



# Test Report : SHP-30K-230

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30KW 3 $\psi$  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

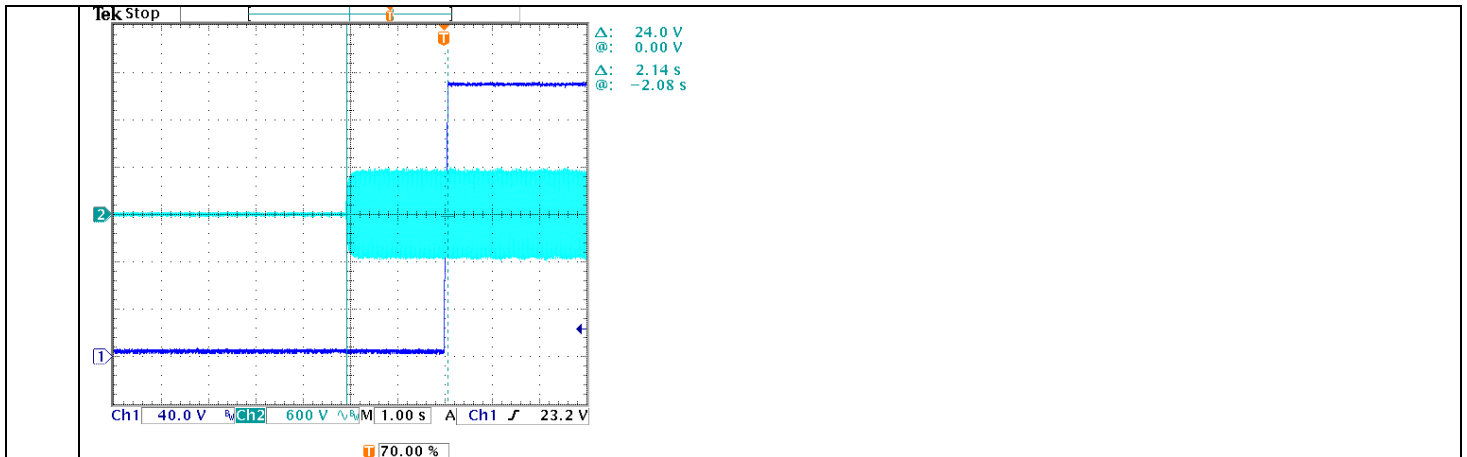
## ■ RELIABILITY TEST

ENVIRONMENT TEST

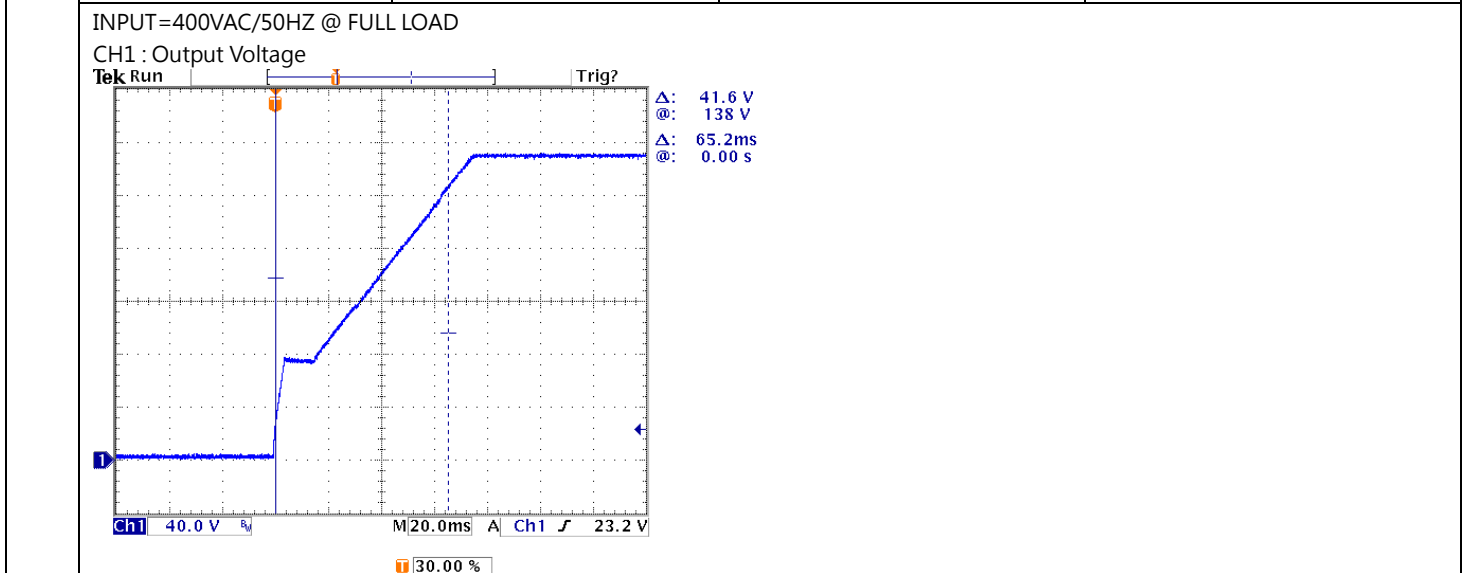
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

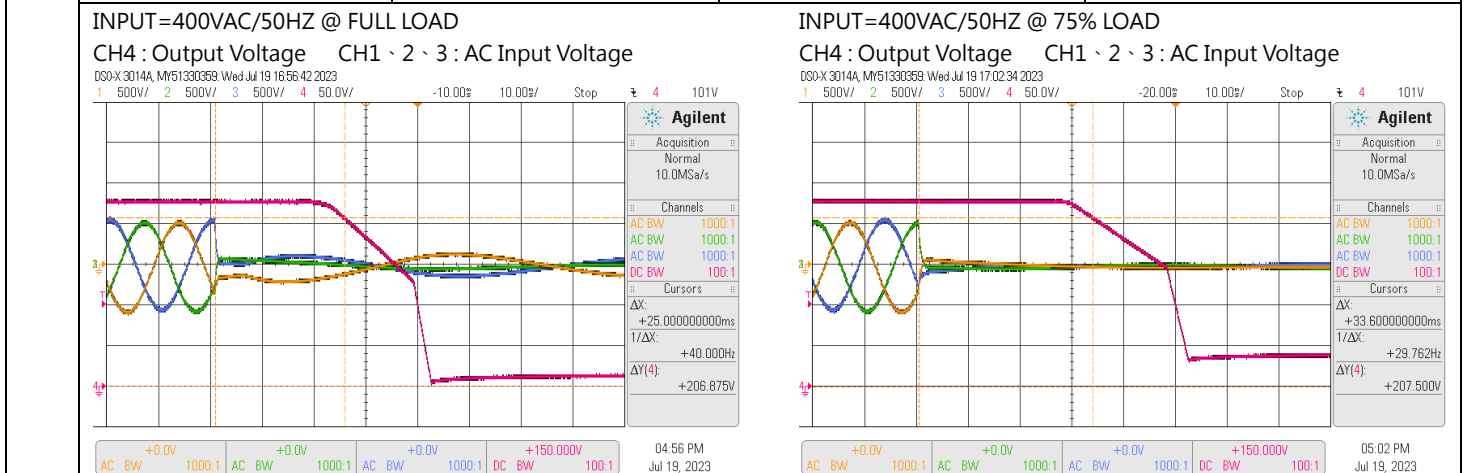
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 170V~ 260V	I/P : 400 VAC I/P : 340 VAC O/P : MIN LOAD Ta : 25°C	162.87V~266.22V/400VAC 162.87V~266.23V/340VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: 1%~ -1%	I/P: 340VAC /530VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0%~-0.27%
3	LINE REGULATION	V1: 0.5%~ -0.5%	I/P: 340VAC~ 530VAC O/P:FULL LOAD Ta:25°C	V1: 0%~0%
4	LOAD REGULATION	V1: 0.5%~ -0.5%	I/P: 400VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.12%~-0.15%
5	OVER/UNDERSHOOT TEST	< $\pm$ 10%	I/P: 400VAC O/P:FULL LOAD Ta:25°C	1.9%~4.17%
6	RIPPLE & NOISE (Max)	V1: 1000mVp-p	I/P:400VAC O/P:FULL LOAD Ta:25°C	V1: 450mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>high frequency :</p> </div> <div style="width: 45%;"> <p>low frequency :</p> </div> </div>				
7	SET UP TIME(Max)	400VAC/3000ms	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	2140 ms
INPUT=400VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage				

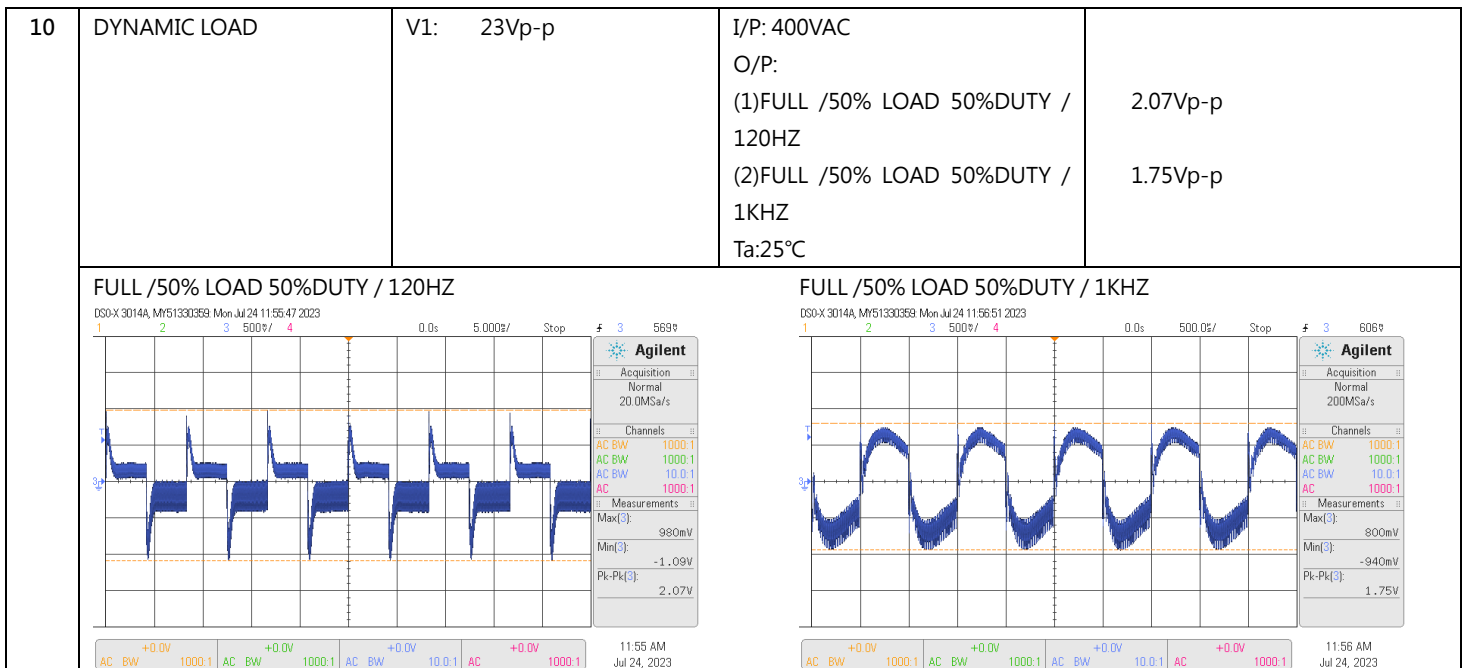


8	RISE TIME (Max)	400VAC/100ms	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	65.2ms
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9	HOLD UP TIME (Typ.)	400VAC/16ms 400VAC/ 20ms	I/P : 400 VAC at Full Load I/P : 400 VAC at 75% Load Ta : 25°C	25ms / Full load 33.6ms / 75% Load
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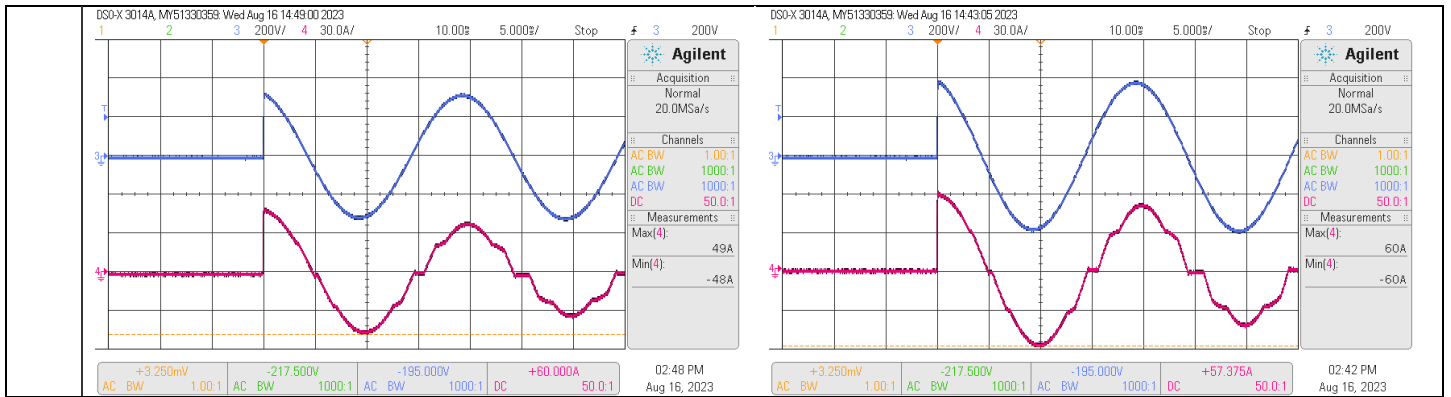


### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	340VAC~530VAC	(1) I/P:TESTING O/P:FULL LOAD  Ta:25°C  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 )	(1) 322V~530V          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 =45.3A/ 400VAC I =37.6A/ 480VAC
4	LEAKAGE CURRENT	<14mA peak / 530VAC, <9mA rms / 530VAC	I/P : 530 VAC O/P : Min LOAD Ta : 25°C	$\Delta$ : L1-FG : 10.96mA peak /6.58mA rms L2-FG : 11mA peak / 6.58mA rms L3-FG : 10.9mA peak / 6.54mA rms Y : N-FG : 1.26mA peak / 0.77mA rms



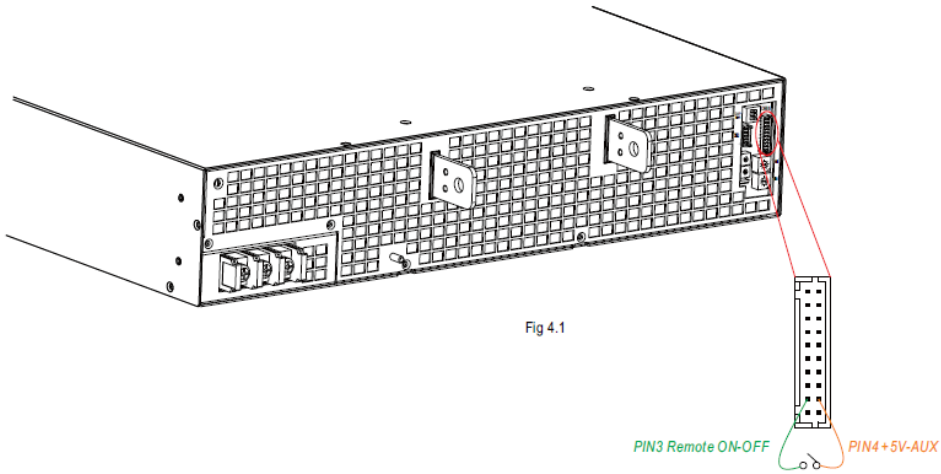
5	POWER FACTOR (Typ.)	$\geq 0.98 / 400VAC$ $\geq 0.98 / 480VAC$	I/P : 400 VAC I/P : 480 VAC O/P : FULL LOAD Ta : 25°C	PF=0.998/400VAC PF=0.997/480VAC																																	
<p>P.F vs LOAD</p> <table border="1"> <caption>Power Factor vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>400VAC PF</th> <th>480VAC PF</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.97</td><td>0.93</td></tr> <tr><td>20%</td><td>0.97</td><td>0.94</td></tr> <tr><td>30%</td><td>0.98</td><td>0.96</td></tr> <tr><td>40%</td><td>0.99</td><td>0.97</td></tr> <tr><td>50%</td><td>0.99</td><td>0.98</td></tr> <tr><td>60%</td><td>0.99</td><td>0.98</td></tr> <tr><td>70%</td><td>0.99</td><td>0.99</td></tr> <tr><td>80%</td><td>0.99</td><td>0.99</td></tr> <tr><td>90%</td><td>0.99</td><td>0.99</td></tr> <tr><td>100%</td><td>0.99</td><td>0.99</td></tr> </tbody> </table>					LOAD (%)	400VAC PF	480VAC PF	10%	0.97	0.93	20%	0.97	0.94	30%	0.98	0.96	40%	0.99	0.97	50%	0.99	0.98	60%	0.99	0.98	70%	0.99	0.99	80%	0.99	0.99	90%	0.99	0.99	100%	0.99	0.99
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6	EFFICIENCY(Typ.)	96.5%	I/P: 480 VAC O/P: 75% LOAD Ta:25°C	96.56																																	
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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 =49A/ 400VAC I =60A/ 480VAC T50= 3.1 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	102.76 % / 530VAC 102.76 % / 400VAC 102.76 % / 340VAC PROTECTION TYPE : Constant current limiting, unit will shutdown after 5 sec. re-power on to recover
2	OVER VOLTAGE PROTECTION	273V~312V Protection type : Shut down o/p voltage, re-power on to recover	I/P: 530VAC I/P: 400VAC I/P: 340VAC z O/P:MIN LOAD Ta:25°C	282.55V/ 530VAC 282.69V/ 400VAC 283.12V/ 340VAC PROTECTION TYPE : 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 : 12.115V Full Load : 11.748V Ripple : 58mV</td> </tr> </tbody> </table>	AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 1.5A	11.4~12.6 V	150mVp-p	No Load : 12.115V Full Load : 11.748V Ripple : 58mV		
AUX	TOLERANCE	RIPPLE	TEST RESULT									
12V / 1.5A	11.4~12.6 V	150mVp-p	No Load : 12.115V Full Load : 11.748V Ripple : 58mV									
2	REMOTE ON/OFF CONTROL	※ The power supply can be turned ON-OFF by using the "Remote ON-OFF" function.  <table border="1"> <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>  <p style="text-align: center;">Fig 4.1</p> <p style="text-align: right;">PIN3 Remote ON-OFF      PIN4 +5V-AUX</p>	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)	Output Status											
Switch close (Short)	power supply ON											
Switch open (Open)	power supply OFF											
		I/P : 400 VAC O/P : FULL LOAD Ta : 25°C Test Result : PASS										
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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.

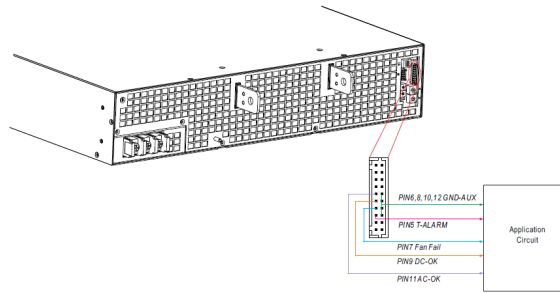


Fig 5.1

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
$V_{out} \leq 74\% \sim 86\%$	78.70%	High (3.5 ~ 5.5V)	3.77V
$V_{out} \geq 74\% \sim 86\%$	81.30%	Low (-0.5 ~ 0.5V)	-0.06V

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	-0.06V
OTP	3.5~5.5V	3.79V

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 <sub>in</sub>	AC OK SIGNAL
AC $\geq 335 \pm 1.5\%$	333.7	3.76V
AC $\leq 320 \pm 1.5\%$	318.1	-0.06V





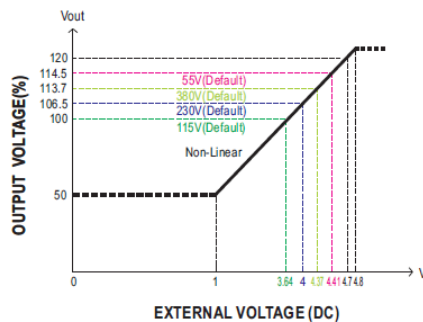
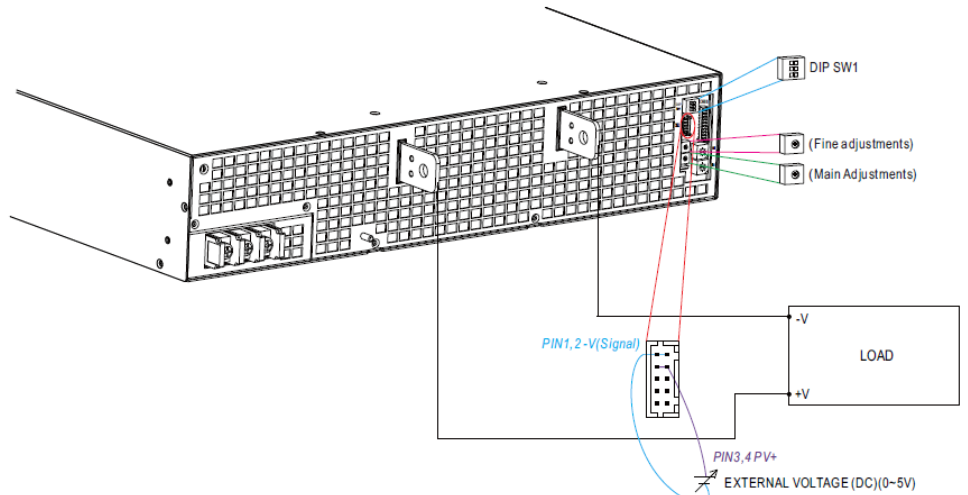
4. Fan Fail  
 High(3.5~5.5V):When the fan fail.  
 Low(-0.5~0.5V):When the fan works normally.  
 The maximum sourcing current is 10mA and only for output.

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

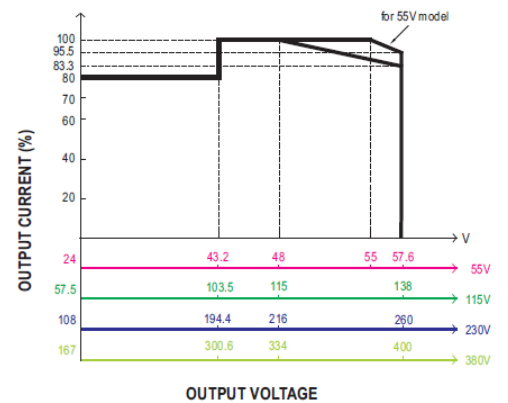
FAN	FAN FAIL SIGNAL
Fan lock	3.78V
Fan works	-0.06V

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	108V $\pm$ 5%	260V $\pm$ 5%
Vout	106.83V	262.27V

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.

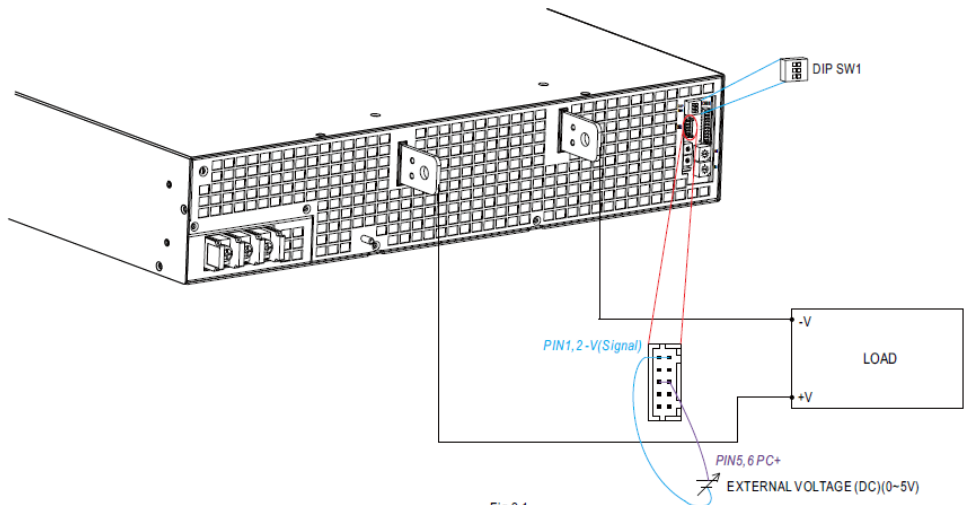


Fig 2.1

※ 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.

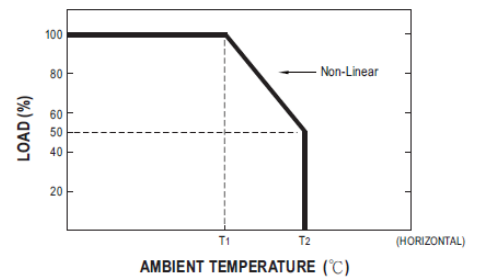
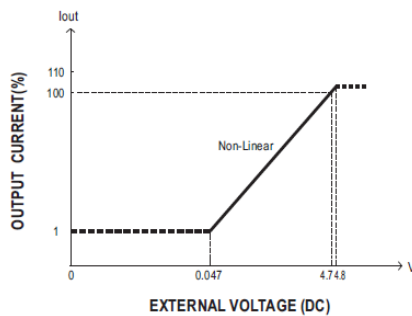


Fig 2.2

- ⊙ 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	1.39A $\pm$ 10%	29.58A $\pm$ 10%	142A $\pm$ 10%
TEST	1.31A	29.3A	141A



6	CURRENT SHARING	CURRENT SHARING TOLERANCE $\leq \pm 10\%$	I/P : 400 VAC O/P : 230V (factory default) 95/50% LOAD Ta : 25°C	O/P : 95% PSU1 : 122A PSU2 : 120 A PSU3 : 121A PSU4 : 121A O/P : 50% PSU1 : 68 A PSU2 : 67 A PSU3 : 68A PSU4 : 68A
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### 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  <u>Vo=216V</u> O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz  <u>Vo=260V</u> 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/ Min. Load 90%Duty/3KHz	Q308 VDS: <u>Vo=230V</u> (1) 996V/59A (2) 995V/98A (3) 876V/62.5A (4) 876V/55A (5) 876V/72.5A (6) 986V/60A  <u>Vo=216V</u> (1) 914V/62.5A (2) 994V/98A (3) 941V/65A  <u>Vo=260V</u> (1) 940V/67.5A (2) 967V/98A (3) 986V/62.5A  VDS: (1) 986V/62.5A (2) 1028V/98A (3) 988V/65A (4) 988V/67.5A (5) 988V/57.5A (6) 989V/60A	Q301 VDS: <u>Vo=230V</u> (1) 1012V/59A (2) 997V/98A (3) 996V/62.5A (4) 980V/55A (5) 980V/72.5A (6) 1012V/60A  <u>Vo=216V</u> (1) 980V/62.5A (2) 988V/98A (3) 988V/65A  <u>Vo=260V</u> (1) 878V/67.5A (2) 955V/98A (3) 957V/62.5A  VDS: (1) 972V/62.5A (2) 989V/98A (3) 980V/65A (4) 981V/67.5A (5) 988V/57.5A (6) 972V/60A



			(5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	
2	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q111 Rated: 650V/120A	<p>I/P:High-Line +3V =533 V AC ON/OFF Vo=216V 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>Q111 VDS: (1) 541V/48A (2) 541V/70A (3) 534V/19A (4) 534V/20.5A (5) 541V/28A (6) 549V/25.5A</p> <p>VDS: (1) 577V/54.5A (2) 457V/67A (3) 577V/46.5A (4) 580V/47A (5) 549V/47A (6) 541V/30A</p>
3	P.F.C DIODE	D93 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 Ta:25°C</p>	<p>D93 (1) 915V (2) 916V (3) 884V (4) 931V</p> <p>(1) 882V (2) 930V (3) 923V (4) 905V</p>



4	Diode Peak Voltage	<p>DJ11 Rated: 20A/650V</p> <p>DJ21 Rated: 20A/650V</p> <p>DJ31 Rated: 20A/650V</p> <p>DJ41 Rated: 20A/650V</p> <p>DJ51 Rated: 20A/650V</p> <p>DJ61 Rated: 20A/650V</p>	<p>AC ON/OFF I/P:High-Line +3V =533 V</p> <p><u>Vo=230V</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</p> <p><u>Vo=260V</u> O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz</p> <p>Ta : 25°C</p>	<table border="0"> <tr> <td><u>Vo=230V</u></td> <td><u>Vo=230V</u></td> </tr> <tr> <td>DJ11:</td> <td>DJ21:</td> </tr> <tr> <td>(1) 572V</td> <td>(1) 564V</td> </tr> <tr> <td>(2) 533V</td> <td>(2) 529V</td> </tr> <tr> <td>(3) 569V</td> <td>(3) 565V</td> </tr> <tr> <td>(4) 573V</td> <td>(4) 565V</td> </tr> <tr> <td>(5) 577V</td> <td>(5) 565V</td> </tr> <tr> <td>(6) 573V</td> <td>(6) 568V</td> </tr> <tr> <td>(7) 529V</td> <td>(7) 525V</td> </tr> <tr> <td>DJ31:</td> <td>DJ41:</td> </tr> <tr> <td>(1) 585V</td> <td>(1) 569V</td> </tr> <tr> <td>(2) 533V</td> <td>(2) 525V</td> </tr> <tr> <td>(3) 584V</td> <td>(3) 569V</td> </tr> <tr> <td>(4) 585V</td> <td>(4) 569V</td> </tr> <tr> <td>(5) 585V</td> <td>(5) 569V</td> </tr> <tr> <td>(6) 588V</td> <td>(6) 569V</td> </tr> <tr> <td>(7) 534V</td> <td>(7) 526V</td> </tr> <tr> <td>DJ51:</td> <td>DJ61:</td> </tr> <tr> <td>(1) 569V</td> <td>(1) 565V</td> </tr> <tr> <td>(2) 529V</td> <td>(2) 537V</td> </tr> <tr> <td>(3) 573V</td> <td>(3) 565V</td> </tr> <tr> <td>(4) 569V</td> <td>(4) 565V</td> </tr> <tr> <td>(5) 569V</td> <td>(5) 565V</td> </tr> <tr> <td>(6) 569V</td> <td>(6) 569V</td> </tr> <tr> <td>(7) 525V</td> <td>(7) 525V</td> </tr> <tr> <td><u>Vo=260V</u></td> <td><u>Vo=260V</u></td> </tr> <tr> <td>DJ11:</td> <td>DJ21:</td> </tr> <tr> <td>(1) 625V</td> <td>(1) 613V</td> </tr> <tr> <td>(2) 584V</td> <td>(2) 576V</td> </tr> <tr> <td>(3) 625V</td> <td>(3) 613V</td> </tr> <tr> <td>DJ31:</td> <td>DJ41:</td> </tr> <tr> <td>(1) 629V</td> <td>(1) 612V</td> </tr> <tr> <td>(2) 588V</td> <td>(2) 521V</td> </tr> <tr> <td>(3) 640V</td> <td>(3) 628V</td> </tr> <tr> <td>DJ51:</td> <td>DJ61:</td> </tr> <tr> <td>(1) 616V</td> <td>(1) 612V</td> </tr> <tr> <td>(2) 588V</td> <td>(2) 580V</td> </tr> <tr> <td>(3) 629V</td> <td>(3) 624V</td> </tr> </table>	<u>Vo=230V</u>	<u>Vo=230V</u>	DJ11:	DJ21:	(1) 572V	(1) 564V	(2) 533V	(2) 529V	(3) 569V	(3) 565V	(4) 573V	(4) 565V	(5) 577V	(5) 565V	(6) 573V	(6) 568V	(7) 529V	(7) 525V	DJ31:	DJ41:	(1) 585V	(1) 569V	(2) 533V	(2) 525V	(3) 584V	(3) 569V	(4) 585V	(4) 569V	(5) 585V	(5) 569V	(6) 588V	(6) 569V	(7) 534V	(7) 526V	DJ51:	DJ61:	(1) 569V	(1) 565V	(2) 529V	(2) 537V	(3) 573V	(3) 565V	(4) 569V	(4) 565V	(5) 569V	(5) 565V	(6) 569V	(6) 569V	(7) 525V	(7) 525V	<u>Vo=260V</u>	<u>Vo=260V</u>	DJ11:	DJ21:	(1) 625V	(1) 613V	(2) 584V	(2) 576V	(3) 625V	(3) 613V	DJ31:	DJ41:	(1) 629V	(1) 612V	(2) 588V	(2) 521V	(3) 640V	(3) 628V	DJ51:	DJ61:	(1) 616V	(1) 612V	(2) 588V	(2) 580V	(3) 629V	(3) 624V
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5	Input Capacitor Voltage	<p>C480-C497 Rated: 820<math>\mu</math> / 450V*2=900V Surge voltage: 500V*2=1KV</p>	<p>I/P:High-Line +3V =533V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue</p> <p>Ta:25°C</p>	<p>(1)897V (2)898V (3)899V (4)883V</p>																																																																												

6	Control IC Voltage Test	<p>PWM IC U982 Rated : 8.9 V~ 15.5V</p> <p>AUX IC U571 Rated : -0.3V~28V</p>	<p>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</p>	<p>U982 (1)14.5V (2)13.7V (3)14V (4)12.4V (5)12.5V</p>	<p>U571 (1)17.78V (2)18.7V (3)20.4V (4)16.9V (5)17.1V</p>
7	TOP SWITCHING STAND BY POWER	<p>Q519 Rated : 3.9A/ 800 V</p>	<p>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</p>	<p>VDS : (1) 700V/1.63A (2) 715V/1.65A</p> <p>VDS : (1) 648V/1.86A (2) 711V/2.04A</p>	

## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	<p>I/P-O/P : 4.25KVAC/min I/P-FG : 3KVAC/min O/P-FG : 3KVAC/min</p>	<p>I/P-O/P : 4.68KVAC/min I/P-FG : 3.6KVAC/min O/P-FG : 3.6 KVAC/min Ta : 25°C</p>	<p>I/P-O/P:28.81mA I/P-FG:31.01mA O/P-FG:29.94mA NO DAMAGE</p>
2	ISOLATION RESISTANCE	<p>I/P-O/P:500VDC&gt;100M<math>\Omega</math> I/P-FG: 500VDC&gt;100M<math>\Omega</math> O/P-FG:500VDC&gt;100M<math>\Omega</math></p>	<p>I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C</p>	<p>I/P-O/P: 9.23G<math>\Omega</math> I/P-FG: 4.64G<math>\Omega</math> O/P-FG: 5.04G<math>\Omega</math> NO DAMAGE</p>
3	GROUNDING CONTINUITY	<p>FG(PE) TO CHASSIS OR TRACE &lt; 100 m<math>\Omega</math></p>	<p>120A / 4min Ta:25°C</p>	<p>6 m<math>\Omega</math></p>

### 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