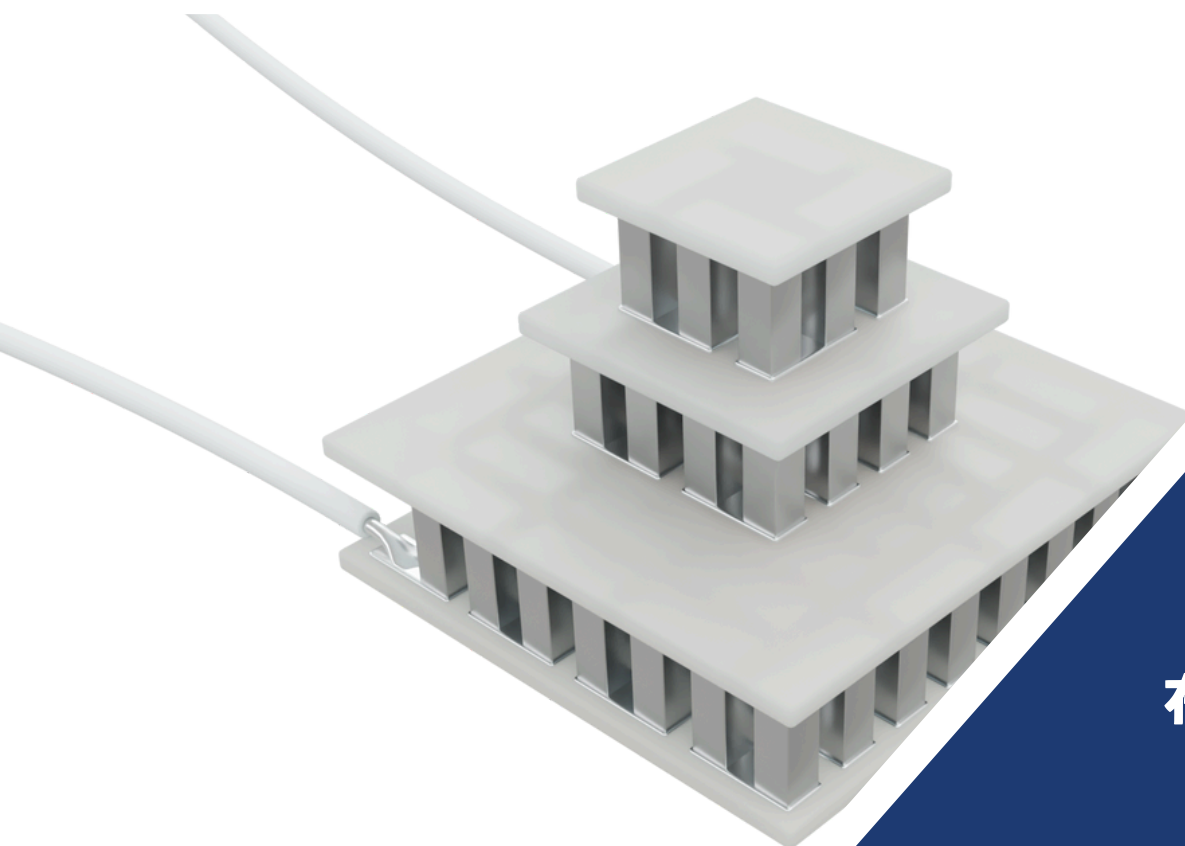


THERMOELECTRIC MICRO & MULTISTAGE COOLERS

微型多级半导体热电模块



布莫让科技

i-TEC

www.itec-bmr.com

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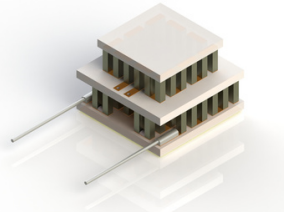
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About Us



i-TEC is headquartered in Xiamen, a high-tech city in the southern part of China. The company was founded based on the expertise of “P&N Technology,” a leading manufacturer in the thermoelectric industry, following years of extensive research and investment dedicated to advancing micro and multistage thermoelectric cooling technologies.

布莫让科技位于中国南方的高科技城市厦门。作为热电行业知名企业，鹏南科技多年来深耕热电制冷技术，专注于超微型及多级热电制冷片的研发设计和制造，取得了显著的研究成果，并成立了布莫让科技。

Today i-TEC team is international group of scientists and high qualified engineers more than 20 years experience on thermoelectric and related subjects such as material science, thermal/mechanical, chemical and others.

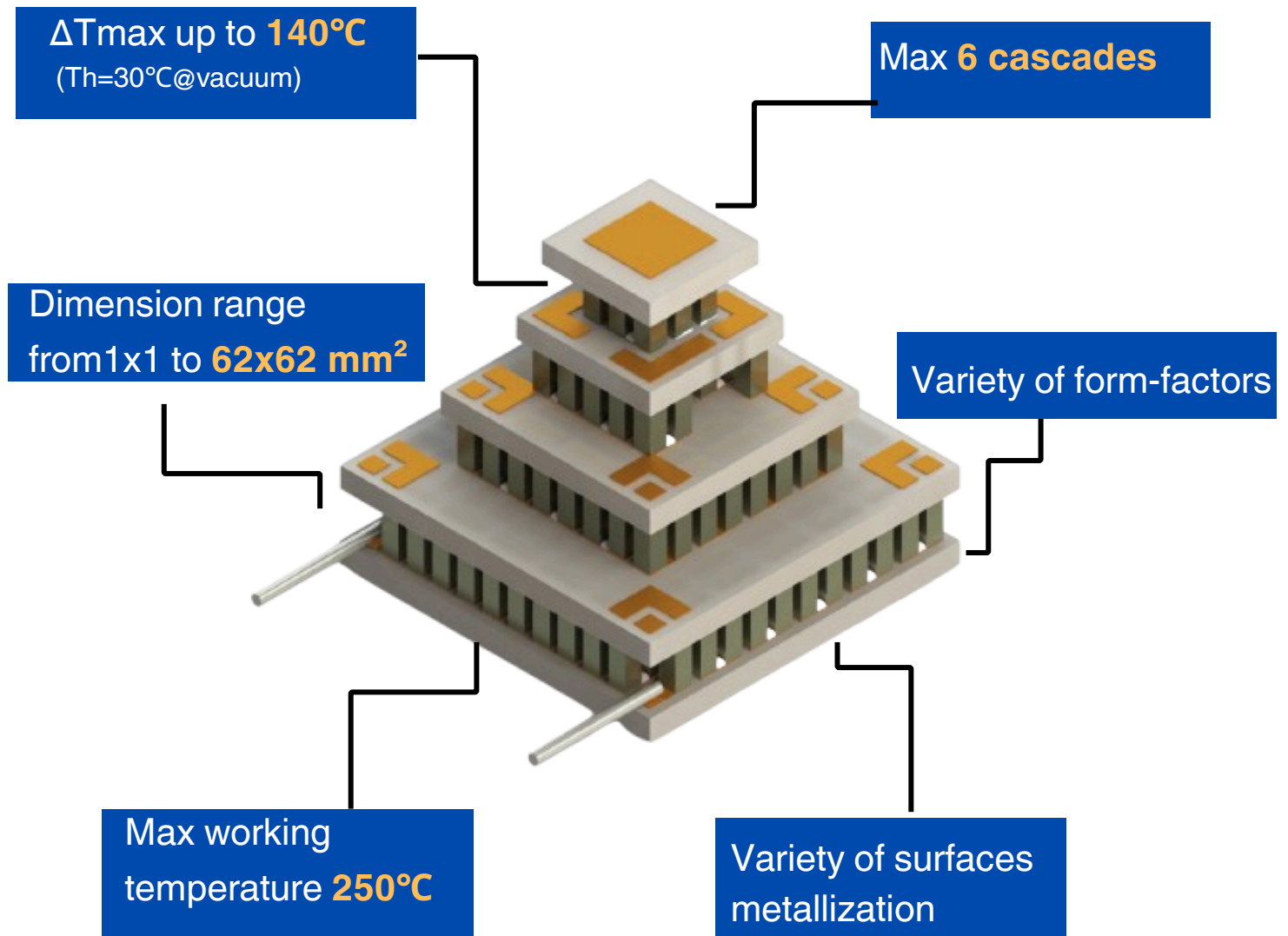
如今，布莫让团队是由世界范围的科学家和工程师组成的多元高素质团队。我们的团队拥有超过20年半导体热电行业（含材料，热学，机械，化学等）工作经验。

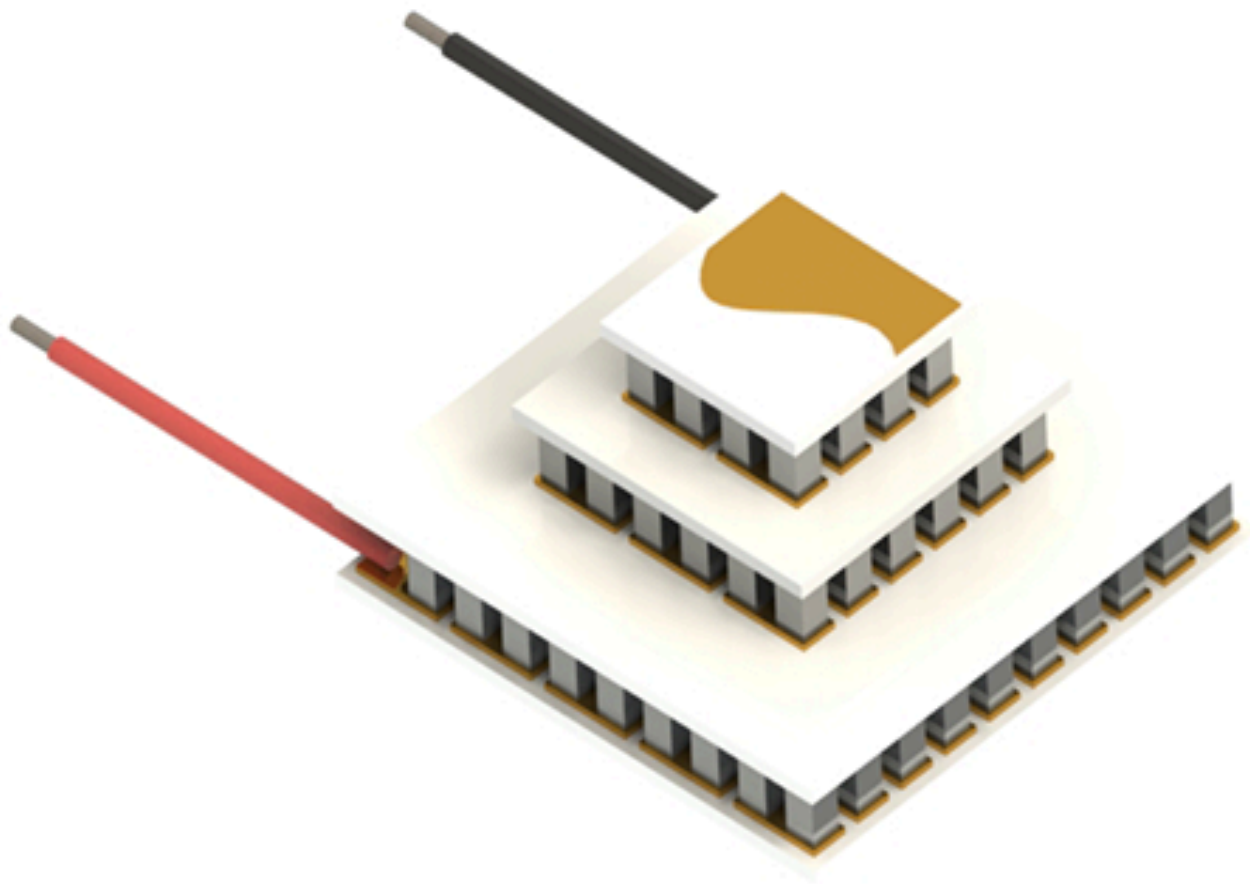
i-TEC: Highly Reliable and stable Thermoelectric Cooler manufacturer for the Photonics and Optoelectronics Industries.

布莫让科技，为光电行业提供高可靠高稳定性的微型多级TEC制造商。

Multi Stage TEC Module

Advantage



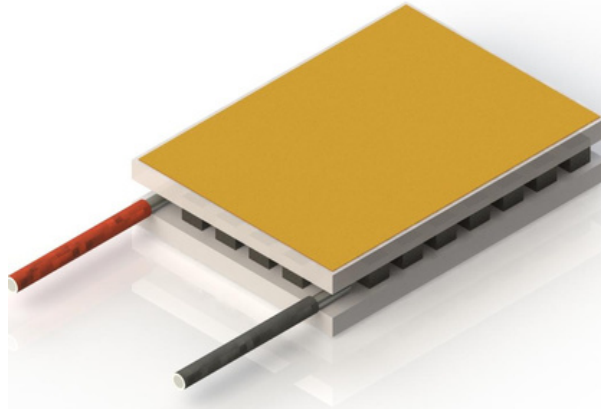


Our Product 我们的产品

i-TEC presents one of the largest ranges of single-stage micro TEC, multistage TEC (including big sized/micro) available at the world market. The product line covers great variety of thermal, electrical and mechanical characteristics, allowing ideally meet all customer's demands. Our product includes single stage micro TEC, multistage TEC (big sized/micro), TEC assembly, and customized solution.

布莫让提供广泛的微型和多级TEC，涵盖了关于热学，电学和机械不同参数要求。我们的产品系列包含微型单级，多级TEC(大/小尺寸)，封装以及定制化服务。

Single Stage 单级 TEC



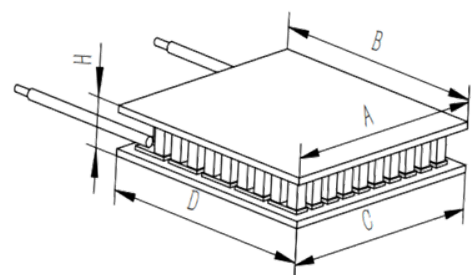
- Single stage micro-TECs reach up to 76K maximum temperature difference (dT_{max}) at standard thermal conditions ($T_h=300K$ @ vacuum).
- Coolers base dimensions lays in the range from 1x1 to 62x62 mm², while minimal height for some modules could be as low as 0.7 mm.
- Micro-TECs are implemented in various form-factors such as square, linear, round, round/square with holes and others.
- Wide range of maximum cooling capacities, currents and voltages are available.
- 单级最大温差可以达到76度 ($T_h=30$ 度, 真空, 无热负荷)。
- 尺寸范围从1x1 to 62x62 mm², 最小高度为0.7mm。
- Micro-TEC 可采用各种形状, 例如方形、线性、圆形、带孔的圆形/方形等。
- 最大制冷量、电流和电压选择范围广泛。

Application: high accuracy temperature stabilization of small size objects like telecom lasers(5G), superluminous diodes ,photo-diodes,IR detectors etc.

应用：小尺寸物体的高精度温度稳定，如电信激光器（5G）、超辐射发光二极管、光电二极管、红外探测器等。

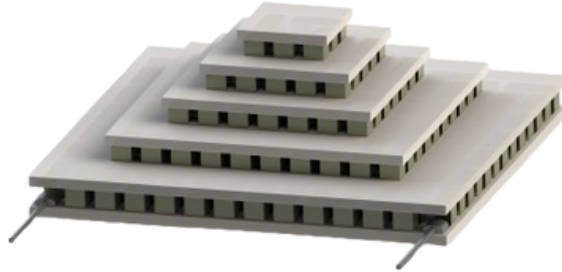
Most commonly use models:

micro-TEC model	dT_{max} (K)	Q_{max} (W)	I_{max} (A)	U_{max} (V)	Top - AxB (mm)	Bottom - CxD (mm)
1i-TEC-002-030208	74	0.08	0.55	0.27	1x1	1x1.6
1i-TEC-017-040415	74	0.64	0.55	2.1	4.8x4.8	4.8x4.8
1i-TEC-024-030204	72	1.7	1.05	2.9	4.2x3	4.2x3.8
1i-TEC-036-030208	74	1.38	0.55	4.2	3x6	3x7
1i-TEC-070-040405	72	7.25	1.55	8.2	9.6x9.6	9.6x9.6



Multi-stage (Big/Micro sized) TEC

大/小尺寸多级TEC



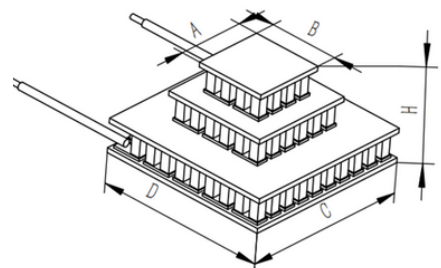
- Multistage TECs include from 2 to 6 cascades and reach ΔT_{max} up to 130K.
- Cold side dimensions are in diapason from 1x1 to 62x62 mm².
- Variety of form-factors are also available: standard pyramidal, cube or along with equal top and bottom dimensions, round, with holes and others.
- 多级 TEC 包括 2 至 6 级， ΔT_{max} 高达 130K。
- 冷面尺寸范围为 1x1 至 62x62 mm²。
- 还提供各种形状：标准金字塔形、立方体或顶部和底部尺寸相同、圆形、带孔等。

Application: Relatively deep cooling and further temperature stabilization. For example: X-Ray、IR-Detector、CCD、CMOS and others.

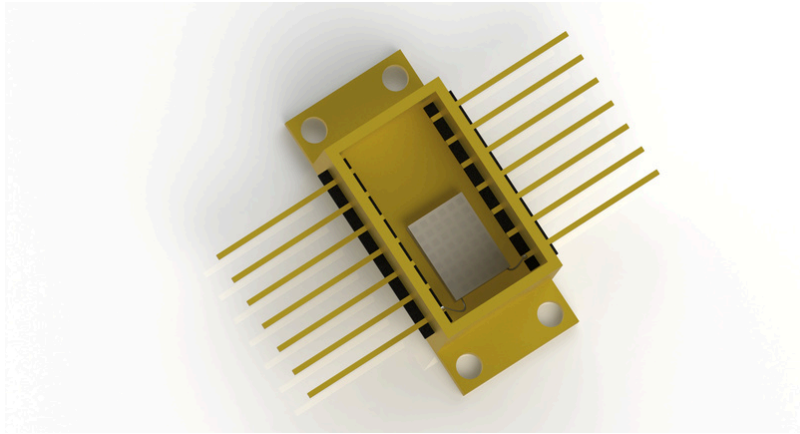
应用：深度冷却和进一步的温度稳定。例如：X 射线、红外探测器、CCD、CMOS 等。

Most commonly use models:

TEC model	ΔT_{max} (K)	Q_{max} (W)	I_{max} (A)	U_{max} (V)	Top - AxB (mm)	Bottom - CxD (mm)	Height, H (mm)
2i-TEC-039-040408	98	0.72	0.82	3.5	4.8x4.8	6.4x6.4	3.3
2i-TEC-042-040212	97	0.62	0.52	3.75	3.2x3.2	5x5	4.1
2i-TEC-066-040215	98	0.71	0.42	6	3.8x3.8	6.2x6.2	4.7
3i-TEC-070-040412	115	0.34	0.49	5.35	3.2x3.2	8x8	5.9
3i-TEC-113-040215	112	0.52	0.32	8.6	3.2x3.2	7.4x7.4	6.8
3i-TEC-071-060208	116	0.51	0.72	5.8	2.6x2.6	6.2x6.2	4.7
4i-TEC-116-060212	128	0.53	1.01	8.4	3.4x3.4	9.8x9.8	7.55
4i-TEC-115-100508/123	127	2.21	4.05	7.5	9x9	18x18	11.1
5i-TEC-183-100508	129	2.32	3.22	10	6x6	21x21	11.2
5i-TEC-125-040408/1224	133	0.25	0.6	7.3	4.8x4.8	9.6x9.6	11.2
3i-TEC-117-2412215	106.4	14.85	8.3	8.1	22x22	44x44	12.9
4i-TEC-362-211020	121.7	15.5	6.6	23	20x20	62x62	14.5
2i-TEC-398-1505075/2	91.5	95.39	11	24	40x40	40x40	6.3
2i-TEC-296-100510/2	92.1	31.84	3.7	25.22	30x30	30x30	7.2



TEC Assemblies 封装



i-TEC offers installation services of the own micro-TECs to the various types of headers and housings including but not limited with: TO5, TO39, TO46, TO66, Butterfly, TOSA, DIL, MS. 布莫让提供不同类型的管座和封装服务，包括但不限于：TO5, TO39, TO46, TO66, Butterfly, TOSA, DIL, MS。

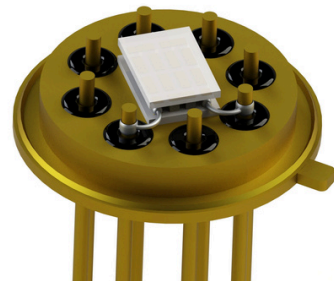
TEC to header installation method:

- Soldering (by default);
- Gluing (optional);

TEC管座安装方法：

- 焊接（默认）；
- 粘胶（可选）；

Installation of different type of thermistors to the micro-TEC cold/hot side is also possible. 我们也可以在 micro-TEC 冷/热面安装不同类型的热敏电阻。



Flexible Individual Solutions 定制化

Newly Designed Micro-TEC Models for New Projects

Our experienced engineering team specializes in promptly delivering custom-designed micro-TEC models tailored to address the specific thermal challenges of our customers' projects.

全新设计的 Micro-TEC 项目

我们经验丰富的工程团队专注于及时交付定制设计的微型 TEC，以解决客户定制化项目的挑战。



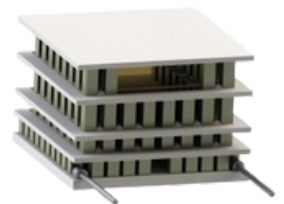
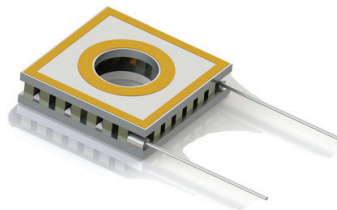
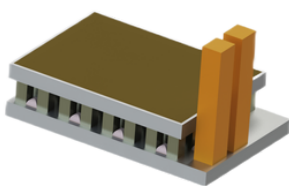
Identical Micro-TEC Models for Existing Projects

i-TEC is capable of producing modules with any* non-standard combinations of thermoelectric dice cross-section, height, pitch, and connection methods. This flexibility allows us to provide quick and efficient identical replacements for micro-TECs in existing projects. This option is ideal when there is an urgent need for a new or additional TEC supplier.

现有相同 Micro-TEC 项目

i-TEC 能够生产具有 TEC 横截面、高度、节距和连接方法的非标准组合的模块。这种灵活性使我们能够为现有项目中的微型 TEC 提供快速、高效的相同替代品。若迫切需要为正在运行的系列产品寻找新的超微型 TEC 替代供应商，我们将是您理想选择。

* Minimal values of TE pellet height 最小晶粒高度 - 0.3 mm;
TE pellet cross section 最小横截面 - 0.2mm²;
Distance between pellets 最小节距 - 0.15 mm;



Manufacturing Options 生产选择

热敏电阻(可选)
可安装到冷/热面陶瓷片。
校准可按要求提供。
Thermistor(optional)
Can be mounted to cold/hot side ceramics.
Calibration is available by request.

微型TEC 外表面加工选项

- 1) 无金属化
- 2) 金属化镀金 (整面金属化或定制图纸)
- 3) 金属化和预上锡:
 - 3.1 焊料 117 (In-Sn, T熔点=117°C)
 - 3.2 焊料 138 (Sn-Bi, T熔点=138°C)
 - 3.3 焊料 143 (In-Ag, T熔点=143°C)
 - 3.4 焊料 157 (In, T熔点=157°C)
 - 3.5 焊料 179 (Sn-In-Ag, T熔点=179°C)
 - 3.6 焊料 207 (Sn-Ag-In, T熔点=207°C)
 - 3.7 其他可定制焊料 (客户指定)

Micro-TEC outer surfaces Finishing:

- 1) No Metallization
- 2) Metallized, Au Plating (blank/custom drawing)
- 3) Metallized and pre-tinned with:
 - 3.1 Solder 117 (In-Sn, Tmelt=117°C)
 - 3.2 Solder 138 (Sn-Bi, Tmelt=138°C)
 - 3.3 Solder 143 (In-Ag, Tmelt=143°C)
 - 3.4 Solder 157 (In, Tmelt=157°C)
 - 3.5 Solder 179 (Sn-In-Ag, T熔点=179°C)
 - 3.6 Solder 207 (Sn-Ag-In, T熔点=207°C)
 - 3.7 Optional (specified by Customer)

导线:

- 1) 镀锡铜
- 2) 镀银铜
- 3) 线束焊盘
- 4) 接线柱
- 5) 带绝缘皮的导线

Terminal contacts:

- 1) Tinned solid Cu wire
- 2) Silver-plated Cu wire
- 3) Wire Bouding Pads
- 4) Wire Bouding Posts
- 5) Insulated Wires

陶瓷片材料:

- 1) Al₂O₃ 96% (*-默认)
- 2) Al₂O₃ 99.6%
- 3) ALN

Ceramics material:

- 1) Al₂O₃ 96% (*-used by default)
- 2) Al₂O₃ 99.6%
- 3) ALN

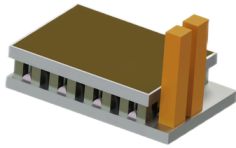
TEC Assembly Solder:

- 1) Sn99Bi1 (m.p.=230°C), RoHS (by default)
- 2) Au80Sn20 (m.p.=280°C), RoHS

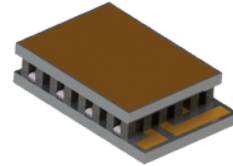
TEC 组装焊料:

- 1) Sn99Bi1 (m.p.=230°C), RoHS 默认
- 2) Au80Sn20 (m.p.=280°C), RoHS

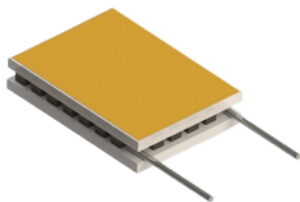
Manufacturing Examples 生产选择举例



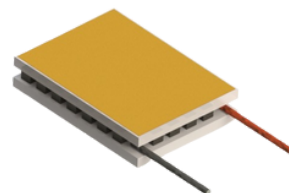
WIRE BOUDING POST
接线柱



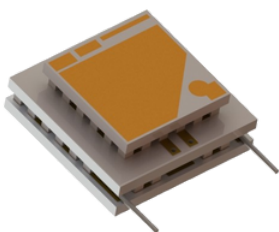
WIRE BOUDING PAD
线束焊盘



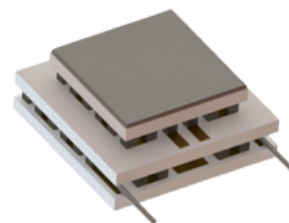
BARE COPPER WIRE
裸铜线



INSULATED WIRE
绝缘导线



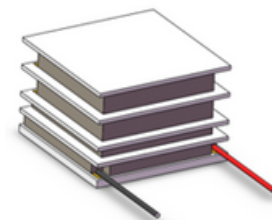
CUSTOMIZED AU MENTALIZATION
定制化镀金层



PRE-TINNING
预上锡



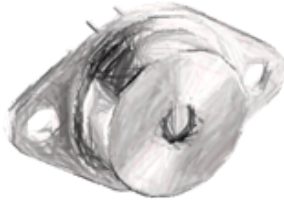
THERMISTOR
热敏电阻



CUSTOMIZED HEIGHT
定制高度

Application 应用领域

IR DETECTOR



Effectively Reduce Thermal Noise, Enhancing Detector Sensitivity and Resolution.

i-TEC Advantages:

- Greater Temperature Difference
- Reduced Power Consumption
- High Reliability and Quality (Reports available upon customer request)

有效降低噪声，增强探测器灵敏度和分辨率。

布莫让优点：

- 实现高温差，深度制冷
- 降低功耗
- 高可靠性和高品质（可根据客户要求提供报告）

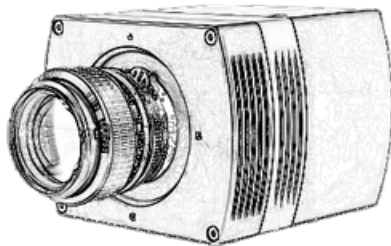


SILICON DRIFT DETECTOR



Application 应用领域

CCD/EMCCD/CMOS/SCMOS



When utilizing CCD technology, dark current is a key parameter that absolutely needs to be minimized.

In order to obtain the best sensitivity of the CCD, the thermoelectric cooling of the sensor must be deep enough to nearly eliminate this noise source.

i-TEC Advantages:

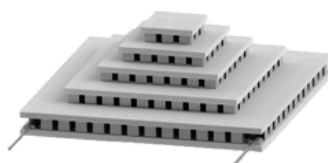
- Large Cold-Side Area
- Deep Cooling Performance
- Deeper Cooling Capabilities
- Testing capabilities per Telcordia and MIL-STD requirements (Reports available upon customer request)

当使用 CCD 技术时，暗电流是一个绝对需要最小化的关键参数。

为了获得 CCD 的最佳灵敏度，传感器的热电冷却必须足够深，以几乎消除该噪声源。

布莫让优点：

- 增大冷端面积
- 深度制冷性能
- 较强的冷却能力
- 符合 Telcordia 和 MIL-STD 要求的测试能力（可根据客户要求提供报告）



Application 应用领域

MEDICAL: PCR



TEC can realize the switch between cooling and heating by changing the current direction, which is especially suitable for applications where PCR requires both heating and cooling. The application conditions of PCR have high requirements on the thermal cycle life of TEC.

i-TEC Advantages:

- Excellent Long-Term Temperature Cycling Life
- Minimized Temperature Gradient (Uniformity $< 0.5^{\circ}\text{C}$)
- Adhesive Technology for Flexible Adhesive Layers
- Precise Control with Faster Heating and Cooling Rates

布莫让产品广泛应用于医疗市场，如PCR。

TEC可以通过改变电流方向实现冷却和加热的切换，特别适合PCR同时需要加热和冷却的应用。PCR的应用条件对TEC的热循环寿命有很高的要求。

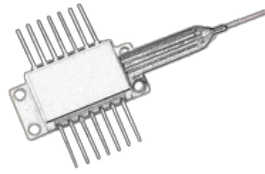
布莫让优点:

- 长时间温度循环寿命
- 温度梯度小（均匀度 $< 0.5^{\circ}\text{C}$ ）
- 柔性粘合层的粘胶技术
- 精确控温，加热和冷却速度更快



Application 应用领域

LASER



Several parameters of laser diode depends on temperature, such as wavelength, threshold current, efficiency, and lifetime. TEC is critical component in laser application.

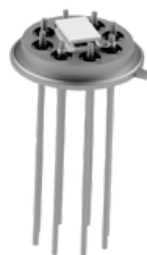
i-TEC Advantages:

- High-Precision Temperature Control
- Reduced Power Consumption
- Lower Current Consumption
- High Reliability and Quality (Reports available upon customer request)

激光二极管的所有参数取决于温度，例如波长、阈值电流、效率和寿命。TEC 是激光应用中的关键部件。

布莫让优点：

- 高精度温度控制
- 降低功耗
- 更低的电流消耗
- 高可靠性和高品质（可根据客户要求提供报告）



Why i-TEC? 布莫让优势

i-TEC are committed to delivering cutting-edge, high-quality solutions tailored to meet the unique needs of our customers.

布莫让致力于提供尖端、高质量的解决方案，以满足客户的独特需求。

QUALITY AND RELIABILITY 品质和可靠性



Our products are designed and manufactured with the highest standards, ensuring optimal performance and long-lasting reliability.

- Own onsite laboratory for all set reliability tests:
 - mechanical (vibration, shock, shear force, alloy integrity);
 - environmental (high temperature storage, temperature cycling, thermal shock);
 - operational (Vacuum performance test, high temperature on/off, high temperature operation test).
- Full test capability required by Telcordia GR468 CORE and MIL-STD-883.



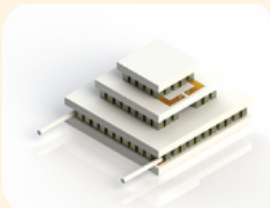
我们的产品按照最高标准设计和制造，确保最佳性能和持久可靠性。

- 自己的实验室可进行所有设置的可靠性测试：
 - 机械（振动、冲击、剪切力、焊料完整性）；
 - 环境（高温储存、温度循环，冷热冲击）；
 - 运行（真空性能测试，高温通断，高温运行测试等）。
- Telcordia GR468 CORE 和 MIL-STD-883所需的完整测试能力。

CUSTOMIZATION CAPABILITIES 定制能力



- 13-year experienced cross-functional engineering team supports your project from concept to validation, integrating thermal, mechanical and electrical expertise.
- Mission-Critical Customization-solve extreme thermal challenges in constrained environments
- Full In-House Customization--from module to assembly,100% control over quality & performance
- From Requirements to Samples within 30 Days: 1~3 Days Technical Proposal + 2~4 weeks Prototyping
- Low MOQ Barriers --support pilot runs (1pcs) to mass production



我们拥有13年经验的专业研发团队，从概念到验证全程支持您的项目，融合热、机械与电气方面的专业技术。

关键项目定制 —— 解决受限环境中的极端散热挑战

全流程内部定制 —— 从模块到组件装配，100%掌控质量与性能

从需求到样品最快30天 —— 13天内提供技术方案 + 2~4周完成样机制作

低起订量限制 —— 支持从试产（1件）到批量生产

Why i-TEC? 布莫让优势

i-TEC are committed to delivering cutting-edge, high-quality solutions tailored to meet the unique needs of our customers.

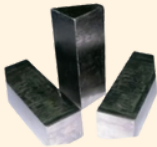
布莫让致力于提供尖端、高质量的解决方案，以满足客户的独特需求。

INGOTS INTEGRATED AND HIGH-QUALITY MANUFACTURING 晶体材料垂直化整合和高品质制造

We control every aspect of production to ensure precision and consistency.



- We have a standard clean workshop to ensure the cleanliness of products.
- We oversee every step of production, from ingot production to final assembly(with header installation).
- Our in-house manufacturing procedure are ISO-certified.



我们控制生产的每个环节，以确保精度和一致性。

- 我们拥有标准的洁净车间，保证产品的洁净度。
- 我们监督生产的每一步，从晶棒原材料生产到最终组装（含管座安装）。
- 我们的内部制造流程已通过 ISO 9001 认证。

GLOBAL SERVICE WITH LOCAL EXPERTISE 凭借本地专业知识服务全球



With a strong presence in China, Europe,US, we offer global expertise backed by localized support, ensuring our solutions are accessible and responsive to your needs wherever you are.

- P&N Europe was founded in Germany in 2018.
- US distributors are available.
- Our world wide presence and comprehensive distribution network allow us to provide local support to your projects at any time.



凭借在中国、欧洲、美国的强大影响力，我们提供以本地化支持的全球专业服务，确保无论您身在何处，我们的解决方案都可以随时满足您的需求。

- P&N Europe 于 2018 年在德国成立。
- 美国经销商可提供产品和服务。
- 我们遍布全球的业务和全面的分销网络使我们能够随时为您的项目提供本地支持。

Design/Selection Checklist

Customer information

Contact Person:

Company:

Phone/Fax:

Email:

Project information:

Running project/New project:

Potential volume per year:

Application:

Requirements Specification

Object to be cooled:

Temperature ($^{\circ}\text{C}$):

Size (mm):

Full Heat Load (W):

Restriction on TEC Dimensions:

Height (mm):

Cold Side (mm):

Hot Side (mm):

Restrictions on Electrical Parameters (if applicable):

Input Power (W):

Current (A):

Voltage (V):

TEC Environment (vacuum, N2, other)

Restriction on Heat Removal:

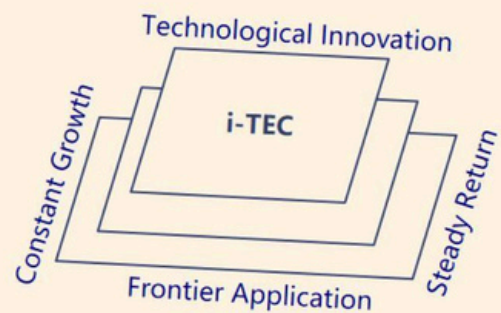
Heat sink temperature during operation ($^{\circ}\text{C}$):

(If you do not know this temperature, please specify the parameters stated below)

Ambient Temperature ($^{\circ}\text{C}$):

Thermal Resistance of Heat-Sink ($^{\circ}\text{C}/\text{W}$):

Other additional information:



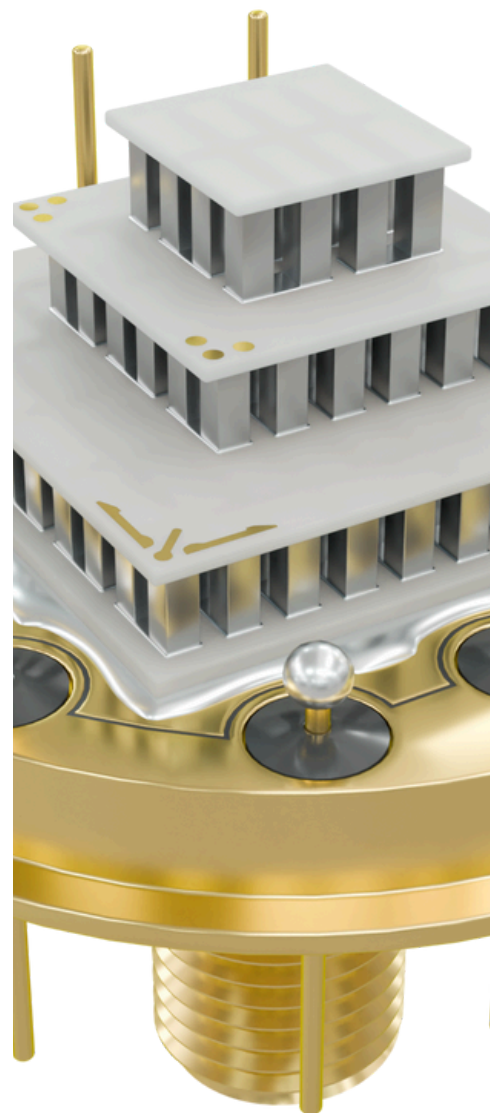
OUR PARTNERS 合作伙伴

Whether in Europe or beyond, our customers can count on a smooth and efficient experience. Our dedicated teams in each region are committed to providing exceptional service, from order fulfillment to after-sales support, ensuring customer satisfaction at every step.

无论是在欧洲还是其他地区，我们的客户都可以得到顺畅高效的服务。我们在每个地区的专业团队致力于提供卓越的服务，从订单到售后支持，确保每一步得到客户的认可。



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Hi-tech Zone, Xiamen, Fujian, China