



# Test Report: HVGC-320-1400

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320W Single Output LED Power Supply

## ■ 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

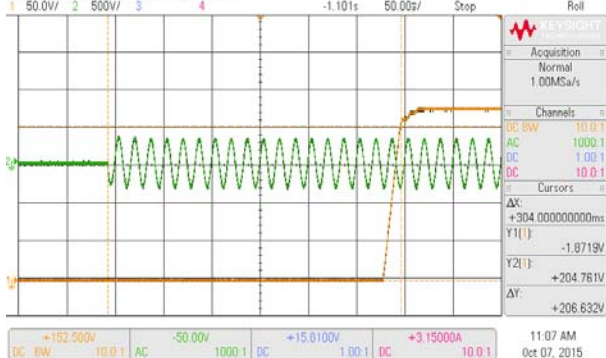
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	1.43A/347VAC@CV MAX-1V 1.418A/347VAC@CV MIN 1.43A/480VAC@CV MAX-1V 1.418A/480VAC@CV MIN 0.84%
2	OPEN CIRCUIT VOLTAGE (max)	234V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	229V
3	CONSTANT CURRENT REGION	CH1: 114.3V~ 228.6 V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	0.408V~228.6V/347VAC
4	CURRENT ADJ. RANGE	CH1: 700mA~1400mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	0.648A~1.519A /347VAC@CV MAX-1V 0.647A~ 1.51A /347VAC@CV MIN 0.649A~1.519A /480VAC@CV MAX-1V 0.648A~ 1.51A /480VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	1.43%
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/ 304 ms 347VAC/ 279 ms 480VAC/ 227 ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

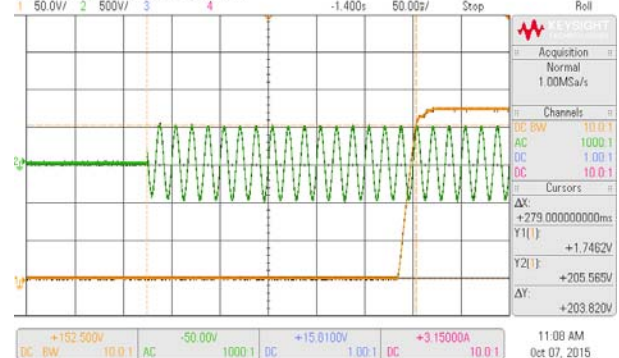
090-X 3014A, M152161480 Wed Oct 07 11:08:15 2015



INPUT=347VAC/60HZ @ FULL LOAD

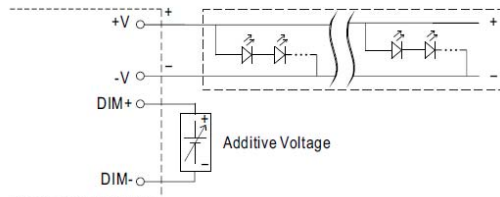
CH1 : Output Voltage CH2 : AC Input Voltage

090-X 3014A, M152161480 Wed Oct 07 11:09:26 2015

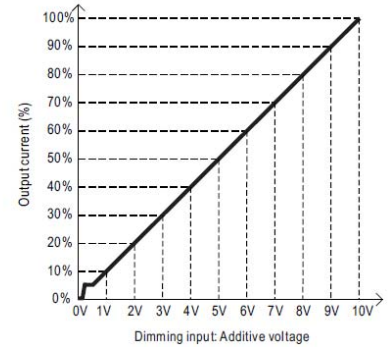


7	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used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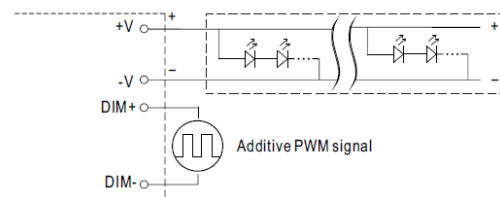
◎ Applying additive 0 ~ 10VDC



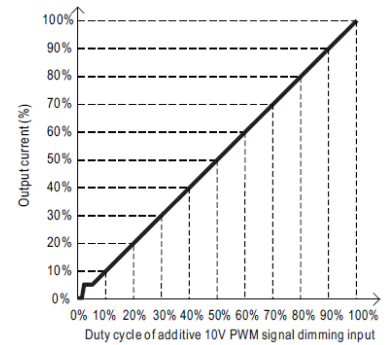
"DO NOT connect "DIM- to -V"



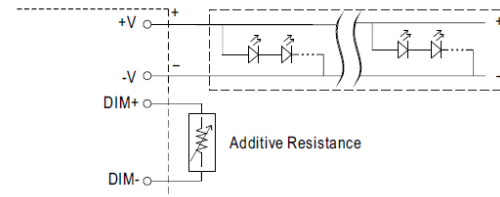
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



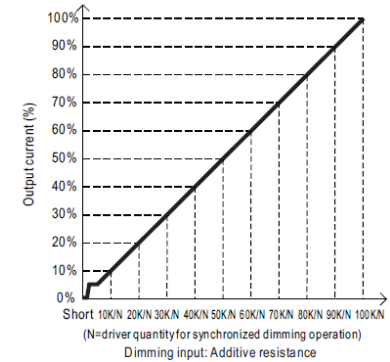
"DO NOT connect "DIM- to -V"



◎ 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	0.166A	0.298A	0.431A	0.563A	0.694A	0.824A	0.956A	1.084A	1.214A	1.336A	1.513A
%	0.00%	11.86%	21.29%	30.79%	40.21%	49.57%	58.86%	68.29%	77.43%	86.71%	95.43%	108.07%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.178A	0.308A	0.441A	0.582A	0.721A	0.846A	0.991A	1.129A	1.213A	1.400A	1.513A
%	0.00%	12.71%	22.00%	31.50%	41.57%	51.50%	60.43%	70.79%	80.64%	86.64%	100.00%	108.07%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.174A	0.307A	0.445A	0.579A	0.714A	0.849A	0.984A	1.119A	1.254A	1.388A	1.513A
%	0.00%	12.43%	21.93%	31.79%	41.36%	51.00%	60.64%	70.29%	79.93%	89.57%	99.14%	108.07%

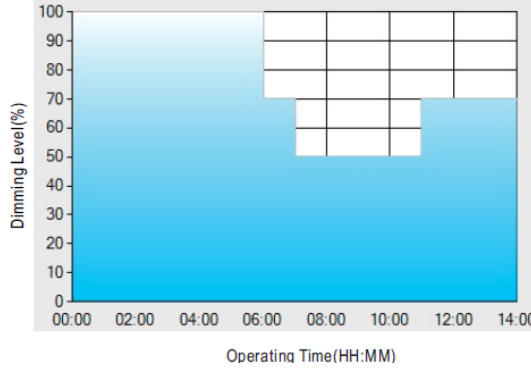
TEST RESULT : OK

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.

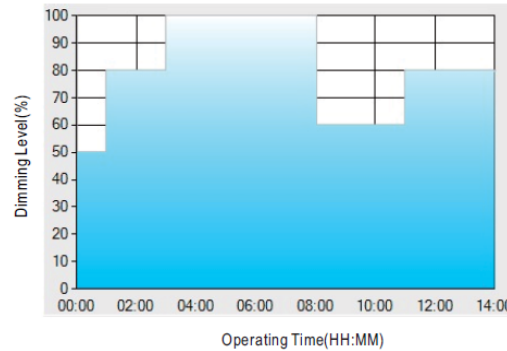
Ex : Ⓒ D01-Type: the profile recommended for residential lighting



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%

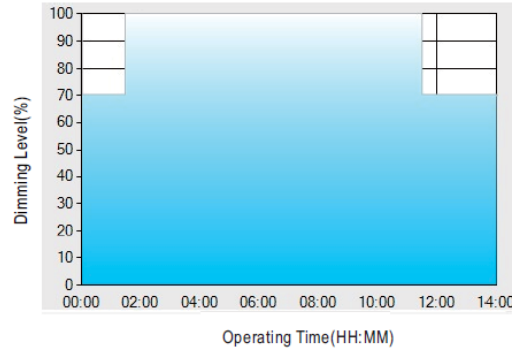
Ex : Ⓒ D02-Type: the profile recommended for street lighting



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:

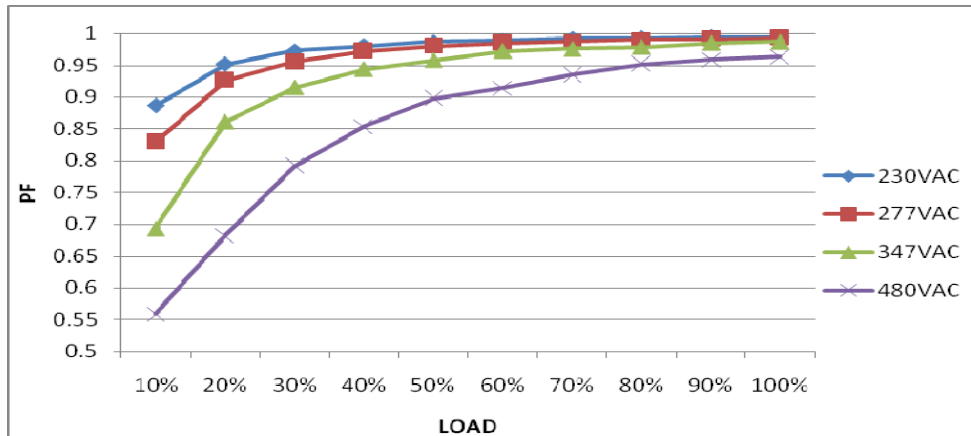
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

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

## INPUT FUNCTION TEST

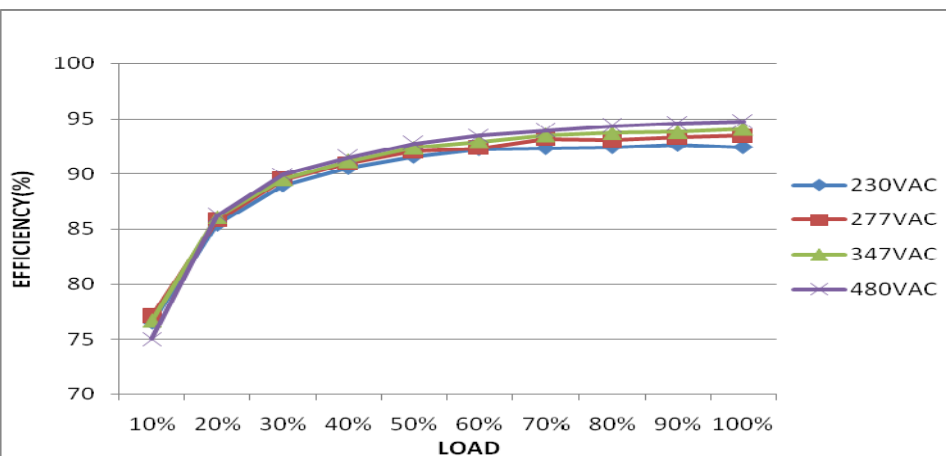
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	116V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	(1).TEST:OK (2).TEST :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 = 0.996A/ 347VAC I = 0.726 A/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= 0.992/347V/100%LOAD PF= 0.978/480V/100%LOAD PF= 0.995/277V/100%LOAD PF= 0.997/230V/100%LOAD

P.F vs LOAD

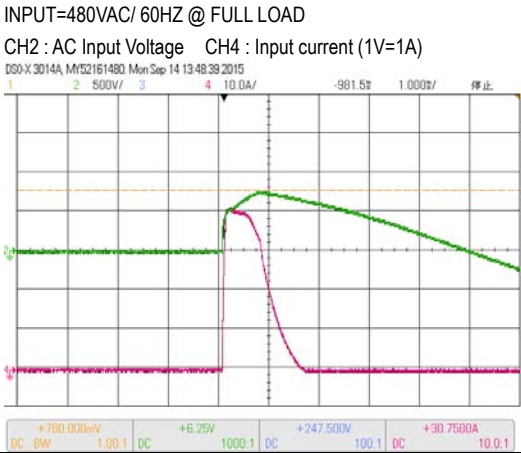


5	EFFICIENCY (TYP)	93.5 %	I/P: 347VAC O/P:FULL LOAD Ta:25°C	94.03 %
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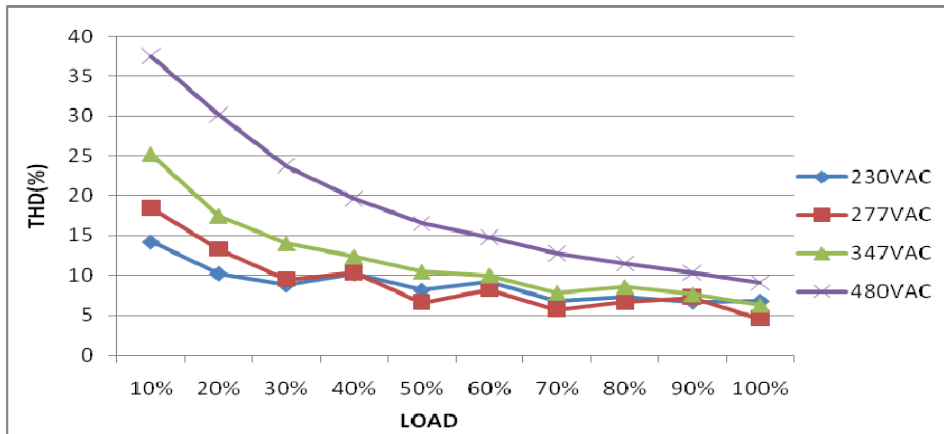
EFFICIENCY vs LOAD



6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START  (twitdh=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-X 3014A, M552161480, Mon Sep 14 13:48:39 2015			



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 : 9.64 %/230V 50% THD : 5.88%/230V 100% THD : 8.44%/277V 50% THD : 8.23%/277V 100% THD : 11.83%/347V 50% THD : 7.96%/347V 100% THD : 16.92%/480V 60% THD : 11.33%/480V 100%
	THD vs LOAD			



## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 240 V~ 263 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	249.27V/ 528VAC 248.92V/ 347VAC 249.27V/ 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)792V/8.03A (2)774V/5.26A (3)786V/2A
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)817V/4.18A (2)810V/3.34A (3)804V/4.14A
3	Diode <b>Peak Voltage</b>	D103 Rated 10A/400V	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)242V (2)15.2V (3)242V
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)401V (2)413V (3)409V (4)401V
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) 14.4V (2) 15.45V (3) 14.08V (4) 14.48V

## 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: 3.19mA O/P-FG: 0.54 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°C	I/P-O/P:29.6 GΩ I/P-FG: 13.7 GΩ O/P-FG: 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	24 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.56mA N-FG: 0.56mA L,N -V(+): 0.115mA L,N-V(-): 0.115mA

### 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