



RK-23/048RD100-7200

SPECIFICATION



SCOPE

This functional specification defines the performance characteristics of the switching mode regulated power supply, and also defines world wide safety requirements and manufacturer's process test requirements.

This supply is used for telecommunication system and has paralleling capability to accommodate N identical power supplies in parallel , one for redundancy . It's maximum power output is 6000W .

1. INPUT REQUIREMENTS

1.1 VOLTAGE (SINUSOIDAL)

The power supply can accept the following input power:

INPUT VOLTAGE RANGE	STARTING VOLTAGE	MINIMUM VOLTAGE	NORMAL VOLTAGE	MAXIMUM VOLTAGE	MAXIMUM INPUT CURRENT
3 ϕ W 267-495VAC	208VAC	156VAC	380VAC	520VAC	16ARMS
3 ϕ 4W 154-286VAC	120VAC	90VAC	220VAC	300VAC	27ARMS





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The input frequency range is from 45HZ to 65 HZ.

Note: Under the starting voltage condition, the power supply can't have full load output. The other condition can have full load output.

1.2 POWER LINE DISTURBANCE REQUIREMENTS

The power supply can maintain regulation with the following disturbances in input AC line voltage:

- (1) AC line input under voltage of 30% below the normal nominal input voltage, applied for four seconds, repeated ten times with a 10% duty cycle.
- (2) AC line input over voltage of 30% above the normal nominal input voltage, applied for four seconds, repeated ten times with a 10% duty cycle.

1.3 INPUT OVERCURRENT PROTECTION

The supply has internal primary over current protection. This protection component is a three-phase AC Breaker, which maximum current capacity is thirty Amperes. If any component on the line side of the breaker is shorted or opened , it may not cause a fire or any other safety risk . The breaker has approved by UL, CSA, and

TUV.

1.3 INRUSH CURRENT

All of the AC line the peak inrush does not exceed 50A . All internal components (including the AC Breaker , bulk rectifiers and surge limiting device) are able to withstand the surge current without damage .

1.4 POWER SUPPLY EFFICIENCY

The power supply efficiency is at least 90% at normal input voltage, full load and temperature 25 °C

1.5 INPUT CONNECTOR AND WIRING

The AC input connector rated at 27Amp or greater . All internal AC wiring is 16 AWG or larger .

1.6 POWER FACTOR CORRECTION AND HARMONIC DISTORTION

The power supply , with normal nominal AC input voltage and full load , the power factor correction is at least 0.98 . The power supply does also meet the input current distortion standard .



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**1.7 AC INPUT SWITCH**

AC input switch: ○ on , ● off.

2. OUTPUT REQUIREMENTS**2.1 REGULATION AND RIPPLE**

The regulation and ripple noise as follow :

VOLT		LOAD	EQ MODE			FLOATING MODE		
3 ϕ 5W	3 ϕ 4W		REG	RIPPLE	NOISE (P-P)	REG	RIPPLE	NOISE (P-P)
267VAC	154VAC	0A ~ 105A	55V \pm 0.5%	10mv	100mv	54V \pm 0.5%	10mv	100mv
380VAC	220VAC	0A ~ 105A	55V \pm 0.5%	10mv	100mv	54V \pm 0.5%	10mv	100mv
495VAC	286VAC	0A ~ 105A	55V \pm 0.5%	10mv	100mv	54V \pm 0.5%	10mv	100mv

2.2 DISPLAY REGULATION

EITEM	MODE	DESCTIPTION	REGULATION
1	Voltage : 54.0V	Real Voltage	
2	Current : 0.2A	Real Current	
3	Temp: 25°C	Real Temp	
4	Mode : FLT	Display / Setup mode Default : FLT	Mode : FLT / EQ / OFF
5	Address : 00	Display / Setup Address Default : 00	Address : 00 ~ 30
6	FLT Voltage : 54.0V	Display / Setup FLT Default : 54.0V	FLT Voltage : 40V ~ 60V
7	EQ Voltage : 55.0V	Display / Setup EQ Default : 55.0V	EQ Voltage : 40V ~ 60V
8	Current Limit : 108.0A	Display / Setup Current Default : 108.0A	Current limit : 21A ~ 115.5A
9	Temp Limit: 90°C	Display / Setup TEMP Default: 90°C	Temp limit: 20°C ~ 90°C
10	Voltage Max : 58V	Display / SETUP Voltage Default : 58.0V	Voltage min : 50V ~ 60V
11	Voltage Min : 50V	Display / SETUP Voltage Default : 50.0V	Voltage min : 40 ~ 55V





12	Display mode : ENG	Display / SETUP Disp Default : ENG	Mode: ENG / Chinese
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2.3 PARALLELING ON OUTPUTS

The power supply has the capability of current sharing with multiple other powers supplies . It also has designed to minimize the mismatch of output current and balance the current in parallel power supplies within 5% .

2.4 OUTPUT POWER CONNECTORS

The following tables detail the DC output connector requirements :

PIN	Definition	Color	AWG	PIN	Definition	Color	AWG
1	AC IN PHASE R	RED	14	20			
2	AC IN PHASE S	WHITE	14	21			
3	AC IN PHASE T	BLUE	14	22	AC OK	GRAY	24
4				23	ALM / AC OK	GREEN	24
5				24	SHARE BUS	BROWN	22
6	NEUTRAL	GREEN	14	25			
7				26			
8	EMI F.G	YELLOW / GREEN	16	27			
9	CHASSIS F.G	YELLOW / GREEN	16	28	-48V BAT	RED	22
10	RS485 T-	YELLOW	24	29	-48VS	ORANGE	22
11	RS485 R-	ORANGE	24	30			
12				31	RTN2	BLUE/GREEN	22
13				32			
14				33			
15				34	-48V	BLACK	8
16	RS485 R+	BLUE	24	35	-48V	BLACK	8
17	RS485 T+	WHITE	24	36	0V	RED	8
18	ALM	PURPLE	24	37	0V	RED	8
19				38			

Note: 1. The connector type is ELCON 262-0006-01100.

2. - 48VS means the - 48V sensing





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2.5 DC output switch: on , off.

When the DC switch off, the LCD display will show a “DC” signal.

3. SECONDARY PROTECTION

3.1 OVERVOLTAGE PROTECTION (OVP)

When the rectifier is abnormal operation and its output voltage is higher and higher by itself, the rectifier shall be shut down and latched as soon as the output voltage attaches the voltage what is $60\pm 0.5VDC$. The supply cannot restart automatically, unless the fault has moved and AC in reset.

3.2 OVERCURRENT AND SHORT CIRCUIT LIMITATION (OCL)

The over current's range is from 21A to 115.5A, it's adjustable. When the supply is in over current condition, it is entering into constant current mode.

3.3 OVER TEMPERATURE PROTECTION (OTP)

When the temperature of heat sink rises over $85\pm 3^{\circ}C$, the supply shall be shut down, until the temperature cools down to restart point $70\pm 3^{\circ}C$. The supply can restart automatically. The temperature detected circuits have a minimum of $20^{\circ}C$ esterase.

3.4 FAN FAULTS

The fan faults detected circuit is designed to dependent on the HIGH TEMPERATURE PROTECTION circuit. When the fan is fault and cannot be operated normally, it shall cause the supply for higher temperature, then, drives the HIGH TEMPERATURE PROTECTION circuit.

3.5 RESET AFTER SHUTDOWN

If the supply latches into shutdown due to a fault condition, it shall return to normal operation only after the fault has been removed and the supply is reset. Reset can be accomplished by pushing the AC switch button from on-to-off-to on. The duration of “**off**” time necessary to reset the power supply must be longer than 100 seconds.

4. SIGNAL REQUIREMENTS

4.1 LCD DISPLAY

4.1.1 This supply has a LCD display, there are 12 display modes and 9 set up modes



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among them. SEE SECTION 3.2 DISPLAY REGULATION. All mode selections can be chosen through its own keypad or the RS485 bus.

4.1.2 Each LCD display of supply in system will be on, even the supply is failing.

4.2 LED MEANING

4.2.1 AC OK LED

The AC OK LED indicates the function of the supply's primary side whether is normal or not. When it lights GREEN, it means normally.

4.2.2 ALARM LED

When any of failure in the supply as following occurs, the ALARM LED will light RED.

4.2.2.1 LVA (LOW VOLTAGE ALARM)

When output voltage is lower than 48V (adjustable), the ALARM LED lights RED and alarm signal will be transferred through RS485 Bus to HCU.

4.2.2.2 HVA (HIGH VOLTAGE ALARM)

When output voltage is upper than 58V (adjustable), the ALARM LED lights RED and alarm signal will be transferred through RS485 to HCU.

4.2.2.3 OVP (OVER VOLTAGE PROTECTION)

Referring to SECTION 4.1. When OVP occurs, the ALARM LED lights RED and alarm signal will be transferred through RS485 to HCU.

4.2.2.4 OTP (OVER TEMPERATURE PROTECTION)

Referring to SECTION 4.3. When OTP occurs, the ALARM LED lights RED and alarm signal will be transferred through RS485 to HCU.

4.2.2.5 OCL (OVER CURRENT LIMITATION)

Referring to SECTION 4.2. When OCL occurs, the ALARM LED lights RED and alarm signal will be transferred through RS485 to HCU.

4.2.2.6 DC SWITCH

Referring to SECTION 3.5. When the DC SWITCH is " OFF ", the ALARM LED lights RED and alarm signal will be transferred through RS485 to HCU.

4.2.2.7 DC ON / OFF

When the supply receives the " DC OFF " signal from the HCU, it





will be shut down and the ALARM LED lights RED.

5. NOISE

5.1 WIDE BAND NOISE REPPLE

The wide band noise (10K ~ 100MHZ) is less than 5mV.

5.2 NARROW BAND NOISE RIPPLE

Measuring the narrow band noise with the network analysis meter or spectrum Meter. There are four stages as follow:

- (1) 3.4KHZ ~ 150KHZ: The noise is less than 5mV (-44dB)
- (2) 150KHZ ~ 200KHZ: The noise is less than 3mV (-48dB)
- (3) 200KHZ ~ 500KHZ: The noise is less than 2mV (-52dB)
- (4) 500KHZ ~ 30MHZ: The noise is less than 1mV (-58dB)

5.3 PSOPHOMETRIC NOISE

Measuring the sophomoric noise with HP 3555B transmission and noise meter. The noise level is less than 2mV (-52dB).

5.4 PEAK TO PEAK NOISE

The peak-to-peak noise is less than 100mV as specified in SECTION 3.1.

Measuring the peak-to-peak noise, the output terminal must be paralleled with low pass filter.

5.5 AUDIBLE NOISE

The audible noise is measured less than 45 dBA with 1 meter away from the supply.

6. TIMING

6.1 TURN ON DELAY

The supply has TURN – ON DELAY at least 16 seconds.

6.2 HOLD UP TIME

After AC line TURN – OFF, the supply can maintain output voltage in regulation at least 3 mini-seconds.

7. ELECTROMAGNETIC COMPATIBILITY

7.1 VDE

The supply can comply to VDE “ class B “ for GOP requirements.





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8. SAFETY

8.1 STANDARDS

The supply obtained certification according to IEC 950, UL, CSA. And TUV, for the nominal input voltage ranges, specified in SECTION 3.1.

8.2 AC / DC BREAKERS

AC / DC BREAKERS meet “ high break current “ requirements of UL, CSA and TUV.

8.3 GROUND LEAKAGE CURRENT

The ground leakage current of the supply is less than 5 milliamps. The measurement is performed with AC input at 3 ϕ 5 W 430VAC or 3 ϕ 4W 250VAC, 60HZ.

9. ENVIROMENT

9.1 OPERATING

The supply can operate well from -5°C to +45°C and relative humidity from 10%RH (Non-condensing environment).

9.2 STARTING

The starting temperature range of the supply is from 0°C to +45°C.

9.3 STORAGE & SHIPPING

The environment temperature range of STORAGE & SHIPPING is form -20°C to +80°C.

9.4 ALTITUDE

The supply can operate well at the altitude of 3000 meters (9836 feet).

9.5 COOLING

The supply provides forced air-cooling for the host system.

10. RELIABILITY

10.1 FAILURE RATE

The failure rate is maintained throughout the operational life and less than 0.5% per



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1000 hours. It is measured with underling condition: 220VAC, sea level, and 35°C ambient temperature and full load as specification SECTION 3.1.

10.2 M.T.B.F.

The supply can maintain a minimum life of 100,000 POH (Power –On Hours) over a period of ten years operating in the environment described of SECTION 10.0.

10.3 AC CYCLES

The supply can withstand a minimum of 1,000 times of AC power cycles of any nominal input line volts without failure rate degradation. The supply also can withstand a minimum of 2,000 times for remote DC ON / OFF cycles of nominal input line volts.

11. PRODUCTION TESTING

11.1 BURN IN

Each supply must be cycled as 15 minutes “ ON “ 15 minutes “ OFF “ for 24 hours, full load and normal line, at ambient 45°C. The burn – in room must be controlled to 45°C ±5°C temperature. The thermal protection must be checked first, in advance, the burn – in test. The fastest approach is to lock out fan for 0.5 hour then checking whether alarm led lights red or not. Lighting red is good and no lighting is fault.

11.2 HI-POT

The supply must be tested by 50HZ 1.5KVAC between output connector pin1, 3,4, 5 and chassis, and 50HZ 500VAC between all secondary (pin34, 35, pin36, 37) and chassis for 1 minute at final assembly stage, the leakage current is less than 30mA.

11.3 GROUND CONTINUITY

The continuity must be measured less than 0.1 ohms between pin31 and chassis at final assembly stage. The testing time must be longer than 5 seconds without any damage.

11.4 SHOCK & VIBRATION

The acceptance criterion for the shock & vibration test shall meet all electrical and chancel requirements with no internal damage.

11.4.1 OPERATION VIBRATION LEVELS:



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5 ~ 17HZ 0.048 inch bauble amplitude displacement.

17 ~ 199HZ 0.73GS acceleration.

200 ~ 500HZ 0.33GS acceleration.

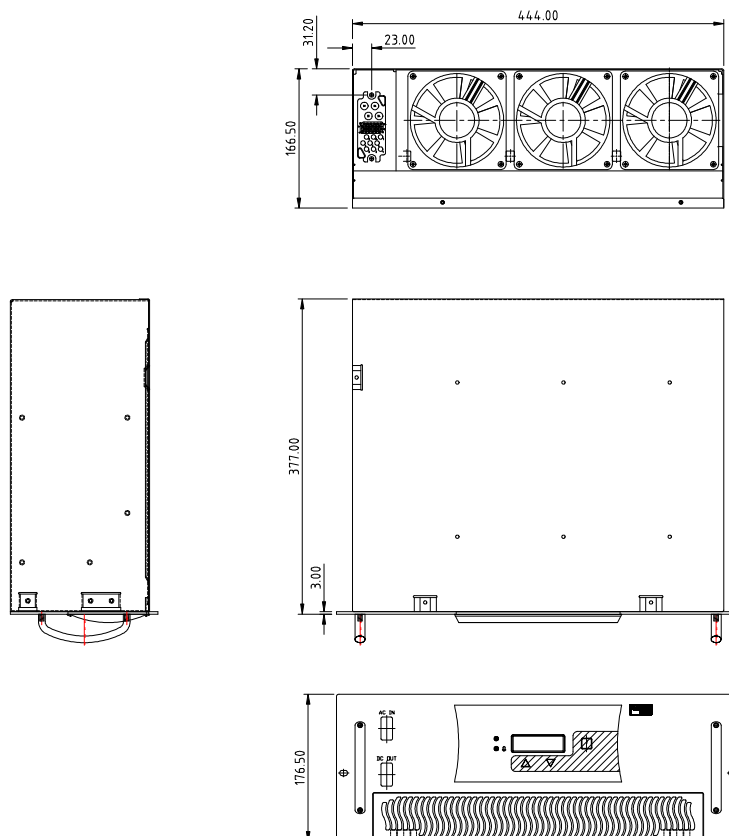
Frequency to be swept at a rate of 0.067 decades / minute (4 decades / hour). well at resonant frequencies for 30 minutes. This test shall be conducted on all three axes of rectifier.

11.4.2 SHOCK NON – OPERATION

The supply shall be subjected to a series of 6 shocks, 1 on each side, top and bottom. Each shock shall consist of a 2 G square wave pulse with a Velocity change of 167 in / sec.

12. DOCUMENT

12.1 MECHANICAL DRAWING



12.2 OUTPUT CONNECTOR DEFINITION

Referring to SECTION 3.4.



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