



# Test Report: LPF-25D-12

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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<br>O/P : FULL LOAD<br>Ta : 25°C                                                                          | V1 : 80 mVp-p (Max )                     | P       |
| 2  | CONSTANT CURRENT REGION  | V1= 6V~12V                                     | I/P : 230VAC<br>O/P : CV MODE<br>Ta : 25°C                                                                            | O/P= 6V : 2.143 A<br>O/P= 11V : 2.147 A  | P       |
| 3  | OUTPUT VOLTAGE TOLERANCE | V1 : 4 %~ -4 % (Max)                           | I/P : 100 VAC / 305 VAC<br>O/P : FULL/ MIN LOAD<br>Ta : 25°C                                                          | V1 : 1.483 %~ -0.278 %                   | P       |
| 4  | LINE REGULATION          | V1 : 0.5 %~ -0.5 % (Max)                       | I/P : 100 VAC ~ 305 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                               | V1 : 0.035 %~ -0.035 %                   | P       |
| 5  | LOAD REGULATION          | V1 : 2 %~ -2 % (Max)                           | I/P : 230 VAC<br>O/P : FULL ~MIN LOAD<br>Ta : 25°C                                                                    | V1 : 0.278 %~ -0.278 %                   | P       |
| 6  | SET UP TIME              | 230VAC : 500 ms (Max)<br>115VAC : 1500 ms(Max) | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                        | 230VAC/ 331.562 ms<br>115VAC/ 325.542 ms | P       |
| 7  | RISE TIME                | 230VAC : 80 ms (Max)<br>115VAC : 80 ms (Max)   | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                        | 230VAC/ 3 ms<br>115VAC/ 3 ms             | P       |
| 8  | HOLD UP TIME             | 230VAC : 16 ms (TYP)<br>115VAC : 16 ms (TYP)   | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                        | 230VAC/ 73 ms<br>115VAC/ 76 ms           | P       |
| 9  | OVER/UNDERSHOOT TEST     | < ±5%                                          | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                         | TEST : <5 %                              | P       |
| 10 | DYNAMIC LOAD             | V1 : 1200 mVp-p                                | I/P : 230 VAC<br>(1).O/P : FULL /Min LOAD 90%DUTY/<br>1KHZ<br>(2).O/P : FULL /Min LOAD 50%DUTY/<br>120HZ<br>Ta : 25°C | (1) 864 mVp-p<br>(2) 1180 mVp-p          | P       |

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DIMMER TEST

SPEC:

\*Output constant current level can be adjusted through output cable by 1 ~ 10Vdc, PWM signal or resistor between ADJ1(+) and ADJ2(-).

\*Reference resistance value for output current adjustment (Typical)

|                  |     |     |     |     |     |     |     |     |     |      |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Resistance value | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K |
| Output current   | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

\*1 ~ 10V dimming function for output current adjustment (Typical)

|                |     |     |     |     |     |     |     |     |     |      |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Dimming value  | 1V  | 2V  | 3V  | 4V  | 5V  | 6V  | 7V  | 8V  | 9V  | 10V  |
| Output current | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

\*10V PWM signal for output current adjustment (Typical)

|                |     |     |     |     |     |     |     |     |     |      |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Duty value     | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| Output current | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

TEST RESULT: I/P : 230 VAC ;Ta : 25°C

|   |                  |        |        |        |        |        |        |        |        |        |        |
|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | Resistance value | 10K    | 20K    | 30K    | 40K    | 50K    | 60K    | 70K    | 80K    | 90K    | 100K   |
|   | Output current   | 0.209A | 0.421A | 0.630A | 0.838A | 1.057A | 1.262A | 1.471A | 1.685A | 1.894A | 2.092A |
|   | %                | 9.95%  | 20.05% | 30.00% | 39.90% | 50.33% | 60.01% | 70.05% | 80.24% | 90.19% | 99.62% |
| 2 | Dimming value    | 1V     | 2V     | 3V     | 4V     | 5V     | 6V     | 7V     | 8V     | 9V     | 10V    |
|   | Output current   | 0.210A | 0.419A | 0.633A | 0.841A | 1.055A | 1.264A | 1.474A | 1.687A | 1.897A | 2.092A |
|   | %                | 10.00% | 19.95% | 30.14% | 40.05% | 50.24% | 60.19% | 70.19% | 80.33% | 90.33% | 99.62% |
| 3 | Duty value       | 10%    | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%   |
|   | Output current   | 0.213A | 0.423A | 0.635A | 0.845A | 1.058A | 1.268A | 1.478A | 1.690A | 1.899A | 2.097A |
|   | %                | 10.14% | 20.14% | 30.24% | 40.24% | 50.38% | 60.38% | 70.38% | 80.48% | 90.43% | 99.86% |

P

## INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                                                     | TEST CONDITION                                                                                                                           | RESULT                                                            | VERDICT |
|----|-----------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------|
| 1  | INPUT VOLTAGE RANGE   | 100VAC~305 VAC                                                    | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                            | 86 V~305V                                                         | P       |
|    |                       |                                                                   | I/P :<br>LOW-LINE=3V=97 V<br>HIGH-LINE=305 V<br>O/P : FULL/MIN LOAD<br>ON : 30 Sec . OFF : 30 Sec 10MIN<br>( AC POWER ON/OFF NO DAMAGE ) | TEST : OK                                                         |         |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE OSC                                      | I/P : 100 VAC ~ 305 VAC<br>O/P : FULL~MIN LOAD<br>Ta : 25°C                                                                              | TEST : OK                                                         | P       |
| 3  | POWER FACTOR          | 0.95 / 230 VAC(TYP)<br>0.97 / 115 VAC(TYP)<br>0.92 / 277 VAC(TYP) | I/P : 230 VAC<br>I/P : 115 VAC<br>I/P : 277 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                          | PF= 0.975 / 100%<br>PF= 0.997 / 100%<br>PF= 0.953 / 100%          | P       |
| 4  | EFFICIENCY            | 84% (TYP)                                                         | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                            | 84.25 %                                                           | P       |
| 5  | INPUT CURRENT         | 230V/ 0.25 A (TYP)<br>115V/ 0.4 A (TYP)<br>277V/ 0.2 A (TYP)      | I/P : 230 VAC<br>I/P : 115 VAC<br>I/P : 277 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                          | I= 0.134 A/ 230 VAC<br>I= 0.259 A/ 115 VAC<br>I= 0.114 A/ 277 VAC | P       |
| 6  | INRUSH CURRENT        | 230V/ 50 A (TYP)<br>COLD START                                    | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                            | I= 37.8 A/ 230 VAC                                                | P       |
| 7  | LEAKAGE CURRENT       | < 0.75 mA / 240 VAC                                               | I/P : 240 VAC<br>O/P : Min LOAD<br>Ta : 25°C                                                                                             | L-CASE : 0.003 mA<br>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<br>I/P : 115 VAC<br>O/P : TESTING<br>Ta : 25°C  | 102.24 %/ 230 VAC<br>102.06 %/ 115 VAC<br>Constant Current Limiting ,recovers automatically after fault condition is removed. | P       |
| 2  | OVER VOLTAGE PROTECTION     | CH1 : 15 V ~ 18 V                            | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : MIN LOAD<br>Ta : 25°C | 15.93 V/ 230 VAC<br>15.95 V/ 115 VAC<br>Shut down and latch off o/p voltage, re-power on to recover                           | P       |
| 3  | OVER TEMPERATURE PROTECTION | SPEC :<br>TSW1 : 95± 5°C O.T.P.<br>NO DAMAGE | I/P : 230 VAC<br>O/P : FULL LOAD                              | O.T.P. Active<br>Shut down o/p voltage , recovers automatically after temperature goes down                                   | P       |
| 4  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE       | I/P : 305 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                 | NO DAMAGE<br>Hiccup mode, recovers automatically after fault condition is removed.                                            | P       |

## COMPONENT STRESS TEST

| NO | TEST ITEM                                              | SPECIFICATION                         | TEST CONDITION                                                                                                                            | RESULT                                 | VERDICT |
|----|--------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | U2 Rated :<br>IP7518: 700V / 2A       | I/P : High-Line +3V = 308 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                       | (1) 652 V<br>(2) 530 V<br>(3) 656 V    | P       |
| 2  | Diode Peak Voltage                                     | D101 Rated :<br>PFR30L60CT: 60V / 30A | I/P : High-Line +3V = 308 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                        | (1) 49.2 V<br>(2) 36.4 V<br>(3) 47.8 V | P       |
| 3  | Input Capacitor Voltage                                | C5 Rated :<br>22u/450V 105°C 16*20 RH | I/P : High-Line +3V = 308 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load Change<br>Ta : 25°C | (1) 446 V<br>(2) 446 V<br>(3) 438 V    | P       |
| 4  | Control IC Voltage Test                                | U 2 Rated :<br>IP7518:30V             | I/P : High-Line +3V = 308 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load Change<br>Ta : 25°C | (1) 22.8 V<br>(2) 14.1 V<br>(3) 19.5 V | P       |
| 5  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q1 Rated :<br>NDF10N60ZG: 600V/ 10 A  | I/P : High-Line +3V = 308 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                       | (1) 512 V<br>(2) 448 V<br>(3) 448 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<br>Ta : 25°C    | I/P-O/P : 1.370 mA<br><br>NO DAMAGE | P       |
| 2  | ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ                   | I/P-O/P : 500 VDC<br>Ta : 25°C/70%RH | I/P-O/P : >9999 MΩ<br><br>NO DAMAGE | P       |
| 3  | APPROVAL             | TUV : Certificate NO :<br>UL : File NO : |                                      |                                     | N/A     |

### E.M.C TEST

| NO | TEST ITEM                                   | SPECIFICATION                                          | TEST CONDITION                                                                   | RESULT                        | VERDICT |
|----|---------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------|---------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS C                                 | I/P:230VAC/240VAC/220VAC50HZ<br>O/P:100%,75%,50%LOAD<br>CLASS C ≥ 50%<br>Ta:25°C | PASS                          | P       |
| 2  | CONDUCTION                                  | EN55015                                                | I/P: 230 VAC (50HZ)/115V[60HZ]<br>O/P:FULL/50% LOAD<br>Ta:25°C                   | PASS<br>Test by certified Lab | P       |
| 3  | RADIATION                                   | EN55015                                                | I/P: 230 VAC (50HZ)/115V[60HZ]<br>O/P: FULL/50% LOAD<br>Ta:25°C                  | PASS<br>Test by certified Lab | P       |
| 4  | E.S.D                                       | EN61000-4-2<br>LIGHT INDUSTRY<br>AIR:8KV / Contact:4KV | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                    | CRITERIA A                    | P       |
| 5  | E.F.T                                       | EN61000-4-4<br>LIGHT INDUSTRY<br>INPUT: 1KV            | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                    | CRITERIA A                    | P       |
| 6  | SURGE                                       | IEC61000-4-5<br>INDUSTRY<br>L-N :2KV                   | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>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                                             | <div>MODEL : LPF-25D-12</div> <div>1. ROOM AMBIENT BURN-IN : 2.5 HRS</div> <div>I/P : 230VAC O/P : 95% LOAD Ta=35.0 °C</div> <div>2. HIGH AMBIENT BURN-IN : 3.5 HRS</div> <div>I/P : 230VAC O/P : 95% LOAD Ta=50.9 °C</div> <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT<br/>Ta= 35.0 °C</th><th>HIGH AMBIENT<br/>Ta= 50.9 °C</th></tr><tr><td>1</td><td>LF2</td><td>LF-802</td><td>55.9°C</td><td>72.6°C</td></tr><tr><td>2</td><td>BD1</td><td>UD2KB80</td><td>59.2°C</td><td>74.6°C</td></tr><tr><td>3</td><td>L1</td><td>TR-6102</td><td>61.1°C</td><td>76.6°C</td></tr><tr><td>4</td><td>Q1</td><td>NDF10N60ZG</td><td>63.2°C</td><td>79.3°C</td></tr><tr><td>5</td><td>D1</td><td>MUR460</td><td>64.4°C</td><td>80.2°C</td></tr><tr><td>6</td><td>C18</td><td>47uF/50V YXM</td><td>65.5°C</td><td>78.8°C</td></tr><tr><td>7</td><td>C54</td><td>22uF/50V YXM</td><td>63.0°C</td><td>81.4°C</td></tr><tr><td>8</td><td>C5</td><td>22uF/450V RH</td><td>67.1°C</td><td>82.9°C</td></tr><tr><td>9</td><td>U1</td><td>NCP1608B</td><td>64.3°C</td><td>80.4°C</td></tr><tr><td>10</td><td>U2</td><td>IP7518</td><td>73.7°C</td><td>91.2°C</td></tr><tr><td>11</td><td>T1</td><td>TF-6357</td><td>69.8°C</td><td>85.4°C</td></tr><tr><td>12</td><td>D101</td><td>PFR30L60CT 30A/60V</td><td>66.4°C</td><td>81.4°C</td></tr><tr><td>13</td><td>C105</td><td>560u/25V ZLH</td><td>64.7°C</td><td>79.5°C</td></tr></table> |                                                                   |                             | NO      | Position | P/N | ROOM AMBIENT<br>Ta= 35.0 °C | HIGH AMBIENT<br>Ta= 50.9 °C | 1 | LF2 | LF-802 | 55.9°C | 72.6°C | 2 | BD1 | UD2KB80 | 59.2°C | 74.6°C | 3 | L1 | TR-6102 | 61.1°C | 76.6°C | 4 | Q1 | NDF10N60ZG | 63.2°C | 79.3°C | 5 | D1 | MUR460 | 64.4°C | 80.2°C | 6 | C18 | 47uF/50V YXM | 65.5°C | 78.8°C | 7 | C54 | 22uF/50V YXM | 63.0°C | 81.4°C | 8 | C5 | 22uF/450V RH | 67.1°C | 82.9°C | 9 | U1 | NCP1608B | 64.3°C | 80.4°C | 10 | U2 | IP7518 | 73.7°C | 91.2°C | 11 | T1 | TF-6357 | 69.8°C | 85.4°C | 12 | D101 | PFR30L60CT 30A/60V | 66.4°C | 81.4°C | 13 | C105 | 560u/25V ZLH | 64.7°C | 79.5°C | P |
| NO | Position                                                          | P/N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ROOM AMBIENT<br>Ta= 35.0 °C                                       | HIGH AMBIENT<br>Ta= 50.9 °C |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 1  | LF2                                                               | LF-802                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 55.9°C                                                            | 72.6°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 2  | BD1                                                               | UD2KB80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 59.2°C                                                            | 74.6°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 3  | L1                                                                | TR-6102                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 61.1°C                                                            | 76.6°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 4  | Q1                                                                | NDF10N60ZG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 63.2°C                                                            | 79.3°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 5  | D1                                                                | MUR460                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 64.4°C                                                            | 80.2°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 6  | C18                                                               | 47uF/50V YXM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 65.5°C                                                            | 78.8°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 7  | C54                                                               | 22uF/50V YXM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 63.0°C                                                            | 81.4°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 8  | C5                                                                | 22uF/450V RH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 67.1°C                                                            | 82.9°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 9  | U1                                                                | NCP1608B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 64.3°C                                                            | 80.4°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 10 | U2                                                                | IP7518                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 73.7°C                                                            | 91.2°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 11 | T1                                                                | TF-6357                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 69.8°C                                                            | 85.4°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 12 | D101                                                              | PFR30L60CT 30A/60V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 66.4°C                                                            | 81.4°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 13 | C105                                                              | 560u/25V ZLH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64.7°C                                                            | 79.5°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 2  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | I/P : 305VAC/100VAC<br>O/P : 95 % LOAD<br>Ta= -40°C               | TEST : OK                   | P       |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 3  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50 °C<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I/P : 305 VAC<br>O/P : 95% LOAD<br>Ta= 50 °C<br>HUMIDITY= 95 %R.H | TEST : OK                   | P       |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 4  | TEMPERATURE<br>COEFFICIENT                                        | ± 0.03 %(0~50°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I/P : 230 VAC<br>O/P : 95% LOAD                                   | ± 0.004 %(0~50°C)           | P       |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 5  | STORAGE TEMPERATURE TEST                                          | 1. Thermal shock Temperature : -45°C~ +85°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 5 CYCLE<br>5. Input/Output condition : STATIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   | OK                          | P       |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |
| 6  | THERMAL SHOCK TEST                                                | 1. Thermal shock Temperature : -45°C~ +55°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 10 CYCLE<br>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST<br>turn on 58sec : turn off 2sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                   | OK                          | P       |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |                    |        |        |    |      |              |        |        |   |

|    |                             |                                                                                                                                                                                                                         |                                                         |   |
|----|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---|
| 7  | VIBRATION TEST              | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 12min/sweep cycle<br>(4) Acceleration : 5G<br>(5) Test Time : 72min in each axis (X.Y.Z)<br>(6) Ta : 25℃                   | TEST : OK                                               | P |
| 8  | CAPACITOR<br>LIFE CYCLE     | LPF-25D-12:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 230VAC O/P : FULL LOAD Ta=25 ℃ LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta=50 ℃ LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta=50 ℃ LIFE TIME | (1) 382565.7 HRS<br>(2) 72953.3 HRS<br>(3) 106912.3 HRS | P |
| 9  | MTBF                        | MIL-HDBK-217F NOTICES2 PARTS COUNT<br>TOTAL FAILURE RATE : 418.5KHRS                                                                                                                                                    |                                                         | P |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) :<br>50,000 hours @ Tcase70℃                                                                                                                                     |                                                         | P |

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

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