



Test Report: HVG-150-20

150W Single Output Switching 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

■ ESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 347VAC O/P : FULL LOAD Ta : 25°C	V1 : 9.4 mVp-p (Max)
2	CONSTANT CURRENT REGION	11V~20 V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=11V : 7.659 A O/P=19V : 7.66 A
3	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 17V ~ 22 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	16.6 V ~ 22.61 V/ 480 VAC 16.6 V ~ 22.61 V/ 347 VAC
4	OUTPUT CURRENT ADJUST RANGE	CH1 : 4.13A~7.5 A	I/P : 480 VAC I/P : 347 VAC O/P : CV MODE Ta : 25°C	3.914 A~ 8.189 A/ 480 VAC 3.914 A~ 8.189 A/ 347 VAC
5	OUTPUT VOLTAGE TOLERANCE	V1 : 1%~-1 % (Max)	I/P : 180 VAC / 480 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.2 %~-0.2 %
6	LINE REGULATION	V1 : 0.5 %~-0.5% (Max)	I/P : 180 VAC ~ 480 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~-0 %
7	LOAD REGULATION	V1 : 1 %~-1% (Max)	I/P : 347 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.2 %~-0.2 %
8	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/ 243 ms 347VAC/ 299 ms 230VAC/ 342 ms
9	RISE TIME	480 VAC : 80 ms (Max) 347VAC : 80 ms (Max) 230VAC : 80 ms (Max)	I/P : 480 VAC I/P : 347 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	480 VAC/ 55 ms 347VAC/ 60 ms 230VAC/ 60 ms
10	HOLD UP TIME	480 VAC : 18 ms (TYP) 347VAC : 18 ms (TYP)	I/P : 480 VAC I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	480 VAC/ 36 ms 347VAC/ 24 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %

12	DYNAMIC LOAD	V1 : 2000 mVp-p	I/P : 347 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1)704 mVp-p (2)632 mVp-p (3)588 mVp-p (4)689 mVp-p
----	--------------	-----------------	---	--

13

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	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℃

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0.000A	0.880A	1.620A	2.370A	3.110A	3.940A	4.610A	5.310A	6.020A	6.820A	7.540A	7.749A
	%	0	11.73%	21.60%	31.60%	41.47%	52.53%	61.47%	70.80%	80.27%	90.93%	100.53%	103.32%
2	Dimming value	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0.000A	0.840A	1.580A	2.330A	3.060A	3.790A	4.540A	5.280A	6.020A	6.750A	7.490A	7.749A
	%	0.00%	11.20%	21.07%	31.07%	40.80%	50.53%	60.53%	70.40%	80.27%	90.00%	99.87%	103.32%
3	Duty value	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0.000A	1.080A	1.790A	2.500A	3.220A	3.930A	4.650A	5.360A	6.080A	6.800A	7.500A	7.749A
		0.00%	14.40%	23.87%	33.33%	42.93%	52.40%	62.00%	71.47%	81.07%	90.67%	100.0%	103.32%

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~480 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	169 V~480V
			I/P : LOW-LINE-3V=177V HIGH-LINE+3V=531 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 ~ 480 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 / 480 VAC(TYP)	I/P : 230VAC I/P : 277VAC I/P : 347VAC I/P : 480VAC O/P : FULL LOAD Ta : 25°C	PF= 0.994 / 230 VAC PF= 0.991 / 277 VAC PF= 0.980 / 347VAC PF= 0.963 / 480VAC
4	EFFICIENCY	90.5 % (TYP)	I/P : 347 VAC O/P : FULL LOAD Ta : 25°C	91.52 %
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 = 0.48 A/ 347 VAC I = 0.37 A/ 480 VAC
6	INRUSH CURRENT	480V/ 35 A (TYP) (twidth=790 us measured at 50% Ipeak) COLD START	I/P : 480VAC O/P : FULL LOAD Ta : 25°C	I = 25 A/ 480VAC T50= 789 us
7	LEAKAGE CURRENT	< 0.75 mA / 480 VAC	I/P : 480 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.36 mA N-FG : 0.36 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 : 7.45 THD : 7.23 THD : 6.01
		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 : 11.9

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95% ~ 108%	I/P : 480 VAC I/P : 347 VAC O/P : TESTING Ta : 25°C	102%/ 480 VAC 102%/ 347 VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH1 : 23 V ~ 27 V	I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C	24.881 V/ 480VAC 24.958 V/ 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	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) 340 V (3) 660 V
2	Diode Peak Voltage	Q101 Rated : 80A/75V	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) 71.6 V (2) 74 V (3) 68.8 V
3	Input Capacitor Voltage	C5 Rated : 56u/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) 416 V (2) 432 V (3) 436 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) 17.8 V (2) 17.6 V (3) 18.4 V (4) 16 V (5) 15.8 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) 896 V (2) 820 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 : 2KVAC/min O/P-FG : 1.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.4KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 3.72 mA I/P-FG : 2.634 mA O/P-FG : 3.59 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 : 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	15 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 347V/230VAC/60HZ O/P:100%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 : HVG-150-15</div> <div>1. ROOM AMBIENT BURN-IN : 13 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta= 28.4 °C</div> <div>2. HIGH AMBIENT BURN-IN : 3 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta=60.8 °C FULL LOAD Ta=60.8 °C]</div> <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=28.4 °C</th><th>HIGH AMBIENT Ta=60.8 °C</th></tr></thead><tbody><tr><td>1</td><td>LF2</td><td>57.8°C</td><td>83.7°C</td></tr><tr><td>2</td><td>BD1</td><td>60.3°C</td><td>85.9°C</td></tr><tr><td>3</td><td>L2</td><td>67.3°C</td><td>93.5°C</td></tr><tr><td>4</td><td>C48</td><td>61.1°C</td><td>86.7°C</td></tr><tr><td>5</td><td>C46</td><td>60.1°C</td><td>85.7°C</td></tr><tr><td>6</td><td>C15</td><td>65.1°C</td><td>90.7°C</td></tr><tr><td>7</td><td>Q1</td><td>65.0°C</td><td>90.7°C</td></tr><tr><td>8</td><td>C5</td><td>66.8°C</td><td>91.2°C</td></tr><tr><td>9</td><td>Q4</td><td>69.7°C</td><td>95.2°C</td></tr><tr><td>10</td><td>C62</td><td>64.3°C</td><td>88.8°C</td></tr><tr><td>11</td><td>RTH2</td><td>64.0°C</td><td>88.5°C</td></tr><tr><td>12</td><td>T1</td><td>75.7°C</td><td>100.3°C</td></tr><tr><td>13</td><td>C203</td><td>71.2°C</td><td>96.5°C</td></tr><tr><td>14</td><td>Q101</td><td>75.2°C</td><td>100.5°C</td></tr><tr><td>15</td><td>C104</td><td>68.4°C</td><td>93.8°C</td></tr><tr><td>16</td><td>C105</td><td>65.2°C</td><td>91.1°C</td></tr><tr><td>17</td><td>C106</td><td>64.8°C</td><td>90.5°C</td></tr><tr><td>18</td><td>U2</td><td>64.8°C</td><td>88.6°C</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta=28.4 °C	HIGH AMBIENT Ta=60.8 °C	1	LF2	57.8°C	83.7°C	2	BD1	60.3°C	85.9°C	3	L2	67.3°C	93.5°C	4	C48	61.1°C	86.7°C	5	C46	60.1°C	85.7°C	6	C15	65.1°C	90.7°C	7	Q1	65.0°C	90.7°C	8	C5	66.8°C	91.2°C	9	Q4	69.7°C	95.2°C	10	C62	64.3°C	88.8°C	11	RTH2	64.0°C	88.5°C	12	T1	75.7°C	100.3°C	13	C203	71.2°C	96.5°C	14	Q101	75.2°C	100.5°C	15	C104	68.4°C	93.8°C	16	C105	65.2°C	91.1°C	17	C106	64.8°C	90.5°C	18	U2	64.8°C	88.6°C
NO	Position	ROOM AMBIENT Ta=28.4 °C	HIGH AMBIENT Ta=60.8 °C																																																																													
1	LF2	57.8°C	83.7°C																																																																													
2	BD1	60.3°C	85.9°C																																																																													
3	L2	67.3°C	93.5°C																																																																													
4	C48	61.1°C	86.7°C																																																																													
5	C46	60.1°C	85.7°C																																																																													
6	C15	65.1°C	90.7°C																																																																													
7	Q1	65.0°C	90.7°C																																																																													
8	C5	66.8°C	91.2°C																																																																													
9	Q4	69.7°C	95.2°C																																																																													
10	C62	64.3°C	88.8°C																																																																													
11	RTH2	64.0°C	88.5°C																																																																													
12	T1	75.7°C	100.3°C																																																																													
13	C203	71.2°C	96.5°C																																																																													
14	Q101	75.2°C	100.5°C																																																																													
15	C104	68.4°C	93.8°C																																																																													
16	C105	65.2°C	91.1°C																																																																													
17	C106	64.8°C	90.5°C																																																																													
18	U2	64.8°C	88.6°C																																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 347 VAC O/P : 104 % 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= -40 °C	TEST : OK																																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 528 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																												
5	TEMPERATURE COEFFICIENT	± 0.03%(0~50°C)	I/P : 347 VAC O/P : FULL LOAD	± 0.003 %(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 : -45°C ~ +55°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	HVG-150-15: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) 165032 HRS (2) 27362 HRS (3) 45522 HRS (4) 76442 HRS
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 158.6 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 70°C	

SAMPLE	TEST RESULT	TESTER	REVIEW	APPROVAL
PRODUCT SAMPLE	PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023