



**LM2842  
Cap-Drop**

**TI reference design number: PMP9311 Rev A1**

**Input: 230V<sub>AC</sub>  
Output: 3.3V<sub>DC</sub> @ 85mA**

**AC-DC Converter Test Results**

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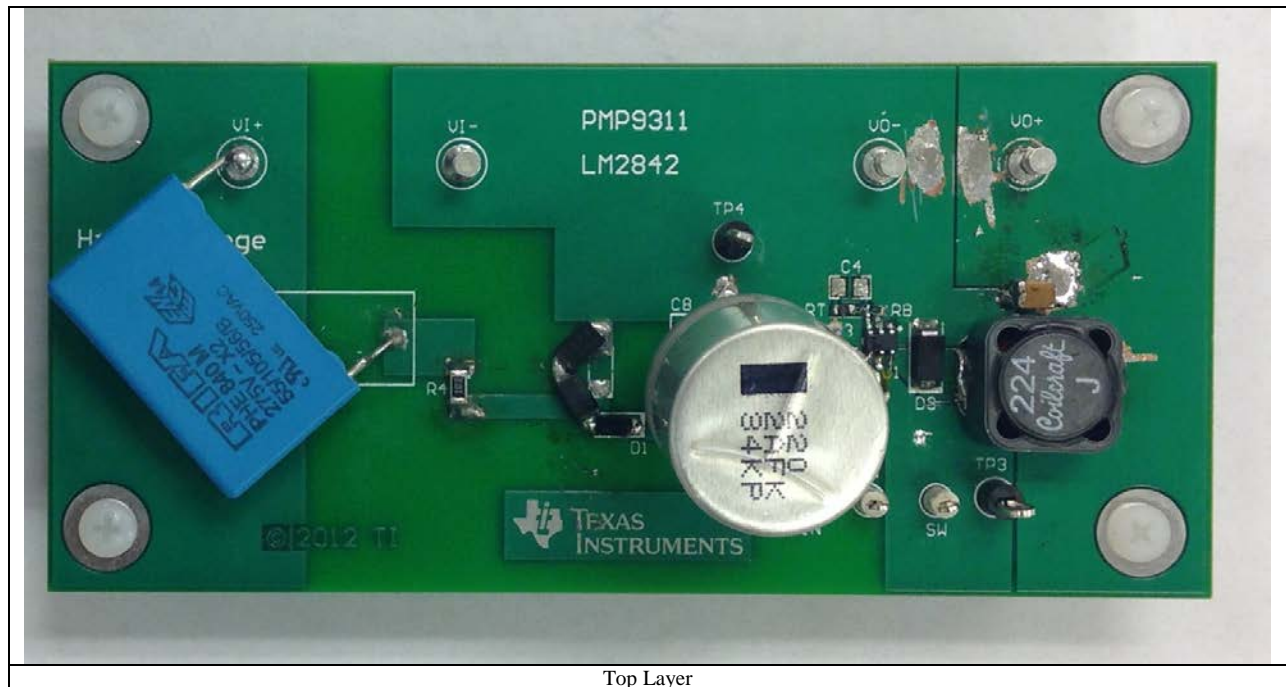
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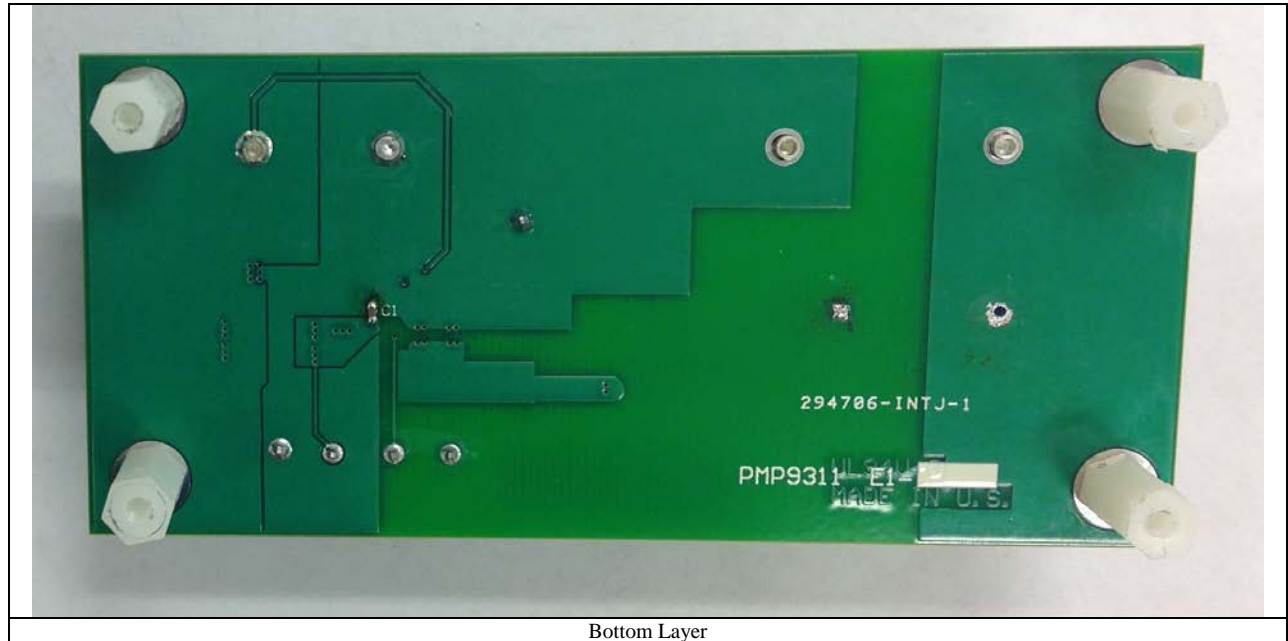
## 1. Circuit Description

PMP9311 is a Capacitor Drop circuit that utilizes the LM2842 Buck Regulator. The EVM is intended to work with an input of 230V<sub>AC</sub> (50 Hz). The output voltage is set to 3.3V<sub>DC</sub> at 85mA. Switching Frequency of the EVM is programed to 550 kHz. The EVM includes an external UVLO Circuit. PMP9311 is suitable for 8VA 3-phase e-meters applications.

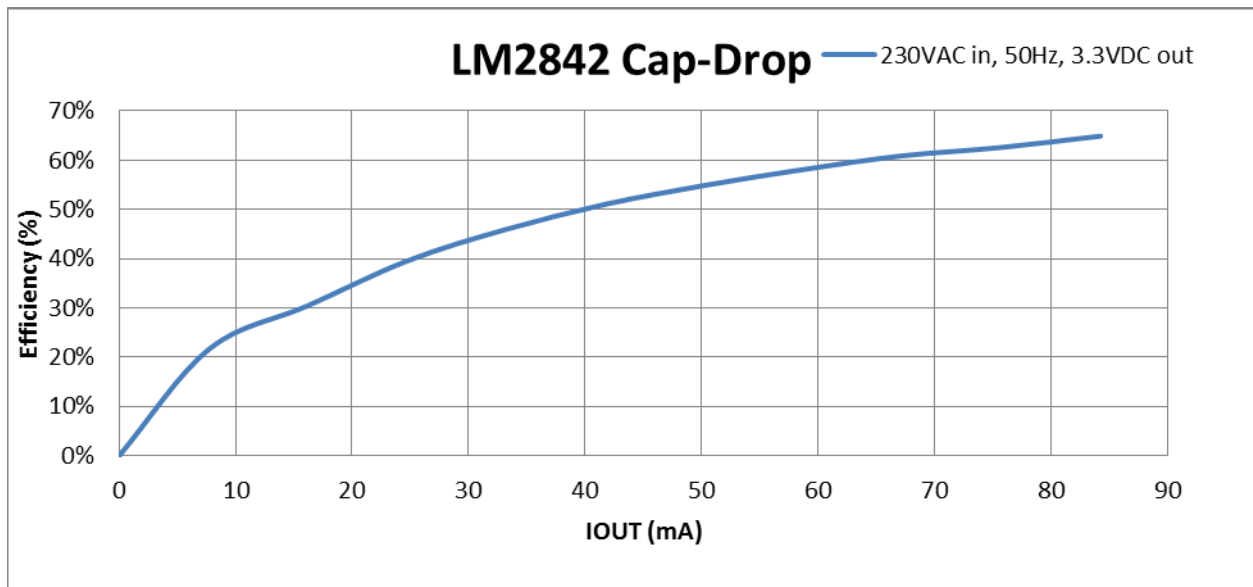
## 2. Fabrication

The LM2842 Cap-Drop circuit is a two layer board with overall dimensions of 1.925" (49mm) x 4.2" (106mm). The copper weight is 1oz each layer.





### 3.1 Efficiency

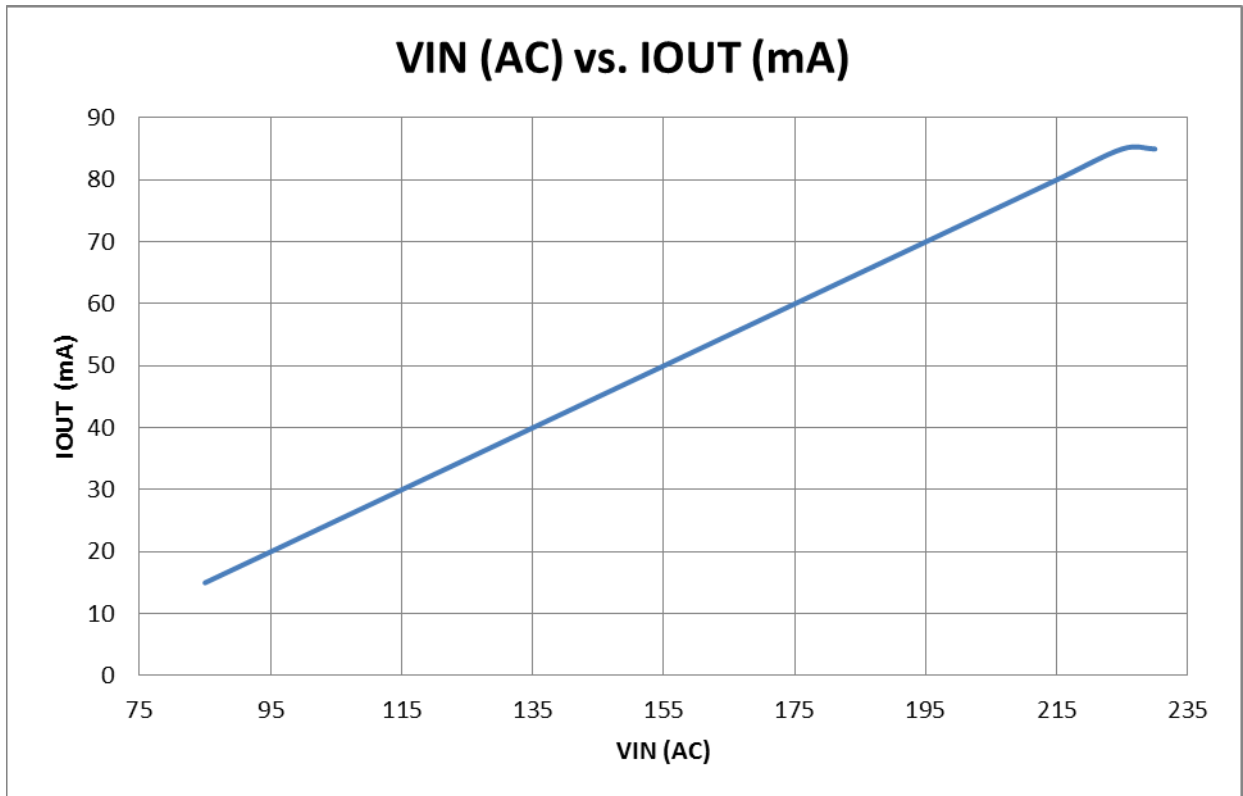


All Efficiency measurements taken at Vin of 42V DC connected to C8

### 3.2 LM2842 Cap-Drop Efficiency Data

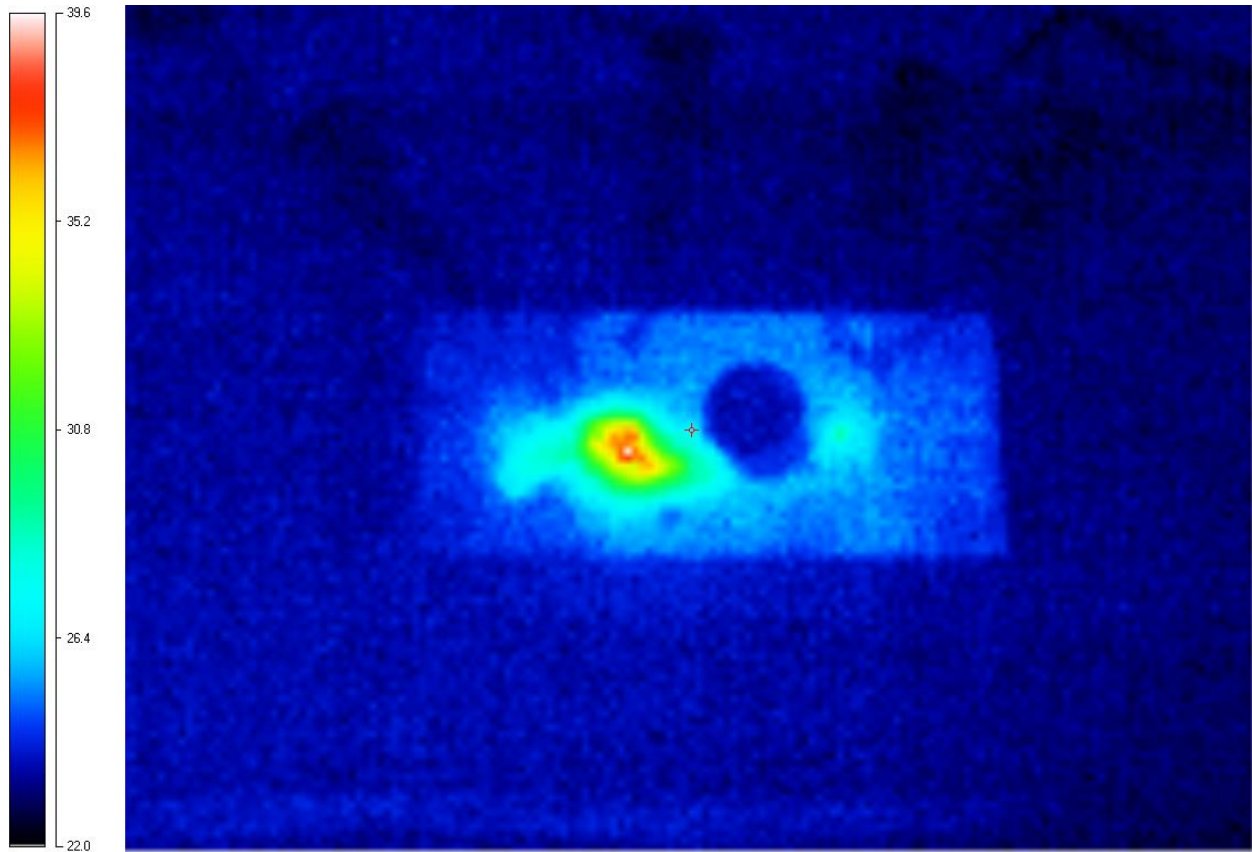
Vin (V <sub>DC</sub> )	Iin (mA <sub>DC</sub> )	Vout (V <sub>DC</sub> )	Iout (mA <sub>DC</sub> )	Efficiency (%)	Pin (mW)	Pout (mW)	Losses (mW)
39.5	1.00	3.30	0.00	0.00%	39	0	39
39.5	2.96	3.27	7.77	21.75%	117	25	91
39.3	4.40	3.26	16.15	30.43%	173	53	120
39.2	5.20	3.26	24.77	39.61%	204	81	123
39.1	6.02	3.26	33.16	45.94%	235	108	127
39.1	6.82	3.26	41.76	51.08%	267	136	130
39.1	7.63	3.26	50.24	54.90%	298	164	134
38.8	8.46	3.25	58.70	58.12%	328	191	137
38.6	9.28	3.25	67.18	60.90%	358	218	140
38.4	10.23	3.25	75.78	62.62%	393	246	147
38.0	11.10	3.25	84.26	64.92%	422	274	148

### 3.3 LM2842 Cap-Drop $V_{INAC}$ at 50 Hz vs. $I_{OUT}$ (mA)



## 4. Thermal

### 4.1 Steady State Temperature - 230V<sub>AC</sub> in, 3.3V<sub>DC</sub> out at a load of 85mA



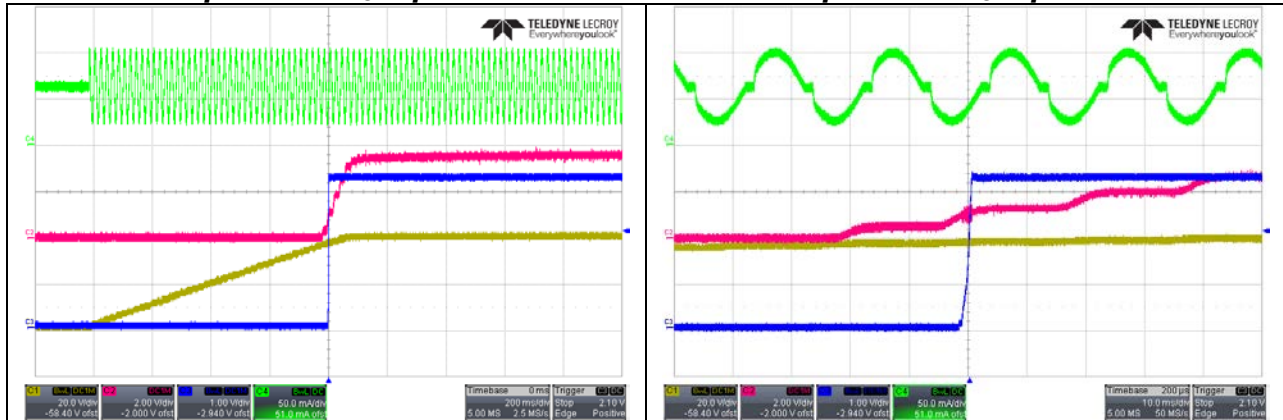
#### *Top View*

The RIN resistors are the warmest component on the PCB and display a temperature rise of 14°C

## 5. Power Up

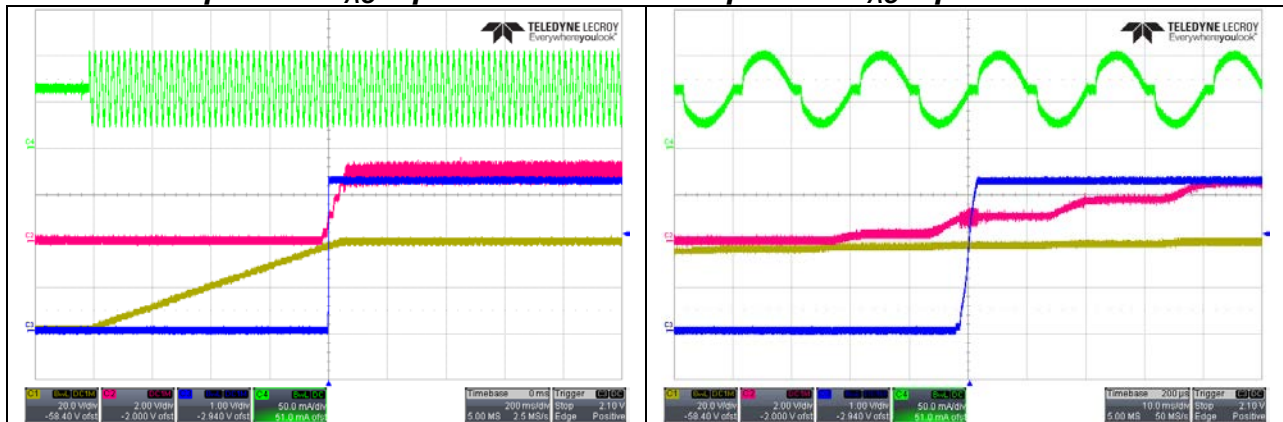
### 5.1 Power Up at 230V<sub>AC</sub> Input – No Load

### Power Up at 230V<sub>AC</sub> Input – Zoom



Channel 1 VIN<sub>DC</sub>  
Channel 2 Enable  
Channel 3 V<sub>OUT</sub>  
Channel 4 I<sub>IN,AC</sub>

### 5.2 Power Up at 230V<sub>AC</sub> Input – 85mA Power Up at 230V<sub>AC</sub> Input – Zoom

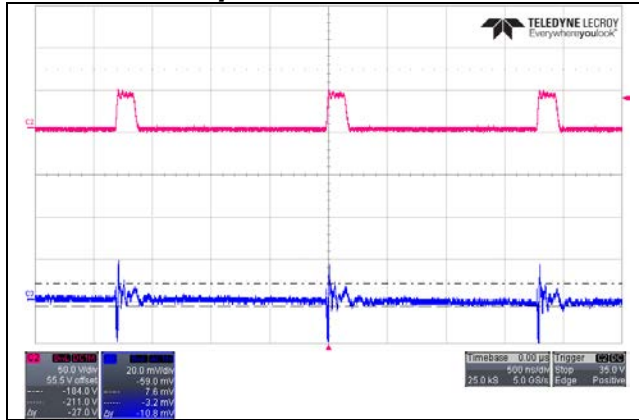


Channel 1 VIN<sub>DC</sub>  
Channel 2 Enable  
Channel 3 V<sub>OUT</sub>  
Channel 4 I<sub>IN,AC</sub>



## 6. Switch Node Voltage and Output Ripple Voltage

### 6.1 230V<sub>AC</sub> Input – 85mA Load



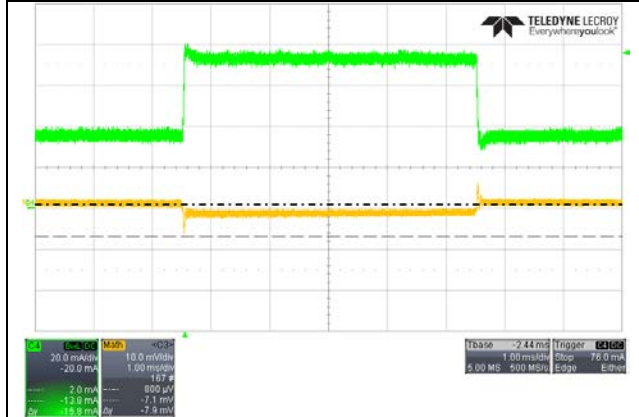
Less than 11mV p-p Ripple

Channel 2 VSW

Channel 3 VOUT

## 7. Transient Response

### 7.1 230V<sub>AC</sub> Input – 42mA to 85mA, 100mA/μs, 100 Hz, 50% duty cycle.



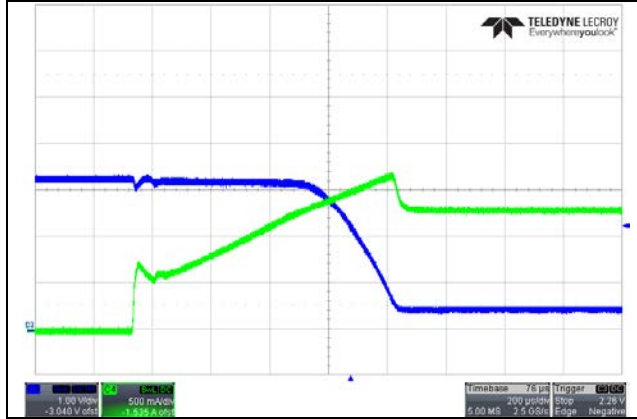
Cursors indicate ~7.9mV of deviation across the output capacitor.

Channel 2 VOUT

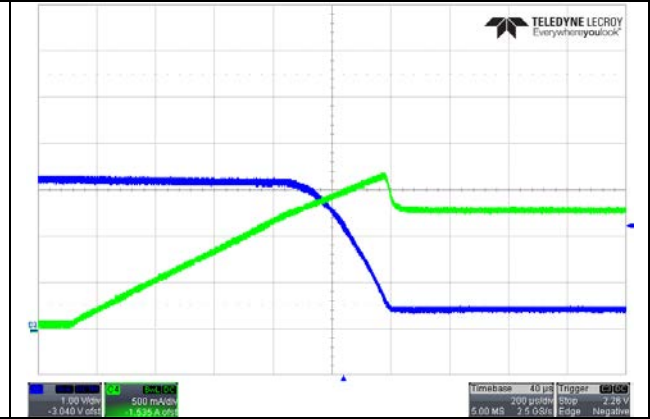
Channel 4 IOUTC

## 8. Short Circuit Test

### 8.1 230V<sub>AC</sub> input - No Load



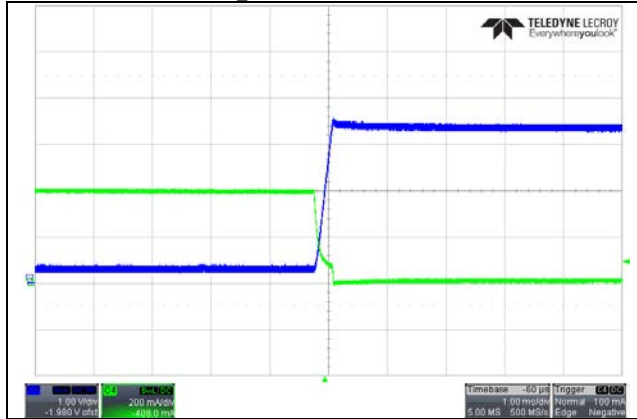
### 230V<sub>AC</sub> input – 85mA Load



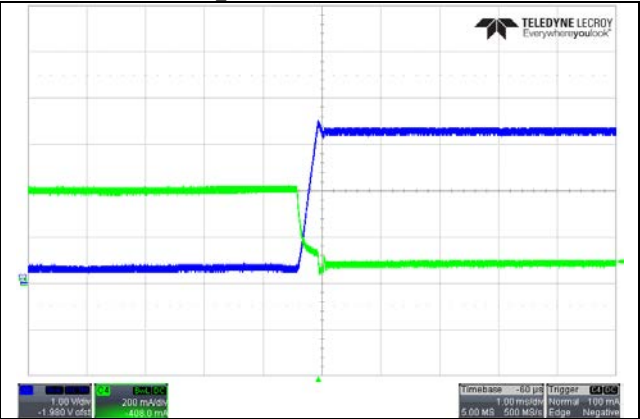
Channel 2 VOUT  
Channel 4 IOU

## 9. Short Circuit Recovery Test

### 9.1 230V<sub>AC</sub> input - No Load



### 230V<sub>AC</sub> input – 85mA Load



Channel 2 VOUT  
Channel 4 IOUT

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