

LOW DROPOUT POSITIVE VOLTAGE REGULATOR

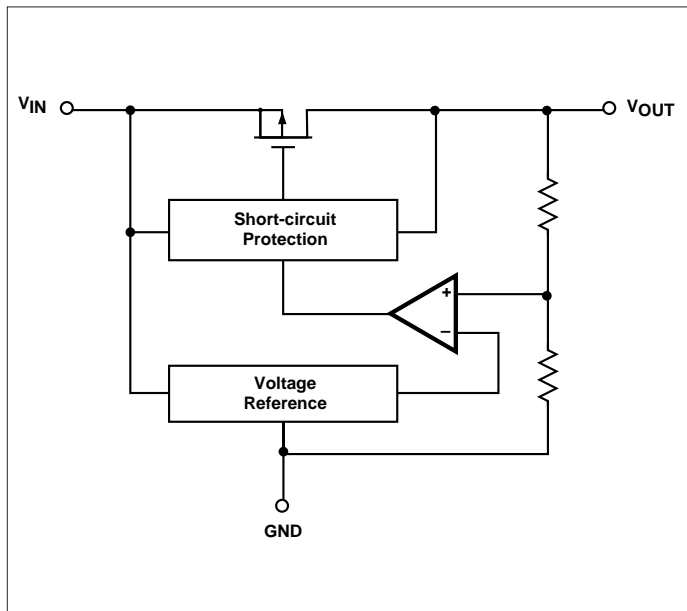
FEATURES

- 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 μ A (Typ.)
- Low Temperature Drift ± 100 ppm/ $^{\circ}C$ Typ
- Excellent Line Regulation 0.2%/V Typ
- Package Options SOT-23A-3
SOT-89-3
TO-92
- Short Circuit Protected
- Standard 3.0V, 3.3V and 5.0V Output Voltages
- 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
- Consumer Products

FUNCTIONAL BLOCK DIAGRAM



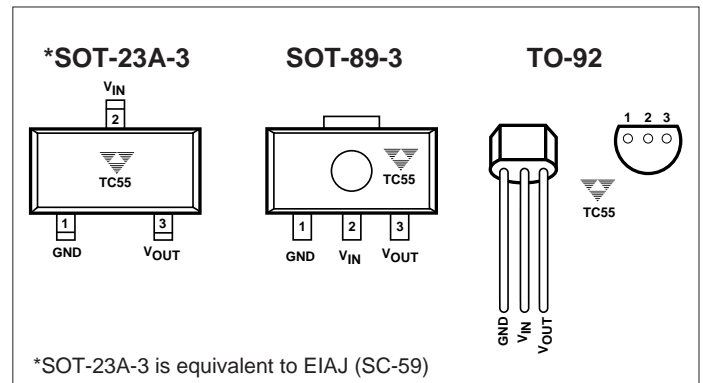
GENERAL DESCRIPTION

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 μ 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.

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-23A-3 (Equivalent to EIAJ (SC-59))
MB: SOT-89-3
ZB: TO-92-3

Taping Direction: _____
Standard Taping
Reverse Taping
No suffix: TO-92 Bulk

LOW DROPOUT POSITIVE VOLTAGE REGULATOR

TC55 Series

ABSOLUTE MAXIMUM RATINGS*

| Item | Code | Ratings | Units |
|---|------------------------------|--------------------------------------|------------------|
| Input Voltage | V_{IN} | +12 | V |
| Output Current | I_{OUT} | $Pd/(V_{IN} - V_{OUT})$ | mA |
| Output Voltage | V_{OUT} | $(V_{SS} - 0.3)$ to $(V_{IN} + 0.3)$ | V |
| Power Dissipation: ($T_A \leq 70^\circ\text{C}$) | SOT-23A-3 SOT-89 TO-92 | Pd 240 400 440 | mW |
| Operating Temperature Range | T_A | - 40 to +85 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | - 65 to +150 | $^\circ\text{C}$ |

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|---|---|-----------|------------|------------|-----------------------|
| $V_{OUT(A)}$ | Output Voltage | $I_{OUT} = 40\text{mA}$ $V_{IN} = 6.0\text{V}$ | — 4.90 | — 5.0 | — 5.10 | V |
| I_{OUTmax} | Maximum Output Current | $V_{IN} = 6.0\text{V}$, $V_{OUT(A)} \geq 4.5\text{V}$ | 250 | — | — | mA |
| ΔV_{OUT} | Load Regulation | $V_{IN} = 6.0\text{V}$, $1\text{mA} \leq I_{OUT} \leq 100\text{mA}$ | — | 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 | $V_{IN} = 6.0\text{V}$ | — | 1.1 | 3.0 | μA |
| $\frac{V_{OUT(A)} \cdot 100}{\Delta V_{IN} \cdot V_{OUT(S)}}$ | Voltage Regulation | $I_{OUT} = 40\text{mA}$ $6.0\text{V} \leq V_{IN} \leq 10.0\text{V}$ | — | 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 | $I_{OUT} = 40\text{mA}$ $-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ | — | ± 100 | — | ppm/ $^\circ\text{C}$ |
| | Long Term Stability | $T_A = 125^\circ\text{C}$, 1000 Hours | — | 0.5 | — | % |

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 $V_{IN} = V_{OUT(S)} + 1.0\text{V}$
 V_{IN1} : Input Voltage when the output voltage is 98% $V_{OUT(A)}$

TC55RP40 ELECTRICAL CHARACTERISTICS: $V_{OUT(S)} = 5.0\text{V}$, $T_A = 25^\circ\text{C}$ unless otherwise specified (see REMARKS).

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|---|---|-----------|------------|------------|-----------------------|
| $V_{OUT(A)}$ | Output Voltage | $I_{OUT} = 40\text{mA}$ $V_{IN} = 5.0\text{V}$ | — 3.92 | — 4.0 | — 4.08 | V |
| I_{OUTmax} | Maximum Output Current | $V_{IN} = 5.0\text{V}$, $V_{OUT(A)} \geq 3.6\text{V}$ | 200 | — | — | mA |
| ΔV_{OUT} | Load Regulation | $V_{IN} = 5.0\text{V}$, $1\text{mA} \leq I_{OUT} \leq 100\text{mA}$ | — | 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 | $V_{IN} = 5.0\text{V}$ | — | 1.0 | 2.9 | μA |
| $\frac{\Delta V_{OUT(A)} \cdot 100}{\Delta V_{IN} \cdot V_{OUT(S)}}$ | Voltage Regulation | $I_{OUT} = 40\text{mA}$ $5.0\text{V} \leq V_{IN} \leq 10.0\text{V}$ | — | 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 | $I_{OUT} = 40\text{mA}$ $-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ | — | ± 100 | — | ppm/ $^\circ\text{C}$ |
| | Long Term Stability | $T_A = 125^\circ\text{C}$, 1000 Hours | — | 0.5 | — | % |

LOW DROPOUT POSITIVE VOLTAGE REGULATOR

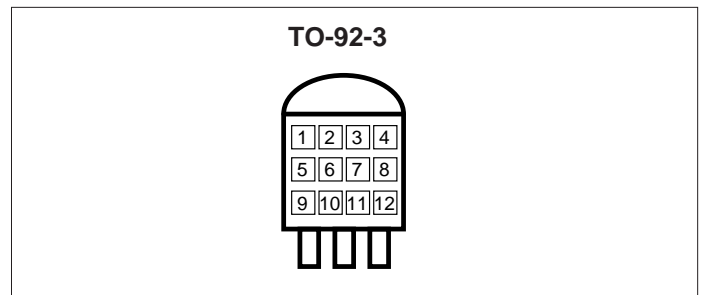
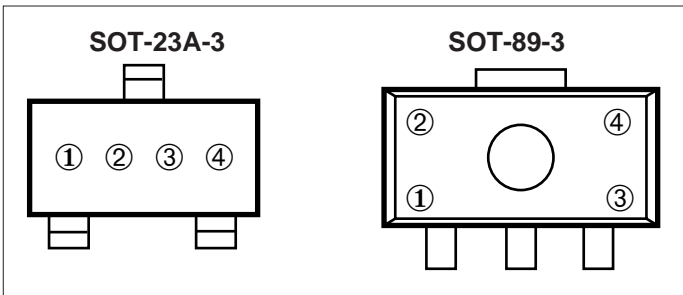
TC55 Series

TC55RP30 ELECTRICAL CHARACTERISTICS: $V_{OUT(S)} = 5.0V$, $T_A = 25^\circ C$ unless otherwise specified (see REMARKS).

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|---|--|-----------|------------|------------|-----------------|
| $V_{OUT(A)}$ | Output Voltage | $I_{OUT} = 40mA$ $V_{IN} = 4.0V$ | — 2.94 | — 3.0 | — 3.06 | V |
| I_{OUTmax} | Maximum Output Current | $V_{IN} = 4.0V$, $V_{OUT(A)} \geq 2.7V$ | 150 | — | — | mA |
| ΔV_{OUT} | Load Regulation | $V_{IN} = 4.0V$, $1 mA \leq I_{OUT} \leq 80mA$ | — | 45 | 90 | mV |
| V_{dif} | I/O Voltage Difference | $I_{OUT} = 80mA$ $I_{OUT} = 160mA$ | — — | 180 400 | 360 700 | mV |
| I_{SS} | Current Consumption | $V_{IN} = 4.0V$ | — | 0.9 | 2.8 | μA |
| $\frac{V_{OUT(A)} \cdot 100}{\Delta V_{IN} \cdot V_{OUT(S)}}$ | Voltage Regulation | $I_{OUT} = 40mA$ $4.0V \leq V_{IN} \leq 10.0V$ | — | 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 | $I_{OUT} = 40mA$ $-40^\circ C \leq T_A \leq 85^\circ C$ | — | ± 100 | — | ppm/ $^\circ C$ |
| | Long Term Stability | $T_A = 125^\circ C$, 1000 Hours | — | 0.5 | — | % |

*Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields. Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability.

MARKING



① represents first voltage digit

2 3 4 5 6
ex: 3.xV = ③①①①①

② represents first decimal place voltage (x.0 - x.9)

A = x.0 E = x.4 L = x.8
B = x.1 F = x.5 M = x.9
C = x.2 H = x.6
D = x.3 K = x.7

ex: 3.4V = ③②E①①①

③ represents Polarity
0 = Positive (fixed)

④ represents assembly lot number

①, ②, ③ & ④ = 55RP (fixed)

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