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 ±3%
◆ SOT-89 and SOT-23 packages

Applications

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

SOT-89   SOT-23

VIN

GND VIN VOUT   GND VOUT

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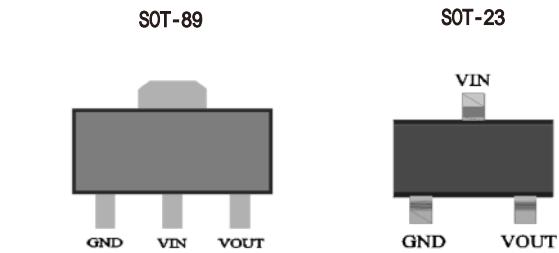
Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

Selection Table

Part No.	Output Voltage	Package	Marking
HT7121-1	2.1V		
HT7123-1	2.3V		
HT7125-1	2.5V		
HT7127-1	2.7V		
HT7130-1	3.0V	SOT-89	SOT-89 (for 71xx-1)
HT7133-1	3.3V	SOT-23	SOT-23 (for HTXX)
HT7136-1	3.6V		
HT7140-1	4.0V		
HT7144-1	4.4V		
HT7150-1	5.0V		

Absolute Maximum Ratings (T_a = 25 °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	°C
Storage Temperature Range	T_{stg}	- 50 to + 125	°C

Electrical Characteristics

HT7121-1, +2.1V Output Type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.1V	I_{OUT}=10mA	2.037	2.1	2.163	V
I_{OUT}	Output Current	4.1V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	4.1V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Drop (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	Current Consumption	4.1V	No load	—	2.5	5.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.1V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\dfrac{\Delta V_{DET}}{\Delta Ta}$	Temperature Coefficient	4.1V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7123-1, +2.3V Output Type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.3V	I_{OUT}=10mA	2.231	2.3	2.369	V
I_{OUT}	Output Current	4.3V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	4.3V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Drop (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	Current Consumption	4.3V	No load	—	2.5	5.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.3V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\dfrac{\Delta V_{DET}}{\Delta Ta}$	Temperature Coefficient	4.3V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7125-1, +2.5V Output Type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.5V	I_{OUT}=10mA	2.425	2.5	2.575	V
I_{OUT}	Output Current	4.5V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	4.5V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Drop (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	Current Consumption	4.5V	No load	—	2.5	5.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.5V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\dfrac{\Delta V_{DET}}{\Delta Ta}$	Temperature Coefficient	4.5V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7127-1, +2.7V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.7V	I_{OUT}=10mA	2.619	2.7	2.781	V
I_{OUT}	Output Current	4.7V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	4.7V	1mA≤I_{OUT}≤50mA	—	60	150	mV
V_{DIF}	Voltage Drop (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	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_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	4.7V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7130-1, +3.0V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.0V	I_{OUT}=10mA	2.91	3.0	3.09	V
I_{OUT}	Output Current	5.0V	—	60	100	—	mA
ΔV_{OUT}	Load Regulation	5.0V	1mA≤I_{OUT}≤50mA		60	150	mV
V_{DIF}	Voltage Drop (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	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_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.0V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7133-1, +3.3V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.5V	I_{OUT}=10mA	3.201	3.3	3.399	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 (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	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_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\frac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.5V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7136-1, +3.6V Output Type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.6V	I_{OUT}=10mA	3.492	3.6	3.708	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 (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	Current Consumption	5.6V	No load	—	2.5	5.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.6V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\dfrac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	5.6V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7140-1, +4.0V Output Type Ta=25°C

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

HT7144-1, +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	4.268	4.4	4.532	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 (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	100	—	mV
I_{SS}	Current Consumption	6.4V	No load	—	2.5	5.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	5.4V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	28	V
$\dfrac{\Delta V_{DET}}{\Delta T_a}$	Temperature Coefficient	6.4V	I_{OUT}=10mA -40°C<Ta<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_{IN} = V_{OUT}+2V with a fixed load.

HT7150-1, +5.0V Output Type   Ta=25°C

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

Typical Performance Characteristics

Test Condition: Vin=Vout+2V, I$_{OUT}$=10mA, T$_J$=25°C, unless otherwise noted

Output Voltage vs Input Voltage

HT7133-1

HT7150-1
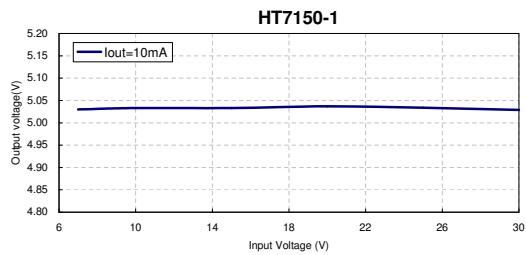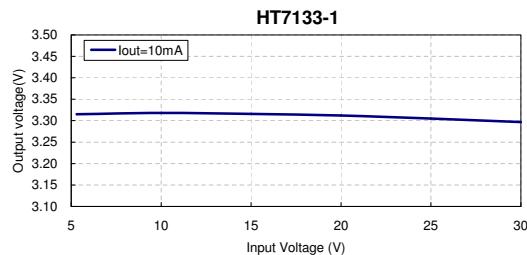
Quiescent current (Iout=0mA) vs Temperature

HT7133-1

HT7150-1
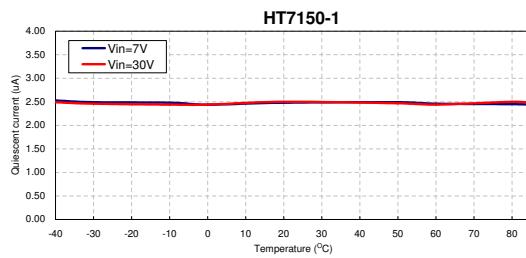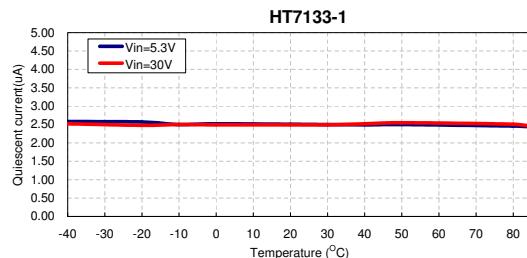
Output Voltage vs Temperature (Vin=Vout+2V)

HT7133-1

HT7150-1

Output Voltage vs Temperature

HT7133-1

HT7150-1
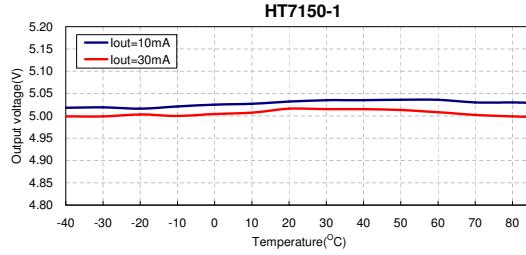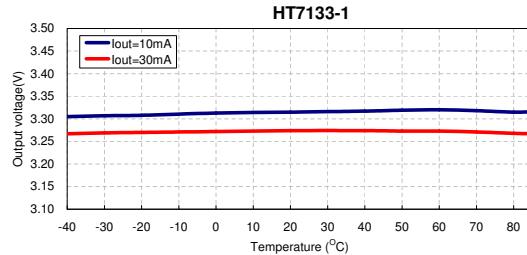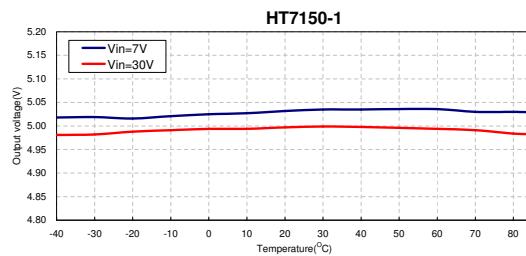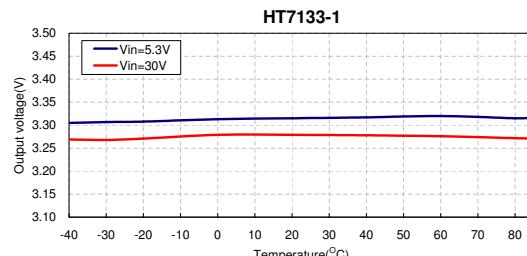
Application Circuits

Basic Circuit
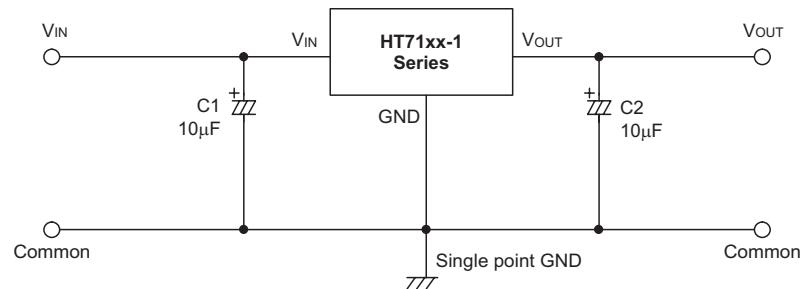
High Output Current Positive Voltage Regulator
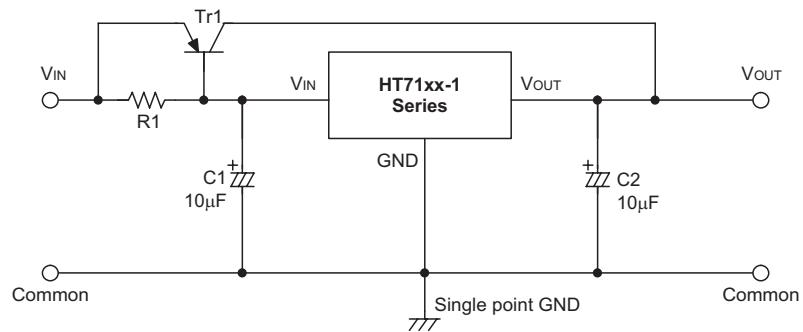
### Short-Circuit Protection for Tr1
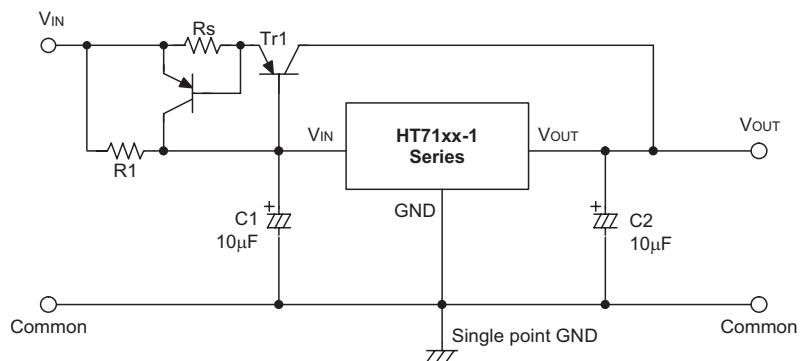
Circuit for Increasing Output Voltage

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

Circuit for Increasing Output Voltage

$$V_{OUT} = V_{XX} + V_{D1}$$
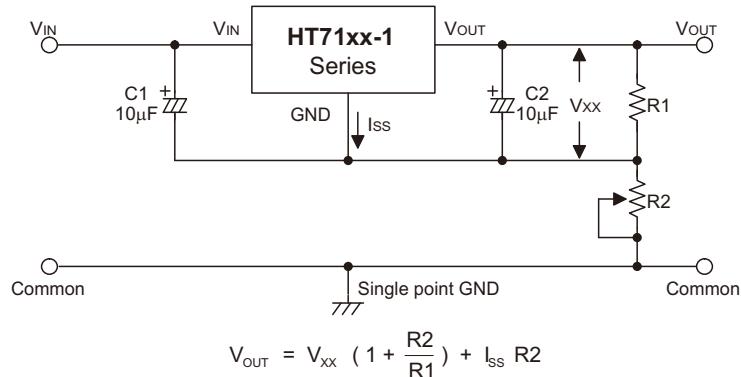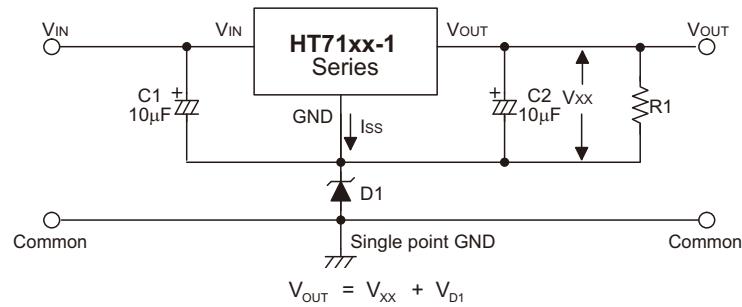
Constant Current Regulator

$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$
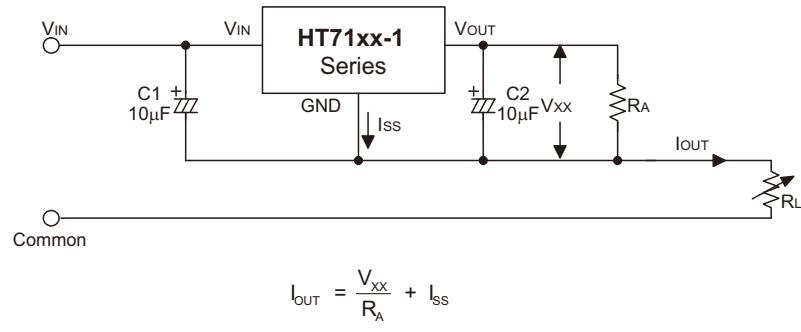
Dual Supply
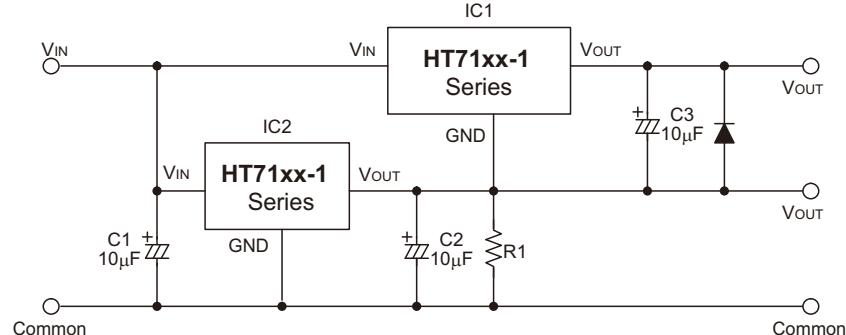
Physical Dimensions

SOT-89
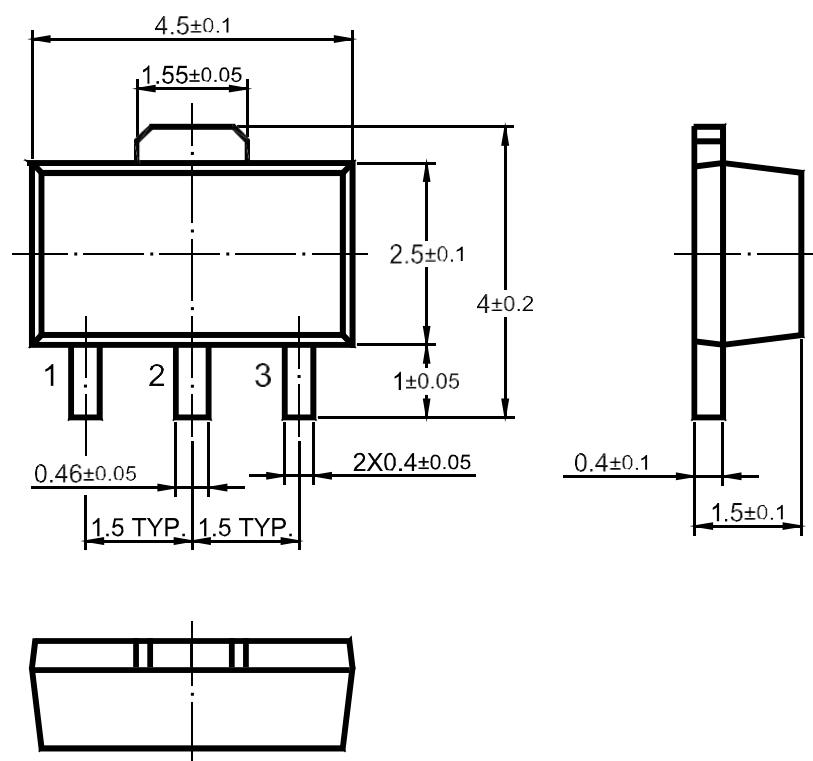
Dimensions in mm

SOT-23
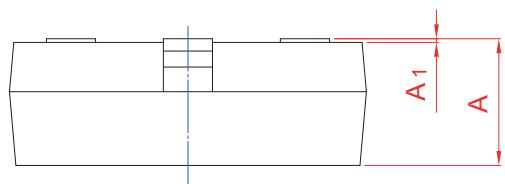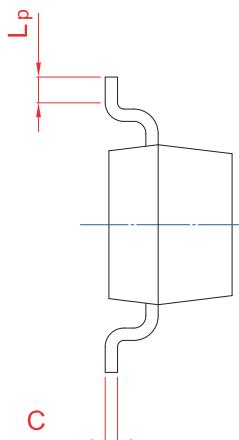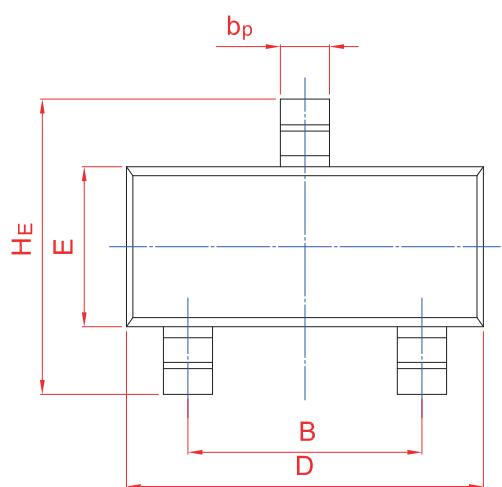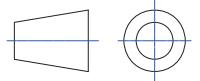
UNIT	A	B	b$_p$	C	D	E	H$_E$	A$_1$	L$_p$
mm	1.40	2.04	0.50	0.19	3.10	1.65	3.00	0.100	0.50
	0.95	1.78	0.35	0.08	2.70	1.20	2.20	0.013	0.20