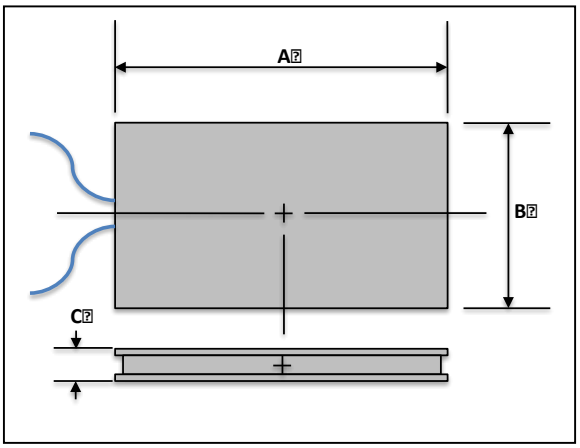
HIGH EFFICIENCY PB/TAGS TEG MODULES

Thermoelectric Power Generator Features

- **Produces up to 18 watts of power at 415C ΔT**
- **Operates up to 600C[1]**
- **Projected Max Power 35 watts**
- **Fully Encapsulated Array**
  (Greatly simplifies generator construction)
- **High Performance PbTe and TAGS**
  (Up to 12% efficient)



A (cm)	B (cm)	C (cm)
5.1	4.2	0.5

Description

The Series PBTAGS-200:009A6 Thermoelectric Power Array is designed as a solid state converter of heat to electricity at higher temperatures up to 600°C. It consists of 54 couples of high performing PbTe and TAGS based materials produced using proprietary crystal growth and device technologies. Individual dice are sandwiched between high temperature ceramic plates. Long operational life is possible when used in a reducing atmosphere.

Applications

Power Supplies

- Use waste heat to generate a source of power in remote locations.
- Burn a hydrocarbon fuel to generate a source of power in remote locations.
- Cathodic protection
- Telecommunications

Self-Powered Devices

- Heaters
- Water Heaters
- Furnaces
- Vehicle Engine Heaters

Waste Heat Recovery

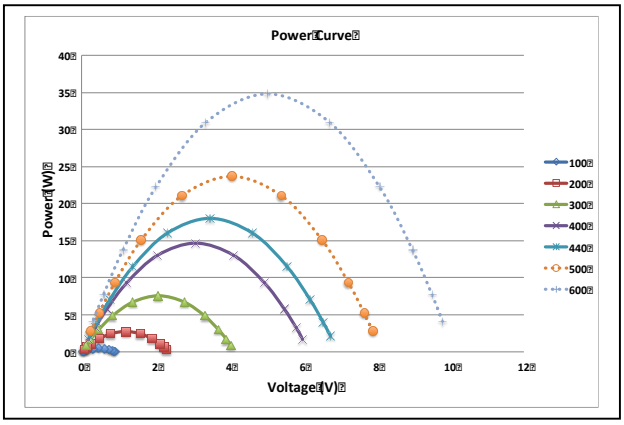
- Engine exhaust powered alternator replacement
- Industrial operations such as refineries, foundries, glass and cement plants

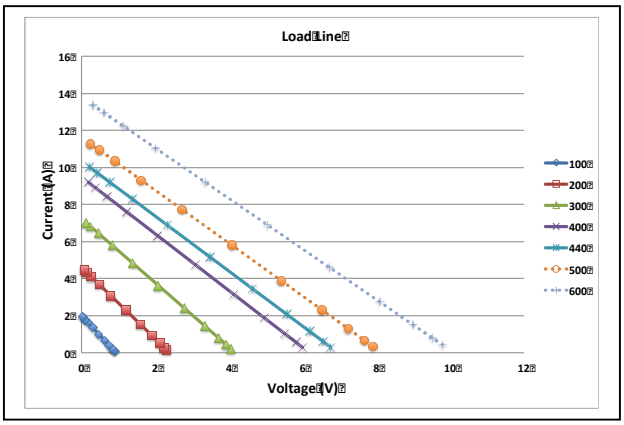
Renewable Energy

- Solar Concentrators
- Wood burning stoves
- Geothermal
- Incinerators

Thermal and Electrical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
Power	T_h=440C, T_c=25C @ matched load		18		Watts
Voltage, Open Circuit	T_h=440C, T_c=25C		7.0		Volts
Voltage, Matched Load	T_h=440C, T_c=25C @ matched load		3.5		Volts
Internal Resistance	T_h=440C, T_c=25C		0.67		Ohms
	T=25C		0.44		Ohms
Current	T_h=440C, T_c=25C @ matched load		5		Amps
	T_h=440C, T_c=25C @ short circuit		10		Amps
Heat Flux	T_h=440C, T_c=25C @ matched load				Watts
	T_h=440C, T_c=25C @ open circuit				Watts
Heat Flux Density	T_h=440C, T_c=25C @ matched load				W/cm^2





Application Notes:

Topic	Notes
Beta Prototype	• Test Arrays have received bench testing consisting of resistance and mechanical checks. • Test modules have received bench testing consisting of multiple temperature cycles to a temperature difference (DT) of 350C • Base materials have received bench evaluations to 440C • Delivered modules have been tested once up to 300C to ensure internal electrical interconnect forms • High temperature performance based upon previous test experience • High temperature electrical connections (up to 700C) are implemented on the hot side providing better performance stability over multiple heat cycles and sustained high temperatures
Mechanical Interface	• Plates: AlN with external isolated interconnect metal • Orientation: External connectors tied to cold side • Positive normal compression required at all times (180-240 psi) with stress relief at temperature • Hot Side: Recommend use of high temperature sheet (e.g. Grafoil sheet) • Cold Side: Recommend use of thermal paste
Electrical Connection	• High temperature wire with male quick connect terminals • All terminals attached on cold side plates • Recommend attaching large interconnect wire (No. 3 or larger) • Fixed support for stress relief
[1]Reliability & Lifetime	• Some slow degradation may occur at 600C. • Tested to hot/cold cycles to 300C with < 15% degradation