модуль, igbt, мост диодный Минск +375447584780

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Мы не работаем с частными (физическими) лицами.

Мы работаем только с юридическими лицами(организациями) и ИП и только по безналичному расчёту.

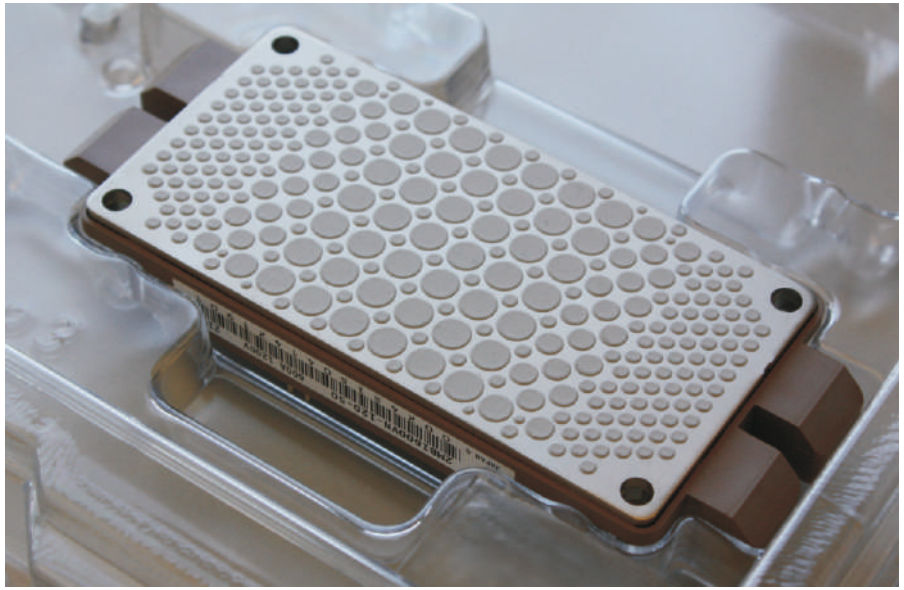
каталог, описание, технические, характеристики, datasheet, параметры, маркировка,габариты, фото

КАТАЛОГ МИНСК

модуль, igbt, модуль диодный

купить, продажа

Industrialized process for Pre-applied Thermal Interface Material (TIM)



Fuji Electric's printing process of pre-applied TIM is automated and carried out by a computer controlled printing line under clean environment.

Precise printing equipment and optimized module specific printing patterns guarantee a uniform print and maximum thermal conductivity.

3D-imaging tests ensure the compliance of our specified TIM thickness.

The whole process is controlled by our qualified staff to ensure our high quality standards.

Features	Process - Benefits	Thermal - Benefits
+ Optimized for Fuji modules	+ Outsourcing of a dirty process	+ Higher thermal conductivity
+ Increase lifetime of IGBT	+ Stable quality level	+ Uniform thermal resistance
+ Advanced IGBT power density	+ Increased system reliability	+ Higher reliability and life time.

The range of modules with pre-applied TIM is being continually expanded.
For latest availablity status please refer to *actual product information* ▶

or contact us: ▶ *info.semi@fujielectric-europe.com*

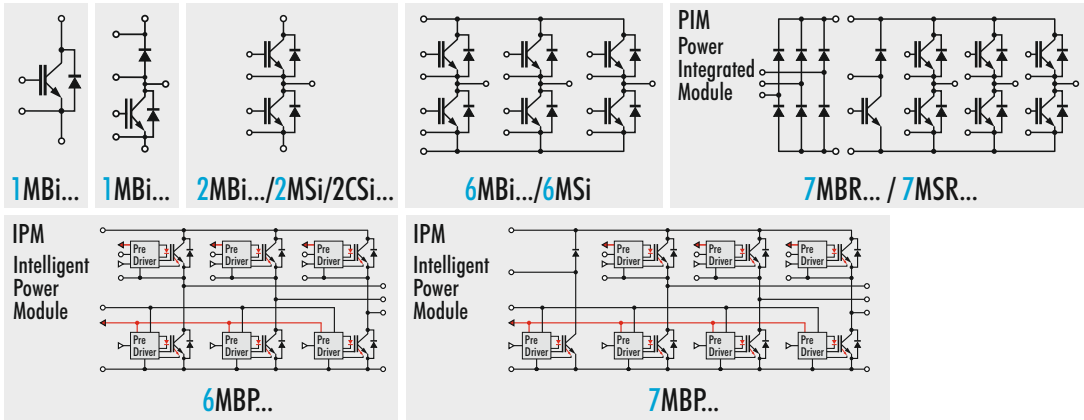
About Type Name

The Type Name is not exactly the item code for the ordering process

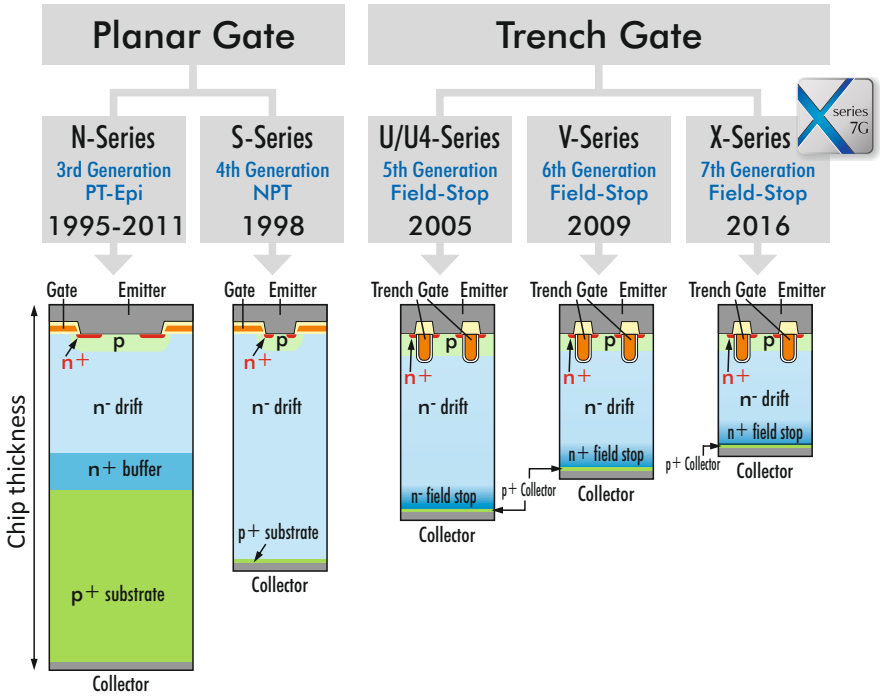
1. Standard IGBT-modules, hybrid-modules and all SiC-modules

2 MBi 450□□...□ - 120□ - □□

- Suffix = RoHS compliant. Numerals indicate other specific properties in addition to RoHS.
- Variation of chip & configuration
- Voltage class: 060 = 600V · 065 = 650V · 120 = 1200V · 170 = 1700V · 330 = 3300V
- Package type and other properties
- IGBT-series/Chip generation (U = U-series, V = V-series, X = X-series etc.)
- Current class I_C [A]
- Device type & configuration
  - MBi .....: Standard IGBT module (1-, 2- and 6-pack)
  - MBR .....: PIM IGBT (Power Integrated Module)
  - MBP .....: IPM IGBT (Intelligent Power Module)
  - MSi , MSR: The "S" indicates hybrid module with Si-IGBT & SiC Schottky free wheeling diodes
  - CSi .....: All SiC module (SiC MOS-FET & SiC Schottky diode)
- Number of IGBT-switches (not number of chips)



Evolution of IGBT technology



About Type Name

The Type Name is not exactly the item code for the ordering process

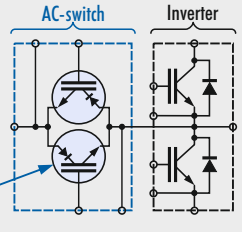
2. Modules with RB-IGBT (Reverse Blocking IGBT)

4MBi300VG-120R1-50

Voltage class of inverter part
060 = 600V
120 = 1200V
170 = 1700V

Voltage class of AC-switch/RB-IGBT
R = 600V
R1 = 900V
R2 = 1200V

IGBT module for 1 phase
3-Level inverters



3. Discrete IGBTs

FGW35N60HD

- F: Fuji
- G: IGBT
- W: Package
- 35: I_C [A]
- N: N-channel
- 60: Voltage: 60 = 600V · 65 = 650V · 120 = 1200V
- HD: Series

4. Super-Junction MOSFETs

FMP60N133S2FD

- F: Fuji
- M: MOSFET
- P: Package
- 60: V_{DS}: 60 = 600V · 65 = 650V
- N: N-channel
- 133: $R_{DS(on),max}$ [mΩ]
- S2: Super-Junction MOSFET, S2-Series
- FD: With built-in FRED

5. SiC Schottky Barrier Diodes

FDCP25S65

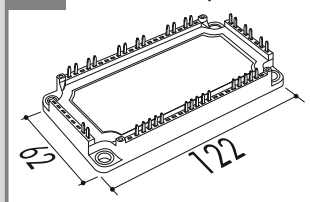
- F: Fuji
- DC: SiC-Diode
- P: Package
- 25: I_{FAV} [A]
- S: Configuration C = Dual S = Single
- 65: Voltage: 65 = 650V · 120 = 1200V

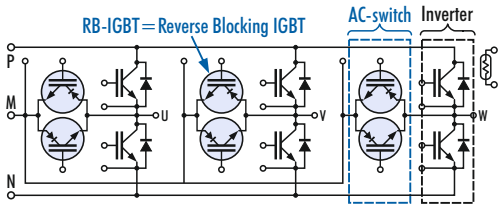
IGBT-Modules for 3-Level-inverters

		I_C	600V V-Series 6th Generation	600V AC-switch	1200V V-Series 6th Generation	1200V AC-switch	1700V V-Series 6th Generation	1700V AC-switch
3 Phase	1	50A			12MBi 50VN-120-50	600V		
		75A			12MBi 75VN-120-50	600V		
		100A			12MBi 100VN-120-50	600V		
	2	50A			12MBi 50VX-120-50	600V		
		75A			12MBi 75VX-120-50	600V		
		100A			12MBi 100VX-120-50	600V		
1 Phase	3	220A					4MBi 220VF-170R2-50	1200V
		300A			4MBi 300VG-120R-50 4MBi 300VG-120R1-50	600V 900V		
		340A			4MBi 340VF-120R-50	600V		
		400A	4MBi 400VG-060R-50	600V	4MBi 400VF-120R-50	600V		

1

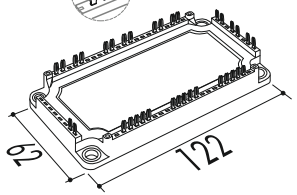
Solder pins

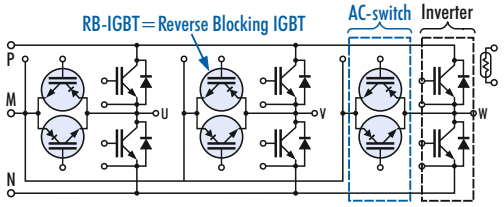




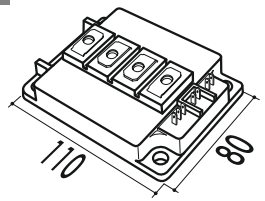
2

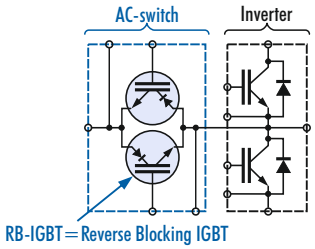
PressFit contacts





3

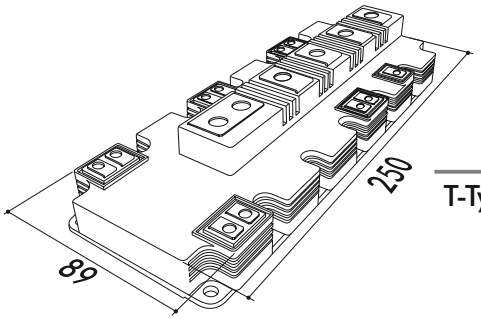




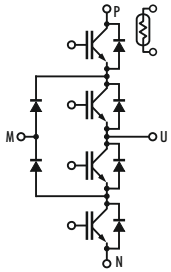
IGBT-Modules for 3-Level-inverters

1 Phase

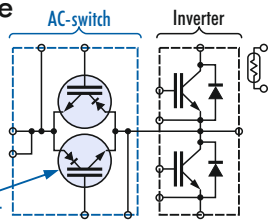
4



I-Type



T-Type



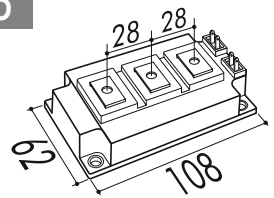
RB-IGBT = Reverse Blocking IGBT

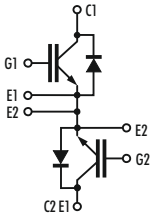
I_C	1200V V-Series 6th Generation	1200V AC-switch	1700V V-Series 6th Generation	1700V AC-switch
600A	4MBi 600VC-120-50			
450A	4MBi 450VB-120R1-50	900V	4MBi 450VB-170R2-50	1200V
600A			4MBi 600VB-170R2-50	1200V
650A	4MBi 650VB-120R1-50	900V		
900A	4MBi 900VB-120R1-50	900V		

AC-switch

2-Pack

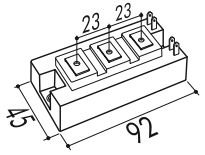
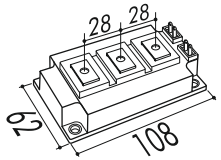
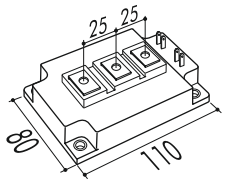
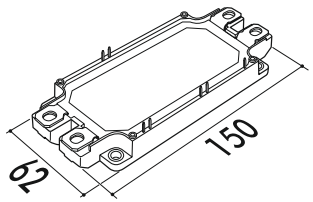
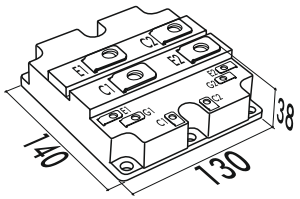
5





I_C	1200V V-Series 6th Generation
450A	2MBi 450VH-120F-50

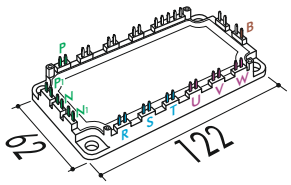
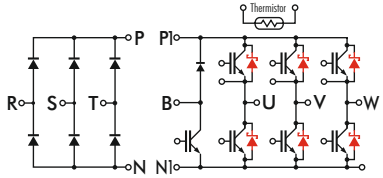
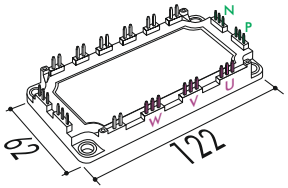
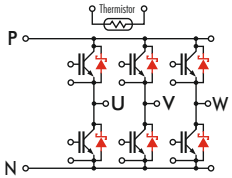
Hybrid IGBT-Modules with SiC-SBD

			I_C	1200V V-Series 6th Generation	1700V V-Series 6th Generation
2-Pack	6		200A	2MSi 200VAB-120-53	
	7		300A	2MSi 300VAH-120C-53	
	8		400A		2MSi 400VAE-170-53
	9		300A	2MSi 300VAN-120-53*	
			450A	2MSi 450VAN-120-53	2MSi 450VAN-170-53*
			550A		2MSi 550VAN-170-53*
			600A	2MSi 600VAN-120-53*	
	10		1200A		2MSi 1200VAT-170EC 2MSi 1200VAT-170PC

Suffix -53 = With $V_{CE,sat}$ & V_F rank label

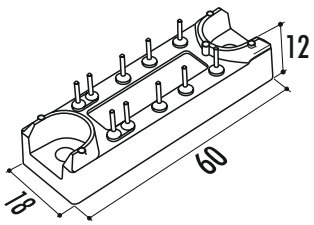
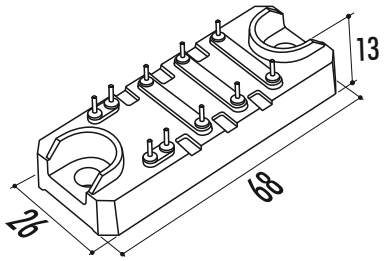
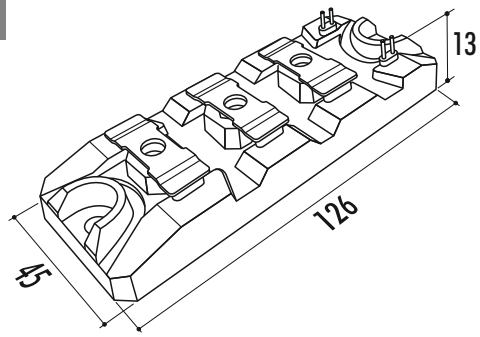
*) Under development

Hybrid IGBT-Modules with SiC-SBD

			I_C	600V V-Series 6th Generation	1200V V-Series 6th Generation
PIM	11		35A		7MSR 35VAB-120-50
			50A	7MSR 50VAB-060-50	7MSR 50VAB-120-50
			75A	7MSR 75VAB-060-50	
			100A	7MSR 100VAB-060-50	
6-Pack	12	 	100A		6MSi 100VAB-120-50

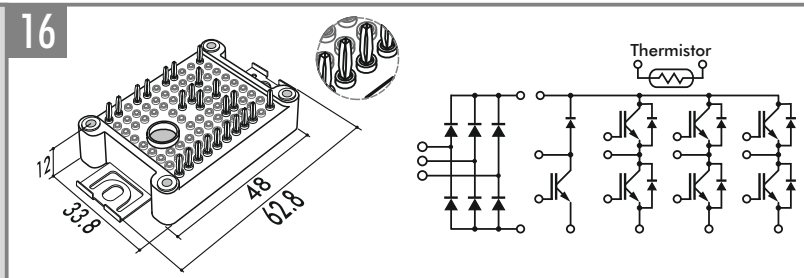
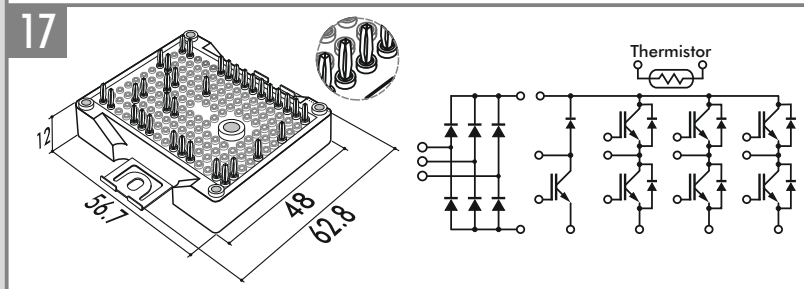
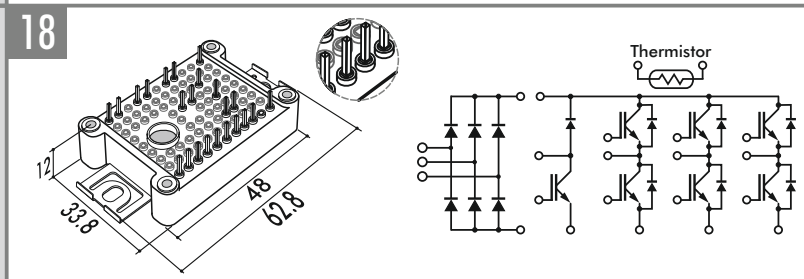
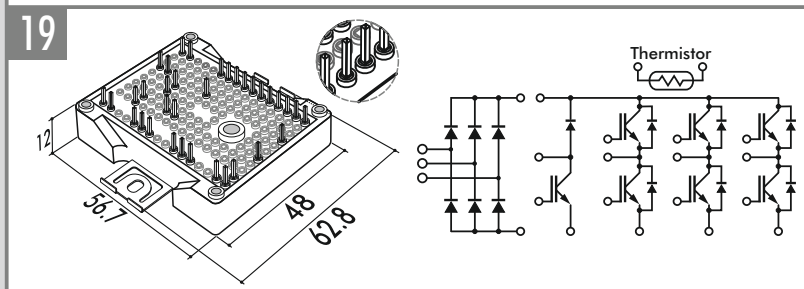
All SiC 2in1modules (SiC MOS-FET & SiC Schottky diode)

All SiC

			I_C	1200V 1st gen. TrenchMOS
2-Pack	13		25A	2CSi 25CAN-120-50*
			50A	2CSi 50CAN-120-50*
	14		75A	2CSi 75CAM-120-50*
			100A	2CSi 100CAM-120-50*
	15		200A	2CSi 200CAS-120-50*
			300A	2CSi 300CAS-120-50*
			400A	2CSi 400CAS-120-50*

*) Under development

Small PIM IGBTs (Power Integrated Modules)

		I_C	600V V-Series 6th Generation	650V X-Series 7th Generation	1200V V-Series 6th Generation	1200V X-Series 7th Generation
With PressFit contacts	16 	10A	7MBR 10VKA-060-50	7MBR 10XKA-065-50	7MBR 10VKA-120-50	7MBR 10XKA-120-50
		15A	7MBR 15VKA-060-50	7MBR 15XKA-065-50	7MBR 15VKA-120-50	7MBR 15XKA-120-50
		20A	7MBR 20VKA-060-50	7MBR 20XKA-065-50		
		25A				7MBR 25XKA-120-50
		30A	7MBR 30VKA-060-50	7MBR 30XKA-065-50		
	17 	15A			7MBR 15VKB-120-50	7MBR 15XKB-120-50
		25A			7MBR 25VKB-120-50	7MBR 25XKB-120-50
		35A			7MBR 35VKB-120-50	7MBR 35XKB-120-50
		50A	7MBR 50VKB-060-50	7MBR 50XKB-065-50		
With solder pins	18 	10A	7MBR 10VKC-060-50	7MBR 10XKC-065-50	7MBR 10VKC-120-50	7MBR 10XKC-120-50
		15A	7MBR 15VKC-060-50	7MBR 15XKC-065-50	7MBR 15VKC-120-50	7MBR 15XKC-120-50
		20A	7MBR 20VKC-060-50	7MBR 20XKC-065-50		
		25A				7MBR 25XKC-120-50
		30A	7MBR 30VKC-060-50	7MBR 30XKC-065-50		
	19 	15A			7MBR 15VKD-120-50	7MBR 15XKD-120-50
		25A			7MBR 25VKD-120-50	7MBR 25XKD-120-50
		35A			7MBR 35VKD-120-50	7MBR 35XKD-120-50
		50A	7MBR 50VKD-060-50	7MBR 50XKD-065-50		

PIM IGBTs (Power Integrated Module) with solder pins

With solder pins

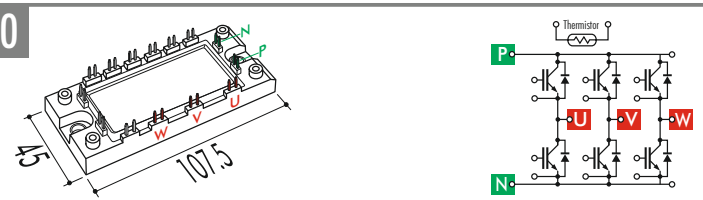
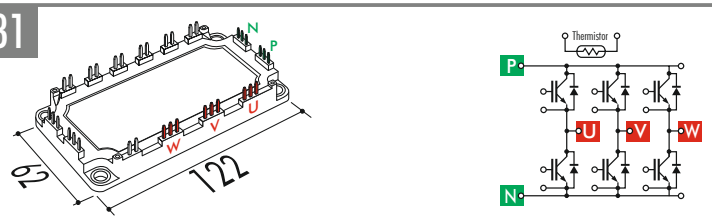
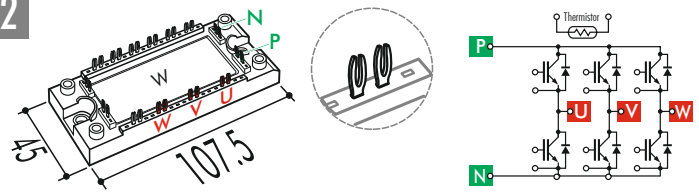
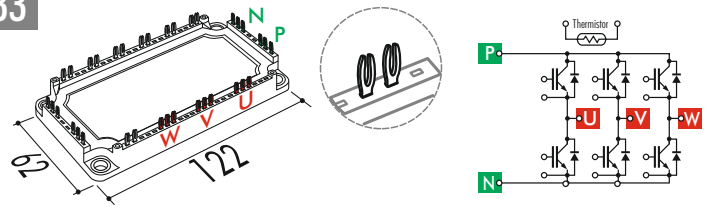
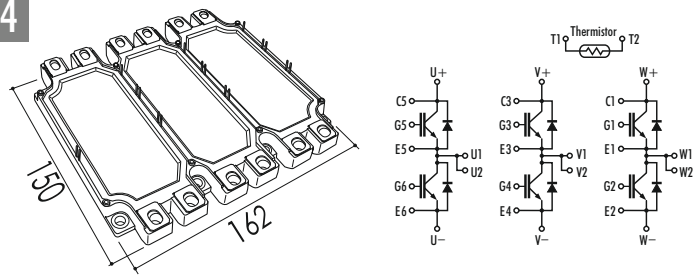
	I_C	600V V-Series 6th Generation	650V X-Series 7th Generation	1200V V-Series 6th Generation	1200V X-Series 7th Generation
20	25A			7MBR 25VA-120-50	
	35A			7MBR 35VA-120-50	
	50A	7MBR 50VA-060-50			
21	35A			7MBR 35VB-120-50	
	50A			7MBR 50VB-120-50	
	75A	7MBR 75VB-060-50		7MBR 75VB-120-50	
	100A	7MBR 100VB-060-50			
22	25A			7MBR 25VM-120-50	
	35A			7MBR 35VM-120-50	7MBR 35XMA-120-50
	50A		7MBR 50XMA-065-50	7MBR 50VM-120-50	7MBR 50XMA-120-50
	75A		7MBR 75XMA-065-50		7MBR 75XME-120-50
23	25A			7MBR 25VP-120-50	
	35A			7MBR 35VP-120-50	7MBR 35XPA-120-50
	50A	7MBR 50VP-060-50	7MBR 50XPA-065-50	7MBR 50VP-120-50	7MBR 50XPA-120-50
	75A	7MBR 75VP-060-50	7MBR 75XPA-065-50		7MBR 75XPE-120-50
	100A	7MBR 100VP-060-50	7MBR 100XPE-065-50		
24	50A			7MBR 50VN-120-50	
	75A		7MBR 75XNA-065-50	7MBR 75VN-120-50	7MBR 75XNA-120-50
	100A		7MBR 100XNA-065-50	7MBR 100VN-120-50	7MBR 100XNA-120-50
	150A		7MBR 150XNA-065-50	7MBR 150VN-120-50	7MBR 150XNE-120-50
25	50A			7MBR 50VR-120-50	
	75A			7MBR 75VR-120-50	7MBR 75XRA-120-50
	100A	7MBR 100VR-060-50	7MBR 100XRA-065-50	7MBR 100VR-120-50	7MBR 100XRA-120-50
	150A	7MBR 150VR-060-50	7MBR 150XRA-065-50 7MBR 150XRE-065-50	7MBR 150VR-120-50	7MBR 150XRE-120-50

PIM IGBTs (Power Integrated Modules) with PressFit contacts

With PressFit contacts

	I_C	600V V-Series 6th Generation	650V X-Series 7th Generation	1200V V-Series 6th Generation	1200V X-Series 7th Generation
26	25A		7MBR 50XWA-065-50	7MBR 25VW-120-50	
	35A			7MBR 35VW-120-50	7MBR 35XWA-120-50
	50A			7MBR 50VW-120-50	7MBR 50XWA-120-50
	75A		7MBR 75XWA-065-50		7MBR 75XWE-120-50
27	50A			7MBR 50VX-120-50	
	75A		7MBR 75XXA-065-50	7MBR 75VX-120-50	7MBR 75XXA-120-50
	100A		7MBR 100XXA-065-50	7MBR 100VX-120-50	7MBR 100XXA-120-50
	150A		7MBR 150XXA-065-50	7MBR 150VX-120-50	7MBR 150XXE-120-50
28	25A			7MBR 25VY-120-50	
	35A			7MBR 35VY-120-50	7MBR 35XYA-120-50
	50A	7MBR 50VY-060-50	7MBR 50XYA-065-50	7MBR 50VY-120-50	7MBR 50XYA-120-50
	75A	7MBR 75VY-060-50	7MBR 75XYA-065-50		7MBR 75XYE-120-50
	100A	7MBR 100VY-060-50	7MBR 100XYE-065-50		
29	50A			7MBR 50VZ-120-50	
	75A			7MBR 75VZ-120-50	7MBR 75XZA-120-50
	100A	7MBR 100VZ-060-50	7MBR 100XZA-065-50	7MBR 100VZ-120-50	7MBR 100XZA-120-50
	150A	7MBR 150VZ-060-50	7MBR 150XZA-065-50	7MBR 150VZ-120-50	7MBR 150XZE-120-50

6-Pack IGBTs

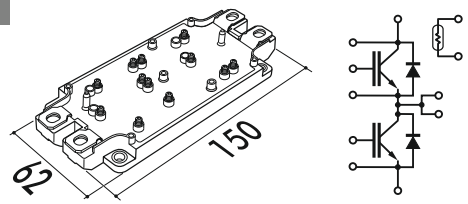
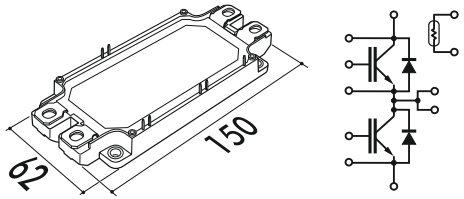
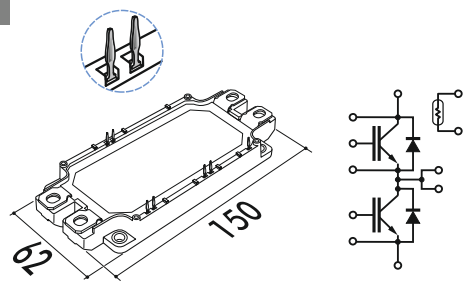
		I_C	600V	1200V		1700V
			V-Series 6th Generation	V-Series 6th Generation	X-Series 7th Generation	X-Series 7th Generation
With solder pins	30 	50A	6MBi 50VA-060-50	6MBi 50VA-120-50		
		75A	6MBi 75VA-060-50	6MBi 75VA-120-50		
		100A	6MBi 100VA-060-50	6MBi 100VA-120-50	6MBi 100XAE-120-50 *	
	31 	100A		6MBi 100VB-120-50	6MBi 100XBA-120-50	
		150A	6MBi 150VB-060-50	6MBi 150VB-120-50	6MBi 150XBA-120-50	
		180A		6MBi 180VB-120-50		
		200A		6MBi 180VB-120-55 Equivalent to 200A by lower $R_{th(j-c)}$	6MBi 200XBA-120-50 6MBi 200XBE-120-50	
With PressFit contacts	32 	50A	6MBi 50VW-060-50	6MBi 50VW-120-50		
		75A	6MBi 75VW-060-50	6MBi 75VW-120-50		
		100A	6MBi 100VW-060-50	6MBi 100VW-120-50		
	33 	100A		6MBi 100VX-120-50	6MBi 100XXA-120-50	
		150A	6MBi 150VX-060-50	6MBi 150VX-120-50	6MBi 150XXA-120-50	
		180A		6MBi 180VX-120-50		
		200A		6MBi 180VX-120-55 Equivalent to 200A by lower $R_{th(j-c)}$	6MBi 200XXA-120-50 6MBi 200XXE-120-50	
High power	34 	225A			6MBi 225XNA-120-50*	6MBi 225XNA-170-50*
		300A			6MBi 300XNA-120-50*	6MBi 300XNA-170-50*
		450A			6MBi 450XNA-120-50*	6MBi 450XNA-170-50*
		600A			6MBi 600XNA-120-50*	6MBi 600XNA-170-50*

*) Under development

Fuji Electric

2-Pack IGBT-Modules

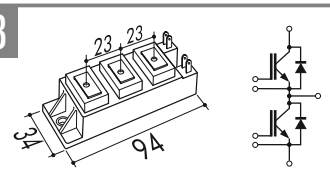
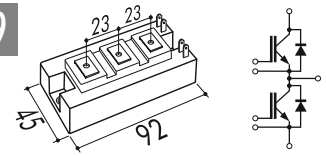
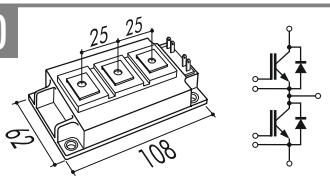
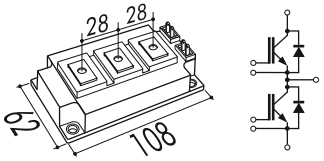
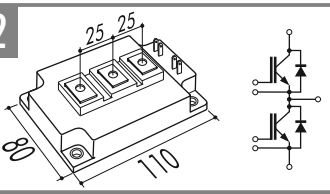
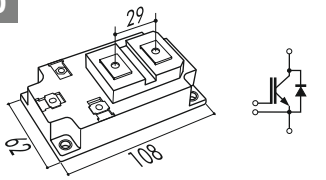
with Spring-, Pin- & PressFit contacts

		I_C	1200V V-Series 6th Generation	1200V V-Series 6th Generation With SiN-substrate 20% Lower thermal impedance	1200V X-Series 7th Generation	1700 V-Series 6th Generation	1700 X-Series 7th Generation
Spring contacts	35 	225A	2MBi 225VJ-120-50				
		300A	2MBi 300VJ-120-50				
		450A	2MBi 450VJ-120-50				
		550A				2MBi 550VJ-170-50	
		600A		2MBi 600VJ-120-50			
Solder pins	36 	225A	2MBi 225VN-120-50	2MBi 225VN-120S -50	2MBi 225XNA-120-50		2MBi 225XNA-170-50 *
		300A	2MBi 300VN-120-50	2MBi 300VN-120S -50	2MBi 300XNA-120-50	2MBi 300VN-170-50	2MBi 300XNA-170-50 *
		450A	2MBi 450VN-120-50	2MBi 450VN-120S -50	2MBi 450XNA-120-50	2MBi 450VN-170-50	2MBi 450XNA-170-50 *
		550A				2MBi 550VN-170-50	
		600A		2MBi 600VN-120-50	2MBi 600XNG-120-50 2MBi 600XNE-120-50 1)		2MBi 600XNE-170-50 1)
		800A			2MBi 800XNE-120-50 1)		
PressFit contacts	37 	225A	2MBi 225VX-120-50		2MBi 225XNB-120-50	2MBi 225VX-170-50	2MBi 225XNB-170-50*
		300A	2MBi 300VX-120-50		2MBi 300XNB-120-50	2MBi 300VX-170-50	2MBi 300XNB-170-50*
		450A	2MBi 450VX-120-50		2MBi 450XNB-120-50	2MBi 450VX-170-50	2MBi 450XNB-170-50*
		550A				2MBi 550VX-170-50	
		600A		2MBi 600VX-120-50	2MBi 600XNH-120-50 2MBi 600XNF-120-50 1)		2MBi 600XNF-170-50 1)
		800A			2MBi 800XNF-120-50 1)		

1): With enhanced package properties (thicker terminals, AlN substrate , Visol=4kV , CTI=600)

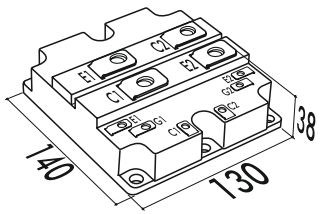
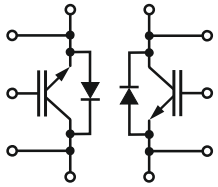
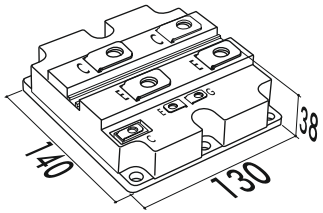
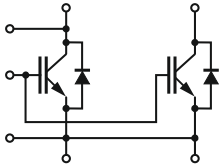
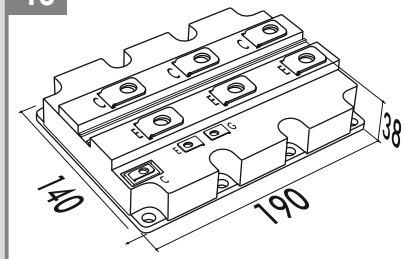
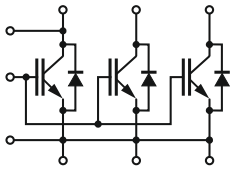
*) Under development

Standard1- & 2-Pack

		I_C	600V V-Series 6th Generation	650V X-Series 7th Generation	1200V V-Series 6th Generation	1200V X-Series 7th Generation	1700V V-Series 6th Generation	1700V X-Series 7th Generation
2-Pack	38 	75A			2MBi 75VA-120-50		2MBi 75VA-170-50	2MBi 75XAA-170-50 *
		100A	2MBi 100VA-060-50		2MBi 100VA-120-50	2MBi 100XAA-120-50 *	2MBi 100VA-170-50	2MBi 100XAA-170-50 *
		150A	2MBi 150VA-060-50	2MBi 150XAA-065-50 *	2MBi 150VA-120-50	2MBi 150XAA-120-50 *		2MBi 150XAA-170-50 *
		200A	2MBi 200VA-060-50	2MBi 200XAA-065-50 *		2MBi 200XAA-120-50 *		
	39 	150A			2MBi 150VB-120-50			
		200A			2MBi 200VB-120-50	2MBi 200XBE-120-50 *		
		300A	2MBi 300VB-060-50	2MBi 300XBE-065-50 *		2MBi 300XBE-120-50 *		
		400A	2MBi 400VB-060-50	2MBi 400XBE-065-50 *				
	40 	300A			2MBi 300VD-120-50			
		400A	2MBi 400VD-060-50	2MBi 400XDE-065-50 *	2MBi 400VD-120-50	2MBi 400XDE-120-50 *		
		600A	2MBi 600VD-060-50	2MBi 600XDE-065-50 *		2MBi 600XDE-120-50 *		
	41 	150A					2MBi 150VH-170-50	2MBi 150XHA-170-50 *
		200A			2MBi 200VH-120-50		2MBi 200VH-170-50	2MBi 200XHA-170-50 *
		300A			2MBi 300VH-120-50	2MBi 300XHA-120-50 *	2MBi 300VH-170-50	2MBi 300XHA-170-50 *
		400A						2MBi 400XHA-170-50 *
		450A			2MBi 450VH-120-50	2MBi 450XHA-120-50 *		
		600A				2MBi 600XHA-120-50 *		
	42 	300A			2MBi 300VE-120-50		2MBi 300VE-170-50	2MBi 300XEE-170-50 *
		400A					2MBi 400VE-170-50	2MBi 400XEE-170-50 *
		450A			2MBi 450VE-120-50	2MBi 450XEE-120-50 *		
		600A	2MBi 600VE-060-50	2MBi 600XEE-065-50 *	2MBi 600VE-120-50	2MBi 600XEE-120-50 *		2MBi 600XEE-170-50 *
1-Pack	43 	300A					1MBi 300V-170-50	
		400A			1MBi 400V-120-50 1MBi 400VF-120-50		1MBi 400V-170-50	
		600A			1MBi 600V-120-50 1MBi 600VF-120-50		1MBi 600V-170-50	
		900A			1MBi 900V-120-50			

*) Under development

High Power Modules 1- & 2-Pack

		I_C	1200V	1700V		3300V	
			V-Series 6th Generation With Cu-baseplate Soft turn-off	V-Series 6th Generation With Cu-baseplate Low switching loss	V-Series 6th Generation With AlSiC-baseplate Low switching loss	U-Series 5th Generation With AlSiC-baseplate Soft turn-off	U-Series 5th Generation With AlSiC-baseplate Low switching loss
2-Pack	44  	600A	2MBi 600VG-120P	2MBi 600VG-170E	2MBi 600VT-170E		
		800A	2MBi 800VG-120P	2MBi 800VG-170E	2MBi 800VT-170E		
		1200A	2MBi 1200VG-120P	2MBi 1200VG-170E	2MBi 1200VT-170E		
1-Pack	45  	800A				1MBi 800UG-330	
		1000A				1MBi 1000UG-330	1MBi 1000UG-330B
		1200A	1MBi 1200VC-120P	1MBi 1200VC-170E	1MBi 1200VR-170E		
		1600A	1MBi 1600VC-120P	1MBi 1600VC-170E	1MBi 1600VR-170E		
		2400A	1MBi 2400VC-120P	1MBi 2400VC-170E	1MBi 2400VR-170E		
	46  	1200A				1MBi 1200UE-330	
		1500A				1MBi 1500UE-330	1MBi 1500UE-330B
		2400A	1MBi 2400VD-120P	1MBi 2400VD-170E	1MBi 2400VS-170E		
		3600A	1MBi 3600VD-120P	1MBi 3600VD-170E	1MBi 3600VS-170E		

High Power next Core (HPnC)

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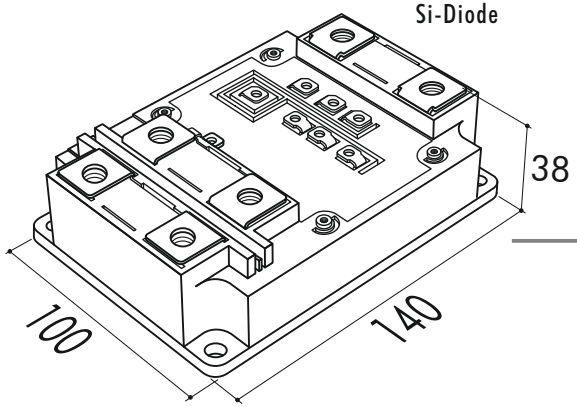
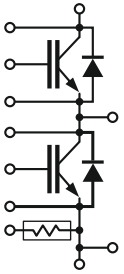


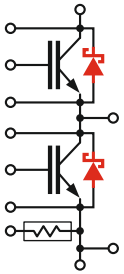
All Silicon Modules

Si-IGBT (X-Series, 7th generation)
Si-Diode



Hybrid Modules

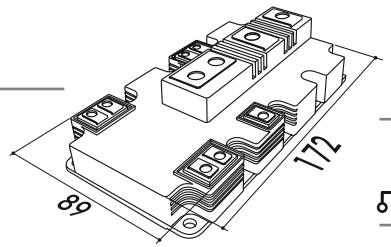
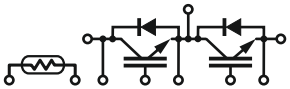
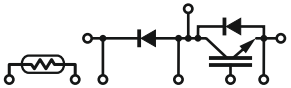
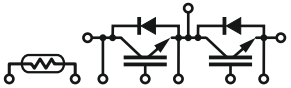
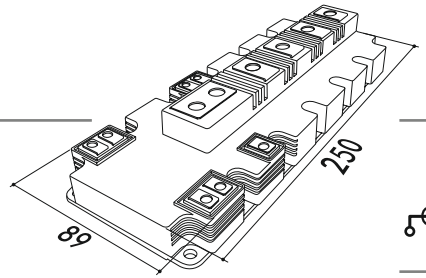
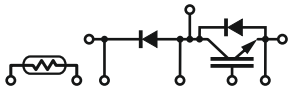
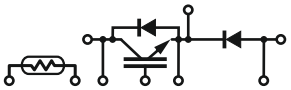
Si-IGBT (X-Series, 7th generation)
SiC-Schottky Diode



	I_C	1700V X-Series 7th Generation	3300V X-Series 7th Generation
All Silicon Modules Si-IGBT & Si-Diode	450A		2MBi 450XUF-330-50*
	1000A	2MBi 1000XUF-170-50*	
Hybrid Modules Si-IGBT & SiC-Diode	450A		2MSi 450XUF- 330-50*
	1000A	2MSi 1000XUF-170-50*	

*) Under development

High Power Modules, 2-Pack & Chopper

		I_C	1200V V-Series 6th Generation E-type (Low switching loss) P-type (Soft turn-off)	1200V X-Series 7th Generation E-type (Low switching loss) P-type (Soft turn-off)	1700V V-Series 6th Generation E-type (Low switching loss) P-type (Soft turn-off)	1700V X-Series 7th Generation
48 2-Pack	 	600A	2MBi 600VXA-120E-50			
		650A			2MBi 650VXA-170E-50 2MBi 650VXA-170EA-50 *(With larger free wheeling diode)*	
		900A	2MBi 900VXA-120E-50 2MBi 900VXA-120P-50	2MBi 900XXA-120E-50* 2MBi 900XXA-120P-50*		
		1200A		2MBi 1200XXE-120E-50* 2MBi 1200XXE-120P-50*		2MBi 1200XXE-170-50*
Chopper		650A			1MBi 650VXA-170EL-50	
		900A	1MBi 900VXA-120PD-50			
		650A			1MBi 650VXA-170EH-50	
		900A	1MBi 900VXA-120PC-50			
49 2-Pack		1000A			2MBi 1000VXB-170E-50 2MBi 1000VXB-170EA-50 *(With larger free wheeling diode)*	
		1400A	2MBi 1400VXB-120E-50 2MBi 1400VXB-120P-50	2MBi 1400XXB-120P-50*	2MBi 1400VXB-170E-50 2MBi 1400VXB-170P-50	2MBi 1400XXB-170-50*
		1800A		2MBi 1800XXF-120P-50*		2MBi 1800XXF-170-50*
Chopper		1000A			1MBi 1000VXB-170EL-50	
		1400A	1MBi 1400VXB-120PL-54		1MBi 1400VXB-170PL-50	
		1000A			1MBi 1000VXB-170EH-50	
		1400A	1MBi 1400VXB-120PH-54		1MBi 1400VXB-170PH-50	

Above devices are available with $V_{CE,sat}$ & V_F rank label for optimum paralleling (→suffix -54 instead of -50)

*) Under development

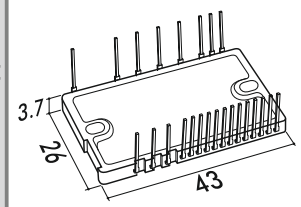
IPM IGBTs (Intelligent Power Modules)

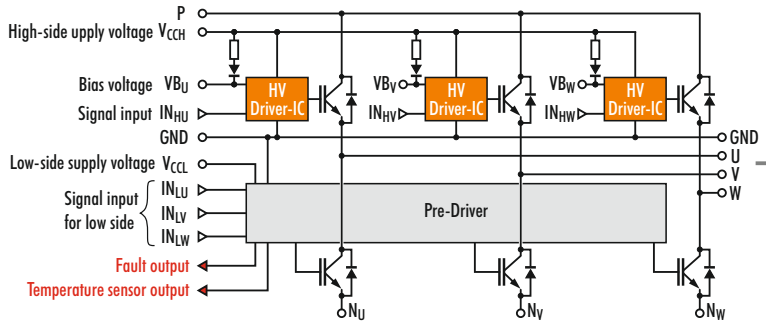
Built-in protection functions

- Fault status output (Alarm)
- Under voltage protection (self shutdown)
- Short circuit protection (self shutdown)
- Overheating protection (self shutdown)
- Temperature sensor function ($V_{temp,out}$)

50 With High Voltage Driver-IC

Without Brake-Chopper

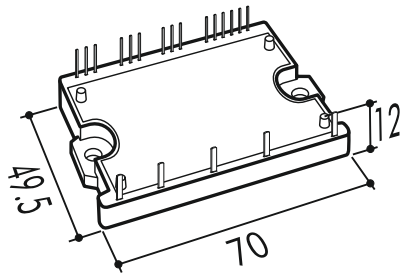


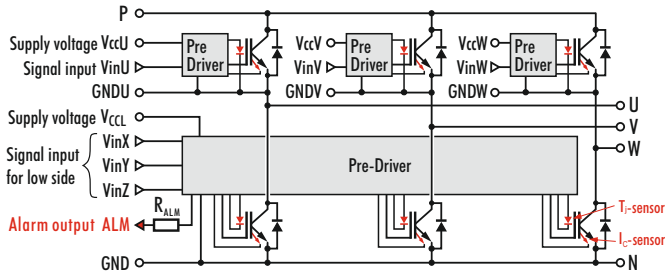


I_C	600V V-Series 6th Generation	600V X-Series 7th Generation	1200V V-Series 6th Generation
15A		6MBP 15XSD-060-50	
20A		6MBP 20XSD-060-50	
30A		6MBP 30XSD-060-50	
35A		6MBP 35XSD-060-50	
15A		6MBP 15XSF-060-50	
20A		6MBP 20XSF-060-50	
30A		6MBP 30XSF-060-50	
35A		6MBP 35XSF-060-50	

51 I_c- & T_j-Sensors on chip

Without Brake-Chopper

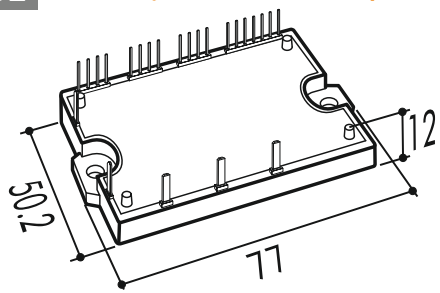


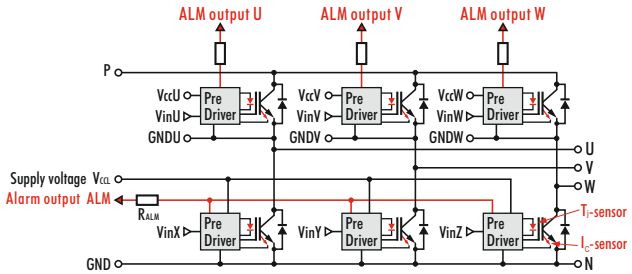


I_C	600V V-Series 6th Generation	600V X-Series 7th Generation	1200V V-Series 6th Generation
10A			6MBP 10VAA-120-50
15A			6MBP 15VAA-120-50
20A	6MBP 20VAA-060-50		
25A			6MBP 25VAA-120-50
30A	6MBP 30VAA-060-50		
50A	6MBP 50VAA-060-50		

52 I_c- & T_j-Sensors on chip

Without Brake-Chopper

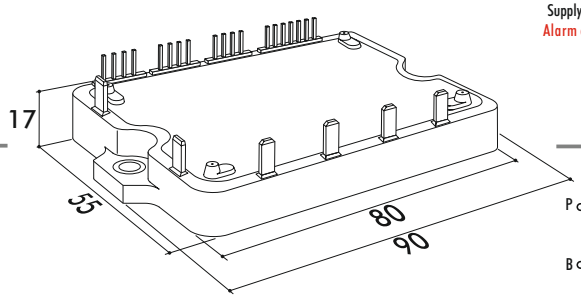


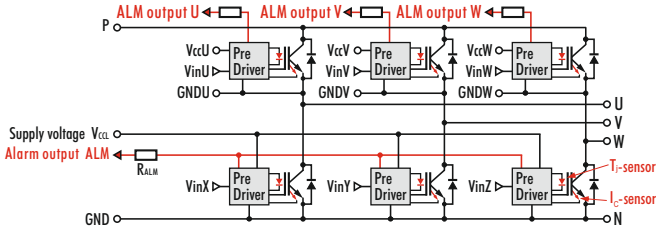


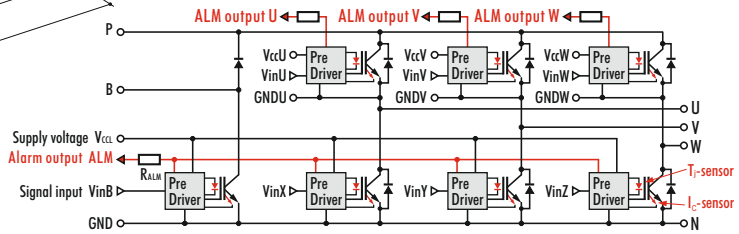
I_C	600V V-Series 6th Generation	600V X-Series 7th Generation	1200V V-Series 6th Generation
25A			6MBP 25VBA-120-50
35A			6MBP 35VBA-120-50
50A	6MBP 50VBA-060-50		6MBP 50VBA-120-50
75A	6MBP 75VBA-060-50		

IPM IGBTs (Intelligent Power Modules)

53 I_c- & T_j-Sensors on chip







Built-in protection functions

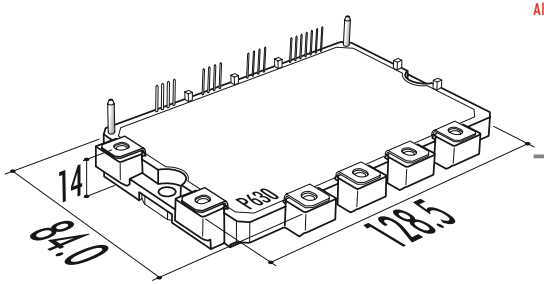
- Fault status output (Alarm)
- Under voltage protection (self shutdown)
- Short circuit protection (self shutdown)
- Overheating protection (self shutdown)
- Temperature sensor function ($V_{temp,out}$)

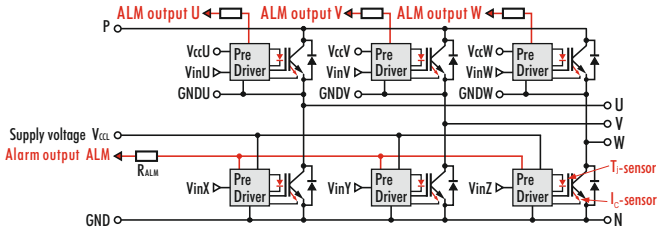
	I_C	600V V-Series 6th Generation	1200V V-Series 6th Generation
Without Brake-Chopper	25A		6MBP 25VFN-120-50
	35A		6MBP 35VFN-120-50
	50A	6MBP 50VFN-060-50	6MBP 50VFN-120-50
	75A	6MBP 75VFN-060-50	
	100A	6MBP 100VFN-060-50	
With Brake-Chopper	25A		7MBP 25VFN-120-50
	35A		7MBP 35VFN-120-50
	50A	7MBP 50VFN-060-50	7MBP 50VFN-120-50
	75A	7MBP 75VFN-060-50	
	100A	7MBP 100VFN-060-50	

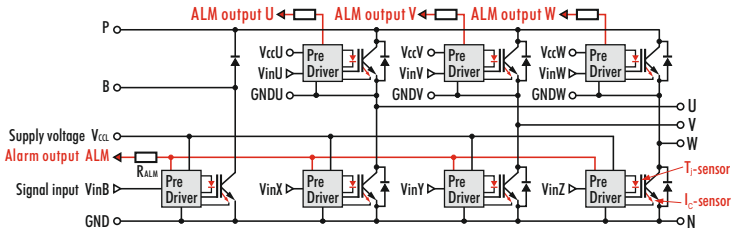
IPM IGBTs (Intelligent Power Modules)

Built-in protection functions
- Fault status output (Alarm)
- Under voltage protection (self shutdown)
- Short circuit protection (self shutdown)
- Overheating protection (self shutdown)
- Temperature sensor function ($V_{temp,out}$)

54 I_c- & T_j-Sensors on chip

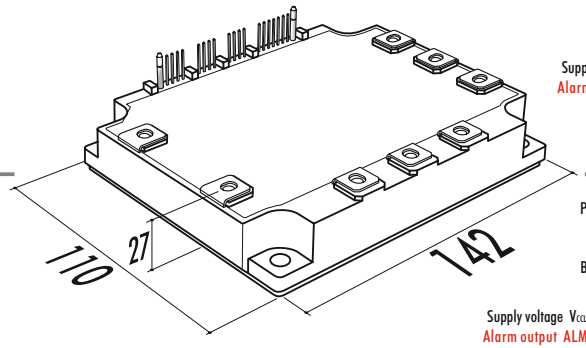


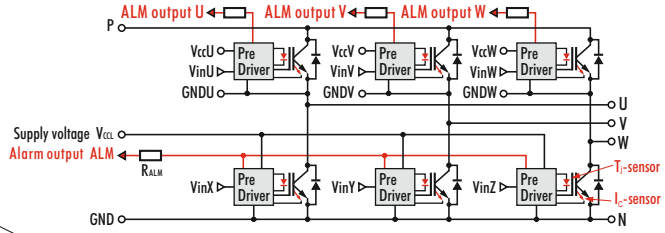


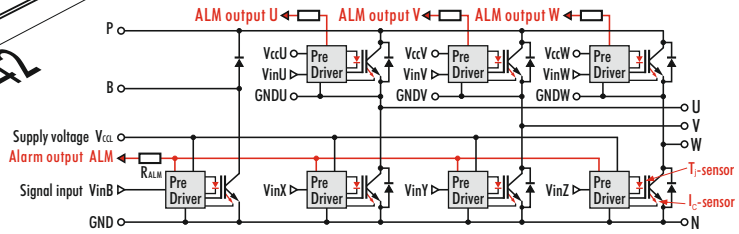


	I_C	600V V-Series 6th Generation	1200V V-Series 6th Generation
Without Brake-Chopper	25A		6MBP 25VDA-120-50
	35A		6MBP 35VDA-120-50
	50A	6MBP 50VDA-060-50	6MBP 50VDA-120-50 6MBP 50VDN-120-50 1)
	75A	6MBP 75VDA-060-50	6MBP 75VDA-120-50 6MBP 75VDN-120-50 1)
	100A	6MBP 100VDA-060-50 6MBP 100VDN-060-50 1)	6MBP 100VDA-120-50 6MBP 100VDN-120-50 1)
	150A	6MBP 150VDA-060-50 6MBP 150VDN-060-50 1)	
	200A	6MBP 200VDA-060-50 6MBP 200VDN-060-50 1)	
With Brake-Chopper	25A		7MBP 25VDA-120-50
	35A		7MBP 35VDA-120-50
	50A	7MBP 50VDA-060-50	7MBP 50VDA-120-50 7MBP 50VDN-120-50 1)
	75A	7MBP 75VDA-060-50	7MBP 75VDA-120-50 7MBP 75VDN-120-50 1)
	100A	7MBP 100VDA-060-50 7MBP 100VDN-060-50 1)	7MBP 100VDA-120-50 7MBP 100VDN-120-50 1)
	150A	7MBP 150VDA-060-50 7MBP 150VDN-060-50 1)	
	200A	7MBP 200VDA-060-50 7MBP 200VDN-060-50 1)	

55 I_c- & T_j-Sensors on chip



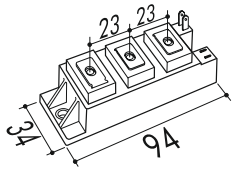
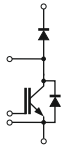
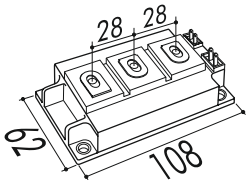
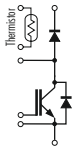




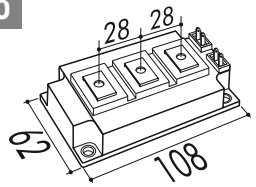
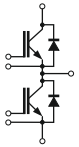
	I_C	600V V-Series 6th Generation	1200V V-Series 6th Generation
Without Brake-Chopper	100A		6MBP 100VEA-120-50
	150A		6MBP 150VEA-120-50
	200A	6MBP 200VEA-060-50	6MBP 200VEA-120-50
	300A	6MBP 300VEA-060-50	
	400A	6MBP 400VEA-060-50	
With Brake-Chopper	100A		7MBP 100VEA-120-50
	150A		7MBP 150VEA-120-50
	200A	7MBP 200VEA-060-50	7MBP 200VEA-120-50
	300A	7MBP 300VEA-060-50	
	400A	7MBP 400VEA-060-50	

1) With high thermal performance

Chopper (Standard and high speed IGBTs)

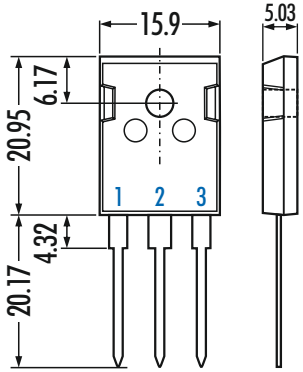
		I_C	1200V Planar-NPT High Speed-Series	1200V U-Series 5th Generation	1200V V-Series 6th Generation
Chopper	56  	50A		1MBi 50U4F-120L-50	
		75A		1MBi 75U4F-120L-50	
		100A		1MBi 100U4F-120L-50	
		150A			1MBi 150VA-120L-50
		200A			1MBi 200VA-120L-50
	57  	200A	1MBi 200HH-120L-50	1MBi 200U4H-120L-50 Without thermistor	
		300A	1MBi 300HH-120L-50		
		400A	1MBi 400HH-120L-50		

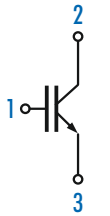
High Speed IGBTs

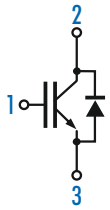
		I_C	1200V Planar-NPT High Speed-Series
2-Pack	58  	100A	2MBi 100HJ-120-50
		150A	2MBi 150HJ-120-50
		200A	2MBi 200HJ-120-50
		300A	2MBi 300HJ-120-50

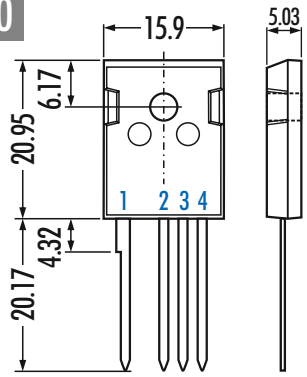
Discrete IGBTs

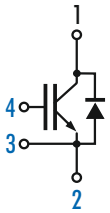
		I_C	V-Series, 6th Generation Low loss ,~10kHz 600V	V-Series, 6th Generation Low loss ,~10kHz 1200V	V-Series, 6th Generation High speed , 10~30kHz 600V	V-Series, 6th Generation High speed , 10~30kHz 1200V	W-Series, 6th Generation Ultra high speed , 20~100kHz 650V	W-Series, 6th Generation Ultra high speed , 20~100kHz 1200V
TO-247	59	15A				FGW 15N 120H		
		25A						FGW 25N 120W
		30A				FGW 30N 120H		
		35A			FGW 35N 60H			
		40A				FGW 40N 120H	FGW 40N 65W	FGW 40N 120W
		50A			FGW 50N 60H		FGW 50N 65W	
		60A					FGW 60N 65W	
		75A			FGW 75N 60H		FGW 75N 65W	
		15A		FGW 15N 120VD		FGW 15N 120HD		
		25A		FGW 25N 120VD				FGW 25N 120WD FGW 25N 120WE [1)]
		30A	FGW 30N 60VD			FGW 30N 120HD		
		35A			FGW 35N 60HD FGW 35N 60HC [1)]			
		40A		FGW 40N 120VD		FGW 40N 120HD	FGW 40N 65WD FGW 40N 65WE [1)]	FGW 40N 120WD FGW 40N 120WE [1)]
		50A	FGW 50N 60VD		FGW 50N 60HD FGW 50N 60HC [1)]		FGW 50N 65WD FGW 50N 65WE [1)]	
		60A					FGW 60N 65WD FGW 60N 65WE [1)]	
		75A			FGW 75N 60HD FGW 75N 60HC [1)]		FGW 75N 65WE [1)]	
TO-247-4	60	40A						FGZ 40N 120WE [1)]
		50A					FGZ 50N 65WD FGZ 50N 65WE [1)]	
		75A					FGZ 75N 65WE [1)]	





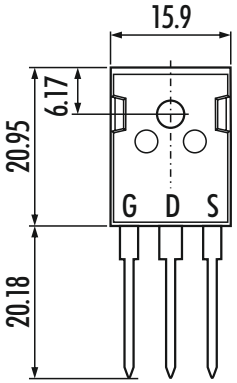




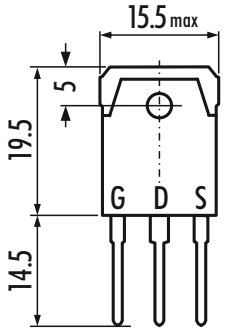


1) With full rating free wheeling diode

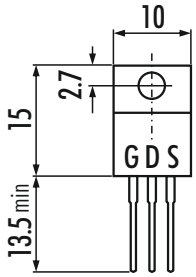
Super-Junction MOSFET



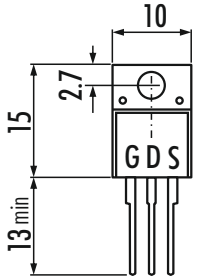
TO-247



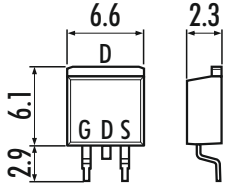
TO-3P(Q)



TO-220



TO-220F

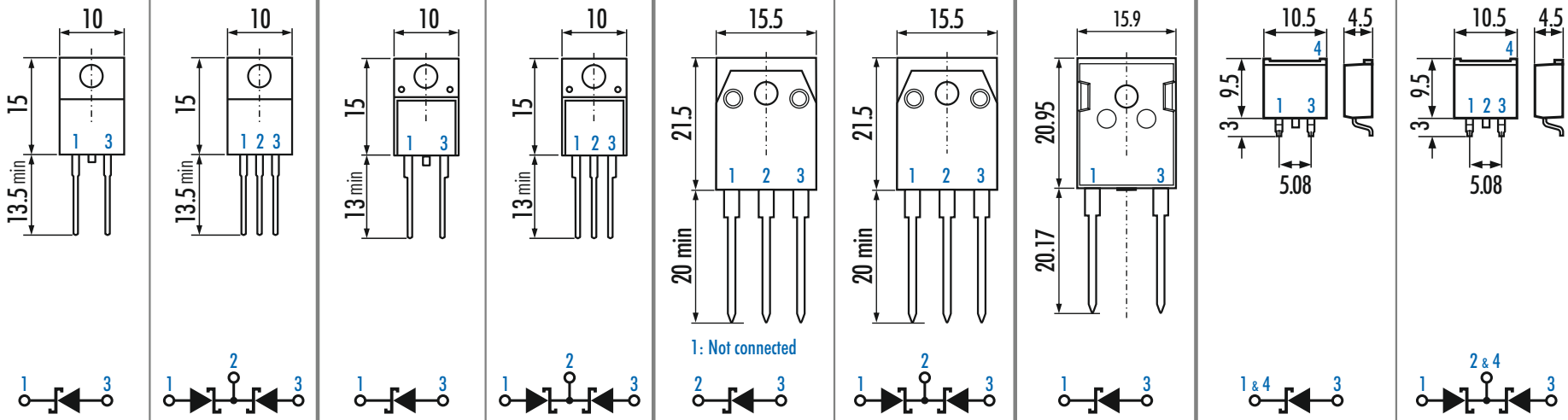


TO-252

V_{DS}	$R_{DS(on),max}$	I_D	TO-247	TO-3P(Q)	TO-220	TO-220F	TO-252
600V	25.4 mΩ	95.5 A	FMW 60N 025S2				
	40.0 mΩ	77.5 A	FMW 60N 040S2				
	55.0 mΩ	66.4 A	FMW 60N 055S2				
	70.0 mΩ	53.2 A	FMW 60N 070S2			FMV 60N 070S2	
	79.0 mΩ	47.9 A	FMW 60N 079S2		FMP 60N 079S2	FMV 60N 079S2	
	88.0 mΩ	42.3 A	FMW 60N 088S2		FMP 60N 088S2	FMV 60N 088S2	
	99.0 mΩ	38.1 A	FMW 60N 099S2		FMP 60N 099S2	FMV 60N 099S2	
	125.0 mΩ	30.1 A	FMW 60N 125S2		FMP 60N 125S2	FMV 60N 125S2	
	160.0 mΩ	23.9 A	FMW 60N 160S2		FMP 60N 160S2	FMV 60N 160S2	
	190.0 mΩ	20.0 A	FMW 60N 190S2	FMH 60N 190S2	FMP 60N 190S2	FMV 60N 190S2	
	280.0 mΩ	13.0 A		FMH 60N 280S2	FMP 60N 280S2	FMV 60N 280S2	FMD 60N 280S2
	380.0 mΩ	10.0 A			FMP 60N 380S2	FMV 60N 380S2	FMD 60N 380S2
650V	37.0 mΩ	83.5 A	FMW 65N 037S2*				
	70.0 mΩ	53.6 A	FMW 65N 070S2*			FMV 65N 070S2*	
	92.0 mΩ	38.0 A	FMW 65N 092S2*		FMP 65N 092S2*	FMV 65N 092S2*	
	104.0 mΩ	31.3 A	FMW 65N 104S2*		FMP 65N 104S2*	FMV 65N 104S2*	
600V (With built-in FRED)	27.0 mΩ	95.5 A	FMW 60N 027S2 FD				
	43.0 mΩ	77.5 A	FMW 60N 043S2 FD				
	59.0 mΩ	66.4 A	FMW 60N 059S2 FD				
	75.0 mΩ	53.2 A	FMW 60N 075S2 FD			FMV 60N 075S2 FD	
	84.0 mΩ	47.9 A	FMW 60N 084S2 FD		FMP 60N 084S2 FD	FMV 60N 084S2 FD	
	94.0 mΩ	42.3 A	FMW 60N 094S2 FD		FMP 60N 094S2 FD	FMV 60N 094S2 FD	
	105.0 mΩ	38.1 A	FMW 60N 105S2 FD		FMP 60N 105S2 FD	FMV 60N 105S2 FD	
	133.0 mΩ	30.1 A	FMW 60N 133S2 FD		FMP 60N 133S2 FD	FMV 60N 133S2 FD	
	170.0 mΩ	23.9 A	FMW 60N 170S2 FD		FMP 60N 170S2 FD	FMV 60N 170S2 FD	

*) Under development

SiC Schottky Barrier Diodes



I_{FAV}		TO-220 Single	TO-220 Dual	TO-220F (insulated) Single	TO-220F (insulated) Dual	TO-247 Single	TO-247 Dual	TO-247-2 Single	T-Pack S Single	T-Pack S Dual
650V	10A	FDCP 10S 65		FDCA 10S 65		FDCY 10S 65			FDCC 10S 65	
	20A		FDCP 20C 65		FDCA 20C 65		FDCY 20C 65			FDCC 20C 65
	25A	FDCP 25S 65		FDCA 25S 65		FDCY 25S 65			FDCC 25S 65	
	50A						FDCY 50C 65			
1200V	18A			FDCA 18S 120		FDCY 18S 120		FDCW 18T 120		
	36A						FDCY 36C 120			

Single IGBT-Drivers

	Type name	I_{peak}	$V_{iso,max}$	f_{max}
Single power supply needed with $V_{DC} = +20$ V — 1200V	VLA 517-01R	4A	2.5kV	40kHz
Single power supply needed with $V_{DC} = +20$ V — 1700V				
Built-in power supply with short circuit protection — 1200V	VLA 542-01R	5A	2.5kV	20kHz
Built-in power supply with short circuit protection and adjustable fall-time — 1700V	VLA 546-01R	5A	4.0kV	20kHz
Built-in power supply with short circuit protection — 1200V	VLA 551-01R	5A	2.5kV	20kHz
Built-in power supply with short circuit protection — 1700V	VLA 551K-01R	5A	4.0kV	20kHz
Built-in power supply with short circuit protection and adjustable fall-time — 1200V	VLA 500-01R	12A	2.5kV	20kHz
	VLA 502-01R	12A	2.5kV	60kHz
Built-in power supply with short circuit protection and adjustable fall-time — 1700V	VLA 500K-01R	12A	4.0kV	20kHz
Built-in power supply with short circuit protection and adjustable fall-time — 1200V				
Built-in power supply with short circuit protection and adjustable fall-time — 1700V	VLA 574-01R	15A	4.0kV	20kHz
Built-in power supply with short circuit protection and adjustable fall-time — 1200V				
Built-in power supply with short circuit protection and adjustable fall-time — 1700V	VLA 552-01R	24A	4.0kV	10kHz

Dual IGBT-Drivers

	Type name	I_{peak}	$V_{iso,max}$	f_{max}
Built-in power supply & Short circuit protection with adjustable fall-time and UVLO — 1200V	VLA 567-01R	8A	2.5kV	20kHz
Built-in power supply & Short circuit protection with adjustable fall-time and UVLO — 1700V				
Built-in power supply & Short circuit protection — 1200V	VLA 536-01R	5A	2.5kV	20kHz
Built-in power supply & Short circuit protection — 1700V				
Built-in power supply & Short circuit protection — 1200V	VLA 559-01R	24A	4.0kV	5kHz
Built-in power supply & Short circuit protection — 1700V	VLA 559-02R	24A	4.0kV	5kHz

4 channel DC/DC converter for gate power supply

Package	Type name	$V_{iso,max}$	Applications
17.5 max, 86.0 max, 40.0 max	VLA 130-24205QR	2.5kV	Inverter up to 30kW Gate power supply for 3-Level IGBTs

For further plug & play IGBT-drivers please refer to the following suppliers:

power integrations
www.igbt-driver.com

AgileSwitch
www.agileswitch.com

MITSUBISHI ELECTRIC

Changes for the Better

OPTICAL DEVICES

for a greener tomorrow

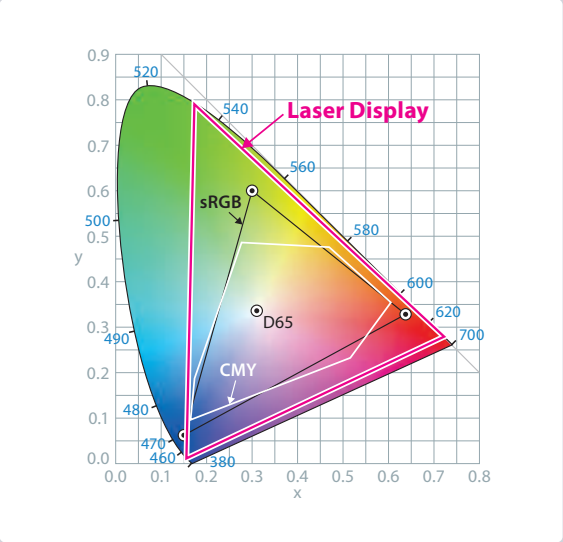
Optical Devices

Mitsubishi Electric Optical Devices:
The Key to Connecting Information Networks in the Future.

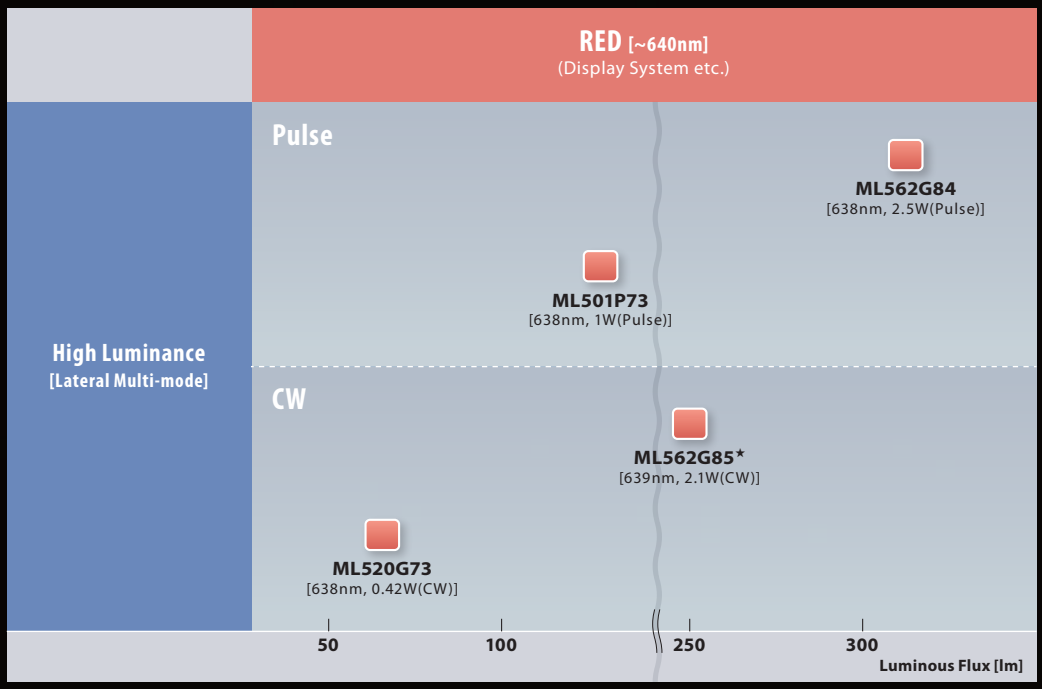
LASER DIODES FOR INDUSTRY & DISPLAY

638nm High-output Laser Diode for Industry and Displays

Compared to LEDs, semiconductor lasers have lower power consumption, higher output and can be used with optical systems having a higher maximum aperture. These considerable advantages mean that they can be used for projectors that do not require focal adjustment. Mitsubishi Electric has a range of lasers available, including a multi-mode semiconductor laser with a wavelength below 640nm and 2.5W output (when pulse-driven), 2.1W output (when CW-driven) that provides highly visible, vibrant red colors for color projectors.



Selection map of Red Laser Diodes



ML562G85
ML562G84

ML501P73

ML520G73

★: New Product

Line-up of Laser Diodes

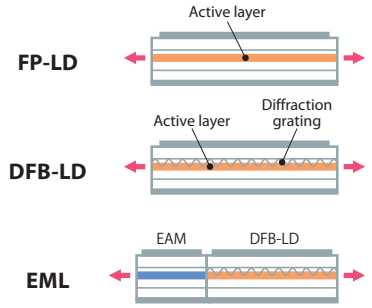
Type Number	Application	Wavelength [nm]	Output Power @CW [mW]	Output Power @Pulse [mW]	Case Temperature [°C]	Package
ML562G85★	Display	639	2100	–	45	ϕ9mm TO-CAN
ML562G84	Display	638	–	2500	45	ϕ9mm TO-CAN
ML501P73	Display	638	500	1000	40	ϕ5.6mm Capless
ML520G73	Display	638	420	–	35	ϕ5.6mm TO-CAN

★: New Product

OPTICAL DEVICES FOR OPTICAL COMMUNICATION SYSTEMS

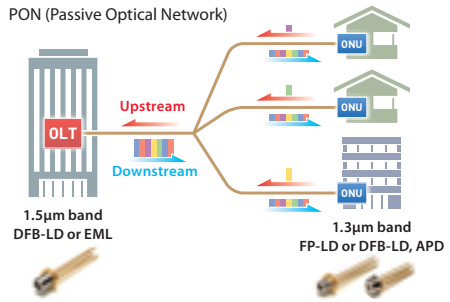
DFB-LD: Distributed Feedback Laser Diode

DFB-LDs are semiconductor lasers that enable further and faster signal transmission than conventional FP-LDs through maintaining the oscillation spectrum in a single longitudinal mode (a single wavelength component). This is achieved by installing a minute periodic structure (diffraction grating) within the internal elements of the laser diode.
EMLs are also available, featuring an electro-absorption modulator (EAM) integrated in front of the DFB-LD, for even further transmission.



Laser Diodes and Photo Diodes for Fiber to the Home (FTTH)

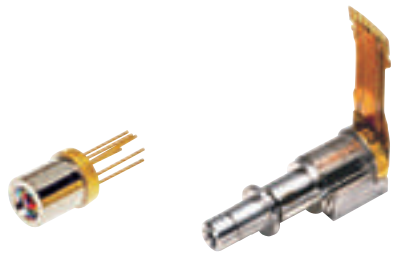
GE-PON and G-PON are widely used in the FTTH fields in response to increasing data traffic caused by the Social Networking and the Cloud Computing. Our optical devices such as FP-LDs, DFB-LDs and APDs for GE-PON and G-PON have good delivery records.
In addition, next-generation FTTHs such as 10G-EPON and XG-PON are considered to introduce for future high-speed and large-capacity data communications.We also have products lineup for 10G-EPON and XG-PON.



CAN EML Device for 10Gbps Transmission

Mitsubishi Electric has developed an electro-absorption modulation (EML) device with superior performance at high temperature and integrated it into a Peltier cooler, realizing a smaller package and lower power consumption. The TO56 chassis—known for its excellent mass-production characteristics—is adopted.
In addition to a lineup including the industry-standard XMD-MSA TOSA and TO56 CAN appropriate for BiDi* modules, these devices contribute to the energy-saving operation of optical transmission equipment and various other needs.

*BiDi : Bidirectional

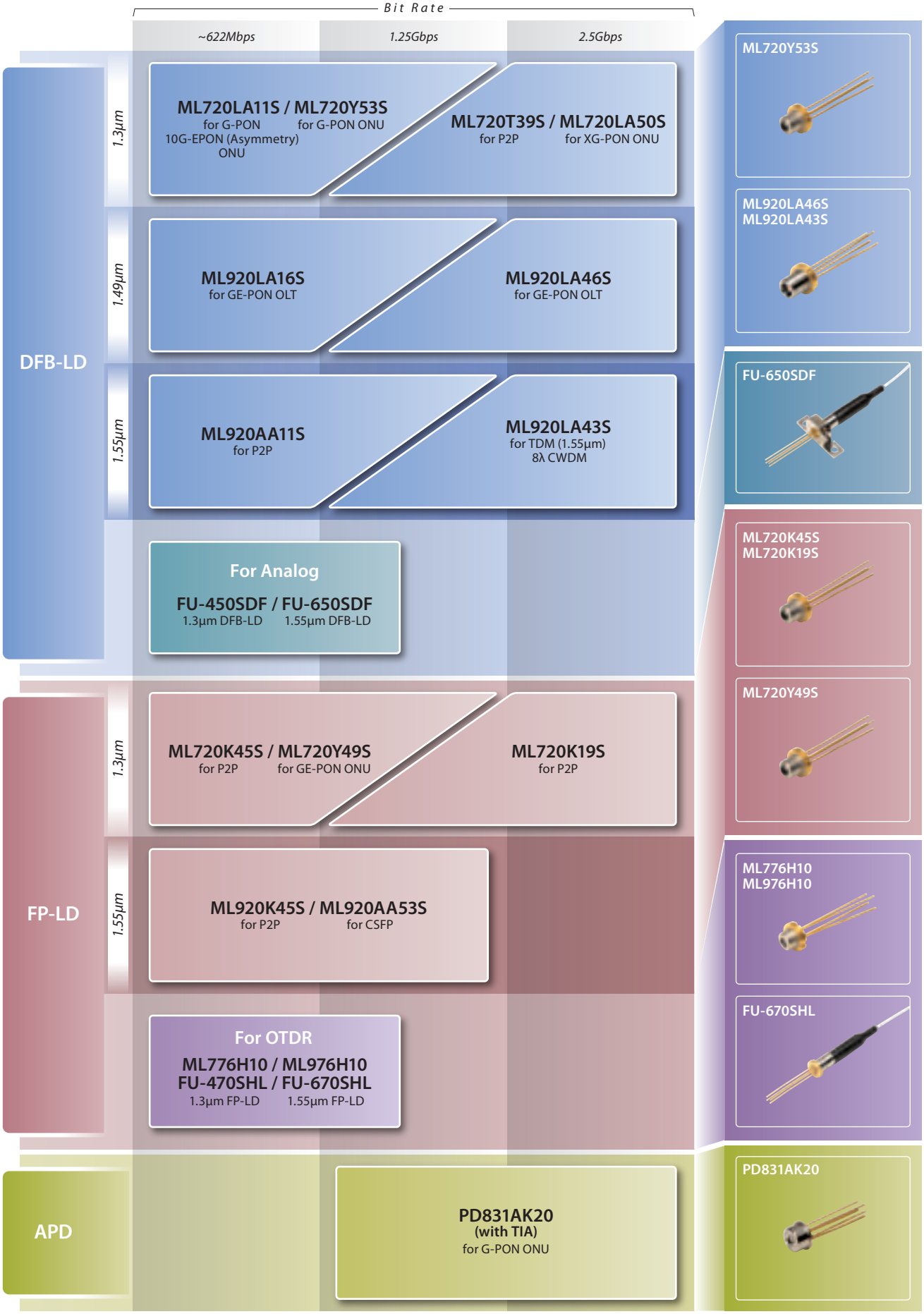


TO56 TOSA

Terminology

APC ····· Angled Physical Contact
APD ····· Avalanche Photo Diode
APD TIA ····· Avalanche Photo Diode Trans Impedance Amplifier
B-PON ····· Broadband Passive Optical Network
CPRI ····· Common Public Radio Interface
CWDM ····· Coarse Wavelength Division Multiplexing
DFB-LD ····· Distributed FeedBack Laser Diode
DWDM ····· Dense Wavelength Division Multiplexing
EAM ····· Electro Absorption Modulator
EML ····· Electro absorption Modulator integrated Laser diode
ER ····· Extended Reach
FP-LD ····· Fabry-Perot Laser Diode
FR ····· Fiber Reach
FTTH ····· Fiber To The Home
G-PON ····· Gigabit Passive Optical Network
GE-PON ····· Gigabit Ethernet Passive Optical Network
LC ····· Lucent Connector
LED ····· Light Emitting Diode
LR ····· Long Reach
LRM ····· Long Reach Multimode
OLT ····· Optical Line Terminal
ONU ····· Optical Network Unit
OTDR ····· Optical Time Domain Reflectometer
P2P ····· Peer to Peer
PC ····· Physical Contact
PD-TIA ····· Photo Diode with Trans-Impedance Amplifier
RoF ····· Radio over Fiber
ROSA ····· Receiver Optical Sub-Assembly
SC ····· Single fiber Connector
SDH ····· Synchronous Digital Hierarchy
SFP+ ····· Small Form-factor Pluggable Plus
SONET ····· Synchronous Optical NETwork
TOSA ····· Transmitter Optical Sub-Assembly
VSR ····· Very Short Reach
X2 ····· 2nd Generation XENPAK
XENPAK ····· 10 Gigabit Ethernet Transceiver Package
XFP ····· 10 Gigabit small Form-factor Pluggable
10G-EPON ····· 10 Gigabit Ethernet Passive Optical Network
XG-PON ····· 10 Gigabit Passive Optical Network
XLMD-MSA ····· 40 Gbps Miniature Device Multi Source Agreement
XMD-MSA ····· 10 Gbps Miniature Device Multi Source Agreement

Selection Map of OPTICAL DEVICES [**Under 2.5Gbps**]



Selection Map of OPTICAL DEVICES [**Over 10Gbps**]

Bit Rate

		10Gbps	25Gbps	100Gbps
EML	1.3μm		**FU-411REA**★ for 10km TDM	**FU-402REA**★ (28Gbps x 4λ) for 100Gbps 10/40km
EML	1.49μm	**ML958K59**★ for Bidirectional (Df=12.2mm) 40km **ML958H59**★ for Bidirectional (Df=10.2mm) 40km		
EML	1.55μm	**ML958D56** for 40km TDM **ML958N60**★ for 80km TDM **ML958N63**★★ for 25km DWDM		
EML	1.577μm	**ML958K55** for 10G-EPON OLT **ML958H55** for XG-PON OLT		
DFB-LD	1.3μm	**ML768K42T** for 10GBASE-LR **ML768LA42T** for CPRI **ML769T56T** For 10G-EPON ONU **ML768T42T** for 10G-EPON ONU	**ML764AA58T**★★ for 2km TDM	**ML7xx58**★★ for 4λ CWDM
APD		**PD831AP28**★★ for 80km **PD831AH28**★★ for 10G EPON ONU & 40km TDM **PD831W24** for 10G EPON ONU		**FU-302RPA**★★ for 100Gbps 40km

FU-402REA

FU-411REA

ML958K59
ML958H59
ML958D56
ML958N60
ML958N63
ML958K55
ML958H55

ML768K42T

ML769T56T
ML768T42T

FU-302RPA

PD831AP28
PD831AH28
PD831W24

★: New Product ★★: Under Development

Line Up of LD / LD Modules [Under 2.5Gbps]

	Type Number	Chip Type	Package	Wavelength [nm]	Case Temp. [°C]	Features
2.5G	ML720T39S	DFB-LD	TO56-CAN	1310	−40~+95	P2P
	ML720LA50S	DFB-LD	TO56-CAN	1270	−40~+95	XG-PON ONU
	ML720K19S	FP-LD	TO56-CAN	1310	−40~+85	P2P
	ML920LA46S	DFB-LD	TO56-CAN	1490	−40~+85	G-PON OLT
	ML920LA43S	DFB-LD	TO56-CAN	1550	−20~+95	P2P
	ML920LA43S	DFB-LD	TO56-CAN	1470~1610 8λ CWDM	−10~+85	8λ CWDM
1.25G/ ~622M	ML720LA11S	DFB-LD	TO56-CAN	1310	−40~+85	G-PON ONU, 10G-EPON (Asymmetry) ONU
	ML720Y53S	DFB-LD	TO56-CAN	1310	−40~+85	G-PON ONU
	ML720K45S	FP-LD	TO56-CAN	1310	−40~+85	P2P
	ML720Y49S	FP-LD	TO56-CAN	1310	−40~+85	GE-PON ONU, High coupling efficiency
	ML920LA16S	DFB-LD	TO56-CAN	1490	−40~+85	GE-PON OLT
	ML920AA11S	DFB-LD	TO56-CAN	1550	−40~+85	P2P
	ML920K45S	FP-LD	TO56-CAN	1550	−40~+85	P2P
	ML920AA53S	FP-LD	TO56-CAN	1530	−40~+95	P2P, CSFP
For Analog	FU-450SDF	DFB-LD	Coaxial Pigtail	1310	−20~+85	CATV Return Path, RoF
	FU-650SDF	DFB-LD	Coaxial Pigtail	1550	−20~+85	CATV Return Path, RoF
For OTDR	FU-470SHL	FP-LD	Coaxial Pigtail	1310	−20~+70	OTDR
	FU-670SHL	FP-LD	Coaxial Pigtail	1550	−20~+70	OTDR
	ML776H10	FP-LD	TO56-CAN	1310	−40~+85	OTDR
	ML976H10	FP-LD	TO56-CAN	1550	−40~+85	OTDR

Line Up of APD [Under 2.5Gbps]

	Type Number	Chip Type	Package	Wavelength [nm]	Case Temp. [°C]	Features
2.5G	PD831AK20	APD	TO46-CAN	1490	−40~+85	Built-in TIA, G-PON ONU

SAFETY CAUTIONS FOR USE OR DISPOSAL OF LISTED PRODUCTS

The warnings below apply to all products listed in this pamphlet.

	WARNING
Laser Beam	While the laser diode is on, its gives a laser beam. Even if we can't see a laser beam by its wavelengt, penetration into the eye by a laser beam or its reflected light may cause eye injury. Prevent the irradiating part or its reflected light from entering the eyes.
Injury	Fiber fragments may cause injury. In cases of fiber bending or breakage, never touch the fragment.
GaAs	Gallium arsenide (GaAs) is used in these products. To avoid danger, strictly observe the following cautions. • Never place the products in your mouth. • Never burn or break the products, or use any type of chemical treatment to reduce them to gas or powder. • When disposing of the products, always follow the laws which apply, as well as your own company's internal waste treatment regulations.
Disposal of Flame-Retarded Fiber Core Wire	Flame retardant resin must be disposed of according to law of industrial waste in disposal place. This product is a bromine type flame-retarded resin, containing bromine compounds and antimony trioxide. All disposal operations should be conducted with full consideration of this content.

Line Up of **LD / LD Modules [Over 10Gbps]**

	Type Number	Chip Type	Package	Wavelength [nm]	Case Temp. [°C]	Features
100G	FU-402REA★	EML	TOSA, LC Receptacle	LAN-WDM	–5~+80	28Gbps x 4λ
	ML7xx58★★	DFB-LD	TBD	4λ CWDM	+20~+70	25Gbps x 4λ
25G	FU-411REA★	EML	TOSA, LC Receptacle	1310	–5~+80	28Gbps, XLMD-MSA Compliant
	ML764AA58T★★	DFB-LD	TO56-CAN	1310	–20~+85	25Gbps
10G	ML958K59★	EML	TO56-CAN	1490	–5~+80	Bidirectional (Df=12.2mm) 40km
	ML958H59★	EML	TO56-CAN	1490	–5~+80	Bidirectional (Df=10.2mm) 40km
	ML958D56	EML	TO56-CAN	1550	–5~+80	XFP/SFP+ 40km
	ML958N60★	EML	TO56-CAN	1550	–5~+80	XFP/SFP+ 80km
	ML958N63★★	EML	TO56-CAN	1550	–40~+95	25km DWDM
	ML958K55	EML	TO56-CAN	1577	–5~+80	10G-EPON OLT
	ML958H55	EML	TO56-CAN	1577	–5~+80	XG-PON OLT
	ML768K42T	DFB-LD	TO56-CAN	1310	–40~+95	10GBASE-LR, SONET/SDH
	ML768LA42T	DFB-LD	TO56-CAN	1270, 1330	–40~+95	CPRI, 10Gbps x 2λ
	ML769T56T	DFB-LD	TO56-CAN	1270	–40~+95	10G-EPON (Symmetry) ONU
	ML768T42T	DFB-LD	TO56-CAN	1270	–5~+75	10G-EPON (Symmetry) ONU

★: New Product ★★: Under Development

Line Up of **APD / APD Modules [Over 10Gbps]**

	Type Number	Chip Type	Package	Wavelength [nm]	Case Temp. [°C]	Features
100G	FU-302RPA★★	APD	ROSA	1310	–5~+80	28Gbps x 4λ, Built-in TIA, 40km
10G	PD831AP28★★	APD	TO46-CAN	1550	–5~+85	Built-in TIA, SFP+ 80km
	PD831AH28★★	APD	TO46-CAN	1310 / 1577	–40~+90	Built-in TIA, 10G-EPON/XG-PON ONU & 40km
	PD831W24	APD	TO46-CAN	1577	–40~+90	Built-in TIA, 10G-EPON/XG-PON ONU

★★: Under Development

Type Name Definition of Optical Devices for Optical Communication Systems

FU- 6 50 S DF- FW1M15

- FU: Optical Module
- 6: LD Module

No.	Wavelength
4	1.3μm
6	1.55μm

- PD/APD Module

No.	Wavelength
3	Long–

- 50: Model of product
- S: Shows using optical fiber
  S : Single-mode fiber P : Polarization Maintaining fiber none : Multi-mode fiber R : LC receptacle
- DF: Shows kind of LD chip

LD	FP laser diode	PD	Photo diode
DF	DFB laser diode	AP	Avalanche photo diode
HL	High power FP Laser diode	PP	Photo diode with preamp
EA	EAM Laser diode	PA	Avalanche photo diode with preamp

- FW1M15: Shows connector type, pin-connection type, level of optical output, customer code and specification's number, Swavelength cord, etc.

Type Name Definition of Laser and Photo Diodes

ML 7 68K 42 T

- ML: Device Type [ML: Laser Diode PD: Photo Diode]
- 7: Wavelength
- 68K: Package*
- 42: Chip Series
- T: Pin Assignment (Available for Monitor PD Contained Package)

Categories

Device Type	Wavelength	Wavelength Range (nm)
ML	5	500<λ≤700
	6	700<λ≤1000
	7	1250<λ≤1400
	9	1400<λ
PD	7 8	1000<λ≤1600

Type	N	C	R	F	E	S	T
LD	Anode Common	Cathode Common	Cathode Common	Anode Common	Cathode Common	Floating	Floating
PD	Cathode Common	Cathode Common	Anode Common	Floating	Floating	Floating	Anode Common

*Please contact our sales office about the selection packages.

Please visit our website for further details.

www.MitsubishiElectric.com

Keep safety first in your circuit designs!

- Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

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eco Changes **for a greener tomorrow**

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MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow

SILICON RF DEVICES

Sillicon RF Devices

Better Performance for Radio Communication Network

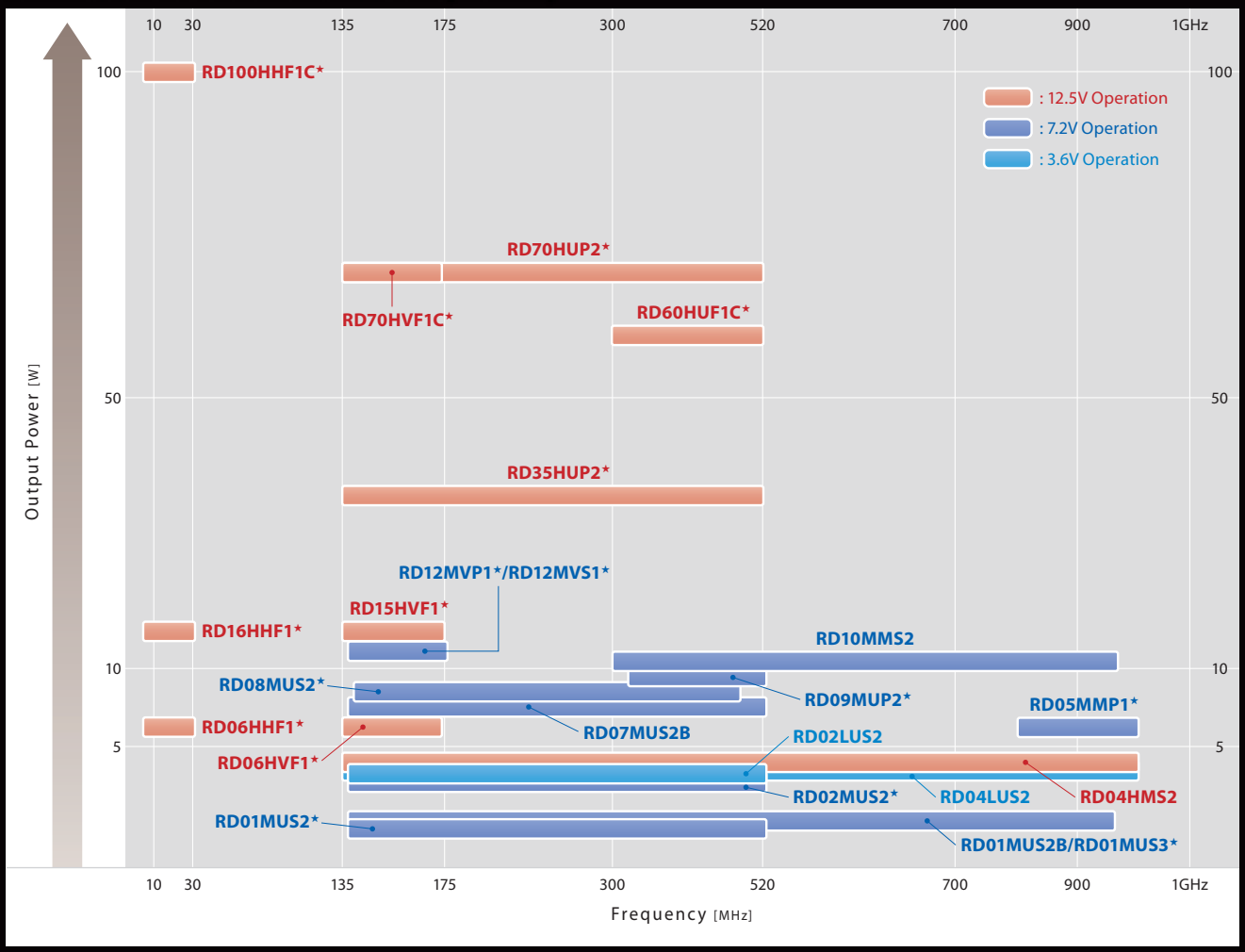
Mitsubishi Electric Silicon RF Devices are Key parts of RF Power Amplifications for various kind of Mobile Radio, Professional Mobile Radios, Amateur Radios and TELEMATICS for automotive.
Mitsubishi Electric Silicon RF Devices strongly support for Radio communication network.

LINE UP

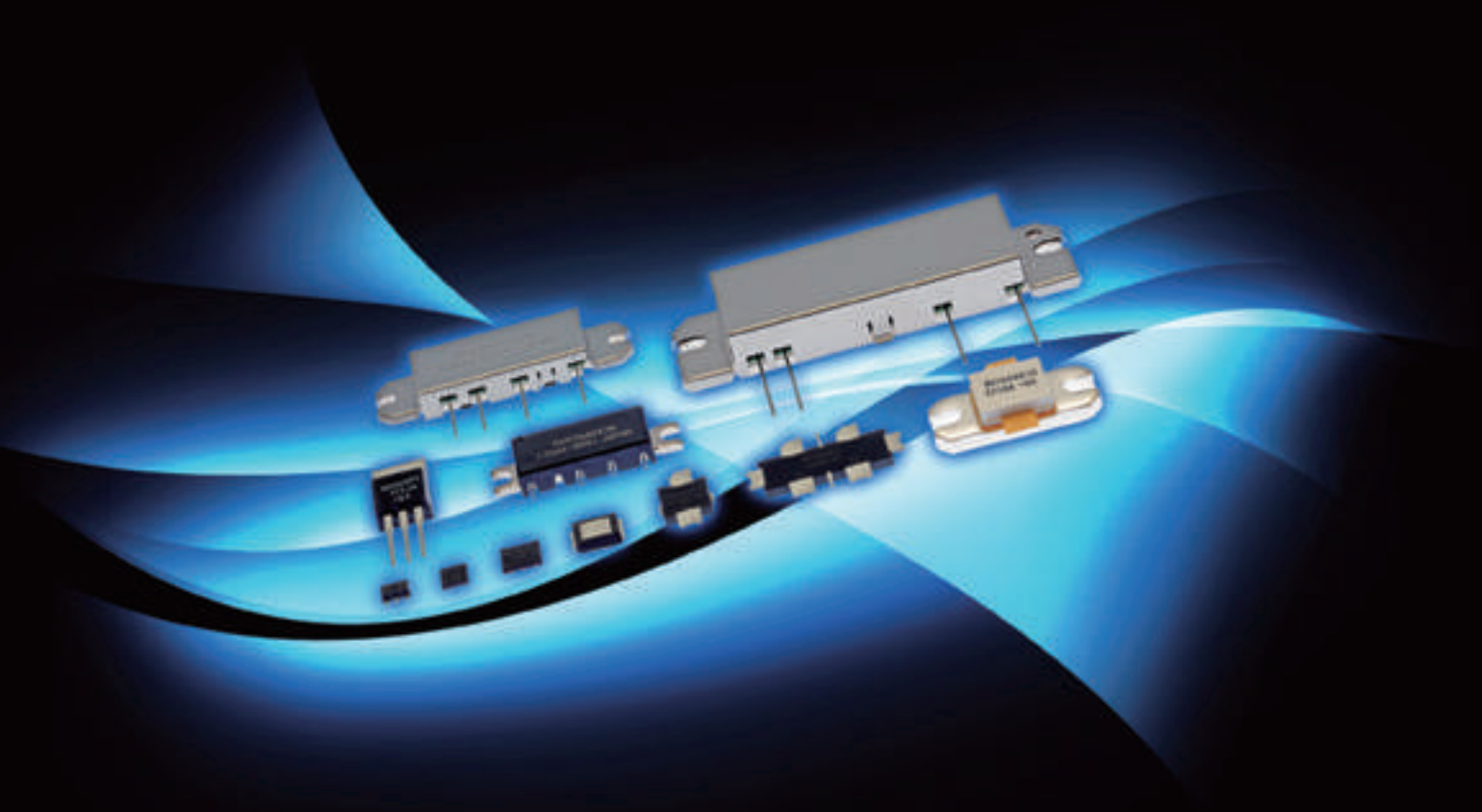
			MAP For SELECTION	PRODUCT LIST
Silicon RF Devices	FET	3.6V Operation High Output Power Si MOS FET (Discrete)	Page 1	Page 3
		7.2v Operation High Output Power Si MOS FET (Discrete)	Page 1	Page 3~4
		12.5v Operation High Output Power Si MOS FET (Discrete)	Page 1	Page 3
	Hybrid IC	7.2v Operation High Output Power Si MOS FET Module	Page 2	Page 5
		9.6v Operation High Output Power Si MOS FET Module	Page 2	Page 5
		12.5v Operation High Output Power Si MOS FET Module	Page 2	Page 5~6

SELECTION MAP

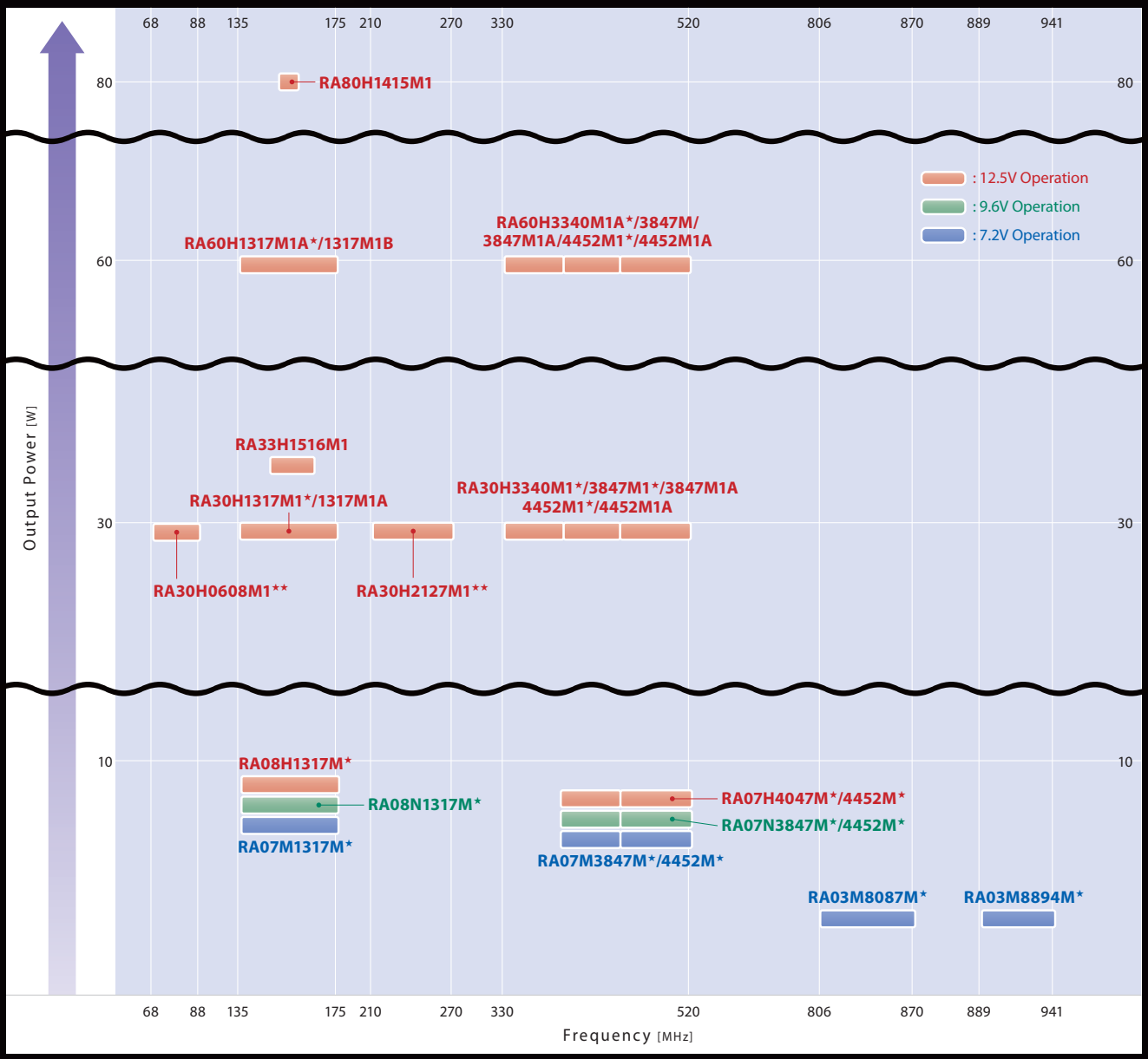
HIGH OUTPUT POWER Si MOS FET (DISCRETE)



★: New Product



HIGH OUTPUT POWER Si MOS FET MODULE



★: New Product ★★: Under Development

PRODUCT LIST

3.6V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	Frequency Band	Pin [W]	Po (Typ.) [W]	ηd (Typ.) [%]	Package Type
		VDSS [V]	Pch [W]						
RD02LUS2	Si, MOS†	25	15.6	3.6	UHF	0.2	2.3	70	SOT-89
RD04LUS2	Si, MOS†	25	46.3	3.6	UHF	0.4	4.5	65	SLP

Ta=25°C †: Gate Protection Diode

7.2V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	Frequency Band	Pin [W]	Po (Typ.) [W]	ηd (Typ.) [%]	Package Type
		VDSS [V]	Pch [W]						
RD01MUS2	Si, MOS†	40	12.5	7.2	UHF	0.03	1.3	65	SOT-89
RD01MUS2B	Si, MOS†	25	12.5	7.2	VHF	0.03	1.4	75	SOT-89
					UHF	0.03	1.6	70	
					900	0.03	1.5	65	
RD02MUS2★	Si, MOS†	40	50	7.2	VHF	0.05	3	65	SLP
					UHF	0.05	3	65	
RD05MMP1★	Si, MOS†	40	73	7.2	900	0.7	6	46	PMM
RD07MUS2B★	Si, MOS†	30	50	7.2	VHF	0.3	7.2	65	SLP
					UHF	0.4	8	63	
					900	0.5	7	58	
RD08MUS2★★	Si, MOS†	25	46	7.2	UHF	0.2	8.5	65	SLP
RD09MUP2★	Si, MOS†	40	83	7.2	UHF	0.8	9	60	PMM
RD10MMS2★	Si, MOS†	40	62	7.2	900	1	12	58	SLP
RD12MVP1★	Si, MOS†	50	125	7.2	VHF	0.5	12	57	PMM
RD12MVS1★	Si, MOS†	50	50	7.2	VHF	1	12	57	SLP

Ta=25°C †: Gate Protection Diode ★: New Product ★★: Under Development

12.5V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	Frequency Band	Pin [W]	Po (Typ.) [W]	ηd (Typ.) [%]	Package Type
		VDSS [V]	Pch [W]						
RD04HMS2	Si, MOS†	40	50	12.5	VHF	0.2	5.5	73	SLP
					UHF	0.2	6	62	
					900	0.2	5	58	
RD06HHF1★	Si, MOS†	50	27.8	12.5	HF	0.15	10	65	TO-220S
RD06HVF1★	Si, MOS†	50	27.8	12.5	VHF	0.3	10	65	TO-220S
RD15HVF1★	Si, MOS†	30	48	12.5	VHF	0.6	18	60	TO-220S
RD16HHF1★	Si, MOS†	50	56.8	12.5	HF	0.4	19	65	TO-220S
RD35HUP2★	Si, MOS†	40	166	12.5	UHF	3	35	55	HPM005
RD60HUF1C★	Si, MOS†	30	150	12.5	UHF	10	65	55	Ceramic (Large)
RD70HVF1C★	Si, MOS†	30	150	12.5	VHF	4	75	60	Ceramic (Large)
					UHF	10	55	55	
RD70HUP2★	Si, MOS†	40	300	12.5	VHF	4	84	74	HPM006
					UHF	5	75	64	
RD100HHF1C★	Si, MOS	50	176.5	12.5	HF	7	110	60	Ceramic (Large)

Ta=25°C †: Gate Protection Diode ★: New Product

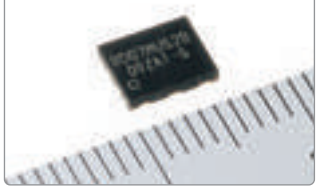
7.2V OPERATION HIGH OUTPUT POWER Si MOS FET (DUAL FET DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	Frequency Band	Pin [W]	Po (Typ.) [W]	ηd (Typ.) [%]	Package Type
		VDSS [V]	Pch [W]						
RD01MUS3★	Si, MOS†	25	6.2	7.2	UHF	0.001	0.15	60	QFN (4mm)
	Si, MOS†	25	8.3	7.2	UHF	0.1	1.8	70	

Ta=25°C †: Gate Protection Diode ★: New Product

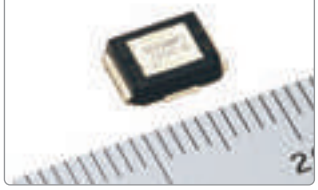
SOT-89

SLP



TO-220S

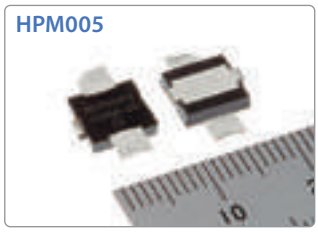
PMM



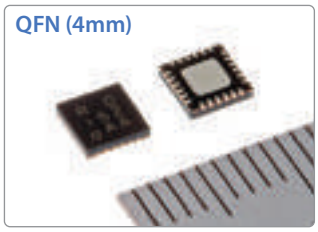
HPM006

Ceramic (Large)

HPM005



QFN (4mm)



Type Name Definition of Silicon RF Devices

HIGH OUTPUT POWER Si MOS FET (Discrete Devices)

RD 07 M U S 2B

A B C D E F

A Si MOS FET (Discrete)

B Output Power (W)

C Operation Voltage (V)

Symbol	Voltage
L	3.6V
M	7.2V
H	12.5V

D Frequency Range (MHz)

Symbol	Frequency Range
H	30MHz
V	175MHz
U	520MHz
M	900MHz

E Outline

Symbol	Segment
S	Mold
F	Flange
P	Power Mold Mini

F Serial Number

HIGH OUTPUT POWER Si MOS FET MODULE

RA 07 M 4452 M

A B C D E

A Module

B Output Power (W)

C Operation Voltage (V)

Symbol	Voltage
M	7.2V
N	9.6V
H	12.5V

D Frequency Range (MHz)

Symbol (Example)	Frequency Range (Example)
4452	440~ 520MHz
1317	135~ 175MHz

E Frequency Unit

Symbol	Unit
M	MHz
G	GHz

Note: Type number show the outline of products. For detail specification, Please confirm a formal specification.

PRODUCT LIST

7.2V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	ηT (min) [%]	Package Type
		min	max					
RA03M8087M★	9.2	806	870	7.2	0.05	3.6	32*1	H46S
RA03M8894M★	9.2	889	941	7.2	0.05	3.6	32*1	H46S
RA07M1317M★	9.2	135	175	7.2	0.02	6.5	45*2	H46S
RA07M3847M★	9.2	378	470	7.2	0.05	7	40*3	H46S
RA07M4452M★	9.2	440	520	7.2	0.05	7	40*3	H46S

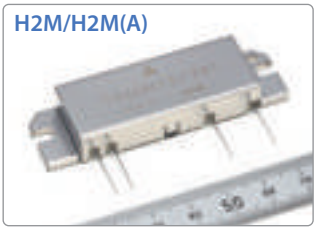
Ta=25°C *1: When Po=3.6W *2: When Po=6W *3: When Po=6.5W ★: New Product

9.6V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

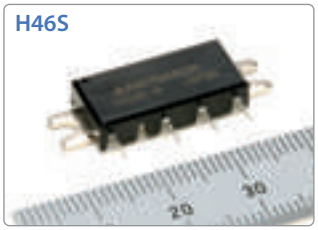
Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	ηT (min) [%]	Package Type
		min	max					
RA08N1317M★	13.2	135	175	9.6	0.02	8	50*1	H46S
RA07N4047M★	13.2	400	470	9.6	0.05	7.5	43*2	H46S
RA07N4452M★	13.2	440	520	9.6	0.05	7.5	43*2	H46S

Ta=25°C *1: When Po=8W *2: When Po=7W ★: New Product

H2M/H2M(A)



H46S



H57

12.5V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	ηT (min) [%]	Package Type
		min	max					
RA08H1317M★	13.2	135	175	12.5	0.02	8	40*1	H46S
RA07H4047M★	13.2	400	470	12.5	0.02	7	40*2	H46S
RA07H4452M★	13.2	440	520	12.5	0.02	7	40*2	H46S
RA30H0608M1★★	17	66	88	12.5	0.05	30	40	H2M
RA30H1317M1★	17	135	175	12.5	0.05	35	40	H2M
RA30H1317M1A*	17	136	174	12.5	0.05	30	45	H2M(A)
RA30H2127M1★★	17	210	275	12.5	0.05	30	40	H2M
RA30H3340M1★	17	330	400	12.5	0.05	30	40	H2M
RA30H3847M1★	17	378	470	12.5	0.05	30	42	H2M
RA30H3847M1A*	17	378	470	12.5	0.05	30	40	H2M(A)
RA30H4452M1★	17	440	520	12.5	0.05	30	42	H2M
RA30H4452M1A*	17	440	520	12.5	0.05	30	40	H2M(A)
RA33H1516M1	17	154	164	12.5	0.05	33	50	H57
RA60H1317M1A★	17	136	174	12.5	0.05	60	45	H2M
RA60H1317M1B*	17	136	174	12.5	0.05	60	45	H2M(A)
RA60H3340M1A★	17	330	400	12.5	0.05	60	40	H2M(A)
RA60H3847M1	17	378	470	12.5	0.05	60	40	H2M
RA60H3847M1A*	17	378	470	12.5	0.05	60	40	H2M(A)
RA60H4452M1★	17	440	520	12.5	0.05	60	40	H2M
RA60H4452M1A*	17	440	520	12.5	0.05	60	40	H2M(A)
RA80H1415M1	17	144	148	12.5	0.05	80	50	H2M
		136	174			60		

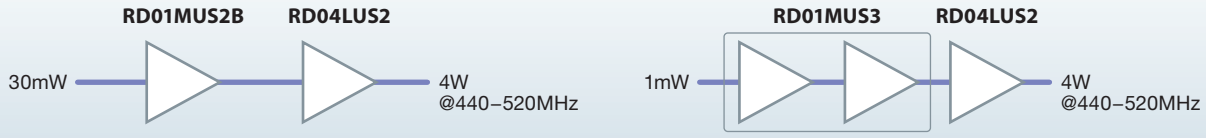
Ta=25°C *: V_{GG1}, V_{GG2} Separation type *1: When Po=8W *2: When Po=7W ★: New Product ★★: Under Development

SiRF devices are compliant with the RoHS (2011/65/EU).

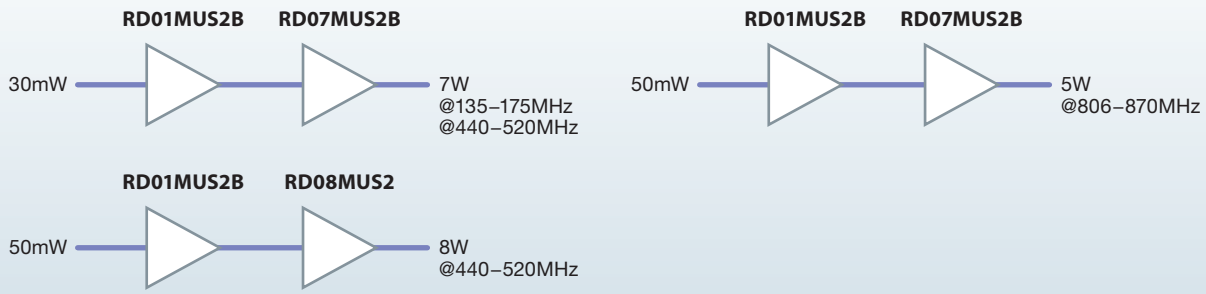
RoHS: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

APPLICATION

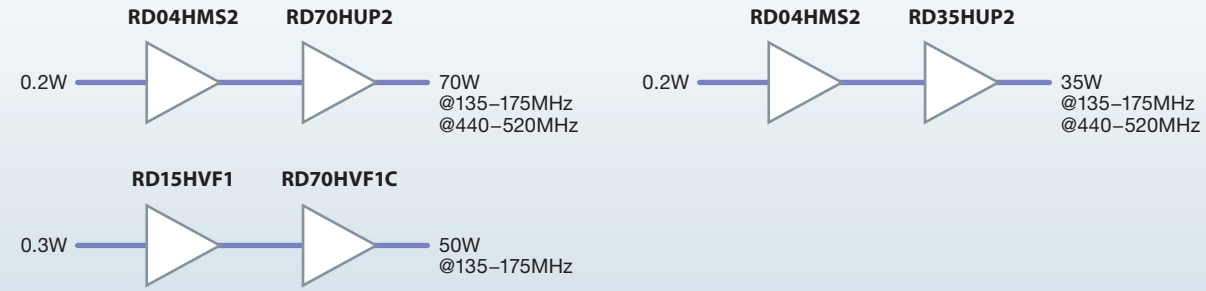
3.6V OPERATION RECOMMENDED LINE UP



7.2V OPERATION RECOMMENDED LINE UP



12.5V OPERATION RECOMMENDED LINE UP



Precautions for the use of Mitsubishi Electric silicon RF power amplifier devices

01.This general catalog do not guarantee the product specifications. Please confirm additional details regarding operation of these products from the formal specification sheet. For copies of the formal specification sheets, please contact one of our sales offices from the list of contact addresses listed on the last page for further information.

02.RA series products (RF power amplifier modules) and RD series products (RF power transistors) are designed for consumer mobile communication terminals and were not specifically designed for use in other applications. In particular, while these products are highly reliable for their designed purpose, they are not manufactured under a quality assurance testing protocol that is sufficient to guarantee the level of reliability typically deemed necessary for critical communications elements. Examples of critical communications elements would include transmitters for base station applications and fixed station applications that operate with long term continuous transmission and a higher on-off frequency during transmitting, especially for systems that may have a high impact to society.

03.RA series and RD series products use MOSFET semiconductor technology. They are sensitive to ESD voltage therefore appropriate ESD precautions are required.

04.In order to maximize reliability of the equipment, it is better to keep the devices temperature low. It is recommended to utilize a sufficient sized heat-sink in conjunction with other cooling methods as needed (fan, etc.) to keep the case temperature for RA series products lower than 60deg/C under standard conditions, and less than 90deg/C under extreme conditions.

05.RA series products are designed to operate into a nominal load impedance of 50 ohms. Under the condition of operating into a severe high load VSWR approaching an open or short, an over load condition could occur. In the worst case there is risk for burn out of the transistors and smoking of other parts including the substrate in the module.

06.The formal specification includes a guarantee against parasitic oscillation under a specified maximum load mismatch condition. The inspection for parasitic oscillation is performed on a sample basis on our manufacturing line. It is recommended that verification of no parasitic oscillation be performed at the completed equipment level also.

07.For specific precautions regarding assembly of these products into the equipment, please refer to the supplementary items in the specification sheet.

08.Warranty for the product is void if the products protective cap (lid) is removed or if the product is modified in any way from it's original form.

09.For additional "Safety first" in your circuit design and notes regarding the materials, please refer the last page of this manual.

10.Please refer to the additional precautions in the formal specification sheet.

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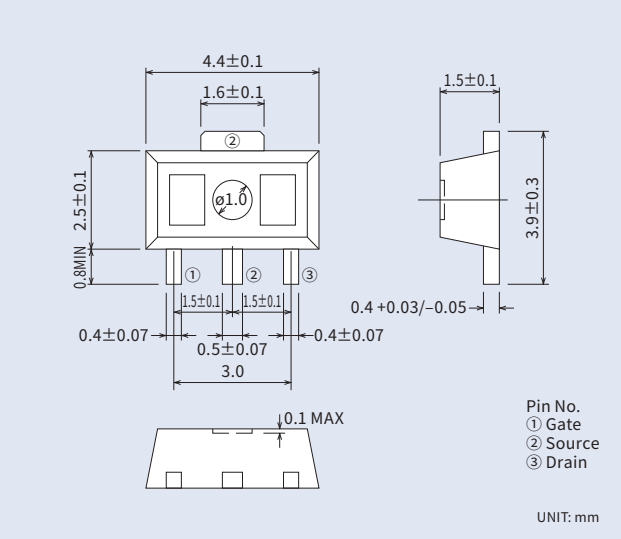
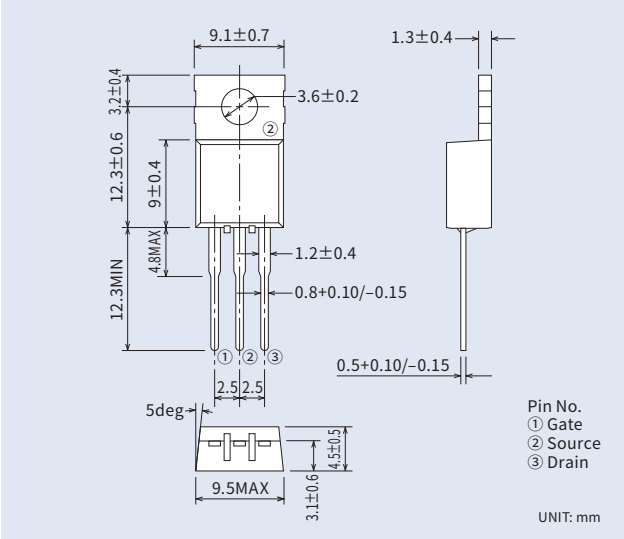
GLOBAL WEB SITE
http://www.MitsubishiElectric.com/semiconductors/

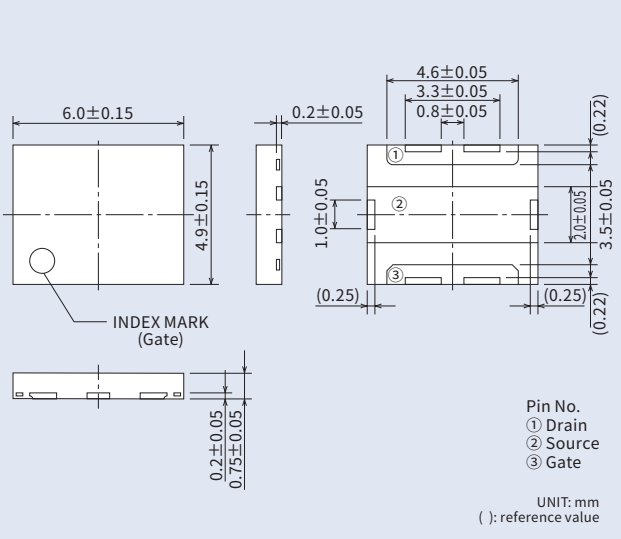
SOT-89



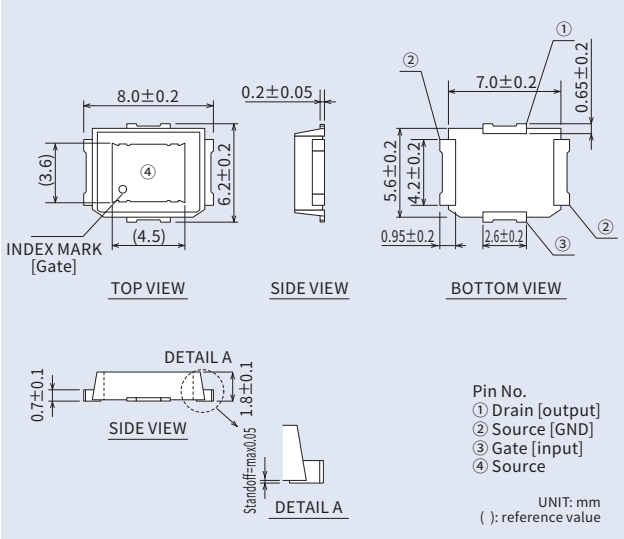
TO-220S



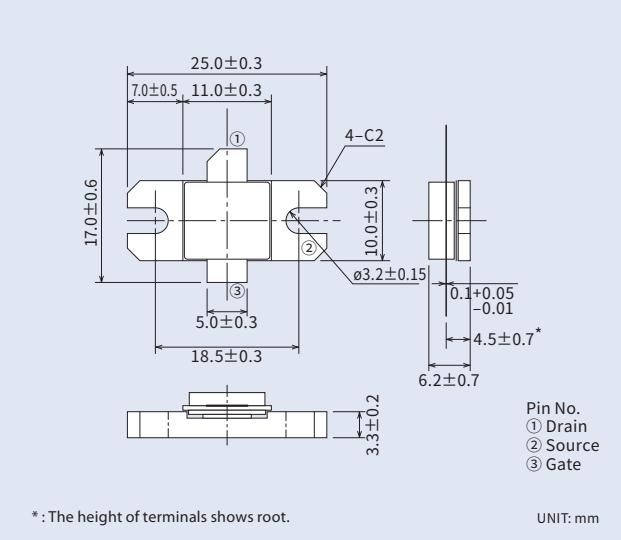
SLP



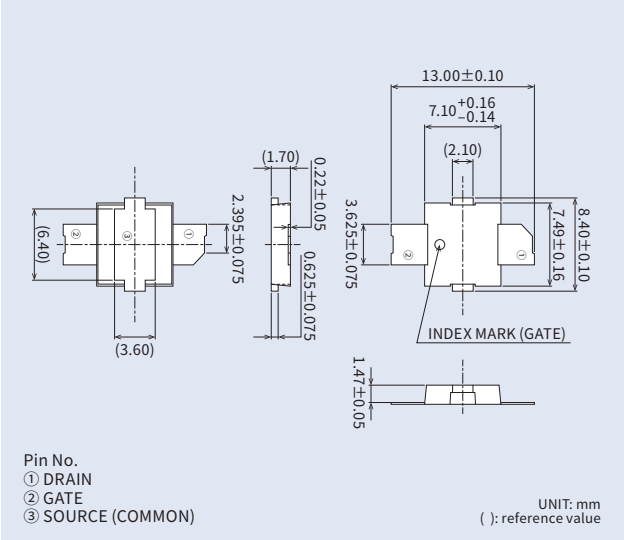
PMM



Ceramic (Large)

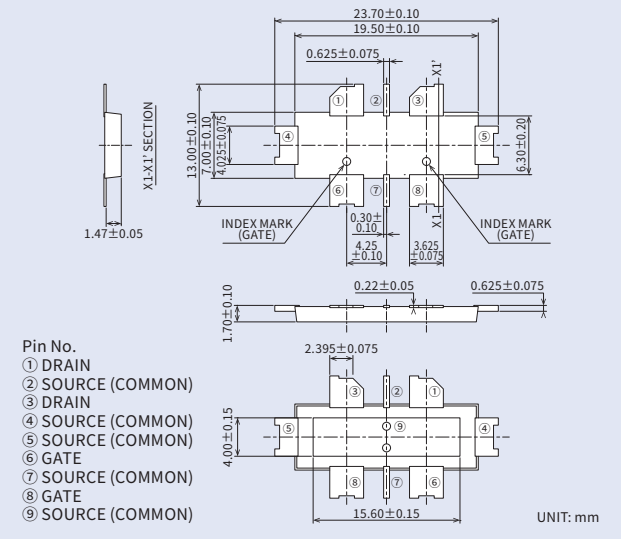


HPM005



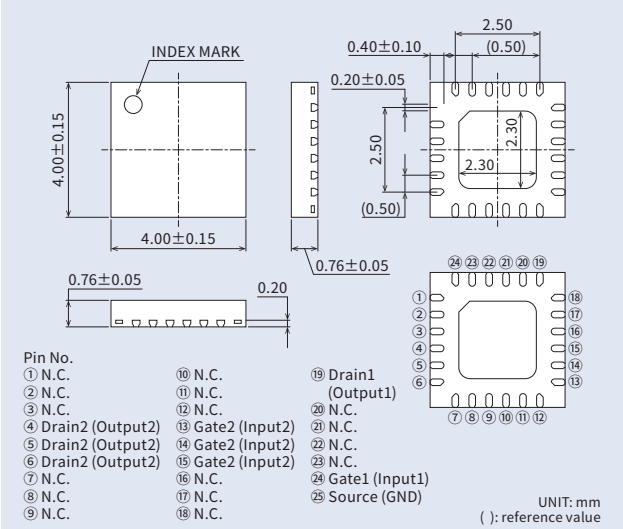
PACKAGE OUTLINE

HPM006



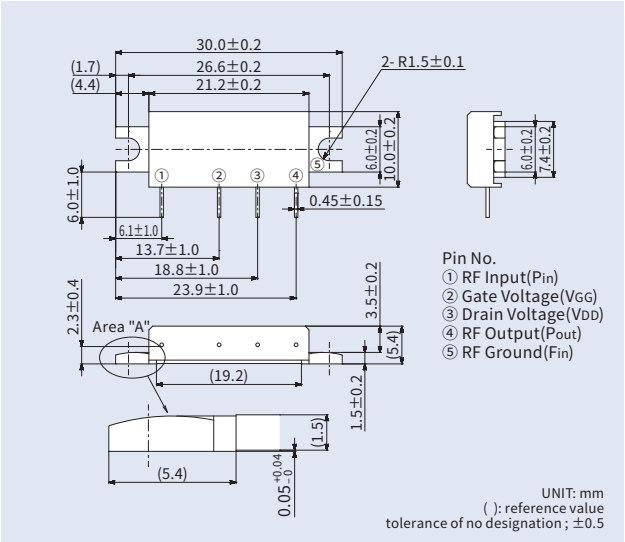
Pin No.
① DRAIN
② SOURCE (COMMON)
③ DRAIN
④ SOURCE (COMMON)
⑤ SOURCE (COMMON)
⑥ GATE
⑦ SOURCE (COMMON)
⑧ GATE
⑨ SOURCE (COMMON)

QFN (4mm)

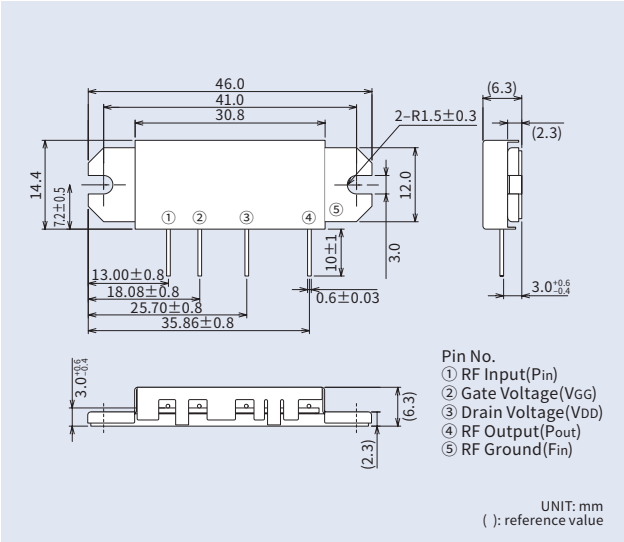


Pin No.
① N.C.
② N.C.
③ N.C.
④ Drain2 (Output2)
⑤ Drain2 (Output2)
⑥ Drain2 (Output2)
⑦ N.C.
⑧ N.C.
⑨ N.C.
⑩ N.C.
⑪ N.C.
⑫ N.C.
⑬ Gate2 (Input2)
⑭ Gate2 (Input2)
⑮ Gate2 (Input2)
⑯ N.C.
⑰ N.C.
⑱ N.C.
⑲ Drain1 (Output1)
⑳ N.C.
㉑ N.C.
㉒ N.C.
㉓ N.C.
㉔ Gate1 (Input1)
㉕ Source (GND)

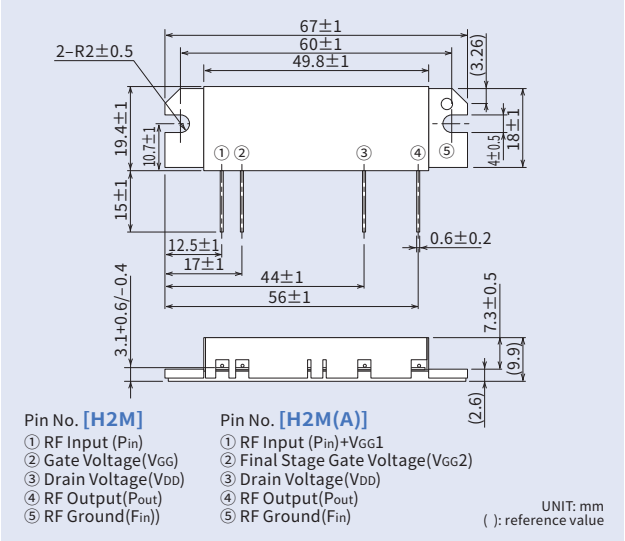
H46S



H57



H2M/H2M(A)



Please visit our website for further details.

www.MitsubishiElectric.com

Keep safety first in your circuit designs!

- Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

- These materials are intended as a reference to assist our customers in the selection of the Mitsubishi semiconductor product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Mitsubishi Electric Corporation or a third party.
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eco Changes **for a greener tomorrow**

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

MITSUBISHI ELECTRIC CORPORATION
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MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow

HIGH FREQUENCY DEVICES

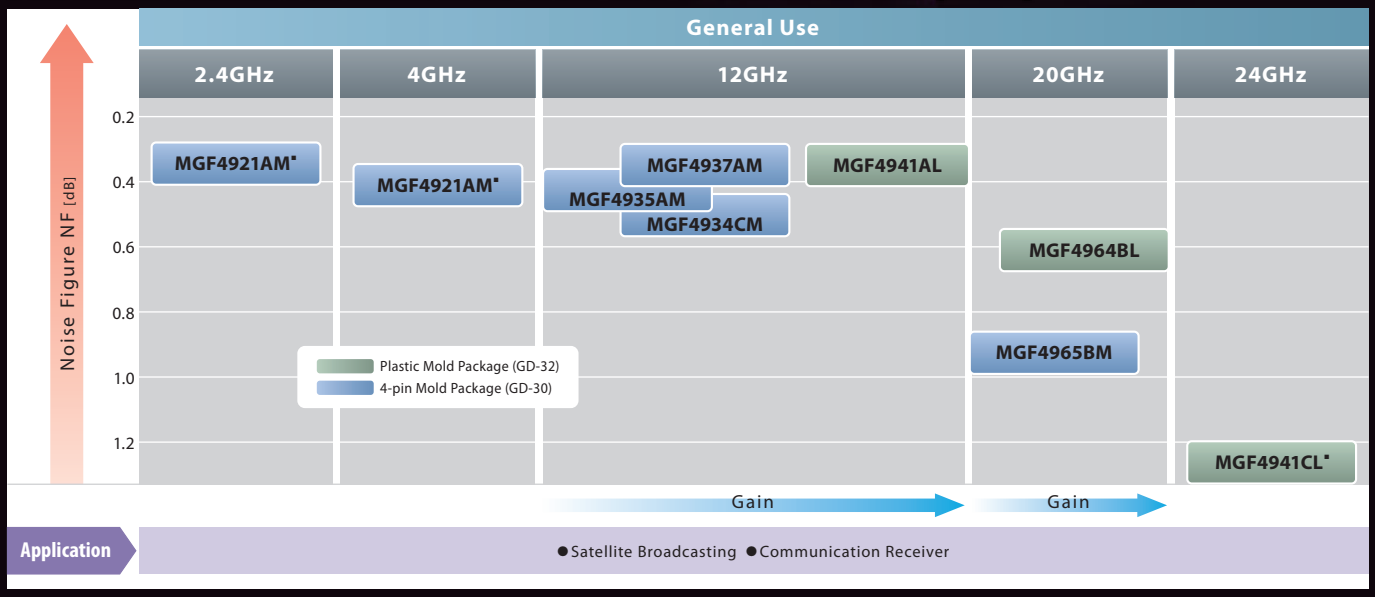
High Frequency Devices

The Best Solution for Realizing the Information and Communication Era

Communication networks, such as high speed Internet, and high-speed data communication, are developing rapidly. We are ready to offer the best solution to the systems for realizing the infomation and communication era by providing of the GaN/GaAs products.

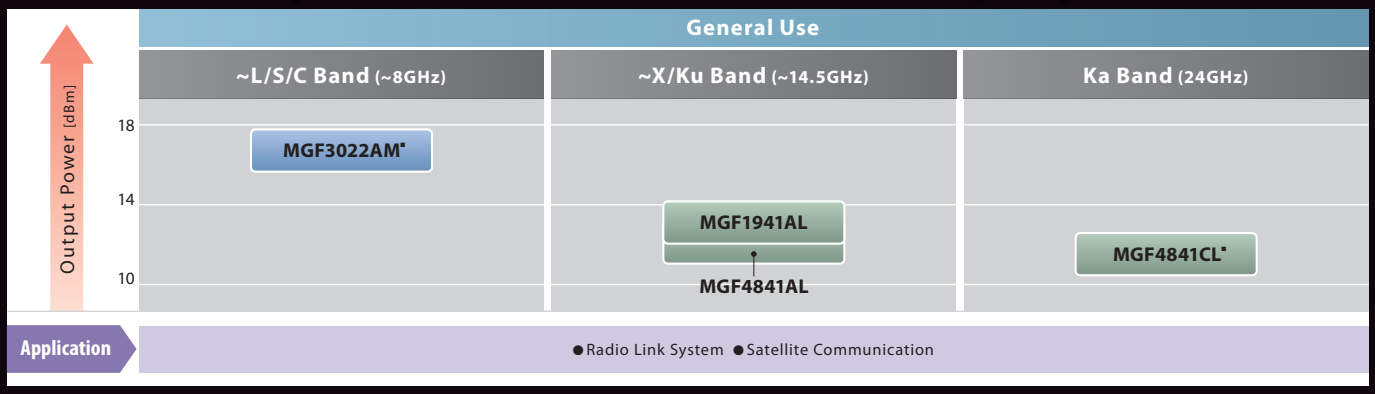
SELECTION MAP

GaAs HEMT SERIES FOR MICROWAVE-BAND LOW-NOISE AMPLIFIERS (Discrete)



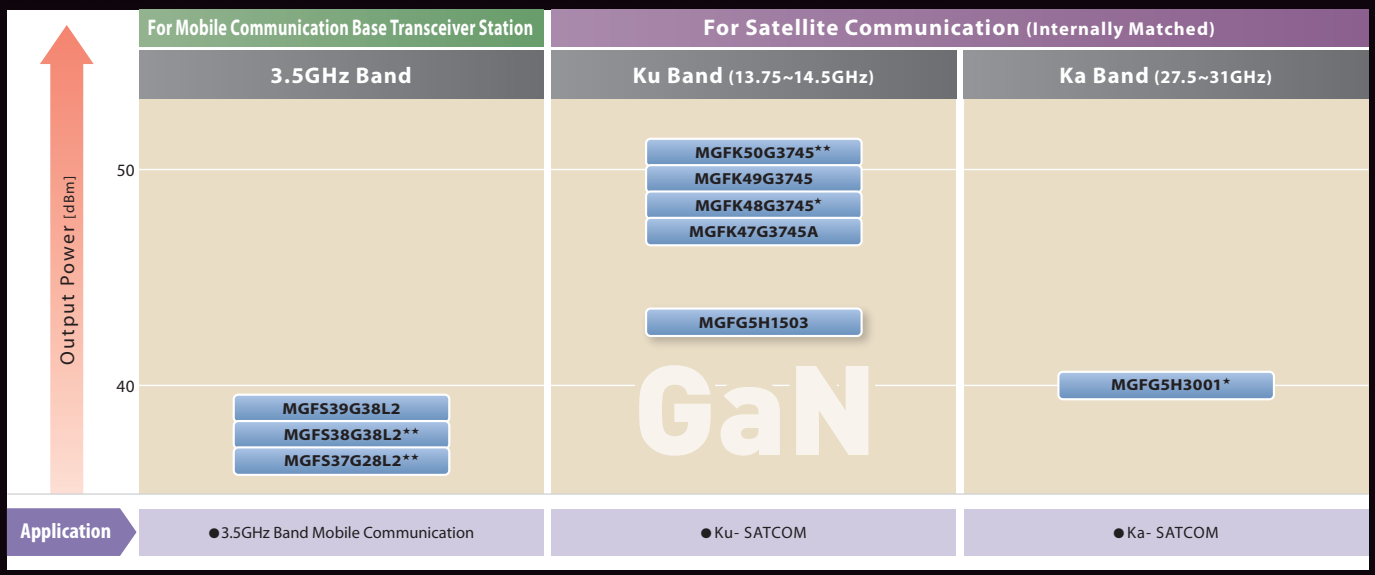
■: AEC-Q101 qualified FET: Field Effect Transistor HEMT: High Electron Mobility Transistor HBT: Heterojunction Bipolar Transistor

GaAs HEMT/MES FET, InGaP HBT SERIES FOR SMALL SIGNAL AMPLIFIERS (Discrete)



■: AEC-Q101 qualified

GaN HEMT SERIES FOR MICROWAVE-BAND HIGH POWER AMPLIFIERS



★: New Product ★★: Under Development

Partially supported by Japan's New Energy and Industrial Technology Development Organization(NEDO).

PRODUCT LIST

GaAs HEMT SERIES FOR MICROWAVE-BAND LOW-NOISE AMPLIFIERS (Discrete)

GD-30

GD-32

Type Number	Noise Figure [dB]		Associated Gain [dB]		Frequency [GHz]	Drain-Source Voltage [V]	Drain Current [mA]	Package Outline
	Typ.	Max.	Min.	Typ.				
MGF4921AM■	0.35	0.55	11.5	13.0	4	2	10	GD-30
MGF4934CM	0.50	0.75	11.5	13.0	12	2	10	GD-30
MGF4935AM	0.45	0.65	11.0	12.0	12	2	10	GD-30
MGF4937AM	0.35	0.50	11.5	13.0	12	2	10	GD-30
MGF4941AL	0.35	0.50	12.0	13.5	12	2	10	GD-32
MGF4964BL	0.65	0.90	11.5	13.5	20	2	10	GD-32
MGF4965BM	0.95	1.25	9.5	11.5	20	2	10	GD-30
MGF4941CL■	2.40	3.80	7.5	10.0	24	1.5	Idss	GD-32

Ta=25°C ■: AEC-Q101 qualified

GaAs HEMT/MES FET, InGaP HBT SERIES FOR SMALL SIGNAL AMPLIFIERS (Discrete)

GD-30

GD-32

Type Number	Output Power at 1dB Gain Compression [dBm]		Output Power [dBm]	Linear Power Gain [dB]	3rd Order IM Distortion [dBc]		Power Added Efficiency [%]	Frequency [GHz]	Drain-Source Voltage [V]	Drain Current [A]	Thermal Resistance [°C/W]		Package Outline
	Min.	Typ.			Min.	Typ.					Typ.	Max.	
MGF1941AL	11.0	15.0	–	10.0	–	–	–	12	3	0.03	–	–	GD-32
MGF4841AL	11.5	14.5	–	12.0	–	–	–	12	2.5	0.025	–	–	GD-32
MGF4841CL■	–	11.5	–	8.5	–	–	–	24	1.5	Idss	–	–	GD-32
MGF3022AM■	14.0	16.5	–	18.0	–	–	–	2.4	3	0.033	–	–	GD-30

Ta=25°C ■: AEC-Q101 qualified

GaN HEMT SERIES FOR MOBILE COMMUNICATION BASE TRANSCEIVER STATION

GF-67

Type Number	Output Power [dBm]	Linear Power Gain [dB]	Power Added Efficiency [%]	Frequency [GHz]	Drain-Source Voltage [V]	Thermal Resistance [°C/W]		Package Outline
						Typ.	Max.	
MGFS39G38L2	39	20	67	3.4~3.8	50	–	10.2	GF-67
MGFS38G38L2★★	38	20	67	3.4~3.8	50	–	11.7	GF-67
MGFS37G38L2★★	37	20	67	3.4~3.8	50	–	13.5	GF-67

Ta=25°C ★★: Under Development

GaN HEMT SERIES FOR SATELLITE COMMUNICATION (Internally Matched)

GF-8

GF-38

GF-65

GF-71

Type Number	Output Power [dBm]	Linear Power Gain [dB]	3rd Order IM Distortion [dBc]		Power Added Efficiency [%]	Frequency [GHz]	Drain-Source Voltage [V]	Drain Current [A]	Thermal Resistance [°C/W]		Package Outline
			Min.	Typ.					Typ.	Max.	
MGFK50G3745★★	50	10	-25	–	30	13.75~14.5	24	2.4	T.B.D.	T.B.D.	GF-38
MGFK49G3745	49	7.5	-25	–	28	13.75~14.5	24	2.1	0.4	0.6	GF-38
MGFK48G3745★	48.3	9.3	-25	–	33	13.75~14.5	24	1.44	0.8	1.0	GF-8
MGFK47G3745A	47	9	-25	–	30	13.75~14.5	24	1.05	1.1	1.4	GF-8
MGFG5H1503	43	20	-25	–	18	13.75~14.5	24	2.7	1.2	1.5	GF-65
MGFG5H3001★	39	15	-25	–	12	27.5~31	24	1.5	2.0	T.B.D.	GF-71

Ta=25°C ★: New Product ★★: Under Development

TYPE NAME DEFINITION OF HIGH FREQUENCY DEVICES

Discrete

MGF 49 41 A L
(A B C D)

- A Device Structure — 1x:MES FET (Small Signal), 3x:HBT, 4x:HEMT
- B Chip Type
- C Series Number
- D Auxiliary Symbol

For Mobile Communication Base Transceiver Station

MGF S 39 G 38 L 2
(A B C D E F)

- A Freq. Band — S
- B Output Power in dBm — ex.39=39dBm
- C Device Structure — G:GaN HEMT
- D Freq. Band in GHz — ex.38=~3.8GHz
- E Package — L:QFN
- F Input / Output Pair — ex.2=Input / Output 2 Pairs

For Satellite Communication (Internally Matched)

MGF K 50 G 3745
(A B C D)

- A Freq. Band — Ku
- B Output Power in dBm — ex.50=50dBm=100W(typ.)
- C Device Structure — G:GaN HEMT
- D Freq. Band in GHz — ex.3745=13.75~14.5GHz

High Frequency devices are compliant with the RoHS (2011/65/EU).

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MITSUBISHI ELECTRIC

Changes for the Better

SiC POWER DEVICES

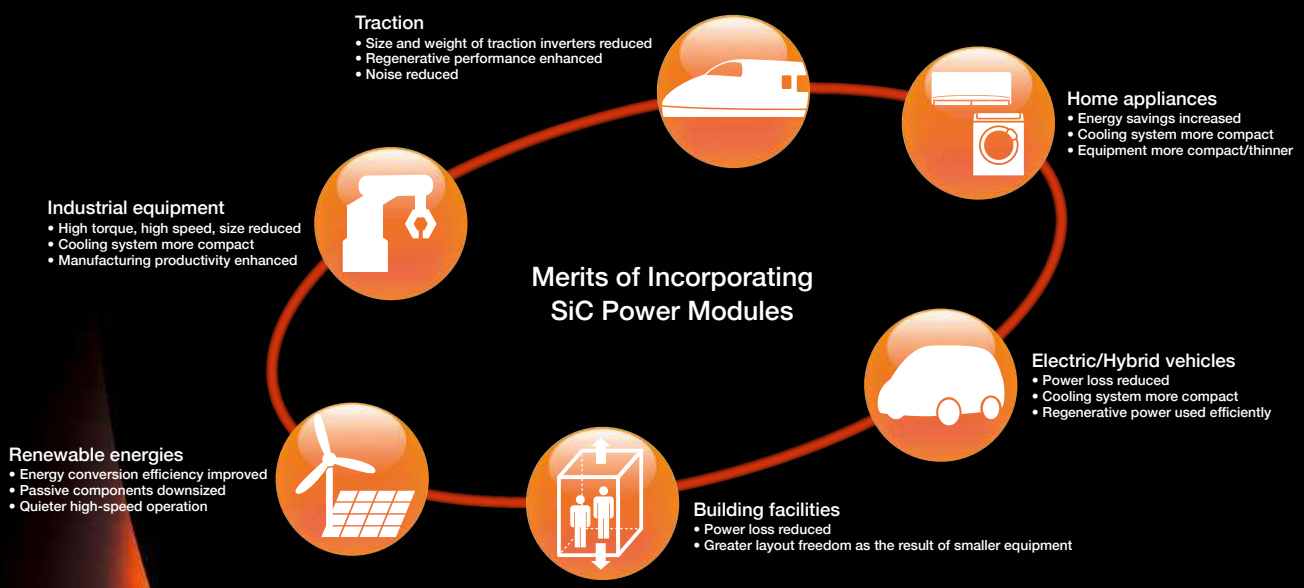
for a greener tomorrow

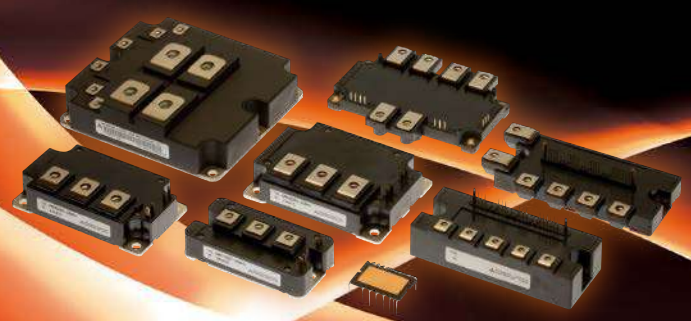
SiC Power Devices

Innovative Power Devices for a Sustainable Future

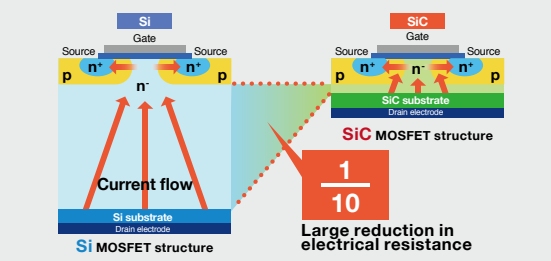
Traction, industrial equipment, building facilities, electric vehicles, renewable energies, home appliances...
Power devices are a key component in power electronics products for contributing to the realization of a low-carbon society. Attracting attention as the most energy-efficient power device is one made using new material, silicon-carbide (SiC). The material characteristics of SiC have led to a dramatic reduction in power loss and significant energy savings for power electronics devices. Mitsubishi Electric began the development of elemental SiC technologies in the early 1990s and has since introduced them to achieve practical energy-saving effects for products manufactured using SiC. Innovative SiC power modules are contributing to the realization of a low-carbon society and more affluent lifestyles.

*SiC: Silicon Carbide-Compound that fuses silicon and carbon at a ratio of one-to-one.



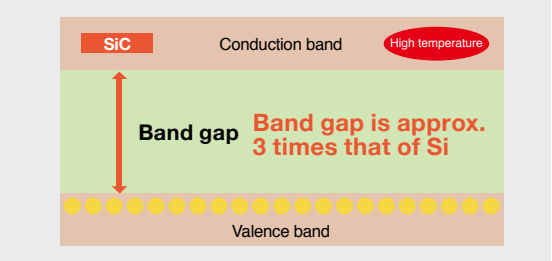


SiC with superior characteristics



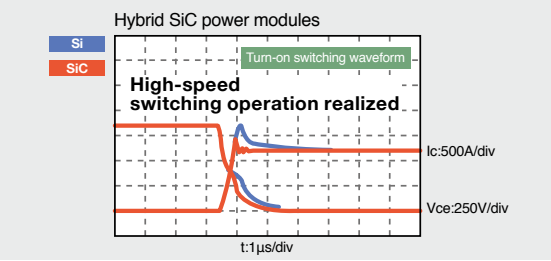
Power loss reduced

SiC has approximately 10 times the critical breakdown strength of silicon. Furthermore, the drift layer that is a main cause of electrical resistance is one-tenth of the thickness. This allows a large reduction in electrical resistance and, in turn, reduces power loss. This SiC characteristic enables dramatic reductions in conductivity loss and switching loss in power devices.



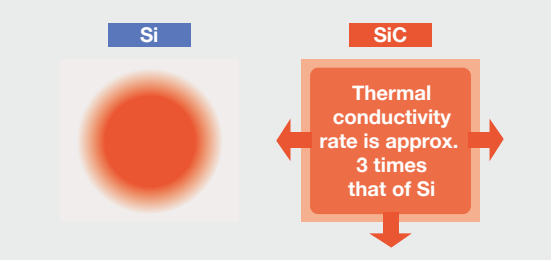
High-temperature operation

When the temperature increases, electrons are exited to the conduction band and the leakage current increases.
At times, this results in abnormal operation.
However, SiC has three times the band gap width of silicon, preventing the flow of leakage current and enabling operation at high temperatures.



High-speed switching operation

With SiC, owing to the high dielectric breakdown, power loss is reduced and high-voltage is easier to achieve, it is possible to use Schottky Barrier Diodes (SBDs), which cannot be used with Si. SBDs can realize high-speed switching motion because they don't have accumulation carriers. As a result, high-speed switching can be realized.



Heat dissipation

SiC has three times the heat conductivity of silicon, which improves heat dissipation.

SiC power modules appropriated by application

Application	Product name	Model	Rating Voltages[V]	Rating Current[A]	Connection	States	Insert pages
Home appliances Industrial equipment	SiC-SBD	BD20060T	600	20	-	Commercially available	P3
		BD20060S			-	Sample available	
Industrial equipment	Hybrid SiC-IPM	PMH200CS1D060	600	200	6 in 1	Commercially available	
		PMH75CL1A120	1200	75	6 in 1	Sample available	P4
	Full SiC-IPM	PMF75CL1A120					
	Full SiC Power Modules	FMF400BX-24A		400	4 in 1	Commercially available	
		FMF800DX-24A		800	2 in 1		P5
	Hybrid SiC Power Modules for High-frequency Switching Applications	CMH100DY-24NFH		100			
		CMH150DY-24NFH		150			
		CMH200DU-24NFH		200			
		CMH300DU-24NFH		300			
		CMH400DU-24NFH		400			
		CMH600DU-24NFH		600			
	Large Hybrid SiC DIPIPM™ for PV Application	PSH50YA2A6	600	50	4 in 1		
Traction	Hybrid SiC Power Modules	CMH1200DC-34S	1700	1200	2 in 1		P6
Home appliances	Super-mini Full SiC DIPIPM™	PSF15S92F6	600	15	6 in 1		
		PSF25S92F6		25			
	Super-mini Hybrid SiC DIPPFC™	PSH20L91A6-A		20Arms	Interleaved		P7
	Super-mini Full SiC DIPPFC™	PSF20L91A6-A					

Terminology

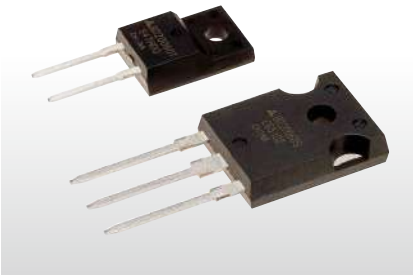
SiC ····· Silicon Carbide
IPM ····· Intelligent Power Module
DIPIPM™ ····· Dual-In-Line Package Intelligent Power Module
DIPPFC™ ····· Dual-In-Line Package Power Factor Correction
SBD ····· Schottky Barrier Diode
MOSFET ····· Metal Oxide Semiconductor Field Effect Transistor
IGBT ····· Insulated Gate Bipolar Transistor
Tr ····· Transistor
FW-SW ····· Freewheeling switching loss
FW-DC ····· Freewheeling DC loss
Tr-SW ····· Transistor switching loss
Tr-DC ····· Transistor DC loss
IGBT-SW ····· IGBT switching loss
IGBT-DC ····· IGBT DC loss
PV ····· Photovoltaics
CSTBT™ ····· Mitsubishi Electric's unique IGBT that makes use of the carrier cumulative effect
JBS ····· Junction Barrier Schottky

600V/20A SiC-SBD for home appliances and industrial equipment

BD20060T Commercially available

BD20060S Sample available

Contribute to reducing power loss and the size of power supply systems for home appliances and industrial equipment

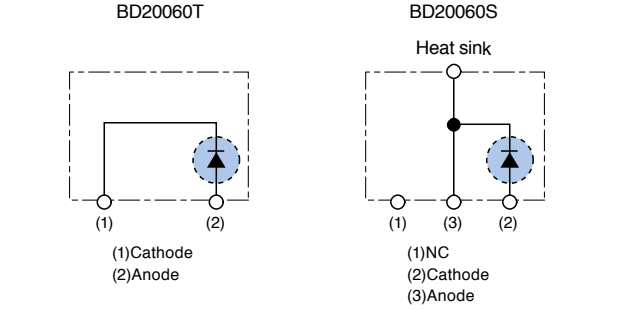


Features

- Power loss is reduced by approx. 21% compared to silicon (Si) products, contributing to energy conversion.
- The SiC-SBD allows high frequency switching and contributes to downsizing the reactor, heat sink and other peripheral components
- JBS structure allows high forward surge capability and contributes to improving reliability

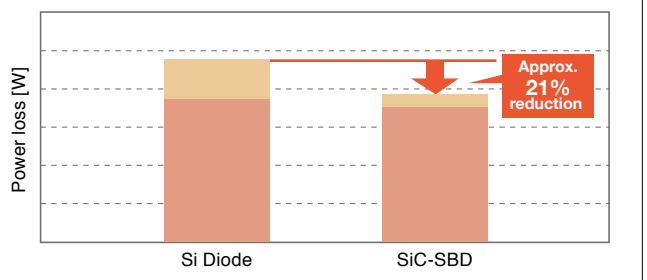
Inner circuit

: SiC-SBD



Power loss comparison

FWD_SW
FWD_DC



Conditions : Vcc=200V, Vout=370V, L=0.2mH, fc=30kHz, Iin=20A, Tj=125℃

600V/200A Hybrid SiC-IPM for Industrial Equipment

PMH200CS1D060 Commercially available

SiC-SBD incorporated in an IPM with a built-in drive circuit and protection functions

Power loss reduction of approx. 20% contributes to enhancing the performance of industrial machinery

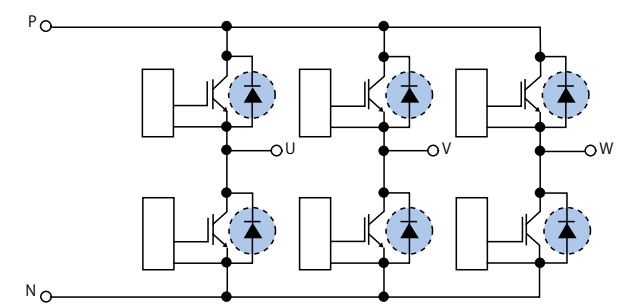
Features

- Hybrid combination of SiC-SBD and IGBT with current and temperature sensors implemented for IPM supplies high functionality and low loss enabling high torque and motor speed
- Recovery loss (Err) reduced by 95% compared to the conventional product*
- Package compatible with the conventional product* making replacement possible

* Conventional product: Mitsubishi Electric S1 Series PM200SC1D060

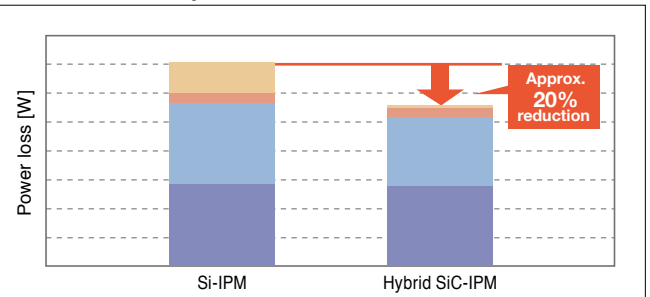
Internal circuit diagram

: SiC-SBD



Power loss comparison

FW_SW
FW_DC
IGBT_SW
IGBT_DC



Condition:Vcc=300V, Io=85Arms, fc=15kHz, VD=15V,P.F=1, Modulation=1, Three-phase modulation, Tj=125°C

1200V/75A Hybrid/Full SiC-IPM for Industrial Equipment PMH75CL1A120/PMF75CL1A120 Sample available

Built-in drive circuit and protection functions realize high functionality

Features

- Incorporates SiC-MOSFET with current sensor and built-in drive circuit and protection functions to deliver high functionality
- Significant reduction in power loss compared to the conventional product*
- Package compatible with the conventional product*

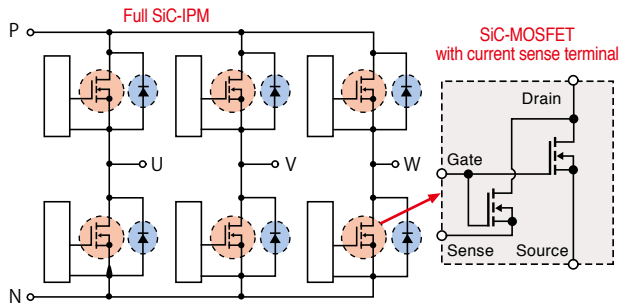
* Conventional product: Mitsubishi Electric IPM L1 Series PM75CL1A120

Main specifications

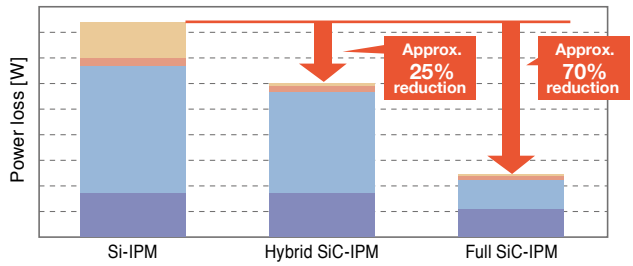
Rating	1200V/75A 6in1
Mounted Functions	• Built-in drive circuit • Under-voltage protection • Short-circuit protection • Over-temperature protection (Monitoring IGBT chip surface)

Internal circuit diagram

:SiC-MOSFET :SiC-SBD



Power loss comparison



Condition:Vcc=600V, Io=31Arms (assuming a 15kW inverter), fc=15kHz, P.F=0.9, Modulation=1, Three-phase modulation, Tj=125°C

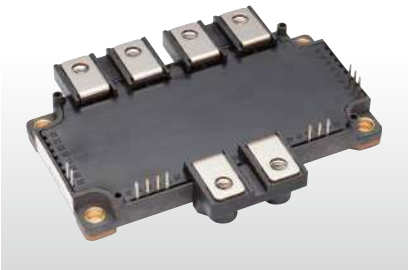
1200V/400A・1200V/800A Full SiC Power Modules for Industrial Equipment FMF400BX-24A/FMF800DX-24A Commercially available

Contributes to reducing size/weight of industrial-use inverters with the mounting area reduced by approx. 60%

Features

- Power loss reduced approx. 70% compared to the conventional product*
- Low-inductance package adopted to deliver full SiC performance
- Contributes to realizing smaller/lighter inverter equipment by significantly reducing the package size and realizing a mounting area approx. 60% smaller compared to the conventional product*

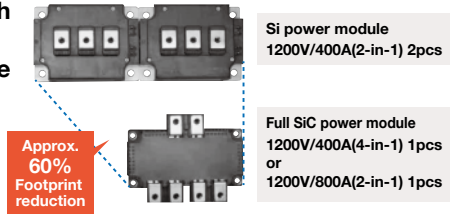
＊Conventional product:Mitsubishi Electric CM400DY-24NF(1200V/400A 2in1) 2pcs



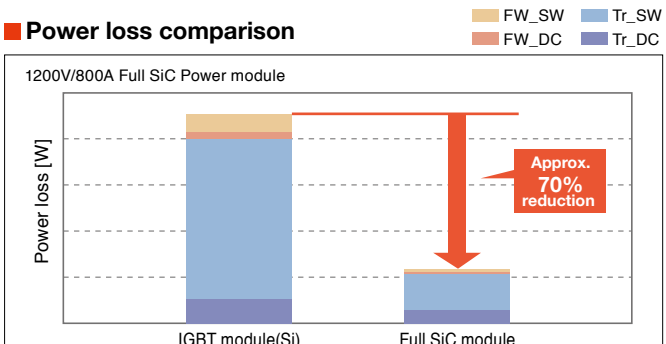
Product lineup

Applications	Rated voltage	Reted current	Circuit configration	Package size (D □W)
Industrial equipment	1200V	400A	4-in-1	92.3 □ 121.7mm
		800A	2-in-1	

Comparison with conventional product package



Power loss comparison



Condition:Vcc=600V, Io=222Arms (assuming a 110kW inverter), fc=15kHz, P.F=0.8, Modulation=1, Three-phase modulation, Tj=125°C

Hybrid SiC Power Modules for High-frequency Switching Applications Commercially available

For optimal operation of power electronics devices that conduct high-frequency switching

Features

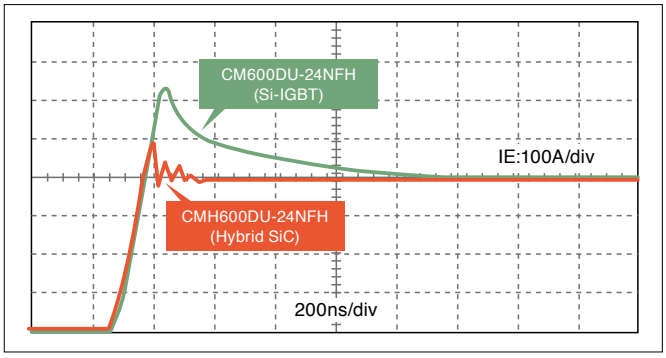
- Power loss reduction of approx. 40% contributes to higher efficiency, smaller size and weight reduction of total system
- Suppresses surge voltage by reducing internal inductance
- Package compatible with the conventional product*

* Conventional product: Mitsubishi Electric NFH Series IGBT Modules

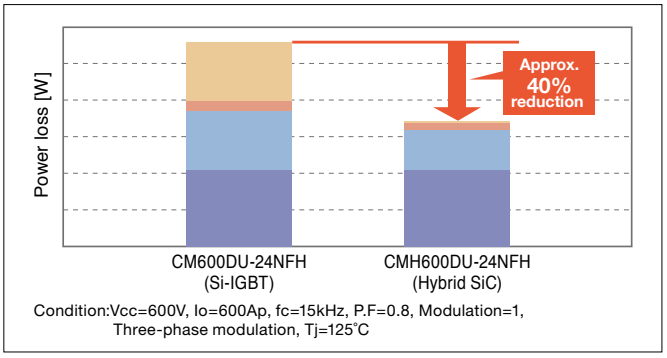
Product lineup

Applications	Model	Rated voltage	Rated current	Circuit configuration	External size (D x W)
Industrial equipment	CMH100DY-24NFH	1200V	100A	2-in-1	48 □ 94mm
	CMH150DY-24NFH		150A		48 □ 94mm
	CMH200DU-24NFH		200A		62 □ 108mm
	CMH300DU-24NFH		300A		62 □ 108mm
	CMH400DU-24NFH		400A		80 □ 110mm
	CMH600DU-24NFH		600A		80 □ 110mm

Recovery waveform (FWD)



Power loss comparison



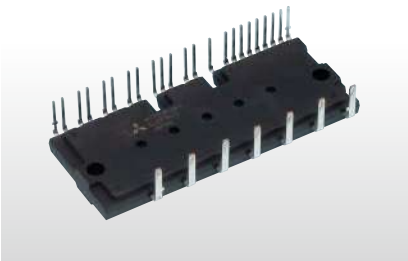
600V/50A Large Hybrid SiC DIPIPM™ for PV Applications PSH50YA2A6 Commercially available

More efficient power modules for PV power conditioner applications

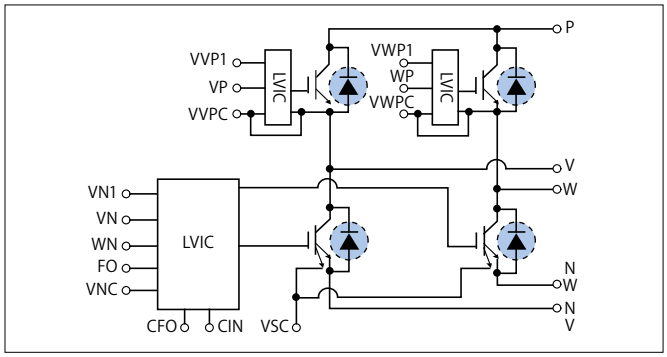
Features

- Hybrid structure achieved with SiC Schottky barrier diode and 7th-generation IGBT chips
- Power loss reduction of approx. 25% compared to the conventional product*
- Helps downsize PV inverter system thanks to modified short-circuit protection scheme

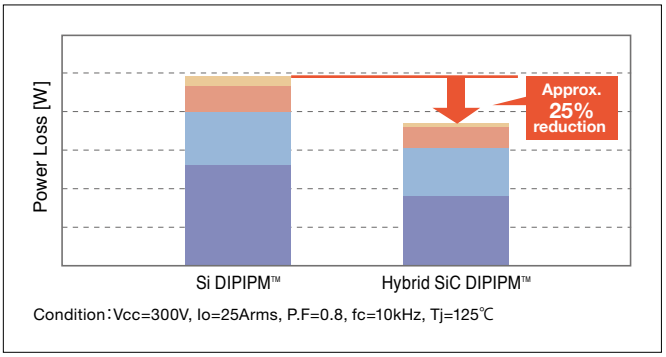
*Conventional product:Mitsubishi Electric Large DIPIPM™ PS61A99



Internal circuit diagram



Power loss comparison



1700V/1200A Hybrid SiC Power Modules for Traction Inverters
CMH1200DC-34S Commercially available

High-power/low-loss/highly reliable modules appropriate for use in traction inverters

Features

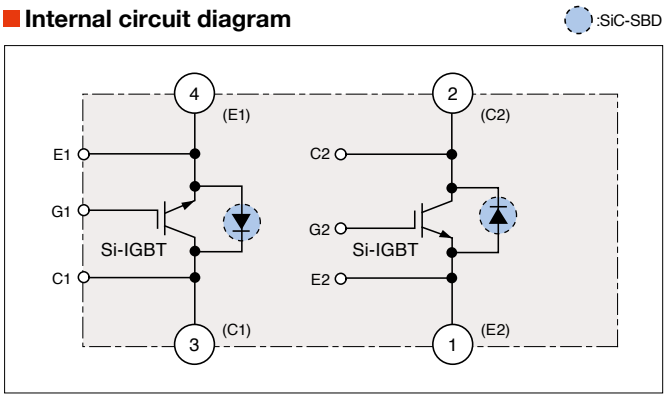
- Power loss reduced approximately 30% compared to the conventional product*
- Highly reliable design appropriate for use in traction
- Package compatible with the conventional product*

* Conventional product: Mitsubishi Electric Power Module CM1200DC-34N

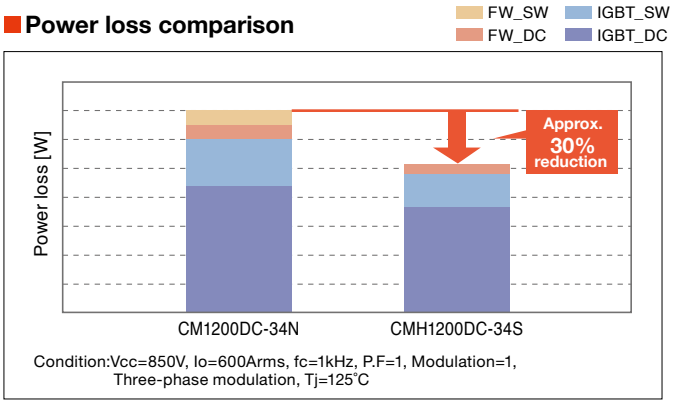
Main specifications

Module	Max.operating temperature		150˚C
	Isolation voltage		4000Vrms
Si-IGBT @150˚C	Collector-emitter saturation voltage		2.3V
	Switching loss 850V/1200V	turn-on	140mJ
		turn-off	390mJ
SiC-SBD @150˚C	Emitter-collector voltage		2.3V
	Capacitive charge		9.0μC

Internal circuit diagram



Power loss comparison



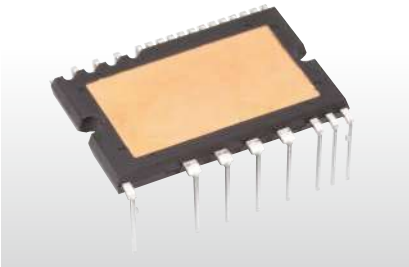
15A/25A Super-mini Full SiC DIPIPM™ for Home Appliances
PSF15S92F6-A Commercially available / PSF25S92F6-A NEW

Contributes to extremely high power-efficiency in air conditioners, and easily applicable to industrial equipment

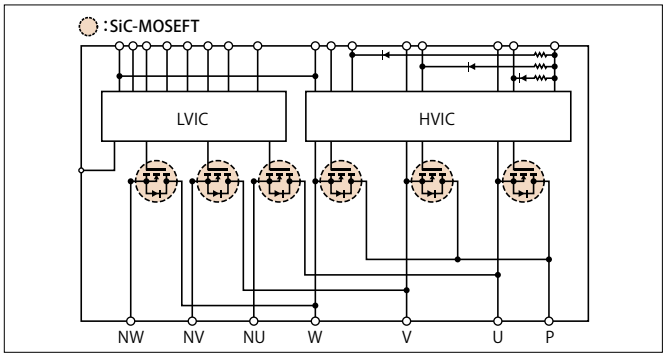
Features

- SiC-MOSFET achieves reduction in ON resistance, power loss reduced approx. 70% compared to conventional product*
- Construct low-noise system by reducing recovery current
- Numerous built-in functions: Bootstrap diode for power supply to drive P-side, temperature information output, etc.
- Unnecessary minus-bias gate drive circuit using original high Vth SiC-MOSFET technology
- As package and pin layout compatibility with conventional products* is ensured, simply replace with this product to improve performance

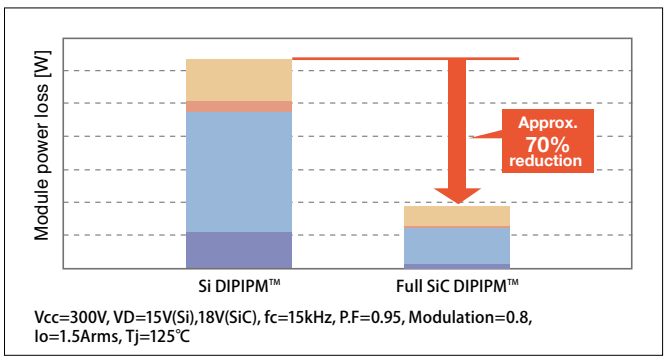
*Conventional product: Mitsubishi Electric Super-mini DIPIPM™ Series



Internal block diagram



Power loss comparison

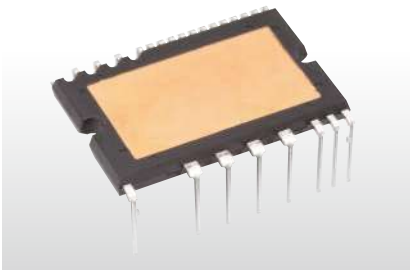


Super-mini Hybrid / Full SiC DIPPFC™ for Home Appliances
PSH20L91A6-A / PSF20L91A6-A Commercially available

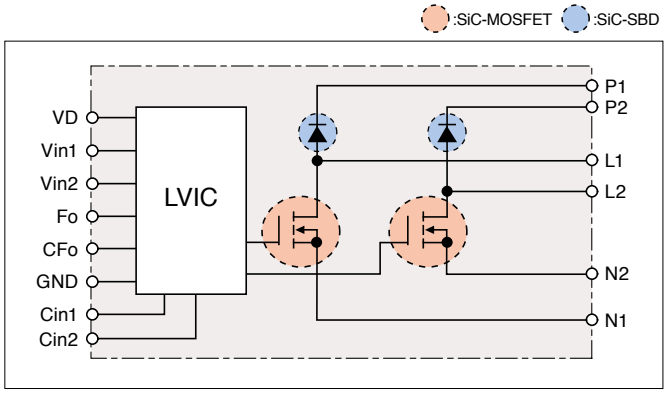
Utilizing SiC enables high-frequency switching and contributes to reducing the size of peripheral components

Features

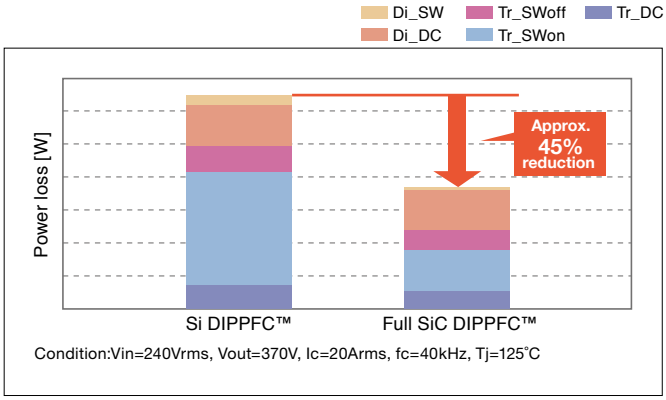
- Incorporating SiC chip in the Super-mini package widely used in home appliances
- The SiC chip allows high-frequency switching (up to 40kHz) and contributes to downsizing the reactor, heat sink and other peripheral components
- Adopts the same package as the Super mini DIPIPM™ to eliminate the need for a spacer between the inverter and heat sink, and to facilitate its implementation



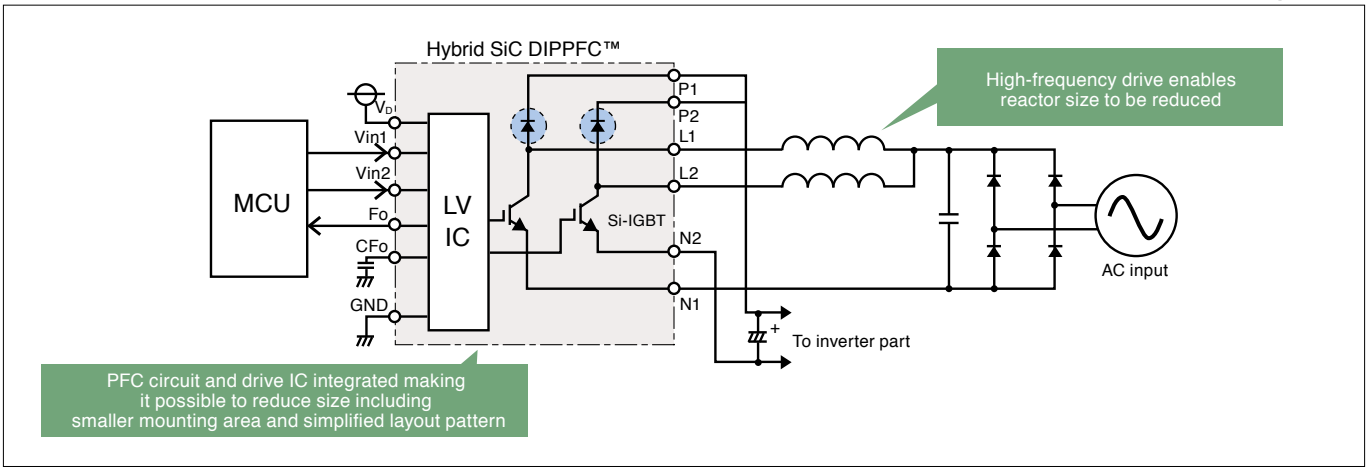
Internal block diagram (Full SiC DIPPFC™)



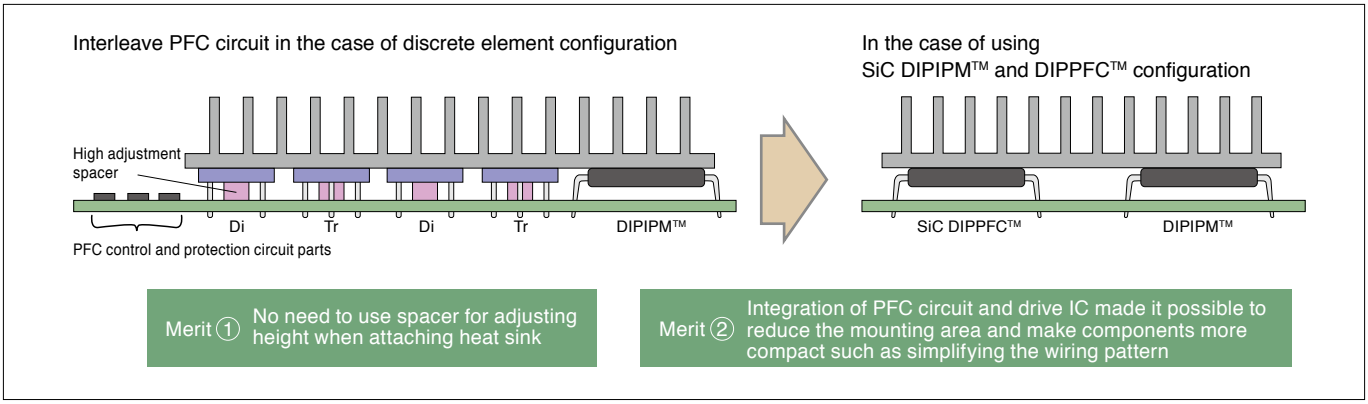
Power loss comparison



Interleaved PFC circuit configuration (for Hybrid SiC DIPPFC™)

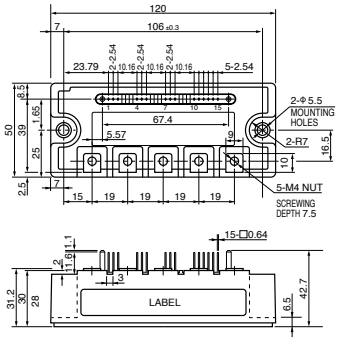


Merits of combined use of SiC DIPIPM™ and DIPPFC™

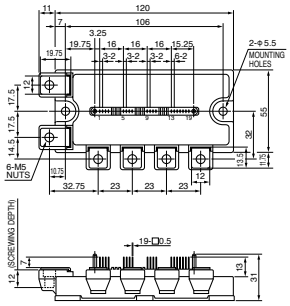


Unit : mm

600V/200A Hybrid SiC-IPM
for Industrial Use
PMH200CS1D060

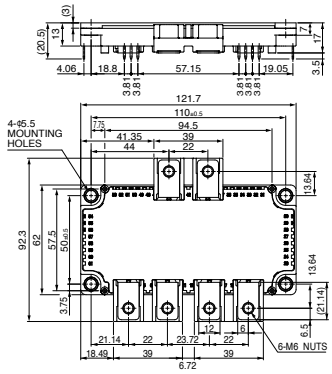


1200V/75A Hybrid/Full SiC-IPM
for Industrial Equipment
PMH75CL1A120/PMF75CL1A120
600V/75A Full SiC-IPM for PV Applications
PMF75B4L1A060

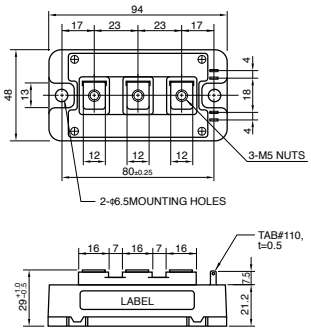


＊Tentative No.

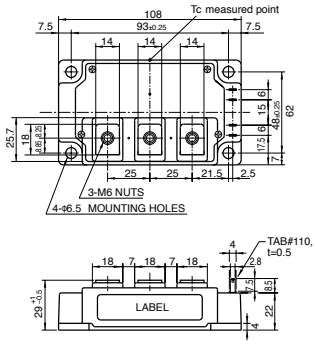
1200V/400A, 1200V/800A
Full SiC Power Modules for Industrial Use
FMF400BX-24A
FMF800DX-24A



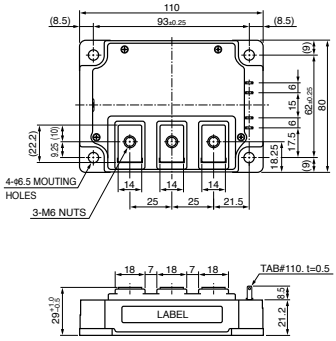
Hybrid SiC Power Modules for
High-frequency Switching Applications
CMH100DY-24NFH
CMH150DY-24NFH



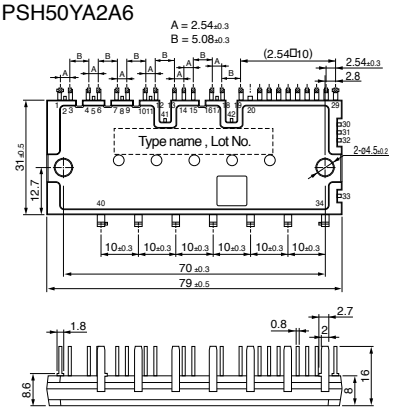
Hybrid SiC Power Modules for
High-frequency Switching Applications
CMH 200DU-24NFH
CMH 300DU-24NFH



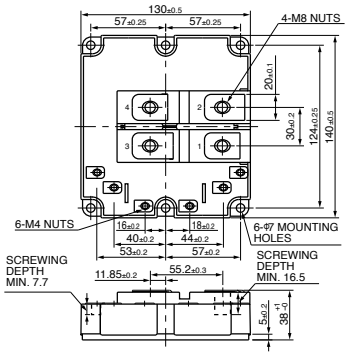
Hybrid SiC Power Modules for
High-frequency Switching Applications
CMH 400DU-24NFH
CMH 600DU-24NFH



600V/50A Large Hybrid SiC DIPIPM™
for PV Applications
PSH50YA2A6

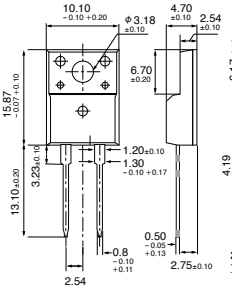


1700V/1200A Hybrid SiC Power Modules
for Traction Inverters
CMH1200DC-34S

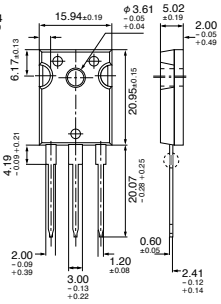


SiC-SBD for power supply systems

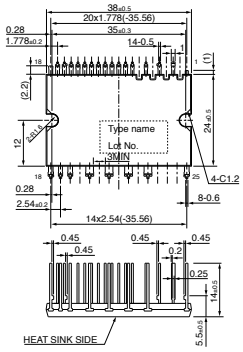
BD20060T



BD20060S



Super-mini Full SiC DIPIPM™
PSF15S92F6-A / PSF25S92F6-A
Super-mini Hybrid / Full SiC DIPPFC™
PSH20L91A6-A / PSF20L91A6-A
Long



Development of Mitsubishi Electric SiC Power Devices and Power Electronics Equipment Incorporating Them

Mitsubishi Electric began developing SiC as a new material in the early 1990s. Pursuing special characteristics, we succeeded in developing various elemental technologies.
In 2010, we commercialized the first air conditioner in the world equipped with a SiC power device.
Furthermore, substantial energy-saving effects have been achieved for traction and FA machinery.
We will continue to provide competitive SiC power modules with advanced development and achievements from now on.

Early 1990s

Developed new material, silicon-carbide (SiC) power semiconductor, maintaining a lead over other companies

2000s

Developed various elemental technologies

2006

January 2006
Successfully developed SiC inverter for driving motor rated at 3.7kW

2009

February 2009
Verified 11kW SiC inverter, world's highest value*1 with approx. 70% reduction in power loss

November 2009
Verified 20kW SiC inverter, world's highest value*1 with approx. 90% reduction in power loss

2010

January 2010
Developed large-capacity power module equipped with SiC diode

October 2010
Launched "Kirigamine" inverter air conditioner

2011

January 2011
Verified highest power conversion efficiency*1 for solar power generation system power conditioner (domestic industry)

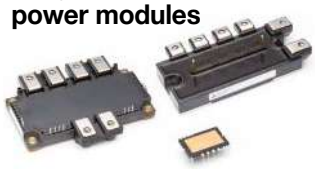
October 2011
Commercialized SiC inverter for use in railcars

2012

March 2012
Developed motor system with built-in SiC inverter*2

September 2012
Verified built-in main circuit system for railcars

July 2012
Began shipping samples of hybrid SiC power modules



December 2012
Launched CNC drive unit equipped with SiC power module

Development of these modules and applications has been partially supported by Japan's Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO).

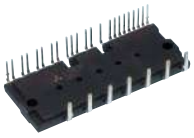
Contributing to the realization of a low-carbon society and more affluent lifestyles

2014

February 2014
Developed EV motor drive system with built-in SiC inverter*2

May 2014
Began shipping samples of hybrid SiC power modules for high-frequency switching applications

November 2014
Launched Large Hybrid SiC DIPIPM™ for PV Applications



2015

January 2015
Launched power conditioner for PV equipped with full SiC-IPM

June 2015
Railcar traction system with full SiC power modules installed in Shinkansen bullet trains

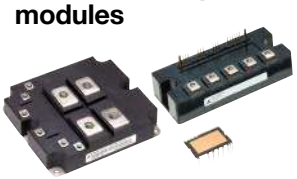
2013

February 2013
Developed SiC for application in elevator control systems*2

February 2013
Developed technologies to increase capacities of SiC power modules*2

March 2013
Delivered auxiliary power supply systems for railcars

May 2013
Launched SiC power modules



December 2013
Launched railcar traction inverter with full SiC power module

2016

April 2016
Launched Super-mini Full SiC DIPIPM™

May 2016
Launched package air conditioners with full SiC DIPIPM™ in Japan

October 2016
Launched room air conditioners with full SiC DIPIPM™ in Japan

2017

March 2017
Launched SiC-SBD

March 2017
Develops World's smallest SiC Inverter for HEVs.

＊1 Researched in press releases by Mitsubishi Electric. ＊2 Currently under development, as of April 2017.
* The year and month listed are based on press releases or information released during the product launch month in Japan.

Please visit our website for further details.

www.MitsubishiElectric.com

Keep safety first in your circuit designs!

- Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

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eco Changes **for a greener tomorrow**

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

MITSUBISHI ELECTRIC CORPORATION
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www.MitsubishiElectric.com

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Specifications subject to change without notice.

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e-Front runners

FUJI Power Semiconductors

IGBT Modules

IGBT 6-pack Page 1

IGBT PIM Page 3

IGBT Standard 2-pack/1-pack Page 6

IGBT High Power Modules Page 7

IGBT IPM Page 12

IGBT Discretes Page 13

Fuji Electric Co., Ltd.

Jul. 2011
PMWW01f

e-Front runners

IGBT 6-pack

mm

With NTC

	Ic	600V Gen. 5 Planar-NPT	600V Gen. 6 Trench-FS	1200V Gen. 5 Trench-FS	1200V Gen. 6 Trench-FS	1700V Gen. 5 Trench-FS
1	35A			6MBI35U4A-120-50		
	50A		6MBI50VA-060-50	6MBI50U4A-120-50	6MBI50VA-120-50	
	75A	6MBI75U2A-060-50	6MBI75VA-060-50	6MBI75U4A-120-50	6MBI75VA-120-50	
	100A		6MBI100VA-060-50		6MBI100VA-120-50	
2	75A					
	100A	6MBI100U2B-060-50		6MBI100U4B-120-50	6MBI100VB-120-50	6MBI100U4B-170-50 *
	150A	6MBI150U2B-060-50	6MBI150VB-060-50	6MBI150U4B-120-50	6MBI150VB-120-50	6MBI150U4B-170-50 *
	180A				6MBI180VB-120-50	
	180A				6MBI180VB-120-55	
3	50A		6MBI50VW-060-50		6MBI50VW-120-50	
	75A		6MBI75VW-060-50		6MBI75VW-120-50	
	100A		6MBI100VW-060-50		6MBI100VW-120-50	
4	100A				6MBI100VX-120-50	
	150A		6MBI150VX-060-50		6MBI150VX-120-50	
	180A				6MBI180VX-120-50	
	180A				6MBI180VX-120-55	

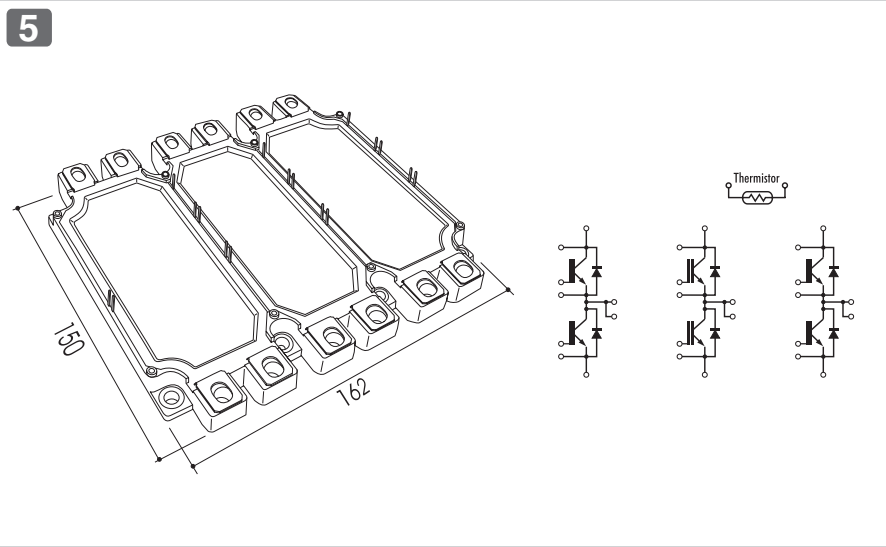
Note: Suffix '-50' in production number indicates RoHS compliant.
6MBI180VB-120-55, 6MBI180VX-120-55; Premium type (Low Thermal Impedance Version)

* Under development

IGBT 6-pack

mm

High power 6-pack



Ic	1200V Gen. 5 Trench-FS	1200V Gen. 6 Trench-FS	1700V Gen. 5 Trench-FS	1700V Gen. 6 Trench-FS
225A	6MBI225U4-120-50	6MBI225V-120-50	6MBI225U4-170	
300A	6MBI300U4-120-50	6MBI300V-120-50	6MBI300U4-170	6MBI300V-170-50 *
450A	6MBI450U4-120-50	6MBI450V-120-50	6MBI450U4-170	6MBI450V-170-50 *
550A		6MBI550V-120-50		

Note: Suffix '-50' in production number indicates RoHS compliant.

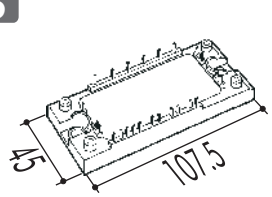
* Under development

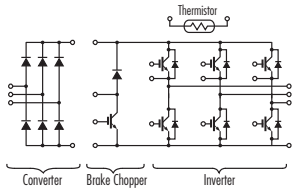
IGBT PIM (Power Integrated Module)

mm

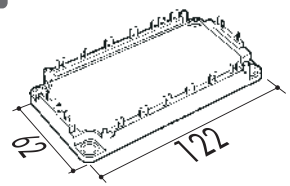
PIM

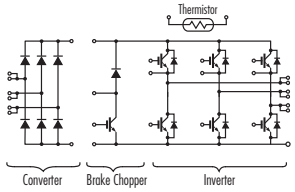
6





7





	600V		1200V	
Ic	Gen. 5 Trench/ Planar-NPT	Gen.6 Trench-FS	Gen. 5 Trench-FS	Gen.6 Trench-FS
10A				
15A				
25A			7MBR25UA120-50	7MBR25VA120-50
30A	7MBR30U2A060-50			
35A			7MBR35UA120-50	7MBR35VA120-50
50A	7MBR50U2A060-50	7MBR50VA060-50	7MBR50UA120-50	
35A			7MBR35UB120-50	7MBR35VB120-50
50A			7MBR50UB120-50	7MBR50VB120-50
75A	7MBR75U2B060-50	7MBR75VB060-50	7MBR75U4B120-50	7MBR75VB120-50
100A	7MBR100U2B060-50	7MBR100VB060-50	7MBR100U4B120-50	

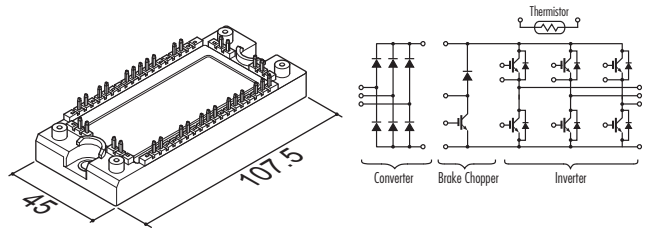
Note: Suffix '-50' in production number indicates RoHS compliant.

e-Front runners

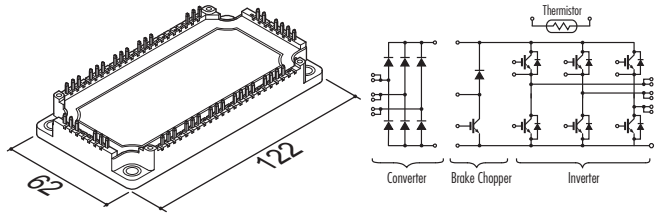
IGBT PIM (Power Integrated Module) mm

PIM

8



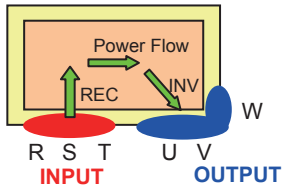
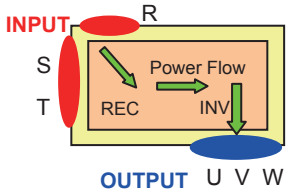
9



Ic	600V Gen. 6 Trench-FS	1200V Gen. 6 Trench-FS
25A		7MBR25VM120-50 7MBR25VP120-50
35A		7MBR35VM120-50 7MBR35VP120-50
50A	7MBR50VP060-50	7MBR50VM120-50 7MBR50VP120-50
75A	7MBR75VP060-50	
100A	7MBR100VP060-50	
50A		7MBR50VN120-50 7MBR50VR120-50
75A		7MBR75VN120-50 7MBR75VR120-50
100A	7MBR100VR060-50	7MBR100VN120-50 7MBR100VR120-50
150A	7MBR150VR060-50	7MBR150VN120-50 7MBR150VR120-50

Note: Suffix '-50' in production number indicates RoHS compliant.

In/Out terminal Layout

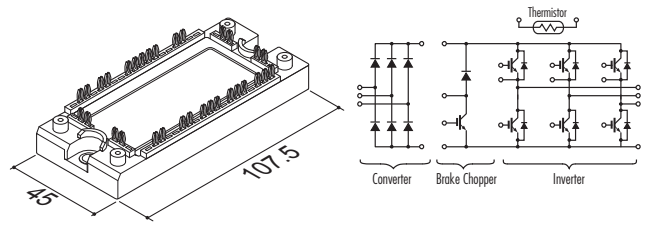
7MBR□VM/VN□-50	7MBR□VP/VR□-50
	

e-Front runners

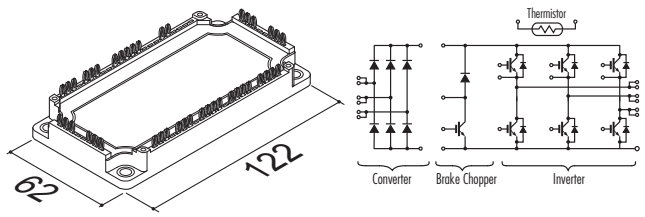
IGBT PIM (Power Integrated Module) mm

PIM

10



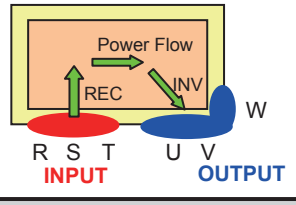
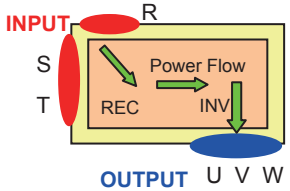
11



Ic	600V Gen. 6 Trench-FS	1200V Gen. 6 Trench-FS
25A		7MBR25VW120-50 7MBR25VY120-50
35A		7MBR35VW120-50 7MBR35VY120-50
50A	7MBR50VY060-50	7MBR50VW120-50 7MBR50VY120-50
75A	7MBR75VY060-50	
100A	7MBR100VY060-50	
50A		7MBR50VX120-50 7MBR50VZ120-50
75A		7MBR75VX120-50 7MBR75VZ120-50
100A	7MBR100VZ060-50	7MBR100VX120-50 7MBR100VZ120-50
150A	7MBR150VZ060-50	7MBR150VX120-50 7MBR150VZ120-50

Note: Suffix '-50' in production number indicates RoHS compliant.

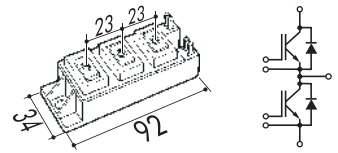
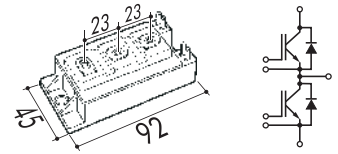
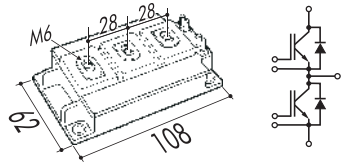
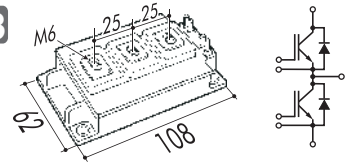
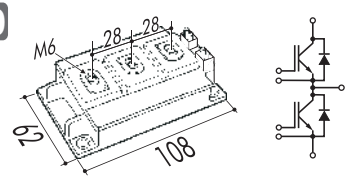
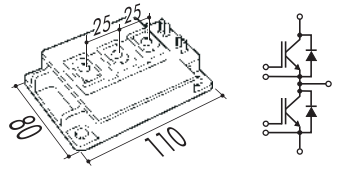
In/Out terminal Layout

7MBR□VW/VX□-50	7MBR□VY/VZ□-50
	

e-Front runners

IGBT Standard 2-pack mm

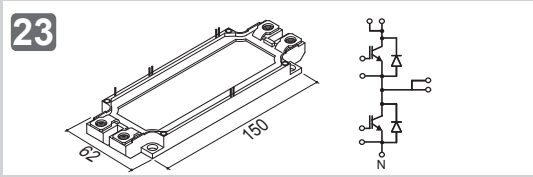
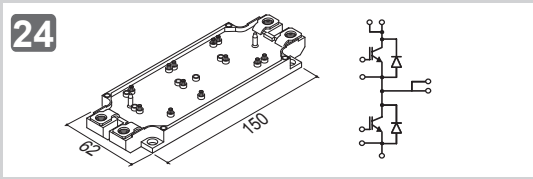
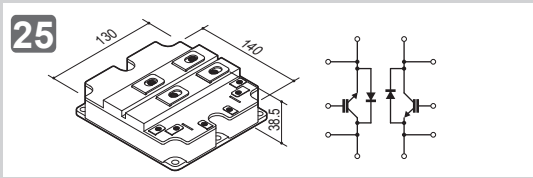
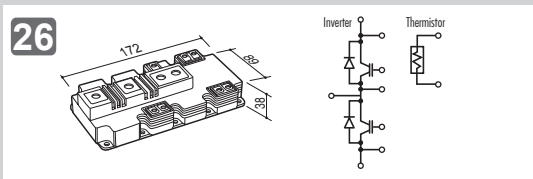
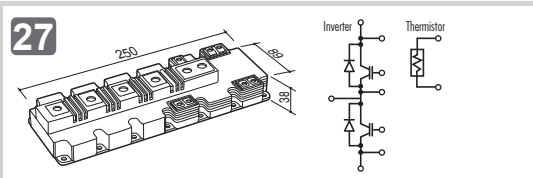
2-pack

	Ic	600V Gen. 5 Planar-NPT	600V Gen. 6 Trench-FS	1200V Gen. 5 Trench-FS	1200V Gen. 6 Trench-FS	1700V Gen. 5 Trench-FS
12 13 	75A			2MBI75U4A-120-50	2MBI75VA-120-50 *	
	100A		2MBI100VA-060-50 *	2MBI100U4A-120-50	2MBI100VA-120-50 *	
	150A	2MBI150U2A-060-50	2MBI150VA-060-50 *	2MBI150U4A-120-50	2MBI150VA-120-50 *	
	200A	2MBI200U2A-060-50	2MBI200VA-060-50 *			
14 15 	100A					
	150A			2MBI150U4B-120-50	2MBI150VB-120-50	
	200A			2MBI200U4B-120-50	2MBI200VB-120-50	
	300A	2MBI300U2B-060-50	2MBI300VB-060-50			
	400A	2MBI400U2B-060-50	2MBI400VB-060-50			
16 	100A					
	150A					
	200A			2MBI200UC-120-50		
	300A			2MBI300UC-120-50		
17 18 	200A			2MBI200U4D-120-50		
	300A			2MBI300U4D-120-50	2MBI300VD-120-50	
	400A		2MBI400VD-060-50		2MBI400VD-120-50	
	600A		2MBI600VD-060-50			
19 20 	100A					2MBI100U4H-170-50
	150A			2MBI150U4H-120-50		2MBI150U4H-170-50
	200A			2MBI200U4H-120-50	2MBI200VH-120-50	2MBI200U4H-170-50
	300A			2MBI300U4H-120-50	2MBI300VH-120-50	2MBI300U4H-170-50
	400A			2MBI400U4H-120-50		2MBI400U4H-170-50
	450A				2MBI450VH-120-50	
21 22 	300A			2MBI300U4E-120	2MBI300VE-120-50	
	450A			2MBI450U4E-120	2MBI450VE-120-50	
	600A	2MBI600U2E-060	2MBI600VE-060-50		2MBI600VE-120-50	

Note: • Suffix '-50' in production number indicates RoHS compliant. • No. 12 14 16 17 19 21 : Gen.5 No. 13 15 18 20 22 : Gen.6 * Under development

e-Front runners

IGBT Standard 2-pack mm

		Ic	1200V Gen. 5 Trench-FS	1200V Gen. 6 Trench-FS	1700V Gen. 5 Trench-FS	1700V Gen. 6 Trench-FS
2-pack	23 	225A	2MBI225U4N-120-50	2MBI225VN-120-50	2MBI225U4N-170-50	
		300A	2MBI300U4N-120-50	2MBI300VN-120-50	2MBI300U4N-170-50	2MBI300VN-170-50
		450A	2MBI450U4N-120-50	2MBI450VN-120-50	2MBI450U4N-170-50	2MBI450VN-170-50
		550A				2MBI550VN-170-50
		600A		2MBI600VN-120-50		
	24 	225A	2MBI225U4J-120-50	2MBI225VJ-120-50		
		300A	2MBI300U4J-120-50	2MBI300VJ-120-50		
		450A	2MBI450U4J-120-50	2MBI450VJ-120-50		
		550A				2MBI550VJ-170-50
		600A		2MBI600VJ-120-50		
	25 	600A	2MBI600U4G-120	2MBI600VG-120 *	2MBI600U4G-170	2MBI600VG-170E *
		800A	2MBI800U4G-120	2MBI800VG-120 *	2MBI800U4G-170	2MBI800VG-170E *
		1200A	2MBI1200U4G-120	2MBI1200VG-120 *	2MBI1200U4G-170	2MBI1200VG-170E *
	26 	600A		2MBI600VXA-120E-50		
		650A				2MBI650VXA-170E-50
		900A		2MBI900VXA-120P-50		
	27 	1000A				2MBI1000VXB-170E-50
		1400A		2MBI1400VXB-120P-50		2MBI1400VXB-170E-50 * 2MBI1400VXB-170P-50 *

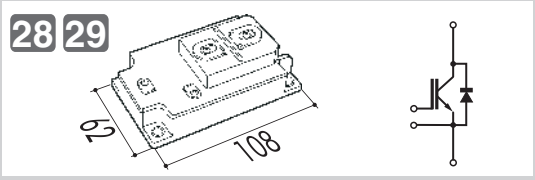
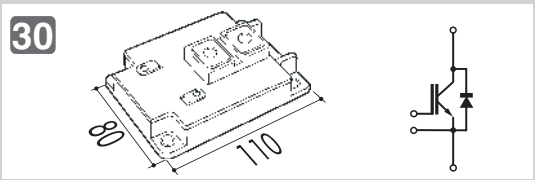
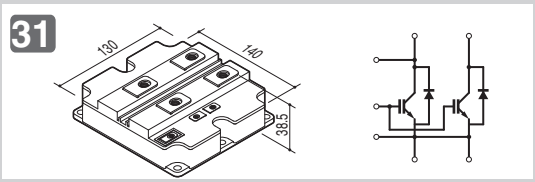
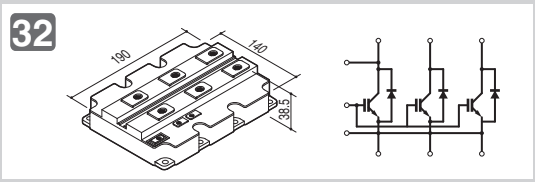
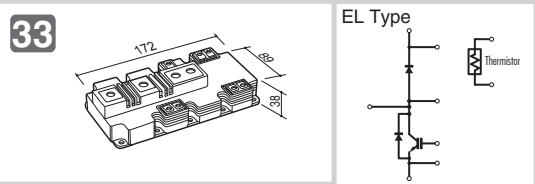
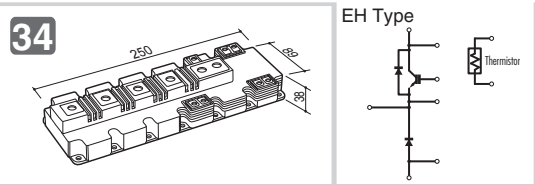
Note: Suffix '-50' in production number indicates RoHS compliant.

* Under development

e-Front runners

IGBT Standard 1-pack

mm

		Ic	1200V Gen. 5 Trench-FS	1200V Gen. 6 Trench-FS	1700V Gen. 5 Trench-FS	1700V Gen. 6 Trench-FS
1-pack	28 29 	200A				
		300A	1MBI300U4-120			
		400A	1MBI400U4-120	1MBI400V-120-50		
		600A	1MBI600U4-120	1MBI600V-120-50		
		900A		1MBI900V-120-50		
	30 	600A	1MBI600U4B-120			
		800A	1MBI800U4B-120			
	31 	1200A	1MBI1200U4C-120	1MBI1200VC-120 *	1MBI1200U4C-170	1MBI1200VC-170E *
		1600A	1MBI1600U4C-120	1MBI1600VC-120 *	1MBI1600U4C-170	1MBI1600VC-170E *
		2400A		1MBI2400VC-120 *		1MBI2400VC-170E *
	32 	2400A	1MBI2400U4D-120	1MBI2400VD-120 *	1MBI2400U4D-170	1MBI2400VD-170E *
		3600A	1MBI3600U4D-120	1MBI3600VD-120 *	1MBI3600U4D-170	1MBI3600VD-170E *
Chopper	33  EL Type	650A				1MBI650VXA-170EL-50 *
						1MBI650VXA-170EH-50 *
	34  EH Type	1000A				1MBI1000VXB-170EL-50 *
						1MBI1000VXB-170EH-50 *
		1400A				

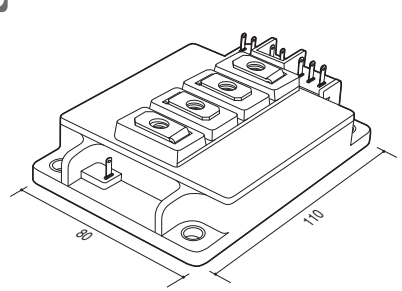
Note: • Suffix '-50' in production number indicates RoHS compliant. • No. 28: Gen.5 No. 29: Gen.6 * Under development

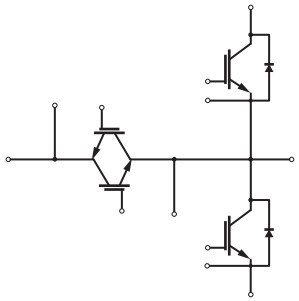
IGBT Advanced NPC 3-level Circuits

mm

3-level

35





Ic	600V Gen. 6 Trench-FS	1200V Gen. 6 Trench-FS
300A		4MBI300VG-120R-50
400A	4MBI400VG-060R-50 *	

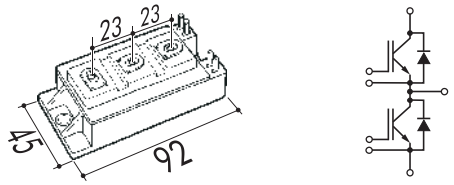
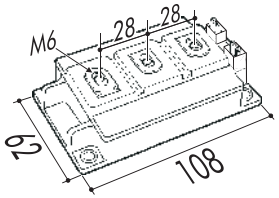
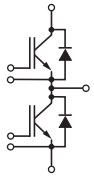
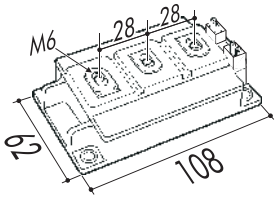
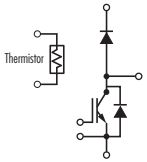
Note: Suffix '-50' in production number indicates RoHS compliant.

* Under development

e-Front runners

IGBT High Speed Modules

mm

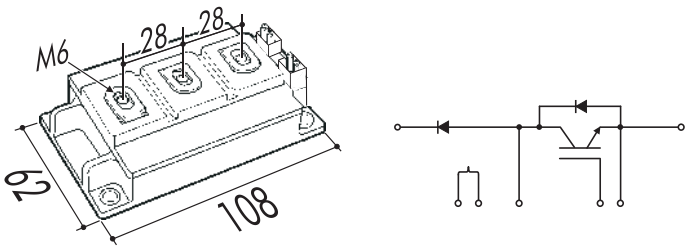
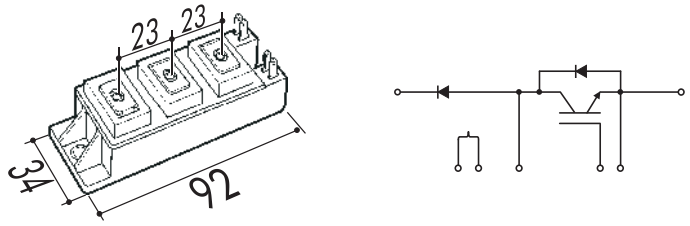
		Ic	1200V Gen. 6 Trench-FS
2 pack	36 	100A	2MBI100HB-120-50
2 pack	37  	150A	2MBI150HH-120-50
		200A	2MBI200HH-120-50
Chopper	38  	200A	1MBI200HH-120L-050 *
		300A	1MBI300HH-120L-050 *
		400A	1MBI400HH-120L-050 *

Note: Suffix '-50' in production number indicates RoHS compliant.

* Under development

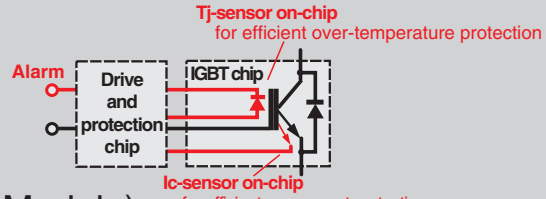
IGBT Chopper

mm

		Ic	600V Gen.5 Planar-NPT	1200V Gen.5 Trench-FS
Chopper	39 	200A		1MBI200U4H-120L-50
		300A	1MBI300U2H-060L-50	
	40 	50A		1MBI50U4F-120L-50
		75A		1MBI75U4F-120L-50
		100A		1MBI100U4F-120L-50

Note: Suffix '-50' in production number indicates RoHS compliant.

e-Front runners



IGBT IPM (Intelligent Power Module)

mm

			Ic	600V Gen. 6 Trench-FS	1200V Gen. 6 Trench-FS
Without brake-chopper	41		10A		6MBP10VAA120-50 *
			15A		6MBP15VAA120-50 *
			20A	6MBP20VAA060-50	
			25A		6MBP25VAA120-50 *
			30A	6MBP30VAA060-50	
			50A	6MBP50VAA060-50	
	42		25A		6MBP25VBA120-50
			35A		6MBP35VBA120-50
			50A	6MBP50VBA060-50	6MBP50VBA120-50
			75A	6MBP75VBA060-50	
Without brake-chopper	43		25A		6MBP25VDA120-50 *
			35A		6MBP35VDA120-50 *
			50A	6MBP50VDA060-50 *	6MBP50VDA120-50 *
			75A	6MBP75VDA060-50 *	6MBP75VDA120-50 *
			100A	6MBP100VDA060-50 *	6MBP100VDA120-50 *
			150A	6MBP150VDA060-50 *	
			200A	6MBP200VDA060-50 *	
With brake-chopper			25A		7MBP25VDA120-50 *
			35A		7MBP35VDA120-50 *
			50A	7MBP50VDA060-50 *	7MBP50VDA120-50 *
			75A	7MBP75VDA060-50 *	7MBP75VDA120-50 *
			100A	7MBP100VDA060-50 *	7MBP100VDA120-50 *
			150A	7MBP150VDA060-50 *	
			200A	7MBP200VDA060-50 *	
Without brake-chopper	44		100A		6MBP100VEA120-50 *
			150A		6MBP150VEA120-50 *
			200A	6MBP200VEA060-50 *	6MBP200VEA120-50 *
			300A	6MBP300VEA060-50 *	
			400A	6MBP400VEA060-50 *	
With brake-chopper			100A		7MBP100VEA120-50 *
			150A		7MBP150VEA120-50 *
			200A	7MBP200VEA060-50 *	7MBP200VEA120-50 *
			300A	7MBP300VEA060-50 *	
			400A	7MBP400VEA060-50 *	

Note: Suffix '-50' in production number indicates RoHS compliant.

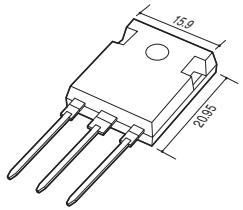
* Under development

IGBT Discretes

mm

TO-247

45



Ic	600V			1200V		
	Trench-FS V series	Trench-FS High Speed V series		Trench-FS V series	Trench-FS High Speed V series	
15A				FGW15N120VD *	FGW15N120HD	FGW15N120H
25A				FGW25N120VD *		
30A	FGW30N60VD *				FGW30N120HD	FGW30N120H
35A		FGW35N60HD	FGW35N60H			
40A				FGW40N120VD *	FGW40N120HD	FGW40N120H
50A	FGW50N60VD *	FGW50N60HD	FGW50N60H			
75A	FGW75N60VD *	FGW75N60HD	FGW75N60H			

* Under development

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