

Global Dual-Use Phase Change Material (PCM) for Thermal Management Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Dual-Use Phase Change Material (PCM) for Thermal Management market size is expected to reach \$ 5084 million by 2032, rising at a market growth of 30.1% CAGR during the forecast period (2026-2032).

Dual-Use Phase Change Material (PCM) for Thermal Management refers to PCM technologies, products or solutions that are applicable both to military equipment thermal management (e.g., missile-borne phased-array radar TR modules, high-power electronic warfare systems, infrared stealth, naval/armored platforms, individual soldier thermal protection) requiring high reliability, high power density, and harsh environment adaptability, and to civilian high-value applications (EV/ESS thermal runaway prevention, AI server PUE optimization, cold-chain logistics, building energy efficiency, smart wearables, automotive thermal comfort seats), enabling synergy in technology and supply chain. It features passive thermal management, buffering transient thermal shocks and stabilizing temperature. It excludes common thermal insulation materials and active cooling systems, and covers organic, inorganic, and composite PCMs (microencapsulated, porous scaffold, thermally enhanced, structure-thermal-stealth integrated).

Dual-use phase change materials (PCM) for thermal management epitomize the same technology, different markets paradigm. In military applications, missile-borne phased-array radar TR modules, high-power electronic warfare systems, and hypersonic vehicles demand PCM that can absorb hundreds of watts per square centimeter within milliseconds to seconds while surviving extreme mechanical stress. This creates extremely high technological barriers, unit prices ranging from tens of thousands to hundreds of thousands of dollars, and gross margins often exceeding

50%. In civilian markets, battery thermal runaway prevention, AI data center peak shaving, and cold chain logistics require PCM to shift from 'high reliability' to 'high cost-effectiveness', with gross margins typically 20-35%, but market size grows exponentially. Pricing: commodity organic paraffin PCM sells for USD 2-5/kg, micro-encapsulated PCM USD 10-30/kg, while military-grade composite cold plates or packaged modules can cost USD 500-2,000/unit. Margins reflect this tiering: Yangtze Optical Electronic (688143), KULR, and ACT maintain 45-65% gross margins; Outlast, leveraging patent licensing and brand, enjoys 40-50%; civilian leaders such as Nabai Chuan and Hangzhou Ruhr achieve 25-35%; low-end building PCM has become a red ocean with margins below 15%. Downstream: military electronics (missiles, radars, EW) account for ~25% of the dual-use PCM market by value (highest unit value), battery thermal runaway protection ~30% (fastest growth, CAGR >35%), cold chain logistics ~20%, data centers & AI servers ~10%, building energy efficiency & smart textiles ~10%, aerospace ~5%. Incremental demand is driven by: (1) China's military electronics upgrade - active phased-array radars and missile-borne TR modules are shifting from 'optional' to 'mandatory' for PCM cold plates; (2) EV penetration exceeding 50% and new safety standards for grid-scale storage driving battery PCM module growth >35% annually; (3) mandatory PUE 2000?

Infrared Signature Control

Global Dual-Use Phase Change Material (PCM) for Thermal Management Market, Segmentation by Application:

Military Electronics (Missile-borne Radar, EW, TR modules)

Aerospace & Hypersonic Vehicles

Electric Vehicle & Energy Storage Battery Pack

Data Center & AI Server Cooling

Passive Cold Chain Shipping

Building Energy Efficiency & Smart Textile

Others

Companies Profiled:

Yangtze Optical Electronic (688143)

KULR Technology Group

Advanced Cooling Technologies (ACT)

Outlast Technologies

Nabai Chuan

Aavid (Boyd Corporation)

Hangzhou Ruhr New Material Technology

va-Q-tec

Shuangliang Energy Saving

Shandong Xiyu Technology

Ningbo Innovation Navigation

Shugang Digital Creation

RuhrTech

Sidike (300806)

TE Connectivity

Molex

Xidian Jubian

Guangdong Changnengda

Shenzhen Senruo New Material

Tan90

Wisesource Hechuang (01116.HK)

Gree Electrical Appliances

Ningbo Panji New Material Technology

Yangtze Optical Electronic Thermal Control Tech

Zite New Materials

Domoan

Beijing Reshu

Shenggui Bianhuan

Key Questions Answered:

1. How big is the global Dual-Use Phase Change Material (PCM) for Thermal Management market?
2. What is the demand of the global Dual-Use Phase Change Material (PCM) for Thermal Management market?
3. What is the year over year growth of the global Dual-Use Phase Change Material (PCM) for Thermal Management market?
4. What is the production and production value of the global Dual-Use Phase Change Material (PCM) for Thermal Management market?
5. Who are the key producers in the global Dual-Use Phase Change Material (PCM) for Thermal Management market?
6. What are the growth factors driving the market demand?

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Figure 37. World Dual-Use Phase Change Material (PCM) for Thermal Management Production Market Share by Type (2021-2032)

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