

General Description

TS9011 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. TS9011 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 0.4V (typ) @ $I_o=250\text{mA}$
- Output Current up to 250mA
- Low Power Consumption, 2 μ A (typ)
- Output Voltage $\pm 2\%$
- Internal Current Limit
- Thermal Shutdown Protection

Ordering Information

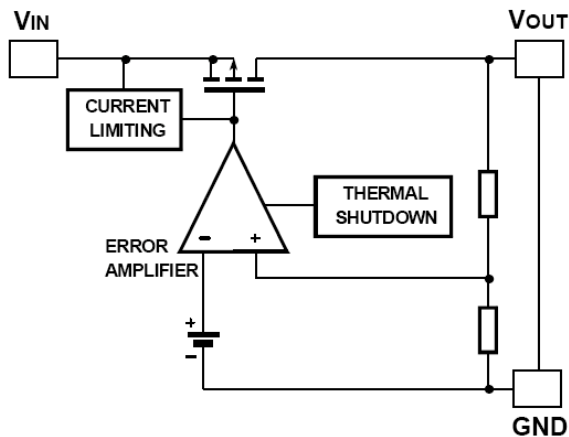
Part No.	Package	Packing
TS9011xCX RF	SOT-23	3kpcs / 7" Reel
TS9011xCY RM	SOT-89	1kpcs / 7" Reel

Note: Refer to detail ordering information table.

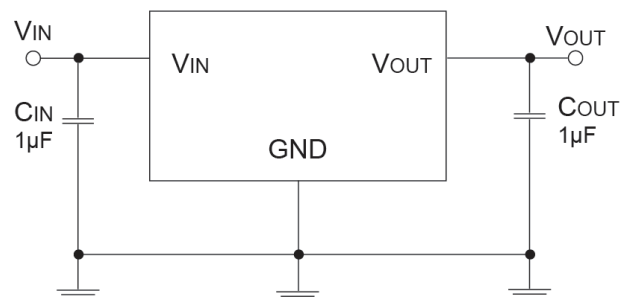
Applications

- Battery-operated systems
- Microprocessor reset circuitry
- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection
- System battery life and charge voltage monitors

Block Diagram



Typical Application Circuit



* Tantalum capacitor for Input & Output capacitor are recommended

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Input Supply Voltage	V_{IN}	12	V
Output Current	I_O	$P_D / (V_{IN} - V_O)$	V
Power Dissipation	SOT-23	0.30	W
	SOT-89	0.50	
Thermal Resistance - Junction to Ambient	SOT-23	333	°C/W
	SOT-89	200	
Operating Ambient Temperature	T_{OPR}	-40 ~ +85	°C
Junction Temperature Range	T_J	-40 ~ +150	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

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

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

Parameter	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_{IN}=V_O + 1V$, $I_O=40\text{mA}$,	TS90115	4.90	5.0	5.10	V
		TS9011S	3.23	3.3	3.36	
		TS9011P	2.94	3.0	3.06	
		TS9011K	2.45	2.5	2.55	
		TS9011D	1.76	1.8	1.83	
		TS9011A	1.47	1.5	1.53	
Maximum Output Current	$V_{IN}=V_O+1V$,	250	--	--	mA	
Input Stability	$V_O+1V \leq V_{IN} \leq V_O+2V$, $I_O=1\text{mA}$	--	0.2	0.3	%	
Load Regulation (Note1)	$V_{IN}=V_O+1V$, $1\text{mA} \leq I_L \leq 100\text{mA}$	TS90115	--	40	80	mV
		TS9011S				
	$V_{IN}=V_O+1V$, $1\text{mA} \leq I_L \leq 80\text{mA}$	TS9011P	--	40	90	
		TS9011K				
		TS9011D				
TS9011A						
Dropout Voltage (Note 2)	$I_O=250\text{mA}$	TS90115	--	400	600	mV
	$I_O=200\text{mA}$	TS9011S	--	400	650	
	$I_O=160\text{mA}$	TS9011P	--	400	700	
	$I_O=160\text{mA}$	TS9011K	--	400	700	
	$I_O=120\text{mA}$	TS9011D	--	400	750	
	$I_O=100\text{mA}$	TS9011A	--	850	1000	
Quiescent Current	$V_{IN}=V_O+1V$, $I_O=0\text{A}$	--	2	5	μA	
Output Current Limit	$V_{OUT} < 0.4V$	--	400	--	mA	
Power Supply Rejection Ratio	At $f=100\text{KHz}$, $I_O=10\text{mA}$,	--	30	--	dB	
Output Voltage Temperature Coefficient (Note 3)		--	100	--	ppm/°C	

Notes:

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.

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

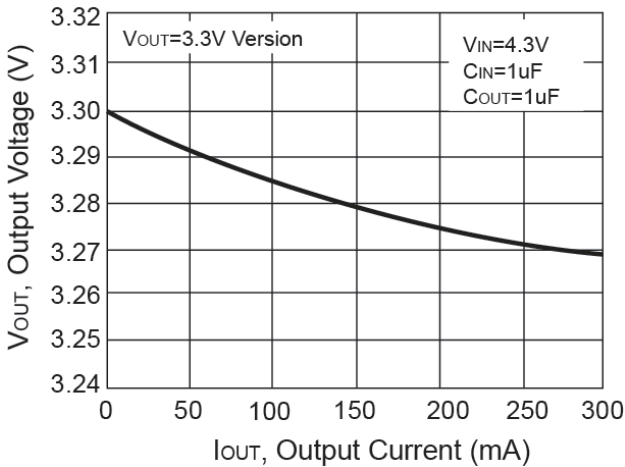


Figure 1. Output Voltage vs. Output Current

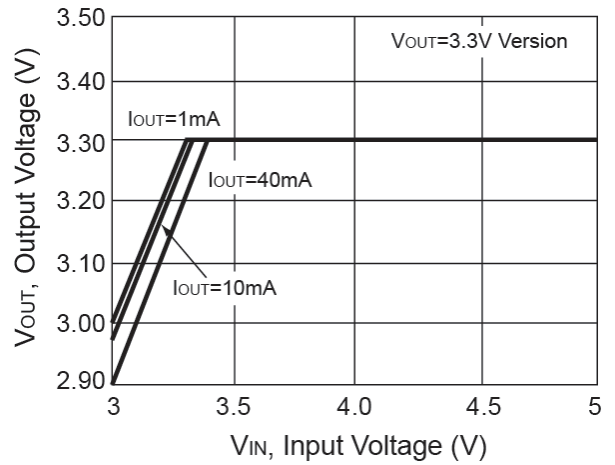


Figure 2. Output Voltage vs. Input Voltage

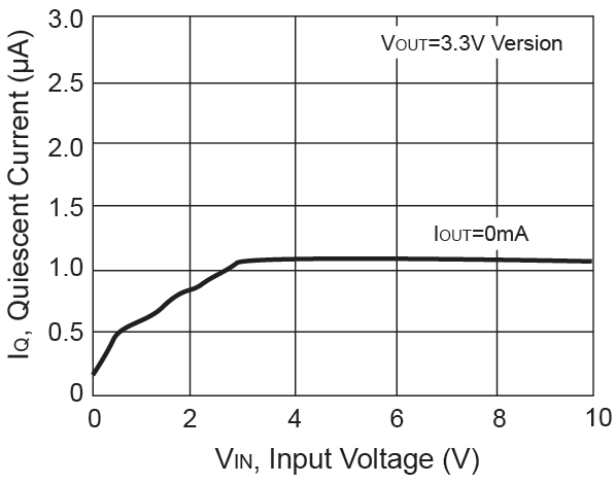


Figure 3. Quiescent Current vs. Input Voltage

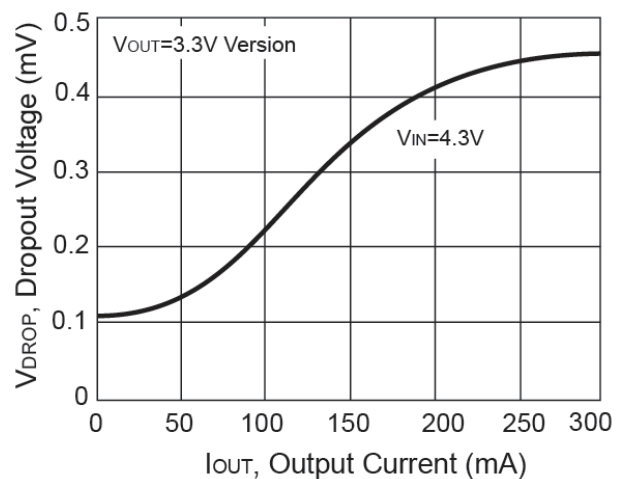


Figure 4. Short Circuit Current vs. Input Voltage



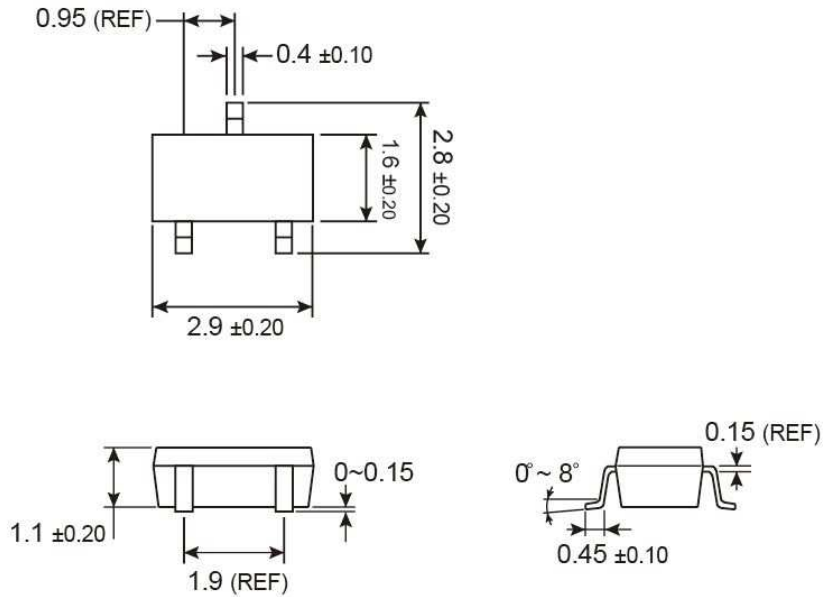
Ordering information

Voltage	SOT-23	SOT-89
1.5V	TS9011ACX RF	
1.8V	TS9011DCX RF	TS9011DCY RM
2.5V	TS9011KCX RF	TS9011KCY RM
3.0V	TS9011PCX RF	TS9011PCY RM
3.3V	TS9011SCX RF	TS9011SCY RM
5V	TS90115CX RF	TS90115CY RM

Packing code information

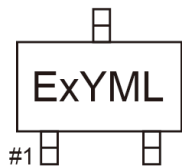
Packing	3kpcs / 7" Reel	1kpcs / 7" Reel
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SOT-23 Mechanical Drawing



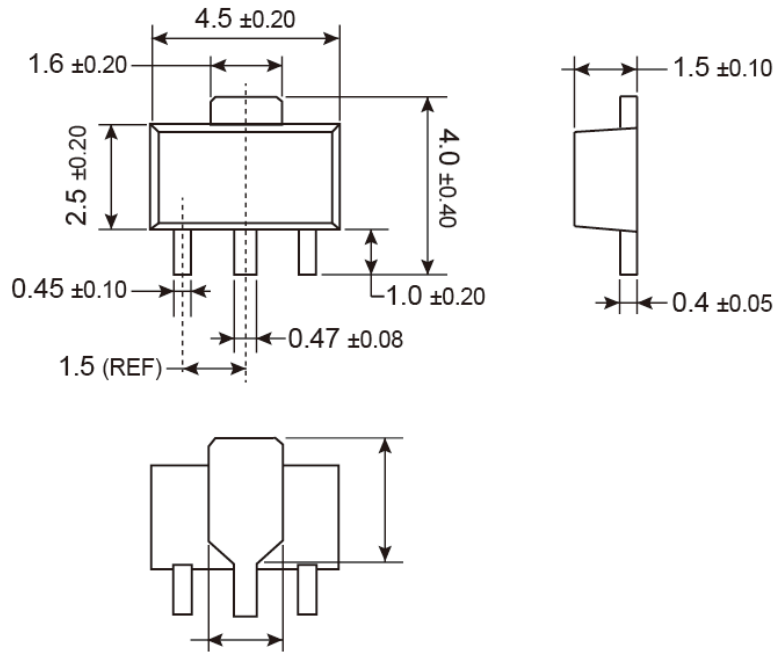
Unit: Millimeters

Marking Diagram



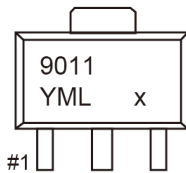
- E** = Product Code
- Y** = Year Code
- M** = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
- L** = Lot Code
- X** = Fixed Output Voltage Code
A=1.5V, **D**=1.8V, **K**=2.5V, **P**=3.0V, **S**=3.3V, **5**=5.0V.

SOT-89 Mechanical Drawing



Unit: Millimeters

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
D=1.8V, **K**=2.5V, **P**=3.0V, **S**=3.3V, **5**=5.0V.

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