



# Test Report: UHP-350-5

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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

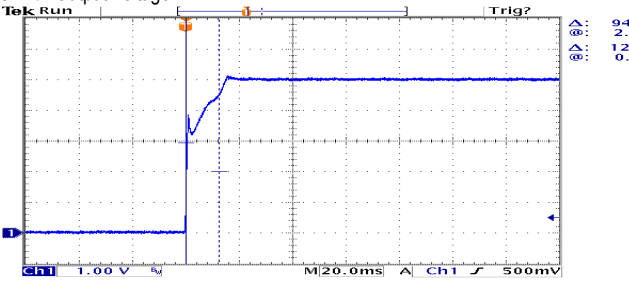
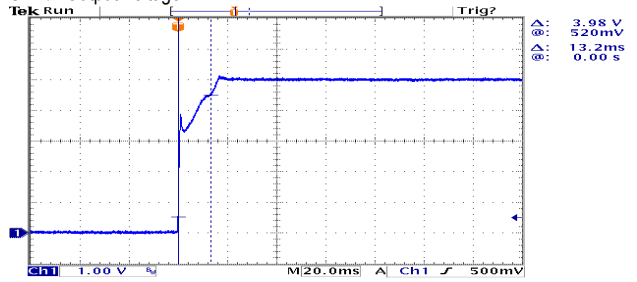
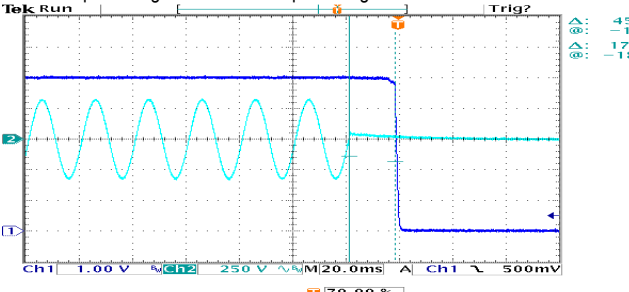
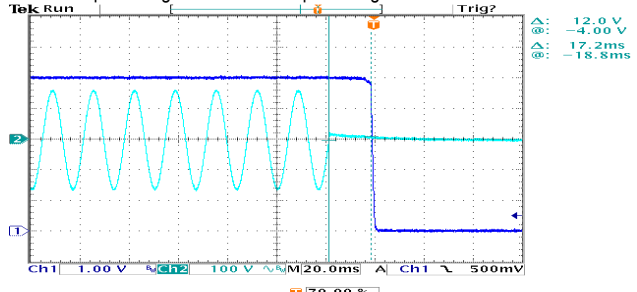
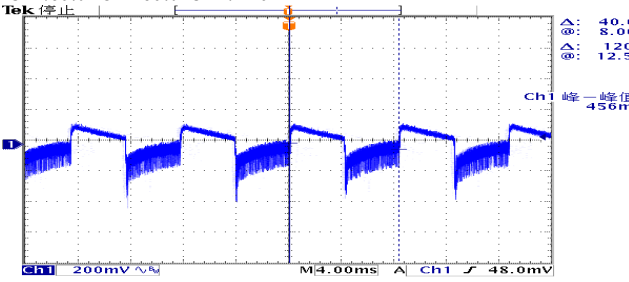
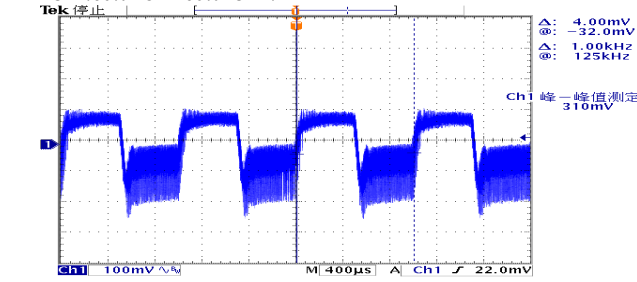
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	4.5V~5.5V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	4.33V~ 5.66V
2	OUTPUT VOLTAGE TOLERANCE	-2%~+2%	I/P: 110VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	-1.4%~+1.4%
3	LINE REGULATION	-0.5%~+0.5%	I/P: 180VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	-0%~+0%
4	LOAD REGULATION	-1%~+1%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	-0.39%~+0.39%
5	OVER/UNDERSHOOT TEST	<±10 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<10%
6	RIPPLE & NOISE (Max)	200mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	73.6mVp-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>				
7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/992 ms 115VAC/880 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>				



350W Slim Type with PFC Switching Power Supply

**UHP-350 series**

8	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/12.4 ms 115VAC/13.2 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage</p>  <p>△: 94.0mV Ⓞ: 2.94 V △: 12.4ms Ⓞ: 0.00 s</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage</p>  <p>△: 3.98 V Ⓞ: 520mV △: 13.2ms Ⓞ: 0.00 s</p>		
9	HOLD UP TIME(Typ)	230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/17.2 ms 115VAC/17.2 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>  <p>△: 45.0 V Ⓞ: -140 V △: 17.2ms Ⓞ: -18.8ms</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>  <p>△: 12.0 V Ⓞ: -4.00 V △: 17.2ms Ⓞ: -18.8ms</p>		
10	DYNAMIC LOAD	V1: 1000 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) 456mVp-p (2) 310mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>  <p>△: 40.0mV Ⓞ: 8.00mV △: 120 Hz Ⓞ: 12.5kHz</p> <p>Ch1 峰-峰值測定 456mV</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>  <p>△: 4.00mV Ⓞ: -32.0mV △: 1.00kHz Ⓞ: 125kHz</p> <p>Ch1 峰-峰值測定 310mV</p>		

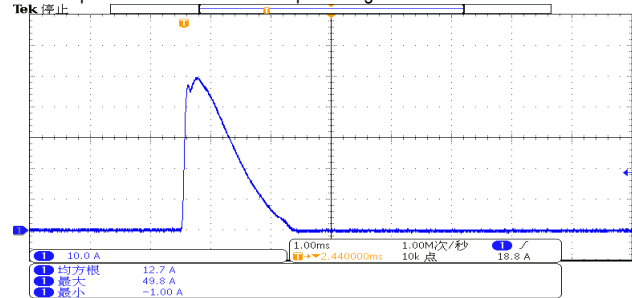


**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: 75%-FULL LOAD Ta: 25°C	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°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	4.0A/115VAC 2.0A/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I = 2.95 A/ 115VAC I = 1.47 A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.266 mA N-FG: 0.275 mA
6	NO LOAD CONSUMPTION	---	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	3.55 W/115VAC 3.1W/230VAC
7	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 30A COLD START	I/P: 230 VAC/115VAC O/P: FULL LOAD Ta: 25°C	I = 49.8A/ 230VAC I = 24.2A/ 115VAC

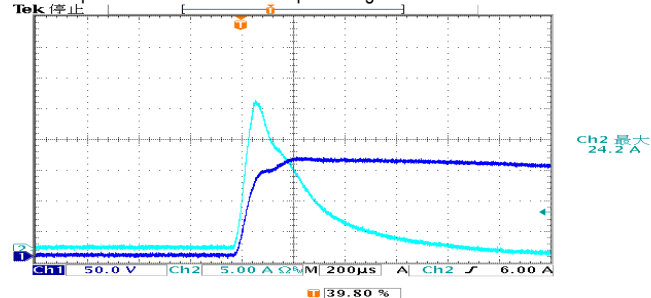
INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



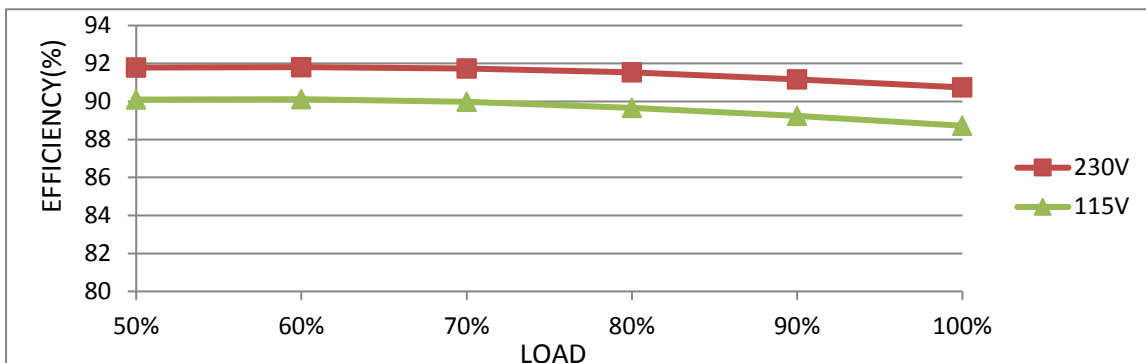
INPUT=115VAC/60HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



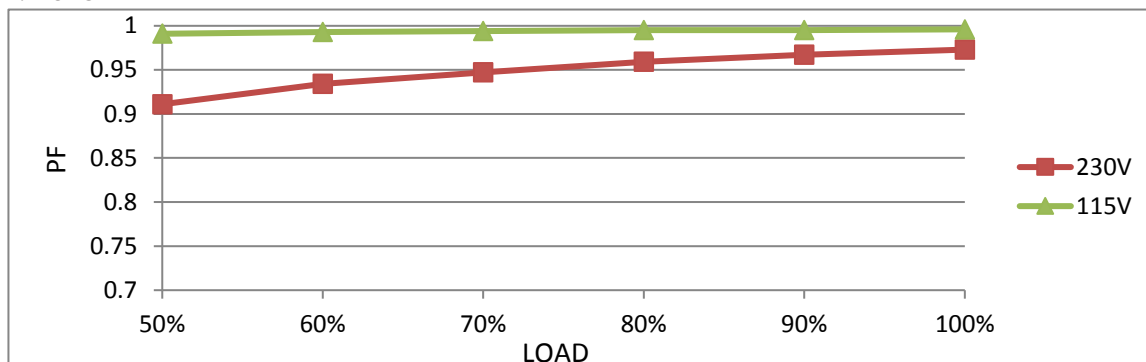
8	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.74%
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EFFICIENCY vs LOAD



9	POWER FACTOR	0.94/ 230VAC 0.98/115VAC	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	PF=0.973/ 230VAC PF=0.996/ 115VAC
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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°C	123.7%/ 110VAC 123.9%/ 230VAC 124.1%/ 264VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	6.270 V/ 90VAC 6.270 V/ 230VAC 6.270V/ 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 down

**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°C	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°C	(1) 474 V (2) 494 V (3) 472 V
2	O/P Diode (MOSFET)	Q100 Rated 170A/30V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 12.2 V (2) 5.12 V (3) 11.8 V
3	Input Capacitor	C5 Rated 180 $\mu$ / 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°C	(1) 398 V (2) 390 V (3) 396 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°C	(1) 13.0 V (2) 13.1 V (3) 13.1 V (4) 12.2 V (5) 13.0 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°C	(1) 498 V (2) 446 V (3) 497 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°C	I/P-O/P: 2.438 mA I/P-FG: 2.222 mA O/P-FG: 11.61 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: 8552 MΩ I/P-FG: 4242 MΩ O/P-FG: 3690 MΩ
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta: 25°C	11 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°C	PASS
2	CONDUCTION	EN55032 CLASS B	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	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-350-5 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=26.2°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=49.5°C																																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26.2 °C</th> <th>HIGH AMBIENT Ta=49.5 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>48.8°C</td><td>71.0°C</td></tr> <tr><td>2</td><td>ZNR1</td><td>47.0°C</td><td>69.7°C</td></tr> <tr><td>3</td><td>BD1</td><td>53.4°C</td><td>75.5°C</td></tr> <tr><td>4</td><td>L1</td><td>61.2°C</td><td>85.3°C</td></tr> <tr><td>5</td><td>C5</td><td>50.4°C</td><td>73.1°C</td></tr> <tr><td>6</td><td>Q1</td><td>49.5°C</td><td>72.0°C</td></tr> <tr><td>7</td><td>D1</td><td>50.9°C</td><td>73.4°C</td></tr> <tr><td>8</td><td>C36</td><td>52.9°C</td><td>75.9°C</td></tr> <tr><td>9</td><td>U1</td><td>48.3°C</td><td>71.1°C</td></tr> <tr><td>10</td><td>U2</td><td>47.9°C</td><td>70.6°C</td></tr> <tr><td>11</td><td>Q11</td><td>60.4°C</td><td>84.1°C</td></tr> <tr><td>12</td><td>T1</td><td>71.6°C</td><td>96.0°C</td></tr> <tr><td>13</td><td>Q103</td><td>60.2°C</td><td>85.1°C</td></tr> <tr><td>14</td><td>Q202</td><td>68.8°C</td><td>93.4°C</td></tr> <tr><td>15</td><td>U100</td><td>51.6°C</td><td>74.3°C</td></tr> <tr><td>16</td><td>C106</td><td>66.5°C</td><td>91.2°C</td></tr> <tr><td>17</td><td>C108</td><td>70.1°C</td><td>95.0°C</td></tr> <tr><td>18</td><td>TSW1</td><td>54.5°C</td><td>77.6°C</td></tr> <tr><td>19</td><td>U4</td><td>48.7°C</td><td>71.5°C</td></tr> <tr><td>20</td><td>TC</td><td>46.2°C</td><td>68.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26.2 °C	HIGH AMBIENT Ta=49.5 °C	1	LF2	48.8°C	71.0°C	2	ZNR1	47.0°C	69.7°C	3	BD1	53.4°C	75.5°C	4	L1	61.2°C	85.3°C	5	C5	50.4°C	73.1°C	6	Q1	49.5°C	72.0°C	7	D1	50.9°C	73.4°C	8	C36	52.9°C	75.9°C	9	U1	48.3°C	71.1°C	10	U2	47.9°C	70.6°C	11	Q11	60.4°C	84.1°C	12	T1	71.6°C	96.0°C	13	Q103	60.2°C	85.1°C	14	Q202	68.8°C	93.4°C	15	U100	51.6°C	74.3°C	16	C106	66.5°C	91.2°C	17	C108	70.1°C	95.0°C	18	TSW1	54.5°C	77.6°C	19	U4	48.7°C	71.5°C	20	TC	46.2°C	68.4°C
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19	U4	48.7°C	71.5°C																																																																																					
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/90VAC O/P: FULL /75% 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	±0.009%/°C (0~50°C)																																																																																				
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: 5 CYCLE 5. Input/Output condition: STATIC		TEST: OK																																																																																				





350W Slim Type with PFC Switching Power Supply

# UHP-350 series

6	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: 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°C	TEST: OK
8	CAPACITOR LIFE CYCLE	UHP-350-5: 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) 1276527 HRS (2) 59708 HRS (3) 427592 HRS (4) 1607052 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°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