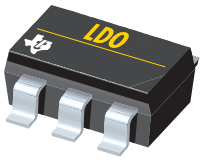
Texas Instruments Low Dropout Regulators (LDO) Quick-Reference Card



What is an LDO?

Low dropout regulators (LDOs) are a simple, inexpensive way to regulate an output voltage that is powered from a higher voltage input. Since LDOs are so easy to design with and use, most engineers have used an LDO at least once. For most applications, the parameters in an LDO datasheet are usually very clear and easy to understand, and this Quick-Reference Card outlines those key parameters for selecting the best LDO for your application.

LDO Parameters

- **Input Voltage**

The minimum V_{IN} must be larger than $V_{OUT} + V_{DO}$, independent from the minimum value given in the selection table.

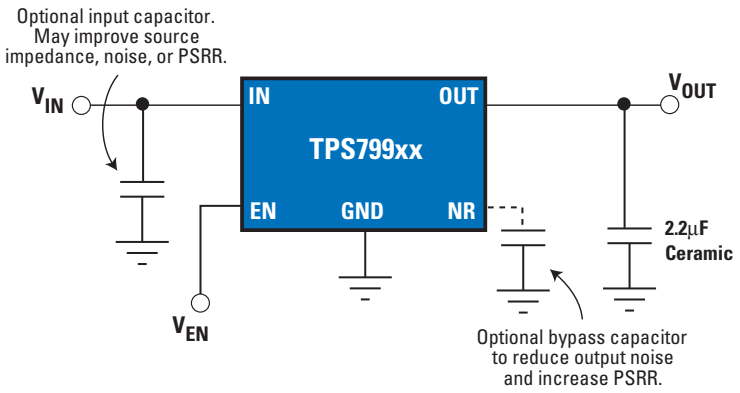
- **Efficiency**

By neglecting the quiescent current (Iq) of the LDO, efficiency can be calculated as V_{OUT}/V_{IN}.

- **Power Dissipation**

$P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$; P_D is limited by package, T_A and T_{JMAX}. Refer to application note SLVA118, "Digital Designer's Guide to Linear Voltage Regulators and Thermal Management," for support. For higher power dissipation or requirements for higher efficiency, TI recommends stepdown (buck) DC/DC converters/controllers.

Typical LDO Circuit



- **Capacitor Requirements**

The output capacitor and especially Equivalent Series Resistance (ESR) are critical for stability. Therefore, some LDOs require tantalum output capacitors, which have high ESR. If an LDO is stable with no output capacitor or with low-ESR ceramic output capacitors, it is usually stable with all capacitor types. Most newer LDOs are stable with low-cost ceramic output capacitors.

- **Noise and PSRR**

Select an LDO with high power supply ripple rejection (PSRR) for noise immunity from the input supply and low output noise (< 50 µVrms). Some LDOs have a bypass (BP) pin for adding capacitance to lower the output noise.

- **PG/SVS**

Devices such as microprocessors, DSPs and FPGAs require a minimum voltage for proper operation. The supply voltage supervisor (SVS) function monitors the system voltages and outputs a signal when the voltages drop below a certain value, so the system can reset and prevent malfunction. An SVS asserts the reset signal after a specified delay, while a Power-Good (PG) function does not have a delay.

- **Reverse Leakage Protection**

In special applications where the voltage on the output of the LDO is higher than the input, the reverse leakage protection feature prevents current from flowing from the LDO output to the input, which can be damaging to the input supply, especially if it is a battery.

Quick Recommendations

Device Family	Output Current	Output Voltages	Package	Price[1]	Features[2]
TPS715xx	50 mA	Adj.,2.5,3.0,3.3,5.0	5/SC-70	$0.34	None
TPS730xx	200 mA	Adj.,1.8,2.5,2.8,2.85,3.0,3.3	5/SOT23	$0.20	EN,BP
			5/WCSP	$0.25	
TPS799xx	200 mA	Adj.,1.2,1.5,1.8,1.9,2.5,2.7,2.8,2.85,3.0,3.3 *"Other voltage options can be available using factory programmable EEPROM technology."*	5/SOT23	$0.30	EN,BP
			5/WCSP	$0.35	
			2x2 QFN	(November '05)	
TPS736xx	400 mA	Adj.,1.25,1.5,1.8,2.5,3.0,3.3 *"Other voltage options can be available using factory programmable EEPROM technology."*	5/SOT23	$0.95	EN,BP
			6/SOT223	$0.95	
			8/QFN	$0.95	
TPS796xx	1000 mA	Adj.,1.8,2.5,2.8,3.0,3.3	6/SOT223	$1.10	EN,BP
			8/QFN	$1.20	
			5/TO263	$1.30	
TPS752xx	2000 mA	Adj.,1.5,1.8,2.5,3.3	20/HTSSOP	$1.80	/EN,SVS

[1]Suggested resale price in U.S. dollars in quantities of 1,000. [2]EN = active high enable, /EN = active low enable, SVS = supply voltage supervisor, BP = bypass pin for noise reduction capacitor.

Quick Cross Reference

TI Device #	TI Pin/Package	Comp Part#	Comp Name	Comp Pin/Package	Notes
TPS730xxDBV	5/SOT23	LP2985IM5X-xx	NSC	5/SOT23	—
TPS730xxDBV	5/SOT23	LP2985AIM5X-xx	NSC	5/SOT23	Grade A
TPS730xxYZQ	5/WCSP	LP2985ITP-x.x	NSC	5/MicroSMD	—
TPS730xxYZQ	5/WCSP	LP2985AITP-x.x	NSC	5/MicroSMD	Grade A
TPS793xxDBV	5/SOT23	LP2985IM5X-xx	NSC	5/SOT23	—
TPS793xxDBV	5/SOT23	LP2985AIM5X-xx	NSC	5/SOT23	Grade A
TPS793xxYZQ	5/WCSP	LP2985ITP-x.x	NSC	5/MicroSMD	—
TPS793xxYZQ	5/WCSP	LP2985AITP-x.x	NSC	5/MicroSMD	Grade A
TPS799xxDBV	5/SOT23	LP3985IM5-x.x	NSC	5/SOT23	—
TPS799xxYZU	5/WCSP	LP3985ITL-x.x	NSC	5/MicroSMD	.600mm Height
TPS799xxYZU	5/WCSP	LP3985IBL-x.x	NSC	5/MicroSMD	.995mm Height
TPS799xxYZU	5/WCSP	LP3999ITL-x.x	NSC	5/MicroSMD	.600mm Height

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