LDO_513

IP Library: Power Supply Range 2.9V to 13V, Low Power, 50mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- CHARGE CONTROL REGULATOR
- VERY LOW DROPOUT VOLTAGE : 60mV
- LARGE INPUT VOLTAGE RANGE
- OUTPUT CURRENT : 50mA
- LOW QUIESCENT CURRENT : 280µA
- HIGH PSRR : 60dB
- NO CURRENT IN POWER DOWN MODE
- SHORT CIRCUIT PROTECTION

TYPICAL APPLICATIONS

– Cellular and Cordless phones supplied by 1 cell Lithium-ion battery / 3 cells Ni-MH or Ni-Cd battery

– PDA (Personal Digital Assistant), Smart phone

– Portable equipment

– Supply for Charge control devices of cellular phone

APPLICATION NOTE

An external capacitor (C_{OUT} = 1µF) with an equivalent serial resistance (ESR) in the range 0.02 to 0.6Ω is used for regulator stability.

The regulator needs two separated power supplies, one (V_{5V}) for the digital parts and programming inputs (Stand-by and Power-down mode) which cannot exceed 5V and one (Vin) as the input voltage of the regulator.

Figure 1 : Block Diagram

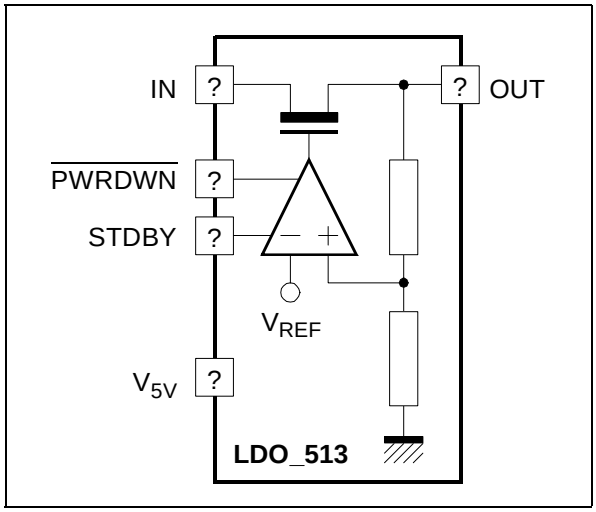
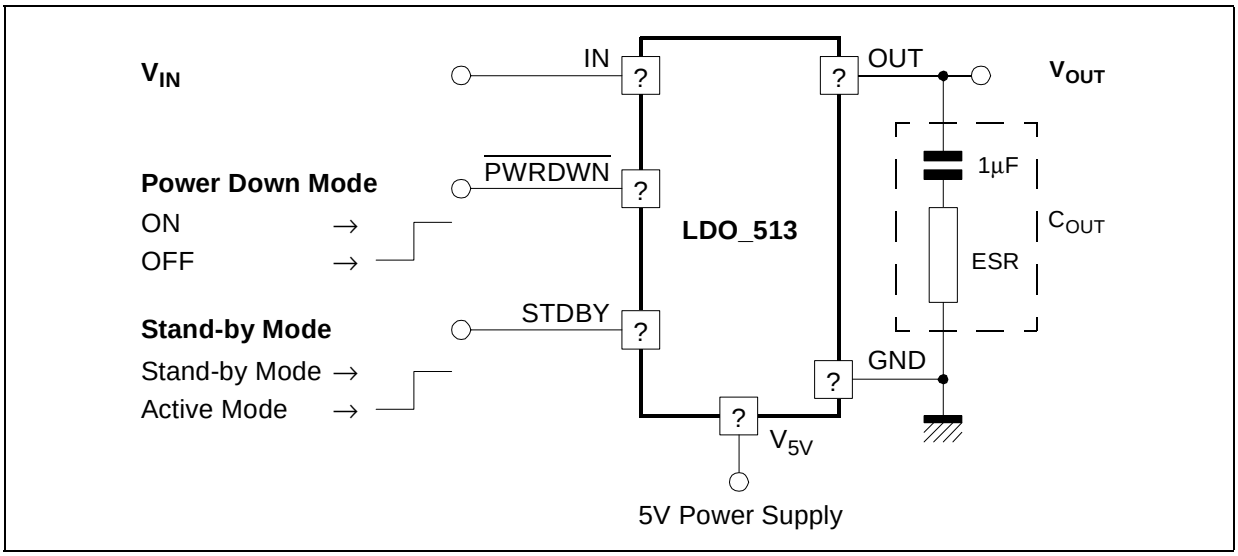


Figure 2 : Typical Application Circuit



ELECTRICAL CHARACTERISTICS

2.9V < V_{IN} < 13V, -30°C < T_A < +85°C, C_{OUT} = 1µF ±20%, 20mΩ < ESR < 0.6Ω, I_{LOAD} = 50mA.

Typical case: V_{IN} = 4V, T = 25°C, C_{OUT} = 1µF.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Voltage Range (Note 1)	V_{IN}		2.9		13	V
Output Voltage	Vout		1.8		5	V
Output Voltage Accuracy				3		%
Output current	I_{OUT}				50	mA
Dropout Voltage	ΔV_{DO}	ΔV_{OUT} = 50mV, I_{LOAD} = 50mA			70	mV
		(Note 2)	200			
Quiescent current	I_Q	I_{LOAD} = 100µA		40		µA
		I_{LOAD} = 10mA		100		
		I_{LOAD} = 50mA		270	340	
Power down mode quiescent current	I_{QPDM}	Power down active		100		nA
Power Supply Rejection Ratio	PSRR	DC	45	60		dB
		f = 10KHz	40	60		
Line Regulation	L_{IR}	I_{LOAD} = 50mA, V_{IN} = 3V to 13V			3	mV
Load Regulation	L_{DR}	I_{LOAD} = 100µA - 50mA			40	mV
Line Transient	L_{IRT}	ΔV_{IN} = 300mV t_{RISE} = t_{FALL} = 10µs			3	mV
Load Transient	L_{DTR}	I_{LOAD}=100µA - 50mA in 10µs			6	mV
Output Noise Voltage	en	100Hz		1.2		$\frac{\mu V}{\sqrt{Hz}}$
		1KHz		400		$\frac{nV}{\sqrt{Hz}}$
		10KHz		150		
		100KHz		70		
	en_{RMS}	BW : 100Hz to 100KHz		35		μV_{RMS}
Output decoupling Capacitor	C_{OUT}			1		µF
Settling time		From power down to active mode			120	µs
Short Circuit Current Limit	I_{SHORT}			100	220	mA

Notes: 1. Above characteristics are given for 2.9V minimum input operating range voltage, but regulator is operational with 2.7V minimum input voltage.

2. All parameters are guaranteed with 200mV min Dropout voltage.

ELECTRICAL CHARACTERISTICS : STAND-BY MODE

$3V < V_{IN} < 5.5V$, $-30°C < T_A < +85°C$, $V_{REF} = 2.8V$, $C_{OUT} = 4.7\mu F \pm 20\%$, $20m\Omega < ESR < 0.6\Omega$.
$I_{LOAD} = 500\mu A$.

Typical case : $V_{IN} = 4V$, Ambient temperature, $I_{LOAD} = 500\mu A$.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output current in stand-by mode	$I_{OUTSTDBY}$				500	µA
Quiescent Current in stand-by mode	I_{STDBY}	$I_{LOAD} = 500\mu A$		20	40	µA
Power Supply Rejection Ratio in stand-by mode	$PSRR_{STY}$	f = 10KHz		70		dB

TYPICAL CHARACTERISTICS

Figure 3 : PSRR vs Frequency for Various Voltage Drop (I_{LOAD} = 50mA)