



# Test Report: GST120A24-R7B

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120W 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 )             | V1:180mVp-p                    | I/P:230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                                     | V1: 21.8mVp-p                                | P       |
| 3  | OUTPUT VOLTAGE(Max)<br>TOLERANCE | V1: -3%~ 3%                    | I/P: 100VAC /264VAC<br>O/P:FULL/ MIN. LOAD<br>Ta:25°C                                                                                                                                      | V1: -0.68%~ 0.7%                             | P       |
| 4  | LINE REGULATION (Max)            | V1: -1%~ 1%                    | I/P: 100VAC~ 264VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                            | V1: 0%~ 0.025%                               | P       |
| 5  | LOAD REGULATION(Max)             | V1: -3%~ 3%                    | I/P: 230VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                                                                                                                                               | V1: -0.68%~ 0.7%                             | P       |
| 6  | SET UP TIME(Max)                 | 230VAC/2000ms<br>115VAC/2500ms | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                             | 230VAC/ 346.455ms<br>115VAC/ 581.485ms       | P       |
| 7  | RISE TIME (Max)                  | 230VAC/30ms<br>115VAC/30ms     | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                             | 230VAC/ 20.580ms<br>115VAC/ 21.193ms         | 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/ 41.847ms<br>115VAC/ 25.910ms         | P       |
| 9  | OVER/UNDERSHOOT TEST             | < +5%                          | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                                    | < +5%                                        | P       |
| 10 | DYNAMIC LOAD                     | V1: 2400mVp-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 | 720mVp-p<br>852mVp-p<br>876mVp-p<br>968mVp-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℃                                                                                                                                                                                      | 65.225V~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)     | 0.93/ 230VAC<br>0.97/115VAC            | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25℃                                                                                                                                                               | PF= 0.944/230VAC<br>PF=0.989 /115VAC       | P       |
| 4  | EFFICIENCY(TYP)       | 90.5%                                  | I/P:230 VAC<br>O/P:FULL LOAD<br>Ta:25℃                                                                                                                                                                                      | 90.51%                                     | P       |
| 5  | INPUT CURRENT (Typ)   | 230V/ 0.7A<br>115V/ 1.4A               | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25℃                                                                                                                                                               | I = 0.599A/ 230VAC<br>I = 1.154A/ 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 = 46.039A/ 230VAC<br>I = 23.565A/ 115VAC | P       |
| 7  | LEAKAGE CURRENT       | < 0.75 mA / 240 VAC                    | I/P : 240 VAC<br>O/P : Min LOAD<br>Ta : 25℃                                                                                                                                                                                 | L-FG : 0.419mA<br>N-FG : 0.419mA           | P       |
| 8  | NO LOAD CONSUMPTION   | < 0.15 W                               | I/P : 115VAC<br>I/P : 230VAC<br>O/P : NO LOAD<br>Ta : 25℃                                                                                                                                                                   | < 0.0682W<br>< 0.1043W                     | P       |

### PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                          | TEST CONDITION                                          | RESULT                                                           | VERDICT |
|----|-----------------------------|----------------------------------------|---------------------------------------------------------|------------------------------------------------------------------|---------|
| 1  | OVER LOAD PROTECTION        | 105%~ 160%                             | I/P: 230VAC<br>I/P: 115VAC<br>O/P: TESTING<br>Ta: 25°C  | 138.2% / 230VAC<br>129.4% / 115VAC<br>Hiccup Mode                | P       |
| 2  | OVER VOLTAGE PROTECTION     | CH: 25.2V~32.4V                        | I/P: 230VAC<br>I/P: 115VAC<br>O/P: MIN LOAD<br>Ta: 25°C | 29.1V / 230VAC<br>29.0V / 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>Shut down o/p volotage · re-power on to recover | 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) 588V<br>(2) 480V<br>(3) 568V                      | P       |
| 2  | Diode <b>Peak Voltage</b>                                     | Q102 Rated<br>104A/150V        | I/P: High-Line +3V =267 V<br>AC ON/OFF<br>O/P: (1) Full Load<br>(2) Output Short<br>(3) Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(4) Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>Ta: 25°C | Q101:<br>(1) 132V<br>(2) 118V<br>(3) 137V<br>(4) 142V | P       |
| 3  | Input Capacitor Voltage                                       | C5 Rated:<br>: 120u/420V 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) 394V<br>(2) 398V<br>(3) 405V                      | P       |
| 4  | Control IC Voltage Test                                       | PWM IC U1 Rated<br>: 28 V      | I/P: High-Line +3V =267 V<br>AC ON/OFF<br>O/P: (1) FULL LOAD<br>(2) Output Short<br>(3) NO LOAD VR MIN LOW LINE<br>Ta: 25°C                                                                                     | (1) 21.2V<br>(2) 15.3V<br>(3) 20.9V                   | 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) 448V<br>(2) 418V<br>(3) 452V                      | P       |

|   |                          |                      |                                                                                                                                                  |                                  |   |
|---|--------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---|
| 7 | P.F.C DIODE              | D1 Rated<br>9A/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℃ | (1) 428V<br>(2) 408V<br>(3) 432V | P |
| 8 | Clamp Diode Peak Voltage | D30 Rated : 800V/ 3A | I/P : High-Line +3V = 267 V<br>AC ON/OFF<br>O/P : (1) Dynamic Load<br>90%Duty/1KHz<br>(2)Full load continue<br>Ta : 25℃                          | (1) 546V<br>(2) 538V             | P |

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION        | TEST CONDITION                  | RESULT                        | VERDICT |
|----|----------------------|----------------------|---------------------------------|-------------------------------|---------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P: 3KVAC/min   | I/P-O/P: 3.6 KVAC/min<br>Ta:25℃ | I/P-O/P: 3.179mA<br>NO DAMAGE | P       |
| 2  | ISOLATION RESISTANCE | I/P-O/P:500VDC>100MΩ | I/P-O/P: 500 VDC<br>Ta:25℃      | I/P-O/P: 9999MΩ<br>NO DAMAGE  | 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%OAD<br>Ta:25℃                | PASS                          | P       |
| 2  | CONDUCTION                                  | EN55022<br>CLASS B                                          | I/P : 230 VAC (50HZ)<br>O/P : FULL/50% LOAD<br>Ta : 25℃ | 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℃     | 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℃       | 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℃       | CRITERIA A                    | P       |
| 6  | SURGE                                       | IEC61000-4-5<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℃       | CRITERIA A                    | P       |
| 7  | Test by certified Lab & Test Report Prepare |                                                             |                                                         |                               |         |

## RELIABILITY TEST

### ENVIRONMENT TEST

| NO | TEST ITEM                                                         | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | TEST CONDITION                                                   | RESULT             | VERDICT |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
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| 1  | TEMPERATURE RISE TEST                                             | <div>MODEL : GST120A24-R7B</div> <div>1. ROOM AMBIENT BURN-IN : 2 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=24.7℃</div> <div>2. HIGH AMBIENT BURN-IN : 2 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=44.4℃</div> <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT<br/>Ta=24.7℃</th><th>HIGH AMBIENT<br/>Ta=44.4℃</th></tr></thead><tbody><tr><td>1</td><td>ZNR1</td><td>61.5℃</td><td>77.1℃</td></tr><tr><td>2</td><td>RTH30</td><td>68.1℃</td><td>85.0℃</td></tr><tr><td>3</td><td>LF2</td><td>62.1℃</td><td>79.0℃</td></tr><tr><td>4</td><td>L1</td><td>62.8℃</td><td>79.5℃</td></tr><tr><td>5</td><td>L2</td><td>64.2℃</td><td>81.1℃</td></tr><tr><td>6</td><td>D6</td><td>65.4℃</td><td>81.9℃</td></tr><tr><td>7</td><td>D30</td><td>75.9℃</td><td>92.2℃</td></tr><tr><td>8</td><td>C5</td><td>67.1℃</td><td>83.1℃</td></tr><tr><td>9</td><td>C52</td><td>74.6℃</td><td>90.9℃</td></tr><tr><td>10</td><td>T1</td><td>85.0℃</td><td>101.5℃</td></tr><tr><td>11</td><td>BD1</td><td>64.1℃</td><td>80.5℃</td></tr><tr><td>12</td><td>D1</td><td>65.1℃</td><td>81.6℃</td></tr><tr><td>13</td><td>Q31</td><td>65.2℃</td><td>82.0℃</td></tr><tr><td>14</td><td>Q32</td><td>66.7℃</td><td>83.5℃</td></tr><tr><td>15</td><td>Q102</td><td>69.3℃</td><td>86.1℃</td></tr><tr><td>16</td><td>C110</td><td>69.0℃</td><td>85.5℃</td></tr><tr><td>17</td><td>LF1</td><td>62.8℃</td><td>78.7℃</td></tr><tr><td>18</td><td>U2</td><td>71.2℃</td><td>85.9℃</td></tr><tr><td>19</td><td>D33</td><td>82.1℃</td><td>100.6℃</td></tr><tr><td>20</td><td>CASE</td><td>53.5℃</td><td>70.3℃</td></tr></tbody></table> |                                                                  |                    | NO      | Position | ROOM AMBIENT<br>Ta=24.7℃ | HIGH AMBIENT<br>Ta=44.4℃ | 1 | ZNR1 | 61.5℃ | 77.1℃ | 2 | RTH30 | 68.1℃ | 85.0℃ | 3 | LF2 | 62.1℃ | 79.0℃ | 4 | L1 | 62.8℃ | 79.5℃ | 5 | L2 | 64.2℃ | 81.1℃ | 6 | D6 | 65.4℃ | 81.9℃ | 7 | D30 | 75.9℃ | 92.2℃ | 8 | C5 | 67.1℃ | 83.1℃ | 9 | C52 | 74.6℃ | 90.9℃ | 10 | T1 | 85.0℃ | 101.5℃ | 11 | BD1 | 64.1℃ | 80.5℃ | 12 | D1 | 65.1℃ | 81.6℃ | 13 | Q31 | 65.2℃ | 82.0℃ | 14 | Q32 | 66.7℃ | 83.5℃ | 15 | Q102 | 69.3℃ | 86.1℃ | 16 | C110 | 69.0℃ | 85.5℃ | 17 | LF1 | 62.8℃ | 78.7℃ | 18 | U2 | 71.2℃ | 85.9℃ | 19 | D33 | 82.1℃ | 100.6℃ | 20 | CASE | 53.5℃ | 70.3℃ |  | P |
| NO | Position                                                          | ROOM AMBIENT<br>Ta=24.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | HIGH AMBIENT<br>Ta=44.4℃                                         |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 1  | ZNR1                                                              | 61.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 77.1℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 2  | RTH30                                                             | 68.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85.0℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 3  | LF2                                                               | 62.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 79.0℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 4  | L1                                                                | 62.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 79.5℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 5  | L2                                                                | 64.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 81.1℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 6  | D6                                                                | 65.4℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 81.9℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 7  | D30                                                               | 75.9℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 92.2℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 8  | C5                                                                | 67.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 83.1℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 9  | C52                                                               | 74.6℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.9℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 10 | T1                                                                | 85.0℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 101.5℃                                                           |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 11 | BD1                                                               | 64.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 80.5℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 12 | D1                                                                | 65.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 81.6℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 13 | Q31                                                               | 65.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 82.0℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 14 | Q32                                                               | 66.7℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 83.5℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 15 | Q102                                                              | 69.3℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 86.1℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 16 | C110                                                              | 69.0℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85.5℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 17 | LF1                                                               | 62.8℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 78.7℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 18 | U2                                                                | 71.2℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85.9℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 19 | D33                                                               | 82.1℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 100.6℃                                                           |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 20 | CASE                                                              | 53.5℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 70.3℃                                                            |                    |         |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 2  | OVER LOAD BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | I/P : 230 VAC<br>O/P : 136% 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>CONTROL45℃<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | I/P : 272 VAC<br>O/P : FULL LOAD<br>Ta= 45℃<br>HUMIDITY= 95 %R.H | TEST : OK          | P       |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 5  | TEMPERATURE<br>COEFFICIENT                                        | ± 0.03 %/℃ (0~45℃)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | I/P : 230 VAC<br>O/P : FULL LOAD                                 | ± 0.009%/℃ (0~45℃) | P       |          |                          |                          |   |      |       |       |   |       |       |       |   |     |       |       |   |    |       |       |   |    |       |       |   |    |       |       |   |     |       |       |   |    |       |       |   |     |       |       |    |    |       |        |    |     |       |       |    |    |       |       |    |     |       |       |    |     |       |       |    |      |       |       |    |      |       |       |    |     |       |       |    |    |       |       |    |     |       |        |    |      |       |       |  |   |
| 6  | STORAGE TEMPERATURE TEST                                          | 1. Thermal shock Temperature : -40℃~ +85℃<br>2. Temperature change rate : 25℃ / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 5 CYCLE<br>5. Input/Output condition : STATIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                  | OK                 | 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 | 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<br>LIFE CYCLE     | SUPPOSE C110 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=45°C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta=45°C LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta=45°C LIFE TIME                 | (1) 145886HRS<br>(2) 45558HRS<br>(3) 80925HRS<br>(4) 121817HRS | P  |
| 10 | MTBF                        | MIL-HDBK-217F<br>TOTAL FAILURE RATE : 368.75 KHRS                                                                                                                                                                                                                                 |                                                                | 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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