

NCV8852GEVB

NCV8852 Evaluation Board User's Manual



ON Semiconductor®

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EVAL BOARD USER'S MANUAL

Description

The NCV8852 evaluation board (NCV8852GEVB) provides a convenient way to evaluate and integrate a complete high-efficiency non-synchronous buck converter design. No additional components are required, other than dc supplies for the input voltage and enable pin. The board can also be connected to an external clock source to synchronize the switching frequency. The board is configured for a 5.0 V output with a 170 kHz switching frequency and a 3 A current limit, intended for applications requiring 2 A of current.

Modifying the NCV8852 evaluation board for different output voltage, switching frequency, or current limit is straightforward, requiring minimal component changes.

Key Features

- 5.0 V Output Voltage
- 170 kHz Switching Frequency
- 2.0 A Current Limit
- Wide Input Voltage of 6.0 V to 36 V
- Regulated through Load Dump Conditions
- External Clock Synchronization up to 500 kHz
- Automotive Grade



Figure 1. NCV8852GEVB Board Picture

NCV8852GEVB

Table 1. DEMONSTRATION BOARD TERMINALS

Pin Name	Function
VIN	Positive dc input voltage
VOUT	Regulated dc output voltage
GND	Common dc return
EN/SYNC	Enable input and external clock synchronization input

Table 2. ABSOLUTE MAXIMUM RATINGS

(Voltages are with respect to GND)

Rating	Value	Units
Dc supply voltage (VIN)	-0.3 to 36	V
Dc supply voltage (EN/SYNC)	-0.3 to 6.0	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$, $6.0\text{ V} \leq V_{IN} \leq 36\text{ V}$, $V_{EN/SYNC} = 5.0\text{ V}$, $0 \leq I_{OUT} \leq 2.0\text{ A}$, unless otherwise specified)

Characteristics	Conditions	Typical Value	Units
Regulation			
Output Voltage		5.0	V
Voltage Accuracy		2	%
Line Regulation	$I_{OUT} = 1.0\text{ A}$	0.04	%
Load Regulation	$V_{IN} = 13.2\text{ V}$	0.12	%
Switching			
Switching Frequency		170	kHz
Soft-start Time		2.0	ms
SYNC Frequency Range		170 to 500	kHz
Current Limit			
Cycle-by-Cycle Current Limit		3.33	A
Over Current Protection Threshold		5.0	A
Protections			
Input Undervoltage Lockout (UVLO)	V_{IN} decreasing	3.1	V
Thermal Shutdown	T_J rising	170	$^\circ\text{C}$

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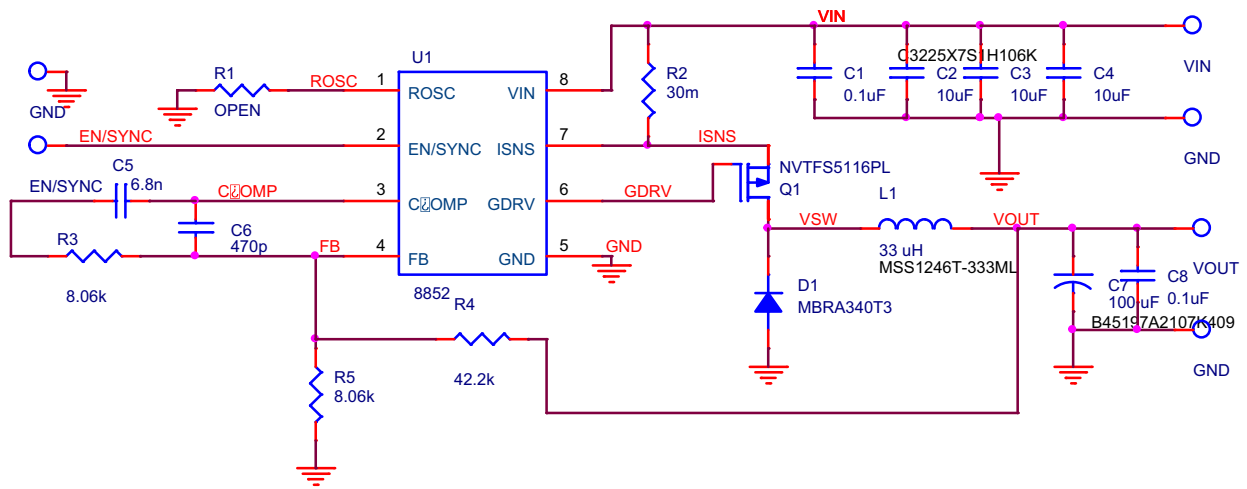


Figure 2. NCV8852GEVB Board Schematic

Operational Guidelines

1. Connect a dc input voltage, within the 6.0 V to 36 V range, between VIN and GND
2. Connect a load between VOUT and GND
3. Connect a dc enable voltage, within the 2.0 V to 5.5 V range, between EN/SYNC and GND
4. Optionally, for external clock synchronization, connect a pulse source between EN/SYNC and GND. The high state level should be within the 2.0 to 5.5 V range, and the low state level within the 0.0 V to 0.8 V range, with a frequency within the 170 kHz to 500 kHz range.

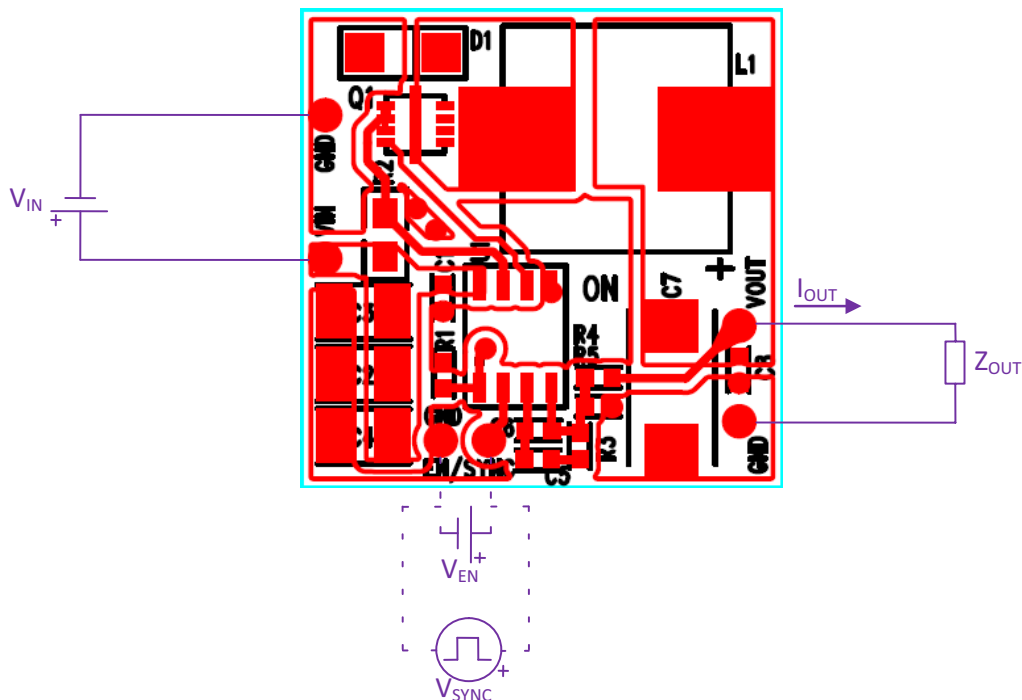


Figure 3. NCV8852GEVB Board Connections

NCV8852GEVB

TYPICAL PERFORMANCE

Efficiency

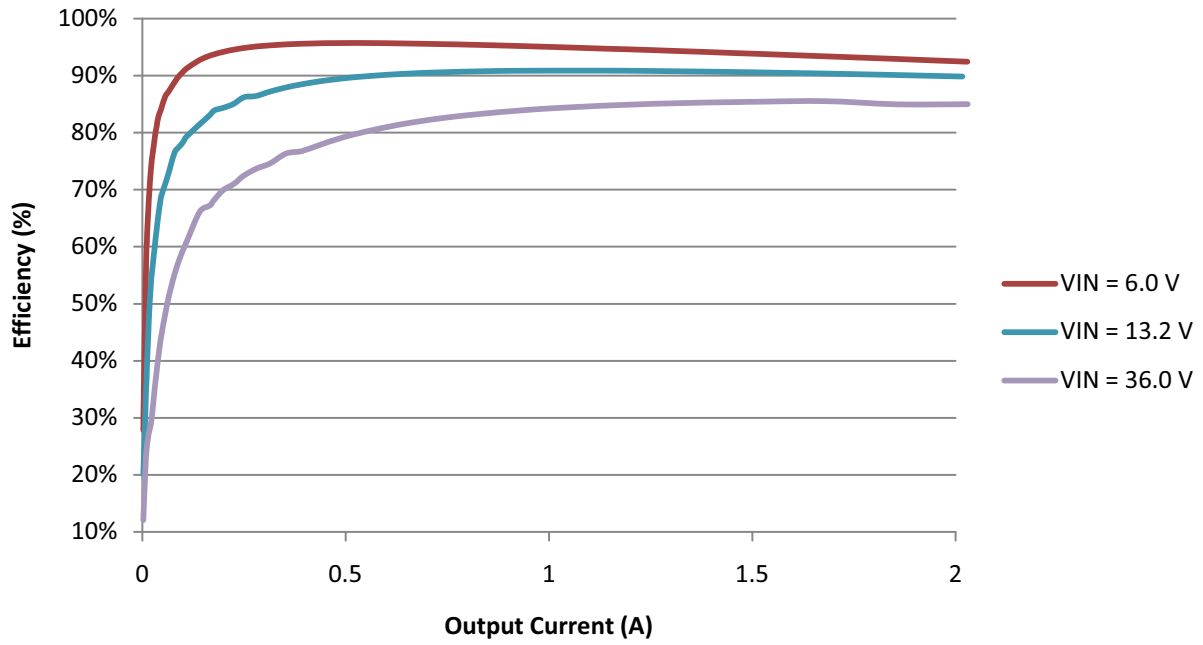


Figure 4. Efficiency at 170 kHz for a 5.0 V output

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Regulation

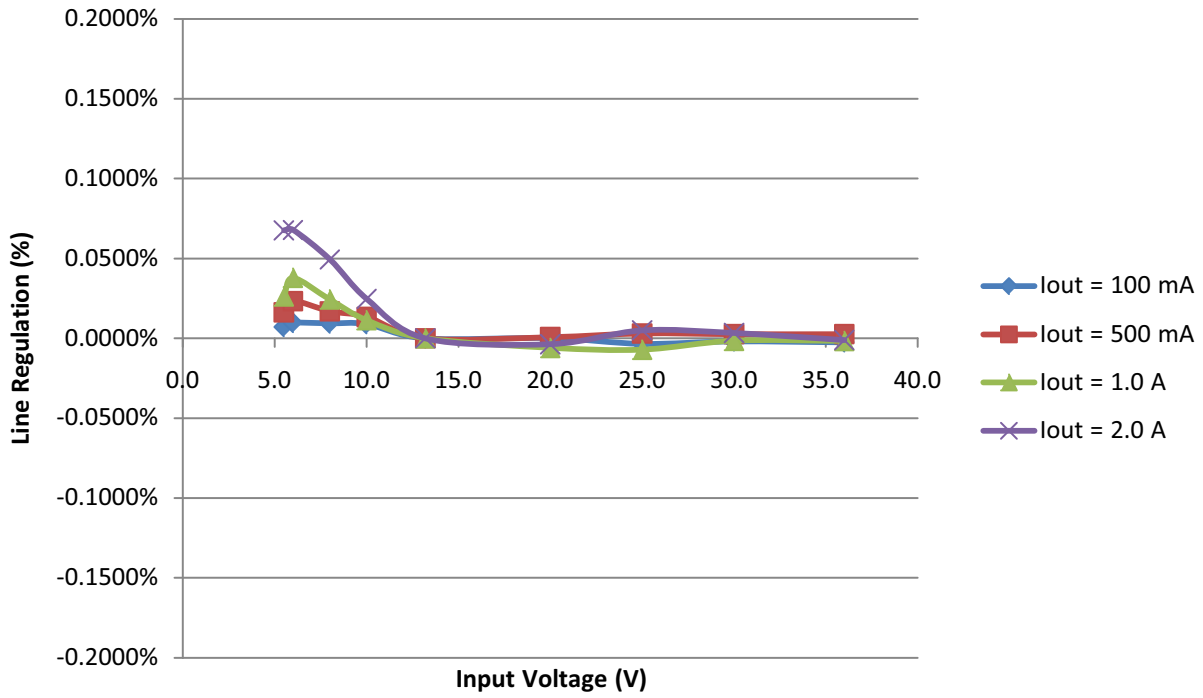


Figure 5. Line Regulation for 170 kHz and a 5.0 V output

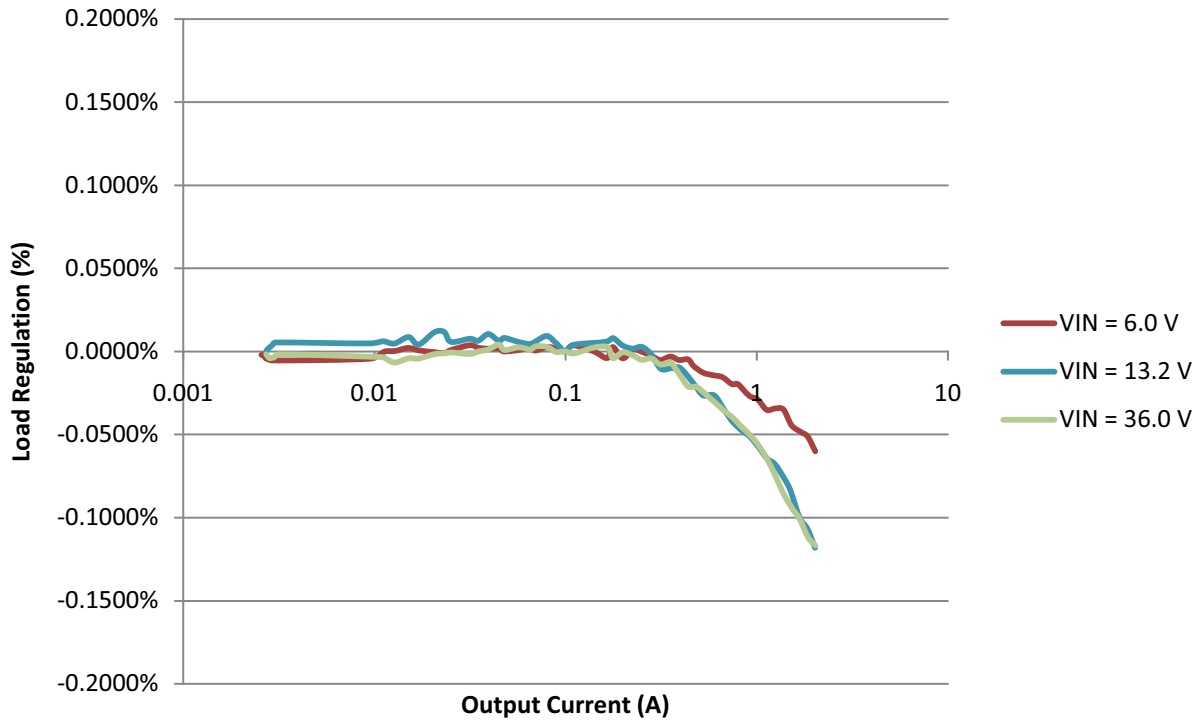
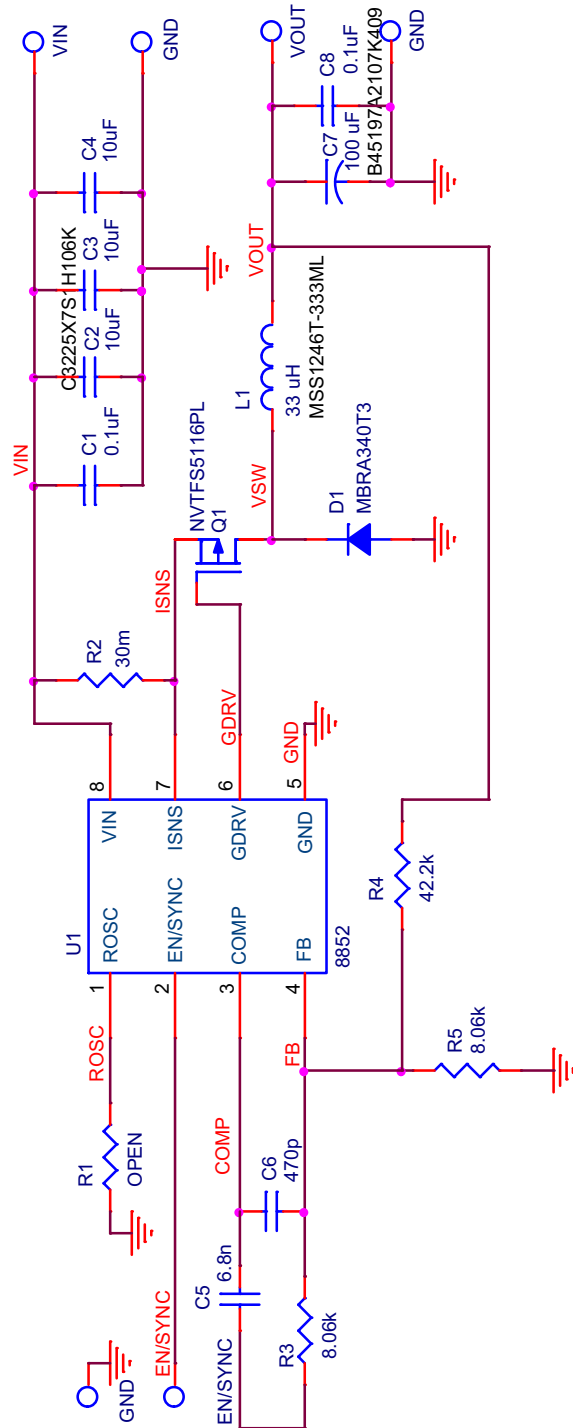


Figure 6. Load Regulation for 170 kHz and a 5.0 V output

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SCHEMATIC



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PCB LAYOUT

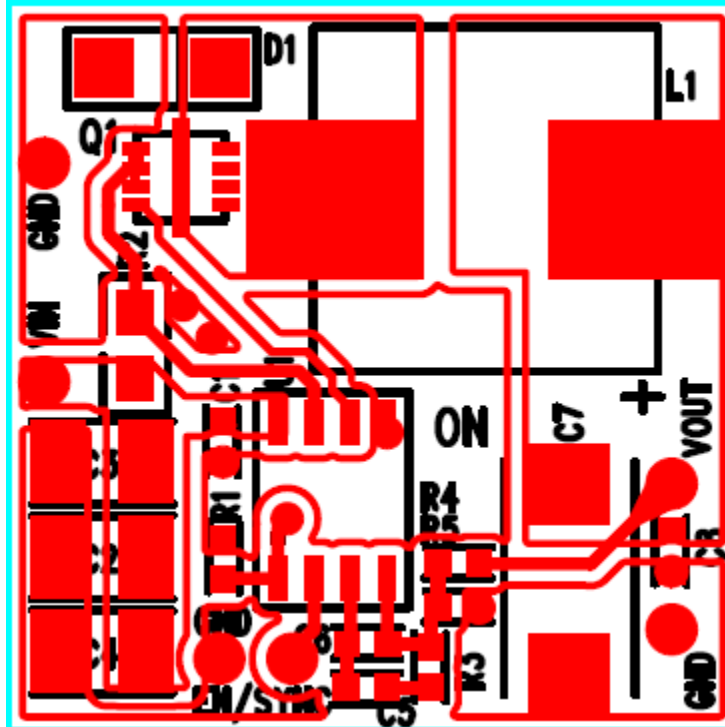


Figure 7. Top View

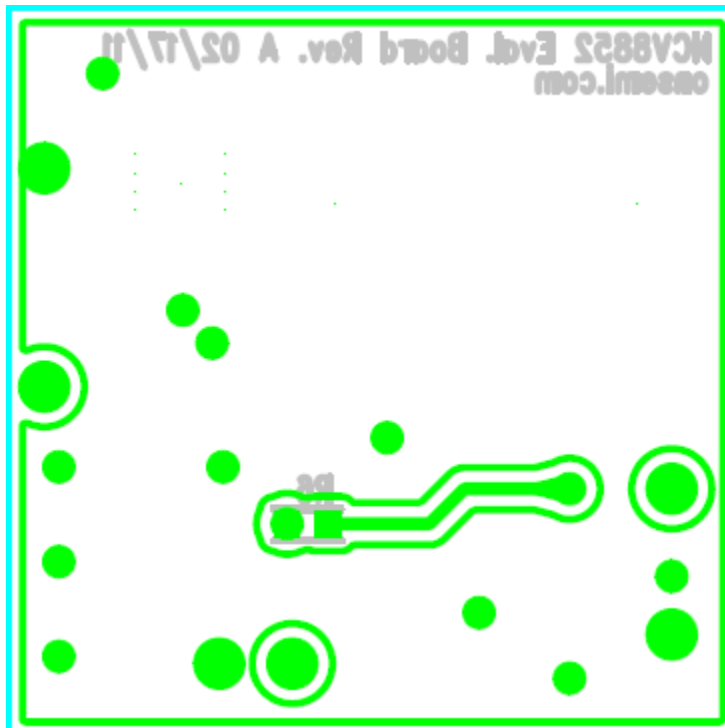



Figure 8. Bottom View

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Table 4. BILL OF MATERIALS

Reference	Value	Part #	Manufacturer	Description	Package
U1		NCV8852	ON Semiconductor	Integrated circuit	SOIC-8
Q1		NVTFS5116PL	ON Semiconductor	Power MOSFET, P-Channel	WDFN8
D1		MBRA340T3G	ON Semiconductor	Diode, Schottky, 40 V, 3 A	SMA
L1	33 μ H	MSS1246T-333ML	Coilcraft	SMT Power Inductor	
R1	No pop				
R2	0.03 Ω	WSL0805R0300FEA18	Vishay/Dale	Resistor, 1%	0805
R3, R5	8.06 k Ω	CRCW06038K06FKEA	Vishay/Dale	Resistor, 1%	0603
R4	42.2 k Ω	CRCW060342K2FKEA	Vishay/Dale	Resistor, 1%	0603
C1	0.1 μ F	GCM188R71H104KA57D	Murata	Capacitor, 50 V, X7R	0603
C2, C3, C4	10 μ F	GRM32DF51H106ZA01L	Murata	Capacitor, 50 V, Y5V	1210
C5	6800 pF	EMK107SD682JA-T	Taiyo Yuden	Capacitor, 16 V	0603
C6	470 pF	06033A471JAT2A	AVX	Capacitor, 25 V, NP0	0603
C7	100 μ F	B45197A2107K409	Kemet	Capacitor, 10 V	2917
C8	0.1	C0603C104K8RACTU	Kemet	Capacitor, 10 V, X7R	0603

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