



# Test Report: HLG-600H-54

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600W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test  
Input Function Test  
Protection Function Test  
Control 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	RIPPLE & NOISE	V1 : 350 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 115 mVp-p (Max)
2	CONSTANT CURRENT REGION	O/P : 27 ~54V	I/P : 230VAC O/P : CV MODE Ta : 25°C	CV= 27V : 11.38A CV= 53V : 11.43A
3	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 45.9 V ~ 56.7 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	58.02 V ~ 42.983 V / 230 VAC 58.02 V ~ 42.983 V / 115 VAC
4	OUTPUT VOLTAGE TOLERANCE	V1 : -1 %~ 1 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.18 %~ 0.02 %
5	LINE REGULATION	V1 : -0.5 %~ 0.5 % (Max)	I/P : 100VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.05 %~ 0 %
6	LOAD REGULATION	V1 : -0.5 %~ 0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.09 %~ 0.06 %
7	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 92 ms 115VAC/ 68 ms
8	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 16.2 ms 115VAC/ 16 ms
9	HOLD UP TIME	230VAC : 15 ms (TYP) 115VAC : 15 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 20.8 ms 115VAC/ 20.8 ms
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : 3.33 %
11	OUTPUT CURRENT ADJ RANGE	CH1 : 5.6 A ~11.2 A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	12.112A ~4.05 A/230VAC 12.131A ~4.05 A/115Vac



# 600W Single Output Switching Power Supply

# HLG-600H series

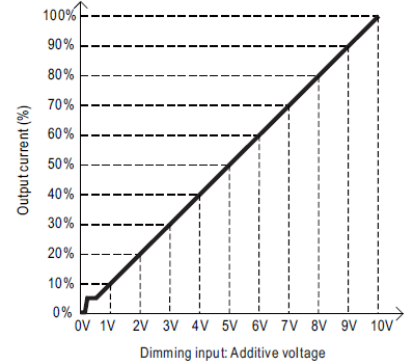
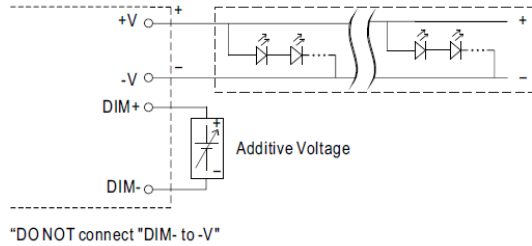
12	DYNAMIC LOAD	V1 : 5400 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1)680 (2)632 (3)656 (4)1490	mVp-p mVp-p mVp-p mVp-p
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## 13 DIMMING OPERATION

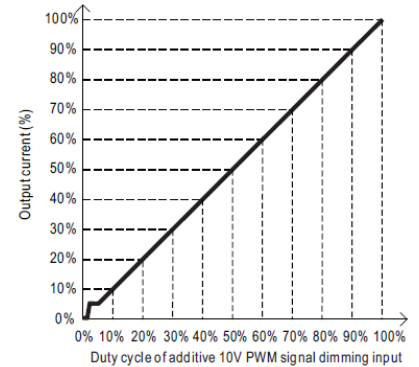
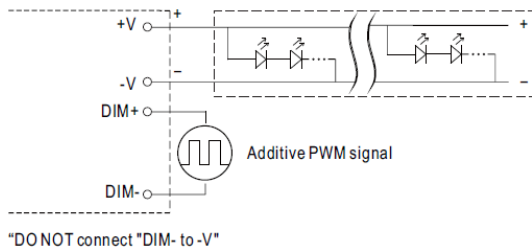
※ 3 in 1 dimming function (for B-Type)

- 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: 100 $\mu$ A (typ.)

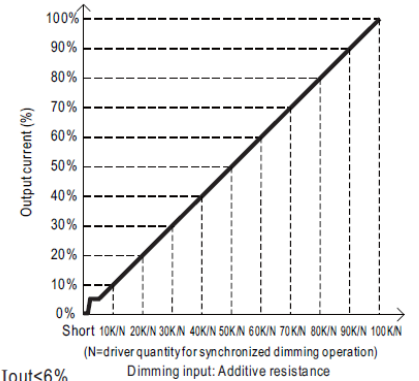
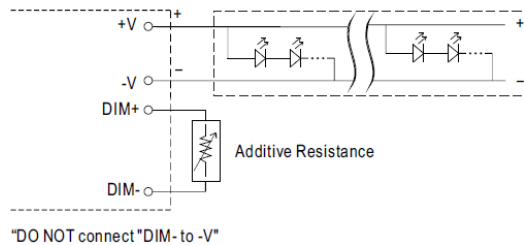
◎ Applying additive 0 ~ 10VDC



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



◎ Applying additive resistance:



Note : 1. Min. dimming level is about 6% 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 0k $\Omega$  or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P : 230VAC

O/P : DIMMING TEST

TA : 25 $^{\circ}$ C

R	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
O/P CURRENT	0	1.260A	2.420A	3.560A	4.720A	5.900A	7.000A	8.120A	9.200A	10.500A	11.400A	11.500A
%	0%	11.25%	21.61%	31.79%	42.14%	52.68%	62.50%	72.50%	82.14%	93.75%	101.79%	102.68%
V	SHORT	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
O/P CURRENT	0	1.240A	2.520A	3.640A	4.720A	5.920A	6.960A	8.160A	9.360A	10.400A	11.400A	11.500A
%	0%	11.07%	22.50%	32.50%	42.14%	52.86%	62.14%	72.86%	83.57%	92.86%	101.79%	102.68%
PWM (100HZ)	SHORT	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
O/P CURRENT	0	1.180A	2.450A	3.640A	4.800A	6.000A	7.160A	8.280A	9.360A	10.400A	11.400A	11.500A
%	0%	10.54%	21.88%	32.50%	42.86%	53.57%	63.93%	73.93%	83.57%	92.86%	101.79%	102.68%

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°C  I/P : LOW-LINE-3V= 87 V (PLEASE CHECK DERATING CURVE) HIGH-LINE+10V=315 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	69.325 V~305V  TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100 VAC ~ 305 VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.98 / 115 VAC(TYP) 0.93 / 277 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.977 / 230 VAC PF= 0.995 / 115 VAC PF= 0.961 / 277 VAC
4	EFFICIENCY	96% (TYP) 96% (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	96.15 % 96.18 %
5	INPUT CURRENT	277V/ 2.9 A (TYP) 230V/ 3.3 A (TYP) 115V/ 7 A (TYP)	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 2.3525 A/ 277 VAC I = 2.7919 A/ 230 VAC I = 5.6518 A/ 115 VAC
6	INRUSH CURRENT	230V/ 70 A (TYP) (twidth=1000us measured at 50% Ipeak) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 54.4 A/ 230 VAC T50= 990 us
7	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.32 mA N-FG : 0.32 mA
8	NO LOAD CONSUMPTION	< 0.5 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD AT REMOTE OFF Ta : 25°C	< 0.2 W < 0.3 W
9	TOTAL HARMONIC DISTORTION	THD< 20% when output loading ≥ 50% at 115VAC/230VAC input and output loading ≥ 75% at 277VAC input	I/P : 115VAC I/P : 230VAC O/P : 50% LOAD Ta : 25°C  I/P : 277VAC O/P : 75% LOAD Ta : 25°C	THD : 10.08 THD : 9.57  THD : 12.57

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95% ~108 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	101.27%/ 230 VAC 101.27%/ 115 VAC Constant current limiting, recovers automatically after fault condition is removed

2	OVER VOLTAGE PROTECTION	CH1 : 59 V~63 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	61.34V/ 230 VAC 61.34V/ 115 VAC Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed

### CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	REMOTE CONTROL	Power on : "Hi" (Open circuit) or ">2 ~ 5V" Power off : "Low" (Short circuit) or "<0 ~ 0.5V"	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	1.45 V~5 V POWER ON 0 V~1.3 V POWER OFF
2	5V STANDBY	5V@0.5A TOLERANCE±5% RIPPLE 100mVp-p	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	4.958V 26mVp-p/230 VAC 4.957V 26mVp-p/115 VAC

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 12 Rated 600 V/ 20 A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 462 V (2) 452 V (3) 444 V
2	Diode Peak Voltage	Q100 Rated 150 V /117 A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 118 V (2) 112 V (3) 116 V
3	Input Capacitor Voltage	C5 Rated 220 u / 450V/105 °C SURGE VOLTAGE 495V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 442 V (2) 440 V (3) 452 V
4	Control IC Voltage Test	U 2 Rated MAX 16 V MIN 8.85V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 13.9 V (2) 13.9 V (3) 14.1 V
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 600V /20.2 A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 464 V (2) 454 V (3) 464 V

## ■ SAFETY & E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 4KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 3.41 mA I/P-FG : 2.88 mA O/P-FG : 3.62 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°C/70% RH	I/P-O/P : 30 GΩ I/P-FG : 17.1 GΩ O/P-FG : 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C /70% RH	21 mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASSC	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 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. 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-600H-24				
		1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 29 °C				
		2. HIGH AMBIENT BURN-IN : 14.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 61.9 °C				
			NO	Position	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta= 61.9 °C
			1	BD1	66.7°C	95.9°C
			2	C10	63.4°C	92.7°C
			3	ZNR3	64.0°C	93.3°C
			4	C2	60.3°C	89.7°C
			5	LF3	61.2°C	90.6°C
			6	Q1	63.6°C	93.0°C
			7	L2	65.6°C	95.6°C
			8	L3	65.6°C	95.6°C
			9	T1	72.5°C	103.8°C
			10	T2	69.3°C	99.9°C
			11	C5	61.0°C	90.4°C
			12	RTH2	62.8°C	92.7°C
			13	D9	65.8°C	96.0°C
			14	Q13	65.5°C	95.9°C
			15	C115	64.9°C	96.0°C
			16	C124	63.4°C	94.3°C
			17	C140	59.2°C	89.0°C
			18	LF100	64.0°C	95.0°C
			19	U1	59.0°C	88.5°C
			20	U2	59.9°C	89.1°C
			21	C560	62.6°C	92.0°C
	22	C562	62.6°C	92.4°C		
	23	C510	62.0°C	91.5°C		
	24	C523	62.4°C	91.6°C		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230VAC/115VAC O/P : 95 % LOAD Ta= -45°C	TEST : OK		
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55 °C NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H	TEST : OK		
4	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~55°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.01 %/°C (0~55°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		



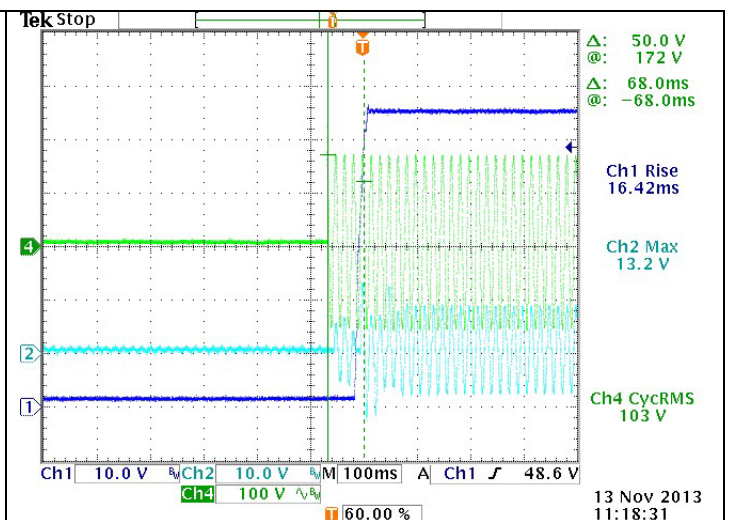
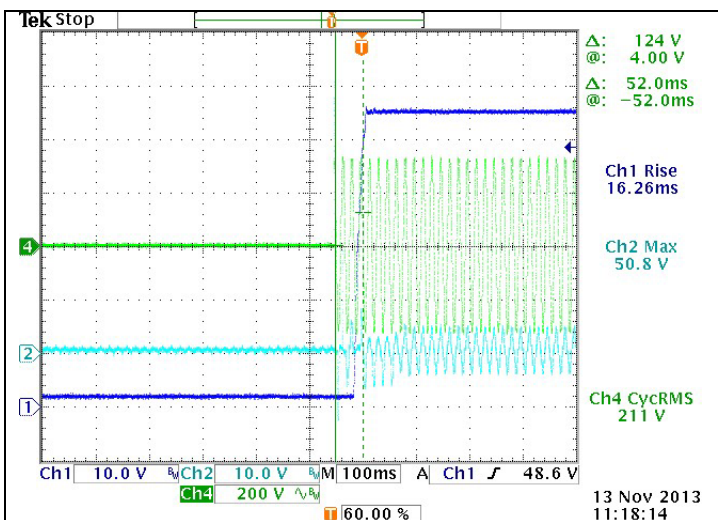


6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +60°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK
7	VIBRATION TEST	1 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	HLG-600H-12 : SUPPOSE C115 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) 76146HRS (2) 90715HRS (3) 108717HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 913.4K hrs min. Telcordia SR-332 (Bellcore) ; 76.9K 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	

Auto Test System Data

Model Name : HLG-600H-54

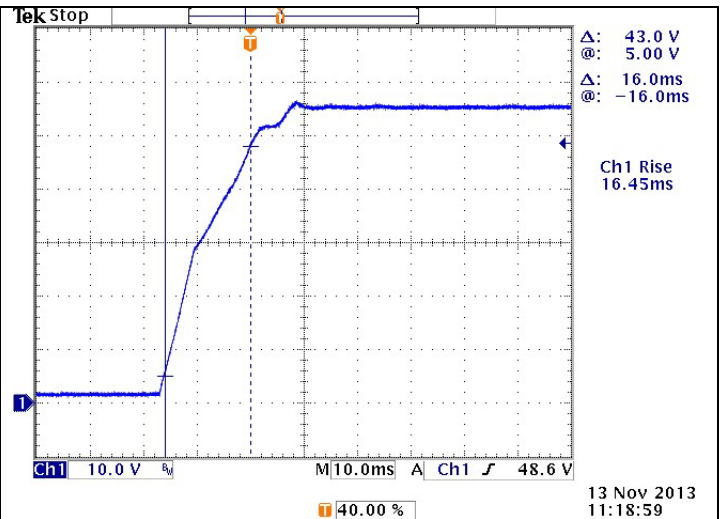
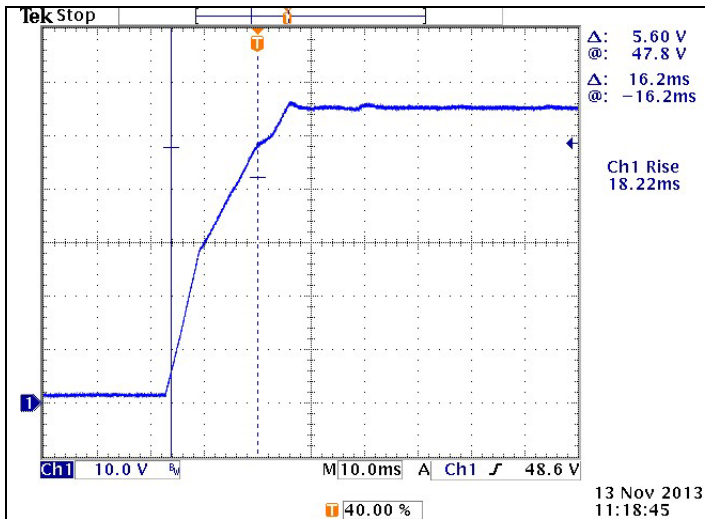
SETUP TIME		SPEC :	230Vac:	500	Unit:(ms)
Test Condition			115Vac:	500	
Vin(Vac)	Fin(HZ)	TEST RESULT		VERDICT	
230	60	52.00		PASS	
115	60	68.00		PASS	





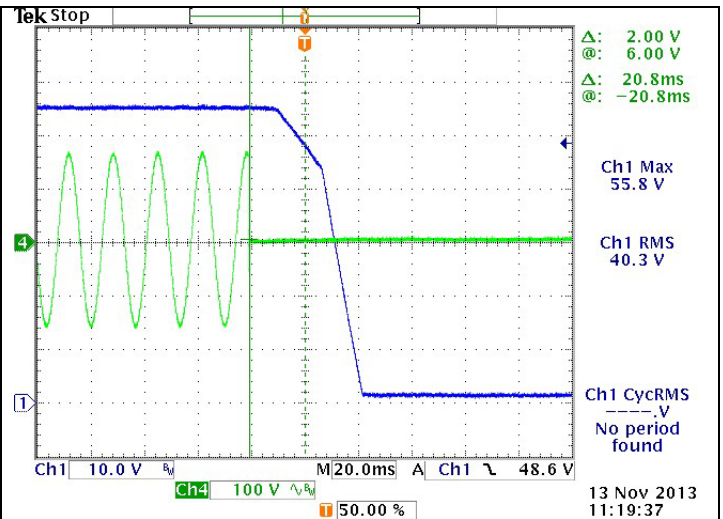
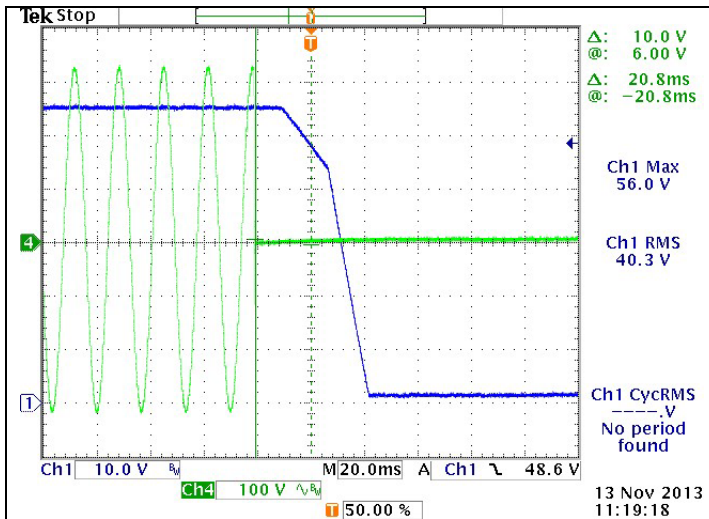
Extended Name = Normal-H Vac/60Hz @ Full LOAD SET UP TIME & Inrush Current TEST INPUT=230VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : Inrush Current CH4 : AC Input Voltage	Extended Name = Normal-L Vac/60Hz @ Full LOAD SET UP TIME & Inrush Current TEST INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : Inrush Current CH4 : AC Input Voltage
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RISE TIME		SPEC :	230Vac:	80	Unit:(ms)
Test Condition			115Vac:	80	
Vin(Vac)	Fin(HZ)	TEST RESULT		VERDICT	
230	60	16.20		PASS	
115	60	16.00		PASS	



Extended Name = Normal-H Vac/60Hz @ Full LOAD CH1:Vout Rise Time Test INPUT=230VAC/60HZ @ FULL LOAD CH1 : Output Voltage	Extended Name = Normal-L Vac/60Hz @ Full LOAD CH1:Vout Rise Time Test INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage
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HOLD UP TIME		SPEC :	230Vac:	15	Unit:(ms)
Test Condition			115Vac:	15	
Vin(Vac)	Fin(HZ)	TEST RESULT		VERDICT	
230	60	20.80		PASS	
115	60	20.80		PASS	



Extended Name = Normal-H Vac/60Hz @ Full LOAD  
 Hold up Time Test  
 INPUT=230VAC/60HZ @ FULL LOAD  
 CH1 : Output Voltage  
 CH4 : AC Input Voltage

Extended Name = Normal-L Vac/60Hz @ Full LOAD  
 Hold up Time Test  
 INPUT=115VAC/60HZ @ FULL LOAD  
 CH1 : Output Voltage  
 CH4 : AC Input Voltage

Efficiency Test										SPEC:	230VAC:	96	Unit:(%)
Test Condition		TEST RESULT											
Vin(Vac)	Fin(HZ)	MIN Load	10% Load	20% Load	30% Load	40% Load	50% Load	60% Load	70% Load	80% Load	90% Load	100% Load	
230	50	0.00	88.31	93.57	94.79	95.49	95.79	95.96	96.10	96.16	96.19	96.15	
230	60	0.00	88.51	93.62	94.79	95.43	95.79	95.96	96.00	96.15	96.20	96.15	
115	50	0.00	87.51	92.61	93.69	94.29	94.63	94.78	94.76	94.85	94.76	94.63	
115	60	0.00	87.58	92.61	93.71	94.32	94.66	94.76	94.74	94.84	94.82	94.64	
277	50	0.00	88.27	90.83	94.54	95.31	95.66	96.00	96.13	96.16	96.22	96.21	
277	60	0.00	88.21	90.71	94.57	95.32	95.63	95.99	96.11	96.15	96.21	96.18	

PF Test										SPEC:	230VAC:	0.95	Unit:( )
										SPEC:	115VAC:	0.98	
										SPEC:	277VAC:	0.93	
Test Conditon		TEST RESULT											
Vin(Vac)	Fin(HZ)	MIN Load	10% Load	20% Load	30% Load	40% Load	50% Load	60% Load	70% Load	80% Load	90% Load	100% Load	
230	50	0.090	0.698	0.857	0.916	0.947	0.963	0.970	0.974	0.976	0.978	0.978	
230	60	0.074	0.644	0.819	0.892	0.932	0.951	0.963	0.968	0.972	0.975	0.977	
115	50	0.140	0.951	0.980	0.988	0.992	0.992	0.994	0.994	0.993	0.998	0.995	
115	60	0.250	0.938	0.976	0.986	0.991	0.991	0.993	0.994	0.993	0.998	0.995	
277	50	0.058	0.595	0.782	0.858	0.901	0.927	0.942	0.951	0.956	0.962	0.965	
277	60	0.043	0.543	0.734	0.821	0.876	0.910	0.928	0.941	0.949	0.956	0.961	

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

12.10.30 A50-F031