HT78XX
High Driver Regulator

Features

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

Applications

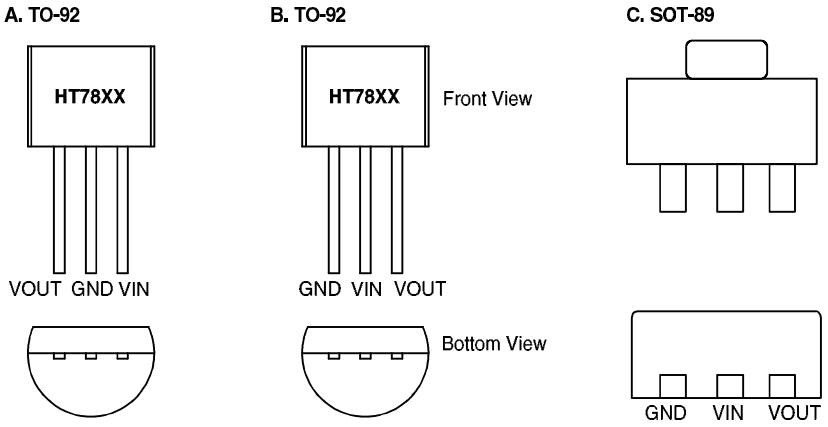
- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

General Description

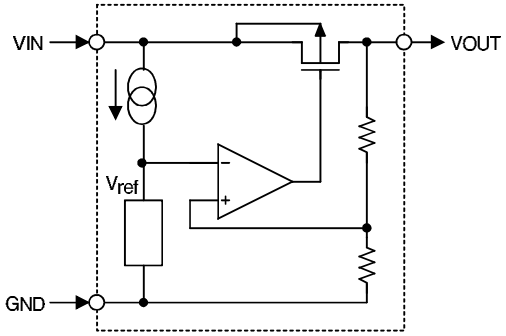
The HT78XX series is a set of three-terminal high current low voltage regulator implemented in CMOS technology. They can deliver 100mA output current and allow an input voltage as high as 12V. They are available with several fixed output voltages ranging from 2.4V to 9V. The advantages of CMOS technology give low voltage dropout and low quiescent current.

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

Pin Assignment



Block Diagram



Selection Guide

Item	Pin Assignment	Output Voltage	Tolerance
HT7830 HT7831	B, C A	3.0V	±2.4%, ±5%
HT7833 HT7834	B, C A	3.3V	±2.4%, ±5%
HT7836 HT7837	B, C A	3.6V	±2.4%, ±5%
HT7838 HT7839	B, C A	3.8V	±2.4%, ±5%
HT7844 HT7845	B, C A	4.4V	±2.4%, ±5%
HT7850 HT7851	B, C A	5.0V	±2.4%, ±5%
HT7860 HT7861	B, C A	6.0V	±2.4%, ±5%
HT7870 HT7871	B, C A	7.0V	±2.4%, ±5%
HT7880 HT7881	B, C A	8.0V	±2.4%, ±5%
HT7890 HT7891	B, C A	9.0V	±2.4%, ±5%

Note: Selectable regulation voltage range from 2.4V to 9V in 0.1V increments. If custom first order 100K piece. (semi-custom part 3)

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: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

HT78XX series (HT7830, HT7831, +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 Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5V	No load	—	200	350	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

HT78XX series (HT7833, HT7834, +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 Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5.5V	No load	—	220	400	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

HT78XX series (HT7836, HT7837, +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 Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5.6V	No load	—	240	410	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

HT78XX series (HT7838, HT7839, +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 Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5.8V	No load	—	260	420	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

HT78XX series (HT7844, HT7845, +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	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	6.4V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	6.4V	No load	—	300	450	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

HT78XX series (HT7850, HT7851, +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	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	7V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	7V	No load	—	330	500	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤15V 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

HT78XX series (HT7860, HT7861, +6.0V output type) (Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	8V	I_{OUT}=10mA	5.7	6	6.3	V
I_{OUT}	Output Current	8V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	8V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	8V	No load	—	390	600	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤15V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	8V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.9	—	mV/°C

HT78XX series (HT7870, HT7871, +7.0V output type) (Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	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 Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	9V	No load	—	450	700	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	8V≤V_{IN}≤20V 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

HT78XX series (HT7880, HT7881, +8.0V output type) (Ta=25°C)

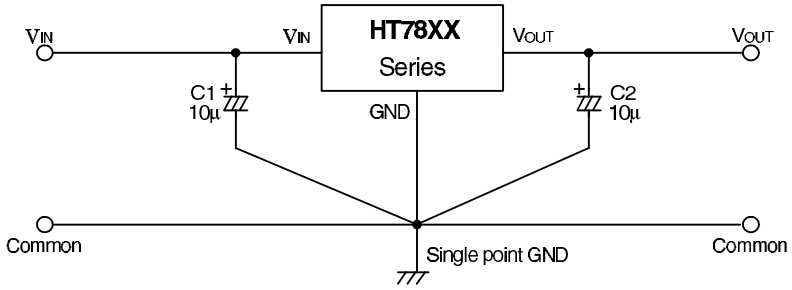
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	10V	I_{OUT}=10mA	7.61	8	8.4	V
I_{OUT}	Output Current	10V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	10V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	10V	No load	—	500	800	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	9V≤V_{IN}≤20V 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

HT78XX series (HT7890, HT7891, +9.0V output type) (Ta=25°C)

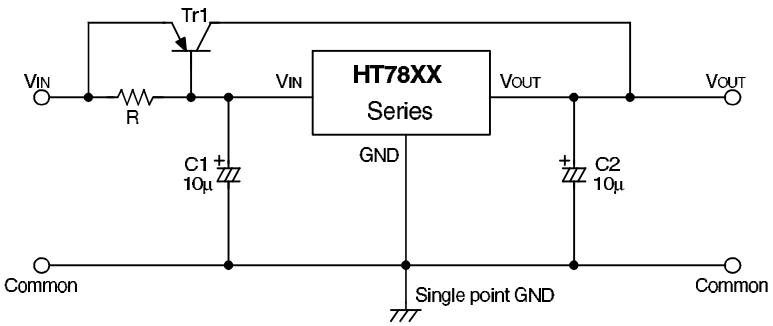
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	12V	I_{OUT}=10mA	8.55	9	9.45	V
I_{OUT}	Output Current	12V	—	100	150	—	mA
ΔV_{OUT}	Load Regulation	12V	1mA≤I_{OUT}≤70mA	—	60	150	mV
V_{DIF}	Voltage Dropout	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	12V	No load	—	600	900	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT}}$	Line Regulation	—	10V≤V_{IN}≤20V 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

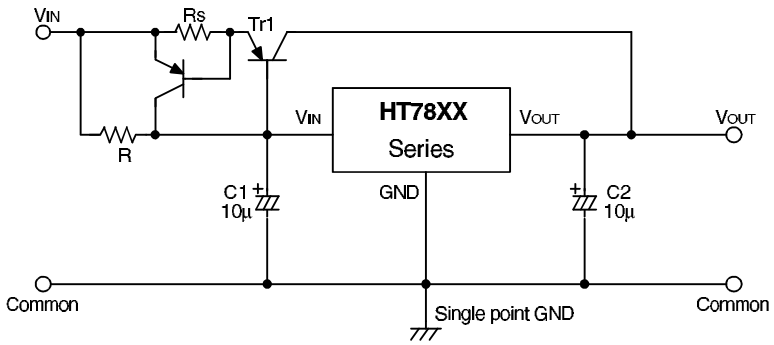
Basic circuit



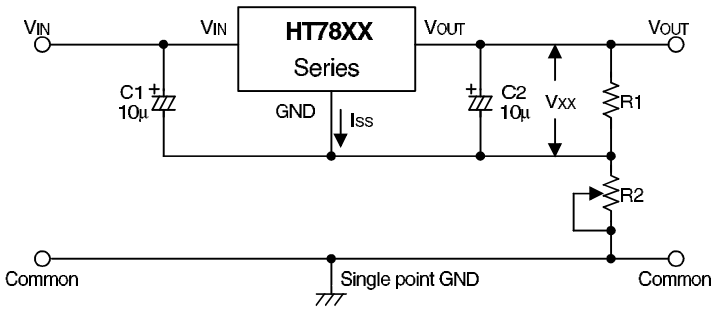
High output current positive voltage regulator



Short-Circuit protection for Tr1

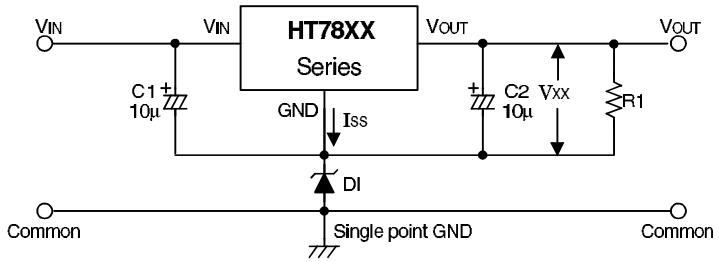


Circuit for increasing output voltage



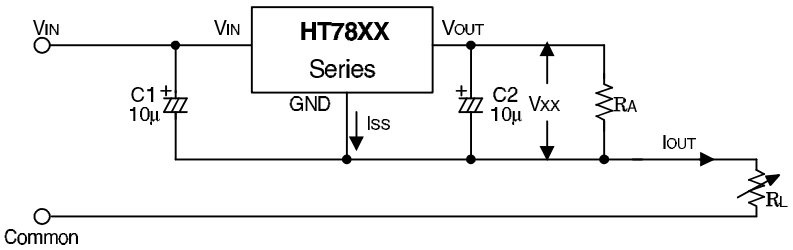
$$V_{OUT} = V_{XX} \left(1 + \frac{R2}{R1}\right) + I_{SS} R2$$

Circuit for increasing output voltage



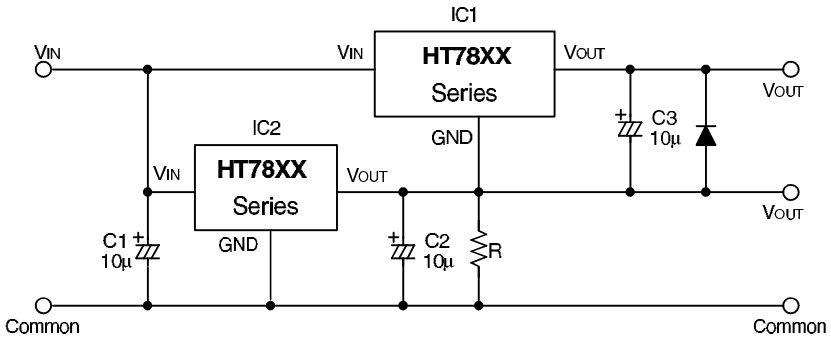
$$V_{OUT} = V_{XX} + V_{DI}$$

Constant current regulator



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

Dual supply

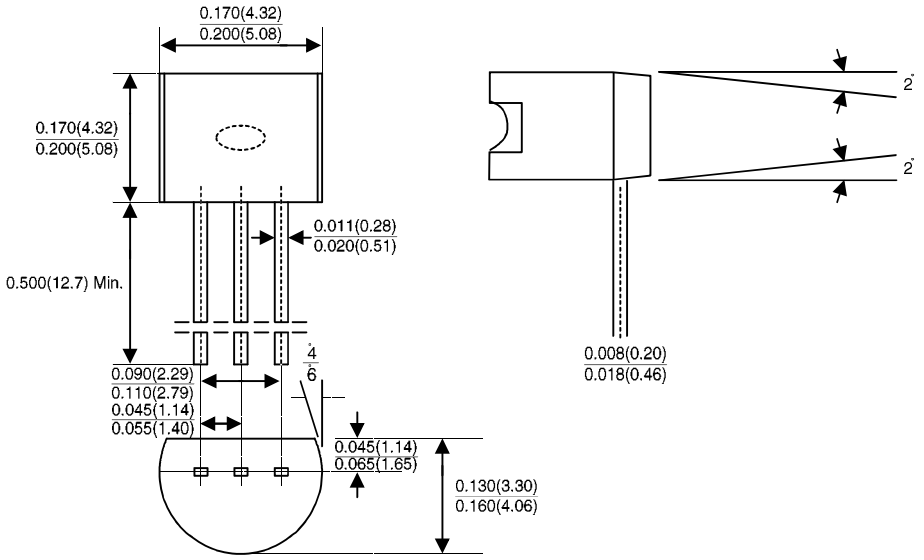


Package Outlines

Dimension

All linear dimensions are in inches and parenthetically in millimeters (Min. / Max.)

3-pin TO-92 package



3-pin SOT-89 package