

Product Preview  
**Phase-Frequency Detector**

The MC100LVEL40 is a phase/frequency detector intended for phase-locked loop applications which require a minimum amount of phase and frequency difference at lock. The device is a basic three state phase detector with differential inputs and outputs. The device is designed to work from either a 3.3V or 5.0V power supply.

When the reference (R) and the feedback (FB) inputs are unequal in frequency and/or phase the differential up (U) and down (D) outputs will provide pulse streams which when subtracted and integrated provide an error voltage for control of a VCO.

- 250MHz Typical Bandwidth
- Small Outline 20-Lead SOIC Packaging
- >2000V ESD Protection

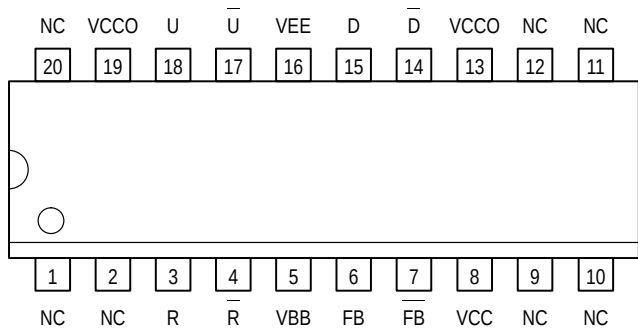
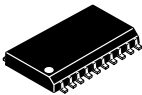


Figure 1. 20-Lead Pinout (Top View)

**MC100LVEL40**



**DW SUFFIX**  
20-LEAD PLASTIC SOIC WIDE PACKAGE  
CASE 751D-04

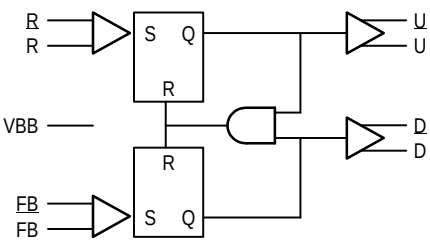


Figure 2. Logic Diagram

**3.3V ECL DC CHARACTERISTICS** ( $T_A = -40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ ;  $V_{EE} = -3.0\text{V}$  to  $-3.8\text{V}$ ;  $V_{CC} = \text{GND}$ )

| Symbol          | Parameter            | -40°C |       |       | 0°C to +85°C |       |       | Unit |
|-----------------|----------------------|-------|-------|-------|--------------|-------|-------|------|
|                 |                      | Min   | Typ   | Max   | Min          | Typ   | Max   |      |
| V <sub>OH</sub> | Output HIGH Voltage  | -1085 | -1005 | -880  | -1025        | -955  | -880  | V    |
| V <sub>OL</sub> | Output LOW Voltage   | -1830 | -1695 | -1555 | -1810        | -1705 | -1620 | V    |
| V <sub>IH</sub> | Input HIGH Voltage   | -1165 |       | -880  | -1165        |       | -880  | V    |
| V <sub>IL</sub> | Input LOW Voltage    | -1810 |       | -1475 | -1810        |       | -1475 | V    |
| I <sub>IL</sub> | Input LOW Current    | 0.5   |       |       | 0.5          |       |       | μA   |
| I <sub>EE</sub> | Power Supply Current |       | 45    |       |              | 45    |       | mA   |

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# MC100LVEL40

## PECL DC CHARACTERISTICS ( $T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ ; $V_{CC} = V_{CC}(\text{min})$ to $V_{CC}(\text{max})$ ; $V_{EE} = \text{GND}$ )

| Symbol   | Characteristic                          | $-40^{\circ}\text{C}$ |       |       | $0^{\circ}\text{C}$ |       |       | $25^{\circ}\text{C}$ |       |       | $85^{\circ}\text{C}$ |       |       | Unit          |
|----------|-----------------------------------------|-----------------------|-------|-------|---------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|---------------|
|          |                                         | Min                   | Typ   | Max   | Min                 | Typ   | Max   | Min                  | Typ   | Max   | Min                  | Typ   | Max   |               |
| $V_{OH}$ | Output HIGH Voltage <sup>1</sup> .      | 2.215                 | 2.295 | 2.420 | 2.275               | 2.345 | 2.420 | 2.275                | 2.345 | 2.420 | 2.275                | 2.345 | 2.420 | V             |
| $V_{OL}$ | Output LOW Voltage <sup>1</sup> .       | 1.470                 | 1.605 | 1.745 | 1.490               | 1.595 | 1.680 | 1.490                | 1.595 | 1.680 | 1.490                | 1.595 | 1.680 | V             |
| $V_{IH}$ | Input HIGH Voltage <sup>1</sup> .       | 2.135                 |       | 2.420 | 2.135               |       | 2.420 | 2.135                |       | 2.420 | 2.135                |       | 2.420 | V             |
| $V_{IL}$ | Input LOW Voltage <sup>1</sup> .        | 1.490                 |       | 1.825 | 1.490               |       | 1.825 | 1.490                |       | 1.825 | 1.490                |       | 1.825 | V             |
| $V_{BB}$ | Output Reference Voltage <sup>1</sup> . | 1.92                  |       | 2.04  | 1.92                |       | 2.04  | 1.92                 |       | 2.04  | 1.92                 |       | 2.04  | V             |
| $V_{CC}$ | Power Supply Voltage                    | 3.0                   |       | 3.8   | 3.0                 |       | 3.8   | 3.0                  |       | 3.8   | 3.0                  |       | 3.8   | V             |
| $I_{IH}$ | Input HIGH Current                      |                       |       | 150   |                     |       | 150   |                      |       | 150   |                      |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current                       |                       |       |       |                     |       |       |                      |       |       |                      |       |       | $\mu\text{A}$ |
|          | R, FB                                   | -300                  |       |       | -300                |       |       | -300                 |       |       | -300                 |       |       |               |
|          | Others                                  | 0.5                   |       |       | 0.5                 |       |       | 0.5                  |       |       | 0.5                  |       |       |               |
| $I_{EE}$ | Power Supply Current                    |                       | 45    |       |                     | 45    |       |                      | 45    |       |                      | 45    |       | mA            |

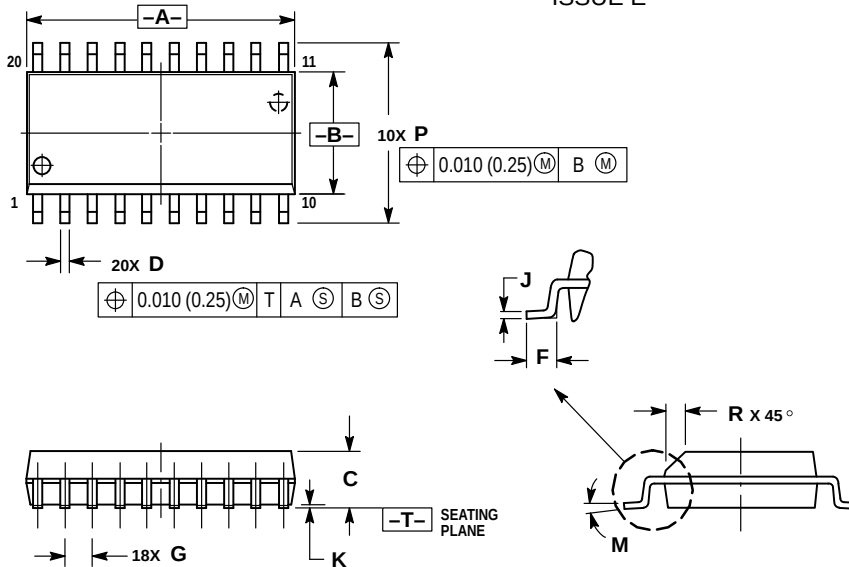
1. These values are for  $V_{CC} = 3.3\text{V}$ . Level Specifications will vary 1:1 with  $V_{CC}$ .

## AC Characteristics ( $T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ )

| Symbol                                 | Parameter                                                   | Min | Typ                        | Max | Unit |
|----------------------------------------|-------------------------------------------------------------|-----|----------------------------|-----|------|
| $f_{\text{max}}$                       | Maximum Toggle Frequency                                    |     | 250                        |     | MHz  |
| $t_{\text{PLH}}$ ,<br>$t_{\text{PHL}}$ | Propagation Delay<br>R to D<br>R to U<br>FB to D<br>FB to U |     | 1100<br>450<br>450<br>1100 |     | ps   |
| $t_r/t_f$                              | Output Rise/Fall Time                                       |     | 350                        |     | ps   |

## OUTLINE DIMENSIONS

**DW SUFFIX**  
**PLASTIC SOIC WIDE PACKAGE**  
**CASE 751D-04**  
**ISSUE E**



## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 12.65       | 12.95 | 0.499     | 0.510 |
| B   | 7.40        | 7.60  | 0.292     | 0.299 |
| C   | 2.35        | 2.65  | 0.093     | 0.104 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.50        | 0.90  | 0.020     | 0.035 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.25        | 0.32  | 0.010     | 0.012 |
| K   | 0.10        | 0.25  | 0.004     | 0.009 |
| M   | 0°          | 7°    | 0°        | 7°    |
| P   | 10.05       | 10.55 | 0.395     | 0.415 |
| R   | 0.25        | 0.75  | 0.010     | 0.029 |

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