



Test Report: HVGC-240-3500

240W Single Output LED Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

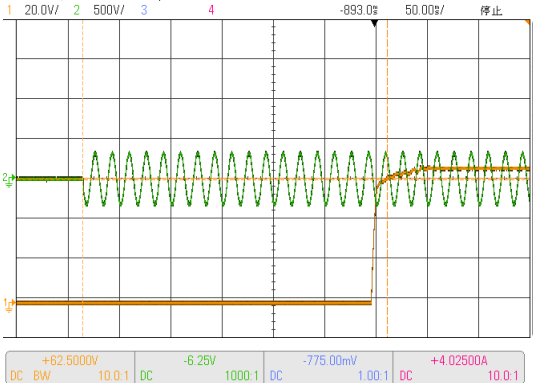
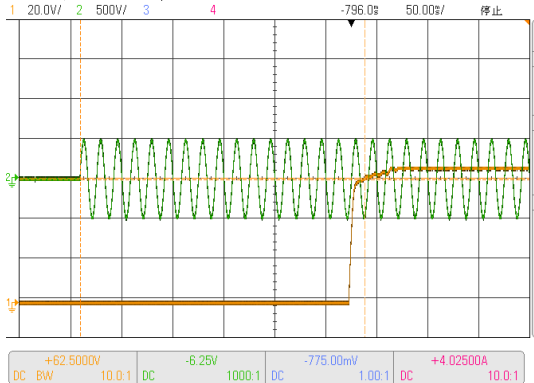
E.M.C. Test

■ RELIABILITY TEST

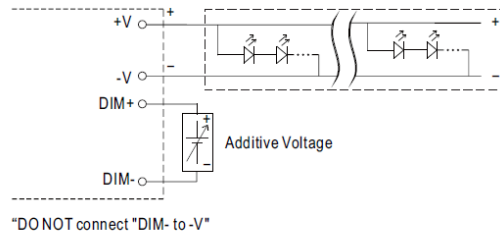
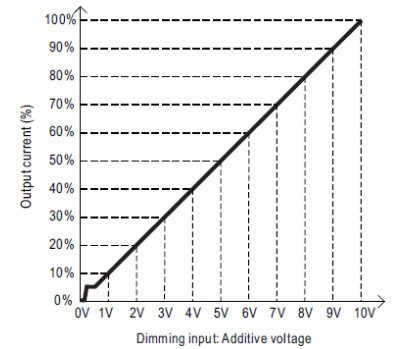
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

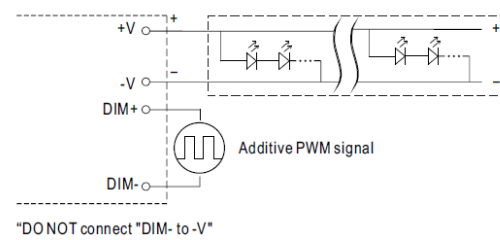
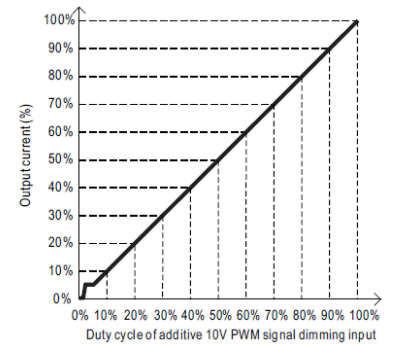
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	3.543 A / 347VAC @ CV MAX-1V 3.542 A / 347VAC @ CV MIN 3.546 A / 480VAC @ CV MAX-1V 3.543 A / 480VAC @ CV MIN
2	CONSTANT CURRENT REGION	CH1: 34.3V ~ 68.6V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	0.384V ~ 68.6V / 347VAC
3	CURRENT ADJ. RANGE	CH1: 1750mA ~ 3500mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	1.526A ~ 3.748A / 347VAC @ CV MAX-1V 1.528A ~ 3.746A / 347VAC @ CV MIN 1.526A ~ 3.749A / 480VAC @ CV MAX-1V 1.532A ~ 3.746A / 480VAC @ CV MIN
4	OPEN CIRCUIT VOLTAGE (max.)	71V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	69.6V
5	CURRENT RIPPLE	5.0% max. @ rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	2.14%
6	OVER/UNDERSHOOT TEST	< ±5%	I/P: 347 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5 %
7	SET UP TIME	230VAC / 500 ms (Max) 347VAC / 500 ms (Max) 480VAC / 500 ms (Max)	I/P: 230VAC I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	230VAC / 297 ms 347VAC / 279 ms 480VAC / 280ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p> <p>DSO-X 3014A, M/52161480, Thu Sep 03 17:23:44 2015</p>  <p>+62.5000V 10.0:1 DC -6.25V 1000:1 DC -775.00mV 1.00:1 DC +4.02500A 10.0:1</p> </div> <div style="width: 45%;"> <p>INPUT=347VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p> <p>DSO-X 3014A, M/52161480, Thu Sep 03 17:24:53 2015</p>  <p>+62.5000V 10.0:1 DC -6.25V 1000:1 DC -775.00mV 1.00:1 DC +4.02500A 10.0:1</p> </div> </div>				
8	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.</p> <p>※Dimming source current from power supply: 100μ A (typ.)</p>		

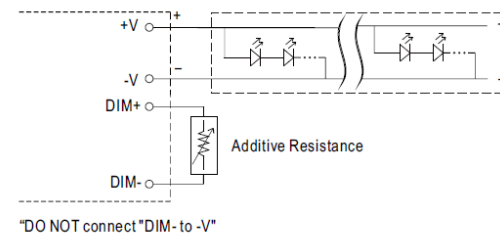
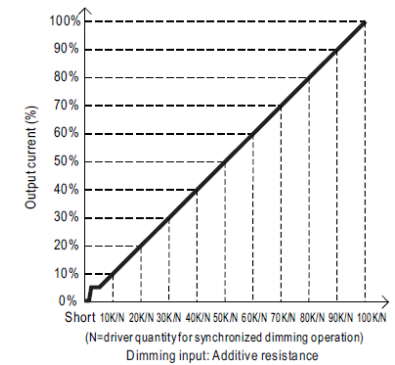
◎ Applying additive 0 ~ 10VDC



◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



◎ Applying additive resistance:



Note : 1. Min. dimming level is about 5% and the output current is not defined when $0\% < I_{out} < 5\%$.
 2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P : 347VAC

O/P : DIMMING TEST

TA : 25°C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.406A	0.746A	1.120A	1.424A	1.761A	2.099A	2.444A	2.778A	3.122A	3.443A	3.666A
%	0.00%	11.60%	21.32%	32.00%	40.67%	50.30%	59.96%	69.83%	79.37%	89.19%	98.38%	104.74%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.410A	0.761A	1.107A	1.439A	1.797A	2.125A	2.464A	2.819A	3.151A	3.507A	3.666A
%	0.00%	11.73%	21.75%	31.63%	41.12%	51.35%	60.71%	70.41%	80.53%	90.02%	100.20%	104.74%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.341A	0.686A	1.034A	1.376A	1.723A	2.064A	2.411A	2.752A	3.095A	3.433A	3.666A
%	0.00%	9.75%	19.59%	29.53%	39.30%	49.22%	58.97%	68.89%	78.63%	88.44%	98.09%	104.74%

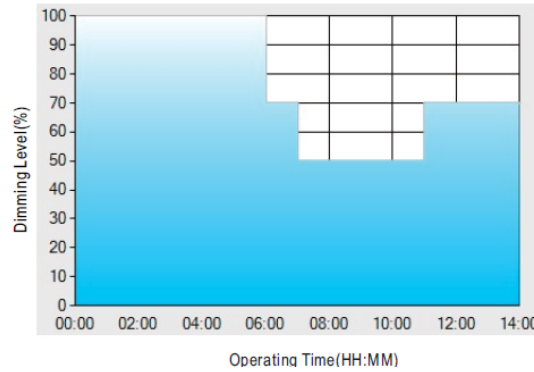
TEST RESULT : OK

9 DIMMING OPERATION (for Dxx-Type by User definition)

※Smart timer dimming function (for Dxx-Type by User definition)

MEAN WELL Smart timer dimming primarily provides the adaptive proportion dimming profile for the output constant current level to perform up to 14 consecutive hours. 3 dimming profiles hereunder are defined accounting for the most frequently seen applications. If other options may be needed, please contact MEAN WELL for details.

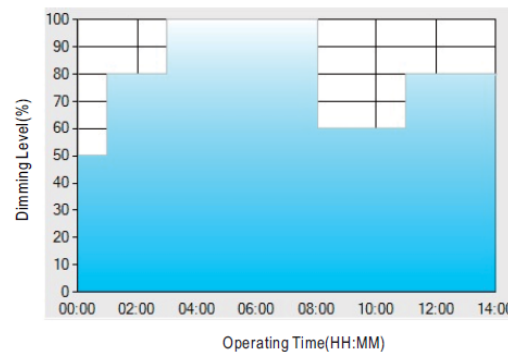
Ex : Ⓒ D01-Type: the profile recommended for residential lighting



Set up for D01-Type in Smart timer dimming software program:

	T1	T2	T3	T4
TIME**	06:00	07:00	11:00	---
LEVEL**	100%	70%	50%	70%

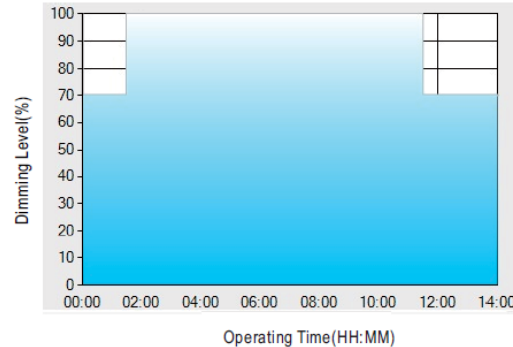
Ex : Ⓒ D02-Type: the profile recommended for street lighting



Set up for D02-Type in Smart timer dimming software program:

	T1	T2	T3	T4	T5
TIME**	01:00	03:00	8:00	11:00	---
LEVEL**	50%	80%	100%	60%	80%

Ex : Ⓒ D03-Type: the profile recommended for tunnel lighting

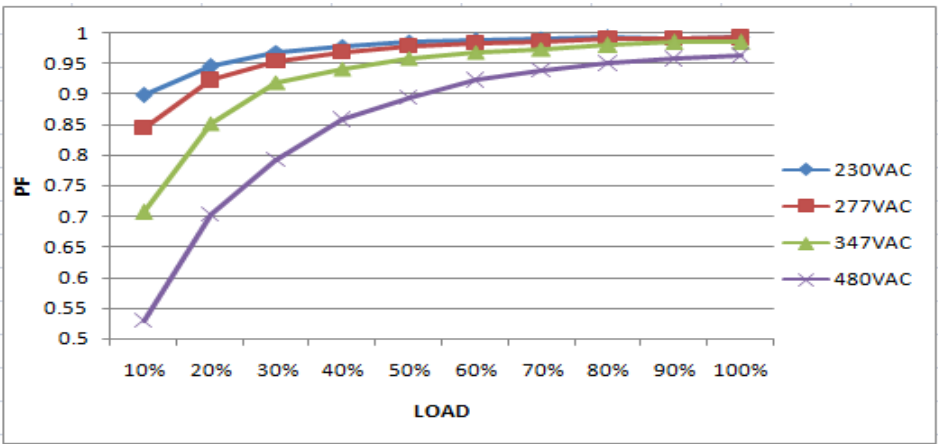


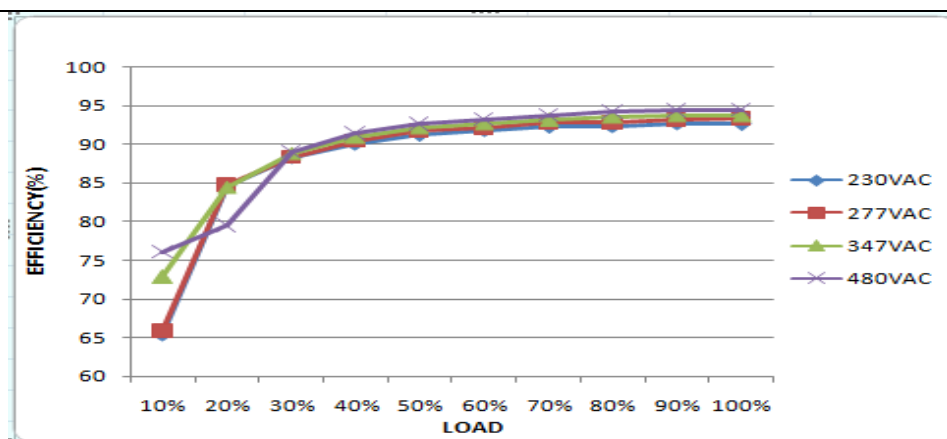
Set up for D03-Type in Smart timer dimming software program:

	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

I/P : 347VAC
O/P : DIMMING TEST
TA : 25°C
TEST RESULT : OK

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																							
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	147V~528V																																																							
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :OK																																																							
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~528VAC O/P:FULL~MIN LOAD Ta:25°C	OK																																																							
3	INPUT CURRENT (TYP)	347VAC/ 0.76 A 480VAC/ 0.56 A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I = 0.752A/ 347VAC I = 0.552A/ 480VAC																																																							
4	POWER FACTOR(TYP)	0.95/347VAC FULL LOAD 0.93/480VAC FULL LOAD 0.97/277 VAC FULL LOAD 0.98/230 VAC FULL LOAD	I/P: 347VAC/480VAC/277VAC/230VAC O/P:FULL LOAD Ta:25°C	PF= 0.987/347V/100%LOAD PF= 0.964 /480V/100%LOAD PF= 0.942/277V/100%LOAD PF= 0.996/230V/100%LOAD																																																							
<p>P.F vs LOAD</p>  <table border="1"> <caption>Approximate data points from P.F vs LOAD graph</caption> <thead> <tr> <th>Load (%)</th> <th>230VAC PF</th> <th>277VAC PF</th> <th>347VAC PF</th> <th>480VAC PF</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.90</td><td>0.85</td><td>0.70</td><td>0.55</td></tr> <tr><td>20%</td><td>0.95</td><td>0.90</td><td>0.85</td><td>0.70</td></tr> <tr><td>30%</td><td>0.97</td><td>0.93</td><td>0.90</td><td>0.80</td></tr> <tr><td>40%</td><td>0.98</td><td>0.95</td><td>0.93</td><td>0.88</td></tr> <tr><td>50%</td><td>0.98</td><td>0.96</td><td>0.95</td><td>0.92</td></tr> <tr><td>60%</td><td>0.99</td><td>0.97</td><td>0.96</td><td>0.94</td></tr> <tr><td>70%</td><td>0.99</td><td>0.98</td><td>0.97</td><td>0.95</td></tr> <tr><td>80%</td><td>0.99</td><td>0.98</td><td>0.98</td><td>0.96</td></tr> <tr><td>90%</td><td>0.99</td><td>0.99</td><td>0.99</td><td>0.97</td></tr> <tr><td>100%</td><td>0.99</td><td>0.99</td><td>0.99</td><td>0.98</td></tr> </tbody> </table>					Load (%)	230VAC PF	277VAC PF	347VAC PF	480VAC PF	10%	0.90	0.85	0.70	0.55	20%	0.95	0.90	0.85	0.70	30%	0.97	0.93	0.90	0.80	40%	0.98	0.95	0.93	0.88	50%	0.98	0.96	0.95	0.92	60%	0.99	0.97	0.96	0.94	70%	0.99	0.98	0.97	0.95	80%	0.99	0.98	0.98	0.96	90%	0.99	0.99	0.99	0.97	100%	0.99	0.99	0.99	0.98
Load (%)	230VAC PF	277VAC PF	347VAC PF	480VAC PF																																																							
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90%	0.99	0.99	0.99	0.97																																																							
100%	0.99	0.99	0.99	0.98																																																							
5	EFFICIENCY (TYP)	92.5%	I/P: 347VAC O/P:FULL LOAD Ta:25°C	93.03 %																																																							
	EFFICIENCY vs LOAD																																																										

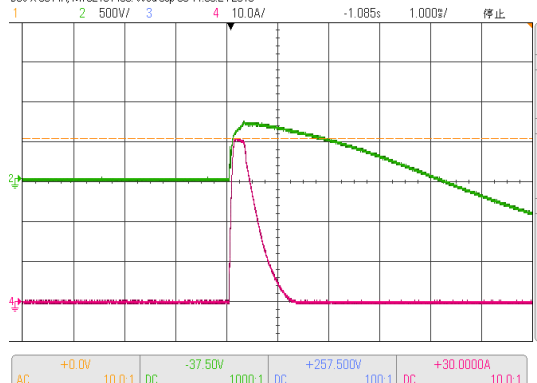


6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START (twidth=532us measured at 50% Ipeak) COLD START	I/P:480VAC O/P:FULL LOAD Ta:25°C	I = 40.9A/ 480VAC T50= 520 us
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INPUT=480VAC/ 60HZ @ FULL LOAD

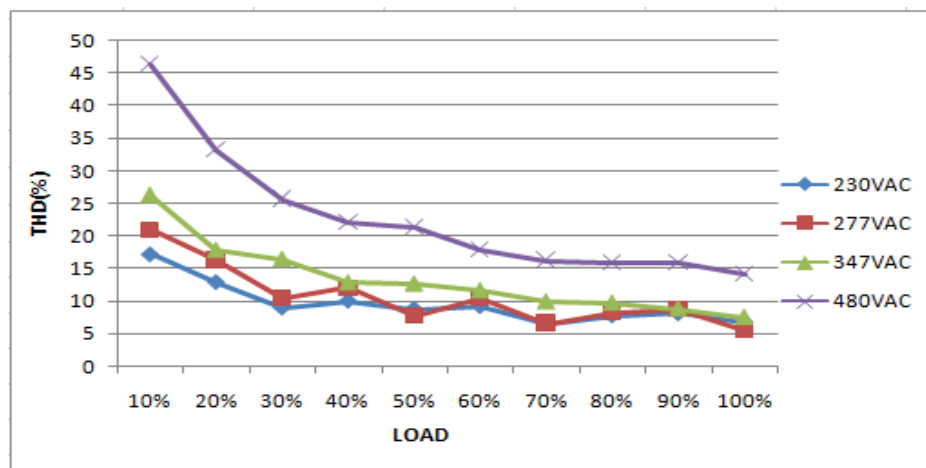
CH2 : AC Input Voltage CH4 : Input current (1V=1A)

DSO-X:3014A, My52161480 Wed Sep 09 11:38:24 2015



7	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 50% or higher at 230V/277V/347V/480V	I/P : 230V/277V/347V O/P : 100% LOAD 50% LOAD I/P : 480V O/P : 60% LOAD Ta : 25°C	THD : 7.38%/230V 50% THD : 7.88%/230V 100% THD : 7.63%/277V 50% THD : 9.77%/277V 100% THD : 9.61%/347V 50% THD : 6.71%/347V 100% THD : 13.43%480V 60% THD : 8.21%480V 100%
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THD vs LOAD



ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
2	OVER VOLTAGE PROTECTION	V1: 72 V~ 79 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P: MIN LOAD Ta:25°C	75.43V/ 528VAC 75.39V/ 347VAC 75.3V/ 180VAC PROTECTION TYPE : Shut down o/p voltage with re-power on to recovery
3	OVER TEMPERATURE PROTECTION	PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover	I/P: 528 VAC I/P: 180 VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 528VAC I/P: 180 VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q901 Rated 9A/ 950V	I/P: High-Line +3V =531V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 836V/6.28A (2) 836V/6.68A (3) 820V/2.96A
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 6A/1050V	I/P: High-Line +3V =531V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 912V/3.91A (2) 824V/3.73A (3) 840V/3.77A
3	Diode Peak Voltage	D101 Rated 20A/ 200V	I/P: High-Line +3V =531 V D101 : AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load continue Ta:25°C	VDS: (1) 154V (2) 41.6V (3) 154V
4	Input Capacitor Voltage	C6 Rated: 82u/450V	I/P: High-Line +3V =531V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue Ta:25°C	(1) 379V (2) 411V (3) 379V (4) 359V
5	Control IC Voltage Test	PWM IC U901 Rated 8.85V~16V	I/P: High-Line +3V =531 V AC ON/OFF O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. Ta:25°C	(1) 14.93V (2) 14.21V (3) 14.29V (4) 12.84V

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG: 2 KVAC/min<4.5mA O/P-FG:1.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P: 2.6mA I/P-FG: 1.08 mA O/P-FG: 0.7mA 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	I/P-O/P: 30 GΩ I/P-FG: 18.1 GΩ O/P-FG: 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	21mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.16 mA N-FG: 0.16mA L,N -V(+): 0.18mA L,N-V(-): 0.17mA

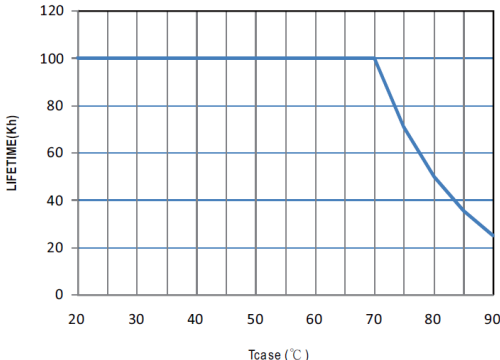
E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	FCC PART 15	I/P: 230/347VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
2	RADIATION	FCC PART 15	I/P: 230/347VAC (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:230/ 347VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230/347VAC/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:230/ 347VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																												
1	TEMPERATURE RISE TEST	<div>MODEL : HVGC-240-3500</div> <div>1. ROOM AMBIENT BURN-IN : 15 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta= 25.5 °C</div> <div>2. HIGH AMBIENT BURN-IN : 3.5 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta= 56.3 °C</div> <table><tr><th>CH.</th><th>Position</th><th>ROOM AMBIENT Ta= 25.5 °C</th><th>HIGH AMBIENT Ta= 56.3 °C</th></tr><tr><td>1</td><td>C1</td><td>58.5°C</td><td>91.3°C</td></tr><tr><td>2</td><td>BD1</td><td>61.1°C</td><td>94.2°C</td></tr><tr><td>3</td><td>L2</td><td>59.8°C</td><td>93.0°C</td></tr><tr><td>4</td><td>C10</td><td>60.3°C</td><td>93.2°C</td></tr><tr><td>5</td><td>C11</td><td>62.1°C</td><td>93.9°C</td></tr><tr><td>6</td><td>Q2</td><td>63.0°C</td><td>97.0°C</td></tr><tr><td>7</td><td>RTH2</td><td>73.6°C</td><td>103.8°C</td></tr><tr><td>8</td><td>Q901</td><td>61.7°C</td><td>97.6°C</td></tr><tr><td>9</td><td>T2</td><td>63.1°C</td><td>97.5°C</td></tr><tr><td>10</td><td>L1</td><td>60.9°C</td><td>94.4°C</td></tr><tr><td>11</td><td>C5</td><td>61.0°C</td><td>94.5°C</td></tr><tr><td>12</td><td>ZNR1</td><td>55.5°C</td><td>87.7°C</td></tr><tr><td>13</td><td>Q35</td><td>61.2°C</td><td>95.2°C</td></tr><tr><td>14</td><td>C46</td><td>60.8°C</td><td>94.7°C</td></tr><tr><td>15</td><td>C54</td><td>59.2°C</td><td>92.3°C</td></tr><tr><td>16</td><td>RTH3</td><td>59.2°C</td><td>92.7°C</td></tr><tr><td>17</td><td>U901</td><td>58.7°C</td><td>92.0°C</td></tr><tr><td>18</td><td>T1</td><td>71.9°C</td><td>104.3°C</td></tr><tr><td>19</td><td>D100</td><td>64.2°C</td><td>96.4°C</td></tr><tr><td>20</td><td>C106</td><td>60.7°C</td><td>93.3°C</td></tr><tr><td>21</td><td>C201</td><td>52.5°C</td><td>86.2°C</td></tr><tr><td>22</td><td>LF100</td><td>57.7°C</td><td>90.2°C</td></tr></table>			CH.	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta= 56.3 °C	1	C1	58.5°C	91.3°C	2	BD1	61.1°C	94.2°C	3	L2	59.8°C	93.0°C	4	C10	60.3°C	93.2°C	5	C11	62.1°C	93.9°C	6	Q2	63.0°C	97.0°C	7	RTH2	73.6°C	103.8°C	8	Q901	61.7°C	97.6°C	9	T2	63.1°C	97.5°C	10	L1	60.9°C	94.4°C	11	C5	61.0°C	94.5°C	12	ZNR1	55.5°C	87.7°C	13	Q35	61.2°C	95.2°C	14	C46	60.8°C	94.7°C	15	C54	59.2°C	92.3°C	16	RTH3	59.2°C	92.7°C	17	U901	58.7°C	92.0°C	18	T1	71.9°C	104.3°C	19	D100	64.2°C	96.4°C	20	C106	60.7°C	93.3°C	21	C201	52.5°C	86.2°C	22	LF100	57.7°C	90.2°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= -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 : 538VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																												
4	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~60°C)	I/P : 347 VAC O/P : FULL LOAD	± 0%/°C (0~60°C)																																																																																												
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -50°C~ +125°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 : $-45^{\circ}\text{C} \sim +65^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test	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 : 70min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C106 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) 295963 HRS (2) 23072 HRS (3) 33201HRS (4) 35836HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 143.6K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 80°C 	

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

12.10.30 A50-F031