

TS9011

250mA CMOS Low Dropout Voltage Regulator

TO-92



SOT-89



SOT-23



Pin assignment

TO-92 & SOT-89

1. Gnd
2. Input
3. Output

SOT-23

1. Gnd
2. Out
3. Input

Low Power Consumption 2uA
Low Drop Out Voltage 0.4V

General Description

The TS9011 series is a positive voltage regulator developed utilizing CMOS technology featured very low power consumption, low dropout voltage and high output voltage accuracy. Built in low on-resistor provides low dropout voltage and large output current. A 1 μ F or greater can be used as an output capacitor.

The TS9011 series 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.

This series are offered in 3-pin TO-92, SOT-89 and SOT-23 package.

Features

- ✧ Dropout voltage typically 0.38V @Io=200mA (Vo=5V)
- ✧ Output current up to 250mA
- ✧ Low power consumption, 2uA(typ) @Vo=5V
- ✧ Output voltage +/-2%
- ✧ Internal current limit
- ✧ Thermal shutdown protection

Applications

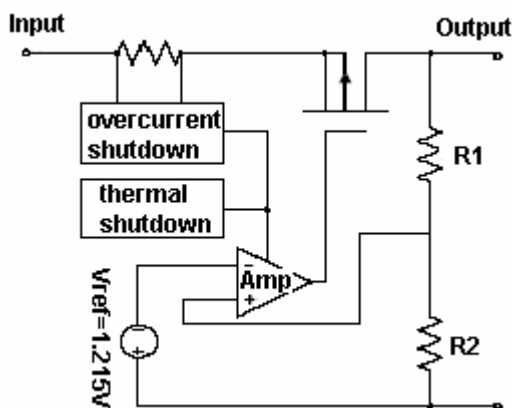
- ✧ Palmtops
- ✧ Video recorders
- ✧ Battery powered equipment
- ✧ PC peripherals
- ✧ CD-ROM
- ✧ Digital signal camera

Ordering Information

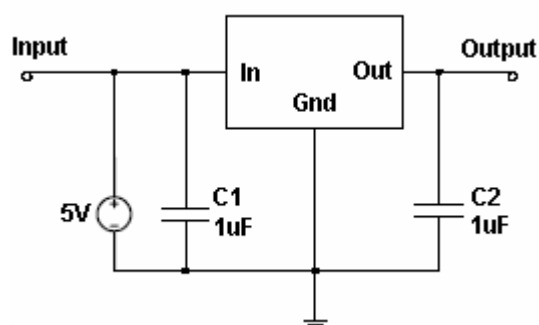
Part No.	Operating Temp. (Ambient)	Package
TS9011 <u>x</u> CT	-20 ~ +85 °C	TO-92
TS9011 <u>x</u> CX		SOT-23
TS9011 <u>x</u> CY		SOT-89

Note: Where x denotes voltage option, available are
A = 1.5V, D=1.8V, K=2.5V, S=3.3V, 5=5.0V.
Contact factory for additional voltage options.

Block Diagram



Typical Application Circuit





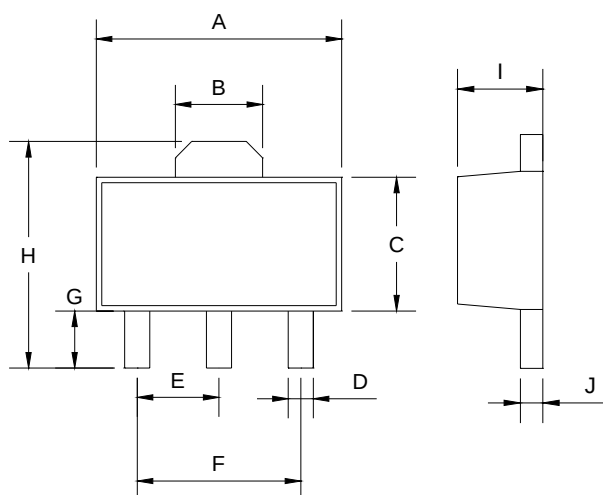
Absolute Maximum Rating							
Input Supply Voltage		Vin(max.)	+12		V		
Input Operating Voltage		Vin(opr.)	+10				
Output Current		Io	PD / (Vin – Vo)		V		
Power Dissipation	SOT-23	PD	0.15		W		
	SOT-89		0.50				
	TO-92		0.65				
Operating Junction Temperature Range		Tj	-40 ~ +125		°C		
Storage Temperature Range		TSTG	-65 ~ +150		°C		
Lead Soldering Temperature (260 °C)			10		S		
Caution: Stress above the listed absolute rating may cause permanent damage to the device.							
Electrical Characteristics							
Ta = 25 °C unless otherwise specified.							
Parameter		Conditions		Min	Typ	Max	Unit
Output Voltage	Vin=Vo + 1V, Io =40mA,	TS90115	4.900	5.0	5.100	V	
		TS9011S	3.234	3.3	3.366		
		TS9011K	2.450	2.5	2.550		
		TS9011D	1.764	1.8	1.836		
		TS9011A	1.47	1.5	1.53		
Maximum Output Current		Vin=Vo+1V,		250	--	--	mA
Input Stability		Vo+1V ≤ Vin ≤ Vo+2V, Io=1mA		--	0.2	0.3	%
Load Regulation (Note1)	Vin=Vo+1V, 1mA≤IL≤100mA	TS90115	--	40	80	mV	
		TS9011S					
	Vin=Vo+1V, 1mA≤IL≤80mA	TS9011K	--	40	90		
		TS9011D					
		TS9011A					
Dropout Voltage (Note 2)	Io=250mA	TS90115	--	400	600	mV	
	Io=200mA	TS9011S	--	400	650		
	Io=160mA	TS9011K	--	400	700		
	Io=120mA	TS9011D	--	400	750		
	Io=100mA	TS9011A	--	850	1000		
Quiescent Current		Vin=Vo+1V, Io=0A		--	2	5	uA
Output Current Limit		Vout < 0.4V		--	400	--	mA
Power Supply Rejection Ratio		At f=100KHz, Io=10mA,		--	30	--	dB
Output Voltage Temperature Coefficient (Note 3)				--	100	--	ppm/ °C

Note: 1. Regulation is measured at constant junction temperature, using pulsed ON time.

2. Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V_{out} inside target value +/-2%.

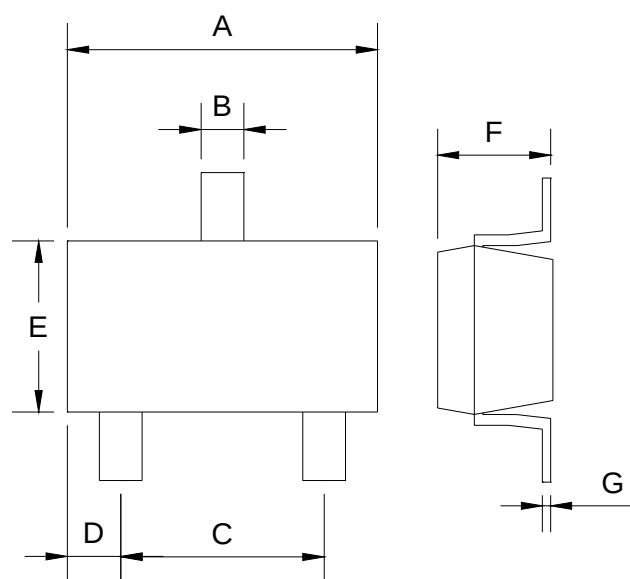
3. Guaranteed by design.

SOT-89 Mechanical Drawing



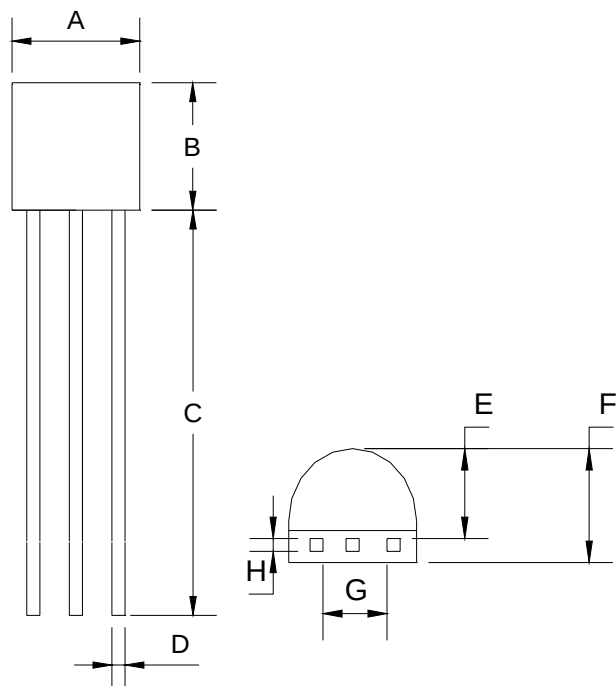
SOT-89 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.50	1.7	0.059	0.070
C	2.30	2.60	0.090	0.102
D	0.40	0.52	0.016	0.020
E	1.50	1.50	0.059	0.059
F	3.00	3.00	0.118	0.118
G	0.89	1.20	0.035	0.047
H	4.05	4.25	0.159	0.167
I	1.4	1.6	0.055	0.068
J	0.35	0.44	0.014	0.017

SOT-23 Mechanical Drawing



SOT-23 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.88	2.91	0.113	0.115
B	0.39	0.42	0.015	0.017
C	1.78	2.03	0.070	0.080
D	0.51	0.61	0.020	0.024
E	1.59	1.66	0.063	0.065
F	1.04	1.08	0.041	0.043
G	0.07	0.09	0.003	0.004

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