

## IP Library: Low Noise, High PSRR 100mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- ULTRA LOW POWER REGULATOR
- ULTRA LOW CONSUMPTION : 45µA FULL LOAD
- VERY LOW NOISE : 30µV
- VERY LOW DROPOUT VOLTAGE : 50mV
- HIGH PSRR : 60dB
- SMALL DECOUPLING CERAMIC CAPACITOR
- 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 ( $C_{OUT} = 2.2\mu\text{F}$ ) with an equivalent serial resistance (ESR) in the range of 0.02 to 0.6Ω is used for regulator stability.

Figure 1 : Block Diagram

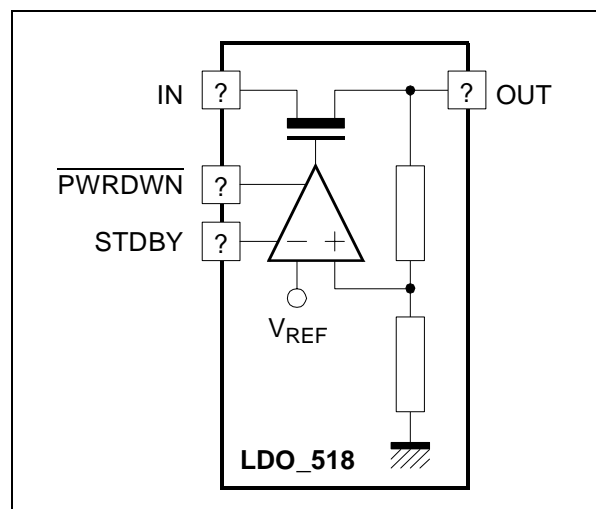
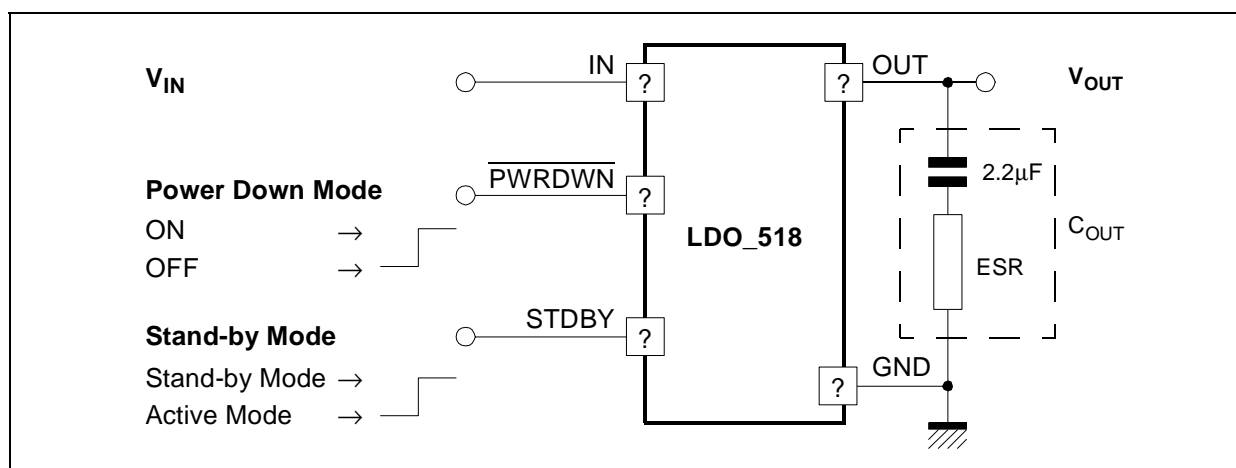


Figure 2 : Typical Application Circuit



**ELECTRICAL CHARACTERISTICS**

$2V < V_{IN} < 5V$ ,  $-55^{\circ}C < T_A < +125^{\circ}C$ ,  $C_{OUT} = 2.2\mu F \pm 20\%$ ,  $20\ m\Omega < ESR < 0.6\Omega$ ,  $I_{LOAD} = 100mA$ .

Typical case :  $V_{IN} = 4V$ ,  $T = 25^{\circ}C$ ,  $C_{OUT} = 2.2\mu F$ .

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Voltage Range (Note 1)	$V_{IN}$		2		5	V
Output Voltage	$V_{OUT}$			1.8		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	$I_Q$	$I_{LOAD} = 100\mu A$		25		$\mu A$
		$I_{LOAD} = 1mA$		25		
		$I_{LOAD} = 10mA$		30		
		$I_{LOAD} = 50mA$		35		
		$I_{LOAD} = 100mA$		45	50	
Power down mode quiescent current	$I_{QPDM}$	Power down active		100		nA
Power Supply Rejection Ratio	PSRR	$\Delta V_{DO} = 170mV$ ; $f < 1KHz$	45	50		dB
		$f < 10KHz$	35	40		
		$\Delta V_{DO} = 500mV$ ; $f < 100Hz$	60	65		
		$f < 1KHz$	55	60		
		$f < 10KHz$	40	45		
Line Regulation	$L_{IR}$	$I_{LOAD} = 100mA$ , $V_{IN} = 2V$ to $5V$		0.5	1	mV
Load Regulation	$L_{DR}$	$I_{LOAD} = 100\mu A - 100mA$		15	20	mV
Line Transient	$L_{IRT}$	$\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$		6	10	mV
Load Transient	$L_{DTR}$	$I_{LOAD} = 100\mu A - 100mA$ in $10\mu s$		7	50	mV
Output Noise Voltage	en	100Hz		140		$\frac{nV}{\sqrt{Hz}}$
		1KHz		75		
		10KHz		70		
	en <sub>RMS</sub>	BW : 100Hz to 100KHz		40		$\mu V_{RMS}$
Settling time		$I_{LOAD} = 100mA$		35		$\mu s$

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.

**ELECTRICAL CHARACTERISTICS**

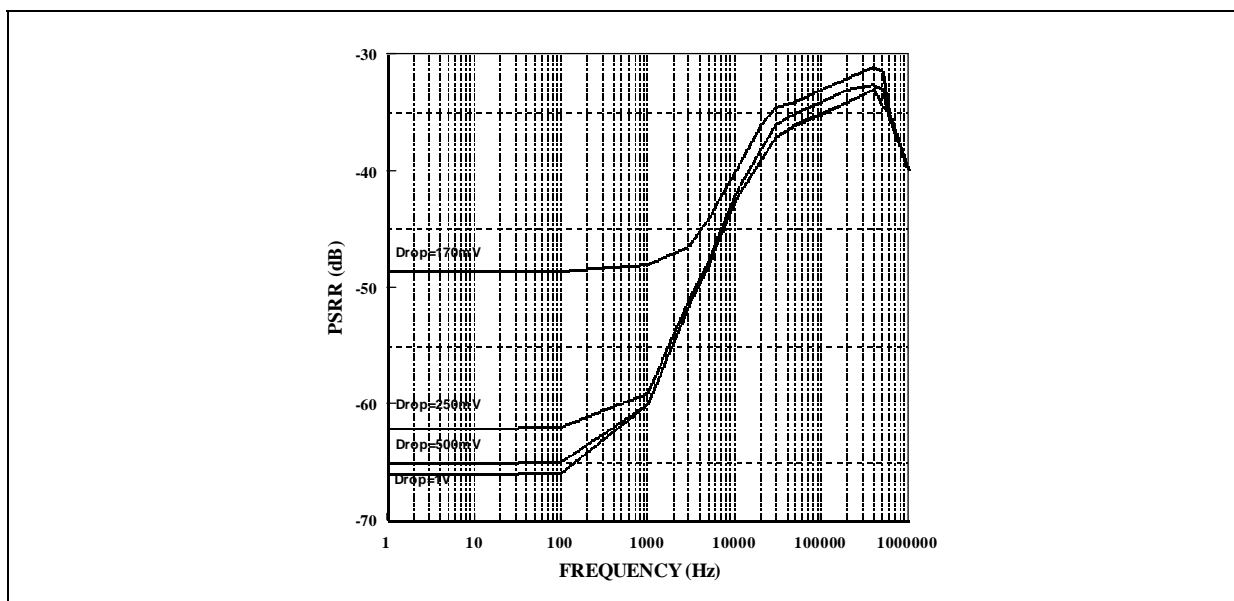
$2V < V_{IN} < 5V$ ,  $-55^{\circ}C < T_A < +125^{\circ}C$ ,  $C_{OUT} = 2.2\mu F \pm 20\%$ ,  $0.02\Omega < ESR < 0.6\Omega$ ,  $I_{LOAD} = 100mA$ .

Typical case :  $V_{IN} = 4V$ , Ambient temperature,  $I_{LOAD} = 100mA$ .

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output decoupling Capacitor	$C_{OUT}$			2.2		$\mu F$
Cout equivalent serial resistor	ESR		0.02		0.6	$\Omega$
Short Circuit Current Limit	$I_{SHORT}$		200	400	800	mA
Settling Time	$t_S$			35	60	$\mu s$

**TYPICAL CHARACTERISTICS**

**Figure 3 : PSRR vs Frequency for Various Dropout ( $V_{OUT} = 1.8V$ , Full Load)**



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