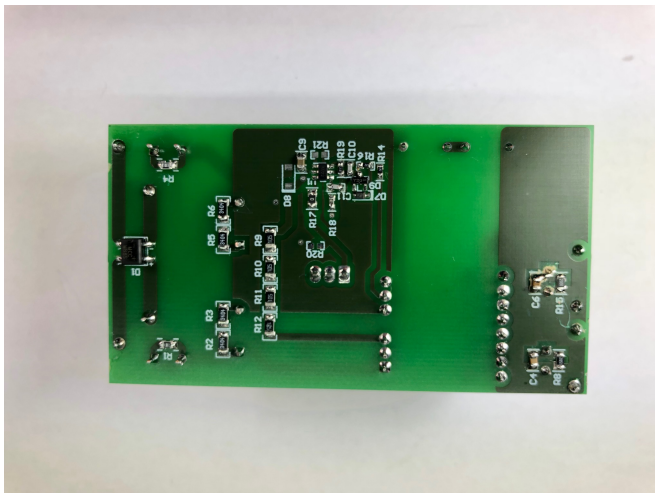
Test Report: PMP30281
85-VAC - 480-VAC Input, Multiple Output Flyback Reference Design

Description

This low cost reference design (PMP30281) generates two isolated outputs (5V@0.4A; 24V@0.3A) from a wide input voltage range (85VAC - 480VAC). The primary side regulated controller UCC28722 drives a cost-efficient bipolar transistor and provides valley-switching operation for highest overall effiency.



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1 Test Prerequisites

1.1 Voltage and Current Requirements

Table 1. Voltage and Current Requirements

PARAMETER	SPECIFICATIONS
V_{IN}	85VAC - 440VAC (480VAC peak)
V_{OUT}	5V@0.4A; 24V@0.3A
Nominal switching frequency	30kHz

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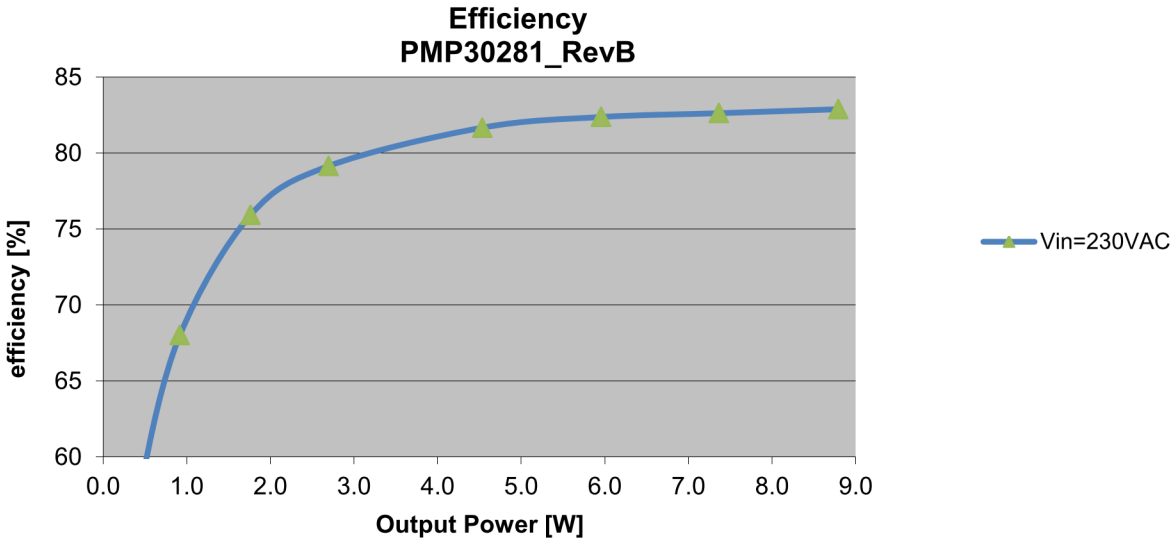
2 Testing and Results

2.1 Efficiency Graphs

Figure 1. Efficiency for 230VAC input



2.2 Load Regulation

Figure 2. Load Regulation Tabelle

INPUT			OUTPUT						
voltage [VAC]	power [W]		5Vout [V]	I_5Vout [A]	24Vout [V]	I_24Vout [A]	power [W]		[%]
230.0	0.720		5.159	0.005	23.890	0.015	0.384		53.4
230.0	0.810		5.032	0.016	23.920	0.017	0.476		58.7
230.0	1.350		5.025	0.026	23.820	0.033	0.918		68.0
230.0	2.324		5.020	0.050	23.820	0.064	1.764		75.9
230.0	3.410		4.999	0.085	23.870	0.095	2.699		79.1
230.0	5.554		4.983	0.145	23.920	0.159	4.536		81.7
230.0	7.232		4.975	0.204	24.010	0.206	5.957		82.4
230.0	8.916		4.977	0.253	24.050	0.254	7.366		82.6
230.0	10.610		4.985	0.302	24.090	0.303	8.794		82.9

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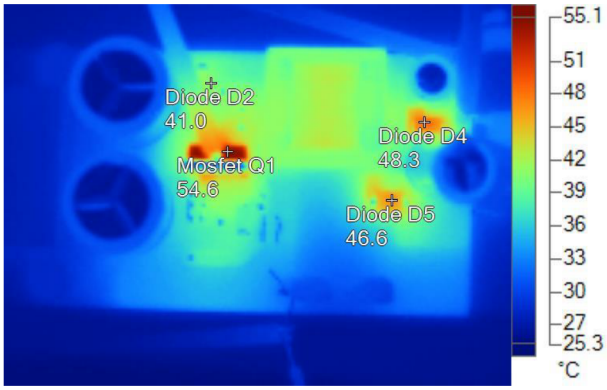
2.3 Thermal Images

Figure 3. The images below show the infrared images taken from the FlexCam after 15min at full load output power and 230VAC input.



Vin=230VAC full load TOP 1226.is2

Name	Temperature	
Mosfet Q1	54.6°C	
Diode D2	41.0°C	
Diode D5	46.6°C	
Diode D4	48.3°C	

2.4 Dimensions

84mm x 46mm

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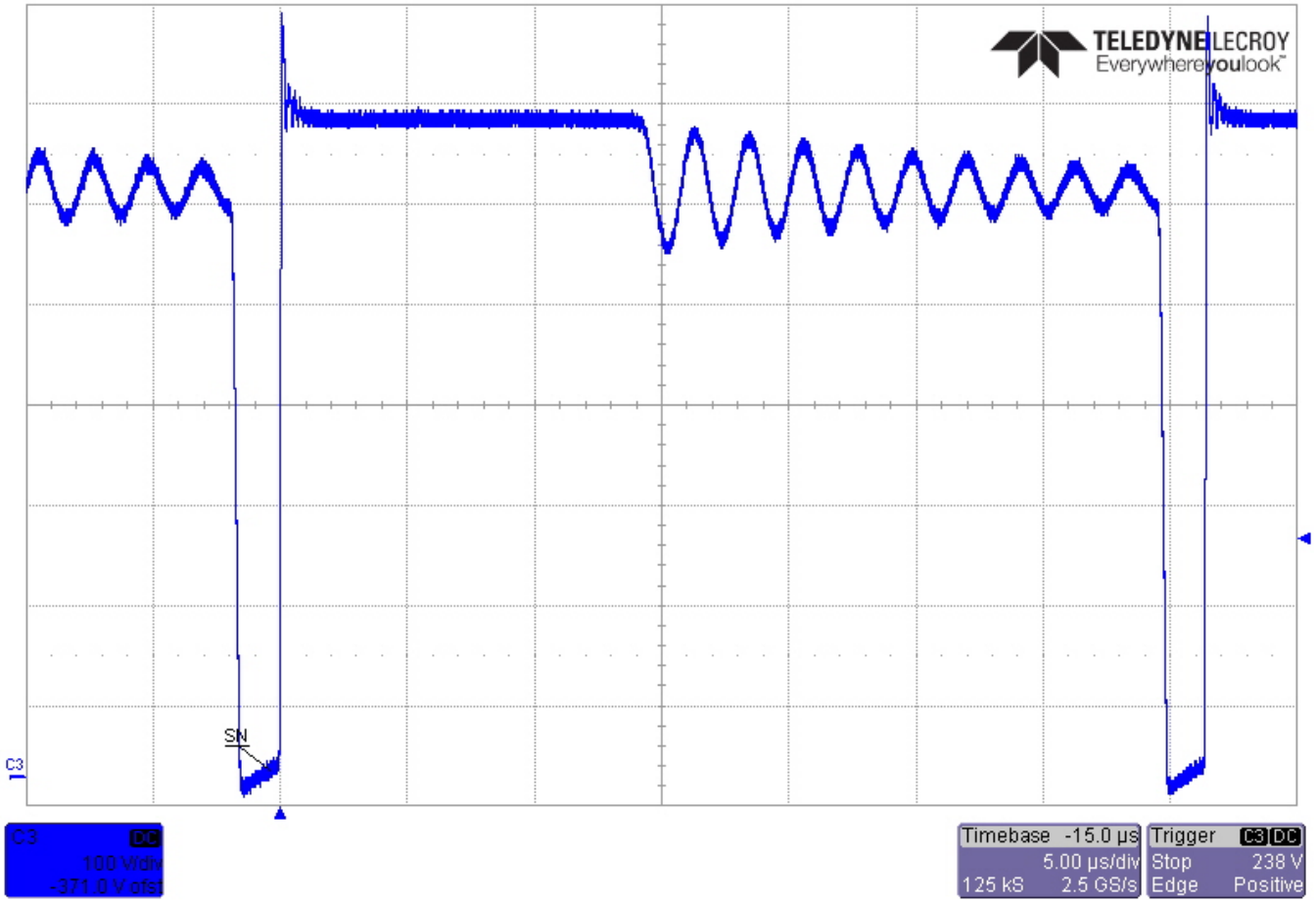
3 Waveforms

3.1 Switching*

Figure 4. Primary Switchnode



Input Voltage = 630VDC

Output Power = 9.2W (full load)

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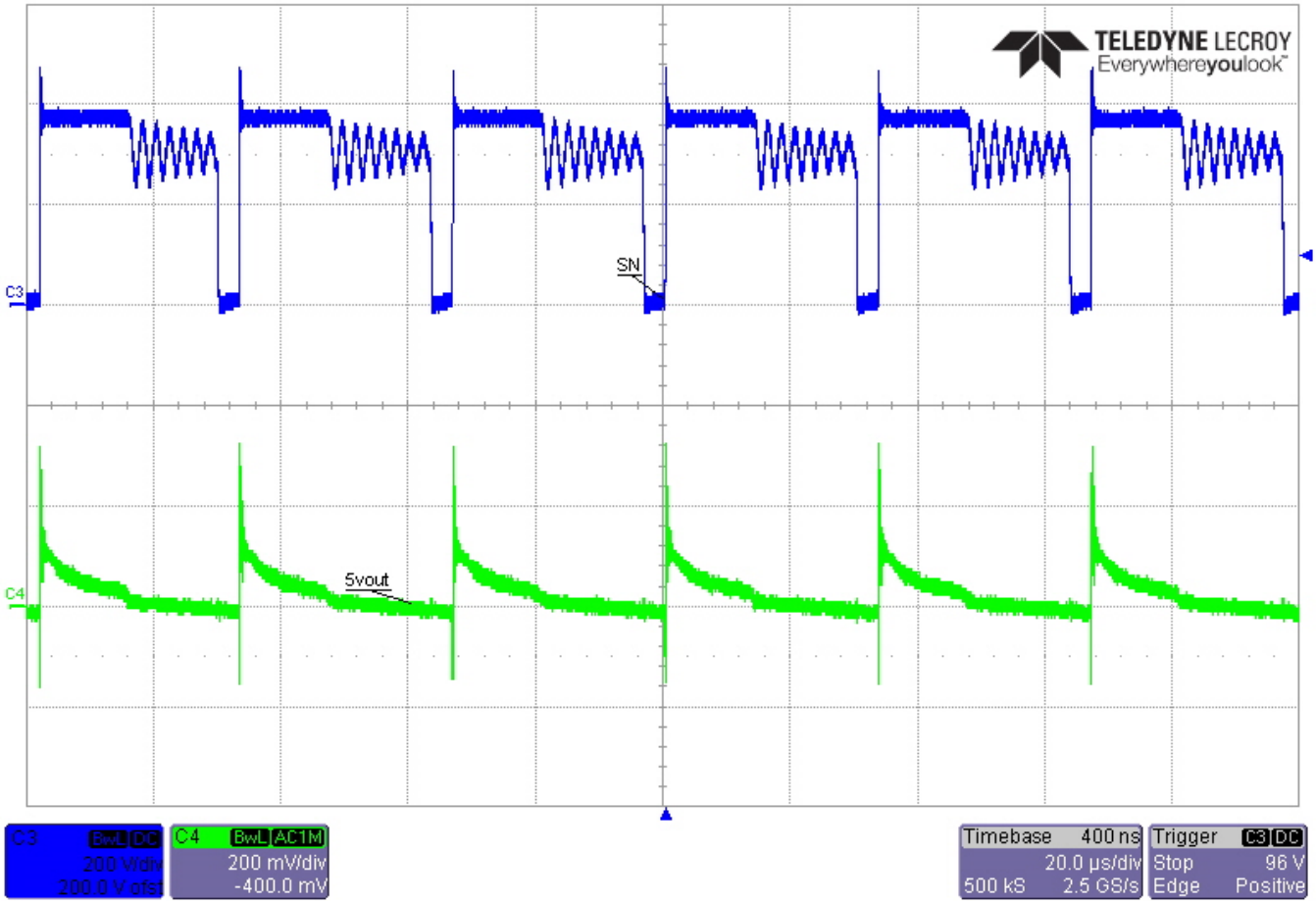
3.2 Output Voltage Ripple*

Figure 5. 5V Output Ripple



Input Voltage = 230VAC

Output Power = 9.2W (full load)

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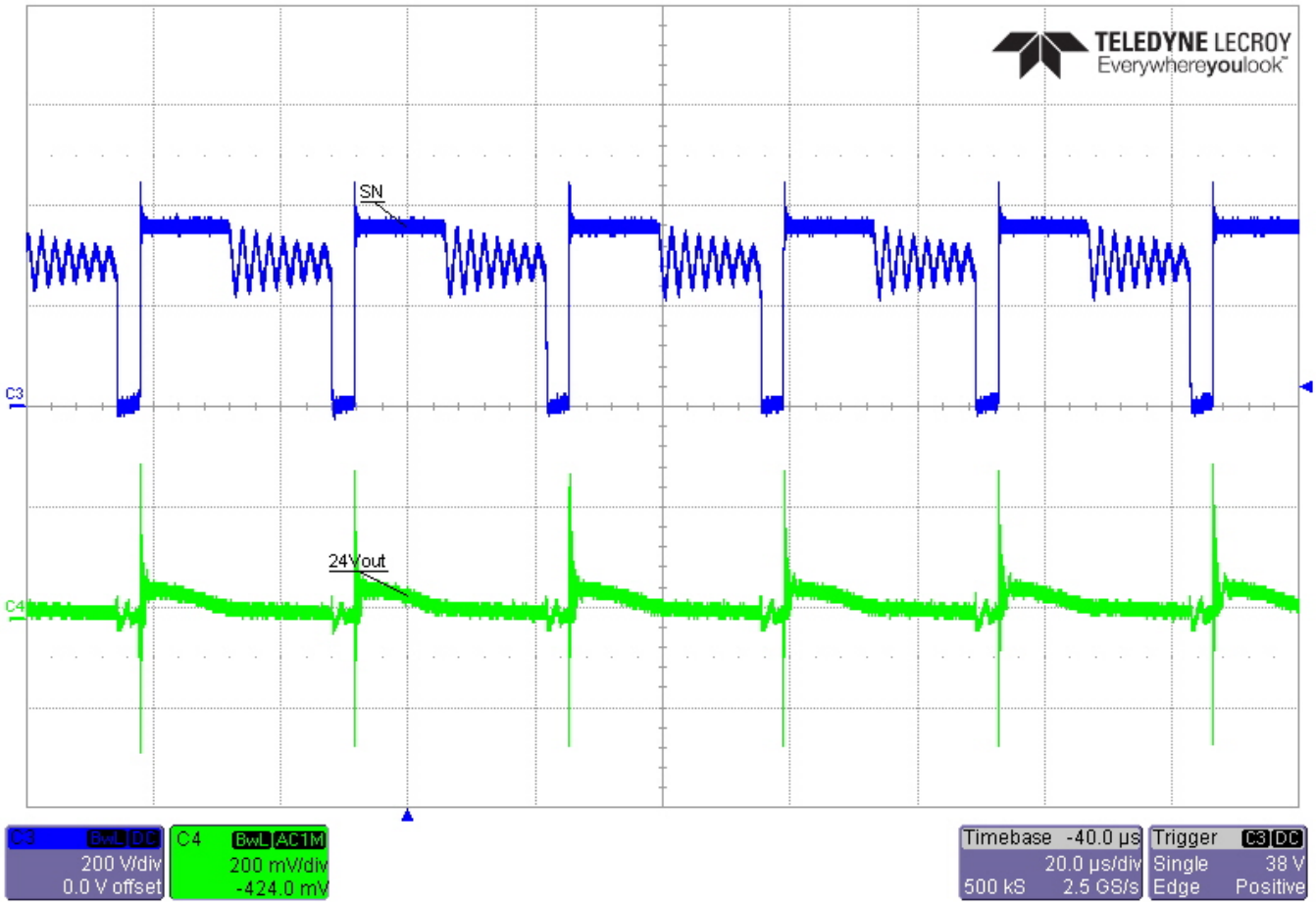
Figure 6. 24V Output Ripple



Input Voltage = 230VAC
Output Power = 9.2W (full load)

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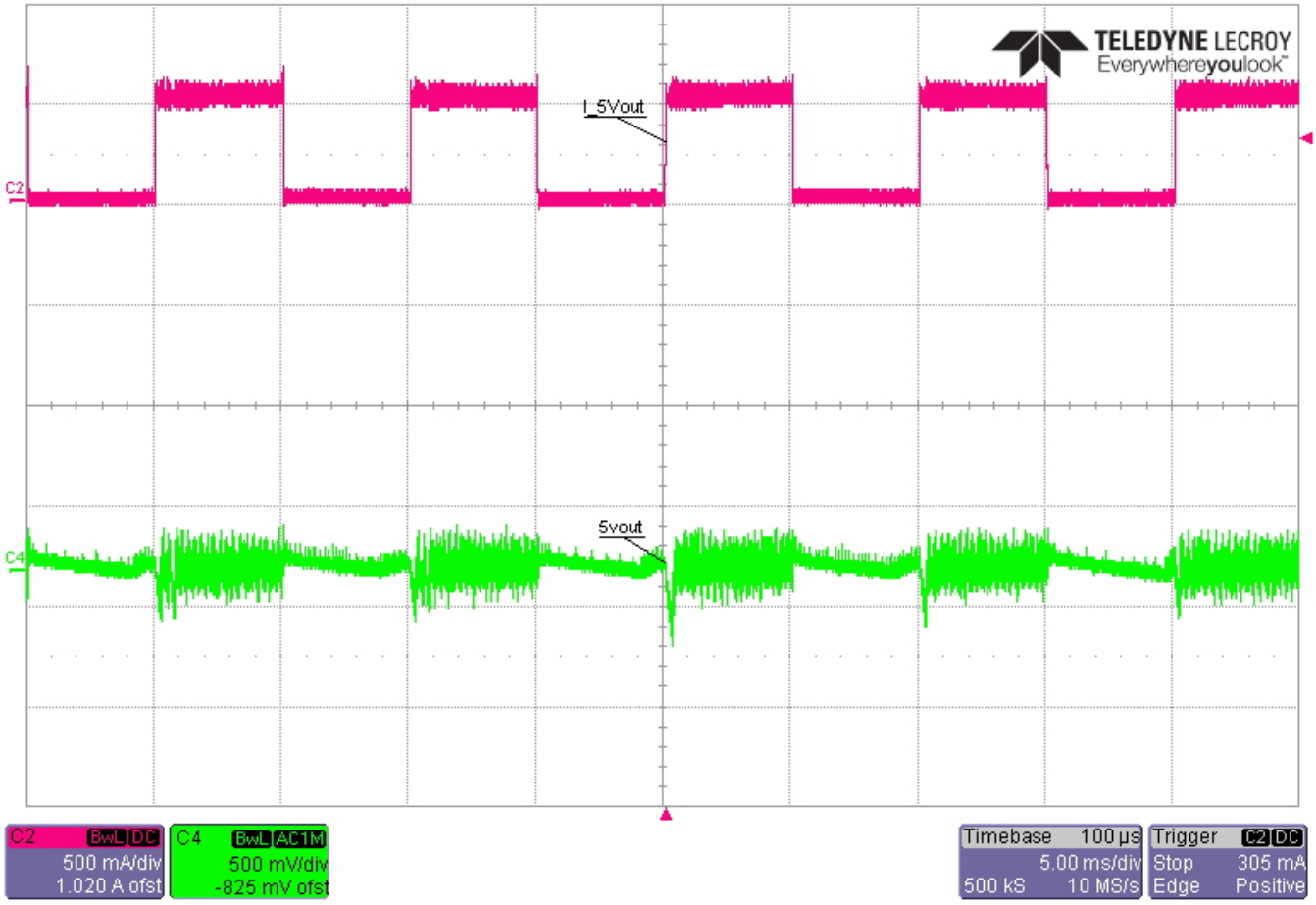
3.3 Load Transients*

Figure 7. 5Vout Load Transient



Input voltage = 230VAC

24Vout Load current = 0.05A

5Vout Load current = 0A to 0.4A

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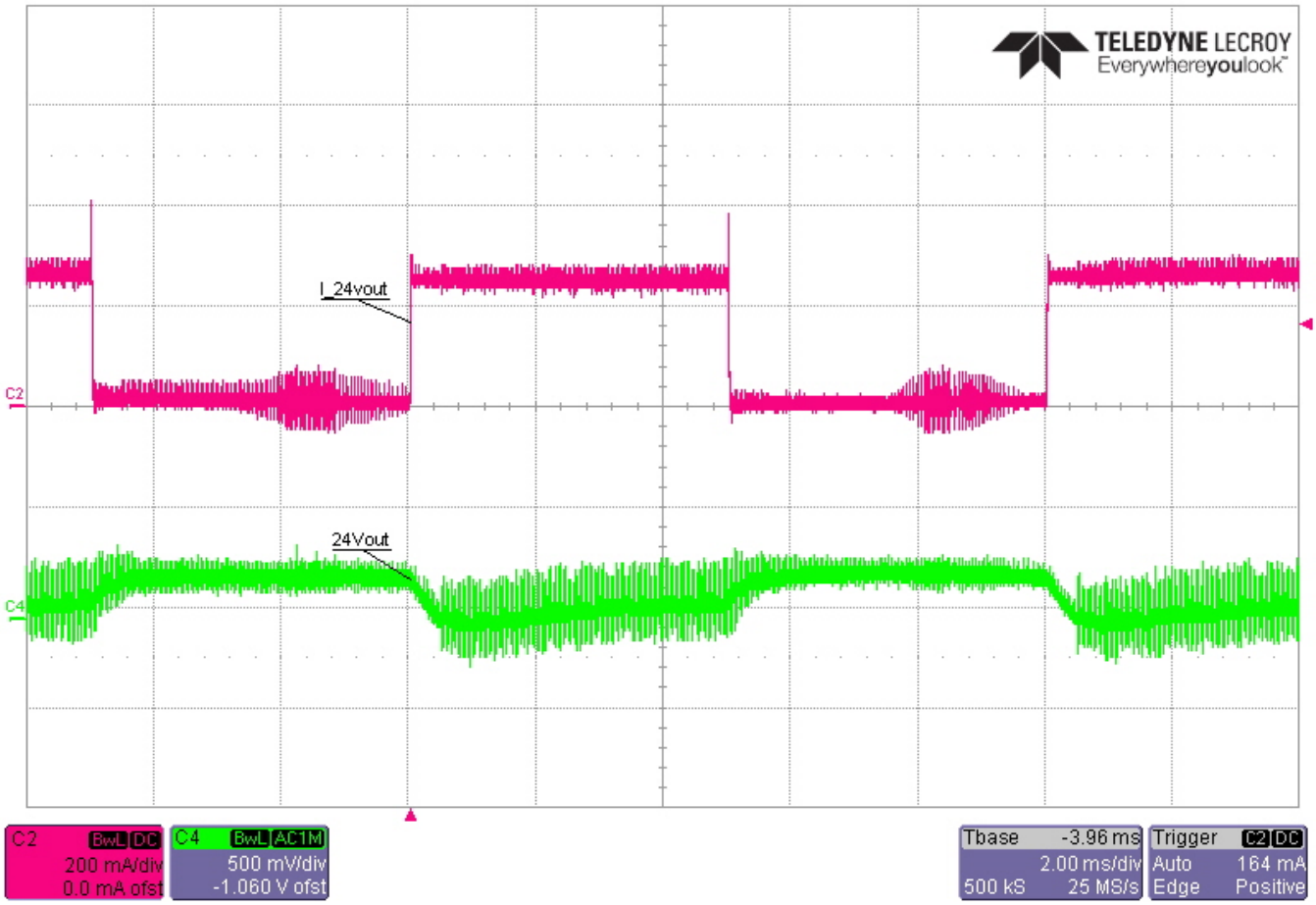
Figure 8. 24Vout Load Transient



Input voltage = 230VAC

5Vout Load current = 0A

24Vout Load current = 0A to 0.3A

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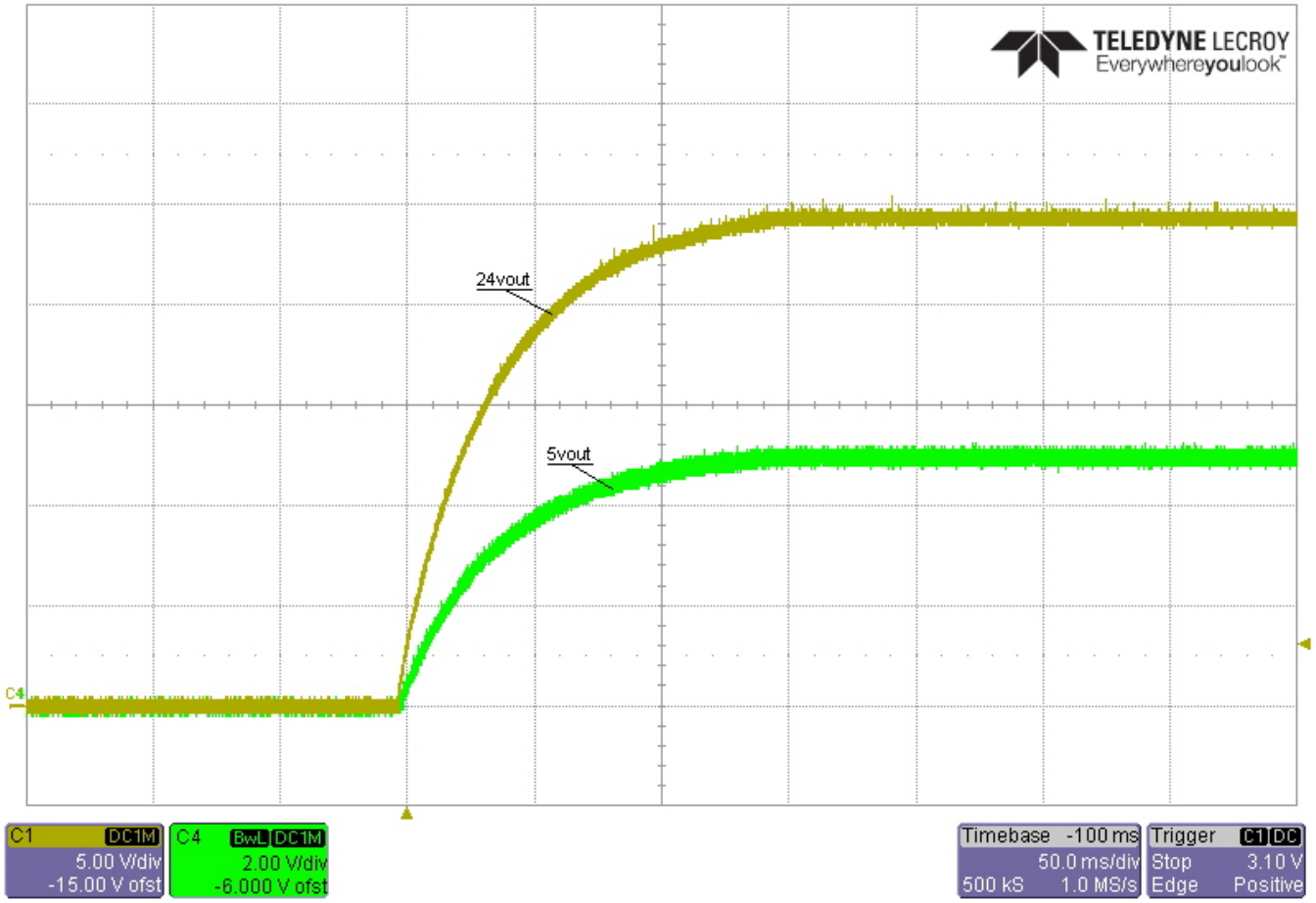
3.4 Start-up Sequence

Figure 9. Startup



Input voltage = 85VAC

Output Power = 9.2W (full load)

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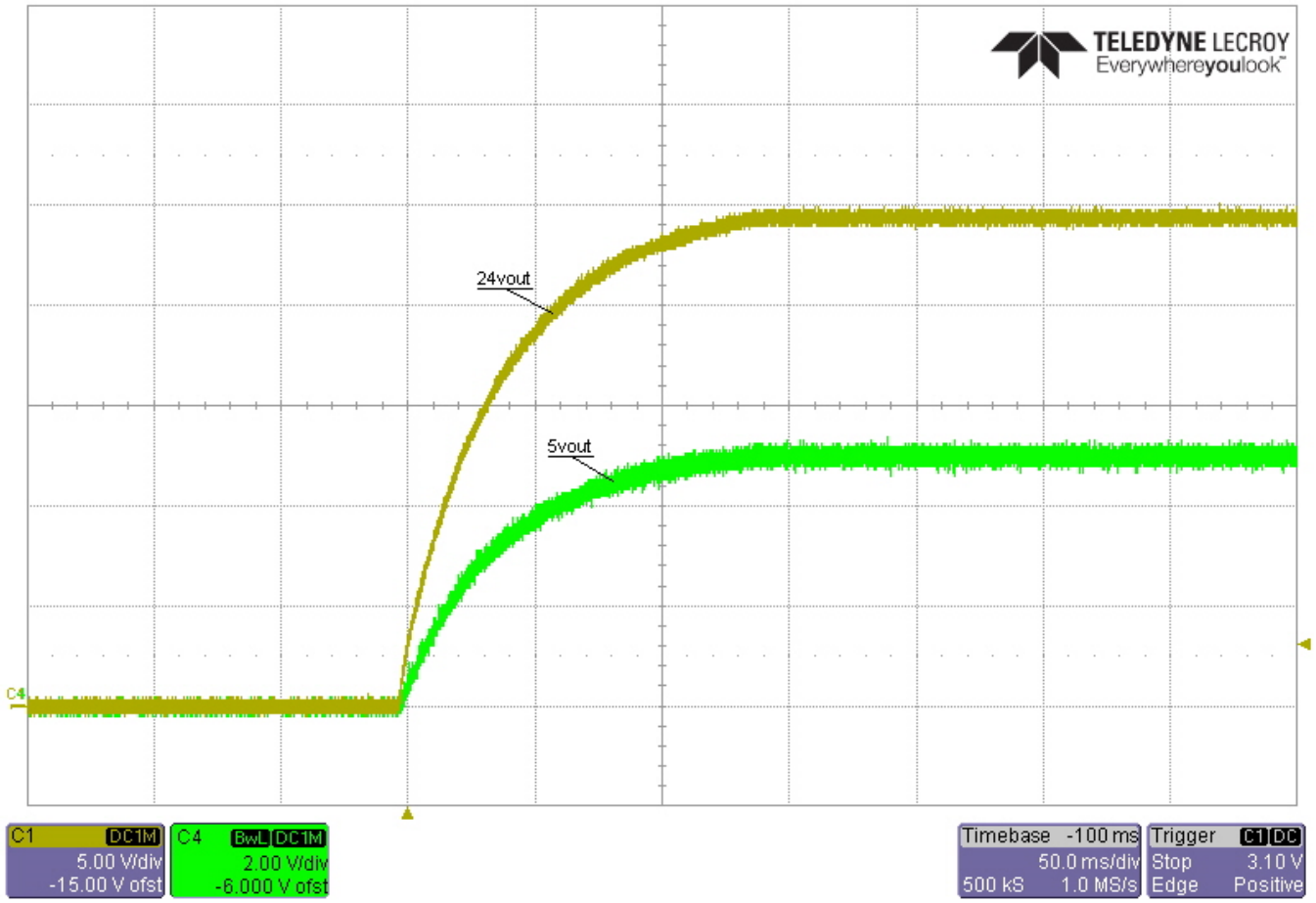
Figure 10. Startup



Input voltage = 272VAC
Output Power = 9.2W (full load)

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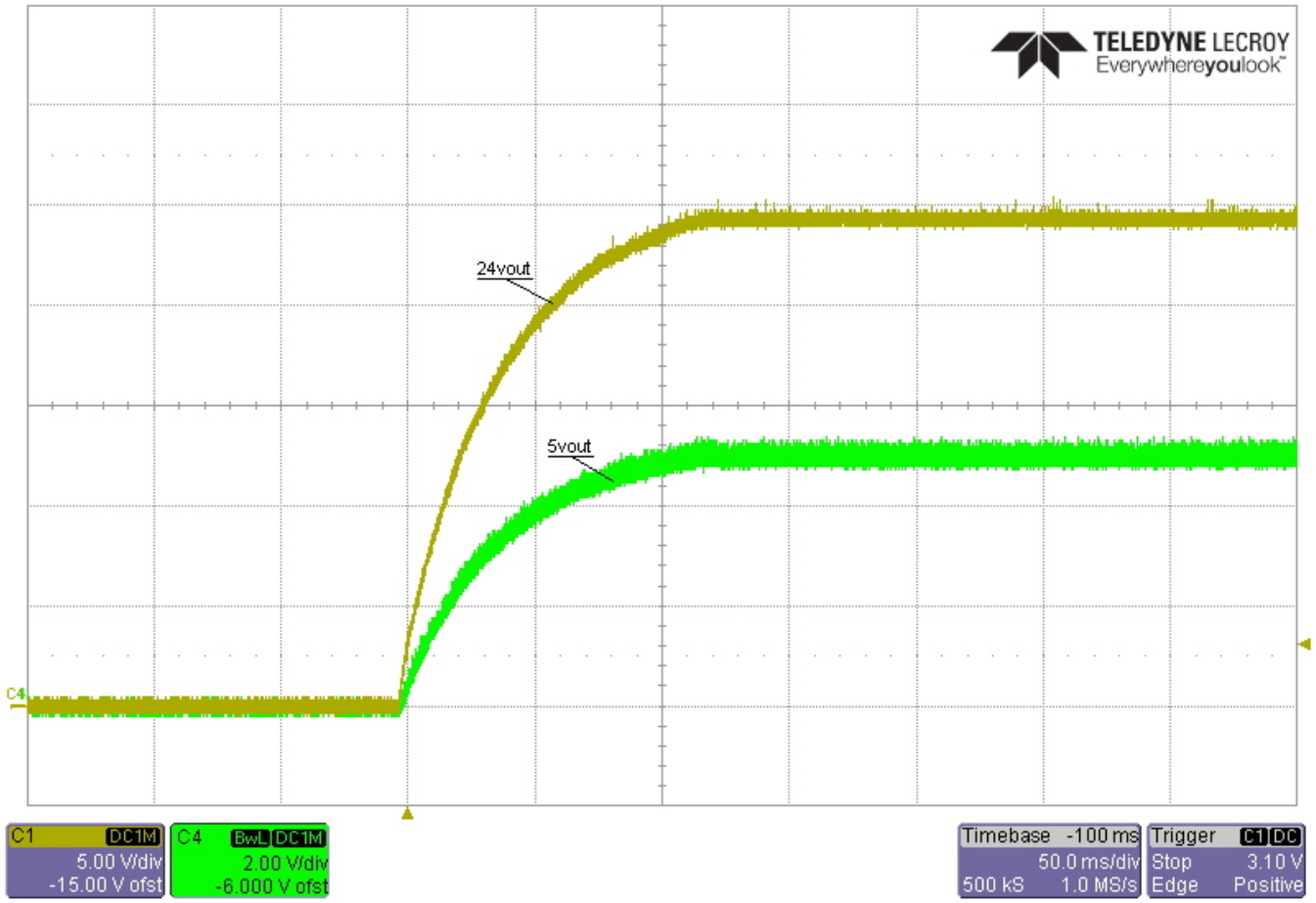
Figure 11. Startup



Input voltage = 630VDC
Output Power = 9.2W (full load)

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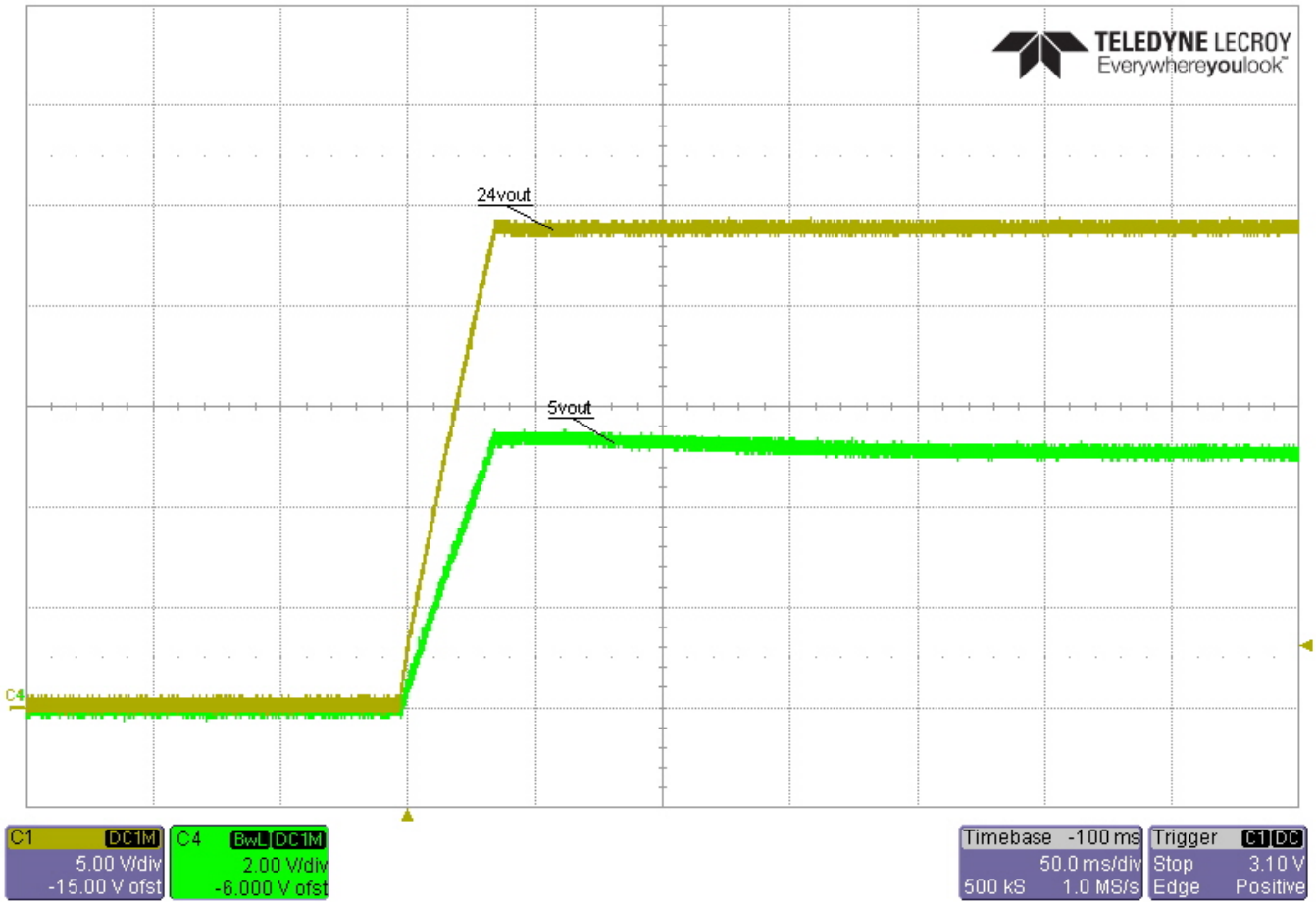
Figure 12. Startup



Input voltage = 85VAC
Output Power = 0W (no load)

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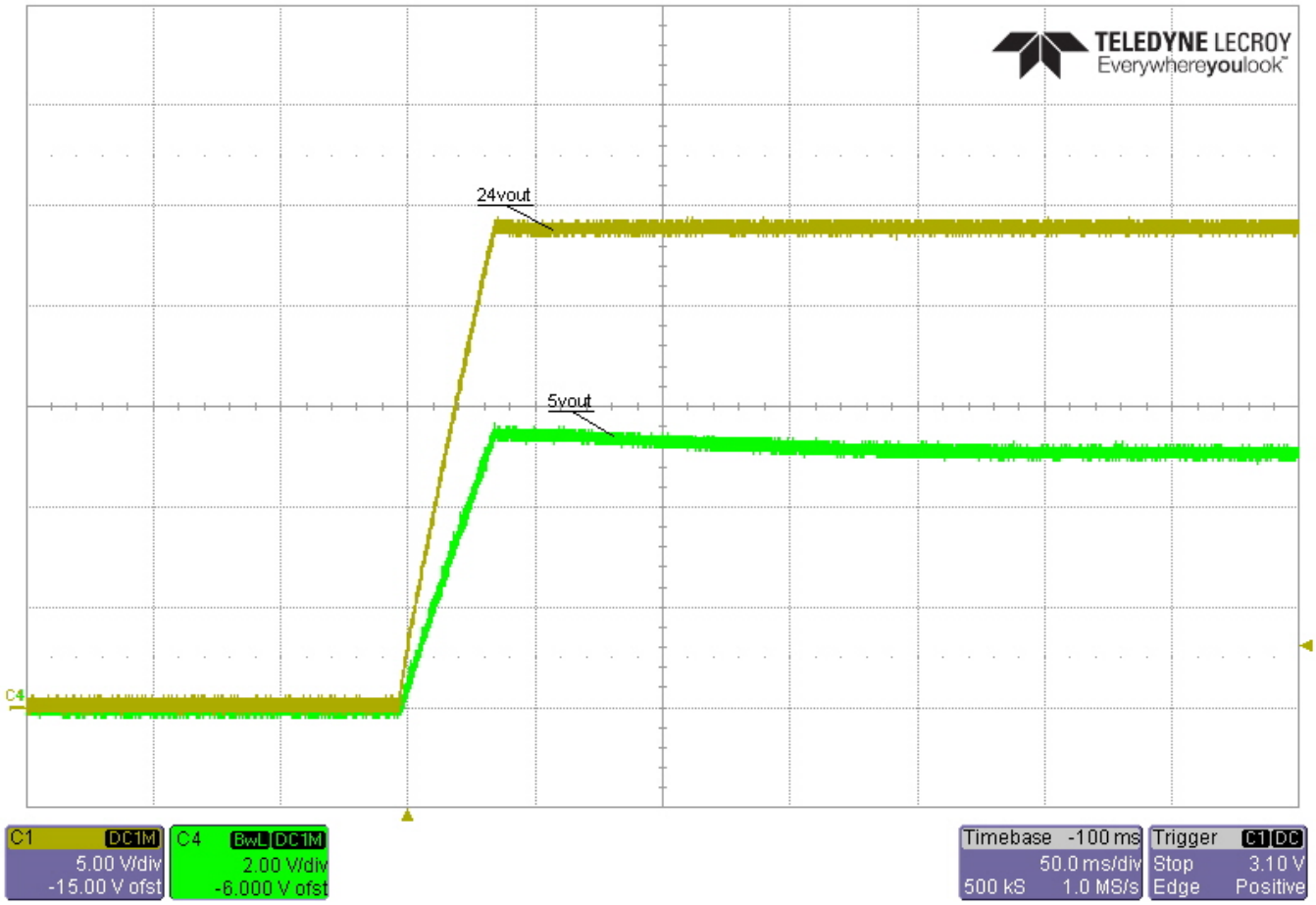
Figure 13.



Input voltage = 273VAC
Output Power = 0W (no load)

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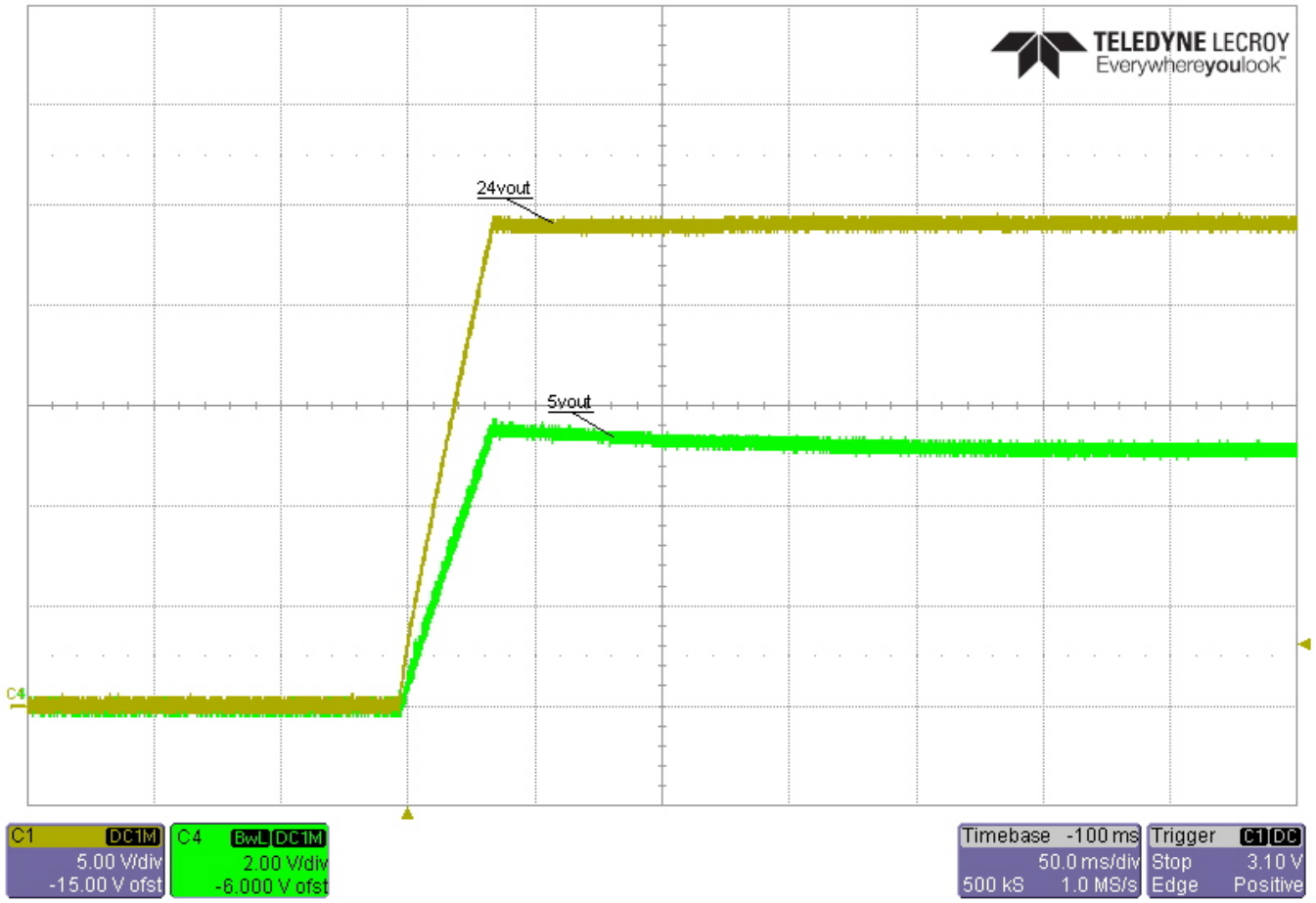
Figure 14. Startup



Input voltage = 630VDC
Output Power = 0W (no load)

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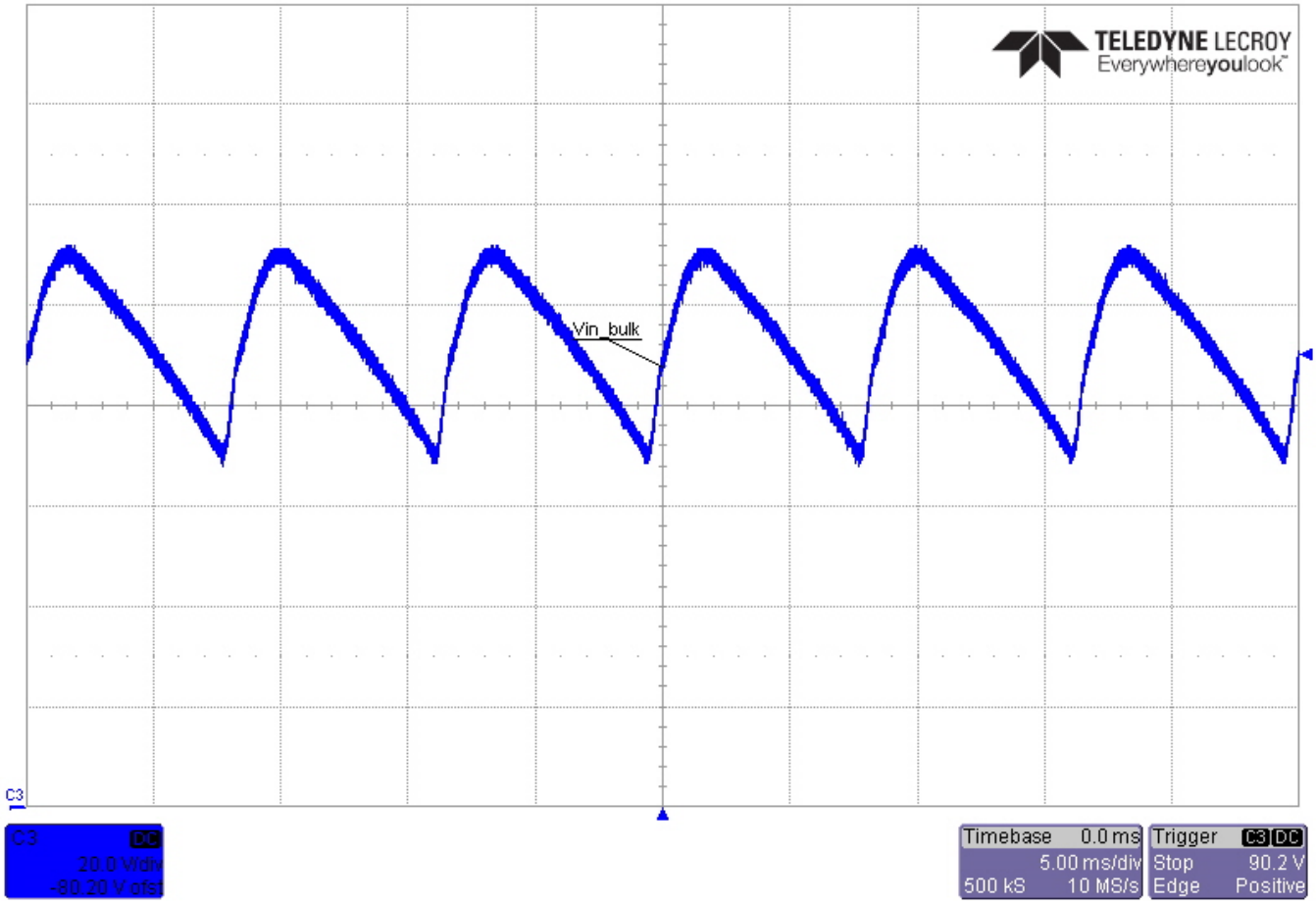
3.5 Input Ripple

Figure 15. Bulk Input Voltage Ripple



Input voltage = 85VAC
Output Power = 9.2W (full load)

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