

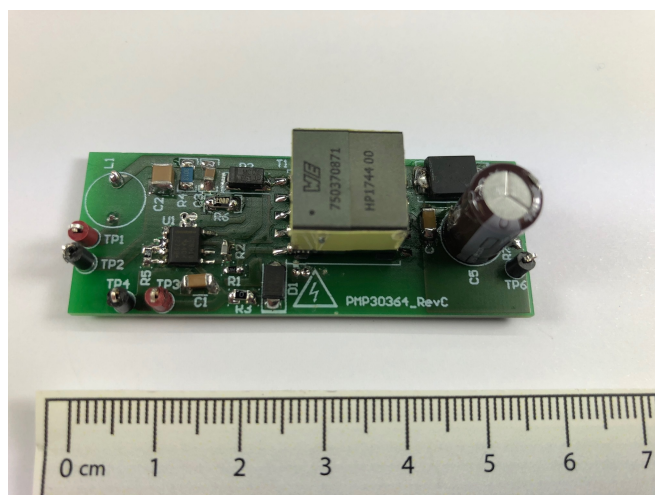
Test Report: PMP30364

108-VDC - 411-VDC Input Non-Isolated Flyback Reference Design



Description

The PMP30364_RevC reference design uses the UCC28910 flyback controller with integrated MOSFET to generate a non-isolated output (6.5V@0.6A) from an 100VDC to 411VDC input. The UCC28910 provides constant-voltage and constant-current output regulation without the use of an optical coupler. The valley switching operation reduces switching losses and achieves high efficiency.



An IMPORTANT NOTICE at the end of this TI reference design addresses authorized use, intellectual property matters and other important disclaimers and information.

1 Test Prerequisites

1.1 Voltage and Current Requirements

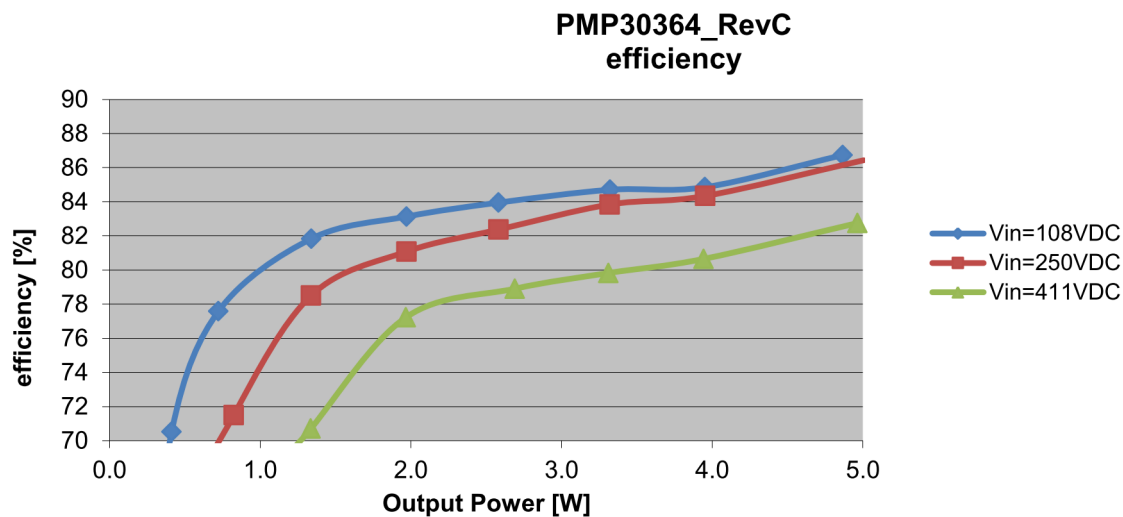
Table 1. Voltage and Current Requirements

PARAMETER	SPECIFICATIONS
V_{IN}	108VDC - 411VDC
V_{OUT}	6.5@0.6A
Nominal switching frequency	50kHz

2 Testing and Results

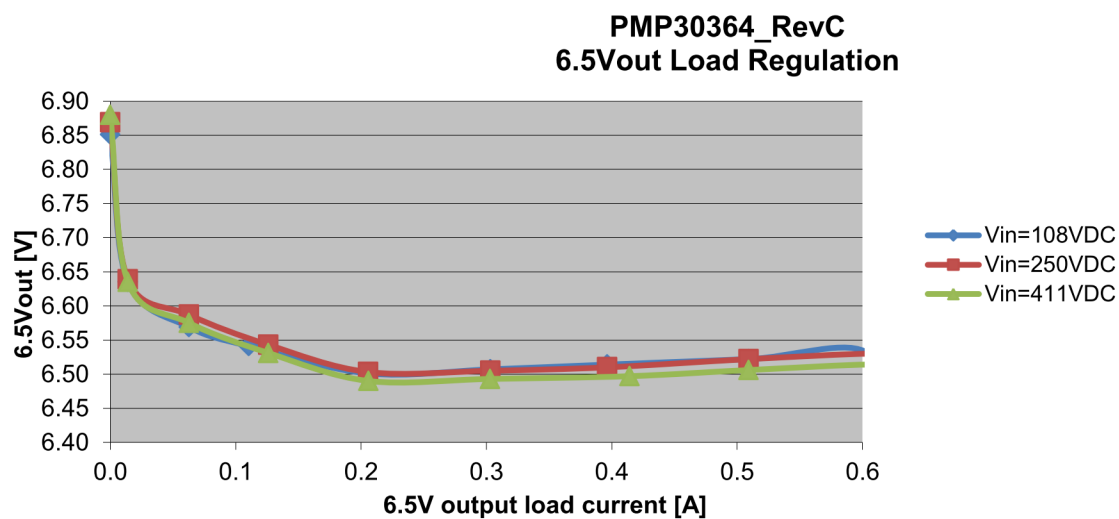
2.1 Efficiency Graphs

Figure 1. Efficiency



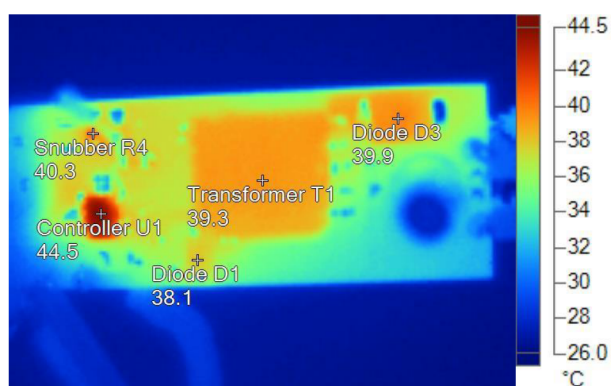
2.2 Efficiency Data*

Figure 2. Load Regulation



2.3 Thermal Images

Figure 3. The images below show the infrared images taken from the FlexCam after 15min at full load output power.



Vin=411VDC Full load_1271.is2

Input Voltage = 411VDC

Output Power = 4.9W

Name	Temperature	
Snubber R4	40.3°C	
Controller U1	44.5°C	
Transformer T1	39.3°C	
Diode D3	39.9°C	
Diode D1	38.1°C	

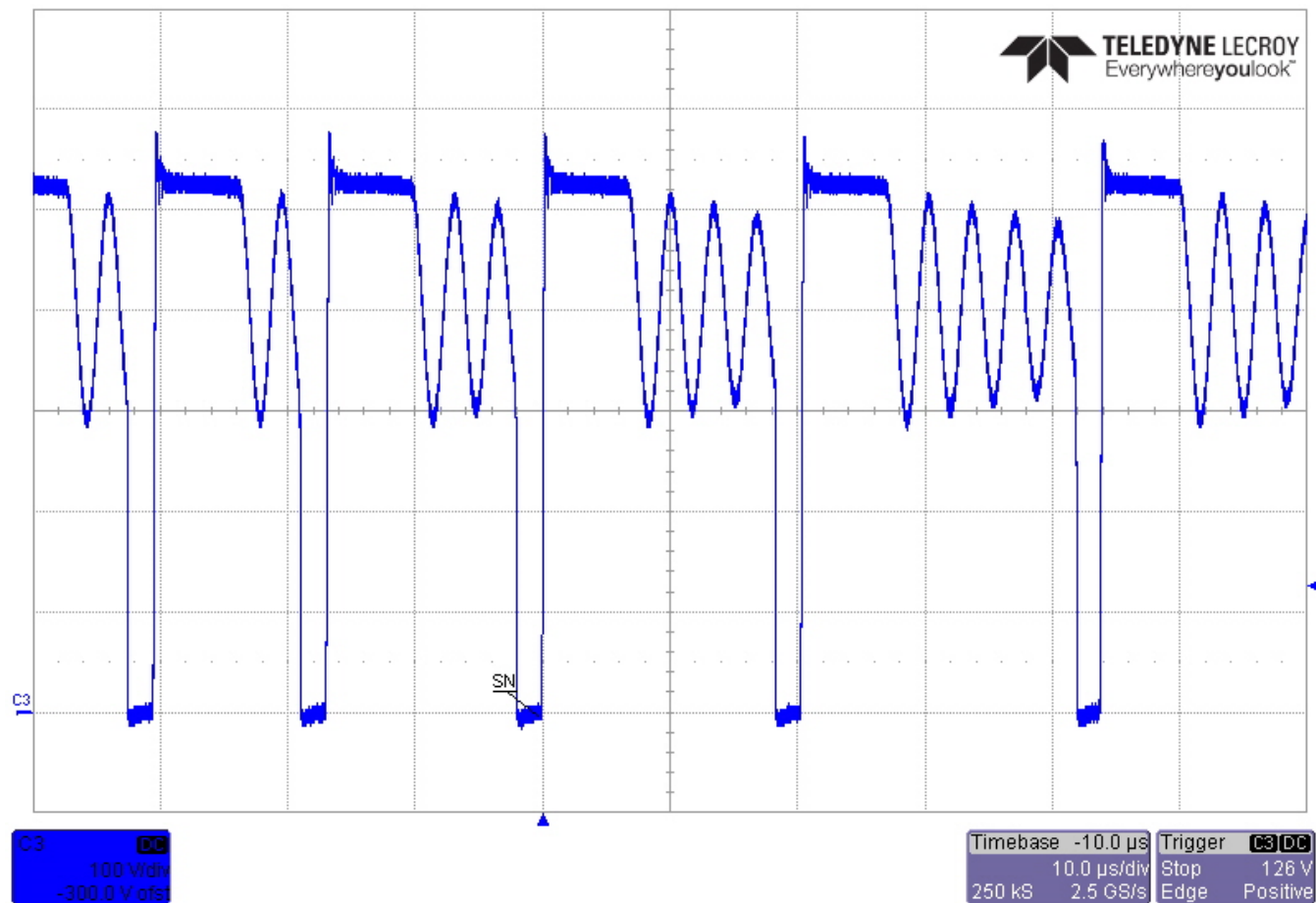
2.4 Dimensions

59mm x 22mm

3 Waveforms

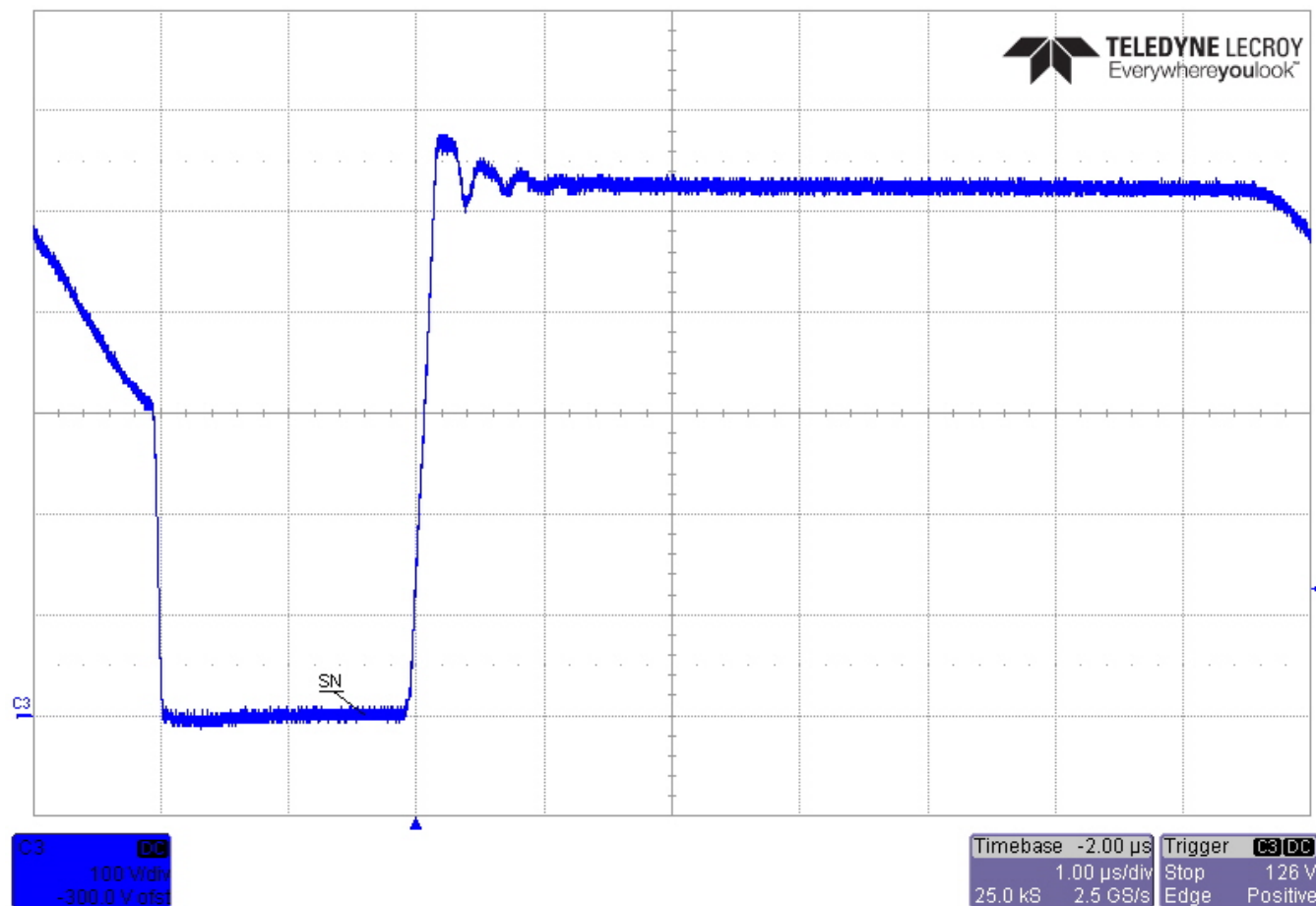
3.1 Switching*

Figure 4. Switchnode



Input Voltage = 411VDC
Output Power = 4.9W

Figure 5. Switchnode

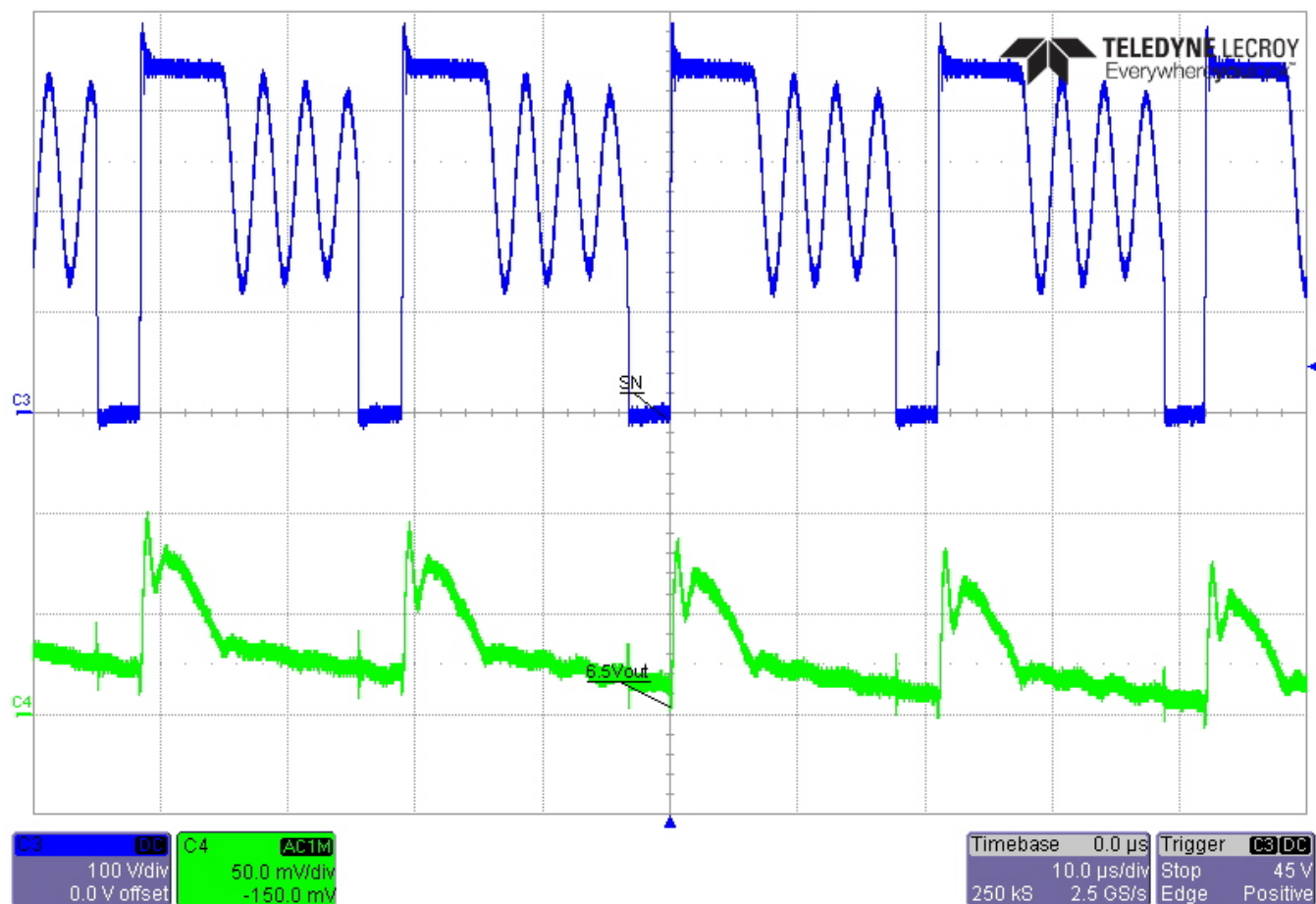


Input Voltage = 411VDC

Output Power = 4.9W

3.2 Output Voltage Ripple*

Figure 6. 6.5Vout Ripple Voltage

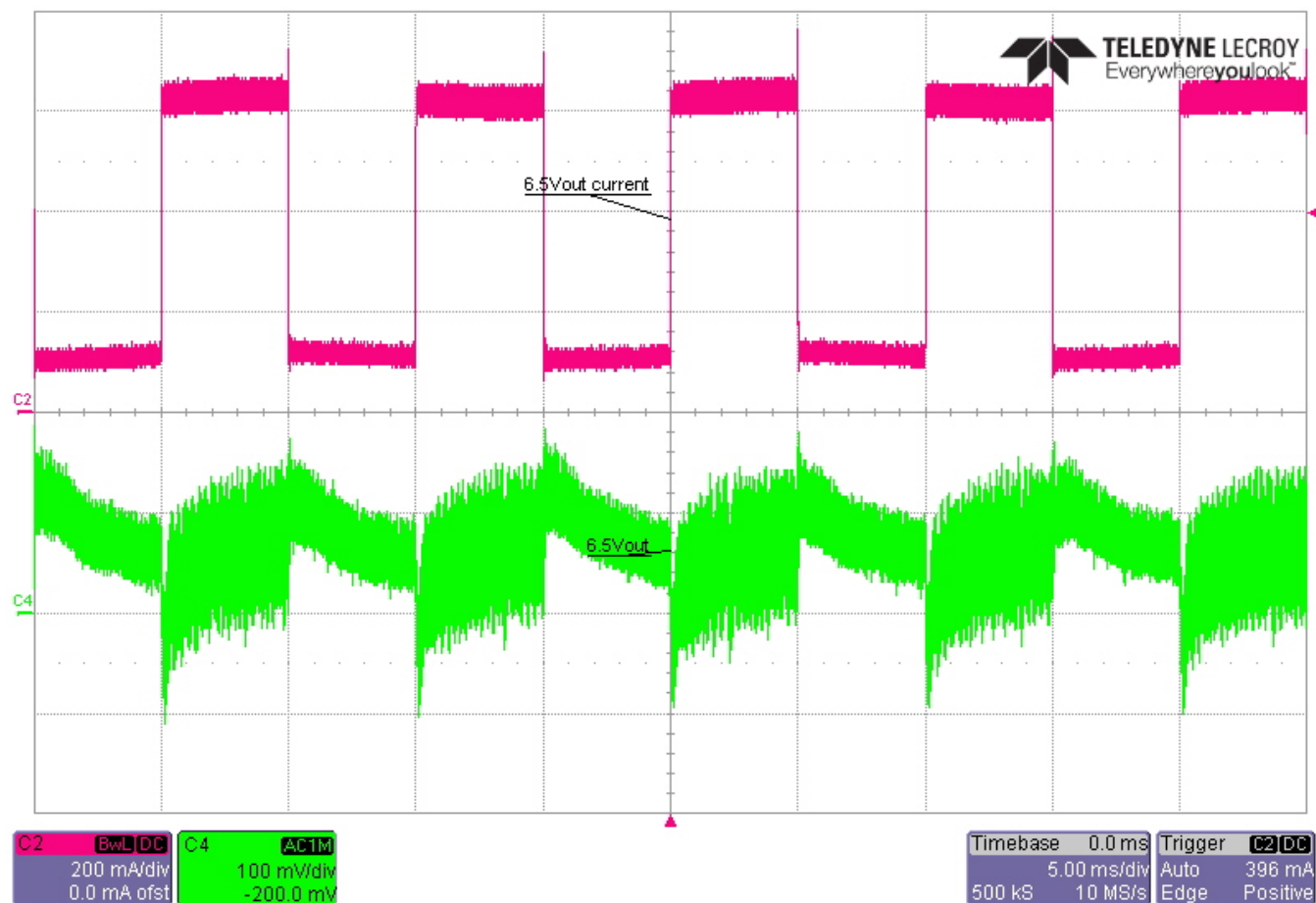


Input Voltage = 250VDC

Output Power = 4.9W

3.3 Load Transients*

Figure 7. Load Transient Response 6.5V output

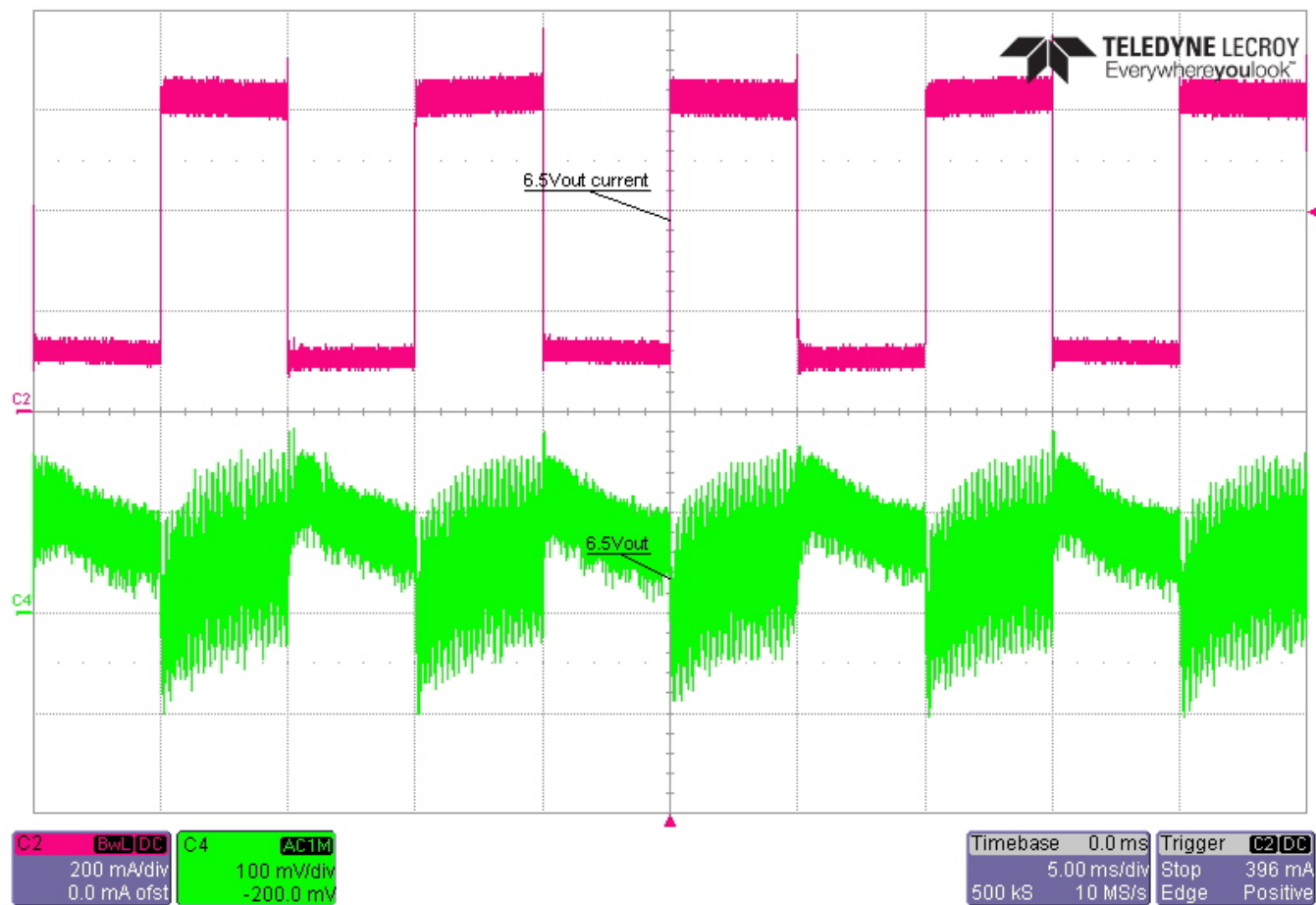


Input Voltage = 108VDC

6.5Vout Load current = 0.1 to 0.6A

15Vout Load current = 0A

Figure 8. Load Transient Response 6.5V output

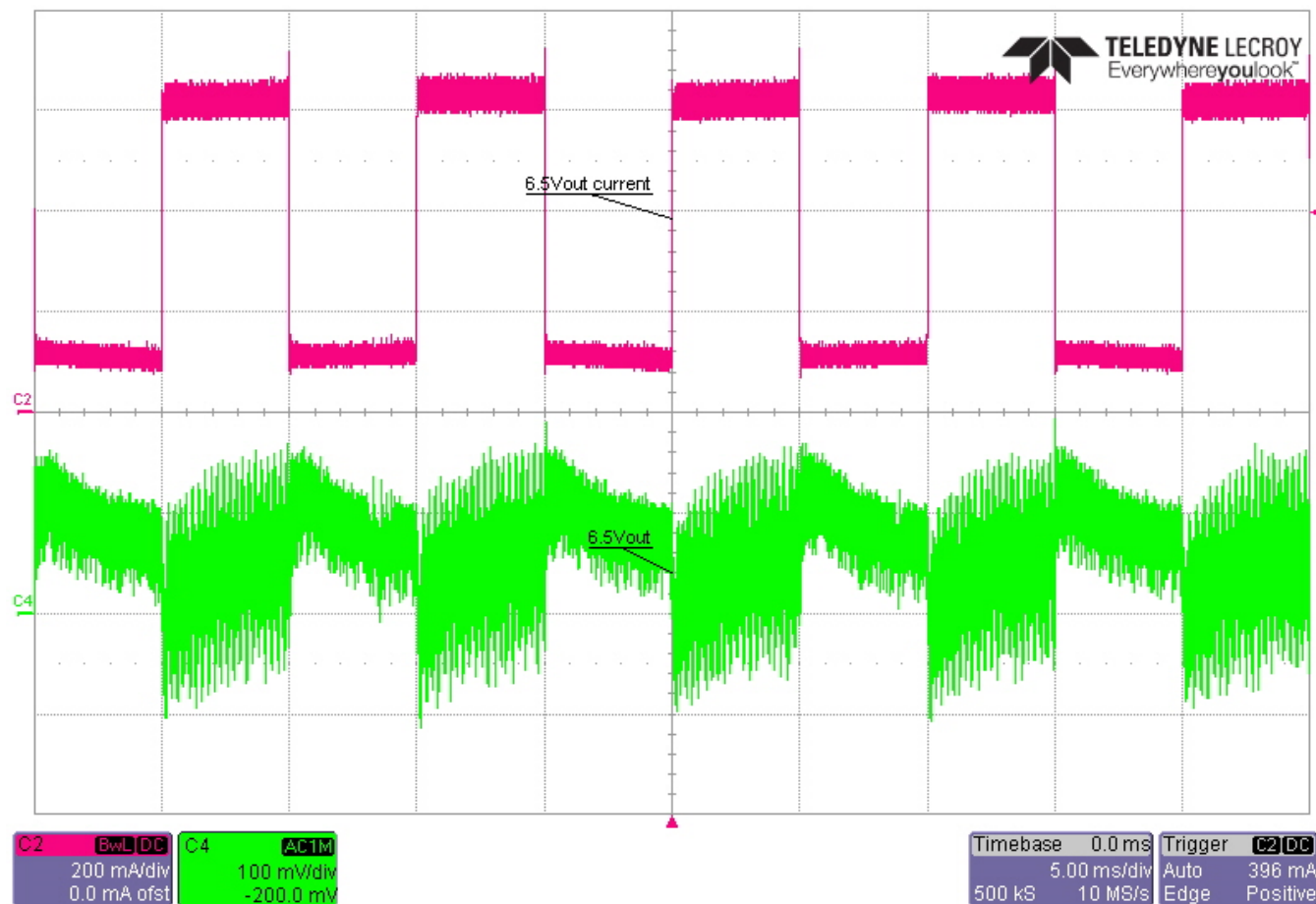


Input Voltage = 250VDC

6.5Vout Load current = 0.1 to 0.6A

15Vout Load current = 0A

Figure 9. Load Transient Response 6.5V output



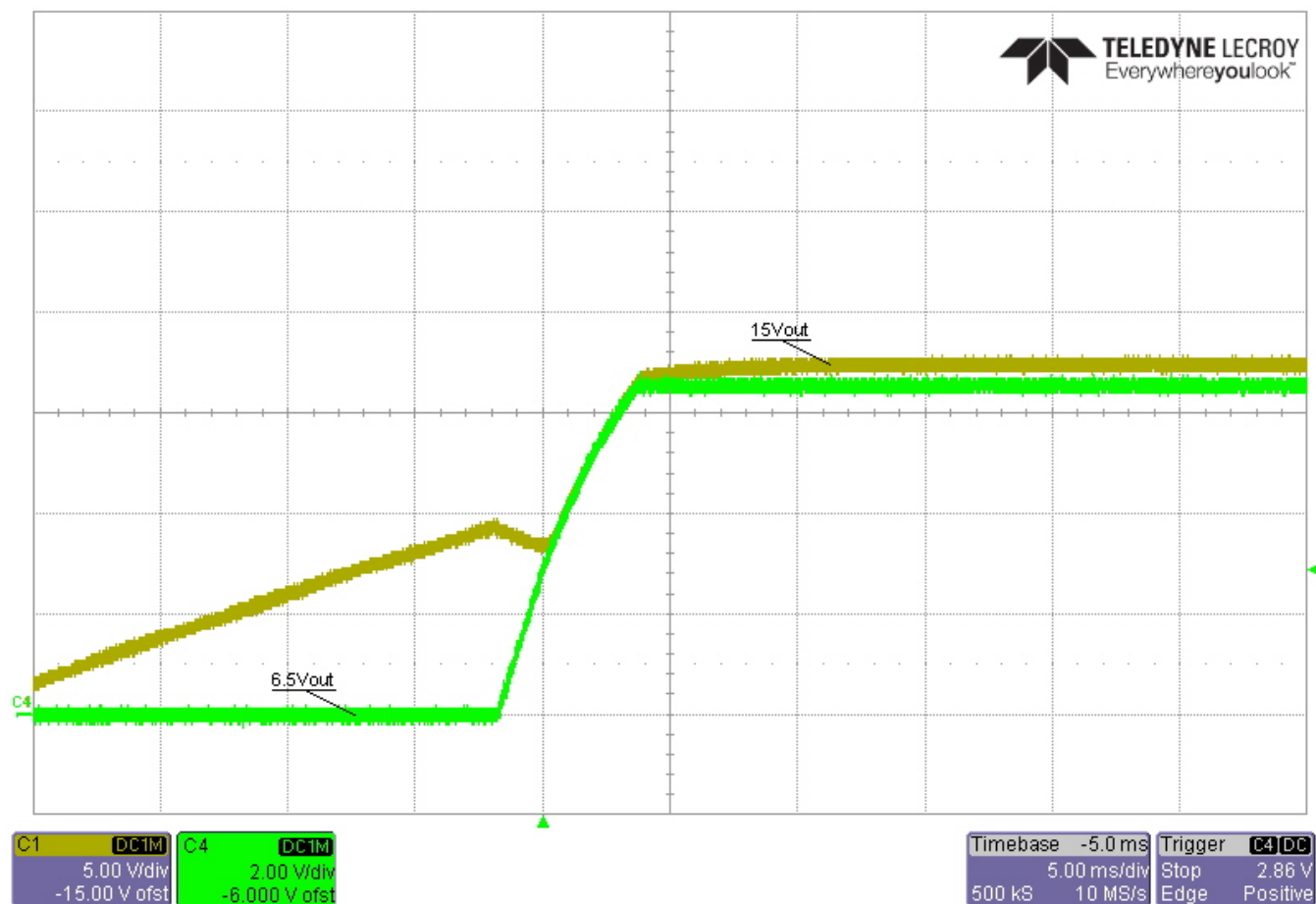
Input Voltage = 410VDC

6.5Vout Load current = 0.1 to 0.6A

15Vout Load current = 0A

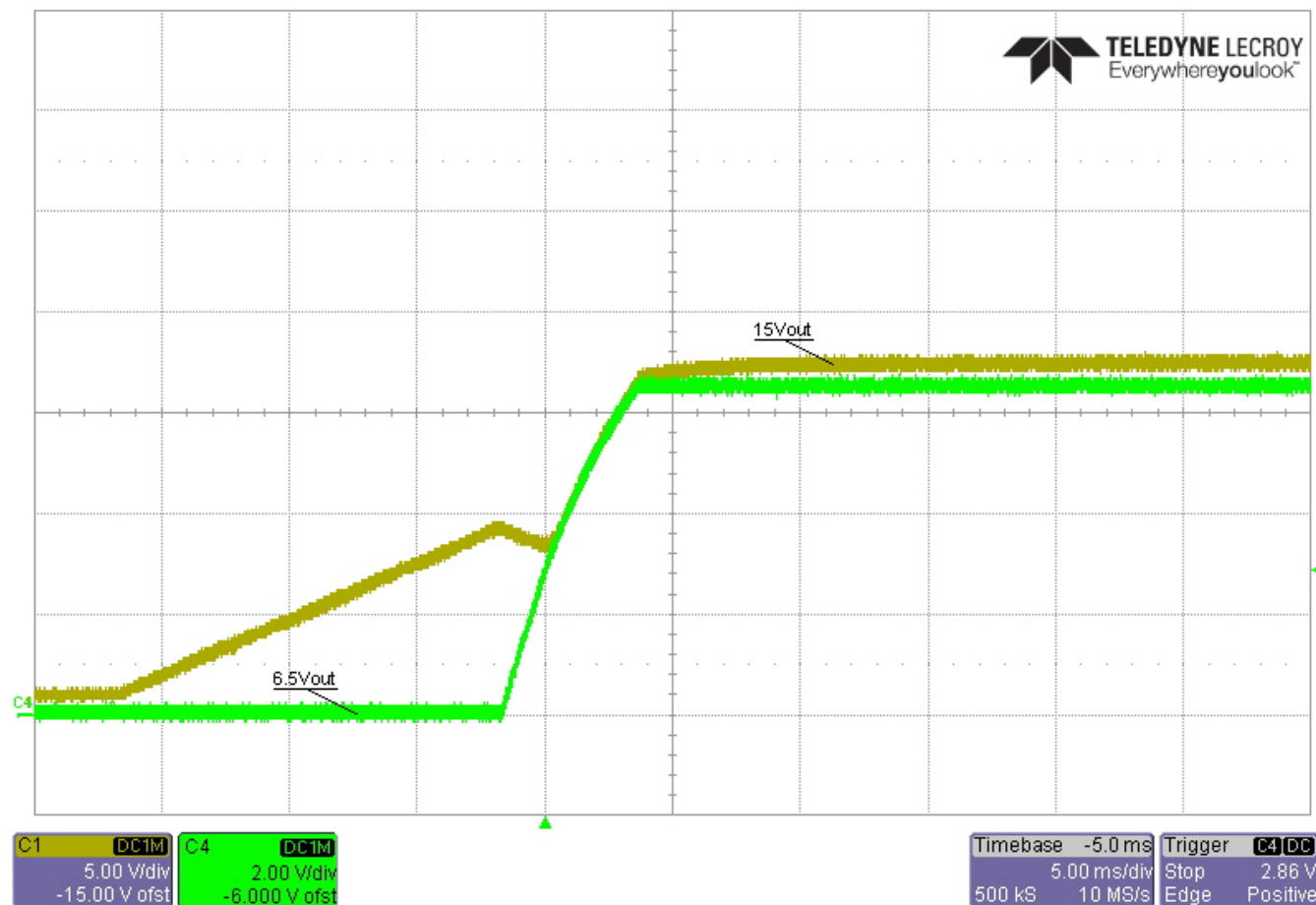
3.4 Start-up Sequence

Figure 10. Startup



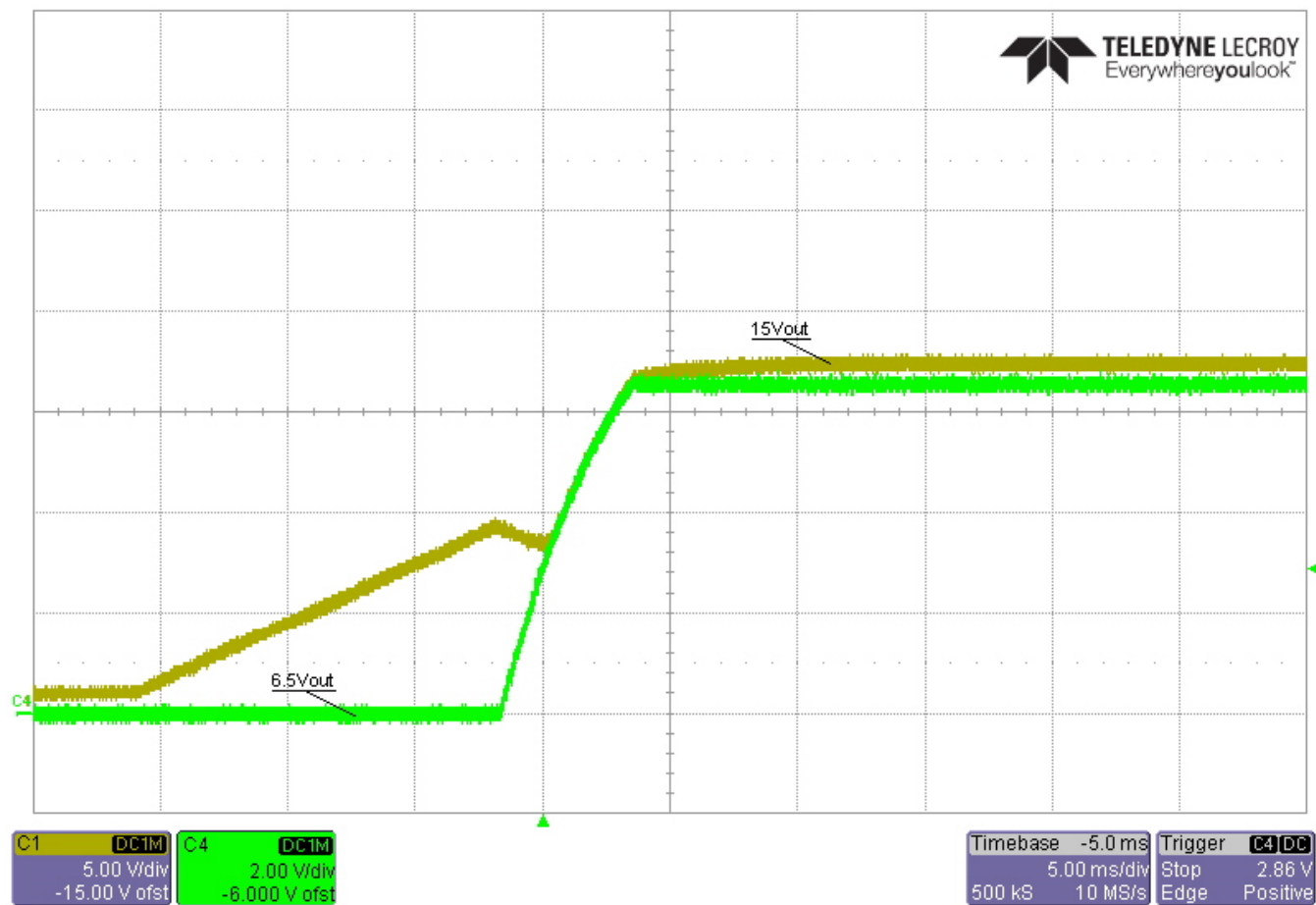
Input Voltage = 108VDC
 6.5Vout Load current = 0.6A
 15Vout Load current = 0A

Figure 11. Startup



Input Voltage = 250VDC
6.5Vout Load current = 0.6A
15Vout Load current = 0A

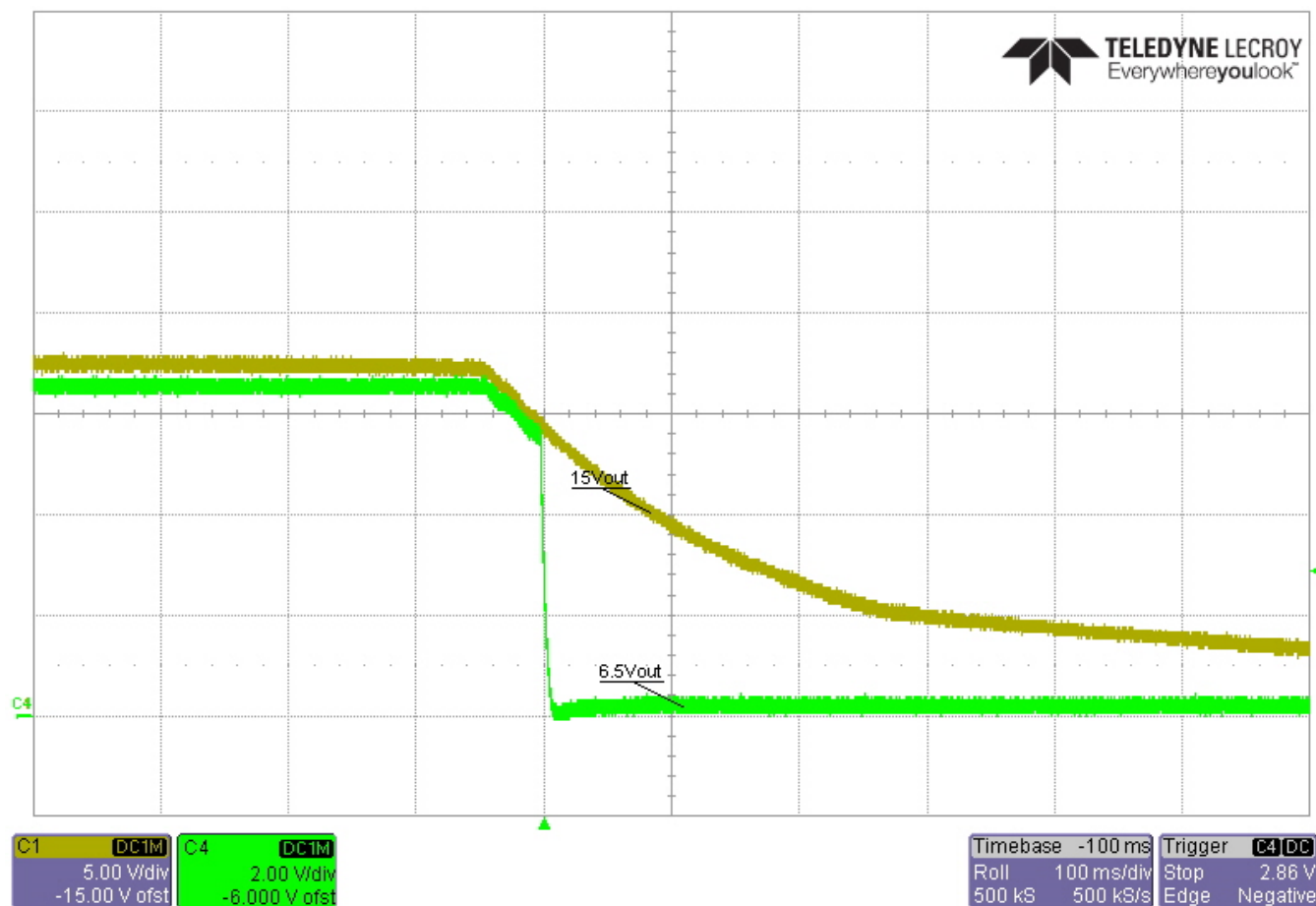
Figure 12. Startup



Input Voltage = 411VDC
 6.5Vout Load current = 0.6A
 15Vout Load current = 0A

3.5 Shutdown Sequence

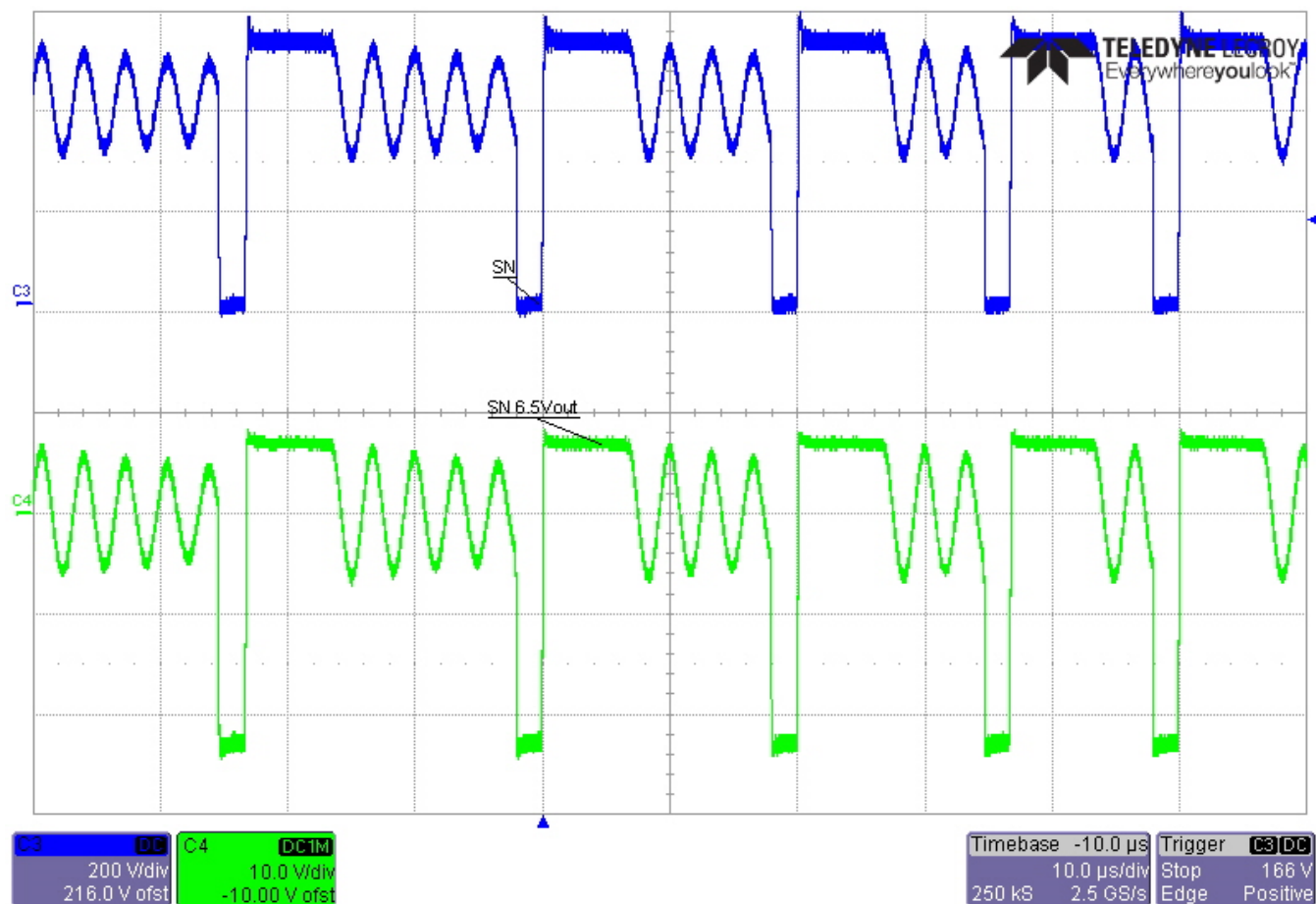
Figure 13. Shutdown



Input Voltage = 250VDC
 6.5Vout Load current = 0.6A
 15Vout Load current = 0A

3.6 Other*

Figure 14. Secondary Side Switchnode 6.5Vout



Input Voltage = 250VDC
6.5Vout Load current = 0.6A
Output Power = 4.9W

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (<https://www.ti.com/legal/termsofsale.html>) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2021, Texas Instruments Incorporated