TS9011

250mA Low Quiescent Current CMOS LDO

SOT-23

Pin Definition:
1. Ground
2. Output
3. Input

SOT-89

Pin Definition:
1. Ground
2. Input
3. Output

TO-92

Pin Definition:
1. Ground
2. Input
3. Output

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 1uF 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 Typically 0.4V@ 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

- 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

Ordering Information

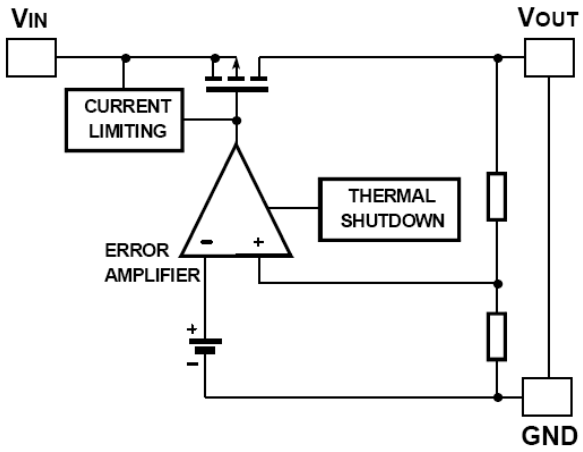
Part No.	Package	Packing
TS9011**x**CX RF	SOT-23	3Kpcs / 7” Reel
TS9011**x**CY RM	SOT-89	1Kpcs / 7” Reel
TS9011**x**CT A3	TO-92	2Kpcs / Ammo
TS9011**x**CT B0	TO-92	1Kpcs / Bulk

Note: Where **x** denotes voltage option, available are

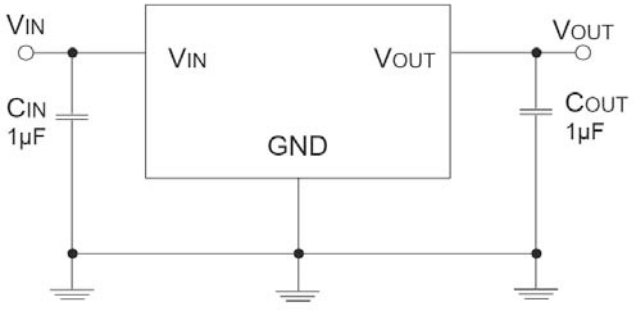
A=1.5V
D=1.8V
K=2.5V
P=3.0V
S=3.3V
5=5V

Contact factory for additional voltage options.

Block Diagram



Typical Application Circuit



* Tantalum capacitor for Input & Output capacitor are recommended

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Absolute Maximum Rating

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	P_D	0.30	W
	SOT-89		0.50	
	TO-92		0.625	
Thermal Resistance - Junction to Ambient	SOT-23	$R\Theta_{JA}$	333	°C/W
	SOT-89		200	
	TO-92		160	
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 (Ta = 25°C, unless otherwise noted)

Parameter	Conditions		Min	Typ	Max	Unit
Output Voltage	V_{IN}=Vo + 1V, Io =40mA,	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}=Vo+1V,		250	--	--	mA
Input Stability	V_O+1V ≤ Vin ≤ V_O+2V, Io=1mA		--	0.2	0.3	%
Load Regulation (Note1)	V_{IN}=Vo+1V, 1mA≤I_L≤100mA	TS90115	--	40	80	mV
		TS9011S				
	V_{IN}=Vo+1V, 1mA≤I_L≤80mA	TS9011P	--	40	90	
		TS9011K				
		TS9011D				
		TS9011A				
Dropout Voltage (Note 2)	Io=250mA	TS90115	--	400	600	mV
	Io=200mA	TS9011S	--	400	650	
	Io=160mA	TS9011P	--	400	700	
	Io=160mA	TS9011K	--	400	700	
	Io=120mA	TS9011D	--	400	750	
	Io=100mA	TS9011A	--	850	1000	
Quiescent Current	V_{IN}=Vo+1V, Io=0A		--	2	5	uA
Output Current Limit	V_{OUT} < 0.4V		--	400	--	mA
Power Supply Rejection Ratio	At f=100KHz, Io=10mA,		--	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 (Ta = 25°C, unless otherwise noted)

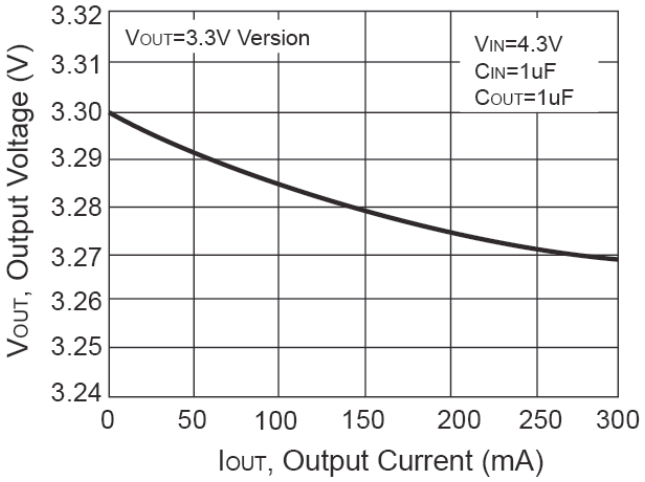


Figure 1. Output Voltage vs. Output Current

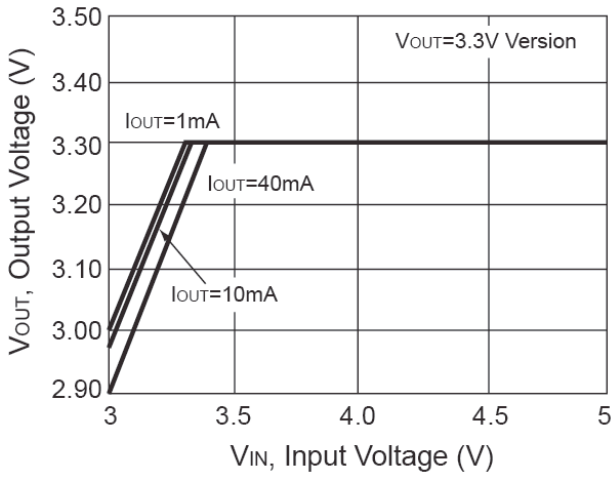


Figure 2. Output Voltage vs. Input Voltage

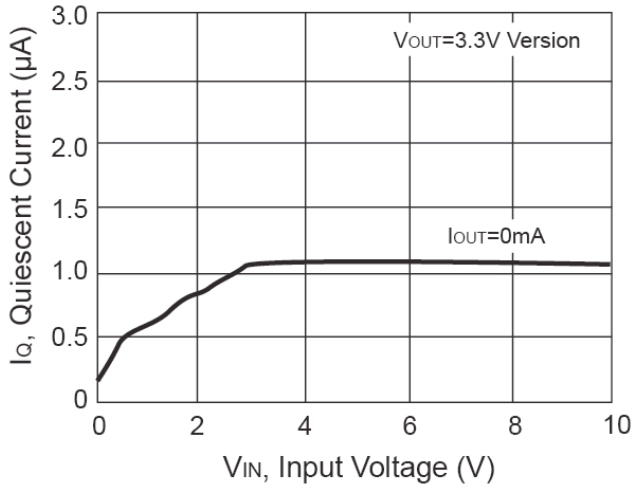


Figure 3. Quiescent Current vs. Input Voltage

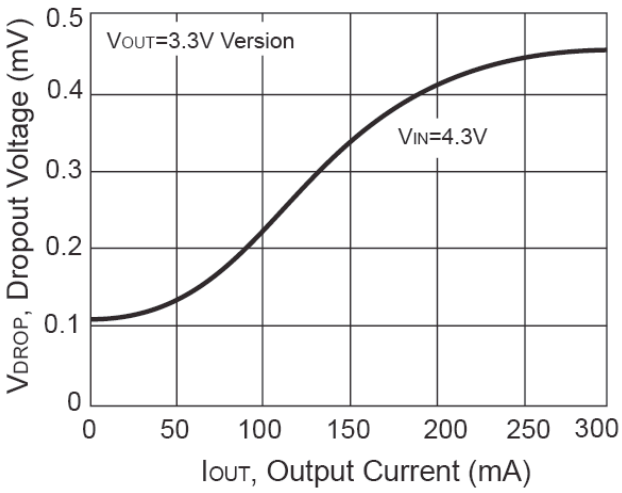
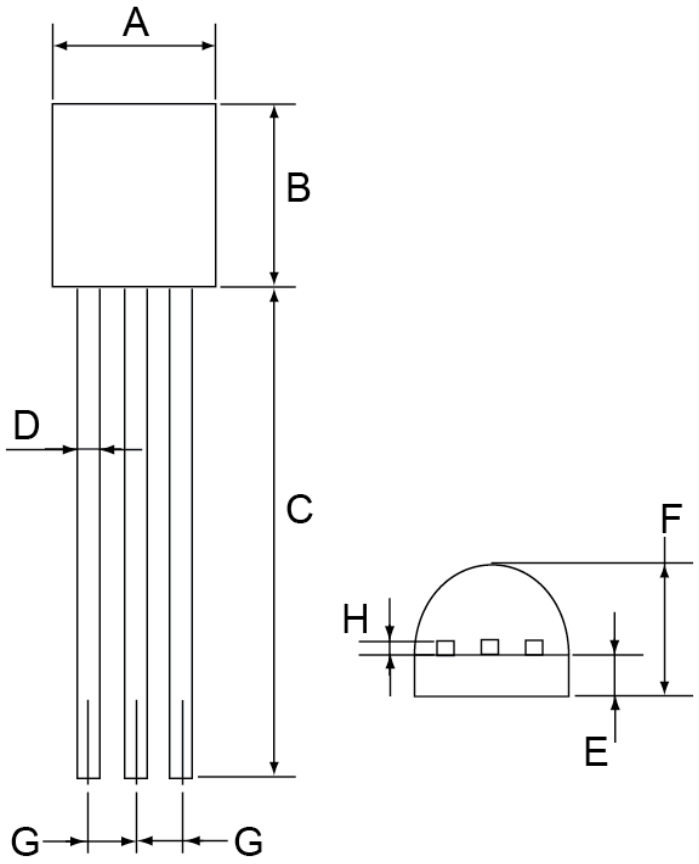


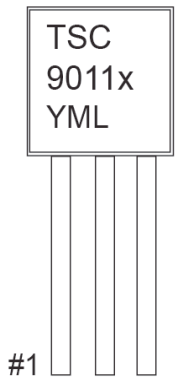
Figure 4. Short Circuit Current vs. Input Voltage

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	13.53 (typ)		0.532 (typ)	
D	0.39	0.49	0.015	0.019
E	1.18	1.28	0.046	0.050
F	3.30	3.70	0.130	0.146
G	1.27	1.31	0.050	0.051
H	0.33	0.43	0.013	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)
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.

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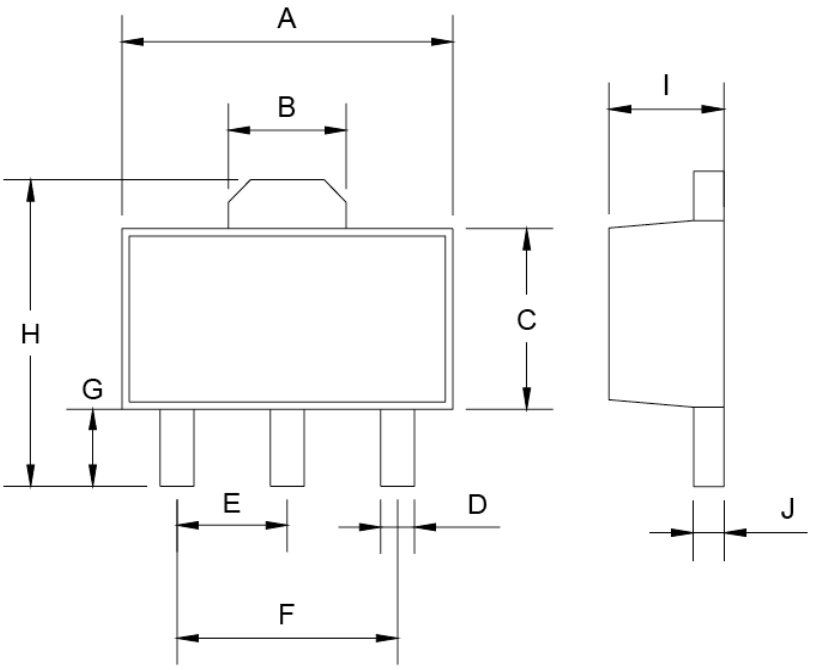
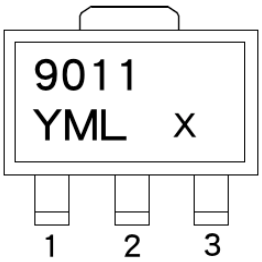
SOT-89 Mechanical Drawing



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



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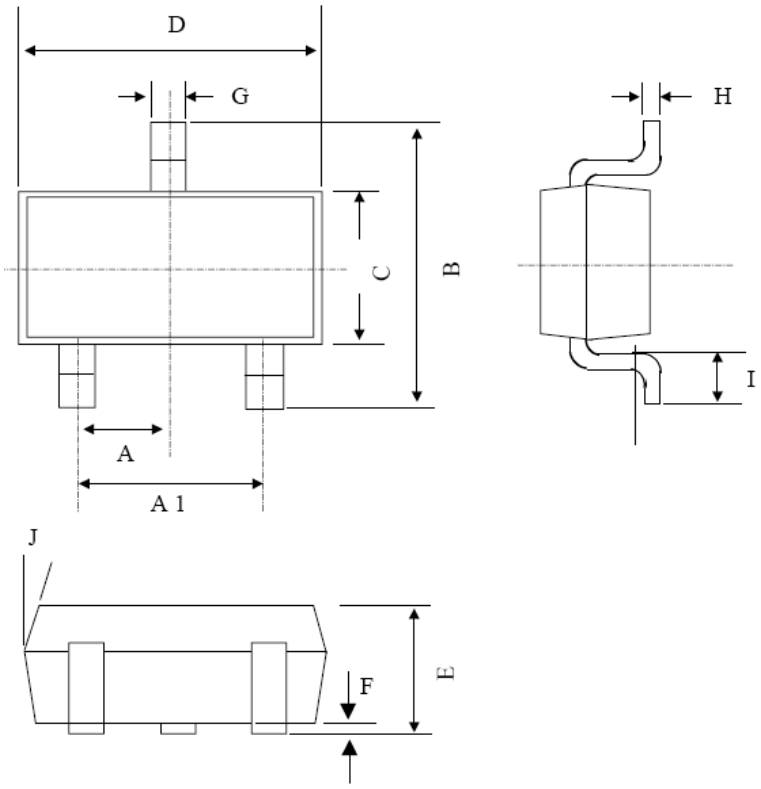
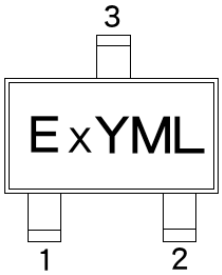
SOT-23 Mechanical Drawing



SOT-23 DIMENSION				
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

Marking Diagram



E = Product Code
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
A=1.5V, **D**=1.8V, **K**=2.5V, **P**=3.0V, **S**=3.3V, **5**=5.0V.

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