



# Test Report: HVGC-240-1400

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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

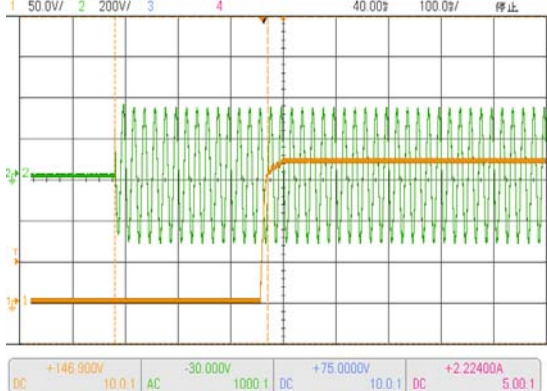
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	1.4131 A / 347VAC @ CV MAX-1V 1.4227 A / 347VAC @ CV MIN 1.4133 A / 480VAC @ CV MAX-1V 1.4222 A / 480VAC @ CV MIN 1.62%
2	CONSTANT CURRENT REGION	CH1: 85.7V~ 171.4V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	85.7V~171.4 V / 347VAC
3	CURRENT ADJ. RANGE	CH1: 700mA~ 1400mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V  Ta: 25°C	0.6273A~1.4994A / 347VAC @ CV MAX-1V 0.6266A~1.5051 A / 347VAC @ CV MIN 0.6289A~1.4991 A / 480VAC @ CV MAX-1V 0.6276A~ 1.5055A / 480VAC @ CV MIN
4	OPEN CIRCUIT VOLTAGE (max.)	176V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	171.4 V
5	CURRENT RIPPLE	5.0% max. @ rated current	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	3.57%
6	LINE REGULATION	V1: 1% ~ -1% (Max)	I/P: 180VAC~528VAC O/P: FULL LOAD Ta: 25°C	V1: 0%~0.01%
7	OVER/UNDERSHOOT TEST	< ±5%	I/P: 347 VAC O/P: FULL LOAD Ta: 25°C	TEST: 2.1%
8	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/290 ms 347VAC/272 ms 480VAC/272 ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

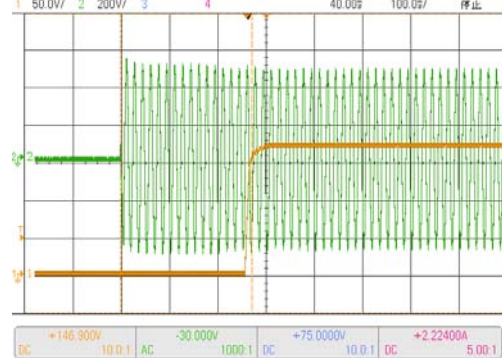
030-X 3014A, M154100664 Thu Sep 24 15:21:27 2015



INPUT=347VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

030-X 3014A, M154100664 Thu Sep 24 15:16:40 2015

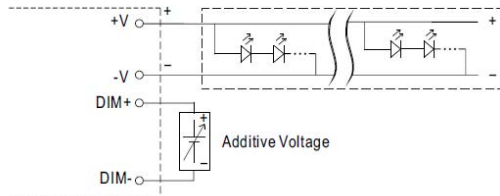


## 8 DIMMING OPERATION (for B-Type)

### ※3 in 1 dimming function

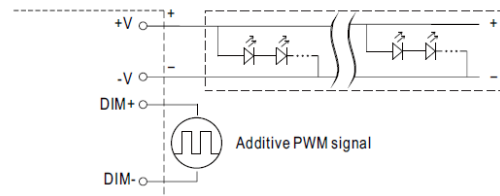
- ※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.
- ※Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- ※Dimming source current from power supply: 100 $\mu$  A (typ.)

#### ◎ Applying additive 0 ~ 10VDC



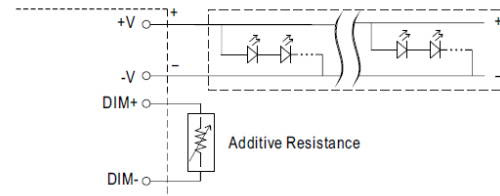
"DO NOT connect "DIM- to -V"

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

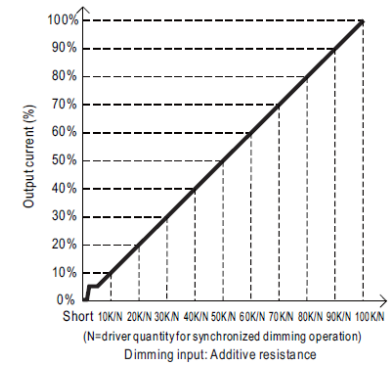
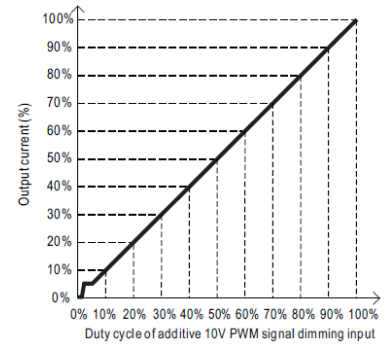
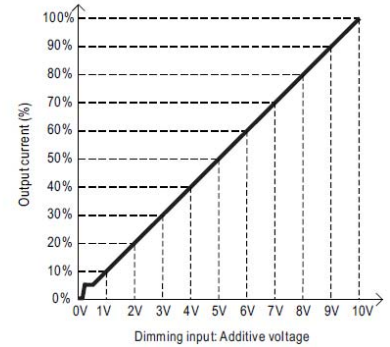


"DO NOT connect "DIM- to -V"

#### ◎ Applying additive resistance:



"DO NOT connect "DIM- to -V"



- Note : 1. Min. dimming level is about 5% and the output current is not defined when 0% < I<sub>out</sub> < 5%.  
 2. The output current could drop down to 0% when dimming input is about 0k $\Omega$  or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P : 347VAC  
 O/P : DIMMING TEST  
 TA : 25 $^{\circ}$ C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.154A	0.289A	0.421A	0.554A	0.681A	0.818A	0.963A	1.092A	1.228A	1.357A	1.440A
%	0.00%	11.00%	20.64%	30.07%	39.57%	48.64%	58.43%	68.79%	78.00%	87.71%	96.93%	102.86%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.170A	0.313A	0.440A	0.578A	0.703A	0.840A	0.971A	1.116A	1.244A	1.381A	1.440A
%	0.00%	12.14%	22.36%	31.43%	41.29%	50.21%	60.00%	69.36%	79.71%	88.86%	98.64%	102.86%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.131A	0.274A	0.414A	0.551A	0.685A	0.822A	0.958A	1.096A	1.229A	1.360A	1.440A

%	0.00%	9.36%	19.57%	29.57%	39.36%	48.93%	58.71%	68.43%	78.29%	87.79%	97.14%	102.86%
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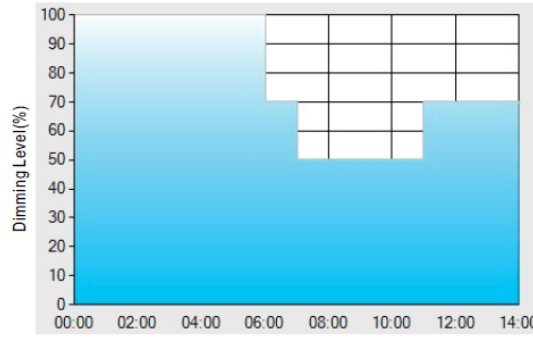
TEST RESULT : OK

**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.

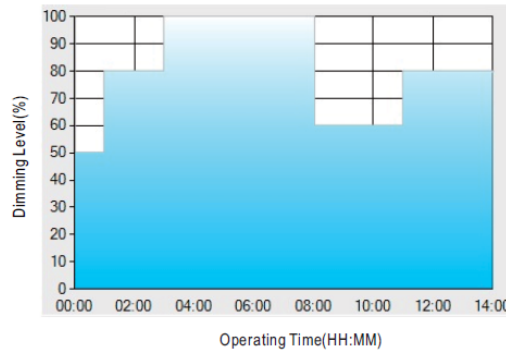
Ex :  D01-Type: the profile recommended for residential lighting



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%

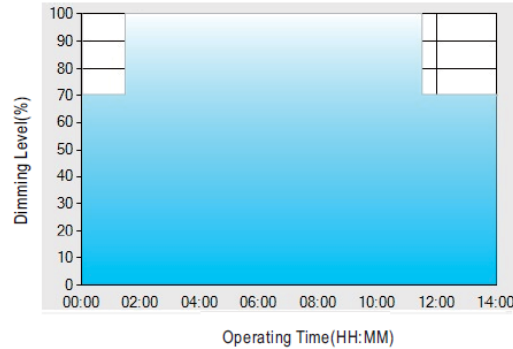
Ex :  D02-Type: the profile recommended for street lighting



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



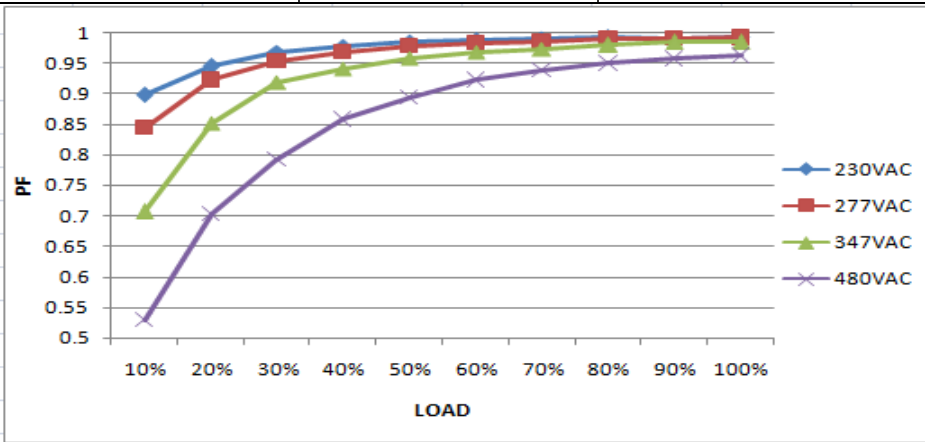
Set up for D03-Type in Smart timer dimming software program:

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

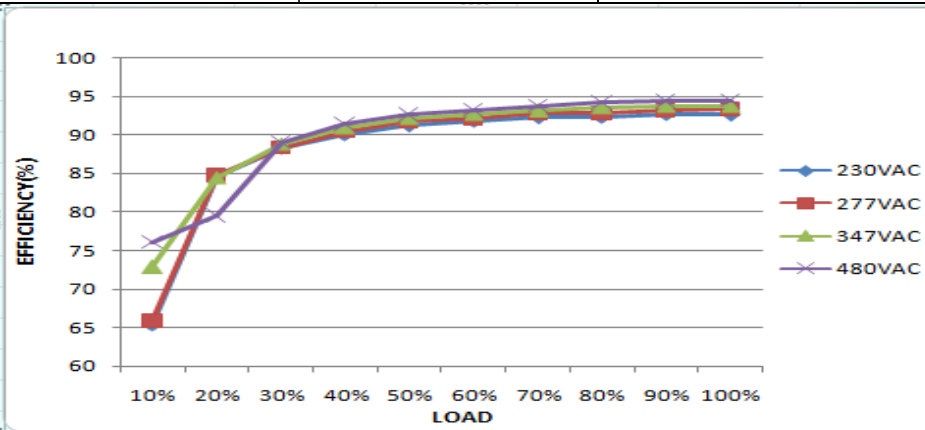
I/P : 347VAC  
O/P : DIMMING TEST  
TA : 25°C  
TEST RESULT : OK

## INPUT FUNCTION TEST

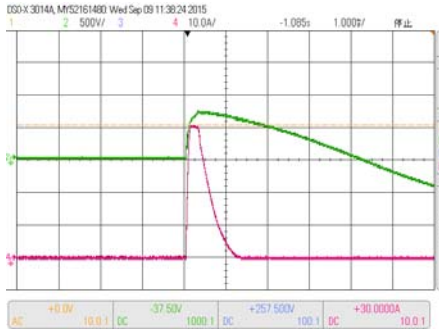
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	138~528V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	(1).TEST:OK (2).TEST :OK
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/ 0.56A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I =0.759A/347VAC I =0.556A/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=0.9898 /347V/100%LOAD PF=0.9741 /480V/100%LOAD PF=0.9909 /277V/100%LOAD PF=0.9926 /230V/100%LOAD



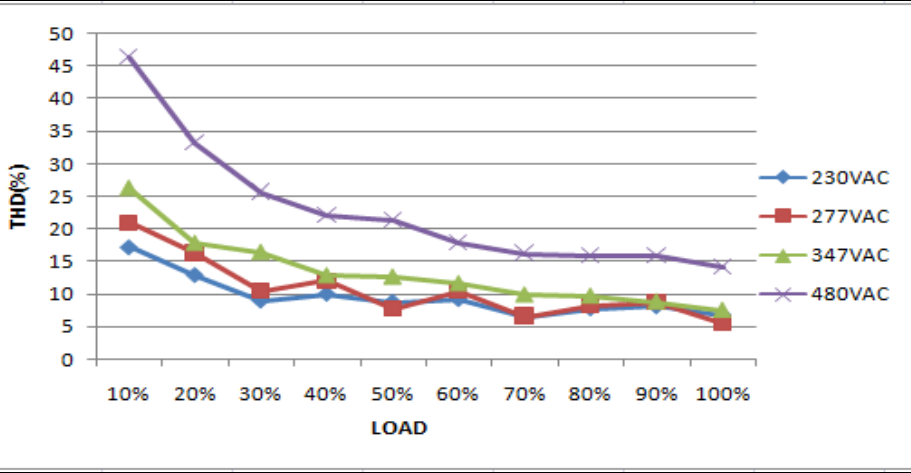
5	EFFICIENCY (TYP)	93%	I/P: 347VAC O/P:FULL LOAD Ta:25°C	93.59 %
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6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START  (twidth= 532 us measured at 50% Ipeak) COLD START	I/P: 347VAC 480VAC O/P:FULL LOAD Ta:25°C	I =40.9 A/ 480VAC  T50= 520 us
	INPUT=480VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)			



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 : 6.9831%/230V 50% THD : 8.0731%/230V 100% THD : 7.8827%/277V 50% THD : 5.5023%/277V 100% THD : 9.9946%/347V 50% THD : 6.2033%/347V 100% THD : 15.71%/480V 60% THD : 9.63 %480V 100%



## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 180 V~ 197 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	187.6V/ 528VAC 186.177V/ 347VAC 187.39V/ 180VAC PROTECTION TYPE : Shut down o/p voltage with re-power on to recovery

2	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
3	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) <b>Peak Voltage</b>	Q901 Rated 9 A/ 950 V	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)787V/7.06A (2)763V/7.3A (3)771V/4.83A
2	P.F.C Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q 1 Rated 6 A/1050 V	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)859V/3.6A (2)811V/3.76A (3)795V/3.52A
3	Diode <b>Peak Voltage</b>	D103 Rated 10 A/400 V  D104 Rated 30GFA40: 3A/400 V	I/P:High-Line +3V =531 V D103 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue  D104 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue  Ta:25°C	VDS: (1)182V (2)186V (3)180V  VDS: (1)180V (2)176V (3)178V
4	<b>Input Capacitor Voltage</b>	C5 Rated: 82 $\mu$ / 450 V	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)390V (2)401.25V (3)388.75V (4) 388.75V
5	<b>Control IC Voltage Test</b>	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) 15.1V (2) 14.7V (3) 15.5V (4) 12.5V

## 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:1.628 mA I/P-FG: 1.18 mA O/P-FG:0.8mA 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:30GΩ I/P-FG:11.4 G Ω O/P-FG: 30G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	22mΩ
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:0.16 mA L,N -V(+):0.18 mA L,N-V(-):0.18 mA

### E.M.C TEST

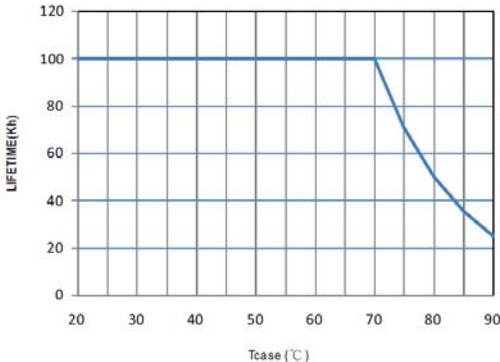
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	FCC Part 15 Subpart B	I/P: 440VAC (60HZ) O/P:FULL/30% LOAD Ta:25°C	PASS Test by certified Lab
2	RADIATION	FCC Part 15 Subpart B	I/P: 480VAC (60HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/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: 230VAC/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	MODEL : HVGC-240-700 1. ROOM AMBIENT BURN-IN : 15 HRS I/P : 347VAC O/P : FULL LOAD Ta= 25.5 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 347VAC O/P : FULL LOAD Ta= 56.3 °C																																																																																																						
				<table border="1"> <thead> <tr> <th>CH.</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.5 °C</th> <th>HIGH AMBIENT Ta= 56.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C1</td><td>62.2°C</td><td>92.2°C</td></tr> <tr><td>2</td><td>BD1</td><td>65.4°C</td><td>95.7°C</td></tr> <tr><td>3</td><td>L2</td><td>65.1°C</td><td>95.4°C</td></tr> <tr><td>4</td><td>C10</td><td>65.1°C</td><td>95.4°C</td></tr> <tr><td>5</td><td>C11</td><td>69.8°C</td><td>97.0°C</td></tr> <tr><td>6</td><td>Q2</td><td>67.3°C</td><td>97.9°C</td></tr> <tr><td>7</td><td>RTH2</td><td>76.4°C</td><td>103.5°C</td></tr> <tr><td>8</td><td>Q901</td><td>69.0°C</td><td>100.1°C</td></tr> <tr><td>9</td><td>T2</td><td>62.3°C</td><td>94.1°C</td></tr> <tr><td>10</td><td>L1</td><td>67.3°C</td><td>98.4°C</td></tr> <tr><td>11</td><td>C5</td><td>66.0°C</td><td>96.9°C</td></tr> <tr><td>12</td><td>ZNR1</td><td>60.1°C</td><td>89.7°C</td></tr> <tr><td>13</td><td>Q35</td><td>65.7°C</td><td>97.6°C</td></tr> <tr><td>14</td><td>C46</td><td>64.7°C</td><td>96.8°C</td></tr> <tr><td>15</td><td>C54</td><td>67.0°C</td><td>98.5°C</td></tr> <tr><td>16</td><td>RTH3</td><td>63.0°C</td><td>94.7°C</td></tr> <tr><td>17</td><td>U1</td><td>63.2°C</td><td>94.2°C</td></tr> <tr><td>18</td><td>U901</td><td>63.6°C</td><td>95.3°C</td></tr> <tr><td>19</td><td>T1</td><td>66.3°C</td><td>98.5°C</td></tr> <tr><td>20</td><td>D103</td><td>62.6°C</td><td>93.0°C</td></tr> <tr><td>21</td><td>D104</td><td>63.7°C</td><td>94.2°C</td></tr> <tr><td>22</td><td>C106</td><td>61.1°C</td><td>91.6°C</td></tr> <tr><td>23</td><td>C201</td><td>61.2°C</td><td>91.9°C</td></tr> <tr><td>24</td><td>LF100</td><td>61.2°C</td><td>91.8°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta= 56.3 °C	1	C1	62.2°C	92.2°C	2	BD1	65.4°C	95.7°C	3	L2	65.1°C	95.4°C	4	C10	65.1°C	95.4°C	5	C11	69.8°C	97.0°C	6	Q2	67.3°C	97.9°C	7	RTH2	76.4°C	103.5°C	8	Q901	69.0°C	100.1°C	9	T2	62.3°C	94.1°C	10	L1	67.3°C	98.4°C	11	C5	66.0°C	96.9°C	12	ZNR1	60.1°C	89.7°C	13	Q35	65.7°C	97.6°C	14	C46	64.7°C	96.8°C	15	C54	67.0°C	98.5°C	16	RTH3	63.0°C	94.7°C	17	U1	63.2°C	94.2°C	18	U901	63.6°C	95.3°C	19	T1	66.3°C	98.5°C	20	D103	62.6°C	93.0°C	21	D104	63.7°C	94.2°C	22	C106	61.1°C	91.6°C	23	C201	61.2°C	91.9°C	24	LF100	61.2°C	91.8°C
CH.	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta= 56.3 °C																																																																																																					
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18	U901	63.6°C	95.3°C																																																																																																					
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21	D104	63.7°C	94.2°C																																																																																																					
22	C106	61.1°C	91.6°C																																																																																																					
23	C201	61.2°C	91.9°C																																																																																																					
24	LF100	61.2°C	91.8°C																																																																																																					
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	± 0.009 %/°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°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 : 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) 221268 HRS (2) 19976 HRS (3) 37783HRS (4) 43303HRS
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