



Device	Application	Input Voltage	Output Voltage	Output Current	Topology
NCP3030A	DC-DC	9-16V	3.3V	0.01-9A	Buck

Table 1: Buck Power Supply

Characteristic	Min	Typ	Max	Unit
Input Voltage	9	12	16	V
Output Voltage	3.33	3.265	3.28	V
Output Current	.01	3	9	A
Oscillator Frequency (NCP3030A)	1.05	1.2	1.35	MHz
Output Voltage Ripple		86		mVpk-pk
Load Regulation				
I _{out} = 0.02-9A, V _{in} = 9V NCP3030		0.99		mV/A
I _{out} = 0.02-9A, V _{in} = 18V NCP3030		0.78		

Circuit Description

The PCB for the NCP3030 is a 2-layer board for use in applications up to 50W. The synchronous buck converter uses voltage mode control, which can also be compensated externally with a transconductance amplifier. The soft-start time is fixed. The NCP3030 demonstration board is a flexible design allowing the use of electrolytic capacitors or ceramic capacitors. Also Q1 and Q3 (MOSFET's) footprints allows the use of SOIC-8NB, SO8-FL, u8FL and D-PAK packages.

Performance

The following figures show typical performance of the NCP3030 demonstration boards.

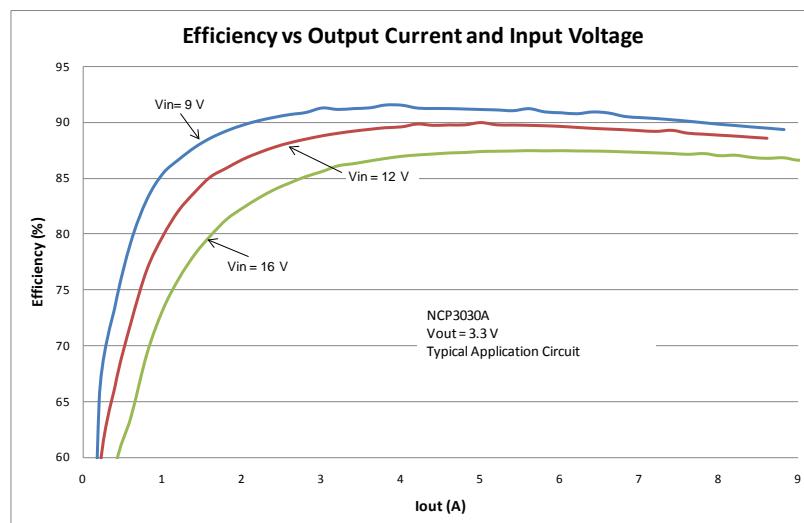


Figure 1: NCP3030A Efficiency at 9V-16.0V with a 3.3V Output Voltage

ON Semiconductor

Load Regulation vs Input Voltage

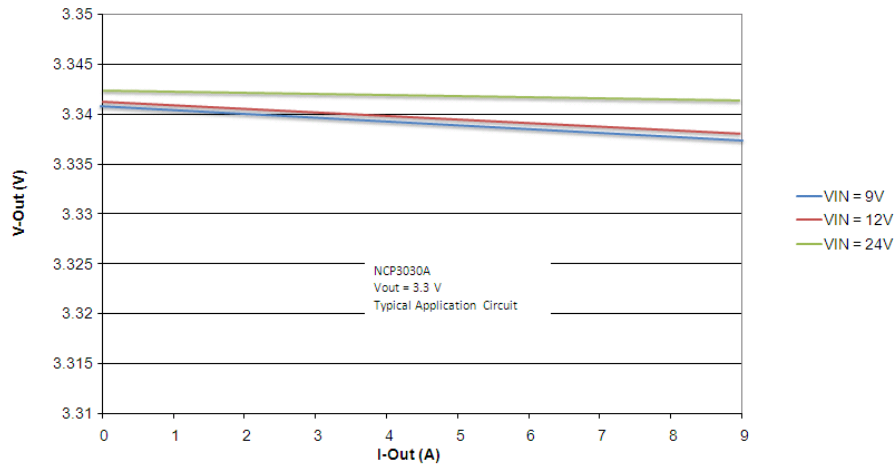


Figure 2: NCP3030B Load Regulation

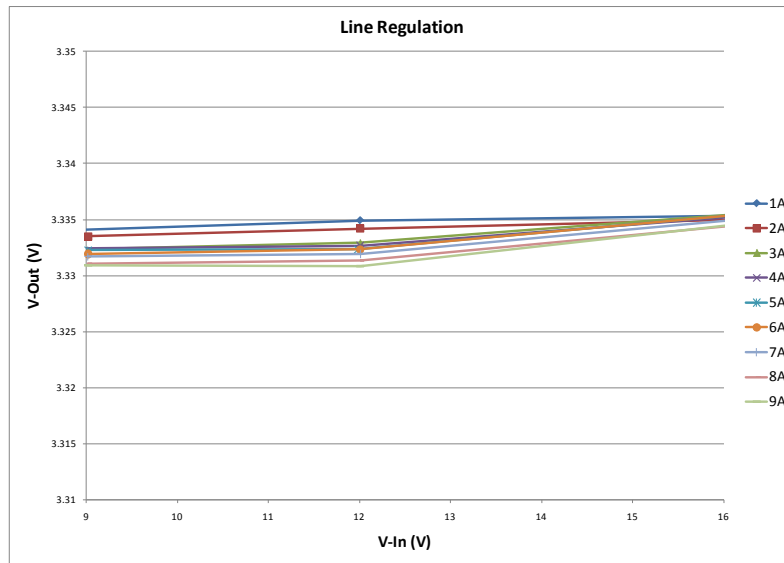


Figure 3: NCP3030B Line Regulation

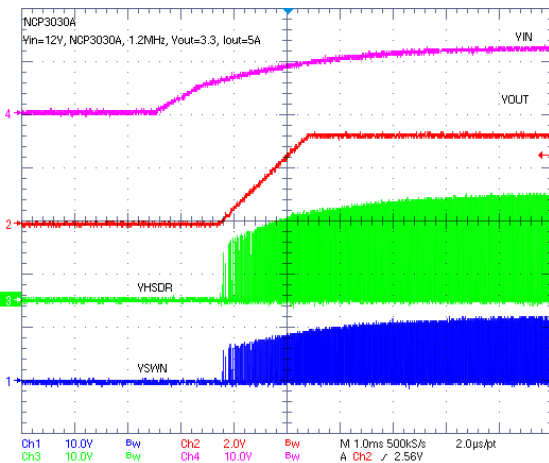


Figure 4: Startup Waveforms (NCP3030A)

Input = 12 V, Output = 3.3 V, Load = 5 A,
CH4 (Purple) = VIN, CH2 (Red) = VOUT,
CH3 (Green) = VHSR, CH1 (Blue) = VSWN
CH1 = CH3 = CH4: 10.0 V/div; CH2: 2.0 V/div;
Time Scale: 1.0 ms/div

ON Semiconductor

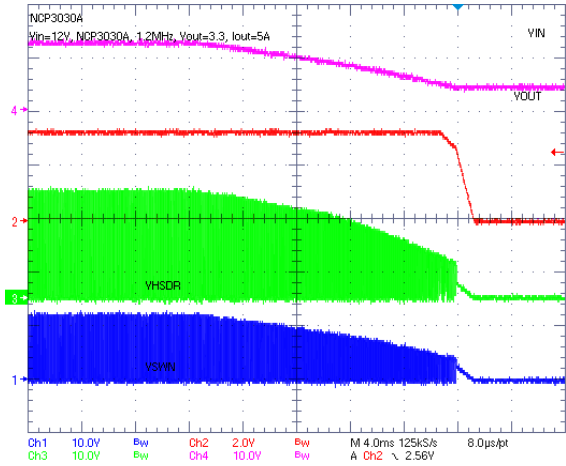


Figure 5: Shutdown Waveforms (NCP3030A)

Input = 12 V, Output = 3.3 V, Load = 5 A,
CH4 (Purple) = VIN, CH2 (Red) = VOUT,
CH3 (Green) = VHSR, CH1 (Blue) =SWN
CH1 = CH3 = CH4: 10.0 V/div; CH2: 2.0 V/div;
Time Scale: 4 ms/div

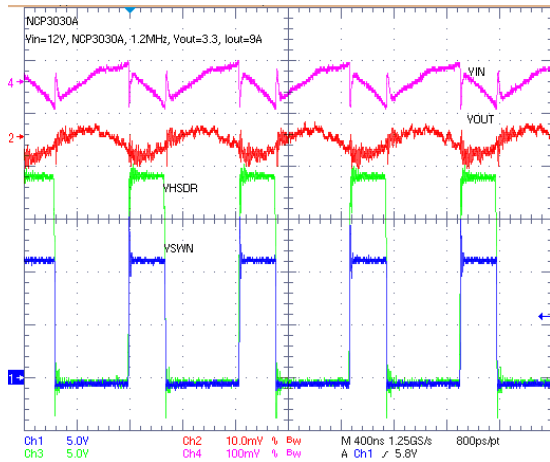


Figure 6: Switching Waveforms (NCP3030A)

Input = 12 V, Output = 3.3 V, Load = 9 A,
CH4 (Purple) = VIN, CH2 (Red) = VOUT,
CH3 (Green) = VHSR, CH1 (Blue) =SWN
CH1 = CH3: 5.0 V/div; CH2: 10 mV/div; CH4:100mV/div
Time Scale: 400 ns/div

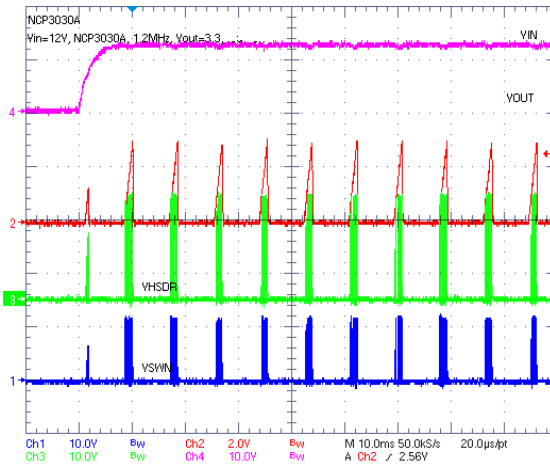


Figure 7: Startup into Current Limit (NCP3030A)

Input = 12 V, Output = 3.3 V, Load = 5 A,
CH4 (Purple) = VIN, CH2 (Red) = VOUT,
CH3 (Green) = VHSR, CH1 (Blue) =SWN
CH1 = CH3 = CH4: 10.0 V/div; CH2: 2.0 V/div;
Time Scale: 10 ms/div

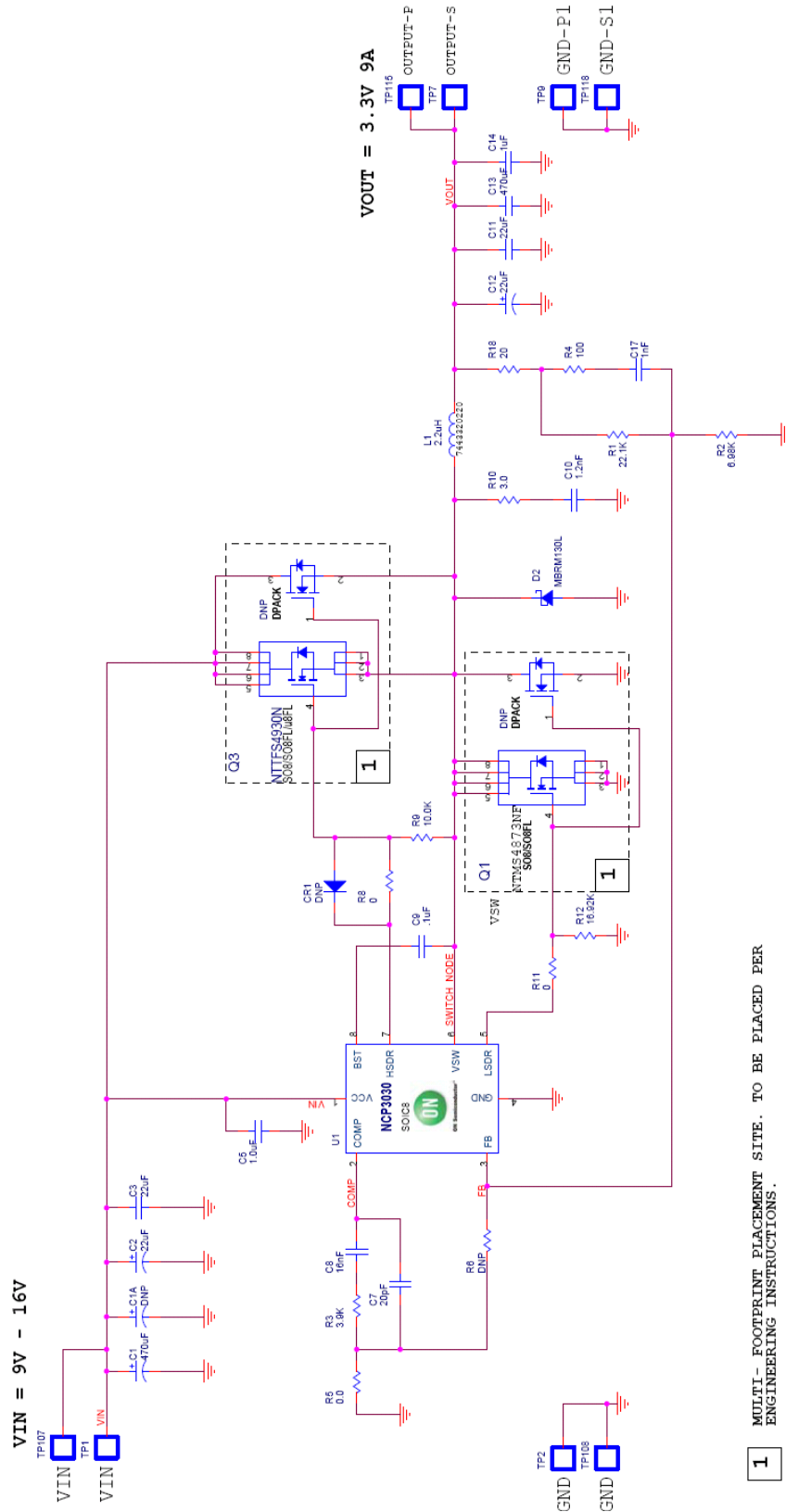


Figure 8: NCP3030 Demo Board Schematic

1 MULTI-FOOTPRINT PLACEMENT SITE. TO BE PLACED PER ENGINEERING INSTRUCTIONS.

ON Semiconductor

Bill Of Materials			
Item	Quantity	Reference	Part
1	5	CR1,C1A,Q2,Q4,R6	Not Placed
2	2	C1,C13	470uF
3	3	C2,C11,C12	22uF
4	2	C14,C3	1uF
5	1	C5	1.0uF
6	1	C7	20pF
7	1	C8	16nF
8	1	C9	0.1uF
9	1	C10	1.2nF
10	1	C17	1nF
11	1	D2	MBRM130L
12	1	L1	2.2uH
13	1	Q1	NTMFS4935N
14	1	Q3	NTTFS4930N
15	1	R1	22.1K
16	1	R2	6.98K
17	1	R3	3.9K
18	1	R4	100
19	1	R5	0
20	2	R11,R8	0
21	1	R9	10.0K
22	1	R10	3
23	1	R12	16.92K
24	1	R18	20
25	1	U1	NCP3030

Table 1: NCP3030 Demo Board Bill Of Materials

© 2010 ON Semiconductor.

Disclaimer: ON Semiconductor is providing this design note "AS IS" and does not assume any liability arising from its use; nor does ON Semiconductor convey any license to its or any third party's intellectual property rights. This document is provided only to assist customers in evaluation of the referenced circuit implementation and the recipient assumes all liability and risk associated with its use, including, but not limited to, compliance with all regulatory standards. ON Semiconductor may change any of its products at any time, without notice.

Design note created by Tim Kaske and Ed Mejia, e-mail: Tim.Kaske@onsemi.com ; Ed.Mejia@onsemi.com