

# HT71XX High Voltage Regulator

#### **Features**

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

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

#### **Applications**

- Battery-powered equipment
- Communication equipment

Audio/Video 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.

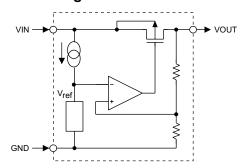
Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

#### **Selection Table**

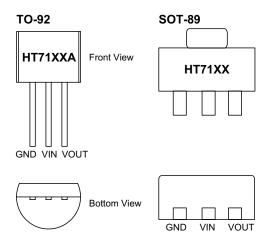
Part No.	Output Voltage	Tolerance
HT7130	3.0V	$\pm 5\%$
HT7133	3.3V	±5%
HT7136	3.6V	±5%
HT7144	4.4V	±5%
HT7150	5.0V	±5%



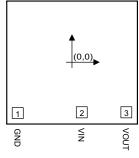
## **Block Diagram**



## **Pin Assignment**



# **Pad Assignment**



**Pad Coordinates** 

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

Unit: µm

Chip size: 1374×1294  $(\mu m)^2$ 

<sup>\*</sup> The IC substrate should be connected to VDD in the PCB layout artwork.



## **Absolute Maximum Ratings**

Supply Voltage0.3V to 28V	Storage Temperature–50°C to 125°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°C

Symbol	D	<b>Test Conditions</b>		7/C		ъл	TT:4
	Parameter	$V_{IN}$	Conditions	Min.	Тур.	Max.	Unit
$V_{OUT}$	Output Voltage	5V	I <sub>OUT</sub> =10mA	2.85	3.0	3.15	V
$I_{OUT}$	Output Current	5V		20	30	_	mA
$\Delta  m V_{OUT}$	Load Regulation	5V	$1 \text{mA} \le I_{OUT} \le 20 \text{mA}$	_	60	100	mV
$ m V_{DIF}$	Voltage Drop	_	I <sub>OUT</sub> =1mA	_	100	_	mV
$I_{SS}$	Current Consumption	5V	No load	_	4	6.0	μΑ
$\boxed{\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}}$	Line Regulation	_	$\begin{array}{c} 4V \leq V_{IN} \leq 24V \\ I_{OUT} = 1mA \end{array}$	_	0.2	_	%/V
V <sub>IN</sub>	Input Voltage		_	_	_	24	V
$\begin{array}{ c c }\hline \Delta V_{OUT} \\ \hline \Delta T_{a} \\ \hline \end{array}$	Temperature Coefficient	5V	I <sub>OUT</sub> =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°C

Cl1	Domonoton	<b>Test Conditions</b>		ъл:	/D	ъл	Unit
Symbol	Parameter	$V_{IN}$	Conditions	Min.	Тур.	Max.	Onit
$V_{ m OUT}$	Output Voltage	5.5V	I <sub>OUT</sub> =10mA	3.135	3.3	3.465	V
$I_{OUT}$	Output Current	5.5V		20	30	_	mA
$\Delta V_{ m OUT}$	Load Regulation	5.5V	$1 \text{mA} \le I_{OUT} \le 30 \text{mA}$	_	60	100	mV
$ m V_{DIF}$	Voltage Drop	_	I <sub>OUT</sub> =1mA	_	100	_	mV
$I_{SS}$	Current Consumption	5.5V	No load	_	4	6	μΑ
$\boxed{\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}}$	Line Regulation		$\begin{array}{c} 4.5V \leq V_{IN} \leq 24V \\ I_{OUT} = 1mA \end{array}$	_	0.2		%/V
$V_{\rm IN}$	Input Voltage		_	_	_	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.5V	I <sub>OUT</sub> =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



# HT7136, +3.6V output type

 $Ta=25^{\circ}C$ 

Symbol	Parameter	<b>Test Conditions</b>		Min.	Т	М	Unit
Symbol	Parameter	$\mathbf{v_{in}}$	Conditions	Wiin.	Тур.	Max.	Unit
$V_{OUT}$	Output Voltage	5.6V	I <sub>OUT</sub> =10mA	3.42	3.6	3.78	V
$I_{OUT}$	Output Current	5.6V		20	30	_	mA
$\Delta V_{ m OUT}$	Load Regulation	5.6V	1mA≤I <sub>OUT</sub> ≤30mA	_	60	100	mV
$V_{ m DIF}$	Voltage Drop	_	I <sub>OUT</sub> =1mA	_	60	_	mV
$I_{SS}$	Current Consumption	5.6V	No load	_	3.0	7.0	μΑ
$\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}$	Line Regulation	_	$\begin{array}{c} 4.6V \hspace{-0.1cm} \leq \hspace{-0.1cm} V_{IN} \hspace{-0.1cm} \leq \hspace{-0.1cm} 12V \\ I_{OUT} \hspace{-0.1cm} = \hspace{-0.1cm} 1 mA \end{array}$		0.2		%/V
V <sub>IN</sub>	Input Voltage		_	_	_	24	V
$\boxed{\frac{\Delta V_{OUT}}{\Delta T_a}}$	Temperature Coefficient	5.6V	I <sub>OUT</sub> =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

## $Ta=25^{\circ}C$

Complete 1	Danamatan		<b>Test Conditions</b>			N/F	Unit
Symbol	Parameter	$\mathbf{v_{in}}$	Conditions	Min.	Тур.	Max.	Unit
$V_{OUT}$	Output Voltage	6.4V	I <sub>OUT</sub> =10mA	4.18	4.4	4.62	V
$I_{OUT}$	Output Current	6.4V		20	30	_	mA
$\Delta V_{ m OUT}$	Load Regulation	6.4V	1mA≤I <sub>OUT</sub> ≤30mA	_	60	100	mV
$V_{ m DIF}$	Voltage Drop	_	I <sub>OUT</sub> =1mA	_	100	_	mV
$I_{SS}$	Current Consumption	6.4V	No load	_	4	7.5	μΑ
$\boxed{\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}}$	Line Regulation	_	$\begin{array}{c} 5.4\text{V}{\leq}\text{V}_{\text{IN}}{\leq}24\text{V} \\ \text{I}_{\text{OUT}}{=}1\text{mA} \end{array}$		0.2	_	%/V
V <sub>IN</sub>	Input Voltage	_	_	_	_	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6.4V	I <sub>OUT</sub> =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



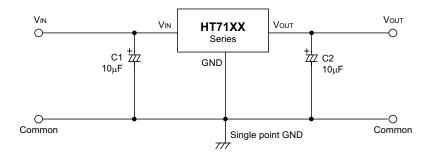
## HT7150, +5.0V output type

Ta=25°C

Cb al	Damamatan	Test Conditions		7/C	Т	ъл	TT:4
Symbol	Parameter	$V_{IN}$	Conditions	Min.	Тур.	Max.	Unit
$V_{OUT}$	Output Voltage	7V	I <sub>OUT</sub> =10mA	4.75	5.0	5.25	V
$I_{OUT}$	Output Current	7V		20	30	_	mA
$\Delta V_{ m OUT}$	Load Regulation	7V	1mA≤I <sub>OUT</sub> ≤30mA	_	60	100	mV
$ m V_{DIF}$	Voltage Drop	_	I <sub>OUT</sub> =1mA	_	100	_	mV
$I_{SS}$	Current Consumption	7V	No load	_	5	9	μА
$\frac{\Delta V_{\rm OUT}}{\Delta V_{\rm IN} \times V_{\rm OUT}}$	Line Regulation	_		_	0.2	_	%/V
$V_{\rm IN}$	Input Voltage	_	_	_	_	24	V
$\frac{\Delta V_{\rm OUT}}{\Delta T_{\rm a}}$	Temperature Coefficient	7V	I <sub>OUT</sub> =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

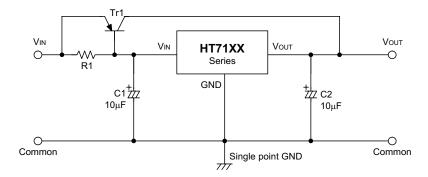
# **Application Circuits**

## **Basic circuits**

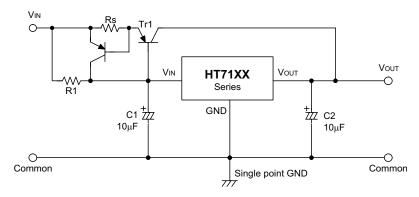




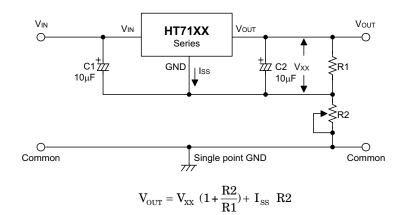
#### High output current positive voltage regulator



#### Short-Circuit protection by Tr1



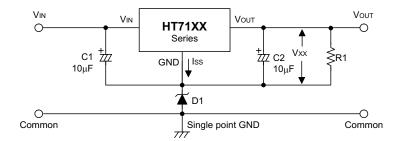
#### Circuit for increasing output voltage



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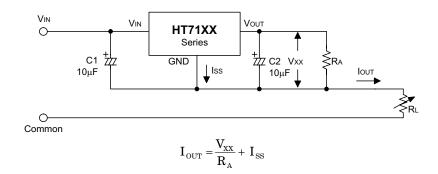


#### Circuit for increasing output voltage

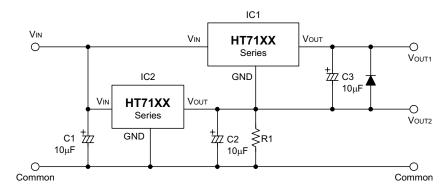


$$V_{\rm OUT} = V_{\rm XX} + V_{\rm D1}$$

## Constant current regulator



#### **Dual supply**





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