



Test Report: SHP-30K-380

30KW 3 ψ 3W High Efficiency Digital 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

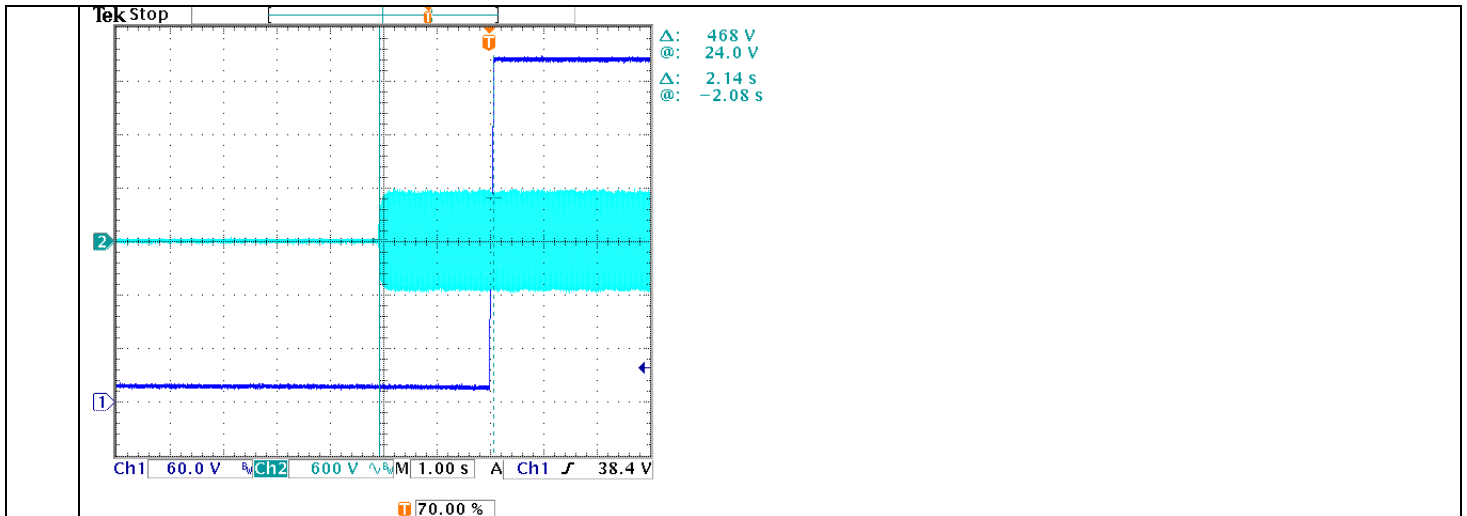
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

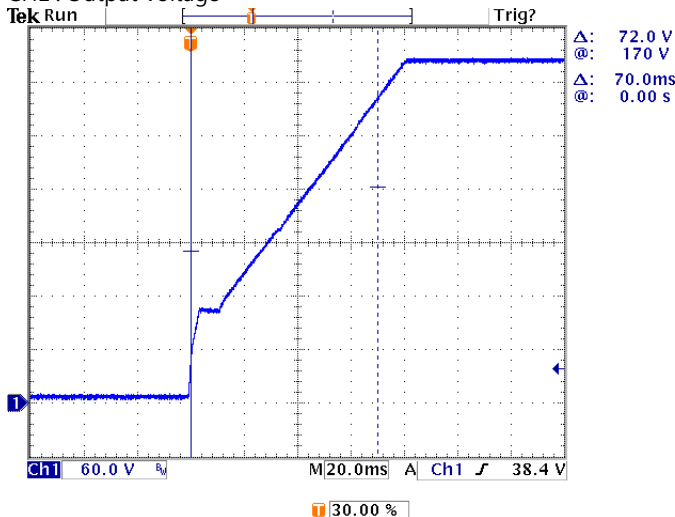
| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|--|-----------------------------|-----------------|---|--|
| 1 | OUTPUT VOLTAGE ADJUST RANGE | CH1: 260V~ 400V | I/P : 400 VAC I/P : 340 VAC O/P : MIN LOAD Ta : 25°C | 253.16V~413.39V/400VAC 253.16V~413.33V/340VAC |
| 2 | OUTPUT VOLTAGE TOLERANCE | V1: 1%~ -1% | I/P: 340VAC /530VAC O/P:FULL/ MIN. LOAD Ta:25°C | V1: 0.01 %~0.018% |
| 3 | LINE REGULATION | V1: 0.5%~ -0.5% | I/P: 340VAC~ 530VAC O/P:FULL LOAD Ta:25°C | V1: 0.002%~-0.005% |
| 4 | LOAD REGULATION | V1: 0.5%~ -0.5% | I/P: 400VAC O/P:FULL ~MIN LOAD Ta:25°C | V1: 0.01%~-0.018% |
| 5 | OVER/UNDERSHOOT TEST | \pm 10% | I/P: 400VAC O/P:FULL LOAD Ta:25°C | -2.7%~1.165% |
| 6 | RIPPLE & NOISE (Max) | V1: 2000mVp-p | I/P:400VAC O/P:FULL LOAD Ta:25°C | V1: 932.81mVp-p |
| high frequency : | | | | |
| low frequency : | | | | |
| 7 | SET UP TIME(Max) | 400VAC/3000ms | I/P : 400 VAC O/P : FULL LOAD Ta : 25°C | 2140ms |
| INPUT=400VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage | | | | |



| | | | | |
|---|-----------------|--------------|---|------|
| 8 | RISE TIME (Max) | 400VAC/100ms | I/P : 400 VAC O/P : FULL LOAD Ta : 25°C | 70ms |
|---|-----------------|--------------|---|------|

INPUT=400VAC/50HZ @ FULL LOAD

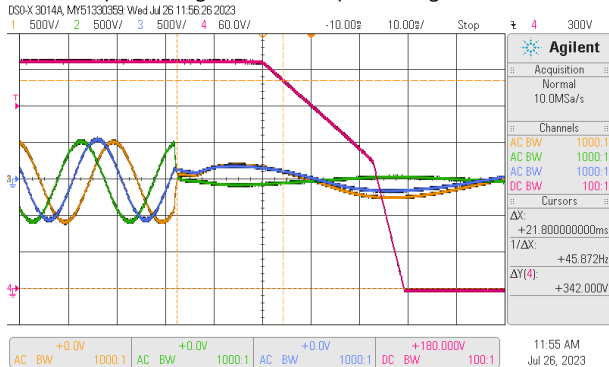
CH1 : Output Voltage



| | | | | |
|---|---------------------|----------------------------|--|--|
| 9 | HOLD UP TIME (Typ.) | 400VAC/16ms 400VAC/20ms | I/P : 400 VAC at Full Load I/P : 400 VAC at 75% Load Ta : 25°C | 21.8 ms / Full load 29.4ms / 75% Load |
|---|---------------------|----------------------------|--|--|

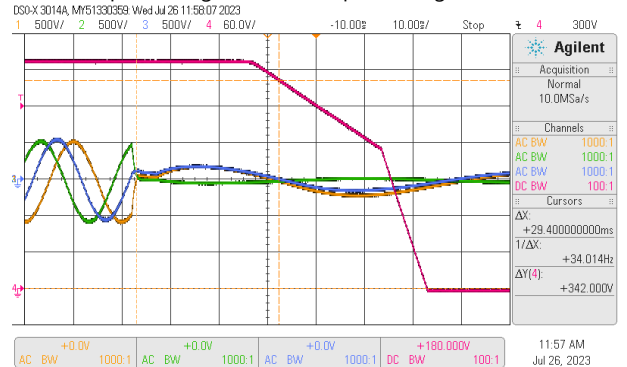
INPUT=400VAC/50HZ @ FULL LOAD

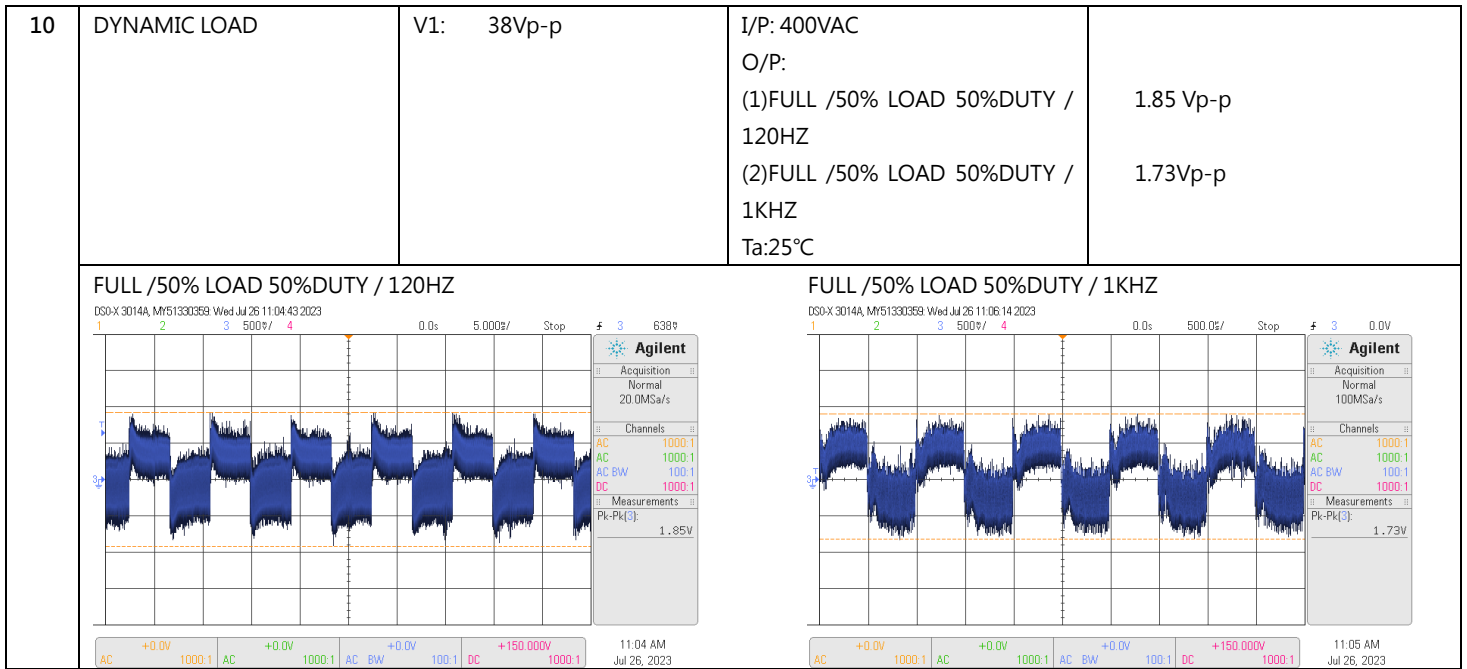
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=400VAC/50HZ @ 75% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage





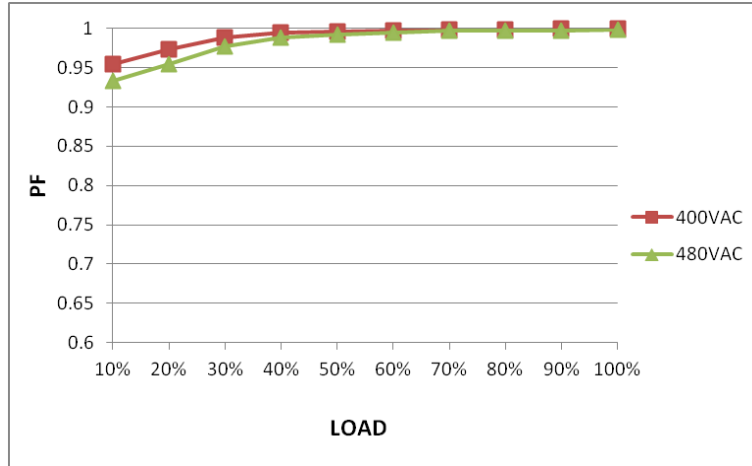
INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------|--|--|--|
| 1 | INPUT VOLTAGE RANGE | 340VAC~530VAC | (1) I/P:TESTING O/P:FULL LOAD Ta:25°C | (1) 318.96V~530V |
| | | | I/P: LOW-LINE-3V=337 V HIGH-LINE+10V=540 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE) | TEST: PASS |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P:340 VAC ~530 VAC O/P:FULL~MIN LOAD Ta:25°C | TEST: PASS |
| 3 | INPUT CURRENT (Typ.) | 400V/ 47A 480V/ 39A | I/P : 400 VAC I/P : 480 VAC O/P : FULL LOAD Ta : 25°C | I =45.57A / 400VAC I =37.73A / 480VAC |
| 4 | LEAKAGE CURRENT | <14mA peak / 530VAC, <9mA rms / 530VAC | I/P : 530 VAC O/P : Min LOAD Ta : 25°C | Δ : L1-FG : 10.9mA peak / 6.58mA rms L2-FG : 11mA peak / 6.58mA rms L3-FG : 10.8mA peak / 6.48mA rms Y : N-FG : 1.27mA peak / 0.84mA rms |
| 5 | POWER FACTOR (Typ.) | ≥ 0.98 / 400VAC ≥ 0.98 / 480VAC | I/P : 400 VAC I/P : 480 VAC | PF=0.998/400VAC PF=0.997/480VAC |



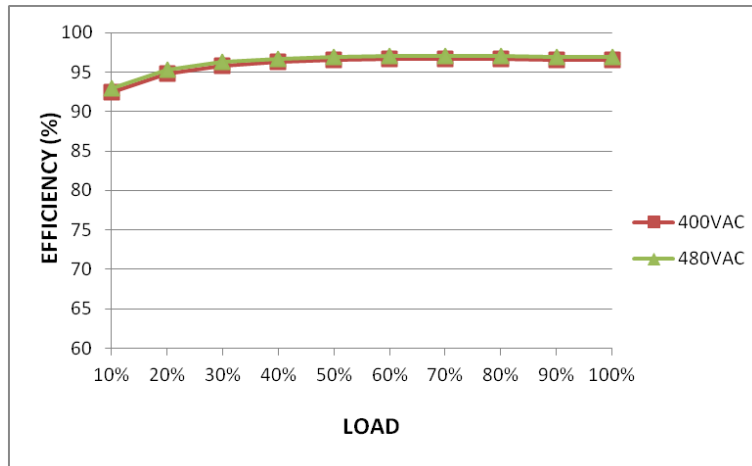
O/P : FULL LOAD
Ta : 25°C

P.F vs LOAD



| | | | | |
|---|------------------|-----|--|--------|
| 6 | EFFICIENCY(Typ.) | 97% | I/P: 480 VAC O/P: 75% LOAD Ta:25°C | 97.39% |
|---|------------------|-----|--|--------|

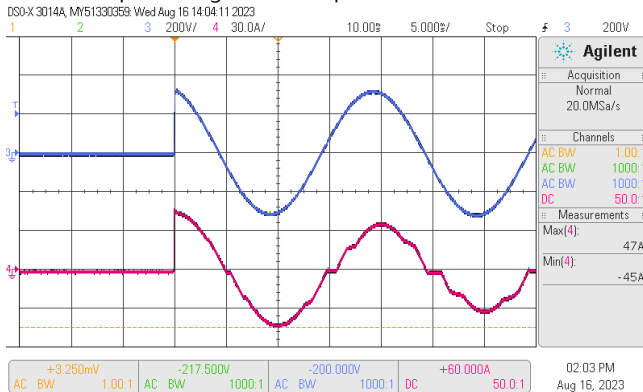
EFFICIENCY vs LOAD



| | | | | |
|---|----------------------|------------------------------------|--|--|
| 7 | INRUSH CURRENT(Typ.) | 400V/60A 480V/80A COLD START | I/P : 400 VAC I/P : 480 VAC O/P : FULL LOAD Ta : 25°C | I =47A/ 400VAC I =54A/ 480VAC T50= 3.2 ms/400V T50= 3.2 ms/480V |
|---|----------------------|------------------------------------|--|--|

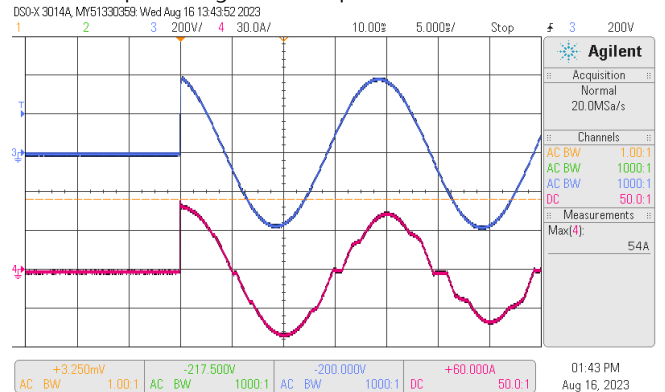
INPUT=400VAC/50HZ @ FULL LOAD

CH3 : AC Input Voltage CH4 : Input current



INPUT=480VAC/ 50HZ @ FULL LOAD

CH3 : AC Input Voltage CH4 : Input current

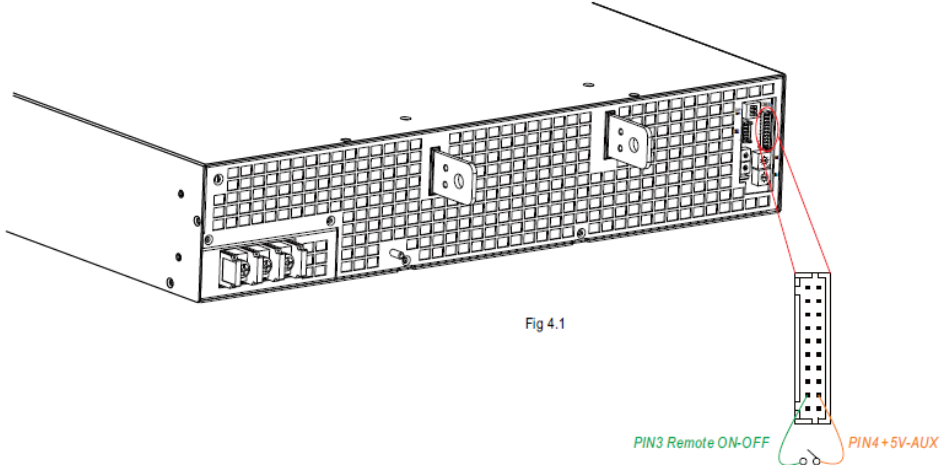


PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|---|--|---|
| 1 | OVER LOAD PROTECTION | 100 %~ 105 % Protection type : Constant current limiting, unit will shutdown after 5 sec. re-power on to recover | I/P: 530VAC I/P: 400VAC I/P: 340VAC O/P:TESTING Ta:25°C | 103.08%/ 530VAC 103.08%/ 400VAC 102.1%/340VAC PROTECTION TYPE : Constant current limiting, shut down O/P voltage after 5 sec. After O/P voltage falls, re-power on to recover |
| 2 | OVER VOLTAGE PROTECTION | 420V~480V Protection type : Shut down o/p voltage, re-power on to recover | I/P: 530VAC I/P: 400VAC I/P: 340VAC O/P:MIN LOAD Ta:25°C | 430V/ 530VAC 430V/ 400VAC 431V/ 340VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover |
| 3 | OVER TEMPERATURE PROTECTION | Protection type : Shut down o/p voltage, recovers automatically after temperature goes down | I/P: 530VAC I/P: 340VAC O/P:FULL LOAD | O.T.P. Active Protection type : Shut down o/p voltage, recovers automatically after temperature goes down |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P: 530VAC I/P: 340VAC O/P: FULL LOAD Ta:25°C | NO DAMAGE PROTECTION TYPE : Constant current limiting, unit will shutdown after 5 sec. re-power on to recover |

CONTROL FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | | | | | | | | |
|------------|-----------------------|--|---|--------|-----|-----------|--------|-------------|------------|-------------|----------|---|
| 1 | AUXILIARY POWER (AUX) | +12V-AUX(pin 15 & 16) 1.Auxiliary voltage output, 11.4~12.6V, referenced to GND-AUX (pin 17 & 18). The maximum load current is 1.5A. This output is not controlled by "Remote ON-OFF." I/P : 400 VAC O/P: FULL LOAD Ta:25°C Test Result : PASS | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>AUX</th> <th>TOLERANCE</th> <th>RIPPLE</th> <th>TEST RESULT</th> </tr> </thead> <tbody> <tr> <td>12V / 1.5A</td> <td>11.4~12.6 V</td> <td>150mVp-p</td> <td>No Load : 12.108V Full Load : 11.424V Ripple : 84mV</td> </tr> </tbody> </table> | | | AUX | TOLERANCE | RIPPLE | TEST RESULT | 12V / 1.5A | 11.4~12.6 V | 150mVp-p | No Load : 12.108V Full Load : 11.424V Ripple : 84mV |
| AUX | TOLERANCE | RIPPLE | TEST RESULT | | | | | | | | | |
| 12V / 1.5A | 11.4~12.6 V | 150mVp-p | No Load : 12.108V Full Load : 11.424V Ripple : 84mV | | | | | | | | | |

| 2 | REMOTE ON/OFF CONTROL | <p>※ The power supply can be turned ON-OFF by using the "Remote ON-OFF" function.</p> <table border="1" data-bbox="523 293 1225 398"> <thead> <tr> <th>Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2)</th> <th>Output Status</th> </tr> </thead> <tbody> <tr> <td>Switch close (Short)</td> <td>power supply ON</td> </tr> <tr> <td>Switch open (Open)</td> <td>power supply OFF</td> </tr> </tbody> </table> <p style="text-align: center;">Table 4.1</p> <div style="text-align: center;">  <p>Fig 4.1</p> </div> <p>I/P : 400 VAC O/P : FULL LOAD Ta : 25°C Test Result : PASS</p> <table border="1" data-bbox="507 1160 1230 1301"> <thead> <tr> <th>Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2)</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </tbody> </table> | Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2) | Output Status | Switch close (Short) | power supply ON | Switch open (Open) | power supply OFF | Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2) | Power Supply Status | SW SHORT | ON | SW OPEN | OFF |
|--|-----------------------|---|--|---------------|----------------------|-----------------|--------------------|------------------|--|---------------------|----------|----|---------|-----|
| Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2) | Output Status | | | | | | | | | | | | | |
| Switch close (Short) | power supply ON | | | | | | | | | | | | | |
| Switch open (Open) | power supply OFF | | | | | | | | | | | | | |
| Between Remote ON-OFF(CN86 pin1) and 5V-AUX(CN86 pin2) | Power Supply Status | | | | | | | | | | | | | |
| SW SHORT | ON | | | | | | | | | | | | | |
| SW OPEN | OFF | | | | | | | | | | | | | |

3 ALARM SIGNAL

※ There are 4 alarm signals, DC-OK, T-ALARM, Fan Fail and AC-OK, in TTL signal form, on CN86. These signals are isolated from output.

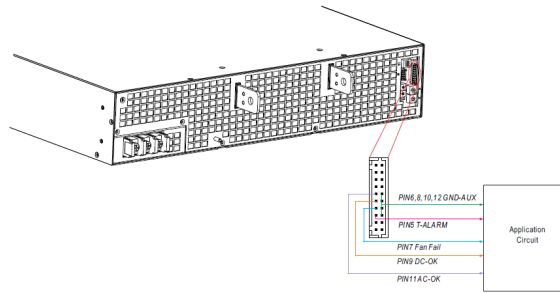


Fig 5.1

| DC-OK & T-ALARM & Fan Fail Signal | Power Supply Status |
|-----------------------------------|---------------------|
| "High" > 3.5~5.5V | OFF |
| "Low" < -0.5~-0.5V | ON |

| AC-OK Signal | Power Supply Status |
|--------------------|---------------------|
| "High" > 3.5~5.5V | ON |
| "Low" < -0.5~-0.5V | OFF |

1. DC OK SIGNAL

High (3.5 ~ 5.5V) : When the $V_{out} \leq 80\% \pm 6\%$.

Low (-0.5 ~ 0.5V) : When $V_{out} \geq 80\% \pm 6\%$.

The maximum sourcing current is 10mA and only for output.

I/P: 400 VAC

O/P: FULL LOAD

Ta: 25°C

Test Result : PASS

| Spec. | Transition point | Spec. | DC OK SIGNAL |
|-------------------------------|------------------|-------------------|--------------|
| $V_{out} \leq 74\% \sim 86\%$ | 77.82% | High (3.5 ~ 5.5V) | 3.82V |
| $V_{out} \geq 74\% \sim 86\%$ | 81.3% | Low (-0.5 ~ 0.5V) | 0.00V |

2. T-ALARM

High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm.

Low (-0.5 ~ 0.5V) : When the internal temperature is normal.

The maximum sourcing current is 10mA and only for output.(Note)

Note: Isolated signal, referenced to (GND-AUX).

I/P: 400 VAC

O/P: FULL LOAD, T-Alarm/10mA Load

Ta: 25°C

Test Result :

| PSU STATUS | T-ALARM SPEC | T-ALARM TEST |
|------------|--------------|--------------|
| NORMAL | -0.5 ~ 0.5V | 0.0011V |
| OTP | 3.5~5.5V | 3.84V |

3. AC OK

High (3.5 ~ 5.5V): When AC input $\geq 335 \pm 1.5\% V_{ac}$, PSU works normally.

Low (-0.5 ~ 0.5V): When AC input $\leq 320 \pm 1.5\% V_{ac}$, PSU shut down.

The maximum sourcing current is 10mA and only for output.

I/P : 400 VAC

O/P: FULL LOAD, AC-OK/10mA Load

Ta : 25°C

Test Result : Pass



| AC | V _{in} | AC OK SIGNAL |
|-------------------------|-----------------|--------------|
| $AC \geq 335 \pm 1.5\%$ | 335.4 | 3.791V |
| $AC \leq 320 \pm 1.5\%$ | 319.9 | 0V |

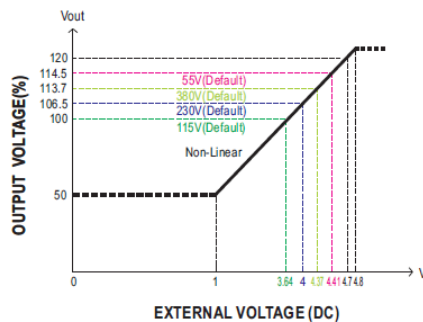
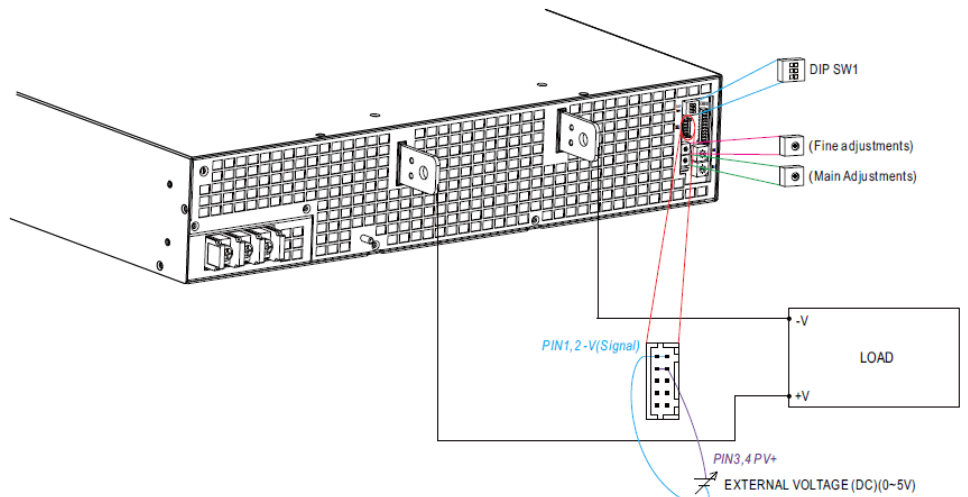
4. Fan Fail
 High(3.5~5.5V):When the fan fail.
 Low(-0.5~0.5V):When the fan works normally.
 The maximum sourcing current is 10mA and only for output.

I/P : 400 VAC
 O/P : FULL LOAD, Fan Fail/10mA Load
 Ta : 25°C
 Test Result : Pass

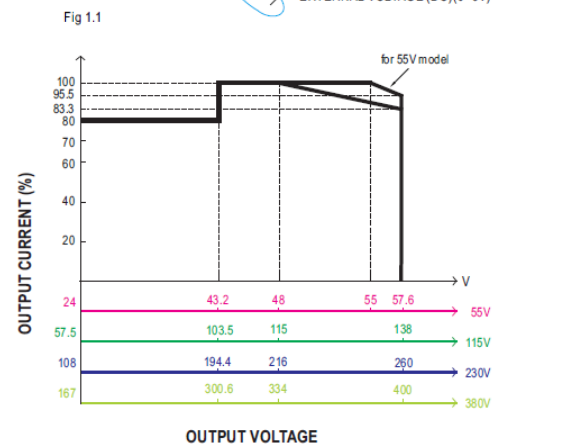
| FAN | FAN FAIL SIGNAL |
|-----------|-----------------|
| Fan lock | 3.82V |
| Fan works | 0.0V |

4 OUTPUT VOLTAGE PROGRAMMABLE(PV)

- (1)Default by potentiometer (SVR)
 (a)Have the DIP switch position-3 set as 
 (b)Output voltage can be trimmed by SVR.
- (2)By Output Voltage Programming
 (a)Have the DIP switch position-3 set as 
 (b)The output voltage can be trimmed to 50~120% by applying EXTERNAL VOLTAGE between PV+ and PV- on CN53.



© The 100% output voltage is 48/115/216/334V.





© The rated current should change with the Output Voltage Programming accordingly.

I/P : 400 VAC
 O/P : FULL LOAD
 Ta : 25°C
 TEST RESULT : pass

| | | | | |
|--|--|----------------------|---------------|---------------|
| | | External voltage(DC) | 1V | 5V |
| | | SPEC | 167V \pm 5% | 400V \pm 5% |
| | | Vout | 164.28V | 405.87V |

5 OUTPUT CURRENT PROGRAMMABLE (PC)

(1)Default Overload Protection(OLP) value
 (a)Have the DIP switch position-2 set as 
 (b)Output current is set default value.

(2)By Constant Current Level Programming
 (a)Have the DIP switch position-2 set as 
 (b)The constant current level can be trimmed to 1~100% of the rated current by applying EXTERNAL VOLTAGE between PC+ and PC- on CN53.

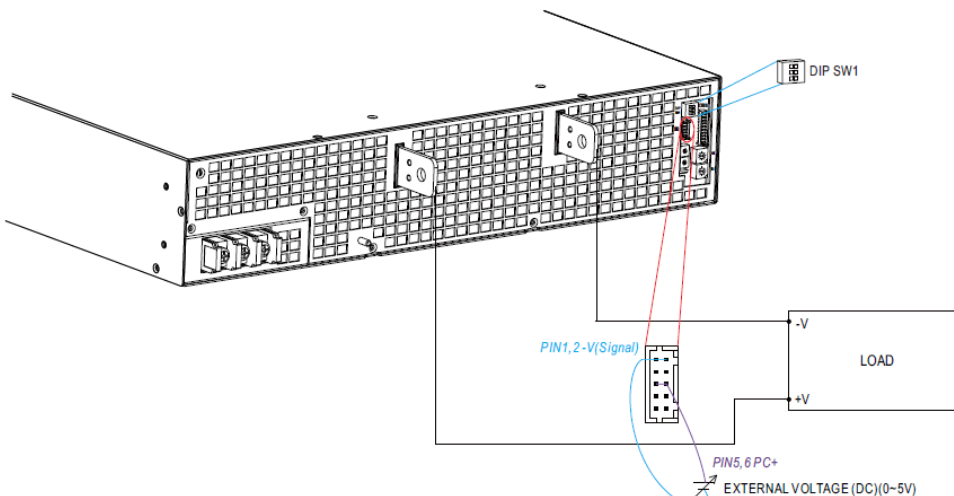


Fig 2.1

※ Under PC function at wattage < 10KW, the power supply might enter burst mode and cause output unstable, please increase the load to minimized the effect.
 ※ Auto de-rating function covered by over temperature protection, it works either in PC mode or under control by communication protocol.
 T1(Typ.): Maximum ambient temperature of full load.
 T2(Typ.): T1+5°C.

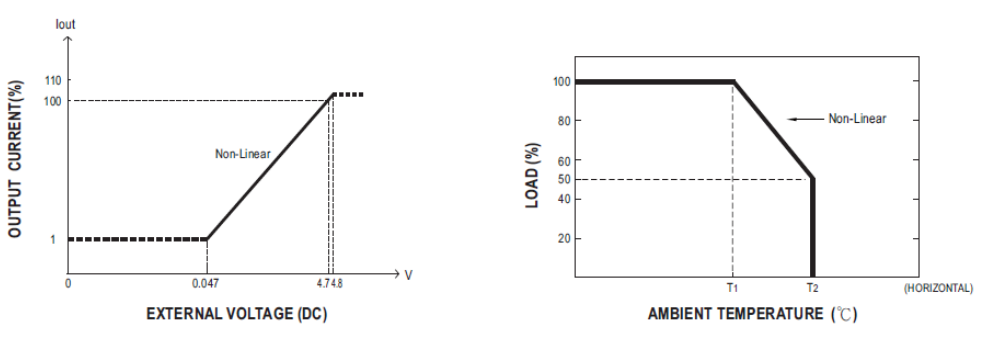


Fig 2.2

- The 100% output current is 346/261/139/90A.
- It might cause higher current ripple when the output current adjust below 20%(@<1V programming)

I/P : 400 VAC
 O/P : TESTING
 Ta : 25°C

| | | | |
|----------------------|----------------|------------------|------------------|
| External voltage(DC) | 0.047V | 1V | 5V |
| SPEC | 0.9A \pm 10% | 19.15A \pm 10% | 91.94A \pm 10% |
| TEST | 0.9A | 18.8A | 90A |



| | | | | |
|---|-----------------|--|---|--|
| 6 | CURRENT SHARING | CURRENT SHARING TOLERANCE $\pm 10\%$ | I/P : 400 VAC O/P : 380V (factory default) 95/50% LOAD Ta : 25°C | O/P : 95% PSU1 : 74.87A PSU2 : 75.17A PSU3 : 74.72A PSU4 : 75.57A O/P : 50% PSU1 : 39.98A PSU2 : 39.72A PSU3 : 39.99A PSU4 : 39.95A |
|---|-----------------|--|---|--|

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|--------------------------------|--|--|
| 1 | PWM Transistor (D to S) or (C to E) Peak Voltage | Q301&Q308 Rated: 1200V/100A | AC ON/OFF I/P:High-Line +3V =533V VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Vo=334V O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz Vo=400V O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz I/P:Low-Line -3V = 337V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ | Q308 VDS: (1) 1008V/67.5A (2) 1020V/98A (3) 1009V/62A (4) 1010V/71A (5) 1009V/72.5A (6) 994V/73.5A (1) 970V/68.5A (2) 1020V/98A (3) 993V/73.7A (1) 994V/65.5A (2) 988V/98A (3) 1001V/72.5A Q308 VDS: (1) 1017V/68.5A (2) 972V/98A (3) 1003V/72A (4) 994V/72A (5) 993V/72A Q301 VDS: (1) 985V/67.5A (2) 996V/98A (3) 986V/62A (4) 986V/71A (5) 986V/72.5A (6) 1003V/73.5A (1) 987V/68.5A (2) 956V/98A (3) 985V/73.7A (1) 893V/65.5A (2) 988V/98A (3) 986V/72.5A Q301 VDS: (1) 986V/68.5A (2) 996V/98A (3) 985V/72A (4) 986V/72A (5) 986V/72A |



| | | | | | |
|---|---|-----------------------------|--|---|---------------|
| | | | <p>Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C</p> | (6) 992V/71A | (6) 1001V/71A |
| 2 | P.F.C Transistor (D to S) or (C to E) Peak Voltage | Q93 Rated: 650V/120A | <p>I/P:High-Line +3V =533 V AC ON/OFF Vo=334V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz</p> <p>I/P:Low-Line -3V = 337V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C</p> | <p>Q93 VDS: (1) 545V/42.5A (2) 534V/56.5A (3) 533V/35.5A * (4) 538V/35.5A (5) 538V/36A (6) 498V/30.5A</p> <p>VDS: (1) 580V/63A (2) 435V/51A (3) 572V/32A (4) 572V/33A (5) 576V/32A (6) 581V/33A</p> | |
| 3 | P.F.C DIODE | D83 Rated : 15 A / 1500V | <p>I/P:High-Line +3V =533 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz</p> <p>I/P:Low-Line -3V = 337V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz</p> | <p>D83 (1) 915V (2) 883V (3) 914V (4) 891V</p> <p>(1) 938V (2) 883V (3) 922V 133406 (4) 916V 133225</p> | |



| | | | | | |
|---|-------------------------|--|---|--|--|
| | | | Ta:25°C | | |
| 4 | Diode Peak Voltage | DJ11 Rated: 15A/1200V DJ21 Rated: 15A/1200V DJ31 Rated: 15A/1200V DJ41 Rated: 15A/1200V DJ51 Rated: 15A/1200V DJ61 Rated: 15A/1200V | AC ON/OFF I/P:High-Line +3V =533 V <u>Vo=380V</u> O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)NO LOAD <u>Vo=400V</u> O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz Ta : 25°C | <u>Vo=380V</u> DJ11: (1) 947V (2) 838V (3) 933V (4) 940V (5) 942V (6) 949V (7) 878V DJ31: (1) 939V (2) 839V (3) 939V (4) 948V (5) 948V (6) 941V (7) 886V DJ51: (1) 941V (2) 839V (3) 949V (4) 957V (5) 957V (6) 932V (7) 877V <u>Vo=400V</u> DJ11: (1) 973V (2) 886V (3) 988V DJ31: (1) 990V (2) 863V (3) 990V DJ51: (1) 966V (2) 885V (3) 988V | <u>Vo=380V</u> DJ21: (1) 933V (2) 839V (3) 941V (4) 948V (5) 948V (6) 932V (7) 893V DJ41: (1) 942V (2) 845V (3) 947V (4) 947V (5) 949V (6) 941V (7) 893V DJ61: (1) 950V (2) 847V (3) 956V (4) 964V (5) 966V (6) 940V (7) 893V <u>Vo=400V</u> DJ21: (1) 950V (2) 886V (3) 972V DJ41: (1) 989V (2) 870V (3) 988V DJ61: (1) 965V (2) 886V (3) 990V |
| 5 | Input Capacitor Voltage | C480-C497 Rated: 820 μ / 450V*2=900V Surge voltage: 500V*2=1KV | I/P:High-Line +3V =533V O/P: (1)Full Load input on/off (2) Min load input on /Off | (1)891V (2)892V | |

| | | | | |
|---|------------------------------|---|---|--|
| | | | (3)Full Load /Min load Change (4)Full load continue Ta:25°C | (3)898V (4)868V |
| 6 | Control IC Voltage Test | PWM IC U982 Rated : 8.9 V~ 15.5V AUX IC U571 Rated : -0.3V~28V | AC ON/OFF I/P:High-Line +3V =533 V O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE) Ta:25°C | U982 U571 (1)13.2V (1)17.7V (2)13.4V (2)18.9V (3)12.8V (3)17.7V (4)12.5V (4)17.2V (5)12.6V (5)17.1V |
| 8 | TOP SWITCHING STAND BY POWER | Q519 Rated : 3.9A/ 800 V | AC ON/OFF I/P:High-Line +3V =533 V O/P: (1)Full Load (2)Remote On/Off I/P:Low-Line -3V =337 V O/P: (1)Full Load (2)Remote On/Off Ta:25°C | VDS : 1. 699V/1.86A 2. 711V/2.04A VDS : (1) 699 V/1.86A (2) 711V/2.04A |

■ SAFETY& E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|---|--|--|
| 1 | WITHSTAND VOLTAGE | I/P-O/P: 4.25KVAC/min I/P-FG :3KVAC/min O/P-FG:3KVAC/min | I/P-O/P: 4.67KVAC/min I/P-FG: 3.6KVAC/min O/P-FG:3.6 KVAC/min Ta:25°C | I/P-O/P: 23.7mA I/P-FG: 21.26mA O/P-FG: 25.94mA NO DAMAGE |
| 2 | ISOLATION RESISTANCE | I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω | I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C | I/P-O/P: 5.7G Ω I/P-FG: 3.7G Ω O/P-FG: 3.26G Ω NO DAMAGE |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 m Ω | 120A / 4min Ta:25°C | 6 m Ω |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---|--|------------|
| 1 | HARMONIC | EN61000-3-2 | I/P: 400 VAC/50HZ O/P:FULL LOAD Ta:25°C | PASS |
| 2 | CONDUCTED | EN55032 /EN55011 CLASS A | I/P : 400 VAC (50HZ) O/P : FULL Ta : 25°C | PASS |
| 3 | RADIATED | EN55032 /EN55011 CLASS A | I/P : 400 VAC (50HZ) O/P : FULL LOAD Ta : 25°C | PASS |
| 4 | E.S.D | EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV | I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 5 | E.F.T | EN61000-4-4 INDUSTRY INPUT : 2KV | I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 6 | SURGE | IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV | I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 7 | Test by certified Lab & Test Report Prepare 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 | MODEL : SHP-30K-115 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 400VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 400VAC O/P : FULL LOAD Ta= 50°C | | |



| NO | Position | ROOM AMBIENT Ta=25°C | HIGH AMBIENT Ta=50°C |
|----|----------|----------------------|----------------------|
| 1 | D70 | 71.1°C | 101.5°C |
| 2 | D75 | 83.2°C | 112.6°C |
| 3 | D93 | 85.7°C | 111.7°C |
| 4 | Q81 | 73.9°C | 96.6°C |
| 5 | Q103 | 84.8°C | 108.4°C |
| 6 | Q121 | 94.6°C | 119.9°C |
| 7 | RY30 | 46.7°C | 69.5°C |
| 8 | L50 | 78.1°C | 103.3°C |
| 9 | L60 | 84.0°C | 113.2°C |
| 10 | U201 | 40.9°C | 64.9°C |
| 11 | U262 | 45.6°C | 68.9°C |
| 12 | C485 | 43.0°C | 66.6°C |
| 13 | LF2 | 69.4°C | 95.9°C |
| 14 | C318 | 55.5°C | 79.9°C |
| 15 | C441 | 38.9°C | 62.6°C |
| 16 | C451 | 35.4°C | 60.1°C |
| 17 | Q303 | 53.8°C | 77.6°C |
| 18 | Q307 | 68.1°C | 91.5°C |
| 19 | T300 | 44.6°C | 69.1°C |
| 20 | T531 | 39.5°C | 63.6°C |
| 21 | T1 | 59.2°C | 86.5°C |
| 22 | T2 | 80.8°C | 100.3°C |
| 23 | T3 | 72.3°C | 96.6°C |
| 24 | RT8 | 47.2°C | 71.7°C |
| 25 | C510 | 39.5°C | 62.7°C |
| 26 | DJ31 | 49.5°C | 70.1°C |
| 27 | DJ51 | 62.4°C | 81.5°C |
| 28 | RT50 | 63.3°C | 87.7°C |
| 29 | RT51 | 56.2°C | 80.7°C |
| 30 | RT52 | 30.6°C | 54.1°C |
| 31 | C904 | 33.2°C | 55.1°C |
| 32 | C934 | 32.2°C | 56.0°C |
| 33 | T600 | 38.9°C | 63.8°C |
| 34 | Q591 | 45.8°C | 72.0°C |
| 35 | Q610 | 36.1°C | 61.2°C |
| 36 | C613 | 33.6°C | 58.6°C |
| 37 | L770 | 26.5°C | 51.2°C |
| 38 | C991 | 25.9°C | 50.0°C |
| 39 | RT71 | 25.2°C | 49.9°C |
| 40 | RT13 | 79.9°C | 104.8°C |
| 41 | L501 | 60.4°C | 81.8°C |
| 42 | T1 | 69.4°C | 95.4°C |
| 43 | T2 | 75.2°C | 98.7°C |
| 44 | T3 | 69.7°C | 95.7°C |
| 45 | L901 | 51.5°C | 76.1°C |
| 46 | RT12 | 72.6°C | 96.4°C |



| | | 47 | RTH8 | 52.7°C | 77.0°C |
|----|---|---|------|---|---|
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | | I/P : 400 VAC O/P : 101.5%LOAD Ta : 25°C | TEST : OK |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | | I/P : 530VAC/340VAC O/P : 100%/90%LOAD Ta= -35°C | TEST : OK |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H NO DAMAGE | | I/P : 540 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H | TEST : OK |
| 5 | TEMPERATURE COEFFICIENT | $\pm 0.03\%/^{\circ}\text{C}(0\sim 50^{\circ}\text{C})$ | | I/P : 400 VAC O/P : FULL LOAD | $\pm 0.0069\%/^{\circ}\text{C}(0\sim 50^{\circ}\text{C})$ |
| 6 | STORAGE TEMPERATURE TEST | -40~85°C | | 1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC | |
| 7 | THERMAL SHOCK TEST | -30~50°C | | 1. Thermal shock Temperature : -35°C~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:380V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:380V/ FULL LOAD Burn In Test | |
| 8 | VIBRATION TEST | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes | | 1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C | |
| 9 | CAPACITOR LIFE CYCLE | SUPPOSE C934 IS THE MOST CRITICAL COMPONENT (1) I/P : 400VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 400VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (3) I/P : 400VAC O/P : 75% LOAD Ta= 50°C LIFE TIME (4) I/P : 400VAC O/P : 50% LOAD Ta= 50°C LIFE TIME | | | (1) 1582636HRS (2) 303828HRS (3) 509509HRS (4) 673427HRS |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 188.1K hrs min. Telcordia SR-332 (Bellcore) ; 20.9K hrs min. MIL-HDBK-217F (25°C) | | | |
| 11 | Ongoing Reliability Test | I/P : 400VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours | | | |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|------------|------------|---------------|
| PASS | DANIEL GAO | SANFORD SU | VINCENT TSENG |

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