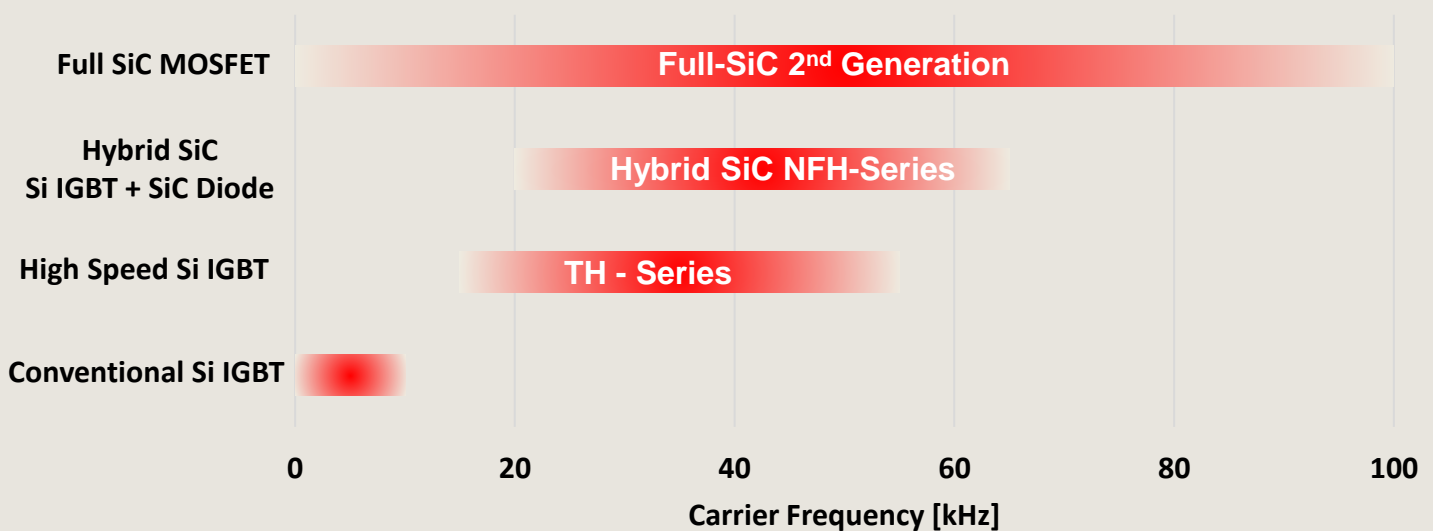


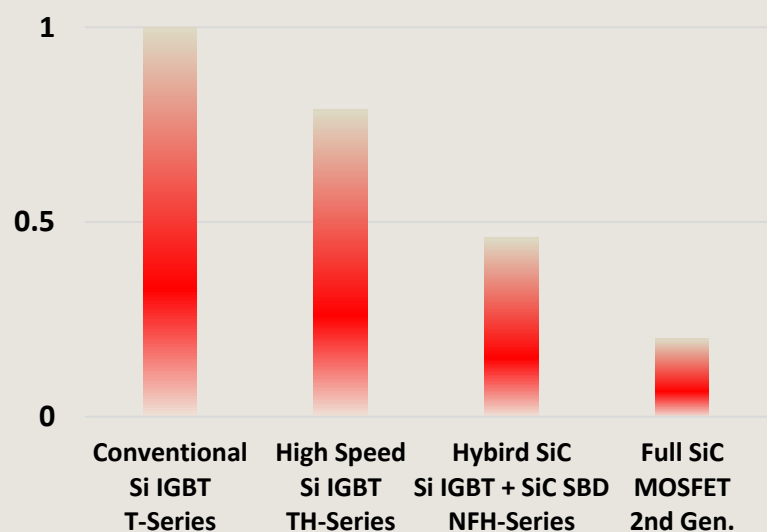
Power Modules for High Frequency Applications

Applications like battery chargers, welding, medical, or industrial power supplies operating at higher switching frequency in the range of several tens of kHz require power modules with optimized fast switching semiconductors and package layouts. Mitsubishi Electric is offering various products based on Si IGBT and SiC Technologies.

Technology Frequency Map



Power Loss Ratio @ $f_c=30\text{kHz}$



Industrial



Medical

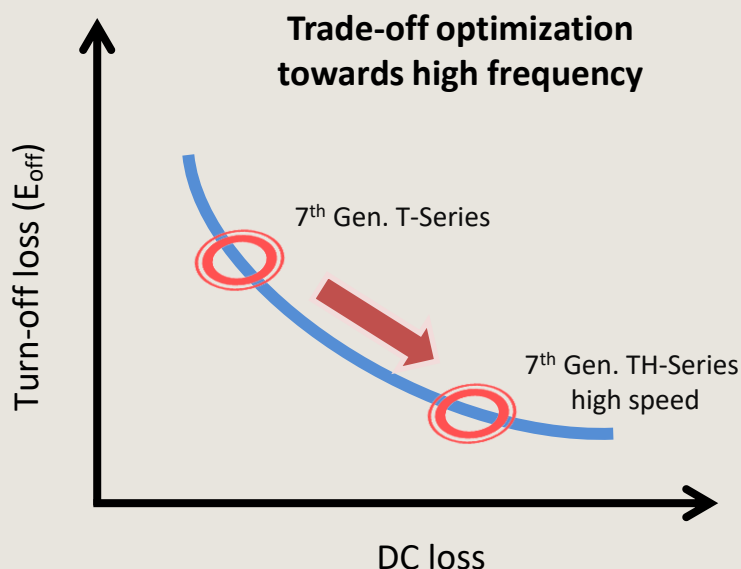


Charging

7th Gen. high speed TH-Series IGBT Modules




Features

- ❑ Latest 7th Gen. CSTBT™ IGBT and RFC-Diode technologies
- ❑ Half bridge Configuration
- ❑ Compatible pkg 48mm, 62mm and 80mm
- ❑ Low power loss at high switching frequency operation (f_c : 20~60kHz)
- ❑ Optimized for trade-off of IGBT and Diode
- ❑ Low thermal resistance and high-power density by AlN ceramic substrate
- ❑ Low inductive package with 4kV insulation
- ❑ High temperature operation with $T_{vjmax} = 175^\circ\text{C}$ junction temperature at overload events



The TH-Series IGBT is equipped with the latest 7th Generation CSTBT™ IGBT and RFC-Diode technology. The chip characteristics has been optimized for the needs of high frequency operation. For instance, comparing the 200A high speed TH-Series with 200A normal speed T-Series device, the turn-off switching energy (E_{off}) has been reduced by 56%. As result, a highly efficient operation at high frequency has been achieved.

Line-up TH-Series 2-in-1 High Speed IGBT Modules

Package	V_{CES} [V]	I_c [A]		
		200	400	600
 48 x 94 mm ²	1200V	CM200DY-24TH		
 62 x 108 mm ²			CM400DY-24TH	
 80 x 110 mm ²			CM400DU-24TH	CM600DU-24TH



Industrial



Medical



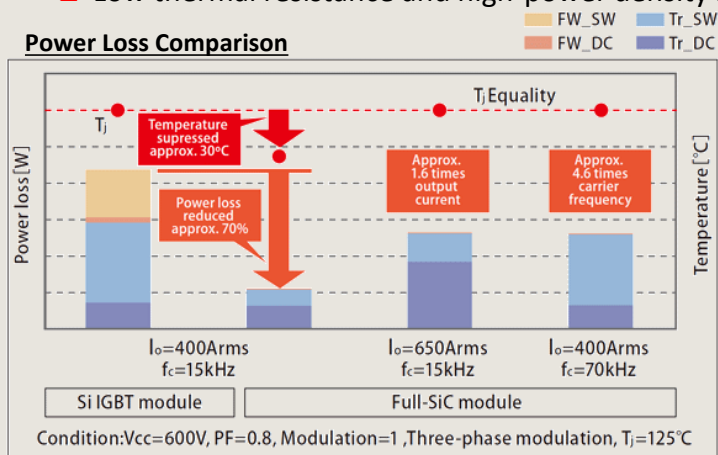
Charging

2nd Gen. Full SiC MOSFET Modules

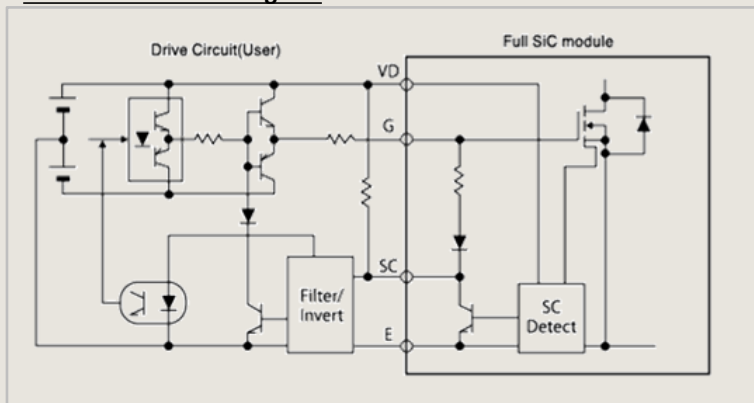
Features

- Low inductance packages adopted to deliver full SiC performance
- Safe operation also in short circuit condition by RTC (Real Time current Control)
- Low power loss by 2nd Generation SiC
- Wide range of switching frequency operation (f_c : 0~100 kHz)
- Low thermal resistance and high-power density by AlN ceramic substrate







Power Loss Comparison



RTC SC-Protection Diagram



Line-up 2nd Gen. Full SiC MOSFET Modules

Package	Model	V _{DSX} [V]	I _D [A]	Circuit	SC protection	
 122 x 62 mm²	FMF600DXE-24BN	1200	600	2-in-1	-	
	FMF600DXE-34BN	1700				
 122 x 62 mm²	FMF400BX-24B	1200V	400	4-in-1	-	
	FMF800DX-24B		800	2-in-1	sense source for external protection	
 62 x 108 mm²	FMF400DY-24B		400	2-in-1	-	
 122 x 66 mm²	FMF300BXZ-24B		300	4-in-1	RTC	
	FMF400BXZ-24B		400			
 122 x 66 mm²	FMF600DXZA-24B		600	2-in-1		
	FMF800DXZA-24B		800			
	FMF300DXZ-34B		300	Chopper		
	FMF300E3XZ-34B		300			
 122 x 122 mm²	FMF1200DXZ-24B	1200	1200	2-in-1		



Industrial



Medical

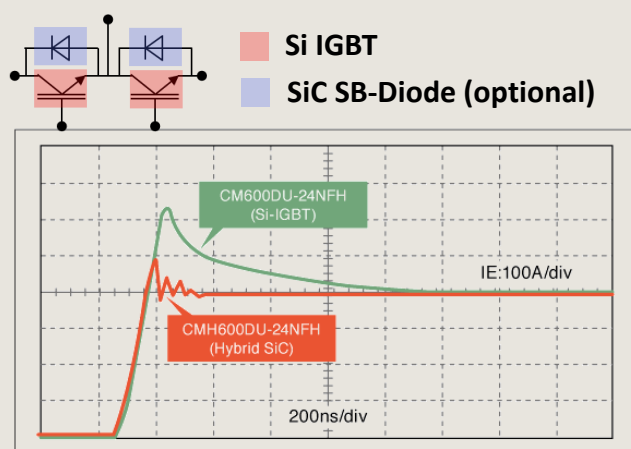


Charging




NFH-Series High speed IGBT with optional SiC Diode

Features

- High Speed IGBT combined with SiC SB-Diode for recovery loss elimination
- Comprehensive Line-up 1200V , 100A ~ 600A half bridge configuration
- Low power loss at high switching frequency operation (f_c : 20~60 kHz)
- Optimized for trade-off of IGBT and Diode
- Low thermal resistance and high power density by AlN ceramic substrate



Line-up 2-in-1 NFH-series High Speed Hybrid Modules

Package	V_{CES} [V]	I_C [A]					
		100	150	200	300	400	600
 48 x 94 mm²	1200	CMH100DY-24NFH	CMH150DY-24NFH				
 62 x 108 mm²				CMH200DU-24NFH	CMH300DU-24NFH		
 80 x 110 mm²						CMH400DU-24NFH	CMH600DU-24NFH

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Industrial



Medical



Charging