

## IP Library: High PSRR, Low Power, 70mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- DIGITAL BASEBAND REGULATOR
- VERY LOW DROPOUT VOLTAGE : 50mV
- HIGH PSRR : 60dB
- LOW QUIESCENT CURRENT : 150μA
- 1μA STAND-BY MODE CURRENT
- NO CURRENT IN POWER DOWN MODE
- SHORT CIRCUIT PROTECTION
- SMALL DECOUPLING CERAMIC CAPACITOR

### 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 Digital (Memory, DSP/Microcontroller) devices.

### APPLICATION NOTE

An external capacitor ( $C_{OUT} = 1\mu F$  typical) with an equivalent serial resistance (ESR) in the range 0.02 to 0.6Ω is used to ensure stability.

Figure 1 : Block Diagram

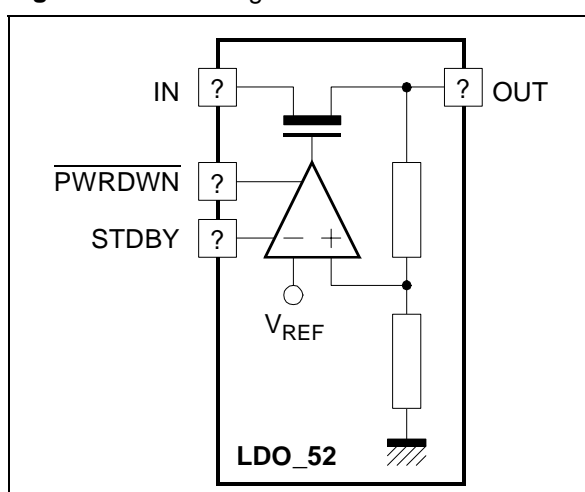
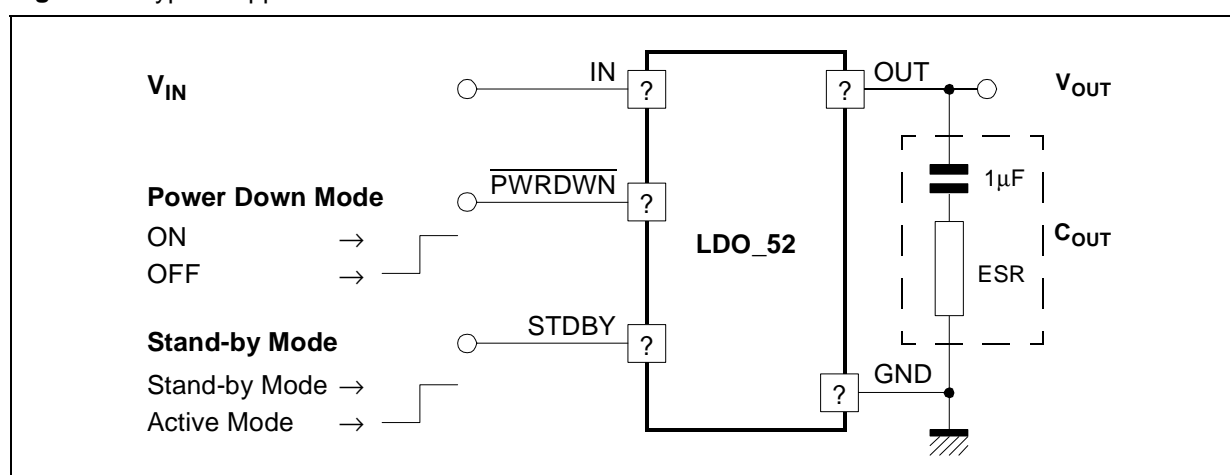


Figure 2 : Typical Application Circuit



**ELECTRICAL CHARACTERISTICS**

$3V < V_{IN} < 5.5V$ ,  $-30^{\circ}C < T < +125^{\circ}C$ ,  $V_{REF} = 2.8V$ ,  $0.8\mu F < C_{OUT} < 1.2\mu F$ ,  $20m\Omega < ESR < 0.6\Omega$ ,  
 $100\mu A < I_{LOAD} < 70mA$ .

**Typical case** :  $V_{IN} = 4V$ ,  $T = 25^{\circ}C$ ,  $I_{OUT} = 35mA$ .

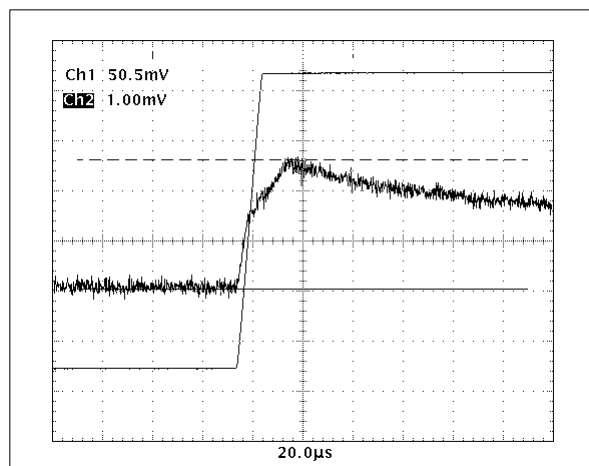
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Voltage Range (Note 1)	$V_{IN}$		3		5,5	V
Output Voltage	$V_{OUT}$			2,8		V
Output Voltage Accuracy			-3		3	%
Output current	$I_{OUT}$	Active mode			70	mA
		Low power mode			500	$\mu A$
$P_{MOS}$ Output Resistance	$R_{ON}$				0,2	$\Omega$
Dropout Voltage	$\Delta V_{DO}$	$\Delta V_{OUT} = 50mV$ , $I_{LOAD} = 70mA$			60	mV
		(Note 2)	170			
Quiescent current	$I_Q$	$I_{LOAD} = 100\mu A$		20	30	$\mu A$
		$I_{LOAD} = 70mA$		150	170	
Stand-by current	$I_{STDBY}$	$I_{LOAD} = 500\mu A$		5	10	$\mu A$
Power down mode quiescent current	$I_{QPRWDWN}$	Power down active		100	1000	nA
Power Supply Rejection Ratio	PSRR	DC	50	60		dB
		$f < 10KHz$	40	45		
Load Regulation	Ldr	$V_{OUT} = 2.8V$		20	35	mV
Line Regulation	Lir	$I_{LOAD} = 70mA$ , $V_{OUT} = 2.8V$		2	3	mV
		Std-by mode $I_{LOAD} = 500\mu A$			10	mV
Line Transient	Lirt	$V_{OUT} = 2.8V$ $I_{LOAD} = 70mA$ , $\Delta V_{IN} = 300mV$ , $t_{RISE} = t_{FALL} = 10\mu s$			3	mV
Load Transient	Ldtr	10% to 90% and 90% to 10% of 70mA in 10 $\mu s$			5	mV
		Recovery time		5	6	$\mu s$
Output decoupling capacitor	$C_{OUT}$			1		$\mu F$
Settling time (from power down to active mode)		$V_{OUT} = 2.8V$ , $C_{OUT} = 1\mu F$		20	50	$\mu s$
Short Circuit Current Limit	$I_{SHORT}$		300		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.

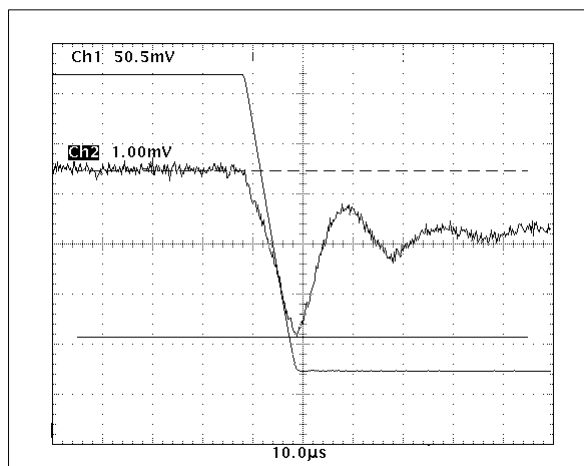
2. All parameters are guaranteed with 170mV Dropout voltage.

## TYPICAL CHARACTERISTICS

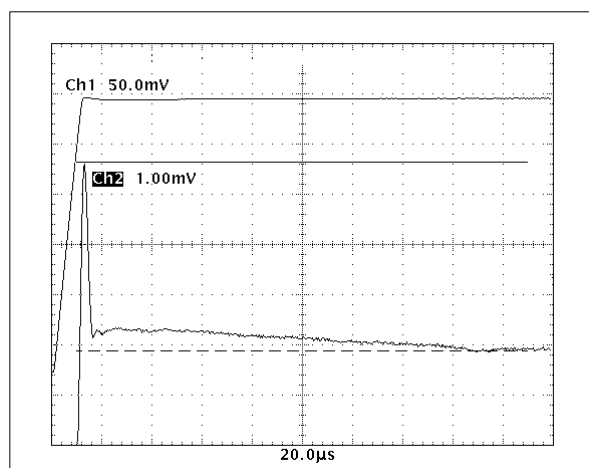
**Figure 3 : Line transient**  
 $(I_{LOAD} = 35\text{mA} ;$   
 $V_{BAT} = 4\text{V} + 300\text{mV with } 10\mu\text{s})$



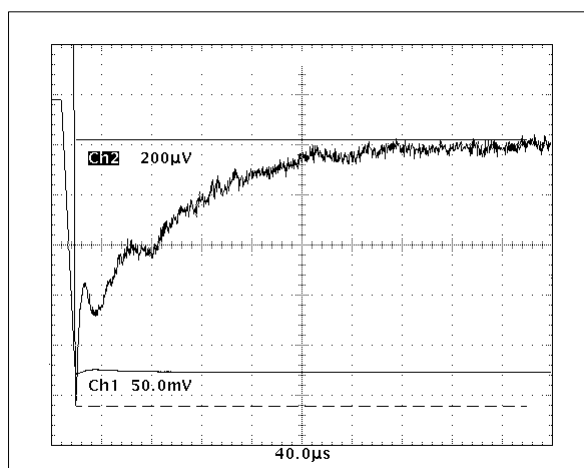
**Figure 4 : Line transient**  
 $(I_{LOAD} = 35\text{mA} ;$   
 $V_{BAT} = 4\text{V} + 300\text{mV with } 10\mu\text{s})$



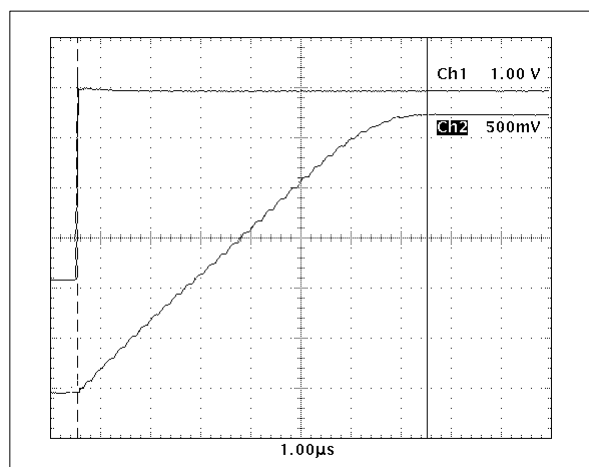
**Figure 5 : Load transient**  
 $(I_{LOAD} = 0 \text{ to } 70\text{mA} ; V_{BAT} = 4\text{V})$



**Figure 6 : Load transient**  
 $(I_{LOAD} = 0 \text{ to } 70\text{mA} ; V_{BAT} = 4\text{V})$



**Figure 7 : Settling Time**



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