KL2402

40V 250mA Ultralow-Quiescent-Current LDO

General Description

The KL2402 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5μA quiescent current at no load, the KL2402 is ideally suited for standby micro-control-unit systems, especially for always-on applications like E-meters, fire alarms, smoke detectors and other battery operated systems. The KL2402 retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

The KL2402 has a 40-V maximum operating voltage limit, a -40°C to 125°C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range. The KL2402 is available in a TO92 through-hole and SOT235, SOT223, SOT893 surface mount packages.

Ordering Information

Part Number	Voltage
KL2402-15	Vout=1.5V
KL2402-18	Vout=1.8V
KL2402-25	Vout=2.5V
KL2402-33	Vout=3.3V
KL2402-50	Vout=5.0V
KL2402-XX	Vout can be trimmed from 1.5V to 5.5V, 0.1V/step

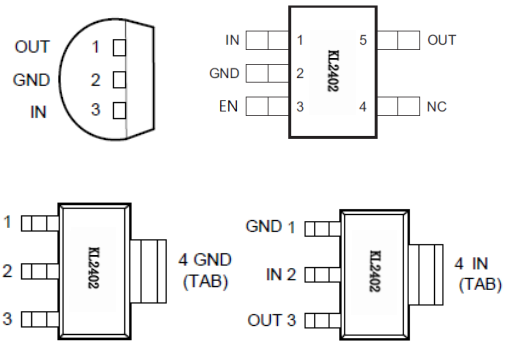
Features

- V_{IN} Range up to 40V
- Output Voltage Tolerances of ±2% Over the Temperature Range
- Output Current of 250 mA
- Ultra Low Quiescent Current (I_Q = 1.2 μA)
- Dropout Voltage Typically 1200 mV at I_{OUT} = 250 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

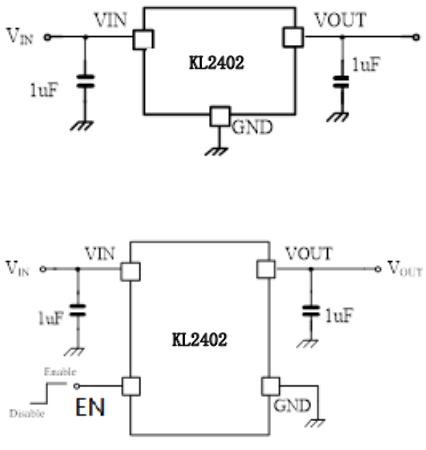
Applications

- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

Pin Configuration



Typical Application Circuit

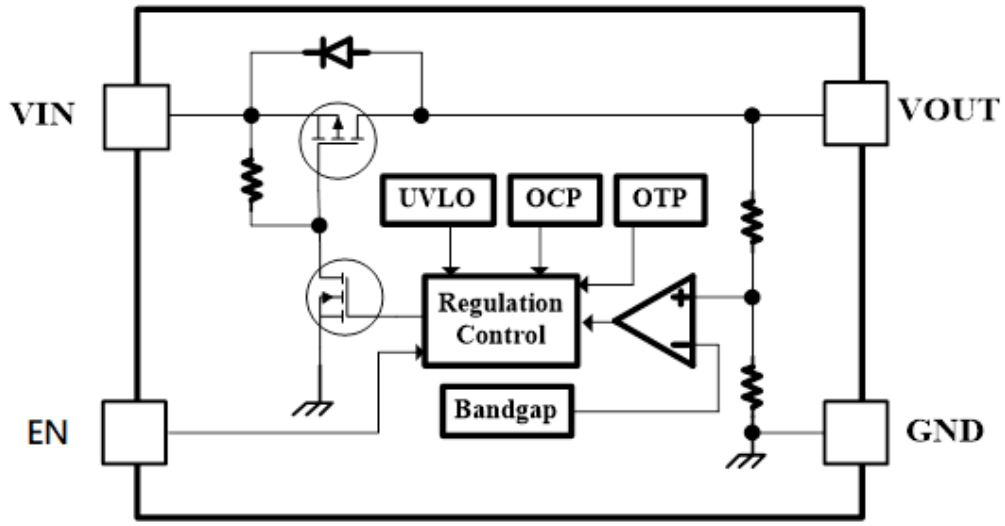


Ceramic Capacitor Stable

Pin Assignment

Pin Name	Pin No. TO92	Pin No. SOT235	Pin No. SOT223 SOT893	Pin No. SOT223 SOT893	Pin Function
VOUT	1	5	3	3	Output Voltage Pin
GND	2	2	2,4	1	Ground
VIN	3	1	1	2,4	Input Voltage pin.
EN	--	3	--	--	Enable

Function Block Diagram



KL2402

Absolute Maximum Ratings (Note1)

- V_{IN} ---------- -0.3V to +45V
- Junction Temperature---------- 125°C
- Lead Temperature (Soldering, 10 sec.)---------- 300°C
- Storage Temperature ---------- –65°C to 150°C

Recommended Operating Conditions

- Input Voltage, V_{IN} ---------- +2.7V to +40V
- Junction Temperature ---------- -40°C to 125°C

Electrical Characteristics

$V_{IN}=V_{OUT}$ + 1V, I_{OUT}=1mA, $C_{IN}=C_{OUT}$=2.2uF, T_J=25℃, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Range	V_{OUT}		1.5		5.5	V
Output Voltage Accuracy	$\triangle V_{OUT}$		-2		2	%
Line Regulation	$\triangle V_{LINE}$	V_{IN} = V_{OUT} + 1V to 40V		2	12	mV
Load Regulation	$\triangle V_{LOAD}$	I_{OUT} = 1mA to 100mA		3	15	mV
		I_{OUT} = 1mA to 250mA		15	30	
Dropout Voltage	V_{DROP}	I_{OUT} = 100mA		400		mV
		I_{OUT} = 250mA		1200		mV
Quiescent Current	I_Q	T_J = 25℃		1.2	2.5	uA
Current Limit	I_{CL}		270	300		mA
Enable high level	V_{ENHI}		0.9			V
Enable low level	V_{ENLO}				0.4	V
Enable pin pull high current	I_{EN}			0.3		uA
Power-supply rejection ratio	PSRR	f = 1kHz		80		dB
		f = 10kHz		60		dB

Typical Characteristics

$V_{IN}=V_{OUT}$ + 1V, I_{OUT}=1mA, V_{OUT}=3.3V, $C_{IN}=C_{OUT}$=1uF, T_J=25℃, unless otherwise specified

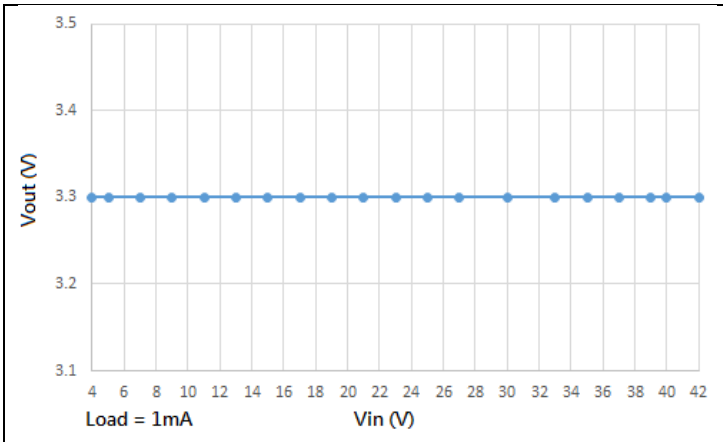


Fig 1 Vout vs Vin

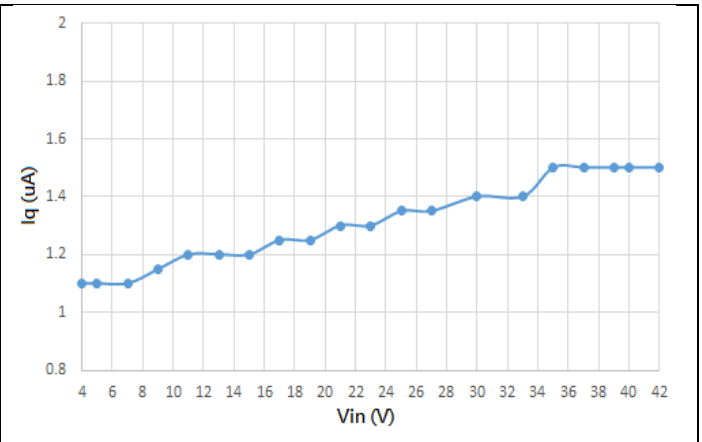


Fig 2 Iq vs Vin

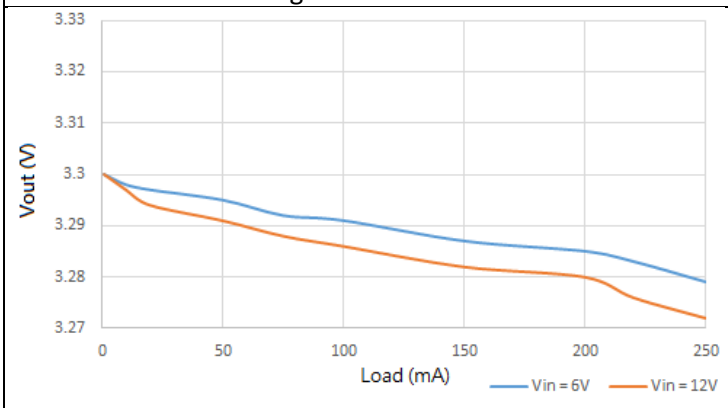


Fig 3 Vout vs Load

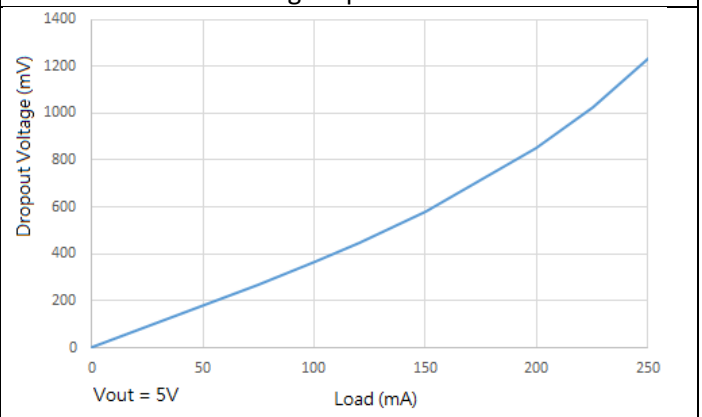


Fig 4 Dropout vs Load

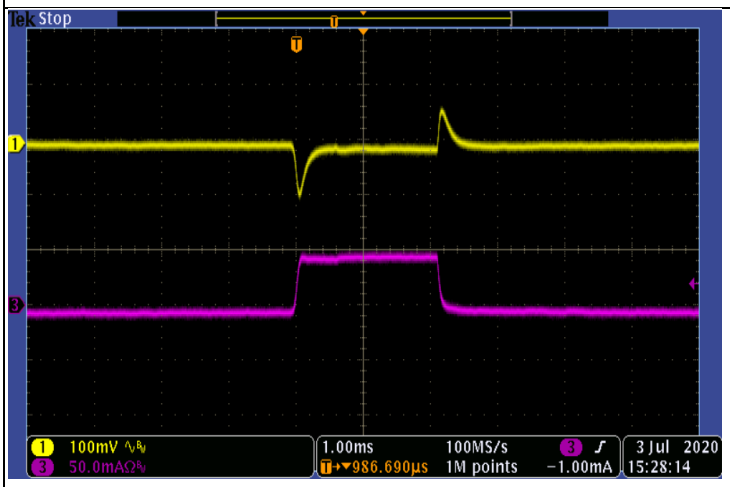


Fig 5 Vout Load Transient (0 to 50mA)

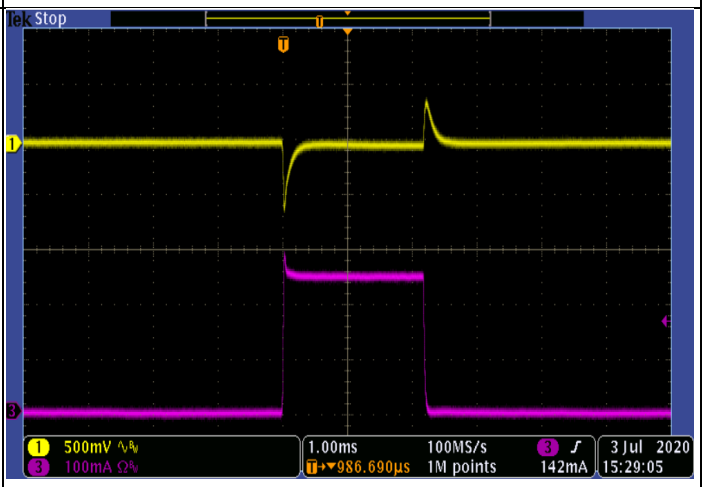


Fig 6 Vout Load Transient (1 to 250mA)

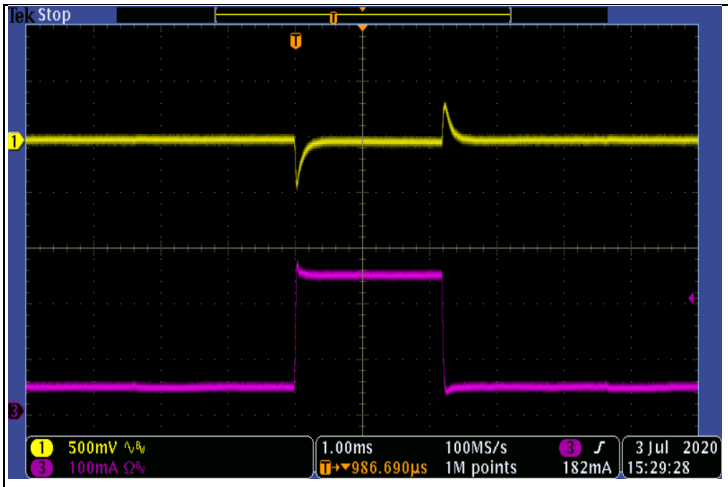


Fig 7 Vout Load Transient (50 to 250mA)

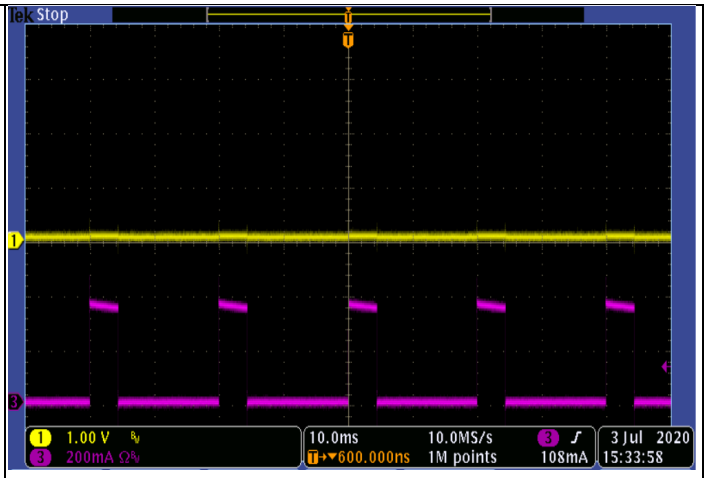


Fig 8 Vout Short to GND

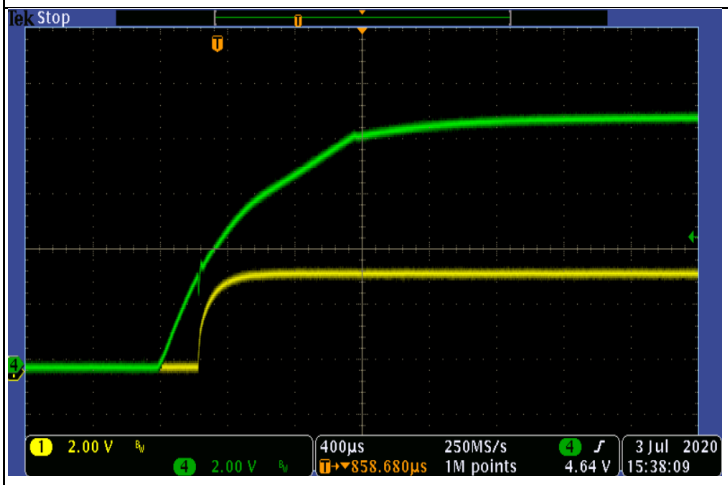
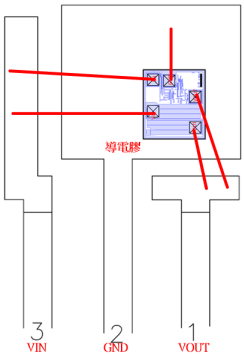


Fig 9 Vin Start up

KL2402

Bonding Diagram Example



TO92 Bonding Diagram