

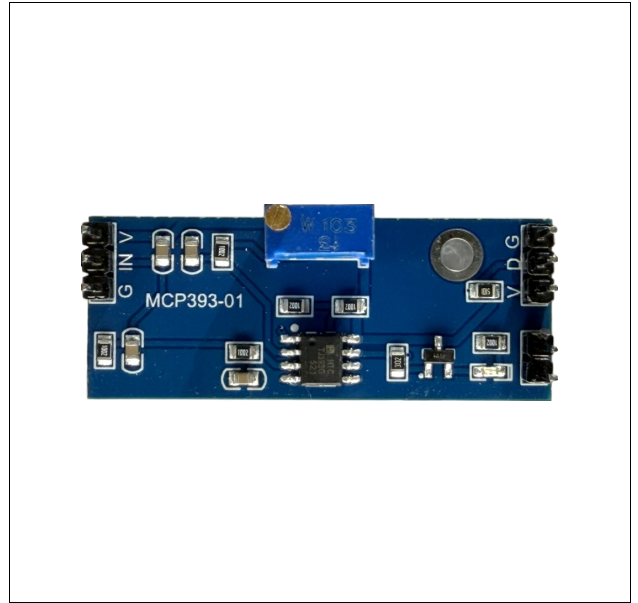
# LM393 Voltage Comparator Module

## FEATURES

- LM393 Voltage Comparator Module
- Input Voltage: 4.5V to 28V
- Adjustable Reference Voltage

## APPLICATIONS

- NTC thermosensitive temperature sensor
- Photosensitive sensor
- Vibration sensor.



## DESCRIPTION

The LM393 voltage comparator module provides precise voltage comparison with linear adjustability.

## ORDERING INFORMATION

Part Number	MCP393-01
Device	LM393 Voltage Comparator Module
Package	Assembled Module (45mm X 18mm)

## APPLICATION GUIDE

The reference voltage is set using the onboard adjustment potentiometer. The LM393 comparator compares the sensor output voltage, such as that from a pressure-sensitive resistor, against the reference voltage and produces a digital high or low output accordingly.

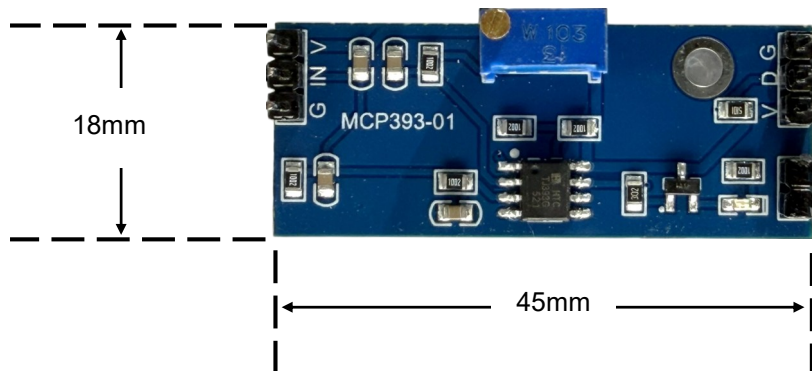


# LM393 Voltage Comparator Module

## PARTS LIST

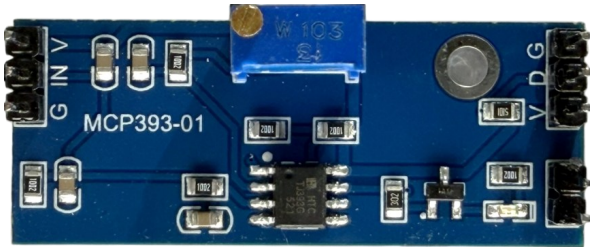
Name	Description	P/N	Qty.	Distributor
PCB	Printed Circuit Board	FR4 Lead-Free PCB	1	TAEJIN
IC	LM393, SOP-8	TJ393GD	1	TAEJIN
Pin Header	1*3 / 2.54mm pitch	Male Pin Header	2	Generic
Pin Header	1*2 / 2.54mm pitch	Male Pin Header	1	Generic
Potentiometer	10k Adjustable Potentiometer	3296W	1	Generic
Resistor	10K $\Omega$ Resistor	10K $\Omega$ 1% Resistor, 2012(0805)	6	Generic
Resistor	5.1K $\Omega$ Resistor	5.1K $\Omega$ 1% Resistor, 2012(0805))	1	Generic
Resistor	3K $\Omega$ Resistor	3K $\Omega$ 1% Resistor, 2012(0805)	1	Generic
Transistor	NPN Transistor	MMBT3904	1	Generic
Capacitor	100nF / 50V Capacitor	100nF / 50V Capacitor, 2012(0805)	4	Generic

## SIZE INFORMATION

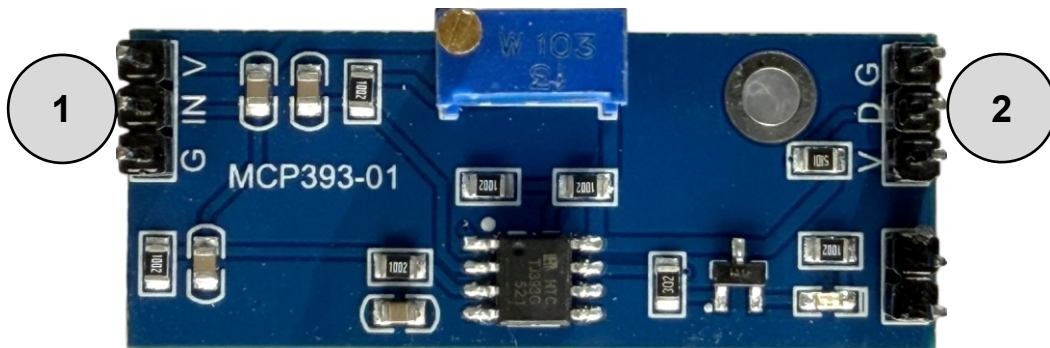


# LM393 Voltage Comparator Module

## PRODUCT IMAGE



## I/O PORT CONFIGURATION AND DESCRIPTION



Designator	Port Name	Port Description
1	Input Stage	V: Positive / IN: Input Voltage / G: Ground, Negative
2	Output Stage	V: Positive / D: High or Low Output / G: Ground, Negative

# LM393 Voltage Comparator Module

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## REVISION NOTICE

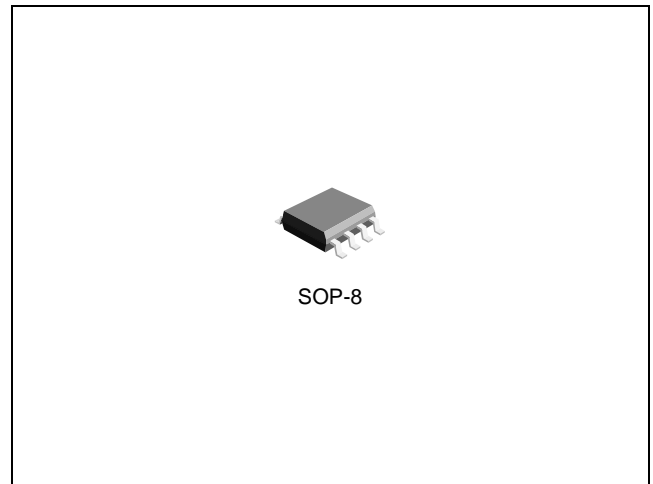
The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.

**FEATURES**

- Wide range of supply voltages
- Low supply current drain independent of supply voltage
- Low input biasing current
- Low input offset current
- Low input offset voltage
- Input common-mode voltage range includes GND
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage
- Output voltage compatible with TTL, MOS and CMOS logic

**DESCRIPTION**

The TJ393 consists of two independent voltage comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. The outputs can be connected to other open-collector outputs to achieve wired-AND relationships.

**ORDERING INFORMATION**

Device	Package
TJ393GD	SOP-8

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	$V_{CC}$	-	36 or $\pm 18$	V
Differential Input Voltage	$V_{ID}$	-	36	V
Input Voltage Range (either input)	$V_{IC}$	-0.3	36	V
Output Voltage	$V_O$	-	36	V
Junction Temperature Range	$T_J$	-40	125	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65	150	$^{\circ}\text{C}$

Note 1. Stresses beyond 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 beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## RECOMMENDED OPERATING CONDITIONS (Note 2)

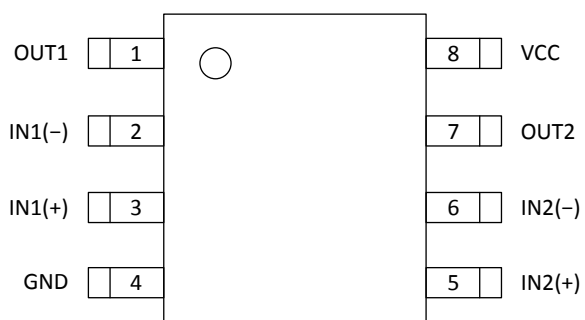
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	2.0	30	V
Operating Ambient Temperature Range	T <sub>OPR</sub>	-40	125	°C

Note 2. The device is not guaranteed to function outside its operating ratings.

## ORDERING INFORMATION

Package	Order No.	Description	Supplied As	Status
SOP-8	TJ393GD	Dual Differential Comparators	Tape & Reel	Active

## PIN CONFIGURATION



SOP-8

## PIN DESCRIPTION

Pin No.	Pin Name	Pin Function
1	OUT1	Output of the Comparator 1
2	IN1(-)	Negative Input of the Comparator 1
3	IN1(+)	Positive Input of the Comparator 1
4	GND	Ground
5	IN2(+)	Positive Input of the Comparator 2
6	IN2(-)	Negative Input of the Comparator 2
7	OUT2	Output of the Comparator 2
8	VCC	Power Supply

## ELECTRICAL CHARACTERISTICS

At specified free-air temperature and  $V_{CC} = 5V$  unless otherwise specified

SYMBOL	PARAMETER	TEST CONDITIONS	$T_A$	MIN	TYP	MAX	UNIT
$V_{IO}$	Input Offset Voltage	$V_{CC} = 5V$ to $30V$ , $V_{IC} = V_{ICR}$ min, $V_O = 1.4V$	25°C	-	2	5	mV
			Full range	-	-	9	
$I_{IO}$	Input Offset Current	$V_O = 1.4V$	25°C	-	5	50	nA
			Full range	-	-	150	
$I_{IB}$	Input Bias Current	$V_O = 1.4V$	25°C	-	-25	-250	nA
			Full range	-	-	-400	
$V_{ICR}$	Common-mode Input Voltage Range (Note 5)		25°C	0	-	$V_{CC} - 1.5$	V
			Full range	0	-	$V_{CC} - 2.0$	
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 4mA$ , $V_{ID} = -1V$	25°C	-	150	400	mV
			Full range	-	-	700	
$A_{VD}$	Large-Signal Differential Voltage Amplification	$V_{CC} = 15V$ , $V_O = 1.4V$ to $11.4V$ , $R_L \geq 15k\Omega$ to $V_{CC}$	25°C	50	200	-	V/mV
$I_{OH}$	High-Level Output Current	$V_{OH} = 5V$ , $V_{ID} = 1V$	25°C	-	0.1	50	nA
		$V_{OH} = 30V$ , $V_{ID} = 1V$	Full range	-	-	1	$\mu A$
$I_{OL}$	Low-Level Output Current	$V_{OL} = 1.5V$ , $V_{ID} = -1V$	25°C	6	-	-	mA
$I_{CC}$	Supply Current	$R_L = \infty$ , $V_{CC} = 5V$	25°C	-	0.8	1	mA
		$R_L = \infty$ , $V_{CC} = 30V$	Full range	-	-	2.5	

Note 3. All characteristics are measured with zero common-mode input voltage, unless otherwise specified.

Note 4. Temperature full range is  $-40^\circ C$  to  $125^\circ C$ .Note 5. The Voltage at either input or common-mode should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is  $V_{CC} - 1.5V$ .

## SWITCHING CHARACTERISTICS

 $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ 

PARAMETER	TEST CONDITIONS	TYP	UNIT
Response Time	$R_L$ connected to 5V through 5.1k $\Omega$ , $C_L = 15pF$ (Note 6, 7)	100mV input step with 5mV overdrive	1.3
		TTL-Level Input Step	0.3

Note 6.  $C_L$  includes probe and jig capacitance.

Note 7. The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

## TYPICAL OPERATING CHARACTERISTICS

T.B.D.

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