Test Report: HVGC-240-700

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

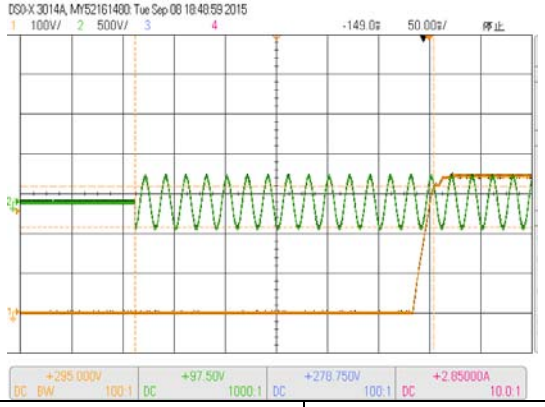
■ DESIGN VERIFY TEST

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℃	0.7049A /347VAC@CV MAX-1V 0.7021A /347VAC@CV MIN 0.7046A/480VAC@CV MAX-1V 0.7022A/480VAC@CV MIN 0.47%
2	CONSTANT CURRENT REGION	CH1:171.4 V~ 342.8 V	I/P: 347VAC O/P:FULL LOAD Ta:25℃	19.416V~342.8V /347VAC
3	CURRENT ADJ. RANGE	CH1: 305mA~ 700mA	I/P: 347VAC I/P:480VAC O/P:CV MIN & CV MAX-1V Ta:25℃	0.298A~0.763A/347VAC@CV MAX-1V 0.595A~7.668 A /347VAC@CV MIN 0.298A~0.764A/480VAC@CV MAX-1V 0.5972A~0.7668 A/480VAC@CV MIN
4	OPEN CIRCUIT VOLTAGE (max.)	354V	I/P: 347VAC O/P:NO LOAD Ta:25℃	347.4V
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 347VAC O/P:FULL LOAD Ta:25℃	3.86%
6	OVER/UNDERSHOOT TEST	< ±5%	I/P: 347 VAC O/P:FULL LOAD Ta:25℃	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℃	230VAC/ 292 ms 347VAC/ 273 ms 480VAC/ 272 ms

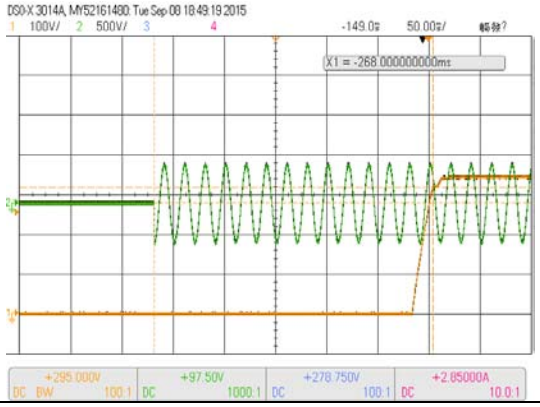
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



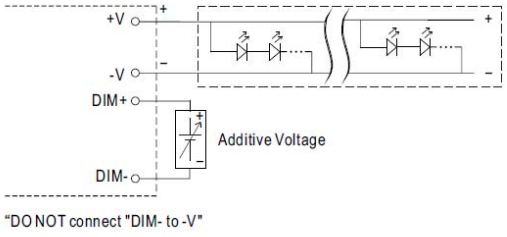
INPUT=347VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

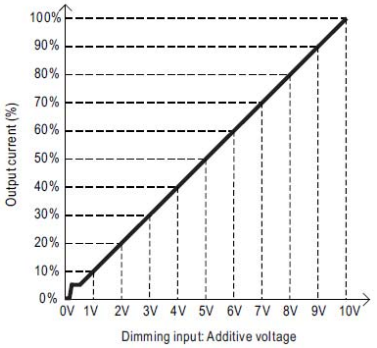


8	DIMMING OPERATION **(for B-Type)**	※**3 in 1 dimming function** ※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance. ※Direct connecting to LEDs is suggested. It is not suitable to be used with additional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

◎ Applying additive 0 ~ 10VDC

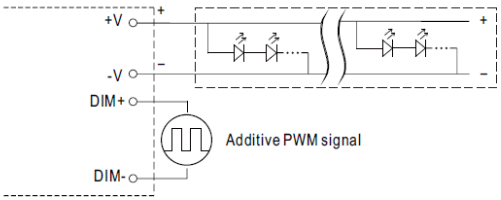


"DO NOT connect "DIM- to -V"

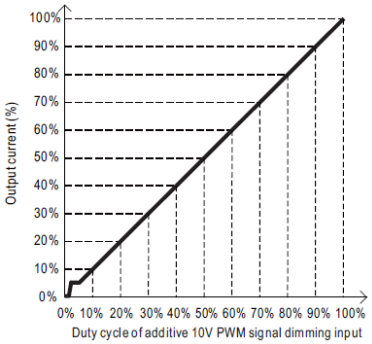


Dimming input: Additive voltage

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

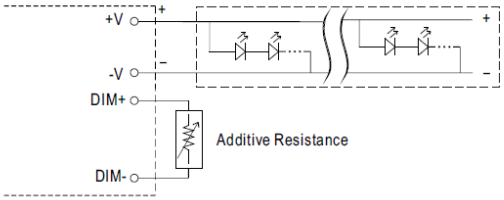


"DO NOT connect "DIM- to -V"

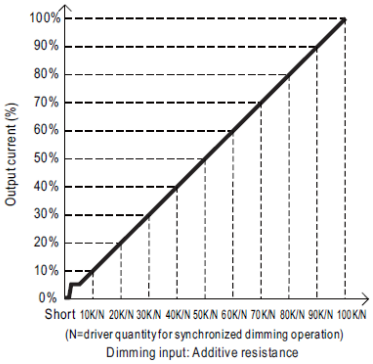


Duty cycle of additive 10V PWM signal dimming input

◎ Applying additive resistance:



"DO NOT connect "DIM- to -V"



(N=driver quantity for synchronized dimming operation)

Dimming input: Additive resistance

Note : 1. Min. dimming level is about 5% and the output current is not defined when 0%< Iout<5%.

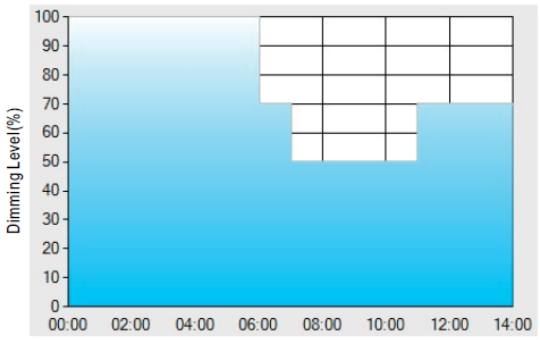
2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P：347VAC
O/P：DIMMING TEST
TA：25℃

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.076A	0.144A	0.216A	0.279A	0.345A	0.410A	0.477A	0.541A	0.606A	0.666A	0.733A
%	0.00%	10.87%	20.60%	30.86%	39.79%	49.23%	58.59%	68.14%	77.24%	86.54%	95.16%	104.76%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.077A	0.147A	0.218A	0.286A	0.355A	0.426A	0.496A	0.564A	0.632A	0.703A	0.733A
%	0.00%	11.03%	20.94%	31.16%	40.79%	50.71%	60.79%	70.79%	80.60%	90.30%	100.37%	104.76%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.067A	0.139A	0.211A	0.281A	0.351A	0.420A	0.489A	0.558A	0.627A	0.697A	0.733A
%	0.00%	9.50%	19.86%	30.09%	40.17%	50.16%	60.00%	69.86%	79.74%	89.60%	99.54%	104.76%

TEST RESULT：OK

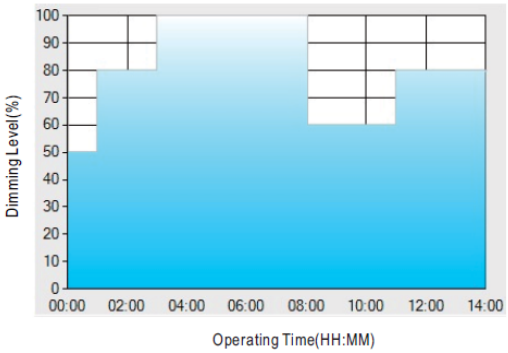
9	DIMMING OPERATION **(for Dxx-Type by User definition)**	※**Smart timer dimming function (for Dxx-Type by User definition)** MEAN WELL Smart timer dimming primarily provides the adaptive proportion dimming profile for the output constant current level to perform up to 14 consecutive hours. 3 dimming 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%

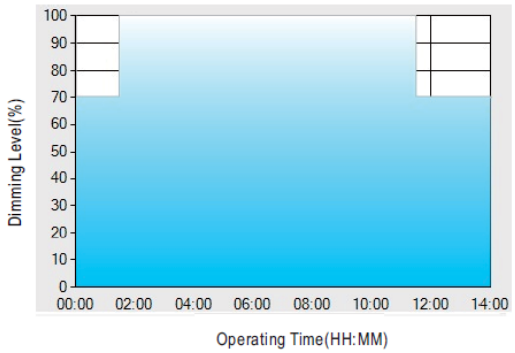
Ex: ◎ D02-Type: the profile recommended for street lighting



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

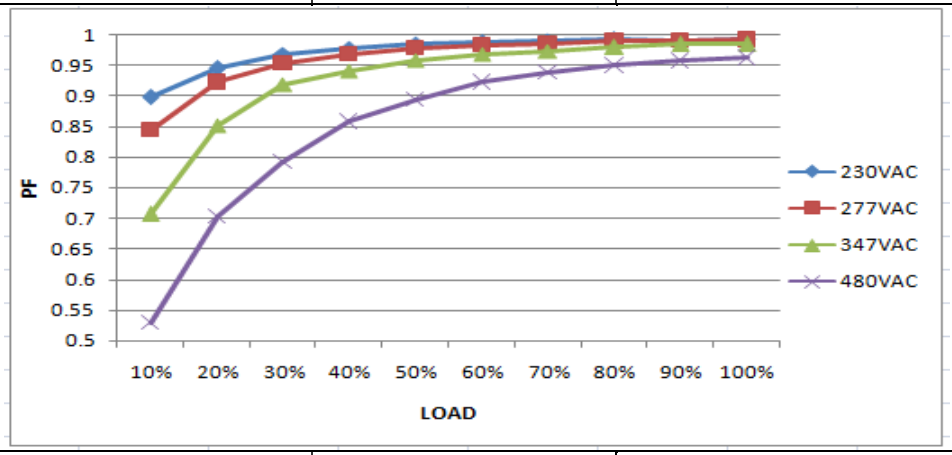
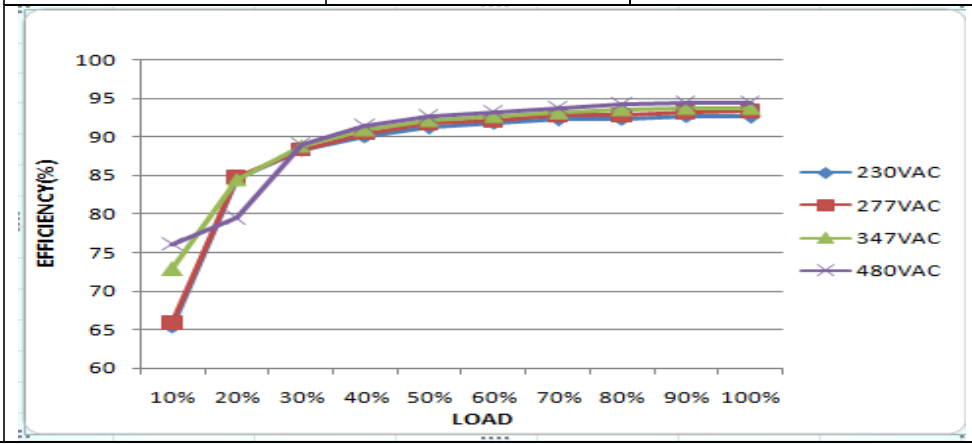


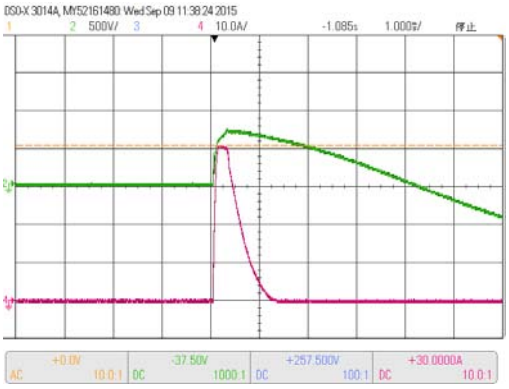
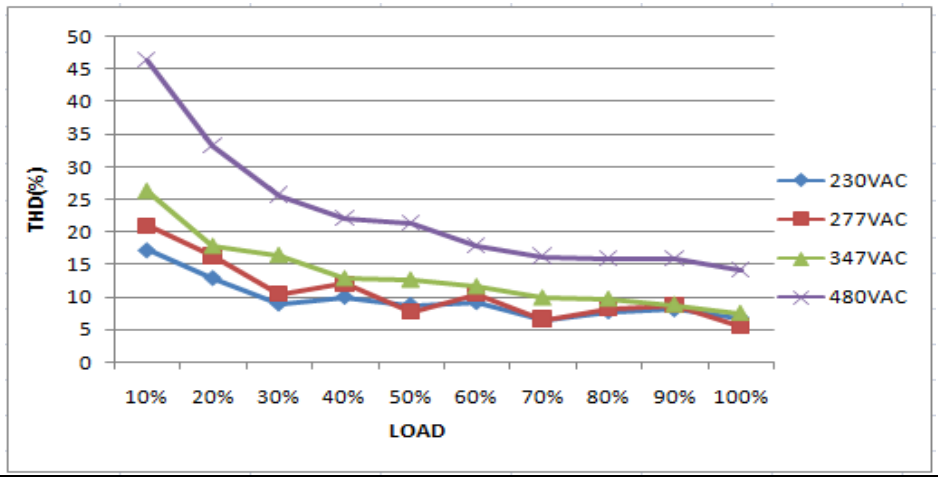
Set up for D03-Type in Smart timer dimming software program:

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

I/P：347VAC
O/P：DIMMING TEST
TA：25℃
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℃	137V~528 V
			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℃	OK
3	INPUT CURRENT (TYP)	347VAC/ 0.76 A 480VAC/ 0.56A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25℃	I = 0.742 A/ 347VAC I = 0.539A/ 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℃	PF= 0.991 /347V/100%LOAD PF= 0.972 /480V/100%LOAD PF= 0.992 /277V/100%LOAD PF= 0.993 /230V/100%LOAD
				
5	EFFICIENCY (TYP)	93.5 %	I/P: 347VAC O/P:FULL LOAD Ta:25℃	93.69%
				

6	INRUSH CURRENT (TYP)	480VV/ 50 A COLD START (twidth= 532 us measured at 50% Ipeak) COLD START	I/P:480VAC O/P:FULL LOAD Ta:25℃	I =40.9A/ 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℃	THD： 12.73%/230V 50% THD： 9.42%/230V 100% THD： 13.33%/277V 50% THD： 10.03%/277V 100% THD： 10.42%/347V 50% THD： 6.17%/347V 100% THD： 16.56 %/480V60% THD： 14.78%480V 100%
	THD vs LOAD 			

ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
2	OVER VOLTAGE PROTECTION	V1: 360 V~ 394 V	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25℃	371.71V/ 528VAC 371.81V/ 347VAC 371.6V/ 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℃	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	Q901Rated 9A/ 950V	I/P:High-Line +3V =531V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue	VDS: (1)871V/8.48A (2)798V/7.52A (3)871V/3.28A
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	VDS: (1)894V/4.04A (2)814V/3.84A (3)846V/3.84A
3	Diode Peak Voltage	D103 Rated 20A/600V D104 Rated 4A/600V	I/P:High-Line +3V =531 V D101： 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℃	D103 VDS: (1)357V (2)13.9V (3)353V VDS: (1)357V (2)17V (3)352V
4	Input Capacitor Voltage	C6 Rated: 82u/450V 105℃	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℃	(1)416V (2)453V (3)416V (4) 404V
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℃	(1) 14.42V (2) 14.1V (3) 13.7V (4) 14.5V

■ 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℃	I/P-O/P: 1.6 mA I/P-FG: 1.01 mA O/P-FG: 0.645 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℃	I/P-O/P: 30GΩ I/P-FG: 14.2G 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℃	21 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480VAC O/P:Min LOAD Ta:25℃	L-FG: 0.16 mA N-FG:. 0.16 mA L,N -V(+): 0.17 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℃	PASS Test by certified Lab
2	RADIATION	FCC Part 15 Subpart B	I/P: 480VAC (60HZ) O/P:FULL/50% LOAD Ta:25℃	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℃	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25℃	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℃	CRITERIA A
6	Test by certified Lab & Test Report Prepare. Any contradictions of the test results, please refer to the latest EMC test report.			

■ 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 ℃ 2. HIGH AMBIENT BURN-IN： 3.5 HRS I/P： 347VAC O/P： FULL LOAD Ta= 56.3 ℃		

		<table><tr><th>CH.</th><th>Position</th><th>ROOM AMBIENT Ta= 25.5 ℃</th><th>HIGH AMBIENT Ta= 56.3 ℃</th></tr><tr><td>1</td><td>C1</td><td>62.2℃</td><td>92.2℃</td></tr><tr><td>2</td><td>BD1</td><td>65.4℃</td><td>95.7℃</td></tr><tr><td>3</td><td>L2</td><td>65.1℃</td><td>95.4℃</td></tr><tr><td>4</td><td>C10</td><td>65.1℃</td><td>95.4℃</td></tr><tr><td>5</td><td>C11</td><td>69.8℃</td><td>97.0℃</td></tr><tr><td>6</td><td>Q2</td><td>67.3℃</td><td>97.9℃</td></tr><tr><td>7</td><td>RTH2</td><td>76.4℃</td><td>103.5℃</td></tr><tr><td>8</td><td>Q901</td><td>69.0℃</td><td>100.1℃</td></tr><tr><td>9</td><td>T2</td><td>62.3℃</td><td>94.1℃</td></tr><tr><td>10</td><td>L1</td><td>67.3℃</td><td>98.4℃</td></tr><tr><td>11</td><td>C5</td><td>66.0℃</td><td>96.9℃</td></tr><tr><td>12</td><td>ZNR1</td><td>60.1℃</td><td>89.7℃</td></tr><tr><td>13</td><td>Q35</td><td>65.7℃</td><td>97.6℃</td></tr><tr><td>14</td><td>C46</td><td>64.7℃</td><td>96.8℃</td></tr><tr><td>15</td><td>C54</td><td>67.0℃</td><td>98.5℃</td></tr><tr><td>16</td><td>RTH3</td><td>63.0℃</td><td>94.7℃</td></tr><tr><td>17</td><td>U1</td><td>63.2℃</td><td>94.2℃</td></tr><tr><td>18</td><td>U901</td><td>63.6℃</td><td>95.3℃</td></tr><tr><td>19</td><td>T1</td><td>66.3℃</td><td>98.5℃</td></tr><tr><td>20</td><td>D103</td><td>62.6℃</td><td>93.0℃</td></tr><tr><td>21</td><td>D104</td><td>63.7℃</td><td>94.2℃</td></tr><tr><td>22</td><td>C106</td><td>61.1℃</td><td>91.6℃</td></tr><tr><td>23</td><td>C201</td><td>61.2℃</td><td>91.9℃</td></tr><tr><td>24</td><td>LF100</td><td>61.2℃</td><td>91.8℃</td></tr></table>		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 528VAC/180VAC O/P： 100 % LOAD Ta= -45℃	TEST：OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 ℃ NO DAMAGE	I/P： 538VAC O/P：FULL LOAD Ta= 60 ℃ HUMIDITY= 95 %R.H	TEST：OK
4	TEMPERATURE COEFFICIENT	± 0.03%/℃(0~60℃)	I/P：347 VAC O/P：FULL LOAD	± 0.009 %/℃(0~60℃)
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -50℃~ +125℃ 2. Temperature change rate ：25℃ / 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℃~ +65℃ 2. Temperature change rate ：25℃ / 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℃		TEST：OK

8	CAPACITOR LIFE CYCLE	SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P： 347VAC O/P：FULL LOAD Tc= 80 ℃ LIFE TIME (2) I/P： 347VAC O/P：75% LOAD Tc= 80 ℃ LIFE TIME (3) I/P： 347VAC O/P：50% LOAD Tc= 80 ℃ LIFE TIME	(1) 40768HRS (2) 61807HRS (3) 64841HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 143.6K hrs min. MIL-HDBK-217F (25℃)	
10	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 50,000 hours	

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

12.10.30 A50-F031