



TEST REPORT: HVG-240-48

240W Constant Voltage + Constant Current LED Driver

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

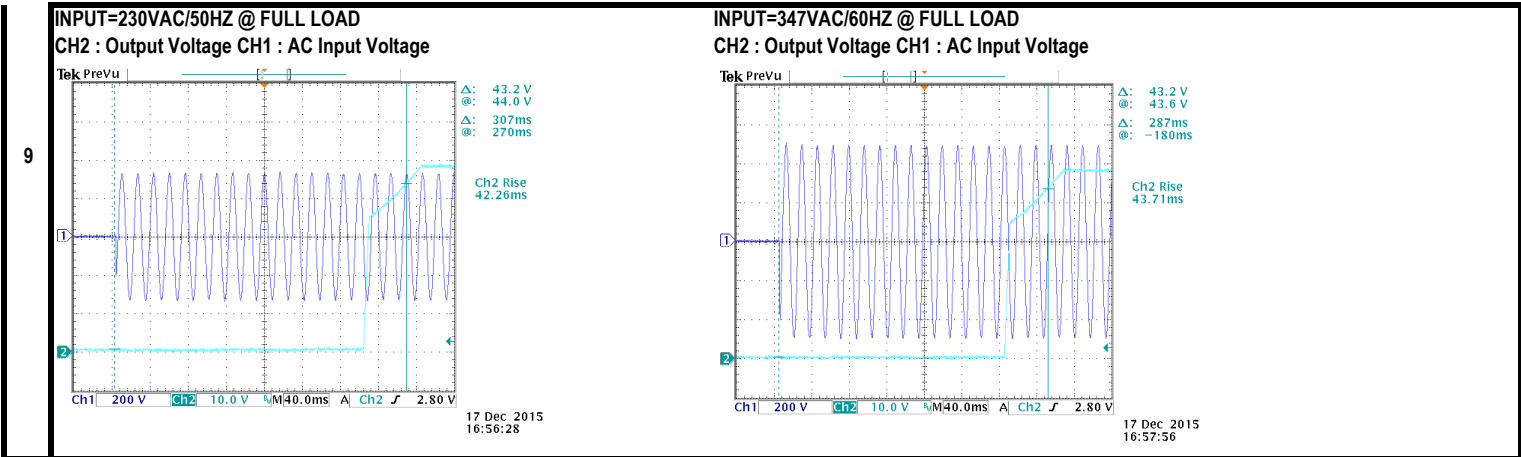
E.M.C. Test

■ RELIABILITY TEST

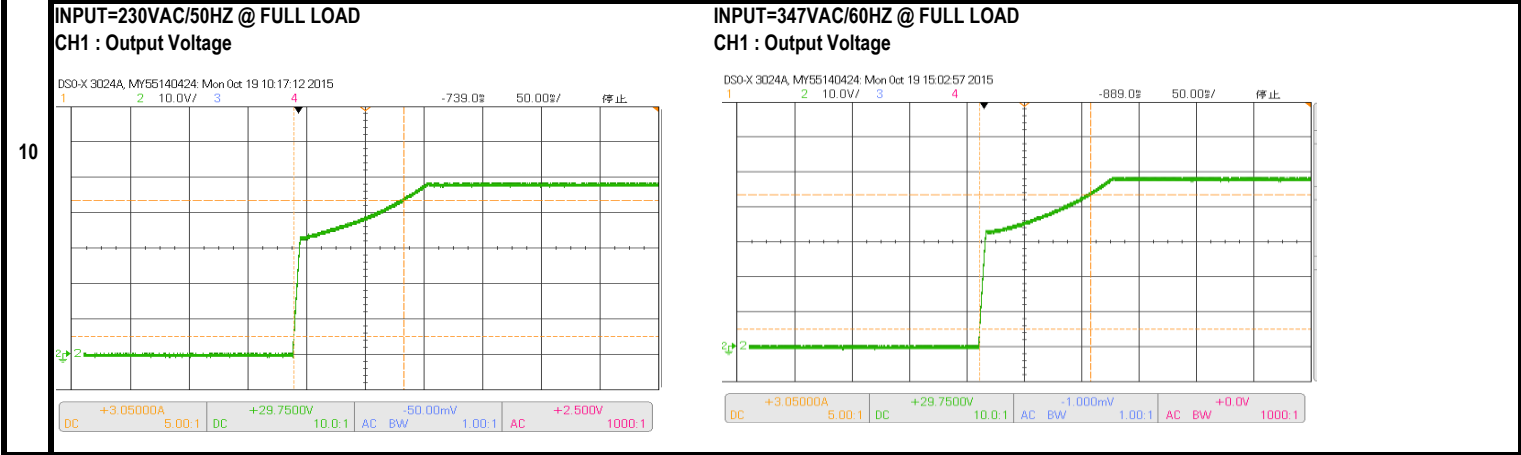
ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION TEST

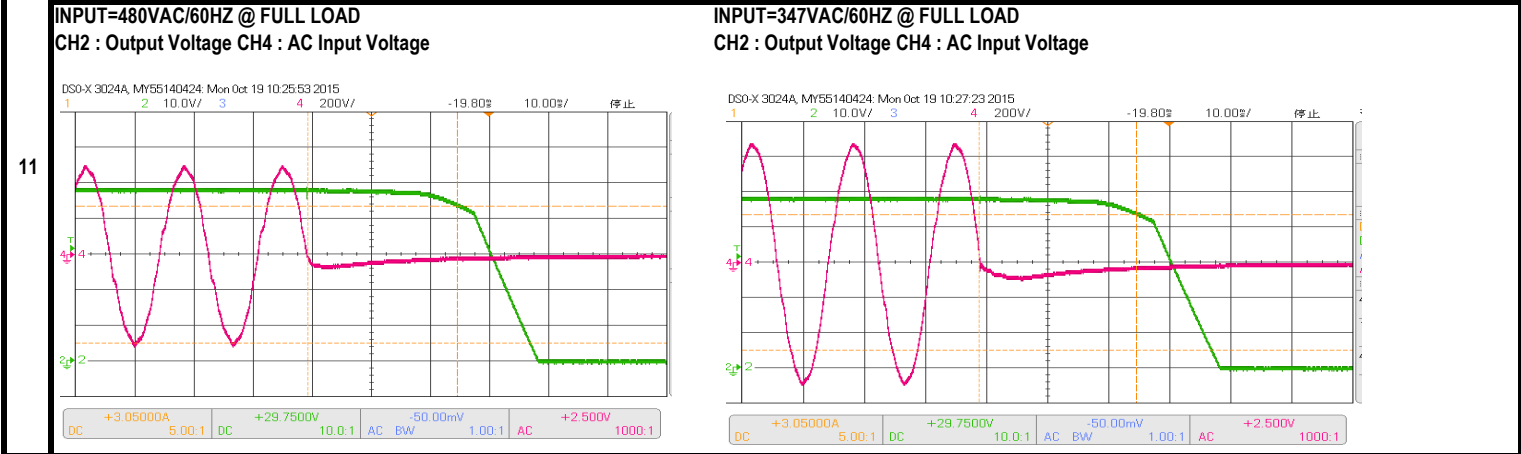
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	CH1: 24V~ 48V	I/P: 347 VAC O/P: FULL LOAD Ta: 25°C CV MODE TEST	0.0575V~47V /347VAC
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 44.80V ~ 51.20V	I/P : 347VAC O/P: MIN LOAD TA : 25°C	CH1: 43.21V ~ 53.14V
3	CURRENT ADJ. RANGE	CH1: 2.5 A~ 5A	I/P: 347 VAC I/P: 230VAC O/P: CV MIN & CV MAX-1V Ta: 25°C CV MODE TEST	1.761A~5.41A/347VAC@CV MAX-1V 1.682A~ 5.33A /347VAC@CV MIN 1.762A~5.4 A/230VAC@CV MAX-1V 1.682A~ 5.325A/230VAC@CV MIN
4	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 180VAC / 528VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.12% ~ 0.01%
5	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 180VAC / 528VAC O/P: FULL LOAD TA : 25°C	V1: -0.01% ~ -0.02%
6	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 347VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: -0.06% ~ 0.05%
7	OVER/UNDERSHOOT TEST	< ±5%	I/P : 347VAC O/P: FULL LOAD TA : 25°C	TEST < ±5%
8	RIPPLE & NOISE(Max)	V1 : 250 mVp-p	I/P : 347VAC	V1 : 133 mVp-p
			O/P: FULL LOAD TA : 25°C	
<p>low frequency :</p> <p>DSO-X 3024A, Mf55140424, Mon Oct 19 13:31:40 2015</p> <p>0.0s 5.000μs 停止</p> <p>+3.05000A 5.00:1 DC +29.7500V 10.0:1 AC BW 1.00:1 -2.500mV 1.00:1 AC BW 1.00:1 +147.500mV 1.00:1</p>				
SET UP TIME (MAX.)	347VAC : 500ms 230VAC : 500ms 480VAC : 500ms	I/P : 347VAC I/P : 230VAC I/P : 480VAC O/P: FULL LOAD TA : 25°C	347VAC: 287ms 230VAC 307ms 480VAC 349ms	



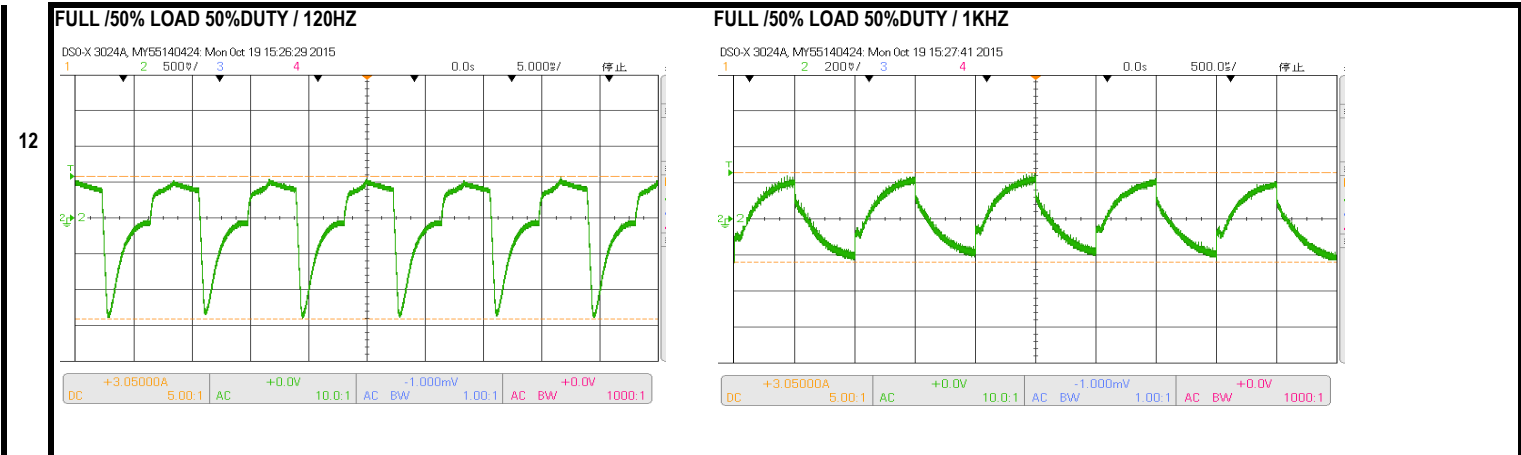
RISE TIME (MAX.)	347VAC : 150ms	I/P : 347VAC	347VAC: 42.4
	230VAC : 150ms	I/P : 230VAC	230VAC: 41.2
	480VAC : 150ms	I/P : 480VAC	480VAC: 41.2
		O/P: FULL LOAD	
		TA : 25°C	



HOLD UP TIME (TYP.)	347VAC : 12ms	I/P : 347VAC	347VAC: 25.4ms
	480VAC : 12ms	I/P : 480VAC	480VAC: 25.0ms
		O/P: FULL LOAD	
		TA : 25°C	



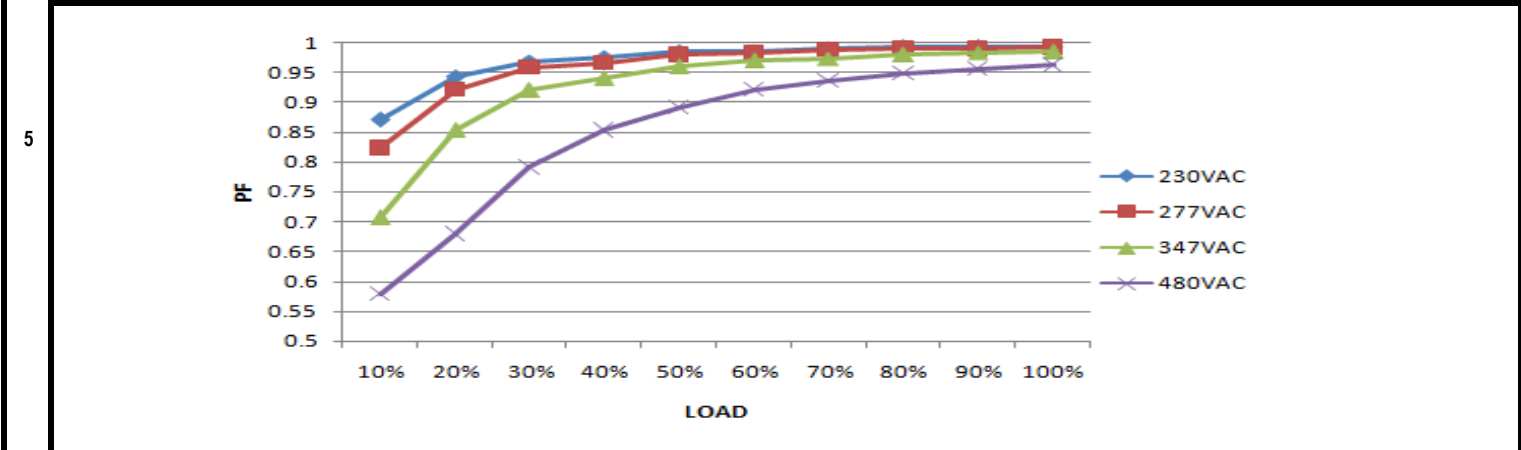
DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 347VAC	(1).	(2).	unit:mVp-p
		O/P:	V1: 1990mv	500mv	
		(1)Full/Min load 50%duty/120HZ			
		(2)Full/Min load 50%duty/1KHZ			
		TA : 25°C			



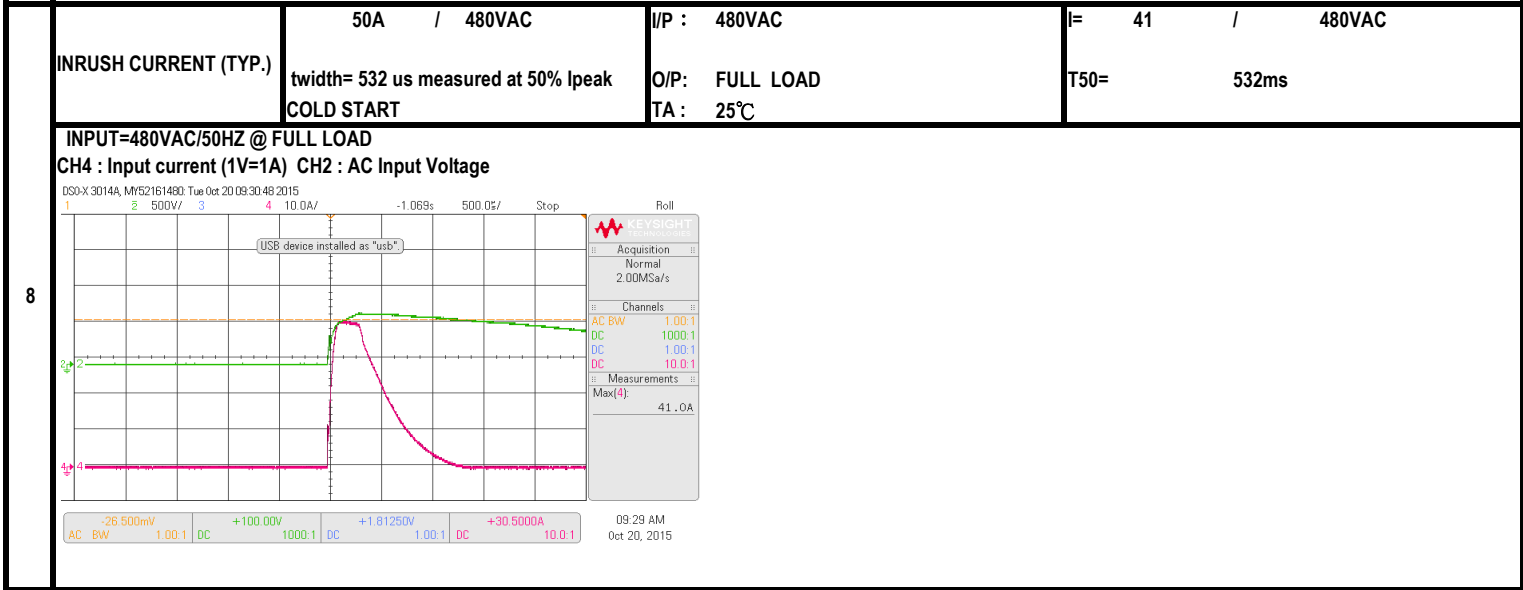
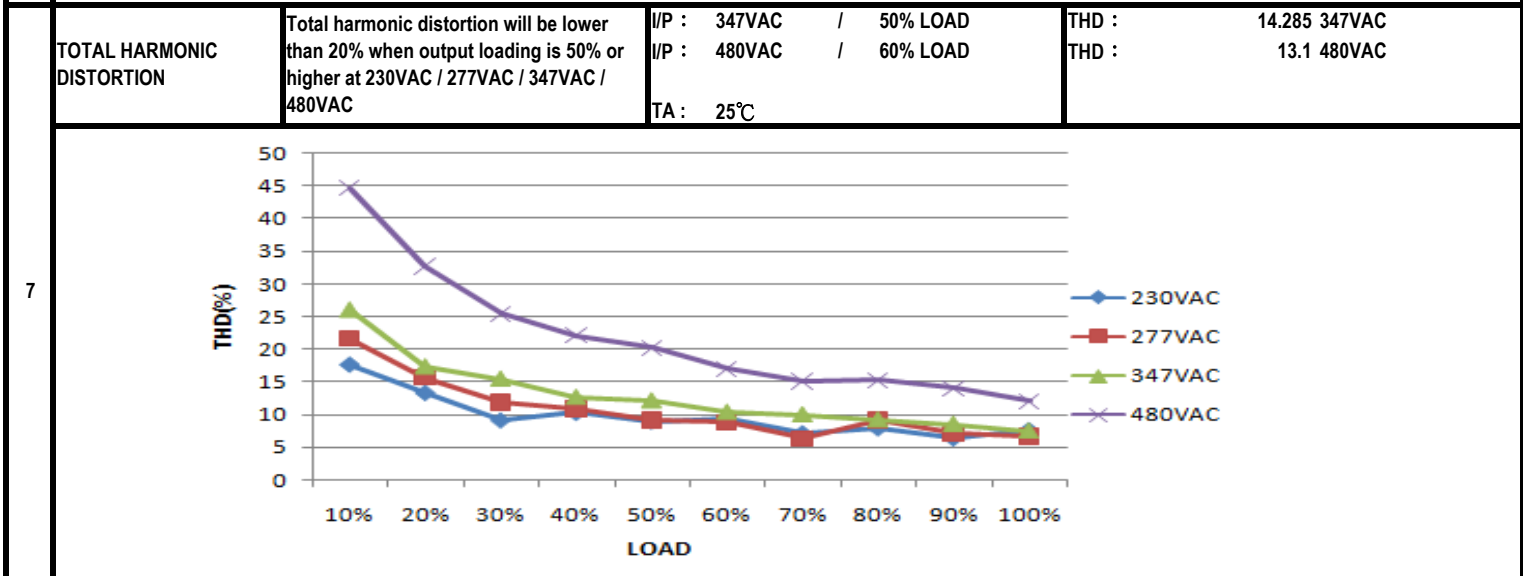
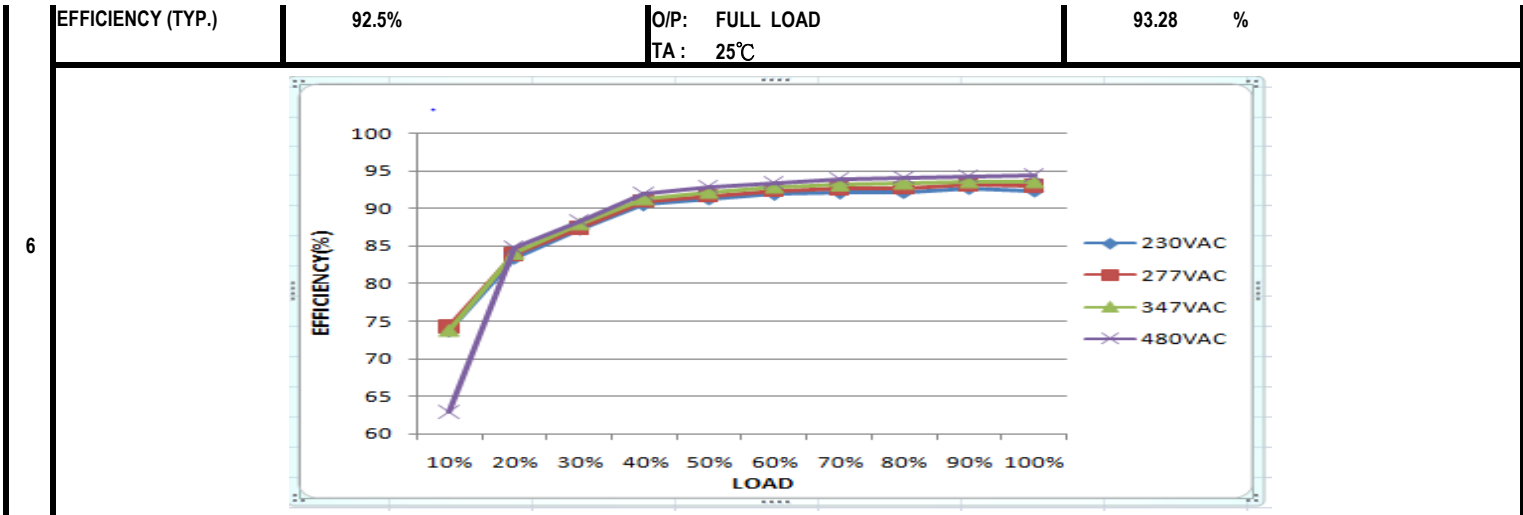
13	TRANSIENT RECOVERY TIME	V1 : 500 us (MAX.)	I/P : 347VAC O/P : 40% load change 50%duty 120HZ TA : 25°C	V1: 0 us
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INPUT FUNCTION TEST

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 = 177VAC HIGH-LINE = 538VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	132.0VAC ~ 528VAC TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 180VAC ~ 528VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.8 / 347VAC 0.6 / 480VAC	I/P : 347VAC I/P : 480VAC O/P : FULL LOAD TA : 25°C	I= 0.7513 / 347VAC I= 0.5553 / 480VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 480VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.36 mA N-FG: 0.37 mA
	POWER FACTOR (TYP.)	0.95 / 347VAC 0.93 / 480VAC 0.97 / 277VAC 0.98 / 230VAC	I/P : 347VAC I/P : 480VAC I/P : 277VAC I/P : 230VAC O/P : FULL LOAD TA : 25°C	PF= 0.9822 / 347VAC PF= 0.9517 / 480VAC PF= 0.989 / 277VAC PF= 0.993 / 230VAC



I/P : 347VAC



PROTECTION FUNCTION TEST			
NO	TEST ITEM	SPECIFICATION	TEST CONDITION
1	OVER LOAD PROTECTION	95% ~ 108%	I/P: 528VAC I/P: 180VAC O/P: TESTING TA: 25°C
			104.4% /528VAC 104.4% /180 VAC Constant Current Limiting

2	OVER VOLTAGE PROTECTION	55.00V ~ 63.00V	I/P: 528VAC I/P: 180VAC O/P: MIN LOAD Ta: 25°C	528VAC 58.86 V 180VAC 58.69 V Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 347VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 528VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant Current Limiting

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q901 Rated : 950V 9.0A	I/P : 531VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta : 25°C	VIN: 531VAC VDS: (1). 863.0V (2). 920.0V (3). 799.0V (4). 863.0V (5). 863.0V (6). 871.0V (7). 904.0V
2	O/P Diode (MOSFET)	Q102 Rated : 150V 117.0A Q101 Rated : 150V 117.0A	I/P : 531VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load (8) NO LOAD Ta : 25°C	Q102 Q101 VDS : VDS: (1). 123.0V 121.0V (2). 42.1V 35.7V (3). 110.5V 110.5V (4). 123.0V 127.0V (5). 123.0V 121.0V (6). 127.0V 125.0V (7). 125.0V 121.0V (8). 141.0V 125.0V
3	Input Capacitor	C5 Rated : 82uf 450V	I/P : 531VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 442.0V (2). 438.0V (3). 404.0V
4	Control IC	U1 Rated : 20V (max) 10V (min)	I/P : 531VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 (1). 13.4V (2). 13.4V (3). 13.4V (4). 13.4V (5). 13.5V
5	PFC Power Transistor	Q1 Rated : 1050V 9.0A	I/P : 531VAC I/P : 177VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load contin: PASS (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta : 25°C	VIN: 531VAC VDS: (1). 832.0V (2). 820.0V (3). 824.0V (4). 832.0V (5). 836.0V (6). 812.0V (7). 824.0V

SAFETY & E.M.C. TEST SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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1	WITHSTAND VOLTAGE	I/P-O/P : 3.75KVAC /min I/P-FG : 2.0KVAC /min O/P-FG : 1.5KVAC /min	I/P-O/P: 4.13KVAC /min I/P-FG: 2.40KVAC /min O/P-FG: 1.80KVAC /min Ta : 25°C	I/P-O/P: 2.0mA I/P-FG: 1.9mA O/P-FG: 1.0mA 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: 500VDC I/P-FG: 500VDC O/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9.6GΩ I/P-FG: 18.2GΩ O/P-FG: 21.2GΩ NO DAMAGE
2	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	26 mΩ

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EN55022 CLASS B	I/P : 347 VAC/50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
2	CONDUCTION	EN55022 CLASS B	I/P : 347 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 347 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 347 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV;L/N-PE : 4KV	I/P : 347 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																												
1	TEMPERATURE RISE TEST	MODEL : HVG-240-48 1. ROOM AMBIENT BURN-IN : 3.0hrs IP: 230VAC O/P: 100% LOAD TA= 24.8°C 2. HIGH AMBIENT BURN-IN : 2.0hrs IP: 230VAC O/P: 100% LOAD TA= 59.2°C	<table border="1"> <thead> <tr> <th>CH.</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.8 °C</th> <th>HIGH AMBIENT Ta= 59.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>62.7°C</td><td>94.9°C</td></tr> <tr><td>2</td><td>Q1</td><td>63.0°C</td><td>96.3°C</td></tr> <tr><td>3</td><td>Q901</td><td>64.3°C</td><td>98.3°C</td></tr> <tr><td>4</td><td>L2</td><td>61.7°C</td><td>93.6°C</td></tr> <tr><td>5</td><td>C2</td><td>60.2°C</td><td>90.5°C</td></tr> <tr><td>6</td><td>C10</td><td>63.0°C</td><td>95.1°C</td></tr> <tr><td>7</td><td>L1</td><td>66.5°C</td><td>100.0°C</td></tr> <tr><td>8</td><td>ZNR2</td><td>73.2°C</td><td>104.2°C</td></tr> <tr><td>9</td><td>RTH3</td><td>60.5°C</td><td>94.3°C</td></tr> <tr><td>10</td><td>T1</td><td>62.7°C</td><td>98.0°C</td></tr> <tr><td>11</td><td>C46</td><td>62.9°C</td><td>96.7°C</td></tr> <tr><td>12</td><td>C54</td><td>61.1°C</td><td>94.8°C</td></tr> <tr><td>13</td><td>Q102</td><td>59.2°C</td><td>93.5°C</td></tr> <tr><td>14</td><td>C102</td><td>57.8°C</td><td>91.6°C</td></tr> <tr><td>15</td><td>C201</td><td>61.2°C</td><td>94.7°C</td></tr> <tr><td>16</td><td>C200</td><td>59.7°C</td><td>93.4°C</td></tr> <tr><td>17</td><td>U1</td><td>64.1°C</td><td>96.0°C</td></tr> <tr><td>18</td><td>C5</td><td>63.1°C</td><td>96.6°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 24.8 °C	HIGH AMBIENT Ta= 59.2 °C	1	BD1	62.7°C	94.9°C	2	Q1	63.0°C	96.3°C	3	Q901	64.3°C	98.3°C	4	L2	61.7°C	93.6°C	5	C2	60.2°C	90.5°C	6	C10	63.0°C	95.1°C	7	L1	66.5°C	100.0°C	8	ZNR2	73.2°C	104.2°C	9	RTH3	60.5°C	94.3°C	10	T1	62.7°C	98.0°C	11	C46	62.9°C	96.7°C	12	C54	61.1°C	94.8°C	13	Q102	59.2°C	93.5°C	14	C102	57.8°C	91.6°C	15	C201	61.2°C	94.7°C	16	C200	59.7°C	93.4°C	17	U1	64.1°C	96.0°C	18	C5	63.1°C	96.6°C	
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18	C5	63.1°C	96.6°C																																																																													
2	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 528VAC / 180VAC O/P : FULL LOAD Ta : -45.0°C	TEST : OK																																																																												
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60°C NO DAMAGE	I/P : 528VAC O/P : FULL LOAD Ta : 60°C HUMIDITY= 95.0% RH	TEST : OK																																																																												
4	TEMPERATURE	±0.03% /°C(0~60°C)	I/P : 347VAC	±0.01% /°C(0~60°C)																																																																												



7	COEFFICIENT	O/P : FULL LOAD	
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	TEST : OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C ~ 65°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 230V Full Load AC ON/OFF te: turn on 3sec ; turn off 1sec @ 15cycle Full Load burn in@ 1cycle	TEST : OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 5G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
8	CAPACITOR LIFE CYCLE	HVG-240-48 :SUPPOSE C102 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). 362820 HRS (2). 33364 HRS (3). 51086 HRS (4). 80465 HRS
9	MTBF	MIL-HDBK-217F NOTICE 2 STRESS ANALYSIS TOTAL FAILURE RATE : 114.5 KHRS (Ta=25°C)	
10	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase70°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG