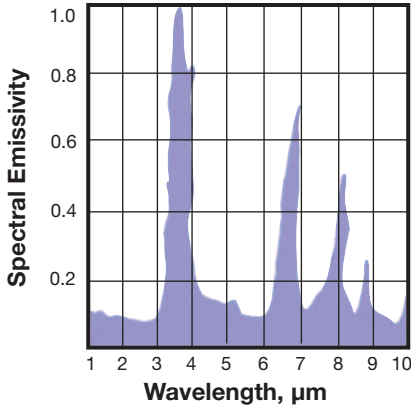
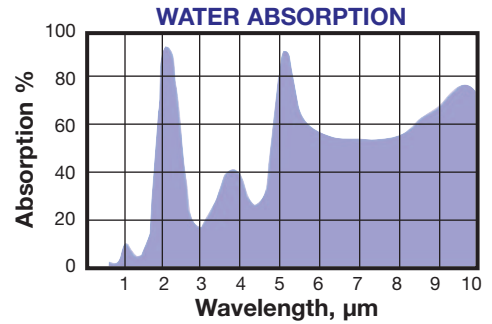


### Medium Wave Infrared E-Mitters

#### SPECTRAL EMISSIVITY OF PET FILM

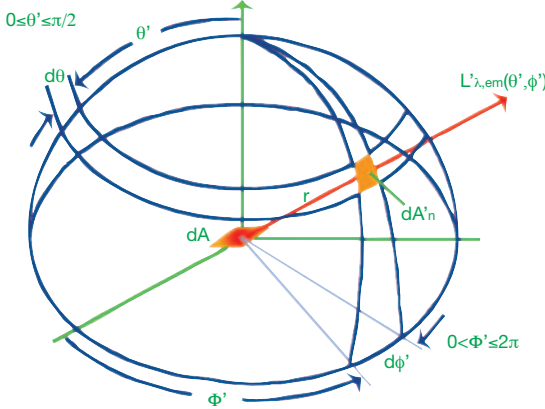


**WAVELENGTH CONTROL** – The very low heat transmission losses through the clear quartz material of the twin bore heaters allow Tempco’s engineers to carefully design the peak emitted wavelength of these heaters to match the peak absorption wavelength for a given material or application. By modifying the temperature of the E-mitter, its peak emitted wavelength will change according to Wien’s displacement law (see page 7-101). All E-mitters will emit a range of wavelengths above and below their peak value. (See spectrum graph on page 7-97.) The design of an efficient infrared heating system must consider both the spectral nature and directional properties of thermal radiation.



**SPECTRAL NATURE:** To address this issue, heaters should be designed to emit wavelengths that closely match the absorption band of the processed material in a given application. By carefully considering the broad side-bands of the emitted radiation and absorption, it is possible to design systems that will enhance the heat transfer rates at different stages of the heating process.

#### Infrared Energy Spectrum Emission



Vaporization of water is best achieved in the infrared spectrum at wavelengths in the range of 3.1 and 6.1  $\mu\text{m}$  (microns). After the water is removed, the infrared heating rate should match the absorption spectrum of the base material to avoid damaging it thermally. Similar approaches are used in many industries, such as automotive, glass and plastic processing, textiles, electronics and many others.

**DIRECTIONAL NATURE:** The directional nature of the heat distribution is dealt with by consideration of how to direct heat toward an application. The efficiency of the heating system depends strongly on the percentage of the total infrared energy generated at the resistance coil that reaches the target material. Consideration must be given to the fact that this infrared energy propagates from the E-mitter in all possible directions with a non-uniform wavelength distribution.

### Design Specifications

Performance Ratings			
Reflective Backing	Gold	White Ceramic	Clear* (no backing)
Maximum Coil Temperature	1472°F (800°C)	2012°F (1100°C)	2012°F (1100°C)
Peak Emitted Wavelength Range (microns)	2.7-6.5	2.1-6.5	2.1-6.5
Radiation Pattern	180°	180°	360°
Nominal Reflected Heat Efficiency	95%	75%	0%

\*Clear tubes are designed for use with external reflector.

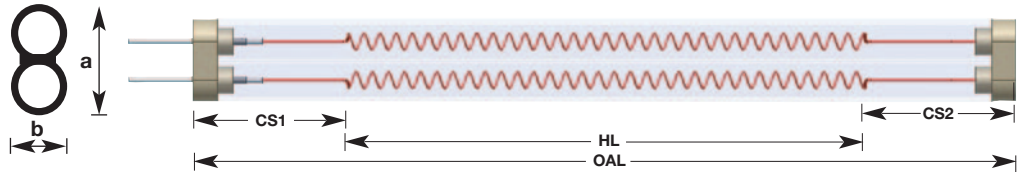
Electrical Ratings			
Twin Bore Tube Size	18 × 8 mm	23 × 11 mm	33 × 15 mm
Maximum Power Density (per unit length)	42 w/in (16.5 w/cm)	51 w/in (20 w/cm)	63.5 w/in (25 w/cm)
Maximum Voltage	480V	480V	600V
Maximum Amperage per circuit	9.5A	13.5A	20A

Standard wattage tolerance is +5%, -10%; closer tolerances available upon request

### Medium Wave Infrared E-Mitters

Wire Leads for Standard Configuration are Stranded Lead Wire, Rated 842°F (450°C), 600V.

OAL: Overall Length  
 CS1: Lead End Cold Section  
 HL: Heated Length  
 CS2: Blind End Cold Section



#### Dimensional Specifications

Twin Tube Size Dimensions (a x b)	18 x 8 mm (.71 x .31 in)	23 x 11 mm (.91 x .43 in)	33 x 15 mm (1.30 x .59 in)
Maximum Length (OAL)	2000 mm (78.75 in)	2000 mm (78.75 in)	3000 mm (118 in)
Minimum Lead End Cold Length (Standard CS1) (both ends of double end units)	50 mm (1.96 in)	50 mm (1.96 in)	50 mm (1.96 in)
Minimum Blind End Cold Length (Standard CS2) (single ended units only)	50 mm (1.96 in)	50 mm (1.96 in)	50 mm (1.96 in)
Overall Length (OAL) Tolerance	± 2.5 mm (0.10 in)		
Heated Length (HL) Tolerance	± 6.5 mm (0.26 in)		

Consult factory for closer tolerances.



#### Exceptional Clear Quartz Twin Bore Material with Proven Application Results

- **Automotive:** Airbag assembly, headliner formation, roof rack bonding, mirror manufacturing, flux powder drying, adhesive activation on protective strips, powder coating, spot repair, friction material bonding, plastic bumper drying, forming & painting
- **Plastics:** PET bottle blow molding, pellet/granulate drying, polypropylene fiber fusing, plastic component extruding/bending, ink drying, and laminating
- **Glass:** Preheating, coating/paint curing, light bulb production
- **Food Industry:** Chocolate processing, cake heating/baking, food warming
- **Paper, Electronics**      ➤ **Metals**      ➤ **Semi-conductor Processing**
- **Textiles,**      ➤ **Furniture**      ➤ **And much more**

## Gemini Series

### Standard Design (Non-Stock) Gemini Medium Wave Infrared E-Mitters

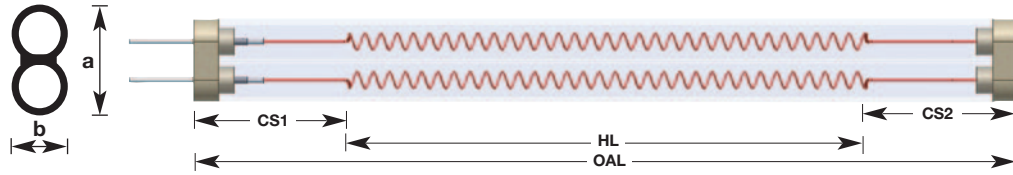
Leads for Standard Configuration are Stranded Lead Wire, Rated 842°F (450°C), 600V.

OAL: Overall Length

CS1: Lead End Cold Section

HL: Heated Length

CS2: Blind End Cold Section

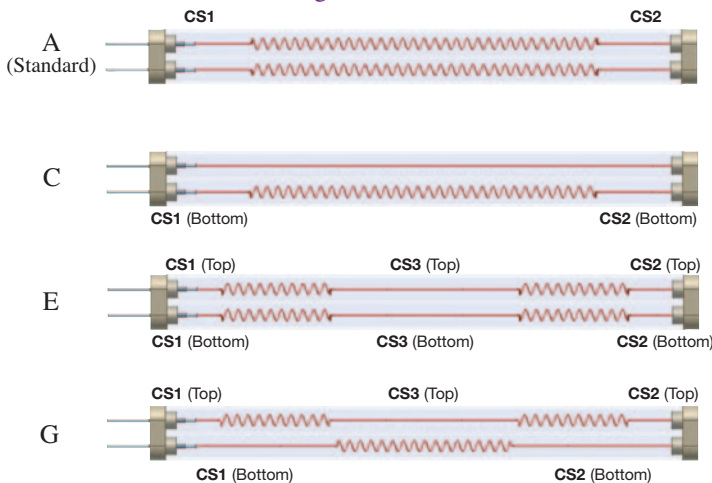


Twin Bore Quartz Format Dimensions				Overall Length		Heated Length		Power Watts	Part Numbers @ 230 Volts Coatings			Linear Power Watts per inch	Configuration Style	Lead Exit Angle
a		b		in	mm	in	mm		Gold	White	None			
in	mm	in	mm	in	mm	in	mm							
0.71	18	0.31	8	15.7	400	11.8	300	500	GEM00001	GEM10001	GEM20001	42.4	A	0°
0.91	23	0.43	11	23.6	600	19.7	500	1000	GEM00002	GEM10002	GEM20002	50.8	A	0°
1.30	33	0.59	15	35.4	900	31.5	800	2000	GEM00003	GEM10003	GEM20003	63.5	A	0°
1.30	33	0.59	15	43.3	1100	39.4	1000	2500	GEM00004	GEM10004	GEM20004	63.5	A	0°
0.91	23	0.43	11	51.2	1300	47.2	1200	2500	GEM00005	GEM10005	GEM20005	53.0	A	0°
1.30	33	0.59	15	55.9	1420	51.2	1300	3250	GEM00006	GEM10006	GEM20006	63.5	A	0°
1.30	33	0.59	15	63.0	1600	59.1	1500	3750	GEM00007	GEM10007	GEM20007	63.5	A	0°
1.30	33	0.59	15	66.9	1700	63.0	1600	4000	GEM00008	GEM10008	GEM20008	63.5	A	0°
1.30	33	0.59	15	70.9	1800	66.9	1700	4100	GEM00009	GEM10009	GEM20009	61.3	A	0°
1.30	33	0.59	15	75.6	1920	70.9	1800	4500	GEM00010	GEM10010	GEM20010	63.5	A	0°
1.30	33	0.59	15	83.5	2120	78.7	2000	5000	GEM00011	GEM10011	GEM20011	63.5	B	0°
1.30	33	0.59	15	102.4	2600	98.4	2500	6250	GEM00012	GEM10012	GEM20012	63.5	B	0°
0.71	18	0.31	8	15.7	400	11.8	300	500	GEM00013	GEM10013	GEM20013	42.4	A	90°
0.91	23	0.43	11	23.6	600	19.7	500	1000	GEM00014	GEM10014	GEM20014	50.8	A	90°
1.30	33	0.59	15	35.4	900	31.5	800	2000	GEM00015	GEM10015	GEM20015	63.5	A	90°
1.30	33	0.59	15	43.3	1100	39.4	1000	2500	GEM00016	GEM10016	GEM20016	63.5	A	90°
0.91	23	0.43	11	51.2	1300	47.2	1200	2500	GEM00017	GEM10017	GEM20017	53.0	A	90°
1.30	33	0.59	15	55.9	1420	51.2	1300	3250	GEM00018	GEM10018	GEM20018	63.5	A	90°
1.30	33	0.59	15	63.0	1600	59.1	1500	3750	GEM00019	GEM10019	GEM20019	63.5	A	90°
1.30	33	0.59	15	66.9	1700	63.0	1600	4000	GEM00020	GEM10020	GEM20020	63.5	A	90°
1.30	33	0.59	15	70.9	1800	66.9	1700	4100	GEM00021	GEM10021	GEM20021	61.3	A	90°
1.30	33	0.59	15	75.6	1920	70.9	1800	4500	GEM00022	GEM10022	GEM20022	63.5	A	90°
1.30	33	0.59	15	83.5	2120	78.7	2000	5000	GEM00023	GEM10023	GEM20023	63.5	B	90°
1.30	33	0.59	15	102.4	2600	98.4	2500	6250	GEM00024	GEM10024	GEM20024	63.5	B	90°

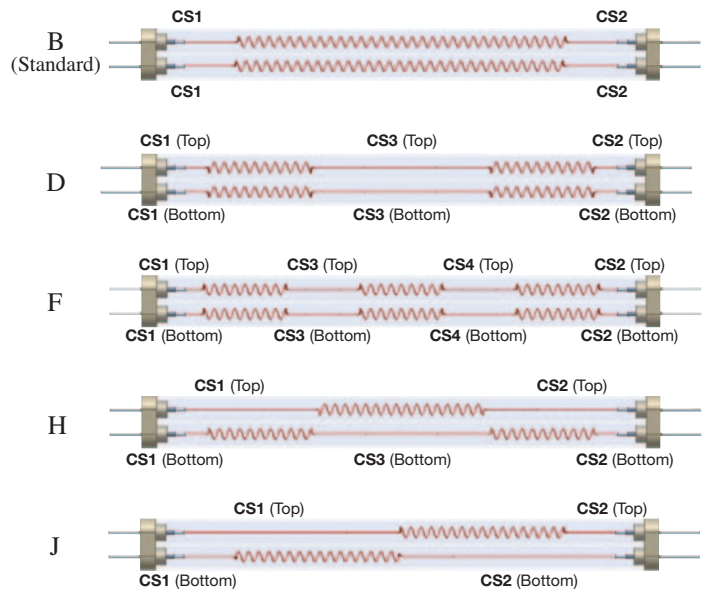
### Optional Winding Patterns

Using alternate stretching configurations to achieve distributed wattage, Tempco can easily customize Gemini series heaters to fit your application. Below are various configurations with “A” Standard for Single Ended and “B” Standard for Double Ended.

#### Single Ended Terminations



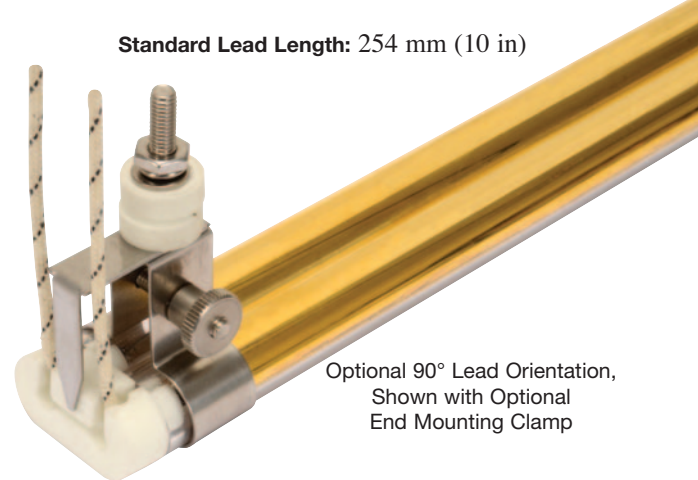
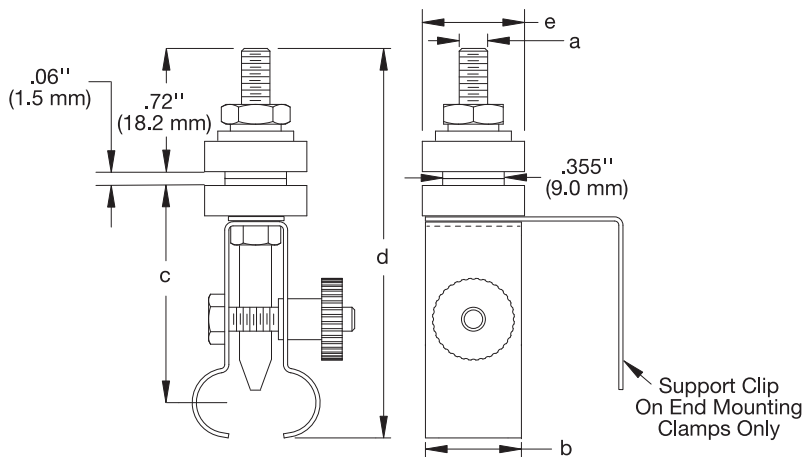
#### Double Ended Terminations



### Gemini Medium Wave Infrared E-Mitters

**Lead configurations and lengths** – 842°F (450°C), 600V insulated lead wire, 3/8" stripped ends standard, oriented straight out ends or at 90° to heater axis. Optional styles of high temperature insulated lead wire and un-insulated ring or spade terminals are available to suit your application. Select size and style from charts

on page 7-23. Bare stranded heater leads up to 9" long may be ordered with optional ceramic bead insulators. Longer lengths are available as lead wire options only. When ordering, specify lead orientation, style, length, and terminals.



Standard Lead Length: 254 mm (10 in)

Optional 90° Lead Orientation, Shown with Optional End Mounting Clamp

### Gemini Stainless Steel Clamp Specifications and Dimensions

Clamp Assembly Part Number	CRK00085	CRK00086	CRK00087	CRK00088	CRK00089	CRK00090
Fits Twin Tube Size	18 × 8 mm		23 × 11 mm		33 × 15 mm	
Clamp Location on Tube	Center	End	Center	End	Center	End
Clamps Required	OAL > 39.4" (1000 mm)	2 per heater	OAL > 59.1" (1500 mm)	2 per heater	OAL > 78.7" (2000 mm)	2 per heater
Mounting Stud Threads (a)	10-32		10-32		10-32	
Clamp Width (b)	0.40" (10.2 mm)		0.40" (10.2 mm)		0.60" (15.2 mm)	
Heater Mounting Height (c)	1.20" (30.5 mm)		1.20" (30.5 mm)		1.41" (35.8 mm)	
Overall Clamp Height (d)	2.44" (62 mm)		2.48" (63.1 mm)		2.77" (70.3 mm)	
Ceramic Insulator Diameter (e)	0.59" (15 mm)		0.59" (15 mm)		0.59" (15 mm)	
Panel Mounting Hole Diameter	0.375" (9.5 mm)		0.375" (9.5 mm)		0.375" (9.5 mm)	

Recommended mounting panel thickness range is 18-14 ga.

### Ordering Information

#### Stock Heaters

Order by Tempco Part Number for heaters listed on page 7-66.

#### Custom Engineered/Manufactured Heaters

Because TEMPCO understands that an electric heater can be very application specific, for sizes not listed TEMPCO will design and manufacture a Gemini Infrared Heater or modular housing to meet your requirements. **Standard lead time is 3 weeks.**

#### Please Specify the following:

- Reflective Coating — Gold, White Ceramic or None
- Twin Bore Tube Size (18 × 8 mm, 23 × 11 mm, or 33 × 15 mm)
- Wattage or Watts/In
- Single or Double End
- Overall Length (OAL)
- Heated Length (HL)
- Lead Orientation (0° or 90°)
- Voltage
- Quantity
- Lead Wire Terminals (page 7-23)
- Lead Wire Style/Length (Page 7-23)
- Winding Pattern (page 7-66, A-J or as required)
- Ceramic Bead Option (9" max. length)
- CRA Linear Housing Option (See page 7-68)
- Cold End Lengths (CE1 & CE2) See Winding Pattern page 7-66

**⚠ WARNING: Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).**

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