

250mA Low Quiescent Current CMOS LDO

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 $1\mu\text{F}$ 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

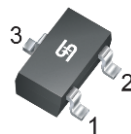
- Dropout voltage 0.4V (typ.) @ $I_o=250\text{mA}$
- Output current up to 250mA
- Low power consumption, $2\mu\text{A}$ (typ.)
- Output voltage $\pm 2\%$
- Internal current limit
- Thermal shutdown protection
- RoHS Compliant
- Halogen-Free

APPLICATION

- 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



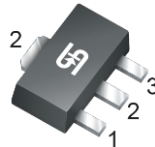
SOT-23



Pin Definition:

1. Ground
2. Output
3. Input

SOT-89

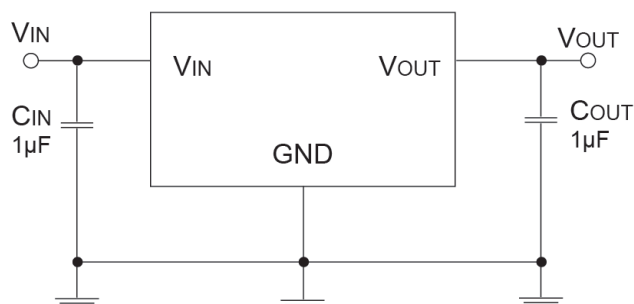


Pin Definition:

1. Ground
2. Input
3. Output

Notes: Moisture sensitivity level: level 3. Per J-STD-020

TYPICAL APPLICATION CIRCUIT



*Tantalum capacitor for Input & Output capacitor are recommended.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise specified) (Note 1)

PARAMETER	SYMBOL	LIMIT	UNIT
Input Supply Voltage	V_{IN}	12	V
Output Current	I_{OUT}	250	mA
Power Dissipation	SOT-23	0.30	W
	SOT-89	0.50	
Operating Ambient Temperature	T_{OPR}	-40 ~ +85	$^\circ\text{C}$
Junction Temperature Range	T_J	-40 ~ +150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Thermal Resistance - Junction to Ambient	SOT-23	333	$^\circ\text{C/W}$
	SOT-89	200	

Note: Measured with FR4 4-layer board having thermal via holes

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

PARAMETER	CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	V _{IN} =V _O + 1V, I _O =40mA,	TS90115	4.90	5.0	5.10	V
		TS9011S	3.23	3.3	3.36	
		TS9011K	2.45	2.5	2.55	
		TS9011D	1.76	1.8	1.83	
Maximum Output Current	V _{IN} =V _O +1V,		250	--	--	mA
Input Stability	V _O +1V ≤ V _{IN} ≤ V _O +2V, I _O =1mA		--	0.2	0.3	%
Load Regulation ^(Note1)	V _{IN} =V _O +1V, 1mA≤I _L ≤100mA	TS90115	--	40	80	mV
		TS9011S				
	V _{IN} =V _O +1V, 1mA≤I _L ≤80mA	TS9011K	--	40	90	
		TS9011D				
Dropout Voltage ^(Note 2)	I _O =250mA	TS90115	--	400	600	mV
	I _O =200mA	TS9011S	--	400	650	
	I _O =160mA	TS9011K	--	400	700	
	I _O =120mA	TS9011D	--	400	750	
Quiescent Current	V _{IN} =V _O +1V, I _O =0A		--	2	5	μA
Output Current Limit	V _{OUT} < 0.4V		--	400	--	mA
Power Supply Rejection Ratio	At f=100kHz, I _O =10mA,		--	30	--	dB
Output Voltage Temperature Coefficient ^(Note 3)			--	100	--	ppm/°C

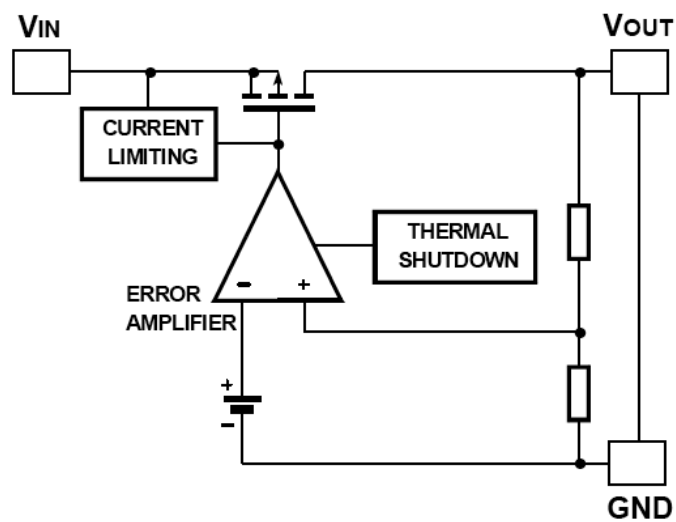
Note:

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 $\pm 2\%$.
3. Guaranteed by design.

ORDERING INFORMATION

OUTPUT VOLTAGE	PART NO.	PACKAGE	PACKING
1.8V	TS9011DCX RFG	SOT-23	3,000pcs / 7" Reel
2.5V	TS9011KCX RFG	SOT-23	3,000pcs / 7" Reel
	TS9011KCY RMG	SOT-89	1,000pcs / 7" Reel
3.3V	TS9011SCX RFG	SOT-23	3,000pcs / 7" Reel
	TS9011SCY RMG	SOT-89	1,000pcs / 7" Reel
5V	TS90115CY RMG	SOT-89	1,000pcs / 7" Reel

FUNCTION BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS CURVES ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

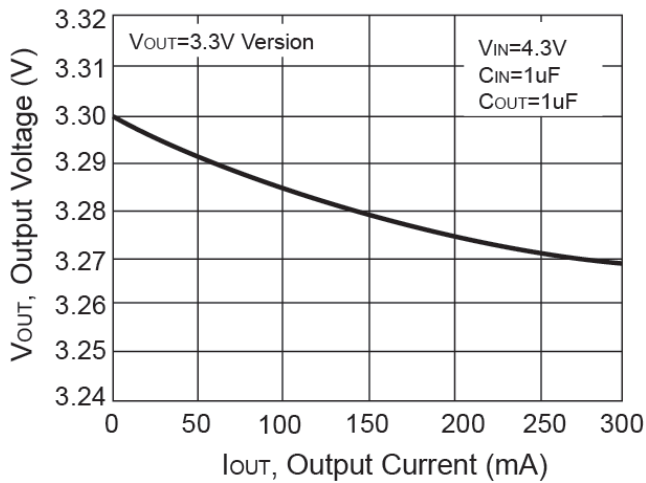


Figure 1. Output Voltage vs. Output Current

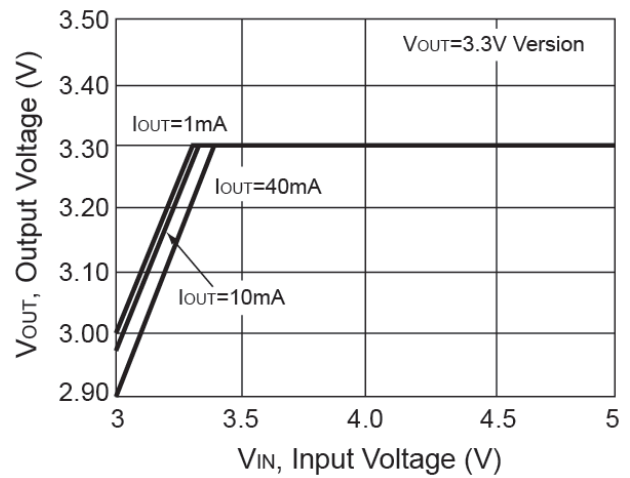


Figure 2. Output Voltage vs. Input Voltage

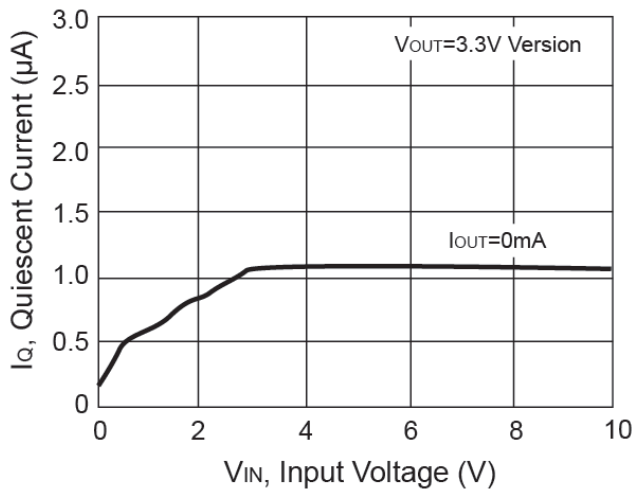


Figure 3. Quiescent Current vs. Input Voltage

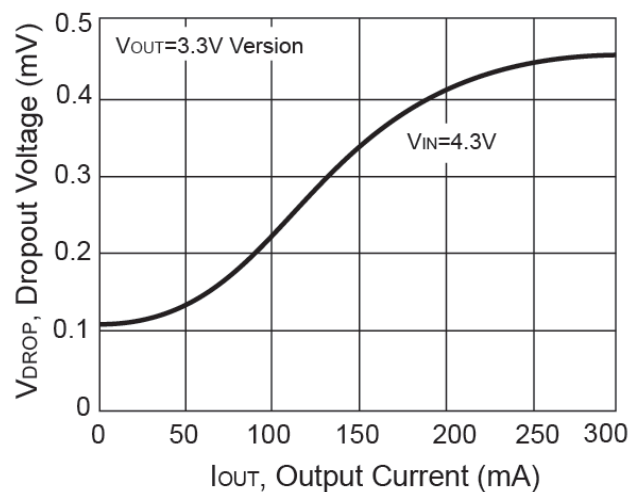
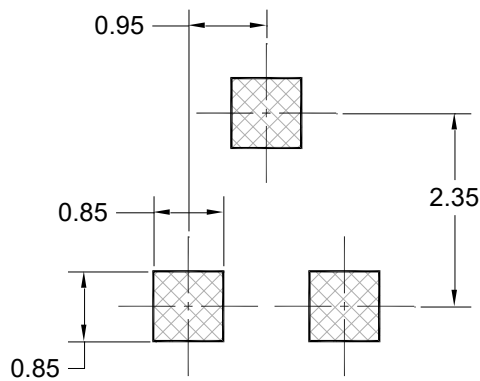
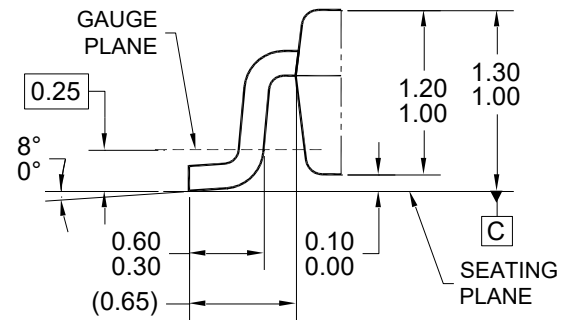
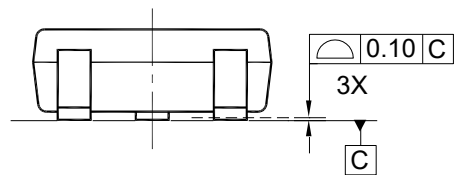
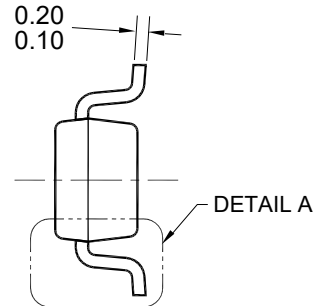
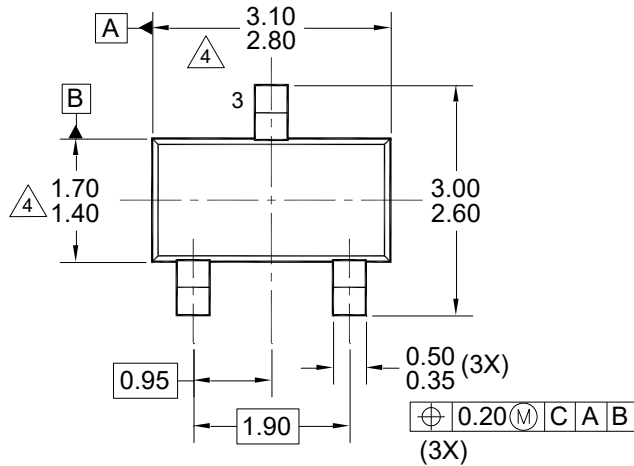


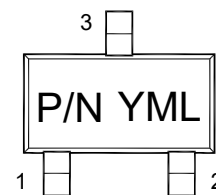
Figure 4. Short Circuit Current vs. Input Voltage

PACKAGE OUTLINE DIMENSIONS

SOT-23



SUGGESTED PAD LAYOUT



MARKING DIAGRAM

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: EIAJ ED-7500A, SC-59.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-SOT23IC-104 REV A.

P/N = PRODUCT DEVICE CODE

Y = YEAR CODE

M = MONTH CODE FOR HALOGEN FREE PRODUCT

O = JAN	P = FEB	Q = MAR	R = APR
S = MAY	T = JUN	U = JUL	V = AUG
W = SEP	X = OCT	Y = NOV	Z = DEC

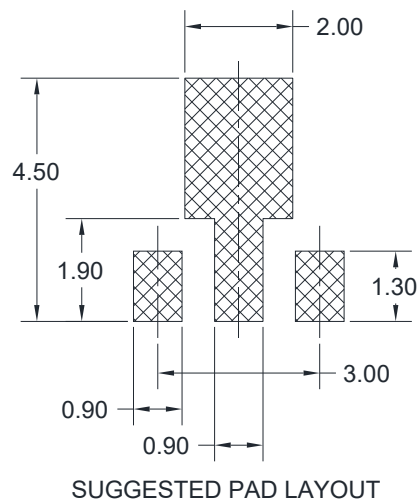
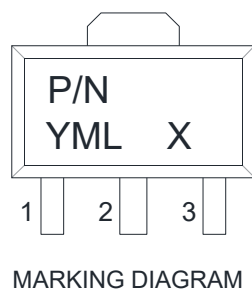
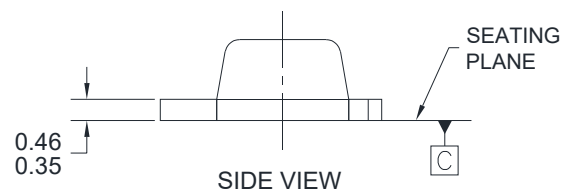
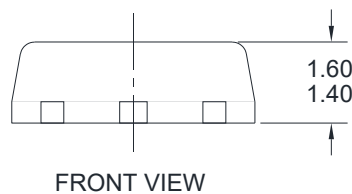
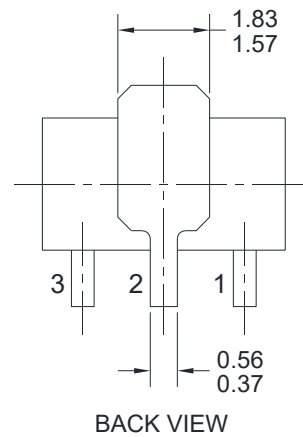
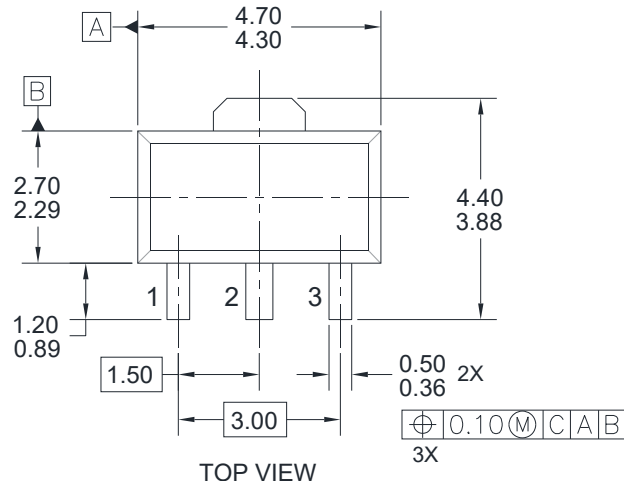
L = LOT CODE

Device code: E

Voltage code: D (1.8V), K (2.5V), S (3.3V)

PACKAGE OUTLINE DIMENSIONS

SOT-89



P/N = Product device code

Device code= 9011

Y = YEAR CODE

M = MONTH CODE FOR HALOGEN FREE PRODUCT

O = JAN P = FEB Q = MAR R = APR

S = MAY T = JUN U = JUL V = AUG

W = SEP X = OCT Y = NOV Z = DEC

L = LOT CODE

X = VOLTAGE CODE

Voltage Code= K (2.5V), S (3.3V), 5 (5V)

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEDEC TO-243, ISSUE C, VARIATION AA.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO REF: HQ2SD07-SOT89-024 REV A.

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