Test Report: LRS-100N2-48

100W Single Output High Peak Power 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

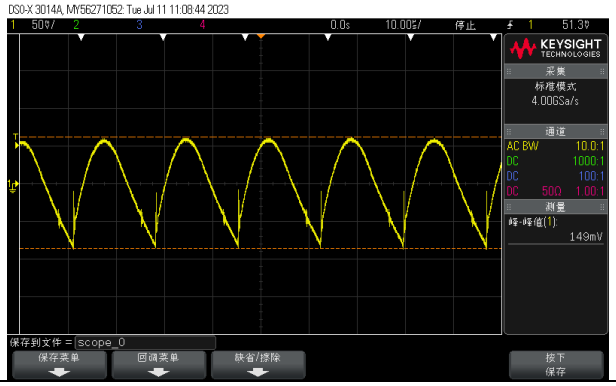
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

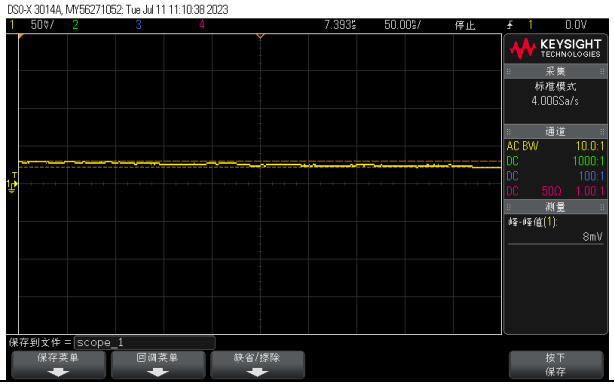
OUTPUT FUNCTION TEST

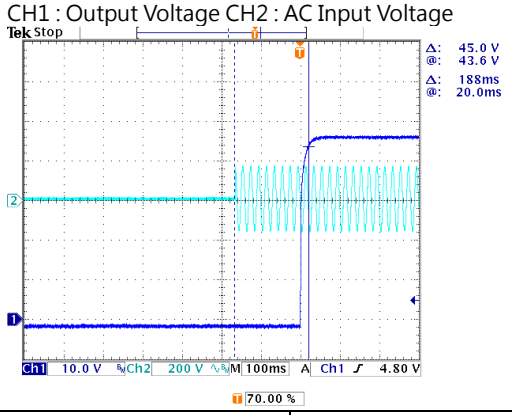
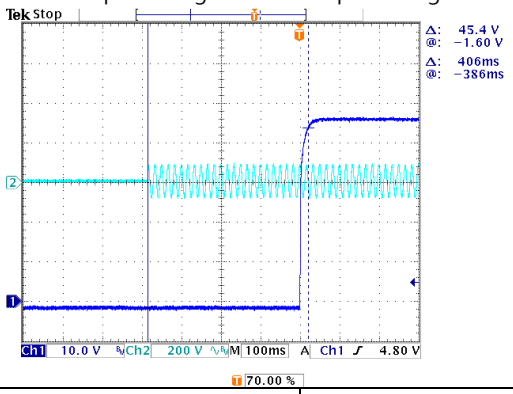
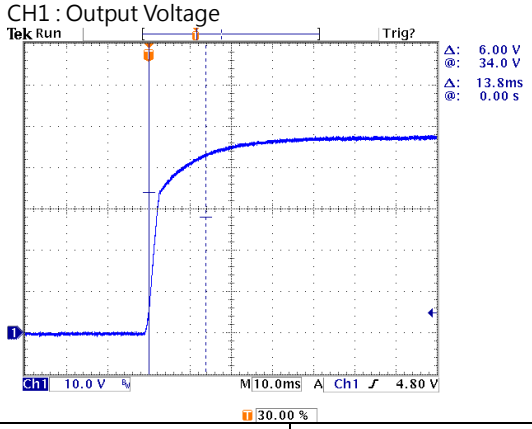
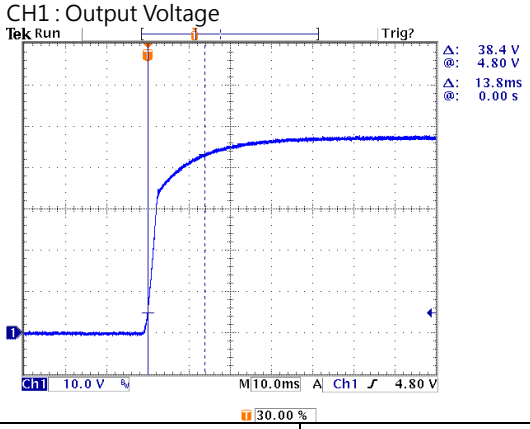
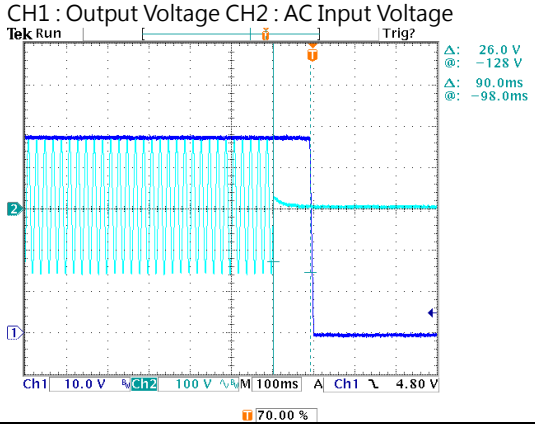
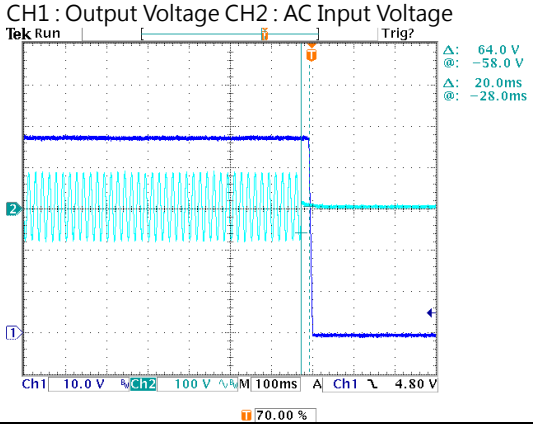
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43.2V~52.8V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	41.76V~55.42V/230VAC 41.78V~55.40V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1%~ 1%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: 0.06%~0.08%
3	LINE REGULATION	V1: -0.5%~0.5%	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0.02%~0.02%
4	LOAD REGULATION	V1: -0.5%~0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.02%~0.02%
5	OVER/UNDERSHOOT TEST	<± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	0.2%
6	RIPPLE & NOISE (Max)	V1: 200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 149mVp-p

high frequency：



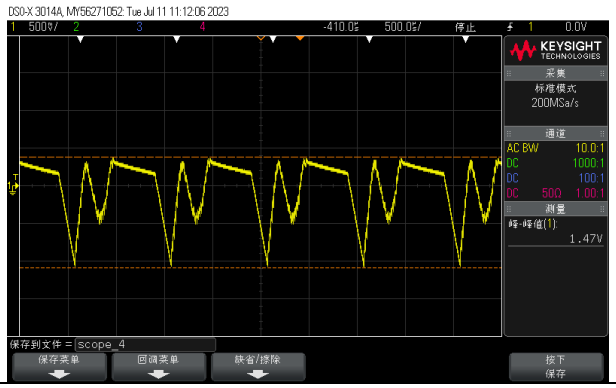
low frequency：



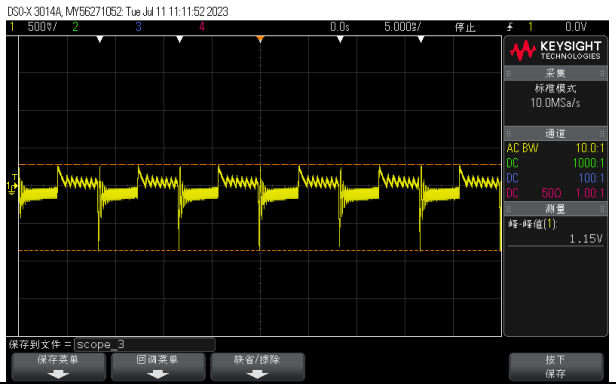
7	SET UP TIME(Max)	230VAC/500ms 115VAC/500ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/188ms 115VAC/406ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1：Output Voltage CH2：AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1：Output Voltage CH2：AC Input Voltage 	
8	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 13.8ms 115VAC/13.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1：Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1：Output Voltage 	
9	HOLD UP TIME (Typ.)	230VAC/55ms 115VAC/10ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/90ms 115VAC/20ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1：Output Voltage CH2：AC Input Voltage 		INPUT=115VAC/60HZ @ FULL 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℃	1470mVp-p 1150mVp-p

FULL /50% LOAD 50%DUTY / 120HZ

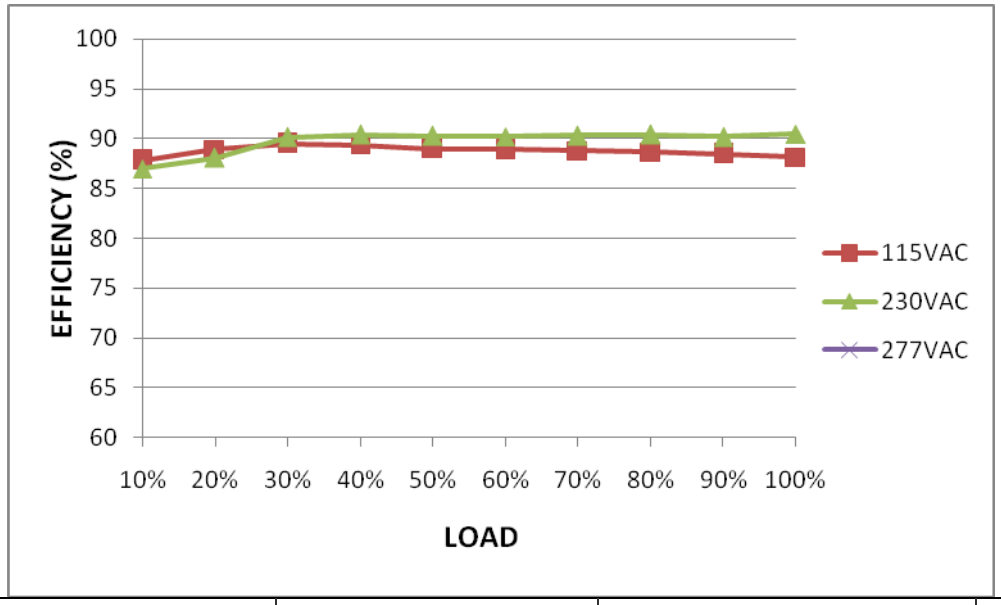
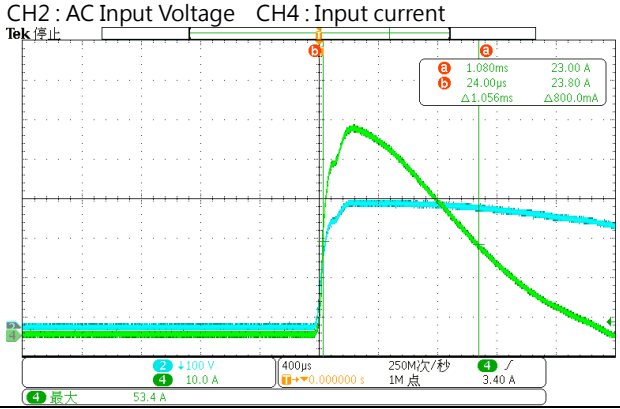


FULL /50% LOAD 50%DUTY / 1KHZ

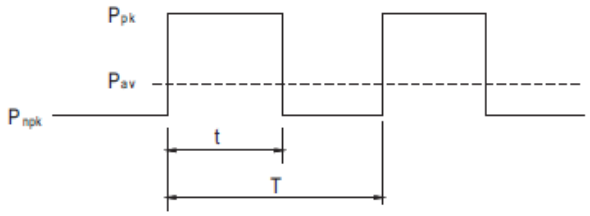


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC 120VDC~ 373VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25℃	(1) 82V~267V (2)117 Vdc~373Vdc/FULL LOAD 117Vdc~373Vdc/50% LOAD (3) 117Vdc~373Vdc/FULL LOAD 117Vdc~373Vdc/50% LOAD
			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/ 1.2A 115V/ 2.1A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =1.11A/ 230VAC I =1.89A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	L -FG: 0.352mA N-FG: 0.358mA

5	NO LOAD CONSUMPTION	< 0.5W	I/P：115VAC I/P：230VAC O/P：NO LOAD Ta：25℃	<0.35W/115VAC < 0.44W/230VAC
6	EFFICIENCY(Typ.)	90.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	90.7%
	EFFICIENCY vs LOAD 			
7	INRUSH CURRENT(Typ.)	230V/55A COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =53.4A/ 230VAC T50=1056us/230V
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current 			

FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PEAK POWER	I/P: 230 VAC O/P:PEAK LOAD (1Hour NO DAMGE) Ta:25℃ Test Result：PASS ■ Function Manual 1.Peak Power $P_{av} = \frac{P_{pk} \times t + P_{npk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5\,sec$ P_{av} : Average output power (W) P_{pk} : Peak output power (W) P_{npk} : Non-peak output power(W) P_{rated} : Rated output power(W) t : Peak power width(sec) T: Period(sec) 		

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~200%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	131.92%/ 264VAC 131.74%/ 230VAC 136.9%/100VAC PROTECTION TYPE：Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover 238.7%/ 264VAC 236.9%/ 230VAC 221.7%/100VAC PROTECTION TYPE：Ouput power >200% rated, hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	55.2V~64.8V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25℃	60.98V/ 264VAC 60.82V/ 230VAC 61.26V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 24A/650V	AC ON/OFF I/P:High-Line +3V =300V 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. (8)PEAK LOAD I/P:Low-Line -3V = 97V 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)PEAK LOAD Ta:25℃	VDS: (1) 620V (2) 548V (3) 632V (4) 632V (5) 640V (6) 630V (7) 624V (8) 616V VDS: (1) 359V (2) 287V (3) 363V (4) 359V (5) 353V (6) 327V (7) 287V (8) 355V
2	Diode Peak Voltage	D101 Rated: 20A/400V	AC ON/OFF I/P:High-Line +3V =300 V 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℃	D101: VDS: (1) 292V (2) 228V (3) 294V (4) 292V (5) 288V (6) 290V (7) 226V (8) 288V

3	Input Capacitor Voltage	C5 Rated: 180μ /400V Surge voltage: 450 V	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℃	 (1)423V (2)419V (3)419V (4) 419V
4	Control IC Voltage Test	PWM IC U1 Rated 9.5V~28V O/P IC U102 Rated -0.3V~ 40V	AC ON/OFF I/P:High-Line +3V =300V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE) Ta:25℃	 (1) 14.42V (2) 12.17V (3) 14.42V (4) 12.1V (5) 14.3V (1) 23V (2) 0.3V (3) 23V (4) 23V (5) 23.4V (6)

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25℃	I/P-O/P:2.242mA I/P-FG:1.842mA O/P-FG:1.623m A 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: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	11mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P: ≤80% LOAD Ta:25℃	PASS_
2	CONDUCTION	Compliance to EAC TP TC 020	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	Compliance to EAC TP TC 020	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL : LRS-100N2-48
1. ROOM AMBIENT BURN-IN : 2 HRS
I/P : 230VAC O/P : FULL LOAD Ta=29.1 ℃
2. HIGH AMBIENT BURN-IN : 2 HRS
I/P : 230VAC O/P : FULL LOAD Ta=52.8 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=29.1 ℃</th><th>HIGH AMBIENT Ta=52.8 ℃</th></tr>
<tr><td>1</td><td>RTH1</td><td>88.8℃</td><td>100.3℃</td></tr>
<tr><td>2</td><td>BD1</td><td>61.3℃</td><td>83.9℃</td></tr>
<tr><td>3</td><td>C5</td><td>50.8℃</td><td>75.1℃</td></tr>
<tr><td>4</td><td>D5</td><td>75.6℃</td><td>91.6℃</td></tr>
<tr><td>5</td><td>R7</td><td>77.8℃</td><td>92.4℃</td></tr>
<tr><td>6</td><td>R15</td><td>74.0℃</td><td>95.6℃</td></tr>
<tr><td>7</td><td>Q1</td><td>69.3℃</td><td>94.3℃</td></tr>
<tr><td>8</td><td>C35</td><td>58.4℃</td><td>82.9℃</td></tr>
<tr><td>9</td><td>U1</td><td>60.5℃</td><td>83.6℃</td></tr>
<tr><td>10</td><td>T1</td><td>91.6℃</td><td>104.5℃</td></tr>
<tr><td>11</td><td>D101</td><td>71.3℃</td><td>108.5℃</td></tr>
<tr><td>12</td><td>C105</td><td>61.5℃</td><td>92.2℃</td></tr>
<tr><td>13</td><td>R100</td><td>62.7℃</td><td>84.5℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P : 230 VAC
O/P : 131%/237% LOAD
Ta : 25℃</td><td>TEST : OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P : 264VAC/115VAC
O/P : 100 % LOAD
Ta=-35/-25 ℃</td><td>TEST : OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃/95 %R.H
NO DAMAGE</td><td>I/P : 272 VAC
O/P : FULL LOAD
Ta= 50 ℃
HUMIDITY= 95 %R.H</td><td>TEST : OK</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %/℃(0~50℃)</td><td>I/P : 230 VAC
O/P : FULL LOAD</td><td>± 0.009 %/℃(0~50℃)</td></tr>
<tr><td>6</td><td>STORAGE TEMPERATURE
TEST</td><td>-40~85℃</td><td colspan="2">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</td></tr>
</table>

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, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：12min/sweep cycle (4) Acceleration：6G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃
9	CAPACITOR LIFE CYCLE	SUPPOSE C 105 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) 197709HRS (2) 33065HRS (3) 81243HRS (4) 160659HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 2802.6K hrs min. Telcordia SR-332 (Bellcore) ; 536.6K 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	WUWQ/HUANGMK	WENF	LINKX

2020.10.1 TAG-QA-009