**会TDK** 

## **AC Input Conformity to RoHS Directive** Single Output, Long Life, Three-phase Input UL/C-UL Approved

# R Series RKY(1.5kW)

The RKY Series has 200V three-phase input specifications compatible with a large output of 1.5kW. This makes it possible to use high power without having to worry about the current limitations of AC lines. In addition, the size of this series is very compact; 92×120×237mm. These products can now be installed in narrow spaces that previously seemed impossible

### **FEATURES**

- Built-In, wide-range variable output function.
- Approved by safety standards (UL, C-UL). Conforms to the Electrical Appliance and Material Safety Law.
- · Conforms to standards for noise terminal voltage VCCI-A and EN55022-A, for immunity EN61000-4-2, 3, 4, 5, 6, 8, 11 and EN61000-6-2.
- 5-year limited warrantee
- It is a product conforming to RoHS directive.

### **APPLICATIONS**

- · Semiconductor fabrication equipment
- · Communication devices
- Information processing devices

### PART NUMBERS AND RATINGS

Output	1500W		
voltage(V)	Current(A)	Part No.	
24	50	RKY24-50R	
36	42	RKY36-42R	
48	32	RKY48-32R	

• Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

• All specifications are subject to change without notice.





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# RKY1500W Type

#### SPECIFICATIONS AND STANDARDS

Part No.			RKY24-50R	RKY36-42R	RKY48-32R	
Rated output voltage and current*1		24V • 50A	36V • 42A	48V • 32A		
Maximum output power W		W	1200	1512	1536	
Input con	Input conditions					
Input volt	age Eac	V	85 to 265[Bated: 100-240]			
Input freq	uencv	Hz	47 to 66[Rated: 50-60](Three phase	e)		
Input curr	ent	A	4tvp./5max.	5tvp./6max.	5tvp./6max.	
Fuse ratir	מ	A	15[Built-in]	15[Built-in]	15[Built-in]	
Surae cu	rent	A	35max.[AC.200-240V, reset after 30	Os minimum.1		
<u> </u>			1.3max./1.9max.[When operating: A	AC.240V. 60Hz. according to ICE60	990-1 Fig. 13/Without phase: AC.240V.	
Leakage current mA			60Hz, according to IEC60990-1 Fig.13]			
Power fac	tor		0.95typ.			
Efficiency	%	200V	87typ.	88typ.	90typ.	
Output ch	aracteristics					
Output vo	ltage Edc	V	24	36	48	
Voltage v	ariable range Edc	v	16.8 to 31.2 (RV operating: 0 to 31.2)	25.2 to 55.0 (RV operating: 0 to 41.4)	33.6 to 55.0 (RV operating: 0 to 55.2)	
Maximum	n output current	А	50	42	32	
Minimum	output current	Α	0	0	0	
Overvolta	ae threshold	V	32 to 36 4	56 to 60	56 to 60	
	ant threshold	Δ	52 5 to 57 5	44 1 to 48 3	33.6 to 36.8	
Overbuild	Source effect	%	0.2max (0.1tvp.)[Within the input vo		00.0 10 00.0	
	Load effect	0∕_	0.2max(0.2typ)[0 to 100% load]		Total effect+1 6max (+0 8typ)	
Voltage	Tomporature offect	/0 0/	1.0max (0.5tvp.)[0.10.100/81080]	Iro: 10 to (65°C]		
stability	Drift/Time offect)	/0 0/	0.5max.(0.3typ.)[Amblent temperation	tout ratings, after input voltage ON	I for 20min to 8h	
		70 0/	U.SITIAX.(U.Ztyp.)[25 C, Input and ou			
Dinala Er	Recovery	~o	±4/11aX.[50 to 100% sudden load cri	lange, ir, ii $\leq$ 50µsj	000	
	ър	mv	200max.	300max.	300max.	
Ripple no	ise ⊨p-p	mv	300max.	400max.	400max.	
Start up t	me	ms	600max.(400typ.)	600max.(400typ.)	600max.(400typ.)	
Hold up ti	me	ms	14min.(20typ.)	1/min.(24typ.)	12min.(16typ.)	
Maximum	load capacitor	µ⊦	100000	100000	100000	
Auxiliary	functions					
Indicator	display		LED(Green) indicates when voltage	e output is ON.		
Overvolta	ge protection		Voltage shut-down type, recover up	oon reset or RC reset.		
Output lo	w voltage detection		No			
Overcurre	ent protection		Rectangular type, automatic recovery (The output voltage will be cut off after 30 seconds. Recover upon reset).			
Overheat	protection		Voltage shut-down type, recover upon reset.			
Remote C	N-OFF <sup>*2</sup>		Yes			
Remote s	ensina* <sup>3</sup>		Yes			
Parallel o	peration		Possible			
Series on	eration		Possible			
Current b	alance		Yes			
Synchronous operation						
Output vo	ltage external variable fun	ction*4	Yes			
Master sl	ave operation		Yes			
Alarm signal			Yes(Power failure signal)			
Atantarte Standarte						
Safety standards UL60950, CSA C22.2 No.60950(C-UL), EN60950(TÜV) approved, Electrical Appliance and Material Safety						
		Law ("DEIXAIN") (Compliant with creepage surface and air clearance in Attachment 8) meet.				
Noise terminal voltage		FCC-Class A, VCCI-Class A, EN55011-A, EN55022-A meet.				
Immunity		EN61000-4-2, 3, 4, 5, 6, 8, 11, EN61000-6-2 meet.				
Radiation field intensity FCC-Class A, VCCI-Class A, EN55011-A, EN55022-A meet.						
Constructions						
External dimensions mm 92		92×120×237[H×W×L]				
Weight	Neight kg 3.0max.					
Mounting method Can be attached to 3 sides						
Case material			Frame and cover: Iron, circuit board: CEM-3			

\*1 Current rating(maximum output current) is determined for -10 to +65°C. Derating is required when used outside this temperature range or when used with a 100V system.

\*2 Short +RC and –RC when not using Remote control.

 $^{*3}$  Short +S/–S and +/– output terminal when not using variable output voltage.

\*4 Short REV and RV when not using variable output voltage.

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# RKY1500W Type

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### SHAPES AND DIMENSIONS



±1mm : without specified dimensions

• Do not insert M4 tap installation screws more than 6mm into the power supply.



# Characteristics, Functions, and Applications

### **BLOCK DIAGRAM**



#### **COMMON SPECIFICATIONS**

Temperature and hum	nidity			
	Operating(°C)	-10 to +65		
Temperature range	Operating available(°C)	-20 to -10		
	Storage(°C)	-30 to +75		
	Operating(%)RH	10 to 05[Maximum wat hulb tomporature: 25°C, without dowing]		
Tiuriiuity range	Storage(%)RH	To to soliviaximum werbuib temperature. 55 C, without dewing		
Vibration and shock				
Vibration	5 to 10Hz	All amplitude 10mm[3 directions, each 1h, sweep time 10min, non-operation]		
	10 to 200Hz	Acceleration 19.6m/s <sup>2</sup> (2G)[3 directions, each 1h, sweep time 10min, non-operation]		
Chaoli	Acceleration	294m/s <sup>2</sup> (30G)[3 directions, each 3 times, non-operation]		
SHOCK	Pulse duration	11±5ms		
Withstand voltage and	l insulation resistance			
	Input terminal to ground(G)	Eac: 2.0kV, 1min[Normal temperature, normal humidity, cutout current 20mA]		
Withstand voltage	Input terminal to output terminal	Eac: 3.0kV, 1min[Normal temperature, normal humidity, cutout current 20mA]		
	Output terminal to ground(G)	Eac: 500V, 1min[Normal temperature, normal humidity, cutout current 100mA]		
	Input terminal to ground(G)			
Insulation resistance	Input terminal to output terminal	Edc: 500V, 100M $\Omega$ min. [Normal temperature, normal humidity]		
	Output terminal to ground(G)			

### **OUTPUT POWER-AMBIENT TEMPERATURE(DERATINGS)**



• All specifications are subject to change without notice.

# Characteristics, Functions, and Applications

### TERMINAL DESIGNATIONS AND FUNCTIONS



Terminal No.	Designations and functions	
1	AC input terminals(L1, L2, L3)	Connect to AC. 200 to 240V three-phase input line.
2	Frame ground terminal(G)	Connect to earth ground. This is connected to the case.
3	DC output terminals(+, -)	Connect to load.
4	Remote sensing terminals	When a problem occurs based on line drop from the power supply to the load, it is possible to compensate for this using remote sensing. For information about connections, please refer to the section on the remote sensing function.
5	Output voltage reference terminal (REF)	This terminal is for a reference voltage for controlling an output voltage and used for a master-slave operation or when using an output voltage adjustment function. Normally it is shorted with a metal bar to an RV terminal.
6	Output voltage adjustment terminal(RV)	This terminal is used for controlling output voltage from outside.
7	Current balance terminal(CB)	This terminal is used when several power supplies are connected in parallel to connect the respective CB and –S terminals in parallel.
8	Power failure terminal (PF)	These terminals output an open mode signal if an output voltage drops to 60 % or lower of a set voltage. They also output the signal if an output voltage is shut down due to an operation of an error detecting circuit for over output voltage protection, fan alarm overheat protection, or overcurrent protection.
9	Remote ON-OFF terminals(+RC, -RC)	Output is turned ON-OFF by disconnecting-connecting the RC terminals (output ON when open). RC terminals are floating. Normally, ±RC terminals are shorted with a metal bar.
10	Output voltage adjustment trim(V.ADJ)	Adjusts output voltage.
11	Operation indicator LED(Green)	This Green LED becomes indicated when voltage is output.

#### INSTALLATIONS

(1) Standard installation



Front





(2) (Horizontal)



Distance the fan surface at least 50 mm away from other components. And install so as to provide heatoutside air exchange. Make sure not to obstruct the vent on the front panel.

• All specifications are subject to change without notice.

Vent hole

Vent hole

Back

FAN

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# Characteristics, Functions, and Applications

#### OUTPUT VOLTAGE EXTERNAL VARIABLE FUNCTION (RV)

The output voltage setting can be adjusted by attaching an external trimmer or an external voltage to the RV terminal.

When using this function, use a twisted wire or a shielded wire (shield wire for –S) for the wiring from the REF, RV, and –S terminals (A recommended length is 2m max.). Care must be taken to make sure that the wires are not disconnected or miswired.

Voltage model (V)	RV voltage (V)	Output voltage variable range (%)
24	0 to 6.5	0 to 130
36	0 to 5.75	0 to 115
48	0 to 5.75	0 to 115

#### HOW TO USE THE FUNCTION

- Remove a short plate between the REF and RV terminals.
- For adjusting output voltage with external trimmer Rotate V.ADJ full clockwise and connect the external trimmer (5kΩ) to the REF, RV, and –S terminals as shown in the diagram (a) below.
- For adjusting output voltage with external voltage
   As shown in the diagram (b) in the right side, connect the external variable power supply at the + end to the RV terminal and at

   end to the –S terminal.



#### **CURRENT BALANCE (CB TERMINAL)**

This terminal has a monitoring function to control and equalize the output current of power supplies connected in parallel by mutually connecting the respective CB terminals and the –S terminals of each power supply. Voltage almost proportional to the output current can be obtained between the CB and –S terminals.

(1)Conditions for current balance

The variation in output voltage between the respective power supplies cannot exceed 2%

(Highest voltage–lowest voltage) ÷ rated voltage=2% max.

The output current is 20 to 90% of the total output rated current. (2) Uniform performance (for two power supplies)

The variation in output current between the respective power supplies does not exceed 10\%  $\,$ 

(Highest current–lowest current)  $\div$  (rated voltage×the number of power supplies in parallel)=10% max.





Equalize the impedance of the load wires coming from each power supply. Use a twisted wire or a shielded wire for the wiring from CB and –S (shield wire for –S). The maximum four power supplies are connected in parallel.

#### **REMOTE ON-OFF**

Power supply output voltage can be turned on/off externally at the Remote On-Off terminals (+RC, –RC) by activating one of the following signals:

Output voltage is turned off when the level is high between the +RC and –RC terminals (open or external voltage application of 2.4 to 24V: incoming current 1.0mA max.).

Output voltage is turned on when the level is low between the +RC and –RC terminals (short or terminal voltage of 0 to 0.4V: outgoing current 1.6mA max.).

 $\pm$ RC terminals are insulated from AC input terminals and the DC output terminals.

Insulation between the  $\pm$ RC terminals and the output conforms to the common specifications (Output to case). Withstand voltage between AC input terminals and  $\pm$ RC terminals conforms to the common specifications (Input to case).



#### POWER FAILURE SIGNAL

This function delivers a signal when an output voltage drops to 60% or lower of a set voltage (less than 5V for 36V). If the power supply protection function operates, however, an output is shut down and a power failure signal is delivered.

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# Characteristics, Functions, and Applications

#### **OUTPUT FORMAT**

Sink current: 50mA max.

Collector emitter voltage: 40V max.

 $\pm$ P/F terminals are insulated from AC input terminals and the DC output terminals.

Insulation between the  $\pm$ P/F terminals and the output conforms to an insulation resistance for an output to the ground of the common specifications. Insulation between AC input terminals and  $\pm$ P/F terminals conforms to an insulation resistance for an input terminal to an output terminal of the common specifications.



P/F signal

- · High-impedance at error detection
- Maximum collector current: 50mA
- (Collector emitter saturation voltage: 0.4V max.)Maximum collector emitter voltage: 40V

### POWER SUPPLY PROTECTION

Protective function	Operation
OV Output overvoltage protection	Output is shut down and the fan stops upon detec- tion of an abnormal output voltage rise. The output recovers after removing the cause upon setting the remote ON-OFF terminal to a high level and then to a low level or upon an input shutdown and a reset after 40s interval.
UV Output under-voltage protection	Output is shut down when the output voltage drops to 60% or lower of the rated output voltage (36V: approx. 5V) and the condition continues for approx. 20s on over current protection and others. The out- put recovers after removing the cause upon input shutdown and a reset after a 40s minimum interval.
FAN Fan alarm	Output is shut down when the fan rotation stops. The output recovers in the same manner as for the OV in the above. In case of an abnormal fan rotation, the output can- not recover.
TH Overheat protection	Output is shut down and the fan stops when the internal temperature of the power supply rises abnormally. The output recovers upon an input shutdown and a reset after 40s interval. Unless the internal temperature drops, the output cannot recover.

#### **REDUNDANT (N+1) OPERATION**

Connect diodes to output terminals of the power supplies before their redundant operation. Equalize the impedance of the load wires coming from each power supply. Use a twisted wire or a shielded wire for the wiring from CB and –S (shield wire for –S). The maximum four power supplies are connected in parallel.



#### MASTER SLAVE FUNCTION

A use of the REF terminal and RV terminal enables the master slave operation. Connect the REF terminal of a power supply selected as a master, the RV terminals of slave power supplies, and respective –S terminals as shown in the diagram below. Then, output voltages of all the power supplies can be simultaneously adjusted with following V.ADJ of the master power supply. The maximum four power supplies are connected in parallel.

· For two or more output loads

Use a twisted wire or a shielded wire for the wiring from RV and -S (shield wire for -S).



#### • For a single output load

Equalize the impedance of the load wires coming from each power supply. Use a twisted wire or a shielded wire for the wiring from RV and -S (shield wire for -S).



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# Characteristics, Functions, and Applications

### INSULATION AND WITHSTAND VOLTAGE TESTS

The insulation and withstand voltage tests may cause deterioration. Care must be taken for execution of the tests. The potential must be equal among input, output, and FG (frame ground) terminals.

It is preferable to use testers which gently start up at the test-ON and automatically discharge charging energy at the test-OFF. Manual discharging after the tests should be through a resistor around 100k $\Omega$  to 1M $\Omega$ . (Do not perform discharging at low impedance. It may cause deterioration.)

In any case, take full countermeasures for electric-shock prevention.

# POWER SUPPLY TERMINAL CONNECTION AT INSULATION AND WITHSTAND VOLTAGE TESTS

Short output or input terminals.



# CONNECTIONS BETWEEN TESTERS AND POWER SUPPLY AT INSULATION AND WITHSTAND VOLTAGE TESTS

For connections between the testers and the power supply body, couple the tester terminals at the corresponding locations listed below before executing the tests.

-	VACIE at a second second		luce define texter	
Test conditions	withstand voltage tester		Insulation tester	
1631 CONULIONS	+ terminal	-terminal	+ terminal	-terminal
Input-to-output	1	3		
withstand voltage	1	3	_	_
Input-to-FG	4	0		
withstand voltage	I	2	_	_
Output-to-FG	0	0		
withstand voltage	3	2	_	
Input-to-FG			4	0
insulation	_	_	I	2
Input-to-output		_	1	2
insulation	_			3
Output-to-FG			2	0
insulation	_	_	3	2

#### PRECAUTIONS

- When using this unit, make sure that the ambient temperature of the power supply is within the operating temperature range. The "ambient temperature of the power supply" refers to the temperature near the power supply inside the device in which the unit is installed.
- Install space at least 10 mm away from other components on sides.
- Make sure to choose input/output wiring and noise filters that can safely accommodate their respective current capacities.
- If the power supply is not used for extended periods of time, we recommend that you apply input voltage for about one hour every two years to maintain the capacitor's performance.
- When power supplies are used serially, the rated current will be limited by the power supply with the lowest rated current. Also make sure to connect a reverse voltage protection diode (Withstand voltage: twice that of the combined output voltage. Forward current: twice that of the output current. Forward voltage drop: as small as possible) to prevent damage to the interior components caused by reverse voltage.
- The materials used in these products are free of designated bromine flameproof materials (PBDPEs and PBBs).
- Specific ODS has not been used in the production of these products.