

NPI: UltraTEC™ UTX Series



Laird[™]
THERMAL SYSTEMS

NPI: UltraTEC™ UTX Series



- The UltraTEC™ UTX Series is a high-performance thermoelectric cooler assembled with next generation thermoelectric material which provides:
 - improved temperature differential and efficiency than standard semiconductor materials
 - higher cooling capacity
- The UltraTEC UTX™ Series uses a large number of N and P couples to generate a higher heat flux density than standard thermoelectric coolers.

Next Generation Materials (NGM)

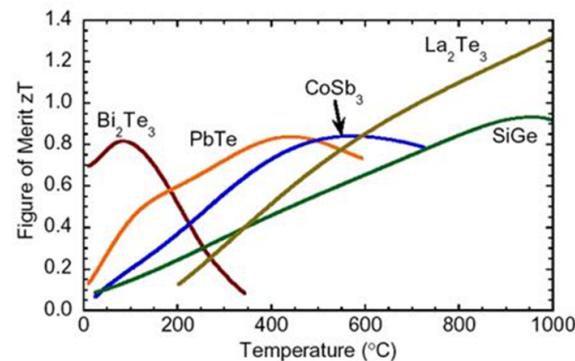
- Same form, fit, and function as standard material (SM)
- Same material composition
- Same nominal ACR with improved tolerance
- Higher performance and efficiency
- Stronger material able to produce smaller sizes

***Used in Premium Thermoelectric Modules
for High Performance Applications***

Available March 2020



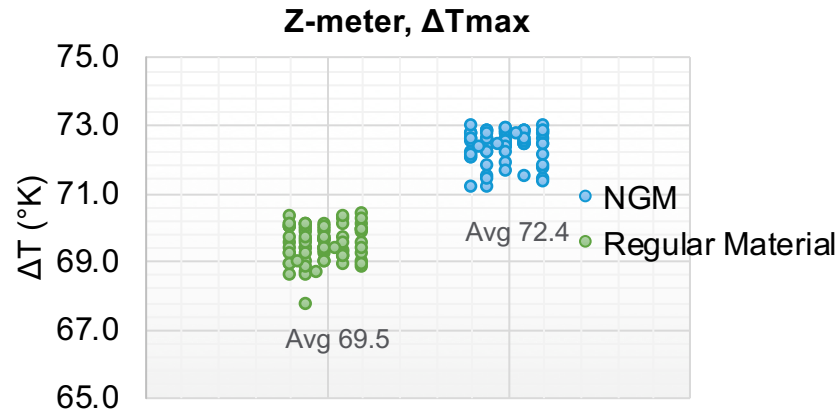
Bi_2Te_3



Improved Temperature Differential

Standard vs NGM, ΔT			
Rod Type	SM ($^{\circ}\text{K}$)	NGM($^{\circ}\text{K}$)	ΔT ($^{\circ}\text{K}$)
Average	69.5	72.4	2.9
Max	70.4	73.0	2.6
Min	67.7	71.2	3.5

- Temperature differential of a low-profile Thermoelectric Module was tested
- **UTX11-12-F2-3030-TA-W6:**
 - ✓ The average ΔT of NGM is 3°K higher than standard material
 - ✓ The ΔT can be more than 4°K for taller Thermoelectric Modules

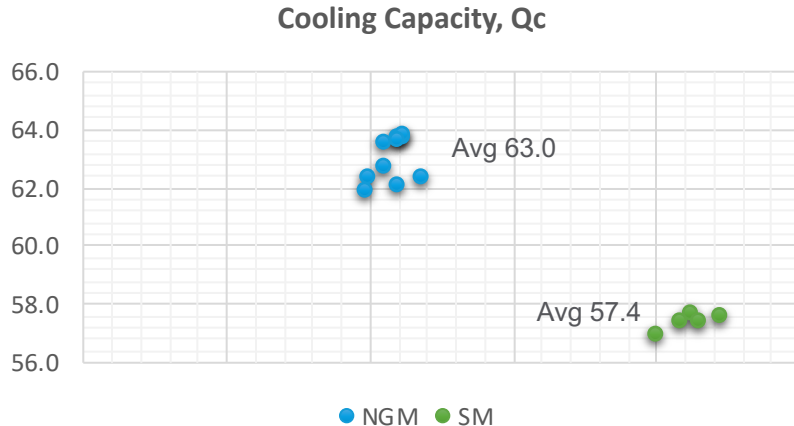


NGM has higher performance and COP

Improved Cooling Capacity

Standard vs NGM, Qc			
Rod Type	SM (W)	NGM (W)	ΔQ_c (W)
Average	57.4	63.0	5.6
Max	57.7	63.8	6.1
Min	57.0	62.0	5.0

- Cooling capacity of a low-profile Thermoelectric Module was tested
- UTX8-12-F2-2525-TA-W6:**
 - ✓ The average Qc of NGM is 5.6W higher than standard material
 - ✓ This is an 10% improvement over standard material

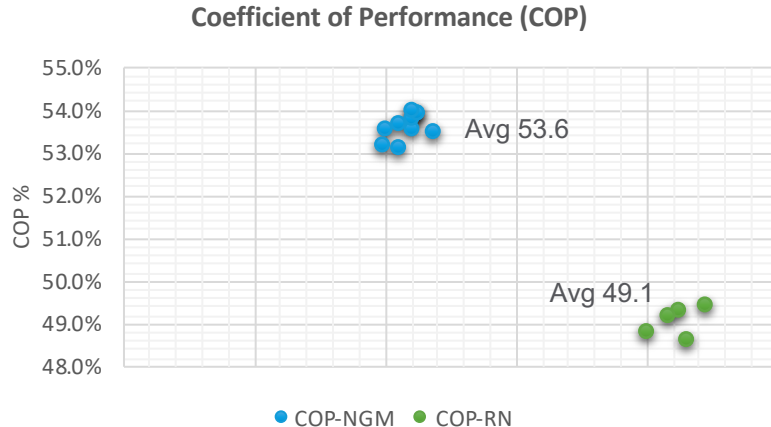


NGM has higher cooling capacity

Improved COP

Standard vs NGM, %			
Rod Type	SM (%)	NGM (%)	Δ (%)
Average	49.1	53.6	4.5
Max	49.4	54.0	4.6
Min	48.7	53.1	4.4

- Cooling capacity of a low-profile Thermoelectric Module was tested
- UTX8-12-F2-2525-TA-W6**
 - ✓ The average COP of NGM is 4.5% higher than standard material
 - ✓ This is an 9% improvement over standard material



NGM has higher efficiency

UltraTEC™ UTX Series

Part Description	Q _c max (W)	I _{max}	V _{max} (VDC)	ΔT (°K)	L1 (mm)	W (mm)	L2 (mm)	H (mm)	Wire AWG
UTX8-12-F2-2525-TA-W6	67	7.9	14.4	71	24	25	27	1.9	24
UTX8-12-F2-3030-TA-W6	67	10.9	14.4	71	30	30	34	2.5	20
UTX11-12-F2-3030-TA-W6	92	14.5	14.4	71	30	30	34	2.4	22
UTX15-12-F2-4040-TA-W6	123	14.6	14.4	71	40	40	44	2.8	20
UTX15-12-F2-3030-TA-W6	128	15.2	14.4	71	30	30	34	2.4	22
UTX6-19-F1-4040-TA-W6	79	6	22.6	71	40	40	40	3.9	22
UTX8-200-F2-4040-TA-W6	115	8.6	22.7	71	40	40	44	3.8	20
UTX15-200-F2-4040-TA-W6	204	15.4	22.7	71	40	40	44	3.3	20
UTX6-24-F1-5555-TA-W6	96	6	27.4	71	55	55	55	3.9	22
UTX8-24-F1-5555-TA-W6	138	8.6	27.4	71	55	55	55	3.8	22
UTX15-24-F2-5252-TA-W6	232	14.5	27.4	71	52	52	56	3.3	18
UTX20-242-F2-5858-TA-W6	323	20	27.5	71	58	58	62	3.0	18
UTX8-288-F2-5252-TA-W6	165	8.6	32.7	71	52	52	56	3.8	20
UTX9-28-F2-4040-TA-W6	178	9.3	32.7	71	40	40	44	2.8	18
UTX15-288-F2-5252-TA-W6	294	15.4	32.7	71	52	52	56	3.3	20

Target Applications

Industrial Lasers:
Laser Projection
Laser Cooling



Industry Application

Industrial Laser Laser Projection

Description

- Entertainment projection for Imax, outdoor theaters and stadiums need high end laser projection.
- The lasers used in these systems need to be cooled to room temperature to maximize image resolution and color pallet.
- Often requires liquid cooling to manage high heat flux density.

Why Thermoelectrics?

- Lower cost solution than recirculating chiller
- Compact form factor
- Solid state construction, low maintenance.
- Mountable in any orientation
- DC Operation

Potential Customers



SONY



CHRISTIE



Panasonic

InFocus

BARCO

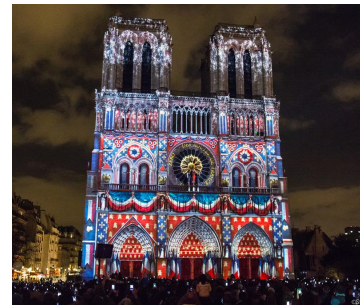
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Specifications

- High heat pumping capacity, > 300W
- $T_h = 40$ to 50°C
- $T_c = 20^{\circ}\text{C}$
- Protection against condensation.
- Low thermal resistances on hot and cold side

Why Laird Thermal Systems?

- TEM automation line yields high quality parts and lower cost.
- Good material growth operation assures best in class thermoelectric materials.
- Wide TEM product breadth of high density TEMs
- Expertise in both thermoelectrics and liquid cooling.



Laser Light Show



Laser Projector

Industry Application

Industrial Laser Laser Cooling

Description

- Industrial lasers are used to cut a wide breadth of materials. They use complex algorithms to control input power, which enables user to adjust cut to accommodate type of materials that is being machined.
- High-tech manufacturing processes used in microelectronics, semiconductor (solar & wafer), tool and die, medical and life science industries all use lasers to cut materials with extreme precision.
- Lasers dissipate a lot of heat, so they need cooling to remain stable during operation.

Why Thermoelectrics?

- Ideal for spot cooling, compact form factor
- Solid-state construction providing long life and low maintenance
- Reverse polarity which enables precise temperature control
- Parts do not outgas

Potential Customers



Specifications

- Dissipate heat generated by laser, which can range from 2 to 10 Watts for direct optical cooling or hundreds of watts for laser system cooling.
- Maintain temperature of laser system at constant temp 20 to $25 \pm 1^\circ\text{C}$, while ambient temp may fluctuate from 18 to 32°C .
- Parts placed inside laser can not outgas.

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