Test Report：　UHP-350-24

350W Slim Type with PFC Switching Power 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

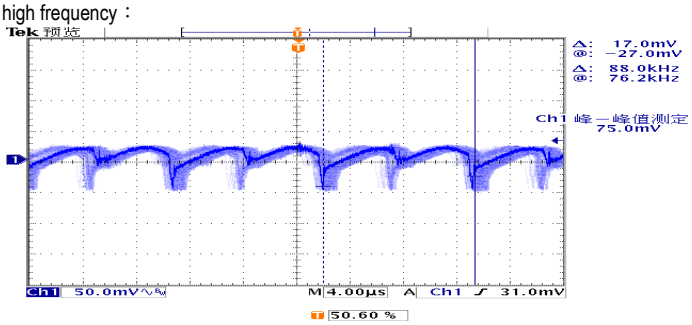
Environment Test

■ DESIGN VERIFY TEST

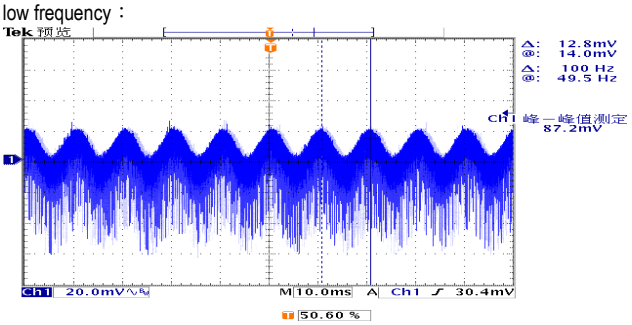
OUTPUT FUNCTION TEST

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℃	21.89V~ 26.67V
2	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P： 110VAC / 264VAC O/P：FULL / NO LOAD Ta：25℃	-0.29%~+0.29%
3	LINE REGULATION	-0.3%~+0.3%	I/P： 180VAC ~ 264VAC O/P：FULL LOAD Ta：25℃	-0%~+0%
4	LOAD REGULATION	-0.5%~+0.5%	I/P： 230VAC O/P：FULL ~NO LOAD Ta：25℃	-0%~+0%
5	OVER/UNDERSHOOT TEST	<±5 %	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<5%
6	RIPPLE & NOISE (Max)	240mVp-p	I/P： 230VAC O/P：FULL LOAD Ta：25℃	87.2mVp-p

high frequency：



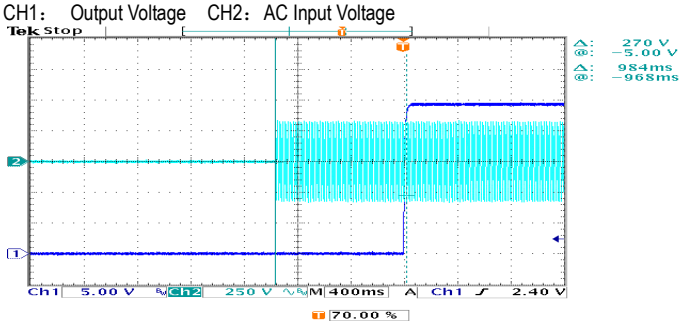
low frequency：



7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/984 ms 115VAC/864 ms

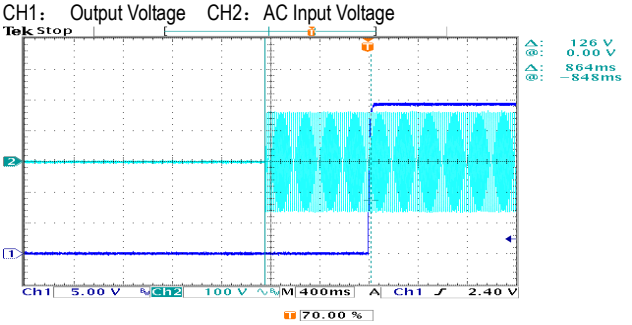
INPUT=230VAC/50HZ @ FULL LOAD

CH1： Output Voltage CH2：AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

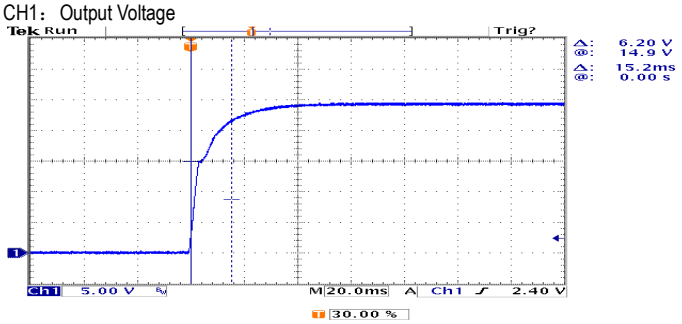
CH1： Output Voltage CH2：AC Input Voltage



8	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/15.2 ms 115VAC/15.6 ms

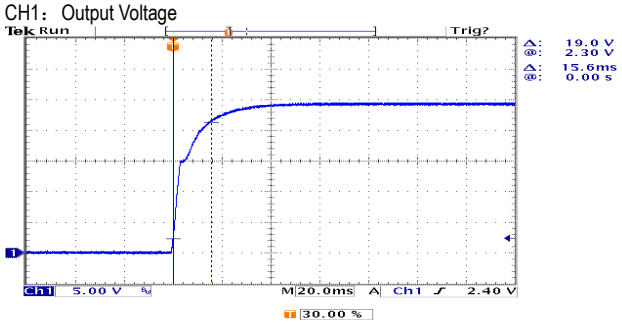
INPUT=230VAC/50HZ @ FULL LOAD

CH1：Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

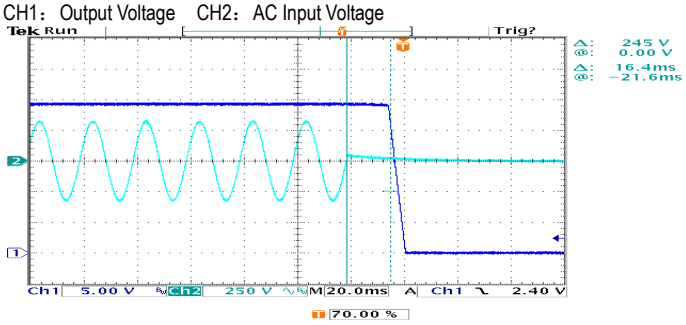
CH1：Output Voltage



9	HOLD UP TIME(Typ)	230VAC/ 10ms 115VAC/ 10ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/16.4 ms 115VAC/16.8 ms

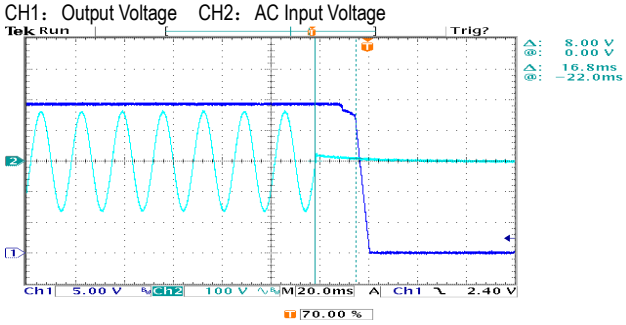
INPUT=230VAC/50HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage



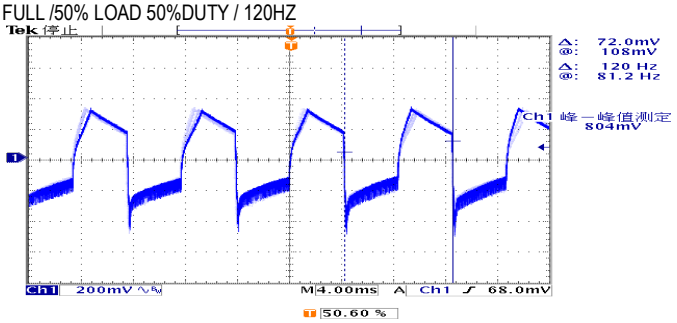
INPUT=115VAC/60HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage

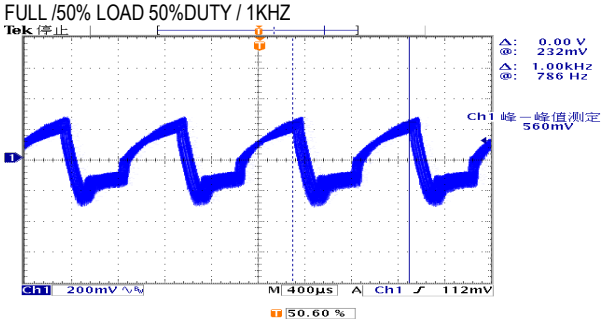


10	DYNAMIC LOAD	V1： 2400 mVp-p	I/P： 230VAC O/P： (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta：25℃	 (1) 804mVp-p (2) 560mVp-p

FULL /50% LOAD 50%DUTY / 120HZ



FULL /50% LOAD 50%DUTY / 1KHZ

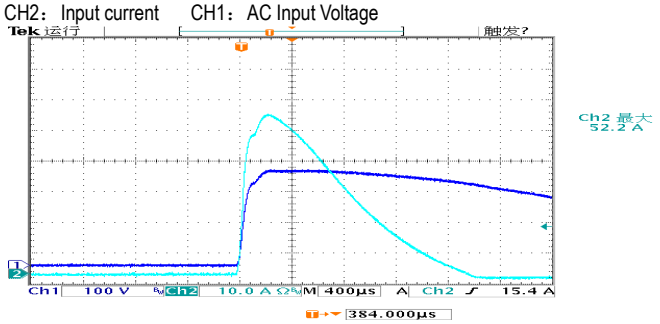


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P：TESTING O/P：75%~FULL LOAD Ta：25℃	87 V~300V
			I/P： (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P：90%/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	4.0A/115VAC 2.0A/230VAC	I/P： 115 VAC I/P： 230 VAC O/P： FULL LOAD Ta：25℃	I = 3.31A/ 115VAC I = 1.62 A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P： 240 VAC O/P：NO LOAD Ta：25℃	L-FG：0.265 mA N-FG：0.275mA
6	NO LOAD CONSUMPTION	---	I/P：115VAC I/P：230VAC O/P：NO LOAD Ta：25℃	1.32 W/115VAC 0.92 W/230VAC
7	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 30A COLD START	I/P： 230 VAC/115VAC O/P：FULL LOAD Ta：25℃	I = 52.2A/ 230VAC I = 23.0A/ 115VAC

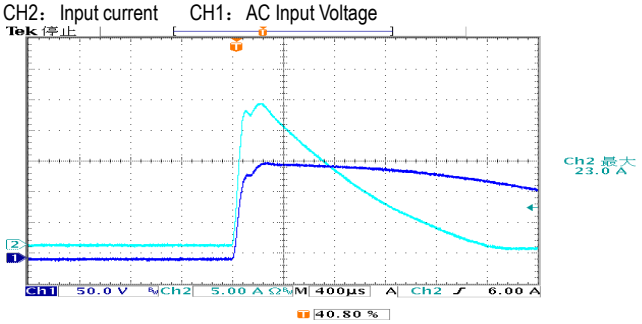
INPUT=230VAC/50HZ @ FULL LOAD

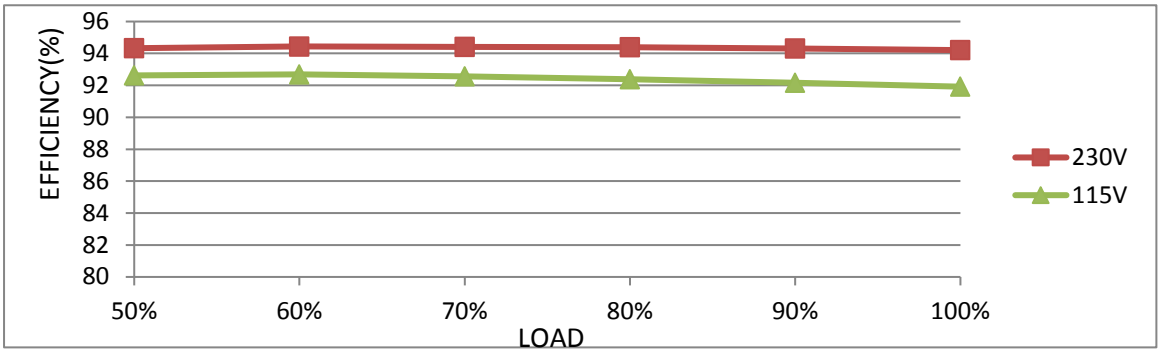
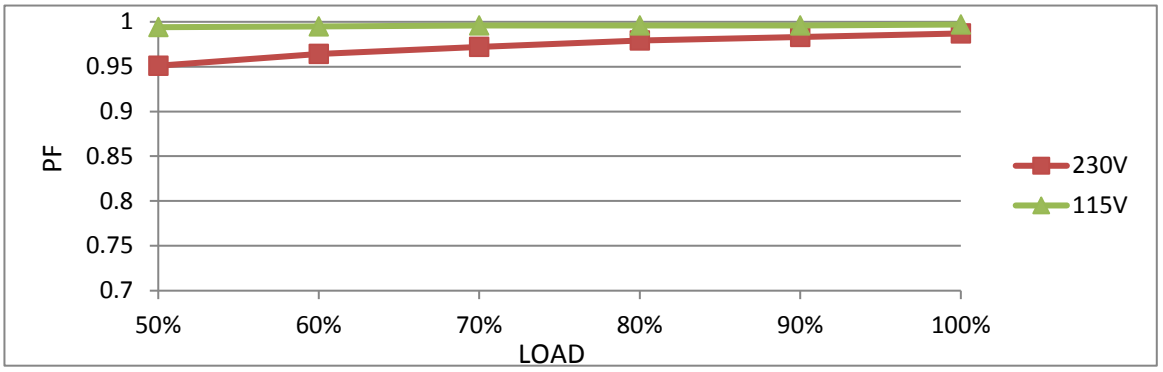
CH2：Input current CH1：AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH2：Input current CH1：AC Input Voltage



8	EFFICIENCY(Typ)	94%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	94.21%
	EFFICIENCY vs LOAD 			
9	POWER FACTOR	0.94/ 230VAC 0.98/115VAC	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF=0.987/ 230VAC PF=0.997/ 115VAC
	P.F vs LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	110~140%	I/P： 110VAC I/P： 230VAC I/P： 264VAC O/P：TESTING Ta：25℃	126.1%/ 110VAC 126.0%/ 230VAC 126.7 %/ 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℃	28.5V/ 90VAC 28.5V/ 230VAC 28.5V/ 264VAC Shut down o/p voltage，re-power on to recovery
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P： 100VAC I/P： 230VAC I/P： 264VAC O/P：90%/FULL LOAD	O.T.P. Active Shut down o/p voltage，recovers automatically after temperature goes dowm

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	DCOK CONTACT RATINGS	15VDC/10mA 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 24A/600V	I/P：High-Line +3V =267V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	(1) 452 V (2) 456 V (3) 450 V
2	O/P Diode (MOSFET)	Q101 Rated 100V/95A	I/P：High-Line +3V =267V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	(1) 53.6 V (2) 11.6 V (3) 52.4 V
3	Input Capacitor	C5 Rated 180 μ / 450 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) 400 V (2) 398 V (3) 399 V
4	Control IC	U1 Rated 16V (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) 13.1 V (2) 13.2 V (3) 13.3 V (4) 13.1 V (5) 12.9 V
5	PFC Power Transistor	Q 1 Rated 24A/600V	I/P：High-Line +3V =267V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	(1) 482 V (2) 412 V (3) 480 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：4.2 KVAC/min I/P-FG： 2.4 KVAC/min O/P-FG：1.5 KVAC/min Ta：25℃	I/P-O/P：2.553 mA I/P-FG： 2.294 mA O/P-FG：11.24 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℃	9 mΩ

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 CLASS B	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	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-350-24
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=29.2℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=49.9℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=29.2 ℃</th><th>HIGH AMBIENT Ta=49.9 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>50.1℃</td><td>69.8℃</td></tr>
<tr><td>2</td><td>C10</td><td>52.6℃</td><td>72.7℃</td></tr>
<tr><td>3</td><td>RTH1</td><td>50.7℃</td><td>70.3℃</td></tr>
<tr><td>4</td><td>BD1</td><td>55.3℃</td><td>74.6℃</td></tr>
<tr><td>5</td><td>L1</td><td>61.4℃</td><td>82.3℃</td></tr>
<tr><td>6</td><td>C5</td><td>50.4℃</td><td>70.1℃</td></tr>
<tr><td>7</td><td>Q1</td><td>51.5℃</td><td>71.5℃</td></tr>
<tr><td>8</td><td>D1</td><td>52.1℃</td><td>71.6℃</td></tr>
<tr><td>9</td><td>C92</td><td>53.4℃</td><td>73.8℃</td></tr>
<tr><td>10</td><td>Q10</td><td>58.5℃</td><td>79.7℃</td></tr>
<tr><td>11</td><td>U2</td><td>47.3℃</td><td>67.2℃</td></tr>
<tr><td>12</td><td>U1</td><td>48.0℃</td><td>68.0℃</td></tr>
<tr><td>13</td><td>T1</td><td>73.2℃</td><td>93.4℃</td></tr>
<tr><td>14</td><td>Q103</td><td>46.8℃</td><td>67.3℃</td></tr>
<tr><td>15</td><td>U100</td><td>43.6℃</td><td>63.6℃</td></tr>
<tr><td>16</td><td>C108</td><td>45.2℃</td><td>65.5℃</td></tr>
<tr><td>17</td><td>TSW1</td><td>53.9℃</td><td>74.6℃</td></tr>
<tr><td>18</td><td>TC</td><td>45.4℃</td><td>65.0℃</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 /75% LOAD
Ta= -35℃</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>±0.004%/℃(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：5 CYCLE
5. Input/Output condition： STATIC</td><td>TEST：OK</td></tr>
</table>

6	THERMAL SHOCK TEST	1. Thermal shock Temperature： -35℃~ +55℃ 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： 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： 60min in each axes (X.Y.Z) (6) Ta： 25℃	TEST： OK
8	CAPACITOR LIFE CYCLE	UHP-350-24： 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) 815041 HRS (2) 148102 HRS (3) 210141 HRS (4) 265537 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 1791.2K hrs min. Telcordia SR-332 (Bellcore) ; 253.4K 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