PHOTO OF THE PROTOTYPE:
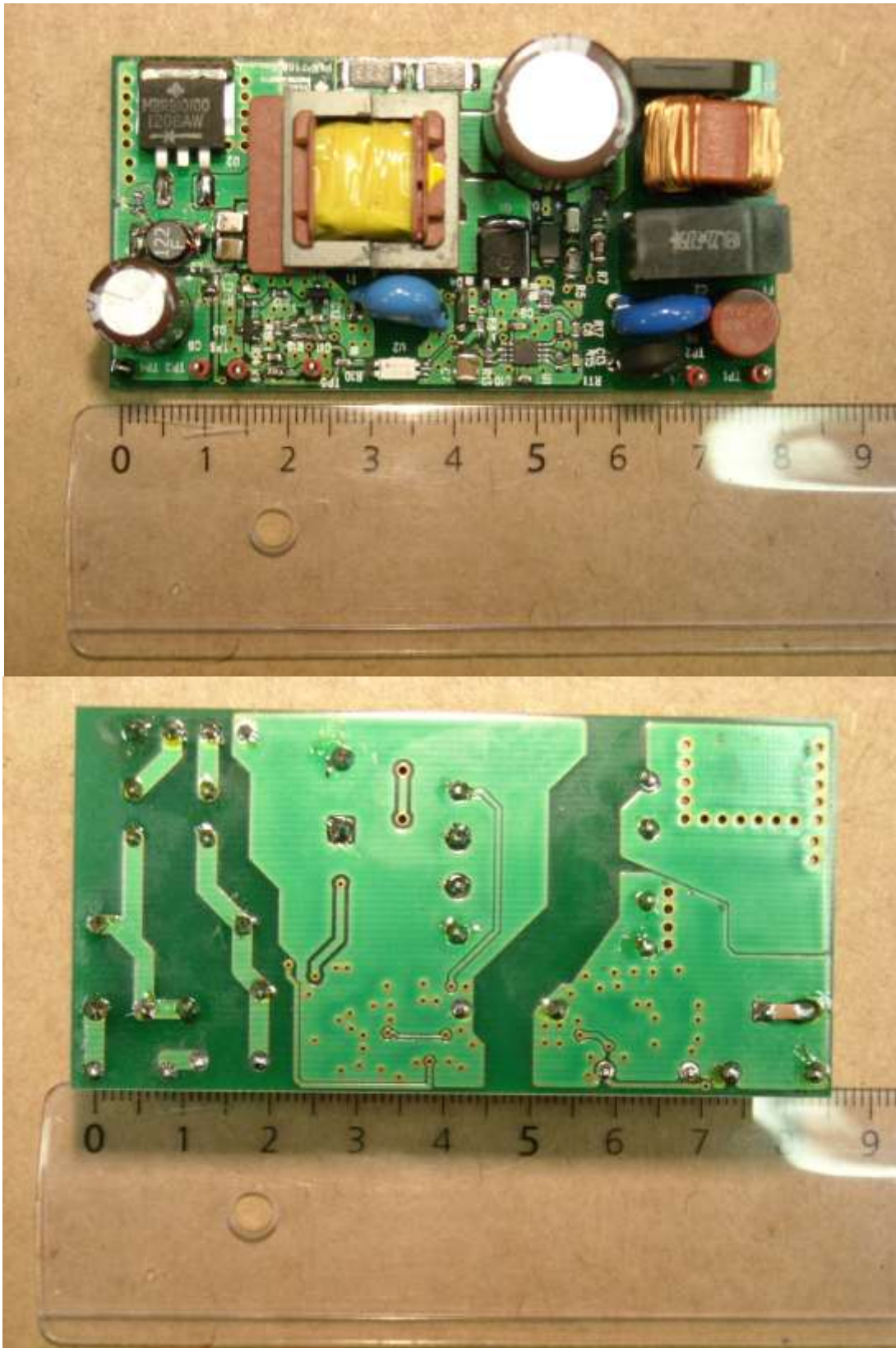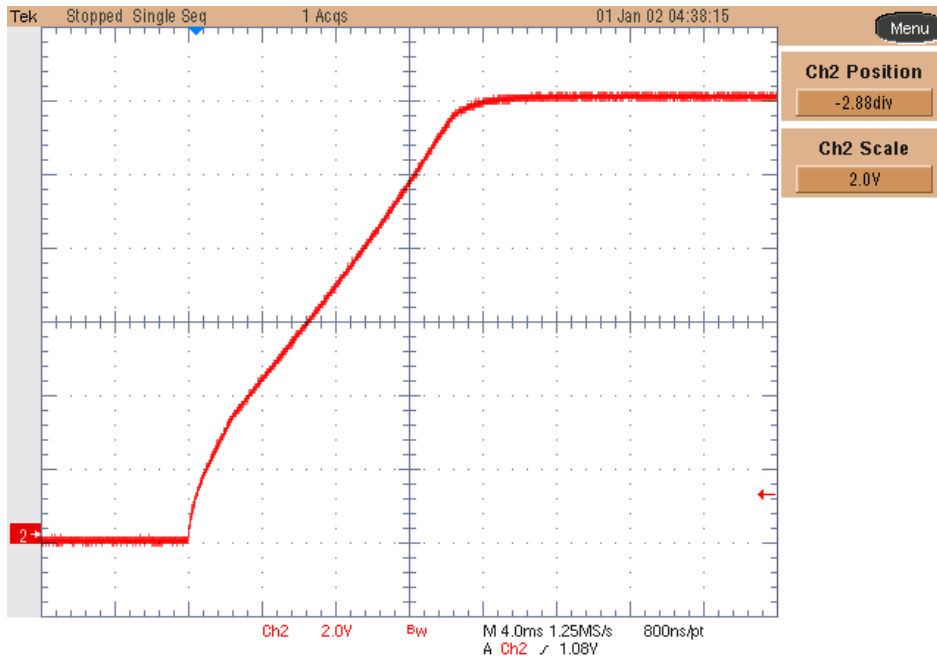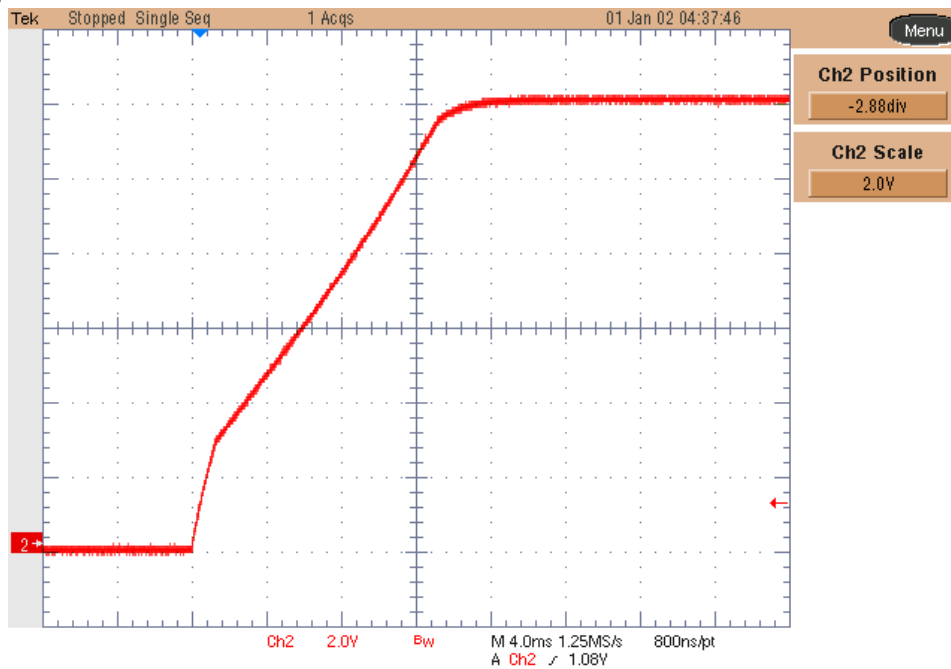
1   Startup

The output voltage behavior at startup is shown in the images below. The input voltage was set to 320Vdc. The output fully loaded in the upper picture and unloaded for the bottom one.

**Ch.2: Output voltage (2V/div, 4ms/div, DC coupling, 20MHz BWL)**
Iout = 2A;

Iout = 0A;

PMP7188 Rev.B Test Results

TEXAS INSTRUMENTS

2 Efficiency

The efficiency data are shown in the tables and graph below. In order to get an accurate measure of the input power, a DC voltage source has been employed, set to the peak value of the three nominal input voltages: 184Vac, 230Vac and 265Vac (260Vdc, 325Vdc and 375Vdc).
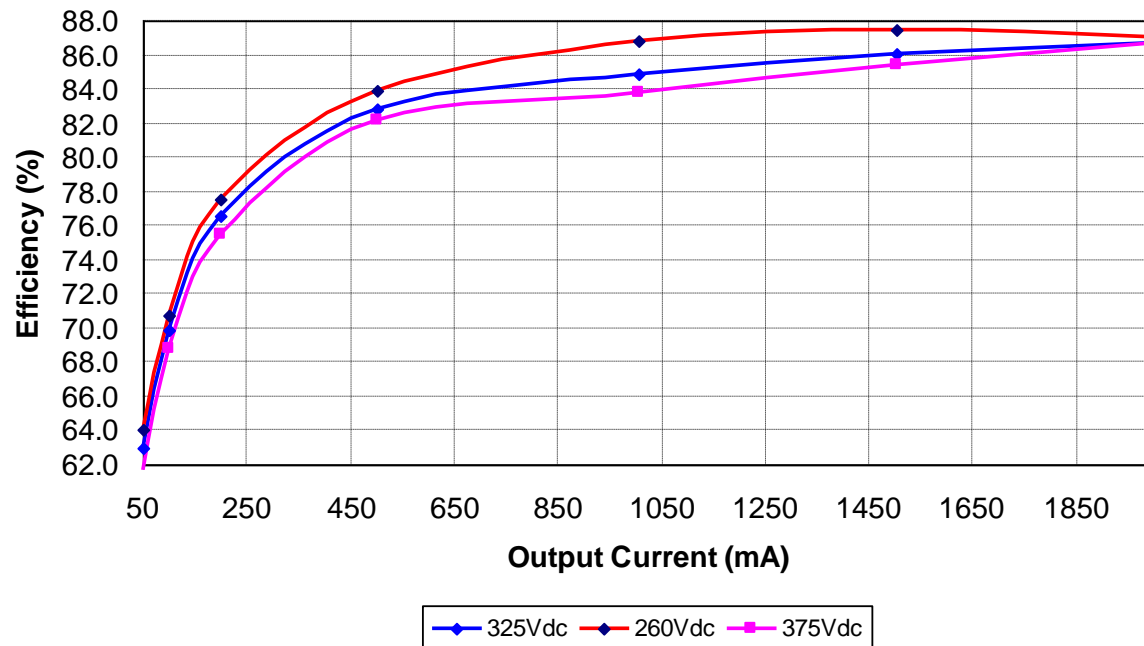

Iout (mA)	Vout (V)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
0.0	12.0900	0.00	0.446	260.2	0.12	0.116	0.00
51.4	12.0898	0.62	3.73	260.2	0.97	0.35	64.03
100.1	12.0897	1.21	6.57	260.2	1.71	0.50	70.79
200.0	12.0893	2.42	11.98	260.2	3.12	0.70	77.57
502.3	12.0885	6.07	27.83	260.2	7.24	1.17	83.85
1004.5	12.0863	12.14	53.8	260.1	13.99	1.85	86.76
1502	12.0839	18.15	79.8	260.1	20.76	2.61	87.44
2002	12.0818	24.19	106.9	260.0	27.79	3.61	87.03

Iout (mA)	Vout (V)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
0.0	12.0898	0.00	0.411	325.0	0.13	0.134	0.00
51.5	12.0895	0.62	3.04	325.1	0.99	0.37	63.00
100.1	12.0889	1.21	5.33	325.1	1.73	0.52	69.84
200.0	12.0886	2.42	9.71	325.1	3.16	0.74	76.59
502.3	12.0878	6.07	22.55	325.0	7.33	1.26	82.85
1004.5	12.0857	12.14	44.0	325.0	14.30	2.16	84.90
1502	12.0833	18.15	64.9	324.9	21.09	2.94	86.07
2002	12.0817	24.19	85.9	324.9	27.91	3.72	86.67

Power Management Solutions

PMP7188 Rev.B Test Results

TEXAS INSTRUMENTS

Iout (mA)	Vout (V)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
0.0	12.0900	0.00	0.428	375.0	0.16	0.161	0.00
51.5	12.0897	0.62	2.69	375.0	1.01	0.39	61.72
100.1	12.0891	1.21	4.69	375.0	1.76	0.55	68.81
200.0	12.0887	2.42	8.54	375.0	3.20	0.78	75.50
502.3	12.0881	6.07	19.71	375.0	7.39	1.32	82.15
1004.5	12.0862	12.14	38.6	375.0	14.49	2.35	83.81
1502	12.0837	18.15	56.7	375.0	21.26	3.11	85.36
2002	12.0818	24.19	74.4	374.9	27.89	3.70	86.72

3   Output Voltage Regulation

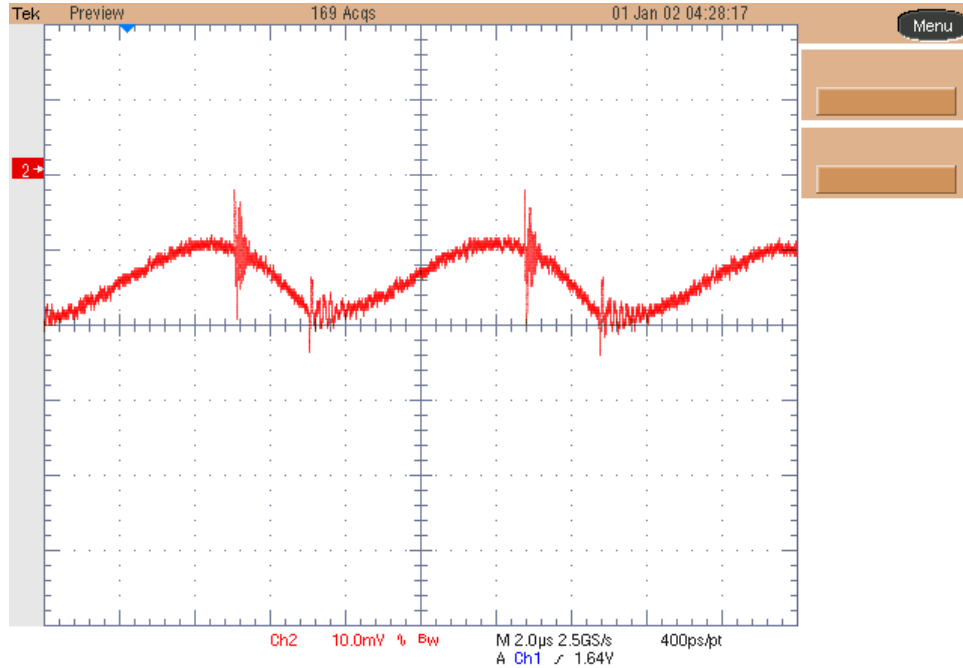The output voltage variation as function of load and input voltage is shown below:
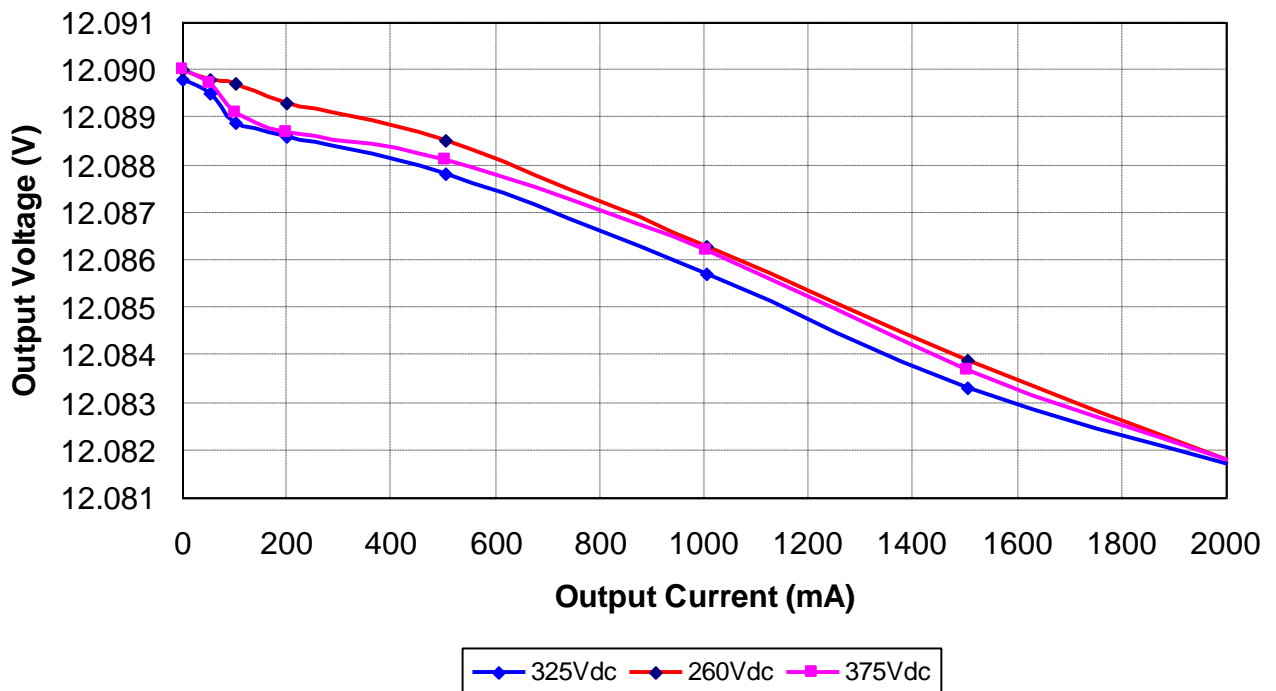
4 Output Ripple Voltage

The output ripple voltage is shown in the plot below. The input was set to 320Vdc and the output respectively to 2A, 100mA and no load.
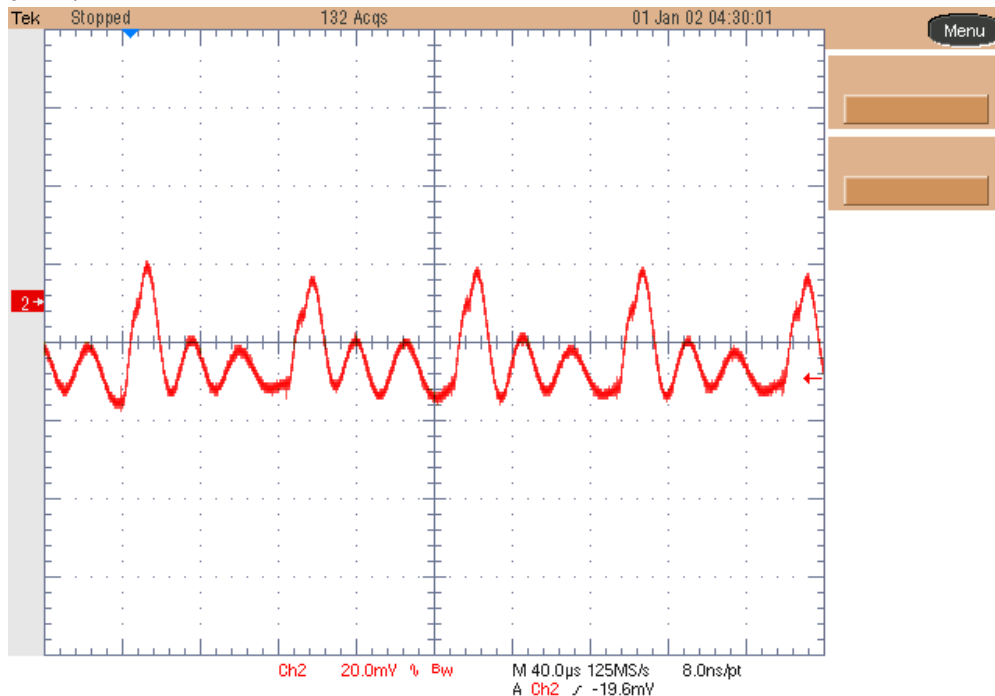
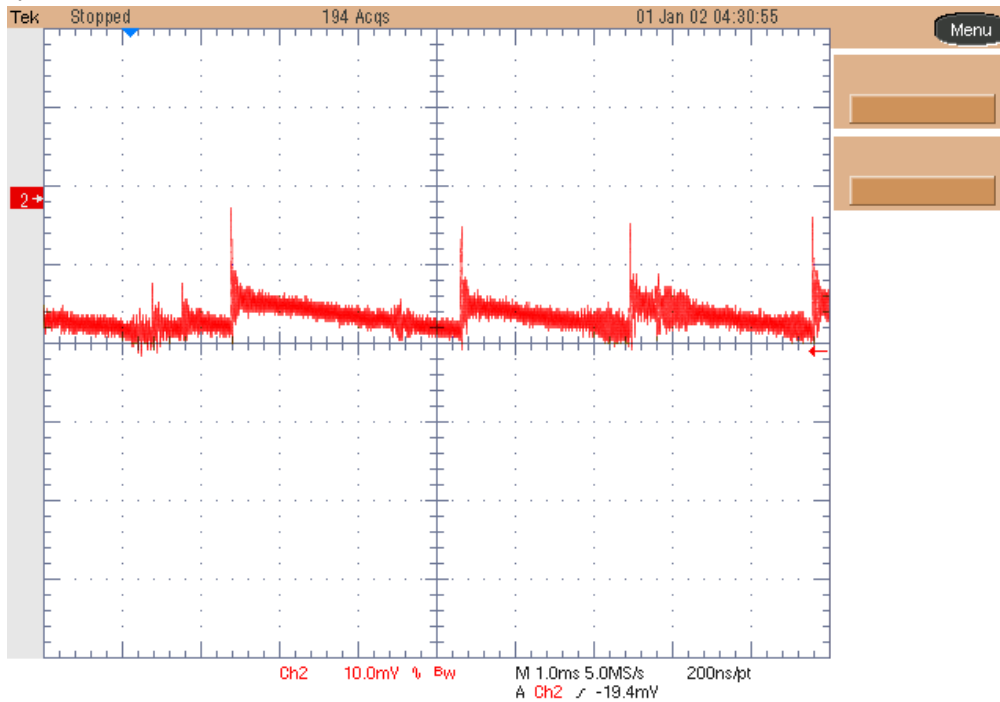**Ch.2: Output Voltage (10mV/div, 2us/div, AC coupling, 20MHz BWL)**
Iout = 2A.

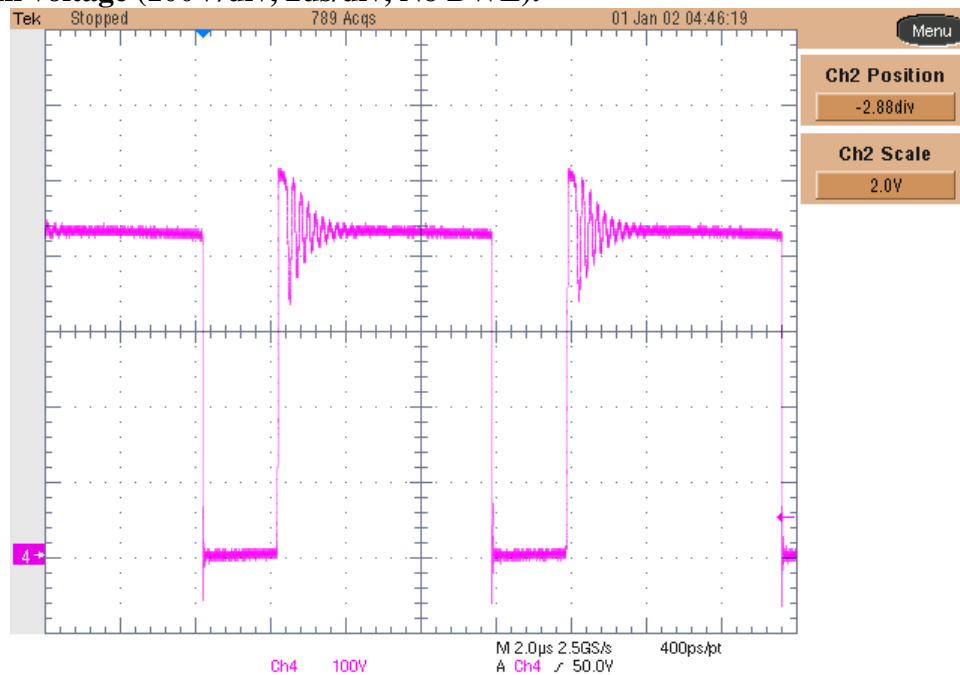**Ch.2: Output Voltage (20mV/div, 40us/div, AC coupling, 20MHz BWL)**
Iout = 100mA.

TEXAS
INSTRUMENTS

Ch.2: Output Voltage (10mV/div, 1ms/div, AC coupling, 20MHz BWL)
Iout = 0A.

5   Switching Node Waveform

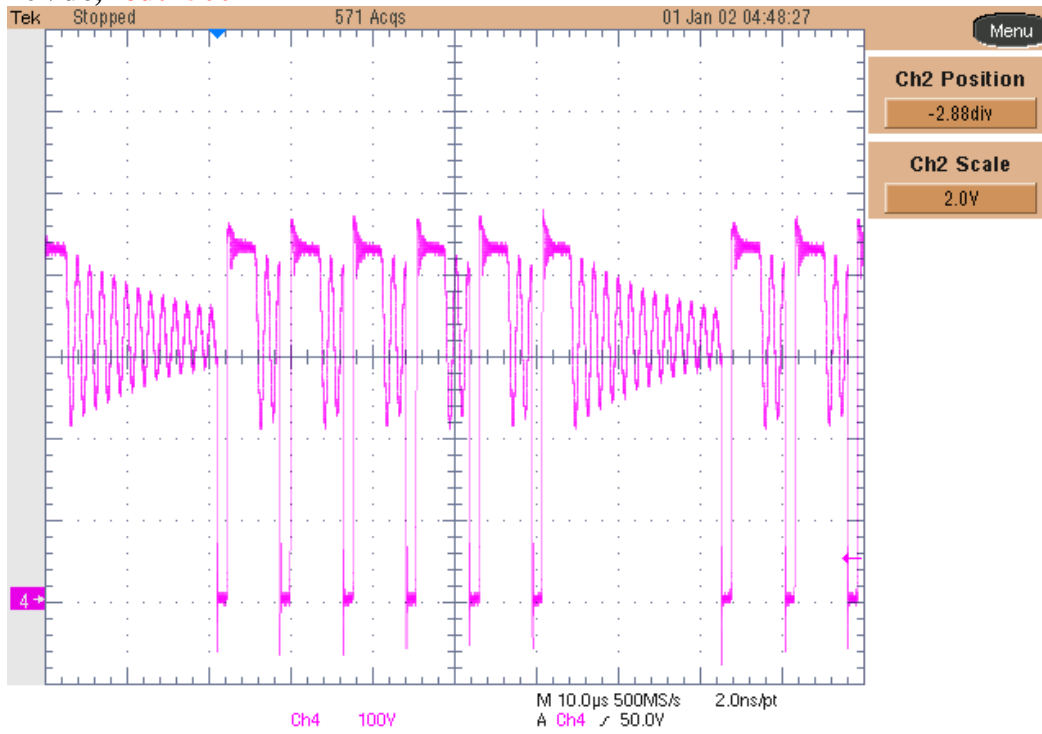The image below shows the peak voltage on the drain of the Mosfet Q1 with a 320Vdc input, and full load.

Ch4: Drain voltage (100V/div, 2us/div, No BWL).

Power Management Solutions

By reducing the load, the converter enters the skip-cycle mode, as shown in the picture below.
Ch4: Drain voltage (100V/div, 10us/div, No BWL).
Vin = 320Vdc, Iout=500mA

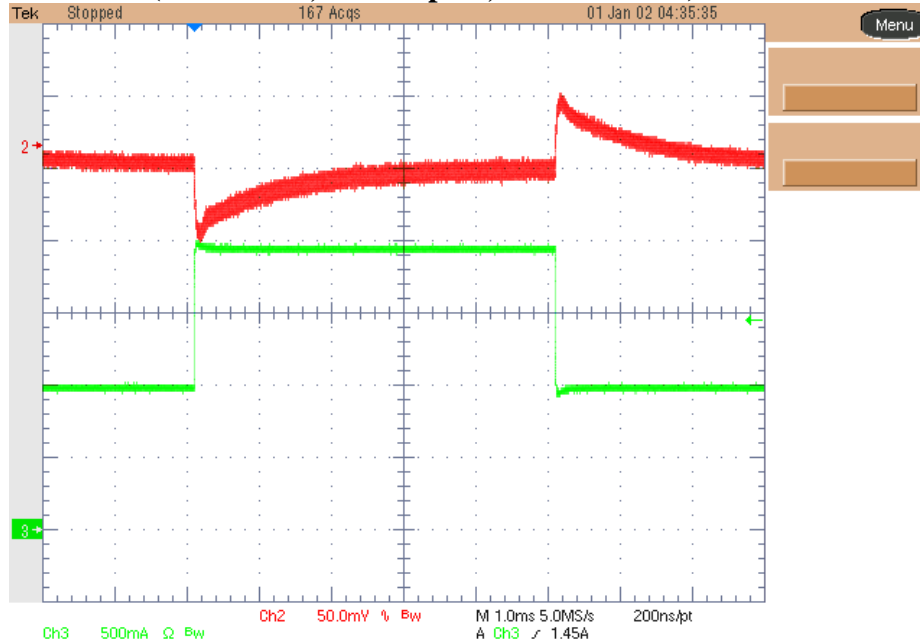**Ch4: Drain voltage (100V/div, 400usec/div, No BWL).**
Vin = 320Vdc, No Load
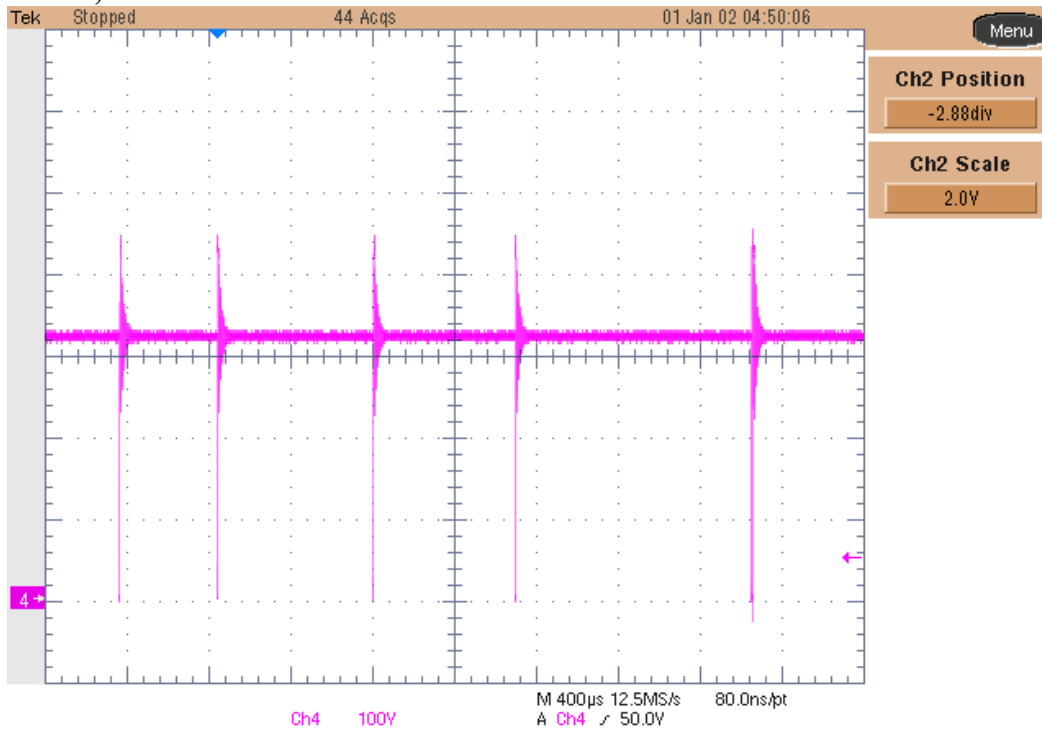
6   Transient Response

The image below shows the transient response of the output voltage when the load has been switched between 1A and 2A. The input voltage was set to 320Vdc.
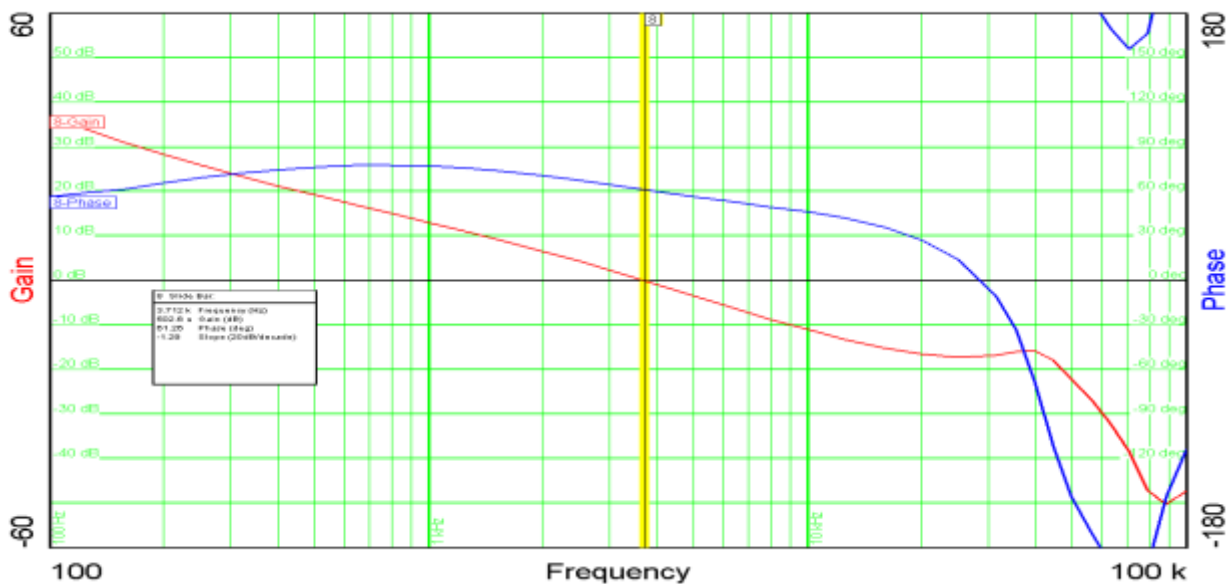**Ch2: Output Voltage (50mV/div, 1ms/div, AC coupled, 20MHz BWL).**
Ch3: Output Current (500mA/div, DC coupled, 20MHz BWL)
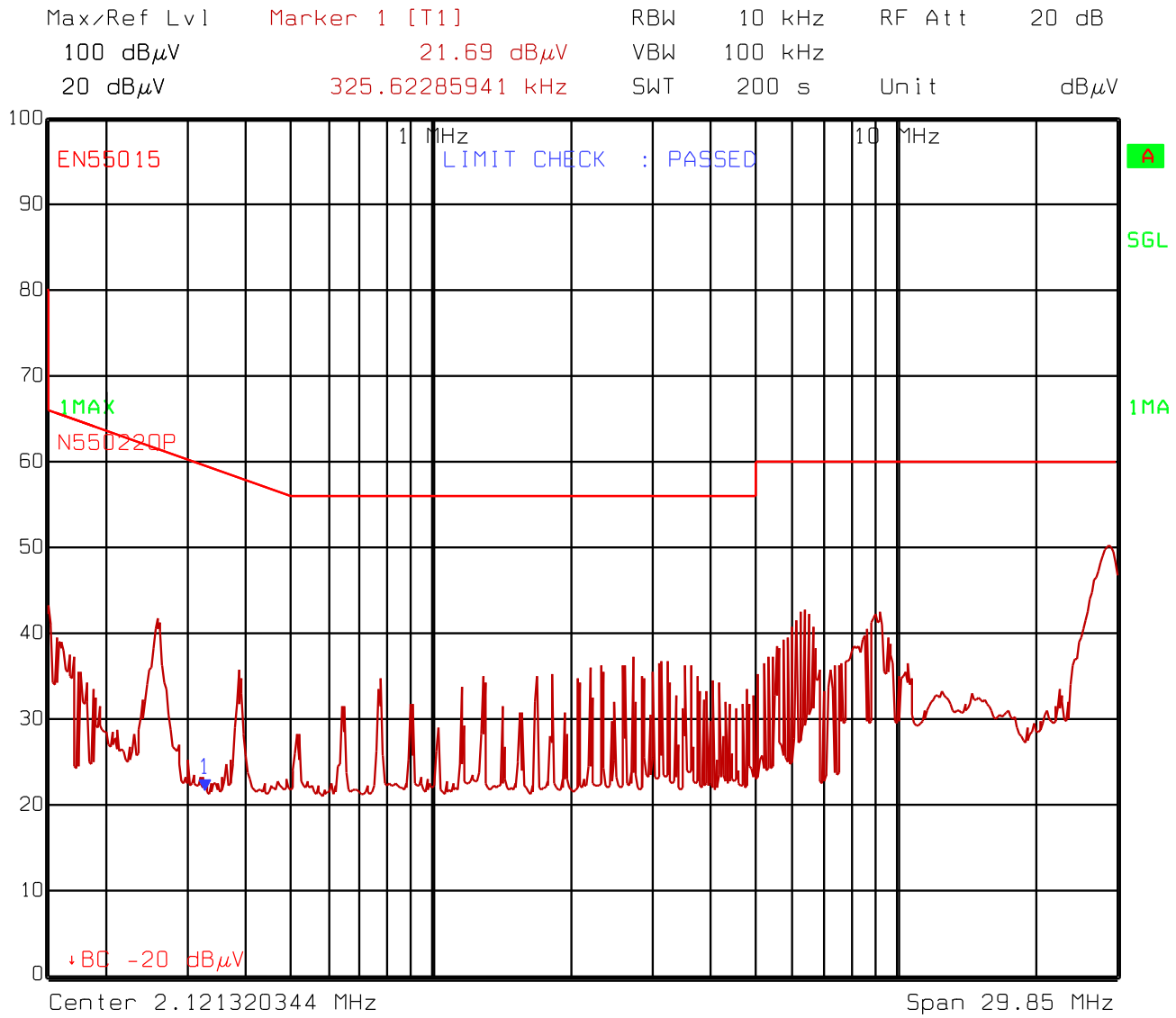

7   Loop Response

The graph below shows the bode-plot analysis. The input voltage was set to 320Vdc and the load to 2A. The crossover frequency was 3.71KHz and the phase margin 61.2 deg., while the gain margin was 17dB.

8 EMI Measurement

The graph below shows the conducted emission EMI noise and the EN55022 Class-B Quasi-Peak limits. The load was connected to a LISN and an isolation transformer; the load was a power resistor, set to 6 Ohm (2A load), while the input voltage was 230Vac.The receiver was set to Quasi-peak detector, 10 KHz bandwidth.


```
Max/Ref Lvl     Marker 1 [T1]           RBW    10 kHz    RF Att    20 dB
  100 dBµV                  21.69 dBµV   VBW   100 kHz
   20 dBµV         325.62285941 kHz     SWT    200 s     Unit      dBµV
```

EN55015 LIMIT CHECK : PASSED
1MAX
N550220P
↓BC -20 dBµV

Center 2.121320344 MHz   Span 29.85 MHz

Title: FFlo1
Date: 26.JUL.2012 15:19:33

9 Thermal Analysis

The graph and data below show the thermal image taken on the prototype when supplied with 320Vdc input and fully loaded. The board has been placed horizontally on the bench, without any air flow. The ambient temperature was 25C.
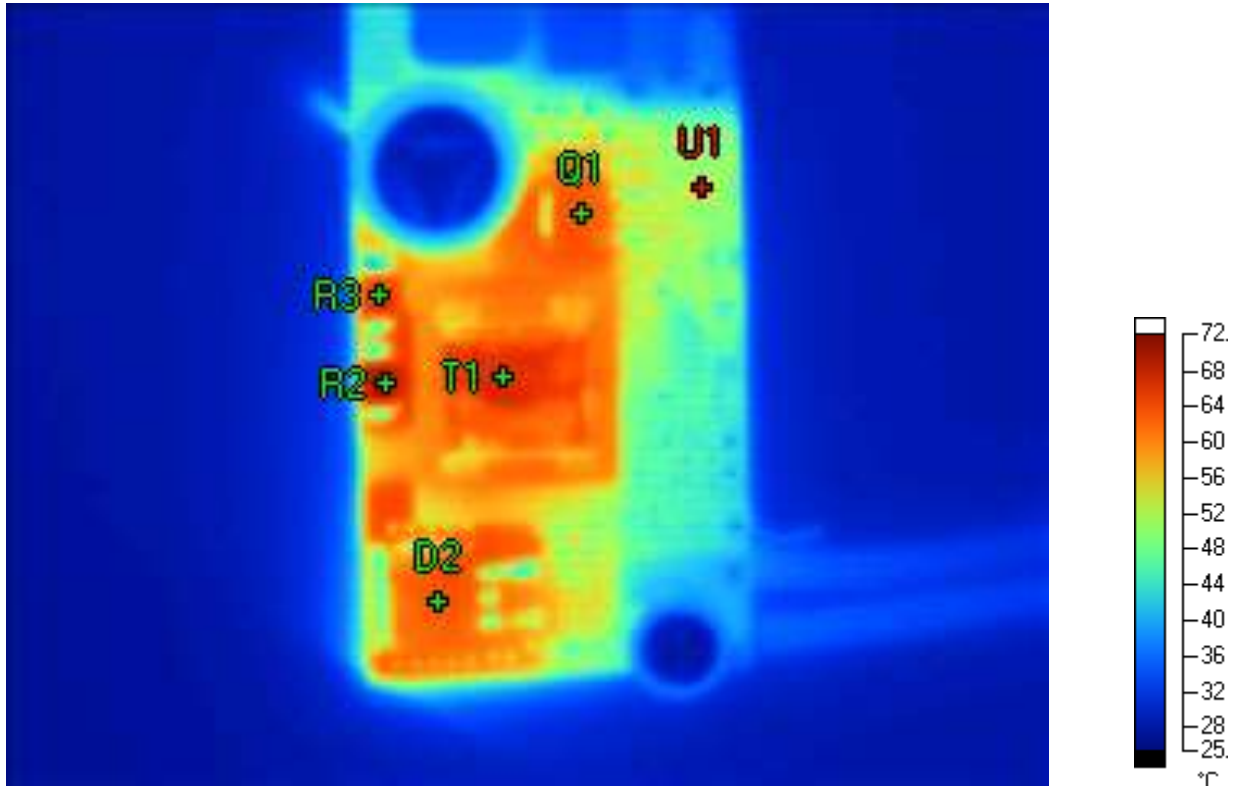
Image Info

Background	25.0 °C
Average Temperature	35.7 °C
Calibration Range	-20.0 °C to 350.0 °C
Camera Model	Ti40FT
Image Range	26.3 °C to 71.3 °C
Image Time	7/24/2012 4:29:40 PM
Manufacturer	Fluke
Camera Serial Number	Ti40FT-070263

Markers

Label	Temperature	Emissivity	Background
R2	71.3 °C	0.95	25.0 °C
T1	66.7 °C	0.95	25.0 °C
D2	63.6 °C	0.95	25.0 °C
Q1	63.8 °C	0.95	25.0 °C
R3	66.5 °C	0.95	25.0 °C
U1	54.5 °C	0.95	25.0 °C

IMPORTANT NOTICE AND DISCLAIMER