



Test Report: APV-25-15

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 : 150 mVp-p (Max) | I/P : 230VAC O/P : FULL LOAD Ta : 25°C | V1 : 55 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 : 0.933 %~ -0.433 % | P |
| 3 | LINE REGULATION | V1 : 1 %~ -1 % (Max) | I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C | V1 : 0.100 %~ -0.040 % | P |
| 4 | LOAD REGULATION | V1 : 2 %~ -2 % (Max) | I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C | V1 : 0.247 %~ -0.167 % | 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/ 277.86 ms 115VAC/ 278.70 ms | P |
| 6 | RISE TIME | 230VAC : 30 ms (Max) 115VAC : 30 ms (Max) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 5.86 ms 115VAC/ 6.36 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/ 70.97 ms 115VAC/ 14.73 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 : 1500 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) 202 mVp-p (2) 604 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 | 83.63 % | P |
| 4 | INPUT CURRENT | 230V/ 0.4 A (TYP) | I/P : 230 VAC | I = 0.295 A/ 230 VAC | P |
| | | 115V/ 0.8 A (TYP) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 0.462 A/ 115 VAC | |
| 5 | INRUSH CURRENT | 230V/ 70 A (TYP) | I/P : 230 VAC | I = 37.7 A/ 230 VAC | P |
| | | 115V/ 35 A (TYP) COLD START | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 18.7 A/ 115 VAC | |
| 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 | >105% | I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C | 145.48 %/ 230 VAC 141.07 %/ 115 VAC Hiccup mode | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 17.25 V ~ 21 V | I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C | 19.1 V/ 230 VAC 19.1 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) 502 V (2) 484 V (3) 486 V | P |
| 2 | Diode Peak Voltage | D100 Rated : STPS10150CT:150V/ 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) 116 V (2) 115 V (3) 97.6 V | P |
| 3 | Input Capacitor Voltage | C5 Rated : 47u/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) 394 V (2) 386 V (3) 392 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 : 0.875 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-25-5 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=32.3 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=42.5 °C | | | P |
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|----|---|--|--|---|---|
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 230 VAC O/P : 144 % 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 | ± 0.021 % (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-25-5 :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) 53906.9 HRS (2) 21169.4 HRS (3) 28688.6 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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