Mitsubishi Electric power modules are at the forefront of the latest energy innovations that seek to solve global environmental issues while creating a more affluent and comfortable society for all. Some of these innovations are photovoltaic (PV) and wind power generation from renewable energy sources, smart grids realizing efficient supply of power, hybrid/electric vehicles (HVs/EVs) that take the next step in reducing carbon emissions and fuel consumption, and home appliances that achieve ground-breaking energy savings. Whether in appliances, railcars, EVs or industrial systems, our power modules are key elements in changing the way energy is used.
Focus Technology

7th-Generation 1,200V-Class IGBT Chip Technology
Cutting-edge technology realizes energy-saving inverter devices

- Latest thin-wafer processing (n-drift layer) achieves thinner wafer than 6th-generation devices
- Performance improved by combining CSTBT™ and light punch-through (LPT) structures
- Inverter system power dissipation minimized using lower \( V_{CEsat} \) and \( E_{off} \)

*CSTBT: Mitsubishi Electric’s unique IGBT that makes use of carrier cumulative effect

• 1200V-class IGBT structure

Comparison of power loss

Modules realizing single-control power supply and photocoupler-less systems for household appliances and low-capacity inverters
Key Features
- Transfer-molded structure with insulation sheet having high heat conductivity simultaneously provides heat dissipation and insulation
- High-voltage IC equipped with drive, protection and level-shift circuits for direct control via input signals from a CPU or microcomputer
- Compact board and highly reliable equipment realized through single power-supply and photocoupler-less systems
- Includes built-in bootstrap diode (BSD)

Modules with built-in control and protection circuits for AC servo robots and PV power generation
Key Features
- Built-in protection circuit for short-circuiting, power supply undervoltage and overheating
- Highly compatible package with simplified printed circuit board (PCB) design
- Special intelligent power modules (IPMs) for power conditioners in PV power generation systems

IGBT modules for general-purpose inverters used in various applications
Key Features
- Various low-inductance packages and power chips available
- Compatible with high-frequency, high-voltage (1,700V) applications
- Large-capacity modules available for renewable energy systems

Modules meeting the high voltage, current and insulation requirements of inverters for traction
Key Features
- High isolation package (10.2kVrms: AC60Hz 1min) matched to high catenary voltage
- Lightweight modules with aluminum silicon carbide (AlSiC) baseplate available
- Range of HV diode modules enabling highly efficient comprehensive converter design

Modules realizing high performance and reliability as motor drives in HVs/EVs
Key Features
- Built-in temperature analog output function realizing highly reliable motor drive
- High-power/temperature cycle life ensures high reliability
- Compliant with the End-of-life Vehicles Directive, regulations relating to substances of environmental concern
- High traceability in managing materials/components throughout the entire production process for each product

Mitsubishi Electric power modules are at the forefront of the latest energy innovations that seek to solve global environmental issues while creating a more affluent and comfortable society for all. Some of these innovations are photovoltaic (PV) and wind power generation from renewable energy sources, smart grids realizing efficient supply of power, hybrid/electric vehicles (HVs/EVs) that take the next step in reducing carbon emissions and fuel consumption, and home appliances that achieve ground-breaking energy savings. Whether in appliances, railcars, EVs or industrial systems, our power modules are key elements in changing the way energy is used.

Feature Products

All-in-one intelligent power modules equipped with 3-phase converter and brake circuit in addition to inverter circuit

- Built-in BSD
- Built-in converter and brake enable system size to be reduced and save design cost, contributing to total cost reduction
- Lower PCB inductance pattern reduces noise, thereby reducing design time and countermeasure parts required for noise reduction
- Built-in BSD with 1,200V withstand voltage reduces number of external parts for power supply to drive the P-side reduces number of external peripheral parts required

*1 BSD: Bootstrap diode

Feature Products

Contributing to reducing annual Power consumption of high-end air conditioners by incorporating SJ-MOSFET

- SJ-MOSFET realizes approx. 80% smaller ON voltage during low-current operation compared to IGBT. It contributes to improving efficiency of air conditioner during steady-state operation especially
- Built-in IGBT function secures sufficient current capability during high-load operation
- Current rating lineup expanded to support 2.2-8.0kW class air conditioners
- External size, pin assignment, etc. secure compatibility with our Super-mini package products
- Built-in BSD* for power supply to drive the P-side reduces number of external peripheral parts required

*1 Compared to Super-mini DIPIPIM Ver.6 PSS15S92F6 (15A/600V)
*2 Super-mini package such as Super-mini DIPIPIM Ver.6 Series, etc.
*3 BSD : Bootstrap diode

Feature Products

Smaller package size realized by integrating newly designed RC-IGBT Recommended for low-cost inverter and fan controller applications

- RC-IGBT* incorporated, reducing package size 30% compared to Super-mini DIPIPIM
- Maximum case temperature increased from 100°C to 115°C, raising operating temperature range and leading to easier system design
- Additional terminals for floating supply and built-in bootstrap diodes simplify PCB wiring pattern
- Both VOT* and OT* functions integrated for temperature protection

*1 RC-IGBT: Reverse conducting IGBT
*2 VOT: Temperature information output function
*3 OT: Over-temperature protection function

PSS05MC1FT, PSS10MC1FT, PSS15MC1FT, PSS25MC1FT, PSS35MC1FT, PSS50MC1FT6

PSM10S94F6, PSM15S94H6, PSM20S94H6

PSM10S94F6, PSM15S94H6, PSM20S94H6

PSS50S92E6-AG, PSS35S92F6-AG, PSS30S92E6-AG, PSS20S92E6-AG, PSS20S92F6-AG, PSS15S92E6-AG, PSS15S92F6-AG, PSS10S92E6-AG, PSS10S92F6-AG, PSS05S92E6-AG, PSS05S92F6-AG

SLIMDIP™-S, SLIMDIP™-L

Power supply and control
Bootstrap capacitor
Shunt resistor
To motor

Feature Products

Internal circuit diagram

Output characteristics (Typical)
**Line-up of DIPIPMTM**

### Series Matrix of 600V / 500V DIPIPMTM

<table>
<thead>
<tr>
<th>Voss (V)</th>
<th>600V</th>
<th>500V</th>
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<tr>
<td>Ic (A)</td>
<td>SLIM</td>
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<tr>
<td>3</td>
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**Chip**

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</table>

**Application circuit of built-in BSD super-mini DIPIPMTM**

---

**Notes:**
- *1: PSS05S92F6 has OT function, PSS10S92F6 has V8 function*
- *2: Analog temperature output*
- *3: AC60H, 1 minute. Corresponds to isolation voltage 2500Vrms in the case of the convex-shaped heat sink*
- *4: High melting point solder (Lead Over 85%) is used for chip soldering of PSS05S92F6 only*
- *5: Pin plating and chip soldering: Lead-free solder*
- *6: Molding resin insulation for PSS05S92F6-C*
- *7: PSS05NC1F6 doesn't integrate brake part*
- *8: LVI 1pcs in case of PSS05NC1F6*

**Term:**
- CIB: Converter inverter brake
### Line-up of DIPIPM™

#### Series Matrix of 1200V DIPIPM™

<table>
<thead>
<tr>
<th>Ic (A)</th>
<th>1200V</th>
<th>Series</th>
<th>IGBT/MOSFET</th>
<th>Protective Function</th>
<th>Specifications</th>
<th>Options</th>
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</table>

**[Notes]**

1. Analog temperature output
2. Pin plating and chip soldering: Lead-free solder
3. PSS**NC1FT is not included brake.
4. LVIC 1pcs in case of PSS**NC1FT

**[Term]**

CIB: Converter inverter brake

---

#### Type Name Definition of DIPIPM™

![Type Name Definition of DIPIPM™](image-url)
New Products

Loaded with built-in functions, contributing to inverters with enhanced energy savings

IPM G1 Series with 7th-generation IGBT

<Main Features>
- Power loss has been reduced with the introduction of the 7th-generation IGBT produced using CSTBT™ and a diode incorporating a RFC² structure that contributes to reducing the power consumed in inverters.
- The new resin-insulated metal baseplate, the same as that for the 7th-generation IGBT modules introduced, eliminates the solder-attached section, and the thermal cycle lifetime has been increased, which contributes to improving inverter reliability.
- In addition to the built-in functions of the previous product,² a low-noise drive, error detection function and bootstrap power source⁴ contribute to lowering inverter noise and shortening design time.
- The introduction of press-fit pins and PC-TIM⁵ contribute to simplifying the inverter assembly process (optional).

*1 CSTBT™: Mitsubishi Electric’s unique IGBT that utilizes the carrier cumulative effect.
*2 RFC: Relaxed field cathode
*3 Conventional product: IPM L-Series
*4 Built-in functions: Supply Undervoltage lock protection (UV), Short-circuit protection (SC), Over-temperature protection (OT)
*5 PC-TIM: Phase change-thermal interface material

*A* package main pin shape and layout

For the “A” package 6-in-1 (CG1A) main pin shape, select either solder pin or screw type. For the pin layout, select either straight or L-shaped.

Main pin shape

Main pin layout

Main pin: Solder pin

Main pin: Screw

B or NC

Straight

L-shaped

Lineup

<table>
<thead>
<tr>
<th>Vces(V)</th>
<th>Package</th>
<th>Main pin shape</th>
<th>Connection</th>
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</table>

* Under Development

Representative reference is “A” package with screw terminal and straight layout (CG1A).
For the pin layout, select either straight or L-shaped.

**Main Features**
- Loaded with built-in functions, contributing to simplifying the inverter assembly process (optional).

Press-fit pins and PC-TIM contribute to reducing the power consumed in inverters.

- Bootstrap power supply: Optional products include 50A, 75A, 100A/650V, 25A, 50A/1200V.
- RFC: Relaxed field cathode lowering inverter noise and shortening design time.

**IPM G1 Series with 7th-generation IGBT**

### Line-up of IPM

<table>
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<tr>
<th>Series (kA)</th>
<th>G Series</th>
<th>L1 Series</th>
<th>S1 Series</th>
<th>VI Series</th>
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</table>

#### IGBT chip

- **Built-in emitter sensor**
  - CSTBT*1: Built-in temperature sensor
  - CSTBT*1: Built-in temperature sensor
  - CSTBT*1: Built-in temperature sensor
  - CSTBT*1: Built-in temperature sensor
  - CSTBT*1: Built-in temperature sensor

#### Compatibility

- **Compliant**
  - L Series
  - S-DASH SERVO
  - V Series

#### Connection

- **D**
  - B4
  - B5
  - B6
  - C
  - R

---

**Notes:**
- *1: Full-gate CSTBT*-2: PCM (Plugged Cell Merged) CSTBT*-3:
- Supply Under Voltage-lock protection, SC: Short-Circuit protection, OT: Over-temperature protection, OC: Over-current protection, CSTBT*-4: Mitsubishi Electric’s unique IGBT that makes use of the carrier cumulative effect
- RoHS: Restriction of hazardous substances in electrical and electronic equipment

---

[Term]

- UV: Supply Under Voltage-lock protection, SC: Short-Circuit protection, OT: Over-temperature protection, OC: Over-current protection, CSTBT*: Mitsubishi Electric’s unique IGBT that makes use of the carrier cumulative effect
- RoHS: Restriction of hazardous substances in electrical and electronic equipment
## Line-up of IPM

<table>
<thead>
<tr>
<th>Series Matrix of 1200V IPM</th>
<th>(No.: Number of outline drawing, see page 10 to 11)</th>
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### 1200V

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<th>L1 Series</th>
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<th>C Series</th>
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<td>PM50GAL120*</td>
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<table>
<thead>
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<th>IGBT chip</th>
<th>CSTBT&lt;sup&gt;1&lt;/sup&gt;</th>
<th>CSTBT&lt;sup&gt;1&lt;/sup&gt;</th>
<th>CSTBT&lt;sup&gt;1&lt;/sup&gt;</th>
<th>CSTBT&lt;sup&gt;1&lt;/sup&gt;</th>
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<tbody>
<tr>
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<td>P-side/N-side</td>
<td>P-side/N-side</td>
<td>N-side</td>
<td>P-side/N-side</td>
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<tr>
<td>DF</td>
<td>P-side/N-side</td>
<td>P-side/N-side</td>
<td>N-side</td>
<td>P-side/N-side</td>
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<tr>
<td>SC</td>
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<td>P-side/N-side</td>
<td>N-side</td>
<td>P-side/N-side</td>
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<tr>
<td>OC</td>
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</tbody>
</table>

**Notes:** 1: Full-gate CSTBT<sup>1</sup> 2: PCM (Plugged Cell Merged) CSTBT<sup>1</sup>

**Term:**
- UV: Supply Under Voltage-look protection
- SC: Short circuit protection
- OC: Over-current protection
- CSTBT<sup>1</sup>: Carrier stored trench-gate bipolar transistor
- RoHS: Restriction of hazardous substances in electrical and electronic equipment

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[Non-recommended] Please contact to the sales offices.
Line-up of IPM

Outline Drawing of IPM

10 PM50, 75, 100, 150CGB/RGB060
PM200CGBB060
PM25, 50, 75, 100CGB/RGB120

11 PM200, 300CGC/RGC060
PM100, 150, 200CGC/RGC120

12 PM50, 75, 100CGA/CGAL060
PM50, 75RGA060
PM25, 50CGA/CGAL120
PM25RGA120
Line-up of MOSFET Modules

### Series Matrix of MOSFET Modules

RoHS directive compliant

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<thead>
<tr>
<th>Voss (V)</th>
<th>75V</th>
<th>100V</th>
<th>150V</th>
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<tbody>
<tr>
<td>100</td>
<td>FM200TU-07A</td>
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<td>FM200TU-2A</td>
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<tr>
<td>200</td>
<td>FM400TU-07A</td>
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<td>FM400TU-2A</td>
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<tr>
<td>300</td>
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<td>FM600TU-2A</td>
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</table>

### Outline Drawing of MOSFET Modules

Unit: mm
New Products

Contributes to realizing smaller, energy-saving large-capacity inverters

T Series 7th-generation IGBT Module

<Main Features>

- Power loss has been reduced with the introduced of the 7th-generation IGBT produced using CSTB™ and a diode incorporating a relaxed field of cathode (RFC) structure, which contributes to reducing the power consumed in inverters.
- The new structure introduced eliminates the solder-attached section, and the thermal cycle lifetime has been increased, which contributes to improving the reliability of inverters.
- The introduction of press-fit pins and PC-TIM* contribute to simplifying the assembly process for inverters.

*1 PC-TIM: Phase change - pin interface material
*2 CSTB™: Mitsubishi Electric’s unique IGBT that makes use of the carrier cumulative effect.

New structure realizes improved reliability (improved thermal cycle lifetime)

NX package structure comparison

6th-generation IGBT

6th-generation IGBT

7th-generation IGBT

7th-generation IGBT

Compared to standard package structure

6th-generation IGBT

7th-generation IGBT

Resin insulated metal baseplate

Adopts SoLid Cover(SLC) Technology

* Under development
* New Product

Base board Solder Ceramic insulation board

Base board Solder Ceramic insulation board

DP resin Chip Wire

Chip Wire

Added pattern thickness

US bonding adopted

Thick metal substrate(TMS)
- Assembly process simplified

- **PC-TIM support**
  - Handling simple using heat dissipation grease
  - Heat dissipation application process eliminated
  - Contact heat resistance reduced through high thermal conductivity
  - High heat resistance improves quality
  - Disparity in contact heat resistance reduced by managing thickness

- **Press-fit terminal support (NX)**
  - Possible to select the control pin shape (soldered terminals/press-fit terminals)
  - Solder attachment process eliminated

**Series atrix of 7th-generation IGBT Modules**

<table>
<thead>
<tr>
<th>Vo(D) (V)</th>
<th>600V</th>
<th>1200V</th>
<th>1700V</th>
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<tr>
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<td>NX type</td>
<td>Std type</td>
<td>Connection</td>
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<td>75</td>
<td>CM100DX-13T**</td>
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</tbody>
</table>

* Under Development  ** New Product
Feature Products

Contributes to realizing smaller, energy-saving large-capacity inverters

Power Module for 3-level Inverter

- Main Features
  - Compatible with 3-level inverters, reducing power consumption approx. 30%∗1
  - New package developed∗2 contributing to lower inductance and simplified inverter circuit structure
  - IGBT specifications optimized∗3 with development of new compact, low-inductance package
  - 4-in-1* and 1-in-1/2-in-1* lineup contributes to improved compactness and freedom in inverter design

*1 Comparison between 3-level inverter incorporated in this device and 2-level inverter in conventional device.
*2 1-in-1/2-in-1 type external dimensions of 130x67mm, 4-in-1 type external dimensions of 115x82mm, new package developed with innovative terminal positioning.
*3 IGBT specifications optimized for 3-level inverters, adopting CSTBT (Mitsubishi Electric’s unique IGBT that makes use of the carrier cumulative effect).
*4 4-in-1 module with one 3-level inverter arm in one package.
*5 Bidirectional switch model as emitter common connection.

Lineup

<table>
<thead>
<tr>
<th>Main application</th>
<th>Model</th>
<th>Module type</th>
<th>Rated voltage</th>
<th>Rated current</th>
<th>Circuit structure</th>
<th>External dimensions</th>
<th>WxD (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-500kW inverter</td>
<td>CM400ST-24S1</td>
<td>IGBT</td>
<td>1200V</td>
<td>400A</td>
<td>4-in-1</td>
<td>115x82</td>
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<tr>
<td>500kW - inverter</td>
<td>CM1400HA-24S</td>
<td>IGBT</td>
<td>1200V</td>
<td>1400A</td>
<td>1-in-1</td>
<td>130x67</td>
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<tr>
<td></td>
<td>RM1400HA-24S</td>
<td>Diode</td>
<td>1200V</td>
<td>1400A</td>
<td>1-in-1</td>
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<td>CM1000HA-34S</td>
<td>IGBT</td>
<td>1700V</td>
<td>1000A</td>
<td>1-in-1</td>
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</tbody>
</table>

Evolution of IGBT Module Series

- 4th-generation of IGBT
  - F Series
    - Standard (Std) type
    - NF Series
    - Standard (Std) type
    - NFH Series
    - MPD type
  - A Series
    - NX type
    - Standard (Std) type

- 5th-generation of IGBT
  - S Series, S1 Series
    - NX type
    - Standard (Std) type
    - MPD type
    - 3-Level type

- 6th/7th-generation of IGBT
  - T Series
    - NX type
    - Standard (Std) type

Type Name Definition of IGBT Modules

<table>
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<tr>
<th>CM 150 DY -24 NF</th>
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<tbody>
<tr>
<td>Series name</td>
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<tr>
<td>Voltage class</td>
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<tr>
<td>Outline drawing</td>
</tr>
<tr>
<td>and other</td>
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<td>specifications</td>
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<td>Connection type</td>
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<tr>
<td>Rated current</td>
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<tr>
<td>capacity</td>
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<tr>
<td>IGBT module</td>
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</tbody>
</table>

Features of IGBT Module Series

- S Series
  - Lineup includes various package types
  - 6th-generation CSTBT™ delivers low-loss performance
  - Thinner package (Height: 17mm) (NX type)
  - Suited to large-capacity applications (1200V/2500A, 1700V/1800A) (MPD type)

- NFH Series
  - High-speed CSTBT™ delivers low-loss performance
  - Soft switching (resonant) turn-off function (ZVS)
  - Enhanced inner wire (skin effect)

CSTBT™: Mitsubishi Electric’s unique IGBT that makes use of the carrier cumulative effect.
Line-up of IGBT / Diode Modules

### Matrix of 600V IGBT Modules (No.: Number of outline drawing, see page 19 to 20)

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### Matrix of Power Module for 3-level Inverter (No.: Number of outline drawing, see page 22 to 23)

<table>
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<th>Voltage</th>
<th>IC/If</th>
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<th>1200V Diode Module</th>
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<td>RM1400HA-24S*</td>
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* New Product

RoHS directive (2011/65/EU) compliant
Line-up of IGBT Modules

Matrix of 6th/6.1th-generation of IGBT Modules <S Series / S1 Series> 1200V/1700V

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<th>Series</th>
<th>Nk type</th>
<th>NX type</th>
<th>MPD type</th>
<th>Connection No.</th>
<th>std type</th>
<th>MPD type</th>
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Connection

RoHS directive (2011/65/EU) compliant

Note: Number of Outline Drawing, see page 19 to 23

*: New Product
# Series Matrix of IGBT Modules 1200V/1700V

<table>
<thead>
<tr>
<th>1200V</th>
<th>1700V</th>
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<tr>
<td><strong>Series</strong></td>
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<td>1400</td>
<td>CM1400DUC-24NF</td>
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</tbody>
</table>

**Connection**

- **H**, **D**, **T**, **R**, **E3**

*Non-recommended* Please contact to the sales offices.
Line-up of IGBT Modules

Outline Drawing of IGBT Modules

01 CM75,100MX-12A

02 CM100,150,200RX-12A CM75RX-24S

03 CM300,400DX-12A CM150,200DX-24S

04 CM35,50,75,100MXA-24S

05 CM75TX-24S

06 CM600,1000DXL-24S

07 CM75,100,150TL/RL-12NF CM50,75,100TL/RL-24NF

08 CM150,200,300DY-12NF CM100,150DY-24NF CM100,150,200DY-24A CM75,100DY-34A CM100,150E3Y-24NF

09 CM200TL/RL-12NF CM150,200TL/RL-24NF

Unit: mm
Line-up of IGBT Modules

19. CM1800DY-34S
CM2500DY-24S

20. CM75RX-34S

21. CM150DX-34SA
CM200DX-34SA
CM300DX-34SA

22. CM200RXL-24S
CM300RXL-24S
CM150RXL-34SA

23. CM450DXL-34SA
CM600DXL-34SA

24. CM75MxA-34SA

25. CM150EXS-24S
CM200EXS-24S
CM300EXS-24S
CM200EX-34SA

26. CM100TX-24S
CM150TX-24S

27. CM100RX-24S
CM150RX-24S

Outline Drawing of IGBT Modules

Unit: mm
Line-up of IGBT Modules

- Outline Drawing of IGBT Modules

| 37 | CM500C2Y-24S  
    | CM1400HA-24S  
    | CM1000HA-34S  
    | RM1400HA-24S  |

| 38 | CM100,150,200TXP-13T  
    | CM100,150,200TXP-24T |

| 39 | CM150,200RXP-13T  
    | CM100,150RXP-24T  |

| 40 | CM300,450,600DXP-13T  
    | CM225,300,450,600DXP-24T |

| 41 | CM1000DXP-24T  

Unit: mm
**New Products**

Industry-leading power and operating temperature range for smaller, higher-capacity inverter systems

X Series HVIGBT Modules (6,500V/1,000A)

### Main Features
- Power loss reduced by incorporating 7th-generation IGBT and RFC*1 diode
- Maximum operation temperature of 150 degrees Celsius, a world's first*2 for the 6.5kV class
- High SOA capability, high snap-off tolerance
- Thermal resistance improved approx. 10% compared to using LNFLR structure*3 (CM750HG-130R)
- Replacement is simple using package compatible with IGBT H Series and R Series modules

*1 RFC: Relaxed field of cathode
*2 As of May 2015, based on Mitsubishi Electric research
*3 LNFLR: Linearly-Narrowed Field Limiting Ring

#### Increased current capacity

<table>
<thead>
<tr>
<th>V (kV)</th>
<th>H Series (190mm x 140mm)</th>
<th>X Series (190mm x 140mm)</th>
<th>X Series (130mm X 140mm)</th>
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<tbody>
<tr>
<td>3.3kV</td>
<td>1200A (400A/segment)</td>
<td>1800A (600A/segment)</td>
<td>1200A (600A/segment)</td>
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<td>(190mm x 140mm)</td>
<td>(190mm x 140mm)</td>
<td>(130mm X 140mm)</td>
</tr>
<tr>
<td>4.5kV</td>
<td>900A (300A/segment)</td>
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<td>6.5kV</td>
<td>600A (200 A/segment)</td>
<td>900A (300A/segment)</td>
<td>600A (300A/segment)</td>
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<td></td>
<td>(200 A/segment)</td>
<td>(300A/segment)</td>
<td>(300A/segment)</td>
</tr>
</tbody>
</table>

1. Current capability is increased 1.5 times for the same package size.
2. Same current capability is realized in smaller package.

#### Characteristics graph

**Output current characteristics**

Condition: Tj=125°C, Vcc=3600V, P.F=0.85, fo=50Hz, Tf=80°C

- X Series vs R Series
- Saturation voltage between collector and emitter
- Heat resistance comparison

#### LNFLR structure (edge termination optimized)

- Increased 28%
- Edge termination
- Active chip area

Compared to previous product*, active chip area is increased 28% by optimizing edge termination.

* CM750HG-130R
Line-up of HV Modules

### Series Matrix of HVIGBT/HVIPM (No.: Number of outline drawing, see page 26 and 27)

<table>
<thead>
<tr>
<th>Icon</th>
<th>1700V</th>
<th>2500V</th>
<th>3300V</th>
<th>4500V</th>
<th>6500V</th>
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<td>Type No.</td>
<td>Connection</td>
<td>Type No.</td>
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<tr>
<td>200</td>
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<td>D HA 07</td>
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<tr>
<td>400</td>
<td>CM600DY-34H</td>
<td>D HA 01</td>
<td>CM400DY-66H</td>
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<tr>
<td>600</td>
<td>CM800DZB-34N</td>
<td>D NB 01</td>
<td>CM1200HCB-50H</td>
<td>H HC 03</td>
<td>CM800HC-66H</td>
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<tr>
<td>900</td>
<td>CM800DZ-34H</td>
<td>D HB 01</td>
<td>CM2400HE-66H</td>
<td>H HC 03</td>
<td>CM800HC-66H</td>
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<tr>
<td>1000</td>
<td>CM1200HC-34N</td>
<td>H HB 03</td>
<td>CM1200HCB-34N</td>
<td>H HB 03</td>
<td>CM1200HCB-34N</td>
</tr>
<tr>
<td>1200</td>
<td>CM1200DB-34N</td>
<td>D N 04</td>
<td>CM1200HC-50H</td>
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<td>1500</td>
<td>CM1200CH-34N</td>
<td>H HC 02</td>
<td>CM1200HC-50H</td>
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### Series Matrix of HVDIODE Modules (No.: Number of outline drawing, see page 28)

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<td>Connection</td>
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<td>RM200DG-130S</td>
<td>D SD 18</td>
<td>RM200DG-130F</td>
<td>D FG 18</td>
</tr>
<tr>
<td>300</td>
<td>RM400DG-90S</td>
<td>D SD 18</td>
<td>RM400DG-90F</td>
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</tr>
<tr>
<td>400</td>
<td>RM400DG-66S</td>
<td>D SD 18</td>
<td>RM400DG-90F</td>
<td>D FG 18</td>
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<tr>
<td>600</td>
<td>RM600DY-66S</td>
<td>D SD 18</td>
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<td>RM1800HE-34S</td>
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</table>

### Type Name Definition of IGBT Modules

- **Series name**: Outline drawing and package type
- **Voltage class**: Rating current class
- **Connection type**: Connection
- **Rating current class**: Outline drawing and package type
- **Series name**: Outline drawing and package type
- **Voltage class**: Rating current class
- **Connection type**: Connection
- **Rating current class**: Outline drawing and package type

- **Under Development**: Indicates that the product is in development and may not be available for immediate purchase.
- **New Product**: Indicates a newly released product.
- **High-Insulation package**: Indicates that the product is designed for high insulation levels, typically with specified voltage ratings.

- **Under Development**: Please contact the sales office for more information.
- **New Product**: New IGBT modules.

**Type Description**:
- **Series**: (Low-loss) F: ASIC base plate, FG*: ASIC base plate
- **Series**: (Standard) SH: ASIC base plate, SD: Cu base plate, SG*: ASIC base plate
- **Series**: Under Development
- **New Product**: New IGBT modules.

**Notes**:
- Under Development: Please contact the sales office.
- High-Insulation package (10.2kV, AC 1min.)
Outline Drawing of HVIGBT Modules

16. RM1200DB-34S

17. RM1800HE-34S
   RM1200HE-66S
   RM600HE-90S

18. RM400,1200DG-66S
    RM300DG-90S
    RM400,800,1200DG-90F
    RM200,600DG-130S
    RM250DG-130F

19. RM400,600DY-66S

20. RM1000,1500DC-66F

21. RM1200DB-66S
    RM900DB/HC-90S

Unit: mm
Power Modules for Electric and Hybrid Vehicles

New Products

Package with 6-in-1 connection and integrated water-cooled fin contributes to more compact, high-power inverters for automobiles

Matrix of 650V and 900V Power Modules (No.: Number of outline drawing, please refer to page 30)

Matrix of 1200V Power Modules (No.: Number of Outline Drawing, please refer to page 30)

Features

Common

- Long power/temperature cycle life
- High-precision on-chip temperature sensor
- High traceability in managing materials/components for each product throughout the entire production process

J Series T-PM (Transfer-molded Power Module)

- Structure incorporates transfer modeling and original direct lead bonding (DLB) technique
- DLB structure reduces internal wiring resistance and inductance
- Completely Pb-free (including the pins)

J Series IPM

- Drive circuit and protection circuits for short-circuiting, power supply undervoltage and overheating
- Built-in isolated switching power supply for IGBT drive and IPM control functions (PM600CJG060G, PM500CJG120G)
- Redundancy function for failsafe design and high system performance, chip temperature analog output function and DC-link voltage analog output function
- Built-in automotive-grade photocouplers and interface connector(s)

Matrix of 650V and 900V Power Modules

Rating current class

Type Name Definition of Power Modules for Electric and Hybrid Vehicles

PM 500 C JG 120 G

Options
Voltage class
Series name and structure
Connection type
Rating current class
CT: IGBT, PM: IPM
Power Modules for Electric and Hybrid Vehicles

Matrix of 1200V Power Modules (No. : Number of Outline Drawing, please refer to page 30)

- **Connection**
  - Common inductance
  - DLB structure reduces internal wiring resistance and lead bonding (DLB) technique

**Features**
- Direct lead bonding (DLB) structure ensures high reliability connection contribute to more compact inverters for automobiles
- Integrated direct water-cooling structure with cooling fins and 6-in-1 <Main Features>
  - Package with 6-in-1 connection and integrated water-cooled fin
  - Suitable for a variety of electric and hybrid vehicle inverters
  - Completely lead-free, conforms to RoHS directives (2011/65/EU)

**High Power J1 Series Power Modules for Automobiles**
- CT300CJ1A060
- CT300CJ1A120
- CT400CJ1A090
- CT600CJ1A060

**CT300CJ1A060**
- 800 V
- 300 A
- FL 128.8 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**CT300CJ1A120**
- 800 V
- 120 A
- FL 128.8 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**CT400CJ1A090**
- 800 V
- 90 A
- FL 128.8 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**CT600CJ1A060**
- 800 V
- 60 A
- FL 128.8 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**CT1000CJ1B120**
- 1200 V
- 120 A
- FL 244.5 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**CT600CJ1B120**
- 1200 V
- 120 A
- FL 244.5 W
- L 30 ± 0.1 mm
- H 10.1 ± 0.1 mm
- W 14 ± 0.1 mm

**PM with pin fin**
- Built-in automotive-grade photocouplers and interface connector(s)
- Performance, chip temperature analog output function and IPM control functions
- Built-in isolated switching power supply for IGBT drive and supply* undervoltage and overheating
- Drive circuit and protection circuits for short-circuiting, power supply regulations relating to substances of environmental concern
- Package structure compliant with the End-of-Life-Vehicles Directive, regulations relating to substances of environmental concern

**Outline Drawing of Power Modules for Electric and Hybrid Vehicles**

Unit: mm
## Authorised Distributors for Mitsubishi Electric Power Semiconductors

<table>
<thead>
<tr>
<th>Country</th>
<th>Name</th>
<th>Address</th>
<th>Phone Numbers</th>
<th>Email/Website</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Austria</strong></td>
<td>GLYN AUSTRIA</td>
<td>Campus 21 / Businesspark Wien Süd</td>
<td>+43 (01) 890 3202 0</td>
<td><a href="mailto:sales@glyn.at">sales@glyn.at</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liebermannstr. A02/301, A-2345 Brunn am Gebirge</td>
<td>+43 (01) 890 3202 20</td>
<td><a href="http://www.glyn.at">www.glyn.at</a></td>
</tr>
<tr>
<td></td>
<td>HY-LINE COMPONENTS GmbH</td>
<td>Inselkammerstr. 10, D-82008 Unterhaching</td>
<td>+49 (0)89 61 45 03 10</td>
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<td>Fax +375 (17) 292-6372</td>
<td><a href="http://www.symmetron.ru">www.symmetron.ru</a></td>
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<td><a href="http://www.glyn.com">www.glyn.com</a></td>
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<td><a href="http://www.glyn-nordic.dk">www.glyn-nordic.dk</a></td>
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<td><a href="mailto:yfouletier@compelec.com">yfouletier@compelec.com</a></td>
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</tbody>
</table>
Power Modules for Electric and Hybrid Vehicles

Matrix of 650V and 900V Power Modules (No.: Number of outline drawing, please refer to page 30)

Matrix of 1200V Power Modules (No.: Number of outline drawing, please refer to page 30)

- High traceability in managing materials/components for each
- High-precision on-chip temperature sensor
- Long power/temperature cycle life
- Common DLB structure reduces internal wiring resistance and lead bonding (DLB) technique

**Features**

- Direct lead bonding (DLB) structure ensures high reliability
- Connection contribute to more compact inverters for automobiles

**Main Features**

- Completely lead-free, conforms to RoHS directives (2011/65/EU)

**Series name and Voltage class**

<table>
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<tr>
<th>Voltage class</th>
<th>Series name</th>
<th>CT1000CJ1B060</th>
<th>CT300CJ1A120</th>
<th>CT600CJ1A060</th>
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<td>PM</td>
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</tbody>
</table>

**Package structure compliant with the End-of-Life-Vehicles Directive,**

- Built-in automotive-grade photocouplers and interface connector(s)
- Performance, chip temperature analog output function and redundancy function for failsafe design and high system performance
- Drive circuit and protection circuits for short-circuiting, power supply interruption and overcurrent protection

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