



# Test Report: DHP-12K1U -48

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3200~12800W 1U Distributed Power/Charger System

## ■ DESIGN VERIFY TEST

Output Function Test  
Input Function Test  
Control Function Test

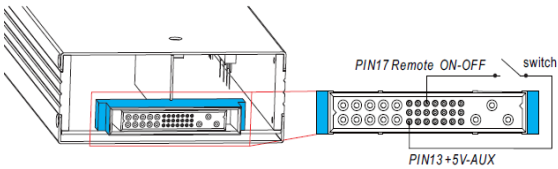
## ■ SAFETY & E.M.C. TEST

Safety Test  
E.M.C. Test

## ■ RELIABILITY TEST

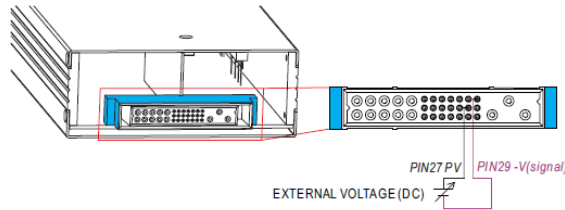
ENVIRONMENT TEST



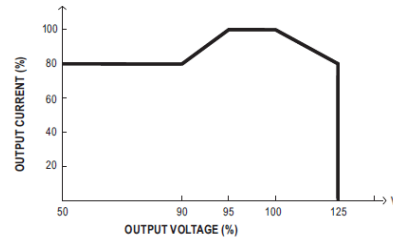
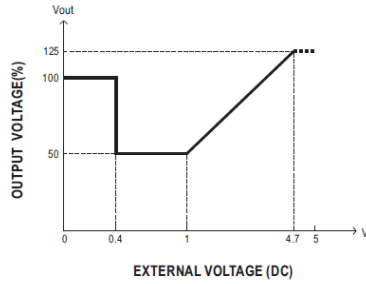
			12V / 0.8A	10.8~13.2 V	450mVp-p	12.096V 0.8A 121 mVp-p																
			5V / 0.3A	4.5 ~ 5.5V	150mVp-p	4.73V/0.3A 117 mVp-p																
2	REMOTE ON/OFF CONTROL	<p>The power supply can be turned ON/OFF individually or along with other units by using the "Remote ON-OFF" function.</p>  <table border="1" data-bbox="1066 548 1481 645"> <thead> <tr> <th>Between Remote ON-OFF and +5V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>Switch Short</td> <td>ON</td> </tr> <tr> <td>Switch Open</td> <td>OFF</td> </tr> </tbody> </table> <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="470 779 1021 884"> <thead> <tr> <th>Between ON/OFF and +5V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </tbody> </table>					Between Remote ON-OFF and +5V-AUX	Power Supply Status	Switch Short	ON	Switch Open	OFF	Between ON/OFF and +5V-AUX	Power Supply Status	SW SHORT	ON	SW OPEN	OFF				
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3	REMOTE SENSE	S+ / S- >0.5V Compensate voltage drop on the load wiring up to 0.5V.	I/P: 230 VAC O/P:FULL LOAD Ta:25°C		> 0.5 V																	
4	ALARM SIGNAL	<p>1. DC OK SIGNAL</p> <p>High (4.5 ~ 5.5V) : When the <math>V_{out} \leq 80\% \pm 5\%</math>.</p> <p>Low (-0.1 ~ 0.5V) : When <math>V_{out} \geq 80\% \pm 5\%</math>.</p> <p>The maximum sourcing current is 10mA and only for output.</p> <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="470 1276 949 1384"> <thead> <tr> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td><math>V_{out} \leq 75\%</math></td> <td>4.98V</td> </tr> <tr> <td><math>V_{out} \geq 85\%</math></td> <td>0.0087v</td> </tr> </tbody> </table>		Vout	DC OK SIGNAL	$V_{out} \leq 75\%$	4.98V	$V_{out} \geq 85\%$	0.0087v	<p>2. AC OK SIGNAL</p> <p>High (4.5 ~ 5.5V) : When the input voltage is <math>\geq 87V_{rms}</math>.</p> <p>Low (-0.5 ~ 0.5V) : When the input voltage is <math>\leq 75V_{rms}</math>.</p> <p>The maximum sourcing current is 10mA and only for output.</p> <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <table border="1" data-bbox="1013 1272 1481 1377"> <thead> <tr> <th>Vin</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td><math>VAC \geq 87V_{rms}</math></td> <td>4.98V</td> </tr> <tr> <td><math>VAC \leq 75V_{rms}</math></td> <td>-0.035V</td> </tr> </tbody> </table>				Vin	DC OK SIGNAL	$VAC \geq 87V_{rms}$	4.98V	$VAC \leq 75V_{rms}$	-0.035V			
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		<p>3. T-ALARM</p> <p>High (4.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails.</p> <p>Low (-0.1 ~ 0.5V) : When the internal temperature is normal, and when Fan works normally.</p> <p>The maximum sourcing current is 10mA and only for output</p> <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="526 1653 1289 1758"> <thead> <tr> <th>P.SU STATUS</th> <th>Vo</th> <th>T-ALARM SPEC</th> <th>T-ALARM TEST</th> </tr> </thead> <tbody> <tr> <td>NORMAL</td> <td>100%±2%</td> <td>-0.1 ~0.5V</td> <td>-0.0975V</td> </tr> <tr> <td>OTP</td> <td>0V</td> <td>4.5~5.5V</td> <td>5.003V</td> </tr> <tr> <td>FAN LOCK</td> <td>0V</td> <td>4.5~5.5V</td> <td>5.003V</td> </tr> </tbody> </table>					P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST	NORMAL	100%±2%	-0.1 ~0.5V	-0.0975V	OTP	0V	4.5~5.5V	5.003V	FAN LOCK	0V	4.5~5.5V	5.003V
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5 OUTPUT VOLTAGE PROGRAMMABLE(PV)

※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed to 50~125% of the nominal voltage by applying EXTERNAL VOLTAGE.



◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

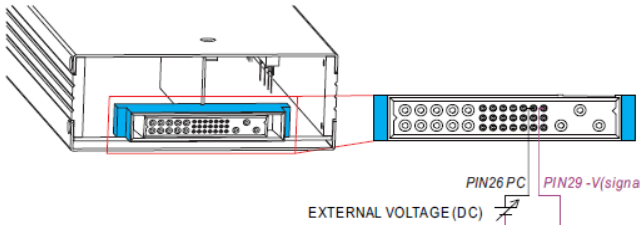
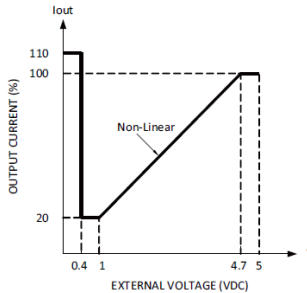


◎ The rated current should change with the Output Voltage Programming accordingly.  
 ◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

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

TEST RESULT :

	PV	<0.4V	1V	3.479V	4.7V	5V
MODEL						
SPEC		48V±5%	24V±5%	48V±5%	60V±5%	60V±5%
Vout		48.167V	23.89V	48.29V	60.5 V	61.76V

<p>6</p> <p>OUTPUT CURRENT PROGRAMMABLE (PC)</p>	<p>※ The constant current level can be trimmed to 20~ 100% of the rated current by applying EXTERNAL VOLTAGE.</p>  <p>EXTERNAL VOLTAGE (DC)</p> <p>PIN26 PC</p> <p>PIN29 -V(signal)</p> <p>◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.</p>  <p>OUTPUT CURRENT (%)</p> <p>EXTERNAL VOLTAGE (VDC)</p> <p>I/P: 230 VAC O/P: TESTING Ta: 25°C</p> <table border="1" data-bbox="475 1108 1468 1209"> <tr> <td>ADJ V</td> <td>&lt;0.4V</td> <td>1V</td> <td>4.7V</td> <td>5V</td> </tr> <tr> <td>SPEC</td> <td>110%±5%</td> <td>20%±5%</td> <td>100%±5%</td> <td>100%±5%</td> </tr> <tr> <td>TEST</td> <td>110%</td> <td>19.7%</td> <td>100.89%</td> <td>102.6%</td> </tr> </table>	ADJ V	<0.4V	1V	4.7V	5V	SPEC	110%±5%	20%±5%	100%±5%	100%±5%	TEST	110%	19.7%	100.89%	102.6%	
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<p>7</p> <p>CURRENT SHARING</p>	<p>&lt; ±5%</p>	<p>I/P : 230 VAC O/P : FULL/50% LOAD Ta : 25°C</p>	<p>O/P : 100%</p> <p>PSU1 : 67.21 A PSU2 : 67.14 A PSU3 : 67.24 A PSU4 : 67.01 A</p> <p>O/P : 50%</p> <p>PSU1 : 33.89 A PSU2 : 33.63 A PSU3 : 33.6 A PSU4 : 33.59 A</p>														

**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:0.7KVDC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.84KVDC/min Ta:25°C	I/P-O/P: 11.88 mA I/P-FG: 10.63 mA O/P-FG:0.002 mA 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: 22.6 GΩ I/P-FG: 20 GΩ O/P-FG: 10GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	25mΩ

**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 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 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-6-2 INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report.			

■ **RELIABILITY TEST**

■ **ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : DHP-12K1U-48 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD		



		NO	Position	ROOM AMBIENT Ta= 25°C	HIGH AMBIENT Ta= 50°C
		1	BD1	53.5°C	78.7°C
		2	RY1	44.1°C	70.4°C
		3	D7	63.2°C	88.9°C
		4	D8	76.6°C	102.3°C
		5	T3	40.0°C	65.5°C
		6	U900	42.9°C	68.2°C
		7	Q900	60.0°C	85.8°C
		8	Q902	59.6°C	84.6°C
		9	C5	30.8°C	54.4°C
		10	U902	48.7°C	74.4°C
		11	Q1	53.8°C	80.0°C
		12	Q3	51.2°C	77.0°C
		13	T1-2	64.7°C	91.1°C
		14	T1-1	80.1°C	106.4°C
		15	T2-2	57.7°C	82.7°C
		16	T2-1	70.6°C	96.9°C
		17	T301	34.0°C	57.9°C
		18	U71	39.5°C	63.2°C
		19	U201	40.6°C	65.8°C
		20	C111	50.9°C	76.2°C
		21	C121	45.6°C	70.4°C
		22	C115	46.4°C	71.2°C
		23	C116	45.9°C	70.8°C
		24	Q401	59.8°C	85.5°C
		25	Q411	59.5°C	85.2°C
		26	Q101	54.8°C	80.2°C
		27	Q108	53.8°C	79.3°C
		28	U110	49.4°C	74.5°C
		29	RT90	40.0°C	64.2°C
		30	U903	34.1°C	58.5°C
		31	U501	47.2°C	71.7°C
		32	RG76	85.4°C	110.3°C
		33	L1	43.3°C	68.0°C
		34	L3	62.1°C	87.2°C
		35	R900	47.1°C	71.8°C
		36	ZR2	37.9°C	63.3°C
		37	LF1	51.6°C	78.0°C
		38	C2	43.5°C	69.0°C
		39	C10	50.4°C	76.3°C
		40	ZR1	48.5°C	74.0°C
		41	RT1	37.2°C	62.4°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )		I/P : 230 VAC O/P : 110 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 230VAC/180VAC O/P : 100 % LOAD Ta= -30°C/-25°C	TEST : OK



4	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
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.001 %/°C(0~50°C)
6	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 : 10 CYCLE 5. Input/Output condition : STATIC		OK
7	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 : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test		OK
8	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
9	CAPACITOR LIFE CYCLE	SUPPOSE C111 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) 383955HRS (2) 66460HRS (3) 16891HRS (4) 294949HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 176.1K hrs min. Telcordia SR-332 (Bellcore) ; 44.5K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing reliability test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours		

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

2018.4.30 GP-A50-F010