



# Test Report: NTS-1200-224

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1200W High Reliable True Sine Wave Power Inverter

- **DESIGN VERIFY TEST**

- Output Function Test

- Input Function Test

- Protection Function Test

- Control Function Test

- APPLICATION Test

- Component Stress Test

- **SAFETY & E.M.C. TEST**

- Safety Test

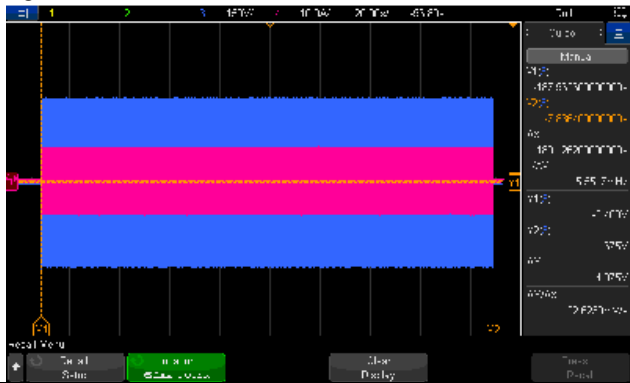
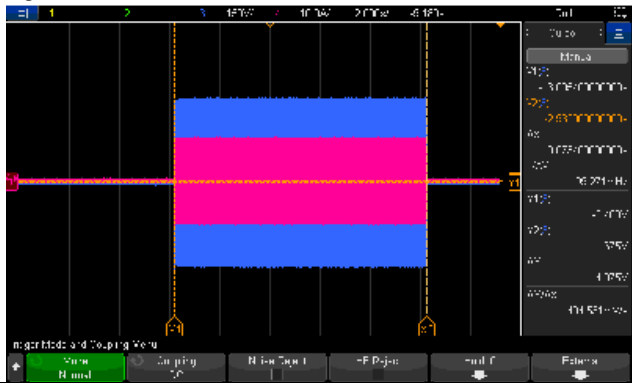
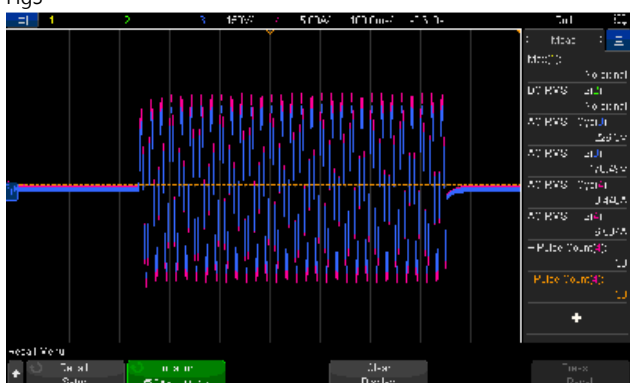
- E.M.C. Test

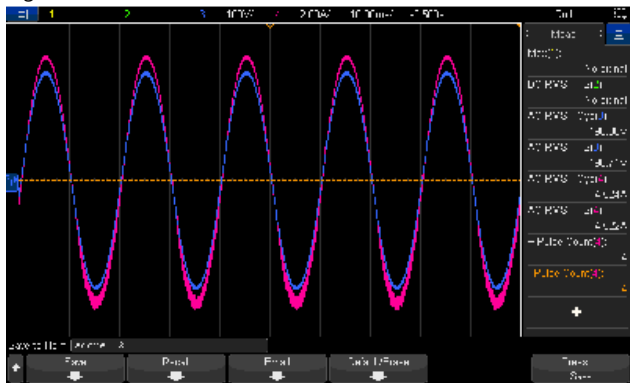
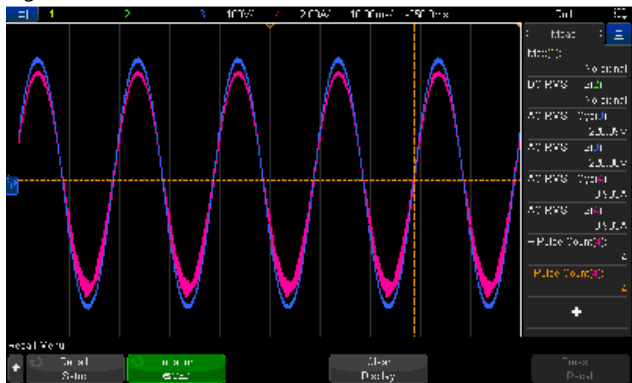
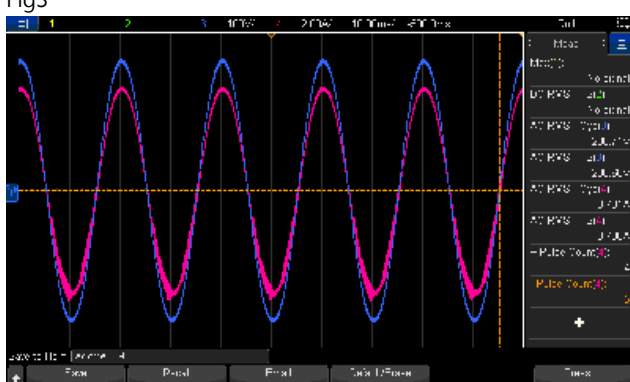
- **RELIABILITY TEST**

- ENVIRONMENT TEST

## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

| NO                                                                                                                                                                                                                                                                                                                                                 | TEST ITEM                  | SPECIFICATION                                                                             | TEST CONDITION                          | RESULT                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                  | RATED POWER                | 1200W                                                                                     | IP: 24VDC<br>Ta:25°C                    | <u>1224</u> W                                                                                                                        |
| 2                                                                                                                                                                                                                                                                                                                                                  | MAXIMUM OUTPUT POWER (TYP) | (1)1380W/180sec.<br>(2)1800w/10sec<br>(3)SURGE POWER 2000W FOR 30CYCLE Vin (30 ± 5 CYCLE) | IP: 25VDC<br>OP:TESTING LOAD<br>Ta:25°C | (1) 229.2 V/ 5.96 A/ 180.12 Sec<br>(2) 228.8 V/ 7.75 A/ 10.07 Sec<br>(3) 226.1 V/ 8.440 A/ 30 Cycle                                  |
| CH3:O/P VAC CH4:O/P IAC                                                                                                                                                                                                                                                                                                                            |                            |                                                                                           |                                         |                                                                                                                                      |
| <div> <div> <p>Fig1</p>  </div> <div> <p>Fig2</p>  </div> <div> <p>Fig3</p>  </div> </div> |                            |                                                                                           |                                         |                                                                                                                                      |
| 3                                                                                                                                                                                                                                                                                                                                                  | AC Voltage                 | 200 / 220 / 230 / 240Vac selectable by DIP S.W                                            | IP: 24VDC<br>OP: FULL LOAD<br>Ta:25°C   | DIP S.W 200VAC: <u>199.5</u> V<br>DIP S.W 220VAC: <u>219.3</u> V<br>DIP S.W 230VAC: <u>229.2</u> V<br>DIP S.W 240VAC: <u>239.2</u> V |
| 4                                                                                                                                                                                                                                                                                                                                                  | FREQUENCY                  | 50/60Hz (±0.1HZ) selectable by DIP S.W                                                    | IP: 24VDC<br>OP: FULL LOAD<br>Ta:25°C   | DIP S.W 50HZ: <u>50.041</u> HZ<br>DIP S.W 60HZ: <u>59.958</u> HZ                                                                     |

|                         |                       |                                                                                    |                                                                                                         |                                                                                                   |
|-------------------------|-----------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 5                       | WAVEFORM              | True sine wave (THD<3%)                                                            | IP:25VDC<br>OP:75% LOAD( 900W )<br>(1) Vo(min)<br>(2) Vo(nor)<br>(3) Vo(max)<br>Ta:25°C                 | (1) 1.33 % / Vo(min)/75% LOAD<br>(2) 1.73 % / Vo(nor) /75% LOAD<br>(3) 1.11 % / Vo(max) /75% LOAD |
| CH3:O/P VAC CH4:O/P IAC |                       |                                                                                    |                                                                                                         |                                                                                                   |
| Fig1                    |                       |   |                                                                                                         |                                                                                                   |
| Fig2                    |                       |  |                                                                                                         |                                                                                                   |
| Fig3                    |                       |  |                                                                                                         |                                                                                                   |
| 6                       | AC REGULATION         | ±3%                                                                                | IP: 25VDC<br>OP:75% LOAD( 900W )<br>Ta:25°C                                                             | -0.27 %                                                                                           |
| 7                       | Overshoot /Undershoot | <±10%                                                                              | IP: 24VDC<br>OP:<br>(1) full load turn on<br>(2) no load turn on<br>(3) full /no load change<br>Ta:25°C | (1) -8.91 %<br>(2) -6.26 %<br>(3) -3.13 %                                                         |
| 8                       | O/P voltage DC offset | Vin(nor)= 24 v · Vo< 200mV · no load : 86.3 mV / full load: 76 mV                  |                                                                                                         |                                                                                                   |

| 9                                                                                                 | LED STATUS                                                                                                                                                                                    | <ul style="list-style-type: none"> <li> <b>Status test</b> <table> <tr> <th>LED</th><th>Status</th><th>RESULT</th></tr> <tr> <td>Green</td><td> Inverter OK</td><td>OK</td></tr> <tr> <td>Orange</td><td> Remote off<br/> Saving mode</td><td>OK</td></tr> <tr> <td>Red</td><td> Abnormal Status<br/>(See SPEC)</td><td>OK</td></tr> </table> </li> <li> <b>Battery test</b> <table> <tr> <th>LED</th><th>Battery RANGE</th><th>RESULT</th></tr> <tr> <td><b>Green</b> </td><td>25.0~31.0 Vdc±0.5v</td><td>25.05Vdc ~ 30.86 Vdc</td></tr> <tr> <td><b>Orange</b> </td><td>22.0~25.0Vdc ±0.5v</td><td>22.04Vdc ~ 25.68 Vdc</td></tr> <tr> <td><b>Red</b> </td><td>&lt; 22.0 Vdc ±0.5v<br/>&gt; 31.0vdc±0.5v</td><td>&lt; 21.98 Vdc<br/>&gt; 30.97 Vdc</td></tr> </table> </li> <li> <b>Load test</b> <table> <tr> <th>LED</th><th>LOAD RANGE</th><th>RESULT</th></tr> <tr> <td><b>Green</b> </td><td>Min. load ~ 40%±5% LOAD</td><td>Min. load ~ 40.2 %</td></tr> <tr> <td><b>Orange</b> </td><td>40%±5% ~ 80%±5% LOAD</td><td>42.5%~ 80.7 %</td></tr> <tr> <td><b>Red</b> </td><td>≥ 80%±5% LOAD</td><td>≥ 82.5 %</td></tr> </table> </li> </ul> | LED | Status | RESULT | Green |  Inverter OK | OK | Orange |  Remote off<br> Saving mode | OK | Red |  Abnormal Status<br>(See SPEC) | OK | LED | Battery RANGE | RESULT | <b>Green</b>  | 25.0~31.0 Vdc±0.5v | 25.05Vdc ~ 30.86 Vdc | <b>Orange</b>  | 22.0~25.0Vdc ±0.5v | 22.04Vdc ~ 25.68 Vdc | <b>Red</b>  | < 22.0 Vdc ±0.5v<br>> 31.0vdc±0.5v | < 21.98 Vdc<br>> 30.97 Vdc | LED | LOAD RANGE | RESULT | <b>Green</b>  | Min. load ~ 40%±5% LOAD | Min. load ~ 40.2 % | <b>Orange</b>  | 40%±5% ~ 80%±5% LOAD | 42.5%~ 80.7 % | <b>Red</b>  | ≥ 80%±5% LOAD | ≥ 82.5 % |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|--------|-------|-----------------------------------------------------------------------------------------------|----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|-----------------------------------------------------------------------------------------------------------------|----|-----|---------------|--------|------------------------------------------------------------------------------------------------|--------------------|----------------------|-------------------------------------------------------------------------------------------------|--------------------|----------------------|----------------------------------------------------------------------------------------------|------------------------------------|----------------------------|-----|------------|--------|--------------------------------------------------------------------------------------------------|-------------------------|--------------------|---------------------------------------------------------------------------------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------|---------------|----------|
| LED                                                                                               | Status                                                                                                                                                                                        | RESULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| Green                                                                                             |  Inverter OK                                                                                                 | OK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| Orange                                                                                            |  Remote off<br> Saving mode | OK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| Red                                                                                               |  Abnormal Status<br>(See SPEC)                                                                               | OK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| LED                                                                                               | Battery RANGE                                                                                                                                                                                 | RESULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Green</b>     | 25.0~31.0 Vdc±0.5v                                                                                                                                                                            | 25.05Vdc ~ 30.86 Vdc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Orange</b>    | 22.0~25.0Vdc ±0.5v                                                                                                                                                                            | 22.04Vdc ~ 25.68 Vdc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Red</b>       | < 22.0 Vdc ±0.5v<br>> 31.0vdc±0.5v                                                                                                                                                            | < 21.98 Vdc<br>> 30.97 Vdc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| LED                                                                                               | LOAD RANGE                                                                                                                                                                                    | RESULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Green</b>   | Min. load ~ 40%±5% LOAD                                                                                                                                                                       | Min. load ~ 40.2 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Orange</b>  | 40%±5% ~ 80%±5% LOAD                                                                                                                                                                          | 42.5%~ 80.7 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |
| <b>Red</b>     | ≥ 80%±5% LOAD                                                                                                                                                                                 | ≥ 82.5 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |        |        |       |                                                                                               |    |        |                                                                                                                                                                                               |    |     |                                                                                                                 |    |     |               |        |                                                                                                |                    |                      |                                                                                                 |                    |                      |                                                                                              |                                    |                            |     |            |        |                                                                                                  |                         |                    |                                                                                                   |                      |               |                                                                                                |               |          |

## INPUT FUNCTION TEST

| NO | TEST ITEM           | SPECIFICATION | TEST CONDITION                                                                                                                                                                                                                                                                                     | RESULT                                                                                                         |
|----|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1  | VOLTAGE RANGE (TYP) | 20VDC~33VDC   | IP: TESTING<br>OP:NO LOAD/FULL LOAD<br>Ta:25°C<br><br>I/P:<br>LOW-LINE=20.5V<br>HIGH-LINE=32.5V<br>O/P:FULL/MIN LOAD<br>(PLEASE CHECK DERATING CURVE)<br>ON:30Sec OFF:30Sec<br>10MIN<br>(POWER ON/OFF NO DAMAGE)<br>I/P: 24V<br>O/P:FULL LOAD<br>ON:30ec OFF:30ec 12Hr<br>(POWER ON/OFF NO DAMAGE) | <u>20.07</u> VDC~ <u>32.8</u> VDC/NO LOAD<br><u>20.2</u> VDC~ <u>32.9</u> VDC/FULL LOAD<br><br>Test: <u>OK</u> |

|   |                              |                                                                 |                                                                          |                                  |
|---|------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------|
| 2 | DC CURRENT (TYP)             | 60A                                                             | IP: 24VDC<br>OP: FULL LOAD<br>Ta: 25°C                                   | <u>54.44</u> A                   |
| 3 | NO LOAD DISSIPATION (Typ.)   | $\leq 1.4W$ @standby saving mode<br>$\leq 25W$ @NON-Saving Mode | IP: 24VDC<br>OP: NO LOAD<br>Ta: 25°C                                     | <u>1.303</u> W<br><u>20.76</u> W |
| 4 | SAVING MODE TO NORMAL        | $P_o \geq 25W$                                                  | IP: 24VDC<br>OP: TESTING LOAD<br>Ta: 25°C                                | <u>21</u> W                      |
| 5 | NORMAL TO SAVING MODE        | $P_o \leq 10W$                                                  | IP: 24VDC<br>OP: TESTING LOAD<br>Ta: 25°C                                | <u>15</u> W                      |
| 6 | OFF MODE CURRENT DRAW (Typ.) | $\leq 1mA$                                                      | IP: 24VDC<br>OP: Sw off<br>Ta: 25°C                                      | <u>0.75</u> mA                   |
| 7 | EFFICIENCY(TYP)              | 900W/92%                                                        | IP: 25VDC<br>OP: $P_o = 900W$<br>230V/50HZ (factory setting)<br>Ta: 25°C | <u>92.5</u> %                    |

#### PROTECTION TEST

| NO | TEST ITEM          | SPECIFICATION    | TEST CONDITION                                     | RESULT         |
|----|--------------------|------------------|----------------------------------------------------|----------------|
| 1  | BAT LOW ALARM      | 22V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>21.97</u> V |
| 2  | BAT LOW SHUT DOWN  | 20V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>20.14</u> V |
| 3  | BAT LOW RESTART    | 25V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>25.04</u> V |
| 4  | BAT HIGH ALARM     | 31V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>30.96</u> V |
| 5  | BAT HIGH SHUT DOWN | 33V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>33.07</u> V |
| 6  | BAT HIGH RESTART   | 30V $\pm$ 0.5VDC | IP: TESTING<br>OP: FULL LOAD<br>SW: ON<br>Ta: 25°C | <u>29.97</u> V |

|   |                  |                                                                                                  |                                                           |                                                                                                                                             |
|---|------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 7 | OVER TEMPERATURE | Shut down o/p voltage:<br>re-power on                                                            | IP: HI LINE/LOW-LINE<br>OP: FULL LOAD<br>SW:ON<br>Ta:25°C | Shut down o/p voltage, re-power on<br>to recover<br>LED DISPLAY: <u>OK</u>                                                                  |
| 8 | OUTPUT SHORT     | Shut down o/p voltage:<br>re-power on                                                            | IP: 24VDC<br>O/P: FULL LOAD<br>SW:ON<br>Ta:25°C           | Shut down o/p voltage, re-power on<br>to recover<br>LED DISPLAY: <u>OK</u><br>(1).TEST: <u>OK</u>                                           |
| 9 | OVER LOAD (typ.) | 105%~115%LOAD 180sec<br>115%~150%LOAD 10 sec<br>Shut down o/p voltage,<br>re-power on to recover | IP: 24VDC<br>OP: TESTING<br>SW:ON<br>Ta:25°C              | (1). <u>107 %~ 114 %</u> <u>180.12</u> sec<br>(2). <u>116 %~ 147 %</u> <u>10.07</u> sec<br>Shut down o/p voltage, re-power on<br>to recover |

### CONTROL FUNCTION TEST

| NO | TEST ITEM      | SPECIFICATION                                                                                                                                  | TEST CONDITION                        | RESULT                                                                                 |
|----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------|
| 1  | REMOTE CONTROL | (1).Power ON-OFF remote<br>control by front panel dry contact<br>connector (by RELAY)<br>Open : Normal work<br>Short : Remote off<br>(2). IRC3 | IP: 24VDC<br>OP: FULL LOAD<br>Ta:25°C | Open : Normal work<br>Short : Remote off<br>(1).TEST: <u>OK</u><br>(2).TEST: <u>OK</u> |

### APPLICATION TEST

| NO | TEST ITEM                    | SPECIFICATION                                                                                                                | TEST CONDITION                                          | RESULT |
|----|------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------|
| 1  | LAMP                         | LAMP: <u>618</u> W · turn on <u>OK</u><br>LAMP: <u>1037</u> W · turn on <u>OK</u><br>LAMP: <u>1400</u> W · turn on <u>OK</u> | 1. Vin=HIGH LINE<br>2. O/P=110V/60Hz<br>TEST: <u>OK</u> |        |
| 2  | INDUCTION<br>MOTOR           | <u>0.5</u> HP                                                                                                                | 1. Vin=HIGH LINE<br>2. O/P=110V/60Hz<br>TEST: <u>OK</u> |        |
| 3  | SWITCHING<br>POWER<br>SUPPLY | WITH PFC: <u>RSP-1600-48</u> ·<br>O/P= <u>1245.4</u> W                                                                       | 1. Vin=HIGH LINE<br>2. O/P=110V/60Hz<br>TEST: <u>OK</u> |        |
|    |                              | NO PFC: <u>SE-1000-48</u> ·<br>O/P= <u>643.5</u> W                                                                           | 1. Vin=HIGH LINE<br>2. O/P=110V/60Hz<br>TEST: <u>OK</u> |        |

# COMPONENT WEAFORM TEST

| NO | TEST ITEM                                                          | SPECIFICATION                                                  | TEST CONDITION                                                                                                                                                                  | RESULT                                                                     |                                                                        |
|----|--------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1  | DC TO DC Power Transistor<br>( D to S) or (C to E) Peak<br>Voltage | Q101 Rated<br>: 100V /80 A                                     | I/P: high line<br>O/P:V(max)/Freq 60HZ<br>VDS:<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(3)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C  | Q101<br>(1) 75.4V<br>(2) 76.2V<br>(3) 79.4V<br>(4) 75.4V<br>(5) 76.2V      | Q105<br>(1) 76.6V<br>(2) 77.4V<br>(3) 79.8V<br>(4) 77.4V<br>(5) 77.4V  |
| 2  | DC TO DC Diode Peak<br>Voltage                                     | D 151 Rated<br>: 600V/ 20A                                     | I/P: high line<br>O/P:V(max) /Freq 60HZ<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(3)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C         | D151<br>(1) 524V<br>(2) 560V<br>(3) 548V<br>(4) 544V<br>(5) 524V           | D152<br>(1) 520V<br>(2) 548V<br>(3) 548V<br>(4) 544V<br>(5) 524V       |
| 3  | DC BUS Capacitor Voltage                                           | C161/C162 Rated<br>: 680 u/ 315 V                              | I/P: high line<br>O/P:V(max) /Freq 60HZ<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(3)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C         | C161<br>(1) 258V<br>(2) 258V<br>(3) 256V<br>(4) 258V<br>(5) 256V           | C162<br>(1) 262V<br>(2) 262V<br>(3) 262V<br>(4) 262V<br>(5) 262V       |
| 4  | DC TO AC Power Transistor<br>( D to S) or (C to E) Peak<br>Voltage | Q 1 Rated<br>: 30A / 650 V                                     | I/P: high line<br>O/P:V(max) /Freq 60HZ<br>VDS:<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(3)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C | Q1<br>(1) 536V<br>(2) 540V<br>(3) 552V<br>(4) 536V<br>(5) 544V             | Q4<br>(1) 540V<br>(2) 540V<br>(3) 540V<br>(4) 544V<br>(5) 548V         |
| 5  | AUX PWM MOS                                                        | Q201 Rated<br>: 65 A/ 200 V<br><br>Q501 Rated<br>: 120 A/ 60 V | I/P: high line<br>O/P:V(max) /Freq 60HZ<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(5)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C         | Q201<br>(1) 109.2V<br>(2) 109.2V<br>(3) 109.2V<br>(4) 109.2V<br>(5) 109.2V | Q105<br>(1) 49.0 V<br>(2) 49.0V<br>(3) 49.0V<br>(4) 49.0V<br>(5) 49.0V |

|   |                         |                                                                                                                                                             |                                                                                                                                                                         |                                                                                                                                                         |                                                                                                                                                        |
|---|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | Control IC Voltage Test | MCU IC U301 Rated<br>2.4V~ 3.6 V<br><br>AUX IC U201 Rated<br>8.2V~30V<br><br>CHARGE IC U501 Rated<br>-0.3V~20V<br><br>Gate Driver IC U81 Rated<br>-0.3V~20V | I/P: high line<br>O/P:V(max) /Freq 60HZ<br>O/P: (1)Full Load Turn On<br>(2) Output Short<br>(3)O.L.P(200%) Turn On<br>(4) NO LOAD Turn On<br>(5) Saving mode<br>Ta:25°C | U301<br>(1) 3.50V<br>(2) 3.42V<br>(3) 3.46V<br>(4) 3.50V<br>(5) 3.46V<br><br>U201<br>(1) 12.22V<br>(2) 12.22V<br>(3) 12.22V<br>(4) 12.22V<br>(5) 12.22V | U501<br>(1) 12.30V<br>(2) 12.30V<br>(3) 12.03V<br>(4) 12.30V<br>(5) 12.30V<br><br>U81<br>(1) 5.07V<br>(2) 5.07V<br>(3) 5.07V<br>(4) 5.07V<br>(5) 5.07V |
|---|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|

## SAFETY & EMC TEST

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION                                         | TEST CONDITION                                                    | RESULT                                                     |
|----|----------------------|-------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------|
| 1  | WITHSTAND VOLTAGE    | BAT I/P-AC O/P: 3 KVAC/min<br>AC O/P-FG: 1.5 KVAC/min | BAT I/P-AC O/P: 3.6 KVAC/min<br>AC O/P-FG:1.8 KVAC/min<br>Ta:25°C | BAT I/P-AC O/P: 7.16 mA<br>AC O/P-FG: 5.99 mA<br>NO DAMAGE |
| 2  | GROUNDING CONTINUITY | IEC62368<br>FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ    | 40 A / 2min<br>Ta:25°C                                            | 3mΩ                                                        |

### E.M.C TEST

| NO | TEST ITEM                                                                                                                         | SPECIFICATION                                      | TEST CONDITION                               | RESULT                                                       |
|----|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------|--------------------------------------------------------------|
| 1  | RADIATION                                                                                                                         | EN55032 CISPR32<br>(except for Type-UN)<br>CLASS A | I/P:24 VDC<br>O/P: :FULL/50% LOAD<br>Ta:25°C | CLASS A                                                      |
| 2  | E.S.D                                                                                                                             | EN61000-4-2<br>AIR : 8KV / Contact : 4KV           | I/P: 24VDC<br>O/P:FULL LOAD<br>Ta:25°C       | <div> <div>■ CRITERIA A</div> <div>□ CRITERIA B</div> </div> |
| 3  | Test by certified Lab & Test Report Prepare<br>Any contradictions of the test results, please refer to the latest EMC test report |                                                    |                                              |                                                              |

## Reliability Test

| NO | TEST ITEM                       | SPECIFICATION                                                              | TEST CONDITION                              | RESULT                  |                          |
|----|---------------------------------|----------------------------------------------------------------------------|---------------------------------------------|-------------------------|--------------------------|
| 1  | TEMPERATURE RISE TEST           | MODEL : NTU-1200-224                                                       |                                             |                         |                          |
|    |                                 | 1. ROOM AMBIENT BURN-IN : 2 HRS<br>I/P : 25VDC O/P : FULL LOAD Ta= 25.0 °C |                                             |                         |                          |
|    |                                 | 2. HIGH AMBIENT BURN-IN : 2 HRS<br>I/P : 25VDC O/P : FULL LOAD Ta= 35.0 °C |                                             |                         |                          |
|    |                                 | NO                                                                         | Position                                    | ROOM AMBIENT Ta=25.0 °C | HIGH AMBIENT Ta= 35.0 °C |
|    |                                 | 1                                                                          | C101                                        | 60.8°C                  | 68.9°C                   |
|    |                                 | 2                                                                          | T101                                        | 78.6°C                  | 87.6°C                   |
|    |                                 | 3                                                                          | D151                                        | 56.9°C                  | 65.6°C                   |
|    |                                 | 4                                                                          | RTH6                                        | 52.1°C                  | 61.6°C                   |
|    |                                 | 5                                                                          | Q105                                        | 47.3°C                  | 56.4°C                   |
|    |                                 | 6                                                                          | Q104                                        | 53.6°C                  | 63.1°C                   |
|    |                                 | 7                                                                          | C531                                        | 29.2°C                  | 41.0°C                   |
|    |                                 | 8                                                                          | T501                                        | 27.8°C                  | 39.3°C                   |
|    |                                 | 9                                                                          | Q501                                        | 31.3°C                  | 42.4°C                   |
|    |                                 | 10                                                                         | U301                                        | 34.0°C                  | 45.3°C                   |
|    |                                 | 11                                                                         | U361                                        | 31.5°C                  | 42.9°C                   |
|    |                                 | 12                                                                         | TSW1                                        | 42.0°C                  | 52.4°C                   |
|    |                                 | 13                                                                         | Q141                                        | 31.1°C                  | 42.2°C                   |
|    |                                 | 14                                                                         | Q1                                          | 62.4°C                  | 73.0°C                   |
|    |                                 | 15                                                                         | Q4                                          | 54.9°C                  | 65.7°C                   |
|    |                                 | 16                                                                         | R223                                        | 41.1°C                  | 52.5°C                   |
|    |                                 | 17                                                                         | C222                                        | 35.9°C                  | 47.4°C                   |
|    |                                 | 18                                                                         | Q201                                        | 35.6°C                  | 48.2°C                   |
|    |                                 | 19                                                                         | D154                                        | 56.6°C                  | 65.1°C                   |
|    |                                 | 20                                                                         | C161                                        | 38.0°C                  | 48.2°C                   |
|    |                                 | 21                                                                         | L10                                         | 48.6°C                  | 58.7°C                   |
|    |                                 | 22                                                                         | C222                                        | 30.5°C                  | 41.3°C                   |
|    |                                 | 23                                                                         | T202                                        | 27.9°C                  | 39.7°C                   |
|    |                                 | 24                                                                         | RY1                                         | 34.6°C                  | 45.5°C                   |
|    |                                 | 25                                                                         | ZNR1                                        | 27.4°C                  | 38.2°C                   |
|    |                                 | 26                                                                         | LF1                                         | 34.2°C                  | 43.8°C                   |
|    |                                 | 27                                                                         | R213                                        | 46.4°C                  | 60.1°C                   |
|    |                                 | 28                                                                         | U501                                        | 31.8°C                  | 42.7°C                   |
|    |                                 | 29                                                                         | R24                                         | 61.3°C                  | 70.7°C                   |
|    |                                 | 30                                                                         | U81                                         | 35.6°C                  | 46.1°C                   |
|    |                                 | 31                                                                         | D501                                        | 31.4°C                  | 42.3°C                   |
|    |                                 | 32                                                                         | R501                                        | 33.5°C                  | 44.4°C                   |
|    |                                 | 33                                                                         | U201                                        | 43.6°C                  | 55.0°C                   |
|    |                                 | 34                                                                         | Q203                                        | 37.0°C                  | 48.6°C                   |
| 35 | TC1                             | 34.5°C                                                                     | 44.4°C                                      |                         |                          |
| 36 | TC2                             | 34.0°C                                                                     | 44.5°C                                      |                         |                          |
| 37 | C104                            | 58.9°C                                                                     | 67.1°C                                      |                         |                          |
| 2  | LOW TEMPERATURE<br>TURN ON TEST | TURN ON AFTER 2<br>HOUR                                                    | I/P : 25VDC<br>O/P : 100%LOAD<br>Ta= -25 °C | TEST : OK               |                          |

|   |                                                                   |                                                                                                                                                                                                                                 |                                                                    |                                  |
|---|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------|
| 3 | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 35 °C<br>NO DAMAGE                                                                                                                                                                   | I/P : 32.5VDC<br>O/P : FULL LOAD<br>Ta= 35 °C<br>HUMIDITY= 95 %R.H | TEST : OK                        |
| 4 | STORAGE TEMPERATURE<br>TEST                                       | 1. Thermal shock Temperature : -45°C~ +90°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                        |
| 5 | THERMAL SHOCK TEST                                                | 1. Thermal shock Temperature : -25°C~ +40°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 : 25VDC/Full Load |                                                                    | TEST : OK                        |
| 6 | VIBRATION TEST                                                    | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 10min/sweep cycle<br>(4) Acceleration : 4G<br>(5) Test Time : 60min in each axis (X.Y.Z)<br>(6) Ta : 25°C                          |                                                                    | TEST : OK                        |
| 7 | CAPACITOR<br>LIFE CYCLE                                           | SUPPOSE C101 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 25VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME<br>(2) I/P : 25VDC O/P : FULL LOAD Ta= 35 °C LIFE TIME                                                                       |                                                                    | (1) 302931HRS<br>(2) 172786.3HRS |
| 8 | MTBF                                                              | Conducted by Parts Stress Analysis Prediction<br>198.9K hrs min. Telcordia TR/SR-332 (Bellcore) ; 62.0K hrs min. MIL-HDBK-217F (25°C)                                                                                           |                                                                    |                                  |
| 9 | Ongoing Reliability Test                                          | I/P : 25VDC O/P : 80% LOAD TA=50°C<br>Demonstration Mean Time Between Failure : 30,000 hours                                                                                                                                    |                                                                    |                                  |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|--------|--------|----------|
| PASS        | LIUTT  |        | WANGDZ   |

2018.4.30 GP-A50-F010