HOLTEK

# HT75XX

## High Driver Regulator

### Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 24V)
- High output current : 100mA ($P_d \leq 250mW$)
- TO-92 and SOT-89 package

### Applications

- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

### General Description

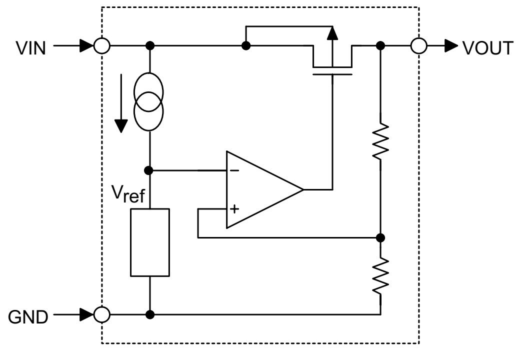
The HT75XX series is a set of three-terminal high current low voltage regulator implemented in CMOS technology. They can deliver 100mA output current and allow an input voltage as high as 24V. They are available with several fixed output voltages ranging from 3.0V to 8V. CMOS technology ensures low voltage 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.

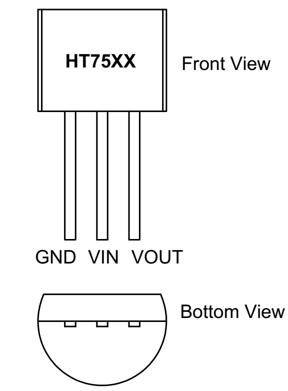
### Selection Table

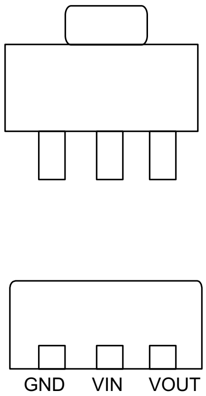
| Part No. | Output Voltage | Tolerance |
|---|---|---|
| HT7530 | 3.0V | ±5% |
| HT7533 | 3.3V | ±5% |
| HT7536 | 3.6V | ±5% |
| HT7544 | 4.4V | ±5% |
| HT7550 | 5.0V | ±5% |
| HT7580 | 8.0V | ±5% |

## Block Diagram

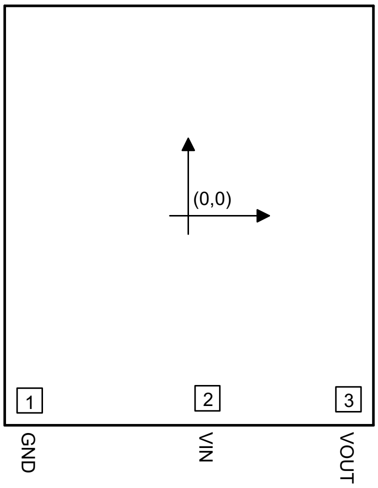



## Pin Assignment



## Pad Assignment




Chip size: 1390 × 1530 (μm)$^2$

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

## Pad Coordinates

Unit: μm

| Pad No. | X | Y |
|---|---|---|
| 1 | –506.50 | –589.50 |
| 2 | 61.00 | –582.50 |
| 3 | 510.50 | –585.50 |

## Absolute Maximum Ratings

Supply Voltage ............................... –0.3V to 26V

Power Consumption ............................. 250mW

Storage Temperature ................. –50°C to 125°C

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

### HT7530, +3.0V output type

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 5V | $I_{OUT}$=10mA | 2.85 | 3.0 | 3.15 | V |
| $I_{OUT}$ | Output Current | 5V | — | 60 | 100 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 5V | 1mA≤$I_{OUT}$≤50mA | | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 5V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4V≤$V_{IN}$≤12V<br>$I_{OUT}$=1mA | — | 0.2 | — | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5V | $I_{OUT}$=10mA<br>0°C<Ta<70°C | — | ±0.45 | — | mV/°C |

### HT7533, +3.3V output type

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 5.5V | $I_{OUT}$=10mA | 3.14 | 3.3 | 3.47 | V |
| $I_{OUT}$ | Output Current | 5.5V | — | 60 | 100 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 5.5V | 1mA≤$I_{OUT}$≤50mA | — | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 5.5V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4.5V≤$V_{IN}$≤12V<br>$I_{OUT}$=1mA | — | 0.2 | — | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5.5V | $I_{OUT}$=10mA<br>0°C<Ta<70°C | — | ±0.5 | — | mV/°C |

**HT7536, +3.6V output type**

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 5.6V | $I_{OUT}$=10mA | 3.42 | 3.6 | 3.78 | V |
| $I_{OUT}$ | Output Current | 5.6V | — | 60 | 100 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 5.6V | 1mA≤$I_{OUT}$≤50mA | — | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 5.6V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 4.6V≤$V_{IN}$≤12V<br>$I_{OUT}$=1mA | — | 0.2 | — | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 5.6V | $I_{OUT}$=10mA<br>0°C<Ta<70°C | — | ±0.6 | — | mV/°C |

**HT7544, +4.4V output type**

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 6.4V | $I_{OUT}$=10mA | 4.18 | 4.4 | 4.62 | V |
| $I_{OUT}$ | Output Current | 6.4V | — | 60 | 100 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 6.4V | 1mA≤$I_{OUT}$≤50mA | — | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 6.4V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 5.4V≤$V_{IN}$≤12V<br>$I_{OUT}$=1mA | — | 0.2 | — | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 6.4V | $I_{OUT}$=10mA<br>0°C<Ta<70°C | — | ±0.7 | — | mV/°C |

**HT7550, +5.0V output type**

Ta=25°C

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 7V | $I_{OUT}$=10mA | 4.75 | 5.0 | 5.25 | V |
| $I_{OUT}$ | Output Current | 7V | — | 100 | 150 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 7V | 1mA≤$I_{OUT}$≤70mA | — | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 7V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 6V≤$V_{IN}$≤15V $I_{OUT}$=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 |

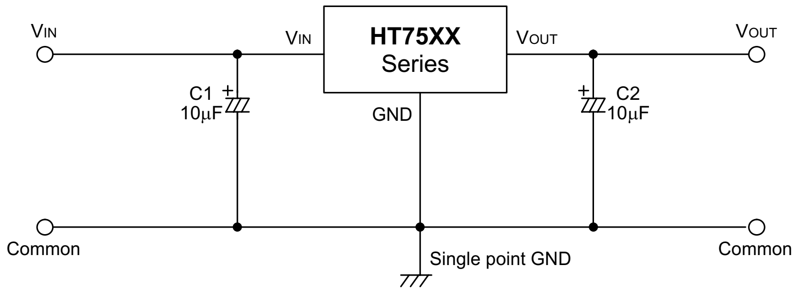
**HT7580, +8.0V output type**

Ta=25°C

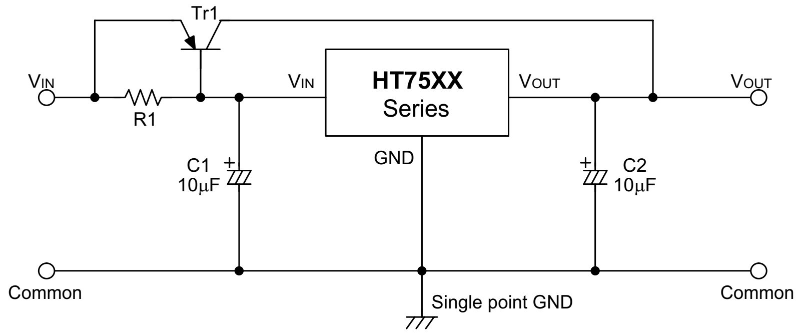
| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage Tolerance | 10V | $I_{OUT}$=10mA | 7.61 | 8.0 | 8.4 | V |
| $I_{OUT}$ | Output Current | 10V | — | 100 | 150 | — | mA |
| $\Delta V_{OUT}$ | Load Regulation | 10V | 1mA≤$I_{OUT}$≤70mA | — | 60 | 150 | mV |
| $V_{DIF}$ | Voltage Drop | — | $I_{OUT}$=1mA | — | 100 | — | mV |
| $I_{SS}$ | Current Consumption | 10V | No load | — | 10 | 20 | μA |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | 9V≤$V_{IN}$≤20V $I_{OUT}$=1mA | — | 0.2 | — | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 24 | V |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient | 10V | $I_{OUT}$=10mA 0°C<Ta<70°C | — | ±1.2 | — | mV/°C |

## Application Circuits

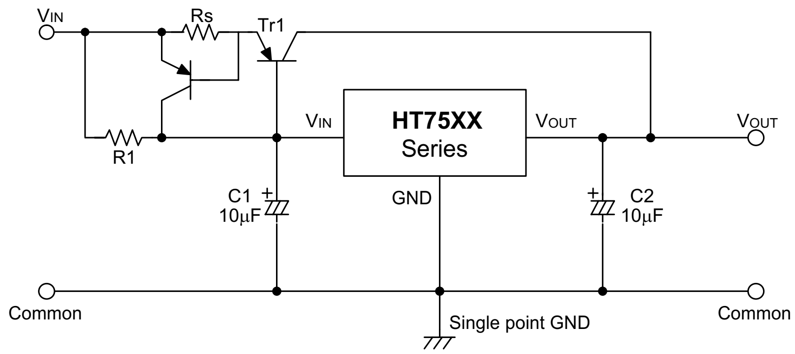
### Basic circuit



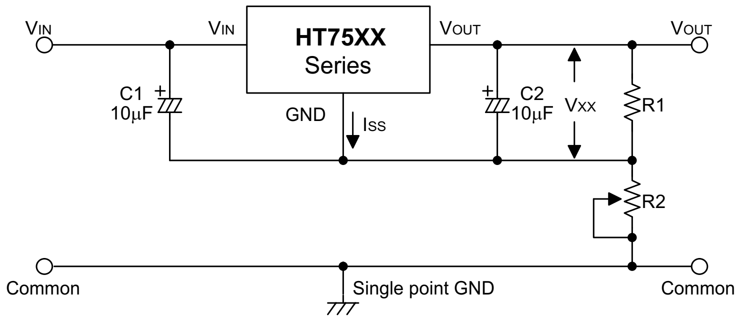

### High output current positive voltage regulator




### Short-Circuit protection for Tr1

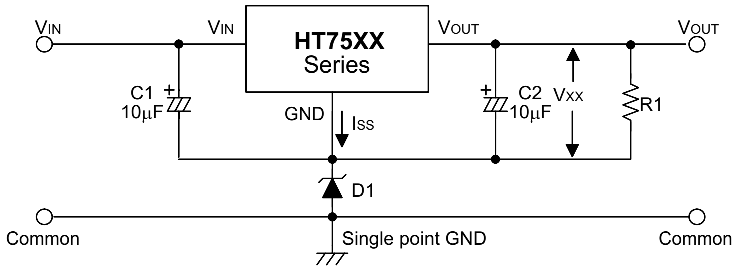


**Circuit for increasing output voltage**



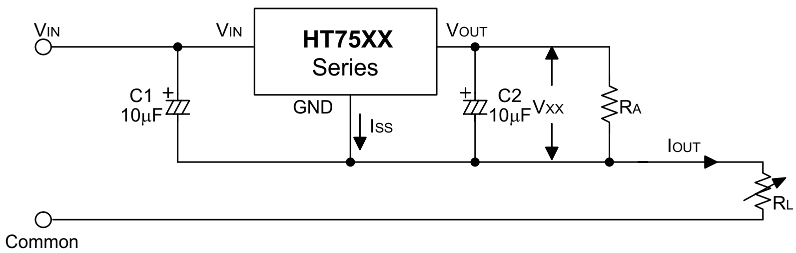

$$V_{OUT} = V_{XX}\left(1+\frac{R2}{R1}\right)+I_{SS}R2$$

**Circuit for increasing output voltage**



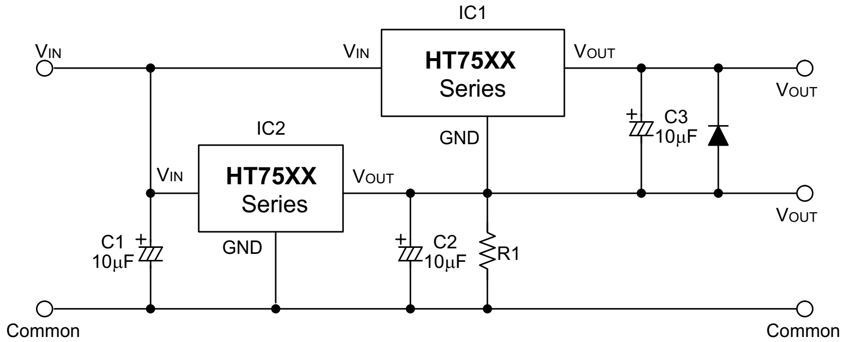

$$V_{OUT} = V_{XX} + V_{D1}$$

**Constant current regulator**




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

**Dual supply**


IC1
VIN
VIN
HT75XX
Series
VOUT
VOUT
GND
IC2
C3
10µF
VIN
HT75XX
Series
VOUT
VOUT
C1
10µF
GND
C2
10µF
R1
Common
Common

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