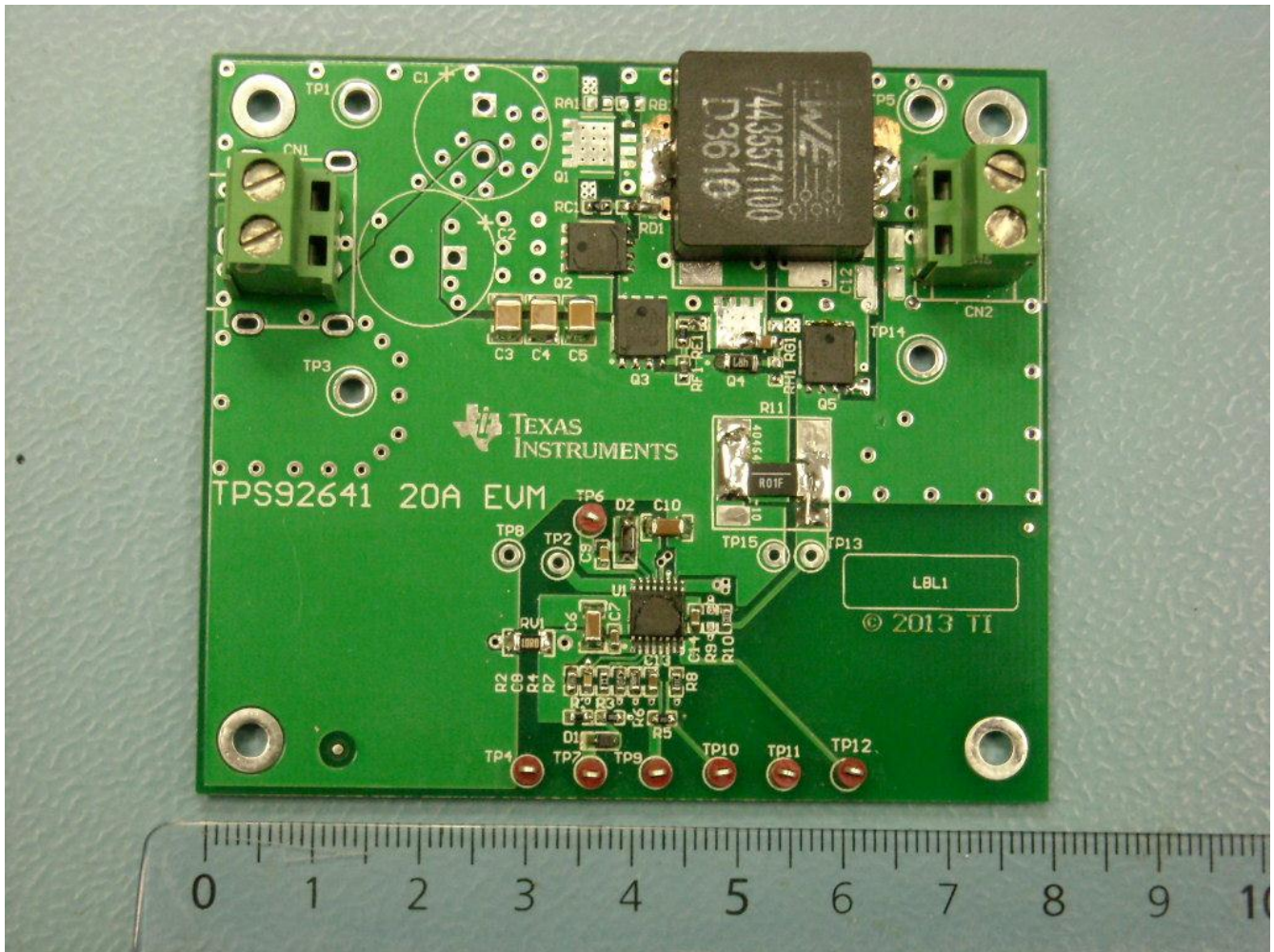


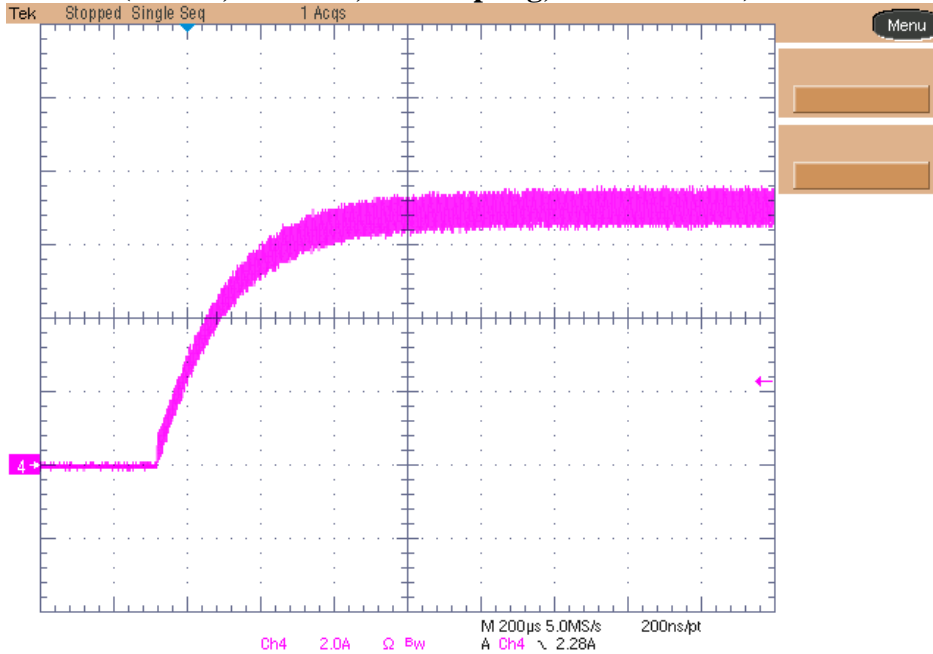
Photo of the prototype:



1 LED current at startup and during PWM dimming

The output current behavior at startup is shown in the image below. The input voltage has been set to 12V. Twenty LEDs, 350mA nominal current, $V_f=3.7V$, were connected in parallel to the output. This load setup has been kept the same for the entire test.

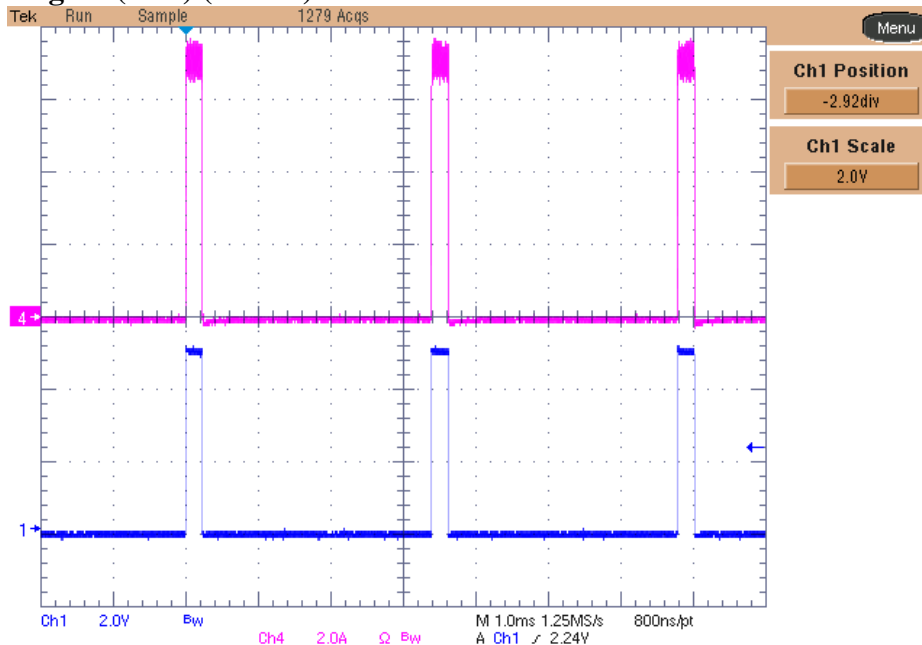
Ch.4: LED current (2A/div, 200u/div, DC coupling, 20MHz BWL)



The output current tracks the UDIM signal, connected between TP7 (0-5V PWM signal) and ground, as shown below. The frequency was 300Hz and the $T_{on}=240\mu\text{sec}$.

Ch.4: LED current (2A/div, 1msec/div, DC coupling, 20MHz BWL)

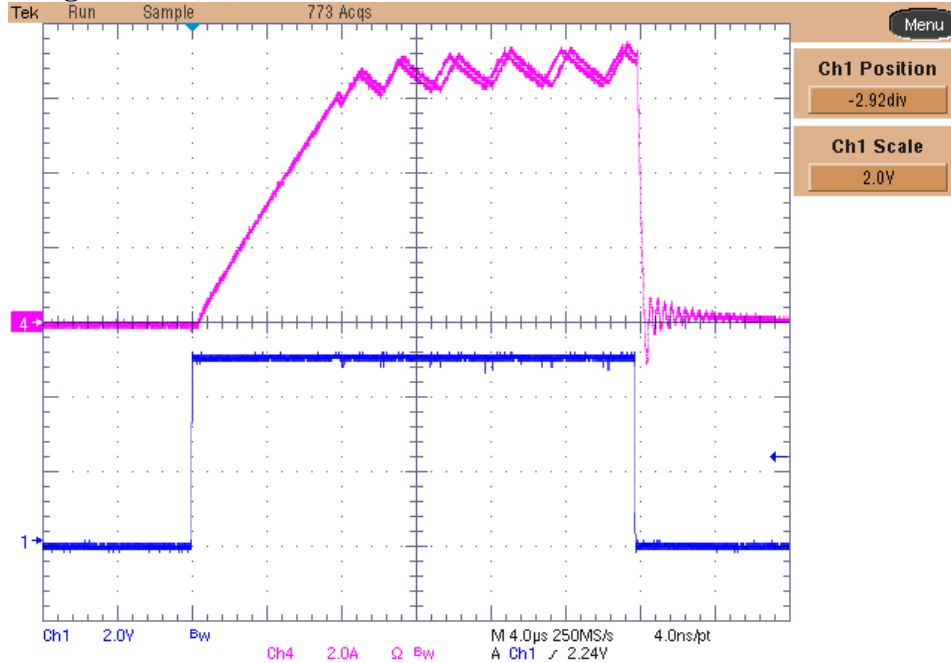
Ch.1: UDIM signal (TP7) (2V/div)



The picture below shows more in details the ramp up of the LED current when the Ton of the PWM signal was reduced to 24 usec. The frequency was again 300Hz.

Ch.4: LED current (2A/div, 4usec/div, DC coupling, 20MHz BWL)

Ch.1: UDIM signal (TP7) (2V/div)



2 LED Ripple Current

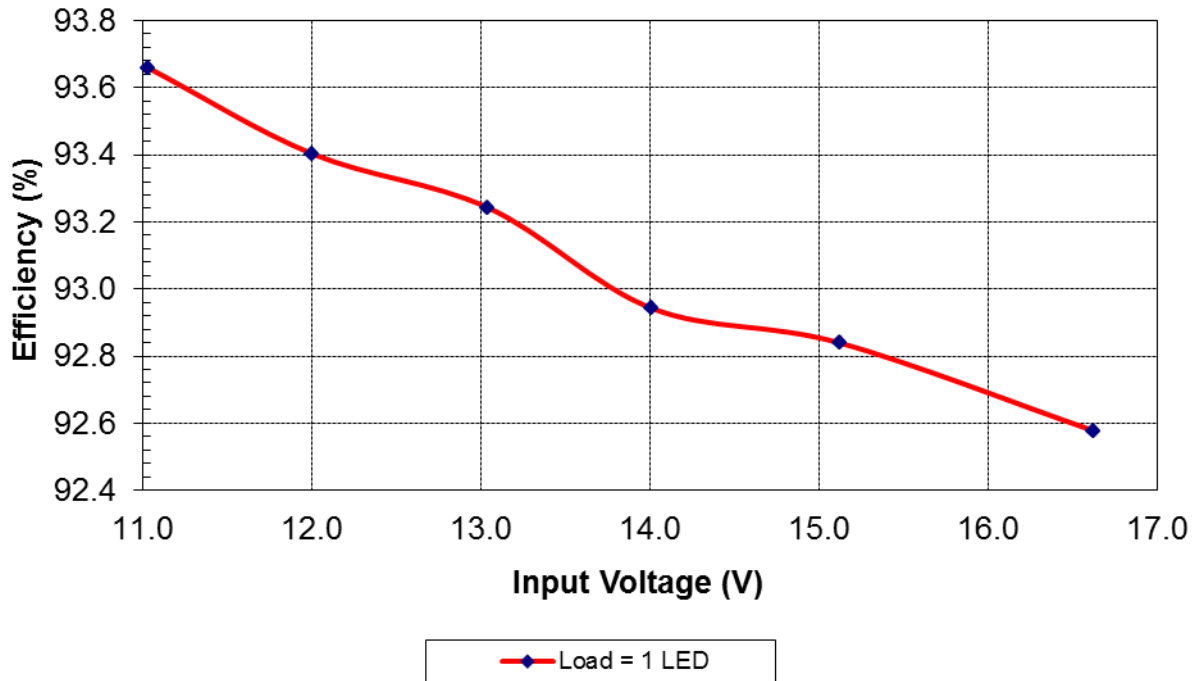
The output ripple current is shown in the plot below. The input was set to 12V and the dimming input set to 0V.

Ch.4: LED current (1A/div, 2usec/div, DC coupling, 20MHz BWL), no dimming



3 Efficiency

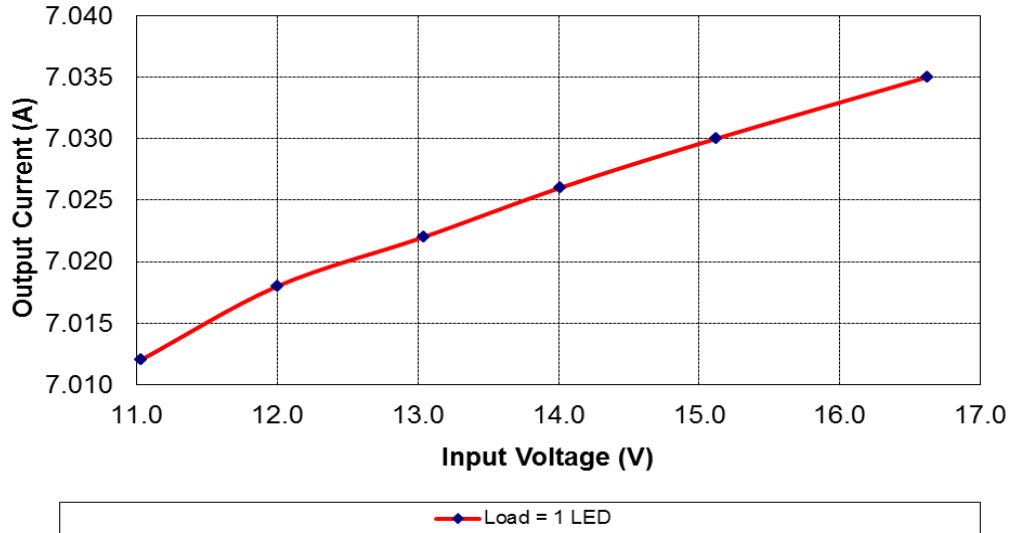
The efficiency data are shown in the tables and graph below. The load was the same like in the previous measurements. The input voltage has been adjusted between 11V and 16.5V.



Iout (A)	Vout (V)	Pout (W)	Iin (A)	Vin (V)	Pin (W)	Ploss (W)	Eff (%)
7.012	3.740	26.225	2.539	11.03	28.000	1.775	93.7
7.018	3.734	26.205	2.338	12.00	28.056	1.851	93.4
7.022	3.728	26.178	2.153	13.04	28.075	1.897	93.2
7.026	3.714	26.095	2.004	14.01	28.076	1.981	92.9
7.030	3.714	26.109	1.860	15.12	28.123	2.014	92.8
7.035	3.705	26.065	1.694	16.62	28.154	2.090	92.6

4 LED Current Regulation

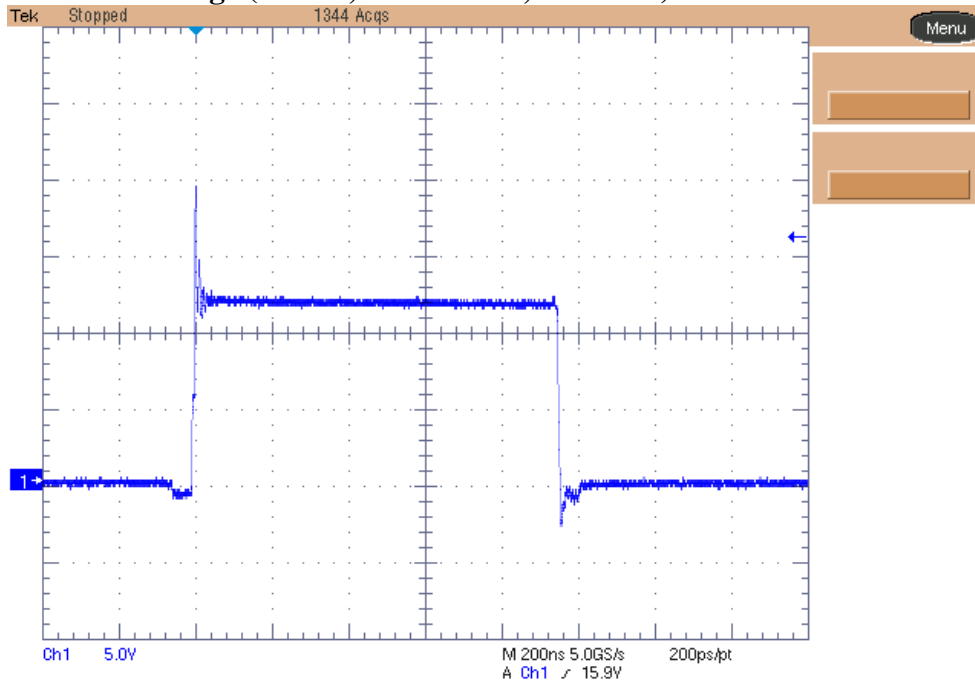
The output current variation as function of input voltage is shown below.



5 Switching Node Waveform

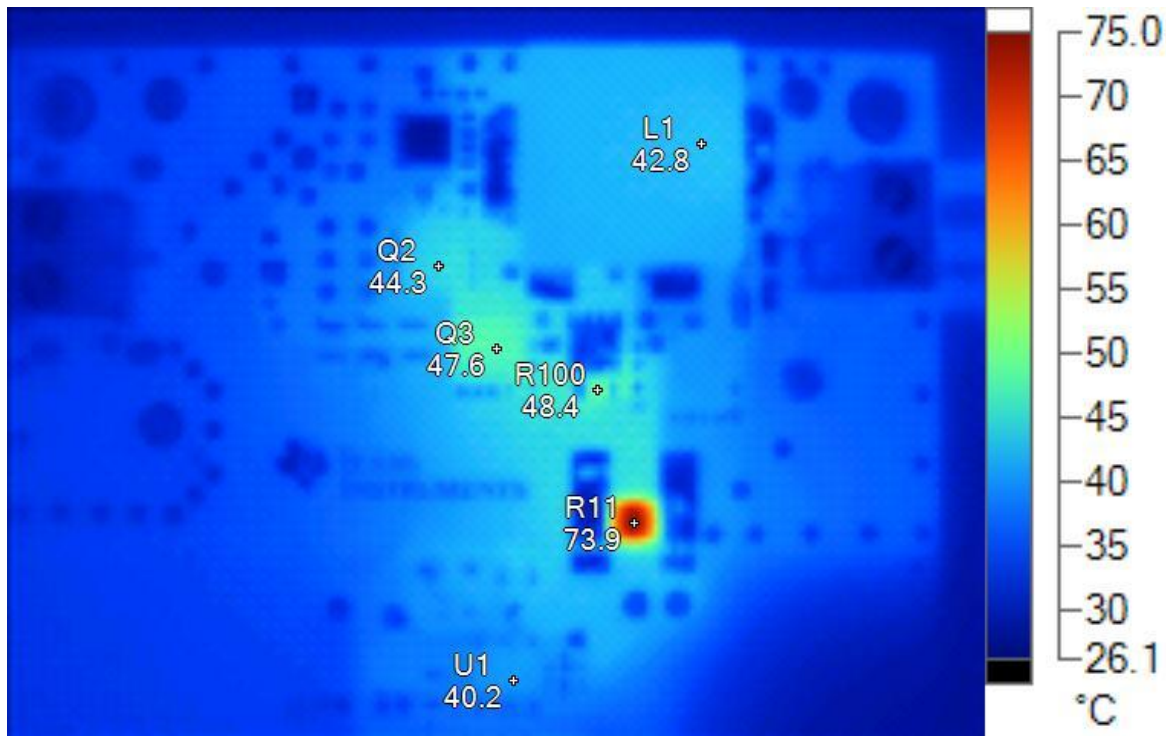
The image below shows the voltage on drain of Q4 at 12V input voltage in nominal conditions (no dimming).

Ch1: Drain-Source voltage (5V/div, 200nsec/div, No BWL)



6 Thermal Analysis

The thermal analysis of the converter shows the temperatures for each component, in the graph below. The converter has been placed horizontally on the bench without any forced convection. The input voltage was 12V and the output connected to 20 LED in parallel, each rated @ 350mA. The ambient temperature was 25C.



9/6/2013 12:22:02 PM

Image Info

Background temperature	25.0°C
Average Temperature	35.8°C
Image Range	27.1°C to 73.9°C
Camera Model	Ti40FT
Camera Manufacturer	Fluke
Image Time	9/6/2013 12:22:02 PM

Main Image Markers

Name	Temperature
Q3	47.6°C
R11	73.9°C
U1	40.2°C
R100	48.4°C
L1	42.8°C
Q2	44.3°C

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