

# MDM800H45E2-H

## FEATURES

- \* Low Reverse Recovery Loss diode module.
- \* 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<sub>C</sub>=25°C)

Item	Symbol	Unit	MDM800H45E2-H
Repetitive Peak Reverse Voltage	V <sub>RRM</sub>	V	4,500
Forward Current	DC	A	800
	1ms		1,600
Operating Junction Temperature	T <sub>vj op</sub>	°C	-40 ~ +125
Storage Temperature	T <sub>stg</sub>	°C	-50 ~ +125
Isolation Test Voltage	Terminals-base	V <sub>ISO</sub>	10,200(AC 1 minute)
	Terminal 1-Terminal 2	V <sub>ISO T-T</sub>	10,200(AC 1 minute)
Screw Torque	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 <sub>RRM</sub>	mA	-	1.4	17	V <sub>R</sub> =4,500V, T <sub>vj</sub> =125°C
Forward Voltage Drop	V <sub>F</sub>	V	-	4.2	4.7	I <sub>F</sub> =800A, T <sub>vj</sub> =125°C
Reverse Recovery Time	t <sub>rr</sub>	μs	-	0.9	1.8	V <sub>R</sub> =2,600V, I <sub>F</sub> =800A, L <sub>S</sub> =190nH
Reverse Recovery Loss	E <sub>rr(10%)</sub>	J/P	-	1.8	2.7	T <sub>vj</sub> =125°C, R <sub>G</sub> =4.7Ω (3)
Partial discharge extinction voltage	V <sub>e</sub>	V <sub>RMS</sub>	3,500	-	-	f=50Hz, Q <sub>PD</sub> ≤10pC(acc. to IEC 61287)

Notes: (3) Counter arm; MBN800H45E2-H V<sub>GE</sub>=±15V

R<sub>G</sub> value is the test condition's value for evaluation of the switching times, not recommended value.

Please, determine the suitable R<sub>G</sub> 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 <sub>CE</sub>	mΩ	-	0.3	-	per arm, T <sub>vj</sub> =25°C
Stray inductance module	L <sub>SCE</sub>	nH	-	42	-	per arm
Thermal Impedance	R <sub>th(j-c)</sub>	K/W	-	-	0.026	Junction to case (per arm)
Comparative tracking index	CTI	-	-	600	-	
Contact Thermal Impedance	R <sub>th(c-f)</sub>	K/W	-	0.007	-	Case to fin(λgrease=1W/(m·K), heat-sink flatness ≤50um)

\* 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.

# MDM800H45E2-H

## DEFINITION OF TEST CIRCUIT

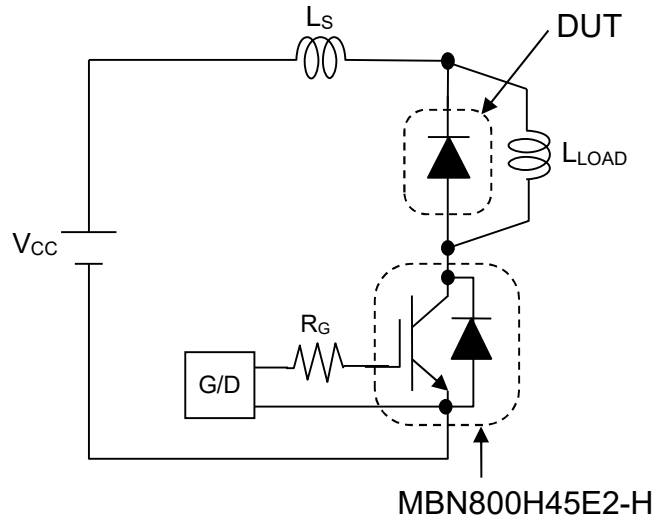


Fig.1 Switching test circuit

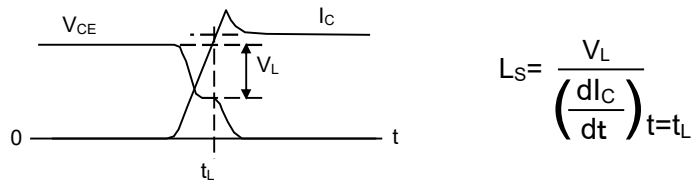
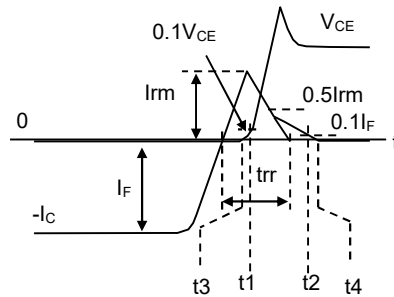


Fig.2 Definition of stray inductance



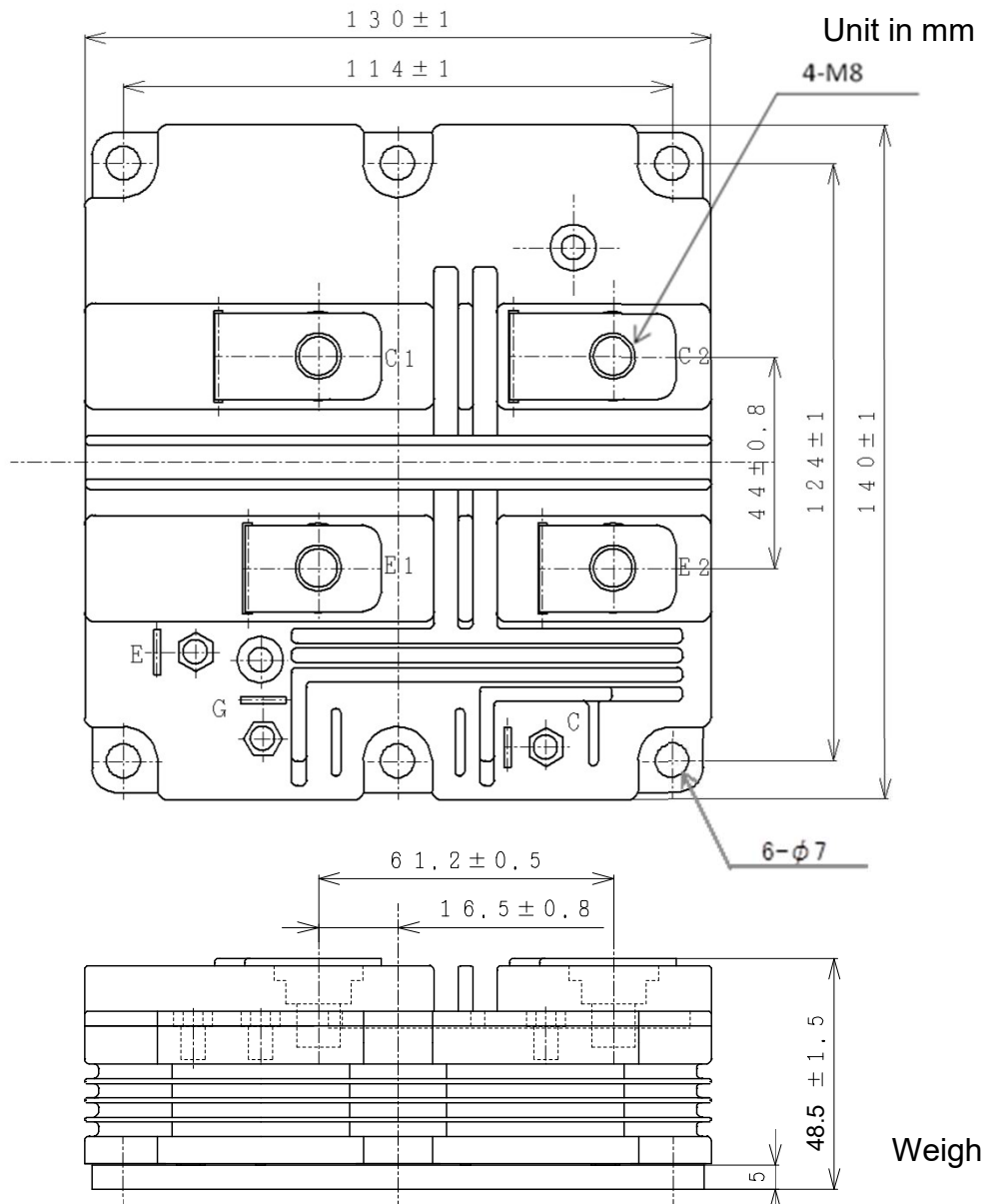
$$E_{rr(10\%)} = \int_{t_1}^{t_2} I_F \cdot V_{CE} dt$$

$$E_{rr(full)} = \int_{t_3}^{t_4} I_F \cdot V_{CE} dt$$

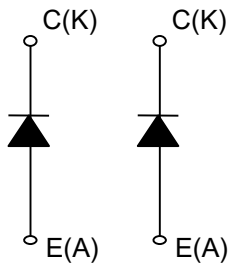
Fig.3 Definition of switching loss

# MDM800H45E2-H

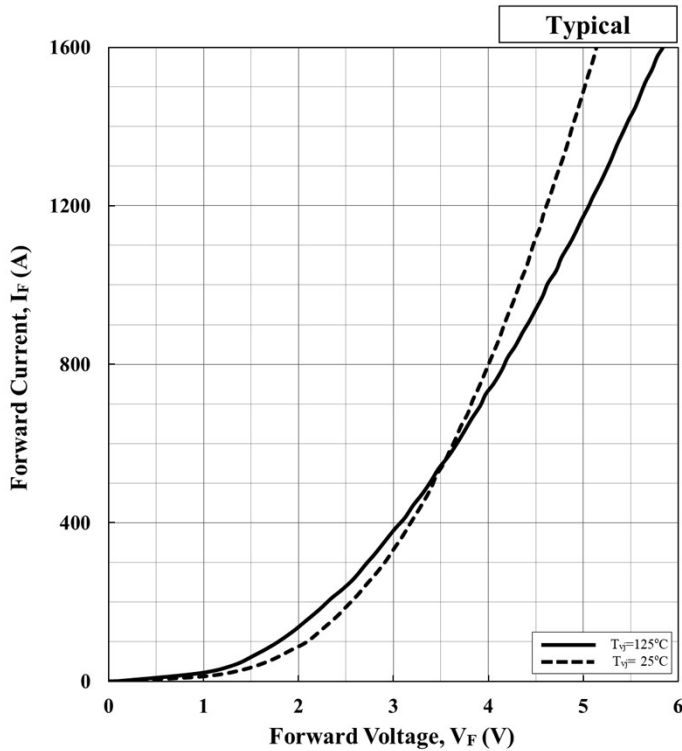
## OUTLINE DRAWING



## CIRCUIT DIAGRAM



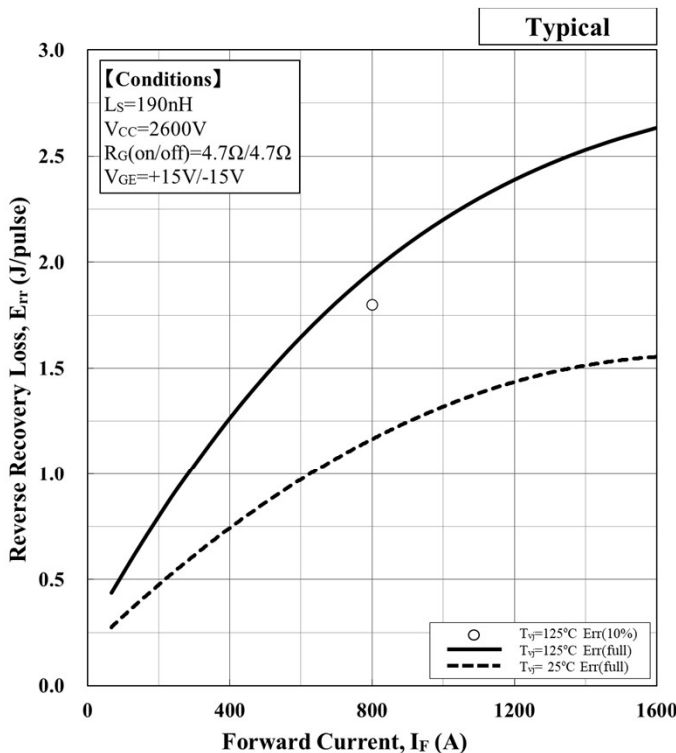
# MDM800H45E2-H



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

Temp.[°C]	$a_3$	$a_2$	$a_1$	$a_0$
25	5.94.E-10	-2.37.E-06	4.39.E-03	1.73.E+00
125	4.94.E-10	-2.10.E-06	4.85.E-03	1.41.E+00

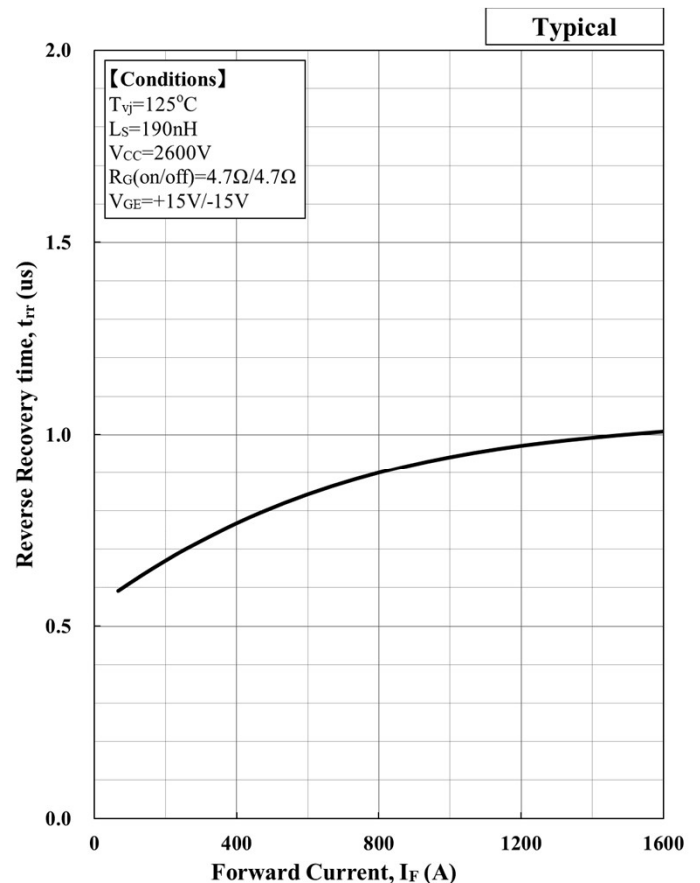
Forward Current vs. Forward Voltage



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

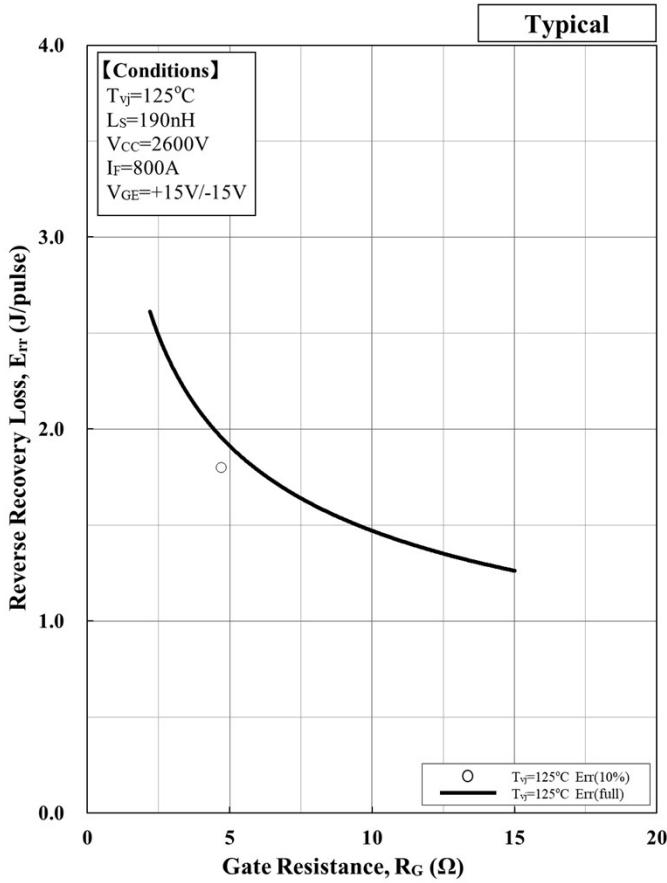
Temp.[°C]	$a_3$	$a_2$	$a_1$	$a_0$
25	1.14E-10	-7.59E-07	1.81E-03	1.44E-01
125	1.92E-10	-1.27E-06	3.04E-03	2.42E-01

Recovery loss vs. Forward current

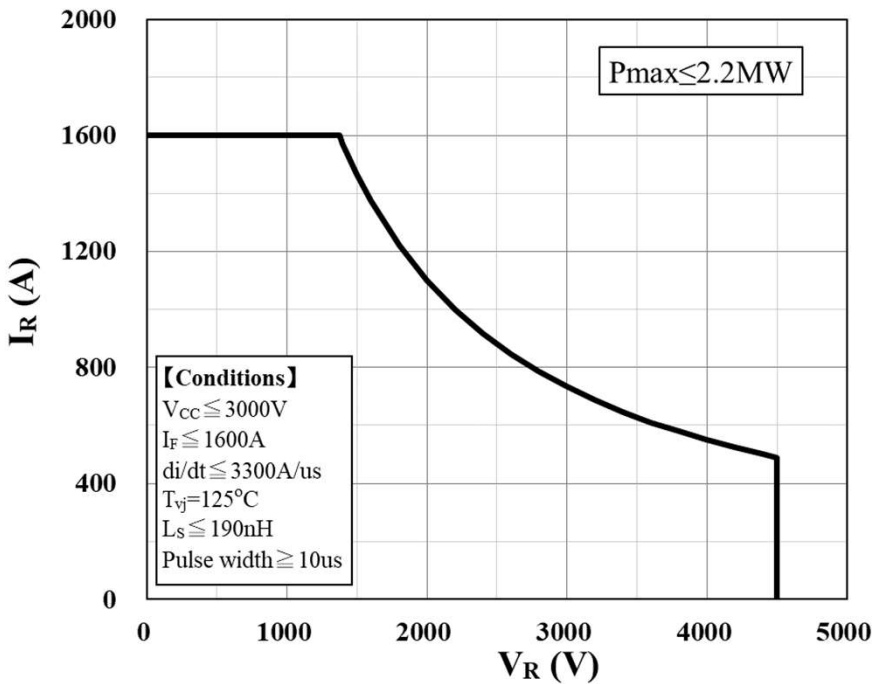


Reverse Recovery time vs. Forward Current

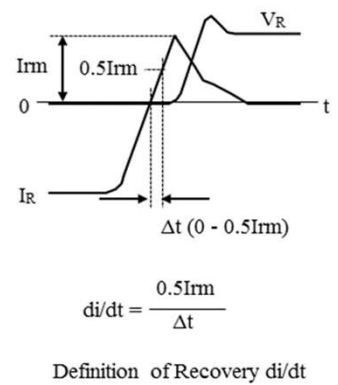
# MDM800H45E2-H



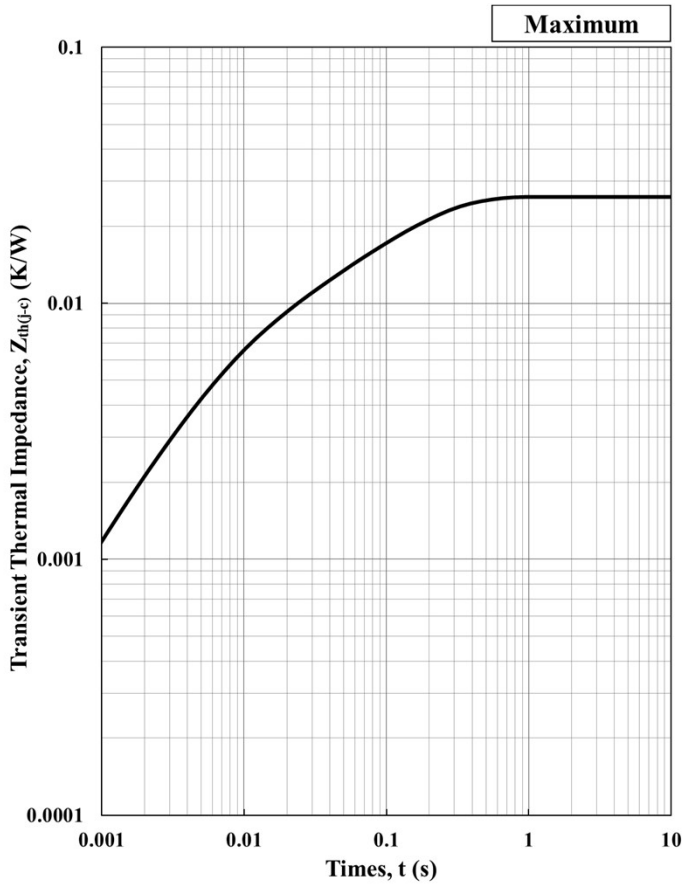
Reverse Recovery loss vs. Gate Resistance



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



# MDM800H45E2-H



**Transient Thermal Impedance Curve**

Foster model lumped circuit constant

n	1	2	3	4	Unit
R th, Diode [n]	1.61E-02	4.91E-03	4.76E-03	2.61E-04	[K/W]
C th, Diode [n]	1.02E+01	5.51E+00	1.28E+00	3.29E+00	[J/K]

Cauer model lumped circuit constant

n	1	2	3	4	Unit
R th, Diode [n]	3.81E-03	5.20E-03	8.04E-03	8.93E-03	[K/W]
C th, Diode [n]	7.34E-01	5.00E-01	4.02E+00	1.11E+01	[J/K]

**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)".
3. Semiconductor devices may sometimes break down by accidental or unexpected surge voltage, so please be careful about the safety design such as redundant design and malfunction prevention design which don't cause the damage expand even if they break down.
4. In cases where extremely high reliability is required (such as use in nuclear power control, aerospace and aviation, traffic equipment, life-support-related medical equipment, fuel control equipment and various kinds of safety equipment), safety should be ensured by using semiconductor devices that feature assured safety or by means of users' fail-safe precautions or other arrangement. Or consult with MPSD's sales department staff. (When semiconductor devices fail, as a result the semiconductor devices or wiring, wiring pattern may smoke, ignite, or the semiconductor devices themselves may burst.)
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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