



# Test Report: HVGC-320-2800

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320W Single Output LED Power Supply

## ■ 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

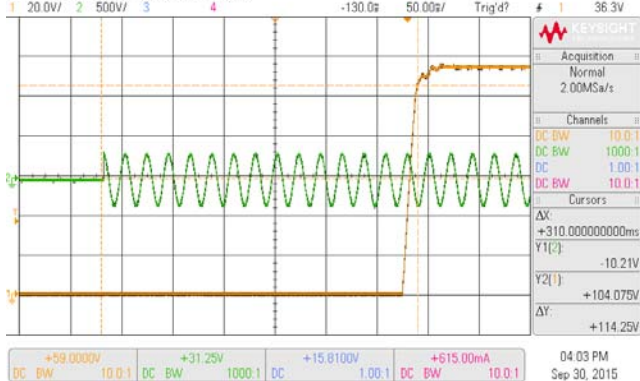
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	2.843A /347VAC@CV MAX-1V 2.783A /347VAC@CV MIN 2.844A /480VAC@CV MAX-1V 2.782A /480VAC@CV MIN 2.22%
2	OPEN CIRCUIT VOLTAGE (max)	118V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	115V
3	CONSTANT CURRENT REGION	CH1: 57V~ 114.3 V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	0.43V~114.3V /347VAC
4	CURRENT ADJ. RANGE	CH1: 1400mA~2800mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	1.207A~ 2.971A /347VAC@CV MAX-1V 1.185A~2.912A /347VAC@CV MIN 1.206A~ 2.97A/480VAC@CV MAX-1V 1.184A~ 2.913A/480VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	1.19%
6	SET UP TIME	230VAC/ 500 ms (Max) 347VAC/ 500 ms (Max) 480VAC/ 500 ms (Max)	I/P: 230VAC I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 310 ms 347VAC/ 286ms 480VAC/ 290ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

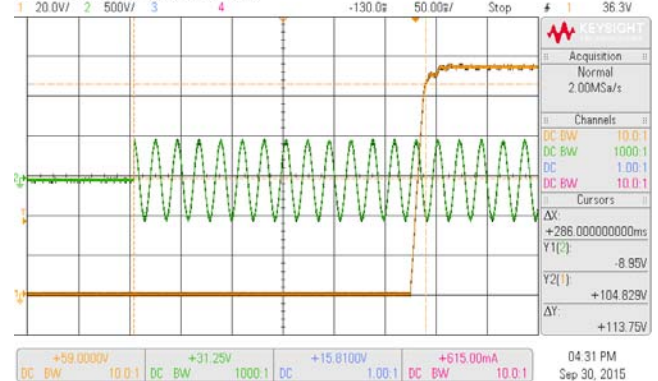
D90-X-3014A, M152161400, Wed Sep 30 16:04:38 2015



INPUT=347VAC/60HZ @ FULL LOAD

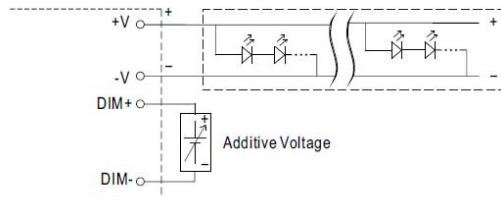
CH1 : Output Voltage CH2 : AC Input Voltage

D90-X-3014A, M152161400, Wed Sep 30 16:32:35 2015

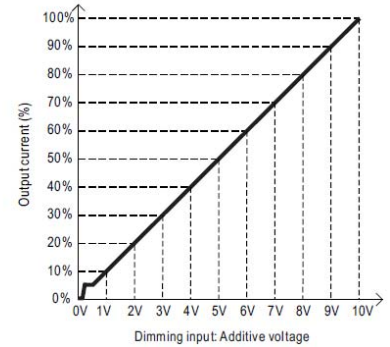


7	<b>DIMMING OPERATION (for B-Type)</b>	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.</p> <p>※Dimming source current from power supply: 100μ A (typ.)</p>
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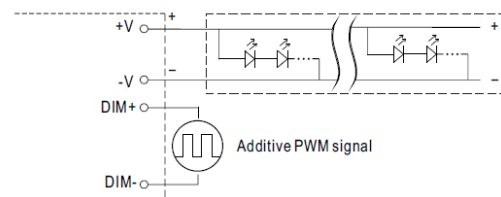
◎ Applying additive 0 ~ 10VDC



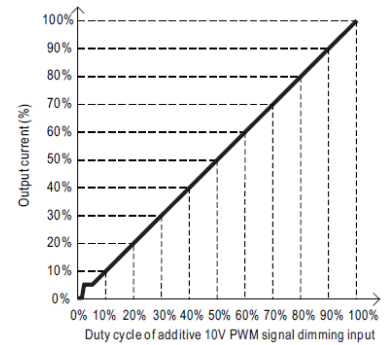
"DO NOT connect "DIM- to -V"



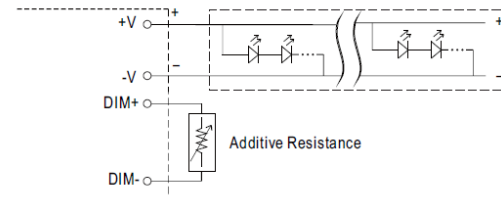
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



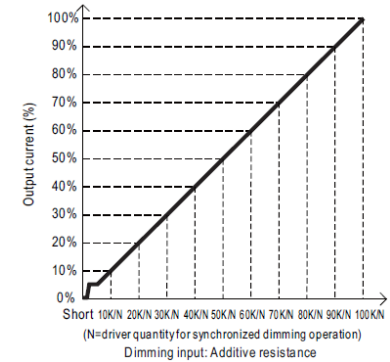
"DO NOT connect "DIM- to -V"



◎ Applying additive resistance:



"DO NOT connect "DIM- to -V"



Note : 1. Min. dimming level is about 5% and the output current is not defined when  $0\% < I_{out} < 5\%$ .

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 : 347VAC

O/P : DIMMING TEST

TA : 25°C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.308A	0.577A	0.844A	1.101A	1.355A	1.611A	1.871A	2.121A	2.500A	2.700A	2.907A
%	0.00%	11.00%	20.61%	30.14%	39.32%	48.39%	57.54%	66.82%	75.75%	89.29%	96.43%	103.82%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.334A	0.612A	0.896A	1.145A	1.448A	1.718A	1.982A	2.260A	2.547A	2.800A	2.907A
%	0.00%	11.93%	21.86%	32.00%	40.89%	51.71%	61.36%	70.79%	80.71%	90.96%	100.00%	103.82%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.335A	0.609A	0.889A	1.155A	1.428A	1.698A	1.972A	2.247A	2.522A	2.786A	2.907A
%	0.00%	11.96%	21.75%	31.75%	41.25%	51.00%	60.64%	70.43%	80.25%	90.07%	99.50%	103.82%

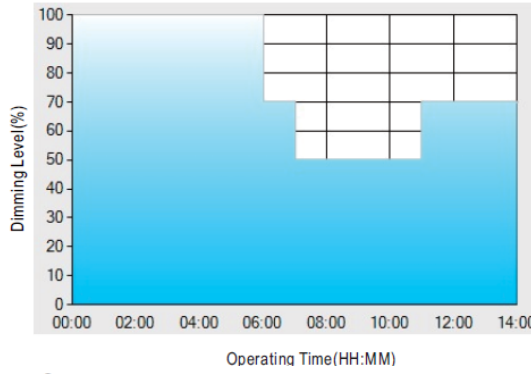
TEST RESULT : OK

**8 DIMMING OPERATION  
(for Dxx-Type by User definition)**

※**Smart timer dimming function (for Dxx-Type by User definition)**

MEAN WELL Smart timer dimming primarily provides the adaptive proportion dimming profile for the output constant current level to perform up to 14 consecutive hours. 3 dimming profiles hereunder are defined accounting for the most frequently seen applications. If other options may be needed, please contact MEAN WELL for details.

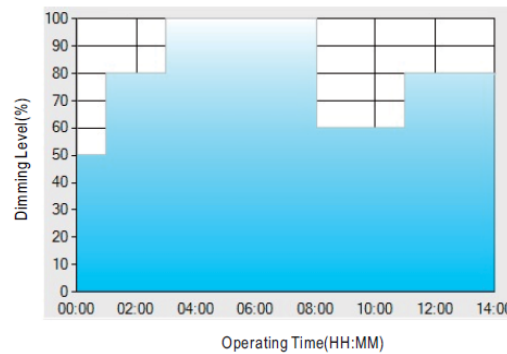
Ex: Ⓒ D01-Type: the profile recommended for residential lighting



Set up for D01-Type in Smart timer dimming software program:

	T1	T2	T3	T4
TIME**	06:00	07:00	11:00	---
LEVEL**	100%	70%	50%	70%

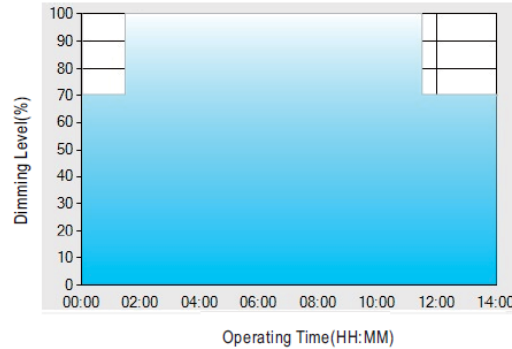
Ex: Ⓒ D02-Type: the profile recommended for street lighting



Set up for D02-Type in Smart timer dimming software program:

	T1	T2	T3	T4	T5
TIME**	01:00	03:00	8:00	11:00	---
LEVEL**	50%	80%	100%	60%	80%

Ex: Ⓒ D03-Type: the profile recommended for tunnel lighting



Set up for D03-Type in Smart timer dimming software program:

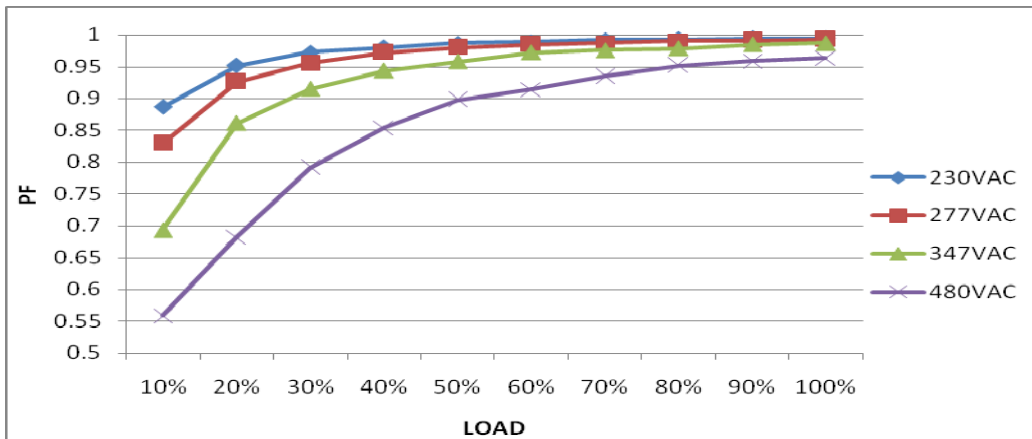
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

I/P : 347VAC  
O/P : DIMMING TEST  
TA : 25°C  
TEST RESULT : OK

## INPUT FUNCTION TEST

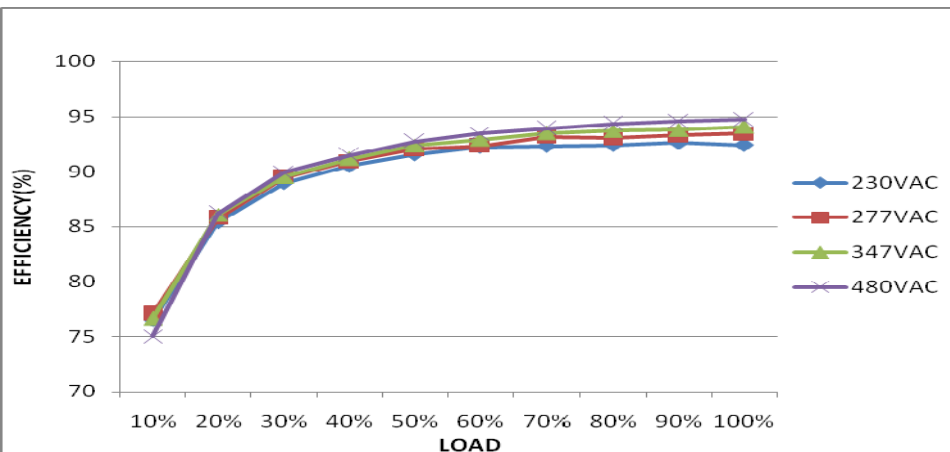
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	120V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	(1).TEST:OK (2).TEST :OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~528VAC O/P:FULL~MIN LOAD Ta:25°C	OK
3	INPUT CURRENT (TYP)	347VAC/ 1.1 A 480VAC/ 0.8 A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I = 0.995A/ 347VAC I = 0.724A/ 480VAC
4	POWER FACTOR(TYP)	0.95/347VAC FULL LOAD 0.93/480VAC FULL LOAD 0.97/277 VAC FULL LOAD 0.98/230 VAC FULL LOAD	I/P: 347VAC/480VAC/277VAC/230VAC O/P:FULL LOAD Ta:25°C	PF= 0.991/347V/100%LOAD PF= 0.978/480V/100%LOAD PF= 0.995/277V/100%LOAD PF= 0.996/230V/100%LOAD

P.F vs LOAD

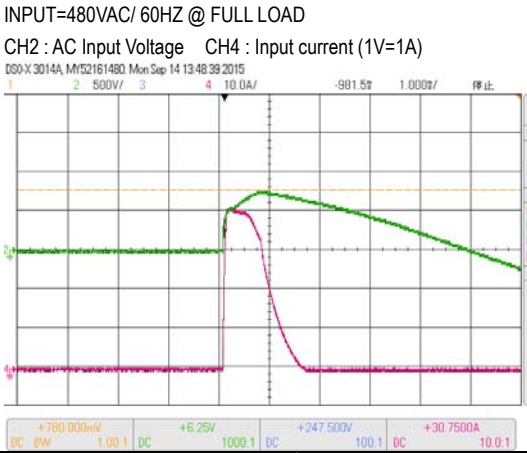


5	EFFICIENCY (TYP)	93.5 %	I/P: 347VAC O/P:FULL LOAD Ta:25°C	93.76%
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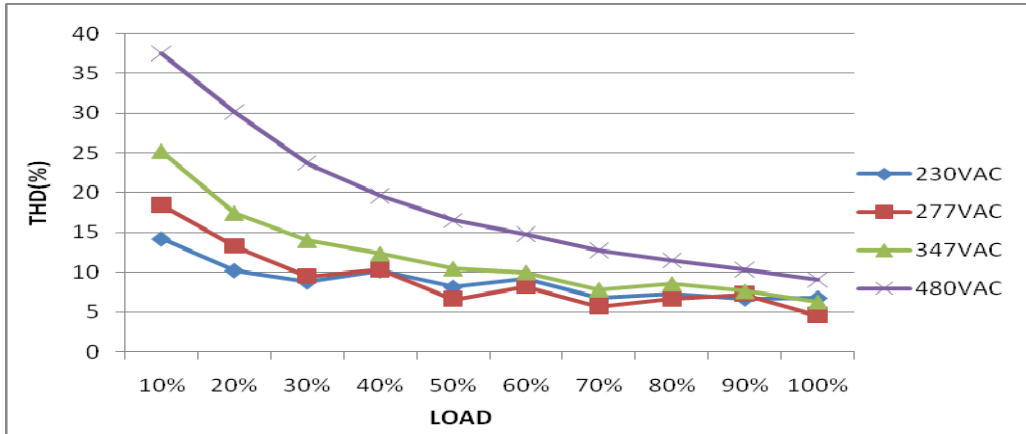
EFFICIENCY vs LOAD



6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START  (twidth=920us measured at 50% Ipeak) COLD START	I/P: 480VAC O/P:FULL LOAD Ta:25°C	I = 41.6A/ 480VAC  T50= 920 us
	INPUT=480VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)			



7	TOTAL HARMONIC DISTORTION	THD < 20% @ ≥ 50% load/230VAC, or 277VAC, or 347VAC, or @ ≥ 60% load/480VAC	I/P : 230V/277V/347V O/P : 100% LOAD 50% LOAD I/P : 480VAC O/P : 60% LOAD Ta : 25°C	THD : 6.73%/230V 50% THD : 5.38%/230V 100% THD : 5.91%/277V 50% THD : 5.81%/277V 100% THD : 7.03%/347V 50% THD : 4.93%/347V 100% THD : 13.16%/480V 60% THD : 7.88%/480V 100%
	THD vs LOAD			



## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 120 V~131 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P: MIN LOAD Ta:25°C	125.21V/ 528VAC 125.11V/ 347VAC 125.06V/ 180VAC PROTECTION TYPE : Shut down o/p voltage with re-power on to recovery

2	OVER TEMPERATURE PROTECTION	PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover-	I/P: 528 VAC I/P: 180 VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 528VAC I/P: 180 VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Constant current limiting, 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) <b>Peak Voltage</b>	Q901 Rated 9A/ 950V	I/P: High-Line +3V =531V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 793V/4.87A (2) 774V/7.54A (3) 769V/1.88A
2	P.F.C Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q 1 Rated 6A/1050V	I/P: High-Line +3V =531V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 814V/4.13A (2) 785V/3.78A (3) 837V/3.85A
3	Diode <b>Peak Voltage</b>	D103 Rated 20A/300V	I/P: High-Line +3V =531 V D103 : AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 430V (2) 4.57V (3) 430V
4	<b>Input Capacitor Voltage</b>	C6 Rated: 82u/450V	I/P: High-Line +3V =531V 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) 410V (2) 386V (3) 394V (4) 406V
5	<b>Control IC Voltage Test</b>	PWM IC U901 Rated 8.85V~16V	I/P: High-Line +3V =531 V AC ON/OFF O/P(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. Ta:25°C	(1) 14.45V (2) 14.05V (3) 14.21V (4) 14.13V

## SAFETY & EMC TEST

### 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: 4.125 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P: 1.64 mA I/P-FG: 3.16 mA O/P-FG: 0.6mA 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: 30GΩ I/P-FG: 14.1G Ω O/P-FG: 30G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	24mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.43 mA N-FG: 0.42 mA L,N -V(+): 0.05 mA L,N-V(-): 0.05 mA

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	FCC Part 15 Subpart B	I/P: 440VAC (60HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
2	RADIATION	FCC Part 15 Subpart B	I/P: 480VAC (60HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	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 : HVGC-320-3500 1. ROOM AMBIENT BURN-IN : 18 HRS I/P : 347VAC O/P : FULL LOAD Ta= 29 °C 2. HIGH AMBIENT BURN-IN : 6 HRS I/P : 347VAC O/P : FULL LOAD Ta= 59.3 °C																																																																																																										
		<table border="1"> <thead> <tr> <th>CH.</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29 °C</th> <th>HIGH AMBIENT Ta= 59.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>60.5°C</td><td>95.3°C</td></tr> <tr><td>2</td><td>L2</td><td>58.5°C</td><td>93.6°C</td></tr> <tr><td>3</td><td>ZNR2</td><td>56.3°C</td><td>91.3°C</td></tr> <tr><td>4</td><td>C10</td><td>60.4°C</td><td>95.7°C</td></tr> <tr><td>5</td><td>C2</td><td>55.8°C</td><td>90.5°C</td></tr> <tr><td>6</td><td>Q1</td><td>61.6°C</td><td>97.0°C</td></tr> <tr><td>7</td><td>C5</td><td>60.5°C</td><td>95.2°C</td></tr> <tr><td>8</td><td>RTH2</td><td>81.4°C</td><td>108.5°C</td></tr> <tr><td>9</td><td>Q902</td><td>61.3°C</td><td>97.4°C</td></tr> <tr><td>10</td><td>T2</td><td>60.5°C</td><td>97.1°C</td></tr> <tr><td>11</td><td>C902</td><td>59.2°C</td><td>95.5°C</td></tr> <tr><td>12</td><td>L1</td><td>59.2°C</td><td>96.4°C</td></tr> <tr><td>13</td><td>C54</td><td>57.3°C</td><td>94.2°C</td></tr> <tr><td>14</td><td>C46</td><td>57.4°C</td><td>94.7°C</td></tr> <tr><td>15</td><td>RTH3</td><td>55.1°C</td><td>91.0°C</td></tr> <tr><td>16</td><td>T1</td><td>61.9°C</td><td>101.4°C</td></tr> <tr><td>17</td><td>C200</td><td>58.8°C</td><td>93.9°C</td></tr> <tr><td>18</td><td>C201</td><td>58.4°C</td><td>93.5°C</td></tr> <tr><td>19</td><td>D100</td><td>64.2°C</td><td>99.0°C</td></tr> <tr><td>20</td><td>D103</td><td>64.3°C</td><td>98.6°C</td></tr> <tr><td>21</td><td>C105</td><td>58.1°C</td><td>92.7°C</td></tr> <tr><td>22</td><td>LF100</td><td>58.2°C</td><td>93.4°C</td></tr> <tr><td>23</td><td>U1</td><td>56.1°C</td><td>91.5°C</td></tr> <tr><td>24</td><td>U901</td><td>55.7°C</td><td>92.4°C</td></tr> <tr><td>25</td><td>C6</td><td>57.5°C</td><td>94.1°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta= 59.3 °C	1	BD1	60.5°C	95.3°C	2	L2	58.5°C	93.6°C	3	ZNR2	56.3°C	91.3°C	4	C10	60.4°C	95.7°C	5	C2	55.8°C	90.5°C	6	Q1	61.6°C	97.0°C	7	C5	60.5°C	95.2°C	8	RTH2	81.4°C	108.5°C	9	Q902	61.3°C	97.4°C	10	T2	60.5°C	97.1°C	11	C902	59.2°C	95.5°C	12	L1	59.2°C	96.4°C	13	C54	57.3°C	94.2°C	14	C46	57.4°C	94.7°C	15	RTH3	55.1°C	91.0°C	16	T1	61.9°C	101.4°C	17	C200	58.8°C	93.9°C	18	C201	58.4°C	93.5°C	19	D100	64.2°C	99.0°C	20	D103	64.3°C	98.6°C	21	C105	58.1°C	92.7°C	22	LF100	58.2°C	93.4°C	23	U1	56.1°C	91.5°C	24	U901	55.7°C	92.4°C	25	C6	57.5°C	94.1°C		
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15	RTH3	55.1°C	91.0°C																																																																																																									
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24	U901	55.7°C	92.4°C																																																																																																									
25	C6	57.5°C	94.1°C																																																																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 528VAC/180VAC O/P : 100 % LOAD Ta= -45°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 : 538VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																								
4	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~60°C)	I/P : 347 VAC O/P : FULL LOAD	± 0.019 %/°C (0~60°C)																																																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -50°C~ +125°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		OK																																																																																																								



# 320W Single Output LED Power Supply **HVGC-320** series

6	THERMAL SHOCK TEST	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	OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 70min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Tc= 80 °C LIFE TIME (2) I/P : 347VAC O/P : 75% LOAD Tc= 80 °C LIFE TIME (3) I/P : 347VAC O/P : 50% LOAD Tc= 80 °C LIFE TIME	(1) 43140HRS (2) 47916HRS (3) 49808HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 141.2K 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	DANIEL GAO	SANFORD SU	VINCENT ZENG

12.10.30 A50-F031