Mounting Instructions for High Power Modules
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1. Scope

This document describes about recommended mounting procedures for M151/M152/M155/M156/M256/M278 packages.

This mounting instruction is available only for the following modules.

1MBlxxxxVC-120P/1MBlxxxxVC-170E (M151 package)
1MBlxxxxVD-120P/1MBlxxxxVD-170E (M152 package)
1MBlxxxxVR-170E/1MBlxxxxUG-330x (M155 package)
1MBlxxxxVS-170E/1MBlxxxxUE-330x (M156 package)
2MBlxxxxVG-120P/2MBlxxxxVG-170E (M256 package)
2MBlxxxxVT-170E (M278 package)

(ex. 1MBI1200VC-120P)

Note: M151/M152/M256 package・・・・・・・・・・Cu-baseplate
M155/M156/M278 package・・・・・・・・・・AlSiC-baseplate
2. The surface of the heat sink

Please keep the following surface about the heat sink surface to attach IGBT.
   Flatness $\leq 50\mu m$ (Sampling frequency=100mm)
   Surface $R_z \leq 10\mu m$

When mounting (when tightened it) IGBT module when a heat sink surface is out of the range mentioned above, the ceramic (insulation board) which there is between the chip in the IGBT module and a metal base increases stress and might break this module.

When the plane of the heat sink becomes hollow, CTR (contact thermal resistance) may increase.

3. Thermal grease application

Please apply thermal grease between a heat sink and the mounting surface of the IGBT module to decrease CTR. Please apply the thermal grease on appropriate thickness. When an application thickness of the thermal grease is inappropriate, the heat radiation to a fin worsens, and it may lead to destruction that chip temperature exceeds $T_{vjmax}$. As an application method of the thermal grease, we recommend the application method with the stencil mask. (This is because application on the thickness that is uniform on the module back side is possible)

The figure 1 show an outline of the thermal grease application method.
The figure 2,3 shows the example of the stencil mask.
The IGBT module which thermal paste was applied to is attached to a heat sink, and, please tighten a screw by recommended torque.

When a thermal grease thickness is uniform, it can calculate the necessary weight as follows.

\[
\text{Thermal grease thickness (um)} = \frac{\text{Weight of thermal grease (g) x 10^4}}{\text{Baseplate area of IGBT module (cm}^2) \times \text{Density of thermal grease (g/cm}^3)\right]
\]

The thickness of the thermal grease recommends 100um.

Model name: HTC01K
Manufacturer: ELECTROLUBE

The most suitable application thickness of the thermal grease changes by a characteristic and an application method of the thermal grease to use. Please use it after confirming it.

4. Clamping

The figure 4,5 show a clamping sequence of the screws for the mounting IGBT module.
Please tighten the screw by prescribed clamping torque.

(Please refer to each model specification for the prescribed torque.)

When torque is short, a module might be warped during movement, and CTR might grow big.
When torque is excessive, a case might be broken.
1. Back to Room Temp.
2. Measure weight of IGBT
3. Adjust zero
4. Bottom tool
5. Set IGBT module
6. Metal mask and Frame
7. Fix tools and put grease with Knife
8. Print with metal squeegee (begin)
9. Print with metal squeegee (end)
10. After printing
11. Open metal mask
12. Check grease weight

Figure 1. Outline of the thermal grease application method
Figure 2. The example of the stencil mask for M151/M155/M256/M278 packages

Figure 3. The example of the stencil mask for M152/M156 packages
The first (Temporary clamping) specified torque ×1/3
②⇒⑤⇒③⇒⑥⇒①⇒④

The second specified torque
②⇒⑤⇒③⇒⑥⇒①⇒④

| Figure 4. Clamping sequence of the screws for the M151/M155/M256/M278 packages. |
|---|---|
| ① | ② |
| ③ | ④ |
| ⑤ | ⑥ |
| ⑦ | ⑧ |

<table>
<thead>
<tr>
<th>Torque</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first (Temporary clamping) specified torque ×1/3</td>
<td>②⇒⑤⇒③⇒⑥⇒①⇒④</td>
</tr>
<tr>
<td>The second specified torque</td>
<td>②⇒⑤⇒③⇒⑥⇒①⇒④</td>
</tr>
</tbody>
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Figure 5. Clamping sequence of the screws for the M152/M156 packages.

<table>
<thead>
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<th>Sequence</th>
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<tr>
<td>The first (Temporary clamping) specified torque ×1/3</td>
<td>②⇒⑤⇒③⇒⑥⇒①⇒④</td>
</tr>
<tr>
<td>The second specified torque</td>
<td>②⇒⑤⇒③⇒⑥⇒①⇒④</td>
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Warning:

This manual contains the product specifications, characteristics, data, materials, and structures as of Oct. 2017. The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this manual, be sure to obtain the latest specifications.

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(1) During transportation and storage
   Keep locating the shipping carton boxes to suitable side up. Otherwise, unexpected stress might
   affect to the boxes. For example, bend the terminal pins, deform the inner resin case, and so on.
   When you throw or drop the product, it gives the product damage.
   If the product is wet with water, that it may be broken or malfunctions, please subjected to sufficient
   measures to rain or condensation.
   Temperature and humidity of an environment during transportation are described in the
   specification sheet. There conditions shall be kept under the specification.

(2) Assembly environment
   Since this power module device is very weak against electro static discharge, the ESD
   countermeasure in the assembly environment shall be suitable within the specification described in
   specification sheet. Especially, when the conducting pad is removed from control pins, the product
   is most likely to get electrical damage.

(3) Operating environment
   If the product had been used in the environment with acid, organic matter, and corrosive gas
   (hydrogen sulfide, sulfurous acid gas), the product's performance and appearance can not be
   ensured easily.