



# Test Report: APC-35-1050

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35W 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 : 350 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 65 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 11V ~ 33V	I/P : 230VAC O/P : CV MODE Ta : 25°C	O/P= 11V : 1.052 A O/P= 32V : 1.052 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 5 %~ -5 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.309 %~ -0.060 %	P
4	LINE REGULATION	V1 : 1 %~ -1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.006 %~ -0.003 %	P
5	LOAD REGULATION	V1 : 3 %~ -3 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.027 %~ -0.036 %	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°C	230VAC/ 282.71 ms 115VAC/ 285.17 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°C	230VAC/ 7.21 ms 115VAC/ 7.27 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°C	230VAC/ 110.30 ms 115VAC/ 24.19 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 3300 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°C	(1) 604 mVp-p (2) 1540 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°C	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°C	TEST : OK	P
3	EFFICIENCY	84% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	84.14 %	P
4	INPUT CURRENT	230V/ 0.5 A (TYP) 115V/ 0.75 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.391 A/ 230 VAC I = 0.621 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°C	I = 39.3 A/ 230 VAC I = 19.3 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	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 : 36 V ~ 43 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	38.6 V/ 230 VAC 38.6 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°C	NO DAMAGE Hiccup mode	P

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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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°C	(1) 534 V (2) 458 V (3) 488 V	P
2	Diode Peak Voltage	D100 Rated : FCF10A40: 400 V/ 10 A	I/P : High-Line +3V = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 296 V (2) 300 V (3) 260 V	P
3	Input Capacitor Voltage	C5 Rated : 82u/420V 105°C 18*25 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°C	(1) 384 V (2) 372 V (3) 368 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°C	(1) 11.7 V (2) 11.8 V (3) 11.7 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°C	I/P-O/P : 1.627 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70% RH	I/P-O/P : >9999 MΩ NO DAMAGE	P

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/240VAC/220VAC50HZ O/P:100%LOAD CLASS A Ta:25°C	PASS	P
2	CONDUCTION	EN55022 CLASSB	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASSB	I/P: 230 VAC (50HZ)/115V[60HZ] O/P: FULL LOAD Ta:25°C	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°C	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°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

## ■ RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	TEMPERATURE RISE TEST	<p>MODEL : APC-35-1050</p> <p>1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=31.2 °C</p> <p>2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=44.2 °C</p> <table border="1" data-bbox="502 425 1340 929"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 31.2 °C</th> <th>HIGH AMBIENT Ta= 44.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>LF-804</td><td>75.1°C</td><td>88.3°C</td></tr> <tr><td>2</td><td>BD1</td><td>KBP208G</td><td>75.3°C</td><td>90.1°C</td></tr> <tr><td>3</td><td>C5</td><td>82uF/420V KM</td><td>69.8°C</td><td>87.2°C</td></tr> <tr><td>4</td><td>C9</td><td>100uF/25V KY</td><td>82.2°C</td><td>97.0°C</td></tr> <tr><td>5</td><td>ZD1</td><td>P6KE180A</td><td>77.0°C</td><td>97.2°C</td></tr> <tr><td>6</td><td>D1</td><td>S1M 1A/1KV</td><td>87.9°C</td><td>103.9°C</td></tr> <tr><td>7</td><td>Q1</td><td>NDF06N60ZG</td><td>90.9°C</td><td>106.8°C</td></tr> <tr><td>8</td><td>T1</td><td>TF-6405</td><td>89.7°C</td><td>106.4°C</td></tr> <tr><td>9</td><td>D100</td><td>FCF10A40</td><td>77.5°C</td><td>95.8°C</td></tr> <tr><td>10</td><td>C106</td><td>220uF/50V KY</td><td>65.4°C</td><td>80.4°C</td></tr> <tr><td>11</td><td>C105</td><td>220uF/50V KY</td><td>66.0°C</td><td>81.5°C</td></tr> <tr><td>12</td><td>C200</td><td>22uF/50V KY</td><td>69.6°C</td><td>85.9°C</td></tr> <tr><td>13</td><td>C108</td><td>47uF/50V GL</td><td>62.1°C</td><td>78.4°C</td></tr> </tbody> </table>			NO	Position	P/N	ROOM AMBIENT Ta= 31.2 °C	HIGH AMBIENT Ta= 44.2 °C	1	LF1	LF-804	75.1°C	88.3°C	2	BD1	KBP208G	75.3°C	90.1°C	3	C5	82uF/420V KM	69.8°C	87.2°C	4	C9	100uF/25V KY	82.2°C	97.0°C	5	ZD1	P6KE180A	77.0°C	97.2°C	6	D1	S1M 1A/1KV	87.9°C	103.9°C	7	Q1	NDF06N60ZG	90.9°C	106.8°C	8	T1	TF-6405	89.7°C	106.4°C	9	D100	FCF10A40	77.5°C	95.8°C	10	C106	220uF/50V KY	65.4°C	80.4°C	11	C105	220uF/50V KY	66.0°C	81.5°C	12	C200	22uF/50V KY	69.6°C	85.9°C	13	C108	47uF/50V GL	62.1°C	78.4°C	P
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 95 % LOAD Ta= -30°C	TEST : OK	P																																																																						
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 264 VAC O/P : 95% LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																						
4	TEMPERATURE COEFFICIENT	± 0.2 % (0~50°C)	I/P : 230 VAC O/P : 95% LOAD	± 0.059 % (0~50°C)	P																																																																						
5	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature : -45°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 5 CYCLE</p> <p>5. Input/Output condition : STATIC</p>			P																																																																						
6	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -35°C~ +45°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 10 CYCLE</p> <p>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</p>			P																																																																						
7	VIBRATION TEST	<p>1 Carton &amp; 1 Set</p> <p>(1) Waveform : Sine Wave</p> <p>(2) Frequency : 10~500Hz</p> <p>(3) Sweep Time : 12min/sweep cycle</p> <p>(4) Acceleration : 2G</p> <p>(5) Test Time : 72min in each axis (X.Y.Z)</p> <p>(6) Ta : 25°C</p>			P																																																																						



# 35W Single Output Switching Power Supply

# APC-35 series

8	CAPACITOR LIFE CYCLE	APC-35-1050 :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=40 °C LIFE TIME	(1) 192696 HRS (2) 57288 HRS	P
9	MTBF	Conducted by Parts Stress Analysis Prediction 4955.9K hrs min. Telcordia SR-332 (Bellcore); 550.4K hrs min. MIL-HDBK-217F (25°C)		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20,000 hours @ Tcase 80°C; 50,000 hours @ Tcase 65°C		P

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

2009/08/04 A50-F023