



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

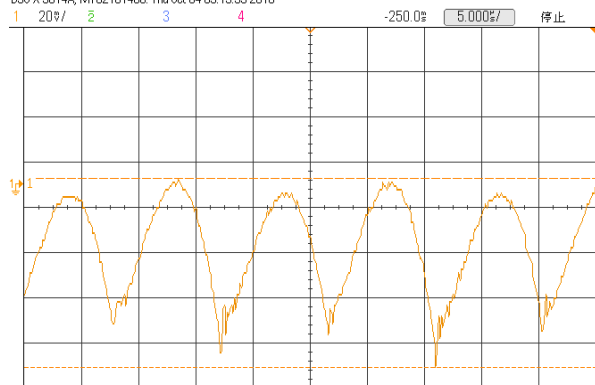
DESIGN VERIFY TEST

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

high frequency :

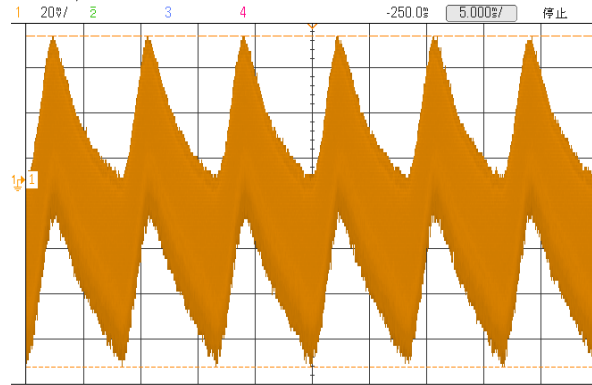
DSO-X 3014A, MY52161480, Thu Oct 04 09:19:39 2018



AC BW 10.0V 10.0ns DC -512.50V 1000.1 DC +301.250V 100.1 DC +0.0A 10.0.1

low frequency :

DSO-X 3014A, MY52161480, Thu Oct 04 09:19:46 2018



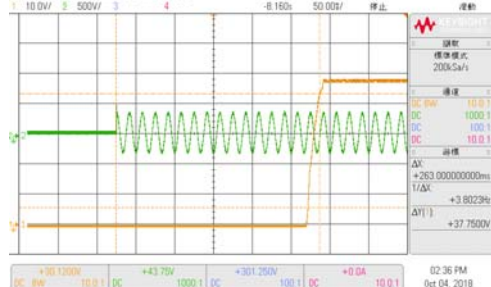
AC BW 10.0V 10.0ms DC -512.50V 1000.1 DC +301.250V 100.1 DC +0.0A 10.0.1

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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INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

DSO-X 3014A, MY52161480, Thu Oct 04 14:30:50 2018

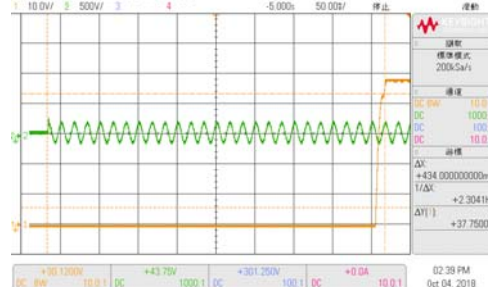


AC BW 10.0V 10.0ms DC +43.75V 1000.1 DC +301.250V 100.1 DC +0.0A 10.0.1 02:36 PM Oct 04, 2018

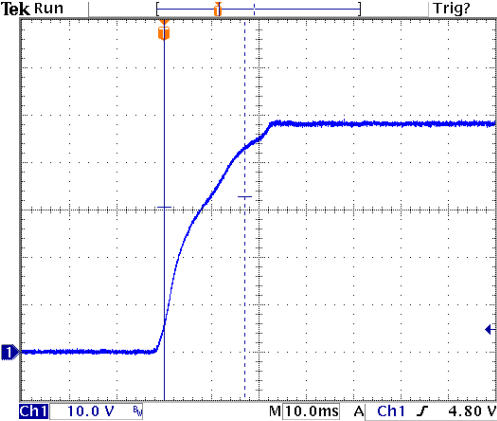
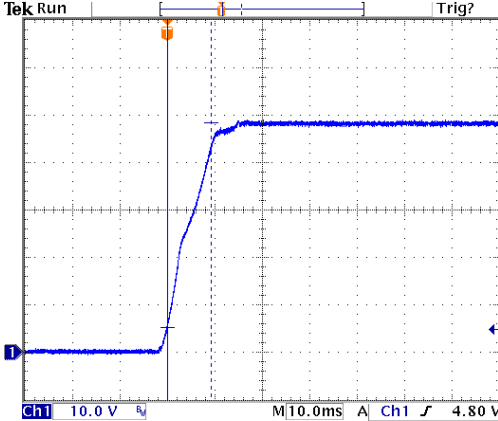
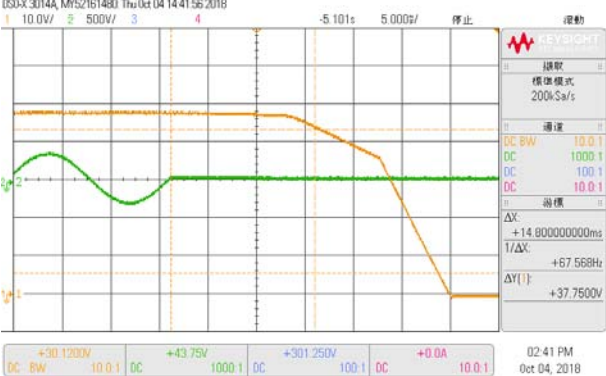
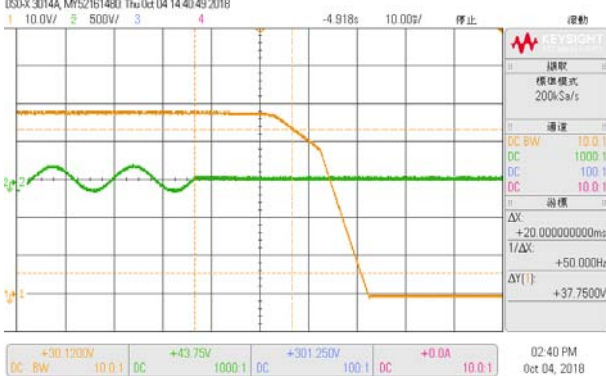
INPUT=115VAC/60HZ @78% LOAD

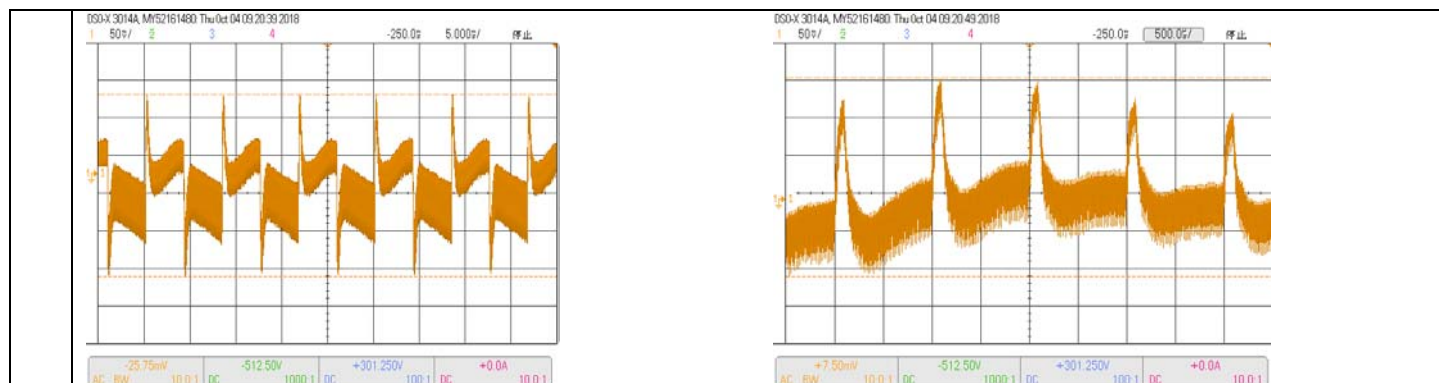
CH1 : Output Voltage CH2 : AC Input Voltage

DSO-X 3014A, MY52161480, Thu Oct 04 14:40:30 2018



AC BW 10.0V 10.0ms DC +43.75V 1000.1 DC +301.250V 100.1 DC +0.0A 10.0.1 02:39 PM Oct 04, 2018

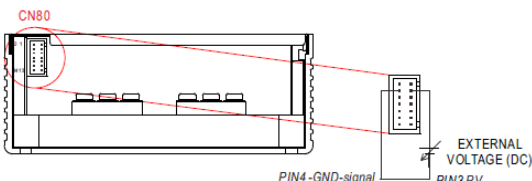
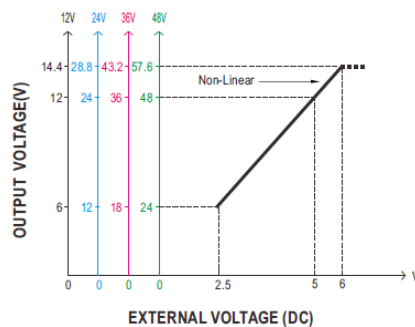
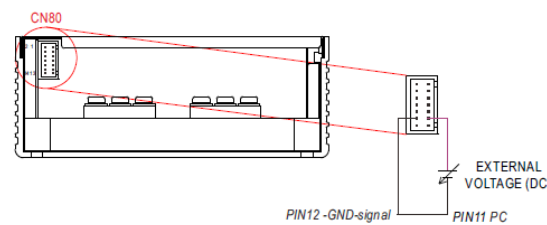
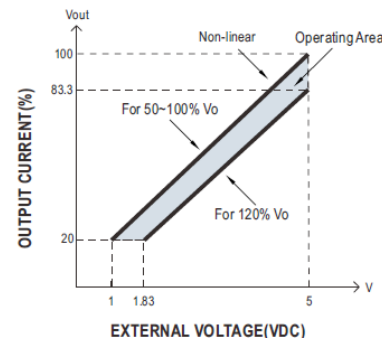
8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	230VAC/ 17 ms 115VAC/ 9.2 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage  INPUT=115VAC/60HZ @ 78% LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (Typ.)	230VAC/12ms 115VAC/12ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 78% LOAD Ta : 25°C	230VAC/ 14.8 ms 115VAC/ 20 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ 78% LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
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℃	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℃	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℃	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℃	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℃	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%
	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
	INPUT=230VAC/50HZ @ FULL LOAD CH3 : AC Input Voltage CH4 : Input current INPUT=115VAC/ 60HZ @ 78% LOAD CH3 : AC Input Voltage CH4 : Input current 			

		Test Result : <table><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	OUTPUT VOLTAGE PROGRAMMABLE(PV)	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.   I/P: 230 VAC O/P:FULL LOAD Ta:25°C TEST RESULT : <table><tr><td>PV</td><td>2.5V</td><td>5V</td><td>6V</td></tr><tr><td>MODEL</td><td></td><td></td><td></td></tr><tr><td>SPEC</td><td>23.5~24.5V</td><td>47~49V</td><td>56.4~58.8V</td></tr><tr><td>Vout</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	OUTPUT CURRENT PROGRAMMABLE (PC)	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.   I/P: 230 VAC O/P:TESTING Ta:25°C TEST RESULT : <table><tr><td>Vo</td><td colspan="2">48V(100% Vo)</td><td colspan="2">57.6V(120% Vo)</td></tr><tr><td>PC</td><td>1V</td><td>5V</td><td>1.83V</td><td>5V</td></tr><tr><td>SPEC</td><td>3.2~5.3A</td><td>20~22A</td><td>3.99~6.09A</td><td>16.44~18.54A</td></tr><tr><td>TEST</td><td>3.98A</td><td>20.87A</td><td>5.49A</td><td>17.21A</td></tr></table>	Vo	48V(100% Vo)		57.6V(120% Vo)		PC	1V	5V	1.83V	5V	SPEC	3.2~5.3A	20~22A	3.99~6.09A	16.44~18.54A	TEST	3.98A	20.87A	5.49A	17.21A
Vo	48V(100% Vo)		57.6V(120% Vo)																			
PC	1V	5V	1.83V	5V																		
SPEC	3.2~5.3A	20~22A	3.99~6.09A	16.44~18.54A																		
TEST	3.98A	20.87A	5.49A	17.21A																		
5	DC-OK SIGNAL	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 $\pm$ 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 $\pm$ 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 $\pm$ 20V Q200 Rated VDS : 150V VGS $\pm$ 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 Ta:25°C	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

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			
		NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50 °C
		1	BD2	69.0°C	93.9°C
		2	ZR1	45.5°C	72.1°C
		3	LF3	54.7°C	81.5°C
		4	C6	58.1°C	84.6°C
		5	L2	77.1°C	105.3°C
		6	T51	65.1°C	92.6°C
		7	Q62	55.2°C	81.7°C
		8	RY1	60.2°C	87.6°C
		9	L3	86.6°C	117.7°C
		10	T1-1	71.4°C	101.2°C
		11	T1-2	60.9°C	91.3°C
		12	T2-1	78.4°C	107.4°C
		13	T2-2	77.3°C	107.0°C
		14	C925	72.3°C	101.8°C
		15	C118	50.6°C	79.0°C
		16	C120	55.5°C	84.0°C
		17	C125	50.0°C	78.0°C
		18	Q103	51.3°C	79.3°C
		19	U101	55.0°C	82.3°C
		20	Q201	51.4°C	79.0°C
		21	U201	90.9°C	112.2°C
		22	Q903	62.6°C	91.0°C
		23	RT15	55.4°C	82.0°C
		24	D56	75.5°C	97.9°C
		25	Q901	66.7°C	97.9°C
		26	U1	54.5°C	82.1°C
		27	U703	50.1°C	78.5°C
		28	C475	87.0°C	106.5°C
		29	T951	90.9°C	106.9°C
		30	D420	78.4°C	100.4°C
		31	U400	76.1°C	99.3°C
		32	C405	65.0°C	90.7°C
		33	Q480	84.0°C	104.0°C
		34	TSW1	73.4°C	97.5°C
		35	TSW2	56.6°C	85.1°C

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 218.86K hrs min. Telcordia SR-332 (Bellcore) ; 69.81K 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