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MITSUBISHI ELECTRIC

Power Devices General Catalog

State-of-the-art technology pursuing energy-savings and environmental protection.

Mitsubishi Electric power devices meet demands for energy-saving and eco-friendly semiconductors with advanced technology and a diversified product line-up. Industrial use, traction, home appliances ... wherever electric power or motor control is needed, we have the means and tools to respond, including the industry's first DIIPMs™ (Dual-In-line Package Intelligent Power Modules), and the HVIPMs (High-voltage Intelligent Power Modules).

Transistor Arrays

**High-voltage
Integrated Circuits**

Power Modules

High-power Devices

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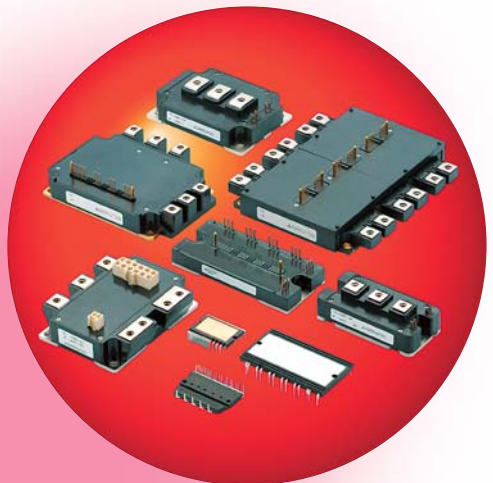
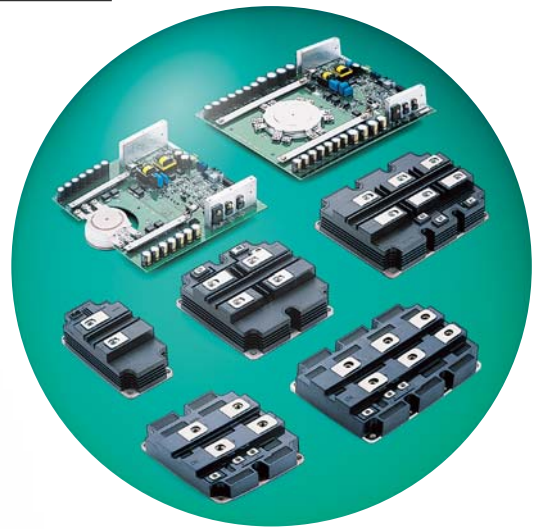
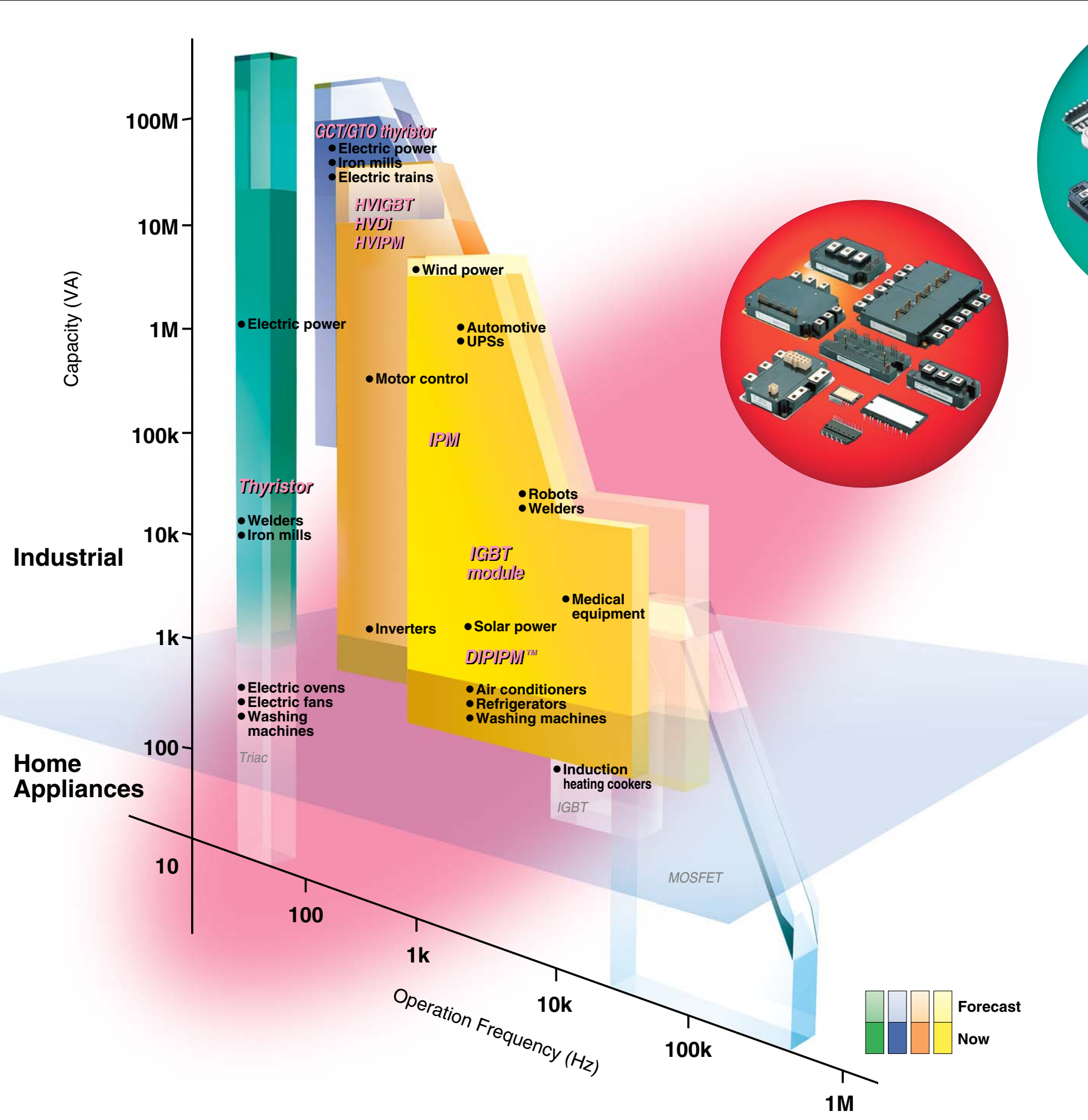
Transistor Arrays

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Applications

Power Devices Offering Unlimited Application Potential

Mitsubishi Electric power devices have a wide variety of applications in various fields, such as industrial machinery, electric railways, office automation, household power appliances and motor control. We are pursuing improvements in energy efficiency, development of technologies that reduce power consumption, and the expansion of our product line-up.



■ Main application & products

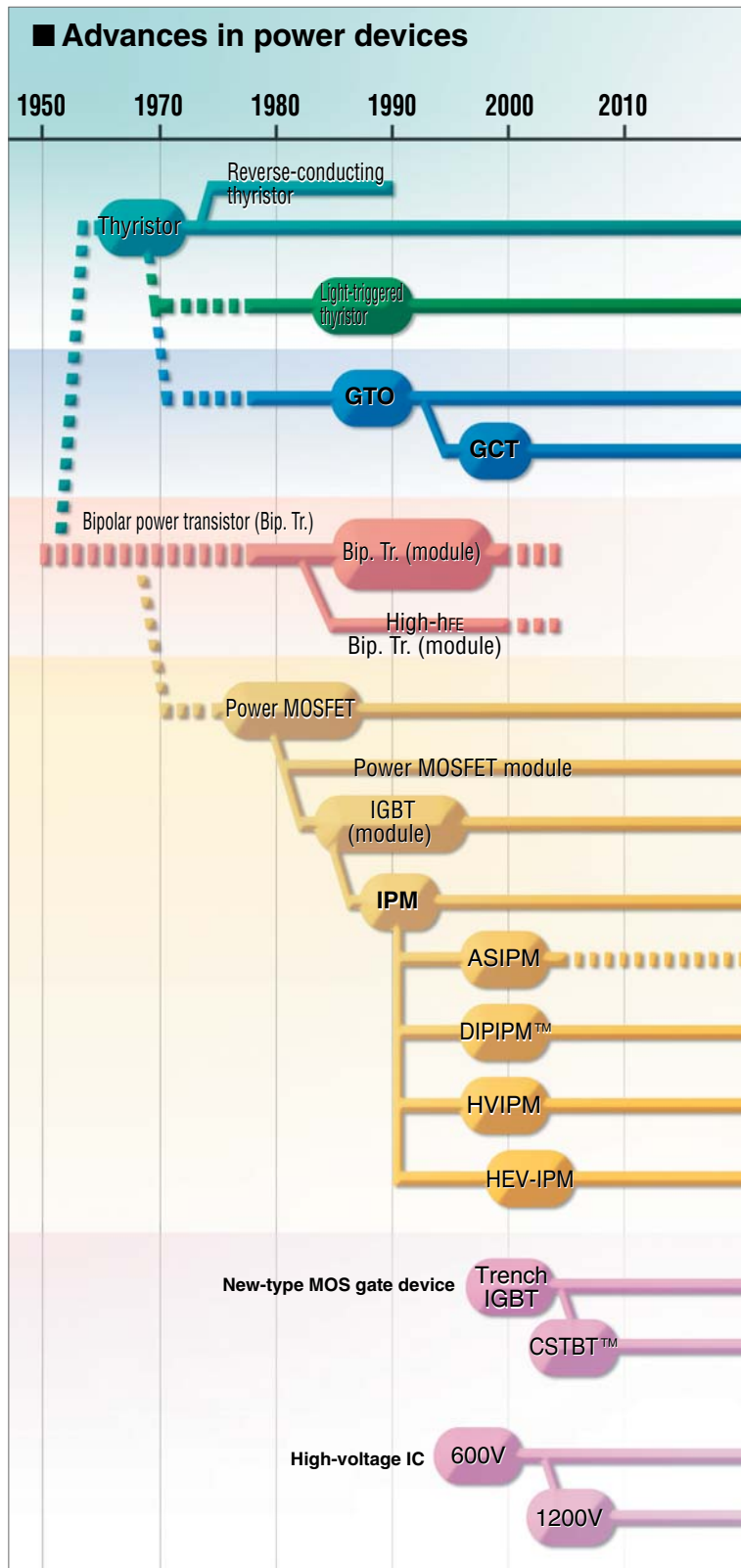
	DIPIPM™	IPM	IGBT module	GCT/GTO thyristor	Thyristor	HVIGBT HVIPM
Industrial use	Electric power					
	Iron mills					
	Electric Trains *1					
	Automotive *1					
	UPSs					
	Inverters					
	Motor control					
	Welders					
	Medical equipment					
Home Appliances	Wind power Solar power					
	Air conditioners					
	Refrigerators					
Washing machines						

*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

The technological progress of power devices is closely related to market needs. There is a constant requirement for them to be less noisy, more efficient, smaller, lighter, more advanced in function, more accurate, and have larger capacities.

In order to meet these needs with precision, Mitsubishi Electric is now accelerating the improvement of its existing devices and the research and development of new devices. Energetic efforts are being made to develop and commercialize IGBT modules, and in particular IPMs.



Actual Principle of CSTBT™

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

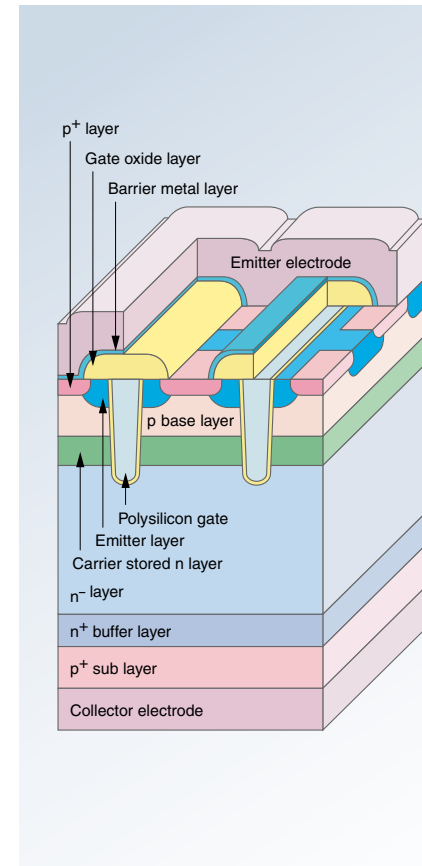
In addition to the conventional trench structure, CSTBT™ has a carrier-stored n layer to accumulate carriers as shown in the diagram on the right. The concentration of the n layer (conservation of charge layer) connected with the p base layer is higher than the n⁻ layer, and the internal electric potential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

This high internal electric potential serves as a barrier to prevent holes infused from the p⁺ layer to n⁻ 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 a charge layer, and the n layer controls the shift of holes to the p base layer.

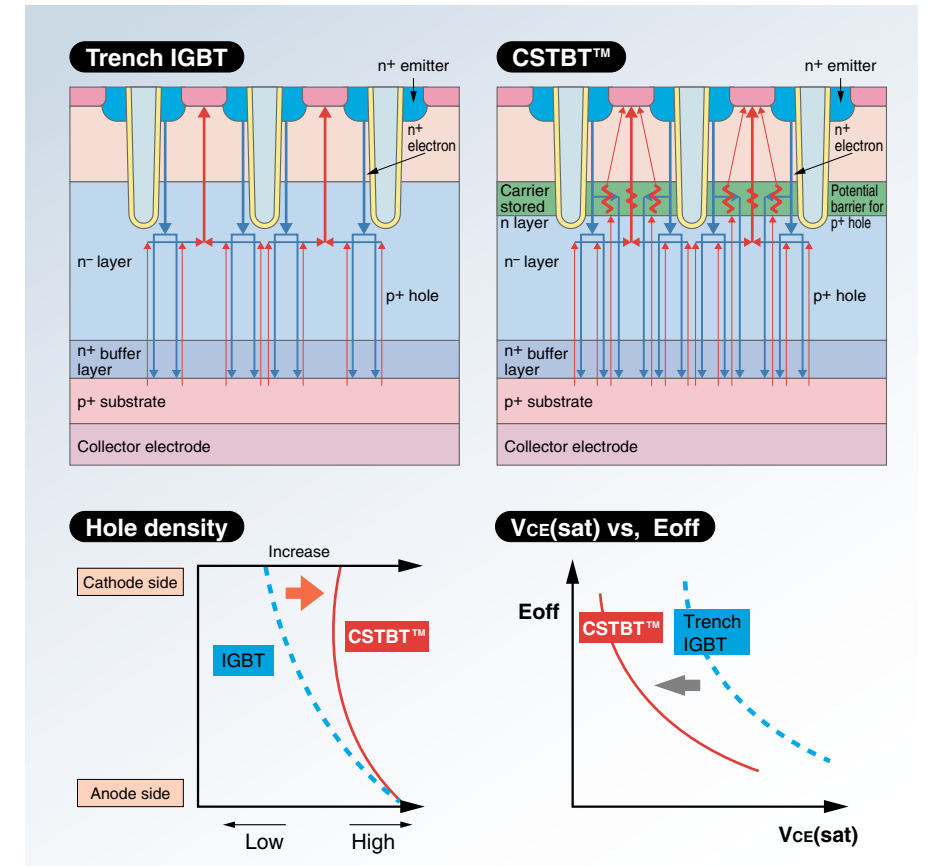
This conservation of charge function drastically improves the on-state characteristics of CSTBT™, compared to the trench structure of IGBTs. Increasing the carrier density on the emitter side and decreasing the impedance in silicon makes on-state voltage reduction possible.

CSTBT™: Mitsubishi Electric's original IGBT, utilizing a novel carrier storage effect

CSTBT™ chip structure



Comparison of trench IGBT and CSTBT™



High-voltage Technology of 1200V HVICs

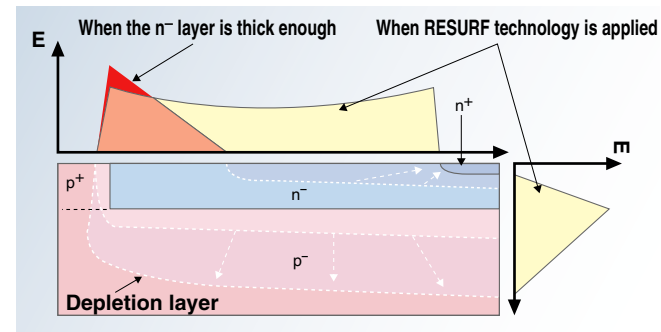
Utilizing reduced surface field (RESURF) technology, Mitsubishi Electric Corporation has developed a 1200V horizontal MOSFET for level shift circuits.

We have further developed a split-RESURF structure for level shift technology without high-potential wiring. Our high-voltage integrated circuits (HVICs) have a high-rating of 1200V.

What is RESURF?

The p⁻ substrate depletion layer forcibly extends the p⁺n⁻ junction depletion layer underneath the surface. The n⁻ layer becomes a complete depletion layer, and the surface electric field is thereby reduced.

The RESURF structure has the ability to withstand high-voltage in the vertical direction because the p⁻ substrate depletion layer extends in the depth direction. The rating of the entire device can therefore be increased significantly.

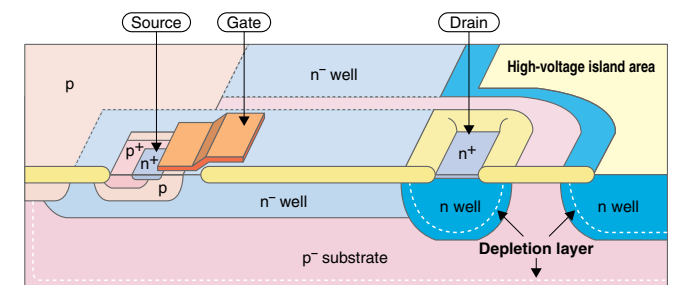


What is split-RESURF structure?

The split-RESURF structure is characterized by a narrow p⁻ substrate area exposed on the surface between the drain and island areas of the horizontal MOSFET for level shift circuits.

When high-voltage is applied across the power supply electrodes, the p⁻ substrate becomes a depletion layer between the n-diffusion areas; therefore, the surface potential of this p⁻ substrate area is not significantly different from that of the n-diffusion areas.

In the past, HVIC maximum ratings were limited to 600V because, under high-potential wiring, a dielectric film is required to have the ability to withstand the same voltage as semiconductor junctions. The split-RESURF structure enables an HVIC to achieve a rating of 1200V.



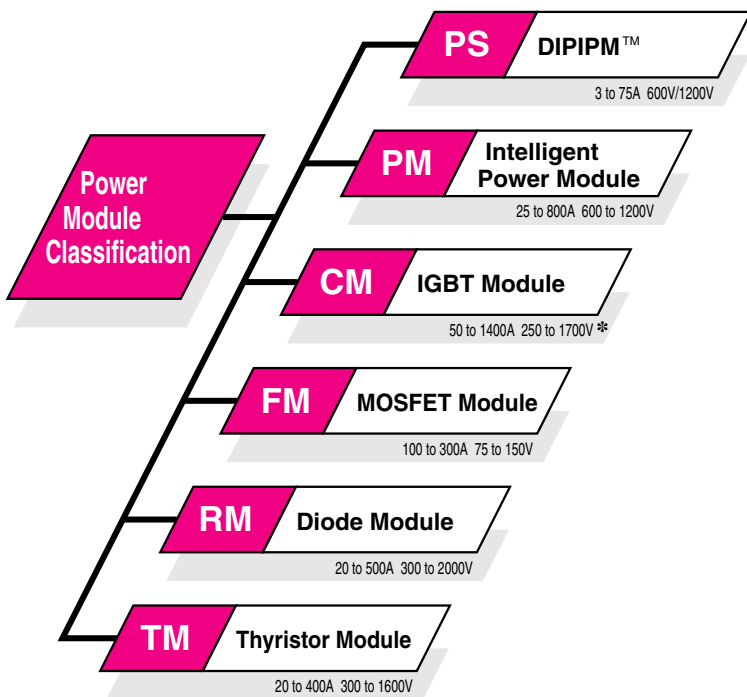
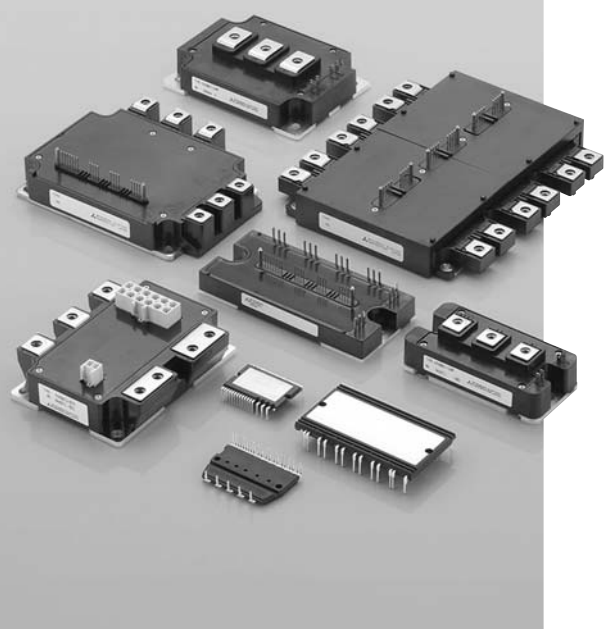
Power Modules

Industry-leading Technologies and a Wide Range of Products

The power module is a compound-type semiconductor that is installed in a package after wiring semiconductor chips to meet the application needs and specifications. Power modules are classified into diodes, thyristors, IGBTs and intelligent power modules (IPMs) according to the type of chips installed. Since 1978, when we placed these power modules in practical use, Mitsubishi Electric 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 doing our utmost to develop products and improve product characteristics in this field.

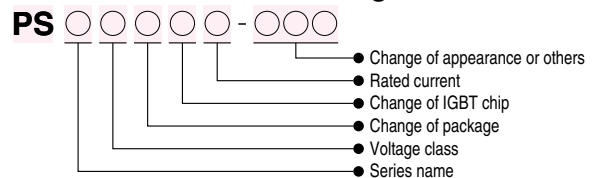
■ Features:

- New package design for less environmental pollution, which also contributes to energy savings due to reduced power loss
- Long creeping distance and high dielectric strength (1500V to 3500V)
- 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 such as inverters, choppers and uninterruptible power supplies (UPSs)
- Compliance with international standards (UL1557) has been certified (Yellow Card No. E80276, File No.E80271) (excluding some products)
- The ease of both installation and wiring due to the design allows application equipment to be reduced in size and weight

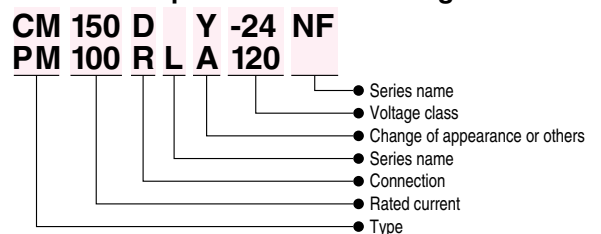


*: Please refer to high-power device for IGBT modules over 2500V

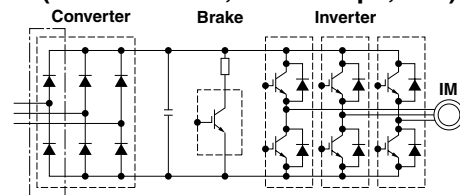
■ Codes for DIPIPM™ naming



■ Codes for power module naming

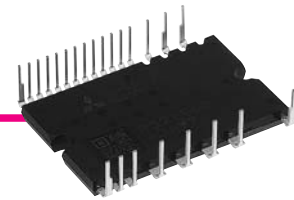


■ Application of IPM/IGBT to AC motor controls (VVVF inverter, servo amps, etc.)



DIIPM™

Dual In-line Package Intelligent Power Module



Strongly supporting smaller and more energy-saving electric home appliances and low-power industrial equipment.

DIIPM™ Series are being used widely in both home appliances such as air conditioners, refrigerators and washing machines, as well as small-capacity industrial equipment such as inverters and servo amplifiers.

They contribute greatly to power-savings and product miniaturization.

In addition to 600V-rated devices, 1200V-rated devices designed for the global market are included in the line-up.

■ Applications

- Air conditioners, refrigerators, washing machines, and package air conditioners
- Low-power industrial motor drives

■ Features

- Wide line-up from 3A to 75A/600V, and 5A to 35A/1200V
- Use of low-loss IGBT or CSTBT™
- Direct drive by control unit possible (non-optocoupler interface)
- Single supply scheme simplifies the power supply circuits
- External-terminal plating using a lead-free solder in compliance with the RoHS directive
The lead-free solder is used for soldering the power chips in the DIIPM™ Ver. 4 series

■ Series map

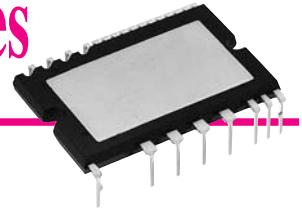
VCES (V)	Ic (A)									
	3A	5A	10A	15A	20A	25A	30A	35A	50A	75A
600V	Super-mini DIIPM™ Ver. 4 Series • PS2196*-4/-4S/-T/-ST • PS2199*-4/-T									
	Mini DIIPM™ Ver. 3 Series • PS2156*-P • PS2156*-SP									
							Mini DIIPM™ Ver. 4 Series • PS2176*			
							Large DIIPM™ Ver. 3/3.5 Series • PS2126*-P/-AP • PS21869-P/-AP			
					DIPPSC™ Series • PS81B9*-A/-W					
							DIPPFCT™ Series 1) • PS5178*			
1200V	Large DIIPM™ Ver. 4 Series • PS22A7*									

1) PS5178* correspond to input current 20Arms and 30Arms



Super-mini and Mini DIIPM™ Ver. 4 Series

Super-mini and Mini Dual In-line Package Intelligent Power Module Ver. 4 Series



■ Applications

- Low-power home appliances (air conditioners, washing machines and refrigerators)
- Small-capacity industrial motor drives

■ 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 (SC) protection Over-temperature (OT) protection [-T series only]
- Error output: Corresponds to SC, UV (N-side only), and OT protection
- IGBT drive power supply: 15VDC single power supply (bootstrap supply scheme can be applied)
- Input interface: 3V, 5V compatible, high active logic

■ Features

- Use of an insulated thermal radiating sheet structure realizes low thermal resistance
- A lead-free solder is used in terminal plating and power chip soldering (RoHS directive compliance)

■ Line-up

Super-mini-package Series

PS2196* Series	Type	Ratings	fc max.(kHz)	Outline drawings no.
Isolation voltage 1500Vrms class (*1)	PS21961-4/-4S/-T/-ST	3A/600V	20	PS1 PS2 PS3 (*2) PS4
	PS21962-4/-4S/-T/-ST	5A/600V		
	PS21963-4E/-4ES/-ET/-EST	8A/600V		
	PS21963-4/-4S/-T/-ST	10A/600V		
	PS21964-4/-4S/-T/-ST	15A/600V		
	PS21965-4/-4S/-T/-ST	20A/600V		
	PS21997-4/-T	30A/600V		

*1: Corresponds to isolation voltage 2500Vrms in the case of using the convex-shaped heat sink

*2: 3 shunts type is not available for PS21997

-T: Over temperature protection is available

-S: N-side open emitter (3 shunts)

(Other 3 terminal forming types are available)

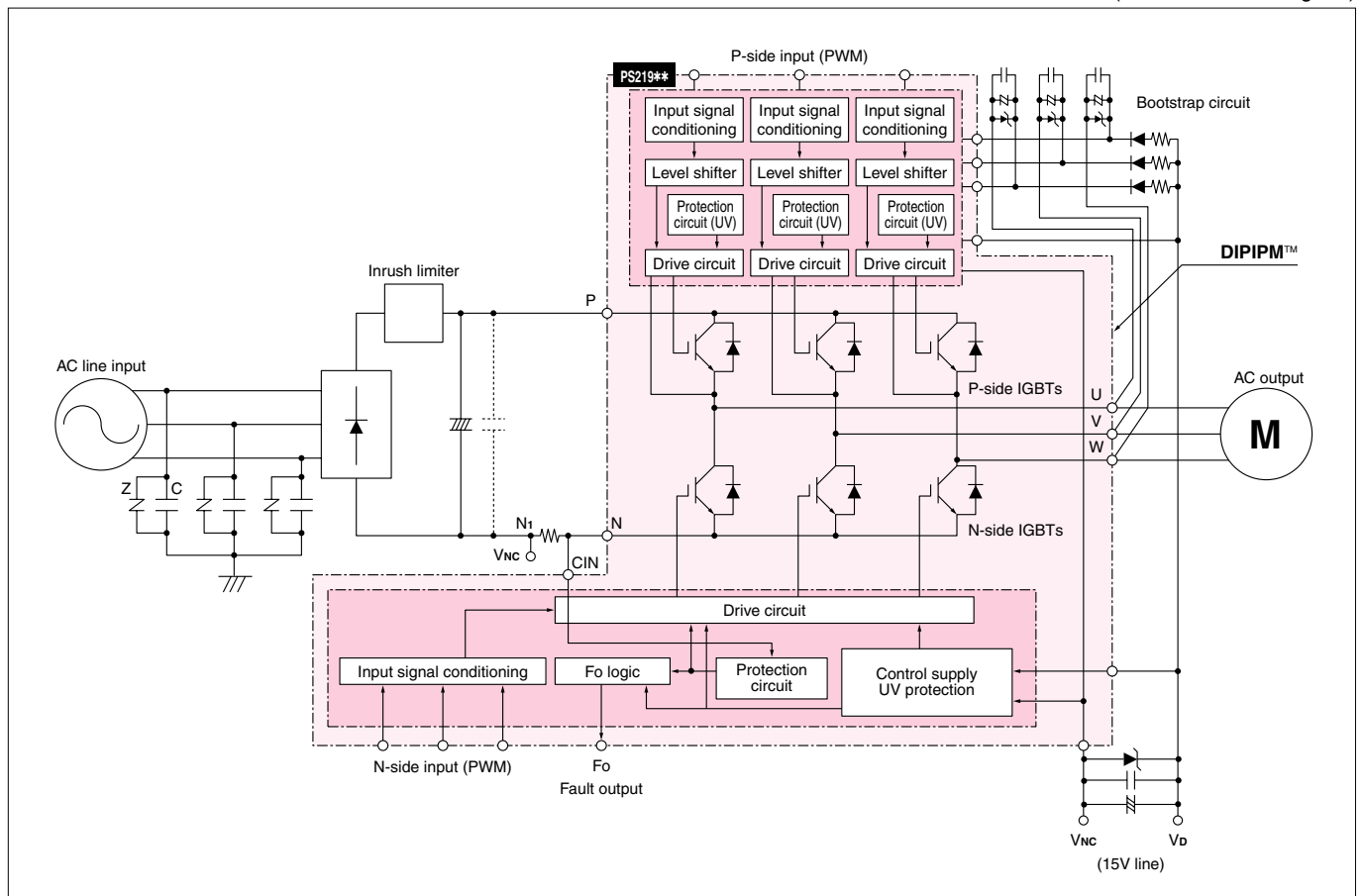
Mini-package Series

	Type	Ratings	fc max.(kHz)	Outline drawings no.
Isolation voltage 2500Vrms class	PS21765	20A/600V	20	PS10
	PS21767/-V	30A/600V		

-V: Higher switching speed

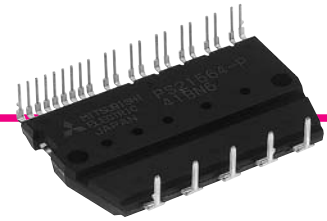
■ Block diagram

(PS219** block diagram)



DIPIPM™ Ver. 3/3.5 Series

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



■ Applications

- Low-power home appliances (air conditioners, washing machines, refrigerators)
- Small-capacity industrial motor drives

■ 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 (SC) protection
- Error output: Corresponds to SC and UV (N-side only) protection
- IGBT drive power supply: 15VDC single power supply (bootstrap supply scheme can be applied)
- Input interface: 3V, 5V compatible, high active logic

■ Features

- A lead-free solder is used in terminal plating (RoHS directive compliance)

■ Line-up

Mini-package Series

	Ver.	Type	Ratings	fc max.(kHz)	Outline drawings no.
Isolation voltage 2500Vrms class	3	PS21562-P/-SP	5A/600V	20	PS5 PS6
		PS21563-P/-SP	10A/600V		
		PS21564-P/-SP	15A/600V		
		PS21565-P/-SP	20A/600V		

-SP: N-side open emitter (3 shunts)

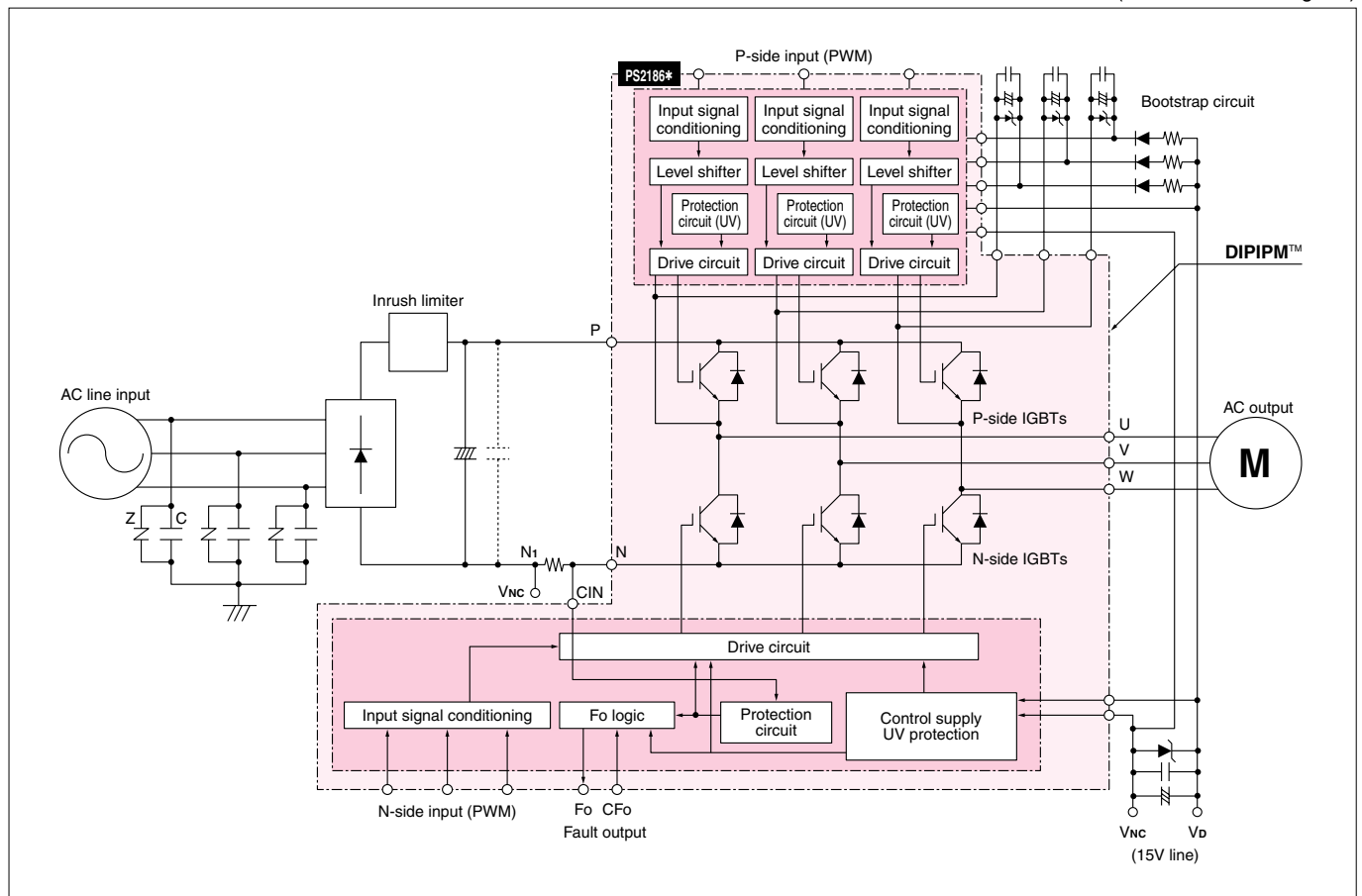
Large-package Series

	Ver.	Type	Ratings	fc max.(kHz)	Outline drawings no.
Isolation voltage 2500Vrms class	3.5	PS21265-P/-AP	20A/600V	20	PS9
		PS21267-P/-AP	30A/600V		
	3	PS21869-P/-AP	50A/600V	20	PS7

-AP: Long outer terminal

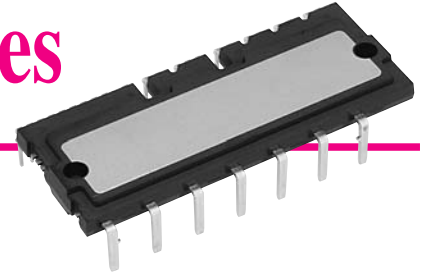
■ Block diagram

(PS2186* block diagram)



Large DIPIPM™ Ver. 4 Series

Large Dual In-line Package Intelligent Power Module Ver. 4 Series



■ Applications

- Low-power appliances (air conditioners, general-purpose inverter, AC servo amplifier, etc.)

■ 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 (SC) protection
- Error output: Corresponds to SC and UV (N-side only) protection
- IGBT drive power supply: 15VDC single power supply (bootstrap supply scheme can be applied)
- Input interface: 5V compatible, high active logic

■ Features

- Outputting LVIC temperature by analog signal
- Use of an insulated thermal radiating sheet structure realizes low thermal resistance
- A lead-free solder is used in terminal plating and power chip soldering (RoHS directive compliance)

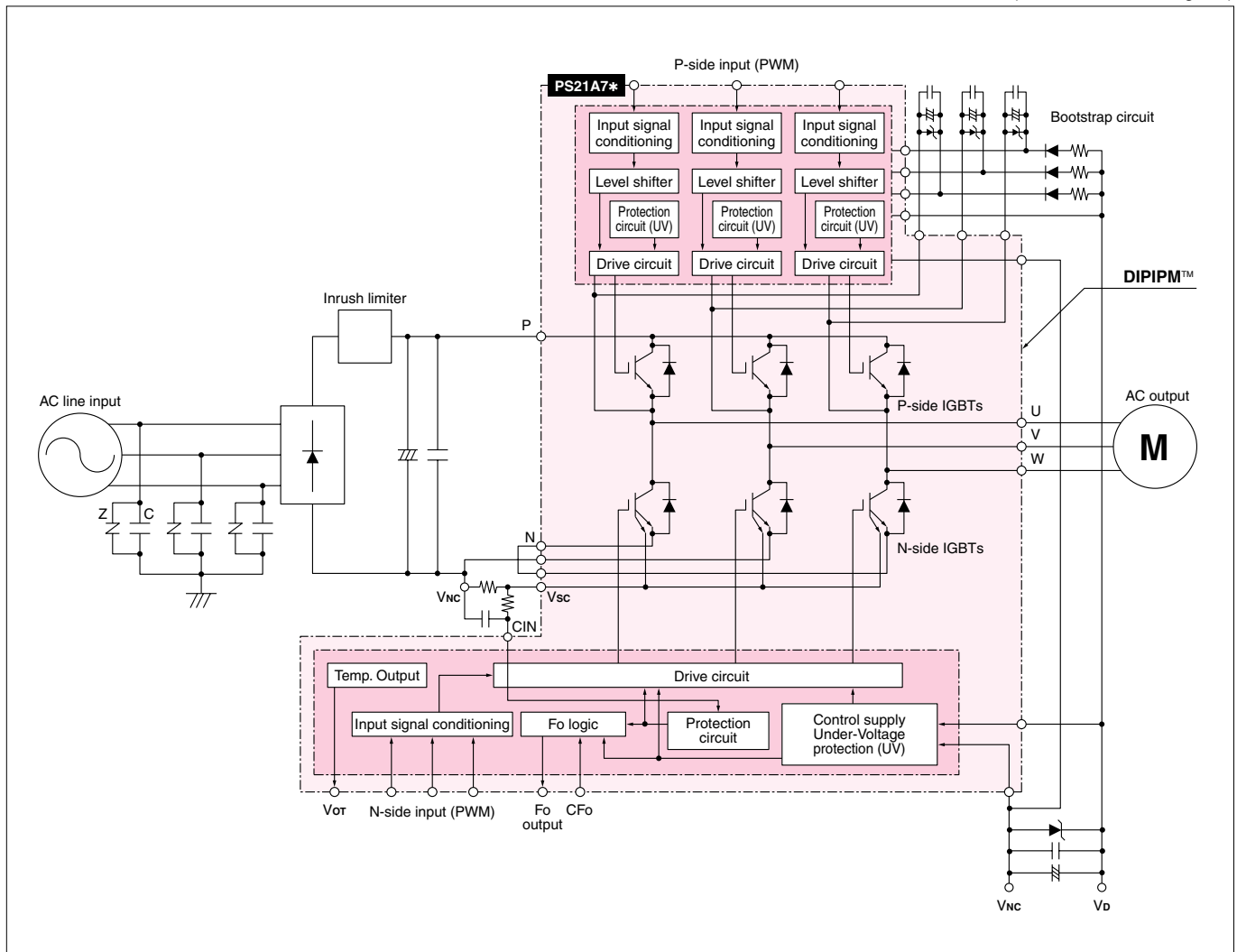
■ Line-up

Large-package Series

	Type	Ratings	fc max.(kHz)	Outline drawings no.
Isolation voltage 2500Vrms class	PS21A79	50A/600V	20	PS8
	PS21A7A	75A/600V		
	PS22A72	5A/1200V	20	PS8
	PS22A73	10A/1200V		
	PS22A74	15A/1200V		
	PS22A76	25A/1200V		
PS22A78-E	35A/1200V			

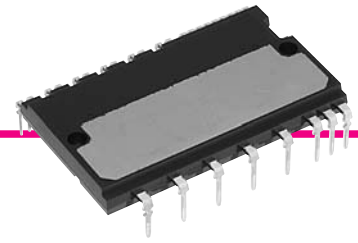
■ Block diagram

(PS21A7* block diagram)



Mini DIPPFCTM Series

Mini Dual In-line Package Power Factor Correction Series



■ Applications

- Air conditioners, general purpose inverters, etc.

■ Internal functions

- Low-loss IGBT
- Rectifier circuit
- IGBT drive circuit
- Control supply under-voltage protection (UV)

■ Features

- A lead-free solder is used in terminal plating (RoHS directive compliance)
- Special IC **M63914FP** for DIPPFCTM control is available. The combination with the IC can offer short circuit and over voltage protection

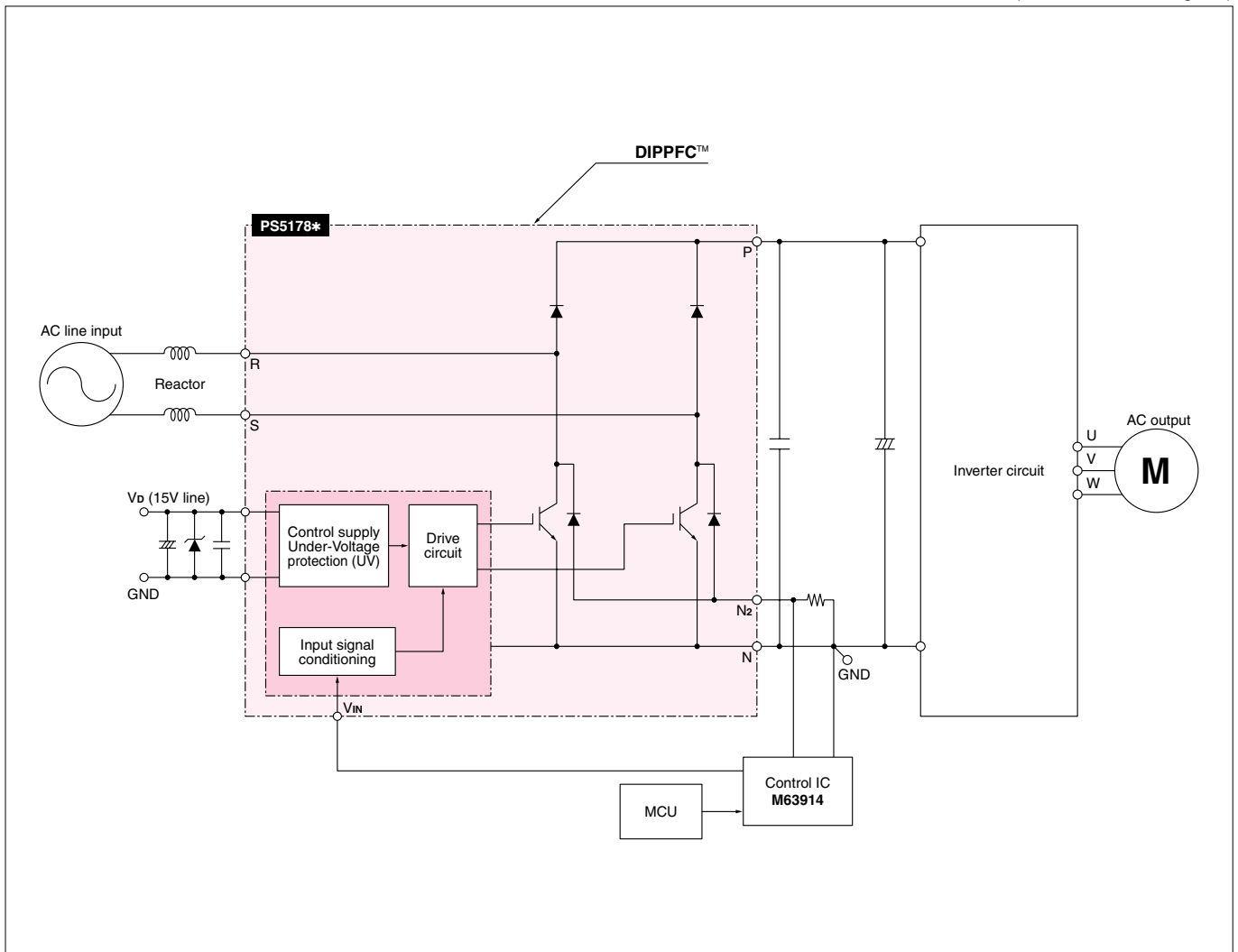
■ Line-up

Mini DIPPFCTM Series

	Type	Ratings		fc typ.(kHz)	Outline drawings no.
		Input voltage	Input current		
Isolation voltage 2500Vrms class	PS51787	90 to 264Vrms	20Arms	20	PS10
	PS51789		30Arms		

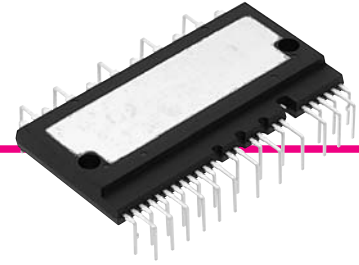
■ Block diagram

(PS5178* block diagram)



DIPPSC™ Series

Dual In-line Package Partial Switching Circuit Series



■ Applications

- Low-power home appliances (air conditioners, washing machines and refrigerators)
- Small-capacity industrial motor drive

■ Internal functions

● Inverter part

- 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 (SC) protection
- Error output: Corresponds to SC and UV (N-side only) protection
- IGBT drive power supply: 17VDC single power supply (bootstrap supply scheme can be applied)
- Input interface: 3, 5V compatible, high active logic

● PSC part

Drive circuit, control supply under-voltage (UV) protection, and Short-circuit (SC) protection
Error output for SC and UV protection

■ Features

- Built-in PSC (Partial Switching Circuit) for power factor corrector
- Outputting LVIC temperature by analog signal
- Use of an insulated thermal radiating sheet structure realizes low thermal resistance.
- A lead-free solder is used in terminal plating (RoHS directive compliance)

■ Line-up

DIPPSC™ Series

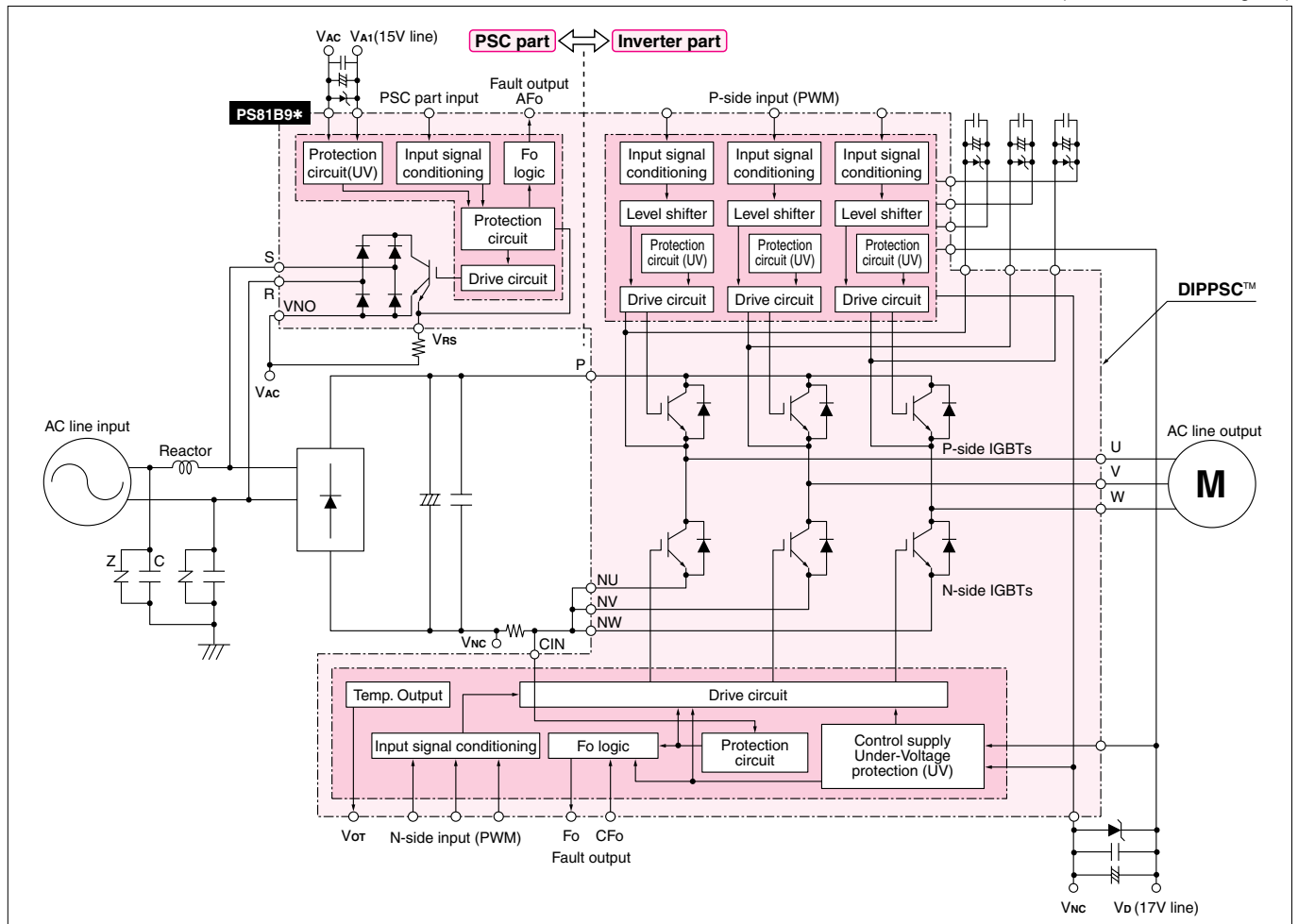
	Type	Ratings		fc max.(kHz)	Outline drawings no.
		Partial SW part	Inverter part		
Isolation voltage 2500Vrms class	PS81B93-AE-EW	15A/600V	8A/600V	20	PS11 PS12
	PS81B93-AJ-W	15A/600V	10A/600V		
	PS81B94-AJ-W	20A/600V	15A/600V		
	PS81B95-AJ-W	20A/600V	20A/600V		

-A : Long outer terminal

-W : Both sides zigzag terminal

■ Block diagram

(PS81B9* 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

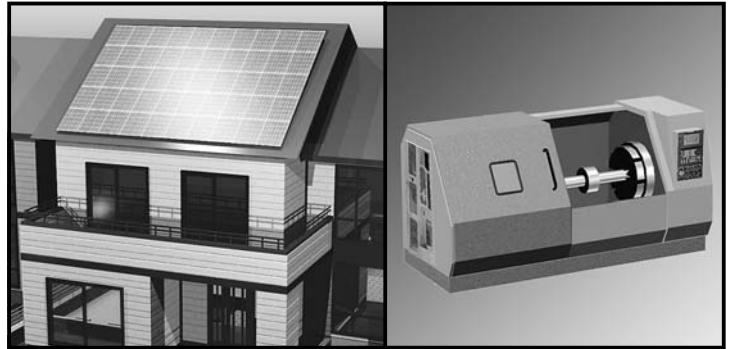
such as the 3rd-generation IPM "S Series" and 4th-generation IPM "S-DASH Series", and now adds the miniaturized and lightweight 5th-generation "L Series" to its line-up. The "L Series" incorporates a CSTBT™ chip for reduced power loss and a new compact package.

■ Applications

- Motor control devices
(220VAC/440VAC inverters, servos, etc.)
- DC power supplies such as UPS
- * IPMs for photovoltaic generation using solar devices series

■ Features (L1/S1 Series)

- Low-loss by new CSTBT™ chip optimized $V_{CE(sat)}$ vs E_{off} trade-off
- Optimized thermal sensor on chip (T_j sensor)
- Improved of power cycle capability
- Completely lead-free (RoHS directive compliance)
- The package compatible to the L-Series IPML1 Series
- Adoption of new small-package
(50A/600V and 25A/1200V Pin type)L1 Series



■ Intelligent Power Modules (L1 Series)

600V

V _{CEs} (V)	Connection	Main terminal	I _c (A)					
			50	75	100	150	200	300
600	3∅	Screw	PM50CL1A060	PM75CL1A060	PM100CL1A060	PM150CL1A060	PM200CL1A060	PM300CL1A060
		Pin	PM50CL1B060	PM75CL1B060	PM100CL1B060	PM150CL1B060	—	—
	3∅ +Brake	Screw	PM50RL1A060	PM75RL1A060	PM100RL1A060	PM150RL1A060	PM200RL1A060	PM300RL1A060
		Pin	PM50RL1B060 PM50RL1C060	PM75RL1B060	PM100RL1B060	PM150RL1B060	—	—

1200V

V _{CEs} (V)	Connection	Main terminal	I _c (A)				
			25	50	75	100	150
1200	3∅	Screw	PM25CL1A120	PM50CL1A120	PM75CL1A120	PM100CL1A120	PM150CL1A120
		Pin	PM25CL1B120	PM50CL1B120	PM75CL1B120	—	—
	3∅ +Brake	Screw	PM25RL1A120	PM50RL1A120	PM75RL1A120	PM100RL1A120	PM150RL1A120
		Pin	PM25RL1B120 PM25RL1C120	PM50RL1B120	PM75RL1B120	—	—

■ 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 L1 Series S1 Series

V Series, S-DASH Series, S-DASH Servo Series, L Series, L1 Series, S1 Series are RoHS directive compliance. S Series are not RoHS directive compliance.

High-speed intelligent power modules

220VAC for Line

Type	Rating		Applicable motor rating(kW)	Output characteristics		Built-in functions						Outline drawings no.				
	V _{CEs} (V)	I _c (A)		Phase	V _{ac}	OC	SC	UV	OT	BR	PFo		NFo			
L1 Series	600	50	3.7	3	220	x	o	o	o	o	o	o	P35			
						PM50RL1B060	x	o	o	o	o	o	o	P36		
		PM75RL1A060	75			5.5/7.5	x	o	o	o	o	o	o	P35		
		PM75RL1B060					x	o	o	o	o	o	o	P36		
		PM100RL1A060	100			11	x	o	o	o	o	o	o	P35		
		PM100RL1B060					x	o	o	o	o	o	o	P36		
		PM150RL1A060	150			15/18.5	x	o	o	o	o	o	o	P35		
		PM150RL1B060					x	o	o	o	o	o	o	P36		
		PM200RL1A060	200			22	x	o	o	o	o	o	o	P37		
		PM300RL1A060	300			30	x	o	o	o	o	o	o			
		PM50CL1A060	50			3.7	x	o	o	o	x	o	o	P35		
		PM50CL1B060					x	o	o	o	x	o	o	P36		
		PM75CL1A060	75			5.5/7.5	x	o	o	o	x	o	o	P35		
		PM75CL1B060					x	o	o	o	x	o	o	P36		
		PM100CL1A060	100			11	x	o	o	o	x	o	o	P35		
		PM100CL1B060					x	o	o	o	x	o	o	P36		
		PM150CL1A060	150			15/18.5	x	o	o	o	x	o	o	P35		
		PM150CL1B060					x	o	o	o	x	o	o	P36		
		PM200CL1A060	200			22	x	o	o	o	x	o	o	P37		
		PM300CL1A060	300			30	x	o	o	o	x	o	o			
PM50RL1C060	50	3.7	x	o	o	o	o	o	o	P39						
S1 Series	600	50	3.7	3	220	x	o	o	o	x	x	o	P40			
						PM50CS1D060	x	o	o	o	x	x		o		
						PM75CS1D060	75	5.5/7.5	x	o	o	o		x	x	o
						PM100CS1D060	100	11	x	o	o	o		x	x	o
						PM150CS1D060	150	15/18.5	x	o	o	o		x	x	o
PM200CS1D060	200	22	x	o	o	o	x	x	o							
L Series	600	200	22	3	220	x	o	o	o	x	o	o	P37			
						PM200CLA060	x	o	o	o	x	o		o		
						PM300CLA060	300	30	x	o	o	o	x	o	o	P38
						PM450CLA060	450	37/45	x	o	o	o	x	o	o	
PM600CLA060	600	55	x	o	o	o	x	o	o							

OC: Overcurrent 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
 x: Non-integrated

IPM

Intelligent Power Modules

High-speed intelligent power modules

220VAC for Line

Type	Rating		Applicable motor rating(kW)	Output characteristics		Built-in functions						Outline drawings no.											
	V _{CES} (V)	I _C (A)		Phase	Vac	OC	SC	UV	OT	BR	PFo		NFo										
S-DASH Series	600			3	220								P2	PM50RSD060	50	3.7	○	○	○	△	○	○	○
														PM75RSD060	75	5.5/7.5	○	○	○	△	○	○	○
														PM100RSD060	100	11	○	○	○	△	○	○	○
														PM150RSD060	150	15/18.5	○	○	○	△	○	○	○
														PM200RSD060	200	22	○	○	○	△	○	○	○
													P3	PM300RSD060	300	30	○	○	○	△	○	○	○
														PM50CSD060	50	3.7	○	○	○	△	×	○	○
														PM75CSD060	75	5.5/7.5	○	○	○	△	×	○	○
														PM100CSD060	100	11	○	○	○	△	×	○	○
														PM150CSD060	150	15/18.5	○	○	○	△	×	○	○
													P3	PM200CSD060	200	22	○	○	○	△	×	○	○
														PM300CSD060	300	30	○	○	○	△	×	○	○
														PM50RSE060	50	3.7	○	○	○	△	○	×	○
														PM75RSE060	75	5.5/7.5	○	○	○	△	○	×	○
														PM100RSE060	100	11	○	○	○	△	○	×	○
													P31	PM150RSE060	150	15/18.5	○	○	○	△	○	×	○
														PM200RSE060	200	22	○	○	○	△	○	×	○
														PM300RSE060	300	30	○	○	○	△	○	×	○
														PM50CSE060	50	3.7	○	○	○	△	×	×	○
														PM75CSE060	75	5.5/7.5	○	○	○	△	×	×	○
P31	PM100CSE060	100	11	○	○	○	△	×	×	○													
	PM150CSE060	150	15/18.5	○	○	○	△	×	×	○													
	PM200CSE060	200	22	○	○	○	△	×	×	○													
	PM300CSE060	300	30	○	○	○	△	×	×	○													
	P32	PM75RVA060	75	5.5/7.5	○	○	○	△	○	○	○												
PM100CVA060		100	11	○	○	○	△	×	○	○													
PM150CVA060		150	15	○	○	○	△	×	○	○													
PM200CVA060		200	22	○	○	○	△	×	○	○													
PM300CVA060		300	30	○	○	○	△	×	○	○													
V Series				1										PM400DVA060	400	37	○	○	○	△	×	○	○
														PM600DVA060	600	45/55	○	○	○	△	×	○	○

OC: Overcurrent 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

440VAC for Line

Type	Rating		Applicable motor rating(kW)	Output characteristics		Built-in functions						Outline drawings no.		
	V _{CES} (V)	I _C (A)		Phase	V _{ac}	OC	SC	UV	OT	BR	PFo		NFo	
L1 Series	PM25RL1A120	25	3.7	3	440	x	o	o	o	o	o	o	P35	
	PM25RL1B120					x	o	o	o	o	o	o	o	P36
	PM50RL1A120	50	7.5			x	o	o	o	o	o	o	o	P35
	PM50RL1B120					x	o	o	o	o	o	o	o	P36
	PM75RL1A120	75	15			x	o	o	o	o	o	o	o	P35
	PM75RL1B120					x	o	o	o	o	o	o	o	P36
	PM100RL1A120	100	18.5/22			x	o	o	o	o	o	o	o	P37
	PM150RL1A120	150	30			x	o	o	o	o	o	o	o	
	PM25CL1A120	25	3.7			x	o	o	o	o	x	o	o	P35
	PM25CL1B120					x	o	o	o	o	x	o	o	P36
	PM50CL1A120	50	7.5			x	o	o	o	o	x	o	o	P35
	PM50CL1B120					x	o	o	o	o	x	o	o	P36
	PM75CL1A120	75	15			x	o	o	o	o	x	o	o	P35
	PM75CL1B120					x	o	o	o	o	x	o	o	P36
	PM100CL1A120	100	18.5/22			x	o	o	o	o	x	o	o	P37
	PM150CL1A120	150	30			x	o	o	o	o	x	o	o	
PM25RL1C120	25	3.7	x	o	o	o	o	x	o	o	P39			
S1 Series	PM25CS1D120	25	3.7	x	o	o	o	o	x	x	o	P40		
	PM50CS1D120	50	7.5	x	o	o	o	o	x	x	o			
	PM75CS1D120	75	15	x	o	o	o	o	x	x	o			
	PM100CS1D120	100	18.5/22	x	o	o	o	o	x	x	o			
L Series	PM100CLA120	100	18.5/22	x	o	o	o	o	x	o	o	P37		
	PM150CLA120	150	30	x	o	o	o	o	x	o	o			
	PM200CLA120	200	37/45	x	o	o	o	o	x	o	o	P38		
	PM300CLA120	300	55	x	o	o	o	o	x	o	o			
	PM450CLA120	450	75	x	o	o	o	o	x	o	o			
S-DASH Series	PM50RSD120	50	7.5	o	o	o	o	△	o	o	o	P2		
	PM75RSD120	75	15	o	o	o	o	△	o	o	o	P3		
	PM100RSD120	100	18.5/22	o	o	o	o	△	o	o	o			
	PM150RSD120	150	30	o	o	o	o	△	o	o	o			
	PM50CSD120	50	7.5	o	o	o	o	△	x	o	o	P2		
	PM75CSD120	75	15	o	o	o	o	△	x	o	o	P3		
	PM100CSD120	100	18.5/22	o	o	o	o	△	x	o	o			
	PM150CSD120	150	30	o	o	o	o	△	x	o	o			
	PM50RSE120	50	7.5	o	o	o	o	△	o	x	o	P31		
	PM75RSE120	75	15	o	o	o	o	△	o	x	o			
	PM100RSE120	100	18.5/22	o	o	o	o	△	o	x	o	P32		
	PM150RSE120	150	30	o	o	o	o	△	o	x	o			
	PM50CSE120	50	7.5	o	o	o	o	△	x	x	o	P31		
	PM75CSE120	75	15	o	o	o	o	△	x	x	o			
	PM100CSE120	100	18.5/22	o	o	o	o	△	x	x	o	P32		
	PM150CSE120	150	30	o	o	o	o	△	x	x	o			
V Series	PM50RVA120	50	7.5	o	o	o	o	△	o	o	o	P25		
	PM75CVA120	75	15	o	o	o	o	△	x	o	o	P26		
	PM100CVA120	100	18.5/22	o	o	o	o	△	x	o	o			
	PM150CVA120	150	30	o	o	o	o	△	x	o	o	P27		
	PM200DVA120	200	30/37	o	o	o	o	△	x	o	o	P28		
	PM300DVA120	300	45/55	o	o	o	o	△	x	o	o	P29		

OC: Overcurrent 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
 x: Non-integrated

IPM

Intelligent Power Modules

For Solar Power

Type	Rating		Output characteristics		Built-in functions							Outline drawings no.		
	V _{CES} (V)	I _c (A)	Phase	V _{ac}	OC	SC	UV	OT	Con	PFo	NFo			
PM50B4LA060	600	50	2	220	×	○	○	○	×	○	○	P35		
PM50B4LB060					×	○	○	○	×	○	○	P36		
PM50B5LA060					×	○	○	○	○:1	○	○	P35		
PM50B5LB060					×	○	○	○	○:1	○	○	P36		
PM50B6LA060					×	○	○	○	○:2	○	○	P35		
PM50B6LB060					×	○	○	○	○:2	○	○	P36		
PM75B4LA060		75			2	220	×	○	○	○	×	○	○	P35
PM75B4LB060							×	○	○	○	×	○	○	P36
PM75B5LA060							×	○	○	○	○:1	○	○	P35
PM75B5LB060							×	○	○	○	○:1	○	○	P36
PM75B6LA060							×	○	○	○	○:2	○	○	P35
PM75B6LB060							×	○	○	○	○:2	○	○	P36

OC: Overcurrent 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 the IGBT as the industrial power semiconductor switch, performance has been improved and applications have increased, and now it has replaced transistors in most electric powered industrial equipment. Mitsubishi Electric developed the "F Series", a 4th-generation trench IGBT module 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, combines the characteristics of the popular planar IGBT and the trench IGBT, and is known for reducing power loss. The "NFH Series", suitable for higher-frequency switching-use, has been newly-developed and put into mass production.

(NF Series)

■ Applications

- General-purpose inverters
- AC servo amplifiers
- Wind power/solar power
- UPS

■ Features

- Same outer dimensions as 3rd-generation H Series
- Uses low-loss CSTBT™
- Same driving power as 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 (Utilizes an aluminum nitride ceramic substrate)
- Compliant with RoHS directives

(NFH Series)

■ Applications

- CT scanners
- MRIs
- Induction heating equipment
- Welding machines

■ Features

- 5th-generation CSTBT™
- Low turn-off losses (below 20% standard 1200V NFH Series)
- Soft switching turn-off function
- Enhanced inner wiring (skin effect)
- High-power cycle lifetime
- Compliant with RoHS directives





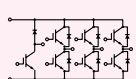
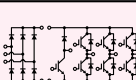
■ IGBT modules series map

3rd-generation (former)	3rd-generation (latter)	4th-generation	5th-generation
H Series	U Series KA Series	F Series DUS Series (high-frequency)	NX Series NF/A Series Mega Power Dual NFH Series (high-frequency)

IGBT Modules


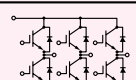
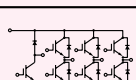
Insulated Gate Bipolar Transistor Modules

IGBT modules <NX Series>


Connection	V _{CES} (V)	I _c (A)										
		35	50	75	100	150	200	300	400(450)	600	1000	
H 	600										CM600HX-12A* NX101	
	1200									CM400HX-24A* NX101	CM600HX-24A*	
D 	600								CM300DX-12A* NX201	CM400DX-12A*		
	1200					CM150DX-24A*	CM200DX-24A*	CM300DX-24A*	CM450DX-24A*	CM600DXL-24A NX201	CM1000DXL-24A NXL21	
R 	600				CM100RX-12A* NX701	CM150RX-12A*	CM200RX-12A*					
	1200			CM75RX-24A* NX701	CM100RX-24A*							
M 	600			CM75MX-12A* NXM01	CM100MX-12A*							
	1200	CM35MX-24A* NXM01	CM50MX-24A*	CM75MX-24A*								

*: Built-in NTC thermistor

IGBT modules <NF Series>



Connection	V _{CES} (V)	I _c (A)							
		50	75	100	150	200	300	400	600
D 	600				CM150DY-12NF N201	CM200DY-12NF N202	CM300DY-12NF N203	CM400DY-12NF N202	CM600DY-12NF N203
	1200			CM100DY-24NF N201	CM150DY-24NF N202	CM200DY-24NF N203	CM300DY-24NF U205	CM400DY-24NF U205	CM600DY-24NF U205
T 	600		CM75TL-12NF NF601	CM100TL-12NF NF601	CM150TL-12NF NF602	CM200TL-12NF NF602			
	1200	CM50TL-24NF NF601	CM75TL-24NF NF601	CM100TL-24NF NF601	CM150TL-24NF NF602	CM200TL-24NF NF602			
R 	600		CM75RL-12NF NF601	CM100RL-12NF NF601	CM150RL-12NF NF602	CM200RL-12NF NF602			
	1200	CM50RL-24NF NF601	CM75RL-24NF NF601	CM100RL-24NF NF601	CM150RL-24NF NF602	CM200RL-24NF NF602			

IGBT modules <For high-frequency switching use (NFH Series / F Series DUS)>

Connection	V _{CES} (V)	I _c (A)					
		100	150	200	300	400	600
D 	600	CM100DUS-12F* U203	CM150DUS-12F* U203	CM200DU-12NFH U201	CM300DU-12NFH U201	CM400DU-12NFH U201	CM600DU-12NFH U206
	1200	CM100DU-24NFH U203	CM150DU-24NFH U203	CM200DU-24NFH U201	CM300DU-24NFH U201	CM400DU-24NFH U206	CM600DU-24NFH U206

*: High-speed turn-off F Series

IGBT modules <A Series>

Connection	V _{CES} (V)	I _c (A)					
		100	150	200	300	400	600
H 	1200					CM400HA-24A* H106	CM600HA-24A* H106
							CM600HB-24A* H107
D 	1200	CM100DY-24A N201	CM150DY-24A N201	CM200DY-24A N201	CM300DY-24A N202	CM400DY-24A N203	CM600DY-24A N203


*: Not RoHS directive compliant

● Numbers H106, H107, U201, U203, U205, U206, N201 to N203, NF601, NF602, NX101, NX201, NX701, NXM01, NXL21 are recorded with product names to show the outline drawing numbers

IGBT Modules


Insulated Gate Bipolar Transistor Modules

■ IGBT modules <Mega Power Dual>

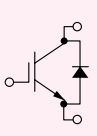
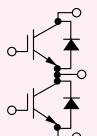
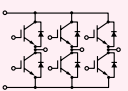
Connection	V _{CES} (V)	I _c (A)		
		900	1000	1400
D		1200	CM900DU-24NF * N204	CM1400DU-24NF * N204
		1700	CM1000DU-34NF * N204	

*: Not RoHS directive compliant


■ IGBT modules <1700V Dual>

Connection	V _{CES} (V)	I _c (A)						
		75	100	150	200	300	400	
D		1700	CM75DY-34A	CM100DY-34A	CM150DY-34A	CM200DY-34A	CM300DY-34A	CM400DY-34A
			N201		N202		N203	N205

■ IGBT modules <F Series>


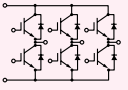
Connection	V _{CES} (V)	I _c (A)								
		50	75	100	150	200	300(350)	400(450)	600	
H		250						CM450HA-5F H105	CM600HA-5F CM600HN-5F H106	
		600							CM600HU-12F U101	
		1200							CM400HU-24F U101	CM600HU-24F U102
D		250					CM350DU-5F U202	CM400DU-5F U201	CM600DU-5F U202	
		600		CM75DU-12F	CM100DU-12F	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 _{CES} (V)	I _c (A)						
		50	75	100	150	200	300	
E3		600		CM75E3U-12H *	CM100E3U-12H *	CM150E3U-12H *	CM200E3U-12NF *	CM300E3U-12H *
		1200	CM50E3U-24H *	CM75E3U-24H *	CM100E3U-24NF *	CM150E3U-24H *		

*: Production on orders

■ IGBT modules <KA Series>

Connection	V _{CES} (V)	I _c (A)							
		50	75	100	150	200	300	400	
D		1700			CM100DU-34KA	CM150DU-34KA	CM200DU-34KA	CM300DU-34KA	CM400DU-34KA
					U201		U202	U205	
T		1700	CM50TU-34KA	CM75TU-34KA					
			U602						



● Numbers H105, H106, U101, U102, U111, U112, U201 to U205, U601, U602, N201 to N205 are recorded with product names to show the outline drawing numbers

IGBT Modules

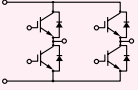
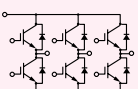
Insulated Gate Bipolar Transistor Modules

■ IGBT modules <U Series>

1 arm to 2 arms

Connection	V _{CES} (V)	I _c (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		U203			U201			
		CM50DU-24H	CM75DU-24H	CM100DU-24H	CM150DU-24H	CM200DU-24H	CM300DU-24H		
		U203			U201		U202		

4 arms to 6 arms

Connection	V _{CES} (V)	I _c (A)				
		50	75	100	150	200
B 	600		CM75BU-12H	CM100BU-12H		
T 	600		CM75TU-12H	CM100TU-12H	CM150TU-12H	CM200TU-12H
	1200		U401		U602	
		CM50TU-24H	CM75TU-24H	CM100TU-24H		
			U601		U602	
		U601		U602		

● Numbers 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.

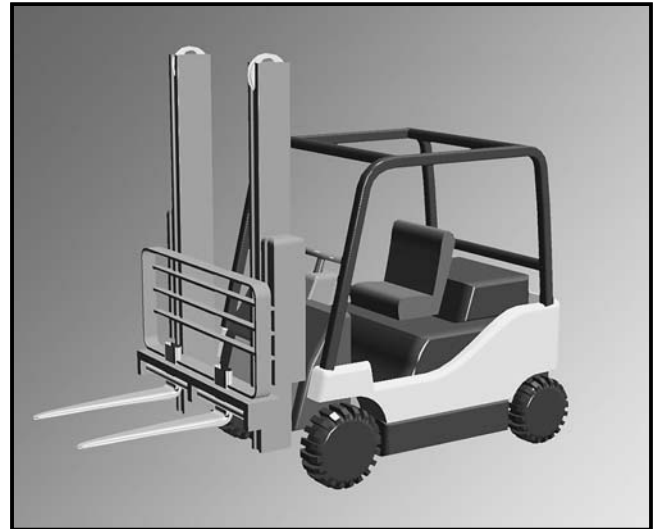
However, the ease of an assembly, the miniaturization of equipment, and the improvement in reliability are being strongly required recently. The line-up of the low-voltage MOSFET module has been realized corresponding to such a large-capacity and low-voltage use.

■ Applications

- Battery forklift
- UPS

■ Features

- Using low-loss trench MOSFET chip
- Using connector terminal for gate source
- Built-in temperature sensor
- Completely lead-free (RoHS directive compliance)



■ Power MOSFET modules

Connection	V _{DSS} (V)	I _D (A)		
		100	200	300
T	75	FM200TU-07A	FM400TU-07A	FM600TU-07A
		F601		
	100	FM200TU-2A	FM400TU-2A	FM600TU-2A
		F601		
	150	FM200TU-3A	FM400TU-3A	FM600TU-3A
		F601		

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

Diode Modules

High-speed diode modules

Not RoHS directive compliant (Except. RM25HG-24S, RM50HG-12S, RM35HG-34S)

Connection	V _{RRM} (V)	I _{DC} (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									
	1000	RM20HA-20F		RM50HA-20F		RM100HA-20F	R3	RM200HA-20F							
	1200	RM20HA-24F RM25HG-24S*1	R2 R4	RM50HA-24F	R3	RM100HA-24F		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									
	1000	RM20CA-20F		RM50CA-20F RM50CA-20S		RM100CA-20F	R5								
C1	1200	RM20CA-24F		RM50CA-24F		RM100CA-24F									
	300	RM20C1A-6S ×		RM50C1A-6S ×											
	600	RM20C1A-12F RM20C1A-12S	R5	RM50C1A-12F RM50C1A-12S	R5	RM100C1A-12F									
D	1000	RM20C1A-20F		RM50C1A-20F RM50C1A-20S		RM100C1A-20F	R5								
	1200	RM20C1A-24F		RM50C1A-24F		RM100C1A-24F									
D	600	RM20DA-12F RM20DA-12S		RM50DA-12F RM50DA-12S											
	1000	RM20DA-20F						RM200DA-20F							
	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

RoHS directive compliant

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

×: Plan for production discontinue

New diode modules

RoHS directive compliant

Connection	V _{RRM} (V)	I _o (A)							
		7		24		12		36	
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 _{RRM} (V)	I _T (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	T2	TM25DZ-M	T3	TM55DZ-M	T3	TM90DZ-M	T3	TM130DZ-M	T5	TM200DZ-M	T5	TM400DZ-M	T6
	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	T3	TM55CZ-M	T3	TM90CZ-M	T3	TM130CZ-M ×	T5	TM200CZ-M	T5	TM400CZ-M	T6
	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	T6
	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	T6
	800													TM400UZ-H	
	1200													TM400UZ-24	
	1600													TM400UZ-2H	
R 	400	TM20RA-M	T7	TM25RZ-M	T8	TM55RZ-M	T8	TM90RZ-M	T8	TM130RZ-M	T5	TM200RZ-M ×	T5		T6
	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	T8	TM55EZ-M	T8	TM90EZ-M	T8	TM130EZ-M ×	T5	TM200EZ-M ×	T5		T6
	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 ×			T6
	800									TM130GZ-H		TM200GZ-H			
	1200									TM130GZ-24		TM200GZ-24			
	1600									TM130GZ-2H		TM200GZ-2H			
T3 	400	TM10T3B-M ^{*1}	T10	TM15T3A-M ^{*1 *3 ×}	T11	TM25T3A-M ^{*1 *4}	T11								T6
	800	TM10T3B-H ^{*1}		TM15T3A-H ^{*1 *3}		TM25T3A-H ^{*1 *4}									
S 	300					TM60SA-6 ^{*1 *4}	T12	TM90SA-6 ^{*2}	T12			TM150SA-6 ^{*2}	T14		T6
	400					TM60SZ-M ^{*1 *4}	T13	TM100SZ-M ^{*2 *5}	T13						

*1: DC output current *2: Non-isolation *3: I_T=30A *4: I_T=60A *5: I_T=100A

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

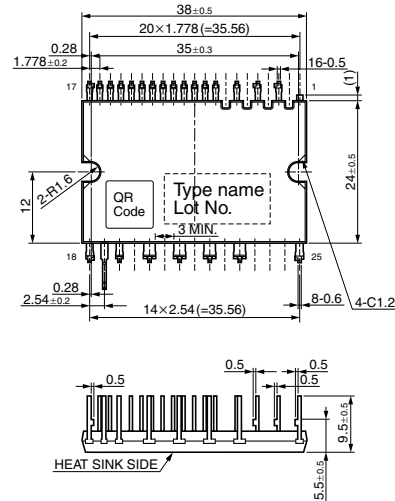
×: Plan for production discontinue

Power modules outline drawings

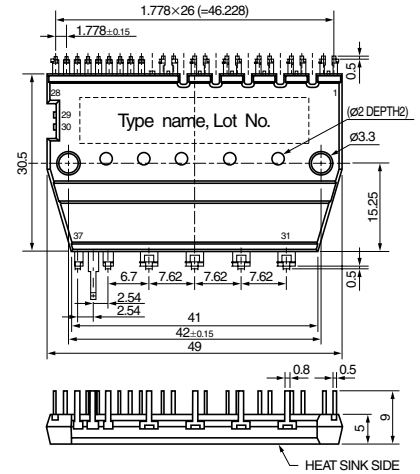
(unit: mm)

DIIPM™
Dual In-Line Package
Intelligent Power Modules

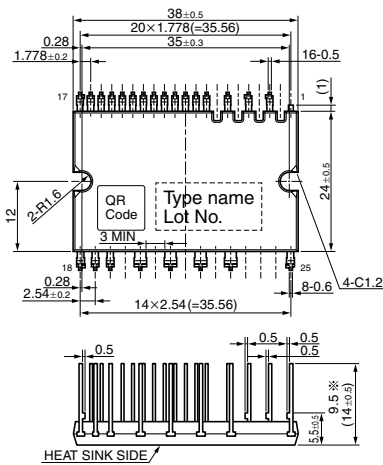
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PS2196*-4S/-ST
PS21963-4ES/-EST



PS6 Mini DIIPM™ Ver. 3
PS2156*-SP

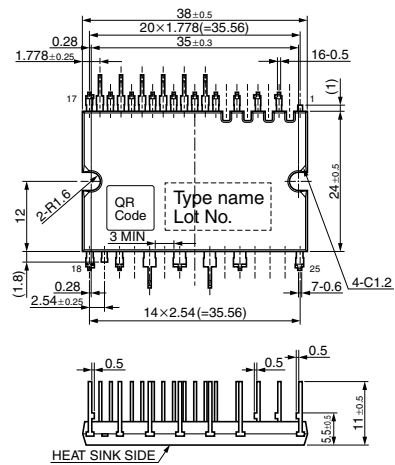


PS1 Super-mini DIIPM™ Ver. 4
PS219**-4/-4A/-T/-AT
PS219*3-4E/-4AE/-ET/-AET

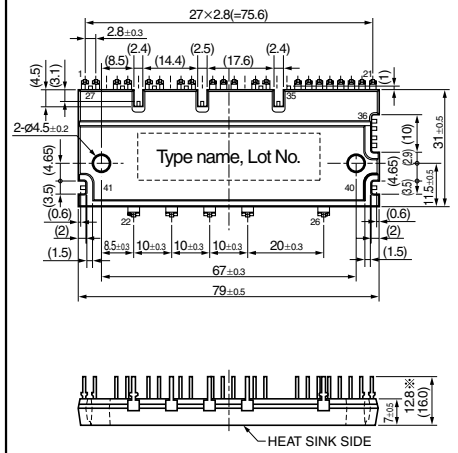


※ In the case of -A, this length is 14.0mm

PS4 Super-mini DIIPM™ Ver. 4
PS219**-4W/-TW
PS219*3-4EW/-ETW

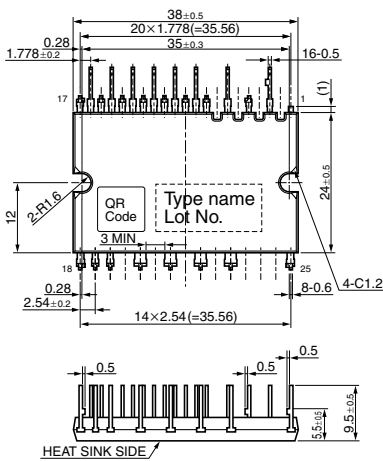


PS7 Large DIIPM™ Ver. 3
PS21869-P/-AP

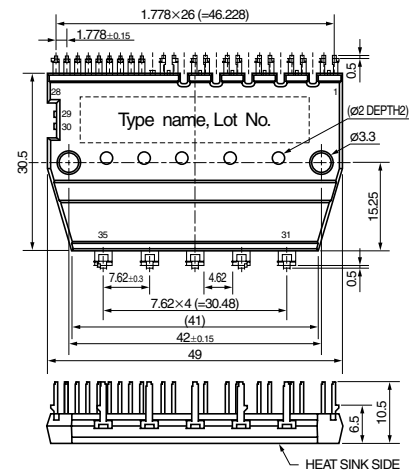


※ In the case of -AP, this length is 16.0mm

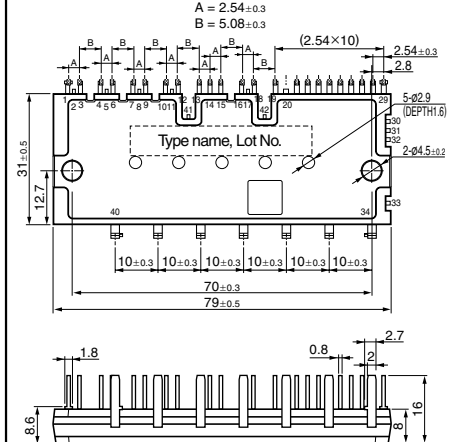
PS2 Super-mini DIIPM™ Ver. 4
PS219**-4C/-CT
PS219*3-4CE/-CET



PS5 Mini DIIPM™ Ver. 3
PS2156*-P



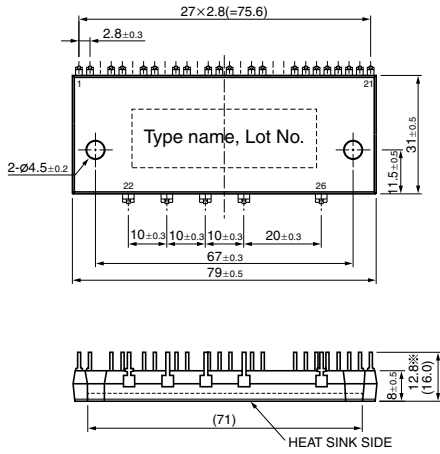
PS8 Large DIIPM™ Ver. 4
PS21A79 PS22A72 PS22A74
PS21A7A PS22A73 PS22A76
PS22A78-E



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PS9

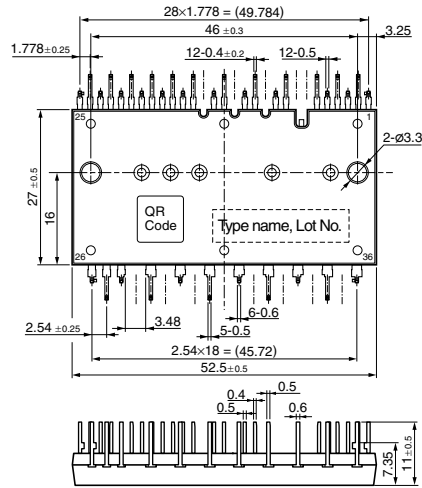
Large DIPIPM™ Ver. 3.5
PS21265-P/-AP
PS21267-P/-AP



※ In the case of -AP, this length is 16.0mm

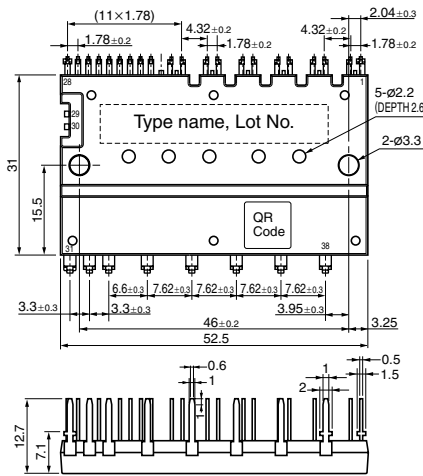
PS12

DIPPSCTM
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PS81B93-W PS81B95-W



PS10

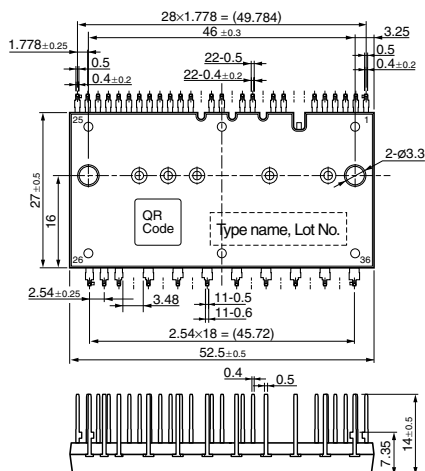
Mini DIPIPM™ Ver. 4 **DIPPSCTM**
PS21765 PS51787
PS21767/-V PS51789



Note: All outer lead terminals are with lead free solder (Sn-Cu) plating

PS11

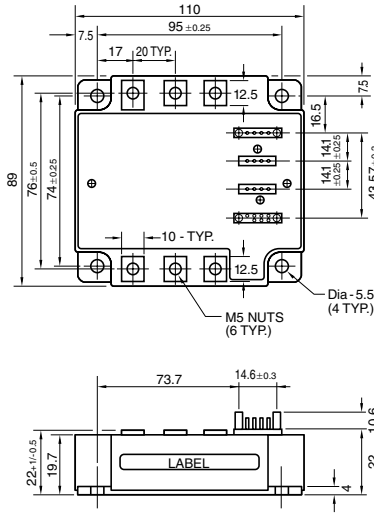
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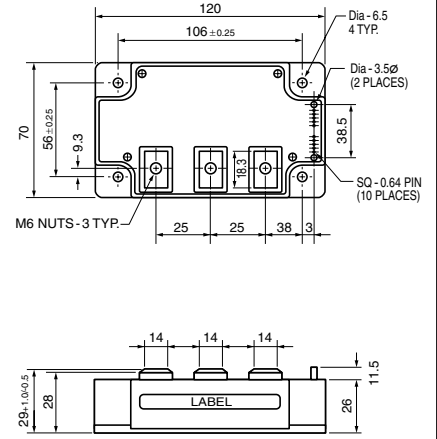
IPM

Intelligent Power Modules

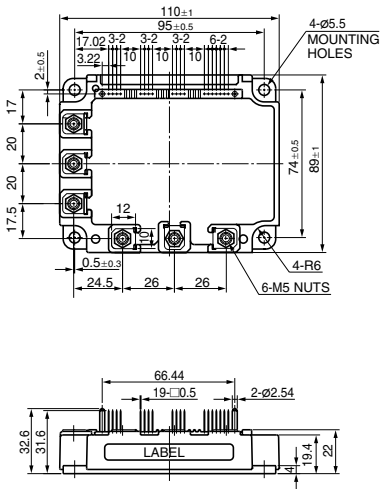
P25
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PM75RVA060
PM100CVA060



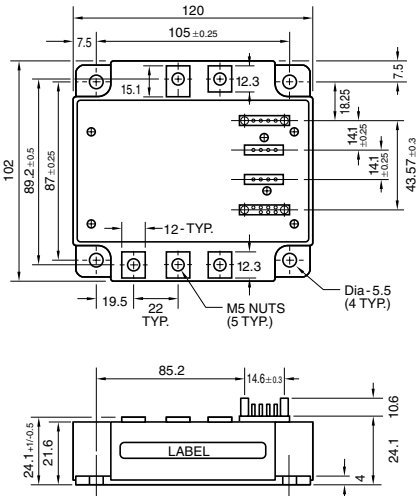
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PM200DVA120
PM400DVA060



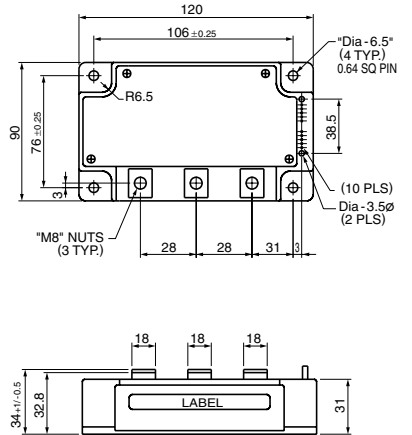
P2
PM50,75,100,150CSD/RSD060
PM50,75CSD/RSD120



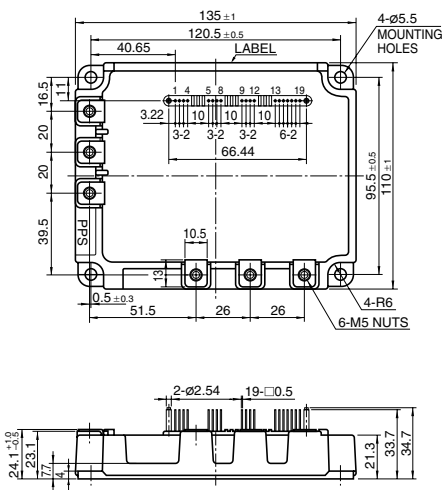
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PM75,100CVA120
PM150,200CVA060



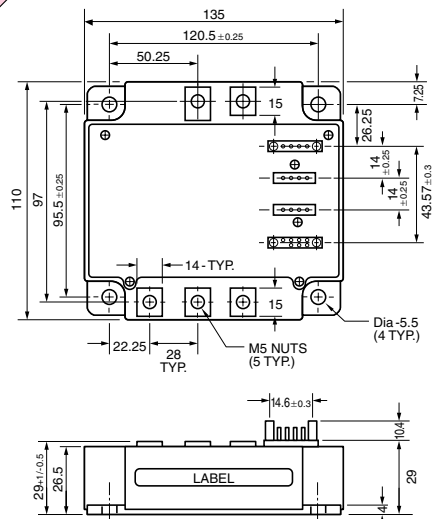
P29
PM300DVA120
PM600DVA060



P3
PM200,300CSD/RSD060
PM100,150CSD/RSD120



P27
PM150CVA120
PM300CVA060



P31
PM50,75,100,150CSE/RSE060
PM50,75CSE/RSE120

