



Test Report: HSP-300-4.2

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

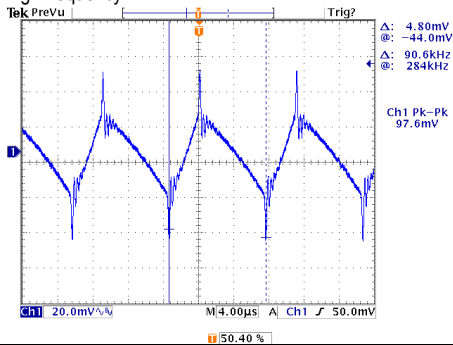
ENVIRONMENT TEST

DESIGN VERIFY TEST

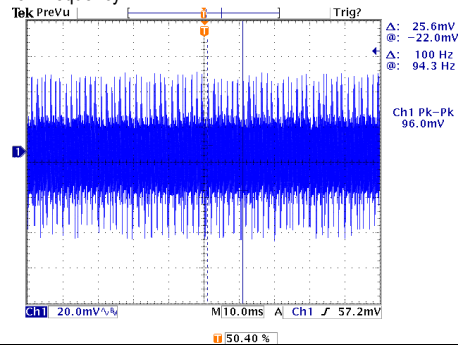
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	V1: 3.6 V~ 4.4 V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	2.845V~4.543V/230VAC 2.845V~4.543V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 2%~ -2%	I/P: 100VAC /264VAC O/P: FULL/ MIN. LOAD Ta: 25°C	V1: 1.688%~ -0.098%
3	LINE REGULATION (Max)	V1: 0.5%~ -0.5%	I/P: 100VAC~ 264VAC O/P: FULL LOAD Ta: 25°C	V1: 0%~ -0.002%
4	LOAD REGULATION(Max)	V1: 1%~ -1%	I/P: 230VAC O/P: FULL ~MIN LOAD Ta: 25°C	V1: 0.101%~ -0.098%
5	OVER/UNDERSHOOT TEST	< ± 10%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<10%
6	RIPPLE & NOISE(Max)	V1: 150 mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 97.6mVp-p

high frequency :



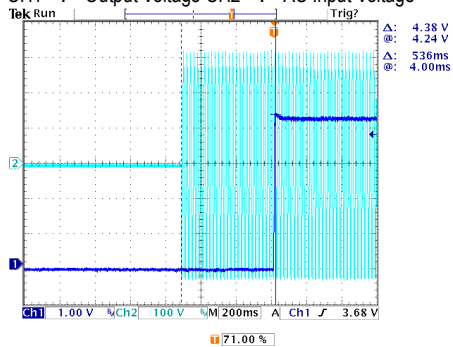
low frequency :



7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 536ms 115VAC/ 2370ms
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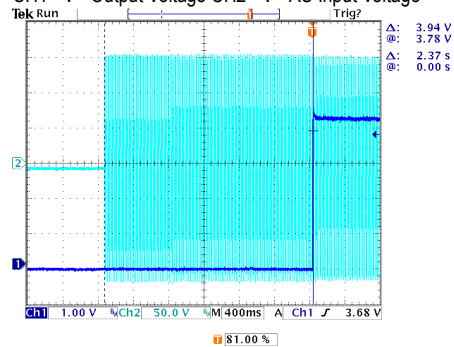
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

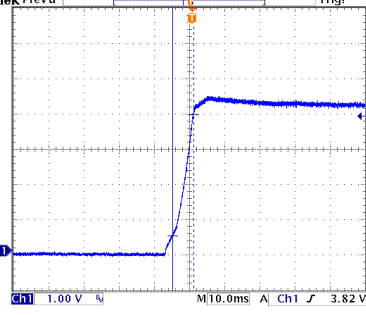
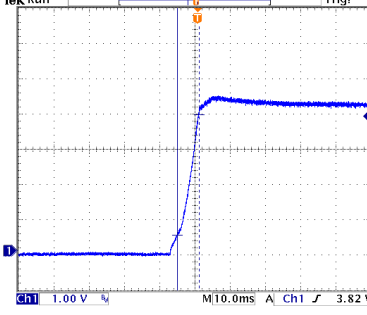
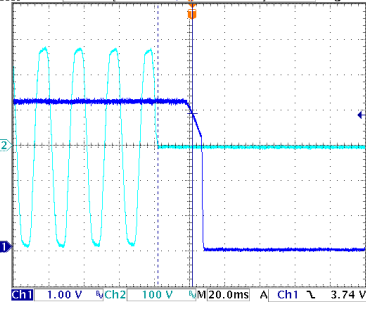
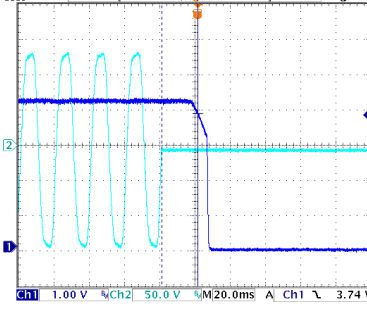
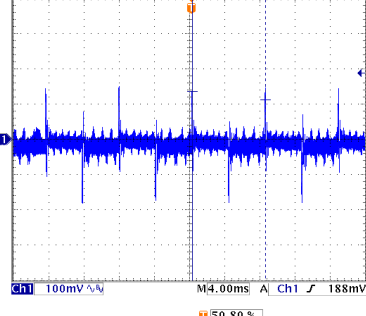
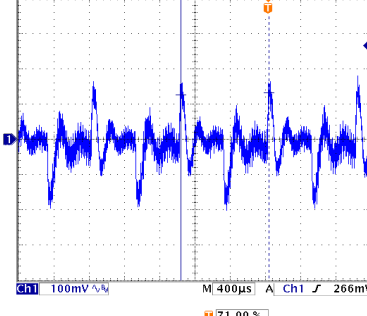
CH1 : Output Voltage CH2 : AC Input Voltage





300W Single Output Switching Power Supply

HSP-300 series

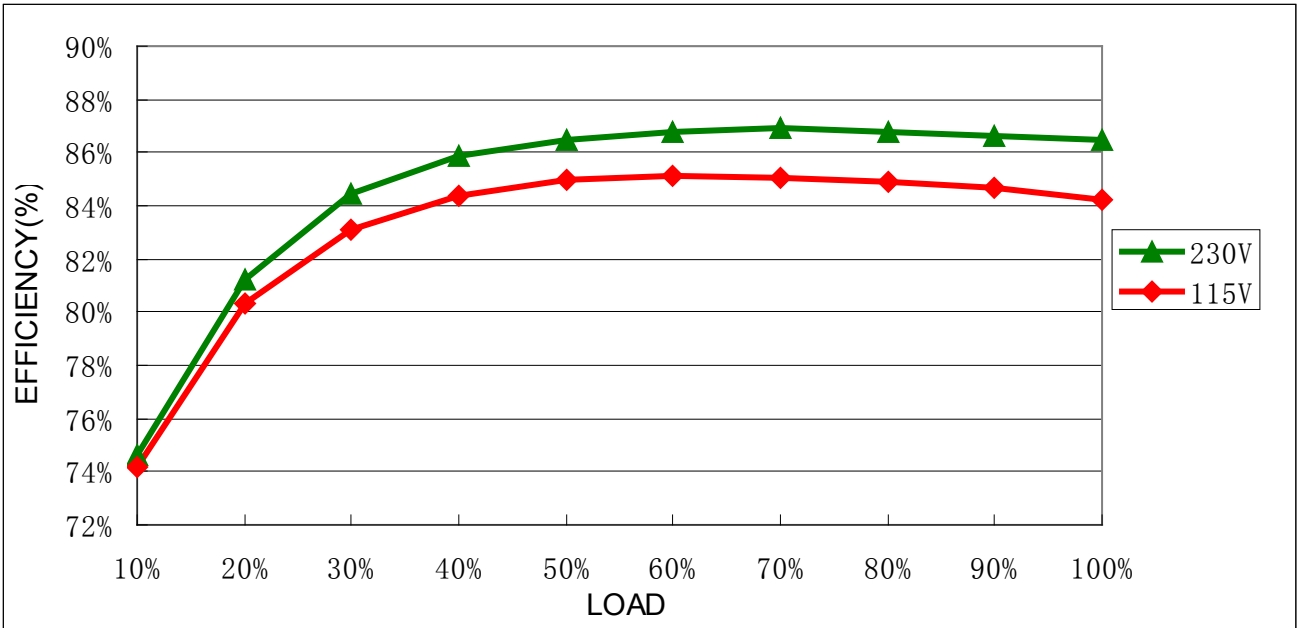
8	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6.028ms 115VAC/ 6.207ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 		
9	HOLD UP TIME(Typ)	230VAC/ 8ms 115VAC/ 8ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 19.6ms 115VAC/ 20.4ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		
10	DYNAMIC LOAD	V1: 840 mVp-p	I/P: 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C	332mVp-p 382mVp-p
FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 		



INPUT FUNCTION TEST

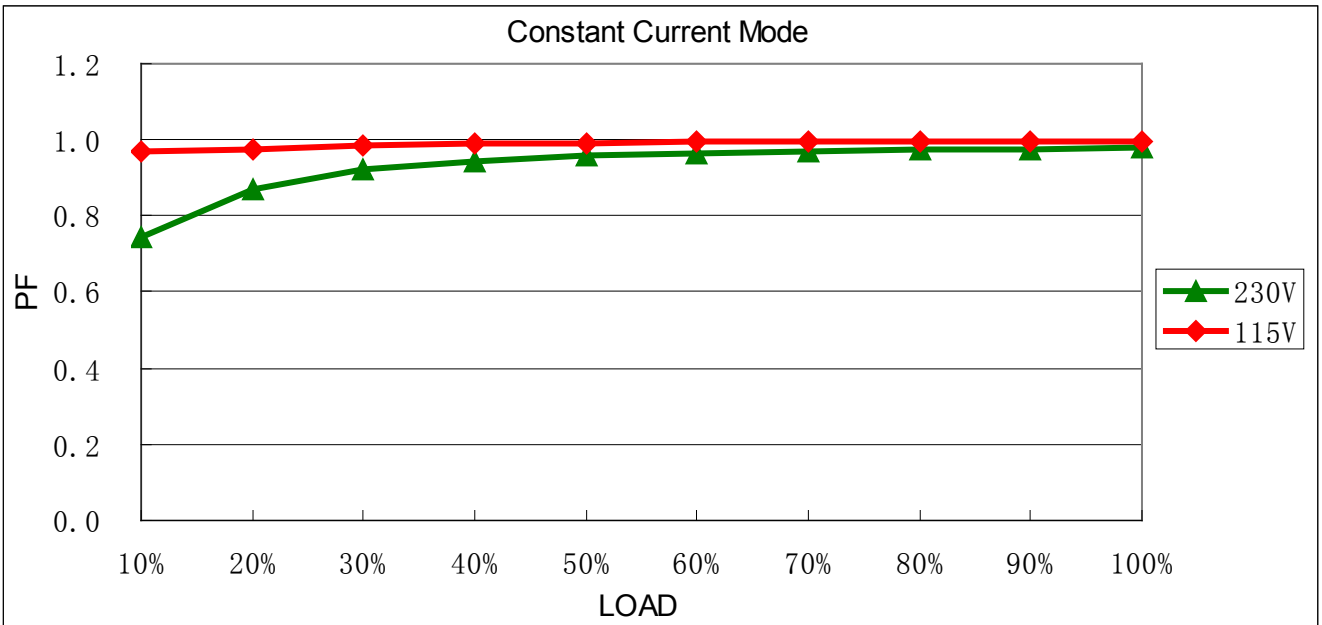
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~267V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON: 3Sec OFF: 3Sec 12HOURS (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/ 1.95A 115V/ 3.9A	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I =1.32A/ 230VAC I =2.64A/ 115VAC
4	LEAKAGE CURRENT	< 1mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.1775 mA N-FG: 0.1770 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 = 20.7 A/ 230VAC I = 10.0 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)	85%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	86.45%

EFFICIENCY vs LOAD



7	POWER FACTOR	0.93/ 230 VAC(TYP)	I/P: 230 VAC	PF=0.978/ 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	131.69%/ 230VAC 133.63%/ 180VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 4.6 V~ 5.4 V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	5.068V/ 230VAC 5.027V/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

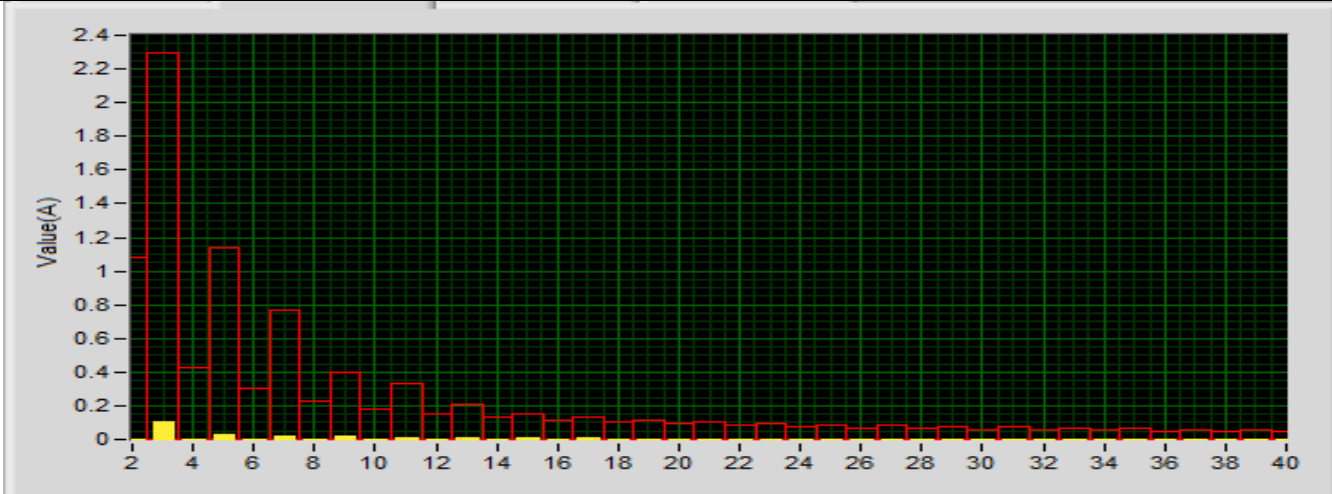
COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	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) 432V (2) 466V (3) 432V
2	Diode Peak Voltage	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) 19.8V (2) 19.8V (3) 19.9V Q102: (1) 24.6V (2) 24.5V (3) 24.5V
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) 386V (2) 386V (3) 386V
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) 12.8V (2) 12.9V (3) 12.9V

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: 1.633mA I/P-FG: 2.063mA O/P-FG: 1.420mA 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-300-4.2 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>49.1°C</td><td>73.0°C</td></tr> <tr><td>2</td><td>LF2</td><td>53.9°C</td><td>77.9°C</td></tr> <tr><td>3</td><td>BD1</td><td>62.0°C</td><td>86.1°C</td></tr> <tr><td>4</td><td>C10</td><td>64.5°C</td><td>88.2°C</td></tr> <tr><td>5</td><td>C5</td><td>68.0°C</td><td>91.6°C</td></tr> <tr><td>6</td><td>Q1</td><td>61.8°C</td><td>86.9°C</td></tr> <tr><td>7</td><td>Q2</td><td>61.9°C</td><td>87.0°C</td></tr> <tr><td>8</td><td>Q4</td><td>71.3°C</td><td>97.4°C</td></tr> <tr><td>9</td><td>Q3</td><td>72.3°C</td><td>98.6°C</td></tr> <tr><td>10</td><td>D23</td><td>87.0°C</td><td>111.2°C</td></tr> <tr><td>11</td><td>C61</td><td>80.5°C</td><td>104.5°C</td></tr> <tr><td>12</td><td>TSW1</td><td>72.2°C</td><td>96.2°C</td></tr> <tr><td>13</td><td>L1</td><td>76.4°C</td><td>104.6°C</td></tr> <tr><td>14</td><td>T1</td><td>77.0°C</td><td>101.4°C</td></tr> <tr><td>15</td><td>C166</td><td>71.3°C</td><td>96.2°C</td></tr> <tr><td>16</td><td>Q101</td><td>83.3°C</td><td>107.1°C</td></tr> <tr><td>17</td><td>Q100</td><td>75.1°C</td><td>99.7°C</td></tr> <tr><td>18</td><td>L100</td><td>73.5°C</td><td>99.4°C</td></tr> <tr><td>19</td><td>C105</td><td>68.9°C</td><td>94.4°C</td></tr> <tr><td>20</td><td>Q102</td><td>63.9°C</td><td>89.3°C</td></tr> <tr><td>21</td><td>D1</td><td>64.0°C</td><td>88.0°C</td></tr> <tr><td>22</td><td>U1</td><td>73.1°C</td><td>97.0°C</td></tr> <tr><td>23</td><td>Q105</td><td>77.5°C</td><td>102.4°C</td></tr> <tr><td>24</td><td>TC</td><td>56.7°C</td><td>81.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29.7 °C	HIGH AMBIENT Ta=56.1 °C	1	ZNR1	49.1°C	73.0°C	2	LF2	53.9°C	77.9°C	3	BD1	62.0°C	86.1°C	4	C10	64.5°C	88.2°C	5	C5	68.0°C	91.6°C	6	Q1	61.8°C	86.9°C	7	Q2	61.9°C	87.0°C	8	Q4	71.3°C	97.4°C	9	Q3	72.3°C	98.6°C	10	D23	87.0°C	111.2°C	11	C61	80.5°C	104.5°C	12	TSW1	72.2°C	96.2°C	13	L1	76.4°C	104.6°C	14	T1	77.0°C	101.4°C	15	C166	71.3°C	96.2°C	16	Q101	83.3°C	107.1°C	17	Q100	75.1°C	99.7°C	18	L100	73.5°C	99.4°C	19	C105	68.9°C	94.4°C	20	Q102	63.9°C	89.3°C	21	D1	64.0°C	88.0°C	22	U1	73.1°C	97.0°C	23	Q105	77.5°C	102.4°C	24	TC	56.7°C	81.5°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	±0.018 %/°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) 192943 HRS (2) 51345 HRS (3) 115583 HRS (4) 190318 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