Test Report: XLG-150-12

150W Constant Voltage + Constant Current LED Driver

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

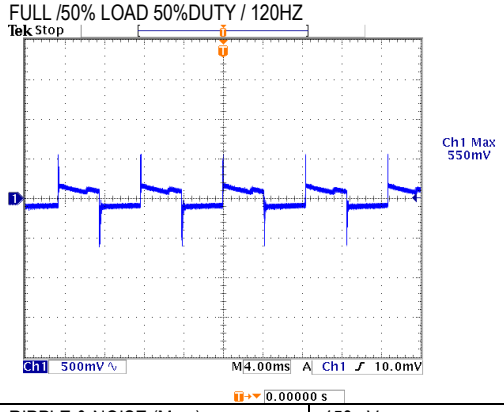
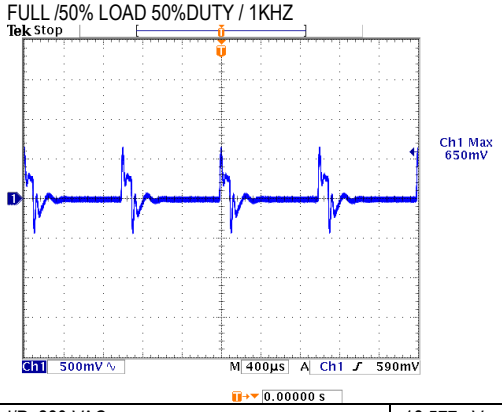
Safety Test
E.M.C. Test

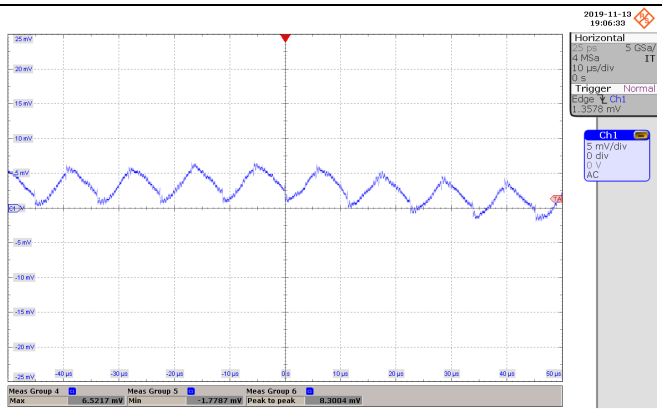
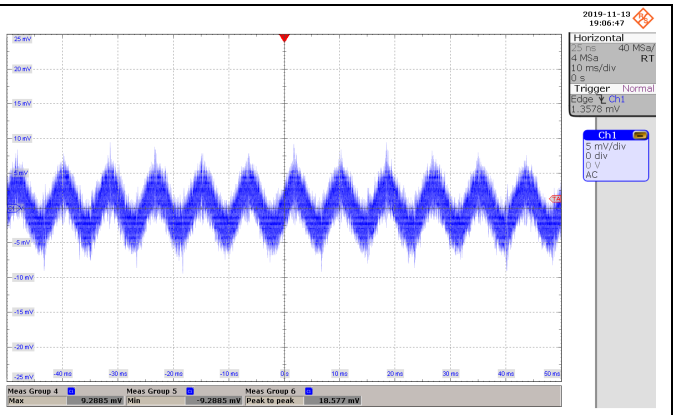
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

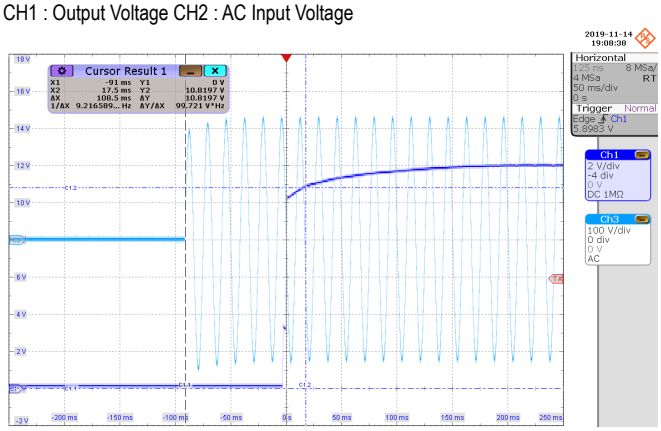
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	8.4 V~ 12V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	1V~11.9V /230VAC
2	CURRENT ADJ. RANGE	6.5A~ 12.5A	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25℃	5.2969A~14.805A /230VAC@CV MAX-1V 5.2922A~14.82A /230VAC@CV MIN 5.3063A~14.818A/115VAC@CV MAX-1V 5.3053A~14.817A/115VAC@CV MIN
3	OUTPUT VOLTAGE TOLERANCE (Max)	-3 % ~ 3%	I/P:100VAC –305VAC O/P:MIN LOAD—FULL LOAD Ta: 25℃	:0.083%~1.083%
4	LINE REGULATION (Max)	: -0.5% ~ 0.5%	I/P:110VAC~305AC O/P:FULL LOAD Ta:25℃	0.083%~0.083%
5	LOAD REGULATION (Max)	-2% ~ 2%	I/P: 230 VAC O/P: MIN / HALF/ FULL LOAD Ta:25℃	0.083%~1.083%
6	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P: FULL LOAD/Min LOAD Ta:25℃	TEST:1.75%/-2.667%
7	DYNAMIC LOAD	V1： 1200 mVp-p	I/P： 230VAC O/P： (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta：25℃	(1) 550mVp-p (2) 650mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
8	RIPPLE & NOISE (Max)	150mVp-p	I/P: 230 VAC O/P: MIN LOAD—FULL LOAD Ta:25℃	18.577mVp-p / 100% load
	high frequency：		low frequency：	

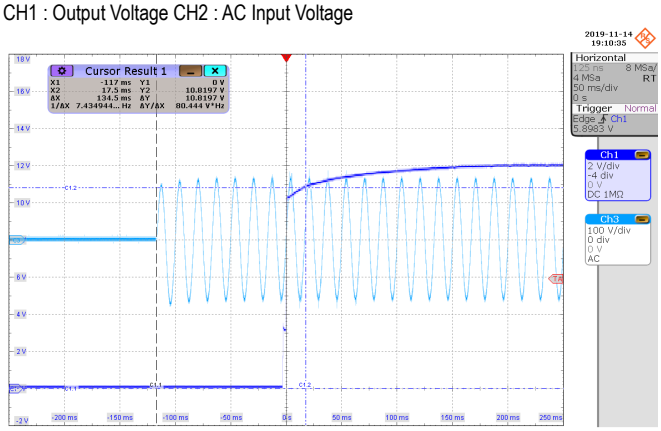



9	SET UP TIME (Max)	230VAC/ 500ms 115VAC/ 1200ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/108.5ms 115 VAC/134.5ms

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

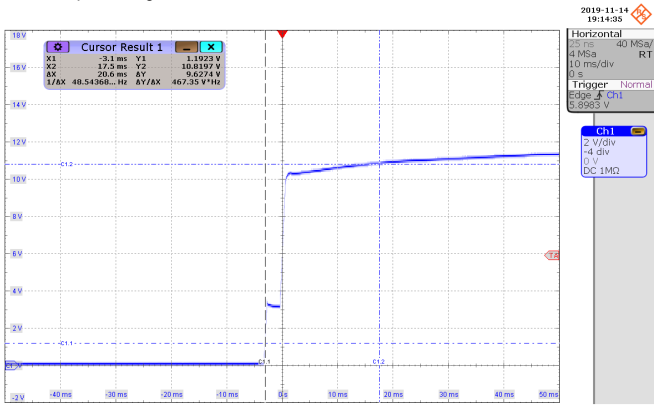


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

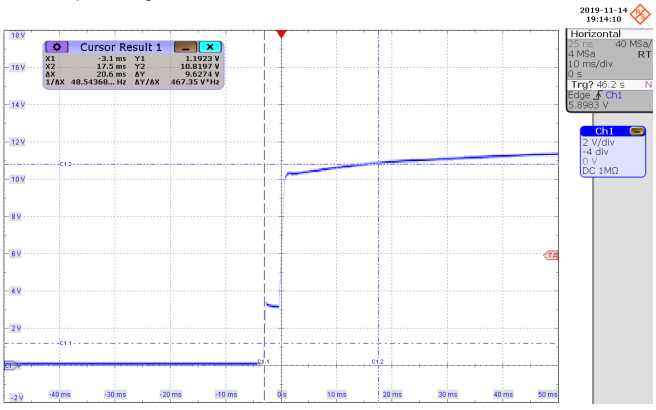


10	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/20.6ms 115 VAC/20.6ms

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

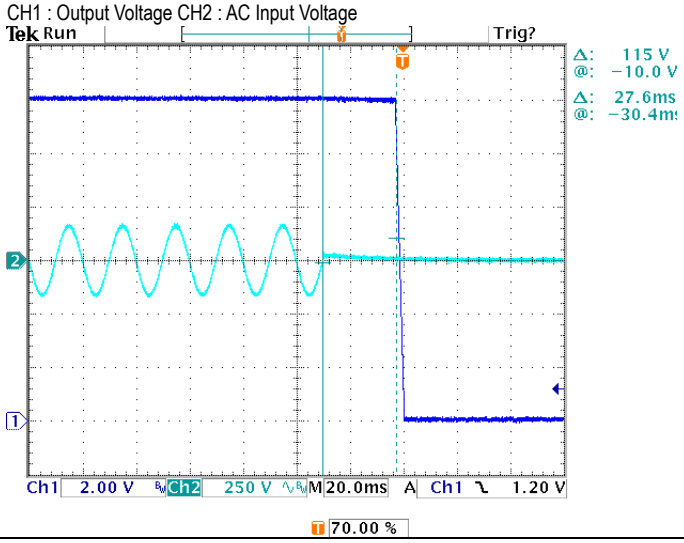


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

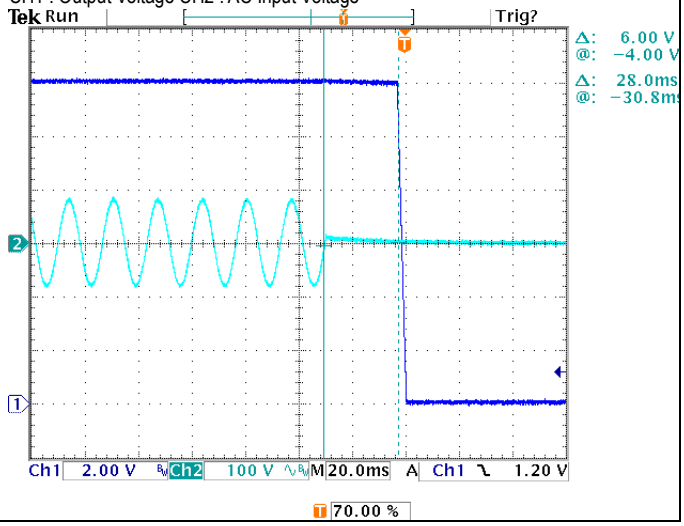


11	HOLD UP TIME (Typ.)	230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/27.6ms 115 VAC/28ms

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

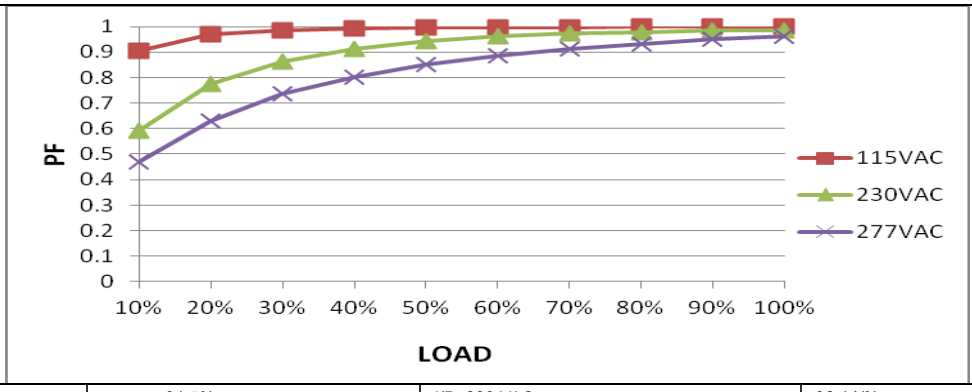


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



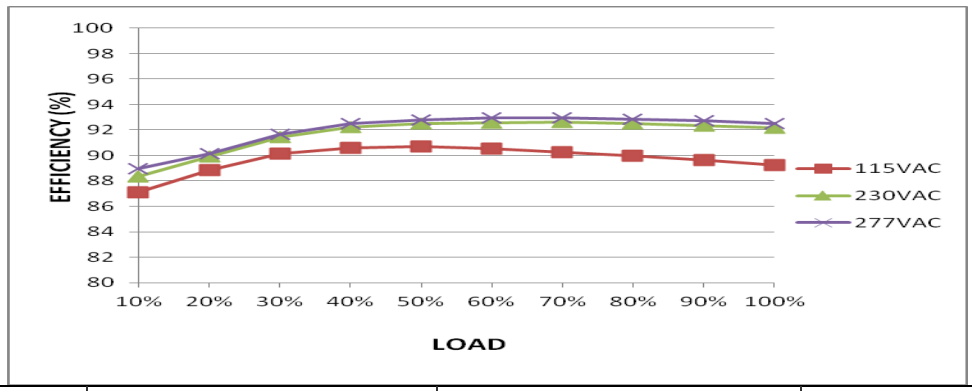
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	79V~308 V
			I/P: LOW-LINE-3VAC=97 VAC HIGH-LINE+10VAC=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: 100VAC~305VAC O/P:FULL~MIN LOAD Ta:25℃	OK
3	INPUT CURRENT (TYP)	277VAC/ 0.8 A 230 VAC/ 1 A 115 VAC/ 1.8 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃	I = 0.58A/277VAC I = 0.69A/230VAC I = 1.4A/115VAC
4	LEAKAGE CURRENT	<0.75mA/277AC	I/P ： 277 VAC O/P ：MIN LOAD Ta ：25℃	L-FG: 0.22 mA N-FG:. 0.21mA
5	NO LOAD CONSUMPTION	<0.5W	I/P ：115VAC I/P ：230VAC O/P ：NO LOAD Ta ：25℃	0.3038W/115VAC 0.337W/230VAC
6	POWER FACTOR(TYP)	0.92/277 VAC FULL LOAD 0.95/230 VAC FULL LOAD 0.97/115 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃	PF=0.958/277V/100%LOAD PF=0.986/230V/100%LOAD PF=0.999/115V/100%LOAD
	P.F vs LOAD			



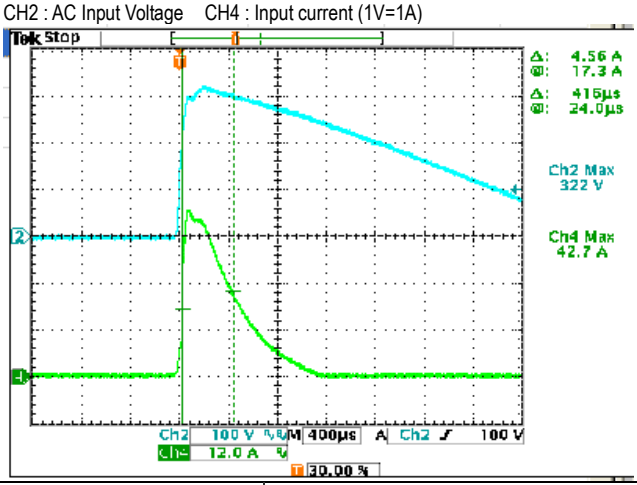
7	EFFICIENCY (TYP)	91.5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	92.14/%

EFFICIENCY vs LOAD



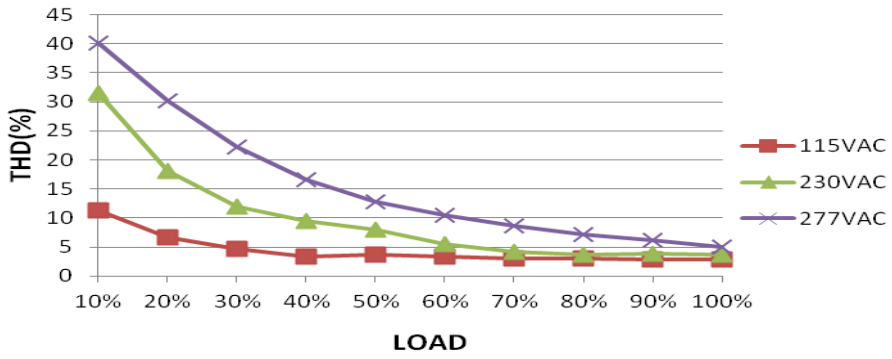
8	INRUSH CURRENT (TYP)	230 V/ 50A COLD START (twidth=500us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	I = 42.7 A/ 230VAC T50= 415 us

INPUT=230VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current (1V=1A)



9	TOTAL HARMONIC DISTORTION	THD<10%(@load≧50% /115VC,230VAC; @load≧75% /277VAC)	I/P： 115VAC I/P： 230VAC O/P：50% LOAD Ta：25℃	THD: 3.74% THD: 7.92%
			I/P： 277VAC O/P：75% LOAD Ta：25℃	THD:8.01%

THD&LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	95%~ 108%	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	102.56%/ 305VAC 102.56%/ 230VAC 102.56%/100VAC PROTECTION TYPE： Hiccup mode or constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.5V~ 18V	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P:MIN LOAD Ta:25℃	15.742V/ 305VAC 15.709V/ 230VAC 15.753V/100VAC PROTECTION TYPE： Shut down output voltage, re-power on to recovery
3	OVERTEMPERATURE PROTECTION	NO DAMAGE	I/P: 305 VAC I/P: 110 VAC O/P:FULL LOAD	O.T.P Active PROTECTION TYPE： Shut down output voltage, re-power on to recovery
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 100 VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Hiccup mode or constant current limiting, recovers automatically after fault condition is removed
5	INPUT OVER VOLTAGE (for XLG-150I only)	320 ~ 390VAC (Shut down output voltage when the input voltage exceeds protection voltage Can survive input voltage stress of 440Vac for 48 hours	I/P：TESTING O/P: FULL LOAD Ta:25℃	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q6 Rated VDS：600V/11A	AC ON/OFF I/P:High-Line +3V =308V I/P:Low-Line -3V = 97V VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/	Q3 308VAC 97VAC VDS VDS (1) 465V (1)461V (2) 473V (2)493V (3) 473V (3) 489V

			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)LED MODE max (10)LED MODE min Ta:25℃	(4)477V (4) 493V (5)477V (5) 493V (6)477V (6) 489V (7)473V (7) 469V (8) 445V (8) 489V (9)461V (9) 457V (10) 461V (10) 465V
2	PFC OUTPUT DIODE PEAK VOLTAGE TEST	D1 Rated : 9 A/ 600V	I/P:High-Line +3V =308 V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25℃	D1 308VAC VDS (1)492V (2)488V (3)456V (4)508V
3	Diode Peak Voltage	Q100 Rated : 100A/40V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (5).NO LOAD Ta:25℃	Q100: VDS: (1)26.1V (2)29.7V (3)29.7V (4)29.3V (5)29.5V
4	Control IC Voltage Test	PWM IC U2 Rated – 30V	I/P:High-Line +3VAC=308V AC ON/OFF O/P: (1)Full Load Input On/Off (2) Output Short (3)O.L.P (4)O.V.P. (5 Low Line No Load Vo(min) (6) CV MAX (7) CV MIN Ta:25℃	U1 (1) 25.5V (2) 25.5V (3) 25.5V (4) 25.5V (5) 13.6V (6) 25.5V (7) 25.5V
5	PFC Transistor	Q1 Rated 10.6A/650V	I/P：High-Line +3V =308V O/P： (1) Full Load Turn on (2) Output Short (3) Full load continue Ta：25℃	 (1) 462 V (2) 474 V (3) 454 V
6	Input Capacitor Voltage	C5 Rated： 82 μf 450 V	I/P：High-Line +3V =308 V 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)447V (2)444V (3)444V (4)443V

SAFETY & EMC TEST REPORT

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG:2 KVAC/min<4.5mA O/P-FG:1.5KVAC/min	I/P-O/P: 4.2 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25℃	I/P-O/P: 3.49 mA I/P-FG: 2.88 mA O/P-FG: 6.33 mA 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: 22.9GΩ I/P-FG: 19G Ω O/P-FG: 10.11G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	37 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P：230 VAC/50HZ O/P：FULL/50% LOAD Ta：25℃	PASS
2	CONDUCTION	EN55015	I/P：230 VAC/50HZ O/P：FULL 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 LIGHT 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 LIGHT INDUSTRY INPUT：2KV	I/P： 230VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N：4KV L,N-PE：6KV	I/P： 230VAC/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： XLG-150-12A
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=25.0℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=55.0℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=25.0 ℃</th><th>HIGH AMBIENT Ta=55.0 ℃</th></tr>
<tr><td>1</td><td>BD1</td><td>69.9℃</td><td>84.1℃</td></tr>
<tr><td>2</td><td>Q1</td><td>70.5℃</td><td>84.5℃</td></tr>
<tr><td>3</td><td>LF2</td><td>69.6℃</td><td>82.8℃</td></tr>
<tr><td>4</td><td>LF1</td><td>68.6℃</td><td>82.0℃</td></tr>
<tr><td>5</td><td>L1</td><td>70.9℃</td><td>83.8℃</td></tr>
<tr><td>6</td><td>L2</td><td>73.0℃</td><td>86.2℃</td></tr>
<tr><td>7</td><td>ZNR4</td><td>62.6℃</td><td>77.9℃</td></tr>
<tr><td>8</td><td>RTH1</td><td>71.9℃</td><td>85.1℃</td></tr>
<tr><td>9</td><td>C5</td><td>74.3℃</td><td>86.9℃</td></tr>
<tr><td>10</td><td>C13</td><td>73.2℃</td><td>86.2℃</td></tr>
<tr><td>11</td><td>T1(core)</td><td>77.5℃</td><td>91.9℃</td></tr>
<tr><td>12</td><td>T1(wire)</td><td>80.5℃</td><td>93.7℃</td></tr>
<tr><td>13</td><td>C105</td><td>76.0℃</td><td>90.2℃</td></tr>
<tr><td>14</td><td>C108</td><td>70.4℃</td><td>86.0℃</td></tr>
<tr><td>15</td><td>LF100</td><td>71.2℃</td><td>86.9℃</td></tr>
<tr><td>16</td><td>D1</td><td>75.4℃</td><td>87.5℃</td></tr>
<tr><td>17</td><td>Q5</td><td>79.2℃</td><td>90.5℃</td></tr>
<tr><td>18</td><td>Q101</td><td>74.8℃</td><td>90.1℃</td></tr>
<tr><td>19</td><td>J102</td><td>78.4℃</td><td>92.2℃</td></tr>
<tr><td>20</td><td>RTH3</td><td>69.5℃</td><td>83.9℃</td></tr>
<tr><td>21</td><td>TC</td><td>58.0℃</td><td>78.1℃</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： 305VAC/100VAC
O/P：100% LOAD
Ta= -45℃/ -35℃</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 55℃
NO DAMAGE</td><td>I/P： 305VAC
O/P：FULL LOAD
Ta=55℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.06 %/℃(0~60℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.007 %/℃(0~60℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td>-40℃~ +80℃</td><td colspan="2">1. Thermal shock Temperature： -50℃~ +125℃
2. Temperature change rate ：25℃ / MIN
3. Dwell time low and high temperature ： 30 MIN/EACH
4. Total test cycle：200CYCLE
5. Input/Output condition： STATIC
TEST：OK</td></tr>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td>-40~+55℃</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +60℃
2. Temperature change rate ：25℃ / MIN
3. Dwell time low and high temperature ： 30 MIN/EACH
4. Total test cycle：16CYCLE
5. Input/Output condition：
15cycle:230VAC/ FULL LOAD AC on 3 sec/AC off 1 sec TEST
1cycle:230VAC/ FULL LOAD Burn In Test
TEST：OK</td></tr>
</table>

7	VIBRATION TEST	10~ 500Hz, 5G 12min./1cycle, period for 72min. 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：72min in each axis (X.Y.Z) (6) Ta：25℃ TEST：OK	
8	CAPACITOR LIFE CYCLE	XLG-150-12：SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Tc= 75 ℃ LIFE TIME (2) I/P： 230VAC O/P：75% LOAD Tc= 75 ℃ LIFE TIME (3) I/P： 230VAC O/P：50% LOAD Tc= 75 ℃ LIFE TIME		(1) 157047 HRS (2) 211851 HRS (3) 285779 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 2269.5K hrs min. Telcordia SR-332 (Bellcore)； 213.3K 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	LIUWY