



Test Report: HVGC-150-350

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 : 42V-428V Ta : 25°C	1.6 %~ -1.6 %
2	OUTPUT VOLTAGE RANGE	42V ~ 428V	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	O/P=42V : 0.35 A O/P=427V : 0.355 A
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 210mA~ 350mA	I/P : 480 VAC I/P : 347 VAC O/P : LED : 427V Ta : 25°C	0.1776 A~ 0.3911 A / 480 VAC 0.1784 A~ 0.3914 A / 347 VAC
4	CURRENT RIPPLE	8.0% max. @rated current	I/P : 347VAC O/P : LED MODE : 42V-428V Ta : 25°C	LED=42V 6.55 % LED=427V 5.87 %
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/ 187 ms 347VAC/ 225 ms 230VAC/ 358 ms
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %

9	<p>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)</p> <table border="1"> <tr> <td>Resistance value</td> <td>10K</td> <td>20K</td> <td>30K</td> <td>40K</td> <td>50K</td> <td>60K</td> <td>70K</td> <td>80K</td> <td>90K</td> <td>100K</td> </tr> <tr> <td>Output current</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <td>Dimming value</td> <td>1V</td> <td>2V</td> <td>3V</td> <td>4V</td> <td>5V</td> <td>6V</td> <td>7V</td> <td>8V</td> <td>9V</td> <td>10V</td> </tr> <tr> <td>Output current</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical)</p> <table border="1"> <tr> <td>Duty value</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> <tr> <td>Output current</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>TEST RESULT: I/P : 230 VAC ;Ta : 25°C</p> <table border="1"> <tr> <td rowspan="3">1</td> <td>Resistance value</td> <td>SHORT</td> <td>10K</td> <td>20K</td> <td>30K</td> <td>40K</td> <td>50K</td> <td>60K</td> <td>70K</td> <td>80K</td> <td>90K</td> <td>100K</td> <td>OPEN</td> </tr> <tr> <td>Output current</td> <td>0.000A</td> <td>0.037A</td> <td>0.071A</td> <td>0.111A</td> <td>0.148A</td> <td>0.193A</td> <td>0.229A</td> <td>0.261A</td> <td>0.278A</td> <td>0.330A</td> <td>0.349A</td> <td>0.3557A</td> </tr> <tr> <td>%</td> <td>0.00%</td> <td>10.51%</td> <td>20.23%</td> <td>31.60%</td> <td>42.37%</td> <td>55.11%</td> <td>65.29%</td> <td>74.46%</td> <td>79.49%</td> <td>94.37%</td> <td>99.83%</td> <td>101.628%</td> </tr> <tr> <td rowspan="3">2</td> <td>Dimming value</td> <td>SHORT</td> <td>1V</td> <td>2V</td> <td>3V</td> <td>4V</td> <td>5V</td> <td>6V</td> <td>7V</td> <td>8V</td> <td>9V</td> <td>10V</td> <td>OPEN</td> </tr> <tr> <td>Output current</td> <td>0.000A</td> <td>0.035A</td> <td>0.069A</td> <td>0.102A</td> <td>0.138A</td> <td>0.173A</td> <td>0.207A</td> <td>0.244A</td> <td>0.282A</td> <td>0.315A</td> <td>0.352A</td> <td>0.3557A</td> </tr> <tr> <td>%</td> <td>0.00%</td> <td>9.94%</td> <td>19.63%</td> <td>29.06%</td> <td>39.46%</td> <td>49.46%</td> <td>59.17%</td> <td>69.60%</td> <td>80.60%</td> <td>89.86%</td> <td>100.49%</td> <td>101.628%</td> </tr> <tr> <td rowspan="3">3</td> <td>Duty value</td> <td>SHORT</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> <td>OPEN</td> </tr> <tr> <td>Output current</td> <td>0.000A</td> <td>0.034A</td> <td>0.069A</td> <td>0.103A</td> <td>0.139A</td> <td>0.174A</td> <td>0.209A</td> <td>0.245A</td> <td>0.281A</td> <td>0.316A</td> <td>0.352A</td> <td>0.3557A</td> </tr> <tr> <td>%</td> <td>0.00%</td> <td>9.83%</td> <td>19.63%</td> <td>29.54%</td> <td>39.60%</td> <td>49.71%</td> <td>59.77%</td> <td>70.00%</td> <td>80.20%</td> <td>90.34%</td> <td>100.46%</td> <td>101.628%</td> </tr> </table>	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN	Output current	0.000A	0.037A	0.071A	0.111A	0.148A	0.193A	0.229A	0.261A	0.278A	0.330A	0.349A	0.3557A	%	0.00%	10.51%	20.23%	31.60%	42.37%	55.11%	65.29%	74.46%	79.49%	94.37%	99.83%	101.628%	2	Dimming value	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN	Output current	0.000A	0.035A	0.069A	0.102A	0.138A	0.173A	0.207A	0.244A	0.282A	0.315A	0.352A	0.3557A	%	0.00%	9.94%	19.63%	29.06%	39.46%	49.46%	59.17%	69.60%	80.60%	89.86%	100.49%	101.628%	3	Duty value	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN	Output current	0.000A	0.034A	0.069A	0.103A	0.139A	0.174A	0.209A	0.245A	0.281A	0.316A	0.352A	0.3557A	%	0.00%	9.83%	19.63%	29.54%	39.60%	49.71%	59.77%	70.00%	80.20%	90.34%	100.46%	101.628%
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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 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)	169 V~528V 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= 0.9952 / 230 VAC PF= 0.9844 / 277 VAC PF= 0.9833 / 347VAC PF= 0.9513 / 480VAC

4	EFFICIENCY	91 % (TYP)	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	91.79 %
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 = 0.4618 A/ 347 VAC I = 0.3474 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 : 0.3 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 : 11.8 THD : 13.9 THD : 16.8
		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 : 420 V ~ 460 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	438.71V/ 480VAC 442.52V/ 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 : 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) 692 V (2) 188 V (3) 690 V
2	Diode Peak Voltage	D100 Rated : 3A/1KV	I/P : High-Line +3V = 531 V	(1) 884 V

			O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(2) 704 V (3) 876 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) 428 V (2) 440 V (3) 428 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) 17.4 V (2) 17.4 V (3) 17 V (4) 16.4 V (5) 16.4 V (6) 16 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) 924 V (2) 840 V (3) 868 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 : 2.52 mA I/P-FG : 1.95 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 : 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: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
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-150-350 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> <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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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																																																																																					
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°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
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 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) 44823HRS (2) 49280HRS (3) 52309HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 179.5K 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		

RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031