



## LM2903B

### LINEAR INTEGRATED CIRCUIT

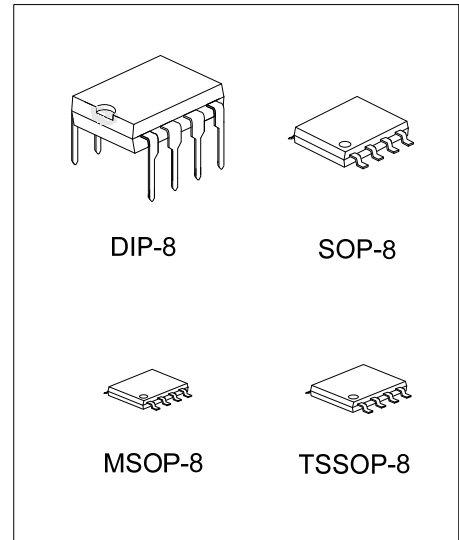
## DUAL DIFFERENTIAL COMPARATOR

### ■ DESCRIPTION

The UTC **LM2903B** consists of two independent voltage comparators, designed specifically to operate from a single power supply over a wide voltage range.

### ■ FEATURES

- \* Single or dual supply operation
- \* Wide operating supply range  
( $V_{CC}=2V \sim 36V$  or  $\pm 1 \sim \pm 18V$ )
- \* Input common-mode voltage includes ground
- \* Low supply current drain  $I_{CC}=0.55mA$  (Typical)
- \* Open Collector Outputs for Wired and Connection
- \* Low Output Saturation Voltage
- \* Output compatible with TTL, DTL, and CMOS logic system
- \* High ESD (2kV, HBM)



### ■ ORDERING INFORMATION

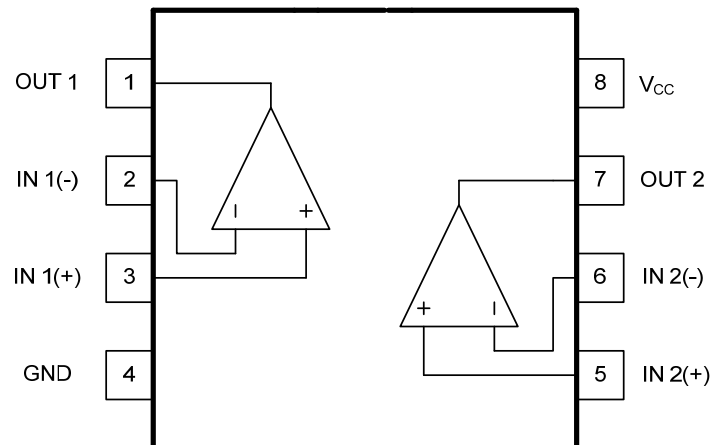
| Ordering Number |                | Package | Packing   |
|-----------------|----------------|---------|-----------|
| Lead Free       | Halogen-Free   |         |           |
| LM2903BL-D08-T  | LM2903BG-D08-T | DIP-8   | Tube      |
| LM2903BL-S08-R  | LM2903BG-S08-R | SOP-8   | Tape Reel |
| LM2903BL-P08-R  | LM2903BG-P08-R | TSSOP-8 | Tape Reel |
| LM2903BL-SM1-R  | LM2903BG-SM1-R | MSOP-8  | Tape Reel |

|                                                                                                |                                                                                                                                                      |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>LM2903BG-D08-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) D08: DIP-8, S08: SOP-8, P08: TSSOP-8, SM1: MSOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|

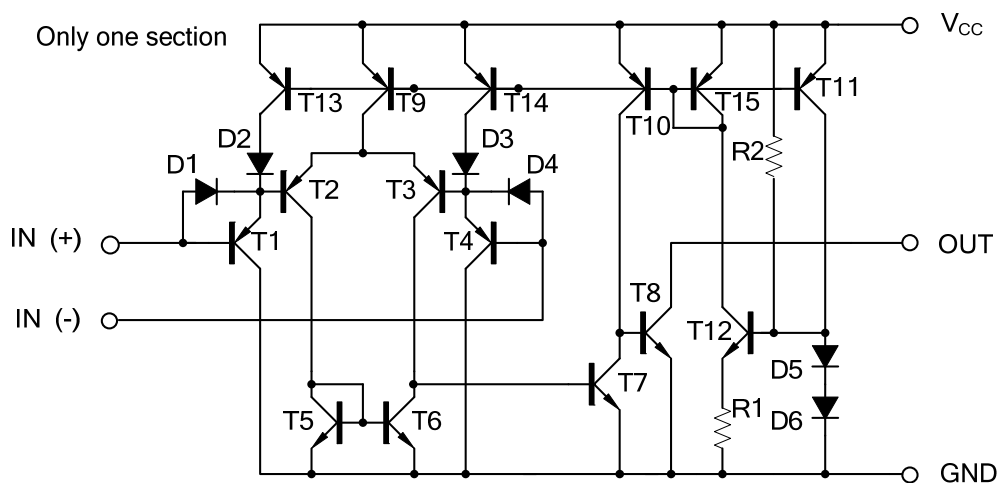
## MARKING

| DIP-8   | SOP-8 / MSOP-8 |
|---------|----------------|
|         |                |
| TSSOP-8 | -              |
|         | -              |

## PIN DESCRIPTION



## BLOCK DIAGRAM



■ **ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                       |                                               | SYMBOL        | RATINGS    | UNIT             |
|-------------------------------------------------|-----------------------------------------------|---------------|------------|------------------|
| Supply Voltage                                  |                                               | $V_{CC}$      | 38         | V                |
| Differential Input Voltage                      |                                               | $V_{I(DIFF)}$ | $\pm 38$   | V                |
| Input Voltage                                   |                                               | $V_{IN}$      | -0.3 ~ +38 | V                |
| Power Dissipation<br>( $T_A=25^\circ\text{C}$ ) | DIP-8                                         | $P_D$         | 780        | mW               |
|                                                 | SOP-8                                         |               | 420        | mW               |
|                                                 | TSSOP-8                                       |               | 350        | mW               |
|                                                 | MSOP-8                                        |               | 300        | mW               |
| Electrostatic Discharge                         | Human-Body Model (HBM)<br>Per JESD22-A114/115 | $V_{(ESD)}$   | 2000       | V                |
| Junction Temperature                            |                                               | $T_J$         | +150       | $^\circ\text{C}$ |
| Operating Temperature Range (Note 2)            |                                               | $T_{OPR}$     | -40 ~ +125 | $^\circ\text{C}$ |
| Storage Temperature Range                       |                                               | $T_{STG}$     | -65 ~ +150 | $^\circ\text{C}$ |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

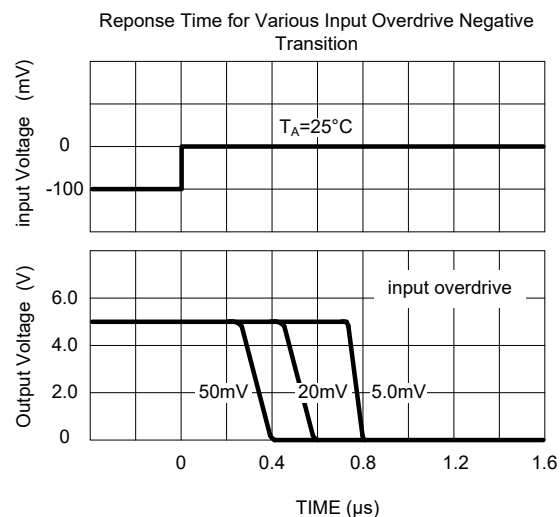
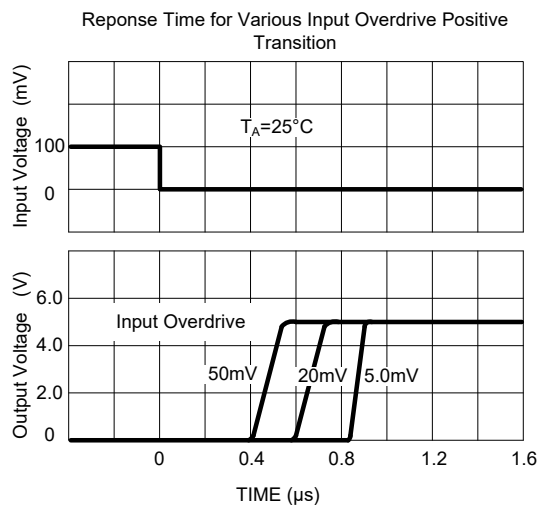
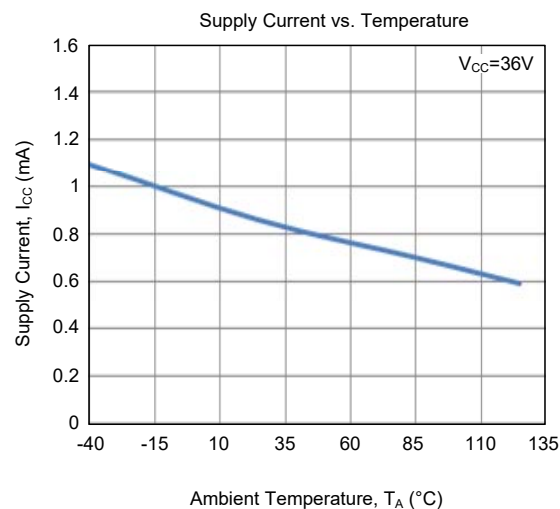
2. It is guarantee by design, not 100% be tested.

■ **ELECTRICAL CHARACTERISTICS**

( $V_{CC}=5.0\text{V}$ ,  $T_A=25^\circ\text{C}$ , All voltage referenced to GND unless otherwise specified)

| PARAMETER                  | SYMBOL        | TEST CONDITIONS                                                                                        | MIN | TYP  | MAX          | UNIT          |
|----------------------------|---------------|--------------------------------------------------------------------------------------------------------|-----|------|--------------|---------------|
| Power Supply Current       | $I_{CC}$      | $R_L=\infty$ , $V_{CC}=5\text{V}$                                                                      |     | 0.55 | 0.8          | mA            |
|                            |               | $V_{CC}=36\text{V}$ , $T_A=-\text{Full range}$                                                         |     |      | 1.1          | mA            |
| Input Offset Voltage       | $V_{I(OFF)}$  | $V_{CM}=0\text{V}$ to $V_{CC}-1.5\text{V}$<br>$V_{O(P)}=1.4\text{V}$ , $R_S=0\Omega$                   |     | 0.1  | $\pm 2.5$    | mV            |
|                            |               | $T_A=-\text{Full range}$                                                                               |     |      | $\pm 4$      | mV            |
| Input Offset Current       | $I_{I(OFF)}$  |                                                                                                        |     | 5    | 50           | nA            |
|                            |               | $T_A=-\text{Full range}$                                                                               |     |      | 100          | nA            |
| Input Bias Current         | $I_{I(BIAS)}$ |                                                                                                        |     | 125  | 250          | nA            |
|                            |               | $T_A=-\text{Full range}$                                                                               |     |      | 400          | nA            |
| Input Common Mode Voltage  | $V_{I(CM)}$   | $V_{CC}=3\sim 36\text{V}$                                                                              | 0   |      | $V_{CC}-1.5$ | V             |
|                            |               | $T_A=-\text{Full range}$                                                                               | 0   |      | $V_{CC}-2.0$ | V             |
| Large Signal Voltage Gain  | $G_V$         | $V_{CC}=15\text{V}$ , $R_L \geq 15\text{k}\Omega$                                                      | 50  | 70   |              | dB            |
| Output Saturation Voltage  | $V_{SAT}$     | $V_{I(-)}>1\text{V}$ , $V_{I(+)}=0\text{V}$ , $I_{SINK}=4\text{mA}$                                    |     | 140  | 400          | mV            |
|                            |               | $T_A=-\text{Full range}$                                                                               |     |      | 550          | mV            |
| Output Sink Current        | $I_{O(SINK)}$ | $V_{I(-)}>1\text{V}$ , $V_{I(+)}=0\text{V}$ , $V_{O(P)}<1.5\text{V}$                                   | 6   | 16   |              | mA            |
| Output Leakage Current     | $I_{O(LEAK)}$ | $V_{I(+)}=1\text{V}$ , $V_{I(-)}=0\text{V}$                                                            |     | 0.1  |              | nA            |
|                            |               | $V_{O(P)}=5\text{V}$<br>$V_{O(P)}=36\text{V}$                                                          |     |      | 1.0          | $\mu\text{A}$ |
| Large Signal Response Time | $t_R$         | $V_{IN}=\text{TTL logic wing}$<br>$V_{REF}=1.4\text{V}$ , $V_{RL}=5\text{V}$ , $R_L=5.1\text{k}\Omega$ |     | 220  |              | ns            |
| Response Time              | $t_R$         | $V_{RL}=5\text{V}$ , $R_L=5.1\text{k}\Omega$                                                           |     | 800  |              | ns            |

## ■ TYPICAL CHARACTERISTICS



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