500nA I_Q, 300mA Low-Dropout Linear Regulator

General Description

The KL1503 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 500nA quiescent current at no load, the KL1503 is ideally suited for standby micro-control-unit systems, especially for always-on applications like portable, and other battery operated systems. The KL1503 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 KL1503 has a 6V maximum operating voltage limit, a 0°C to 100°C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range. The KL1503 is available in SOT893 SOT235, DFN1X1 surface mount packages.

Ordering Information

Part Number	Package	Body Size
KL1503	SOT89-3 SOT23-5 DFN1X1-4L	

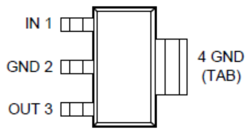
Features

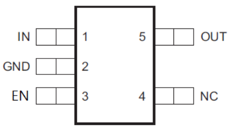
- VIN Range up to 6V
- Output Voltage Tolerances of ±2% Over the Temperature Range
- 300mA Maximum Output Current
- Ultra Low Quiescent Current (I_Q = 500nA)
- Dropout Voltage Typically 400 mV at IOUT = 250 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

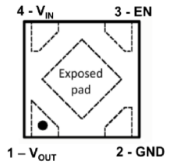
Applications

- Portable, Battery Powered Equipment
- Ultra Low Power Microcontroller
- Notebook computers

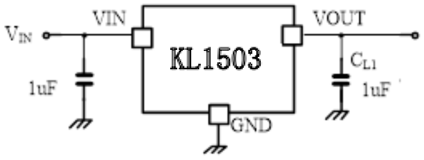
Pin Configuration

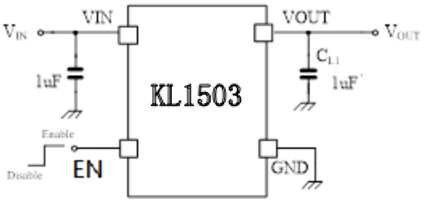






Typical Application Circuit



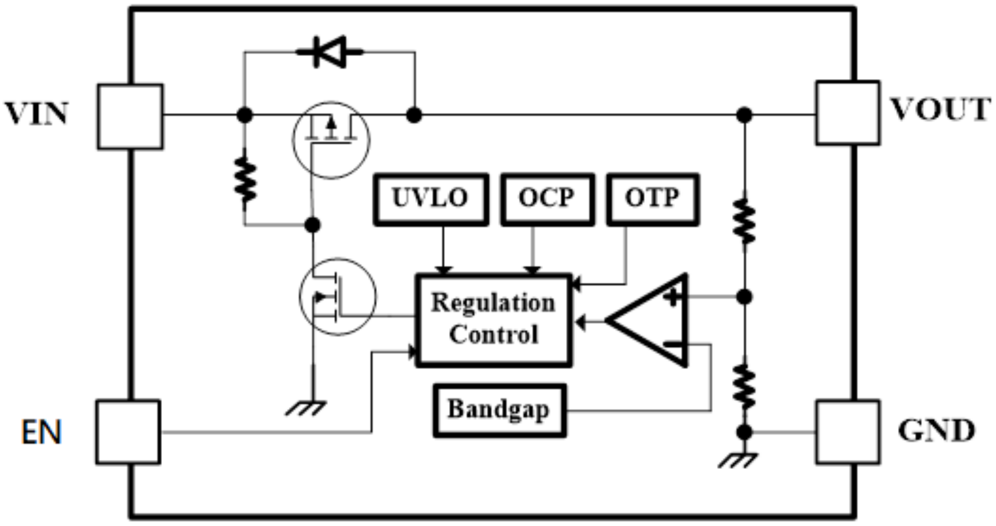


Ceramic Capacitor Stable

Pin Assignment

Pin Name	Pin No. SOT893	Pin No. SOT235	Pin No. DFN1X1	Pin Function
VOUT	3	5	1	Output Voltage Pin
GND	2,4	2	2	Ground
VIN	1	1	4	Input Voltage pin.
EN	--	3	3	Enable

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} --- -0.3V to +6.5V
- 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} -- +2.5V to +6V
- Junction Temperature --- 0°C to 125°C

Electrical Characteristics

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Range	V_{OUT}		1.2		5.0	V
Output Voltage Accuracy	△V_{OUT}		-2%		2%	V
Line Regulation	△V_{LINE}	V_{IN}=V_{OUT} + 1V to 5V,		20	50	mV
Load Regulation	△V_{LOAD}	I_{OUT}= 1mA to 100mA		10	30	mV
		I_{OUT}= 1mA to 250mA		20	30	
Dropout Voltage	V_{DROP}	I_{OUT}=100mA		150		mV
		I_{OUT}=250mA		400		mV
Quiescent Current	I_Q	T_J= 25℃		0.5	1	uA
Current Limit	I_{CL}		360	560		mA
Enable high level	V_{ENHI}		0.9			V
Enable low level	V_{ENLO}				0.4	V
Thermal Shutdown	T_{SD}			140		℃
Thermal Shutdown Hy	T_{SDHY}			20		℃

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

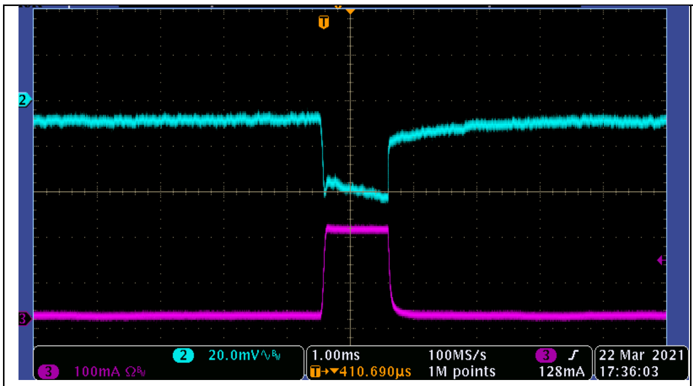


Fig 1 Load Transient (1mA to 200mA)

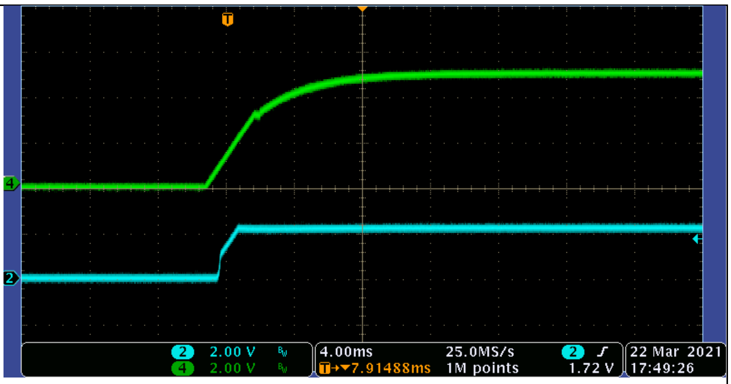


Fig 2 Vin Start up

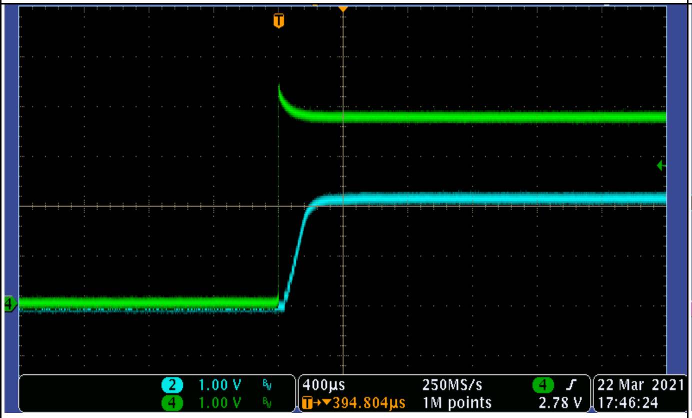


Fig 3 EN Start up

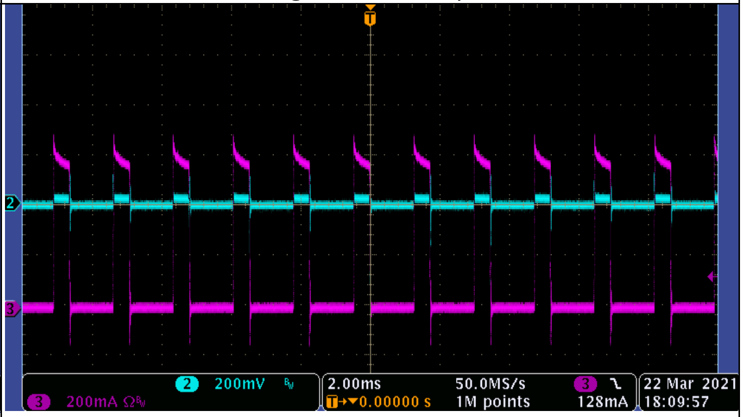
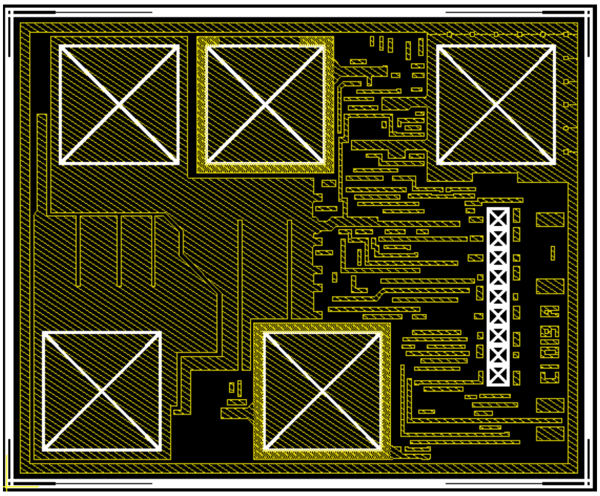


Fig 4 Vout Short to GND

PAD Location and Coordinates

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.360 * 0.305	mm^2	
Scribe line width	60	um	
TOP Metal thickness	3	µm	
Metal layers	3	layers	
Top Metallization	Al-Cu		
Wafer Thickness	736	µm	
CUP (circuit under PAD) or not	YES		

PAD NAME	PAD SIZE (μm^2)	Coordinate
VOUT	60*60	(49,49)
VOUT	60*60	(162,49)
ENABLE	60*60	(133,196)
GND	60*60	(251,196)
VIN	60*60	(58,196)

Bonding Diagram Example