

IP Library: High PSRR, Low power, 80mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- ANALOG BASEBAND REGULATOR
- VERY LOW DROPOUT VOLTAGE : 50mV
- HIGH PSRR : 60dB
- LOW QUIESCENT CURRENT : 130 μ A
- LOW OUTPUT VOLTAGE NOISE
- NO CURRENT IN POWER DOWN MODE
- SHORT CIRCUIT PROTECTION
- SMALL DECOUPLING CERAMIC CAPACITOR

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 Analog and Mixed-signal 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 0.6 Ω is used for regulator stability.

Figure 1 : Block Diagram

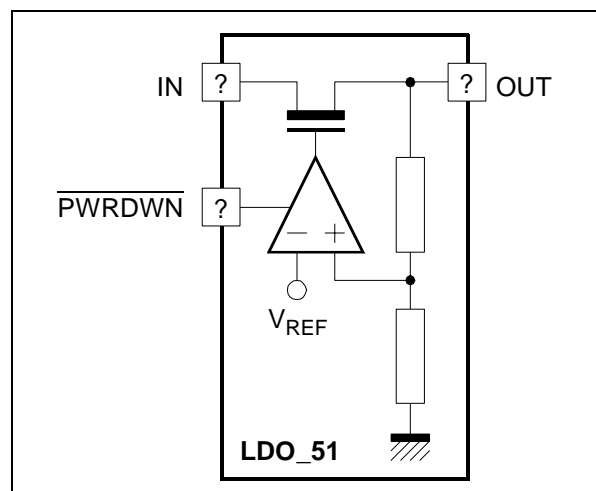
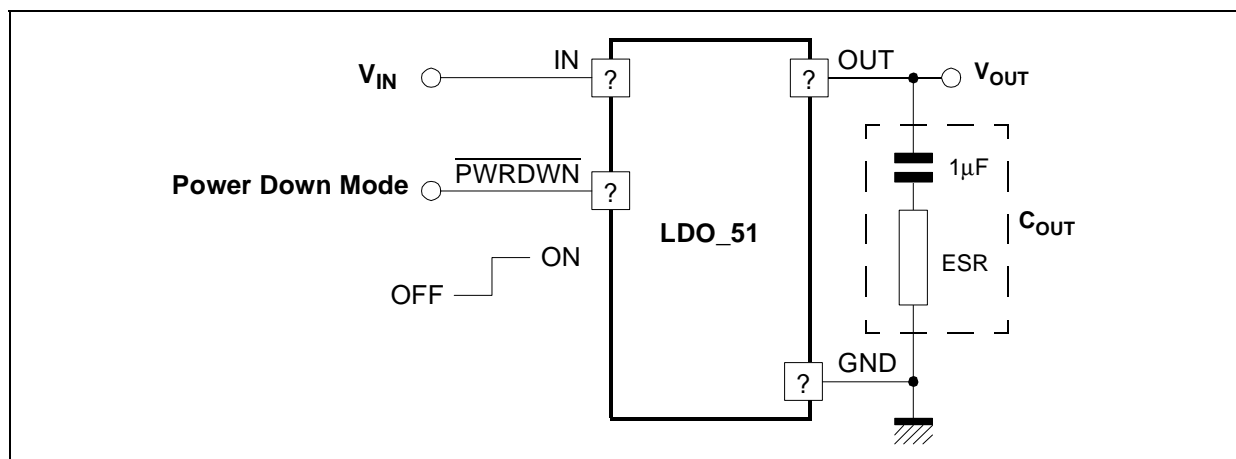


Figure 2 : Typical Application Circuit



ELECTRICAL CHARACTERISTICS

$3V < V_{IN} < 5.5V$, $-55^{\circ}C < T_A < +125^{\circ}C$, $V_{REF} = 2.8V$, $0.8\mu F < C_{OUT} < 1.2\mu F$, $20m\Omega < ESR < 0.6\Omega$.
 $100\mu A < I_{LOAD} < 80mA$.

Typical case : $V_{IN} = 4V$, $T = 25^{\circ}C$, $I_{OUT} = 40mA$.

| 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} | | 0,1 | | 80 | mA |
| P_{MOS} Output Resistance | R_{ON} | | | | 0,5 | Ω |
| Dropout Voltage | ΔV_{DO} | $\Delta V_{OUT} = 50mV$, $I_{LOAD} = 80mA$ | | | 50 | mV |
| | | (Note 2) | 170 | | | |
| Quiescent current | I_Q | $I_{LOAD} = 100\mu A$ | | 30 | 50 | μA |
| | | $I_{LOAD} = 80mA$ | | 130 | 170 | |
| Power down mode quiescent current | I_{QPDM} | Power down active | | 100 | | nA |
| Power Supply Rejection Ratio | PSRR | $f < 10KHz$ | 50 | 60 | | dB |
| | | $f < 100KHz$ | 40 | 50 | | |
| Line Regulation | Lir | $I_{LOAD} = 80mA$, $V_{IN} = 3V$ to $5.1V$ | | 3 | 6 | mV |
| Load Regulation | Ldr | | | 30 | 45 | mV |
| Line Transient | Lirt | $\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$ | | | 1 | mV |
| Load Transient | Ldtr | 10% to 90% and 90% to 10% of 80mA in $10\mu s$ | | | 1 | mV |
| Output Noise Voltage | en | 100Hz | | | 1,5 | $\frac{\mu V}{\sqrt{Hz}}$ |
| | | 1KHz | | | 550 | $\frac{nV}{\sqrt{Hz}}$ |
| | | 100KHz | | | 300 | $\frac{nV}{\sqrt{Hz}}$ |
| Output decoupling Capacitor | C_{OUT} | | | 1 | | μF |
| Settling time | | From power down to active mode | | | 25 | μs |
| Short Circuit Current Limit | I_{SHORT} | | 180 | 230 | 300 | 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

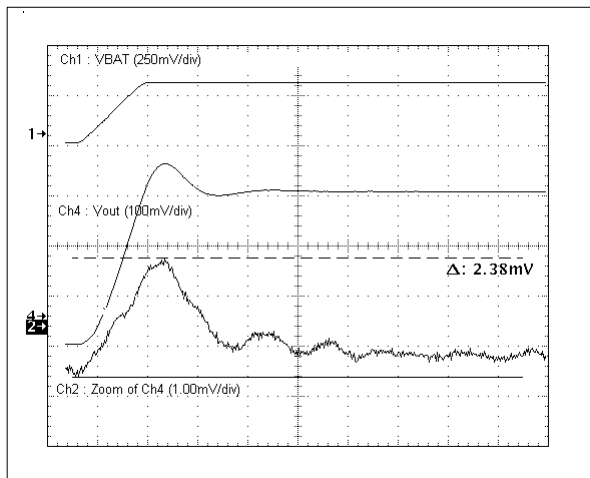


Figure 4 : Settling Time

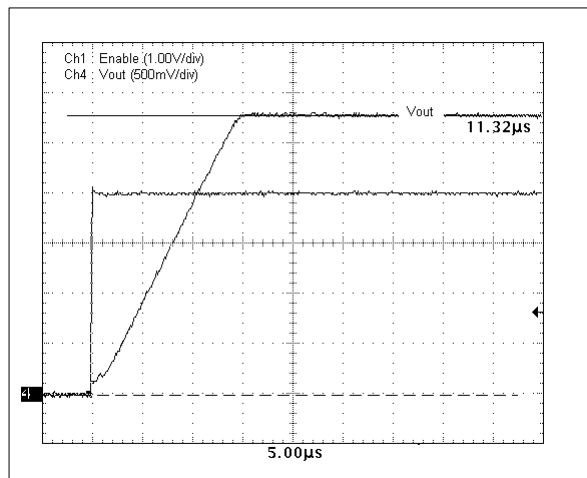


Figure 5 : Load Transient (rising edge)

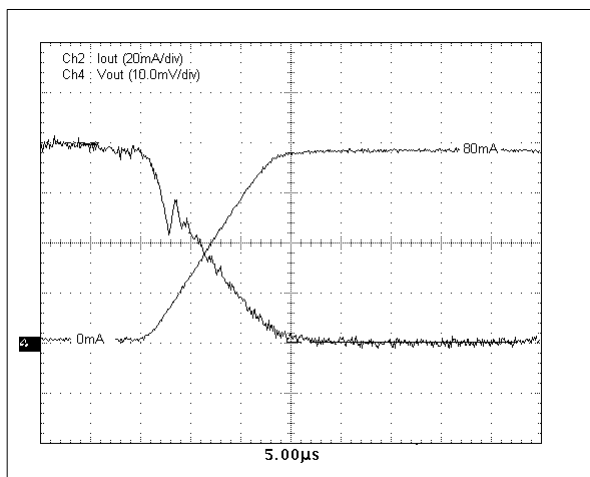


Figure 6 : Load Transient (falling edge)

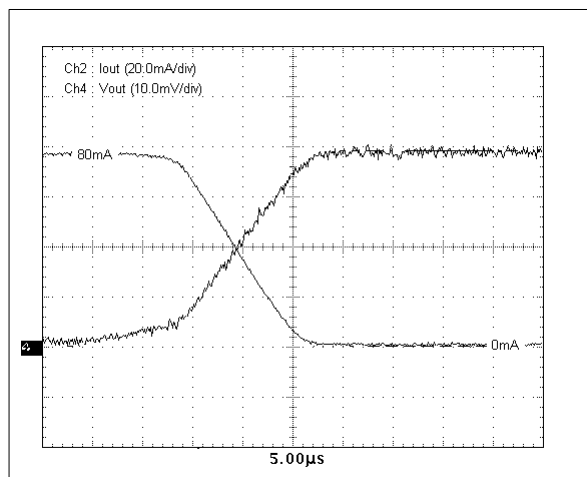


Figure 7 : PSRR vs Frequency
 ($I_{LOAD} \text{ max} - V_{IN} \text{ min}$)

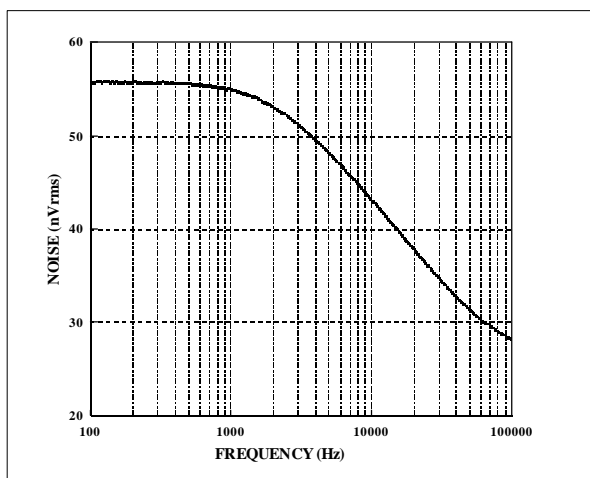


Figure 8 : Noise vs Frequency
 ($I_{LOAD} \text{ max} - V_{IN} \text{ min}$)

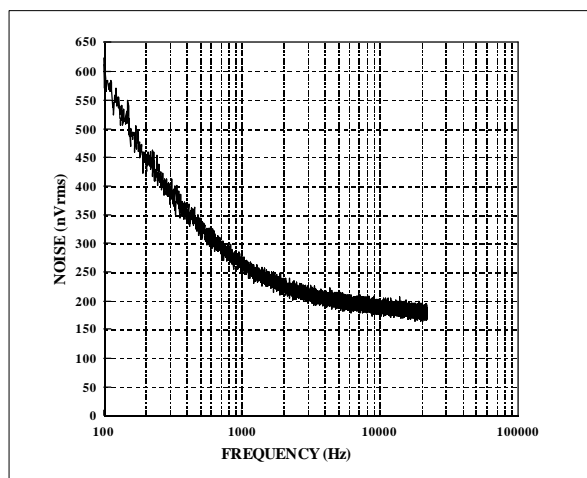
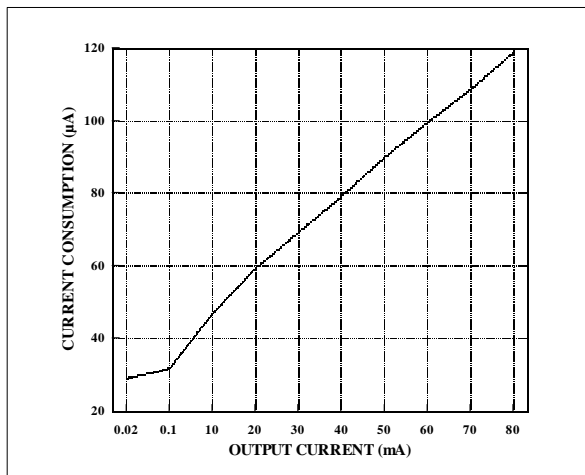


Figure 9 : Current Consumption vs Output Current
($V_{IN} = 4V$)



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