



# Test Report: UHP-500-5

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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

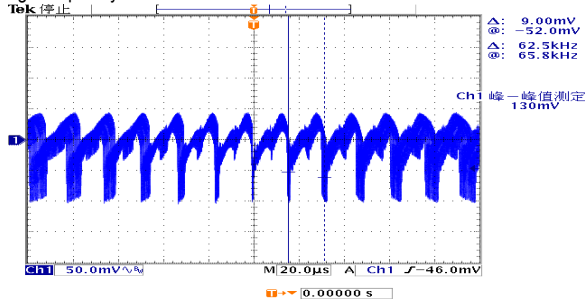
Environment Test

## DESIGN VERIFY TEST

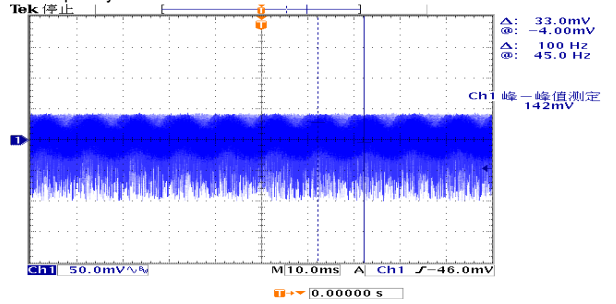
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	4.5V~5.5V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	4.37V~5.63V
2	PEAK LOAD	150% peak load capability(100ms)	I/P: 230VAC O/P: 150% LOAD Ta: 25°C	TEST: OK
3	OUTPUT VOLTAGE TOLERANCE	-2%~+2%	I/P: 90VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	- 0.8%~ +0.8%
4	LINE REGULATION	-0.5%~+0.5%	I/P: 110VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	- 0 %~ +0.39%
5	LOAD REGULATION	-1%~+1%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	- 0.23%~ +0.23%
6	OVER/UNDERSHOOT TEST	<± 10 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<10%
7	RIPPLE & NOISE (Max)	200mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	142mVp-p

high frequency :



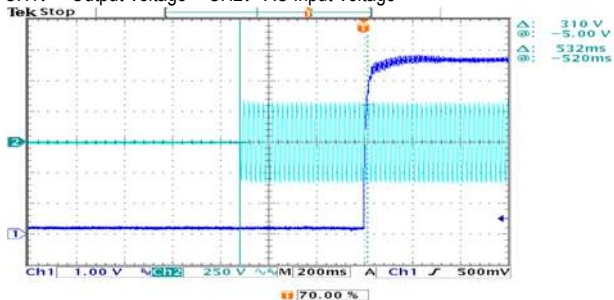
low frequency :



8	SET UP TIME(Max)	230VAC/ 1000ms 115VAC/1000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/532 ms 115VAC/436 ms
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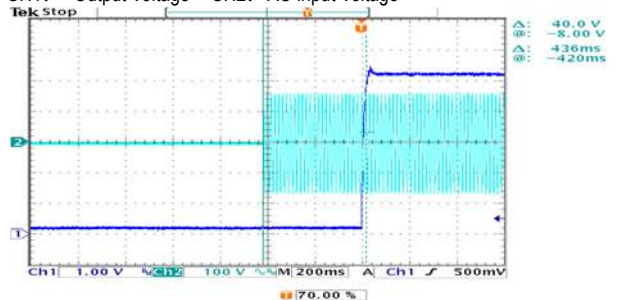
INPUT=230VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage





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/13.2 ms 115VAC/14.4 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°C	230VAC/18.4ms 115VAC/18.4 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) 624mVp-p (2) 556mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		

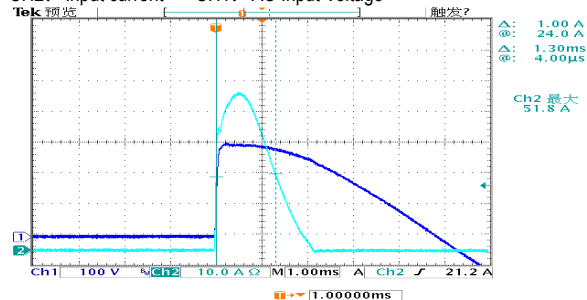


**INPUT FUNCTION TEST**

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 = 3.96A/ 115VAC I = 1.97A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.375 mA N-FG: 0.367 mA
6	NO LOAD CONSUMPTION	---	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	3.95W/115VAC 3.45W/230VAC
7	INRUSH CURRENT(Typ)	230V/60A 115V/30A COLD START	I/P: 230VAC/115VAC O/P: FULL LOAD Ta: 25°C	I =51.8A/ 230VAC I =13.4A/ 115VAC

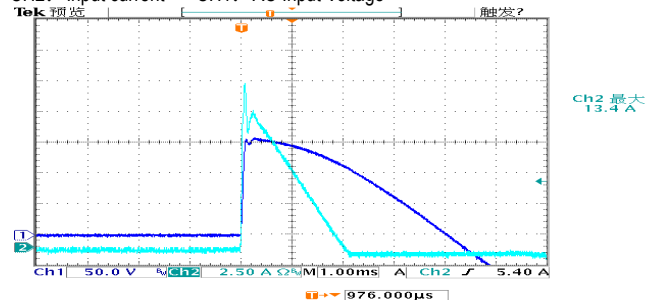
INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



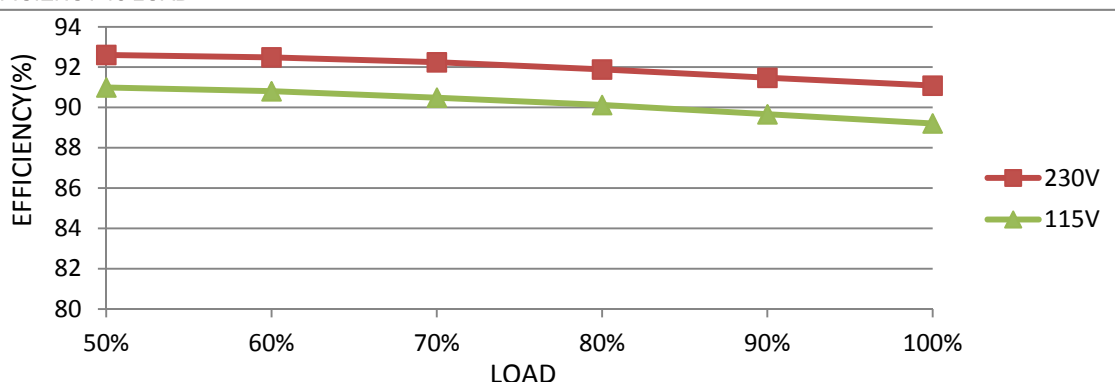
INPUT=115VAC/60HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



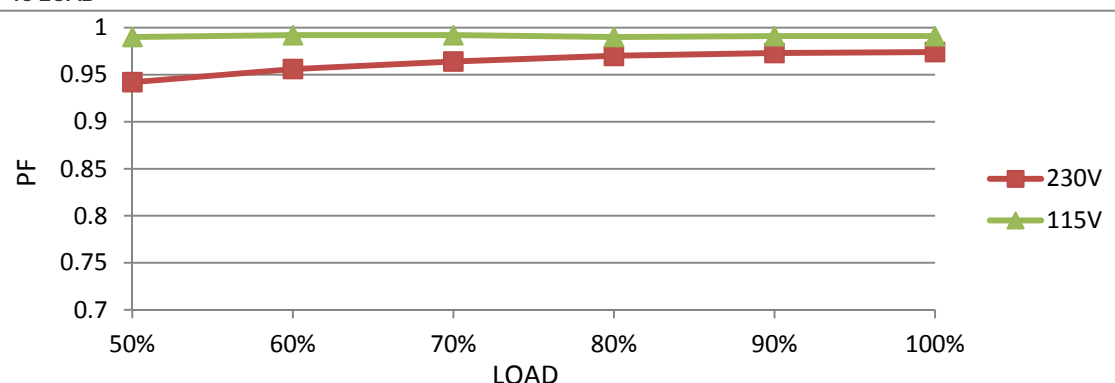
8	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	91.08 %
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EFFICIENCY vs LOAD



9	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=0.991/ 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	123%/ 110VAC 124 %/ 230VAC 124%/ 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	6.262 V/ 90VAC 6.267 V/ 230VAC 6.231 V/ 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) 526 V (2) 548 V (3) 522 V
2	O/P Diode (MOSFET)	Q100 Rated 30V/150A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 13.2 V (2) 13.2 V (3) 13.4 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) 416 V (2) 416 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) 14.3 V (2) 14.7 V (3) 14.3 V (4) 11.9 V (5) 14.0 V
5	PFC Power Transistor	Q 2 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) 450 V (2) 454 V (3) 453 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: 3.625 mA I/P-FG: 3.585 mA O/P-FG: 2.741 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-500-5 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=27.8°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=43.2°C																																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=27.8 °C</th> <th>HIGH AMBIENT Ta=43.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>59.3°C</td><td>73.7°C</td></tr> <tr><td>2</td><td>D9</td><td>63.2°C</td><td>79.4°C</td></tr> <tr><td>3</td><td>Q2</td><td>60.0°C</td><td>75.7°C</td></tr> <tr><td>4</td><td>D5</td><td>62.0°C</td><td>78.0°C</td></tr> <tr><td>5</td><td>C5</td><td>54.7°C</td><td>69.2°C</td></tr> <tr><td>6</td><td>Q10</td><td>66.3°C</td><td>82.4°C</td></tr> <tr><td>7</td><td>Q11</td><td>65.2°C</td><td>81.2°C</td></tr> <tr><td>8</td><td>C93</td><td>62.0°C</td><td>77.8°C</td></tr> <tr><td>9</td><td>C36</td><td>65.1°C</td><td>80.9°C</td></tr> <tr><td>10</td><td>U1</td><td>52.1°C</td><td>67.0°C</td></tr> <tr><td>11</td><td>U2</td><td>53.8°C</td><td>68.9°C</td></tr> <tr><td>12</td><td>T1</td><td>90.1°C</td><td>108.0°C</td></tr> <tr><td>13</td><td>Q103</td><td>85.7°C</td><td>101.8°C</td></tr> <tr><td>14</td><td>Q100</td><td>84.5°C</td><td>100.3°C</td></tr> <tr><td>15</td><td>Q210</td><td>94.4°C</td><td>110.1°C</td></tr> <tr><td>16</td><td>U100</td><td>82.8°C</td><td>98.7°C</td></tr> <tr><td>17</td><td>C115</td><td>92.6°C</td><td>109.2°C</td></tr> <tr><td>18</td><td>C119</td><td>94.7°C</td><td>111.4°C</td></tr> <tr><td>19</td><td>TSW1</td><td>78.2°C</td><td>91.8°C</td></tr> <tr><td>20</td><td>Tc</td><td>61.1°C</td><td>79.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=27.8 °C	HIGH AMBIENT Ta=43.2 °C	1	BD1	59.3°C	73.7°C	2	D9	63.2°C	79.4°C	3	Q2	60.0°C	75.7°C	4	D5	62.0°C	78.0°C	5	C5	54.7°C	69.2°C	6	Q10	66.3°C	82.4°C	7	Q11	65.2°C	81.2°C	8	C93	62.0°C	77.8°C	9	C36	65.1°C	80.9°C	10	U1	52.1°C	67.0°C	11	U2	53.8°C	68.9°C	12	T1	90.1°C	108.0°C	13	Q103	85.7°C	101.8°C	14	Q100	84.5°C	100.3°C	15	Q210	94.4°C	110.1°C	16	U100	82.8°C	98.7°C	17	C115	92.6°C	109.2°C	18	C119	94.7°C	111.4°C	19	TSW1	78.2°C	91.8°C	20	Tc	61.1°C	79.5°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 40°C NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta=40°C HUMIDITY= 95%R.H	TEST: OK																																																																																				
4	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P: 230 VAC O/P: FULL LOAD	± 0.01%/°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: 100 CYCLE 5. Input/Output condition: STATIC		TEST: OK																																																																																				





500W Slim Type with PFC Switching Supply

# UHP-500 series

6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -25°C~+45°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-500-5: 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= 40 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 40 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 40 °C LIFE TIME	(1) 90371 HRS (2) 13837 HRS (3) 339649 HRS (4) 2729166 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 40°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	SHENJW/ZHUOKB	SKY	LIUWY