



Test Report: HVGC-320-2100

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

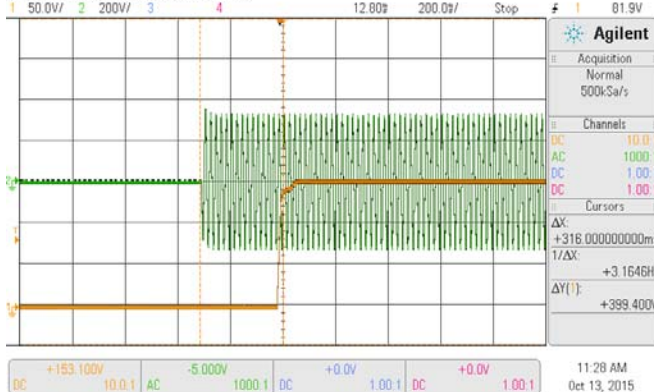
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	2.1432A /347VAC@CV MAX-1V 2.1321A /347VAC@CV MIN 2.1479A/480VAC@CV MAX-1V 2.126A/480VAC@CV MIN 1.52%
2	OPEN CIRCUIT VOLTAGE (max)	156V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	153V
3	CONSTANT CURRENT REGION	CH1: 76.2V~ 152.4 V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	0.5V~ 152.4V /347VAC
4	CURRENT ADJ. RANGE	CH1: 1050mA~2100mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	0.9151A~2.2397A /347VAC@CV MAX-1V 0.8881A~2.2477 A /347VAC@CV MIN 0.9153A~2.2403A/480VAC@CV MAX-1V 0.8889A~2.2461A/480VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	1.17%
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/ 316ms 347VAC/ 286ms 480VAC/ 278 ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

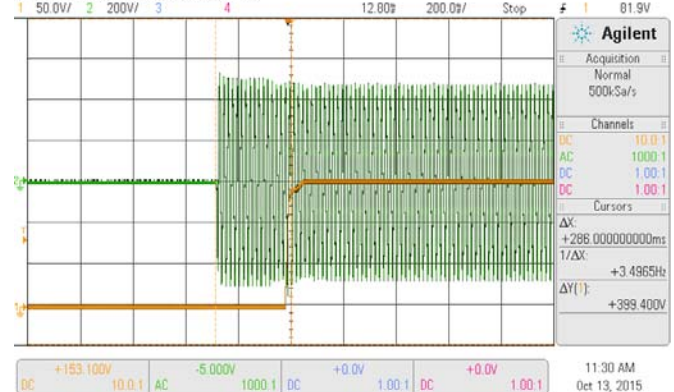
DSO-X.3014A, M154100664 Tue Oct 13 11:28:30 2015



INPUT=347VAC/60HZ @ FULL LOAD

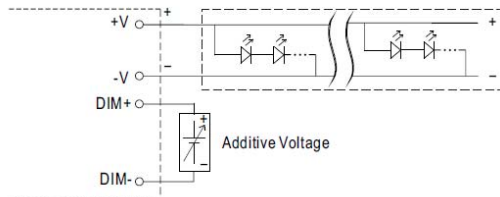
CH1 : Output Voltage CH2 : AC Input Voltage

DSO-X.3014A, M154100664 Tue Oct 13 11:30:55 2015

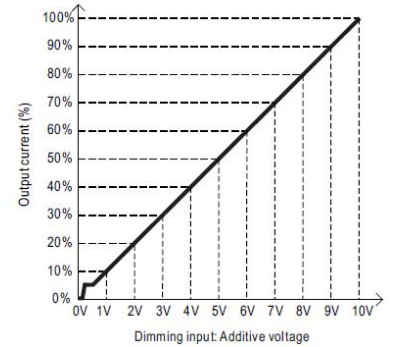


7	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used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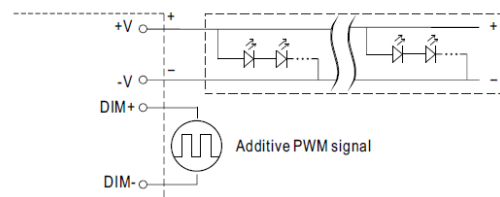
◎ Applying additive 0 ~ 10VDC



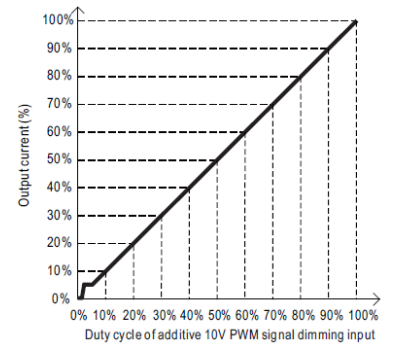
"DO NOT connect "DIM- to -V"



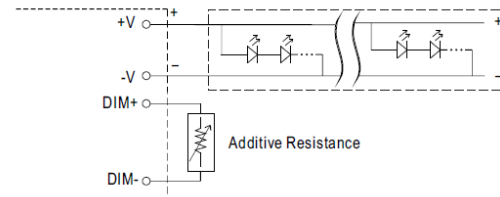
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



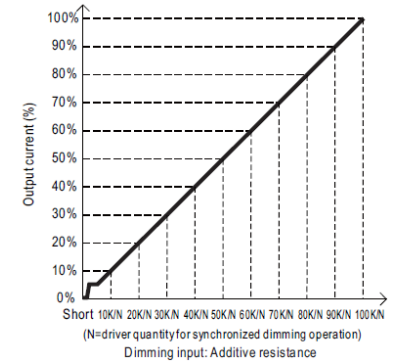
"DO NOT connect "DIM- to -V"



◎ 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	0.245A	0.457A	0.667A	0.866A	1.062A	1.259A	1.460A	1.652A	1.844A	2.019A	2.174A
%	0.00%	11.67%	21.76%	31.76%	41.24%	50.57%	59.95%	69.52%	78.67%	87.81%	96.14%	103.52%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.263A	0.471A	0.689A	0.873A	1.089A	1.284A	1.498A	1.704A	1.912A	2.100A	2.174A
%	0.00%	12.52%	22.43%	32.81%	41.57%	51.86%	61.14%	71.33%	81.14%	91.05%	100.00%	103.52%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.251A	0.463A	0.678A	0.877A	1.081A	1.285A	1.491A	1.695A	1.894A	2.097A	2.217A
%	0.00%	11.95%	22.05%	32.29%	41.76%	51.48%	61.19%	71.00%	80.71%	90.19%	99.86%	105.59%

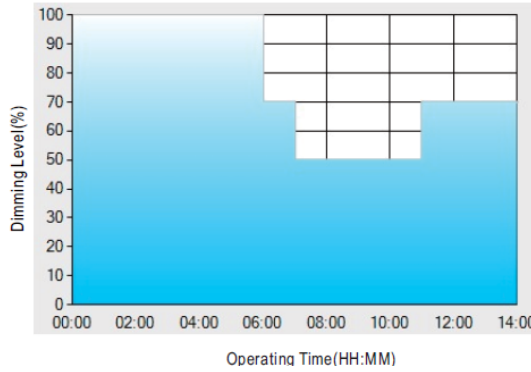
TEST RESULT : OK

**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.

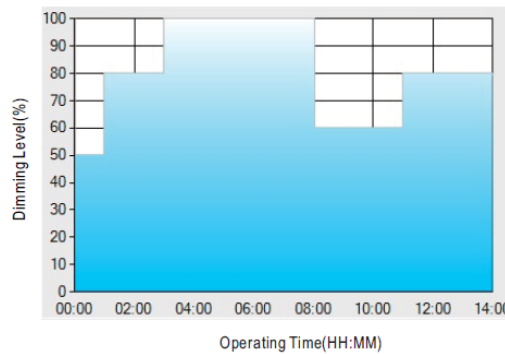
Ex : Ⓒ D01-Type: the profile recommended for residential lighting



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%

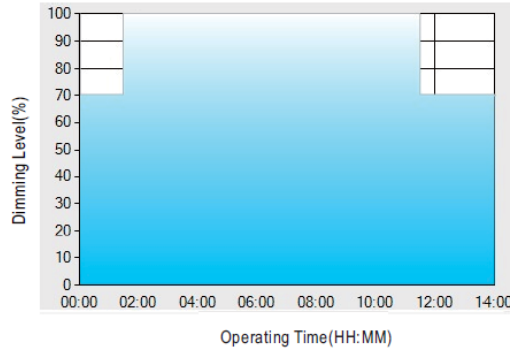
Ex : Ⓒ D02-Type: the profile recommended for street lighting



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:

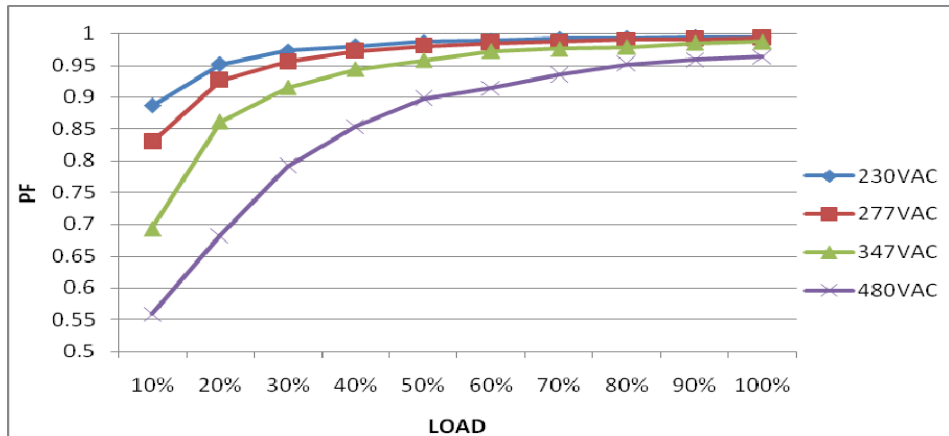
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

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

INPUT FUNCTION TEST

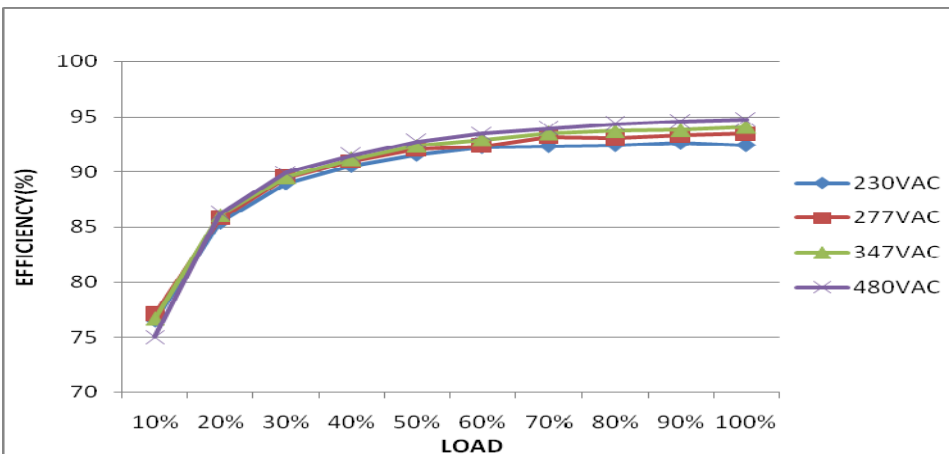
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	120.7V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :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/ 1.1A 480VAC/ 0.8 A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I =1.008 A/ 347VAC I =0.7346A/ 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=0.9917 /347V/100%LOAD PF= 0.9795 /480V/100%LOAD PF= 0.9924/277V/100%LOAD PF= 0.9932/230V/100%LOAD

P.F vs LOAD

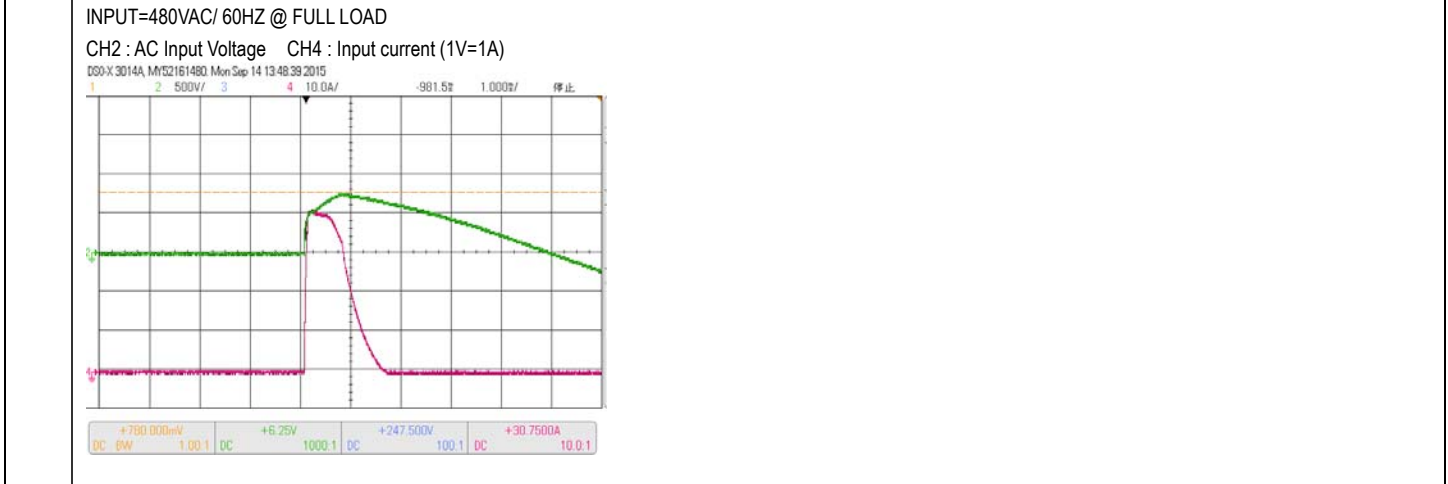


5	EFFICIENCY (TYP)	93.5 %	I/P: 347VAC O/P:FULL LOAD Ta:25°C	94.09 %
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EFFICIENCY vs LOAD

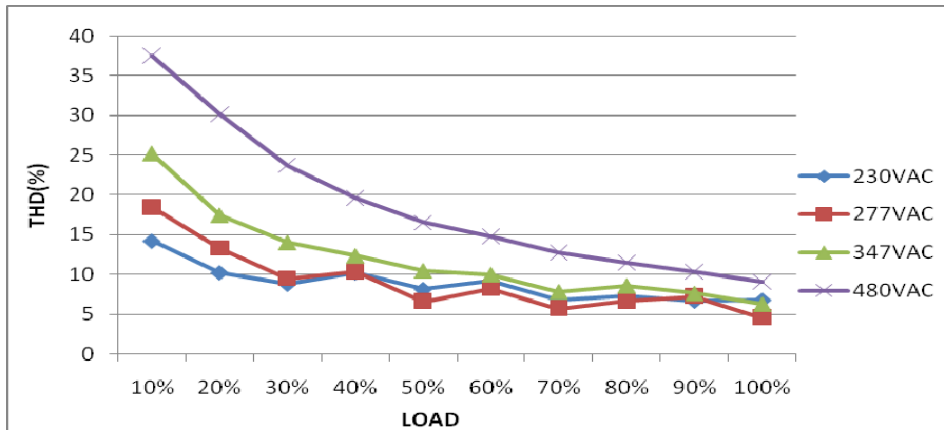


6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START (twidth= 920 us measured at 50% Ipeak) COLD START	I/P: 480VAC O/P:FULL LOAD Ta:25°C	I = 41.6 A/ 480VAC T50= 920 us
	INPUT=480VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) DSO-V 3014A, MY52161480, Mon Sep 14 13:48:39 2015 			



7	TOTAL HARMONIC DISTORTION	THD< 20% @ \geq 50% load/230VAC, or 277VAC, or 347VAC, or @ \geq 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 : 7.60 %/230V 50% THD : 7.630 %/230V 100% THD : 8.07 %/277V 50% THD : 5.25%/277V 100% THD : 12.85%/347V 50% THD : 7.16 %/347V 100% THD : 15.23%480V 60% THD : 10.89%480V 100%
	THD vs LOAD 			

THD vs LOAD



ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 160 V~175 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	166.56V/ 528VAC 166.13V/ 347VAC 166.58V/ 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) Peak Voltage	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)788V/2.61A (2)807V/7.30A (3)782V/2.15A
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	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)869V/3.81A (2)851V/2.85A (3)813V/0.3.73A
3	Diode Peak Voltage	D101 Rated 10A/400 V D100 Rated 10 A/400V	I/P:High-Line +3V =531 V D101 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue D100 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25°C	VDS: (1)314V (2)17.8V (3)307V VDS: (1)321V (2)16.8V (3)314V
4	Input Capacitor Voltage	C6 Rated: 120u/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)386V (2)386V (3)407V (4)399 V
5	Control IC Voltage Test	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) 13.937V (2) 13.937V (3) 13.937V (4) 12.9V

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:1.42 mA I/P-FG: 3.19 mA O/P-FG: 0.7mA 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:7.18G 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	18mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.54mA N-FG:0.54 mA L,N -V(+):0.15 mA L,N-V(-):0.15 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-320-700 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>60.7°C</td><td>97.1°C</td></tr> <tr><td>2</td><td>L2</td><td>57.5°C</td><td>93.8°C</td></tr> <tr><td>3</td><td>ZNR2</td><td>56.4°C</td><td>92.1°C</td></tr> <tr><td>4</td><td>C10</td><td>58.8°C</td><td>95.1°C</td></tr> <tr><td>5</td><td>C2</td><td>56.1°C</td><td>91.6°C</td></tr> <tr><td>6</td><td>Q1</td><td>61.3°C</td><td>97.9°C</td></tr> <tr><td>7</td><td>C5</td><td>60.3°C</td><td>96.9°C</td></tr> <tr><td>8</td><td>RTH2</td><td>77.8°C</td><td>108.3°C</td></tr> <tr><td>9</td><td>Q902</td><td>61.7°C</td><td>104.1°C</td></tr> <tr><td>10</td><td>T2</td><td>61.1°C</td><td>99.3°C</td></tr> <tr><td>11</td><td>C902</td><td>62.1°C</td><td>99.6°C</td></tr> <tr><td>12</td><td>L1</td><td>59.9°C</td><td>98.3°C</td></tr> <tr><td>13</td><td>C54</td><td>58.1°C</td><td>97.8°C</td></tr> <tr><td>14</td><td>C46</td><td>58.7°C</td><td>99.7°C</td></tr> <tr><td>15</td><td>RTH3</td><td>56.1°C</td><td>94.5°C</td></tr> <tr><td>16</td><td>T1</td><td>62.8°C</td><td>98.9°C</td></tr> <tr><td>17</td><td>C200</td><td>57.9°C</td><td>93.5°C</td></tr> <tr><td>18</td><td>C201</td><td>58.3°C</td><td>94.7°C</td></tr> <tr><td>19</td><td>D100</td><td>57.9°C</td><td>92.7°C</td></tr> <tr><td>20</td><td>D103</td><td>59.0°C</td><td>94.1°C</td></tr> <tr><td>21</td><td>C105</td><td>56.1°C</td><td>91.4°C</td></tr> <tr><td>22</td><td>LF100</td><td>56.4°C</td><td>91.6°C</td></tr> <tr><td>23</td><td>U1</td><td>56.2°C</td><td>91.9°C</td></tr> <tr><td>24</td><td>U901</td><td>56.1°C</td><td>94.5°C</td></tr> <tr><td>25</td><td>C6</td><td>59.7°C</td><td>99.8°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta= 59.3 °C	1	BD1	60.7°C	97.1°C	2	L2	57.5°C	93.8°C	3	ZNR2	56.4°C	92.1°C	4	C10	58.8°C	95.1°C	5	C2	56.1°C	91.6°C	6	Q1	61.3°C	97.9°C	7	C5	60.3°C	96.9°C	8	RTH2	77.8°C	108.3°C	9	Q902	61.7°C	104.1°C	10	T2	61.1°C	99.3°C	11	C902	62.1°C	99.6°C	12	L1	59.9°C	98.3°C	13	C54	58.1°C	97.8°C	14	C46	58.7°C	99.7°C	15	RTH3	56.1°C	94.5°C	16	T1	62.8°C	98.9°C	17	C200	57.9°C	93.5°C	18	C201	58.3°C	94.7°C	19	D100	57.9°C	92.7°C	20	D103	59.0°C	94.1°C	21	C105	56.1°C	91.4°C	22	LF100	56.4°C	91.6°C	23	U1	56.2°C	91.9°C	24	U901	56.1°C	94.5°C	25	C6	59.7°C	99.8°C		
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24	U901	56.1°C	94.5°C																																																																																																									
25	C6	59.7°C	99.8°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	± 0.011 %/°C (0~60°C)																																																																																																								



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

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
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) 50542 HRS (2) 51256 HRS (3) 54923HRS
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