



# Test Report: HVGC-320-1050

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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

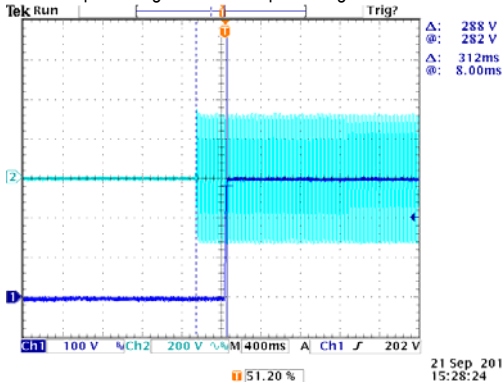
## DESIGN VERIFY TEST

### 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	1.0779A /347VAC@CV MAX-1V 1.0664A /347VAC@CV MIN 1.0783A /480VAC@CV MAX-1V 1.0693A /480VAC@CV MIN 2.69%
2	OPEN CIRCUIT VOLTAGE (max)	311V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	305.5V
3	CONSTANT CURRENT REGION	CH1: 152.4V~304.8 V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	152.4V~304.8V /347VAC
4	CURRENT ADJ. RANGE	CH1: 525mA~1050mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	0.455A~1.1231A /347VAC@CV MAX-1V 0.4546A~1.1171 A /347VAC@CV MIN 0.4654A~1.1231A /480VAC@CV MAX-1V 0.4529A~1.1171A /480VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	2.3%
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/ 312ms 347VAC/ 276ms 480VAC/ 292ms

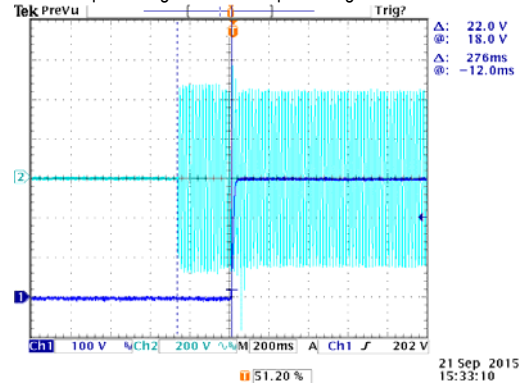
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



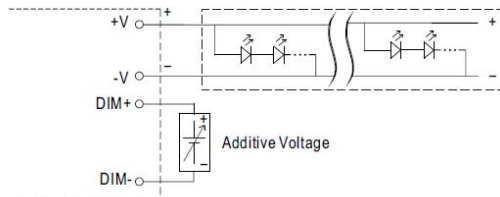
INPUT=347VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

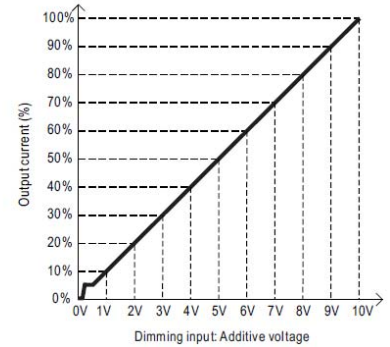


7	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used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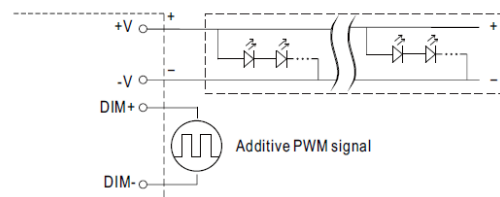
◎ Applying additive 0 ~ 10VDC



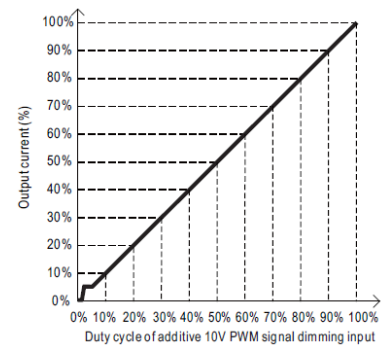
"DO NOT connect "DIM- to -V"



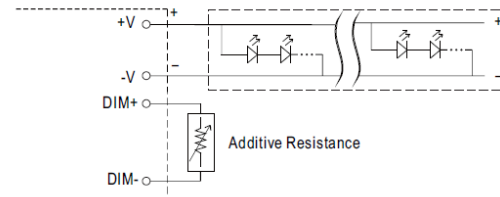
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



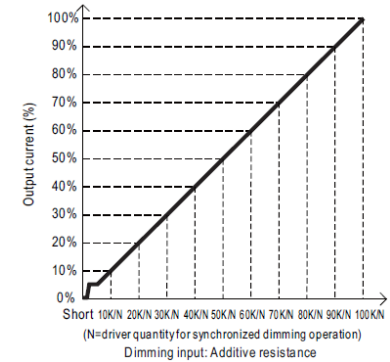
"DO NOT connect "DIM- to -V"



◎ 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<sub>out</sub> < 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	0.111A	0.218A	0.317A	0.417A	0.513A	0.614A	0.710A	0.817A	0.914A	1.010A	1.082A
%	0.00%	10.57%	20.76%	30.19%	39.71%	48.86%	58.48%	67.62%	77.81%	87.05%	96.19%	103.05%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.130A	0.230A	0.335A	0.441A	0.541A	0.634A	0.737A	0.841A	0.946A	1.050A	1.082A
%	0.00%	12.38%	21.90%	31.90%	42.00%	51.52%	60.38%	70.19%	80.10%	90.10%	100.00%	103.05%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.114A	0.215A	0.323A	0.422A	0.530A	0.631A	0.731A	0.843A	0.956A	1.040A	1.082A
%	0.00%	10.86%	20.48%	30.76%	40.19%	50.48%	60.10%	69.62%	80.29%	91.05%	99.05%	103.05%

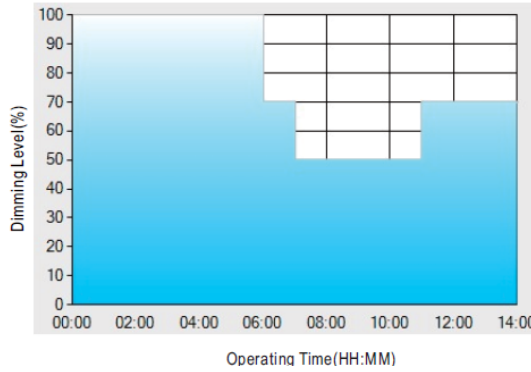
TEST RESULT : OK

**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.

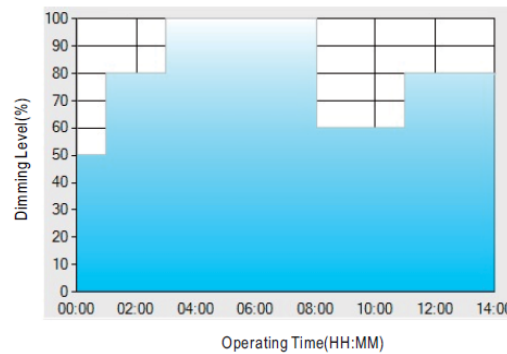
Ex: Ⓒ D01-Type: the profile recommended for residential lighting



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%

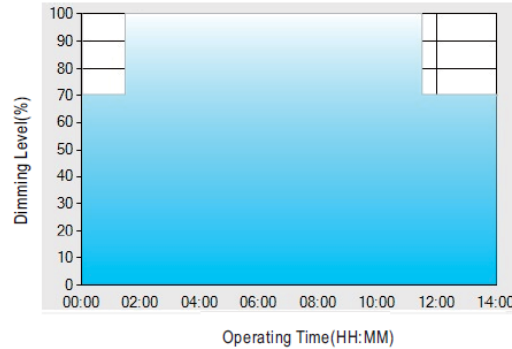
Ex: Ⓒ D02-Type: the profile recommended for street lighting



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:

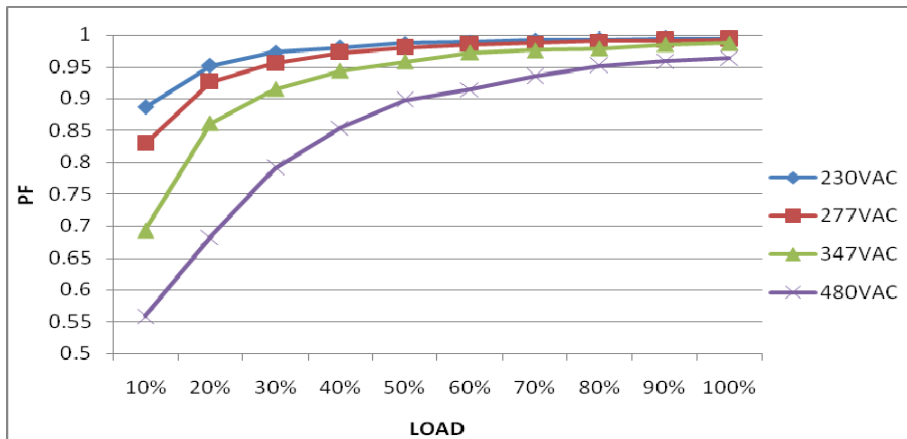
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

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

## INPUT FUNCTION TEST

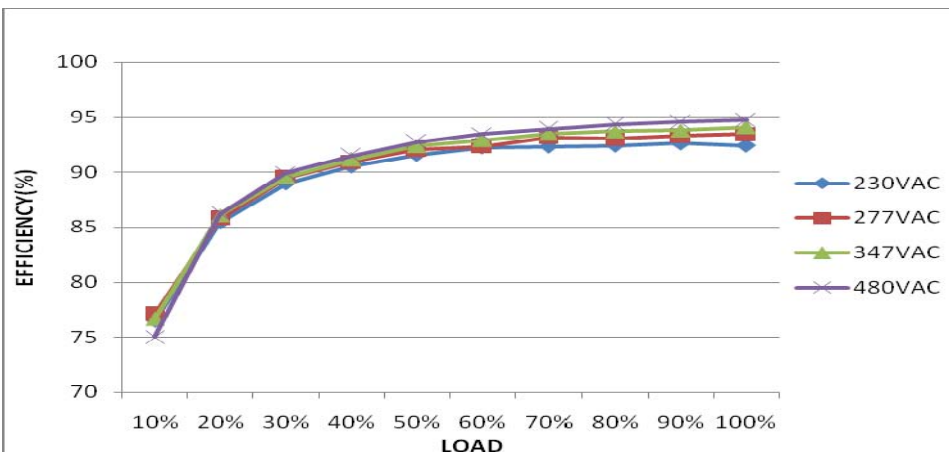
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	90V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	(1).TEST:OK (2).TEST :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 =0.9965 A/ 347VAC I =0.7277 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= 0.9908 /347V/100%LOAD PF= 0.9766 /480V/100%LOAD PF=0.9915 /277V/100%LOAD PF= 0.9945 /230V/100%LOAD

P.F vs LOAD



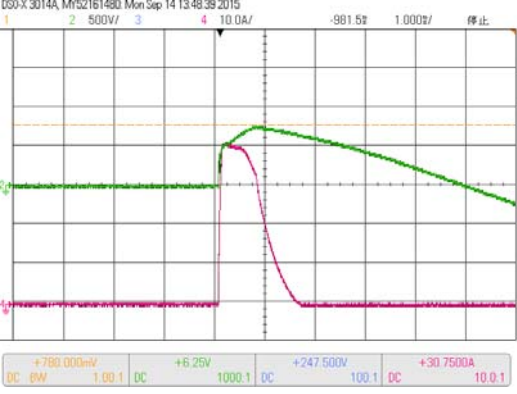
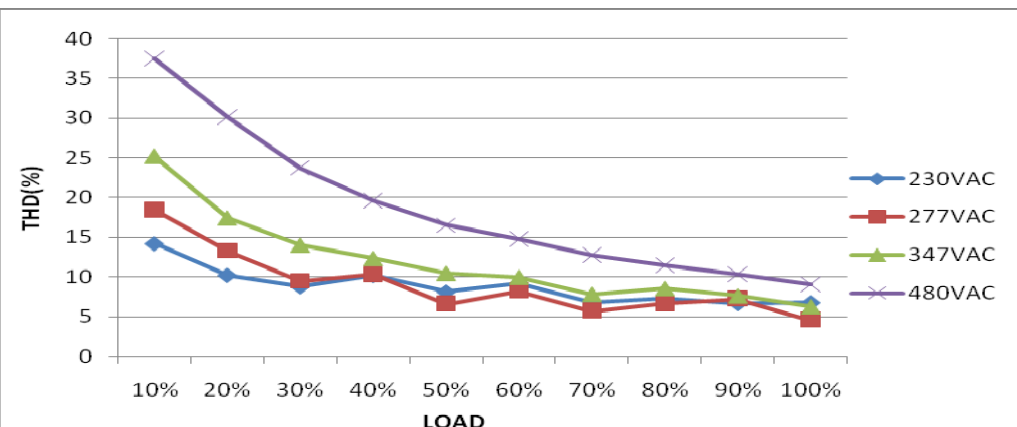
5	EFFICIENCY (TYP)	93.5 %	I/P: 347VAC O/P:FULL LOAD Ta:25°C	94.03%
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EFFICIENCY vs LOAD





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

6	<b>INRUSH CURRENT (TYP)</b>	480VV/ 50 A <b>COLD START</b>  (twidh= 920us measured at 50% Ipeak) <b>COLD START</b>	I/P: 480VAC O/P: FULL LOAD Ta: 25°C	I = 41.6A/ 480VAC  T50= 920 us																																																							
<p>INPUT=480VAC/ 60HZ @ FULL LOAD            CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p>  <p>DC: +780.000mW 1.00.1 DC +6.25V 1000.1 DC +247.500V 100.1 DC +30.7500A 10.0.1</p>																																																											
7	<b>TOTAL HARMONIC DISTORTION</b>	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 : 6.576 %/230V 50% THD : 3.860 %/230V 100% THD : 5.177 %/277V 50% THD : 6.314 %/277V 100% THD : 12.182 %/347V 50% THD : 6.994 %/347V 100% THD : 16.09 %/480V 60% THD : 11.49 %/480V 100%																																																							
<p><b>THD vs LOAD</b></p>  <table border="1"> <caption>THD vs LOAD Data</caption> <thead> <tr> <th>Input Voltage</th> <th>10% Load</th> <th>20% Load</th> <th>30% Load</th> <th>40% Load</th> <th>50% Load</th> <th>60% Load</th> <th>70% Load</th> <th>80% Load</th> <th>90% Load</th> <th>100% Load</th> </tr> </thead> <tbody> <tr> <td>230VAC</td> <td>14.5</td> <td>10.5</td> <td>9.5</td> <td>10.5</td> <td>8.5</td> <td>9.5</td> <td>7.5</td> <td>8.5</td> <td>7.5</td> <td>6.5</td> </tr> <tr> <td>277VAC</td> <td>18.5</td> <td>13.5</td> <td>10.5</td> <td>11.5</td> <td>7.5</td> <td>9.5</td> <td>6.5</td> <td>7.5</td> <td>7.5</td> <td>5.5</td> </tr> <tr> <td>347VAC</td> <td>25.5</td> <td>17.5</td> <td>14.5</td> <td>12.5</td> <td>11.5</td> <td>10.5</td> <td>8.5</td> <td>9.5</td> <td>8.5</td> <td>7.5</td> </tr> <tr> <td>480VAC</td> <td>38.5</td> <td>30.5</td> <td>24.5</td> <td>20.5</td> <td>17.5</td> <td>15.5</td> <td>13.5</td> <td>12.5</td> <td>11.5</td> <td>10.5</td> </tr> </tbody> </table>					Input Voltage	10% Load	20% Load	30% Load	40% Load	50% Load	60% Load	70% Load	80% Load	90% Load	100% Load	230VAC	14.5	10.5	9.5	10.5	8.5	9.5	7.5	8.5	7.5	6.5	277VAC	18.5	13.5	10.5	11.5	7.5	9.5	6.5	7.5	7.5	5.5	347VAC	25.5	17.5	14.5	12.5	11.5	10.5	8.5	9.5	8.5	7.5	480VAC	38.5	30.5	24.5	20.5	17.5	15.5	13.5	12.5	11.5	10.5
Input Voltage	10% Load	20% Load	30% Load	40% Load	50% Load	60% Load	70% Load	80% Load	90% Load	100% Load																																																	
230VAC	14.5	10.5	9.5	10.5	8.5	9.5	7.5	8.5	7.5	6.5																																																	
277VAC	18.5	13.5	10.5	11.5	7.5	9.5	6.5	7.5	7.5	5.5																																																	
347VAC	25.5	17.5	14.5	12.5	11.5	10.5	8.5	9.5	8.5	7.5																																																	
480VAC	38.5	30.5	24.5	20.5	17.5	15.5	13.5	12.5	11.5	10.5																																																	

## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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1	OVER VOLTAGE PROTECTION	V1: 320 V~ 351 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	329.11V/ 528VAC 327.47V/ 347VAC 329.59V/ 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 9A950V	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) 816V/7.62A (2)816V/7.78A (3)777V/2.01A
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)819V/3.93A (2)813V/3.17A (3)807V/1.89A
3	Diode <b>Peak Voltage</b>	D103 Rated 10 A/400 V  D104 Rated 3A/ 400 V	I/P:High-Line +3V =531 V D103 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue D104 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue  Ta:25°C	VDS: (1)289V (2)0V (3)297V  VDS: (1)297V (2)0V (3)297V
4	Input Capacitor Voltage	C6 Rated: 120μ/ 450 V	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)382V (2)406V (3)398V (4) 382V

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) 14.3V (2) 14.3V (3) 14.06V (4) 12.9V
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## 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:1.511 mA I/P-FG:3.11 mA O/P-FG: 0.596 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: 30GΩ I/P-FG: 4.23 G Ω O/P-FG:30 G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	27 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.5mA N-FG:0.5mA L,N -V(+):0.11mA L,N-V(-): 0.11 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																																																																																																										
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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)																																																																																																								
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																																																																																																								



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

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