



## T-Series IGBT Modules – Standard-Type

The new Mitsubishi Electric 7<sup>th</sup> Generation Standard-Type IGBTs for 650V, 1200V and 1700V have been developed for the purpose of highest power density inverters and best-in-class thermal behavior.

The new 7<sup>th</sup> Generation CSTBT™ and diode chip set provides high efficiency by reducing both dynamic and static losses. The innovative TMS packaging technology provides very low thermal impedance, low package inductance and high thermal cycling capacity. The new Mitsubishi Standard-Type modules facilitate a high performance and reliability and compact inverter design.


The well established 34mm and 62mm package styles greatly simplify the design of medium power inverters for various applications like industrial drives, wind power, solar power and UPS. The newly introduced 48mm package for 300A and 400A rated currents enables a more compact inverter size than with comparable modules in 62mm outline.

The 62mm package is a defacto standard in the market since many years. The 7th Generation extends the rated current range of this 62mm standard package, pushing its limits from previously 450A/1200V to 600A/1200V. This gives advantages in terms of operational inverter power, efficiency, reliability and even switching frequency.

### Product Advantages

- ❑ Low-loss 7<sup>th</sup> generation CSTBT™
- ❑ Low package inductance
- ❑ Low internal electrical resistance
- ❑ High thermal conductivity
- ❑ Compact size
- ❑ Wide power range
- ❑ Light weight

User benefits	Achieved by
Extended module life time	High thermal cycling capability by new TMS-Technology reduced "pump-out"-effect by symmetric TMS construction
Reduction of assembly costs	PC-TIM (pre-applied Phase Change Thermal Interface Material) production lot-independant paralleling capability
Increased power density for - less cooling effort - higher load conditions	Low loss 7th gen. Chipset increased active area by common substrate layer Low thermal resistance $R_{th(j-c)}$
high energy efficiency	Low losses by reduced package inductance due to laminated main terminals
Scalable platform concepts	full power rating line-up of 650V and 1200V modules up to 600A

Circuit	Topology	Package outline	Package size	650V	1200V	1700V
2in1	D		34mm x 94mm	100A	100A	75A
				150A	150A	100A
				200A		
			48mm x 94mm	300A	200A	150A
				400A	300A	200A
					450A	300A
	62mm x 118mm		450A	300A		
			600A	400A		
2in1 AC switch	C1		62mm x 118mm		450A	
					600A	



Industrial



Wind



Solar

for a greener tomorrow



## TMS (Thick-Metal-Substrate)-Technology

The newly introduced TMS-Technology is a packaging technology developed for realizing low inductance and very high thermal conductivity. Instead of the conventional package structure with several ceramic substrates soldered to a copper baseplate, the Thick-Metal-Substrate contains a high thermal conductive **silicon nitride ceramic** with thick copper layers brazed directly to the top and bottom sides.

The **thick copper layer** underneath the IGBT chip provides low lead resistance and thus allows a higher current density. At the same time, it enables a better heat spreading directly next to the chip. This, in combination with the elimination of the substrate solder, means that both the thermal resistance and temperature cycling capacity are improved.

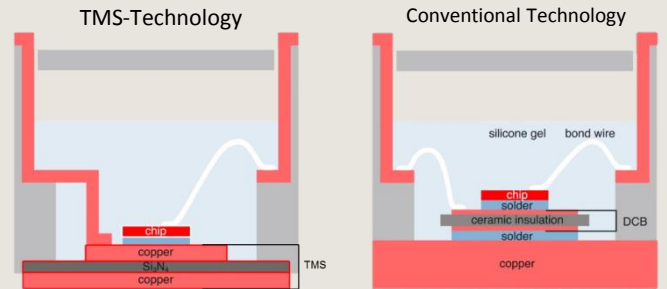
The **symmetrically stacked structure** of the TMS- Technology prevents the typical bending of baseplates in operation. This improves the thermal interface between the module and the heatsink.

Finally the total thermal resistance from junction to heatsink is reduced by more than half compared to conventional modules.

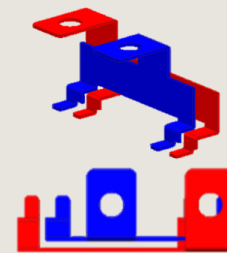
The TMS contains **one common substrate** instead of multi substrate arrangements as used in conventional modules. This expands the effective mounting area for chips and by eliminating wire bond interconnections - the internal stray inductance and lead resistance are reduced.

The main terminals are connected to the TMS by laminated internal bus bar with **increased laminated area** and **ultrasonic bonding**. This reduces the package inductance by 30% and contributes to low lead resistance .

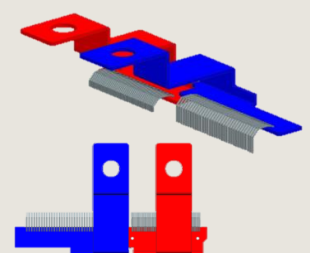
*new*



7<sup>th</sup> Generation main terminal Connection Technology



Conventional Technology



## User-friendly by PC-TIM

The Standard-Type of 7<sup>th</sup> Generation IGBT modules is also available with Pre-applied Phase Change Thermal Interface Material (PC-TIM).

The structure and consistency of Mitsubishi PC-TIM compliments the advantages of TMS-technology and removes the need for applying thermal grease. By PC-TIM a very low thermal contact resistance is achieved.

This feature enables a highly reliable mounting process even in harsh environments and easy maintenance in the field.



**Mitsubishi Electric Europe B.V. (European Headquarters)**

- Semiconductor European Business Group -

Mitsubishi-Electric-Platz 1 / D-40882 Ratingen

Phone +49 (0) 2102 486 0

Fax +49 (0) 2102 486 7220

[www.MitsubishiElectric.com](http://www.MitsubishiElectric.com)

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