HT75XX

High Driver/Low Power Regulator

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 12V)
- High output current : 100mA ($P_d \leq 250mW$)
- TO-92 and SOT-89 package

Applications

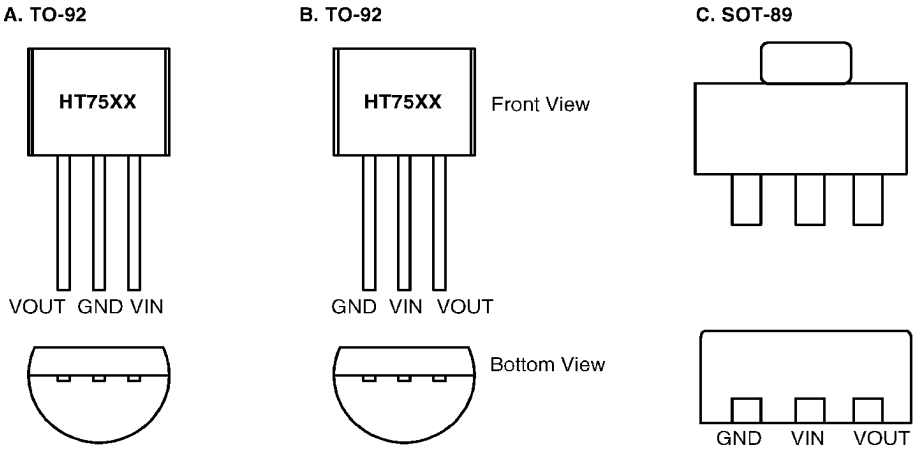
- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

General Description

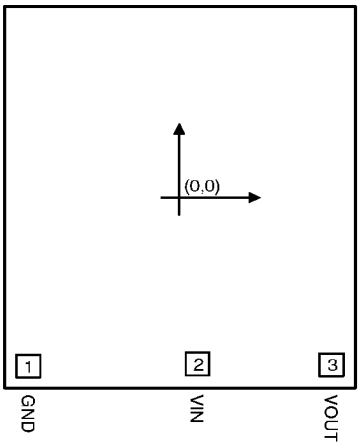
The HT75XX series is a set of three-terminal high current low voltage regulator implemented in CMOS technology. They can deliver 100mA output current and allow an input voltage as high as 12V. They are available with several fixed output voltages ranging from 2.4V to 9V. CMOS technology ensures low voltage 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.

Pin Assignment



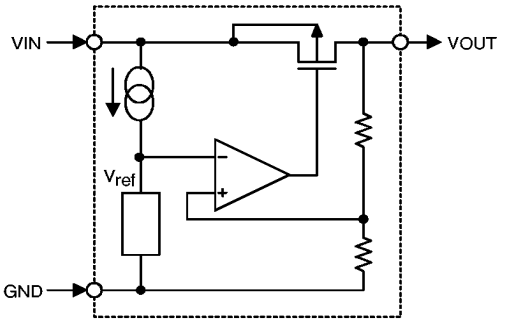
Pad Coordinates



Chip size: 1390 × 1530 (μm)^2

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

Block Diagram



Unit: μm

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

Selection Guide

Part No.	Pin Assignment	Output Voltage	Tolerance
HT7530 HT7531	B, C A	3.0V	±2.4%, ±5%
HT7533 HT7534	B, C A	3.3V	±2.4%, ±5%
HT7536 HT7537	B, C A	3.6V	±2.4%, ±5%
HT7538 HT7539	B, C A	3.8V	±2.4%, ±5%
HT7544 HT7545	B, C A	4.4V	±2.4%, ±5%
HT7550 HT7551	B, C A	5.0V	±2.4%, ±5%
HT7560 HT7561	B, C A	6.0V	±2.4%, ±5%

Part No.	Pin Assignment	Output Voltage	Tolerance
HT7570 HT7571	B, C A	7.0V	±2.4%, ±5%
HT7580 HT7581	B, C A	8.0V	±2.4%, ±5%
HT7590 HT7591	B, C A	9.0V	±2.4%, ±5%

Note: For semi-custom parts, selectable regulated voltage range is from 2.4V to 9V in 0.1V increment, if custom's first order is 100k pieces.

Absolute Maximum Ratings*

Supply Voltage ..... –0.3V to 13V
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

HT75XX series (HT7530, HT7531, +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
ΔV_{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
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	4V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.45	—	mV/°C

HT75XX series (HT7533, HT7534, +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
ΔV_{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
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	4.5V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.5V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.5	—	mV/°C

HT75XX series (HT7536, HT7537, +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
ΔV_{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
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	4.6V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.6V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.6	—	mV/°C

HT75XX series (HT7538, HT7539, +3.8V output type) (Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	5.8V	I_{OUT}=10mA	3.61	3.8	3.99	V
I_{OUT}	Output Current	5.8V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	5.8V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5.8V	No load	—	10	20	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	4.8V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.8V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.6	—	mV/°C

HT75XX series (HT7544, HT7545, +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
ΔV_{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
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	5.4V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6.4V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.7	—	mV/°C

HT75XX series (HT7550, HT7551, +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
ΔV_{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
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	7V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.75	—	mV/°C

HT75XX series (HT7560, HT7561, +6.0V output type) (Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	9V	I_{OUT}=10mA	5.7	6.0	6.3	V
I_{OUT}	Output Current	9V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	9V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	9V	No load	—	10	20	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	9V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.9	—	mV/°C

HT75XX series (HT7570, HT7571, +7.0V output type) (Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	9V	I_{OUT}=10mA	6.65	7.0	7.35	V
I_{OUT}	Output Current	9V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	9V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	9V	No load	—	10	20	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	8V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	9V	I_{OUT}=10mA 0°C<Ta<70°C	—	±1.05	—	mV/°C

HT75XX series (HT7580, HT7581, +8.0V output type) (Ta=25°C)

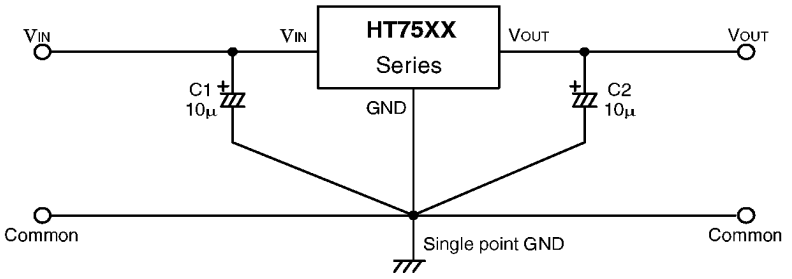
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	10V	I_{OUT}=10mA	7.61	8.0	8.4	V
I_{OUT}	Output Current	10V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	10V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	10V	No load	—	10	20	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	9V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	10V	I_{OUT}=10mA 0°C<Ta<70°C	—	±1.2	—	mV/°C

HT75XX series (HT7590, HT7591, +9.0V output type) (Ta=25°C)

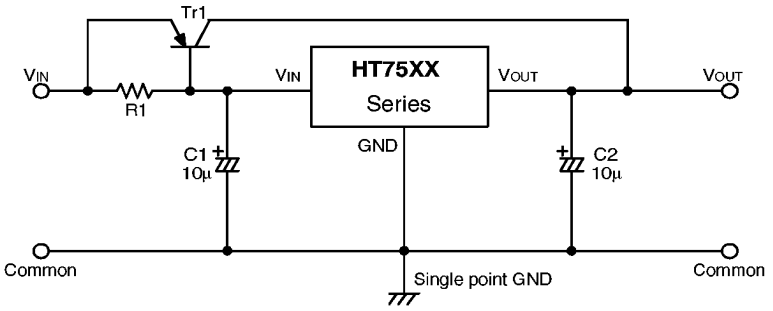
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	12V	I_{OUT}=10mA	8.55	9.0	9.45	V
I_{OUT}	Output Current	12V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	12V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	12V	No load	—	10	20	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	10V≤V_{IN}≤12V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	12V	I_{OUT}=10mA 0°C<Ta<70°C	—	±1.35	—	mV/°C

Application Circuit

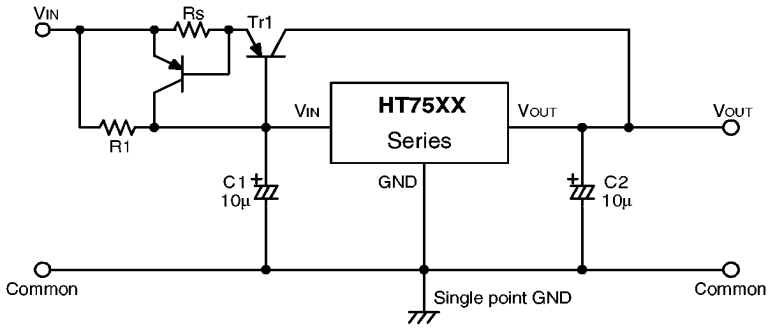
Basic circuit



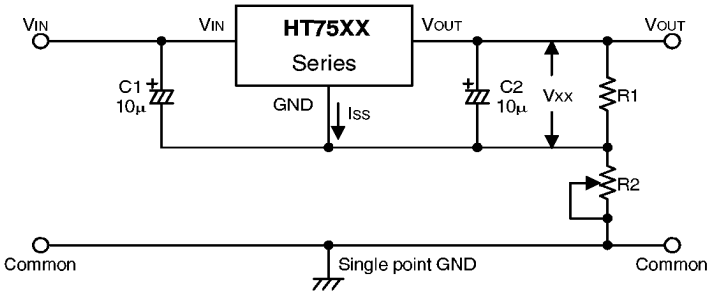
High output current positive voltage regulator



Short-Circuit protection for Tr1

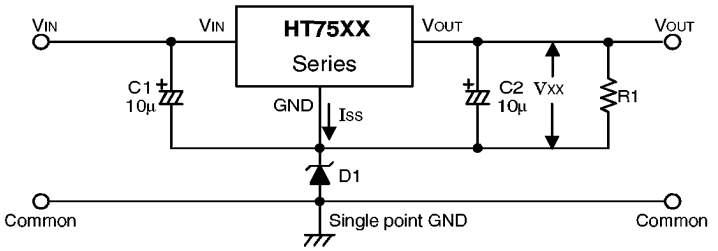


Circuit for increasing output voltage



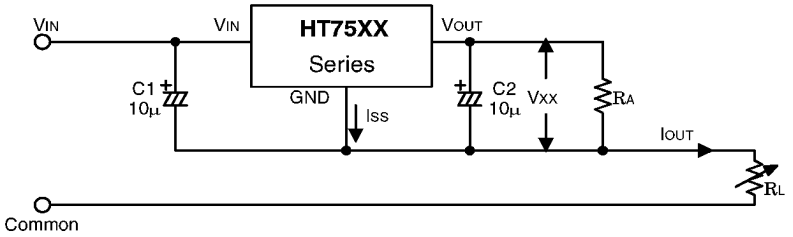
$$V_{OUT} = V_{XX} \left(1 + \frac{R2}{R1}\right) + I_{SS} R2$$

Circuit for increasing output voltage



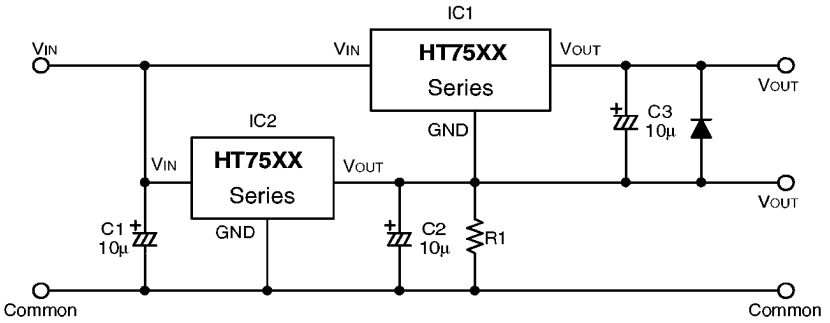
$$V_{OUT} = V_{XX} + V_{D1}$$

Constant current regulator



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

Dual supply

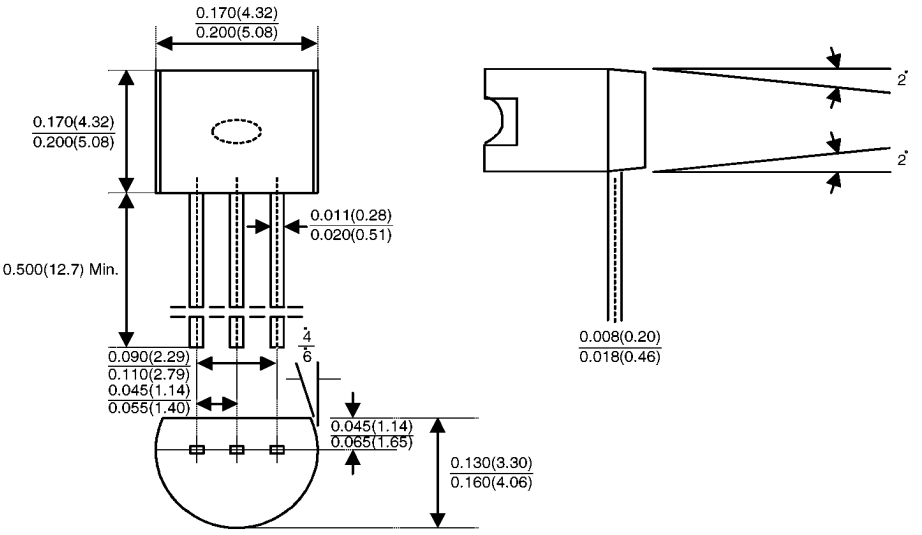


Package Outlines

Dimension

All linear dimensions are in inches and parenthetically in millimeters ($\frac{\text{Min.}}{\text{Max.}}$)

3-pin TO-92 package



3-pin SOT-89 package