



Thermoelectric  
Materials • Devices • Systems

## 20 watt module Data Sheet

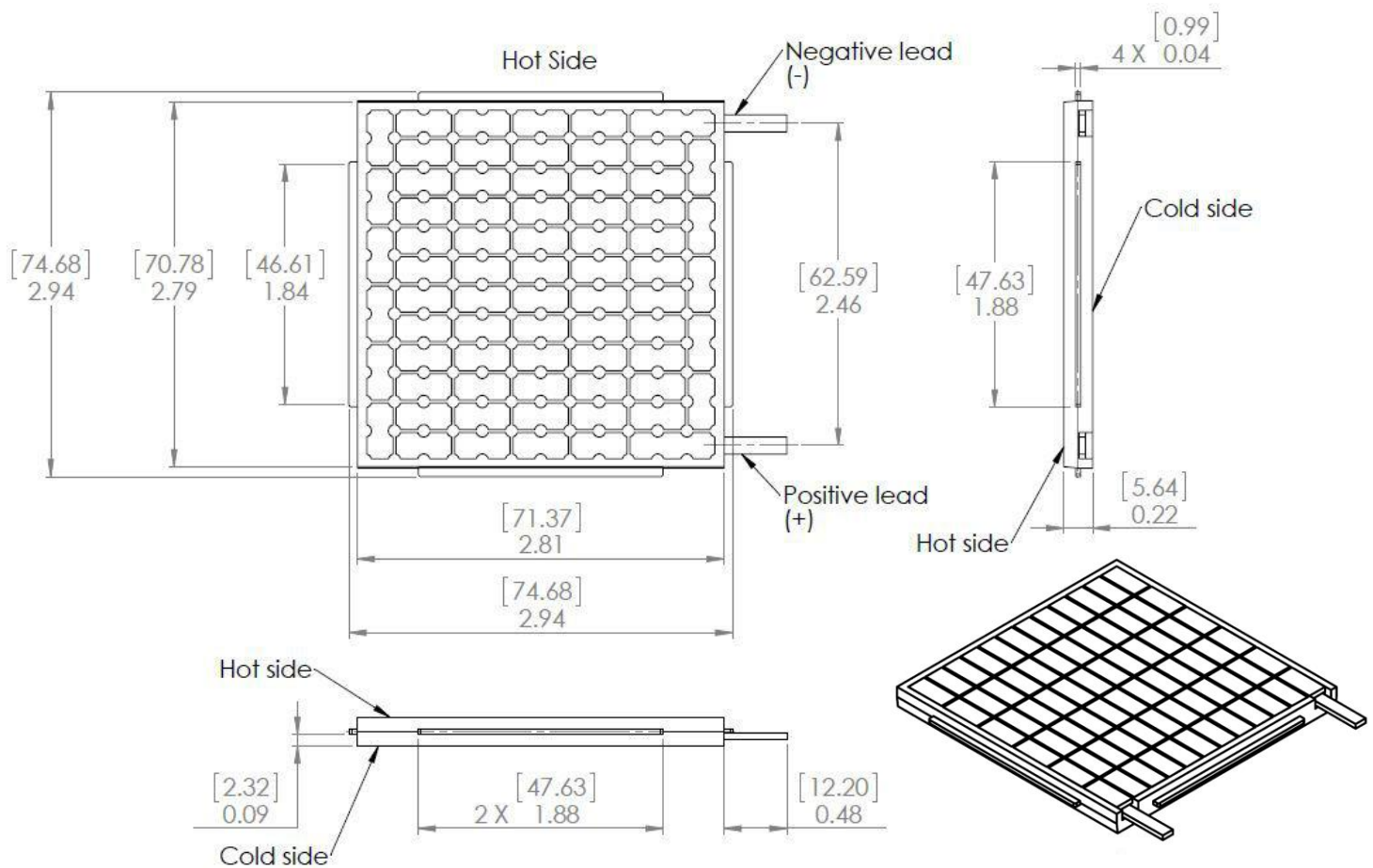
### FEATURES

- **Produce more than 20 watts of power**  
( $T_h=250^\circ\text{C}$ ,  $T_c=50^\circ\text{C}$ )
- **Intermittent Operation beyond  $350^\circ\text{C}$**
- **Intermittent Power up to 30 watts**
- **Rugged Construction** (no ceramic, no solders, fiber reinforced construction makes module tolerant to abuse)
- **Long life** (> than 10 years when properly used)
- **71 couples**  $(\text{Bi,Sb})_2(\text{Te,Se})_3$
- **Produce 15mW @  $\Delta T=5^\circ\text{C}$**

### DESCRIPTION

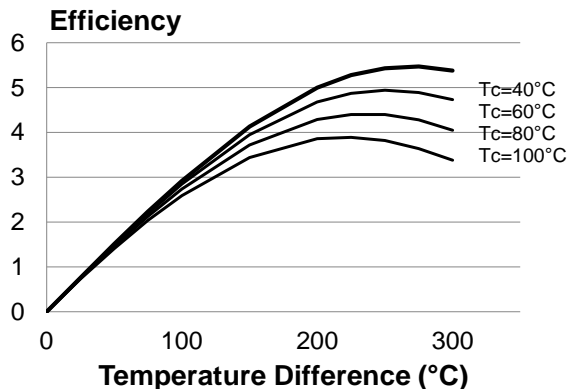
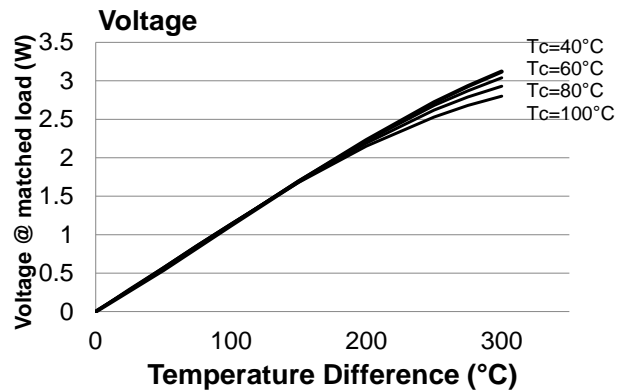
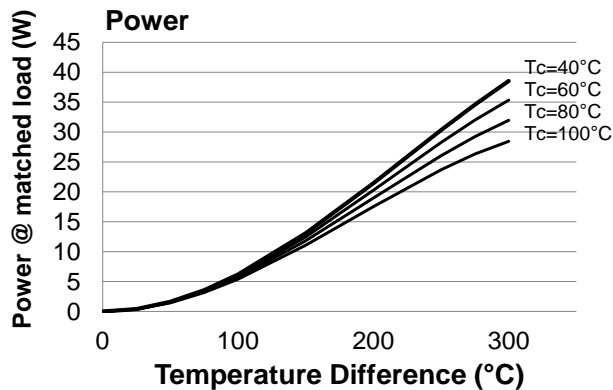
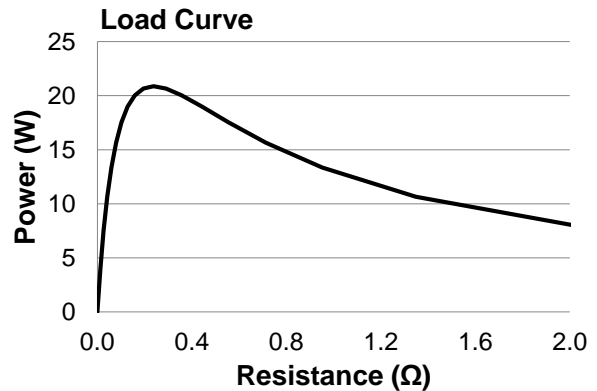
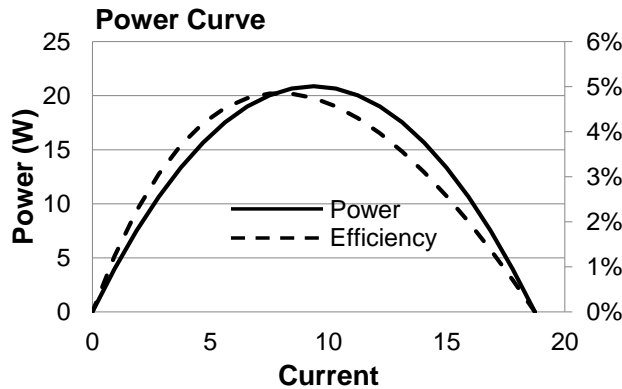
This module is designed specifically for the generation of power and is able to tolerate intermittent temperatures exceeding  $350^\circ\text{C}$  but for maximum life expectancy it should not exceed  $250^\circ\text{C}$ . These high temperature properties are made possible by the bonded metal conductors that eliminate the presence of all solders.

While the module is optimized for waste heat recovery, its reversible properties make it suitable as a thermoelectric cooler, especially for high temperature applications where sensitive electronic equipment must be cooled to below the ambient temperatures.



# 20 watt module Data Sheet

| Thermal and Electrical Characteristics |                                  |      |      |      |                   |
|--|----------------------------------|------|------|------|-------------------|
| Parameter                              | Conditions                       | min  | typ  | max  | units             |
| Power                                  | Th=250°C, Tc=50°C @matched load  | 20.0 | 21.0 | 22.0 | Watts             |
| Open Circuit Voltage                   | Th=250°C, Tc=50°C                | 4.2  | 4.5  | 4.8  | Volts             |
| Matched load Voltage                   | Th=250°C, Tc=50°C                | 2.1  | 2.25 | 2.4  | Volts             |
| Internal Resistance                    | Th=250°C, Tc=50°C                | 0.24 | 0.25 | 0.26 | Ω                 |
|  | T = 25°C                         | 0.14 | 0.15 | 0.16 | Ω                 |
| Current                                | Th=250°C, Tc=50°C @matched load  | 9.0  | 9.5  | 10.0 | Amps              |
|  | Th=250°C, Tc=50°C @short circuit | 18.0 | 19.0 | 20.0 | Amps              |
| Heat Flux                              | Th=250°C, Tc=50°C @matched load  | 450  | 475  | 500  | Watts             |
|  | Th=250°C, Tc=50°C open circuit   | 310  | 325  | 340  | Watts             |
| Heat Flux Density                      | Th=250°C, Tc=50°C @matched load  | 9    | 10   | 11   | W/cm <sup>2</sup> |
| Mass                                   |                                  | 101  | 102  | 104  | grams             |



Stated temperatures are assumed to be on the module surface and not the heat exchangers.

Module surfaces are conductive and require the use of an insulator when used against metal heat exchangers. Ceramic wafers with thermal grease provide optimum performance.

Recommended mounting pressure is 100 to 200 psi uniformly distributed over the module surface.