



# LDO\_517

## IP Library: Wide Range ESR Capacitor, Low Noise, 100mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- AnyESR REGULATOR
- VERY COMMON OUTPUT DECOUPLING CERAMIC CAPACITOR
- LOW CONSUMPTION : 250µA FULL LOAD
- VERY LOW NOISE : 30µV
- VERY LOW DROPOUT VOLTAGE : 50mV
- HIGH PSRR : 60dB
- STANDBY AND POWER DOWN MODE
- 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 RF devices for cellular phone

### APPLICATION NOTE

An external capacitor ( $C_{OUT} = 1\mu F$ ) with an equivalent serial resistance (ESR) up to  $1\Omega$  is used for regulator stability.

Figure 1 : Block Diagram

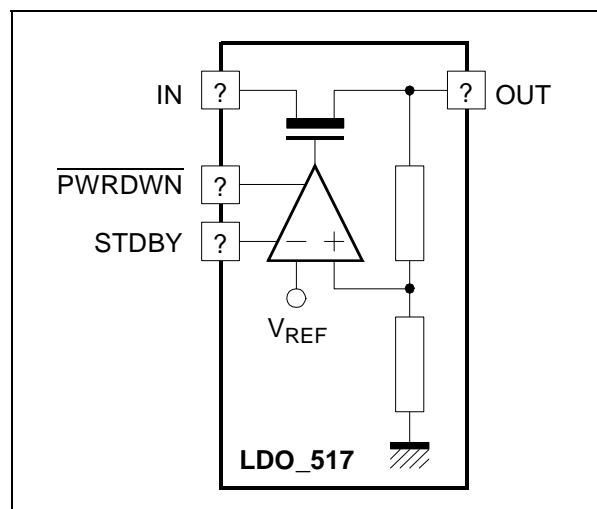
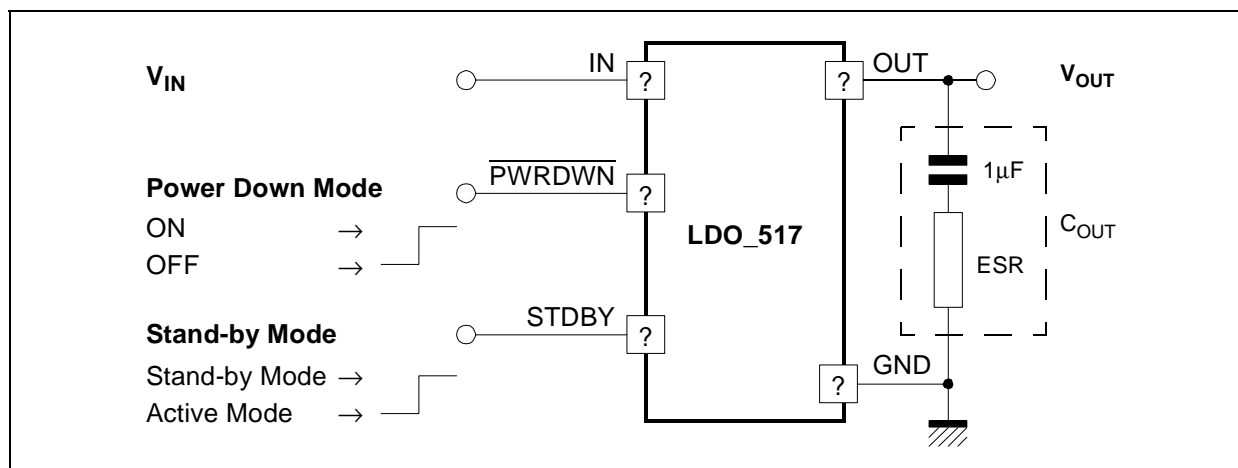


Figure 2 : Typical Application Circuit



**ELECTRICAL CHARACTERISTICS**

$3V < V_{IN} < 5.5V$ ,  $-30^{\circ}C < T_A < +125^{\circ}C$ ,  $C_{OUT} = 1\mu F \pm 20\%$ ,  $ESR < 1\Omega$ ,  $I_{LOAD} = 100mA$ .

Typical case :  $V_{IN} = 4V$ ,  $T = 25^{\circ}C$ ,  $C_{OUT} = 1\mu F$ .

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Voltage Range (Note 1)	$V_{IN}$		3		5.5	V
Output Voltage	$V_{OUT}$			2.8		V
Output Voltage Accuracy				3		%
Output current	$I_{OUT}$				100	mA
Dropout Voltage	$\Delta V_{DO}$	$\Delta V_{OUT} = 50mV$ , $I_{LOAD} = 100mA$			50	mV
		(Note 2)	170			
Quiescent current	$I_Q$	$I_{LOAD} = 100\mu A$		50	65	$\mu A$
		$I_{LOAD} = 100mA$		250	450	
Power down mode quiescent current	$I_{QPDM}$	Power down active		100		nA
Power Supply Rejection Ratio	PSRR	DC ; Dropout = 170mV	45	55		dB
		10KHz < f < 100KHz	45	55		
		DC ; Dropout = 200mV	55	60		
		10KHz < f < 100KHz	50	60		
Line Regulation	$L_{IR}$	$I_{LOAD} = 100mA$ , $V_{IN} = 3V$ to 5.5V		5	15	mV
Load Regulation	$L_{DR}$	$I_{LOAD} = 100\mu A - 100mA$		15	20	mV
Line Transient	$L_{IRT}$	$\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$			3	mV
Load Transient	$L_{DTR}$	$I_{LOAD} = 100\mu A - 100mA$ in 10 $\mu s$			3	mV
Output Noise Voltage (Note 3)	en	100Hz		80		$\frac{nV}{\sqrt{Hz}}$
		1KHz - 10KHz		70		
		100KHz		85		
	en <sub>RMS</sub>	BW : 100Hz to 100KHz			30	$\mu V_{RMS}$
Output decoupling Capacitor	$C_{OUT}$			1		$\mu F$
Settling time		$I_{LOAD} = 100mA$		20		$\mu s$
Short Circuit Current Limit	$I_{SHORT}$		200	400	800	mA

Notes: 1. Above characteristics are given for 3V minimum input operating range voltage, but regulator is operational with 2.5V minimum input voltage.

2. All parameters are guaranteed with 170mV min Dropout voltage.

3. Output Noise density reaches its maximum at 1MHz (300nV /  $\sqrt{Hz}$  typical).

**ELECTRICAL CHARACTERISTICS : (STAND-BY MODE)**

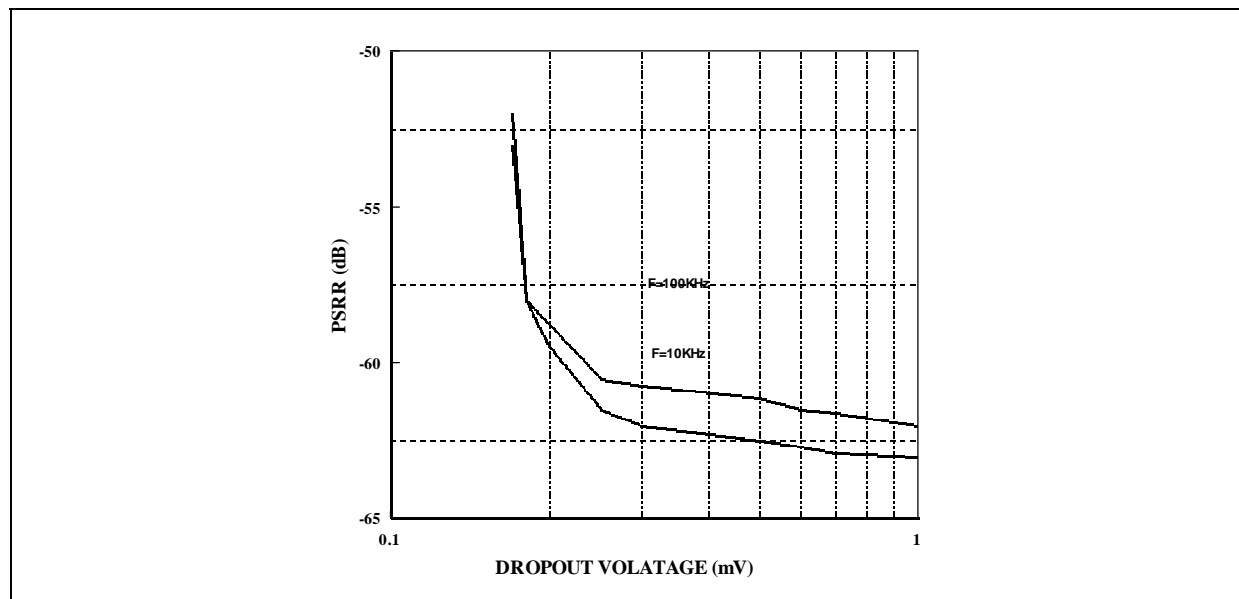
$3V < V_{IN} < 5.5V$ ,  $-30^{\circ}C < T_A < +125^{\circ}C$ ,  $C_{OUT} = 1\mu F \pm 20\%$ ,  $ESR < 1\Omega$ ,  $I_{LOAD} = 500\mu A$ .

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	$\mu A$
Quiescent Current in stand-by mode	$I_{STDBY}$	$I_{LOAD} = 500\mu A$		15	20	$\mu A$
Power Supply Rejection Ratio in stand-by mode	PSRR <sub>STY</sub>	DC ; Dropout > 1V		65		dB
		f = 10KHz		65		
		f = 100KHz		45		
Line Regulation in stand-by mode	$L_{IRSTBY}$	$V_{IN} = 3V$ to 5.5V		2		mV
Load Regulation in stand-by mode	$L_{DRSTBY}$	$I_{LOAD} = 100\mu A - 500\mu A$		1		mV

**TYPICAL CHARACTERISTICS**

**Figure 3** : PSRR vs Dropout for Various Frequency ( $V_{OUT} = 2.8V$ , Full Load)



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