

VOLTAGE DETECTOR

FEATURES

- Precise Detection Thresholds Standard $\pm 2.0\%$
Custom $\pm 1.0\%$
- Small Packages SOT-23A-3, SOT-89, TO-92
- Low Current Drain Typ. $1\mu\text{A}$
- Wide Detection Range 2.1V to 6.0V
- Wide Operating Voltage Range 1.5V to 10V

APPLICATIONS

- Battery Voltage Monitoring
- Microprocessor Reset
- System Brownout Protection
- Switching Circuit in Battery Backup
- Level Discriminator

PIN CONFIGURATIONS



FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The TC54 Series are CMOS voltage detectors, suited especially for battery-powered applications because of their extremely low $1\mu\text{A}$ operating current and small surface-mount packaging. Each part is laser trimmed to the desired threshold voltage which can be specified from 2.1V to 6.0V, in 0.1V steps.

The device includes a comparator, low-current high-precision reference, laser-trimmed divider, hysteresis circuit and output driver. The TC54 is available with either an open-drain or complementary output stage.

In operation, the TC54's output (V_{OUT}) remains in the logic HIGH state as long as V_{IN} is greater than the specified threshold voltage (V_{DET}). When V_{IN} falls below V_{DET}, the output is driven to a logic LOW. V_{OUT} remains LOW until V_{IN} rises above V_{DET} by an amount V_{HYST}, whereupon it resets to a logic HIGH.

ORDERING INFORMATION

PART CODE TC54 V X XX X X X XX XXX

Output form: _____

N = Nch Open Drain
C = CMOS Output

Detected 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°C to $+85^\circ\text{C}$ _____

Package Type and Pin Count: _____

CB: SOT-23A-3*, MB: SOT-89-3, ZB: TO-92-3

Taping Direction: _____

Standard Taping
Reverse Taping
No suffix: TO-92 Bulk

*SOT-23A-3 is equivalent to EIAJ (SC-59).

VOLTAGE DETECTOR

TC54

TIMING CHART



DESCRIPTION OF OPERATION

Refer to the Timing Chart below. In normal steady-state operation, when $V_{IN} > V_{DET}^-$, the output will be at a logic high. In the case of the TC54V, this is an open-drain condition. If and when the input falls below V_{DET}^- , the output will pull down (Logic 0) to V_{SS} . Generally, V_{OUT} can pull down to within 0.5V of V_{SS} at rated output current and input voltage. (See the Electrical Characteristics section).

The output, V_{OUT} , will stay valid until the input voltage falls below the Minimum Operating Voltage, $V_{IN(MIN)}$, of 1.5V. Below this minimum operating voltage, the output is undefined. During power-up or anytime V_{IN} has fallen below $V_{IN(MIN)}$, V_{OUT} will remain undefined until V_{IN} rises above $V_{IN(MIN)}$, at which time the output will become valid. V_{OUT} will be in its active low state while $V_{IN(MIN)} < V_{IN} < V_{DET}^+$. ($V_{DET}^+ = V_{DET}^- + V_{HYST}$). If and when the input rises above V_{DET}^+ , the output will assume its inactive state. (High for TC54VC, open-drain for TC54VN).

APPLICATIONS

Refer to TelCom Semiconductor Application Note #2, *Using the TC54 Voltage Detector*.

MARKING



① = output (Nch or CMOS) plus first voltage digit

	2	3	4	5	6
Nch	M	N	P	R	S
CMOS	C	D	E	F	H

ex: CMOS 3.x = ①○○○

② = first voltage decimal (0-9)

ex: CMOS 3.4 = ①④○○

③ & ④ = assembly lot number



①, ② & ③ = 54_ (fixed)

④ = output (C = CMOS, N = Nch)

⑤ = first voltage digit (2-6)

⑥ = first voltage decimal (0-9)

⑦ = extra feature code : fixed : 0

⑧ = detecting accuracy

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

⑨, ⑩, ⑪ & ⑫ = assembly lot number