



Test Report: APV-35-12

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 |
|----|-----------|---------------|----------------|--------|---------|
|----|-----------|---------------|----------------|--------|---------|

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|---|-----------------------|---|--|--|---|
| 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 | Q1 Rated : | I/P : High-Line +3V = 267 V | (1) 508 V | P |

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|---|-----------------------------------|--|--|--|---|
| | (D to S) or (C to E) Peak Voltage | NDF06N60ZG : 600 V/ 6.0 A | O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (2) 496 V (3) 488 V | |
| 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 |

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| 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 |
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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 |

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| 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 | Conducted by Parts Stress Analysis Prediction 5489.6K hrs min. Telcordia SR-332 (Bellcore) ; 600.8K hrs min. MIL-HDBK-217F (25°C) | | | 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