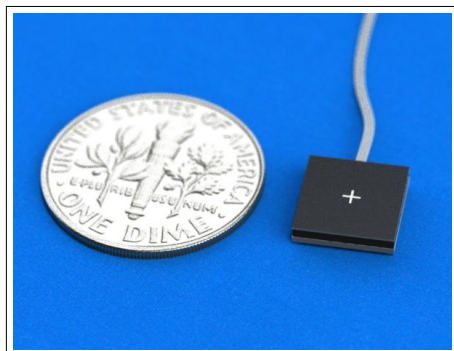


## Thermoelectric Heat Flux Sensor

HFD04-059-05L08

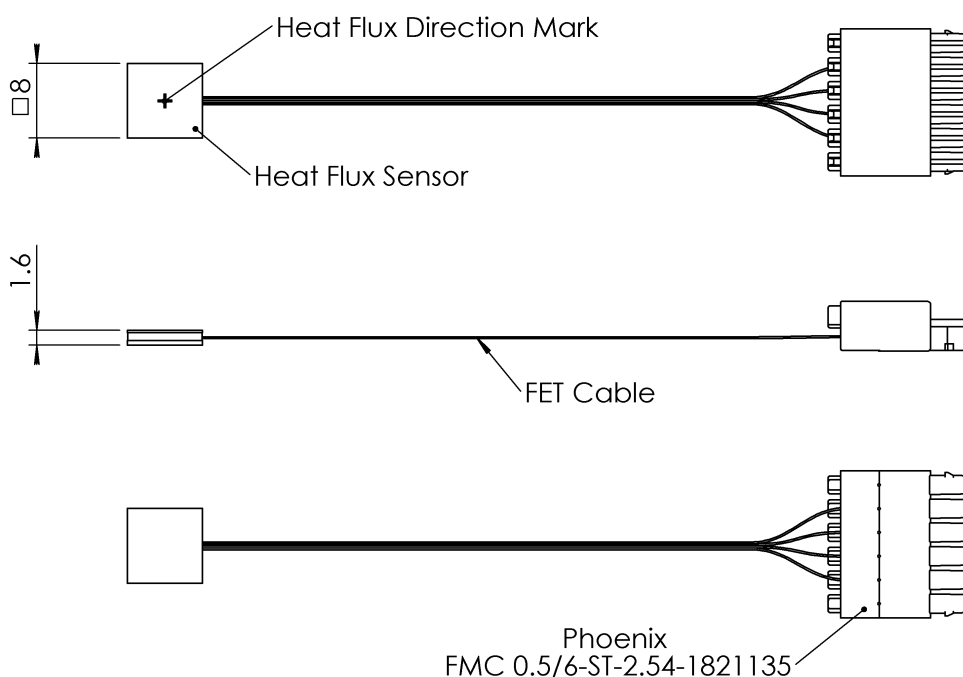


The HFD04-059-05L08 – high sensitive and self-calibrating sensor of conduction, convection and radiation heat fluxes in a wide range of heat flux intensities. Compatible with RMT Datalogger DX8140.

- Ultra-High Sensitivity
- Miniature Dimensions
- Self-calibrating
- FET cable
- Phoenix Connector

|                                   |                                     |          |
|-----------------------------------|-------------------------------------|----------|
| Sensitivity $S_e$                 | $\mu\text{V}/(\text{W}/\text{m}^2)$ | 22       |
| Integral sensitivity $S_a$        | $\text{V}/\text{W}$                 | 0.34     |
| Heat Flux Range $P_e$             | $\pm\text{W}/\text{m}^2$            | 8 500    |
| Integral Heat Flux Range $P_a$    | $\pm\text{W}$                       | 0.55     |
| Thermal Time Constant             | s                                   | 1.6      |
| Thermal Resistance $R_T$          | $\text{K}/(\text{W}/\text{m}^2)$    | 1.20E-03 |
| Integral Thermal Resistance $R_T$ | $\text{K}/\text{W}$                 | 19.3     |

## Dimensions (mm)



## Detailed Specification

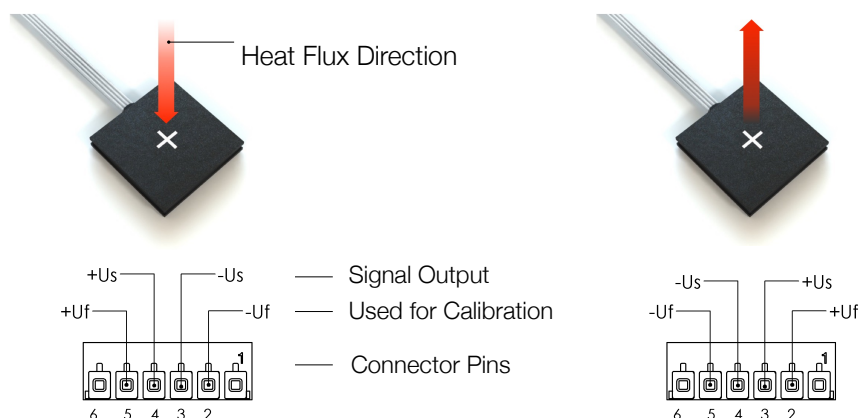
HFD04-059-05L08

|                                             |                        |                            |
|---------------------------------------------|------------------------|----------------------------|
| Sensor Type                                 |                        | Thermoelectric             |
| Surface material                            |                        | Aluminum, painted black    |
| Protection class <sup>(2)</sup>             |                        | IP67                       |
| Surface dimensions AxB                      | mm <sup>2</sup>        | 8x8                        |
| Thickness H                                 | mm                     | 1.6                        |
| Pellet pairs                                |                        | 59                         |
| Sensitivity Se                              | μV/(W/m <sup>2</sup> ) | 22                         |
| Integral sensitivity Sa                     | V/W                    | 0.34                       |
| Heat Flux Range Pe                          | ±W/m <sup>2</sup>      | 8 500                      |
| Integral Heat Flux Range Pa                 | ±W                     | 0.55                       |
| Thermal Time Constant                       | s                      | 1.6                        |
| Thermal Resistance RT                       | K/(W/m <sup>2</sup> )  | 1.20E-03                   |
| Integral Thermal Resistance RT              | K/W                    | 19.3                       |
| Electrical Resistance ACR                   | Ohm                    | 3.73                       |
| Temperature Dependence <sup>(3)</sup> dS/dT | %/°C                   | 0.25                       |
| Linearity with Power dS/dP                  | ±%/(W/m <sup>2</sup> ) | 0.03%                      |
| Homogeneity dS/dA                           | ±%                     | 1                          |
| Calibration Accuracy                        | ±%                     | 3                          |
| Calibration Temperature Range               | °C                     | -40 ... +85                |
| Operating Temperature Range                 | °C                     | -60 ... +150               |
| Max. compressive Force for clamping         | kg                     | 19                         |
| Cable Length <sup>(4)</sup> L               | cm                     | 180                        |
| Connector type <sup>(5)</sup>               |                        | FMC 0,5/6-ST-2,54-18211355 |
| RoHS                                        |                        | Compliant                  |

1. Performance parameters shown in specifications are given for ambient temperature Ta=300 K (27 °C)
2. Application in water - not more than 1 hour. Maximum temperature 100°C.
3. Average value at Ta=300 K (27 °C). Detailed temperature dependence is given in table
4. Sensor is equipped with thin FEP Flat Ribbon Cable, 0.025" Pitch, 32 AWG, 1,8 m.  
Wire resistance 0.54Ohm/m
5. Cable is ended by miniature connector FMC 0,5/6-ST-2,54-18211355 (Phoenix).  
The reciprocal connector p/n is MCV 0,5/6-G-2,54 SMD R44-1821588

## Pinout Configuration

HFD04-059-05L08



RMT Heat Flux Sensor Cable is ended by miniature connector FMC 0,5/6-ST-2,54-18211355 (Phoenix). The reciprocal connector p/n is MCV 0.5/6-G-2.54 SMD R44-1821588 (not included).

## Self-Calibration Method

Sensitivity of thermoelectric heat flux sensor  $S_a$  [V/W]

$$S_a = \frac{U}{P} = N \times \alpha \times R_t$$

U – sensor signal at heat flux  $P_e$ ;  
N – number of pellet pairs inside a sensor;  
 $R_t$  – thermal resistance;  
 $\alpha$  – Seebeck coefficient (average value P-N pair)

Figure-of Merit Z of thermoelectric sensor

$$Z = \frac{(N \times \alpha)^2 \times R_t}{ACR}$$

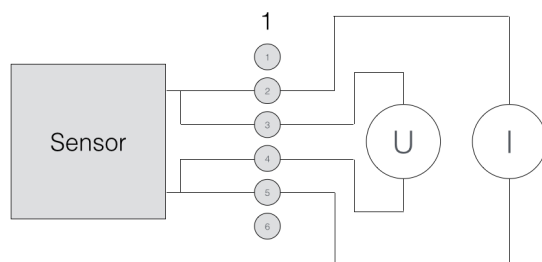
Calibration expression with use of Z, ACR and Seebeck coefficient  $\alpha$

$$S_a = \frac{1}{(\alpha \times N)} \times Z \times ACR$$

$$S_e = S_a \times S \quad \text{where } S - \text{surface area}$$

## Measurement Scheme

Self-calibration to be made by measurement of Figure-of-Merit and ACR Resistance of thermoelectric heat flux sensor by four-wire method which is provided by four wires of the FET cable connected to the sensor.



Use series of Z-Meters made by RMT for measurement of Figure-of-Merit and ACR resistance of thermoelectric heat flux sensor.

Or RMT Datalogger DX8140 developed for HTX, HFX series of heat flux sensors.

## Contacts

### **Russia - RMT Ltd. Headquarters**

Warshavskoe sh. 46, 115230, Moscow

Russia

Tel: +7-499-678-2082

Fax: +7-499-678-2083

Web: [www.rmtltd.ru](http://www.rmtltd.ru)

Email: [info@rmtltd.ru](mailto:info@rmtltd.ru)

### **Europe/USA - TEC Microsystems GmbH**

Schwarzschildstrasse 8, 12489 Berlin

Germany

Tel: +49 30 6789 3314

Fax: +49 30 6789 3315

Web: [www.tec-microsystems.com](http://www.tec-microsystems.com)

Email: [info@tec-microsystems.com](mailto:info@tec-microsystems.com)

### **Korea - Sunflower Energy**

1F, 665-6, Pungdeokcheon-dong

Suji-gu, Yongin-si, Gyeonggi-do

South Korea

Tel: +82 312767992

Fax: +82 312767993

web: [www.sunfl.co.kr](http://www.sunfl.co.kr)

### **China - ProTEC Ltd.**

深圳市南山区登良路恒裕中心B座207

电话: +86-755-61596066

传真: +86-755-61596036

邮编: 518054

Web: [www.protecltd.com](http://www.protecltd.com)

Email: [info@protecltd.com](mailto:info@protecltd.com)

### **Taiwan - Wellspring & Vim Tech Corp**

9F-1, No.657 Pei-an Rd.

Taipei 104

Taiwan

Tel: +886 2-85091756

Fax: +886 2-85091846

web: [www.wellvim.com.tw](http://www.wellvim.com.tw)

Email: [info@wellvim.com.tw](mailto:info@wellvim.com.tw)

## Legal Notice

All logos, images, trademarks and product names (collectively Materials) are proprietary to RMT Ltd and/ or any of its affiliates, or subsidiaries, or other respective owners that have granted RMT Ltd the permission and/or license to use such Materials. All images are provided by RMT Ltd. and are subjects of copyright protection.

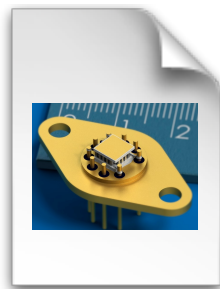
RMT Ltd, TEC Microsystems GmbH and ProTEC Ltd. do not grant a copyright license (express or implied) to the Recipient, except that Recipient may reproduce the logos, images and text materials in this press-release without any alteration for non-promotional or editorial purposes only with a written note about materials owner.

## Copyright Protection Warning

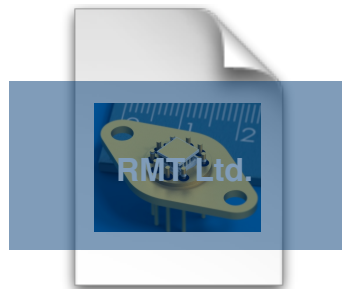
Graphics materials and texts from this datasheet may not be used commercially without a prior response in writing on company letterhead and signed by RMT Ltd authority.

Thank you for respecting the intellectual property rights protected by the International Copyright laws.

All Images contain RMT hidden watermark for the immediate proof of their origin.



RMT Image



Hidden Watermark