



# Test Report: LPF-16D-30

---

16W 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 : 200 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= 16.5V~30V                                  | I/P : 230VAC<br>O/P : CV MODE<br>Ta : 25°C                                                                            | O/P= 16.5V : 0.556 A<br>O/P= 29V : 0.557 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 : 0.307 %~ -0.363 %                     | 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 : 0.014 %~ -0.014 %                     | P       |
| 5  | LOAD REGULATION          | V1 : 0.5 %~ -0.5 % (Max)                       | I/P : 230 VAC<br>O/P : FULL ~MIN LOAD<br>Ta : 25°C                                                                    | V1 : 0.027 %~ -0.030 %                     | 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/ 273.732 ms<br>115VAC/ 240.747 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/ 17 ms<br>115VAC/ 17 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/ 121 ms<br>115VAC/ 122 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 : 3000 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) 350 mVp-p<br>(2) 480 mVp-p             | P       |

11

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   | 0.038A | 0.093A | 0.148A | 0.208A | 0.261A | 0.315A | 0.371A | 0.429A | 0.484A | 0.537A |
|   | %                | 7.04%  | 17.22% | 27.41% | 38.52% | 48.33% | 58.33% | 68.70% | 79.44% | 89.63% | 99.44% |
| 2 | Dimming value    | 1V     | 2V     | 3V     | 4V     | 5V     | 6V     | 7V     | 8V     | 9V     | 10V    |
|   | Output current   | 0.039A | 0.093A | 0.150A | 0.211A | 0.262A | 0.319A | 0.374A | 0.432A | 0.487A | 0.539A |
|   | %                | 7.22%  | 17.22% | 27.78% | 39.07% | 48.52% | 59.07% | 69.26% | 80.00% | 90.19% | 99.81% |
| 3 | Duty value       | 10%    | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%   |
|   | Output current   | 0.040A | 0.096A | 0.152A | 0.214A | 0.265A | 0.321A | 0.378A | 0.434A | 0.490A | 0.541A |
|   | %                | 7.41%  | 17.77% | 28.15% | 39.63% | 49.07% | 59.44% | 70.00% | 80.37% | 90.74% | 100.2% |

P

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<br><br>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 ) | 83 V~305V<br><br>TEST : OK                                        | P       |
| 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= 0.968 / 100%<br>PF= 0.995 / 100%<br>PF= 0.939 / 100%          | P       |
| 4  | EFFICIENCY            | 84.5% (TYP)                                                       | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                                                | 85.22 %                                                           | 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= 0.083 A/ 230 VAC<br>I= 0.168 A/ 115 VAC<br>I= 0.072 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 = 36.5 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  | 102.88 %/ 230 VAC<br>102.87 %/ 115 VAC<br>Constant Current Limiting ,recovers automatically after fault condition is removed. | P       |
| 2  | OVER VOLTAGE PROTECTION     | CH1 : 34 V ~ 40 V                            | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : MIN LOAD<br>Ta : 25°C | 37.07 V/ 230 VAC<br>31.18 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 : 100±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) 632 V<br>(2) 462 V<br>(3) 618 V    | P       |
| 2  | Diode Peak Voltage                                     | D101 Rated :<br>V30150C: 150V / 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) 120 V<br>(2) 90.0 V<br>(3) 115 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) 440 V<br>(2) 444 V<br>(3) 437 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) 19.7 V<br>(2) 14.0 V<br>(3) 19.4 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) 436 V<br>(2) 438 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 : 1.432 mA<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>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-16D-24</div> <div>1. ROOM AMBIENT BURN-IN : 2.5 HRS</div> <div>I/P : 230VAC O/P : 95% LOAD Ta=32.2 °C</div> <div>2. HIGH AMBIENT BURN-IN : 3.5 HRS</div> <div>I/P : 230VAC O/P : 95% LOAD Ta=50.1 °C</div> <table><thead><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT<br/>Ta= 32.2 °C</th><th>HIGH AMBIENT<br/>Ta= 50.1 °C</th></tr></thead><tbody><tr><td>1</td><td>LF2</td><td>LF-802</td><td>54.6°C</td><td>71.8°C</td></tr><tr><td>2</td><td>BD1</td><td>UD2KB80</td><td>60.7°C</td><td>77.0°C</td></tr><tr><td>3</td><td>L1</td><td>TR-6102</td><td>61.5°C</td><td>78.2°C</td></tr><tr><td>4</td><td>Q1</td><td>NDF10N60ZG</td><td>66.7°C</td><td>83.7°C</td></tr><tr><td>5</td><td>D1</td><td>MUR460</td><td>67.4°C</td><td>84.8°C</td></tr><tr><td>6</td><td>C18</td><td>47uF/50V YXM</td><td>64.6°C</td><td>81.4°C</td></tr><tr><td>7</td><td>C54</td><td>22uF/50V YXM</td><td>65.1°C</td><td>83.3°C</td></tr><tr><td>8</td><td>C5</td><td>22uF/450V RH</td><td>63.0°C</td><td>81.5°C</td></tr><tr><td>9</td><td>U1</td><td>NCP1608B</td><td>68.5°C</td><td>84.7°C</td></tr><tr><td>10</td><td>U2</td><td>IP7518</td><td>77.8°C</td><td>97.0°C</td></tr><tr><td>11</td><td>T1</td><td>TF-6360</td><td>62.8°C</td><td>80.9°C</td></tr><tr><td>12</td><td>D101</td><td>YA868C12R</td><td>54.6°C</td><td>71.3°C</td></tr><tr><td>13</td><td>C105</td><td>390u/35V ZLH</td><td>53.0°C</td><td>70.1°C</td></tr></tbody></table> |                                                                   |                             | NO      | Position | P/N | ROOM AMBIENT<br>Ta= 32.2 °C | HIGH AMBIENT<br>Ta= 50.1 °C | 1 | LF2 | LF-802 | 54.6°C | 71.8°C | 2 | BD1 | UD2KB80 | 60.7°C | 77.0°C | 3 | L1 | TR-6102 | 61.5°C | 78.2°C | 4 | Q1 | NDF10N60ZG | 66.7°C | 83.7°C | 5 | D1 | MUR460 | 67.4°C | 84.8°C | 6 | C18 | 47uF/50V YXM | 64.6°C | 81.4°C | 7 | C54 | 22uF/50V YXM | 65.1°C | 83.3°C | 8 | C5 | 22uF/450V RH | 63.0°C | 81.5°C | 9 | U1 | NCP1608B | 68.5°C | 84.7°C | 10 | U2 | IP7518 | 77.8°C | 97.0°C | 11 | T1 | TF-6360 | 62.8°C | 80.9°C | 12 | D101 | YA868C12R | 54.6°C | 71.3°C | 13 | C105 | 390u/35V ZLH | 53.0°C | 70.1°C | P |
| NO | Position                                                          | P/N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ROOM AMBIENT<br>Ta= 32.2 °C                                       | HIGH AMBIENT<br>Ta= 50.1 °C |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 1  | LF2                                                               | LF-802                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 54.6°C                                                            | 71.8°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 2  | BD1                                                               | UD2KB80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 60.7°C                                                            | 77.0°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 3  | L1                                                                | TR-6102                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 61.5°C                                                            | 78.2°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 4  | Q1                                                                | NDF10N60ZG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 66.7°C                                                            | 83.7°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 5  | D1                                                                | MUR460                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 67.4°C                                                            | 84.8°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 6  | C18                                                               | 47uF/50V YXM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 64.6°C                                                            | 81.4°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 7  | C54                                                               | 22uF/50V YXM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 65.1°C                                                            | 83.3°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 8  | C5                                                                | 22uF/450V RH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 63.0°C                                                            | 81.5°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 9  | U1                                                                | NCP1608B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 68.5°C                                                            | 84.7°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 10 | U2                                                                | IP7518                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 77.8°C                                                            | 97.0°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 11 | T1                                                                | TF-6360                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 62.8°C                                                            | 80.9°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 12 | D101                                                              | YA868C12R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54.6°C                                                            | 71.3°C                      |         |          |     |                             |                             |   |     |        |        |        |   |     |         |        |        |   |    |         |        |        |   |    |            |        |        |   |    |        |        |        |   |     |              |        |        |   |     |              |        |        |   |    |              |        |        |   |    |          |        |        |    |    |        |        |        |    |    |         |        |        |    |      |           |        |        |    |      |              |        |        |   |
| 13 | C105                                                              | 390u/35V ZLH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 53.0°C                                                            | 70.1°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                                   | ± 0.017 %(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 : 2G<br>(5) Test Time : 72min in each axis (X.Y.Z)<br>(6) Ta : 25°C                     | TEST : OK                                              | P |
| 8  | CAPACITOR<br>LIFE CYCLE     | LPF-16D-24:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 230VAC O/P : FULL LOAD Ta=25 °C LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME | (1) 741737.5 HRS<br>(2) 138547.5 HRS<br>(3) 168315 HRS | P |
| 9  | MTBF                        | Conducted by Parts Stress Analysis Prediction<br>3572.8K 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) :<br>50,000 hours @ Tcase70°C                                                                                                                                       |                                                        | P |

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

2009/08/04 A50-F023