Pb RoHS COMPLIANCE

SOT-23

Pin Definition:

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

SOT-89

Pin Definition:

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

TO-92

Pin Definition:

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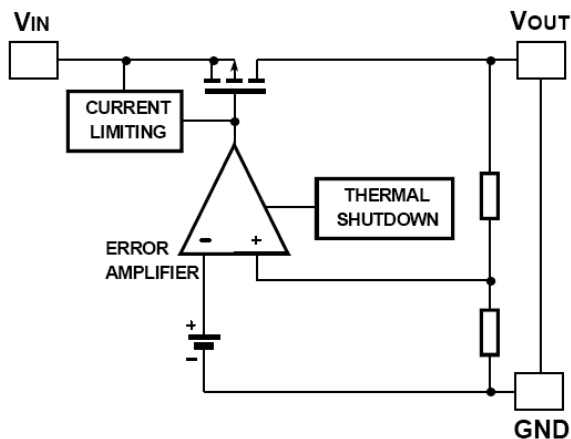
Features

- Dropout voltage typically 0.4V @ Io=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**x**CT A3	TO-92	2Kpcs / Ammo
TS9000**x**CT B0	TO-92	1Kpcs / Bulk
TS9000**x**CX RF	SOT-23	3Kpcs / 7" Reel
TS9000**x**CY RM	SOT-89	1Kpcs / 7" Reel
TS9000A**x**CT A3	TO-92	2Kpcs / Ammo
TS9000A**x**CT B0	TO-92	1Kpcs / Bulk
TS9000A**x**CX RF	SOT-23	3Kpcs / 7" Reel
TS9000A**x**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

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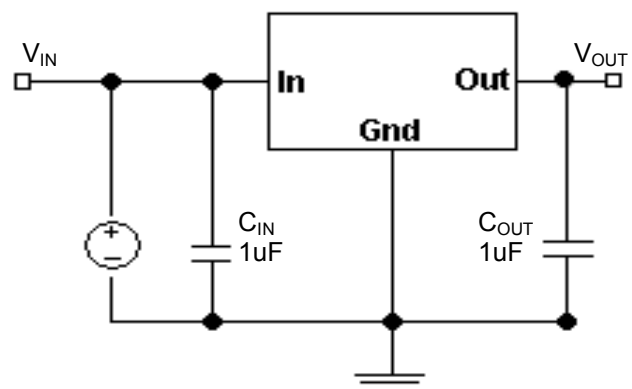
Absolute Maximum Rating

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 (Ta = 25 oC , unless otherwise noted)

| Parameter	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_{IN}=V_O + 0.4V$, 1mA ≤ Io ≤ 300mA,	0.98|Vo|	--	1.02|Vo|	
Input Supply Voltage		Vo+0.3V	--	7	V
Output Voltage Temperature Coefficient		--	40	--	ppm/ °C
Line Regulation	$V_O+1V ≤ V_{IN} ≤ Vo+2V$, Io=5mA	--	0.02	0.1	%
Load Regulation	1mA ≤ IL ≤ 300mA	--	0.2	1.0	%
Dropout Voltage	I_O =300mA, V_O =Vo-2%	--	--	400	mV
Quiescent Current	V_{IN} =5V, Io=0A	--	30	50	uA
Short Circuit Current	V_O < 0.4V	--	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.
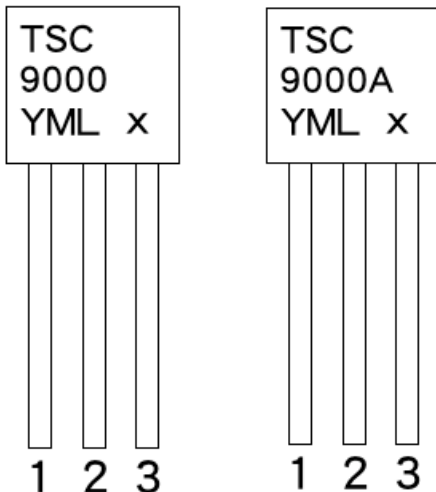
The internal P-channel pass transistor receives data from the error amplifier, over current shutdown and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over current and thermal shutdown circuits become active when the junction 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
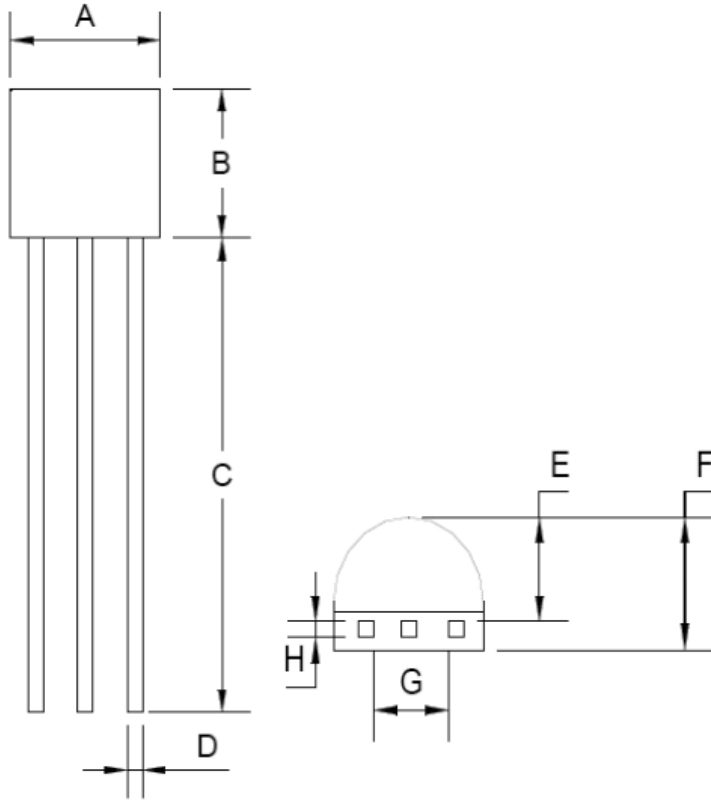
DIM	TO-92 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017

Marking Diagram

TSC
9000
YML x

TSC
9000A
YML x

1 2 3

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)

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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SOT-89 Mechanical Drawing
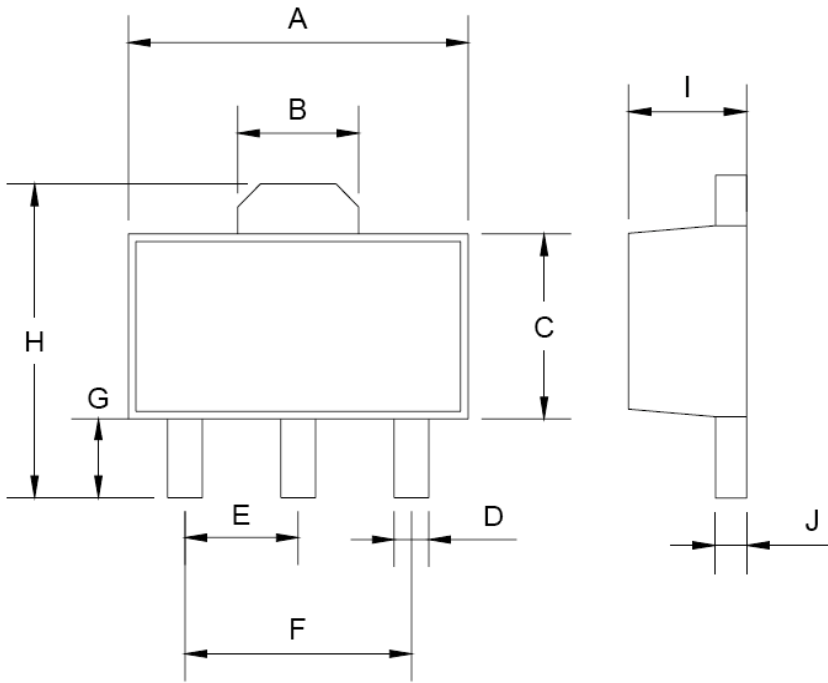
DIM	\multicolumn{2}{c}{MILLIMETERS}	\multicolumn{2}{c}{INCHES}
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.40	1.75	0.055	0.069
C	2.40	2.60	0.094	0.102
D	0.36	0.48	0.014	0.018
E	1.40	1.60	0.054	0.063
F	2.90	3.10	0.114	0.122
G	0.89	1.20	0.035	0.047
H	--	4.25	--	0.167
I	1.40	1.60	0.055	0.068
J	0.38	0.43	0.014	0.017
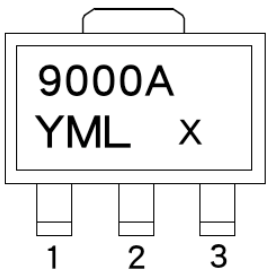
SOT-89 DIMENSION

Marking Diagram

9000A
YML   X

1 2 3

9000
YML   X

1 2 3

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)

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
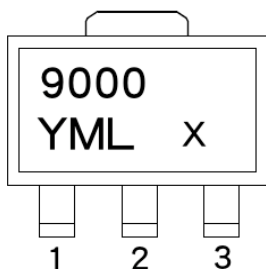
SOT-23 Mechanical Drawing
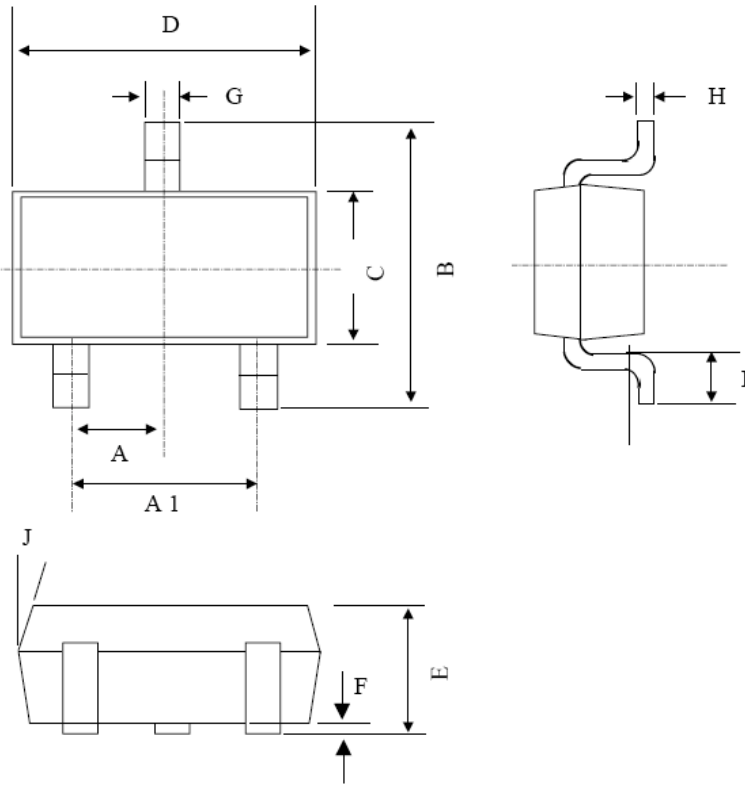
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.95 BSC		0.037 BSC	
A1	1.9 BSC		0.074 BSC	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	5º	10º	5º	10º

SOT-23 DIMENSION

Marking Diagram
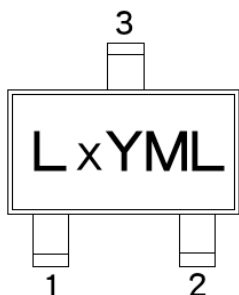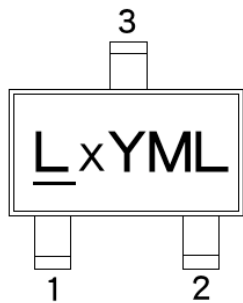
L = Product Code
  L: TS9000
  L: TS9000A
Y = Year Code
M = Month Code
  (**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug,
   I=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code
X = Fixed Output Voltage Code
  K=2.5V, **M**=2.7V, **N**=2.8V, **P**=3.0V,
  S=3.3V, **U**=3.5V, **V**=3.6V, **X**=3.8V

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