

NCV8x1930GEVB

NCV8x1930 Family Low Quiescent Current Automotive Synchronous Buck Controller Evaluation Board User's Manual



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Description

This NCV8x1930 demonstration board provides a convenient way to evaluate the fixed high-frequency, low quiescent current buck controller design of this switching regulator family. Spread spectrum operating up to 38 V (typical) is employed to minimize the peak radiated emissions of switching regulators. It may be synchronized to a clock or to separate NCV8x1930 of similar frequency range. Peak current mode control is employed for fast transient response and tight regulation over wide input voltage and output load ranges. Feedback compensation is internal to the device, permitting design simplification. The NCV8x1930 is capable of converting from an automotive input voltage range of 3.5 V (4.5 V during startup) to 18 V at a constant base switching frequency. Under load dump conditions up to 45 V, the regulator shuts down. A high voltage bias regulator with automatic switchover to an external 5 V bias supply is used for improved efficiency. Several protection features such as UVLO, current limit, short circuit protection, and thermal shutdown are provided. High switching frequency produces low output voltage ripple even when using small inductor values and an all-ceramic output filter capacitor configuration, forming a space-efficient switching solution.

Key Features

- 30 μ A Operating Current at No Load
- Capable of 45 V Load Dump
- 75 mV Current Sensing (891930)
- 50 mV Current Sensing (881930)
- Board Selectable Fixed Output Voltages With Lockout
- 410 kHz (881930) or 2 MHz (891930) Switching Frequency with Synchronization Capability
- Adaptive Non-Overlap Circuitry
- Adjustable Soft-Start
- Integrated Spread Spectrum
- Logic Level Enable Input Can Be Tied Directly to Battery
- Short Circuit Protection Pulse Skip
- Battery Monitoring for UVLO and Overvoltage Protection
- Thermal Shutdown (TSD)
- Individual Enable and Reset Pins
- QFN Package with Wettable Flanks (Pin Edge Plating)
- NCV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements: AEC-Q100 Qualified and PPAP Capable

EVAL BOARD USER'S MANUAL

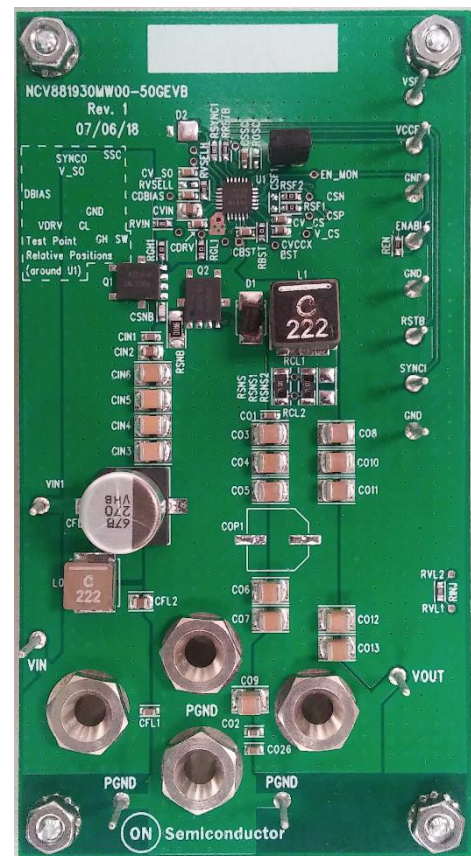


Figure 1. NCV8x1930 Evaluation Board (NCV881930MW00-50GEVB Shown)

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Radio and Infotainment, Telematics, ADAS (Safety Applications), Instrumentation & Clusters

End Products

- Automotive

NCV8x1930GEVB

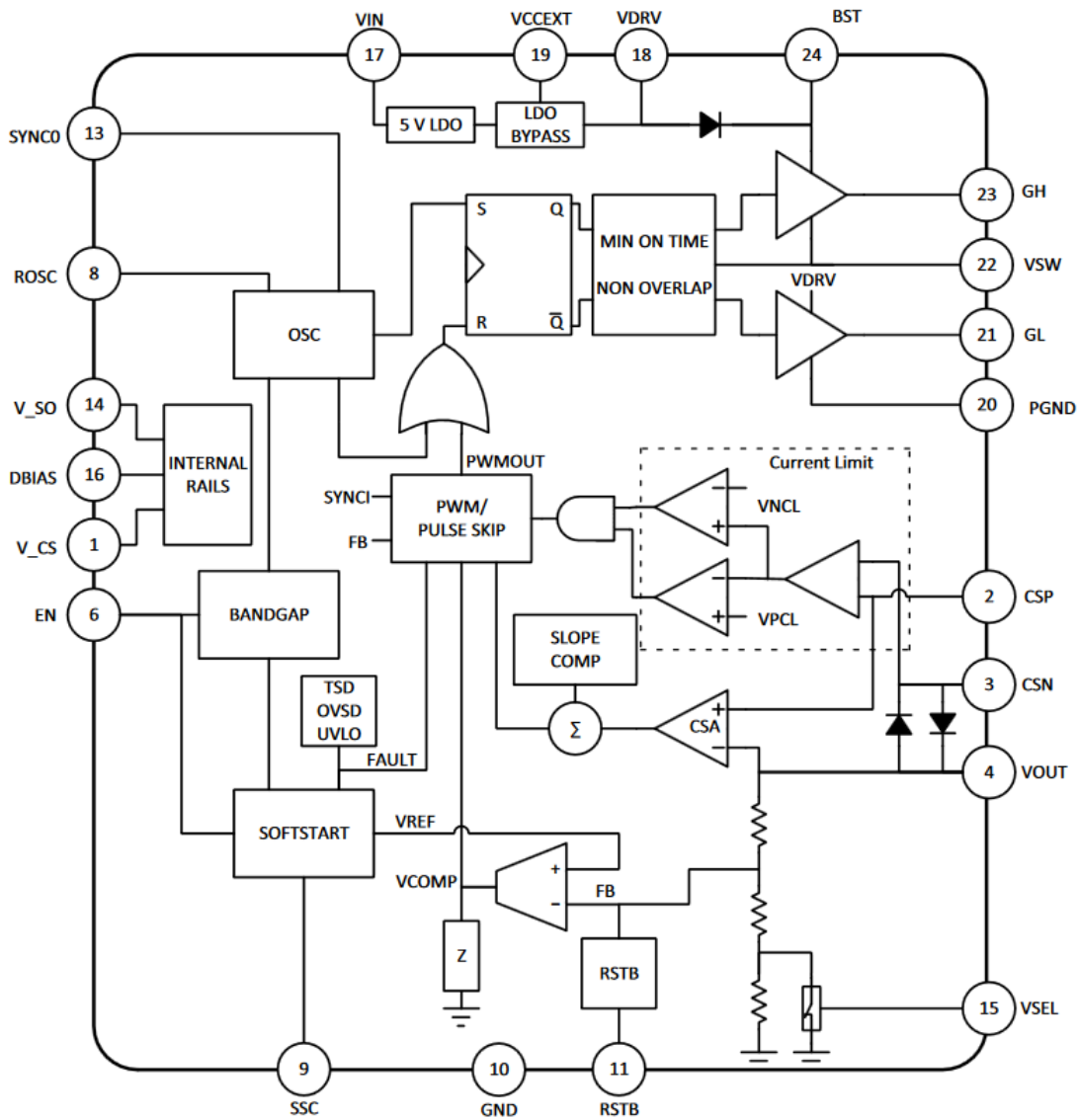


Figure 2. NCV8x1930 Simplified Block Diagram

Table 1. EVALUATION BOARD TERMINALS

Terminal	Function
VIN	Positive DC input voltage
GND	Common DC return
VOUT	Regulated DC output voltage
ENABLE	Enable input
VCCEXT	External 5 V Bias Supply, when used
SYNCI	External Synchronization input

NCV8x1930GEVB

ABSOLUTE MAXIMUM RATINGS (Voltage are with respect to GND)

Rating	Value	Unit
DC supply voltage (VIN)	-0.3 to 45 *	V
DC supply voltage (EN)	-0.3 to 45 *	V
DC supply voltage (VCCEXT)	-0.3 to 7	V
DC supply voltage (SYNCl)	-0.3 to 6	V
Junction temperature	-40 to 150	°C
Ambient temperature (demo board)	-40 to 125	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

*Input EMI Aluminum polymer capacitor has a maximum DC voltage rating of 35 V.

ELECTRICAL CHARACTERISTICS ((VEN = VBAT = VIN = 6.0 V to 35 V, VBST = VSW + (VDRV – 0.5 V), CBST = 0.1 μF, CDRV = 1 μF. Min / Max values are valid for the temperature range –40°C < TJ < 150°C unless noted otherwise, and are guaranteed by test, design or statistical correlation.)

Parameter	Test Condition	Typ	Unit
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SWITCHING

Switching Frequency NCV881930 Boards NCV891930 Boards		410 2	kHz MHz
Soft-start delay NCV881930 Boards NCV891930 Boards		240 190	μs

CURRENT LIMIT

Positive current limit threshold voltage – NCV881930 boards	$0 \leq (CSP - CSN) \leq 200 \text{ mV}, 1.2 \text{ V} \leq CSN \leq 10.0 \text{ V}, VIN < VIN_HIGH$	50	mV
	$0 \leq (CSP - CSN) \leq 200 \text{ mV}, 1.2 \text{ V} \leq CSN \leq 10.0 \text{ V}, VIN > VINH$ (Guaranteed by design)	53.3	mV
Positive current limit threshold voltage – NCV891930 boards	$0 \leq (CSP - CSN) \leq 200 \text{ mV}, 1.2 \text{ V} \leq CSN \leq 10.0 \text{ V}, VIN < VIN_HIGH$	75	mV
	$0 \leq (CSP - CSN) \leq 200 \text{ mV}, 1.2 \text{ V} \leq CSN \leq 10.0 \text{ V}, VIN > VINH$ (Guaranteed by design)	80	mV

PROTECTIONS

UVLO start threshold	V _{IN} rising	4.0 – 4.5	V
UVLO stop threshold	V _{IN} falling	3.2 – 3.5	V
UVLO hysteresis		0.9	V
Thermal shutdown	T _J rising	170	°C
Thermal shutdown hysteresis	T _J falling	15	°C

OUTPUT REGULATION

NCV8x1930MW00–33GEVB		3.3	V
NCV8x1930MW00–50GEVB		5.0	V
NCV891930MW01–365GEVB		3.65	V
NCV891930MW01–40GEVB		4.0	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NCV8x1930GEVB

Operational Guidelines

This evaluation board family is designed for a maximum load of 6 A (10 A maximum for the NCV881930MW00–50GEVB) over an input voltage range of 6 V to 35 V (37 V surge). A number of components vary in value between boards to optimize them for the given output voltage, switching frequency, and load current (listed as SEE BOM on the schematic).

This test procedure will demonstrate the general functionality of the NCV8x1930 evaluation boards:

1. Connect a DC input voltage, within the 6 V to 40 V range, between VIN and PGND. Initial setting should be 6 V.
2. Connect an oscilloscope channel between the SW test point pad and PGND.
3. Connect an electronic load (set to 6 A for evaluation board's output voltage) or calculated equivalent power resistive load between VOUT and PGND.
4. Connect a digital voltmeter between VOUT and PGND.
5. Connect an ammeter in line with the electronic load or calculated equivalent power resistive load.
6. Connect a jumper wire between ENABLE and VIN.
7. The following should be observed on the connected test equipment:

- NCV891930MW00–33GEVB, NCV881930MW00–33GEVB
 - ♦ Digital Voltmeter reads $3.3\text{ V} \pm 2\%$ and should remain at this level until ENABLE jumper is removed.
 - ♦ Ammeter reads 6 A.

- NCV891930MW00–50GEVB, NCV881930MW00–50GEVB
 - ♦ Digital Voltmeter reads $5.0\text{ V} \pm 2\%$ and should remain at this level until ENABLE jumper is removed.
 - ♦ Ammeter reads 6 A.
 - NCV891930MW01–3.65GEVB
 - ♦ Digital Voltmeter reads $3.65\text{ V} \pm 2\%$ and should remain at this level until ENABLE jumper is removed.
 - ♦ Ammeter reads 6 A.
 - NCV891930MW01–40GEVB
 - ♦ Digital Voltmeter reads $4.0\text{ V} \pm 2\%$ and should remain at this level until ENABLE jumper is removed.
 - ♦ Ammeter reads 6 A.
8. Increase VIN to approximately 7.5 V.
 - ♦ Note that the switching waveform now shows the distinctive spread spectrum behavior around the appropriate frequency (410 kHz for NCV881930 boards and 2 MHz for the NCV891930 boards)
 9. Further increase VIN to approximately 19.5 V.
 - ♦ Note that the switching waveform now shows a fixed 410 kHz for the NCV881930 boards and a fixed 1 MHz for the NCV891930 boards.
 10. Reduce VIN to 13.2 V (spread spectrum behavior should return).
 11. Remove ENABLE jumper – both ammeter and voltmeter readings should show zero.

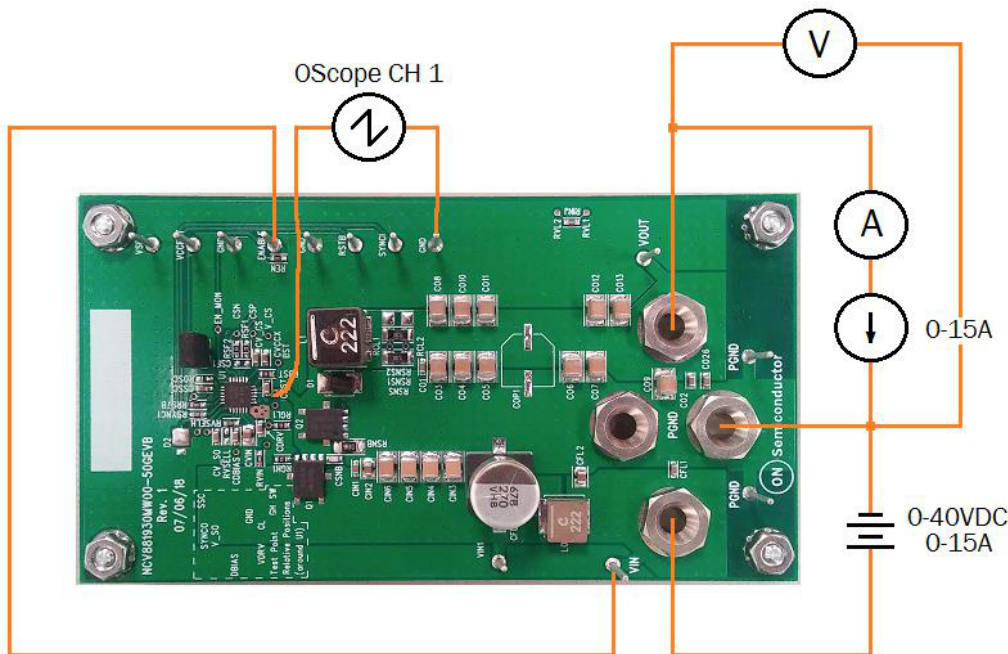


Figure 3. NCV8x1930MW0x-xxxGEVB PCB Connections

NCV8x1930GEVB

Typical Performance

Start-up

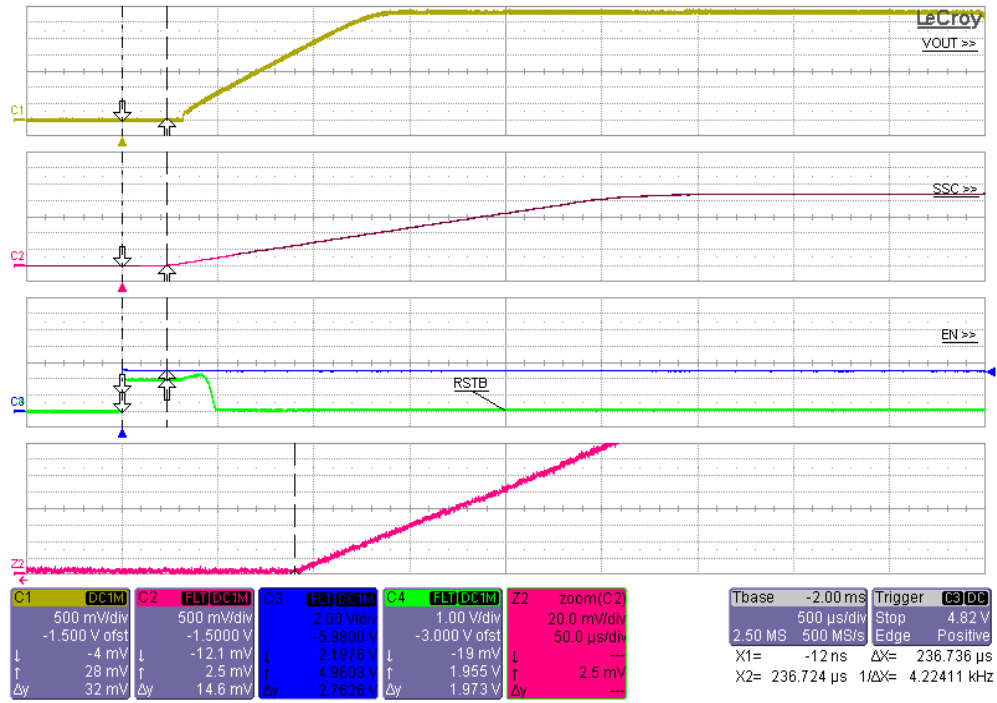


Figure 4. Typical Start-up Profile for NCV881930MW00-33GEVB

Efficiency

Efficiency with VCCEXT Open, 5.0 V Output

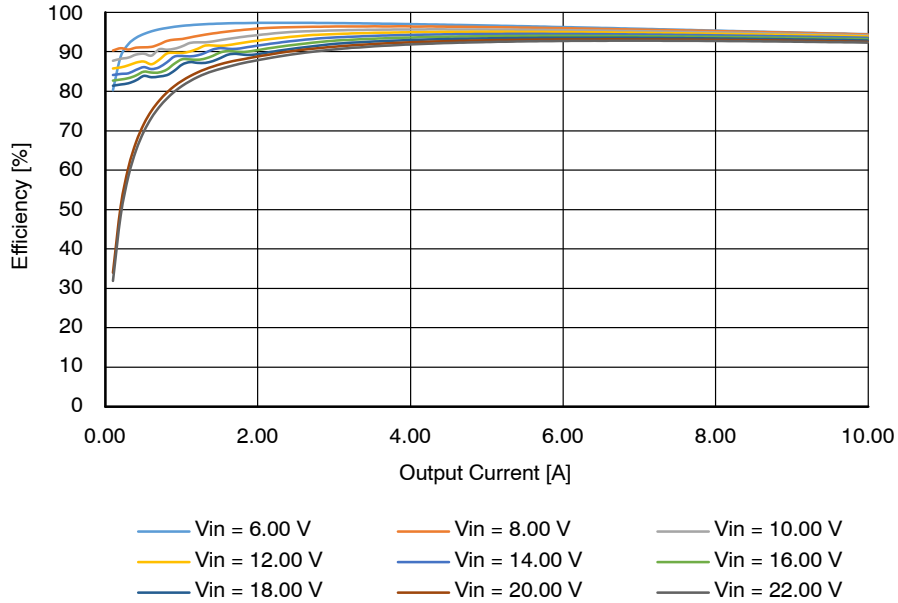


Figure 5. NCV881930MW00-50GEVB Efficiency w/ VCCEXT Open

NCV8x1930GEVB

Efficiency with VCCEXT Open, 3.3 V Output

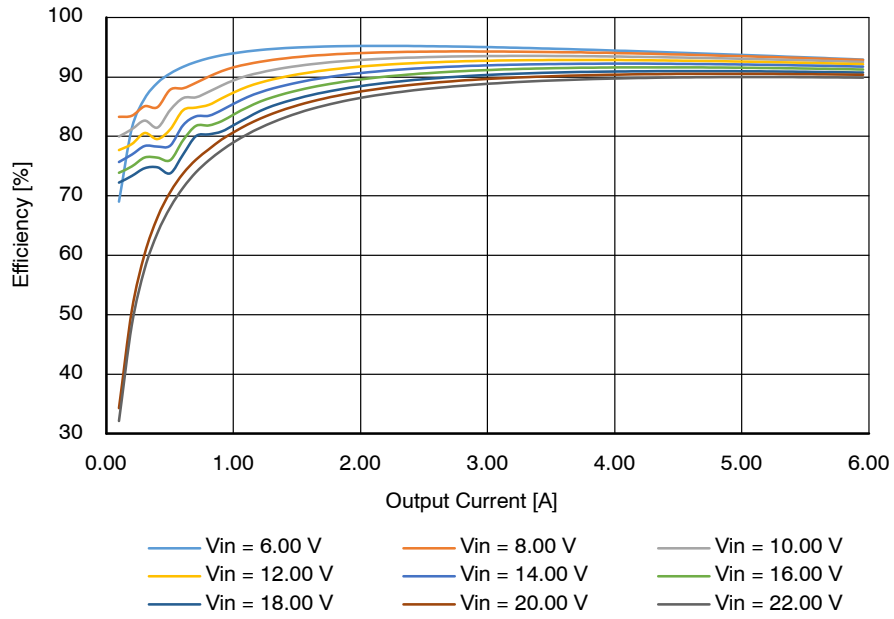


Figure 6. NCV881930MW00-33GEVB Efficiency w/ VCCEXT Open

Efficiency with VCCEXT Connected to EXT Supply, 5.0 V Output

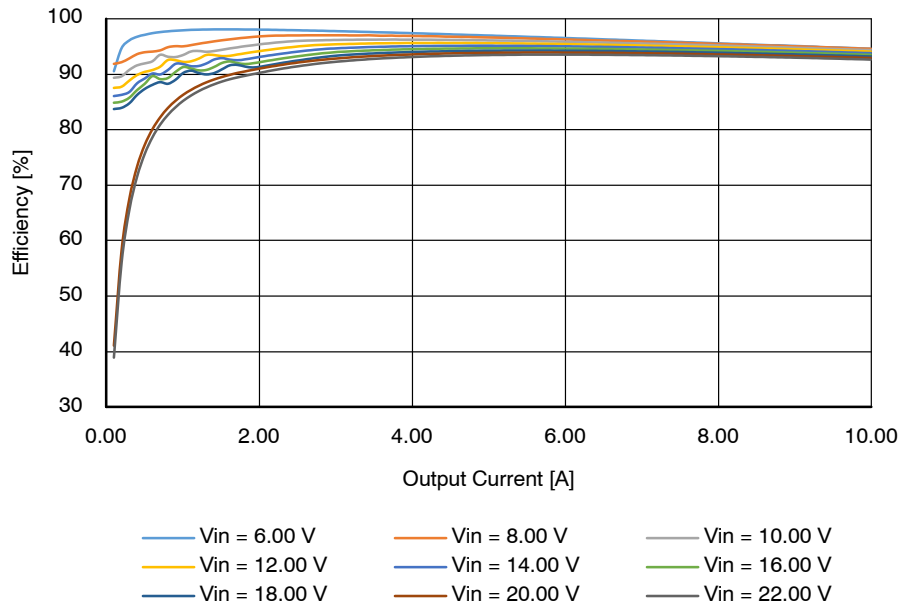


Figure 7. NCV881930MW00-50GEVB Efficiency w/ VCCEXT Connected to External Supply, 5.0 V Output

NCV8x1930GEVB

Efficiency with VCCEXT Connected to EXT Supply, 3.3 V Output

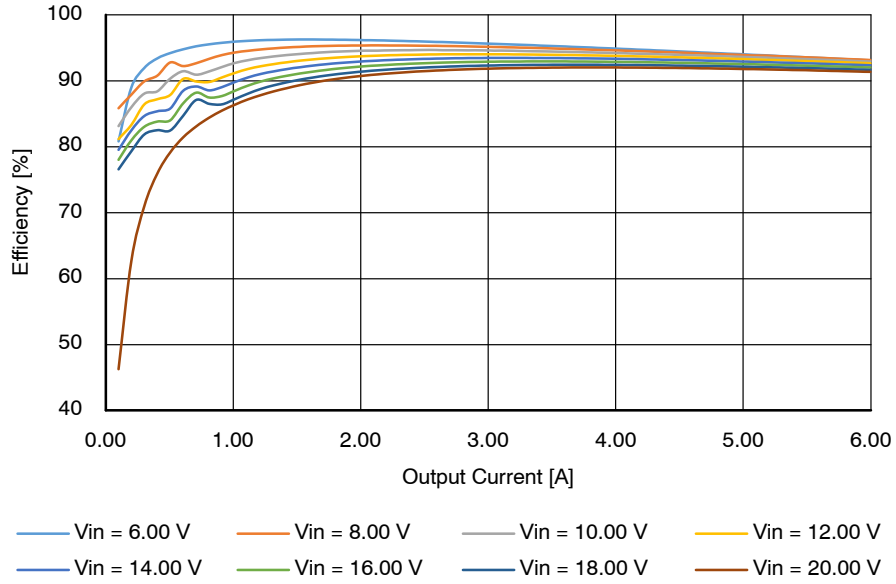


Figure 8. NCV881930MW00–33GEVB Efficiency w/ VCCEXT Connected to External Supply, 3.3 V Output

Efficiency with VCCEXT Connected to Vout 5.0 V Output

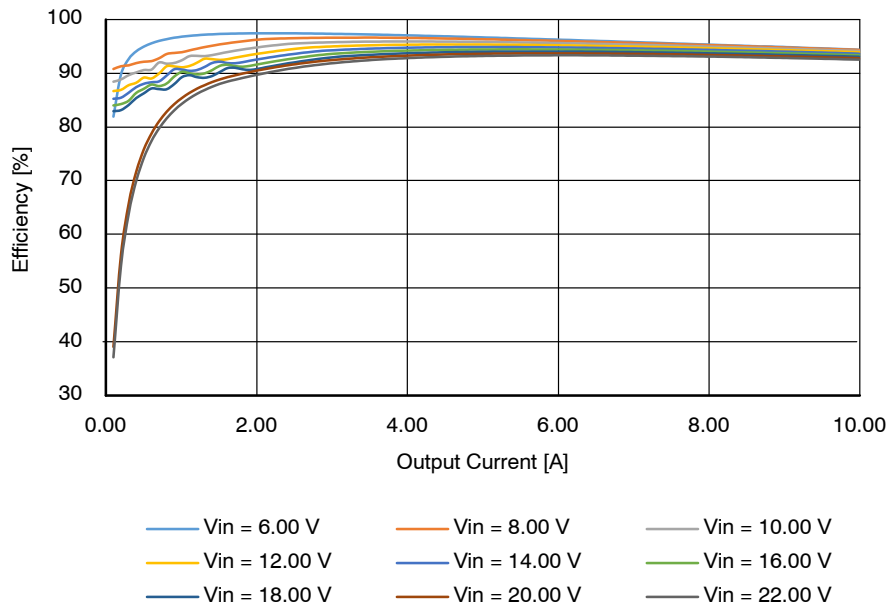


Figure 9. NCV881930MW00–50GEVB Efficiency w/ VCCEXT connected to VOUT, 5.0 V Output

NCV8x1930GEVB

Operating Description

VCCEXT

VIN supplies VDRV and logic power via the IC's internal LDO. VCCEXT pin is ignored if connected to a voltage less than 4.5 V or left unconnected. For improved efficiency, an external 5 V source may be connected to VCCEXT to permit bypassing of the internal LDO (see Tables 2 and 3). The

LDO bypass efficiency improvement is reduced at lower currents when the IC enters pulse-skip mode. An IC power consumption reduction of about 250 mW has been measured on a demo board configured with NVMFS5C468NL power transistors at an input voltage of 13 V.

Table 2. NCV881930MW00–50GEVB TYPICAL IC POWER CONSUMPTION IMPROVEMENT

VCCEXT = VOUT vs VCCEXT = OPEN, I _{OUT} > 1 A							
VIN (V)	6	8	10	12	14	16	18
mW	8.7	33.7	58.6	83.3	108	131	156

Table 3. NCV891930MW00–50GEVB TYPICAL IC POWER CONSUMPTION IMPROVEMENT

VCCEXT = VOUT vs VCCEXT = OPEN, I _{OUT} > 1 A							
VIN (V)	6	8	10	12	14	16	18
mW	9.1	88.7	151	213	279	386	448

Spread Spectrum

In SMPS devices, switching translates to higher efficiency. As a consequence, the switching also leads to a higher EMI profile. We can greatly reduce some of the peak radiated emissions with some spread spectrum techniques. Spread spectrum is a method used to reduce the peak electromagnetic emissions of a switching regulator.

The NCV8x1930 has spread spectrum functionality for reduced peak radiated emissions. This IC uses a pseudo-random generator to set the oscillator frequency to one of 8 discrete frequency bins. Each digital bin represents a shift in frequency by 8.2 kHz over the range 410 kHz to 467 kHz for the NCV881930 and a shift in frequency by 40 kHz over the range of 2.0 MHz to 2.28 MHz for the NCV891930. Over time, each bin is used an equal number of times to ensure an even spread of the spectrum. This reduces the peak energy at the fundamental 410 kHz for the NCV881930 (2.0 MHz for the NCV891930) frequency, and spreads it into a wider band.

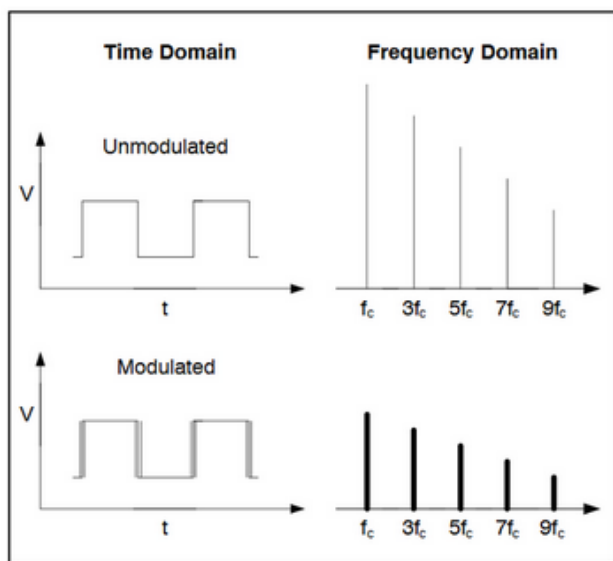


Figure 10. Spread Spectrum Comparison

Table 4. PSEUDO-RANDOM FREQUENCY BINS

14% Pseudo Random Bin #	NCV881930 Switching Frequency	NCV891930 Switching Frequency
0	410 kHz	2.00 MHz
1	418 kHz	2.04 MHz
2	426 kHz	2.08 MHz
3	435 kHz	2.12 MHz
4	443 kHz	2.16 MHz
5	451 kHz	2.20 MHz
6	459 kHz	2.24 MHz
7	467 kHz	2.28 MHz

The period of each cycle will change inversely to the switching frequency but the duty cycle will remain constant.

NCV8x1930MW0x-xxxGEVB Schematic

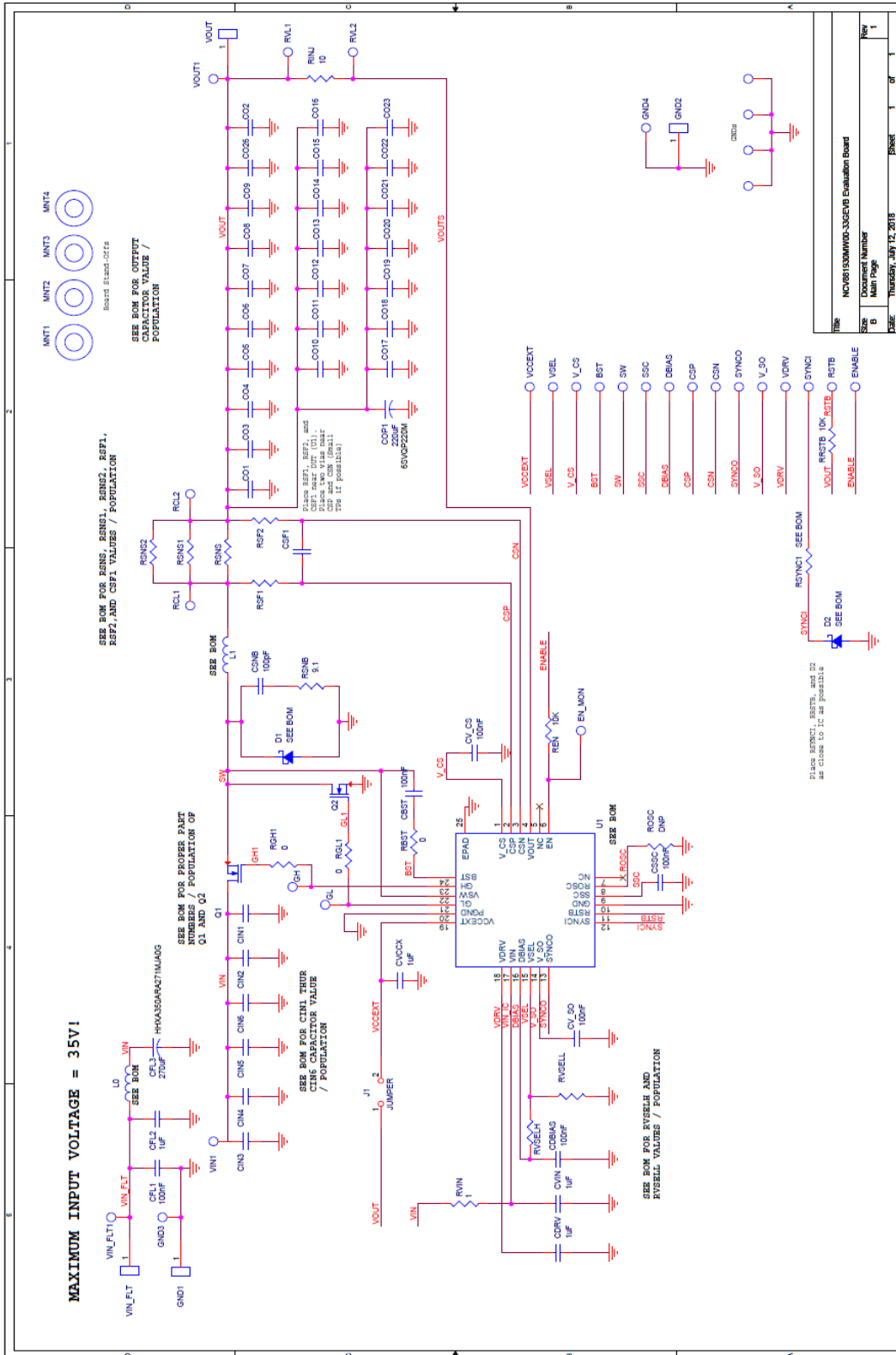


Figure 11. NCV8x1930MW0x-xxxGEVB Schematic (for All Boards)

NCV8x1930GEVB

PCB Layout

NCV891930MW01-365GEVB Rev 1 07/06/18
TOP and SILKSCREEN Layers

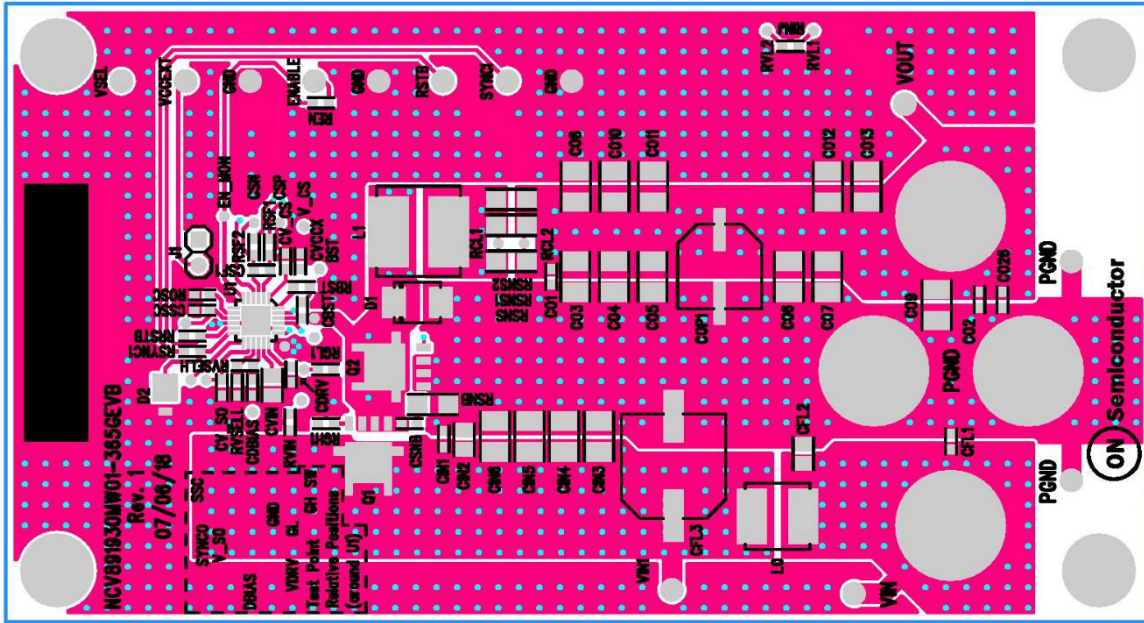


Figure 12. NCV8x1930MW0x-xxxGEVB PCB Layout – TOP (NCV891930MW01-365GEVB Shown)

NCV891930MW01-365GEVB Rev 1 07/06/18
GND Layer

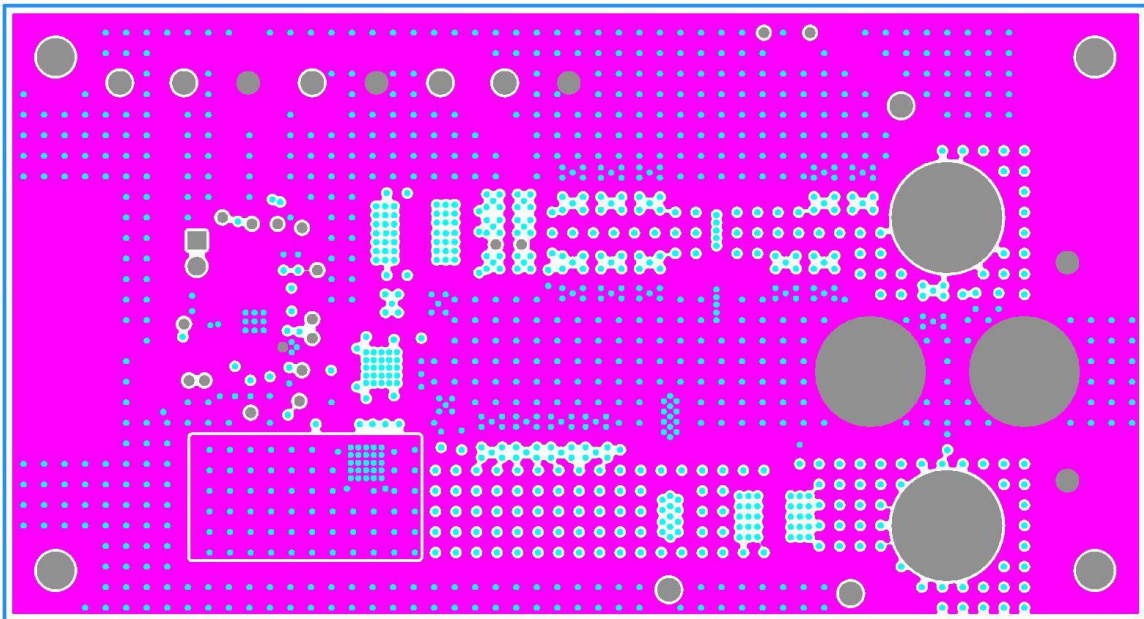


Figure 13. NCV8x1930MW0x-xxxGEVB PCB Layout – GND (NCV891930MW01-365GEVB Shown)

NCV8x1930GEVB

PCB Layout (continued)

NCV891930MW01-365GEVB Rev 1 07/06/18
MID Layer

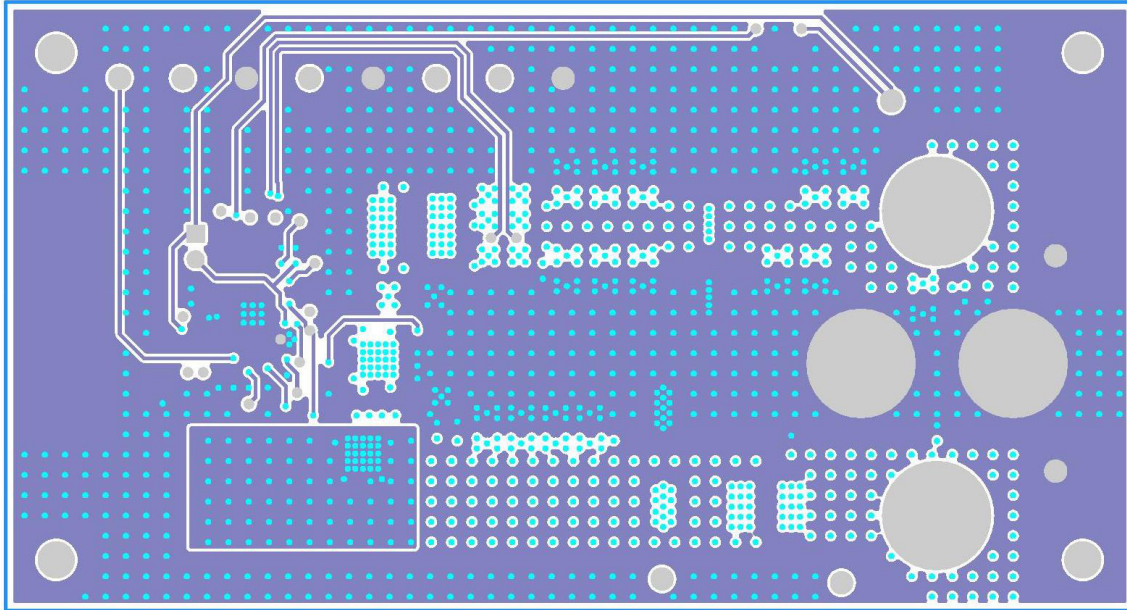


Figure 14. NCV8x1930MW0x-xxxGEVB PCB Layout – MID (NCV891930MW01-365GEVB Shown)

NCV891930MW01-365GEVB Rev 1 07/06/18
BOTTOM and SILKSCREEN Layers (mirrored)

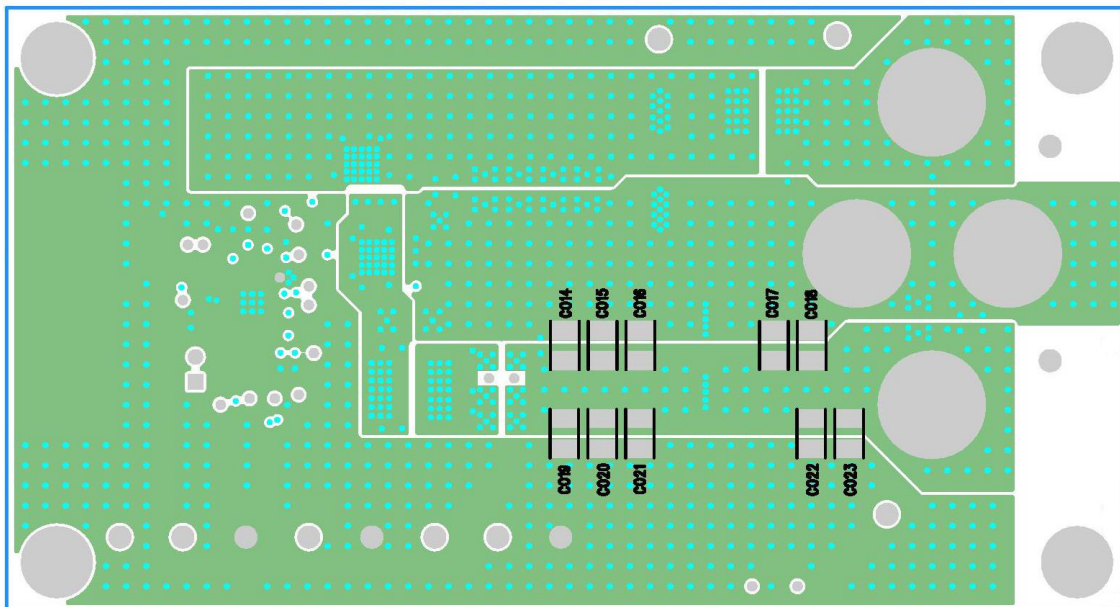


Figure 15. NCV8x1930MW0x-xxxGEVB PCB Layout – BOTTOM (NCV891930MW01-365GEVB Shown)

NCV8x1930GEVB

Table 5. BILL OF MATERIALS FOR THE NCV881930MW00-33GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, COP26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4, CIN5, CIN6	4	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thur CO13	11	CAP CER 22 μ F 10 V X7R 1210 / CAP CER 22 μ F 25 V X7R 1210	22 μ F	10%	1210	Murata Electronics North America	GCM32ER71A226 KE12L or GRJ32EC71E226K E11L	No
CO14 thur CO23	Do Not Pop	CAP CER 22 μ F 10 V X7R 1210 / CAP CER 22 μ F 25 V X7R 1210	22 μ F	10%	1210	Murata Electronics North America	GCM32ER71A226 KE12L or GRJ32EC71E226K E11L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50 V C0G 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50 V C0G 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 2 A SMB	60V / 2 A	N/A	SMB_DIODE	ON Semiconductor	NRVBS260T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 3.3 μ H 19.4 A	3.3 μ H	20%	XAL8080	Coilcraft	XAL7070-332ME	No
Q1, Q2	2	40 V, 4.5 m, 78 A, Single N-Channel SO-8FL	40 V / 78 A	N/A	SO8_FL	ON Semiconductor	NVMF5C460NLW FAFT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES 0.012 Ω 1% 1/2 W 0805	0.012 Ω	1%	1206	Susumu	KRL1220E-M-R01 2-F-T5	Yes
RSNS2	Do Not Pop	RES 0.012 Ω 1% 1/2 W 0805	0.012 Ω	1%	1206	Susumu	KRL1220E-M-R01 2-F-T5	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes
RVSELH	Do Not Pop	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RVSELL	1	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes

NCV8x1930GEVB

Table 5. BILL OF MATERIALS FOR THE NCV881930MW00-33GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thur GND7, RSTB, SYNCI, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00-00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 410 kHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV881930MW00 R2G	No

NCV8x1930GEVB

Table 6. BILL OF MATERIALS FOR THE NCV881930MW00-50GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, CO26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4, CIN5, CIN6	4	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thur CO14	12	CAP CER 22 μ F 10 V X7R 1210 / CAP CER 22 μ F 25 V X7R 1210	22 μ F	10%	1210	Murata Electronics North America	GCM32ER71A226 KE12L or GRJ32EC71E226K E11L	No
CO15 thur CO23	Do Not Pop	CAP CER 22 μ F 10 V X7R 1210 / CAP CER 22 μ F 25 V X7R 1210	22 μ F	10%	1210	Murata Electronics North America	GCM32ER71A226 KE12L or GRJ32EC71E226K E11L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50 V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 3 A SMB	60 V / 3 A	N/A	SMB_DIODE	ON Semiconductor	NRVBAF360T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20 V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 2.2 μ H 24 A	2.2 μ H	20%	XAL80xx	Coilcraft	XAL8080-222ME	No
Q1, Q2	2	40 V, 4.5 m, 78 A, Single N-Channel SO-8FL	40 V / 78 A	N/A	SO8_FL	ON Semiconductor	NVMFS5C460NLW FAFT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES SMD 0.007 Ω 1% 1 W 1206	0.007 Ω	1%	1206	Rohm Semiconductor	PMR18EZPFU7L00	Yes
RSNS2	DNP	RES SMD 0.007 Ω 1% 1 W 1206	0.007 Ω	1%	1206	Rohm Semiconductor	PMR18EZPFU7L00	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes
RVSELH	1	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes

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Table 6. BILL OF MATERIALS FOR THE NCV881930MW00-50GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
RVSELL	Do Not Pop	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thru GND7, RSTB, SYNCl, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00- 00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 410 kHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV881930MW00 R2G	No

NCV8x1930GEVB

Table 7. BILL OF MATERIALS FOR THE NCV891930MW00-33GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, CO26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4	Do Not Pop	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CIN5, CIN6	2	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thru CO23	21	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50 V C0G 0603	100pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50 V C0G 0603	100pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 2 A SMB	60 V / 2 A	N/A	SMB_DIODE	ON Semiconductor	NRVBS260T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20 V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 0.65 μ H 40 A	0.65 μ H	20%	XAL80XX	Coilcraft	XAL7070-651ME	No
Q1, Q2	2	N-Channel Power MOSFET 40 V 37 A SO-8FL	40 V / 37 A	N/A	SO8_FL	ON Semiconductor	NVMF55C468NLW FT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	110 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSNS2	DNP	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes
RVSELH	Do Not Pop	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes

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Table 7. BILL OF MATERIALS FOR THE NCV891930MW00-33GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
RVSELL	1	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thru GND7, RSTB, SYNCl, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00- 00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 2 MHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV891930MW00 R2G	No

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Table 8. BILL OF MATERIALS FOR THE NCV891930MW00-50GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, CO26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4	Do Not Pop	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CIN5, CIN6	2	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thur CO15, CO19, CO20	15	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
CO16 thur 18, CO21 thur CO23	Do Not Pop	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50 V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50 V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 2 A SMB	60 V / 2 A	N/A	SMB_DIODE	ON Semiconductor	NRVBS260T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20 V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 1.0 μ H 28 A	1.0 μ H	20%	XAL80XX	Coilcraft	XAL7030-102ME	No
Q1, Q2	2	N-Channel Power MOSFET 40 V 37 A SO-8FL	40 V / 37 A	N/A	SO8_FL	ON Semiconductor	NVMFS5C468NLW FT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES SMD 0.018 Ω 5% 1W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSNS2	DNP	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes

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Table 8. BILL OF MATERIALS FOR THE NCV891930MW00-50GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
RVSELH	1	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RVSELL	Do Not Pop	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thru GND7, RSTB, SYNCl, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00- 00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 2 MHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV891930MW00 R2G	No

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Table 9. BILL OF MATERIALS FOR THE NCV891930MW01-365GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, CO26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4	Do Not Pop	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CIN5, CIN6	2	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thru CO23	21	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50 V C0G 0603	100pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50 V C0G 0603	100pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 2 A SMB	60 V / 2 A	N/A	SMB_DIODE	ON Semiconductor	NRVBS260T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20 V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 0.8 μ H 37.8 A	0.80 μ H	20%	XAL80XX	Coilcraft	XAL7070-801ME	No
Q1, Q2	2	N-Channel Power MOSFET 40 V 37A SO-8FL	40 V / 37 A	N/A	SO8_FL	ON Semiconductor	NVMF55C468NLW FT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSNS2	DNP	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes
RVSELH	Do Not Pop	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes

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Table 9. BILL OF MATERIALS FOR THE NCV891930MW01-365GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
RVSELL	1	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thru GND7, RSTB, SYNCl, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00- 00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 2 MHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV891930MW01 R2G	No

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Table 10. BILL OF MATERIALS FOR THE NCV891930MW01-40GEVB

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
CBST, CDBIAS, CFL1, CIN1, CO1, CO26, CSSC, CV_CS, CV_SO	9	CAP CER 0.1 μ F 50 V 10% X7R 0603	0.1 μ F	10%	603	Murata Electronics North America	GCM188R71H104K A57D	Yes
CDRV, CO2, CVCCX	3	CAP CER 1 μ F 16 V X7R 0603	1 μ F	10%	603	Murata Electronics North America	GCM188R71C105K A64D	Yes
CFL2, CIN2, CVIN	3	CAP CER 1 μ F 50 V 10% X7R 0805	1 μ F	10%	805	TDK Corporation	CGA4J3X7R1H105 K125AE	Yes
CIN3, CIN4	Do Not Pop	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CIN5, CIN6	2	CAP CER 4.7 μ F 50 V X7R 1210	4.7 μ F	10%	1210	Kemet	C1210C475K5RAC AUTO	Yes
CFL3	1	CAP ALUM POLY HYB 270 μ F 35 V SMD	270 μ F	20%	FK_V_G	Chemi-Con	HHXB350ARA271 MJA0G	Yes
CO3 thru CO22	20	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
CO23	1	CAP CER 10 μ F 16 V X7R 1206 / CAP CER 10 μ F 25 V X7R 1210	10 μ F	10%	1206 / 1210	Murata Electronics North America	GCM31CR71C106 KA64L / GCM32ER71E106 KA57L	No
COP1	Do Not Pop	CAP ALUM POLY 220 μ F 20% 6.3 V SMD	220 μ F	20%	CAP_SMD_8P3	Panasonic Electronic Components	6SVQP220M	Yes
CSF1	Do Not Pop	CAP CER 100 pF 50 V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
CSNB	1	CAP CER 100 pF 50V COG 0603	100 pF	5%	603	Murata Electronics North America	GCM1885C1H101J A16D	Yes
D1	1	DIODE SCHOTTKY 60 V 2 A SMB	60 V / 2 A	N/A	SMB_DIODE	ON Semiconductor	NRVBS260T3G	No
D2	Do Not Pop	DIODE SCHOTTKY 20 V 1 A POWERMITE	20 V / 1 A	N/A	POWERMITE	ON Semiconductor	MBRM120L1TG	No
L0	1	INDUCTOR POWER 2.2 μ H 15.9 A SMD	2.2 μ H	20%	XAL60XX	Coilcraft	XAL6030-222ME	No
L1	1	INDUCTOR POWER 0.8 μ H 37.8 A	0.80 μ H	20%	XAL80XX	Coilcraft	XAL7070-801ME	No
Q1, Q2	2	N-Channel Power MOSFET 40 V 37 A SO-8FL	40 V / 37 A	N/A	SO8_FL	ON Semiconductor	NVMF5C468NLW FT1G	No
RBST, RGH1, RGL1	3	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
REN, RRSTB	2	RES SMD 10 k Ω 1% 1/10 W 0603	10 k Ω	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RINJ	1	RES SMD 10 Ω 1% 1/10 W 0603	10 Ω	1%	603	Vishay Dale	CRCW060310R0F KEA	Yes
ROSC	Do Not Pop		TBD		603			
RSF1, RSF2	2	RES SMD 0.0 Ω JUMPER 1/10 W 0603	0 Ω	N/A	603	Vishay Dale	CRCW06030000Z0 EA	Yes
RSNB	1	RES SMD 9.1 Ω 1% 1/4 W 1206	9.1 Ω	1%	1206	Stackpole Electronics Inc.	RMCF1206FT9R10	Yes
RSNS, RSNS1	2	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSNS2	DNP	RES SMD 0.018 Ω 5% 1 W 1206	0.018 Ω	1%	1206	Panasonic Electronic Components	ERJ-8CWJR018V	Yes
RSYNC1	1	RES SMD 100 Ω 1% 1/10 W 0603	100 Ω	1%	603	Vishay Dale	CRCW0603100RF KEA	Yes
RVIN	1	RES SMD 1 Ω 1% 1/10 W 0603	1 Ω	1%	603	Vishay Dale	CRCW06031R00F KEA	Yes

NCV8x1930GEVB

Table 10. BILL OF MATERIALS FOR THE NCV891930MW01-40GEVB (continued)

Reference Designator(s)	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed
RVSELH	1	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
RVSELL	Do Not Pop	RES SMD 10 kΩ 1% 1/10 W 0603	10 kΩ	1%	603	Vishay Dale	CRCW060310K0F KEA	Yes
GND1, GND2, VIN_FLT, VOUT	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Connectivity Johnson	108-0740-001	No
ENABLE, GND3 thru GND7, RSTB, SYNCl, VCCEXT, VIN1, VIN_FLT1, VOUT1, VSEL	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes
BST, CSN, CSP, DBIAS, EN_MON, GH, GL, GND8, RCL1, RCL2, RVL1, RVL2, SSC, SW, SYNCO, V_CS, V_SO, VDRV	Do Not Pop	CIRCUIT PIN PRNTD .020"D .425"L	N/A	N/A	SMALLTP	Mill-Max Manufacturing Corp.	3128-2-00-15-00- 00-08-0	Yes
J1	1	CONN HEADER 2POS .100 VERT GOLD	N/A	N/A	JMP	Molex Connector Corporation	22-28-4026	Yes
	1	CONN JUMPER SHORTING GOLD	N/A	N/A	JMP	Sullins Connector Solutions	SSC02SYAN	Yes
MNT1, MNT2, MNT3, MNT4	4	18-8 Stainless Steel Male-Female Threaded Hex Standoff, 1/4" Hex Size, 5/8" Length, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	91075A433	Yes
	4	18-8 Stainless Steel Locknut with External-Tooth Lock Washer, 4-40 Thread Size	N/A	N/A	#4MOUNT	McMaster-Carr	96278A005	Yes
U1	1	Low Iq 2 MHz Automotive Synchronous Buck Controller	N/A	N/A	QFN24_4X4_P5	ON Semiconductor	NCV891930MW01 R2G	No

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