

## Chapter 7 Notes

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## 1. Precautions for Use

- Use this IPM within the absolute maximum ratings (voltage, current, temperature, etc.). This IPM might be destroyed if used beyond the absolute maximum ratings.
- Please refer to this application manual for detailed information on usage, PCB layout, mounting instruction, etc.
- The equipment containing IPM should have adequate fuses or circuit breakers to prevent the equipment from causing secondary destruction (ex. fire, explosion etc.)
- Check that the turn-off voltage and current are within the RBSOA specifications.
- When designing, consider the rise in package temperature, virtual junction temperature, and lead terminal temperature, and confirm that they are within the absolute maximum ratings.
- This IPM is made from incombustible material. However, if the IPM breaks down, it may emit smoke or fire. The IPM may become hot during operation. Thus when operating in places with flammable or combustible materials, or in places where heat is generated, smoke or fire may occur. Please take measures to prevent the spread of fire.
- Do not touch the product terminals or package directly during operation or while power is being supplied in order to avoid electric shock or burns.
- Connect an appropriate ceramic capacitor close to VCCH(U) and COM, VCCH(V) and COM, VCCH(W) and COM, and VCCL and COM terminals so that high frequency noise such as switching noise is not directly applied to VCCH(U), VCCH(V), VCCH(W) and VCCL terminals.
- If noise is applied to the control terminal, the IPM may malfunction. Please make sure that unstable operation or malfunction due to noise does not occur.
- If  $V_{B(U)}$ ,  $V_{B(V)}$  or  $V_{B(W)}$  falls below  $V_{B(off)}$  due to noise, etc., the corresponding high-side IGBT may turn-off. Connect an appropriate ceramic capacitor between VB(U) and VS(U), VB(V) and VS(V), VB(W) and VS(W) terminals.
- The input signal voltage must exceed the threshold voltage.
- If excessive static electricity is applied to the control terminals, the IPM may be damaged. Implement some countermeasures against static electricity.
- When handling the IPM, hold it by the case (package body) without touching the lead terminals.
- We recommend that you handle the IPM on a grounded conductive floor and table mat.
- Before touching the IPM terminals, discharge static electricity from your body and clothes by grounding through a high resistance of about 1MΩ.
- When soldering, ground the soldering iron or solder bath to prevent the leakage voltage being applied to the product.
- Do not apply mechanical stress that may deform the terminals.
- Use this IPM within its reliability and lifetime. If used beyond the reliability lifetime, the IPM may be destroyed before the target lifetime of the equipment.

## 2. Precautions for Handling and Storage

- The lifetime of semiconductor products is not permanent. Please consider the semiconductor's thermal fatigue caused by temperature cycle due to self-generated heat, and use the product within the  $\Delta T_{vj}$  power cycle lifetime and  $\Delta T_c$  power cycle lifetime. The  $\Delta T_c$  power cycle depends on the changes on the case temperature ( $T_c$ ) and is affected by the cooling conditions. Therefore, design and verify the heat generation and cooling conditions of semiconductor products in consideration of the target lifetime of the equipment.
- Do not use the IPM in an environment containing acids, organic substances, corrosive gases (hydrogen sulfide, sulfurous acid gas, etc.) and corrosive liquids (cutting fluid, etc.), as the IPM may oxidize or corrode and cause failures.
- The IPM is not designed for continuous use in high temperature and high humidity environment.
- The IPM is not radiation proof. Avoid using it in environments where radiation is received or in high altitudes.
- In environment with rapid temperature changes, condensation may occur which may affect the operation and appearance of the IPM.
- When designing for a new equipment, obtain the latest specifications and application notes and check the data.
- Store the product in an environment temperature of 5~35°C and humidity of 45 to 75% RH. If the storage area is very dry, a humidifier may be required. In such case, use only deionized or boiled water because the chlorine in tap water can corrode the terminals.
- It is necessary to prevent external pressure from being applied to the IPM during storage. Even when the IPM is stored in packing box, avoid stacking that may cause deformation of the packing box.
- Store the IPM with the lead terminals unprocessed. This is to avoid rust and other defects that may occur during processing, resulting in poor soldering.
- Use a non-static or conductive container or bag to store the IPM.
- Under the above storage conditions, use the IPM within one year.

### 3. Notice

- (1) This content is subject to change without notice due to changes in product specifications or for other reasons. In case of using a product described in this document, please obtain the latest specification and check the data.
- (2) Do not use the product described in this specification for the following applications.  
Aerospace equipment, airborne equipment, nuclear power control equipment, submarine relay equipment, medical equipment, etc.
- (3) The product described in this application manual are intended for use in general electronic equipment (such as compressor motor drive for air conditioner, fan motor drive for air conditioner). If you intend to use the product for a special purpose, please contact Fuji Electric Co., Ltd. or its sales representative before designing.
- (4) Fuji Electric Co., Ltd. is constantly striving to improve product quality and reliability. However, semiconductor products can fail with a certain probability. Take measures to ensure safety, such as redundant design, fire prevention design, and malfunction prevention design, so that failure of Fuji Electric's semiconductor products does not result in damage to property or other social damages due to personal injury, fire, etc.,
- (5) If the IPM is used outside the range described in this application note, we cannot guarantee it. If a phenomenon outside the scope of this specification occurs using IPM, please contact Fuji Electric.
- (6) If you have any questions or any unclear matter in this specification and the application note, please contact Fuji Electric Co., Ltd. or its sales agencies. Neither Fuji Electric Co., Ltd. nor its agencies shall be liable for any injury or damage caused by any use of the products not in accordance with instruction set forth herein.
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