Test Report: DHP-1UT-BHV-380

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

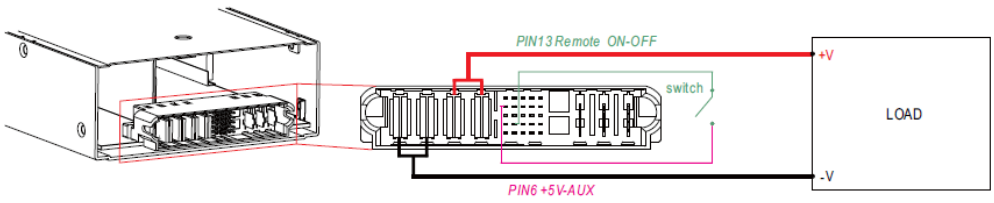
OUTPUT FUNCTION TEST

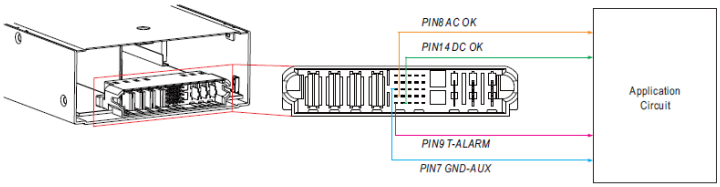
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	MAX. OUTPUT CURRENT	33.6A	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	33.6A
2	MAX. OUTPUT POWER	12768W	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	12768W

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC 127VDC~400VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD (PLEASE CHECK DERATING CURVE) Ta:25℃	(1)168Vac~264Vac/FULL LOAD 85Vac~264Vac/50%LOAD (2)242Vdc~400Vdc/FULL LOAD 108Vdc~400Vdc/50% LOAD (3) 242Vdc~400Vdc/FULL LOAD 107Vdc~400Vdc/50% LOAD
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:180 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (Typ.) per RECTIFIER	230V/ 17 A	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =14.86 A/ 230VAC
4	LEAKAGE CURRENT per RECTIFIER	<2 mA / 230 VAC	I/P： 230 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.933 mA N-FG： 0.996 mA

CONTROL FUNCTION TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>AUXILIARY POWER (AUX)</td><td colspan="3">Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX (pin7).
The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by “Remote ON-OFF”.
Auxiliary voltage output,4.5~5.5V, referance to GND_AUX(pin7).The maximum load current is 0.3A.
The output has the built-in "Oring diodes" and is not controlled by the Remote ON/OFF control.
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result：
<table>
<tr><th>AUX</th><th>TOLERANCE</th><th>SPEC. RIPPLE</th><th>TEST RESULT</th></tr>
<tr><td>12V / 0.8A</td><td>10.8~13.2 V</td><td>450mVp-p</td><td>11.418 / 306mV</td></tr>
<tr><td>5V/0.3A</td><td>4.5~5.5V</td><td>150 mVp-p</td><td>4.71V/0.3A
117 mVp-p</td></tr>
</table></td></tr>
<tr><td>2</td><td>REMOTE ON/OFF CONTROL</td><td colspan="3">The power supply can be turned ON/OFF individually or along with other units by using the "Remote ON-OFF" function.
 

<table>
<tr><th>Between Remote ON-OFF and +5V-AUX</th><th>Power Supply Status</th></tr>
<tr><td>Switch Short</td><td>ON</td></tr>
<tr><td>Switch Open</td><td>OFF</td></tr>
</table>
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result：
<table>
<tr><th>Between ON/OFF and +5V-AUX</th><th>Power Supply Status</th></tr>
<tr><td>Switch Short</td><td>ON</td></tr>
<tr><td>Switch Open</td><td>OFF</td></tr>
</table></td></tr>
<tr><td>3</td><td>ALARM SIGNAL</td><td colspan="3">※ There are 3 alarm signals, DC-OK, AC-OK and T-ALARM, in TTL signal form, on CN1. These signals are isolated from output. The maximum sink current is 10mA.
 

<table>
<tr><th>DC-OK signal</th><th>Power Supply Mode Status</th><th>Charger Mode Status</th></tr>
<tr><td>"High" > 3.5~5.5V</td><td>Vout ≦ 77%±5%</td><td>Vout ≦ 66%±5%</td></tr>
<tr><td>"Low" < -0.5~0.5V</td><td>Vout ≧ 80%±5%</td><td>Vout ≧ 67%±5%</td></tr>
</table>
<table>
<tr><th>AC-OK signal</th><th>Power Supply and Charger Mode Status</th></tr>
<tr><td>"High" > 3.5~5.5V</td><td>Input voltage ≧ 87Vrms</td></tr>
<tr><td>"Low" < -0.5~0.5V</td><td>Input voltage ≦ 75Vrms</td></tr>
</table>
<table>
<tr><th>T-ALARM signal</th><th>Power Supply and Charger Mode Status</th></tr>
<tr><td>"High" > 3.5~5.5V</td><td>OFF(OTP or Fan Fail)</td></tr>
<tr><td>"Low" < -0.5~0.5V</td><td>ON(Normal Work)</td></tr>
</table>
1. DC OK SIGNAL
For power supply mode</td></tr>
</table>

High (3.5 ~ 5.5V) : When the Vout≦ 77%±5%.

Low (-0.5 ~ 0.5V) : When the Vout≧ 80%±5%.

The maximum sourcing current is 10mA and only for output.

I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃

Test Result：

Vout	DC OK SIGNAL
Vout≦72%	4.9 V
Vout≧85%	0.00v

2. T-ALARM

High (>3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails.

Low (<-0.5 ~ 0.5V) : When the internal temperature is normal, and when Fan works normally.

The maximum sourcing current is 10mA and only for output

I/P: 230 VAC
O/P:Full Load
Ta:25℃

Test Result：

P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST
NORMAL	100%±2%	<-0.5 ~0.5V	0.00V
OTP	0V	>3.5~5.5V	4.9V
FAN LOCK	0V	>3.5~5.5V	4.9V

3. AC OK

The maximum sourcing current is 10mA and only for output.

Low (-0.5 ~ 0.5V) : When the input voltage is≦ 75Vrms.

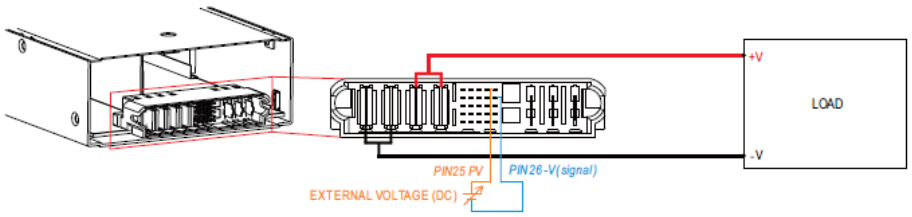
High (3.5 ~ 5.5V) : When the input voltage is≧ 87Vrms .

I/P : Test Voltage
O/P: Full Load
Ta : 25℃

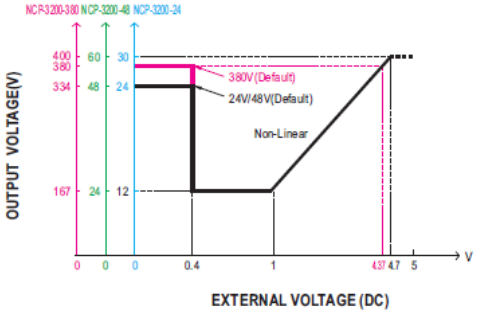
Test Result：

AC	AC OK SIGNAL
AC ≧ 87Vrms	4.9V
AC ≦ 75Vrms	0.00V

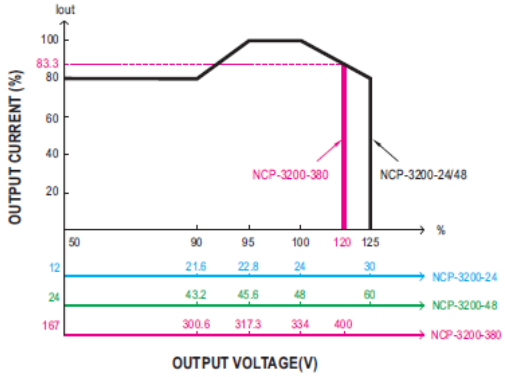
4	OUTPUT VOLTAGE PROGRAMMABLE(PV)	※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed to 50~125%(24/48V models) or 50~120%(380V model) of the nominal voltage by applying EXTERNAL VOLTAGE.



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



◎ For power supply mode
◎ The 100% output voltage is 24/48/334V.

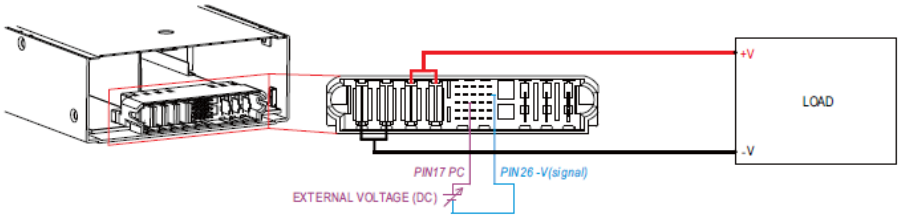


◎ The rated current should change with the Output Voltage Programming accordingly.
◎ The 100% output current is 133/67/9.6A.
◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

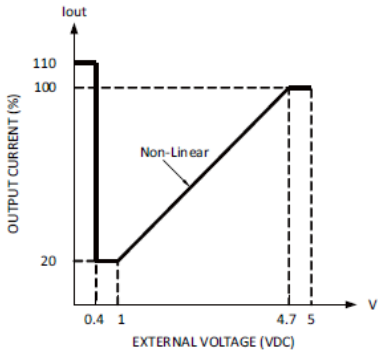
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
TEST RESULT：

PV / MODEL	0.3V	1V	4.37V	4.7V	5V
SPEC	380V±5%	167V±5%	380V±5%	400V±5%	400V±5%
Vout	379.8	165.8	379.50	401.50	407.60

5	OUTPUT CURRENT PROGRAMMABLE (PC)	※ The constant current level can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE. ※ If setting output current to a much lower level, as output status turns to constant current mode, it might cause higher current ripple under such condition.



◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.
◎ Output will shut down after O/P voltage is below < 80% of Vset for 5 sec, re-power on to recover.



◎ The 100% output current is 133/67/9.6A.
◎ Notice the output power do not over rated power (max.)

I/P: 230 VAC
O/P:TESTING
Ta:25℃
TEST RESULT：

PC V	0.3V	1V	4.7V	5V
SPEC	110%±10%	20%±10%	100%±10%	100%±10%
TEST	111.46%	19.38%	102.08%	104.17%

6	CURRENT SHARING	Maximum 10 rack shelfs in parallel CURRENT SHARING TOLERANCE < ±10% I/P： 230 VAC O/P：90%/45% LOAD Ta：25℃ TEST RESULT：

NO	45% LOAD	90% LOAD	NO	45% LOAD	90% LOAD	NO	45% LOAD	90% LOAD	NO	45% LOAD	90% LOAD
0	3.69	7.59	10	3.59	7.59	20	3.69	7.50	30	3.69	7.50
1	3.69	7.50	11	3.69	7.59	21	3.69	7.59	31	3.69	7.50
2	3.80	7.59	12	3.69	7.39	22	3.80	7.50	32	3.69	7.59
3	3.36	7.50	13	3.69	7.50	23	3.69	7.50	33	3.69	7.59
4	3.69	7.50	14	3.69	7.59	24	3.59	7.59	34	3.59	7.50
5	3.69	7.59	15	3.80	7.59	25	3.69	7.50	35	3.69	7.59
6	3.69	7.50	16	3.80	7.59	26	3.59	7.50	36	3.69	7.50
7	3.80	7.50	17	3.80	7.50	27	3.59	7.50	37	3.59	7.50
8	3.69	7.59	18	3.69	7.50	28	3.69	7.50	38	3.69	7.50
9	3.59	7.50	19	3.69	7.50	29	3.69	7.59	39	3.69	7.50

Unit :A

■ SAFETY& E.M.C. TEST

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:1.5KVDC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.8KVDC/min Ta:25℃	I/P-O/P:12.52mA I/P-FG:11.32mA O/P-FG: 0.002 m A 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℃	I/P-O/P: 3.56 GΩ I/P-FG: 5.7 GΩ O/P-FG: 8.06 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	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℃	PASS
2	CONDUCTION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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℃	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL : DHP-1UT-BHV-380
1. ROOM AMBIENT BURN-IN : 2 HRS
I/P : 230VAC O/P : FULL LOAD Ta= 25 ℃
2. HIGH AMBIENT BURN-IN : 2.5 HRS
I/P : 230VAC O/P : FULL LOAD Ta= 50 ℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25 ℃</th><th>HIGH AMBIENT Ta= 50 ℃</th></tr>
<tr><td>1</td><td>BD1</td><td>54.7</td><td>80.9</td></tr>
<tr><td>2</td><td>D7</td><td>60.1</td><td>85.2</td></tr>
<tr><td>3</td><td>D8</td><td>51.1</td><td>75.6</td></tr>
<tr><td>4</td><td>T3</td><td>33.4</td><td>57.7</td></tr>
<tr><td>5</td><td>U900</td><td>33.4</td><td>61.2</td></tr>
<tr><td>6</td><td>Q900</td><td>50.4</td><td>75.9</td></tr>
<tr><td>7</td><td>Q902</td><td>47.6</td><td>72.3</td></tr>
<tr><td>8</td><td>C6</td><td>32.8</td><td>55.5</td></tr>
<tr><td>9</td><td>U902</td><td>49.1</td><td>76.5</td></tr>
<tr><td>10</td><td>Q1</td><td>44.4</td><td>70.9</td></tr>
<tr><td>11</td><td>Q3</td><td>40.9</td><td>66.3</td></tr>
<tr><td>12</td><td>T1</td><td>61.1</td><td>87.5</td></tr>
<tr><td>13</td><td>T2</td><td>55.3</td><td>80.6</td></tr>
<tr><td>14</td><td>T301</td><td>39.6</td><td>62.0</td></tr>
<tr><td>15</td><td>U71</td><td>50.6</td><td>73.1</td></tr>
<tr><td>16</td><td>U201</td><td>37.3</td><td>62.1</td></tr>
<tr><td>17</td><td>C117</td><td>42.4</td><td>67.4</td></tr>
<tr><td>18</td><td>C112</td><td>39.5</td><td>64.2</td></tr>
<tr><td>19</td><td>Q401</td><td>39.4</td><td>64.0</td></tr>
<tr><td>20</td><td>D165</td><td>54.5</td><td>79.6</td></tr>
<tr><td>21</td><td>D403</td><td>55.9</td><td>80.5</td></tr>
<tr><td>22</td><td>D404</td><td>61.4</td><td>85.7</td></tr>
<tr><td>23</td><td>D409</td><td>62.0</td><td>86.3</td></tr>
<tr><td>24</td><td>D410</td><td>62.8</td><td>87.3</td></tr>
<tr><td>25</td><td>RT90</td><td>34.5</td><td>58.1</td></tr>
<tr><td>26</td><td>U903</td><td>32.4</td><td>55.4</td></tr>
<tr><td>27</td><td>U501</td><td>44.9</td><td>72.0</td></tr>
<tr><td>28</td><td>RG76</td><td>47.1</td><td>71.8</td></tr>
<tr><td>29</td><td>L1</td><td>42.1</td><td>65.7</td></tr>
<tr><td>30</td><td>L3</td><td>47.2</td><td>71.8</td></tr>
<tr><td>31</td><td>LF2</td><td>42.4</td><td>67.0</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P : 230 VAC
O/P : 108 % LOAD
Ta : 25℃</td><td>TEST : OK</td></tr>
</table>

3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/180VAC O/P： 80 % LOAD Ta= -35 ℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃/95 %R.H NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 50℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.024 %/℃(0~50℃)
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： STATIC	
7	THERMAL SHOCK TEST	-20~50℃	1. Thermal shock Temperature： -25℃~ +55℃ 2. Temperature change rate ：25℃ / 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	
8	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：3G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C121 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME		(1) 1065251.8HRS (2) 188311.7HRS (3) 270506.1HRS (4) 326144HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 3698.9K hrs min. Telcordia SR-332 (Bellcore) ; 818.3K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 50,000 hours		

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

2020.10.1 TAG-QA-009