

## LOW DROPOUT POSITIVE VOLTAGE REGULATOR

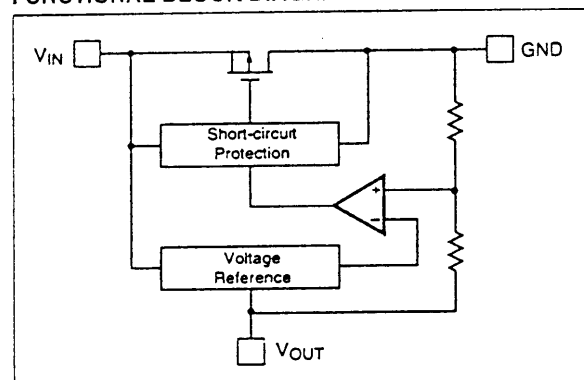
### FEATURES

- Very Low "Dropout" Voltage 120mV typ at 100mA  
380mV typ at 200mA
- High Output Current ..... 250mA ( $V_{OUT}=5.0V$ )
- High Accuracy Output Voltage .....  $\pm 2\%$   
( $\pm 1\%$  Semicustom Version)
- Wide Output Voltage Range ..... 2.1V-6.0V
- Low Power Consumption ..... 1.1 $\mu A$  ( $V_{OUT}=5.0V$ )  
(at NO LOAD)
- Good Temperature Stability .....  $\pm 100ppm/^{\circ}C$  Typ
- Good Voltage Regulation ..... 0.1%/V Typ
- Package Options ..... SOT-23-3 (150mW) Surface Mount  
SOT-89-3 (500mW) Surface Mount  
TO-92 Through-hole Package
- Short Circuit Protected
- Custom voltages available from 2.1V to 6.0V (in 0.1V steps).

### APPLICATIONS

- Battery-Powered Devices
- Cameras and Portable Video Equipment
- Pagers and Cellular Phones
- Solar-Powered Instruments
- Portable Instruments

### FUNCTIONAL BLOCK DIAGRAM



### GENERAL DESCRIPTION

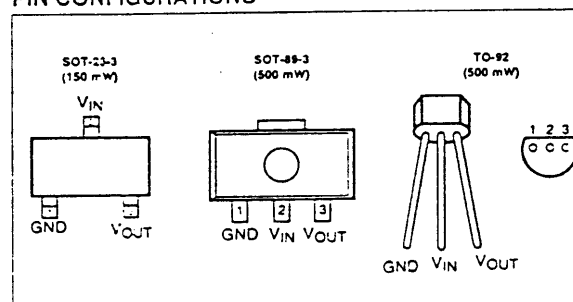
The TC55 Series is a collection of CMOS low dropout positive voltage regulators which can source up to 250mA of current with an extremely low input-output voltage differential of 380mV.

The low dropout voltage combined with the low current consumption of only 1.1  $\mu A$  makes this part ideal for battery operation. The low voltage differential (dropout voltage) extends battery operating lifetime. It also permits high currents in small packages when operated with minimum  $V_{IN} - V_{OUT}$  differentials.

The circuit also incorporates short-circuit protection to ensure maximum reliability.

**3**

### PIN CONFIGURATIONS



### ORDERING INFORMATION

**PART CODE** TC55 RP XX X X X XX XXX

Output Voltage: \_\_\_\_\_

Ex: 21 = 2.1V; 60 = 6.0V

Extra Feature Code: Fixed: 0 \_\_\_\_\_

Tolerance: \_\_\_\_\_

1 =  $\pm 1.0\%$  (custom)

2 =  $\pm 2.0\%$  (standard)

Temperature: E: - 40 $^{\circ}C$  to +85 $^{\circ}C$  \_\_\_\_\_

Package Type and Pin Count: \_\_\_\_\_

CB: SOT-23-3

MB: SOT-89-3

ZB: TO-92

Taping Direction: \_\_\_\_\_

723: Left Taping

713: Right Taping

no suffix: TO-92 Bulk

TC55 Series

ABSOLUTE MAXIMUM RATINGS

Item	Code	Ratings	Units
Input Voltage	$V_{IN}$	+12	V
Output Current	$I_{OUT}$	$P_d/(V_{IN} - V_{OUT})$	mA
Output Voltage	$V_{OUT}$	$(V_{SS} - 0.3)$ to $(V_{IN} + 0.3)$	V
Power Dissipation	SOT-23 SOT-89 TO-92	150 500 500	mW
Operating Temperature Range	$T_A$	-40 to +85	°C
Storage Temperature Range	$T_{stg}$	-65 to +150	°C

TC55RP50 ELECTRICAL CHARACTERISTICS:  $V_{OUT}(S) = 5.0V$ ,  $T_A = 25^\circ C$  (see REMARKS)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{OUT}(A)$	Output Voltage	$I_{OUT} = 40 \text{ mA}$ $V_{IN} = 6.0V$	x 0.98 4.90	$V_{OUT}(S)$ 5.0	x 1.02 5.10	V
$I_{OUTmax}$	Maximum Output Current	$V_{IN} = 6.0V$ , $V_{OUT}(A) \geq 4.5V$	250			mA
$\Delta V_{OUT}$	Load Regulation	$V_{IN} = 6.0V$ , $1 \text{ mA} \leq I_{OUT} \leq 100 \text{ mA}$		40	80	mV
$V_{dif}$	I/O Voltage Difference	$I_{OUT} = 100 \text{ mA}$ $I_{OUT} = 200 \text{ mA}$		120 380	300 600	mV
$I_{SS}$	Current Consumption	$V_{IN} = 6.0V$		1.1	3.0	$\mu A$
$\frac{V_{OUT}(A) - 100}{\Delta V_{IN} \cdot V_{OUT}(S)}$	Voltage Regulation	$I_{OUT} = 40 \text{ mA}$ $6.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
$V_{IN}$	Input Voltage				10.0	V
$\frac{\Delta V_{OUT}(A) \cdot 10^6}{V_{OUT}(S) \cdot \Delta T_A}$	Temperature Coefficient of Output Voltage	$I_{OUT} = 40 \text{ mA}$ $-40^\circ C \leq T_A \leq 85^\circ C$		$\pm 100$		ppm/°C

REMARKS:  $V_{OUT}(S)$ : Preset value of Output voltage  
 $V_{OUT}(A)$ : Actual value of Output voltage  
 $V_{dif}$ : Definition of I/O voltage difference =  $(V_{IN1} - V_{OUT}(A))$   
 $V_{OUT}(A)$ : Output Voltage when  $I_{OUT}$  is fixed and  $V_{IN} = V_{OUT}(S) + 1.0V$   
 $V_{IN1}$ : Input Voltage when the output voltage is 98%  $V_{OUT}(A)$

TC55RP40 ELECTRICAL CHARACTERISTICS:  $V_{OUT}(S) = 4.0V$ ,  $T_A = 25^\circ C$  (see REMARKS)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{OUT}(A)$	Output Voltage	$I_{OUT} = 30 \text{ mA}$ $V_{IN} = 5.0V$	x 0.98 3.92	$V_{OUT}(S)$ 4.0	x 1.02 4.08	V
$I_{OUTmax}$	Maximum Output Current	$V_{IN} = 5.0V$ , $V_{OUT}(A) \geq 3.6V$	200			mA
$\Delta V_{OUT}$	Load Regulation	$V_{IN} = 5.0V$ , $1 \text{ mA} \leq I_{OUT} \leq 100 \text{ mA}$		45	90	mV
$V_{dif}$	I/O Voltage Difference	$I_{OUT} = 100 \text{ mA}$ $I_{OUT} = 200 \text{ mA}$		170 400	330 630	mV
$I_{SS}$	Current Consumption	$V_{IN} = 5.0V$		1.0	2.9	$\mu A$
$\frac{\Delta V_{OUT}(A) - 100}{\Delta V_{IN} \cdot V_{OUT}(S)}$	Voltage Regulation	$I_{OUT} = 30 \text{ mA}$ $5.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
$V_{IN}$	Input Voltage				10.0	V
$\frac{\Delta V_{OUT}(A)}{V_{OUT}(S) \cdot \Delta T_A}$	Temperature Coefficient of Output Voltage	$I_{OUT} = 30 \text{ mA}$ $-40^\circ C \leq T_A \leq 85^\circ C$		$\pm 100$		ppm/°C

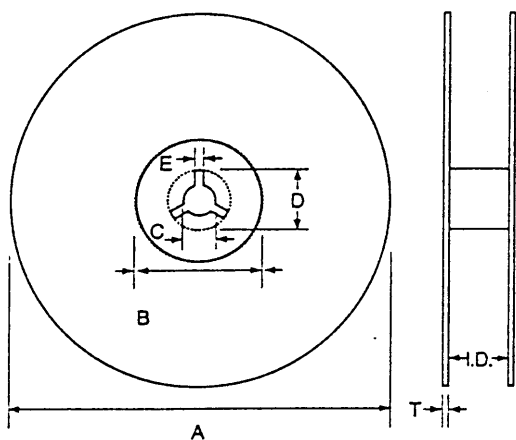
TC55 Series

TC55RP30 ELECTRICAL CHARACTERISTICS:  $V_{OUT(S)} = 3.0V$ ,  $T_A = 25^\circ C$  (see REMARKS)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{OUT(A)}$	Output Voltage	$I_{OUT} = 20\text{ mA}$ $V_{IN} = 4.0V$	$\times 0.98$ 2.94	$V_{OUT(S)}$ 3.0	$\times 1.02$ 3.06	V
$I_{OUTmax}$	Maximum Output Current	$V_{IN} = 4.0V$ , $V_{OUT(A)} \geq 2.7V$	150			mA
$\Delta V_{OUT}$	Load Regulation	$V_{IN} = 4.0V$ , $1\text{ mA} \leq I_{OUT} \leq 80\text{ mA}$		45	90	mV
$V_{dl}$	I/O Voltage Difference	$I_{OUT} = 80\text{ mA}$ $I_{OUT} = 160\text{ mA}$		180 400	360 700	mV
$I_{SS}$	Current Consumption	$V_{IN} = 4.0V$		0.9	2.8	$\mu A$
$\frac{V_{OUT(A)} - 100}{\Delta V_{IN} - V_{OUT(S)}}$	Voltage Regulation	$I_{OUT} = 20\text{ mA}$ $4.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
$V_{IN}$	Input Voltage				10.0	V
$\frac{\Delta V_{OUT(A)} \cdot 10^6}{\Delta T_A \cdot V_{OUT(S)}}$	Temperature Coefficient of Output Voltage	$I_{OUT} = 20\text{ mA}$ $-40^\circ C \leq T_A \leq 85^\circ C$		$\pm 100$		ppm/ $^\circ C$

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TAPING REEL



SOT-23-3: 3,000 pcs/Reel  
SOT-89-3: 1,000 pcs/Reel  
TO-92: 2,000 pcs/Reel

TAPING REEL

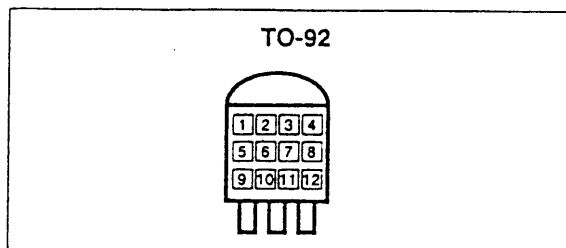
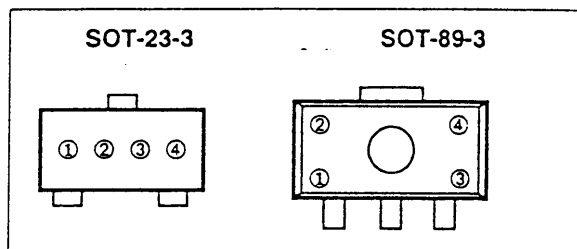
	SOT-23		SOT-89		TO-92
A	178	$\pm 1.0$	178	$\pm 2.0$	360
B	60	$\pm 2.0$	80	$\pm 1.0$	80
C	13	$\pm 0.2$	13	$\pm 0.05$	30
D	22	$\pm 0.5$	21	$\pm 0.5$	45
E	2	$\pm 0.2$	2	$\pm 0.2$	2
I.D.	8.5	$\pm 1.5$	14.0	$+1/-1.5$	43
T	1.5	$\pm 0.3$	2.0	$\pm 0.5$	5

(unit = mm)

Reel Materials: SOT-23/SOT-89: Plastic  
TO-92: Cardboard + Plastic Hub

## TC55 Series

## MARKING



① represents first voltage digit

2 3 4 5 6

ex: 3.X = ○ ○ ③ ○

② first voltage decimal (0-9)

ex: 3.4 = ○ ○ ③ ④

③ represents tolerance/feature code

1 =  $\pm 1.0\%$  (custom)

2 =  $\pm 2.0\%$  (standard)

④ represents assembly lot number

①, ② & ③ = 55R<sub>1</sub> (fixed)

④ = output voltage polarity : P : positive

⑤ = first voltage digit (2-6)

⑥ = first voltage decimal (0-9)

⑦ = extra feature code : fixed : 0

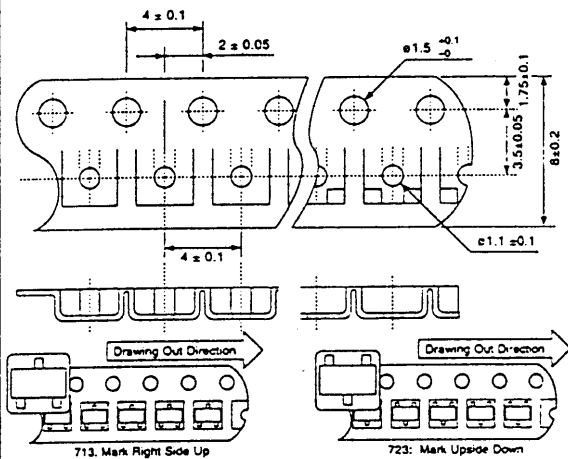
⑧ = regulation accuracy

1 =  $\pm 1.0\%$  (custom), 2 =  $\pm 2.0\%$  (standard)

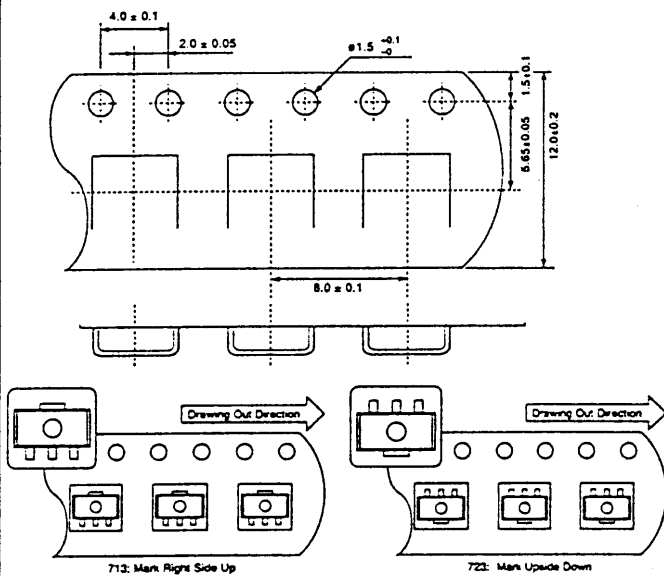
⑨, ⑩, ⑪ & ⑫ = assembly lot number

TAPING FORM

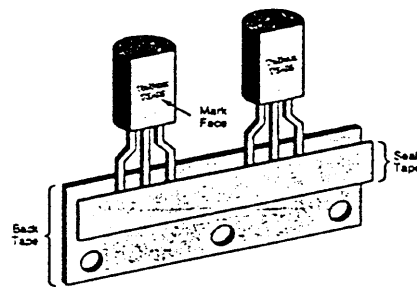
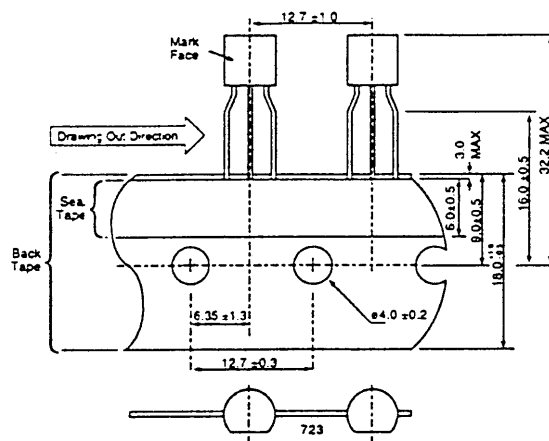
SOT-23-3



SOT-89-3



TO-92



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