TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

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 0.38V@ 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

Ordering Information

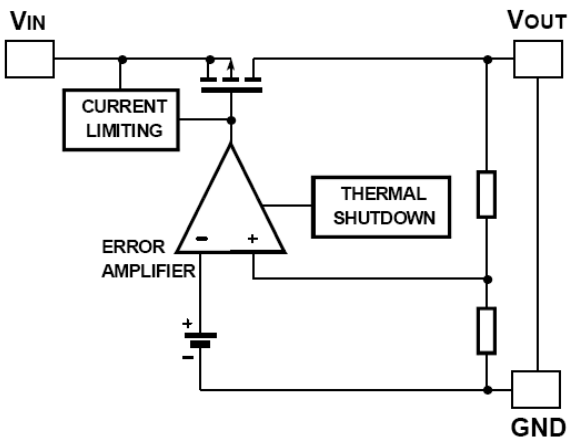
Part No.	Package	Packing
TS9011**x**CX RF	SOT-23	3Kpcs / 7” Reel
TS9011**x**CY RM	SOT-89	1Kpcs / 7” Reel
TS9011**x**CT A3	TO-92	2Kpcs / Ammo
TS9011**x**CT B0	TO-92	1Kpcs / Bulk

Note: Where **x** denotes voltage option, available are
A=1.5V, **D**=1.8V**, K**=2.5V, **N**=2.8V, **P**=3.0V,
S=3.3V, **5**=5V
Contact factory for additional voltage options.

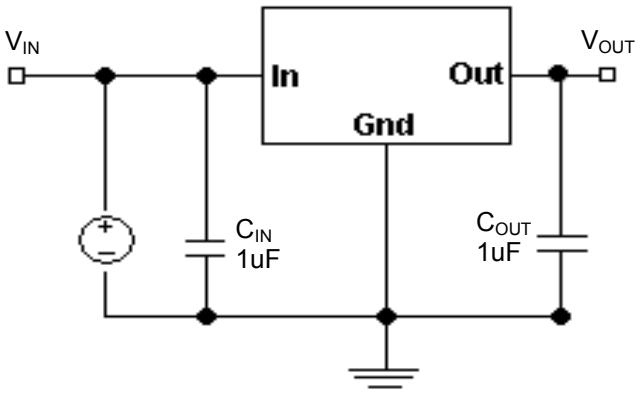
Applications

- 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



TS9011

250mA Low Quiescent Current CMOS LDO

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	
Operating Junction Temperature Range		T_J	-40 ~ +150	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260°C)			10	S

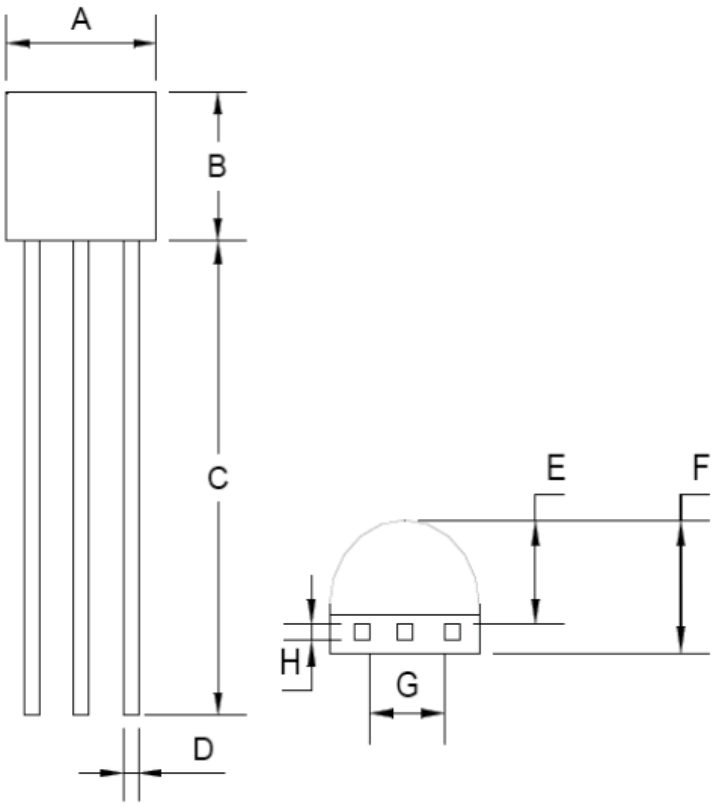
Notes:
a. Stress above the listed absolute rating may cause permanent damage to the device.

Electrical Characteristics (Ta = 25°C, unless otherwise noted)

Parameter	Conditions		Min	Typ	Max	Unit
Output Voltage	V_{IN}=Vo + 1V, o =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

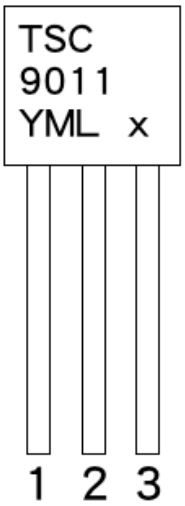
Notes:
1. Regulation is measured at constant junction temperature, using pulsed ON time.
2. Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V_{OUT} inside target value +/-2%.
3. Guaranteed by design.

TO-92 Mechanical Drawing



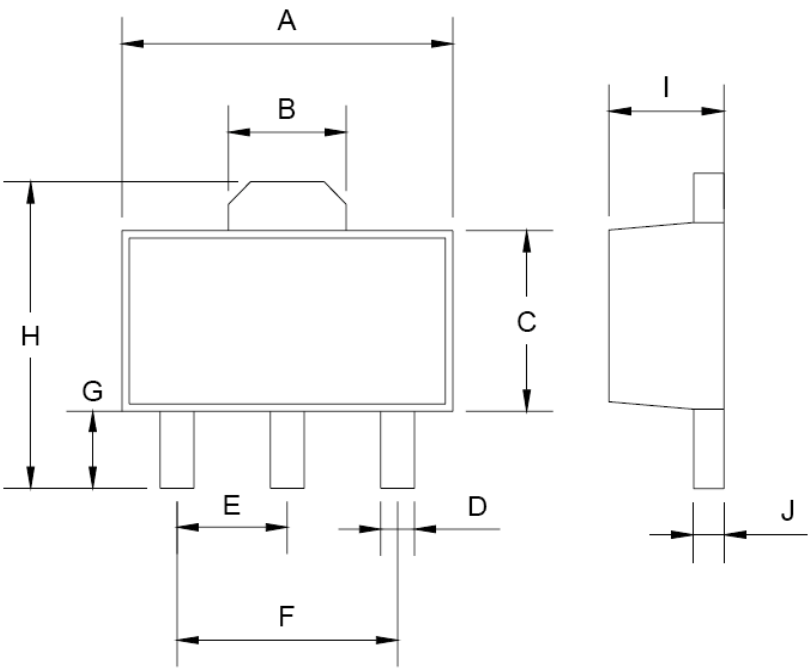
TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017

Marking Diagram



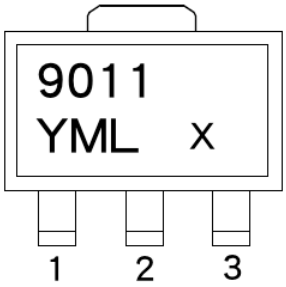
Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code
X = Fixed Output Voltage Code
A=1.5V, **D**=1.8V, **K**=2.5V, **P**=3.0V, **N**=2.8V, **S**=3.3V, **5**=5.0V.

SOT-89 Mechanical Drawing



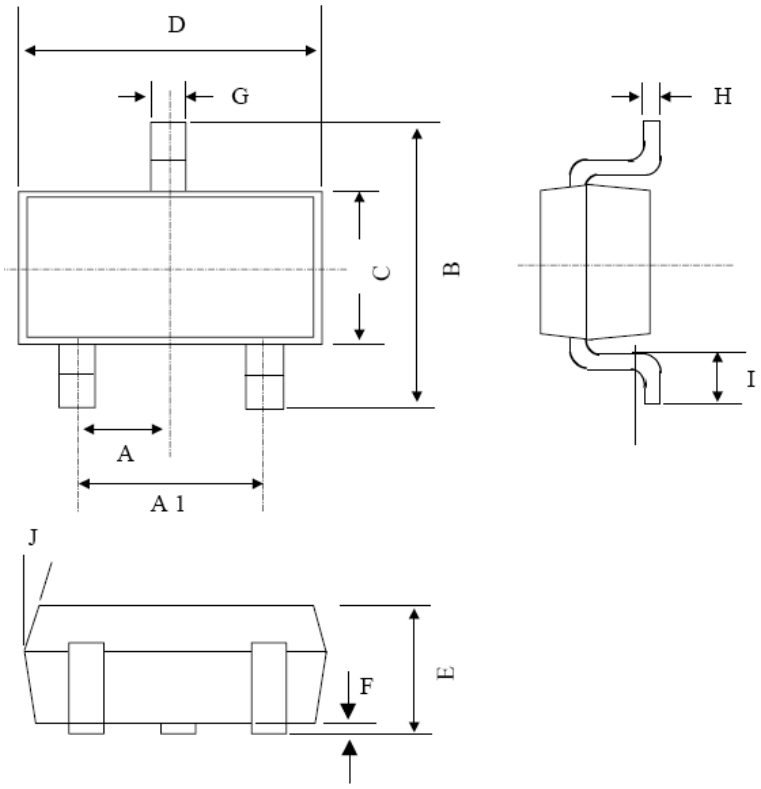
SOT-89 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.40	1.75	0.055	0.069
C	2.40	2.60	0.094	0.102
D	0.36	0.48	0.014	0.018
E	1.40	1.60	0.054	0.063
F	2.90	3.10	0.114	0.122
G	0.89	1.20	0.035	0.047
H	--	4.25	--	0.167
I	1.40	1.60	0.055	0.068
J	0.38	0.43	0.014	0.017

Marking Diagram



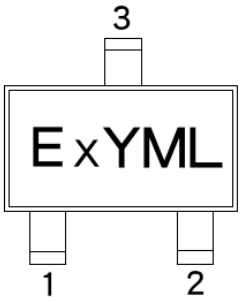
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SOT-23 Mechanical Drawing



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	5°	10°	5°	10°

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, **N**=2.8V, **S**=3.3V, **5**=5.0V.

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