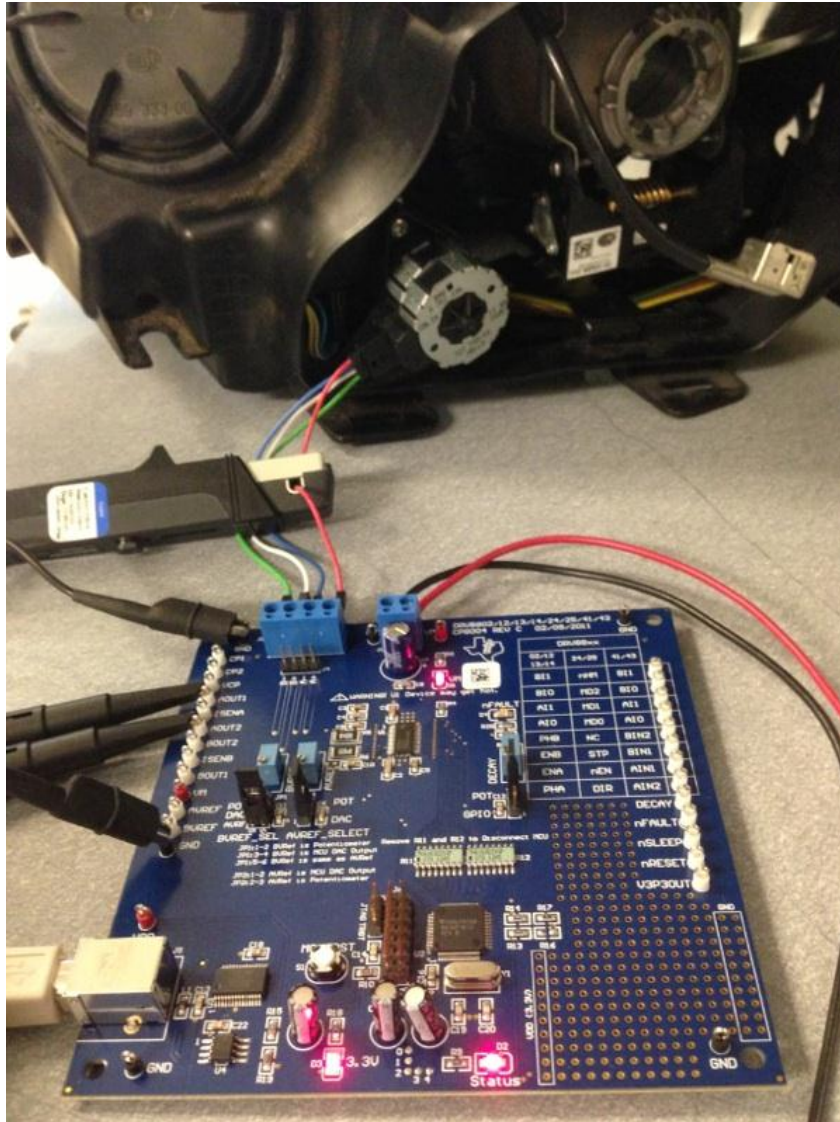


The DRV8824EVM was utilized for this test report, which includes the following:

- A. Stepper Motor Parameters
- B. Configuration
- C. Phase A and Phase B Current Waveforms in Steady States
- D. Phase A Current Chopping Waveform
- E. Phase A Current Waveform from Steady State to Stepping in Upwards Direction
- F. Phase A Current Waveform from Steady State to Stepping in Downwards Direction
- G. VM Waveform on Enable
- H. Thermal Image



## A. Stepper Motor Parameters

The following measurements were taken using the stepper motor installed in the automotive headlight assembly.

Phase	Resistance	Inductance
A+ (Red Wire) to A- (Blue Wire)	18.95 $\Omega$	7.17mH
B+ (White Wire) to B- (Green Wire)	21.4 $\Omega$	7.77mH

Furthermore, approximately 250 steps (450 degrees of rotation) were needed to move the vertical position of the headlight from the lowest position to the highest position and vice versa.

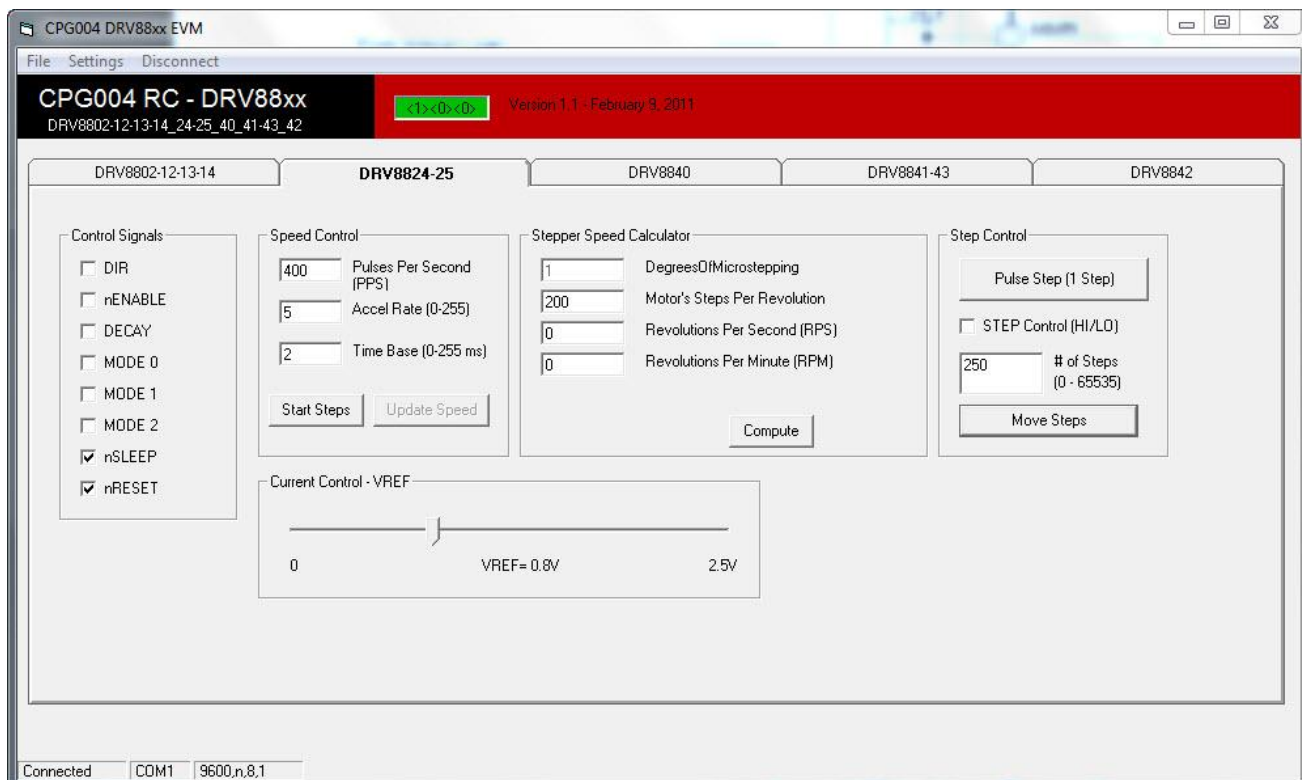
## B. Configuration

A VM voltage of 12V was used with VREF configured to 0.8V to set a 400mA full-scale (100%) chopping current.

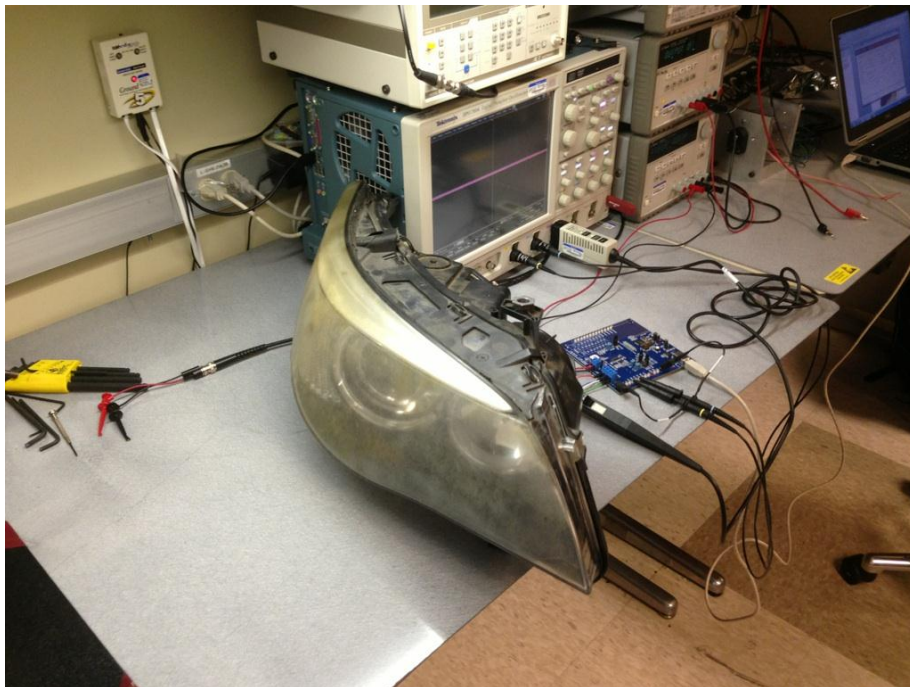
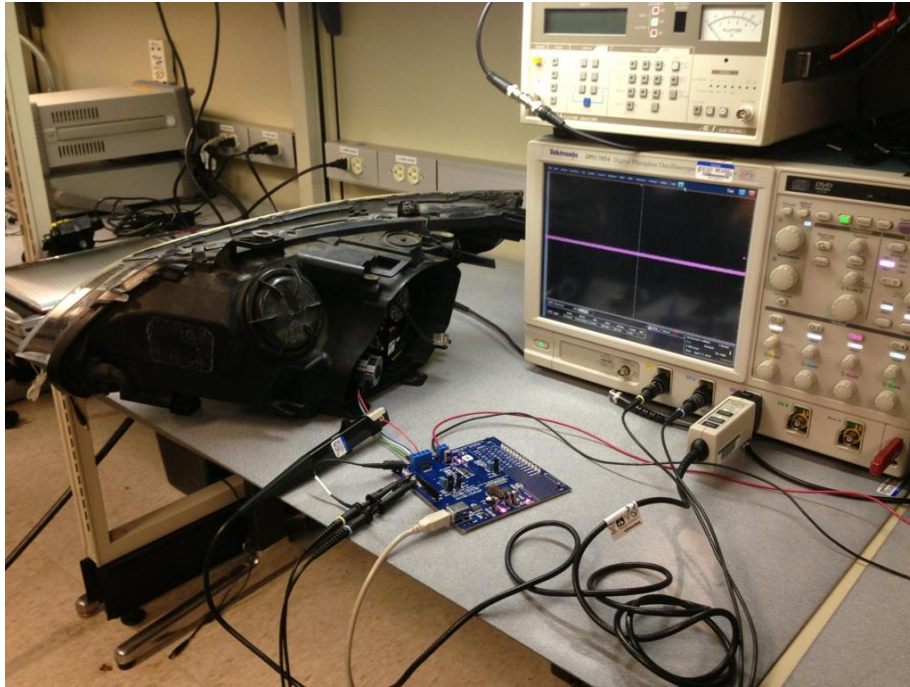
The driver was configured in the full step and slow decay modes. The relative current and step directions for the full step mode are shown in the table below.

Full Step	Winding Current A	Winding Current B	Electrical Angle
1	71%	71%	45
2	-71%	71%	135
3	-71%	-71%	225
4	71%	-71%	315

The DRV8824EVM GUI was configured as shown below.

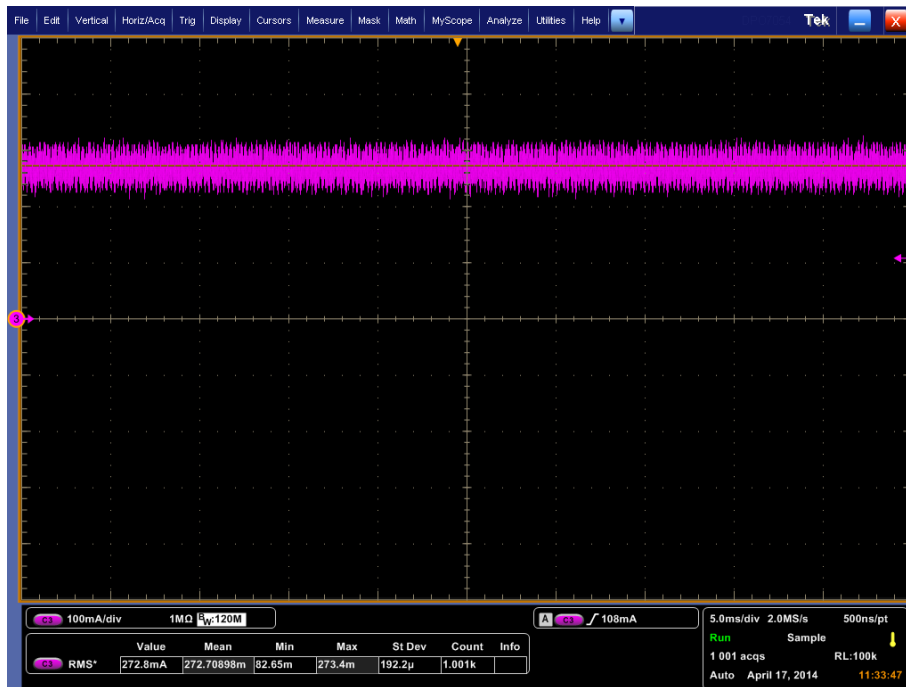
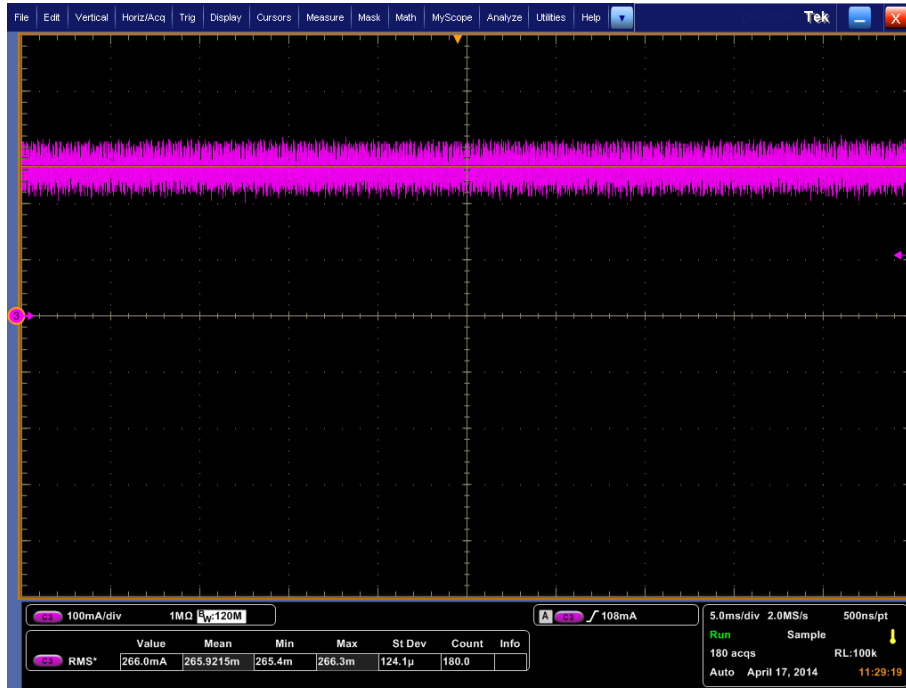


The following pictures illustrate the test setup.

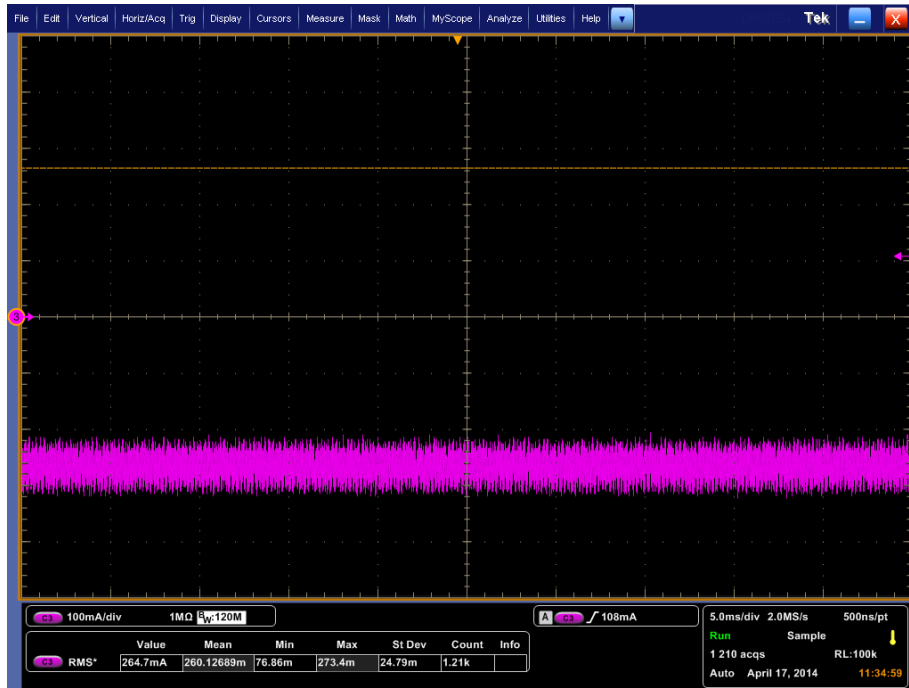
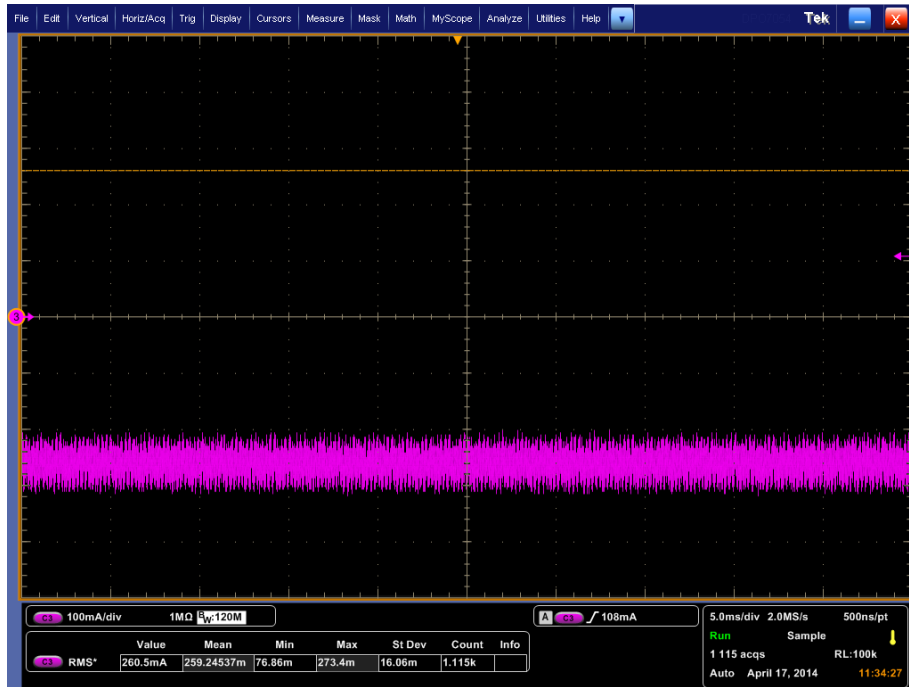


## C. Phase A and Phase B Current Waveforms in Steady States

The waveforms below illustrate the following, respectively: Phase A RMS current in the +71% winding current state, Phase B RMS current in the +71% winding current state, Phase A RMS current in the -71% winding current state, and Phase B RMS current in the -71% winding current state.

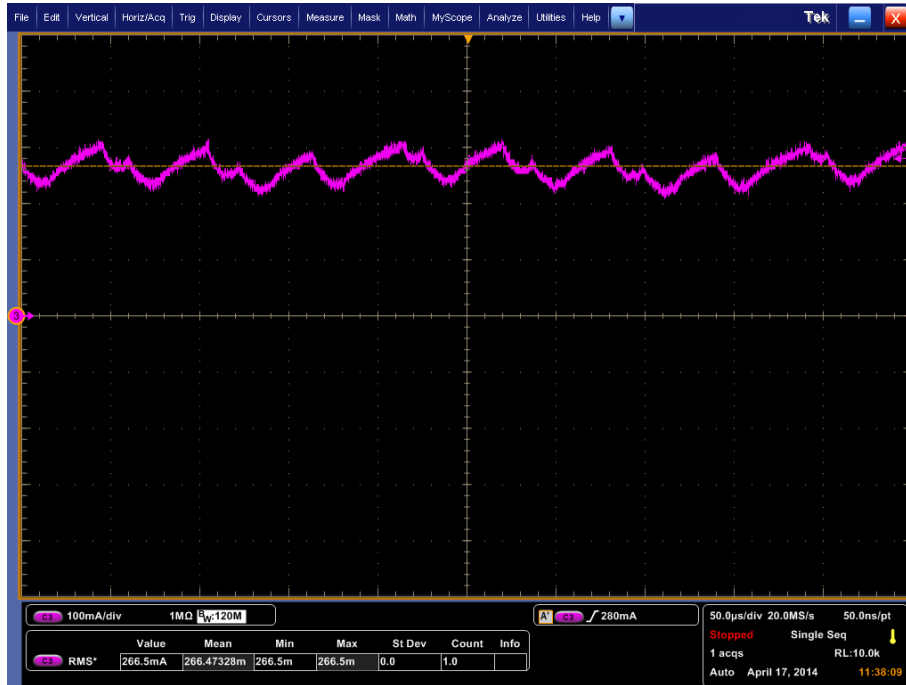






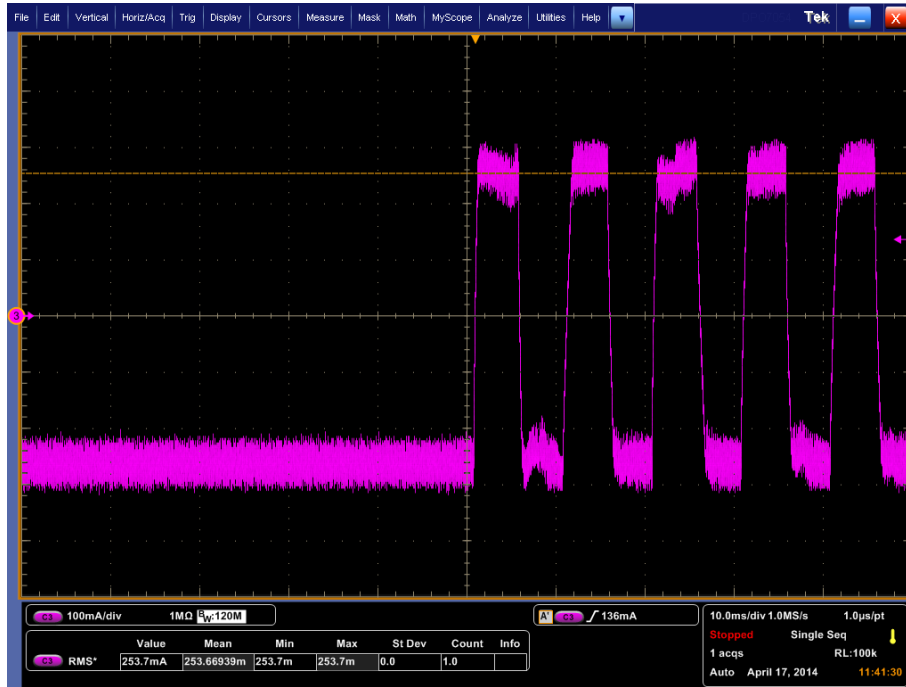
## D. Phase A Current Chopping Waveform

The following waveform illustrates the Phase A RMS current in the +71% winding current state with the chopping current configured to 284mA (0.71\*400mA).



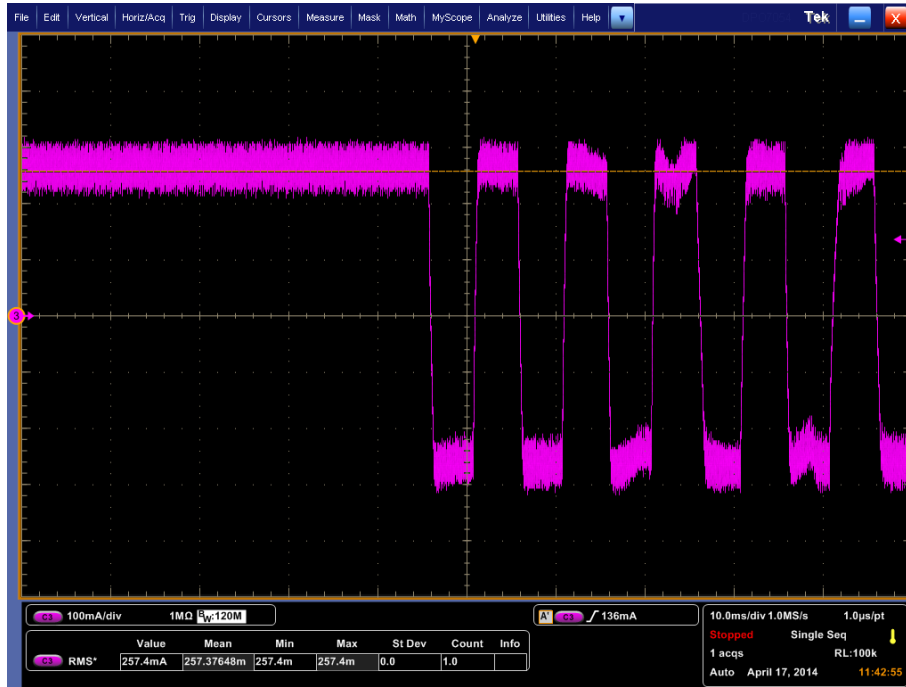
## E. Phase A Current Waveform from Steady State to Stepping in Upwards Direction

The following waveform illustrates the Phase A RMS current transitioning from the -71% winding current state to a repetitive cycling of full step states which moved the headlight position in the upwards direction.



## F. Phase A Current Waveform from Steady State to Stepping in Downwards Direction

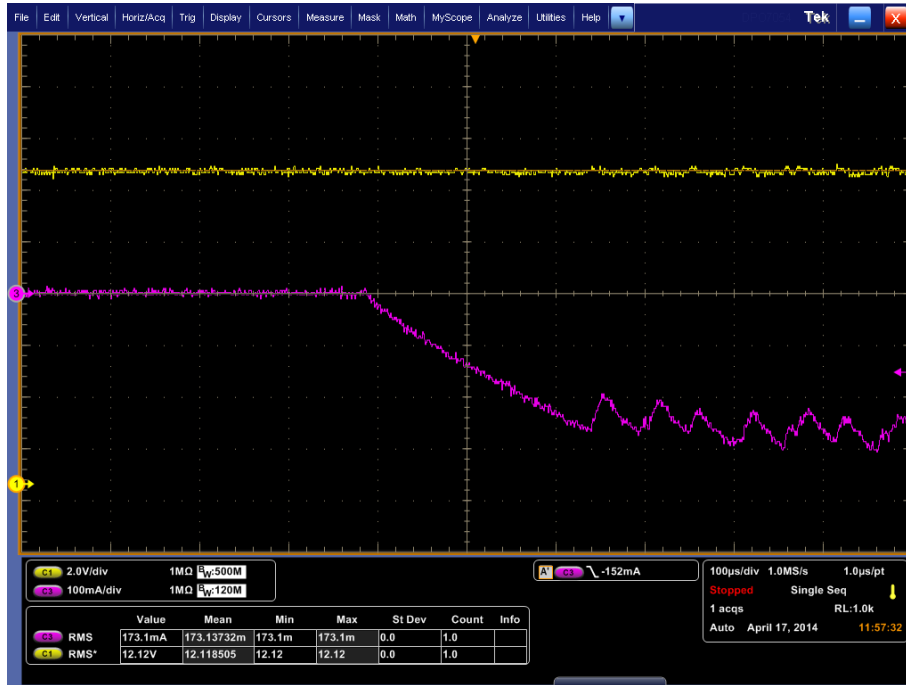
The following waveform illustrates the Phase A RMS current transitioning from the +71% winding current state to a repetitive cycling of full step states which moved the headlight position in the downwards direction.





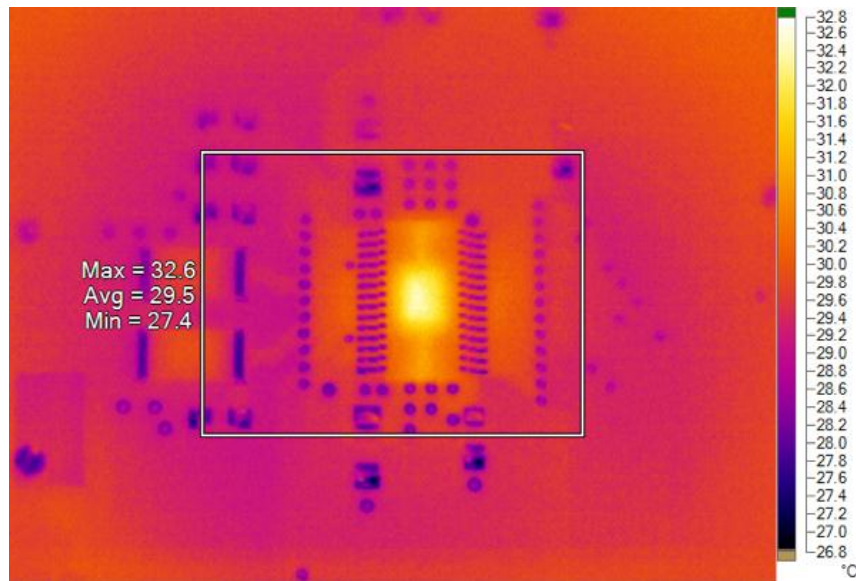
## G. VM Waveform on Enable

The following waveform illustrates the VM RMS voltage as the motor driver was enabled. There was no voltage droop evident on the VM rail.



## H. Thermal Image

The following is a thermal image of the DRV8824EVM captured with the stepper motor driver enabled. The maximum and average case temperature measurements were 32.6°C and 29.5°C respectively.



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