



# Test Report: HSP-300-2.8

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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

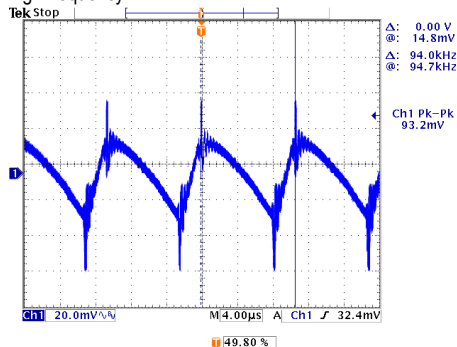
ENVIRONMENT TEST

## ■ DESIGN VERIFY TEST

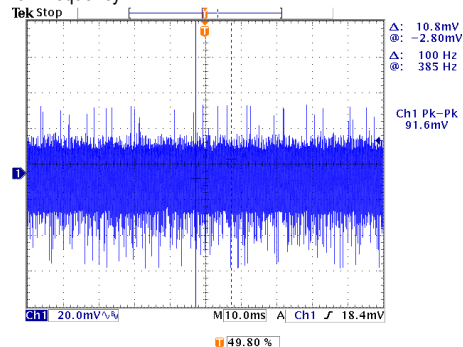
## OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	V1: 2.5V~3V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	2.421V~3.064V/230VAC 2.421V~3.064V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 2%~-2%	I/P: 100VAC/264VAC O/P: FULL/ MIN. LOAD Ta: 25°C	V1: 1.16%~-0.91%
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: 0.12%~-0.12%
5	OVER/UNDERSHOOT TEST	< ± 10%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<10%
6	RIPPLE & NOISE(Max)	V1: 110mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 93.2mVp-p

high frequency :



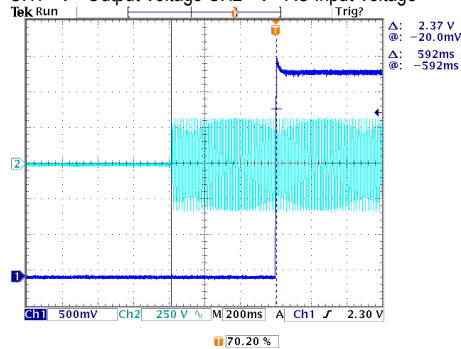
low frequency :



7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 592ms 115VAC/ 2050ms
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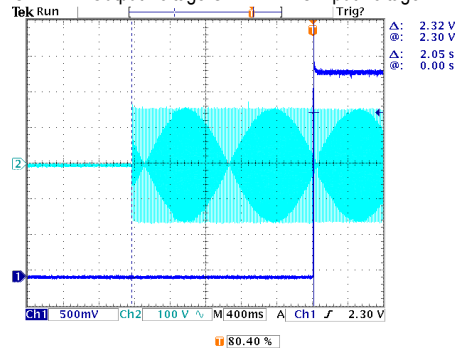
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



8	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6.392ms 115VAC/ 6.445ms
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# 300W Single Output Switching Power Supply

# HSP-300 series

<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>		
<p>9 HOLD UP TIME(Typ)</p>	<p>230VAC/ 8ms 115VAC/ 8ms</p>	<p>I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C</p>	<p>230VAC/ 16.8ms 115VAC/ 18.0ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		
<p>10 DYNAMIC LOAD</p>	<p>V1: 560 mVp-p</p>	<p>I/P: 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C</p>	<p>306mVp-p 298mVp-p</p>
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>	<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>		

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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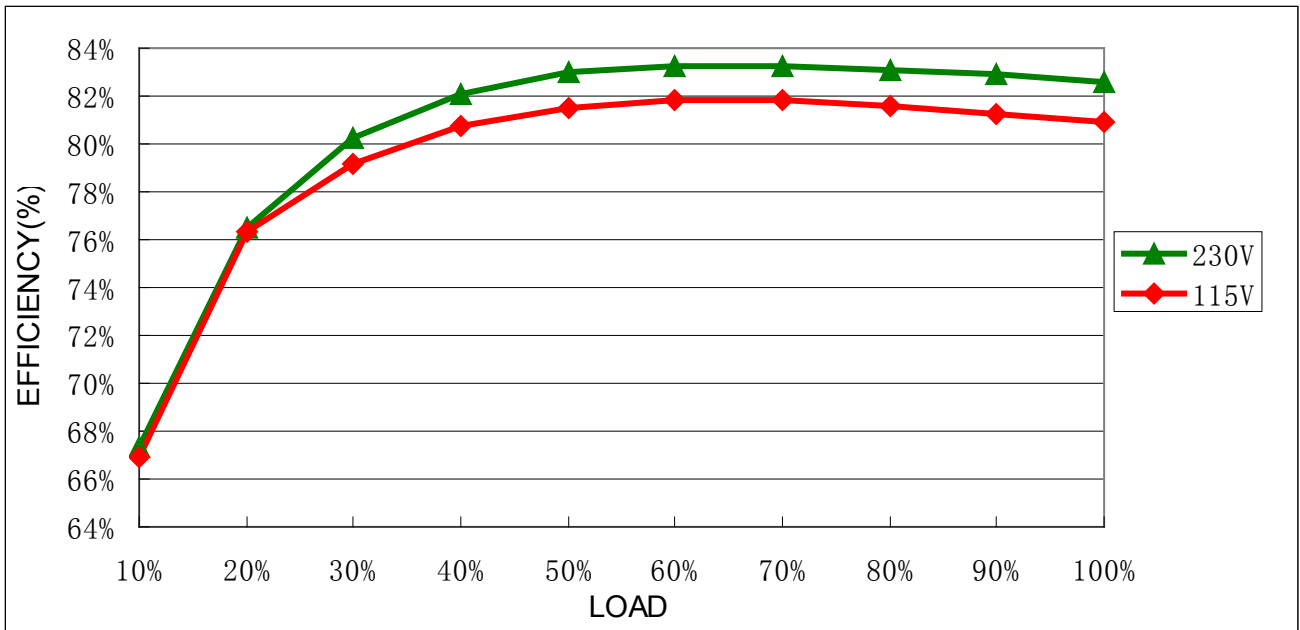


### 300W Single Output Switching Power Supply

# HSP-300 series

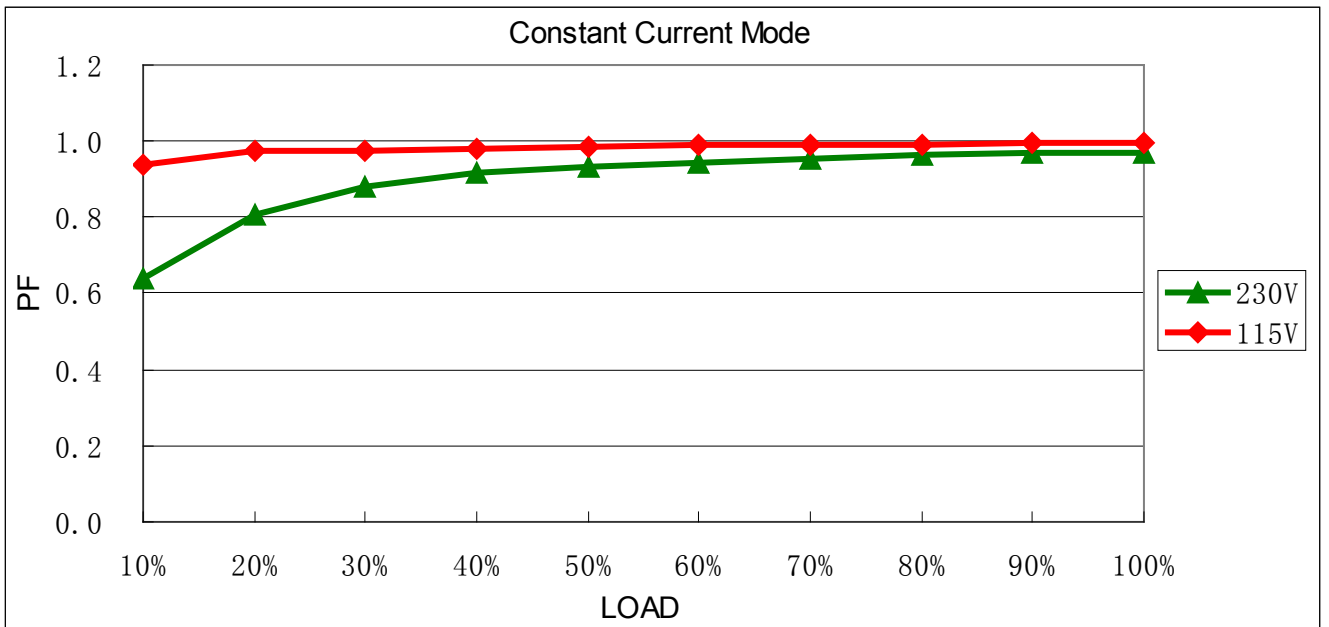
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~267V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON: 3Sec OFF: 3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY 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/ 1.4A 115V/ 2.8A	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 0.916A/ 230VAC I = 1.527A/ 115VAC
4	LEAKAGE CURRENT	< 1mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.2287 mA N-FG: 0.2290 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 = 25.2 A/ 230VAC I = 20.0 A/ 115VAC
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/50HZ @ FULL LOAD		
6	EFFICIENCY(Typ)	80%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	82.61%

EFFICIENCY vs LOAD



7	POWER FACTOR	0.93/ 230 VAC(TYP)	I/P: 230 VAC	PF=0.971/ 230 VAC
		0.98/ 115 VAC(TYP)	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	PF=0.995/ 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	123.92%/ 230VAC 124.14%/ 180VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 3.22 V~ 3.78 V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	3.316V/ 230VAC 3.329V/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

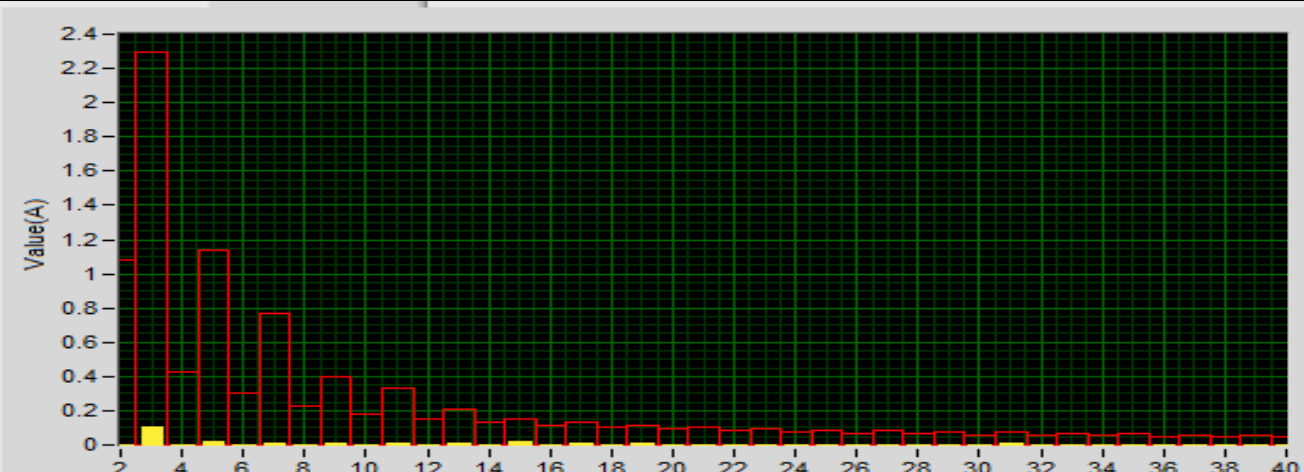
## COMPONENT STRESS TEST

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) 426V (2) 460V (3) 426V
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) 19.5V (2) 19.5V (3) 19.1V  Q102: (1) 19.5V (2) 19.3V (3) 19.1V
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) 396V (2) 384V (3) 382V
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) 13.0V (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: 1.373mA I/P-FG: 1.756mA O/P-FG: 0.980mA 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	7 mΩ

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 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-300-2.8 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 34.0 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 54.0 °C																																																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 34.0 °C</th> <th>HIGH AMBIENT Ta=54.0 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>47.3°C</td><td>67.9°C</td></tr> <tr><td>2</td><td>RHT1</td><td>57.2°C</td><td>79.0°C</td></tr> <tr><td>3</td><td>LF2</td><td>52.4°C</td><td>74.0°C</td></tr> <tr><td>4</td><td>D5</td><td>60.0°C</td><td>81.3°C</td></tr> <tr><td>5</td><td>Q105</td><td>85.3°C</td><td>107.0°C</td></tr> <tr><td>6</td><td>C5</td><td>60.6°C</td><td>81.8°C</td></tr> <tr><td>7</td><td>Q1</td><td>63.6°C</td><td>85.9°C</td></tr> <tr><td>8</td><td>Q2</td><td>62.3°C</td><td>84.5°C</td></tr> <tr><td>9</td><td>Q4</td><td>71.5°C</td><td>94.7°C</td></tr> <tr><td>10</td><td>Q3</td><td>74.9°C</td><td>98.2°C</td></tr> <tr><td>11</td><td>D23</td><td>91.0°C</td><td>113.2°C</td></tr> <tr><td>12</td><td>C61</td><td>67.0°C</td><td>90.0°C</td></tr> <tr><td>13</td><td>TSW1</td><td>70.5°C</td><td>92.1°C</td></tr> <tr><td>14</td><td>L1</td><td>69.4°C</td><td>91.7°C</td></tr> <tr><td>15</td><td>T1</td><td>79.5°C</td><td>101.7°C</td></tr> <tr><td>16</td><td>C166</td><td>73.0°C</td><td>94.5°C</td></tr> <tr><td>17</td><td>Q101</td><td>77.2°C</td><td>99.2°C</td></tr> <tr><td>18</td><td>Q100</td><td>73.1°C</td><td>95.2°C</td></tr> <tr><td>19</td><td>L100</td><td>71.9°C</td><td>93.7°C</td></tr> <tr><td>20</td><td>C105</td><td>67.6°C</td><td>90.0°C</td></tr> <tr><td>21</td><td>Q102</td><td>64.9°C</td><td>86.8°C</td></tr> <tr><td>22</td><td>D1</td><td>61.3°C</td><td>82.6°C</td></tr> <tr><td>23</td><td>U1</td><td>56.9°C</td><td>78.6°C</td></tr> <tr><td>24</td><td>TC</td><td>58.5°C</td><td>80.0°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 34.0 °C	HIGH AMBIENT Ta=54.0 °C	1	ZNR1	47.3°C	67.9°C	2	RHT1	57.2°C	79.0°C	3	LF2	52.4°C	74.0°C	4	D5	60.0°C	81.3°C	5	Q105	85.3°C	107.0°C	6	C5	60.6°C	81.8°C	7	Q1	63.6°C	85.9°C	8	Q2	62.3°C	84.5°C	9	Q4	71.5°C	94.7°C	10	Q3	74.9°C	98.2°C	11	D23	91.0°C	113.2°C	12	C61	67.0°C	90.0°C	13	TSW1	70.5°C	92.1°C	14	L1	69.4°C	91.7°C	15	T1	79.5°C	101.7°C	16	C166	73.0°C	94.5°C	17	Q101	77.2°C	99.2°C	18	Q100	73.1°C	95.2°C	19	L100	71.9°C	93.7°C	20	C105	67.6°C	90.0°C	21	Q102	64.9°C	86.8°C	22	D1	61.3°C	82.6°C	23	U1	56.9°C	78.6°C	24	TC	58.5°C	80.0°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	±0.020 %/°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) 153469 HRS (2) 32503 HRS (3) 72086 HRS (4) 117949 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1277.1K hrs min. Telcordia SR-332 (Bellcore); 148.2K hrs min. MIL-HDBK-217F (25°C)	
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