



# Test Report: GST90A15-P1M

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90W AC-DC High Reliability Industrial Adaptor

## ■ 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(Max )             | V1:150mVp-p                    | I/P:230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                                     | V1: 110mVp-p (Max )                          | P       |
| 3  | OUTPUT VOLTAGE(Max)<br>TOLERANCE | V1: -5%~ 5%                    | I/P: 100VAC /264VAC<br>O/P:FULL/ MIN. LOAD<br>Ta:25°C                                                                                                                                      | V1: -0.703 %~ 0.703%                         | P       |
| 4  | LINE REGULATION (Max)            | V1: -1%~ 1%                    | I/P: 100VAC~ 264VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                            | V1: 0 %~ 0%                                  | P       |
| 5  | LOAD REGULATION(Max)             | V1: -5%~ 5%                    | I/P: 230VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                                                                                                                                               | V1: -0.703 %~ 0.703 %                        | P       |
| 6  | SET UP TIME(Max)                 | 230VAC/1000ms<br>115VAC/1000ms | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                             | 230VAC/ 393.147 ms<br>115VAC/ 336.279 ms     | P       |
| 7  | RISE TIME (Max)                  | 230VAC/50ms<br>115VAC/50ms     | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                             | 230VAC/ 14.248 ms<br>115VAC/ 14.112 ms       | P       |
| 8  | HOLD UP TIME(Typ )               | 230VAC/20ms<br>115VAC/20ms     | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                             | 230VAC/ 34.376 ms<br>115VAC/ 22.973 ms       | P       |
| 9  | OVER/UNDERSHOOT TEST             | < +5%                          | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                                    | < +5%                                        | P       |
| 10 | DYNAMIC LOAD                     | V1: 1500mVp-p                  | I/P: 230VAC<br>O/P(1)FULL /Min LOAD<br>90%DUTY / 1KHZ<br>(2) (1)FULL /Min LOAD<br>90%DUTY / 3KHZ<br>(3)FULL /Min LOAD<br>90%DUTY / 5KHZ<br>(4)FULL /Min LOAD<br>50%DUTY / 120HZ<br>Ta:25°C | 748mVp-p<br>708mVp-p<br>708mVp-p<br>892mVp-p | P       |

### INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                          | TEST CONDITION                                                                                                                                                                                                              | RESULT                                     | VERDICT |
|----|-----------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|
| 1  | INPUT VOLTAGE RANGE   | 100VAC~264VAC                          | I/P:TESTING<br>O/P:FULL LOAD<br>Ta:25℃                                                                                                                                                                                      | 59.200 V~264V                              | P       |
|    |                       |                                        | I/P:<br>(1)LOW-LINE-3V=87 V<br>HIGH-LINE+15%=300 V<br>O/P:FULL/MIN LOAD<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℃                                                                                                                                                                         | TEST: OK                                   | P       |
| 3  | POWER FACTOR(TYP)     | 0.91/ 230VAC<br>0.95/115VAC            | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25℃                                                                                                                                                               | PF=0.965/230VAC<br>PF=0.991/115VAC         | P       |
| 4  | EFFICIENCY(TYP)       | 89.5%                                  | I/P:230 VAC<br>O/P:FULL LOAD<br>Ta:25℃                                                                                                                                                                                      | 89.69%                                     | P       |
| 5  | INPUT CURRENT (Typ)   | 230V/ 0.6A<br>115V/ 1.3A               | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25℃                                                                                                                                                               | I =0.449A/ 230VAC<br>I =0.882A/ 115VAC     | P       |
| 6  | INRUSH CURRENT(Typ)   | 230VAC/70A<br>115VAC/35A<br>COLD START | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25℃                                                                                                                                                               | I = 42.50 A/ 230VAC<br>I = 21.71 A/ 115VAC | P       |
| 7  | LEAKAGE CURRENT       | < 1 mA / 240 VAC                       | I/P : 240 VAC<br>O/P : Min LOAD<br>Ta : 25℃                                                                                                                                                                                 | L-FG : 0.45 mA<br>N-FG : 0.45 mA           | P       |
| 8  | NO LOAD CONSUMPTION   | < 0.15 W                               | I/P : 115VAC<br>I/P : 230VAC<br>O/P : NO LOAD<br>Ta : 25℃                                                                                                                                                                   | < 0.0454W<br>< 0.0618W                     | P       |

### PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                          | TEST CONDITION                                         | RESULT                                                   | VERDICT |
|----|-----------------------------|----------------------------------------|--------------------------------------------------------|----------------------------------------------------------|---------|
| 1  | OVER LOAD PROTECTION        | 105%~ 150%                             | I/P: 230VAC<br>I/P: 115VAC<br>O/P: TESTING<br>Ta:25°C  | 143.0%/ 230VAC<br>138.5%/115VAC<br>Hiccup Mode           | P       |
| 2  | OVER VOLTAGE PROTECTION     | CH:15.75V~20.25V                       | I/P: 230VAC<br>I/P: 115VAC<br>O/P: MIN LOAD<br>Ta:25°C | 17.7V/ 230VAC<br>17.8V/ 115VAC<br>Shut down Re- power ON | P       |
| 3  | OVER TEMPERATURE PROTECTION | NO DAMAGE                              | I/P: 230 VAC<br>O/P: FULL LOAD                         | O.T.P. Active<br>Shunt down Re-power ON                  | P       |
| 4  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P: 264VAC<br>O/P: FULL LOAD<br>Ta:25°C               | NO DAMAGE<br>Hiccup Mode                                 | P       |

### COMPONENT STRESS TEST

| NO | TEST ITEM                                                     | SPECIFICATION                  | TEST CONDITION                                                                                                                                           | RESULT                                                        | VERDICT |
|----|---------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------|
| 1  | PWM Transistor<br>( D to S) or (C to E) <b>Peak Voltage</b>   | Q32 Rated<br>11A/700V          | I/P: High-Line +3V =267V<br>AC ON/OFF<br>O/P: (1) Full Load<br>(2) Output Short<br>(3) Full Load Continue<br>Ta:25°C                                     | (1) 608V<br>(2) 486V<br>(3) 580V                              | P       |
| 2  | Diode <b>Peak Voltage</b>                                     | Q101 Rated<br>62A/100V         | I/P: High-Line +3V =267 V<br>AC ON/OFF<br>O/P: (1) Full Load<br>(2) Output Short<br>(3) 0%→400% Load.<br>(4).NO LOAD<br>Ta:25°C                          | Q101:<br>(1) 94.8V<br>(2) 78.0V<br>(3) 96.8V<br>(4) 94.8V     | P       |
| 3  | Input Capacitor Voltage                                       | C5 Rated:<br>: 100u/400V 105°C | 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°C                  | (1) 400V<br>(2) 390V<br>(3) 400V                              | P       |
| 4  | Control IC Voltage Test                                       | PWM IC U1 Rated<br>28 V(MAX.)  | 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°C | (1) 18.9V<br>(2) 15.4V<br>(3) 18.0V<br>(4) 20.1V<br>(5) 17.3V | P       |
| 6  | P.F.C Transistor<br>( D to S) or (C to E) <b>Peak Voltage</b> | Q31 Rated<br>15.8A/600V        | I/P: High-Line +3V =267 V<br>AC ON/OFF<br>O/P: (1) Full Load<br>(2) Output Short<br>(3) Full Load Continue<br>Ta:25°C                                    | (1) 436V<br>(2) 414V<br>(3) 418V                              | P       |

|   |                          |                      |                                                                                                                                                   |                                  |   |
|---|--------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---|
| 7 | P.F.C DIODE              | D1 Rated<br>4A/600V  | 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 100% Load/<br>Min. Load 50%Duty/120Hz<br>Ta:25°C | (1) 412V<br>(2) 414V<br>(3) 426V | P |
| 8 | Clamp Diode Peak Voltage | D30 Rated : 800V/ 2A | 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°C                          | (1) 550 V<br>(2) 540 V           | P |

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION                                                       | TEST CONDITION                                                                  | RESULT                                                              | VERDICT |
|----|----------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------|---------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P: 3KVAC/min<br>I/P-FG :2KVAC/min<br>O/P-FG:0.5KVAC/min       | I/P-O/P: 3.6 KVAC/min<br>I/P-FG: 2.4 KVAC/min<br>O/P-FG:0.6 KVAC/min<br>Ta:25°C | I/P-O/P: 1.472mA<br>I/P-FG:1.994 mA<br>O/P-FG: 0.451mA<br>NO DAMAGE | P       |
| 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    | P       |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                              | 40A / 2min<br>Ta:25°C                                                           | 16 mΩ BY PCB                                                        | P       |

### E.M.C TEST

| NO | TEST ITEM                                   | SPECIFICATION                                                   | TEST CONDITION                                           | RESULT                        | VERDICT |
|----|---------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------|-------------------------------|---------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS A                                          | I/P:230VAC/50HZ<br>O/P:100%,75%,50%OAD<br>Ta:25°C        | PASS                          | P       |
| 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 | P       |
| 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 | 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><br>LIGHT INDUSTRY<br>L-N : 1KV<br>L,N-PE : 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 : GST90A15-P1M</div> <div>1. ROOM AMBIENT BURN-IN : 1 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=22.5℃</div> <div>2. HIGH AMBIENT BURN-IN : 1 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=44.9℃</div> <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT<br/>Ta=22.5℃</th><th>HIGH AMBIENT<br/>Ta=44.9℃</th></tr></thead><tbody><tr><td>1</td><td>LF1</td><td>59.7℃</td><td>78.2℃</td></tr><tr><td>2</td><td>LF2</td><td>57.5℃</td><td>77.2℃</td></tr><tr><td>3</td><td>BD1</td><td>60.7℃</td><td>80.1℃</td></tr><tr><td>4</td><td>LF3</td><td>63.6℃</td><td>83.0℃</td></tr><tr><td>5</td><td>L2</td><td>65.3℃</td><td>84.3℃</td></tr><tr><td>6</td><td>C5</td><td>65.9℃</td><td>85.2℃</td></tr><tr><td>7</td><td>D1</td><td>69.5℃</td><td>85.7℃</td></tr><tr><td>8</td><td>Q31</td><td>65.4℃</td><td>84.9℃</td></tr><tr><td>9</td><td>Q32</td><td>67.3℃</td><td>87.0℃</td></tr><tr><td>10</td><td>D30</td><td>77.8℃</td><td>97.8℃</td></tr><tr><td>11</td><td>C52</td><td>66.8℃</td><td>86.2℃</td></tr><tr><td>12</td><td>T1</td><td>75.2℃</td><td>94.7℃</td></tr><tr><td>13</td><td>RTH30</td><td>65.3℃</td><td>84.7℃</td></tr><tr><td>14</td><td>Q101</td><td>64.6℃</td><td>83.9℃</td></tr><tr><td>15</td><td>CASE</td><td>50.8℃</td><td>71.0℃</td></tr><tr><td>16</td><td>Q102</td><td>61.5℃</td><td>81.4℃</td></tr><tr><td>17</td><td>C109</td><td>64.5℃</td><td>84.3℃</td></tr><tr><td>18</td><td>U2</td><td>63.8℃</td><td>83.0℃</td></tr><tr><td>19</td><td>R56</td><td>67.2℃</td><td>84.5℃</td></tr><tr><td>20</td><td>R64</td><td>67.2℃</td><td>86.7℃</td></tr><tr><td>21</td><td>R58</td><td>70.4℃</td><td>90.2℃</td></tr><tr><td>22</td><td>LF101</td><td>58.7℃</td><td>79.3℃</td></tr></tbody></table> |                                                                 |                   | NO      | Position | ROOM AMBIENT<br>Ta=22.5℃ | HIGH AMBIENT<br>Ta=44.9℃ | 1 | LF1 | 59.7℃ | 78.2℃ | 2 | LF2 | 57.5℃ | 77.2℃ | 3 | BD1 | 60.7℃ | 80.1℃ | 4 | LF3 | 63.6℃ | 83.0℃ | 5 | L2 | 65.3℃ | 84.3℃ | 6 | C5 | 65.9℃ | 85.2℃ | 7 | D1 | 69.5℃ | 85.7℃ | 8 | Q31 | 65.4℃ | 84.9℃ | 9 | Q32 | 67.3℃ | 87.0℃ | 10 | D30 | 77.8℃ | 97.8℃ | 11 | C52 | 66.8℃ | 86.2℃ | 12 | T1 | 75.2℃ | 94.7℃ | 13 | RTH30 | 65.3℃ | 84.7℃ | 14 | Q101 | 64.6℃ | 83.9℃ | 15 | CASE | 50.8℃ | 71.0℃ | 16 | Q102 | 61.5℃ | 81.4℃ | 17 | C109 | 64.5℃ | 84.3℃ | 18 | U2 | 63.8℃ | 83.0℃ | 19 | R56 | 67.2℃ | 84.5℃ | 20 | R64 | 67.2℃ | 86.7℃ | 21 | R58 | 70.4℃ | 90.2℃ | 22 | LF101 | 58.7℃ | 79.3℃ | P |
| NO | Position                                                          | ROOM AMBIENT<br>Ta=22.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | HIGH AMBIENT<br>Ta=44.9℃                                        |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 1  | LF1                                                               | 59.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 78.2℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 2  | LF2                                                               | 57.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 77.2℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 3  | BD1                                                               | 60.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 80.1℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 4  | LF3                                                               | 63.6℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 83.0℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 5  | L2                                                                | 65.3℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84.3℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 6  | C5                                                                | 65.9℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 85.2℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 7  | D1                                                                | 69.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 85.7℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 8  | Q31                                                               | 65.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84.9℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 9  | Q32                                                               | 67.3℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 87.0℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 10 | D30                                                               | 77.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 97.8℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 11 | C52                                                               | 66.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 86.2℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 12 | T1                                                                | 75.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 94.7℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 13 | RTH30                                                             | 65.3℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84.7℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 14 | Q101                                                              | 64.6℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 83.9℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 15 | CASE                                                              | 50.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 71.0℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 16 | Q102                                                              | 61.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 81.4℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 17 | C109                                                              | 64.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84.3℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 18 | U2                                                                | 63.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 83.0℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 19 | R56                                                               | 67.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 84.5℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 20 | R64                                                               | 67.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 86.7℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 21 | R58                                                               | 70.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 90.2℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 22 | LF101                                                             | 58.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 79.3℃                                                           |                   |         |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 2  | OVER LOAD BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | I/P : 230 VAC<br>O/P : 126% LOAD<br>Ta : 25℃                    | TEST : OK         | P       |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | I/P : 264VAC/100VAC<br>O/P : 100 % LOAD<br>Ta=-30℃              | TEST : OK         | P       |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 40℃<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | I/P : 272 VAC<br>O/P : FULL LOAD<br>Ta=40℃<br>HUMIDITY= 95 %R.H | TEST : OK         | P       |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |
| 5  | TEMPERATURE<br>COEFFICIENT                                        | ±0.03%/℃ (0~40℃)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | I/P : 230 VAC<br>O/P : FULL LOAD                                | ±0.012%/℃ (0~40℃) | P       |          |                          |                          |   |     |       |       |   |     |       |       |   |     |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |     |       |       |    |     |       |       |    |     |       |       |    |    |       |       |    |       |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |      |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |     |       |       |    |       |       |       |   |

|    |                             |                                                                                                                                                                                                                                                                                   |                                                                     |   |
|----|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---|
| 6  | STORAGE TEMPERATURE TEST    | 1. Thermal shock Temperature : -40°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                                                            | TEST : OK                                                           | P |
| 7  | THERMAL SHOCK TEST          | 1. Thermal shock Temperature : -30°C ~ +70°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 | TEST : OK                                                           | P |
| 8  | 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 : 60min in each axis (X.Y.Z)<br>(6) Ta : 25°C                                                                            | TEST : OK                                                           | P |
| 9  | CAPACITOR LIFE CYCLE        | SUPPOSE C109 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=40°C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta=40°C LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta=40°C LIFE TIME                 | (1) 171060 HRS<br>(2) 72452 HRS<br>(3) 127834 HRS<br>(4) 240196 HRS | P |
| 10 | MTBF                        | MIL-HDBK-217F<br>TOTAL FAILURE RATE : 348.7KHRS                                                                                                                                                                                                                                   |                                                                     | P |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C                                                                                                                                                                                             |                                                                     | P |

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

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