



# Test Report: UHP-500-24

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500W Slim Type with PFC Switching Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress 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	OUTPUT VOLTAGE ADJUST RANGE	22.8V~25.2V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	22.18V~25.98V
2	PEAK LOAD	150% peak load capability(100ms)	I/P: 230VAC O/P: 150% LOAD Ta: 25°C	TEST: OK
3	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P: 90VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	- 0%~+0.45%
4	LINE REGULATION	-0.3%~+0.3%	I/P: 110VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	- 0%~+0.04%
5	LOAD REGULATION	-0.5%~+0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	- 0%~+0.04%
6	OVER/UNDERSHOOT TEST	<±5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5%
7	RIPPLE & NOISE (Max)	240mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	130mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>high frequency :</p> </div> <div style="width: 45%;"> <p>low frequency :</p> </div> </div>				
8	SET UP TIME(Max)	230VAC/ 1000ms 115VAC/1000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/636 ms 115VAC/468 ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> </div> </div>				



500W Slim Type with PFC Switching Supply

**UHP-500 series**

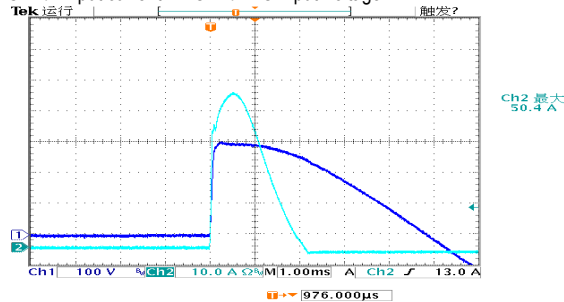
9	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/7.8ms 115VAC/9.2 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage		
10		HOLD UP TIME(Typ)	230VAC/ 12ms 115VAC/ 12ms	230VAC/17.2ms 115VAC/17.2 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage		
11	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 1240mVp-p (2) 436mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87 V~300V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/NO LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230VAC ON: 0.5 Sec OFF: 0.5 Sec 20MIN ( POWER ON/OFF NO DAMAGE )	TEST: OK
2	Withstand 300VAC Surge	300VAC input for 5 seconds No damage	I/P: 300VAC O/P: FULL LOAD Ta: 25°C	TEST: OK
3	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~264 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
4	AC CURRENT	4.85A/115VAC 2.6A/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I = 4.71A/ 115VAC I = 2.34A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.372mA N-FG: 0.348mA
6	INRUSH CURRENT(Typ)	230V/60A 115V/30A COLD START	I/P: 230VAC/115VAC O/P: FULL LOAD Ta: 25°C	I = 50.4A/ 230VAC I = 12.3A/ 115VAC

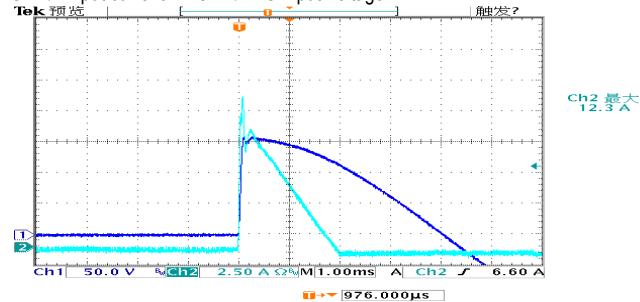
INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



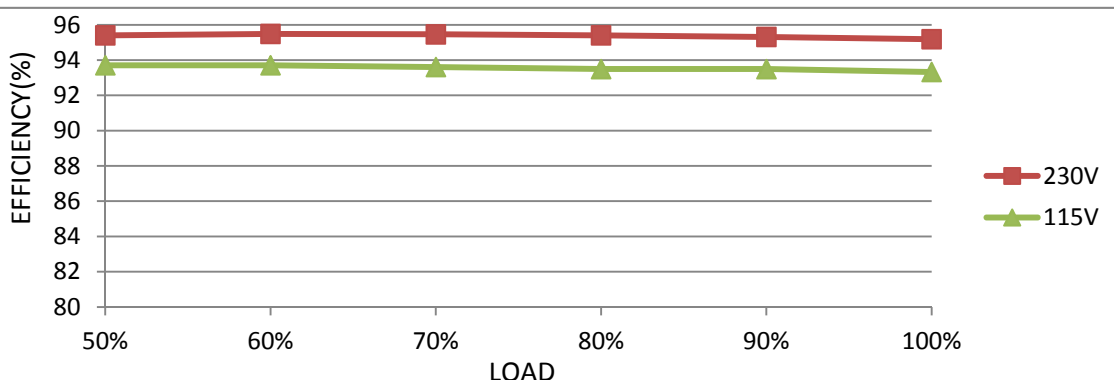


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# UHP-500 series

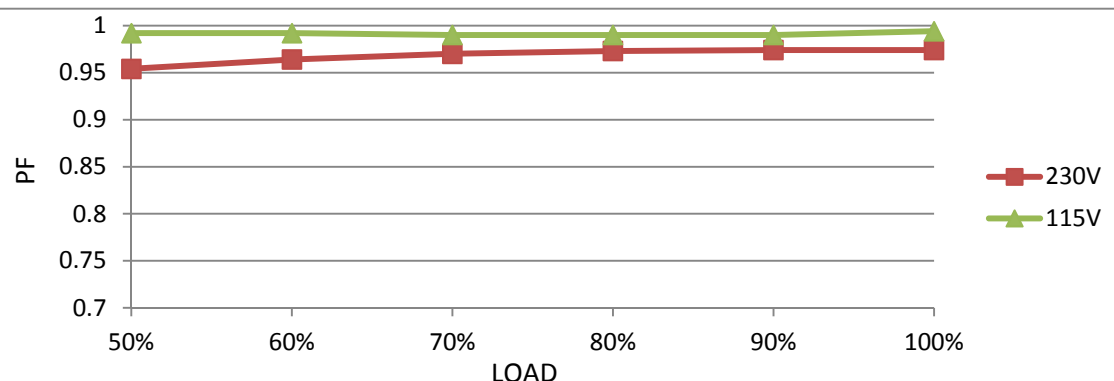
7	EFFICIENCY(Typ)	94.5%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	95.1%
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EFFICIENCY vs LOAD



8	POWER FACTOR	0.95/ 230VAC 0.98/115VAC	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	PF=0.974/ 230VAC PF=0.994/ 115VAC
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P.F vs LOAD



## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110~140%	I/P: 110VAC I/P: 230VAC I/P: 264VAC O/P: TESTING Ta: 25°C	113.5%/ 110VAC 120.5%/ 230VAC 120.5%/ 264VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	26.4V~31.2V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	28.231 V/ 90VAC 28.231V/ 230VAC 28.251V/ 264VAC Shut down o/p voltage, re-power on to recovery
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 110VAC I/P: 230VAC I/P: 264VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 90VAC I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	REDUNDANT CONTROL	For parallel connection protection:For parallel applications,when one PSU can not work,the another one will be automatically enabled.This can preven the system crash,and provide the reliability of system	I/P: 230 VAC O/P:FULL LOAD	TEST: OK
2	DC OK CONTACT RATINGS	30VDC/1A RESISTIVE LOAD	I/P:230VAC O/P:FULL LOAD Ta:25°C	TEST: OK

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q10 Rated 22A/600V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 510 V (2) 510 V (3) 513 V
2	O/P Diode (MOSFET)	Q100 Rated 80V/74A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 56.0 V (2) 20.2 V (3) 57.3 V
3	Input Capacitor	C5 Rated 270 μ/ 420 V	I/P: High-Line +3V =267 V O/P: (1) FULL LOAD input on/off (2) NO LOAD input on /Off (3) FULL LOAD /NO LOAD Change Ta: 25°C	(1) 418 V (2) 418 V (3) 418 V
4	Control IC	U1 Rated 20V (MAX.)	I/P: High-Line +3V =267 V O/P: ((1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P (5) Low Line No Load Vo(min) Ta: 25°C	(1) 13.9 V (2) 13.8 V (3) 13.8 V (4) 13.7 V (5) 14.0 V
5	PFC Power Transistor	Q2 Rated 22A/600V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 536 V (2) 448 V (3) 539 V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75 KVAC/min I/P-FG: 2.0 KVAC/min O/P-FG: 1.25 KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 1.5 KVAC/min Ta: 25°C	I/P-O/P: 7.04 mA I/P-FG: 3.809 mA O/P-FG: 3.538 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/70%RH	I/P-O/P: >9999 MΩ I/P-FG: >9999 MΩ O/P-FG: >9999 MΩ
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta: 25°C	12mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55032	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55032	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 HEAVY INDUSTRY AIR: 8KV Contact: 4KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS CRITERIA A
5	E.F.T	EN61000-4-4 HEAVY INDUSTRY INPUT: 2KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS CRITERIA A
6	SURGE	EN61000-4-5 HEAVY INDUSTRY L-N: 2KV L,N-PE: 4KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS 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: UHP-500-24 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=25.1°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=49°C																																																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=25.1 °C</th> <th>HIGH AMBIENT Ta=49 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>41.3°C</td><td>63.1°C</td></tr> <tr><td>2</td><td>C10</td><td>53.0°C</td><td>75.9°C</td></tr> <tr><td>3</td><td>LF3</td><td>47.0°C</td><td>68.8°C</td></tr> <tr><td>4</td><td>BD1</td><td>60.8°C</td><td>82.5°C</td></tr> <tr><td>5</td><td>D8</td><td>60.9°C</td><td>91.2°C</td></tr> <tr><td>6</td><td>D9</td><td>64.0°C</td><td>93.3°C</td></tr> <tr><td>7</td><td>L3</td><td>62.4°C</td><td>96.1°C</td></tr> <tr><td>8</td><td>Q2</td><td>51.6°C</td><td>75.4°C</td></tr> <tr><td>9</td><td>Q4</td><td>49.0°C</td><td>73.0°C</td></tr> <tr><td>10</td><td>D5</td><td>56.7°C</td><td>86.9°C</td></tr> <tr><td>11</td><td>C5</td><td>49.7°C</td><td>71.5°C</td></tr> <tr><td>12</td><td>Q10</td><td>109.6°C</td><td>116.4°C</td></tr> <tr><td>13</td><td>Q11</td><td>110.9°C</td><td>115.8°C</td></tr> <tr><td>14</td><td>C93</td><td>73.8°C</td><td>95.8°C</td></tr> <tr><td>15</td><td>C36</td><td>71.7°C</td><td>91.8°C</td></tr> <tr><td>16</td><td>U1</td><td>45.3°C</td><td>68.8°C</td></tr> <tr><td>17</td><td>U2</td><td>46.8°C</td><td>71.9°C</td></tr> <tr><td>18</td><td>C38</td><td>66.2°C</td><td>86.7°C</td></tr> <tr><td>19</td><td>D30</td><td>56.9°C</td><td>88.2°C</td></tr> <tr><td>20</td><td>T1</td><td>67.8°C</td><td>94.1°C</td></tr> <tr><td>21</td><td>Q101</td><td>54.1°C</td><td>82.7°C</td></tr> <tr><td>22</td><td>Q103</td><td>59.8°C</td><td>87.1°C</td></tr> <tr><td>23</td><td>C115</td><td>45.4°C</td><td>68.8°C</td></tr> <tr><td>24</td><td>C119</td><td>45.8°C</td><td>69.6°C</td></tr> <tr><td>25</td><td>RTH2</td><td>49.9°C</td><td>73.0°C</td></tr> <tr><td>26</td><td>TSW1</td><td>53.0°C</td><td>77.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=25.1 °C	HIGH AMBIENT Ta=49 °C	1	LF1	41.3°C	63.1°C	2	C10	53.0°C	75.9°C	3	LF3	47.0°C	68.8°C	4	BD1	60.8°C	82.5°C	5	D8	60.9°C	91.2°C	6	D9	64.0°C	93.3°C	7	L3	62.4°C	96.1°C	8	Q2	51.6°C	75.4°C	9	Q4	49.0°C	73.0°C	10	D5	56.7°C	86.9°C	11	C5	49.7°C	71.5°C	12	Q10	109.6°C	116.4°C	13	Q11	110.9°C	115.8°C	14	C93	73.8°C	95.8°C	15	C36	71.7°C	91.8°C	16	U1	45.3°C	68.8°C	17	U2	46.8°C	71.9°C	18	C38	66.2°C	86.7°C	19	D30	56.9°C	88.2°C	20	T1	67.8°C	94.1°C	21	Q101	54.1°C	82.7°C	22	Q103	59.8°C	87.1°C	23	C115	45.4°C	68.8°C	24	C119	45.8°C	69.6°C	25	RTH2	49.9°C	73.0°C	26	TSW1	53.0°C	77.4°C
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/90VAC O/P: FULL /80% LOAD Ta= -35°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: 264VAC O/P: FULL LOAD Ta=50°C HUMIDITY= 95%R.H	TEST: OK																																																																																																												
4	TEMPERATURE COEFFICIENT	±0.03 %/°C (0-50°C)	I/P: 230 VAC O/P: FULL LOAD	±0.001%/°C (0-50°C)																																																																																																												





500W Slim Type with PFC Switching Supply

# UHP-500 series

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: 100 CYCLE 5. Input/Output condition: STATIC	TEST: OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -25°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: 230VAC/FULL LOAD AC ON/OFF TEST AC on 3 sec/AC off 1 sec TEST	TEST: OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 5G (5) Test Time: 180min in each axes (X.Y.Z) (6) Ta: 25°C	TEST: OK
8	CAPACITOR LIFE CYCLE	UHP-500-24: SUPPOSE C105 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) 177224 HRS (2) 32875 HRS (3) 128170 HRS (4) 267187 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 168K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Ta 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	SHENJW/ZHUOKB	SKY	LIUWY