



Test Report: RHB-8K1U-12

1600~8000W 1U Distributed Power/Charger System

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Control Function Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

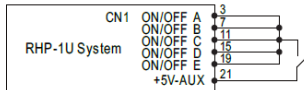
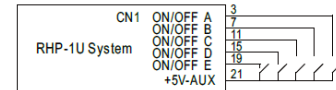
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BOOST CHARGE VOLTAGE(Vboost)(default)	Default, programmable 14.4V±0.12V	I/P: 230 VAC O/P: CV MODE Ta:25°C	14.409V
2	FLOAT CHARGE VOLTAGE	Default, programmable 13.8V±0.12V	I/P: 230 VAC O/P: CV MODE Ta:25°C	13.874V
3	OUTPUT CURRENT	500A±15A	I/P: 230 VAC O/P:CV MODE-2V Ta:25°C	500A

INPUT FUNCTION TEST

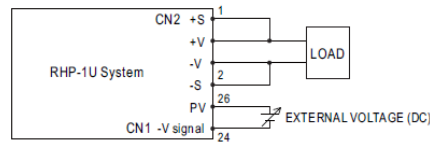
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: BAT. LOAD Ta:25°C	150 V~ 264 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%= 300 V O/P: BAT. LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec. OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 100 VAC ~264 VAC O/P: FULL~MIN LOAD Ta:25°C	TEST: OK
3	LEAKAGE CURRENT per RECTIFIER	< 1.5 mA / 230VAC	I/P: 230 VAC O/P: Min LOAD Ta:25°C	L-FG: 0.74 mA N-FG: 0.74 mA
4	AC CURRENT (Typ.) per RECTIFIER	230 V/ 8 A 115 V/ 14 A	I/P: 230 VAC	I = 7.49A/ 230VAC
			I/P: 115 VAC O/P: BAT. LOAD Ta:25°C	I = 12.41A/ 115VAC

CONTROL FUNCTION TEST

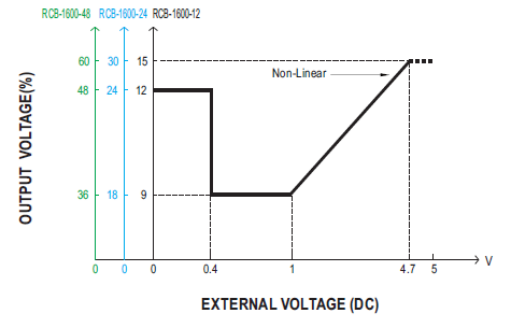
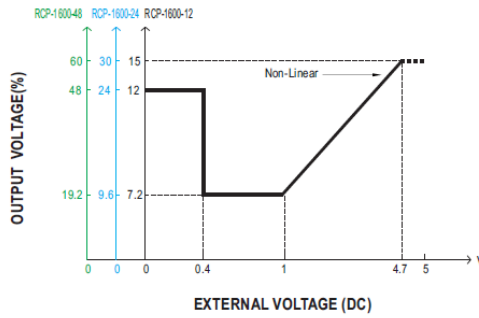
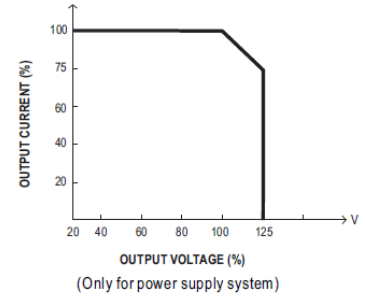
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	AUXILIARY POWER (AUX)	1. 5V±10%@0.3A ripple:150mVp-p 2. 12V±10%@0.8A ripple:250mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25°C	4.74 V 0.3 A ; ripple: 24mVp-p 11.28V 0.8 A ; ripple: 195 mVp-p						
2	REMOTE ON/OFF CONTROL	<p>The PSU can be turned ON/OFF together or separately by using the "Remote ON/OFF" function.</p> <div style="display: flex; justify-content: space-around;">   <table border="1" style="margin-left: auto;"> <thead> <tr> <th>Between ON/OFF and +5V-AUX</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>SW Open</td> <td>OFF</td> </tr> <tr> <td>SW Short</td> <td>ON</td> </tr> </tbody> </table> </div> <p>I/P: 230 VAC O/P: FULL LOAD Ta:25°C</p>			Between ON/OFF and +5V-AUX	Output	SW Open	OFF	SW Short	ON
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		<p>Test Result :</p> <table border="1"> <tr> <td>Between Remote ON-OFF and +5V-AUX</td> <td>OUTPUT</td> </tr> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </table>	Between Remote ON-OFF and +5V-AUX	OUTPUT	SW SHORT	ON	SW OPEN	OFF																																	
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<p>3</p>	<p>ALARM SIGNAL</p>	<p>1. DC OK SIGNAL High (4.5 ~ 5.5V) : When the $V_{out} \leq 8V/16V/32V \pm 1V$. Low (0 ~ 0.5V) : When $V_{out} \geq 8V/16V/32V \pm 1V$. The maximum sourcing current is 10mA and only for output. DC OK is associated with battery low protection. I/P: 230 VAC O/P: FULL LOAD Ta: 25°C Test Result :</p> <table border="1"> <tr> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> <tr> <td>$V_{out} \leq 75\%$</td> <td>5V</td> </tr> <tr> <td>$V_{out} \geq 85\%$</td> <td>-0.09V</td> </tr> </table> <p>2. T-ALARM</p> <table border="1"> <tr> <th>P.S.U STATUS</th> <th>Vo</th> <th>T-ALARM</th> </tr> <tr> <td>NORMAL</td> <td>100%±2%</td> <td>-0.1 ~-0.5V</td> </tr> <tr> <td>OTP OR FAN LOCK</td> <td>0V</td> <td>4.5~5.5V</td> </tr> </table> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C Test Result :</p> <table border="1"> <tr> <th>P.S.U STATUS</th> <th>T-ALARM</th> </tr> <tr> <td>NORMAL</td> <td>-0.09V</td> </tr> <tr> <td>OTP OR FAN LOCK</td> <td>4.937V</td> </tr> </table> <p>3. AC-OK :</p> <table border="1"> <tr> <th>AC IN</th> <th>Vo</th> <th>AC OK</th> </tr> <tr> <td>$AC I/P \geq 87V_{rms}$</td> <td>100%±2%</td> <td>4.5~5.5V</td> </tr> <tr> <td>$AC I/P \leq 75V_{rms}$</td> <td>0V</td> <td>0~0.5V</td> </tr> </table> <p>I/P: TEST O/P: 60% LOAD Test Result :</p> <table border="1"> <tr> <th>AC IN</th> <th>Vo</th> <th>AC OK</th> </tr> <tr> <td>$AC I/P \geq 87V$</td> <td>100.4%</td> <td>5.36V</td> </tr> <tr> <td>$AC I/P \leq 75V$</td> <td>0.002V</td> <td>0.00V</td> </tr> </table>	Vout	DC OK SIGNAL	$V_{out} \leq 75\%$	5V	$V_{out} \geq 85\%$	-0.09V	P.S.U STATUS	Vo	T-ALARM	NORMAL	100%±2%	-0.1 ~-0.5V	OTP OR FAN LOCK	0V	4.5~5.5V	P.S.U STATUS	T-ALARM	NORMAL	-0.09V	OTP OR FAN LOCK	4.937V	AC IN	Vo	AC OK	$AC I/P \geq 87V_{rms}$	100%±2%	4.5~5.5V	$AC I/P \leq 75V_{rms}$	0V	0~0.5V	AC IN	Vo	AC OK	$AC I/P \geq 87V$	100.4%	5.36V	$AC I/P \leq 75V$	0.002V	0.00V
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<p>4</p>	<p>OUTPUT VOLTAGE PROGRAMMABLE(PV)</p>	<p>DIP switch position 4 : OFF</p>																																							

※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.



+S & +V, -S & -V also need to be connected on CN1. (Only for power supply system)



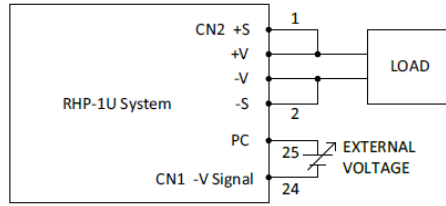
I/P: 230 VAC
 O/P: FULL LOAD
 Ta: 25°C
 Test Result :

MODEL \ PV	<0.4V	1V	4.7V	5V
SPEC	12V±5%	9V±5%	15V±5%	15V±5%
Vout	12.088V	8.941V	14.929V	15.132V

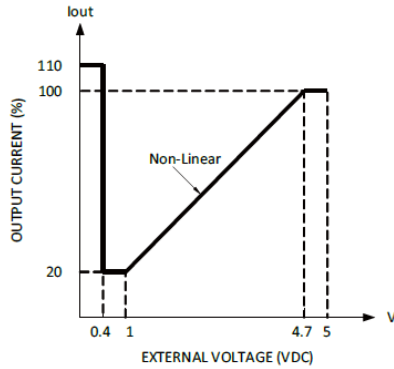
5 OUTPUT CURRENT PROGRAMMABLE (PC)

DIP switch position 4 : OFF

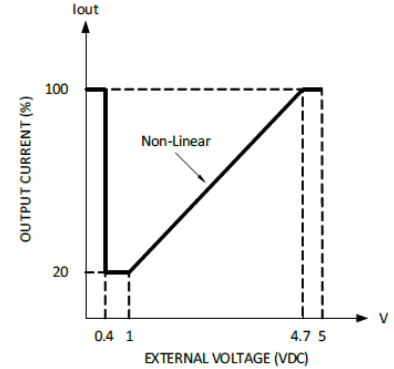
※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.



+S & +V, -S & -V also need to be connected on CN1. (Only for power supply system)



☉ For power supply system



☉ For charger system

I/P: 230 VAC

O/P: TESTING

Ta: 25°C

Test Result :

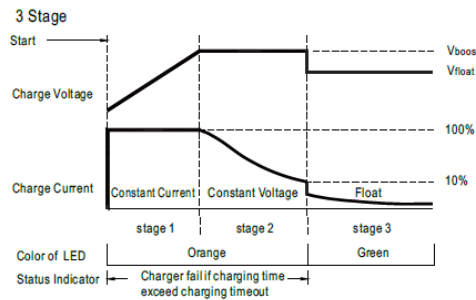
ADJ V	<0.4V	1V	4.7V	5V
SPEC	100%±10%	20%±10%	100%±10%	100%±10%
I _{out}	101.45%	20.58%	101.45%	102.18%

6 Charging Curve

※ By factory default, this charger performs the default curve which can be programmed via PMBus.

※ To disable / enable the charging curve, change to a 2 stage curve, a different curve frequently used for certain types of batteries in the industry, and so on, please refer to the Installation Manual.

☉ Default 3 stage charging curve



☉ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

I/P: 230 VAC

O/P: FULL LOAD

Test Result :

☉ Embedded 3 stage charging curve

MODEL	Description	V _{boost}	V _{float}
12V	Default, programmable	14.4	13.8
	Pre-defined, gel batter	14	13.6
	Pre-defined, flooded battery	14.2	13.4
24V	Pre-defined, AGM battery	14.5	13.5
	Default, programmable	28.8	27.6
	Pre-defined, gel batter	28	27.2
48V	Pre-defined, flooded battery	28.4	26.8
	Pre-defined, AGM battery	29	27
	Default, programmable	57.6	55.2
48V	Pre-defined, gel batter	56	54.4
	Pre-defined, flooded battery	56.8	53.6
	Pre-defined, AGM battery	58	54

MODEL	Constant voltage(V _{boost})	Float (V _{float})	Turn state current
12V	14.4V± 0.12V	13.8V± 0.12V	50A± 15.0A
	14.43V	13.82V	49.25A

7 LED Status Indicators

※ LED Status Indicators

LED	Description
● Green	Float (stage 3)
● Orange	Charging (stage 1 or stage 2)
● Red	The LED will present a constant red light when the abnormal status (OTP, OLP, fan fail and charging timeout) arises.
● Red (Flashing)	The LED will flash with the red light when the internal temperature reaches 60°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.)

		TEST : OK
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SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG: 2KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.8 KVAC/min Ta:25°C	I/P-O/P:6.23mA I/P-FG:5.77mA O/P-FG:6.08mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 7.28GΩ I/P-FG: 5.7GΩ O/P-FG: 9.2GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	17mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100% LOAD Ta:25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																																																				
1	TEMPERATURE RISE TEST	MODEL : RHB-8K1U-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 28.3 °C 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 230VAC O/P : FULL LOAD Ta= 52.5 °C																																																																																																																																						
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28	C101	47.0°C	73.6°C																																																																																																																																					
29	T52	37.9°C	65.3°C																																																																																																																																					
30	RTH21	54.0°C	76.4°C																																																																																																																																					
31	RTH9	45.3°C	72.3°C																																																																																																																																					
32	U671	43.8°C	70.0°C																																																																																																																																					
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230VAC/180VAC O/P : 100 % LOAD Ta= -35°C / -30°C	TEST : OK																																																																																																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																																																				

4	TEMPERATURE COEFFICIENT	$\pm 0.03\% / ^\circ\text{C}$ (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	$\pm 0.005\% / ^\circ\text{C}$ (0-50°C)
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C ~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST(13500 TIMES) 1cycle:230V/ FULL LOAD Burn In Test		OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50°C LIFE TIME		(1) 781466HRS (2) 119480HRS (3) 179758HRS (4) 222934HRS
9	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031