



Test Report: HLG-320H-C2100

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

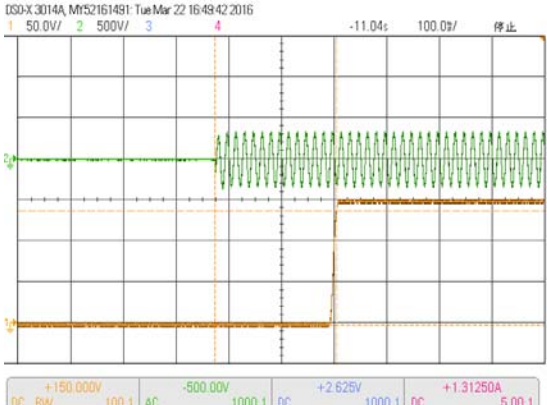
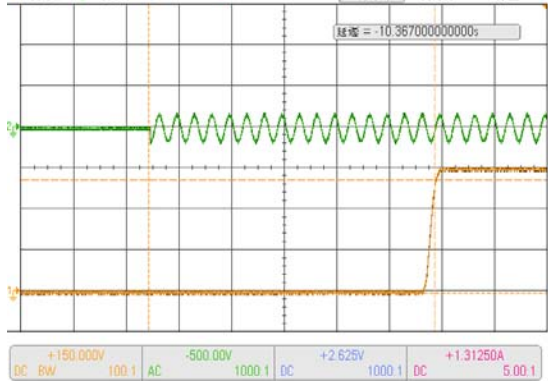
E.M.C. Test

■ RELIABILITY TEST

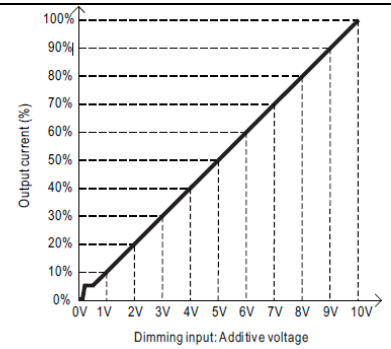
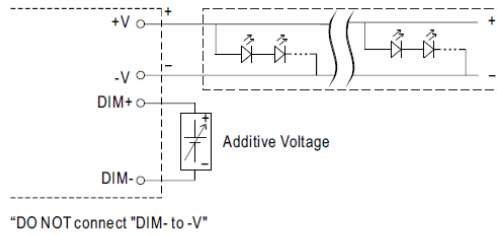
ENVIRONMENT TEST

DESIGN VERIFY TEST

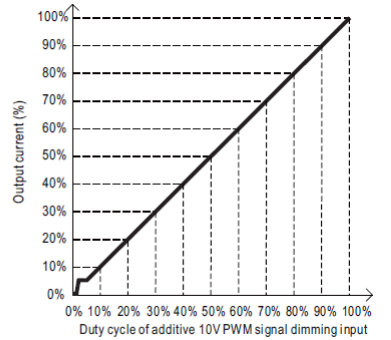
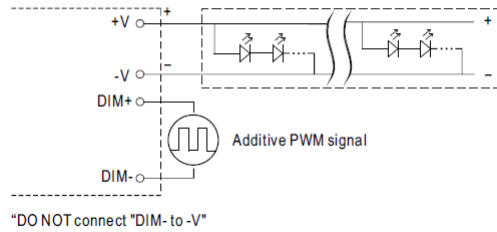
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 230 VAC I/P: 115VAC O/P: FULL LOAD Ta: 25°C	2.184A /230VAC@CV MAX-1V 2.185A /230VAC@CV MIN 2.183A/115VAC@CV MAX-1V 2.183A/115VAC@CV MIN 0.1%
2	CONSTANT CURRENT REGION	CH1: 76 V~ 152V	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	0.5V~151V /230VAC
3	OPEN CIRCUIT VOLTAGE (max.)	156V	I/P: 230 VAC O/P: NO LOAD Ta: 25°C	153V
4	CURRENT ADJ. RANGE	CH1: 1050mA~ 2100mA	I/P: 230 VAC I/P: 115VAC O/P: CV MIN & CV MAX-1V Ta: 25°C	0.830A~ 2.369 A /230VAC@CV MAX-1V 0.830A~2.369A /230VAC@CV MIN 0.831A~2.369A/115VAC@CV MAX-1V 0.832A~2.369A/115VAC@CV MIN
5	CURRENT RIPPLE	5.0% max. @rated current	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	1.42%
6	SET UP TIME (Max)	230VAC/ 500 ms (Max) 115VAC/ 1000 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/230ms 115 VAC/272ms
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.)		

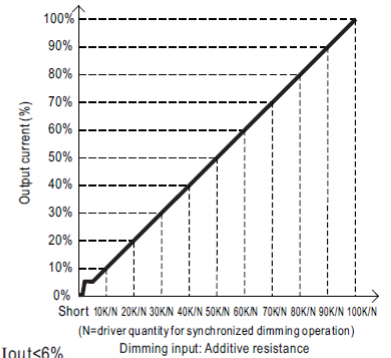
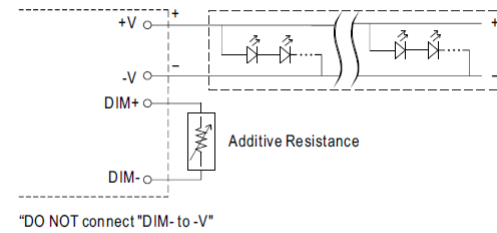
◎ Applying additive 0 ~ 10VDC



◎ 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 $0\% < I_{out} < 6\%$.
 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 : 230VAC

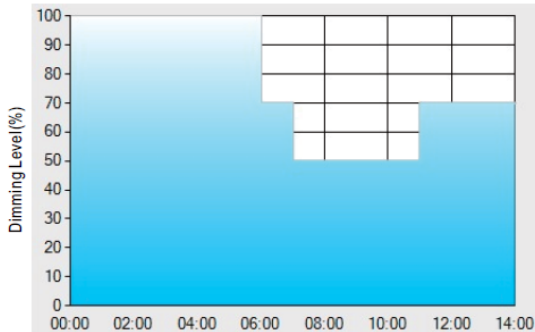
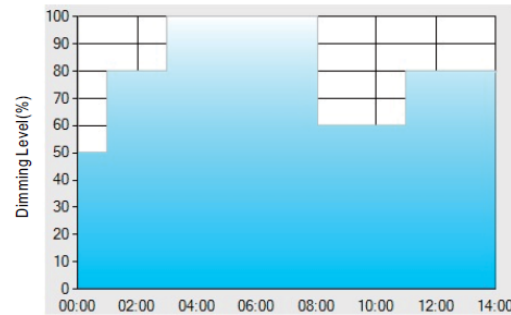
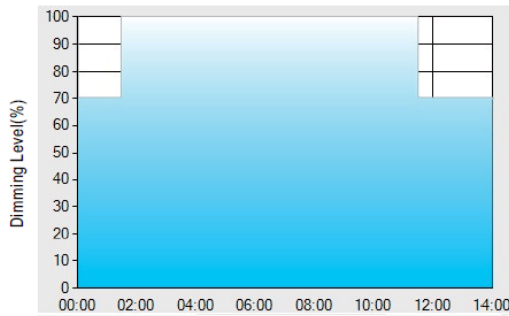
O/P : DIMMING TEST

TA : 25°C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.00000A	0.221A	0.434A	0.634A	0.844A	1.040A	1.240A	1.430A	1.650A	1.860A	2.050A	2.100A
%	0.00%	10.52%	20.67%	30.19%	40.19%	49.52%	59.05%	68.10%	78.57%	88.57%	97.62%	100.00%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.00000A	0.262A	0.468A	0.658A	0.864A	1.090A	1.280A	1.470A	1.680A	1.900A	2.080A	2.100A
%	0.00%	12.48%	22.29%	31.33%	41.14%	51.90%	60.95%	70.00%	80.00%	90.48%	99.05%	100.00%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0.00000A	0.238A	0.461A	0.670A	0.884A	1.080A	1.290A	1.490A	1.680A	1.870A	2.060A	2.100A
%	0.00%	11.33%	21.95%	31.90%	42.10%	51.43%	61.43%	70.95%	80.00%	89.05%	98.10%	100.00%

TEST RESULT : OK

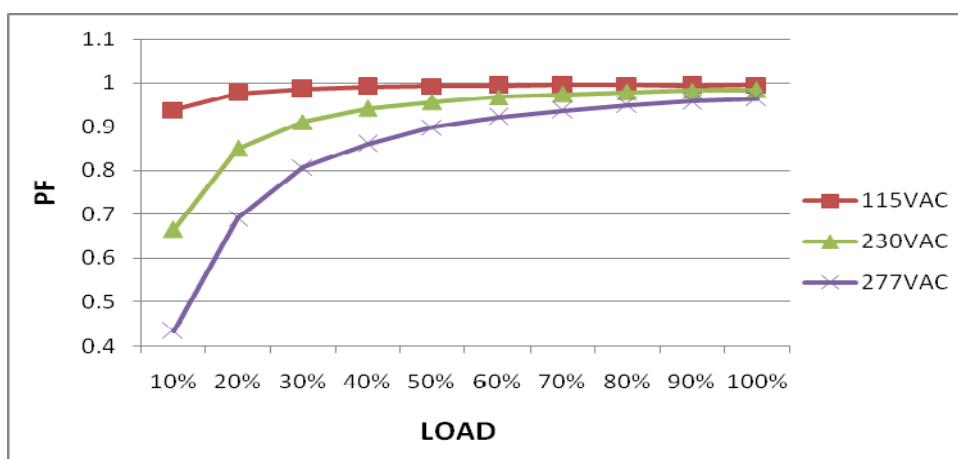
- 8 DIMMING OPERATION (primary side; for DA-Type)
- ※**DALI Interface**
 - * Apply DALI signal between DA+ and DA-.
 - * DALI protocol comprises 16 groups and 64 addresses.
 - * First step is fixed at 8% of output. Please contact MEAN WELL for other setup.

		I/P : 230VAC O/P : DIMMING TEST TA : 25℃ 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  Operating Time(HH:MM) 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  Operating Time(HH:MM) 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  Operating Time(HH:MM) 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		T1	T2	T3	T4	TIME**	06:00	07:00	11:00	--	LEVEL**	100%	70%	50%	70%		T1	T2	T3	T4	T5	TIME**	01:00	03:00	8:00	11:00	--	LEVEL**	50%	80%	100%	60%	80%		T1	T2	T3	TIME**	01:30	11:00	--	LEVEL**	70%	100%	70%
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	T1	T2	T3																																												
TIME**	01:30	11:00	--																																												
LEVEL**	70%	100%	70%																																												

INPUT FUNCTION TEST

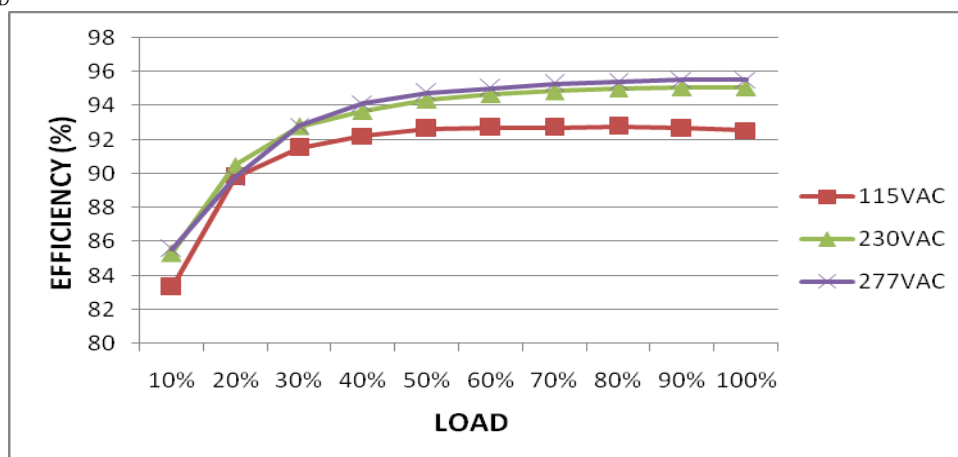
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	48.3V~305 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 110 VAC ~305VAC O/P:FULL ~MIN LOAD Ta:25°C	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°C	I=1.252 A/277VAC I=1.4828 A/ 230VAC I= 3.0311 A/ 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°C	PF= 0.9818 /230V/100%LOAD PF= 0.9971 /115V/100%LOAD PF=0.9615 /277V/100%LOAD

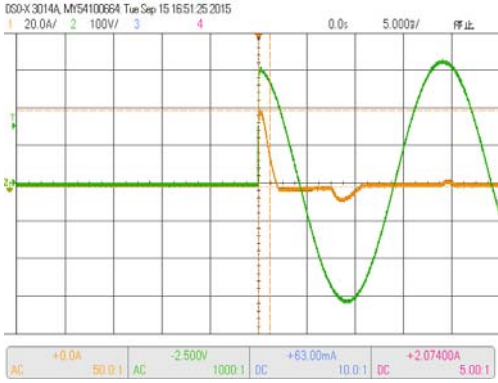
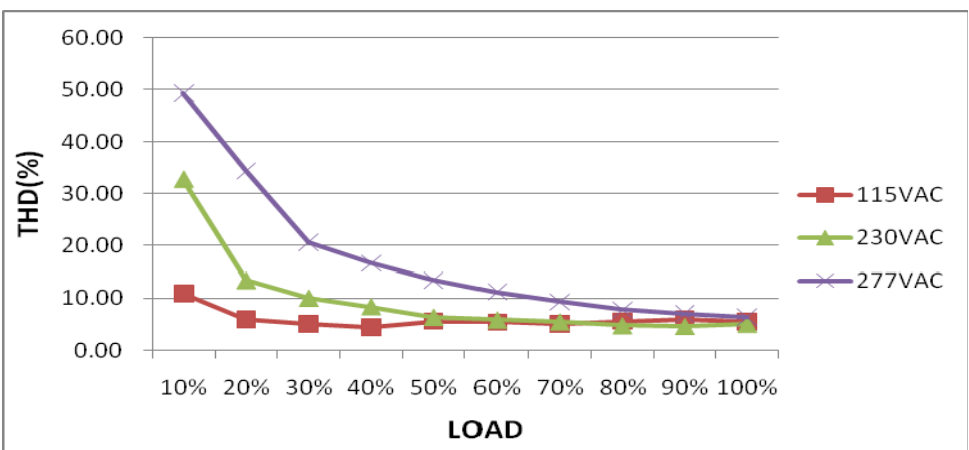
P.F vs LOAD



5	EFFICIENCY (TYP)	94 %	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	95.05%
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EFFICIENCY vs LOAD



6	INRUSH CURRENT (TYP)	230 V/ 70 A COLD START (twidh=1200us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I = 40.25 A/ 230VAC 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, THD < 20% @ ≥ 70% load/277VAC	I/P : 230VAC O/P : 100% LOAD 50% LOAD Ta : 25°C I/P : 277VAC O/P : 100% LOAD 70% LOAD Ta : 25°C	THD : 4.57 % THD : 8.04 % THD : 7.11 % THD : 11.58 %
	THD vs LOAD 			

ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 160 V~ 175 V	I/P: 305VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	169.28V/ 305VAC 169.35V/ 230VAC 168.29V/ 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°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	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 Ta:25°C	VDS: (1)521V/5.37A (2)546V/3A (3)468V/2.56A
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 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 Ta:25°C	VDS: (1)562V/17.1A (2)546V/10.35A (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°C	(1)481V (2)450V (3)446V
4	Diode Peak Voltage	D102 Rated 10A/400 V	I/P:High-Line +3V =308 V D100 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25°C	VDS: (1)334V (2)18.1V (3)334V
5	Input Capacitor Voltage	C5 Rated: 220 μ / 450 V 105 °C Surge voltage : 495V	I/P:High-Line +3V =267V 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)475V (2)443V (3)446V (4) 440V
6	Control IC Voltage Test	PWM IC U900 Rated 16V/8.85V(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°C	(1) 2.1V (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°C	I/P-O/P:4.33Ma I/P-FG:4.11 mA O/P-FG:3.82mA 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: 30 GΩ I/P-FG:30G 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	26mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25°C	L-FG:0.3 mA N-FG:0.3 mA L,N -V(+):0.24 mA L,N-V(-):0.24 mA

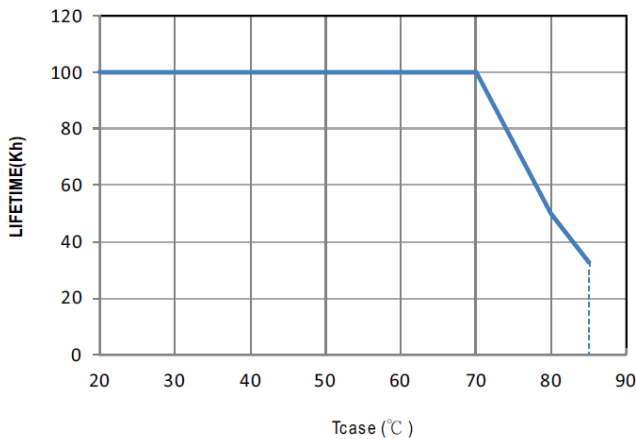
E.M.C TEST

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°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	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°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	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°C	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 ℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 29.4 ℃</th><th>HIGH AMBIENT Ta=50.3℃</th></tr><tr><td>1</td><td>L2</td><td>57.9℃</td><td>78.8℃</td></tr><tr><td>2</td><td>C11</td><td>58.1℃</td><td>79.0℃</td></tr><tr><td>3</td><td>L1</td><td>56.6℃</td><td>77.5℃</td></tr><tr><td>4</td><td>BD1</td><td>60.5℃</td><td>81.4℃</td></tr><tr><td>5</td><td>Q1</td><td>60.5℃</td><td>81.4℃</td></tr><tr><td>6</td><td>RY1</td><td>58.8℃</td><td>79.7℃</td></tr><tr><td>7</td><td>C5</td><td>56.9℃</td><td>77.8℃</td></tr><tr><td>8</td><td>C81</td><td>58.5℃</td><td>79.4℃</td></tr><tr><td>9</td><td>U1</td><td>56.5℃</td><td>77.4℃</td></tr><tr><td>10</td><td>U900</td><td>56.6℃</td><td>77.5℃</td></tr><tr><td>11</td><td>C902</td><td>59.2℃</td><td>80.1℃</td></tr><tr><td>12</td><td>RTH2</td><td>56.9℃</td><td>77.8℃</td></tr><tr><td>13</td><td>C906</td><td>55.8℃</td><td>76.7℃</td></tr><tr><td>14</td><td>T1</td><td>70.8℃</td><td>91.7℃</td></tr><tr><td>15</td><td>C202</td><td>56.1℃</td><td>77.0℃</td></tr><tr><td>16</td><td>C201</td><td>54.7℃</td><td>75.6℃</td></tr><tr><td>17</td><td>D102</td><td>61.3℃</td><td>82.2℃</td></tr><tr><td>18</td><td>D103</td><td>59.2℃</td><td>80.1℃</td></tr><tr><td>19</td><td>C103</td><td>55.4℃</td><td>76.3℃</td></tr><tr><td>20</td><td>C108</td><td>53.2℃</td><td>74.1℃</td></tr><tr><td>21</td><td>C110</td><td>51.8℃</td><td>72.7℃</td></tr><tr><td>22</td><td>Q5</td><td>59.8℃</td><td>80.7℃</td></tr></table>			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℃
NO	Position	ROOM AMBIENT Ta= 29.4 ℃	HIGH AMBIENT Ta=50.3℃																																																																																													
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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℃																																																																																													
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																																																																																												

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : $-45^{\circ}\text{C} \sim +65^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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°C	TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C103 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 60°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 60°C 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°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase 75°C 	

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

12.10.30 A50-F031