Test Report: HLG-480H-30

480W Constant Voltage + Constant Current LED Driver

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

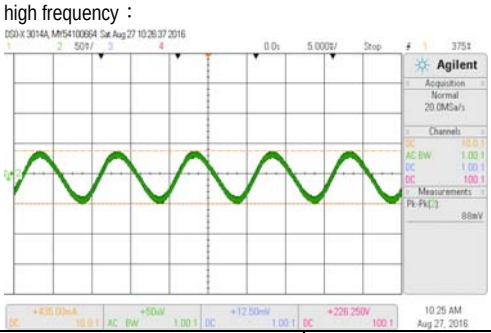
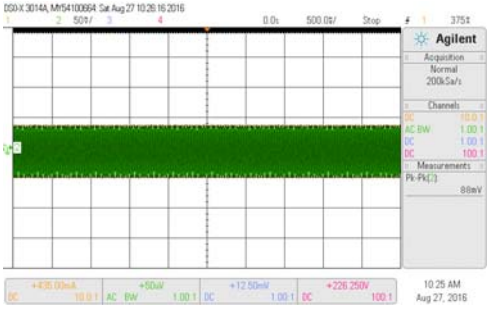
Safety Test
E.M.C. Test

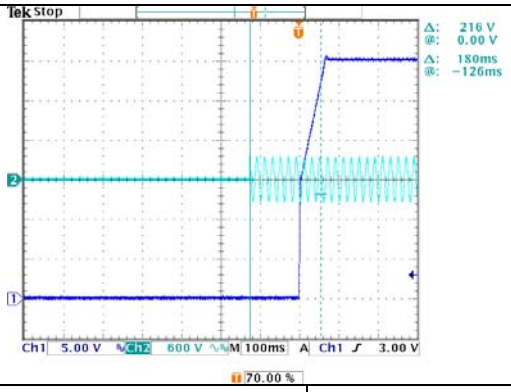
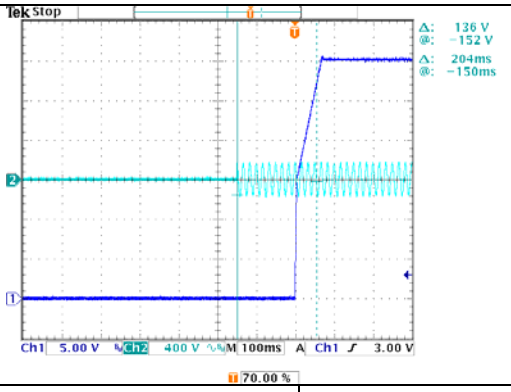
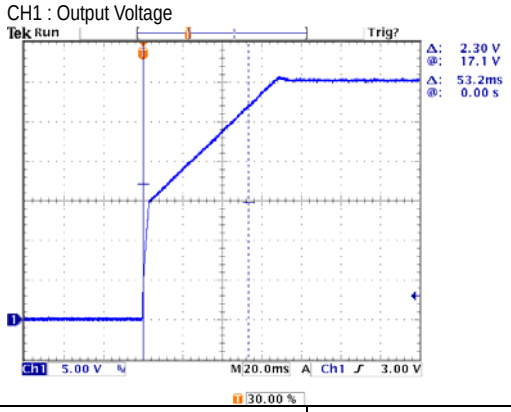
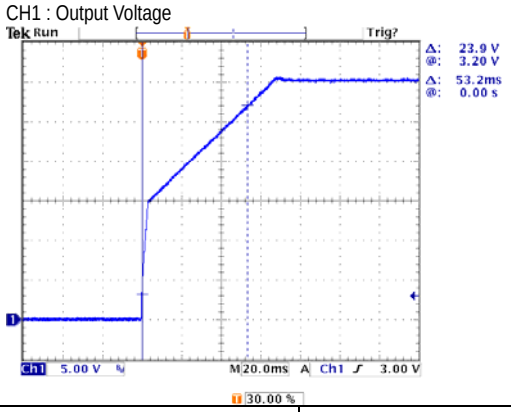
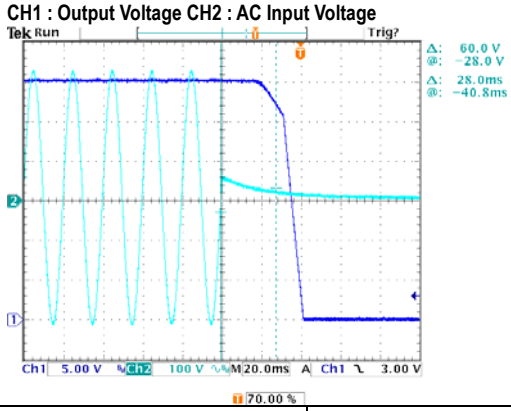
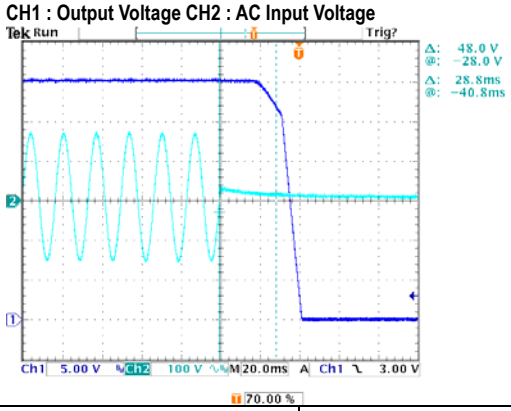
■ RELIABILITY TEST

ENVIRONMENT TEST

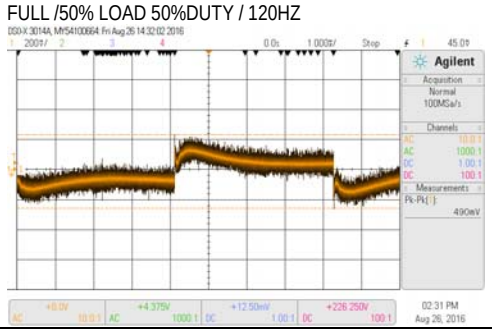
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

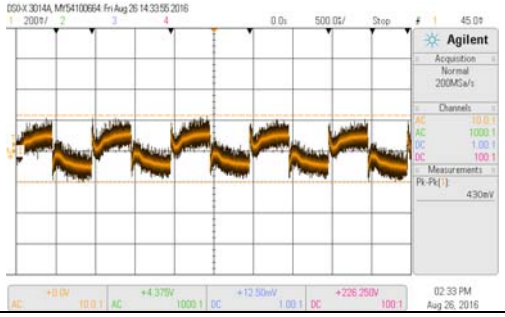
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	CH1: 15 V~ 30V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	0.8V~30 VAC
2	VOLTAGE ADJUST RANGE	CH1: 25.5 V~ 31.5V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25℃	22.89V~32.21V /230VAC 22.89V~32.21V/115VAC
3	CURRENT ADJ. RANGE	CH1: 8 A~ 16 A	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25℃	6.598A~17.263A /230VAC@CV MAX-1V 6.616A~ 17.25A /230VAC@CV MIN 6.594A~ 17.253A/115VAC@CV MAX-1V 6.617A~17.25 A/115VAC@CV MIN
4	OUTPUT VOLTAGE TOLERANCE (Max)	V1:1% ~ -1 %	I/P:100VAC /305AC O/P:FULL/ MIN LOAD Ta:25℃	V1:0.3%~-0.1 %
5	LINE REGULATION (Max)	V1: 0.5% ~ -0.5 %	I/P:100VAC~305AC O/P:FULL LOAD Ta:25℃	V1: 0 %~ 0 %
6	LOAD REGULATION (Max)	V1: 0.5 % ~ -0.5 %	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25℃	V1:0.2 %~ -0.2 %
7	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	TEST: <1.2%
8	RIPPLE & NOISE (Max)	V1: 200 mVp-p	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	V1: 88 mVp-p
	high frequency： 		low frequency： 	
9	SET UP TIME (Max)	230VAC/ 500 ms 115VAC/ 500 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/180 ms 115 VAC/ 204ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

				
10	RISE TIME (Max)	230VAC/ 80 ms 115VAC/ 80 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/53.2 ms 115 VAC/53.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
11	HOLD UP TIME (Typ.)	230VAC/ 16 ms 115VAC/ 16 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 28ms 115 VAC/28.8 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** 	
12	DYNAMIC LOAD	V1: 3000 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 490mVp-p 430mVp-p

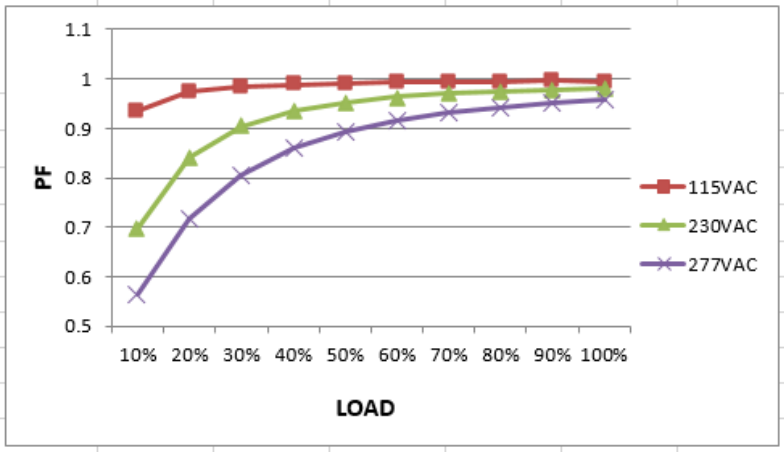
FULL /50% LOAD 50%DUTY / 120HZ

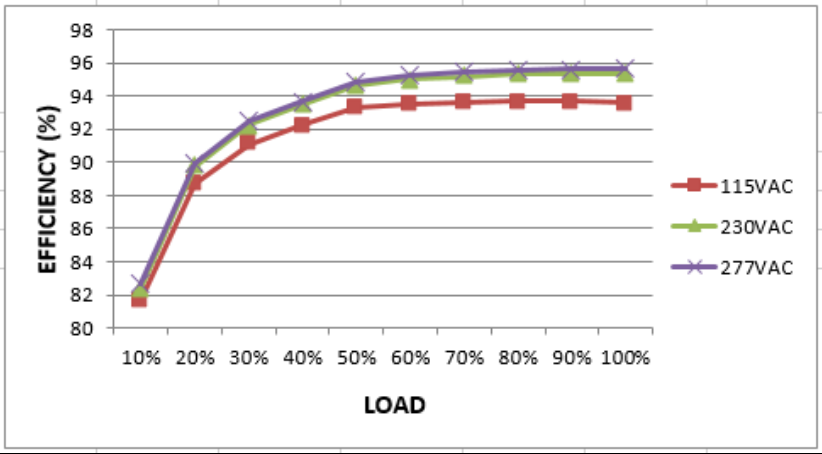


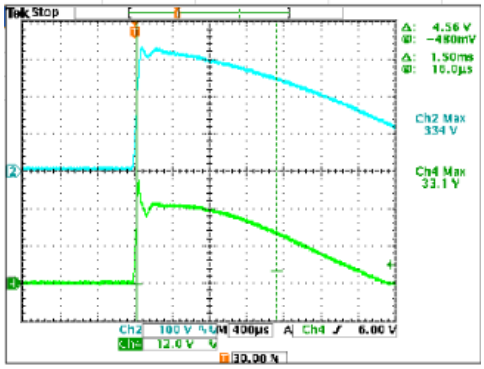
FULL /50% LOAD 50%DUTY / 1KHZ

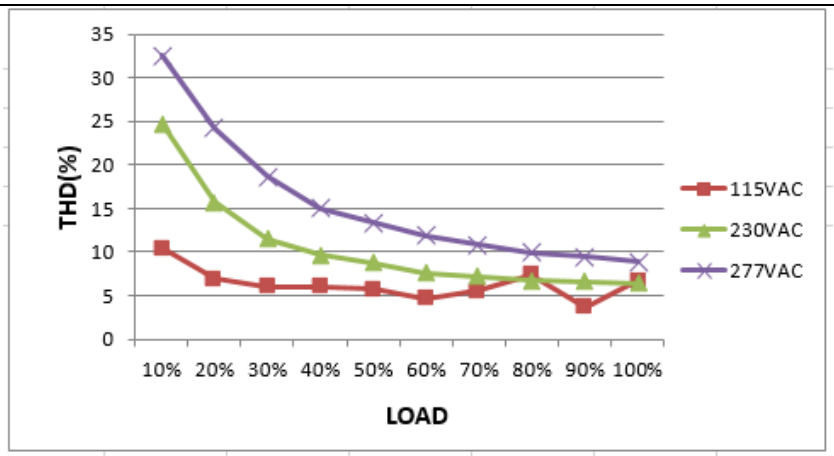


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	75V~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)	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/ 2 A 230 VAC/ 2.45 A 115 VAC/ 5 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃	I= 1.888A/277VAC I = 2236A/ 230VAC I = 4.547A/ 115VAC
4	LEAKAGE CURRENT	< 0.75 mA / 277VAC	I/P ： 277 VAC O/P ：Min LOAD Ta ：25℃	L-FG: 0.34mA N-FG: 0.34mA
5	POWER FACTOR(TYP)	0.97/230 VAC FULL LOAD 0.98/115 VAC FULL LOAD 0.95/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃	PF= 0.981/230V/100%LOAD PF= 0.996/115V/100%LOAD PF= 0.958/277V/100%LOAD
				
6	EFFICIENCY (TYP)	94.5 % 95%	I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25℃	94.677% /230V 95.004% /277V



7	INRUSH CURRENT (TYP)	230 V/ 35A COLD START (twidth=1800us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	I = 33.1A/ 230VAC T50= 1500 us
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 			
8	TOTAL HARMONIC DISTORTION	THD< 20% @ output load≧ 40% at 115VAC/230/277VAC input	I/P： 115VAC O/P：100% LOAD 40% LOAD Ta：25℃	THD： 6.3 % THD： 6.36 %
			I/P： 230VAC O/P：100% LOAD 40% LOAD Ta：25℃	THD： 6.46 % THD： 9.24 %
			I/P： 277VAC O/P：100% LOAD 40% LOAD Ta：25℃	THD： 8.99 % THD： 15.76 %



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	95 %~ 108 % PROTECTION TYPE： Constant current limiting, recovers automatically after fault condition is removed	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	103.1%/ 305VAC 103.4%/ 230VAC 103.8%/100VAC PROTECTION TYPE： Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 33 V~ 40 V PROTECTION TYPE： Shut down output voltage, re-power on to recovery	I/P: 305VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	34.471V/ 305VAC 34.423V/ 230VAC 34.531V/ 90VAC PROTECTION TYPE： Shut down output voltage, re-power on to recovery
3	OVER TEMPERATURE PROTECTION	PROTECTION TYPE： Shut down output voltage, re-power on to recovery	I/P: 305 VAC I/P: 90 VAC O/P:FULL LOAD	O.T.P Active PROTECTION TYPE： Shut down output voltage, re-power on to recovery
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE： Constant current limiting, recovers automatically after fault condition is removed	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**	Q 10 Rated 13 A/ 650 V Q 13Rated 13 A/ 650V	I/P:High-Line +3V =308V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz	Q10 VDS: (1)537V (2)533V (3)537V (4)541V (5)537V (6)537V (7)550V	Q13 VDS: (1)550V (2)525V (3)550V (4)550V (5)546V (6)550V (7)537V

			(6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25℃	
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 13 A/650V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25℃	308V VDS: (1)533V (2)456V (3)533V (4)541V (5)537V (6)541V (7)537V
3	P.F.C DIODE	D8 Rated 12A/ 600V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25℃	VDS: 305V (1)486V (2)474V (3)486V (4)478V
4	Diode Peak **Voltage**	Q100 Rated 80A/100 V Q101 Rated 80A/100 V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD Ta:25℃	Q100: VDS: (1)72.3V (2)9.6V (3)73.9V (4)73.1V (5)73.9V (6)73.1V (7)8.8V (8)66.7V Q101: VDS: (1)77.1V (2)12.8V (3)77.1V (4)79.5V (5)79.5V (6)76.3V (7)8V (8)73.9V
5	**Input Capacitor Voltage**	C5 Rated: 150 μ / 450V	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)443V (2)443V (3)449V (4)443V
6	**Control IC Voltage Test**	PWM IC U2 Rated 16V~ 8.85V(MIN.) PFC IC U1 Rated 20V~10.5V(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℃	U2 (1) 13.12V (2) 13.37V (3) 13.37V (4) 13.81V U1 (1)14.5V (2)14.5V (3)14.5V (4)14.5V (5)14.5V

■ SAFETY & EMC TEST REPORT

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 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:4.132 mA I/P-FG:4.82 mA O/P-FG:6.21 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:17.6 GΩ I/P-FG: 10.7G 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℃	26 mΩ

E.M.C TEST

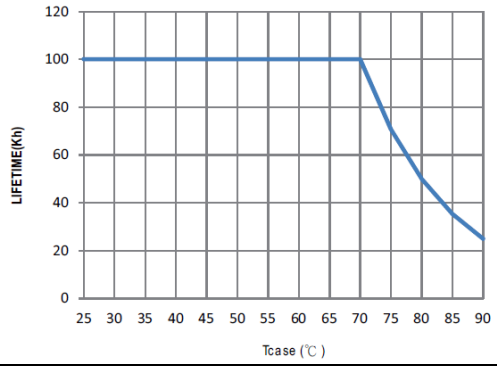
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC /50HZ O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC /50HZ O/P:FULL LOAD Ta:25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT 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 LIGHT INDUSTRY INPUT: 1KV	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： HLG-480H-24
1. ROOM AMBIENT BURN-IN：2.5 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 29.4 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 63.8 ℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 29.4 ℃</th><th>HIGH AMBIENT Ta= 63.8 ℃</th></tr>
<tr><td>1</td><td>BD2</td><td>89.8℃</td><td>98.1℃</td></tr>
<tr><td>2</td><td>C10</td><td>86.5℃</td><td>94.8℃</td></tr>
<tr><td>3</td><td>Q1</td><td>86.4℃</td><td>97.8℃</td></tr>
<tr><td>4</td><td>D8</td><td>90.1℃</td><td>99.1℃</td></tr>
<tr><td>5</td><td>Q10</td><td>88.8℃</td><td>94.8℃</td></tr>
<tr><td>6</td><td>Q12</td><td>89.7℃</td><td>98.7℃</td></tr>
<tr><td>7</td><td>RY1</td><td>87.6℃</td><td>96.1℃</td></tr>
<tr><td>8</td><td>LF2</td><td>83.3℃</td><td>90.7℃</td></tr>
<tr><td>9</td><td>ZNR2</td><td>83.2℃</td><td>90.3℃</td></tr>
<tr><td>10</td><td>C1</td><td>82.2℃</td><td>89.4℃</td></tr>
<tr><td>11</td><td>C5</td><td>83.3℃</td><td>90.5℃</td></tr>
<tr><td>12</td><td>L3</td><td>87.9℃</td><td>97.2℃</td></tr>
<tr><td>13</td><td>U1</td><td>83.6℃</td><td>90.2℃</td></tr>
<tr><td>14</td><td>U2</td><td>83.4℃</td><td>90.9℃</td></tr>
<tr><td>15</td><td>T1 Primary side</td><td>89.7℃</td><td>100.7℃</td></tr>
<tr><td>16</td><td>T2 Primary side</td><td>91.8℃</td><td>101.6℃</td></tr>
<tr><td>17</td><td>Q100</td><td>84.9℃</td><td>95.7℃</td></tr>
<tr><td>18</td><td>Q121</td><td>84.4℃</td><td>95.4℃</td></tr>
<tr><td>19</td><td>C115</td><td>81.2℃</td><td>91.6℃</td></tr>
<tr><td>20</td><td>C117</td><td>80.9℃</td><td>99.5℃</td></tr>
<tr><td>21</td><td>LF100</td><td>80.1℃</td><td>91.8℃</td></tr>
<tr><td>22</td><td>T500</td><td>83.1℃</td><td>91.6℃</td></tr>
<tr><td>23</td><td>C511</td><td>84.3℃</td><td>92.7℃</td></tr>
<tr><td>24</td><td>U501</td><td>83.4℃</td><td>90.9℃</td></tr>
<tr><td>25</td><td>J101</td><td>86.3℃</td><td>97.5℃</td></tr>
<tr><td>26</td><td>RTH2</td><td>84.4℃</td><td>92.6℃</td></tr>
<tr><td>27</td><td>C93</td><td>86.1℃</td><td>98.7℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 305VAC/100VAC
O/P： 100 % LOAD
Ta= -45 ℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 60 ℃
NO DAMAGE</td><td>I/P： 315 VAC
O/P：FULL LOAD
Ta= 60℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.02 %/℃(0~60℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.006 %/℃(0~60℃)</td></tr>
</table>

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：100 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 C117 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) 95027HRS (2) 19111HRS (3) 52542HRS (4) 86291HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 345.5K hrs min. Telcordia SR-332 (Bellcore) ; 95.3K hrs min. MIL-HDBK-217F (25℃)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase75℃	



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

12.10.30 A50-F031