

MD-2/0-48RD35-6035

Specification



1.0 Scope

This specification describes the functional tests of the switch mode rectifier. Which is used for telecommunication system and paralleled more than 15 units to support much high current applications.

2.0 Function test procedure

2.1 Regulation and ripple

2.1.1 Line load conditions:

AC input normal line at 200~240 VAC, tolerance $\pm 20\%$ the frequency range from 45HZ to 65HZ. The output load minimum at 0A & maximum at 35A.

2.1.2 Regulation & ripple:

The regulation & ripple noise as follow:

Volts	Load	EQ Mode			Floating Mode		
		REG	ripple	noise(p-p)	REG	ripple	noise(p-p)
180V	0A/35A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV
220V	0A/35A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV
264V	0A/35A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV

2.1.3 Display Regulation:

ITEM	MODE	DESCRIPTION	REGULATION
1	Voltage : 54.0V	Real Voltage	
2	Current : 0.21A	Real Current	
3	Temp : 28.1°C	Real Temp	
4	Mode : FLT	Display/setup Mode Alarm : FLT	Mode : FLT/EQ/OFF
5	Address : 00 ~ 30	Display/setup Address Alarm : 00	Address : 00 ~ 30
6	FLT Voltage : 54.0V	Display/setup FLT Voltage alarm :54V	FLT Voltage : 40V ~ 60V
7	EQ Voltage : 55.0V	Display/setup EQ	EQ Voltage : 40V ~ 60V



		Voltage alarm :55V	
8	Current Limit : 36.0A	Display/setup Current limit alarm :36A	Current Limit : 7A ~ 38.5A
9	Temp Limit : 90°C	Display/setup Temp limit alarm :90°C	Temp Limit : 20°C~90°C
10	Voltage Max : 58V	Display/setup Voltage Max alarm :58V	Voltage MIN : 50V ~ 60V
11	Voltage Min : 50V	Display/setup Voltage Min Min alarm :50V	Voltage Min : 40V ~ 55V

2.2 Input current measurements

2.2.1 Inrush current

Set the input line to 286VAC and full load 35A. 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 the peak inrush does not exceed 30A.

2.2.2 Steady state full load current

Set the input line to 220VAC and loads to 35A. Verify the steady state current does not exceed 10A(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 320Vac±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 80Vac±20V.

2.4 Protection Functions

2.4.1 Output OVP

Set the AC input Voltage to 220Vac and the load to 5% , to apply a programmable DC source to the output of the rectifier , then increasing up from 55V to 65V per 0.2V step , to check what voltage the rectifier will be shut down. The OVP result must be 60±0.5V:

2.4.2 OVER CURRENT LIMIT

Set AC line to 220Vac and constant R load 1.4Ω. Then measuring output current within 35A±0.5A.

2.4.3 High Temperature protection.

When the temperature of heat sink rises over 90°C , the rectifier will be shunt 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 35A. The power factor corrector shall



be at least 0.98.

2.6 Efficiency Measurements

Set AC line to 220Vac , set load to 35A. 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 2.12.

3.0 Dignostic test procedure

3.1 LCD Display

3.1.1 This rectifier has a LCD display , there are 11 display modes and 8 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.

3.1.3 AC input switch : on , off

3.1.4 DC output switch : on , off

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 48V (Adjustable) ,
alarm LED light on and alarm signal will be transferred through
485 bus to HCU.

3.2.2.3 HVA:

Output Voltage upper than 57V(Adjustable). Alarm led light and
alarm signal transfer to HCU.

3.2.2.4 OVP:

When output rises over 60V , 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°C,
the alarm-led light and the rectifier off.

4.0 Timing

4.1 Turn on delay

The rectifier must has TURN-ON delay at least 10 seconds.

4.2 Hold up time

After AC line TURN-OFF , the output shall last Vout in regulation at least
3 mini-seconds.

5.0 Power line disturbance

5.1 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 3000Volts with 1.6 microseconds rise time(Tr)
from 10% to 90% , and decay time(Tf) 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.

5.2 OVER/UNDER Voltage

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





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(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 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.

6.0 ELECTROMAGNETIC COMPATIBILITY

6.1 VDE

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

7.0 Safety

7.1 Standards

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

7.1.1 IEC 950

7.1.2 UL

7.1.3 CSA

7.2 FUSE

Fuse links shall meet ‘high break’ current requirements of IEC-127-3.

7.3 Ground leakage

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

7.4 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.

7.5 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.



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8.0 Environment

8.1 Operating

The rectifier must operate well from -15°C to +45°C and relative humidity from 10%RH ~ 90%RH(non-condensing Environment).

8.2 Starting

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

8.3 Storage & Ship

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

8.4 Altitude

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

8.5 Cooling

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

8.6 Shock & Vibration

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

8.6.1 Operation vibration levels:

5 ~ 17Hz 0.048 inch double amplitude displacement.

17 ~ 199Hz 0.73Gs acceleration.

200 ~ 500Hz 0.33Gs acceleration.

Frequence 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.

8.6.2 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.

8.7 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.

8.8 Audible noise

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

9.0 Reliability

9.1 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 1000hours.

9.2 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.

9.3 AC cycles

The rectifier shall be designed to withstand minimum of 1,000 times for 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.

10.0 System test

The capacity of the rectifier system is determined by the customer requirements. The installing capacity is up 75 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 $\pm 5\%$ 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 is controlled by itself or HCU with 485bus. 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 485bus. Each rectifier can be chosen the EQ/FLT mode individually.

10.8 Battery charge/Discharge calculated.

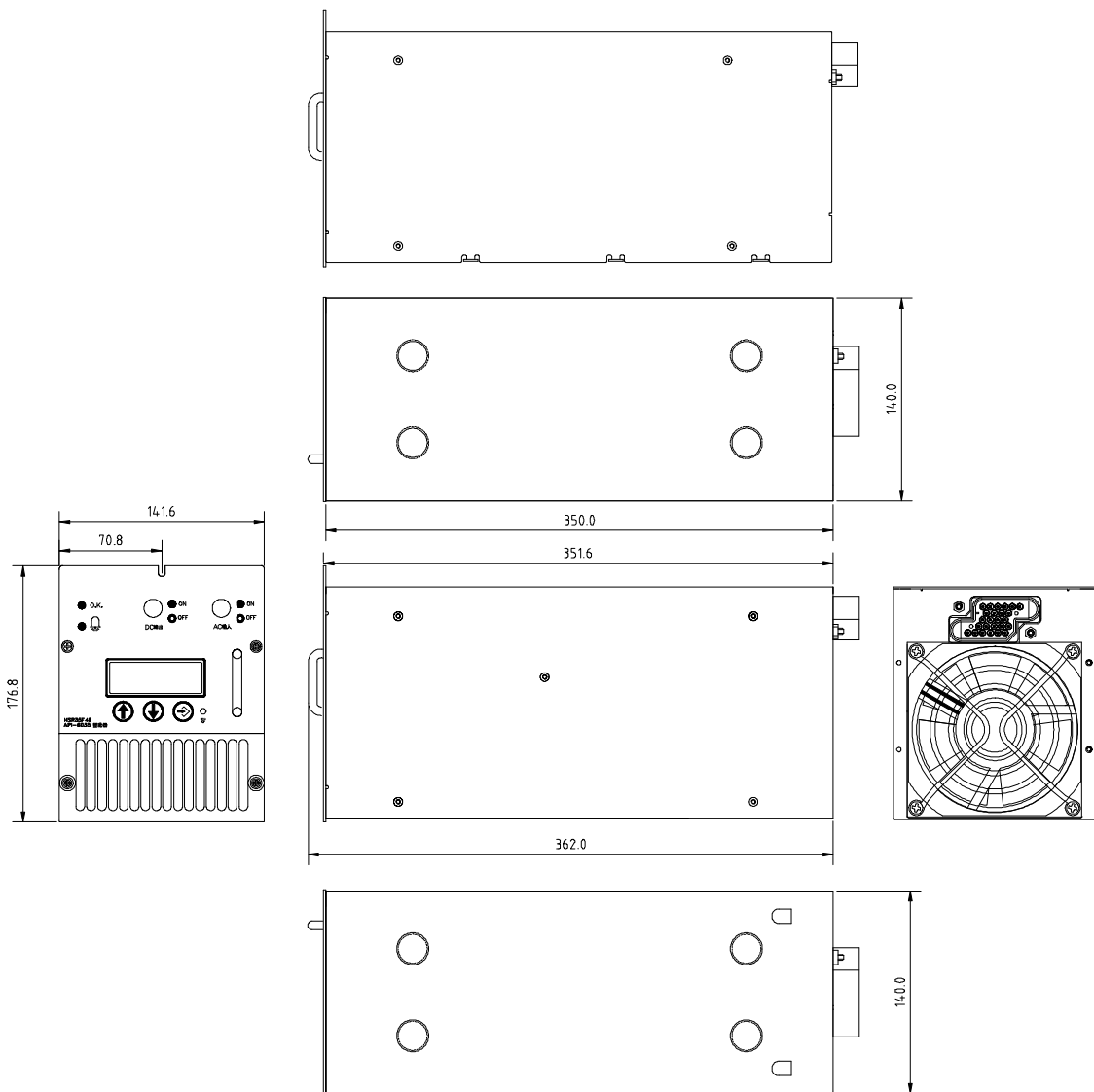
The capacity of battery in system can be calculated by HCU unit.

The HCU starts counting the discharging A; H will be flashing till AC turns ON within 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. Respectfully, it will be switched back FLT mode.

11.0 Document:

11.1 Mechanical drawing, SEE fig-12.1 of page 13.



Output connector , SEE fig-12.2 of page14.

1.Connector Definition

PIN	COLOR	FUNCTION	PIN	COLOR	FUNCTION
1	RED	OUTPUT 0V	14	PURPLE	Share Bus
2	RED	OUTPUT 0V	15	BLACK	Field Ground
3	RED	OUTPUT 0V	16	RED	OUTPUT SENSE -48VS
4	BLACK	OUTPUT -48V	17	GREEN+YELLOW	RTN2
5	BLACK	OUTPUT -48V	18	YELLOWGREEN	Field Ground
6	BLACK	OUTPUT -48V	19		
7	RED	OUTPUT 0V	20	WHITE	OUTPUT ALARM RFA/ALM
8	BLACK	OUTPUT -48V	21	GRAY	AC OK
9	BLACK	DATA TRAN TXD -	22	BLUE	ALM COM
10	WHITE	DATA RECV TXD - / RXD -	23		
11	RED	DATA RECV TXD + / RXD +	24	BLUE	AC IN
12	GREEN	DATA TRAN TXD+	25	WHITE	AC IN
13	BROWN+BLACK	-48V-BATTERY			

2.RS 485 Cable Definition

PIN	COLOR	FUNCTION	PIN	COLOR	FUNCTION
1	RED	RXD +	3	GREEN	T +
2	WHITE	RXD -	4	BLACK	T -

3.Signal 9 Pins Cable Definition

PIN	COLOR	FUNCTION	PIN	COLOR	FUNCTION
1	BROWN.BLACK	-48V-BATTERY	6	BLUE	ALM COM
2	BROWN.BLACK	-48V-BATTERY	7	PURPLE	SHARE BUS
3	RED	OUTPUT SENSE -48VS	8	GRAY	AC OK
4	YELLOW.GREEN	RTN2	9	WHITE	RFA/ALM
5	YELLOW.GREEN	RTN2	CABLE.SHELF	BLACK	FIELD GROUND