产品简述 (Product Profile)

水冷散热器是一种IGBT、GTO等功率元件高效散热器，控制功率模块的温度，使其在所处的工作环境条件下不超过标准及规范所规定的最高温度，最高允许温度的计算以有限元热分析与元器件工作条件分析为基础，并且与产品的可靠性要求及使用环境要求相一致。从而达到功率模块安全、稳定可靠性运行及延长设备使用寿命。

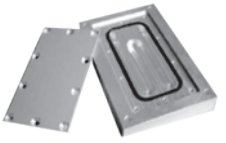
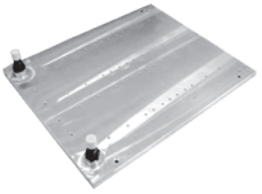
LCP serves as a highly effective heat sink for power modules like IGBT/GTO to control the temperature of their working conditions under the upper limit specified in the standards and norms. The calculation of the upper temperature limit is based on Finite Element Analysis and the working condition analysis of the components. Besides,this calculation should be in line with requirements for the production reliability and operating condition, which ensures the safety and stability of the power modules and extends the service life of the equipment.

产品参数 (Product Parameters)

尺寸 Size range	长度（Length）*宽度（Width）*厚度(Thickness)：<1250*800*60mm
表面处理 Surface treatment	本色（Natural color） 阳极氧化（Anodic oxidation） 发黑（Black oxide coating） 镀镍（Nickel plating） 镀铬（Chrome plating）
平面度 Planeness	<0.05(100×100)mm
粗糙度 Roughness	<1.6μm
接头方式 Connector pattern	真空钎焊或者氩弧焊 (Vacuum brazing or argon arc welding)
冷却液温度（℃） Inlet temperature	零下30℃至60℃（-30℃~60℃）
冷却剂 Coolant	纯水或者水与乙二醇的混合液（Pure water or a mixture of water and glycol）
流量（LPM） Flow rate	<80L/min
液冷板表面温升（℃） Temperature rise	<30℃
最大工作压力（MPa） Max. operating pressure	0.6MPa---3.0MPa
发热量 Heat dissipation	<30kW
热阻 Thermal resistance	<2℃/kW(根据热源分布而定) (According to source distribution)

水冷散热器
Liquid Cooling Plate

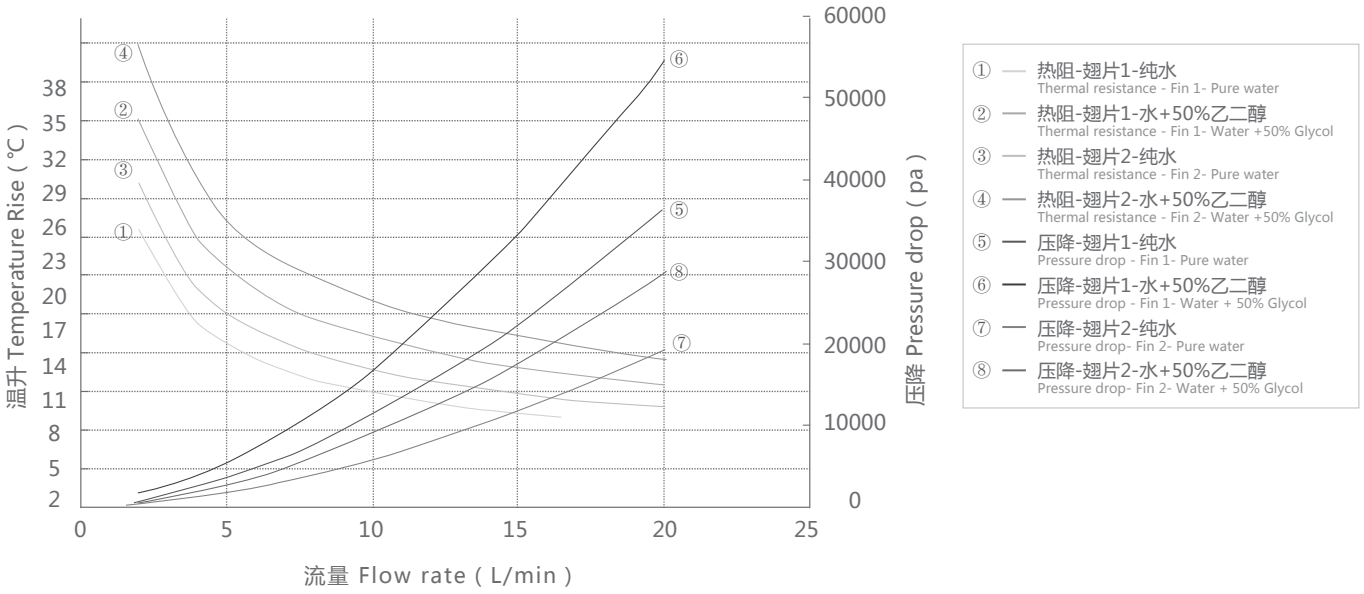
常用加工工艺与分类 (Manufacturing Processes and Characteristics)

结构样式 Structure	工　艺 Processing	特　　点 Characteristics	图　片 Picture
钻孔式 Drilling type	CNC钻孔或型材拉槽 用堵头加焊接将部分区域密封,CNC外型加工 Drilling hole or kerving groove by CNC sealing the part of region with a plug and the welding CNC final machining	工艺简单, 批量生产成本低,性能较低 Simple to make; low cost in volume production;low performance	
压管式 Pressed-in-pipe type	CNC铣槽或型材拉槽 将折弯铜管或焊或压或粘入槽腔 CNC外型加工 Milling groove or kerving groove by CNC The bended pipe is welded/stamped/glued in the groove CNC final machining	工艺简单, 批量生产成本低, 性能较低 Simple to make; low cost in volume production;low performance	
组装式 Assembling type	CNC或压铸加工水腔与外型与外盖 用螺丝与密封圈或胶水压合密封 "CNC or die-casting Al base/cover plate and water channels" Sealing by O-rings and glues	工艺简单,成本低, 性能居中,可靠性低 Simple to make; low cost; medium performance; low reliabilityy	
摩擦焊/电子束焊 Friction welding / Electron beam welding type	CNC加工水腔与外盖 摩擦焊/电子束焊做密封焊接 CNC成品加工 CNC machining the base/cover plate Friction welding/Electron beam weld the base and cover plates together CNC final machining	工艺相对复杂,结构相对灵活 性能较好,可靠性高, 成本较高 Comparativly hard to make;flexible structures;good performance;good reliability;relatively high cost	
真空钎焊 Vacuum brazing type	CNC或其他方式加工水腔 真空钎焊做面密封 CNC成品加工 CNC machining the base/cover plate the base and cover plates is welded by vacuum brazing togeter CNC final machining	工艺复杂，结构灵活 性能最好，可靠性高 成本最高 Hard to make；flexible structures excellent performance；good reliability; highest cost	

FZ450R12ME3模块水冷板的性能 (The LCP Properties&Parameters for FZ450R12ME3)

适用于所有相同尺寸规格的发热元件，即尺寸为62mm*122mm。水冷板的温升=热阻*散热功率。

Applicable to all the thermal devices sized in 62*122mm. The ΔT of LCP = Thermal resistance * Heat dissipation power.



	翅片1:高3mm(Fin 1: height 3mm)				翅片2:高5mm(Fin 2: height 5mm)			
	纯水(Pure water)		50%纯水+50%乙二醇 (Pure water+50% glycol)		纯水(Pure water)		纯水+50%乙二醇 (Pure water+50% glycol)	
流量 Flow rate (L/min)	热 阻 Thermal resistance (R,℃/kw)	压 降 Pressure drop (ΔP,Pa)	热 阻 Thermal resistance (R,℃/kw)	压 降 Pressure drop (ΔP,Pa)	热 阻 Thermal resistance (R,℃/kw)	压 降 Pressure drop (ΔP,Pa)	热 阻 Thermal resistance (R,℃/kw)	压 降 Pressure drop (ΔP,Pa)
2	23.4	752	32.3	1602	27.1	386	37.8	682
4	16.3	2375	22.8	3971	19	1252	27	1904
6	13.5	4727	18.9	7272	15.8	2495	22.5	3735
8	11.9	7709	16.6	11613	13.9	4069	19.8	6078
10	10.8	11267	15.1	16874	12.6	5947	18	8877
12	10.1	15363	14	22961	11.8	8109	16.7	12102
14	9.5	19968	13.2	29819	11.1	10540	15.7	15729
16	9.1	25058	12.5	37408	10.5	13227	14.9	19738
18	8.7	30616	11.9	45696	10.1	16161	14.2	24115
20	8.4	36624	11.5	54658	9.7	19332	13.6	28847

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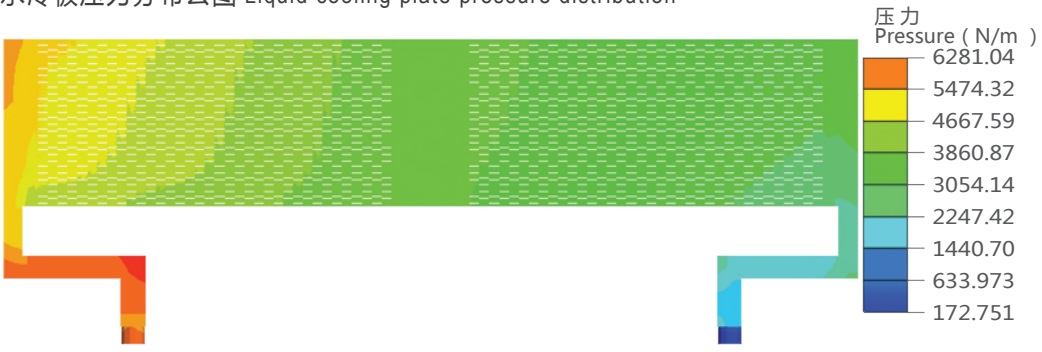
应用 (Application)

交通运输 电力机车 、动车、电驱舰艇、电动汽车等	Transportation Electrical locomotive, high speed train, electric drive vessels,electric vehicles and so on.
电力输送 特高压直流输电、柔性直流输电等	Smart Grid UHVDC，VSC-HVDC and so on
新能源 风力发电、光伏发电等	New energy Wind power converters，photovoltaic power converters and so on
其他 工业变频、信号处理、UPS、医疗、激光等	Other Industrial frequency converters, signal processing, UPS, medical appliance, laser and so on

仿真图 (Simulation Picture)

水冷板压力分布云图 Liquid cooling plate pressure distribution



水冷板表面温度云图 Liquid cooling plate surface temperature chart