LDO_512

IP Library: Ultra Low Noise, High PSRR, Low Power, 30mA Very Low Dropout Voltage Regulators

PRODUCT PREVIEW

- RF REGULATOR
- VERY LOW DROPOUT VOLTAGE : 30mV
- ULTRA LOW OUTPUT VOLTAGE NOISE
- HIGH PSRR : 70dB
- LOW STAND-BY CURRENT : 20µA
- LOW QUIESCENT CURRENT : 150µA FULL LOAD
- NO CURRENT IN POWER DOWN MODE
- SHORT CIRCUIT PROTECTION
- SMALL DECOUPLING CERAMIC CAPACITOR
- BIPOLAR INPUT STAGE

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

Figure 1 : Block Diagram

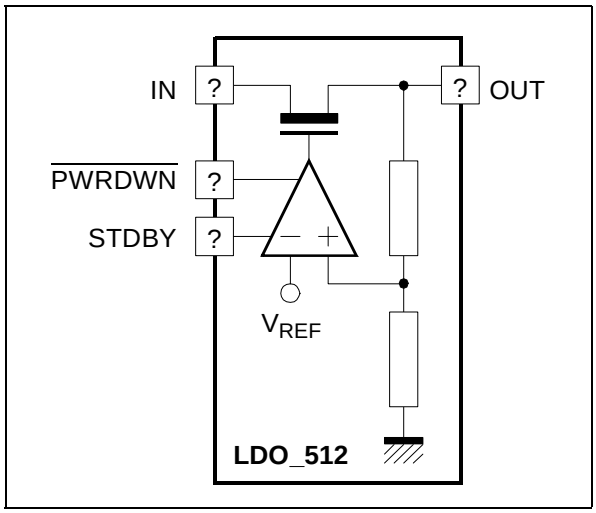
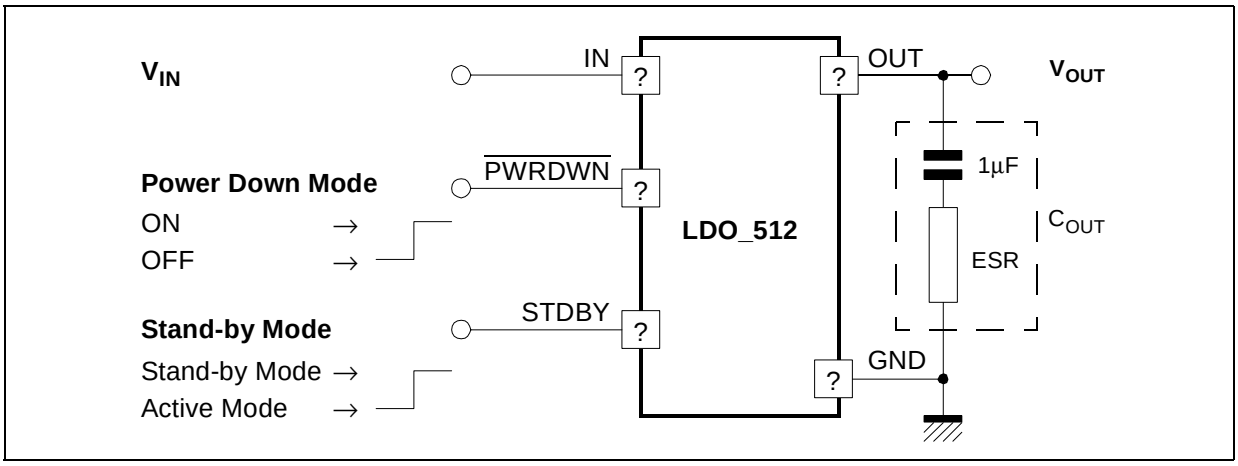


Figure 2 : Typical Application Circuit



ELECTRICAL CHARACTERISTICS

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

Typical case : $V_{IN} = 4V$, $T = 25°C$, $I_{OUT} = 15mA$.

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 current	I_{OUT}				30	mA
PMOS Output Resistance	R_{ON}				0.4	Ω
Input Current	I_{IN}			200	600	nA
Dropout Voltage	ΔV_{DO}	$I_{LOAD} = 30mA$, $\Delta V_{OUT} = 50mV$			30	mV
		(Note 2)	170			
Quiescent current	I_Q	$I_{LOAD} = 100\mu A$		100	150	µA
		$I_{LOAD} = 30mA$		150	280	
Stand-by current	I_{STDBY}	$I_{LOAD} = 100\mu A$		20	30	µA
Power down mode quiescent current	I_{PDN}	Power down active		0.1		µA
Power Supply Rejection Ratio	PSRR	f < 100KHz	55	70		dB
Power Supply Rejection Ratio in stand-by mode	$PSRR_{STY}$	f < 100kHz	60	65		dB
Load Regulation	L_{DR}			10	12	mV
Line Regulation	L_{IR}	$I_{LOAD} = 30mA$, $V_{IN} = 3V$ to $5.1V$, $V_{OUT} = 2.8V$		0.5	1	mV
Line Transcient	L_{IRT}	$V_{OUT} = 2.8V$, $I_{OUT} = 30mA$, $\Delta V_{IN} = 300mV$ $t_{RISE} = t_{FALL} = 10\mu s$		0.5	1.5	mV
Load Transcient	L_{DTR}	$V_{OUT} = 2.8V$, $t_{RISE} = t_{FALL} = 10\mu s$ $100\mu A < I_{LOAD} < 30mA$			3	mV
		Recovery time		10	20	µs
Output Voltage Noise	en	100Hz < f ≤ 1KHz		30	70	$\frac{nV}{\sqrt{Hz}}$
		1KHz < f ≤ 100KHz		20	35	
		f > 100KHz		20	30	
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 : PSRR vs Frequency
(Iload max - Vin min)

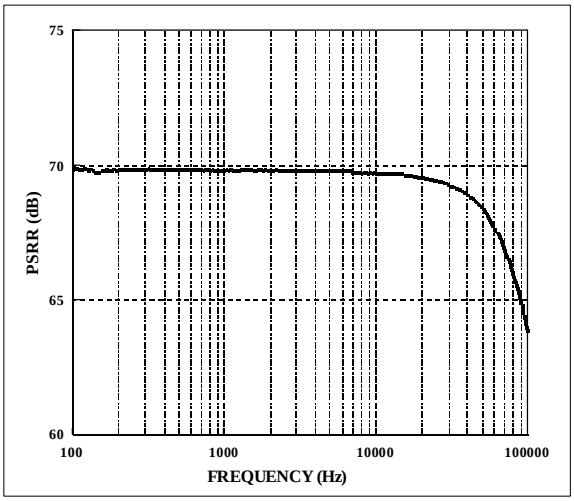


Figure 4 : Noise vs Frequency
(Iload max - Vin min)

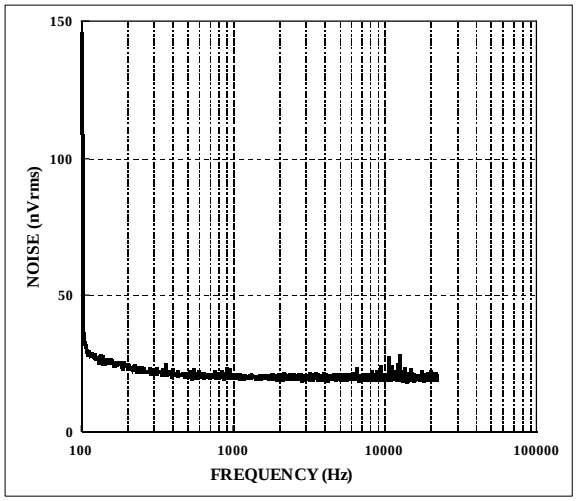


Figure 5 : Load Transient (rising egde)

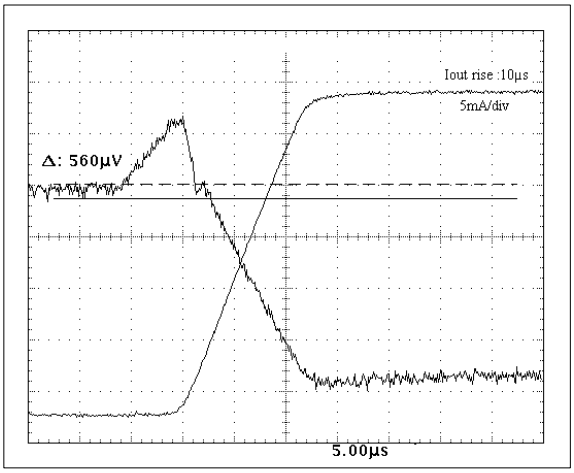


Figure 6 : Load Transient (falling egde)

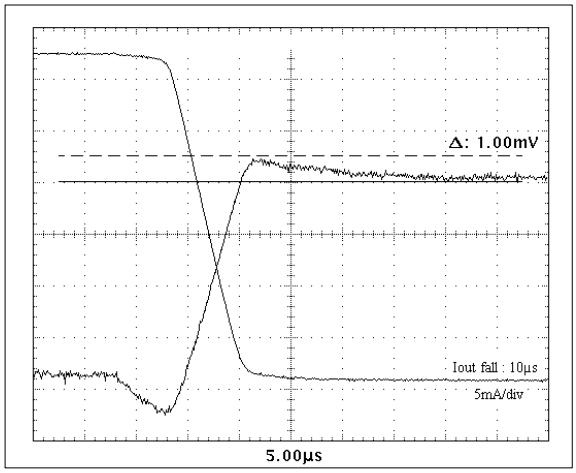


Figure 7 : Load Transient in Std-by mode
(rising egde)

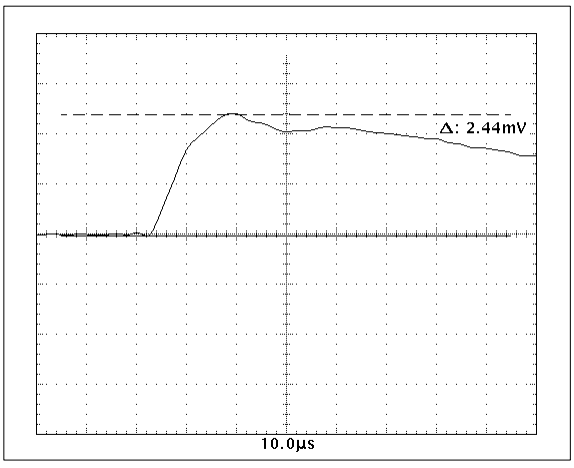


Figure 8 : Load Transient in Std-by mode
(falling egde)

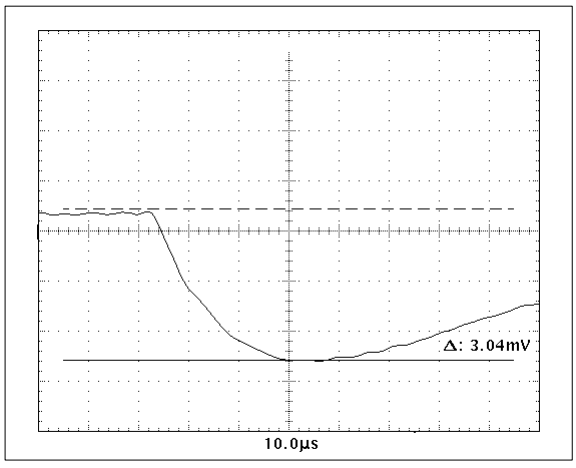


Figure 9 : Output Voltage vs Input Voltage (Line Regulation)

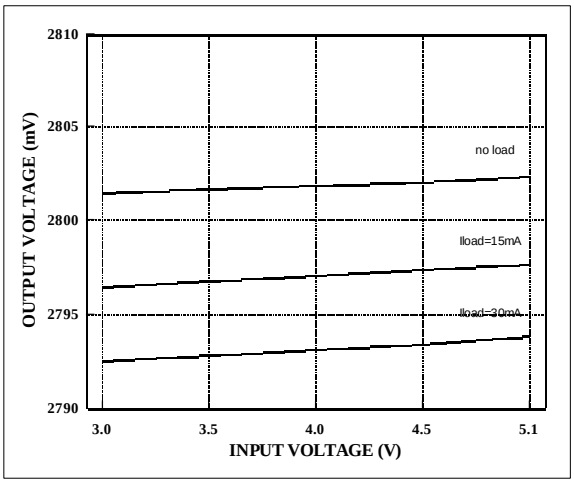


Figure 10 : Output Voltage vs Input Voltage (Line Regulation - Stand-by mode)

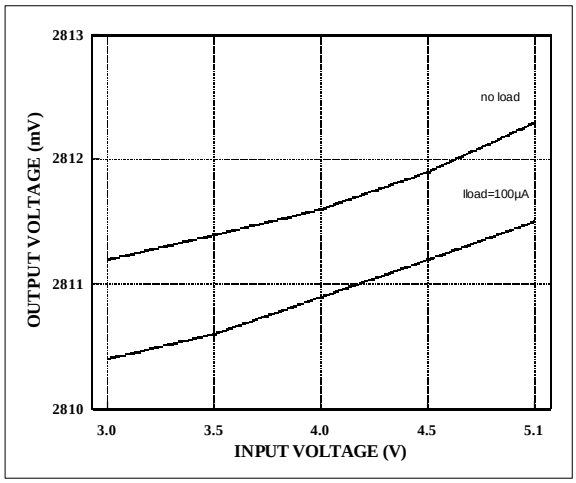


Figure 11 : Line Transient (rising egde ; Vin min ; Iload max)

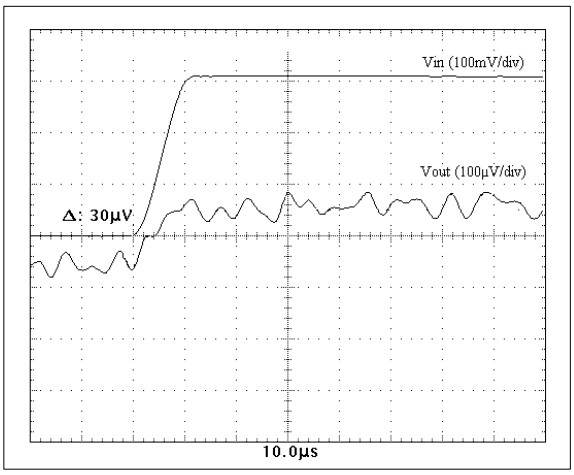


Figure 12 : Line Transient (falling egde ; Vin min ; Iload max)

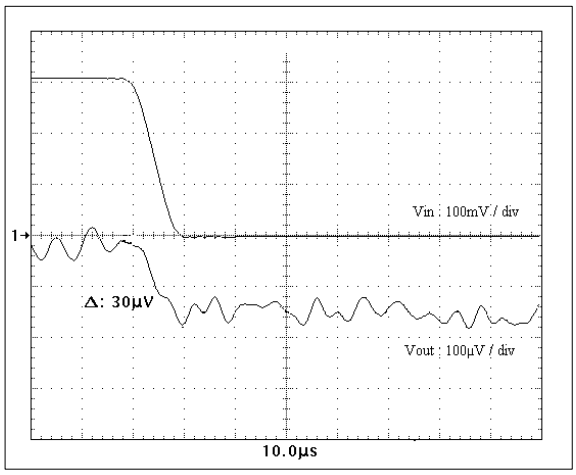


Figure 13 : Output Voltage vs Output Current (Load Regulation)

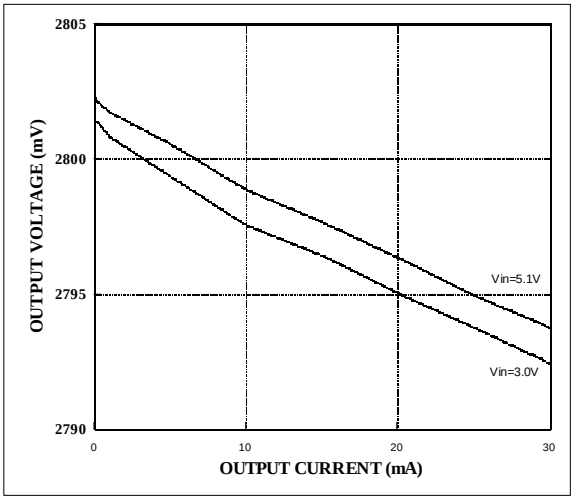


Figure 14 : Output Voltage vs Output Current (Load Regulation - Stand-by mode)