

## MD-2/0-58R32-990020

### Specification



#### 1. 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 many 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 $\pm$ 30% the frequency range from 45HZ to 65HZ . The output load minimum at 0A & maximum at 32A .

##### 2.1.2. Regulation & ripple:

The regulation & ripple noise as follow:

Volts Load		Output Volts		
		REG	Ripple	Noise (p – p)
180V	0A/32A	58V $\pm$ 0.5%	10mV	100mV
220V	0A/32A	58V $\pm$ 0.5%	10mV	100mV
264V	0A/32A	58V $\pm$ 0.5%	10mV	100mV

## 2.2 Input current measurements

### 2.2.1. Inrush current

Set the input line to 286VAC and full load 32A . 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 32A . 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 $\pm$ 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. 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 $\pm$ 0.3V .

### 2.4.2. OVER CURRENT LIMIT

Set AC line to 220Vac and constant R load 1.4 $\Omega$  . Then measuring output current within 32A $\pm$ 0.5A .

### 2.4.3. High Temperature protection

When the temperature of heat sink rises over 80°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 32A . The power factor corrector shall be at least 0.98 .

### 2.6 Efficiency Measurements

Set AC line to 220Vac , set load to 32A . 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

Measurements 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 ~ 500KHz . 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. Diagnostic test procedure

### 3.1 LED test

#### 3.1.1. AC OK

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

#### 3.1.2. ALARM :

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

### 3.1.2.2 OVP :

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

### 3.1.2.3 OTP :

Refer to section 2.4.3 . If heat sink's temperature rises over 80°C , the alarm – led light and the rectifier off .

### 3.1.2.4 OCL :

Refer section 2.4.2 . If the output current loads over 32A , the alarm – led light .

## 4. 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  $V_{out}$  in regulation at least 3 mini – seconds .

## 5. 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 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 independence of 2( $\pm 0.5$ ) 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. ELECTROMAGNETIC COMPATIBICIT

### 6.1 VDE

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

## 7. 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 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 .

## 8. Environment

### 8.1 Operating

The rectifier must operate well from -5°C to +50°C and relative humidity from 10%RH ~ 90%RH(non – condensing Environment) .

## 8.2 Starting

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

## 8.3 Storage & Ship

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

## 8.4 Altitude

The rectifier must operate will 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. 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

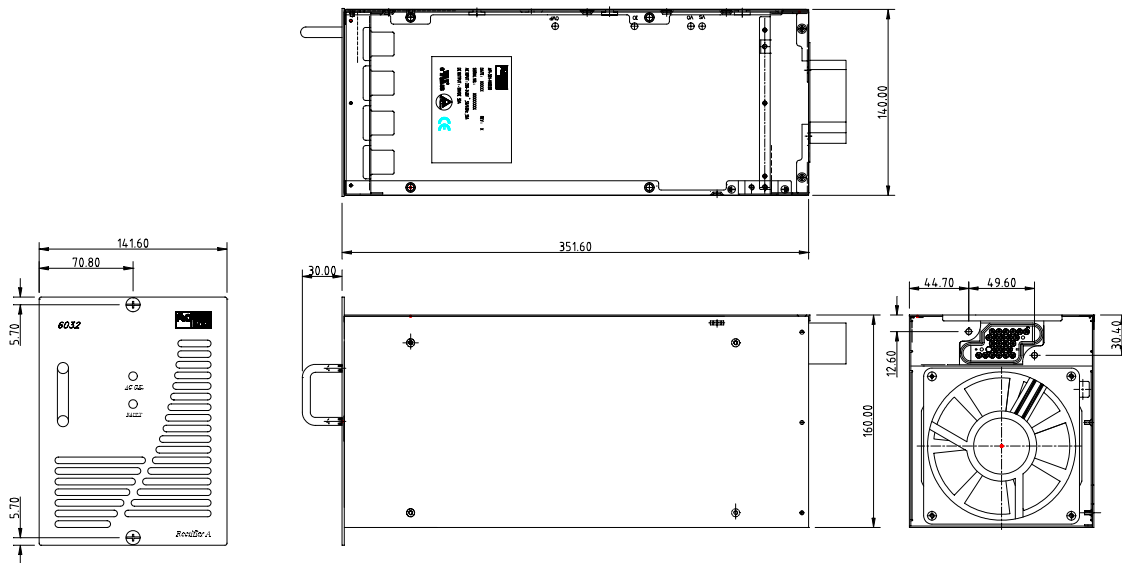
The rectifier shall be designed for a minimum life of 100,000 POH(power – on hours) over a period of ten years operating in the environment described of section 10.1 .

### 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. Document:

10.1 Mechanical drawing, SEE fig – 12.1 of page 13.



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11.2 Output connector, SEE fig – 12.2 of page 14.

#### Connector Definition

PIN	COLOR	FUNCTION	PIN	COLOR	FUNCTION
1	RED	OUTPUT 0V	14	GRAY	SHARE BUS
2	RED	OUTPUT 0V	15	VIOLET	FIELD GROUND
3	RED	OUTPUT 0V	16	RED	OUTPUT SENSE -48VS
4	BLACK	OUTPUT -58V	17	YELLOW - ORANGE	RTN2
5	BLACK	OUTPUT -58V	18	YELLOW / GREEN	FIELD GROUND
6	BLACK	OUTPUT -58V	19		
7	RED	OUTPUT 0V	20	WHITE	OUTPUT ALARM RFA/ALM
8	BLACK	OUTPUT -58V	21	BLUE	AC OK
9			22	GREEN	ALM COM
10			23		
11			24	BLUE	AC IN
12			25	WHITE	AC IN
13	BROWN / BLACK	-48V - BATTERY			