

## 500mA Low Quiescent Current CMOS LDO

### DESCRIPTION

TS9013 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 2.2 $\mu$ F or greater can be used as an output capacitor. TS9013 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

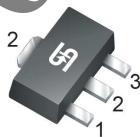
- Output current up to 500mA
- Low power consumption, 15 $\mu$ A(typ.) @ $V_O=5V$
- Output voltage  $\pm 2\%$
- Internal current limit
- Thermal shutdown protection
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC.
- Halogen-free according to IEC 61249-2-21

### APPLICATION

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



**SOT-89**



**Pin Definition:**

1. Ground
2. Input
3. Output

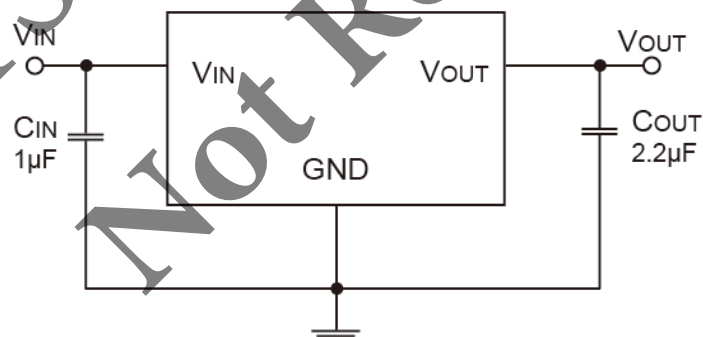
**SOT-223**



**Pin Definition:**

1. Input
2. Ground
3. Output

### TYPICAL APPLICATION CIRCUIT



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Input Supply Voltage	$V_{IN}$	12	V
Recommend Operating Input Voltage	$V_{IN}$	10	V
Output Current	$I_o$	500	mA
Power Dissipation (without heat sink)	SOT-89	0.5	W
	SOT-223	0.7	
Operating Junction Temperature Range	$T_J$	-40 ~ +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^\circ\text{C}$
Lead Soldering Temperature (260 $^\circ\text{C}$ )		5	S

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

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{IN}=V_O + 1V,$ $I_o = 1mA,$	TS90135	4.90	5.0	5.10	V
		TS9013S	3.23	3.3	3.36	
		TS9013K	2.45	2.5	2.55	
		TS9013D	1.76	1.8	1.83	
	$V_{IN}=V_O + 1V,$ $I_o = 1mA \sim 500mA$	TS90135	4.85	5.0	5.10	V
		TS9013S	3.20	3.3	3.36	
		TS9013K	2.42	2.5	2.55	
		TS9013D	1.74	1.8	1.83	
Maximum Output Current	$V_{IN}=V_O+1V,$	500	--	--	mA	
Input Stability	$V_O+1V \leq V_{IN} \leq V_O+2V, I_o=1mA$	--	0.2	0.3	%	
Load Regulation (Note1)	$V_{IN}=V_O+1V,$ $1mA \leq I_L \leq 500mA$	TS90135	--	40	80	mV
		TS9013S	--	40	90	
	$V_{IN}=V_O+1V,$ $1mA \leq I_L \leq 500mA$	TS9013K	--	40	90	
		TS9013D	--	40	90	
Dropout Voltage (Note 2)	$I_o=300mA$	TS90135	--	300	500	mV
		TS9013S	--	300	500	
	$I_o=500mA$	TS90135	--	500	600	
		TS9013S	--	500	600	
	$I_o=500mA$	TS9013K	--	600	850	
		TS9013D	--	600	850	
Quiescent Current	$V_{IN}=V_O+1V, I_o=0A$	--	15	25	$\mu\text{A}$	
Output Current Limit	$V_{OUT} \leq 0.4V$	550	--	--	mA	
Power Supply Rejection Ratio	At $f=100\text{KHz}, I_o=10mA$	--	30	--	dB	
Output Voltage Temperature Coefficient		--	100	--	ppm/ $^\circ\text{C}$	

**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 +/- 3%.

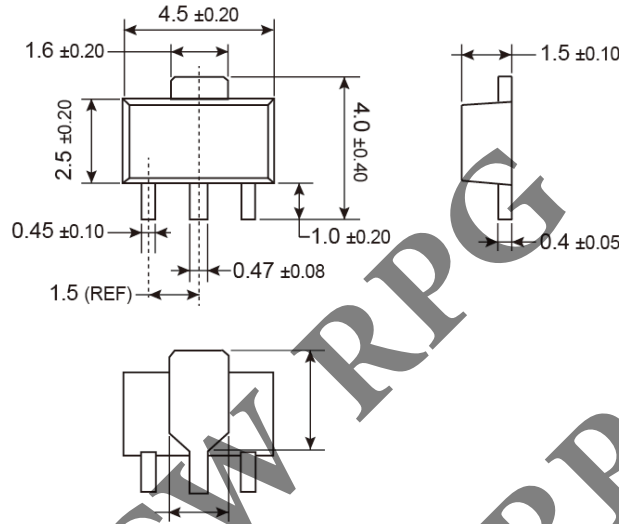
**ORDERING INFORMATION**

OUTPUT VOLTAGE	PART NO.	PACKAGE	PACKING
1.8V	TS9013DCW RPG	SOT-223	2,500pcs / 13" Reel
	TS9013DCY RMG	SOT-89	1,000pcs / 7" Reel
2.5V	TS9013KCW RPG	SOT-223	2,500pcs / 13" Reel
3.3V	TS9013SCW RPG	SOT-223	2,500pcs / 13" Reel
	TS9013SCY RMG	SOT-89	1,000pcs / 7" Reel
5V	TS90135CW RPG	SOT-223	2,500pcs / 13" Reel

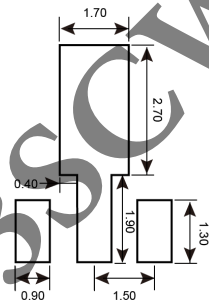
TS90135CW RPG  
 TS9013SCW RPG  
 Not Recommended

**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

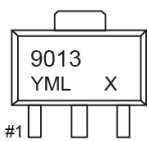
**SOT-89**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



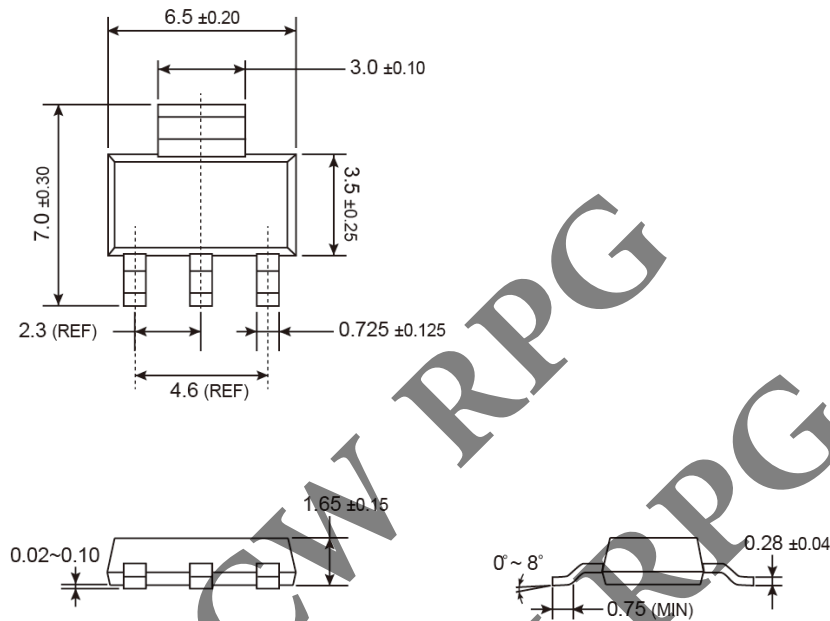
**MARKING DIAGRAM**



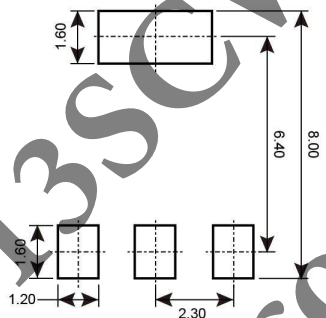
- Y = Year Code
- M = Month Code for Halogen Free Product
- O =Jan    P =Feb    Q =Mar    R =Apr
- S =May    T =Jun    U =Jul    V =Aug
- W =Sep    X =Oct    Y =Nov    Z =Dec
- L = Lot Code (1~9, A~Z)
- X = Fixed Output Voltage Code
- 18=1.8V, 33=3.3V, 50=5.0V..

**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

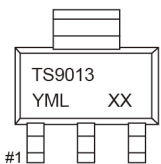
**SOT-223**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



**MARKING DIAGRAM**



- Y** = Year Code
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TS9013SCW RPG  
Not Recommended

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