



# Test Report: HVGC-150-1400

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150W Constant Current Mode LED Driver

## ■ 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

■ **ESIGN VERIFY TEST**

**OUTPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	± 5%	I/P : 347VAC O/P : LED MODE : 9V-107V Ta : 25°C	-0.28      %-      -0.12      %
2	OUTPUT VOLTAGE RANGE	12V ~ 107V	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	O/P=12V : 1.401 A O/P=106V : 1.402 A
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 840mA-1400m A	I/P : 480 VAC I/P : 347 VAC O/P : LED : 106V Ta : 25°C	0.732      A~      1.566      A/ 480 VAC 0.732      A~      1.566      A/ 347 VAC
4	CURRENT RIPPLE	8.0% max. @rated current	I/P : 347VAC O/P : LED MODE : 12V-107V Ta : 25°C	LED=12V      3.09      % LED=106V      1.74      %
5	SET UP TIME	480 VAC :    400    ms (Max) 347VAC :    400    ms(Max) 230VAC :    500    ms(Max)	I/P : 480 VAC I/P : 347 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	480 VAC/      198      ms 347VAC/      265      ms 230VAC/      378      ms
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	TEST :      <5      %

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**DIMMER TEST**

(B Type only)

SPEC:

※Built-in 3 in 1 dimming function, IP67 rated. Output constant current level can be adjusted through output cable by connecting a resistor

or  
0 ~ 10Vdc or 10V PWM signal between DIM+ and DIM-.

※Please DO NOT connect "DIM-" to "-V".

※Reference resistance value for output current adjustment (Typical)

Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

\*1 ~ 10V dimming function for output current adjustment (Typical)

Dimming value	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

\*10V PWM signal for output current adjustment (Typical) : Frequency range :100Hz ~ 3KHz

Duty value	Short	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

TEST RESULT: I/P : 230 VAC ;Ta : 25°C

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0.000A	0.164A	0.299A	0.432A	0.559A	0.704A	0.831A	0.956A	1.081A	1.233A	1.370A	1.4489A
	%	0.00%	11.74%	21.36%	30.87%	39.93%	50.29%	59.38%	68.29%	77.20%	88.06%	97.88%	103.49%
2	Dimming value	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0.000A	0.172A	0.297A	0.437A	0.581A	0.721A	0.853A	0.988A	1.130A	1.266A	1.380A	1.4489A
	%	0.00%	12.25%	21.24%	31.24%	41.51%	51.53%	60.93%	70.58%	80.71%	90.46%	98.54%	103.49%
3	Duty value	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0.000A	0.166A	0.303A	0.440A	0.576A	0.713A	0.849A	0.987A	1.123A	1.260A	1.380A	1.4489A
	%	0.00%	11.88%	21.65%	31.41%	41.16%	50.91%	60.67%	70.46%	80.20%	90.03%	98.55%	103.49%

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	170 V~528V
			I/P : LOW-LINE-3V=177V HIGH-LINE+10V=538 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 180VAC ~ 528 VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	POWER FACTOR	0.98 / 230 VAC(TYP)	I/P : 230VAC	PF= 0.9941 / 230 VAC
		0.97 / 277VAC(TYP)	I/P : 277VAC	PF= 0.9937 / 277 VAC
		0.95 /347 VAC(TYP)	I/P : 347VAC	PF= 0.9838 / 347VAC
		0.93 / 480VAC(TYP)	I/P : 480VAC O/P : FULL LOAD Ta : 25°C	PF= 0.9532 / 480VAC
4	EFFICIENCY	90 % (TYP)	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	91.973 %
5	INPUT CURRENT	347V/ 0.5 A (TYP)	I/P : 347 VAC	I = 0.4796
		480V/ 0.38 A (TYP)	I/P : 480 VAC O/P : FULL LOAD Ta : 25°C	I = 0.3590
6	INRUSH CURRENT	480V/ 35 A (TYP) (twidth=790us measured at 50% Ipeak) COLD START	I/P : 480VAC O/P : FULL LOAD Ta : 25°C	I = 28 A T50= 780 us
7	LEAKAGE CURRENT	< 0.75 mA / 480 VAC	I/P : 480 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.3 mA N-FG : 0.3 mA
8	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 50% or higher at 230VAC / 277VAC / 347VAC	I/P : 230VAC I/P : 277VAC I/P : 347VAC O/P : 50% LOAD Ta : 25°C	THD : 11.4 THD : 13.3 THD : 16.3
		Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 480VAC	I/P : 480VAC O/P : 75% LOAD Ta : 25°C	THD : 15.2

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1 : 113V ~ 124 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	118.81V/ 480VAC 118.77V/ 347 VAC Shut down o/p voltage with auto-recovery or re-power on to recovery
2	OVER TEMPERATURE PROTECTION	SPEC : NO DAMAGE	I/P : 347 VAC O/P : FULL LOAD	O.T.P. Active  Shut down o/p voltage, recovers automatically after temperature goes down
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 528VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q3 Rated : 7A/950V	I/P : High-Line +3V = 531 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 808 V (2) 200 V (3) 748 V
2	Diode Peak Voltage	D100 Rated : 15A/600V	I/P : High-Line +3V = 531 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 288 V (2) 188 V (3) 284 V
3	Input Capacitor Voltage	C5 Rated : 22u/450V	I/P : High-Line +3V = 531 V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change Ta : 25°C	(1) 440 V (2) 440 V (3) 444 V
4	Control IC Voltage Test	U1 Rated : 10.3V~22.5V  U2 Rated : 11V~28V	I/P : High-Line +3V = 531 V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Ta : 25°C	(1) 20 V (2) 20.6 V (3) 20.4 V  (4) 18.8 V (5) 19 V (6) 19 V
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 7A/950V	I/P : High-Line +3V = 531 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 920 V (2) 844 V (3) 848 V

**SAFETY & E.M.C. TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 1.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 3.36 mA I/P-FG : 2.26 mA O/P-FG : 4.4 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 /70%RH	I/P-O/P : 21.2 GΩ I/P-FG : 6 GΩ O/P-FG : 7.53 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	25 mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:230VAC/380VAC/50HZ/60HZ O/P:100/50%ELECTRONIC LOAD O/P:100%LED LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B FCC Part 15 Subpart B	I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B FCC Part 15 Subpart B	I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD/50% LOAD Ta:25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
7	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-150-1400 1. ROOM AMBIENT BURN-IN : 12 HRS I/P : 347VAC O/P : FULL LOAD Ta=26.2 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 347VAC O/P : FULL LOAD Ta=57.8 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26.2 °C</th> <th>HIGH AMBIENT Ta=57.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C46</td><td>52.2°C</td><td>81.4°C</td></tr> <tr><td>2</td><td>LF2</td><td>50.5°C</td><td>79.9°C</td></tr> <tr><td>3</td><td>BD1</td><td>53.0°C</td><td>82.2°C</td></tr> <tr><td>4</td><td>C48</td><td>54.1°C</td><td>83.4°C</td></tr> <tr><td>5</td><td>L2</td><td>60.5°C</td><td>92.4°C</td></tr> <tr><td>6</td><td>Q1</td><td>59.4°C</td><td>89.9°C</td></tr> <tr><td>7</td><td>C5</td><td>62.3°C</td><td>90.3°C</td></tr> <tr><td>8</td><td>T1</td><td>67.6°C</td><td>96.2°C</td></tr> <tr><td>9</td><td>C15</td><td>55.8°C</td><td>85.6°C</td></tr> <tr><td>10</td><td>T3</td><td>62.9°C</td><td>91.8°C</td></tr> <tr><td>11</td><td>Q3</td><td>61.7°C</td><td>90.9°C</td></tr> <tr><td>12</td><td>D19</td><td>65.5°C</td><td>93.8°C</td></tr> <tr><td>13</td><td>C62</td><td>56.2°C</td><td>84.7°C</td></tr> <tr><td>14</td><td>RTH2</td><td>55.9°C</td><td>84.4°C</td></tr> <tr><td>15</td><td>D100</td><td>62.2°C</td><td>90.9°C</td></tr> <tr><td>16</td><td>C203</td><td>57.3°C</td><td>85.9°C</td></tr> <tr><td>17</td><td>C104</td><td>53.4°C</td><td>82.3°C</td></tr> <tr><td>18</td><td>C105</td><td>51.6°C</td><td>80.5°C</td></tr> <tr><td>19</td><td>C106</td><td>51.2°C</td><td>80.1°C</td></tr> <tr><td>20</td><td>LF100</td><td>52.7°C</td><td>81.4°C</td></tr> <tr><td>21</td><td>U1</td><td>58.5°C</td><td>87.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26.2 °C	HIGH AMBIENT Ta=57.8 °C	1	C46	52.2°C	81.4°C	2	LF2	50.5°C	79.9°C	3	BD1	53.0°C	82.2°C	4	C48	54.1°C	83.4°C	5	L2	60.5°C	92.4°C	6	Q1	59.4°C	89.9°C	7	C5	62.3°C	90.3°C	8	T1	67.6°C	96.2°C	9	C15	55.8°C	85.6°C	10	T3	62.9°C	91.8°C	11	Q3	61.7°C	90.9°C	12	D19	65.5°C	93.8°C	13	C62	56.2°C	84.7°C	14	RTH2	55.9°C	84.4°C	15	D100	62.2°C	90.9°C	16	C203	57.3°C	85.9°C	17	C104	53.4°C	82.3°C	18	C105	51.6°C	80.5°C	19	C106	51.2°C	80.1°C	20	LF100	52.7°C	81.4°C	21	U1	58.5°C	87.8°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 347 VAC O/P : 99% LOAD Ta : 25°C	TEST : OK																																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 528VAC/200VAC O/P : 100 % LOAD Ta= -45 °C	TEST : OK																																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60°C NO DAMAGE	I/P : 531 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																								
5	TEMPERATURE COEFFICIENT	±0.03 %(0-50°C)	I/P : 347 VAC O/P : FULL LOAD	± 0.016 %(0-50°C)																																																																																								

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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
7.	THERMAL SHOCK TEST	1. Thermal shock Temperature : -40°C~ +65°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 347VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK
8	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 : 72min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	HVGC-150-1400:SUPPOSE C104 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) 40311HRS (2) 51584HRS (3) 58506HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 179.5K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031