Test Report: APC-25-500

25W 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	VERDICT
1	RIPPLE & NOISE	V1：300 mVp-p (Max)	I/P： 230VAC O/P：FULL LOAD Ta：25℃	V1： 70 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 15 V ~ 50 V	I/P： 230VAC O/P：CV MODE Ta：25℃	O/P= 15V： 0.513 A O/P= 49V： 0.512 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1： 5 %~ -5 % (Max)	I/P：100 VAC / 264 VAC O/P：FULL/ MIN LOAD Ta：25℃	V1： 0.528 %~ -0.012 %	P
4	LINE REGULATION	V1： 1 %~ -1 % (Max)	I/P：100 VAC ~ 264 VAC O/P：FULL LOAD Ta：25℃	V1： 0.012 %~ -0.012 %	P
5	LOAD REGULATION	V1：3 %~ -3 % (Max)	I/P： 230 VAC O/P：FULL ~MIN LOAD Ta：25℃	V1： 0.012 %~ -0.012 %	P
6	SET UP TIME	230VAC： 1500 ms (Max) 115VAC： 1500 ms(Max)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 278.13 ms 115VAC/ 285.13 ms	P
7	RISE TIME	230VAC： 40 ms (Max) 115VAC： 40 ms (Max)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 16.21 ms 115VAC/ 15.86 ms	P
8	HOLD UP TIME	230VAC： 20 ms (TYP) 115VAC： 12 ms (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 76.97 ms 115VAC/ 17.82 ms	P
9	OVER/UNDERSHOOT TEST	< ± 5%	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	TEST： <5 %	P
10	DYNAMIC LOAD	V1： 5000 mVp-p	I/P： 230 VAC (1).O/P：FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P：FULL /Min LOAD 50%DUTY/ 120HZ Ta：25℃	(1) 316 mVp-p (2) 2610 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	87 V~ 264 V	P
			(1)I/P: LOW-LINE-3V= 87 V HIGH-LINE+15%= 300 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (2) I/P:230VAC ON: 0.5 Sec . OFF: 0.5 Sec 20MIN (AC POWER ON/OFF NO DAMAGE)	TEST: (1) OK (2) OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P： 90 VAC ~ 264 VAC O/P：FULL~MIN LOAD Ta：25℃	TEST： OK	P
3	EFFICIENCY	83% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	84.40 %	P
4	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.8 A (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 0.289 A/ 230 VAC I = 0.441 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 70 A (TYP) 115V/ 35 A (TYP) COLD START	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 35.5 A/ 230 VAC I = 17.3 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	L-CASE： 0.003 mA N-CASE： 0.003 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	CH1： 55 V ~ 68 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	60.5 V/ 230 VAC 60.5 V/ 115 VAC Shut down o/p voltage, re-power on to recover	P
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 264 VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Hiccup mode	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : NDF06N60ZG : 600 V/ 6.0 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25℃	(1) 498 V (2) 432 V (3) 494 V	P
2	Diode Peak Voltage	D103 Rated : HER305: 400 V/ 3.0 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25℃	(1) 307 V (2) 294 V (3) 254 V	P
3	Input Capacitor Voltage	C5 Rated : 47u/420V 105℃ 18*20 KM	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25℃	(1) 390 V (2) 370 V (3) 374 V	P
4	Control IC Voltage Test	U 1 Rated : NCP1200D100R2G: 16V (MAX)	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25℃	(1) 11.7 V (2) 11.8 V (3) 11.6 V	P

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min	I/P-O/P : 3.6 KVAC/min Ta : 25℃	I/P-O/P : 2.070 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25℃/70% RH	I/P-O/P : >9999 MΩ NO DAMAGE	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT

1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/240VAC/220VAC50HZ O/P:100%LOAD CLASS A Ta:25℃	PASS	P
2	CONDUCTION	EN55022 CLASSB	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASSB	I/P: 230 VAC (50HZ)/115V[60HZ] O/P: FULL LOAD Ta:25℃	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： APC-25-500
1. ROOM AMBIENT BURN-IN：2.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=33.2 ℃
2. HIGH AMBIENT BURN-IN：3.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=44.1 ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 33.2 ℃</th><th>HIGH AMBIENT Ta= 44.1 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>LF-804</td><td>68.4℃</td><td>86.6℃</td></tr>
<tr><td>2</td><td>BD1</td><td>KBP208G</td><td>69.5℃</td><td>87.7℃</td></tr>
<tr><td>3</td><td>C5</td><td>47uF/420V KM</td><td>62.2℃</td><td>79.6℃</td></tr>
<tr><td>4</td><td>C9</td><td>100uF/25V KY</td><td>73.1℃</td><td>92.6℃</td></tr>
<tr><td>5</td><td>ZD1</td><td>P6KE180A</td><td>72.5℃</td><td>89.5℃</td></tr>
<tr><td>6</td><td>D1</td><td>S1M 1A/1KV</td><td>77.1℃</td><td>93.4℃</td></tr>
<tr><td>7</td><td>Q1</td><td>NDF06N60ZG</td><td>83.7℃</td><td>98.6℃</td></tr>
<tr><td>8</td><td>T1</td><td>TF-6404</td><td>81.5℃</td><td>91.6℃</td></tr>
<tr><td>9</td><td>D103</td><td>HER304</td><td>81.5℃</td><td>92.1℃</td></tr>
<tr><td>10</td><td>C106</td><td>120uF/63V GL</td><td>68.1℃</td><td>81.7℃</td></tr>
<tr><td>11</td><td>C105</td><td>47uF/63V GL</td><td>61.6℃</td><td>76.1℃</td></tr>
<tr><td>12</td><td>C200</td><td>47uF/50V YXF</td><td>69.0℃</td><td>82.7℃</td></tr>
<tr><td>13</td><td>C108</td><td>47uF/63V GL</td><td>54.0℃</td><td>69.3℃</td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 95 % LOAD
Ta= -30℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 40 ℃
NO DAMAGE</td><td>I/P： 264 VAC
O/P：95% LOAD
Ta= 40 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.2 %(0~50℃)</td><td>I/P： 230 VAC
O/P：95% LOAD</td><td>± 0.004 %(0~50℃)</td><td>P</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +85℃
2. Temperature change rate ：25℃ / MIN
3. Dwell time low and high temperature ： 30 MIN/EACH
4. Total test cycle：5 CYCLE
5. Input/Output condition： STATIC</td><td>OK</td><td>P</td></tr>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -35℃~ +45℃
2. Temperature change rate ：25℃ / 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 58sec；turn off 2sec</td><td>OK</td><td>P</td></tr>
<tr><td>7</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(1) Waveform： Sine Wave
(2) Frequency：10~500Hz
(3) Sweep Time：12min/sweep cycle
(4) Acceleration：2G
(5) Test Time：72min in each axis (X.Y.Z)
(6) Ta：25℃</td><td>TEST：OK</td><td>P</td></tr>
</table>

8	CAPACITOR LIFE CYCLE	APC-25-500 :SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta=25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta=40 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta=40 ℃ LIFE TIME	(1) 168792.8 HRS (2) 48617 HRS (3) 109388.3 HRS	P
9	MTBF	Conducted by Parts Stress Analysis Prediction 4955.9K hrs min. Telcordia SR-332 (Bellcore) ; 504.9K hrs min. MIL-HDBK-217F (25℃)		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20,000 hours @ Tcase 75℃; 50,000 hours @ Tcase 60℃		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2012/05/30	PRODUCT SAMPLE	PASS	ZOULF	HOWAY

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