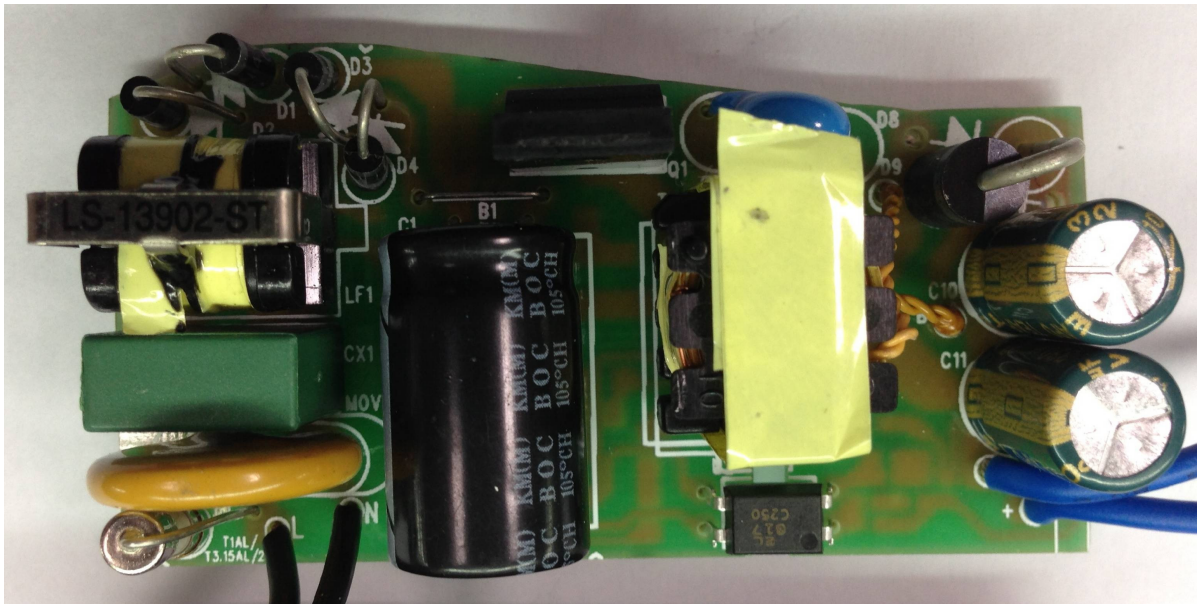
12W Adapter Demo Board Base on PWM Controller GR8830E



GR8830E --- 12V/1A

Contents

1 Test Equipments

Name	Mark
AC Source	Chroma 61502
Oscilloscope	LeCroy WaveJet 314
Power Meter	WT210
Electronic Load	Chroma 63102
True RMS Multimeter	Fluke 45

2 Demo Board Specification

Parameter	Specification
Input Voltage	90Vac~264Vac
Input Frequency	47Hz~63Hz
Output Voltage and Current	12V/1A
Output Power	12W
Efficiency	> 83%

3 Demo Board Test Item List

All test conditions is base on ambient temperature 25℃;

Test item	Specification	Result
Input current (90V/60Hz~130V / 60Hz)	---	NA
Input current (180V/50Hz~264V / 50Hz)	---	NA
Standby power (90V/60Hz, 115V/60Hz, 230V/50Hz, 264V/50Hz)	<75mW	**PASS**
Efficiency	>83%	**PASS**
Ripple & Noise	<1.5%	**PASS**
Line regulation	<0.5%	**PASS**
Load regulation	<3%	**PASS**
Dynamic (Peak-Peak, I_load=10%-100%)	<5%	**PASS**
Overshoot	<5%	**PASS**
Turn on time	<3S	**PASS**
Hold up time	>10ms	**PASS**
Output rising time	---	NA
Output falling time	---	NA
Voltage stress on mosfet	<600V	**PASS**
Voltage stress on secondary rectifiers	<60V	**PASS**
Over voltage protection (Vcc)	---	NA
Current limit	<1.5A	**PASS**

4 Electronic Characteristics Test Items List

All test conditions is base on ambient temperature 25℃;

4.1 Standby Power

Test Condition:

Test input Power with No load.

- AC to startup resistance test data and results are as follows.

AC IN	P_out (W)	V_out (V)	I_in (mA)	P_in (mW)	Spec	Result
$90V_{AC}$/60Hz	0	*12.227*	*3.87*	*41.4*	< 75mW	***PASS***
$115V_{AC}$/60Hz	0	*12.227*	*4.63*	*40.3*		
$230V_{AC}$/50Hz	0	*12.227*	*7.46*	*51.5*		
$264V_{AC}$/50Hz	0	*12.227*	*8.53*	*57.3*		

- Bulk cap to startup resistance test data and results are as follows.

AC IN	P_out (W)	V_out (V)	I_in (mA)	P_in (mW)	Spec	Result
$90V_{AC}$/60Hz	0	*12.227*	*3.91*	*43.0*	< 75mW	***PASS***
$115V_{AC}$/60Hz	0	*12.227*	*4.67*	*43.2*		
$230V_{AC}$/50Hz	0	*12.227*	*7.49*	*63.5*		
$264V_{AC}$/50Hz	0	*12.227*	*8.57*	*73.1*		

4.2 Efficiency

Energy Star Test Condition

According to Energy Star, We chose input voltage value, including 90V, 115V, 230V, 264V, and 25%, 50%, 75%, Full Load Current, Then Calculate the efficiency and Average efficiency

Test data and results are as follows:

- AWM 24 AWG wire (150 cm) output voltage test data and results are as follows:

I_Load / AC IN	25%	50%	75%	100%	AVG (%)	Spec	Result
90V_{AC}/60Hz	*85.24*	*85.33*	*83.33*	*82.25*	*84.04*	-	-
115V_{AC}/60Hz	*85.00*	*84.03*	*84.67*	*83.40*	*84.27*	*> 83%*	***PASS***
230V_{AC}/50Hz	*83.38*	*85.45*	*85.23*	*83.52*	*84.39*		***PASS***
264V_{AC}/50Hz	*82.48*	*83.36*	*82.04*	*81.86*	*82.43*	-	-

5 Ripple & Noise

Test Condition:

The ripple & noise are measured by using 20MHz bandwidth Limited oscilloscope with a 10uF low impedance electronic capacitor and a 0.1uF Ceramic capacitor.

Test data and results are as follows:

AC IN	Load	V(p-p)	Spec	Note	Result
$90V_{AC}$/47Hz	No Load	*11.2mV*	<1.5%	Figure 1	***PASS***
	Full Load	*26.2mV*		Figure 2	***PASS***
$264V_{AC}$/50Hz	No Load	*15.0mV*		Figure 3	***PASS***
	Full Load	*17.5mV*		Figure 4	***PASS***

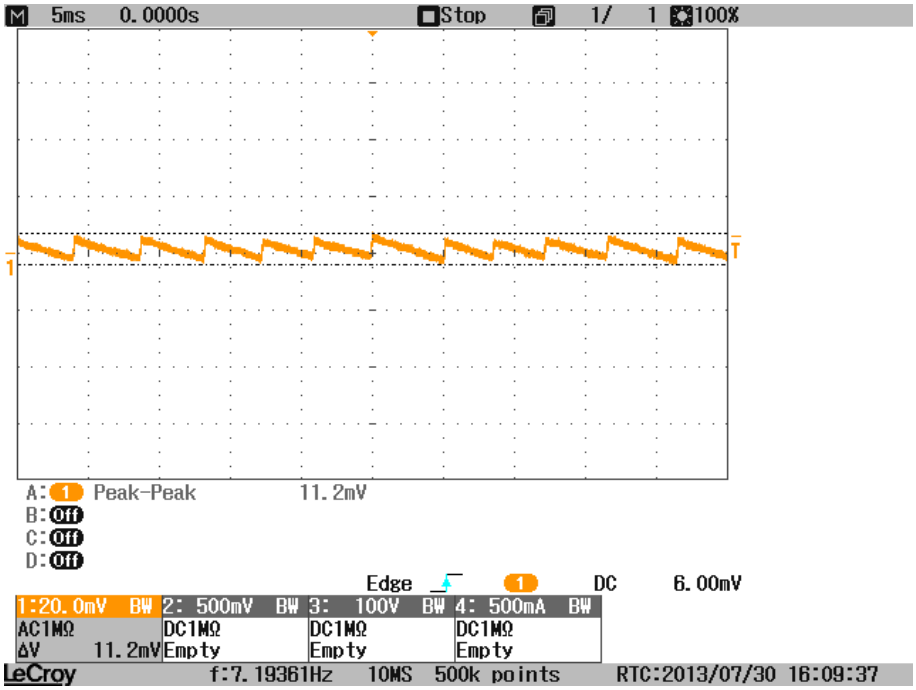


Figure 1 The waveform of Ripple & Noise at Vin=90Vac/47Hz & No-load

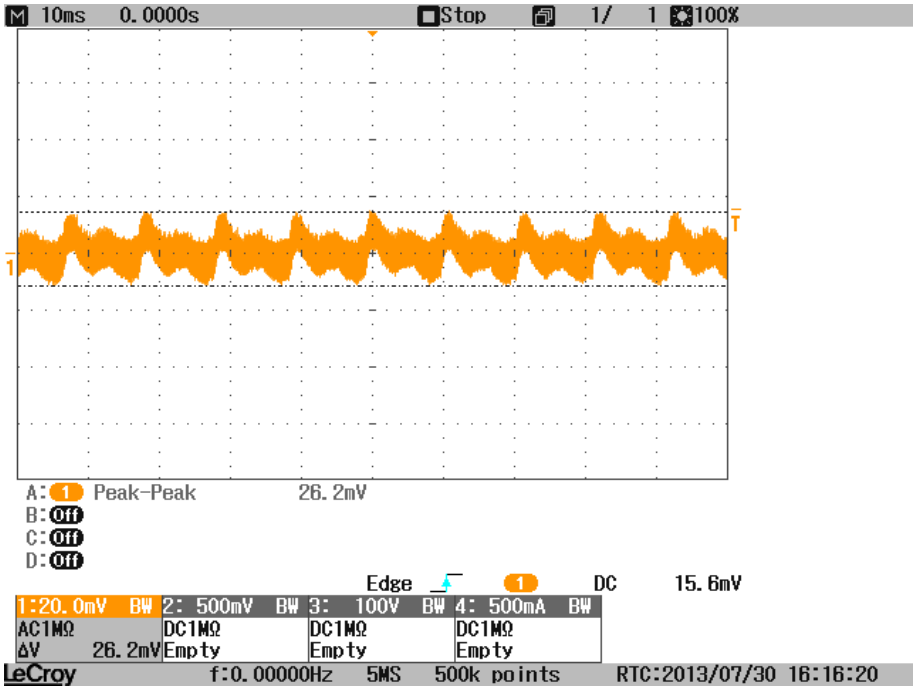


Figure 2 The waveform of Ripple & Noise at Vin = 90Vac/47Hz & full-load

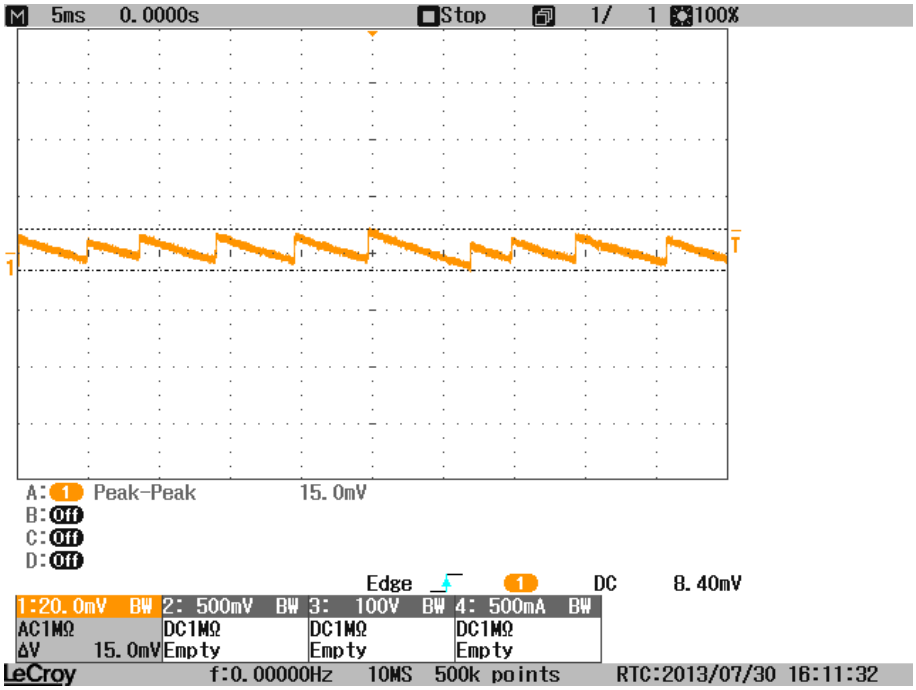


Figure 3 The waveform of Ripple & Noise at Vin=264Vac/50Hz & No-load

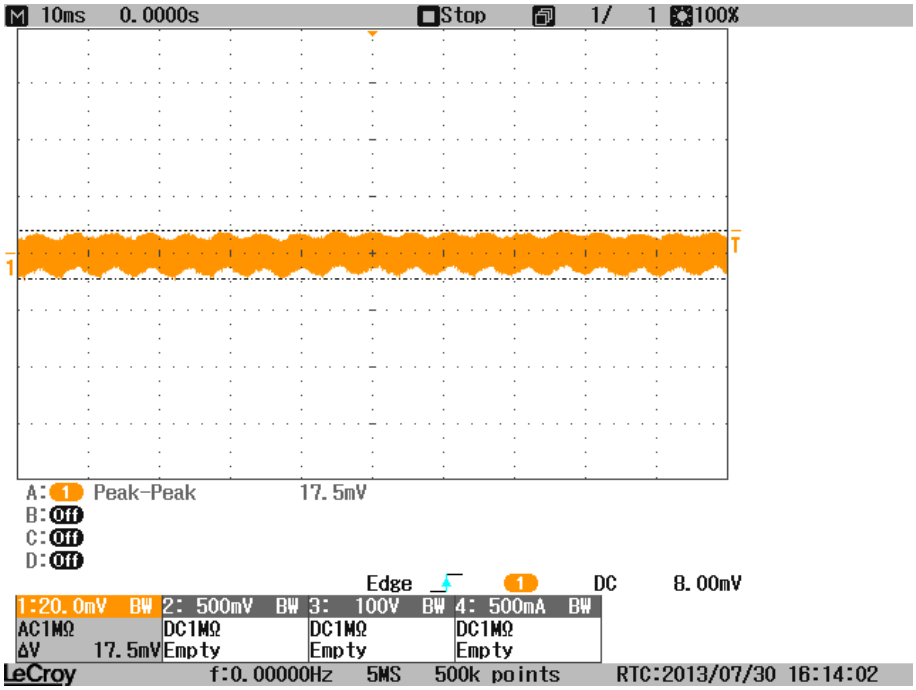


Figure 4 The waveform of Ripple & Noise at Vin = 264Vac/50Hz & full-load

5.1 Line & Load Regulation

Test Condition:

Test point is at PCB end.

Test data and results are as follows:

AC IN	Vo (V) 25% Load	Vo (V) 50% Load	Vo (V) 100%Load	Spec.	Result
90V_{AC}/60Hz	*12.153*	*12.068*	*11.897*	-	-
115V_{AC}/60Hz	*12.153*	*12.068*	*11.898*	-	-
230V_{AC}/50Hz	*12.152*	*12.068*	*11.898*	-	-
264V_{AC}/50Hz	*12.153*	*12.067*	*11.897*	-	-
Line Regulation	*0.008%*			< 0.5%	***PASS***
Load Regulation	*2.143%*			< 3%	***PASS***

5.2 Dynamic Response Test

Test Condition:

Vo (p-p) Means Output Voltage peak to peak Value , Load Current From 10% to 100%, rising slew rate=0.8A/uS, Pulse Width Time equal 1mS

Test data and results are as follows:

AC IN	Vo(max)	Vo(min)	Spec	Note	Result
90V_{AC}/47Hz	*12.2V*	*11.8V*	<5%	Figure 5	***PASS***
264V_{AC}/50Hz	*12.2V*	*11.8V*		Figure 6	***PASS***

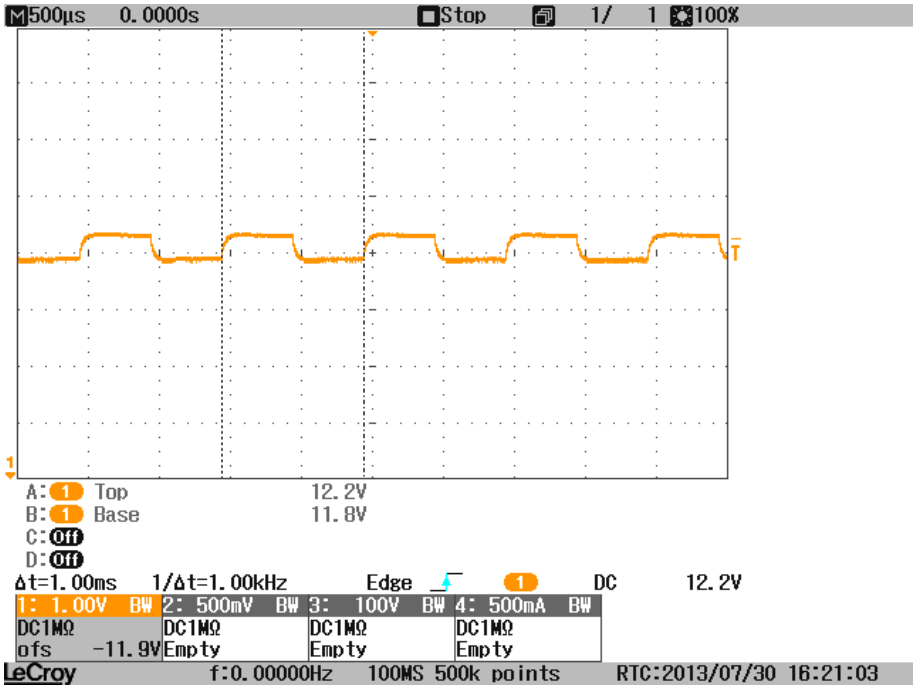


Figure 5 The waveform of Dynamic Response at Vin = 90Vac/47Hz & full-load

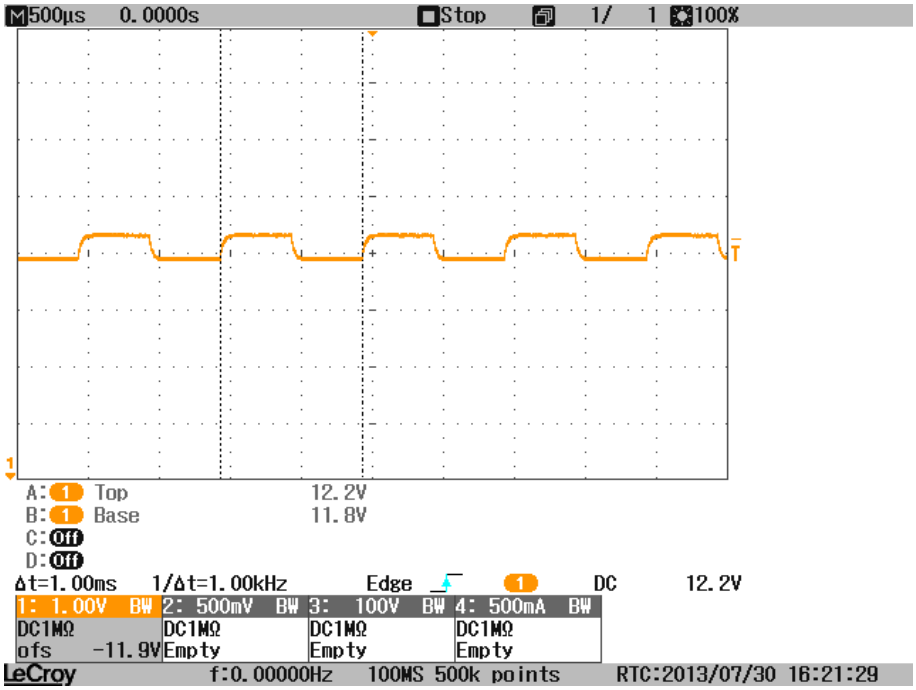


Figure 6 The waveform of Dynamic Response at Vin = 264Vac/50Hz & full-load

5.3 Over Shoot

Test Condition:

Test data and results are as follows:

AC IN	Load	Test Data	Spec	Note	Result
90V_{AC}/47Hz	No Load	*1.03%*	<5%	Figure 7-1	***PASS***
	Full Load	*3.17%*		Figure 7-2	***PASS***
264V_{AC}/50Hz	No Load	*0.51%*		Figure 8-1	***PASS***
	Full Load	*3.17%*		Figure 8-2	***PASS***

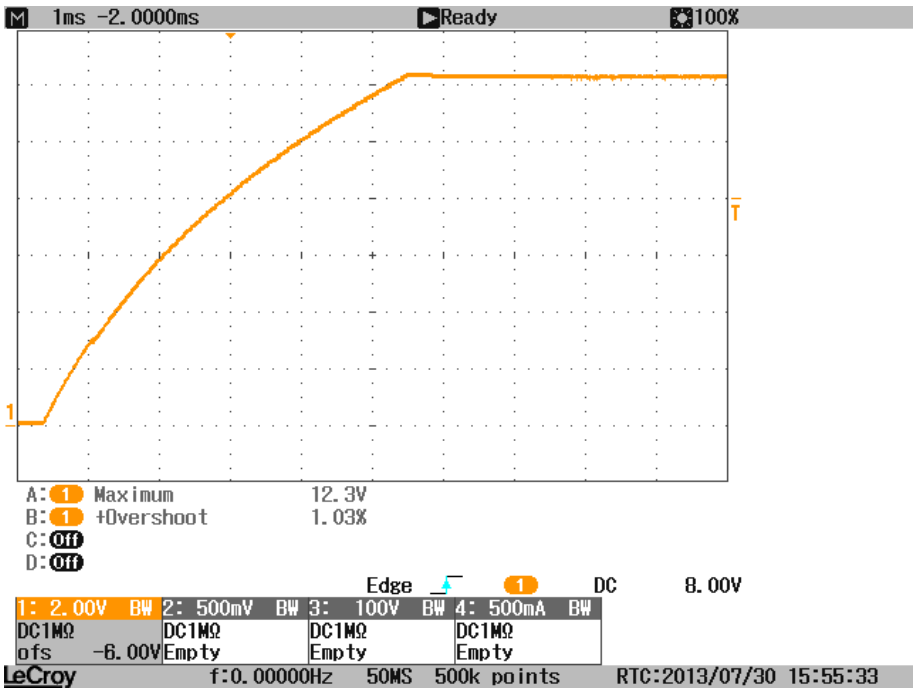


Figure 7-1 The waveform of Over shoot at Vin = 90Vac/60Hz & No-load

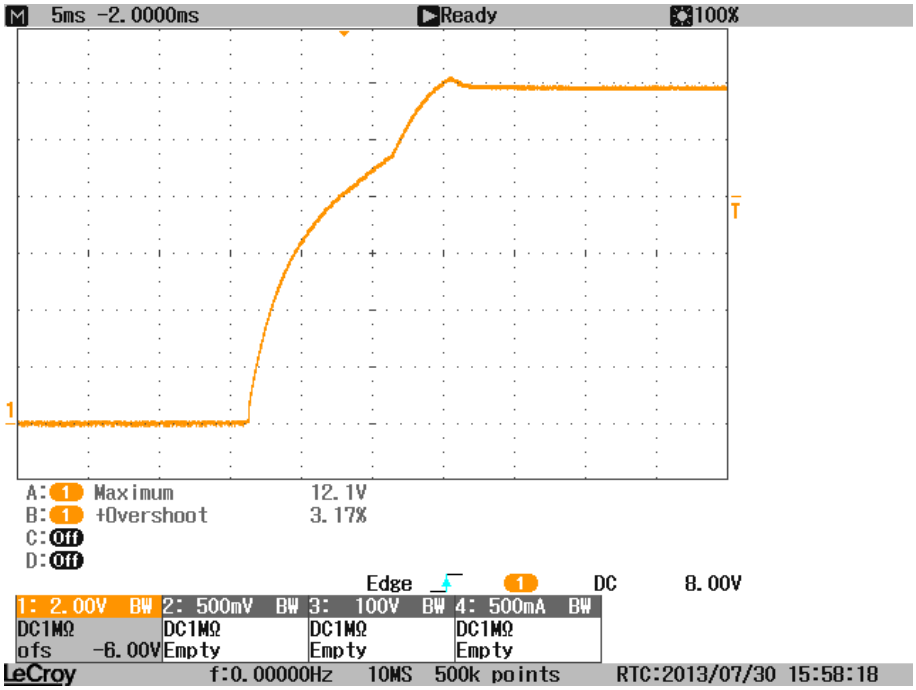


Figure 7-2 The waveform of Over shoot at Vin = 90Vac/60Hz & Full-load

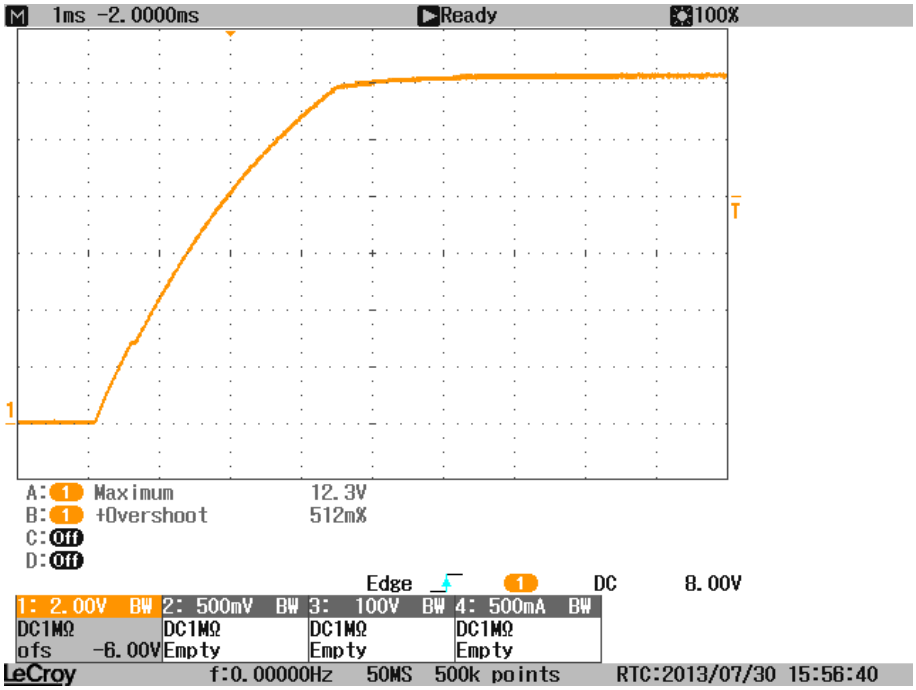


Figure 8-1 The waveform of Over Shoot at Vin = 264Vac/50Hz & No-load

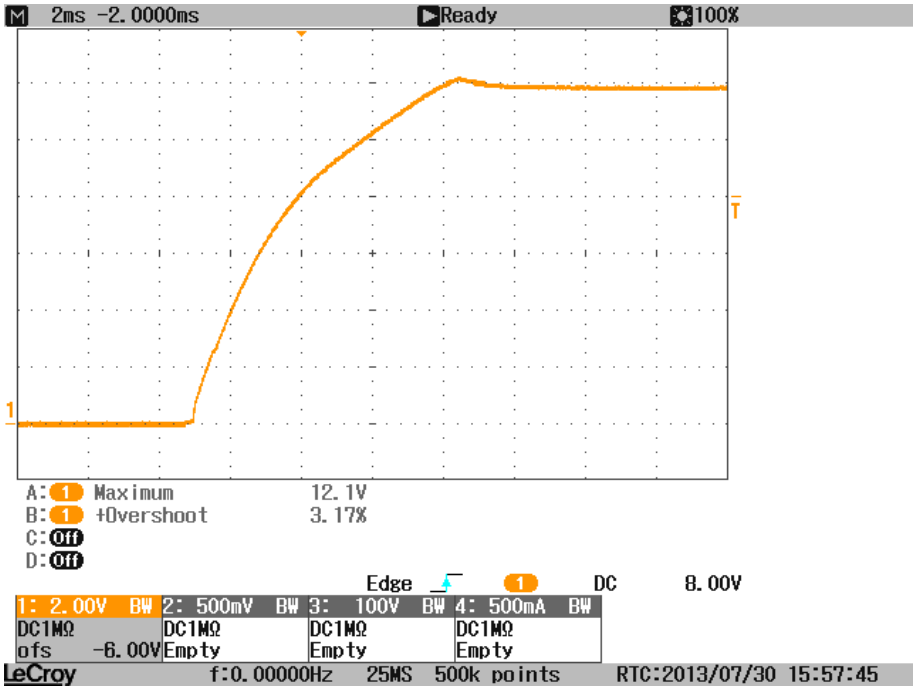


Figure 8-2 The waveform of Over Shoot at Vin = 264Vac/50Hz & Full-load

5.4 Time Sequence Characteristic

Test Condition:

Turn on delay time; Hold up time is all base on full load.

- AC to startup resistance test data and results are as follows.

Item	AC IN	Time	Spec	Note	Result
Turn on delay time	90V_{AC}/47Hz	*1.72 S*	<3 S	Figure 9	***PASS***
Hold up time	115V_{AC}/60Hz	*12.6 mS*	>10 ms	Figure 10	***PASS***

- Bulk cap to startup resistance test data and results are as follows.

Item	AC IN	Time	Spec	Note	Result
Turn on delay time	90V_{AC}/47Hz	*1.11 S*	<3 S	Figure 11	***PASS***

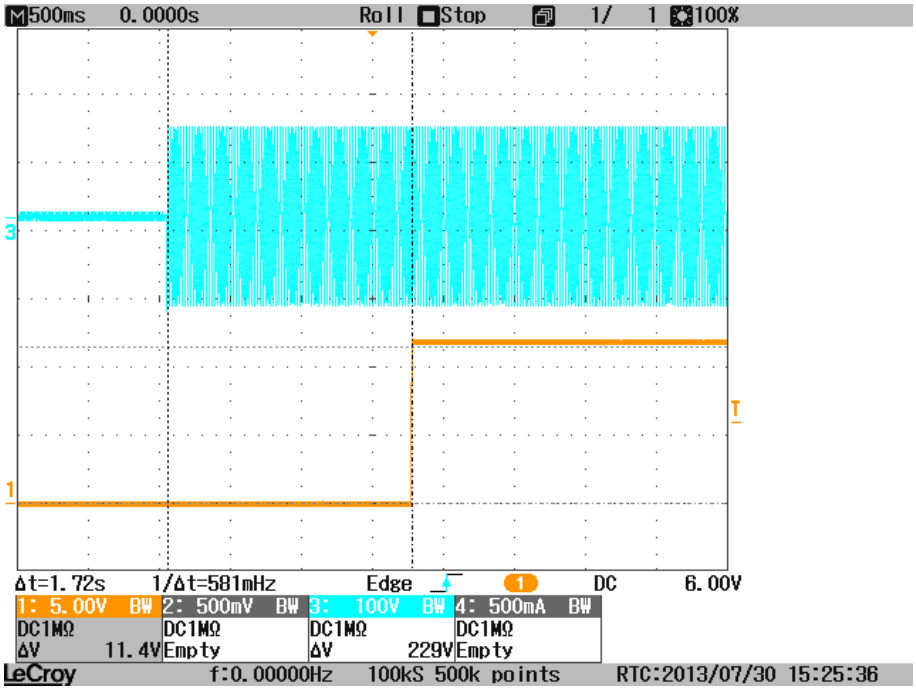


Figure 9 The waveform of Turn on Time at Vin=90Vac/47Hz & full-load

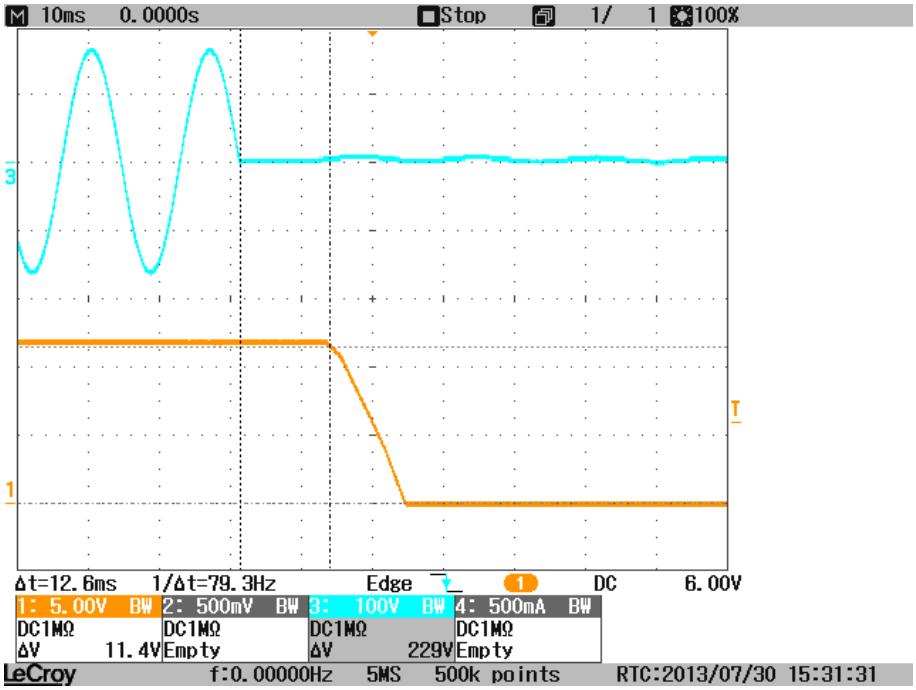


Figure 10 The waveform of Hold up Time at Vin = 115Vac/60Hz & full-load

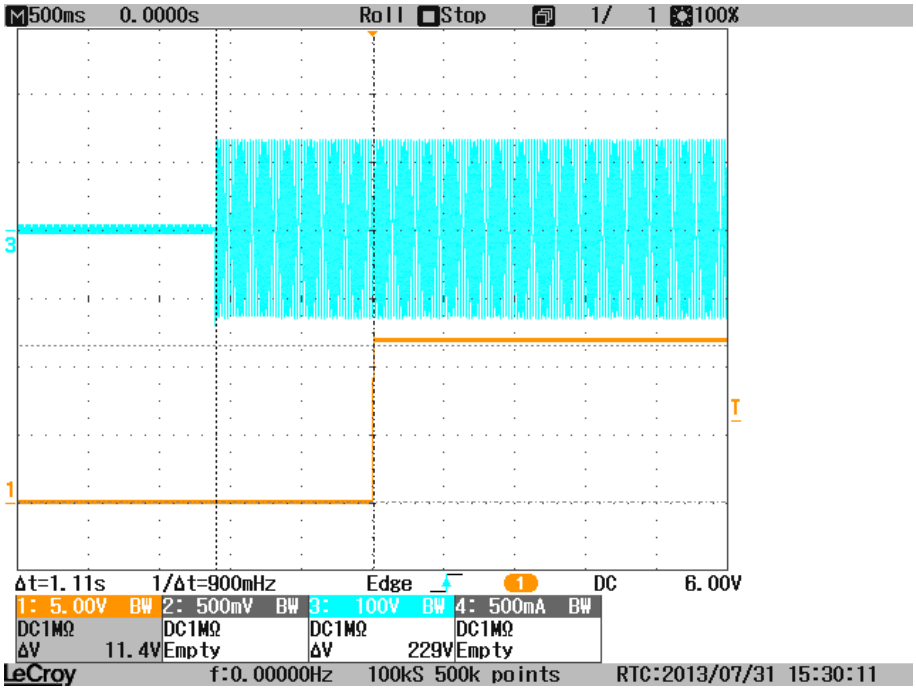


Figure 11 The waveform of Turn on Time at Vin=90Vac/47Hz & full-load

5.5 Voltage stress on MOSFET

Test Condition:

- Measure the voltage on MOSFET full load

AC IN	State	Stress on MOSFET	Spec	Note	Result
264V_{AC}/50Hz	Normal	*565V*	<600V	Figure17	***PASS***
	Startup	*568V*		Figure18	***PASS***

- Measure the voltage on secondary rectifiers full load

AC IN	State	Stress on Rectifier	Spec	Note	Result
264V_{AC}/50Hz	Normal	*52.8V*	<60V	Figure19	***PASS***
	Startup	*52.5V*		Figure20	***PASS***

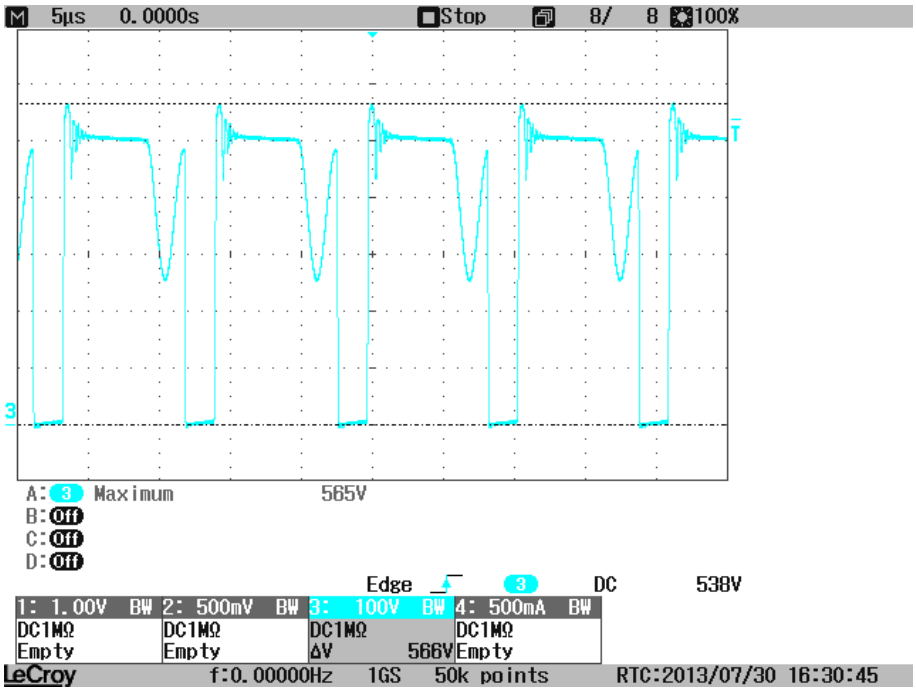


Figure 17 The waveform of Drain at Vin = 264Vac/50Hz & full-load

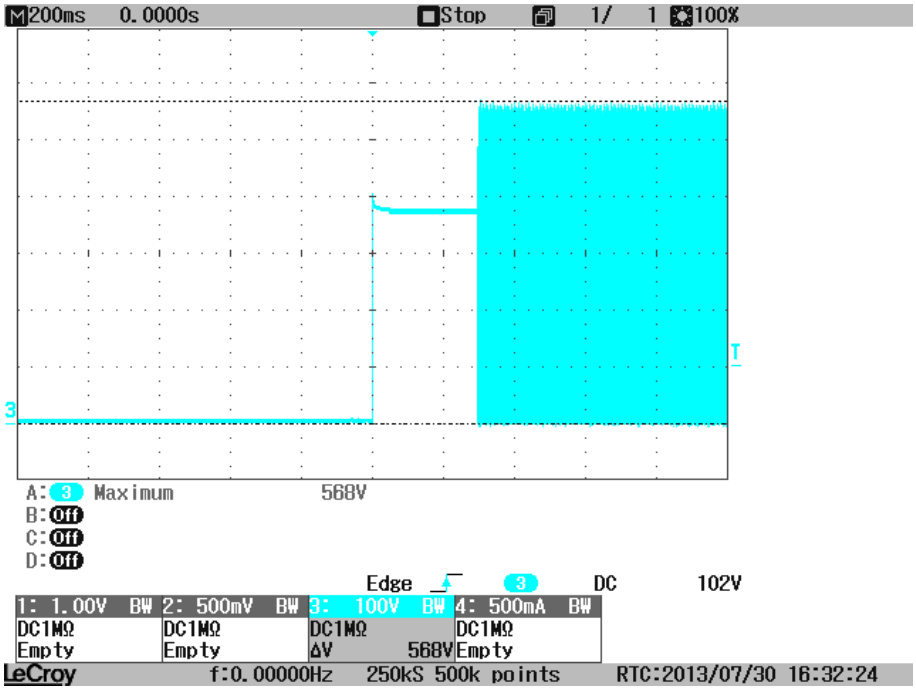


Figure 18 The waveform of Drain at Vin = 264Vac/50Hz & full-load Startup

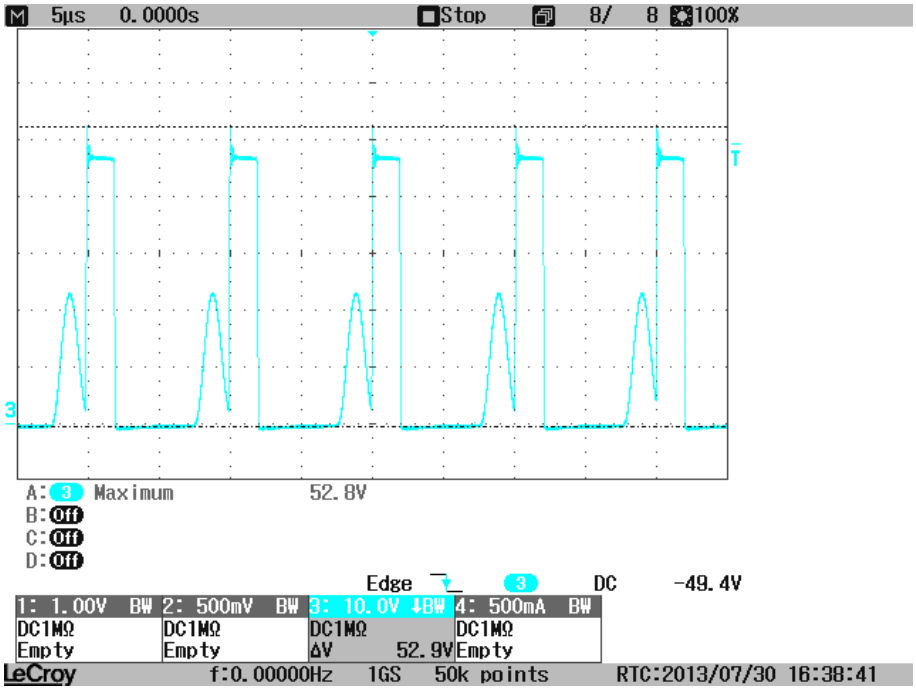


Figure 19 The waveform of rectifier at Vin = 264Vac/50Hz & full-load

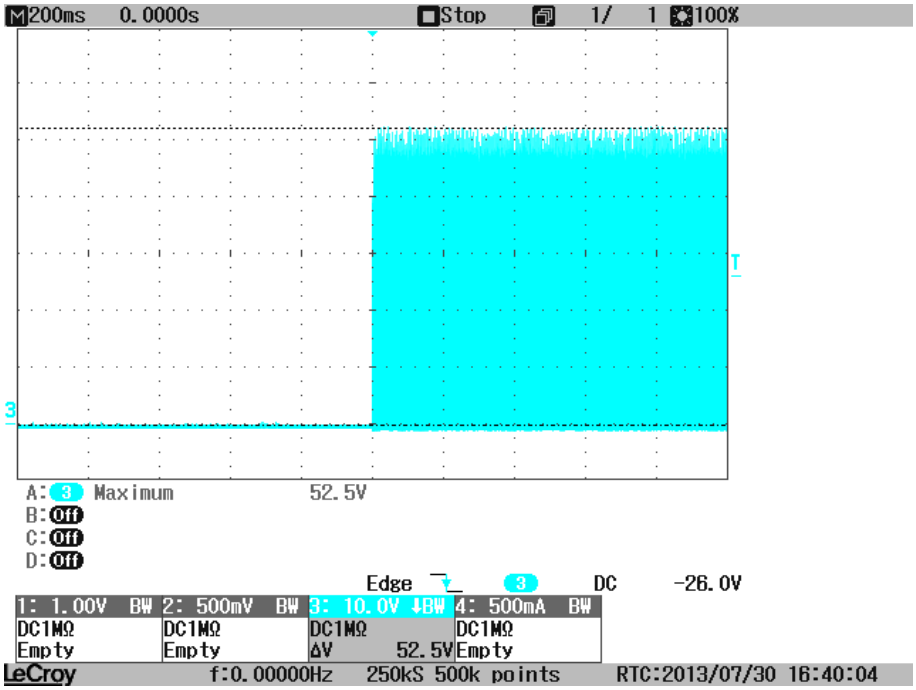


Figure 20 The waveform of rectifier at Vin = 264Vac/50Hz & full-load Startup

5.6 Current Limit

AC IN	Current Limit Value (A)	Spec	Result
90V_{AC}/47Hz	*1.090*	<1.4A	***PASS***
115V_{AC}/60Hz	*1.369*		
132V_{AC}/60Hz	*1.346*		
180V_{AC}/50Hz	*1.398*		
230V_{AC}/50Hz	*1.370*		
264V_{AC}/50Hz	*1.368*		