Test Report: XDR-960E-48

960W AC/DC Economical Ultra Slim Industrial DIN Rail Power

■ 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

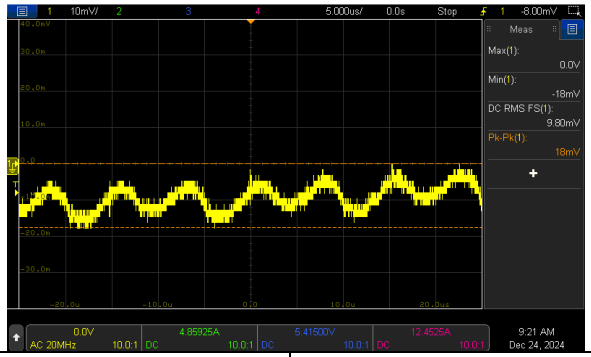
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

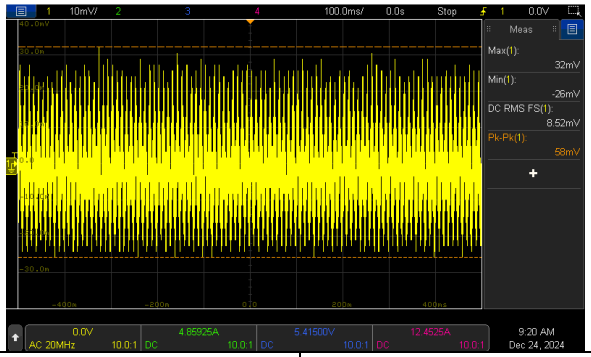
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 48V~55V	I/P： 230 VAC O/P：MIN LOAD Ta：25℃	46.288V~56.85V/230VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ +1%	I/P: 180VAC~ 264VAC O/P:FULL~ MIN. LOAD Ta:25℃	V1: -0.0291% ~ 0%
3	LINE REGULATION	V1: -0.5% ~ +0.5%	I/P: 180VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: 0% ~ 0.0042%
4	LOAD REGULATION	V1: -1% ~ +1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.0062% ~ 0.0229%
5	OVER/UNDERSHOOT TEST	<±5%	I/P: 230VAC O/P:FULL LOAD / NO LOAD Ta:25℃	0.73%→FULL LOAD 1.10% →NO LOAD
6	RIPPLE & NOISE (Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	18mVp-p / high frequency 58mVp-p / low frequency

high frequency：

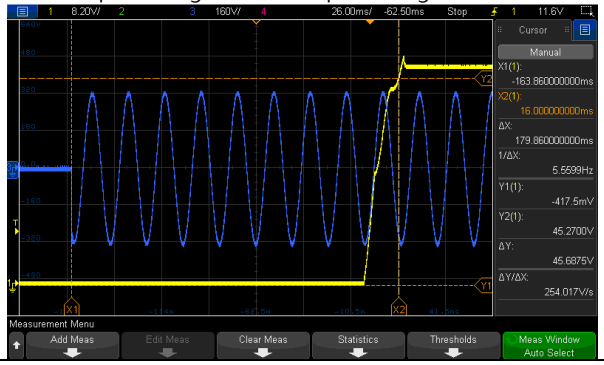


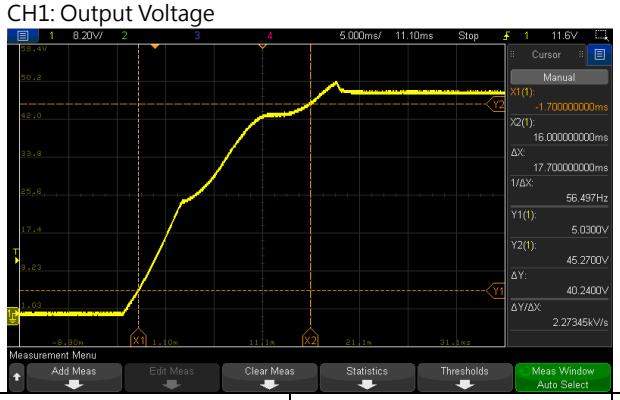
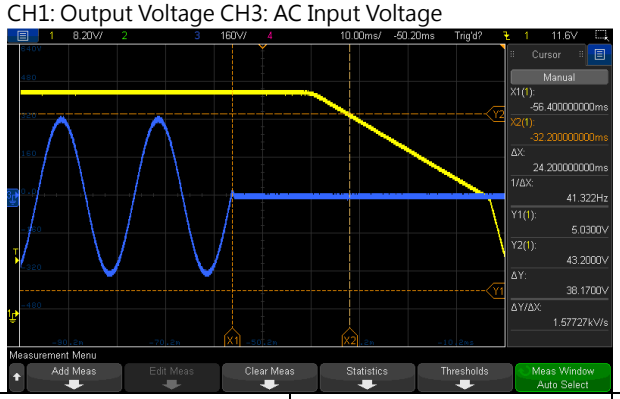
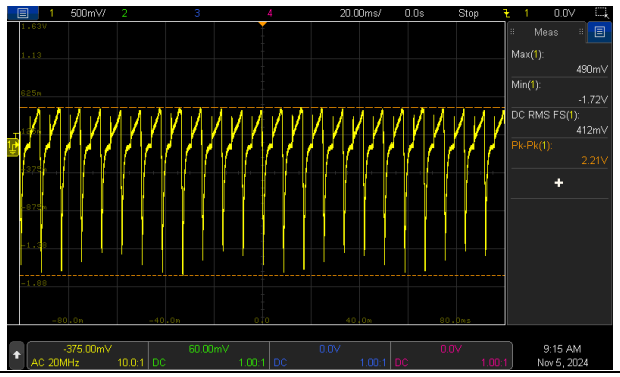
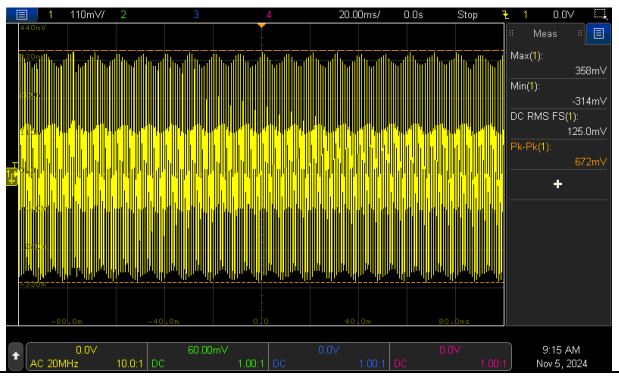
low frequency：



7	SET UP TIME (Max)	230VAC/500ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 179.86ms

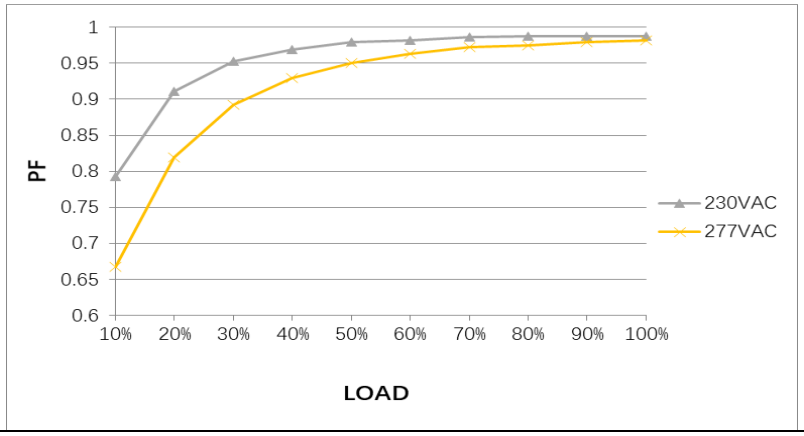
INPUT=230VAC/50HZ @ FULL LOAD
CH1: Output Voltage CH3: AC Input Voltage

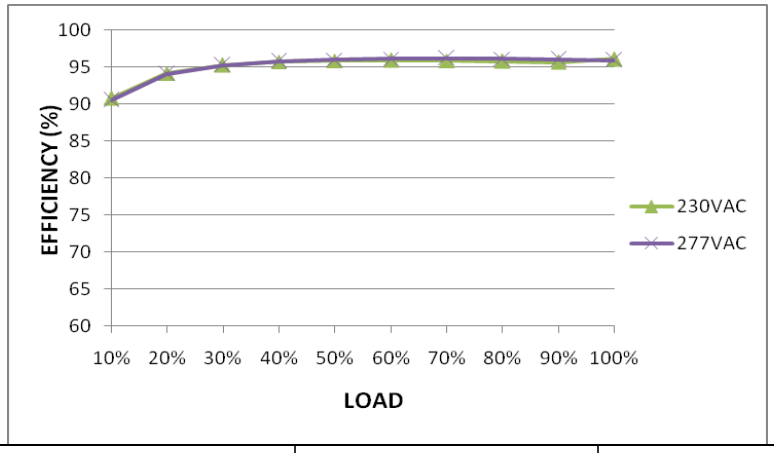
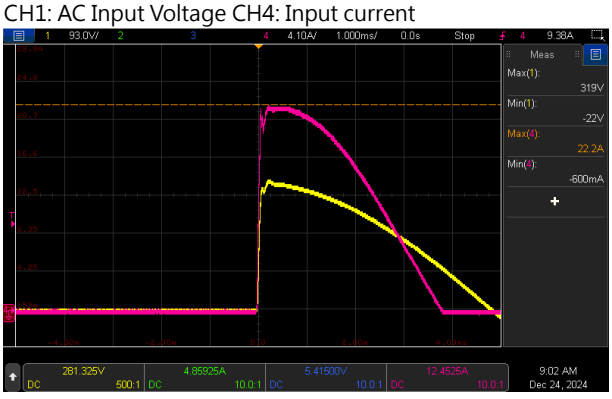
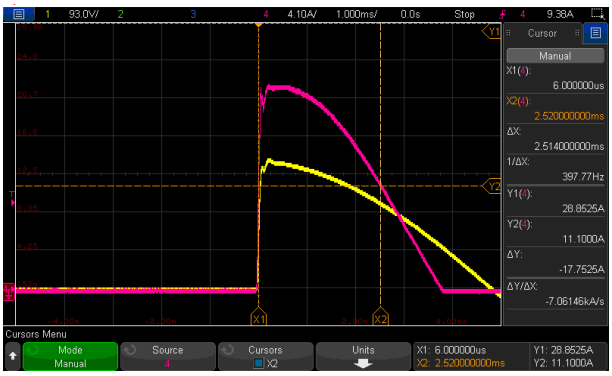


8	RISE TIME (Max)	230VAC/50ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 17.7ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage 			
9	HOLD UP TIME (Typ.)	230VAC/ 15ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 24.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage 			
10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1) FULL/ MIN LOAD 50%DUTY / 120HZ (2) FULL/ MIN LOAD 50%DUTY / 1KHZ Ta:25℃	2210mVp-p 672mVp-p
	FULL / MIN LOAD 50%DUTY / 120HZ 		FULL / MIN LOAD 50%DUTY / 1KHZ 	

11	TRANSIENT RECOVERY TIME	V1: 4800mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	397mVp-p

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~264VAC 254.5VDC~ 370VDC	(1) I/P: TESTING O/P: FULL / 85% LOAD (2) I/P: DC TESTING (L: + N: -) O/P: FULL / 85% LOAD (3) I/P: DC TESTING (L: - N: +) O/P: FULL / 85% LOAD Ta:25℃	(1)137.2VAC~264VAC/ FULL LOAD 137.2VAC~264VAC/ 85% LOAD (2) 125.8Vdc~370Vdc/FULL LOAD 125.8Vdc~370Vdc/85% LOAD (3) 125.8Vdc~370Vdc/FULL LOAD 125.8Vdc~370Vdc/85% LOAD
			I/P: HIGH-LINE+15%=300V 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:180VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST：OK
3	INPUT CURRENT (Typ.)	230V/ 4.5A	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =4.427A/ 230VAC
4	LEAKAGE CURRENT	< 3.5mA / 240 VAC	I/P： 240 VAC/60HZ O/P：Min LOAD Ta：25℃	1.14mA
5	NO LOAD CONSUMPTION	< 3.6W	I/P：230VAC O/P：NO LOAD Ta：25℃	2.91W/ 230VAC
6	POWER FACTOR (Typ.)	0.95/ 230VAC	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	PF=0.9883/230VAC
	P.F vs LOAD			

7	EFFICIENCY(Typ.)	95.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	96.07%
	EFFICIENCY vs LOAD 			
8	INRUSH CURRENT(Typ.)	230V/30A COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 22.2A/ 230VAC T50= 2514us/230V
	INPUT=230VAC/50HZ @ FULL LOAD CH1: AC Input Voltage CH4: Input current  			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~130% rated output power Protection type: Hiccup mode when output voltage <30%, recovers automatically after fault condition is removed Constant current limiting without shutdown within 30%~100% rated output voltage, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 230VAC I/P: 200VAC O/P:TESTING Ta:25℃	119.3%/ 264VAC 119.3%/ 230VAC 119.3%/ 200VAC PROTECTION TYPE： Hiccup mode when output voltage <30%, recovers automatically after fault condition is removed Constant current limiting without shutdown within 30%~100% rated output voltage, recovers automatically after fault condition is removed

2	OVER VOLTAGE PROTECTION	56V~65V Protection type: Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 180VAC O/P:MIN LOAD Ta:25℃	61.2V/ 264VAC 61.2V/ 180VAC 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: 180VAC 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 Protection type: Hiccup mode, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 180VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE OK 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 30VAC/0.5A RESISTIVE LOAD	I/P:230VAC O/P:FULL LOAD Ta:25℃	TEST : OK
2	PARALLEL	Up to 3840W (3+1) units; Please refer to the Instruction manual	I/P : 230 VAC O/P : TESTING LOAD Ta : 25℃	TEST : OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q13/Q14 Rated: 62A/600 V	AC ON/OFF I/P: High-Line +3V =267V 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℃	Q13 VDS: (1) 451V (2) 510V (3) 456V (4) 441V (5) 441V (6) 450V (7) 504V	Q14 VDS: (1) 470V (2) 518V (3) 470V (4) 470V (5) 469V (6) 454V (7) 481V

2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated: 64A/600 V	AC ON/OFF I/P: High-Line +3V =267V 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℃	Q2 : VDS: (1) 472V (2) 472V (3) 469V (4) 472V (5) 472V (6) 469V (7) 460V
3	P.F.C DIODE	D18 Rated: 8A/ 650V	I/P: High-Line +3V =267V 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) 434V (2) 450V (3) 437V (4) 440V
4	Diode Peak Voltage	Q100/Q107 Rated：74A/ 200V	AC ON/OFF I/P: High-Line +3V =267 V Vo=Vomax 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 脫離前 Vo=Vnormal O/P: (1) Full Load Ta:25℃	Q100 : Vo=Vomax VDS: (1) 128.4V (2) 128.4V (3) 134.0V (4) 136.5V (5) 137.3V (6) 136.5V (7) 126.3V (8) 126.3V (9) 127.2V Vo=Vnormal (1) 119.7V Q107 : Vo=Vomax VDS: (1) 126.1V (2) 126.9V (3) 130.2V (4) 133.6V (5) 133.6V (6) 129.6V (7) 124.7V (8) 126.4V (9) 125.5V Vo=Vnormal (1) 117.0V
5	Input Capacitor Voltage	C5 : Rated：180u/450V	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 Ta:25℃	(1) 428V (2) 436V (3) 445V (4) 430V

6	Control IC Voltage Test	PWM IC U5 Rated：8.9V~ 15.5V PFC IC U2 Rated：9.75V~ 20V O/P IC U100 Rated：4.2V~35V U103 Rated: 4.5V~ 36V U104 Rated: 3.3~24 V	AC ON/OFF I/P: High-Line +3V =267 V O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin (LOW LINE) Ta:25℃	U2/U5： (1) 14.1V (2) 14.1V (3) 14.1V (4) 14.0V (5) 14.0V U100/U103/U104： (1) 11.66V (2) 11.89V (3) 11.74V (4) 11.51V (5) 11.58V

SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4 K VAC/min I/P-FG : 2 K VAC/min O/P-FG: 1.5 KVAC/min O/P-DC OK: 0.5 KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 1.8 KVAC/min O/P-DC OK: 0.6 KVAC/min Ta:25℃	I/P-O/P: 4.62 mA I/P-FG: 3.01 mA O/P-FG: 6.02 m A O/P-DC OK: 0.007 m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ O/P-FG: 500 VDC>100MΩ I/P-FG: 500 VDC >100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25℃	I/P-O/P: 50 GΩ I/P-FG: 50 GΩ O/P-FG: 50 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	8mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 ■ CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ PASS □ FAIL
2	CONDUCTION	BS EN/EN55032 (CISPR32) / BS EN/EN61204-3 / CNS15936 CLASS B	I/P： 230 VAC (50HZ)/115 VAC (60HZ) O/P：FULL/50% LOAD/10% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032 (CISPR32) / BS EN/EN61204-3 / CNS15936 CLASS B	I/P： 230 VAC (50HZ)/115 VAC (60HZ) O/P：FULL/50% LOAD/10% LOAD Ta：25℃	PASS Test by certified Lab

4	E.S.D	BS EN/EN61000-4-2 AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	■ CRITERIA A □ CRITERIA B
5	E.F.T	BS EN/EN61000-4-4 INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	■ CRITERIA A □ CRITERIA B
6	SURGE	BS EN/EN61000-4-5 2KV/Line-Line 4KV/Line-Line-Chassis	I/P： 230 VAC/50HZ O/P：MIN/FULL LOAD D Ta：25℃	■ CRITERIA A □ CRITERIA B
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： XDR-960E-24 1. ROOM AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 21.7 ℃ 2. HIGH AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 51.8 ℃		

NO	Position	ROOM AMBIENT Ta=21.7℃	HIGH AMBIENT Ta=51.8℃
1	C2	65.3℃	94.4℃
2	LF2	69.8℃	99.1℃
3	BD1	91.9℃	116℃
4	RTH2	73.6℃	102.4℃
6	L5	76.7℃	105.4℃
7	Q4	63.5℃	91.9℃
8	Q2	67.4℃	95.5℃
9	C60	55℃	84℃
10	C5	55.7℃	84.4℃
11	C6	53.6℃	82.2℃
12	Q5	62.3℃	90.5℃
13	U2	58.5℃	86.7℃
14	D19	70.2℃	98.2℃
15	U1	66.2℃	93.5℃
16	D18	64.2℃	92.1℃
17	D16	62.5℃	90.4℃
18	Q14	63.5℃	92.5℃

NO	Position	ROOM AMBIENT Ta=21.7℃	HIGH AMBIENT Ta=51.8℃
19	T1coil	72.1℃	101.3℃
20	T1core	65.3℃	94.4℃
21	C52	67.5℃	96.4℃
22	C63	61.9℃	92.2℃
23	T2	52.5℃	83.5℃
24	C134	62.6℃	92.4℃
25	D103	65.1℃	93.8℃
26	U5	67.6℃	96.6℃
27	U6	74.4℃	103.5℃
28	Q9	66.6℃	94.7℃
29	D23	60.9℃	89.7℃
30	C51	62.9℃	91.9℃
31	Q101	67.5℃	97.2℃
32	Q103	69.4℃	99.1℃
33	Q105	71.2℃	101.3℃
34	RTH3	63.5℃	93.1℃
35	U100	70.3℃	101.8℃
36	U103	66.1℃	94.5℃
37	U9	61.6℃	90.3℃
38	D32	64.9℃	93.1℃
39	U102	79℃	109.1℃
40	ZNR1	53.2℃	82.7℃
41	LF100	78.9℃	108.7℃
42	C107	71.4℃	100℃
43	C108	70.5℃	99.6℃
44	RY100	67.3℃	96.2℃
45	C103	68℃	98.9℃
46	R105	66.1℃	97.2℃
47	TSW1	63.3℃	91.5℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P：118.8%LOAD Ta：25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/200VAC O/P： 100%LOAD Ta= -35 ℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃/95 %R.H NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 50℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	±0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	0.006 %/℃(0~50℃)
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： STATIC	

7	THERMAL SHOCK TEST	-30~50℃	1. Thermal shock Temperature： -35℃~ +55℃ 2. Temperature change rate ：25℃ / 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, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：3G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃
9	CAPACITOR LIFE CYCLE	SUPPOSE C109 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta=50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 154834.9HRS (2) 29952.1HRS (3) 116959.3HRS (4) 303826.9HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction Khrs min. Telcordia SR-332 (Bellcore)； K hrs min. MIL-HDBK-217F (25℃)	
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure：30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Hanxr	Liutt	Wangzd

2020.10.1 TAG-QA-00