



# Test Report: NSP-1000-48

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1000W AC/DC High Reliable Multi-Industrial Enclosed Type Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

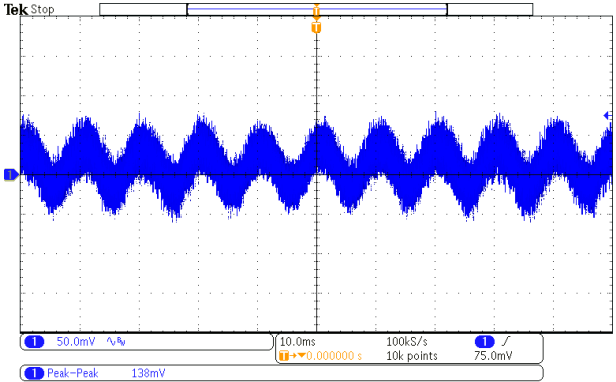
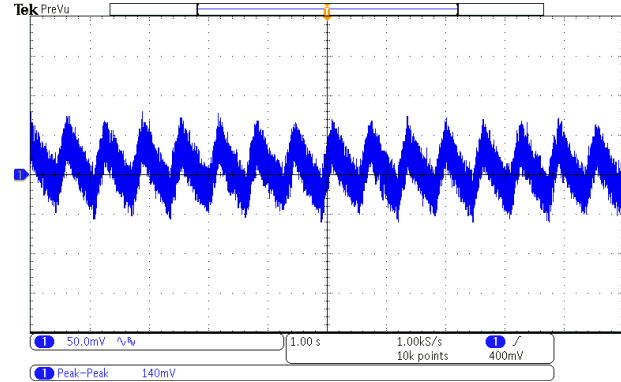
E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

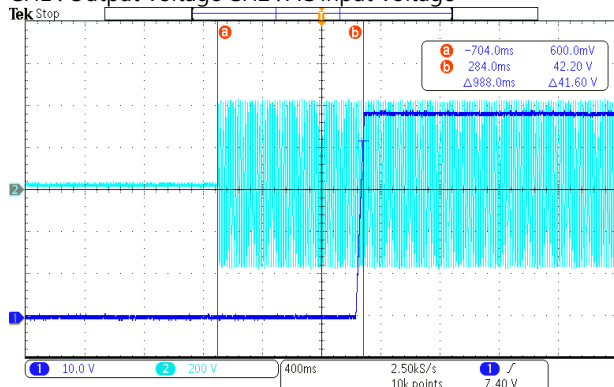
## ■ DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

| NO                                                                                                                                                                                                                                                             | TEST ITEM                      | SPECIFICATION                                   | TEST CONDITION                                                               | RESULT                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|
| 1                                                                                                                                                                                                                                                              | OUTPUT VOLTAGE<br>ADJUST RANGE | CH1: 43.2V~55V                                  | I/P : 230 VAC<br>O/P : MIN LOAD<br>Ta : 25°C                                 | 40.86V~57.86V/230VAC                              |
| 2                                                                                                                                                                                                                                                              | OUTPUT VOLTAGE<br>TOLERANCE    | V1: -1%~ 1%                                     | I/P: 85VAC /305VAC<br>O/P:FULL/ MIN. LOAD<br>Ta:25°C                         | V1: 0.4%~ 0.6%                                    |
| 3                                                                                                                                                                                                                                                              | LINE REGULATION                | V1: -0.5%~ 0.5%                                 | I/P: 85VAC~ 305VAC<br>O/P:FULL LOAD<br>Ta:25°C                               | V1: -0.1%~0.12%                                   |
| 4                                                                                                                                                                                                                                                              | LOAD REGULATION                | V1: -0.5%~ 0.5%                                 | I/P: 230VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                                 | V1: 0.1%~ 0.25 %                                  |
| 5                                                                                                                                                                                                                                                              | OVER/UNDERSHOOT TEST           | < ± 5%                                          | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C                                      | 3.2%                                              |
| 6                                                                                                                                                                                                                                                              | RIPPLE & NOISE (Max)           | V1:300mVp-p                                     | I/P: 230 VAC<br>O/P: MIN LOAD—FULL LOAD<br>Ta:25°C                           | V1: 140mVp-p / 100% load                          |
| <div> <div> <p>high frequency :</p>  </div> <div> <p>low frequency :</p>  </div> </div> |                                |                                                 |                                                                              |                                                   |
| 7                                                                                                                                                                                                                                                              | SET UP TIME(Max)               | 277VAC/1500ms<br>230VAC/1500ms<br>115VAC/2500ms | I/P : 277VAC<br>I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>Ta : 25°C | 277VAC/ 988ms<br>230VAC/ 1198ms<br>115VAC/ 1950ms |

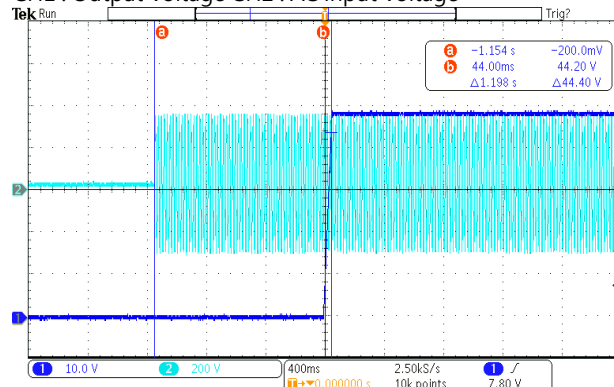
INPUT=277VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



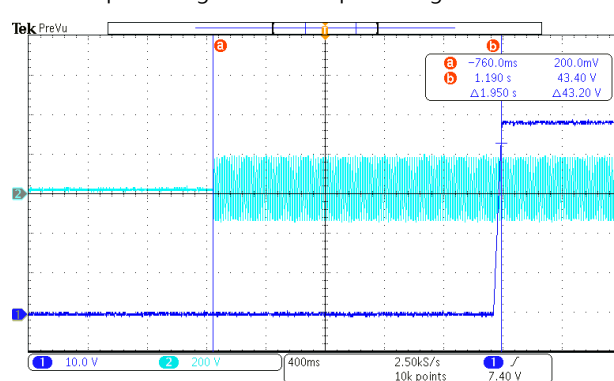
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



8

RISE TIME (Max)

277VAC/80ms

230VAC/80ms

115VAC/80ms

I/P : 277VAC

I/P : 230VAC

I/P : 115VAC

O/P : FULL LOAD

Ta : 25°C

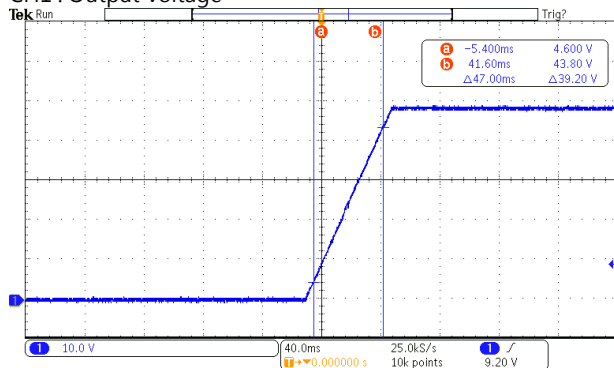
277VAC/ 47ms

230VAC/ 47ms

115VAC/ 46ms

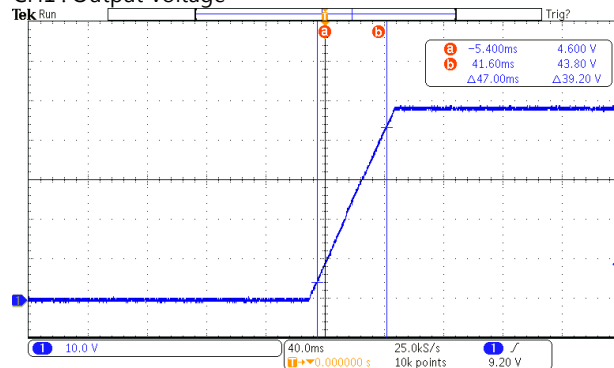
INPUT=277VAC/60HZ @ FULL LOAD

CH1 : Output Voltage



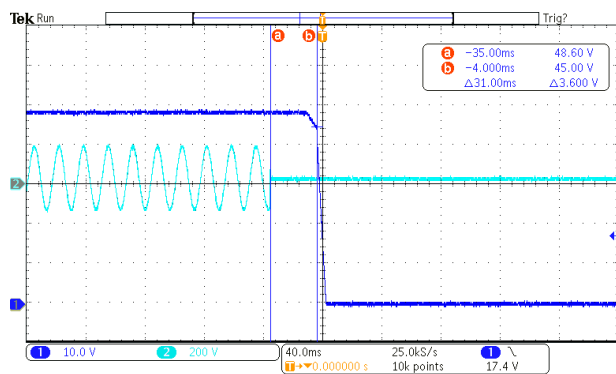
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage

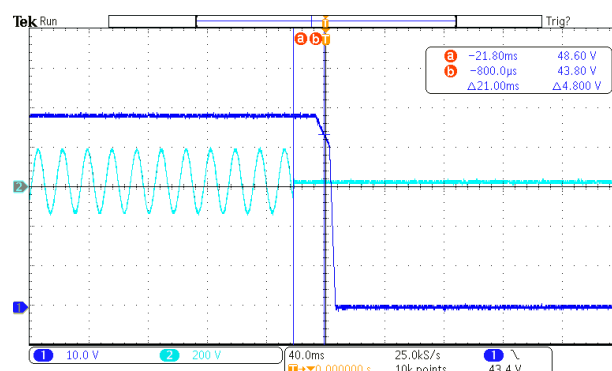


|   |                                                                                    |                                       |                                                                                                   |                                                                                                                                              |
|---|------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p>INPUT=115VAC/60HZ @ FULL LOAD<br/>CH1 : Output Voltage</p>                      |                                       |                                                                                                   |                                                                                                                                              |
| 9 | <p>HOLD UP TIME (Typ.)</p>                                                         | <p>12ms@70%load<br/>8ms@full load</p> | <p>I/P : 277 VAC<br/>I/P : 230VAC<br/>I/P : 115 VAC<br/>O/P : 70%LOAD/FULL LOAD<br/>Ta : 25°C</p> | <p>FULL LOAD<br/>277VAC: 21.8ms<br/>230VAC: 21.4ms<br/>115VAC: 21ms</p> <p>70% LOAD<br/>277VAC: 31ms<br/>230VAC: 29.5ms<br/>115VAC: 31ms</p> |
|   | <p>INPUT=277VAC/60HZ@70% LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage</p>  |                                       |                                                                                                   |                                                                                                                                              |
|   | <p>INPUT=277VAC/60HZ@FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage</p> |                                       |                                                                                                   |                                                                                                                                              |
|   | <p>INPUT=230VAC/50HZ@70% LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage</p>  |                                       |                                                                                                   |                                                                                                                                              |
|   | <p>INPUT=230VAC/50HZ@FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage</p> |                                       |                                                                                                   |                                                                                                                                              |

INPUT=115VAC/60HZ@70% LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ@FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



10 DYNAMIC LOAD

V1: 9600mVp-p

I/P: 230VAC

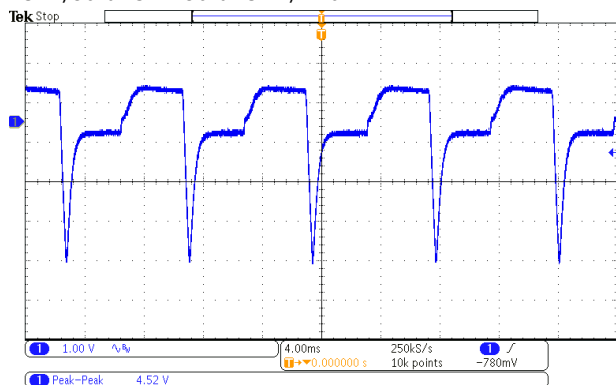
O/P:

(1)FULL /50% LOAD 50%DUTY / 120HZ  
(2)FULL /50% LOAD 50%DUTY / 1KHZ  
Ta:25°C

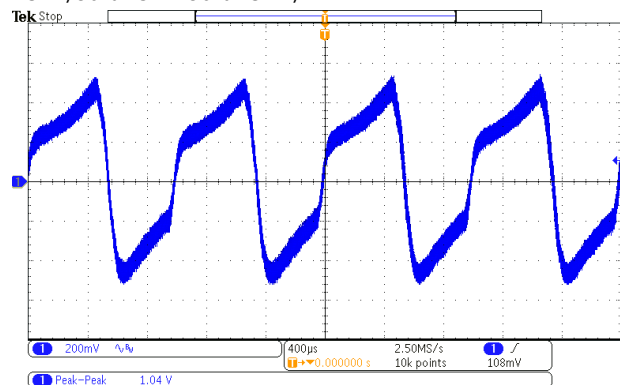
4520mVp-p

1040mVp-p

FULL /50% LOAD 50%DUTY / 120HZ



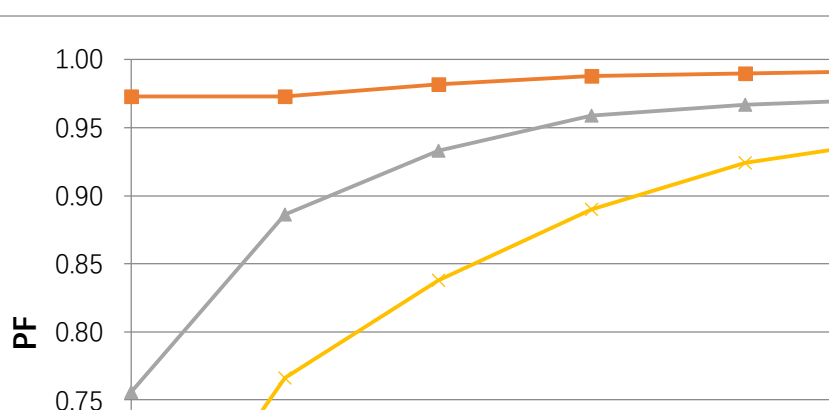
FULL /50% LOAD 50%DUTY / 1KHZ

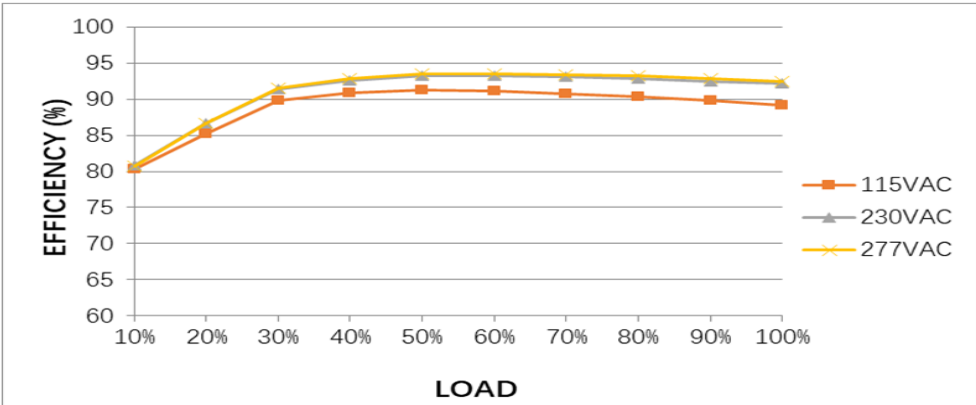
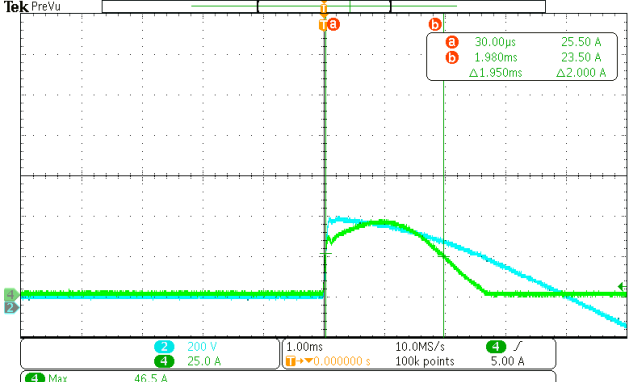
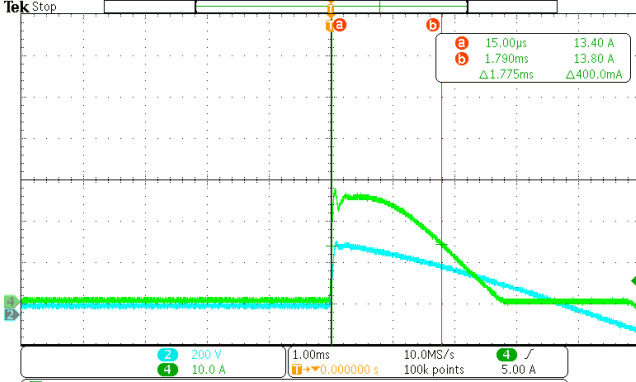
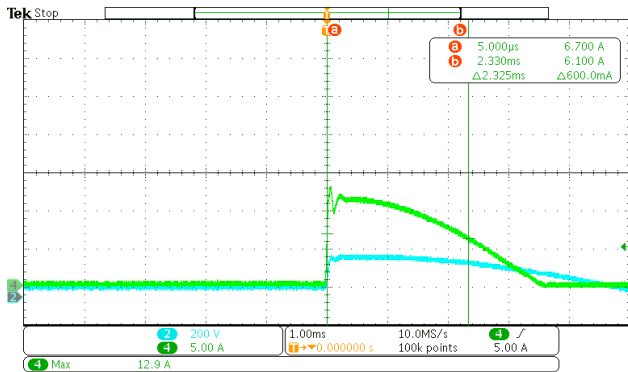


## INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                                      | TEST CONDITION                                                                                                                                                     | RESULT                                                                                                                           |
|----|-----------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 1  | INPUT VOLTAGE RANGE   | 85VAC~305VAC<br>120VDC~ 431VDC                     | (1) I/P:TESTING<br>O/P:FULL LOAD<br>(2) I/P:DC TESTING(L:+ N:-)<br>O/P: FULL / 50% LOAD<br>(3) I/P:DC TESTING(L:- N:+)<br>O/P: FULL / 50% LOAD<br>Ta:25°C          | (1)72V~308VAC<br>(2) 120Vdc~431Vdc/FULL LOAD<br>120Vdc~431Vdc/50% LOAD<br>(3) 120Vdc~431Vdc/FULL LOAD<br>120Vdc~431 Vdc/50% LOAD |
|    |                       |                                                    | I/P:<br>LOW-LINE-3V=82V<br>HIGH-LINE+10V=315 V<br>O/P:FULL/MIN LOAD<br>(PLEASE CHECK DERATING CURVE)<br>ON: 30 Sec OFF: 30 Sec 10MIN<br>( POWER ON/OFF NO DAMAGE ) | TEST:PASS                                                                                                                        |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE                           | I/P:85VAC ~305VAC<br>O/P:FULL~MIN LOAD<br>Ta:25°C                                                                                                                  | TEST: PASS                                                                                                                       |
| 3  | INPUT CURRENT (Typ.)  | 277V/ 5A<br>230V/ 6A<br>115V/ 12A                  | I/P : 277VAC<br>I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                       | I =4.0A/ 277VAC<br>I =4.8A/ 230VAC<br>I =9.8A/ 115VAC                                                                            |
| 4  | LEAKAGE CURRENT       | Earth leakage current<br>< 350 $\mu$ A(rms)@277VAC | I/P : 277 VAC<br>O/P : Min LOAD<br>Ta : 25°C                                                                                                                       | L-FG : 230.2 $\mu$ A<br>N-FG : 229.6 $\mu$ A                                                                                     |
|    |                       | Touch current<br><100 $\mu$ A (rms)@277 VAC        |                                                                                                                                                                    | L-V+: 72.4 $\mu$ A<br>L-V-: 73.2 $\mu$ A<br>N-V+: 73.4 $\mu$ A<br>N-V-: 73.4 $\mu$ A                                             |
| 5  | POWER FACTOR (Typ.)   | 0.92/277VAC<br>0.95/ 230VAC<br>0.98/ 115VAC        | I/P : 277VAC<br>I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                       | PF=0.965/277VAC<br>PF=0.984/230VAC<br>PF=0.994/115VAC                                                                            |

P.F vs LOAD



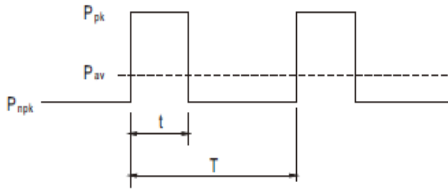
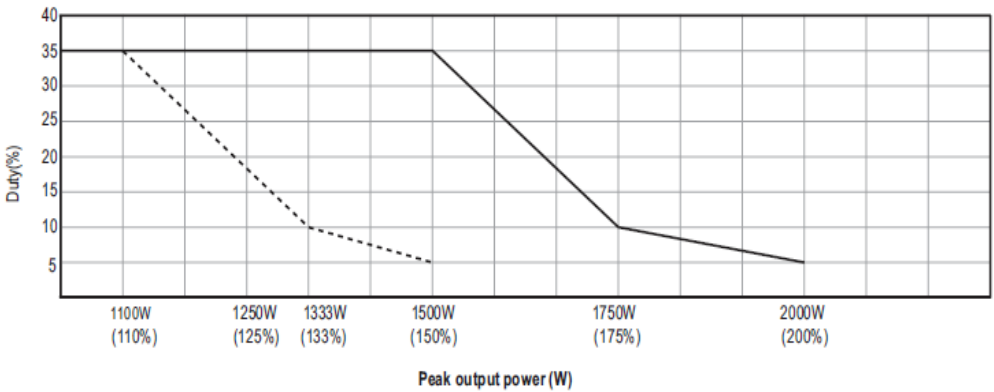
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EFFICIENCY(Typ.)     | 94%                                                  | I/P:230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                                      | 94.5%                                                                                                                    |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------|------------|------------|------------|----|---------|----|---------|----|---------|----|----------|----|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|
| EFFICIENCY vs LOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
|  <table><thead><tr><th>LOAD (%)</th><th>115VAC (%)</th><th>230VAC (%)</th><th>277VAC (%)</th></tr></thead><tbody><tr><td>10</td><td>80</td><td>80</td><td>80</td></tr><tr><td>20</td><td>85</td><td>85</td><td>85</td></tr><tr><td>30</td><td>90</td><td>90</td><td>90</td></tr><tr><td>40</td><td>91</td><td>91</td><td>91</td></tr><tr><td>50</td><td>91</td><td>92</td><td>92</td></tr><tr><td>60</td><td>91</td><td>92</td><td>92</td></tr><tr><td>70</td><td>91</td><td>92</td><td>92</td></tr><tr><td>80</td><td>91</td><td>92</td><td>92</td></tr><tr><td>90</td><td>91</td><td>92</td><td>92</td></tr><tr><td>100</td><td>90</td><td>92</td><td>92</td></tr></tbody></table> |                      |                                                      |                                                                              |                                                                                                                          | LOAD (%)    | 115VAC (%) | 230VAC (%) | 277VAC (%) | 10 | 80      | 80 | 80      | 20 | 85      | 85 | 85       | 30 | 90       | 90 | 90 | 40 | 91 | 91 | 91 | 50 | 91 | 92 | 92 | 60 | 91 | 92 | 92 | 70 | 91 | 92 | 92 | 80 | 91 | 92 | 92 | 90 | 91 | 92 | 92 | 100 | 90 | 92 | 92 |
| LOAD (%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 115VAC (%)           | 230VAC (%)                                           | 277VAC (%)                                                                   |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 80                   | 80                                                   | 80                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 85                   | 85                                                   | 85                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 90                   | 90                                                   | 90                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 91                                                   | 91                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 91                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 90                   | 92                                                   | 92                                                                           |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | INRUSH CURRENT(Typ.) | 50A/277VAC<br>40A/230VAC<br>25A/115VAC<br>COLD START | I/P : 277VAC<br>I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>Ta : 25°C | I =46.5A/ 277VAC<br>T50=1950us/277V<br><br>I =27.4A/230VAC<br>T50=1775us/230V<br><br>I =12.9A/ 115VAC<br>T50=2325us/115V |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| INPUT=277VAC/50HZ @ FULL LOAD<br>CH2 : AC Input Voltage CH4 : Input current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
|  <table><thead><tr><th>Measurement</th><th>Value</th></tr></thead><tbody><tr><td>1</td><td>30.00µs</td></tr><tr><td>2</td><td>25.50 A</td></tr><tr><td>3</td><td>1.980ms</td></tr><tr><td>4</td><td>23.50 A</td></tr><tr><td>5</td><td>Δ1.950ms</td></tr><tr><td>6</td><td>Δ2.000 A</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                       |                      |                                                      |                                                                              |                                                                                                                          | Measurement | Value      | 1          | 30.00µs    | 2  | 25.50 A | 3  | 1.980ms | 4  | 23.50 A | 5  | Δ1.950ms | 6  | Δ2.000 A |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Value                |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 30.00µs              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 25.50 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.980ms              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 23.50 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ1.950ms             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ2.000 A             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| INPUT=230VAC/50HZ @ FULL LOAD<br>CH2 : AC Input Voltage CH4 : Input current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
|  <table><thead><tr><th>Measurement</th><th>Value</th></tr></thead><tbody><tr><td>1</td><td>15.00µs</td></tr><tr><td>2</td><td>13.40 A</td></tr><tr><td>3</td><td>1.790ms</td></tr><tr><td>4</td><td>13.80 A</td></tr><tr><td>5</td><td>Δ1.775ms</td></tr><tr><td>6</td><td>Δ400.0mA</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                      |                      |                                                      |                                                                              |                                                                                                                          | Measurement | Value      | 1          | 15.00µs    | 2  | 13.40 A | 3  | 1.790ms | 4  | 13.80 A | 5  | Δ1.775ms | 6  | Δ400.0mA |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Value                |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15.00µs              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 13.40 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.790ms              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 13.80 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ1.775ms             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ400.0mA             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| INPUT=115VAC/50HZ @ FULL LOAD<br>CH2 : AC Input Voltage CH4 : Input current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
|  <table><thead><tr><th>Measurement</th><th>Value</th></tr></thead><tbody><tr><td>1</td><td>5.000µs</td></tr><tr><td>2</td><td>6.700 A</td></tr><tr><td>3</td><td>2.330ms</td></tr><tr><td>4</td><td>6.100 A</td></tr><tr><td>5</td><td>Δ2.325ms</td></tr><tr><td>6</td><td>Δ600.0mA</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                       |                      |                                                      |                                                                              |                                                                                                                          | Measurement | Value      | 1          | 5.000µs    | 2  | 6.700 A | 3  | 2.330ms | 4  | 6.100 A | 5  | Δ2.325ms | 6  | Δ600.0mA |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Value                |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5.000µs              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.700 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.330ms              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.100 A              |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ2.325ms             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Δ600.0mA             |                                                      |                                                                              |                                                                                                                          |             |            |            |            |    |         |    |         |    |         |    |          |    |          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |

## PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                          | TEST CONDITION                                                        | RESULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----|-----------------------------|----------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | OVER LOAD PROTECTION        | 105 % ~ 200 %                          | I/P: 305VAC<br>I/P: 230VAC<br>I/P: 85VAC<br>O/P: TESTING<br>Ta: 25°C  | 112%/ 305VAC<br>112%/ 230VAC<br>112%/85VAC<br>Protection type :<br><b>Peak Load Mode:</b><br>From 105% to 200% of rated output power, unit will shut down after 5 seconds of continuous operation. AC repower on to recover.<br>At >200% of rated output power, constant current limiting is activated. Unit will shut down after 5 seconds of continuous operation. AC repower on to recover.<br><br><b>Current Limiting Mode:</b><br>Constant current limiting, recovers automatically after abnormal condition is removed. |
| 2  | OVER VOLTAGE PROTECTION     | 56V~63V                                | I/P: 305VAC<br>I/P: 230VAC<br>I/P: 85VAC<br>O/P: MIN LOAD<br>Ta: 25°C | 58.7V/ 305VAC<br>58.7V/ 230VAC<br>58.7V/ 85VAC<br>Protection type :<br>Shut down and latch off output voltage, re-power on to recover                                                                                                                                                                                                                                                                                                                                                                                         |
| 3  | OVER TEMPERATURE PROTECTION | NO DAMAGE                              | I/P: 305VAC<br>I/P: 85VAC<br>O/P: FULL LOAD                           | O.T.P. Active<br>Protection type :<br>Shut down output voltage, recovers automatically after temperature goes down                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P: 305VAC<br>I/P: 85VAC<br>O/P: FULL LOAD<br>Ta: 25°C               | NO DAMAGE<br>Protection type :<br><b>Peak Load Mode:</b><br>Constant current limiting, unit will shut down after 5 Sec, AC repower on to recover.<br><br><b>Current Limiting Mode:</b><br>Constant current limiting, recovers automatically after abnormal condition is removed.                                                                                                                                                                                                                                              |



## CONTROL FUNCTION TEST

| NO | TEST ITEM  | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TEST CONDITION | RESULT |
|----|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------|
| 1  | PEAK POWER | <p>■ Function Manual</p> <p><b>1. Peak Power</b></p> $P_{av} = \frac{P_{pk} \times t + P_{npk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5 \text{ sec}$  <p> <math>P_{av}</math>: Average output power (W)<br/> <math>P_{pk}</math>: Peak output power (W)<br/> <math>P_{npk}</math>: Non-peak output power (W)<br/> <math>P_{rated}</math>: Rated output power (W)<br/> <math>t</math>: Peak power width(sec)<br/> <math>T</math>: Period(sec) </p>  <p>For example (24V model)</p> <p> <math>V_{in}=220Vac</math>, <math>Duty\_max=5\%</math><br/> <math>P_{av}=P_{rated}=1000W</math><br/> <math>P_{pk}=2000W</math><br/> <math>t \leq 5sec</math><br/> <math>T \geq \frac{5sec}{5\%} = 100sec</math><br/> <math>P_{npk} \leq \frac{TP_{av}-tP_{pk}}{T-t} = 947.4W</math> </p> <p>Note: When the output voltage is adjusted to the upper limit, the peak power is 150% of rated power</p> <p> I/P: 100/200 VAC<br/> O/P: PEAK LOAD<br/> Ta: 25°C<br/> TEST RESULT : PASS </p> |                |        |

2

OUTPUT VOLTAGE PROGRAMMABLE(PV)

2

Pin5 PV

16

Pin11 GND

External Voltage (Vdc)

CN1

ON

OFF

1

2

3

4

ON

OFF

1

2

3

4

+Vo

-Vo

DIP switch

126.7 (15V)

114.6 (48V)

120 (other)

OUTPUT VOLTAGE(%)

Non-Linear

1

0

4.7

4.8

Vdc

EXTERNAL VOLTAGE (Vdc)

I/P: 230 VAC

O/P:FULL LOAD

Ta:25°C

TEST RESULT :

|                      |       |               |                |                 |                |
|----------------------|-------|---------------|----------------|-----------------|----------------|
| External voltage(DC) | <0.4V | 1V            | 2.596V         | 4.7V            | 4.8V           |
| SPEC(%)              | 0%    | 0%~6%         | 50%±5%         | 114.6%±5%       | 114.6%±5%      |
| Vout(%)              | 0%    | 0.461V(0.96%) | 23.65V(49.27%) | 54.16V(112.84%) | 55.5V(115.63%) |

3

OUTPUT CURRENT PROGRAMMABLE (PC)

2

Pin6 PC

16

Pin11 GND

External Voltage (Vdc)

CN1

ON

OFF

1

2

3

4

ON

OFF

1

2

3

4

+Vo

-Vo

DIP switch

100

1

0

OUTPUT CURRENT(%)

Non-Linear

4.7

4.8

Vdc

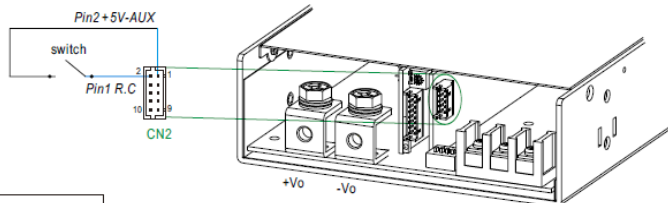
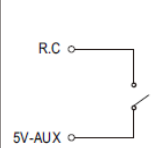
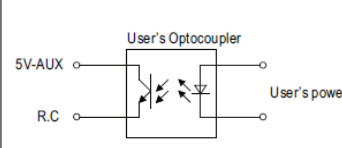
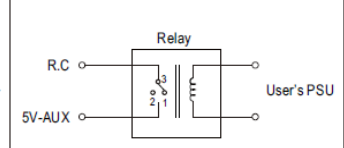
EXTERNAL VOLTAGE (Vdc)

I/P: 230 VAC

O/P:TESTING

Ta:25°C

|                      |       |       |        |         |         |
|----------------------|-------|-------|--------|---------|---------|
| External voltage(DC) | <0.4V | 1V    | 2.831V | 4.7V    | 4.8V    |
| SPEC(%)              | 0%    | 0%~6% | 50%±5% | 100%±5% | 100%±5% |
| Iout(%)              | 0%    | 3%    | 49.79% | 99.52%  | 101.19% |

|                                     |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
|-------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------|---------------|---------------------------------------|----------|--------------|------------|-------------|-------------------------------------|---------------------|-----------|-------------|----------|-----------------|
| 4                                   | REMOTE CONTROL                        | <div>4.Remote Control</div> <div>※ The power supply can be turned ON/OFF individually or along with other units by using the "Remote Control" function with external switch, potocoupler or relay.</div> <div></div> <table><tr><td>PSU Vo Status</td><td>Between +5V-AUX(Pin 2) and R.C(Pin 1)</td></tr><tr><td>Power ON</td><td>Switch Short</td></tr><tr><td>Power OFF</td><td>Switch Open</td></tr></table> <div><div><p>R.C. by external switch.</p></div><div><p>R.C. by user's optocoupler control module.</p></div><div><p>R.C. by user's Relay control module.</p></div></div> <div>I/P: 230 VAC<br/>O/P:FULL LOAD<br/>Ta:25°C<br/>Test Result :</div> <table><tr><td>Between +5V-AUX(Pin2) and R.C(Pin1)</td><td>Power Supply Status</td></tr><tr><td>SW SHORT</td><td>ON</td></tr><tr><td>SW OPEN</td><td>OFF</td></tr></table> |                                          |        | PSU Vo Status | Between +5V-AUX(Pin 2) and R.C(Pin 1) | Power ON | Switch Short | Power OFF  | Switch Open | Between +5V-AUX(Pin2) and R.C(Pin1) | Power Supply Status | SW SHORT  | ON          | SW OPEN  | OFF             |
| PSU Vo Status                       | Between +5V-AUX(Pin 2) and R.C(Pin 1) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| Power ON                            | Switch Short                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| Power OFF                           | Switch Open                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| Between +5V-AUX(Pin2) and R.C(Pin1) | Power Supply Status                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| SW SHORT                            | ON                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| SW OPEN                             | OFF                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| 5                                   | REMOTE SENSE                          | S+ / S->0.5V<br>Compensate voltage drop on the load wiring up to 0.5V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C | > 0.5V |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| 6                                   | AUXILIARY POWER                       | <div>1.Auxiliary voltage output, 10.2~13.8V, referenced to GND-AUX (pin2).<br/>The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF".</div> <div>2.Auxiliary voltage output, 4.25~5.75V, referenced to GND-AUX (pin2).<br/>The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF"</div> <div>I/P: 230 VAC<br/>O/P:FULL LOAD<br/>Ta:25°C<br/>Test Result :</div> <table><tr><td>AUX</td><td>TOLERANCE</td><td>RIPPLE</td><td>TEST RESULT</td></tr><tr><td>12V / 0.8A</td><td>10.2~13.8 V</td><td>150mVp-p</td><td>11.92V/ 113mVp-p</td></tr><tr><td>5V / 0.2A</td><td>4.25~5.75 V</td><td>450mVp-p</td><td>4.83V/114 mVp-p</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                       |                                          |        | AUX           | TOLERANCE                             | RIPPLE   | TEST RESULT  | 12V / 0.8A | 10.2~13.8 V | 150mVp-p                            | 11.92V/ 113mVp-p    | 5V / 0.2A | 4.25~5.75 V | 450mVp-p | 4.83V/114 mVp-p |
| AUX                                 | TOLERANCE                             | RIPPLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | TEST RESULT                              |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| 12V / 0.8A                          | 10.2~13.8 V                           | 150mVp-p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 11.92V/ 113mVp-p                         |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| 5V / 0.2A                           | 4.25~5.75 V                           | 450mVp-p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.83V/114 mVp-p                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |
| 7                                   | DC OK SIGNAL                          | <div>I/P:230VAC<br/>O/P: FULL LOAD<br/>Ta:25°C<br/>TEST: OK</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                          |        |               |                                       |          |              |            |             |                                     |                     |           |             |          |                 |

|                                                                                                                                                             |                       |                           |  |                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8                                                                                                                                                           | LED Status indicators | ※ LED Status Indicators   |  |                                                                                                                                                                                                 |
|                                                                                                                                                             |                       | Description               |  | Output of alarm                                                                                                                                                                                 |
|                                                                                                                                                             |                       | Normal operation          |  | Green : Steadily lit                                                                                         |
|                                                                                                                                                             |                       | Remote off                |  | Red : Steadily lit                                                                                           |
|                                                                                                                                                             |                       | Internal over-temperature |  | Orange : 1 Blink/Pause    |
|                                                                                                                                                             |                       | Overload/Short            |  | Red : 1 Blink/Pause       |
|                                                                                                                                                             |                       | Over voltage              |  | Red : 2 Blink/Pause       |
|                                                                                                                                                             |                       | Over temperature          |  | Red : 3 Blink/Pause       |
|                                                                                                                                                             |                       | Fan fail                  |  | Red : 4 Blink/Pause       |
|                                                                                                                                                             |                       | AC under voltage          |  | Red : 5 Blink/Pause       |
|                                                                                                                                                             |                       | Others (Note)             |  | Red : 6 Blink/Pause   |
| Note: 1. Others include hardware fault etc.<br>2. In PC mode, both OLP and SCP operate in constant current limiting, with the indicator steadily lit green. |                       |                           |  |                                                                                                                                                                                                 |
| I/P:230VAC<br>O/P:FULL LOAD<br>Ta:25°C<br>TEST :PASS                                                                                                        |                       |                           |  |                                                                                                                                                                                                 |

|   |                  |                                                                                                                        |                                             |                                        |
|---|------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------|
| 9 | FAN NOISE (Typ.) | 10% load @18 dB<br>70% load @24 dB<br><br>Built-in intelligent fan speed control detect by PSU' S internal temperature | I/P : 230 VAC<br>O/P : TESTING<br>Ta : 25°C | 10% load: 16.39dB<br>70% load: 23.33dB |
|---|------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------|

## COMPONENT STRESS TEST

| NO | TEST ITEM                                                 | SPECIFICATION           | TEST CONDITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RESULT                                                                                                                                                                                                                 |
|----|-----------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | PWM Transistor<br>( D to S) or (C to E)<br>Peak Voltage   | Q53<br>Rated:650V/33.7A | AC ON/OFF<br>I/P:High-Line +3V =308V<br>VDS:<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>(8)0%~150%LOAD<br>(9)0%LOAD~SHORT<br><br>I/P:Low-Line -3V = 82V<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25°C | VDS:<br>(1) 456V<br>(2) 442V<br>(3) 504V<br><br>(4) 500V<br>(5) 504V<br>(6) 512V<br>(7) 516V<br>(8) 43.2V<br>(9) 51.3V<br><br>VDS:<br>(1) 540V<br>(2) 520V<br>(3) 516V<br>(4) 516V<br>(5) 512V<br>(6) 504V<br>(7) 508V |
| 2  | P.F.C Transistor<br>( D to S) or (C to E)<br>Peak Voltage | Q1<br>Rated: 650V/53A   | I/P:High-Line +3V =308V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.                                                                                                                                                                                                                                                                                                                                                                                    | VDS:<br>(1) 466V<br>(2) 433V<br>(3) 462V<br><br>(4) 466V<br>(5) 450V<br>(6) 441V<br>(7) 433V                                                                                                                           |

|   |                    |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                               |
|---|--------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|   |                    |                                                      | I/P:Low-Line -3V =82V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25°C                                                                    | VDS:<br>(1) 582V<br>(2) 614V<br>(3) 614V<br>(4) 606V<br>(5) 622V<br>(6) 534V<br>(7) 458V                      |
| 3 | P.F.C DIODE        | D4 Rated: 20A/650V                                   | I/P:High-Line +3V =308 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><br>I/P:Low-Line -3V = 82V<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 | (1) 483V<br>(2) 483V<br>(3) 504V<br>(4) 508V<br><br>(1) 524V<br>(2) 495V<br>(3) 532V<br>(4) 520V              |
| 4 | Diode Peak Voltage | Q100 Rated<br>60A/250V<br><br>Q103 Rated<br>60A/250V | AC ON/OFF<br>I/P:High-Line +3V =308 V<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>(8).NO LOAD<br>Ta:25°C                                                  | Q101:<br>VDS:<br>(1) 180V<br>(2) 169V<br>(3) 189V<br>(4) 199V<br>(5) 169V<br>(6) 169V<br>(7) 171V<br>(8) 183V |

|   |                         |                                                                                                         |                                                                                                                                                              |                                                                                                                                                                                                                               |
|---|-------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                         |                                                                                                         |                                                                                                                                                              | Q104:<br>VDS:<br>(1) 185V<br>(2) 163V<br>(3) 181V<br>(4) 177V<br>(5) 183V<br>(6) 173V<br>(7) 157V<br>(8) 185V                                                                                                                 |
| 5 | Input Capacitor Voltage | C5 Rated:<br>470μ/450V<br>Surge voltage: 495V                                                           | I/P:High-Line +3V =308V<br>O/P: (1)Full Load input on/off<br>(2) Min load input on /Off<br>(3)Full Load /Min load Change<br>(4)Full load continue<br>Ta:25°C | (1)454V<br>(2)446V<br>(3)458V<br>(4) 446V                                                                                                                                                                                     |
| 6 | Control IC Voltage Test | PWM IC U500<br>Rated: 8V~30V<br><br>PFC IC U1<br>Rated: 11.9V~25V<br><br>O/P IC U100<br>Rated: 4.2V~30V | AC ON/OFF<br>I/P:High-Line +3V =308 V<br>O/P(1)FULL LOAD<br>(2) Output Short<br>(3)O.L.P<br>(4)O.V.P.<br>(5)NO LOAD VRmin(LOW LINE)<br>Ta:25°C               | U500<br>(1) 17V<br>(2) 17.2V<br>(3) 17V<br>(4) 17.2V<br>(5) 17.2V<br><br>U1:<br>(1) 17.8V<br>(2) 18V<br>(3) 17.8V<br>(4) 17.6V<br>(5) 17.8V<br><br>U100<br>(1) 12.26V<br>(2) 12.26V<br>(3) 12.18V<br>(4) 12.18V<br>(5) 12.18V |

## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION                                                                   | TEST CONDITION                                                                   | RESULT                                                                                |
|----|----------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P: 4 K VAC/min<br>I/P-FG : 2 K VAC/min<br>O/P-FG: 1.5 KVAC/min            | I/P-O/P: 4.4 KVAC/min<br>I/P-FG: 2.4 KVAC/min<br>O/P-FG: 1.8 KVAC/min<br>Ta:25°C | I/P - O/P: 3.254 mA<br>I / P - F G : 2.821 mA<br>O / P - F G : 1.849 m A<br>NO DAMAGE |
| 2  | ISOLATION RESISTANCE | I/P-O/P: 500 VDC>100MΩ<br>I / P - F G : 500 VDC>100MΩ<br>O/P-FG: 500 VDC >100MΩ | I/P-O/P: 500 VDC<br>I / P - F G : 500 VDC<br>O/P-FG: 500 VDC<br>Ta:25°C          | I/P - O/P: >9999 MΩ<br>I / P - F G : 9999 MΩ<br>O / P - F G : 9999 MΩ<br>NO DAMAGE    |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                                          | 40A / 2min<br>Ta:25°C                                                            | 14mΩ                                                                                  |

### E.M.C TEST

| NO | TEST ITEM                                                                                                                         | SPECIFICATION                             | TEST CONDITION                                           | RESULT                        |
|----|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------|-------------------------------|
| 1  | HARMONIC                                                                                                                          | EN61000-3-2<br>CLASS A                    | I/P:230VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C              | PASS                          |
| 2  | CONDUCTION                                                                                                                        | EN55032<br>EN55014-1<br>EN55011           | I/P : 230 VAC (50HZ)<br>O/P : FULL/50% LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab |
| 3  | RADIATION                                                                                                                         | EN55032<br>EN55014-1<br>EN55011           | I/P : 230 VAC (50HZ)<br>O/P : FULL LOAD<br>Ta : 25°C     | PASS<br>Test by certified Lab |
| 4  | E.S.D                                                                                                                             | EN61000-4-2<br>AIR : 15KV / Contact : 8KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 5  | E.F.T                                                                                                                             | EN61000-4-4<br>INPUT : 2KV                | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 6  | SURGE                                                                                                                             | IEC61000-4-5<br>L-N : 2KV<br>L,N-PE : 4KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    |
| 7  | Test by certified Lab & Test Report Prepare<br>Any contradictions of the test results, please refer to the latest EMC test report |                                           |                                                          |                               |



## ■ RELIABILITY TEST

### ENVIRONMENT TEST

| NO | TEST ITEM                       | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | TEST CONDITION                                              | RESULT    |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
|----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------|----|----------|-------------------------|-------------------------|---|-----|--------|--------|---|-----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|-----|--------|--------|----|-----|--------|--------|----|-----|--------|--------|----|-----|--------|--------|----|----|--------|---------|----|----|--------|---------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|-----|--------|--------|
| 1  | TEMPERATURE RISE TEST           | <div>MODEL : NSP-1000-48</div> <div>1. ROOM AMBIENT BURN-IN : 2HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=30.2 °C</div> <div>2. HIGH AMBIENT BURN-IN : 2HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=60.7 °C</div> <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=30.2 °C</th><th>HIGH AMBIENT Ta=60.7 °C</th></tr><tr><td>1</td><td>LF2</td><td>37.1°C</td><td>67.6°C</td></tr><tr><td>2</td><td>BD1</td><td>55.4°C</td><td>85.9°C</td></tr><tr><td>3</td><td>Q1</td><td>52.6°C</td><td>83.1°C</td></tr><tr><td>4</td><td>D4</td><td>50.7°C</td><td>81.2°C</td></tr><tr><td>5</td><td>L1</td><td>44.1°C</td><td>74.6°C</td></tr><tr><td>6</td><td>C5</td><td>39.8°C</td><td>70.3°C</td></tr><tr><td>7</td><td>U1</td><td>43.5°C</td><td>74.0°C</td></tr><tr><td>8</td><td>U2</td><td>46.2°C</td><td>76.7°C</td></tr><tr><td>9</td><td>Q50</td><td>49.6°C</td><td>80.1°C</td></tr><tr><td>10</td><td>Q51</td><td>50.2°C</td><td>80.7°C</td></tr><tr><td>11</td><td>Q52</td><td>46.8°C</td><td>77.3°C</td></tr><tr><td>12</td><td>Q53</td><td>46.5°C</td><td>77.0°C</td></tr><tr><td>13</td><td>L3</td><td>71.9°C</td><td>102.4°C</td></tr><tr><td>14</td><td>T1</td><td>73.8°C</td><td>104.3°C</td></tr><tr><td>15</td><td>D100</td><td>54.5°C</td><td>85.0°C</td></tr><tr><td>16</td><td>L100</td><td>53.1°C</td><td>83.6°C</td></tr><tr><td>17</td><td>C110</td><td>41.6°C</td><td>72.1°C</td></tr><tr><td>18</td><td>U100</td><td>62.1°C</td><td>92.6°C</td></tr><tr><td>19</td><td>Q102</td><td>51.9°C</td><td>82.4°C</td></tr><tr><td>20</td><td>R118</td><td>58.9°C</td><td>89.4°C</td></tr><tr><td>21</td><td>RTH5</td><td>37.6°C</td><td>68.1°C</td></tr><tr><td>22</td><td>RTH6</td><td>49.2°C</td><td>79.7°C</td></tr><tr><td>23</td><td>RT31</td><td>44.9°C</td><td>75.4°C</td></tr><tr><td>24</td><td>RT32</td><td>43.8°C</td><td>74.3°C</td></tr><tr><td>25</td><td>C14</td><td>37.4°C</td><td>67.9°C</td></tr></table> |                                                             |           | NO | Position | ROOM AMBIENT Ta=30.2 °C | HIGH AMBIENT Ta=60.7 °C | 1 | LF2 | 37.1°C | 67.6°C | 2 | BD1 | 55.4°C | 85.9°C | 3 | Q1 | 52.6°C | 83.1°C | 4 | D4 | 50.7°C | 81.2°C | 5 | L1 | 44.1°C | 74.6°C | 6 | C5 | 39.8°C | 70.3°C | 7 | U1 | 43.5°C | 74.0°C | 8 | U2 | 46.2°C | 76.7°C | 9 | Q50 | 49.6°C | 80.1°C | 10 | Q51 | 50.2°C | 80.7°C | 11 | Q52 | 46.8°C | 77.3°C | 12 | Q53 | 46.5°C | 77.0°C | 13 | L3 | 71.9°C | 102.4°C | 14 | T1 | 73.8°C | 104.3°C | 15 | D100 | 54.5°C | 85.0°C | 16 | L100 | 53.1°C | 83.6°C | 17 | C110 | 41.6°C | 72.1°C | 18 | U100 | 62.1°C | 92.6°C | 19 | Q102 | 51.9°C | 82.4°C | 20 | R118 | 58.9°C | 89.4°C | 21 | RTH5 | 37.6°C | 68.1°C | 22 | RTH6 | 49.2°C | 79.7°C | 23 | RT31 | 44.9°C | 75.4°C | 24 | RT32 | 43.8°C | 74.3°C | 25 | C14 | 37.4°C | 67.9°C |
| NO | Position                        | ROOM AMBIENT Ta=30.2 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | HIGH AMBIENT Ta=60.7 °C                                     |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 1  | LF2                             | 37.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 67.6°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 2  | BD1                             | 55.4°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 85.9°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 3  | Q1                              | 52.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 83.1°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 4  | D4                              | 50.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 81.2°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 5  | L1                              | 44.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 74.6°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 6  | C5                              | 39.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 70.3°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 7  | U1                              | 43.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 74.0°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 8  | U2                              | 46.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 76.7°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 9  | Q50                             | 49.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 80.1°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 10 | Q51                             | 50.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 80.7°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 11 | Q52                             | 46.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 77.3°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 12 | Q53                             | 46.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 77.0°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 13 | L3                              | 71.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 102.4°C                                                     |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 14 | T1                              | 73.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 104.3°C                                                     |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 15 | D100                            | 54.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 85.0°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 16 | L100                            | 53.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 83.6°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 17 | C110                            | 41.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 72.1°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 18 | U100                            | 62.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 92.6°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 19 | Q102                            | 51.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 82.4°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 20 | R118                            | 58.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 89.4°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 21 | RTH5                            | 37.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 68.1°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 22 | RTH6                            | 49.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 79.7°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 23 | RT31                            | 44.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 75.4°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 24 | RT32                            | 43.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 74.3°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 25 | C14                             | 37.4°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 67.9°C                                                      |           |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 2  | OVER LOAD BURN-IN TEST          | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I/P : 230 VAC<br>O/P : 112%LOAD<br>Ta : 25°C                | TEST : OK |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |
| 3  | LOW TEMPERATURE<br>TURN ON TEST | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | I/P : 305VAC/90VAC<br>O/P : 60%/ 100%LOAD<br>Ta= -45/-35 °C | TEST : OK |    |          |                         |                         |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |     |        |        |    |     |        |        |    |     |        |        |    |    |        |         |    |    |        |         |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |     |        |        |

|    |                                                                   |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                               |                                                                  |
|----|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 60 °C/95 %R.H<br>NO DAMAGE                                                                                                                                                                                                 | I/P : 315 VAC<br>O/P : FULL LOAD<br>Ta= 65 °C<br>HUMIDITY= 95 %R.H                                                                                                                                                                                                                                            | TEST : OK                                                        |
| 5  | TEMPERATURE<br>COEFFICIENT                                        | ±0.03 %/°C(0~60°C)                                                                                                                                                                                                                                                    | I/P : 230 VAC<br>O/P : FULL LOAD                                                                                                                                                                                                                                                                              | ±0.003 %/°C(0~60°C)                                              |
| 6  | STORAGE TEMPERATURE<br>TEST                                       | -40~85°C                                                                                                                                                                                                                                                              | 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 : 10 CYCLE<br>5. Input/output condition : STATIC                                                                                        |                                                                  |
| 7  | THERMAL SHOCK TEST                                                | -30~60°C                                                                                                                                                                                                                                                              | 1. Thermal shock Temperature : -35°C~ +65°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 : 16 CYCLE<br>5. Input/output condition :<br>15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST<br>1cycle:230V/ FULL LOAD Burn In Test |                                                                  |
| 8  | VIBRATION TEST                                                    | 10 ~ 500Hz, 2G 10min./1cycle,<br>60min. each along X, Y, Z axes                                                                                                                                                                                                       | (1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 10min/sweep cycle<br>(4) Acceleration : 3G<br>(5) Test Time : 180min in each axis (X.Y.Z)<br>(6) Ta : 25°C                                                                                                                           |                                                                  |
| 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=60 °C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta=60 °C LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta=60 °C LIFE TIME |                                                                                                                                                                                                                                                                                                               | (1) 951714HRS<br>(2) 148506HRS<br>(3) 187577HRS<br>(4) 226499HRS |
| 10 | MTBF                                                              | Conducted by Parts Stress Analysis Prediction<br>910.8K hrs min. Telcordia SR-332 (Bellcore) ; 87.5K hrs min. MIL-HDBK-217F (25°C)                                                                                                                                    |                                                                                                                                                                                                                                                                                                               |                                                                  |
| 11 | Ongoing Reliability Test                                          | I/P : 230VAC O/P : FULL LOAD TA=50°C<br>Demonstration Mean Time Between Failure : 50,000 hours                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                               |                                                                  |

| TEST RESULT | TESTER          | REVIEW | APPROVAL |
|-------------|-----------------|--------|----------|
| PASS        | WUWQIN/ZHOUBIAO | WENF   | WUWQ     |

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