

MC14569B

Programmable Divide-By-N Dual 4-Bit Binary/BCD Down Counter

The MC14569B is a programmable divide-by-N dual 4-bit binary or BCD down counter constructed with MOS P-Channel and N-Channel enhancement mode devices (complementary MOS) in a monolithic structure.

This device has been designed for use with the MC14568B phase comparator/counter in frequency synthesizers, phase-locked loops, and other frequency division applications requiring low power dissipation and/or high noise immunity.

Features

- Speed-up Circuitry for Zero Detection
- Each 4-Bit Counter Can Divide Independently in BCD or Binary Mode
- Can be Cascaded With MC14526B for Frequency Synthesizer Applications
- All Outputs are Buffered
- Schmitt Triggered Clock Conditioning
- Pb-Free Packages are Available*

MAXIMUM RATINGS (Voltages Referenced to V_{SS})

| Symbol | Parameter | Value | Unit |
|-------------------|---|------------------------|-------------|
| V_{DD} | DC Supply Voltage Range | -0.5 to +18.0 | V |
| V_{in}, V_{out} | Input or Output Voltage Range (DC or Transient) | -0.5 to $V_{DD} + 0.5$ | V |
| I_{in}, I_{out} | Input or Output Current (DC or Transient) per Pin | ± 10 | mA |
| P_D | Power Dissipation, per Package (Note 1) | 500 | mW |
| T_A | Ambient Temperature Range | -55 to +125 | $^{\circ}C$ |
| T_{stg} | Storage Temperature Range | -65 to +150 | $^{\circ}C$ |
| T_L | Lead Temperature (8-Second Soldering) | 260 | $^{\circ}C$ |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Temperature Derating:

Plastic "P and D/DW" Packages: - 7.0 mW/ $^{\circ}C$ From 65 $^{\circ}C$ To 125 $^{\circ}C$

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V_{SS} or V_{DD}). Unused outputs must be left open.

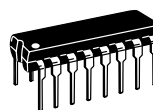
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



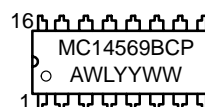
ON Semiconductor®

<http://onsemi.com>

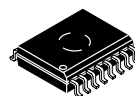
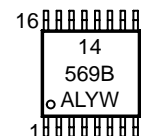
MARKING DIAGRAMS



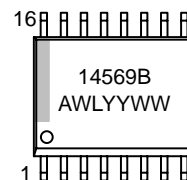
PDIP-16
P SUFFIX
CASE 648



TSSOP-16
DT SUFFIX
CASE 948F



SOIC-16
DW SUFFIX
CASE 751G



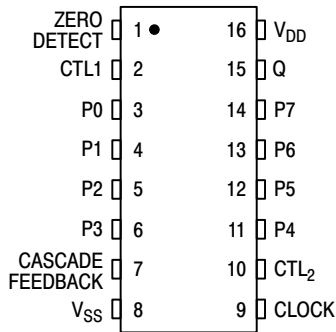
A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

ORDERING INFORMATION

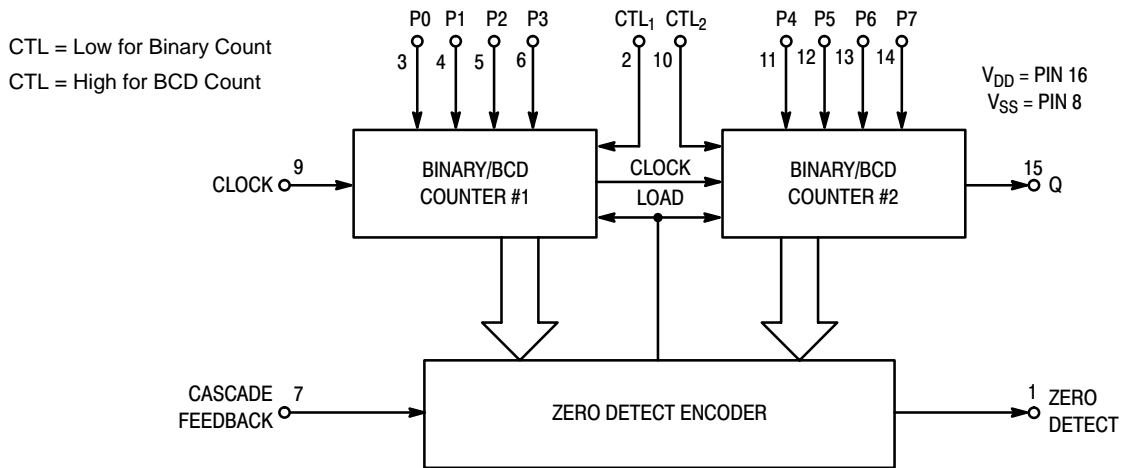
See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

MC14569B

PIN ASSIGNMENT



BLOCK DIAGRAM



ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|-------------------------|--------------------------|
| MC14569BCP | PDIP-16 | 500 Units / Rail |
| MC14569BCPG | PDIP-16 (Pb-Free) | 500 Units / Rail |
| MC14569BDW | SOIC-16 WB | 47 Units / Rail |
| MC14569BDWG | SOIC-16 WB (Pb-Free) | 47 Units / Rail |
| MC14569BDWR2 | SOIC-16 WB | 1000 Units / Tape & Reel |
| MC14569BDWR2G | SOIC-16 WB (Pb-Free) | 1000 Units / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MC14569B

ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

| Characteristic | Symbol | V_{DD} Vdc | - 55°C | | 25°C | | | 125°C | | Unit |
|---|----------|-----------------|---|-----------|-------|-----------------|-----------|-------|-----------|-----------|
| | | | Min | Max | Min | Typ (Note 2) | Max | Min | Max | |
| Output Voltage "0" Level $V_{in} = V_{DD}$ or 0 | V_{OL} | 5.0 | - | 0.05 | - | 0 | 0.05 | - | 0.05 | Vdc |
| | | 10 | - | 0.05 | - | 0 | 0.05 | - | 0.05 | |
| 15 | | - | 0.05 | - | 0 | 0.05 | - | 0.05 | | |
| $V_{in} = 0$ or V_{DD} "1" Level | V_{OH} | 5.0 | 4.95 | - | 4.95 | 5.0 | - | 4.95 | - | Vdc |
| 10 | | 9.95 | - | 9.95 | 10 | - | 9.95 | - | | |
| 15 | | 14.95 | - | 14.95 | 15 | - | 14.95 | - | | |
| Input Voltage "0" Level ($V_O = 4.5$ or 0.5 Vdc) ($V_O = 9.0$ or 1.0 Vdc) ($V_O = 13.5$ or 1.5 Vdc) | V_{IL} | 5.0 | - | 1.5 | - | 2.25 | 1.5 | - | 1.5 | Vdc |
| | | 10 | - | 3.0 | - | 4.50 | 3.0 | - | 3.0 | |
| 15 | | - | 4.0 | - | 6.75 | 4.0 | - | 4.0 | | |
| ($V_O = 0.5$ or 4.5 Vdc) ($V_O = 1.0$ or 9.0 Vdc) ($V_O = 1.5$ or 13.5 Vdc) "1" Level | V_{IH} | 5.0 | 3.5 | - | 3.5 | 2.75 | - | 3.5 | - | Vdc |
| 10 | | 7.0 | - | 7.0 | 5.50 | - | 7.0 | - | | |
| 15 | | 11 | - | 11 | 8.25 | - | 11 | - | | |
| Output Drive Current ($V_{OH} = 2.5$ Vdc) ($V_{OH} = 4.6$ Vdc) ($V_{OH} = 9.5$ Vdc) ($V_{OH} = 13.5$ Vdc) Source | I_{OH} | 5.0 | -3.0 | - | -2.4 | -4.2 | - | -1.7 | - | mAdc |
| | | 5.0 | -0.64 | - | -0.51 | -0.88 | - | -0.36 | - | |
| 10 | | -1.6 | - | -1.3 | -2.25 | - | -0.9 | - | | |
| 15 | | -4.2 | - | -3.4 | -8.8 | - | -2.4 | - | | |
| ($V_{OL} = 0.4$ Vdc) ($V_{OL} = 0.5$ Vdc) ($V_{OL} = 1.5$ Vdc) Sink | I_{OL} | 5.0 | 0.64 | - | 0.51 | 0.88 | - | 0.36 | - | mAdc |
| 10 | | 1.6 | - | 1.3 | 2.25 | - | 0.9 | - | | |
| 15 | | 4.2 | - | 3.4 | 8.8 | - | 2.4 | - | | |
| Input Current | I_{in} | 15 | - | ± 0.1 | - | ± 0.00001 | ± 0.1 | - | ± 1.0 | μ Adc |
| Input Capacitance ($V_{in} = 0$) | C_{in} | - | - | - | - | 5.0 | 7.5 | - | - | pF |
| Quiescent Current (Per Package) | I_{DD} | 5.0 | - | 5.0 | - | 0.005 | 5.0 | - | 150 | μ Adc |
| | | 10 | - | 10 | - | 0.010 | 10 | - | 300 | |
| | | 15 | - | 20 | - | 0.015 | 20 | - | 600 | |
| Total Supply Current (Notes 3 & 4) (Dynamic plus Quiescent, Per Package) ($C_L = 50$ pF on all outputs, all buffers switching) | I_T | 5.0 | $I_T = (0.58 \mu\text{A/kHz}) f + I_{DD}$ $I_T = (1.20 \mu\text{A/kHz}) f + I_{DD}$ $I_T = (1.95 \mu\text{A/kHz}) f + I_{DD}$ | | | | | | | μ Adc |

2. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

3. The formulas given are for the typical characteristics only at 25°C.

4. To calculate total supply current at loads other than 50 pF:

$$I_T(C_L) = I_T(50 \text{ pF}) + (C_L - 50) Vfk$$

where: I_T is in μA (per package), C_L in pF, $V = (V_{DD} - V_{SS})$ in volts, f in kHz is input frequency, and $k = 0.001$.

MC14569B

SWITCHING CHARACTERISTICS ($C_L = 50 \text{ pF}$, $T_A = 25^\circ\text{C}$)

| Characteristic | Symbol | V_{DD} Vdc | All Types | | | Unit | | |
|---|-----------------------|-----------------|-----------|-----------------|-----|---------------|------|----|
| | | | Min | Typ (Note 5) | Max | | | |
| Output Rise Time | t_{TLH} | 5.0 | – | 100 | 200 | ns | | |
| | | 10 | – | 50 | 100 | | | |
| | | 15 | – | 40 | 80 | | | |
| Output Fall Time | t_{THL} | 5.0 | – | 100 | 200 | ns | | |
| | | 10 | – | 50 | 100 | | | |
| | | 15 | – | 40 | 80 | | | |
| Turn-On Delay Time Zero Detect Output | t_{PLH} | 5.0 | – | 420 | 700 | ns | | |
| | | 10 | – | 175 | 300 | | | |
| | | 15 | – | 125 | 250 | | | |
| | | Q Output | | 5.0 | – | 675 | 1200 | ns |
| | | | | 10 | – | 285 | 500 | |
| | | | | 15 | – | 200 | 400 | |
| Turn-Off Delay Time Zero Detect Output | t_{PHL} | 5.0 | – | 380 | 600 | ns | | |
| | | 10 | – | 150 | 300 | | | |
| | | 15 | – | 100 | 200 | | | |
| | | Q Output | | 5.0 | – | 530 | 1000 | ns |
| | | | | 10 | – | 225 | 400 | |
| | | | | 15 | – | 155 | 300 | |
| Clock Pulse Width | t_{WH} | 5.0 | 300 | 100 | – | ns | | |
| | | 10 | 150 | 45 | – | | | |
| | | 15 | 115 | 30 | – | | | |
| Clock Pulse Frequency | f_{cl} | 5.0 | – | 3.5 | 2.1 | MHz | | |
| | | 10 | – | 9.5 | 5.1 | | | |
| | | 15 | – | 13.0 | 7.8 | | | |
| Clock Pulse Rise and Fall Time | t_{TLH} , t_{THL} | 5.0 | NO LIMIT | | | μs | | |
| | | 10 | | | | | | |
| | | 15 | | | | | | |

5. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

SWITCHING WAVEFORMS

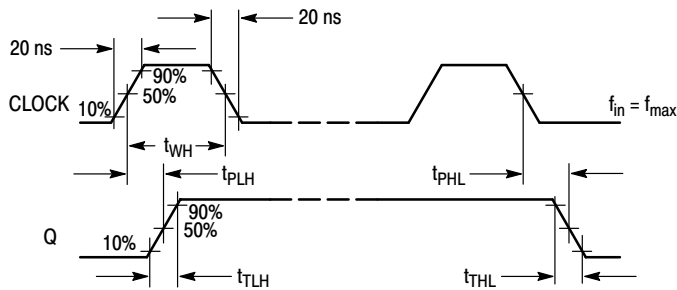


Figure 1.

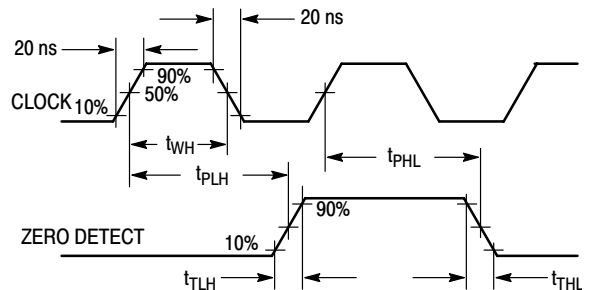


Figure 2.

MC14569B

PIN DESCRIPTIONS

INPUTS

P0, P1, P2, P3 (Pins 3, 4, 5, 6) – Preset Inputs. Programmable inputs for the least significant counter. May be binary or BCD depending on the control input.

P4, P5, P6, P7 (Pins 11, 12, 13, 14) – Preset Inputs. Programmable inputs for the most significant counter. May be binary or BCD depending on the control input.

Clock (Pin 9) – Preset data is decremented by one on each positive transition of this signal.

OUTPUTS

Zero Detect (Pin 1) – This output is normally low and goes high for one clock cycle when the counter has decremented to zero.

Q (Pin 15) – Output of the last stage of the most significant counter. This output will be inactive unless the preset input P7 has been set high.

CONTROLS

Cascade Feedback (Pin 7) – This pin is normally set high. When low, loading of the preset inputs (P0 through P7) is inhibited, i.e., P0 through P7 are “don’t cares.” Refer to Table 1 for output characteristics.

CTL₁ (Pin 2) – This pin controls the counting mode of the least significant counter. When set high, counting mode is BCD. When set low, counting mode is binary.

CTL₂ (Pin 10) – This pin controls the counting mode of the most significant counter. When set high, counting mode is BCD. When set low, counting mode is binary.

SUPPLY PINS

V_{SS} (Pin 18) – Negative Supply Voltage. This pin is usually connected to ground.

V_{DD} (Pin 16) – Positive Supply Voltage. This pin is connected to a positive supply voltage ranging from 3.0 V to 18 V.

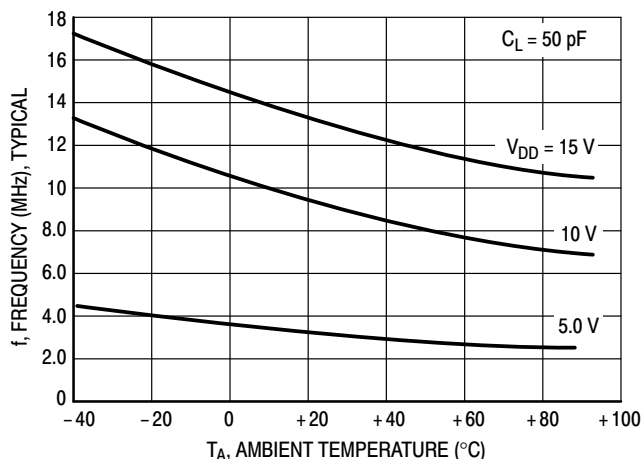
OPERATING CHARACTERISTICS

The MC14569B is a programmable divide-by-N dual 4-bit down counter. This counter may be programmed (i.e., preset) in BCD or binary code through inputs P0 to P7. For each counter, the counting sequence may be chosen independently by applying a high (for BCD count) or a low (for binary count) to the control inputs CTL₁ and CTL₂.

The divide ratio N (N being the value programmed on the preset inputs P0 to P7) is automatically loaded into the counter as soon as the count 1 is detected. Therefore, a division ratio of one is not possible. After N clock cycles,

one pulse appears on the Zero Detect output. (See Timing Diagram.) The Q output is the output of the last stage of the most significant counter (See Tables 1 through 5, Mode Controls.)

When cascading the MC14569B to the MC14526B, the Cascade Feedback input, Q, and Zero Detect outputs must be respectively connected to “0”, Clock, and Load of the following counter. If the MC14569B is used alone, Cascade Feedback must be connected to V_{DD}.



MC14569B

Table 1 Mode Controls (Cascade Feedback = Low)

| Counter Control Values | | Divide Ratio | |
|------------------------|------------------|--------------|-----|
| CTL ₁ | CTL ₂ | Zero Detect | Q |
| 0 | 0 | 256 | 256 |
| 0 | 1 | 160 | 160 |
| 1 | 0 | 160 | 160 |
| 1 | 1 | 100 | 100 |

NOTE: Data Preset Inputs (P0–P7) are “Don’t Cares” while Cascade Feedback is Low.

Table 2 Mode Controls (CTL₁ = Low, CTL₂ = Low, Cascade Feedback = High)

| Preset Inputs | | | | | | | | Divide Ratio | | Comments | |
|-------------------|----------------|----------------|----------------|-------------------|----------------|----------------|----------------|--------------|-----|---|----------------------|
| P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 | Zero Detect | Q | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 256 | 256 | Max Count Illegal State Min Count | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | X | X | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | X | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 15 | X | | |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 16 | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 32 | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| • | • | • | • | • | • | • | • | • | X | | |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 127 | X | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 128 | | Q Output Active ↓ |
| • | • | • | • | • | • | • | • | • | • | | |
| • | • | • | • | • | • | • | • | • | • | | |
| • | • | • | • | • | • | • | • | • | • | | |
| • | • | • | • | • | • | • | • | • | • | | |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 136 | 136 | | |
| • | • | • | • | • | • | • | • | • | • | | |
| • | • | • | • | • | • | • | • | • | • | | |
| • | • | • | • | • | • | • | • | • | • | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255 | 255 | | |
| 2 ⁷ | 2 ⁶ | 2 ⁵ | 2 ⁴ | 2 ³ | 2 ² | 2 ¹ | 2 ⁰ | | | Bit Value | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | | | Counting Sequence | |
| Counter #2 Binary | | | | Counter #1 Binary | | | | | | | |

X = No Output (Always Low)

MC14569B

Table 3 Mode Controls (CTL₁ = High, CTL₂ = Low, Cascade Feedback = High)

| Preset Inputs | | | | | | | | Divide Ratio | | Comments | |
|----------------------|----|----|----|-------------------|----|----|----|--------------|-----|---|----------------------|
| P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 | Zero Detect | Q | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 160 | Max Count Illegal State Min Count | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | X | X | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | X | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 9 | X | | |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 19 | X | | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 30 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 50 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 60 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 70 | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| . | . | . | . | . | . | . | . | . | X | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 80 | Q Output Active ↓ | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 90 | 90 | | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 150 | 150 | | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| . | . | . | . | . | . | . | . | . | . | | |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 159 | 159 | | |
| 80 | 40 | 20 | 10 | 8 | 4 | 2 | 1 | | | | Bit Value |
| Counter #2 Binary | | | | Counter #1 BCD | | | | | | | Counting Sequence |

X = No Output (Always Low)

MC14569B

Table 4 Mode Controls (CTL₁ = Low, CTL₂ = High, Cascade Feedback = High)

| Preset Values | | | | | | | | Divide Ratio | | Comments |
|-----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|--------------|-----|---|
| P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 | Zero Detect | Q | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 160 | Max Count Illegal State Min Count |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | X | X | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | X | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | X | |
| . | . | . | . | . | . | . | . | . | X | |
| . | . | . | . | . | . | . | . | . | X | |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 15 | X | |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 16 | X | |
| . | . | . | . | . | . | . | . | . | X | |
| . | . | . | . | . | . | . | . | . | X | |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 31 | X | |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 32 | X | |
| . | . | . | . | . | . | . | . | . | X | |
| . | . | . | . | . | . | . | . | . | X | |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 48 | X | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | X | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 80 | X | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 112 | X | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 128 | Q Output Active ↓ |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 144 | 144 | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 159 | 159 | |
| . | . | . | . | . | . | . | . | . | . | |
| 2 ⁷ 128 | 2 ⁶ 64 | 2 ⁵ 32 | 2 ⁴ 16 | 2 ³ 8 | 2 ² 4 | 2 ¹ 2 | 2 ⁰ 1 | | | Bit Value |
| Counter #2 BCD | | | | Counter #1 Binary | | | | | | Counting Sequence |

X = No Output (Always Low)

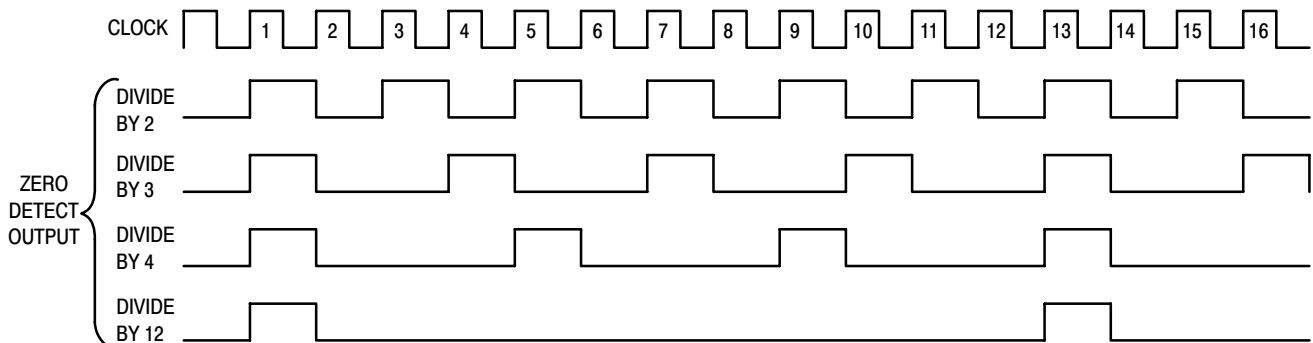
MC14569B

Table 5 Mode Controls (CTL₁ = High, CTL₂ = High, Cascade Feedback = High)

| Preset Values | | | | | | | | Divide Ratio | | Comments |
|-------------------|----|----|----|-------------------|----|----|----|--------------|-----|---|
| P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 | Zero Detect | Q | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 100 | Max Count illegal state Min Count |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | X | X | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | X | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 9 | X | |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 30 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 50 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 70 | X | |
| • | • | • | • | • | • | • | • | • | X | |
| • | • | • | • | • | • | • | • | • | X | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 80 | Q Output Active ↓ |
| • | • | • | • | • | • | • | • | • | • | |
| • | • | • | • | • | • | • | • | • | • | |
| • | • | • | • | • | • | • | • | • | • | |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 90 | 90 | |
| • | • | • | • | • | • | • | • | • | • | |
| • | • | • | • | • | • | • | • | • | • | |
| • | • | • | • | • | • | • | • | • | • | |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 99 | 99 | |
| 80 | 40 | 20 | 10 | 8 | 4 | 2 | 1 | | | |
| Counter #2 BCD | | | | Counter #1 BCD | | | | | | Counting Sequence |

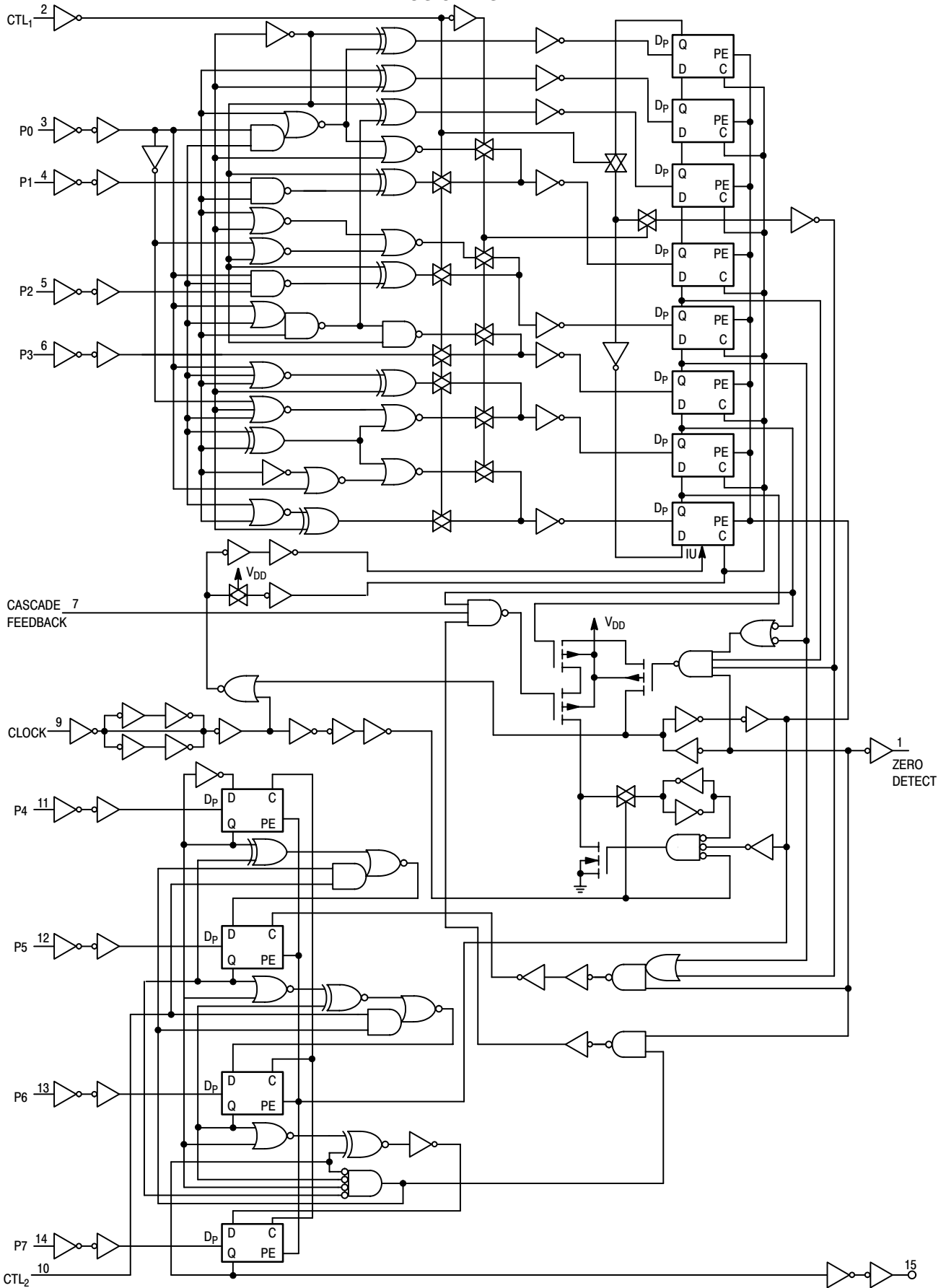
X = No Output (Always Low)

TIMING DIAGRAM MC14569B



MC14569B

LOGIC DIAGRAM



MC14569B

TYPICAL APPLICATIONS

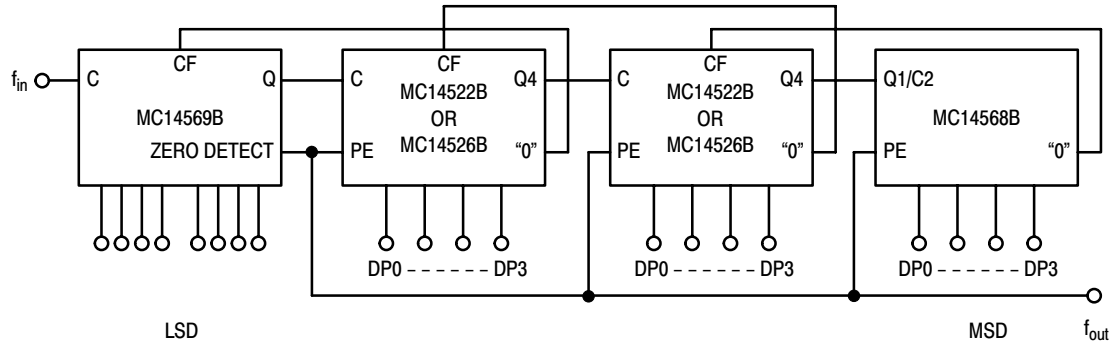
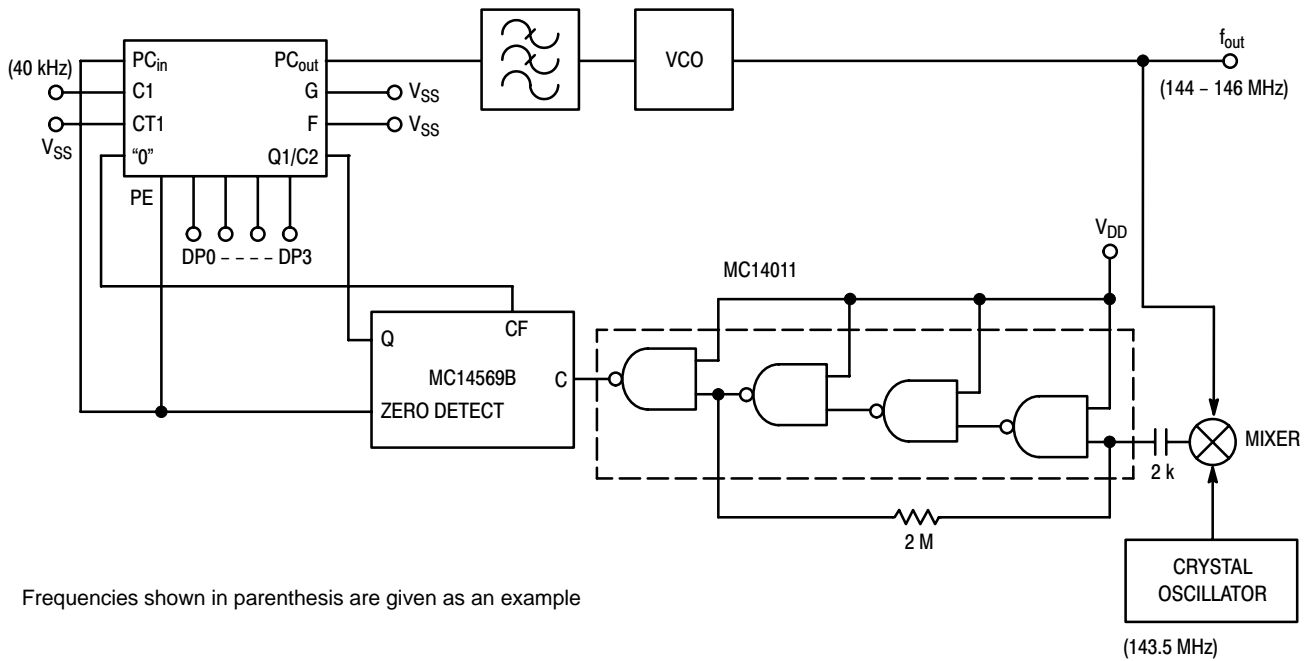


Figure 3. Cascading MC14568B and MC14522B or MC14526B with MC14569B



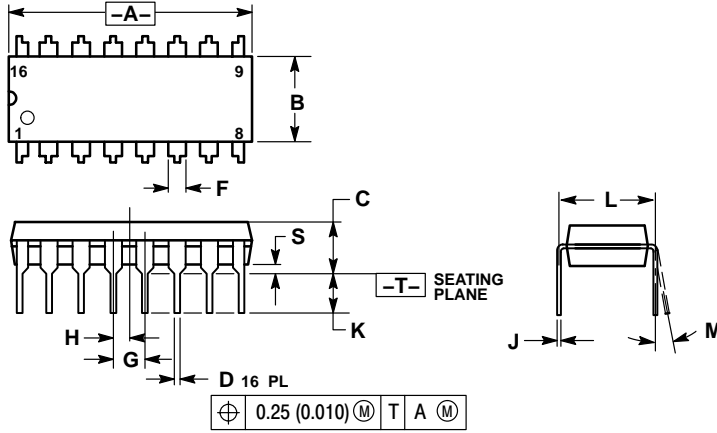
Frequencies shown in parenthesis are given as an example

Figure 4. Frequency Synthesizer with MC14568B and MC14569B Using a Mixer (Channel Spacing 10 kHz)

MC14569B

PACKAGE DIMENSIONS

PDIP-16
P SUFFIX
PLASTIC DIP PACKAGE
CASE 648-08
ISSUE T

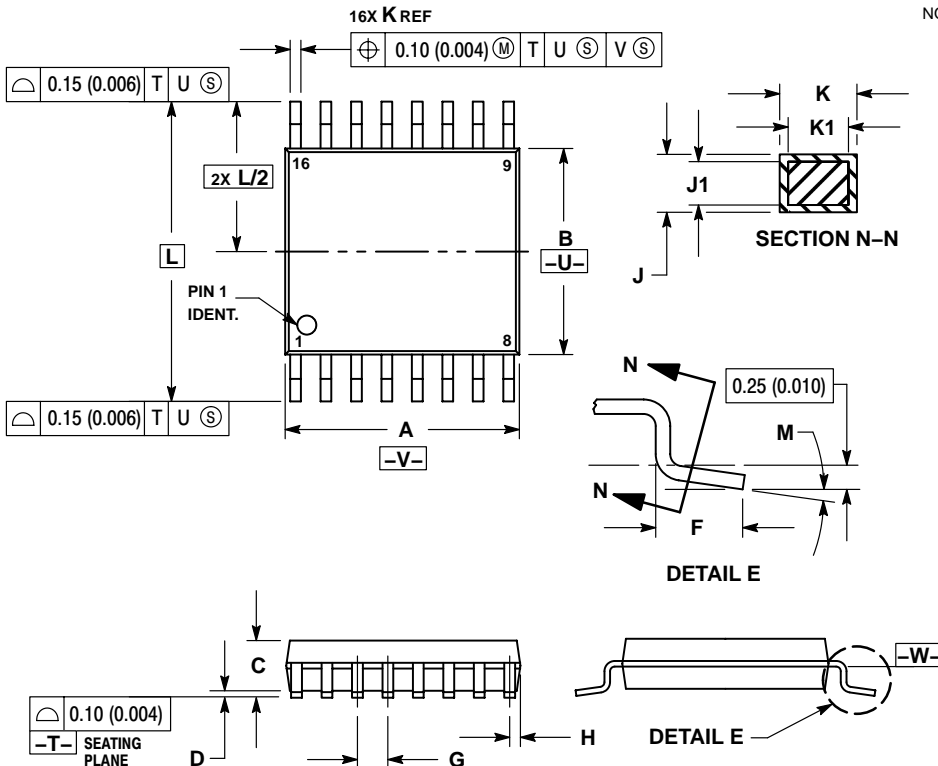


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.740 | 0.770 | 18.80 | 19.55 |
| B | 0.250 | 0.270 | 6.35 | 6.85 |
| C | 0.145 | 0.175 | 3.69 | 4.44 |
| D | 0.015 | 0.021 | 0.39 | 0.53 |
| F | 0.040 | 0.70 | 1.02 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.050 BSC | | 1.27 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.130 | 2.80 | 3.30 |
| L | 0.295 | 0.305 | 7.50 | 7.74 |
| M | 0° | 10° | 0° | 10° |
| S | 0.020 | 0.040 | 0.51 | 1.01 |

TSSOP-16
DT SUFFIX
PLASTIC TSSOP PACKAGE
CASE 948F-01
ISSUE A



NOTES:

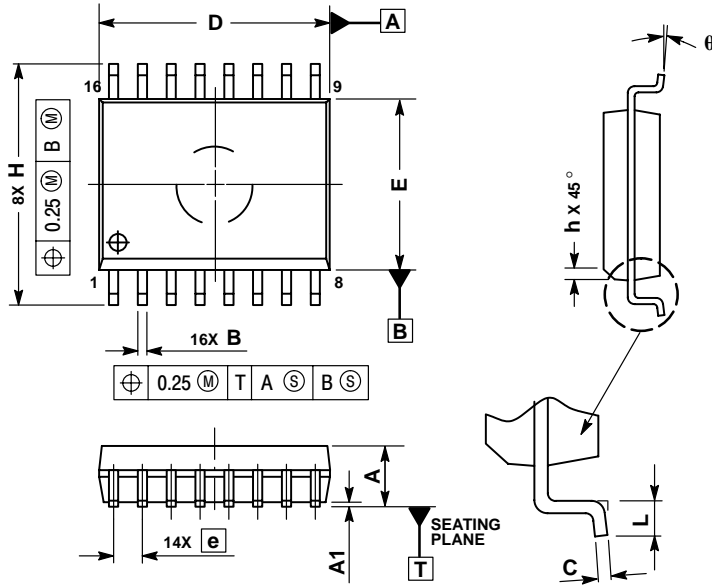
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.90 | 5.10 | 0.193 | 0.200 |
| B | 4.30 | 4.50 | 0.169 | 0.177 |
| C | --- | 1.20 | --- | 0.047 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.50 | 0.75 | 0.020 | 0.030 |
| G | 0.65 BSC | | 0.026 BSC | |
| H | 0.18 | 0.28 | 0.007 | 0.011 |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| J1 | 0.09 | 0.16 | 0.004 | 0.006 |
| K | 0.19 | 0.30 | 0.007 | 0.012 |
| K1 | 0.19 | 0.25 | 0.007 | 0.010 |
| L | 6.40 BSC | | 0.252 BSC | |
| M | 0° | 8° | 0° | 8° |

MC14569B

PACKAGE DIMENSIONS

SOIC-16 WB
 DW SUFFIX
 PLASTIC SOIC PACKAGE
 CASE 751G-03
 ISSUE C



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 2.35 | 2.65 |
| A1 | 0.10 | 0.25 |
| B | 0.35 | 0.49 |
| C | 0.23 | 0.32 |
| D | 10.15 | 10.45 |
| E | 7.40 | 7.60 |
| e | 1.27 BSC | |
| H | 10.05 | 10.55 |
| h | 0.25 | 0.75 |
| L | 0.50 | 0.90 |
| q | 0° | 7° |

MC14569B

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA

Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada

Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada

Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your
local Sales Representative.

This datasheet has been download from:

www.datasheetcatalog.com

Datasheets for electronics components.