24V 500mA Ultralow-Quiescent-Current LDO

General Description

The HM78XXH 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 HM78XXH 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 HM78XXH 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 HM78XXH has a 24-V maximum operating voltage limit, a -40°C to 125°C operating temperature range, and ±2% output voltage tolerance. The HM78XXH is available in a TO-92 through-hole and SOT23-3, SOT23-5, SOT-223, SOT89-3, ESOP8 surface mount packages.

Ordering Information

Part Number	Voltage
HM7815H	Vout=1.5V
HM7818H	Vout=1.8V
HM7825H	Vout=2.5V
HM7833H	Vout=3.3V
HM7850H	Vout=5.0V
HM78XXH	Vout can trim from 1.5V to 5.5V, 0.1V/step

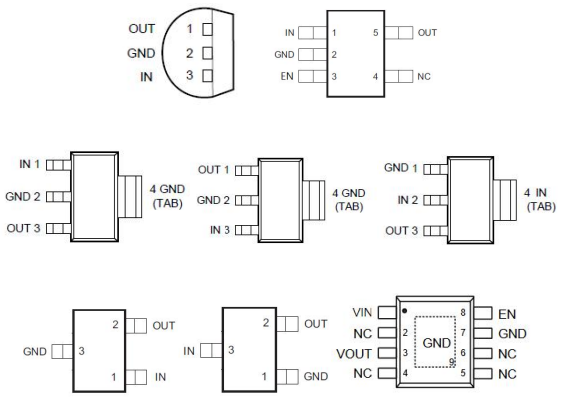
Features

- VIN Range up to 24V
- Output Voltage Tolerances of ±2%
- Output Current of 500 mA
- Ultra Low Quiescent Current (IQ = 1.5 μA)
- Dropout Voltage Typically 2400 mV at IOUT = 500 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

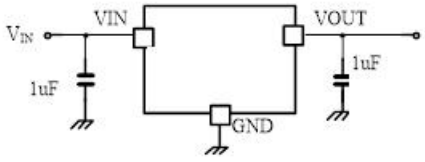
Applications

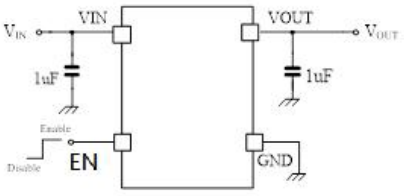
- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

Pin Configuration



Typical Application Circuit

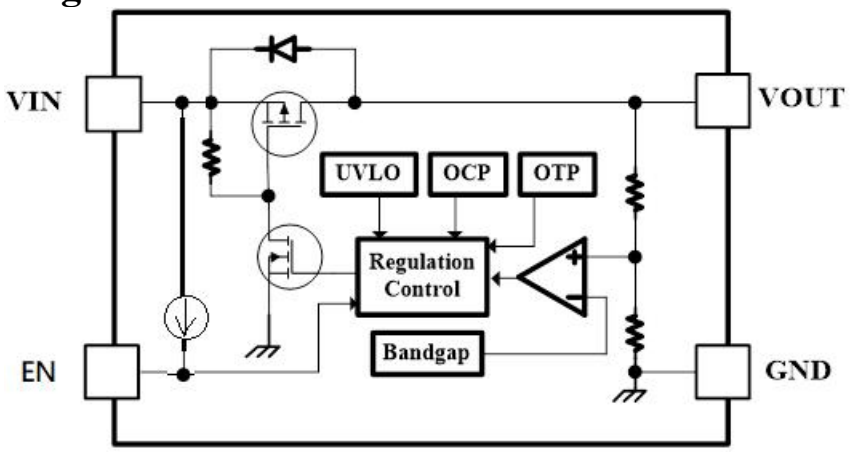




Pin Assignment

Pin Name	Pin No. ¢hπфн	Pin No. SOT23-5	Pin No. SOT-223 SOTyфπo	Pin No. SOT-223 SOTyфπo	Pin No. SOT23-3	Pin No. SOT23-3	Pin No. 9{hty	Pin Function
VOUT	1	5	3	3	2	2	3	Output Voltage Pin
GND	2	2	2,4	1	3	1	7,9	Ground
VIN	3	1	1	2,4	1	3	1	Input Voltage pin.
EN	--	3	--	--	--	--	8	Enable

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ---------- -0.3V to +28V
- 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 +24V
- Junction Temperature ---------- -40°C to 125°C

Electrical Characteristics

V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}		-2%		2%	V
Line Regulation	△V_{LINE}	V_{IN}=V_{OUT} + 1V to 24V,		2	12	mV
Load Regulation	△V_{LOAD}	I_{OUT}= 1mA to 100mA		20	30	mV
		I_{OUT}= 1mA to 500mA		100	160	
Dropout Voltage	V_{DROP}	I_{OUT}=100mA		400		mV
		I_{OUT}=500mA		2400		mV
Quiescent Current	I_Q	T_J= 25℃		1.5	4.0	uA
Current Limit	I_{CL}		520	620		mA
Enable high level	V_{ENHI}		1.0			V
Enable low level	V_{ENLO}				0.3	V
Enable pin pull high current	I_{EN}			0.1		uA
Thermal Shutdown	T_{SD}			140		℃
Thermal Shutdown Hysteresis	T_{HY}			20		℃
Power supply rejection ratio	PSRR	f=1kHz		80		dB
		f=10kHz		60		dB

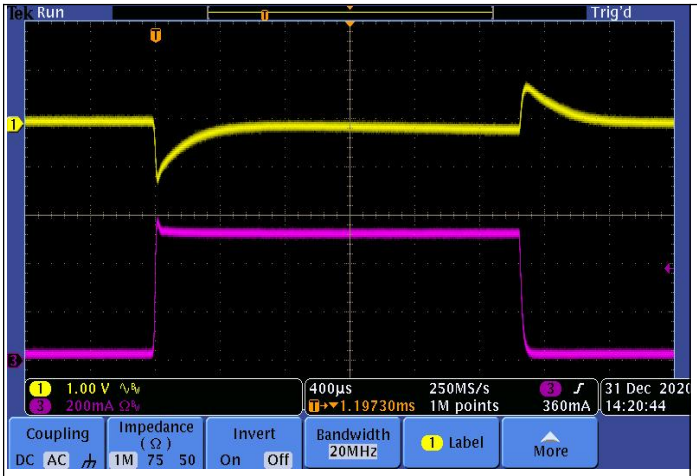


Fig 7 Vout Load Transient (10 to 500mA)

Fig 8 Vout Load Transient (100 to 500mA)

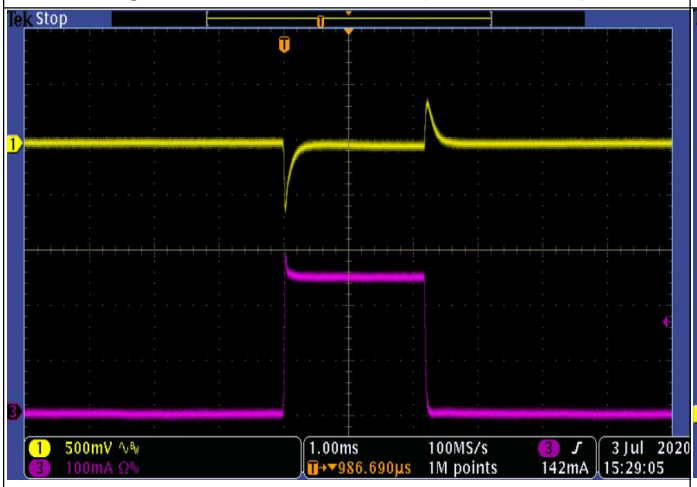


Fig 9 Vout Load Transient (1 to 250mA)

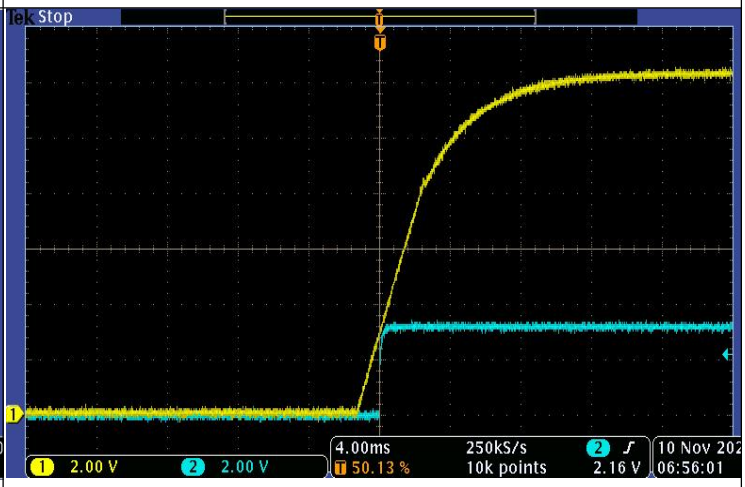


Fig 10 Vin Start up

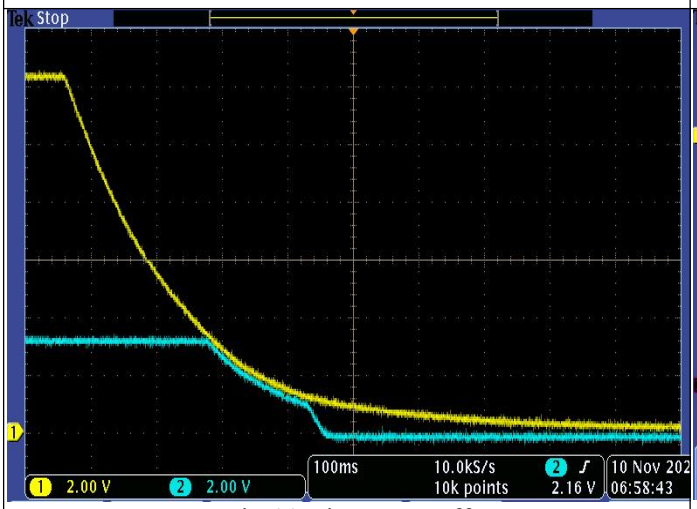


Fig 11 Vin power off

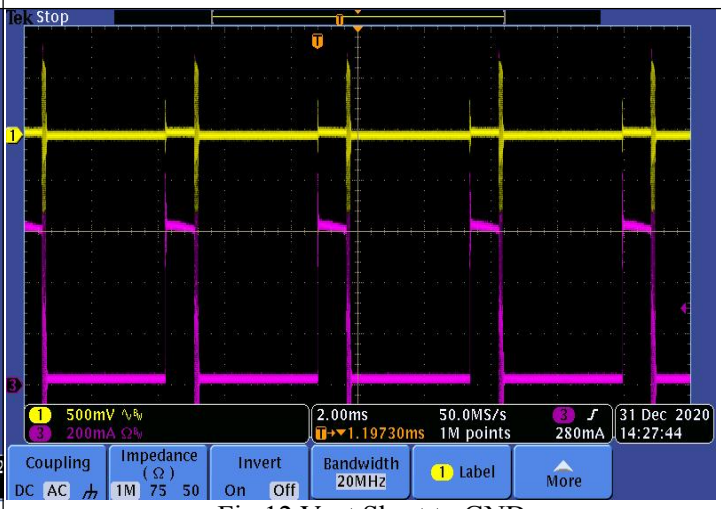


Fig 12 Vout Short to GND