Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 30V)
- Output voltage accuracy: tolerance ±3%
- Package types: 3-pin TO92, 3-pin SOT89 and 5-pin SOT23

Applications

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

General Description

The HT71xx-1 series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages 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.

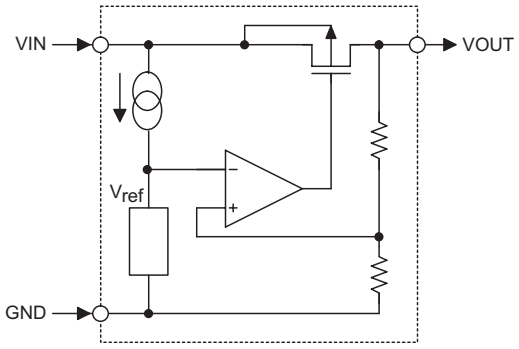
Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

Selection Table

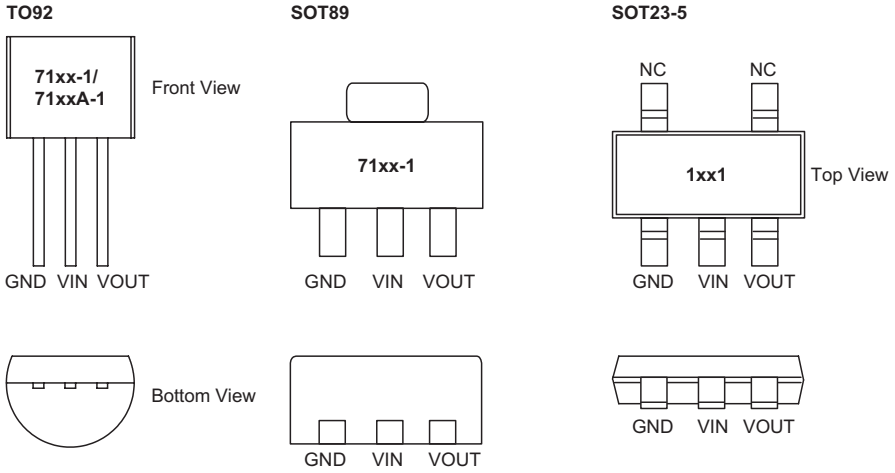
Part No.	Output Voltage	Package	Marking
HT7121-1	2.1V	TO92 SOT89 SOT23-5	71xx-1 (for TO92, 2.1V~2.7V) 71xxA-1 (for TO92, 3.0V~5.0V) 71xx-1 (for SOT89) 1xx1 (for SOT23-5)
HT7123-1	2.3V		
HT7125-1	2.5V		
HT7127-1	2.7V		
HT7130-1	3.0V		
HT7133-1	3.3V		
HT7136-1	3.6V		
HT7144-1	4.4V		
HT7150-1	5.0V		

Note: "xx" stands for output voltages.

Block Diagram



Pin Assignment



Absolute Maximum Ratings

Supply Voltage ..... −0.3V to 33V
Storage Temperature .....−50°C to 125°C
Operating Temperature .....−40°C to 85°C
Maximum Junction Temperature ..... 150°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.

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23-5	500	°C/W
		SOT89	200	°C/W
		TO92	200	°C/W
P_D	Power Dissipation	SOT23-5	0.20	W
		SOT89	0.50	W
		TO92	0.50	W

Note: P_D is measured at Ta = 25°C

Electrical Characteristics

HT7121-1, +2.1V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	4.1V	I_{OUT}=10mA	2.037	2.100	2.163	V
I_{OUT}	Output Current	4.1V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	4.1V	1mA≤I_{OUT}≤20mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	100	mV
I_{SS}	Quiescent Current	4.1V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.1V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	4.1V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	4.3V	I_{OUT}=10mA	2.231	2.300	2.369	V
I_{OUT}	Output Current	4.3V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	4.3V	1mA≤I_{OUT}≤20mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	100	mV
I_{SS}	Quiescent Current	4.3V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.3V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	4.3V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	4.5V	I_{OUT}=10mA	2.425	2.500	2.575	V
I_{OUT}	Output Current	4.5V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	4.5V	1mA≤I_{OUT}≤20mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	100	mV
I_{SS}	Quiescent Current	4.5V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.5V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	4.5V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	4.7V	I_{OUT}=10mA	2.619	2.700	2.781	V
I_{OUT}	Output Current	4.7V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	4.7V	1mA≤I_{OUT}≤20mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	100	mV
I_{SS}	Quiescent Current	4.7V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	3.7V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	4.7V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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	5V	I_{OUT}=10mA	2.910	3.00	3.090	V
I_{OUT}	Output Current	5V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5V	1mA≤I_{OUT}≤20mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	100	mV
I_{SS}	Quiescent Current	5V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
V_{IN}	Input Voltage	—	—	—	—	30	V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	5V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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	5.3V	I_{OUT}=10mA	3.201	3.300	3.399	V
I_{OUT}	Output Current	5.3V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5.3V	1mA≤I_{OUT}≤30mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	55	mV
I_{SS}	Quiescent Current	5.3V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.3V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
V_{IN}	Input Voltage	—	—	—	—	30	V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	5.3V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	5.6V	I_{OUT}=10mA	3.492	3.600	3.708	V
I_{OUT}	Output Current	5.6V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5.6V	1mA≤I_{OUT}≤30mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	55	mV
I_{SS}	Quiescent Current	5.6V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.6V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	5.6V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	6.4V	I_{OUT}=10mA	4.268	4.400	4.532	V
I_{OUT}	Output Current	6.4V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	6.4V	1mA≤I_{OUT}≤30mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	55	mV
I_{SS}	Quiescent Current	6.4V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	5.4V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	6.4V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°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

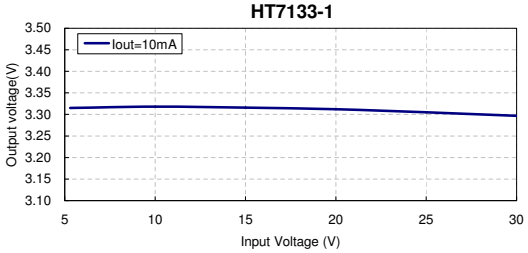
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{IN}	Input Voltage	—	—	—	—	30	V
V_{OUT}	Output Voltage	7V	I_{OUT}=10mA	4.850	5.00	5.150	V
I_{OUT}	Output Current	7V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	7V	1mA≤I_{OUT}≤30mA	—	15	45	mV
V_{DIF}	Dropout Voltage (Note)	—	I_{OUT}=1mA, ΔV_{OUT}=2%	—	35	55	mV
I_{SS}	Quiescent Current	7V	No load	—	2.5	4.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤30V, I_{OUT}=1mA	—	0.1	0.2	%/V
$\frac{\Delta V_{OUT}}{\Delta T_a \times V_{OUT}}$	Temperature Coefficient	7V	I_{OUT}=10mA, -40°C<Ta<85°C	—	±100	—	ppm/°C

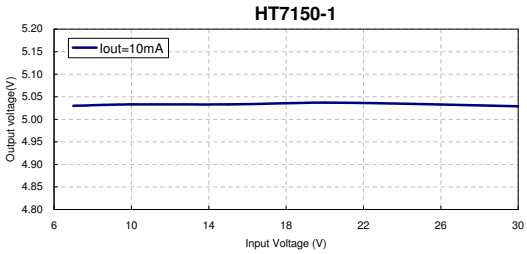
Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

Typical Performance Characteristic

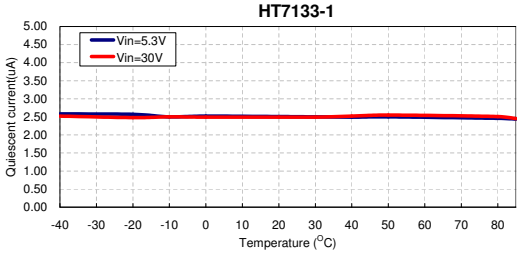
Test Condition: Vin=Vout+2V, Iout=10mA, T_J=25ºC, unless otherwise noted

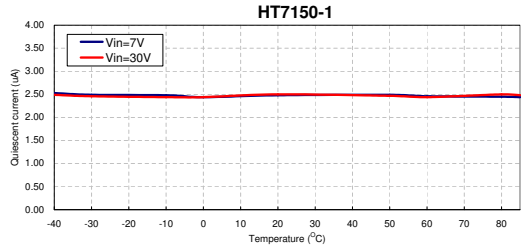
Output Voltage vs Input Voltage



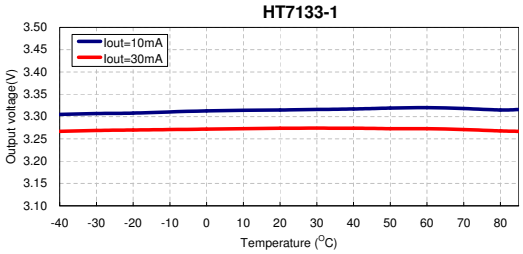


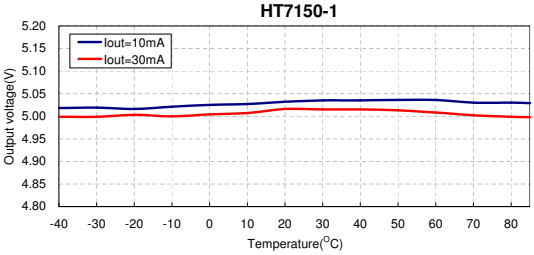
Quiescent Current (Iout=0mA) vs Temperature



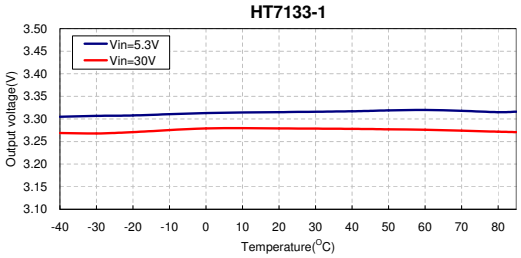


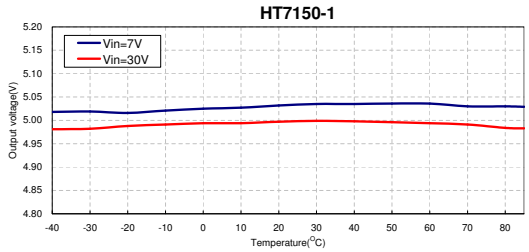
Output Voltage vs Temperature (Vin=Vout+2V)





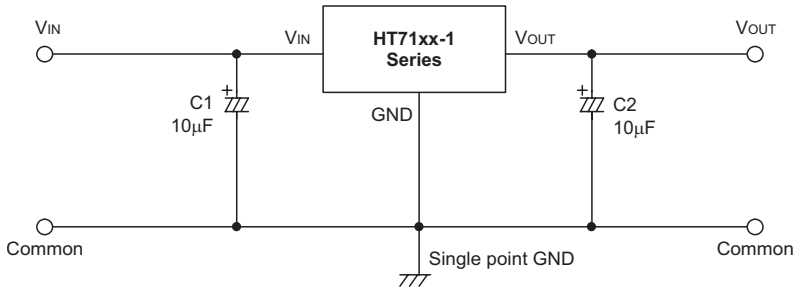
Output Voltage vs Temperature



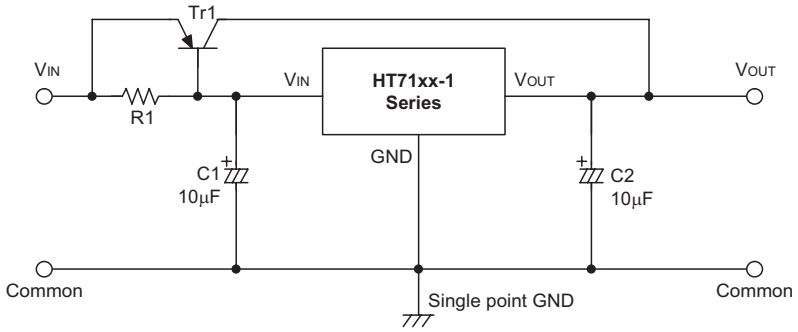


Application Circuits

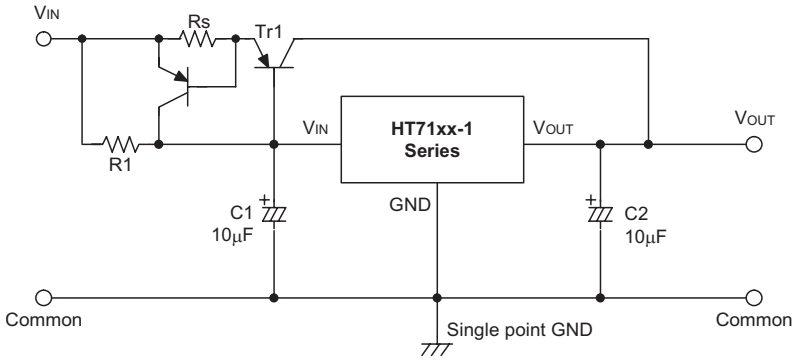
Basic Circuits



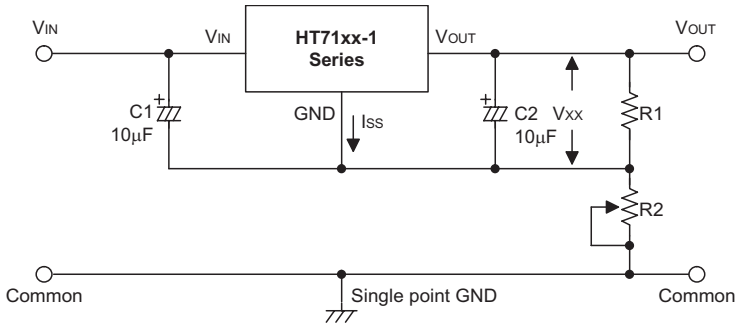
High Output Current Positive Voltage Regulator



Short-Circuit Protection by Tr1

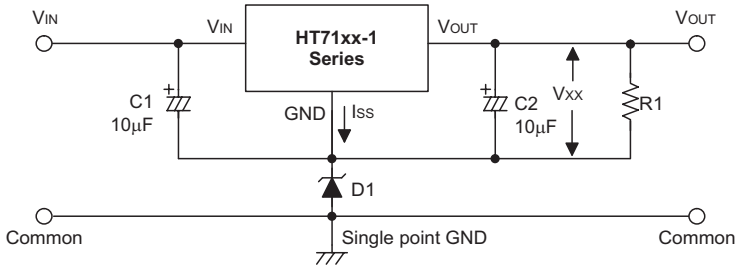


Circuit for Increasing Output Voltage



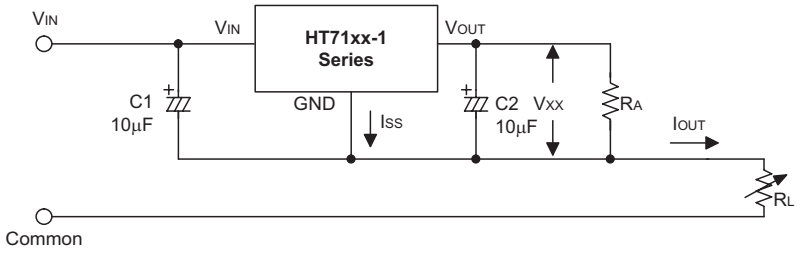
$V_{OUT}=V_{XX}\ (1+R2/R1)+I_{SS}\times R2$

Circuit for Increasing Output Voltage



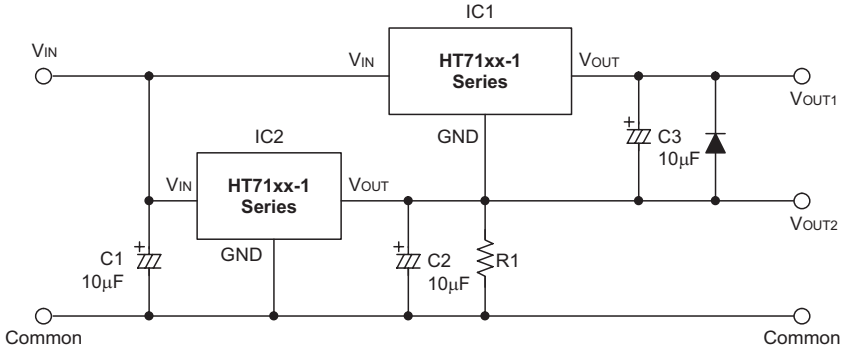
$V_{OUT}=V_{XX}+V_{D1}$

Constant Current Regulator



$I_{OUT}=V_{XX}/R_A+I_{SS}$

Dual Supply



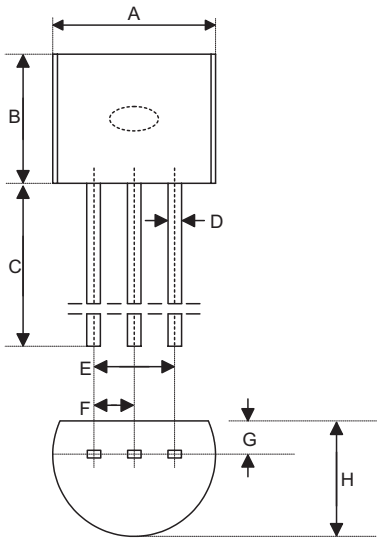
Package Information

Note that the package information provided here is for consultation purposes only. As this information may be updated at regular intervals users are reminded to consult the Holtek website for the latest version of the Package/Carton Information.

Additional supplementary information with regard to packaging is listed below. Click on the relevant section to be transferred to the relevant website page.

- Package Information (include Outline Dimensions, Product Tape and Reel Specifications)
- The Operation Instruction of Packing Materials
- Carton information

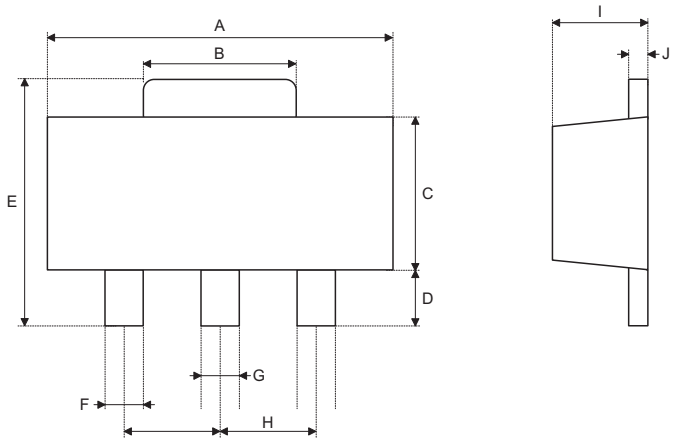
3-pin TO92 Outline Dimensions



Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	0.173	0.180	0.205
B	0.170	—	0.210
C	0.500	0.580	—
D	—	0.015 BSC	—
E	—	0.010 BSC	—
F	—	0.050 BSC	—
G	—	0.035 BSC	—
H	0.125	0.142	0.165

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	4.39	4.57	5.21
B	4.32	—	5.33
C	12.70	14.73	—
D	—	0.38 BSC	—
E	—	2.54 BSC	—
F	—	1.27 BSC	—
G	—	0.89 BSC	—
H	3.18	3.61	4.19

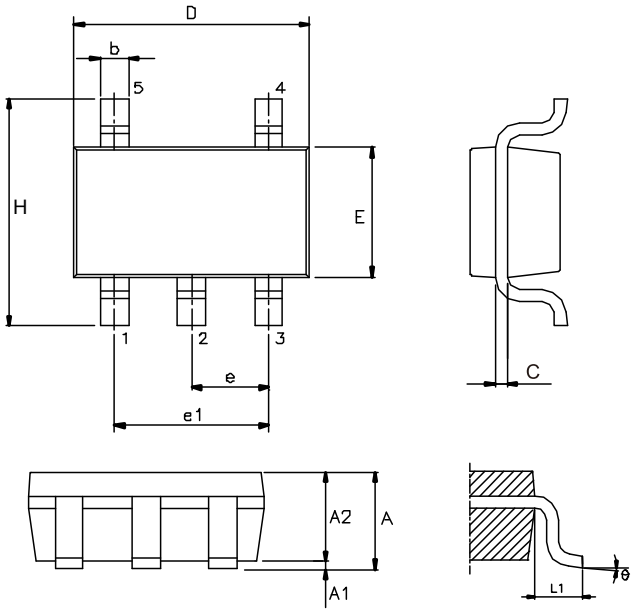
3-pin SOT89 Outline Dimensions



Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	0.173	—	0.185
B	0.053	—	0.072
C	0.090	—	0.106
D	0.031	—	0.047
E	0.155	—	0.173
F	0.014	—	0.019
G	0.017	—	0.022
H	—	0.059 BSC	—
I	0.055	—	0.063
J	0.014	—	0.017

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	4.40	—	4.70
B	1.35	—	1.83
C	2.29	—	2.70
D	0.80	—	1.20
E	3.94	—	4.40
F	0.36	—	0.48
G	0.44	—	0.56
H	—	1.50 BSC	—
I	1.40	—	1.60
J	0.35	—	0.44

5-pin SOT23 Outline Dimensions



Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	—	—	0.057
A1	—	—	0.006
A2	0.035	0.045	0.051
b	0.012	—	0.020
C	0.003	—	0.009
D	—	0.114 BSC	—
E	—	0.063 BSC	—
e	—	0.037 BSC	—
e1	—	0.075 BSC	—
H	—	0.110 BSC	—
L1	—	0.024 BSC	—
θ	0°	—	8°

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	—	—	1.45
A1	—	—	0.15
A2	0.90	1.15	1.30
b	0.30	—	0.50
C	0.08	—	0.22
D	—	2.90 BSC	—
E	—	1.60 BSC	—
e	—	0.95 BSC	—
e1	—	1.90 BSC	—
H	—	2.80 BSC	—
L1	—	0.60 BSC	—
θ	0°	—	8°