

**△RESEARCH MICROWAVE SYSTEMS**

**www.thermwave.com**

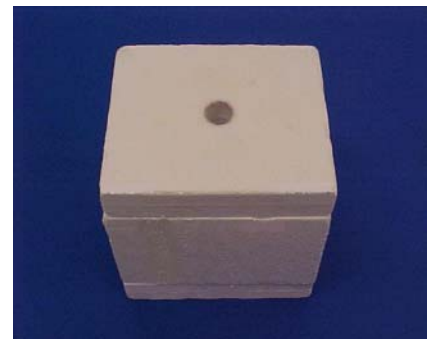
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## **Microwave Technology Catalog**



*Bridging the gap between researchers and microwave applications.*

### **For your microwave heating needs!**



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**Telephone:** (518) 283-9133  
**FAX:** (518) 283-9134

**Address:** 105 Jordan Rd., Troy, NY 12180  
**E-mail:** [info@thermwave.com](mailto:info@thermwave.com)

# △RESEARCH MICROWAVE SYSTEMS

www.thermwave.com

## ■ Therm△WAVE

### ■ Entry level laboratory microwave oven

- Ideal for materials R&D

### ■ Ultra-fast heating

- Heat to 1500 °C in less than 30 minutes\*

### ■ Comes with controller unit

- Variable power output and  
**precise temp control**

### ■ Compact design

- Can easily fit on a countertop



### Specs:

Power requirement: 120 V; 60 Hz

Plug: NEMA 5-15

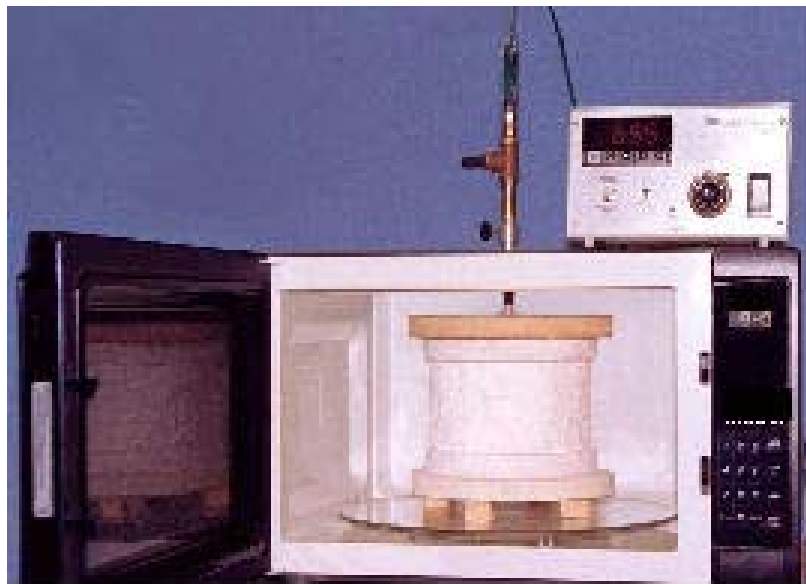
Output Power: 1.25 kW

Dimensions: Out: 23.75" D X 18" W 14" H  
In: 18" D X 17" W X 10.25" H

Frequency: 2.45 GHz

Temp Range: 25 °C to 1500 °C

Cooling: water



\*Depends on the thermal package setup

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## ■ Therm△WAVE 2.0

■ The "next step" in materials R&D

■ Power output of **2.1 kW**  
through **4 magnetrons**

■ **Large interior workspace**

■ Working volume of 2,600 in<sup>3</sup> (42,000 cm<sup>3</sup>)

■ **Convenient design**

■ Practical swing door and lit interior

■ Incorporation of atmospheric control

■ **Inert or ambient atmosphere**

### Specs:

Power requirement: 240 V; 50/60 Hz

Plug: NEMA 6-30R

Output Power: 2.1 kW

Dimensions: Out: 20.75" D X 25.75" W X 18.625" H

In: 13" D X 21" W X 9.825" H

Frequency: 2.45 GHz

Temp Range: 25 °C to 1700 °C

Cooling: air



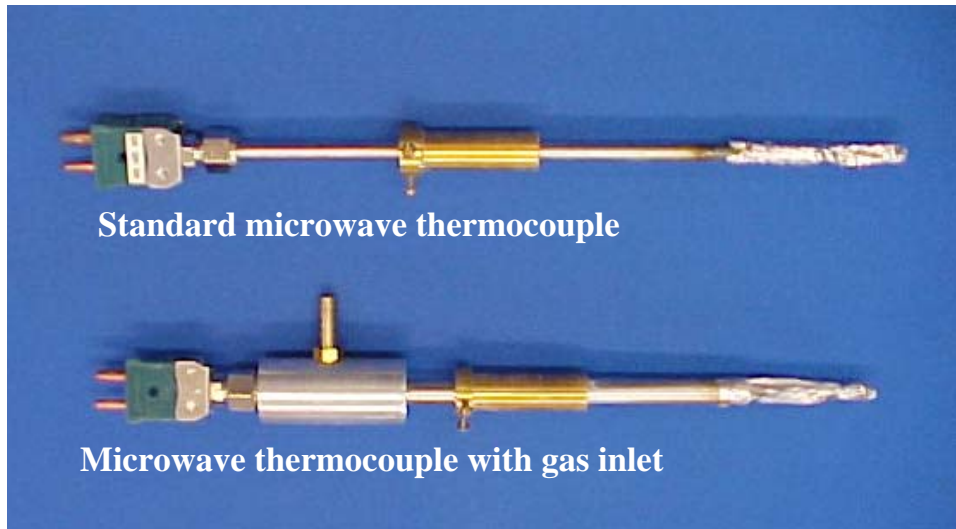
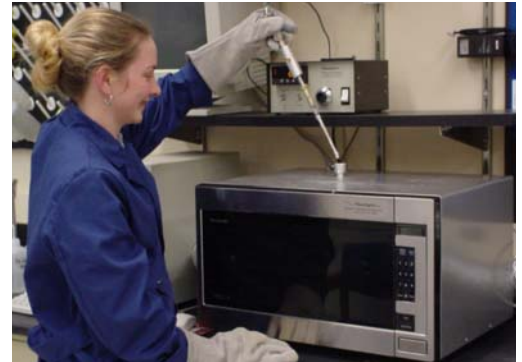
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## ■ Thermocouples

- Interfaces with controller unit
  - Generate temperature vs. time profiles
  - Achieve precise temperature control (+/- 2 °C)
- Engineered specifically for a microwave field
  - Microwave shielded with platinum foil\*



Item No.	Description	Temperature Range
TC-S	Type S Microwave Thermocouple with Platinum Foil	0-1700 °C
TC-S-GI	Type S Microwave Thermocouple with Platinum Foil & Gas Inlet	0-1700 °C
TC-K	Type K MW Thermocouple with Platinum Foil	-200-1250 °C
PF	Replacement Platinum Foil	Upon Request
<b>Thermocouple Repair:</b>		
TC-Rep-1	If returned with at least ½ the platinum foil	Upon Request
TC-Rep-2	If not returned with at least ½ the platinum foil	Upon Request

\*Platinum foil prevents arcing and microwave interference with temperature measurement

## Thermal Pods

- **Highly insulating** ceramic refractory
- **Microwave transparent**
- **Variable pod volumes**
- **Inexpensive** refractory solution
- We also offer **custom** refractory packages



### Example Thermal Pod Setups:

#### ■ Thermal Pod 1400 – Heating applications up to 1400 °C

Part No.	Description	Temperature Rating
TP-1400-01	Outer Shell - 10" OD x 8" ID x 6" H	1400 °C
TP-1400-T1	Top - 10" OD x 2" H	1400 °C
TP-1400-B1	Bottom - 10" OD x 2" H	1400 °C
Working Volume = 300 in <sup>3</sup>		

■ A large volume (300 in<sup>3</sup>) ideal for low temperature ( $\leq 1400$  °C) applications

#### ■ Nested Thermal Pod 1800 – Heating applications up to 1800 °C

Part No.	Description	Temperature Rating
TP-1400-01	Outer Shell - 10" OD x 8" ID x 6" H	1400 °C
TP-1800-03	Inner Shell - 5.25" OD x 3.25" ID x 4.5" H	1800 °C
TP-1800-T2	Top - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800 °C
TP-1800-B2	Bottom - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800 °C
Working Volume = 37 in <sup>3</sup>		

■ A small volume (37 in<sup>3</sup>) ideal for high temperature ( $\geq 1400$  °C) applications



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- Thermal Pods are available in an array of different sizes for your microwave needs
- A complete package includes: top, bottom, and cylindrical shell
- Nested inner shells or alternate size top/bottoms can be purchased to fit your application needs



Item No.	Description	Rated Temp (°C)
TP-1400-01	Outer Shell - 10" OD x 8" ID x 6" H	1400
TP-1400-02	Inner Shell - 7.71" OD x 5.71" ID x 4.5" H	1400
TP-1400-03	Inner Shell - 5.25" OD x 3.25" ID x 4.5" H	1400
TP-1400-04	Inner Shell - 3.0" OD x 2.0" ID x 4.0" H	1400
TP-1400-T1	Top - 10" OD x 2" H	1400
TP-1400-B1	Bottom - 10" OD x 2" H	1400
TP-1400-T2	Top - 8" OD x 2" H	1400
TP-1400-B2	Bottom - 8" OD x 2" H	1400
TP-1400-T3	Top - 5.25" OD x 2" H	1400
TP-1400-B3	Bottom - 5.25" OD x 2" H	1400
TP-1400-BP1	Bottom Plate - 5.71" OD x 1" H	1400
TP-1700-02	Inner Shell - 7.71" OD x 5.71" ID x 4.0" H	1700
TP-1700-03	Inner Shell - 5.25" OD x 3.25" ID x 4.5" H	1700
TP-1700-04	Inner Shell - 3.0" OD x 2.0" ID x 4.0" H	1700
TP-1700-T1	Top - 10" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1700 °C)	1700
TP-1700-B1	Bottom - 10" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1700 °C)	1700
TP-1700-T2	Top - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1700 °C)	1700
TP-1700-B2	Bottom - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1700 °C)	1700
TP-1800-02	Inner Shell - 7.71" OD x 5.71" ID x 4.0" H	1800
TP-1800-03	Inner Shell - 5.25" OD x 3.25" ID x 4.5" H	1800
TP-1800-04	Inner Shell - 3.0" OD x 2.0" ID x 4.0" H	1800
TP-1800-T1	Top - 10" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800
TP-1800-B1	Bottom - 10" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800
TP-1800-T2	Bottom - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800
TP-1800-B2	Top - 8" OD x 2" H (Rated to 1400 °C) w/ Insert (Rated to 1800 °C)	1800

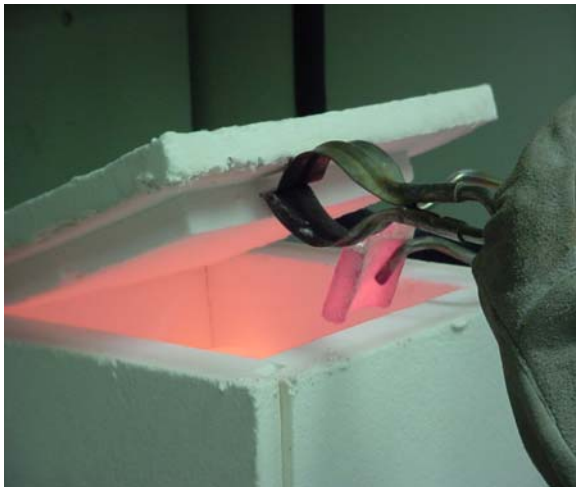
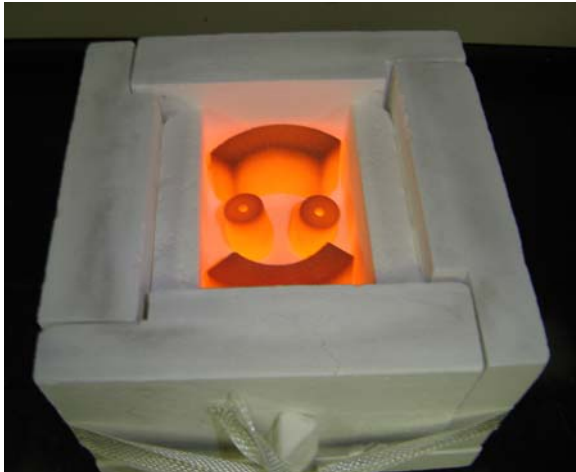
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## Thermal Boxes™

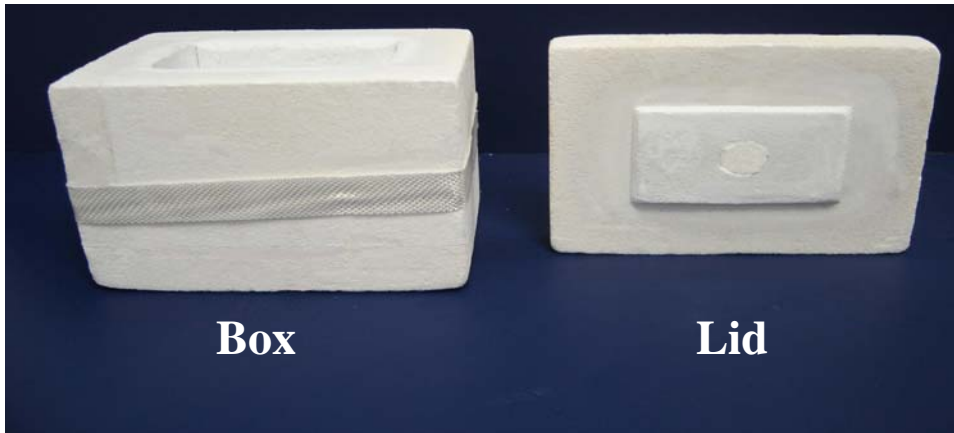
Standard Microwave Thermal Packages for *Reproducible* Research

- **Highly insulating** ceramic refractory
- **Microwave transparent**
- **Use with any microwave sintering system**
- **Variable box volumes**
- **Inexpensive** refractory solution
- **Custom** refractory packages available upon request



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**Box**

**Lid**

- Each package includes a thermal box and a lid
- Thermal box is easily assembled and requires no additional setup

Description	Rated Temp (°C)	Item No.
<b>Standard Thermal Box</b> 7" x 5.5" x 6" OD    4" x 2.5" x 4" ID	1400	TB-1-1
	1700	TB-1-2
	1800	TB-1-3
<b>Short Standard Thermal Box</b> 7" x 5.5" x 4.5" OD    4" x 2.5" x 2.5" ID	1400	TB-2-1
	1700	TB-2-2
	1800	TB-2-3
<b>Square Thermal Box</b> 7" x 7" x 6" OD    4" x 4" x 4" ID	1400	TB-3-1
	1700	TB-3-2
	1800	TB-3-3
<b>Short Square Thermal Box</b> 7" x 7" x 4.5" OD    4" x 4" x 2.5" ID	1400	TB-4-1
	1700	TB-4-2
	1800	TB-4-3
<b>Large Thermal Box</b> 12" x 9" x 7.5" OD    8" x 5" x 4.5" ID	1400	TB-5-1
	1700	TB-5-2
	1800	TB-5-3

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## ■ Crucibles

- High temperature vessels
- Microwave transparent
- Resistant to chemical attack and thermal shock



Material	Temperature	Thermal Shock Resistance	Chemically Resistant
Alumina	1800 °C	√	√
Zirconia	2000 °C	√	√
Quartz	1200 °C	√	√
Fused Silica	1500 °C	√	
Mullite	1500 °C	√	√



Fused Silica Crucible



Quartz Crucibles



Mullite Crucible

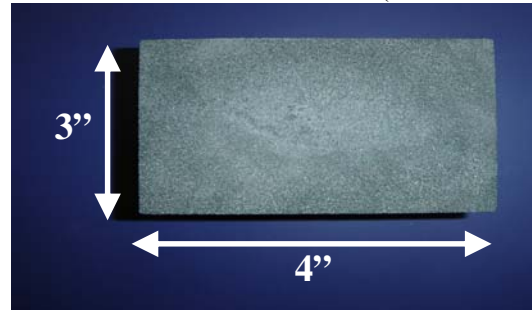
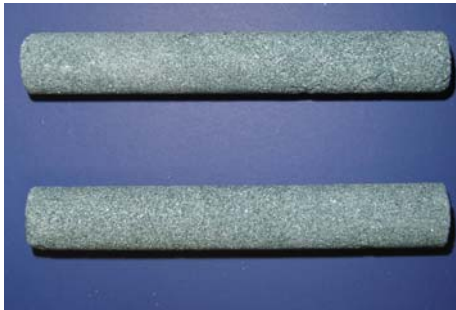
**Call RMS for all your crucible needs**

## ■ RMS Thermcepts™ The best susceptors for microwave research\*

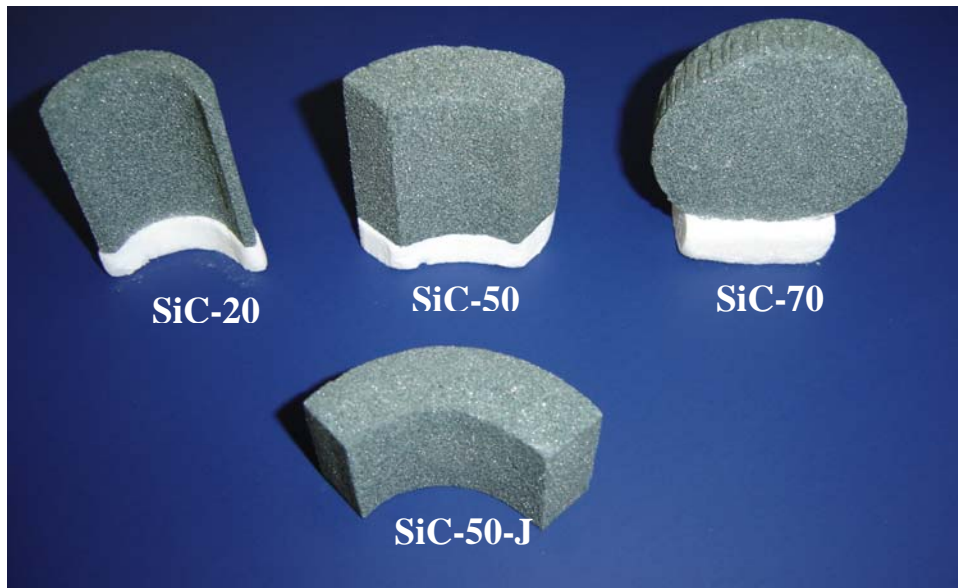
- Converts microwaves into **heat radiation**
- Catalyze **volumetric heating** in non-suscepting materials
- Comes in **multiple sizes**
- **Controllable and reproducible** heating



SiC-70 Thermcepts™ in an RMS Thermal Box™ with zirconia (ZrO<sub>2</sub> ceramic) pellets to be sintered



Susceptors available in standard and custom sizes



Item No.	Description	Temperature Rating
SiC-20	Thermcept - 20 g Silicon Carbide Susceptor	1500 °C
SiC-50	Thermcept - 50 g Silicon Carbide Susceptor	1500 °C
SiC-50-J	Thermcept - 50 g Silicon Carbide Susceptor (Squat Shaped)	1500 °C
SiC-70	Thermcept - 70 g Silicon Carbide Susceptor	1500 °C

\*Susceptor investigation for microwave heating applications. G. Gaustad, J. Metcalfe, H. Shulman, S. Allan. Ceramic Transactions (2005), 166(Innovative Processing and Synthesis of Ceramics, Glasses and Composites VIII), 25-35.