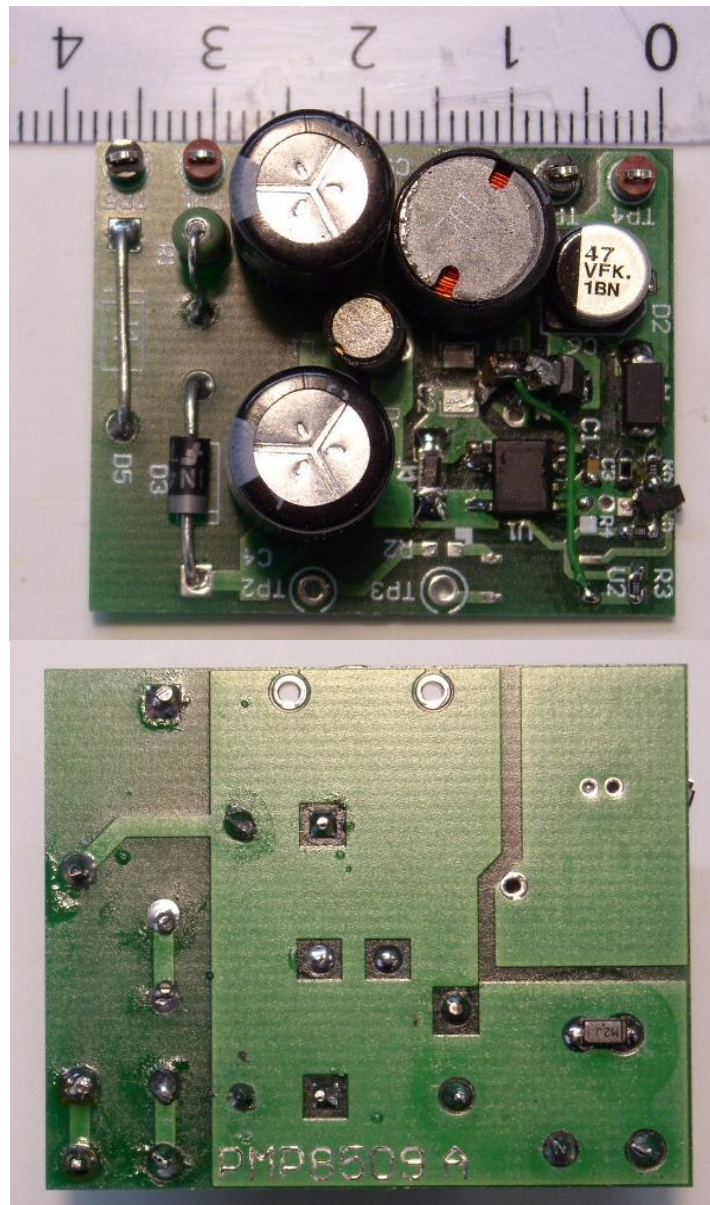


## 1 Photo of the prototype:

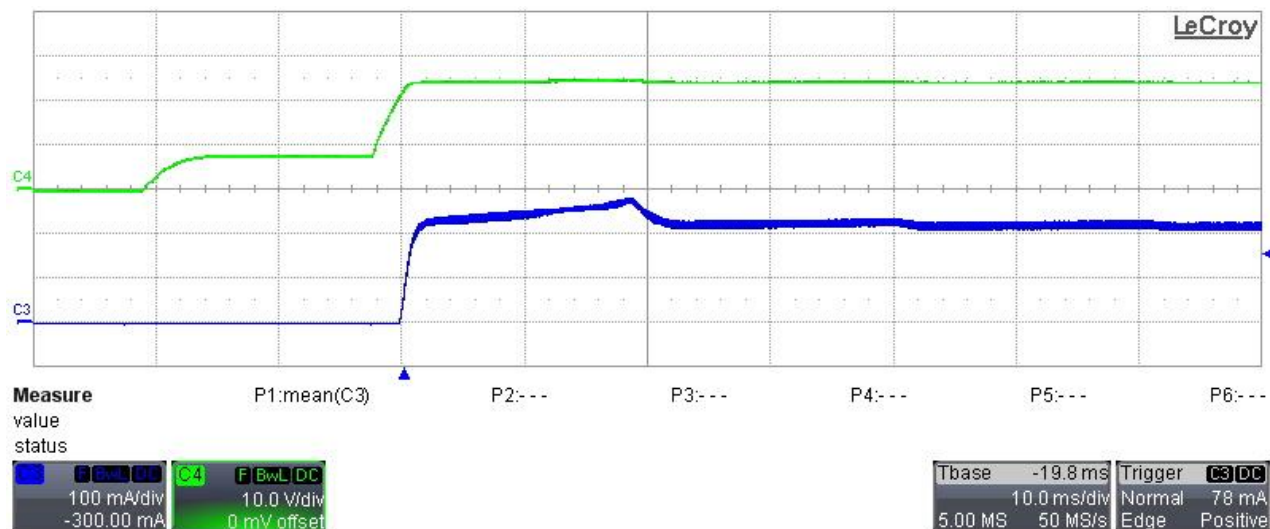


## 2 Startup

The output voltage and current behaviors during start-up are shown in the images below. The input voltage was set to 230VAC. Eight LEDs in series were connected to the output. The second screenshot shows also input VAC voltage.

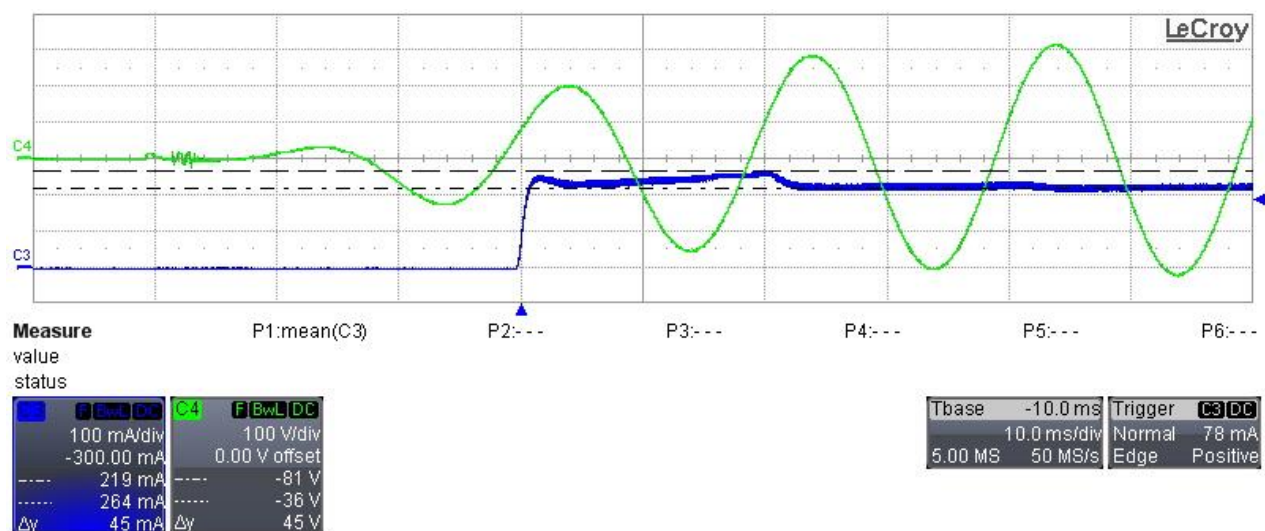
**Ch.3: Output Current (100mA/div, 10ms/div, 20MHz BWL)**

**Ch.4: Output Voltage (10V/div, 20MHz BWL)**



**Ch.3: Output Current (100mA/div, 10ms/div, 20MHz BWL)**

**Ch.4: Input AC Voltage (100V/div, 20MHz BWL)**

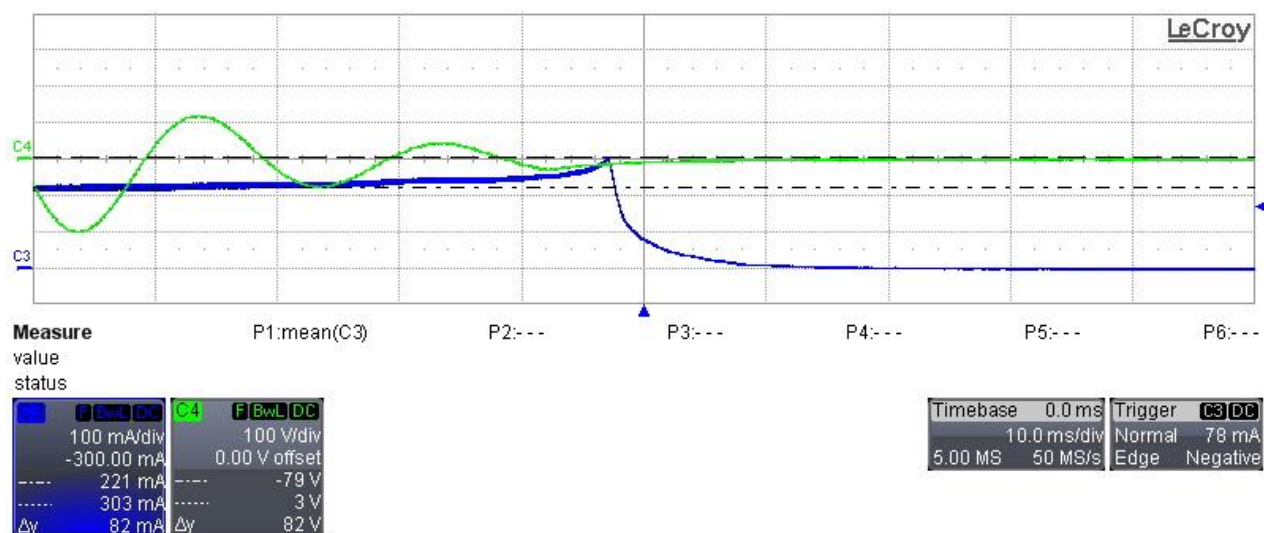


### 3 Shut down

The input AC source (set to 230VAC) has been disconnected while delivering full current @ 24Vout (8 LEDs). The output current ramp down behavior is shown below.

**Ch.3: Output Current (100mA/div, 10ms/div, 20MHz BWL)**

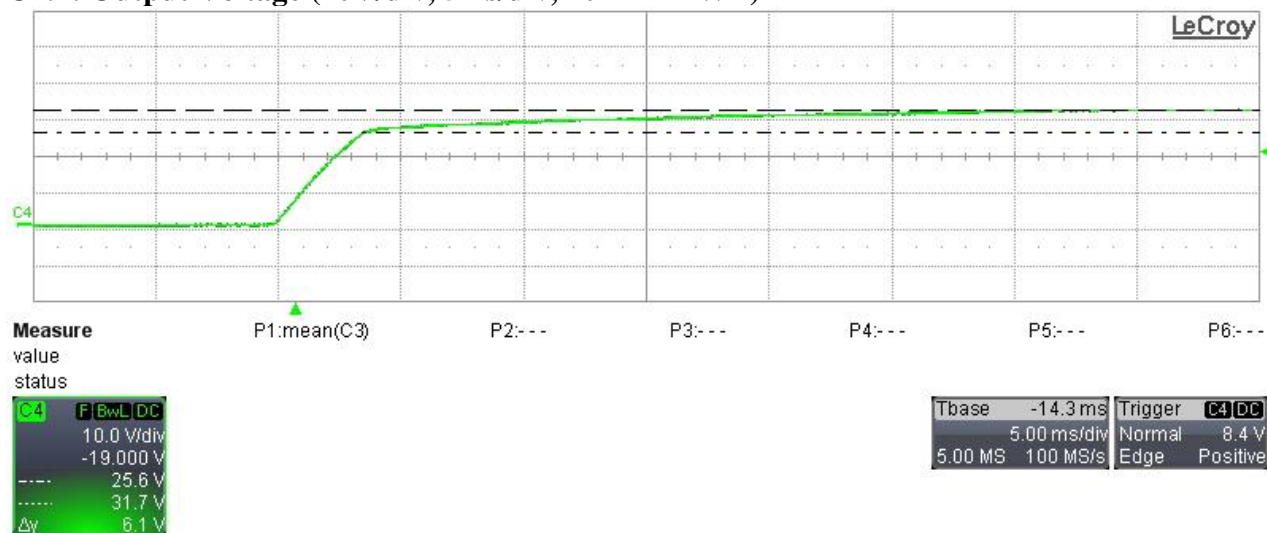
**Ch.4: Input AC Voltage (100V/div, 20MHz BWL)**



### 4 Open String Condition

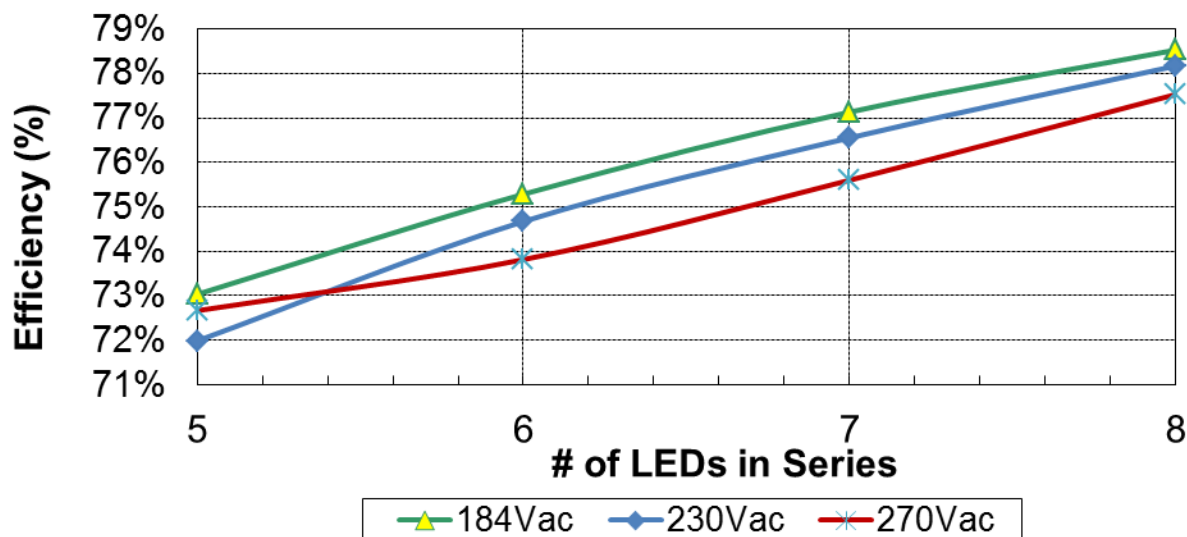
Since this converter supplies constant current, an open-string protection has been implemented. Below is reported what happens to output voltage if the converter is connected to mains and no load is connected. At steady state, Vout had stable value of 33.97V (@230VAC)

**Ch.4: Output Voltage (10V/div, 5ms/div, 20MHz BWL)**



## 5 Efficiency

The efficiency data, versus VAC and number of LEDs in series, are shown in the tables and graph below. The input voltage was set respectively to 184VAC, 230VAC and 270VAC.



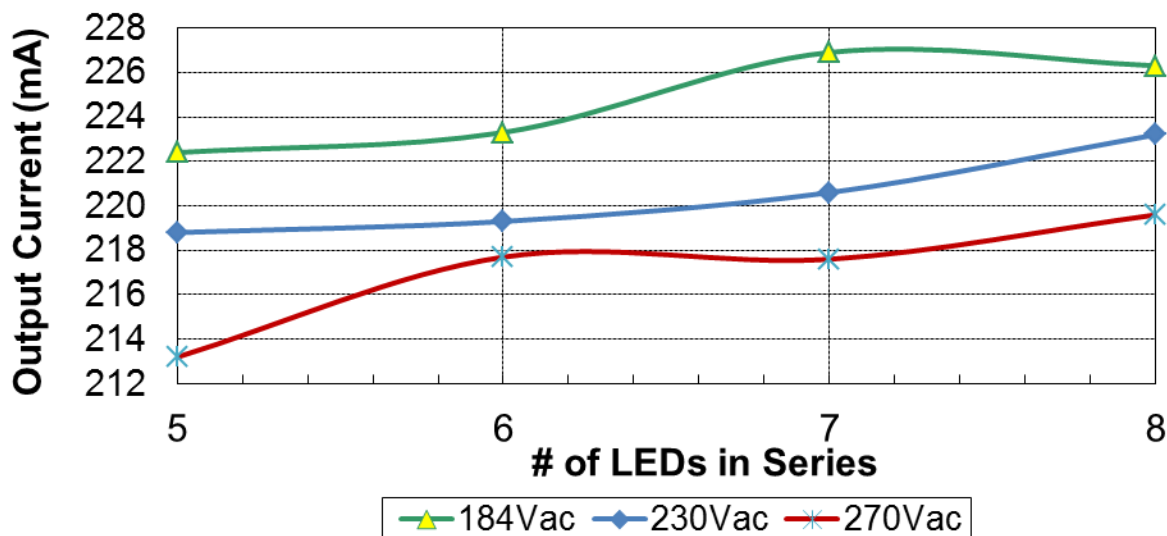
VAC (Vrms)	Pin (W)	Vout (V)	Iout(mA)	Pout (W)	Efficiency (%)	# of LEDs
184	4.720	15.50	222.4	3.45	73.0%	5
184	5.502	18.55	223.3	4.14	75.3%	6
184	6.360	21.62	226.9	4.91	77.1%	7
184	7.118	24.70	226.3	5.59	78.5%	8

VAC (Vrms)	Pin (W)	Vout (V)	Iout(mA)	Pout (W)	Efficiency (%)	# of LEDs
230	4.702	15.47	218.8	3.38	72.0%	5
230	5.445	18.54	219.3	4.07	74.7%	6
230	6.213	21.56	220.6	4.76	76.6%	7
230	7.047	24.68	223.2	5.51	78.2%	8

VAC (Vrms)	Pin (W)	Vout (V)	Iout(mA)	Pout (W)	Efficiency (%)	# of LEDs
270	4.530	15.44	213.2	3.29	72.7%	5
270	5.468	18.54	217.7	4.04	73.8%	6
270	6.197	21.53	217.6	4.68	75.6%	7
270	6.985	24.66	219.6	5.42	77.5%	8

## 6 Output Current Regulation versus # of LEDs

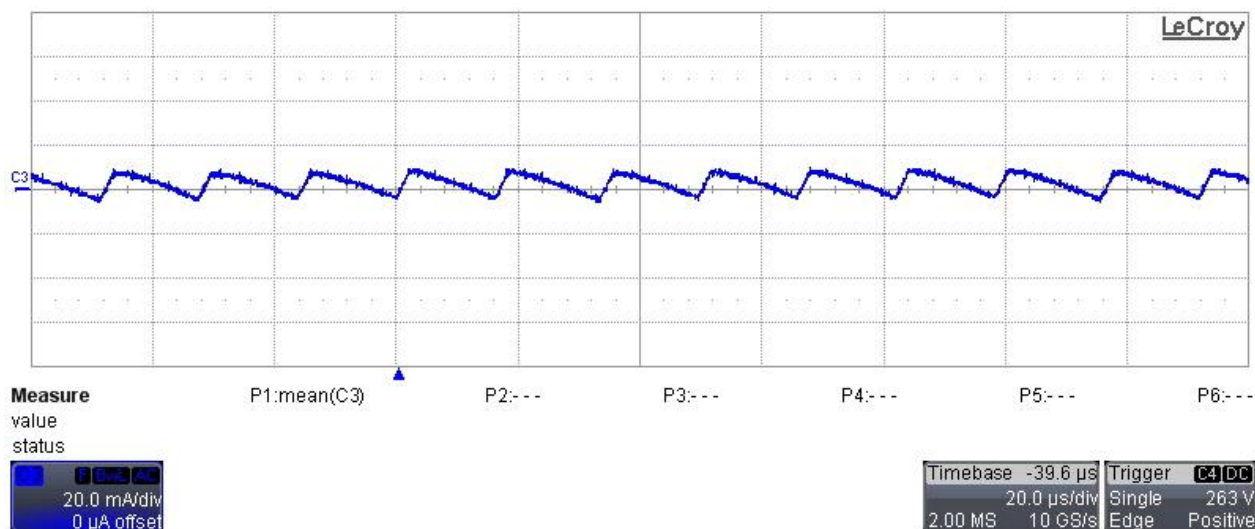
The output current variation versus load current, for three different input voltages, is plotted below.



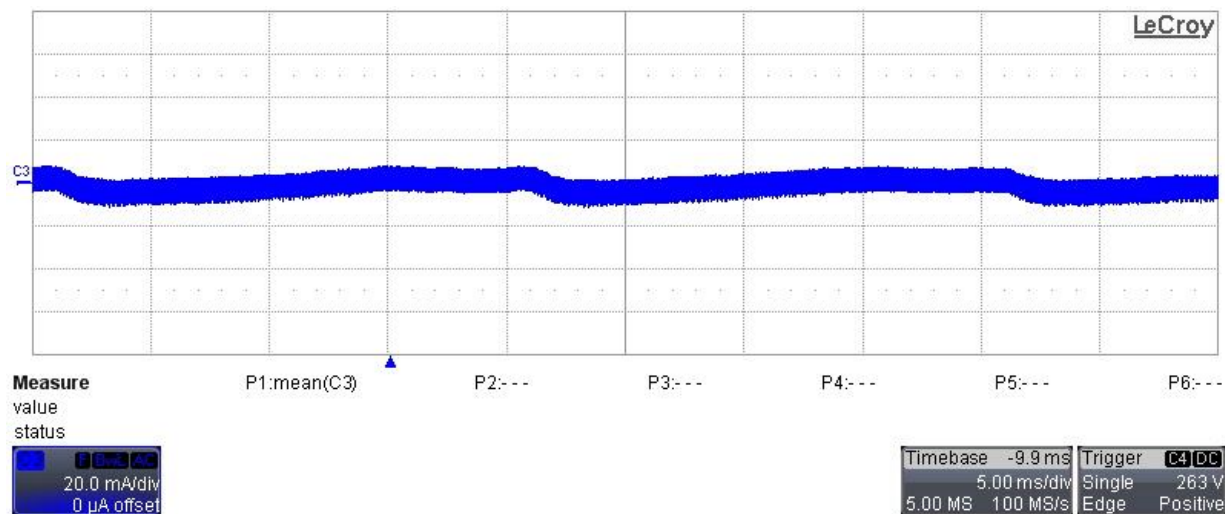
## 7 Output Ripple Current

The output ripple current has been measured by supplying the converter at 184VAC, while loaded with 8 LEDs. The screenshots show the ripple current in different time scale.

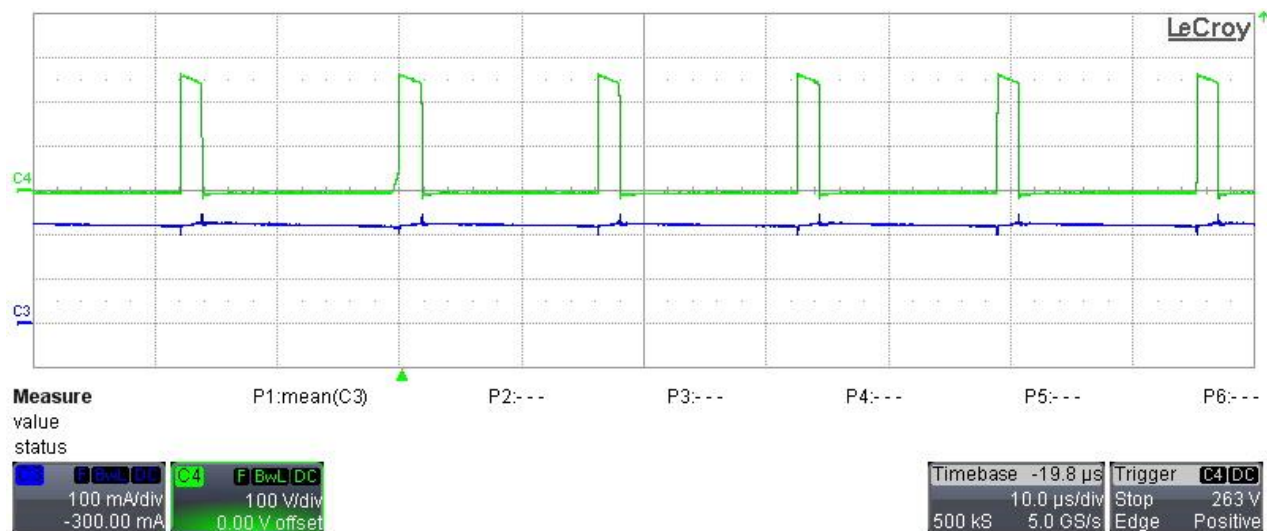
**Ch.3: Output Current (20mA/div, AC coupling, 20us/div, 20MHz BWL)**

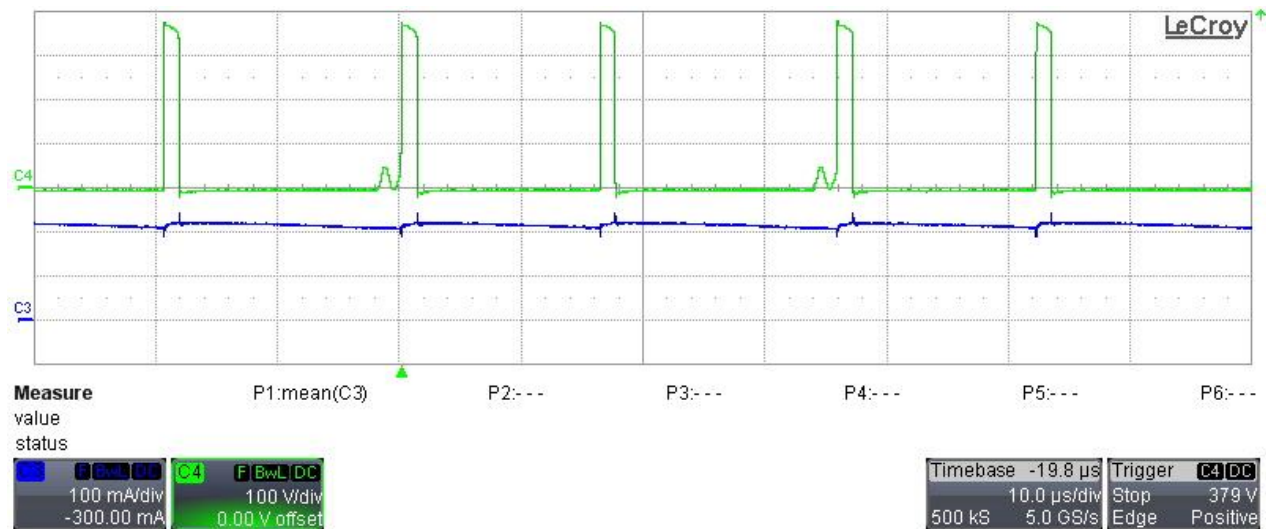




**Ch.3: Output Current (20mA/div, AC coupling, 5ms/div, 20MHz BWL)**

**8 Switch node**

The images below show the switch node of the converter (pin 1, 2), taken respectively at 184VAC and 270VAC input voltage without any change in the load setup.

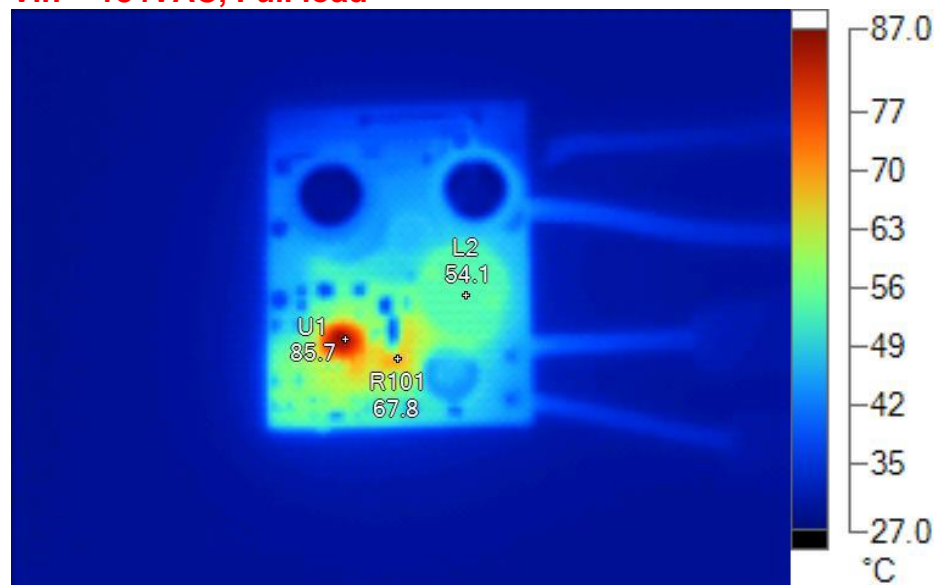
**Vin = 184VAC:**
**Ch.3: Output Current (100mA/div, 10us/div, 20MHz BWL)**
**Ch.4: Pin 1, 2 of U1 (100V/div, 20MHz BWL)**


**Vin = 270VAC:****Ch.3: Output Current (100mA/div, 10us/div, 20MHz BWL)****Ch.4: Pin 1, 2 of U1 (100V/div, 20MHz BWL)**

## 9 Thermal Analysis

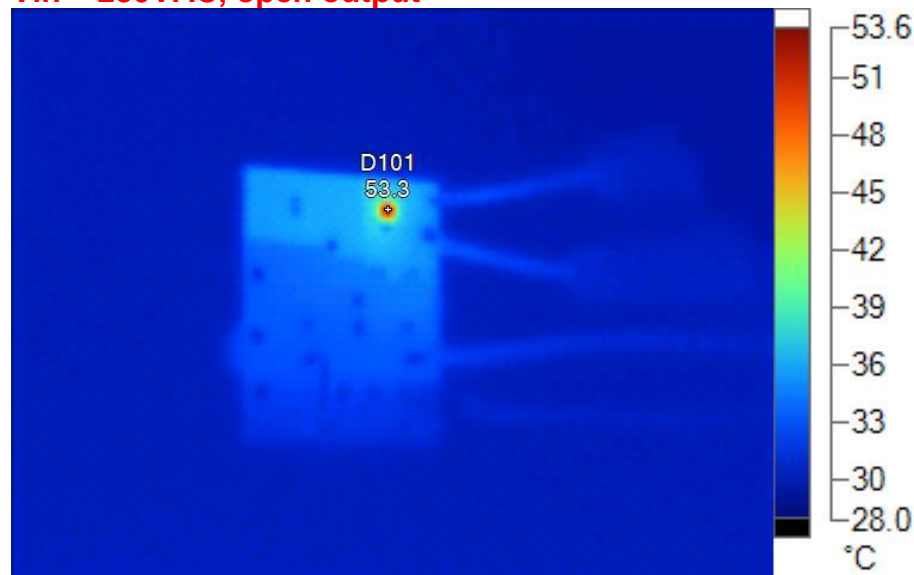
During the thermal analysis, the converter has been placed horizontally on the bench in still air conditions, while fully loaded (8 LEDs) and supplied @ 184VAC (worst case). The second image shows the bottom side of power supply in open string condition, at 230VAC.

**Vin = 184VAC, Full load**



Name	Temperature	Emissivity	Background
U1	85.7°C	0.95	23.0°C
R101	67.8°C	0.95	23.0°C
L2	54.1°C	0.95	23.0°C

**Vin = 230VAC, open output**



Name	Temperature	Emissivity	Background
D101	53.3°C	0.95	23.0°C



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