

## 100mA Low Power LDO

### Features

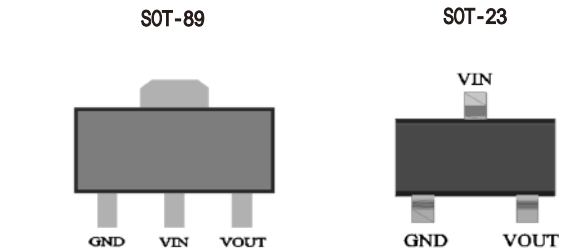
- ◆ Low power consumption
- ◆ Low voltage drop
- ◆ Low temperature coefficient
- ◆ High input voltage (up to 30V)
- ◆ High output current : 100mA
- ◆ Output voltage accuracy: tolerance  $\pm 3\%$
- ◆ SOT-89 and SOT-23 packages

### Applications

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

### General Description

The HT71xx-1 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 30V. They are available with several fixed output voltages ranging from



2.1V 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	Package	Marking
HT7121-1	2.1V	SOT-89 SOT-23	SOT-89 (for 71xx-1) SOT-23 (for HTXX)
HT7123-1	2.3V		
HT7125-1	2.5V		
HT7127-1	2.7V		
HT7130-1	3.0V		
HT7133-1	3.3V		
HT7136-1	3.6V		
HT7140-1	4.0V		
HT7144-1	4.4V		
HT7150-1	5.0V		

### Absolute Maximum Ratings ( $T_a = 25\text{ }^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{IN}$	- 3 to + 30	V
Power Dissipation	$P_{tot}$	500	mW
Operating Temperature	$T_A$	- 40 to + 85	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 50 to + 125	$^\circ\text{C}$

## Electrical Characteristics

### HT7121-1, +2.1V Output Type

 $T_a=25^{\circ}\text{C}$ 

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.1V	I <sub>OUT</sub> =10mA	2.037	2.1	2.163	V
I <sub>OUT</sub>	Output Current	4.1V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	4.1V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	4.1V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.1V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	4.1V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.37	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

### HT7123-1, +2.3V Output Type

 $T_a=25^{\circ}\text{C}$ 

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.3V	I <sub>OUT</sub> =10mA	2.231	2.3	2.369	V
I <sub>OUT</sub>	Output Current	4.3V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	4.3V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	4.3V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.3V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	4.3V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.39	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

### HT7125-1, +2.5V Output Type

 $T_a=25^{\circ}\text{C}$ 

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.5V	I <sub>OUT</sub> =10mA	2.425	2.5	2.575	V
I <sub>OUT</sub>	Output Current	4.5V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	4.5V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	4.5V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.5V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	4.5V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.41	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7127-1, +2.7V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.7V	I <sub>OUT</sub> =10mA	2.619	2.7	2.781	V
I <sub>OUT</sub>	Output Current	4.7V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	4.7V	1mA ≤ I <sub>OUT</sub> ≤ 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	4.7V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.7V ≤ V <sub>IN</sub> ≤ 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	4.7V	I <sub>OUT</sub> =10mA -40°C < T <sub>a</sub> < 85°C	—	±0.43	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7130-1, +3.0V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	5.0V	I <sub>OUT</sub> =10mA	2.91	3.0	3.09	V
I <sub>OUT</sub>	Output Current	5.0V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	5.0V	1mA ≤ I <sub>OUT</sub> ≤ 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5.0V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.0V ≤ V <sub>IN</sub> ≤ 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.0V	I <sub>OUT</sub> =10mA -40°C < T <sub>a</sub> < 85°C	—	±0.45	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7133-1, +3.3V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	5.5V	I <sub>OUT</sub> =10mA	3.201	3.3	3.399	V
I <sub>OUT</sub>	Output Current	5.5V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	5.5V	1mA ≤ I <sub>OUT</sub> ≤ 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5.5V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.5V ≤ V <sub>IN</sub> ≤ 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.5V	I <sub>OUT</sub> =10mA -40°C < T <sub>a</sub> < 85°C	—	±0.5	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7136-1, +3.6V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	5.6V	I <sub>OUT</sub> =10mA	3.492	3.6	3.708	V
I <sub>OUT</sub>	Output Current	5.6V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	5.6V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5.6V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.6V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.6V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.6	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7140-1, +4.0V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	6.0V	I <sub>OUT</sub> =10mA	3.88	4.0	4.12	V
I <sub>OUT</sub>	Output Current	6.0V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	6.0V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	6.0V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	5.0V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	6.0V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.7	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7144-1, +4.4V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	6.4V	I <sub>OUT</sub> =10mA	4.268	4.4	4.532	V
I <sub>OUT</sub>	Output Current	6.4V	—	60	100	—	mA
ΔV <sub>OUT</sub>	Load Regulation	6.4V	1mA≤I <sub>OUT</sub> ≤50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	6.4V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	5.4V≤V <sub>IN</sub> ≤24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	6.4V	I <sub>OUT</sub> =10mA -40°C<T <sub>a</sub> <85°C	—	±0.7	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

**HT7150-1, +5.0V Output Type**

Ta=25°C

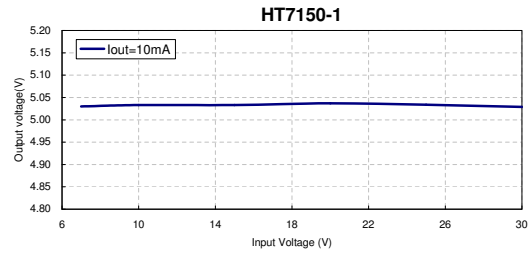
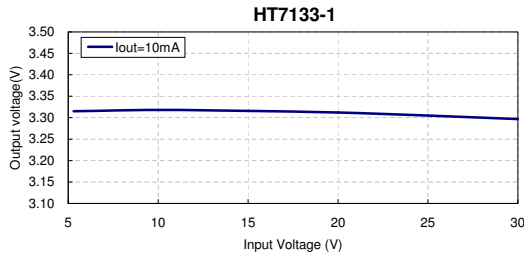
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	7.0V	I <sub>OUT</sub> =10mA	4.85	5.0	5.15	V
I <sub>OUT</sub>	Output Current	7.0V	—	100	150	—	mA
ΔV <sub>OUT</sub>	Load Regulation	7.0V	1mA ≤ I <sub>OUT</sub> ≤ 70mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop (Note)	—	I <sub>OUT</sub> =1mA, ΔV <sub>OUT</sub> =2%	—	100	—	mV
I <sub>SS</sub>	Current Consumption	7.0V	No load	—	2.5	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	6.0V ≤ V <sub>IN</sub> ≤ 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	7.0V	I <sub>OUT</sub> =10mA -40°C < T <sub>a</sub> < 85°C	—	±0.75	—	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V<sub>IN</sub> = V<sub>OUT</sub>+2V with a fixed load.

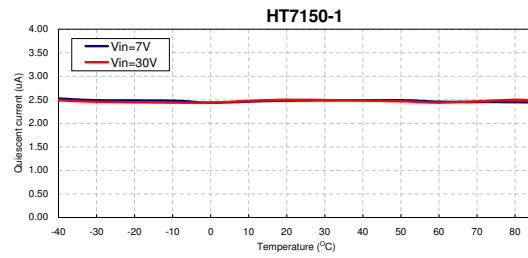
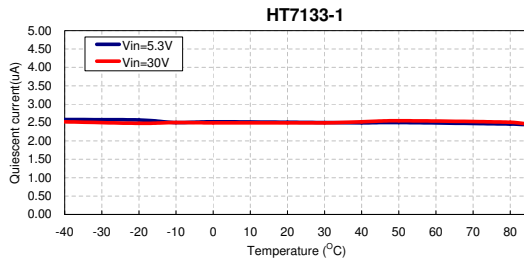
## Typical Performance Characteristics

Test Condition:  $V_{in}=V_{out}+2V$ ,  $I_{OUT}=10mA$ ,  $T_I=25^{\circ}C$ , unless otherwise noted

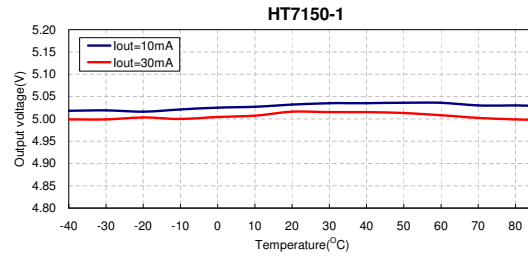
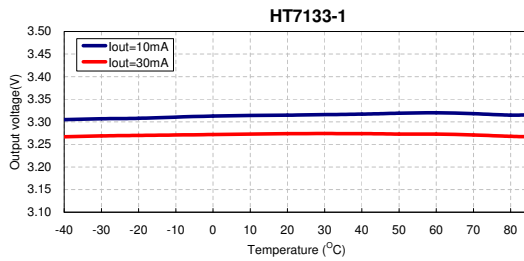
### Output Voltage vs Input Voltage



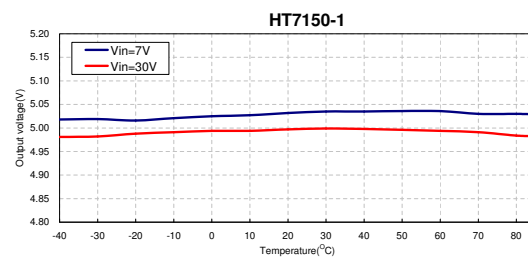
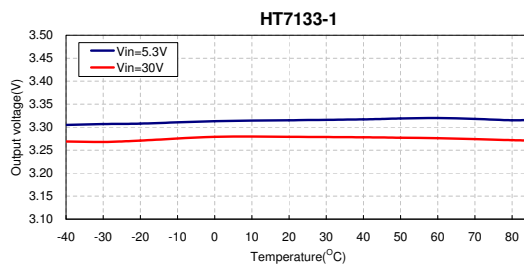
### Quiescent current (Iout=0mA) vs Temperature



### Output Voltage vs Temperature (Vin=Vout+2V)

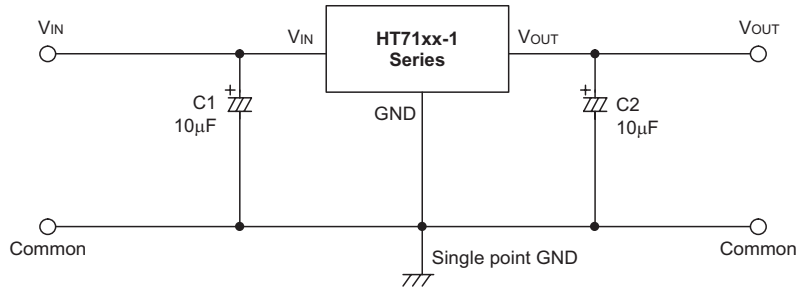


### Output Voltage vs Temperature

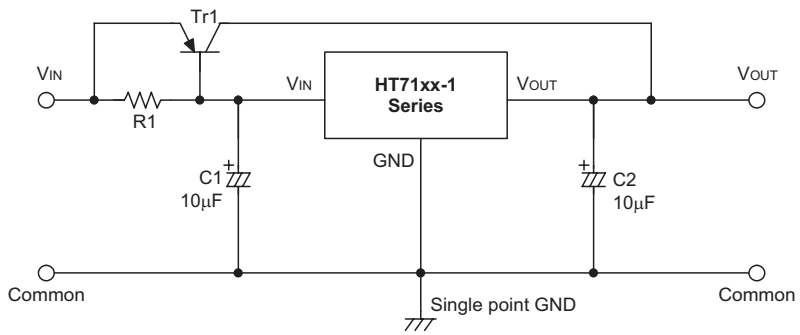


## Application Circuits

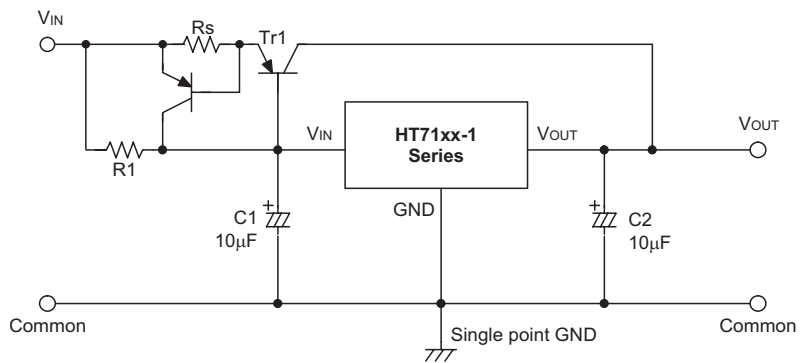
### Basic Circuit



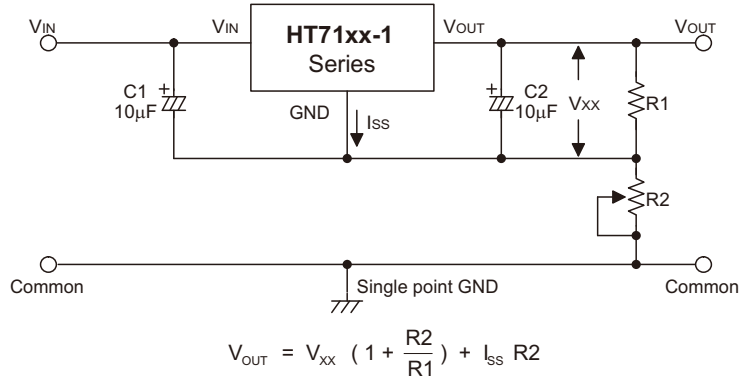
### High Output Current Positive Voltage Regulator



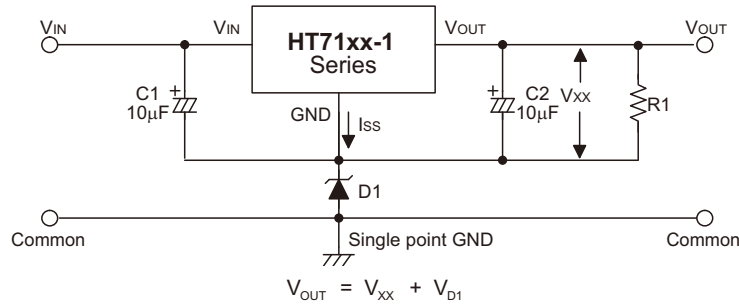
### Short-Circuit Protection for Tr1



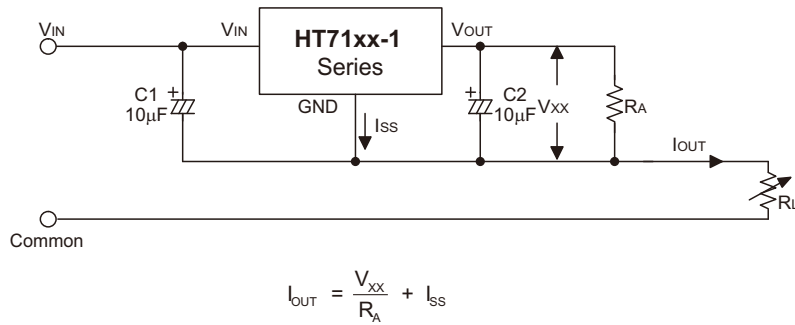
### Circuit for Increasing Output Voltage



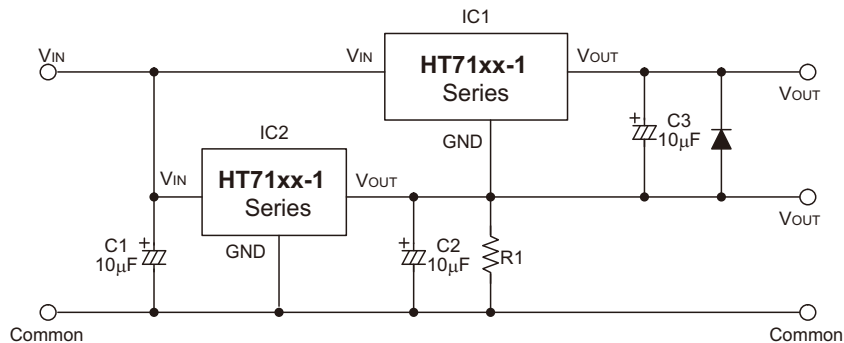
### Circuit for Increasing Output Voltage



### Constant Current Regulator



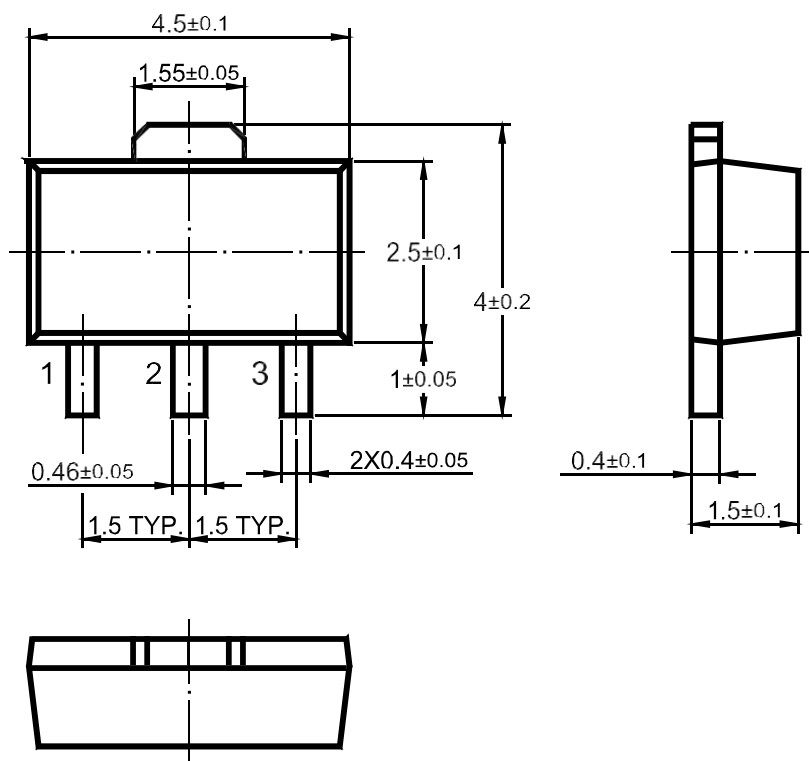
### Dual Supply





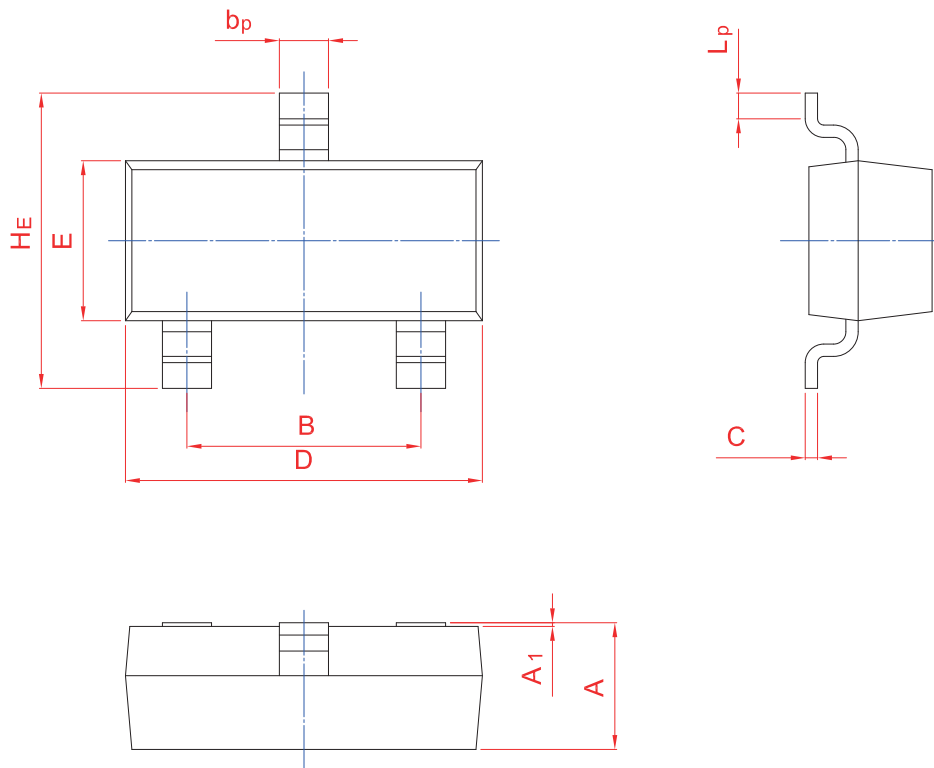
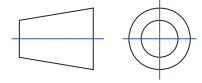
# Physical Dimensions

## SOT-89



Dimensions in mm

SOT-23



UNIT	A	B	b <sub>p</sub>	C	D	E	HE	A <sub>1</sub>	L <sub>p</sub>
mm	1.40	2.04	0.50	0.19	3.10	1.65	3.00	0.100	0.50
	0.95	1.78	0.35	0.08	2.70	1.20	2.20	0.013	0.20