Not recommended for new designs – Please use MCP111/2

TC53

Voltage Detector

Features:

- Highly Accurate: ±2%
- Low-Power Consumption: 1.0μA, 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

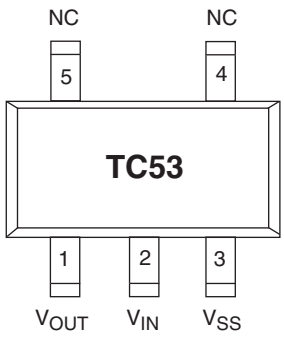
Device Selection Table

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

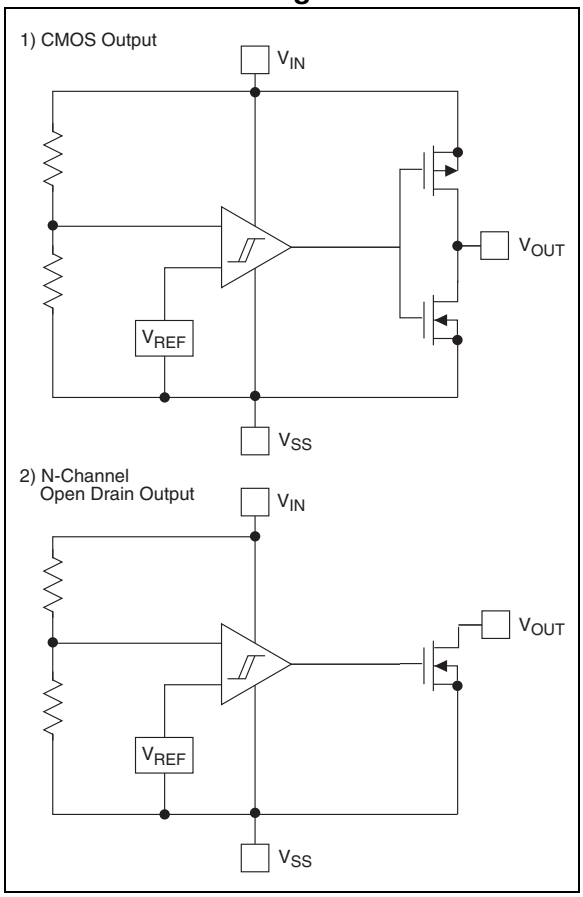
5-Pin SOT-23A



General Description:

The TC53 is a low-power voltage detector. Typical supply current consumption is only 1μA at an input voltage of 2V. The voltage detection threshold setting is factory-programmed and ensured to ±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



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1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Input Voltage .....+12V
Output Current .....50 mA
Output Voltage.....V_{IN} + 0.3V to V_{SS} – 0.3V
Power Dissipation
5-Pin SOT-23A .....240 mW
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°C, unless otherwise specified.
Note 1, **Note 2**.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{DF}	Detect Voltage	V_T x 0.98	V_T ±0.5%	V_T x 1.02	V	**Note 3**
V_{HYS}	Hysteresis Range	V_{DF} x 0.02	V_{DF} x 0.05	V_{DF} x 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)
ΔV_{DF}/ (ΔT_{OPR} V_{DF})	Temperature Characteristics	—	±100	—	ppm/°C	
t_{DLY}	Delay Time ($V_{DR} \rightarrow V_{OUT}$ Inversion)	—	—	0.2	ms	

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 2µA 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.

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2.0 PIN DESCRIPTIONS

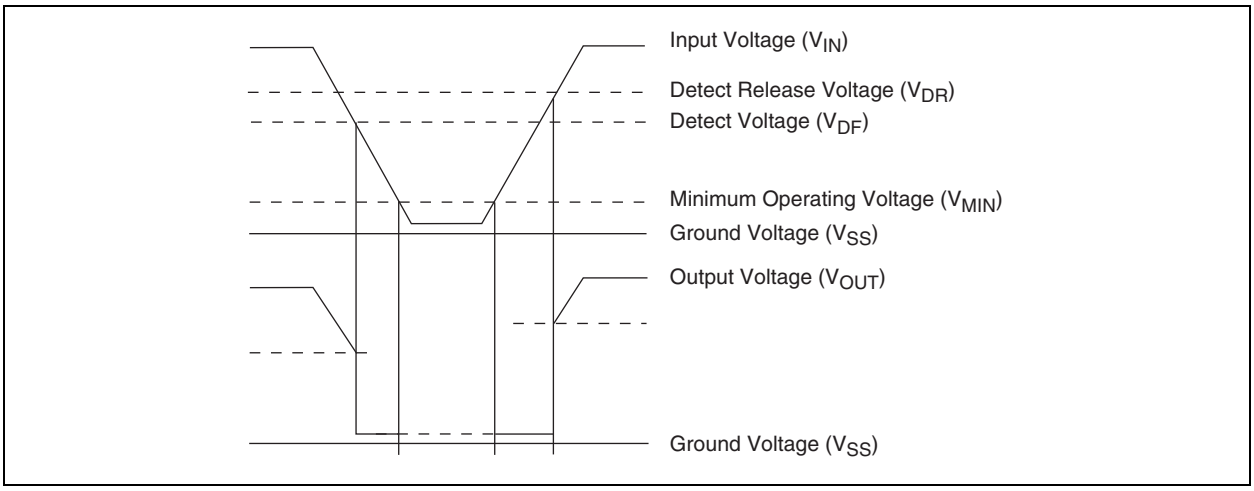
The descriptions of the pins are listed in Table 2-1.

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



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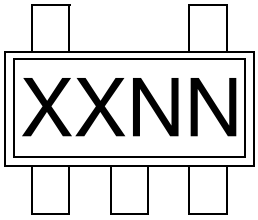
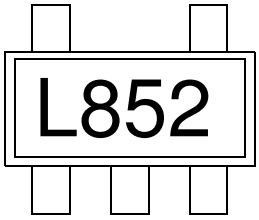
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

5-Lead SOT-23A



Example



Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

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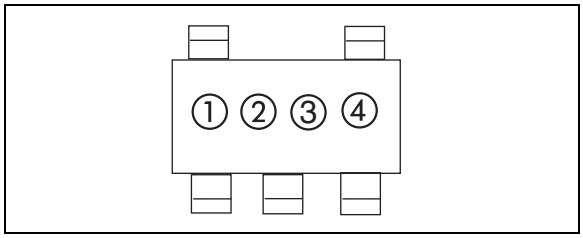


① represents output configuration and first integer of voltage

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

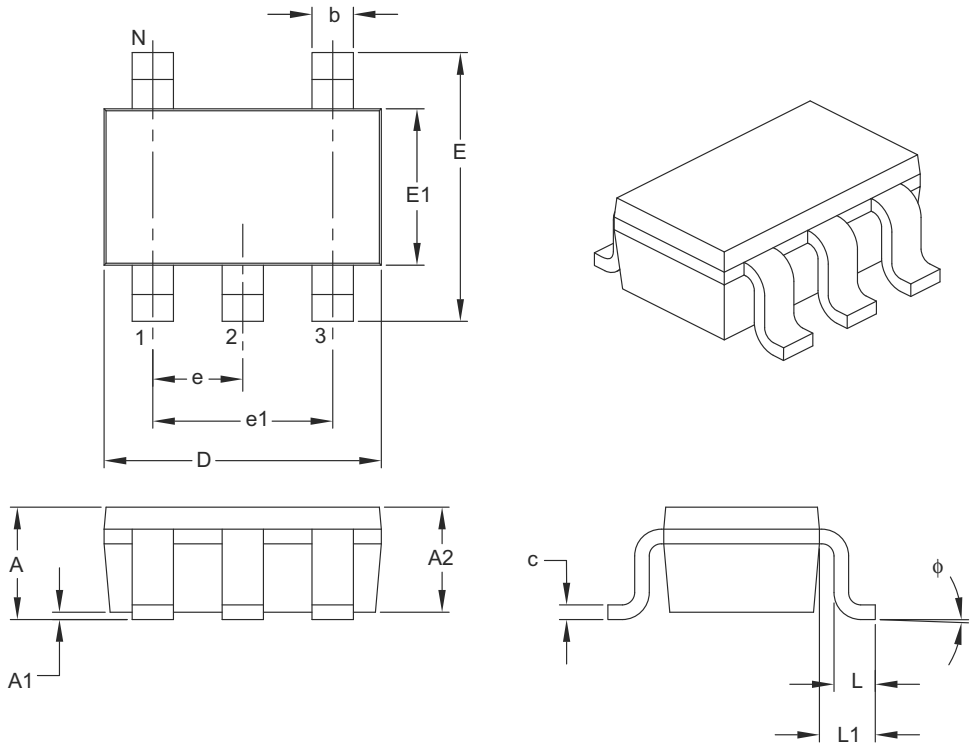
Symbol	Voltage
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

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

④ represents assembly lot code

5-Lead Plastic Small Outline Transistor (CT) [SOT-23]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		5	
Lead Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.90	–	1.45
Molded Package Thickness	A2	0.89	–	1.30
Standoff	A1	0.00	–	0.15
Overall Width	E	2.20	–	3.20
Molded Package Width	E1	1.30	–	1.80
Overall Length	D	2.70	–	3.10
Foot Length	L	0.10	–	0.60
Footprint	L1	0.35	–	0.80
Foot Angle	ϕ	0°	–	30°
Lead Thickness	c	0.08	–	0.26
Lead Width	b	0.20	–	0.51

Notes:

1. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-091B

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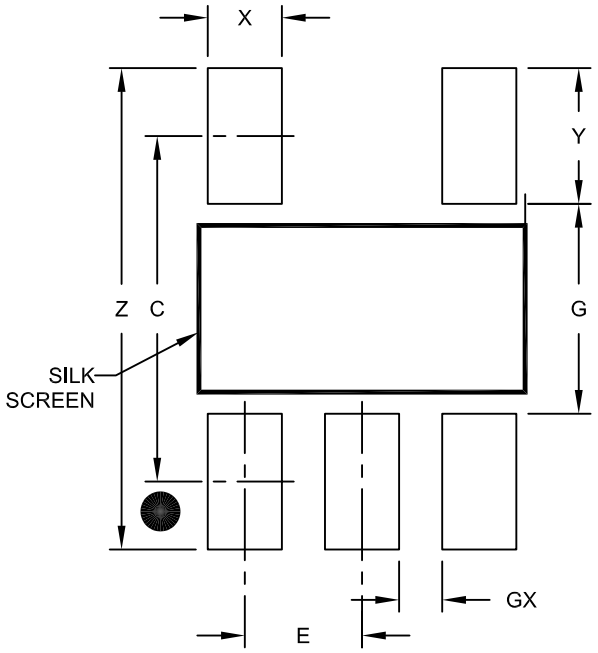
5-Lead Plastic Small Outline Transistor (CT) [SOT-23]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.95 BSC	
Contact Pad Spacing	C		2.80	
Contact Pad Width (X5)	X			0.60
Contact Pad Length (X5)	Y			1.10
Distance Between Pads	G	1.70		
Distance Between Pads	GX	0.35		
Overall Width	Z			3.90

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2091A

NOTES:

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APPENDIX A: REVISION HISTORY

Revision D (August 2011)

- Changed status from active to end-of-life (EOL)

Revision C (July 2002

- Undocumented changes

Revision B (May 2002)

- Undocumented changes

Revision A (March 2001)

- Original Release of this Document.

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 NO.	X	XX	XX	XX	XX	XX
Device	Output Configuration	Detected Voltage	Tolerance	Temperature Range	Package	Tapping Direction

Device:	TC53: Low-power voltage detector
Output Configuration:	N = NMOS C = CMOS
Detected Voltage:	22 = 2.2V 27 = 2.7V 29 = 2.9V
Tolerance:	02 = ±2%
Temperature Range:	E = -40°C to+125°C(Extended)
Package:	CT: 5-Pin SOT-23A Package
Taping Direction:	TR: Standard Taping

Examples:

a) TC53C2202ECTTR: CMOS, 2.2V, ±2% tolerance, Extended Temperature, 5LD SOT-23A, Standard Tapping.

b) TC53N2702ECTTR: NMOS, 2.7V, ±2% tolerance, Extended Temperature, 5LD SOT-23A, Standard Tapping.

c) TC53N2902ECTTR: NMOS, 2.9V, ±2% tolerance, Extended Temperature, 5LD SOT-23A, Standard Tapping.

NOTES:

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