



# Test Report: LRS-50-12

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50W 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

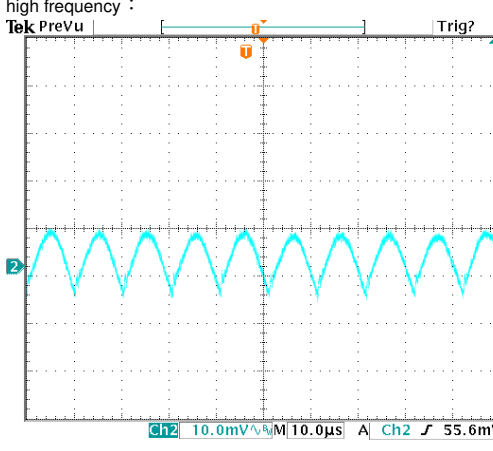
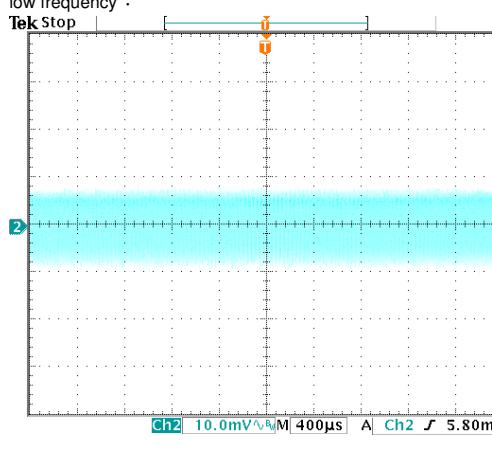
E.M.C. Test

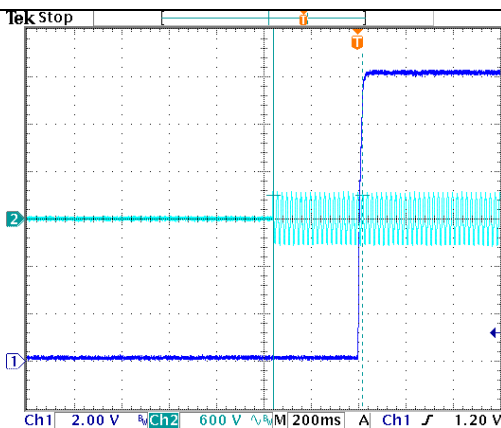
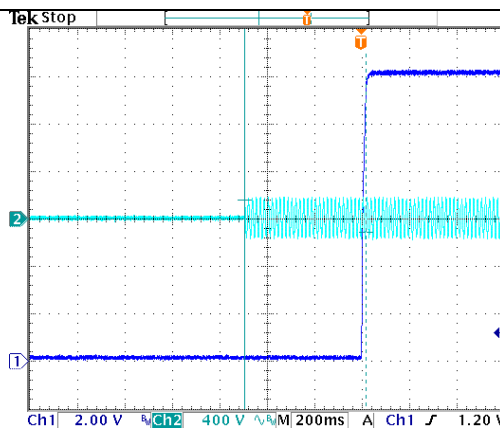
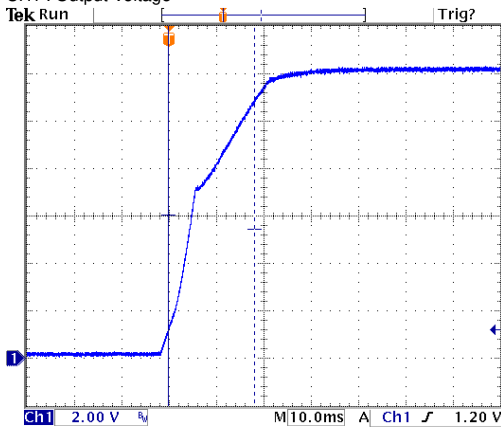
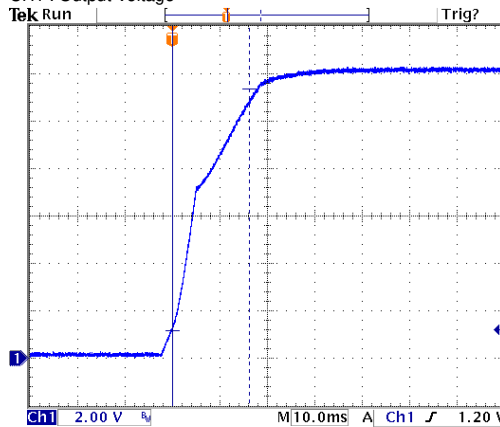
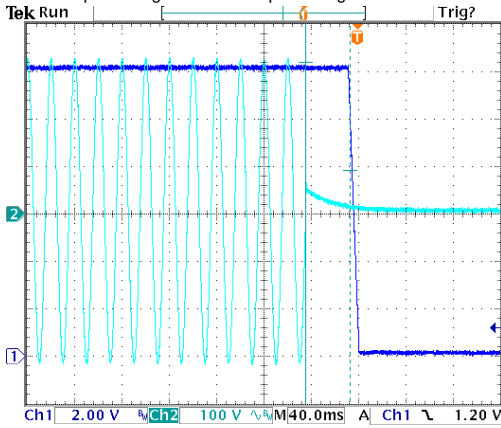
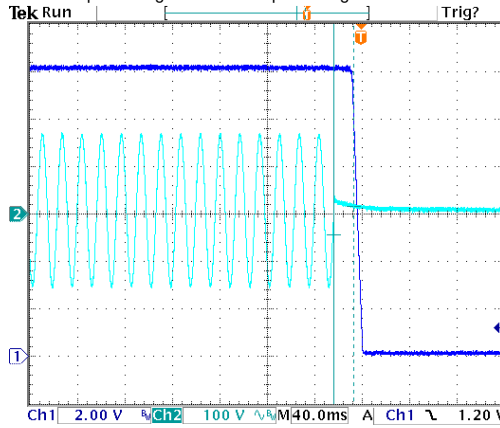
## ■ RELIABILITY TEST

ENVIRONMENT TEST

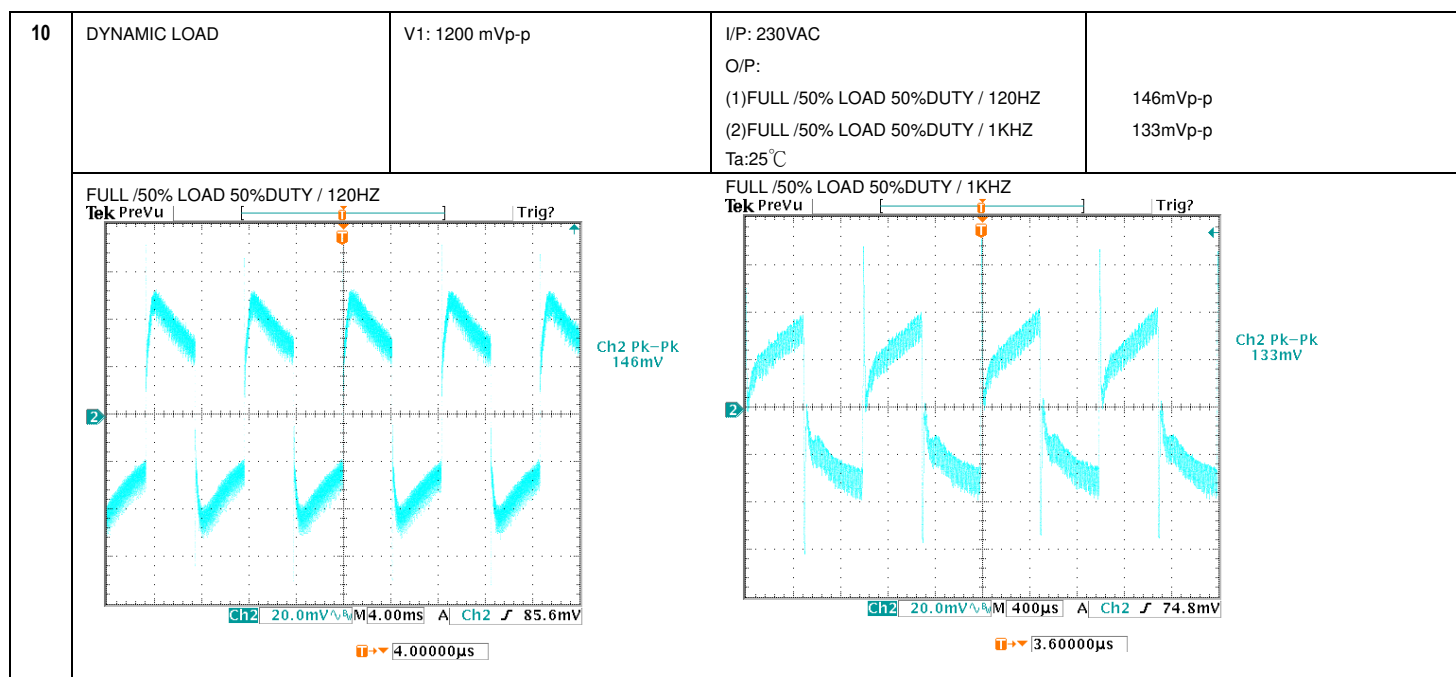
## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

| NO                                                                                                                                                                                                                                                                                                                                                                                                                          | TEST ITEM                        | SPECIFICATION                  | TEST CONDITION                                                               | RESULT                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------|------------------------------------------------------------------------------|--------------------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                           | OUTPUT VOLTAGE<br>ADJUST RANGE   | CH1: 10.2 V~ 13.8 V            | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : MIN LOAD<br>Ta : 25°C                | 10.053V~14.644V/230VAC<br>10.053V~14.644V/115VAC |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                           | OUTPUT VOLTAGE(Max)<br>TOLERANCE | V1: 1 %~ -1 %                  | I/P: 100VAC /264VAC<br>O/P:FULL/ MIN. LOAD<br>Ta:25°C                        | V1: 0%~ 0%                                       |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                           | LINE REGULATION (Max)            | V1: 0.5 %~ -0.5 %              | I/P: 100VAC~ 264VAC<br>O/P:FULL LOAD<br>Ta:25°C                              | V1: 0 %~ 0 %                                     |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                           | LOAD REGULATION(Max)             | V1: 0.5 %~ -0.5 %              | I/P: 230VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                                 | V1: 0 %~ 0 %                                     |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                           | OVER/UNDERSHOOT TEST             | < $\pm 5\%$                    | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                      | < $\pm 5\%$                                      |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                           | RIPPLE & NOISE(Max )             | V1: 120 mVp-p                  | I/P:230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                       | V1: 16.8 mVp-p                                   |
| <div> <div> <p>high frequency :</p>  <p>Ch2 Pk-Pk 15.6mV</p> <p>Ch2 10.0mV 10.0µs A Ch2 55.6mV</p> <p>3.60000µs</p> </div> <div> <p>low frequency :</p>  <p>Ch2 Pk-Pk 16.8mV</p> <p>Ch2 10.0mV 400µs A Ch2 5.80mV</p> <p>3.60000µs</p> </div> </div> |                                  |                                |                                                                              |                                                  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                           | SET UP TIME(Max)                 | 230VAC/1000ms<br>115VAC/2000ms | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C               | 230VAC/ 376.0 ms<br>115VAC/ 512.0 ms             |
| INPUT=230VAC/50HZ @ FULL LOAD<br>CH1 : Output Voltage CH2 : AC Input Voltage                                                                                                                                                                                                                                                                                                                                                |                                  |                                | INPUT=115VAC/60HZ @ FULL LOAD<br>CH1 : Output Voltage CH2 : AC Input Voltage |                                                  |

|                                                                                                                                                                                                 |                                                                                                                                                                                             |                                                                                                                                                                                                     |                                                                                                                                                                                             |                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
|                                                                                                                                                                                                 |  <p>Δ: 0.00 V<br/>@: 300 V<br/>Δ: 376ms<br/>@: -360ms</p> <p>Ch1 2.00 V Ch2 600 V M 200ms A Ch1 1.20 V</p> |                                                                                                                                                                                                     |  <p>Δ: 272 V<br/>@: 160 V<br/>Δ: 512ms<br/>@: -496ms</p> <p>Ch1 2.00 V Ch2 400 V M 200ms A Ch1 1.20 V</p> |                                    |
| 8                                                                                                                                                                                               | RISE TIME (Max)                                                                                                                                                                             | 230VAC/30ms<br>115VAC/30ms                                                                                                                                                                          | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                              | 230VAC/ 18.2 ms<br>115VAC/ 16.2 ms |
| INPUT=230VAC/50HZ @ FULL LOAD                                                                                                                                                                   |                                                                                                                                                                                             | INPUT=115VAC/60HZ @ FULL LOAD                                                                                                                                                                       |                                                                                                                                                                                             |                                    |
| CH1 : Output Voltage                                                                                                                                                                            |                                                                                                                                                                                             | CH1 : Output Voltage                                                                                                                                                                                |                                                                                                                                                                                             |                                    |
|  <p>Δ: 600mV<br/>@: 6.04 V<br/>Δ: 18.2ms<br/>@: -200μs</p> <p>Ch1 2.00 V M 10.0ms A Ch1 1.20 V</p>            |                                                                                                                                                                                             |  <p>Δ: 10.2 V<br/>@: 1.16 V<br/>Δ: 16.2ms<br/>@: 0.00 s</p> <p>Ch1 2.00 V M 10.0ms A Ch1 1.20 V</p>              |                                                                                                                                                                                             |                                    |
| 9                                                                                                                                                                                               | HOLD UP TIME (Typ.)                                                                                                                                                                         | 230VAC/30ms<br>115VAC/12ms                                                                                                                                                                          | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                              | 230VAC/ 37.6 ms<br>115VAC/ 16.8 ms |
| INPUT=230VAC/50HZ @ FULL LOAD                                                                                                                                                                   |                                                                                                                                                                                             | INPUT=115VAC/60HZ @ FULL LOAD                                                                                                                                                                       |                                                                                                                                                                                             |                                    |
| CH1 : Output Voltage CH2 : AC Input Voltage                                                                                                                                                     |                                                                                                                                                                                             | CH1 : Output Voltage CH2 : AC Input Voltage                                                                                                                                                         |                                                                                                                                                                                             |                                    |
|  <p>Δ: 228 V<br/>@: 320 V<br/>Δ: 37.6ms<br/>@: -44.8ms</p> <p>Ch1 2.00 V Ch2 100 V M 40.0ms A Ch1 1.20 V</p> |                                                                                                                                                                                             |  <p>Δ: 60.0 V<br/>@: -44.0 V<br/>Δ: 16.8ms<br/>@: -24.0ms</p> <p>Ch1 2.00 V Ch2 100 V M 40.0ms A Ch1 1.20 V</p> |                                                                                                                                                                                             |                                    |

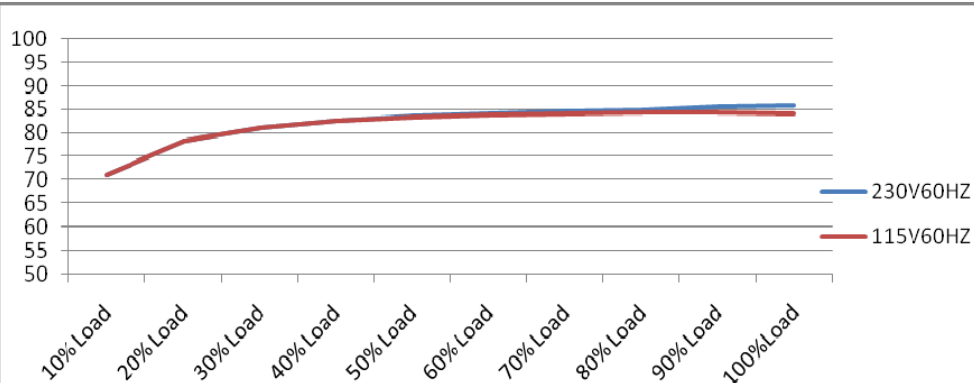
Model: LRS-50-12 Test Report 3 / 9



## INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                 | TEST CONDITION                                                                                                                                                                                                                                                     | RESULT                                      |
|----|-----------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| 1  | INPUT VOLTAGE RANGE   | 85VAC~264VAC<br>120VDC~373VDC | I/P: TESTING<br>O/P: FULL LOAD<br>Ta: 25°C                                                                                                                                                                                                                         | 78VAC~264VAC<br>113VDC~373VDC               |
|    |                       |                               | I/P:<br>(1) LOW-LINE-3V=82 V<br>HIGH-LINE+15%=300 V<br>O/P: FULL/MIN LOAD<br>(PLEASE CHECK DERATING CURVE)<br>ON: 30 Sec OFF: 30 Sec 10MIN<br>(2) 230Vac<br>ON: 0.5 Sec OFF: 0.5 Sec 20MIN<br>(3) 230Vac<br>ON: 3Sec OFF: 3Sec 12HOURS<br>(POWER ON/OFF NO DAMAGE) | TEST: OK                                    |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE      | I/P: 100 VAC ~264 VAC<br>O/P: FULL~MIN LOAD<br>Ta: 25°C                                                                                                                                                                                                            | TEST: OK                                    |
| 3  | INPUT CURRENT (Typ.)  | 230V/ 0.56A<br>115V/ 0.95A    | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                                                                                                     | I = 0.4495 A/ 230VAC<br>I = 0.860 A/ 115VAC |
| 4  | LEAKAGE CURRENT       | <0.75 mA / 240 VAC            | I/P : 240 VAC<br>O/P : Min LOAD<br>Ta : 25°C                                                                                                                                                                                                                       | L-FG : 0.226 mA<br>N-FG : 0.226 mA          |
| 5  | NO LOAD CONSUMPTION   | < 0.2W                        | I/P : 115VAC<br>I/P : 230VAC<br>O/P : NO LOAD<br>Ta : 25°C                                                                                                                                                                                                         | <0.1532W<br>< 0.1556W                       |
| 6  | EFFICIENCY(Typ.)      | 86%                           | I/P: 230 VAC<br>O/P: FULL LOAD<br>Ta: 25°C                                                                                                                                                                                                                         | 86.18%                                      |

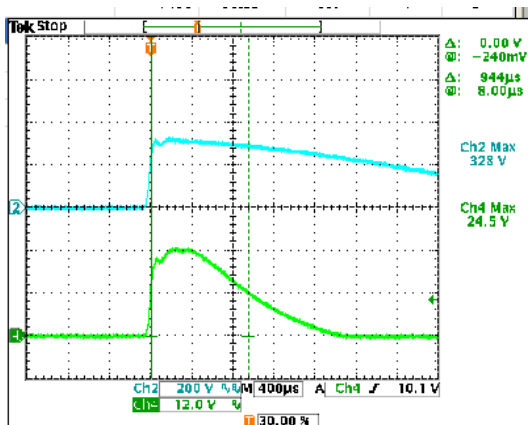
EFFICIENCY vs LOAD



|   |                      |                        |                                              |                  |
|---|----------------------|------------------------|----------------------------------------------|------------------|
| 7 | INRUSH CURRENT(Typ.) | 230V/45A<br>COLD START | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25℃ | I =24.5A/ 230VAC |
|---|----------------------|------------------------|----------------------------------------------|------------------|

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current (1V=1A)



## PROTECTION FUNCTION TEST

| NO | TEST ITEM               | SPECIFICATION                          | TEST CONDITION                                                       | RESULT                                                                                                                                         |
|----|-------------------------|----------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | OVER LOAD PROTECTION    | 110 %~ 150 %                           | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 100VAC<br>O/P: TESTING<br>Ta: 25℃ | 130.5%/ 264VAC<br>130.1%/ 230VAC<br>126.2%/100VAC<br>PROTECTION TYPE :<br>Hiccup mode, recovers automatically after fault condition is removed |
| 2  | OVER VOLTAGE PROTECTION | 13.8 V~16.2 V                          | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 90VAC<br>O/P: MIN LOAD<br>Ta: 25℃ | 15.3V / 264VAC<br>15.31V / 230VAC<br>15.33V / 90VAC<br>PROTECTION TYPE :<br>Shut down o/p voltage, re-power on to recover                      |
| 3  | SHORT PROTECTION        | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P: 264VAC<br>I/P: 90VAC<br>O/P: FULL LOAD<br>Ta: 25℃               | NO DAMAGE<br>PROTECTION TYPE :<br>Hiccup mode, recovers automatically after fault condition is removed                                         |

## COMPONENT STRESS TEST



# 50W Single Output Switching Power Supply

## LRS-50 series

| NO | TEST ITEM                                                  | SPECIFICATION                 | TEST CONDITION                                                                                                                                                                                                                                                                                                                                              | RESULT                                                                                                         |
|----|------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1  | PWM Transistor<br>(D to S) or (C to E) <b>Peak Voltage</b> | Q 1 Rated<br>10A/600V         | I/P:High-Line +3V =267V<br>AC ON/OFF<br>VDS:<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25℃         | VDS:<br>(1) 548 V<br>(2)436V<br>(3)536V<br>(4)548V<br>(5)540V<br>(6)560V<br>(7)552V                            |
| 2  | Diode Peak <b>Voltage</b>                                  | Q100 Rated<br>20A/80V         | I/P:High-Line +3V =267 V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>(8).NO LOAD<br>Ta:25℃ | Q100:<br>VDS:<br>(1)64.4V<br>(2)52.8V<br>(3)64.4V<br>(4)64.1V<br>(5)64.8V<br>(6)64.02V<br>(7)63.6V<br>(8)64.4V |
| 3  | <b>Input Capacitor Voltage</b>                             | C5 Rated:<br>100u/400V 105℃   | I/P:High-Line +3V =267 V<br>O/P: (1)Full Load input on/off<br>(2) Min load input on /Off<br>(3)Full Load /Min load Change<br>Ta:25℃                                                                                                                                                                                                                         | (1)370V<br>(2)372V<br>(3)370V                                                                                  |
| 4  | <b>Control IC Voltage Test</b>                             | PWM IC U1 Rated<br>10.8 V~30V | I/P:High-Line +3V =267 V<br>AC ON/OFF<br>O/P(1)FULL LOAD<br>(2) Output Short<br>(3)O.L.P<br>(4)O.V.P.<br>(5)NO LOAD VR Min.LOW<br>LINE<br>Ta:25℃                                                                                                                                                                                                            | (1) 17.0V<br>(2) 15.0V<br>(3) 17.1V<br>(4) 18.1V<br>(5) 14.8V                                                  |
| 5  | Clamp Diode Peak Voltage                                   | D5 Rated :<br>3A/600V         | I/P : High-Line +3V = 267 V<br>AC ON/OFF<br>O/P : (1) Dynamic Load<br>90%Duty/1KHz<br>(2)Full load continue<br>Ta : 25℃                                                                                                                                                                                                                                     | (1) 464V<br>(2) 464V                                                                                           |

### SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------|---------------|----------------|--------|
|----|-----------|---------------|----------------|--------|

|   |                      |                                                                     |                                                                                  |                                                                  |
|---|----------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1 | WITHSTAND VOLTAGE    | I/P-O/P: 3.75KVAC/min<br>I/P-FG :2KVAC/min<br>O/P-FG:1.25KVAC/min   | I/P-O/P: 4.125KVAC/min<br>I/P-FG: 2.4 KVAC/min<br>O/P-FG:1.5 KVAC/min<br>Ta:25°C | I/P-O/P:2.109mA<br>I/P-FG:2.092mA<br>O/P-FG:2.025mA<br>NO DAMAGE |
| 2 | ISOLATION RESISTANCE | I/P-O/P:500VDC>100MΩ<br>I/P-FG: 500VDC>100MΩ<br>O/P-FG:500VDC>100MΩ | I/P-O/P: 500 VDC<br>I/P-FG: 500 VDC<br>O/P-FG: 500 VDC<br>Ta:25°C                | I/P-O/P: 9999MΩ<br>I/P-FG: 9999MΩ<br>O/P-FG: 9999MΩ<br>NO DAMAGE |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                              | 40A / 2min<br>Ta:25°C                                                            | 6 mΩ                                                             |

## E.M.C TEST

| NO | TEST ITEM                                   | SPECIFICATION                                         | TEST CONDITION                                           | RESULT                        |
|----|---------------------------------------------|-------------------------------------------------------|----------------------------------------------------------|-------------------------------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS A                                | I/P:230VAC/50HZ<br>O/P:100%,75%,50%LOAD<br>Ta:25°C       | PASS                          |
| 2  | CONDUCTION                                  | EN55022<br>CLASS B                                    | I/P : 230 VAC (50HZ)<br>O/P : FULL/50% LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab |
| 3  | RADIATION                                   | EN55022<br>CLASS B                                    | I/P : 230 VAC (50HZ)<br>O/P : FULL LOAD<br>Ta : 25°C     | PASS<br>Test by certified Lab |
| 4  | E.S.D                                       | EN61000-4-2<br>INDUSTRY<br>AIR : 8KV / Contact : 4KV  | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 5  | E.F.T                                       | EN61000-4-4<br>INDUSTRY<br>INPUT : 2KV                | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 6  | SURGE                                       | IEC61000-4-5<br>INDUSTRY<br>L-N : 2KV<br>L,N-PE : 4KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 7  | Test by certified Lab & Test Report Prepare |                                                       |                                                          |                               |

## RELIABILITY TEST

## ENVIRONMENT TEST

| NO | TEST ITEM                                                         | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | TEST CONDITION                                                                              | RESULT           |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
|----|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------|----|----------|-----------------------|-----------------------|---|-----|-------|-------|---|-----|-------|-------|---|----|-------|-------|---|----|-------|--------|---|----|-------|-------|---|-----|-------|-------|---|--------|-------|-------|---|--------|-------|--------|---|------|-------|-----|----|------|-------|-----|----|------|-------|-------|----|------|-------|-------|----|----|-------|-------|----|-----|-------|--------|----|-----|-------|-------|
| 1  | TEMPERATURE RISE TEST                                             | <div>MODEL : LRS-50-5</div> <div>1. ROOM AMBIENT BURN-IN : 2 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=27.0℃</div> <div>2. HIGH AMBIENT BURN-IN : 2 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=43.1℃</div> <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=27.0℃</th><th>HIGH AMBIENT Ta=43.1℃</th></tr><tr><td>1</td><td>LF1</td><td>60.7℃</td><td>78.7℃</td></tr><tr><td>2</td><td>BD1</td><td>68.1℃</td><td>85.1℃</td></tr><tr><td>3</td><td>C5</td><td>65.3℃</td><td>82.8℃</td></tr><tr><td>4</td><td>D5</td><td>93.2℃</td><td>105.1℃</td></tr><tr><td>5</td><td>Q1</td><td>85.4℃</td><td>99.5℃</td></tr><tr><td>6</td><td>C35</td><td>80.2℃</td><td>96.3℃</td></tr><tr><td>7</td><td>T1coil</td><td>79.7℃</td><td>96.9℃</td></tr><tr><td>8</td><td>T1core</td><td>87.4℃</td><td>104.1℃</td></tr><tr><td>9</td><td>C105</td><td>73.0℃</td><td>87℃</td></tr><tr><td>10</td><td>C106</td><td>68.4℃</td><td>82℃</td></tr><tr><td>11</td><td>L100</td><td>80.4℃</td><td>97.6℃</td></tr><tr><td>12</td><td>Q100</td><td>73.7℃</td><td>88.3℃</td></tr><tr><td>13</td><td>U1</td><td>80.2℃</td><td>95.9℃</td></tr><tr><td>14</td><td>D30</td><td>93.2℃</td><td>106.1℃</td></tr><tr><td>15</td><td>D40</td><td>62.4℃</td><td>79.4℃</td></tr></table> |                                                                                             |                  | NO | Position | ROOM AMBIENT Ta=27.0℃ | HIGH AMBIENT Ta=43.1℃ | 1 | LF1 | 60.7℃ | 78.7℃ | 2 | BD1 | 68.1℃ | 85.1℃ | 3 | C5 | 65.3℃ | 82.8℃ | 4 | D5 | 93.2℃ | 105.1℃ | 5 | Q1 | 85.4℃ | 99.5℃ | 6 | C35 | 80.2℃ | 96.3℃ | 7 | T1coil | 79.7℃ | 96.9℃ | 8 | T1core | 87.4℃ | 104.1℃ | 9 | C105 | 73.0℃ | 87℃ | 10 | C106 | 68.4℃ | 82℃ | 11 | L100 | 80.4℃ | 97.6℃ | 12 | Q100 | 73.7℃ | 88.3℃ | 13 | U1 | 80.2℃ | 95.9℃ | 14 | D30 | 93.2℃ | 106.1℃ | 15 | D40 | 62.4℃ | 79.4℃ |
| NO | Position                                                          | ROOM AMBIENT Ta=27.0℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | HIGH AMBIENT Ta=43.1℃                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 1  | LF1                                                               | 60.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 78.7℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 2  | BD1                                                               | 68.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 85.1℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 3  | C5                                                                | 65.3℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 82.8℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 4  | D5                                                                | 93.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 105.1℃                                                                                      |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 5  | Q1                                                                | 85.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 99.5℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 6  | C35                                                               | 80.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 96.3℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 7  | T1coil                                                            | 79.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 96.9℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 8  | T1core                                                            | 87.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 104.1℃                                                                                      |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 9  | C105                                                              | 73.0℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 87℃                                                                                         |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 10 | C106                                                              | 68.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 82℃                                                                                         |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 11 | L100                                                              | 80.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 97.6℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 12 | Q100                                                              | 73.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 88.3℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 13 | U1                                                                | 80.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 95.9℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 14 | D30                                                               | 93.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 106.1℃                                                                                      |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 15 | D40                                                               | 62.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 79.4℃                                                                                       |                  |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 2  | OVER LOAD BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I/P : 230 VAC<br>O/P : 130% LOAD<br>Ta : 25℃                                                | TEST : OK        |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1. I/P : 264VAC/<br>O/P : 100 % LOAD<br>2. I/P : 100VAC/<br>O/P : 75 % LOAD/75%<br>Ta= -30℃ | TEST : OK        |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50℃<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I/P : 272 VAC<br>O/P : FULL LOAD<br>Ta= 50℃<br>HUMIDITY= 95 %R.H                            | TEST : OK        |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 5  | TEMPERATURE<br>COEFFICIENT                                        | ± 0.03 %/℃ (0~50℃)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | I/P : 230 VAC<br>O/P : FULL LOAD                                                            | ±0.02%/℃ (0~50℃) |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 6  | STORAGE TEMPERATURE TEST                                          | 1. Thermal shock Temperature : -40℃~ +85℃<br>2. Temperature change rate : 25℃ / 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               |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |
| 7  | THERMAL SHOCK TEST                                                | 1. Thermal shock Temperature : -30℃~ 70℃<br>2. Temperature change rate : 25℃ / 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               |    |          |                       |                       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |        |   |    |       |       |   |     |       |       |   |        |       |       |   |        |       |        |   |      |       |     |    |      |       |     |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |        |    |     |       |       |



# 50W Single Output Switching Power Supply

## LRS-50 series

|    |                             |                                                                                                                                                                                                                                                                          |                                                               |
|----|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 8  | VIBRATION TEST              | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 10min/sweep cycle<br>(4) Acceleration : 5G<br>(5) Test Time : 60min in each axis (X.Y.Z)<br>(6) Ta : 25℃                                                                    | TEST : OK                                                     |
| 9  | CAPACITOR<br>LIFE CYCLE     | 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<br>(4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME | (1) 90182HRS<br>(2) 26047HRS<br>(3) 82411HRS<br>(4) 153720HRS |
| 10 | MTBF                        | MIL-HDBK-217F<br>TOTAL FAILURE RATE : 645KHRS                                                                                                                                                                                                                            |                                                               |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50℃                                                                                                                                                                                     |                                                               |

| TEST RESULT | TESTER | APPROVAL |
|-------------|--------|----------|
| PASS        | FRANK  | WANGDZ   |

2007/3/20 A50-S014