LM2621 Design Document

National Semiconductor
LM2621
May 2006

1.0 Design Specifications

Inputs	Outputs #1
VinMin=2.7 V	Vout1=3.3 V
VinMax=5.5 V	Iout1=0.65 A

2.0 Design Description

The design uses a SEPIC topology using LM2621 controller.

Control scheme uses hysteretic window to control the output voltage. When the output voltage is below the upper threshold of the window the LM2621 switches with a fixed duty cycle of 70% at 400kHz. Current is ramped up during the first portion of the switch cycle, inductor current IL1& IL2 flows thru the FET (internal to LM2621) and stores energy in the inductor. During the 2nd portion of switch cycle FET (internal to LM2621) turns-off diode D2 conducts carrying the inductor current, current in L2 is the load current. When LM2621 switches continuously, the output voltage ramps up. When output voltage hits upper threshold limit LM2621 stops switching completely and output voltage is allowed to droop.

Note, Oscillator switches at 400kHz but the output ripple of the design is based upon the hysteresis of the gated oscillator as well as the load current.

This design is know for its simplicity and fast transient response. Ripple voltage generated across C4 is sensed by the feedback pin. C3 will allow the high frequency ripple to appear across the feedback pin without being attenuated by R2 & R4.

SEPIC topology provides low input ripple due to the input inductor and allows the output to be stepped up or down with no inversion in output polarity.

High switching frequency and high peak currents require that layout is done properly. A few points to note are:

1) Decoupling capacitors are close to IC pins as possible. Keep separate power ground plane.

2) Input and output capacitors are connected to the power ground plane; all other capacitors are connected to the signal ground plane.

3) High current paths are very short.

4) Feedback connections are short and direct and routed away from any noisy traces (i.e. switch node).

3.0 Schematic

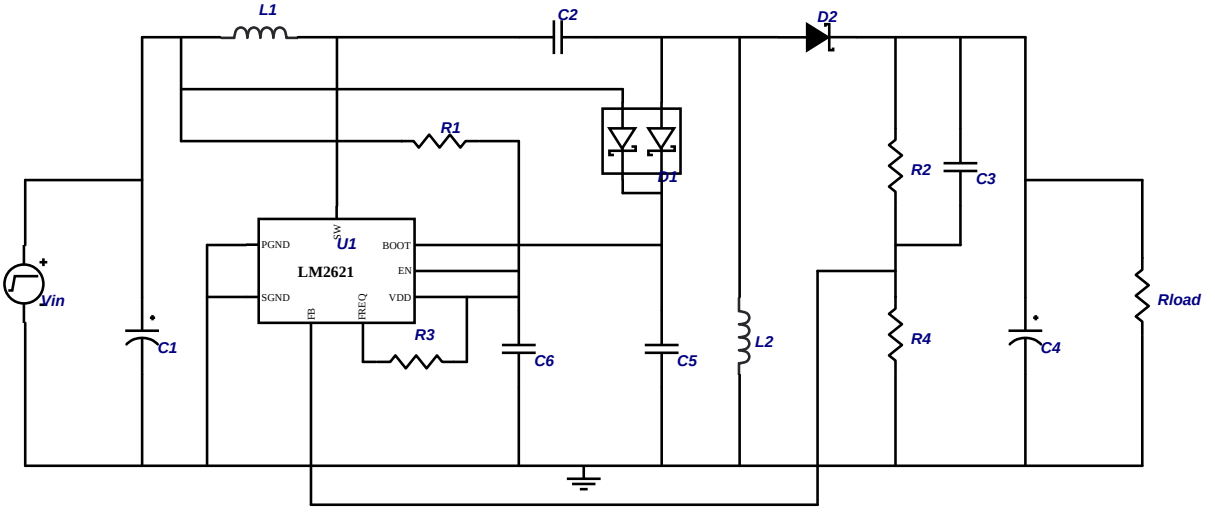

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
C1	Sanyo	10CV220AX	220u F, 0.34 Ohms

Part	Manufacturer	Part#	Attributes
C2	TDK	C2012X7R1C225M	2.2u F
C3	Vishay	VJ0603A331KXXAT	33p F
C4	TDK	C3225X7R0J107MT	100u F, 0.34 Ohms
C5	Vishay	VJ0603Y104KXXAT	0.1u F
C6	Vishay	VJ0603Y104KXXAT	0.1u F
D1	Philips	BAT54C	1 V
D2	Vishay	MBRS120	1 V
L1	Coilcraft	DO1813P-682HC	6.8u H, 0.08 Ohms
L2	Coilcraft	DO1813P-682HC	6.8u H, 0.08 Ohms
R1	Vishay	CRCW08054990FRT6	499 Ohms
R2	Vishay	CRCW08051503FRT6	150k Ohms
R3	Vishay	CRCW08053923FRT6	392kk Ohms
R4	Vishay	CRCW08059092FRT6	90.9k Ohms
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5.0 Layout

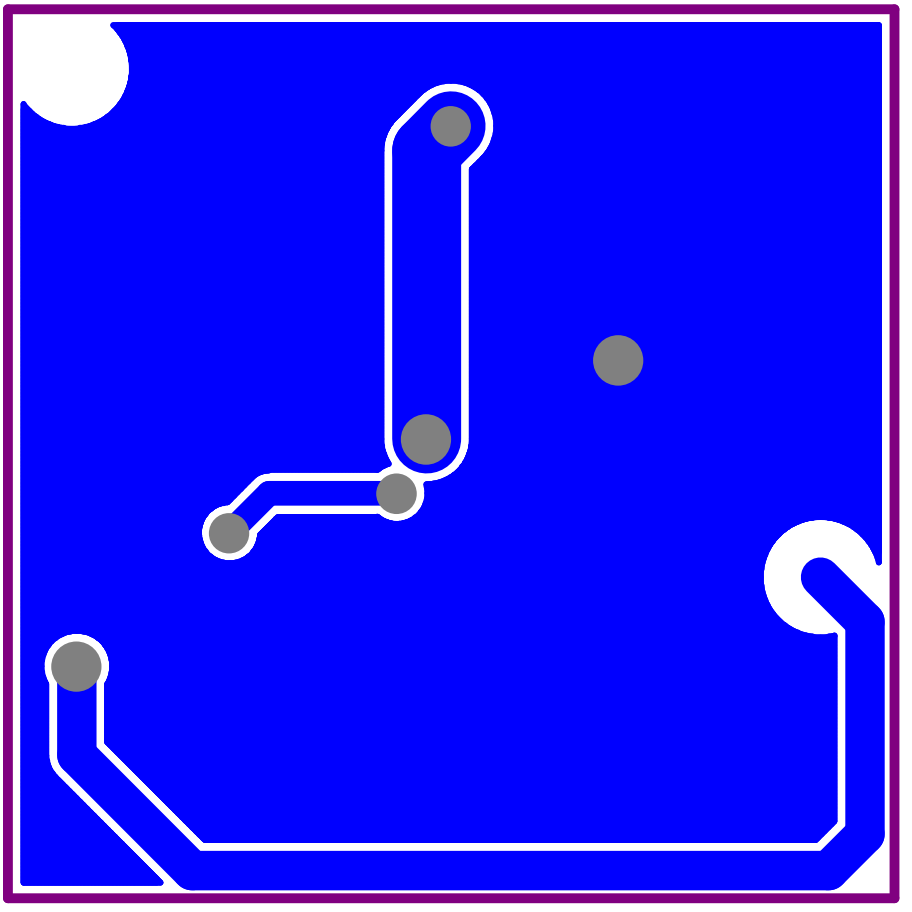

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FIGURE 2. Board's Bottom View

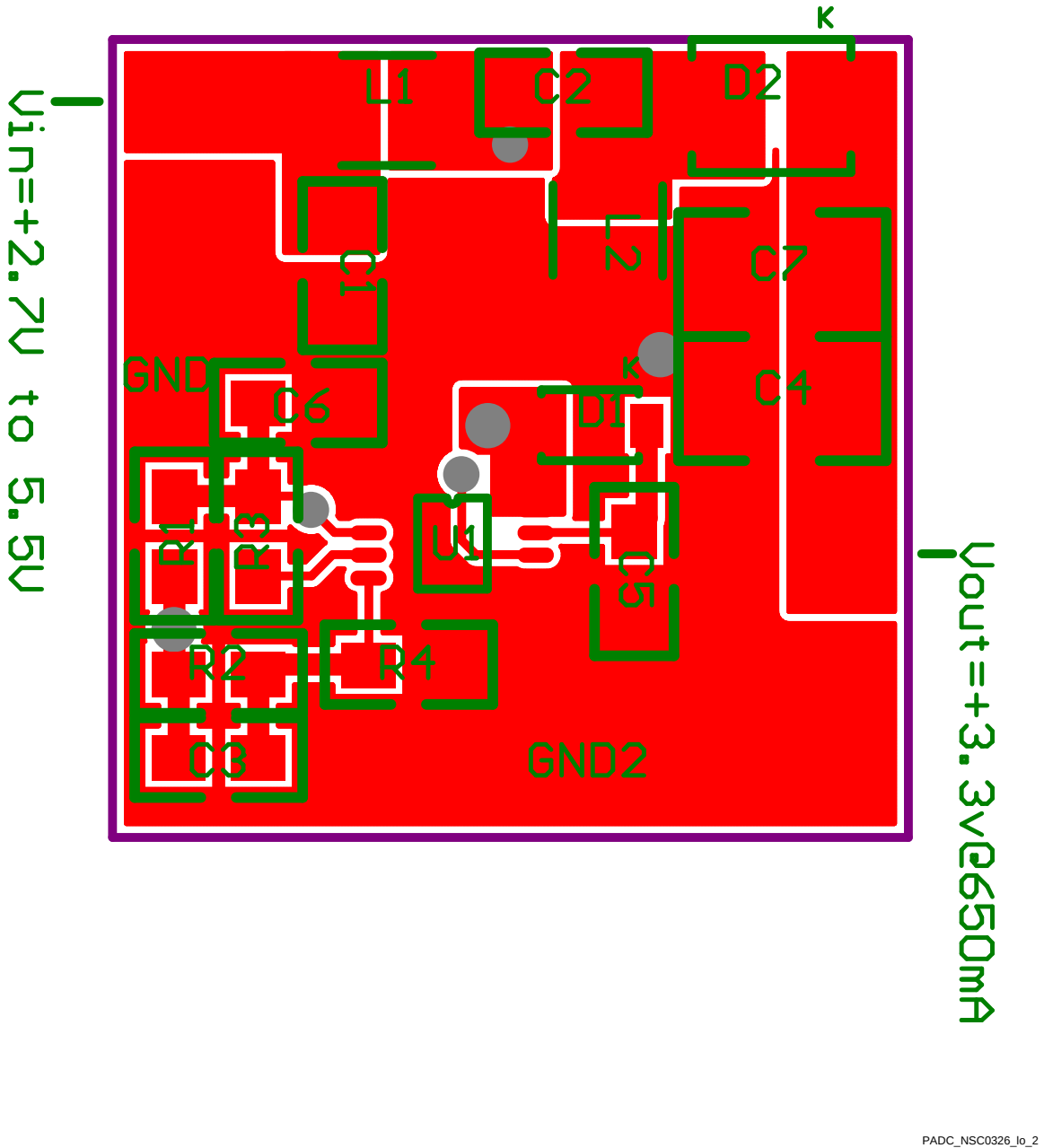

FIGURE 3. Board's Top View

6.0 Waveforms

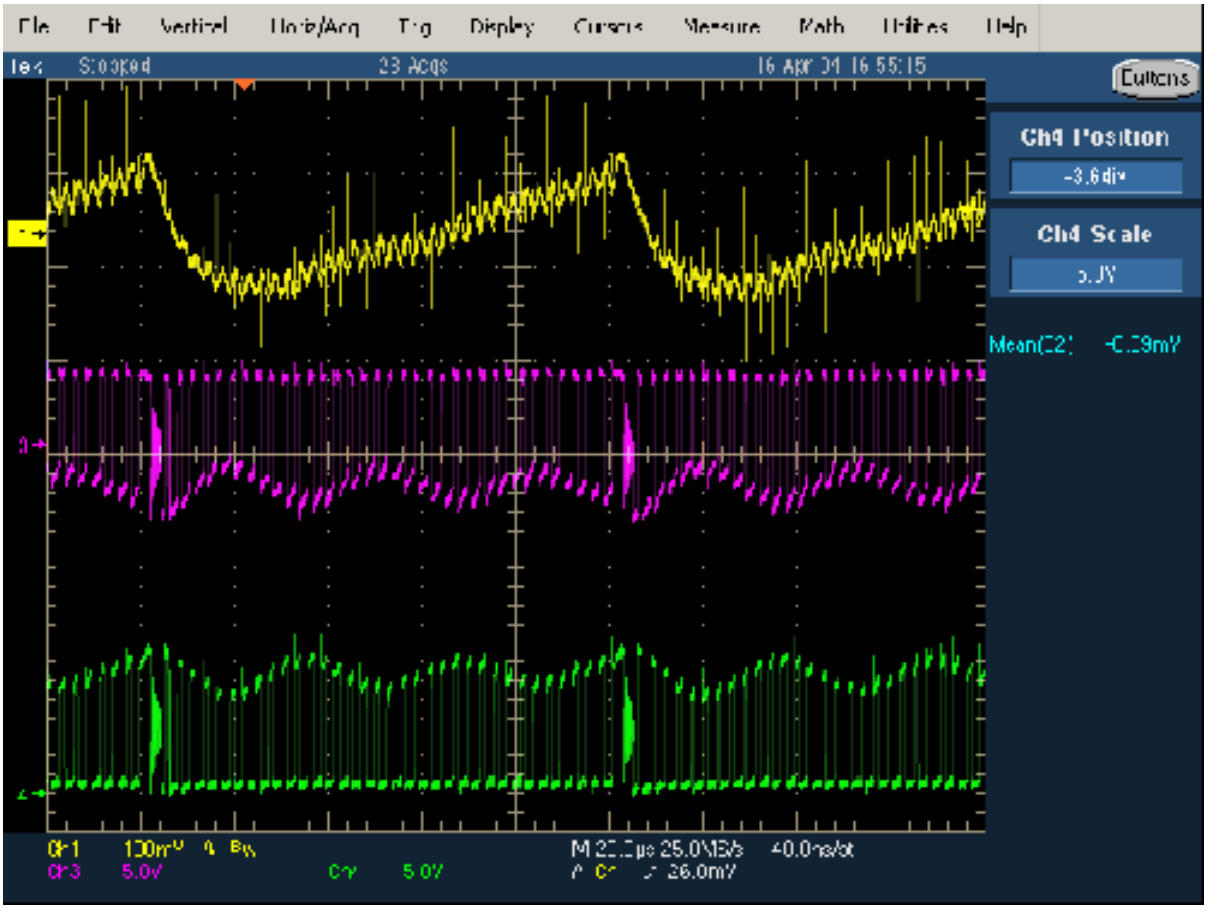

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FIGURE 4. ch1=Vout_ripple ch3=Vreer ch4=Vswitchnode at Vin=2.7V and Iout=0.65A

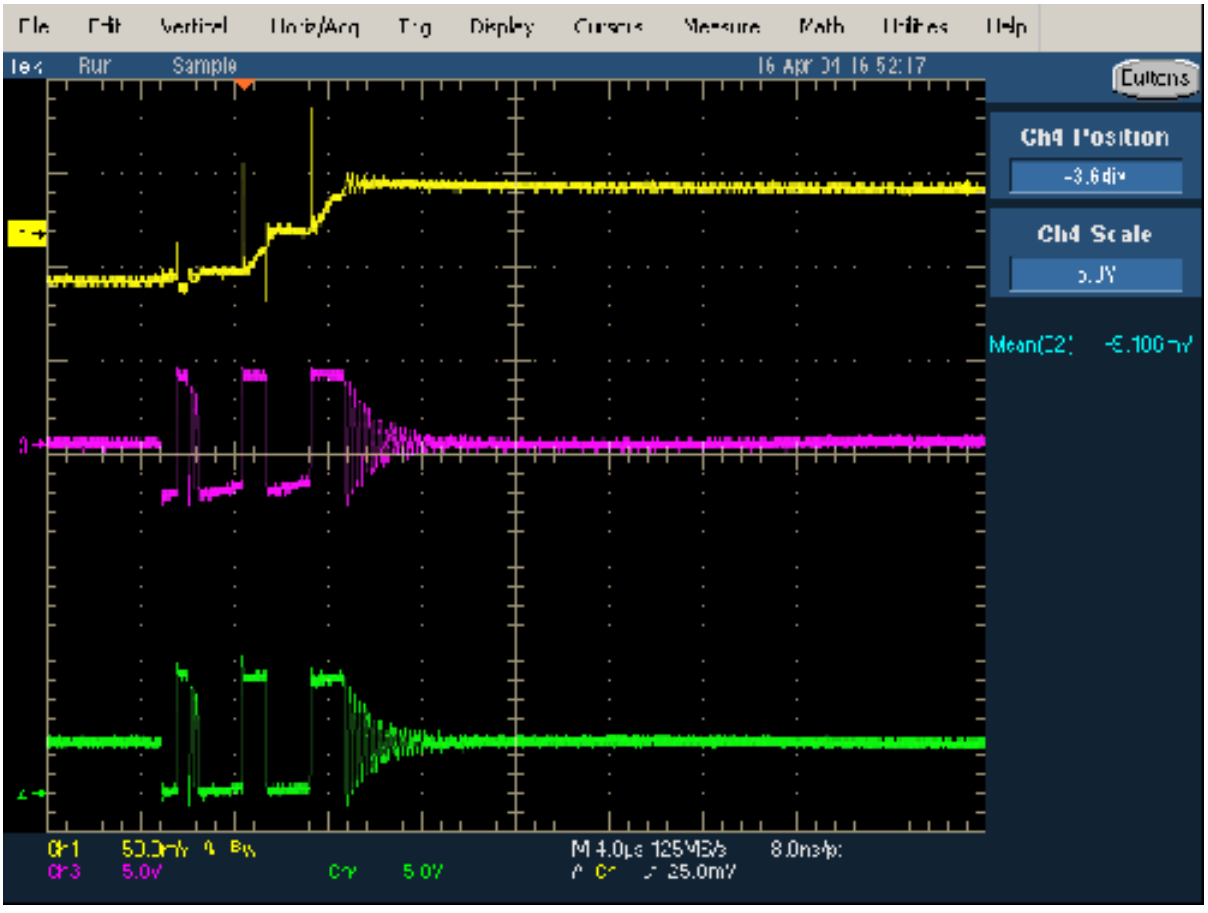

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FIGURE 5. ch1=Vout_ripple ch3=Vreer ch4=Vswitchnode at Vin=2.7V and Iout=0

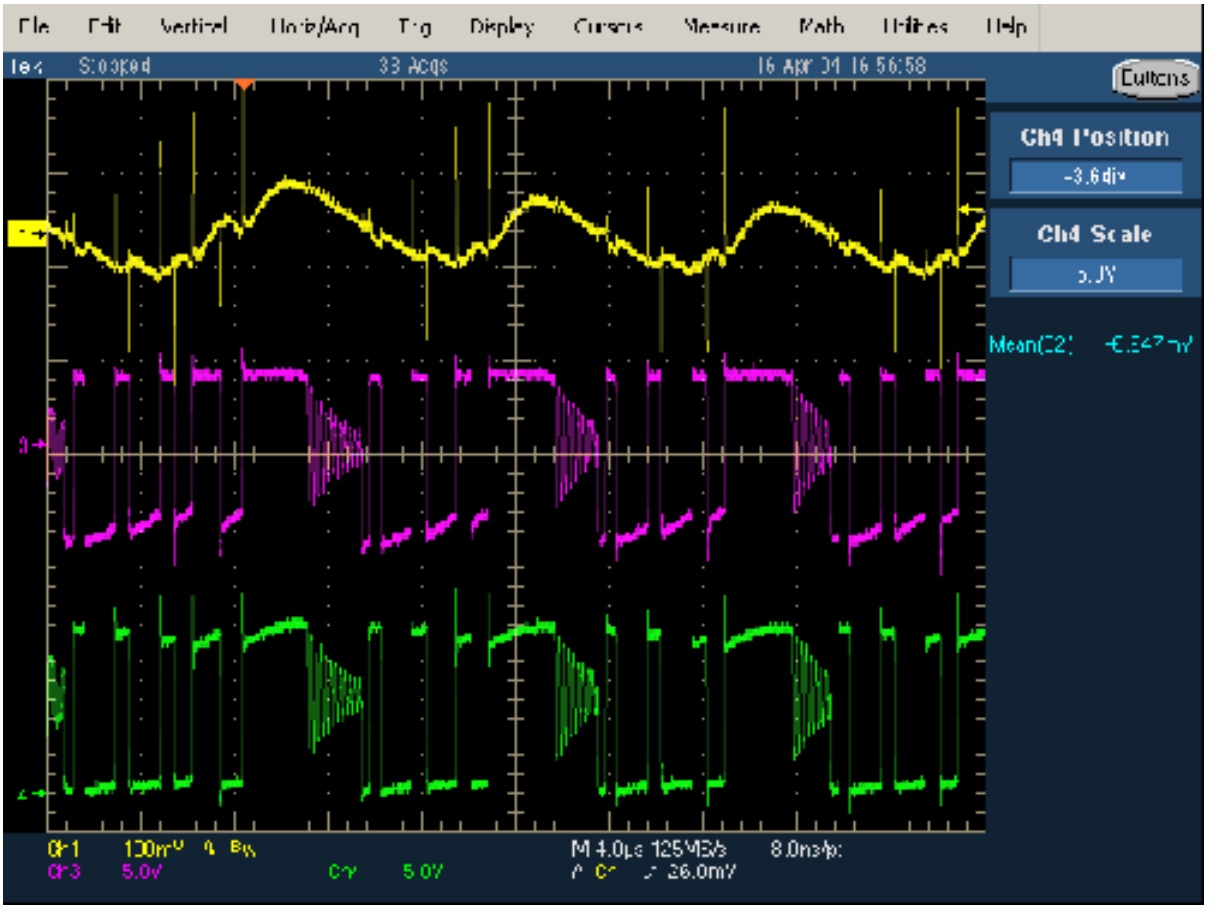

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FIGURE 6. ch1=Vout_ripple ch3=Vreer ch4=Vswitchnode at Vin=5V and Iout=0.65A

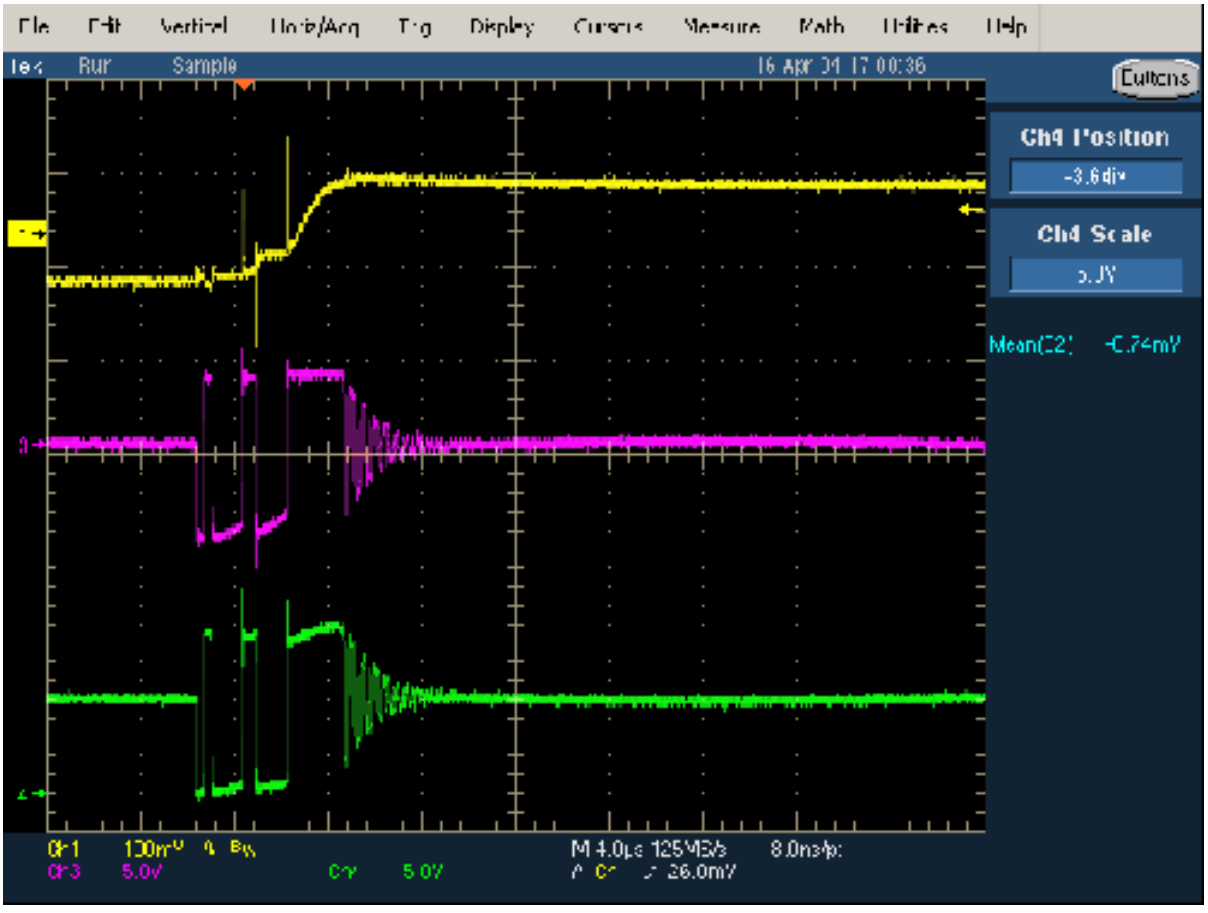

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FIGURE 7. ch1=Vout_ripple ch3=Vreer ch4=Vswitchnode at Vin=5V and Iout=0

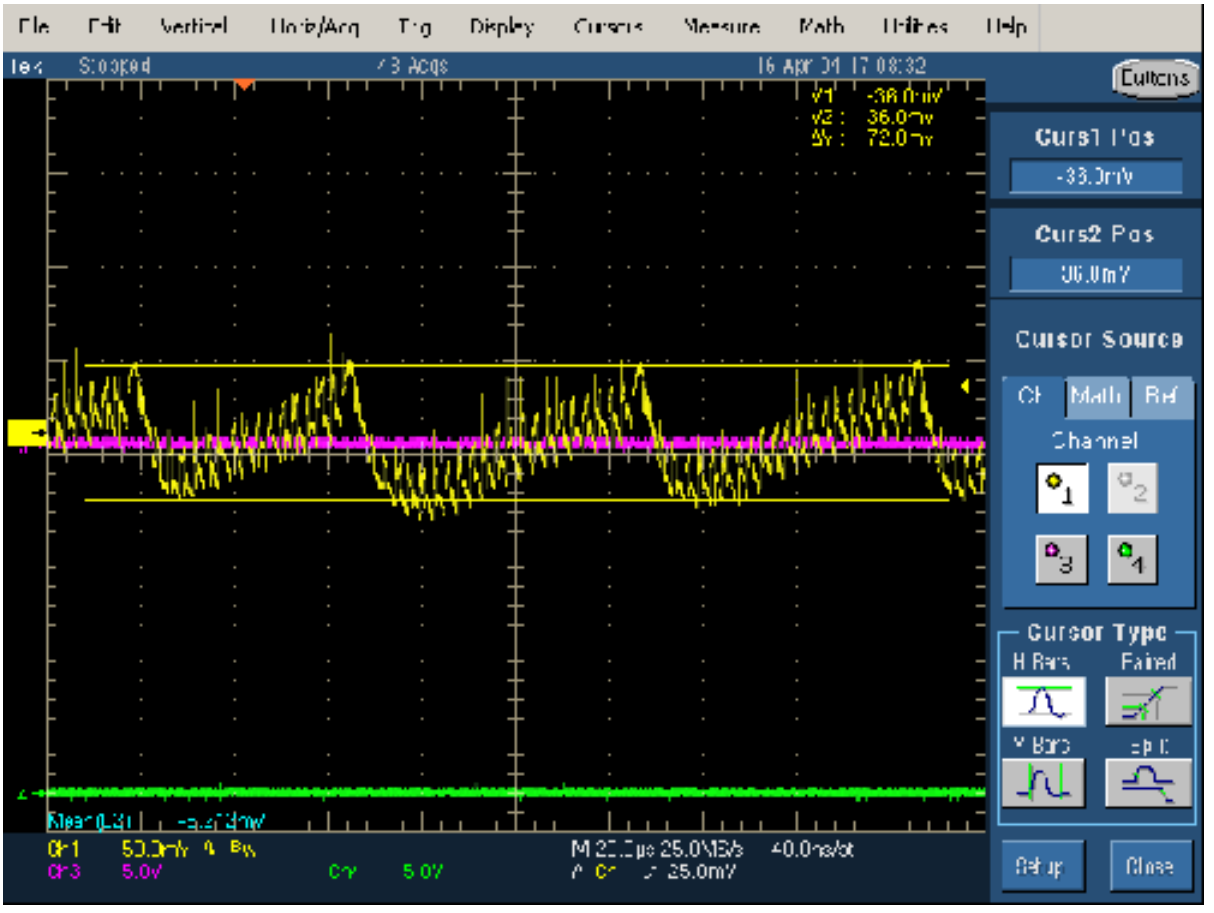

FIGURE 8. Vfeedbackpin for Vin=2.7V and Iout=0.65A

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FIGURE 9. Vfeedbackpin for Vin=2.7V and Iout=0A

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FIGURE 10. Vfeedbackpin for Vin=5V and Iout=0.65A

FIGURE 11. Vfeedbackpin for Vin=5V and Iout=0

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