



# Test Report: HVGC-240-2800

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240W 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

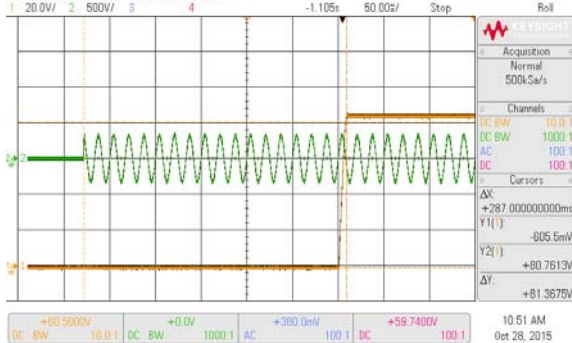
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	2.8072A /347VAC@CV MAX-1V 2.8087A /347VAC@CV MIN 2.8076A /480VAC@CV MAX-1V 2.8053A /480VAC@CV MIN 0.311%
2	CONSTANT CURRENT REGION	CH1: 42.9V~ 85.7V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	27.2V~85.7V /347VAC
3	CURRENT ADJ. RANGE	CH1: 1400mA~ 2800mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	1.2016A~2.988A/347VAC@CV MAX-1V 1.1949A~2.9923 A /347VAC@CV MIN 1.1953A~2.988A/480VAC@CV MAX-1V 1.1927A~2.9904A/480VAC@CV MIN
4	OPEN CIRCUIT VOLTAGE (max.)	88V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	86.8 V
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	2.41%
6	OVER/UNDERSHOOT TEST	< ±5%	I/P: 347 VAC O/P: FULL LOAD Ta: 25°C	TEST: <5%
7	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/ 287ms 347VAC/ 281 ms 480VAC/ 262 ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

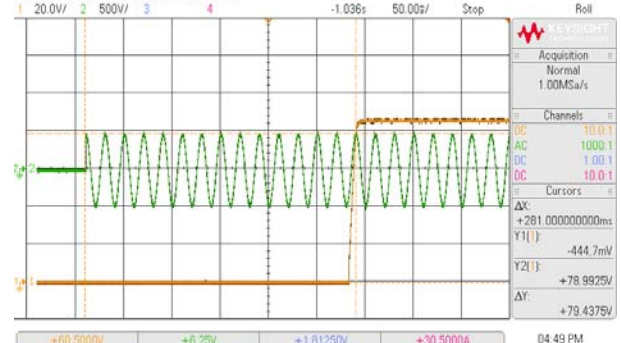
090-X 3024A, M155140430 Wed Oct 28 10:52:19 2015



INPUT=347VAC/60HZ @ FULL LOAD

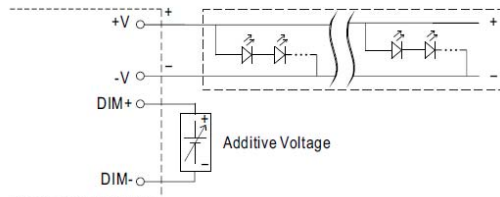
CH1 : Output Voltage CH2 : AC Input Voltage

090-X 3014A, M152161480 Tue Oct 20 16:49:40 2015



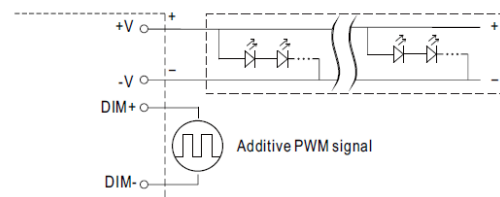
8	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used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



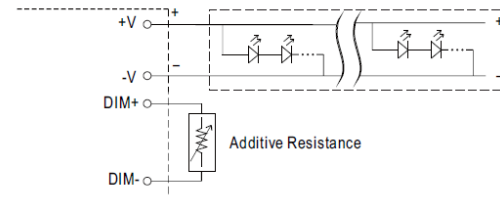
"DO NOT connect "DIM- to -V"

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

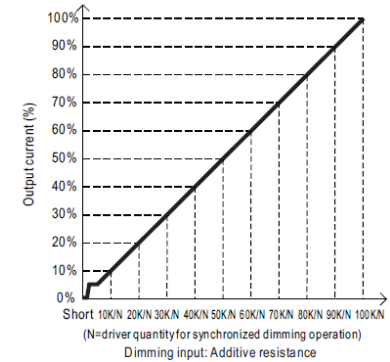
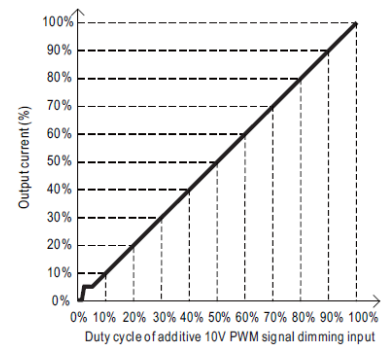
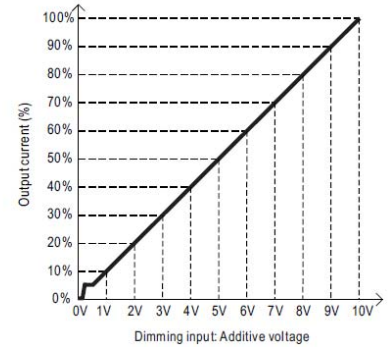


"DO NOT connect "DIM- to -V"

◎ 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	0.315A	0.581A	0.852A	1.123A	1.388A	1.655A	1.912A	2.172A	2.459A	2.718A	2.948A
%	0.00%	11.23%	20.76%	30.44%	40.11%	49.58%	59.12%	68.27%	77.57%	87.82%	97.08%	105.29%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.340A	0.611A	0.908A	1.149A	1.421A	1.711A	2.014A	2.279A	2.542A	2.800A	2.948A
%	0.00%	12.14%	21.82%	32.44%	41.04%	50.76%	61.12%	71.91%	81.38%	90.77%	100.00%	105.29%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.340A	0.618A	0.898A	1.174A	1.453A	1.730A	2.008A	2.287A	2.565A	2.816A	2.948A
%	0.00%	12.15%	22.05%	32.06%	41.91%	51.90%	61.79%	71.71%	81.66%	91.60%	100.57%	105.29%

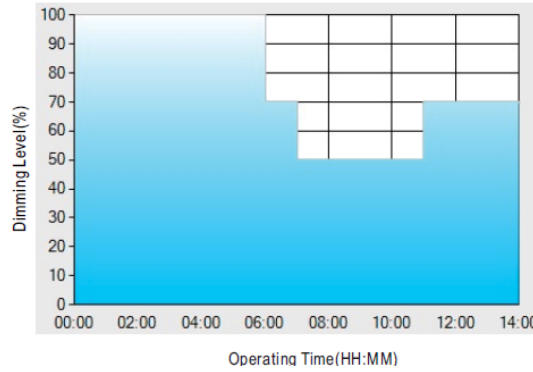
TEST RESULT : OK

9 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.

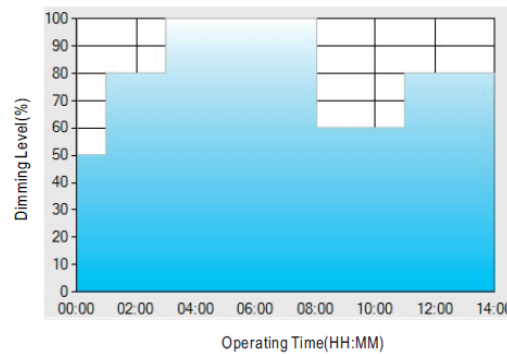
Ex: Ⓒ D01-Type: the profile recommended for residential lighting



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%

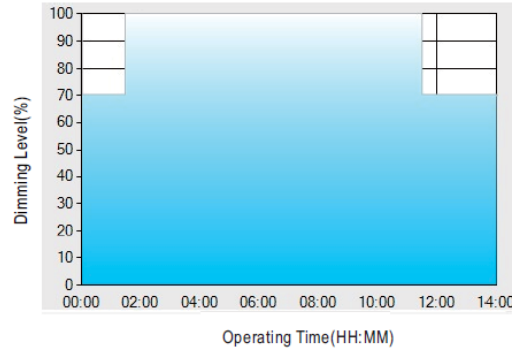
Ex: Ⓒ D02-Type: the profile recommended for street lighting



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



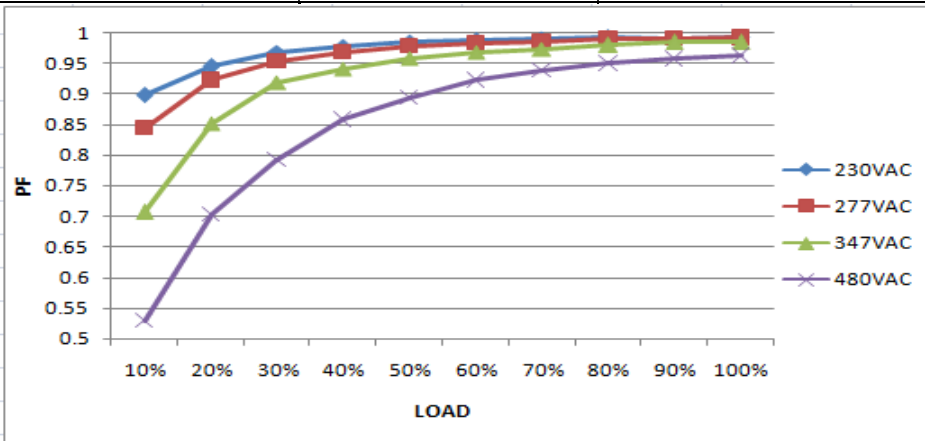
Set up for D03-Type in Smart timer dimming software program:

	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

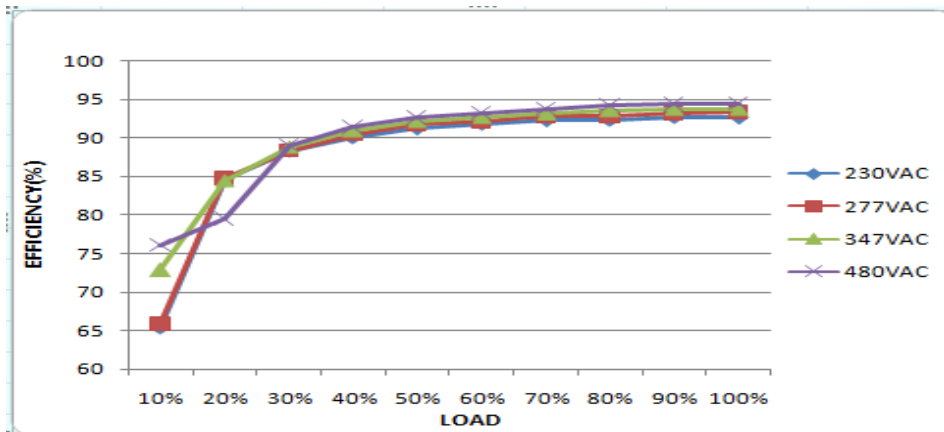
## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	136V~528V
			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/ 0.76 A 480VAC/ 0.56 A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I = 0.759A/ 347VAC I = 0.559A/ 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= 0.993 /347V/100%LOAD PF= 0.977 /480V/100%LOAD PF= 0.994 /277V/100%LOAD PF= 0.997 /230V/100%LOAD

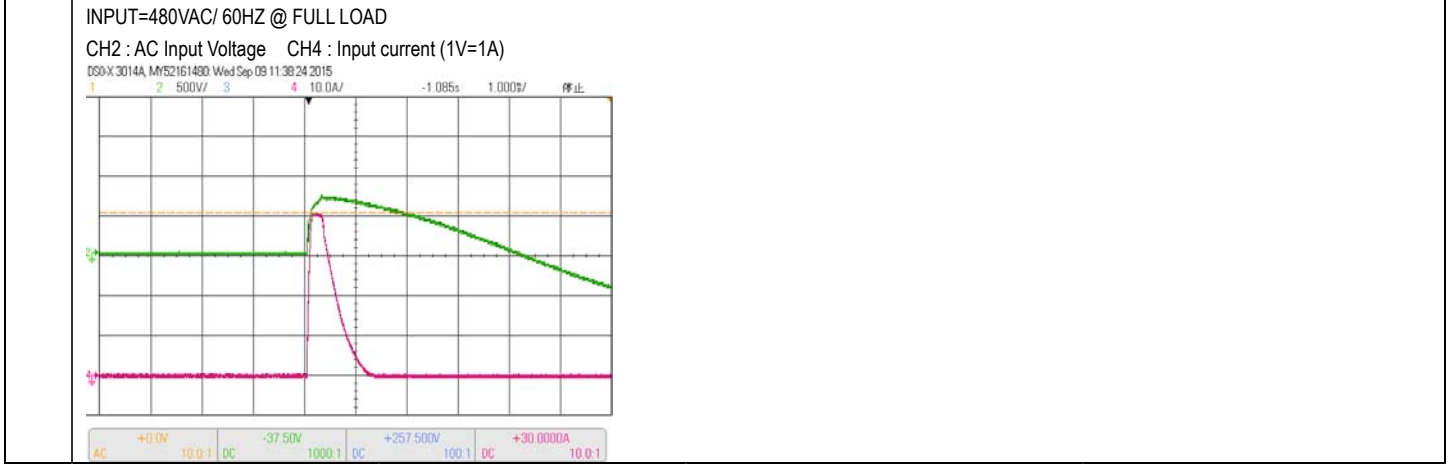


5	EFFICIENCY (TYP)	92.5%	I/P: 347VAC O/P:FULL LOAD Ta:25°C	93.23 %
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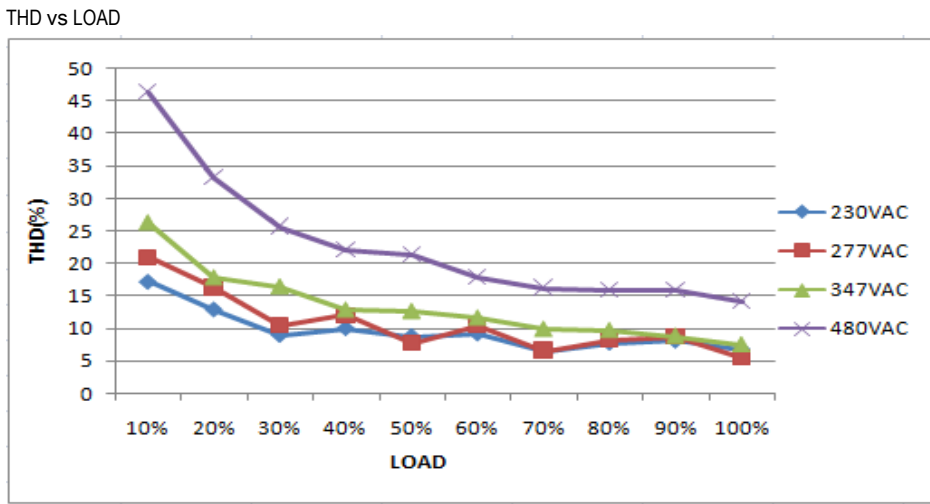
EFFICIENCY vs LOAD



6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START  (twidth= 532 us measured at 50% Ipeak) COLD START	I/P: 347VAC 480VAC O/P:FULL LOAD Ta:25°C	I = 40.9A/ 480VAC  T50= 520 us
	<p>INPUT=480VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p>			



7	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 50% or higher at 230V/277V/347V/480V	I/P : 230V/277V/347V O/P : 100% LOAD 50% LOAD I/P : 480V O/P : 60% LOAD Ta : 25°C	THD : 10.86 %/230V 50% THD : 8.5 %/230V 100% THD : 11.04 %/277V 50% THD : 8.55 %/277V 100% THD : 13.44 %/347V 50% THD : 9.63 %/347V 100% THD : 17.2%/480V 60% THD : 13.73 %/480V 100%
	<p>THD vs LOAD</p>			



## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 90 V~ 99 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	94.23V/ 528VAC 94.21V/ 347VAC 94.22V/ 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, 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  I/P: Low-Line -3V = 177V O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta: 25°C	VDS: (1) 805V/5.83A (2) 821V/5.67A (3) 789V/1.65A  VDS: (1) 837V/5.67A (2) 821V/6.56A (3) 805V/1.37A
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  I/P: Low-Line -3V = 177V O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta: 25°C	VDS: (1) 870V/3.41A (2) 805V/3.49A (3) 829V/2.93A  VDS: (1) 886V/3.25A (2) 878V/3.33A (3) 870V/3.33A
3	Diode <b>Peak Voltage</b>	D100 Rated 20A/300V  -	I/P: High-Line +3V = 531 V D101 : AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load continue  Ta: 25°C	D100 VDS: (1) 194V (2) 196V (3) 192V
4	Input Capacitor <b>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	(1) 439V (2) 411V (3) 407V

			(3)Full Load /Min load Change (4)Full load continue Ta:25°C	(4)407V
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) 14.52V (2) 15.1V (3) 13.84 V (4) 12.7V

## 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: 1.504mA I/P-FG: 1.02 mA O/P-FG: 0.68mA 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: 9.79GΩ I/P-FG: 7.92G Ω O/P-FG: 27.2G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	21mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA/480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.16mA N-FG: 0.16mA L,N -V(+): 0.17mA L,N-V(-): 0.17mA

### 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/30% LOAD Ta:25°C	PASS Test by certified Lab
2	RADIATION	FCC Part 15 Subpart B	I/P: 480VAC (60HZ) O/P:FULL/50% 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-240-3500 1. ROOM AMBIENT BURN-IN : 15 HRS I/P : 347VAC O/P : FULL LOAD Ta= 25.5 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 347VAC O/P : FULL LOAD Ta= 56.3 °C																																																																																														
				<table border="1"> <thead> <tr> <th>CH.</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.5 °C</th> <th>HIGH AMBIENT Ta= 56.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C1</td><td>58.5°C</td><td>91.3°C</td></tr> <tr><td>2</td><td>BD1</td><td>61.1°C</td><td>94.2°C</td></tr> <tr><td>3</td><td>L2</td><td>59.8°C</td><td>93.0°C</td></tr> <tr><td>4</td><td>C10</td><td>60.3°C</td><td>93.2°C</td></tr> <tr><td>5</td><td>C11</td><td>62.1°C</td><td>93.9°C</td></tr> <tr><td>6</td><td>Q2</td><td>63.0°C</td><td>97.0°C</td></tr> <tr><td>7</td><td>RTH2</td><td>73.6°C</td><td>103.8°C</td></tr> <tr><td>8</td><td>Q901</td><td>61.7°C</td><td>97.6°C</td></tr> <tr><td>9</td><td>T2</td><td>63.1°C</td><td>97.5°C</td></tr> <tr><td>10</td><td>L1</td><td>60.9°C</td><td>94.4°C</td></tr> <tr><td>11</td><td>C5</td><td>61.0°C</td><td>94.5°C</td></tr> <tr><td>12</td><td>ZNR1</td><td>55.5°C</td><td>87.7°C</td></tr> <tr><td>13</td><td>Q35</td><td>61.2°C</td><td>95.2°C</td></tr> <tr><td>14</td><td>C46</td><td>60.8°C</td><td>94.7°C</td></tr> <tr><td>15</td><td>C54</td><td>59.2°C</td><td>92.3°C</td></tr> <tr><td>16</td><td>RTH3</td><td>59.2°C</td><td>92.7°C</td></tr> <tr><td>17</td><td>U901</td><td>58.7°C</td><td>92.0°C</td></tr> <tr><td>18</td><td>T1</td><td>71.9°C</td><td>104.3°C</td></tr> <tr><td>19</td><td>D100</td><td>64.2°C</td><td>96.4°C</td></tr> <tr><td>20</td><td>C106</td><td>60.7°C</td><td>93.3°C</td></tr> <tr><td>21</td><td>C201</td><td>52.5°C</td><td>86.2°C</td></tr> <tr><td>22</td><td>LF100</td><td>57.7°C</td><td>90.2°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta= 56.3 °C	1	C1	58.5°C	91.3°C	2	BD1	61.1°C	94.2°C	3	L2	59.8°C	93.0°C	4	C10	60.3°C	93.2°C	5	C11	62.1°C	93.9°C	6	Q2	63.0°C	97.0°C	7	RTH2	73.6°C	103.8°C	8	Q901	61.7°C	97.6°C	9	T2	63.1°C	97.5°C	10	L1	60.9°C	94.4°C	11	C5	61.0°C	94.5°C	12	ZNR1	55.5°C	87.7°C	13	Q35	61.2°C	95.2°C	14	C46	60.8°C	94.7°C	15	C54	59.2°C	92.3°C	16	RTH3	59.2°C	92.7°C	17	U901	58.7°C	92.0°C	18	T1	71.9°C	104.3°C	19	D100	64.2°C	96.4°C	20	C106	60.7°C	93.3°C	21	C201	52.5°C	86.2°C	22	LF100	57.7°C	90.2°C
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21	C201	52.5°C	86.2°C																																																																																													
22	LF100	57.7°C	90.2°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%/°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																																																																																												



# 240W Single Output LED Power Supply **HVGC-240** 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) 76112 HRS (2) 80073 HRS (3) 83521HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 143.6K 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