



# TSI Series PV Module - Box Handling and Storage

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This document provides information about the recommended handling of the standard box used to store and ship Toledo Solar TSI-Series Modules.

Each Toledo Solar packing box is filled with 50 modules, along with internal support material. For planning purposes, a fully loaded box weighs up to a maximum of 665 kg (1466) for a 50-module pack. Packaging and wrapping variation may result in slightly lower actual weights. The box includes an integral pallet for easy forklift transport. In order to maintain intended strength, all boxes should remain dry and packed full with modules and support material. The modules and internal support material are integral to the strength of the packaging. When full, intact and dry, the boxes can be vertically stacked indoors up to 4 boxes high for extended periods of time. If any of the modules or support materials are removed from the box or the box is damaged or becomes wet, the boxes should not be stacked in any fashion.

When handling boxes using forklifts or other mechanical aids, ensure the box is supported uniformly, and that the forks are fully extended under the pallet. Forklifts with forks of at least 4 ft. in length are preferred. Do not scrape, pierce, or bend the walls or cover of the boxes; the support capacity of the boxes will be weakened and the modules could be damaged. Do not stack any boxes that have been physically damaged in any way.

Module boxes are intended to serve as a means to transport the modules to site and are not meant for extended outdoor storage of modules. Box corrugate material will become brittle over time when exposed to outdoor elements and will no longer provide the load strength it once did to house the modules safely. Indoor box storage is recommended. It is not recommended to store boxes outdoors for greater than 3 weeks. If it is necessary to store boxes outdoors, they should be covered and protected from moisture. Once a box has become wet, drying will not restore it to its original strength. Never stack boxes that have been wet at any time, even if they can be dried out. Boxes that have been wet should not be reused for transporting modules.

***Failure to follow these recommended handling guidelines may result in damage to modules that will not be covered under the Toledo Solar TSI Series module warranty.***

### Box packaging details

- a. Modules will be packaged in Toledo Solar's 50-pack module boxes.
- b. All modules within a box will be a single Model Number.
- c. Toledo Solar will use commercially reasonable efforts to ship full containers or full truck loads only.
- d. Typical container volumes (for planning purposes only; actual volumes may vary based on any local load re-strictions or shipment locations):
  - i. Sea Container: 28 - 36 boxes or 1400 – 1800 modules
  - ii. Truck Container: 28 - 36 boxes or 1400 – 1800 modules
- e. General Box Dimensions:
  - Length: 1372 mm (54 in)
  - Width: 1118 mm (44 in)
  - Height: 876 mm (34.5 in)
  - Weight: Not to exceed 665 kg (1466 lbs.)

Figure 1: 50-Module Box Dimensions

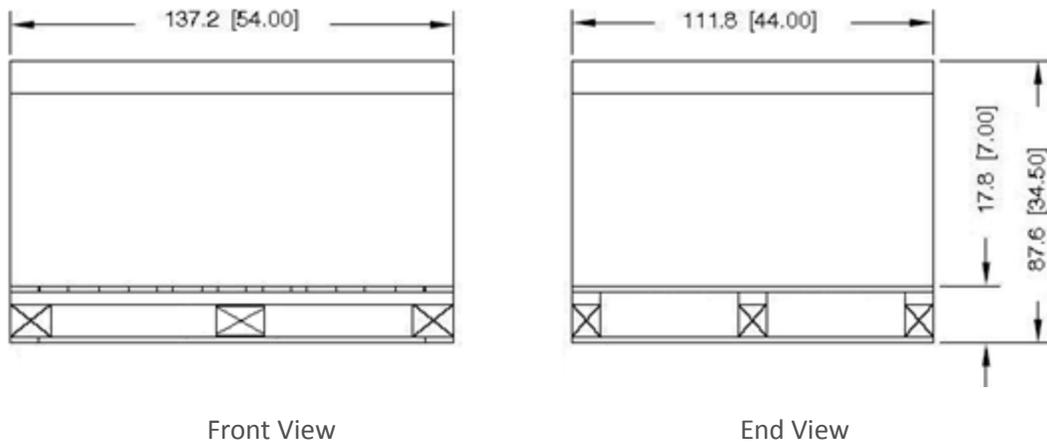
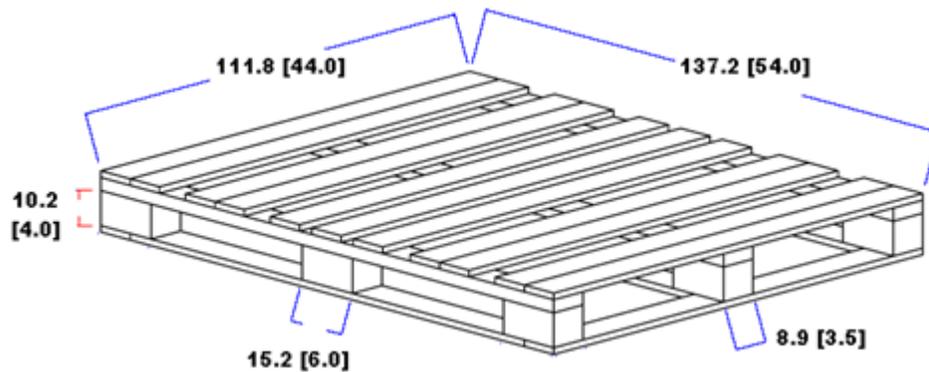


Figure 2: 50-Module Pallet Dimensions



NOTE: All dimensions in centimeters [inches]. Dimensions should be used for general guidance only. Toledo Solar may update or modify box without notice.

### **Partially Full Boxes**

There may be instances, for example at a project site, when boxes have to be repacked and there may not be enough modules to fill a 50-pack box. Under these circumstances, the following guidelines should be followed:

- Boxes that have been wet should not be reused for transporting modules.
- Modules should be packed starting in the center of the 50-pack box and moving outward symmetrically towards the front and back to ensure weight balance is maintained - Figure 3.
- Two persons should be use to load modules when one person cannot walk into the box for safe lifting.
- No boxes should be stacked on top of partially filled boxes.
- Modules should be packed face to face in pairs within each slot, along with re-used paper separator to minimize breakage risk due to transport/vibration. The clip shown in Figure 4 is only used to keep the paper separator in place until another module can be placed in the slot.

**Figure 3: Modules packed for even weight distribution**



**Figure 4: Reusable paper separator to be placed between front faces of modules**

