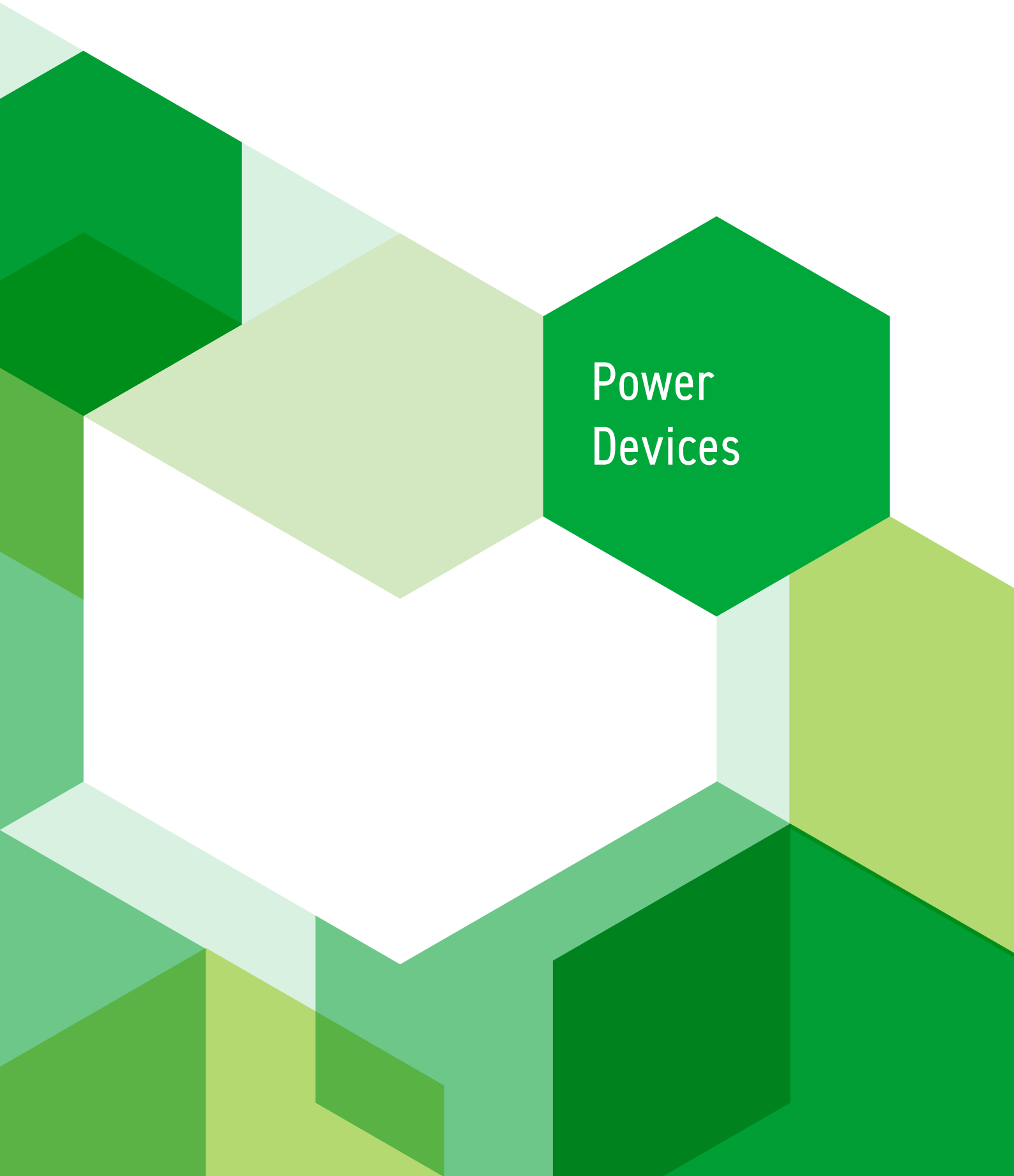


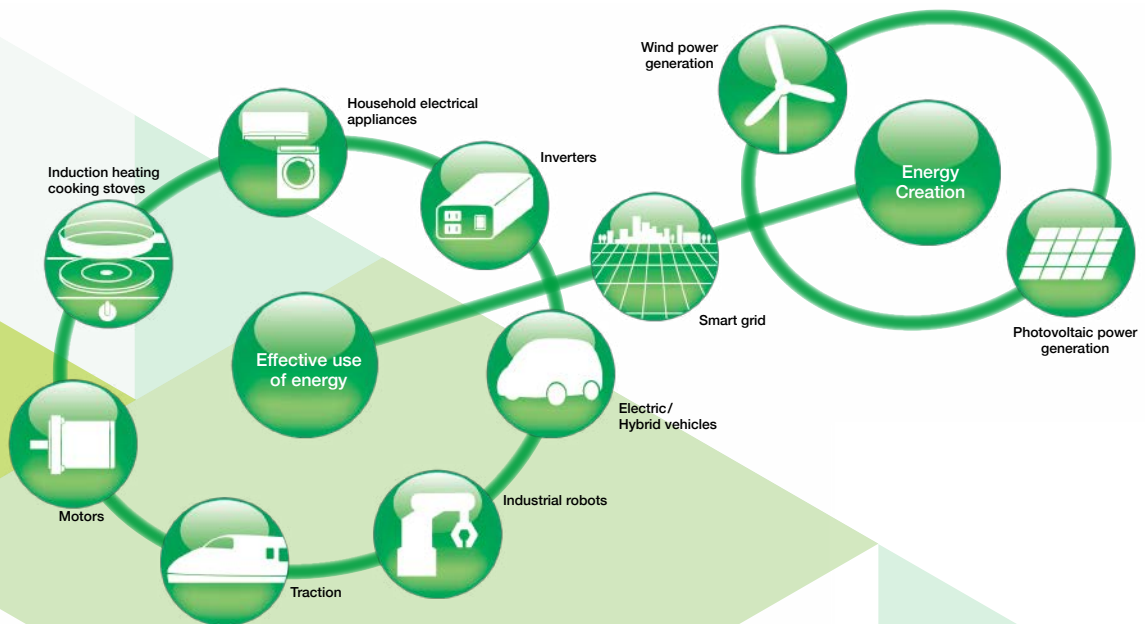
POWER DEVICES



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	Discrete Diode			
SiC Power Modules	5-11	✓ (Hybrid)	✓	✓			600V	15A-30A	 Home Appliance Industrial equipment Traction
							1200V	75A-1200A	
							1700V	300A,1200A	
							3300V	375A,750A	
SiC-SBD	12					✓	600V	20A	 Home Appliance Industrial equipment xEV
							1200V	10A,20A	
SOIPM	13		✓				600V	2A	 Home Appliance
DIIPM	13-18		✓				600V	5A-75A	 Home Appliance
							1200V	5A-100A	
IPM	19-23		✓				600V	50A-800A	 Industrial equipment
							650V	50A-450A	
							1200V	25A-450A	
IGBT Modules	24-34	✓					600V	75A-600A	 Industrial equipment
							650V	50A-600A	
							1200V	35A-1400A	
							1700V	75A-1200A	
MOSFET Modules	35			✓			75V	100A-300A	 Industrial equipment
							100V		
							150V		
HVIGBT Modules	36-40	✓					1700V	600A-3600A	 Traction High Power
							2500V	400A-1200A	
							3300V	400A-1800A	
							4500V	350A-1500A	
							6500V	200A-1000A	
HVDIODE Modules	41-42					✓	1700V	800A-1800A	 Traction High Power
							3300V	400A-1500A	
							4500V	350A-1500A	
							6500V	200A-1000A	
Power Modules for xEV*1	43-44	✓					650V	300A-1000A	 xEV
							1200V	300A,600A	

*1 EV: Electric Vehicle

*2 SOIPM,DIIPM,SLIMDIP,DIIPM+,DIPFC,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.

Early 1990s

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

2006

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

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)*³

October 2011
Commercialized SiC inverter for use in railcars



2000s

Developed various elemental technologies

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*²



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*²

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

2014

February 2014
Developed EV motor drive system with built-in SiC inverter*2



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



November 2014
Launched Large Hybrid SiC DIIPM™ for PV Applications



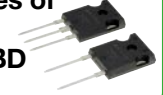
2018

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

2019

June 2019
Began shipping samples of 1200V SiC-SBD

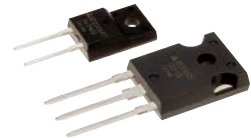


February 2019
Develops Super Compact Power Unit for Hybrid Electric Vehicle

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

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

2015

January 2015
Launched power conditioner for PV equipped with full SiC-IPM*3

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



2016

April 2016
Launched Super mini Full SiC DIIPM™



October 2016
Launched package air conditioners with full SiC DIIPM™ in Japan



February 2013
Developed technologies to increase capacities of SiC power modules*1



May 2013
Launched SiC power modules



December 2013
Launched railcar traction inverter with full SiC power module



May 2016
Launched room air conditioners with full SiC DIIPM™ in Japan



*1 Researched in press releases by Mitsubishi Electric.

*2 Currently under development, as of April 2019.

*3 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	SiC-MOSFET Built-in Hybrid SiC Power Modules	FMH600STX-24B	1200	600	3Level T-type	Under development	5	
		FMH600FX-24B			Vienna rectifier			
	Full SiC Power Modules	FMF300BXZ-24B	1200	300	4in1		6	
		FMF400BX-24B			4in1			
		FMF400BXZ-24B			4in1			
		FMF600DXZ-24B			2in1			
		FMF800DX-24B			2in1			
		FMF800DXZ-24B			2in1			
		FMF1200DXZ-24B			2in1			
		FMF300DXZ-34B			2in1			
	Full SiC-IPM	PMF75CGA120	1700	300	2in1		7	
		PMF75CGAL120			2in1(Chopper)			
	Hybrid SiC Power Modules for High-frequency Switching Applications	CMH100DY-24NFH	1200	100	2in1		Commercially available	
		CMH150DY-24NFH						150
		CMH200DU-24NFH						200
CMH300DU-24NFH		300						
CMH300DX-24NFH		300						
CMH400DU-24NFH		400						
CMH600DU-24NFH		600						
CMH400HC6-24NFM		400						
Traction	Full SiC Power Modules	FMF375DC-66A	3300	375	2in1	Under development	8	
	Hybrid SiC Power Modules	FMF750DC-66A						750
Home appliances	Super mini Full SiC DIIPM	PSF15S92F6	600	15	6in1	Commercially available	9	
		PSF25S92F6		25				
	Super mini Hybrid SiC DIPPFM	PSH30L92C6-W	600	30Arms	Three-phase interleaved			
		PSH20L91A6-A			Two-phase interleaved			
Super mini Full SiC DIPPFM	PSF20L91A6-A	600	20Arms	Two-phase interleaved				



1200V/600A SiC-MOSFET Built-in Hybrid SiC Power Modules for Industrial Equipment

Under development

Contributes to improvement of power loss and downsizing of equipment by optimized to IGBT and Diode configuration

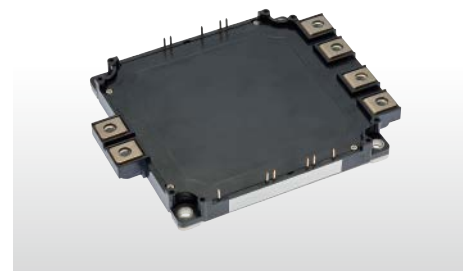
Features

- SiC-MOSFET built-in hybrid power module
- Contributes to improvement of power loss and downsizing of equipment by optimized to IGBT and Diode for 3Level T type and Vienna rectifier
- Reduction surge voltage by Low-inductance package

Product lineup

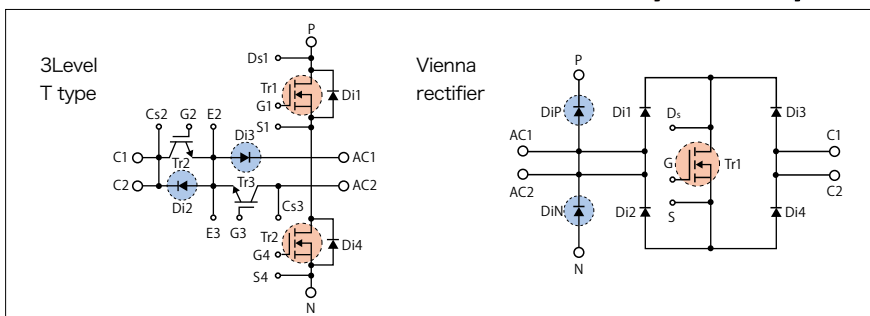
Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMH600STX-24B**	1200V	600A	3Level T-type	152mmx121.7mm
FMH600FX-24B**			Vienna rectifier	

**Under Development



Internal circuit diagram

●:SiC-MOSFET ●:SiC-SBD





Full-SiC Power Modules for Industrial Equipment

Under development

Contributes to reducing size/weight of industrial-use inverters

■ Features

- Power loss reduced approx. 70% compared to the conventional product*
- Low-inductance package adopted to deliver full SiC performance
- 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	92.3mm x 121.7mm
FMF800DX-24B**		800A	2 in 1	

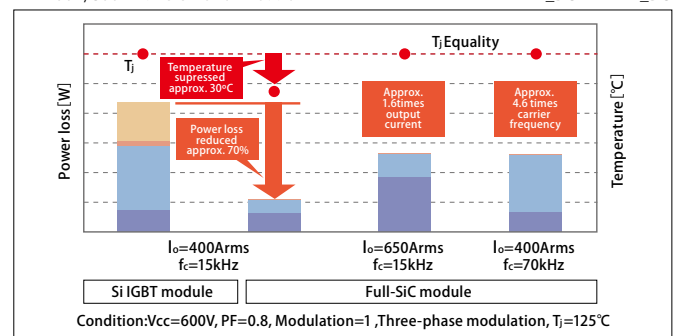
★★:Under development



■ Power loss comparison

1200V/800A Full SiC Power module

FW_SW Tr_SW
FW_DC Tr_DC



Full-SiC Power Modules for Industrial Equipment

(built-in short-circuit protection function)

Under development

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

■ Features

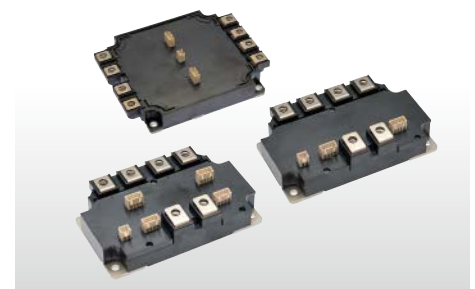
- By using short circuit monitoring circuit in the module it is possible to transfer a short circuit detection signal to the system side
- Power loss reduced approx. 70% compared to the conventional product*
- Low- inductance package adopted to deliver full SiC performance

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

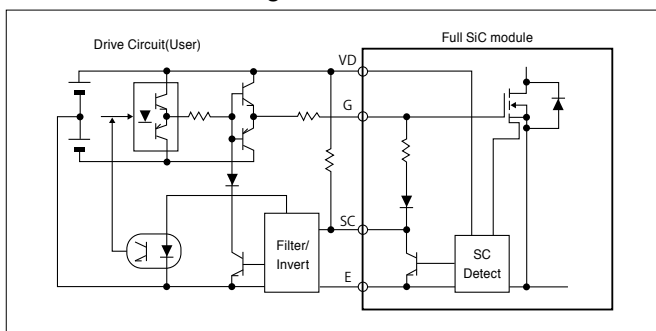
■ Product lineup

Model	Rated voltage	Rated current	Circuit configuration	Package size (D x W)
FMF300BXZ-24B**	1200V	300A	4 in 1	79.6mm x 122mm
FMF400BXZ-24B**		400A	4 in 1	
FMF600DXZ-24B**		600A	2 in 1	
FMF800DXZ-24B**		800A	2 in 1	
FMF1200DXZ-24B**	1200V	1200A	2 in 1	152mm x 122mm
FMF300DXZ-34B**	1700V	300A	2 in 1	79.6mm x 122mm
FMF300E3XZ-34B**		300A	2 in 1 (Chopper)	

★★:Under development



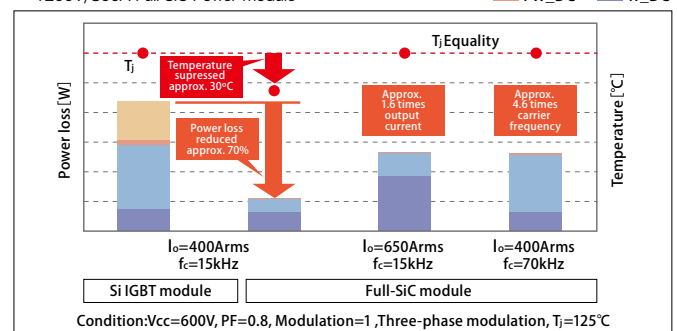
■ Protection circuit diagram



■ Power loss comparison

1200V/800A Full SiC Power module

FW_SW Tr_SW
FW_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

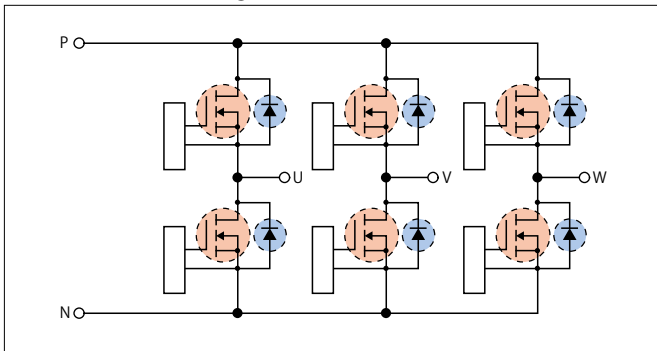
- Realized high performance and low power loss by 2nd. generation SiC-MOSFET and SiC-SBD with current sense and temperature sense
- External size is reduced approx.30% with the conventional Silicon IPM products* of the same rating.
- Available to drive it by the equivalent I/F and power supply circuit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

* Conventional product: Mitsubishi Electric G1 Series PM75CG1B120



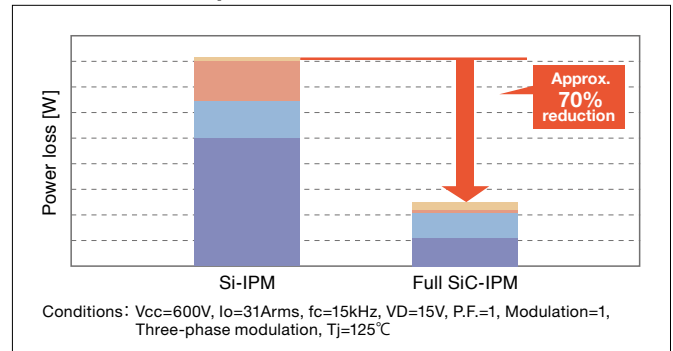
■ Internal circuit diagram

● SiC-MOSFET ● SiC-SBD



■ Power loss comparison

FW_SW IGBT_SW
FW_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*

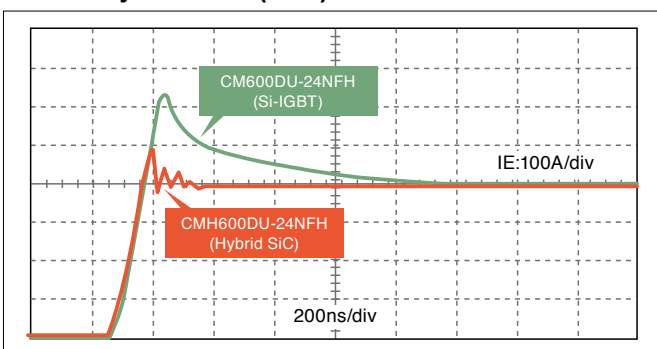
* Conventional product: Mitsubishi Electric NFH Series IGBT Modules

■ 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
	CMH300DX-24NFH		300A		62.5 x 152mm
	CMH400DU-24NFH		400A		80x110mm
	CMH600DU-24NFH		600A		80x110mm
	CMH400HC6-24NFM		400A		1 in 1

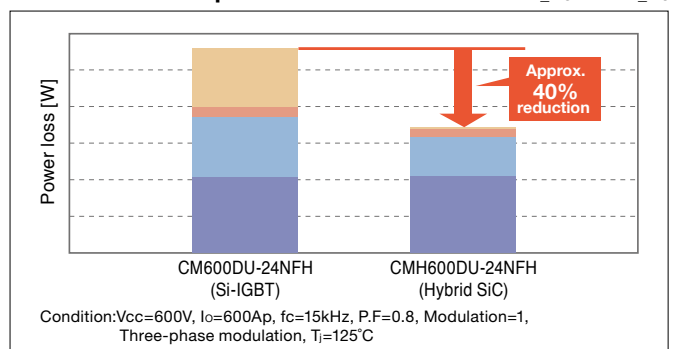


■ Recovery waveform (FWD)



■ Power loss comparison

FW_SW Tr_SW
FW_DC Tr_DC





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

FMF375DC-66A **Under development** / FMF750DC-66A **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

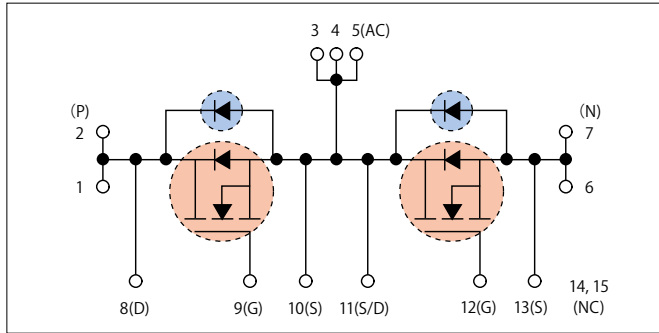
	Model	Rated Voltage	Rated Current	Circuit configuration	External size (D x W)
Full SiC	FMF375DC-66A**	3300V	375A	2 in 1	100 × 140 mm
	FMF750DC-66A		750A		

** Under Development



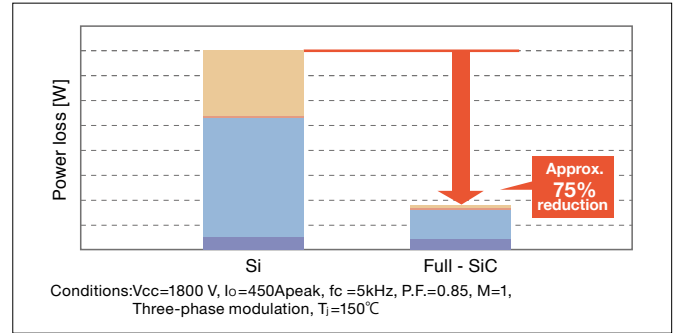
Internal circuit diagram

● SiC-MOSFET ● SiC-SBD



Power loss comparison

■ Diode_SW ■ Diode_DC
■ IGBT_SW ■ 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

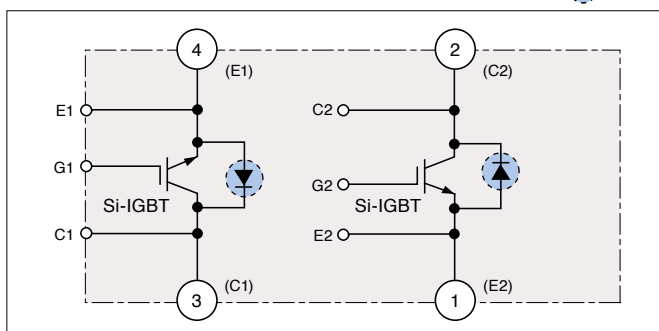
Main specifications

Module	Max. operating temperature		150°C
	Si-IGBT @ 150°C	Isolation voltage	
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



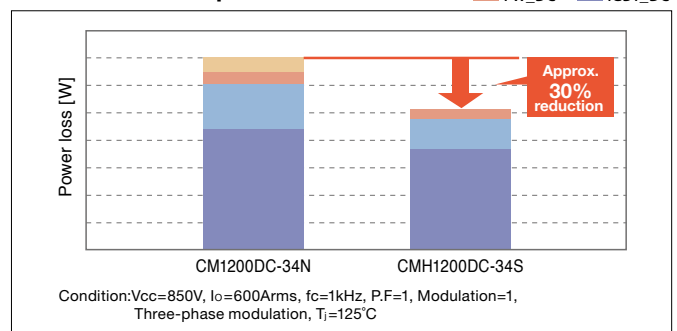
Internal circuit diagram

● SiC-SBD



Power loss comparison

■ FW_SW ■ IGBT_SW
■ FW_DC ■ IGBT_DC





15A/25A Super mini Full SiC DIIPM™ for Home Appliances

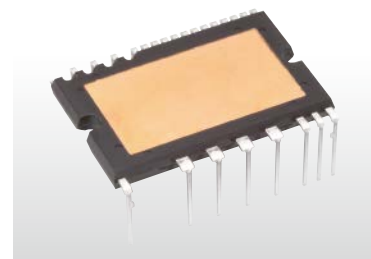
PSF15S92F6-A/PSF25S92F6-A Commercially available

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

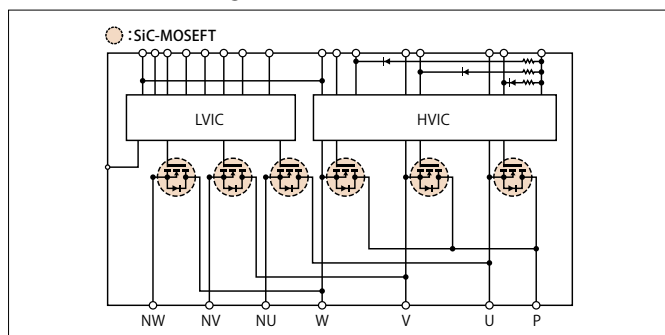
■ Features

- 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

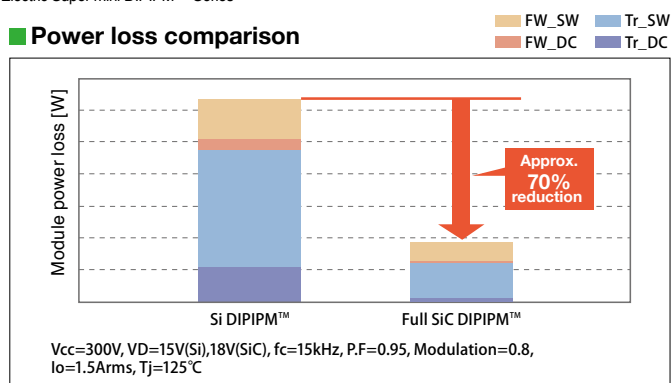
*Conventional product: Mitsubishi Electric Super mini DIIPM™ Series



■ Internal block diagram



■ Power loss comparison



Super mini Hybrid / Full SiC DIPFC™ for Home Appliances

PSH20L91A6-A / PSF20L91A6-A/
PSH30L92C6-W Commercially available

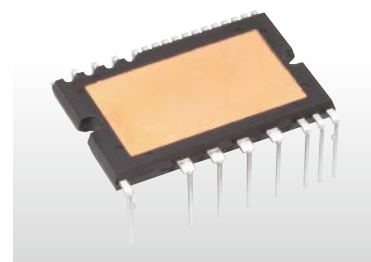
Utilizing SiC enables high-frequency switching and contributes to reducing the size of peripheral components

■ Features

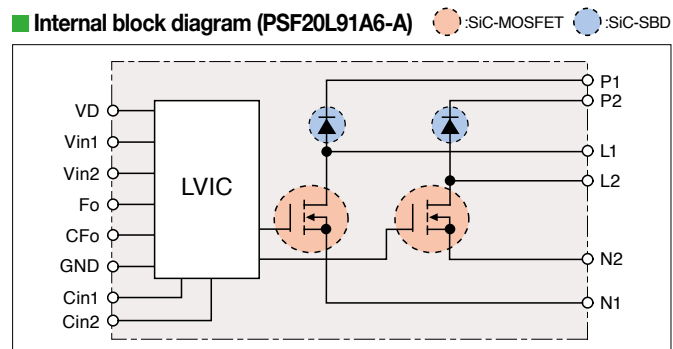
- Incorporating SiC chip in the Super mini package widely used in home appliances
- The SiC chip allows high-frequency switching (up to 40kHz) and contributes to downsizing the reactor, heat sink and other peripheral components
- Adopts the same package as the Super mini DIIPM™ to eliminate the need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

■ Product lineup

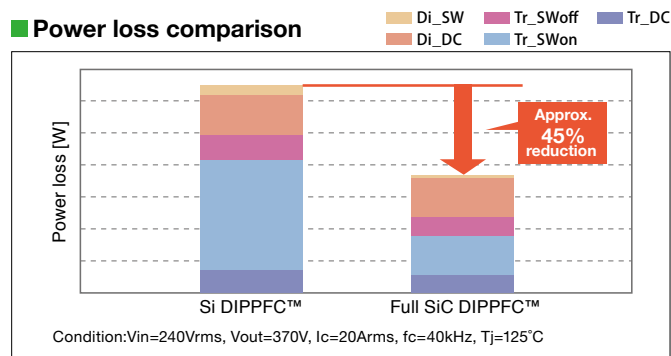
Model	Circuit configuration	Chips
PSH20L91A6-A	2phase Interleaved	Hybrid SiC
PSF20L91A6-A		Full SiC
PSH30L92C6-W	3phase Interleaved	Hybrid SiC



■ Internal block diagram (PSF20L91A6-A)



■ Power loss comparison



■ Outline Drawing of SiC Power Modules

Unit:mm

<p>SiC-MOSFET Built-in Hybrid SiC Power Modules for Industrial Equipment FMH600STX-24B FMH600FX-24B</p>	<p>Full SiC Power Modules for Industrial Equipment FMF400BX-24B, FMF800DX-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 CMH300DX-24NFH</p>

SiC Power Modules

Outline Drawing of SiC Power Modules

Unit:mm

<p>Hybrid SiC Power Modules for High-frequency Switching Applications CMH400DU-24NFH CMH600DU-24NFH</p>	<p>Hybrid SiC Power Modules for High-frequency Switching Applications CMH400HC6-24NFM</p>	<p>3300V Full SiC Power Modules for Traction Inverters and HVDC system FMF375DC-66A/FMF750DC-66A</p>
<p>1700V/1200A Hybrid SiC Power Module for Traction Inverters CMH1200DC-34S</p>	<p>Super mini Full SiC DIIPM™ PSF15S92F6-A / PSF25S92F6-A Super mini Hybrid / Full SiC DIPPFCTM PSH20L91A6-A/PSF20L91A6-A Long</p>	<p>Super mini Full SiC DIIPM™ PSF15S92F6-C/PSF25S92F6-C Control side of Zigzag</p>
<p>Super mini Full SiC DIIPM™ PSF15S92F6/PSF25S92F6 Short</p>	<p>Super mini Hybrid SiC DIPPFCTM PSH30L92C6-W Both side of Zigzag</p>	



SiC-SBD(Schottky Barrier Diode) for power supply systems 600V series 1200V series

Sample available

Contribute to reducing power loss and the size of power supply systems

■ Features

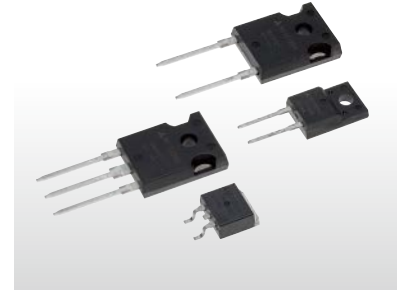
- Power loss is reduced by approx. 21%^{*1} compared to the conventional silicon (Si) products, contributing to energy conversion.
- The SiC-SBD allows high frequency switching and contributes to downsizing the reactor, heat sink and other peripheral components
- JBS^{*2} structure allows high forward surge capability and contributes to improving reliability

*1 Conventional Si (Silicon) product: Si diode which is equipped with Mitsubishi Electric DIPFC™
*2 Junction Barrier Schottky

■ Product lineup

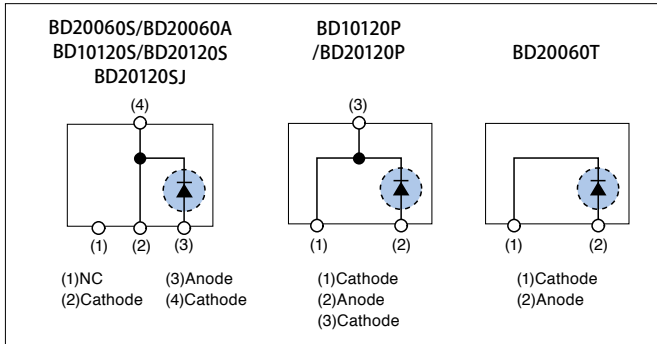
Application	Model	Rated Voltage	Rated Current	Package
Home appliance	BD20060T	600V	20A	TO-220FP-2
	BD20060S**			TO-247-3
	BD20060A**			TO-263-2
Industrial equipment	BD10120S**	1200V	10A	TO-247-3
	BD10120P**			TO-247-2
	BD20120S**		20A	TO-247-3
	BD20120P**			TO-247-2
Model	BD20120SJ**			TO-247-3

**Under development



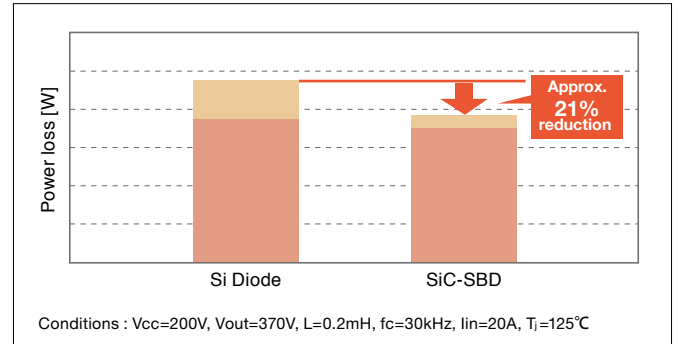
■ Inner circuit

: SiC-SBD



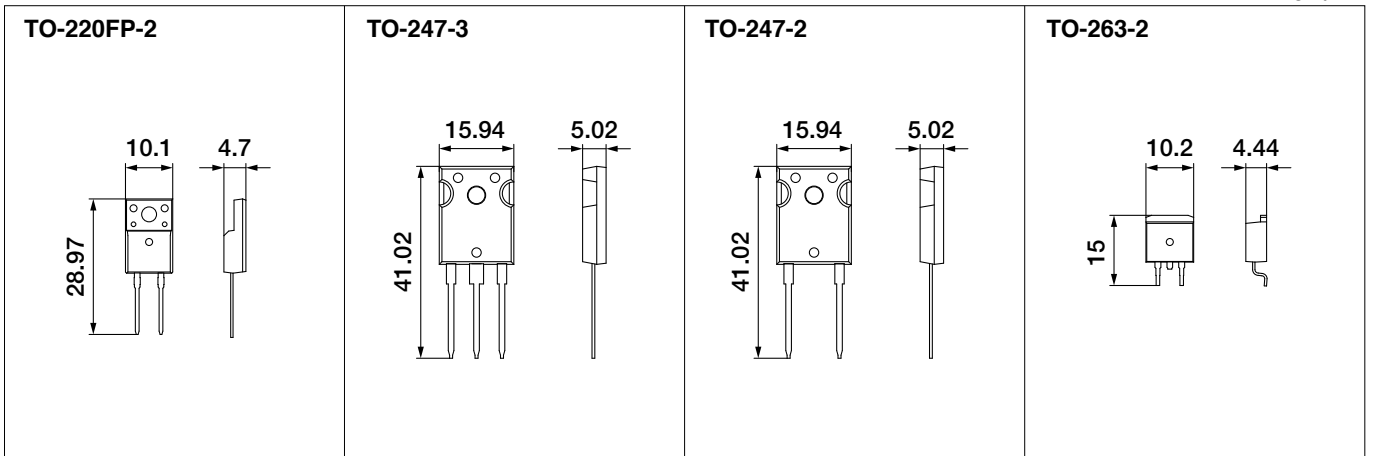
■ Power loss comparison

Diode_SW
 Diode_DC










■ Outline Drawing of SiC-SBD

Unit:mm



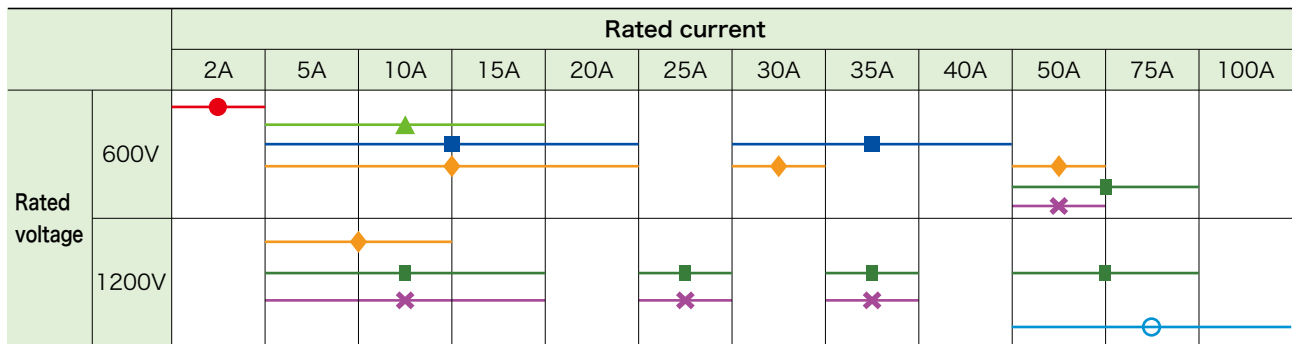
Package, Main Application

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

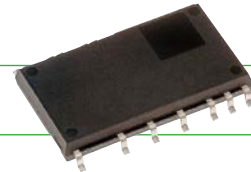
Data sheet here



Rated Lineup



New Products



Surface mount package IPM SOIPM™

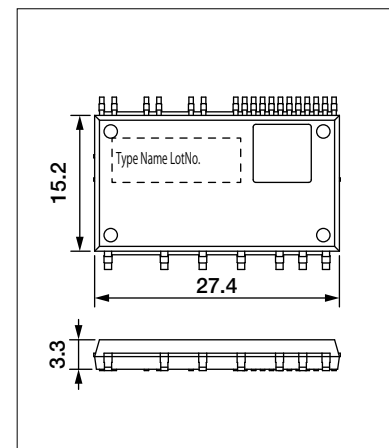
A small Surface mount package IPM has been newly developed for fan and low-power motor drive applications

<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^{*1} 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™

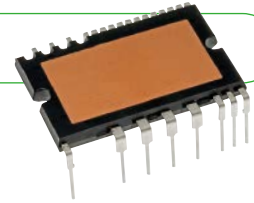
Type name	Rated current	Rated voltage	Chips	Protection	Shape
SP2SK	2A	600V	RC-IGBT, HVIC, LVIC, BSD	UV, SC, OT V _{OT} , IL	Surface mount package

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



New Products

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



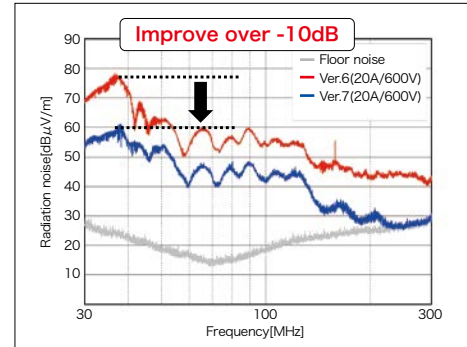
Super Mini DIIPM™ Ver.7

<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

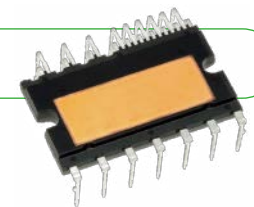
*1 CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect

Radiation noise



Featured Products

Smaller package size realized by integrating newly designed RC-IGBT Recommended for low-cost inverter and fan controller applications



SLIMDIP™ SLIMDIP-S, SLIMDIP-L, SLIMDIP-W

<Main Features>

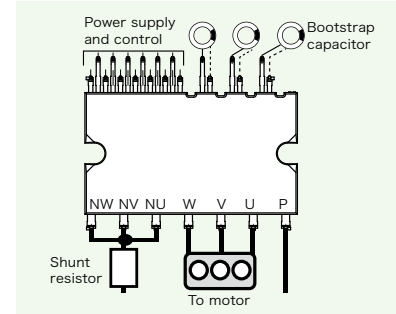
- RC-IGBT*1 incorporated, reducing package size 30% compared to Super mini DIIPM
- Maximum case temperature expanded to 115°C, increasing the operating temperature range and leading to easier system design temperature range and leading to easier system design
- Additional terminals for floating supply and built-in bootstrap diodes simplify PCB wiring pattern
- Both V_{OT}^2 and OT^3 functions integrated for temperature protection
- New SLIMDIP-W line-up for washing machine, fans etc.

*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-L	Air conditioner
SLIMDIP-W	Washing machine, Fan

Wiring example

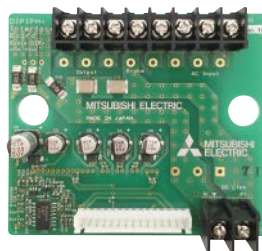


Customer Support

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



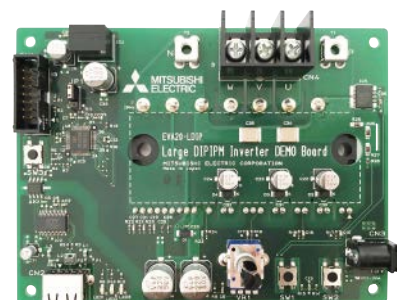
For Super mini DIIPM
EVA11-SDIP



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™

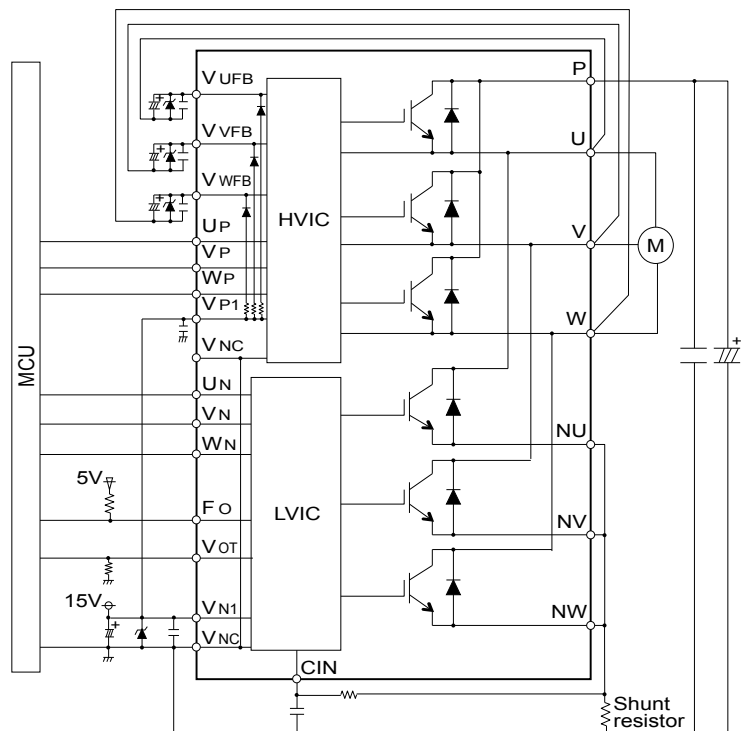
V _{CE} (V)		600V						
I _c (A)	Series	SLIMDIP	Super mini		Mini		Large	DIIPM+
			Ver.7	Ver.6	Ver.7	—	Ver.6	CIB/CI
5	SLIMDIP-S			PSS05S92F6-AG PSS05S92E6-AG		PSS05S51F6		
10	SLIMDIP-L SLIMDIP-W*			PSS10S92F6-AG PSS10S92E6-AG		PSS10S51F6		
15				PSS15S92F6-AG PSS15S92E6-AG		PSS15S51F6		
20		PSS20S93F6-AG* PSS20S93E6-AG*	PSS20S92F6-AG PSS20S92E6-AG		PSS20S73F6*	PSS20S51F6 PSS20S71F6		
30		PSS30S93F6-AG* PSS30S93E6-AG*	PSS30S92F6-AG PSS30S92E6-AG		PSS30S73F6*	PSS30S71F6		
35			PSS35S92F6-AG PSS35S92E6-AG					
40		PSS40S93F6-AG* PSS40S93E6-AG*						
50					PSS50S73F6*	PSS50S71F6	PSS50SA2F6*	PSS50MC1F6 PSS50NC1F6*5
75							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 part
	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	—	—	—	—
	V _{OT}	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_{OT} 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_{OT}: 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™

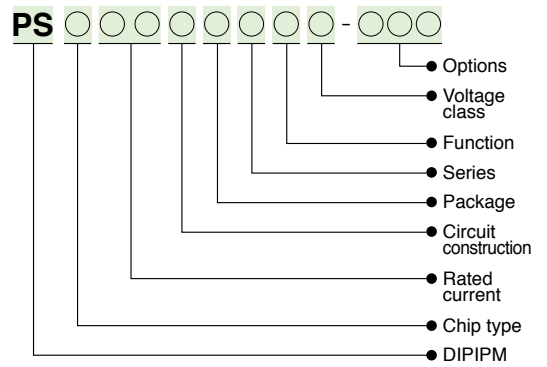
V _{CEs} (V)		1200V			
I _c (A)	Series	Mini	Large	DIIPM+	Large DIIPM+
			Ver.6	CIB/CI	CI
5	PSS05S72FT	PSS05SA2FT	PSS05MC1FT PSS05NC1FT*1		
10	PSS10S72FT	PSS10SA2FT	PSS10MC1FT PSS10NC1FT*1		
15		PSS15SA2FT	PSS15MC1FT PSS15NC1FT*1		
25		PSS25SA2FT	PSS25MC1FT PSS25NC1FT*1		
35		PSS35SA2FT	PSS35MC1FT PSS35NC1FT*1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

★: New Product ★★: Under development

[Notes] *1: PSS**NC1FT is not included brake

*2 : RoHS directive (2011/65/EU and (EU) 2015/863)

Type Name Definition of DIIPM™



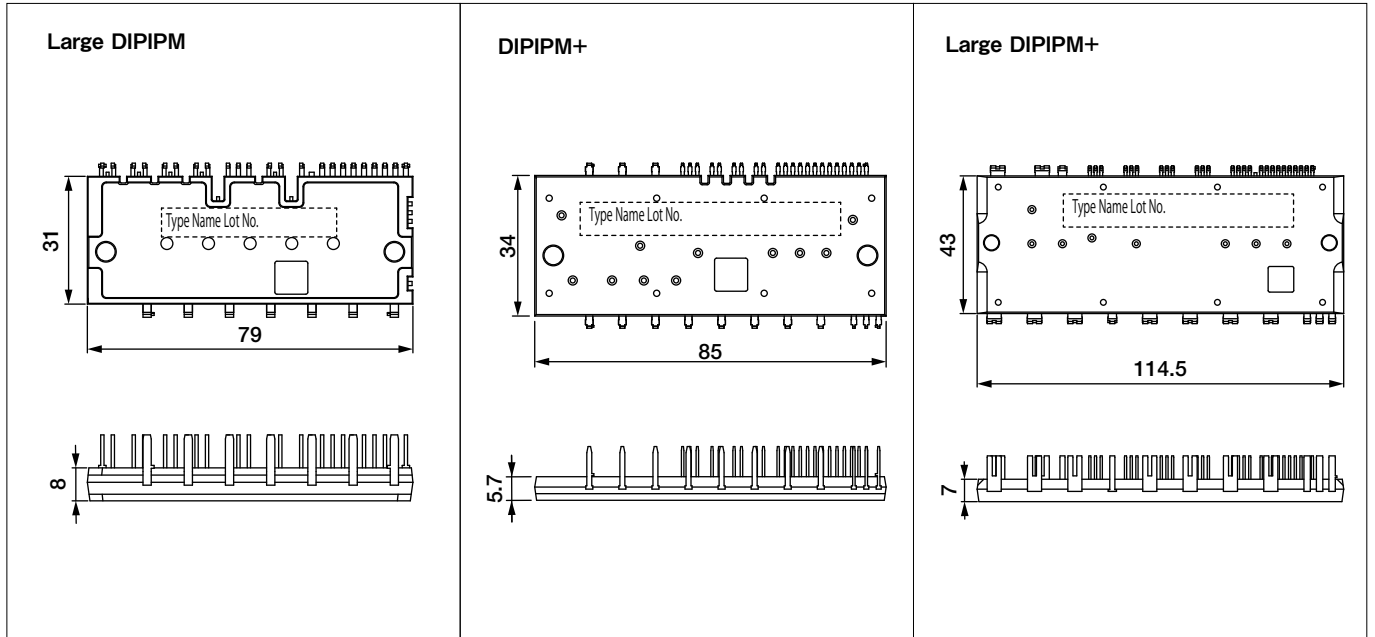
■ Outline Drawing of DIIPM™

Unit:mm







<p>SLIMDIP Normal</p>	<p>SLIMDIP Short</p>	
<p>Super mini DIIPM Ver.6 Long</p>	<p>Super mini DIIPM Ver.7 Long</p>	
<p>Mini DIIPM (PSSxxS51F6)</p>	<p>Mini DIIPM(PSSxxS51F6) Control side of Zigzag</p>	<p>Mini DIIPM (PSSxxS7x6) 1200V Mini DIIPM</p>

■ Outline Drawing of DIIPM™

Unit:mm



Series , Main Application

Series		Main Application
G1		Motion control/Renewable energy/Power supply
L1		
S1		
V1		
Photovoltaic		Photovoltaic
L		Motion control/Renewable energy/Power supply

Data sheet here

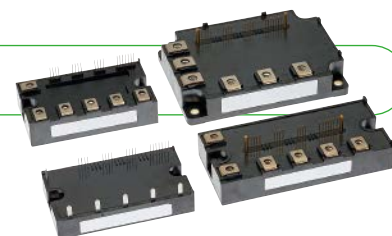


Rated Lineup



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™¹ and a diode incorporating a RFC² 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,³ 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

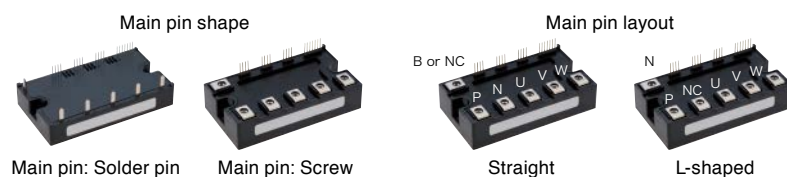
² RFC: Relaxed field cathode

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 Modules 650V/600V (No.: Number of outline drawing, see page 22 to 23)


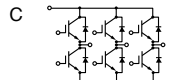
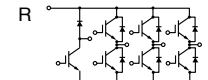
V _{CE} (V) Series I _c (A)	650V						600V												
	G1 Series			L1 Series			S1 Series			V1 Series			Photovoltaic			L Series			
	Connection	No.		Connection	No.		Connection	No.		Connection	No.		Connection	No.		Connection	No.		
50	PM50CG1A065	C	12										PM50B4LA060	B4	01				
	PM50RG1A065	R	12										PM50B5LA060	B5	01				
	PM50CG1B065	C	10	PM50CL1A060	C	01							PM50B6LA060	B6	01				
	PM50RG1B065	R	10	PM50CL1B060	C	02							PM50B4LB060	B4	02				
	PM50CG1AL065	C	12	PM50RL1A060	R	01	PM50CS1D060	C	05				PM50B5LB060	B5	02				
	PM50CG1AP065	C	09	PM50RL1B060	R	02							PM50B6LB060	B6	02				
	PM50CG1APL065	C	09	PM50RL1C060	R	03							PM50B4L1C060	B4	03				
	PM50RG1AP065	R	09										PM50B5L1C060	B5	03				
												PM50B6L1C060	B6	03					
75	PM75CG1A065	C	12										PM75B4LA060	B4	01				
	PM75RG1A065	R	12										PM75B5LA060	B5	01				
	PM75CG1B065	C	10	PM75CL1A060	C	01							PM75B6LA060	B6	01				
	PM75RG1B065	R	10	PM75CL1B060	C	02							PM75B4LB060	B4	02				
	PM75CG1AL065	C	12	PM75RL1A060	R	01	PM75CS1D060	C	05				PM75B5LB060	B5	02				
	PM75CG1AP065	C	09	PM75RL1B060	R	02							PM75B6LB060	B6	02				
	PM75CG1APL065	C	09										PM75B4L1C060	B4	03				
	PM75RG1AP065	R	09										PM75B5L1C060	B5	03				
												PM75B6L1C060	B6	03					
100	PM100CG1A065	C	12																
	PM100CG1B065	C	10	PM100CL1A060	C	01													
	PM100RG1B065	R	10	PM100CL1B060	C	02													
	PM100CG1AL065	C	12	PM100RL1A060	R	01	PM100CS1D060	C	05										
	PM100CG1AP065	C	09	PM100RL1B060	R	02													
	PM100CG1APL065	C	09																
150	PM150CG1B065	C	10	PM150CL1A060	C	01													
	PM150RG1B065	R	10	PM150CL1B060	C	02													
				PM150RL1A060	R	01	PM150CS1D060	C	05										
				PM150RL1B060	R	02													
200	PM200CG1B065	C	10																
	PM200RG1B065	R	10	PM200CL1A060	C	04													
	PM200CG1C065	C	11	PM200RL1A060	R	04	PM200CS1D060	C	05										
	PM200RG1C065	R	11																
300	PM300CG1C065	C	11	PM300CL1A060	C	04													
	PM300RG1C065	R	11	PM300RL1A060	R	04													
400/450	PM450CG1C065	C	11									PM400DV1A060	D	06			PM450CLA060	C	08
	PM450RG1C065	R	11																
600												PM600DV1A060	D	06			PM600CLA060	C	08
800												PM800DV1B060	D	07					
IGBT chip	CSTBT*1 Emitter sensor installed Temperature sensor installed			CSTBT*1 Built-in emitter sensor Built-in temperature sensor			CSTBT*1 Built-in emitter sensor Built-in temperature sensor			CSTBT*1 Built-in emitter sensor Built-in temperature sensor			CSTBT*1 Built-in emitter sensor Built-in temperature sensor			CSTBT*2 Built-in emitter sensor Built-in temperature sensor			
	UV	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side			P-side/N-side		
	OT	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side			P-side/N-side		
	SC	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side			P-side/N-side		
Identification	P-side/N-side			-			-			-			-			-			
RoHS directive*3	Compliant			Compliant			Compliant			Compliant			Compliant			Compliant			
Compatibility	-			L Series			S-DASH SERVO			V Series			-			-			
Connection	D			B4			B5			B6			C			R			

[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 Modules 1200V (No.: Number of outline drawing, see page 22 to 23)

V _{CE} (V)	1200V															
	Series	G1 Series			L1 Series			S1 Series			V1 Series			L Series		
I _c (A)		Connection	No.		Connection	No.		Connection	No.		Connection	No.		Connection	No.	
25	PM25CG1A120	C	12													
	PM25CG1B120	C	10													
	PM25RG1A120	R	12	PM25CL1A120	C	01										
	PM25RG1B120	R	10	PM25CL1B120	C	02										
	PM25CG1AL120	C	12	PM25RL1A120	R	01	PM25CS1D120	C	05							
	PM25CG1AP120	C	09	PM25RL1B120	R	02										
	PM25CG1APL120	C	09	PM25RL1C120	R	03										
	PM25RG1AP120	R	09													
35	PM35CG1A120	C	12													
	PM35CG1B120	C	10													
	PM35RG1A120	R	12													
	PM35RG1B120	R	10													
	PM35CG1AL120	C	12													
	PM35CG1AP120	C	09													
	PM35CG1APL120	C	09													
	PM35RG1AP120	R	09													
50	PM50CG1A120	C	12													
	PM50CG1B120	C	10	PM50CL1A120	C	01										
	PM50RG1B120	R	10	PM50CL1B120	C	02	PM50CS1D120	C	05							
	PM50CG1AL120	C	12	PM50RL1A120	R	01										
	PM50CG1AP120	C	09	PM50RL1B120	R	02										
	PM50CG1APL120	C	09													
75	PM75CG1B120	C	10	PM75CL1A120	C	01										
	PM75RG1B120	R	10	PM75CL1B120	C	02	PM75CS1D120	C	05							
				PM75RL1A120	R	01										
				PM75RL1B120	R	02										
100	PM100CG1B120	C	10													
	PM100CG1C120	C	11	PM100CL1A120	C	04	PM100CS1D120	C	05							
	PM100RG1B120	R	10	PM100RL1A120	R	04										
	PM100RG1C120	R	11													
150	PM150CG1C120	C	11	PM150CL1A120	C	04										
	PM150RG1C120	R	11	PM150RL1A120	R	04										
200	PM200CG1C120	C	11							PM200DV1A120	D	06	PM200CLA120	C	08	
	PM200RG1C120	R	11													
300										PM300DV1A120	D	06	PM300CLA120	C	08	
450										PM450DV1A120	D	06	PM450CLA120	C	08	
IGBT chip	CSTBT*1 Emitter sensor installed Temperature sensor installed			CSTBT*1 Built-in current sensor Built-in temperature sensor			CSTBT*1 Built-in current sensor Built-in temperature sensor			CSTBT*1 Built-in current sensor Built-in temperature sensor			CSTBT*2 Built-in current sensor Built-in temperature sensor			
Fault output	UV	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side		
	OT	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side		
	SC	P-side/N-side			P-side/N-side			N-side			P-side/N-side			P-side/N-side		
	Identification	P-side/N-side			-			-			-			-		
RoHS directive*2	Compliant			Compliant			Compliant			Compliant			Compliant			
Compatibility	-			L Series			S-DASH SERVO			V Series			-			
Connection																

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

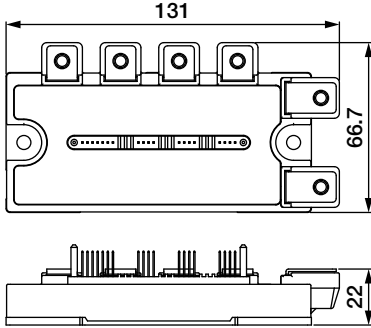
[Term] CSTBT™: Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect
UV: Power supply Under Voltage protection
SC: Short Circuit protection
OT: Over Temperature protection
RoHS: the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment

Outline Drawing of IPM

Unit:mm

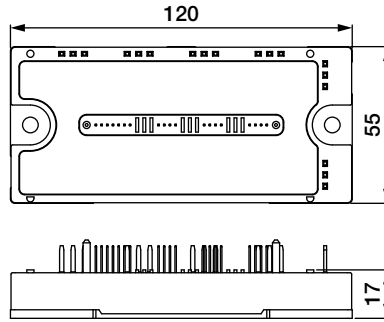
01

PM50,75,100,150CL1A/RL1A060
PM25,50,75CL1A/RL1A120
PM50,75B4/B5/B6LA060



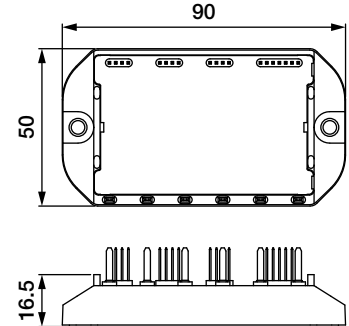
02

PM50,75,100,150CL1B/RL1B060
PM25,50,75CL1B/RL1B120
PM50,75B4/B5/B6LB060



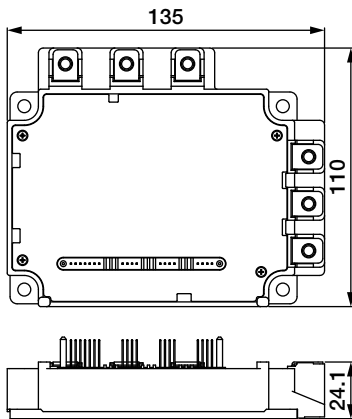
03

PM50RL1C060
PM25RL1C120
PM50,75,B4/B5/B6L1C060



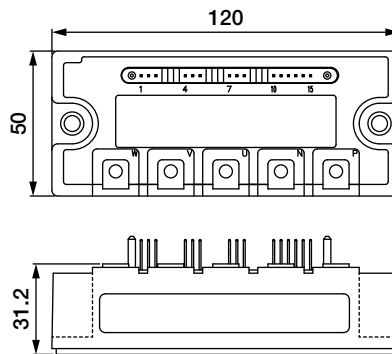
04

PM200,300CL1A/RL1A060
PM100,150CL1A/RL1A120



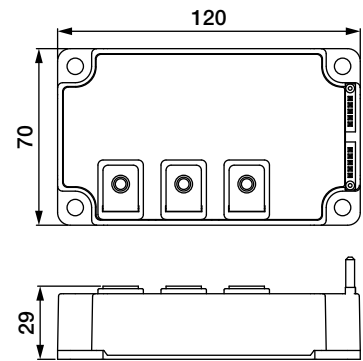
05

PM50,75,100,150,200CS1D060
PM25,50,75,100CS1D120



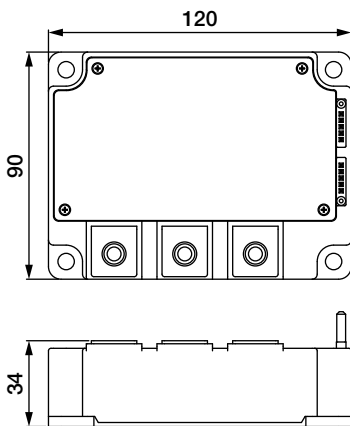
06

PM400,600DV1A060
PM200,300,450DV1A120



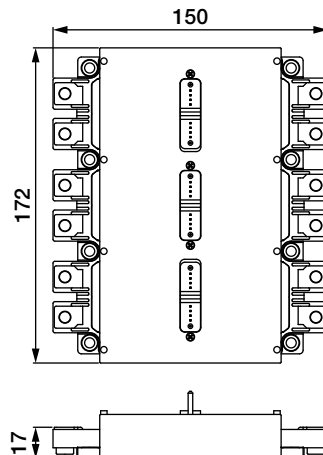
07

PM800DV1B060



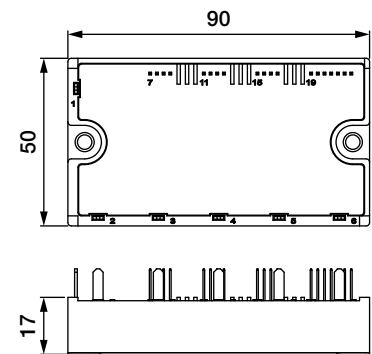
08

PM450,600CLA060
PM200,300,450CLA120



09

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

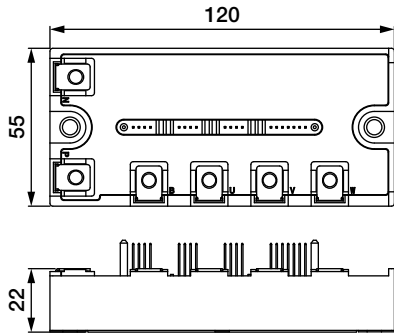


Outline Drawing of IPM

Unit:mm

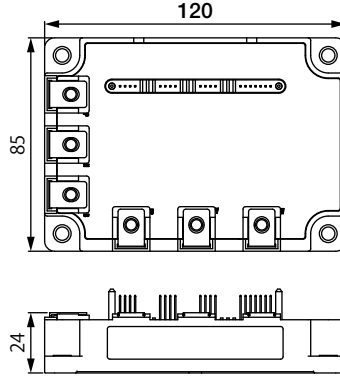
10

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



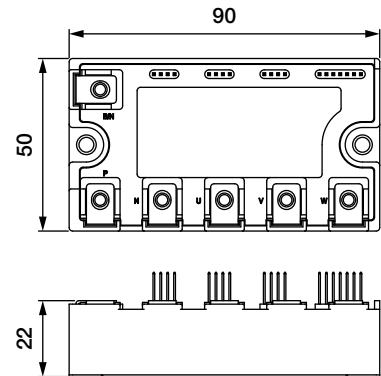
11

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



12

PM50,75,100CG1A/CG1AL065
PM50,75RG1AP065
PM25,35,50CG1A/CG1AL120
PM25,35RG1A120



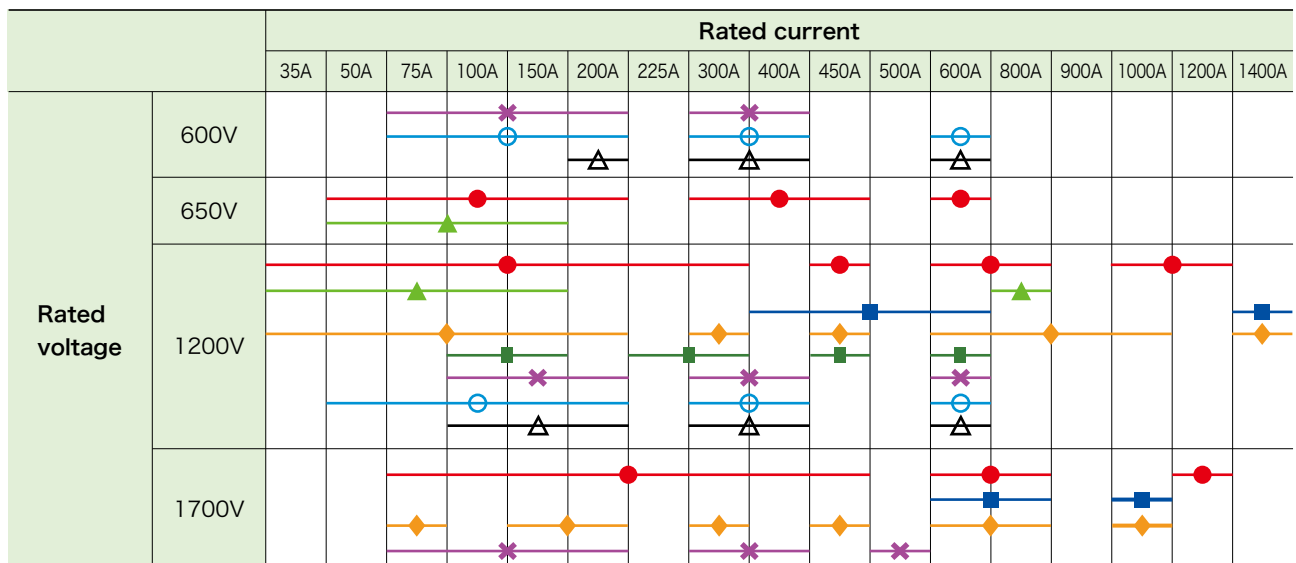
Series , Main Application

Series	Main Application
T	Motion control/Renewable energy /Power supply
T1	
For 3-level Inverters	
S	
S1	
A	
NF	
NF(NFH type)	

Data sheet here

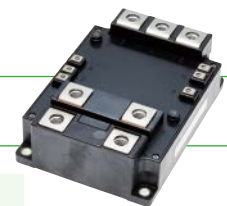


Rated Lineup



New Products

Under Development



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

IGBT module T-series (LV100 for industrial)

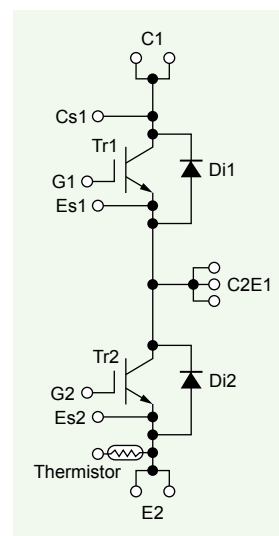
IGBT module 2in1 type

■ Lineup

800A/1700V, 800A/1700V(with enhanced FWD), 1200A/1700V
800A/1200V, 1200A/1200V 2in1 type (Under development)

<Main Features>

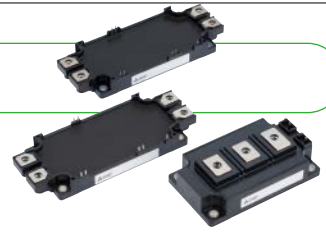
- Next generation high capacity standard package for industrial use
- Improved ease of use by applying low impedance package
- Reducing the switching loss and optimal for the applications that are used in 1 to 5KHz
- Isolation voltage 4kV





Featured Products

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



IGBT Module T/T1-Series

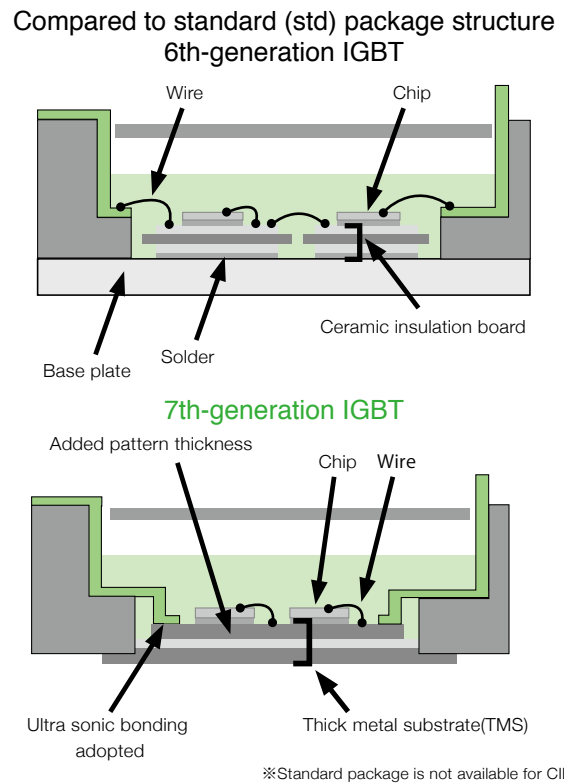
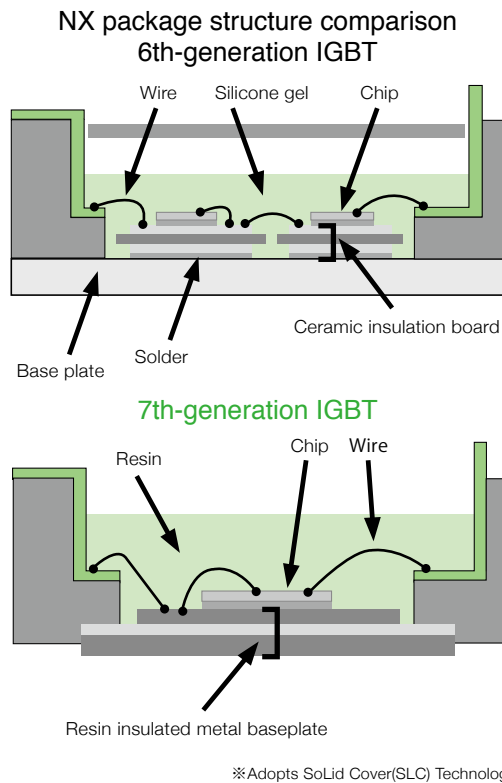
<Main Features>

- 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™² 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-TIM¹ 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

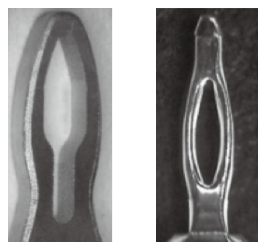
■ New structure realizes improved reliability (improved thermal cycle lifetime)



◆ 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

Lineup of IGBT Modules

Matrix of IGBT Modules 650V/600V (No.: Number of outline drawing, see page 29 to 34)

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

V _{CE(S)} (V)	650V						600V													
	T/T1-Series NX Type		Connection	No.	T-Series std Type		Connection	No.	A-Series NX Type		Connection	No.	NF-Series		Connection	No.	NF-Series NFH Type		Connection	No.
I _C (A)																				
50	CM50MXUB-13T CM50MXUB-13T1 CM50MXUBP-13T CM50MXUBP-13T1	M	42 42 46 46																	
75	CM75MXUB-13T CM75MXUB-13T1 CM75MXUBP-13T CM75MXUBP-13T1	M	42 42 46 46					CM75MX-12A	M	01			CM75TL-12NF CM75RL-12NF	T R	07 07					
100	CM100TX-13T CM100XP-13T CM100MXUB-13T CM100MXUB-13T1 CM100MXUBP-13T CM100MXUBP-13T1 CM100MXUD-13T CM100MXUD-13T1 CM100MXUDP-13T CM100MXUDP-13T1	T	33 37 42 42 46 46 44 44 48 48	CM100DY-13T	D	30		CM100MX-12A CM100RX-12A	M R	01 02			CM100TL-12NF CM100RL-12NF	T R	07 07					
150	CM150TX-13T CM150XP-13T CM150RX-13T CM150RXP-13T CM150MXUD-13T CM150MXUD-13T1 CM150MXUDP-13T CM150MXUDP-13T1	T	33 37 34 38 44 44 48 48	CM150DY-13T	D	30		CM150RX-12A	R	02			CM150DY-12NF CM150TL-12NF CM150RL-12NF	D T R	08 07 07					
200	CM200TX-13T CM200XP-13T CM200RX-13T CM200RXP-13T	T	33 37 34 38	CM200DY-13T	D	30		CM200RX-12A	R	02			CM200DY-12NF CM200TL-12NF CM200RL-12NF	D T R	08 09 09	CM200DU-12NFH	D	13		
225																				
300	CM300DX-13T CM300DXP-13T	D	28 39	CM300DY-13T	D	31		CM300DX-12A	D	03			CM300DY-12NF	D	08	CM300DU-12NFH	D	14		
400				CM400DY-13T	D	31		CM400DX-12A	D	03			CM400DY-12NF	D	10	CM400DU-12NFH	D	14		
450	CM450DX-13T CM450DXP-13T	D	28 39																	
600	CM600DX-13T CM600DXP-13T	D	28 39	CM600DY-13T	D	32							CM600DY-12NF	D	11	CM600DU-12NFH	D	15		
1000																				
Connection																				

Matrix of Power Modules for 3-level Inverter (No.: Number of outline drawing, see page 30 to 32)

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

V _{CE(S)} /V _{RRM}	1200 V IGBT Module			1700 V IGBT Module			1200 V Diode Module			1700 V Diode Module			
	T/S/S1-Series std Type		Connection	No.	S/S1-Series std Type		Connection	No.	S/S1-Series std Type		Connection	No.	
I _C /I _F													
400	CM400ST-24S1 CM400C1Y-24S	S	35										
450	CM450C1Y-24T	C1	32										
500	CM500C2Y-24S	C2	36										
600	CM600C1Y-24T	C1	32	CM600HA-34S	H	36					RM600DY-34S	D	32
800				CM800HA-34S	H	36					RM800DY-34S	D	32
1000				CM1000HA-34S	H	36							
1400	CM1400HA-24S	H	36						RM1400HA-24S*	H	36		
Connection													

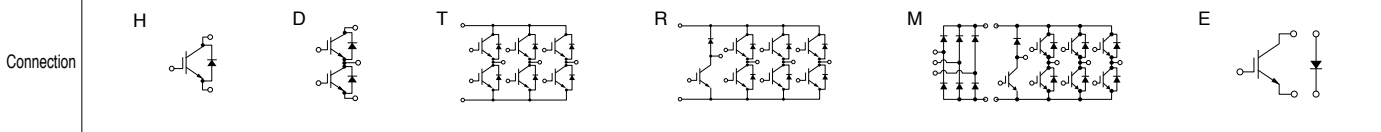
* Connection of diode module and IGBT module are different.

★: New Product

Matrix of IGBT Modules 1700V(No.: Number of Outline Drawing, see page 29 to 34)

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

V _{CEs} (V)		1700V																			
Series	T-Series LV100 Type			T-Series NX Type			T-Series std Type			S/S1-Series NX Type			S/S1-Series std Type			S/S1-Series MPD Type			A-Series std Type		
	I _c	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.	Connection	No.		
75						CM75DY-34T	D	30	CM75MXA-34SA CM75RX-34SA	M R	23 19							CM75DY-34A	D	08	
100				CM100TX-34T CM100TXP-34T	T T	33 37	CM100DY-34T	D	30									CM100DY-34A	D	08	
150				CM150TX-34T CM150TXP-34T	T T	33 37	CM150DY-34T	D	31	CM150DX-34SA CM150RXL-34SA	D R	20 21						CM150DY-34A	D	10	
200							CM200DY-34T	D	31	CM200DX-34SA CM200EXS-34SA	D E	20 24						CM200DY-34A	D	10	
225				CM225DX-34T CM225DXP-34T	D D	28 39															
300				CM300DX-34T CM300DXP-34T	D D	28 39	CM300DY-34T	D	32	CM300DX-34SA	D	20						CM300DY-34A	D	11	
400							CM400DY-34T	D	32									CM400DY-34A	D	18	
450				CM450DX-34T CM450DXP-34T	D D	28 39			CM450DXL-34SA	D	22										
500																		CM500HA-34A	H	16	
600				CM600DX-34T CM600DXP-34T	D D	28 39			CM600DXL-34SA	D	22	CM600HA-34S	H	36							
800	CM800DW-34T** CM800DW-34TA**	D D	49 49									CM800HA-34S	H	36							
1000												CM1000HA-34S	H	36	CM1000DUC-34SA	D	17				
1200	CM1200DW-34T**	D	49																		



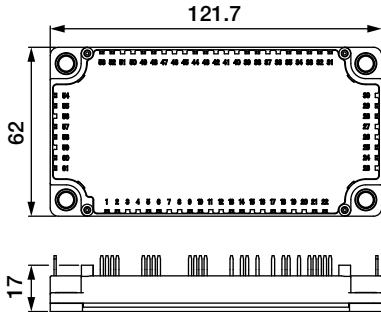
★★: Under Development

Lineup of IGBT Modules

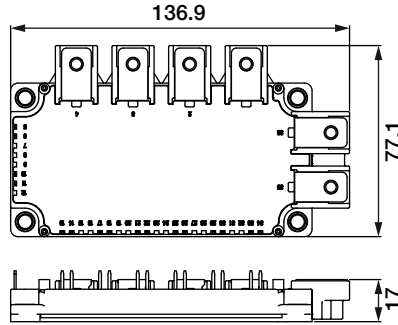
Outline Drawing of IGBT Modules

Unit:mm

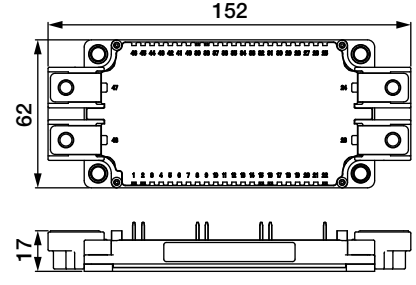
01 CM75,100MX-12A



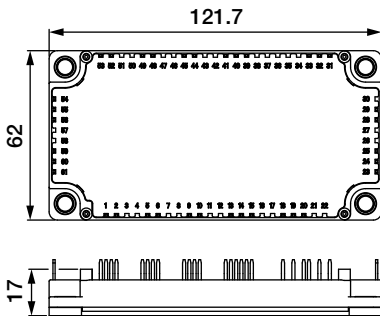
02 CM100,150,200RX-12A
CM75RX-24S



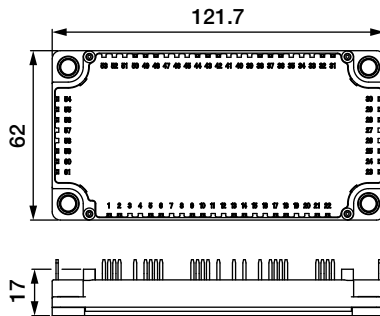
03 CM300,400DX-12A
CM150,200DX-24S



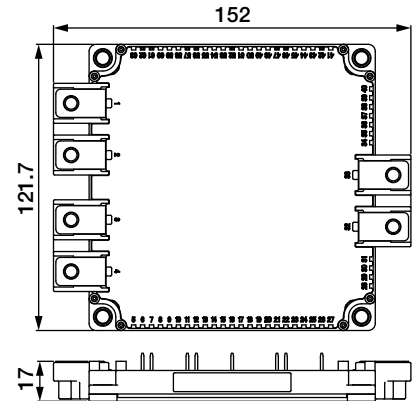
04 CM35,50,75,100MXA-24S



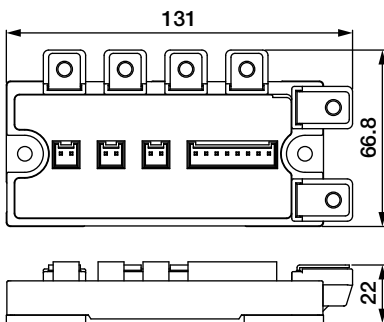
05 CM75TX-24S



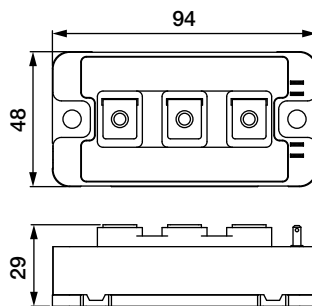
06 CM600,1000DXL-24S



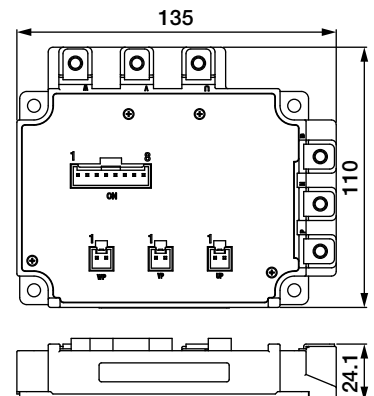
07 CM75,100,150TL/RL-12NF
CM50,75,100TL/RL-24NF



08 CM150,200,300DY-12NF
CM100,150DY-24NF
CM100,150,200DY-24A
CM75,100DY-34A
CM100,150E3Y-24NF



09 CM200TL/RL-12NF
CM150,200TL/RL-24NF

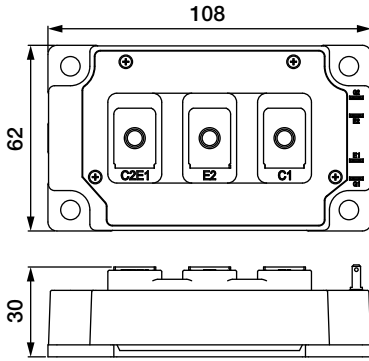


■ Outline Drawing of IGBT Modules

Unit:mm

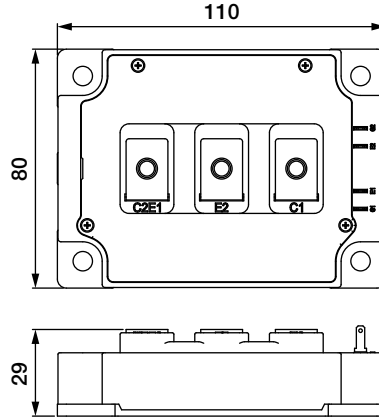
10

CM400DY-12NF
CM200DY-24NF
CM300DY-24A
CM300DY-24S
CM150,200DY-34A



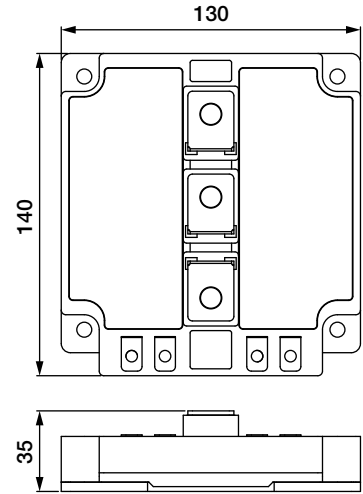
11

CM600DY-12NF CM400C1Y-24S
CM400DY-24NF CM450DY-24S
CM400,600DY-24A CM600DY-24S
CM300DY-34A CM300DY-24NF



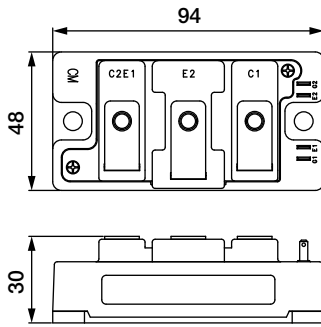
12

CM600DU-24NF
CM800DY-24S



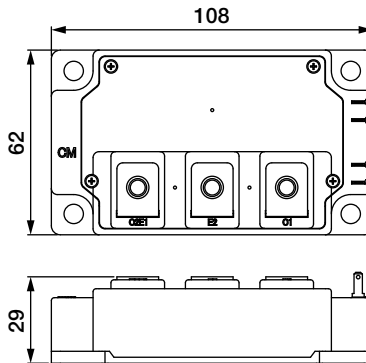
13

CM200DU-12NFH
CM100,150DU-24NFH



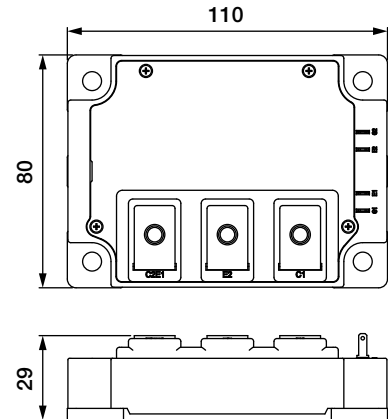
14

CM300,400DU-12NFH
CM200,300DU-24NFH



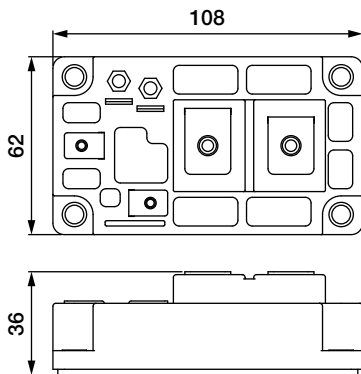
15

CM600DU-12NFH
CM400,600DU-24NFH



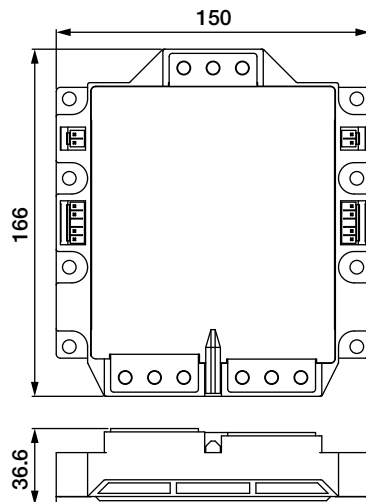
16

CM400,600HA-24A
CM500HA-34A



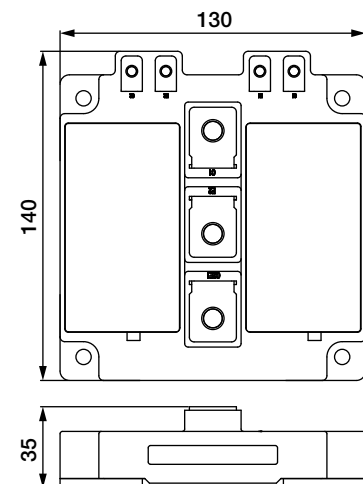
17

CM900,1400DUC-24S
CM1000DUC-34SA



18

CM400DY-34A

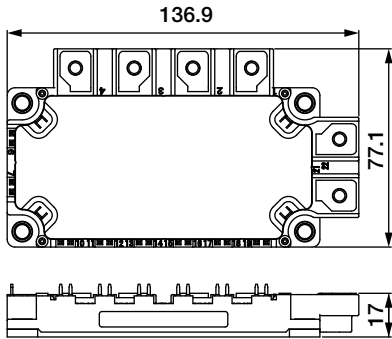


Lineup of IGBT Modules

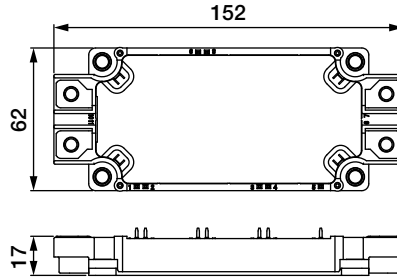
Outline Drawing of IGBT Modules

Unit:mm

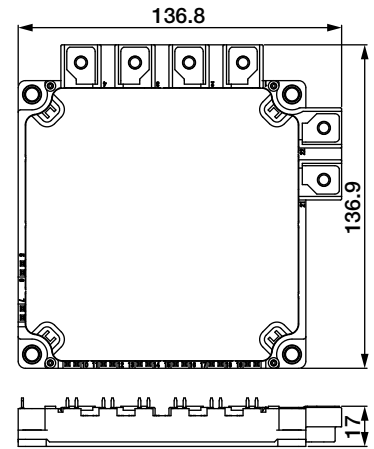
19 CM75RX-34SA



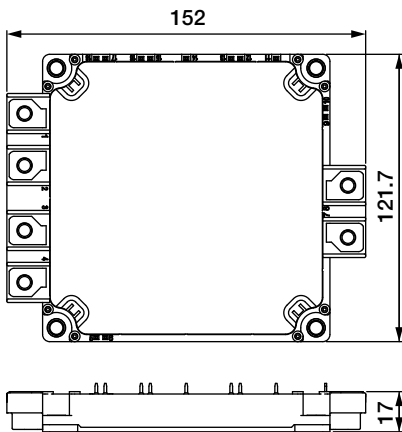
20 CM150DX-34SA
CM200DX-34SA
CM300DX-34SA



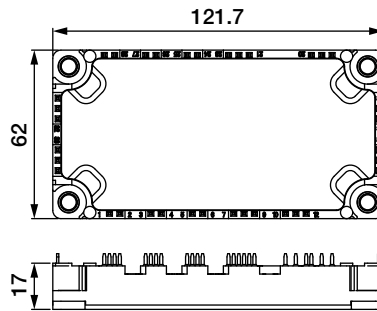
21 CM200RXL-24S
CM300RXL-24S1
CM150RXL-34SA



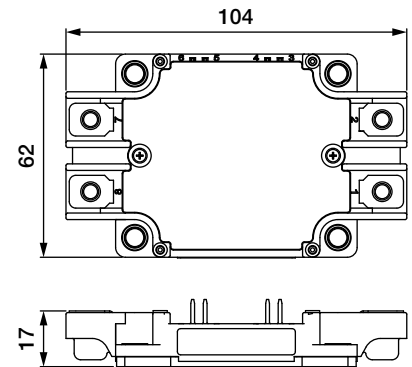
22 CM450DXL-34SA
CM600DXL-34SA



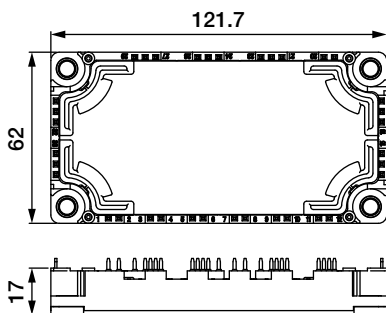
23 CM75MXA-34SA



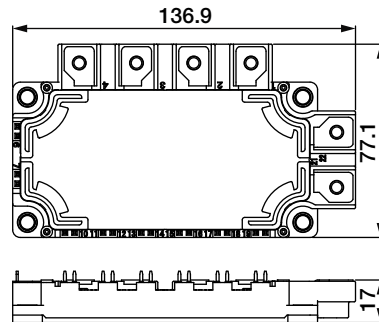
24 CM150EXS-24S
CM200EXS-24S
CM300EXS-24S
CM200EXS-34SA



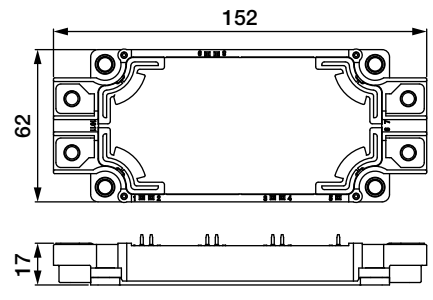
25 CM100TX-24S1
CM150TX-24S1



26 CM100RX-24S1
CM150RX-24S1

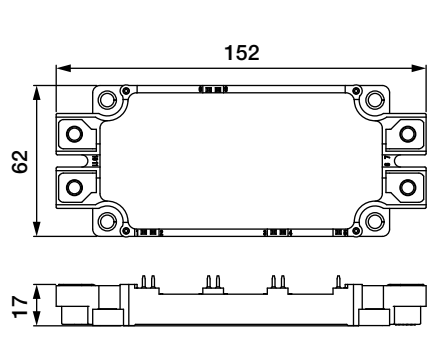
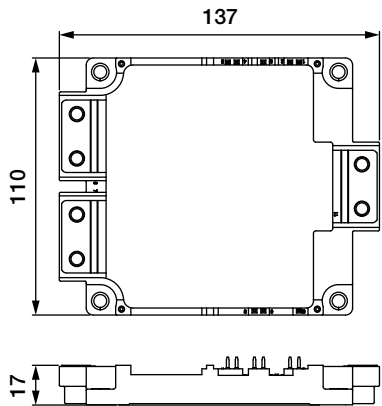
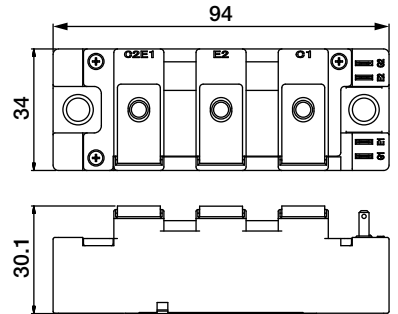
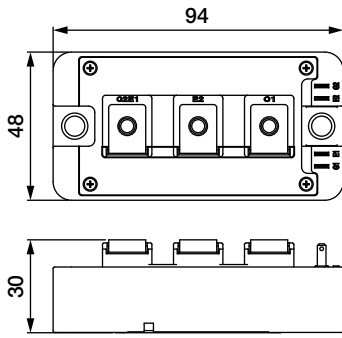
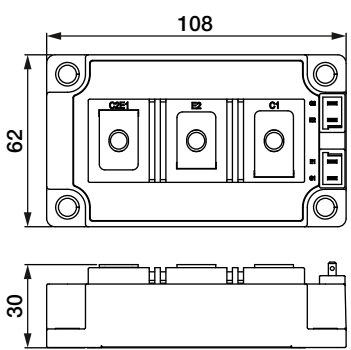
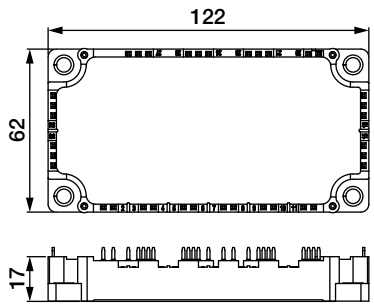
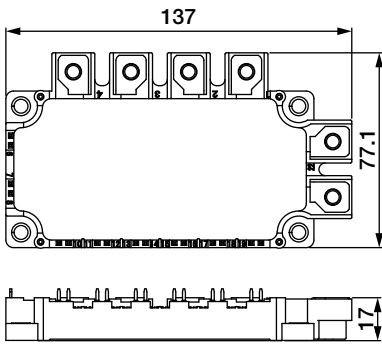
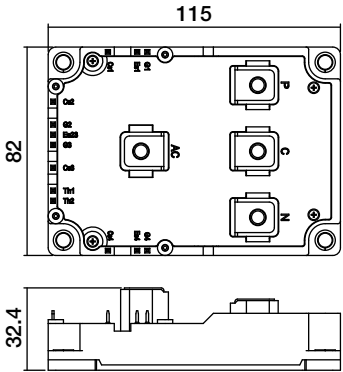
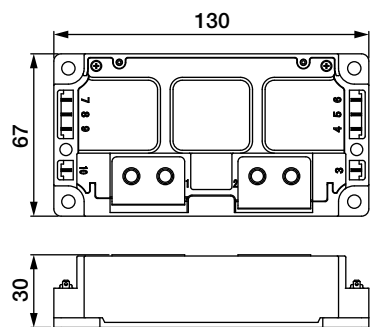


27 CM225DX-24S1
CM300DX-24S1
CM450DX-24S1
CM600DX-24S1



Outline Drawing of IGBT Modules

Unit:mm

<p>28</p> <p>CM300,450,600DX-13T CM225,300,450,600DX-24T CM800DX-24T1 CM225,300,450DX,600DX-34T</p> 	<p>29</p> <p>CM1000DX-24T</p> 	<p>30</p> <p>CM100,150,200DY-13T CM100,150DY-24T CM75,100DY-34T</p> 
<p>31</p> <p>CM300,400DY-13T CM200,300DY-24T CM150,200DY-34T</p> 	<p>32</p> <p>CM600DY-13T CM450,600DY-24T CM450,600C1Y-24T CM300,400DY-34T RM600,800DY-34S</p> 	<p>33</p> <p>CM100,150,200TX-13T CM100,150,200TX-24T CM100,150TX-34T</p> 
<p>34</p> <p>CM150,200RX-13T CM100,150RX-24T</p> 	<p>35</p> <p>CM400ST-24S1</p> 	<p>36</p> <p>CM500C2Y-24S CM1400HA-24S CM600,800,1000HA-34S RM1400HA-24S</p> 

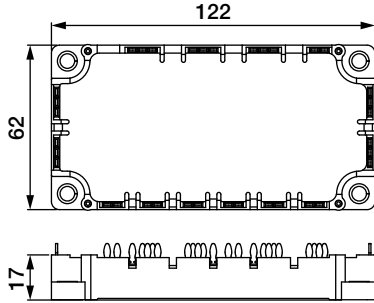
Lineup of IGBT Modules

Outline Drawing of IGBT Modules

Unit:mm

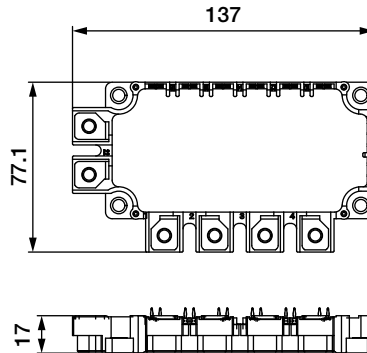
37

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



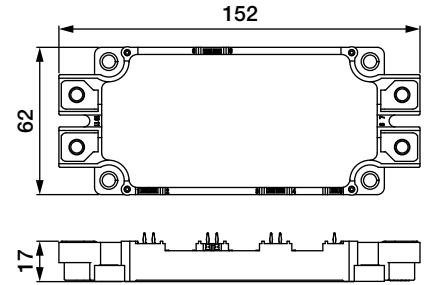
38

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



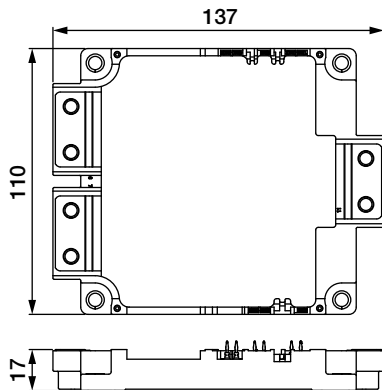
39

CM300,450,600DXP-13T
CM225,300,450,600DXP-24T
CM800DXP-24T1
CM225,300,450,600DXP-34T



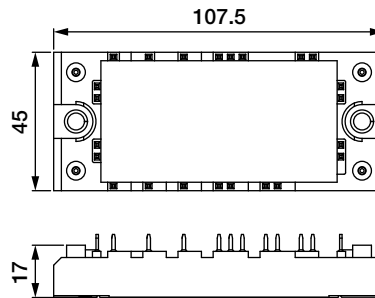
40

CM1000DXP-24T



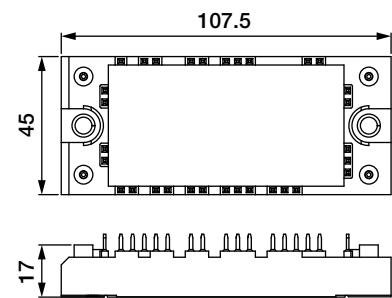
41

CM35,50MXUA-24T/24T1



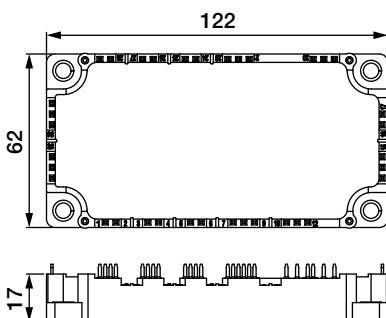
42

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



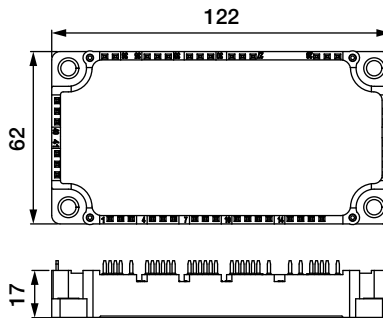
43

CM75,100MXUC-24T/24T1



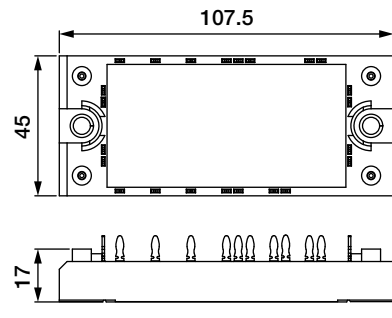
44

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



45

CM35/50MXUAP-24T/T1

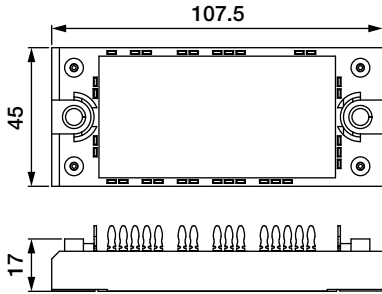


■ Outline Drawing of IGBT Modules

Unit:mm

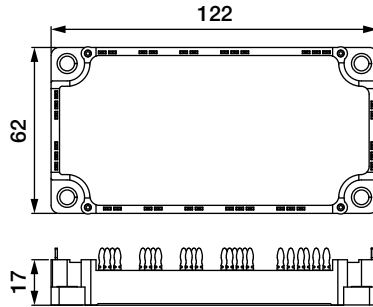
46

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



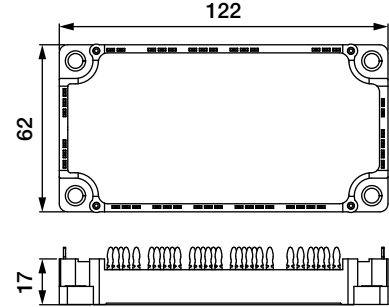
47

CM75/100MXUCP-24T/T1



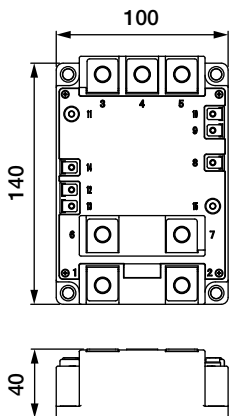
48

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



49

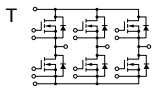
CM800,1200DW-24T
CM800,1200DW-34T/TA



Lineup of MOSFET Modules

Series Matrix of MOSFET Modules

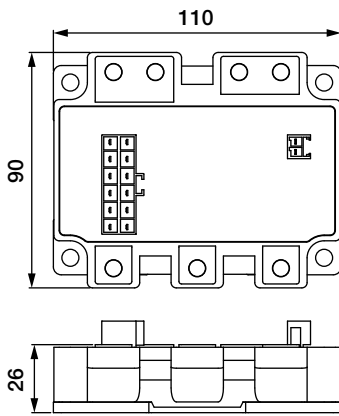
RoHS directive (2011/65/EU, (EU)2015/863) compliant

V _{bss} I _b (A)	75V		100V		150V	
		Connection		Connection		Connection
100	FM200TU-07A	T	FM200TU-2A	T	FM200TU-3A	T
200	FM400TU-07A	T	FM400TU-2A	T	FM400TU-3A	T
300	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



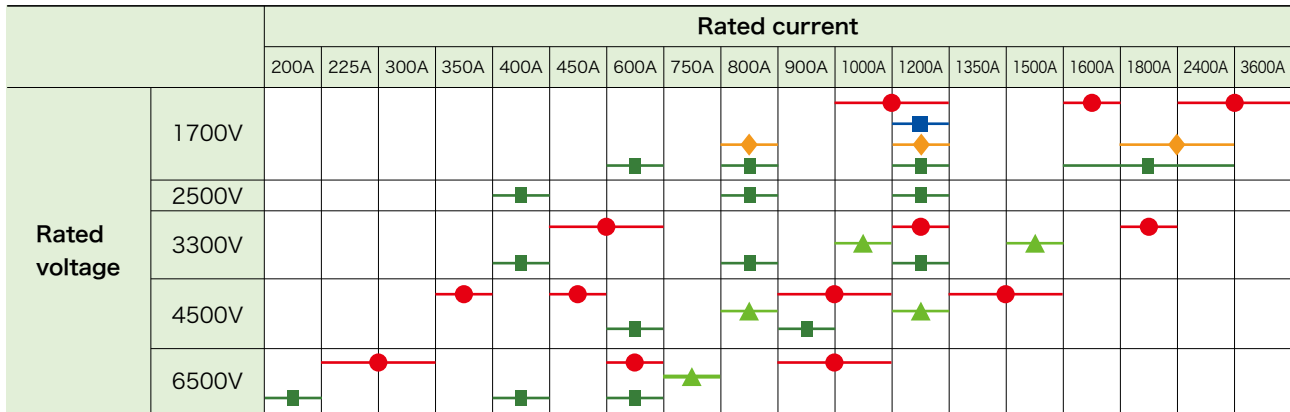
Series , Main Application

Series	Main Application
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^{*1} diode
- Industry-leading power^{*2} for increased inverter capacity
- External size reduced 33% while maintaining the same voltage resistance and rated current as conventional products,^{*3} contributing to inverter downsizing
- Optimal package internal structure realizes improved heat dissipation, humidity resistance and flame retardance, increasing product life

*1 RFC : Relaxed field of cathode

*2 3.3kV - 6.5kV (as of Apr. 1, 2020 based on Mitsubishi Electric research)

*3 Comparison of X Series CM1200HC-66X and H Series CM1200HC-66H

Product lineup

std type	1.7kV	3.3kV	4.5kV	6.6kV
	1200A 1600A 2400A	1200A	900A 1000A	600A
	2400A 3600A	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^{*1} diode
- Industry's highest 3.3kV/600A Si module power density of 8.57A/cm²^{*4} 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

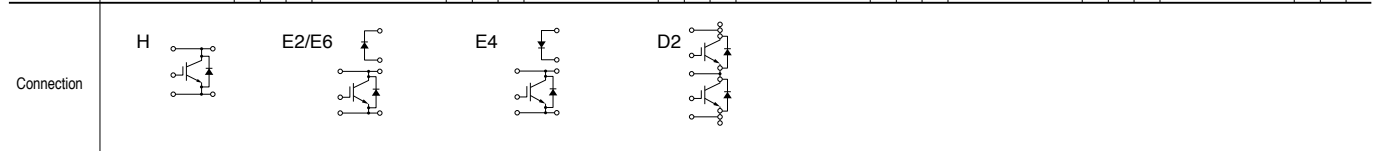
*4 As of Apr. 1, 2020 based on Mitsubishi Electric research

Product lineup

LV100	1.7kV	3.3kV	HV100	3.3kV	4.5kV	6.6kV
	1000A	450A		450A	350A	225A
	1200A	600A		600A	450A	300A

Series Matrix of HVIGBT(No.: Number of Outline Drawing, see page 39 to 40)

V _{CEs} (V) I _c (A)	4500V												6500V															
	X-Series				R-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.					
200A																									CM200HG-130H	H	G	05
225A													CM225DG-130X**(*)	D2	G	10												
300A													CM300DG-130X**(*)	D2	G	10												
350A	CM350DG-90X**(*)	D2	G	10																								
400A																									CM400HG-130H	H	G	07
																									CM400E2G-130H	E2	G	06
																									CM400E4G-130H	E4	G	06
450A	CM450DG-90X**(*)	D2	G	10																								
600A									CM600HG-90H	H	G	07	CM600HG-130X**	H	G	07	CM600HGB-130X**	H	G	06	CM600E4G-130X**	E4	G	06				
																									CM600HG-130H	H	G	06
750A																					CM750HG-130R	H	G	06				
800A					CM800HC-90R	H	C	03	CM800HG-90R	H	G	07																
900A	CM900HC-90X**	H	C	03									CM900HG-90H	H	C	04	CM900HG-90H	H	G	06	CM900HG-130X*	H	G	06				
	CM900HG-90X*	H	G	07																								
	CM900HGB-90X**	H	G	06																								
	CM900E4G-90X**	E4	G	06																								
1000A	CM1000HG-90X*	H	G	07																	CM1000HG-130XA	H	G	06				
1200A					CM1200HC-90R	H	C	04	CM1200HC-90RA	H	C	04																
					CM1200HG-90R	H	G	06																				
1350A	CM1350HC-90X*	H	C	04																								
	CM1350HG-90X*	H	G	06																								
1500A	CM1500HC-90XA	H	C	04																								
	CM1500HG-90X*	H	G	06																								



[Type]

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

★★: Under Development ★: New Product
 (*)Type name may change during development.
 Please check the latest information on the website.

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

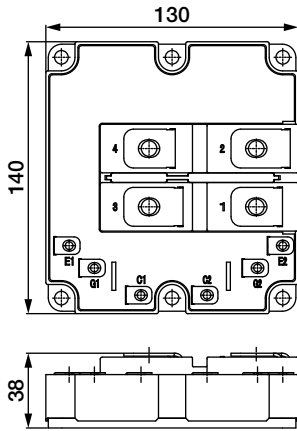
Lineup of HVIGBT Modules

Outline Drawing of HVIGBT Modules

Unit:mm

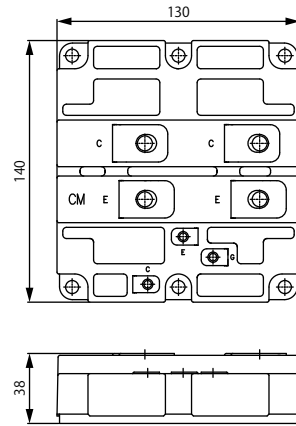
01

CM1200DC-34N/S
CM800DZB-34N
CM600DY/E2Y-34H
CM800DZ-34H



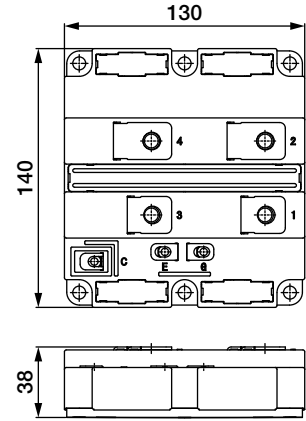
02

CM1200,1600HC-34H



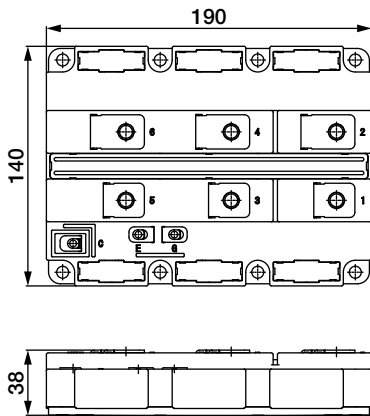
03

CM1200E4C-34X
CM1600,2400HC-34X
CM1200HC-66X
CM900HC-90X
etc.



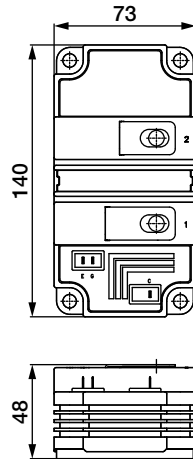
04

CM2400HCB-34X, CM3600HC-34X
CM1200E4C-66X, CM1200HCB-66X
CM1800HC-66X, CM1350HC-90X
CM1500HC-90XA
etc.



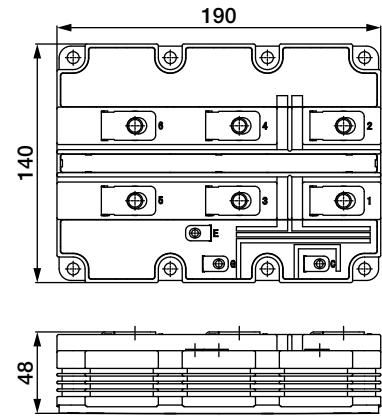
05

CM400HG-66H
CM200HG-130H



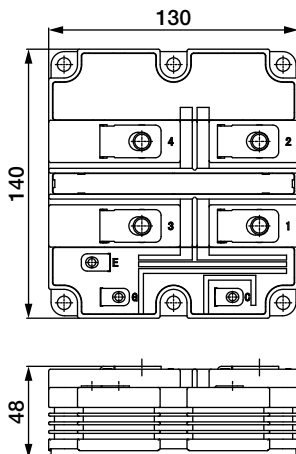
06

CM1800HG-66X, CM900HGB-90X,
CM900E4G-90X, CM1350HG-90X,
CM1500HG-90X, CM600HGB-130X,
CM600E4G-130X, CM900HG-130X,
CM1000HG-130XA
etc.



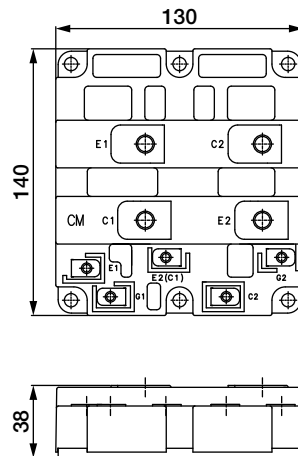
07

CM900, 1000HG-90X
CM800HG-90R
CM600HG-90H/130X
CM400HG-130H



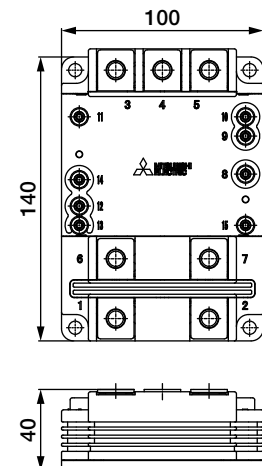
08

CM400DY-50H/66H



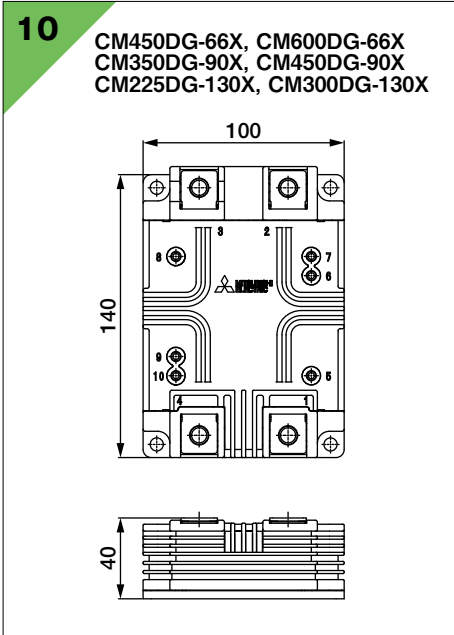
09

CM1000DC-34X, CM1200DC-34X
CM450DC-66X, CM600DC-66X




10 Outline Drawing of HVIGBT Modules

Unit:mm



HV DIODE Modules

Series , Main Application

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

Data sheet here

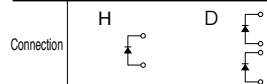


Rated Lineup

Rated voltage		Rated current												
		200A	250A	300A	400A	450A	600A	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 42)

V _{PRM}	I _F (A)	1700V			3300V			4500V			6500V										
		Connection	Type	No.	Connection	Type	No.	Connection	Type	No.	Connection	Type	No.								
	200													RM200DG-130S	D	G	13				
	250																	RM250DG-130F	D	G	13
	300																	RM300DG-90S	D	G	13
	400																	RM400DG-66S	D	G	13
	450																	RM400DY-66S	D	B	14
	600																	RM400DG-90F	D	G	13
	800																	RM450DG-90X*	D	G	13
	900																	RM450DG-130X**	D	G	13
	1000																	RM600DY-66S	D	B	14
	1200																	RM600DC-66X*	D	C	14
	1500																	RM600DG-66X**	D	G	13
	1800																	RM600DG-130S	D	G	13
																		RM600DG-130X**	D	G	13
																		RM800DC-34X**	D	C	11
																		RM800DG-90F	D	G	13
																		RM900HC-90S	H	C	13
																		RM900DB-90S	H	C	14
																		RM900DG-90X**	D	G	13
																		RM900DB-90S	D	B	14
																		RM900DG-90X**	D	G	13
																		RM1000DC-66F	D	C	14
																		RM1000DG-130XA*	D	G	13
																		RM1200DG-66S	D	G	13
																		RM1200HE-66S	H	C	12
																		RM1200DB-66S	D	B	14
																		RM1200DC-66X**	D	C	14
																		RM1200DG-66X*	D	G	13
																		RM1200DG-90F	D	D	13
																		RM1500HE-66F	H	C	12
																		RM1500DC-90X**	D	C	14
																		RM1500DG-90X**	D	G	13
																		RM1800HE-34S	H	C	12



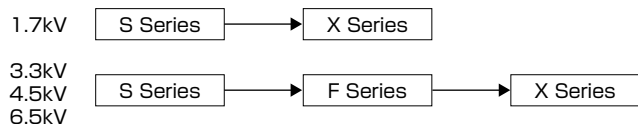
[Type]

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

★: New product ★★: Under Development

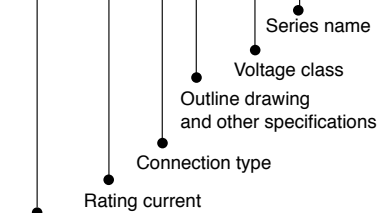
The outline drawing is written the figure of principal part numbers that have a common dimension.

Evolution of HV DIODE Module Series



Type Name Definition of IGBT Modules

RM 1200 D G -66 X



CM: IGBT, RM: DIODE, PM: IPM

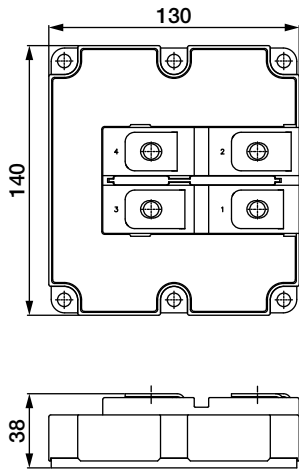
Lineup of HVDIODE Modules

Outline Drawing of HVDIODE Modules

Unit:mm

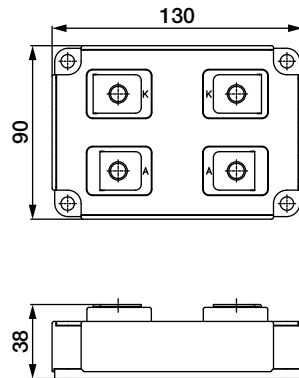
11

RM800,1200DC-34X
RM1200DB-34S



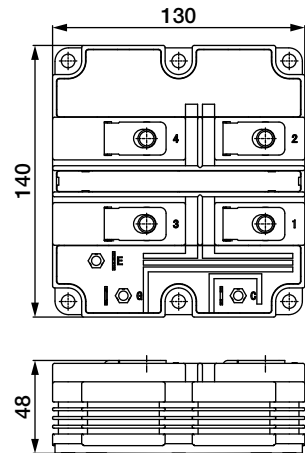
12

RM1800HE-34S, RM1500HE-66F
RM1200HE-66S, RM600HE-90S



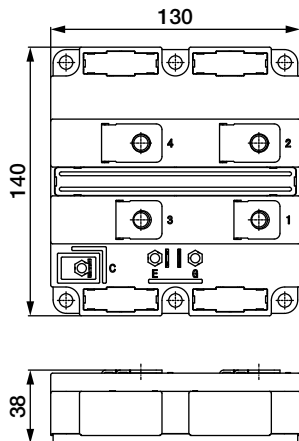
13

RM600/900/1200DG-66X
RM450/900/1500DG-90X
RM300/450/600DG-130X
RM1000DG-130XA
etc.





14

RM600,1200DC-66X
RM1500DC-90X
RM1000,1500DC-66F
RM400,600DY-66S
RM1200DB-66S, RM900DB/HC-90S






Power Modules for xEV

Series , Main Application

Series	Main Application
J1 	xEV
J 	

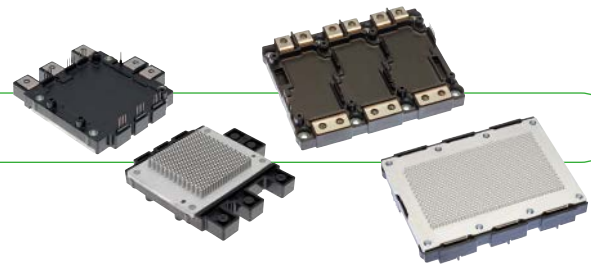
Rated Lineup

		Rated current			
		300A	600A	700A	1000A
Rated voltage	650V				
	1200V				



Featured Products

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



J1 Series / High Power J1 Series power Modules for xEV

CT600C1A060-A, CT700CJ1A060-A
CT1000CJ1B060, CT600CJ1B120

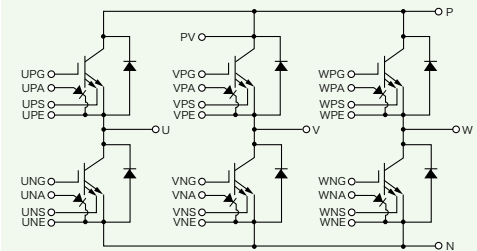
<Main Features>

- 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

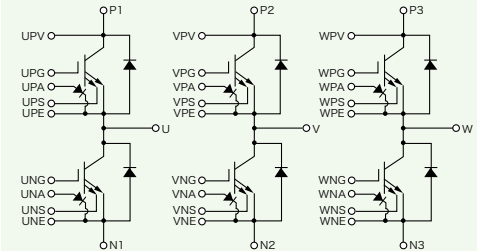
*CSTBT™: Mitsubishi Electric's unique IGBT that utilizes the carrier cumulative effect.

Block Diagram

J1 Series



High Power J1 Series



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

J Series T-PM (Transfer-molded Power Module)

- Structure incorporates transfer molding and original direct lead bonding(DLB) technique
- DLB structure reduces internal wiring resistance and inductance
- Completely Pb-free (including the pins)

Matrix of 650V Power Modules

V _{CEs} (V)	650V					
I _c (A)	J1 Series			J Series		
	Power Module with pin fin	Connection	No.	T-PM	Connection	No.
300	-	-	-	CT300DJG060	D	02
600	CT600CJ1A060-A	C	01	-	-	-
700	CT700CJ1A060-A	C	01	-	-	-
1000	CT1000CJ1B060	C	03	-	-	-
Connection						

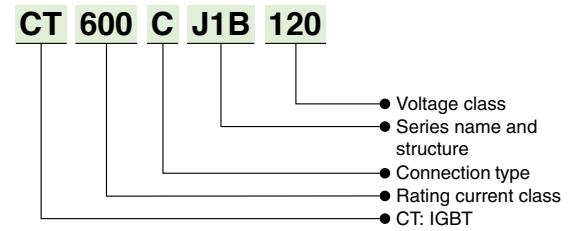
★★: Under Development

Matrix of 1200V Power Modules

V _{CEs} (V)	1200V			
I _c (A)	J1 Series			
	Power Module with pin fin	Connection	No.	
300	CT300CJ1A120-A★★	C	01	
600	CT600CJ1B120	C	03	
Connection				

★★: Under Development

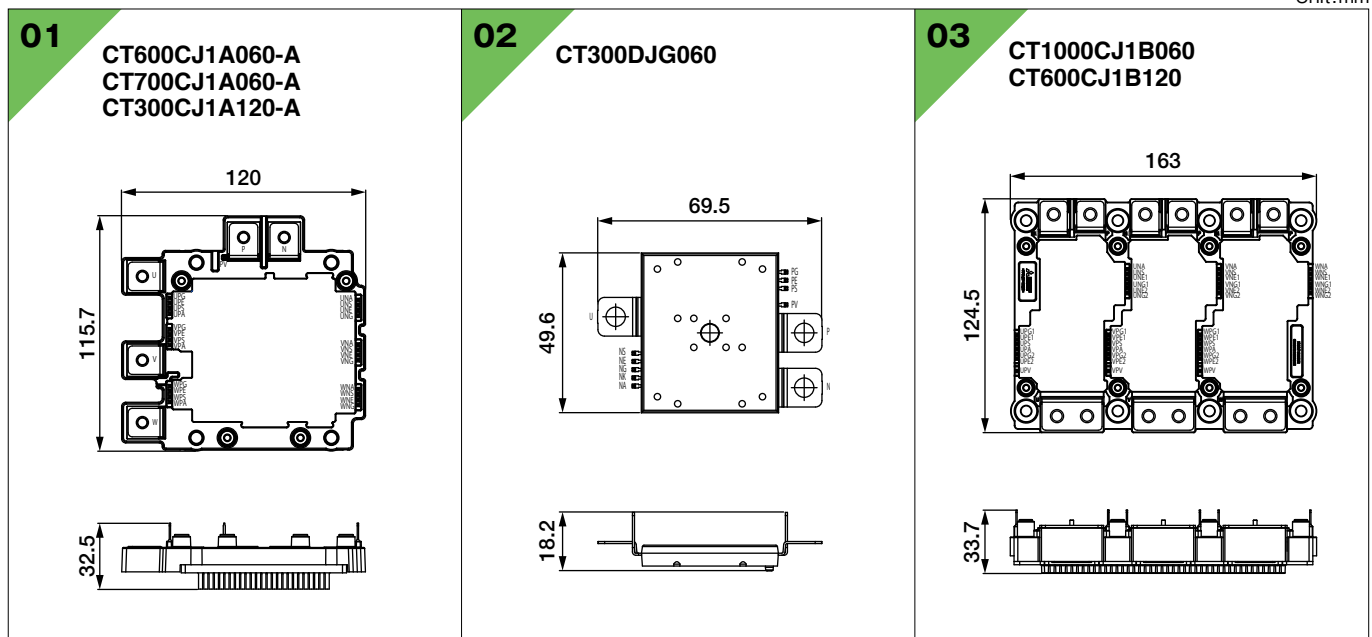
Type Name Definition of Power Modules for xEV



NOTE: In case of CT1000CJ1B060 and CT600CJ1B120, each pair of arms is not connected internally.

Outline Drawing of Power Modules for xEV

Unit:mm



Mitsubishi Electric Semiconductors & Devices Website

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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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