

*Changes for the Better*

MTSUBISHI Power Devices  
5th generation IGBT Module



*Achieve low losses and high versatility using CSTBT™*

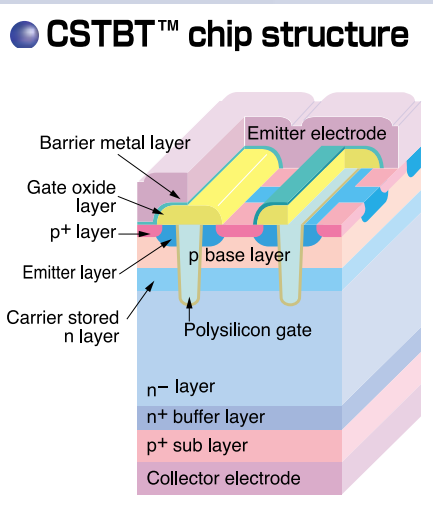
# 5th generation IGBT Module NF/NFH/A series



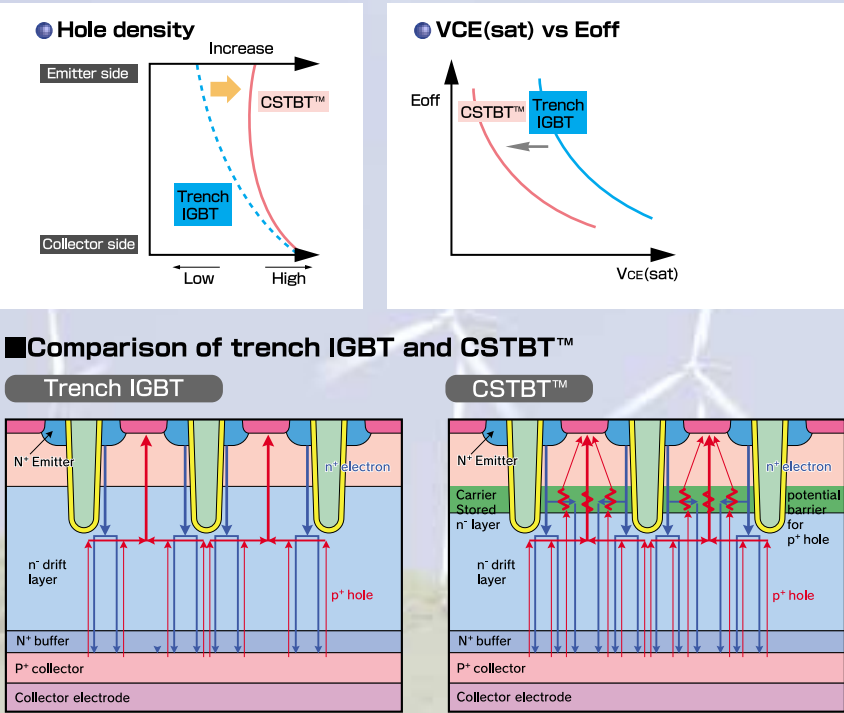
15 years have passed since IGBT was firstly developed and produced as industrial power semiconductor switch. During these years, its performance has been greatly improved and its utilization has become widespread instead of transistor in most industrial application fields. We are introducing IGBT modules 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 ~ 1400A.

# 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



Achieve significant performance improvement of high-frequency devices like CTs and MRIs.

# IGBT Module NFH series

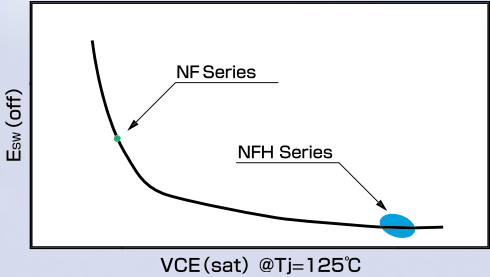
■Features

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

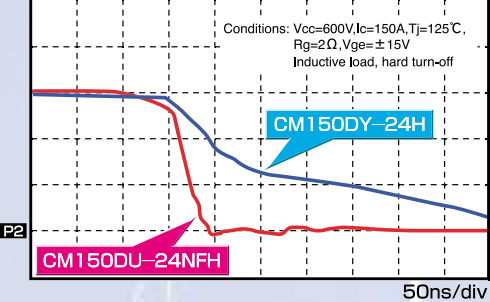
■Applications

- CT scanners
- MRIs
- Induction heating equipments

■Trade-off Curve



■Comparison of turn-off current waveform



■IGBT Module NFH series Line-up

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

\* : F series(High speed turn-off)



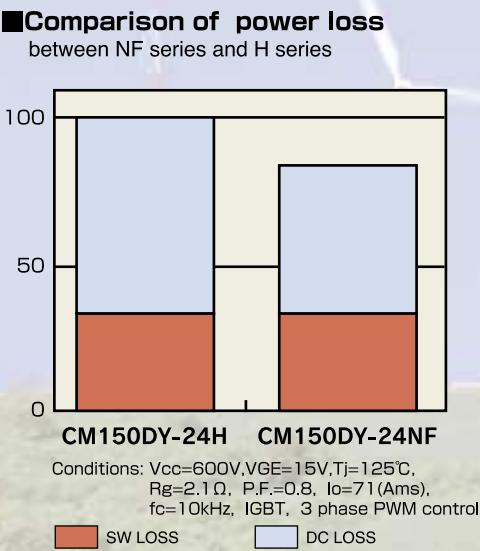
Achieve a higher power cycle lifetime by using the 5th generation IGBT chips and new package construction.

# IGBT Module NF series



- Features**
- Same outer dimensions as the 3rd generation H series
  - Adopt low loss CSTBT™
  - Same driving power as that of the H series
  - High speed soft recovery free-wheel diode
  - Low inductance
  - High power cycle endurance
  - Low thermal resistance (employing aluminum nitride ceramic substrate)

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



**■ IGBT Module NF series Line-up**

Connection	$V_{CES}$ (V)	$I_c$ (A)									
		50	75	100	150	200	300	400	600	900/1000	1400
<div>D</div>	600				CM150DY-12NF	CM200DY-12NF	CM300DY-12NF	CM400DY-12NF	CM600DY-12NF		
	1200			CM100DY-24NF	CM150DY-24NF	CM200DY-24NF	CM300DY-24NF	CM400DY-24NF	CM600DU-24NF	CM900DU-24NF	CM1400DU-24
	1700									CM1000DU-34NF	
<div>T</div>	600		CM75TL-12NF	CM100TL-12NF	CM150TL-12NF	CM200TL-12NF					
	1200	CM50TL-24NF	CM75TL-24NF	CM100TL-24NF	CM150TL-24NF	CM200TL-24NF					
<div>R</div>	600		CM75RL-12NF	CM100RL-12NF	CM150RL-12NF	CM200RL-12NF					
	1200	CM50RL-24NF	CM75RL-24NF	CM100RL-24NF	CM150RL-24NF	CM200RL-24NF					

Industrial IGBT module with low on-state voltage and low EMI

# IGBT module A series

- Features**
- Using low loss CSTBT™
  - Low saturation voltage
  - High speed soft recovery free-wheel diode
  - Low inductance

- Applications**
- Inverters for AC motor control
  - Power supply devices for DC motor control
  - NC machines
  - UPS



**■ IGBT Module A series Line-up**

Connection	$V_{CES}$ (V)	$I_c$ (A)					
		100	150	200	300	400	600
<div>H</div>	1200					CM400HA-24A	CM600HA-2
<div>D</div>	1200	CM100DY-24A	CM150DY-24A	CM200DY-24A	CM300DY-24A	CM400DY-24A	CM600DY-2