



Test Report: UHP-750-48

750W 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

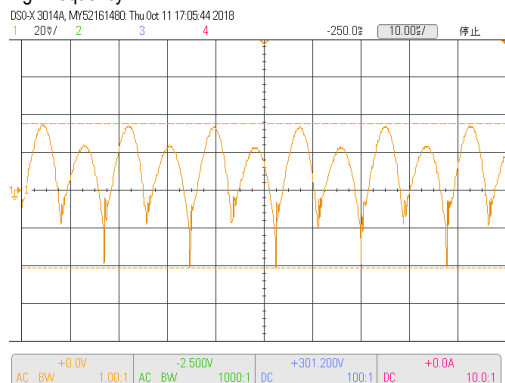
- ENVIRONMENT TEST

DESIGN VERIFY TEST

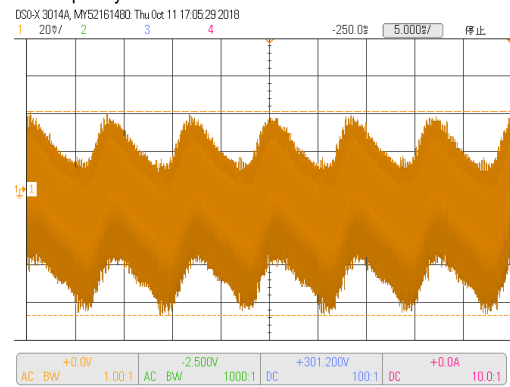
OUTPUT FUNCTION TEST

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	46.08V~59.11V/230VAC 46.08V~59.1V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1%~ -1%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.02%~ 0 %
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: 0.02%~ 0 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 250mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 108 mVp-p

high frequency :



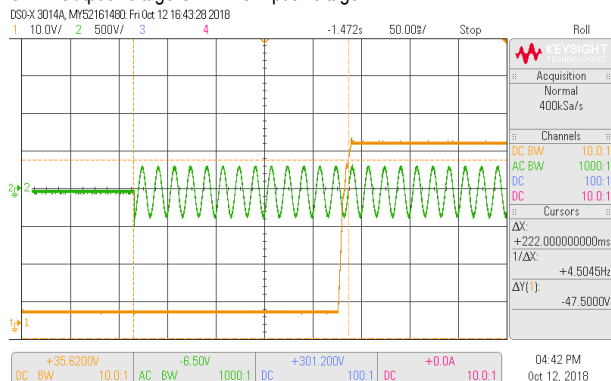
low frequency :



7	SET UP TIME(Max)	230VAC/1000ms 115VAC/1000ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 75% LOAD Ta : 25°C	230VAC/ 222 ms 115VAC/ 265 ms
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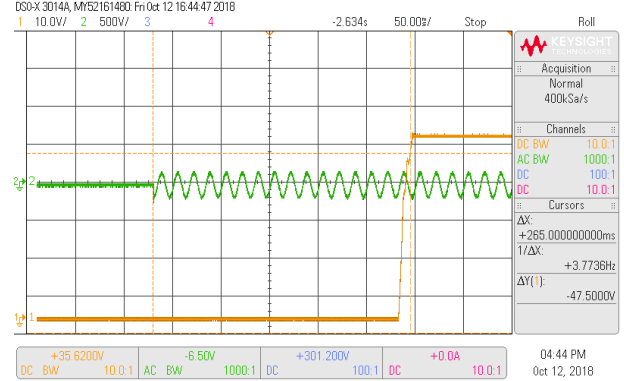
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

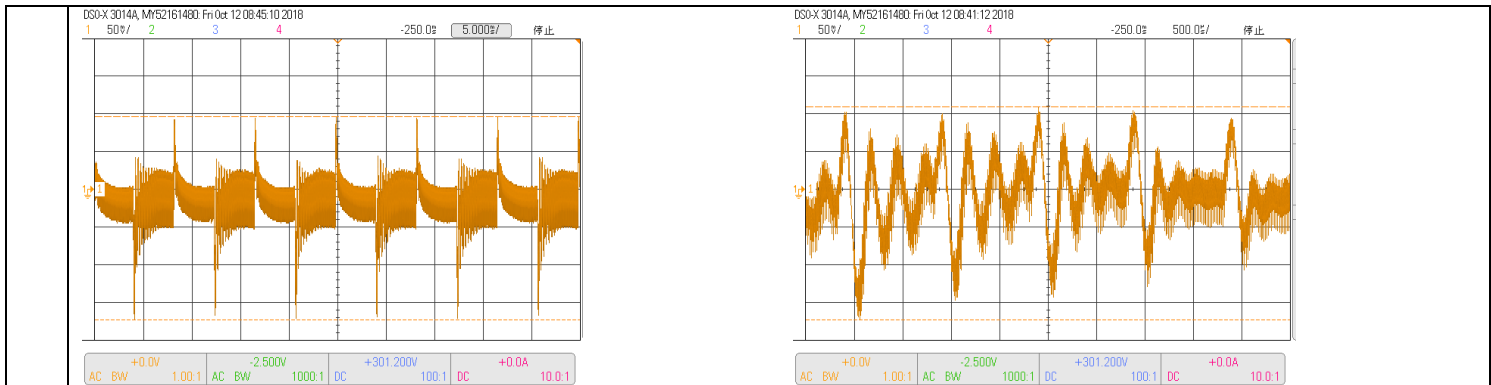


INPUT=115VAC/60HZ @ 75% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

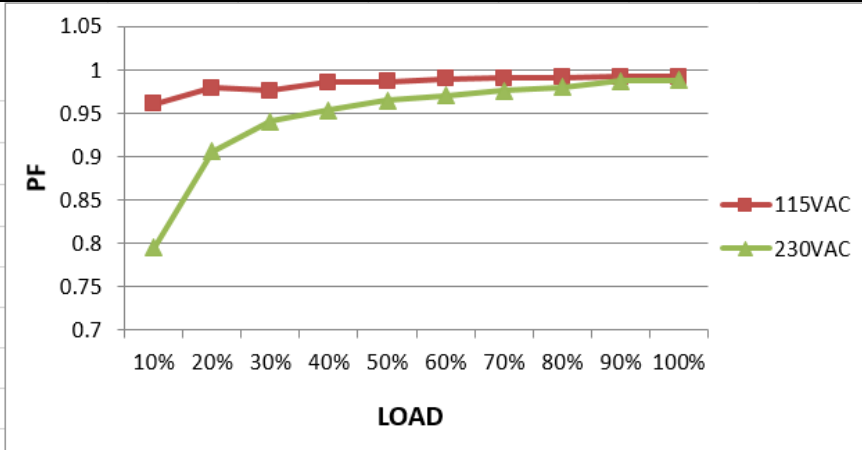


8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 75% LOAD Ta : 25°C	230VAC/ 13 ms 115VAC/ 13.2 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ 75% LOAD</p> <p>CH1 : Output Voltage</p>		
9	HOLD UP TIME (Typ.)	230VAC/12ms 115VAC/12ms	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 75% LOAD Ta : 25°C	230VAC/ 15.2 ms 115VAC/ 15.2 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ 75% LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</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	269mVp-p 281mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		



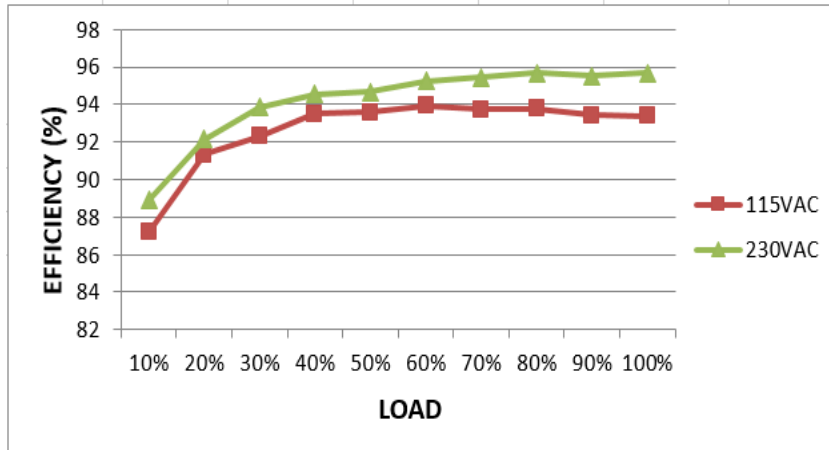
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	80V~264V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL 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/ 3.8 A 115V/ 7.5 A	I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =3.52A/ 230VAC I =7.28A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.39 mA N-FG : 0.38 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 : FULL LOAD Ta : 25°C	PF=0.986/230VAC PF=0.99/115VAC
	P.F vs LOAD			



6	EFFICIENCY(Typ.)	95%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	95.8%
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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 : 75% LOAD Ta : 25°C	I=24.3A/ 230VAC I=11.1A/ 115VAC T50= 1850us/230V
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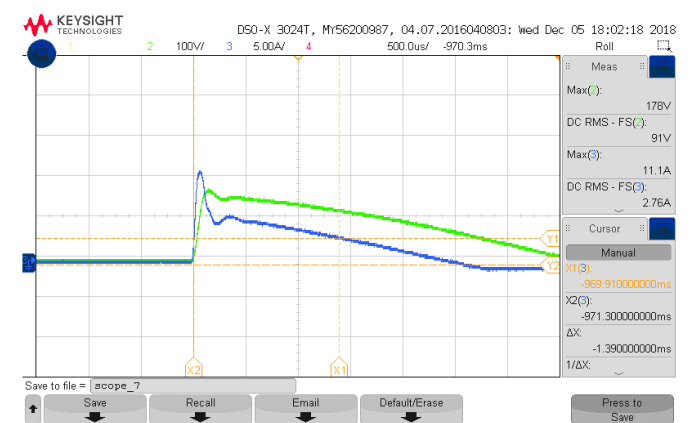
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



INPUT=115VAC/ 60HZ @ 75% LOAD

CH2 : AC Input Voltage CH4 : Input current



8	NO LOAD CONSUMPTION	---	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	3.79 W/115VAC 3.23 W/230VAC
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 125% Protection type : Hiccup mode, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 230VAC I/P: 180VAC O/P: TESTING Ta: 25°C	115.03% / 264VAC 115.03% / 230VAC 114.9% / 180VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
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	62.75 V / 264VAC 62.78V / 230VAC 62.82 V / 90VAC 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 : Shut down O/P voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE Protection type : Hiccup mode, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE PROTECTION TYPE : Protection type : Hiccup mode, recovers automatically after fault condition is removed

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC OK CONTACT RATINGS	30VDC/1A RESISTIVE LOAD	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	TEST : OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q900 Rated 31A / 650 V	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 /	VDS: (1) 458V (2) 466V (3) 458V (4) 458V (5) 458V (6) 474V (7) 482V

			Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C	
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 31A/ 650 V	I/P:High-Line +3V =300V 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)486V (2)478V (3)474V (4)482V (5)470V (6)466V (7)559V
3	P.F.C DIODE	D8 Rated 15 A/ 600 V	I/P:High-Line +3V =300V 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) 470V (2) 406V (3) 458V (4) 466V
4	Diode Peak Voltage	Q102 Rated VDS : 150V Q100 Rated VDS : 150V	I/P:High-Line +3V =300V 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	Q102: VDS: (1)118.2V (2)114.1V (3)113.3V (4)113.3V (5)113.3V (6)113.3V (7)109.3V (8)111.7V Q100: VDS: (1)103.7V (2)103.7V (3)103.7V (4)103.7V (5)104.5V (6)103.7V (7)104.5V (8)111V
5	Input Capacitor Voltage	C5 Rated: : 150μ/ 450 V 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)449V (2)441V (3)448V (4)449V
6	Control IC Voltage Test	PFC IC U1 Rated 10.5V~ 20V PWM IC U2 Rated 8.85V~ 16 V O/P IC U101 Rated 8V~ 24V	I/P:High-Line +3V =300V 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 (1) 15.6V (2) 13.8V (3) 13V (4) 14.2V (5) 13.6V U2 (1) 15.6V (2) 12.4V (3) 12.4V U101 (1) 12.35V (2) 7.45V (3) 7.29V (4) 11.87V (5) 9.45V

			(4) 14.4V (5) 12.7V	
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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: 5.41mA I/P-FG: 4.98mA O/P-FG: 4.33mA 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: 12.5GΩ I/P-FG: 6.5GΩ O/P-FG: 1.3GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	18 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 <u>INDUSTRY</u> 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 <u>INDUSTRY</u> INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 <u>INDUSTRY</u> 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-750-48 (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 : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C		

		NO	Position	ROOM AMBIENT Ta=25°C	HIGH AMBIENT Ta= 50°C
		1	BD1	60.1°C	83.3°C
		2	LF3	49.8°C	73.7°C
		3	ZR1	42.8°C	66.7°C
		4	C10	55.3°C	79.2°C
		5	L2	70.0°C	94.6°C
		6	Q1	49.6°C	73.9°C
		7	Q900	66.4°C	94.4°C
		8	C426	51.4°C	76.9°C
		9	T1-1	69.6°C	96.0°C
		10	T1-2	65.0°C	91.1°C
		11	T2-1	68.2°C	94.5°C
		12	T2-2	66.3°C	93.1°C
		13	C120	42.7°C	68.5°C
		14	C126	38.6°C	64.0°C
		15	C251	47.4°C	73.3°C
		16	RY11	41.4°C	66.2°C
		17	TSW1	51.5°C	75.8°C
		18	C5	47.8°C	72.3°C
		19	RY1	51.5°C	75.6°C
		20	C920	51.7°C	77.0°C
		21	U1	44.0°C	68.5°C
		22	U101	51.8°C	78.1°C
		23	Q101	43.8°C	69.4°C
		24	Q103	44.6°C	70.0°C
		25	Q200	43.3°C	68.4°C
		26	Q202	44.4°C	70.8°C
		27	C410	59.9°C	85.9°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	± 0.001%/°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~ +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	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) 1007305HRS (2) 168421HRS (3) 215514HRS (4) 262703HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 833.9K hrs min. Telcordia SR-332 (Bellcore) ; 104.9K 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