



# Test Report: APV-35-12

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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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 32 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 : 1.142 %~ -0.675 %	P
3	LINE REGULATION	V1 : 1 %~ -1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.058 %~ -0.017 %	P
4	LOAD REGULATION	V1 : 2 %~ -2 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.350 %~ -0.308 %	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/ 281.47 ms 115VAC/ 284.85 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/ 6.75 ms 115VAC/ 6.68 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/ 100.48 ms 115VAC/ 21.34 ms	P
8	OVER/UNDERSHOOT TEST	< ± 5 %	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	P
9	DYNAMIC LOAD	V1 : 1200 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) 189 mVp-p (2) 402 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	83 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	83.24 %	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 = 0.414 A/ 230 VAC I = 0.664 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 45 A (TYP) Twidth =440 us measured at 50% Ipeak COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 40.4 A/ 230 VAC Twidth =383 us	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	146.7 %/ 230 VAC 143.6 %/ 115 VAC Hiccup mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 13.8 V ~ 16.2 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	14.99 V/ 230 VAC 14.99 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) 508 V (2) 496 V (3) 488 V	P
2	Diode Peak Voltage	D100 Rated : STPS20H100CT:100V/ 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) 79.6 V (2) 73.2 V (3) 79.2 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) 404 V (2) 396 V (3) 380 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) 11.9 V (2) 11.9 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 : 0.882 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			P

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

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