



Test Report: UHP-1000-12

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

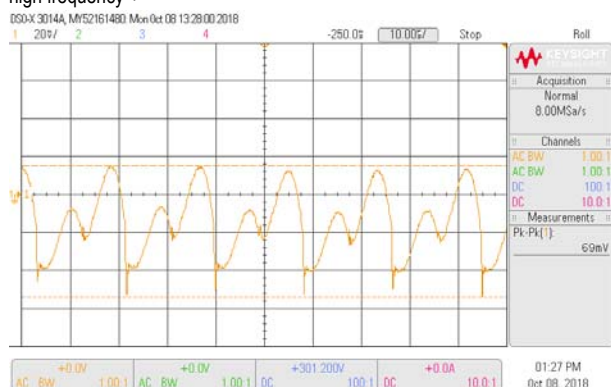
ENVIRONMENT TEST

DESIGN VERIFY TEST

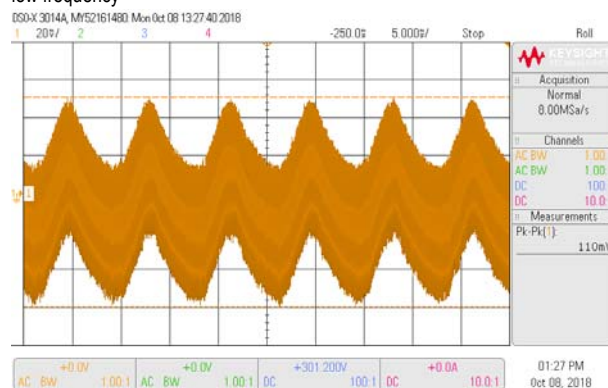
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 12 V~ 14.4V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	11.7V~14.78V/230VAC 11.68V~14.79V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1%~ -1%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.33%~ -0.33 %
3	LINE REGULATION (Max)	V1: 0.5%~ -0.5%	I/P: 180VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0%
4	LOAD REGULATION(Max)	V1: 0.5%~ -0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.33%~ -0.33 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 110m Vp-p

high frequency :



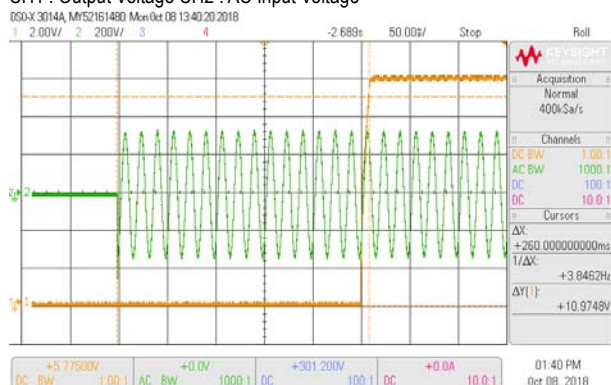
low frequency :



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/ 260 ms 115VAC/ 398 ms
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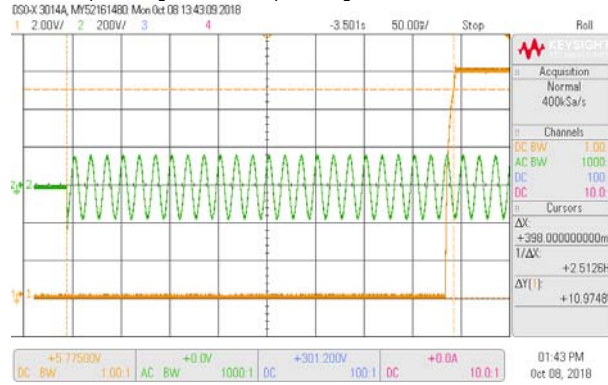
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

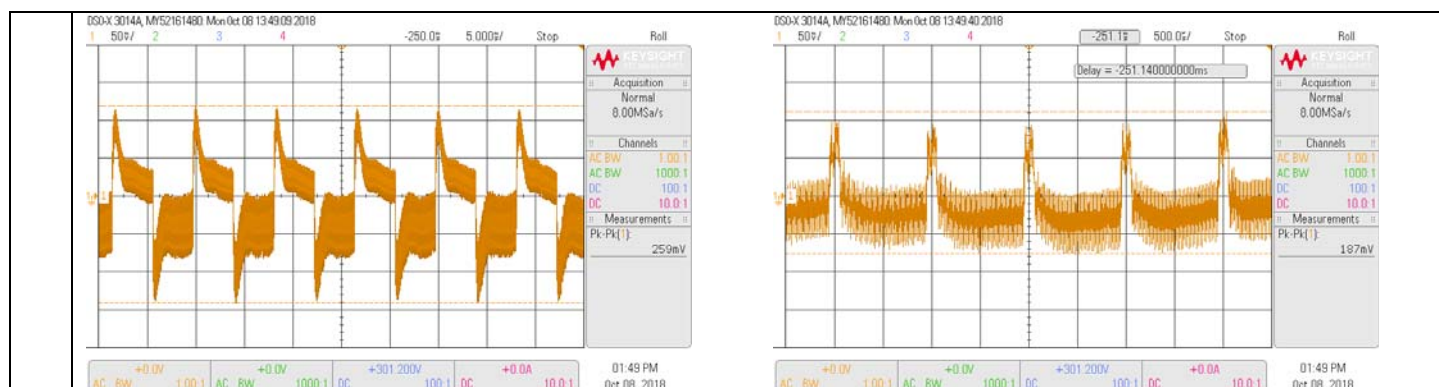


INPUT=115VAC/60HZ @ 78% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



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/ 7.6 ms 115VAC/ 7.8 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/ 15.7ms 115VAC/ 20.8 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: 1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	259mVp-p 187mVp-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 =4.53A/ 230VAC I =9.19A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25℃	L-FG : 0.52 mA N-FG : 0.5 mA
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=0.983/230VAC PF=0.996/115VAC
	P.F vs LOAD			

6	EFFICIENCY(Typ.)	94%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.23 %
	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	

8	NO LOAD CONSUMPTION	---	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	12.17 W/115VAC 9.53 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	115.83%/ 264VAC 115.83%/ 230VAC 115.83%/180VAC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
2	OVER VOLTAGE PROTECTION	14.5V~16V 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	15.483V/ 264VAC 15.5V/ 230VAC 15.446V/ 90VAC 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: 264VAC I/P: 90VAC O/P:FULL LOAD	O.T.P.Active Protection type : 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

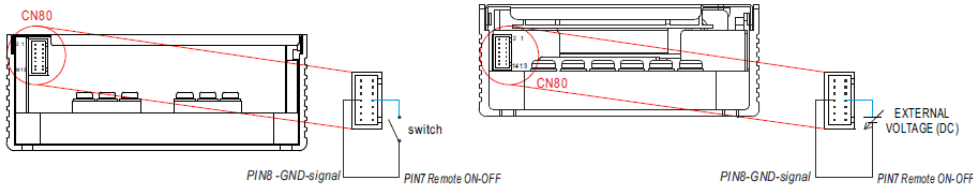
CONTROL FUNCTION TEST

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><tr><th>AUX</th><th>TOLERANCE</th><th>RIPPLE</th><th>TEST RESULT</th></tr><tr><td>12V / 0.5A</td><td>10.8~13.2 V</td><td>150mVp-p</td><td>12.24V/63.4mVp-p</td></tr></table>			AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 0.5A	10.8~13.2 V	150mVp-p	12.24V/63.4mVp-p
AUX	TOLERANCE	RIPPLE	TEST RESULT									
12V / 0.5A	10.8~13.2 V	150mVp-p	12.24V/63.4mVp-p									

2 REMOTE ON/OFF CONTROL

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.



Remote ON-OFF	Power Supply Status
"Low" <0~0.5V or Short circuit	ON
"Hi" >2~5V or Open circuit	OFF

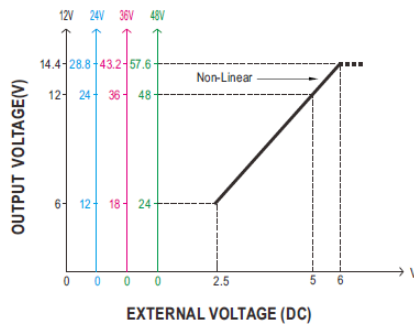
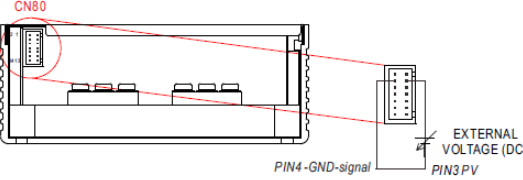
I/P: 230 VAC
O/P:FULL LOAD
Ta:25°C
Test Result :

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 :

	PV	2.5V	5V	6V
MODEL				
SPEC		5.85~6.15V	11.7~12.3V	14.1~14.7V
Vout		5.93V	12.02V	14.44V

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. OUTPUT CURRENT (%) EXTERNAL VOLTAGE(VDC) I/P: 230 VAC O/P:TESTING Ta:25°C TEST RESULT : <table><tr><td>Vo</td><td colspan="2">12V(100%Vo)</td><td colspan="2">14.4V(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>12~20A</td><td>76~84A</td><td>12~20A</td><td>62.64~70.64A</td></tr><tr><td>TEST</td><td>18.01A</td><td>81.7A</td><td>14.9A</td><td>67.7A</td></tr></table>				Vo	12V(100%Vo)		14.4V(120%Vo)		PC	1V	5V	1.83V	5V	SPEC	12~20A	76~84A	12~20A	62.64~70.64A	TEST	18.01A	81.7A	14.9A	67.7A
Vo	12V(100%Vo)		14.4V(120%Vo)																						
PC	1V	5V	1.83V	5V																					
SPEC	12~20A	76~84A	12~20A	62.64~70.64A																					
TEST	18.01A	81.7A	14.9A	67.7A																					
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 =4.97V PSU turn off = 0.02V																					

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q902 22 A/ 650V	I/P: High-Line +3V = 303V 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) 486V (2) 490V (3) 486V (4) 490V (5) 490V (6) 490V (7) 482V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q62 22A/ 600V	I/P: High-Line +3V = 303 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	VDS: (1) 437V (2) 425V (3) 409V (4) 409V (5) 437V (6) 401V (7) 421V

			(7)0%→400% Load. Ta:25℃	
3	P.F.C DIODE	D56 22A/ 650V	I/P:High-Line +3V =303 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℃	(1) 348V (2) 368V (3) 356V (4) 372V
4	Diode Peak Voltage	Q100 VDS : 40V Q200 VDS : 40V	I/P:High-Line +3V =303 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℃	Q100: VDS: (1)32V (2)24.3V (3) 32.5V (4) 32.1V (5) 31.9V (6) 31.5V (7) 31.1V (8) 29.5V Q200: VDS: (1)30.3 V (2) 35.6V (3) 34.8V (4) 34.4V (5) 34V (6) 35.2V (7) 34.8V (8) 30.4V
5	Input Capacitor Voltage	C5 :220μ/ 450V SURGE VOLTAGE=500V	I/P:High-Line +3V =303V 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℃	(1) 449V (2) 449V (3) 446V (4) 448V
6	Control IC Voltage Test	PFC IC U1 Rated 10.6V~ 21 V PWM IC U2 Rated 8.85 V~ 16V O/P U101 Rated 8V~ 24V	I/P:High-Line +3V =303 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℃	U1 (1) 13.6V (2) 13.6V (3) 13.2V (4) 13.2V (5) 10.81V U2 (1) 12.57V (2) 11.53V (3) 11.37V (4) 11.93V (5) 10.16V U101 (1) 12.57V (2) 13.06V (3) 12.33V (4) 11.45V (5) 11.13V
7	TOP SWITCHING STAND BY POWER	U400 : 1.8A/ 700V	I/P:High-Line +3V =303V AC ON/OFF O/P: (1)Full Load (2)Remote On/Off Ta:25℃	(1) 558V (2) 553V

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℃	I/P-O/P:6.9mA I/P-FG:7.59mA O/P-FG:4.75mA 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℃	I/P-O/P: 2.56GΩ I/P-FG: 1.01GΩ O/P-FG: 2.72GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	17mΩ

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℃	PASS
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25℃	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25℃	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℃	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-1000-12 (Operate with additional aluminum plate) 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 ℃ 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 230VAC O/P : FULL LOAD Ta= 45 ℃		

			NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 45 °C
			1	BD2	78.9℃	94.6℃
			2	C11	64.2℃	80.8℃
			3	LF3	58.8℃	76.6℃
			4	C2	50.9℃	68.9℃
			5	LF2	53.5℃	71.5℃
			6	LF1	52.6℃	69.6℃
			7	C65	59.6℃	76.9℃
			8	C6	66.2℃	84.3℃
			9	L1	66.9℃	85.3℃
			10	L2	80.4℃	101.9℃
			11	T51	63.0℃	82.2℃
			12	T52	65.7℃	85.1℃
			13	Q62	60.3℃	77.6℃
			14	Q64	65.5℃	82.8℃
			15	RY1	63.6℃	80.3℃
			16	L3	103.5℃	117.0℃
			17	T1-1	78.8℃	104.7℃
			18	T1-2	84.8℃	109.6℃
			19	T2-1	83.3℃	107.6℃
			20	T2-2	83.6℃	110.0℃
			21	C925	77.7℃	99.1℃
			22	C118	76.6℃	101.1℃
			23	C120	82.9℃	108.5℃
			24	C126	74.1℃	96.0℃
			25	C127	67.6℃	88.4℃
			26	Q101	64.8℃	94.2℃
			27	Q103	71.7℃	92.0℃
			28	U101	66.5℃	90.9℃
			29	Q201	74.4℃	103.1℃
			30	Q202	67.8℃	93.2℃
			31	U201	68.2℃	104.1℃
			32	Q903	81.8℃	105.0℃
			33	D55	64.0℃	85.7℃
			34	Q901	72.8℃	97.7℃
			35	U1	57.7℃	76.0℃
			36	U2	58.7℃	74.7℃
			37	U703	64.3℃	86.0℃
			38	C475	74.1℃	94.4℃
			39	T951	78.3℃	98.8℃
			40	D420	66.8℃	86.8℃
			41	U400	67.6℃	86.3℃
			42	C405	64.3℃	84.3℃
			43	Q480	74.1℃	97.6℃
			44	D405	62.6℃	82.4℃
			45	TSW1	77.4℃	92.2℃
			46	TSW2	76.7℃	98.4℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 111 % LOAD Ta : 25℃		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 45℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 45℃ HUMIDITY= 95 %R.H		TEST : OK	

5	TEMPERATURE COEFFICIENT	$\pm 0.03^{\circ}\text{C}(0\sim 45^{\circ}\text{C})$	I/P : 230 VAC O/P : FULL LOAD	$\pm 0.008\%/^{\circ}\text{C}(0\sim 45^{\circ}\text{C})$
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : $-45^{\circ}\text{C}\sim +90^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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 : $-35^{\circ}\text{C}\sim +45^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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= 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) 56251HRS (2) 9208HRS (3) 58624HRS (4) 200949HRS
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