



Test Report: HVGC-240-2100

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

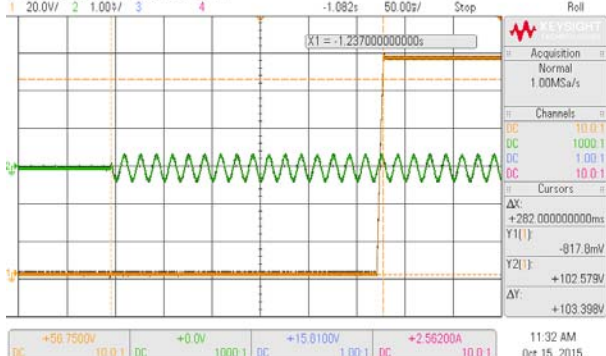
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	1.0492A / 347VAC @ CV MAX-1V 1.0316A / 347VAC @ CV MIN 1.0492A / 480VAC @ CV MAX-1V 1.0312A / 480VAC @ CV MIN 1.74%
2	CONSTANT CURRENT REGION	CH1: 57.2V~ 114.3V	I/P: 347VAC O/P: FULL LOAD Ta: 25°C	0.336V~114.3V / 347VAC
3	CURRENT ADJ. RANGE	CH1: 1050mA~ 2100mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	0.902A~ 2.227A / 347VAC @ CV MAX-1V 0.889A~ 2.196 A / 347VAC @ CV MIN 0.903A~ 2.226A / 480VAC @ CV MAX-1V 0.888A~ 2.196A / 480VAC @ CV MIN
4	OPEN CIRCUIT VOLTAGE (max.)	117V	I/P: 347VAC O/P: NO LOAD Ta: 25°C	115.7 V
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/ 282ms 347VAC/ 259.8 ms 480VAC/ 261.6ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

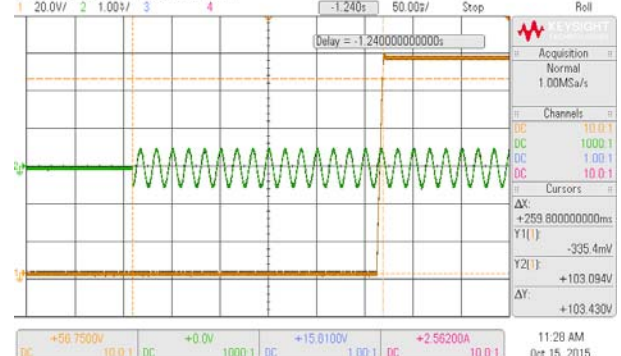
090X 3014A, M52161480 Thu Oct 15 11:32:56 2015



INPUT=347VAC/60HZ @ FULL LOAD

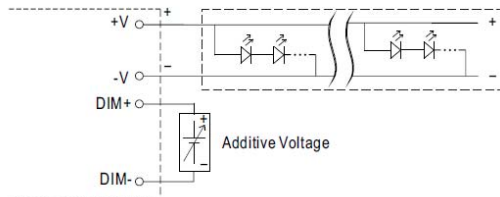
CH1 : Output Voltage CH2 : AC Input Voltage

090X 3014A, M52161480 Thu Oct 15 11:29:54 2015

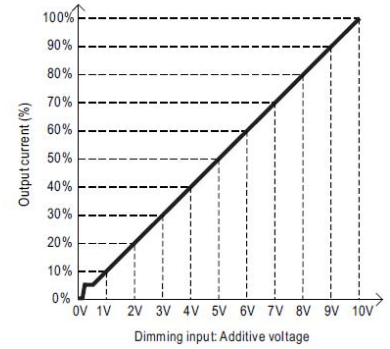


8	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.</p> <p>※Dimming source current from power supply: 100µ A (typ.)</p>		
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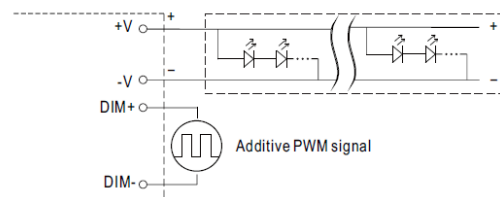
◎ Applying additive 0 ~ 10VDC



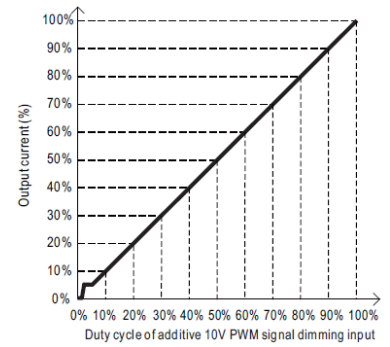
"DO NOT connect "DIM- to -V"



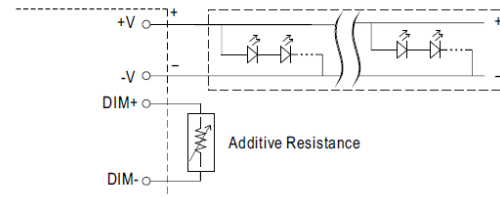
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



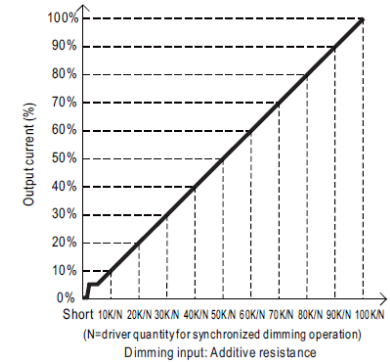
"DO NOT connect "DIM- to -V"



◎ 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_{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	0.211A	0.413A	0.613A	0.813A	1.011A	1.208A	1.410A	1.602A	1.800A	2.049A	2.164A
%	0.00%	10.03%	19.64%	29.19%	38.72%	48.14%	57.54%	67.12%	76.30%	85.70%	97.57%	103.05%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.242A	0.432A	0.664A	0.833A	1.061A	1.285A	1.491A	1.695A	1.895A	2.102A	2.164A
%	0.00%	11.54%	20.55%	31.61%	39.64%	50.52%	61.19%	71.00%	80.71%	90.24%	100.07%	103.02%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.260A	0.471A	0.676A	0.904A	1.090A	1.290A	1.470A	1.660A	1.850A	2.050A	2.100A
%	0.00%	12.38%	22.43%	32.19%	43.05%	51.90%	61.43%	70.00%	79.05%	88.10%	97.62%	100.00%

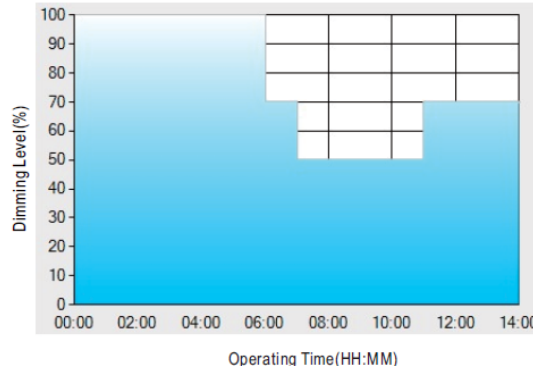
TEST RESULT : OK

**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.

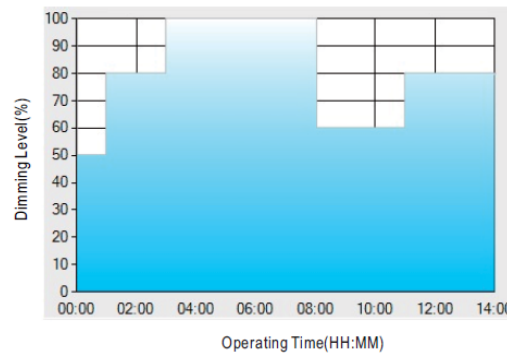
Ex : Ⓒ D01-Type: the profile recommended for residential lighting



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%

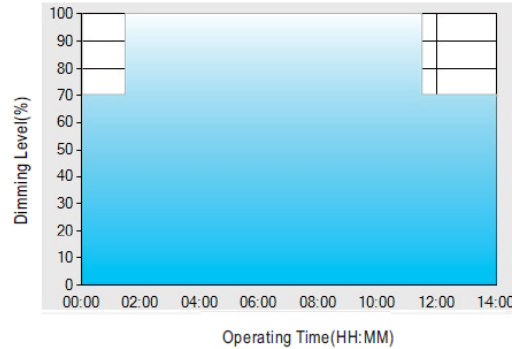
Ex : Ⓒ D02-Type: the profile recommended for street lighting



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



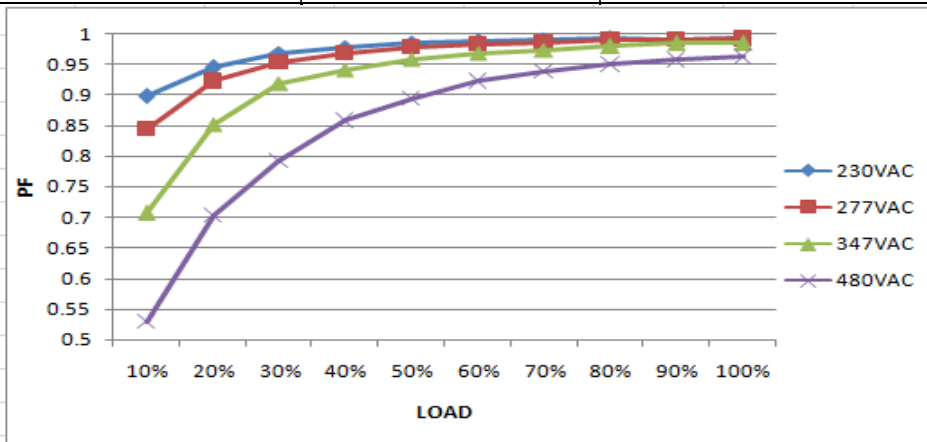
Set up for D03-Type in Smart timer dimming software program:

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

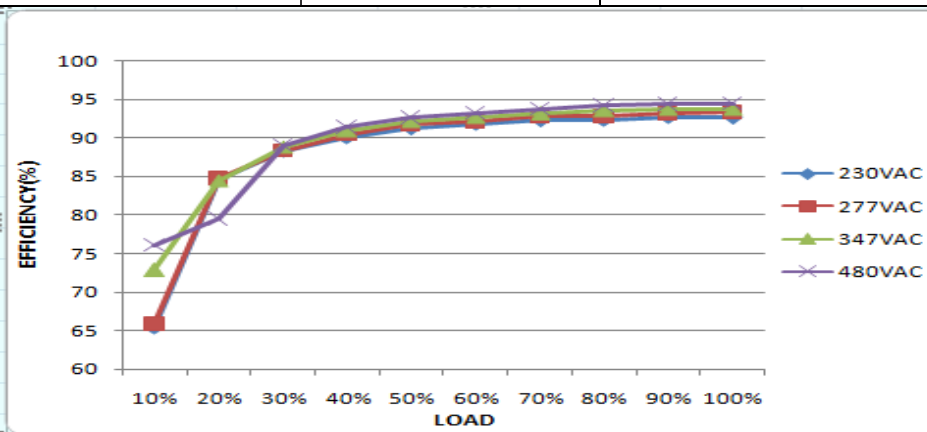
I/P : 347VAC
O/P : DIMMING TEST
TA : 25°C
TEST RESULT : OK

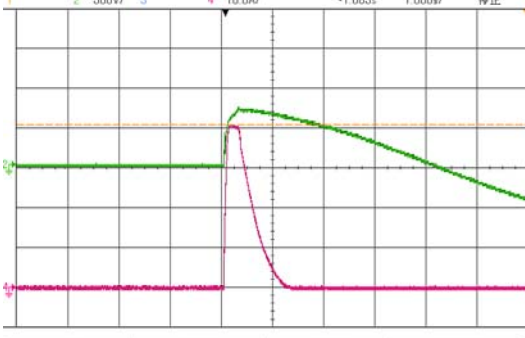
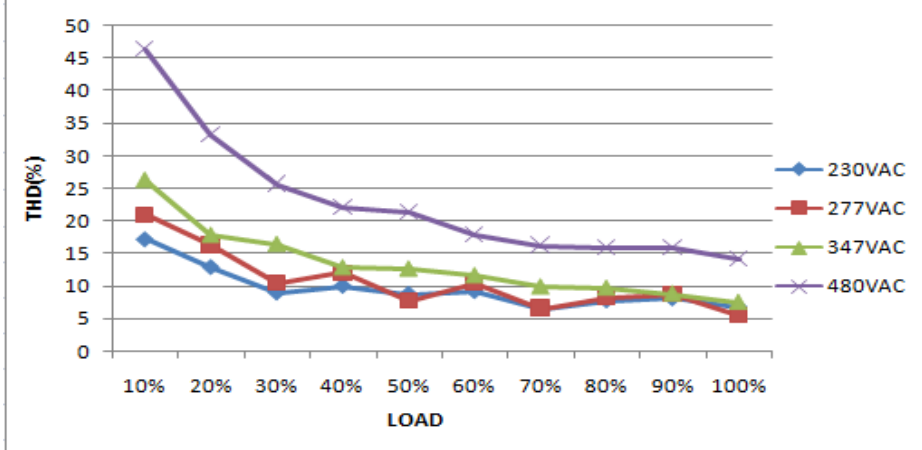
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	137V~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 = 0.756A/ 347VAC I = 0.548A/ 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= 0.967 /480V/100%LOAD PF= 0.994 /277V/100%LOAD PF= 0.995 /230V/100%LOAD



5	EFFICIENCY (TYP)	92.5%	I/P: 347VAC O/P:FULL LOAD Ta:25°C	93.55%
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6	INRUSH CURRENT (TYP)	480V/ 50 A COLD START (twidh= 532 us measured at 50% Ipeak) COLD START	I/P: 480VAC O/P: FULL LOAD Ta: 25°C	I = 40.9A/ 480VAC T50= 520 us																																																							
<p>INPUT=480VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) DSO-X:3014A, MY52161400 Wed Sep 09 11:38:24 2015</p>  <p>AC: +0.0V 10.0V 1 DC -37.50V 1000.1 DC +257.500V 100.1 DC +30.0000A 10.0.1</p>																																																											
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 : 12.48%/230V 50% THD : 8.22%/230V 100% THD : 13.51%/277V 50% THD : 9.98%/277V 100% THD : 16.44%/347V 50% THD : 9.89%/347V 100% THD : 16.3%/480V 60% THD : 13.13%/480V 100%																																																							
 <table border="1"> <caption>THD (%) vs Load (%) Data</caption> <thead> <tr> <th>Load (%)</th> <th>230VAC</th> <th>277VAC</th> <th>347VAC</th> <th>480VAC</th> </tr> </thead> <tbody> <tr><td>10%</td><td>18</td><td>22</td><td>27</td><td>48</td></tr> <tr><td>20%</td><td>13</td><td>17</td><td>20</td><td>35</td></tr> <tr><td>30%</td><td>10</td><td>12</td><td>16</td><td>25</td></tr> <tr><td>40%</td><td>10</td><td>11</td><td>14</td><td>22</td></tr> <tr><td>50%</td><td>9</td><td>10</td><td>13</td><td>20</td></tr> <tr><td>60%</td><td>9</td><td>10</td><td>12</td><td>18</td></tr> <tr><td>70%</td><td>8</td><td>9</td><td>11</td><td>17</td></tr> <tr><td>80%</td><td>8</td><td>9</td><td>10</td><td>16</td></tr> <tr><td>90%</td><td>8</td><td>9</td><td>9</td><td>15</td></tr> <tr><td>100%</td><td>7</td><td>8</td><td>8</td><td>14</td></tr> </tbody> </table>					Load (%)	230VAC	277VAC	347VAC	480VAC	10%	18	22	27	48	20%	13	17	20	35	30%	10	12	16	25	40%	10	11	14	22	50%	9	10	13	20	60%	9	10	12	18	70%	8	9	11	17	80%	8	9	10	16	90%	8	9	9	15	100%	7	8	8	14
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ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 120 V~ 131.4 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P: MIN LOAD Ta: 25°C	124.06V/ 528VAC 124.35V/ 347VAC 124.31V/ 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
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) 809V/6.1A (2) 801V/7.36A (3) 777V/1.65A
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) 871V/3.45A (2) 831V/3.45A (3) 863V/3.13
3	Diode Peak Voltage	D101 Rated 10A/400V	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)260 V (2) 256V (3) 252V
4	Input Capacitor Voltage	C6 Rated: 82u/450V 105°C	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)419V (2)427V (3) 375V (4) 363V
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) 15.1V (2) 14.9V (3) 15.7V (4) 14.7V

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: 1.64 mA I/P-FG: 1.03 mA O/P-FG: 0.68mA 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: 26.1GΩ I/P-FG: 8.9G 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	21mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA/480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.13 mA N-FG: 0.12mA L,N -V(+): 0.15mA L,N-V(-): 0.14mA

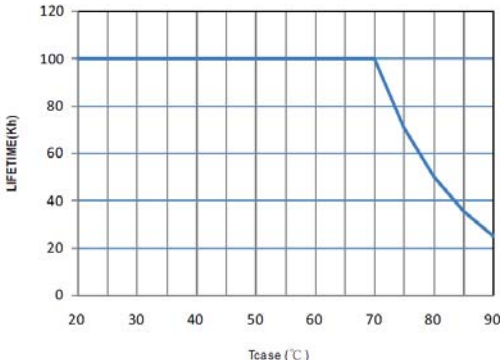
E.M.C TEST

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-240-3500 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>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> </tbody> </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
CH.	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta= 56.3 °C																																																																																													
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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																																																																																													
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°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