

85V Input Voltage, 100mA, Very High Voltage Linear Regulator

Description

The NDP6802 is a very high voltage tolerant linear regulator in SOT89 package and is able to withstand continuous DC or transient input voltages of up to 85V.

The NDP6802 is stable with any output capacitance greater than 1 μ F and any input capacitance greater than 1 μ F, therefore NDP6802 only require minimal board space, the internal thermal shutdown and current limiting to protect the system during fault conditions.

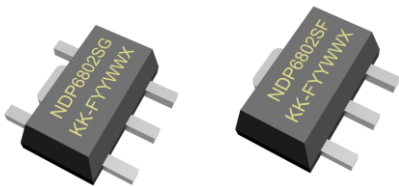
In addition, the NDP6802 is ideal for battery applications. It can also withstand and maintain regulation during very high and fast voltage transients. And only draw 3 μ A from input.

Features

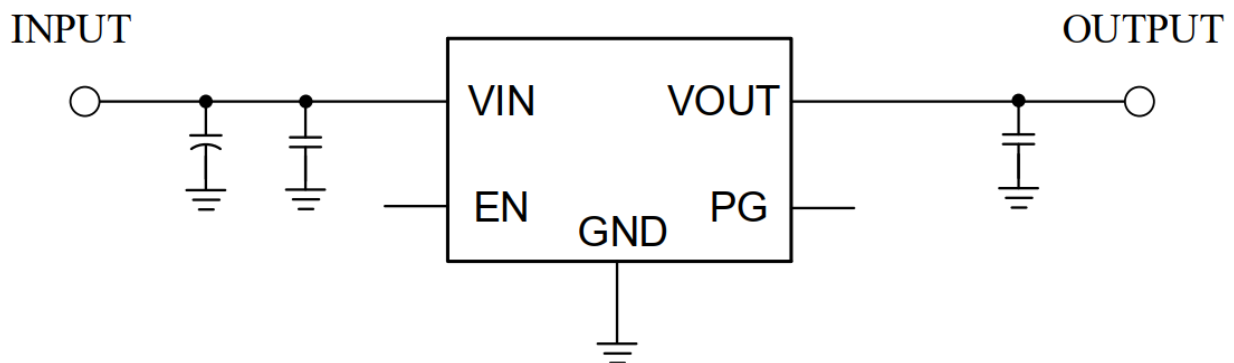
- Very High Maximum Input Voltage:85V
- Output Accuracy: $\pm 2\%$
- Low Quiescent Current:3 μ A
- Maximum Output Current:100mA
- Output Voltage: 3.3V/5.0V/12V
- Stable with Small Capacitance
- Input Capacitance $\geq 1\mu$ F
- Output Capacitance $\geq 1\mu$ F
- Built in Current Limit
- Built in Thermal Regulator
- Available in SOT89 Package

Applications

- Automotive
- Power over Ethernet
- Battery Powered Systems
- Bias Power Supplies



Typical Application

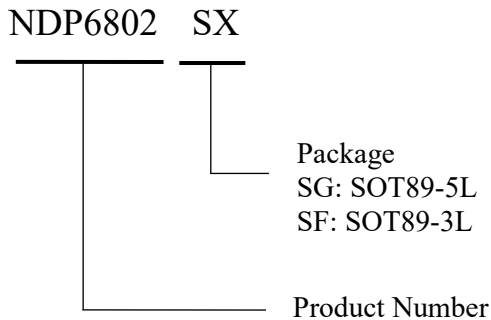


Note: When using a solid or ceramic input cap make sure the transient input voltage does not exceed 85V.

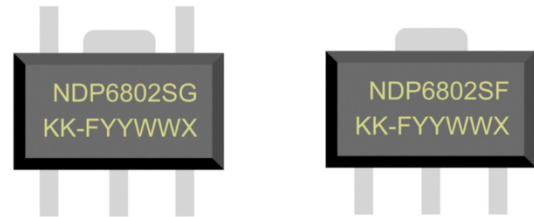
Order Information

Orderable Device	Package Type	Packing Qty/reel	MSL- Peak Temp -Floor Life	Eco Std	Marking Information
NDP6802SG	SOT89-5L	1000	MSL3-260°C-168hrs	RoHS & Green	Refer to below
NDP6802SF	SOT89-3L	1000	MSL3-260°C-168hrs	RoHS & Green	Refer to below

Product Naming



Top Side Marking



YY: Year (23=2023,24=2024...)
WW: Weekly (01-53)
F/X: Internal ID Code
KK: 33-3.3V Output
50-5.0V Output
A2-12V Output

Notes:

- (1) **RoHS:** Quoted from **RoHS Directive (EU) 2015/863**, Deep-Pool defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. Deep-Pool may reference these types of products as "**Pb-Free**".
- (2) **RoHS Exempt:** Deep-Pool defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
- (3) **Green:** Deep-Pool defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JEDEC (**JS709C**) low halogen requirements of ≤ 1000 ppm threshold.
- (4) **MSL, Peak Temp. -** The Moisture Sensitivity Level rating according to the JEDEC (**J-STD-020F**) industry standard classifications, as well as the peak solder temperature of SMT and the floor life after unpacking, which customers should pay attention and strictly comply with the standard to use.
- (5) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

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Pin Function and Definition



SOT89-5L	SOT89-3L	Pin Name	Description
1	/	EN	Enable, Internal Pull Up
2	2	GND	Ground
3	/	PG	Power Good, Open Drain Output
4	3	VOUT	Output
5	1	VIN	Power Input

Absolute Maximum Ratings (at T_A= 25°C)

Characteristics	Symbol	Rating	Units
VIN to GND		-0.3 to 95	V
VOUT to GND		-0.3 to 15	V
EN, PG to GND		-0.3 to 7	V
Power Dissipation	PD	1000	mW
Operating Junction Temperature	T _A	-40 to 150	°C
Storage Junction Temperature	T _{stg}	-65 to 150	°C

Notes:

1. The value of PD is also related to the heat dissipation capacity of printed circuit boards.
2. Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

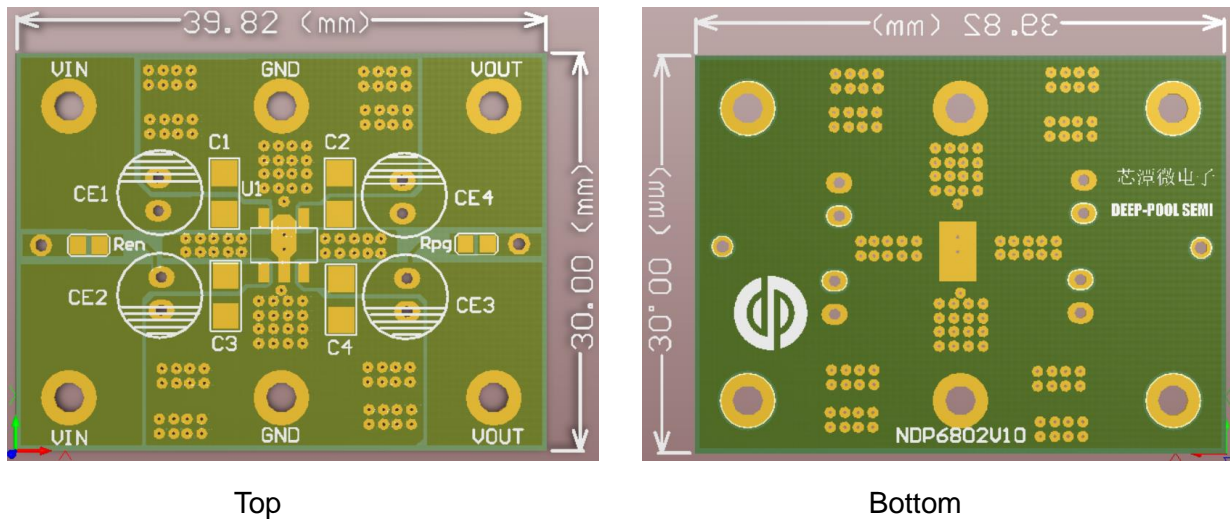
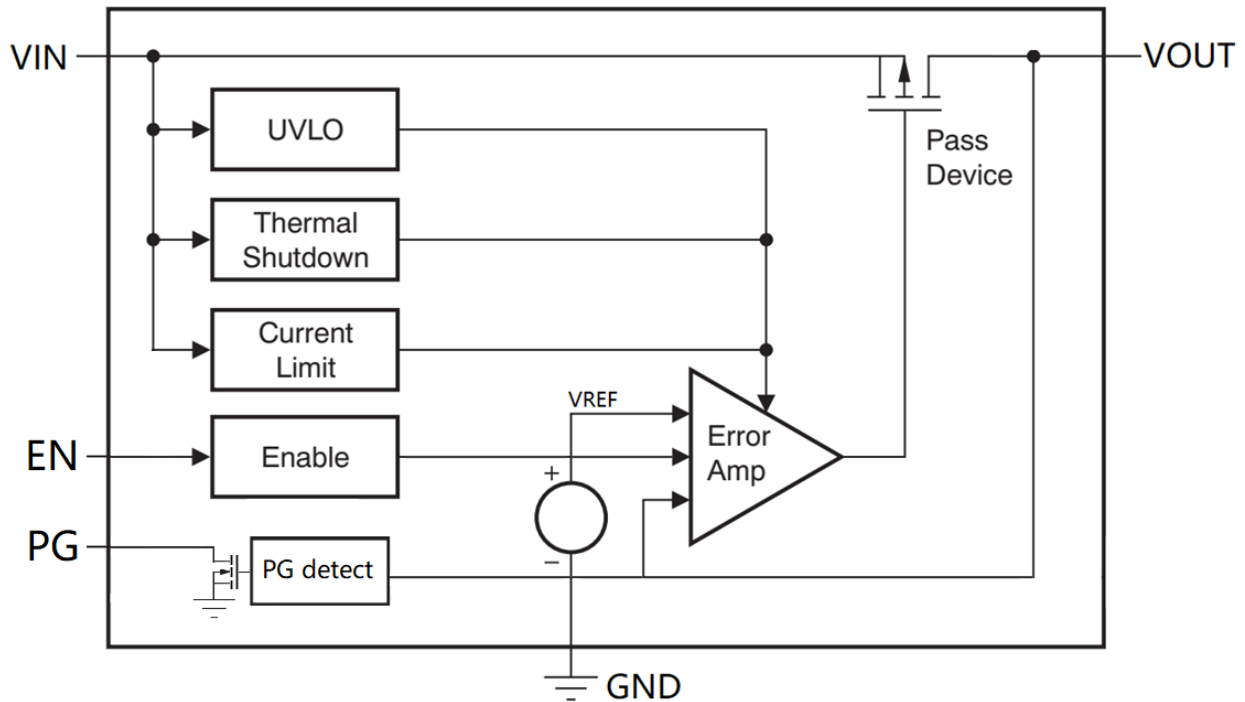
Recommended Operating Range

Electrical Parameter	Symbol	Min	Typ	Max	Units
Input Voltage	V _{IN}	V _{OUT} +2		72	V
Output Current	I _{OUT}	0		80	mA
Input Cap	C _{IN}	1			μ F
Output Cap	C _{OUT}	1			μ F
Thermal Resistance from Junction to Case	θ _{JC}		14.6		°C/W
Thermal Resistance from Junction to Ambient	θ _{JA}		44		°C/W

Electrical Characteristics

TJ = 25°C, V_{IN} = 48V, unless otherwise noted.

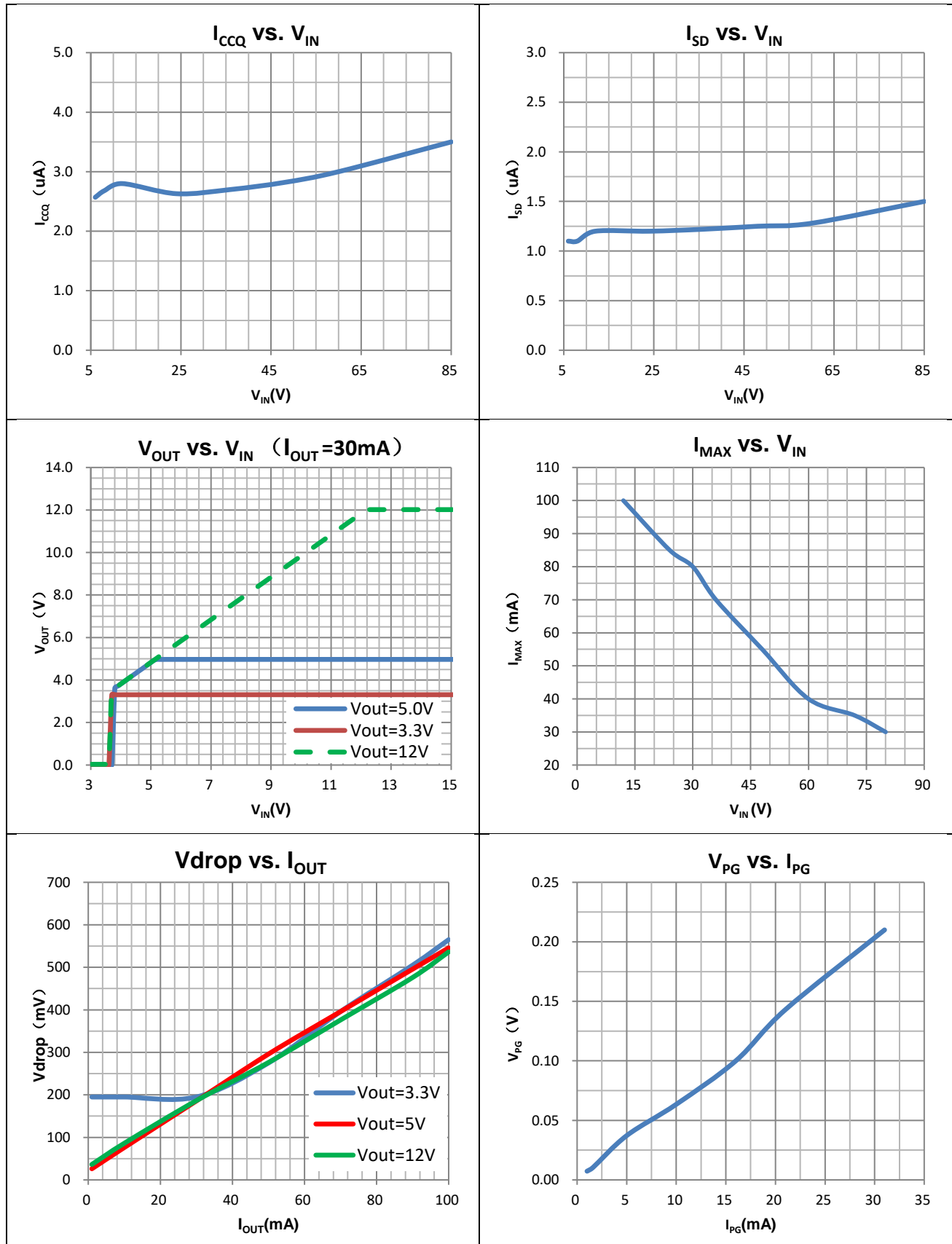
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	V _{IN}		4	-	85	V
UVLO OFF Voltage	V _{UVLO_OFF}	V _{IN} Rising	3.65	3.8	3.95	V
UVLO ON Voltage	V _{UVLO_ON}	V _{IN} Falling	3.3	3.4	3.5	V
Output Voltage	V _{OUT}	33 Device, I _{OUT} = 5mA	3.234	3.3	3.366	V
		50 Device, I _{OUT} = 5mA	4.90	5	5.10	V
		A2 Device, I _{OUT} = 5mA	11.76	12	12.24	V
Quiescent Current	I _{CCQ}	No Load		3.0	5.0	μA
Shutdown Current	I _{SD}	V _{EN} = 0V		1.1	1.5	μA
Power Supply Rejection Ratio	P _{SRR}	I _{OUT} = 15mA, C _{OUT} = 10μF, f = 100Hz		60		dB
Maximum Output Current	I _{MAX}	V _{IN} = 24V		100		mA
Current Limit	I _{LIMIT}			120		mA
Short Circuit Current	I _{SHORT}	V _{OUT} = 0V		120		mA
Dropout Voltage	V _{DROP}	33 Device, I _{OUT} = 50mA		550		mV
		50 Device, I _{OUT} = 50mA		300		mV
		A2 Device, I _{OUT} = 50mA		300		mV
Enable Internal Pull Up Voltage	V _{EN}			3.5		V
Enable ON Voltage	V _{EN_H}	V _{EN} Rising	1			V
Enable OFF Voltage	V _{EN_L}	V _{EN} Falling			0.3	V
PG Output Low Voltage	V _{PG_L}	I _{PG} = 5mA		30		mV
PG Pull Down OFF Voltage	V _{OUT_PGH}	33 Device, V _{OUT} Drooping		2.8		V
		50 Device, V _{OUT} Drooping		4.3		V
		A2 Device, V _{OUT} Drooping		10		V
Thermal Shutdown Temperature	T _{SD}			150		°C
Thermal Shutdown Hysteresis Temperature	T _{SH}			30		°C

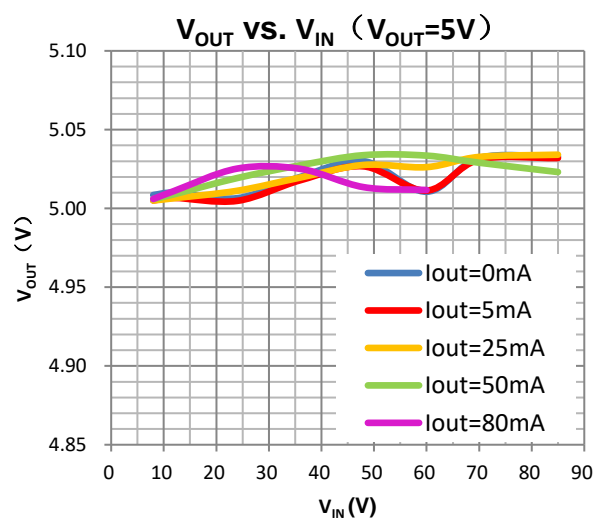
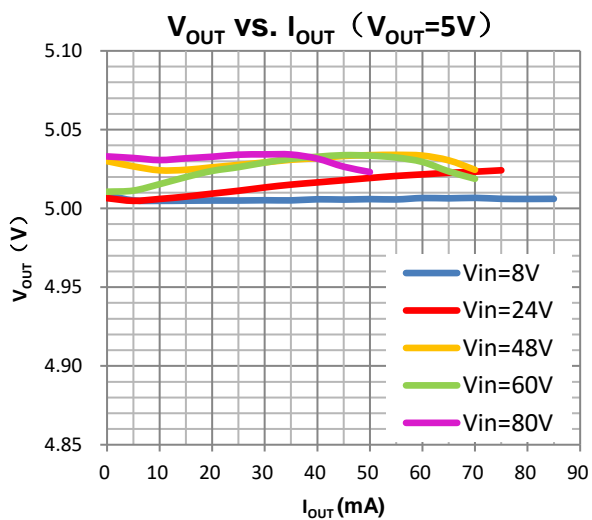
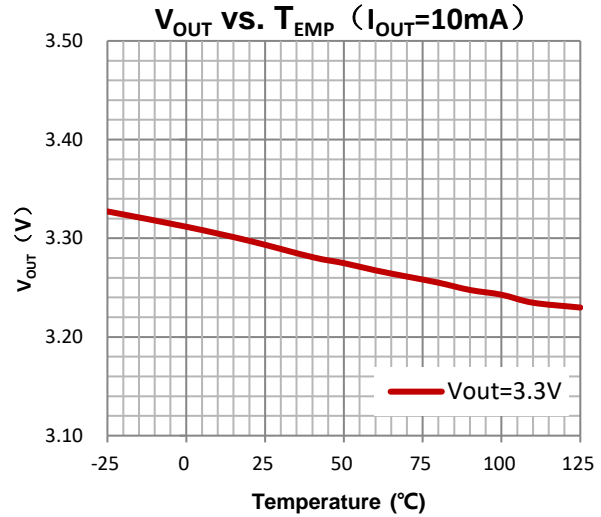
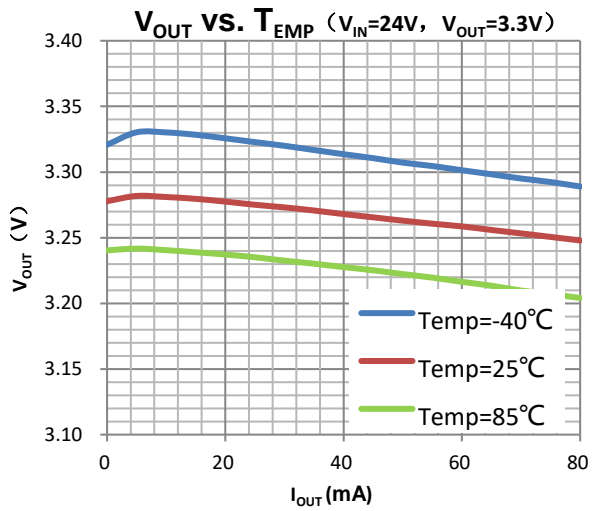
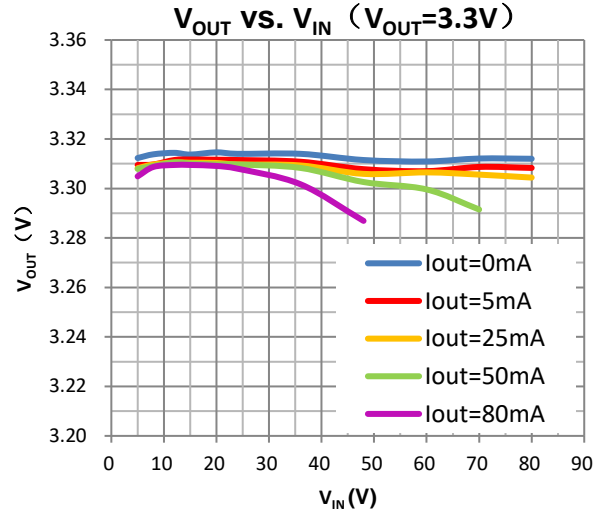
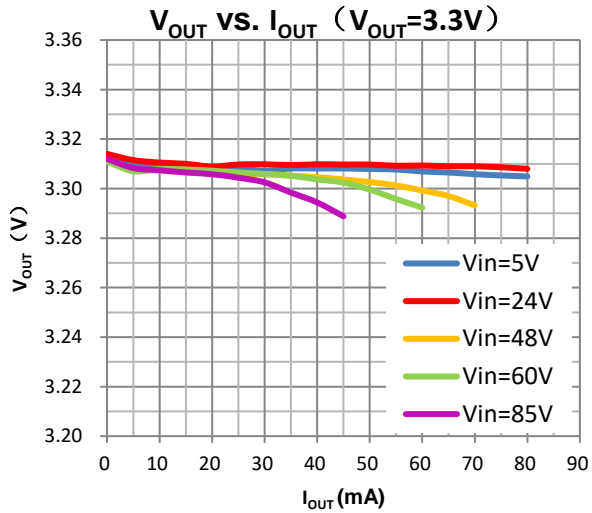


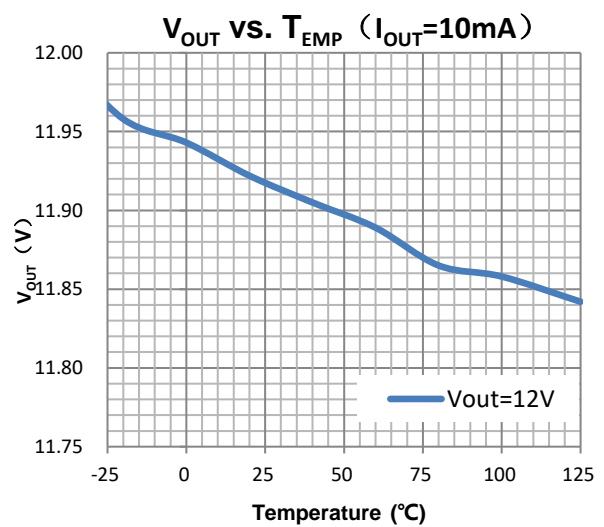
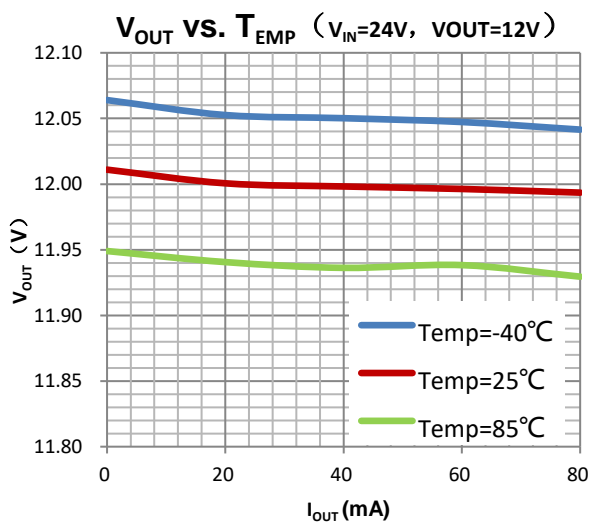
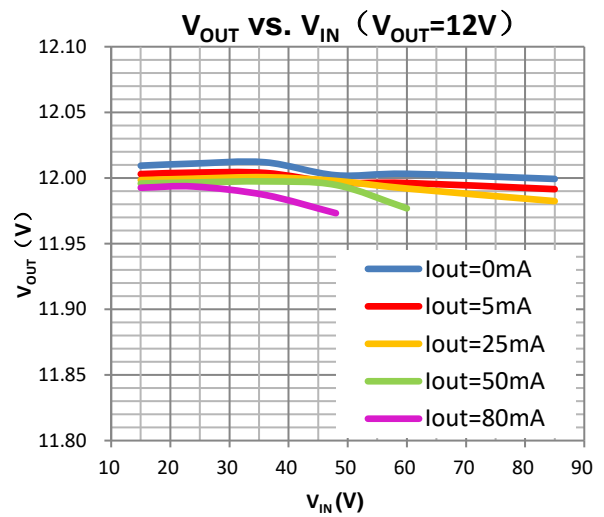
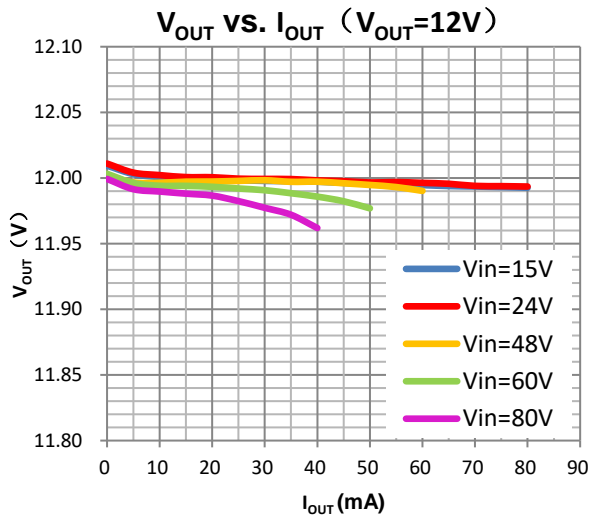
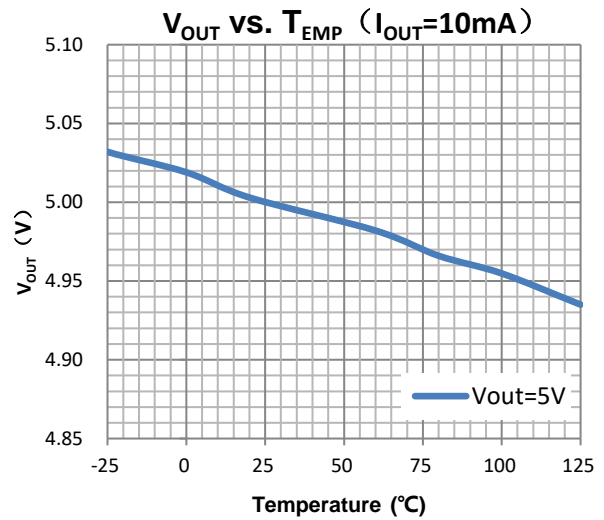
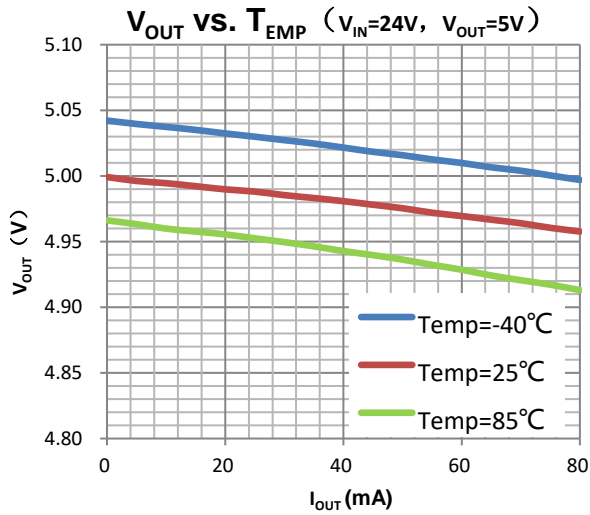
Note: Considering 12 cm² of copper Board heat-sink.

Typical Performance Characteristics

$T_J = 25^\circ\text{C}$, $V_{IN} = 48\text{V}$, unless otherwise noted.







Operation

The NDP6802 series is a very high voltage tolerant linear regulator, it is designed for use in high-voltage applications where standard linear regulators cannot be used. This function is fully integrated into a SOT89 package, minimizing PCB area and reducing number of components when compared with a multi-chip discrete solution.

Current Limit

The fixed internal current limit of the NDP6802 device helps protect the regulator during fault conditions. The maximum amount of current the device can source is the current limit (100mA, typical). For reliable operation, the device does not operate in current limit for extended periods of time.

Dropout Operation

If the input voltage is lower than the nominal output voltage plus the specified dropout voltage, but all other conditions are met for normal operation, the device operates in dropout mode. In this mode of operation, the output voltage is the same as the input voltage minus the dropout voltage. The transient performance of the device is significantly degraded because the pass device is in saturation and no longer controls the current through the LDO. Line or load transients in dropout can result in large output voltage deviations.

Power Good Instructions

PG is an open-collector flag that indicates output voltage regulation. PG pulls down if output voltage is above $0.85 \times V_{OUT}$. If the power good functionality is not needed, float the PG pin.

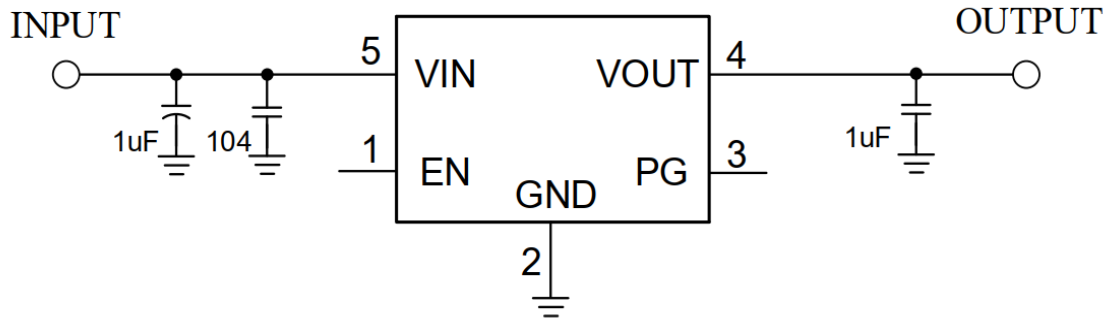
Input / Output Capacitor Requirements

The NDP6802 device linear regulator achieves stability with a minimum output capacitance of $1 \mu F$ and input capacitance of $1 \mu F$. Low equivalent series resistance (ESR) capacitors should be used for the input, output, and bypass capacitors. Ceramic capacitors with X7R and X5R dielectrics are required. Ceramic X7R capacitors offer improved voltage and temperature coefficients, while ceramic X5R capacitors are the most cost-effective and are available in higher values.

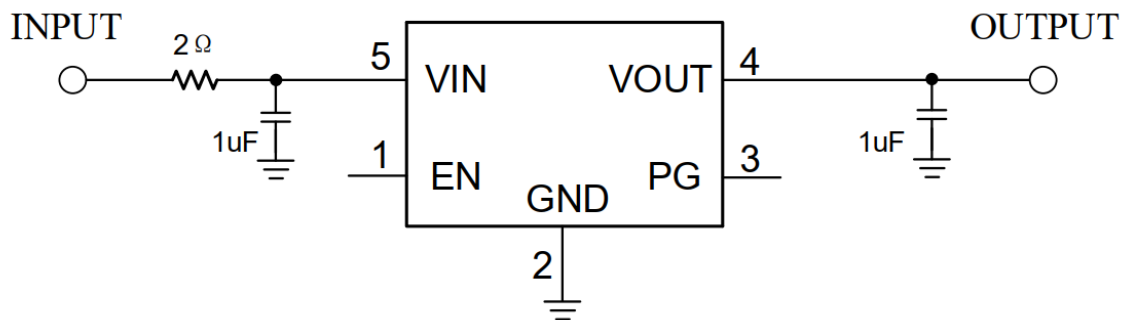
Thermal Protection

Thermal protection disables the output when the junction temperature rises to approximately $150^{\circ}C$, allowing the device to cool. When the junction temperature cools to approximately $120^{\circ}C$, the output circuitry is enabled. Depending on power dissipation, thermal resistance, and ambient temperature, the thermal protection circuit may cycle on and off. This cycling limits the dissipation of the regulator, protecting it from damage as a result of overheating.

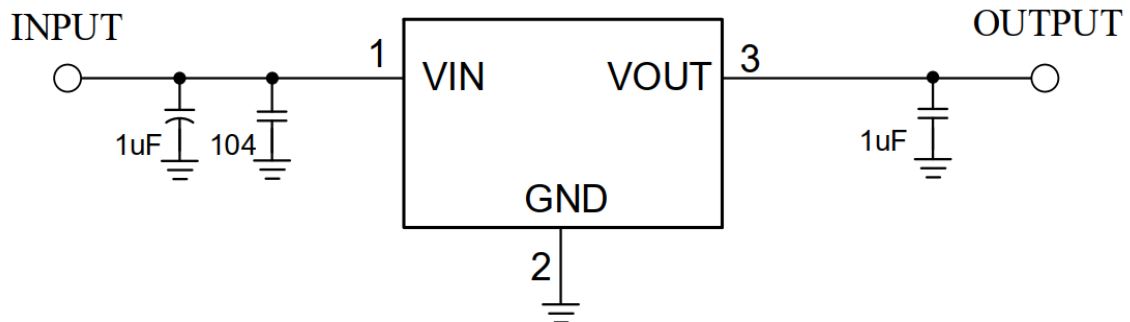
Typical Applications



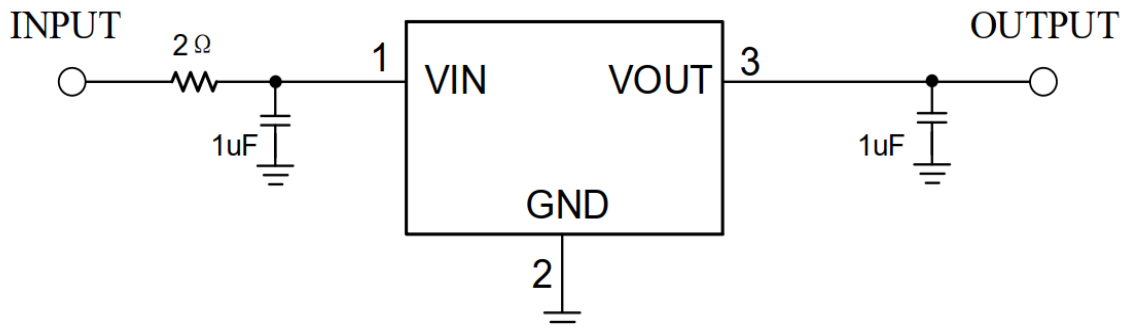
SOP89-5L Typical Application NO.1



SOP89-5L Typical Application NO.2



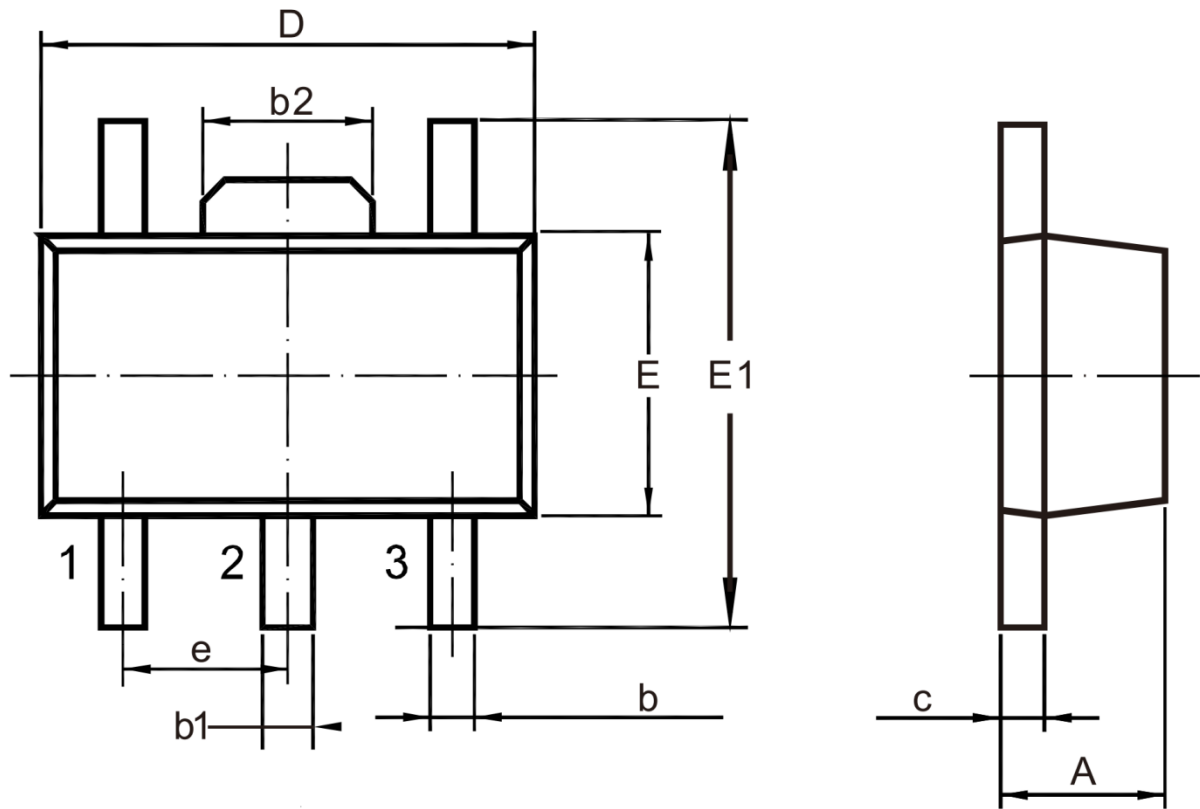
SOP89-3L Typical Application NO.1



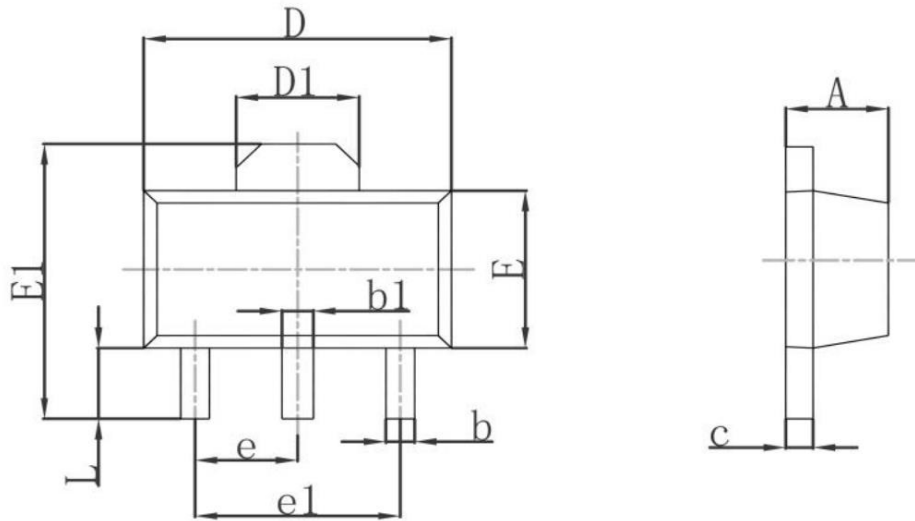
SOP89-3L Typical Application NO.2

Package Outline Drawing

SOT89-5L Package



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.4	1.6
b	0.35	0.45
b1	0.47	0.53
b2	1.5	1.6
c	0.3	0.5
D	4.4	4.6
E	2.4	2.6
E1	4.3	4.7
e	1.5 (BSC)	



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.400	1.600
b	0.320	0.520
b1	0.400	0.580
c	0.350	0.440
D	4.400	4.600
D1	1.550REF	
E	2.300	2.600
E1	3.940	4.250
e	1.500TYP	
e1	3.000TYP	
L	0.900	1.200

Notes

1. Use millimeters as the primary measurement
2. Dimensioning and tolerances conform to ASME Y14.5M. – 1994
3. These dimensions do not include mold flash or protrusions.
4. Mold flash or protrusions shall not exceed 0.15mm

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