

### The search for state-of-the-art technology has landed on energy-savings and environmental protection.

Mitsubishi Power Devices meets demands for energy-saving and eco-friendly semiconductors with advanced technology and a diversified product lineup. Industrial use, Traction, Home appliances ... wherever electric power or motor control is needed, we have the means and tools to oblige including industry-first DIP-IPM (Dual-In-line Package Intelligent Power Module).

**Power Modules**  
**High Power Devices**  
**High Voltage Integrated Circuits**  
**Transistor-Array**



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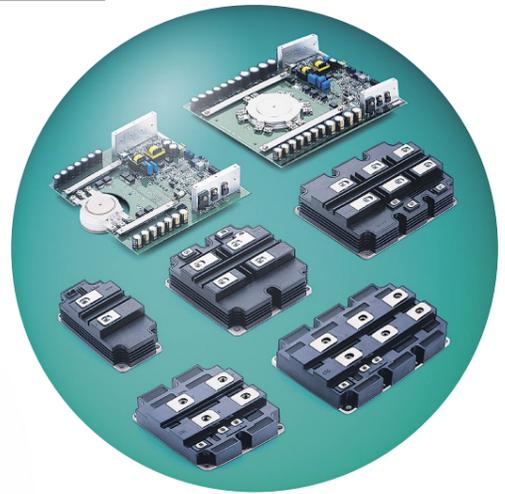
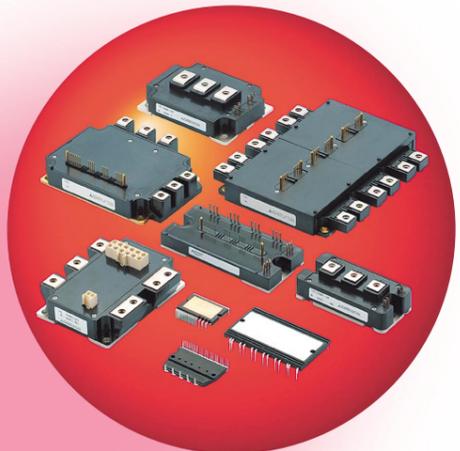
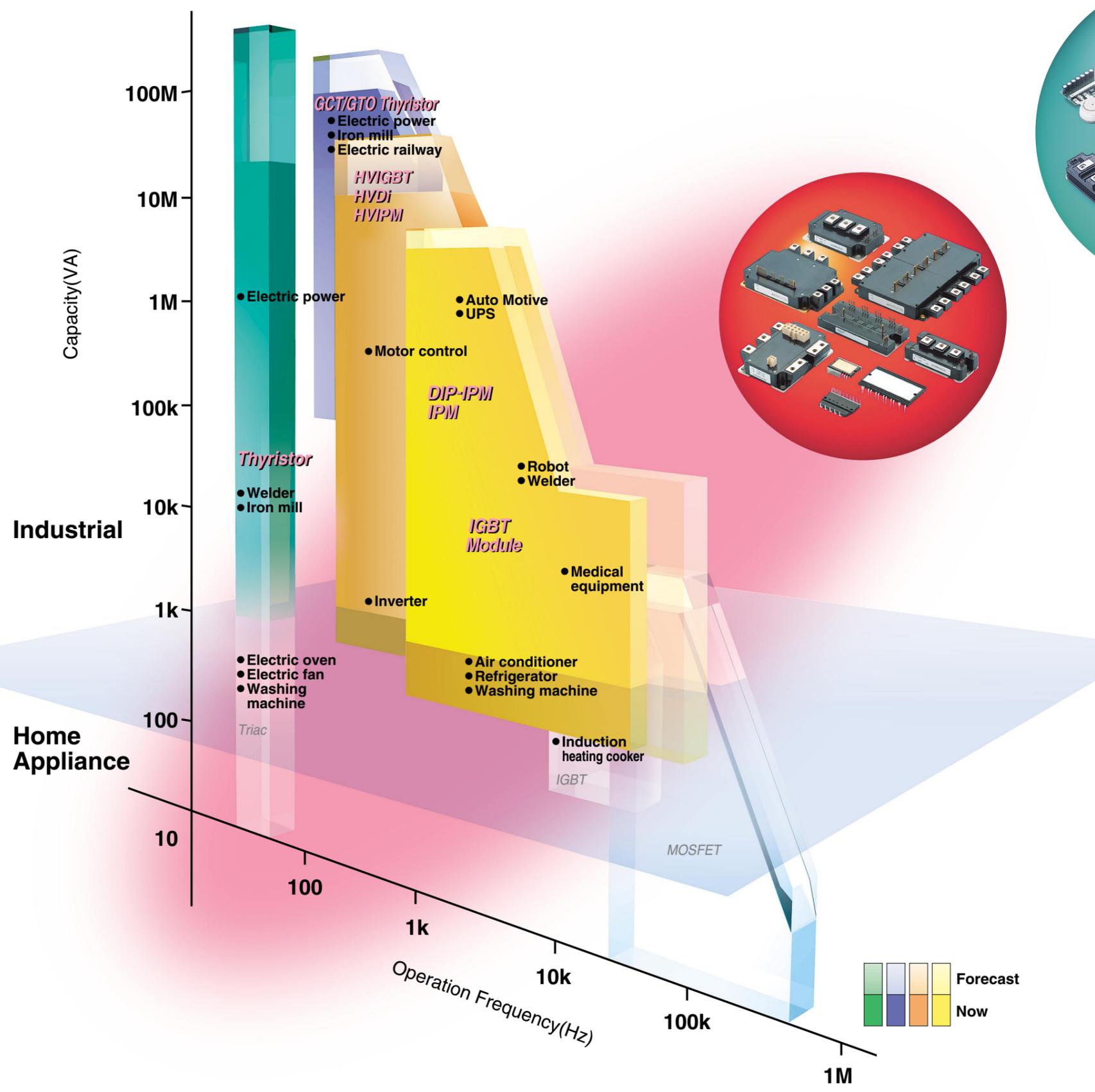
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# Application

# Power Device Offer Unlimited Application Potential.

Mitsubishi Power Devices are widely applied to various fields, such as industrial, electric railway, office automation, household power appliances and motor controls. For the power devices, we also plan to improve energy efficiency, develop the technology for reduction of power consumption and increase the product lineup.



■ Main application & products

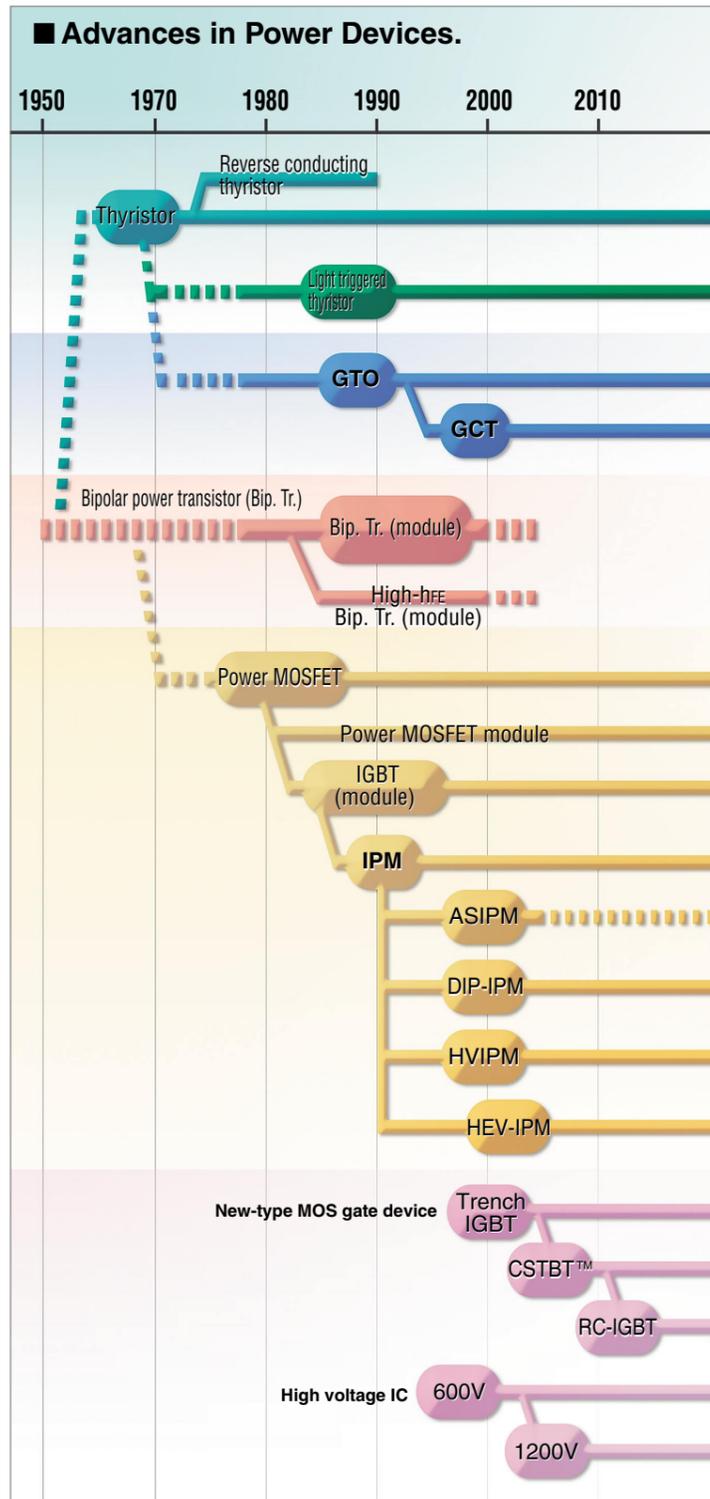
	DIP-IPM	IPM	IGBT Module	GCT/GTO Thyristor	Thyristor	HVIGBT HVIPM
Industrial use	Electric power					
	Iron mill					
	Electric railway *1					
	Auto motive *1					
	UPS					
	Inverter					
	Motor control					
	Welder					
Home Appliance	Medical equipment					
	Air conditioner					
	Refrigerator					
Washing machine						

\*1 : This is limited to the case when the relevant mutual parties can confirm and agree with the operating conditions, quality control and guarantee system.

# Trends in Power Device Technology

Technological progress of power devices has a close relationship with their market needs. That is, they are always required to be less noisy, higher efficient, smaller size, lighter weight, more advanced in function, more accurate, and larger capacity.

In order to meet these needs precisely, Mitsubishi is now accelerating the improvement of her existing devices and the research and development of new devices. Mitsubishi is making energetic efforts to develop and commercialize IGBT modules, IPMs in particular.



## Actual Principle of CSTBT™

CSTBT™ has achieved an extremely low-loss structure by advancing a conventional trench structure IGBT.

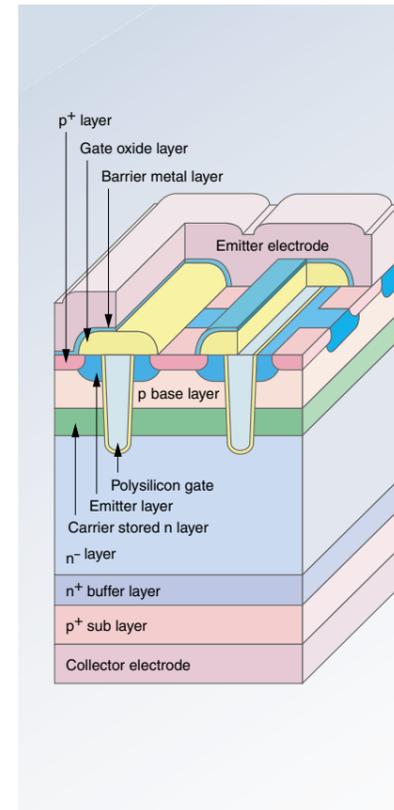
In addition to the conventional trench structure, CSTBT™ has a carrier stored n layer to accumulate carriers as shown in the diagram in the right. The concentration of n layer (conservation of charge layer) connected with p base layer is higher than that of n<sup>-</sup> layer, and the internal electric potential difference between p base and n layer is higher than that of p base and n<sup>-</sup> layer.

This high internal electric potential serves as a barrier to prevent holes infused from p<sup>+</sup> layer to n<sup>-</sup> layer from going through to the emitter side. In short, holes can be stored on the emitter side of an element by the conservation of charge layer, and the n layer controls the shift of holes to the p base layer.

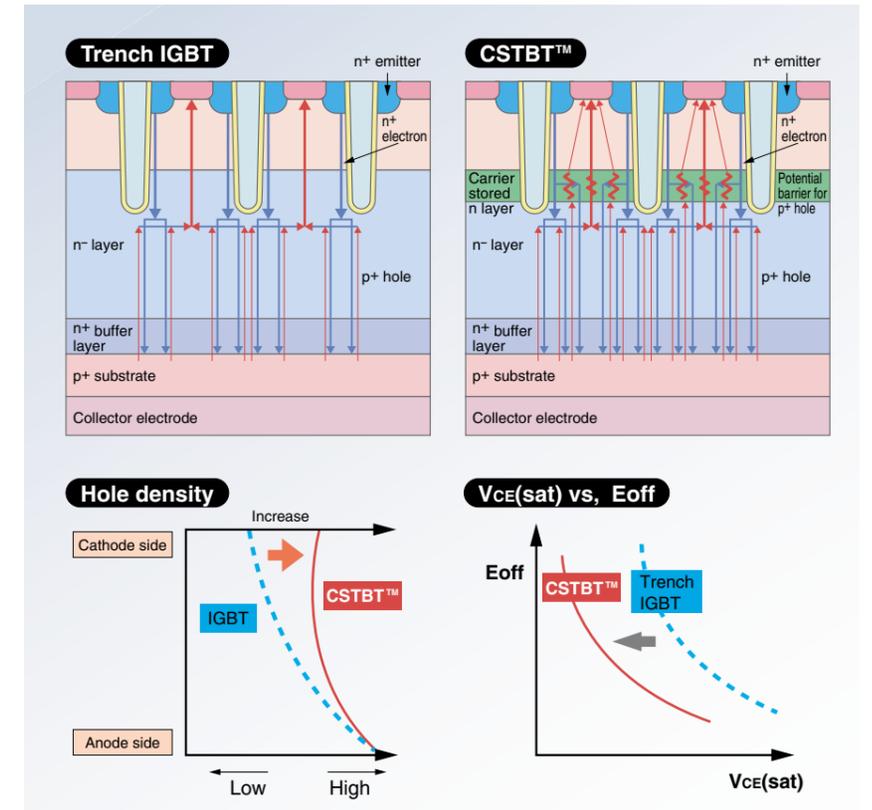
This conservation of charge function drastically improves on-state characteristics of CSTBT™, comparing to the trench structure IGBT. Increasing the carriers density on the emitter side and decreasing the impedance in silicon made on-state voltage reduction possible.

CSTBT™ : Mitsubishi's original IGBT utilizing the novel carrier storage effect

## CSTBT™ chip structure



## Comparison of trench IGBT and CSTBT™



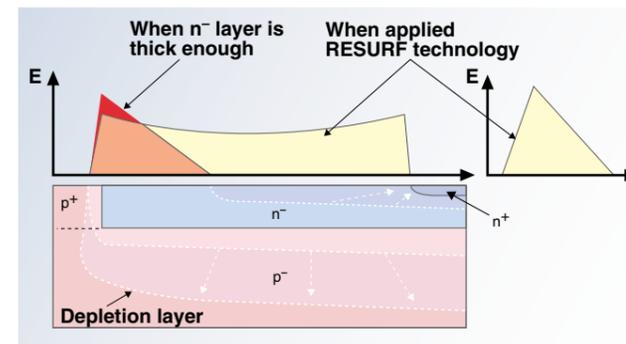
## High Voltage Technology of 1200V HVIC

As for the withstand voltage of a single chip, 600V was the limits conventionally because the appeared pn junction on the chip surface would be destroyed by the deflection of distribution of the surface electric field. (So that they surrendered by deflection of distribution of a surface electric field, and the pn junction that cropped out in chip surface destroyed it.) However, We equalized distribution of the surface electric field by using MFFP\*1 structure to scatter the electric field, and using RESURF\*2 structure to restrain concentration of an electric field and realized a withstand voltage of 1,200V.

\*1 : Multiple Floating Field Plate  
\*2 : REduced SURface Field

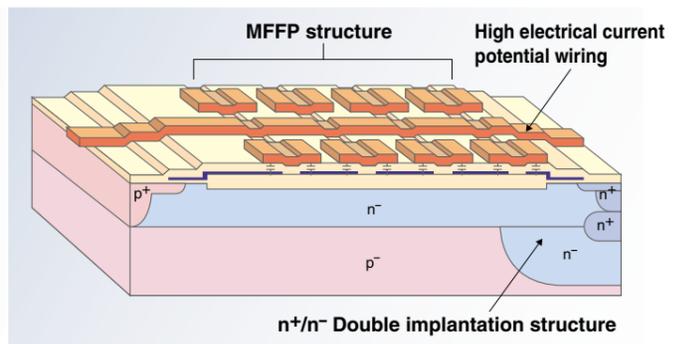
## RESURF(REDUCED SURFACE FIELD)Structure

- The depletion layer from a base lengthen the depletion layer from the surface pn junction forcibly and relax surface electric field. This greatly raises the withstand voltage of a surface pn junction.



## MFFP and Double implantation structure

- MFFP: Capacity combination between floating field plate electrodes formed by double structure of Al and Poly-Si relaxes surface electric field and performs shielding of an electric field generated by high voltage potential wiring.
- Double implantation structure: It raises the junction voltage to a base over 600V.



# Power Modules

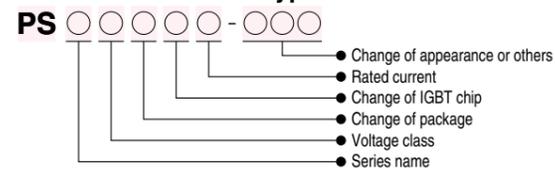
## The Industry's Leading Technologies and a Wide Range Products

The power module is a compound type semiconductor that is installed in a package after wiring semiconductor chips to meet the application and specifications. Power modules are classified into diodes, thyristors, IGBT and IPM (Intelligent Power Module) according to the type of chips installed. Since 1978, when we placed these power modules in practical use, Mitsubishi has always been endeavoring to extend the corresponding market through developing new devices. In recent years, the demand for IGBT modules and IPMs has rapidly increased and we are exerting ourselves to develop products and improve product characteristics in this field.

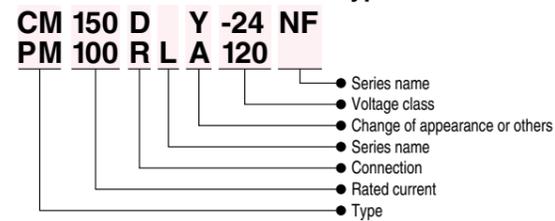
### ■ Features:

- New package-design for less environmental pollution which also contributes to energy savings due to reduced power loss.
- Creeping distance is long and the dielectric strength is high (1500V to 3000V).
- Since we offer a variety of models in terms of voltage, current, wiring pattern, etc., our power modules can be used in a wide range of applications from inverters, choppers and uninterruptible power supplies (UPS's).
- Compliance with international standard (UL1557) has already been certified (Yellow Card No. E80276, File No.E80271)(except apart of products).
- The ease of both installation and wiring due to the design allows application equipment to be reduced in dimensions and weight.

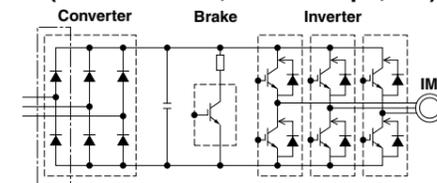
### ■ Codes for DIP-IPM type name



### ■ Codes for Power Module type name

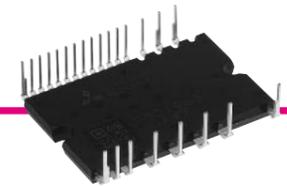


### ■ Application of IPM/IGBT to AC motor controls (VVVF Inverter, Servo Amps, etc)



# DIP-IPM

## Dual In-Line Package Intelligent Power Module



**Strongly support the miniaturization and the power saving of home electric appliances and Low power industrial equipments.**

DIP-IPM series are being used widely in both the home appliance such as air conditioners, refrigerators and washing machines, and capacity industrial equipment such as inverter, servo motor etc.. It contributes greatly to the power saving and the miniaturization. Moreover, 1200V series have been newly added to the lineup of present 600V series.

### ■ Application

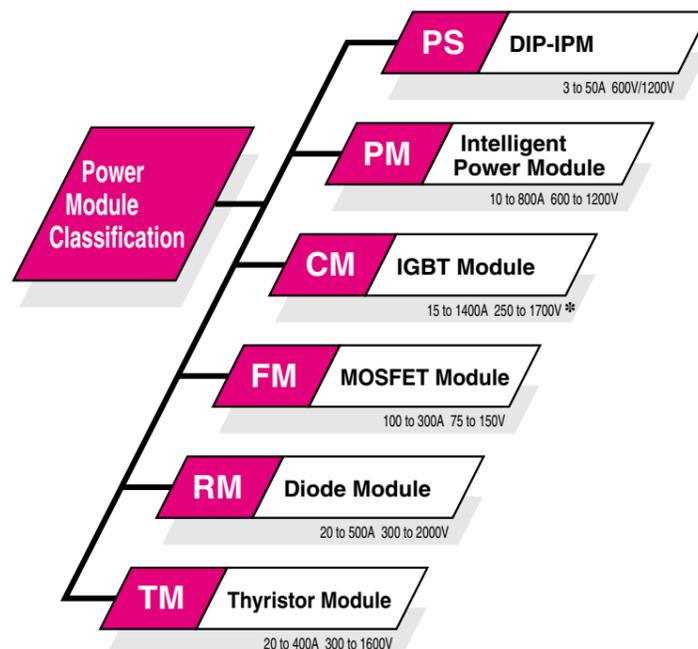
- Air conditioner, refrigerator, washing machine, and package air conditioner.
- Low power industrial motor drive.

### ■ Features

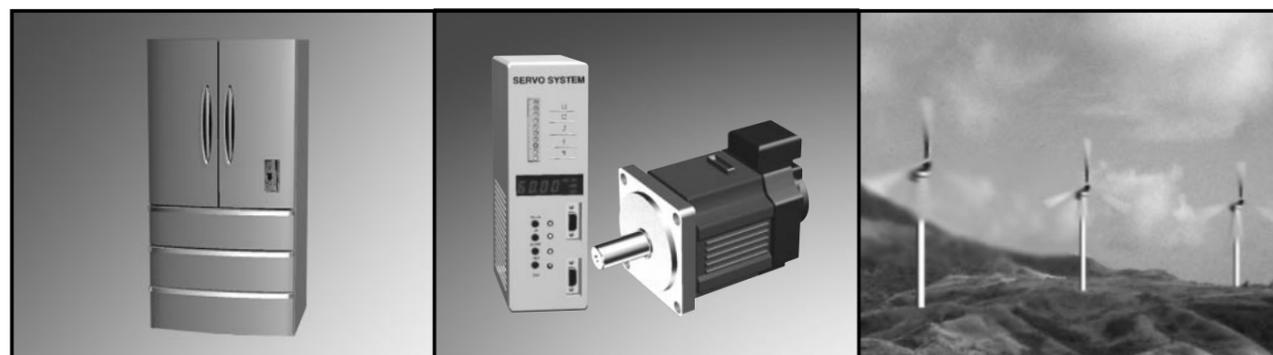
- Wide lineup 3A to 50A/600V, 5A to 25A/1200V.
- Using low loss IGBT or CSTBT™
- Direct drive by control unit possible. (non-photocoupler interface)
- Single supply scheme simplifies the power supply circuits.
- RoHS compliant lead free structure. (600V Ver.3 · Ver.4, 1200V)

### ■ Series Map

VCES (V)	Ic (A)							
	5A	10A	15A	20A	25A	30A	40A	50A
600V	Mini DIP-IPM Ver.3 Series · PS2156X-P · PS2156X-SP(3 shunts)							
	Super mini DIP-IPM Ver.4 Series · PS2196X-4/-4A/-4C/-4S/-4W							
					Large DIP-IPM Ver.3/3.5 Series · PS2126X-P/-AP · PS21869-P/-AP			
1200V					Large DIP-IPM 3 shunts Series · PS2106X			
	Large DIP-IPM 3 shunts Series · PS2205X							

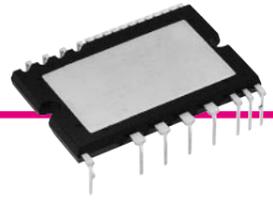


\*: Please refer to High-power device for IGBT Module over 2500V.



# DIP-IPM Ver.4 Series

Dual In-Line Package Intelligent Power Module Ver.4 Series



## Application

- Low power household appliances (Air conditioners, washing machines and refrigerators)

## Line up

	Type name	Ratings	fc max.(kHz)	Outline drawings No.
Isolation voltage 1500Vrms class	PS21962-4I-4A/4C/4S/4W	5A/600V	20	PS1 PS2 PS3 PS4
	PS21963-4E/4AE/4CE/4ES/4EW	8A/600V		
	PS21963-4I-4A/4C/4S/4W	10A/600V		
	PS21964-4I-4A/4C/4S/4W	15A/600V		
	PS21965-4I-4A/4C/4S/4W	20A/600V		

•With over temperature protection series

	Type name	Ratings	fc max.(kHz)	Outline drawings No.
Isolation voltage 1500Vrms class	PS21962-4T/4AT/4CT/4ST/4TW	5A/600V	20	PS1 PS2 PS3 PS4
	PS21963-4ET/4AET/4CET/4EST/4ETW	8A/600V		
	PS21963-4T/4AT/4CT/4ST/4TW	10A/600V		
	PS21964-4T/4AT/4CT/4ST/4TW	15A/600V		
	PS21965-4T/4AT/4CT/4ST/4TW	20A/600V		

(-A: Long pin type, -C: Zigzag pin type, -S: N-side open emitter type  
-W: Both sides zigzag pin type)

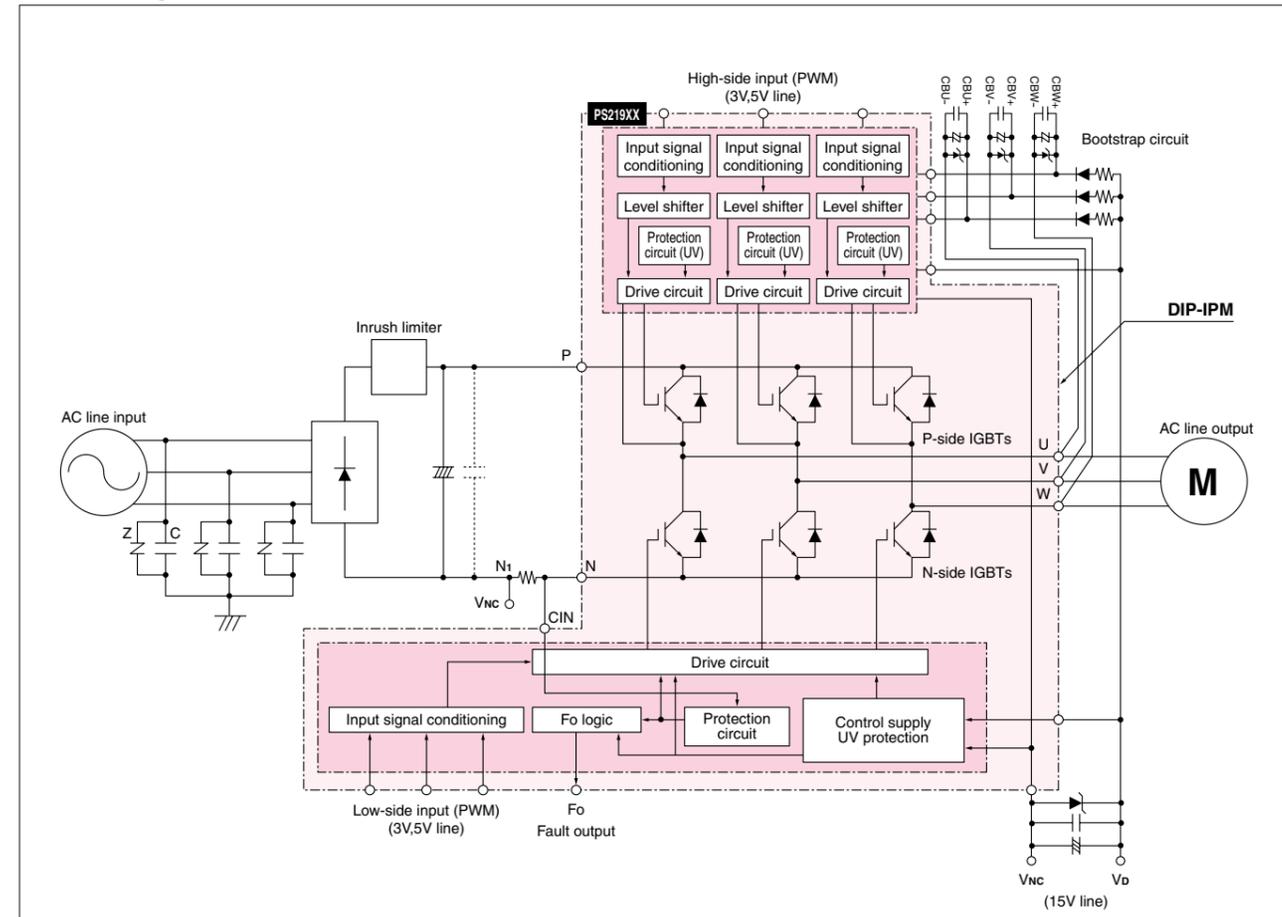
## Internal functions

- For P-side IGBTs : Drive circuit, High voltage high-speed level shifting, and Control supply under-voltage (UV) protection.
- For N-side IGBTs : Drive circuit, Control supply under-voltage (UV) protection, and Short-circuit protection (SC). The SC protection needs external shunt resistor. Over temperature protection (OT) [-T series only]
- Error output : Corresponds to a Short-circuit fault (SC) or a control supply under-voltage fault (UV) [ N-side control supply only] or over temperature fault (OT) [-T series only]
- IGBT drive power supply : DC 15V single power supply (bootstrap supply scheme can be applied).
- Input interface: 3V,5V compatible,high active logic.

## Features

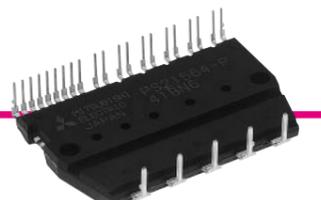
- Using of new insulation structure realizes a miniaturization.
- Complete lead free is realized in consideration of earth environment. (RoHS directive compliance)

## Block diagram



# DIP-IPM Ver.3/3.5 Series

Dual In-Line Package Intelligent Power Module Ver.3/3.5 Series



## Application

- Low power household appliances (Air conditioners, washing machines, refrigerators)
- Small capacity industrial motor drive.

## Line up

	Ver.	Type name	Ratings	fc max.(kHz)	Outline drawings No.
Isolation voltage 2500Vrms class	3	PS21562-P	5A/600V	20	PS5
		PS21563-P	10A/600V		
		PS21564-P	15A/600V		
		PS21562-SP	5A/600V		
		PS21563-SP	10A/600V		
		PS21564-SP	15A/600V		
	3.5	PS21265-P/-AP	20A/600V	20	PS9
		PS21267-P/-AP	30A/600V		
		PS21869-P/AP	50A/600V		
		3	PS21869-P/AP		

(-AP: Long pin type, -SP: N-side open emitter type)

## Internal functions

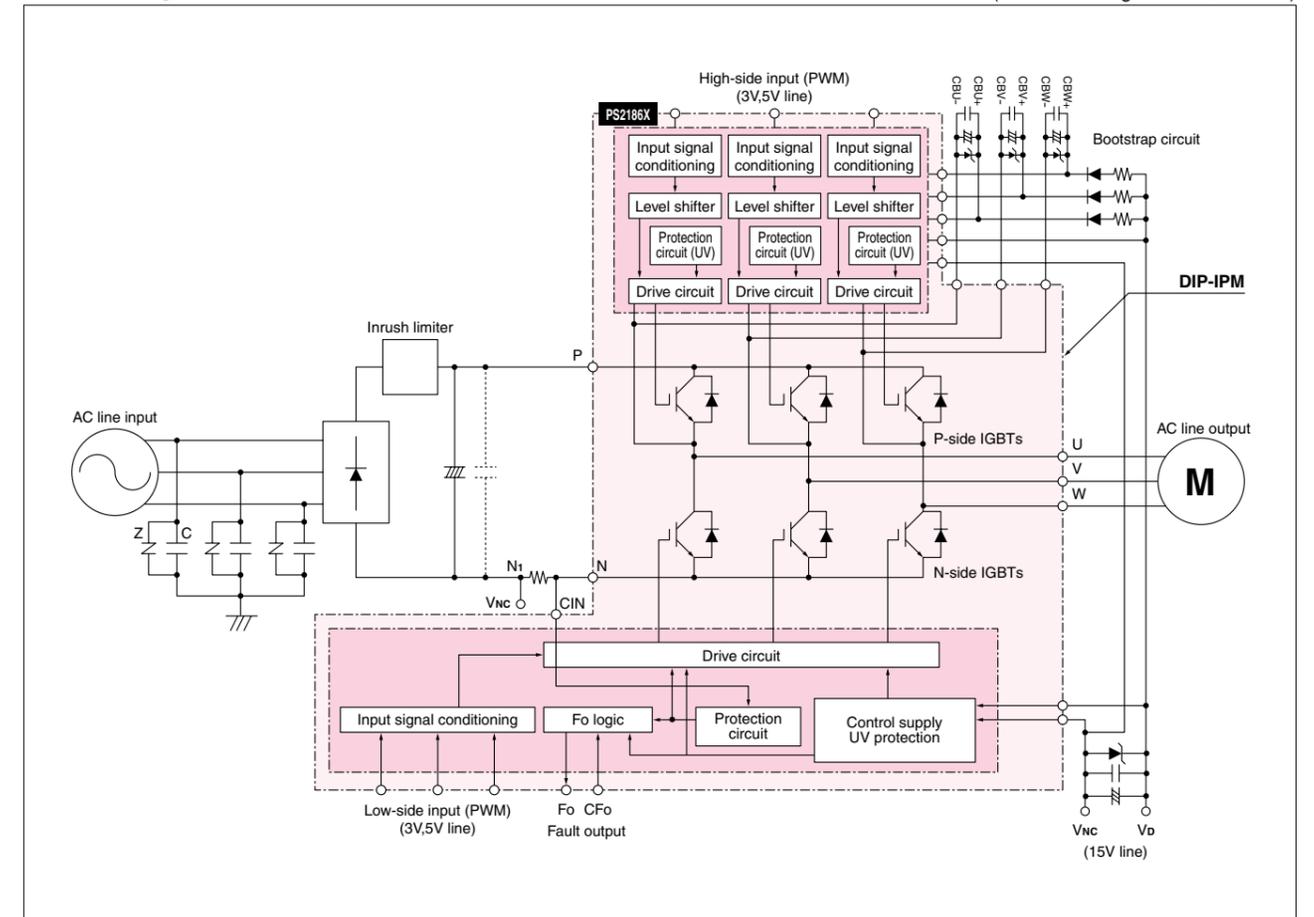
- For P-side IGBTs : Drive circuit, High voltage high-speed level shifting, and Control supply under-voltage (UV) protection.
- For N-side IGBTs : Drive circuit, Control supply under-voltage protection (UV), and Short-circuit protection (SC). The SC protection needs external shunt resistor.
- Error output : Corresponds to a Short-circuit fault(SC) or a Control supply under-voltage fault (UV) [ N-side control supply only]
- IGBT drive power supply : DC 15V single power supply (Bootstrap supply scheme can be applied).
- Input interface: 3V,5V compatible, high active logic.

## Features

- Terminals lead free solder plating (RoHS directive compliance)

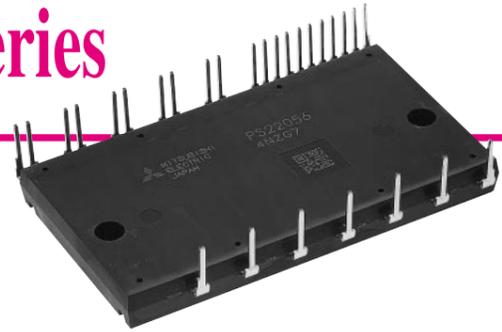
## Block diagram

(This block diagram is PS2186X's)



# Large DIP-IPM 3 shunts Series

Large Dual In-Line Package Intelligent Power Module 3 shunts Series



## Application

- Low power industrial appliances.  
(Air conditioners, General-purpose inverter, AC servo, and etc.)

## Line up

	Type name	Rated	fc max.(kHz)	Outline drawings No.
Isolation voltage 2500Vrms class	PS21065	20A/600V	20	PS8
	PS21067	30A/600V		
	PS21069	50A/600V		
	PS22052	5A/1200V	15	
	PS22053	10A/1200V		
	PS22054	15A/1200V		
	PS22056	25A/1200V		

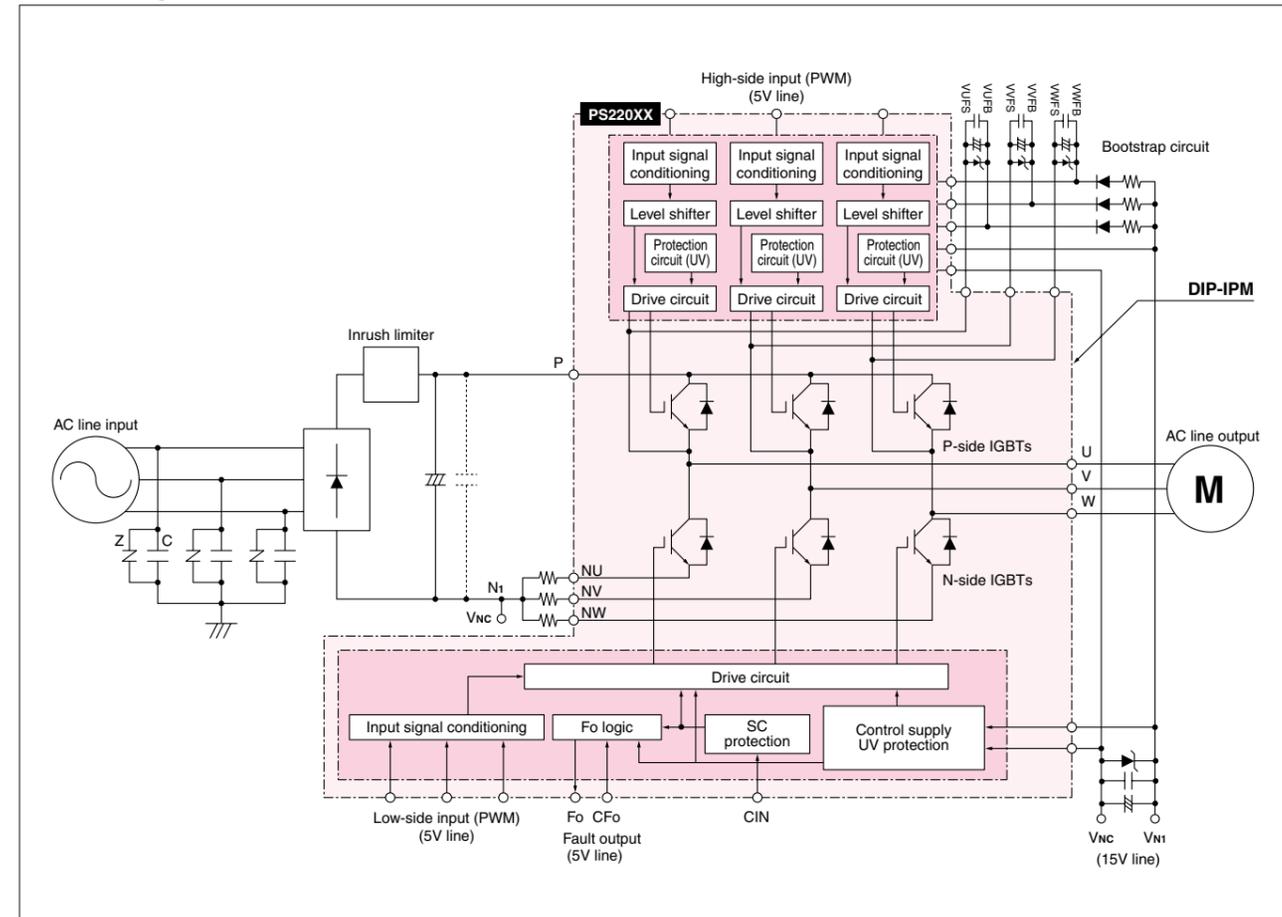
## Internal functions

- For P-side IGBTs :  
Drive circuit, High voltage high-speed level shifting, and Control supply under-voltage (UV) protection.
- For N-side IGBTs :  
Drive circuit, Control supply under-voltage protection (UV), and Short-circuit protection (SC).  
The SC protection needs external shunt resistor.
- Error output :  
Corresponds to a Short-circuit fault (SC) or a Control supply under-voltage fault (UV) [ N-side control supply only ]
- IGBT drive power supply :  
DC 15V single power supply (Bootstrap supply scheme can be applied).
- Input interface:  
5V compatible, high active logic.

## Features

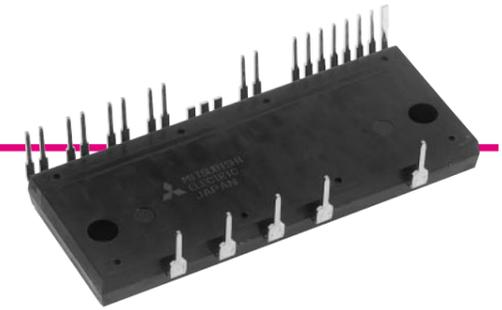
- Terminals lead free solder plating. (RoHS directive compliance)
- N-side IGBTs' emitter open.

## Block diagram



# DIP-PFC Series

Dual In-Line Package Power Factor Corrector Series



## Application

- Air conditioner, General purpose inverter, etc.

## Internal functions

- Low-loss IGBT
- IGBT drive circuit and protection circuit. (Control supply under-voltage protection.)
- AC/DC conversion.

## Features

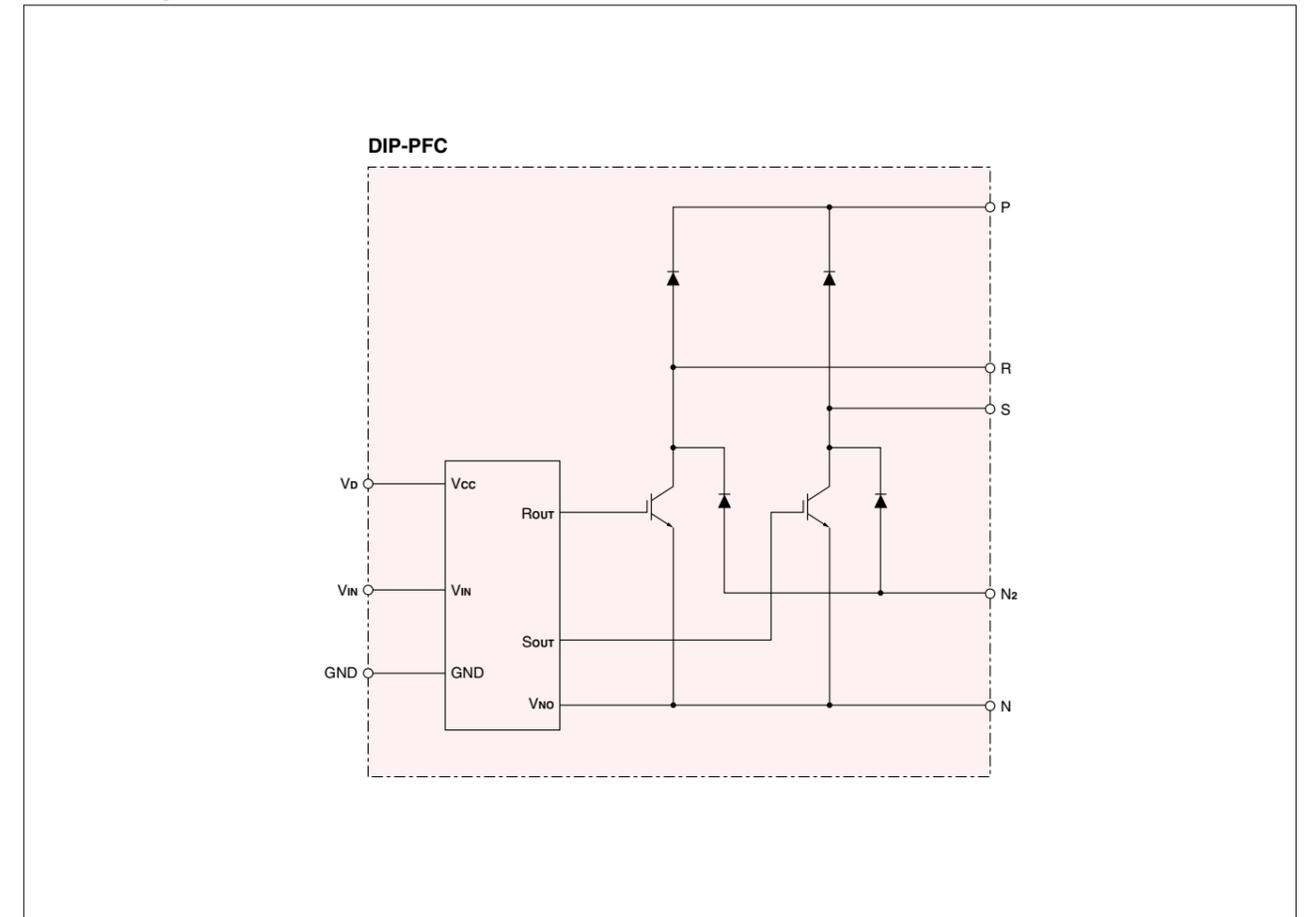
- Terminals lead free solder plating. (RoHS directive compliance)

## DIP-PFC

Type name	Rated voltage(V)	Rated input current(Arms)	Switching frequency(kHz)	Protection function (Note1) (Note2) UV	Outline drawings No.
PS51277-AP	90 to 264	15	20	○	PS10
PS51259-AP		20			

- Note1 : UV : Control supply under voltage  
○ : Built-in integrated
- Note2 : In combination with specially developed control IC, PFC can provide the following functions with fault signal output.  
OV1 : Output voltage repression under light load  
OV2 : Output over voltage protection  
SC : Short-circuit protection

## Block diagram



# IPM

## Intelligent Power Modules

In recent years, new demands for ease-of-use and environmental concerns have been added to the need for improved performance, miniaturization, compactness and reduced power loss in motor controllers such as general purpose inverters and AC servos for industrial equipment. Mitsubishi electric is already in production of power modules

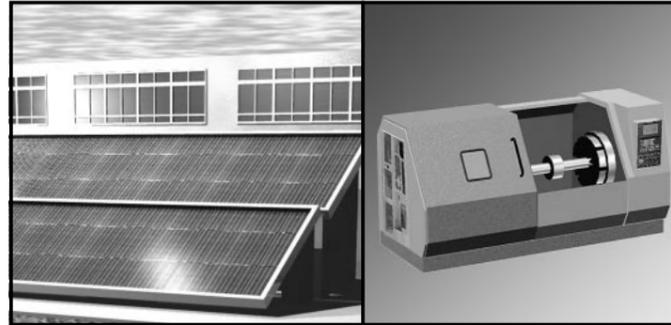
such as the 3rd-generation IPM "S Series" and 4th-generation IPM "S-DASH Series", and now adds the miniaturized and lightweight 5th-generation "L Series" to its lineup. The L Series incorporates a CSTBT™ chip for reduced power loss and a new compact package.

### Application

- Motor control devices (AC220V/AC440V inverters, servos, etc.)
- DC power supplies such as UPS
- \* IPMs for Photovoltaic generation using solar devices series

### Features (L Series)

- Adoption of 5th-generation new trench chip (CSTBT™) delivers low saturation voltage.
- Incorporation of newly developed control IC reduces controller's power consumption and improved the noise immunity.
- New small package
- Increased rated current for brake part (Based on RoHS regulation)



### Intelligent Power Modules (L Series)

#### 600V

VCES (V)	Connection	Main terminal	Ic (A)							
			50	75	100	150	200	300	450	600
600	3φ	Screw	PM50CLA060	PM75CLA060	PM100CLA060	PM150CLA060	PM200CLA060	PM300CLA060	PM450CLA060	PM600CLA060
		Pin	PM50CLB060	PM75CLB060	PM100CLB060	PM150CLB060	—	—	—	—
	3φ +Brake	Screw	PM50RLA060	PM75RLA060	PM100RLA060	PM150RLA060	PM200RLA060	PM300RLA060	—	—
		Pin	PM50RLB060	PM75RLB060	PM100RLB060	PM150RLB060	—	—	—	—

#### 1200V

VCES (V)	Connection	Main terminal	Ic (A)							
			25	50	75	100	150	200	300	450
1200	3φ	Screw	PM25CLA120	PM50CLA120	PM75CLA120	PM100CLA120	PM150CLA120	PM200CLA120	PM300CLA120	PM450CLA120
		Pin	PM25CLB120	PM50CLB120	PM75CLB120	—	—	—	—	—
	3φ +Brake	Screw	PM25RLA120	PM50RLA120	PM75RLA120	PM100RLA120	PM150RLA120	—	—	—
		Pin	PM25RLB120	PM50RLB120	PM75RLB120	—	—	—	—	—

### IPM series map

3rd generation (Former)	3rd generation (Latter)	4th generation	5th generation
S series	V series	S-DASH series S-DASH Servo series	L series

# IPM

## Intelligent Power Modules

### High speed type Intelligent power modules

#### AC220V for Line

Type name	Rating		Applicable motor rating (kW)	Output characteristics		Built-in function						Outline drawings No.		
	VCES (V)	Ic (A)		Phase	Vac	OC	SC	UV	OT	BR	PFo		NFo	
L series														
PM50RLA060		50	3.7			x	o	o	o	o	o	o		P35
PM50RLB060		50	3.7			x	o	o	o	o	o	o		P36
PM75RLA060		75	5.5/7.5			x	o	o	o	o	o	o		P35
PM75RLB060		75	5.5/7.5			x	o	o	o	o	o	o		P36
PM100RLA060		100	11			x	o	o	o	o	o	o		P35
PM100RLB060		100	11			x	o	o	o	o	o	o		P36
PM150RLA060		150	15/18.5			x	o	o	o	o	o	o		P35
PM150RLB060		150	15/18.5			x	o	o	o	o	o	o		P36
PM200RLA060		200	22			x	o	o	o	o	o	o		P37
PM300RLA060		300	30			x	o	o	o	o	o	o		P37
PM50CLA060		50	3.7			x	o	o	o	x	o	o		P35
PM50CLB060		50	3.7			x	o	o	o	x	o	o		P36
PM75CLA060		75	5.5/7.5			x	o	o	o	x	o	o		P35
PM75CLB060		75	5.5/7.5			x	o	o	o	x	o	o		P36
PM100CLA060		100	11			x	o	o	o	x	o	o		P35
PM100CLB060		100	11			x	o	o	o	x	o	o		P36
PM150CLA060		150	15/18.5			x	o	o	o	x	o	o		P35
PM150CLB060		150	15/18.5			x	o	o	o	x	o	o		P36
PM200CLA060		200	22			x	o	o	o	x	o	o		P37
PM300CLA060		300	30			x	o	o	o	x	o	o		P37
PM450CLA060		450	37/45			x	o	o	o	x	o	o		P38
PM600CLA060		600	55			x	o	o	o	x	o	o		P38
S-DASH series														
PM50RSD060		50	3.7			o	o	o	o	o	o	o		P2
PM75RSD060		75	5.5/7.5			o	o	o	o	o	o	o		P2
PM100RSD060		100	11			o	o	o	o	o	o	o		P3
PM150RSD060		150	15/18.5			o	o	o	o	o	o	o		P3
PM200RSD060		200	22			o	o	o	o	o	o	o		P3
PM300RSD060		300	30			o	o	o	o	o	o	o		P3
PM50CSD060		50	3.7			o	o	o	o	o	o	o		P2
PM75CSD060		75	5.5/7.5			o	o	o	o	o	o	o		P2
PM100CSD060		100	11			o	o	o	o	o	o	o		P3
PM150CSD060		150	15/18.5			o	o	o	o	o	o	o		P3
PM200CSD060		200	22			o	o	o	o	o	o	o		P3
PM300CSD060		300	30			o	o	o	o	o	o	o		P3
PM50RSE060		50	3.7			o	o	o	o	o	x	o		P31
PM75RSE060		75	5.5/7.5			o	o	o	o	o	x	o		P31
PM100RSE060		100	11			o	o	o	o	o	x	o		P31
PM150RSE060		150	15/18.5			o	o	o	o	o	x	o		P31
PM200RSE060		200	22			o	o	o	o	o	x	o		P32
PM300RSE060		300	30			o	o	o	o	o	x	o		P32
PM50CSE060		50	3.7			o	o	o	o	o	x	x	o	P31
PM75CSE060		75	5.5/7.5			o	o	o	o	o	x	x	o	P31
PM100CSE060		100	11			o	o	o	o	o	x	x	o	P31
PM150CSE060		150	15/18.5			o	o	o	o	o	x	x	o	P32
PM200CSE060		200	22			o	o	o	o	o	x	x	o	P32
PM300CSE060		300	30			o	o	o	o	o	x	x	o	P32
S-DASH Servo series														
PM50CBS060		50	3.7			o	o	o	o	o	x	x	o	P33
PM75CBS060		75	5.5/7.5			o	o	o	o	o	x	x	o	P33
PM100CBS060		100	11			o	o	o	o	o	x	x	o	P33
PM150CBS060		150	15/18.5			o	o	o	o	o	x	x	o	P33
PM200CBS060		200	22			o	o	o	o	o	x	x	o	P34
PM300CBS060		300	30			o	o	o	o	o	x	x	o	P34
V series														
PM75RVA060		75	5.5/7.5			o	o	o	o	o	o	o		P25
PM100CVA060		100	11			o	o	o	o	o	x	o		P26
PM150CVA060		150	15			o	o	o	o	o	x	o		P26
PM200CVA060		200	22			o	o	o	o	o	x	o		P27
PM300CVA060		300	30			o	o	o	o	o	x	o		P27
PM400DVA060		400	37			o	o	o	o	o	x	o		P28
PM600DVA060		600	45/55			o	o	o	o	o	x	o		P29

OC : Over-current protection  
 SC : Short-circuit protection  
 UV : Control supply under voltage  
 OT : Over temperature protection  
 BR : Elements for braking control  
 PFo : P side fault output  
 NFo : N side fault output  
 o : Built-in integrated  
 Δ : Installed only with N-side  
 x : non-integrated

### AC440V for Line

Type name	Rating		Applicable motor rating(kW)	Output characteristics		Built-in function						Outline drawings No.						
	V <sub>CES</sub> (V)	I <sub>c</sub> (A)		Phase	Vac	OC	SC	UV	OT	BR	PFo		NFo					
<b>L series</b> PM25RLA120	1200	25	3.7	3	440	X	○	○	○	○	○	○	P35					
PM25RLB120						X	○	○	○	○	○	○	○	P36				
PM50RLA120						50	7.5	X	○	○	○	○	○	○	○	P35		
PM50RLB120								X	○	○	○	○	○	○	○	P36		
PM75RLA120								75	15	X	○	○	○	○	○	○	○	P35
PM75RLB120		X	○							○	○	○	○	○	○	P36		
PM100RLA120		100	18.5/22							X	○	○	○	○	○	○	P37	
PM150RLA120		150	30			X	○	○	○	○	○	○	○	P37				
PM25CLA120		25	3.7			3.7	X	○	○	○	X	○	○	○	P35			
PM25CLB120							X	○	○	○	X	○	○	○	P36			
PM50CLA120							50	7.5	X	○	○	○	X	○	○	○	P35	
PM50CLB120									X	○	○	○	X	○	○	○	P36	
PM75CLA120									75	15	X	○	○	○	X	○	○	P35
PM75CLB120		X	○			○	○	X	○	○	○	○	P36					
PM100CLA120		100	18.5/22			X	○	○	○	X	○	○	○	P37				
PM150CLA120		150	30			X	○	○	○	X	○	○	○	P37				
PM200CLA120		200	37/45			X	○	○	○	X	○	○	○	P38				
PM300CLA120		300	55			X	○	○	○	X	○	○	○	P38				
PM450CLA120		450	75			X	○	○	○	X	○	○	○	P38				
<b>S-DASH series</b> PM50RSD120		1200	75			15	3	440	○	○	○	△	○	○	○	P2		
PM75RSD120									○	○	○	△	○	○	○	○	P3	
PM100RSD120									100	18.5/22	○	○	○	△	○	○	○	P3
PM150RSD120									150	30	○	○	○	△	○	○	○	P3
PM50CSD120									50	7.5	○	○	○	△	X	○	○	○
PM75CSD120			75			15					○	○	○	△	X	○	○	P2
PM100CSD120	100		18.5/22	○	○	○					△	X	○	○	P3			
PM150CSD120	150		30	○	○	○			△	X	○	○	P3					
PM50RSE120	50		7.5	7.5	○	○			○	△	○	X	○	○	P31			
PM75RSE120					75	15			○	○	○	△	○	X	○	P31		
PM100RSE120					100	18.5/22			○	○	○	△	○	X	○	P32		
PM150RSE120					150	30			○	○	○	△	○	X	○	P32		
PM50CSE120					50	7.5			○	○	○	△	X	X	○	P31		
PM75CSE120	75		15	○	○	○			△	X	X	○	P31					
PM100CSE120	100		18.5/22	○	○	○			△	X	X	○	P32					
PM150CSE120	150		30	○	○	○			△	X	X	○	P32					
<b>V series</b> PM50RVA120	1200		75	15	3	440			○	○	○	△	○	○	○	P25		
PM75CVA120									○	○	○	△	X	○	○	○	P26	
PM100CVA120									100	18.5/22	○	○	○	△	X	○	○	P27
PM150CVA120									150	30	○	○	○	△	X	○	○	P27
PM200DVA120									200	30/37	○	○	○	△	X	○	○	P28
PM300DVA120									300	45/55	○	○	○	△	X	○	○	P29

OC : Over-current protection  
 SC : Short-circuit protection  
 UV : Control supply under voltage  
 OT : Over temperature protection  
 BR : Elements for braking control  
 PFo : P side fault output  
 NFo : N side fault output  
 ○ : Built-in integrated  
 △ : Installed only with N-side  
 × : non-integrated

### For Solar Power

Type name	Rating		Output characteristics		Built-in function						Outline drawings No.					
	V <sub>CES</sub> (V)	I <sub>c</sub> (A)	Phase	Vac	OC	SC	UV	OT	Con	PFo		NFo				
PM50B4LA060	600	50	2	220	X	○	○	○	X	○	○	P36				
PM50B4LB060					X	○	○	○	X	○	○	P36				
PM50B5LA060					75	○:1	X	○	○	○	○	○	○	P35		
PM50B5LB060							X	○	○	○	○	○	○	P36		
PM50B6LA060							○:2	○	X	○	○	○	○	○	P35	
PM50B6LB060									X	○	○	○	○	○	○	P36
PM75B4LA060									X	○	○	○	X	○	○	P35
PM75B4LB060		X					○	○	○	X	○	○	P36			
PM75B5LA060		○:1			○	X	○	○	○	○	○	○	P35			
PM75B5LB060						X	○	○	○	○	○	○	P36			
PM75B6LA060						○:2	○	X	○	○	○	○	○	P35		
PM75B6LB060		X			○			○	○	○	○	○	P36			

OC : Over-current protection  
 SC : Short-circuit protection  
 UV : Control supply under voltage  
 OT : Over temperature protection  
 Con : Step up converter  
 PFo : P side fault output  
 NFo : N side fault output  
 ○ : Built-in integrated  
 × : non-integrated  
 ○:1 → Built-in 1 converter  
 ○:2 → Built-in 2 converter

# IGBT Modules

## Insulated Gate Bipolar Transistor Modules

In the past 15 years since the development of IGBT as the industrial power semiconductor switch, performance has been improved and applications have increased in that time and now it has replaced the transistor for most electric-powered industrial equipment. Mitsubishi developed the "F Series", a 4th-generation trench IGBT module in production that delivers power savings and noise reduction at the same

time. The "NF/A Series", a 5th-generation IGBT module that adopts the CSTBT™ chip, combining the characteristics of the popular planar IGBT and the trench IGBT, known for its reduced power loss; and the "NFH Series", suitable for higher-frequency switching use have been newly developed and put into mass production.

### (NF Series)

#### ■ Applications

- General-purpose inverter
- AC servos/CVCF
- Wind power/solar power

#### ■ Features

- Same outer dimensions as 3rd generation H series
- Using low loss CSTBT™
- Same driving power as that of the H series
- High speed soft recovery free-wheel diode
- Low inductance (half the value of the H series)
- High power cycle lifetime
- Low thermal resistance (employing aluminum nitride ceramic substrate)
- Based on RoHS regulation



### (NFH Series)

#### ■ Applications

- CT scanners
- MRIs
- Induction heating equipments

#### ■ Features

- 5th generation CSTBT™
- Low turn-off losses (below 20% standard 1200V series)
- Soft switching turn-off function
- Enhanced inner wiring (skin effect)
- High power cycle lifetime
- Based on RoHS regulation

### ■ IGBT Modules series map

3rd generation (Former)	3rd generation (Latter)	4th generation	5th generation
H series	U series KA series	F series DUS series (High frequency)	NF/A series Mega Power Dual NFH series (High frequency)

# IGBT Modules

## Insulated Gate Bipolar Transistor Modules

### ■ IGBT Modules <NF series>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)							
		50	75	100	150	200	300	400	600
D	600				CM150DY-12NF	CM200DY-12NF	CM300DY-12NF	CM400DY-12NF	CM600DY-12NF
	1200			CM100DY-24NF	CM150DY-24NF	CM200DY-24NF	CM300DY-24NF	CM400DY-24NF	CM600DY-24NF
T	600		CM75TL-12NF	CM100TL-12NF	CM150TL-12NF	CM200TL-12NF			
	1200	CM50TL-24NF	CM75TL-24NF	CM100TL-24NF	CM150TL-24NF	CM200TL-24NF			
R	600		CM75RL-12NF	CM100RL-12NF	CM150RL-12NF	CM200RL-12NF			
	1200	CM50RL-24NF	CM75RL-24NF	CM100RL-24NF	CM150RL-24NF	CM200RL-24NF			

### ■ IGBT Modules <For high frequency switching use (NFH series / F series DUS)>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)					
		100	150	200	300	400	600
D	600	CM100DUS-12F *	CM150DUS-12F *	CM200DU-12NFH	CM300DU-12NFH	CM400DU-12NFH	CM600DU-12NFH
	1200	CM100DU-24NFH	CM150DU-24NFH	CM200DU-24NFH	CM300DU-24NFH	CM400DU-24NFH	CM600DU-24NFH

\*: High speed turn-off F series

### ■ IGBT Modules <A series>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)					
		100	150	200	300	400	600
H	1200					CM400HA-24A *	CM600HA-24A *
D	1200	CM100DY-24A	CM150DY-24A	CM200DY-24A	CM300DY-24A	CM400DY-24A	CM600DY-24A

\*: Not RoHS directive compliance

### ■ IGBT Modules <Mega Power Dual>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)		
		900	1000	1400
D	1200	CM900DU-24NF		CM1400DU-24NF
	1700		CM1000DU-34NF	

### ■ IGBT Modules <1700V Dual>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)					
		75	100	150	200	300	400
D	1700	CM75DY-34A *	CM100DY-34A *	CM150DY-34A *	CM200DY-34A *	CM300DY-34A *	CM400DY-34A **

★: New product ★★: Under development

● Numbers H106, H107, U201, U203, U205, U206, N201 to N205, NF601, NF602 are recorded with product names to show the outline-drawing numbers.

# IGBT Modules

## Insulated Gate Bipolar Transistor Modules

### IGBT Modules <F series>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)								
		50	75	100	150	200	300(350)	400(450)	600	
H	250							CM450HA-5F H105	CM600HA-5F CM600HN-5F H106	
	600								CM600HU-12F U101	
	1200							CM400HU-24F U101	CM600HU-24F U102	
D	250							CM350DU-5F U202	CM400DU-5F U201	CM600DU-5F U202
	600		CM75DU-12F	CM100DU-12F	CM150DU-12F	CM200DU-12F	CM300DU-12F	CM400DU-12F		
	1200	CM50DU-24F	CM75DU-24F	CM100DU-24F	CM150DU-24F	CM200DU-24F	CM300DU-24F	CM400DU-24F	CM600DU-24F	
T	600		CM75TU-12F	CM100TU-12F	CM150TU-12F	CM200TU-12F				
	1200	CM50TU-24F	CM75TU-24F	CM100TU-24F						

### IGBT Modules <For brake systems>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)					
		50	75	100	150	200	300
E3	600		CM75E3U-12H*	CM100E3U-12H*	CM150E3U-12H*	CM200E3U-12H*	CM300E3U-12H*
	1200	CM50E3U-24H*	CM75E3U-24H*	CM100E3U-24H*	CM150E3U-24H*		

\*: Production on orders

### IGBT Modules <KA series>

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)						
		50	75	100	150	200	300	400
D	1700			CM100DU-34KA	CM150DU-34KA	CM200DU-34KA	CM300DU-34KA	CM400DU-34KA
T	1700	CM50TU-34KA	CM75TU-34KA					

● Numbers H105, H106, U101, U102, U111, U112, U201 to U205, U601, U602 are recorded with product names to show the outline-drawing numbers.

# IGBT Modules

## Insulated Gate Bipolar Transistor Modules

### IGBT Modules <U series>

#### 1 arm to 2 arms

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)							
		50	75	100	150	200	300	400	600
H	600								CM600HU-12H U101
	1200							CM400HU-24H U101	CM600HU-24H U102
D	600		CM75DU-12H	CM100DU-12H	CM150DU-12H	CM200DU-12H	CM300DU-12H	CM400DU-12H	
	1200	CM50DU-24H	CM75DU-24H	CM100DU-24H	CM150DU-24H	CM200DU-24H	CM300DU-24H		

#### 4 arms to 6 arms

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)				
		50	75	100	150	200
B	600		CM75BU-12H	CM100BU-12H		
T	600		CM75TU-12H	CM100TU-12H	CM150TU-12H	CM200TU-12H
	1200	CM50TU-24H	CM75TU-24H	CM100TU-24H		

### IGBT Modules <H series>

H series is not RoHS directive compliance, will stop product at 2008

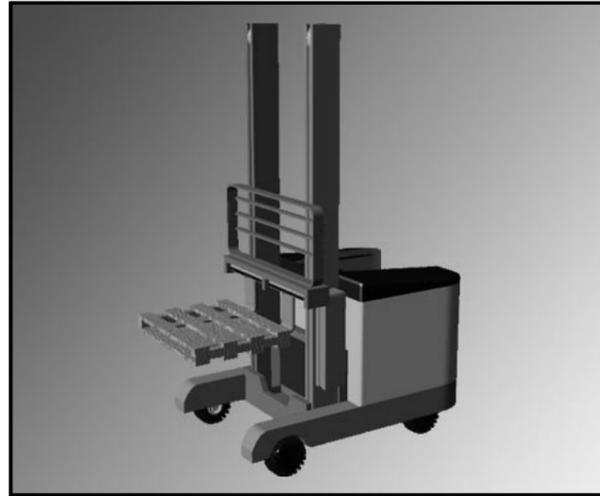
Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)												
		10	15	20	30(25)	50	75	100	150	200	300	400	600	1000
H	600										CM300HA-12H H101	CM400HA-12H H102	CM600HA-12H H102	
	1200										CM200HA-24H H101	CM300HA-24H H103	CM400HA-24H H102	CM600HA-24H H104
	1400											CM400HA-28H H103	CM600HA-28H H102	CM1000HA-28H H104
D	600					CM50DY-12H	CM75DY-12H	CM100DY-12H	CM150DY-12H	CM200DY-12H	CM300DY-12H	CM400DY-12H		
	1200					CM50DY-24H	CM75DY-24H	CM100DY-24H	CM150DY-24H	CM200DY-24H	CM300DY-24H			
	1400					CM50DY-28H	CM75DY-28H	CM100DY-28H		CM200DY-28H	CM300DY-28H			
T	600		CM15TF-12H	CM20TF-12H	CM30TF-12H	CM50TF-12H	CM75TF-12H	CM100TF-12H	CM150TF-12H					
	1200		CM15TF-24H	CM20TF-24H	CM30TF-24H	CM50TF-24H	CM75TF-24H	CM100TF-24H						
	1400					CM50TF-28H	CM75TF-28H	CM100TF-28H						

● Numbers H101 to H104, H201 to H204, H601 to H605, U101, U102, U201 to U203, U401, U601 and U602 are recorded with product names to show the outline-drawing numbers.

# Power MOSFET Modules

Circuits which made from parallel connection of low-voltage IGBT module and discrete MOSFET up to now are mainly used by the electric power conversion equipment for drives motors, typically like a battery drive forklift.

However, the ease of an assembly, the miniaturization of equipment, and the improvement in reliability are being strongly required recently. The lineup of the low-voltage MOSFET module has been realized corresponding to such a large capacity and low voltage use.



## Application

- Battery forklift
- UPS

## Features

- Using low loss trench MOSFET chip
- Using connector terminal for gate source.
- Built-in temperature sensor

## Power MOSFET Modules

Connection	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)		
		100	200	300
T	75	FM200TU-07A *	FM400TU-07A *	FM600TU-07A *
		F601		
		100	FM200TU-2A *	FM400TU-2A *
F601				
150	150	FM200TU-3A *	FM400TU-3A *	FM600TU-3A *
		F601		

● Numbers F601 is recorded with product names to show the outline-drawing number.

★ : New product

# Diode Modules

## High speed Diode Modules

Connection	V <sub>RRM</sub> (V)	I <sub>DC</sub> (A)						
		20(25)	50(35)	100	200	250	300	400/450
H	250/500						RM250HA-10F R1	RM450HA-5H R23
	600	RM20HA-12F R2	RM50HA-12F RM50HG-12S*1 R3 R4	RM100HA-12F R3				
	1000	RM20HA-20F R2	RM50HA-20F R3	RM100HA-20F R3	RM200HA-20F R5			
	1200	RM20HA-24F RM25HG-24S*1 R4	RM50HA-24F R3	RM100HA-24F R3	RM200HA-24F R5		RM300HA-24F R1	RM400HA-24S R6
	1700		RM35HG-34S*1 R4					
C	300	RM20CA-6S ×	RM50CA-6S ×					
	450						RM300CA-9W *2 R24	
	600	RM20CA-12F RM20CA-12S	RM50CA-12F RM50CA-12S	RM100CA-12F R5				
	1000	RM20CA-20F	RM50CA-20F RM50CA-20S	RM100CA-20F R5				
	1200	RM20CA-24F	RM50CA-24F	RM100CA-24F R5				
C1	300	RM20C1A-6S ×	RM50C1A-6S ×					
	600	RM20C1A-12F RM20C1A-12S R5	RM50C1A-12F RM50C1A-12S R5	RM100C1A-12F R5				
	1000	RM20C1A-20F	RM50C1A-20F RM50C1A-20S	RM100C1A-20F R5				
	1200	RM20C1A-24F	RM50C1A-24F	RM100C1A-24F R5				
D	600	RM20DA-12F RM20DA-12S	RM50DA-12F RM50DA-12S					
	1000	RM20DA-20F			RM200DA-20F R7			
	1200	RM20DA-24F			RM200DA-24F R7			

Note : "F" at the end of type name means the high-speed diode module for the transistor modules.  
"H" or "S" at the end of type name means the super high-speed diode module for the MOSFET or IGBT modules.

\*1 : For the snubber circuit of IGBT modules and IPMs  
\*2 : Exclusive use for welder

× : Plan for production discontinue

## Diode Modules

Connection	V <sub>RRM</sub> (V)	I <sub>F(AV)</sub> (A)								
		20	30	40	50	60	100	150	250	500
H	400									RM500HA-M R8
	800									RM500HA-H R8
	1200									RM500HA-24 R8
	1600									RM500HA-2H R8
D	400		RM30DZ-M R9			RM60DZ-M R9	RM100DZ-M R9	RM150DZ-M R9	RM250DZ-M R9	RM500DZ-M R12
	800		RM30DZ-H R9			RM60DZ-H R9	RM100DZ-H R9	RM150DZ-H R9	RM250DZ-H R9	RM500DZ-H R12
	1200		RM30DZ-24 R10			RM60DZ-24 R9	RM100DZ-24 R9	RM150DZ-24 R9	RM250DZ-24 R9	RM500DZ-24 R12
	1600		RM30DZ-2H R10			RM60DZ-2H R9	RM100DZ-2H R9	RM150DZ-2H R9	RM250DZ-2H R9	RM500DZ-2H R12
C	400		RM30CZ-M R9			RM60CZ-M R9	RM100CZ-M R9	RM150CZ-M R9	RM250CZ-M R9	
	800		RM30CZ-H R9			RM60CZ-H R9	RM100CZ-H R9	RM150CZ-H R9	RM250CZ-H R9	
	1200		RM30CZ-24 R10			RM60CZ-24 R9	RM100CZ-24 R9	RM150CZ-24 R9	RM250CZ-24 R9	
	1600		RM30CZ-2H R10			RM60CZ-2H R9	RM100CZ-2H R9	RM150CZ-2H R9	RM250CZ-2H R9	
U	400							RM150UZ-M R11	RM250UZ-M × R11	RM500UZ-M R12
	800							RM150UZ-H R11	RM250UZ-H R11	RM500UZ-H R12
	1200							RM150UZ-24 R11	RM250UZ-24 R11	RM500UZ-24 R12
	1600							RM150UZ-2H R11	RM250UZ-2H R11	RM500UZ-2H R12
D2	2000					RM50D2Z-40 R10		RM100D2Z-40 R10		
T (DC output current)	400	RM10TA-M R13	RM15TA-M R13	RM20TPM-M × R20		RM30TA-M R16 R17 R20	RM30TB-M × RM30TPM-M × R16 R17 R20	RM50TC-M R18	RM75TC-M RM75TPM-M R19 R22	
	800	RM10TA-H R13	RM15TA-H R13	RM20TPM-H R20		RM30TA-H RM30TB-H RM30TPM-H R16 R17 R20	RM50TC-H R18	RM75TC-H RM75TPM-H R19 R22		
	1200	RM10TA-24 R13	RM15TA-24 R13	RM20TA-24 × RM20TPM-24 × R15 R21		RM30TC-24 R18	RM50TC-24 R18	RM75TC-24 RM75TPM-24 R19 R22		
	1600	RM10TA-2H R13	RM15TA-2H R13	RM20TA-2H RM20TPM-2H R15 R21		RM30TC-2H R18	RM50TC-2H R18	RM75TC-2H RM75TPM-2H R19 R22		
	2000		RM15TC-40 R14			RM30TC-40 × R14				

Note : Models RM10TB-M, -H and RM15TBM, -H are discontinued.

× : Plan for production discontinue

## New Diode Modules

Connection	V <sub>RRM</sub> (V)	I <sub>F(AV)</sub> (A)			
		10	20	25	30
TN	800		RM20TNA-H R25		RM30TNA-H R25
	1600	RM10TN-2H R25		RM25TN-2H R25	

● Numbers from R1 to R25 are recorded with product names to show the outline-drawing numbers.

# Thyristor Modules

## Thyristor Modules

connection	V <sub>RRM</sub> (V)	I <sub>T</sub> (AV) (A)								
		20	25	55	90	130	150	200	400	
H	400								TM400HA-M	T1
	800								TM400HA-H	
	1200								TM400HA-24	
	1600								TM400HA-2H	
D	400	TM20DA-M	TM25DZ-M	TM55DZ-M	TM90DZ-M	TM130DZ-M			TM200DZ-M	TM400DZ-M
	800	TM20DA-H	TM25DZ-H	TM55DZ-H	TM90DZ-H	TM130DZ-H			TM200DZ-H	TM400DZ-H
	1200		TM25DZ-24	TM55DZ-24	TM90DZ-24	TM130DZ-24			TM200DZ-24	TM400DZ-24
	1600		TM25DZ-2H	TM55DZ-2H	TM90DZ-2H	TM130DZ-2H			TM200DZ-2H	TM400DZ-2H
C	400		TM25CZ-M	TM55CZ-M	TM90CZ-M	TM130CZ-M			TM200CZ-M	TM400CZ-M
	800		TM25CZ-H	TM55CZ-H	TM90CZ-H	TM130CZ-H			TM200CZ-H	TM400CZ-H
	1200		TM25CZ-24	TM55CZ-24	TM90CZ-24	TM130CZ-24			TM200CZ-24	TM400CZ-24
	1600		TM25CZ-2H	TM55CZ-2H	TM90CZ-2H	TM130CZ-2H			TM200CZ-2H	TM400CZ-2H
P	400					TM130PZ-M			TM200PZ-M	TM400PZ-M
	800					TM130PZ-H			TM200PZ-H	TM400PZ-H
	1200					TM130PZ-24			TM200PZ-24	TM400PZ-24
	1600					TM130PZ-2H			TM200PZ-2H	TM400PZ-2H
U	400								TM400UZ-M	
	800								TM400UZ-H	
	1200								TM400UZ-24	
	1600								TM400UZ-2H	
R	400	TM20RA-M	TM25RZ-M	TM55RZ-M	TM90RZ-M	TM130RZ-M			TM200RZ-M	
	800	TM20RA-H	TM25RZ-H	TM55RZ-H	TM90RZ-H	TM130RZ-H			TM200RZ-H	
	1200		TM25RZ-24	TM55RZ-24	TM90RZ-24	TM130RZ-24			TM200RZ-24	
	1600		TM25RZ-2H	TM55RZ-2H	TM90RZ-2H	TM130RZ-2H			TM200RZ-2H	
E	400		TM25EZ-M	TM55EZ-M	TM90EZ-M	TM130EZ-M			TM200EZ-M	
	800		TM25EZ-H	TM55EZ-H	TM90EZ-H	TM130EZ-H			TM200EZ-H	
	1200		TM25EZ-24	TM55EZ-24	TM90EZ-24	TM130EZ-24			TM200EZ-24	
	1600		TM25EZ-2H	TM55EZ-2H	TM90EZ-2H	TM130EZ-2H			TM200EZ-2H	
G	400					TM130GZ-M			TM200GZ-M	
	800					TM130GZ-H			TM200GZ-H	
	1200					TM130GZ-24			TM200GZ-24	
	1600					TM130GZ-2H			TM200GZ-2H	
T3	400	TM10T3B-M	TM15T3A-M	TM25T3A-M						
	800	TM10T3B-H	TM15T3A-H	TM25T3A-H						
S	300			TM60SA-6	TM90SA-6			TM150SA-6		
	400			TM60SZ-M	TM100SZ-M					

\*1: DC output current \*2: Non-isolation \*3: I<sub>T</sub>=300A \*4: I<sub>T</sub>=60A \*5: I<sub>T</sub>=100A

Numbers from T1 to T14 are recorded with product names to show the outline-drawing numbers.

×: Plan for production discontinue

## Power Modules outline drawing

(unit : mm)

**PS3** DIP-IPM Ver.4  
PS21962-4S PS21964-4S  
PS21963-4ES PS21965-4S  
PS21963-4S

**DIP - IPM**  
Dual In-Line Package  
Intelligent Power Modules

**PS6** DIP-IPM Ver.3  
PS21562-SP  
PS21563-SP  
PS21564-SP

**PS1** DIP-IPM Ver.4  
PS21962-4/-4A PS21964-4/-4A  
PS21963-4E/-4AE PS21965-4/-4A  
PS21963-4/-4A

**PS4** DIP-IPM Ver.4  
PS21962-4W PS21964-4W  
PS21963-4EW PS21965-4W  
PS21963-4W

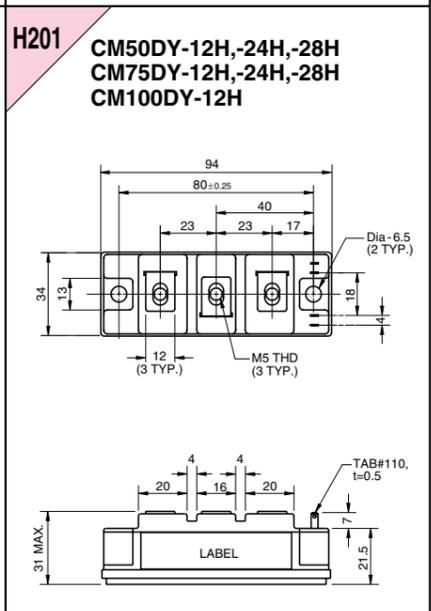
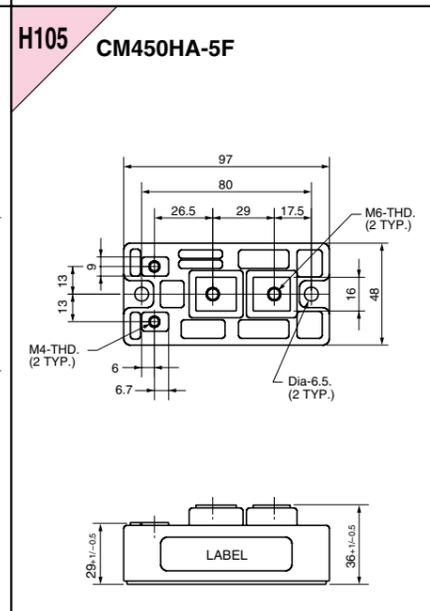
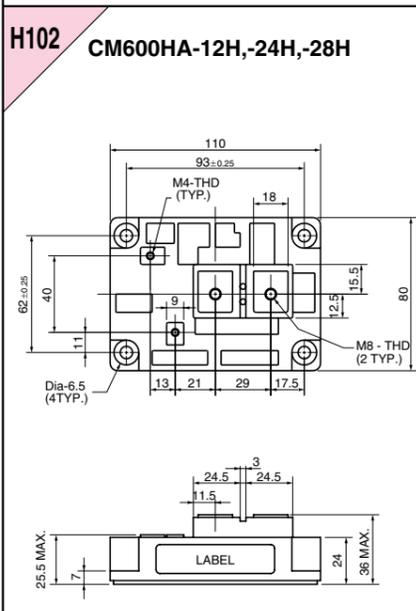
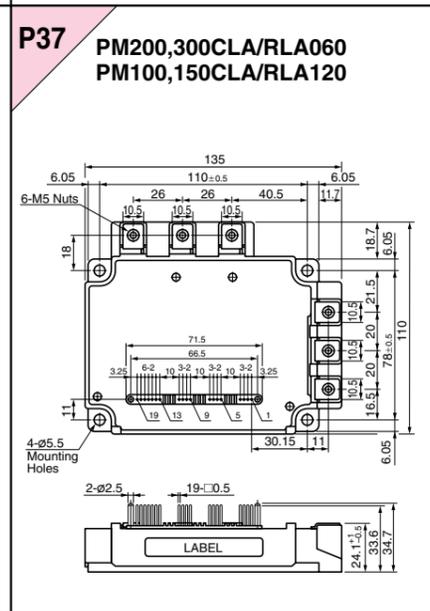
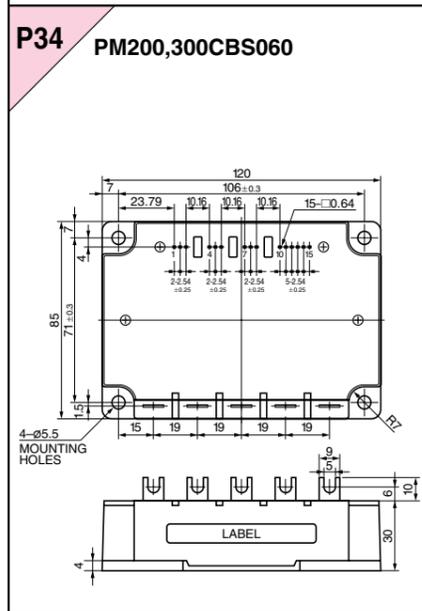
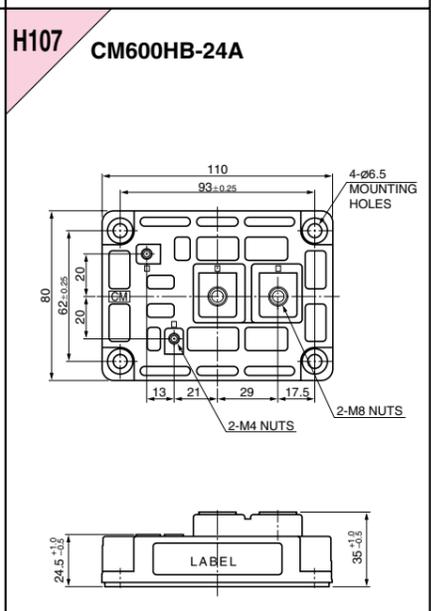
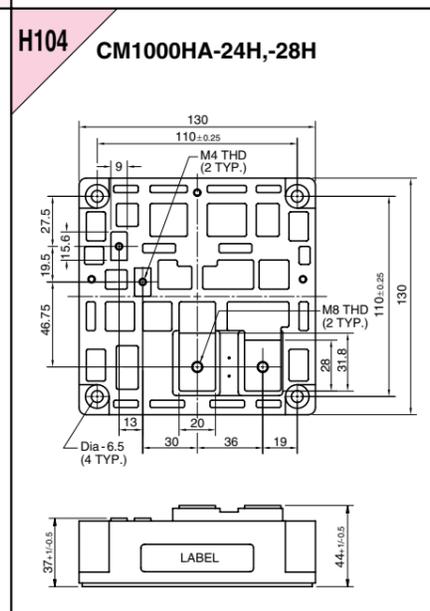
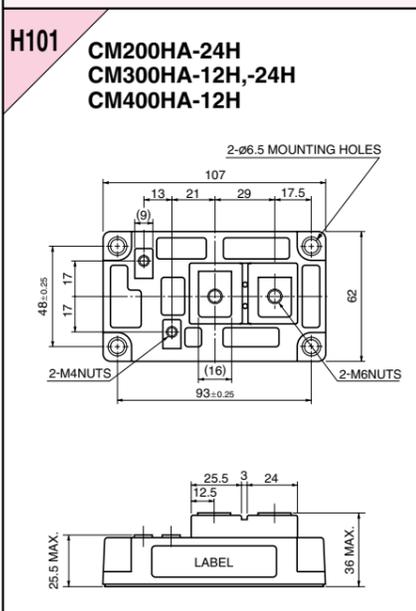
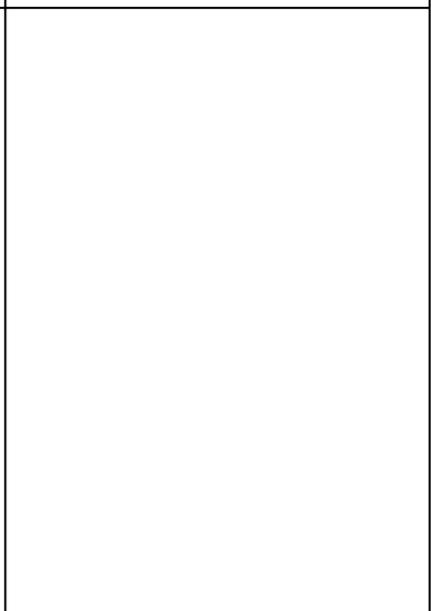
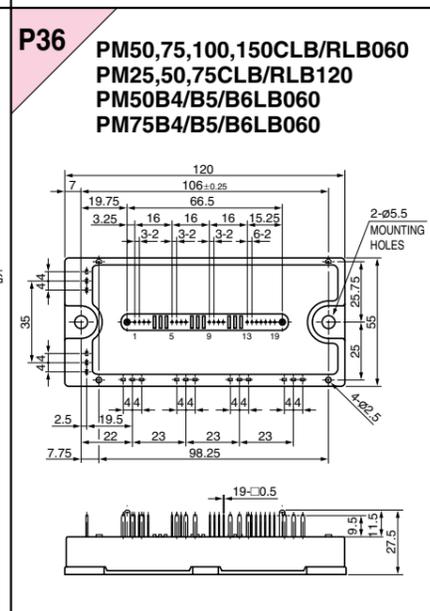
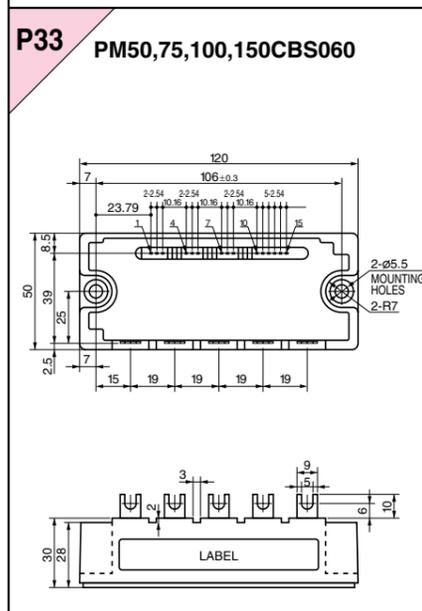
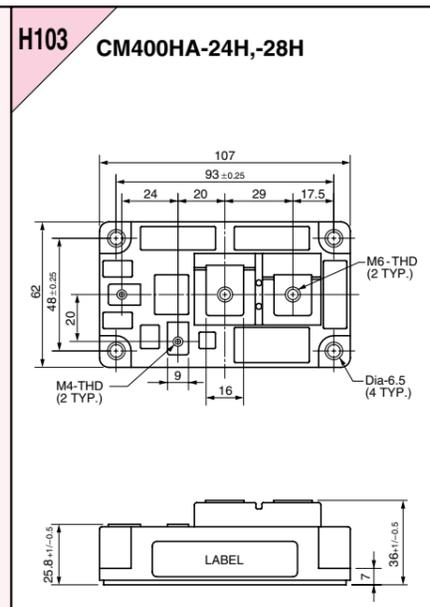
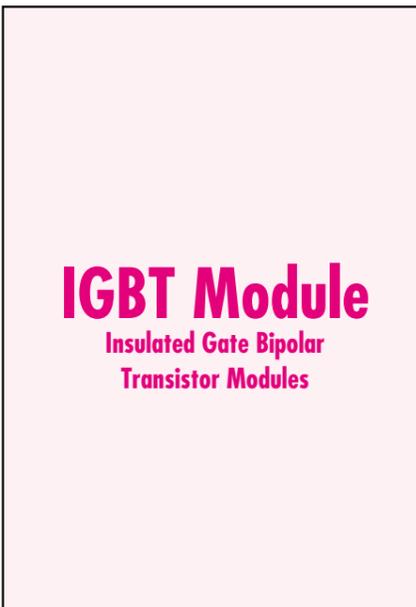
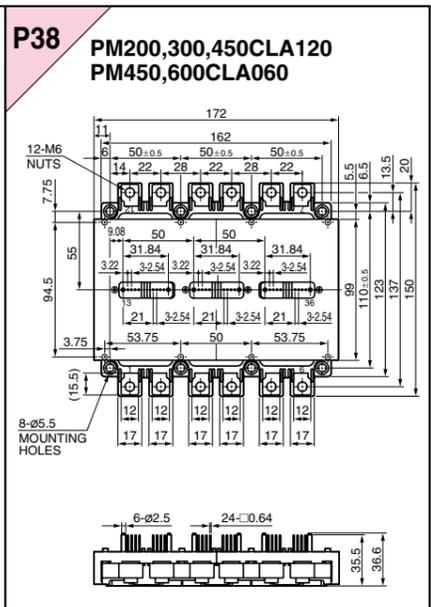
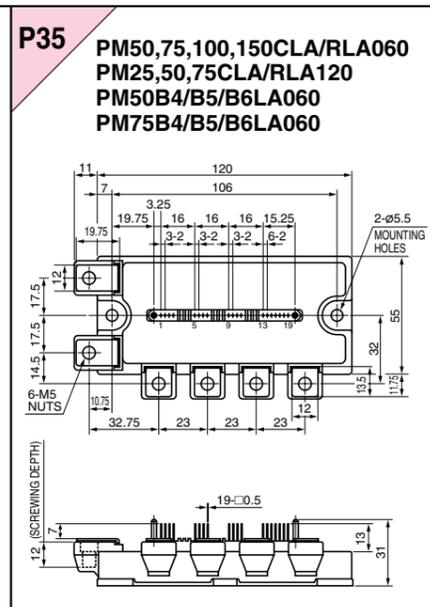
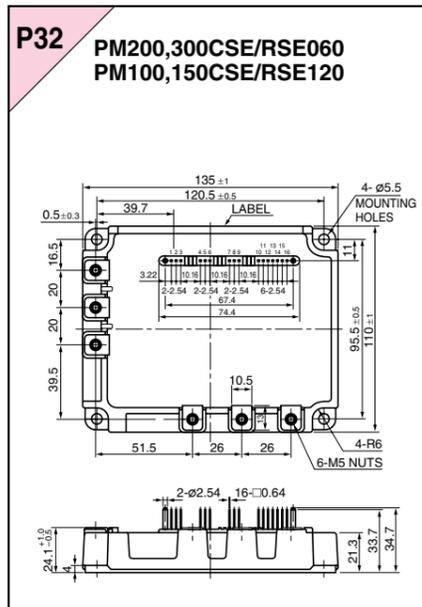
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PS21869-P/-AP

**PS2** DIP-IPM Ver.4  
PS21962-4C PS21964-4C  
PS21963-4CE PS21965-4C  
PS21963-4C

**PS5** DIP-IPM Ver.3  
PS21562-P  
PS21563-P  
PS21564-P

**PS8** DIP-IPM Ver.3 1200V DIP-IPM  
PS21065 PS22052  
PS21067 PS22053  
PS21069 PS22054  
PS22056



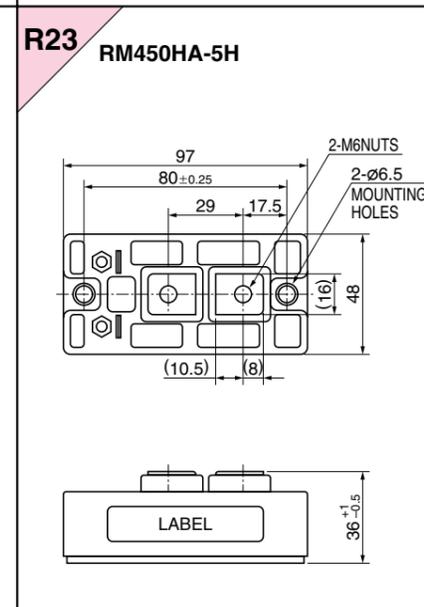
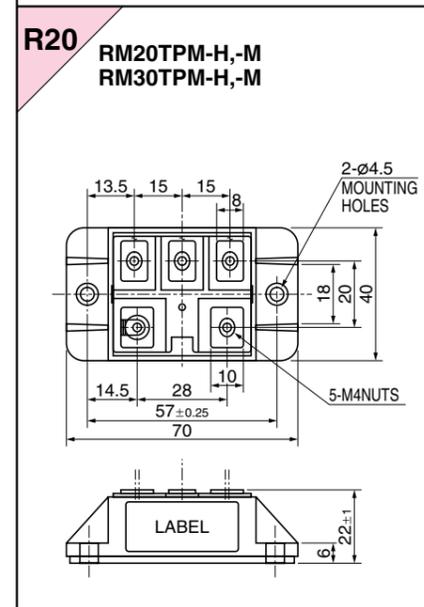
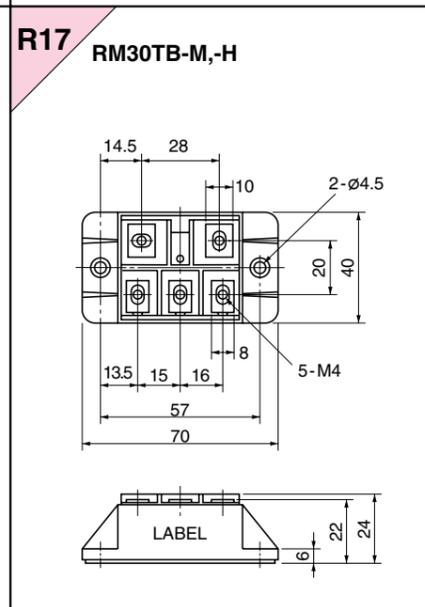
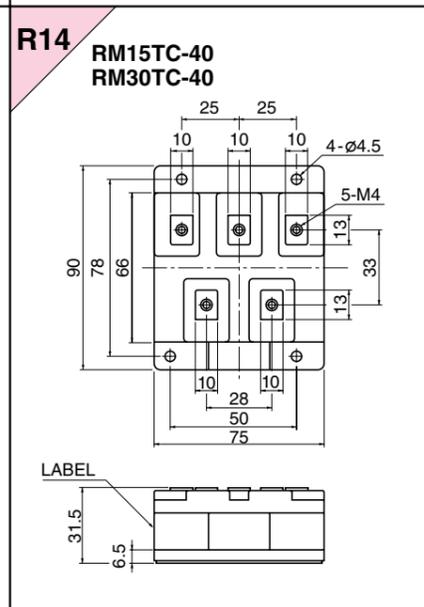
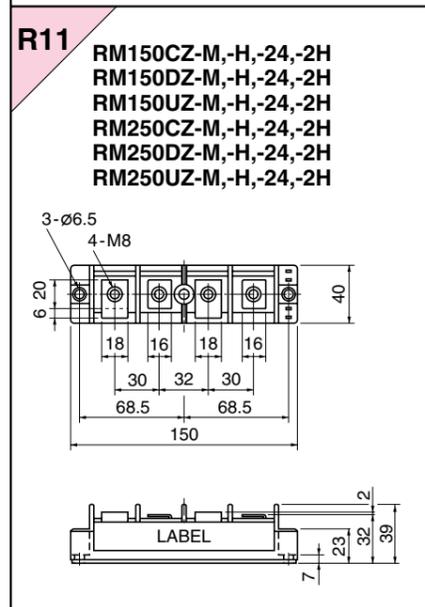
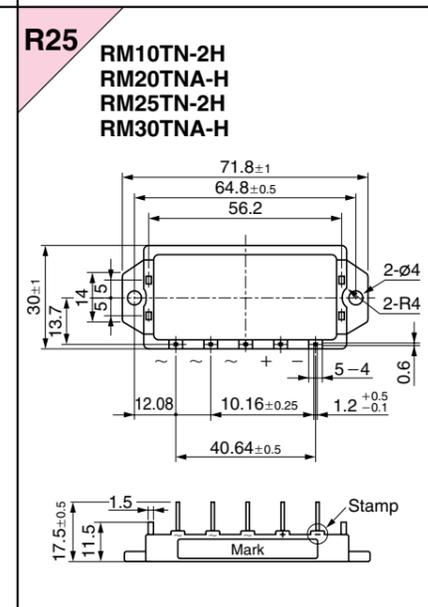
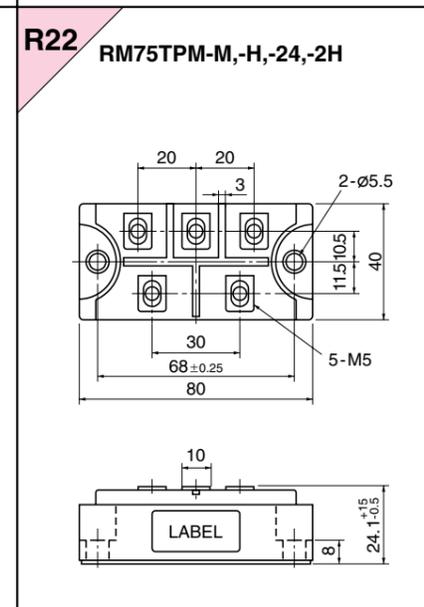
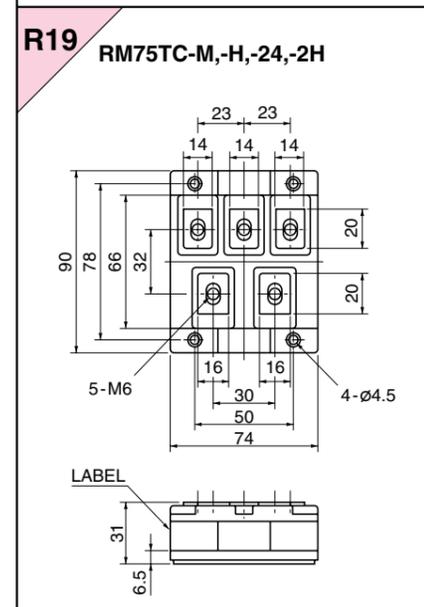
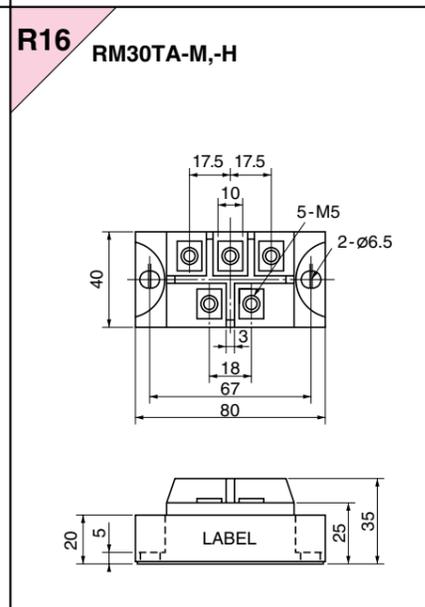
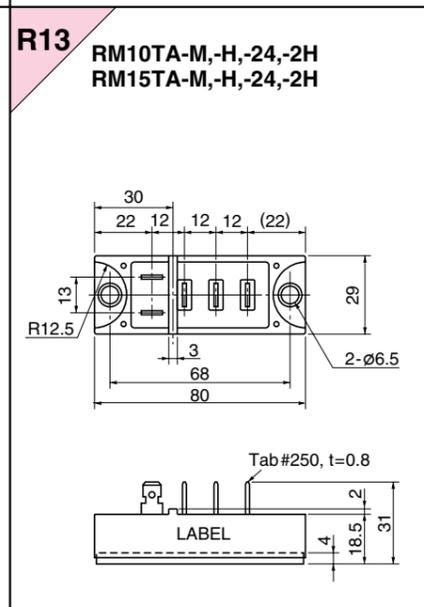
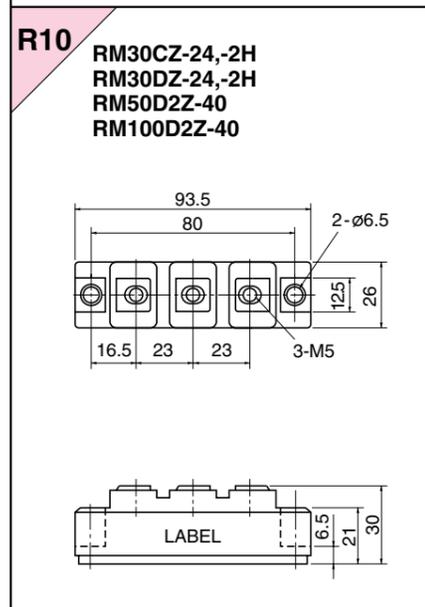
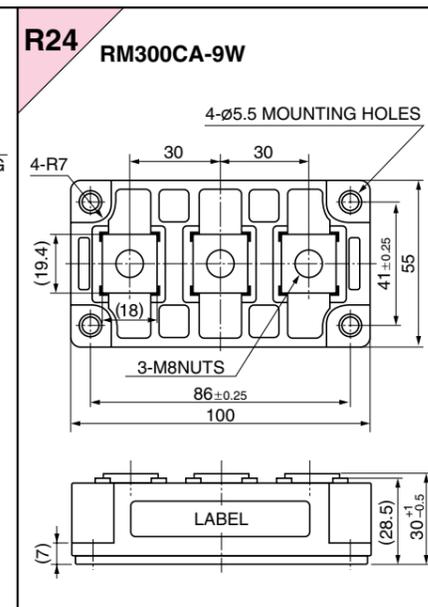
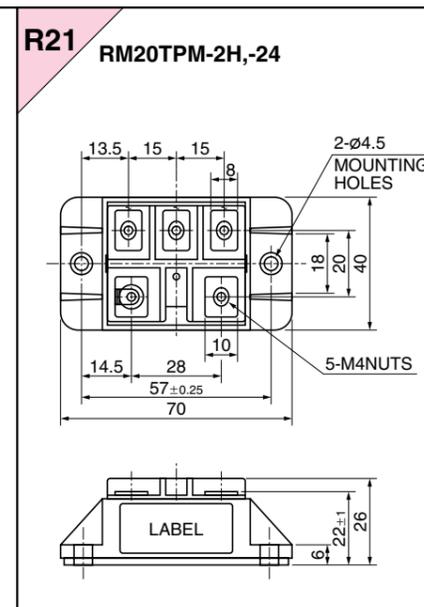
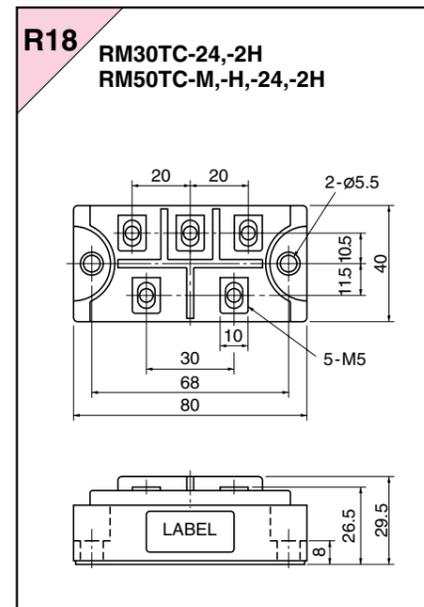
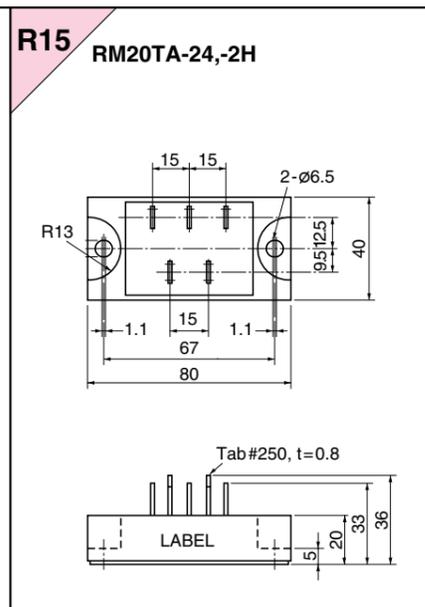
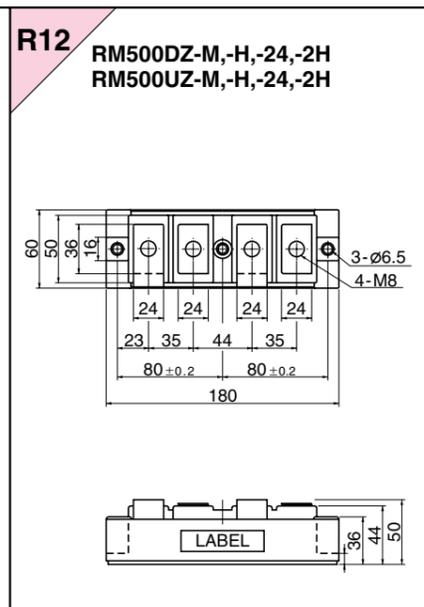
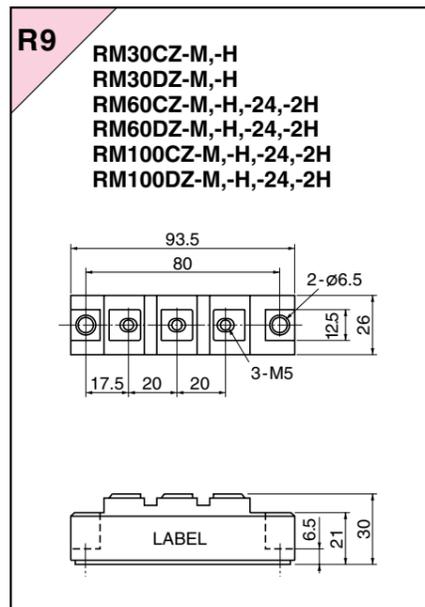


**IGBT Module**  
Insulated Gate Bipolar  
Transistor Modules

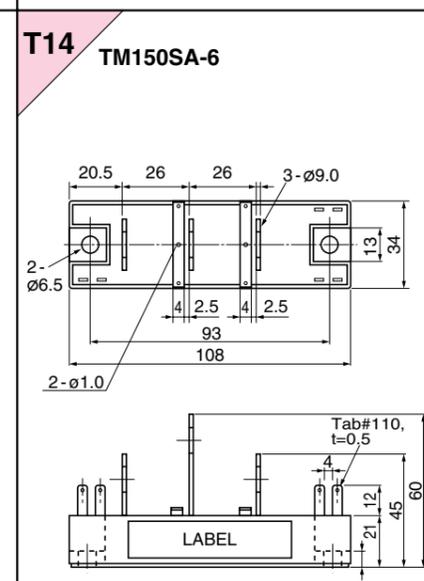
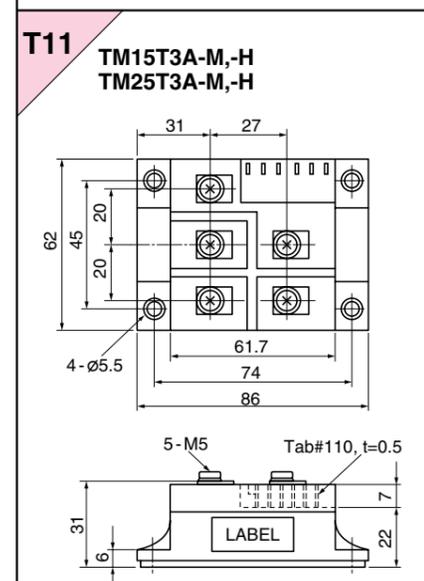
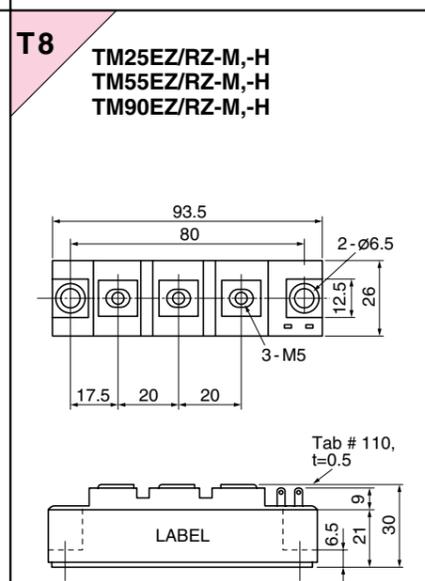
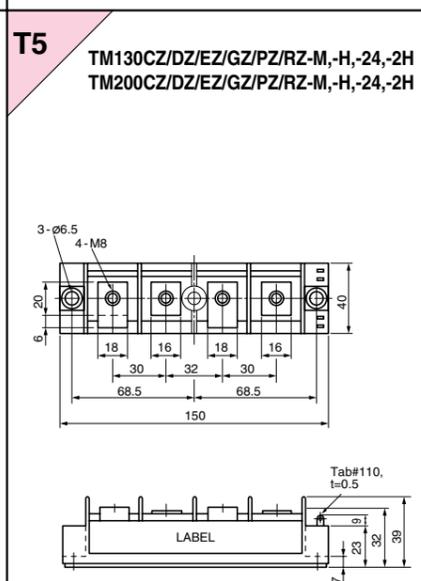
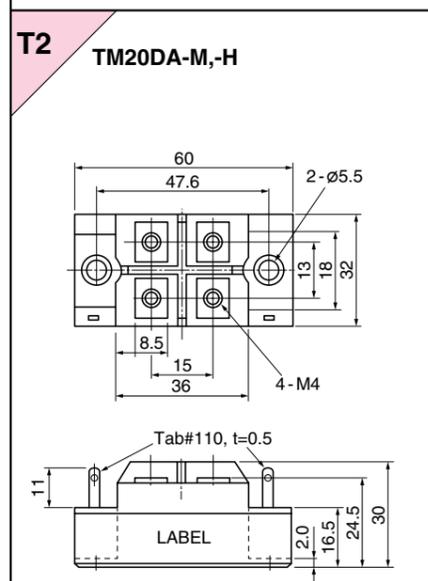
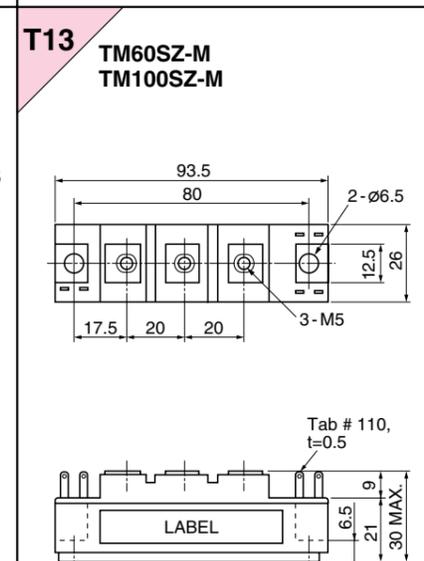
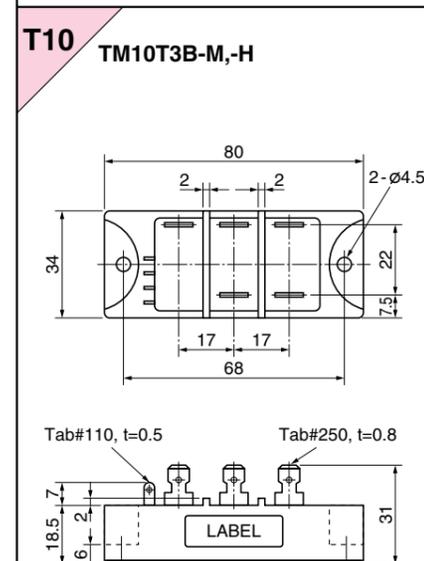
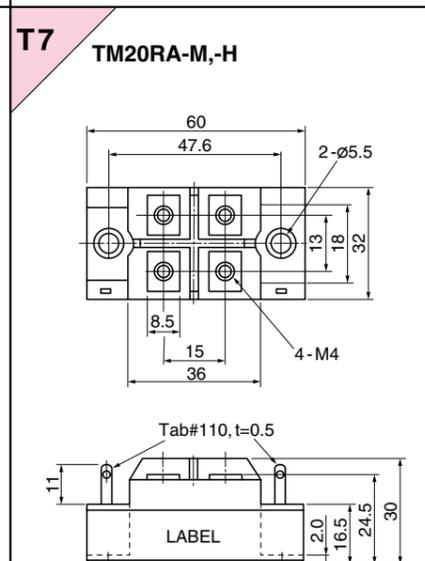
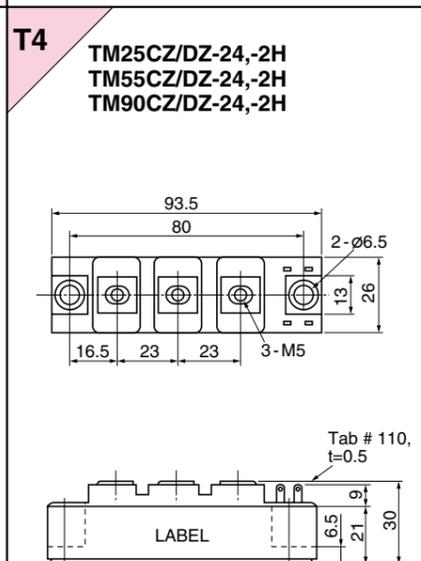
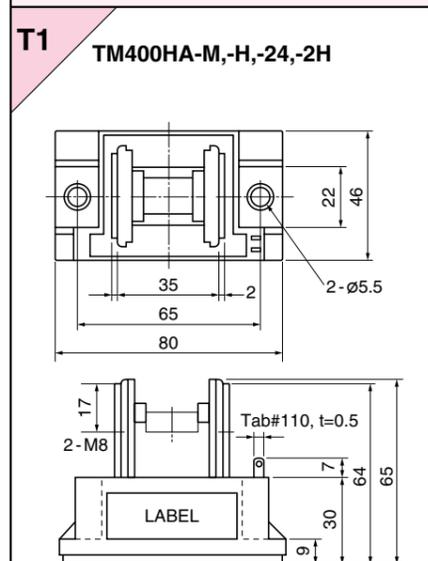
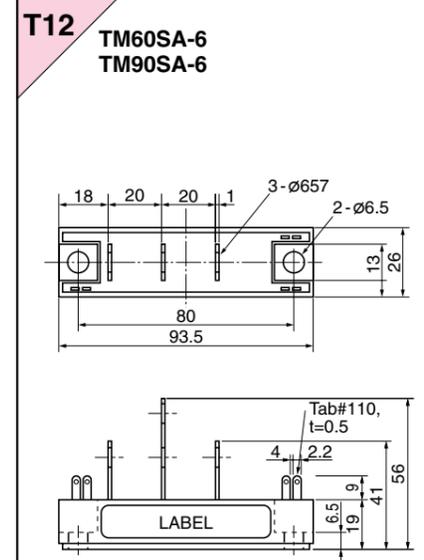
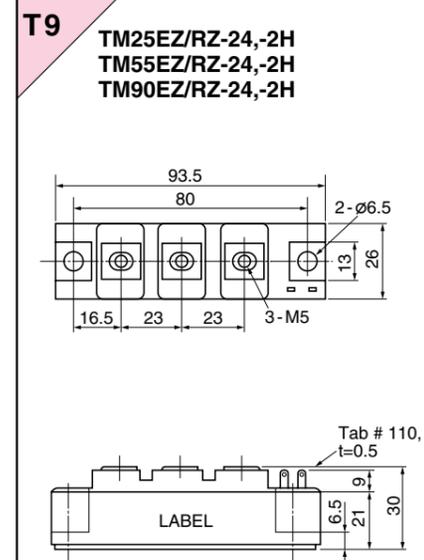
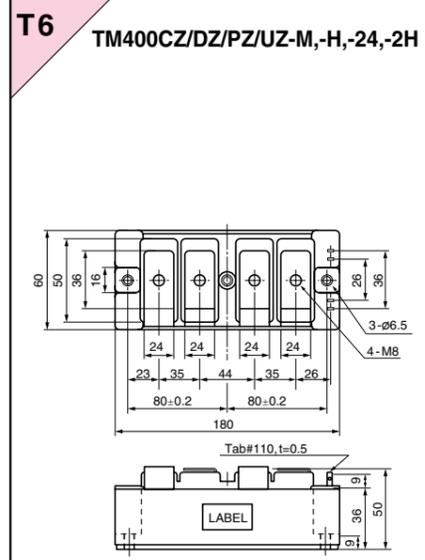
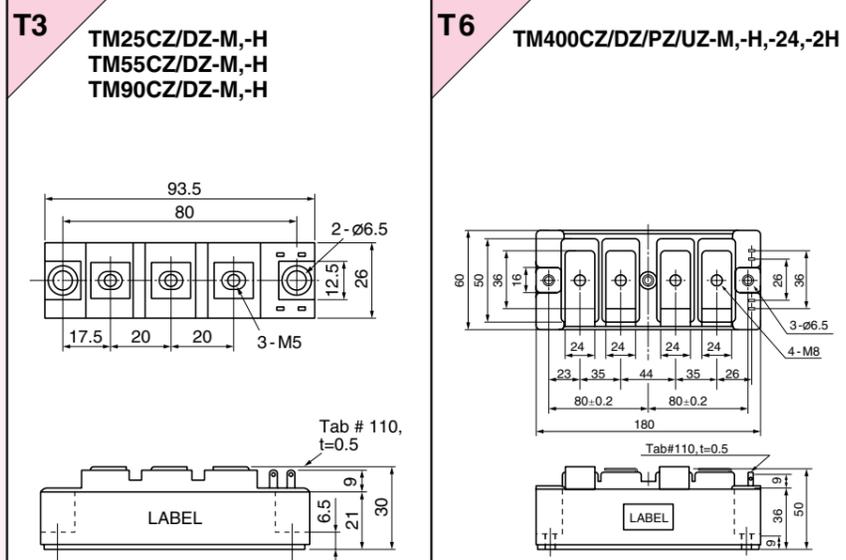








# Thyristor Modules

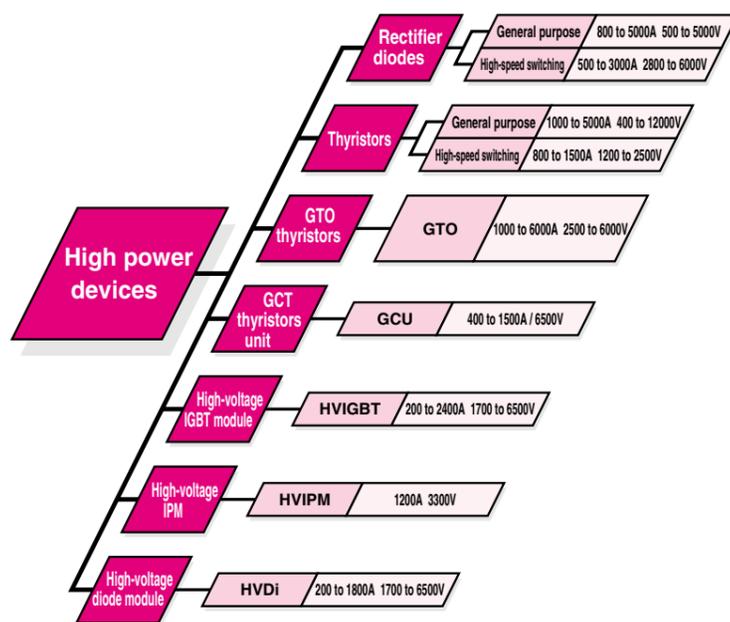
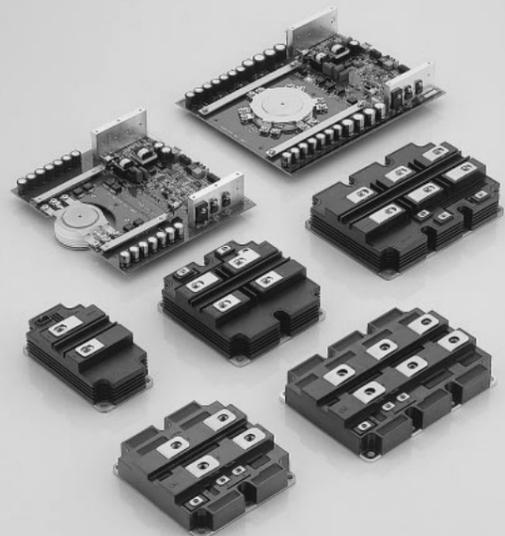


# High Power Devices

## Variety of Products Apply for Wide Range Needs

High power devices are semiconductor devices represented by GCT thyristors and HVIGBT Modules, and these devices are now used in equipment designed for tractions, including Shinkansen trains, and in power system equipment.

We offer a variety of high-power devices to suit diversified applications. These devices include: diodes, thyristors, GTO thyristors, GCT (Gate Commutated Turn-off) thyristors, HVIGBT (High-Voltage Insulated Gate Bipolar Transistor) modules, HVIPM (High-Voltage Intelligent Power Modules), etc.



### Naming system

PM	1200	H	CE	330	-1	(TYPE 1)
CM	1200	H	A	-66	H	(TYPE 2)
FG	4000	G	X	-90	DA	(TYPE 3)
GCU	15	CA		-130		(TYPE 3)

- Series code
- Voltage class
  - For TYPE 1: Withstand voltage class  $\times 10 = V_{CES}$   
Example: 330  $\times 10 = 3,300$  V
  - For TYPE 2: Withstand voltage class  $\times 50 = V_{CES}$   
Example: 66  $\times 50 = 4,500$  V
  - For TYPE 3: Withstand voltage class  $\times 50 = V_{ORV}$  or  $V_{REV}$   
Example: 90  $\times 50 = 4,500$  V
- Voltage classification or turn-off time or high frequency type in case of "x"
- Auxiliary number (denotes the type of outline or manufacturing process)
- Connection
- Rated current capacity (However, the GCT Thyristor Unit is shown as a value multiplied by 1/100.)
- Type of device

### Types and symbols

Type of device	Symbol	Outline			
		Stud or flat base	Flat	Moduled	Type
General-purpose Rectifier Diode / High-speed switching Rectifier Diode	SR	FD	—	3	
General-purpose Thyristor / High-speed switching Thyristor	CR	FT	—	3	
GTO Thyristor	—	FG	—	3	
GCT Thyristor Unit	—	GCU	—	3	
HVIGBT Module	—	—	CM	2	
HVIPM	—	—	PM	1	
HVDi Module	—	—	RM	2	



## GTO/GCT Thyristors and HVIGBT Module Series

High-power devices are used in a wide range of fields such as heavy industrial application, electric power system and traction application. A high voltage, a large capacity, and a low power loss are always demanded from the market.

We are doing an improvement of the existing devices and new development. The GCT Thyristor unit series and the HVIGBT module series are newly added to the lineup of the existing devices such as Diodes, Thyristors and the GTO Thyristors, and it corresponds to various market needs.

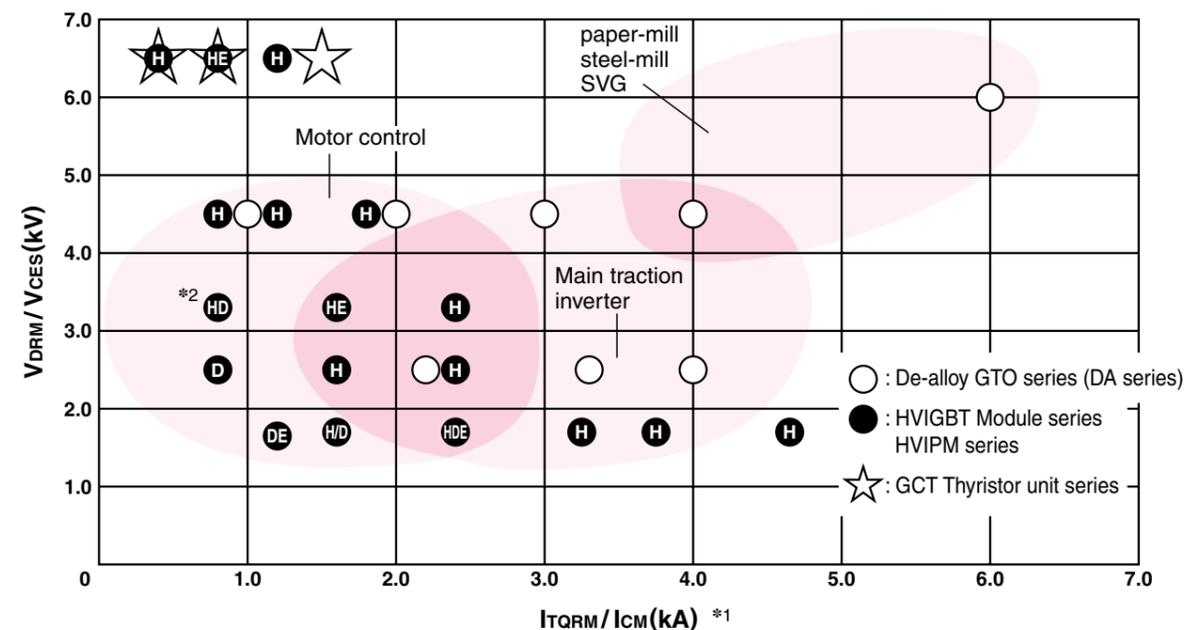
### GCT Thyristor series (Gate Commutated Turn-off Thyristor)

The GCT Thyristor is high power device that takes the place of the existing GTO Thyristors. Because the turn-off capability improves rapidly, and the turn-off time was shortened to about 1/10 of the GTO Thyristors, it is the most suitable for the application that needs the series connection. Because the GCT Thyristor can be turn-off only with the clamping circuit even if there is no snubber circuit that the GTO Thyristor needs, making to a low loss and the small size and lightening the equipment are achieved.

### HVIGBT Module (High Voltage Insulated Gate Bipolar Transistor Module)

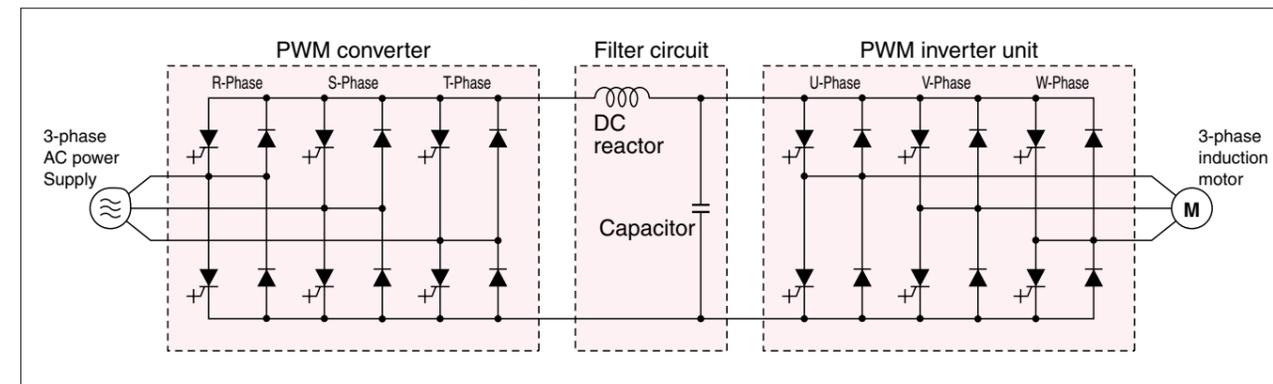
The HVIGBT modules were manufactured from the special line managed in the high quality, and achieved high reliability and high heat cycle lifetime by adopting the AISiC baseplate.

Abundant lineup between 1.7kV and 6.5kV, and it is used for the traction application and heavy industrial use widely. N series equipped with CSTBT™ chip developed by original our company and the HG series with high insulation package were newly developed.



\*1 :  $I_{cM} = I_c \times 2$   
\*2 : "H" denotes the single type, "D" denotes the dual type, and "E" denotes the chopper type.

### Main circuit of PWM converter/inverter system



# Rectifier Diodes

## ■ Rectifier Diodes for general use

Type name	Voltage (V) current (A)*1	500	600	2800	3000	4000	5000	Shape
FD1000A-56	800			●				Flat type ø45
FD1000D-56				●				Flat type ø35
FD1600CP-10	1600	●						Flat type ø35
FD1600A-60					●			Flat type ø50
FD1600CV-80						●		Flat type ø60
FD3500BP-12	3500		●					Flat type ø60
FD3500AH-56				●				Flat type ø80
FD5000AV-100DA	5000						●	Flat type ø85

\*1 : Shown by the average forward current.

## ■ Rectifier Diodes for fast switching

Type name	Voltage (V) current (A)*1	2800	4500	6000	Shape
FD1000FV-90	800		●		Flat type ø60
FD1000FX-90				●	Flat type ø60
FD1000FH-56	1000	●			Flat type ø50
FD1500AV-90	1500		●		Flat type ø70
FD2000DU-120	1700			●	Flat type ø130

\*1 : Shown by the average forward current.

## ■ Rectifier Diodes for fast switching (Soft recovery type)

Type name	Voltage (V) current (A)*1	4500	6000	Shape
FD500JV-90DA	500	●		Flat type ø47
FD1500CV-90DA	1500	●		Flat type ø85
FD1500AU-120DA	1500		●	Flat type ø85
FD3000AU-120DA	3000		●	Flat type ø130

\*1 : Shown by the average forward current.

# Thyristors / GTO Thyristors

Thyristors / Gate Turn-off Thyristors

## ■ Thyristors for general use

Type name	Voltage (V) current (A)*1	400	1200	1400	2500	2700	2800	4000	12000	Shape
FT1000A-50	1000				●					Flat type ø50
FT1000BV-80								●		Flat type ø60
FT1500DL-28	1500			●						Flat type ø50
FT1500CH-54						●				Flat type ø60
FT1500DV-80								●		Flat type ø80
FT1500GV-80		*2							●	Flat type ø80
FT1500AU-240	2500								●	Flat type ø105
FT2500CL-24			●							Flat type ø60
FT2500BH-56								●		Flat type ø80
FT5000AP-8		5000	●							Flat type ø80

\*1 : Shown by the average ON current.

\*2 : Current type inverter thyristor

## ■ Fast switching Thyristors

Type name	Voltage (V) current (A)*1	1200	1800	2500	Shape
FT1000CY-24	800	● (15)			Flat type ø50
FT1000CX-36				● (30)	Flat type ø50
FT1000AX-50	1000			● (35)	Flat type ø60
FT1500EX-24	1500	● (30)			Flat type ø60
FT1500EY-24		● (20)			Flat type ø60

\*1 : Shown by the average ON current.

Note : Numerical values in ( ) indicate the maximum shut-off time [ $\mu$ s].

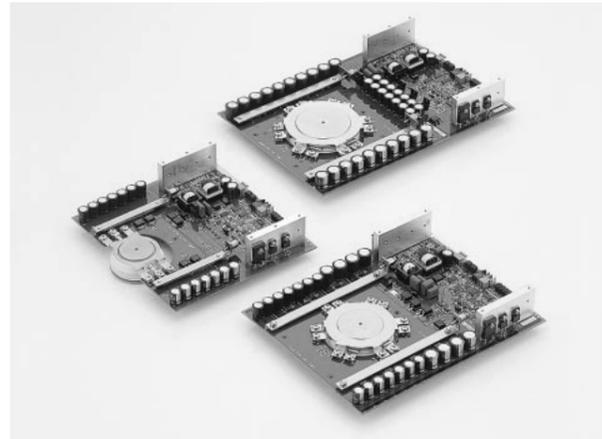
## ■ GTO Thyristors

Type name	Voltage (V) current (A)*1	2500	4500	6000	Shape
FG1000BV-90DA	1000		●		Flat type ø47
FG2000JV-90DA	2000		●		Flat type ø63
FG2000FX-50DA	2200	●			Flat type ø63
FG3000DV-90DA	3000		●		Flat type ø70
FG3000GX-90DA					Flat type ø75
FG4000BX-90DA					Flat type ø85
FG3300AH-50DA		3300	●		
FG4000EX-50DA	4000	●			Flat type ø85
FG4000CX-90DA				●	Flat type ø85
FG4000GX-90DA				●	Flat type ø85
FG6000AU-120D	6000			●	Flat type ø130

\*1 : Shown by the repeatable control ON current.

# GCT Thyristors Unit

Gate Commutated Turn-off Thyristors Unit



Photograph of the GCT Thyristor Unit Series

## ■ Features

GCT thyristor unit is the new product which combine GCT thyristor and gate driver.  
GCT thyristor is operated by optimized designed gate driver and get highest performance on its characteristics.

## ■ Application

The handling of GCT thyristor unit is easy because GCT thyristor and gate driver are combined in the unit.  
GCT thyristor unit is most suitable for following high power electronics application.

- Electric Power Application
  - SVG (Static Var Generator)
  - BTB (Back to Back)
  - Frequency exchanger
- Heavy Industrial Application
  - Motor drive for Fun, Pump, Steel mill and paper mill
- AC Switch Application

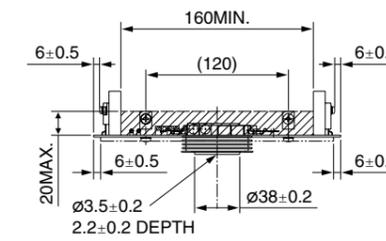
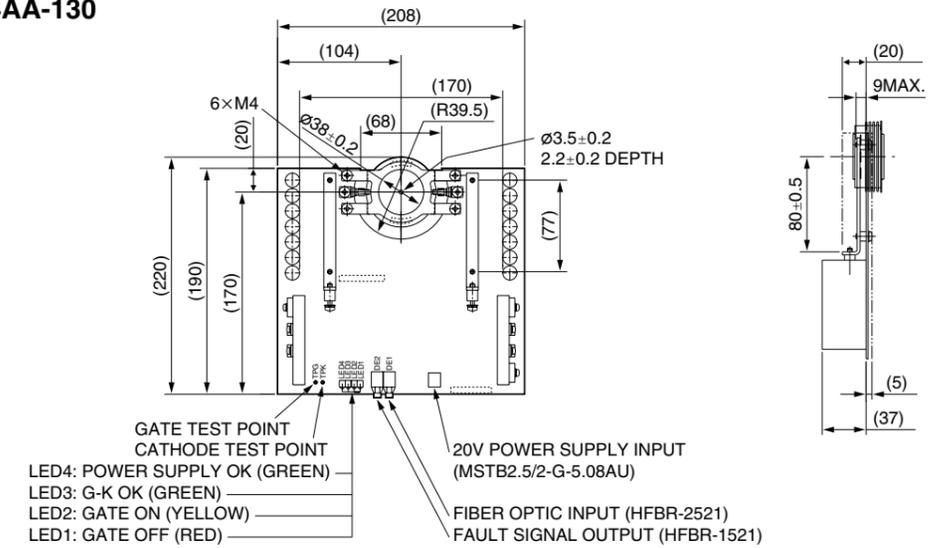
## ■ GCT Units

Type name	Structure	V <sub>DRM</sub> (V)	V <sub>RRM</sub> (V)	I <sub>TQRM</sub> (A)	T <sub>j</sub> (°C)	Frequency f (Hz)	Gate driver supply		Control input signal
		Repetitive peak off state voltage	Repetitive peak reverse voltage	Repetitive controllable on state current	Junction temperature		V <sub>c</sub>	Supply connector	
GCU04AA-130	Symmetrical	6500	6500	400	125	780	20V DC	Made in Phoenix contact Co.,Ltd Type name: MSTB25/2-G-508AU	Optical fiber data link Transmitter: HFBR-1521: Made in Agilent Co.,Ltd. Receiver: HFBR-2521: Made in Agilent Co.,Ltd.
GCU08BA-130				800					
GCU15CA-130				1500					

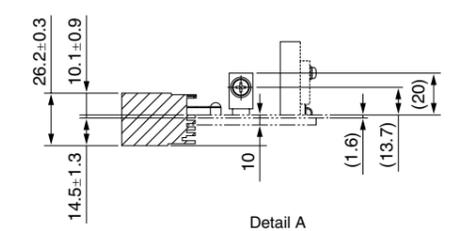
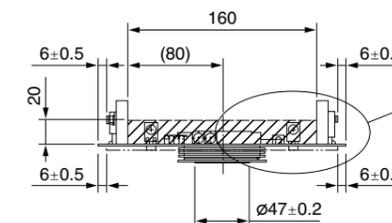
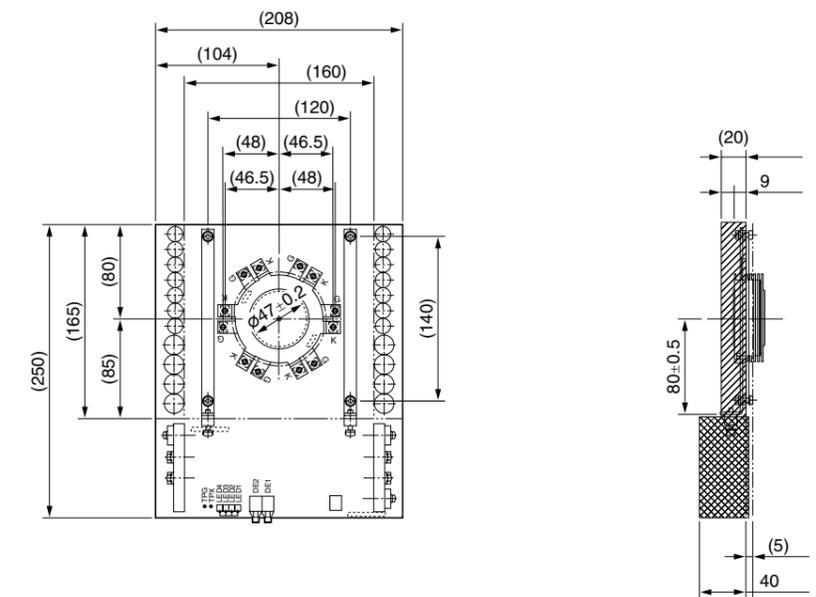
## ■ GCT Thyristor Outline Drawing

(unit : mm)

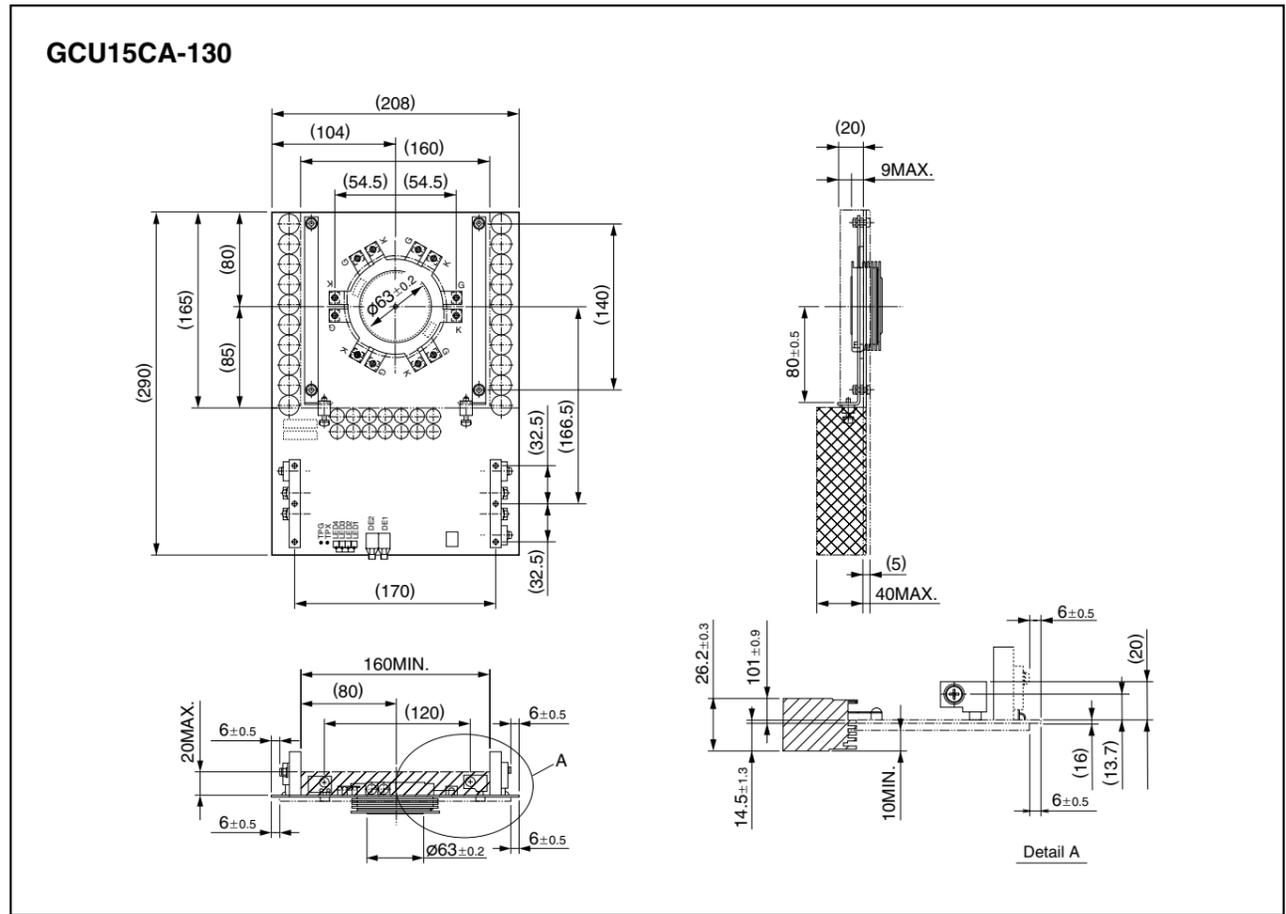
### GCU04AA-130



### GCU08BA-130



(unit : mm)



# HVIGBT Modules

High Voltage Insulated Gate Bipolar Transistor Modules



Photograph of HVIGBT Modules Series

- **Features**
  - High isolation voltage (10.2kVrms, AC 1min.)
  - High voltage/Large capacity (6.5kV/600A, 1.7kV/2.4kA)
  - High heat cycle lifetime
  - Abundant lineup with various connecting
- **Application**
  - Traction Application
    - Inverter, Converter, SIV
  - Heavy Industrial Application
    - Motor drive for Fun, Pump, Steel mill and paper mill
  - DC chopper equipmet

■ High Voltage Insulated Gate Bipolar Transistor Module <N Series> : Low loss, CSTBT™ Chip

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)		
		1200	1800	2400
H	1700		CM1800HC-34N*	CM2400HC-34N*
			CM10	
D	1700	CM1200DB-34N* CM1200DC-34N*		
		CM9		
E4	1700	CM1200E4C-34N*		
		CM10		

★ : New product

■ High Voltage Insulated Gate Bipolar Transistor Module <HG Series> : High isolation, AISiC Baseplate

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)				
		200	400	600	800	1200
H	3300		CM400HG-66H*		CM800HG-66H**	CM1200HG-66H*
			CM11		CM12	CM13
	6500	CM200HG-130H**	CM400HG-130H**	CM600HG-130H*		
		CM11	CM12	CM13		
E4	6500		CM400E4G-130H**			
			CM13			

● Numbers CM9 to CM13 are recorded with product names to show the outline-drawing numbers.

★ : New product  
★★ : Under development

# HVIGBT Modules

## High Voltage Insulated Gate Bipolar Transistor Modules

### High Voltage Insulated Gate Bipolar Transistor Module <HC Series> : Low loss, AISiC Baseplate

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)					
		800	900	1200	1600	1800	2400
H	1700			CM1200HC-34H	CM1600HC-34H	CM1800HC-34H	CM2400HC-34H
				CM7		CM8	
	2500			CM1200HC-50H			
				CM8			
H	3300	CM800HC-66H		CM1200HC-66H			
		CM7		CM8			
H	4500		CM900HC-90H*				
		CM8					
D	1700	CM800DZ-34H					
		CM4					
E2	3300	CM800E2C-66H					
		CM800E6C-66H					
		CM8					

★ : New product

### High Voltage Insulated Gate Bipolar Transistor Module <HB Series> : Low loss, Cu Baseplate

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)				
		400	600	800	900	1200
H	2500			CM800HB-50H		CM1200HB-50H
				CM7		CM8
	3300			CM800HB-66H		CM1200HB-66H
H	4500	CM400HB-90H	CM600HB-90H		CM900HB-90H	
		CM7		CM8		
E2	3300			CM800E2Z-66H		
				CM8		

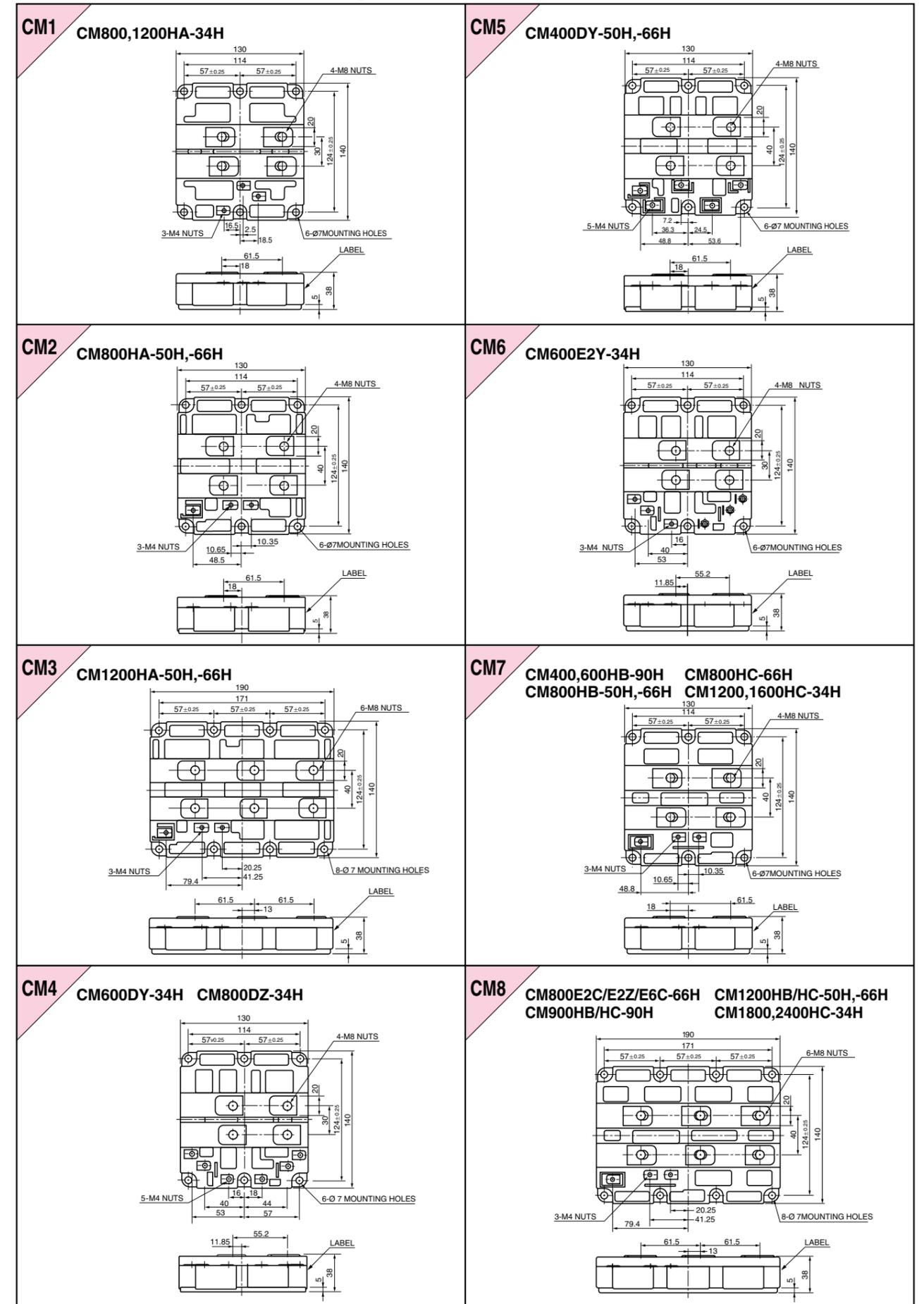
### High Voltage Insulated Gate Bipolar Transistor Module <HA Series> : Cu Baseplate

Connection	V <sub>CES</sub> (V)	I <sub>c</sub> (A)			
		400	600	800	1200
H	1700			CM800HA-34H	CM1200HA-34H
				CM1	
	2500			CM800HA-50H	CM1200HA-50H
H	3300			CM800HA-66H	CM1200HA-66H
				CM2	
D	1700		CM600DY-34H		
			CM4		
	2500	CM400DY-50H			
D	3300	CM400DY-66H			
		CM5			
E2	1700		CM600E2Y-34H		
			CM6		

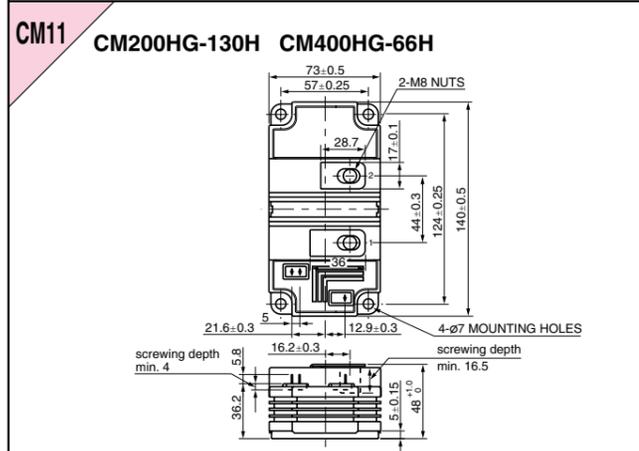
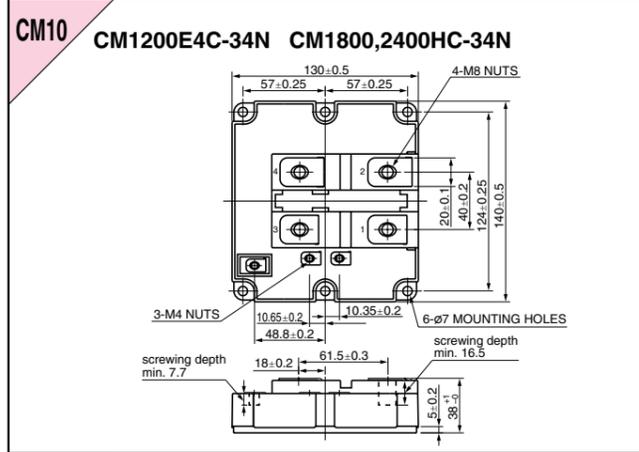
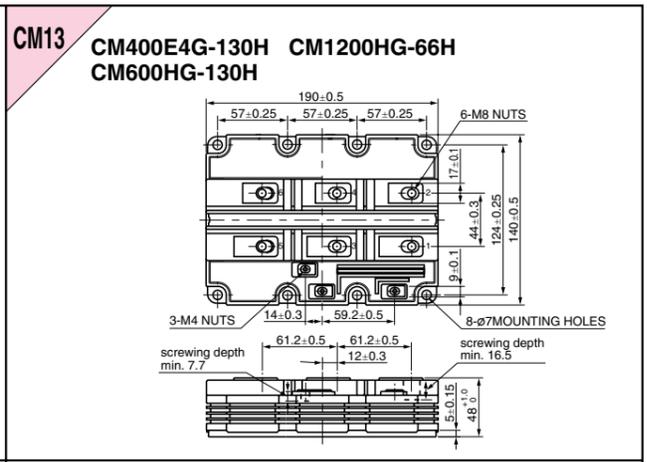
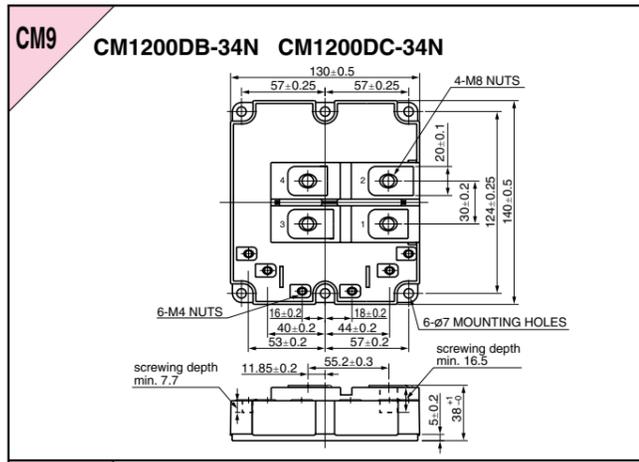
● Numbers CM1 to CM8 are recorded with product names to show the outline-drawing numbers.

### HVIGBT Modules outline drawings

(Unit : mm)



(Unit : mm)



# HVDi Modules

High Voltage Diode Modules

## ■ HVDi Modules : Copper baseplate

connection	VRRM (V)	Ic (A)				
		400	600	900	1200	1600
D	3300	RM400DY-66S	RM600DY-66S		RM1200DB-66S**	
	4500	RM1		RM900DB-90S**	RM3	

\*\* : Under development

## ■ HVDi Modules : AISiC baseplate

connection	VRRM (V)	Ic (A)				
		400	600	900	1200	1800
H	1700					RM1800HE-34S
	3300				RM1200HE-66S	RM2
	4500		RM600HE-90S*			

\* : New product

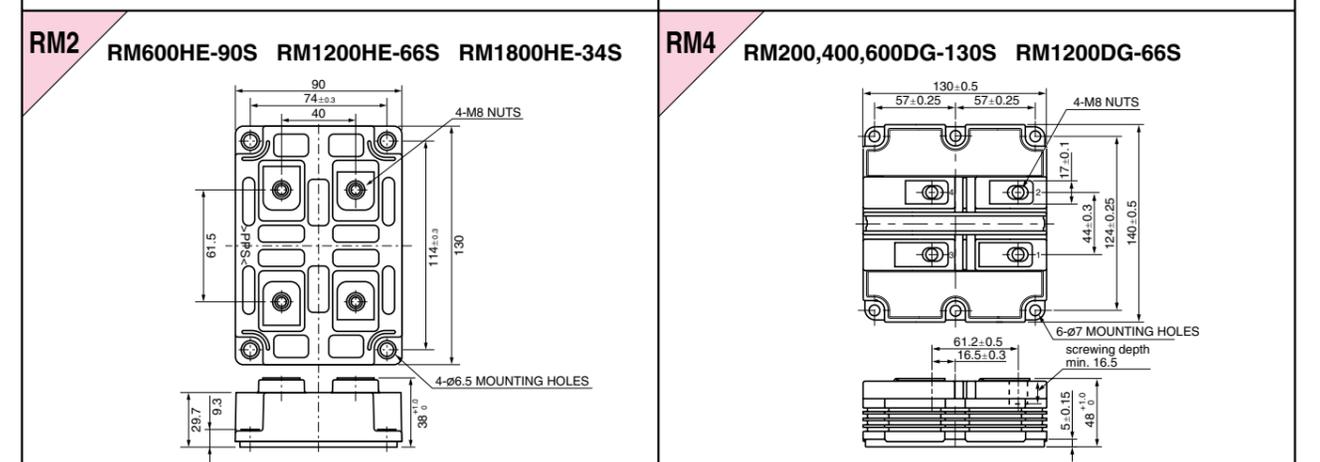
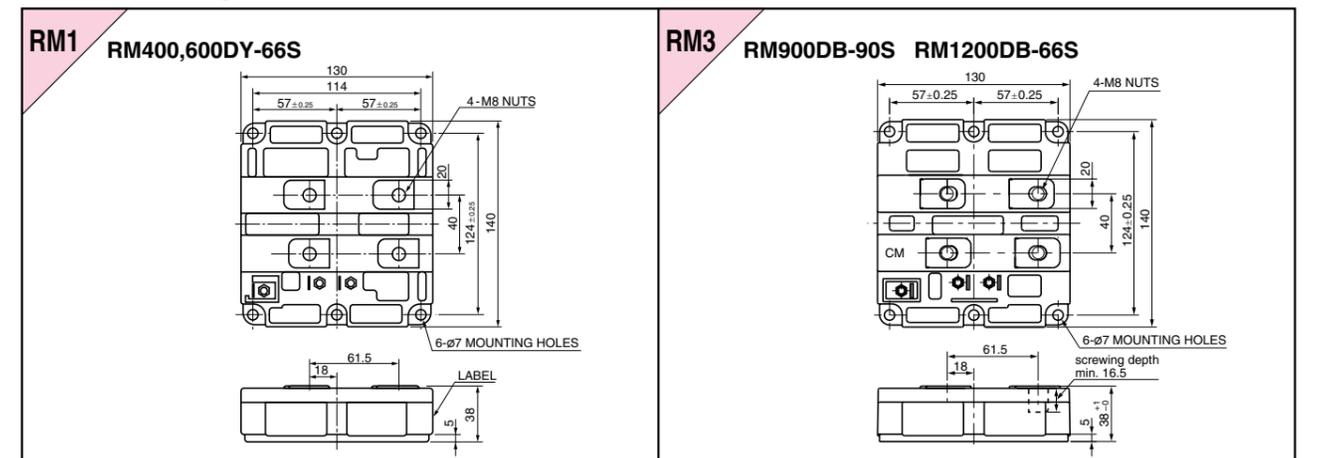
## ■ HVDi Modules : High isolation, AISiC baseplate

connection	VRRM (V)	Ic (A)				
		200	400	600	900	1200
D	3300					RM1200DG-66S**
	6500	RM200DG-130S**	RM400DG-130S**	RM600DG-130S**		RM4

\*\* : Under development

## ■ Outline drawing

(Unit : mm)



# HVIPM

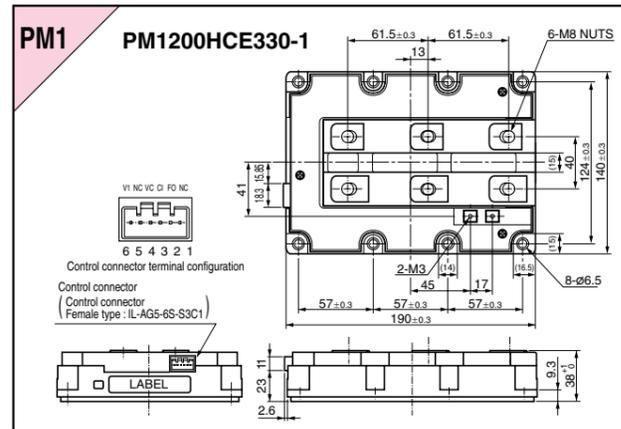
High Voltage Intelligent Power Modules

## High Voltage Intelligent Power Modules

connection	V <sub>RRM</sub> (V)	I <sub>c</sub> (A)
H	3300	1200
		PM1200HCE330-1
		PM1

## Outline drawing

(Unit : mm)



# High Voltage Integrated Circuits

## 600V and 1200V Half Bridge Driver HVIC

This product is a semiconductor integrated circuit designed to directly drive the power MOS/IGBT modules of half bridge composition by integrating the 600V(1200V) and 8/24V dielectric elements onto one chip.

The internal installation of high side/low side driver circuits, protective circuits against the power supply voltage drop and interlocking circuits enables a device to drive/control the power elements without using the photocoupler from a logic circuit such as a microcomputer.

### Application

Most suitable for the following applied products to drive the power MOS/IGBT modules for inverters.

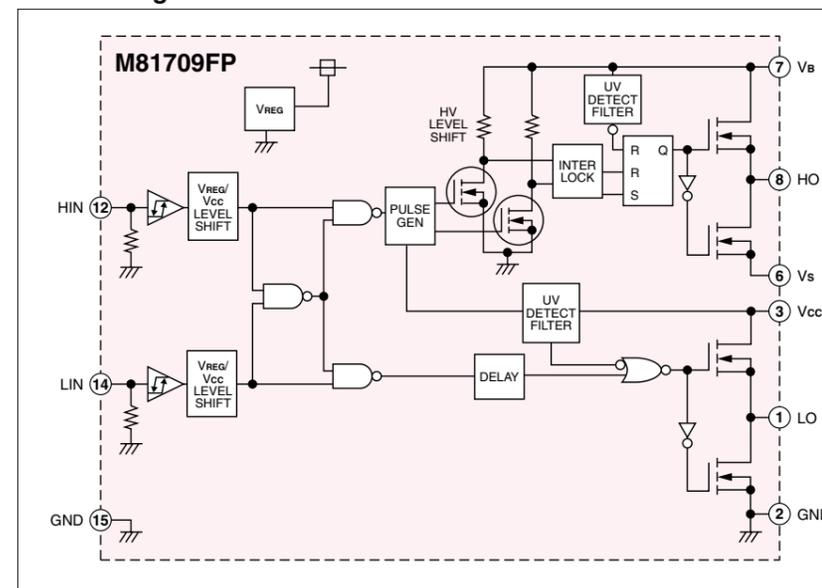
- General inverters
- Air conditioners, refrigerators and washing machines
- AC servo motors
- DC brushless motors
- Plasma display panel
- Illumination machinery

## Reference by function

Type name	Floating supply voltage [V]	Output current [A]	Driving method	Number of input-signal	Dead-time control	Remarks	Package outline	Outlines drawings
M63975FP (Lead free)	24	±0.5	Low side	1	—	—	10P2N	(12)
M63991FP (pb free)	600	±2.0	Half bridge	2	Input-signal	With interlock function	16P2N	(5)
M63992FP (pb free)		±0.3						
M63993FP (Lead free)		±0.5	Half bridge	1	Inside	—	8P2S	(11)
M63994FP (Lead free)	±2.0	2						
M63996FP (pb free)	600	±2.0	Half bridge	2	Input-signal	SD/With interlock function	16P2N	(5)
M81700FP (Lead free)						With interlock function		
M81701FP (Lead free)		With SD function						
M81702FP (Lead free)		—						
M81703FP (Lead free)		—						
M81705FP (Lead free)		+0.15/-0.125	High side	1	—	—	8P2S	(11)
M81706AFP (pb free)		+0.12/-0.25	Half bridge	2	Input-signal	With interlock function	16P2N	(5)
M81707FP (pb free)		±0.1	Dual high side			—		
M81708FP (pb free)		+0.12/-0.25	Half bridge	1	Inside	With interlock function	8P2S	(11)
M81709FP (pb free)		±2.0				—		
M81713FP (pb free)	±0.5	Dual low side	1×2	Input-signal	With interlock function	24P2Q	(17)	
M81019FP ★★ (pb free)	±1.0				—			
M81711FP ★★ (pb free)	24	±0.5	Half bridge	2	Input-signal	With interlock function	16P4/16P2N	(2)/(5)
M81716FP ★★ (pb free)	600	+0.12/-0.25				—		
M81719FP ★★ (pb free)	600	±1.0	Half bridge	2	Input-signal	With interlock function	24P2Q	(17)
M81721FP ★★ (pb free)		±3.0				—		
M81722FP ★★ (pb free)		±0.1	Dual high side	1×2	—	—	8P2S	(11)
M81723FP ★★ (pb free)	300	±0.1	High side	1	—	—	16P2N	(5)
M81725FP ★★ (pb free)	600	±3.0				—	8P2S	(11)
M63958P/FP ★★ (pb free)	600	+0.5/-0.25	Half bridge	—	Inside	—	16P4/16P2N	(2)/(5)

★★ : Under development

## Block diagram

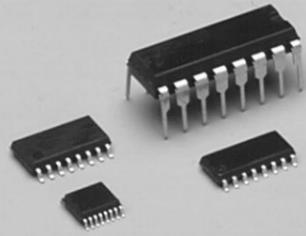


# Transistor-Array

## Wide Products Range Help Reduce Product Size and Weight

Transistor array is the semiconductor integrated circuit in which a minute input current enables a big current drive. They are used in a wide range of fields due to its abundant product series (50mA to 1.5A/35V to 80V).

Application of the surface mounting package also enables the compact, lightweight and high density mounting of set.



### Application

- Drivers for stepping motors of printers and facsimile machines
- Thermal head drivers for handheld word processors and thermal printers
- Hammer head drivers for calculators with a printer and ECRs
- Drivers for relays, solenoids, lamps, LEDs and fluorescent display tubes

### Codes for transistor array type name

M 5 4523 P  
M 6 3823 FP  
M 6 3803 KP

- Package type  
P/WP: DIP type FP/GP/DP: SOP type KP: SSOP type
- Circuit type and circuit kind per product's series
- Application and the range of ambient temperature for operation
- Abbreviation shows the Mitsubishi Integrated Circuit

### Quick reference

Current	Voltage	35V	40V	50V	80V		
50mA			◇⑥M54513P/FP				
150mA				△⑦M54580P/FP			
200mA			◇⑥M81016P/FP/KP				
300mA		◇⑦M63802P/FP/GP/KP ◇⑦M63803P/FP/GP/KP ◇⑦M63804P/FP/GP/KP ◇⑦M63805P/FP/KP ◇⑦M63806P/FP/KP ◇⑦M63807P/FP/KP ◇⑦M63812P/FP/GP/KP ◇⑦M63813P/FP/GP/KP ◇⑦M63814P/FP/GP/KP ◇⑦M63815P/FP/KP ◇⑦M63816P/FP/KP ◇⑦M63817P/FP/KP	△⑦M54561P				
	350mA		◇⑥M54571P				
	400mA		◇⑥M54522P/FP ◇⑥M54530P/FP ◇⑥M54531P/FP	◇⑦M54566P/FP ◇⑦M54583P/FP			
	500mA			△⑥M63840P/FP/KP **	◇⑦M54523P/FP ◇⑦M54525AGP △⑥M54562P/FP △⑥M54563P/FP △⑥M54564P/FP ◇⑦M54585P/FP/KP ◇⑦M54587P/FP △⑦M63800FP ◇⑦M63820FP/KP ◇⑦M63823P/FP/GP ◇⑦M63824G/KP ◇⑦M63826P/FP/GP ◇⑦M63827WP/DP ◇⑦M63828WP/DP ◇⑦M63832GP/KP ◇⑦M63834FP/KP ◇⑦M63836FP/KP		
		1.5A			◇⑥M54532P/FP ◇⑥M54567P/FP ◇⑥M63830P/FP	◇⑥M63850P/FP **	

◇ : Output current-synchronized type    △ : Output current-sourcing type  
○ : Circled numbers indicate the number of circuits.

\*\* : Under development



# Transistor-Array

### Reference by function

Type name.	Unit	Io max [mA]	Vo max [V]	Input-function voltage	Output current	Darlington transistor	With output clamp-diode	Low collector-emitter voltage	High input threshold voltage	Mini-frat package	Package outlines	Outlines drawings
M54513FP	8	50	40	H	Sink			●		●	20P2N	④
M54513P											18P4G	③
M54522FP	8	400	40	H	Sink	●	●			●	20P2N	⑥
M54522P											18P4G	③
M54523FP	7	500	50	H	Sink	●	●			●	16P2N	⑤
M54523P											16P4	②
M54525AGP	7	500	50	H	Sink	●	●		●	●	16P2S	⑦
M54530FP	7	400	40	H	Sink	●	●			●	16P2N	⑤
M54530P											16P4	②
M54531FP	7	400	40	H	Sink	●	●			●	16P2N	⑤
M54531P											16P4	②
M54532FP	4	1500	50	H	Sink	●	●			●	16P2N	⑤
M54532P											16P4	②
M54561P	7	300	40	L	Source	●	●				16P4	②
M54562FP	8	500	50	H	Source	●	●			●	20P2N	⑥
M54562P											18P4G	③
M54563FP	8	500	50	H	Source	●	●			●	20P2N	⑥
M54563P											18P4G	③
M54564FP	8	500	50	H	Source	●				●	20P2N	⑥
M54564P											18P4G	③
M54566FP	7	400	50	L	Sink	●				●	16P2N	⑤
M54566P											16P4	②
M54567FP	4	1500	50	L	Sink	●	●			●	16P2N	⑤
M54567P											16P4	②
M54571P	6	350	40	H	Sink		●	●			20P4	④
M54580FP	7	150	50	L	Source	●				●	16P2N	⑤
M54580P											16P4	②
M54583FP	8	400	50	L	Sink	●				●	20P2N	⑥
M54583P											18P4G	③
M54585FP	8	500	50	H	Sink	●	●			●	20P2N	⑥
M54585KP											20P2E	⑨
M54585P	8	500	50	L	Sink	●	●			●	18P4G	③
M54587FP											20P2N	⑥
M54587P	8	500	50	L	Sink	●	●			●	20P4	④

# Transistor-Array

## Reference by function

Type name.	Unit	Io max [mA]	Vo max [V]	Input-function voltage	Output current	Darlington transistor	With output clamp-diode	Low collector-emitter voltage	High input threshold voltage	Mini-frat package	Package outlines	Outlines drawings										
M63800FP	7	500	50	H	Source	●	●	●		●	16P2N	⑤										
M63802FP	7	300	35	H	Sink			●	●		●	⑤										
M63802GP											●	⑦										
M63802KP											●	⑧										
M63802P											●	②										
M63803FP	7	300	35	H	Sink			●			●	⑤										
M63803GP											●	⑦										
M63803KP											●	⑧										
M63803P											●	②										
M63804FP	7	300	35	H	Sink			●			●	⑤										
M63804GP											●	⑦										
M63804KP											●	⑧										
M63804P											●	②										
M63805FP	8	300	35	H	Sink			●	●		●	⑥										
M63805KP											●	⑨										
M63805P											●	③										
M63806FP											8	300	35	H	Sink			●			●	⑥
M63806KP	●	⑨																				
M63806P	●	③																				
M63807FP	8	300	35	H	Sink			●													●	⑥
M63807KP											●	⑨										
M63807P											●	③										
M63812FP											7	300	35	H	Sink	●	●	●			●	⑤
M63812GP	●	⑦																				
M63812KP	●	⑧																				
M63812P	●	②																				
M63813FP	7	300	35	H	Sink	●	●	●			●	⑤										
M63813GP											●	⑦										
M63813KP											●	⑧										
M63813P											●	②										
M63814FP	8	300	35	H	Sink	●	●	●			●	⑤										
M63814GP											●	⑦										
M63814KP											●	⑧										
M63814P											●	②										
M63815FP	8	300	35	H	Sink	●	●	●			●	⑥										
M63815KP											●	⑨										
M63815P											●	③										
M63816FP											8	300	35	H	Sink	●	●	●			●	⑥
M63816KP	●	⑨																				
M63816P	●	③																				
M63817FP	8	300	35	H	Sink	●	●	●													●	⑥
M63817KP											●	⑨										
M63817P											●	③										
M63820FP											8	500	50	H	Sink	●	●				●	⑥
M63820KP	●	⑨																				
M63823FP	7	500	50	H	Sink	●	●														●	⑤
M63823GP																					●	⑦
M63823P											●	②										
M63824GP											7	500	50	H	Sink	●	●				●	⑦
M63824KP	●	⑭																				
M63826FP	7	500	50	H	Sink	●	●														●	⑤
M63826GP																					●	⑦
M63826P											●	②										
M63827WP											7	500	50	H	Sink	●	●				●	⑮
M63827DP	●	⑮																				
M63828WP	7	500	50	H	Sink	●	●														●	⑮
M63828DP																					●	⑮
M63830FP											4	1500	50	L	Sink	●	●				●	⑤
M63830P																					●	②
M63832GP	7	500	50	L	Sink	●															●	⑦
M63832KP																					●	⑭
M63834FP											8	500	50	L	Sink	●					●	⑥
M63834KP																					●	⑨
M63836FP	8	500	50	L	Sink	●	●														●	⑥
M63836KP																					●	⑨
M63840FP **											8	500	40	H	Source	●	●				●	⑥
M63840KP **																					●	⑨
M63840P **	●	③																				

\*\* : Under development

# Transistor-Array

## CMOS-ARRAY

Type name.	Unit	Io max [mA]	Vo max [V]	Output current	Function	Mini-frat package	Package outlines	Outlines drawings
M81016P	8	200	40	Sink	OUTAL D-TYPE FLIP-FLOP DRIVER WITH CLEAR		20P4B	⑬
M81016FP						●	20P2N	⑥
M81016KP						●	20P2E	⑨

## DMOS-ARRAY

Type name.	Unit	Io max [mA]	Vo max [V]	Input-function voltage	Output current	Darlington transistor	With output clamp-diode	Low collector-emitter voltage	High input threshold voltage	Mini-frat package	Package outlines	Outlines drawings
M63850FP **	4	1500	80	L	Sink	●	●			●	16P2N	⑤
M63850P **											16P4	②

\*\* : Under development

High Voltage Integrated Circuits and Transistor-Array outline drawings

(Unit : mm)

