



MD-2/0-24RD70-8570

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 65 HZ. The output load minimum at 0A & maximum at 72A.

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/70A	27.5V \pm 0.5%	10mV	100mV	27V \pm 0.5%	10mV	100mV
220V	0A/70A	27.5V \pm 0.5%	10mV	100mV	27V \pm 0.5%	10mV	100mV
264V	0A/70A	27.5V \pm 0.5%	10mV	100mV	27V \pm 0.5%	10mV	100mV





2.1.3 Display Regulation:

ITEM	MODE	DESCRIPTION	REGULATION
1	Voltage: 27.0V	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 ~ 75	Display/setup Address Alarm: 00	Address: adjustable 00 ~ 75
6	FLT Voltage: 27.0V	Display/setup FLT Voltage alarm: 27V	FLT Voltage: adjustable 20V ~ 30V
7	EQ Voltage: 27.5V	Display/setup EQ Voltage alarm: 27.5V	EQ Voltage: adjustable 14A ~ 77.0A
8	Current Limit: 77.0A	Display/setup Current Limit alarm: 72A	Current Limit: adjustable 14A ~ 77.0A
9	Temp Limit: 90°C	Display/setup Temp Limit alarm: 90°C	Temp Limit: adjustable 20°C ~ 90°C
10	Voltage Max: 28.5V	Display/setup Voltage Max alarm: 28.5V	Voltage MIN: adjustable 24V ~ 30V
11	Voltage Min: 24V	Display/setup Voltage Min alarm: 24V	Voltage Min: adjustable 20V ~ 26V

2.2 Input current measurements

2.2.1 Inrush current

Set the input line to 286VAC and full load 70A. This test should be performed after input AC volts have 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 70A. 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 tripped down during sliding up AC input from 285V to 350V at middle load condition. The OVP result must be within 320Vac \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 80Vac \pm 20V.

2.4 Protection Functions

2.4.1 OVER CURRENT LIMIT

Set AC line to 220Vac and constant R load 0.35 Ω . Then measuring output current within 77A \pm 0.5A.

2.4.2 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 70A. The power factor corrector shall be at least 0.98.

2.6 Efficiency Measurements

Set AC line to 220Vac, set load to 70A. The Efficiency shall be at least 88%, 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 Diagnostic 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 keypad 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 24V (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 28.5V (Adjustable). Alarm led light and alarm signal transfer to HCU.

3.2.2.4 OVP:

When output rises over 30V, the rectifier will shut down and show alarm led on till ac restart.

3.2.2.5 OTP:

Refer 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 have TURN-ON delay at least 10 seconds.

4.2 Hold up time

After AC line TURN-OFF, the output shall last V_{olt} in regulation at least 3 minutes.





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:

- (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 COMPATIBICIT

6.1 VDE

The rectifier shall conform to the class "B" requirements of VDE VFG 243/1991. 10K ~ 150 KHZ CONDVCTION EMI MARGIN: UNDER 3 dB.

7.0 Safety

7.1 Standards

The rectifier shall provide the required production 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 PA24 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 PA1~3 and chassis, and 500Vdc between all secondary (PA-36~37, PA-34~35) and chassis for 1 minute at final assembly stage, the leakage current is less than 20mA.

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 requirement 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.

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.

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 $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$. The burn-in room must be controlled to $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 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 of 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 to 75 units depend on the customers need.

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

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





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 are 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 be itself or HCU with 485bus. 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 A; H, which is flashing till AC ON. By one minute when the system voltage is lower than 26V 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. Reversal, it will be switched back FLT mode.





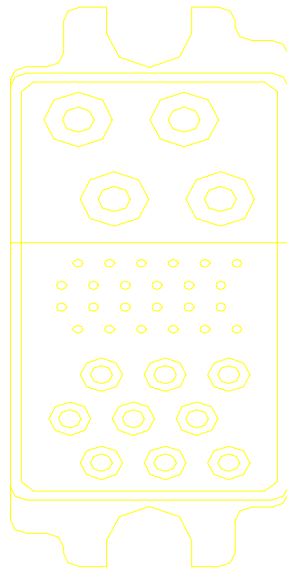
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HIGH QUALITY SWITCHING POWER SUPPLIES

11.0 Document:

11.1 Output connector

37
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36
34
28
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16
10
7
4
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Connect Definition:

Pin	Color	Function	Pin	Color	Function
1	WHITE	AC IN	20	RED	OUTPUT SENSE 24VS
2			21	GRAY	ALM COM
3	BLUE	AC IN	22		
4			23		
5			24	VIOLET / BLACK	RTN 2
6			25	BLUS	OUTPUT ALARM RFA / ALM
7	YELLOW	Field Ground	26	BROWN	AC OK
8	YELLOW/GREEN	AC Field Ground	27	GREEN	Share Bus
9			28		
10	YELLOW	DATA TRAN TXD -	29		
11	ORANGE	DATA RECV TXD- / RXD -	30		
12			31		
13			32		
14			33		
15			34	WHITE	OUTPUT 0V
16	WHITE	DATA TRAN TXD +	35	WHITE	OUTPUT 0V
17	BLUE	DATA RECV TXD + / RXD +	36	RED	OUTPUT 24V
18			37	RED	OUTPUT 24V
19	YELLOW/ORANGE	24V BATTERY	38		



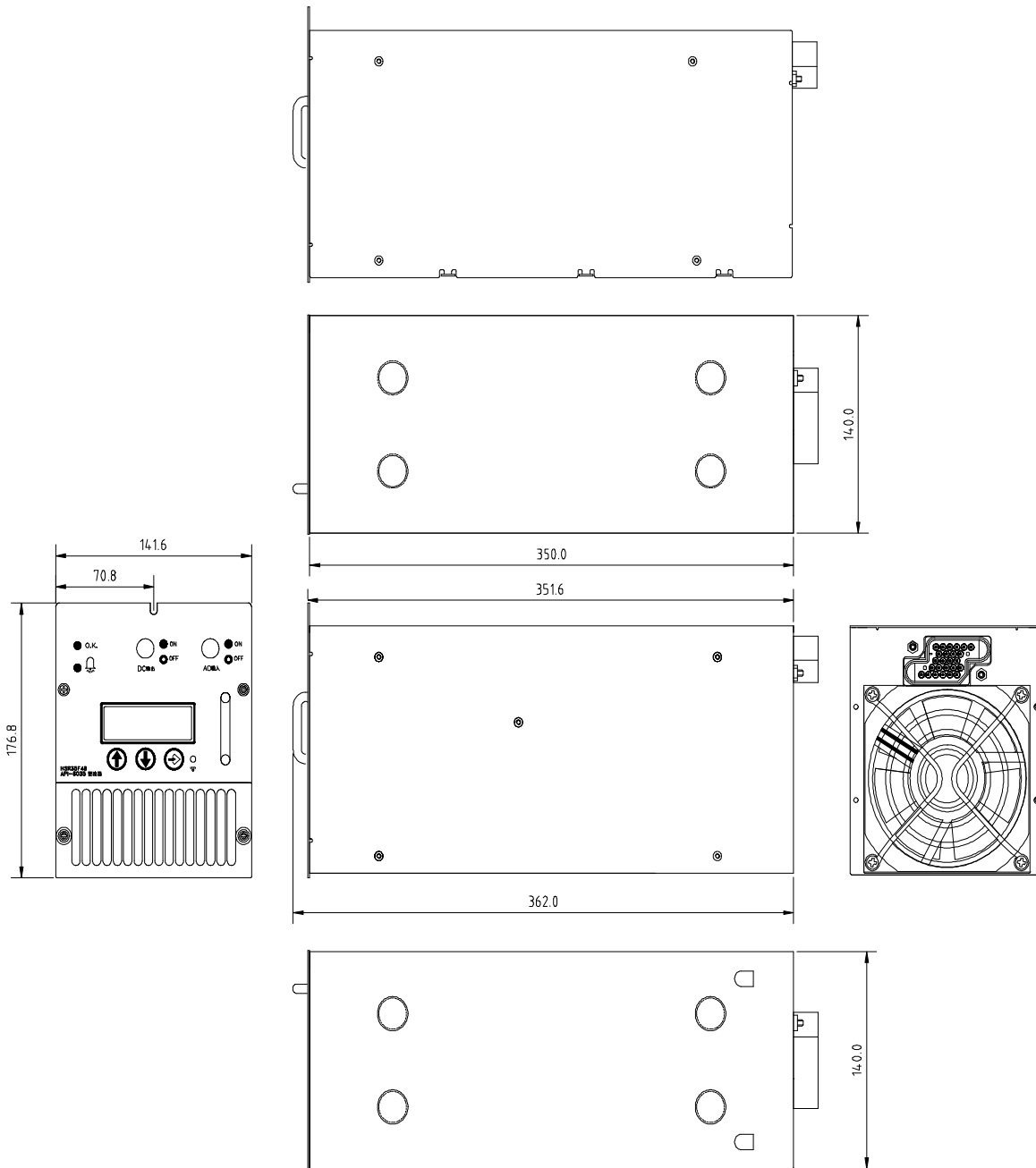
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