250mA CMOS Voltage Regulators

Features

- Quiescent Current: 3.0μA
- Maximum Withstand Input Voltage: 48V
- Output Current: 250mA
- Low Dropout Voltage: 550mV(Typ.)@100mA
- Output Voltage: 3.0V, 3.3V, 5.0V
- Output Voltage Accuracy: Tolerance±1%
- Output Short Circuit Protection

Applications

- Battery Power Supply Equipment
- Communication Equipment
- Audio/Video Equipment
- Smart Battery Packs

General Description

The HT75H series is a low-dropout linear regulator built with CMOS technology. It features a 48V withstand voltage and multiple fixed output voltages ranging from 2.0V to 5.0V. The device can supply an output current of 250 mA with a typical quiescent current of 2.0 μA. It integrates output short-circuit protection and thermal current foldback to prevent system failure.

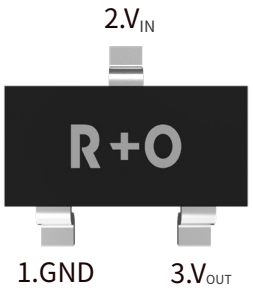
It is widely used for power supply in various audio, video and communication devices.

Reference News

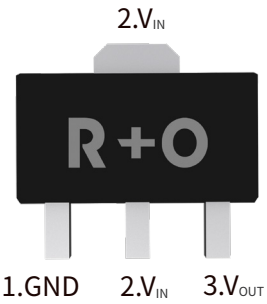
SOT-23 Marking:	SOT-23-3L Marking:	SOT-89 Marking:
HT7530SH: w HT30	HT7530S1H: W30H	HT7530H: 7530-1 H DC
HT7533SH: w HT33	HT7533S1H: W33H	HT7533H: 7533-1 H DC
HT7550SH: w HT50	HT7550S1H: W50H	HT7550H: 7550-1 H DC

Output Current
250mA
Input Voltage
48V

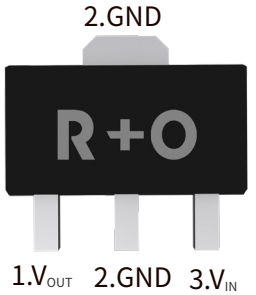
SOT-23(-3L)



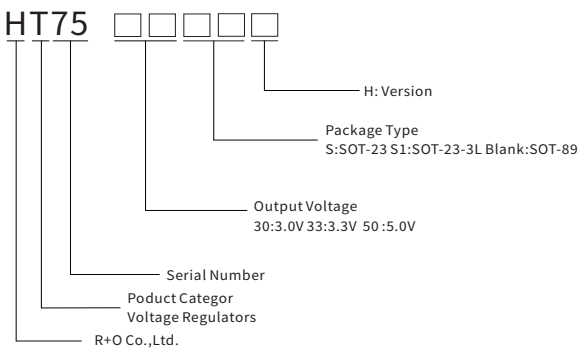
SOT-89



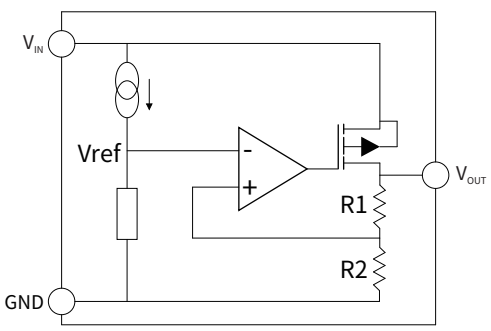
SOT-89(L)



Part Numbering



Block Diagram

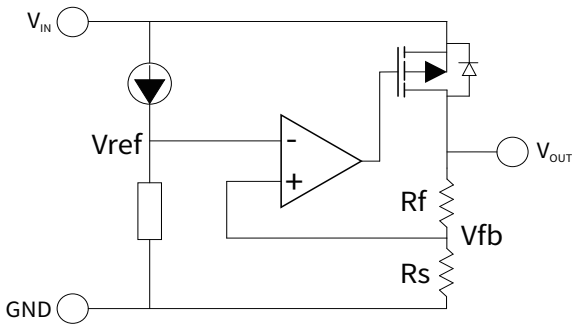


Ordering Information

Package	Package Code	Unit Weight(g)	Reel(pcs)	Box(pcs)	Carton(pcs)	Delivery Mode	MSL
SOT-23	R1	0.008	3000	30000	120000	7''	3
SOT-23-3L	R1	0.0132	3000	30000	120000	7''	3
SOT-89	R1	0.045	1000	10000	40000	7''	3

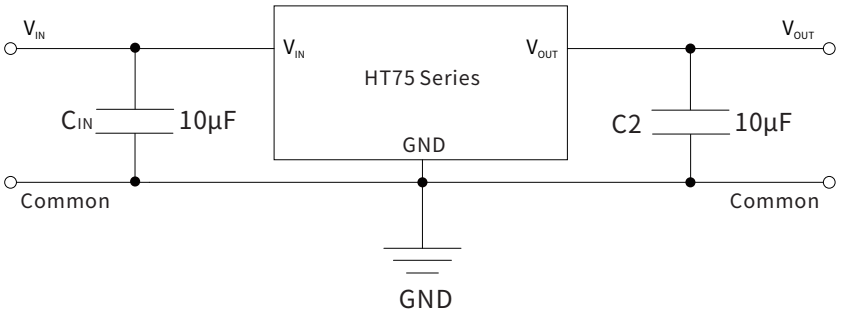
Application Description

The error amplifier compares the input voltage of the divider resistor composed of feedback resistors.Rs and Rf with the reference voltage vref, and provides the necessarygate voltage to the output transistor through this error amplifier, so that the output voltage is not affected by input voltage or temperature changes and remains constant.



1. When applying, try to connect the capacitors close to the V_{IN} and V_{OUT} pins.
2.The circuit uses a phase compensation circuit and uses the ESR of the output capacitor for compensation. Therefore,a capacitor larger than 2.2μF must be connected to the output ground. Tantalum capacitors are recommended.
3.Pay attention to the input and output voltage and load current conditions to prevent the power consumption inside the IC from exceeding the maximum power consumption allowed by the package.

Typical Application Circuit



Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified)

Parameter	Symbol	Value	Unit
Input Voltage/Limit	V_{IN}	-0.3~+52	V
Operating Current	I_O	250	mA
Power Dissipation	P_D	SOT-89: 500	mW
		SOT-23-3L: 400	
		SOT-23: 250	
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	SOT-89: 200	°C /W
		SOT-23-3L: 250	
		SOT-23: 500	
Solder Temperature/Time	T_d	260/10	°C /S
Operating Ambient Temperature	T_A	-40 to +85	°C
Junction and Storage Temperature	T_J, T_{stg}	150,-50 to +125	°C

Note:Exceed these limits to damage to the device, exposure to Absolute Maximum Rating conditions may affect the reliability of the chip.

Electrical Characteristics(T_A = 25°C Unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	T_A = 25°C	--	48	--	V
Output Voltage	V_{OUT}	I_{OUT} = 10mA, V_{IN} = V_{OUT} + 2.0V	V_{OUT} × 0.99	V_{OUT}	V_{OUT} × 1.01	V
Output Current	I_O	V_{IN} = V_{OUT} + 2.0V	--	250	--	mA
Quiescent Current	I_Q	I_{OUT} = 0mA	--	2.0	3.0	μA
Line Regulation	$\triangle V_{OUT} / \triangle V_{IN} \cdot V_{OUT}$	I_{OUT} = 1mA V_{OUT} + 1.0V ⩽ V_{IN} ⩽ 48V	--	--	0.2	%/V
Load Regulation	$\triangle V_{OUT}$	1mA ⩽ I_{OUT} ⩽ 200mA V_{IN} = V_{OUT} + 2.0V	--	15	75	mV
Output Voltage Temperature Coefficient	$\triangle V_{OUT} / \triangle T_A \cdot V_{OUT}$	I_{OUT} = 1mA, V_{IN} = V_{OUT} + 2.0V T_A = -40 to 85°C	--	65	--	PPM/°C
Dropout Voltage	V_D	I_{OUT} = 100mA, $\triangle V_{OUT}$ = 2%	--	550	--	mV

Note:
When V_{IN}=V_{OUT}+2.0V,as the output voltage declined 2%,the V_{DIF}=V_{IN}-V_{OUT}.
The input withstand voltage value of 48V does not mean that the circuit can work normally under a 48V power supply voltage. When the machine is turned on or off, the voltage pulse generated on the 48V power supply may Far greater than 48V, causing permanent damage to the chip.

Ratings And Characteristics Curves(V_{IN}=5.3V,V_{OUT}=3.3V,C1=C2=10μF, T_A = 25°C Unless otherwise specified)

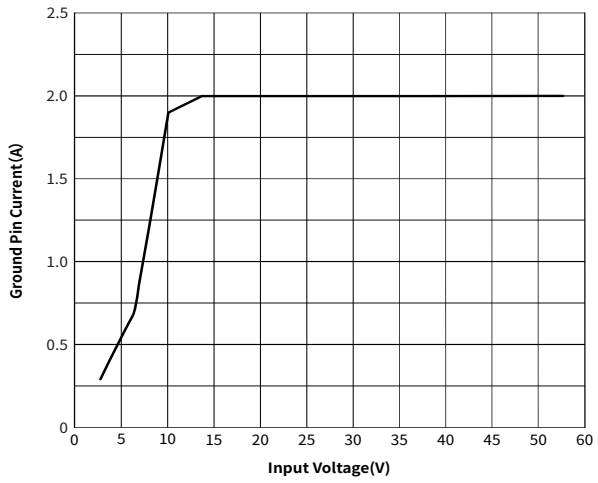


Fig.1 Ground Pin Current vs. Input Voltage

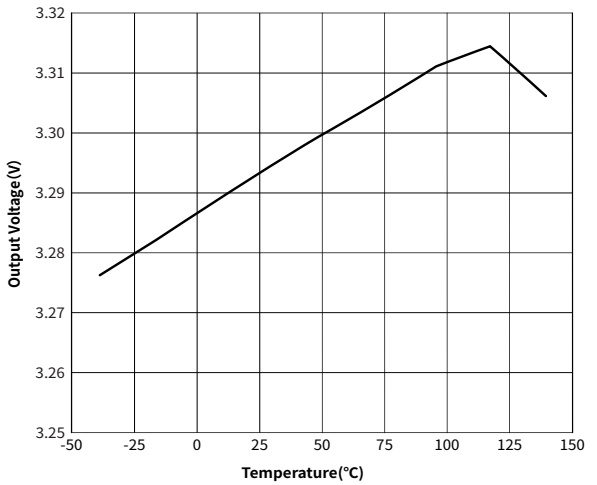


Fig.2 Output Voltage vs. Temperature

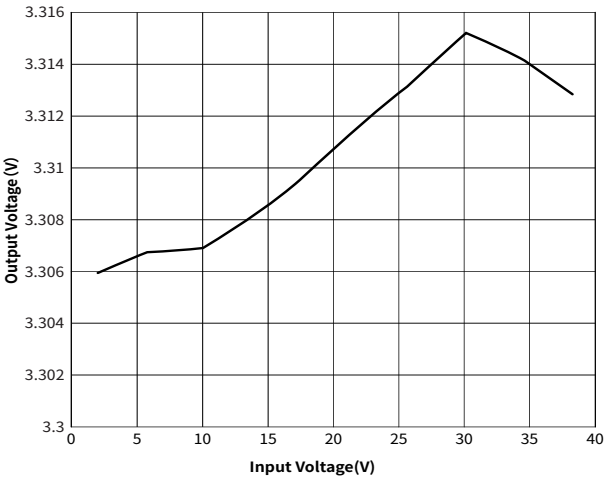


Fig.3 Output Voltage vs. Input Voltage

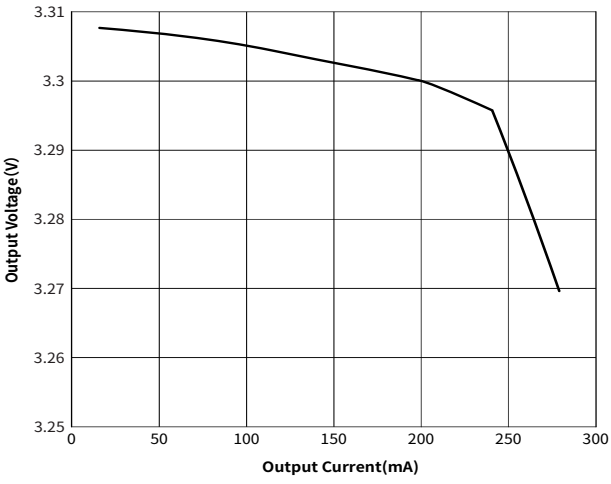
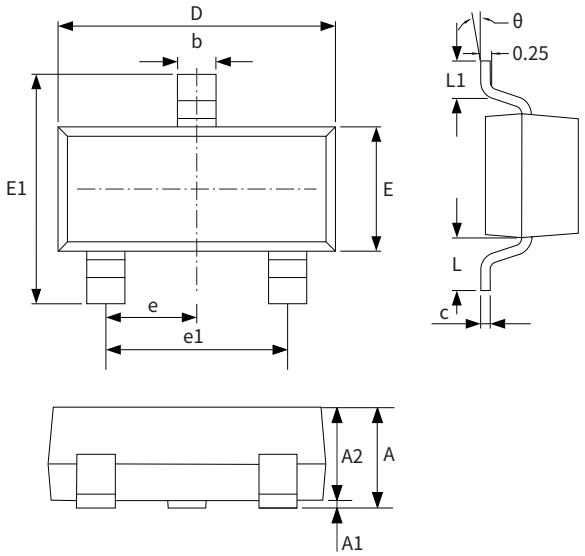


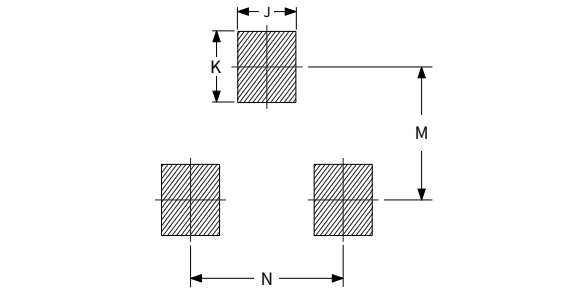
Fig.4 Output Voltage vs. Output Current

Package Outline Dimensions (SOT-23)



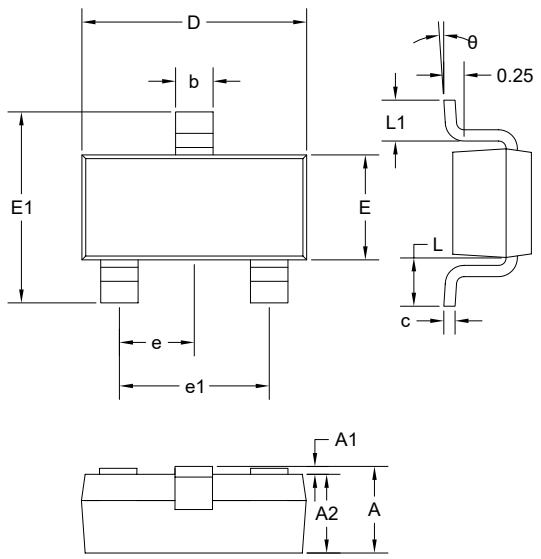
Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.15	0.035	0.045
A1	-	0.10	-	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.950TYP		0.037TYP	
e1	1.80	2.00	0.071	0.079
L	0.550REF		0.022REF	
L1	0.30	0.50	0.012	0.020
θ	-	8°	-	8°

Suggested Pad Layout



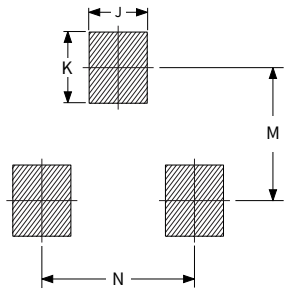
Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	0.80	-	0.031	-
K	-	0.90	-	0.035
M	2.00	-	0.078	-
N	-	1.90	-	0.074

Package Outline Dimensions (SOT-23-3L)



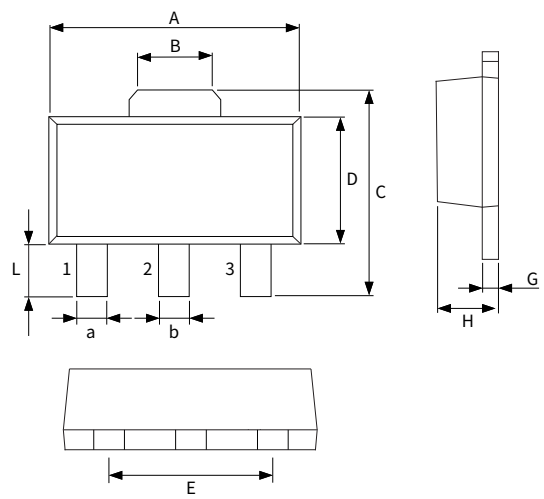
Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.05	1.25	0.041	0.049
A1	-	0.10	-	0.004
A2	1.05	1.15	0.041	0.045
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.82	3.02	0.111	0.119
E	1.50	1.70	0.059	0.067
E1	2.65	2.95	0.104	0.116
e	0.90	1.00	0.035	0.039
e1	1.80	2.00	0.071	0.079
L	0.45	0.65	0.018	0.026
L1	0.30	0.60	0.012	0.024
θ	-	8°	-	8°

Suggested Pad Layout



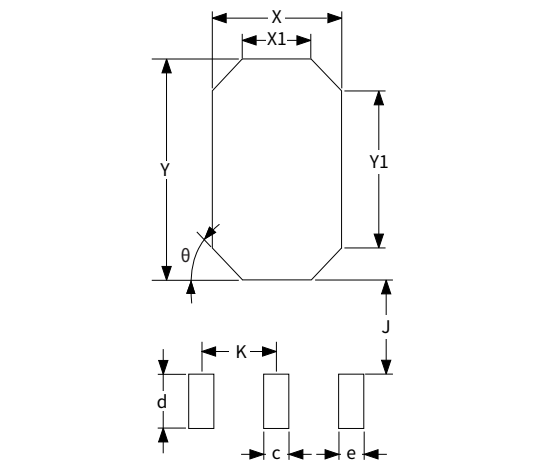
Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	0.80	-	0.031	-
K	-	0.95	-	0.037
M	2.00	-	0.078	-
N	-	2.0	-	0.079

Package Outline Dimensions (SOT-89)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	1.35	1.83	0.053	0.072
C	3.75	4.25	0.148	0.167
D	2.29	2.60	0.090	0.102
E	2.95	3.05	0.116	0.120
a	0.35	0.48	0.014	0.019
b	0.40	0.56	0.016	0.022
L	0.80	1.20	0.031	0.047
G	0.35	0.44	0.014	0.017
H	1.40	1.60	0.055	0.063

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
c	0.80	1.00	0.032	0.04
d	1.30	1.50	0.052	0.060
e	0.70	0.90	0.028	0.036
J	1.80	2.00	0.072	0.080
K	1.40	1.60	0.056	0.064
X	2.50	2.70	0.100	0.108
X1	1.30	1.50	0.052	0.060
Y	4.30	4.50	0.172	0.180
Y1	3.10	3.30	0.124	0.132
θ	-	45°	-	45°