LDO_59

IP Library: Ultra Low Noise, High PSRR, Low Power, 20mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- RF REGULATOR
- VERY LOW DROPOUT VOLTAGE : 60mV
- ULTRA LOW OUTPUT VOLTAGE NOISE
- HIGH PSRR : 70dB
- LOW QUIESCENT CURRENT : 70µA FULL LOAD
- NO CURRENT IN POWER DOWN MODE
- SHORT CIRCUIT PROTECTION
- SMALL DECOUPLING CERAMIC CAPACITOR
- MOS INPUT STAGE

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} = 1µF typical) with an equivalent serial resistance (ESR) in the range 0.02 to 0.6Ω is used to ensure stability.

Figure 1 : Block Diagram

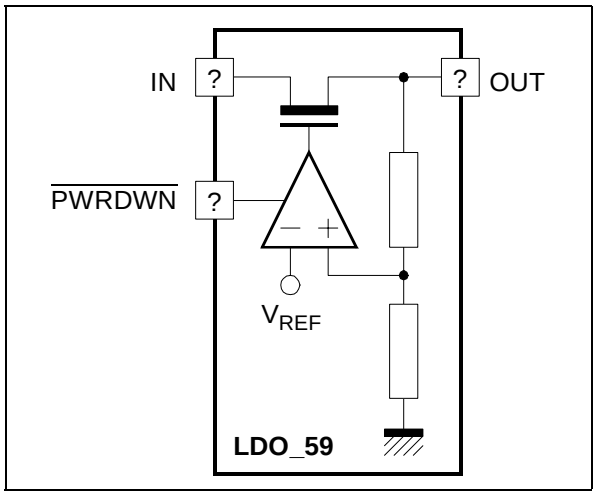
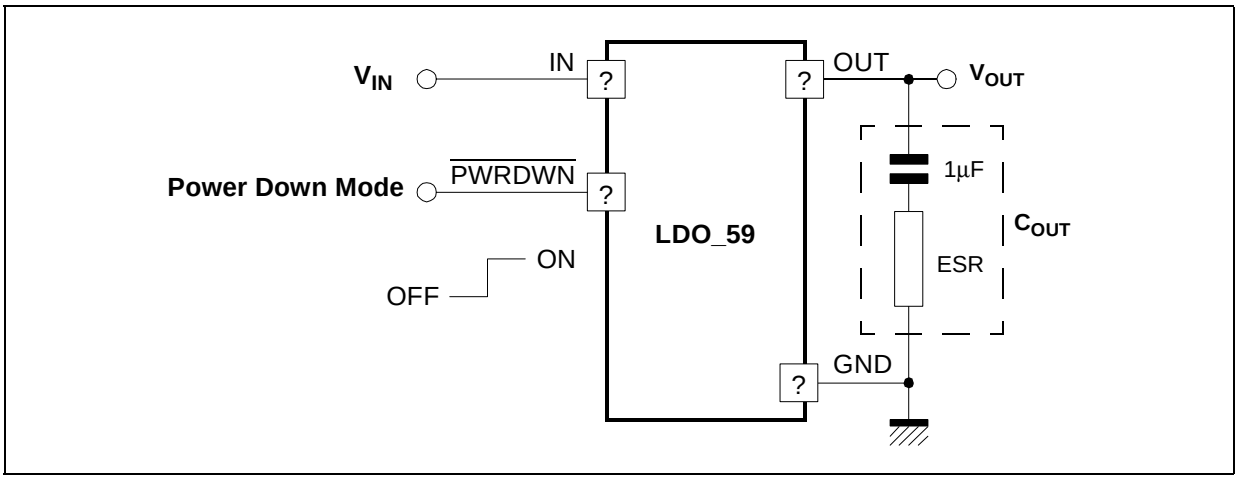


Figure 2 : Typical Application Circuit



ELECTRICAL CHARACTERISTICS

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

Typical case : $V_{IN} = 4V$, $T = 25°C$, $I_{OUT} = 10mA$.

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_{LOAD}				20	mA
P_{MOS} Output Resistance	R_{ON}				0,6	Ω
Dropout Voltage	ΔV_{DO}	$\Delta V_{OUT} = 50mV$, $I_{LOAD} = 20mA$			60	mV
		(Note 2)	170			
Quiescent current	I_Q	$I_{LOAD} = 100\mu A$		50	70	µA
		$I_{LOAD} = 20mA$		70	150	µA
Power down mode quiescent current	$I_{QPRWDWN}$	Power down active		100		nA
Power Supply Rejection Ratio	PSRR	DC to 10KHz	55	70		dB
		f < 100KHz	40	50		
Load Regulation	Ldr			6	9	mV
Line Regulation	Lir	$I_{LOAD} = 20mA$, $V_{OUT} = 2.8V$		0,5	1	mV
Line Transient	Lirt	$V_{OUT} = 2.8V$, $I_{LOAD} = 20mA$, $\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$		0,5	1	mV
Load Transient	Ldtr	$V_{OUT} = 2.8V$ $t_{FALL} = t_{RISE} = 10\mu s$		0,3	1	mV
		Recovery time		4	6	µs
Output Noise Voltage	en	$V_{OUT} = 2.8V$ 100Hz < f < 1KHz		160	200	$\frac{nV}{\sqrt{Hz}}$
		1KHz < f < 100KHz			60	
Output decoupling capacitor	C_{OUT}			1		µF
Settling time (from power down to active mode)		$V_{OUT} = 2.8V$, $C_{OUT} = 1.2\mu F$		20	50	µs
Short Circuit Current Limit	I_{SHORT}				200	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.

TYPCIAL CHARACTERISTICS

Figure 3 : Line transient (rising edge)

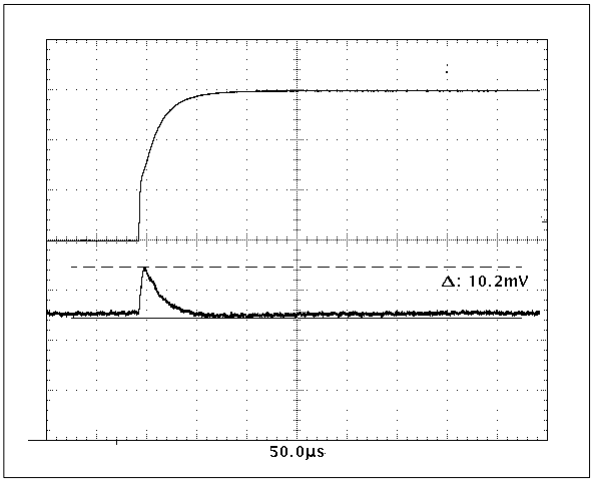


Figure 4 : Line transient (falling edge)

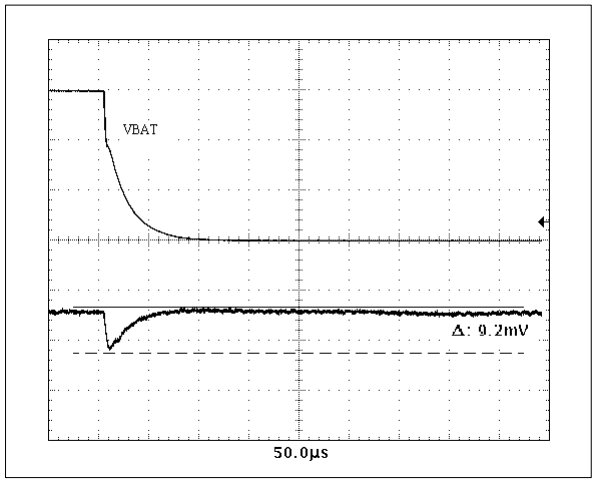


Figure 5 : Load transient (rising edge)

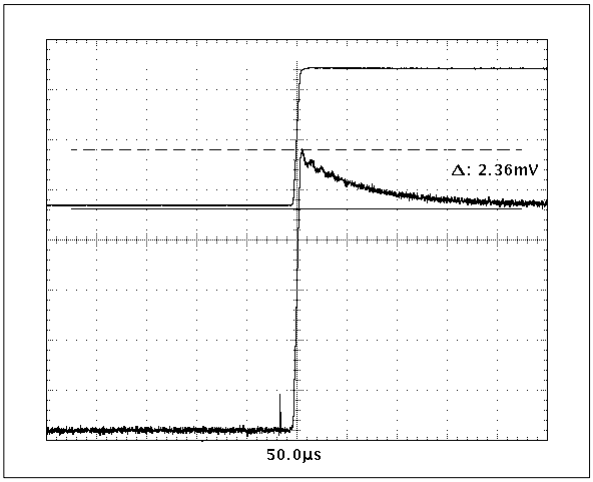


Figure 6 : Load transient (falling edge)

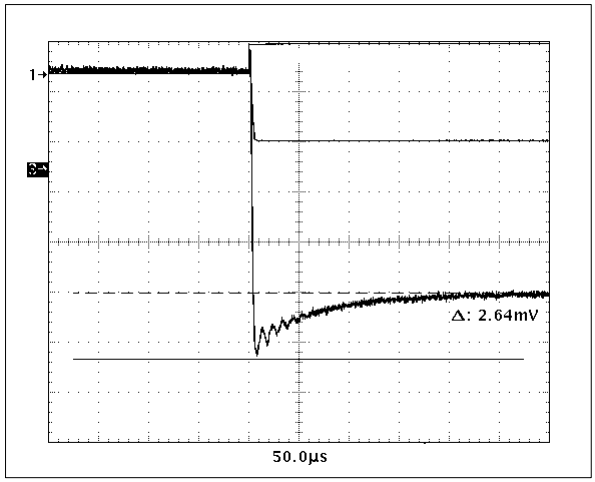


Figure 7 : Settling time

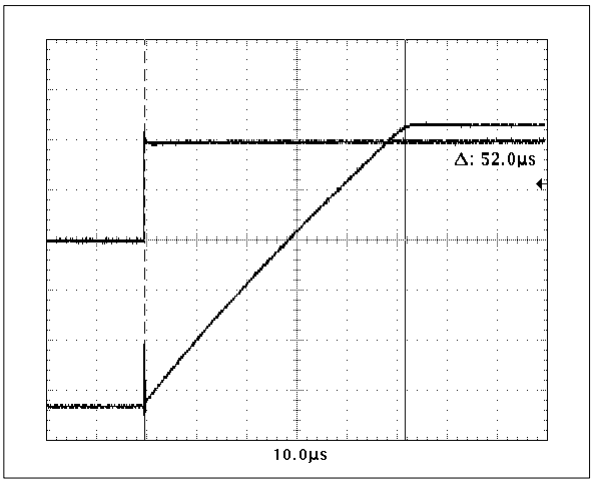


Figure 8 : PSRR vs Frequency
(I_{LOAD} = 20mA ; V_{IN}min)