



Test Report: UHP-500-12

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

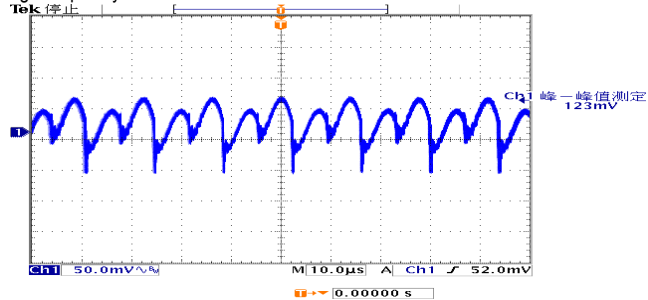
Environment Test

DESIGN VERIFY TEST

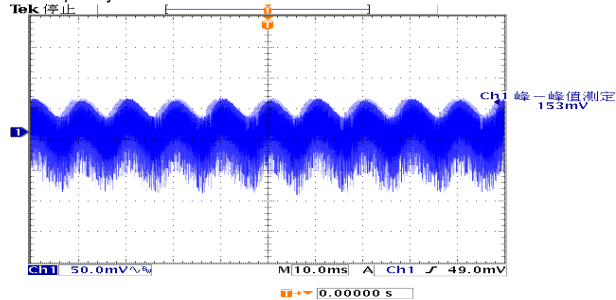
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	11.4V~12.6V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	11.08V~13.06V
2	PEAK LOAD	150% peak load capability(100ms)	I/P: 230VAC O/P: 150% LOAD Ta: 25°C	TEST: OK
3	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P: 90VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	- 0%~+0.83%
4	LINE REGULATION	-0.3%~+0.3%	I/P: 110VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	- 0%~+0.08%
5	LOAD REGULATION	-0.5%~+0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	- 0.16%~+0%
6	OVER/UNDERSHOOT TEST	<±5%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5%
7	RIPPLE & NOISE (Max)	200mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	153mVp-p

high frequency :



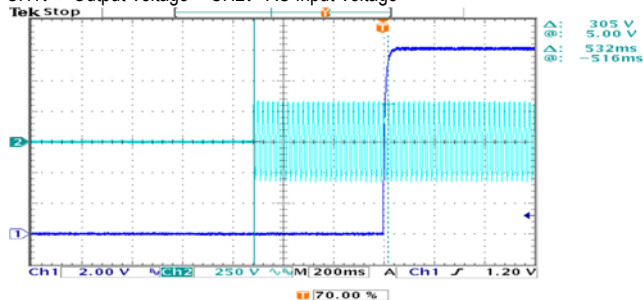
low frequency :



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/420 ms
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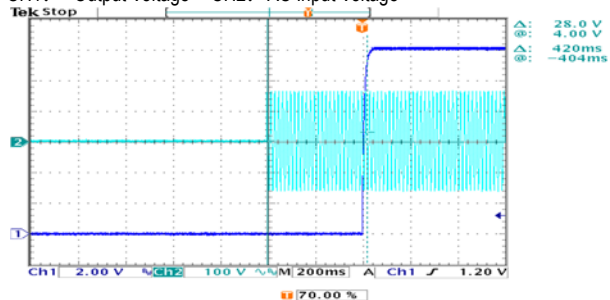
INPUT=230VAC/50HZ @ FULL LOAD

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

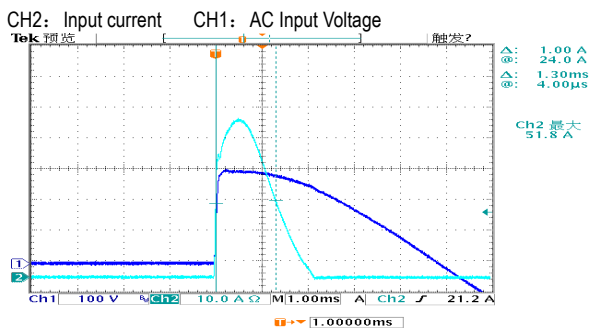
UHP-500 series

9	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/14.6 ms 115VAC/15.0 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/16.8ms 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		
11	DYNAMIC LOAD	V1: 1200 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) 480mVp-p (2) 452mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		

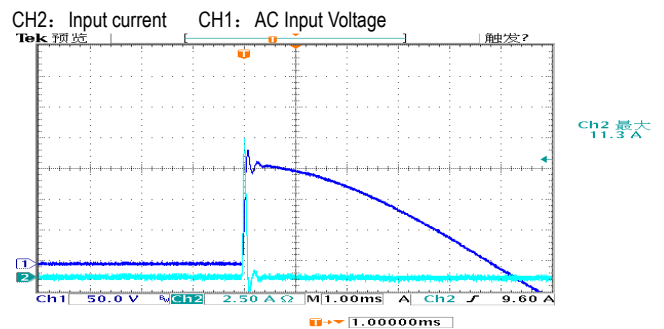
INPUT FUNCTION TEST

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 = 4.76A/ 115VAC I = 2.36A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.694 mA N-FG: 0.744mA
6	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 =11.3A/ 115VAC

INPUT=230VAC/50HZ @ FULL LOAD

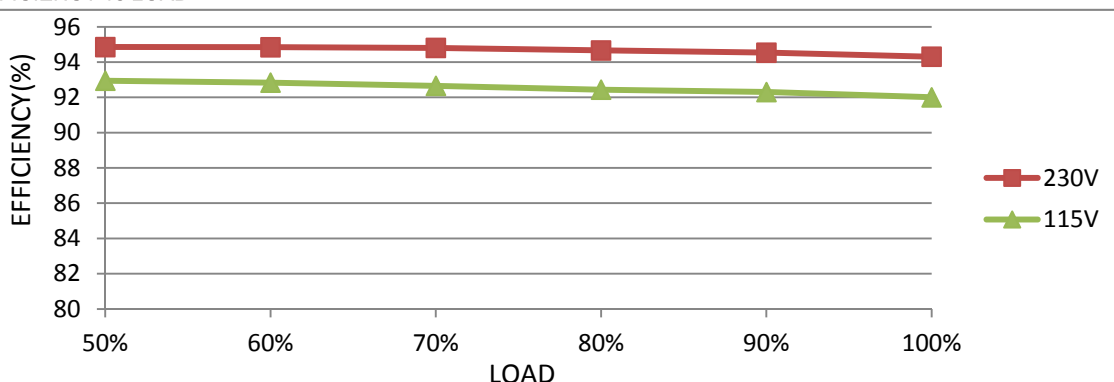


INPUT=115VAC/60HZ @ FULL LOAD



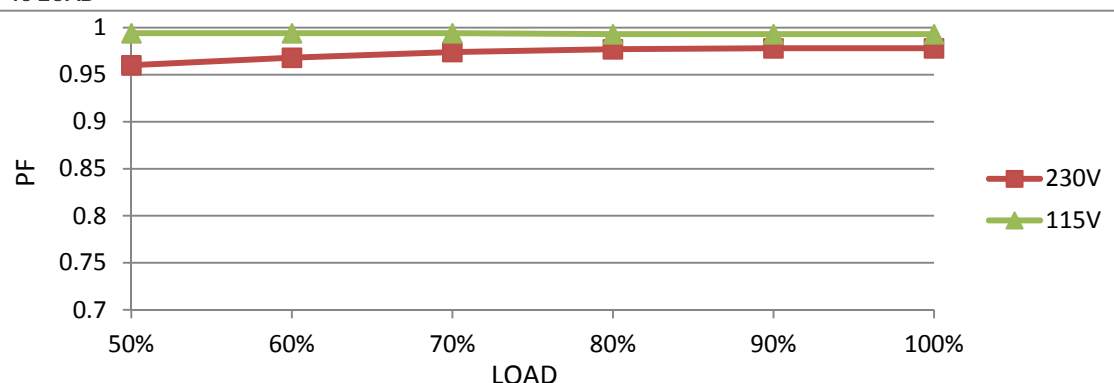
7	EFFICIENCY(Typ)	94%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	94.3 %
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EFFICIENCY vs LOAD



8	POWER FACTOR	0.95/ 230VAC 0.98/115VAC	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	PF=0.978/ 230VAC PF=0.994/ 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	131.8%/ 110VAC 131.8%/ 230VAC 131.6%/ 264VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.2V~15.6V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	14.2 V/ 90VAC 14.3 V/ 230VAC 14.3 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	Q11 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) 536 V (2) 562 V (3) 538 V
2	O/P Diode (MOSFET)	Q100 Rated 40V/100A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 25.8 V (2) 9.2 V (3) 26.4 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) 418 V (2) 416 V (3) 414 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) 14.4 V (2) 15.1 V (3) 14.7 V (4) 13.6 V (5) 13.7 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°C	(1) 474 V (2) 444 V (3) 471 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: 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°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-500-12 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>64.3°C</td><td>79.5°C</td></tr> <tr><td>2</td><td>D9</td><td>57.0°C</td><td>74.6°C</td></tr> <tr><td>3</td><td>Q2</td><td>56.5°C</td><td>73.6°C</td></tr> <tr><td>4</td><td>D5</td><td>57.8°C</td><td>75.5°C</td></tr> <tr><td>5</td><td>C5</td><td>52.7°C</td><td>68.4°C</td></tr> <tr><td>6</td><td>Q10</td><td>63.4°C</td><td>81.8°C</td></tr> <tr><td>7</td><td>Q11</td><td>62.3°C</td><td>80.7°C</td></tr> <tr><td>8</td><td>C93</td><td>58.8°C</td><td>76.9°C</td></tr> <tr><td>9</td><td>C36</td><td>61.9°C</td><td>79.9°C</td></tr> <tr><td>10</td><td>U1</td><td>49.1°C</td><td>65.5°C</td></tr> <tr><td>11</td><td>U2</td><td>50.2°C</td><td>66.7°C</td></tr> <tr><td>12</td><td>T1</td><td>83.1°C</td><td>100.2°C</td></tr> <tr><td>13</td><td>Q103</td><td>68.1°C</td><td>85.3°C</td></tr> <tr><td>14</td><td>Q100</td><td>65.2°C</td><td>81.9°C</td></tr> <tr><td>15</td><td>Q210</td><td>58.8°C</td><td>74.5°C</td></tr> <tr><td>16</td><td>U100</td><td>56.8°C</td><td>72.6°C</td></tr> <tr><td>17</td><td>C115</td><td>61.3°C</td><td>77.6°C</td></tr> <tr><td>18</td><td>C119</td><td>61.6°C</td><td>78.2°C</td></tr> <tr><td>19</td><td>Tc</td><td>66.3°C</td><td>83.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=27.8 °C	HIGH AMBIENT Ta=43.2 °C	1	BD1	64.3°C	79.5°C	2	D9	57.0°C	74.6°C	3	Q2	56.5°C	73.6°C	4	D5	57.8°C	75.5°C	5	C5	52.7°C	68.4°C	6	Q10	63.4°C	81.8°C	7	Q11	62.3°C	80.7°C	8	C93	58.8°C	76.9°C	9	C36	61.9°C	79.9°C	10	U1	49.1°C	65.5°C	11	U2	50.2°C	66.7°C	12	T1	83.1°C	100.2°C	13	Q103	68.1°C	85.3°C	14	Q100	65.2°C	81.9°C	15	Q210	58.8°C	74.5°C	16	U100	56.8°C	72.6°C	17	C115	61.3°C	77.6°C	18	C119	61.6°C	78.2°C	19	Tc	66.3°C	83.4°C
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18	C119	61.6°C	78.2°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 45°C NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta=45°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~ +50°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-500-12: 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= 45 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 45 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 45 °C LIFE TIME	(1) 166228 HRS (2) 54080 HRS (3) 195991 HRS (4) 412622 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 45°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	SHENJW/ZHUOKB	SKY	LIUWY