产品特点：

- ✓ 小体积 127*125*62mm
- ✓ 高可靠性
- ✓ 使用 TS-35/7.5 或 TS-35/15 安装，便于生产维护
- ✓ 效率 93%以上，低损耗
- ✓ 并联冗余功能（可选）
- ✓ 150%的峰值带载能力
- ✓ 内置主动式 PFC 功能，PF>0.9
- ✓ 内置 DC OK 和远程隔离信号输出
- ✓ PCBA 涂覆三防漆
- ✓ 符合环保要求 RoHS6

Features:

- ✓ Small size 127*125*62mm
- ✓ High Reliability
- ✓ Use TS-35/7.5 or TS-35/15 for easy installation, production and maintenance
- ✓ High efficiency 93%, low power dissipation
- ✓ parallel redundancy (optional)
- ✓ 150% peak load capability
- ✓ Built-in active PFC , PF> 0.9
- ✓ Built-in DC OK and remote isolation signal output
- ✓ Conformal coating on PCBAs
- ✓ Comply with RoHS6

应用领域：

- ✓ 工业控制
- ✓ 清洁能源
- ✓ 轨道交通
- ✓ 生产制造
- ✓ 对尺寸大小、环境要求十分严酷的场合
- ✓ 对寿命、可靠性要求很高的供配电系统

Application:

- ✓ Industrial control
- ✓ Clean energy
- ✓ Rail transit
- ✓ Manufacturing
- ✓ Where the size and environment are very harsh
- ✓ Power supply and distribution systems that require high lifetime and reliability

EDF-480-48

产品规格书

PRODUCT SPECIFICATION

制造安全产品　驱动绿色世界 Power a Safe and Green world

Excellent 卓越 **C**reative 创造 **U**nited 协作

合肥华耀电子工业有限公司
ECU ELECTRONICS INDUSTRIAL CO.,LTD.

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Rev: A02

目录 Catalog

订购信息 Ordering Information：

设计号 Design NO:

ECU2.939.10657

物料号 Part No：

5.13.70.0711

客户签章 Customer's signature：

日期 DATE：

版本更改记录 Revisions

版本 Rev	日期 Date	更改说明 Description	核准 Approved
A00	2022-8-10	第一次发行 First Issue	扶廷武
A01	2023-9-7	升级模板 Upgrade the template	陈虎
A02	2025-01-13	添加三防漆 Add Conformal coating	陈虎

设计 Designed

田 朗

审核 Checked

王金明

批准 Approved

陈 虎

基本参数 Basic Parameter

项目 Item	单位 Unit	规格 Specification	备注 Notes
产品输入输出类型 Input And Output Type	A+D		A) AC-DC; B) AC-AC; C) DC-AC; D) DC-DC
产品工作原理类属 Working Principle	A		A) 开关电源；B)线性电源 A)Switching power supply; B)Linear power supply
输出电压 Output Voltage	V	48	
额定功率 Total Rated Power	W	480	
峰值功率 Total Peak Power	W	720	5 秒 5 Seconds
效率 Efficiency	%	93	230Vac/50Hz,额定负载,0.5h后测试 Run the test after 0.5 hours at full load
功率因数校正 Power Factor Correction	A		A)主动式active PFC；B)被动式Passive PFC； C)无No
纹波&噪声 Ripple Noise	mVp-p	240	详见备注 See remarks
产品认证标志 Product Certification Mark	1、6		0 无、1 CE、2 CCC、3 CQC、4 TUV、5 UL、6 CB、7 TUVul、8 CSA、 9 FCC、10 KC、11 GL、12 ATEX，13 IECEx，14 CUL，15 其它 others

1. 输出纹波噪声测试条件/DC output ripple & noise test conditions:

1)示波器须设置在 20M 赫兹带宽/Oscilloscope should be limited at 20MHZ bandwidth;

2)将 0.1uF 的陶瓷电容和 47uF 的电解电容并联在线材末端/ Connect 0.1uF ceramic capacitors and 47uF electrolytic capacitors in parallel at the end of the wire;

3)使用 300mm 的双绞线连接电源和负载/ Connect the load and power supply with a 300mm twisted pair;

4)在负载端进行测试/ Test on the load side;

5)若无特殊说明，以上规格参数均在输入电压范围为 85~264Vac，温度范围 25℃的环境下测量。/ Unless otherwise specified, the above specifications are measured in the input voltage range of 85~264Vac and the temperature range of 25 °C.

2. "/"：不符合项 "/" ：Non-conformance term;

输入特性： Input Characteristics：

项目 Item	单位 Unit	最小值 Min	额定值 Rated	最大值 Max	备注 Notes
输入电压类型 Input Voltage Type			B+D		A)三相供电；B)单相供电；C)双相供电；D)直流供电；E)其它不规则供电 A)Three-phase; B)Single-phase; C)Dual phase; D)DC power supply; E)Other power supply
输入电压 Input Voltage	Vac	85	115/230	264	参考输出降额曲线 Refer to output derating curve.
	Vdc	100	310	370	
输入频率 Input Frequency	Hz	47	50	63	
输入电流 Input Current	A			2.4	230Vac 满载Full load
				5.5	115Vac, 满载 Full load.
输入冲击电流 Inrush Current	A			15	115Vac, 满载，冷机启动Full load. cold start.
				30	230Vac, 满载，冷机启动Full load. cold start.
输入冲击电流方案 Inrush Current Mode			B		A)主动式Active；B)被动式Passive； C)单电阻 Only Resistance；D)无NO
功率因数 Power Factor	/	0.99	/	/	115Vac, 满载Full load.
		0.94			230Vac, 满载Full load.
空载损耗 No-Load Consumption	W			5	230Vac,空载No load @ Vout=48V

输入保险 Input Fuse	T10A/250Vac

“/”：不符合项 “/”：Non-conformance term;

输出特性：Output Characteristics：

项目 Item	单位 Unit	最小值 Min	典型值 Typ	最大值 Max	备注 Notes
标准输出电压 Output Voltage	Vdc		48		
输出电压可调范围 Output Voltage Adjustable Range	Vdc	46		56	
额定输出电流 Rated Output Current	A	0		10	@48V输出 Output@48V
峰值输出电流1 Output Peak Current1	A			11	参考降额曲线Ref to derating curve
峰值输出电流2 Output Peak Current2	A			15	@48V输出 Output@48V
峰值功率持续时间1 Peak Power Duration	s			5	参考降额曲线Ref to derating curve
峰值电流持续时间2 Output Current (Boost)	s			5	5秒后，电源将进入恒流模式，详见峰值功率图及限流特性图 The power supply will enter constant current mode after 5 Seconds; For details see Boost Characteristic and Current Limiting Characteristic
负载调整率 Load Regulation	%	/	/	+/-1	230Vac ,0% ~ 100% load最小负载到额定负载 Min load to rated load
输入电压调整率 Line Regulation	%			+/-0.5	85~264Vac 额定负载 Rated load
温度调整率 Temperature Regulation	%			+/-0.07	+/-0.07% @ 0℃~+60℃； +/-1% @ −25℃~0℃&+60℃~+70℃； +/-2.5% @ −40℃~−25℃；
电压误差 Voltage Tolerance	%			+/-2	-25℃~+70℃
开机延迟时间 Setup Time	s			2	115Vac&230Vac 100% Load 额定负载 Rated load
上升时间 Rise Time	ms			100	输出从10%上升到90%的时间 The time taken while output voltage increased from 10% to 90%
保持时间 Hold Up Time	ms	15			115Vac, 满载Full load
	ms	20			230Vac, 满载Full load
过冲响应 Overshoot Response (O/P Voltage)	%			+/-5	开关机时 Power on/off
负载动态 Load Dynamic Response	%			+/-5	设定周期20ms,升降电流0.1A/μs,在10%~90%负载 Setting period 20ms. Rising and falling current 0.1A/μs@ 10%~90% load
串联功能 Series Connection	V				详见附件 See Appendix
并联冗余功能 Parallel Connection	A				详见附件 See Appendix

“/”：不符合项 “/”：Non-conformance term;

环境特性 Environment Characteristics

项目 Item	单位 Unit	最小值 Min	典型值 Rated	最大值 Max	备注 Notes
温度 Temperature	℃	-25	25	70	工作温度Operation Temperature； 50℃~70℃以上需降额使用，参考降额曲线；-40℃启动； Derated@50℃~70℃, refer to derating curve; Start up@-40℃
		-40	25	85	贮藏温度Storage Temperature
相对湿度 Humidity	RH	5%		95%	工作湿度Operation Humidity
		5%		95%	贮藏湿度Storage Humidity
振动 Vibration	幅度<15Hz，±2mm（IEC 60068-2-6）/15Hz…150Hz，2.3g，90分钟 < 15Hz, amplitude ±2.5mm(acc. to IEC 60068-2-6) / 15Hz ... 150Hz,2.3g, 90 min.				
冲击 Impact	30g，各个方向（IEC 60068-2-27） 30g, each direction(acc. to IEC 60068-2-27)				
海拔高度 Altitude	≤3000m，3000m以上降额使用，15%load/Km，最高海拔5000m ≤3000m， derated over 3000m, 15% load/Km, max altitude 5000m				
冷却方式 Cooling Mode	空气自然冷却 Air Cooling				
防护等级 IP Level	IP20				
污染等级 Pollution Level	PD2				
RoHS环境指令	符合Compliant				
阻燃等级（外壳） Flame Rating(Case)	UL94V-0				
船级社 DNV GL	/				
三防漆 Conformal Coating	PCBA 涂覆三防漆 Conformal coating on PCBAs				

“/”：不符合项 “/”：Non-conformance term;

保护功能 Protection Function

项目 Item	技术要求 Technical Requirement	恢复方式 Recovery Mode	保护方式 Protection Mode	备注 Notes
输出短路保护 Output Short Circuit Protection	电源无损坏，关闭输出电压 Power supply no damaged, shut down O/P voltage.	A	B	恢复方式Recovery mode： A) 自动恢复Auto recovers; B) 重启恢复Restart; 保护方式Protection mode： A）恒功率Constant power; B）恒电流Constant current; C）输出掉电Output voltage drop;
输出过流保护 Output Over Current Protection	160%~180% @ Io	A	B	
输出过压保护 Output Over Voltage Protection	120~170% @ Vo	A	C	
过温保护 Over Temperature Protection	关闭输出电压 Shut Down O/P Voltage.	A	C	

“/”：不符合项 “/”：Non-conformance term;

特殊功能 Specific Function

项目 Item	技术要求 Technical Requirement
面板显示 Panel Display	当输出指标正常时，绿色LED常亮/Output Voltage≥43.2V，Green LED is always on;
远程信号 Remote Signal	与输出隔离，常开触点；当输出电压大于85%时，DC OK为低阻抗≤50mΩ，最大耐受直流30 V / 1 A/ Normally open contact, isolated output,；Output voltage≥85%V，DC OK is a low impedance ≤ 50mΩ， Max DC 30 V / 1 A

"/"：不符合项 "/"：Non-conformance term;

电气安全 Electrical Safety

项目 Item	测试方法 Test Method	测试条件 Test Conditions	备注 Notes
高压测试 Hi-pot Test	输入-输出 I/P-O/P	4242Vdc. 60s,≤1mA	
	输入-大地 I/P-PE	2121Vdc. 60s,≤1mA	
	输出-大地 O/P-PE	700Vdc.60s, ≤1mA	
绝缘阻抗 Withstand Resistance	输入-输出 I/P-O/P	500VDC.≧5MΩ	
	输入-大地 I/P-PE	500VDC.≧5MΩ	
	输出-大地 O/P-PE	500VDC.≧5MΩ	
泄露电流 Leakage Current	L、N-外壳/L、N-Case	3.5mA Max	
	L、N-PE/L、N-PE	3.5mA Max	
接地阻抗 PE Resistance	PE-外壳/PE-Case	< 0.1Ohm	
过电压等级 Overvoltage category	III，II	III (IEC 61010-1, IEC 61010-2-201, EN 62368-1, EN 61558-2-16) II (EN 62368-1, EN 60335-1)	
电气设备安全等级类属 Electrical Equipment Safety Class	A	A)一类设备Class I ;B)二类设备Class II;C)三类设备（最高标称电压不超过50Vac或120VDC，以及不属于AB）Class III(The maximum nominal voltage does not exceed 50Vac or 120VDC, and is not part of A,B); EN 61140，GB/T17045	
安规标准 Safety Standard	/	UL1310（CLASS II产品 Product）	
		EN62368-1，GB4943.1资讯类Information technology	
	/	EN60601-1，GB9706.1医疗类Medical	
	/	EN61347-1，EN61347-2-13，GB7000.1， GB19510.1，GB 19510.14 灯具类Lamp	
		EN60335-1，EN60335-2-29，GB4706.1 家电类Household appliances	
		EN61010，GB4793.1工控类Industrial control	

1) "/"：不符合项"/"Non-conformance;

电磁兼容 Electromagnetic Compatibility

项目 Item	测试方法 Test Method	测试条件 Test Conditions	
静电ESD Electrostatic Discharge	IEC 61000-4-2 GB17626-2	Criteria A； Air Discharge: ±8kV；Contact Discharge: ±4kV	
射频辐射RS Radiated Field	IEC 61000-4-3 GB17626-3	Criteria A； 80-1000MHz, 10V/M, 80% modulation (1kHz)；	
脉冲杂讯EFT Electrical Fast Transient / Burst	IEC 61000-4-4 GB17626-4	Criteria A； ±4kV	
雷击 Surge	IEC 61000-4-5 GB17626-5	Criteria A； Common Mode: 4kV；Differential Mode: 2kV	
射频传导 Conducted Emission	IEC 61000-4-6 GB17626-6	Criteria A； 0.15-80MHz, 10Vrms，80% modulation (1kHz) 80MHz-1GHz, 10Vrms，80% modulation (1kHz) 1.4GHz-2GHz, 10Vrms，80% modulation (1kHz) 2GHz-2.7GHz, 10Vrms，80% modulation (1kHz)	
电源磁场 Power Frequency Magnetic Fields	IEC 61000-4-8 GB17626-8	30A/meter, Criteria B	
脉冲磁场抗扰度试验 Impulse Magnetic Field Immunity Test	IEC 61000-4-9 GB17626-9	300A/meter, Criteria B	
阻尼振荡磁场抗扰度试验 Damped Oscillatory Magnetic Field Immunity Test	IEC 61000-4-10 GB17626-10	100A/meter 100KHz and 100MHz, Criteria B	
电压瞬断 Voltage Dips And Interruptions	IEC 61000-4-11 GB17626-11	Voltage Dips >95% reduction,0.5 period	Criteria A
		Voltage Dips >30% reduction,25 period	Criteria B
		Voltage interruptions >95% reduction,250 period	Criteria B
低能量脉冲 Low Energy Pulse Test (Ring Wave)	IEC 61000-4-12 GB17626-12	Criteria B Common Mode:2kV；Differential Mode: 1kV	
谐波 Harmonic Current Emission	IEC/EN 61000-3-2 GB17625-1	Class A	
电磁耐受标准 Immunity Generic Standards		EN 55024,GB17618资讯类Information technology	
	/	EN55014-2家电类Household appliances	
	/	EN60601-1-2医疗类Medical	
	/	EN61547灯具类Lamps	
		EN61000-6-1,EN50082-1,GB/T17799-1轻工业环境Light industry environment	
		EN 61000-6-2,EN55082-2,GB/T17799-2工业环境Industry environment	
传导和辐射通用标准 CE&RE		GB9254, CISPR 32, EN 55032 ：Class B 资讯类Information technology	
	/	GB4824, CISPR 11, EN 55011 ：Class B 医疗类Medical	
	/	GB17743，EN55015，CISPR15：Class B 灯具类Lamps	
		GB4343-1, CISPR14，EN55014-1：Class B 家电类Household appliances	
		EN 61000-6-3，FCC Title 47, EN55011：Class B 工控类Industrial control	
电压波动和闪烁 Voltage Fluctuation and Flicker	IEC/EN 61000-3-3，GB17625.2；Criteria B		

1) 标准A：规格界限内正常性能Criteria A: Normal performance within the specification limits;

2) 标准B：可自行恢复的临时性退化或功能丧失Criteria B: Temporary degradation or loss of function which is self-recoverable;

3) 标准C：不可自行恢复的临时性退化或功能丧失，必须重新启动后才能恢复正常工作Criteria C:Need to restart the power supply, to return to normal work;

4) 标准D：永久性退化或功能丧失，需要更换零部件或维修人员介入Criteria D:Permanent degeneration or loss of function;

5) 不对称：共模（线对地）Asymmetrical: Common mode (Line to earth);

6)对称：差模（线对线）Symmetrical: Differential mode (Line to line);

7) “/”：不符合项“/”Non-conformance;

8) 电源应视为系统内元件的一部分，需结合终端设备进行EMC确认Power should be considered part of the element within the system, to be combined with the terminal device EMC acknowledgment;

可靠性数据 Reliability

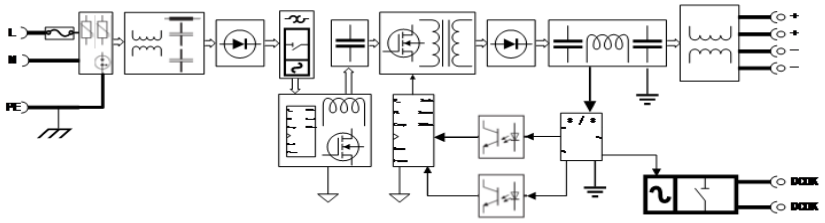
项目 Item	数据 Data	测试条件 Test Conditions
产品老化 Burn-in	100%	230Vac，满载Full load, 40℃ ±5℃，4小时Hours
平均无故障时间 MTBF	370K hrs Min	230Vac，满载Full load，25℃，MIL HDBK 217F

“/”：不符合项 “/”Non-conformance;

结构与安装 Mechanical Installation

项目 Item	数据 Data	备注 Note
尺寸mm（长宽高） Size	127 * 125* 62	材质：铝；Case material : AL
重量Kg Weight	1.2	
安装方式 Installation	导轨式安装 Mounted On 35mm DIN Rails	TS-35/7.5或TS-35/15 EN 60715
最小间距 Space	上下(Above/Below)：45mm；左右(Left and right side): 0mm,5mm With a Heat Source	
输入端子 Input Terminal	脚距7.5mm，3位Pitch=7.5mm, 3pin 7 PIN---L 8 PIN---N 9 PIN---FG	直插式连接Push-In Terminal; 硬导线横截面Hard wire cross section 0.2 mm² ... 4 mm²; 柔性导线横截面Flexible wire cross section 0.2 mm² ... 2.5 mm² 横截面Cross section AWG 24 ... 12 剥线长度Strip length 10 mm
输出端子 Output Terminal	脚距7.5mm，4位/Pitch=7.5mm, 4pin 1 PIN---V+ 2 PIN---V+ 3 PIN---V- 4 PIN---V-	直插式连接Push-In Terminal; 硬导线横截面Hard/Flexible wire cross section 0.2 mm² ... 6 mm² 横截面Cross section AWG 24 ... 8 剥线长度Strip length 14mm-15 mm
输出DC OK端子 Output DC OK Terminal	脚距5mm，4位/Pitch=5mm, 2pin 5 PIN---DC OK 6 PIN---DC OK	直插式连接Push-In Terminal; 硬导线横截面Hard wire cross section 0.2 mm² ... 4 mm²; 柔性导线横截面Flexible wire cross section 0.2 mm² ... 2.5 mm² 横截面Cross section AWG 24 ... 12 剥线长度Strip length 10 mm

框架图 Block diagram



附件（安装示意图、降额曲线、典型应用、导轨安装方法）

Appendix(Installation Instruction /Derating Curve/Typical Application/Din-rail Installation Method)

1. 产品装配示意图 Product assembly

说明：

Note：

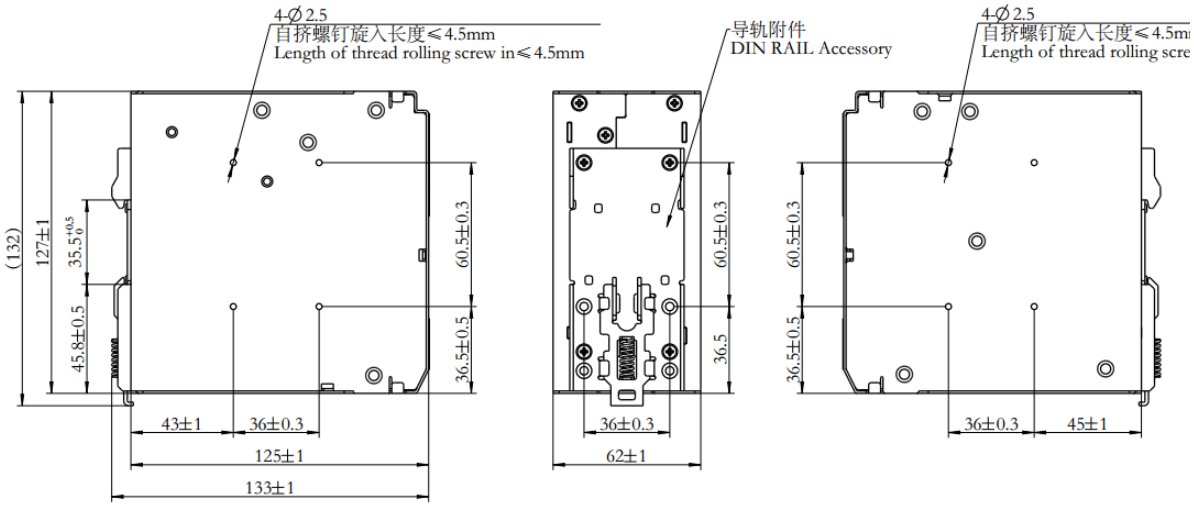
A:产品名称特性示意，具体参数依照规格书。

A:Refer to product specifications.

B:建议扭矩：M3.0 螺钉<0.4 N·m;M4.0 螺钉<0.6N·m。

B:Suggested tightening torque:M3.0 screw<0.4 N·m;M4.0 screw<0.6 N·m.

Install rail / 安装轨道: TS35/7.5 or TS35/15



2. 降额曲线 Derating Curve：

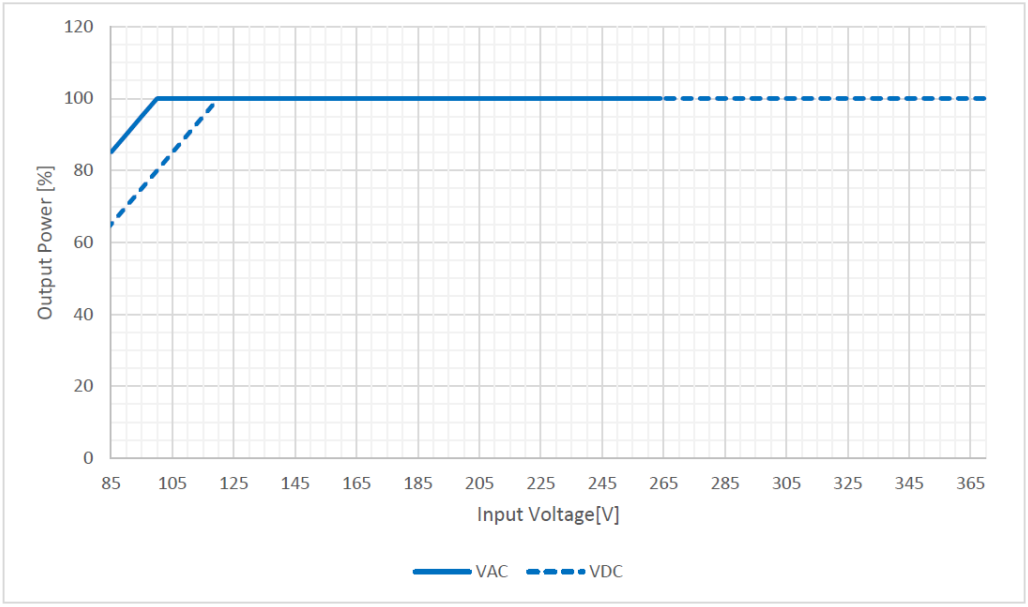


图1：输入电压下输出功率降额曲线
Fig1: Output Power Derating curve depending on Input Voltage

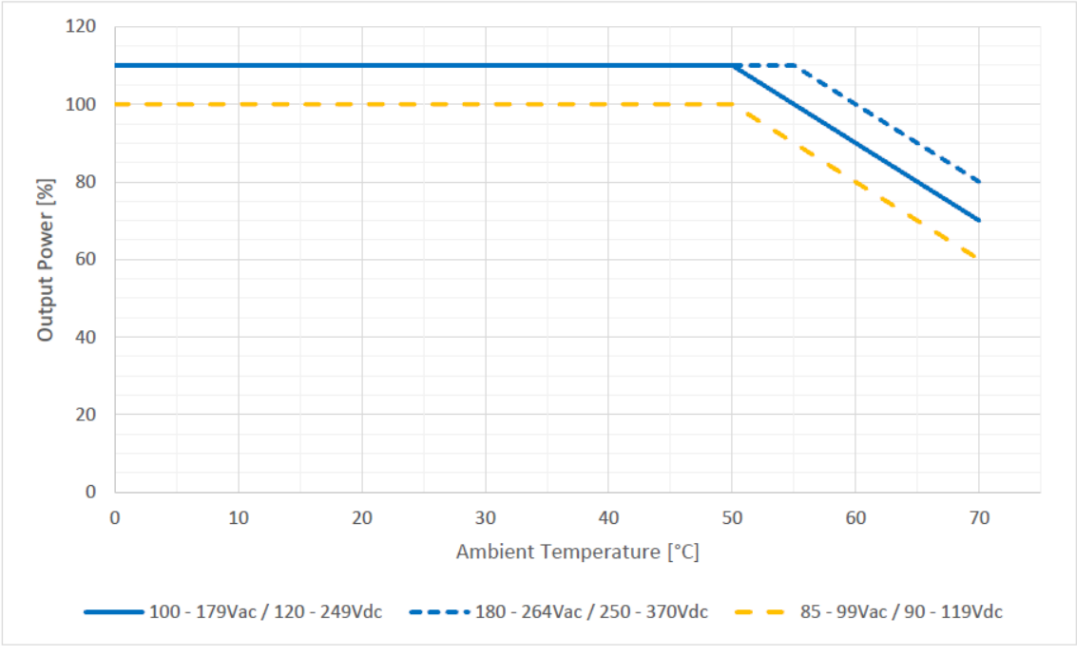


图2：环境温度和输入电压下输出功率降额曲线
Fig2: Output Power Derating curve depending on Ambient Temperature and Input Voltage

总输出功率的降额计算：
Calculation of total output power derating:
输出功率（%）=[图1(%)×图2(%)]/100
Total Output Power [%] =(Fig1 Output Power[%] * Fig2 Output Power[%])/100
对于图2，仅在看降额曲线时按11A输出电流，其他正常情况下按10A
For Fig2: Run 11A only when looking at the Derating curve, other normal conditions run 10A.

3. 限流特性 Current Limiting Characteristic

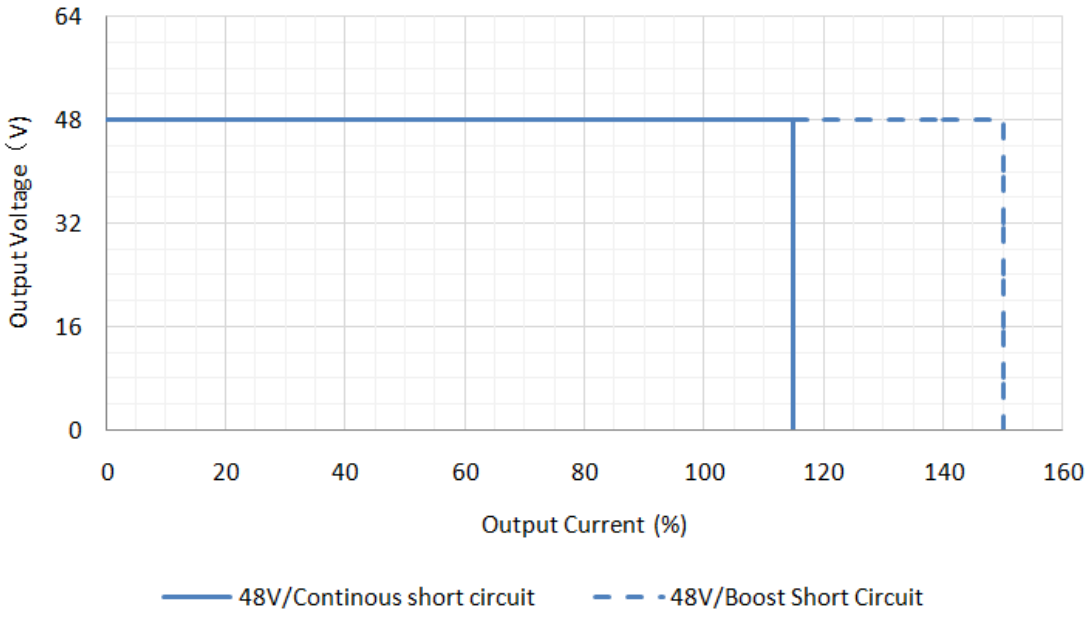


图1： 正常输出电压下，正常和峰值工作时的限流曲线
Fig 1:Current limiting curve in normal and Boost operation depending on the nominal output voltage

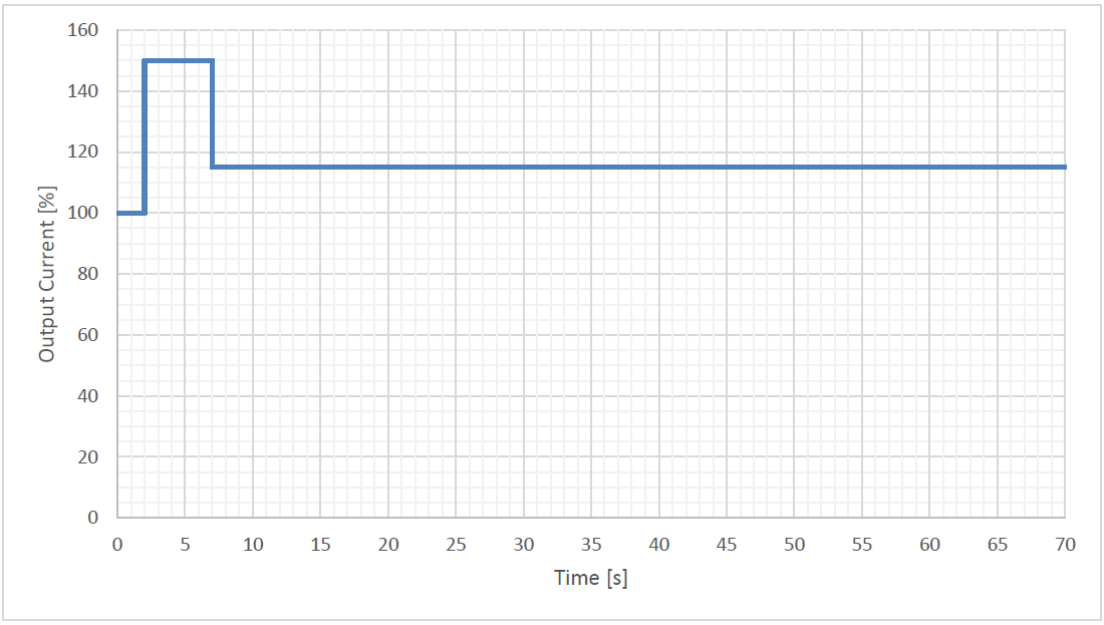


图2:短路情况下，非重复的峰值电流特性
Fig 2: Non-repetitive Boost during continuous short circuit

4. 峰值功率特性 Boost Characteristic

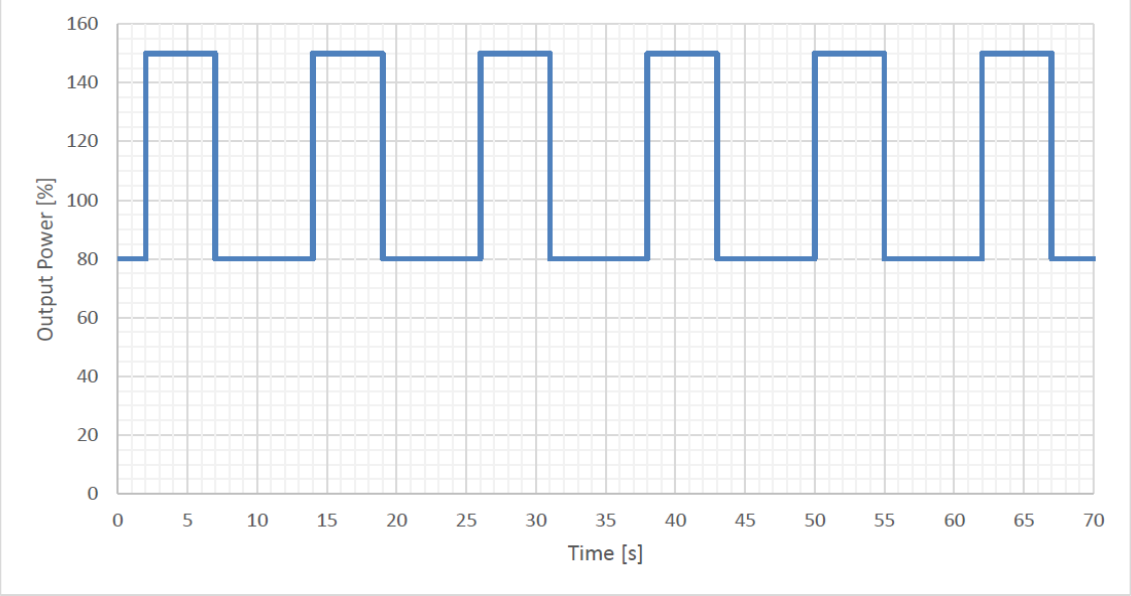


图1: 环温50˚C情况下（80%➞150%输出功率），峰值功率时间5s
Fig 1: Timing between two Boost events for 5s at 50˚C ambient (80%➞150% output power)

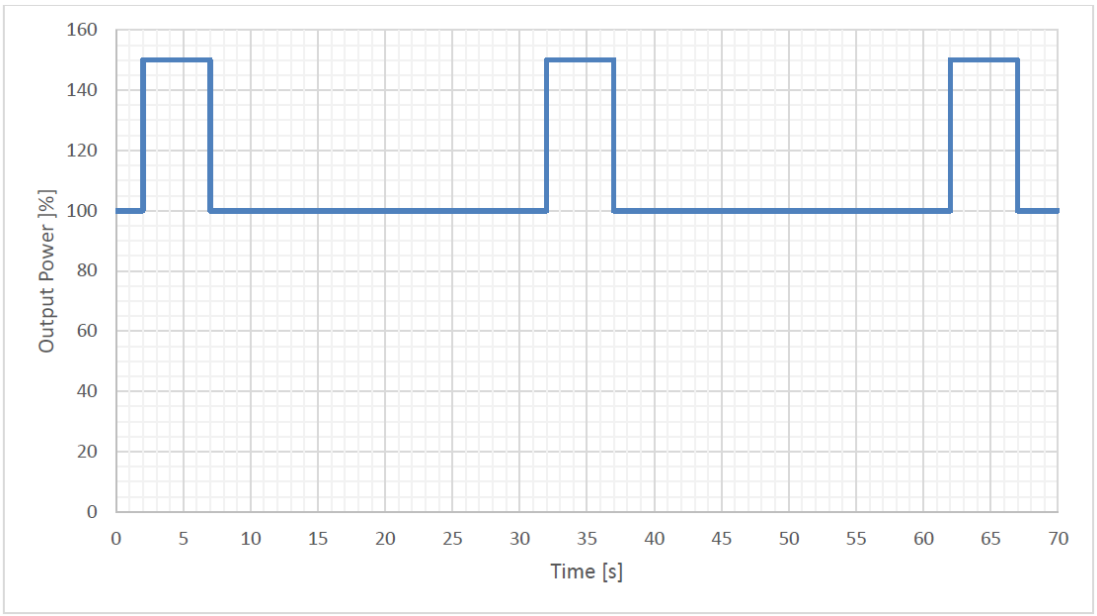
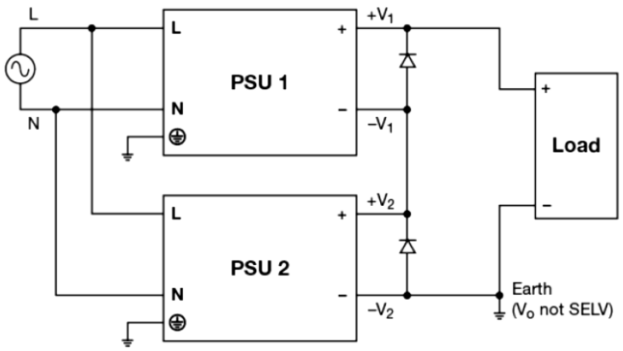


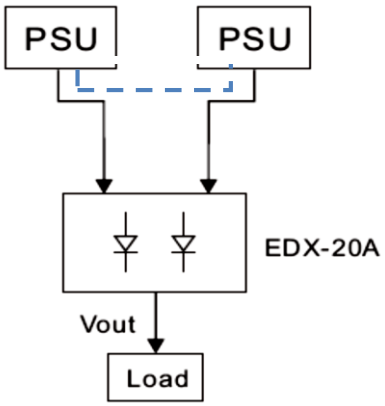
图2: 环温50˚C情况下（100%➞150%输出功率），峰值功率时间5s
Fig 2: Timing between two Boost events for 5s at 50˚C ambient (100%➞150% output power)

5. 典型应用 Typical Application：

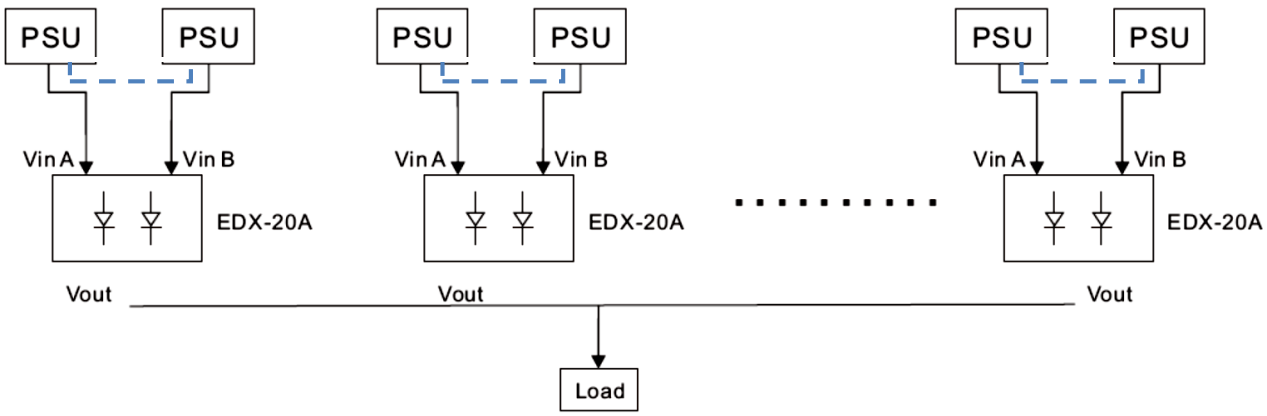
3.1 串联接线图 Series Operation Connection Diagram：



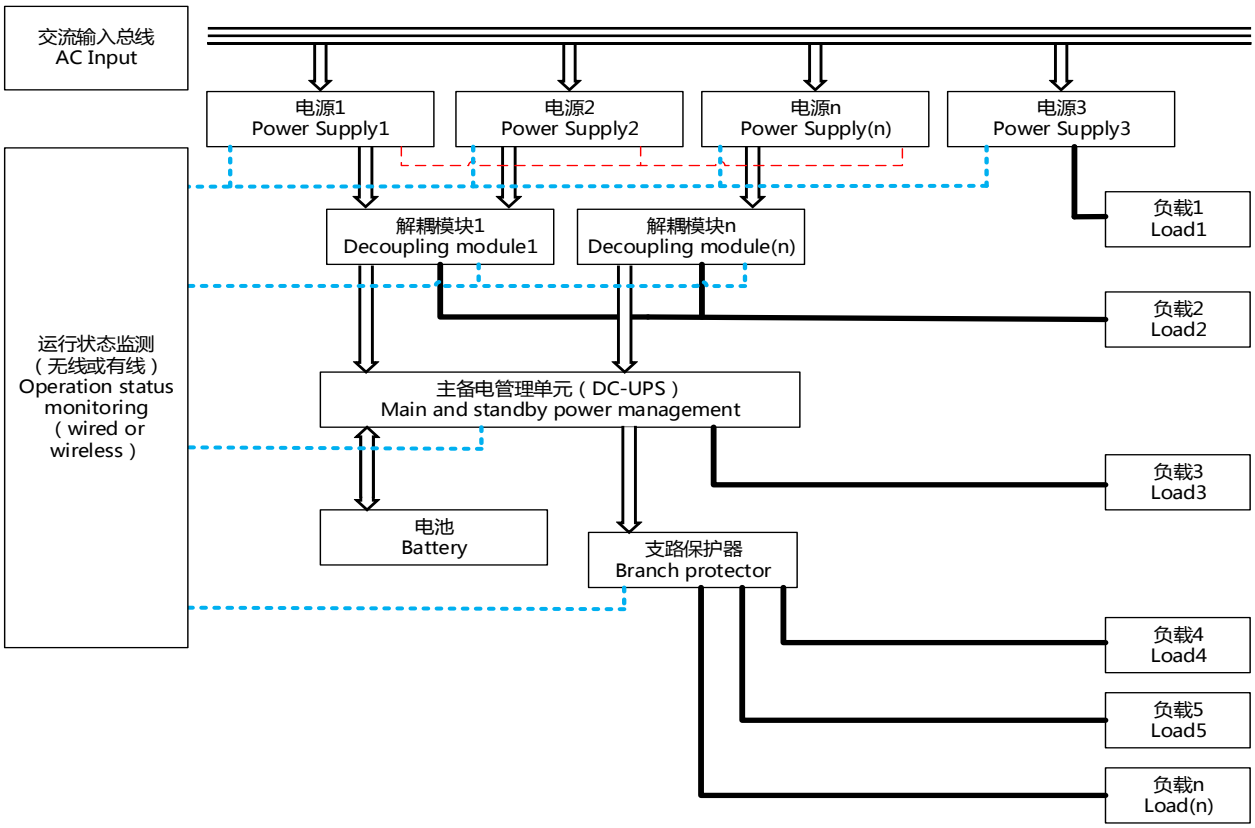
3.2 1+1 冗余接线图 1+1 Redundancy Connection Diagram



3.3 1+N 冗余接线图 1+N Redundancy Connection Diagram:

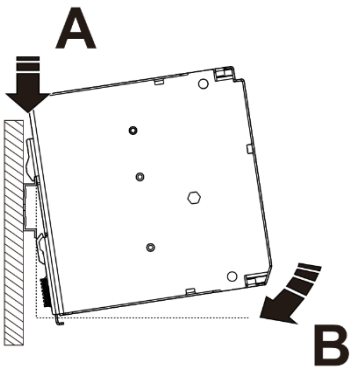


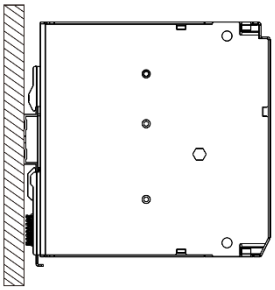
3.4 可靠性系统构建图 Reliability system：



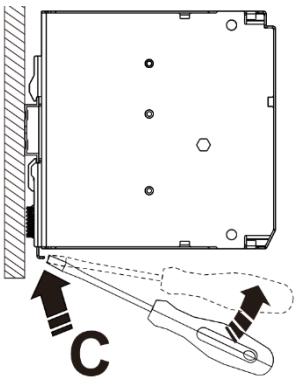
6. 导轨安装方法 Din Track Mounting：

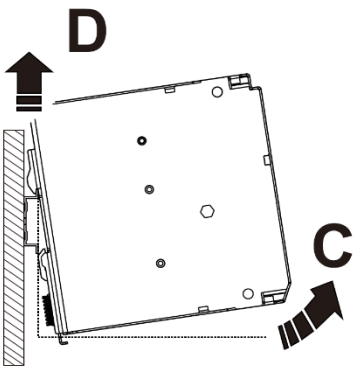
（1）To mount the Block on a DI track, hook portion (A) of the Block onto the track and press the Block in direction (B).
安装：将(A)部分挂入导轨，朝(B)方向按压卡入导轨





（2）To dismount the Block, pull down portion (C) with a flat-blade screw-driver and pull out the Block.
拆卸：用平口螺丝刀下拉(C)部分拆卸电源





(3)通用壁挂式安装图Mounting the universal wall adapter