



Test Report: UHP-1000-48

1000W Slim Type with PFC Switching 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

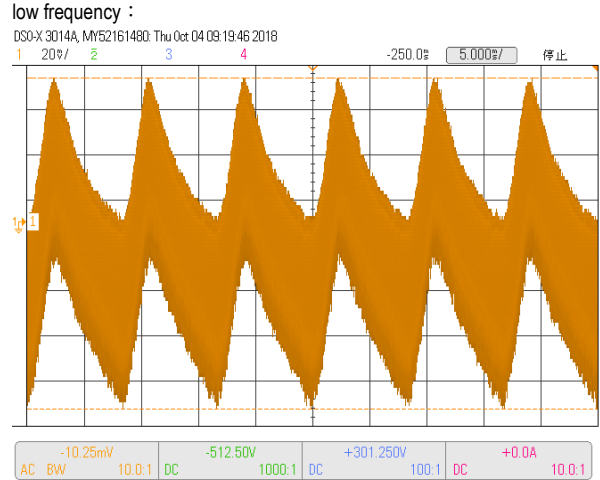
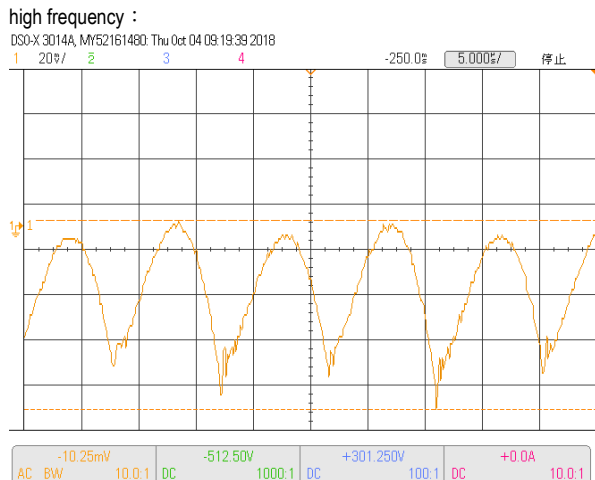
■ RELIABILITY TEST

ENVIRONMENT TEST

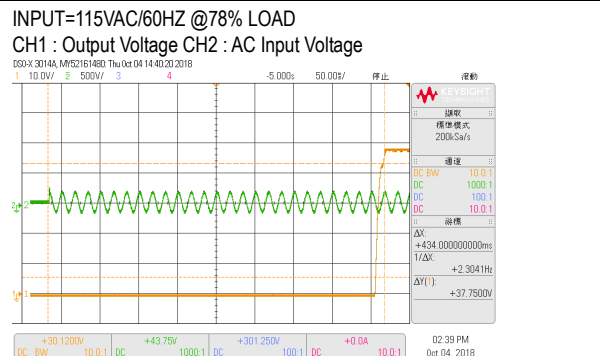
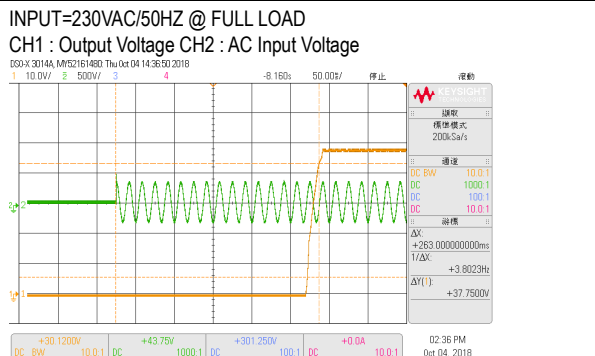
■ DESIGN VERIFY TEST

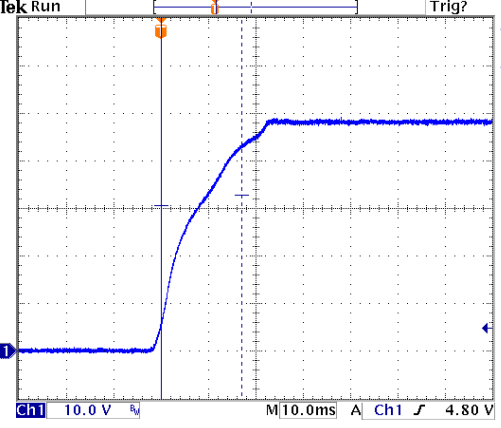
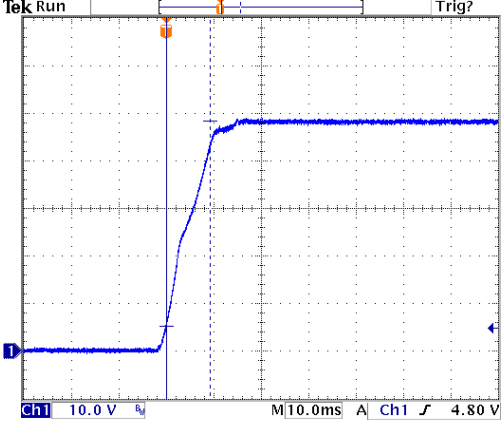
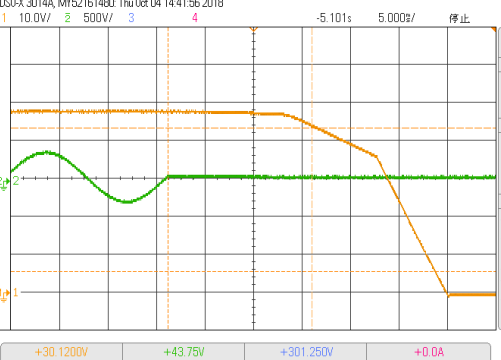
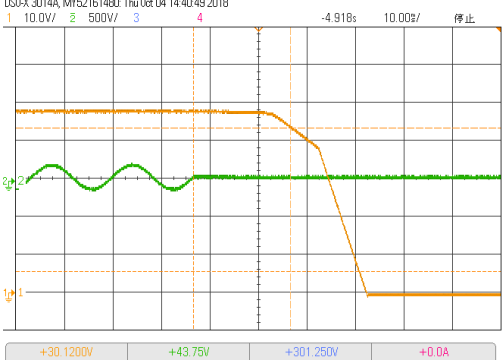
OUTPUT FUNCTION TEST

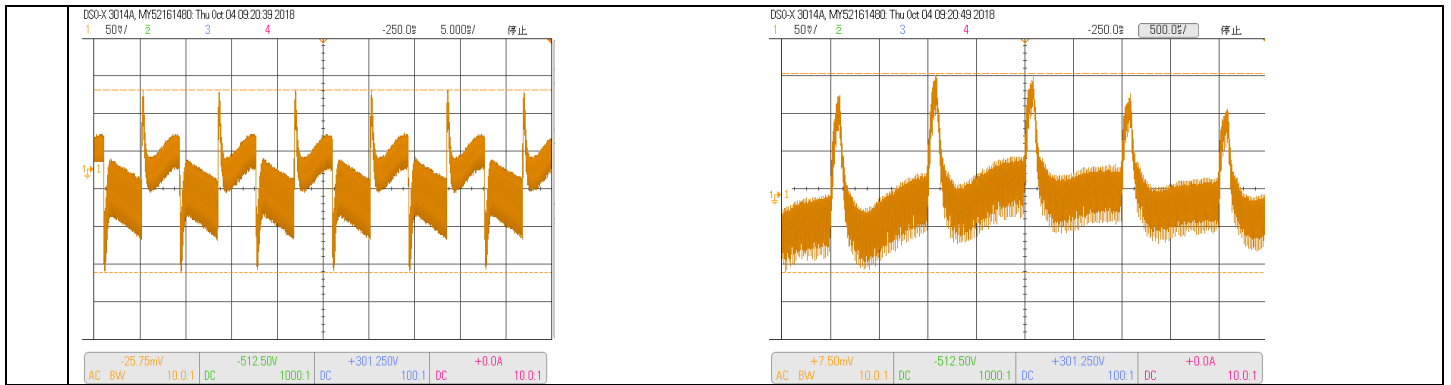
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 48V~ 57.6V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	46.82V~58.99V/230VAC 46.78V~58.94V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1%~ -1%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.1%~ 0%
3	LINE REGULATION (Max)	V1: 0.5%~ -0.5%	I/P: 180VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0.02%~ -0.02 %
4	LOAD REGULATION(Max)	V1: 0.5%~ -0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.01 %~ -0.03 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 300mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 146mVp-p



7	SET UP TIME(Max)	230VAC/1000ms 115VAC/1000ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	230VAC/ 263ms 115VAC/ 434ms
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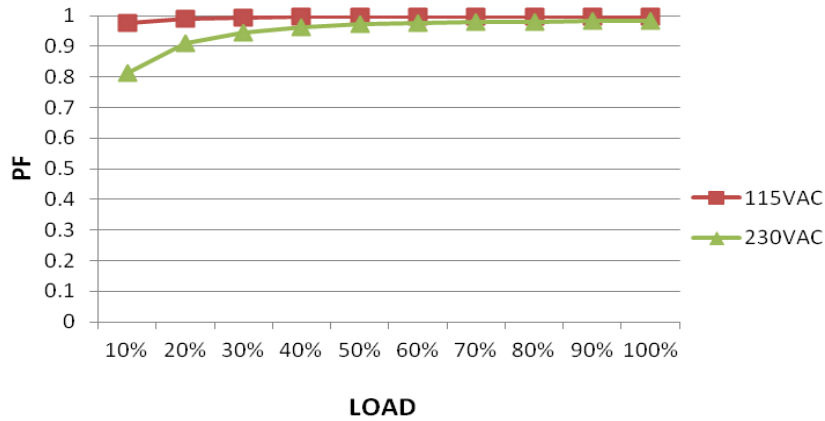


8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	230VAC/ 17 ms 115VAC/ 9.2 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>  <p>Δ: 2.20 V @: 30.6 V Δ: 17.0ms @: 0.00 s</p>		<p>INPUT=115VAC/60HZ @ 78% LOAD</p> <p>CH1 : Output Voltage</p>  <p>Δ: 43.2 V @: 5.20 V Δ: 9.20ms @: 0.00 s</p>		
9	HOLD UP TIME (Typ.)	230VAC/12ms 115VAC/12ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	230VAC/ 14.8 ms 115VAC/ 20 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>ΔX: +14.800000000ms T/ΔX: +67.568Hz ΔY(1): +37.7500V</p>		<p>INPUT=115VAC/60HZ @ 78% LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>ΔX: +20.000000000ms T/ΔX: +50.000Hz ΔY(1): +37.7500V</p>		
10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	241mVp-p 263mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		



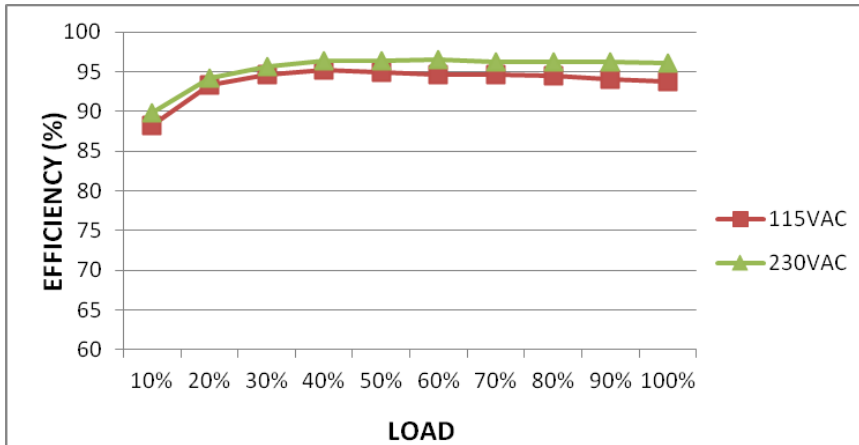
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	74V~264V
			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/ 5.3 A 115V/ 10.1 A	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	I =4.7A/ 230VAC I =9.56A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.58 mA N-FG : 0.56mA
5	POWER FACTOR (Typ.)	0.95/ 230VAC 0.99/115VAC	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	PF=0.982/230VAC PF=0.997/115VAC
			P.F vs LOAD	



6	EFFICIENCY(Typ.)	96%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	96.01%
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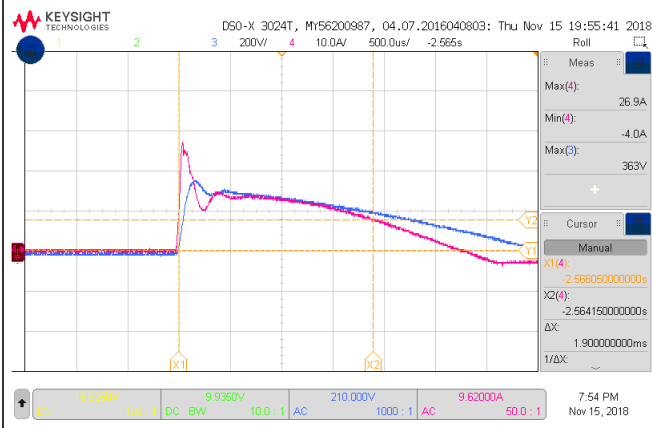
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/40A 115V/20A COLD START	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	I =26.9A/ 230VAC I =13.3A/ 115VAC T50=1900us/230V
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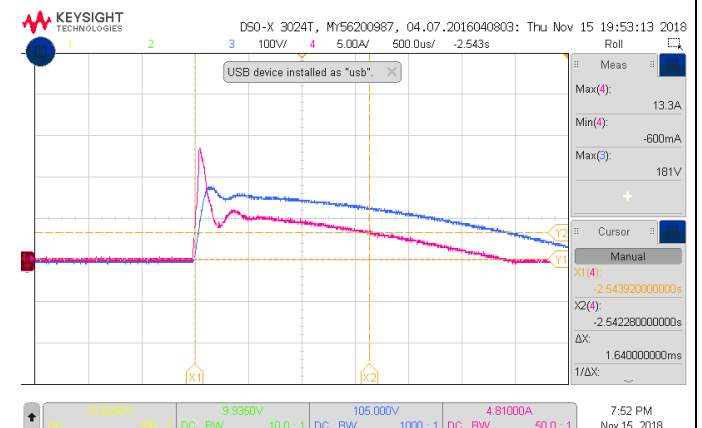
INPUT=230VAC/50HZ @ FULL LOAD

CH3 : AC Input Voltage CH4 : Input current



INPUT=115VAC/60HZ @ 78% LOAD

CH3 : AC Input Voltage CH4 : Input current



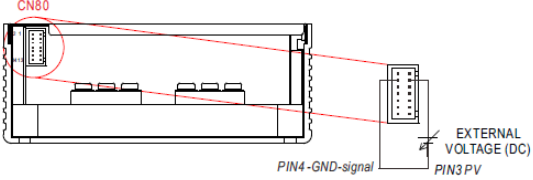
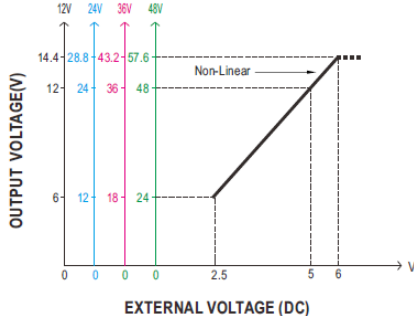
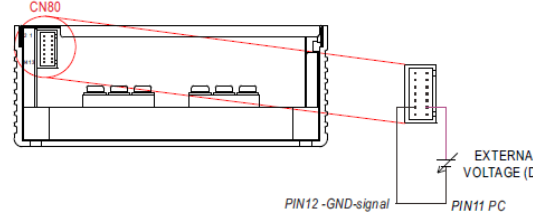
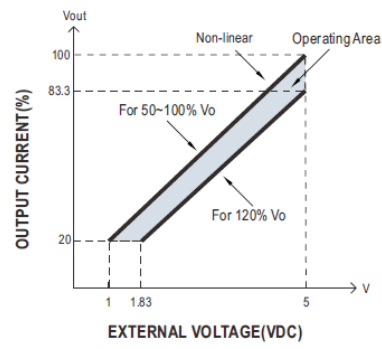
8	NO LOAD CONSUMPTION	---	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	7.98 W/115VAC 5.55 W/230VAC
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 120% Protection type : Shut down O/P voltage,re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 180VAC O/P: TESTING Ta:25°C	110.14%/ 264VAC 110.09%/ 230VAC 110.05%/180VAC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
2	OVER VOLTAGE PROTECTION	59V~66V Protection type :Shut down O/P voltage,re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	61.41V/ 264VAC 61.41V/ 230VAC 61.44V/ 90VAC PROTECTION TYPE : Protection type :Shut down O/P voltage,re-power on to recoverS
3	OVER TEMPERATURE PROTECTION	Protection type :Shut down O/P voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 90VAC 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 Shut down O/P voltage,re-power on to recover	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Shut down O/P voltage,re-power on to recover

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT								
1	AUXILIARY POWER (AUX)	12V@0.5A tolerance±10%, ripple 150mVp-p I/P: 230 VAC O/P: FULL LOAD Ta:25°C Test Result :										
				<table border="1"> <thead> <tr> <th>AUX</th> <th>TOLERANCE</th> <th>RIPPLE</th> <th>TEST RESULT</th> </tr> </thead> <tbody> <tr> <td>12V / 0.5A</td> <td>10.8~13.2 V</td> <td>150mVp-p</td> <td>12.21V/90.9 mVp-p</td> </tr> </tbody> </table>	AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 0.5A	10.8~13.2 V	150mVp-p	12.21V/90.9 mVp-p
AUX	TOLERANCE	RIPPLE	TEST RESULT									
12V / 0.5A	10.8~13.2 V	150mVp-p	12.21V/90.9 mVp-p									
2	REMOTE ON/OFF CONTROL	<p>3.Remote ON-OFF Control 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"> <thead> <tr> <th>Remote ON-OFF</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>"Low" <0~0.5V or Short circuit</td> <td>ON</td> </tr> <tr> <td>"Hi" >2~5V or Open circuit</td> <td>OFF</td> </tr> </tbody> </table> I/P: 230 VAC O/P: FULL LOAD	Remote ON-OFF	Power Supply Status	"Low" <0~0.5V or Short circuit	ON	"Hi" >2~5V or Open circuit	OFF				
Remote ON-OFF	Power Supply Status											
"Low" <0~0.5V or Short circuit	ON											
"Hi" >2~5V or Open circuit	OFF											

		<p>Ta:25°C Test Result :</p> <table border="1"> <tr> <td>Between ON/OFF and +5V-AUX</td> <td>Power Supply Status</td> </tr> <tr> <td>"LOW"<0~0.5V or Short Circuit</td> <td>ON</td> </tr> <tr> <td>"HI">2~5V or Open Circuit</td> <td>OFF</td> </tr> </table>	Between ON/OFF and +5V-AUX	Power Supply Status	"LOW"<0~0.5V or Short Circuit	ON	"HI">2~5V or Open Circuit	OFF														
Between ON/OFF and +5V-AUX	Power Supply Status																					
"LOW"<0~0.5V or Short Circuit	ON																					
"HI">2~5V or Open Circuit	OFF																					
3	<p>OUTPUT VOLTAGE PROGRAMMABLE(PV)</p>	<p>1.Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim) ※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.</p>   <p>I/P: 230 VAC O/P:FULL LOAD Ta:25°C TEST RESULT :</p> <table border="1"> <tr> <td></td> <td>PV</td> <td>2.5V</td> <td>5V</td> <td>6V</td> </tr> <tr> <td>MODEL</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SPEC</td> <td></td> <td>23.5~24.5V</td> <td>47~49V</td> <td>56.4~58.8V</td> </tr> <tr> <td>Vout</td> <td></td> <td>24.18V</td> <td>48.39V</td> <td>58.05V</td> </tr> </table>		PV	2.5V	5V	6V	MODEL					SPEC		23.5~24.5V	47~49V	56.4~58.8V	Vout		24.18V	48.39V	58.05V
	PV	2.5V	5V	6V																		
MODEL																						
SPEC		23.5~24.5V	47~49V	56.4~58.8V																		
Vout		24.18V	48.39V	58.05V																		
4	<p>OUTPUT CURRENT PROGRAMMABLE (PC)</p>	<p>2.Output Current Programming (or, PC / remote current programming / dynamic current trim) ※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.</p>   <p>I/P: 230 VAC O/P:TESTING Ta:25°C TEST RESULT :</p> <table border="1"> <tr> <td>Vo</td> <td>48V(100% Vo)</td> <td>57.6V(120% Vo)</td> </tr> <tr> <td>PC</td> <td>1V</td> <td>5V</td> </tr> <tr> <td>SPEC</td> <td>3.2~5.3A</td> <td>20~22A</td> </tr> <tr> <td>TEST</td> <td>3.98A</td> <td>20.87A</td> </tr> </table>	Vo	48V(100% Vo)	57.6V(120% Vo)	PC	1V	5V	SPEC	3.2~5.3A	20~22A	TEST	3.98A	20.87A								
Vo	48V(100% Vo)	57.6V(120% Vo)																				
PC	1V	5V																				
SPEC	3.2~5.3A	20~22A																				
TEST	3.98A	20.87A																				
5	<p>DC-OK SIGNAL</p>	<table border="1"> <tr> <td>The TTL signal out, PSU turn on = >2.4 ~ 5V ; PSU turn off = <0 ~ 0.4V.</td> <td>I/P:230VAC O/P:FULL LOAD Ta:25°C</td> <td>PSU turn on =5.05V PSU turn off = 0.2V</td> </tr> </table>	The TTL signal out, PSU turn on = >2.4 ~ 5V ; PSU turn off = <0 ~ 0.4V.	I/P:230VAC O/P:FULL LOAD Ta:25°C	PSU turn on =5.05V PSU turn off = 0.2V																	
The TTL signal out, PSU turn on = >2.4 ~ 5V ; PSU turn off = <0 ~ 0.4V.	I/P:230VAC O/P:FULL LOAD Ta:25°C	PSU turn on =5.05V PSU turn off = 0.2V																				

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q902 Rated: 22 A/ 650V VGS ± 25V	I/P:High-Line +3V =300V AC ON/OFF 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 (7)0%→400% Load. Ta:25°C	VDS: (1) 438V (2)422V (3) 434V (4) 430V (5) 426V (6)426V (7) 434V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q62 Rated: 22A/ 600V VGS ± 25V	I/P:High-Line +3V =300 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. Ta:25°C	VDS: (1) 431V (2) 427V (3) 403V (4) 403V (5) 403V (6) 427V (7) 435V
3	P.F.C DIODE	D56 Rated : 22A/ 650V	I/P:High-Line +3V =300 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 Ta:25°C	(1) 252V (2) 220V (3) 317V (4) 349V
4	Diode Peak Voltage	Q100 Rated: VDS : 150V VGS ± 20V Q200 Rated VDS : 150V VGS ± 20V	I/P:High-Line +3V =300 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	Q100: VDS: (1) 99.5V (2) 102V (3) 103.6V (4) 103.6V (5) 103.6V (6) 103.6V (7) 102V (8) 102V Q200: VDS: (1)103.6V (2) 102.8V (3) 102.8V (4) 102.8V (5) 104.4V (6)103.6V (7) 103.6V (8) 102V

			Ta:25°C	
5	Input Capacitor Voltage	C5 Rated: :220µ/ 450V SURGE VOLTAGE=500V	I/P:High-Line +3V =300V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25°C	(1) 433V (2) 437V (3) 425V (4) 421V
6	Control IC Voltage Test	PFC IC U1 Rated 10.6V~ 21 V PWM IC U2 Rated 8.85 V~ 16V O/P IC U101 Rated 8V~ 24V	I/P:High-Line +3V =300 V AC ON/OFF 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	U1: U101: (1) 13.17V (1) 13.17V (2)12.29V (2) 12.53V (3)12.21V (3) 11.48V (4) 12.21V (4) 11.56V (5) 11.175V (5) 10.84V U2: (1) 12.29V (2) 11.4V (3) 11V (4) 11.72V (5) 10.44V
7	TOP SWITCHING STAND BY POWER	U400 Rated : 1.8A/ 700V	I/P:High-Line +3V =300 V AC ON/OFF O/P: (1)Full Load (2)Remote On/Off Ta:25°C	(1) 590V (2) 561V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5KVAC/min Ta:25°C	I/P-O/P: 7.35mA I/P-FG: 7.51mA O/P-FG: 5.36mA 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: 4.2GΩ I/P-FG: 4.6GΩ O/P-FG: 0.28 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	17 mΩ

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 B	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-1000-48 (Operate with additional aluminum plate) 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C																																																																																																																																																		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 110 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/180VAC O/P : 100 % 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 NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03 °C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.008%/°C(0~50°C)
6	STORAGE TEMPERATURE TEST	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		OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C~ +45°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		OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C120 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= 50°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50°C LIFE TIME		(1) 371538HRS (2) 51565HRS (3) 103007HRS (4) 166592HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 662.3K hrs min. Telcordia SR-332 (Bellcore) ; 69.8K 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 : 30,000 hours		

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

2018.4.30 GP-A50-F010