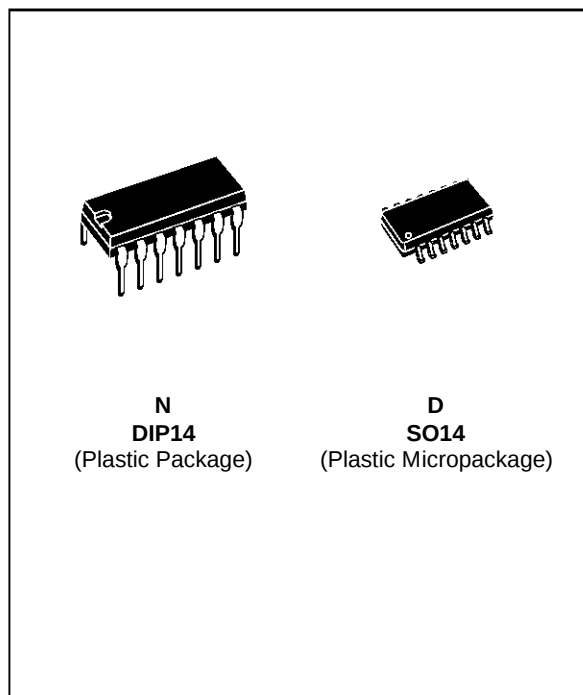


## 3V MICROPPOWER QUAD VOLTAGE COMPARATORS

- DEDICATED TO **3.3V OR BATTERY SUPPLY**  
(specified at 3V and 5V)
- EXTREMELY LOW SUPPLY CURRENT :  
**9µA typ/comparator**
- WIDE SINGLE SUPPLY RANGE  
**2.7V to 16V**
- EXTREMELY LOW INPUT CURRENTS :  
**1pA TYP**
- INPUT COMMON-MODE VOLTAGE RANGE  
INCLUDES GND
- FAST RESPONSE TIME : 2.5µs typ for  
5mV overdrive
- PIN-TO-PIN AND FUNCTIONALLY  
COMPATIBLE WITH BIPOLAR LM339



### DESCRIPTION

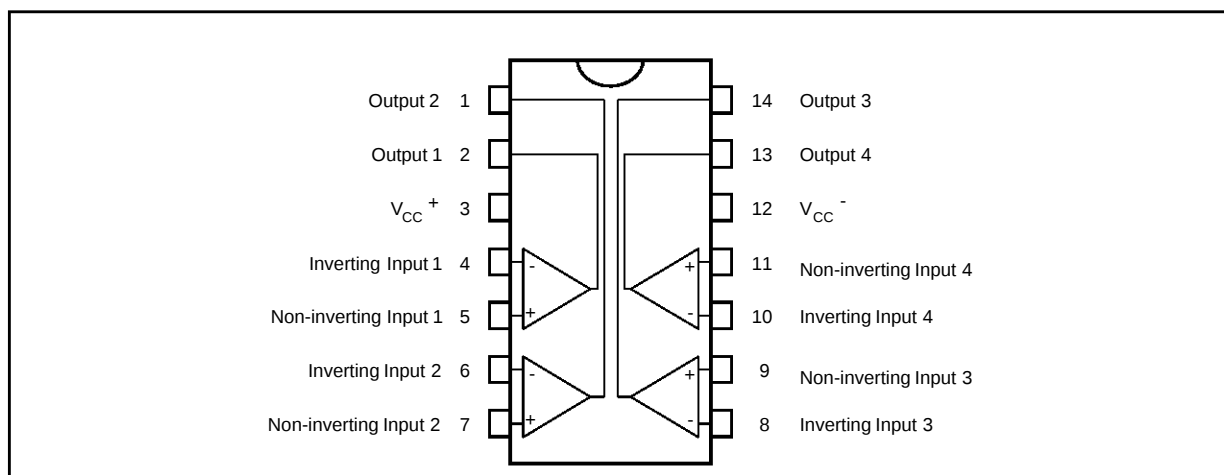
The TS3V339 is a micropower quad CMOS voltage comparator with extremely low consumption of 9µA typ / comparator (20 times less than bipolar LM339). Similar performances are offered by the quad micropower comparator TS3V3704 with a push-pull CMOS output.

Thus response times remain similar to the LM339.

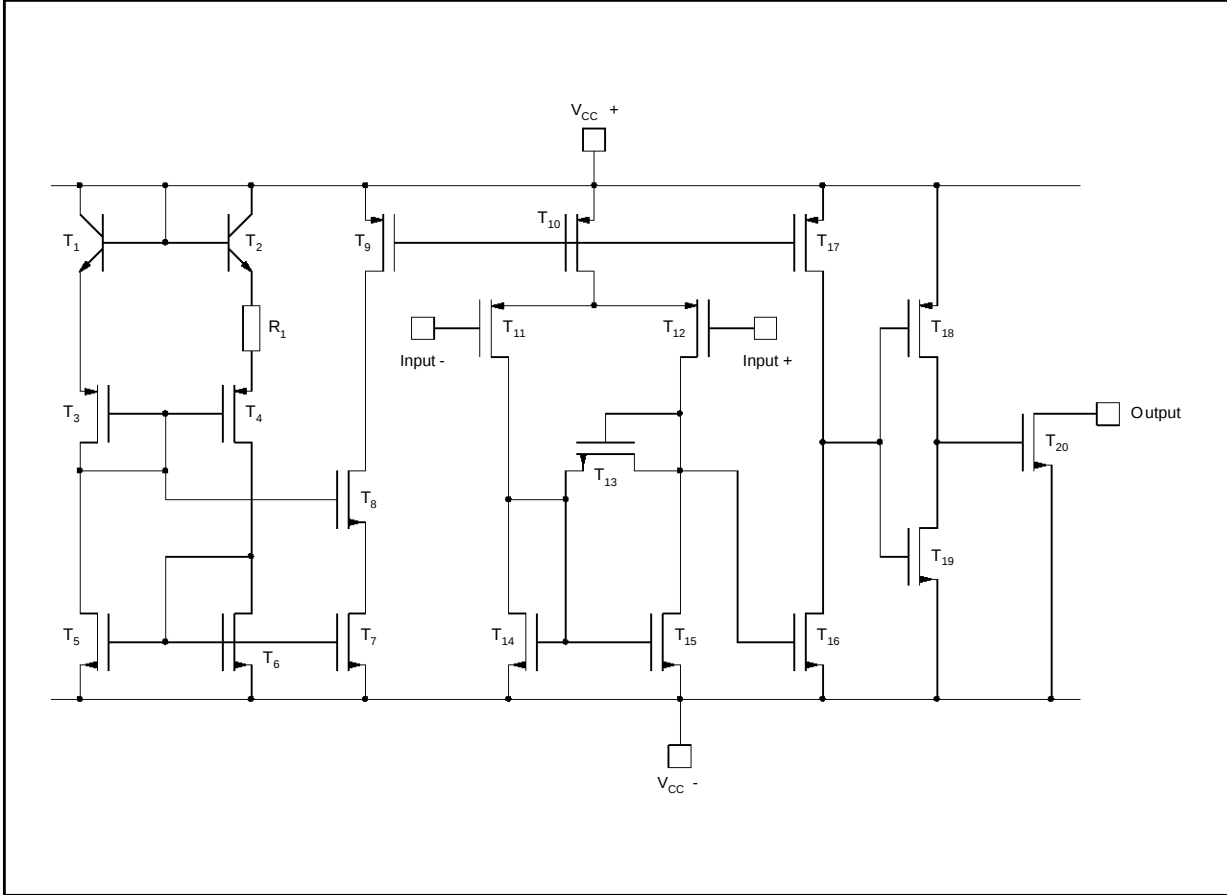
### ORDER CODES

| Part Number | Temperature Range | Package |   |
|-------------|-------------------|---------|---|
|             |                   | N       | D |
| TS3V339I    | -40°C, +125°C     | ●       | ● |

### PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM (for 1/4 TS3V339)



MAXIMUM RATINGS

| Symbol       | Parameter                             | Value       | Unit               |
|--------------|---------------------------------------|-------------|--------------------|
| $V_{CC}^{+}$ | Supply Voltage - (note 1)             | 18          | V                  |
| $V_{id}$     | Differential Input Voltage - (note 2) | $\pm 18$    | V                  |
| $V_i$        | Input Voltage - (note 3)              | 18          | V                  |
| $V_o$        | Output Voltage                        | 18          | V                  |
| $I_o$        | Output Current                        | 20          | mA                 |
| $T_{oper}$   | Operating Free-Air Temperature Range  | -40 to +125 | $^{\circ}\text{C}$ |
| $T_{stg}$    | Storage Temperature Range             | -65 to +150 | $^{\circ}\text{C}$ |

Notes : 1. All voltage values, except differential voltage, are with respect to network ground terminal.  
2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.  
3. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.  
4. Short circuit from outputs to  $V_{CC}^{+}$  can cause excessive heating and eventual destruction.

OPERATING CONDITIONS

| Symbol       | Parameter                       | Value                   | Unit |
|--------------|---------------------------------|-------------------------|------|
| $V_{CC}^{+}$ | Supply Voltage                  | 2.7 to 16               | V    |
| $V_{icm}$    | Common Mode Input Voltage Range | 0 to $V_{CC}^{+} - 1.5$ | V    |

**ELECTRICAL CHARACTERISTICS**

$V_{CC}^+ = 3V$ ,  $V_{CC}^- = 0V$ ,  $T_{amb} = 25^\circ C$  (unless otherwise specified)

| Symbol    | Parameter                                                                                                                   | Min.                                           | Typ.        | Max.       | Unit    |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------|------------|---------|
| $V_{io}$  | Input Offset Voltage - (note 1)<br>$V_{ic} = 1.5V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                 |                                                |             | 5<br>6.5   | mV      |
| $I_{io}$  | Input Offset Current - (note 2)<br>$V_{ic} = 1.5V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                 |                                                | 1           | 300        | pA      |
| $I_{ib}$  | Input Bias Current - (note 2)<br>$V_{ic} = 1.5V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                   |                                                | 1           | 600        | pA      |
| $V_{icm}$ | Input Common Mode Voltage Range<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                    | 0 to $V_{CC}^+ - 1.2$<br>0 to $V_{CC}^+ - 1.5$ |             |            | V       |
| CMR       | Common-mode Rejection Ratio<br>$V_{ic} = V_{icm min.}$                                                                      |                                                | 70          |            | dB      |
| SVR       | Supply Voltage Rejection Ratio<br>$V_{CC}^+ = 3V$ to 5V                                                                     |                                                | 70          |            | dB      |
| $I_{OH}$  | High Level Output Current<br>$V_{id} = +1V$ , $V_{OH} = 3V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                        |                                                | 2           | 40<br>1000 | nA      |
| $V_{OL}$  | Low Level Output Voltage<br>$V_{id} = +1V$ , $I_{OL} = +6mA$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                       |                                                | 400         | 550<br>800 | mV      |
| $I_{CC}$  | Supply Current (each comparator)<br>No load - Outputs low<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                          |                                                | 9           | 20<br>25   | $\mu A$ |
| $t_{PLH}$ | Response Time Low to High<br>$V_{ic} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV<br>TTL Input |                                                | 1.5<br>0.7  |            | $\mu s$ |
| $t_{PHL}$ | Response Time High to Low<br>$V_{ic} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV<br>TTL Input |                                                | 2.5<br>0.08 |            | $\mu s$ |

**Note :** 1. The specified offset voltage is the maximum value required to drive the output up to 4.5V or down to 0.3V.  
2. Maximum values including unavoidable inaccuracies of the industrial test.

**ELECTRICAL CHARACTERISTICS**

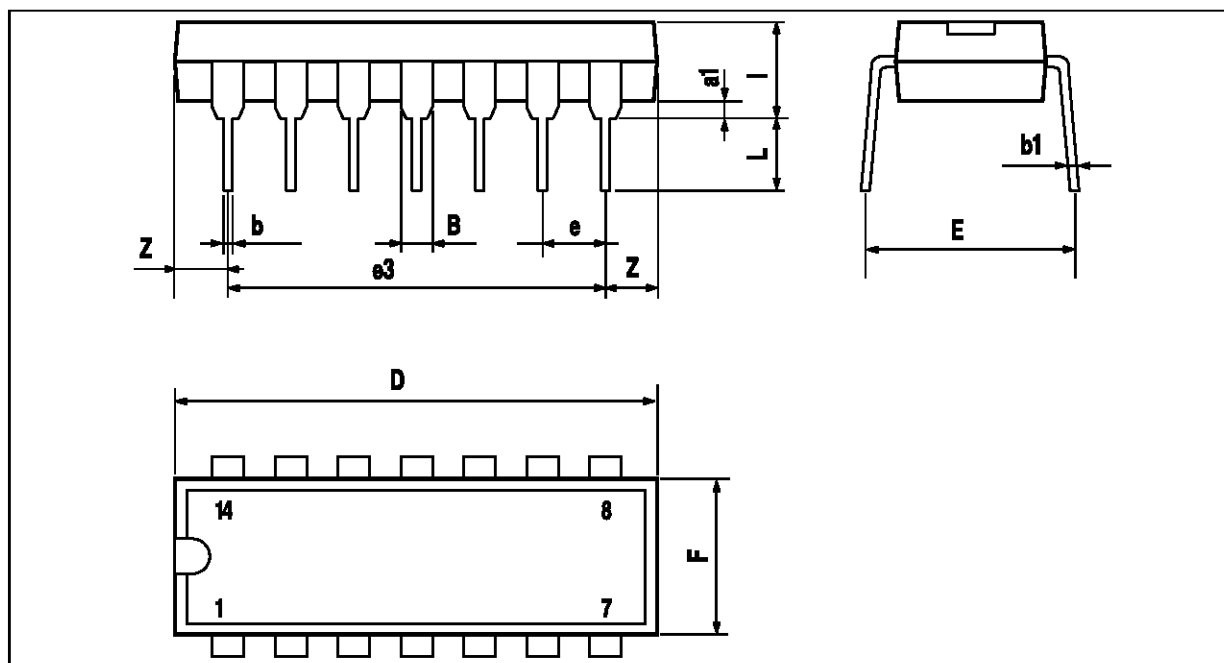
$V_{CC}^{+} = 5V$ ,  $V_{CC}^{-} = 0V$ ,  $T_{amb} = 25^{\circ}C$  (unless otherwise specified)

| Symbol    | Parameter                                                                                                                   | Min.                                               | Typ.        | Max.       | Unit    |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------|------------|---------|
| $V_{io}$  | Input Offset Voltage - (note 1)<br>$V_{ic} = 2.5V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                 |                                                    | 1.4         | 5<br>6.5   | mV      |
| $I_{io}$  | Input Offset Current - (note 2)<br>$V_{ic} = 2.5 V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                |                                                    | 1           | 300        | pA      |
| $I_{ib}$  | Input Bias Current - (note 2)<br>$V_{ic} = 2.5 V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                  |                                                    | 1           | 600        | pA      |
| $V_{icm}$ | Input Common Mode Voltage Range<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                    | 0 to $V_{CC}^{+} - 1.2$<br>0 to $V_{CC}^{+} - 1.5$ |             |            | V       |
| CMR       | Common-mode Rejection Ratio<br>$V_{ic} = V_{icm min.}$                                                                      |                                                    | 70          |            | dB      |
| SVR       | Supply Voltage Rejection Ratio<br>$V_{CC}^{+} = +5V$ to $+10V$                                                              |                                                    | 80          |            | dB      |
| $I_{OH}$  | High Level Output Current<br>$V_{id} = 1V$ , $V_{OH} = +5V$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                        |                                                    | 2           | 40<br>1000 | nA      |
| $V_{OL}$  | Low Level Output Voltage<br>$V_{id} = -1V$ , $I_{OL} = 6mA$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                        |                                                    | 260         | 400<br>650 | mV      |
| $I_{CC}$  | Supply Current (each comparator)<br>No load - Outputs low<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                          |                                                    | 10          | 20<br>25   | $\mu A$ |
| $t_{PLH}$ | Response Time Low to High<br>$V_{ic} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV<br>TTL Input |                                                    | 1.5<br>0.7  |            | $\mu s$ |
| $t_{PHL}$ | Response Time High to Low<br>$V_{ic} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV<br>TTL Input |                                                    | 2.5<br>0.08 |            | $\mu s$ |

**Note :** 1. The specified offset voltage is the maximum value required to drive the output up to 4.5V or down to 0.3V.  
2. Maximum values including unavoidable inaccuracies of the industrial test.

## PACKAGE MECHANICAL DATA

14 PINS - PLASTIC DIP



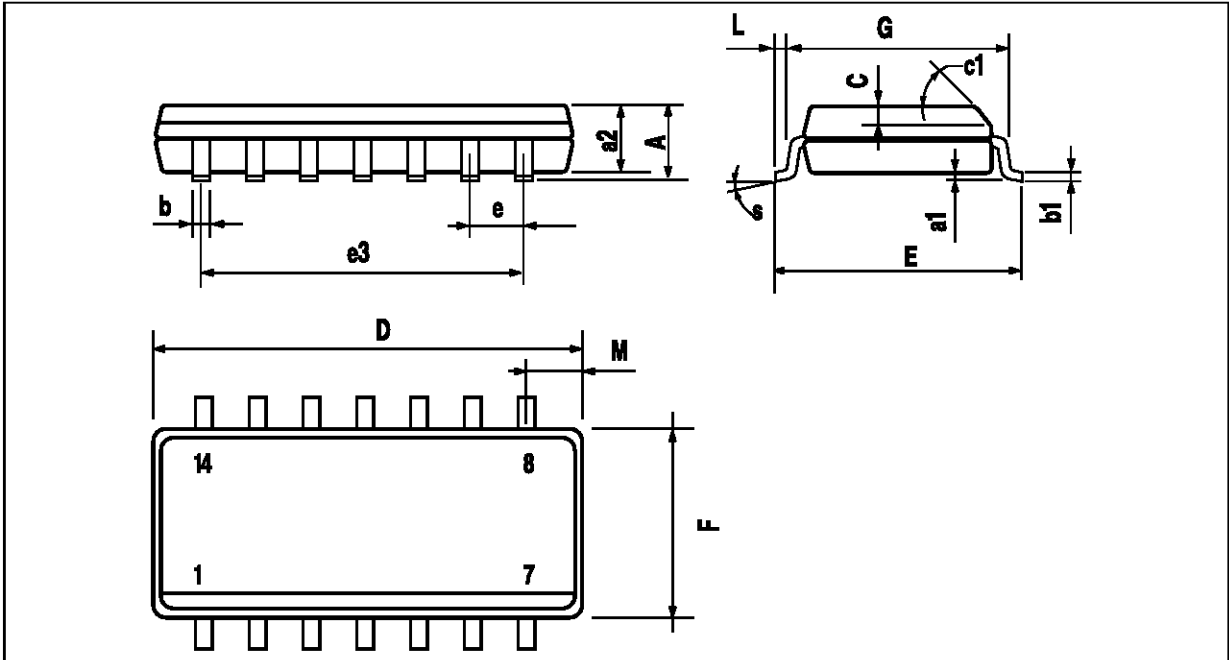
PM-DIP14.EPS

| Dim.  | Millimeters |       |      | Inches |       |       |
|-------|-------------|-------|------|--------|-------|-------|
|       | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| $a_1$ | 0.51        |       |      | 0.020  |       |       |
| $B$   | 1.39        |       | 1.65 | 0.055  |       | 0.065 |
| $b$   |             | 0.5   |      |        | 0.020 |       |
| $b_1$ |             | 0.25  |      |        | 0.010 |       |
| $D$   |             |       | 20   |        |       | 0.787 |
| $E$   |             | 8.5   |      |        | 0.335 |       |
| $e$   |             | 2.54  |      |        | 0.100 |       |
| $e_3$ |             | 15.24 |      |        | 0.600 |       |
| $F$   |             |       | 7.1  |        |       | 0.280 |
| $i$   |             |       | 5.1  |        |       | 0.201 |
| $L$   |             | 3.3   |      |        | 0.130 |       |
| $Z$   | 1.27        |       | 2.54 | 0.050  |       | 0.100 |

DIP14.TBL

**PACKAGE MECHANICAL DATA**

14 PINS - PLASTIC MICROPACKAGE (SO)



PM-S014.EPS

| Dim. | Millimeters |      |      | Inches |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             |      | 1.75 |        |       | 0.069 |
| a1   | 0.1         |      | 0.2  | 0.004  |       | 0.008 |
| a2   |             |      | 1.6  |        |       | 0.063 |
| b    | 0.35        |      | 0.46 | 0.014  |       | 0.018 |
| b1   | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C    |             | 0.5  |      |        | 0.020 |       |
| c1   | 45° (typ.)  |      |      |        |       |       |
| D    | 8.55        |      | 8.75 | 0.336  |       | 0.334 |
| E    | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e    |             | 1.27 |      |        | 0.050 |       |
| e3   |             | 7.62 |      |        | 0.300 |       |
| F    | 3.8         |      | 4.0  | 0.150  |       | 0.157 |
| G    | 4.6         |      | 5.3  | 0.181  |       | 0.208 |
| L    | 0.5         |      | 1.27 | 0.020  |       | 0.050 |
| M    |             |      | 0.68 |        |       | 0.027 |
| S    | 8° (max.)   |      |      |        |       |       |

SO14.TBL

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