



# Test Report: HSP-300-5

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300W Single Output 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

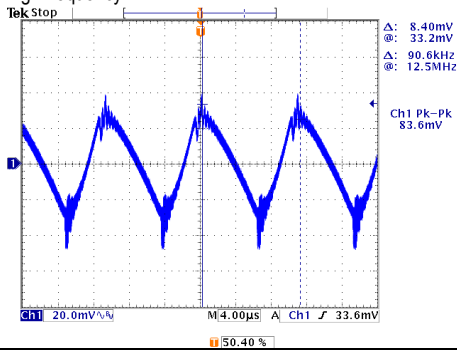
ENVIRONMENT TEST

## DESIGN VERIFY TEST

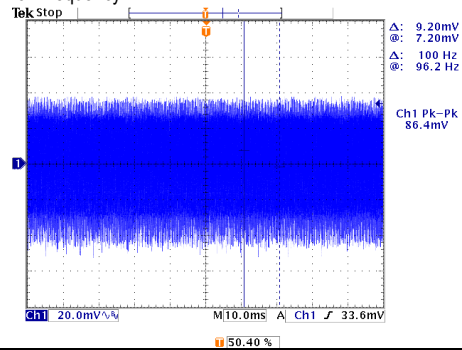
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	V1: 4.5V~5.5V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	4.195V~5.794V/230VAC 4.195V~5.797V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 2%~-2%	I/P: 100VAC/264VAC O/P: FULL/ MIN. LOAD Ta: 25°C	V1: 1.7%~-0.039%
3	LINE REGULATION (Max)	V1: 0.5%~-0.5%	I/P: 100VAC~264VAC O/P: FULL LOAD Ta: 25°C	V1: 0%~0%
4	LOAD REGULATION(Max)	V1: 1%~-1%	I/P: 230VAC O/P: FULL~MIN LOAD Ta: 25°C	V1: 0.039%~-0.039%
5	OVER/UNDERSHOOT TEST	< ± 10%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<10%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 86.4mVp-p

high frequency :



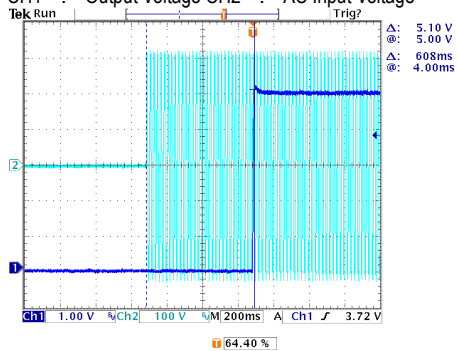
low frequency :



7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 608ms 115VAC/ 2260ms
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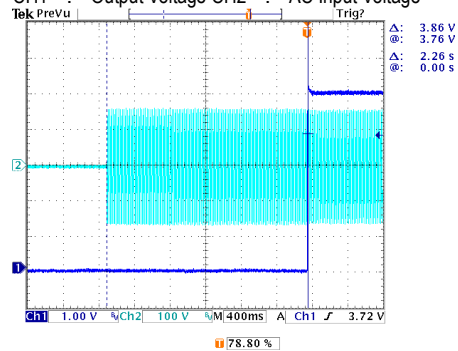
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

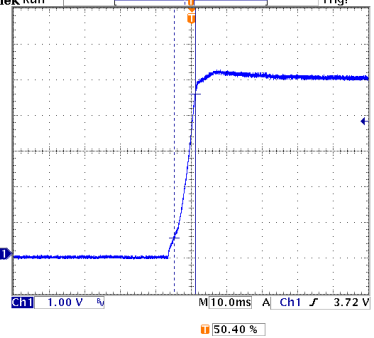
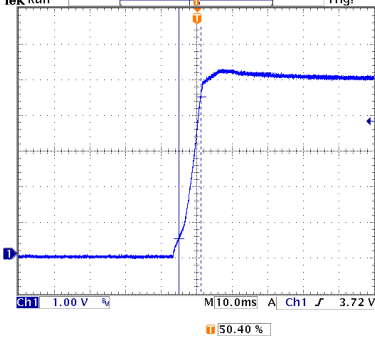
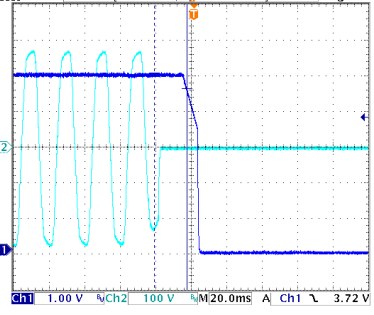
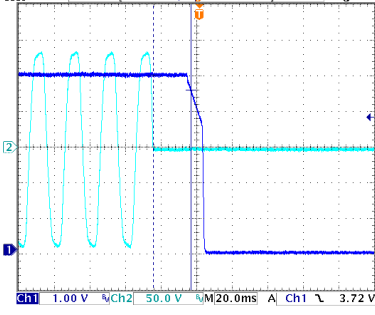
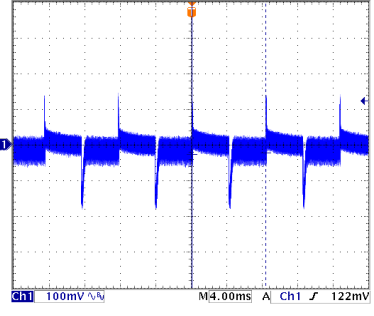
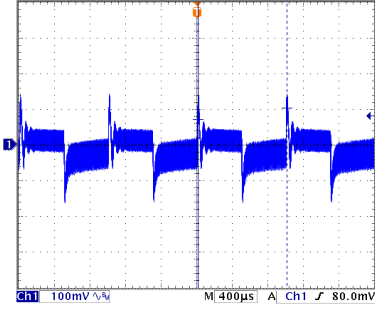
CH1 : Output Voltage CH2 : AC Input Voltage





# 300W Single Output Switching Power Supply

# HSP-300 series

8	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6.025ms 115VAC/ 6.270ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p> 		
9	HOLD UP TIME(Typ)	230VAC/ 8ms 115VAC/ 8ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 18.4ms 115VAC/ 21.2ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</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	312mVp-p 294mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p> <p>Tek Stop</p> 		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p> <p>Tek Stop</p> 		



## INPUT FUNCTION TEST

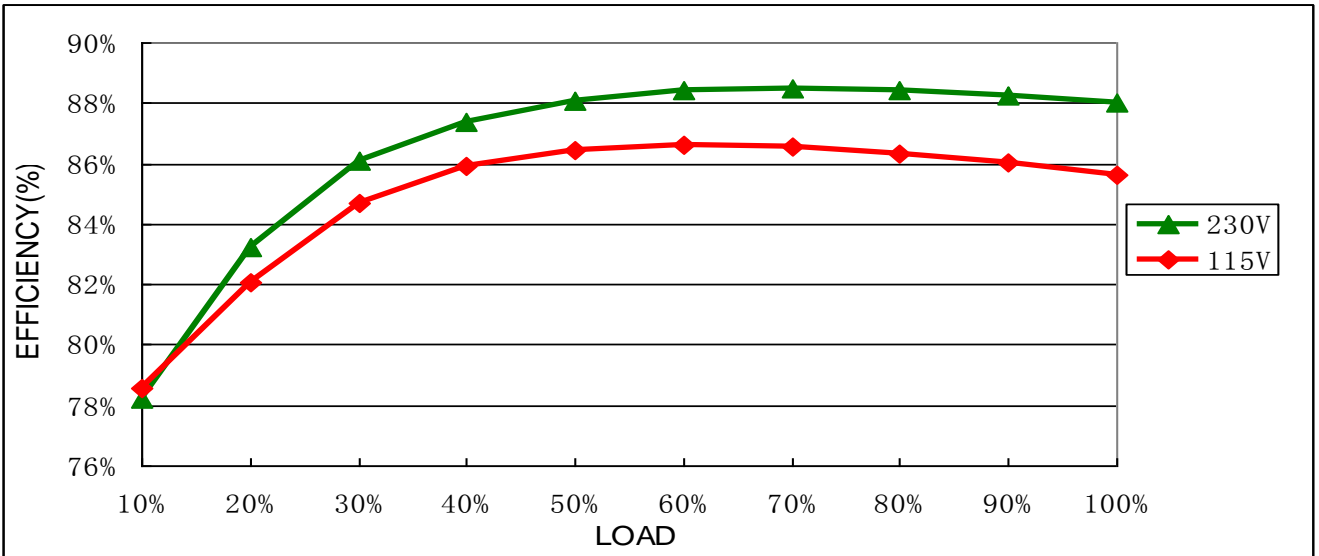
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~267V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON: 3Sec OFF: 3Sec 12HOURS ( POWER ON/OFF NO DAMAGE )	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~264 VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ)	230V/ 2.35A 115V/ 4.7A	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 1.52A/ 230VAC I = 3.08A/ 115VAC
4	LEAKAGE CURRENT	< 1mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.2378 mA N-FG: 0.2341 mA
5	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 30A COLD START	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 27.2 A/ 230VAC I = 14.3 A/ 115VAC
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current CH1 : AC Input Voltage</p>		<p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current CH1 : AC Input Voltage</p>		
6	EFFICIENCY(Typ)	87%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	88.03%



300W Single Output Switching Power Supply

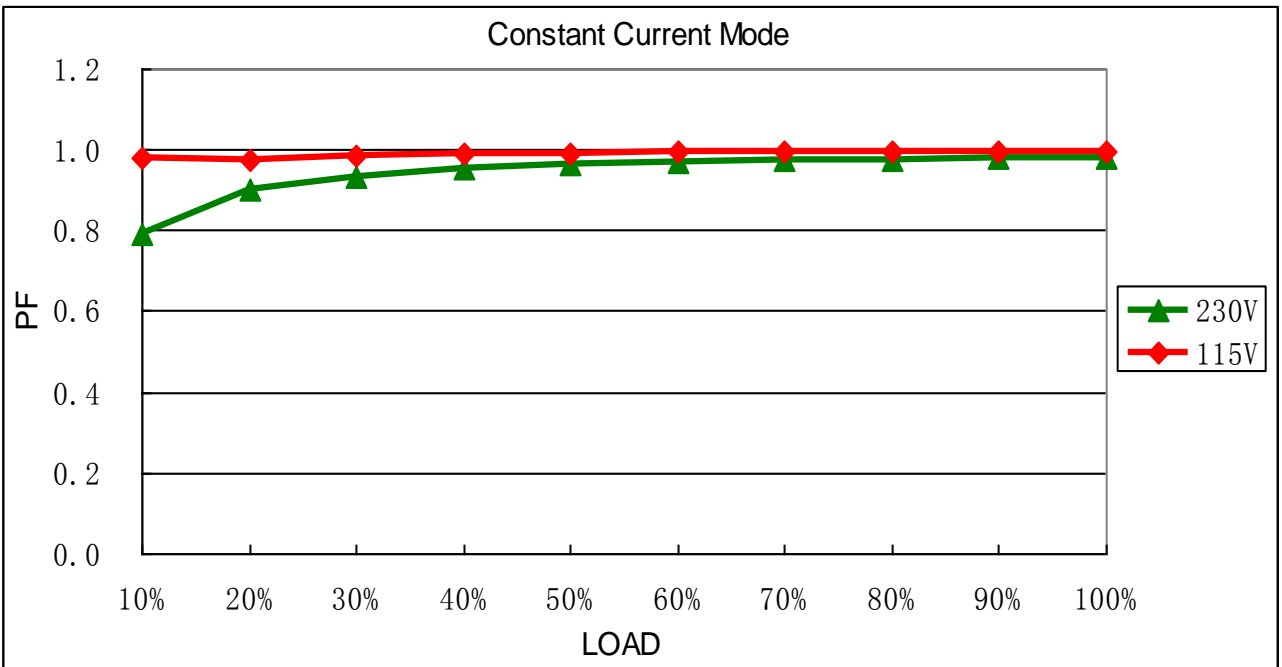
HSP-300 series

EFFICIENCY vs LOAD



7	POWER FACTOR	0.93/ 230 VAC(TYP)	I/P: 230 VAC	PF=0.982/ 230 VAC
		0.98/ 115 VAC(TYP)	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	PF=0.997/ 115 VAC

P.F vs LOAD



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~ 135 %	I/P: 230VAC I/P: 180VAC O/P: TESTING Ta: 25°C	122.35%/ 230VAC 127.32%/ 180VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 5.7 V~ 7.0 V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	6.635V/ 230VAC 6.613V/115VAC Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after fault condition is removed
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed

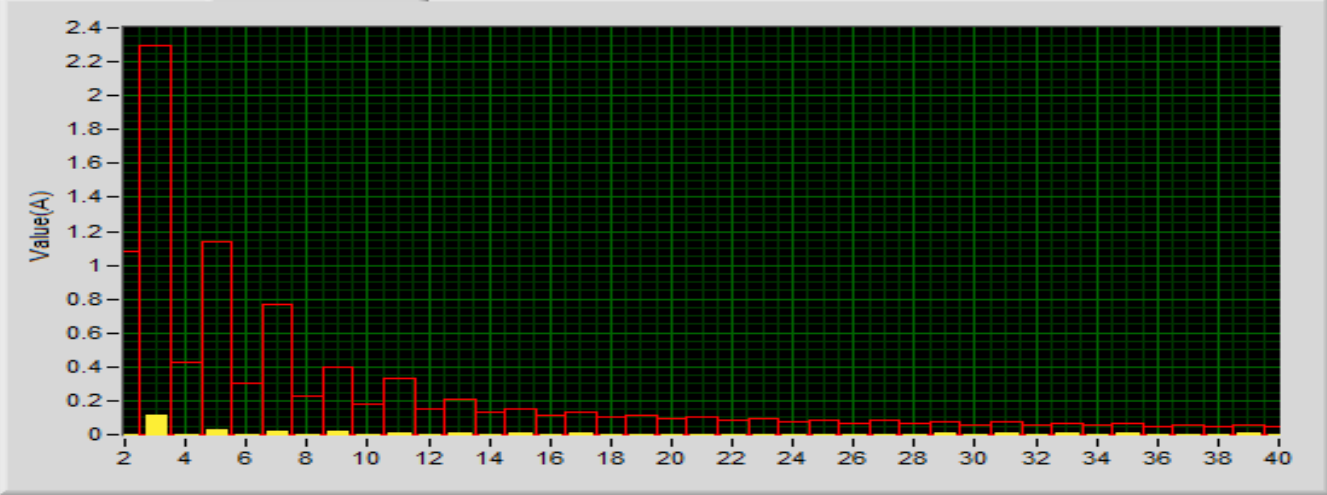
**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q 4 Rated 600V/16A	I/P: High-Line +3V =267V O/P: (1)Full Load Turn on (2) Output Short (3)Full load continue Ta: 25°C	(1) 420V (2) 460V (3) 416V
2	Diode <b>Peak Voltage</b>	Q100 Rated 40V/120A  Q102 Rated 30V/100A	I/P: High-Line +3V =267V O/P: (1)Full Load Turn on (2) Output Short (3)Full load continue Ta: 25°C	Q100: (1) 20.6V (2) 20.9V (3) 20.1V  Q102: (1) 25.6V (2) 25.4V (3) 25.4V
3	Input Capacitor Voltage	C5 Rated 150u/ 400V	I/P: High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta: 25°C	(1) 384V (2) 386V (3) 384V
4	Control IC Voltage Test	U1 Rated 30V (MAX.)	I/P: High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta: 25°C	(1) 13.1V (2) 13.1V (3) 13.1V

## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG : 2KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 0.6 KVAC/min Ta: 25°C	I/P-O/P: 1.691mA I/P-FG: 2.322mA O/P-FG: 1.010mA 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	I/P-O/P: >9999MΩ I/P-FG: >9999MΩ O/P-FG: >9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta: 25°C	6 mΩ

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 115V/230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
				
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P: FULL/50% LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 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 LIGHT INDUSTRY AIR: 8KV / Contact: 4KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
6	SURGE	EN61000-4-5 INDUSTRY L-N : 2KV L,N-PE: 4KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	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: HSP-300-5 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29.7 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 56.1 °C																																																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29.7 °C</th> <th>HIGH AMBIENT Ta=56.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>46.3°C</td><td>73.5°C</td></tr> <tr><td>2</td><td>LF2</td><td>53.6°C</td><td>79.5°C</td></tr> <tr><td>3</td><td>BD1</td><td>62.8°C</td><td>89.2°C</td></tr> <tr><td>4</td><td>C10</td><td>63.1°C</td><td>88.8°C</td></tr> <tr><td>5</td><td>C5</td><td>66.1°C</td><td>91.5°C</td></tr> <tr><td>6</td><td>Q1</td><td>63.6°C</td><td>92.2°C</td></tr> <tr><td>7</td><td>Q2</td><td>59.0°C</td><td>86.8°C</td></tr> <tr><td>8</td><td>Q4</td><td>69.7°C</td><td>98.2°C</td></tr> <tr><td>9</td><td>Q3</td><td>71.0°C</td><td>99.6°C</td></tr> <tr><td>10</td><td>D23</td><td>86.1°C</td><td>112.3°C</td></tr> <tr><td>11</td><td>C61</td><td>78.1°C</td><td>104.9°C</td></tr> <tr><td>12</td><td>TSW1</td><td>73.8°C</td><td>100.3°C</td></tr> <tr><td>13</td><td>L1</td><td>76.1°C</td><td>102.6°C</td></tr> <tr><td>14</td><td>T1</td><td>83.1°C</td><td>110.4°C</td></tr> <tr><td>15</td><td>C166</td><td>69.7°C</td><td>96.5°C</td></tr> <tr><td>16</td><td>Q101</td><td>70.3°C</td><td>97.3°C</td></tr> <tr><td>17</td><td>Q100</td><td>69.5°C</td><td>96.4°C</td></tr> <tr><td>18</td><td>L100</td><td>72.0°C</td><td>100.0°C</td></tr> <tr><td>19</td><td>C105</td><td>69.3°C</td><td>96.7°C</td></tr> <tr><td>20</td><td>C108</td><td>60.1°C</td><td>87.7°C</td></tr> <tr><td>21</td><td>Q102</td><td>69.7°C</td><td>97.2°C</td></tr> <tr><td>22</td><td>D1</td><td>64.3°C</td><td>90.7°C</td></tr> <tr><td>23</td><td>U1</td><td>71.2°C</td><td>97.5°C</td></tr> <tr><td>24</td><td>Q105</td><td>73.5°C</td><td>100.3°C</td></tr> <tr><td>25</td><td>TC</td><td>56.1°C</td><td>82.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29.7 °C	HIGH AMBIENT Ta=56.1 °C	1	ZNR1	46.3°C	73.5°C	2	LF2	53.6°C	79.5°C	3	BD1	62.8°C	89.2°C	4	C10	63.1°C	88.8°C	5	C5	66.1°C	91.5°C	6	Q1	63.6°C	92.2°C	7	Q2	59.0°C	86.8°C	8	Q4	69.7°C	98.2°C	9	Q3	71.0°C	99.6°C	10	D23	86.1°C	112.3°C	11	C61	78.1°C	104.9°C	12	TSW1	73.8°C	100.3°C	13	L1	76.1°C	102.6°C	14	T1	83.1°C	110.4°C	15	C166	69.7°C	96.5°C	16	Q101	70.3°C	97.3°C	17	Q100	69.5°C	96.4°C	18	L100	72.0°C	100.0°C	19	C105	69.3°C	96.7°C	20	C108	60.1°C	87.7°C	21	Q102	69.7°C	97.2°C	22	D1	64.3°C	90.7°C	23	U1	71.2°C	97.5°C	24	Q105	73.5°C	100.3°C	25	TC	56.1°C	82.7°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 230 VAC O/P: 120 %LOAD Ta: 25°C	TEST: OK																																																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/100VAC O/P: 100 %LOAD Ta= -35 °C	TEST: OK																																																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE	I/P: 272 VAC O/P: FULL LOAD Ta= 45 °C HUMIDITY= 95 %R.H	TEST: OK																																																																																																								
5	TEMPERATURE COEFFICIENT	±0.03 %/°C (0-60°C)	I/P: 230 VAC O/P: FULL LOAD	±0.022 %/°C (0-60°C)																																																																																																								





### 300W Single Output Switching Power Supply

# HSP-300 series

6	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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature: -35°C~ +50°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 turn on 58 sec; turn off 2 sec	TEST: OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 3G (5) Test Time: 90min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
9	CAPACITOR LIFE CYCLE	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) 187694 HRS (2) 43814 HRS (3) 101320 HRS (4) 177539 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE: 263.2K HRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 45°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY