

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

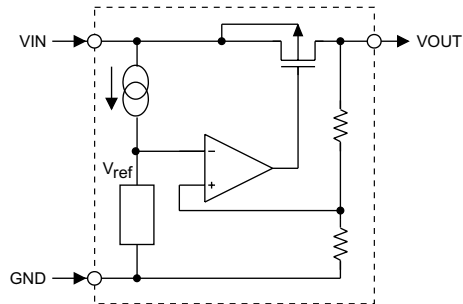
The HT71XX series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 24V. They are available with several fixed output voltages ranging from 3.0V to 5.0V. CMOS technology ensures low voltage drop and low quiescent current.

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

Selection Table

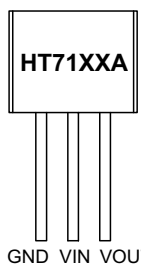
| Part No. | Output Voltage | Tolerance |
|-----------------|-----------------------|------------------|
| HT7130 | 3.0V | ±5% |
| HT7133 | 3.3V | ±5% |
| HT7136 | 3.6V | ±5% |
| HT7144 | 4.4V | ±5% |
| HT7150 | 5.0V | ±5% |

Block Diagram



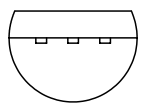
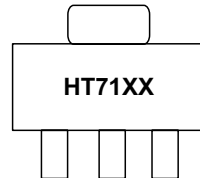
Pin Assignment

TO-92

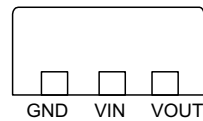


Front View

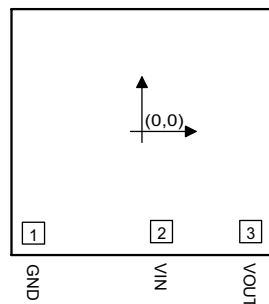
SOT-89



Bottom View



Pad Assignment



Chip size: $1374 \times 1294 (\mu\text{m})^2$

* The IC substrate should be connected to VDD in the PCB layout artwork.

Pad Coordinates

Unit: μm

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

Absolute Maximum Ratings

| | | | |
|-------------------------|--------------|-----------------------------|----------------|
| Supply Voltage | -0.3V to 28V | Storage Temperature | -50°C to 125°C |
| Power Consumption | 200mW | Operating Temperature | 0°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

T_a=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|-------------------------|-----------------|--|------|-------|------|-------|
| | | V _{IN} | Conditions | | | | |
| 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≤I _{OUT} ≤20mA | — | 60 | 100 | mV |
| V _{DIF} | Voltage Drop | — | I _{OUT} =1mA | — | 100 | — | mV |
| I _{SS} | Current Consumption | 5V | No load | — | 4 | 6.0 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4V≤V _{IN} ≤24V I _{OUT} =1mA | — | 0.2 | — | %/V |
| V _{IN} | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5V | I _{OUT} =10mA 0°C<T _a <70°C | — | ±0.45 | — | mV/°C |

HT7133, +3.3V output type

T_a=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|-------------------------|-----------------|--|-------|------|-------|-------|
| | | V _{IN} | Conditions | | | | |
| 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 _{DIF} | Voltage Drop | — | I _{OUT} =1mA | — | 100 | — | mV |
| I _{SS} | Current Consumption | 5.5V | No load | — | 4 | 6 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4.5V≤V _{IN} ≤24V I _{OUT} =1mA | — | 0.2 | — | %/V |
| V _{IN} | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5.5V | I _{OUT} =10mA 0°C<T _a <70°C | — | ±0.5 | — | mV/°C |

HT7136, +3.6V output type

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|-------------------------|-----------------|--|------|------|------|-------|
| | | V _{IN} | Conditions | | | | |
| 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≤I _{OUT} ≤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 |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4.6V≤V _{IN} ≤12V I _{OUT} =1mA | — | 0.2 | — | %/V |
| V _{IN} | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5.6V | I _{OUT} =10mA 0°C<Ta<70°C | — | ±0.6 | — | mV/°C |

HT7144, +4.4V output type

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|-------------------------|-----------------|--|------|------|------|-------|
| | | V _{IN} | Conditions | | | | |
| 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≤I _{OUT} ≤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 |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 5.4V≤V _{IN} ≤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 | — | ±0.7 | — | mV/°C |

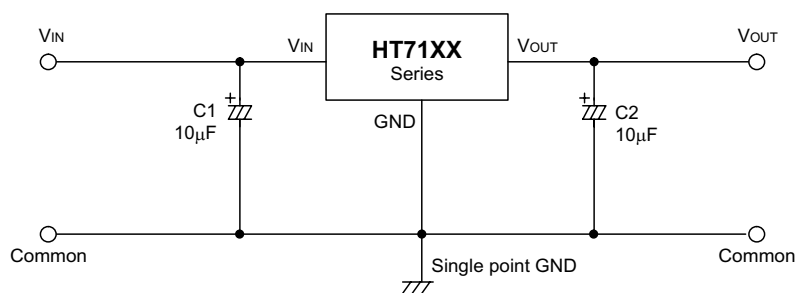
HT7150, +5.0V output type

Ta=25°C

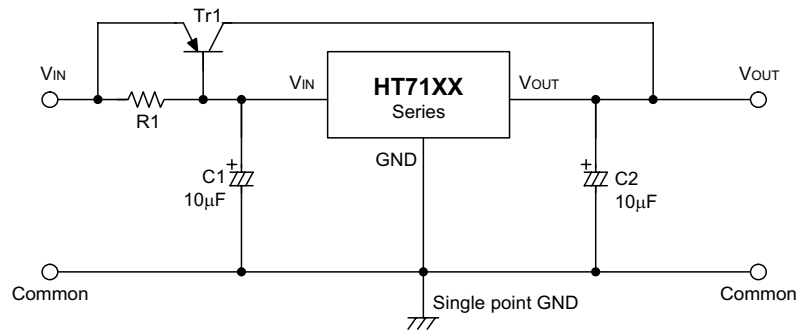
| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|-------------------------|-----------------|--|------|-------|------|-------|
| | | V _{IN} | Conditions | | | | |
| V _{OUT} | Output Voltage | 7V | I _{OUT} =10mA | 4.75 | 5.0 | 5.25 | V |
| I _{OUT} | Output Current | 7V | — | 20 | 30 | — | mA |
| ΔV _{OUT} | Load Regulation | 7V | 1mA≤I _{OUT} ≤30mA | — | 60 | 100 | mV |
| V _{DIF} | Voltage Drop | — | I _{OUT} =1mA | — | 100 | — | mV |
| I _{SS} | Current Consumption | 7V | No load | — | 5 | 9 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 6V≤V _{IN} ≤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 | — | ±0.75 | — | mV/°C |

Application Circuits

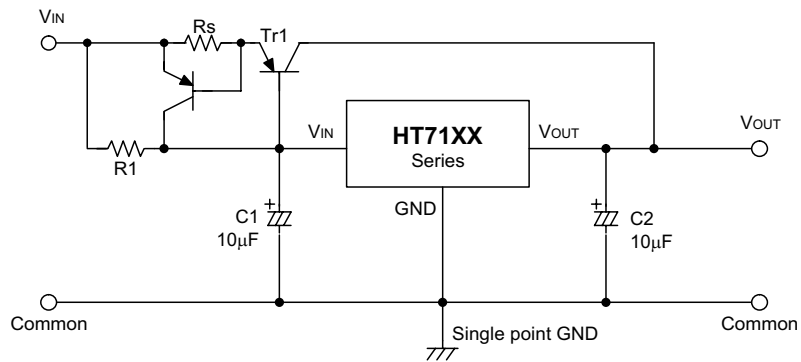
Basic circuits



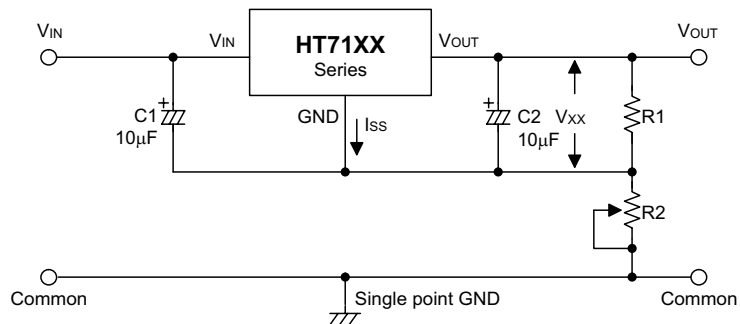
High output current positive voltage regulator



Short-Circuit protection by $Tr1$

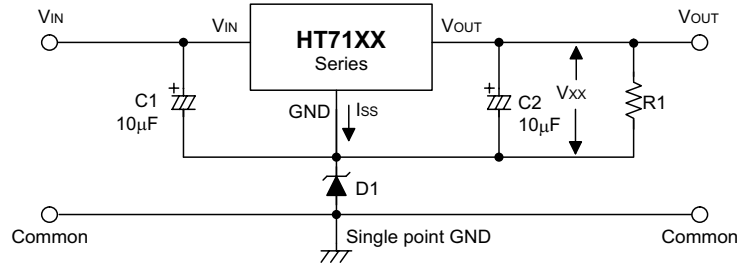


Circuit for increasing output voltage



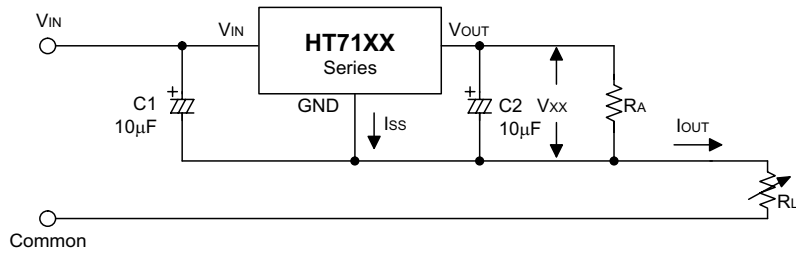
$$V_{OUT} = V_{XX} \left(1 + \frac{R2}{R1}\right) + I_{SS} R2$$

Circuit for increasing output voltage



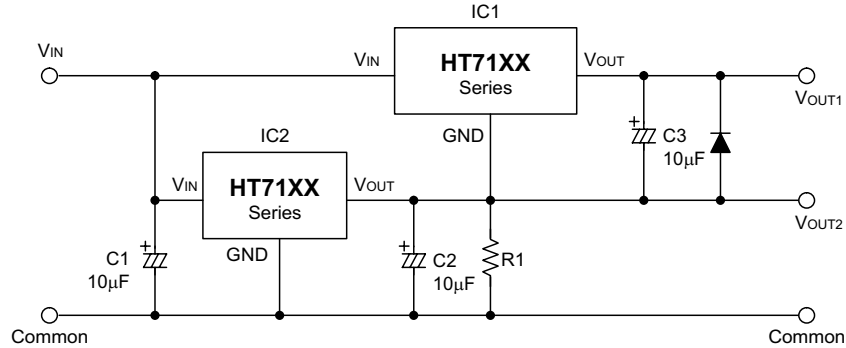
$$V_{OUT} = V_{XX} + V_{D1}$$

Constant current regulator



$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

Dual supply



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