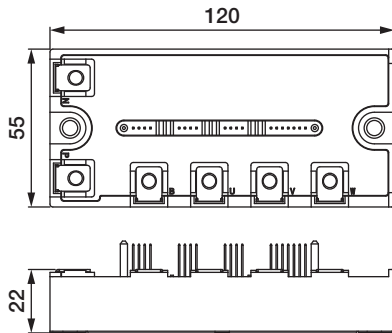
**03**

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



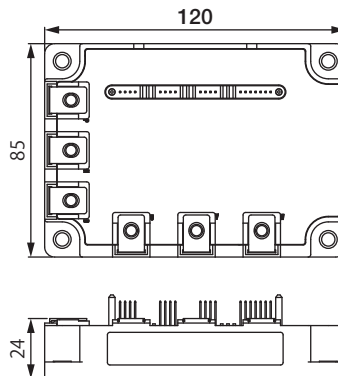
**04**

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



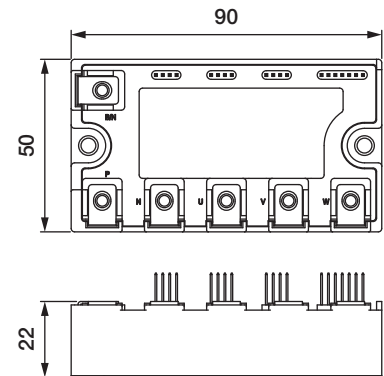
**05**

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








**06**

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



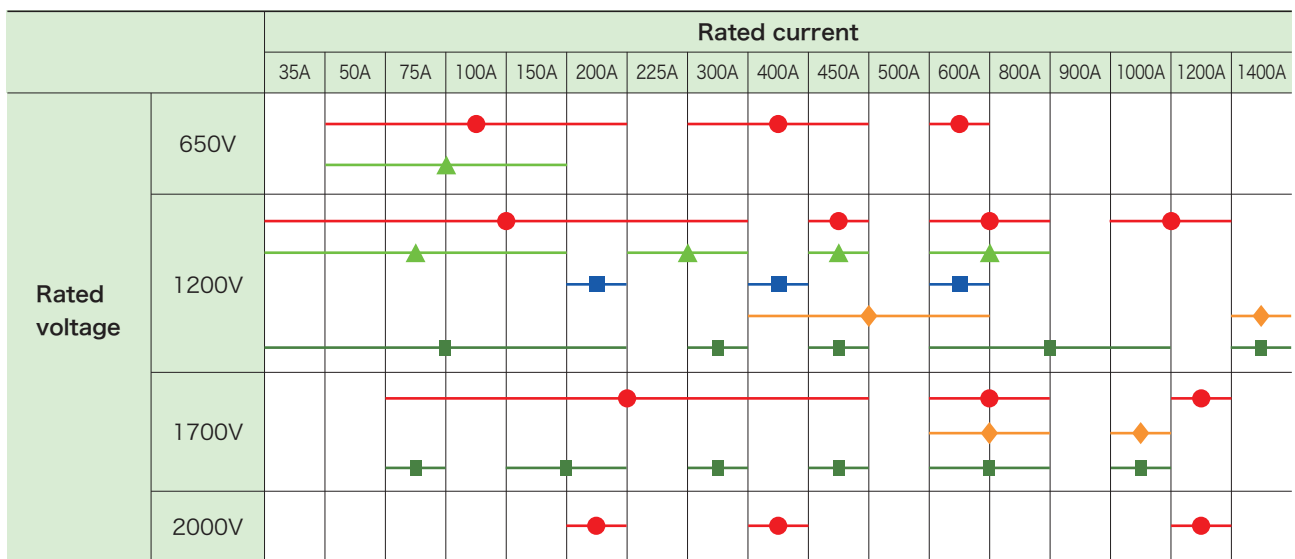
## Series , Main Application

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

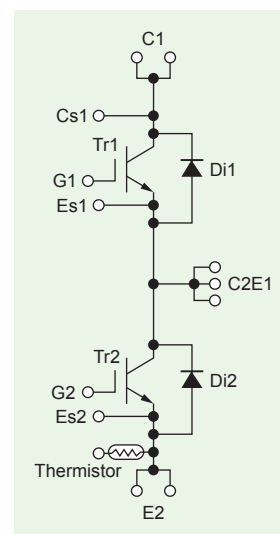
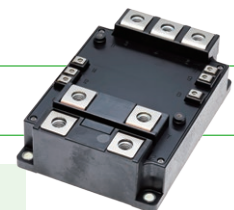
1200A/2000V

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

800A/1200V, 1200A/1200V

<Main Features>

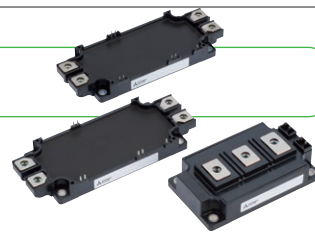
- Next generation high capacity standard package for industrial use
- Improved ease of use by applying low impedance package
- Reducing the switching loss and optimal for the applications that are used in 1 to 5KHz
- Isolation voltage 4kV





## 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

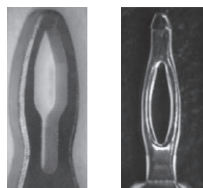
\*1 PC-TIM: Phase change - thermal interface material

\*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

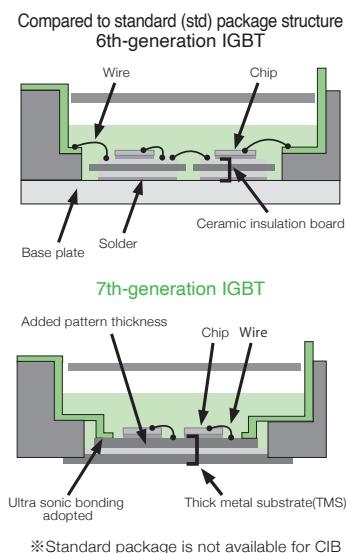
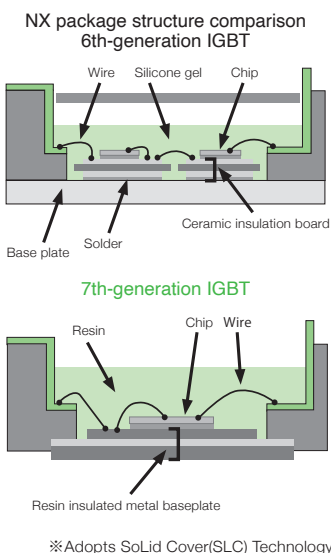
#### ■ Press-fit pin



① Main pin

② Signal pin

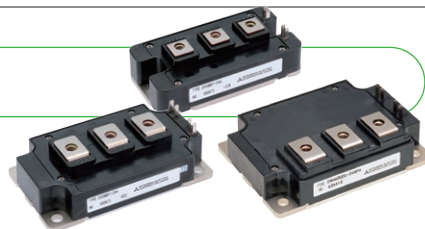
#### ■ New structure realizes improved reliability (improved thermal cycle lifetime)



## 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



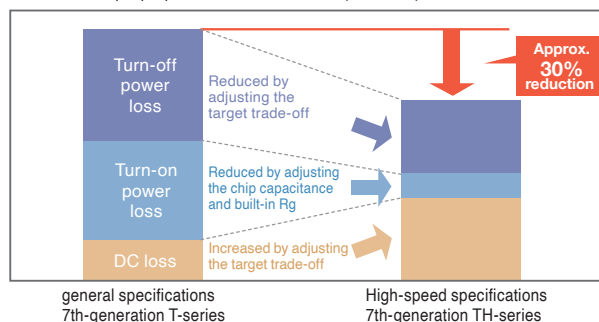
80 x 110mm  
1200V/400A,600A  
• CM400DU-24TH  
• CM600DU-24TH

#### ■ 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 27 to 31)

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

V <sub>CEs</sub>	650V						600V			
	Series	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										

Matrix of Power Modules for 3-level Inverter (No.: Number of outline drawing, see page 27 to 31)

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

V <sub>CEs</sub> /V <sub>RRM</sub>	1200 V IGBT Module			1700 V IGBT Module			1200 V Diode Module			1700 V Diode Module		
I <sub>c</sub> /I <sub>F</sub>	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.
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												

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

★: New Product

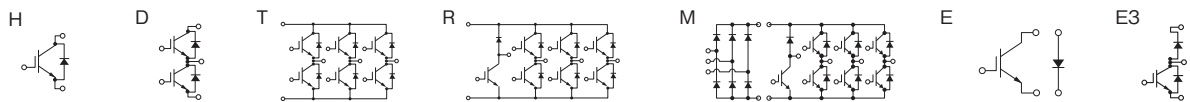
# Lineup of IGBT Modules

## Matrix of IGBT Modules 1200V (No.: Number of Outline Drawing, see page 27 to 31)

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

V <sub>CE</sub> S		1200V																				
Series	T-Series LV100 Type			T/T1-Series NX Type			T-Series std Type			TH-Series			S-Series NX Type			S-Series std Type <sup>*2</sup>			S-Series MPD Type <sup>*2</sup>			
	I <sub>C</sub>	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.			
35A				CM35MXUA-24T CM35MXUA-24T1 CM35MXUAP-24T CM35MXUAP-24T1	M M M M	31 31 35 35								CM35MXA-24S	M	03						
50A				CM50MXUA-24T CM50MXUA-24T1 CM50MXUAP-24T CM50MXUAP-24T1	M M M M	31 31 35 35								CM50MXA-24S	M	03						
75A				CM75MXUB-24T CM75MXUB-24T1 CM75MXUBP-24T CM75MXUBP-24T1 CM75MXUC-24T CM75MXUC-24T1 CM75MXUCP-24T CM75MXUCP-24T1	M M M M M M M M	32 32 36 36 33 33 37 37								CM75MXA-24S CM75TX-24S CM75RX-24S	M T R	03 04 01						
100A				CM100TX-24T CM100TXP-24T CM100RX-24T CM100RX-24T CM100MXUC-24T CM100MXUC-24T1 CM100MXUCP-24T CM100MXUCP-24T1	T T R R M M M M	24 27 25 28 33 33 37 37	CM100DY-24T	D	19					CM100MXA-24S	M	03						
150A				CM150TX-24T CM150TXP-24T CM150RX-24T CM150RX-24T CM150MXUD-24T CM150MXUD-24T1 CM150MXUDP-24T CM150MXUDP-24T1	T T R R M M M M	24 27 25 28 34 34 38 38	CM150DY-24T	D	19					CM150DX-24S CM150EXS-24S	D E	02 16						
200A				CM200TX-24T CM200TXP-24T	T T	24 27	CM200DY-24T	D	20	CM200DY-24TH	D	06		CM200EXS-24S CM200RXL-24S CM200DX-24S	E R D	16 15 02						
225A				CM225DX-24T CM225DXP-24T CM225DX-24T1 CM225DXP-24T1	D D D D	17 29 17 29																
300A				CM300DX-24T CM300DXP-24T CM300DX-24T1 CM300DXP-24T1	D D D D	17 29 17 29	CM300DY-24T	D	20					CM300EXS-24S	E	16	CM300DY-24S	D	07			
400A										CM400DY-24TH CM400DU-24TH	D D	08 13										
450A				CM450DX-24T CM450DXP-24T CM450DX-24T1 CM450DXP-24T1	D D D D	17 29 17 29	CM450DY-24T	D	21								CM450DY-24S	D	09			
600A				CM600DX-24T CM600DXP-24T CM600DX-24T1 CM600DXP-24T1	D D D D	17 29 17 29	CM600DY-24T	D	21	CM600DU-24TH	D	13	CM600DXL-24S	D	05	CM600DY-24S	D	09				
800A	CM800DW-24T	D	39	CM800DX-24T1 CM800DXP-24T1	D D	17 29											CM800DY-24S	D	10			
900A																				CM900DUC-24S	D	14
1000A				CM1000DX-24T CM1000DXP-24T	D D	18 30							CM1000DXL-24S	D	05							
1200A	CM1200DW-24T	D	39																			
1400A																	CM1400HA-24S	H	26	CM1400DUC-24S	D	14

Connection



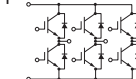
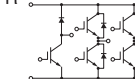
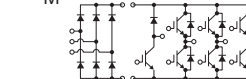



\* 1: A-Series have model name ending with A, NF-Series have model name ending with NF/NFH  
 \* 2: std Type have model name "CM\*\*DY/HA-24S, MPD Type have model name "CM\*\*DUC-24S"

# Lineup of IGBT Modules


## Matrix of IGBT Modules 1700V (No.: Number of Outline Drawing, see page 27 to 31)

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

V <sub>CES</sub>		1700V											
Series	T-Series LV100 Type			T-Series NX Type			T-Series std Type			S-Series std Type			
	I <sub>C</sub>	Connection	No.	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 27 to 31)

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

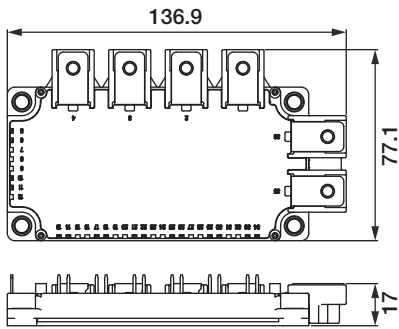
V <sub>CES</sub>		2000V					
Series	T-Series LV100 Type			T-Series std Type			
	I <sub>C</sub>	Connection	No.	Connection	No.	No.	
200A				CM200DY-40TA	D	21	
400A				CM400DY-40T CM400DY-40TA	D D	23 21	
1200A	CM1200DW-40T	D	39				
Connection		D 					

# Lineup of IGBT Modules

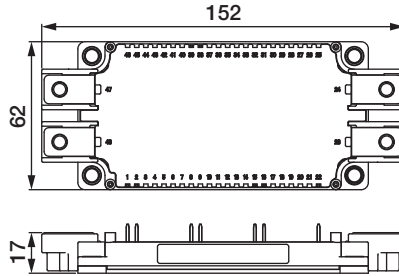
## Outline Drawing of IGBT Modules

Unit:mm

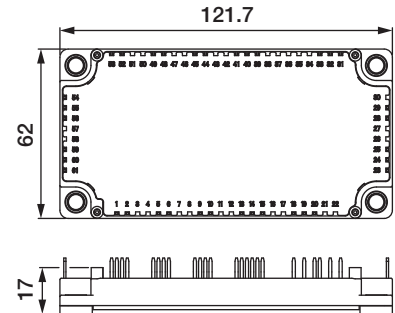
**01** CM75RX-24S



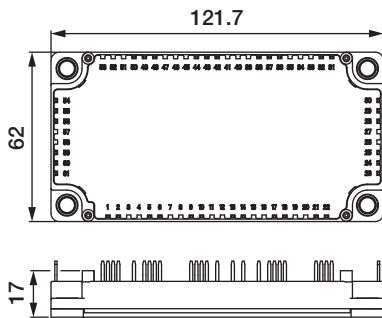
**02** CM150,200DX-24S



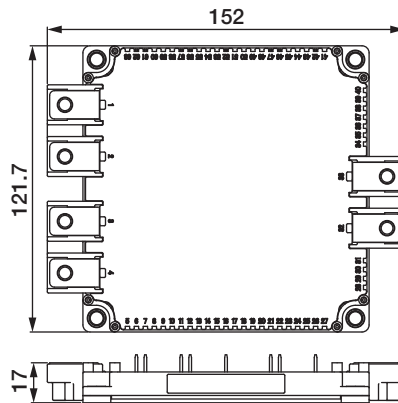
**03** CM35,50,75,100MXA-24S



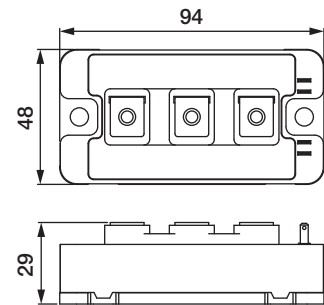
**04** CM75TX-24S



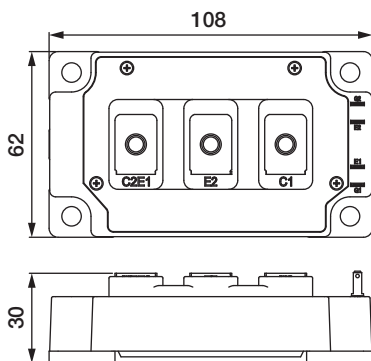
**05** CM600,1000DXL-24S



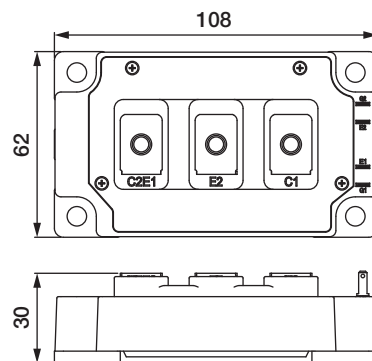
**06** CM200DY-24TH



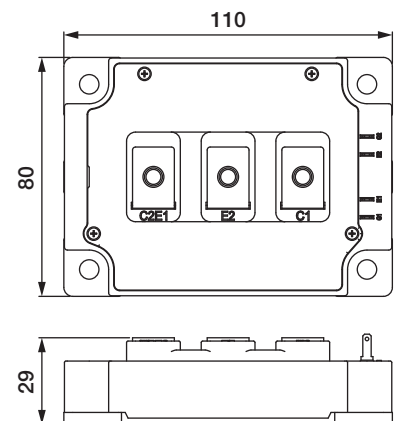
**07** CM300DY-24S



**08** CM400DY-24TH



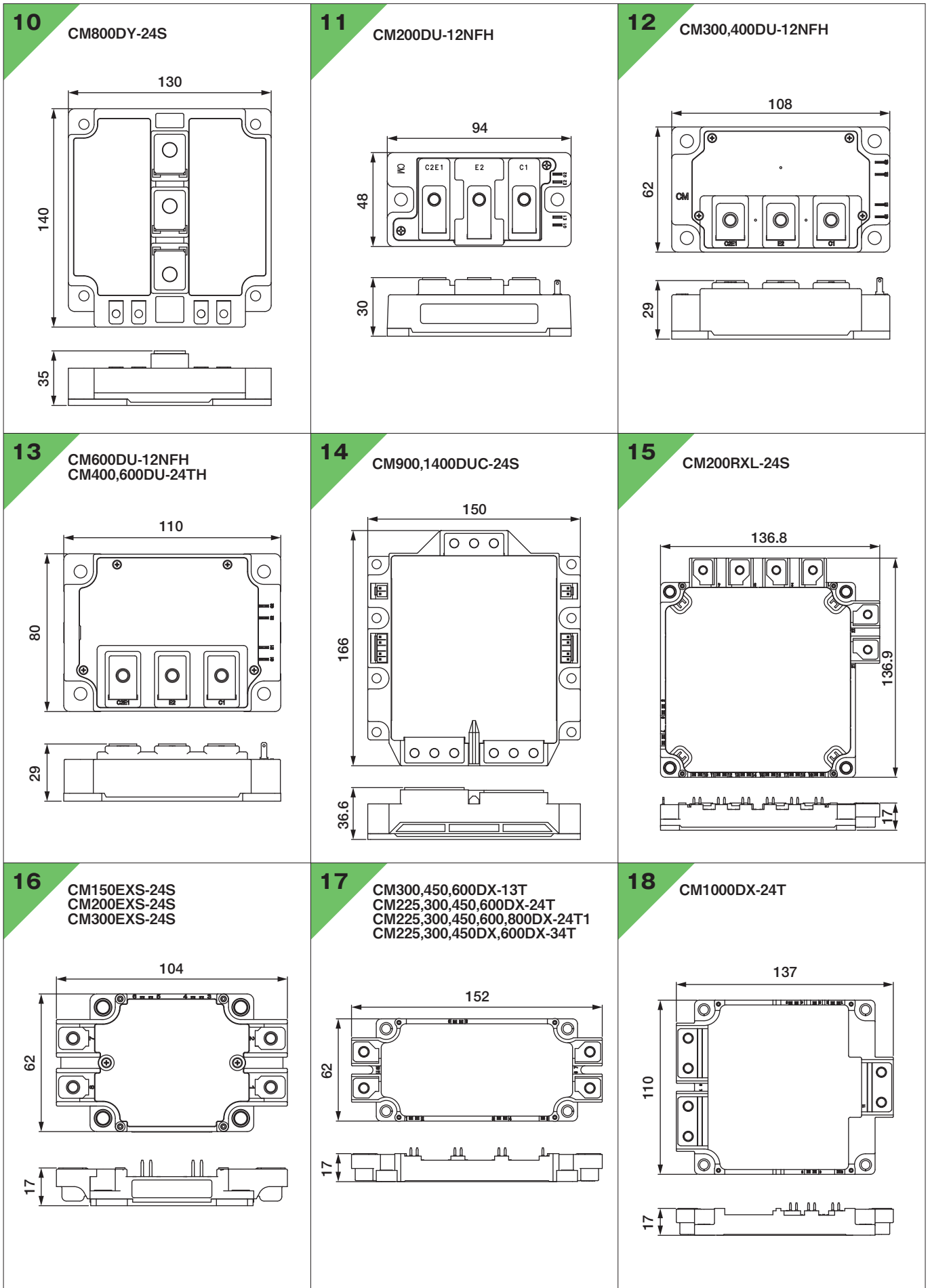
**09** CM400C1Y-24S  
CM450DY-24S  
CM600DY-24S



# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm



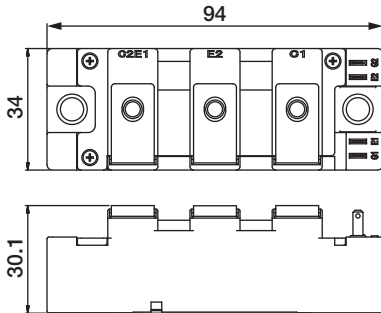
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

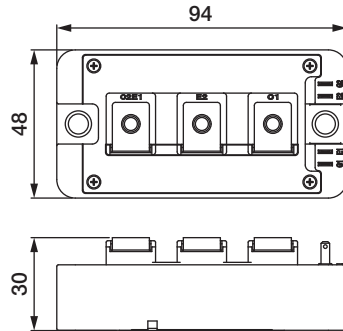
**19**

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



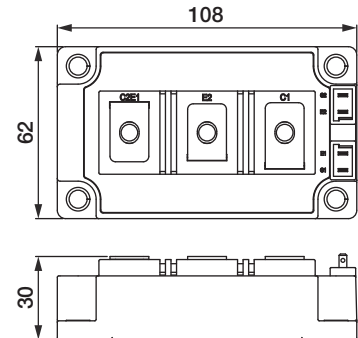
**20**

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



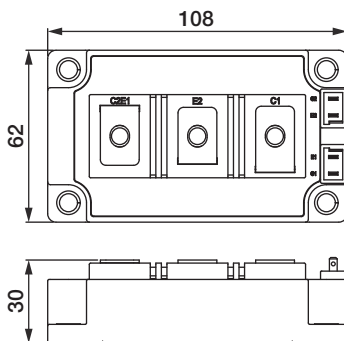
**21**

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



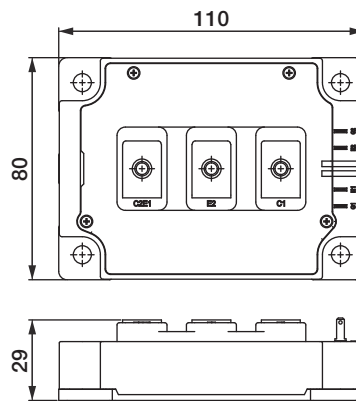
**22**

RM600,800DY-34S



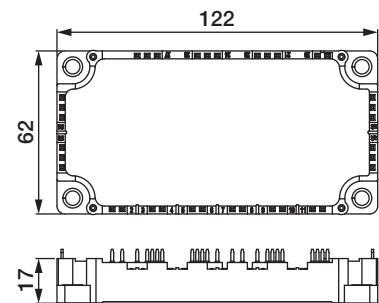
**23**

CM400DY-40T



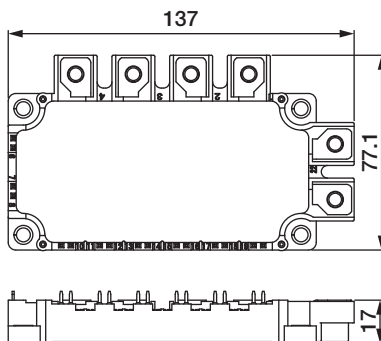
**24**

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



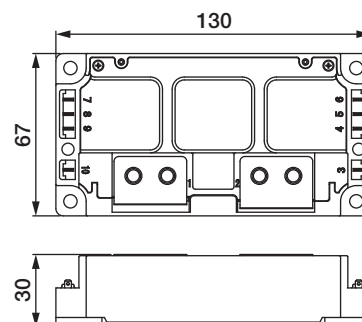
**25**

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



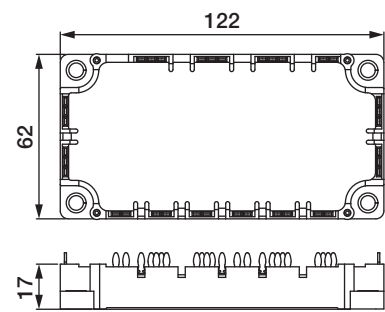
**26**

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



**27**

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



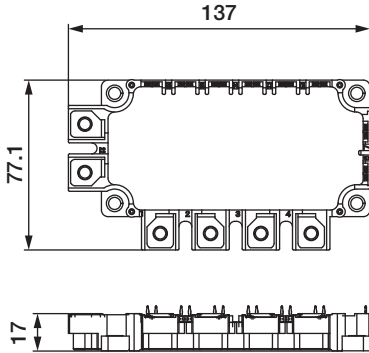
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

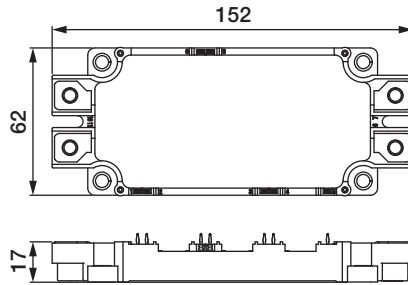
**28**

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



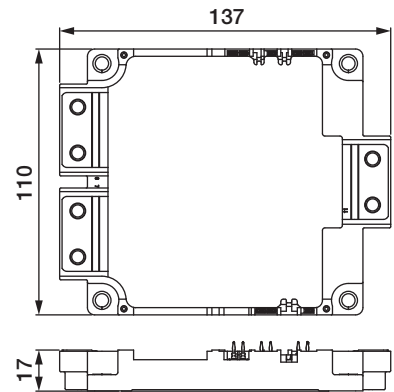
**29**

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



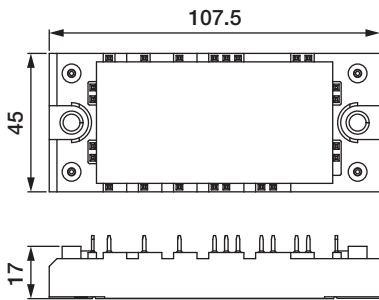
**30**

CM1000DXP-24T



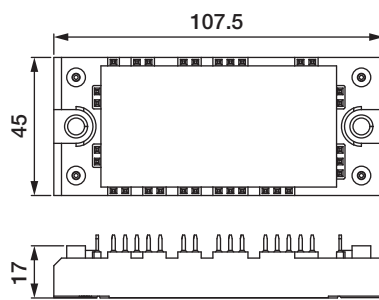
**31**

CM35,50MXUA-24T/24T1



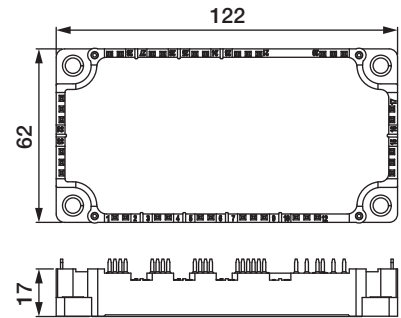
**32**

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



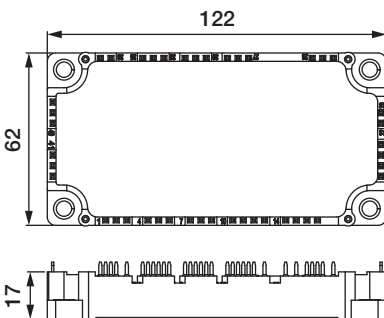
**33**

CM75,100MXUC-24T/24T1



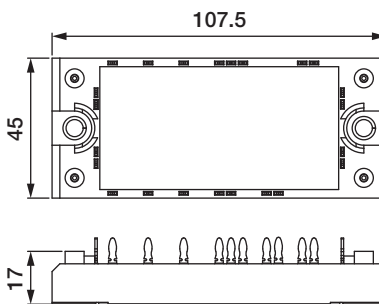
**34**

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



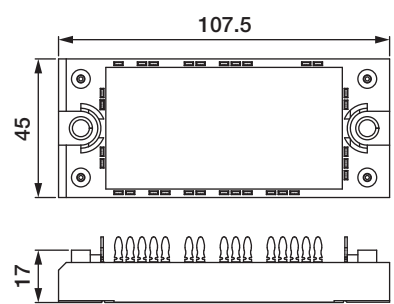
**35**

CM35/50MXUAP-24T/T1



**36**

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



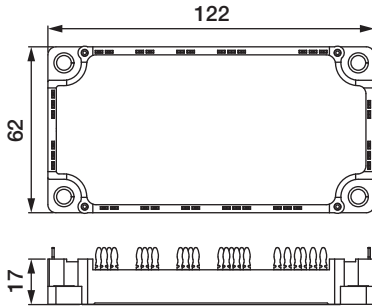
# Lineup of IGBT Modules

## Outline Drawing of IGBT Modules

Unit:mm

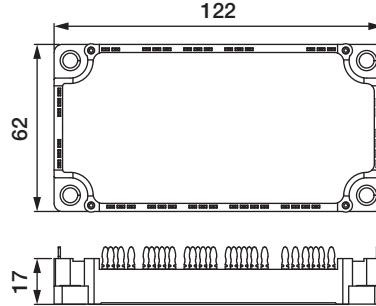
**37**

CM75/100MXUCP-24T/T1



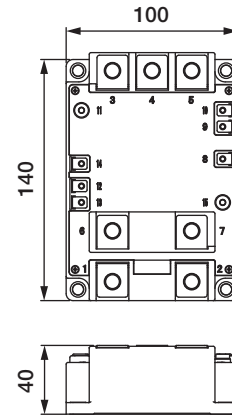
**38**

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








**39**

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





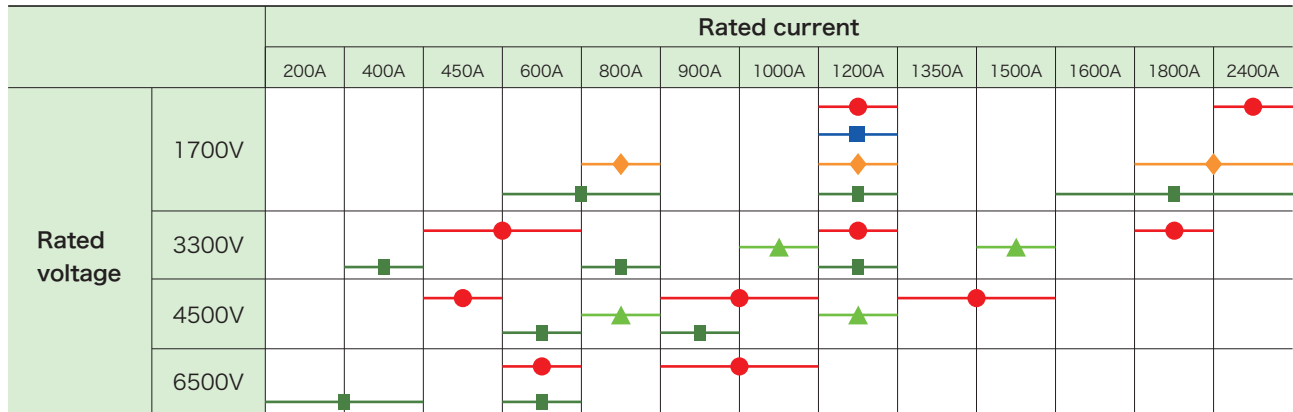
## Series , Main Application

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

Data sheet here



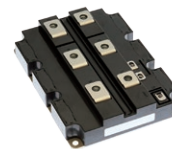
## Rated Lineup



## 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 35)

V <sub>CEs</sub> I <sub>c</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	-	CM400DY-66H	D1	B	06																			
450A												CM450DA-66X	D2	A	07	CM450DE-66X	D2	E	08																									
600A								CM600DY-34H	D1	B	01	CM600E2Y-34H	E2	B	01	CM600DA-66X	D2	A	07	CM600DE-66X	D2	E	08	CM600E1A-66X*	E1	A	07																	
800A					CM800DZB-34N	D1	C	-	CM800DZ-34H	D1	C	-								CM800HC-66H	H	C	-	CM800E4C-66H	E4	C	-	CM800E6C-66H	E2	C	-													
1000A																			CM1000HC-66R	H	C	-	CM1000E4C-66R	E4	C	-																		
1200A	CM1200DA-34X	D2 E4	A C	07 02	CM1200HCB-34N	H	C	-	CM1200DC-34N	D1	C	-	CM1200E4C-34N	E4	C	-	CM1200DC-34S	D1	C	-	CMH1200DC-34S	D1	C	01	CM1200HC-34H	H	C	-	CM1200HC-66X	H	C	02	CM1200HCB-66X	H	C	03	CM1200HG-66H	H	C	-	CM1200HC-66H	H	C	-
1500A																				CM1500HC-66R	H	C	-																					
1600A									CM1600HC-34H	H	C	-																																
1800A					CM1800HC-34N	H	C	-	CM1800HCB-34N	H	C	-	CM1800HC-34H	H	C	-	CM1800HC-66X	H	C	03	CM1800HG-66X	H	G	04																				
2400A	CM2400HC-34X	H	C	02	CM2400HCB-34X	H	C	03	CM2400HC-34N	H	C	-	CM2400HCB-34N	H	C	-	CM2400HC-34H	H	C	03																								
Connection	H	E1		E2/E6		E4		D1		D2																																		

[Type]

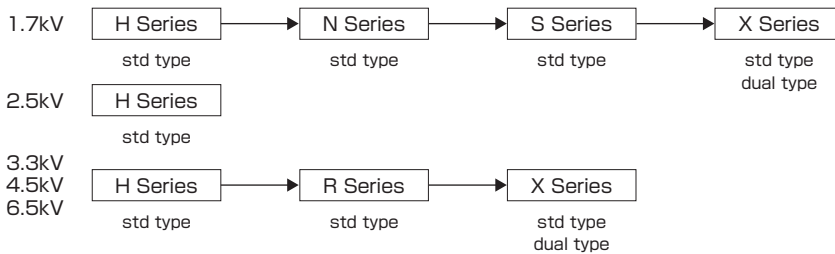
A: Al base plate 6kV Isolation  
 C: AISiC base plate 6kV Isolation  
 G: AISiC base plate 10kV Isolation  
 E: Al base plate 10kV Isolation

★: New Product

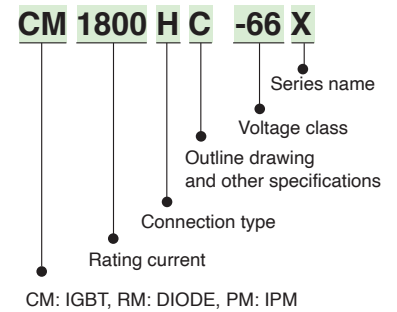
The outline drawing is written the figure of principal part numbers that have a common dimension.

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

### Evolution of HVIGBT Module Series



### Type Name Definition of IGBT Modules



# Lineup of HVIGBT Modules

## Series Matrix of HVIGBT (No.: Number of Outline Drawing, see page 35)

V <sub>GES</sub> I <sub>c</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 CM400E2G-130H CM400E4G-130H	H E2 E4	G G 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 CM800HG-90R	H H	C G	02 05																
900A	CM900HC-90X CM900HG-90X CM900E2G-90X	H H E2	C G G	02 05 04					CM900HC-90H CM900HG-90H	H H	C G	- -	CM900HG-130X	H	G	04								
1000A	CM1000HG-90X	H	G	05									CM1000HG-130XA	H	G	04								
1200A					CM1200HC-90RA CM1200HG-90R	H H	C G	- -																
1350A	CM1350HC-90X CM1350HG-90X	H H	C G	03 04																				
1500A	CM1500HC-90XA CM1500HG-90X	H H	C G	03 04																				
Connection	H		E2		E4		D2																	

[Type]

- A: Al base plate 6kV Isolation
- C: AISiC base plate 6kV Isolation
- G: AISiC 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.

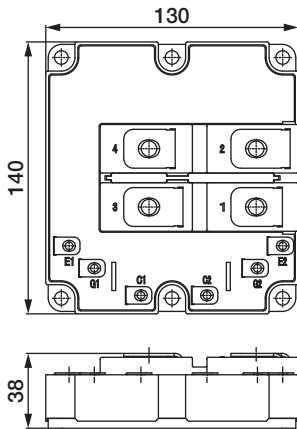
# Lineup of HVIGBT Modules

## Outline Drawing of HVIGBT Modules

Unit:mm

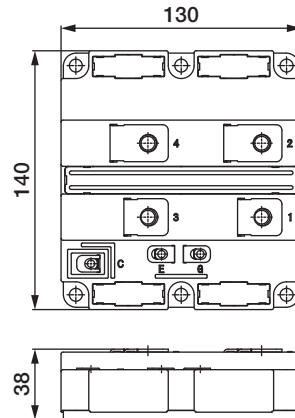
01

CMH1200DC-34S  
CM600DY/E2Y-34H



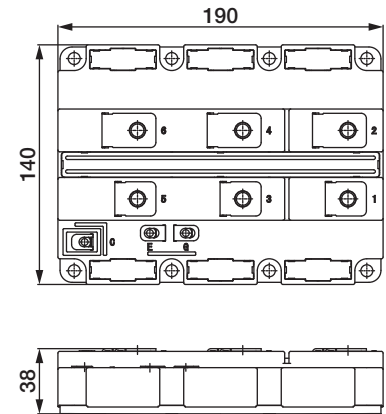
02

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



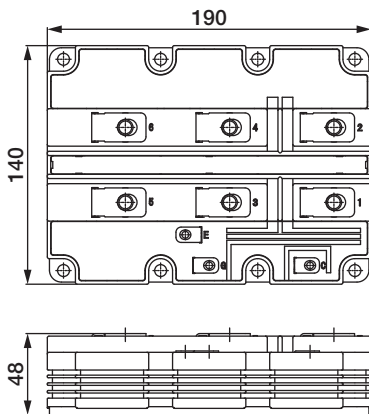
03

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



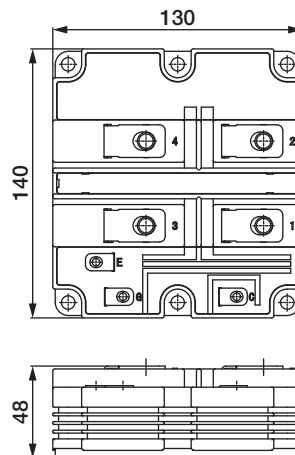
04

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



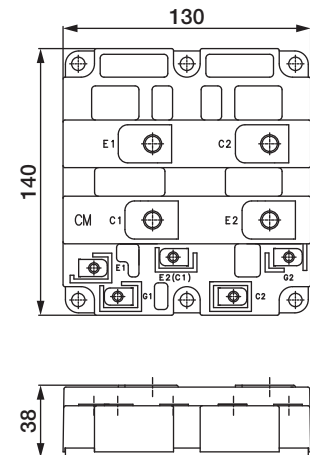
05

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



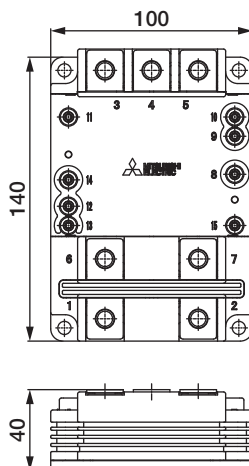
06

CM400DY-66H



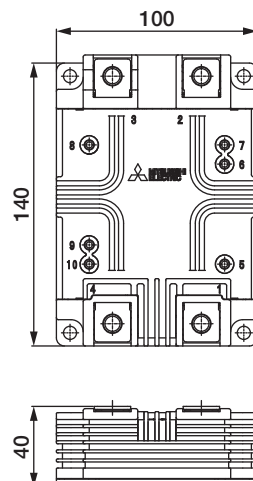
07

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



08

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



# HV DIODE Modules

## Series , Main Application

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

Data sheet here

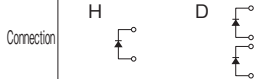


## Rated Lineup

		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 37)

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	09	
400A				RM400DG-66S RM400DY-66S	D D	G B	- -										
450A							RM450DG-90X	D	G	09				RM450DG-130X*	D	G	09
600A				RM600DY-66S RM600DC-66X	D D	B C	- 10							RM600DG-130S RM600DG-130X*	D D	G G	09 09
750A							RM750DC-90X**	D	C	10							
800A							RM800DG-90F	D	G	09							
900A							RM900HC-90S RM900DB-90S RM900DG-90X*	H D D	C B G	- 10 09							
1000A				RM1000DC-66F	D	C	-							RM1000DG-130XA	D	G	09
1200A	RM1200DB-34S	D	B	-	RM1200DG-66S RM1200HE-66S RM1200DB-66S RM1200DC-66X* RM1200DG-66X	D H D D	G C B C	- - - 10 09	RM1200DG-90F	D	G	09					
1500A				RM1500HE-66F RM1500DC-66F	H D	C C	- -	RM1500DG-90X*	D	G	09						
1800A	RM1800HE-34S	H	C	-													



[Type]

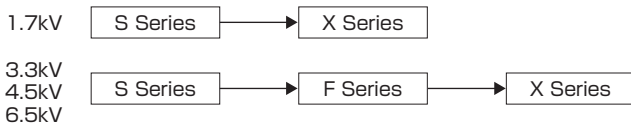
B: Cu base plate 6kV Isolation  
C: AISiC base plate 6kV Isolation  
G: AISiC base plate 10kV Isolation

★: New Product ★★: Under Development

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

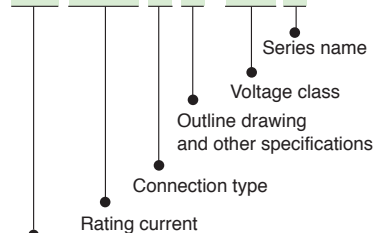
Non-recommended: Please contact to the sales offices.

## Evolution of HV DIODE Module Series



## Type Name Definition of IGBT Modules

**RM 1200 D G -66 X**



CM: IGBT, RM: DIODE, PM: IPM

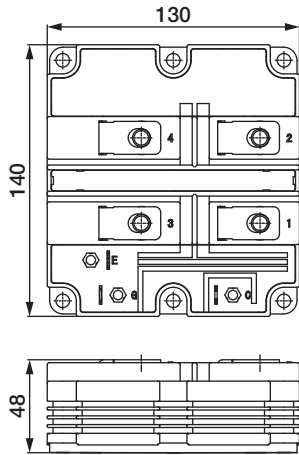
# Lineup of HVDIODE Modules

## Outline Drawing of HVDIODE Modules

Unit:mm

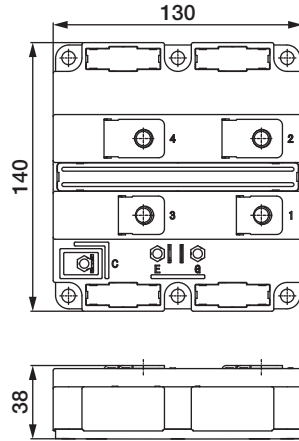
**09**

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



**10**

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

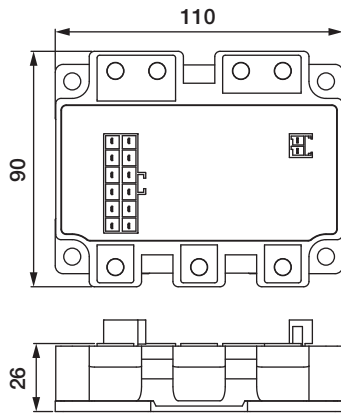
V <sub>DSS</sub> I <sub>D</sub>	75V		100V		150V	
		Connection		Connection		Connection
100A	FM200TU-07A	T	FM200TU-2A	T	FM200TU-3A	T
200A	FM400TU-07A	T	FM400TU-2A	T	FM400TU-3A	T
300A	FM600TU-07A	T	FM600TU-2A	T	FM600TU-3A	T

Connection

## Outline Drawing of MOSFET Modules

Unit:mm

FM200TU-07A, -2A, -3A  
FM400TU-07A, -2A, -3A  
FM600TU-07A, -2A, -3A



Data sheet  
here



## Series , Main Application

Series	Main Application
J1	xEV

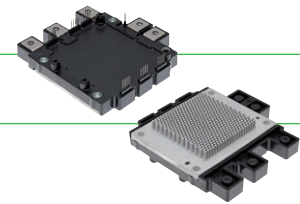
## Rated Lineup

		Rated current	
		600A	700A
Rated voltage	650V	●	



## 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

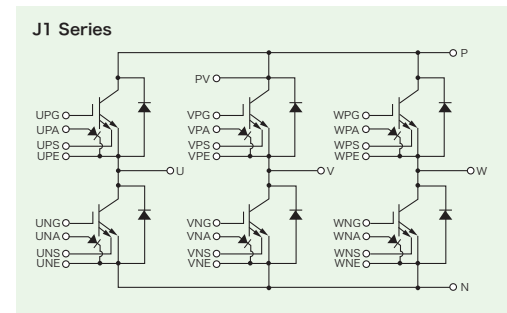
CT600C1A060-A, CT700CJ1A060-A

#### <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

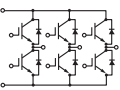
### Common

- 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

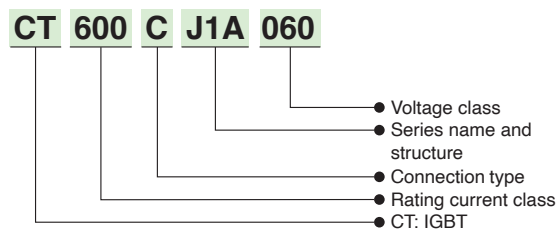


# Power Modules for xEV

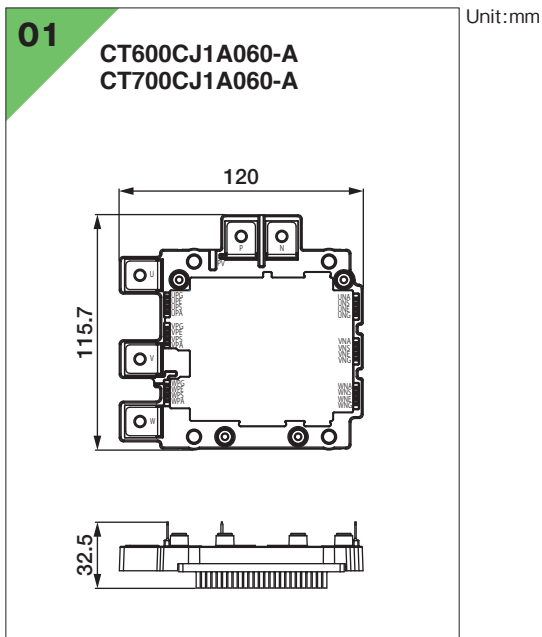
## Matrix of 650V Power Modules

V <sub>CEs</sub>	650V		
Series	J1 Series		
I <sub>c</sub>	Power Module with pin fin	Connection	No.
300A	—	—	—
600A	CT600CJ1A060-A	C	01
700A	CT700CJ1A060-A	C	01
Connection			

## Type Name Definition of Power Modules for xEV



## Outline Drawing of Power Modules for xEV





MEMO

Lined area for writing the memo content.

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



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