



# LDO\_514

## IP Library: High PSRR, Very Low power, 200mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- RF REGULATOR
- VERY LOW DROPOUT VOLTAGE : 50mV
- VERY LOW CONSUMPTION : 320µA FULL LOAD
- VERY GOOD TRANSIENT BEHAVIOUR : 1mV
- OUTPUT CURRENT : 200mA
- HIGH PSRR : 65dB
- 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 ( $C_{OUT} = 1\mu\text{F}$ ) with an equivalent serial resistance (ESR) in the range 0.02 to 0.6Ω is used for regulator stability.

Figure 1 : Block Diagram

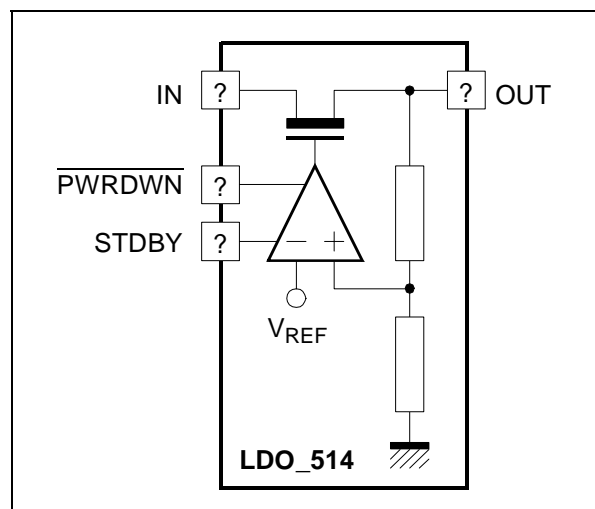
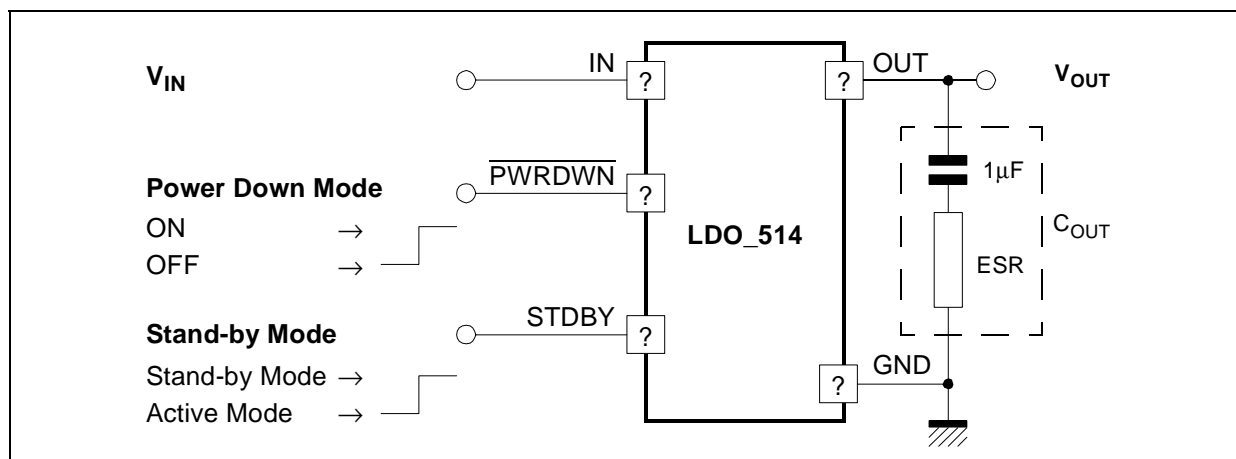


Figure 2 : Typical Application Circuit



**ELECTRICAL CHARACTERISTICS**

$3V < V_{IN} < 5.5V$ ,  $-55^{\circ}C < T_A < +125^{\circ}C$ ,  $C_{OUT} = 1\mu F \pm 20\%$ ,  $20m\Omega < ESR < 0.6\Omega$ ,  $I_{LOAD} = 200mA$ .

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	$I_{OUT}$				200	mA
Dropout Voltage	$\Delta V_{DO}$	$\Delta V_{OUT} = 50mV$ , $I_{LOAD} = 200mA$			50	mV
		(Note 2)	170			
Quiescent current	$I_Q$	$I_{LOAD} = 100\mu A$		70	110	$\mu A$
		$I_{LOAD} = 20mA$		90	130	
		$I_{LOAD} = 200mA$		320	440	
Power down mode quiescent current	$I_{QPDM}$	Power down active		100		nA
Power Supply Rejection Ratio	PSRR	DC		65		dB
		$f = 10KHz$		60		
		$f = 100KHz$		50		
Line Regulation	$L_{IR}$	$I_{LOAD} = 200mA$ , $V_{IN} = 3V$ to $5.5V$		1.5	2.5	mV
Load Regulation	$L_{DR}$	$I_{LOAD} = 100\mu A - 200mA$		35	40	mV
Line Transient	$L_{IRT}$	$\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$		<1		mV
Load Transient	$L_{DTR}$	$I_{LOAD} = 100\mu A - 200mA$ in $10\mu s$		0.5	1	mV
Output Noise Voltage	en	100Hz		1400		$\frac{nV}{\sqrt{Hz}}$
		1KHz		450		
		10KHz		150		
	en <sub>RMS</sub>	BW : 100Hz to 100KHz		45		$\mu V_{RMS}$
Output decoupling Capacitor	$C_{OUT}$			1		$\mu F$
Settling time		$I_{LOAD} = 200mA$		15	30	$\mu s$
Short Circuit Current Limit	$I_{SHORT}$			800		mA

Notes: 1. Above characteristics are given for 3V minimum input operating range voltage, but regulator is operational with 2.7V minimum input voltage.

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

**ELECTRICAL CHARACTERISTICS : STAND-BY MODE**

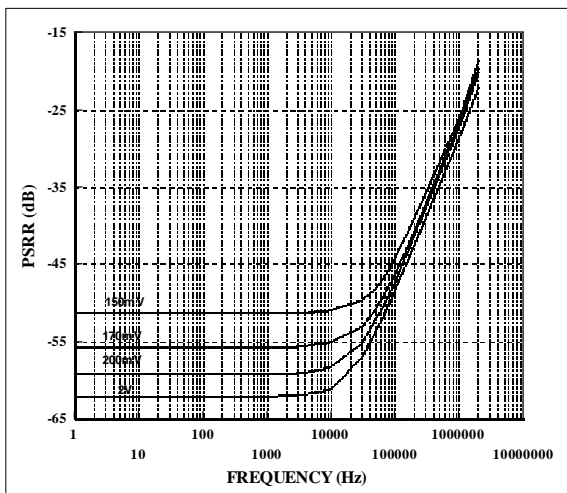
$3V < V_{IN} < 5.5V$ ,  $-30^{\circ}C < T_A < +85^{\circ}C$ ,  $V_{REF} = 2.8V$ ,  $C_{OUT} = 4.7\mu F \pm 20\%$ ,  $20m\Omega < ESR < 0.6\Omega$ .  
 $I_{LOAD} = 500\mu A$ .

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

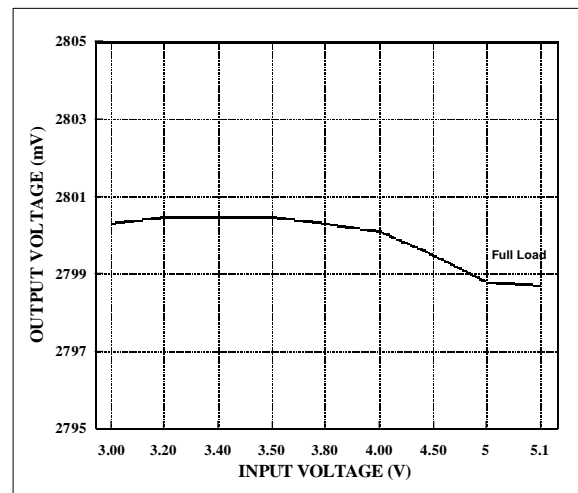
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output current in stand-by mode	$I_{OUTSTDBY}$				200	$\mu A$
Quiescent Current in stand-by mode	$I_{STDBY}$	$I_{LOAD} = 500\mu A$		15	20	
Power Supply Rejection Ratio in stand-by mode	$PSRR_{STY}$	$f = 10KHz$		55		dB
Line Regulation in stand-by mode	$Lir_{STBY}$	$V_{IN} = 3V \text{ to } 5.5V$		2		mV
Load Regulation in stand-by mode	$Ldr_{STBY}$	$I_{LOAD} = 100\mu A - 500\mu A$		1		mV

**TYPICAL CHARACTERISTICS**

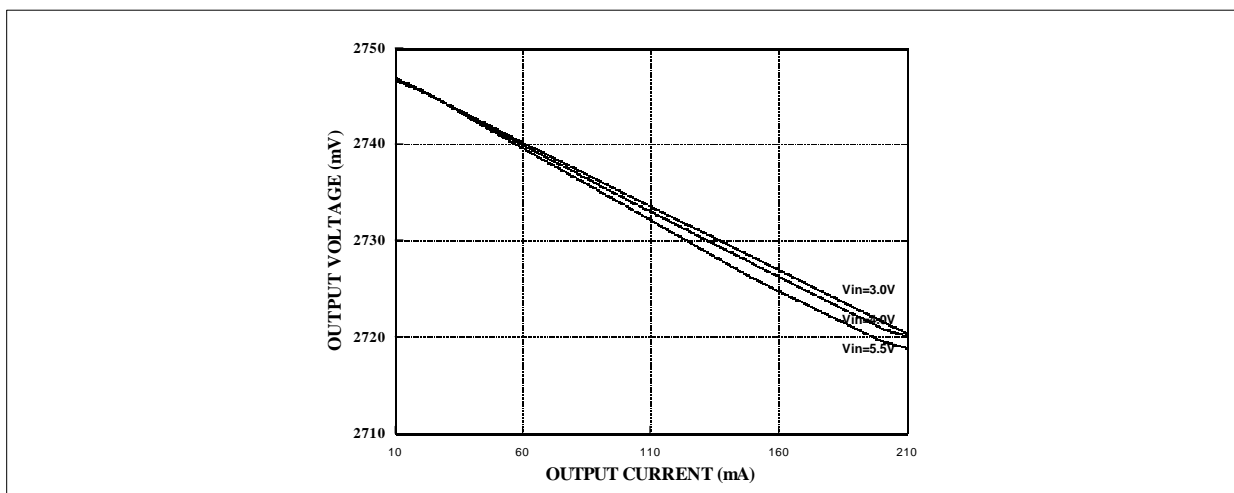
**Figure 3 : PSRR vs Freq for Various Voltage Drop**  
 $(V_{OUT} = 2.8V, \text{ Full Load})$



**Figure 4 : Output Voltage vs. Input Voltage**  
 $(V_{OUT} = 2.8V, \text{ Full Load})$



**Figure 5 : Output Voltage vs Output Current (Load Regulation)**



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States

<http://www.st.com>