

**Test Data
For PMP20999
June 20th 2017**



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1. Design Specifications

Vin Minimum	15VDC
Vin Maximum	30VDC
Vin Nominal	24VDC
Vout	-12VDC
Iout	1A
Switching Frequency	≈ 500KHz

2. Circuit Description

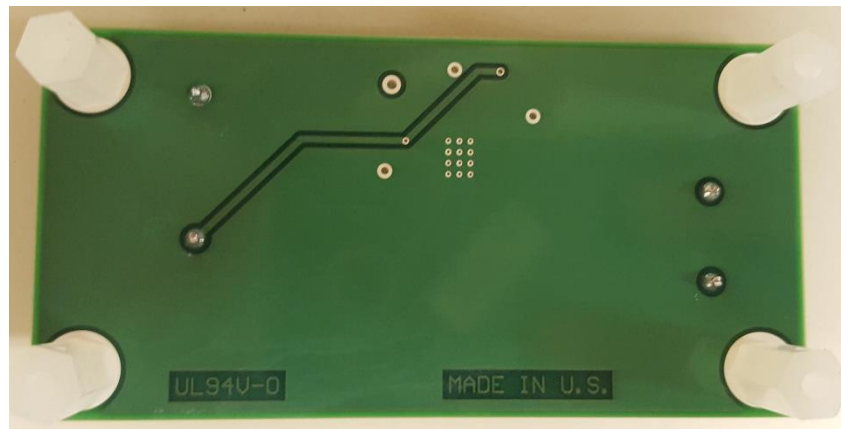
PMP20999 is a Synchronous Inverting Buck-Boost Converter using the LM46002 Synchronous Buck Regulator IC. The design accepts an input voltage of 15Vin to 30Vin and provides an output of -12Vout capable of supplying 1A of continuous current to the load. This design was built on the PMP9380 Rev1B PCB, which is a 4-layer board with 1oz. Copper on all four layers.

3. PMP20999 Board Photos

Board Dimensions: 3.2" x 1.6"

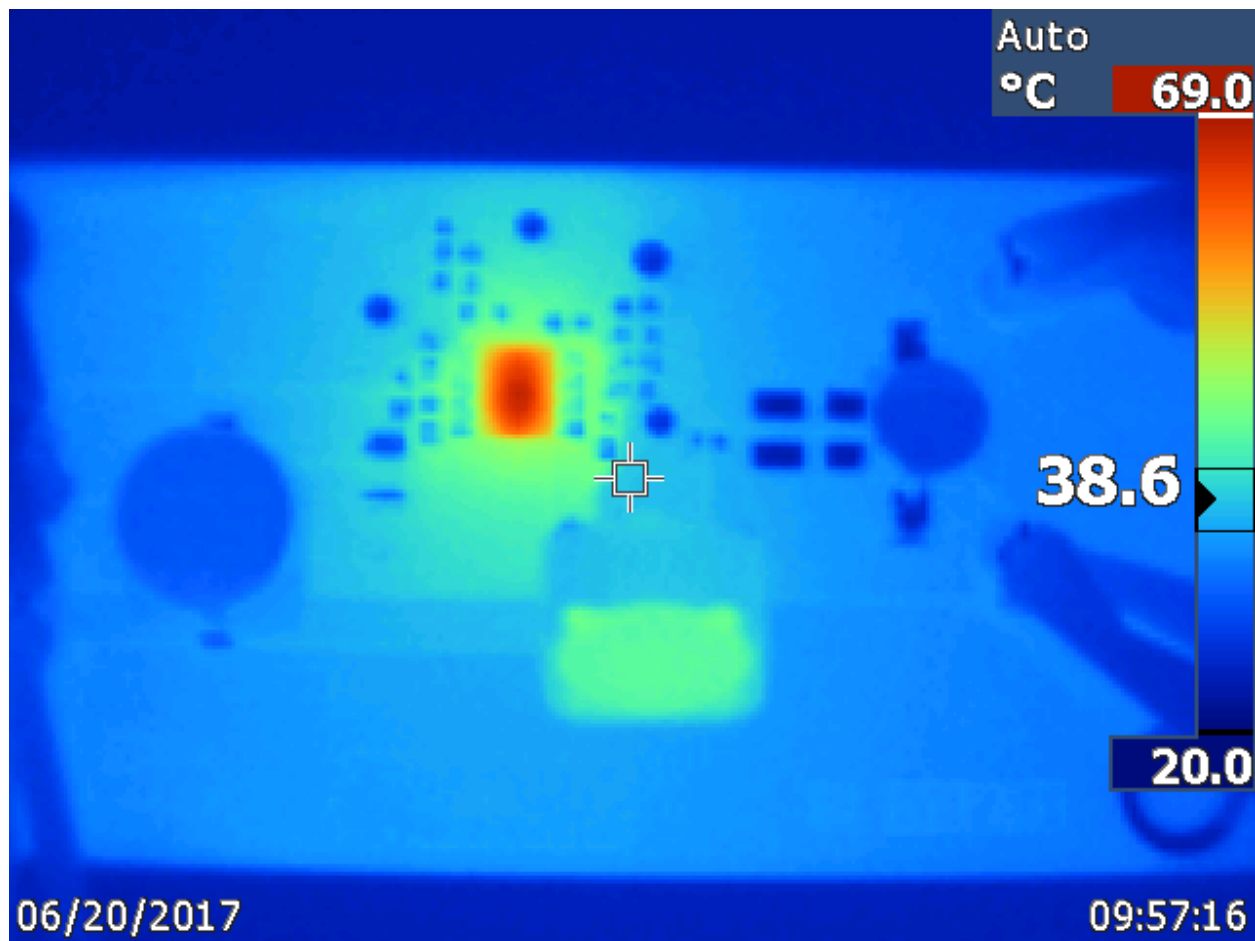


Board Photo (Top)

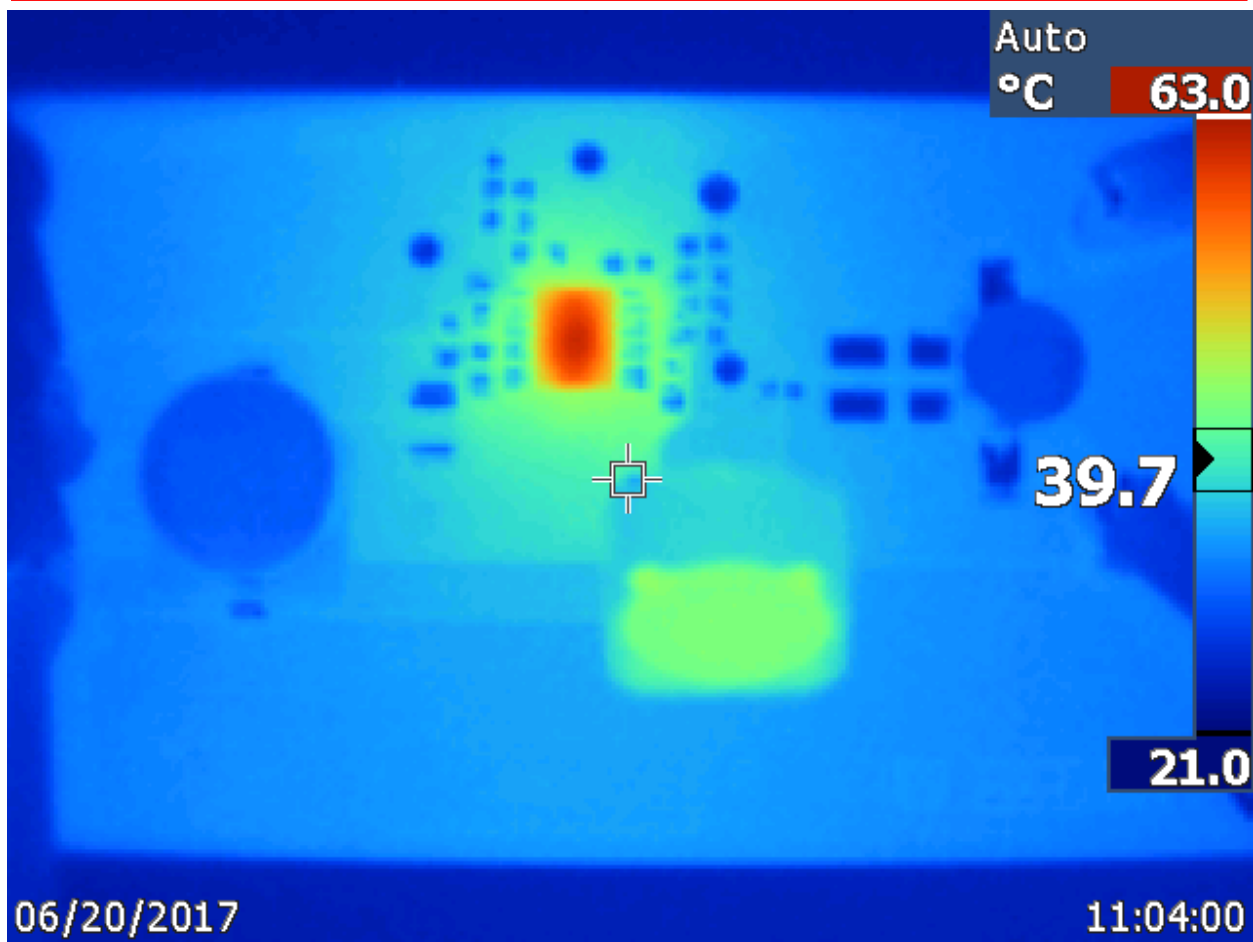


Board Photo (Bottom)

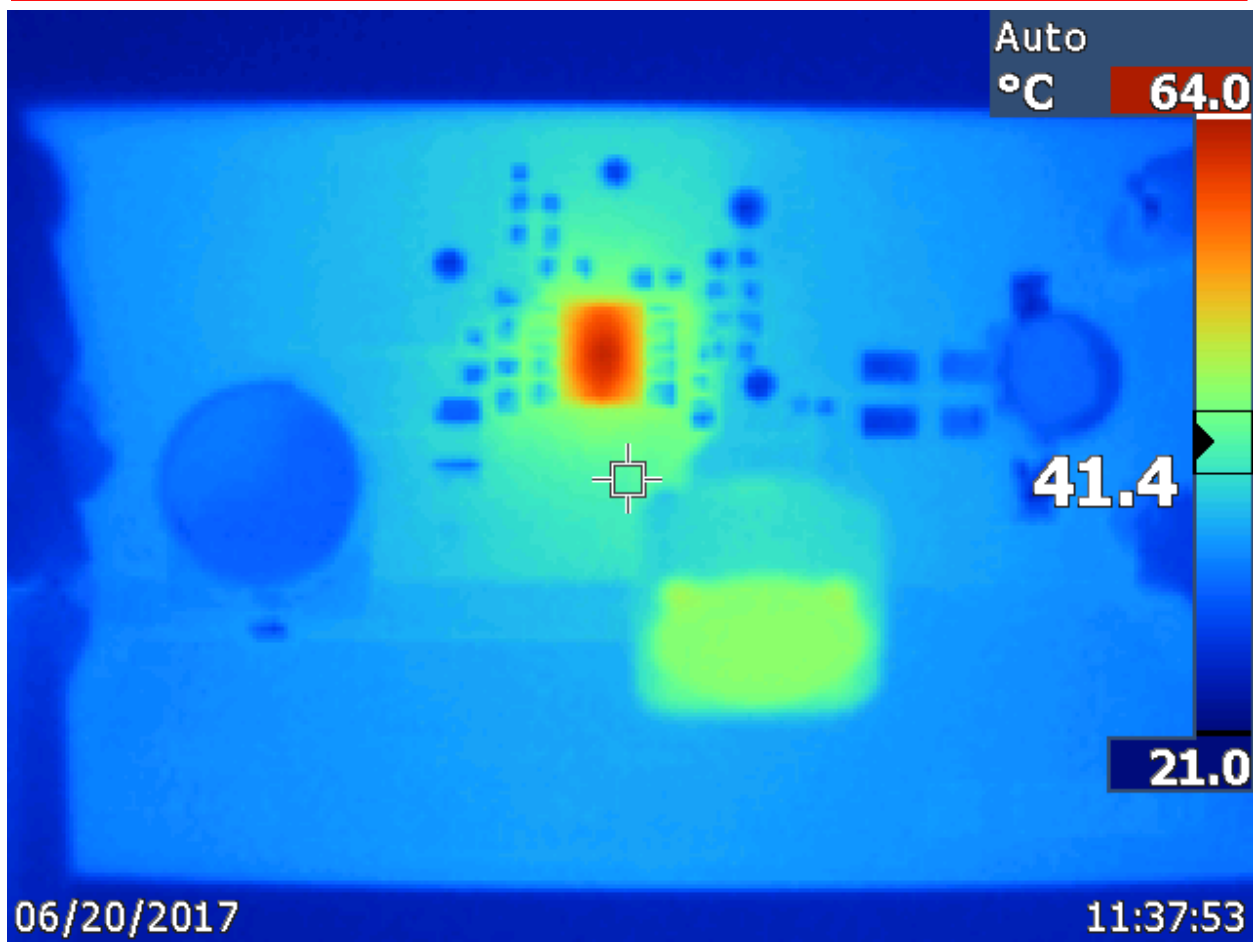
4. Thermal Data



IR thermal image taken at steady state with 15Vin and 1A load (no airflow; ambient at room temperature)



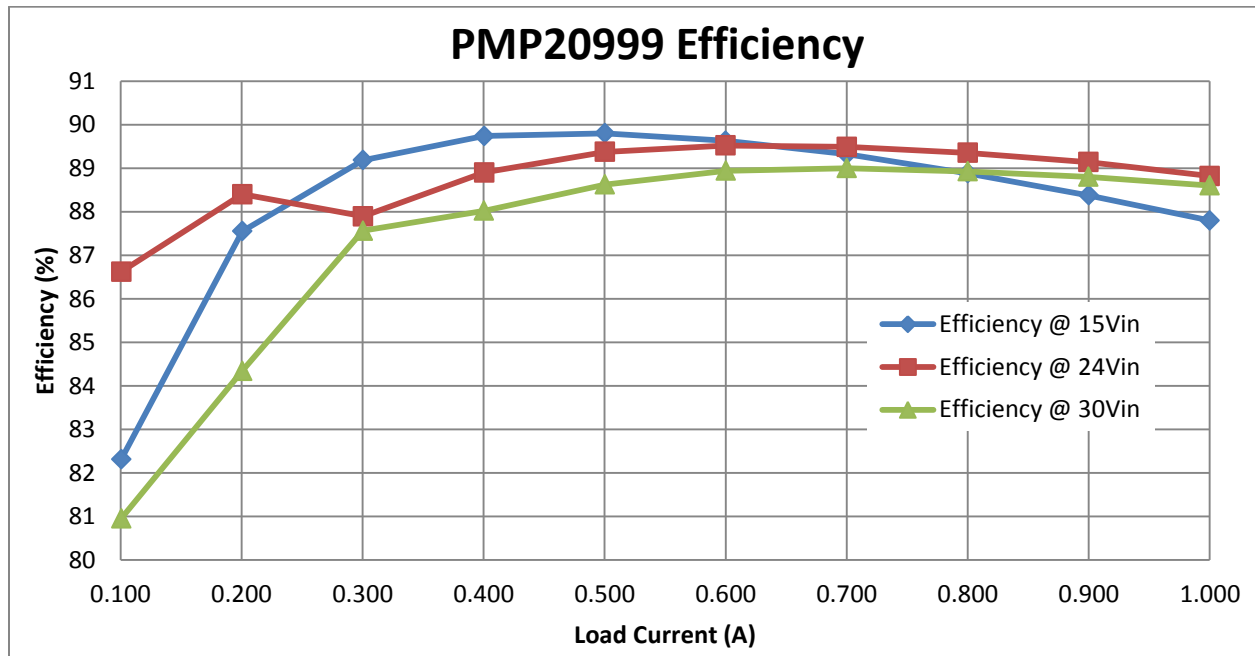
IR thermal image taken at steady state with 24Vin and 1A load (no airflow; ambient at room temperature)



IR thermal image taken at steady state with 30Vin and 1A load (no airflow; ambient at room temperature)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

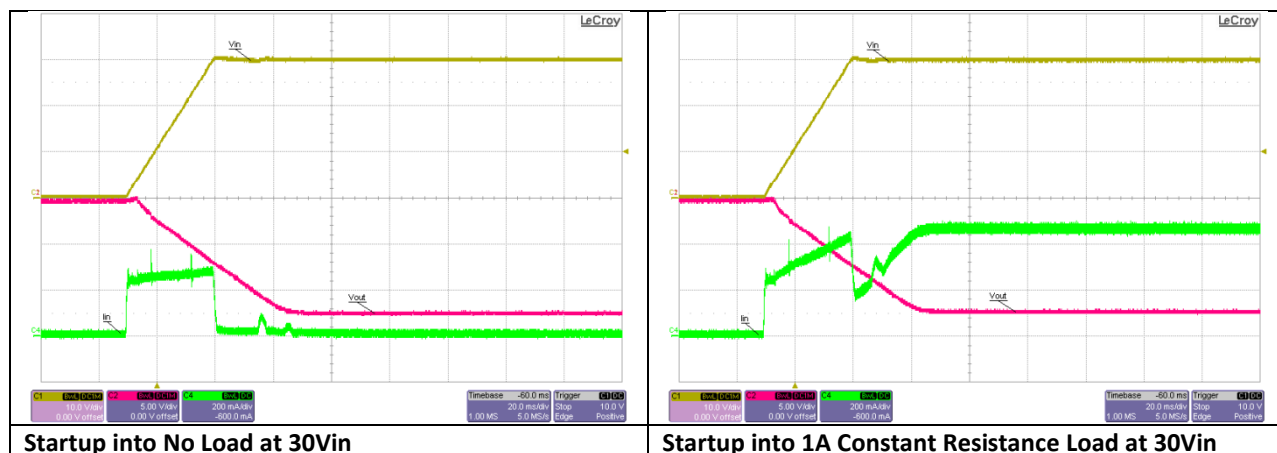
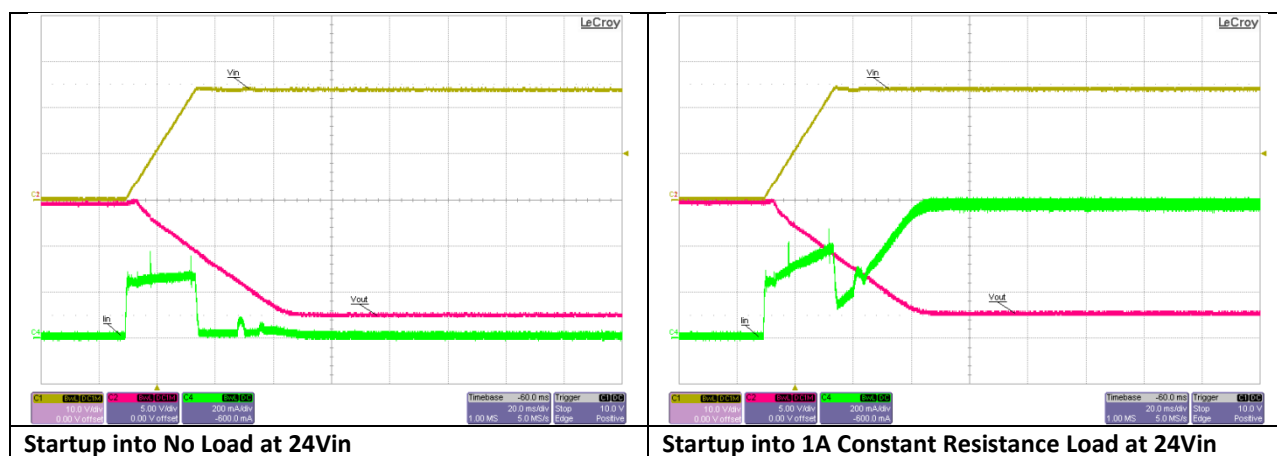
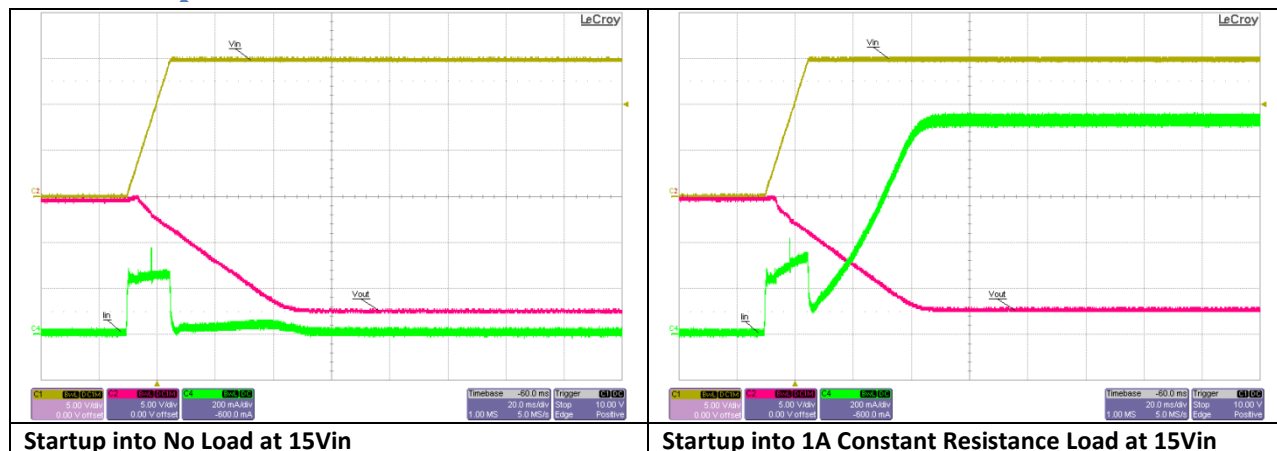
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
15.005	0.098	12.045	0.101	1.473	1.213	0.261	82.32
15.005	0.184	12.044	0.201	2.759	2.416	0.343	87.55
15.005	0.270	12.041	0.300	4.056	3.617	0.439	89.19
15.005	0.358	12.037	0.401	5.372	4.821	0.551	89.74
15.005	0.447	12.034	0.500	6.704	6.021	0.683	89.81
15.005	0.537	12.030	0.600	8.054	7.219	0.835	89.63
15.005	0.628	12.025	0.700	9.426	8.420	1.006	89.32
15.005	0.721	12.018	0.800	10.818	9.616	1.203	88.88
15.005	0.815	12.015	0.900	12.235	10.813	1.422	88.38
15.005	0.912	12.009	1.000	13.678	12.009	1.669	87.80

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
24.013	0.058	12.043	0.101	1.400	1.213	0.187	86.62
24.013	0.114	12.043	0.201	2.733	2.416	0.317	88.40
24.013	0.171	12.039	0.300	4.116	3.618	0.498	87.90
24.013	0.226	12.036	0.401	5.422	4.821	0.602	88.90
24.013	0.281	12.033	0.500	6.736	6.020	0.716	89.38
24.013	0.336	12.029	0.600	8.064	7.219	0.845	89.52
24.013	0.392	12.024	0.700	9.408	8.419	0.989	89.49
24.013	0.448	12.021	0.800	10.762	9.617	1.146	89.36
24.013	0.505	12.017	0.900	12.131	10.814	1.317	89.14
24.013	0.563	12.011	1.000	13.522	12.010	1.511	88.82

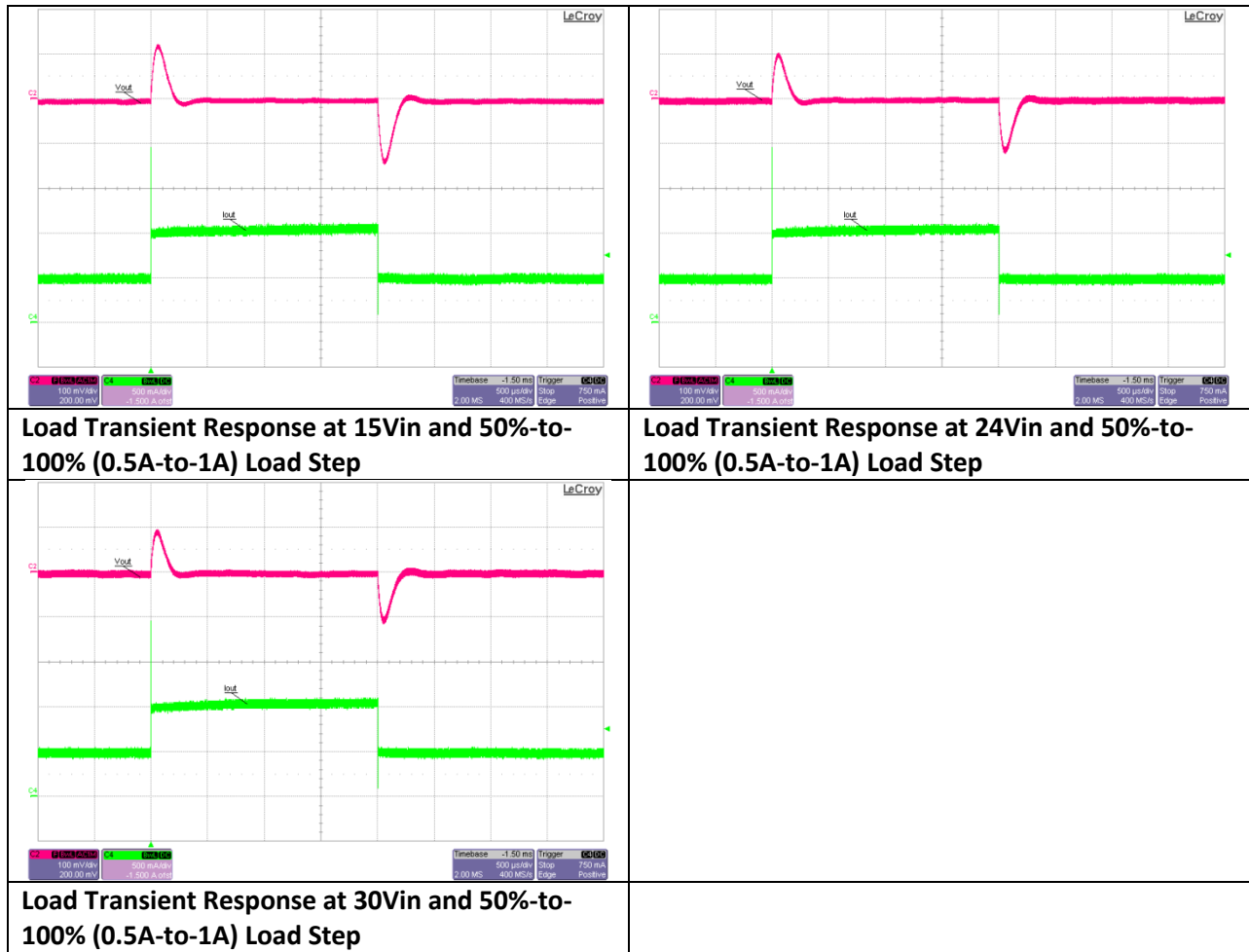
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
30.011	0.050	12.039	0.101	1.498	1.212	0.285	80.96
30.011	0.095	12.038	0.201	2.863	2.415	0.448	84.35
30.011	0.138	12.037	0.300	4.129	3.616	0.513	87.57
30.011	0.182	12.034	0.400	5.474	4.818	0.656	88.02
30.011	0.226	12.031	0.500	6.791	6.019	0.772	88.63
30.011	0.270	12.026	0.600	8.115	7.218	0.897	88.95
30.011	0.315	12.024	0.700	9.459	8.419	1.040	89.00
30.011	0.360	12.020	0.800	10.813	9.616	1.197	88.93
30.011	0.406	12.015	0.900	12.175	10.812	1.363	88.80
30.011	0.452	12.011	1.000	13.556	12.011	1.544	88.61

6 Waveforms

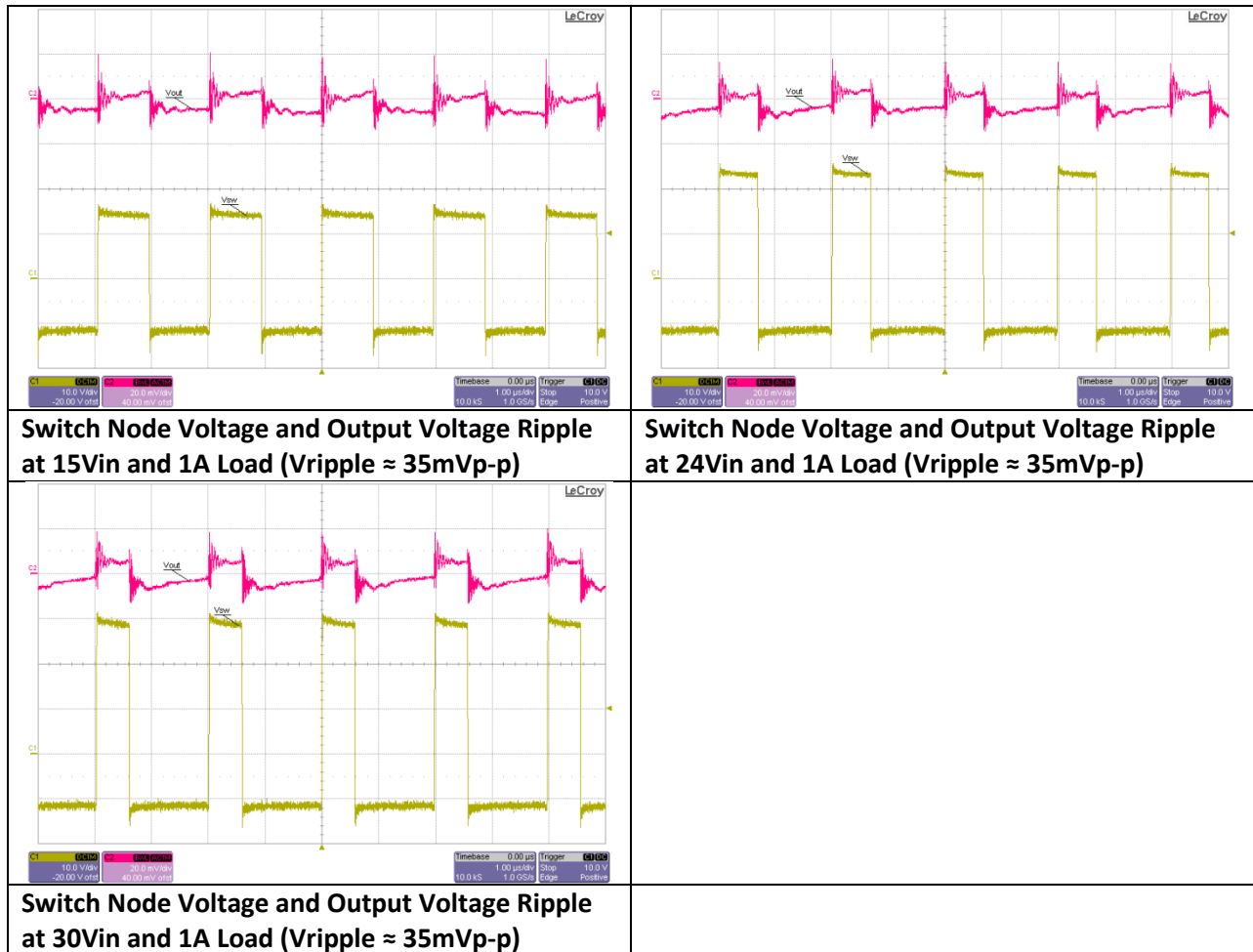
6.1 Startup



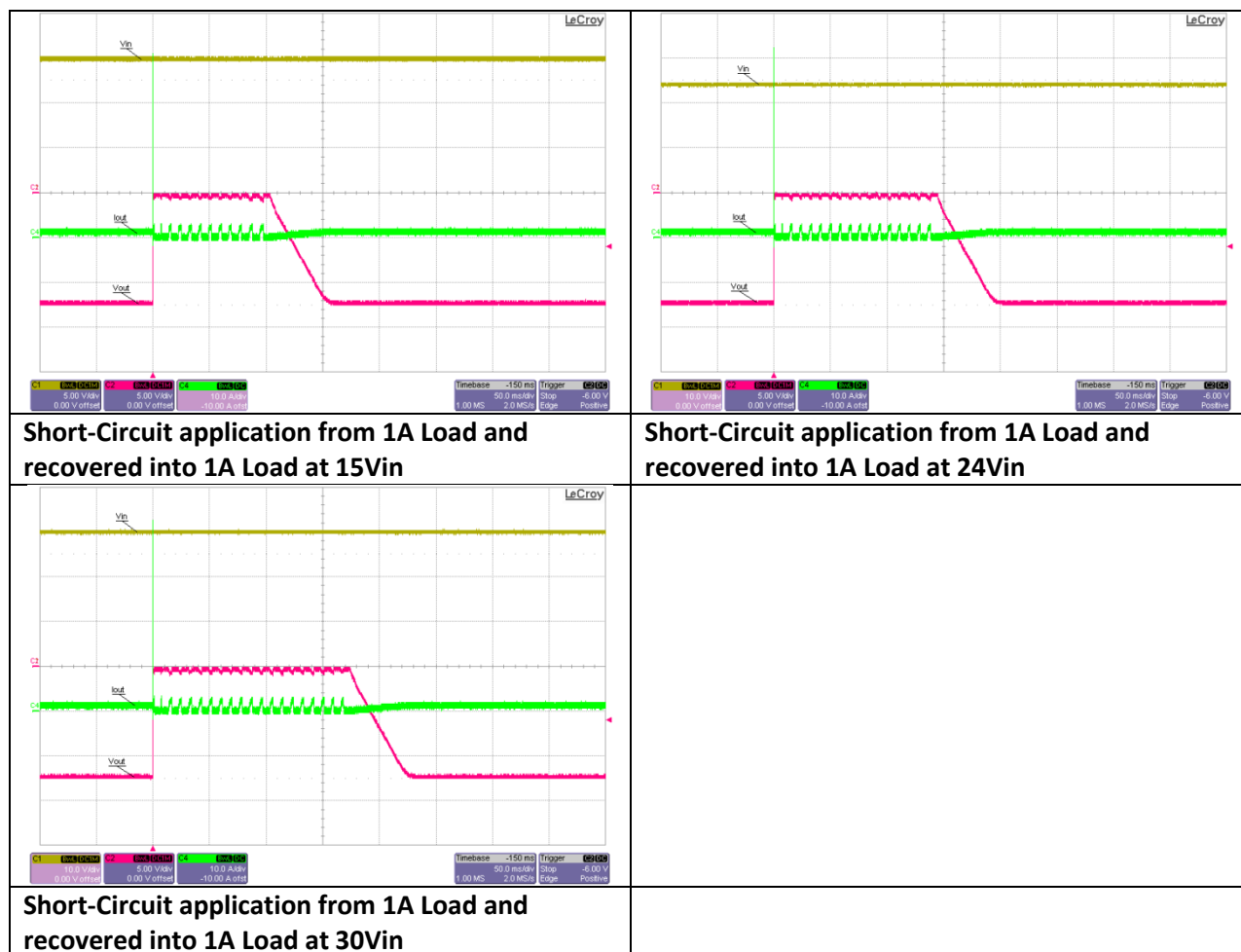
6.2 Load Transient Response



6.3 Output Voltage Ripple and Switch Node Voltage



6.4 Short Circuit Application and Recovery



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