

Changes for the Better

Power Devices 5th Generation IPM
L-Series/IPM for Photovoltaic generation



Realization of Low loss through use of a 5th generation trench chip (CSTBT™) and low noise through a newly developed control IC

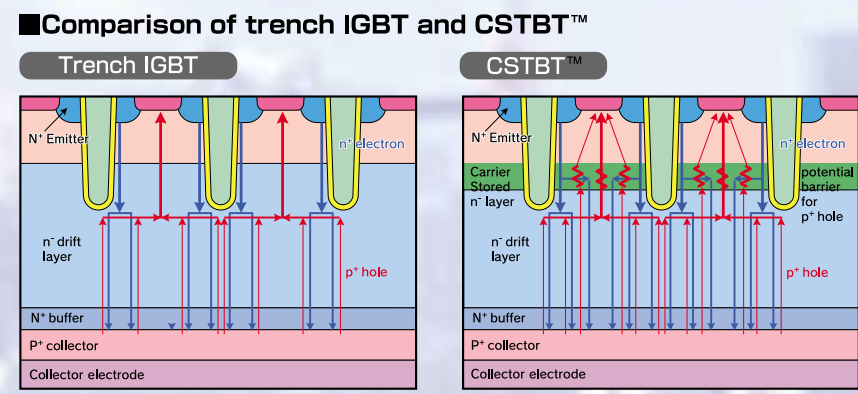
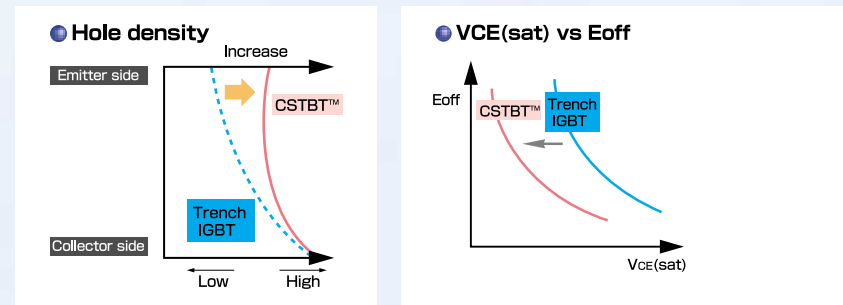
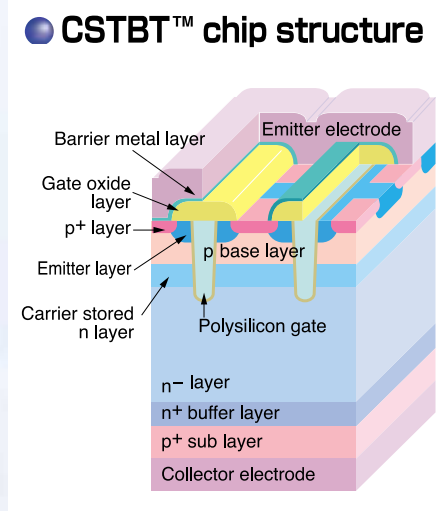
5th Generation IPM L-Series/IPM for Photovoltaic generation



15 years have passed since IGBT was firstly developed and produced as industrial power semiconductor switch. During these years, its performance has been greatly improved and its utilization has become widespread instead of transistor in most industrial application fields. We are introducing IGBT modules developed by using the latest CSTBT™ chips, which combines the advantages of trench IGBT featured with low loss and planar IGBT featured with versatility. These new IGBT module series line up covers the range from 50A~600A/600V, 25A~450A/1200V.

New structure IGBT (CSTBT™)

CSTBT™ has an additional n layer with a comparatively high density of impurity between the p base layer and n⁻ layer as compared to the conventional trench structure IGBT. For conventional IGBT in on-state, holes are injected from the p⁺ collector side to the emitter side through only an n⁻ layer. However, for a CSTBT™, the density of the n layer connected to p base layer is higher than that of n⁻ layer, which makes the internal electric potential difference between p base and n layer higher than that of p base and n⁻ layer. This high internal electric potential serves as a barrier to prevent holes infused from p⁺ layer to n⁻ layer from going through to the emitter side. In short, holes will be stored at the emitter side due to limitation of holes movement by the n barrier. This conservation of charge function makes the high distribution of a CSTBT™ minority carries close to that of a pin diode, therefore drastically reduces on-state voltage, in comparing to a conventional IGBT.



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

A small, decentralized power supplies such as the photovoltaic generation, wind power generation, and fuel cells are spreading from the rise of environmental problems. In addition, the spread of a domestic photovoltaic generation system and the fuel cell system will be expected in the future.

Because the voltage to which these generate electricity is DC, it is necessary to convert it into AC to use it at home.

The device for the DC-AC conversion is a power conditioner, and the power device is used for it. Efficiency is requested in the power conditioner, and the power device with low loss is requested. It is IPM for the photovoltaic generation to have satisfied such a demand.

IPM for Photovoltaic generation

■ Features

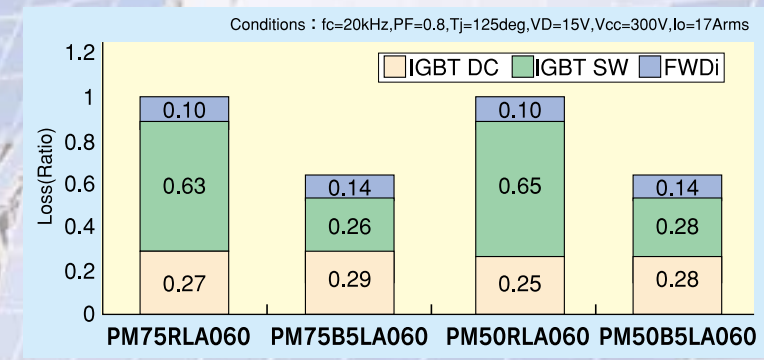
- Integration of the 5th generation trench chip (CSTBT™) achieves lower saturation voltage
- Equipped with newly developed control IC
- Using small package as same outer dimensions as L-series IPM
- The single phase output inverter circuit and the chopper circuit are built into IPM
(4 : no chopper circuit, 5 : chopper circuit×1, 6 : chopper circuit×2)

■ Applications

- Power conditioners for Photovoltaic generation and Fuel Cell



■ Applications



■ Product series

600V

V _{CES} (V)	Connection	Terminal	I _c (A)	
			50	75
600V	2φ	Screw	PM50B4LA060	PM75B4LA060
		Pin	PM50B4LB060	PM75B4LB060
	2φ +1 Chopper	Screw	PM50B5LA060	PM75B5LA060
		Pin	PM50B5LB060	PM75B5LB060
	2φ +2 Chopper	Screw	PM50B6LA060	PM75B6LA060
		Pin	PM50B6LB060	PM75B6LB060

In recent years, motor control devices such as general-purpose inverters and AC servos used in industrial equipments are being required by ever-increased demands, not only for improved performance and reduced size, but also for ease of use and benefit to the environment.

To meet these needs, Mitsubishi Electric developed the “S-DASH” series IPMs previously. Now we introduce the 5th generation IPM “L-series”, the first IPM using the latest CSTBT™ chips. Together with new low-profile package, it not only contributes greatly to a low loss, but also allows for foot print size reduction and light weight of the end products.

Realization of Low loss through use of a 5th generation trench chip (CSTBT™) and low noise through a newly developed control IC

5th Generation IPM L-Series



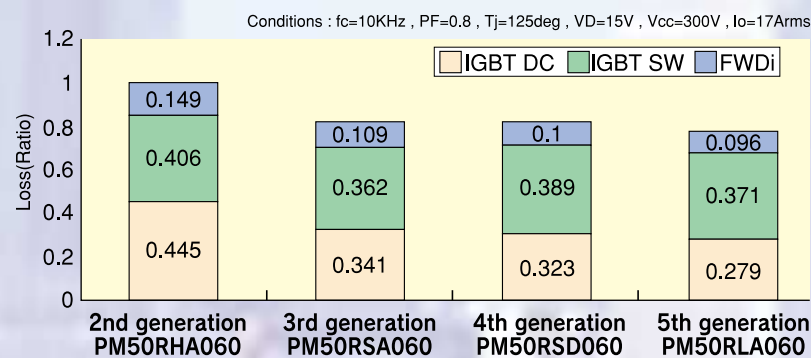
■Features

- Integration of the 5th generation trench chip (CSTBT™) achieves lower saturation voltage
- Implementation of a newly developed IC allows for:
 - Reductions in EMI, and improvements in EMS
 - Large reductions in control power consumption
- New low-profile package
- Increased current rating for braking circuit

■Applications

- Motor control devices (AC 220V / AC 440V inverters, servos, etc.)
- Power supplies such as UPS

■Comparisons of Power Loss for Each Generation of Mitsubishi IPM



■Product series

600V

V _{CEs} (V)	Connection	Terminal	I _c (A)							
			50	75	100	150	200	300	450	600
600V	3 φ	Screw	PM50CLA060	PM75CLA060	PM100CLA060	PM150CLA060	PM200CLA060	PM300CLA060	PM450CLA060	PM600CLA060
		Pin	PM50CLB060	PM75CLB060	—	—	—	—	—	—
	3 φ +Brake	Screw	PM50RLA060	PM75RLA060	PM100RLA060	PM150RLA060	PM200RLA060	PM300RLA060	—	—
		Pin	PM50RLB060	PM75RLB060	—	—	—	—	—	—

1200V

V _{CEs} (V)	Connection	Terminal	I _c (A)							
			25	50	75	100	150	200	300	450
1200V	3 φ	Screw	PM25CLA120	PM50CLA120	PM75CLA120	PM100CLA120	PM150CLA120	PM200CLA120	PM300CLA120	PM450CLA120
		Pin	PM25CLB120	PM50CLB120	PM75CLB120	—	—	—	—	—
	3 φ +Brake	Screw	PM25RLA120	PM50RLA120	PM75RLA120	PM100RLA120	PM150RLA120	—	—	—
		Pin	PM25RLB120	PM50RLB120	PM75RLB120	—	—	—	—	—