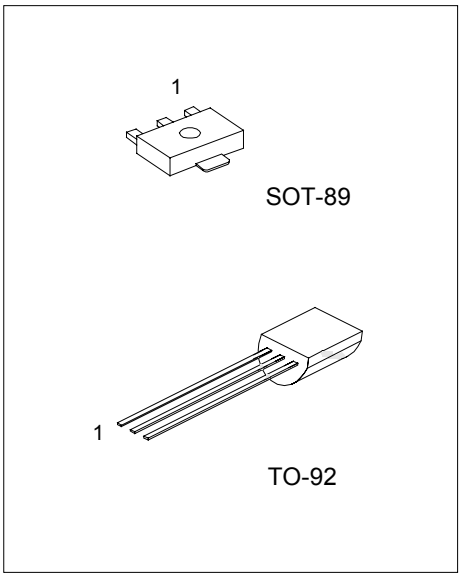
THREE-TERMINAL LOW POWER VOLTAGE REGULATORS



TO-92 : HT10XX-B : 1: VOUT 2: GND 3: VIN

TO-92 : HT10XX-C : 1: GND 2:VIN 3:VOUT

SOT-89 : 1: GND 2:VIN 3:VOUT

DESCRIPTION

The UTC HT10XX series is a set of three-Terminal low power voltage regulators implemented in CMOS technology . They are available with several fixed output voltages ranging from 1.5V~7.0V. The advantage of CMOS technology is low voltage dropout 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.

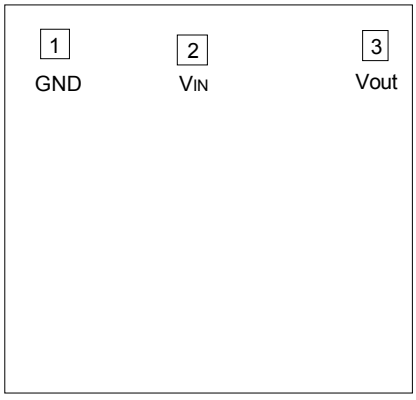
FEATURES

* Low power consumption
*Low voltage dropout
*Low temperature coefficient
*Wide operating voltage (12V Max.)

APPLICATIONS

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

PAD ASSIGNMENT



(0,0)

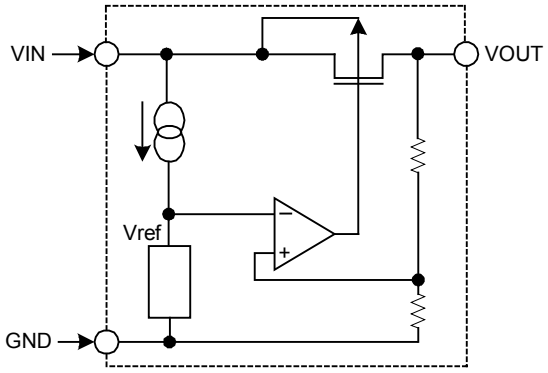
Chip size: 1.34 ×1.30 mm^2

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

PAD NO.	X	Y
1	184	1137
2	615	1121
3	1194	1132

Unit: μm

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	-0.3 ~ +13	V
Power Dissipation	Pd	250	mW
Storage Temperature	Tstg	-50 ~ +125	℃
Operating Temperature	Topr	0 ~ +70	℃

UTC HT1025 (+2.5V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	VIN=4.5V,I_{OUT}=10mA ±2.4% ±5%	2.440 2.375	2.5 2.5	2.560 2.625	V
Output Current	I_{OUT}	VIN=4.5V	20	30		mA
Load Regulation	ΔV_{OUT}	VIN=4.5V,1mA≤I_{OUT}≤20mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	VIN=4.5V,No load		2.2	6.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	3.5V≤V_{IN}≤12V,I_{OUT}=0.5mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	VIN=4.5V,I_{OUT}=10mA 0°C<Ta<70°C		±0.35		mV/℃

UTC HT1028 (+2.8V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.8V, I_{OUT}=10mA ±2.4% ±5%	2.732 2.660	2.8 2.8	2.867 2.940	V
Output Current	I_{OUT}	V_{IN}=4.8V	20	30	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}=4.8V, 1mA≤I_{OUT}≤20mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=4.8V, No load		2.5	6.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	3.8V≤V_{IN}≤12V, I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=4.8V, I_{OUT}=10mA 0°C<Ta<70°C		±0.4		mV/℃

UTC HT1030 (+3.0V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5V, I_{OUT}=10mA ±2.4% ±5%	2.928 2.850	3.0 3.0	3.072 3.150	V
Output Current	I_{OUT}	V_{IN}=5V	20	30	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}=5V, 1mA≤I_{OUT}≤20mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=5V, No load		2.5	6.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	4V≤V_{IN}≤12V, I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=5V, I_{OUT}=10mA 0°C<Ta<70°C		±0.45		mV/℃

UTC HT1033 (+3.3V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.5V, I_{OUT}=10mA ±2.4% ±5%	3.220 3.135	3.3 3.3	3.379 3.465	V
Output Current	I_{OUT}	V_{IN}=5.5V	20	30		mA
Load Regulation	ΔV_{OUT}	V_{IN}=5.5V, 1mA≤I_{OUT}≤30mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=5.5V, No load		2.5	6.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	4.5V≤V_{IN}≤12V, I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=5.5V, I_{OUT}=10mA 0°C<Ta<70°C		±0.5		mV/℃

UTC HT1036 (+3.6V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.6V,I_{OUT}=10mA ±2.4% ±5%	3.513 3.420	3.6 3.6	3.686 3.780	V
Output Current	I_{OUT}	V_{IN}=5.6V	20	30		mA
Load Regulation	ΔV_{OUT}	V_{IN}=5.6V,1mA≤I_{OUT}≤30mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=5.6V,No load		3.0	7.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	4.6V≤V_{IN}≤12V,I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=5.6V,I_{OUT}=10mA 0°C<Ta<70°C		±0.6		mV/℃

UTC HT1044 (+4.4V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=6.4V,I_{OUT}=10mA ±2.4% ±5%	4.294 4.180	4.4 4.4	4.505 4.620	V
Output Current	I_{OUT}	V_{IN}=6.4V	20	30		mA
Load Regulation	ΔV_{OUT}	V_{IN}=6.4V,1mA≤I_{OUT}≤30mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=6.4V,No load		3.0	7.5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	5.4V≤V_{IN}≤12V,I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=6.4V,I_{OUT}=10mA 0°C<Ta<70°C		±0.7		mV/℃

UTC HT1050 (+5.0V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=7V,I_{OUT}=10mA ±2.4% ±5%	4.88 4.75	5.0 5.0	5.12 5.25	V
Output Current	I_{OUT}	V_{IN}=7V	20	30		mA
Load Regulation	ΔV_{OUT}	V_{IN}=7V,1mA≤I_{OUT}≤30mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	V_{IN}=7V,No load		3.5	9.0	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	6V≤V_{IN}≤12V,I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	V_{IN}=7V,I_{OUT}=10mA 0°C<Ta<70°C		±0.75		mV/℃

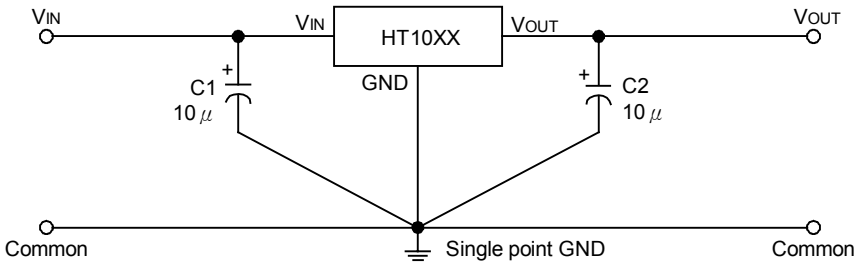
UTC HT1070 (+7.0V output type) ELECTRICAL CHARACTRISTICS (Ta=25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=9V,I_{OUT}=10mA ±2.4% ±5%	6.832 6.65	7.0 7.0	7.168 7.35	V

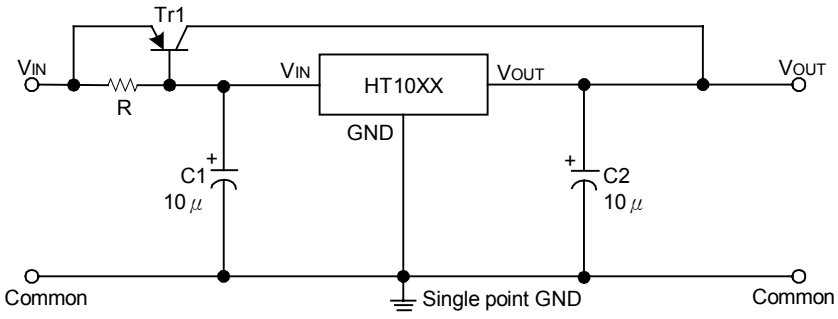
Output Current	I_{OUT}	VIN=9V	20	30		mA
Load Regulation	ΔV_{OUT}	VIN=9V,1mA≤I_{OUT}≤30mA		60	100	mV
Voltage Dropout	V_d	I_{OUT}=1mA		60		mV
Current Consumption	I_{SS}	VIN=9V,No load		5.0	12.5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	8V≤V_{IN}≤12V,I_{OUT}=1mA		0.2		%/V
Input Voltage	V_{IN}				12	V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	VIN=9V,I_{OUT}=10mA 0°C<Ta<70°C		±1.05		mV/℃

APPLICATION CIRCUIT

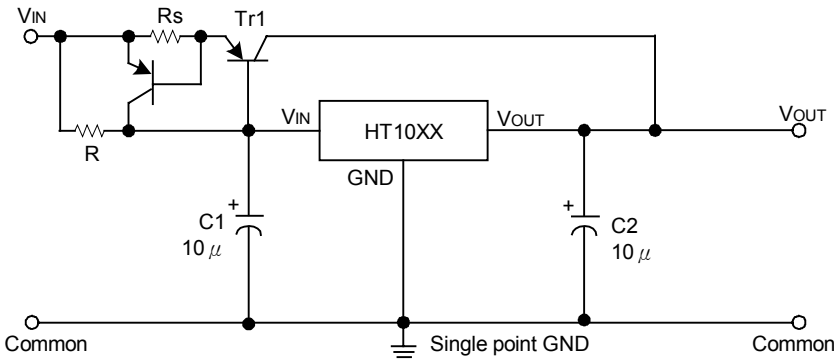
The basic circuits using the HT10XX series



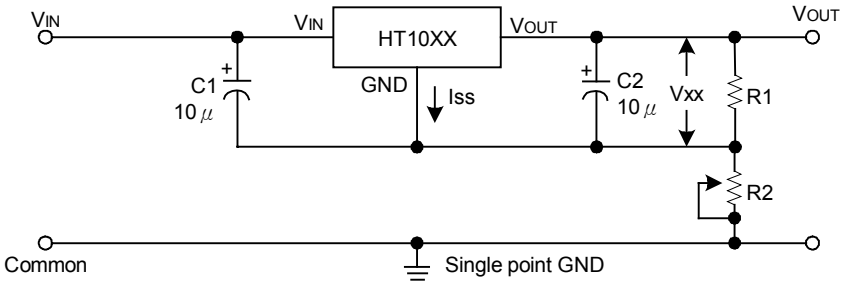
High output current positive voltage regulator



Short-circuit protection for Tr1

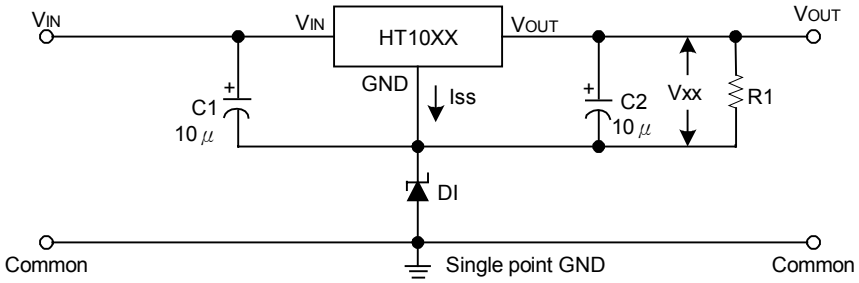


Circuit for increasing output voltage



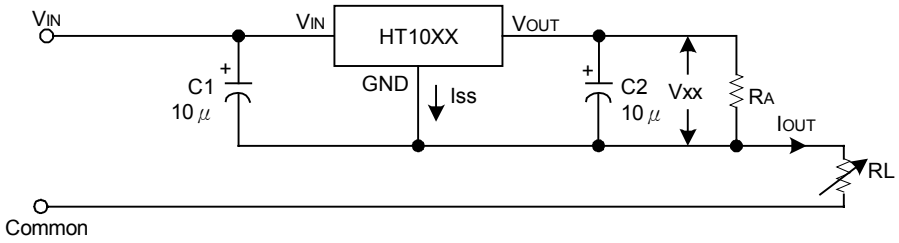
$$VOUT=Vxx(1+\frac{R2}{R1}) + IssR2$$
$$\fallingdotseq Vxx(1+\frac{R2}{R1})$$

Circuit for increasing output voltage



VOUT=Vxx+VDI

Constant current regulator



$$IOUT=\frac{Vxx}{R_A}+Iss$$

Dual supply