



Test Report: DHP-12K1U -24

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

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

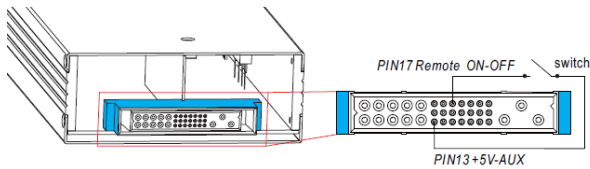
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	MAX. OUTPUT CURRENT	532A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	532A
2	MAX. OUTPUT POWER	12768W	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	12768W

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	(1) I/P:AC TESTING O/P: FULL / 50% LOAD Ta:25°C	(1) 162Vac~264Vac/FULL LOAD 85Vac~264Vac/50%LOAD
			I/P: (1)LOW-LINE-3V=87V HIGH-LINE+15%=300V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE) Ta:25°C	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:180 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 17 A	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =15.32 A/ 230VAC
4	LEAKAGE CURRENT	<1.5 mA / 230 VAC	I/P : 230 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.62 mA N-FG : 0.62 mA

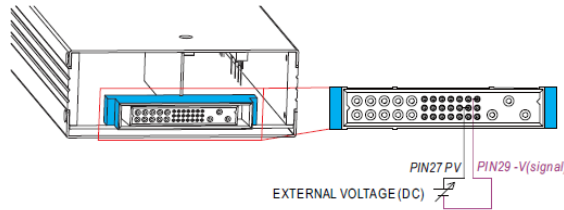
CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT								
1	AUXILIARY POWER (AUX)	1.Auxiliary voltage output, 10.6~13.2V, referenced to GND-AUX (pin2). The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF." 2.Auxiliary voltage output, 4.5~5.5V, referenced to GND-AUX (pin2). The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF"	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	Test Result :								
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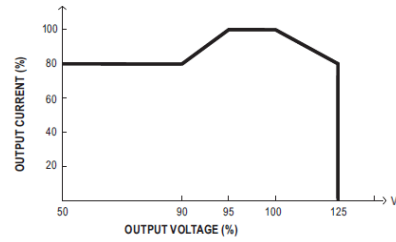
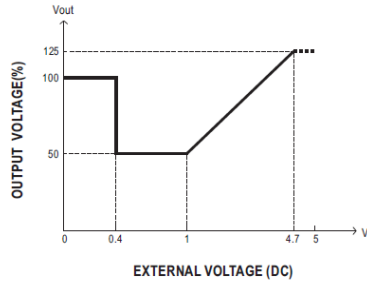
			12V / 0.8A	10.8~13.2 V	450mVp-p	12.128V /0.8A 121 mVp-p																
			5V / 0.3A	4.5 ~ 5.5V	150mVp-p	4.71V/0.3A 117 mVp-p																
2	REMOTE CONTROL	ON/OFF	<p>The power supply can be turned ON/OFF individually or along with other units by using the "Remote ON-OFF" function.</p>  <table border="1" data-bbox="1050 481 1492 577"> <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="427 745 976 880"> <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	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	> 0.5 V	Compensate voltage drop on the load wiring up to 0.5V.																
4	ALARM SIGNAL	1. DC OK SIGNAL	<p>High (4.5 ~ 5.5V) : When the $V_{out} \leq 80\% \pm 5\%$.</p> <p>Low (-0.5 ~ 0.5V) : When $V_{out} \geq 80\% \pm 5\%$.</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="427 1361 943 1469"> <thead> <tr> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td>$V_{out} \leq 75\%$</td> <td>4.98V</td> </tr> <tr> <td>$V_{out} \geq 85\%$</td> <td>0.0081v</td> </tr> </tbody> </table>		Vout	DC OK SIGNAL	$V_{out} \leq 75\%$	4.98V	$V_{out} \geq 85\%$	0.0081v	2. AC OK SIGNAL	<p>High (4.5 ~ 5.5V) : When the input voltage is $\geq 87V_{rms}$.</p> <p>Low (-0.5 ~ 0.5V) : When the input voltage is $\leq 75V_{rms}$.</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="986 1355 1501 1451"> <thead> <tr> <th>Vin</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td>$VAC \geq 87V_{rms}$</td> <td>4.98V</td> </tr> <tr> <td>$VAC \leq 75V_{rms}$</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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		3. T-ALARM	<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="483 1758 1281 1863"> <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>0.0081v</td> </tr> <tr> <td>OTP</td> <td>0V</td> <td>4.5~5.5V</td> <td>4.961V</td> </tr> <tr> <td>FAN LOCK</td> <td>0V</td> <td>4.5~5.5V</td> <td>4.961V</td> </tr> </tbody> </table>				P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST	NORMAL	100%±2%	-0.1 ~0.5V	0.0081v	OTP	0V	4.5~5.5V	4.961V	FAN LOCK	0V	4.5~5.5V	4.961V
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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.

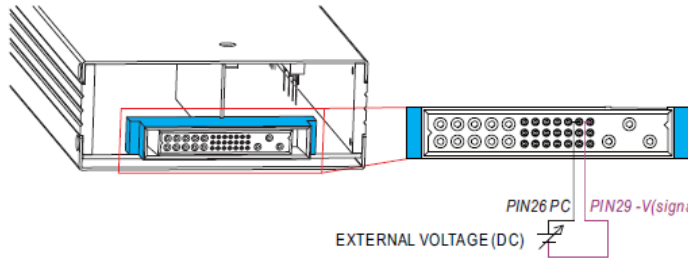
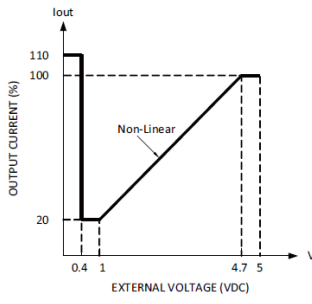


◎ The rated current should change with the Output Voltage Programming accordingly.
 ◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

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

TEST RESULT :

MODEL \ PV	<0.3V	1V	3.435V	4.7V	5V
SPEC	24V±5%	12V±5%	24V±5%	30V±5%	30V±5%
Vout	24.03V	12.063V	24.068V	30.47V	30.99V

<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 PIN29 -V(signal)</p> <p>◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.</p>  <p>I/P: 230 VAC O/P: TESTING Ta:25°C</p> <table border="1" data-bbox="427 1086 1468 1198"> <tr> <td>ADJ V</td> <td><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>110.37%</td> <td>21.2%</td> <td>100%</td> <td>102.25%</td> </tr> </table>	ADJ V	<0.4V	1V	4.7V	5V	SPEC	110%±5%	20%±5%	100%±5%	100%±5%	TEST	110.37%	21.2%	100%	102.25%
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<p>7</p>	<p>CURRENT SHARING</p>	<p>< ±5%</p> <p>I/P : 230 VAC O/P : FULL/50% LOAD Ta : 25°C</p> <p>O/P : 100% PSU1 : 133.1 A PSU2 : 133.5 A PSU3 : 133.5 A PSU4 : 133.5 A O/P : 50% PSU1 : 66.6 A PSU2 : 67.1 A PSU3 : 66.9 A PSU4 : 67.1 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: 12.04 mA I/P-FG: 10.73mA 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: 13 GΩ I/P-FG: 2.86GΩ O/P-FG: 5 GΩ 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

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : DHP-12K1U-24 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	63.0°C	86.4°C
		2	RY1	44.2°C	67.6°C
		3	D7	68.4°C	92.1°C
		4	D8	62.7°C	86.8°C
		5	T3	36.0°C	59.6°C
		6	U900	41.9°C	64.6°C
		7	Q900	64.2°C	87.7°C
		8	Q902	53.9°C	77.9°C
		9	C5	31.9°C	53.9°C
		10	U902	51.3°C	74.5°C
		11	Q1	63.0°C	87.0°C
		12	Q3	54.3°C	77.4°C
		13	T1-2	68.2°C	90.7°C
		14	T1-1	58.4°C	80.8°C
		15	T2-2	65.0°C	87.3°C
		16	T2-1	58.7°C	80.8°C
		17	T301	30.6°C	53.3°C
		18	U71	38.6°C	61.4°C
		19	U201	45.1°C	67.9°C
		20	C111	59.2°C	81.0°C
		21	C121	52.4°C	74.9°C
		22	C115	55.4°C	78.2°C
		23	C116	53.6°C	76.2°C
		24	Q401	73.9°C	99.6°C
		25	Q411	85.1°C	107.7°C
		26	Q101	66.3°C	89.9°C
		27	Q108	66.7°C	89.9°C
		28	U425	60.0°C	83.0°C
		29	RT90	40.0°C	63.4°C
		30	U903	31.3°C	54.8°C
		31	U501	50.8°C	74.0°C
		32	RG76	91.6°C	114.4°C
		33	L1	38.4°C	61.1°C
		34	L3	56.8°C	78.9°C
		35	R900	42.5°C	66.1°C
		36	ZR2	39.7°C	63.4°C
		37	LF1	51.4°C	75.4°C
		38	C2	41.5°C	65.2°C
		39	C10	47.0°C	70.6°C
		40	ZR1	46.4°C	69.9°C
		41	RT1	37.0°C	60.6°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)		I/P : 230 VAC O/P : 109 % 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	± 0.0016 %/°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) 84676.8HRS (2) 18691HRS (3) 88819HRS (4) 237199HRS
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