

onsemi DCDC Converter

2022 July

DCDC Converter

Overview

DCDC converter is a power supply circuit for conversion from DC input to DC output. There are 4 types of applications;

- 1)Stepping down voltage, 2)Stepping up voltage, 3)Stepping up/down voltage, and 4)Generate Negative voltage.

Step-Down Voltage	Buck Converter, Step-down Converter
Step-Up Voltage	Boost Converter, Step-up Converter
Stepping up/down voltage	Step-up/down Converter, Buck-Boost Converter
Generate Negative Voltage	Negative Voltage Converter, Inverting Converter

Topologies

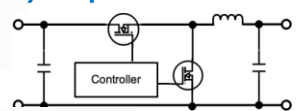
DCDC converters are roughly divided into two types : Isolated type / Non isolated type.

Isolated type directly block the current between input and output and for ensuring safety requirements, used for splitting ground loops and following / level shifting

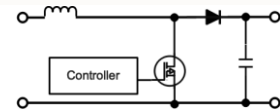
Non isolated type is single circuit in which current flows between input and output and for cost reduction, size saving, and efficiency pursuit

Non Isolation

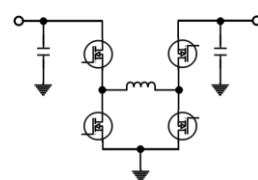
1) Step-down



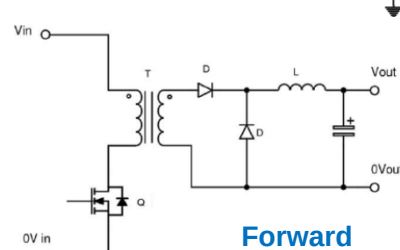
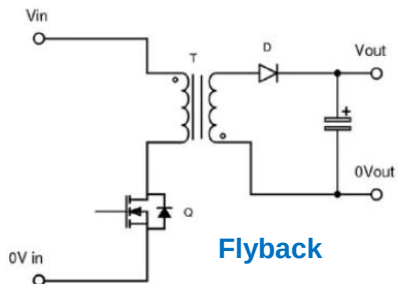
2) Step-up



3) Step-Up/Step-Down

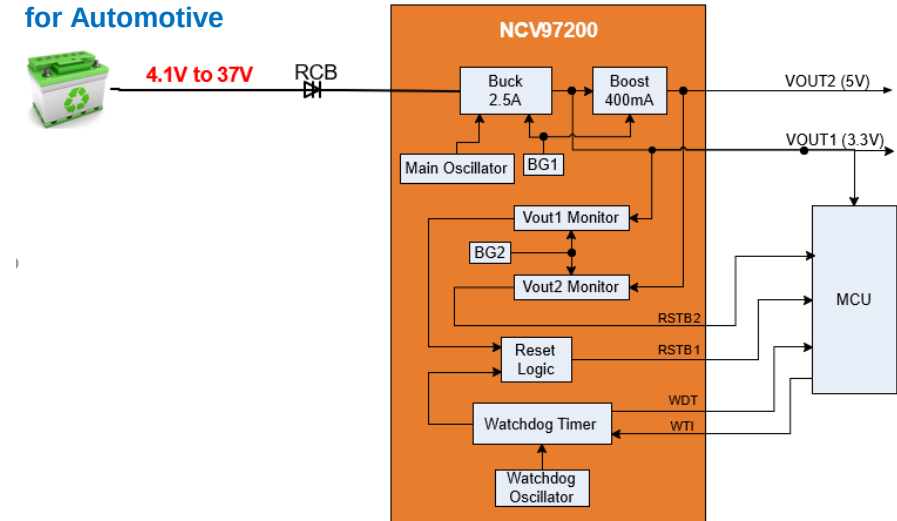


Isolation

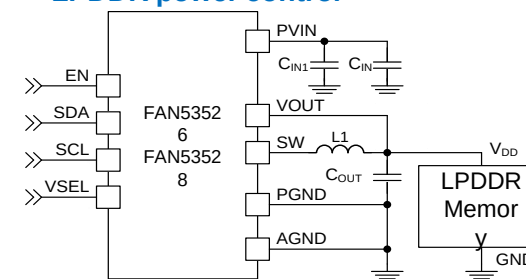


Target Application

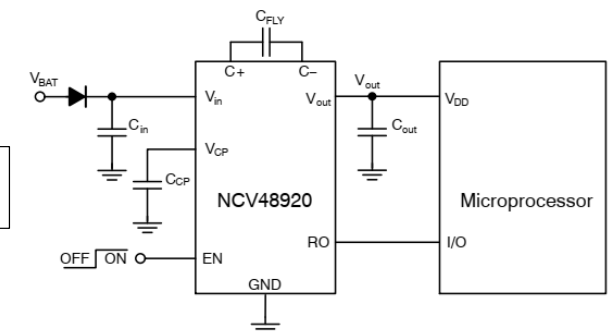
DCDC Operation for Automotive



For main memory : LPDDR power control

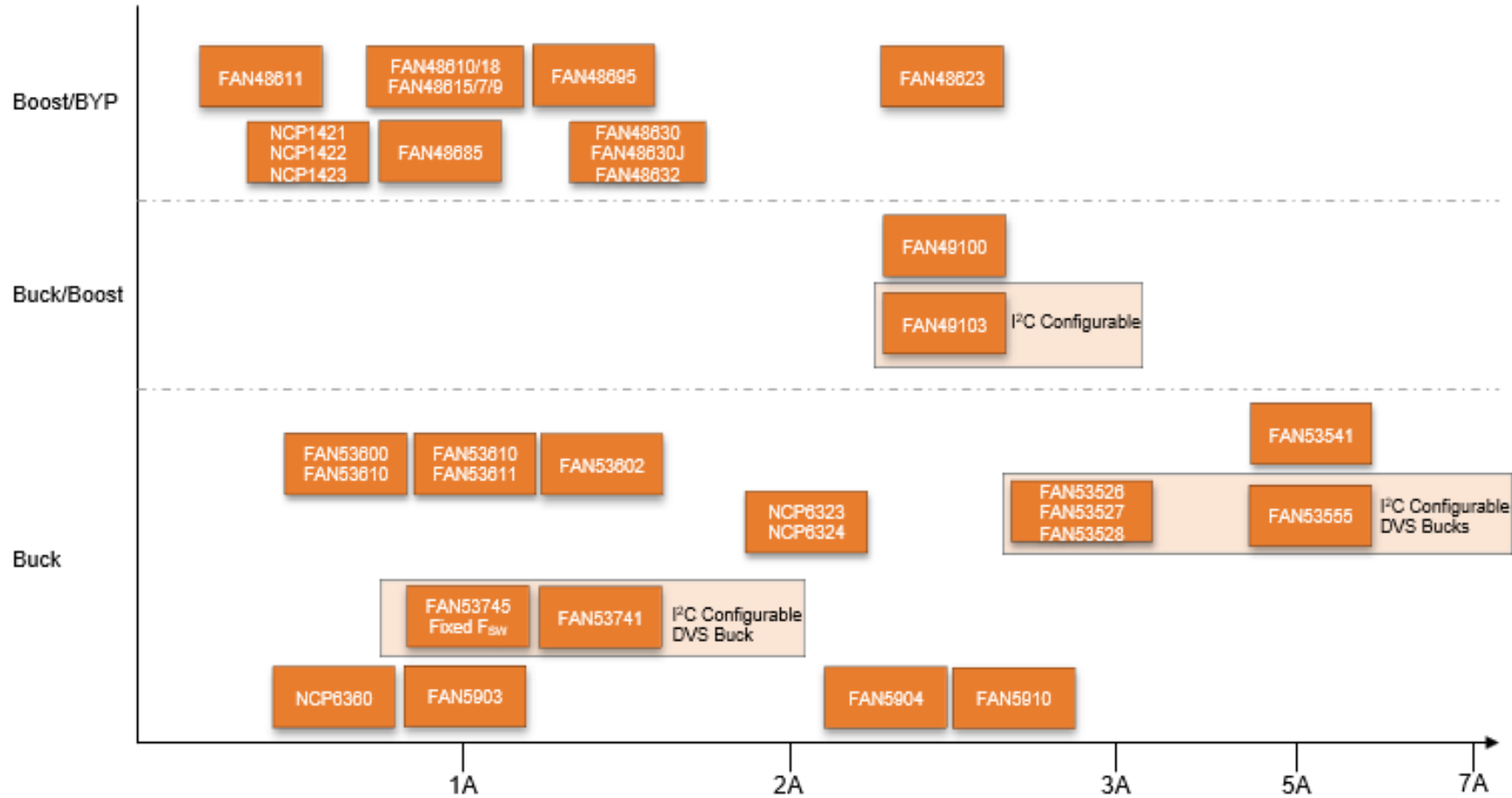


Power Control for Processor

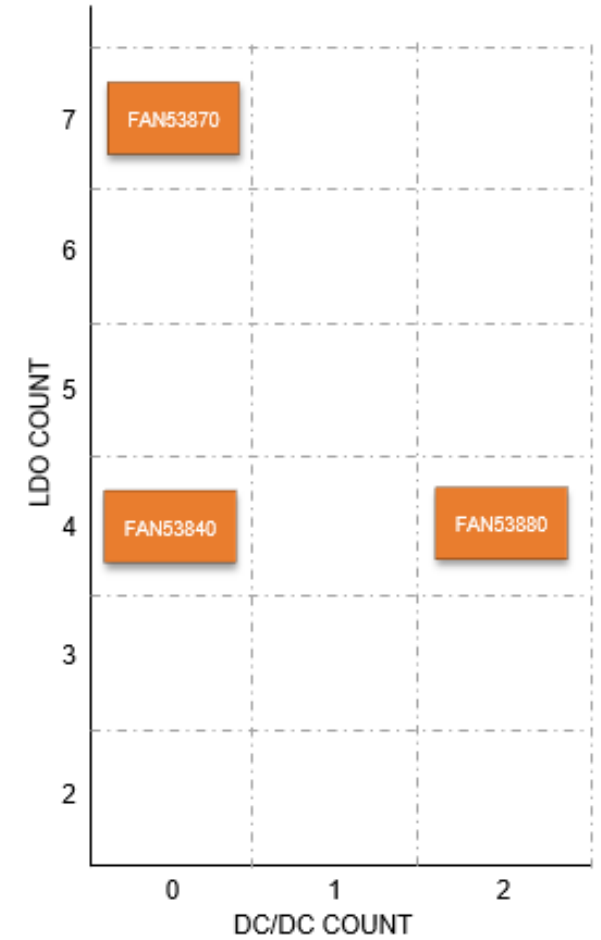


DCDC Converter Portfolio

Discrete



Sub PMIC



Automotive Buck Converters, Buck Controllers

Buck Converters

Type	P/N	V _{in} range (V)	Load dump (V)	V _{out} (V)	I _{out} (A)	Synch. Rectification	F _{sw} (kHz)	Internal Comp.	POR / PG	SYNC I/O	Spread Spectrum	Package	Footprint (mm)
Battery Connected (Pre-Regulation)	NCV890430	3.5 - 37	45	2.5 / 3.3 / 5.0	0.6	Y	2000	Y	Y	-	-	DFN8	3 x 3
	NCV890100	4.5 - 36	40	adjustable	1.2	-	2000	-	-	-	-	DFN8	3 x 3
	NCV890103	4.5 - 36	40	adjustable	1.2	-	2000	-	Y	-	-	DFN10	3 x 3
	NCV890104	4.5 - 36	40	adjustable	1.2	-	2000	-	Y	-	Y	DFN12	4 x 4
	NCV890200	4.5 - 36	40	adjustable	2	-	2000	-	-	-	-	SOIC8 EP	4.9 x 6
	NCV890203	4.5 - 36	40	adjustable	2	-	2000	-	Y	-	-	DFN10	3 x 3
	NCV890204	4.5 - 36	40	adjustable	2	-	2000	-	Y	-	Y	DFN12	4 x 4
	NCV891330	3.7 - 36	45	3.3 / 3.8 / 4.0 / 5.0	3	-	2000	Y	Y	-	-	SOIC8 EP	4.9 x 6
	NCV891334	3.7 - 36	45	3.3, 5.0	3	-	2000	Y	Y	Y	-	DFN12	4 x 4



1

DFN8



DFN10



1

SOIC8 EP



1

DFN12

Buck Controllers

Type	P/N	V _{in} range (V)	Load Dump (V)	V _{out} (V)	Synch. Rectification	F _{sw} (kHz)	Internal Comp.	RSTB or PG pin	SYNC I/O	Spread Spectrum	Package	Footprint (mm)
Battery Connected "Pre-regulation"	NCV8852	3.1 - 36	44	adjustable	-	adjustable	-	-	Y	-	SOIC8	4.9 x 6
	NCV881930	3.5 - 38	45	3.3 / 5.0	Y	410	Y	Y	Y	Y	QFNW24	4 x 4
	NCV891930	3.5 - 38	45	3.3 / 5.0 3.65 / 4.0	Y	2000	Y	Y	Y	Y	QFNW24	4 x 4



1

SOIC8



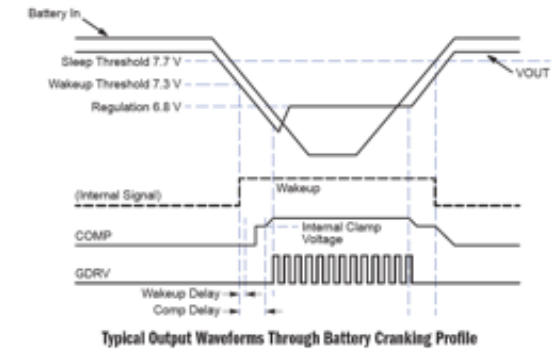
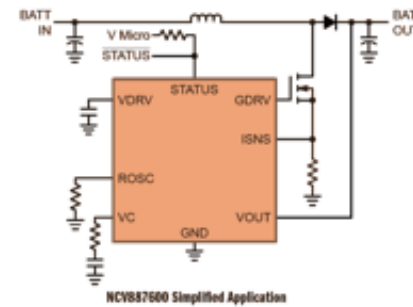
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QFNW24

Automotive Non-Synchronous Boost Controllers

Type	P/N	Vin range (V)	Load Dump (V)	Vref (V)	Dmax (%)	Fsw (kHz)	Isource (mA)	Isink (mA)	Short-circ. protection	Package
Battery Facing Boost, Flyback & SEPIC	NCV8870xx	3.2 - 40	45	1.2	93	50 / 100	800	600	Y	SOIC8
	NCV8871xx	3.2 - 40	45	1.2	86 to 93	170 / 340 / 1000	program.	program.	Y	SOIC8
	NCV8873xx	3.2 - 40	45	0.2	86.5 to 92.5	400 / 1000	800	600	-	SOIC8
	NCV898031	3.2 - 40	45	1.2	88	2000	800	600	Y	SOIC8



Type	P/N	Vin range (V)	Load Dump (V)	Wake-up threshold (V)	Vout (V)	Dmax (%)	Fsw (kHz)	Iq max (μA)	Package
Battery Facing Start-Stop Boost	NCV8876xx	2 - 40	45	7.3	6.8	83	170	11	SOIC8
	NCV8877xx	2 - 40	45	7.3 / 9.11 / 10.65 / 13	6.8 / 8.55 / 10 / 12	83	170	12	SOIC8
	NCV887801	2 - 40	45	7.3	6.8	83	450	12	SOIC8



Buck / Step-down Converters (Featured Products)

P/N	IOUT	VIN Range	VOUT Range	I _Q / I _{SD}	I2C	F _{sw}	Package	DVS	Other features
FAN53600/10	0.6/1.0A	2.3 to 5.5V	Trim 2.8 to 3.3V	26uA / 0.25uA	No	Hys – 3.0MHz	CSP6 (1.16 x 0.88mm)	N/A	Sync to external freq / FPWM Mode
FAN53601/11	0.6/1.0A	2.3 to 5.5V	Trim 1.0 to 1.8V	24uA / 0.25uA	No	Hys – 6.0MHz	CSP6 (1.16 x 0.88mm)	N/A	Sync to external freq / FPWM Mode
FAN53602	1.2A	2.3 to 5.5V	1.233V	24uA / 0.25uA	No	Hys – 6.0Mhz	CSP6 (1.16 x 0.88mm)	N/A	Sync to external freq / FPWM Mode
FAN53741	1.3A	2.3 to 5.5V	0.6V to 3.3V	60uA / 0.5uA	Yes	Hys – 2.5Mhz	CSP6 (1.38 x 0.94mm)	No	Programmable Current Limit
FAN53745	1A	2.3 to 5.5V	1.5 to 3.3V	43uA / 0.25uA	Yes	Fixed 3.3MHz	CSP6 (1.50 x 0.94mm)	Yes	FPWM/AUTO Mode by I2C, / Automatic Pass-Through
FAN53526	3A	2.5 to 5.5V	0.6 to 1.39V	50uA / 0.1uA	Yes	Hys – 2.4MHz	CSP15 (2.015 x 1.31mm)	Yes	VSEL based MODE change
FAN53527	3A	2.5 to 5.5V	1.0 to 1.39V	48uA / 0.1uA	Yes	Hys – 2.4MHz	CSP15 (2.015 x 1.31mm)	Yes	VSEL/MODE pin based Voltage and MODE change
FAN53528	3A	2.5 to 5.5V	0.4 to 0.9V	50uA / 0.1uA	Yes/ VSEL	Hys – 2.4MHz	CSP15 (2.015 x 1.31mm)	Yes	VSEL based VOUT change / MODE change
FAN53541	5A	2.7 to 5.5V	0.8V to 90% of V _{IN}	50uA/0.1uA	No	Hys – 2.4MHz	CSP20 (1.96 x 1.56mm)	No	Sync to external freq Pin based MODE change (AUTO/FPWM)
FAN53555	3A - 5A	2.5 to 5.5V	0.6 to 1.4V	60uA / 0.1uA	Yes	Hys - 2.4MHz	CSP20 (1.60 x 2.00mm)	Yes	VSEL based VOUT change
RF Bucks									
FAN5903	1A	2.6 to 5.5V	0.4 to 3.5V (analog pin control)	70uA / 1uA	No	Hys – 3/6MHz (pin selectable)	CSP9 (1.34 x 1.29mm)	Yes	Auto Bypass mode (200mOhms)
FAN5910	2.5A	2.6 to 5.5V	0.4 to 3.6V (analog pin control)	600uA (50uA sleep) / 0.5uA	No	Hys – 2.9MHz	CSP16 (1.615 x 1.615mm)	Yes	LDO-Assist 100% DC / Bypass mode

Boost / Step-up Converters (Featured Products)

P/N	IOUT	VIN Range	VOUT Range	Peak Efficiency	VOUT Selection	I _Q / I _{SD}	Typ F _{sw}	Package	Comments
FAN48611	0.35A	2.5 to 4.8V	5.25V	95%	N/A	90uA / 2.7uA	2.5MHz	CSP9 (1.215 x 1.215mm)	
FAN48610	1A	2.5 to 4.8V	3.3V, 4.5V, 5.0V	95%	N/A	85uA / 3uA	2.5MHz	CSP9 (1.215 x 1.215mm)	Auto Pass-through
FAN48618	1A	2.7 to 4.8V	5.25V	95%	N/A	90uA / 2.7uA	2.5MHz	CSP9 (1.215 x 1.215mm)	
FAN48615/7/9*	1A	2.5 to 5.5V	5.25V, 5.4V / 5.0V / 5.0V	95%	N/A	95uA (3.5uA F-PT)	2.3MHz	CSP9 (1.215 x 1.215mm)	PWM only Auto/Forced Pass-through
FAN48685	0.8A	2.5 to 5.5V	3.6V / 5.0V / 5.45V (MODE0/1)	93%	MODE0/1	3uA (Forced PT)	2.5Mhz	CSP9 (1.215 x 1.215mm)	PWM only Auto/Forced Pass-through
FAN48695	1A	2.5 to 5.5V	5.0V	95%	N/A	27uA / 3uA (9uA F-PT)	2.5MHz	CSP9 (1.405 x 1.355mm)	Auto/Forced Pass-through
FAN48630	1.5A	2.35 to 5.5V	3.15V to 5.29V (Trim and VSEL)	96%	VSEL	150uA / 1.5uA (4uA F-PT)	2.5MHz	CSP16 (1.78 x 1.78mm)	Auto/Forced Bypass mode / Power Good
FAN48630J	1.5A	2.35 to 5.5V	3.15V / 3.60V (VSEL)	96%	VSEL	150uA / 1.5uA (4uA F-PT)	2.5Mhz	CSP16 (1.78 x 1.78mm)	Auto/Forced Bypass mode / Power Good
FAN48632	1.5A / 2.0A pulsed	2.35 to 5.5V	3.30, 3.50V, 3.70V (Trim and VSEL)	96%	VSEL	150uA / 1.5uA (4uA F-PT)	2.5MHz	CSP16 (1.78 x 1.78mm)	Auto/Forced Bypass mode / Power Good
FAN48623	2.5A	2.5 to 5.5V	Trim 3.0 to 5.0V	97%	VSEL	135uA / 4uA (6uA F-PT)	Hysteretic	CSP16 (1.81 x 1.81mm)	Auto/Forced Bypass mode / Power Good

PMICs (Featured Products)

P/N	# of Bucks	# of Boosts	# of LDOs	VIN Range	Buck IOUT	Boost IOUT	LDO IOUT	Sequenci ng	DVS	Package
FAN53880	1	1	4	1.9V to 5.5V (LDO) 2.5V to 5.5V (DC/DC)	1.2A	1A	300mA	Yes	No	CSP25 (2.16 x 2.16mm)
FAN53870	N/A	N/A	7	1.0V to 2.0V (LDO1- 2) 1.9V to 5.5V (LDO3- 6)	N/A	N/A	1000mA (LDO1-2) 300mA (LDO3-7)	Yes	No	CSP20 (1.61 x 1.96mm)
FAN53840	N/A	N/A	4	1.0V to 2.0V (LDO1) 1.9V to 5.5V (LDO2- 4)	N/A	N/A	1000mA (LDO1) 300mA (LDO2-4)	No	No	CSP16 (1.52 x 1.52mm)

