Test Report: HLG-320H-C1400

320W 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

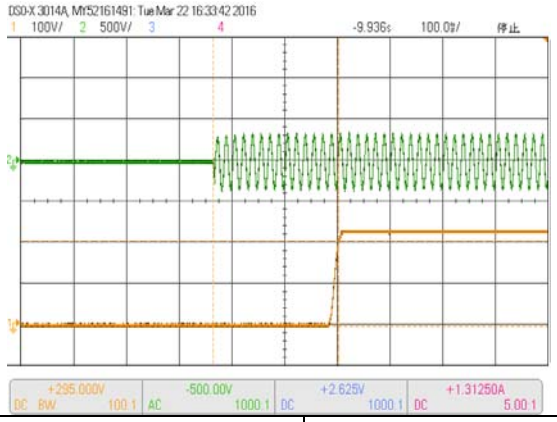
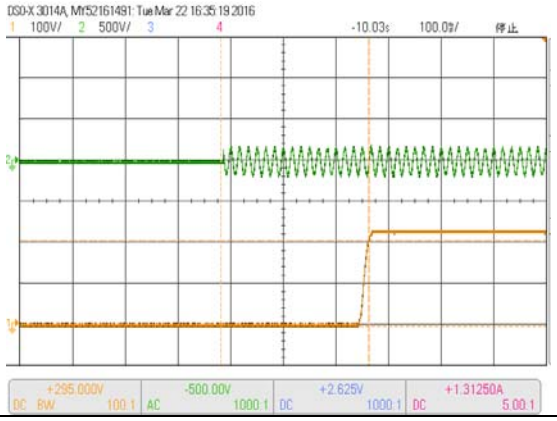
Safety Test
E.M.C. Test

■ RELIABILITY TEST

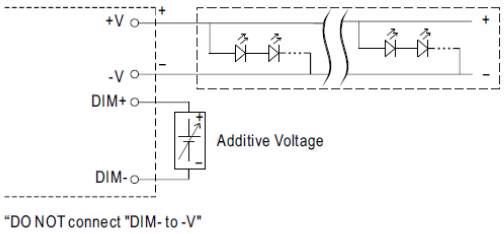
ENVIRONMENT TEST

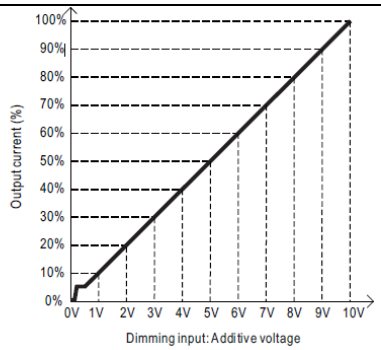
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

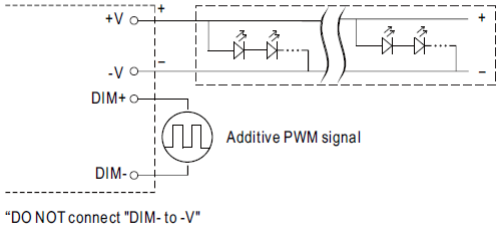
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃	1.3898A /230VAC@CV MAX-1V 1.3892A /230VAC@CV MIN 1.3904A/115VAC@CV MAX-1V 1.3911A/115VAC@CV MIN 0.14%
2	CONSTANT CURRENT REGION	CH1: 114 V~ 229V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	0.5V~228V /230VAC
3	OPEN CIRCUIT VOLTAGE (max.)	234V	I/P: 230 VAC O/P:NO LOAD Ta:25℃	230V
4	CURRENT ADJ. RANGE	CH1:700mA~ 1400mA	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25℃	0.560A~ 1.629 A /230VAC@CV MAX-1V 0.558A~1.626 A /230VAC@CV MIN 0.561A~1.629A/115VAC@CV MAX-1V 0.558A~1.629A/115VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	1.14%
6	SET UP TIME (Max)	230VAC/ 500 ms (Max) 115VAC/ 1000ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 238 ms 115 VAC/ 280 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	
7	DIMMING OPERATION **(for B-Type)**	**※3 in 1 dimming function (for B-Type)** * 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.)		

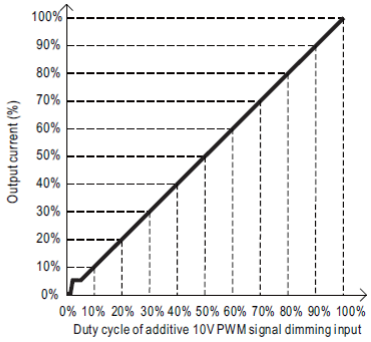
◎ Applying additive 0 ~ 10VDC



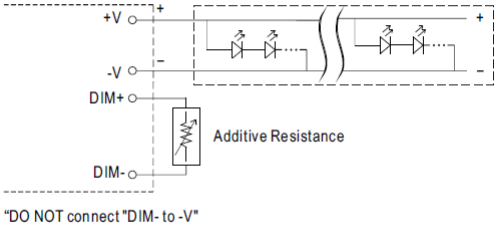


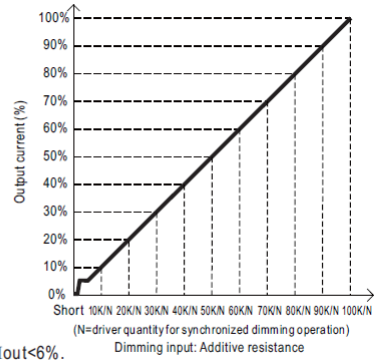
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):





◎ Applying additive resistance:





Note : 1. Min. dimming level is about 6% and the output current is not defined when 0%< Iout<6%.
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：230VAC
O/P：DIMMING TEST
TA：25℃

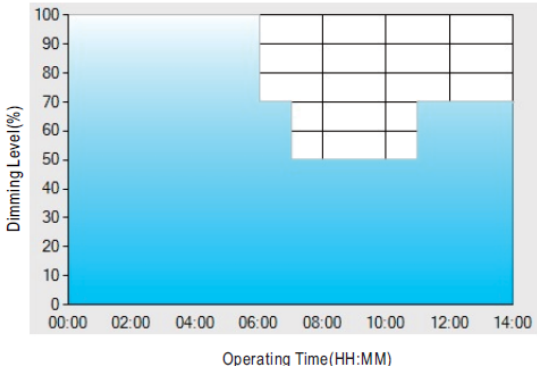
R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.125A	0.265A	0.412A	0.554A	0.700A	0.836A	0.980A	1.120A	1.260A	1.380A	1.400A
%	0.00%	8.93%	18.93%	29.43%	39.57%	50.00%	59.71%	70.00%	80.00%	90.00%	98.57%	100.00%

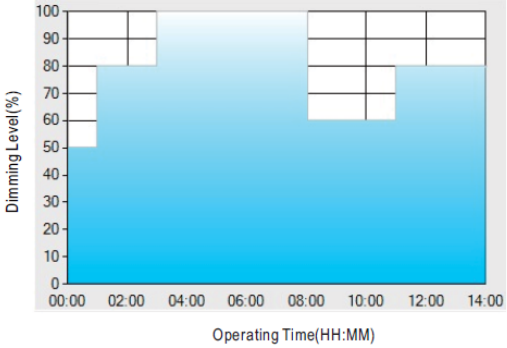
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.152A	0.286A	0.434A	0.562A	0.714A	0.856A	0.980A	1.120A	1.250A	1.380A	1.400A
%	0.00%	10.86%	20.43%	31.00%	40.14%	51.00%	61.14%	70.00%	80.00%	89.29%	98.57%	100.00%

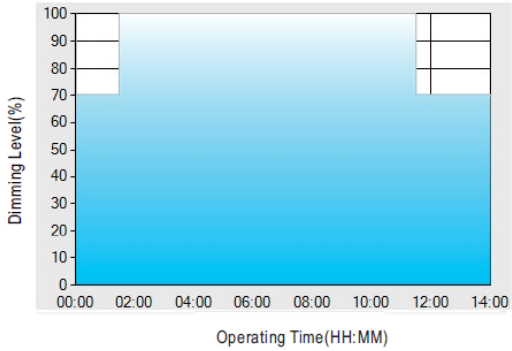
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.149A	0.293A	0.448A	0.592A	0.728A	0.864A	0.996A	1.130A	1.250A	1.370A	1.400A
%	0.00%	10.64%	20.93%	32.00%	42.29%	52.00%	61.71%	71.14%	80.71%	89.29%	97.86%	100.00%

TEST RESULT：OK

8	DIMMING OPERATION **(primary side; for DA-Type)**	※**DALI Interface** * Apply DALI signal between DA+ and DA-. * DALI protocol comprises 16 groups and 64 addresses. * First step is fixed at 8% of output. Please contact MEAN WELL for other setup.

<table>
<tr><td></td><td></td><td>I/P：230VAC
O/P：DIMMING TEST
TA：25℃
TEST RESULT：OK</td></tr>
<tr><td>9</td><td>DIMMING OPERATION
(for Dxx-Type by User definition)</td><td>
※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:
<table>
<tr><td></td><td>T1</td><td>T2</td><td>T3</td><td>T4</td></tr>
<tr><td>TIME**</td><td>06:00</td><td>07:00</td><td>11:00</td><td>---</td></tr>
<tr><td>LEVEL**</td><td>100%</td><td>70%</td><td>50%</td><td>70%</td></tr>
</table>
Ex: ◎ D02-Type: the profile recommended for street lighting


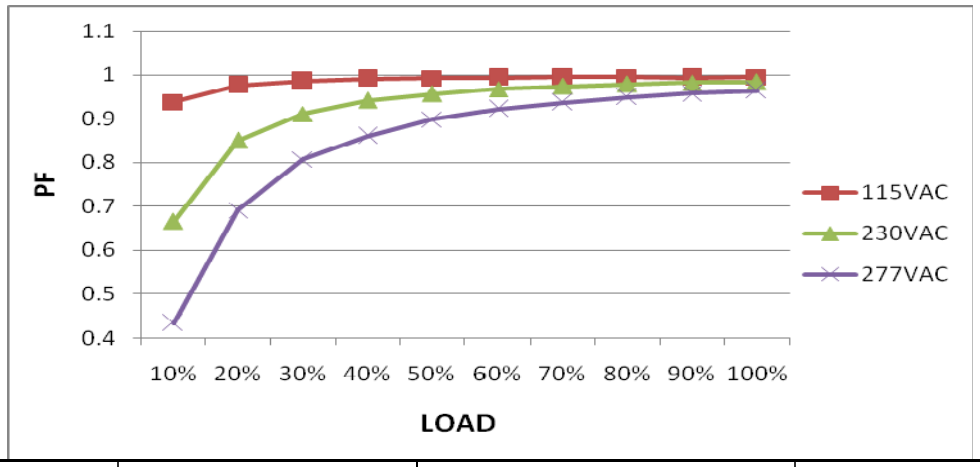
Set up for D02-Type in Smart timer dimming software program:
<table>
<tr><td></td><td>T1</td><td>T2</td><td>T3</td><td>T4</td><td>T5</td></tr>
<tr><td>TIME**</td><td>01:00</td><td>03:00</td><td>8:00</td><td>11:00</td><td>---</td></tr>
<tr><td>LEVEL**</td><td>50%</td><td>80%</td><td>100%</td><td>60%</td><td>80%</td></tr>
</table>
Ex: ◎ D03-Type: the profile recommended for tunnel lighting


Set up for D03-Type in Smart timer dimming software program:
<table>
<tr><td></td><td>T1</td><td>T2</td><td>T3</td></tr>
<tr><td>TIME**</td><td>01:30</td><td>11:00</td><td>---</td></tr>
<tr><td>LEVEL**</td><td>70%</td><td>100%</td><td>70%</td></tr>
</table>
I/P：230VAC
O/P：DIMMING TEST
TA：25℃
TEST RESULT：OK
</td></tr>
</table>

INPUT FUNCTION TEST

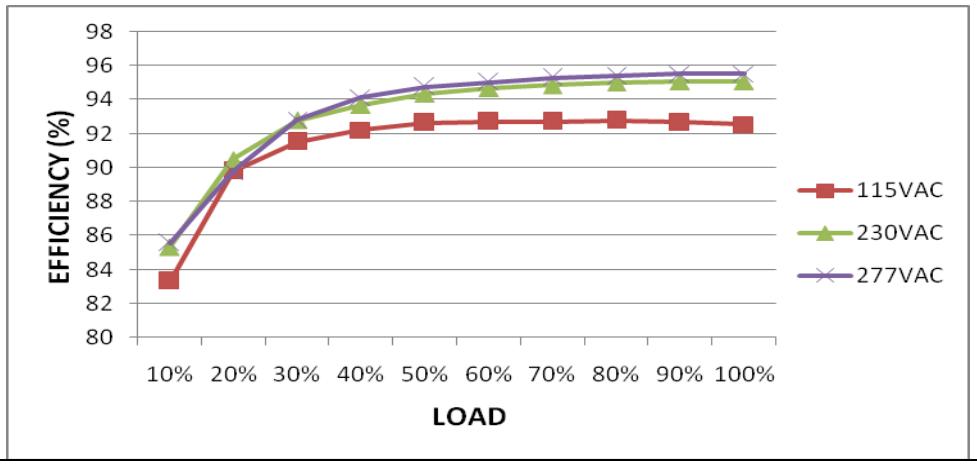
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	66V~305 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 100 VAC ~305VAC O/P:FULL~MIN LOAD Ta:25℃	OK
3	INPUT CURRENT (TYP)	277VAC/ 1.45 A 230 VAC/ 1.65 A 115 VAC/ 3.5 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃	I=1.248 A/277VAC I =1.478 A/ 230VAC I =3.024A/ 115VAC
4	POWER FACTOR(TYP)	0.95/230 VAC FULL LOAD 0.98/115 VAC FULL LOAD 0.92/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃	PF=0.9851 /230V/100%LOAD PF=0.9973/115V/100%LOAD PF=0.964/277V/100%LOAD

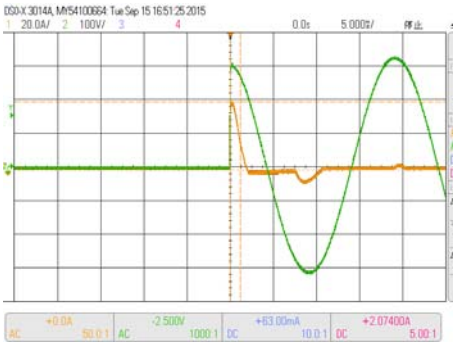
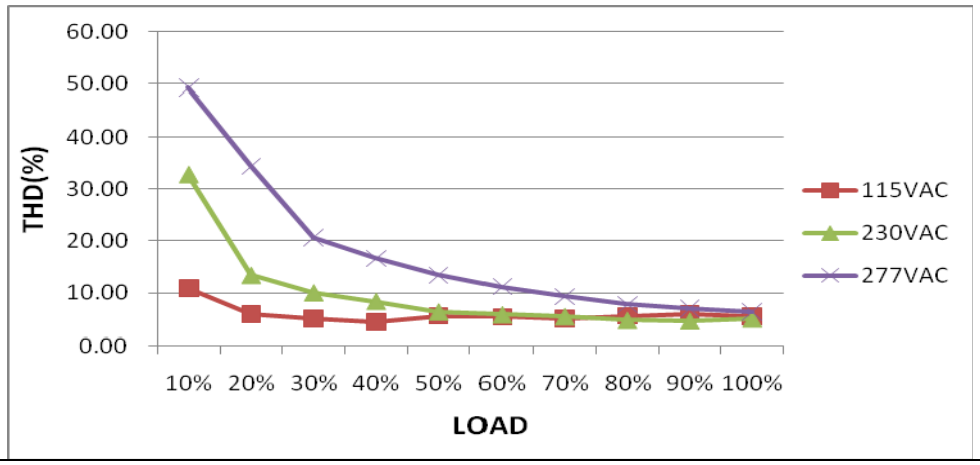
P.F vs LOAD



5	EFFICIENCY (TYP)	94 %	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	94.59 %

EFFICIENCY vs LOAD



6	INRUSH CURRENT (TYP)	230 V/ 70 A COLD START (twidth=1200us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	I = 40.25 A/ 230VAC NOTE8 T50= 1200 us
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 			
7	TOTAL HARMONIC DISTORTION	THD< 20%@≧50% load/115VAC/230VAC,	I/P： 230VAC O/P：100% LOAD 50% LOAD Ta：25℃	THD： 4.3 % THD： 7.1 %
		THD< 20%@≧70% load/277VAC	I/P： 277VAC O/P：100% LOAD 70% LOAD Ta：25℃	THD： 7.12 % THD: 10.94 %
	THD vs LOAD 			

ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 235 V~ 252 V	I/P: 305VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	241.58V/ 305VAC 241.55V/ 230VAC 241.39V/ 90VAC PROTECTION TYPE： Shut down and latch off o/p voltage, re-power on to recover

2	OVER TEMPERATURE PROTECTION	PROTECTION TYPE： Shut down and latch off o/p voltage, re-power on to recover	I/P: 305 VAC I/P: 90 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: 305VAC I/P: 90 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**	Q5 Rated 20 A/ 600 V	I/P:High-Line +3V =308v AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue I/P:Low-Line -3V = 107V O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	 VDS: (1)521V/5.37A (2)546V2..93/A (3)468V/2.56A VDS: (1)465V/7.65A (2)503V2.93/A (3)450V/2.37A
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 20A/ 600V	I/P:High-Line +3V =308v AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue I/P:Low-Line -3V = 107V O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	 VDS: (1)562V/17.1A (2)546V/10.35 A (3)537V/14.8A
3	P.F.C DIODE	D2 Rated 15A/600V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	 (1)481 (2)450V (3)446V
4	Diode Peak **Voltage**	D102 Rated 10 A/600 V	I/P:High-Line +3V =308 V D102： AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue VTa:25℃	 VDS: (1)496V (2)29.3V (3)500V
5	**Input Capacitor Voltage**	C5 Rated: 220 μ / 450 V 105℃ Surge Voltage 495V	I/P:High-Line +3V =308V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue	(1)475V (2)443V (3)446V (4) 440V

			Ta:25℃	
6	**Control IC Voltage Test**	PWM IC U900 Rated 16V/8.85V(MIN.) PFC IC U1 Rated 20 V/ 8.6 V(MIN.)	I/P:High-Line +3V =308 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25℃	(1) 12.1V (2) 12.8V (3) 12.8V (4) 12.0V (1)14.5V (2)15.3V (3)15.3V (4)13.2V

■ 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:4.33mA I/P-FG: 4.28 mA O/P-FG: 3.92 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:23.8 GΩ I/P-FG:21.5 G Ω O/P-FG:30 G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	26mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25℃	L-FG:0.3 mA N-FG:0.3 mA L,N -V(+):0.24 mA L,N-V(-):0.24 mA

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOADOP Ta:25℃	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A

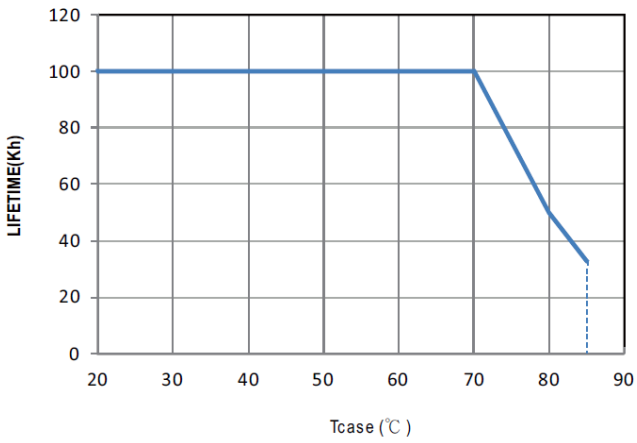
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL： HLG-320H-C1050 1. ROOM AMBIENT BURN-IN：1.5 HRS I/P： 230VAC O/P： FULL LOAD Ta=29.4℃ 2. HIGH AMBIENT BURN-IN： 14 HRS I/P： 230VAC O/P： FULL LOAD Ta=50.3 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 305VAC/110VAC 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： 315 VAC O/P：FULL LOAD Ta= 60℃ HUMIDITY= 95 %R.H	TEST：OK
4	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.001%/℃(0~50℃)

NO	Position	ROOM AMBIENT Ta= 29.4 ℃	HIGH AMBIENT Ta=50.3℃
1	L2	57.9℃	78.8℃
2	C11	58.1℃	79.0℃
3	L1	56.6℃	77.5℃
4	BD1	60.5℃	81.4℃
5	Q1	60.5℃	81.4℃
6	RY1	58.8℃	79.7℃
7	C5	56.9℃	77.8℃
8	C81	58.5℃	79.4℃
9	U1	56.5℃	77.4℃
10	U900	56.6℃	77.5℃
11	C902	59.2℃	80.1℃
12	RTH2	56.9℃	77.8℃
13	C906	55.8℃	76.7℃
14	T1	70.8℃	91.7℃
15	C202	56.1℃	77.0℃
16	C201	54.7℃	75.6℃
17	D102	61.3℃	82.2℃
18	D103	59.2℃	80.1℃
19	C103	55.4℃	76.3℃
20	C108	53.2℃	74.1℃
21	C110	51.8℃	72.7℃
22	Q5	59.8℃	80.7℃

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：72min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C103 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 60 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 60 ℃ LIFE TIME	(1) 310950HRS (2) 64075HRS (3) 68874HRS (4) 70543HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 168.2K hrs min. MIL-HDBK-217F (25℃)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase 75℃ 	

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

12.10.30 A50-F031