Test Report: XLG-20-H

21W Constant Current Mode LED Driver

■ 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

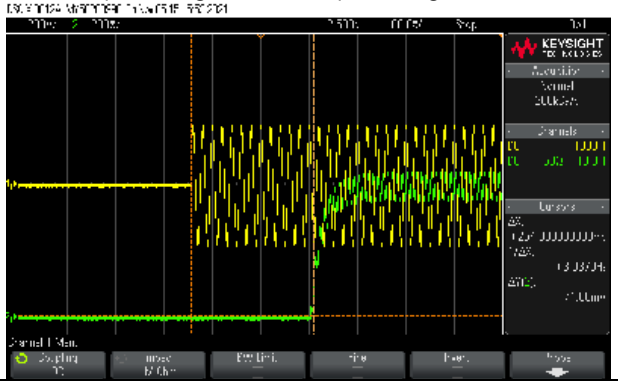
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

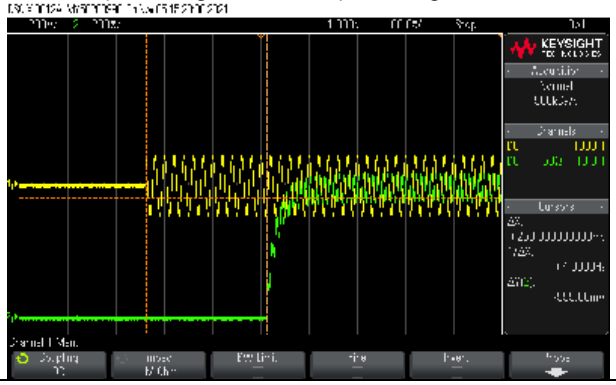
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±8%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	-1.71%~3.42%
2	LINE REGULATION	< ±3%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	-1.71%
3	OPEN CIRCUIT VOLTAGE (max)	40V	I/P: 230VAC O/P:NO LOAD CP: OPEN Ta:25℃	35.62V
4	CONSTANT CURRENT OPERATION VOLTAGE	CH1: 18V~30 V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	16.2V~32.8V
5	CURRENT RIPPLE	< 20%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	< 20%
6	SET UP TIME (Max)	230VAC/500ms 115VAC/500ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC/254 ms 115 VAC/250ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

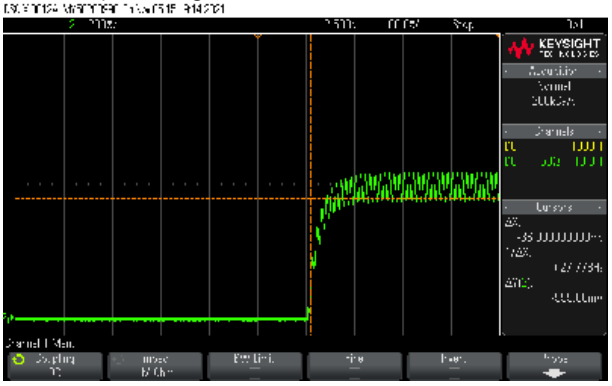


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

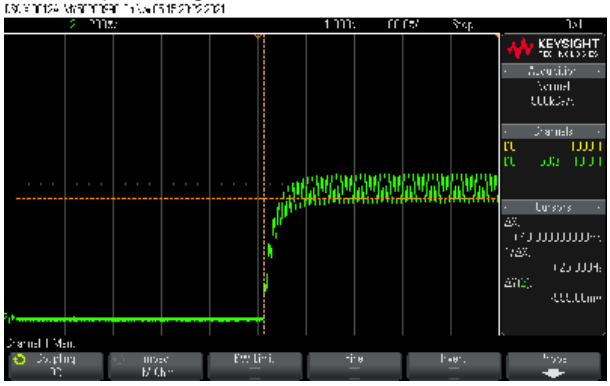


7	RISE TIME (Max)	230VAC/150 ms 115VAC/150ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC/ 36ms 115 VAC/40ms

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



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

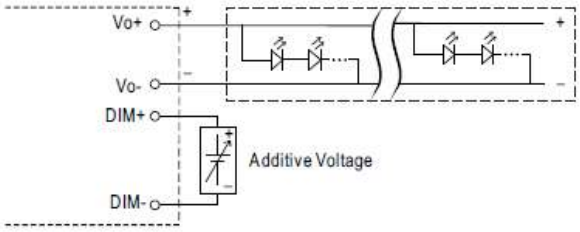


8 DIMMING OPERATION **(forB-Type)**

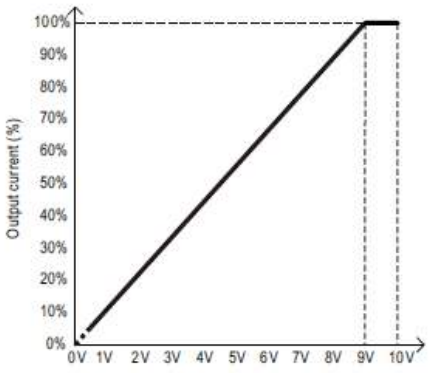
※ 3 in 1 dimming function (for B-Type)

- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 1 ~ 10VDC, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: 103μA (typ.)

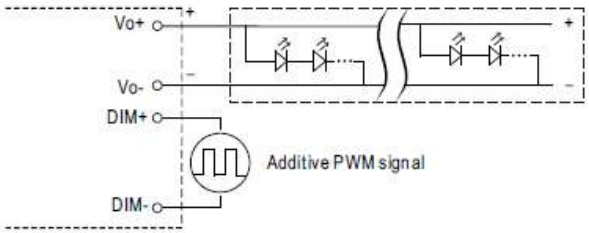
◎ Applying additive 1 ~ 10VDC



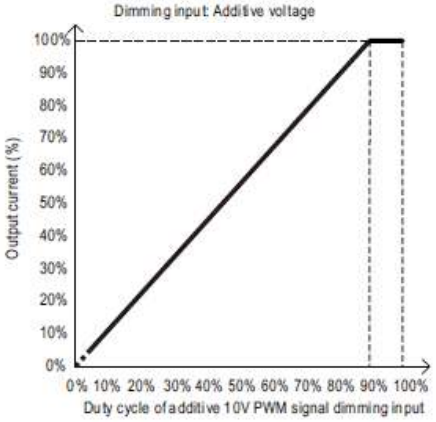
"DO NOT connect "DIM- to Vo-"



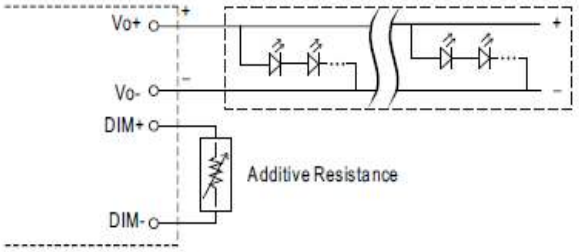
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



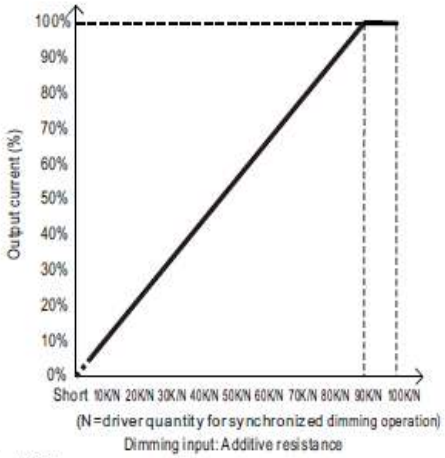
"DO NOT connect "DIM- to Vo-"



◎ Applying additive resistance:



"DO NOT connect "DIM- to Vo-"



Note : 1. Min. dimming level is about 3% and the output current is not defined when 0%< Iout<3%.

I/P： 230 VAC O/P：DIMMING TEST

1	V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0.099 A	0.175A	0.247A	0.322A	0.395A	0.468A	0.541A	0.616A	0.688A	0.693A	0.693A
	%	12.83 %	22.75%	32.10 %	41.77 %	51.32 %	60.78 %	70.23 %	80.00 %	89.30 %	98.97%	99.03%
2	PWM	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current （100Hz）	0.098 A	0.174A	0.247A	0.321A	0.395A	0.468A	0.549A	0.614A	0.686A	0.692A	0.693A
	%	12.78 %	22.65%	32.05 %	41.66 %	51.32 %	60.78 %	71.32 %	79.69 %	89.09 %	98.91%	98.97%
3	R	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0.100 A	0.189A	0.250A	0.331A	0.402A	0.465A	0.556A	0.632A	0.691A	0.692A	0.697A
	%	12.94 %	24.55%	32.42 %	42.99 %	52.21 %	60.39 %	72.23 %	82.05 %	89.70 %	98.84%	99.60%

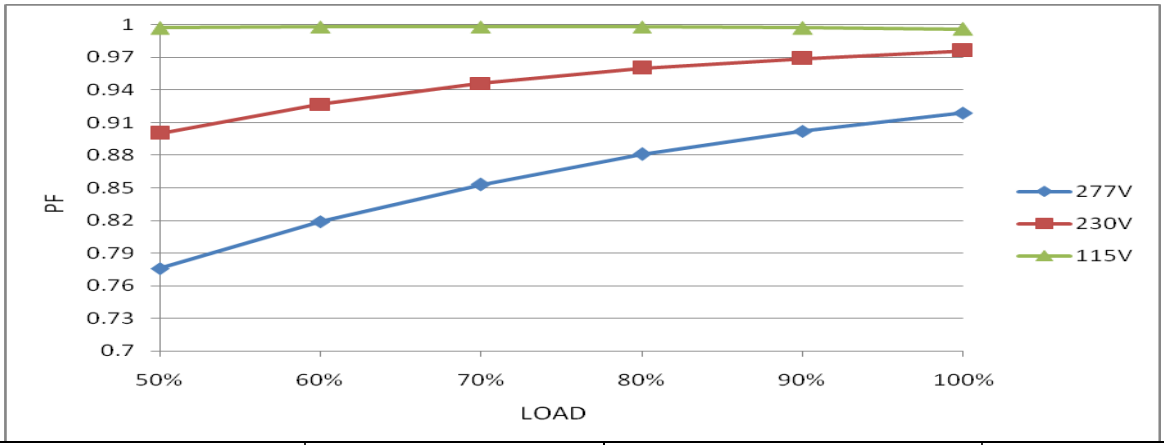
TEST RESULT：OK

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305VAC	(1) I/P:TESTING O/P:FULL LOAD Ta:25℃	(1) 87VAC ~308VAC
			I/P: LOW-LINE-3V=87 VAC HIGH-LINE+10V=315 VAC 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 ~305VAC O/P:FULL~MIN LOAD	OK

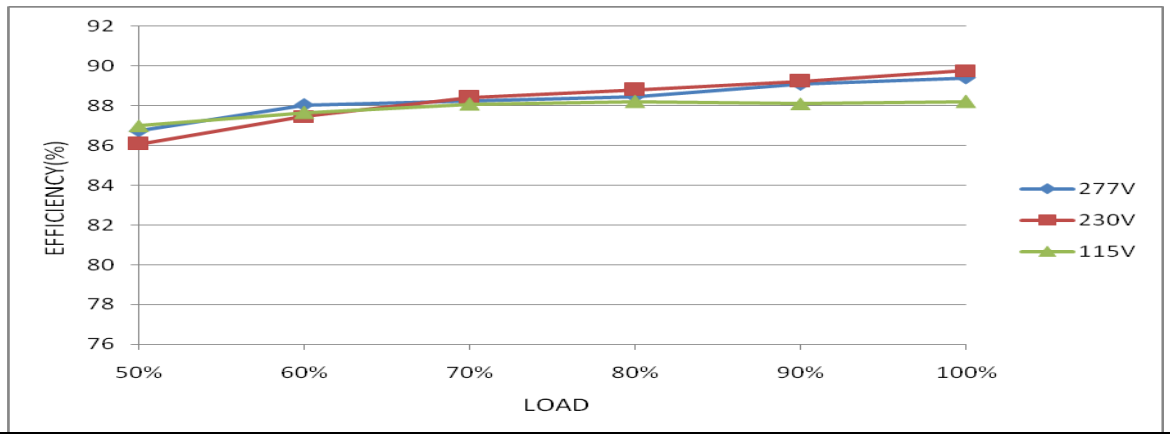
			Ta:25℃	
3	INPUT CURRENT (TYP)	277VAC/ 0.2A 230 VAC/0.2A 115 VAC/ 0.3A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	I= 0.092A/277VAC I = 0.104A/ 230VAC I = 0.202A/ 115VAC
4	NO LOAD POWER CONSUMPTION	<0.5W	I/P: 230 VAC O/P:NO LOAD Ta:25℃	0.394W
5	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.427 mA N-FG:. 0.426mA
6	POWER FACTOR(TYP)	0.95/230 VAC FULL LOAD 0.97/115 VAC FULL LOAD 0.91/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	PF= 0.976/230V/100%LOAD PF= 0.996/115V/100%LOAD PF=0.919/277V/100%LOAD

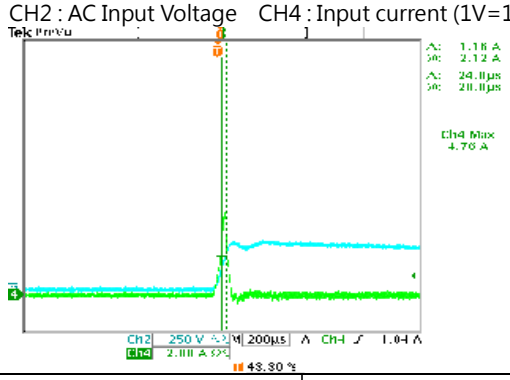
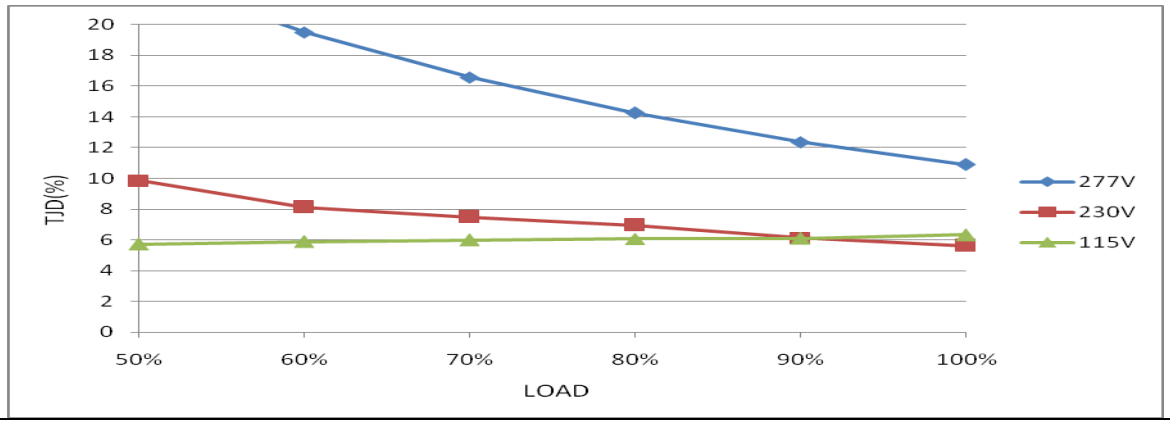
P.F vs LOAD



7	EFFICIENCY (TYP)	88 %	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	89.76%

EFFICIENCY vs LOAD



8	INRUSH CURRENT (TYP)	230 V/ 5A COLD START (twidth=350us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	`I = 4.76A/ 230VAC T50= 24 us
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 			
9	TOTAL HARMONIC DISTORTION	THD<20%@load,≥ 50% at 230VAC/115VAC, load,≥ 75% at 277VAC	I/P：277VAC /230VAC/115VAC O/P：75%LOAD 50% LOAD Ta：25℃	THD：5.72% 115VAC 50% THD：12.38% 230VAC 50% THD：15.34% 277VAC 75%
	THD vs LOAD 			

ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 90 VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed.

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 6 A/ 800 V	AC ON/OFF I/P:High-Line +3V =308v VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P:Low-Line -3V = 87V VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short	308V VDS: (1) 618V (2) 618V (3) 561V (4) 537V (5) 465V	87V VDS: (1) 293V (2) 289V (3) 257V (4) 245V (5) 150V
2	Diode Peak **Voltage**	D100 Rated 3 A/ 600 V	AC ON/OFF I/P:High-Line +3V =308 V Q101 : VDS: O/P: (1)LEDmax (2) LEDmax continue (3) Output Short Ta:25℃	 (1) 140V (2) 138V (3) 110V	
3	**Control IC Voltage Test**	PWM IC U1 Rated -0.3V~30V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) NO LOAD Ta:25℃	 U1 (1) 19V (2) 13.8V (3) 17.8V (4) 13.8V (5) 17.8V	
4	Clamp Diode Peak Voltage	D11 Rated : 400V /2A D10 Rated : 1000V /1A	AC ON/OFF I/P : High-Line +3V = 308 V O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) NO LOAD Ta : 25℃	 D11 (1)184V (2)183V (3)162V (4)158V (5)183V	 D10 (1)563V (2)529V (3)529V (4)505V (5)585V

■ SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-FG: 2 KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25℃	I/P-O/P: 3.642mA I/P-FG: 3.428mA O/P-FG: 3.025mA
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: 9999 MΩ I/P-FG: 9999 MΩ O/P-FG: 9999 M Ω
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	9mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230VAC/50Hz O/P:50%/FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab
3	RADIATION	EN55015	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 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

<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： XLG-20-H-B
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=32.3 ℃
2. HIGH AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=61.1 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=32.3℃</th><th>HIGH AMBIENT Ta=61.1℃</th></tr>
<tr><td>1</td><td>D5</td><td>47.3℃</td><td>76.6℃</td></tr>
<tr><td>2</td><td>BD1</td><td>48.7℃</td><td>77.9℃</td></tr>
<tr><td>3</td><td>C13</td><td>50.5℃</td><td>79.8℃</td></tr>
<tr><td>4</td><td>U1</td><td>49.9℃</td><td>79.3℃</td></tr>
<tr><td>5</td><td>Q1</td><td>52.6℃</td><td>82.4℃</td></tr>
<tr><td>6</td><td>D10</td><td>52.0℃</td><td>81.5℃</td></tr>
<tr><td>7</td><td>Q10</td><td>58.6℃</td><td>87.8℃</td></tr>
<tr><td>8</td><td>T1 初</td><td>52.6℃</td><td>81.9℃</td></tr>
<tr><td>9</td><td>C101</td><td>48.1℃</td><td>77.3℃</td></tr>
<tr><td>10</td><td>C102</td><td>50.1℃</td><td>79.4℃</td></tr>
<tr><td>11</td><td>D100</td><td>60.4℃</td><td>89.9℃</td></tr>
<tr><td>12</td><td>D600</td><td>54.2℃</td><td>83.0℃</td></tr>
<tr><td>13</td><td>U600</td><td>49.6℃</td><td>78.9℃</td></tr>
<tr><td>14</td><td>TC</td><td>45.3℃</td><td>74.0℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 230VAC/100VAC
O/P： 100%LOAD
Ta= -45/-30 ℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 60 ℃
NO DAMAGE</td><td>I/P： 315 VAC
O/P：FULL LOAD
Ta=60 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %/(0℃~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.001 %/℃(0~50℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE
TEST</td><td>-40~80℃</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：10CYCLE
5. Input/Output condition： STATIC
TEST：OK</td></tr>
</table>

6	THERMAL SHOCK TEST	-40~60℃	1. Thermal shock Temperature： -45℃~ +65℃ 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 TEST：OK
7	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℃
8	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Tc=80 ℃ LIFE TIME (2) I/P： 230VAC O/P：75% LOAD Tc=80 ℃ LIFE TIME (3) I/P： 230VAC O/P：50% LOAD Tc= 80 ℃ LIFE TIME	 (1) 57274HRS (2) 59350HRS (3) 61059HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 5721.2K hrs min. Telcordia SR-332 (Bellcore)； 747.1K hrs min. MIL-HDBK-217F (25℃)	
10	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD Ta=50℃ Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/ZHOUB	WENF	LINKX