

## Voltage Detector

### Features

- Highly Accurate:  $\pm 2\%$
- Low Power Consumption:  $1.0\mu\text{A}$ , Typ.
- Detect Voltage Range: 1.6V to 6.0V and 7.7V
- Operating Voltage: 1.5V to 10.0V
- Output Configuration: Open-Drain or CMOS
- Space-Saving 5-Pin SOT-23A Package

### Typical Applications

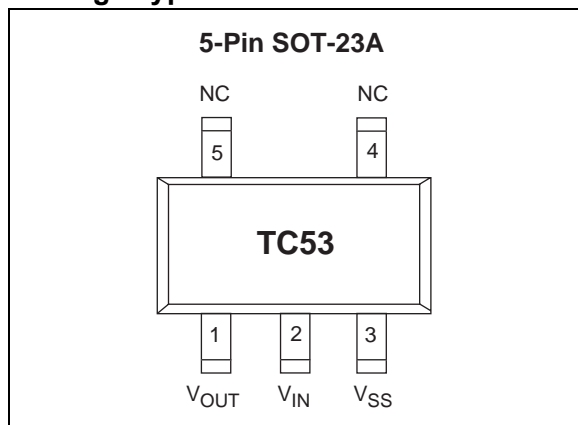
- Microprocessor Reset Circuits
- Battery Life Monitors and Recharge Voltage Monitors
- Memory Battery Backup Circuitry
- Power-On Reset Circuits
- Power Failure Detection
- Delay Circuitry

### Device Selection Table

| Part Number     | Package       | Temp. Range    |
|-----------------|---------------|----------------|
| TC53-xxxxxxxxxx | 5-Pin SOT-23A | -40°C to +85°C |

Other output voltages are available. Please contact Microchip Technology Inc. for details.

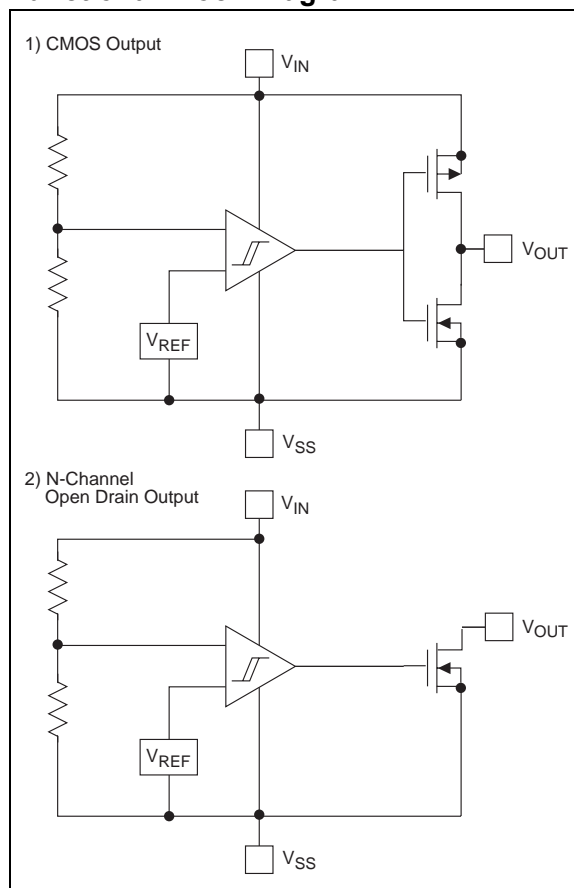
### Package Type



### General Description

The TC53 is a low power voltage detector. Typical supply current consumption is only  $1\mu\text{A}$  at an input voltage of 2V. The voltage detection threshold setting is factory-programmed and guaranteed to  $\pm 2\%$  accuracy. Threshold settings are available over a range of 1.6V to 6.0V. The TC53 has both complementary (CMOS) and open drain (NMOS) output configuration options. TC53 is the ideal voltage detector for precision applications in which small size, low installed cost, high accuracy and low supply current consumption are critical.

### Functional Block Diagram



## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings\*

|                                   |                                    |
|-----------------------------------|------------------------------------|
| Input Voltage .....               | +12V                               |
| Output Current .....              | 50mA                               |
| Output Voltage .....              | $V_{IN} + 0.3V$ to $V_{SS} - 0.3V$ |
| Power Dissipation                 |                                    |
| 5-Pin SOT-23A .....               | 240mW                              |
| Operating Temperature Range ..... | -40°C to +85°C                     |
| Storage Temperature Range .....   | -40°C to +125°C                    |

\*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 operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

### TC53 ELECTRICAL SPECIFICATIONS

| Electrical Characteristics: $T_A = 25^\circ\text{C}$ , unless otherwise specified. Note 1, Note 2. |   |                      |                      |                      |                       |   |
|--|---|----------------------|----------------------|----------------------|-----------------------|---|
| Symbol   | Parameter   | Min                  | Typ                  | Max                  | Units                 | Test Conditions   |
| $V_{DF}$   | Detect Voltage  | $V_T \times 0.98$    | $V_T \pm 0.5\%$      | $V_T \times 1.02$    | V                     | Note 3  |
| $V_{HYS}$  | Hysteresis Range  | $V_{DF} \times 0.02$ | $V_{DF} \times 0.05$ | $V_{DF} \times 0.08$ | V                     |   |
| $I_{SS}$   | Supply Current  | —                    | 0.9                  | 2.6                  | $\mu\text{A}$         | $V_{IN} = 1.5V$<br>$V_{IN} = 2.0V$<br>$V_{IN} = 3.0V$<br>$V_{IN} = 4.0V$<br>$V_{IN} = 5.0V$                         |
| $V_{IN}$   | Operating Voltage                                       | 1.5                  | —                    | 10.0                 | V                     | $V_{DF} = 2.1$ to $6.0V$  |
| $I_{OUT}$  | Output Current  | —                    | 2.2                  | —                    | mA                    | N-ch; $V_{DS} = 0.5V$ , $V_{IN} = 1.0V$<br>$V_{IN} = 2.0V$<br>$V_{IN} = 3.0V$<br>$V_{IN} = 4.0V$<br>$V_{IN} = 5.0V$ |
|  |   | —                    | 7.7                  | —                    |                       |   |
|  |   | —                    | 10.1                 | —                    |                       |   |
|  |   | —                    | 11.5                 | —                    |                       |   |
|  |   | —                    | 13.0                 | —                    |                       |   |
|  |   | —                    | -10.0                | —                    |                       | P-ch; $V_{DS} = 2.1V$ , $V_{IN} = 8.0V$<br>(CMOS Output)  |
| $\frac{\Delta V_{DF}}{(\Delta T_{OPR} V_{DF})}$  | Temperature Characteristics                             | —                    | $\pm 100$            | —                    | ppm/ $^\circ\text{C}$ |   |
| $t_{DLY}$  | Delay Time<br>( $V_{DR} \rightarrow V_{OUT}$ Inversion) | —                    | —                    | 0.2                  | msec                  |   |

- Note**
- 1: An additional resistor between the  $V_{IN}$  pin and the supply voltage may alter the electrical characteristics due to the increasing values of  $V_{DR}$ .
  - 2: The power consumption during power-start to output being stable (release operation) is  $2\mu\text{A}$  greater than it is after that period (completion of release operation) because of rush current in the delay circuit.
  - 3:  $V_T$  is the factory-programmed voltage detection threshold.

## 2.0 PIN DESCRIPTIONS

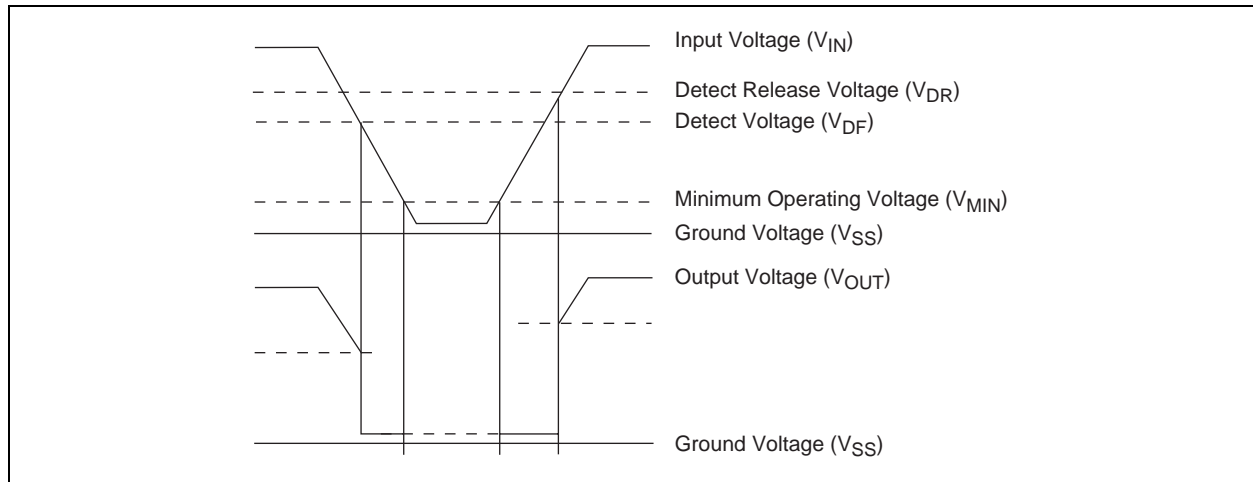
The descriptions of the pins are listed in Table 2-1.

**TABLE 2-1: PIN FUNCTION TABLE**

| Pin No.<br>(5-Pin SOT-23A) | Symbol     | Description           |
|----------------------------|------------|-----------------------|
| 1                          | $V_{OUT1}$ | Output.               |
| 2                          | $V_{IN}$   | Supply voltage input. |
| 3                          | $V_{SS}$   | Ground terminal.      |
| 4                          | NC         | Not connected.        |
| 5                          | NC         | Not connected.        |

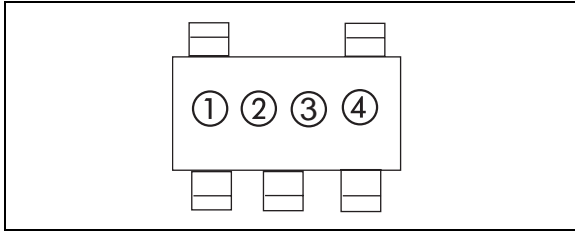
## 3.0 DETAILED DESCRIPTION

**FIGURE 3-1: TIMING DIAGRAM**



## 4.0 PACKAGING INFORMATION

### 4.1 Package Marking Information



① represents output configuration and first integer of voltage

| Symbol | Output | Voltage |
|--------|--------|---------|
| A      | CMOS   | 0.      |
| B      | CMOS   | 1.      |
| C      | CMOS   | 2.      |
| D      | CMOS   | 3.      |
| E      | CMOS   | 4.      |
| F      | CMOS   | 5.      |
| H      | CMOS   | 6.      |

| Symbol | Output | Voltage |
|--------|--------|---------|
| K      | Nch    | 0.      |
| L      | Nch    | 1.      |
| M      | Nch    | 2.      |
| N      | Nch    | 3.      |
| P      | Nch    | 4.      |
| R      | Nch    | 5.      |
| S      | Nch    | 6.      |

② represents first decimal of output voltage

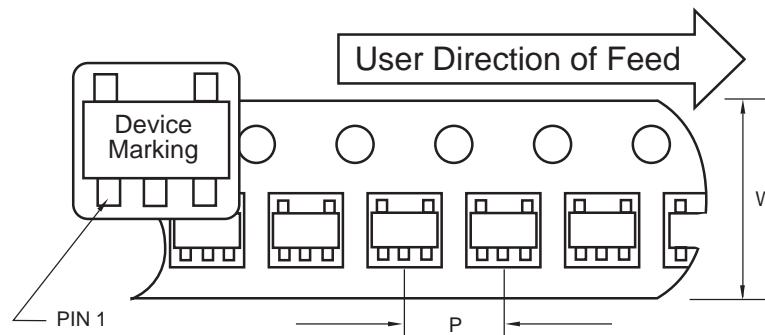
| Symbol | Voltage |
|--------|---------|
| 0      | .0      |
| 1      | .1      |
| 2      | .2      |
| 3      | .3      |
| 4      | .4      |
| 5      | .5      |
| 6      | .6      |
| 7      | .7      |
| 8      | .8      |
| 9      | .9      |

③ represents delay function and delay time  
3 = no delay function

④ represents assembly lot code

## 4.2 Taping Form

### Component Taping Orientation for 5-Pin SOT-23A (EIAJ SC-74A) Devices



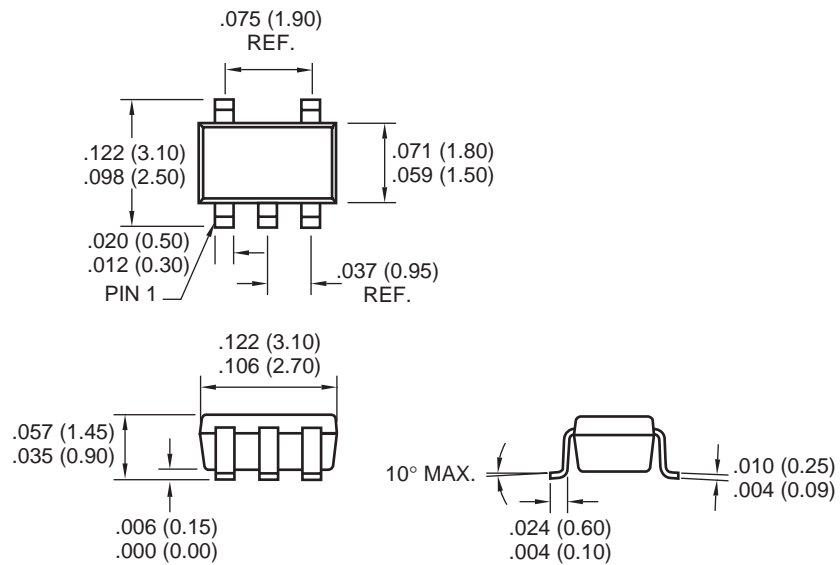
Standard Reel Component Orientation  
 TR Suffix Device  
 (Mark Right Side Up)

Carrier Tape, Number of Components Per Reel and Reel Size

| Package       | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------------|-------------------|-----------|--------------------|-----------|
| 5-Pin SOT-23A | 8 mm              | 4 mm      | 3000               | 7 in      |

## 4.3 Package Dimensions

### SOT-23A-5



Dimensions: inches (mm)

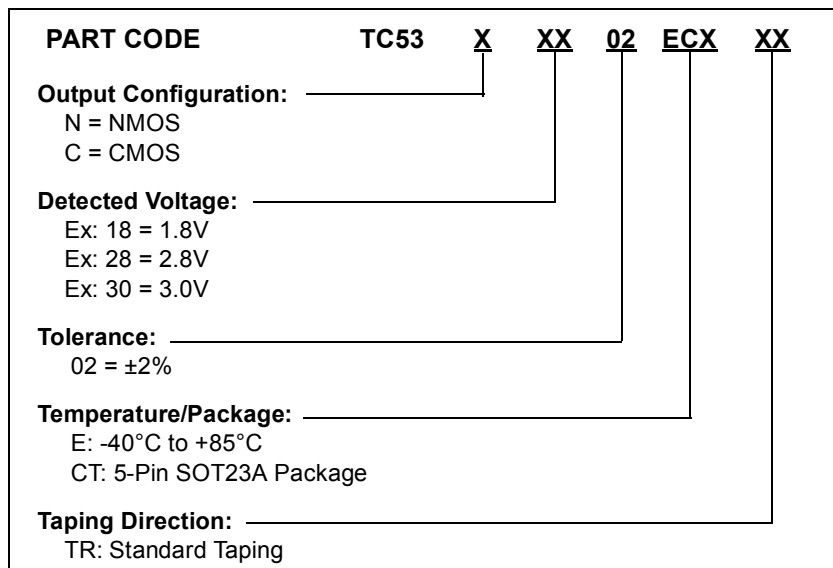
# TC53

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NOTES:

## PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.



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Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

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