



# Test Report: HVGC-480-L

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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

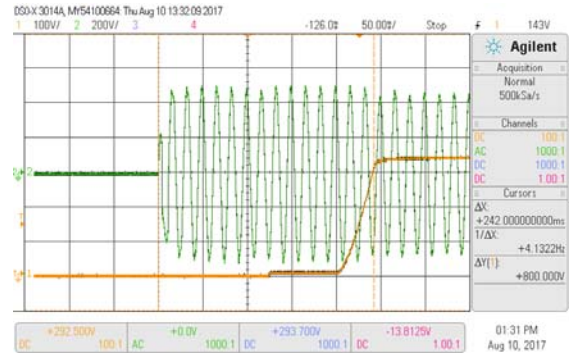
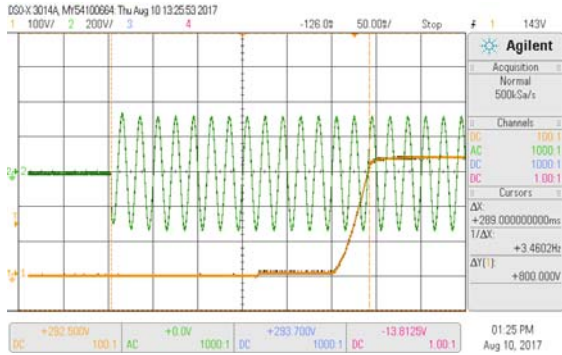
## ■ RELIABILITY TEST

ENVIRONMENT TEST

## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Io: 1.4A & 1.75A Ta: 25°C	Io: 1.4A: 1.411 A/347VAC@LED MAX-2V 1.418A/347VAC@LED MIN 1.412A/480VAC@LED MAX-2V 1.418A/480VAC@LED MIN 1.28% Io: 1.75A: 1.749A/347VAC@LED MAX-2V 1.7644A/347VAC@LED MIN 1.749 A/480VAC@LED MAX-2V 1.765A/480VAC@LED MIN 0.857%
2	FULL POWER CURRENT RANGE	1400~1750mA	I/P: 347VAC O/P: FULL LOAD Io: 1.4A & 1.75A Ta: 25°C	1.4A / 343V 1.75A / 274.3V
3	OPEN CIRCUIT VOLTAGE (max)	350V	I/P: 347VAC O/P: NO LOAD Io: Io Adj = 1.4A Ta: 25°C	347.1V
4	CONSTANT CURRENT REGION	CH1: 137V~ 343V	I/P: 347VAC O/P: FULL LOAD Io: 1.4A & 1.75A Ta: 25°C	Io: 1.4A: 0.8V~343V/347VAC  Io: 1.75A: 0.8V~274.3V/347VAC
5	CURRENT ADJ. RANGE	CH1: 700mA~1750mA	I/P: 347VAC I/P: 480VAC O/P: LED MIN & LED MAX-2V Io: 100 KΩ Ta: 25°C	649mA~1765mA/347VAC@LED=274.3V 653mA~1775mA/347VAC@LED=137V 649mA~1764mA/480VAC@LED=274.3V 652mA~1774mA/480VAC@LED=137V
6	CURRENT RIPPLE	5% max. @rated current	I/P: 347VAC O/P: FULL LOAD Io: 1.4A & 1.75A Ta: 25°C	Io: 1.4A: 3.18%  Io: 1.75A: 2.88%
7	SET UP TIME	230VAC/ 500 ms (Max) 347VAC/ 500 ms (Max) 480VAC/ 500 ms (Max)	I/P: 230VAC I/P: 347VAC I/P: 480VAC O/P: FULL LOAD Ta: 25°C	230VAC/289ms 347VAC/242 ms 480VAC/ 229ms
		INPUT=230VAC/50HZ @ FULL LOAD@ Io: 1.4A CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=347VAC/60HZ @ FULL LOAD@ Io:1.4A CH1 : Output Voltage CH2 : AC Input Voltage	

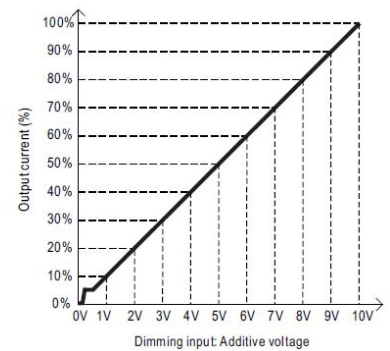
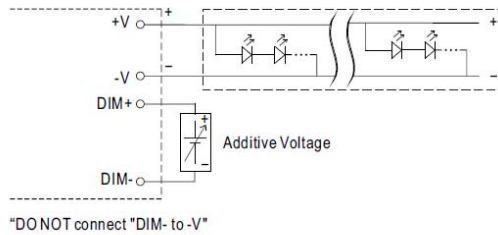


## 8 DIMMING OPERATION (for B-Type)

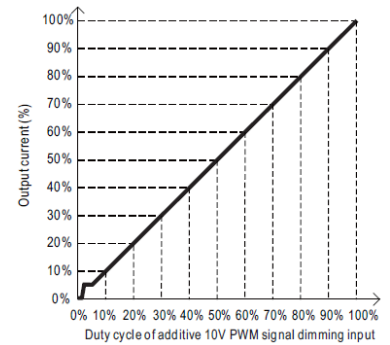
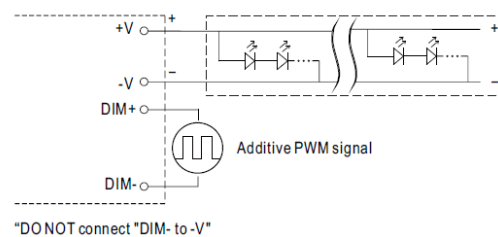
### ※3 in 1 dimming function

- ※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: 100 $\mu$  A (typ.)

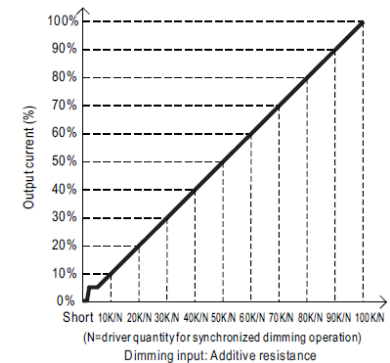
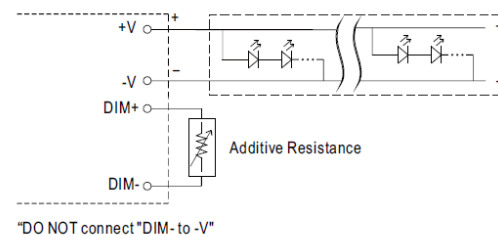
#### ◎ Applying additive 0 ~ 10VDC



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



#### ◎ Applying additive resistance:



Note : 1. Min. dimming level is about 5% and the output current is not defined when 0% < I<sub>out</sub> < 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 : 347VAC

O/P : DIMMING TEST  
TA : 25°C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.0000A	0.151A	0.283A	0.422A	0.554A	0.694A	0.834A	0.975A	1.109A	1.253A	1.392A	1.392A
%	0.00%	10.79%	20.21%	30.14%	39.57%	49.57%	59.57%	69.64%	79.21%	89.50%	99.43%	99.43%
V	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0.0000A	0.157A	0.289A	0.428A	0.567A	0.714A	0.847A	0.998A	1.130A	1.270A	1.396A	1.396A
%	0.00%	11.21%	20.64%	30.57%	40.50%	51.00%	60.50%	71.29%	80.71%	90.71%	99.71%	99.71%
PWM (100HZ)	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0.0000A	0.151A	0.283A	0.422A	0.554A	0.694A	0.834A	0.975A	1.109A	1.253A	1.392A	1.392A
%	0.00%	10.79%	20.21%	30.14%	39.57%	49.57%	59.57%	69.64%	79.21%	89.50%	99.43%	99.43%

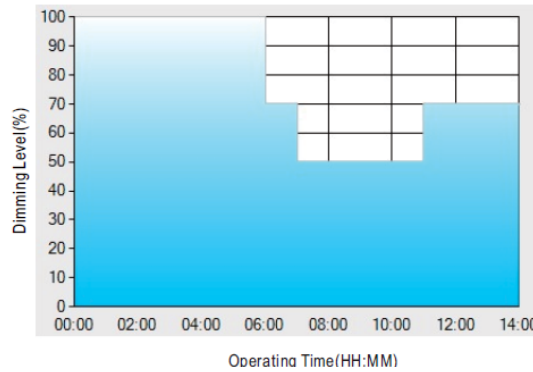
TEST RESULT : OK

**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.

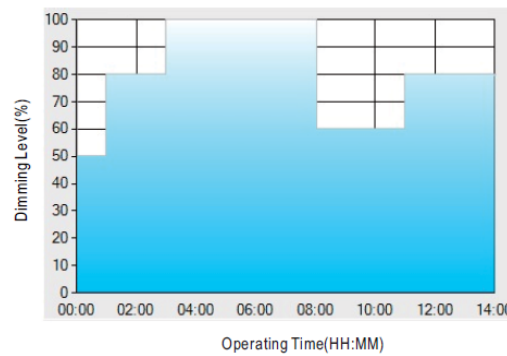
Ex: Ⓒ D01-Type: the profile recommended for residential lighting



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%

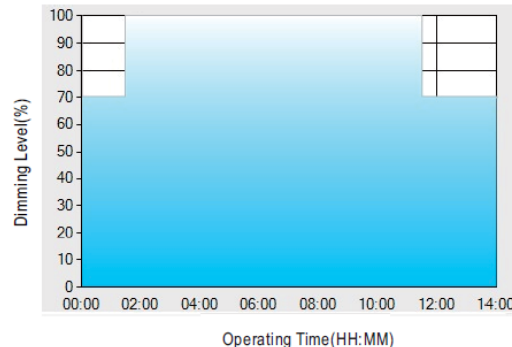
Ex: Ⓒ D02-Type: the profile recommended for street lighting



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:

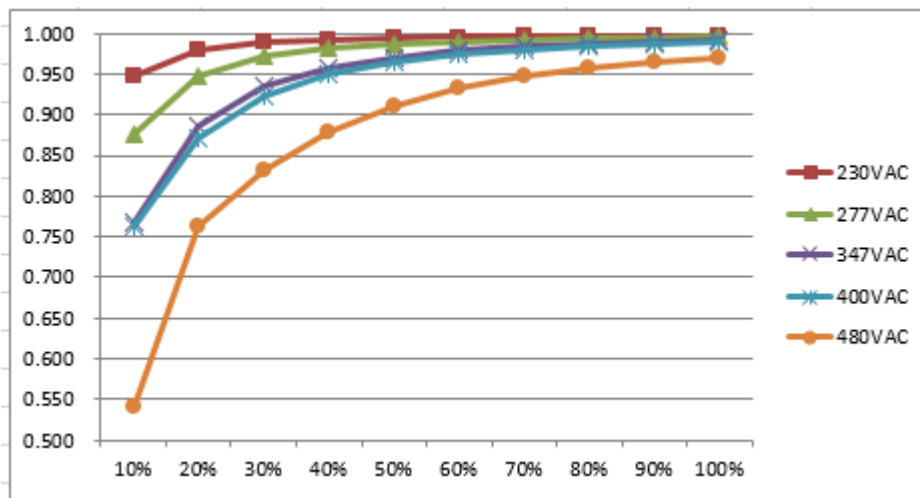
	T1	T2	T3
TIME**	01:30	11:00	---
LEVEL**	70%	100%	70%

		I/P : 347VAC O/P : DIMMING TEST TA : 25°C TEST RESULT : OK
10	DALI interface(primary side)	DALI protocol including 16 groups and 64 addresses. First step is fixed at 6% of output. I/P : 347VAC O/P : DALI TEST TA : 25°C TEST RESULT : OK

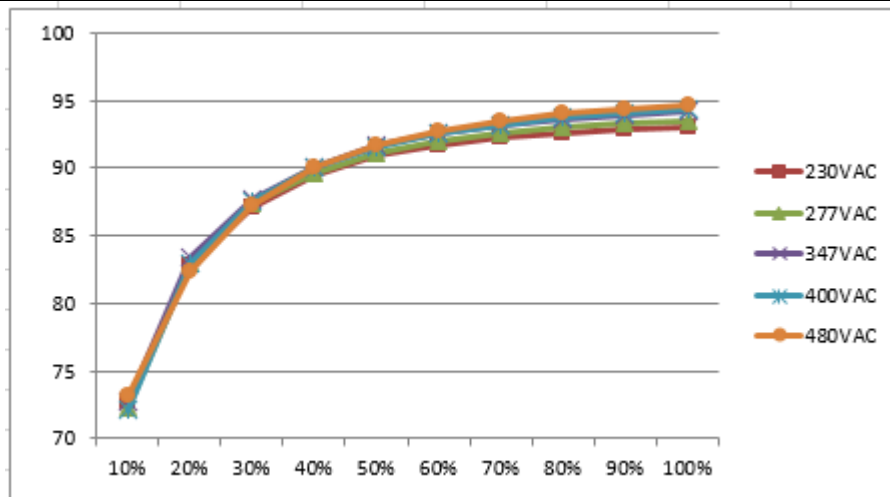
## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	158V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 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: 180 VAC ~528VAC O/P:FULL~MIN LOAD Ta:25°C	OK
3	INPUT CURRENT (TYP)	347VAC/ 1.52 A 480VAC/ 1.11A	I/P: 347VAC/480VAC O/P:FULL LOAD Ta:25°C	I =1.4850A/ 347VAC I =1.0936A/480VAC
4	POWER FACTOR(TYP)	0.98/230 VAC FULL LOAD 0.98/277 VAC FULL LOAD 0.97/347VAC FULL LOAD 0.96/400 VAC FULL LOAD 0.95/480VAC FULL LOAD	I/P: 230VAC/277VAC/347VAC/400VAC/480VAC O/P:FULL LOAD Ta:25°C	PF=0.9981/230V/100%LOAD PF=0.9972/277V/100%LOAD PF=0.9937 /347V/100%LOAD PF= 0.989/400V/100%LOAD PF= 0.9793/480V/100%LOAD

P.F vs LOAD



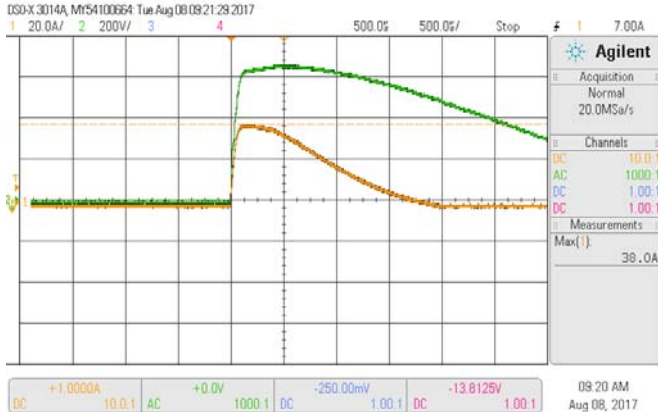
5	EFFICIENCY (TYP)	94.5%	I/P: 347VAC O/P:FULL LOAD. Ta:25°C	94.64%
	EFFICIENCY vs LOAD			



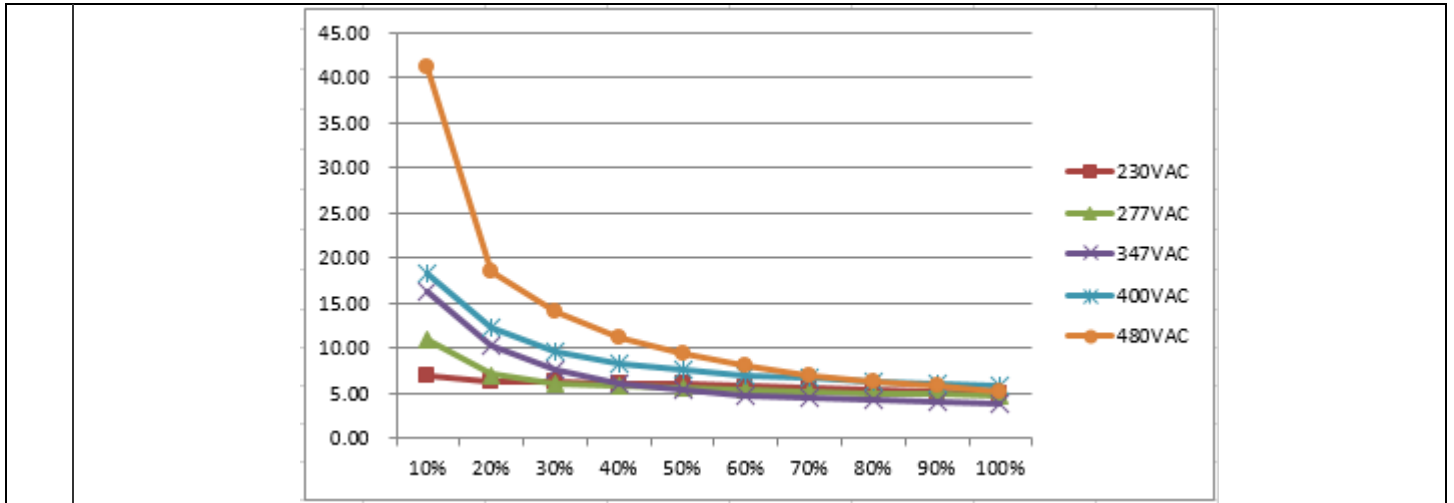
6	INRUSH CURRENT (TYP)	480V/ 40A COLD START  (twidth=1100 us measured at 50% Ipeak) COLD START	I/P: 480VAC O/P: FULL LOAD Ta: 25°C	I = 38A/480VAC  T50= 920 $\mu$ S
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INPUT=480VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current



7	TOTAL HARMONIC DISTORTION	THD < 20% output load $\geq$ 50% at 230VAC/277VAC/347VAC/400 VAC /480VAC input	I/P : 230V/277V/347V/480V/400VAC O/P : 100% LOAD 50% LOAD Ta : 25°C	THD : 4.12 %/230V 50% THD : 3.56 %/230V 100% THD : 2.43 %/277V 50% THD : 2.30 %/277V 100% THD : 4.74 %/347V 50% THD : 4.10 %/347V 100% THD : 10.36 %480V 50% THD : 7.65 %480V 100% THD : 7.86 %400V 50% THD : 6.08 %400V 100%
	THD vs LOAD			



## ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1:351V~ 381 V PROTECTION TYPE : Shut down output voltage, re-power on to recovery	I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C	361.4V/ 528VAC 361.4V/ 347VAC 361.4V/ 180VAC 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: 528 VAC I/P: 180 VAC O/P:FULL LOAD	O.T.P. Active 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: 528VAC I/P: 180 VAC O/P: FULL LOAD Io:1.4A &1.75A Ta:25°C	Io: 1.4A NO DAMAGE PROTECTION TYPE : Constant current, recovers automatically after fault condition is removed  Io: 1.75A 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	Q11 Rated 9A/ 950V	Io:1.4A I/P:High-Line +3V =531V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue I/P:Low-Line -3V = 177V O/P: (1)Full Load (2)Output Short	Io: 1.4A Q11 VDS: (1)826V (2)786V (3)794V  VDS: (1)826V (2)810V  Io: 1.75A. Q11 VDS: (1)834V (2)794V (3)786V  VDS: (1)826V (2)786V

		Q13 Rated 9A/ 950V	(3) Full Load continue <b>Io: 1.75A</b> I/P:High-Line +3V =531V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue I/P:Low-Line -3V = 177V O/P: (1)Full Load (2)Output Short (3) Full Load continue	(3)778V Q13 VDS: (1)850V (2)786V (3)770V VDS: (1)826V (2)810V (3)826V	(3)810V Q13 VDS: (1)850V (2)786V (3)786 VDS: (1) 802V (2)778 V (3) 794V
2	P.F.C Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q4 Rated 9A/ 950V	I/P:High-Line +3V =531V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue I/P:Low-Line -3V = 177V O/P: (1)Full Load (2)Output Short (3) Full Load continue	Io: 1.4A Q1 VDS: (1)V (2)802V (3)810V VDS: (1)907V (2)794V (3)899V	
3	P.F.C DIODE	D8 Rated 8 A/ 1200 V	I/P:High-Line +3V =531 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue  I/P:Low-Line -3V = 177V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25°C	(1)818V (2)754V (3)786V  (1)834V (2)802V (3)826V	
4	Diode <b>Peak Voltage</b>	D102 Rated 10 A/400 V  D114 Rated 3 A/400 V	<b>Io:1.4A /1.75A</b> I/P:High-Line +3V =531 V D102 : AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue D114 : AC ON/OFF O/P: (1) Full Load (2)Output Short (3) Full Load continue  Ta:25°C	<b>Io: 1.4A</b> <b>D102</b> VDS: (1)345V (2)3V (3)345V  D114 VDS: (1)345V (2)3V (3)345V	<b>Io: 1.75A</b> <b>D102</b> VDS: (1)272V (2)7V (3)272V  D114 VDS: (1)276V (2)7V (3)276V
5	<b>Input Capacitor Voltage</b>	C5 Rated: 150 μ/ 450V	I/P:High-Line +3V =531V 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)414V (2)414V (3)418V (4)390V	



6	<b>Control IC Voltage Test</b>	PFC IC U1 Rated 20V~10.5V(MIN.)	I/P:High-Line +3V =531 V AC ON/OFF O/P(1)FULL LOAD	Io: 1.4A (1) 13.6V (2) 13.6V (3) 13.8V (4) 13.4V (5) 13.4V	Io: 1.4A (1) 13.4V (2) 13.4V (3) 13.6V (4) 13.4V (5) 13.4V
		PWM IC U2 Rated 16V~ 8.85V(MIN.)	(2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin.LOW LINE Ta:25°C		

## 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:2.74 mA I/P-FG:1.88 mA O/P-FG:5.98mA 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:29.6G 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	28mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.28mA N-FG: 0.28mA

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	FCC Part 15 Subpart B	I/P:230/400/480VAC (50HZ/60HZ) O/P:FULL/80% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	FCC Part 15 Subpart B	I/P:230/400/480VAC (50HZ/60HZ) O/P:FULL/80% LOAD Ta:25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230/400VAC (50HZ) O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230/400VAC (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: 230/400VAC (50HZ) O/P:FULL LOAD Ta:25°C	CRITERIA A
6	Test by certified Lab & Test Report Prepare			

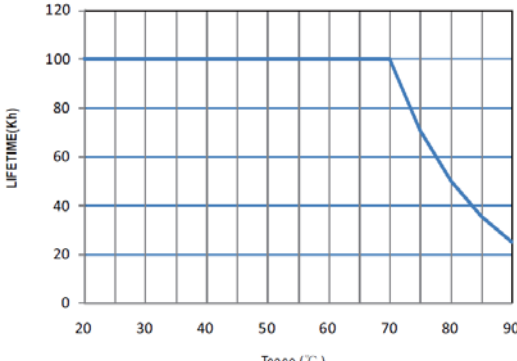
## ■ RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																								
1	TEMPERATURE RISE TEST	MODEL : HVGC-480-L 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 347VAC O/P : FULL LOAD 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 347VAC O/P : FULL LOAD																																																																																																										
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 528VAC/180VAC 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 : 538VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																								
4	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~60°C)	I/P : 347 VAC O/P : FULL LOAD	± 0.006 %/°C (0~60°C)																																																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -50°C ~ +125°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 100 CYCLE 5. Input/Output condition : STATIC		OK																																																																																																								



# 480W Single Output LED Power Supply **HVGC-480** series

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 : 16 CYCLE 5. Input/Output condition : 15cycle:347V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:347V/ 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 C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 347VAC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 347VAC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 347VAC O/P : 50% LOAD Ta= 60 °C LIFE TIME	(1) 420489 HRS (2) 56259 HRS (3) 56279HRS (4) 58035HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 286.1K hrs min. Telcordia SR-332(Bellcore) ; 72.9K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 80°C <div style="text-align: center;">  </div>	

TEST RESULT	TESTER	REVIEW	APPROVAL
<b>PASS</b>	<b>DANIEL GAO</b>	<b>SANFORD SU</b>	<b>VINCENT ZENG</b>

12.10.30 A50-F031