Test Report: HLG-320H-C2800

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

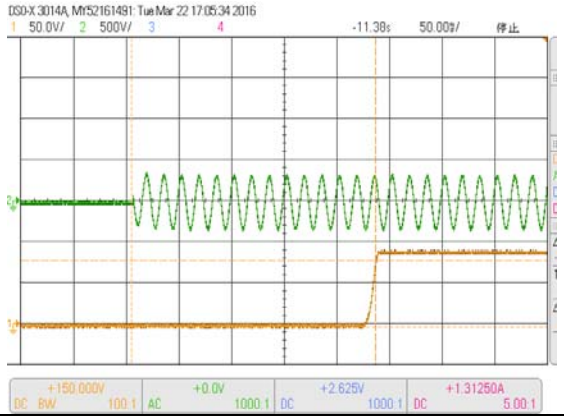
■ DESIGN VERIFY TEST

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℃	2.8101 A /230VAC@CV MAX-1V 2.8144A /230VAC@CV MIN 2.8106 A/115VAC@CV MAX-1V 2.8144A/115VAC@CV MIN 0.16%
2	CONSTANT CURRENT REGION	CH1:57 V~ 114V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	57V~ 114V /230VAC
3	OPEN CIRCUIT VOLTAGE (max.)	118V	I/P: 230 VAC O/P:NO LOAD Ta:25℃	115V
4	CURRENT ADJ. RANGE	CH1:1400mA~ 2800mA	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25℃	1.1094A~3.0129A/230VAC@CV MAX-1V 1.1154A~ 3.2345A /230VAC@CV MIN 1.1093A~3.1381A/115VAC@CV MAX-1V 1.1155A~3.2364A/115VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	1.06%
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/ 232 ms 115 VAC/ 275ms

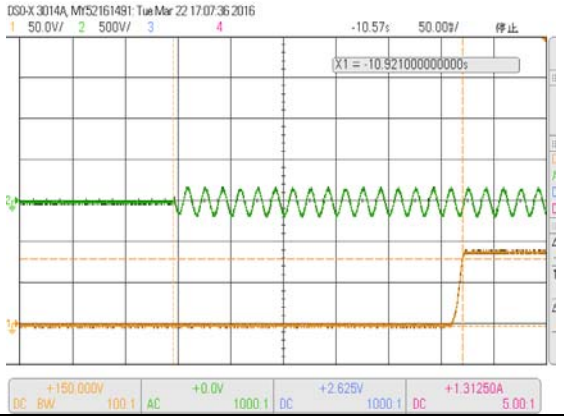
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



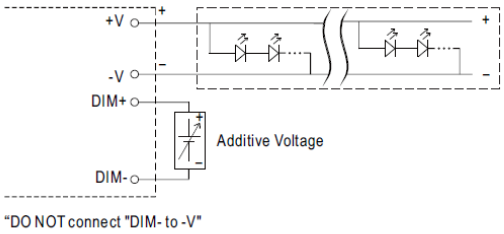
INPUT=115VAC/60HZ @ FULL LOAD

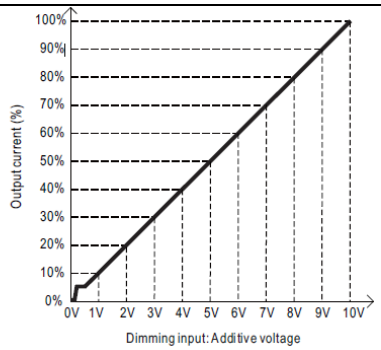
CH1 : Output Voltage CH2 : AC Input Voltage



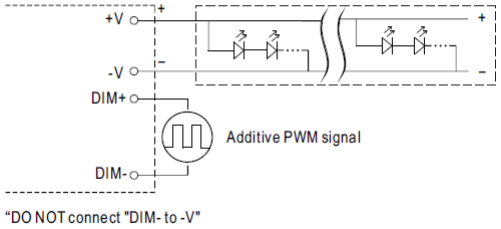
7	DIMMING OPERATION **(for B-Type)**	※**3 in 1 dimming function (for B-Type)** * Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance. *Direct connecting to LEDs is suggested. It is not suitable to be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

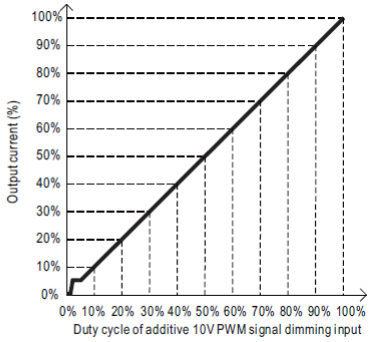
◎ Applying additive 0 ~ 10VDC



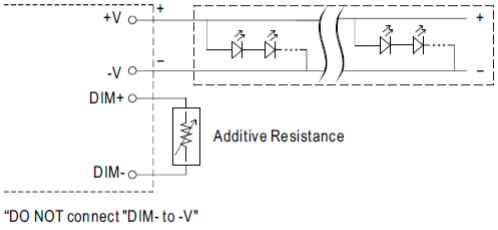


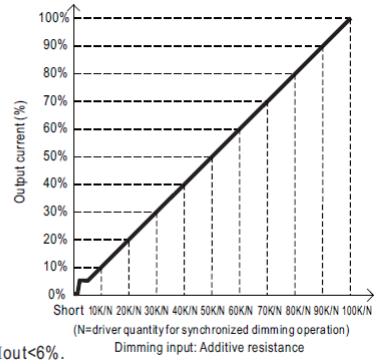
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):





◎ Applying additive resistance:





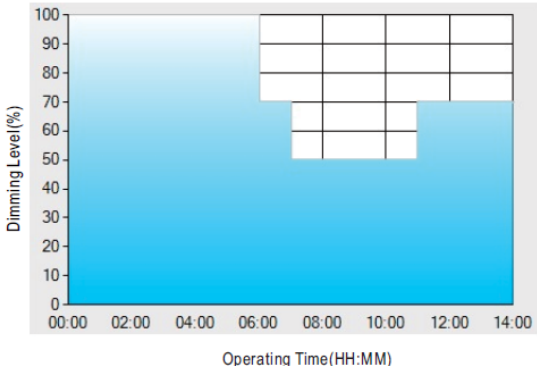
Note : 1. Min. dimming level is about 6% and the output current is not defined when 0%< Iout<6%.
2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

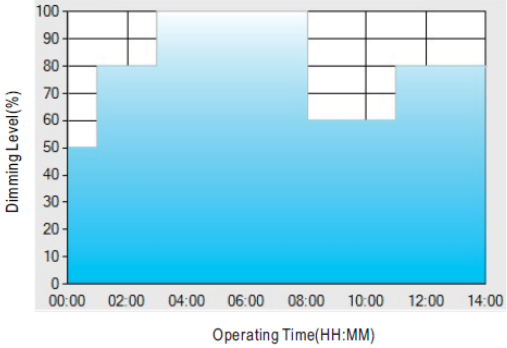
I/P：230VAC
O/P：DIMMING TEST
TA：25℃

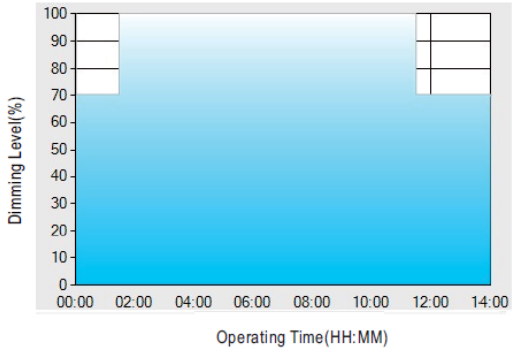
R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.272A	0.558A	0.832A	1.110A	1.390A	1.660A	1.930A	2.200A	2.520A	2.760A	2.820A
%	0.00%	9.71%	19.93%	29.71%	39.64%	49.64%	59.29%	68.93%	78.57%	90.00%	98.57%	100.71%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.285A	0.572A	0.852A	1.140A	1.440A	1.680A	1.970A	2.260A	2.530A	2.750A	2.810A
%	0.00%	10.18%	20.43%	30.43%	40.71%	51.43%	60.00%	70.36%	80.71%	90.36%	98.21%	100.36%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.296A	0.592A	0.884A	1.160A	1.420A	1.710A	1.970A	2.230A	2.480A	2.740A	2.810A
%	0.00%	10.57%	21.14%	31.57%	41.43%	50.71%	61.07%	70.36%	79.64%	88.57%	97.86%	100.36%

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


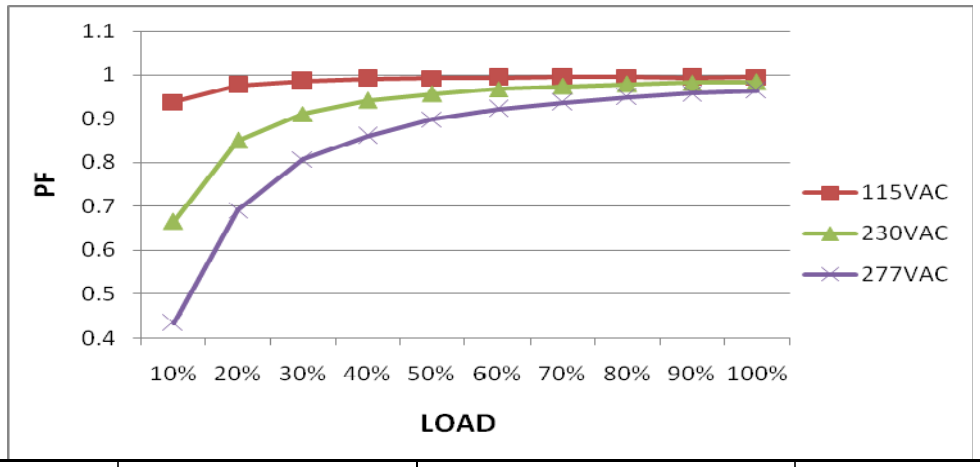
Set up for D02-Type in Smart timer dimming software program:
<table>
<tr><td></td><td>T1</td><td>T2</td><td>T3</td><td>T4</td><td>T5</td></tr>
<tr><td>TIME**</td><td>01:00</td><td>03:00</td><td>8:00</td><td>11:00</td><td>---</td></tr>
<tr><td>LEVEL**</td><td>50%</td><td>80%</td><td>100%</td><td>60%</td>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

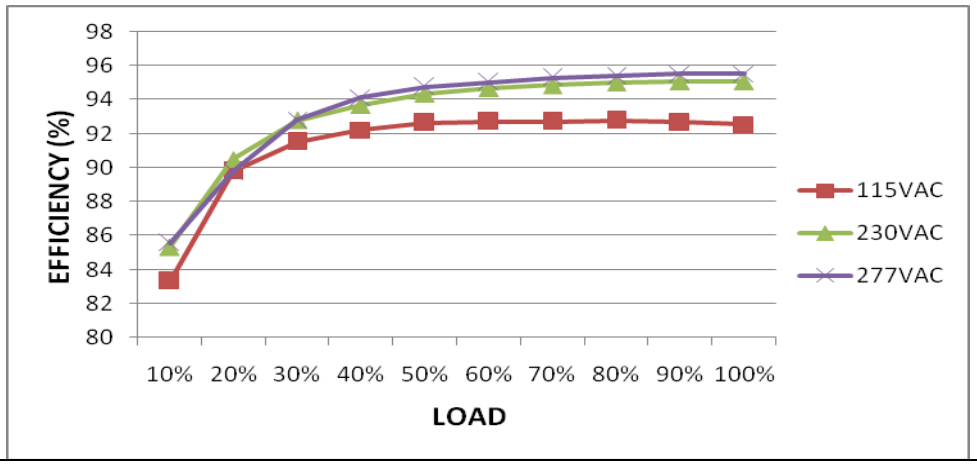
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	72V~305 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :OK
2	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=1.2508 A/277VAC I =1.4826A/ 230VAC I =3.0116A/ 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=0.9849/230V/100%LOAD PF=0.9965 /115V/100%LOAD PF= 0.9645 /277V/100%LOAD

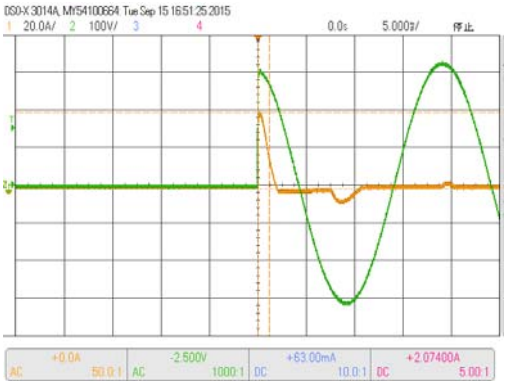
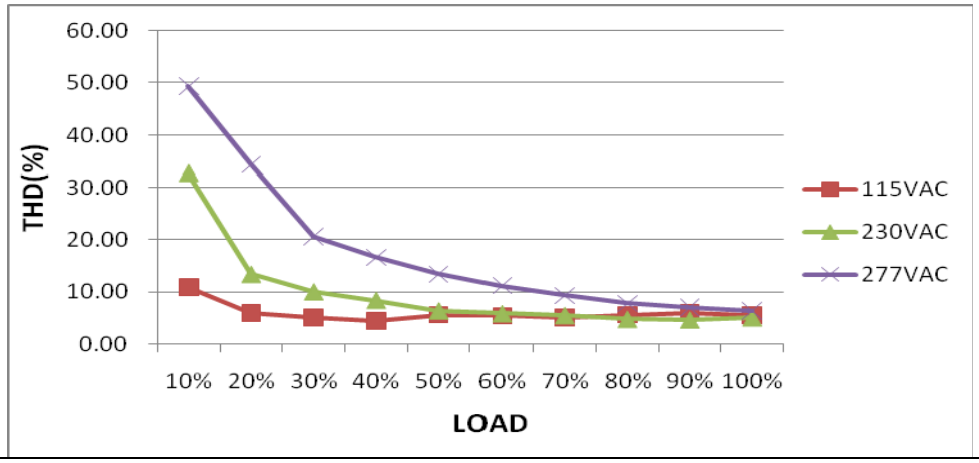
P.F vs LOAD



5	EFFICIENCY (TYP)	94 %	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	95.04%

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 T50= 1200 us
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1 : Input current (1V=20A) 			
7	TOTAL HARMONIC DISTORTION	THD< 20%@≧50% load/115VAC/230VAC,	I/P： 230VAC O/P：100% LOAD 50% LOAD Ta：25℃	THD： 4.57 % THD： 7.55 %
		THD< 20%@≧70% load/277VAC	I/P： 277VAC O/P：100% LOAD 70% LOAD Ta：25℃	THD： 6.73 % THD： 11.33 %
	THD vs LOAD 			

ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 120 V~ 132 V	I/P: 305VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	127.23V/ 305VAC 127.24V/ 230VAC 127.25V/ 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 VGS :± 25 V	I/P:High-Line +3V =308V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	VDS: (1)521V/5.37A (2)546V3.3/A (3)468V/2.56A
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q 1 Rated 20 A/600 V VGS:±25V	I/P:High-Line +3V =308v AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	VDS: (1)562V/17.1A (2)546V/19.8A (3)596V/14.8A
3	P.F.C DIODE	D2 Rated 20 A/600 V	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)481V (2)450V (3)446V
4	Diode Peak **Voltage**	D102 Rated 20A/300 V	I/P:High-Line +3V =308 V D102： AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	VDS: (1)253V (2)15.6V (3)253V
5	**Input Capacitor Voltage**	C5 Rated: 220μ/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 Ta:25℃	(1)475V (2)443V (3)446V (4) 440V
6	**Control IC Voltage Test**	PWM IC U900 Rated 8.85 V~16V	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) 12V

■ 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:4.33 mA I/P-FG: 4.1 mA O/P-FG:3.8 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:18.5GΩ I/P-FG:6.28G 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℃	26 mΩ
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(+):0.21 mA L,N-V(-): 0.21 mA

E.M.C TEST

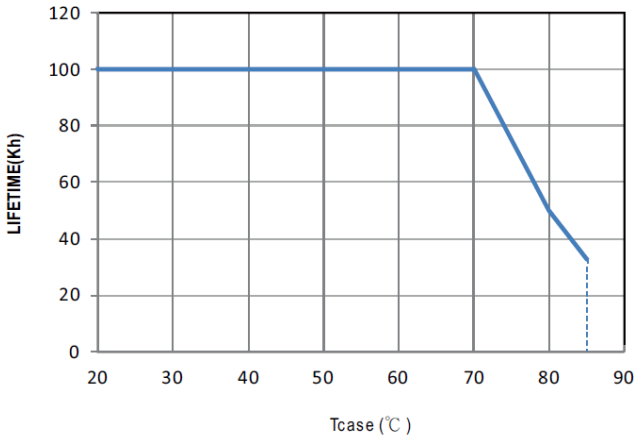
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25℃	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-C3500 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℃)
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

NO	Position	ROOM AMBIENT Ta=29.4℃	HIGH AMBIENT Ta=50.3℃
1	L2	58.2℃	79.1℃
2	C11	59.7℃	80.6℃
3	L1	59.6℃	80.5℃
4	BD1	62.3℃	83.2℃
5	Q1	61.6℃	82.5℃
6	RY1	59.6℃	80.5℃
7	C5	58.5℃	79.4℃
8	C81	60.3℃	81.2℃
9	U1	58.9℃	79.8℃
10	U900	58.6℃	79.5℃
11	C902	60.3℃	81.2℃
12	RTH2	58.8℃	79.7℃
13	C906	57.7℃	78.6℃
14	T1	63.4℃	84.3℃
15	C202	59.2℃	80.1℃
16	C201	57.6℃	78.5℃
17	D102	64.4℃	85.3℃
18	D103	62.2℃	83.1℃
19	C103	58.6℃	79.5℃
20	C108	58.5℃	79.4℃
21	C110	57.7℃	78.6℃
22	Q5	61.2℃	82.1℃

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) 239040HRS (2) 45007HRS (3) 54293HRS (4) 58880HRS
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

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