

LDO Regulators Glossary

Outline

The Low Drop Out (LDO) regulator operates even when the voltage difference between the input and output is low.

This document explains terminologies such as absolute max. rating, operating range, electric characteristics, and built-in function listed in LDO regulator datasheet.

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1. Absolute maximum ratings

Term	Symbol	Description
Input voltage	V_{IN}	The maximum rated voltage that can be applied to the V_{IN} terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Bias voltage	V_{BAT} V_{BIAS}	The maximum rated voltage that can be applied to the V_{BAT} or V_{BIAS} terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Control voltage	V_{CT}	The maximum rated voltage that can be applied to the CONTROL terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Adjustable voltage	V_{ADJ}	The maximum rated voltage that can be applied to the V_{BAT} or V_{ADJ} terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Output voltage	V_{OUT}	The maximum rated voltage that can be applied to the V_{OUT} terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Output current	I_{OUT}	The maximum rated current that can be applied to the output terminal without causing permanent damage to an IC or degrading its characteristics or reliability
Power dissipation	P_D	The maximum power consumption that does not cause permanent damage to an IC over the entire operating range
Operating temperature range	T_{opr}	The ambient temperature range in which an IC functions properly
Storage temperature range	T_{stg}	The ambient temperature range in which an IC can be stored and transported without voltage application

2. Operating range

Term	Symbol	Description
Input voltage	V_{IN}	The input voltage range in which the normal operation and electrical characteristics of an IC are guaranteed
Bias voltage	V_{BIAS}	The bias voltage range in which the normal operation and electrical characteristics of an IC are guaranteed
Control voltage	V_{CT}	The control voltage range in which the normal operation and electrical characteristics of an IC are guaranteed
Output voltage	V_{OUT}	The output voltage range in which the normal operation and electrical characteristics of an IC are guaranteed
Output current	I_{OUT}	The maximum output current at which the normal operation and electrical characteristics of an IC are guaranteed
Input capacitor	C_{IN}	The minimum input capacitor value at which the normal operation and electrical characteristics of an IC are guaranteed
Bias capacitor	C_{BIAS}	The minimum bias capacitor value at which the normal operation and electrical characteristics of an IC are guaranteed
Output capacitor	C_{OUT}	The minimum output capacitor value at which the normal operation and electrical characteristics of an IC are guaranteed
Operating temperature	T_{opr}	The operating temperature range in which the normal operation and electrical characteristics of an IC are guaranteed

3. Electrical characteristics

Term	Symbol	Description
Output voltage accuracy	V_{OUT}	The accuracy of output voltage when the output current specified as a test condition is applied
Bias voltage	V_{BAT} V_{BIAS}	The bias voltage range in which the proper operation and electrical characteristics of an IC are guaranteed
Input voltage	V_{IN}	The input voltage range in which the proper operation and electrical characteristics of an IC are guaranteed
Adjustable voltage	V_{ADJ}	The reference voltage of the internal error amplifier
Line regulation	Reg·line	The variation of the output voltage as a function of input voltage changes over the specified test condition
Load regulation	Reg·load	The variation of the output voltage as a function of output current changes over the specified test condition
Quiescent current	I_B	The current that flows to the GND terminal under the specified test conditions
Standby current	$I_B(OFF)$ $I_{BIAS(OFF)}$ $I_{IN(OFF)}$	The current that flows to the GND terminal when an IC is in the standby state by maintaining the control voltage at zero
Minimum dropout voltage	$V_{IN} - V_{OUT}$ V_{DO}	The drain-source on-voltage of the output MOSFET when the output current specified as a test condition is applied
Temperature coefficient	T_{CVO}	The rate of change of the output voltage over the temperature range specified as a test condition
Output noise voltage	V_{NO}	The noise voltage generated at the output of the specified test circuit
Ripple rejection ratio	R.R.	The ratio of output voltage ripple to input voltage ripple applied to the specified test circuit
Control voltage (ON)	$V_{CT(ON)}$	The CONTROL terminal voltage at which an IC turns on
Control voltage (OFF)	$V_{CT(OFF)}$	The CONTROL terminal voltage at which an IC is in the standby state
Control pulldown current	I_{CT}	The current that flows through the CONTROL terminal when the control voltage specified as a test condition is applied
Load transient response	ΔV_{OUT}	The variation of the output voltage as a function of output current changes over the specified test condition
Undervoltage lockout	V_{UVLO}	The input voltage at which the undervoltage lockout circuit is tripped to prevent a malfunction in the event of the voltage dropping below the operational value
Output discharge on-resistance	R_{SD}	The value of the resistor that discharges an output capacitor when the output turns off

Term	Symbol	Description
Turn-on delay Turn-off delay	t_{ON} t_{OFF}	<p>The time required for the output voltage to rise to its 90% point after the control voltage rises to its 10% point, and the time required for the output voltage to fall to its 10% point after the control voltage falls to its 90% point</p>

4. Built-in Functions

Term	Description
Overcurrent protection	A protection function that limits the output current in the event that it exceeds the programmed value
Foldback	A protection function that decreases the output voltage and thereby the output current in the event of an overcurrent condition. This output voltage-vs-output current curve is called the foldback curve.
Thermal shutdown	A function that protects an IC by turning off its output in the event that the IC temperature exceeds the programmed value
Inrush current reduction	A function that prevents a false malfunction of the overcurrent protection circuitry and an overshoot of the output voltage by limiting the current that flows to an output capacitor when the output turns on
Auto output discharge function	A function that discharges the charge stored in an output capacitor when the CONTROL terminal voltage drops to the Low level, turning off the output
Undervoltage lockout circuit	A function that maintains an IC in the standby state to prevent a malfunction in the event that the input voltage drops below the specified operating value
Output-voltage soft-start	A function that prevents a malfunction of the overcurrent protection circuitry and an overshoot of the output voltage by slowly raising the output voltage to slowly charge an output capacitor
Control pulldown connection	A function that pulls the CONTROL terminal to the Low level to prevent the internal circuitry from entering an undefined state in the event that the CONTROL terminal becomes open

5. Related Links

- Product Line Ups (Catalog)
- Product Line Ups (Detail)
- Product Line Ups (Parametric search)
- Stock check & Purchase
- FAQ of Low Dropout Regulator ICs
- Application Notes

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