



# Test Report: XLG-20- L

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## 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

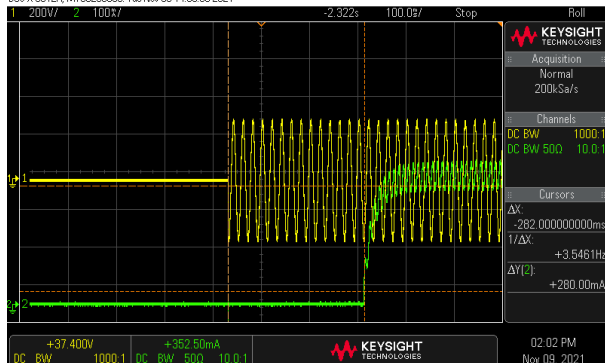
### OUTPUT FUNCTION TEST

N O	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±8%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	-2.57%~3.43%
2	LINE REGULATION	< ±3%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	-2.5%
3	OPEN CIRCUIT VOLTAGE (max)	60V	I/P: 230VAC O/P:NO LOAD CP: OPEN Ta:25°C	57.83V
4	CONSTANT CURRENT OPERATION VOLTAGE	CH1: 32.4V~54V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	28.6V~55.2V /230VAC
5	CURRENT RIPPLE	< 20%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	< 20%
6	SET UP TIME (Max)	230VAC/500ms 115VAC/500ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	230VAC/282ms 115 VAC/ 288ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

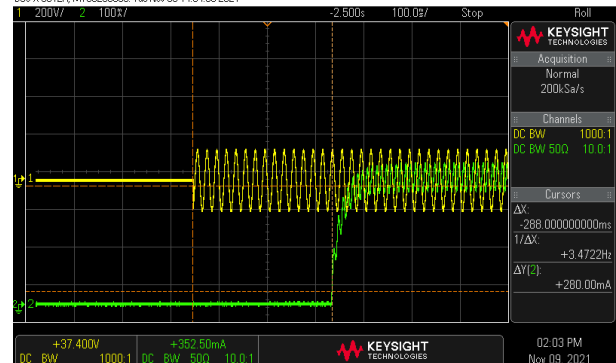
DSO-X 3012A, MY66200390 Tue Nov 09 14 03:09 2021



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

DSO-X 3012A, MY66200390 Tue Nov 09 14 04:06 2021

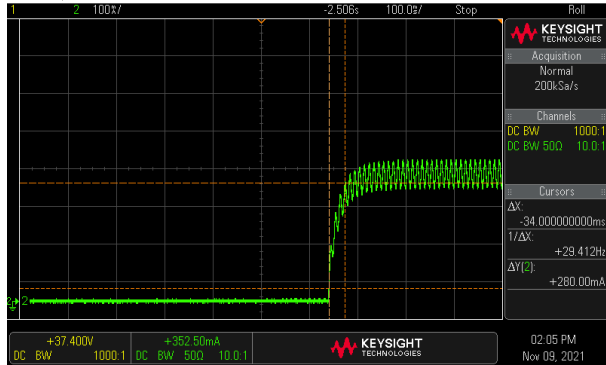


7	RISE TIME (Max)	230VAC/150ms 115VAC/150ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta:25°C LEDH MODE TEST	230VAC/ 34ms 115 VAC/ 38ms
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INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage

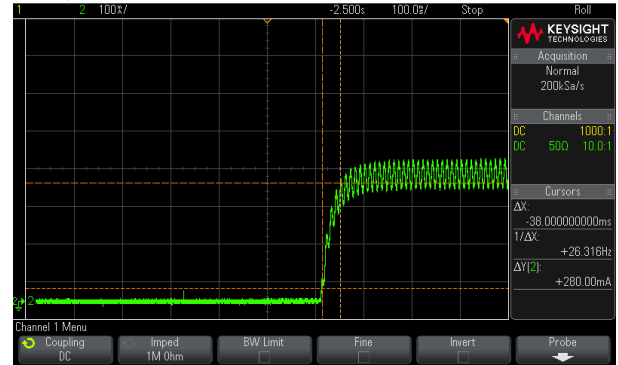
DSO-X 3012A, MY56200390 Tue Nov 09 14:06:06 2021



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage

DSO-X 3012A, MY56200390 Tue Nov 09 11:55:08 2021

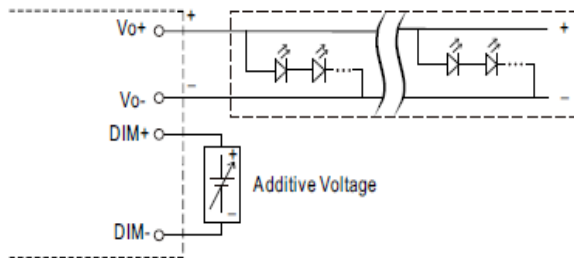


8 DIMMING OPERATION (for B-Type)

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

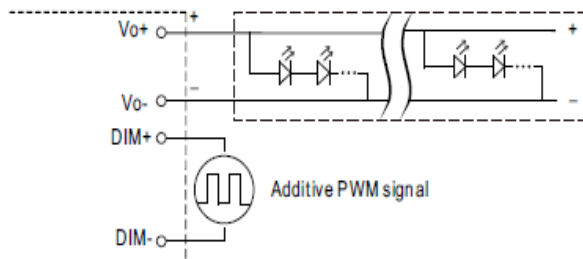
- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-:
  - 1 ~ 10VDC, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: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

◎ Applying additive 1 ~ 10VDC

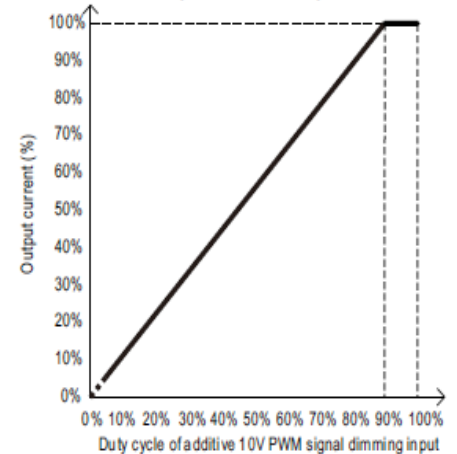
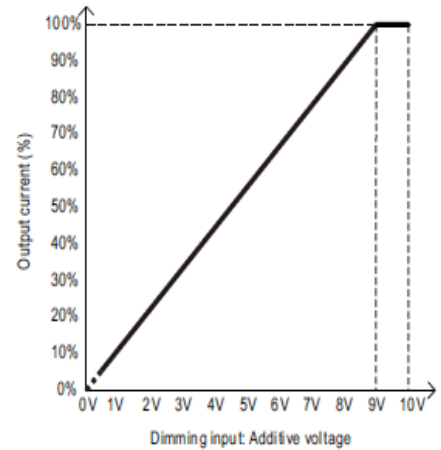


"DO NOT connect DIM- to Vo-"

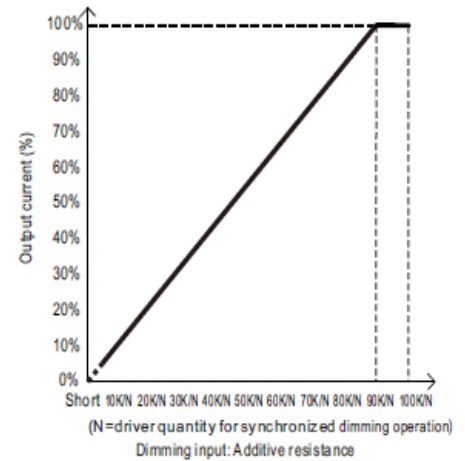
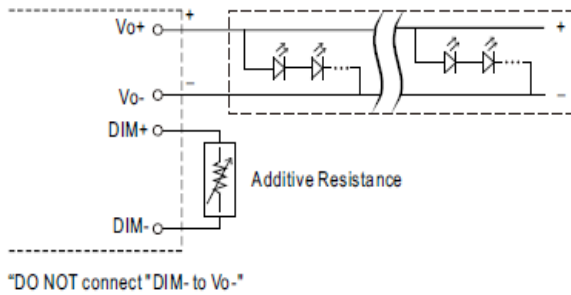
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



"DO NOT connect DIM- to Vo-"



© Applying additive resistance:



Note : 1. Min. dimming level is about 3% and the output current is not defined when  $0\% < I_{out} < 3\%$ .

I/P : 230 VAC O/P : DIMMING TEST

	V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
1	Output Current	0.050 A	0.08 8A	0.125A	0.161A	0.198A	0.235A	0.272A	0.309A	0.345A	0.347A	0.348A
	%	12.94 %	22.8 6%	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	0.08 9A	0.126A	0.162A	0.199A	0.235A	0.273A	0.310A	0.344A	0.347A	0.348A
	%	13.04 %	23.1 7%	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	0.09 0A	0.129A	0.166A	0.199A	0.237A	0.277A	0.312A	0.346A	0.348A	0.348A
	%	13.30 %	23.4 3%	33.48 %	43.01 %	51.74 %	61.53 %	71.87 %	81.12 %	89.77 %	99.40%	99.49%

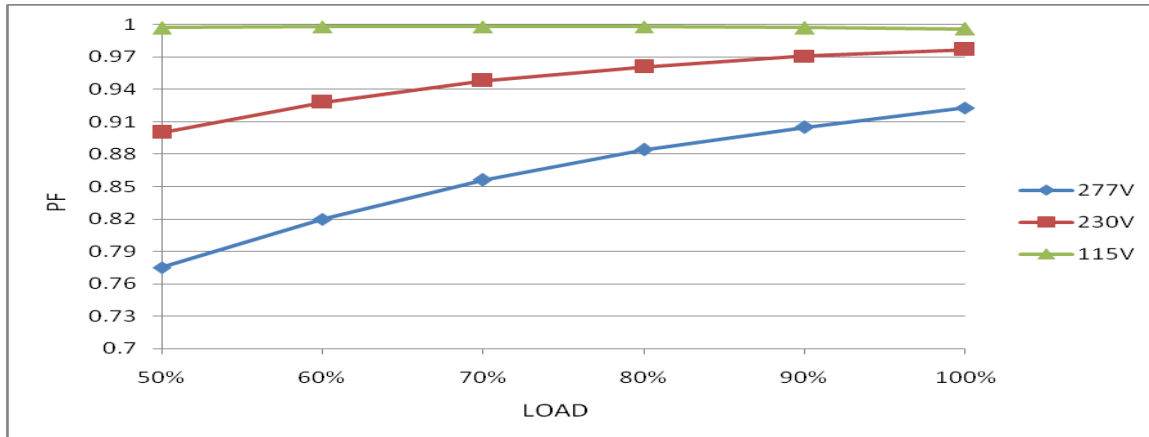
TEST RESULT : OK

## INPUT FUNCTION TEST

N O	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°C	OK

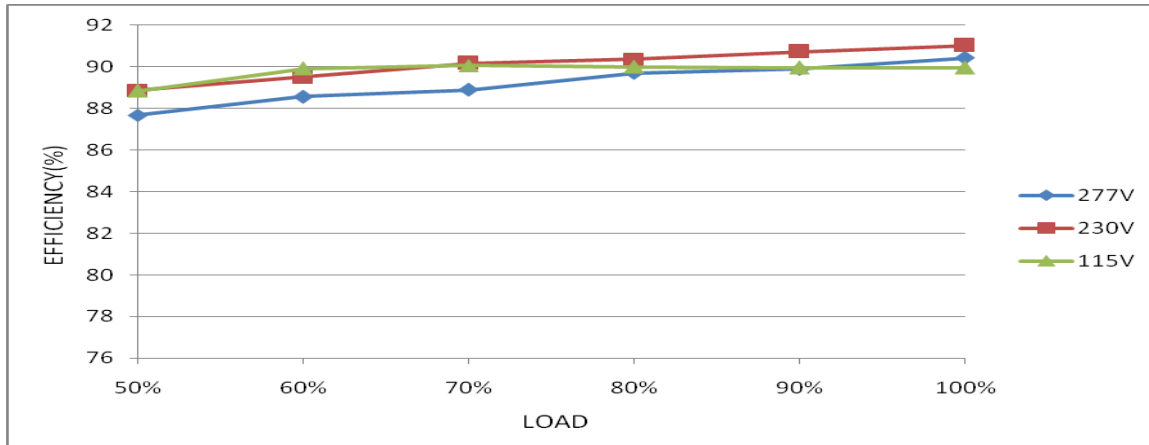
3	INPUT CURRENT (TYP)	277VAC/0.2A 230 VAC/0.2A 115 VAC/0.3A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	I= 0.081A/277VAC I =0.091A/ 230VAC I =0.176A/ 115VAC
4	NO LOAD POWER CONSUMPTION	<0.5W	I/P: 230 VAC O/P:NO LOAD Ta:25°C	0.373W
5	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25°C	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°C <b>LEDH MODE TEST</b>	PF= 0.977/230V/100%LOAD PF=0.996/115V/100%LOAD PF= 0.923/277V/100%LOAD

P.F vs LOAD



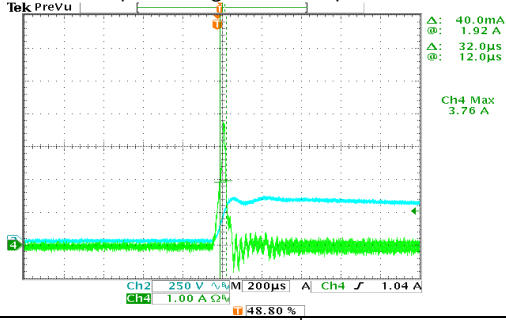
7	EFFICIENCY (TYP)	89%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	91.02%
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EFFICIENCY vs LOAD



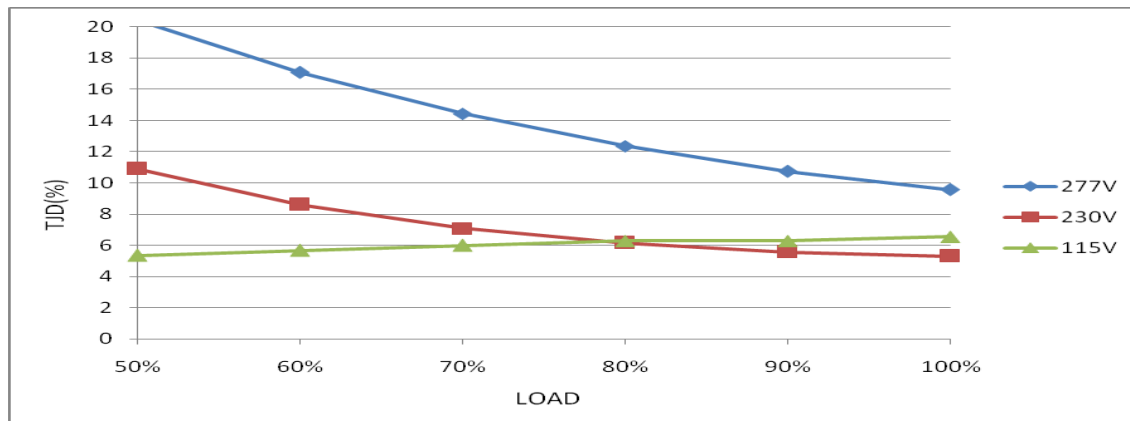
8	INRUSH CURRENT (TYP)	230 V/ 50A COLD START  (twitdh=350us measured at 50% Ipeak) COLD START	I/P: 230 VAC  O/P:FULL LOAD Ta:25°C <b>LEDH MODE TEST</b>	I = 3.76 A/ 230VAC  T50= 32 us
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INPUT=230VAC/50HZ @ FULL LOAD  
CH2 : AC Input Voltage CH4 : Input current (1V=1A)



9	TOTAL HARMONIC DISTORTION	THD<20%@load <sub>≥</sub> 50% at 230VAC/115VAC, load <sub>≥</sub> 75% at 277VAC	I/P : 277VAC /230VAC/115VAC O/P : 75%LOAD 50% LOAD Ta : 25°C	THD : 5.35% 115VAC 50% THD : 10.89% 230VAC 50% THD : 13.32% 277VAC 75%
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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°C	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°C	(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°C	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°C	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°C	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°C	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°C	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°C	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS  Test by certified Lab
3	RADIATION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	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°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	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°C	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 : XLG-20-L-B 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=24.1 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=62.4 °C																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=24.1 °C</th> <th>HIGH AMBIENT Ta=62.4°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZR2</td><td>35.9°C</td><td>77.3°C</td></tr> <tr><td>2</td><td>D5</td><td>35.3°C</td><td>76.7°C</td></tr> <tr><td>3</td><td>C7</td><td>35.9°C</td><td>77.4°C</td></tr> <tr><td>4</td><td>BD1</td><td>36.0°C</td><td>77.1°C</td></tr> <tr><td>5</td><td>C13</td><td>37.4°C</td><td>79.0°C</td></tr> <tr><td>6</td><td>U1</td><td>37.3°C</td><td>79.0°C</td></tr> <tr><td>7</td><td>Q1</td><td>38.0°C</td><td>80.1°C</td></tr> <tr><td>8</td><td>D10</td><td>36.5°C</td><td>77.7°C</td></tr> <tr><td>9</td><td>Q10</td><td>43.9°C</td><td>85.1°C</td></tr> <tr><td>10</td><td>T1</td><td>39.3°C</td><td>80.7°C</td></tr> <tr><td>12</td><td>C101</td><td>34.9°C</td><td>76.1°C</td></tr> <tr><td>13</td><td>C102</td><td>36.6°C</td><td>77.9°C</td></tr> <tr><td>14</td><td>C110</td><td>34.6°C</td><td>75.8°C</td></tr> <tr><td>15</td><td>D100</td><td>39.3°C</td><td>80.7°C</td></tr> <tr><td>16</td><td>D600</td><td>34.3°C</td><td>75.2°C</td></tr> <tr><td>17</td><td>U600</td><td>35.3°C</td><td>76.3°C</td></tr> <tr><td>18</td><td>TC</td><td>33.8°C</td><td>74.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=24.1 °C	HIGH AMBIENT Ta=62.4°C	1	ZR2	35.9°C	77.3°C	2	D5	35.3°C	76.7°C	3	C7	35.9°C	77.4°C	4	BD1	36.0°C	77.1°C	5	C13	37.4°C	79.0°C	6	U1	37.3°C	79.0°C	7	Q1	38.0°C	80.1°C	8	D10	36.5°C	77.7°C	9	Q10	43.9°C	85.1°C	10	T1	39.3°C	80.7°C	12	C101	34.9°C	76.1°C	13	C102	36.6°C	77.9°C	14	C110	34.6°C	75.8°C	15	D100	39.3°C	80.7°C	16	D600	34.3°C	75.2°C	17	U600	35.3°C	76.3°C	18	TC	33.8°C	74.2°C
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14	C110	34.6°C	75.8°C																																																																									
15	D100	39.3°C	80.7°C																																																																									
16	D600	34.3°C	75.2°C																																																																									
17	U600	35.3°C	76.3°C																																																																									
18	TC	33.8°C	74.2°C																																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230VAC/100VAC O/P : 100 %LOAD Ta= -45/-30 °C	TEST : OK																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta=60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																								
4	TEMPERATURE COEFFICIENT	$\pm 0.03 \%$ /(0°C~50°C)	I/P : 230 VAC O/P : FULL LOAD	$\pm 0.001 \%$ /°C(0~50°C)																																																																								
5	STORAGE TEMPERATURE TEST	-40~80°C	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 : 10CYCLE 5. Input/Output condition : STATIC TEST : OK																																																																									

6	THERMAL SHOCK TEST	-40~60°C	1. Thermal shock Temperature : -45°C~ +65°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 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°C
8	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Tc=80 °C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Tc=80 °C LIFE TIME (3) I/P : 230VAC O/P : 50% LOAD Tc= 80 °C 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°C)	
10	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD Ta=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/ZHOUB	WENF	LINKX