



Test Report: HLG-480H-C2100

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

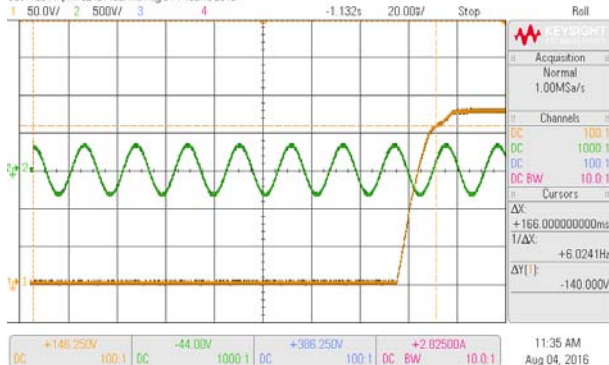
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C	2.118A/230VAC@CV MAX-1V 2.113A/230VAC@CV MIN 2.118A/115VAC@CV MAX-1V 2.114A/115VAC@CV MIN 0.86%
2	CONSTANT CURRENT REGION	CH1: 114 V~ 229V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	0.27V~229V /230VAC
3	OPEN CIRCUIT VOLTAGE (max.)	280V	I/P: 230 VAC O/P:NO LOAD Ta:25°C	231.18V/230VAC
4	CURRENT ADJ. RANGE	CH1:1050mA~ 2100mA	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25°C	0.874A~ 2.271A /230VAC@CV MAX-1V 0.874A~ 2.266A /230VAC@CV MIN 0.874A~2.27A/115VAC@CV MAX-1V 0.874A~2.266A/115VAC@CV MIN
5	CURRENT RIPPLE	5% max. @rated current	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	2.13%
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°C	230VAC/ 166ms 115 VAC/ 191.2ms

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

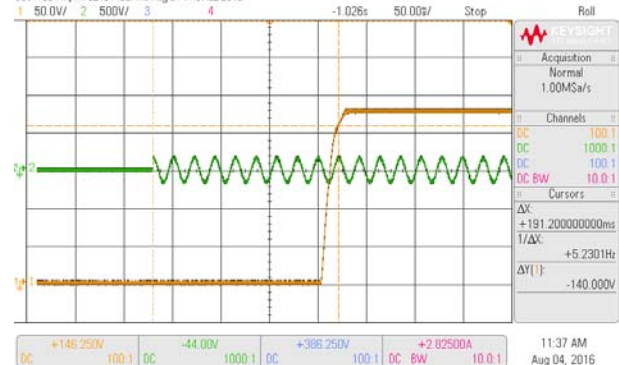
050-X 3014A, M/52161480 Thu Aug 04 11:38:15 2016



INPUT=115VAC/60HZ @ FULL LOAD

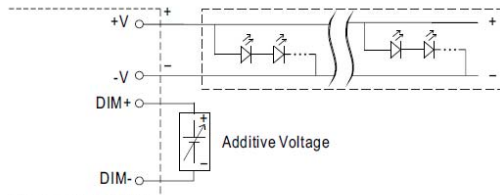
CH1 : Output Voltage CH2 : AC Input Voltage

050-X 3014A, M/52161480 Thu Aug 04 11:37:32 2016

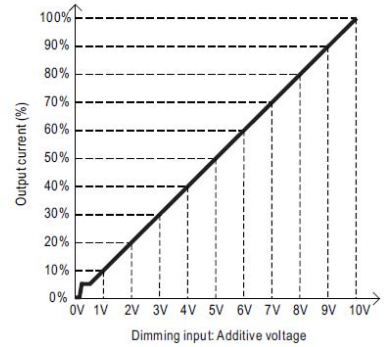


7	DIMMING OPERATION (for B-Type)	<p>※3 in 1 dimming function</p> <p>※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.</p> <p>※Direct connecting to LEDs is suggested. It is not suitable to be used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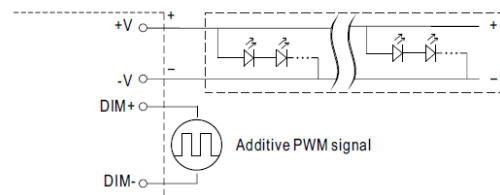
◎ Applying additive 0 ~ 10VDC



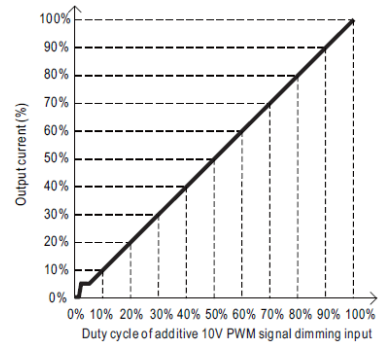
"DO NOT connect "DIM- to -V"



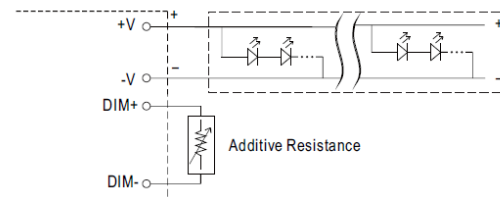
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



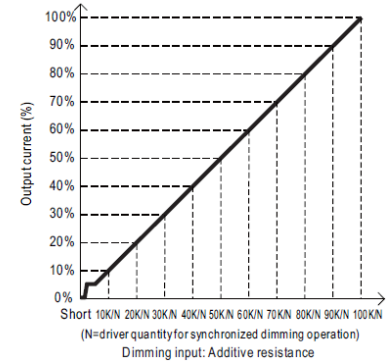
"DO NOT connect "DIM- to -V"



◎ 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% < I_{out} < 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.

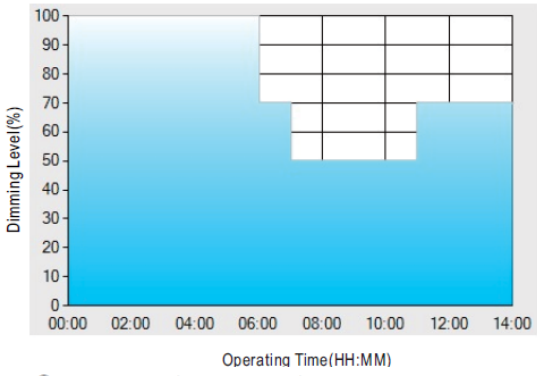
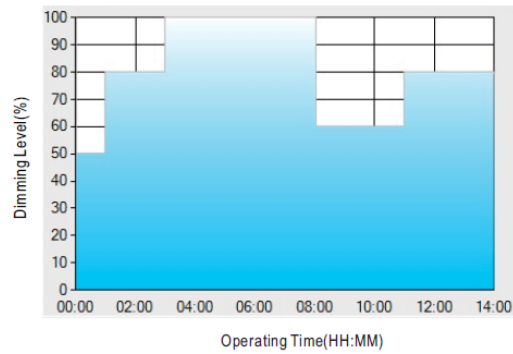
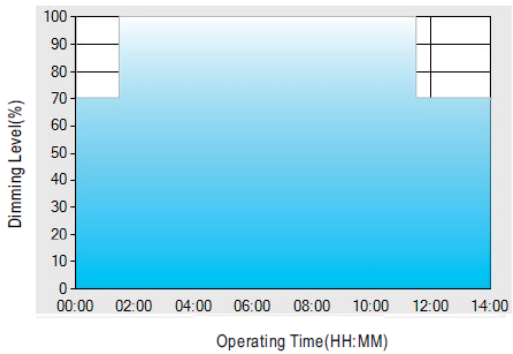
I/P : 230VAC

O/P : DIMMING TEST

TA : 25°C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0A	0.205A	0.409A	0.638A	0.858A	1.075A	1.290A	1.490A	1.700A	1.940A	2.100A	2.100A
%	0%	9.76%	19.48%	30.38%	40.86%	51.19%	61.43%	70.95%	80.95%	92.38%	100.00%	100.00%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0A	0.206A	0.426A	0.644A	0.852A	1.060A	1.277A	1.480A	1.700A	1.900A	2.100A	2.100A
%	0%	9.81%	20.29%	30.67%	40.57%	50.48%	60.81%	70.48%	80.95%	90.48%	100.00%	100.00%
PWM (100HZ)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0A	0.161A	0.391A	0.613A	0.834A	1.055A	1.273A	1.470A	1.680A	1.900A	2.100A	2.100A
%	0%	7.67%	18.62%	29.19%	39.71%	50.24%	60.62%	70.00%	80.00%	90.48%	100.00%	100.00%

TEST RESULT : OK

<p>8</p>	<p>DIMMING OPERATION (for Dxx-Type by User definition)</p>	<p>※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 : ① D01-Type: the profile recommended for residential lighting</p>  <p>Set up for D01-Type in Smart timer dimming software program:</p> <table border="1" data-bbox="1061 593 1500 728"> <thead> <tr> <th></th> <th>T1</th> <th>T2</th> <th>T3</th> <th>T4</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Ex : ② D02-Type: the profile recommended for street lighting</p>  <p>Set up for D02-Type in Smart timer dimming software program:</p> <table border="1" data-bbox="1013 990 1513 1120"> <thead> <tr> <th></th> <th>T1</th> <th>T2</th> <th>T3</th> <th>T4</th> <th>T5</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Ex : ③ D03-Type: the profile recommended for tunnel lighting</p>  <p>Set up for D03-Type in Smart timer dimming software program:</p> <table border="1" data-bbox="1077 1384 1433 1518"> <thead> <tr> <th></th> <th>T1</th> <th>T2</th> <th>T3</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>I/P : 230VAC O/P : DIMMING TEST TA : 25°C TEST RESULT : OK</p>		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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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	76V-305 V



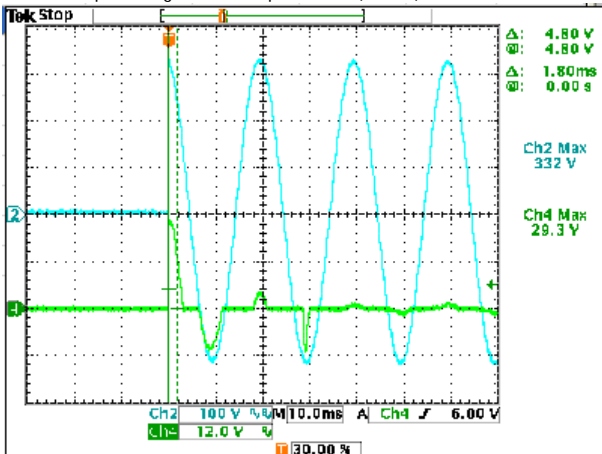
480W Single Output LED Power Supply

HLG-480H-C series

			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°C	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°C	I = 1.891A/277VAC I = 2.263A/ 230VAC I = 4.653A/ 115VAC
4	LEAKAGE CURRENT	< 0.75 mA/ 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG: 0.19mA N-FG: 0.19mA
5	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°C	I = 29.3A/ 230VAC T50= 1320 us

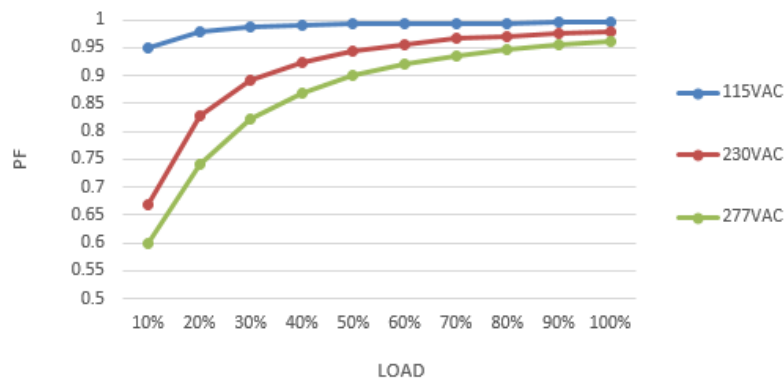
INPUT=230VAC/50HZ @ FULL LOAD

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°C	PF= 0.985 /230V/100%LOAD PF= 0.995/115V/100%LOAD PF= 0.962/277V/100%LOAD
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P.F vs LOAD



7	EFFICIENCY (TYP)	95 %	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	95.15%																																												
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC (%)</th> <th>230VAC (%)</th> <th>277VAC (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>75</td><td>76</td><td>76</td></tr> <tr><td>20%</td><td>85</td><td>86</td><td>86</td></tr> <tr><td>30%</td><td>88</td><td>89</td><td>89</td></tr> <tr><td>40%</td><td>90</td><td>91</td><td>91</td></tr> <tr><td>50%</td><td>91</td><td>92</td><td>92</td></tr> <tr><td>60%</td><td>92</td><td>93</td><td>93</td></tr> <tr><td>70%</td><td>92</td><td>94</td><td>94</td></tr> <tr><td>80%</td><td>93</td><td>94</td><td>94</td></tr> <tr><td>90%</td><td>93</td><td>95</td><td>95</td></tr> <tr><td>100%</td><td>93</td><td>95</td><td>95</td></tr> </tbody> </table>					LOAD (%)	115VAC (%)	230VAC (%)	277VAC (%)	10%	75	76	76	20%	85	86	86	30%	88	89	89	40%	90	91	91	50%	91	92	92	60%	92	93	93	70%	92	94	94	80%	93	94	94	90%	93	95	95	100%	93	95	95
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80%	93	94	94																																													
90%	93	95	95																																													
100%	93	95	95																																													
8	TOTAL HARMONIC DISTORTION	<p>THD < 20% @ output load \geq 40% at 115VAC/230VAC/277VAC input</p>	<p>I/P : 230VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p> <p>I/P : 230VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p> <p>I/P : 277VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p>	<p>THD : 4.7 % THD : 6.6 %</p> <p>THD : 7.41 % THD : 10.13 %</p> <p>THD : 10.47 % THD : 14.68 %</p>																																												
<p>THD&LOAD</p> <table border="1"> <caption>THD vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC (%)</th> <th>230VAC (%)</th> <th>277VAC (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>10</td><td>26</td><td>33</td></tr> <tr><td>20%</td><td>7</td><td>15</td><td>24</td></tr> <tr><td>30%</td><td>6</td><td>13</td><td>19</td></tr> <tr><td>40%</td><td>6</td><td>11</td><td>16</td></tr> <tr><td>50%</td><td>5</td><td>10</td><td>14</td></tr> <tr><td>60%</td><td>5</td><td>9</td><td>13</td></tr> <tr><td>70%</td><td>5</td><td>8</td><td>12</td></tr> <tr><td>80%</td><td>5</td><td>8</td><td>11</td></tr> <tr><td>90%</td><td>5</td><td>7</td><td>10</td></tr> <tr><td>100%</td><td>4</td><td>7</td><td>10</td></tr> </tbody> </table>					LOAD (%)	115VAC (%)	230VAC (%)	277VAC (%)	10%	10	26	33	20%	7	15	24	30%	6	13	19	40%	6	11	16	50%	5	10	14	60%	5	9	13	70%	5	8	12	80%	5	8	11	90%	5	7	10	100%	4	7	10
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 289 V~ 322 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°C	302V/ 305VAC 302V/ 230VAC 302V/ 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°C	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/ 600 V Q 12 Rated 13 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 (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°C	Q10 Q12 VDS: (1) 458V (2) 454V (3) 450V (4) 434V VDS: (1) 478V (2) 490V (3)454 V (4) 474V VDS: (1) 474V (2) 454V (3) 462V (4) 438V VDS: (1)478 V (2) 474V (3) 470V (4) 466V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 13 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 (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°C	Q1 VDS: (1) 554V (2) 446V (3) 518V (4) 446V VDS: (1) 587V (2) 502V (3) 575V (4) 442V
3	P.F.C DIODE	D8 Rated 10A/600V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load	308V (1) 470V (2) 450V

			(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°C	(3) 454V (4) 466V 97V (1)534 V (2) 450V (3) 526V (4) 470V
4	Diode Peak Voltage	D102 Rated 10A/400 V D103 Rated 1.35A/400V	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°C	D102: 308V D103: 308V VDS: (1) 231V (2) 7.61V (3) 233V (4) 233V VDS: (1) 232V (2) 8.7V (3) 232V (4) 232V
5	Input Capacitor Voltage	C5 Rated: 150uF/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°C	(1) 448V (2) 448V (3) 441V
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°C	U2 (1) 13.5V (2) 13.58V (3) 13.42V U1 (1)14.54V (2)14.38V (3)14.22V

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°C	I/P-O/P: 4.6 mA I/P-FG: 3.77mA O/P-FG: 5.28mA 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: 30GΩ I/P-FG: 19.5GΩ O/P-FG: 23GΩ NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	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°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 LIGHT 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 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	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°C	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°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 60°C		

		NO	Position	ROOM AMBIENT Ta= 31.2 °C	HIGH AMBIENT Ta= 60°C
		1	BD2	70.0°C	96.9°C
		2	C10	65.3°C	93.0°C
		3	Q1	65.1°C	92.2°C
		4	D8	69.7°C	97.6°C
		5	Q10	68.6°C	96.4°C
		6	Q12	69.6°C	97.1°C
		7	RY1	67.5°C	94.4°C
		8	LF2	61.3°C	87.3°C
		9	ZNR2	60.9°C	86.6°C
		10	C1	60.1°C	85.8°C
		11	C5	61.2°C	87.3°C
		12	L3	68.6°C	96.3°C
		13	U1	60.5°C	86.1°C
		14	U2	61.2°C	86.6°C
		15	T1	75.2°C	98.6°C
		16	T2	78.6°C	102.6°C
		17	D102	67.0°C	92.2°C
		18	D114	66.1°C	91.0°C
		19	C105	62.0°C	86.3°C
		20	LF100	60.5°C	84.8°C
		21	T500	63.0°C	87.8°C
		22	C511	63.0°C	88.5°C
		23	U501	60.8°C	85.9°C
		24	J101	62.0°C	86.9°C
		25	C93	63.4°C	89.0°C
		26	RTH2	62.5°C	87.3°C
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 305VAC/100VAC O/P : 100 % LOAD Ta= -45°C	TEST : OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE		I/P : 315 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK
4	TEMPERATURE COEFFICIENT	± 0.03%/°C (0-60°C)		I/P : 230 VAC O/P : FULL LOAD	± 0.007 %/°C (0-60°C)
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / 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°C~ +65°C 2. Temperature change rate : 25°C / 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



480W Single Output LED Power Supply

HLG-480H-C series

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°C	TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Tc= 75°C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Tc= 75°C LIFE TIME (3) I/P : 230VAC O/P : 50% LOAD Tc= 75°C 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°C)	
10	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C 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