Test Report： UHP-500-24

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

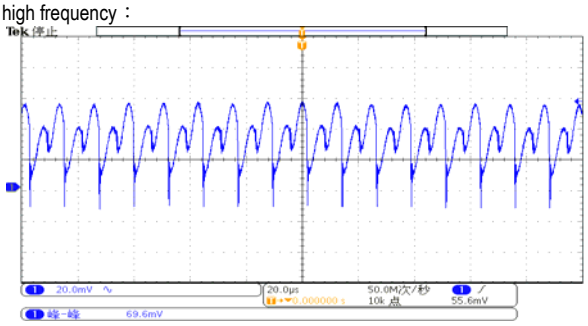
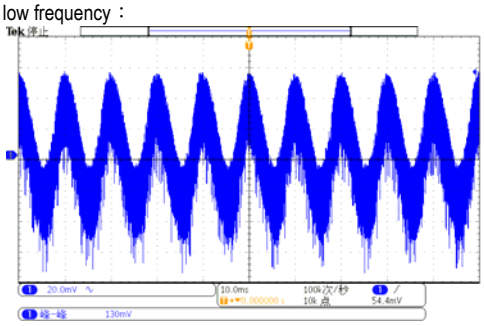
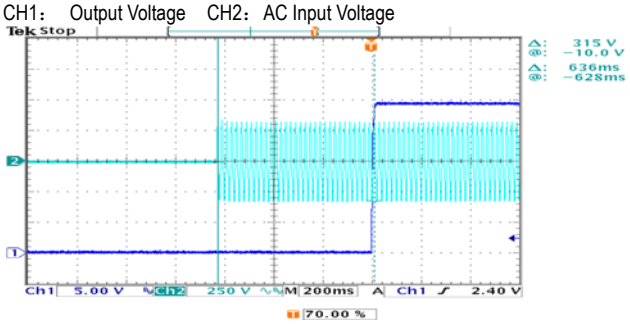
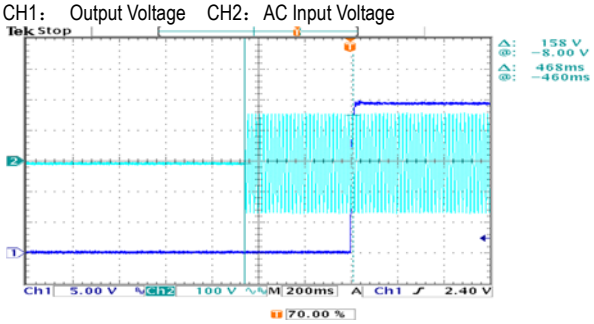
Safety Test
E.M.C. Test

■ RELIABILITY TEST

Environment Test

■ DESIGN VERIFY TEST

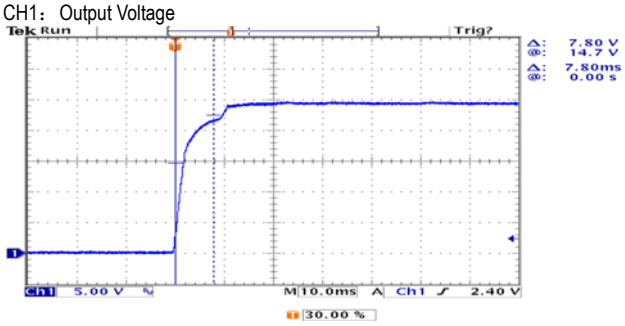
OUTPUT FUNCTION TEST

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℃	22.18V~25.98V
2	PEAK LOAD	150% peak load capability(100ms)	I/P： 230VAC O/P：150% LOAD Ta：25℃	TEST： OK
3	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P： 90VAC / 264VAC O/P：FULL / NO LOAD Ta：25℃	－0%~＋0.45%
4	LINE REGULATION	-0.3%~+0.3%	I/P： 110VAC ~ 264VAC O/P：FULL LOAD Ta：25℃	－0 %~＋0.04%
5	LOAD REGULATION	-0.5%~+0.5%	I/P： 230VAC O/P：FULL ~NO LOAD Ta：25℃	－0%~＋0.04%
6	OVER/UNDERSHOOT TEST	<±5 %	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<5%
7	RIPPLE & NOISE (Max)	240mVp-p	I/P： 230VAC O/P：FULL LOAD Ta：25℃	130mVp-p
	high frequency： 		low frequency： 	
8	SET UP TIME(Max)	230VAC/ 1000ms 115VAC/1000ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/636 ms 115VAC/468 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 	

9	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/7.8ms 115VAC/9.2 ms

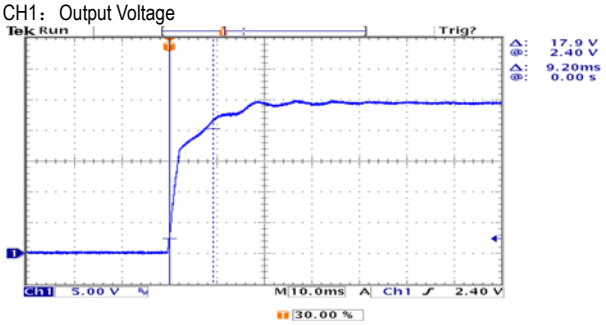
INPUT=230VAC/50HZ @ FULL LOAD

CH1：Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

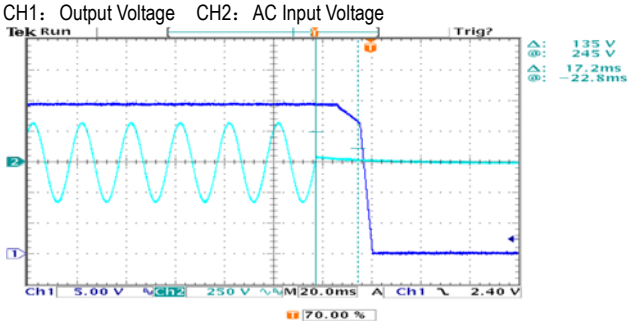
CH1：Output Voltage



10	HOLD UP TIME(Typ)	230VAC/ 12ms 115VAC/ 12ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/17.2ms 115VAC/17.2 ms

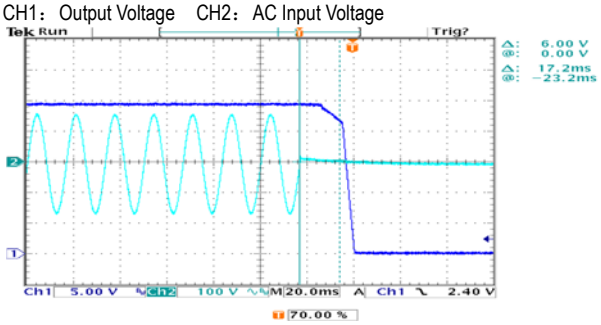
INPUT=230VAC/50HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage



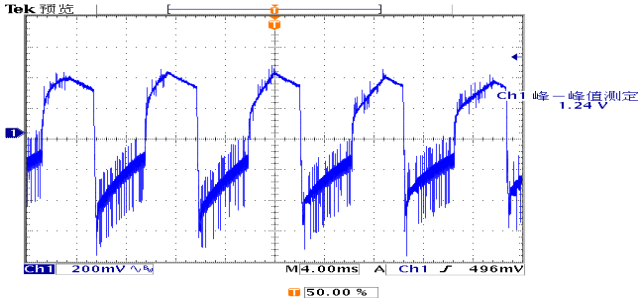
INPUT=115VAC/60HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage

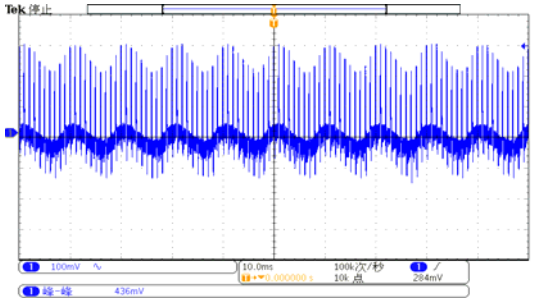


11	DYNAMIC LOAD	V1： 2400 mVp-p	I/P： 230VAC O/P： (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta：25℃	(1) 1240mVp-p (2) 436mVp-p

FULL /50% LOAD 50%DUTY / 120HZ



FULL /50% LOAD 50%DUTY / 1KHZ

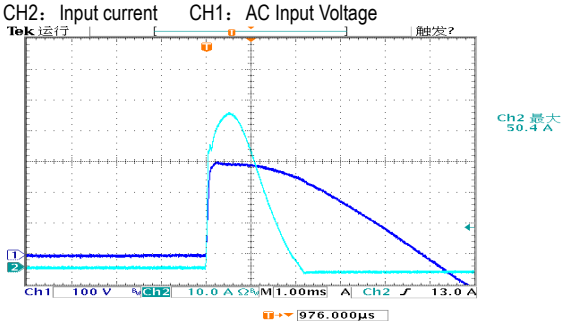


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P：TESTING O/P： FULL LOAD Ta：25℃	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℃	TEST： OK
3	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P： 90 VAC ~264 VAC O/P：FULL~NO LOAD Ta：25℃	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℃	I = 4.71A/ 115VAC I =2.34A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P： 240 VAC O/P：NO LOAD Ta：25℃	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℃	I =50.4A/ 230VAC I =12.3A/ 115VAC

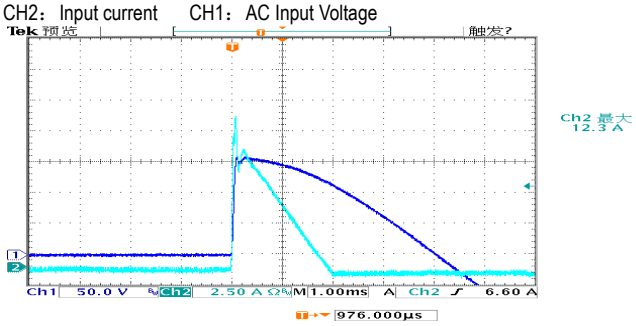
INPUT=230VAC/50HZ @ FULL LOAD

CH2：Input current CH1：AC Input Voltage



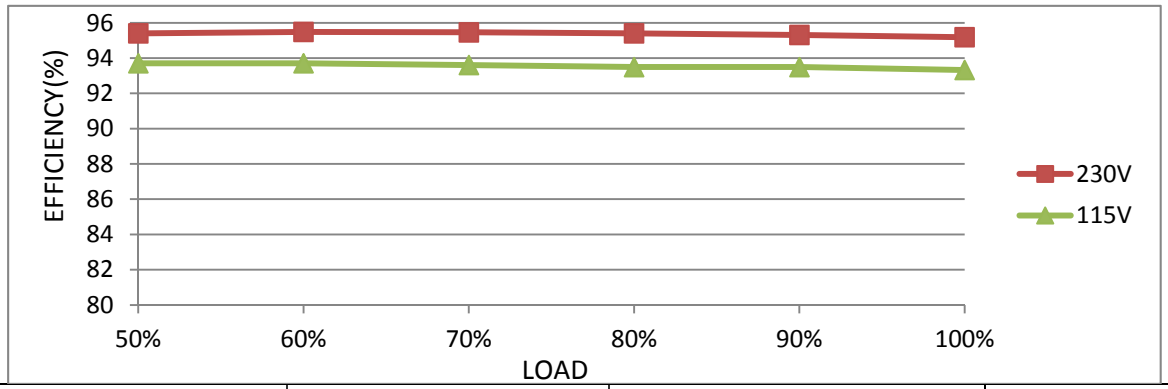
INPUT=115VAC/60HZ @ FULL LOAD

CH2：Input current CH1：AC Input Voltage



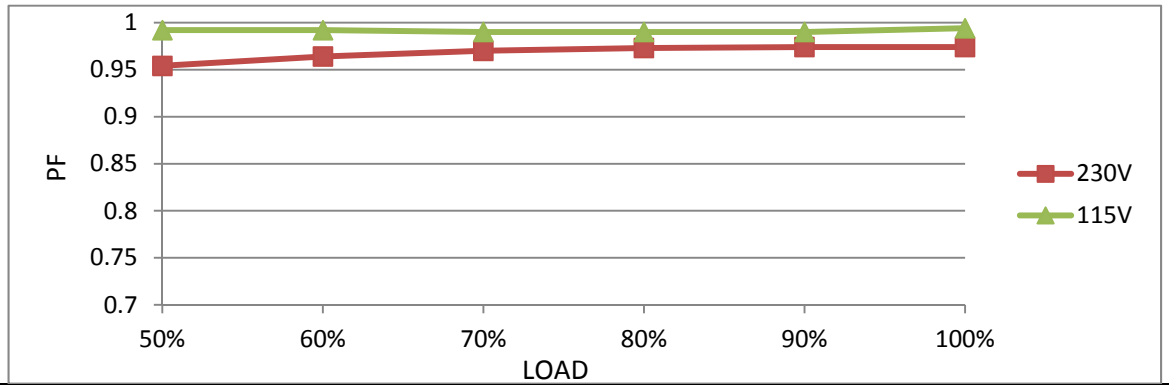
7	EFFICIENCY(Typ)	94.5%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	95.1 %

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℃	PF=0.974/ 230VAC PF=0.994/ 115VAC

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℃	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℃	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 dowm
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 90VAC I/P： 264VAC O/P：FULL LOAD Ta：25℃	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℃	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℃	(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℃	(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℃	(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℃	(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℃	(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℃	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℃/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℃	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℃	PASS
2	CONDUCTION	EN55032	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55032	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	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℃	PASS CRITERIA A
5	E.F.T	EN61000-4-4 HEAVY INDUSTRY INPUT：2KV	I/P： 230VAC/50HZ O/P：FULL LOAD Ta：25℃	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℃	PASS CRITERIA A
7	Test by certified Lab ＆ Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT 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： UHP-500-48
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=28.6℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=44.5℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=28.6 ℃</th><th>HIGH AMBIENT Ta=44.5 ℃</th></tr>
<tr><td>1</td><td>BD1</td><td>58.3℃</td><td>71.1℃</td></tr>
<tr><td>2</td><td>D9</td><td>62.9℃</td><td>75.9℃</td></tr>
<tr><td>3</td><td>Q2</td><td>56.6℃</td><td>70.2℃</td></tr>
<tr><td>4</td><td>D5</td><td>60.5℃</td><td>73.5℃</td></tr>
<tr><td>5</td><td>C5</td><td>51.6℃</td><td>64.4℃</td></tr>
<tr><td>6</td><td>Q10</td><td>69.9℃</td><td>84.2℃</td></tr>
<tr><td>7</td><td>Q11</td><td>68.0℃</td><td>82.2℃</td></tr>
<tr><td>8</td><td>C93</td><td>63.5℃</td><td>77.3℃</td></tr>
<tr><td>9</td><td>C36</td><td>58.9℃</td><td>72.6℃</td></tr>
<tr><td>10</td><td>U1</td><td>50.0℃</td><td>62.8℃</td></tr>
<tr><td>11</td><td>U2</td><td>51.4℃</td><td>64.5℃</td></tr>
<tr><td>12</td><td>T1</td><td>70.7℃</td><td>84.9℃</td></tr>
<tr><td>13</td><td>Q103</td><td>60.3℃</td><td>75.3℃</td></tr>
<tr><td>14</td><td>Q100</td><td>54.5℃</td><td>69.2℃</td></tr>
<tr><td>15</td><td>Q210</td><td>48.2℃</td><td>61.7℃</td></tr>
<tr><td>16</td><td>U100</td><td>49.3℃</td><td>63.2℃</td></tr>
<tr><td>17</td><td>C115</td><td>48.7℃</td><td>62.8℃</td></tr>
<tr><td>18</td><td>C119</td><td>49.8℃</td><td>64.3℃</td></tr>
<tr><td>19</td><td>TSW1</td><td>65.2℃</td><td>78.7℃</td></tr>
<tr><td>20</td><td>Tc</td><td>56.4℃</td><td>70.5℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/90VAC
O/P：FULL /80% LOAD
Ta= -25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50℃
NO DAMAGE</td><td>I/P： 264VAC
O/P：FULL LOAD
Ta=50℃
HUMIDITY= 95%R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.03 %/℃(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.001%/℃(0~50℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">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：100 CYCLE
5. Input/Output condition： STATIC</td><td>TEST：OK</td></tr>
</table>

6	THERMAL SHOCK TEST	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： 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℃	TEST：OK
8	CAPACITOR LIFE CYCLE	UHP-500-48：SUPPOSE C105 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) 822639 HRS (2) 160235 HRS (3) 234623 HRS (4) 322006 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 168K hrs min. MIL-HDBK-217F (25℃)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) ： 30,000 hours @ Ta 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	SHENJW/ZHUOKB	SKY	LIUWY