



Test Report: LPF-25-20

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 : 60 mVp-p (Max) | P |
| 2 | CONSTANT CURRENT REGION | V1= 11V~20V | I/P : 230VAC O/P : CV MODE Ta : 25°C | O/P= 11V : 1.259 A O/P= 19V : 1.261 A | P |
| 3 | OUTPUT VOLTAGE TOLERANCE | V1 : 4 %~ -4 % (Max) | I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C | V1 : 0.605 %~ -0.099 % | P |
| 4 | LINE REGULATION | V1 : 0.5 %~ -0.5 % (Max) | I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C | V1 : 0.005 %~ -0.005 % | P |
| 5 | LOAD REGULATION | V1 : 1 %~ -1 % (Max) | I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C | V1 : 0.095 %~ -0.099 % | P |
| 6 | SET UP TIME | 230VAC : 500 ms (Max) 115VAC : 1500 ms(Max) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 255.809 ms 115VAC/ 238.463 ms | P |
| 7 | RISE TIME | 230VAC : 80 ms (Max) 115VAC : 80 ms (Max) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 7 ms 115VAC/ 7 ms | P |
| 8 | HOLD UP TIME | 230VAC : 16 ms (TYP) 115VAC : 16 ms (TYP) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 76 ms 115VAC/ 77 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 : 2000 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) 524 mVp-p (2) 628 mVp-p | P |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-----------------------|---|---|---|---------|
| 1 | INPUT VOLTAGE RANGE | 100VAC~305 VAC | I/P : TESTING O/P : FULL LOAD Ta : 25°C | 85 V~305V | P |
| | | | I/P : LOW-LINE-3V=97 V HIGH-LINE=305 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE) | TEST : OK | |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE OSC | I/P : 100 VAC ~ 305 VAC O/P : FULL~MIN LOAD Ta : 25°C | TEST : OK | P |
| 3 | POWER FACTOR | 0.95 / 230 VAC(TYP) 0.97 / 115 VAC(TYP) 0.92 / 277 VAC(TYP) | I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C | PF= 0.975 / 100% PF= 0.995 / 100% PF= 0.953 / 100% | P |
| 4 | EFFICIENCY | 86% (TYP) | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 86.34 % | P |
| 5 | INPUT CURRENT | 230V/ 0.25 A (TYP) 115V/ 0.4 A (TYP) 277V/ 0.2 A (TYP) | I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C | I= 0.141 A/ 230 VAC I= 0.255 A/ 115 VAC I= 0.125 A/ 277 VAC | P |
| 6 | INRUSH CURRENT | 230V/ 50 A (TYP) COLD START | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | I= 38.0 A/ 230 VAC | P |
| 7 | LEAKAGE CURRENT | < 0.75 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 | 95 % ~ 108 % | I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C | 100.80 %/ 230 VAC 100.70 %/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed. | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 23 V ~ 27 V | I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C | 24.74 V/ 230 VAC 24.73 V/ 115 VAC Shut down and latch off o/p voltage, re-power on to recover | P |
| 3 | OVER TEMPERATURE PROTECTION | SPEC : TSW1 : 95± 5°C O.T.P. NO DAMAGE | I/P : 230 VAC O/P : FULL LOAD | O.T.P. Active Shut down o/p voltage · recovers automatically after temperature goes down | P |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P : 305 VAC O/P : FULL LOAD Ta : 25°C | NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed. | P |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|--|---------------------------------------|--|--|---------|
| 1 | Power Transistor (D to S) or (C to E) Peak Voltage | U2 Rated : IP7518: 700V / 2A | I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 640 V (2) 448 V (3) 632 V | P |
| 2 | Diode Peak Voltage | D101 Rated : V30100C: 100V / 30A | I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C | (1) 82.8 V (2) 54.8 V (3) 81.6 V | P |
| 3 | Input Capacitor Voltage | C5 Rated : 22u/450V 105°C 16*20 RH | I/P : High-Line +3V = 308 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) 444 V (2) 440 V (3) 434 V | P |
| 4 | Control IC Voltage Test | U 2 Rated : IP7518:30V | I/P : High-Line +3V = 308 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) 20.0 V (2) 13.9 V (3) 19.2 V | P |
| 5 | Power Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated : NDF10N60ZG: 600V/ 10 A | I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 442 V (2) 440 V (3) 436 V | P |

■ SAFETY & E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|----------------------|--|--------------------------------------|-------------------------------------|---------|
| 1 | WITHSTAND VOLTAGE | I/P-O/P : 3.75 KVAC/min | I/P-O/P : 4 KVAC/min Ta : 25°C | I/P-O/P : 1.509 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 |
| 3 | APPROVAL | TUV : Certificate NO : UL : File NO : | | | N/A |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---|--|--|-------------------------------|---------|
| 1 | HARMONIC | EN61000-3-2 CLASS C | I/P:230VAC/240VAC/220VAC50HZ O/P:100%,75%,50%LOAD CLASS C ≥ 50% Ta:25°C | PASS | P |
| 2 | CONDUCTION | EN55015 | I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL/50% LOAD Ta:25°C | PASS Test by certified Lab | P |
| 3 | RADIATION | EN55015 | I/P: 230 VAC (50HZ)/115V[60HZ] O/P: FULL/50% 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 : LPF-25-12 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=32.1 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=52.0 °C | | | P |
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| 2 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 305VAC/100VAC O/P : 95 % LOAD Ta= -40°C | TEST : OK | P |
| 3 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE | I/P : 305 VAC O/P : 95% LOAD Ta= 50 °C HUMIDITY= 95 %R.H | TEST : OK | P |
| 4 | TEMPERATURE COEFFICIENT | ± 0.03 % (0~50°C) | I/P : 230 VAC O/P : 95% LOAD | ± 0.0264 % (0~50°C) | P |
| 5 | 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 |
| 6 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -45°C~ +55°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 |

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|----|-----------------------------|---|---|---|
| 7 | VIBRATION TEST | 1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C | TEST : OK | P |
| 8 | CAPACITOR LIFE CYCLE | LPF-25-12: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=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME | (1) 491000.3 HRS (2) 99652.1 HRS (3) 129746.8 HRS | P |
| 9 | MTBF | Conducted by Parts Stress Analysis Prediction 3574.2K hrs min. Telcordia SR-332 (Bellcore); 391.6K hrs min. MIL-HDBK-217F (25°C) | | P |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase70°C | | P |

| SAMPLE | TEST RESULT | TESTER | APPROVAL |
|----------------|-------------|--------|----------|
| PRODUCT SAMPLE | PASS | ZOULF | HOWAY |

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