

HT71XX High Voltage Regulator

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient

Applications

- Battery-powered equipment
- Communication equipment

General Description

The HT71XX series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 24V. They are available with several fixed output voltages ranging from 3.0V to 5.0V. CMOS technology ensures low voltage drop and low quiescent current.

- High input voltage (up to 24V)
- TO-92 and SOT-89 packages
- Audio/Video equipment

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

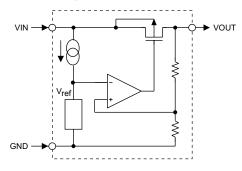
Selection Table

Part No.	Output Voltage	Tolerance
HT7130	$3.0\mathrm{V}$	$\pm 5\%$
HT7133	3.3V	$\pm 5\%$
HT7136	3.6V	$\pm 5\%$
HT7144	4.4V	$\pm 5\%$
HT7150	$5.0\mathrm{V}$	$\pm 5\%$

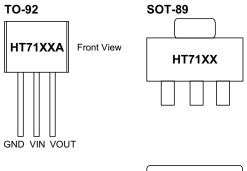
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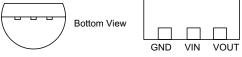


Block Diagram

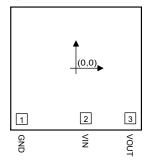


Pin Assignment





Pad Assignment



Pad Coordinates

Unit: μm

Pad No.	X	Y
1	-480.00	-451.50
2	87.50	-444.50
3	482.00	-444.50

Chip size: 1374×1294 $(\mu m)^2$ * The IC substrate should be connected to VDD in the PCB layout artwork.

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Absolute Maximum Ratings

Supply Voltage0.3V to 28V	Storage Temperature– $50^{\circ}C$ to $125^{\circ}C$
Power Consumption 200mW	Operating Temperature0°C to 70°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

HT7130, +3.0V output type

 $Ta=25^{\circ}C$

Symbol	Parameter	Test Conditions		Min.	T	Man	Unit
	Parameter	$\mathbf{V}_{\mathbf{IN}}$	Conditions		Тур.	Max.	Unit
V _{OUT}	Output Voltage	5V	I _{OUT} =10mA	2.85	3.0	3.15	V
I _{OUT}	Output Current	5V	—	20	30		mA
ΔV_{OUT}	Load Regulation	5V	$1mA \le I_{OUT} \le 20mA$		60	100	mV
V _{DIF}	Voltage Drop		I _{OUT} =1mA	_	100		mV
I _{SS}	Current Consumption	5V	No load	_	4	6.0	μA
$\boxed{\frac{\Delta V_{out}}{\Delta V_{iN} \times V_{out}}}$	Line Regulation		$\begin{array}{l} 4V \leq V_{IN} \leq 24V \\ I_{OUT} = 1 mA \end{array}$		0.2		%/V
V _{IN}	Input Voltage			_	_	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5V	I _{OUT} =10mA 0°C <ta<70°c< td=""><td></td><td>± 0.45</td><td></td><td>mV/°C</td></ta<70°c<>		± 0.45		mV/°C

HT7133, +3.3V output type

 $Ta=25^{\circ}C$

Symbol	Parameter	Test Conditions		Min	T	Max.	Unit
	Parameter	$\mathbf{V}_{\mathbf{IN}}$	Conditions	Min.	Тур.	max.	Unit
V _{OUT}	Output Voltage	5.5V	I _{OUT} =10mA	3.135	3.3	3.465	V
I _{OUT}	Output Current	5.5V	—	20	30		mA
ΔV_{OUT}	Load Regulation	5.5V	1mA≤I _{OUT} ≤30mA	_	60	100	mV
$V_{\rm DIF}$	Voltage Drop		I _{OUT} =1mA	—	100	_	mV
I _{SS}	Current Consumption	5.5V	No load	_	4	6	μA
$\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}$	Line Regulation		$\substack{4.5V \leq V_{IN} \leq 24V\\ I_{OUT}=1mA}$	_	0.2		%/V
V _{IN}	Input Voltage			_	_	24	V
$\frac{\Delta V_{\rm OUT}}{\Delta T_{\rm a}}$	Temperature Coefficient	5.5V	I _{OUT} =10mA 0°C <ta<70°c< td=""><td></td><td>±0.5</td><td></td><td>mV/°C</td></ta<70°c<>		±0.5		mV/°C

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 $Ta=25^{\circ}C$

HT7136, +3.6V output type

Symbol	Demonster	Test Conditions		Min	—	Marr	Unit
	Parameter	VIN	Conditions	Min.	Тур.	Max.	Unit
V _{OUT}	Output Voltage	5.6V	I _{OUT} =10mA	3.42	3.6	3.78	V
I _{OUT}	Output Current	5.6V		20	30		mA
ΔV_{OUT}	Load Regulation	5.6V	$1 mA \le I_{OUT} \le 30 mA$		60	100	mV
V _{DIF}	Voltage Drop		I _{OUT} =1mA	_	60	_	mV
I _{SS}	Current Consumption	5.6V	No load	_	3.0	7.0	μA
$\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}$	Line Regulation		$\begin{array}{l} 4.6V {\leq} V_{IN} {\leq} 12V \\ I_{OUT} {=} 1mA \end{array}$		0.2	_	%/V
V _{IN}	Input Voltage				_	24	V
$\frac{\Delta V_{\rm OUT}}{\Delta T_{\rm a}}$	Temperature Coefficient	5.6V	I _{OUT} =10mA 0°C <ta<70°c< td=""><td>_</td><td>±0.6</td><td>_</td><td>mV/°C</td></ta<70°c<>	_	±0.6	_	mV/°C

HT7144, +4.4V output type

 $Ta=25^{\circ}C$

Symbol	Demonster	Test Conditions		Ъ <i>П</i>	—	рл	TTee
	Parameter	V _{IN}	Conditions	Min.	Тур.	Max.	Unit
V _{OUT}	Output Voltage	6.4V	I _{OUT} =10mA	4.18	4.4	4.62	V
I _{OUT}	Output Current	6.4V		20	30		mA
ΔV_{OUT}	Load Regulation	6.4V	$1mA \le I_{OUT} \le 30mA$		60	100	mV
V _{DIF}	Voltage Drop		I _{OUT} =1mA		100		mV
I _{SS}	Current Consumption	6.4V	No load	_	4	7.5	μA
$\frac{\Delta V_{\rm out}}{\Delta V_{\rm in} \times V_{\rm out}}$	Line Regulation		$\begin{array}{l} 5.4V {\leq} V_{IN} {\leq} 24V \\ I_{OUT} {=} 1mA \end{array}$		0.2		%/V
V _{IN}	Input Voltage					24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6.4V	I _{OUT} =10mA 0°C <ta<70°c< td=""><td></td><td>±0.7</td><td></td><td>mV/°C</td></ta<70°c<>		±0.7		mV/°C

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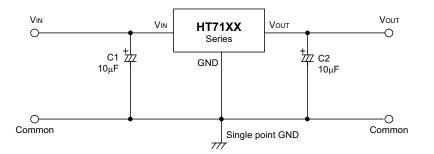
 $Ta=25^{\circ}C$

HT7150, +5.0V output type

Symbol	Demonster	Т	est Conditions	Min.	Тур.	Max.	Unit
	Parameter	VIN	Conditions				
V _{OUT}	Output Voltage	7V	I _{OUT} =10mA	4.75	5.0	5.25	V
I _{OUT}	Output Current	7V		20	30		mA
ΔV_{OUT}	Load Regulation	7V	$1mA \le I_{OUT} \le 30mA$		60	100	mV
V _{DIF}	Voltage Drop		I _{OUT} =1mA	_	100	_	mV
I _{SS}	Current Consumption	7V	No load	_	5	9	μΑ
$\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}$	Line Regulation		$6V \le V_{IN} \le 24V$ I _{OUT} =1mA		0.2		%/V
V _{IN}	Input Voltage			_	_	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	7V	I _{OUT} =10mA 0°C <ta<70°c< td=""><td>_</td><td>±0.75</td><td></td><td>mV/°C</td></ta<70°c<>	_	±0.75		mV/°C

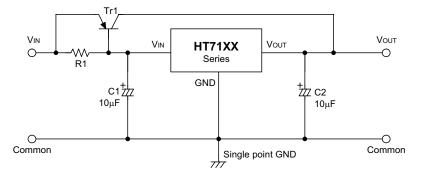
Application Circuits

Basic circuits

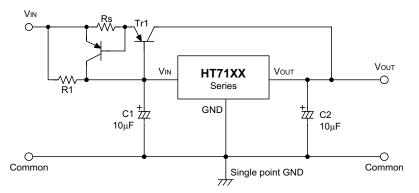




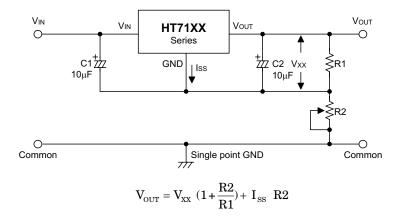
High output current positive voltage regulator



Short-Circuit protection by Tr1



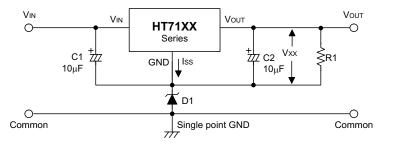
Circuit for increasing output voltage



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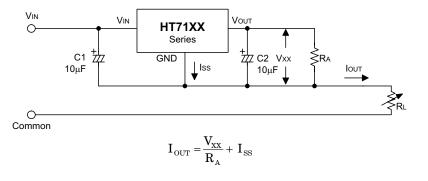


Circuit for increasing output voltage

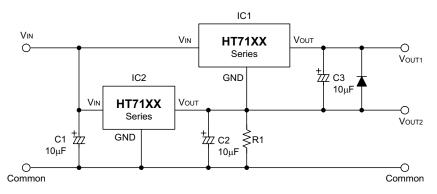


V_{OUT}=V_{XX}+V_{D1}

Constant current regulator







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