



Test Report: HVGC-65-1050

65W 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 : 6V~ 62V Ta : 25°C	-0.18 %- 0.18 %
2	CONSTANT CURRENT REGION	6V ~ 62V	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	O/P=6V : 1.052A O/P=61V : 1.052A
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 630mA~ 1050m A	I/P : 480 VAC I/P : 347 VAC O/P : LED : 61V Ta : 25°C	0.4304 A~ 1.1440 A/ 480 VAC 0.4313 A~ 1.1442 A/ 347 VAC
4	CURRENT RIPPLE	5.0% max. @rated current	I/P : 230VAC O/P : LED : 31V~61V Ta : 25°C	LED=31V 1.9 % LED=61V 2.9 %
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/ 278 ms 347VAC/ 290 ms 230VAC/ 310 ms
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %

7	<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 resistance or cable by connecting a 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>													
	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	0.001A	0.117A	0.218A	0.318A	0.419A	0.519A	0.618A	0.718A	0.815A	0.913A	1.005A	1.090A	
	%	0.10%	11.14%	20.78%	30.31%	39.90%	49.44%	58.85%	68.41%	77.57%	86.96%	95.70%	103.81%	
	2	Dimming value	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
		Output current	0.001A	0.124A	0.230A	0.332A	0.434A	0.539A	0.654A	0.750A	0.856A	0.960A	1.050A	1.090A
		%	0.10%	11.81%	21.92%	31.62%	41.30%	51.31%	62.29%	71.43%	81.52%	91.44%	100.02%	103.82%
	3	Duty value	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
		Output current	0.001A	0.119A	0.221A	0.324A	0.428A	0.531A	0.636A	0.739A	0.843A	0.947A	1.051A	1.090A
		%	0.10%	11.30%	21.07%	30.89%	40.72%	50.59%	60.53%	70.40%	80.29%	90.17%	100.08%	103.81%

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)	169V-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= 1 / 230 VAC PF= 0.991 / 277 VAC PF= 0.977 / 347VAC PF= 0.971 / 480VAC

4	EFFICIENCY	90 % (TYP)	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	91.05 %
5	INPUT CURRENT	347V/ 0.22 A (TYP) 480V/ 0.18 A (TYP)	I/P : 347 VAC I/P : 480 VAC O/P : FULL LOAD Ta : 25°C	I = 0.209 A / 347 VAC I = 0.155 A / 480 VAC
6	INRUSH CURRENT	230V/ 25 A (TYP) (twidth=420us measured at 50% Ipeak) COLD START	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	I = 20 A / 230VAC T50= 406 us
7	LEAKAGE CURRENT	< 0.75 mA / 480 VAC	I/P : 480 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.27 mA N-FG : 0.3 mA
8	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 230VAC / 277VAC / 347VAC	I/P : 230VAC I/P : 277VAC I/P : 347VAC O/P : 60% LOAD Ta : 25°C	THD : 7.16 % THD : 9.63 % THD : 14.49 %
		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 : 12.07 %

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1 : 65 V ~ 72 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	68.97V/ 480VAC 68.92V/ 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 : 9A/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) 668 V (2) 284 V (3) 580 V
2	Diode Peak Voltage	D101 Rated : 10A/200V	I/P : High-Line +3V = 531 V	(1) 187 V

			O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(2) 127 V (3) 181 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) 442 V (2) 434 V (3) 442 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) 19.2 V (2) 19.2 V (3) 19.2 V (4) 16.4 (5) 16.3 (6) 16.4
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 9A/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) 944 V (2) 845 V (3) 852 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 : 3.1 mA I/P-FG : 2.922 mA O/P-FG : 1.725 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 : 6.16 GΩ I/P-FG : 5.75 GΩ O/P-FG : 3.61 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	23 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:100/60%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 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-65-700 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 347VAC O/P : FULL LOAD Ta= 34.2°C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 347VAC O/P : FULL LOAD Ta= 58.9°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 34.2 °C</th> <th>HIGH AMBIENT Ta= 58.9 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>51.5°C</td><td>75.7°C</td></tr> <tr><td>2</td><td>Q1</td><td>57.6°C</td><td>80.9°C</td></tr> <tr><td>3</td><td>Q3</td><td>58.8°C</td><td>81.8°C</td></tr> <tr><td>4</td><td>T1</td><td>61.5°C</td><td>84.2°C</td></tr> <tr><td>5</td><td>C5</td><td>49.9°C</td><td>78.4°C</td></tr> <tr><td>6</td><td>RTH2</td><td>53.5°C</td><td>76.9°C</td></tr> <tr><td>7</td><td>C102</td><td>56.8°C</td><td>80.1°C</td></tr> <tr><td>8</td><td>U2</td><td>54.1°C</td><td>77.6°C</td></tr> <tr><td>9</td><td>D101</td><td>59.5°C</td><td>82.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 34.2 °C	HIGH AMBIENT Ta= 58.9 °C	1	BD1	51.5°C	75.7°C	2	Q1	57.6°C	80.9°C	3	Q3	58.8°C	81.8°C	4	T1	61.5°C	84.2°C	5	C5	49.9°C	78.4°C	6	RTH2	53.5°C	76.9°C	7	C102	56.8°C	80.1°C	8	U2	54.1°C	77.6°C	9	D101	59.5°C	82.7°C	
NO	Position	ROOM AMBIENT Ta= 34.2 °C	HIGH AMBIENT Ta= 58.9 °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= -40 °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%(0-50°C)																																								

5	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<p>1 Carton & 1 Set</p> <ol style="list-style-type: none"> (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	<p>HVGC-65-700 : SUPPOSE C102 IS THE MOST CRITICAL COMPONENT</p> <ol style="list-style-type: none"> (1) I/P : 347VAC O/P : FULL LOAD Tc= 75 °C LIFE TIME (2) I/P : 347VAC O/P : FULL LOAD Tc= 75 °C LIFE TIME (3) I/P : 347VAC O/P : 75% LOAD Tc= 75 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 54492 HRS (2) 58093 HRS (3) 63558 HRS
9	MTBF	<p>Conducted by Parts Stress Analysis Prediction</p> <p>611K hrs min. Telcordia SR-332 (Bellcore) ; 202.7K hrs min. MIL-HDBK-217F (25°C)</p>	
10	Ongoing Reliability Test	<p>I/P : 230VAC O/P : FULL LOAD TA=50°C</p> <p>Demonstration Mean Time Between Failure : 50,000 hours</p>	

RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

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