

Features

- Ultra-low supply current: 6μA typ.
- Input voltage: 12V max.
- Low temperature coefficient
- Voltage regulator output current: 30mA
- Voltage detector includes hysteresis
- High output voltage accuracy: ±3%
- Package: SOT89-5

Applications

- Battery powered system
- Communication equipment
- Audio/Video equipment
- Home application

General Description

The HT71AXXXX devices are CMOS technology voltage regulators which also include an internal voltage detector. The functions of the voltage regulators include a low dropout voltage, good output voltage accuracy as well as the benefits of ultra-low supply current. The inclusion of a voltage detector function in the same device

reduce what would normally be a two chip solution to a single chip solution resulting in reduced product costs. For maximum application flexibility, the voltage detector output is an N-channel open drain.

Selection Table

Part No.	Maximum Input Voltage	Regulator Voltage	Detector Voltage (V _{DF})	LDO Output Current (mA)	Typical Current Consumption (μA)	Tolerance	Package
HT71A3324	12V	3.3V	2.4V	30	6	±3%	SOT89-5
HT71A3327	12V	3.3V	2.7V	30	6	±3%	SOT89-5
HT71A3344	12V	3.3V	4.4V	30	6	±3%	SOT89-5
HT71A5024	12V	5.0V	2.4V	30	6	±3%	SOT89-5
HT71A5027	12V	5.0V	2.7V	30	6	±3%	SOT89-5
HT71A5033	12V	5.0V	3.3V	30	6	±3%	SOT89-5
HT71A5042	12V	5.0V	4.2V	30	6	±3%	SOT89-5
HT71A5044	12V	5.0V	4.4V	30	6	±3%	SOT89-5

The schematic diagram illustrates a two-stage operational amplifier (op-amp) based current source circuit. The circuit is enclosed in a dashed box, indicating it is a single integrated circuit component. The input voltage V_{IN} is connected to the non-inverting input (+) of the first op-amp (labeled "Amp"). The inverting input (-) of the first op-amp is connected to a reference voltage V_{REF} . The output of the first op-amp drives the gate of an N-channel MOSFET. The source of this MOSFET is connected to ground (GND), and its drain is connected to the output voltage V_{OUT} . A resistor is connected between V_{OUT} and the inverting input of the second op-amp. The non-inverting input (+) of the second op-amp is connected to a feedback signal V_{SEN} , which is derived from V_{OUT} through a voltage divider consisting of two resistors. The output of the second op-amp drives the gate of a P-channel MOSFET. The source of this MOSFET is connected to V_{OUT} , and its drain is connected to the output voltage V_{DET} . A resistor is connected between V_{DET} and the inverting input (-) of the second op-amp. A hysteresis block is connected between the output of the second op-amp and its inverting input. The circuit is powered by a positive supply V_{DD} and a negative supply V_{SS} (GND).

HT71Axxxx
SOT89-5-A
(Top View)

Pin No.	Pin Name	Description
1	VOUT	Regulated Voltage Output Pin
2	VIN	Power Supply Input Pin
3	GND	Ground Pin
4	VDET	Voltage Detector Output Pin
5	VSEN	Voltage Detector Input Sense Pin

Absolute Maximum Ratings

Supply Voltage	-0.3V to 14.0V	VSEN Input Voltage Pin.....	-0.3V ~ $V_{IN}+0.3V$
VDET Output Voltage Pin	-0.3V ~ 14V	VOUT Output Voltage Pin.....	-0.3V ~ $V_{IN}+0.3V$
Power Consumption	500mW	Storage Temperature	-50°C to +125°C
Operating Temperature	-40°C to +85°C		

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

$V_{IN}=V_{SEN}=V_{OUT}+2.0V$, unless otherwise specified, $T_a=25^{\circ}C$

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage	—	—	—	12	V
I_{SS}	Supply Current	$V_{OUT}>V_{DET}$, $V_{IN}=V_{SEN}=V_{OUT}+2$ $V_{OUT}<V_{DET}$, $V_{IN}=V_{SEN}=V_{DET}+2$	—	6	12	μA
Voltage Regulator						
V_O	Output Voltage	$V_{IN}=V_{OUT}+2$, $I_{OUT}=10mA$	$V_{OUT}-3\%$	V_{OUT}	$V_{OUT}+3\%$	V
I_{OUT}	Output Current	$V_{IN}=V_{OUT}+2$, $\Delta V_O=3\%$	20	30	—	mA
ΔV_O	Load Regulation	$V_{IN}=V_{OUT}+2$, $1mA \leq I_{OUT} \leq 30mA$	—	60	100	mV
ΔV_{DIF}	Dropout Voltage	$\Delta V_O=2\%$, $I_{OUT}=1mA$	—	100	—	mV
$\frac{\Delta V_O}{\Delta V_{IN} \times V_O}$	Line Regulation	$I_{OUT}=1mA$, $V_{OUT}+1 \leq V_{IN} \leq 12V$	—	0.2	—	%/V
$\frac{\Delta V_O}{\Delta T_a}$	Temperature Coefficient	$I_{OUT}=10mA$, $-40^{\circ}C \leq T_a \leq +85^{\circ}C$	—	± 0.75	—	mV/ $^{\circ}C$
Voltage Detector						
V_D	Detection Voltage	High to Low	$V_{DF}-3\%$		$V_{DF}+3\%$	V
V_{HYS}	Hysteresis Width	—	$V_{DF} \times 0.02$	$V_{DF} \times 0.05$	$V_{DF} \times 0.10$	V
I_{OL}	Output Sink Current	$V_{IN}=V_{SEN}=2V$, $V_{DET}=0.2V$	0.5	1.0	—	mA
$\frac{\Delta V_D}{\Delta T_a}$	Temperature Coefficient	$-40^{\circ}C \leq T_a \leq +85^{\circ}C$	—	± 0.75	—	mV/ $^{\circ}C$

Note: The V_{DF} is the detector voltage of the device. For more detailed information of the detector voltage for different devices, refer to the preceding Selection Table.

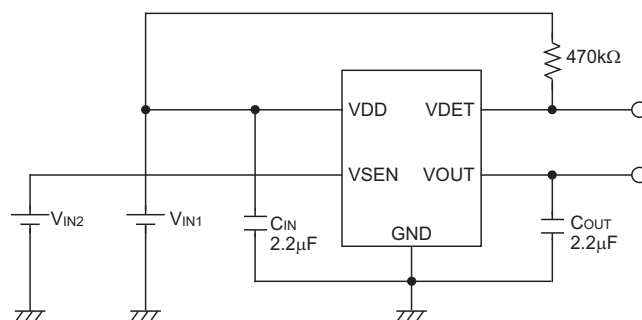
Functional Description

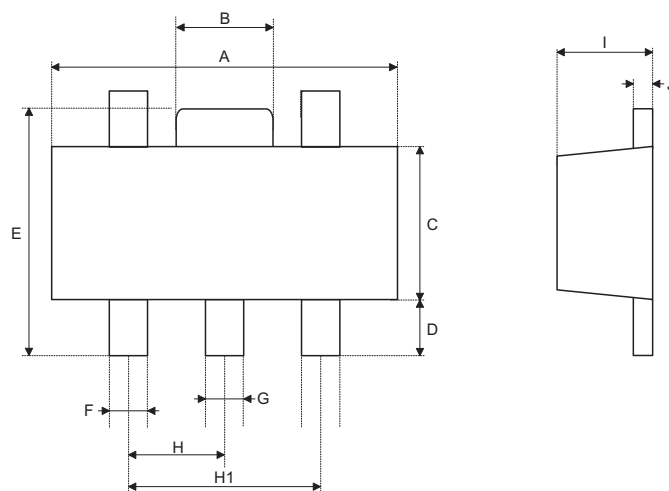
The HT71Axxxx devices are a series of combined regulator and detector devices. The voltage regulator part of the devices have very low dropout voltage and low current consumption and can supply up to 30mA of output current. The output voltage is available in both 3.3V and 5V types. An input voltage of up to 12V can be accepted on their input pin.

The voltage detector part of the devices can detect an externally supplied voltage on its sense pin. This externally supplied voltage will be compared with a fixed internal reference voltage which can have a range of fixed voltages ranging from 2.4V to 4.4V. When the external

sense voltage falls below the detect voltage the detector output will switch low. The detector output is an open drain NMOS type therefore users must connect an external pull-high resistor for correct operation. The voltage detectors consist of a high-precision and low power consumption standard voltage source as well as a comparator, hysteresis circuit, and an output driver. CMOS technology ensures low power consumption. Although designed primarily as fixed voltage detectors, these devices can be used with external components to detect user specified threshold voltages.

Application Circuits



Package Information
5-pin SOT89 Outline Dimensions


Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	0.173	—	0.181
B	0.055	—	0.071
C	0.091	—	0.102
D	0.035	—	0.043
E	0.155	—	0.167
F	0.013	—	0.020
G	0.014	—	0.022
H	—	1.52	—
H1	0.114	—	0.122
I	0.055	—	0.063
J	0.014	—	0.017

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	4.39	—	4.60
B	1.40	—	1.80
C	2.31	—	2.59
D	0.89	—	1.09
E	3.94	—	4.24
F	0.33	—	0.51
G	0.36	—	0.56
H	—	1.52	—
H1	2.90	—	3.10
I	1.40	—	1.60
J	0.36	—	0.43

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