

Test Report: PMP23440

90-V_{AC} to 132-V_{AC} Input, 5-W Primary Side Regulated (PSR) Flyback Reference Design



Description

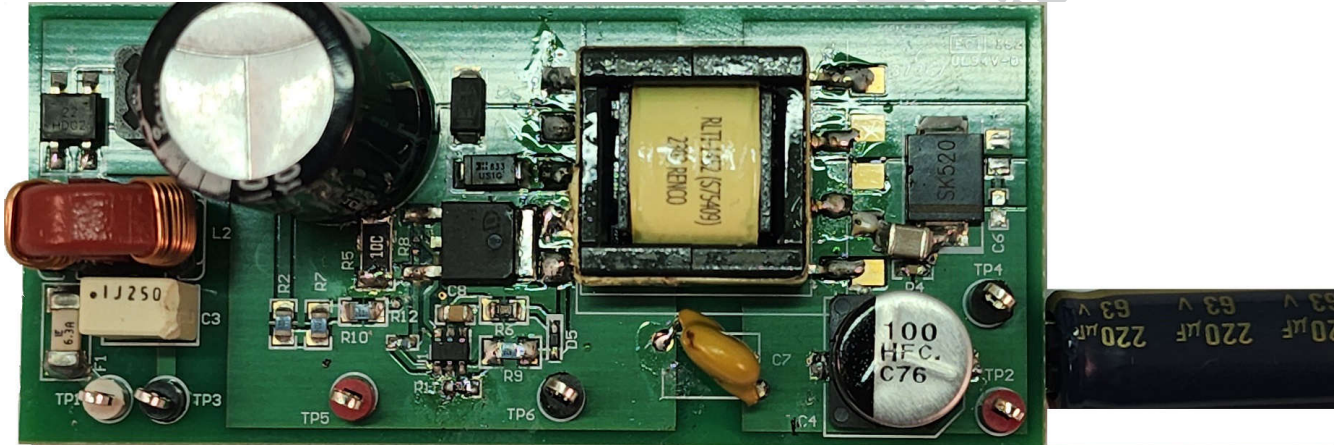
This reference design is a primary-side regulated flyback that outputs 33 V at 5 W, steady state. This product is designed for an LED strobe light application in smoke detectors and hence can output 3-A surges for 20 ms at 1-Hz period.

Features

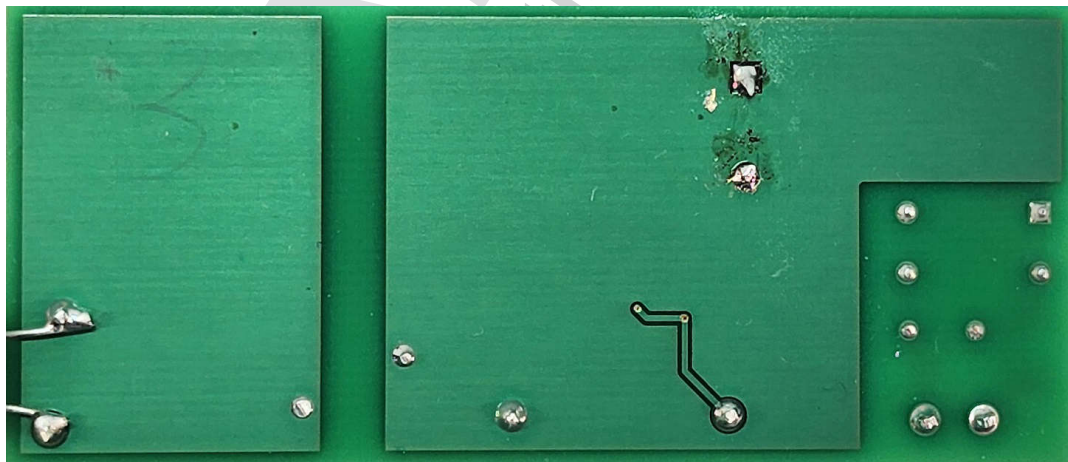
- Low line AC input only
- Primary side regulated
- Low cost
- Class B conducted EMI passed
- Small size

Applications

- [Smoke and heat detector](#)



Top of Board



Bottom of Board

1 Test Prerequisites

1.1 Voltage and Current Requirements

Table 1-1. Voltage and Current Requirements

Parameter	Specifications
Input Voltage Range	90 V _{AC} –132 V _{AC}
Output Voltage Current	33 V 150 mA (3-A peak)

1.2 Required Equipment

- AC voltage source
- DC power meter
- Electronic load
- Multimeters
- Oscilloscope

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2 Testing and Results

2.1 Efficiency Graphs

Efficiency is shown in the following graph.

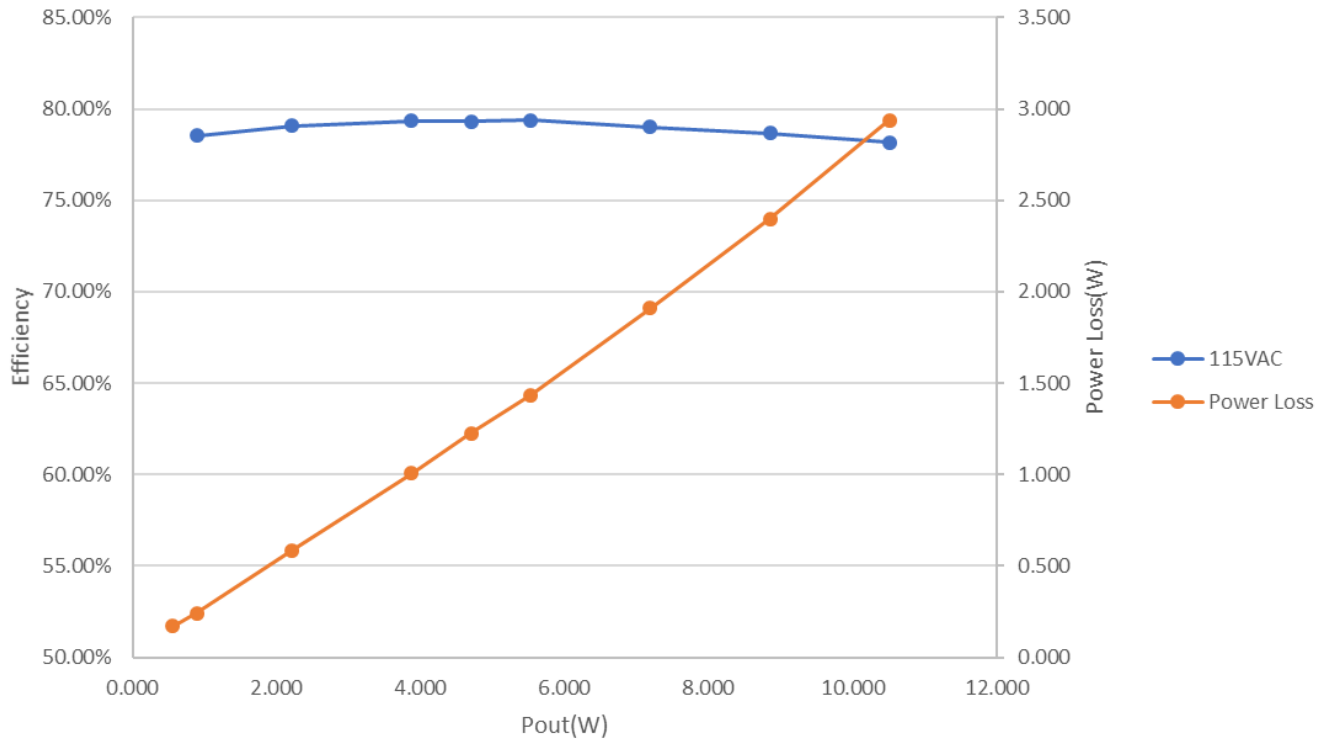


Figure 2-1. Efficiency Graph, P_{OUT} vs Efficiency

2.2 Efficiency Data

Efficiency data is shown in the following table.

V _{IN} (V)	P _{IN} (W)	V _{OUT} (V)	I _{OUT} (A)	P _{OUT} (W)	P _{Loss} (W)	Efficiency (%)
115	0.227	33.31	.0053	0.17654	0.050	77.77
115	0.726	33.32	0.017	0.555	0.171	76.46
115	1.13	33.3	0.027	0.887	0.243	78.53
115	2.8	33.24	0.067	2.214	0.586	79.09
115	4.880	33.21	0.117	3.872	1.008	79.35
115	5.926	33.19	0.142	4.7	1.226	79.3
115	6.963	33.18	0.167	5.527	1.436	79.38
115	9.1	33.19	0.217	7.189	1.911	79.00
115	11.25	33.2	0.267	8.851	2.399	78.68
115	13.448	33.2	0.317	10.511	2.937	78.16

2.3 Thermal Images

Thermal image is shown in the following figure.

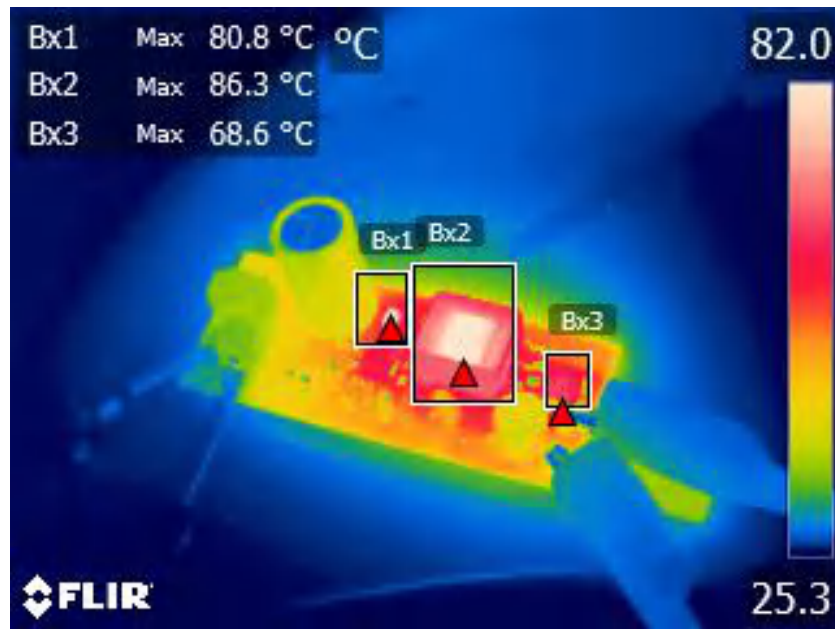
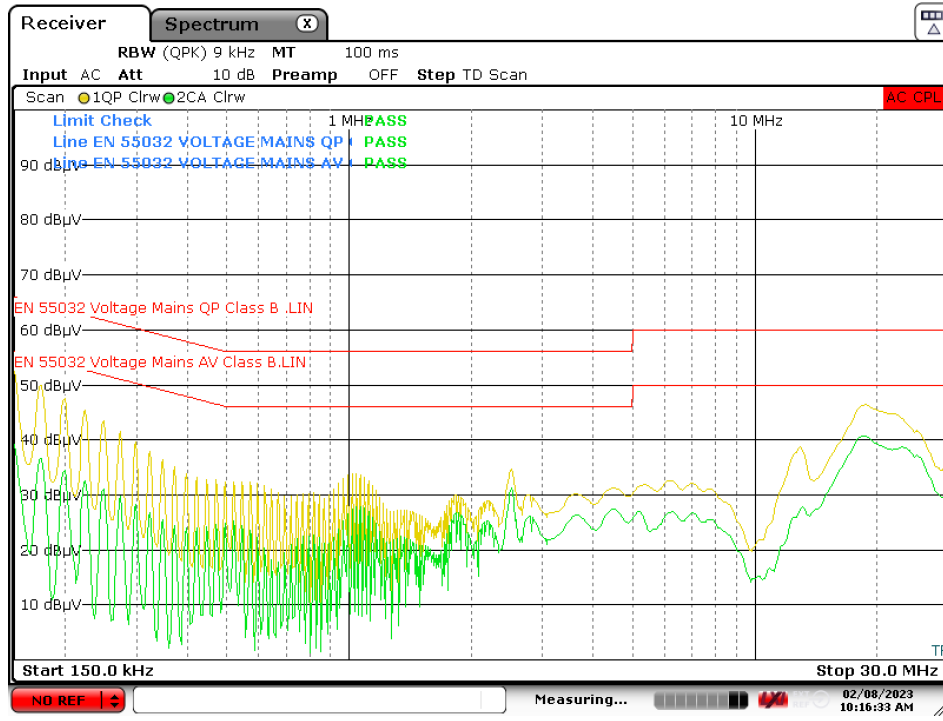


Figure 2-2. Thermal Image

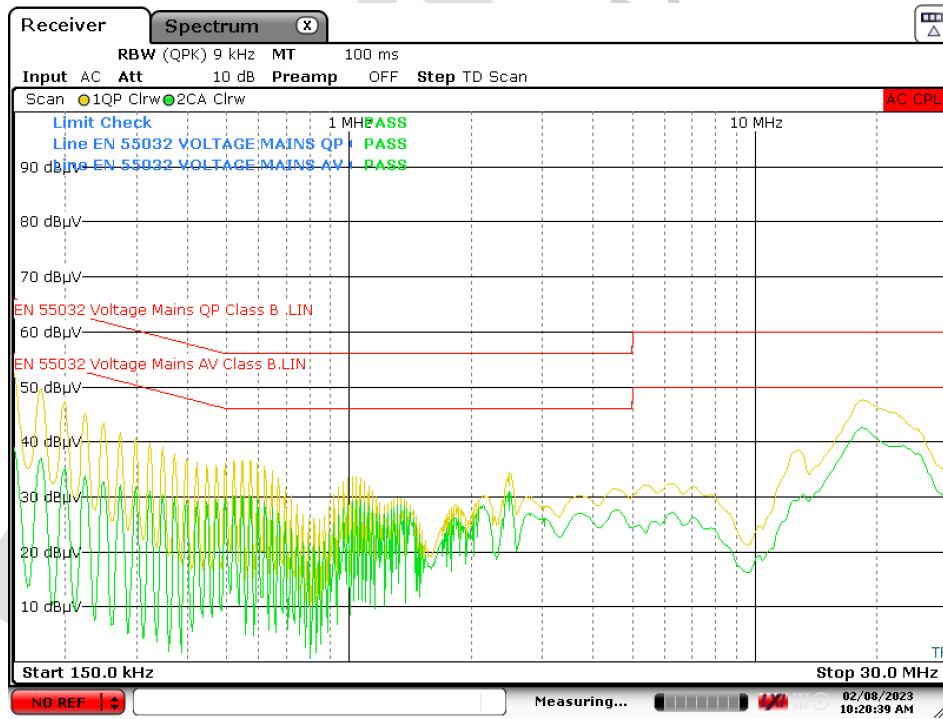
2.4 EMI

EMI data is shown in the following figures.



Date: 8.FEB.2023 10:16:33

Figure 2-3. 115 V_{AC} Line



Date: 8.FEB.2023 10:20:40

Figure 2-4. 115 V_{AC} Ntrl

3 Waveforms

3.1 Switching

Switching behavior is shown in the following figures.

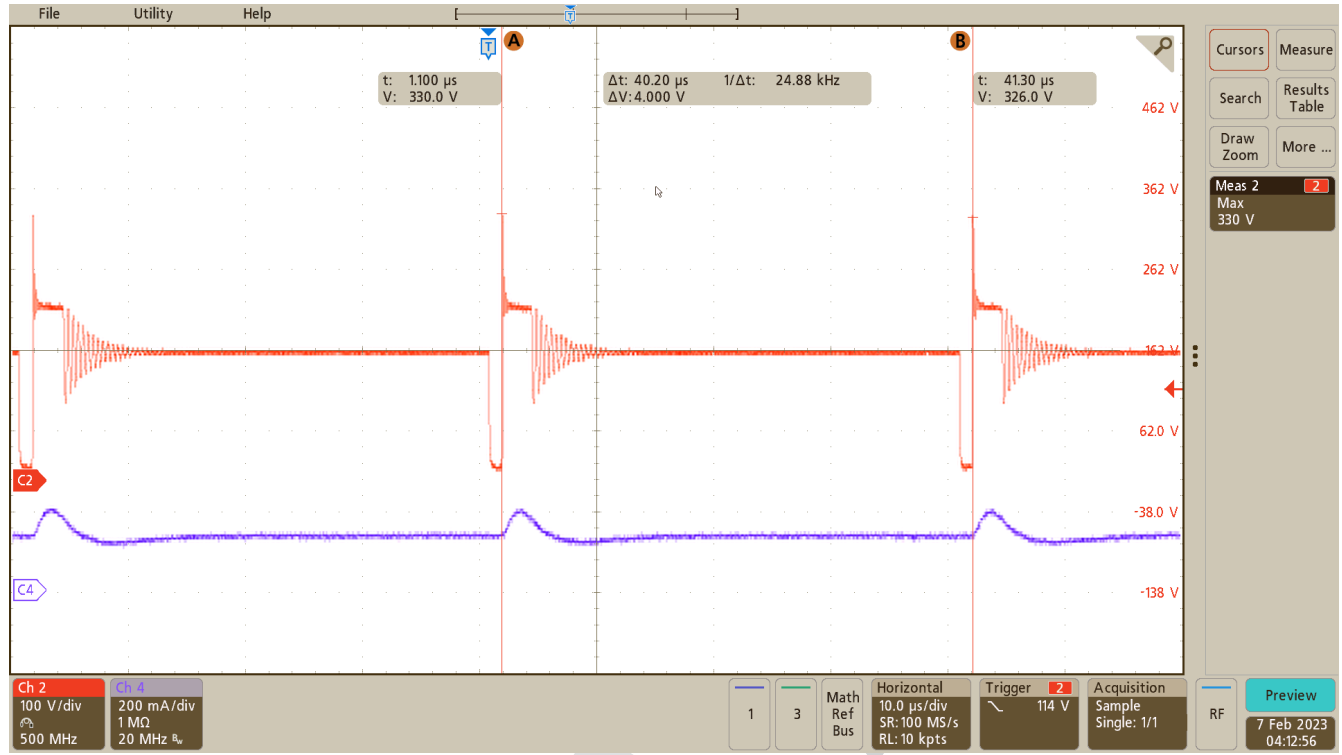


Figure 3-1. V_{sw} at 150 mA

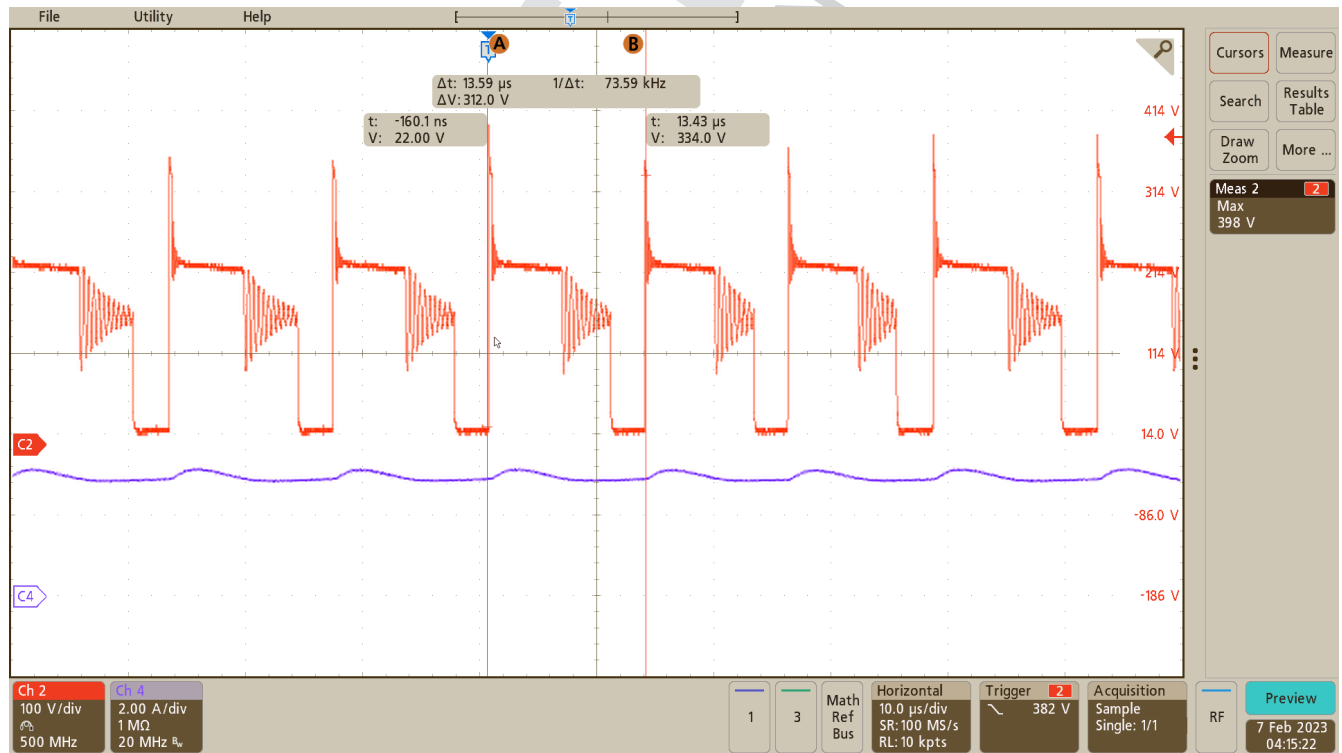


Figure 3-2. V_{sw} at 3-A Pulse

3.2 Output Voltage Ripple

Output voltage ripple is shown in the following figures.

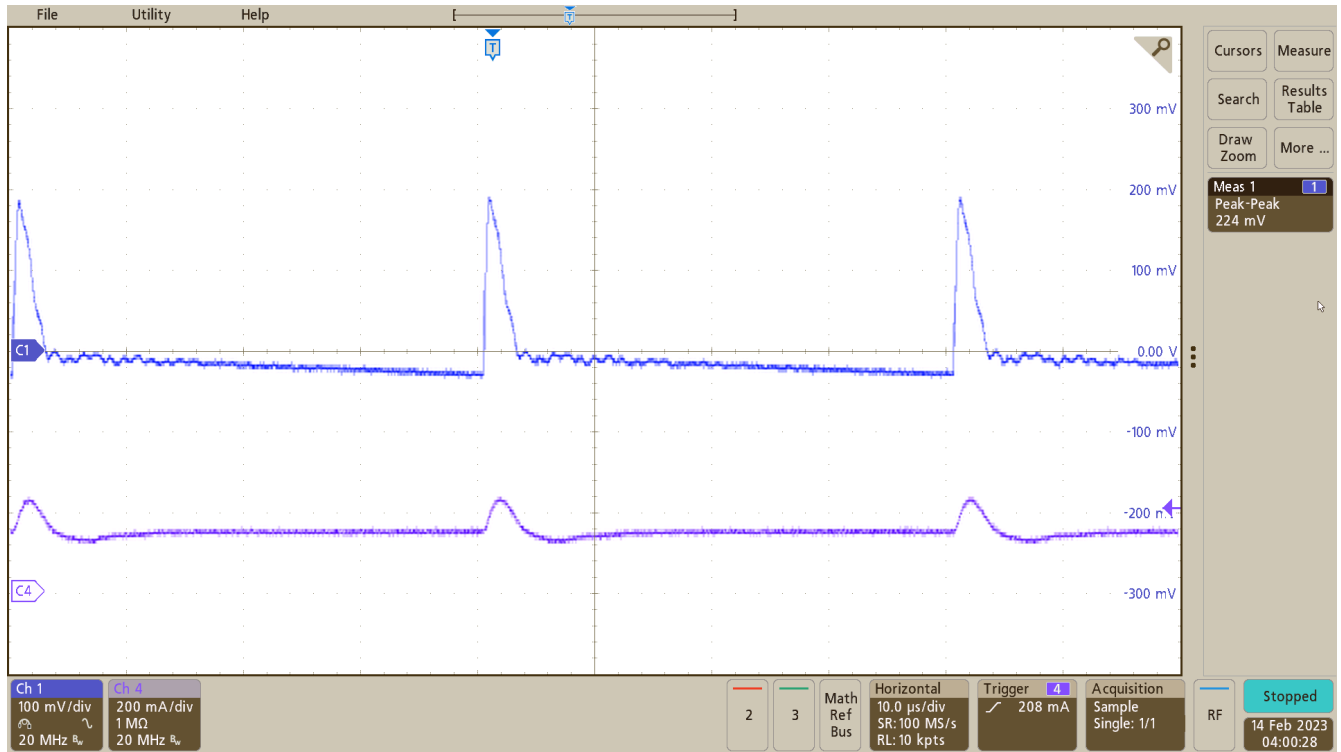


Figure 3-3. Output Voltage Ripple 1

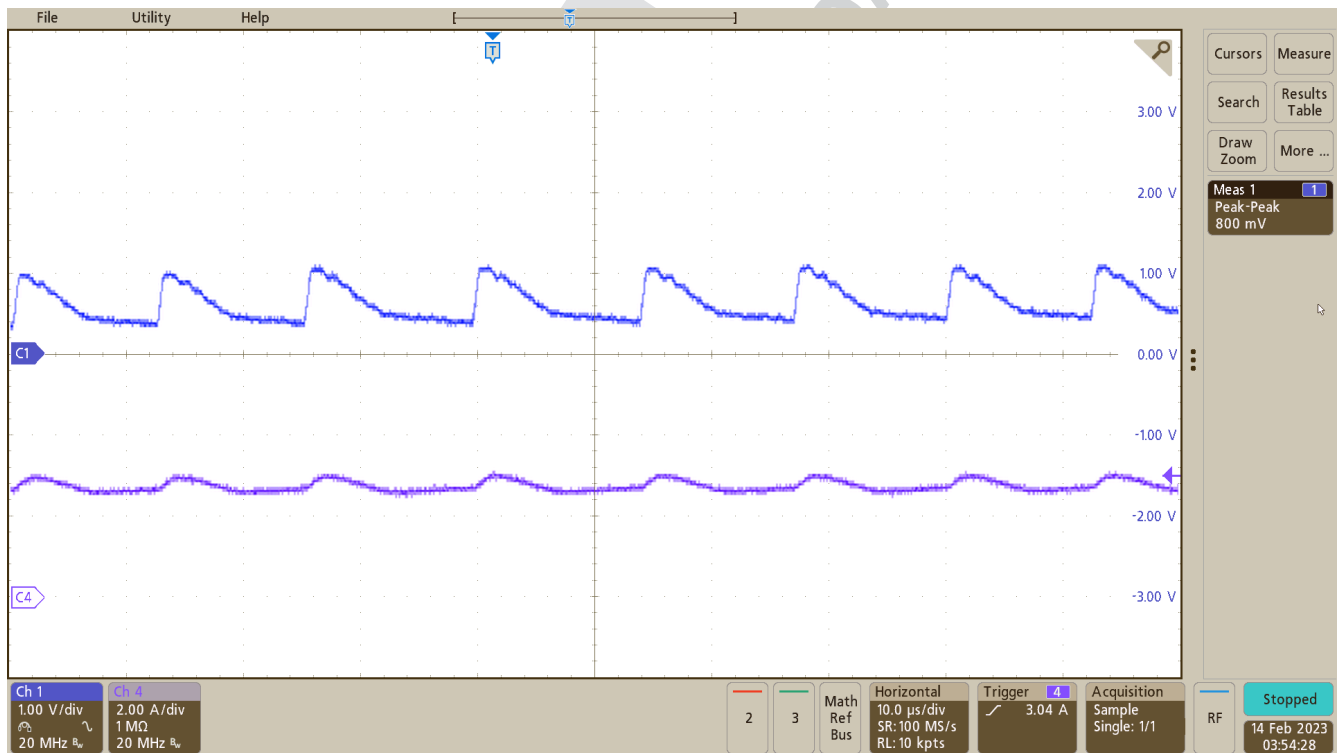


Figure 3-4. Output Voltage Ripple 2

3.3 Load Transients

Load transient response is shown in the following figure.

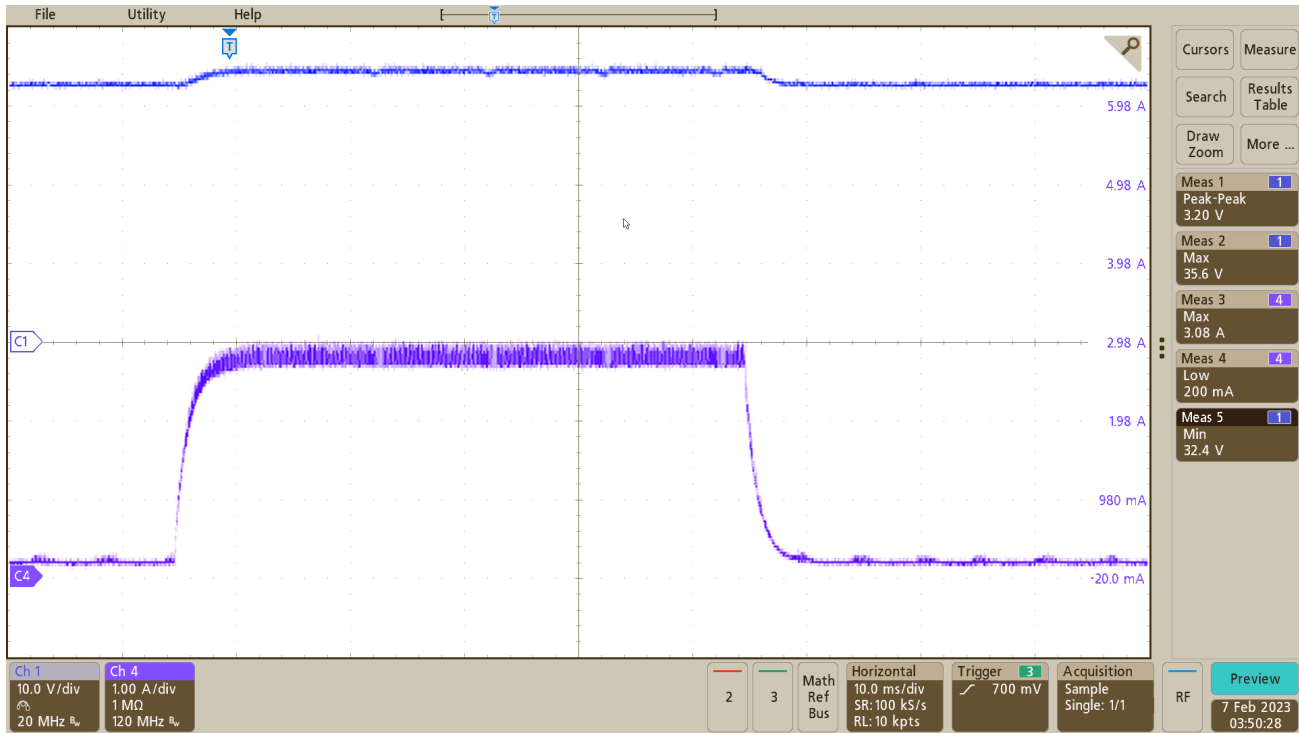


Figure 3-5. Load Transient 1

3.4 Start-Up Sequence

Start-up behavior is shown in the following figure.

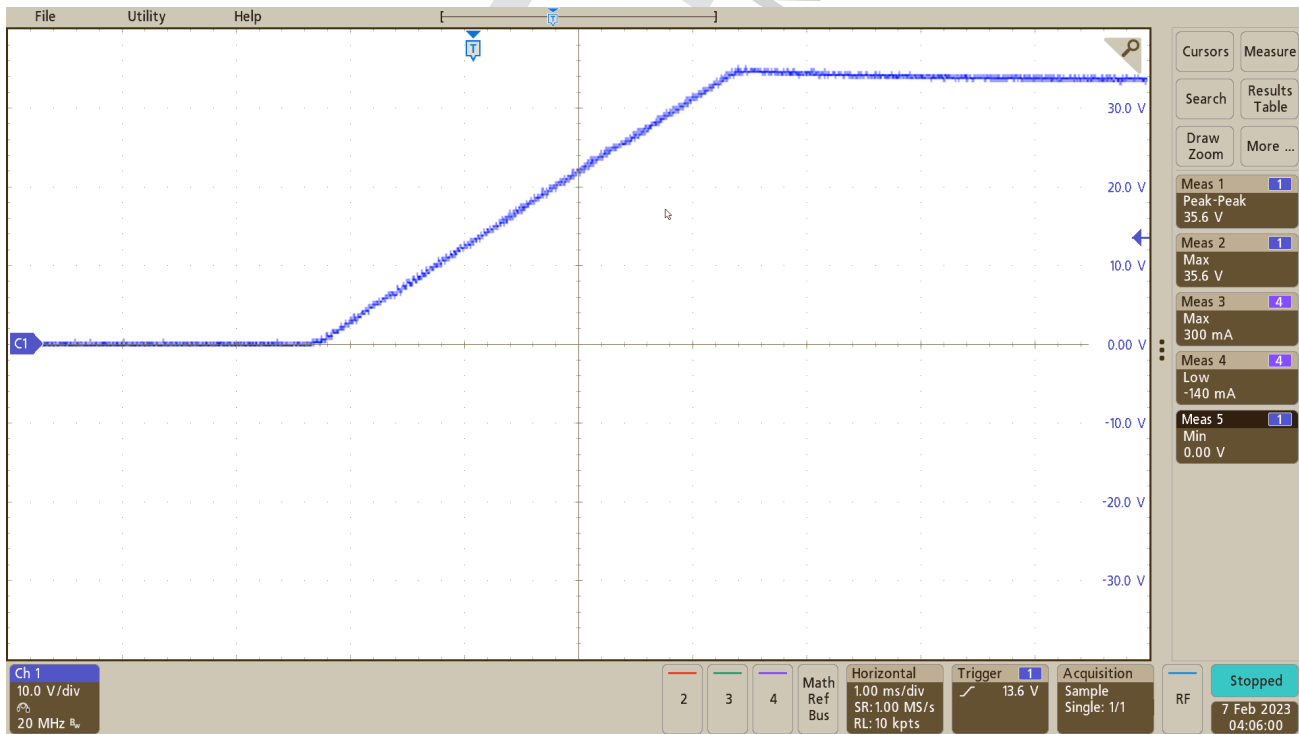


Figure 3-6. Start-Up 1

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