

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

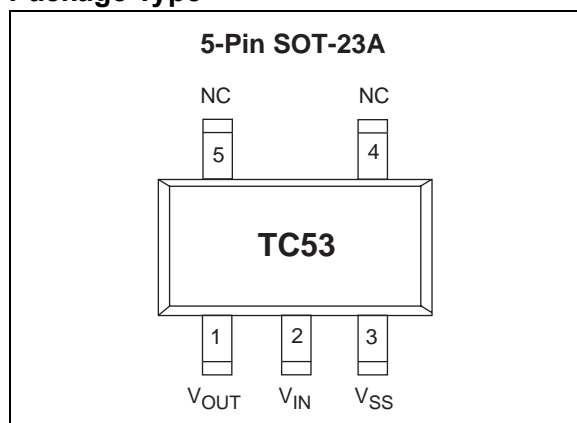
- Microprocessor Reset Circuits
- Battery Life Monitors and Recharge Voltage Monitors
- Memory Battery Backup Circuitry
- Power-On Reset Circuits
- Power Failure Detection
- Delay Circuitry

Device Selection Table

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

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

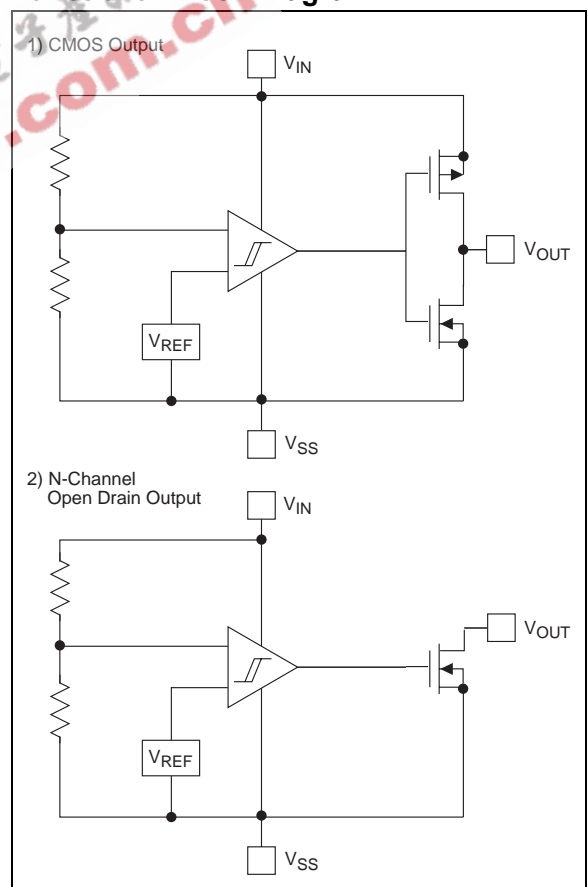
Package Type



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



TC53

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 1.0 1.3 1.6 2.0	2.6 3.0 3.4 3.8 4.2	μA	$V_{IN} = 1.5V$ $V_{IN} = 2.0V$ $V_{IN} = 3.0V$ $V_{IN} = 4.0V$ $V_{IN} = 5.0V$
V_{IN}	Operating Voltage	1.5	—	10.0	V	$V_{DF} = 2.1$ to $6.0V$
I_{OUT}	Output Current	—	2.2 7.7 10.1 11.5 13.0	—	mA	N-ch; $V_{DS} = 0.5V$, $V_{IN} = 1.0V$ $V_{IN} = 2.0V$ $V_{IN} = 3.0V$ $V_{IN} = 4.0V$ $V_{IN} = 5.0V$
			-10.0	—		P-ch; $V_{DS} = 2.1V$, $V_{IN} = 8.0V$ (CMOS Output)
$\frac{\Delta V_{DF}}{(\Delta T_{OPR} V_{DF})}$	Temperature Characteristics	—	± 100	—	ppm/°C	
t_{DLY}	Delay Time ($V_{DR} \rightarrow V_{OUT}$ 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

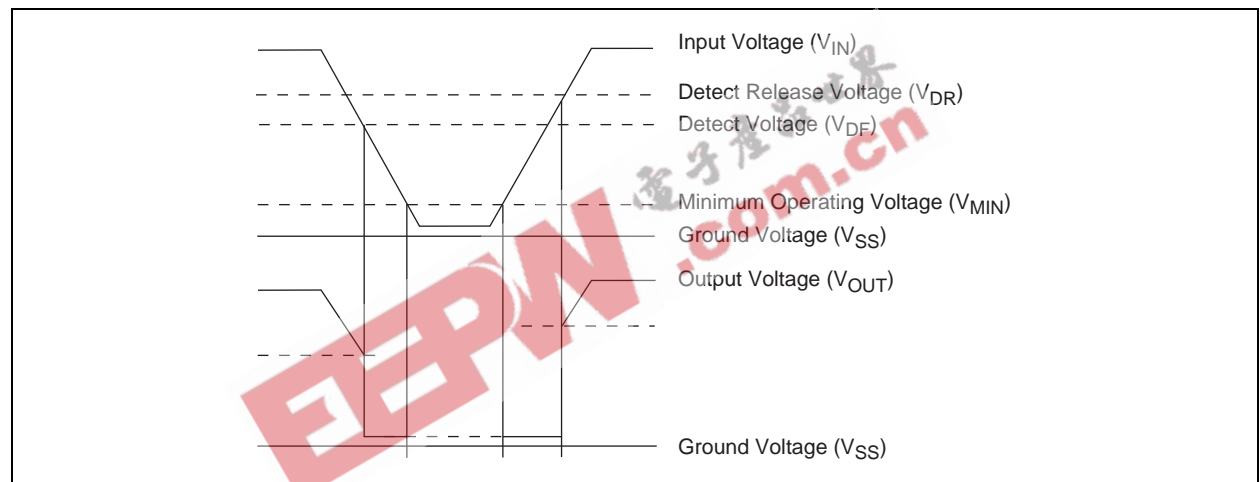
The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin No. (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

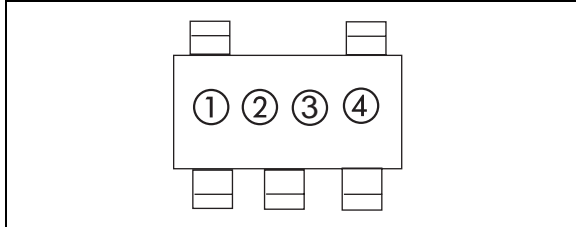
FIGURE 3-1: TIMING DIAGRAM



TC53

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

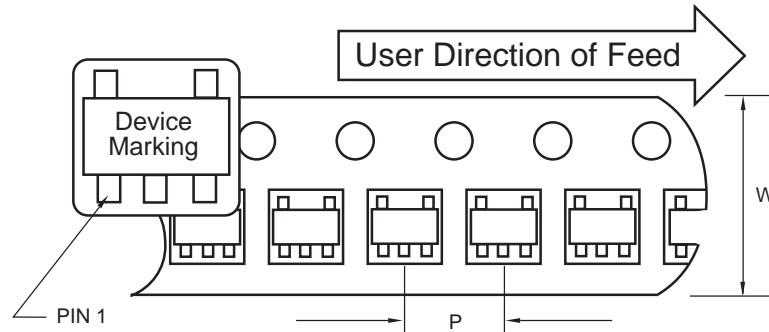
Symbol	Voltage
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

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



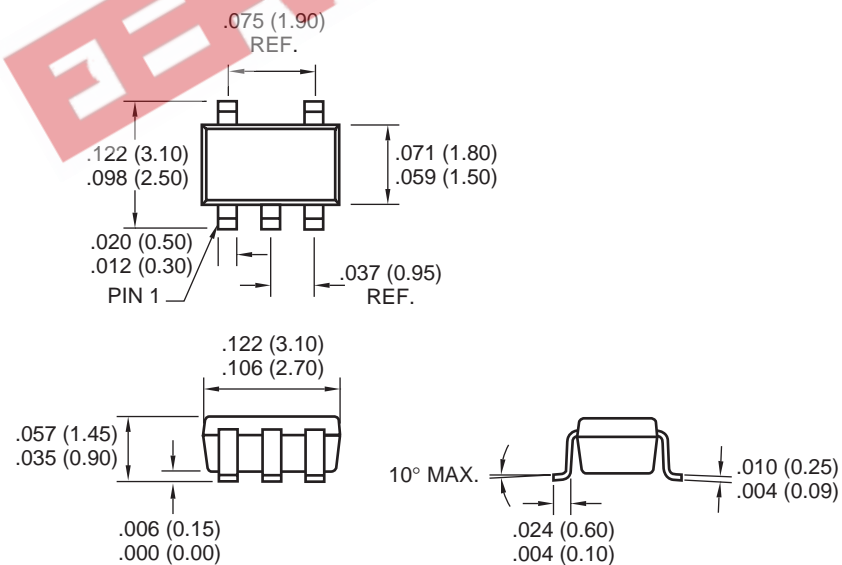
Standard Reel Component Orientation
 TR Suffix Device
 (Mark Right Side Up)

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

NOTES:

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PRODUCT IDENTIFICATION SYSTEM

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

PART CODE	TC53	X	XX	02	ECX	XX
Output Configuration:	_____					
N = NMOS						
C = CMOS						
Detected Voltage:	_____					
Ex: 18 = 1.8V						
Ex: 28 = 2.8V						
Ex: 30 = 3.0V						
Tolerance:	_____					
02 = ±2%						
Temperature/Package:	_____					
E: -40°C to +85°C						
CT: 5-Pin SOT23A Package						
Taping Direction:	_____					
TR: Standard Taping						

Sales and Support

Data Sheets

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:

1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (480) 792-7277
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