



MD-2/0-48RD10-6010 / MD-1/2-48RD10-6010 Specification



1.0 Scope

This specification defines the functional Tests to be performed on Air-cooled Switch Mode Rectifier power supply. The Rectifier supplies mobile communication power Request. The Rectifier parallel “N+1” up to Share 15 Units.

2.0 SUGGESTED TEST CONFIGURATION

2.1 Input power source

AC 50/60HZ Single phase 2 wire and ground wire. Source Voltage variable from 154VAC to 286 VAC; Normal Voltage is 200~240 VAC. Connect AC Source to Regulator terminals PA-1, 5, Connect Ground to Terminal PA-17, System LCD Monitor phase Voltage and Current.

2.2 Output Load

Load resistance determined from NORMAL Voltage and output current at 35A. The output voltage Mode Define of The EQ Mode at 55VDC, and The Floating Mode at 54VDC. Measure DC output Voltage ripple at Load side of Regulator output connector using an 100KHz Low pass filter. The Voltage Levels should be decoupled To DC Return using Low ESR Capacitors 1000uf/80V and parallel High frequency Capacitor of MPP 1uf/100V. The output Connect Terminals PA-4.5.6.8 AT -48V and PA-16, 17 AT-48V and PA-1.2.3.7AT Return.

2.3 Output Voltage

The Rectifier output Voltage Range from 42 TO 60V had Adjustable. The General define The EQ Mode at 55VDC, and The Floating Mode at 54VDC.





3.0 Function Test procedure

3.1 Static Regulation and ripple

3.1.1 line load conditions:

AC input NORMAL line at 200~240 VAC, TOLANCE $\pm 20\%$ The Frequency Range from 45HZ TO 65HZ. The output Load minimum at OA & maximum at 10A.

3.1.2 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	OA/ 10A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV
220V	OA/ 10A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV
264V	OA/ 10A	55V \pm 0.5%	10mV	100mV	54V \pm 0.5%	10mV	100mV

3.2 Input current Measurements

3.2.1 Inrush current

SET the input line to 286VAC and Full Load 35A. The EQ Mode 55VDC output. This Test should be performed after input AC volts have been OFF for at least 100 Seconds to allow the internal Capacitors to discharge. Verify any AC line the peak inrush does not exceed 30A.

3.2.2 Steady State Full Load Current

SET the input line to 150VAC and Loads to surge 35A. Verify the RMS steady state current does not exceed 6A(RMS).

3.3 Input Voltage Measurements

3.3.1 AC OVP

SET the AC input Voltage 285VAC. Full Load the output Regulator. Meet section 3.1 Turn AC line upper to 320Vac $\pm 20V$, AC OVP Trickle, Output power 'OFF', Until AC line down to 285Vac for at least 1.0seconds. The output shall Restarted.

3.3.2 AC UVP

SET the AC line input 150VAC, Full Load, The Regulation must meet section 3.1 spec. Turn AC line down to 80VAC $\pm 20V$, AC UVP





Trickle, output power 'OFF', until AC line up to 150Vac, for at least 1.0 Seconds, The output has Restarted.

✘**P.S:** When AC line under 150VAC , Full Load condition. This Rectifier had Total power limit. Output Voltage will be limited.

3.4 Protection Functions

3.4.1 Output OVP

SET The AC input Voltage to 220VAC and the load to OA minimum. Adjust EQ OR/FLT VR. Let output reach to 60VDC \pm 0.3V. The OVP circuit Trickle. Then power latch, until AC ON/OFF cycle and OVP had clear.

3.4.2 over current limit

SET AC line to 220Vac SET the Load to 10A Maximum. Adjust Display current limit mode to 38.5A NORMAL output Maximum set at 35 A.

3.4.3 High Temperature protection.

If AMBIENT Temperature OVER 90°C, The 'OTP' Trickle alarm LED light and power OFF, Until High Temperature disappear. The Rectifier shall be Restart.

3.5 Power Factor Measurements

SET AC line to 220Vac, SET Load to 10A. The POWER Factor corrector shall at least 0.98.

3.6 Efficiency Measurements

SET The AC line to 220Vac, set Load to 10A. The Efficiency shall at least 90%.

3.7 Wide Band ripple

The wide Band ripple had two stages define as follow:

- I. From 3.4KHz to 150KHz, the ripple should less then 10mV(rms).
- II. From 150KHZ to 30MHz, the ripple should less then 5mV(rms).

3.8 Narrow Band noise

Measurement the narrow Band noise using Network Analysis Metter OR SPECTRUM Metter. They are FOUR STAGE AS Follow:

- I. 3.4KHz~150KHz. The noise should less then 5mV(-44dB)
- II. 150KHz~200KHz. The noise should less then 3mV(-48dB)





III. 200KHz~500KHz. The noise should less then 2mV(-52dB)

IV. 500KHz~30MHz. The noise should less then 1mV(-58dB)

3.9 sophomoric noises

This sophomoric using HP 3555B Transmission and noise set Metter.
The noise should less than 2mV(-52dB).

3.10 peak to peak noise

The Rectifier peak-to-peak noise shall be less than 100mV. Output Terminal parallel Low ESR capacitor as specified in section 2.2.

4.0 Diagnostic Test procedure

4.1 LCD Display

4.1.1 This Rectifier had LCD Display; there are 11 display mode and 8set up mode among them. It switching by push-Bottom.

4.1.2 On 'N+1' System, If Any unit failure, The LCD still work Base on DC-DC STAND-BY power that supply from system -48V OR Battery.

4.1.3 AC Input Switch: on ○ off ●

4.2 LED Test

4.2.1 AC-OK:

PER Unit AC line input. The AC-OK LED light. If any protection triggered, the AC-OK LED stay ON. If the AC-OK LED Dark, reflects system fuse malfunction.

4.2.2 O.C.L:

If output current supply over 10.2 A, O.C.L LED light.

4.2.3 R.E.Q:

At Remote Mode, It Receive signal from H.C.U Manual control OR P.C Remote control, IT wills Change Battery Charge Mode to quickly charge.

4.2.4 R.ON/OFF:

AT Remote ON/OFF Mode. The signal to control per-unit power ON/OFF.

4.2.5 LVA:

OUTPUT Voltage Lower than 48V. LED light and ALARM Signal Transfer to Remote system warning.

4.2.6 HVA:

OUTPUT Voltage upper than 57V. LED Light and Alarm Signal





Transfer to Remote system warning.

4.2.7 OVP:

OUTPUT Voltage OVER 60VDC, the power OFF, The OVP-LED light until OVP clear then AC Restart. The Latch could be disabling.

4.2.8 OTP:

Refer Section 3.4.3, System Ambient OVER 50°C. The OPT-LED light, and The Rectifier OFF.

5.0 Timing

5.1 Turn on Delay

The Rectifier is Create -48V output After AC line Turn-ON at least 1.0 second.

5.2 Hold up time

AC line Turn-OFF, The output shall still ON -48V at least 20 mini-seconds.

6.0 Power Line Disturbance

6.1 Lightning 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.

6.2 OVER/UNDER Voltage

The Rectifier shall meet the Regulation and ripple Volts Requirement of Section 3.1 under the following conditions:

- I. AC line input under Voltage of 30% below the 220VAC for four (4) seconds, repeated ten (10) Times with a 10% duty cycle.
- II. AC line input OVER Volts of 30% above the 220VAC for four (4) Seconds, repeated ten Times with a 10% duty cycle.
- III. AC line input OVER/Under Volts of 35% for 3 Seconds shall cause no damage to the Rectifier.





7.0 ELECTROMAGNETIC COMPATIBILITY

7.1 F.C.C

The Rectifier shall comply with the USA Federal Communication Commission (FCC) Rules and Regulation, part15, Computing Devices “Class B limits”.

7.2 VDE

The Rectifier shall conform to the class B Requirements of VDE VFG 243/1991.

7.3 CISPR

The Rectifier shall conform to the class ‘B’ requirements OF CISPR22.

8.0 Safety

8.1 Standards

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

8.1.1 IEC 950

8.1.2 UL

8.1.3 CSA

8.2 FUSE

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

8.3 Ground Leakage

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

8.4 Ground Continuity

The final Assembly shall have a measured impedance less than 0.1 OHM at 25A DC test current between Ground pin PA-3 of AC input connector and the Rectifier chassis, Damage may result if test time





exceeds 5 Seconds.

8.5 Hi-pot

The final Assembly shall withstand 2000VAC for 1 minute between PA-1, /5 and chassis PA-3 with primary and All Secondary circuits (PA-20, 21,16-17). Also with stand 500VAC for 1 minute between chassis and all secondary.

9.0 Environment

9.1 operating

The Rectifier shall be operation from -15°C TO +50°C NO Damage.
The Relative Humidity from 10%RH~90%RH (non-condensing).

9.2 starting

The Rectifier shall start up Temperature Range from 0°C to +50°C.

9.3 storage Ship

The Rectifier storage ship Temp from -20°C to +80°C.

9.4 Altitude

The Rectifier must operate to an Altitude of 3000 meters (9836 feet).

9.5 Cooling

The Rectifier shall provide forced air-cooling for the host system.

9.6 Shock Vibration

The Acceptance criteria for the Vibration shock Test shall meet all electrical and mechanical requirements with No internal damage.

9.6.1 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). Dwell at resonant frequencies for 30 minute. This test shall be conducted on all three axes of Rectifier.

9.6.2 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.

9.7 Burn in

Use free air natural convection cooling through the Regulator. Each Regulator must be cycled as 15 minutes 'ON' a 15 minutes 'OFF' for 24 hours. At first, Fan lock 0.5HR to check OTP light until RED LED light then Fan lock clear.

9.8 Audible noise

The Minimum Acoustic Requirements will be base on system acoustic Requirements. Measure distance of 1 Meter shall less than 45dBA.

10.0 Reliability

10.1 Failure rate

The failure rate shall be defined at 35°C. Ambient Temp, sea level, 220Vac, Full Load as specification Section 3.1, the failure rate shall be maintained throughout the operational life, the failure rate shall be less than 0.5% per 1000hours.

10.2 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.

10.3 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.

11.0 SYSTEM Test

The Rectifier system 'N+1' defines Base on customer requirements. The Rectifier shall be up to 24 units being installed. AC line input system as following:





- I. 3 ö 5W 380VAC ($\pm 20\%$)
- II. 3 ö 4W 220VAC ($\pm 20\%$)
- III. 1 ö 3W 220VAC ($\pm 20\%$)

11.1 Share

The 'N+1' Rectifier shall be share system load BATTERY (Charge) Load, per unit current share shall less than $\pm 5\%$ Average current.

11.2 sophomoric noise

The system sophomoric noise shall be same as per-unit specified in section 3.9, meet 2mV(rms) -52dB requirements.

11.3 wide Band ripple

The system wide Band ripple shall be same as per-unit specified in section 3.7.

11.4 narrow Band noise

The system narrow Band noise shall be same as per-unit specified in section 3.8.

11.5 peak to peak noise

The system Rectifier peak-to-peak noise shall be same as per-unit specified in section 3.10.

11.6 REMOTE ON/OFF

The system Rectifier control by system HCU Card MANUAL Switching OR P.C. Remote control. They can choose 'N+1' System ANY Unit get ON/OFF Control.

11.7 REMOTE EQ/FLT

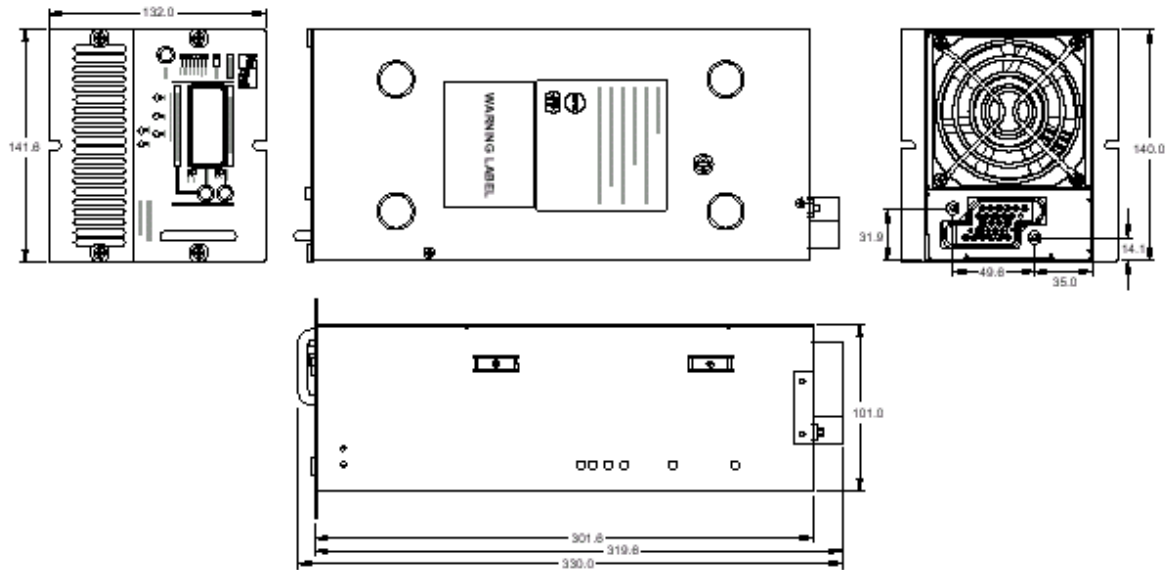
The system Rectifier control by system HCU CARD OF MANUAL Switching OR P.C Remote control 'N+1' SYSTEM, It change Battery of EQ OR Floating charge Mode.

11.8 BATTERY Charge/Discharge Calculated.

The Battery system charge and Discharge of AH (Amper-hour)



Calculated is Base on system Volts lower than 52V(Adjustable), The HCU start calculated Discharge AH. The AH Data flashing 1 minute cycles. until AC line ON. The Rectifier supply system Load, Total



discharge AH Value are fixed. When the charge Discharge AH Value are equal. The Rectifier from EQ Mode change to Floating Mode.