

High performance LDO

Product Overview

LDO is good for noise sensitive analog devices such as Image sensor, AD/DA Converter, Amp, Comparator and PLL. In this case, **PSRR(Power Supply Reduction Ratio)** is very important. In many application driven by battery, lower **Vdrop** and Lower **Iq (Quiescent current)** is very important and these LDOs were called as **High Performance LDO**. **onsemi** is focusing there **LDOs and leading company in the market.**

LDO product portfolio

	Ultra Low Iq	High PSRR	Ultra Low Dropout	Fast Transient	Packaging
<100mA	onsemi.				.65x.65 CSP  onsemi.
150mA	onsemi.	onsemi.	onsemi.	onsemi.	1x1UFN onsemi.
300mA	onsemi.	onsemi.	onsemi.		1x1XFN onsemi.
500mA	onsemi.	onsemi.	onsemi.	onsemi.	2x2DFN onsemi.
700mA	onsemi.	onsemi.	onsemi.		3x3DFN  onsemi.
1A		onsemi.	onsemi.	onsemi.	T0220 onsemi.
1.5A		onsemi.	onsemi.	onsemi.	DPAK onsemi.
3A		onsemi.	onsemi.	onsemi.	SOIC8 onsemi.

Specification Definitions

Quiescent Current

- Low Iq – 50uA to 12uA
- Ultra low Iq – ~**500nA**

PSRR

- Good PSRR – 70db to 82db
- High PSRR – 82db to **95db**

Low Dropout

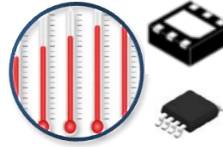
- Low Dropout – 300mV to 150mV
- Ultra low Dropout - **<150mV** to 30mV

Fast Transient Response

- Normal LDO Response - $\pm 200\text{mV}$
- Good Response - $\pm 100\text{mV}$
- Fast Response - **$\pm 40\text{mV}$**

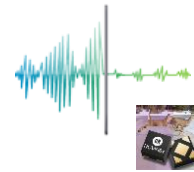
Features

Higher Operating Junction Temperature



- Transistors specifically designed for these higher temperatures of operation
- 150degC Operation

High PSRR, Low Noise



- Improved Image Quality with High PSRR LDO
- Low noise interference with Ultra-low noise LDO
- Patented architecture for best-in-class performance

High Efficiency



- Low Drop Voltage & High density accuracy
- Low Quiescent current to 500nA
- Reduce standby current in system to meet global standby current standard

Wide-Vin + Low



- Wide VIN to support 24VAC, 48V rails, and multi-cell applications
- Ultra-low Iq to extend battery life
- Wide Voltage input for Isolated and Non-Isolated power supplies

Target Application

Apps need lower Vdrop LDOs



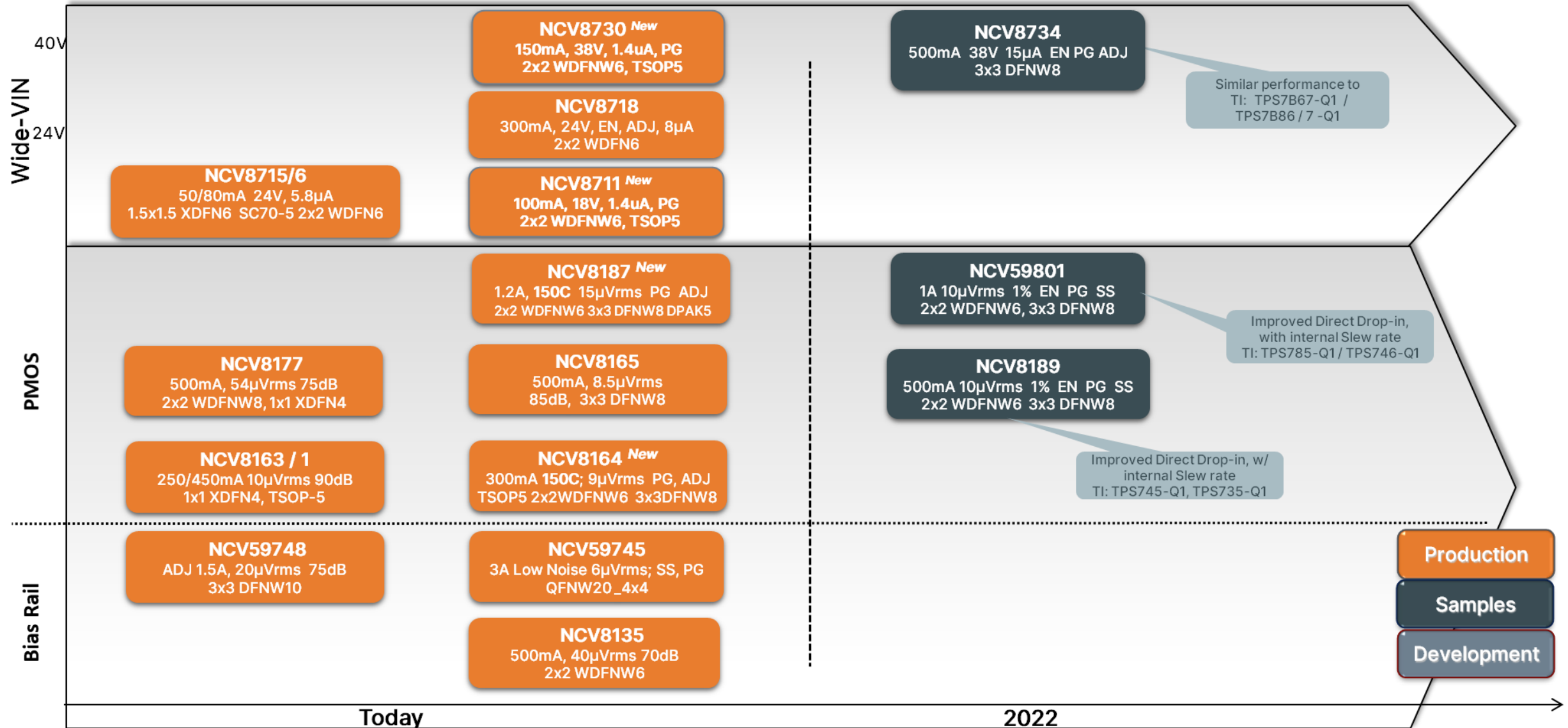
Apps need High PSRR LDOs



Apps need lower Vdrop and Iq LDOs

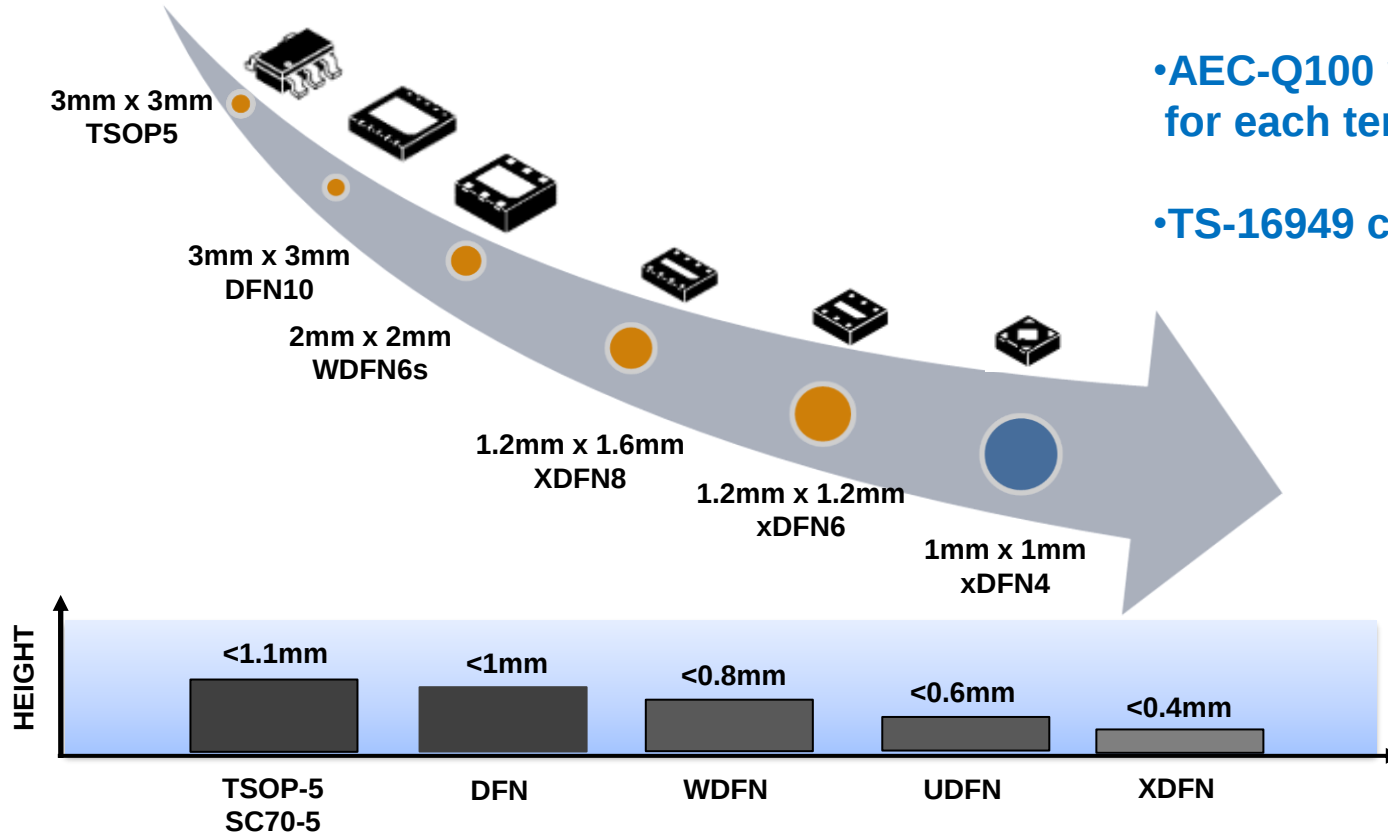


Automotive LDO Roadmap



Package Trend - LDOs

- **LDO Miniaturization - Low Current LDOs**
- Package miniaturization without compromising the performance



•AEC-Q100 with capabilities for each temperature grade

•TS-16949 certified

- Smaller and more power efficient DFN package alternatives to larger standard leaded packages thanks to thermally more efficient construction .

Package	Package Size	Power Dissipation
DFN6 3x3	3x3mm	1.5W
WDFN6 2x2	2x2mm	1W
XDFN4 1x1	1x1mm	0.6W

Standard Leaded Packages

Package	Package Size	Power Dissipation
TSOP-5	3x3mm	0.45W
SC70-5	2x2mm	0.3W

AEC-Q100 Grades

Temperature Grade	Min	Max Tj
Grade 0	-40°C	+150°C
Grade 1	-40°C	+125°C
Grade 2	-40°C	+105°C
Grade 3	-40°C	+85°C

Ultra and Low Quiescent Current LDOs

Product	VIN (V):	IQ (typ):	Package	Vout (V)	Iout (mA)	Enable	Reset	Adjustable Delay Time	Watchdog/ Wakeup
NCV8774C	4.5V to 40V	17uA	DPAK-3	5, 3.3	350	No	No	No	No
NCV8775C	4.5V to 40V	19uA	DPAK-5 D2PAK-5	5, 3.3	350	No	Yes	Yes	No
NCV8772C	4.5V to 40V	18uA	DPAK-5 D2PAK-5	5, 3.3	350	Yes	Yes	No	No
NCV8760C	4.5V to 40V	18uA	DPAK-5 D2PAK-5	5, 3.3	150	No	Yes	Yes	No
NCV8768C			SOIC-8 SOIC-8 EP	5, 3.3	150	Yes	Yes	Yes	Yes / No
NCV8518C			SOIC-8 EP SOIC-16 EP WB	5	250	Yes	Yes	Yes	Yes / Yes
NCV8508C	6V to 40V	76uA	SOIC-8 EP	5	250	No	Yes	Yes	Yes / Yes

Standard LDO with Watchdog/Reset

Product	VIN:	Package	Vout (V)	Iout (mA)	Enable	Reset/ ADJ_threshold	Adjustable Delay Time	Watchdog / Wakeup	Sense Input / Output
NCV4263-2C	5.5V to 40V	SOIC-8 EP SOIC-14	5	200	Yes	Yes/ Yes	Yes	Yes /---	---

LDO Product Lineup

Ultra and Low Quiescent Current LDOs

Product	VIN (V):	IQ (typ):	Package	Vout (V)	Iout (mA)	Enable	Reset	Adjustable Delay Time	Watchdog/ Wakeup
NCV8774C	4.5V to 40V	17uA	DPAK-3	5, 3.3	350	No	No	No	No
NCV8775C	4.5V to 40V	19uA	DPAK-5 D2PAK-5	5, 3.3	350	No	Yes	Yes	No
NCV8772C	4.5V to 40V	18uA	DPAK-5 D2PAK-5	5, 3.3	350	Yes	Yes	No	No
NCV8760C	4.5V to 40V	18uA	DPAK-5 D2PAK-5	5, 3.3	150	No	Yes	Yes	No
NCV8768C			SOIC-8 SOIC-8 EP	5, 3.3	150	Yes	Yes	Yes	Yes / No
NCV8518C			SOIC-8 EP SOIC-16 EP WB	5	250	Yes	Yes	Yes	Yes / Yes
NCV8508C	6V to 40V	76uA	SOIC-8 EP	5	250	No	Yes	Yes	Yes / Yes

*) RTMs:
NCV8768C: Q1-22
NCV8518C: Q2-22

Standard LDOs

Product	VIN:	Package	Vout (V)	Iout (mA)	Enable	Reset/ ADJ_threshold	Adjustable Delay Time	Watchdog / Wakeup	Sense Input / Output
NCV4274C	4.5V to 40V	DPAK-3 D2PAK-3 SOT-223	5, 3.3	400	---	---/---	---	---/---	---
NCV4276C	4.5V to 28V	DPAK-5 D2PAK-5	5, 3.3, ADJ	400	Yes	---/---	---	---/---	---
NCV4275C NCV4290	4.4V to 42V 5.5V to 42V	DPAK-5 D2PAK-5	5, 3.3	450	---	Yes /---	Yes	---/---	---
NCV4263-2C	5.5V to 40V	SOIC-8 EP SOIC-14	5	200	Yes	Yes/ Yes	Yes	Yes /---	---
NCV4269C	5.5V to 40V	SOIC-8 (EP) SOIC-14 TSSOP-14 EP	5	150	---	Yes / Yes Integrated Pullup Resistor	Yes	---/---	Yes Integrated Pullup Resistor
NCV4279C	5.5V to 40V	SOIC-8 SOIC-14	5	150	---	Yes / Yes	Yes	---/---	Yes
NCV4299C	4.4V to 45V	SOIC-8 SOIC-14	5, 3.3	150	Yes SOIC- 14 only	Yes / Yes Integrated Pullup Resistor	Yes	---/---	Yes Integrated Pullup Resistor
NCV4949C	5.5V to 40V	SOIC-8 (EP)	5	100	---	Yes /---	Yes	---/---	yes

Low Output Current LDO

Product	VIN:	Package	Vout (V)	Iout (mA)	Enable	Power Fail
NCV4294C	3.5V to 45V	TSOP-5	5, 3.3	30	---	---
NCV4295C	3.5V to 45V	TSOP-5	5, 3.3	30	---	Yes
NCV4296-2C	3.5V to 45V	TSOP-5	5, 3.3	30	Yes	---
NCV8664C	4.5V to 45V	WDFNW6 2x2 SOT-223 TSOP-5	5, 3.3	150	---	---

Automotive LDO line up (excerpt)

High PSRR & Low Noise									
PN	I _{LOAD}	PSRR @ 1kHz	Noise	Dropout (typ)	V _{IN} Operating	V _{OUT}	I _Q (typ)	Package	RTM
NCV8163	250mA	92dB	6.5μV _{RMS}	80mV	2.2V - 5.5V	1.2V - 5.3V	12μA	TSOP-5; 1*1 XDFN4	Available
NCV8164 w / PG ^{New}	300mA	85dB	9μV _{RMS}	115mV	1.6V - 5.5V	1.2V - 3.6V, ADJ	30μA	TSOP-5, WDFNW6_2*2 (WF)	Available, T _j =150C
NCV8161	450mA	90dB	10μV _{RMS}	225mV	1.9V - 5.5V	1.9V - 5.5V	18μA	TSOP-5; 1*1 XDFN4	Available
NCV8165	500mA	85dB	8.5μV _{RMS}	190mV	1.9V - 5.5V	1.8V - 5.2V	12μA	3*3 DFNW8 (WF)	Available
NCV8177	500mA	75dB	54μV _{RMS}	200mV	1.6V - 5.5V	0.7V - 3.6V	60μA	1*1 XDFN4; 2*2 WDFNW8 (WF)	Available
NCV8187 w / PG ^{New}	1.2A	75dB	15μV _{RMS}	200mV	1.5V - 5.5V	ADJ (0.8V - 5.2V)	30μA	2*2 WDFN6 , 3*3 DFNW8 (WF) DPAK-5	Available, T _j =150C
NCV59748 w/ PG	1.5A	60dB	25μV _{RMS}	60mV	0.8V - 5.5V	ADJ	1.0mA	3*3 DFNW10 (WF)	Available
NCV59745 w/ PG ^{New}	3A	75dB	6μV _{RMS}	105mV	0.9V - 5.5V	0.8V - 3.6V	1.3mA	4*4 QFNW20 (WF)	Available

Wide VIN									
PN	I _{LOAD}	PSRR @ 1kHz	Noise	Dropout (typ)	V _{IN} Operating	V _{OUT}	I _Q	Package	RTM
NCV8715	50mA	52dB	190μV _{RMS}	230mV	2.5V - 24V	1.2V - 5V	3.4μA	1.5*1.5 XDFN6; SC70-5	Available
NCV8716	80mA	54dB	220μV _{RMS}	310mV	2.5V - 24V	1.5V - 5V	3.4μA	WDFN6_2x2	Available
NCV8711 w / PG ^{New}	100mA	70dB	500μV _{RMS}	215mV	2.7 - 18V	1.2 - 17V	1.3μA	TSOP-5, WDFNW6_2*2 (WF)	Available
SCV2951, Grade 0 ^{New}	100mA	40dB	126μV _{RMS}	350mV	2.0V - 30V	5, ADJ	75μA	SOIC-8	Available, T _j =150C
NCV8730 w / PG ^{New}	150mA	70dB	500μV _{RMS}	290mV	2.7 - 38V	1.2 - 24V	1.3μA	TSOP-5, WDFNW6_2*2 (WF)	Available
NCV8718	300mA	60dB	36μV _{RMS}	305mV	2.5V - 24V	1.2V - 5V	4μA	2*2 WDFN6	Available
NCV8535, 7 (PG)	500mA	60dB	31μV _{RMS}	260mV	2.9V - 12V	1.5V - 5V, ADJ	190μA	DFNW10_3*3 (WF)	Available, +/-1.5%
NCV59150	1500mA	62dB	-	300mV	2.24V - 13.5V	1.8V - 5V, ADJ	1.15mA	D2PAK-3, 5, DFN8_4*4	Available, Reverse Current

Automotive LDO lineup (excerpt)

High Performance

PN	I _{LOAD}	PSRR @ 1kHz	Noise	Dropout (typ)	V _{IN} Operating	V _{OUT}	I _Q	Package	RTM
NCV8170	150mA	57dB	85μV _{RMS}	170mV	2.2V – 5.5V	1.2V – 3.6V	.5μA	1*1XDFN4, SOT563-6	Available
NCV8152 Dual	150mA	75dB	75μV _{RMS}	150mV	1.9V – 5.25V	Multiple	50μA/channel	1.2*1.2 XDFN-6	Available
NCV8154 Dual	300mA	75dB	75μV _{RMS}	160mV	1.9V – 5.25V	Multiple	55μA/channel	3*3 DFNW10 (WF) 1.5*1.5 WDFNW6 (WF)	Available
NCV8130	300mA	65dB	40μV _{RMS}	75mV	0.8V - 5.5V	0.8V - 2.1V	80μA	1.2*1.2 XDFN6	Available
NCV8114	300mA	75dB	70μV _{RMS}	135mV	1.7V - 5.5V	0.9V - 3.6V	50μA	TSOP-5	Available
NCV8720	350mA	65dB	40μV _{RMS}	110mV	0.8V – 5.5V	0.8V – 2.1V	80μA	2*2 WDFNW6 (WF)	Available
NCV8133	500mA	70dB	40μV _{RMS}	140mV	0.8V - 5.5V	0.8V - 3.6V	80μA	1.2*1.2 XDFN6	Available
NCV8135	500mA	60dB	35μV _{RMS}	40mV	0.4V – 5.5V	0.4V	35μA	2*2 WDFNW6 (WF)	Available
NCV59800	1A	63dB	15μV _{RMS}	200mV	2.2V - 5.5V	0.75V, ADJ (0.8V – 3.6V)	60μA	3*3 DFNW8 (WF)	Available

Tracking LDOs

Product Overview

Tracking LDO is good for control voltage with high accuracy such as sensor, AD, and MCUs.
By strictly adjust buffered output voltage with reference voltage, it enables to supply high accuracy &very small difference voltage to devices.

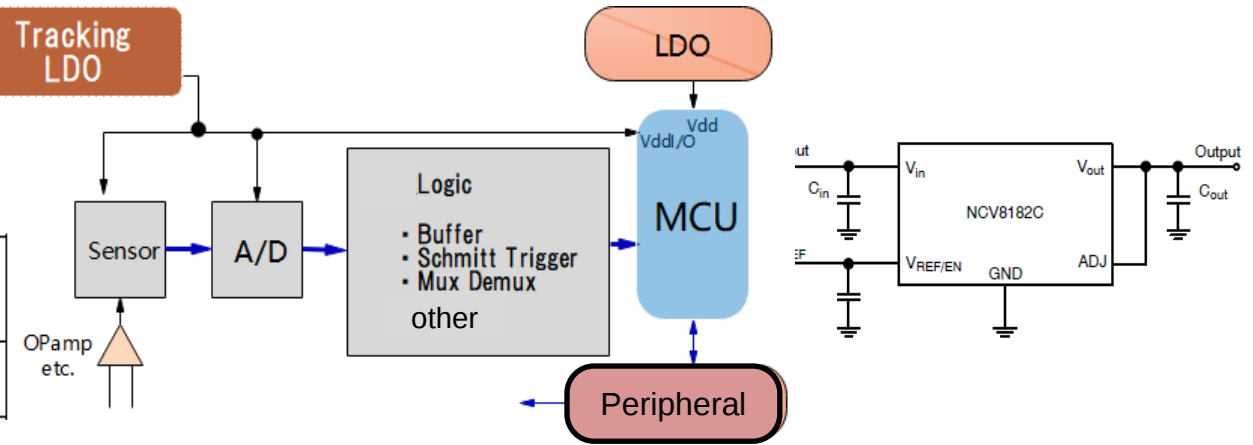
Example : Output accuracy

Output Voltage Tracking (Accuracy %)	$V_{in} = 4.5\text{ V to } 26\text{ V}$, $I_{out} = 100\text{ }\mu\text{A to } 200\text{ mA}$, $V_{REF/EN} = 2.75\text{ V to } (V_{in} - 1\text{ V})$ (Note 9)	ΔV_{out}	-10	-	10	mV
Output Voltage Tracking (Accuracy %)	$V_{in} = 12\text{ V}$, $I_{out} = 30\text{ mA}$, $V_{REF/EN} = 5\text{ V}$ (Note 9)	ΔV_{out}	-5	-	5	mV

Tracking LDO's :

Product	Description	Compliance	Output	Polarity	VO (V)	IO Typ (A)	VI Min (V)	VI Max (V)	VDO Typ (V)	Iq Typ (mA)	PSRR (dB)	Application	Package Type
CS8182	LDO Regulator, 200 mA, with Tracking and Enable	AEC Qualified PPAP Capable Pb-free Halide free	Single	Positive	Tracking	0.2	3.4	45	0.35	0.075	60	Automotive	SOIC-8
NCV4250-2C	LDO Regulator, 50 mA, Ultra-Low Dropout, High PSRR	AEC Qualified PPAP Capable Pb-free Halide free	Single	Positive	Tracking	0.05	4	40	0.12	0.075	70	Automotive	TSOP-5 / SOT-23-5
NCV4254C	LDO Regulator, 70 mA, with Tracking	AEC Qualified PPAP Capable Pb-free Halide free	Single	Positive	Tracking	0.07	4	45	0.22	0.065	60	Automotive	SOIC-8 SOIC-8 EP
NCV8182C	LDO Regulator, 200 mA, Ultra-High PSRR, with Tracking	AEC Qualified PPAP Capable Pb-free Halide free	Single	Positive	Tracking	0.25	3.4	35	0.24	0.11	85	Automotive	DPAK-5
NCV8184	LDO Regulator, 70 mA, Low Iq	AEC Qualified PPAP Capable Pb-free Halide free	Single	Positive	Tracking	0.07	5.7	26	0.35	0.05	60	Automotive	DPAK-5 SOIC-8 SOIC-8 EP

Block Diagram



Automotive LDO Portfolio - Low input voltage

Post-Regulation LDO Portfolio

High PSRR, Low Noise

Low IQ

Production/ON Target 

PN	I _{LOAD}	PSRR @ 1kHz	Noise	Dropout	V _{IN}	V _{OUT}	I _Q	Package	RTM
NCV8170 	150mA	57dB	85μV _{RMS}	170mV	2.2V – 5.5V	1.2V – 3.6V	.05μA	1*1XDFN4, SOT563-6	Available
NCV8752 w/ PG 	200mA	68dB	11.5μV _{RMS}	130mV	2.0V – 5.5V	0.8V – 3.5V	12μA	1.5*1.5 XDFN6; TSOP-5	Available
NCV8163 ^{NEW} 	250mA	92dB	6.5μV _{RMS}	80mV	2.2V – 5.5V	1.2V – 5.3V	12μA	1*1 XDFN4; TSOP-5	Available
NCV8114 	300mA	75dB	70μV _{RMS}	135mV	1.7V – 5.5V	0.9V – 3.6V	50μA	TSOP-5	Available
NCV8161 	450mA	90dB	10μV _{RMS}	225mV	1.9V – 5.5V	1.9V – 5.5V	18μA	1*1 XDFN4; TSOP-5	Available
NCV8165 ^{NEW} 	500mA	85dB	8.5μV _{RMS}	190mV	1.9V – 5.5V	1.8V – 5.2V	12μA	3*3 DFNW8 (WF)	Available
NCV8705 	500mA	75dB	12μV _{RMS}	230mV	2.5V – 5.5V	0.8V – 3.5V, ADJ	13μA	2* 2 WDFN6, 3*3 DFN8	Available
NCV8177 	500mA	75dB	54μV _{RMS}	200mV	1.6V – 5.5V	0.7V – 3.6V	60μA	1*1 XDFN4; 2*2 WDFNW8 (WF)	Available
NCV8152 Dual 	150mA	75dB	75μV _{RMS}	150mV	1.9V – 5.25V	Multiple	50μA/channel	1.2*1.2 XDFN-6	Available
NCV8154 Dual 	300mA	75dB	75μV _{RMS}	160mV	1.9V – 5.25V	Multiple	55μA/channel	3*3 DFN10 (WF) 1.5*1.5 WDFN6 (WF)	Available
NCV8130 ^{NEW} 	300mA	65dB	40μV _{RMS}	75mV	0.8V – 5.5V	0.8V – 2.1V	80μA	1.2*1.2 XDFN6	Available
NCV8720 	350mA	65dB	40μV _{RMS}	110mV	0.8V – 5.5V	0.8V – 2.1V	80μA	2*2 WDFN6 (WF)	Available
NCV8133 	500mA	70dB	40μV _{RMS}	140mV	0.8V – 5.5V	0.8V – 3.6V	80μA	1.2*1.2 XDFN6	Available
NCV8135 ^{NEW}	500mA	60dB	35μV _{RMS}	40mV	0.4V – 5.5V	0.4V	35μA	2*2 WDFN6 (WF)	Available
NCV8716	80mA	52dB	190μV _{RMS}	250mV	2.5V – 24V	1.2V – 5V	5.8μA	1.5*1.5 XDFN6; SC70-5	Available
NCV8718 ^{NEW}	300mA	60dB	36μV _{RMS}	305mV	2.5V – 24V	1.2V – 5V	4μA	2*2 WDFN6	Available
NCV59800	1A	63dB	15μV _{RMS}	200mV	2.2V – 5.5V	0.8V – 5V (ADJ)	60μA	3*3 DFN8 (WF)	Available
NCV59748 w/ PG	1.5A	60dB	25μV _{RMS}	60mV	0.8V – 5.5V	ADJ	1.0mA	3*3 DFN10 (WF)	Available
NCV59744 w/ PG	3A	72dB	33μV _{RMS}	115mV	0.8V – 5.5V	0.8V – 3.6V ADJ	1.3mA	5*5 QFN20	Available

Wide VIN