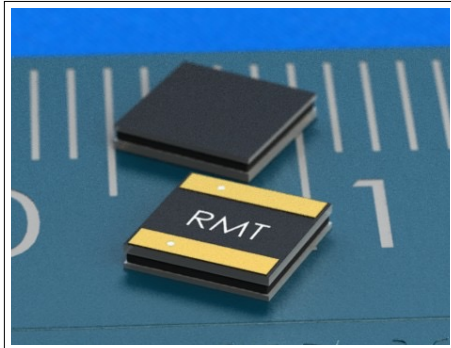


Thermolectric Heat Flux Sensor _____ HRD02-040-05L04

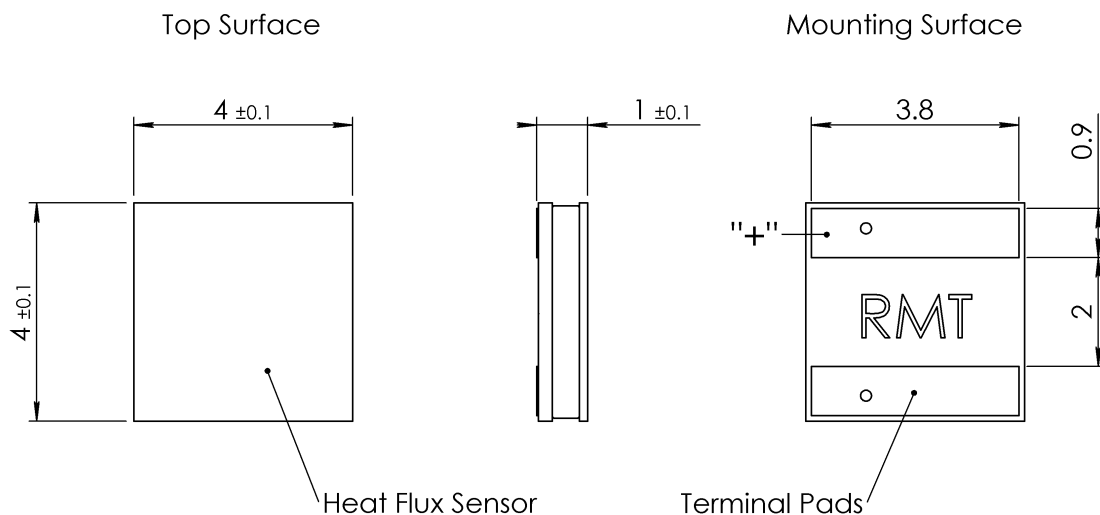


The HRD02-040-05L04 – SMD type, high sensitive and self-calibrating sensor of radiation heat fluxes in a wide range of heat flux intensities. Compatible with RMT Datalogger DX8140.

- Ultra-High Sensitivity
- Miniature Dimensions
- Self-calibrating
- SMD solution
- Suitable for flip-chip

Spectral range	μm	0.2...15
Surface Emissivity ϵ		0.95
Sensitivity S_e	$\mu\text{V}/(\text{W}/\text{m}^2)$	17.3
Integral Sensitivity S_a	V/W	0.48
Detectivity	$\text{cmHz}^{1/2}/\text{W}$	1.70E+09
Time Constant τ	s	0.7
Electrical Resistance ACR1)	Ohm	10.0

Dimensions (mm) _____



Detailed Specification

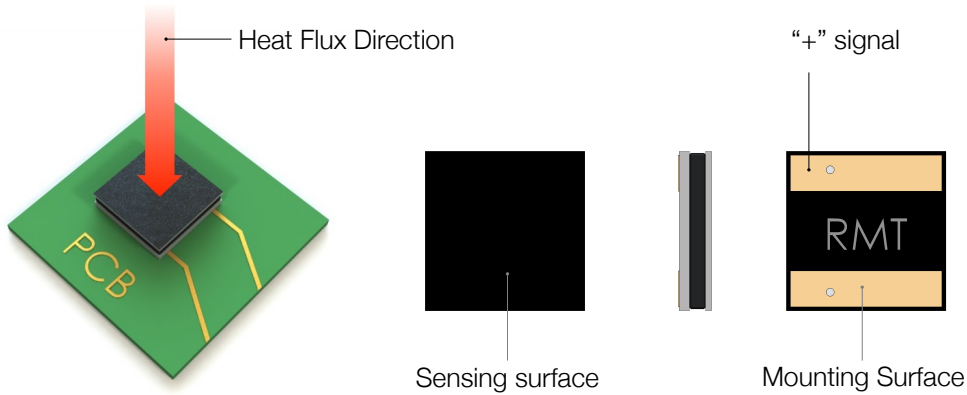
HRD02-040-05L04

Sensor Type		Thermoelectric
Surface material		Aluminum, painted black
Protection		IP67
Surface dimensions AxB	mm ²	6x6
Thickness H	mm	1
Pellet pairs		40
Spectral range	µm	0.2...15
Surface Emissivity ε		0.95
Sensitivity Se	µV/(W/m ²)	17.3
Integral Sensitivity Sa	V/W	0.48
Detectivity	cmHz ^{1/2} /W	1.70E+09
Time Constant τ	s	0.7
Electrical Resistance ACR ¹⁾	Ohm	10.0
Power Density max Pe	±W/m ²	9 000
Maximal Power Pa	±W	0.14
Thermal Resistance RT	K/(W/m ²)	1.30E-03
Integral Thermal Resistance RT	K/W	70.5
Temperature Dependence ²⁾ dS/dT	%/°C	0.25
Linearity with Power dS/dP	±%/(W/m ²)	0.02%
Homogeneity dS/dA.	±%	1
Calibration Accuracy	±%	3
Calibration Temperature Range Min/Max	°C	-40 ... +85
Operating Temperature Range Min/Max	°C	-60 ... +150
Soldering Temperature ³⁾ Max °C	°C	+260
Cooling Method		Convection
Terminal Contacts		Bottom Side
RoHS		Compliant

1. Performance parameters shown in specifications are given for ambient temperature Ta=300 K (27 °C)
2. Average value. Detailed temperature dependance is available.
3. Max duration 5minuters.

Pinout Configuration

HRD02-040-05L04



HRD Heat Flux Sensor has two flat sides. The sensing (working) side is completely black. Bottom side contains two terminal pads for SMT soldering process and a mark between them.

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;
 α – Seebeck coefficient (average value P-N pair)

Figure-of Merit Z of thermoelectric sensor

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

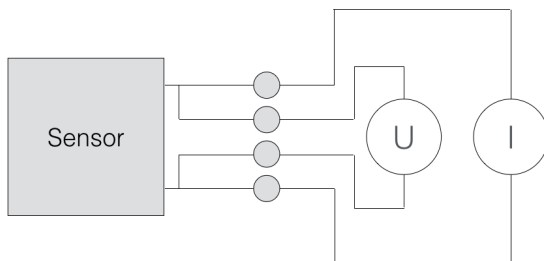
Calibration expression with use of Z, ACR and Seebeck coefficient α

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

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

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

Email: 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

Email: 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

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

Email: 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

Email: info@wellvim.com.tw

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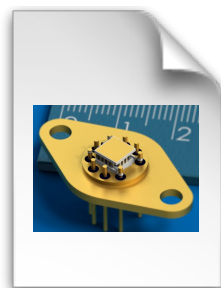
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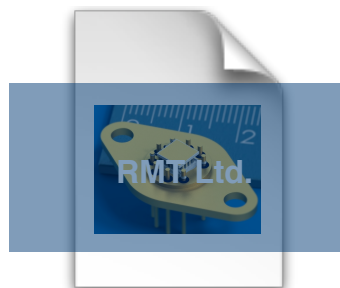
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