



Test Report: HVGC-150-500

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	$\pm 5\%$	I/P : 347VAC O/P : LED MODE : 30V~300V Ta : 25°C	1.2 %~ 1.66 %
2	OUTPUT VOLTAGE RANGE	30V ~ 300V	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	O/P=30V : 0.501A O/P=299V : 0.501A
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 300mA~500m A	I/P : 480 VAC I/P : 347 VAC O/P : LED : 299V Ta : 25°C	0.2841 A~ 0.5957 A/ 480 VAC 0.2841 A~ 0.5944 A/ 347 VAC
4	CURRENT RIPPLE	8.0% max. @rated current	I/P : 347VAC O/P : LED MODE : 30V~300V Ta : 25°C	LED=30V 7.85 % LED=299V 3.53 %
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/ 255 ms 230VAC/ 376 ms
6	OVER/UNDERSHOOT TEST	$< \pm 5\%$	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %

7

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 resistance 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	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

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

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

*10V PWM signal for output current adjustment (Typical)

Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

TEST RESULT: I/P : 230 VAC ;Ta : 25℃

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0.000A	0.061A	0.105A	0.159A	0.206A	0.256A	0.313A	0.357A	0.398A	0.452A	0.485A	0.5141A
	%	0.00%	12.14%	21.06%	31.70%	41.18%	51.18%	62.62%	71.38%	79.56%	90.40%	96.98%	102.82%
2	Dimming value	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0.000A	0.060A	0.107A	0.153A	0.203A	0.254A	0.303A	0.352A	0.402A	0.450A	0.499A	0.5141A
	%	0.00%	12.00%	21.44%	30.54%	40.66%	50.86%	60.52%	70.40%	80.42%	89.94%	99.76%	102.82%
3	Duty value	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0.000A	0.058A	0.106A	0.155A	0.203A	0.252A	0.302A	0.350A	0.400A	0.449A	0.499A	0.5141A
	%	0.00%	11.54%	21.28%	30.98%	40.64%	50.46%	60.30%	70.04%	79.90%	89.80%	99.74%	102.82%

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	167 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) 0.97 / 277VAC(TYP) 0.95 /347 VAC(TYP) 0.93 / 480VAC(TYP)	I/P : 230VAC I/P : 277VAC I/P : 347VAC I/P : 480VAC O/P : FULL LOAD Ta : 25°C	PF= 0.996 / 230 VAC PF= 0.9946 / 277 VAC PF= 0.9854 / 347VAC PF= 0.9602 / 480VAC
4	EFFICIENCY	91 % (TYP)	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	92.457 %
5	INPUT CURRENT	347V/ 0.5 A (TYP) 480V/ 0.38 A (TYP)	I/P : 347 VAC I/P : 480 VAC O/P : FULL LOAD Ta : 25°C	I = 0.4843 A/ 347 VAC I = 0.3611 A/ 480 VAC
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/ 480VAC T50= 780 us
7	LEAKAGE CURRENT	< 0.75 mA / 480 VAC	I/P : 480 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.35 mA N-FG : 0.35 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 : 13.8 THD : 15.7 THD : 18.4
		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 : 16.12

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	97% ~ 103%	I/P : 480 VAC I/P : 347 VAC O/P : TESTING Ta : 25°C	101.1%/ 480 VAC 101.1%/ 347 VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH1 : 316 V ~ 346 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	329.76V/ 480VAC 330.34V/ 347 VAC Shut down o/p voltage with auto-recovery or re-power on to recovery
3	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
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 528 VAC 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) 644 V (2) 244 V (3) 644 V
2	Diode Peak Voltage	D100 Rated : 3A/1KV	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) 824 V (2) 628 V (3) 796 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) 436 V (2) 444 V (3) 448 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) 17.9 V (2) 17.9 V (3) 17.9 V (4) 16.3 V (5) 16.3 V (6) 16.3 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) 912 V (2) 824 V (3) 828 V
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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 : 2.64 mA I/P-FG : 2 mA O/P-FG : 0.47 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 : 30 GΩ I/P-FG : 30 GΩ O/P-FG : 14 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	25 mΩ

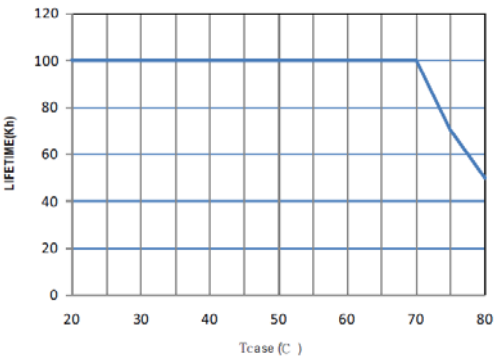
E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:230/347/60HZ O/P:100/75/50%ELECTRONIC LOAD O/P:100% LED LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230/347VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230/347 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P:230/347 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P: 230/347 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230/347 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																				
1	TEMPERATURE RISE TEST	<div>MODEL : HVGC-150-350</div> <div>1. ROOM AMBIENT BURN-IN : 12 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta=26.2 °C</div> <div>2. HIGH AMBIENT BURN-IN : 1 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta=57.8 °C</div> <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 26.2 °C</th><th>HIGH AMBIENT Ta=57.8 °C</th></tr><tr><td>1</td><td>C46</td><td>50.4°C</td><td>80.4°C</td></tr><tr><td>2</td><td>LF2</td><td>48.8°C</td><td>79.1°C</td></tr><tr><td>3</td><td>BD1</td><td>53.3°C</td><td>83.3°C</td></tr><tr><td>4</td><td>C48</td><td>52.2°C</td><td>82.2°C</td></tr><tr><td>5</td><td>L2</td><td>57.8°C</td><td>87.8°C</td></tr><tr><td>6</td><td>Q1</td><td>57.0°C</td><td>87.8°C</td></tr><tr><td>7</td><td>C5</td><td>60.5°C</td><td>88.3°C</td></tr><tr><td>8</td><td>T1</td><td>66.4°C</td><td>94.7°C</td></tr><tr><td>9</td><td>C15</td><td>54.7°C</td><td>84.6°C</td></tr><tr><td>10</td><td>T3</td><td>59.6°C</td><td>88.4°C</td></tr><tr><td>11</td><td>Q3</td><td>59.2°C</td><td>88.2°C</td></tr><tr><td>12</td><td>D19</td><td>63.2°C</td><td>91.4°C</td></tr><tr><td>13</td><td>C62</td><td>54.3°C</td><td>83.6°C</td></tr><tr><td>14</td><td>RTH2</td><td>53.9°C</td><td>83.2°C</td></tr><tr><td>15</td><td>D100</td><td>56.1°C</td><td>86.6°C</td></tr><tr><td>16</td><td>C203</td><td>55.7°C</td><td>84.8°C</td></tr><tr><td>17</td><td>C104</td><td>51.5°C</td><td>81.1°C</td></tr><tr><td>18</td><td>C106</td><td>49.0°C</td><td>78.9°C</td></tr><tr><td>19</td><td>LF100</td><td>49.7°C</td><td>79.6°C</td></tr><tr><td>20</td><td>U1</td><td>56.1°C</td><td>85.5°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 26.2 °C	HIGH AMBIENT Ta=57.8 °C	1	C46	50.4°C	80.4°C	2	LF2	48.8°C	79.1°C	3	BD1	53.3°C	83.3°C	4	C48	52.2°C	82.2°C	5	L2	57.8°C	87.8°C	6	Q1	57.0°C	87.8°C	7	C5	60.5°C	88.3°C	8	T1	66.4°C	94.7°C	9	C15	54.7°C	84.6°C	10	T3	59.6°C	88.4°C	11	Q3	59.2°C	88.2°C	12	D19	63.2°C	91.4°C	13	C62	54.3°C	83.6°C	14	RTH2	53.9°C	83.2°C	15	D100	56.1°C	86.6°C	16	C203	55.7°C	84.8°C	17	C104	51.5°C	81.1°C	18	C106	49.0°C	78.9°C	19	LF100	49.7°C	79.6°C	20	U1	56.1°C	85.5°C
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 528VAC/200VAC 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 : 531 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																				
4	TEMPERATURE COEFFICIENT	±0.03 %(0~50°C)	I/P : 347 VAC O/P : FULL LOAD	± 0.007 %(0~50°C)																																																																																				
5	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																																																																																				

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : $-40^{\circ}\text{C} \sim +65^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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
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 : 72min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
8	CAPACITOR LIFE CYCLE	HVGC-150-350 :SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 347VAC O/P : FULL LOAD Ta= 60°C LIFE TIME (3) I/P : 347VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 347VAC O/P : 50% LOAD Ta= 60°C LIFE TIME	(1) 483120 HRS (2) 49385 HRS (3) 61495 HRS (4) 75927 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 179.5K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ Tcase 80°C 	

RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031