

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

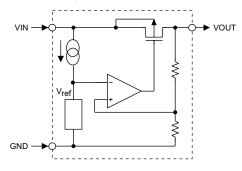
| Part No. | Output Voltage | Tolerance |
|----------|-----------------|-----------|
| HT7130 | 3.0V | $\pm 5\%$ |
| HT7133 | 3.3V | $\pm 5\%$ |
| HT7136 | 3.6V | $\pm 5\%$ |
| HT7144 | 4.4V | $\pm 5\%$ |
| HT7150 | $5.0\mathrm{V}$ | $\pm 5\%$ |

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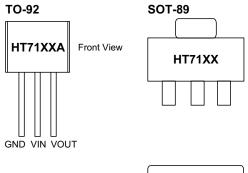
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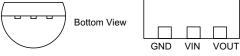


Block Diagram

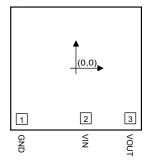


Pin Assignment





Pad Assignment



| Pad | Coord | linates |
|-----|-------|---------|
|-----|-------|---------|

Unit: µm

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

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

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Absolute Maximum Ratings

| Supply Voltage–0.3V 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

 $Ta=25^{\circ}C$

| Symbol | Parameter | Test Conditions | | Min. | T | Mon | Unit |
|---|-------------------------|----------------------------|---|------|------------|------|-------|
| Symbol | 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 | | $4V \le V_{IN} \le 24V$ I _{OUT} =1mA | _ | 0.2 | | %/V |
| V _{IN} | Input Voltage | | | _ | — | 24 | V |
| $\boxed{\frac{\Delta V_{OUT}}{\Delta T_a}}$ | 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 | V _{IN} | Conditions | | Тур. | max. | Umi |
| 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 |
| $\frac{\Delta V_{\rm OUT}}{\Delta T_a}$ | 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 | Demonstern | Test Conditions | | Ъ. Т. | — | Ъ. | TT *4 |
|---|-------------------------|-----------------|--|--------------|----------|------|-------|
| | Parameter | V _{IN} | 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 | $1mA \le I_{OUT} \le 30mA$ | _ | 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 |
| $\frac{\Delta V_{\rm OUT}}{\Delta T_a}$ | 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 | | Min | T | Mart | TT |
|---|-------------------------|-----------------|--|------|----------|------|-------|
| | 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 | μΑ |
| $\frac{\Delta V_{\rm out}}{\Delta V_{\rm in} \times V_{\rm out}}$ | Line Regulation | | $5.4V \le V_{IN} \le 24V$ I _{OUT} =1mA | | 0.2 | | %/V |
| V _{IN} | Input Voltage | _ | | _ | _ | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 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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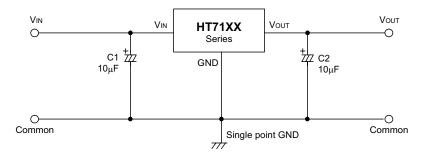
 $Ta=25^{\circ}C$

HT7150, +5.0V output type

| Symbol | Descourse | Test Conditions | | Ъ | — | М | TT *4 |
|---|-------------------------|-----------------|--|------|----------|------|-------|
| | Parameter | V _{IN} | Conditions | Min. | Тур. | Max. | Unit |
| 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≤I _{OUT} ≤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

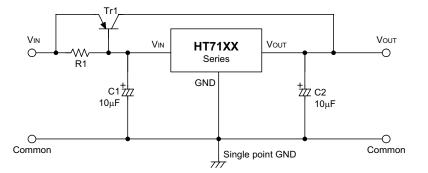


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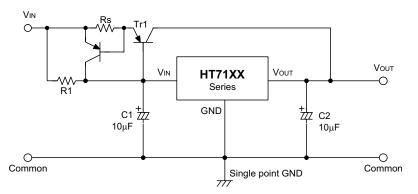
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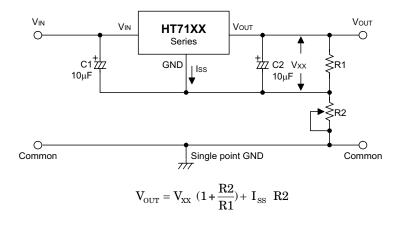
High output current positive voltage regulator



Short-Circuit protection by Tr1



Circuit for increasing output voltage

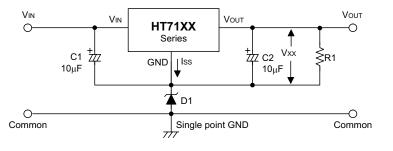


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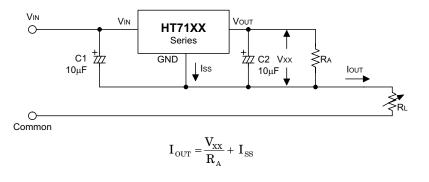


Circuit for increasing output voltage

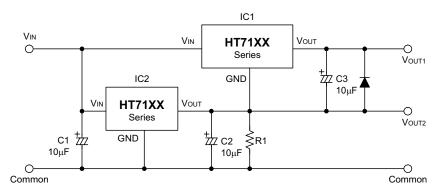


V_{OUT}=V_{XX}+V_{D1}

Constant current regulator



Dual supply



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