



# Test Report: UHP-1500-115

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1500W Conduction Cooling with High Voltage Output

## ■ 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

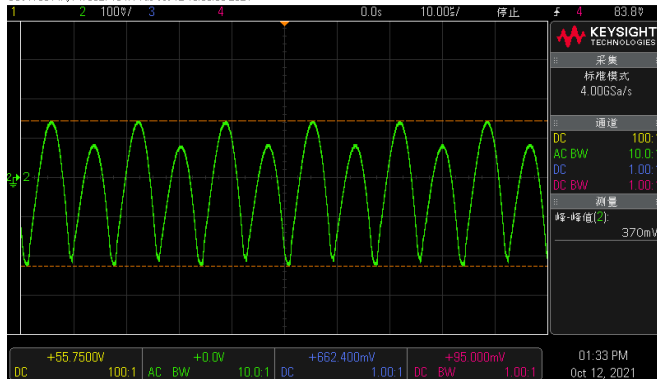
## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 90V~138V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	87.1V~140V/230VAC 87.1V~140V /115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1%~ -1 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:0.062%~0.12%
3	LINE REGULATION (Max)	V1: 0.5%~-0.5 %	I/P: 90VAC ~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.048%~0%
4	LOAD REGULATION(Max)	V1: 0.5%~ -0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.057%~0.115%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	1.7%
6	RIPPLE & NOISE(Max)	V1: 1150mVp-p	I/P: 230 VAC O/P:(1) FULL LOAD Ta:25°C	(1) 450 mVp-p (Max)

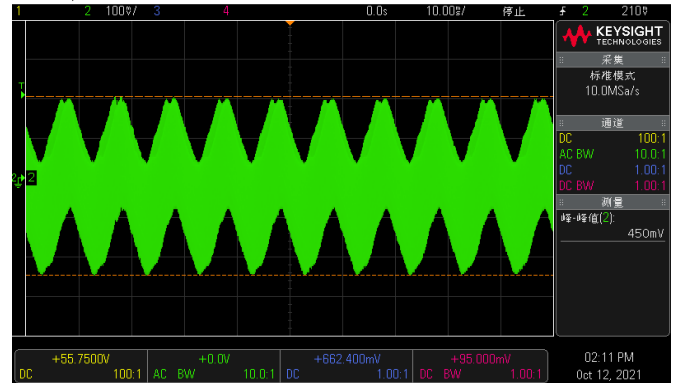
high frequency :

DSO-X 3014A, MY56271047, Tue Oct 12 13:33:39 2021



low frequency :

DSO-X 3014A, MY56271047, Tue Oct 12 14:11:51 2021

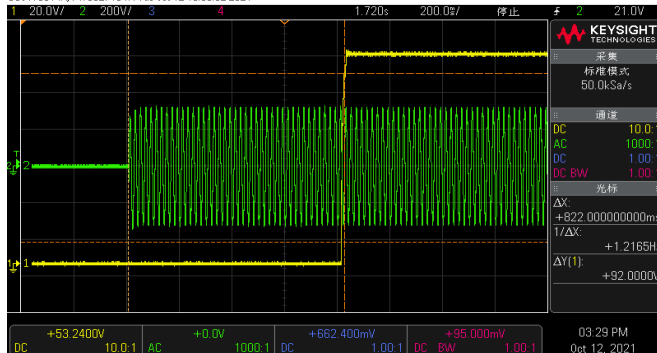


7	SET UP TIME(Max)	230VAC/1800ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/822ms
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INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH3: AC Input Voltage

DSO-X 3014A, MY56271047, Tue Oct 12 15:30:02 2021

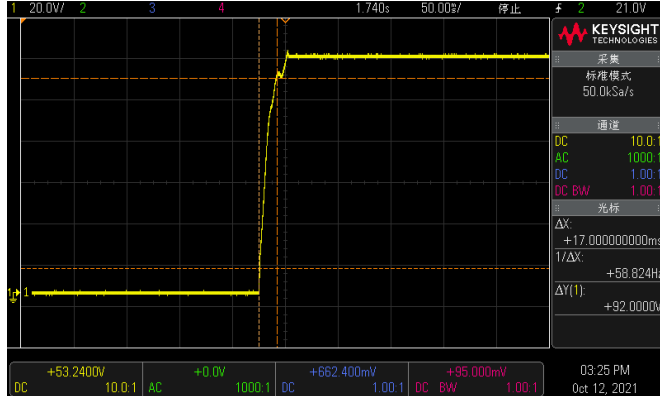


8	RISE TIME (Max)	230VAC/60ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C
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INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage

D30-X 3014A, MY56271047, Tue Oct 12 15:25:45 2021

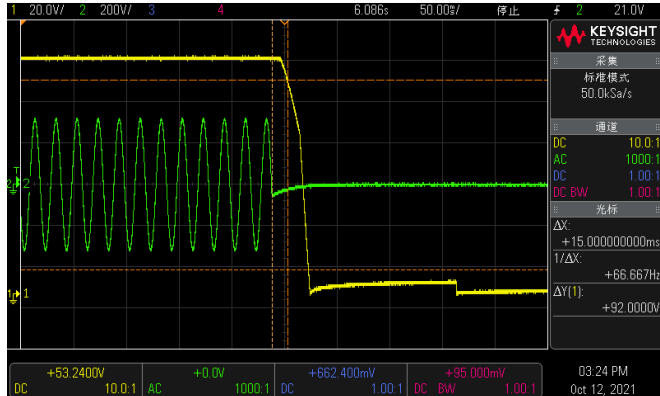


9	HOLD UP TIME (Typ.)	230VAC/10ms at full load 230VAC/16ms at 75% load	I/P : 230 VAC O/P : FULL LOAD/75% LOAD Ta : 25°C
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INPUT=230VAC/50HZ @ FULL LOAD

CH41 : Output Voltage CH2 : AC Input Voltage

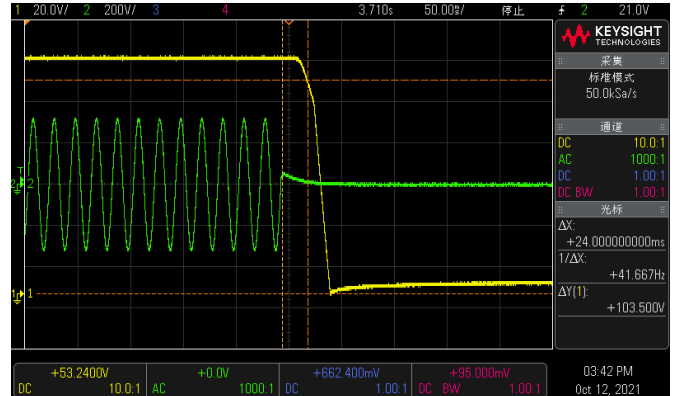
D30-X 3014A, MY56271047, Tue Oct 12 15:24:46 2021



INPUT=230VAC/60HZ @ 75% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

D30-X 3014A, MY56271047, Tue Oct 12 15:42:55 2021



10	DYNAMIC LOAD	V1: 11500 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C
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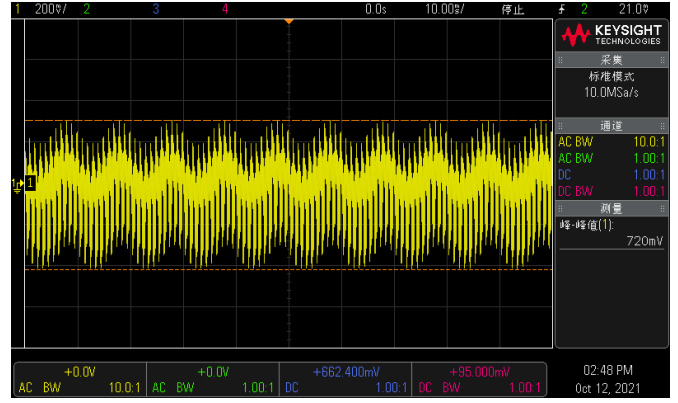
FULL /50% LOAD 50%DUTY / 120HZ

D30-X 3014A, MY56271047, Tue Oct 12 14:47:41 2021



FULL /50% LOAD 50%DUTY / 1KHZ

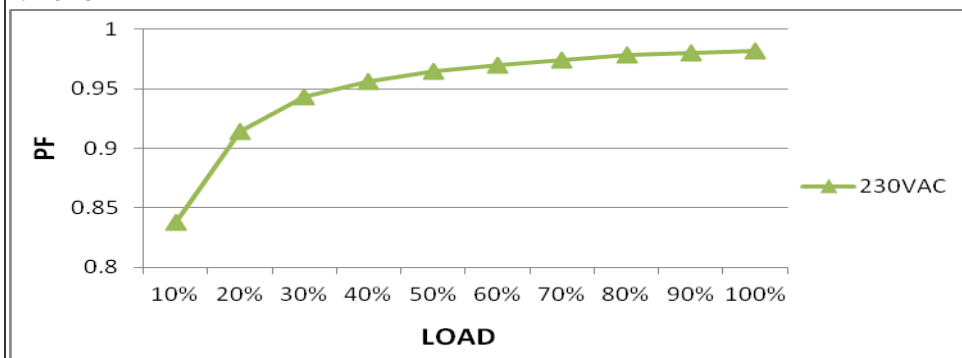
D30-X 3014A, MY56271047, Tue Oct 12 14:48:19 2021



## INPUT FUNCTION TEST

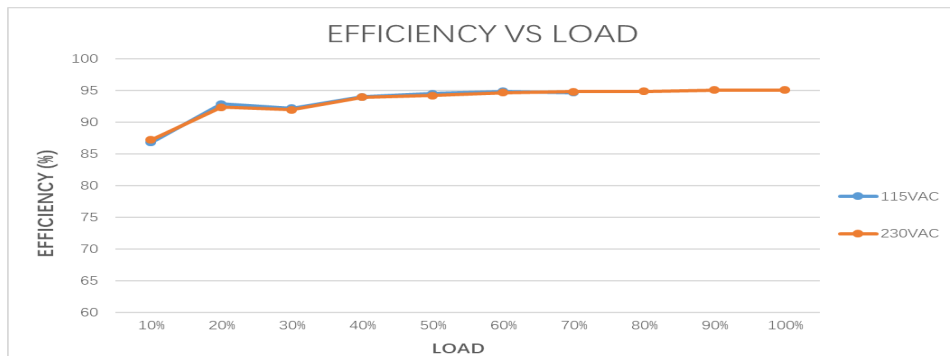
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	180V~264V full load 90V 60% load
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:90 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 8 A	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =6.9913A/ 230VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.572 mA N-FG : 0.566 mA
5	POWER FACTOR (Typ.)	0.95/ 230VAC	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PF=0.982/230VAC

P.F vs LOAD

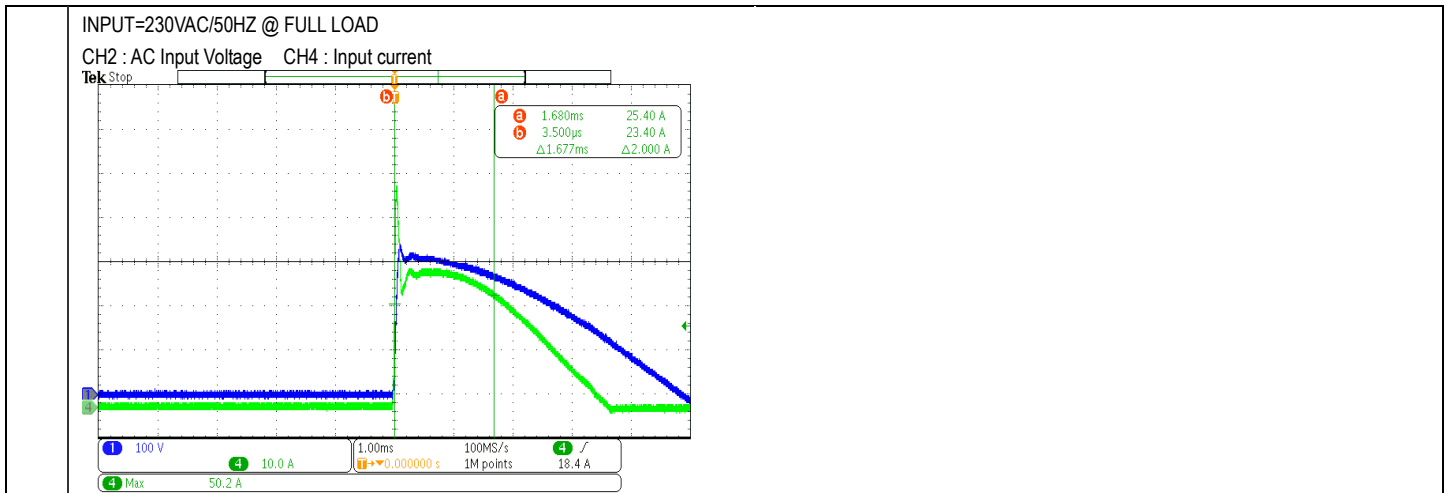


6	EFFICIENCY(Typ.)	95%	I/P:230 VAC O/P :FULL LOAD Ta:25°C	95.2 %
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EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230VAC/60A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =50.2A/ 230VAC T50= 1677us/230V
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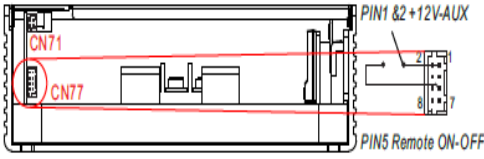


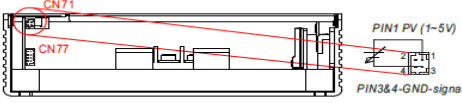
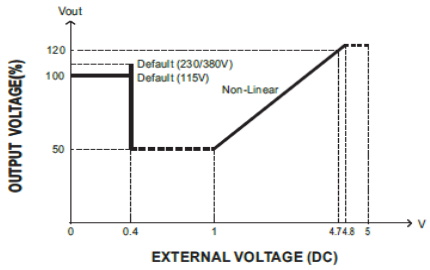
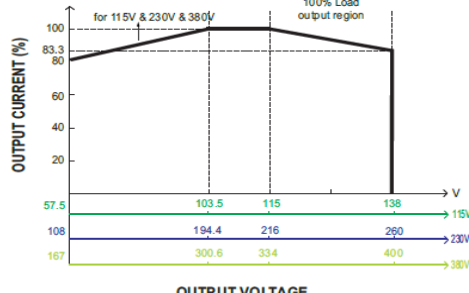
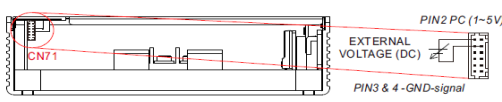
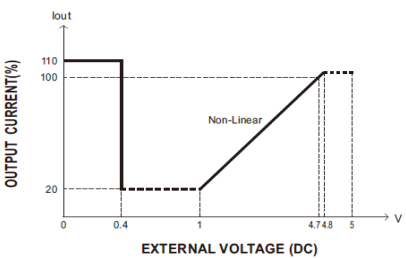
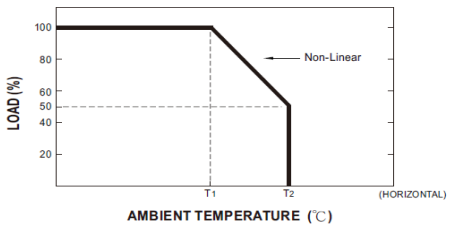
### PROTECTION FUNCTION TEST

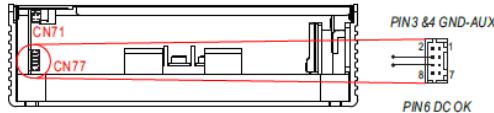
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 125 %	I/P: 264VAC I/P: 230VAC I/P: 180VAC O/P: TESTING Ta:25°C	PROTECTION TYPE : Constant current limiting, unit will shutdown after 5 sec, re-power on to recover. 264VAC :109.8% 230VAC :109.96% 180VAC :109.96%
2	OVER VOLTAGE PROTECTION	145V~175V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	PROTECTION TYPE : Shut down O/P voltage, re-power on to recover 264VAC :154V 230VAC :154V 90VAC :154V
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P.Active OK 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: 264VAC I/P: 90VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE OK 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
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1	AUXILIARY POWER (AUX)	<p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="587 443 1423 591"> <thead> <tr> <th>AUX</th> <th>TOLERANCE</th> <th>RIPPLE</th> <th>TEST RESULT</th> </tr> </thead> <tbody> <tr> <td>12V / 0.4A</td> <td>10.8~13.2 V</td> <td>150mVp-p</td> <td>11.95V/84mVp-p</td> </tr> </tbody> </table>	AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 0.4A	10.8~13.2 V	150mVp-p	11.95V/84mVp-p				
AUX	TOLERANCE	RIPPLE	TEST RESULT											
12V / 0.4A	10.8~13.2 V	150mVp-p	11.95V/84mVp-p											
2	REMOTE ON/OFF CONTROL	<p><b>Remote ON-OFF Control</b> The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.</p>  <table border="1" data-bbox="1161 929 1513 1064"> <thead> <tr> <th>Remote ON-OFF</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>Short circuit</td> <td>ON</td> </tr> <tr> <td>Open circuit</td> <td>OFF</td> </tr> </tbody> </table> <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="507 1265 1056 1366"> <thead> <tr> <th>Between ON/OFF and +12V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>SW SHORT (10.8 ~ 13.2V)</td> <td>ON (12.03V)</td> </tr> <tr> <td>SW OPEN (-0.5 ~ 0.5V)</td> <td>OFF (0.136V)</td> </tr> </tbody> </table>	Remote ON-OFF	Power Supply Status	Short circuit	ON	Open circuit	OFF	Between ON/OFF and +12V-AUX	Power Supply Status	SW SHORT (10.8 ~ 13.2V)	ON (12.03V)	SW OPEN (-0.5 ~ 0.5V)	OFF (0.136V)
Remote ON-OFF	Power Supply Status													
Short circuit	ON													
Open circuit	OFF													
Between ON/OFF and +12V-AUX	Power Supply Status													
SW SHORT (10.8 ~ 13.2V)	ON (12.03V)													
SW OPEN (-0.5 ~ 0.5V)	OFF (0.136V)													

<p>3</p> <p>OUTPUT VOLTAGE PROGRAMMABLE(PV)</p>	<p><b>1. Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)</b>          ※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed to 50%~120% by applying EXTERNAL VOLTAGE.          ※ When PC/PV are used at the same time, PC is preferred</p>  <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: right;">©The rated current should change with the Output Voltage Programming accordingly</p> <p>I/P: 230 VAC          O/P:FULL LOAD          Ta:25°C          TEST RESULT :</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="border: none;"></th> <th style="border: none;">PV</th> <th style="border: none;">0V (0~0.3V)</th> <th style="border: none;">1V (0.45~1V)</th> <th style="border: none;">4.7V</th> <th style="border: none;">5V</th> </tr> </thead> <tbody> <tr> <td style="border: none;">MODEL</td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;">SPEC</td> <td style="border: none;"></td> <td style="border: none;">115V±5%</td> <td style="border: none;">57.5V±5%</td> <td style="border: none;">138V±5%</td> <td style="border: none;">140V±5%</td> </tr> <tr> <td style="border: none;">Vout</td> <td style="border: none;"></td> <td style="border: none;">115.36V</td> <td style="border: none;">57.91V</td> <td style="border: none;">13.7.7V</td> <td style="border: none;">140.02V</td> </tr> </tbody> </table>		PV	0V (0~0.3V)	1V (0.45~1V)	4.7V	5V	MODEL						SPEC		115V±5%	57.5V±5%	138V±5%	140V±5%	Vout		115.36V	57.91V	13.7.7V	140.02V
	PV	0V (0~0.3V)	1V (0.45~1V)	4.7V	5V																				
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Vout		115.36V	57.91V	13.7.7V	140.02V																				
<p>4</p> <p>OUTPUT CURRENT PROGRAMMABLE (PC)</p>	<p><b>2.Constant Current Programming (or, PC / remote current programming / dynamic current trim)</b>          ※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.</p>  <p>©Covered by over temperature protection auto to de-rating function works under operation either in PC mode or under control by communication protocol.          T<sub>1</sub>(Typ.): Maximum ambient temperature of full load.          T<sub>2</sub>(Typ.): T<sub>1</sub>+5°C.</p> <div style="display: flex; justify-content: space-around;">   </div> <p>I/P: 230 VAC          O/P:TESTING          Ta:25°C</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="border: none;">ADJ V</th> <th style="border: none;">0V (0~0.3V)</th> <th style="border: none;">1V (0.45~1V)</th> <th style="border: none;">4.7V</th> <th style="border: none;">5V</th> </tr> </thead> <tbody> <tr> <td style="border: none;">SPEC</td> <td style="border: none;">110%±5%</td> <td style="border: none;">20%±5%</td> <td style="border: none;">100%±5%</td> <td style="border: none;">100%±5%</td> </tr> <tr> <td style="border: none;">TEST</td> <td style="border: none;">109.43%</td> <td style="border: none;">16.61%</td> <td style="border: none;">100.77%</td> <td style="border: none;">102.44%</td> </tr> </tbody> </table>	ADJ V	0V (0~0.3V)	1V (0.45~1V)	4.7V	5V	SPEC	110%±5%	20%±5%	100%±5%	100%±5%	TEST	109.43%	16.61%	100.77%	102.44%									
ADJ V	0V (0~0.3V)	1V (0.45~1V)	4.7V	5V																					
SPEC	110%±5%	20%±5%	100%±5%	100%±5%																					
TEST	109.43%	16.61%	100.77%	102.44%																					

5	DC OK CONTACT RATINGS	<p><b>4.DC-OK Signal</b> DC-OK signal is a TTL level signal. The maximum sink current is 10mA and the maximum external voltage is 5.6V.</p>  <table border="1" data-bbox="1173 353 1516 448"> <thead> <tr> <th>DC-OK signal</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>"High" &gt;4.4~5.5V</td> <td>ON</td> </tr> <tr> <td>"Low" &lt;-0.5~-0.5V</td> <td>OFF</td> </tr> </tbody> </table> <p>CH1: CH3: I/P: 230 VAC O/P: TESTING Ta: 25°C</p> <table border="1" data-bbox="758 645 1305 743"> <thead> <tr> <th>DC-OK signal</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>"High" &gt;4.5~5.5V</td> <td><u>ON(5.16V)</u></td> </tr> <tr> <td>"Low" &lt;-0.5~-0.5V</td> <td><u>OFF (0.01V)</u></td> </tr> </tbody> </table>	DC-OK signal	Power Supply Status	"High" >4.4~5.5V	ON	"Low" <-0.5~-0.5V	OFF	DC-OK signal	Power Supply Status	"High" >4.5~5.5V	<u>ON(5.16V)</u>	"Low" <-0.5~-0.5V	<u>OFF (0.01V)</u>
DC-OK signal	Power Supply Status													
"High" >4.4~5.5V	ON													
"Low" <-0.5~-0.5V	OFF													
DC-OK signal	Power Supply Status													
"High" >4.5~5.5V	<u>ON(5.16V)</u>													
"Low" <-0.5~-0.5V	<u>OFF (0.01V)</u>													

## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q903 Rated <b>22A/ 600V</b>	<p>AC ON/OFF</p> <p>I/P: High-Line +3V = 267V</p> <p>VDS:</p> <p>O/P: (1) Full Load (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (5) 0%→400% Load. (6) NO LOAD (7) 200% Load</p> <p>I/P: Low-Line -3V = 177V</p> <p>O/P: (1) Full Load (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (5) 0%→400% Load. (6) NO LOAD (7) 200% Load</p> <p>Ta: 25°C</p>	<p>VDS:</p> <p>(1) 450V (2) 446V (3) 458V (4) 462V (5) 466V (6) 442V (7) 466V</p> <p>VDS:</p> <p>(1) 458V (2) 446V (3) 454V (4) 466V (5) 466V (6) 442V (7) 458V</p>



2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q51 Rated 34A/ 600V	<p>I/P:High-Line +3V =267 V 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 (7) 0%→400% Load. (8) NO LOAD (9) 200% Load</p> <p>I/P:Low-Line -3V = 177V 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 (7) 0%→400% Load. (8) NO LOAD (9) 200% Load</p> <p>Ta:25°C</p>	<p>VDS: (1)412V (2)410V (3)426V (4)410V (5)422V (6)426V (7)402V (8)406V (9)414V</p> <p>VDS: (1)430V (2)390V (3)430V (4)430V (5)430V (6)426V (7)426V (8)414V (9)422V</p>																						
3	Diode Peak Voltage	<p>D201 Rated 650V/10A</p> <p>D212 Rated 650V/10A</p>	<p>AC ON/OFF I/P:High-Line +3V =267 V 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) 0%→400% Load. (8)NO LOAD (9) burst Mode (10) 200% Load</p> <p>Ta:25°C</p>	<table border="0"> <tr> <td>D201:</td> <td>D212:</td> </tr> <tr> <td>(1)278V</td> <td>(1)306V</td> </tr> <tr> <td>(2)39.4V</td> <td>(2)40.2V</td> </tr> <tr> <td>(3)278V</td> <td>(3)302V</td> </tr> <tr> <td>(4)282V</td> <td>(4)294V</td> </tr> <tr> <td>(5)278V</td> <td>(5)298V</td> </tr> <tr> <td>(6)282V</td> <td>(6)306V</td> </tr> <tr> <td>(7)266V</td> <td>(7)282V</td> </tr> <tr> <td>(8)266V</td> <td>(8)282V</td> </tr> <tr> <td>(9)262V</td> <td>(9)294V</td> </tr> <tr> <td>(10)181V</td> <td>(10)201V</td> </tr> </table>	D201:	D212:	(1)278V	(1)306V	(2)39.4V	(2)40.2V	(3)278V	(3)302V	(4)282V	(4)294V	(5)278V	(5)298V	(6)282V	(6)306V	(7)266V	(7)282V	(8)266V	(8)282V	(9)262V	(9)294V	(10)181V	(10)201V
D201:	D212:																									
(1)278V	(1)306V																									
(2)39.4V	(2)40.2V																									
(3)278V	(3)302V																									
(4)282V	(4)294V																									
(5)278V	(5)298V																									
(6)282V	(6)306V																									
(7)266V	(7)282V																									
(8)266V	(8)282V																									
(9)262V	(9)294V																									
(10)181V	(10)201V																									
4	Input Capacitor Voltage	C5 Rated: 220u/450V	<p>I/P:High-Line +3V =267V 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)404V (2)396V (3)416V (4)404V</p>																						

5	Control IC Voltage Test	<p>PWM IC U800 Rated 8.85 V~ 16V</p> <p>PFC IC U401 Rated 10.6V~ 21 V</p> <p>MCU IC U701 Rated -0.3V~ 4V</p> <p>MCU IC U450 Rated 2.3V~ 6.5V</p>	<p>AC ON/OFF</p> <p>I/P:High-Line +3V =267 V</p> <p>O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE) (6)NO/FULL LOAD (AC on) (7)NO LOAD(AC on) Ta:25°C</p>	<p>U800:</p> <p>(1) 13.1V (2) 13.1V (3) 13.1V (4) 13.1V (5) 13.1V (6) 13.1V (7) 12.9V</p> <p>U401:</p> <p>(1) 13.7V (2) 13.5V (3) 13.5V (4) 13.1V (5) 13.3V (6) 13.7V (7) 12.9V</p> <p>U701:</p> <p>(1) 3.41V (2) 3.49V (3) 3.45V (4) 3.37V (5) 3.37V (6) 3.41V (7) 3.33V</p> <p>U450:</p> <p>(1) 5.09V (2) 5.05V (3) 5.09V (4) 5.01V (5) 5.05V (6) 5.05V (7) 5.01V</p>
6	TOP SWITCHING STAND BY POWER	U601 Rated 800V	<p>AC ON/OFF</p> <p>I/P:High-Line +3V =267 V</p> <p>O/P: (1)Full Load (2)Remote On/Off</p> <p>I/P:Low-Line -3V =97 V</p> <p>O/P: (1)Full Load (2)Remote On/Off</p> <p>Ta:25°C</p>	<p>U601</p> <p>(1) 542 V (2) 542 V</p> <p>(1)542 V (2)542 V</p>

## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 6KVDC/min I/P-FG: 4KVDC/min O/P-FG: 4KVDC/min	I/P-O/P: 6.6 KVDC/min I/P-FG: 4.4 KVDC/min O/P-FG: 4.4KVDC/min Ta: 25°C	I/P-O/P: 0.1uA I/P-FG: 1.0uA O/P-FG: 0.6uA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC > 100MΩ I/P-FG: 500VDC > 100MΩ O/P-FG: 500VDC > 100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta: 25°C	I/P-O/P: > 9999 MΩ I/P-FG: > 9999 MΩ O/P-FG: > 9999 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta: 25°C	4mΩ

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 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 : 230 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 : UHP-1500-115 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=28.7°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=45.8°C																																																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=28.7°C</th> <th>HIGH AMBIENT Ta=45.8°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD2</td><td>84.6°C</td><td>97.8°C</td></tr> <tr><td>2</td><td>L2</td><td>79.5°C</td><td>95.9°C</td></tr> <tr><td>3</td><td>RY1</td><td>65.1°C</td><td>79.7°C</td></tr> <tr><td>4</td><td>C8</td><td>71.7°C</td><td>87.3°C</td></tr> <tr><td>5</td><td>C961</td><td>74.7°C</td><td>91.6°C</td></tr> <tr><td>6</td><td>U601</td><td>78.9°C</td><td>94.4°C</td></tr> <tr><td>7</td><td>T1</td><td>83.0°C</td><td>98.6°C</td></tr> <tr><td>8</td><td>T2</td><td>85.1°C</td><td>101.8°C</td></tr> <tr><td>9</td><td>Q52</td><td>71.9°C</td><td>87.6°C</td></tr> <tr><td>10</td><td>Q66</td><td>75.8°C</td><td>92.0°C</td></tr> <tr><td>11</td><td>D14</td><td>78.2°C</td><td>94.1°C</td></tr> <tr><td>12</td><td>Q904</td><td>81.2°C</td><td>99.6°C</td></tr> <tr><td>13</td><td>Q910</td><td>87.4°C</td><td>106.6°C</td></tr> <tr><td>14</td><td>C53</td><td>72.2°C</td><td>87.7°C</td></tr> <tr><td>15</td><td>D206</td><td>85.1°C</td><td>100.7°C</td></tr> <tr><td>16</td><td>D212</td><td>81.6°C</td><td>97.8°C</td></tr> <tr><td>17</td><td>C117</td><td>64.0°C</td><td>78.4°C</td></tr> <tr><td>18</td><td>C123</td><td>66.4°C</td><td>81.4°C</td></tr> <tr><td>19</td><td>C652</td><td>75.2°C</td><td>91.6°C</td></tr> <tr><td>20</td><td>T601</td><td>80.1°C</td><td>96.2°C</td></tr> <tr><td>21</td><td>R601</td><td>86.8°C</td><td>102.4°C</td></tr> <tr><td>22</td><td>RG50</td><td>72.3°C</td><td>88.5°C</td></tr> <tr><td>23</td><td>L708</td><td>77.8°C</td><td>97.5°C</td></tr> <tr><td>24</td><td>RTH4</td><td>70.9°C</td><td>86.8°C</td></tr> <tr><td>25</td><td>TC</td><td>58.3°C</td><td>73.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=28.7°C	HIGH AMBIENT Ta=45.8°C	1	BD2	84.6°C	97.8°C	2	L2	79.5°C	95.9°C	3	RY1	65.1°C	79.7°C	4	C8	71.7°C	87.3°C	5	C961	74.7°C	91.6°C	6	U601	78.9°C	94.4°C	7	T1	83.0°C	98.6°C	8	T2	85.1°C	101.8°C	9	Q52	71.9°C	87.6°C	10	Q66	75.8°C	92.0°C	11	D14	78.2°C	94.1°C	12	Q904	81.2°C	99.6°C	13	Q910	87.4°C	106.6°C	14	C53	72.2°C	87.7°C	15	D206	85.1°C	100.7°C	16	D212	81.6°C	97.8°C	17	C117	64.0°C	78.4°C	18	C123	66.4°C	81.4°C	19	C652	75.2°C	91.6°C	20	T601	80.1°C	96.2°C	21	R601	86.8°C	102.4°C	22	RG50	72.3°C	88.5°C	23	L708	77.8°C	97.5°C	24	RTH4	70.9°C	86.8°C	25	TC	58.3°C	73.5°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 107.6% LOAD Ta : 25°C	TEST : OK																																																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/90 VAC O/P : FULL LOAD/60% LOAD Ta= - 35 °C	TEST : OK																																																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE	I/P : 272C VAC O/P : FULL LOAD Ta= 45 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																								
5	TEMPERATURE COEFFICIENT	+ 0.03 %/(0°C~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.01 %/°C(0~50°C)																																																																																																								

6	STORAGE TEMPERATURE TEST	-30~85°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 : 10CYCLE 5. Input/Output condition : STATIC
7	THERMAL SHOCK TEST	-30~45°C	1. Thermal shock Temperature : -35°C~ +50°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:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C123 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=45 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=45 °C LIFE TIME	(1) 271411 HRS (2) 78484 HRS (3) 146150 HRS (4) 223379 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 597.3K hrs min. Telcordia SR-332 (Bellcore); 63.3K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LINKX

2018.4.30

GP-A50-F010