



# Thermoelectric Modules

*Handling, Packaging, & Ceramic Inspection Instructions*

April 2016

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## Handling

It is important that the TEMs are handled correctly. Improper handling could cause a performance decrease and possible premature failure.

- Never pull the leads up or to the side. If bending of the wire leads is required hold the heat shrink area which is close to the ceramic with fine nose pliers while supporting the module and bend at wire insulation only.
- Avoid excessive lateral shear force when handling TEMs this may induce damage to the thermoelectric element.
- Sharp bend radiuses in the wire should be avoided and wires should be routed to avoid any sharp edges that could penetrate the wire insulation.

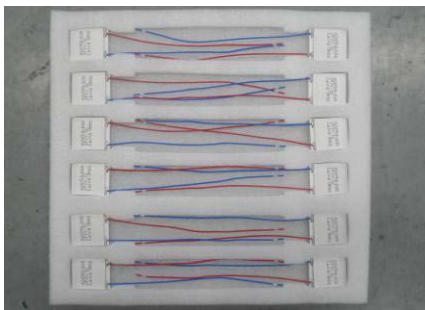
## Packaging

When shipping and handling TEM product, it is important to use the correct container and methods. This has been tested to shipping standards and securely delivers material without breaking. Other packaging may not be suitable and cause material to break during transit, which makes it difficult for our Quality team to investigate.

- For single unit size with dimensions  $<35\text{mm}$  and  $21 < W2 \leq 32\text{mm}$  product, use foam P/N 467033-02, put 12 pcs per layer, 5 layer per box.
- For single unit size with dimensions  $<45\text{mm}$  and  $32 < W2 < 40.5\text{mm}$  product, use foam P/N 467033-03, put 10 pcs per layer, put 5 layers per box.

## Procedure

Place cold side of TEM face up to die-cut foam sheet with lead wires remaining straight. For long lead wire that requires folding, please use rubber-band to hold wires in place.

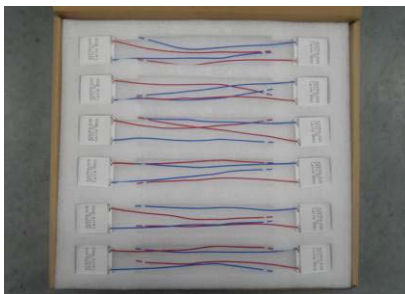


P/N: 467033-02  
Put 12pcs at most per layer



P/N: 467033-03  
Put 10pcs at most per layer

Put the foam and units into packing box, maximum 5 layers per box and put foam sheet on top layer.



Close cardboard box, tape and ship. For multiple box returns please also include an outer packaging box for extra protection.



Inner Box



Outer Box

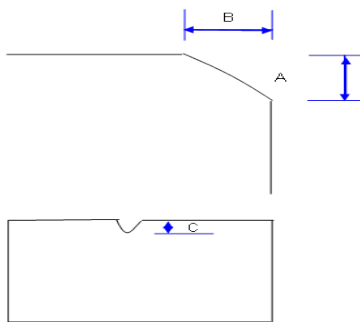
## Ceramic Inspection

Reference datasheet and measure the length and width of TEM with calipers

- No copper trace or dice should exceed edge of ceramic.
- No more than 2 broken corners on each module is allowed.

Using a microscope, visually inspect ceramic crack. No crack is allowed on the ceramic surface, but a ceramic chip may occur which will not affect performance of TEM. It should be below the size specification:

1. For ceramic  $> 30\text{mm}$  (length or width),  $A < 1.0\text{mm}$ ,  $B < 1.0\text{mm}$ ,  $C < 0.5\text{mm}$ .
2. For ceramic  $\leq 30\text{mm}$  (length or width),  $A < 0.5\text{mm}$ ,  $B < 0.5\text{mm}$ ,  $C < 0.3\text{mm}$



A pin hole or pitting may occur on the ceramic surface. If so the diameter needs to be  $\leq 0.5\text{mm}$ . The bottom of pit can be seen (visual inspection) and is acceptable. However for more than two pin holes part should be rejected.

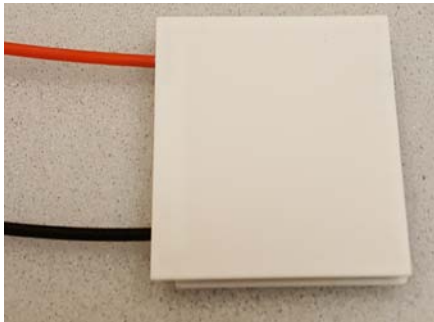
Inspect for any adhesive, solder, or general contamination. Residue that can be observed or felt by the finger on the ceramic surface should be rejected.

Inspect solder on side of ceramic using magnification. If no obvious solder remain it can be accepted.

There are no tin spots on the ceramic surface by visual inspection, the standard for black point and white point:

1. The color is nearly between black, white point and ceramic surrounding, the diameter  $\leq 1.0\text{mm}$  and no more than three points on one side, which can be accepted.
2. The variation of the color between black, white point and ceramic surrounding is obvious, the diameter  $\leq 0.5\text{mm}$  and no more than three points on one side, which can be accepted. (details refer to limited sample)

## *Illustrations of clean ceramic surfaces*



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