

SOT-23



Pin Definition:

TS9000	TS9000A
1. Input	1. Ground
2. Output	2. Output
3. Ground	3. Input

SOT-89



Pin Definition:

TS9000	TS9000A
1. Ground	1. Output
2. Input	2. Ground
3. Output	3. Input

TO-92



Pin Definition:

TS9000	TS9000A
1. Ground	1. Input
2. Input	2. Ground
3. Output	3. Output

General Description

TS9000/TS9000A is a positive voltage regulator developed utilizing CMOS technology featured low quiescent current, low dropout voltage and high output voltage accuracy. Built in low on-resistor provides low dropout voltage and large output current. A 1uF or greater can be used as an output capacitor.

TS9000/TS9000A are prevented device failure under the worst operation condition with both thermal shutdown and current fold-back. These series are recommended for configuring portable devices and large current application, respectively.

Features

- Dropout voltage typically 0.4V @ $I_o=300mA$
- Output current up to 300mA
- Low quiescent current
- Output voltage trimmed before assembly
- Internal current limit
- Thermal shutdown protection

Applications

- Battery power equipment
- Personal communication devices
- Home electronic appliances
- PC peripherals
- CD-ROM
- Digital signal camera

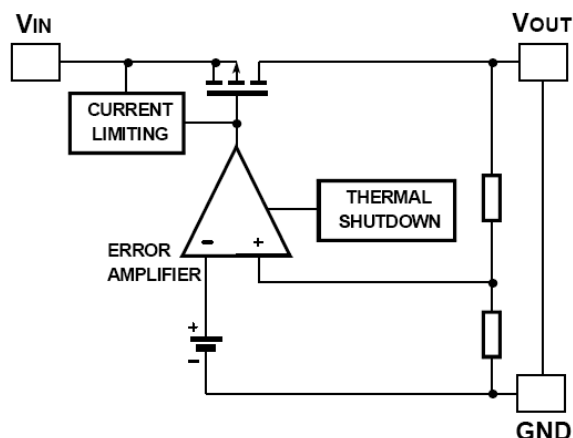
Ordering Information

Part No.	Package	Packing
TS9000 <u>x</u> CT A3	TO-92	2Kpcs / Ammo
TS9000 <u>x</u> CT B0	TO-92	1Kpcs / Bulk
TS9000 <u>x</u> CX RF	SOT-23	3Kpcs / 7" Reel
TS9000 <u>x</u> CY RM	SOT-89	1Kpcs / 7" Reel
TS9000A <u>x</u> CT A3	TO-92	2Kpcs / Ammo
TS9000A <u>x</u> CT B0	TO-92	1Kpcs / Bulk
TS9000A <u>x</u> CX RF	SOT-23	3Kpcs / 7" Reel
TS9000A <u>x</u> CY RM	SOT-89	1Kpcs / 7" Reel

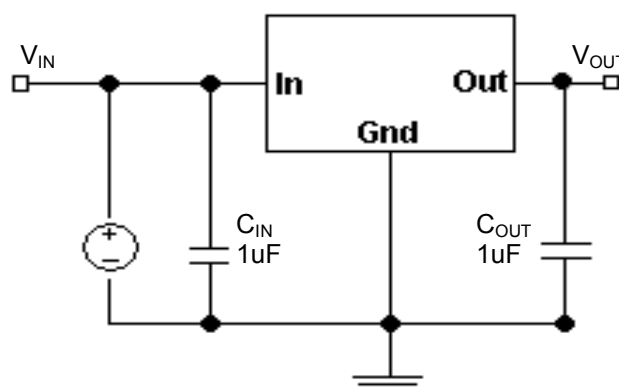
Note: Where x denotes voltage option, available are
D=1.8V, **K**=2.5V, **M**=2.7V, **N**=2.8V, **P**=3.0V,
S=3.3V, **U**=3.5V, **5**=5V

Contact factory for additional voltage options.

Block Diagram



Typical Application Circuit



Absolute Maximum Rating

Parameter		Symbol	Limit	Unit
Input Supply Voltage		V_{IN}	+7	V
Output Current		I_O	$P_D / (V_{IN} - V_O)$	V
Power Dissipation	SOT-23	P_D	0.30	W
	SOT-89		0.50	
	TO-92		0.625	
Operating Ambient Temperature Range		T_{OPR}	-40 ~ +85	°C
Storage Temperature Range		T_{STG}	-40 ~ +125	°C
Lead Soldering Temperature (260 °C)			10	S

Notes:

a. Stress above the listed absolute rating may cause permanent damage to the device.

Electrical Characteristics ($T_a = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_{IN}=V_O + 0.4\text{V}$, $1\text{mA} \leq I_O \leq 300\text{mA}$,	$0.98 V_O $	--	$1.02 V_O $	
Input Supply Voltage		$V_O+0.3\text{V}$	--	7	V
Output Voltage Temperature Coefficient		--	40	--	ppm/ °C
Line Regulation	$V_O+1\text{V} \leq V_{IN} \leq V_O+2\text{V}$, $I_O=5\text{mA}$	--	0.02	0.1	%
Load Regulation	$1\text{mA} \leq I_L \leq 300\text{mA}$	--	0.2	1.0	%
Dropout Voltage	$I_O = 300\text{mA}$, $V_O = V_O - 2\%$	--	--	400	mV
Quiescent Current	$V_{IN} = 5\text{V}$, $I_O = 0\text{A}$	--	30	50	uA
Short Circuit Current	$V_O < 0.4\text{V}$	--	300	400	mA
Output Noise		--	20	--	uVrms
Power Supply Rejection Ratio	At 1KHz	--	55	--	dB

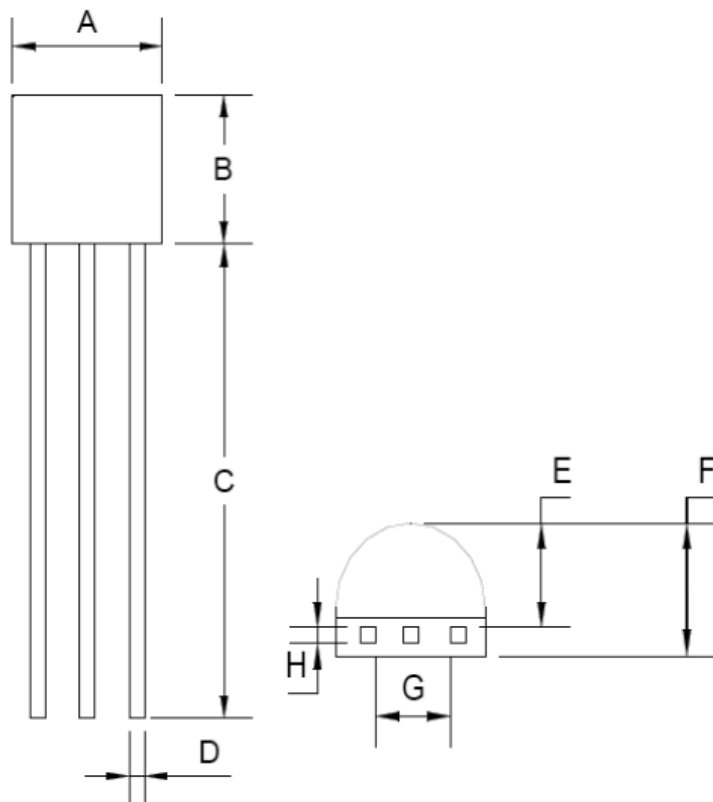
Detail Description

The TS9000/TS9000A series of CMOS regulators contain a P-MOS pass transistor, voltage reference, error amplifier, over current protection and thermal shutdown.

The TS9000/TS9000A series switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over stress. The TS9000 also incorporates current fold-back to reduce power dissipation when the output is short circuit. This feature becomes active when the output drops below 0.8V, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8V.

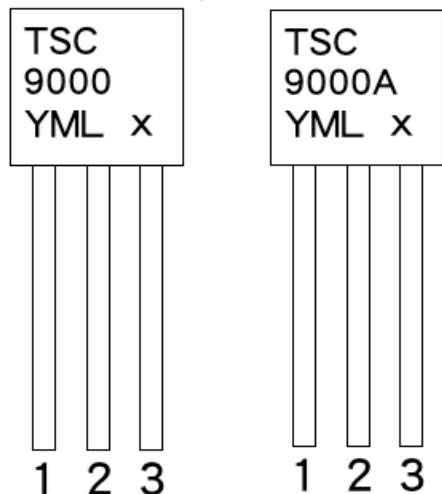
The internal P-channel pass transistor receives data from the error amplifier, over current shutdown and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over current and thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110°C.

TO-92 Mechanical Drawing



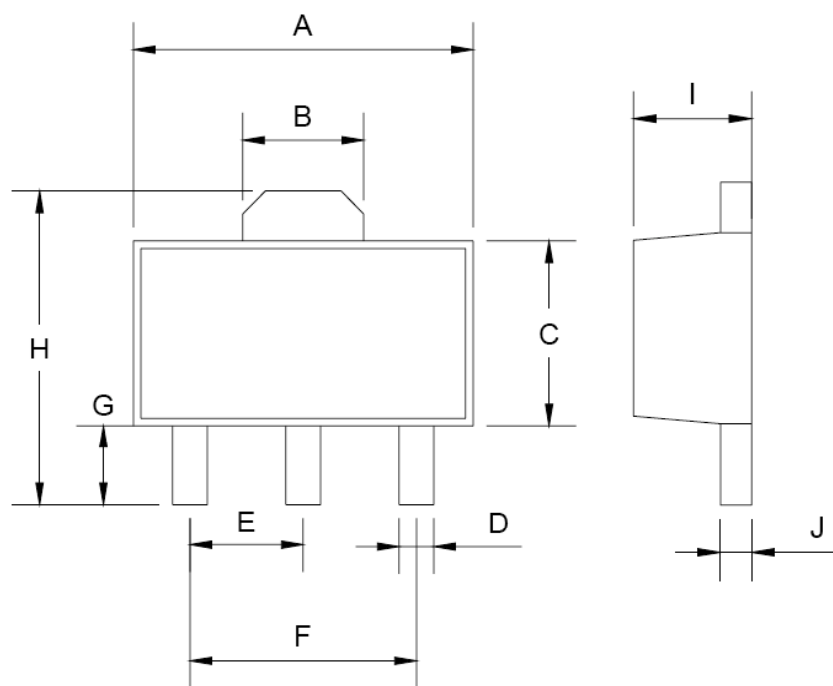
TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017

Marking Diagram



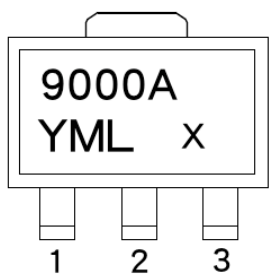
- Y** = Year Code
- M** = Month Code
(A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- L** = Lot Code
- X** = Fixed Output Voltage Code
K=2.5V, M=2.7V, N=2.8V, P=3.0V, S=3.3V, U=3.5V, V=3.6V, X=3.8V

SOT-89 Mechanical Drawing

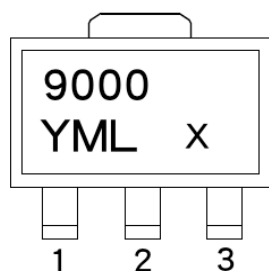


SOT-89 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.40	1.75	0.055	0.069
C	2.40	2.60	0.094	0.102
D	0.36	0.48	0.014	0.018
E	1.40	1.60	0.054	0.063
F	2.90	3.10	0.114	0.122
G	0.89	1.20	0.035	0.047
H	--	4.25	--	0.167
I	1.40	1.60	0.055	0.068
J	0.38	0.43	0.014	0.017

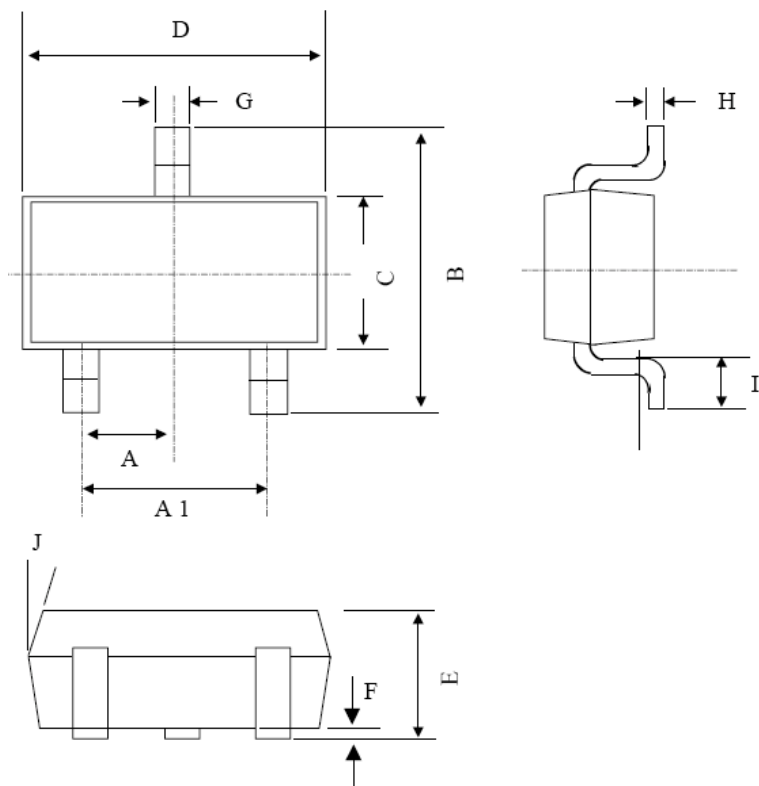
Marking Diagram



Y = Year Code
M = Month Code
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
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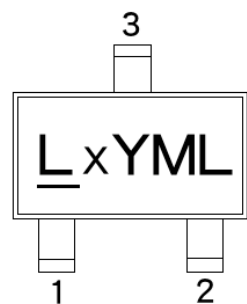


SOT-23 Mechanical Drawing



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.95 BSC		0.037 BSC	
A1	1.9 BSC		0.074 BSC	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	5°	10°	5°	10°

Marking Diagram



L = Product Code

L: TS9000

L: TS9000A

Y = Year Code

M = Month Code

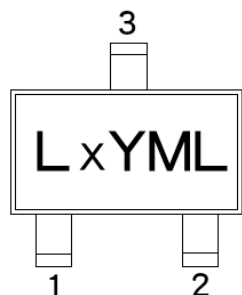
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)

L = Lot Code

X = Fixed Output Voltage Code

K=2.5V, **M**=2.7V, **N**=2.8V, **P**=3.0V,

S=3.3V, **U**=3.5V, **V**=3.6V, **X**=3.8V



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