



# Test Report: XBG-160

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160W Constant Power MODE 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

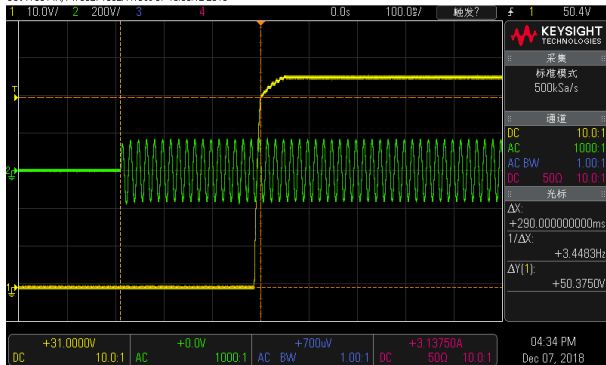
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 230 VAC O/P: FULL/ MIN LOAD Ta: 25°C	0.9%
2	CONSTANT CURRENT REGION	34 V~ 56 V	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	20.4 V~ 57.8 V
3	OPEN CIRCUIT VOLTAGE	60 V	I/P: 230 VAC O/P: NO LOAD	58.25V
4	CURRENT RIPPLE	5.0% max. @rated current	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	1.05%
5	CURRENT ADJ. RANGE	1.425A ~ 4.1A	I/P: 230 VAC O/P: TESTING Ta: 25°C	1.063 A ~ 4.61A
6	CONSTANT POWER	O/P: 159.9W	I/P: 230 VAC O/P: Vo×Io	TEST: OK
7	SET UP TIME(Max)	2000ms/115VAC 500ms/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	290 ms/115 VAC 234 ms/230 VAC

INPUT=115VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage

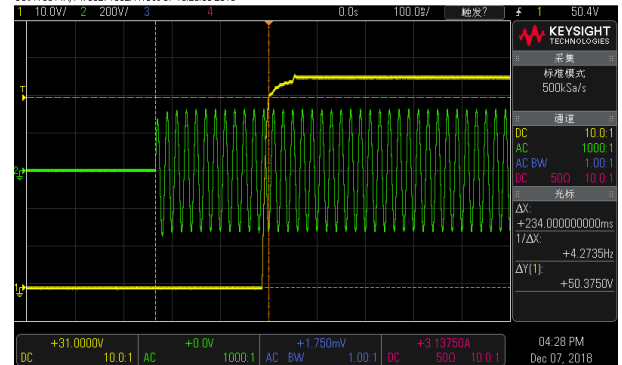
030-X3014A\_M/56271052\_Fri Dec 07 16:35:12 2018



INPUT=230 VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage

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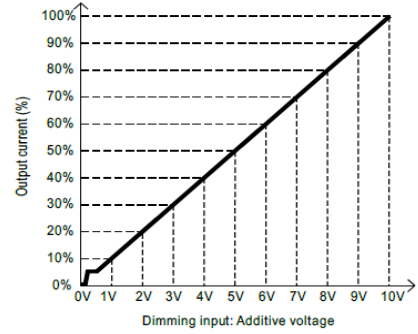
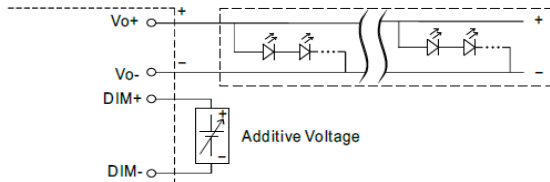


8 DIMMING OPERATION (for AB-Type)

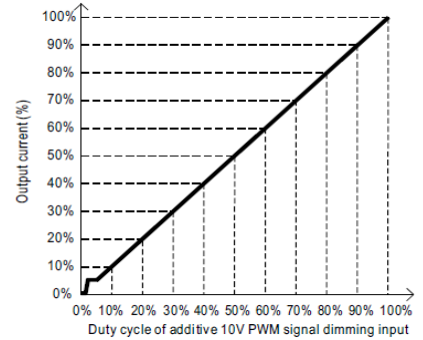
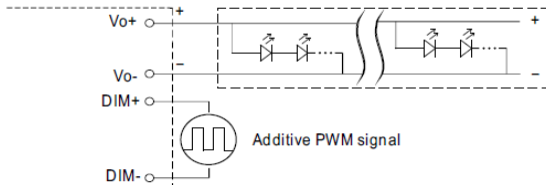
※ 3 in 1 dimming function (for AB-Type)

Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 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: 100µA (typ.)

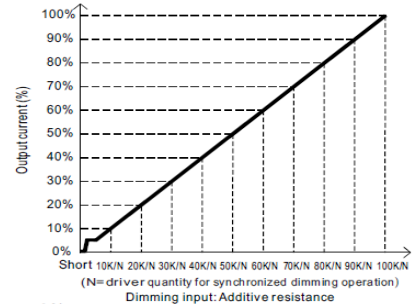
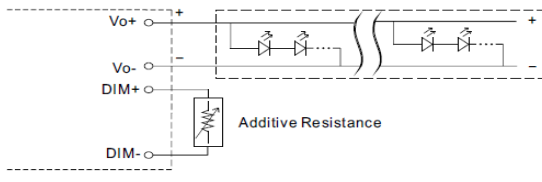
○ Applying additive 0 ~ 10VDC



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



○ Applying additive resistance:



Note : 1. Min. dimming level is about 8% and the output current is not defined when 0% < Iout < 8%.  
 2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P: 230 VAC

O/P: DIMMING TEST

Ta: 25°C

1	DIMMING	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	0.329A	0.617A	0.906A	1.200A	1.482A	1.800A	2.070A	2.360A	2.669A	2.858A	2.858A
%	0%	11.54%	21.65%	31.79%	42.11%	52.00%	63.16%	72.63%	82.81%	93.65%	100.28%	100.28%	
2	PWM	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.282A	0.564A	0.850A	1.134A	1.423A	1.710A	1.998A	2.289A	2.580A	2.843A	2.857A
%	0%	9.89%	19.79%	29.82%	39.79%	49.93%	60.00%	70.11%	80.32%	90.53%	99.75%	100.25%	
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	0.331A	0.615A	0.902A	1.190A	1.477A	1.766A	2.054A	2.344A	2.633A	2.857A	2.857A
%	0%	11.61%	21.58%	31.65%	41.75%	51.82%	61.96%	72.07%	82.25%	92.39%	100.25%	100.25%	

TEST RESULT: OK

TEST RESULT: OK

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P: TESTING O/P: FULL LOAD (PLEASE CHECK DERATING CURVE) Ta: 25°C	87V~305 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P: FULL/MIN LOAD 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 ~305 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	115VAC/ 2.0 A 230 VAC/ 0.8 A 277 VAC/ 0.7 A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	I = 1.53A/ 115VAC I = 0.75A/ 230VAC I = 0.64A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.450mA N-FG: 0.451mA
5	NO LOAD/STANDBY POWER CONSUMPTION	STANDBY POWER CONSUMPTION <0.5W for ABType, NO LOADPOWER CONSUMPTION <0.5W for A	I/P: 230VAC O/P: NO LOAD/STANDBY Ta: 25°C	0.2378W for A 0.334W for ABType
6	INRUSH CURRENT(Typ)	230 V/ 50A COLD START (twidth=620us measured at 50% Ipeak) COLD START at 230V	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I=41.5A/ 230VAC Twidth = 526us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage

D50-X 3014A, MY56271052, Sat Dec 08 09:04:53 2018



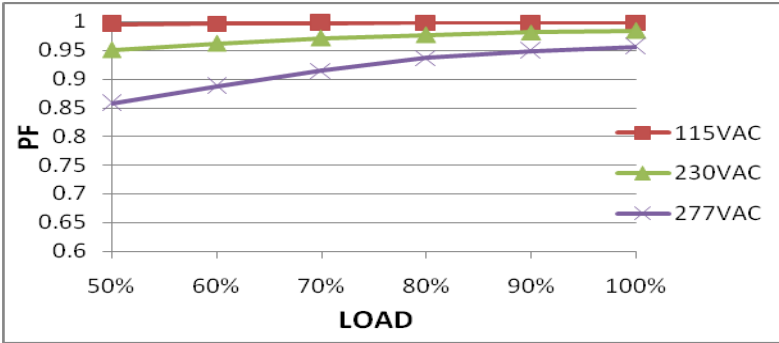


160W Constant Power Mode LED Driver

XBG-160 series

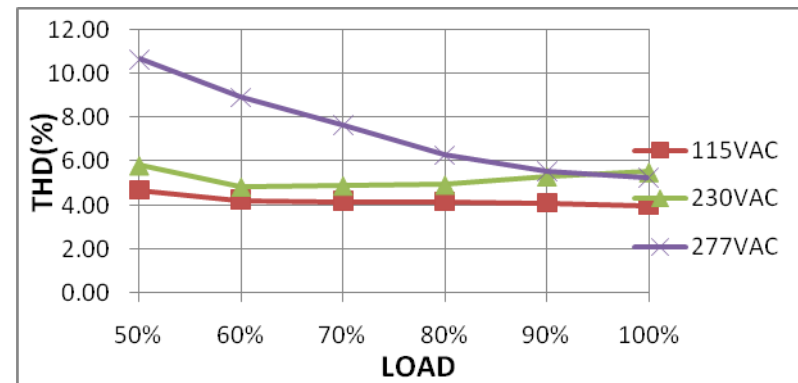
7	POWER FACTOR	0.97/ 115VAC@ FULL LOAD 0.95/ 230VAC@ FULL LOAD 0.92/ 277VAC@ FULL LOAD	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	PF=0.998 @ FULL LOAD /115VAC PF=0.984 @ FULL LOAD /230VAC PF=0.950 @ FULL LOAD /277VAC
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PF vs LOAD



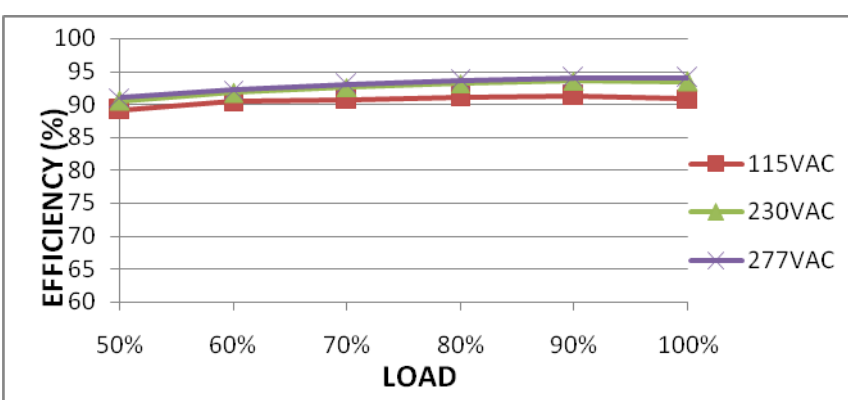
8	TOTAL HARMONIC DISTORTION	THD < 10% (@load ≥ 50%/115VAC; @load ≥ 50%/230VAC; @load ≥ 75%/277VAC)	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 50% / 75% LOAD Ta: 25°C	THD=4.67% @ 50% load /115VAC THD=5.82% @ 50% load /230VAC THD=6.78% @ 75% load /277VAC
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THD vs LOAD



9	EFFICIENCY(Typ)	93%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	93.45%
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EFFICIENCY vs LOAD



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	61V~78V	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: NO LOAD	70.7V/ 100VAC 70.7V/ 230VAC 70.7V/ 305VAC Shut down output voltage, re-power on to recovery
2	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: FULL LOAD	O.T.P. Active Shut down output voltage, recovery automatically after temperature goes down
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE 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	Q2 Rated 8A/600V	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1)466V (2) 458V (3) 438V
2	PFC Transistor	Q1 Rated 11A/600V	I/P: High-Line +3V =308V O/P: (1)Full Load (2)Output Short (3) Full Load continue	(1)453V (2)445V (3)437V
3	P.F.C DIODE	D5 Rated 8 A/ 600 V	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1)450V (2)430V (3)438V
4	Diode Peak Voltage	D100 Rated 30A/150V	I/P: High-Line +3V =308V O/P: (1)Full Load (2)Output Short (3) Full Load continue (4) No Load Ta: 25°C	(1)116V (2)33V (3)115V (4)75V
5	Input Capacitor Voltage	C5 Rated: 100 μ / 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°C	(1)444V (2)449V (3)444V (4)438V

6	Control IC Voltage Test	U2 Rated 30 V	I/P: High-Line +3V =308V O/P(1)FULL LOAD (2) Output Short (3)O.V.P. (4)NO LOAD VR.LOW LINE Ta: 25°C	(1) 12.4V (2) 13.0V (3) 12.6V (4) 13.0V
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**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<4.5mA 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: 2.54 mA I/P-FG: 2.70mA O/P-FG: 2.76mA 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: >9999 G Ω O/P-FG: >9999 G Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	30mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230VAC/50HZ O/P: FULL/50% LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC/50HZ O/P: FULL 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 LIGHT INDUSTRY Air: 8KV Contact: 4KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N : 4KV L-PE: 6KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
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: XBG-160 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=64.3°C																																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29 °C</th> <th>HIGH AMBIENT Ta=64.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>60.9°C</td><td>88.7°C</td></tr> <tr><td>2</td><td>C2</td><td>54.0°C</td><td>85.9°C</td></tr> <tr><td>3</td><td>BD1</td><td>56.7°C</td><td>88.8°C</td></tr> <tr><td>4</td><td>D5</td><td>58.0°C</td><td>91.3°C</td></tr> <tr><td>5</td><td>C5</td><td>55.2°C</td><td>86.5°C</td></tr> <tr><td>8</td><td>Q1</td><td>56.1°C</td><td>88.7°C</td></tr> <tr><td>7</td><td>T1</td><td>61.2°C</td><td>93.0°C</td></tr> <tr><td>8</td><td>C20</td><td>53.1°C</td><td>85.2°C</td></tr> <tr><td>9</td><td>C44</td><td>56.9°C</td><td>88.7°C</td></tr> <tr><td>10</td><td>U2</td><td>53.6°C</td><td>86.2°C</td></tr> <tr><td>11</td><td>Q2</td><td>55.3°C</td><td>89.8°C</td></tr> <tr><td>12</td><td>Q3</td><td>56.6°C</td><td>90.9°C</td></tr> <tr><td>13</td><td>R7</td><td>54.5°C</td><td>85.9°C</td></tr> <tr><td>14</td><td>D100</td><td>59.3°C</td><td>91.4°C</td></tr> <tr><td>15</td><td>D101</td><td>59.4°C</td><td>91.6°C</td></tr> <tr><td>16</td><td>C120</td><td>56.7°C</td><td>88.8°C</td></tr> <tr><td>17</td><td>C104</td><td>54.1°C</td><td>85.9°C</td></tr> <tr><td>18</td><td>C105</td><td>50.7°C</td><td>82.5°C</td></tr> <tr><td>19</td><td>RTH2</td><td>51.3°C</td><td>83.6°C</td></tr> <tr><td>20</td><td>TC</td><td>46.1°C</td><td>78.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta=64.3 °C	1	RTH1	60.9°C	88.7°C	2	C2	54.0°C	85.9°C	3	BD1	56.7°C	88.8°C	4	D5	58.0°C	91.3°C	5	C5	55.2°C	86.5°C	8	Q1	56.1°C	88.7°C	7	T1	61.2°C	93.0°C	8	C20	53.1°C	85.2°C	9	C44	56.9°C	88.7°C	10	U2	53.6°C	86.2°C	11	Q2	55.3°C	89.8°C	12	Q3	56.6°C	90.9°C	13	R7	54.5°C	85.9°C	14	D100	59.3°C	91.4°C	15	D101	59.4°C	91.6°C	16	C120	56.7°C	88.8°C	17	C104	54.1°C	85.9°C	18	C105	50.7°C	82.5°C	19	RTH2	51.3°C	83.6°C	20	TC	46.1°C	78.4°C
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13	R7	54.5°C	85.9°C																																																																																					
14	D100	59.3°C	91.4°C																																																																																					
15	D101	59.4°C	91.6°C																																																																																					
16	C120	56.7°C	88.8°C																																																																																					
17	C104	54.1°C	85.9°C																																																																																					
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19	RTH2	51.3°C	83.6°C																																																																																					
20	TC	46.1°C	78.4°C																																																																																					
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 305VAC/90VAC O/P: FULL LOAD Ta= -45°C/-35°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: 315VAC O/P: FULL LOAD Ta=60 °C HUMIDITY= 95% R.H	TEST: OK																																																																																				
4	TEMPERATURE COEFFICIENT	±0.03%/°C (0~60°C)	I/P: 230 VAC O/P: FULL LOAD	±0.003%/°C (0~60°C)																																																																																				
5	STORAGE TEMPERATURE TEST	-40~+80°C	1. Thermal shock Temperature: -45°C~ +85°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 200 CYCLE 5. Input/Output condition: STATIC TEST: OK																																																																																					





160W Constant Power Mode LED Driver

**XBG-160 series**

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: 16CYCLE 5. Input/Output condition: 15cyle:230VAC/ FULL LOAD AC on 3 sec/AC off 1 sec TEST 1cyle:230VAC/ FULL LOAD Burn In Test TEST: OK
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: 10min/sweep cycle (4) Acceleration: 6G (5) Test Time: 180min in each axis (X.Y.Z) (6) Ta: 25°C
8	CAPACITOR LIFE CYCLE	XBG-160: SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: FULL LOAD Tc= 70 °C LIFE TIME (2) I/P: 230VAC O/P: 75% LOAD Tc= 70 °C LIFE TIME (3) I/P: 230VAC O/P: 50% LOAD Tc= 70 °C LIFE TIME	(1) 113144 HRS (2) 127004 HRS (3) 114194 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 3173.6K hrs min. Telcordia SR-332 (Bellcore) ; 282.4K 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	LIUWY