



Test Report: UHP-350-5

350W Slim Type with PFC Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

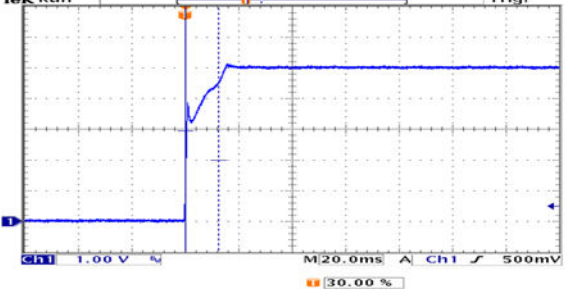
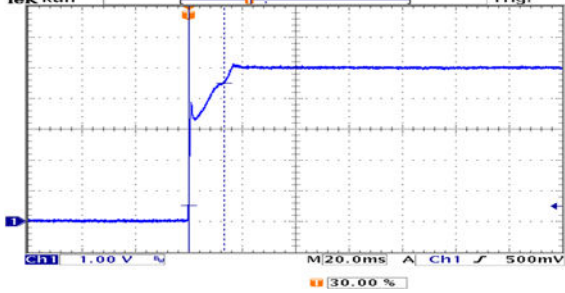
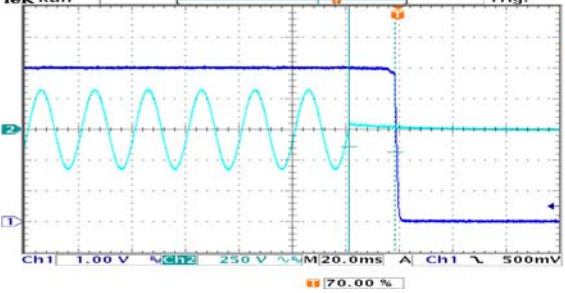
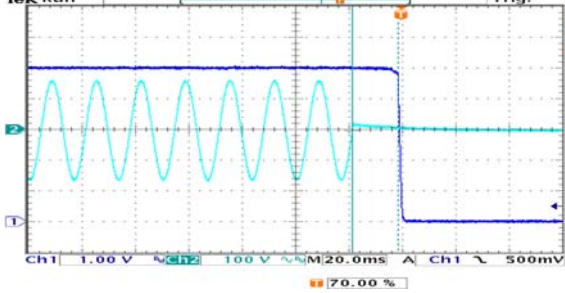
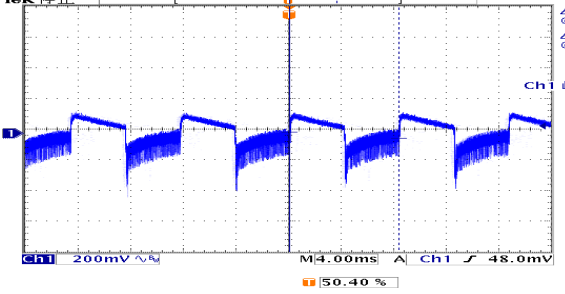
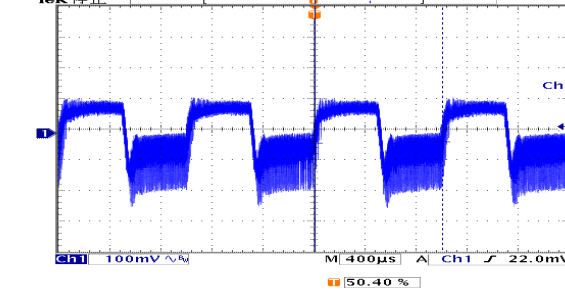
■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

Environment Test

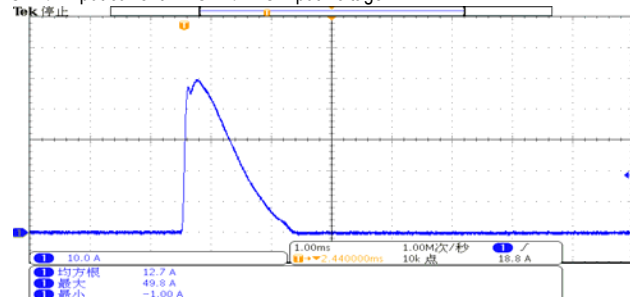
9	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/12.4 ms 115VAC/13.2 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage 				
10	HOLD UP TIME(Typ)	230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/17.2 ms 115VAC/17.2 ms
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: 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
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°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

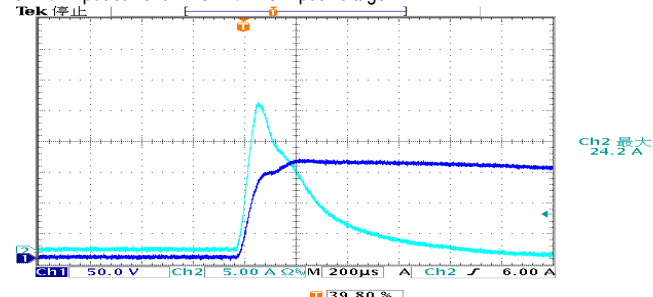
INPUT=230VAC/50HZ @ FULL LOAD

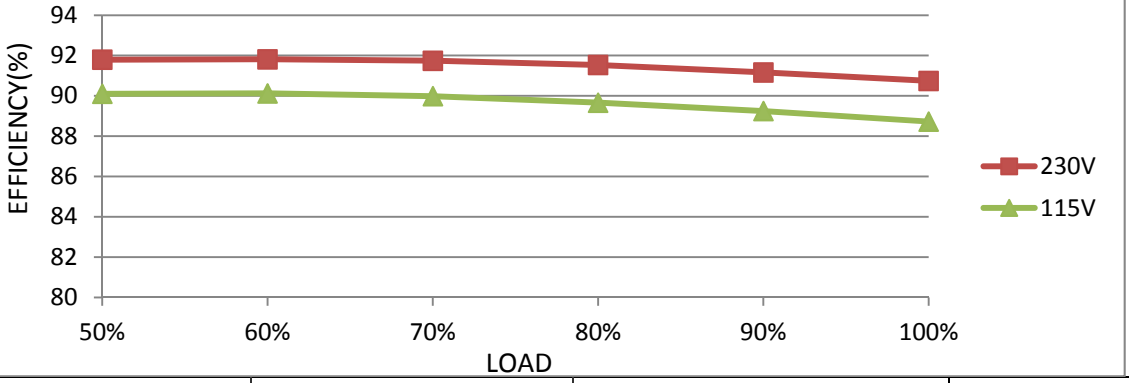
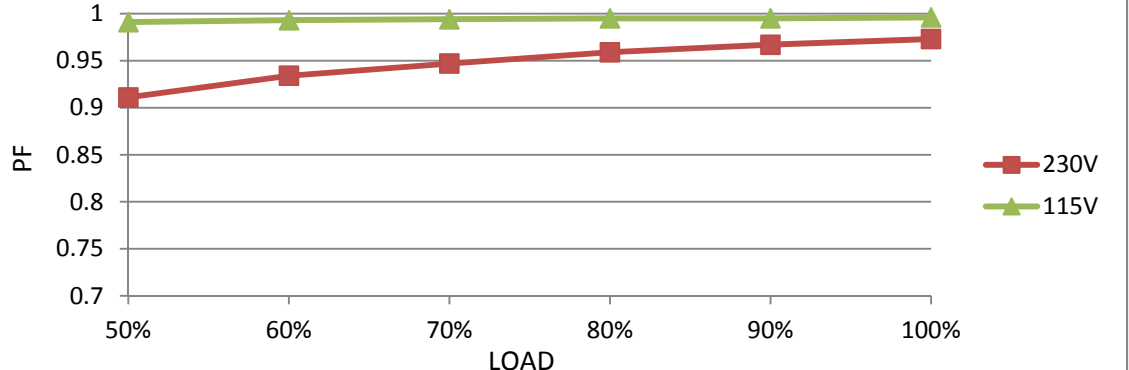
CH2: Input current CH1: AC Input Voltage



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%																					
EFFICIENCY vs LOAD  <table><caption>Efficiency vs Load Data</caption><thead><tr><th>LOAD</th><th>230V</th><th>115V</th></tr></thead><tbody><tr><td>50%</td><td>92.0</td><td>90.0</td></tr><tr><td>60%</td><td>92.0</td><td>90.0</td></tr><tr><td>70%</td><td>92.0</td><td>90.0</td></tr><tr><td>80%</td><td>91.8</td><td>89.8</td></tr><tr><td>90%</td><td>91.5</td><td>89.5</td></tr><tr><td>100%</td><td>91.0</td><td>89.0</td></tr></tbody></table>					LOAD	230V	115V	50%	92.0	90.0	60%	92.0	90.0	70%	92.0	90.0	80%	91.8	89.8	90%	91.5	89.5	100%	91.0	89.0
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80%	91.8	89.8																							
90%	91.5	89.5																							
100%	91.0	89.0																							
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																					
P.F vs LOAD  <table><caption>P.F vs Load Data</caption><thead><tr><th>LOAD</th><th>230V</th><th>115V</th></tr></thead><tbody><tr><td>50%</td><td>0.91</td><td>0.99</td></tr><tr><td>60%</td><td>0.93</td><td>0.99</td></tr><tr><td>70%</td><td>0.94</td><td>0.99</td></tr><tr><td>80%</td><td>0.96</td><td>0.99</td></tr><tr><td>90%</td><td>0.97</td><td>0.99</td></tr><tr><td>100%</td><td>0.98</td><td>0.99</td></tr></tbody></table>					LOAD	230V	115V	50%	0.91	0.99	60%	0.93	0.99	70%	0.94	0.99	80%	0.96	0.99	90%	0.97	0.99	100%	0.98	0.99
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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℃	TEST : OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q10 Rated 17.9A/600V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25℃	(1) 474 V (2) 494 V (3) 472 V
2	O/P Diode (MOSFET)	Q100 Rated 100A/25V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25℃	(1) 12.2 V (2) 5.12 V (3) 11.8 V
3	Input Capacitor	C5 Rated 180 μ / 400 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) 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℃	(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 17.9A/600V	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25℃	(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℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=49.5℃ <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=26.2 ℃</th><th>HIGH AMBIENT Ta=49.5 ℃</th></tr></thead><tbody><tr><td>1</td><td>LF2</td><td>48.8℃</td><td>71.0℃</td></tr><tr><td>2</td><td>ZNR1</td><td>47.0℃</td><td>69.7℃</td></tr><tr><td>3</td><td>BD1</td><td>53.4℃</td><td>75.5℃</td></tr><tr><td>4</td><td>L1</td><td>61.2℃</td><td>85.3℃</td></tr><tr><td>5</td><td>C5</td><td>50.4℃</td><td>73.1℃</td></tr><tr><td>6</td><td>Q1</td><td>49.5℃</td><td>72.0℃</td></tr><tr><td>7</td><td>D1</td><td>50.9℃</td><td>73.4℃</td></tr><tr><td>8</td><td>C36</td><td>52.9℃</td><td>75.9℃</td></tr><tr><td>9</td><td>U1</td><td>48.3℃</td><td>71.1℃</td></tr><tr><td>10</td><td>U2</td><td>47.9℃</td><td>70.6℃</td></tr><tr><td>11</td><td>Q11</td><td>60.4℃</td><td>84.1℃</td></tr><tr><td>12</td><td>T1</td><td>71.6℃</td><td>96.0℃</td></tr><tr><td>13</td><td>Q103</td><td>60.2℃</td><td>85.1℃</td></tr><tr><td>14</td><td>Q202</td><td>68.8℃</td><td>93.4℃</td></tr><tr><td>15</td><td>U100</td><td>51.6℃</td><td>74.3℃</td></tr><tr><td>16</td><td>C106</td><td>66.5℃</td><td>91.2℃</td></tr><tr><td>17</td><td>C108</td><td>70.1℃</td><td>95.0℃</td></tr><tr><td>18</td><td>TSW1</td><td>54.5℃</td><td>77.6℃</td></tr><tr><td>19</td><td>U4</td><td>48.7℃</td><td>71.5℃</td></tr><tr><td>20</td><td>TC</td><td>46.2℃</td><td>68.4℃</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta=26.2 ℃	HIGH AMBIENT Ta=49.5 ℃	1	LF2	48.8℃	71.0℃	2	ZNR1	47.0℃	69.7℃	3	BD1	53.4℃	75.5℃	4	L1	61.2℃	85.3℃	5	C5	50.4℃	73.1℃	6	Q1	49.5℃	72.0℃	7	D1	50.9℃	73.4℃	8	C36	52.9℃	75.9℃	9	U1	48.3℃	71.1℃	10	U2	47.9℃	70.6℃	11	Q11	60.4℃	84.1℃	12	T1	71.6℃	96.0℃	13	Q103	60.2℃	85.1℃	14	Q202	68.8℃	93.4℃	15	U100	51.6℃	74.3℃	16	C106	66.5℃	91.2℃	17	C108	70.1℃	95.0℃	18	TSW1	54.5℃	77.6℃	19	U4	48.7℃	71.5℃	20	TC	46.2℃	68.4℃
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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℃	TEST: OK																																																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta=50℃ HUMIDITY= 95%R.H	TEST: OK																																																																																				
4	TEMPERATURE COEFFICIENT	±0.03 %/℃ (0~50℃)	I/P: 230 VAC O/P: FULL LOAD	±0.009%/℃ (0~50℃)																																																																																				
5	STORAGE TEMPERATURE TEST	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		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 285K 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