

**Test Data
For PMP10650
04/24/2015**



Contents

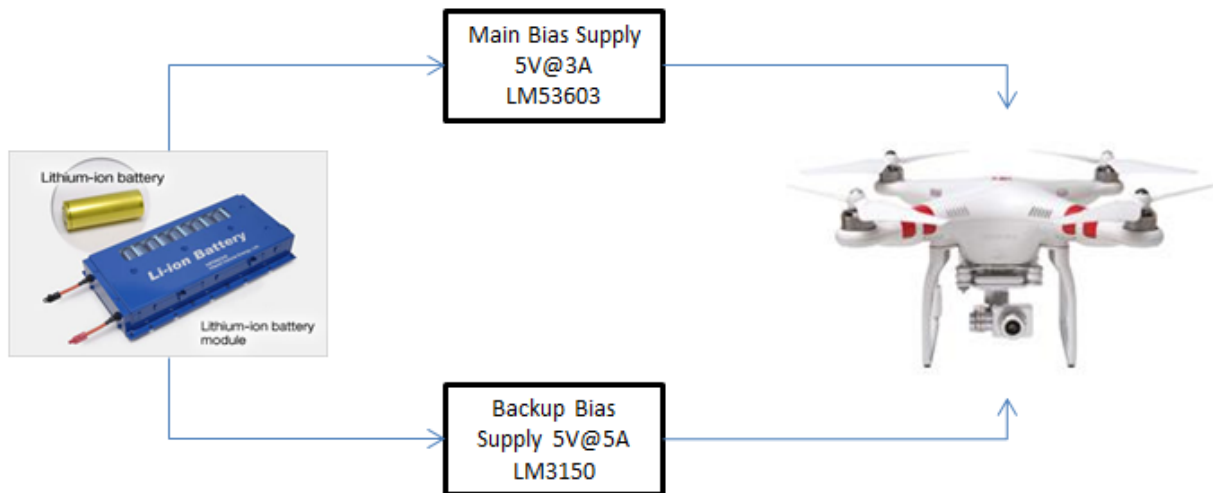
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1. Design Specifications

Vin Minimum	7VDC
Vin Maximum	36VDC(for LM3150)
Vout1	5VDC(From LM3150)
Iout 1	5A
Vout2	5VDC(From LM53603)
Iout 2	3A
Approximate Switching Frequency	2.1MHz for LM53603 and 400KHz for LM3150

2. Circuit Description and PCB details

PMP10650 is a high power density 40W Buck Converter design optimized for Wide Vin Drone Design using the LM3150 controller IC (Used for Drone's Backup Power) and LM53603. The design accepts an input voltage of 7Vin to 36Vin and provides the outputs of 5V@5A for Drone's Backup power and 5V@3A for Drone's manpower. It features a small size and is an inexpensive and more efficient solution.

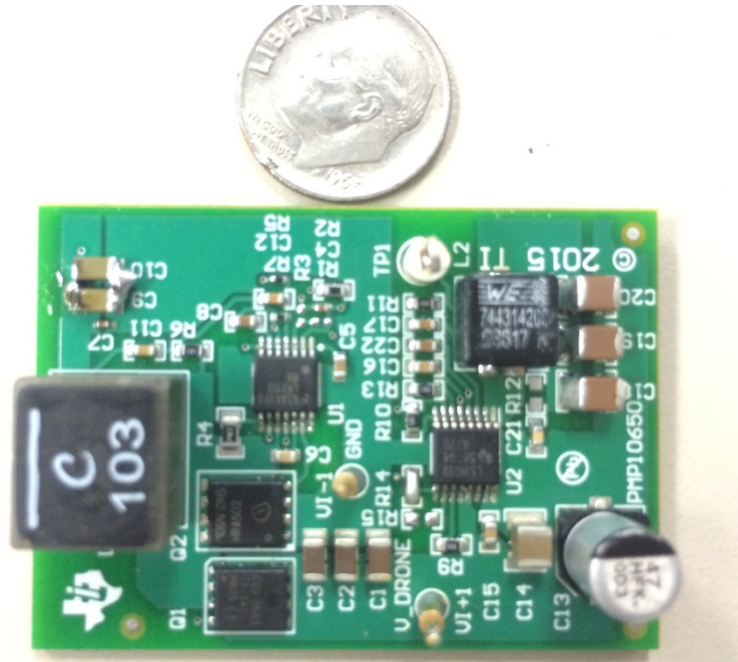


3Cell Lithium ion to 8 Cell lion ion in Series
7V-36V

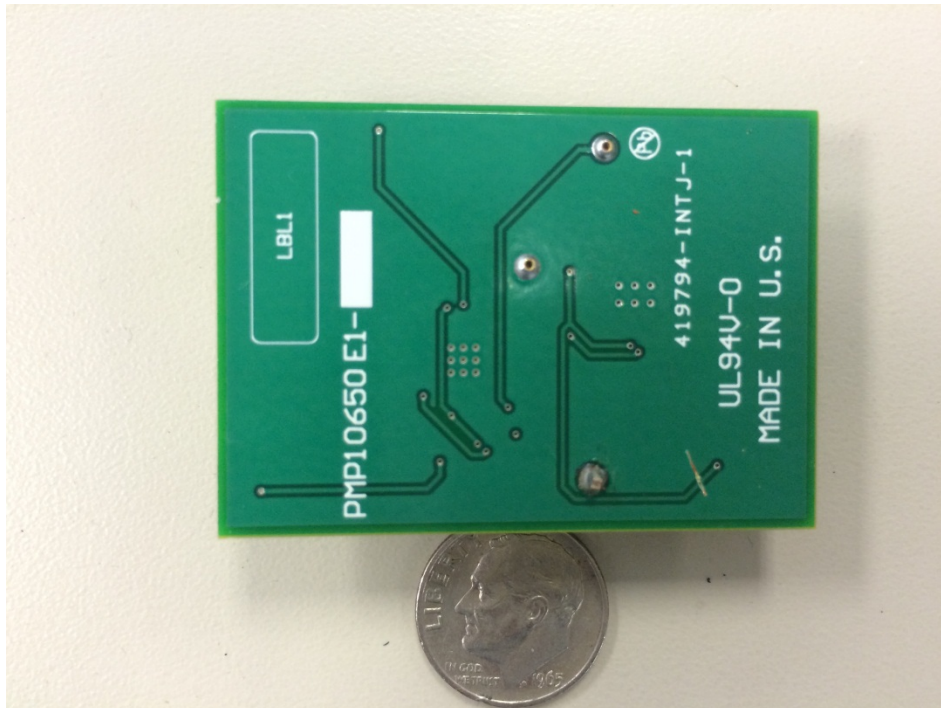
The Board dimension of PMP10650 PCB is 1705mil * 1905mil. Four layer PCB was used for the design.

3. PMP10650 Board Photos

Board Photo (Top)

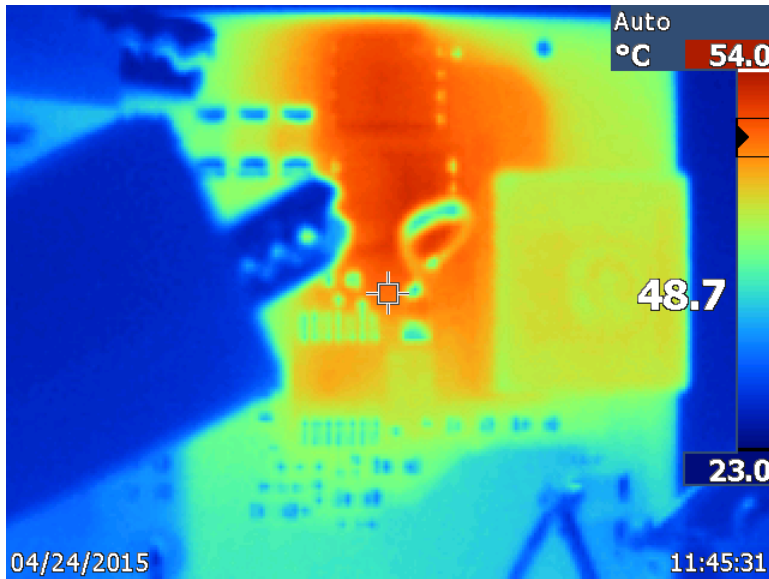


Board Photo (Bottom)

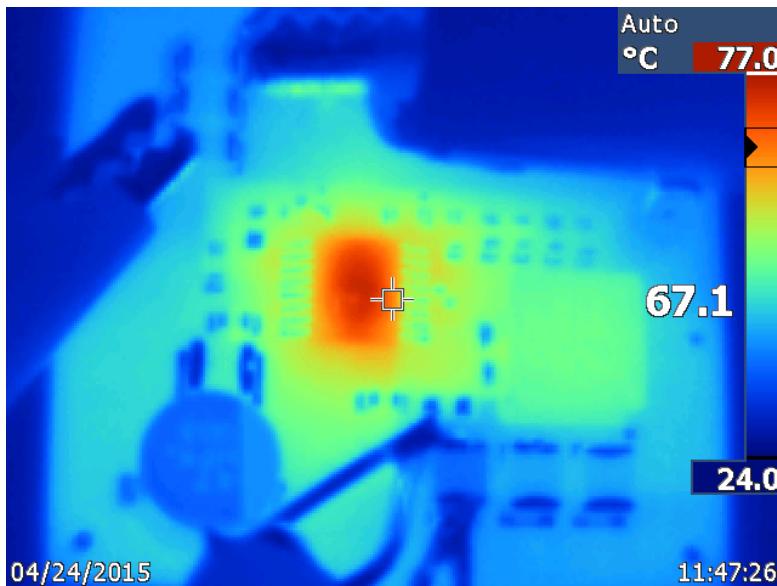


4. Thermal Data

IR thermal image taken at steady state with 14Vin and LM3150 output at full load (no airflow)

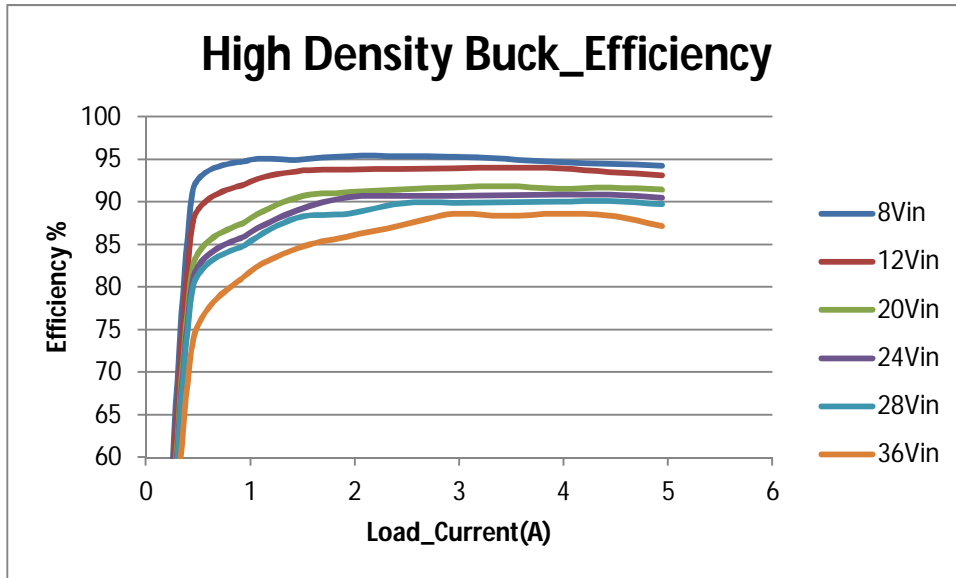


IR thermal image taken at steady state with 14Vin and LM53603 output at full load (no airflow)

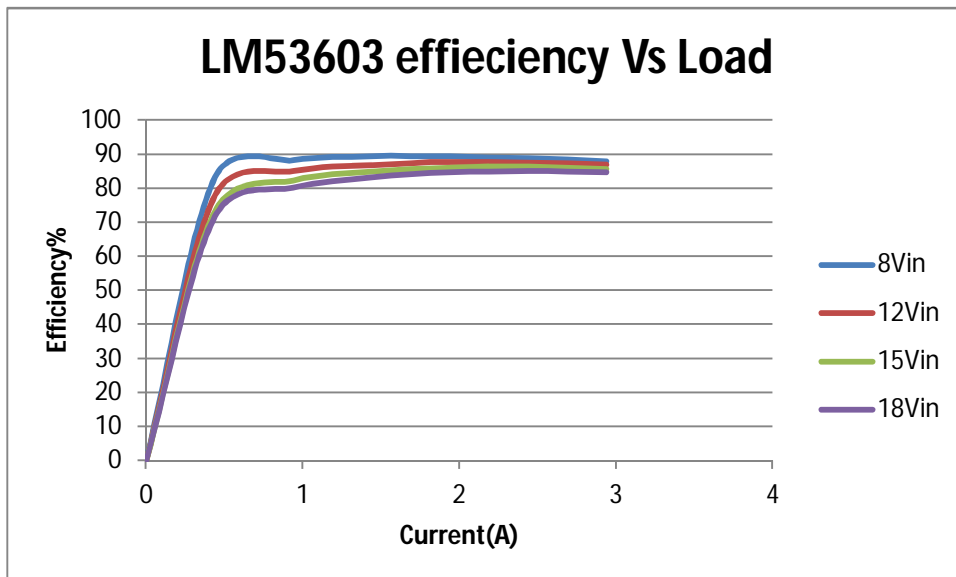


5. Efficiency

5.1 Efficiency Chart – Backup power efficiency (LM3150)



5.2 Efficiency Chart – Main Power Efficiency Vs Load Current



5.3 Efficiency Data

Efficiency of Backup Power (LM3150)

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
8.002	0.015	4.97	0	0
8.002	0.3	4.965	0.44	91.002
8.003	0.615	4.963	0.94	94.786
8.002	0.94	4.961	1.44	94.974
8.002	1.26	4.96	1.94	95.436
8.002	1.585	4.958	2.44	95.382
8.002	1.91	4.956	2.94	95.334
8.002	2.24	4.954	3.44	95.075
8.002	2.575	4.952	3.94	94.689
8.002	2.905	4.949	4.44	94.527
8.002	3.24	4.947	4.94	94.26

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
12.002	0.015	5.01	0	0
12.002	0.21	4.999	0.44	87.27
12.002	0.425	4.996	0.94	92.068
12.002	0.64	4.994	1.44	93.622
12.002	0.86	4.992	1.94	93.826
12.002	1.08	4.99	2.44	93.932
12.002	1.3	4.988	2.94	93.989
12.002	1.52	4.986	3.44	94.019
12.001	1.75	4.984	3.96	93.976
12.001	1.97	4.981	4.44	93.544
12.001	2.2	4.98	4.94	93.179

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
20.01	0.02	5.05	0	0
20.01	0.135	5.037	0.44	82.043
20.01	0.27	5.035	0.94	87.602
20.01	0.4	5.032	1.44	90.531
20.009	0.535	5.03	1.94	91.157
20.009	0.67	5.028	2.44	91.513
20.009	0.805	5.026	2.94	91.738
20.008	0.94	5.024	3.44	91.892
20.008	1.08	5.023	3.94	91.587
20.008	1.215	5.021	4.44	91.705
20.007	1.355	5.019	4.94	91.458

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
24.008	0.02	5.065	0	0
24.008	0.115	5.052	0.44	80.512
24.008	0.23	5.049	0.94	85.951
24.008	0.34	5.046	1.44	89.017
24.007	0.45	5.044	1.94	90.579
24.007	0.565	5.042	2.44	90.7
24.006	0.68	5.04	2.94	90.771
24.005	0.795	5.038	3.44	90.813
24.004	0.91	5.037	3.94	90.854
24.003	1.025	5.036	4.44	90.882
24.002	1.145	5.036	4.94	90.523

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
36.014	0.02	5.101	0	0
36.014	0.085	5.089	0.44	73.147
36.014	0.16	5.078	0.92	81.075
36.014	0.24	5.074	1.44	84.534
36.013	0.315	5.078	1.92	85.946
36.013	0.395	5.087	2.44	87.256
36.013	0.47	5.102	2.94	88.62
36.013	0.555	5.135	3.44	88.378
36.012	0.64	5.185	3.94	88.638
36.012	0.74	5.308	4.44	88.437

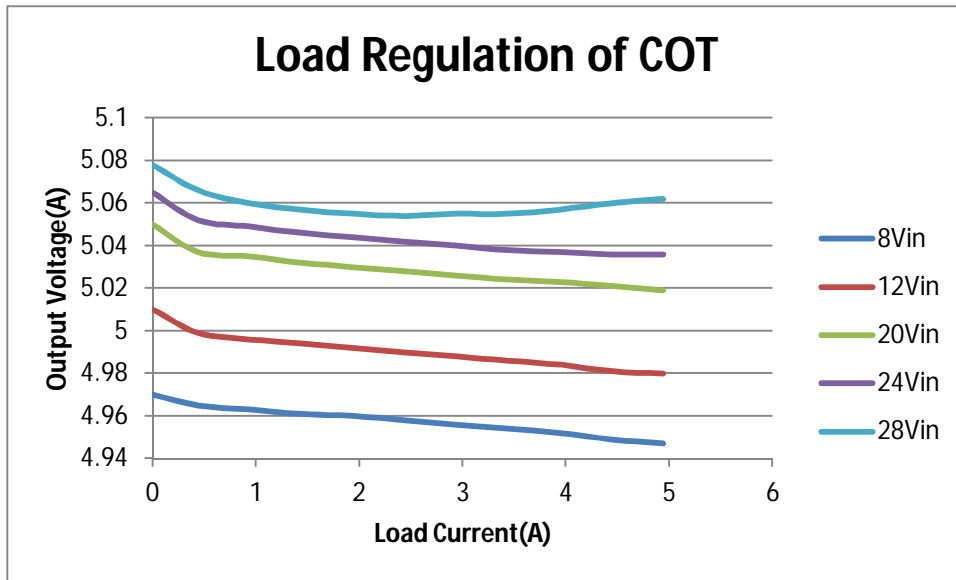
36.013 0.865 5.498 4.94 87.188

Efficiency of Main_power(LM53603)

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
=====				
8.002	0.015	5.06	0	0
8.002	0.33	4.998	0.44	83.279
8.002	0.665	4.997	0.94	88.271
8.002	1.005	4.996	1.44	89.458
8.002	1.355	4.996	1.94	89.389
8.002	1.715	4.995	2.44	88.81
8.002	2.085	4.993	2.94	87.984
12.001	0.015	5.06	0	0
12.001	0.235	4.998	0.44	77.976
12.001	0.46	4.997	0.94	85.087
12.001	0.69	4.996	1.44	86.88
12.001	0.92	4.996	1.94	87.785
12.001	1.16	4.994	2.44	87.531
12.001	1.405	4.99	2.94	87.007
15.007	0.02	5.059	0	0
15.007	0.2	4.997	0.44	73.255
15.007	0.38	4.997	0.94	82.368
15.007	0.565	4.996	1.44	84.848
15.007	0.75	4.995	1.94	86.096
15.007	0.94	4.993	2.44	86.363
15.007	1.14	4.989	2.94	85.736
18.009	0.02	5.058	0	0
18.009	0.17	4.997	0.44	71.816
18.009	0.325	4.995	0.94	80.221
18.009	0.48	4.995	1.44	83.208
18.009	0.635	4.994	1.94	84.72
18.009	0.795	4.991	2.44	85.059
18.009	0.96	4.987	2.94	84.806

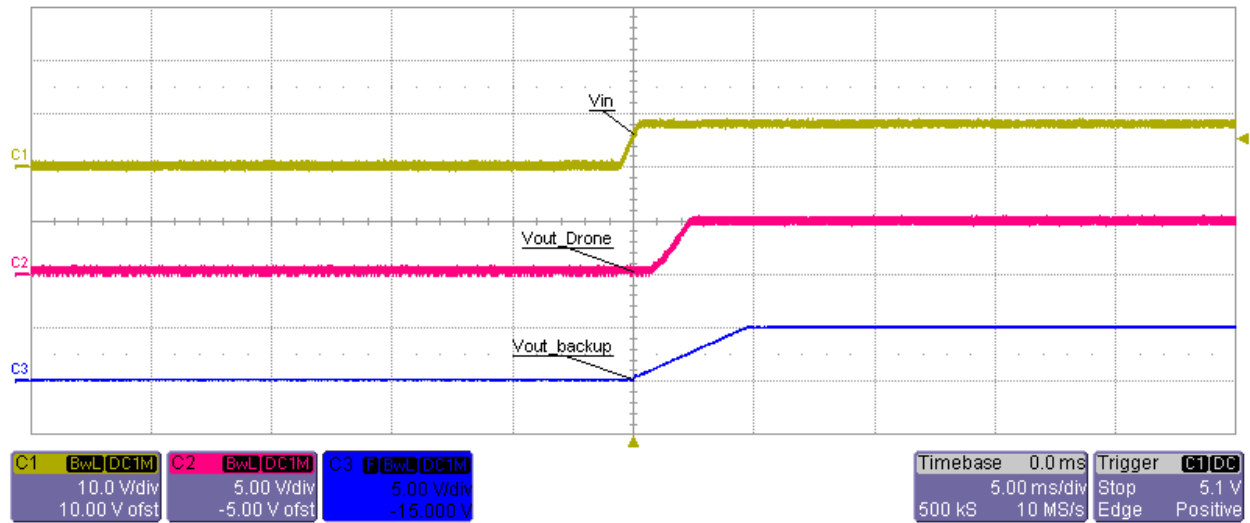
6. LM3150 – (COT output Regulation)

Regulation at Various input Voltages Vs load Current



7. Waveforms

7.1 Startup

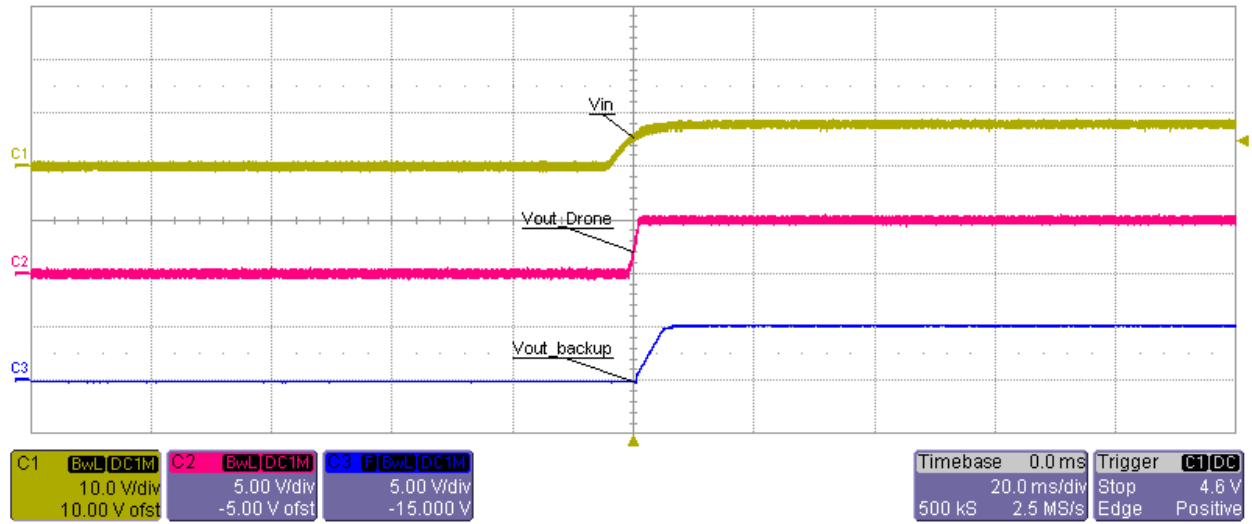


Startup into No Load at 8 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup

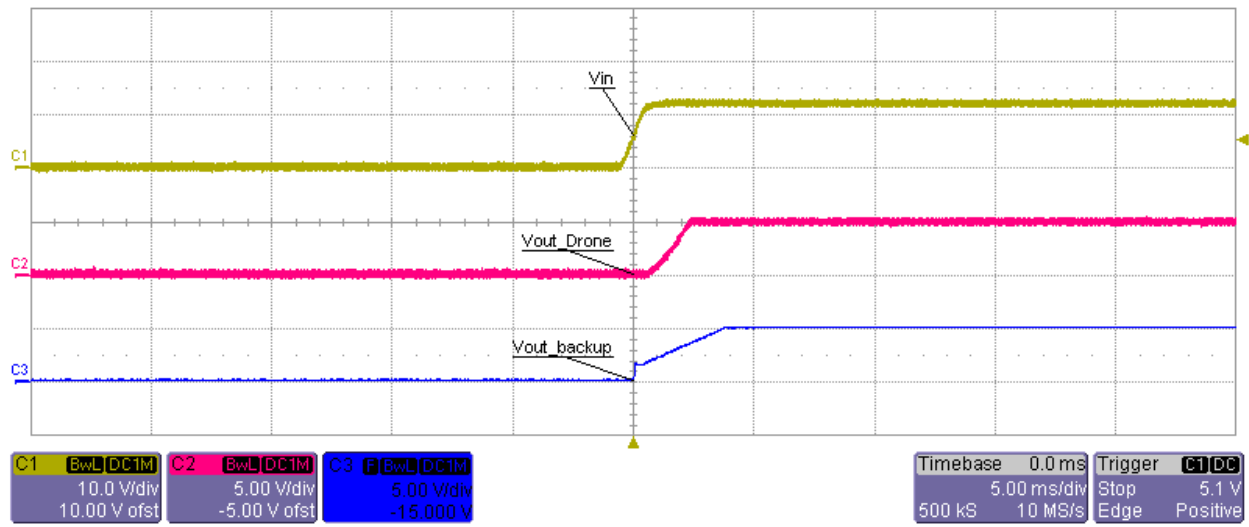


Startup into full Load (all the output was connected to full Load) at 8 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup

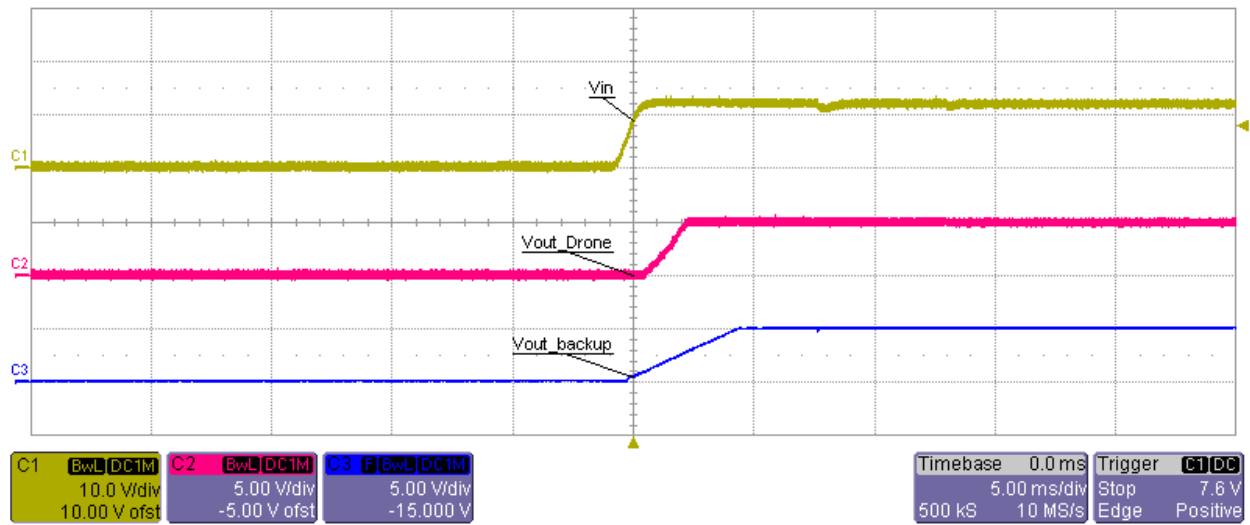


Startup into No Load at 12 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup

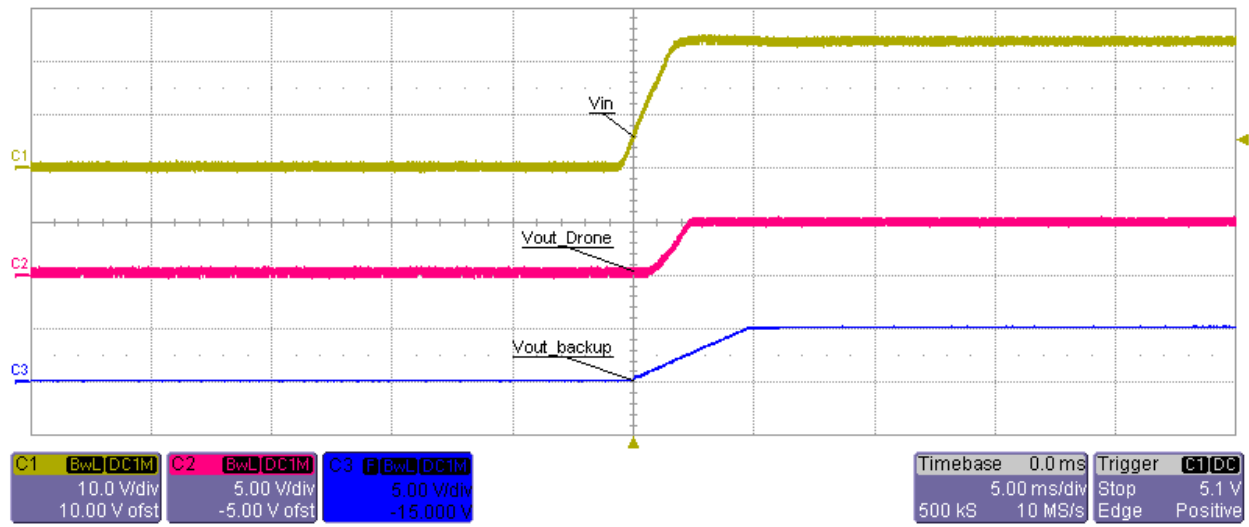


Startup into full Load (all the output was connected to full Load) at 12 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup

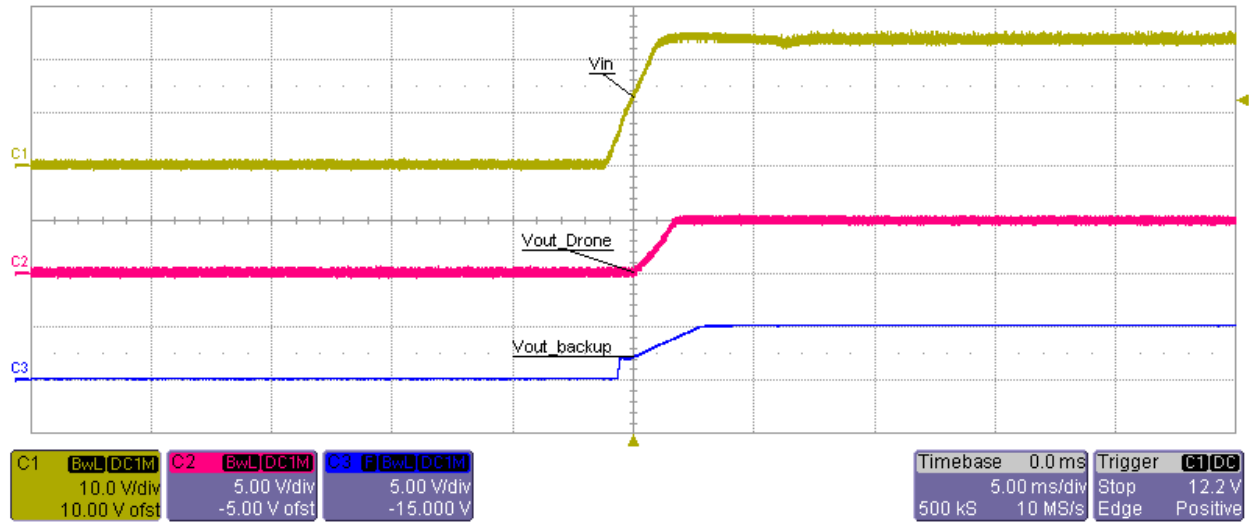


Startup into No Load at 24 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup



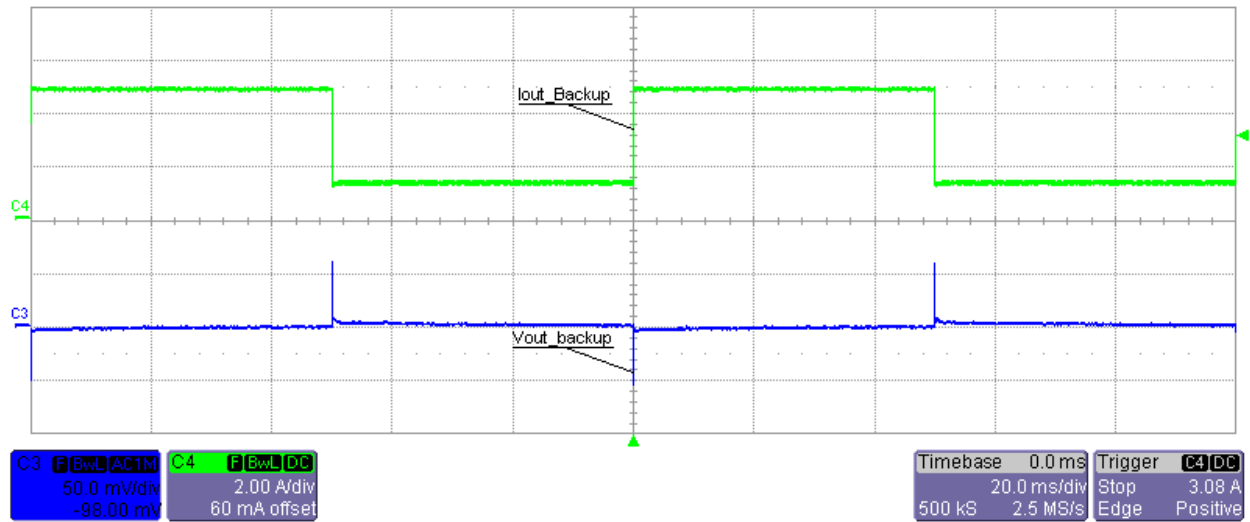
Startup into full Load (all the output was connected to full Load) at 24 Vin

Ch1-Vin

Ch2-Vout_Drone

Ch3-Vout_backup

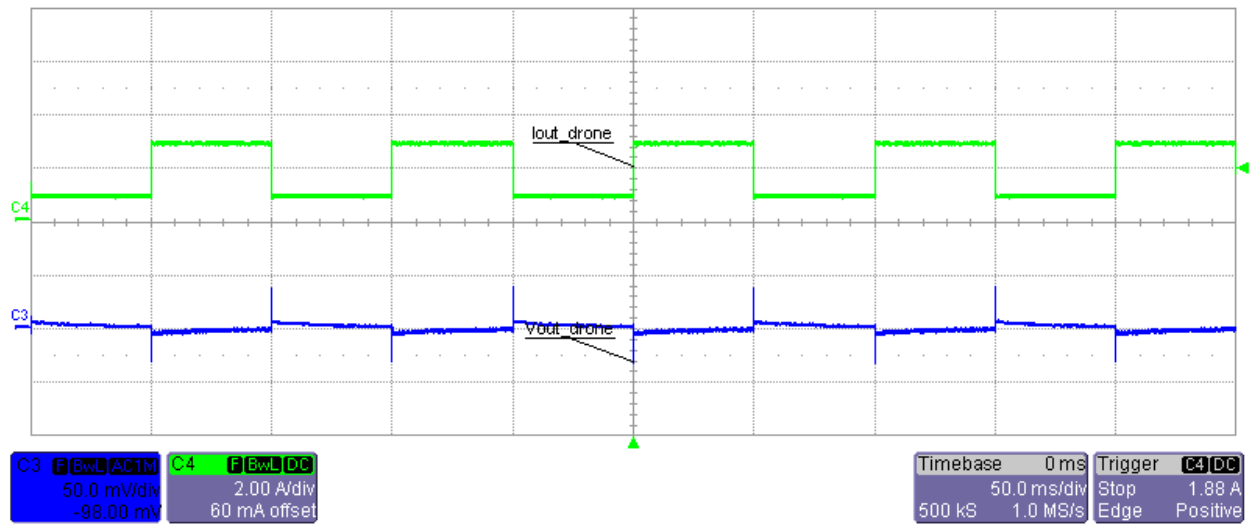
7.2 Load Transient Response



Load Transient Response at 12 Vin and 30%-to-100%(1.5A to 5A) Load Step on 5V Output of LM3150

Ch3 – Vout_Backup

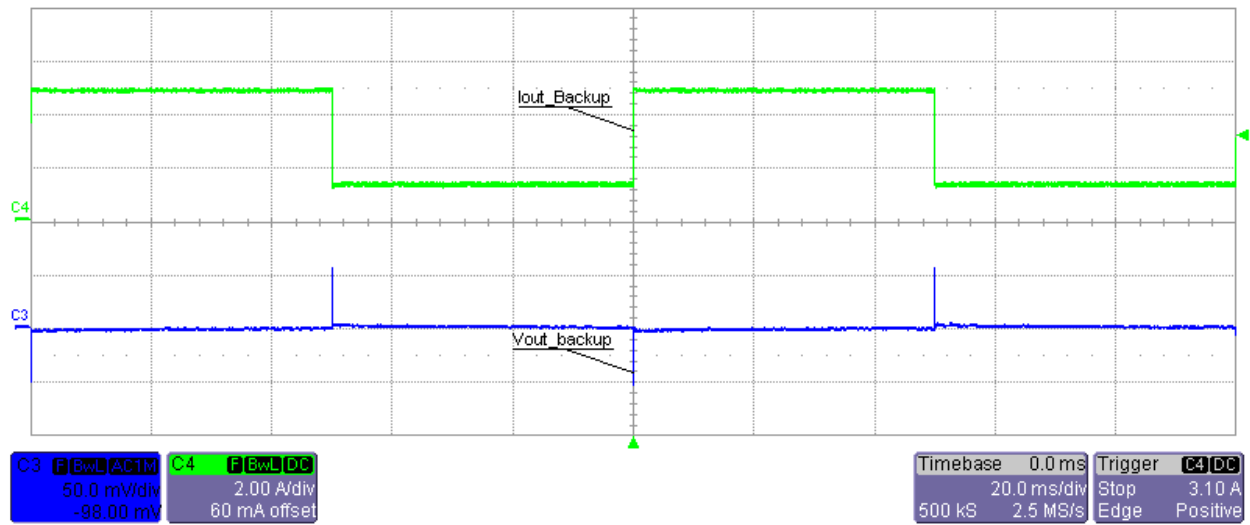
Ch4- Iout_backup



Load Transient Response at 12 Vin and 30%-to-100%(1A to 3A) Load Step on 5V Output of LM53603

Ch3 – Vout_Main

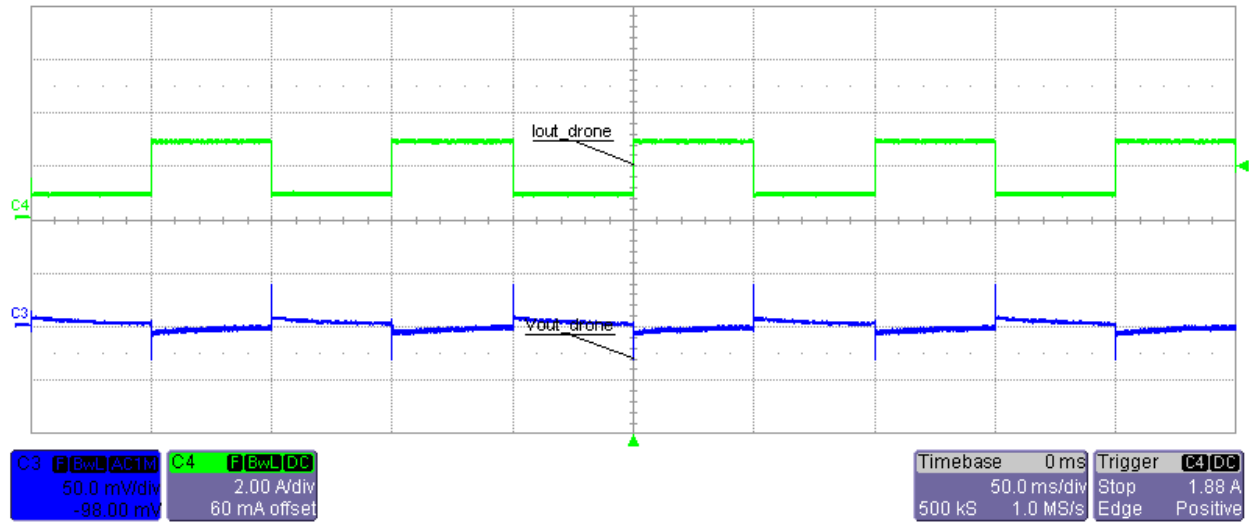
Ch4- Iout_Main



Load Transient Response at 18 Vin and 30%-to-100%(1.5A to 5A) Load Step on 5V Output of LM3150

Ch3 – Vout_Backup

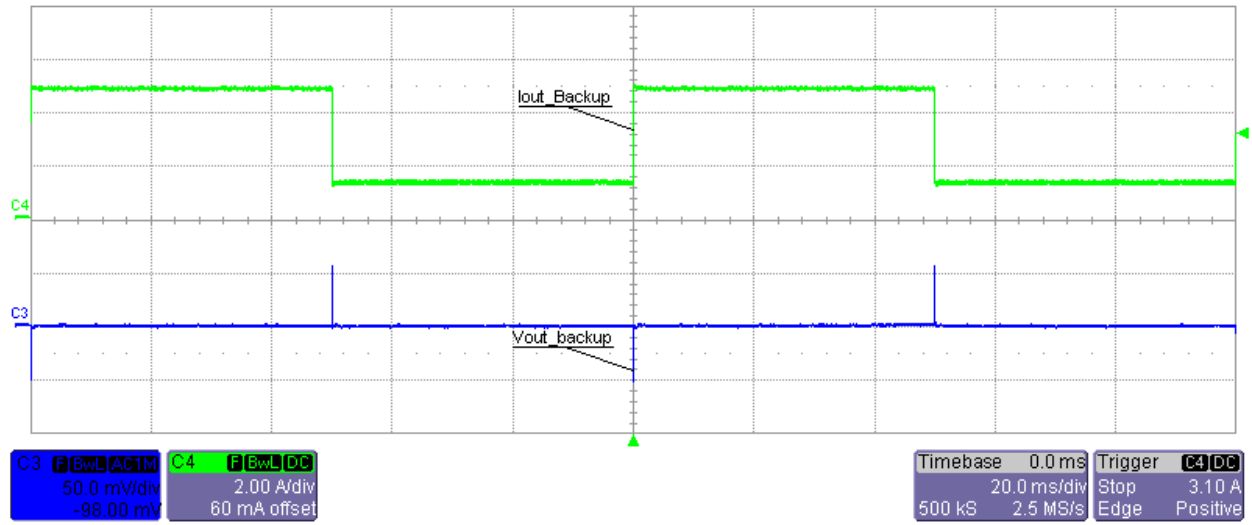
Ch4- Iout_backup



Load Transient Response at 18 Vin and 30%-to-100%(1A to 3A) Load Step on 5V Output of LM53603

Ch3 – Vout_Main

Ch4- Iout_Main

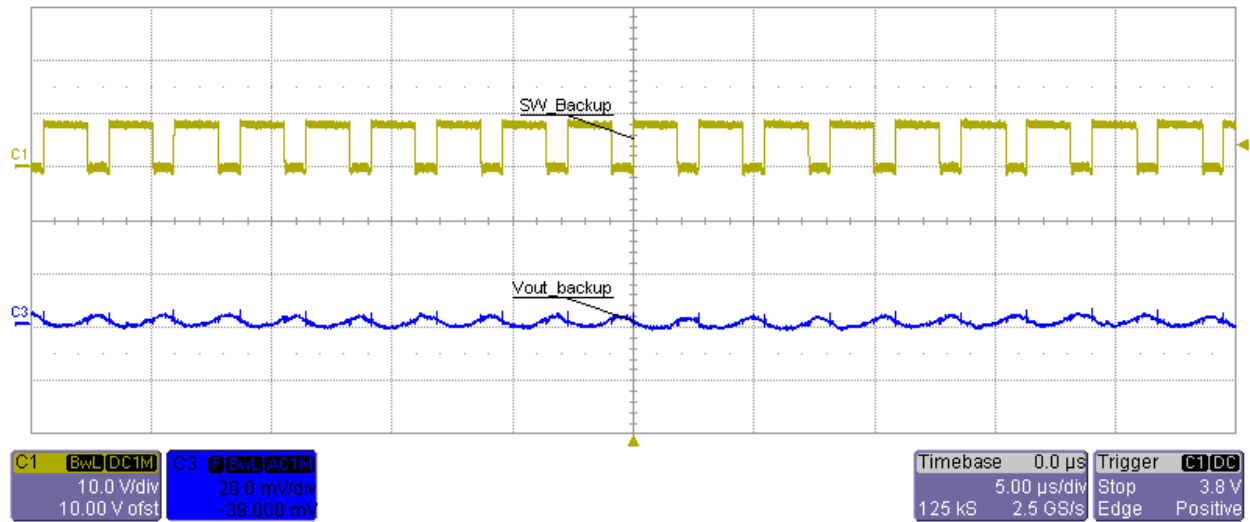


Load Transient Response at 24 Vin and 30%-to-100%(1.5A to 5A) Load Step on 5V Output of LM3150

Ch3 – Vout_Backup

Ch4- Iout_backup

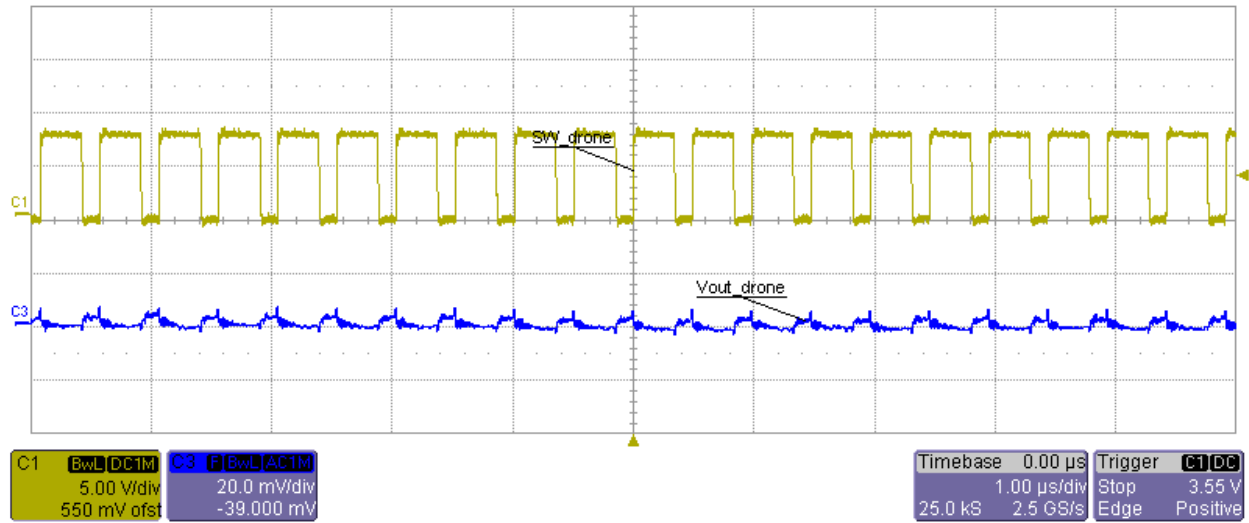
7.3 Output Voltage Ripple and Switch Node Voltage



Switch Node Voltage and Output Voltage Ripple at 8 Vin and Full Load on LM3150 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

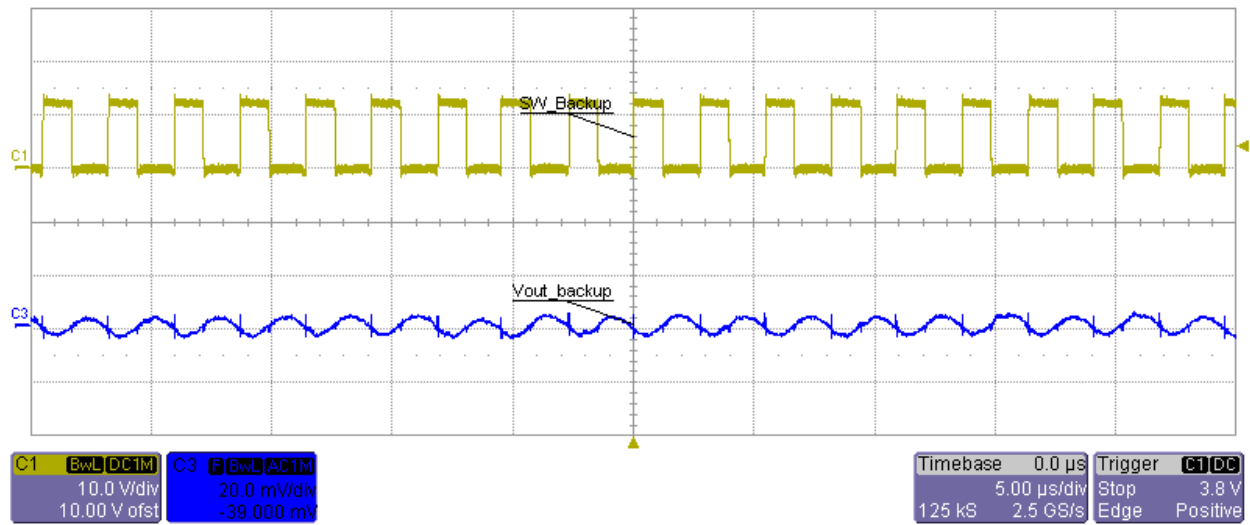
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 8 Vin and Full Load on LM53603 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

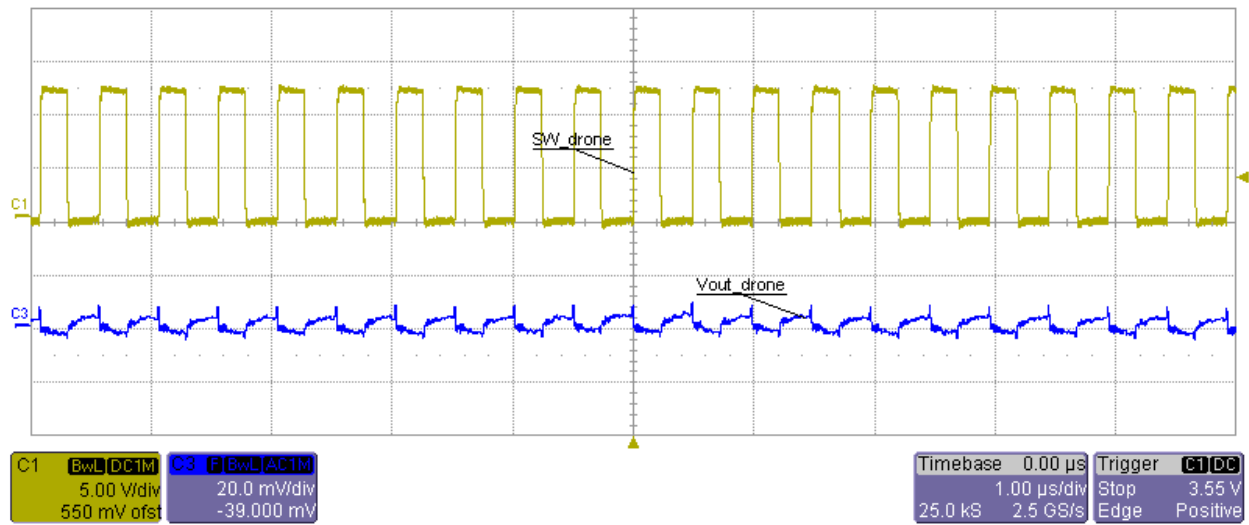
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 12 Vin and Full Load on LM3150 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

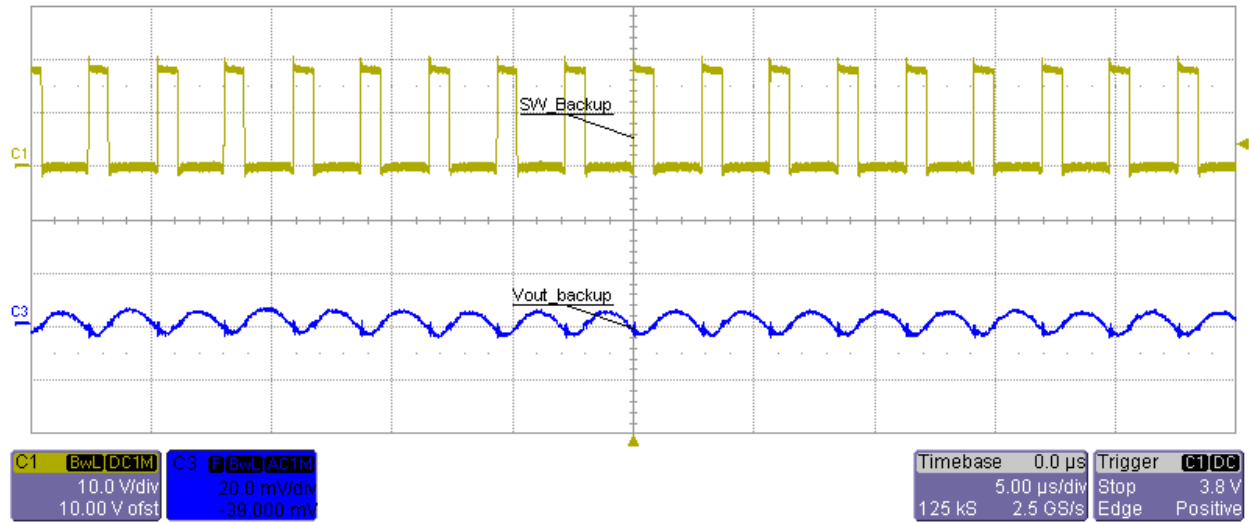
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 12 Vin and Full Load on LM53603 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

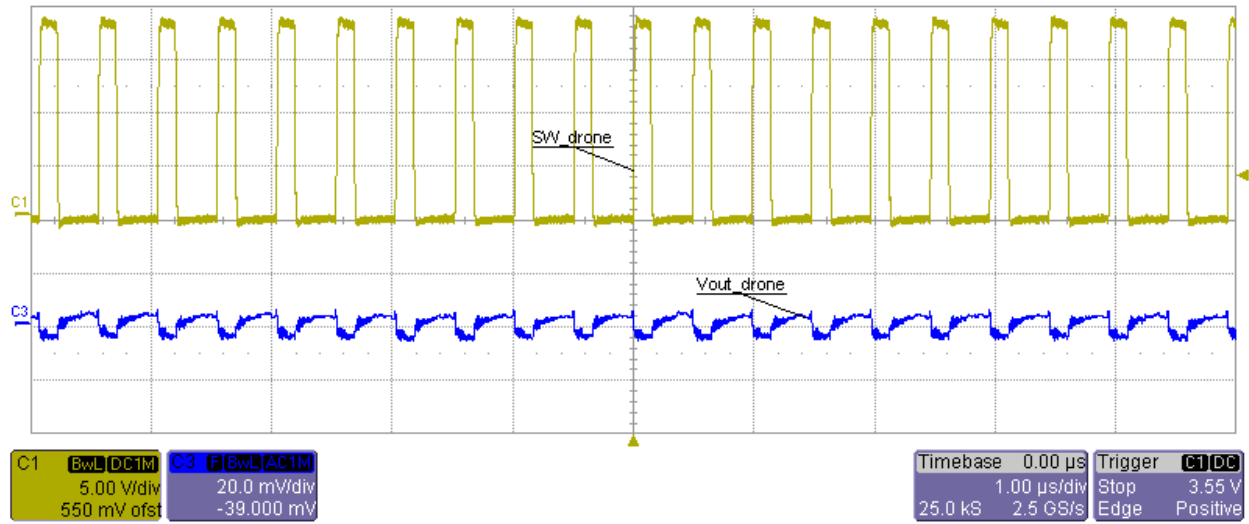
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 18 Vin and Full Load on LM3150 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

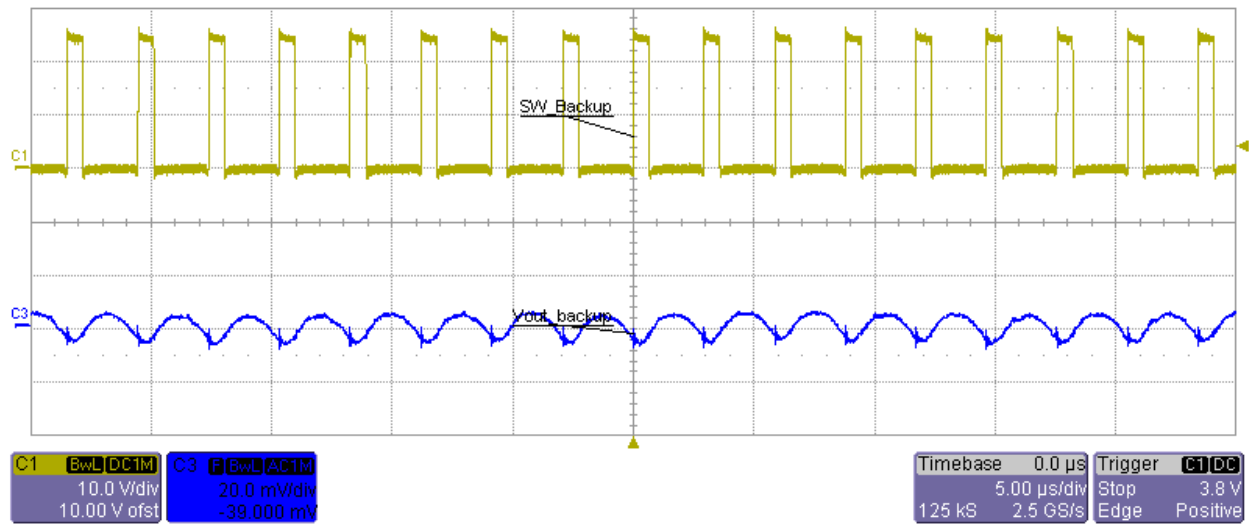
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 18 Vin and Full Load on LM53603 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

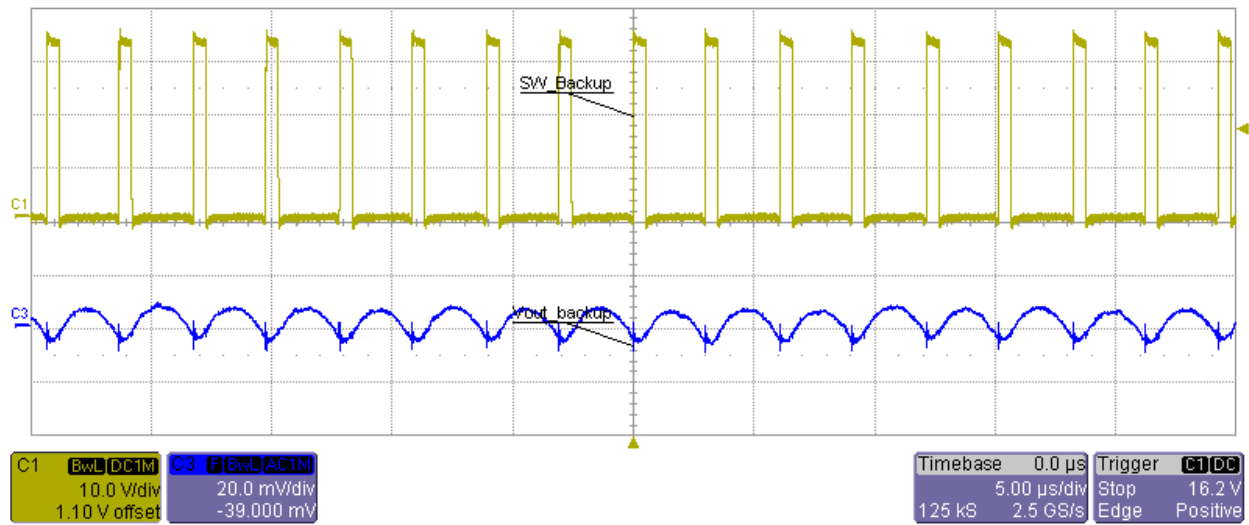
Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 24 Vin and Full Load on LM3150 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

Ch1-Switching Waveform



Switch Node Voltage and Output Voltage Ripple at 32 Vin and Full Load on LM3150 output (Vripple < 20mVp-p)

Ch2-Vout1 (AC Coupled)

Ch1-Switching Waveform

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