Test Report: HLG-480H-C1750

480W 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

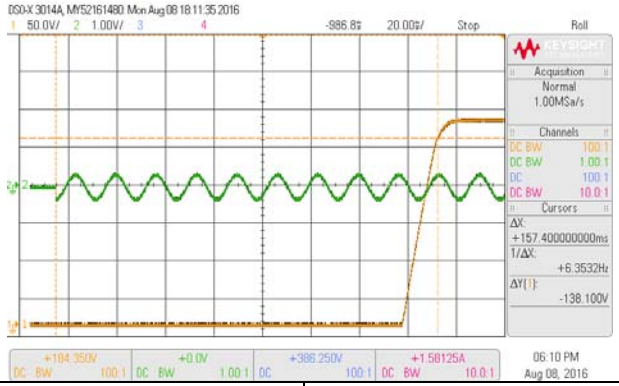
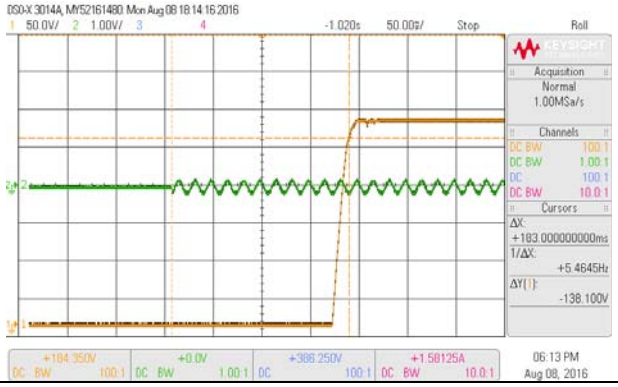
Safety Test
E.M.C. Test

■ RELIABILITY TEST

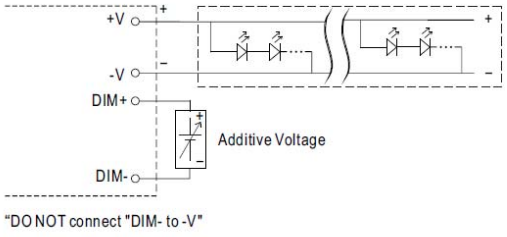
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

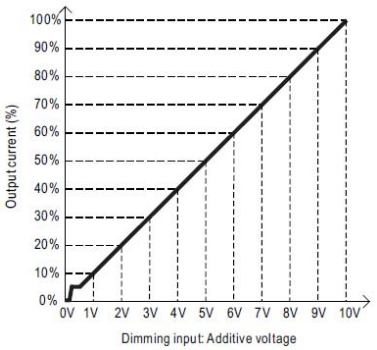
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃	1.75A /230VAC@CV MAX-1V 1.754A /230VAC@CV MIN 1.751A/115VAC@CV MAX-1V 1.755A/115VAC@CV MIN 0.28%
2	CONSTANT CURRENT REGION	CH1: 137 V~ 274V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	0.28V~274V /230VAC
3	OPEN CIRCUIT VOLTAGE (max.)	340V	I/P: 230 VAC O/P:NO LOAD Ta:25℃	275.34V/230Vac
4	CURRENT ADJ. RANGE	CH1:875mA~ 1750mA	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25℃	0.762mA~1886mA/230VAC@CV MAX-1V 0.765mA~1890m A /230VAC@CV MIN 0.762mA~1886mA/115VAC@CV MAX-1V 0.764mA~1890mA/115VAC@CV MIN
5	CURRENT RIPPLE	5% max. @rated current	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	2.25%
6	SET UP TIME (Max)	230VAC/ 500 ms (Max) 115VAC/ 500ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 157.4ms 115 VAC/ 183ms
	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** ※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.)		

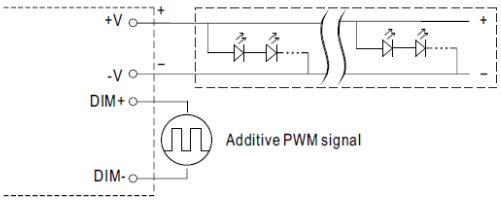
◎ Applying additive 0 ~ 10VDC



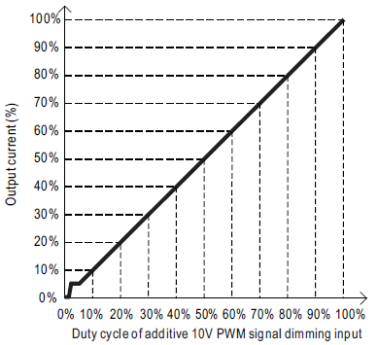
"DO NOT connect "DIM- to -V"



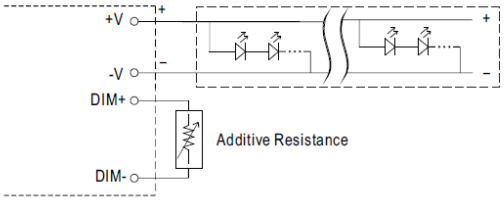
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



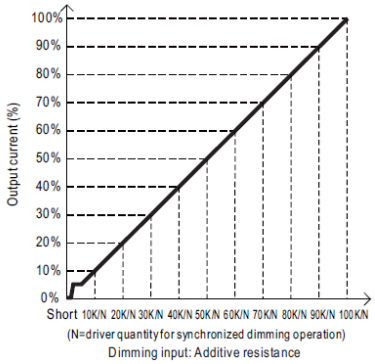
"DO NOT connect "DIM- to -V"



◎ Applying additive resistance:



"DO NOT connect "DIM- to -V"



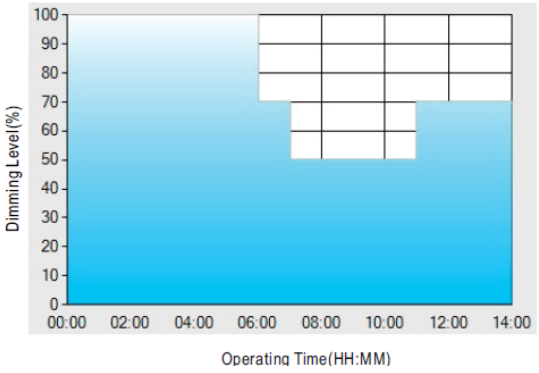
Note : 1. Min. dimming level is about 6% and the output current is not defined when 0%< Iout<6%.
2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

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	0A	0.175A	0.340A	0.525A	0.707A	0.882A	1.044A	1.216A	1.400A	1.590A	1.760A	1.760A
%	0%	10.00%	19.43%	30.00%	40.40%	50.40%	59.66%	69.49%	80.00%	90.86%	100.57%	100.57%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0A	0.180A	0.355A	0.531A	0.731A	0.914A	1.095A	1.258A	1.430A	1.620A	1.760A	1.760A
%	0%	10.29%	20.29%	30.34%	41.77%	52.23%	62.57%	71.89%	81.71%	92.57%	100.57%	100.57%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0A	0.138A	0.321A	0.508A	0.692A	0.858A	1.040A	1.218A	1.400A	1.570A	1.750A	1.760A
%	0%	7.89%	18.34%	29.03%	39.54%	49.03%	59.43%	69.60%	80.00%	89.71%	100.00%	100.57%

TEST RESULT：OK

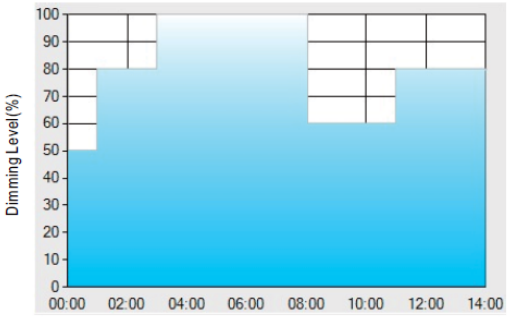
8	DIMMING OPERATION **(for Dxx-Type by User definition)**	**※Smart timer dimming function (for Dxx-Type by User definition)** MEAN WELL Smart timer dimming primarily provides the adaptive proportion dimming profile for the output constant current level to perform up to 14 consecutive hours. 3 dimming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

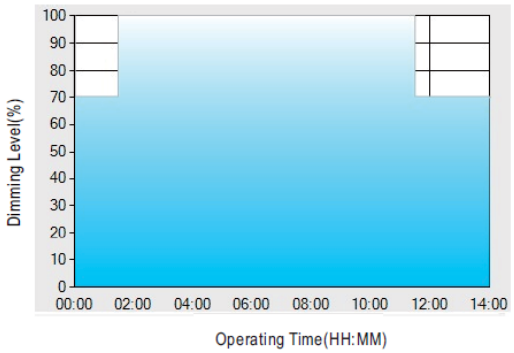
Ex: ◎ D02-Type: the profile recommended for street lighting



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



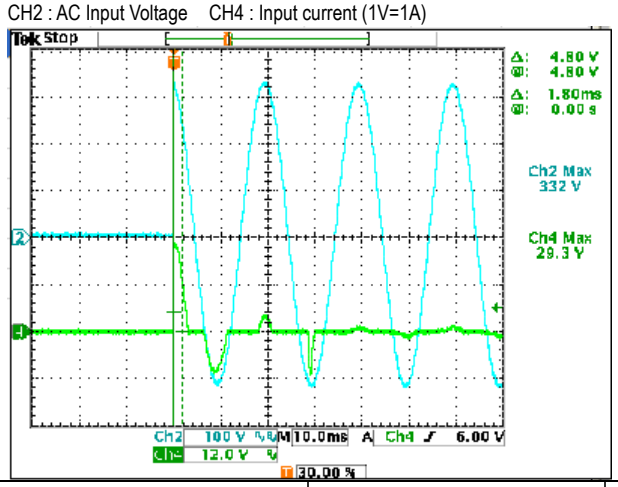
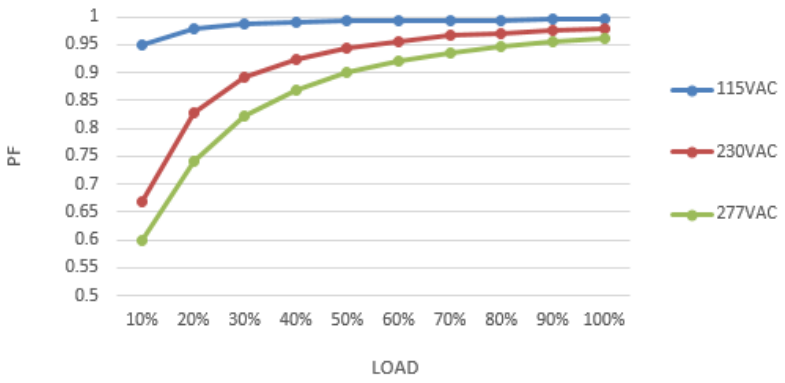
Set up for D03-Type in Smart timer dimming software program:

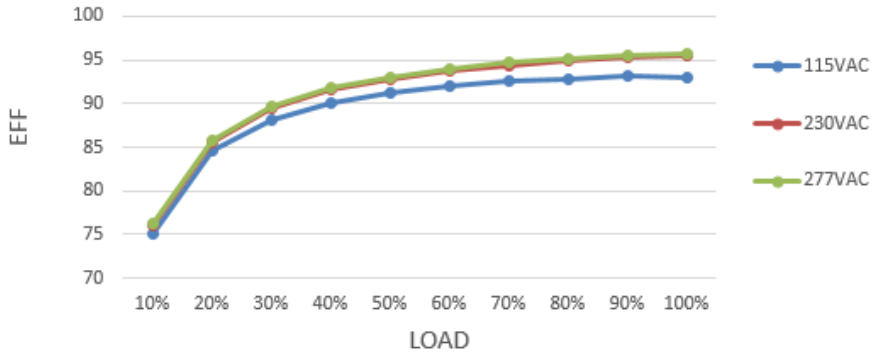
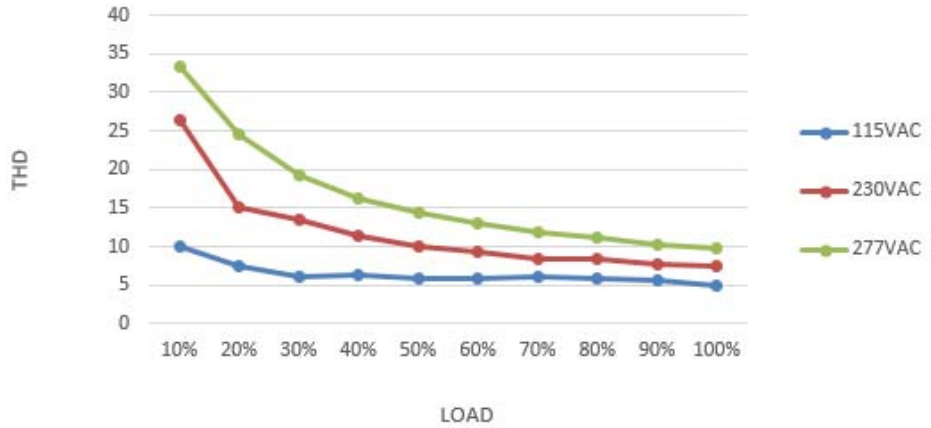
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

I/P：230VAC
O/P：DIMMING TEST
TA：25℃
TEST RESULT：OK

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℃	73.3V~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)	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/ 2A 230 VAC/ 2.45 A 115 VAC/ 5 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃	I=1.879A/277VAC I = 2.23A/ 230VAC I =4.55A/ 115VAC
4	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P： 277 VAC O/P ：Min LOAD Ta ：25℃	L-FG: 0.255mA N-FG:0.26 mA
5	INRUSH CURRENT (TYP)	230 V/ 35 A COLD START (twidth=1800us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	I = 29.3A/ 230VAC T50= 1320 uS
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 			
6	POWER FACTOR(TYP)	0.95/230 VAC FULL LOAD 0.98/115 VAC FULL LOAD 0.94/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃	PF=0.981 /230V/100%LOAD PF=0.998/115V/100%LOAD PF=0.962/277V/100%LOAD
	P.F vs LOAD 			

7	EFFICIENCY (TYP)	95 %	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	95.23%
	EFFICIENCY vs LOAD			
8	TOTAL HARMONIC DISTORTION	THD< 20% @ output load≧ 40% at 115VAC/230VAC/277VAC input	I/P： 115VAC O/P：100% LOAD 40% LOAD Ta：25℃ I/P： 230VAC O/P：100% LOAD 40% LOAD Ta：25℃ I/P： 277VAC O/P：100% LOAD 40% LOAD Ta：25℃	THD： 6.6 % THD： 7 % THD： 7.5 % THD： 12.7 % THD： 10.8 % THD： 15.9 %
	THD&LOAD			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 345 V~ 382 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℃	358.2V/ 305VAC 358.2V/ 230VAC 358.2V/ 90VAC PROTECTION TYPE：Shut down output voltage, re-power on to recovery

2	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
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE： Constant current, 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, 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/650V Q 12 Rated 13 A/ 650 V	I/P:High-Line +3V =308V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD I/P:Low-Line -3V = 97V VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD Ta:25℃	Q10 Q12 VDS: VDS: (1)452V (1)472V (2)460V (2)488V (3)439V (3)443V (4)460V (4)484V VDS: VDS: (1)476V (1)484V (2)460V (2)484V (3)432V (3)442V (4)436V (4)472V
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 13 A/ 650 V	I/P:High-Line +3V =308V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD I/P:Low-Line -3V = 97V VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD Ta:25℃	Q1 VDS: (1) 532V (2) 460V (3)524V (4)472V VDS: (1) 581V (2) 496V (3) 577V (4) 557V
3	P.F.C DIODE	D8 Rated 12 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 (4)NO LOAD I/P:Low-Line -3V = 97V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD Ta:25℃	308V (1) 460V (2) 464V (3) 468V (4) 456V 97V (1)504V (2)452V (3)536V (4)444V

4	Diode Peak **Voltage**	D102 Rated 10A/400 V D103 Rated 3A/400 V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue (4)NO LOAD Ta:25℃	D102: VDS: (1)282V (2)3.5V (3)276V (4)280V D103: VDS: (1)282V (2)3.3V (3)282V (4)276V
5	**Input Capacitor Voltage**	C5 Rated: 150μ/ 450V	I/P:High-Line +3V =308V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full load continue Ta:25℃	(1)448V (2)448V (3)440V
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.V.P. Ta:25℃	(1) 13.65V (2) 13.57V (3) 13.33V (1) 15.42V (2)14.21V (3)14.11V

■ 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<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: 3.6mA I/P-FG:4.03 mA O/P-FG: 5.53mA 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: 26G 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℃	29mΩ

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 LIGHT 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. 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： HLG-480H-C1400 1. ROOM AMBIENT BURN-IN： 3 HRS I/P： 230VAC O/P： FULL LOAD Ta= 31.2℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 60℃		

NO	Position	ROOM AMBIENT Ta= 31.2 ℃	HIGH AMBIENT Ta= 60℃
1	BD2	70.0℃	96.9℃
2	C10	65.3℃	93.0℃
3	Q1	65.1℃	92.2℃
4	D8	69.7℃	97.6℃
5	Q10	68.6℃	96.4℃
6	Q12	69.6℃	97.1℃
7	RY1	67.5℃	94.4℃
8	LF2	61.3℃	87.3℃
9	ZNR2	60.9℃	86.6℃
10	C1	60.1℃	85.8℃
11	C5	61.2℃	87.3℃
12	L3	68.6℃	96.3℃
13	U1	60.5℃	86.1℃
14	U2	61.2℃	86.6℃
15	T1	75.2℃	98.6℃
16	T2	78.6℃	102.6℃
17	D102	67.0℃	92.2℃
18	D114	66.1℃	91.0℃
19	C105	62.0℃	86.3℃
20	LF100	60.5℃	84.8℃
21	T500	63.0℃	87.8℃
22	C511	63.0℃	88.5℃
23	U501	60.8℃	85.9℃
24	J101	62.0℃	86.9℃
25	C93	63.4℃	89.0℃
26	RTH2	62.5℃	87.3℃

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 305VAC/100VAC 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%/℃(0~60℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.007 %/℃(0~60℃)
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -45℃~ +90℃ 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：10 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：60min in each axis (X.Y.Z) (6) Ta：25℃		TEST：OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Tc= 75℃ LIFE TIME (2) I/P： 230VAC O/P：75% LOAD Tc= 75℃ LIFE TIME (3) I/P： 230VAC O/P：50% LOAD Tc= 75℃ LIFE TIME		(1) 94807 HRS (2) 95921 HRS (3) 96707 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 421.1K hrs min. Telcordia SR-332 (Bellcore) ; 110.5K hrs min. MIL-HDBK-217F (25℃)		
10	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 62,000 hours		

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

12.10.30 A50-F031