

MDM500H65E2

FEATURES

- * Low noise recovery: Ultra soft fast recovery diode.
- * High reverse recovery capability:
Super HiRC Structure.
- * High reliability, high durability diodes.
- * Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

| Item | Symbol | Unit | MDM500H65E2 |
|---------------------------------|------------------------------|------------------|--|
| Repetitive Peak Reverse Voltage | V _{R_{RRM}} | V | T _{vj} = 125°C 6,500 |
| | | | T _{vj} = 25°C 6,500 |
| | | | T _{vj} = -40°C 6,000 |
| Forward Current | I _F | A | DC 500 |
| | | | 1ms 1,000 |
| Operating Junction Temperature | T _{vj op} | °C | -40 ~ +125 |
| Storage Temperature | T _{stg} | °C | -50 ~ +125 |
| Isolation Test Voltage | V _{ISO} | V _{RMS} | Terminals-base 10,200(AC 1 minute) |
| | V _{ISO T-T} | | Terminal 1-Terminal 2 10,200(AC 1 minute) |
| Screw Torque | - | N·m | Terminals (M8) 10 (1) |
| | - | | Mounting (M6) 6 (2) |

Notes: (1) Recommended Value 9±1N·m (2) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

| Item | Symbol | Unit | Min. | Typ. | Max. | Test Conditions |
|--------------------------------------|------------------------------|------------------|-------|------|------|---|
| Repetitive Reverse Current | I _{R_{RRM}} | mA | - | 7 | 50 | V _R =6,500V, T _{vj} =150°C |
| Forward Voltage Drop | V _F | V | - | 3.7 | - | I _F =500A, T _{vj} =25°C |
| | | | 3.7 | 4.1 | 4.6 | I _F =500A, T _{vj} =125°C |
| Reverse Recovery Time | t _{rr} | μs | - | 0.8 | - | V _R =3,600V, I _F =500A, L _S =200nH |
| Reverse Recovery Loss | E _{rr(10%)} | J/P | - | 1.65 | 2.1 | T _{vj} =125°C, R _G =12Ω (3) |
| | E _{rr(full)} | J/P | - | 1.8 | - | |
| Partial discharge extinction voltage | V _e | V _{RMS} | 5,000 | - | - | f=50Hz, Q _{PD} ≤10pC(acc. to IEC 61287) |

Notes: (3) Counter arm; MBN500H65E2 V_{GE}=+/-15V

R_G value is the test condition's value for evaluation of the switching times, not recommended value.

Please, determine the suitable R_G value after the measurement of switching waveforms

(overshoot voltage, etc.) with appliance mounted

PACKAGE CHARACTERISTICS

| Item | Symbol | Unit | Min. | Typ. | Max. | Test Conditions |
|----------------------------|--|------|------|-------|-------|--------------------------------|
| Terminal Resistance | R _{C_E} | mΩ | - | 0.3 | - | per arm, T _{vj} =25°C |
| Stray inductance module | L _{S_{C_E}} | nH | - | 42 | - | per arm |
| Thermal Impedance | R _{th(j-c)} | K/W | - | - | 0.026 | Junction to case (per arm) |
| Comparative tracking index | CTI | | - | 600 | - | |
| Contact Thermal Impedance | R _{th(c-f)} | K/W | - | 0.007 | - | Case to fin |

* Please contact our representatives at order.

* For improvement, specifications are subject to change without notice.

* For actual application, please confirm this spec sheet is the newest revision.

MDM500H65E2

DEFINITION OF TEST CIRCUIT

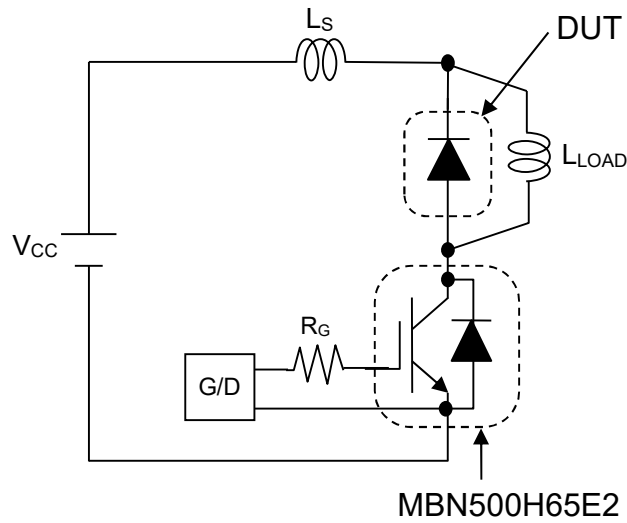


Fig.1 Switching test circuit

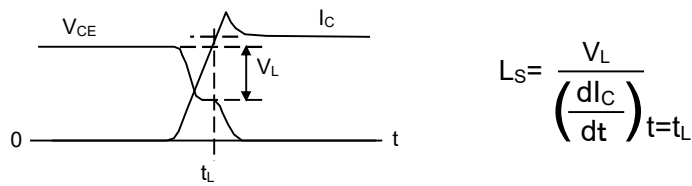


Fig.2 Definition of stray inductance

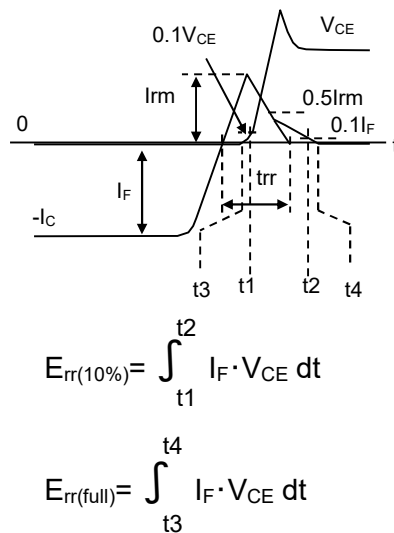
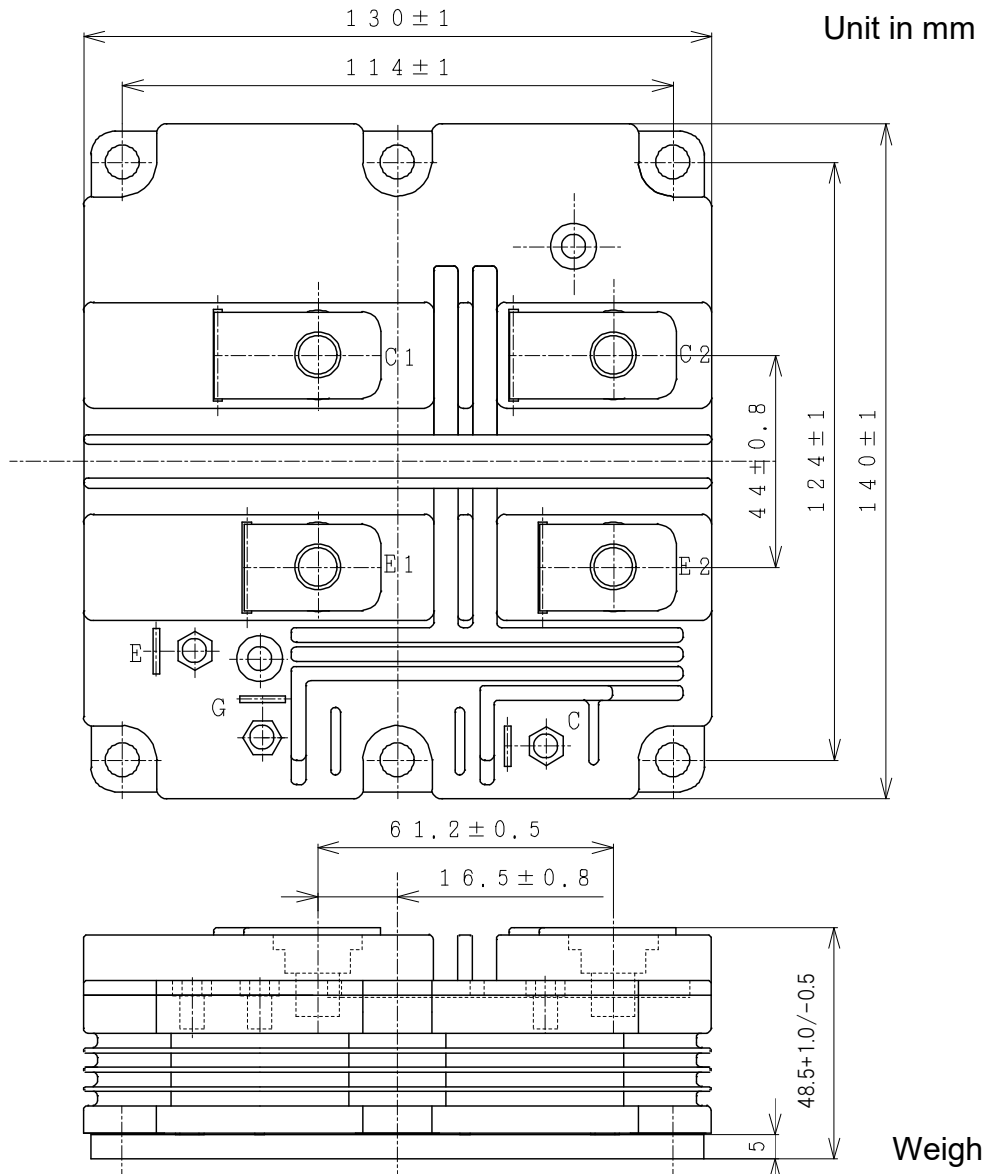


Fig.3 Definition of switching loss

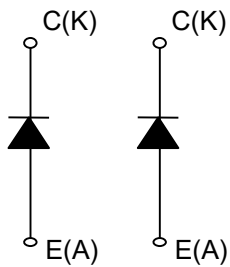
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OUTLINE DRAWING

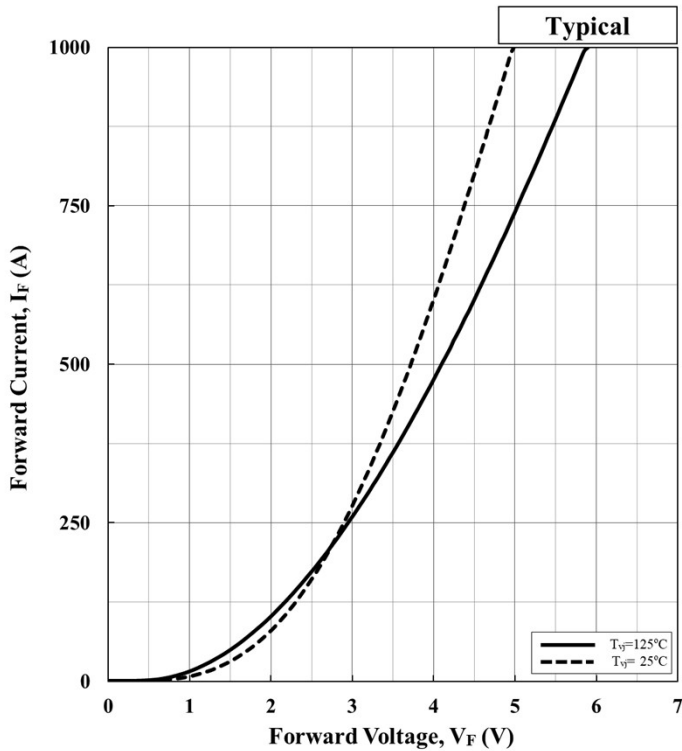


Weight: 1,050g

CIRCUIT DIAGRAM



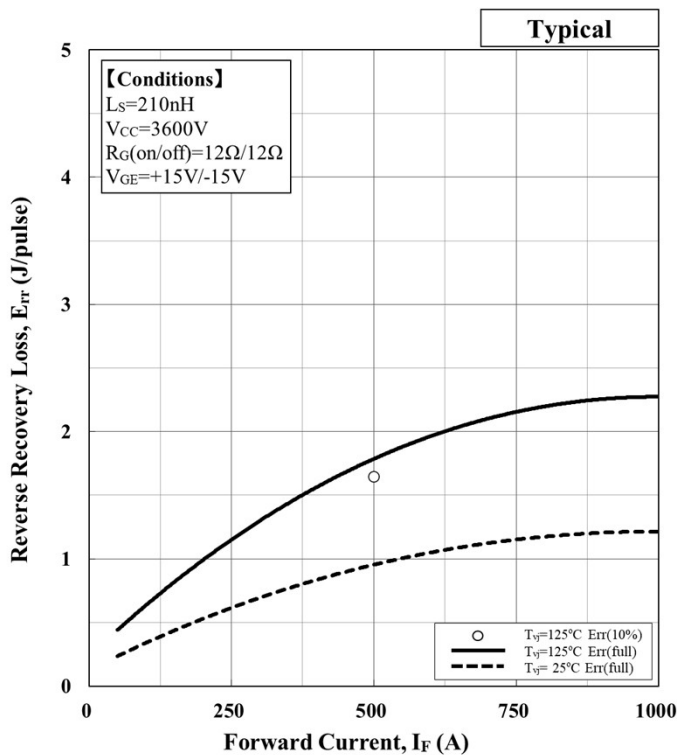
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$$V_F[V] = a_3 \cdot |I_F|^3 + a_2 \cdot |I_F|^2 + a_1 \cdot |I_F| + a_0$$

| Temp.[°C] | a_3 | a_2 | a_1 | a_0 |
|-----------|----------|-----------|----------|----------|
| 25 | 2.93E-09 | -6.34E-06 | 6.92E-03 | 1.50E+00 |
| 125 | 2.89E-09 | -6.62E-06 | 8.45E-03 | 1.19E+00 |

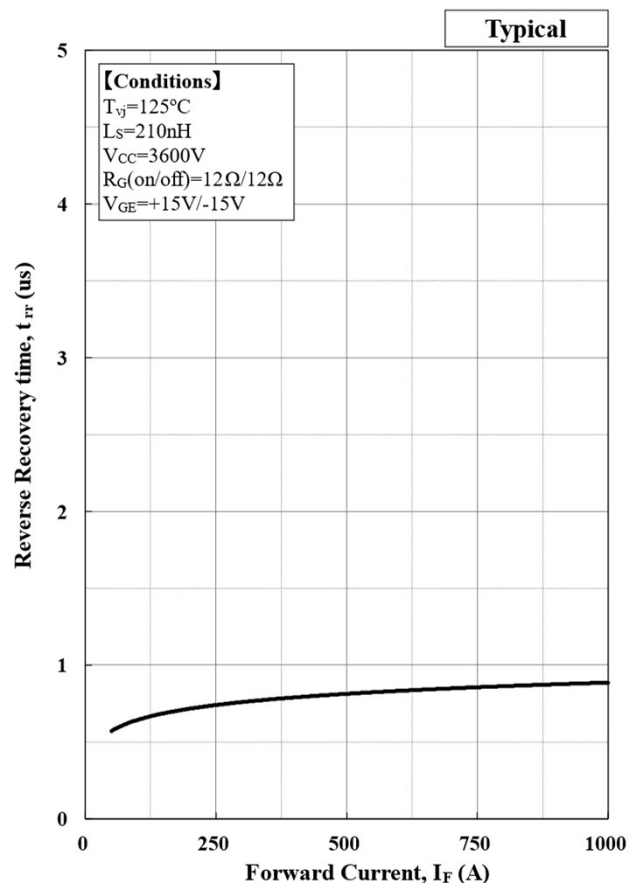
Forward Voltage of diode



$$E [J] = a_3 \cdot |I_F|^3 + a_2 \cdot |I_F|^2 + a_1 \cdot |I_F| + a_0$$

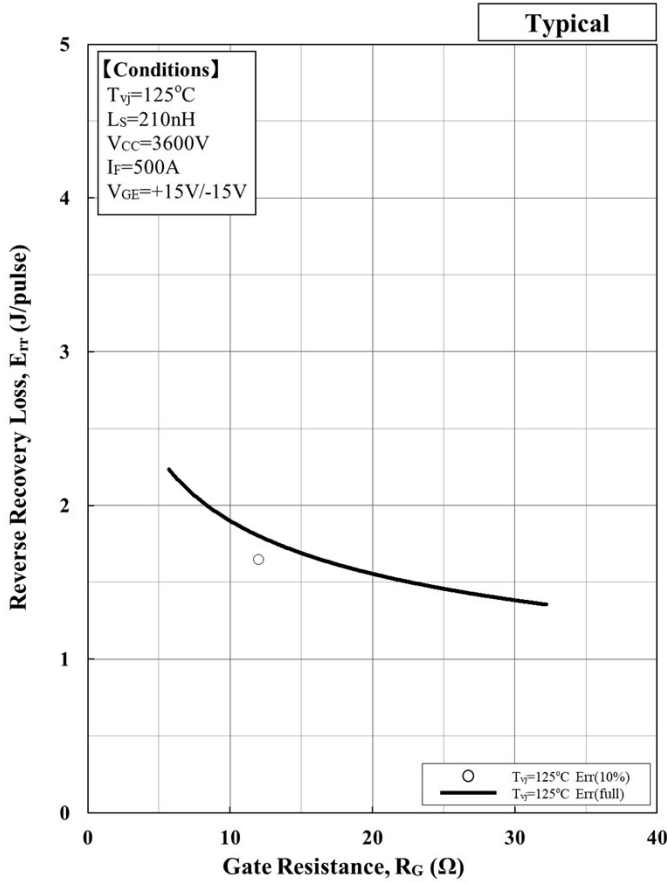
| Temp.[°C] | a_3 | a_2 | a_1 | a_0 |
|-----------|----------|-----------|----------|----------|
| 25 | 8.99E-11 | -1.27E-06 | 2.27E-03 | 1.25E-01 |
| 125 | 1.68E-10 | -2.38E-06 | 4.25E-03 | 2.35E-01 |

Recovery loss vs. Forward current

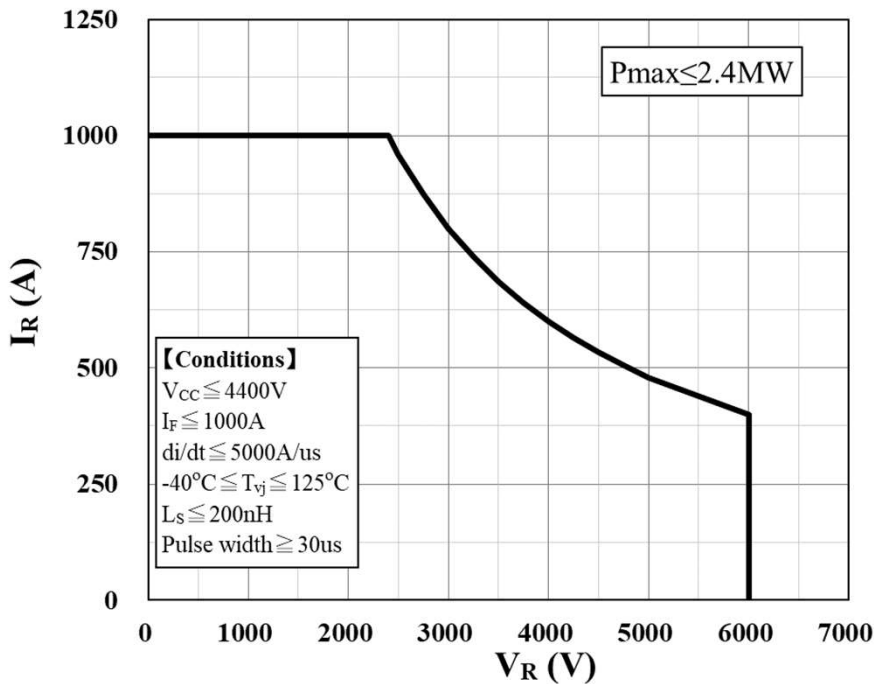


Reverse Recovery time vs. Forward Current

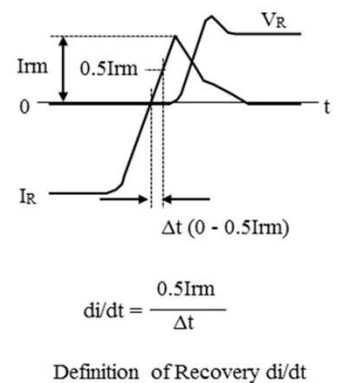
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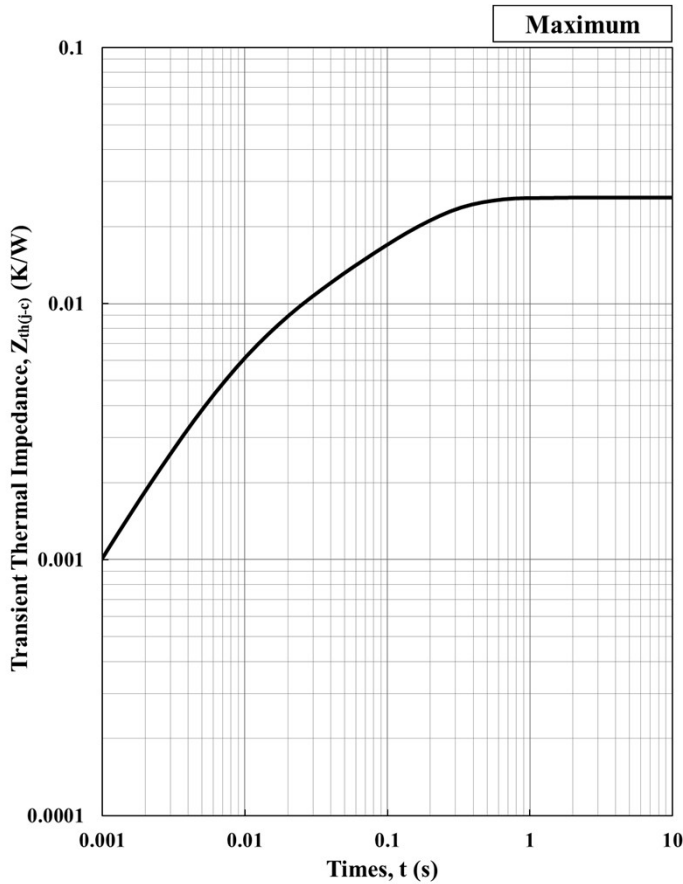
Reverse Recovery loss vs. Gate Resistance



(Defined at power terminal)
Reverse Recovery Safe Operation Area (RRSOA)



MDM500H65E2



Transient Thermal Impedance Curve

Foster model lumped circuit constant

| n | 1 | 2 | 3 | 4 |
|-----------------|----------|----------|----------|----------|
| R th, Diode [n] | 1.61E-02 | 5.01E-03 | 4.65E-03 | 1.98E-04 |
| C th, Diode [n] | 1.02E+01 | 5.74E+00 | 1.50E+00 | 4.72E+00 |

Cauer model lumped circuit constant

| n | 1 | 2 | 3 | 4 |
|-----------------|----------|----------|----------|----------|
| R th, Diode [n] | 4.02E-03 | 5.26E-03 | 8.17E-03 | 8.52E-03 |
| C th, Diode [n] | 8.70E-01 | 5.02E-01 | 4.18E+00 | 1.15E+01 |

Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

| Material | Contained part |
|-----------------------------|----------------|
| Lead (Pb) and its compounds | Solder |

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Minebea POWER SEMICONDUCTORS

Notices

1. Since mishandling of semiconductor devices may cause malfunctions, please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
2. When designing an electronic circuit using semiconductor devices, please do not exceed the absolute maximum rating specified for the device under any external fluctuations. And for pulse applications, please also do not exceed the "Safe Operating Area (SOA)".
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5. A semi-processed article is done now using solder which contains lead inside the semiconductor devices. There is possibility of the regulation substance depend on the applied models, so please check before using.
6. This specification is a material for component selection, which describes specifications of power semiconductor devices (hereinafter referred to as products), characteristic charts, and external dimension drawings.
7. The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact with Minebea power semiconductor sales department for the latest version of this data sheets.
8. For handling other than described in this manual, follow the handling instructions (IGBT-HI-00002).

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- For inquiries relating to the products, please contact nearest representatives that is located "Inquiry" portion on the top page of a home page.
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Minebea POWER SEMICONDUCTORS

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