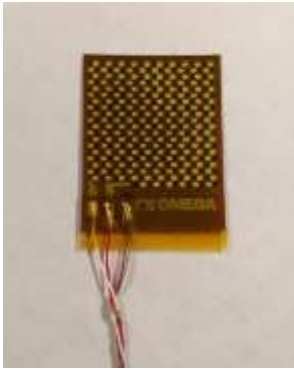


HFS-5

Page 2

**HFS-6**

Page 3

**UHFS-09**

Page 4

**HFS-5 Heat Flux Sensor Description**

The HFS-5 is the first low-cost heat flux sensor on the market. It has minimal thickness while still maintaining excellent sensitivity. The heat flux sensor is flexible enough to be easily attached to round surfaces.

HFS-6 Heat Flux Sensor Description

The HFS-6 is the first low-cost large area heat flux sensor on the market. It is particularly useful for monitoring the performance of thermal insulation and directly in-situ measuring insulation thermal resistance R-values. The sensor has excellent sensitivity that is perfect for measurements of heat transfer through building thermal insulation. Metal encapsulation increases the robustness of the sensor itself for repeated applications of the sensor to measurement surfaces.

UHFS-09 Heat Flux Sensor Description

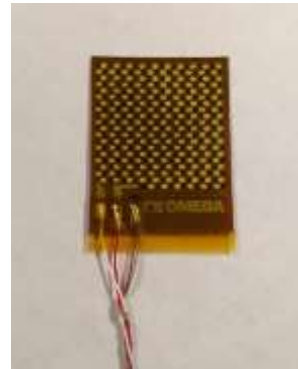
The UHFS-09 is the first low-cost ultra-sensitive plate heat flux sensor on the market. The high sensitivity design makes it ideal for accurately measuring relatively low-heat fluxes such as those seen in both building envelope and soil testing. A rigid, robust & water-proof construction makes the sensor durable and effective in various testing conditions.

HFS-5 Heat Flux Sensor Description

The HFS-5 is the first low-cost heat flux sensor on the market. It has minimal thickness while still maintaining excellent sensitivity. The heat flux sensor is flexible enough to be easily attached to round surfaces.

Current Applications

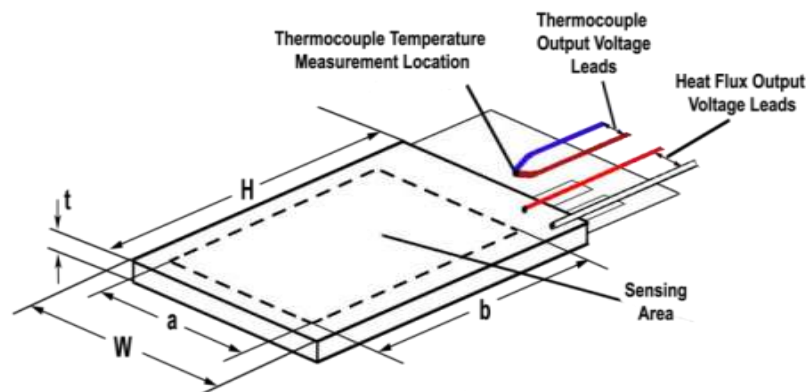
- R&D of heat transfer components
- Energy efficiency of thermal systems
- Heat transfer education
- Wearable technology that detects calorie burn



Heat Flux Sensor Specifications

Sensor Type	Differential-Temperature Thermopile
Encapsulation Material	Kapton (polyimide)
Nominal Sensitivity	Approx. 14.0 mV/(W/cm ²)
Sensor Thickness (t)	Approx. 360 microns
Specific Thermal Resistivity	Approx. 0.9 K/(kW/m ²)
Absolute HFS Thermal Resistance	Approx. 1.0 K/W
Heat Flux Range	+/- 150 kW/m ²
Temperature Range**	-50 °C to 120 °C
Response Time*	Approx. 0.6 seconds
Sensor Surface Thermocouple	Type-T
Sensing Area Dimensions (cm)	a = 2.5 cm b = 2.5 cm
Total Sensor Dimensions (cm)	W = 2.7 cm H = 3.4 cm
Sensing Area (cm²)	6.3 cm ²
Total Sensor Area (cm²)	9.2 cm ²

*Response time is the time it takes for the sensor output to reach 63% of its final value (one time constant)



HFS-6 Heat Flux Sensor Description

The HFS-6 is the first low-cost large area heat flux sensor on the market. It is particularly useful for monitoring the performance of thermal insulation and directly in-situ measuring insulation thermal resistance R-values. The sensor has excellent sensitivity that is perfect for measurements of heat transfer through building thermal insulation. Metal encapsulation increases the robustness of the sensor itself for repeated applications of the sensor to measurement surfaces.

Current Applications

- Thermal monitoring of buildings
- In-situ R-value measurements
- Research & Development
- Thermal energy efficiency



Heat Flux Sensor Specifications

Sensor Type	Differential-Temperature Thermopile
Encapsulation Material	Kapton(polyimide), Copper, High Temperature Black Enamel Coating
Nominal Sensitivity	Approx. 70 – 90 mV/(W/cm ²)
Sensor Thickness (t)	Approx. 600 microns
Specific Thermal Resistivity	Approx. 0.9 K/(kW/m ²)
Heat Flux Range	+/- 150 kW/m ²
Temperature Range**	-50 °C to 120 °C
Response Time*	Approx. 0.9 seconds
Sensing Area Dimensions (cm)	a = 8.6 cm b = 8.6 cm
Total Sensor Dimensions (cm)	W = 9.1 cm H = 10.0 cm
Sensor Surface Thermocouple	Type-T
Sensing Area (cm²)	74 cm ²

*Response time is the time it takes for the sensor output to reach 63% of its final value (one time constant)

UHFS-09 Heat Flux Sensor Description

The UHFS-09 is the first low-cost ultra-sensitive plate heat flux sensor on the market. The high sensitivity design makes it ideal for accurately measuring relatively low-heat fluxes such as those seen in both building envelope and soil testing. A rigid, robust & water-proof construction makes the sensor durable and effective in various testing conditions.

Current Sensor Applications

- In-situ testing & validation of building envelope thermal performance
- Measure soil heat flux for geothermal studies
- Thermal monitoring of buildings



Heat Flux Sensor Specifications

Sensor Type	Differential-Temperature Thermopile
Encapsulation Material	Kapton (polyimide), Epoxy
Temperature Range*	-20 °C to 150 °C
Sensor Surface Thermocouple	Type-T
Nominal Sensitivity	Approx. 1500 mV/(W/cm ²)
Sensing Area Dimensions	a = 6.8 cm b = 7.6 cm
Total Sensor Dimensions	W = 9.2 cm H = 8.7 cm
Sensing Area	52 cm ²
Total Sensor Area	80 cm ²
Sensor Thickness	1.5 mm
Thermal Conductivity	0.2 W/(m-K)
Absolute Thermal Resistance	1.25 K/W

*Response time is the time it takes for the sensor output signal to reach 63% of its final value (one time constant)

