Test Report: XLG-20- L

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

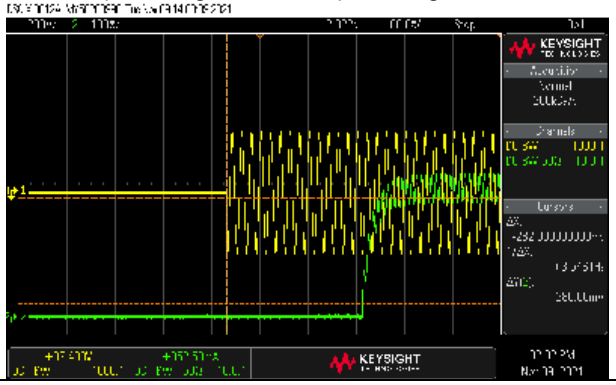
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

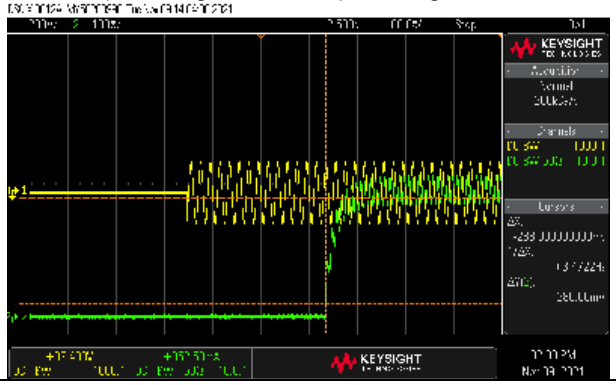
OUTPUT FUNCTION TEST

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**	-2.57%~3.43%
2	LINE REGULATION	< ±3%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	-2.5%
3	OPEN CIRCUIT VOLTAGE (max)	60V	I/P: 230VAC O/P:NO LOAD CP: OPEN Ta:25℃	57.83V
4	CONSTANT CURRENT OPERATION VOLTAGE	CH1: 32.4V~54V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	28.6V~55.2V /230VAC
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/282ms 115 VAC/ 288ms

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

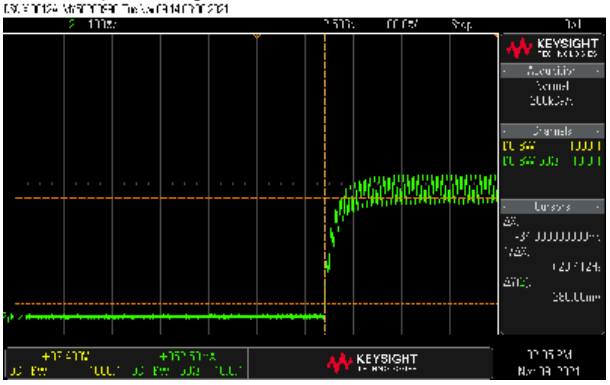


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

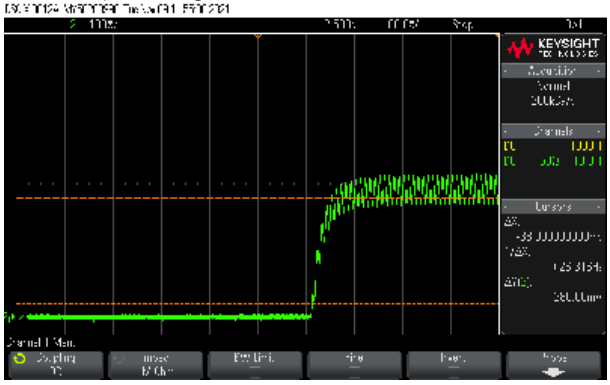


7	RISE TIME (Max)	230VAC/150ms 115VAC/150ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC/ 34ms 115 VAC/ 38ms

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



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

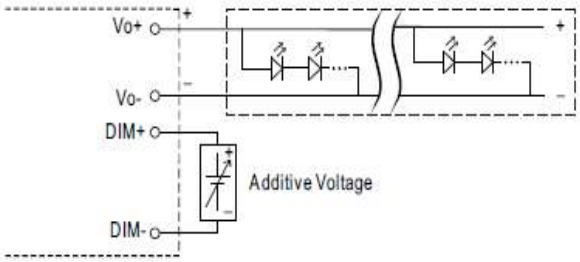


8 DIMMING OPERATION **(forB-Type)**

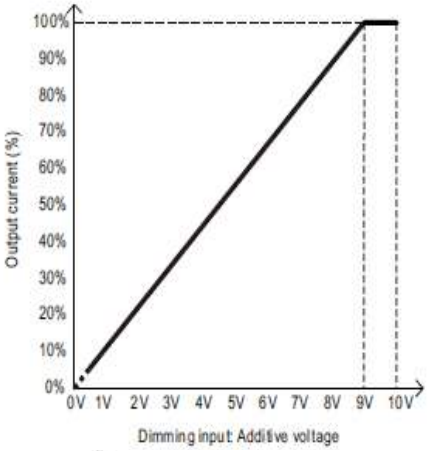
※ 3 in 1 dimming function (for B-Type)

- 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.)

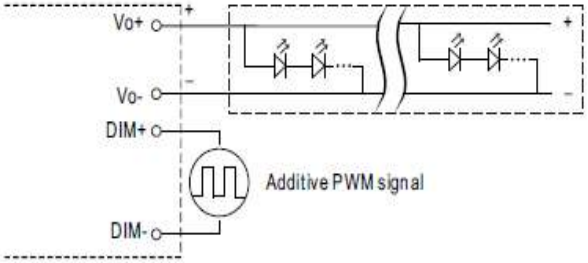
◎ Applying additive 1 ~ 10VDC



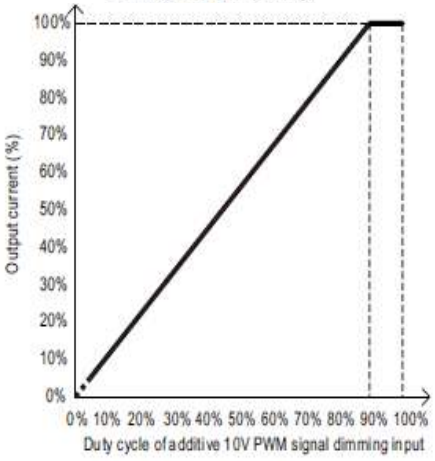
"DO NOT connect "DIM- to Vo-"



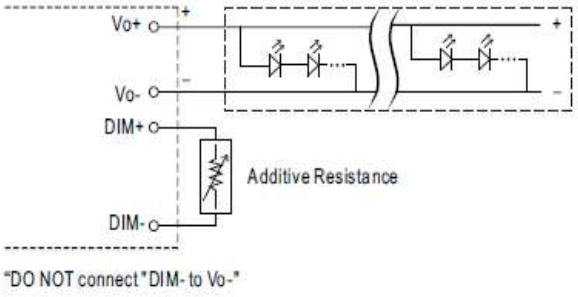
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



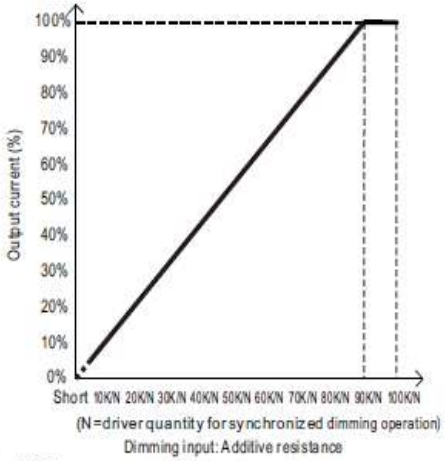
"DO NOT connect "DIM- to Vo-"



◎ 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

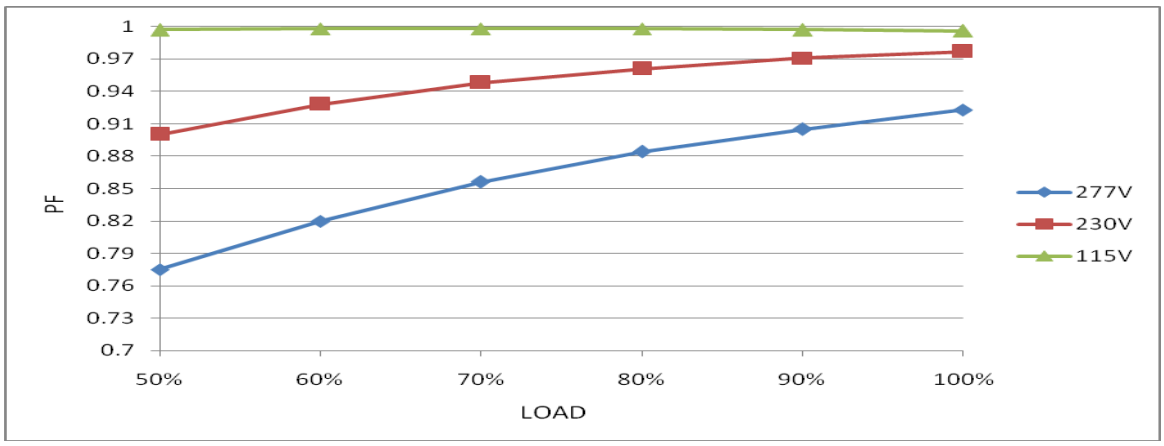
1	V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0.050 A	0.088A	0.125A	0.161A	0.198A	0.235A	0.272A	0.309A	0.345A	0.347A	0.348A
	%	12.94 %	22.86%	32.34 %	41.87 %	51.51 %	60.91 %	70.68 %	80.13 %	89.51 %	99.23%	99.46%
2	PWM	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current （100Hz）	0.050 A	0.089A	0.126A	0.162A	0.199A	0.235A	0.273A	0.310A	0.344A	0.347A	0.348A
	%	13.04 %	23.17%	32.78 %	42.16 %	51.58 %	61.06 %	70.96 %	80.57 %	89.38 %	99.20%	99.40%
3	R	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0.051 A	0.090A	0.129A	0.166A	0.199A	0.237A	0.277A	0.312A	0.346A	0.348A	0.348A
	%	13.30 %	23.43%	33.48 %	43.01 %	51.74 %	61.53 %	71.87 %	81.12 %	89.77 %	99.40%	99.49%

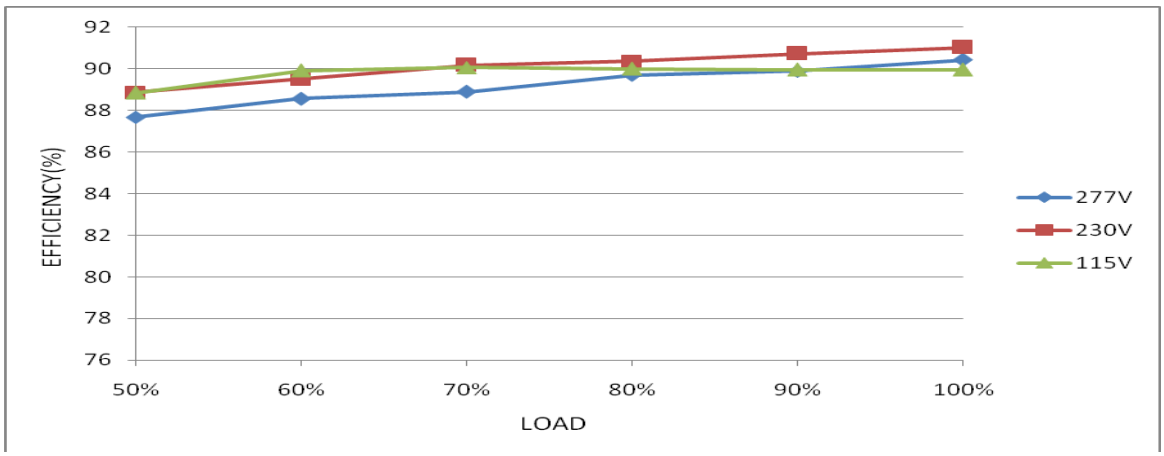
TEST RESULT：OK

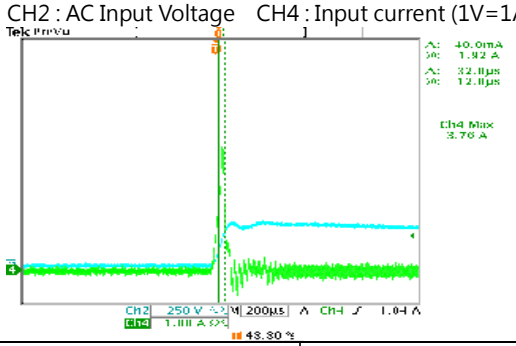
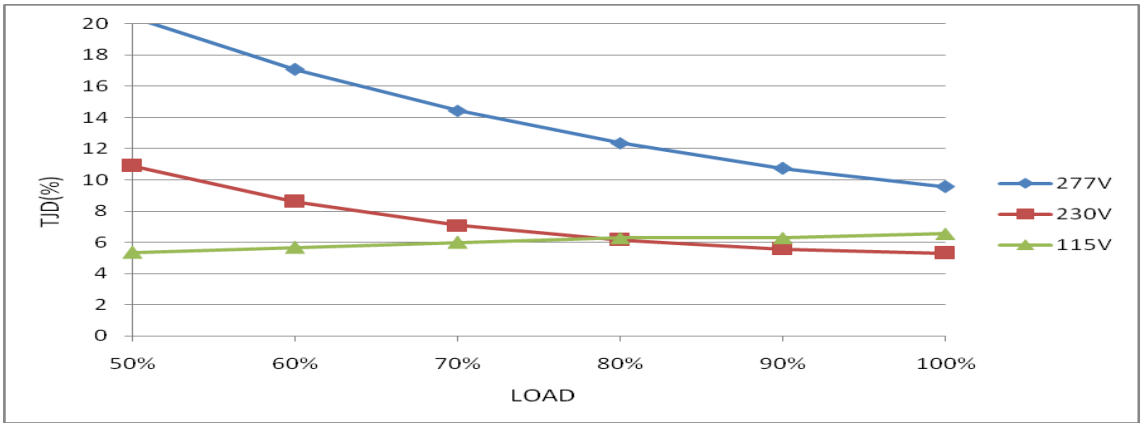
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	(1) I/P:TESTING O/P:FULL LOAD	(1) 87VAC ~ 315VAC
			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 Ta:25℃	OK

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= 0.081A/277VAC I =0.091A/ 230VAC I =0.176A/ 115VAC
4	NO LOAD POWER CONSUMPTION	<0.5W	I/P: 230 VAC O/P:NO LOAD Ta:25℃	0.373W
5	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.438 mA N-FG: 0.421mA
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= 0.977/230V/100%LOAD PF=0.996/115V/100%LOAD PF= 0.923/277V/100%LOAD
	P.F vs LOAD			
7	EFFICIENCY (TYP)	89%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	91.02%
	EFFICIENCY vs LOAD			





8	INRUSH CURRENT (TYP)	230 V/ 50A COLD START (twidth=350us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	`I = 3.76 A/ 230VAC T50= 32 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：5.35% 115VAC 50% THD：10.89% 230VAC 50% THD：13.32% 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 6A/800V	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) 621V (2) 594V (3) 613V (4) 542V (5) 612V	87V VDS: (1) 272V (2) 268V (3) 220V (4) 218V (5) 201V
2	Diode Peak **Voltage**	D100 Rated 3A/600V	AC ON/OFF I/P:High-Line +3V =308 V VDS: O/P: (1)LEDmax (2) LEDmax continue (3) Output Short Ta:25℃	 (1) 281V (2) 280V (3) 283V	
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) 18.1V (2) 13.7V (3) 18.3V (4) 13.9V (5) 13.8V	
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)218V (2)182V (3)165V (4)163V (5)178V	D10 (1)563V (2)547V (3)523V (4)515V (5)571V

■ 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: 3.245mA I/P-FG:3.593mA O/P-FG: 1.976mA 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: 9999GΩ I/P-FG: 9999G Ω O/P-FG: 9999G Ω 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 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-L-B
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=24.1 ℃
2. HIGH AMBIENT BURN-IN： 2HRS
I/P： 230VAC O/P： FULL LOAD Ta=62.4 ℃</td></tr>
<tr><td colspan="5"><table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=24.1 ℃</th><th>HIGH AMBIENT Ta=62.4℃</th></tr>
<tr><td>1</td><td>ZR2</td><td>35.9℃</td><td>77.3℃</td></tr>
<tr><td>2</td><td>D5</td><td>35.3℃</td><td>76.7℃</td></tr>
<tr><td>3</td><td>C7</td><td>35.9℃</td><td>77.4℃</td></tr>
<tr><td>4</td><td>BD1</td><td>36.0℃</td><td>77.1℃</td></tr>
<tr><td>5</td><td>C13</td><td>37.4℃</td><td>79.0℃</td></tr>
<tr><td>6</td><td>U1</td><td>37.3℃</td><td>79.0℃</td></tr>
<tr><td>7</td><td>Q1</td><td>38.0℃</td><td>80.1℃</td></tr>
<tr><td>8</td><td>D10</td><td>36.5℃</td><td>77.7℃</td></tr>
<tr><td>9</td><td>Q10</td><td>43.9℃</td><td>85.1℃</td></tr>
<tr><td>10</td><td>T1</td><td>39.3℃</td><td>80.7℃</td></tr>
<tr><td>12</td><td>C101</td><td>34.9℃</td><td>76.1℃</td></tr>
<tr><td>13</td><td>C102</td><td>36.6℃</td><td>77.9℃</td></tr>
<tr><td>14</td><td>C110</td><td>34.6℃</td><td>75.8℃</td></tr>
<tr><td>15</td><td>D100</td><td>39.3℃</td><td>80.7℃</td></tr>
<tr><td>16</td><td>D600</td><td>34.3℃</td><td>75.2℃</td></tr>
<tr><td>17</td><td>U600</td><td>35.3℃</td><td>76.3℃</td></tr>
<tr><td>18</td><td>TC</td><td>33.8℃</td><td>74.2℃</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) 64928HRS (2) 65877HRS (3) 69666HRS
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