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HIGH QUALITY SWITCHING POWER SUPPLIES

MD-2/0-48RD50-980120

SPECIFICATION



1. Scope

This specification describes the functional tests of the switch mode rectifier . Which is used for telecommunication system and paralleled more than 12 units to support much high current applications .

2. Function test procedure

2.1 Regulation and ripple

2.1.1. Line load conditions :

Ac input normal line at 200 ~ 240VAC , tolerance \pm 20% the frequency range from 45HZ to 65HZ . The output load minimum at 0A & maximum at 50A .

2.1.2. Regulation & ripple :

The regulation & ripple noise as follow :



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Volts Load		EQ Mode			Floating Mode		
		REG	Ripple	Noise(p – p)	REG	Ripple	Noise(p – p)
180V	0A / 50A	55V ± 0.5%	10mV	100mV	54V ± 0.5%	10mV	100mV
220V	0A / 50A	55V ± 0.5%	10mV	100mV	54V ± 0.5%	10mV	100mV
264V	0A / 50A	55V ± 0.5%	10mV	100mV	54V ± 0.5%	10mV	100mV

2.1.3. Display Regulation :

Item	Mode	Description	Regulation
1	V _{DC} : 54.0V	Real output voltage	
2	I _{DC} : 0.21A	Real output current	
3	Temp : 28.1°C	Real inter temperature	
4	R _{ECT} : FLT	Display / setup mode : FLT	Mode : FLT / EQ / OFF
5	A _{DDR} : 00 ~ 60	Display / setup address : 00	Address : 00 ~ 60
6	V _{FLT} : 54.0V	Display / setup FLT Voltage : 54V	FLT Voltage : 40V ~ 60V adjustable
7	V _{EQ} : 55.0V	Display / setup EQ Voltage : 55V	EQ Voltage : 40V ~ 60V adjustable
8	I _{OCL} : 50A	Display / setup current limit : 50A	Current limit : 10A ~ 55A adjustable
9	T _{OTL} : 90°C	Display / setup Temp limit alarm : 90°C	Temp Limit : 20°C ~ 90°C adjustable
10	V _{OVL} : 58V	Display / setup voltage Max alarm : 58V	High voltage alarm : 50V ~ 60V adjustable High voltage alarm
11	V _{UVL} : 50V	Display / setup voltage Min alarm : 50V	Low voltage alarm : 40V ~ 55V adjustable
12	D _{ISP} : ENG 1.0	Language mode : English	
13	V _{OVP} : 61.0V	Over voltage protection : 60V	Over voltage protection : 56 ~ 61V adjustable



2.2 Input current measurements

2.2.1. Inrush current

This test should be performed after input AC volts has been OFF for at least 100 seconds to discharge buck capacitors completely . Verify any AC line and full load 50A that the peak inrush current does not exceed the rated input current .

2.2.2. Steady state full load current

Set the input line to 220VAC and loads to 50A . Verify the steady state current does not exceed 16A(RMS) .

2.3 Input Voltage Measurements

2.3.1. AC OVP

To measure what AC voltage the rectifier will be trimmed down during sliding up AC input from 285V to 350V at middle load condition . The OVP result must be within $320V_{ac} \pm 20V$.

2.3.2. AC UVP

To measure what AC voltage the rectifier will be shut down during sliding down AC input from 150Vac to 55Vac at middle load condition . The UVP result must be within $80V_{ac} \pm 20V$.

2.4 Protection Functions

2.4.1. Output OVP

Set the AC input voltage to 220Vac the load to 5% , display mode V_{FLT} 'S voltage from 54V to 60V , then the rectifier will be shut down . The OVP result must be $60 \pm 0.5V$.

2.4.2. Over Current Limit

Set AC line to 220Vac and constant R load 1.08Ω , then measuring output current within $50 \pm 0.5A$.



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2.4.3. High Temperature protection

When the temperature of heat sink rises over 90°C , the rectifier will be shut down and indicate alarm LED ON until the temperature cools down to restart point .

2.5 Power Factor Measurements

Set AC line to 220Vac , set load to 50A . The power factor shall be at least 0.98 .

2.6 Efficiency Measurements

Set AC line to 220Vac , set load to 50A . The Efficiency shall be at least 90% , at temperature 25°C .

2.7 Wide Band Noise

The wide band noise should be less than 5mV .

2.8 Narrow Band Noise

Measurement the narrow band noise using network analysis meter or spectrum meter .

They are four stages as follow :

- (1) 3.4KHz ~ 150KHz . The noise should be less than 5mV(-44dB)
- (2) 150KHz ~ 200KHz . The noise should be less than 3mV(-48dB)
- (3) 200KHz ~ 500KHz . The noise should be less than 2mV(-52dB)
- (4) 500KHz ~ 30MHz . The noise should be less than 1mV(-58dB)

2.9 Sophomoric noise

This sophomoric noise measure, with HP 3555B transmission and noise meter. The noise level should be less than 2mV(-52dB) .

2.10 The peak to peak noise shall be less than 100mV . The output terminal must be paralleled low pass filter as specified in section 2.1.2 .

2.11 Fan Lock

When Fan is locked or unplug – in , then the power supply would be turned off and the alarm signal would transmit to HCU .



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3. Diagnostic test procedure

3.1 LCD Display

3.1.1. This rectifier has a LCD display , there are 13 display modes and 10 set up modes among them . All mode selections can be chosen through it's own key pad or the 485 bus .

3.1.2. Each LCD display in system will be working forever , even the rectifier itself fails .

3.2 LED Test

3.2.1. AC OK :

The AC OK indicates the AC line and the rectifier are ok .

3.2.2. ALARM :

3.2.2.1 When any of failure in the rectifier occurs , the alarm LED will be light ON .

3.2.2.2 LVA :

When output voltage lower than 50V (Adjustable) , alarm LED light on and alarm signal will be transformed through 485 bus to HCU .

3.2.2.3 HVA :

When output voltage upper than 58V (Adjustable) , alarm led light on and alarm signal transfer to HCU .

3.2.2.4 OVP :

When output voltage rises over $60\pm 0.5V$, the rectifier will shut down and show alarm led on till ac restart .

3.2.2.5 OTP :

Refer to section 2.4.3 . If heat sink's temperature rises over $90^{\circ}C$, the alarm – led light and the rectifier off .



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3.3 Turn on delay

The rectifier must have TURN – ON delay at least 10 seconds .

3.4 Hold up time

After AC line TURN – OFF , the output voltage shall last V_{out} in regulation at least 3 minutes – seconds .

3.5 Walk In

The rectifier must have Walk – in time at least 3 seconds .

4. Power Line Disturbance

4.1 Lighting test

The rectifier shall sustain no damage when subjected three positive and three negative surges , applied between phase and neutral . The surges shall have a peak amplitude of 3000 volts with 1.6 microseconds rise time(T_r) from 10% to 90% , and decay time(T_f) of 10 (+5 , -0) microseconds from the start of the disturbance to the 50% point on the falling edge of the disturbance , the pulse width between 10% points shall not exceed 60 microseconds . The surge generator shall have an output impedance of 2 (± 0.5) ohm .

4.2 Over / Under Voltage

The rectifier shall meet the regulation and ripple requirement of section 2.1.2 under the following conditions :

- (1) AC line input under voltage of 30% below the 220VAC for four (4) seconds , repeated ten (10) times with a 10% duty cycle .
- (2) AC line input OVER / UNDER volts of 30% above the 220VAC for four (4) seconds , repeated ten times with a 10% duty cycle .
- (3) AC line input OVER / UNDER volts of 35% for 3 seconds shall cause no damage to the rectifier .

5. Electromagnetic Compatibility

5.1 VDE

The rectifier shall conform to the class “B” requirements of VDE VFG 243 / 1991 .



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6. Safety

6.1 Standards

The rectifier shall provide the required production against shock and act as fire enclosure .

6.1.1. IEC 950

6.1.2. UL

6.1.3. CSA

6.2 Fuse

Fuse links shall meet 'high break' current requirements of IEC – 127 – 3 .

6.3 Ground leakage

The rectifier ground leakage current shall not exceed 5.0 milliamps , and the test is performed at 250Vac , 60Hz .

6.4 Ground continuity

The continuity must be measured less than 0.10HM between PA17 and chassis at final assembly stage . The testing time must be longer than 5 seconds without any damage .

6.5 Hi – pot

The rectifier must be passed 1.5KVAC between PA24~25 and chassis , and 500Vdc between all secondary (PA – 4.5.6.8 , PA – 1.2.3.7) and chassis for 1 minute at final assembly stage , the leakage current is less than 20mA .

7. Environment

7.1 Operating

The rectifier must operate well from -5°C to +45°C and relative humidity from 10%RH ~ 90%RH (non – condensing Environment) .

7.2 Starting

The rectifier shall start up temperature range from 0°C to +45°C .

7.3 Storage & Ship

The rectifier's storage & ship temp is from -20°C to +80°C .

7.4 Altitude

The rectifier must operate well at altitude of 3000 meters (9836 feet).

7.5 Cooling

The rectifier shall provide forced air cooling for the host system .

7.6 Shock & Vibration

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



7.6.1. Operation vibration levels :

5 ~ 17Hz 0.048 inch double amplitude displacement .

17 ~ 199Hz 0.73 Gs acceleration .

200 ~ 500Hz 0.33 Gs acceleration .

Frequency to be swept at a rate of 0.067 decades / minute (4 decades / hour) . D well at resonant frequencies for 30 minute .

This test shall be conducted on all three axes of rectifier .

7.6.2. Shock non – operation

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

7.7 Burn in

Each rectifier must be cycled as 15 minutes ‘ON’ 15 minutes ‘OFF’ for 24 hours. At ambient 45 °C. The burn – in room must be controlled to 45°C ±3°C temperature . The thermal protection must be checked first , in advance , the burn – in test . The testing approach is to lock out fan for 0.5HR then checking whether alarm led ON or OFF . The good will burn – in continuously , the bad take out .

7.8 Audible noise

The acoustic noise must be measured less than 45dBA with 1 meter away from the rectifier .

8. Reliability

8.1 Failure rate

The failure rate shall be defined at 35°C. Ambient temp , sea level , 220Vac , Full load as specification section 2.1 , the failure rate shall be maintained throughout the operational life , the failure rate shall be less than 0.5% per 1000 hours .

8.2 M.T.B.F

The rectifier shall be designed for a minimum life of 100,000 POH (power – on hours) over a period of ten years operating in the environment described of section 10.1 .

8.3 AC Cycles

The rectifier shall be designed to withstand minimum of 1,000 times off AC power cycles of any nominal input line volts without failure rate degradation . The rectifier shall also withstand a minimum of 2,000 times for remote ON / OFF cycles of any nominal input line volts .

9. System Test

The capacity of the rectifier system is determined by the customer requirements . The





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installing capacity is up to 60 units depend on the customers need .

The rectifier can be adopted on three kinds of a system . Which is shown below .

- (1) 3 ϕ 5W 380VAC(\pm 30%)
- (2) 3 ϕ 4W 220VAC(\pm 30%)
- (3) 1 ϕ 3W 220VAC(\pm 30%)

10.1 Share

The rectifiers should be shared one another within \pm 3% tolerance in system operation .

10.2 Sophomoric Noise

The system sophomoric noise shall be same as one's specification in section 2.9, meet 2mV (rms) / -52dB requirements .

10.3 Wide band ripple

The system wide band ripple shall be same as one's specification in section 2.7 .

10.4 Narrow Band Noise

The system narrow band noise shall be same as one's specification in section 2.8 .

10.5 Peak To Peak Noise

The system rectifier peak-to-peak noise shall be same as one's specification.

10.6 Remote ON / OFF

The rectifiers in system are controlled by itself or HCU with 485 bus. Any rectifier in system can be controlled ON / OFF independently .

10.7 Remote EQ / FLT

The EQ / FLT mode of the rectifier in system is chosen by itself or HCU with 485 bus . Each rectifier can be chosen the EQ / FLT mode individually.

10.8 Battery Charge / Discharge Calculated

HCU unit can calculate the capacity of battery in system.

The HCU starts counting the discharging AH which is reflected till AC ON . By one minute when the system voltage is lower than 52V point (ADJ) .

The system HCU will keep discharging AH is equal to reference AH which is set according to the system capacity in advance . If the discharging AH is less than reference AH , the rectifier will be switched to EQ mode . Reversibly , it will be switched back FLT mode .



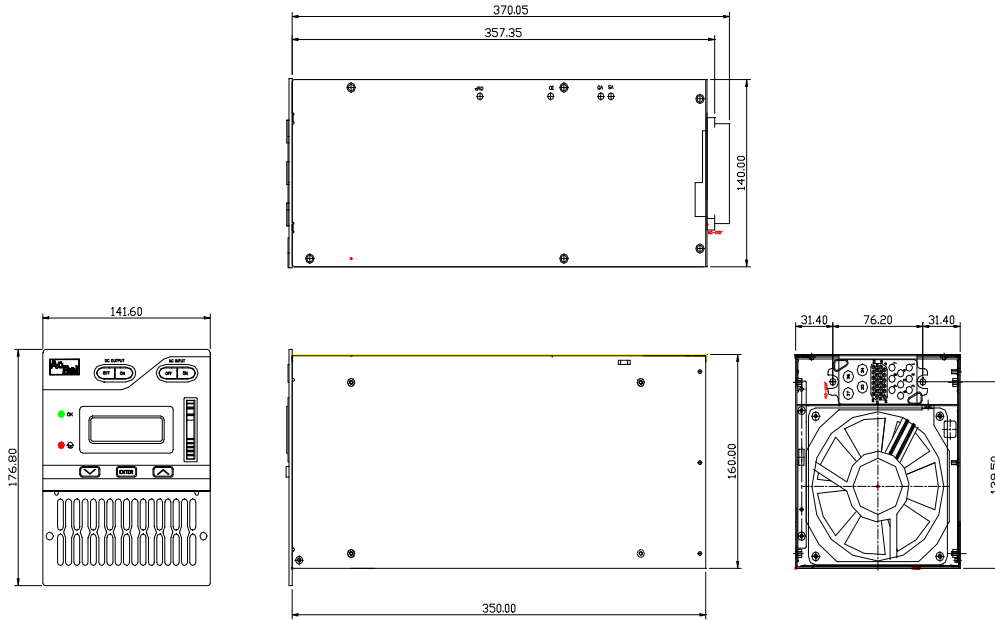
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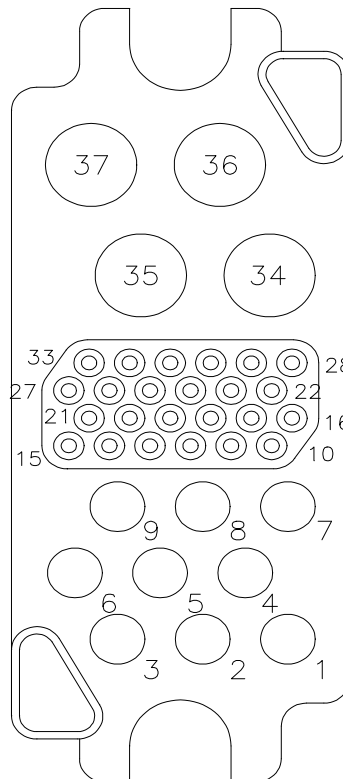
11 Document :

11.1 Mechanical drawing



11.2 Output power connector

The following tables detail the DC output connector requirements :



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PIN	COLOR	DEFINITION	PIN	COLOR	DEFINITION
1	White	AC IN	20	Red	-48VS
2			21	Gray	ALM COM
3	Blue	AC IN	22		
4			23	Black	RTN2
5			24	Purple / Black	RTN2
6			25	Blue	RFA/ALM
7	Yellow	Field Ground	26	Gray	AC OK
8	Yellow / Green	EMI Ground	27	Green	Share Bus
9			28		
10	Yellow	RS485 TXD -	29		
11	Orange	RS485 RXD +	30		
12			31		
13			32		
14			33		
15			34	White	-48V
16	White	RS485 TXD +	35	White	-48V
17	Blue	RS485 RXD +	36	Red	0V
18			37	Red	0V
19	Yellow / Orange	-48V – BATTERY	38		

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