Thermoelectric
SOLUTIONS

Laird TECHNOLOGIES®

Innovative **Technology**
for a **Connected** World

www.lairdtech.com

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for a **Connected** World

About Laird Technologies

Laird Technologies is the world leader in the design and manufacture of customized, performance-critical products for wireless and other advanced electronics applications. Laird Technologies partners with its customers to find solutions for applications in various industries such as:

Network Equipment
Telecommunications
Data Communications
Automotive Electronics
Computers
Aerospace
Military
Medical Equipment
Consumer Electronics

Laird Technologies offers its customers unique product solutions, dedication to research and development, as well as a seamless network of manufacturing and customer support facilities across the globe.

A Brief Introduction to Thermoelectrics

An afterthought before, thermal management of electronics components and systems is now more challenging. Power densities continue to increase and product form factors continue to shrink; therefore, engineers must now consider thermal management technologies and their applications early in the product design process. Simple thermal management solutions, such as adding a fan or heat sink, are no longer typically viable to meet required performance and reliability specifications. In today's complex operating environment, thermoelectrics are required to provide precision cooling and heating in a variety of modular platforms including air conditioning, liquid, and direct contact designs.

Solutions–FAST

With over 40 years' application experience, Laird Technologies finds optimal solutions – FAST! Exceptional engineering expertise in conducting in-depth thermal design studies via thermal modeling, analysis, and design allow accurate definition of your requirements. Our engineers work closely with you to determine the right solution for your application. Whether you need thermoelectric modules, commercial off-the-shelf or customized thermoelectric assemblies, Laird Technologies implements customized solutions from concept and prototype, to feasibility test and performance, through final production.

Why do it yourself?

Due to the increasing complexities of thermal management and the constant pressure to produce more products faster, companies rely on external, specialized thermal management expertise. Laird Technologies is your thermal management partner to determine the best solution for your requirements. The company's expertise can positively change product design to deliver slimmer form factors, lower costs, and more efficient thermal management. Whether you require re-design of existing products or initial design, analysis, test of new product, Laird Technologies delivers global network support.

Thermoelectric Applications

Whether cooling a single component or an entire cabinet, Laird Technologies provides robust units for outdoor applications and compact coolers for components in a wide array of applications. Numerous industry examples include:

Telecom and Photonics Industry

Thermoelectrics can remove heat generated from electronic components located inside a telecom enclosure. Thermoelectrics can also be used to stabilize the sensitive optical components used in laser diodes, pump lasers, and passive optical components.

- Process fluid cooling
- Laser diode temperature stabilization
- Telecom Enclosure Cooling

Medical and Laboratory Industry

Laird Technologies' wide range of small- and medium-size units handle most applications including temperature regulation of samples and stabilization of sensitive instruments. Our temperature controllers maintain key components with high precision. Applications include:

- Analytical instruments
- Medical lasers
- Laboratory equipment

Food and Beverage Industry

Food and beverage temperature maintenance is crucial. Laird Technologies provides a comprehensive selection of assemblies to keep products fresh from the production line to the consumer. Applications include:

- Beverage coolers
- Small refrigerators
- Mobile food containers

Benefits of Using Thermoelectrics

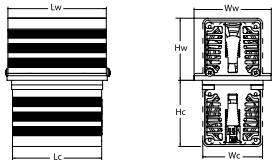
A special combination of benefits are attained by thermoelectrics that makes them the only effective solution for many thermal management applications:

- Precise temperature-control with tolerances of +/- 0.1°C achieved under steady state conditions
- DC operation with reverse polarity to allow for heating and cooling in thermal cycling applications
- Rapid cool down below ambient temperatures
- Tight geometric space constraints and low weight requirements
- Reliable solid-state operation with no sound or vibration (lifetimes of more than 200,000 hours)
- Large temperature differentials, ΔT 100°C, with multistage cascade product line
- Power Generation from waste heat, patented ThermaTEC™ is operational up to 225°C
- Virtually no electrical noise
- Environmentally friendly, no CFC refrigerants
- Low maintenance, easy to repair

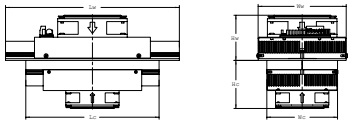
Air-Air Systems (AA)

Air-Air coolers are used to cool (or heat) objects in containers. Heat is absorbed and dissipated by heat exchangers equipped with fans. Simply cut a hole, plug in the assembly and connect it to a power source. Laird Technologies Air-Air coolers are designed for dependable, compact performance.

Drawing AA-026 and AA-033



Drawing AA-034 to AA-200

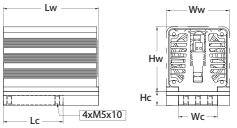


PART NO.	COOLING POWER	CURRENT (A)	POWER INPUT (W)	AMBIENT MAX (°C)	WEIGHT (kg)	DIMENSIONS (mm)					
						Lw	Lc	Ww	Wc		
AA-019-12-22-00-00	20	2.3	28	52	0.3	80	60	60	40	63	38
AA-024-12-22-00-00	25	2.4	29	51	0.6	100	80	80	60	63	55
AA-026-12-22-00-00	25	3.7	44	39	1.0	107	97	84	65	72	67
AA-033-12-22-00-00	32	3.7	44	48	1.4	180	97	84	65	71	67
AA-034-12-22-00-00	33	3.5	42	49	0.9	120	100	100	80	64	57
AA-040-12-22-00-00	41	6.3	76	48	1.8	160	120	122	102	71	76
AA-040-24-22-00-00	39	2.6	62	52	1.8	160	120	122	102	71	76
AAC050-24-22-00-00	49	4.7	113	47	2.7	230	180	122	102	71	80
AA-060-12-22-00-00	58	6.2	74	51	2.5	230	180	122	102	71	81
AA-060-24-22-00-00	58	3.1	74	51	2.5	230	180	122	102	71	81
AA-070-24-22-00-00	71	3.8	91	48	2.5	230	180	122	102	71	81
AA-100-24-22-00-00	102	5.6	134	49	4.0	300	230	152	122	78	83
AA-150-24-22-00-00	143	7.9	190	48	4.1	300	250	180	152	84	83
AA-200-24-22-00-00	193	11.3	271	46	7.0	400	350	180	152	89	89

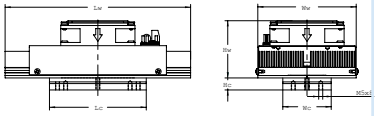
Direct-Air Systems (DA)

Direct-Air assemblies are used in three key applications, including cooling/ heating. The heat is absorbed by the cold plate, pumped through the TEC modules and then dissipated to the air by an air heat sink. Our Direct-Air coolers deliver compact and reliable cooling.

Drawing DA-020 and DA-038



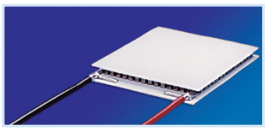
DA-Drawing

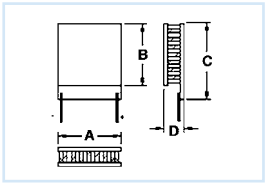


PART NO.	COOLING POWER	CURRENT (A)	POWER INPUT (W)	AMBIENT MAX (°C)	WEIGHT (kg)	DIMENSIONS (mm)					
						Lw	Lc	Ww	Wc	Hw	Hc
DA-014-12-02-00-00	12	1.8	22	44	0.2	60	50	40	30	42	11
DA-020-12-02-00-00	19	2.7	32	44	0.6	97	62	65	40	68	14
DA-024-12-02-00-00	24	2.4	29	48	0.3	80	60	60	40	56	13
DA-034-12-02-00-00	34	2.6	31	46	0.5	100	60	80	40	58	14
DAC035-12-02-00-00	31	4.8	58	54	1.2	160	60	122	60	71	20
DA-038-12-02-00-00	38	3.6	43	43	1.2	180	62	65	40	67	14
DA-044-12-02-00-00	42	3.8	46	46	0.6	120	60	100	40	59	13
DA-045-12-02-00-00	48	6.1	73	46	1.2	160	60	122	60	71	15
DA-045-24-02-00-00	45	2.5	60	50	1.2	160	60	122	60	71	15
DAC060-24-02-00-00	58	4.6	110	48	1.8	230	120	122	60	71	20
DA-075-12-02-00-00	71	7.2	86	49	1.7	230	120	122	60	71	15
DA-075-24-02-00-00	71	3.7	89	49	1.7	230	120	122	60	71	15
DA-115-24-02-00-00	113	5.8	139	47	2.9	300	220	152	60	78	16
DA-135-24-02-00-00	135	6.9	166	42	2.9	300	220	152	60	78	16
DA-160-24-02-00-00	160	7.4	178	46	3.5	300	180	152	130	84	16

PolarTEC™

- Porch style ceramic for increased heat dissipation
- Strong porch style lead attachments
- Full range of size, power and cooling capacities

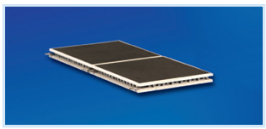


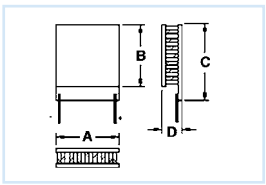


PART NO.	Th=25°C				N	DIMENSIONS				WIRE
	QMAX[1] (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	³TMAX (°C)		A	B	C	D	(152mm)
PT6,7,F2,3030,TA,W6	29	6.0	8.1	65	71	30	30	34	3.8	18 AWG
PT4,12,F2,3030,TA,W6	33	3.9	14.4	65	127	30	30	34	3.2	24 AWG
PT4,12,F2,4040,TA,W6	32	3.7	14.4	67	127	40	40	44	4.1	18 AWG
PT6,12,F2,4040,TA,W6	52	6.0	14.4	65	127	40	40	44	3.8	18 AWG
PT8,12,F2,4040,TA,W6	72	8.5	14.4	64	127	40	40	44	3.3	18 AWG

UltraTEC™

- High heat-pumping capacity within small surface area
- High efficiency
- Strong, porch style lead attachment
- Increased temperature differences (DT)
- Large hot side ceramic for extra heat dissipation

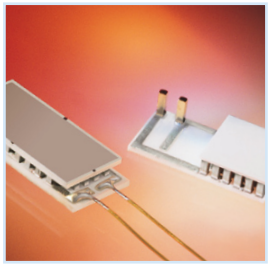




PART NO.	Th=25°C				N	DIMENSIONS				WIRE
	QMAX[1] (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	³TMAX (°C)		A	B	C	D[2]	(152mm)
UT8,12,F2,3030,TA,W6	69	7.9	14.4	69	127	30	30	34	2.6	20 AWG
UT11,12,F2,3030,TA,W6	95	11.0	14.4	69	127	30	30	34	2.4	22 AWG
UT15,12,F2,4040,TA,W6	126	14.6	14.4	69	127	40	40	44	2.8	20 AWG

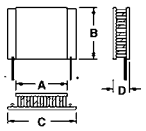
OptoTEC™

- Pb-free construction solders up to 271°C; pre-tinning available for packaging temperatures ranging from 93°C to 232°C
- Aluminum Nitride, Alumina, or Beryllia
- Custom sizes, power densities and ceramic patterns
- Wire bondable posts, metallized pads and wires

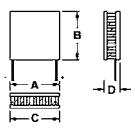


INTERNAL SOLDERING TEMP.			PART NO.	Th=25°C						Th=75°C					DIMENSIONS				
							ΔTMAX (°C)					ΔTMAX (°C)								
138	232	271		QMAX[1]	IMAX	VMAX	OT	ET	HOT	QMAX[1]	VMAX	OT	ET	HOT	N	A	B	C	D_1
OT	-	-	08,04,F0,0203,11,W2.25	0.22	0.8	0.5	67	-	-	0.24	0.57	84	-	-	4	1.8	3.4	3.4	2.4
OT	-	-	08,08,F0,0305,11,W2.25	0.44	0.8	0.9	67	-	-	0.49	1.12	84	-	-	8	3.3	3.3	4.9	2.4
OT	-	-	08,18,F2,0505,11,W2.25	0.97	0.8	2.2	67	-	-	1.09	2.59	84	-	-	18	5	5	6.7	2.4
OT	-	-	12,12,F0,0406,11,W2.25	0.97	1.2	1.5	67	-	-	1.09	1.72	84	-	-	12	4.2	6.2	6.2	2.7
OT	-	HOT	12,18,F2A,0606,11,W2.25	1.46	1.2	2.1	67	-	64	1.72	2.50	84	-	81	18	6.0	6.2	7.2	2.7
OT	-	-	08,32,F2,0707,11,W2.25	1.72	0.8	3.9	67	-	-	1.95	4.60	84	-	-	32	6.6	6.6	8.3	2.4
OT	-	-	15,30,F2A,0610,11,W2.25	3.03	1.5	3.6	67	-	-	3.50	4.2	84	-	-	30	6.2	10.3	12.3	2.1
OT	-	-	08,66,F0,1009,11,W2.25	3.60	0.8	7.9	67	-	-	4.4	9.2	84	-	-	66	9.8	8.9	11.4	2.4
OT	ET	-	20,30,F2A,0610,11,W2.25	4.0	2.0	3.6	67	67	-	4.7	4.2	84	84	-	30	6.2	10.3	12.3	1.8
-	-	HOT	20,31,F2A,0909,11,W2.2.5	4.2	2.0	3.5	-	-	64	4.7	4.5	-	-	81	31	8.8	8.8	11.0	2.2
-	ET	-	20,31,F1A,0909,11,W2.25	4.2	2.0	3.5	-	67	-	4.7	4.5	-	84	-	31	8.8	8.8	8.8	2.2
-	ET	-	19,35,F1N,0612,11,W2.25**	4.64	1.9	4.2	-	65	-	5.28	4.9	-	81	-	35	6.0	12.2	6.0	-
-	-	HOT	12,65,F2A,1312,11,W2.25	5.34	1.2	7.8	-	-	64	5.9	9.3	-	-	81	65	13.2	12.1	13.2	2.7
OT	-	-	15,66,F0,1211,11,W2.25	6.7	1.5	8.0	67	-	-	7.5	9.5	84	-	-	66	12.3	11.3	14.4	2.4
-	-	HOT	20,65,F2A,1312,11,W2.25	8.76	2.0	7.8	-	-	64	9.90	9.3	-	-	81	65	13.2	12.1	13.2	2.2
OT	-	-	20,66,F0,1211,11,W2.25	8.80	2.0	7.8	67	-	-	10.0	9.5	84	-	-	66	12.1	11.1	14.2	2.5

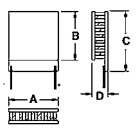
OptoTEC – F0



OptoTEC – F1, F1A, F1N

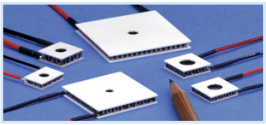


OptoTEC – F2

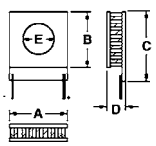


Center Hole

- Features center hole for transmission of light, wires, probes or other hardware through the TEC
- Round or square configurations available



SH Series

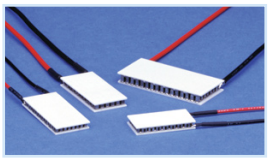


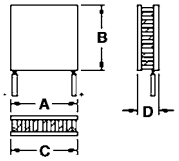
PART NO.	Th=25°C				N	DIMENSIONS				
	QMAX[1] (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	ΔTMAX (°C)		A	B	C	D[2]	E
RH14,14,10,L1,W4.5	3.7	3.9	1.7	68	14	26	26	26	4.7	14.0
RH14,14,06,L1,W4.5	5.7	6.0	1.7	67	14	26	26	26	3.8	14.0
RH14,32,06,L1,W4.5	12.9	6.0	3.9	67	32	44	55	55	3.8	27.0
SH10,23,06,L1,W4.5	4.7	3.0	2.8	67	23	15	15	15	3.6	7.2
SH08,28,05,L1,W4.5	4.9	2.6	3.9	67	28	14.7	10.3	14.7	3.1	4.4
SH10,125,05,L1,W4.5	32.9	3.9	15.2	67	125	30	30	30	3.2	3.6
SH14,125,10,L1,W4.5	32.9	3.9	15.2	68	125	40	40	40	4.7	4.7
SH14,125,06,L1,W4.5	50.7	6.0	15.2	67	125	40	40	40	3.8	4.7
SH14,125,045,L1,W4.5	67.7	8.5	15.2	65	125	40	40	40	3.3	4.7

Notes: 1) QMax rated value at ³T = 0°, Imax and Vmax, Th = 25°C; 2) Thickness for non-metallized versions only. All modules are lead-free. For wiring options contact Laird Technologies.

CP Series

- Low-cost, high-performance
- Designed for higher current, larger heat pumping applications
- Standard for consumer product and industrial cooling
- Ideal for instrumentation and consumer applications
- Excellent for applications from commercial to military



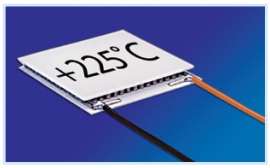


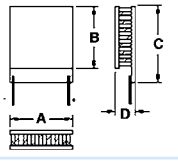
PART NO.	Th=25°C				N	DIMENSIONS (mm)			
	QMAX(1) (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	ΔTMAX (°C)		A	B	C	D(2)
CP08,31,06,L1,W4.5	4.4	2.1	3.8	67	31	12	12	12	3.4
CP10,31,08,L1,W4.5	5.3	2.5	3.8	67	31	15	15	15	4
CP10,31,05,L1,W4.5	8.2	3.9	3.8	67	31	15	15	15	3.2
CP08,63,06,L1,W4.5	9	2.1	7.6	67	63	12	25	12	3.4
CP10,63,06,L1,W4.5	12.7	3	7.6	67	63	15	30	15	3.6
CP10,71,06,L,W4.5	14.4	3	8.6	67	71	23	23	23	3.6
CP10,63,05,L1,W4.5	16.6	3.9	7.6	67	63	15	30	15	3.2
CP08,127,06,L1,W4.5	18.1	2.1	15.4	67	127	25	25	25	3.4
CP14,35,045,L1,W4.5	19	8.5	4.2	65	35	15	30	15	3.3
CP10,127,08,L1,W4.5	21.4	2.5	15.4	67	127	30	30	30	4
CP10,127,06,L1,W4.5	25.7	3	15.4	67	127	30	30	30	3.6
CP14,71,06,L1,W4.5	28.7	6	8.6	67	71	30	30	30	3.8
CP10,127,05,L1,W4.5	33.4	3.9	15.4	67	127	30	30	30	3.2
CP14,71,045,L1,W4.5	38.5	8.5	8.6	65	71	30	30	30	3.3
CP14,127,06,L1,W4.5	51.4	6	15.4	67	127	40	40	40	3.8

ThermaTEC™

High-temperature cooling

- Unique patented technology works up to +225°C
- Full range of size, power, and cooling capacities
- Superior cycling capacity
- Solid state reliability
- Strong, porch-style lead attachment
- Generates power from waste heat

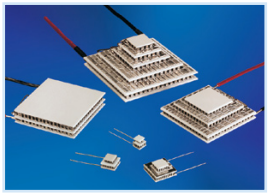




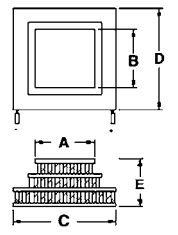
PART NO.	Th=25°C				N	DIMENSIONS (mm)			
	QMAX(1) (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	ΔTMAX (°C)		A	B	C	D(2)
HT4,6,F2,2143,TA,W6	16.0	3.7	7.2	64	63	21	38	43	4.1
HT4,7,F2,3030,TA,W6	18.0	3.7	8.1	67	71	30	30	34	4.1
HT2,12,F2,3030,TA,W6	20.0	2.3	14.4	63	127	30	30	34	3.6
HT9,3,F2,2525,11,TA,W6	20.0	9.6	3.6	66	31	25	25	29	4.9
HT3,12,F2,3030,TA,W6	24.0	2.8	14.4	63	127	30	30	34	3.2
HT4,12,F2,4040,TA,W6	32.0	3.7	14.4	64	127	40	40	44	4.1
HT4,12,F2,3030,TA,W6	33.0	3.9	14.4	63	127	30	30	34	3.2
HT8,7,F2,3030,TA,W6	39.0	8.5	8.1	63	71	30	30	34	3.3
HT6,12,F2,4040,TA,W6	51.0	6.0	14.4	63	127	40	40	44	3.6
HT8,12,F2,4040,TA,W6	72.0	8.5	14.4	63	127	40	40	44	3.3

Multistage

- Ideal for requirements with large temperature differentials (ΔT) up to 131°C
- Standard designs meet most multistage requirements
- Custom designs available to meet any multistage application



Typical Multistage Module



PART NO.	Th=25°C				DIMENSIONS (mm)				
	ΔTMAX (ÞC)	QMAX(1) (WATTS)	IMAX (AMPS)	VMAX (VOLTS)	A	B	C	D	E(2)
MS2,010,06,06,11,11,11,W8	92	0.35	1.1	0.9	3.2	3.2	3.9	3.9	4.2
MS2,024,06,06,11,11,11,W8	92	0.81	1.1	2.2	4.1	4.1	6.1	6.1	4.6
MS2,049,10,10,15,15,11,W8	87	3.4	2.1	3.8	11.5	11.5	15	15	6.6
MS2,049,14,14,15,15,11,W8	87	6.6	4.0	3.8	15	15	20	20	7.2
MS2,107,10,10,12,12,11,W8	89	9.2	3	9.2	22.6	22.6	22.6	22.6	6.25
MS2,190,10,10,12,12,11,W8	87	16.4	2.8	15.7	30	30	30	30	6.5
MS2,192,14,20,11,18,11,W8	87	39.9	6.7	15.6	40	40	40	40	8.1
MS2,192,14,20,15,25,11,W8	88	27.3	4.4	16	40	40	40	40	8.1
MS3,070,20,25,11,W8	118	3	6.5	6.5	14	8	36	36	16
MS3,119,14,15,11,W8	100	7.5	3.9	8	15	15	30	30	10.4
MS3,119,20,15,11,W8	100	14.9	8	8.2	22	22	44	44	12.9
MS3,231,10,15,11,W8	104	6.9	1.9	15.5	15	15	30	30	9.5
MS4,115,14,15,11,W8	122	2.6	3.5	7.6	14.5	4.5	33	24	13.8
MS4,129,10,15,11,W8	115	1.9	1.8	8.2	8	8	23	23	12.5
MS5,257,10,15,11,W8	123	2	1.5	14.5	8	8	30	30	15.4

Notes: 1) QMax rated value at ΔT = 0°, Imax and Vmax, Th = 25°C; 2) Thickness for non-metallized versions only. All modules are lead-free. For wiring options contact Laird Technologies.

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MODEL	WATTS	CONTROL TEMP RANGE
MRC300,DH2,HT,DVN	299	2°C to 40°C
MRC150,DH2,HT,DVN	151	2°C to 40°C

MRC series chillers are designed to cool lasers and other applications in the medical, photonics and semiconductor industries. Cooling capacities range from 150 Watts to 300 Watts. All models come with a high precision temperature controller. Heating, RS232, 115VAC or 230VAC options available.

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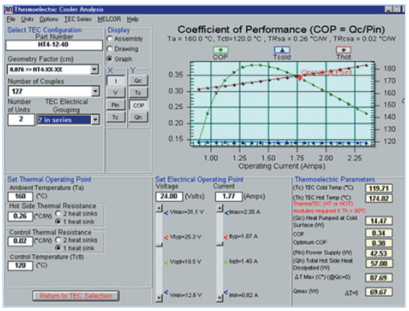

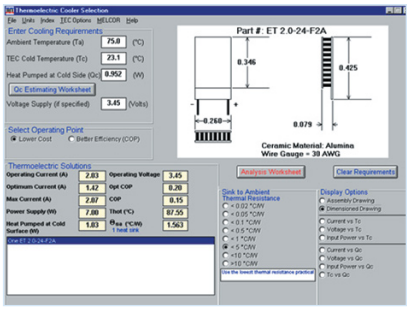

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