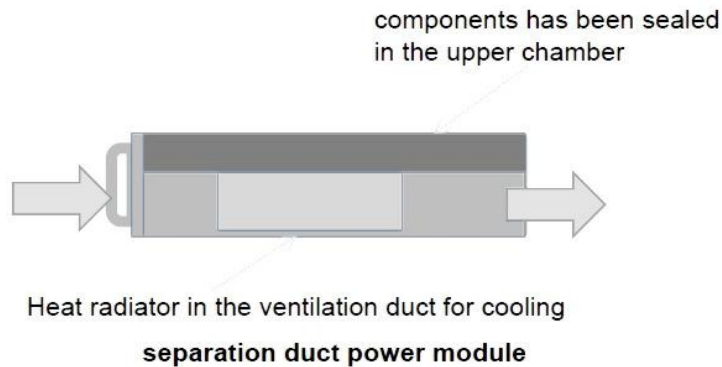


Deltrix 60KW Power Module Combination

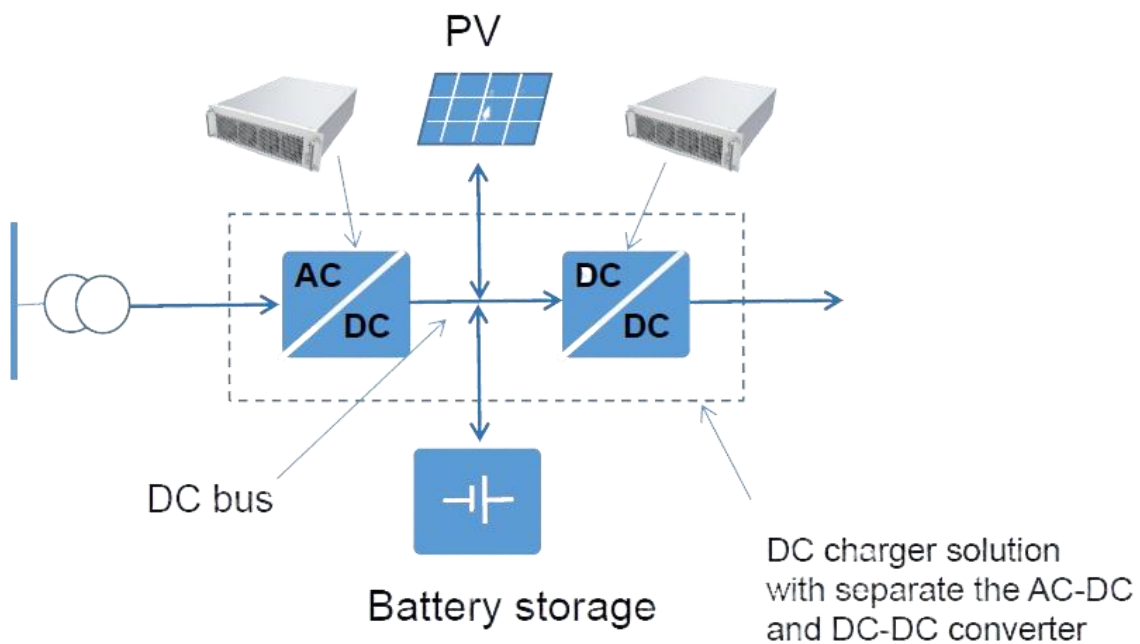
The DT60AD01M & DT60DD01M is a twin-module combination that offers a highly efficient 60KW DC output in a very compact form factor. The revolutionary cooling technology finally eliminates the dusting-up issue that has plagued the module of many manufacturers over the past years. Instead of the usual air flow over the components there is a separate air duct to ensure the components which are sealed in a separate chamber remain protected.



Module Combination Landscape:

DT60AD01M – 60KW AC to DC Mono-directional Module

DT60DD01M – 60KW DC to DC Mono-directional Module



I. Module A: 60KW AC to DC Charging Module

This module has an input range of 323-437Vac on a three-phase, three-wire AC input. There is a single DC output that can be adjusted from 200-750Vdc with active power factor correction.

The modules key features are:

- Input over/under voltage protection
- Lost phase alarm
- Output over current protection
- Output over voltage protection
- Output short circuit protection
- Over temperature protection
- Alarm function
- N+1 redundancy



II. Main Specifications

Rated power	Input voltage range	Output voltage range	Output current range	Ripple(p-p) (Rated Load, Width Limited 20MHz)
60KW	323~437Vac	200~750Vdc	0~120A	≤±1%Vo

III. Environmental Conditions

No.	Items	Technical Specifications	Unit	Remarks
1	Operating Temperature	-40 ~ +65	°C	+50~ +65°C derating 20% in linearity.
2	Storage Temperature	-40 ~ +70	°C	
3	Relative Humidity	Operation	%	
		Storage		
4	Altitude	≤3000	m	It should be derated used according to the rules of e.g. GB/T 3859.2 when it exceed 3000m.
5	Cooling	Forced cooling, Draws air from the front and exhausts heat from the Rear. This module has a temperature-sensing timing function.		

Remarks: when the temperature reaches 50°C~65°C, the module starts derating in auto-linear mode.

IV. Electrical Characteristics

No.	Item	Technical Requirement	Unit	Remark
1. Input Characteristics				
1.1	Rated input voltage	323~437 (typical value 380)	Vac	Can sustain the effective value 530Vac for long time without damage.
1.2	AC input grid frequency range	45~65	Hz	
1.3	AC input rated frequency	50/60	Hz	
1.4	PFC	≥ 0.99		Rated input, rated load
1.5	Max input current	< 120	A	
1.7	Inrush current	Not exceeding the Max. stable 150% of input peak current	-	

2. Output Characteristics

2.1	Output voltage range adjustable	200~750	Vdc	Operate through the Monitoring unit (testing condition: half load)	
2.2	Rated output voltage	500	Vdc	Rated input	
2.3	Output current range	120	A	Output voltage range: 360~500Vdc	
		60	KW	Output voltage range: 500~750Vdc	
2.4	Efficiency	≥ 95	%	Rated input, half load output	
2.5	Ripple	$\leq \pm 1\% V_o$			
	Noise	< 55	dB		
2.6	Starting up output delay	3~10	S	Rated input voltage starting up till output voltage rise to 90% V_o .	
2.7	Turn on/off overshoot amplitude	$\leq \pm 5$			
2.8	Dynamic Response	Overshoot Range	$\Delta V: \leq \pm 5$	%	Load change at 25%-50%-25% or 50%
		Recovery time	$\Delta t: \leq 200$		75%-50%, jumping rate is 0.1A/us; and the jumping period is 4ms

No.	Item	Technical Requirement	Unit	Remark
2.9	Output Voltage Regulated Accuracy	$\leq \pm 0.5$	%	
2.10	Stabilized current precision	$\leq \pm 1$	%	
2.11	Current sharing imbalance	$\leq \pm 5$	%	323-437Vac, at the range of 50~100% load 323-437Vac, 50~100%
2.12	Input current harmonic	≤ 5	%	Rated input, rated load
2.13	Temperature coefficient	$\leq \pm 0.02$	%/°C	Temperature coefficient

3. Protection Characteristics

3.1	Input under voltage protection point	300Vac ± 5	Vac	
3.2	Input under voltage recovery point	310Vac ± 5	Vac	
3.3	Input over voltage protection	456Vac ± 5	Vac	
3.4	Input over voltage recovery point	450Vac ± 5	Vac	
3.6	Output over voltage protection point	780Vdc ± 5	Vdc	Recover when the voltage is +20V above the setting voltage point
3.7	Output over current protection point	The over current is available, Can auto recover	—	
3.8	Short circuit protection	Endure long time short circuit without damage and auto recover.		
3.9	Over temperature protection	> 65	°C	Auto-recoverable when temperature is less than 60°C

V. Safety & EMC

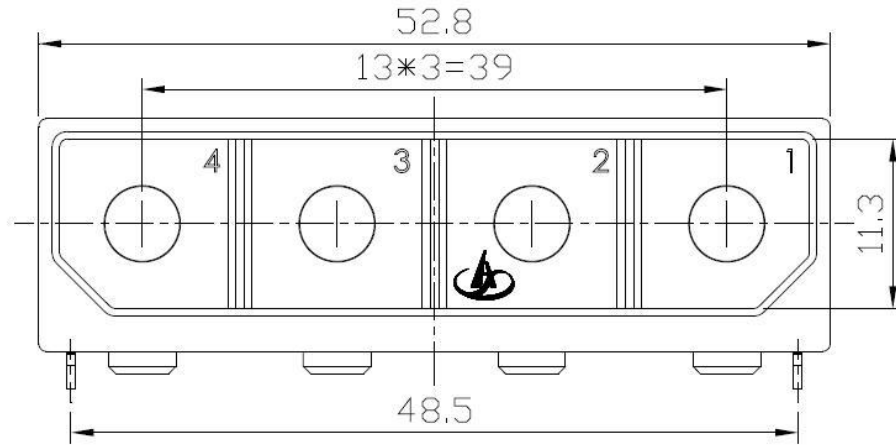
No.	Item		Criteria	Remark
1	Dialectical strength	Input-output	3535Vdc/30mA/ 1min	No flashover, no breakdown.
		Input-ground	3535Vac/30mA/ 1min	
		Output-ground	2121Vdc/30mA/ 1min	
2	Isolation resistance	Input-output	$\geq 10M\Omega @ 1000Vdc$	Under normal air pressure, humidity 90%
		Input-ground	$\geq 10M\Omega @ 1000Vdc$	
		Output-ground	$\geq 10M\Omega @ 1000Vdc$	
3	Ground resistance		$< 0.1\Omega$	
4	Touch current (Input-ground)		$\leq 3.5mA$	
5	EMC	CE	GB 9254-2008CLASS A	
		RE	GB 9254-2008CLASS A	
		EFT	GB/T 17626.4-2008LEVEL 3 criteria B	IEC61000-4-4
		SURGE	GB/T 17626.5-2008LEVEL 3criteriaC Input meet difference mode $\pm 1KV$, common mode $\pm 2KV$	IEC61000-4-5
		DIP	GB/T 17626.11-2008 Drop to 70%UT, duration 10ms, at angle of $0^\circ, 45^\circ, 90^\circ, 135^\circ, 180^\circ, 225^\circ, 270^\circ, 315^\circ$, meeting class B. Drop to 40%UT, duration 100ms, at angle of $0^\circ, 45^\circ, 90^\circ, 135^\circ, 180^\circ, 225^\circ, 270^\circ, 315^\circ$, meeting class C. Drop to 0%UT, duration 5000ms, at angle of $0^\circ, 45^\circ, 90^\circ, 135^\circ, 180^\circ, 225^\circ, 270^\circ, 315^\circ$, meeting class C.	IEC61000-4-11
		ESD	GB/T 17626.2-2006 For the shell which would be touched by human in the normal operation: contact discharge $\pm 6KV$; air discharge $\pm 8KV$ standard B.	IEC61000-4-2
		CS	LEVEL 3 criteria A	IEC61000-4-6
		RS	LEVEL 3 criteria A	IEC61000-4-3
		Current harmonic	CLASS A	IEC 61000-3-2 [6]

VI. Mechanical Characteristics and Connector Definition

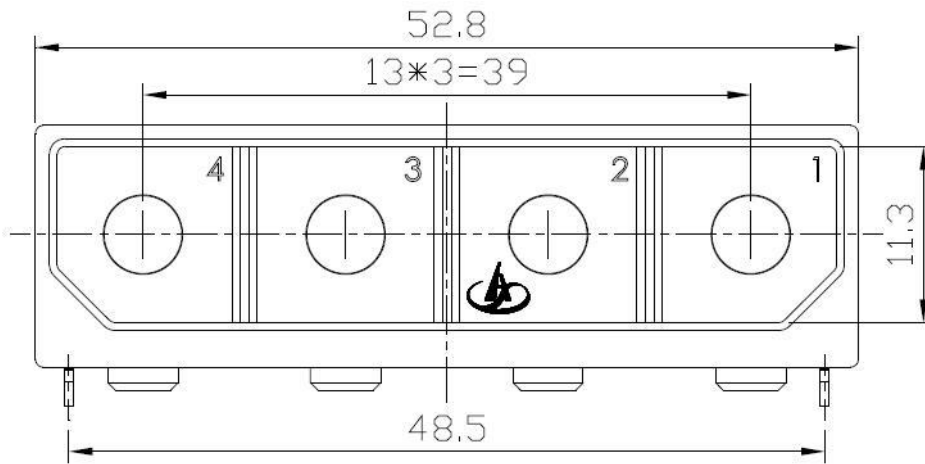
1. Outline Dimensions (L*W*H) = 490mm×360mm×125 mm *2



2. Input connector PIN definition



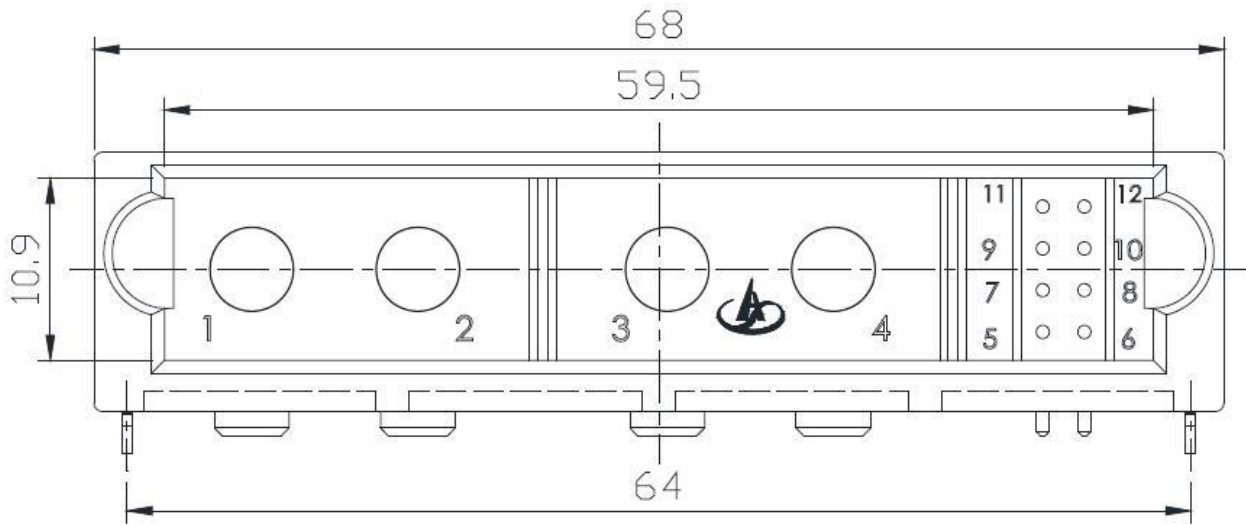
Connector 1



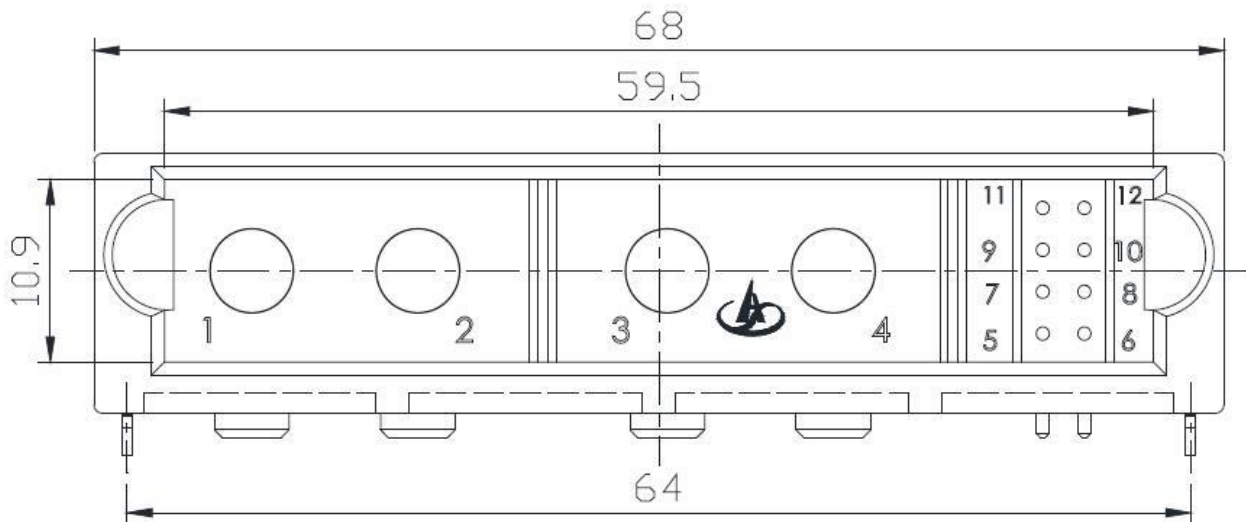
Connector 2

connector 1	1	PSU AC input	Input phase A
	2		
	3	PSU AC input	Input phase B
	4		
connector 2	5	PSU AC input	Input phase C
	6		
	7	NC	
	8	PSU protect ground	CHGND

3. AC/DC Connection DC/DC Connector PIN definition



Connector 3

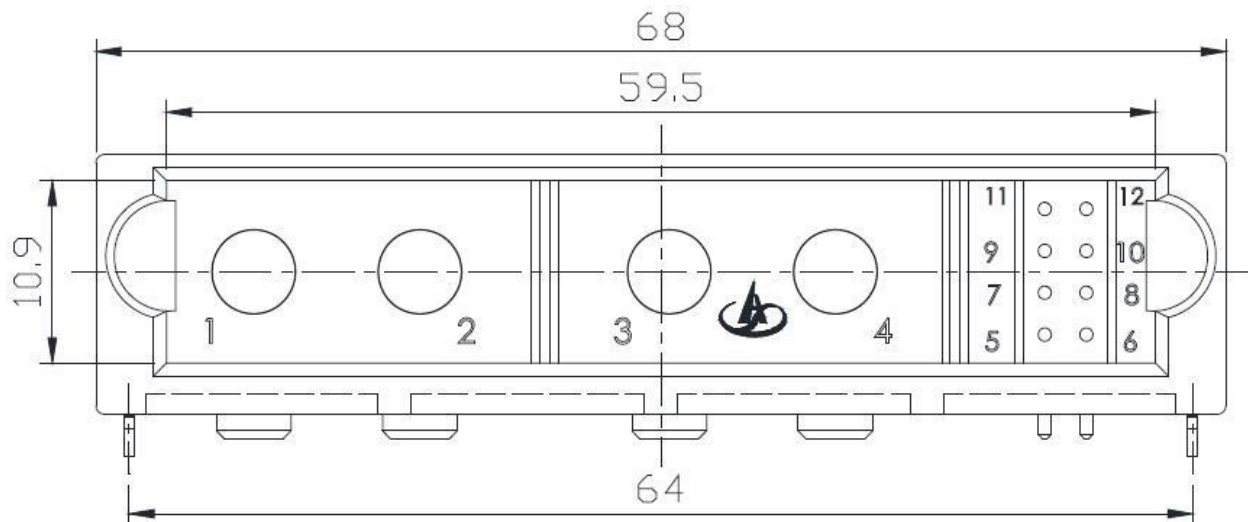


Connector 4

Connector 3	1	OUT+	PSU output positive
	2		
	3	OUT-	PSU output negative
	4		
	5	24V+	Auxiliary power supply
	6	24V-	
	7	NC	
	8		
	9	SHUTDOWN-	
	10	SHUTDOWN+	
	11	CAN-L	PSU communication wire
	12	CAN-H	

Connector 4	1	OUT+	PSU input positive
	2		
	3	OUT-	PSU input negative
	4		
	5	CAN-L	PSU Communication wire
	6		
	7	CAN-H	PSU Communication wire
	8		
	9/10	NC	
	11	NC	
	12	NC	

4. Output Connector PIN definition



Connector 5	1	OUT+	PSU output positive
	2		
	3	OUT-	PSU output negative
	4		
	5	24V+	Auxiliary power supply
	6		
	7	24V-	
	8		
	9/10	NC	
	11/12	NC	

5. Others

No.	Item	Criteria	Remark
1	Placement	horizontal	
2	Connection to ground	Through case, front plane, consolidate screw and rack.	
3	Weight	<43Kg	

VII. Reliability requirement

MTBF: ≥ 50 Khour; test condition: 25°C, rated input, full load output. MTBF ≥ 50 Khour.

VIII. Package, Transportation & Storage

Packaging

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

Transportation

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

Storage

Products should be stored in package box when it is not used. And warehouse temperature should be -40°C - 85°C with relative humidity 10% - 90%. In the warehouse, there should not be harmful gas, inflammable, explosive products, corrosive chemical products, or strong mechanical vibration. Shock and strong magnetic field affection not allowed. The package box should at least 20cm height above the ground, and 50cm away from wall, thermal source or vent. Under this requirement, product has 2 years of storage period, and should be rechecked when over 2 years.

IX. Remarks

Dangerous power output, keep safe space when in operation !



High Temperature Alarm Label.



I. Module B: 60KW DC to DC Charging Module

This DC to DC module has an input range of 700-820Vdc and a rated output power of 750Vdc/60kw.

The module has the following key features:

- Input over/under voltage protection
- Lost phase alarm
- Output over current protection
- Output over voltage protection
- Output short circuit protection
- N+1 redundancy and current sharing



II. Main Specifications

Rated power	Input voltage range	Output voltage range	Output current range	Ripple(p-p) (Rated Load, Width Limited 20MHz)
60KW	700-820Vdc	200-750Vdc	0-120A	$\leq \pm 0.5\%V_o$

III. Environmental Conditions

No.	Items	Technical Specifications	Unit	Remarks
1	Operating Temperature	-40 - +65	°C	+50~ +65°C derating 20% in linearity.
2	Storage Temperature	-40 - +70	°C	
3	Relative Humidity	Operation	≤ 90	
		Storage	≤ 95	
4	Altitude	≤ 3000	m	It should be derated used according to the rules of GB/T 3859.2 when it exceeds 3000m.
5	Cooling	Forced cooling, draws air from the front and exhausts heat from the behind and this module has a temperature-sensing timing function.		

Remarks: when the temperature reaches 50°C - 60°C, the module power will de-rate in auto-linear mode.

IV. Electrical Characteristics

1. Input Characteristics				
No.	Item	Technical Requirement	Unit	Remark
1.1	Rated input voltage	800	Vdc	
	DC Input voltage range	700-820		
1.2	Power De-rate Point	500	Vdc	500VDC~680VDC, 60kW 680VDC~750VDC, 50kW 360VDC~500VDC, 120A 200VDC~360VDC, 100A
1.3	Max Input current	< 89	A	

1.4	Input inrush current	Not exceeding the Max. stable 150% of input peak current	-		
2. Output Characteristics					
2.1	Output voltage range adjustable	200-750	Vdc	Can be adjustable by monitor (testing condition: half load)	
2.2	Rated output voltage	500	Vdc	Rated input.	
2.3	Output current range	0~120	A		
2.4	Overall efficiency	≥97	%	Rated input, output half load	
2.5	Output noise and ripple	≤±0.5%Vo	mVp-p	Width 20MHz. Parallel with 10u+104 Capacitor	
2.6	Soft-start time	3-10	S	Rated input voltage starting up till output voltage rise to 380V	
2.7	Modulation factor	≤±5	%		
2.8	Dynamic response	Overshoot range	ΔV : ≤±5	%	25%-50%-25% or 50%-75%-50% load change, change rate 0.1A/us variable period 4ms
		Recovery time	Δt: ≤200	μS	
2.9	voltage stabilization	≤±0.5	%		
2.10	Line regulation	≤±0.1	%		
2.11	Load regulation	≤±0.5	%		
2.12	Current sharing imbalance	≤±5	%	50-100% Load	
2.13	Input current harmonic	≤5	%	Rated input and load.	
2.14	Temperature coefficient	≤±0.02	%/°C		
3. Protection Characteristics					
3.1	Input under voltage protection point	680±5	Vdc	Can be auto recoverable, test with 5A load.	
3.2	Input under voltage recovery point	700±5	Vdc		
3.3	Input over voltage protection	850±5	Vdc		
3.4	Input over voltage recovery point	820±5	Vdc		
3.5	Input over current protection	95±5	A		
3.6	Output over voltage protection point	780±5	Vdc		
3.7	Output over current protection point	130±5	A		
3.8	Short circuit protection	Endure long time short circuit without damage and auto recover.			
3.9	Over temperature protection	> 65	°C	Auto-recoverable when temperature is less than 65°C	

V. Other Requirement

No.	Item	Requirement	Remark
1	Acoustics Noise	≤55dB	A-weighted. test distance is 1 meter
2	Odour Noise	Does no generate peculiar or unhealthy smell	
3	Failure isolation	The rectifier module can be separated from the system after its failure.	
4	Environmental requirement	Meet 2002/95/EC ;	
5	Three-Proofing requirement	The power supply should be three proofs to prevent the module vulcanization failure	

VI. Safety & EMC

No.	Item	Criteria	Remark	
1	Dialectical strength	Input-output	3535Vdc/30mA/ 1min	No flashover, no breakdown.
		Input-ground	3535Vdc/30mA/ 1min	
		Output-ground	2121Vdc/30mA/ 1min	
2	Isolation resistance	Input-output	≥10MΩ@500Vdc	Under normal air pressure, humidity 90%
		Input-ground	≥10MΩ@500Vdc	
		Output-ground	≥10MΩ@500Vdc	

Performance criterion:

Criterion A: Performance is normal when meet the technical requirements.

Criterion B (DIP test criterion): The performance that can recover automatically when function degrade or lost temporarily.

Criterion B (other test criterion except DIP): The performance that can recover automatically when function degrade or lost temporarily, but in the test, the output voltage must be kept in normal range.

Criterion C: auto-recover for short time function interruption allowable, long time of function interruption and recovery by hand script unallowable.

Criterion R: Any components damage except protection components unallowable, the testing pieces' performance can recover when replaces the damaged protection components.

VII. Logical function and signal

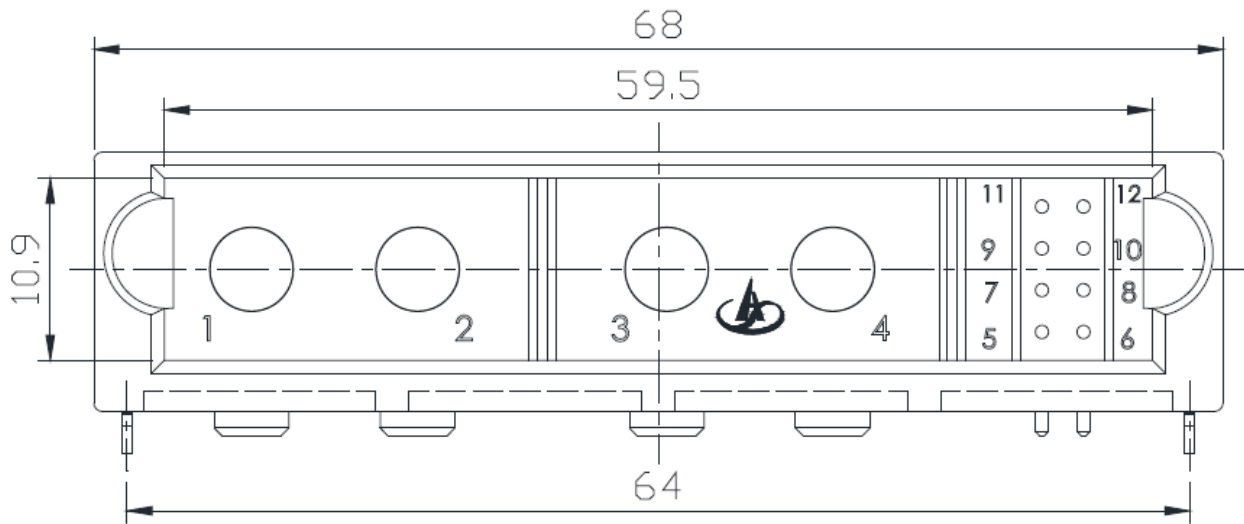
NO.	Item	Description
1	Operate (Green)	The indicator light is green if the module works normally
2	Alarm (Yellow)	If input over/under voltage, input derating, temperature derating, output short circuit and internal PS abnormal, the yellow light will be on.
3	Fault (Red)	Output over current, over voltage, OVT, fan fault and internal PS fault, the red light will be on.

VIII. Mechanical Characteristics and Connector Definition

1. Module Dimensions (mm) L*W*H=490mm×360mm×125 mm



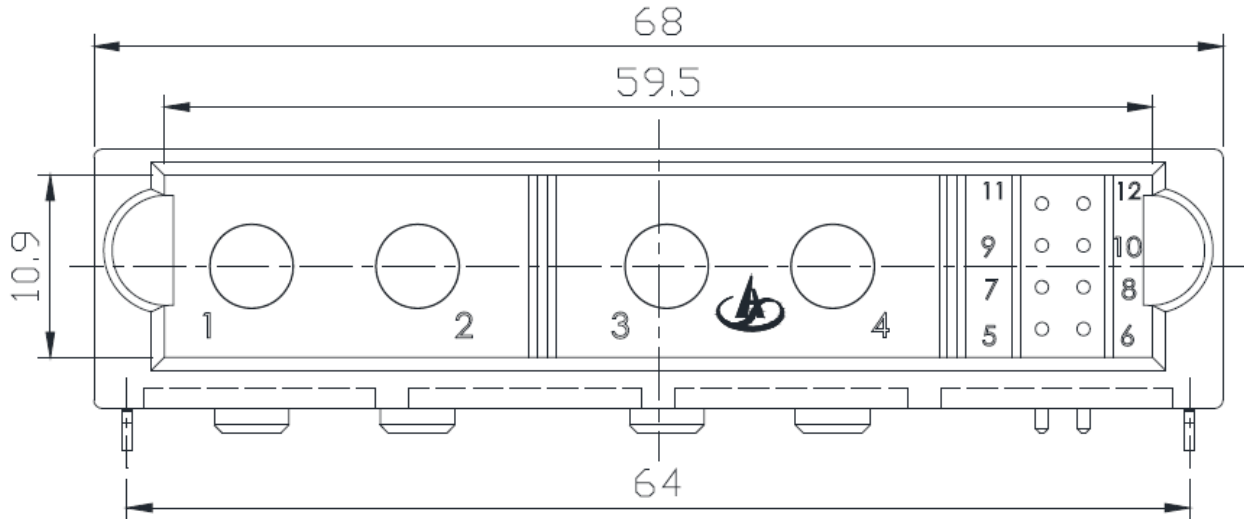
2. Input Connector PIN definition



connector 4

Connector 4	1	OUT+	PSU input positive
	2		
	3	OUT-	PSU input negative
	4		
	5	CAN-L	PSU communication wire
	6		
	7	CAN-H	PSU communication wire
	8		
	9/10	NC	
	11	NC	
	12	NC	

3. Output Connector PIN definition



Connector 5

connector 5	1	OUT+	PSU output positive
	2		
	3	OUT-	PSU output negative
	4		
	5	24V+	Auxiliary power supply
	6		
	7	24V-	
	8		
	9/10	NC	
	11	NC	
	12	NC	

4. Others

No.	Item	Criteria	Remark
1	Placement	horizontal	
2	Connection to ground	Through case, front plane, consolidate screw and rack.	
3	Weight	<25Kg	

IX. Reliability requirement

MTBF ≥ 50Khour; test condition: 25°C, rated input, full load output. MTBF ≥ 50Khour

X. Package, Transportation & Storage

Package

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

Transportation

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

Storage

Products should be stored in package box when it is not used. And warehouse temperature should be -40°C-85°C with relative humidity 10%-90%. In the warehouse, there should not be harmful gas, inflammable, explosive products, corrosive chemical products, or strong mechanical vibration. Shock and strong magnetic field affection not allowed. The package box should at least 20cm height above the ground, and 50cm away from wall, thermal source, or vent. Under this requirement, product has 2 years of storage period, and should be rechecked when over 2 years.

XI. Attention.

Dangerous power output keep a safe distance when in operation!



High Temperature Alarm Label

