

UltraST-T5 Thermal Storage Module System

Engineered PCM module system for scalable thermal buffering in reusable cold-chain packages, pallet boxes, cold rooms, mobile racks, and fan-assisted storage modules.

MODULE FOOTPRINT	THICKNESS	INTERNAL VOLUME
30 x 30 cm	30 x 30 x 5 cm	4.5 L

System definition

UltraST is positioned as a thermal storage module system rather than a loose SKU list. The module format translates PCM chemistry into a repeatable block geometry that can be integrated into containers, racks, cold rooms, and partner equipment.

No fixed duration claim	Engineering capacity basis	Validation required
-------------------------	----------------------------	---------------------

Module configuration and thickness options

Module	Nominal size	Best fit	Selection note
UltraST-T3	30 x 30 x 3 cm	Container liners, tote boxes, limited spaces, fast deployment	Thinner format with easier placement
UltraST-T5	30 x 30 x 5 cm	Pallet boxes, cold-room modules, higher buffer demand	Higher capacity, confirm space and heat transfer

Selected product basis

This manual focuses on 30 x 30 x 5 cm UltraST modules.

Capacity values are calculated from module volume, material density, and latent heat. They should be used as sizing inputs only; package or cold-room hold time requires system-level testing.

Temperature zone mapping

Temperature zone	Material system	SKU	Density	Latent heat	Capacity
-42C	Inorganic UltraST	PCM-INO-ULTRA-365	1.00 kg/L	170.0 kJ/kg	0.212 kWh/block
-21C	Inorganic UltraST	PCM-INO-ULTRA-404	0.80 kg/L	263.5 kJ/kg	0.264 kWh/block
-19C	Inorganic UltraST	PCM-INO-ULTRA-357	0.75 kg/L	238.0 kJ/kg	0.223 kWh/block
5C	Hybrid UltraST	PCM-COM-ULTRA-419	0.75 kg/L	178.5 kJ/kg	0.167 kWh/block

Release note: the -19C T5 density basis is currently treated as project-specific. Public release should keep this line as engineering reference until the product parameter is confirmed.

Cold chain integration method

Step	Engineering action
Pre-charge	Thermally condition modules to the required starting state before packing
Load configuration	Place modules around payload based on heat path, container geometry, and allowable temperature window
Container integration	Use as a liner, side module, lid module, tray module, or removable block depending on package format
Route validation	Test ambient profile, opening events, payload mass, dwell time, and handover delay before operating release

Language boundary

Do not convert module kWh into 48h, 72h, or 120h claims in public copy. The module is a validated starting point for a route-specific package, not a certified transport container by itself.

Cold storage energy buffering

Scenario	Use concept	Validation focus
Peak shaving	Charge during low-cost electricity or PV surplus periods	Charging curve, discharge timing, tariff logic
Door-opening disturbance	Add local thermal reserve around high-traffic areas	Temperature recovery, air flow, product temperature
Outage recovery	Provide temporary thermal buffer during interruption or restart	Hold curve, product safety boundary
Mobile modules	Deploy in racks, side walls, ceilings, or fan-assisted units	Mounting, condensation, service access, cleaning

Partner boundary

Passive Edge provides PCM materials, module data, and engineering selection support. Final equipment design, certification, manufacturing, and delivery remain with project partners or system integrators.