

15KW, 500V Bi-Directional DC Power Supply

I. General

The DT15AD02B is a compact, high frequency, isolated, bi-directional power supply module. The AC side has a 3-phase/3-wire input and supports a voltage range between 304 to 456V. The DC side supports high voltages in the range from 200 to 500 Volts. It is highly suitable as a building block for modular DC Fast Charger for Electric Vehicles.

There are two operating modes:

1. **Charging mode** when in the forward operating direction, charging a battery pack or supplying DC voltage for a load via AC (grid power). There is an adjustable single 200~500Vdc output.
2. **Discharging mode** when operating in the reverse direction, converting and supplying the voltage to a battery pack or DC voltage source for grid power.

The module has the following features:

- Power factor correction
- Over/under voltage protection
- Default phase alarm
- Output over current protection
- Output short circuit protection
- Over temperature protection and alarm function.
- Supports N+1 parallel operation
- Current sharing function



II. Main Specifications

AC-DC				
Input voltage range	Output voltage range	Input current	Output current	Max output power
304-456Vac	200-500Vdc	0-30A	0-30A	15KW
DC-AC				
Input voltage range	Output voltage range	Input current	Output current	Output power
200-500Vdc	304-456Vac	0-30A	0-30A	15KW

III. Quoted Standards

GB 3873-83 communication equipment general specification of product packaging

GB 4943.1-2011 information technology equipment safety

GB 191-2000 packaging storage and transportation icon logo

GB 7260-87 uninterrupted power supply equipment

GB/T 13722-92 Technical requirements and test methods for mobile communication power supply

GB/T 2423.1-2001 environmental testing for electric and electronic products - Part second: Test methods - Test A: low temperature

GB/T 2423.2-2001 environmental testing for electric and electronic products part second: test method test B: high temperature

GB/T 2423.3-1993 Ca: basic environmental testing procedures for electric and electronic products constant damp heat test method

GB/T 2423.5-1995 environmental testing for electric and electronic products - Part second: Test methods - Test Ea and guidance: shock

GB/T 2423.9-2001 electrical and electronic products environmental test second parts: test method test Cb: equipment constant damp heat

GB/T 2423.10-1995 environmental testing for electric and electronic products - Part second: Test methods - Test Fc and guidance: vibration (sinusoidal)

GB/T 2423.16-1999 environmental testing for electric and electronic products - Part second: Test methods - Test J and guidance: long

GB/T 2423.17-1993 Ka: basic environmental testing procedures for electric and electronic products salt spray test method

GB/T 2681-81 Conductor color in electrical equipment

GB/T 2829-2002 cycle count sampling procedures and tables (applied to the test of the stability of the process)

GB/T 2828.1-2003 count sampling inspection procedures first parts: according to the reception quality limit (AQL) of the sample by batch test sampling plan

GB/T 14508-93 grade road freight transport machinery and environmental conditions

YD/T 777-1999 Inverter for communication

YD/T 983-1998 Limits and measurement methods of electromagnetic compatibility for communication power supply equipment

YD/T 282-2000 General test method for reliability of communication equipment

IEC 62109-1:2010 Safety of power conversion equipment for photovoltaic power systems - Part 1: General requirements

IEC 62109-2:2011 Safety of power conversion equipment for photovoltaic power systems - Part second: Particular requirements for Inverters

IEC 62116-2011 Test method for grid connected photovoltaic inverter based on isolated island protection measures

AS4777.2-2002 Adopt inverter grid connected energy systems - Part second: requirements for Inverters

IV. Environmental Conditions

No.	Item	Technical Requirements	Unit	Remarks
1	Rated operating temperature	-40—+60	°C	50°C —60°C derating by 50% in linear way
2	Storage temperature	-40—+70	°C	
3	Relative humidity	Operating	%	40°C ±2°C
		Storage		
4	Altitude	0—2000	m	
5	Cooling mode	Forced air cooling		With fan
Remark: At 50°C ~60°C the module commences automatic linear power derating.				

V. Electrical Characteristics

1. AC-DC					
(a) Input Characteristics					
No.	Item	Technical Requirements	Unit	Remarks	
1.1.1	Rated input voltage	380	Vac		
	Input voltage range	304—456			
1.1.2	frequency	50/60	Hz		
1.1.3	frequency	45—65	Hz		
1.1.4	Power factor	≥0.99	—	Rated input and output	
1.1.5	Max input current	30	A		
1.1.6	Input inrush current	Less than 150% of rated input current	—		
(b) Output Characteristics					
1.2.1	Rated output voltage	500	Vdc		
1.2.2	Output voltage range	200—500	Vdc	Continually adjustable with controlling software	
1.2.3	Output current range	0—30	A		
1.2.4	Max output power	15000	W		
1.2.5	Output ripple and noise	≤±1%Vo	Vp-p	Oscilloscope bandwidth 20MHz, probe paralleled with 10u+104 E-capacitor	
1.2.6	overshoot	≤±5	%		
1.2.7	Dynamic response	overshoot	ΔV: ≤±5	%	25%—50%—25% or 50%—75%—50% load change
		Recovering time	Δt: ≤100	mS	
1.2.8	Combined regulation	≤±1	%		
1.2.9	Load regulation	≤±1	%		
(c) Protection					
1.3.1	input under voltage protecting point	294—304	Vac	Auto recovering, tested with 5A load	
1.3.2	Input under voltage recovering point	304—314	Vac		
1.3.3	Input over voltage protecting point	456—466	Vac	Auto recovering, tested with 5A load	
1.3.4	Input over voltage recovering point	446—456	Vac		
1.3.5	Output undervoltage protection	190-200	Vdc		
1.3.6	Output overvoltage protection	505-515	Vdc		

1.3.7	Output over current protection	Yes, auto recoverable	—	
1.3.8	Short circuit protection	Endure long time short circuit, auto recoverable		
2. DC-AC				
(a) Input Characteristic				
No.	Item	Technical Requirements	Unit	Remarks
2.1.1	Rated input voltage	500	Vdc	
	Input voltage range	200—500		
2.1.2	Max input current	30	A	
2.1.3	Max input power	15000	W	
(b) Output Characteristics				
2.2.1	Rated output voltage	380	Vac	
2.2.2	Output current range	0—30	A	
(c) Protection				
2.3.1	Input under voltage protecting point	190-200	Vdc	After the recovering from the faulty, the module will come into standby mode
2.3.2	input over voltage protecting point	505-515	Vdc	After the recovering from the faulty, the module will come into standby mode
2.3.3	Output under voltage protection	294—304	Vac	Auto recoverable
2.3.4	output undervoltage recovering	304—314	Vac	
2.3.5	Output overvoltage protection	456—466	Vac	Auto recoverable
2.3.6	Output overvoltage recovering	446—456	Vac	
3. Other Features				
No.	Item	Technical Requirements	Unit	Remarks
3.1	AC side current harmonic	≤ 3	%	Rated input, rated output
3.2	efficiency	≥ 93	%	Rated input, rated output
3.3	Soft start time	3-8	S	
3.4	Over temperature protection	>60	$^{\circ}\text{C}$	Auto recoverable when temperature drop to 60°C or below

VI. Other Requirements

No.	Item	Technical requirements	Remarks
1	Acoustics noise	≤65dB	A-weighted, test distance is 1 meter
2	Smell requirement	Does not generate a peculiar smell or unhealthy smell	
3	Failure isolation	If the PSU fails, it can detach from the system safely.	
4	Environment protection requirement	Meet 2002/95/EC; No cadmium, hydrid and fluorid; polymer materials should be specially labeled; can't send out organic compound; no asbestos; the package material should be recoverable.	

VII. Safety & EMC

No.	Item	Criteria	Remarks	
1	Dialectical strength	Input-output	3535Vdc/10mA/ 1min	No flyover, no breakdown.
		Input-ground	3535Vdc/10mA/ 1min	
		Output-ground	3535Vdc/10mA/ 1min	
2	Isolation resistance	Input-output	≥10MΩ@1000Vdc	Under normal air pressure, relative humidity 90%,
		Input-ground	≥10MΩ@1000Vdc	
		Output-ground	≥10MΩ@1000Vdc	
3	Ground resistance	<0.1Ω	50A/4min	
4	Touch current (Input-ground)	≤3.5mA	502Vac/60Hz	
5	EMC	CE	CLASS A	
		RE	CLASS A	
		EFT	LEVEL 3 criteria B	IEC61000-4-4
		SURGE	LEVEL 4 criteria C differential mode ±2KV, common mode ±4KV.	IEC61000-4-5
		DIP	Drop to 70% UT, duration 10ms, at angle of 0°,45°,90°,135°,180°,225°,270°,315°, meeting class B. Drop to 40% UT, duration 100ms, at angle of 0°,45°,90°,135°,180°,225°,270°,315°, meeting class C. Drop to 0% UT, duration 5000ms, at angle of 0°,45°,90°,135°,180°,225°,270°,315°, meeting class C.	IEC61000-4-11
ESD	For the frame which would be touched by human in the normal operation: contact discharge +/- 6KV; air discharge +/-8KV standard B.	IEC61000-4-2		

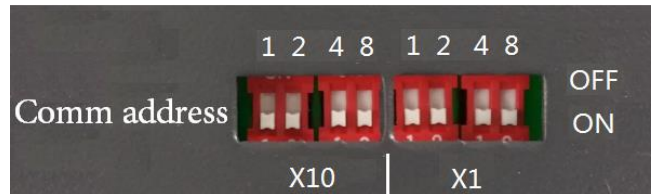
			For the frame which would be touched by human in the normal operation, contact discharge +/- 8KV; air discharge +/-15KV standard R.	
		CS	LEVEL 3 criteria A	IEC61000-4-6
		RS	LEVEL 3 criteria A	IEC61000-4-3
		Voltage wave and flicker	Pst≤1.0 P1t≤0.65; dc≤3%; dmax≤4%; The time of d(t) ≥ 3% is no more than 200mS.	IEC61000-3-3
		Harmonic current	CLASS A	IEC 61000-3-2 [6]
6	Anti Lightning		The AC input terminal can endure surge current wave of 5kA、8/20μS, 5 times each for positive and negative, time cycle 1 minute.	

Criterion Performance:

- **Criterion A:**
 - Performance normal within the technical requirement;
- **Criterion B (DIP testing criterion):**
 - Part of functions temporary worsening or losing is acceptable, for auto recoverable functions
- **Criterion B (other criterions except DIP):**
 - part of functions temporary worsening or losing is acceptable, auto recoverable, but the output voltage should keep in the normal range during testing.
- **Criterion C:**
 - Short time functions interruption but auto recover is allowable, no permission for long time functions interruption or manual recovery.
- **Criterion R:**
 - No permission for any components damage except protection components, and testing unit should recover performance after replaced protection components.

VIII. Communication address setting

The address can be set by the DIP switch on the front panel of the module. By setting the number of X10 and X1, a different address number is fixed for the purpose of communication and the current sharing function. The address= $A(X10)*10+B(X1)*1$. Max 100 addresses is available. Please make sure that no two addresses are the same.



address	X10 switch position				X1 switch position			
	1	2	4	8	1	2	4	8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF	OFF	ON	ON	OFF
7	ON	ON	ON	OFF	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON	ON	OFF	OFF	ON
	OFF	ON	OFF	ON	OFF	ON	OFF	ON
	ON	ON	OFF	ON	ON	ON	OFF	ON
	OFF	OFF	ON	ON	OFF	OFF	ON	ON
	ON	OFF	ON	ON	ON	OFF	ON	ON
	OFF	ON	ON	ON	OFF	ON	ON	ON
	ON	ON	ON	ON	ON	ON	ON	ON

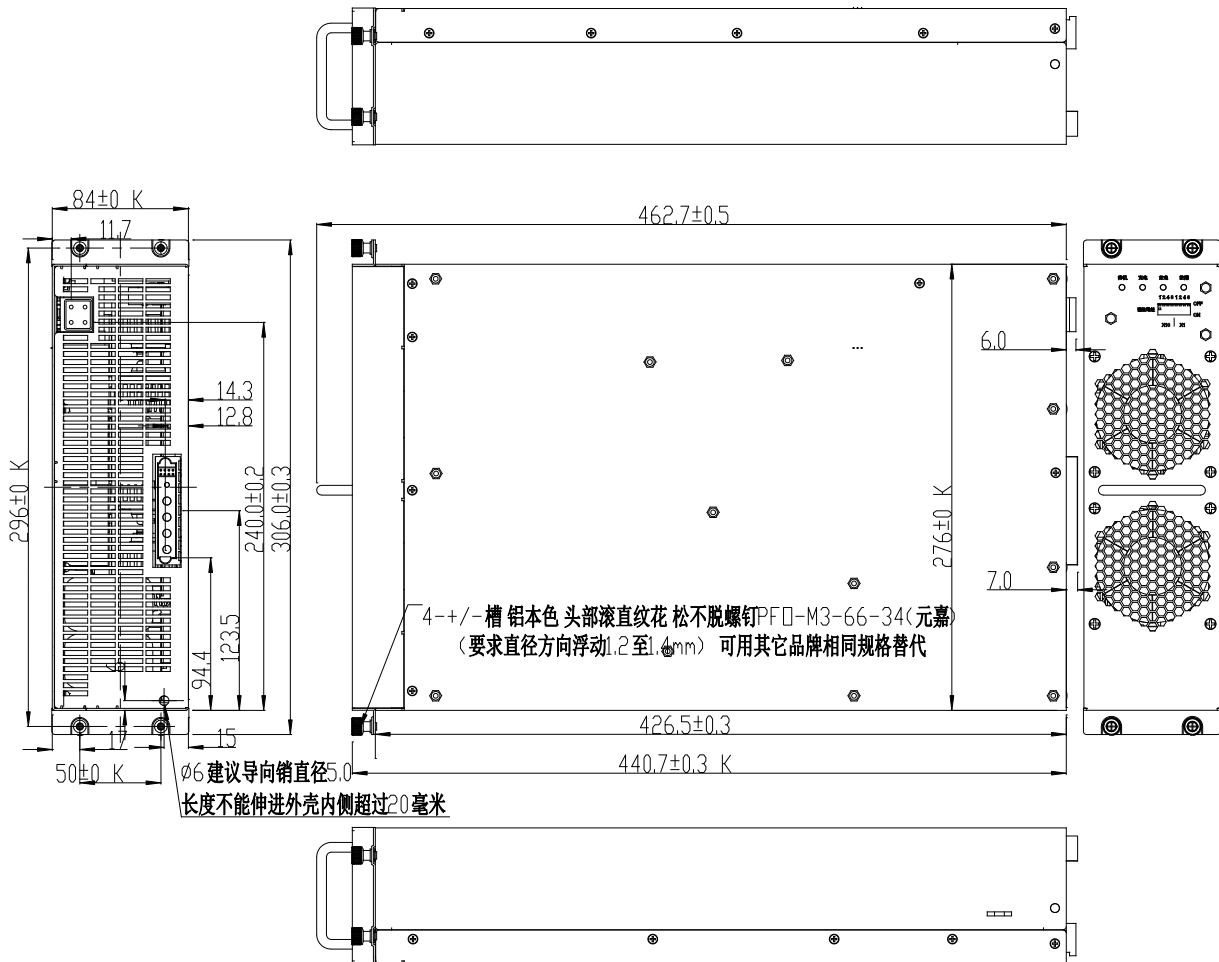
IX. Logical function and signal

No.	Item	Technical Requirements
1	Operation (green)	Charge mode, charge green light on when module in normal operation.
2	Operation (green)	Discharge mode, discharge green light on when module in normal operation.
3	Communication (yellow)	Yellow light flash when communication with upper computer.
4	Alarm (red)	The red light flashes when input over/under voltage, AC default phase, temperature derating, output short circuit and the power supply internal working is abnormal.
5	Fault (red)	Red light on for long time when output over current, output over voltage, over temperature protection, fan fault and power supply internal working is abnormal.

X. Mechanical Characteristics and Connector Definition

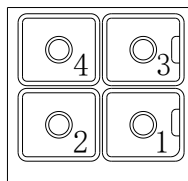
1. Dimensions (Unit : mm)

Height x Width x Depth = 84mm x 306mm x 450mm



2. Input Connector pin definition

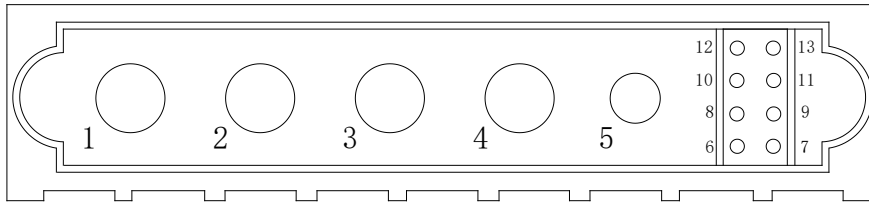
(P/N: CZ36B-4T, Manufacturer: Jonhon)



1	Input phase A
2	NC
3	Input phase B
4	Input phase C

3. Output Connector pin definition

(P/N: CZ36E-13TA004, Manufacturer: Jonhon)



1	OUT-
2	NC
3	OUT+
4	NC
5	CHGND
6	CANH_B
7	CANGND_B
8	NC
9	NC
10	NC
11	CANL
12	CANGND
13	CANH

XI. Reliability

MTBF≥250Khour; testing condition: 25°C, rated input and full load output

XII. Packaging, Transportation & Storage Requirements

Packaging

The product name, model, logo of manufacturer, safety approval, manufacturing date are present on the packaging box. The specifications manual and packing list are included in the packaging box.

Transportation

Suitable for transportation by truck, ship, and plane. The products should be shielded by a cover from direct sunshine and loaded and unloaded carefully.

Storage

The Products should be stored in packaging box when it is not in use. The warehouse temperature should be between 40°C—85°C with the relative humidity between 10%—90%. Within the warehouse, there should be no harmful gases, inflammable, explosive, corrosive chemical products, or strong mechanical vibration. Shock and strong magnetic fields should be avoided.

The packaging box should at least 20cm height above the ground, and 50cm away from walls, thermal sources or vents.

Under these conditions, the product has a 2-years storage period, and should be rechecked after these 2 years.

XIII. Attention

Dangerous power output. keep safe space when in operation.



High Temperature Alarm Label

