LDO_53

IP Library: High PSRR, Very Low Power, 40mA Low Dropout Voltage Regulator

PRODUCT PREVIEW

- DIGITAL BASEBAND REGULATOR
- VERY LOW DROPOUT VOLTAGE : 50mV
- HIGH PSRR : 55dB
- VERY LOW QUIESCENT CURRENT : 100µA FULL LOAD
- 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 Digital (DSP/Microcontroller) devices.

APPLICATION NOTE

An external capacitor (C_{OUT} = 1µF) with an equivalent serial resistance (ESR) in the range 0.02 to 0.6Ω is used for regulator stability.

Figure 1 : Block Diagram

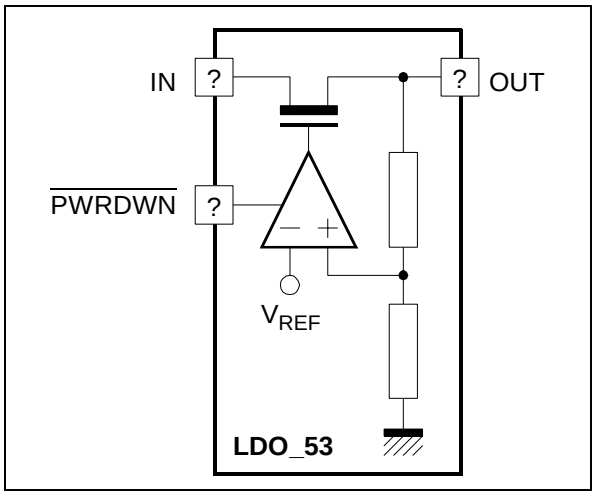
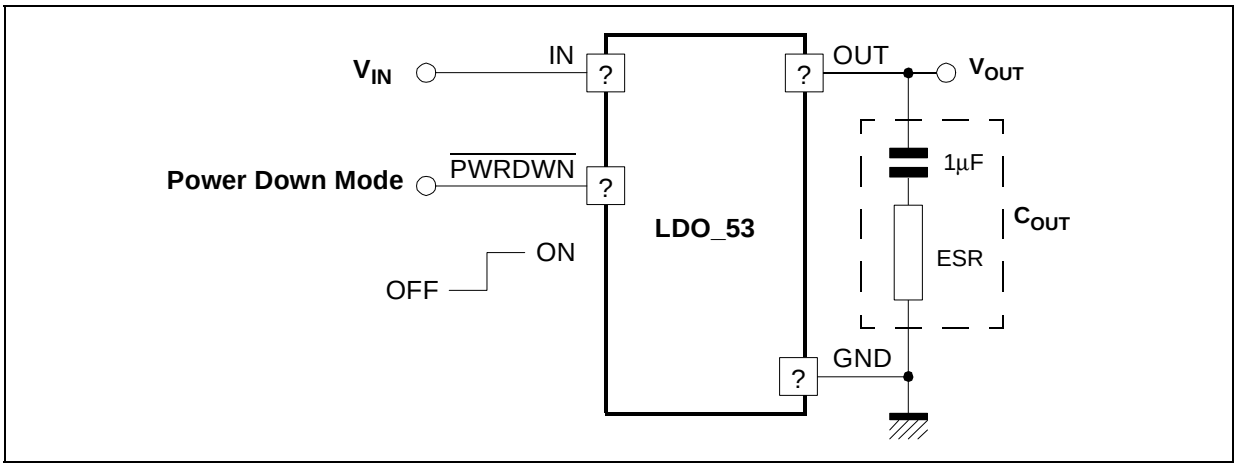


Figure 2 : Typical Application Circuit



ELECTRICAL CHARACTERISTICS

$3V < V_{IN} < 5.5V$, $-30°C < T < +85°C$, $V_{REF} = 2.8V$, $0.8\mu F < C_{OUT} < 1.2\mu F$, $20m\Omega < ESR < 0.6\Omega$. $100\mu A < I_{LOAD} < 40mA$.

Typical case : $V_{IN} = 4V$, $T = 25°C$, $I_{OUT} = 20mA$.

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		40	mA
P_{MOS} Output Resistance	R_{ON}				0,4	Ω
Dropout Voltage	ΔV_{DO}	$\Delta V_{OUT} = 50mV$, $I_{LOAD} = 40mA$			50	mV
		(Note 2)	170			
Quiescent current	I_Q	$I_{LOAD} = 100\mu A$		20	30	µA
		$I_{LOAD} = 40mA$		100	120	
Power down mode quiescent current	I_{QPDN}	Power down active			1	µA
Power Supply Rejection Ratio	PSRR	DC	50	55		dB
		f < 10KHz	45	50		
Load Regulation	Ldr			15	25	mV
Line Regulation	Lir	$I_{LOAD} = 40mA$, $V_{IN} = 3V$ to $5.1V$, $V_{OUT} = 2.8V$		2	3	mV
Line Transcient	Lirt	$V_{OUT} = 2.8V$, $I_{OUT} = 40mA$, $\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$			3	mV
Load Transcient	Ldtr	$V_{OUT} = 2.8V$, $t_{RISE} = t_{FALL} = 10\mu s$ $100\mu A < I_{LOAD} < 40mA$			3	mV
		Recovery time		5	6	µs
Output decoupling capacitor	C_{OUT}			1		µF
Settling time (from power down to active mode)		$V_{OUT} = 2.8V$, $C_{OUT} = 1\mu F$		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 Dropout voltage.

TYPICAL CHARACTERISTICS

Figure 3 : Quiescent Current vs Output Current (I_L = 0 to 40mA - V_{IN} = 4V)

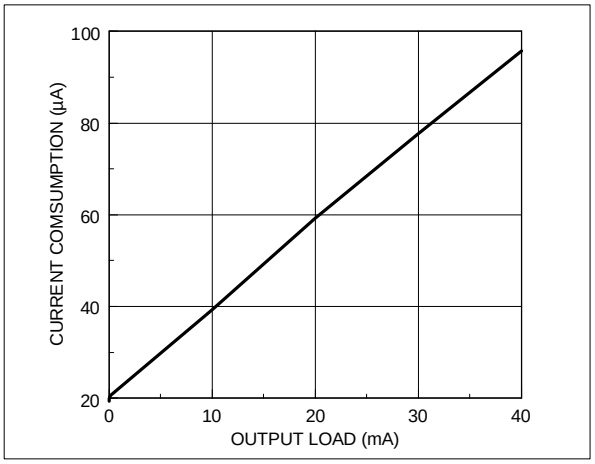


Figure 4 : Settling time (V_{IN} = 4V ; I_{LOAD} = 20mA)

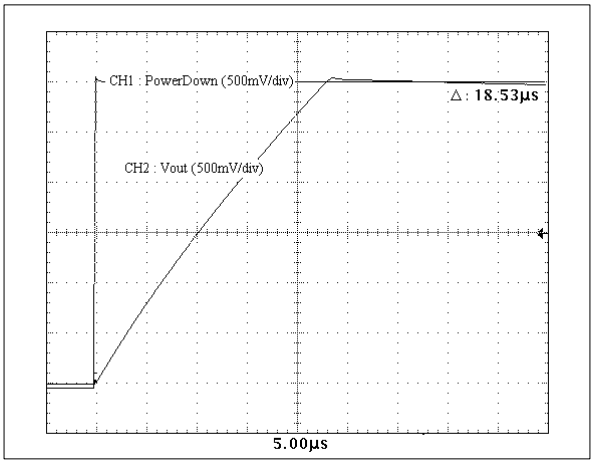


Figure 5 : Line Transient - rising edge (V_{IN} = 4V + 300mV with 10µs)

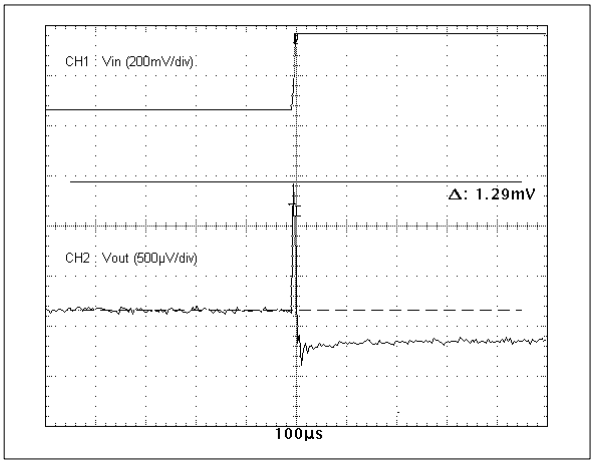


Figure 6 : Line Transient - falling edge (V_{IN} = 4V + 300mV with 10µs)

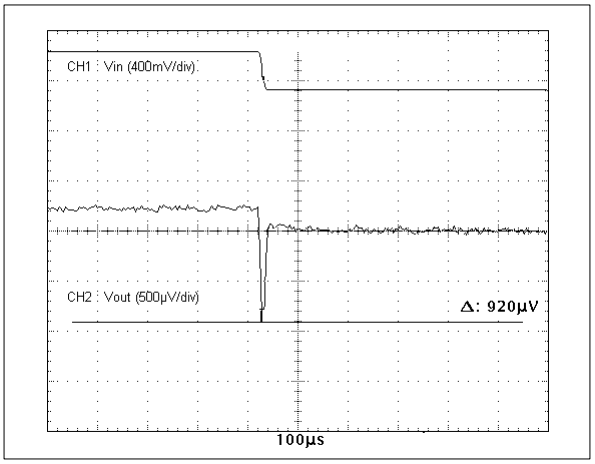


Figure 7 : Load Transient - rising edge (I_L = 0 to 40 mA - V_{IN} = 4V)

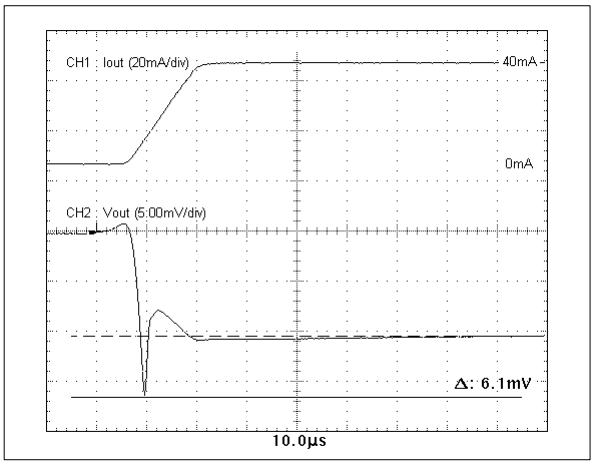


Figure 8 : Load Transient - falling edge (I_L = 40 to 0 mA - V_{IN} = 4V)

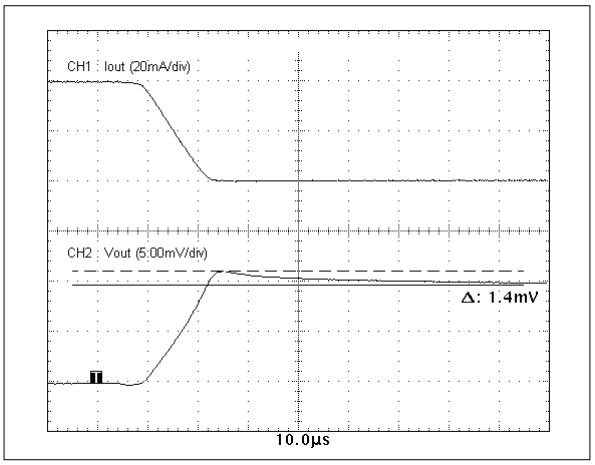


Figure 9 : PSRR vs Frequency (I_{LOAD} max - V_{IN}min)