



LyoWave TurboThaw™ is a tunable high-frequency microwave heating platform designed to accelerate the thawing process for frozen pharmaceutical systems. Utilizing cutting-edge solid-state RF amplifier technology, TurboThaw™ technology delivers proven performance for small molecules, vaccines, biologics, reagents, and medical devices. Key advantages include:

Uniformity and Efficiency: Operating at frequencies specifically targeting water ice, TurboDry™ combines proprietary electronic mixing and metasurface scattering elements to achieve an electric field uniformity over 5 times greater than traditional 2.45 GHz microwave systems at a fraction of the power.

Volumetric Heating: Dielectric heating is compatible with all standard forms of primary packaging and eliminates the need for water baths or forced air convection systems.

Precision Control: Combine with LyoVision™ infrared imaging system and our closed-loop control system to provide accurate and robust control over product temperature during thawing operations.

Compact: Powerful heating performance at the benchtop scale. Characterize and optimize your thawing recipes before scaling to production.

Parameter	Specification
Frequency	>12 GHz
Power	Up to 60W per module
Modulation	Sinusoid, sawtooth, random, constant
Interface	Modbus TCP
Dimensions	24.6" x 24.3" x 8.5"
Electrical	120V/10A

Key Features

Solid-State RF Source



- >12 GHz output at power levels up to 60W per module.
- Patented electromagnetic mixing **improves heating uniformity by 5x** relative to 2.45GHz systems.

Standardized Communication



- Standard Modbus communication interface provides monitoring and control capability.
- Local or remote operation.

Uniformity



- Mechanical agitation gently stirs product to improve melting uniformity and API concentration homogeneity.

Modularity



- Flexible shelf system configuration accommodates a variety of primary packaging up to a total volume of 4L.

Remote Sensing



- Non-invasive infrared imaging of product temperature in real time.
- Time-lapse image logging and user-defined point tracking for simplified post-processing and analysis.

Closed-Loop Control



- RF power and frequency modulation based on real-time feedback from temperature sensors.
- Precise control of product temperature to accelerate development time and optimize the drying process.

Application Areas

Bottles



- Single shelf accommodates up to x4 1L bottles
- Direct replacement to conventional water bath

Saline Bags



- Up to x4 100mL bags or x6 30mL bags per shelf
- No extractables or leachables - materials are directly compatible with high-frequency microwave heating