



Test Report: APV-35-5

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 : 120 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 35 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : 5 %~-5 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 3.54 %~-1.20 %	P
3	LINE REGULATION	V1 : 1 %~-1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.02 %~-0.02 %	P
4	LOAD REGULATION	V1 : 2 %~-2 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 1.14 %~-1.20 %	P
5	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/ 273.83 ms 115VAC/ 277.44 ms	P
6	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/ 2.36 ms 115VAC/ 2.73 ms	P
7	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/ 120.97 ms 115VAC/ 24.39 ms	P
8	OVER/UNDERSHOOT TEST	$\leq \pm 5\%$	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : $\leq 5\%$	P
9	DYNAMIC LOAD	V1 : 1000 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) 249 mVp-p (2) 271 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	76.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	76.87 %	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 = 0.324 A/ 230 VAC I = 0.516 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 = 19.9 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 LOAD PROTECTION	CH1 : 110 % ~ 160 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	143.6 %/ 230 VAC 131.4 %/ 115 VAC Hiccup mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 5.75 V ~ 6.95 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	6.32 V/ 230 VAC 6.32 V/ 115 VAC Shut down o/p voltage, re-power on to recover	P
3	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
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) 530 V (2) 488 V (3) 504 V	P
2	Diode Peak Voltage	D100 Rated : STPS2045CTC:45V/ 20 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) 38.4 V (2) 33.0 V (3) 38.0 V	P
3	Input Capacitor Voltage	C5 Rated : 82u/420V 105°C 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°C	(1) 408 V (2) 392 V (3) 382 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) 11.8 V (2) 11.8 V (3) 11.8 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 : 0.883 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
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																																																																						
1	TEMPERATURE RISE TEST	MODEL : APV-35-5 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=30.2 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=42.2 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 30.2 °C</th><th>HIGH AMBIENT Ta= 42.2 °C</th></tr><tr><td>1</td><td>LF1</td><td>LF-804</td><td>64.3°C</td><td>74.6°C</td></tr><tr><td>2</td><td>BD1</td><td>KBP208G</td><td>60.9°C</td><td>72.0°C</td></tr><tr><td>3</td><td>C5</td><td>82uF/420V KM</td><td>64.4°C</td><td>74.7°C</td></tr><tr><td>4</td><td>C9</td><td>100uF/25V KY</td><td>69.8°C</td><td>80.6°C</td></tr><tr><td>5</td><td>Q1</td><td>NDF06N60ZG</td><td>76.8°C</td><td>87.2°C</td></tr><tr><td>6</td><td>ZD1</td><td>P6KE180A</td><td>78.3°C</td><td>88.5°C</td></tr><tr><td>7</td><td>D1</td><td>S1M 1A/1KV</td><td>88.6°C</td><td>98.7°C</td></tr><tr><td>8</td><td>U1</td><td>NCP1200D60R2G</td><td>73.8°C</td><td>83.9°C</td></tr><tr><td>9</td><td>T1</td><td>TF-6393</td><td>88.9°C</td><td>99.1°C</td></tr><tr><td>10</td><td>D100</td><td>STPS2045CTC</td><td>102.6°C</td><td>112.2°C</td></tr><tr><td>11</td><td>C106</td><td>1000uF/10V ZLH</td><td>86.6°C</td><td>94.3°C</td></tr><tr><td>12</td><td>C107</td><td>1000uF/10V GL</td><td>68.8°C</td><td>79.5°C</td></tr><tr><td>13</td><td>LF100</td><td>TR-574-R3</td><td>77.8°C</td><td>90.4°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 30.2 °C	HIGH AMBIENT Ta= 42.2 °C	1	LF1	LF-804	64.3°C	74.6°C	2	BD1	KBP208G	60.9°C	72.0°C	3	C5	82uF/420V KM	64.4°C	74.7°C	4	C9	100uF/25V KY	69.8°C	80.6°C	5	Q1	NDF06N60ZG	76.8°C	87.2°C	6	ZD1	P6KE180A	78.3°C	88.5°C	7	D1	S1M 1A/1KV	88.6°C	98.7°C	8	U1	NCP1200D60R2G	73.8°C	83.9°C	9	T1	TF-6393	88.9°C	99.1°C	10	D100	STPS2045CTC	102.6°C	112.2°C	11	C106	1000uF/10V ZLH	86.6°C	94.3°C	12	C107	1000uF/10V GL	68.8°C	79.5°C	13	LF100	TR-574-R3	77.8°C	90.4°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 140 % LOAD Ta : 25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : FULL LOAD Ta= -30°C	TEST : OK	P
4	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 : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 % (0~50°C)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C ~ +85°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	OK		P
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°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 58sec ; turn off 2sec	OK		P
8	VIBRATION TEST	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°C	TEST : OK		P
9	CAPACITOR LIFE CYCLE	APV-35-5 :SUPPOSE C106 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 (3) I/P : 230VAC O/P : 75% LOAD Ta=40 °C LIFE TIME	(1) 51402.6 HRS (2) 20741.4 HRS (3) 46392.6 HRS		P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 692.8KHRS			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20,000 hours @ Tcase 70°C ; 50,000 hours @ Tcase 55°C			P

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

2009/08/04 A50-F023