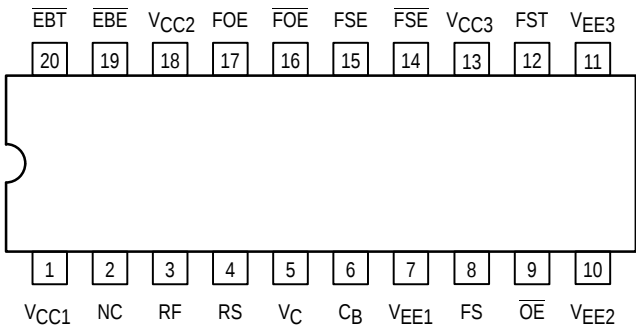


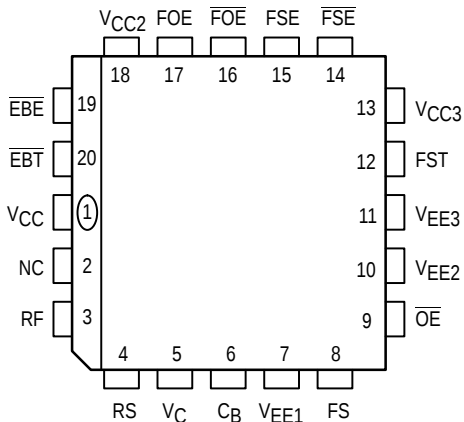
# 130MHz Voltage Controlled Multivibrator

- High Frequency VCM Ideal for PLL Applications
- Single External Resistor Determines Center Frequency; Additional Resistor Determines f/V Sensitivity
- Internal Ripple Counter (1/2, 1/4, 1/8) for Low Frequency Applications, TTL/ECL Outputs
- VCO Output Enable Pins (TTL/ECL Level)
- +5.0V Single Supply Voltage
- Packages: DIP, PLCC

Pinout: 20-Lead Plastic Package (Top View)

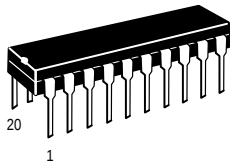


Pinout: 20-Lead PLCC Package (Top View)

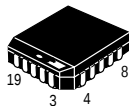


MC12101

130MHz VOLTAGE  
CONTROLLED  
MULTIVIBRATOR



P SUFFIX  
PLASTIC DIP PACKAGE  
CASE 738-03



FN SUFFIX  
PLCC PACKAGE  
CASE 775-02

## PIN NAMES

| Pin      | Function                     |
|----------|------------------------------|
| RF, RS   | Center Frequency Inputs      |
| VC       | Frequency Control Input      |
| CB       | Bias Filter Input            |
| FS       | Frequency Select Input       |
| OE       | TTL Output Enable            |
| FST      | TTL +2, +4, +8 Output        |
| FSE, FSE | Diff ECL +2, +4, +8 Outputs  |
| FOE, FOE | Diff ECL +1 Outputs          |
| EBE      | VCO Disable, ECL Level Input |
| EBT      | VCO Disable, TTL Level Input |



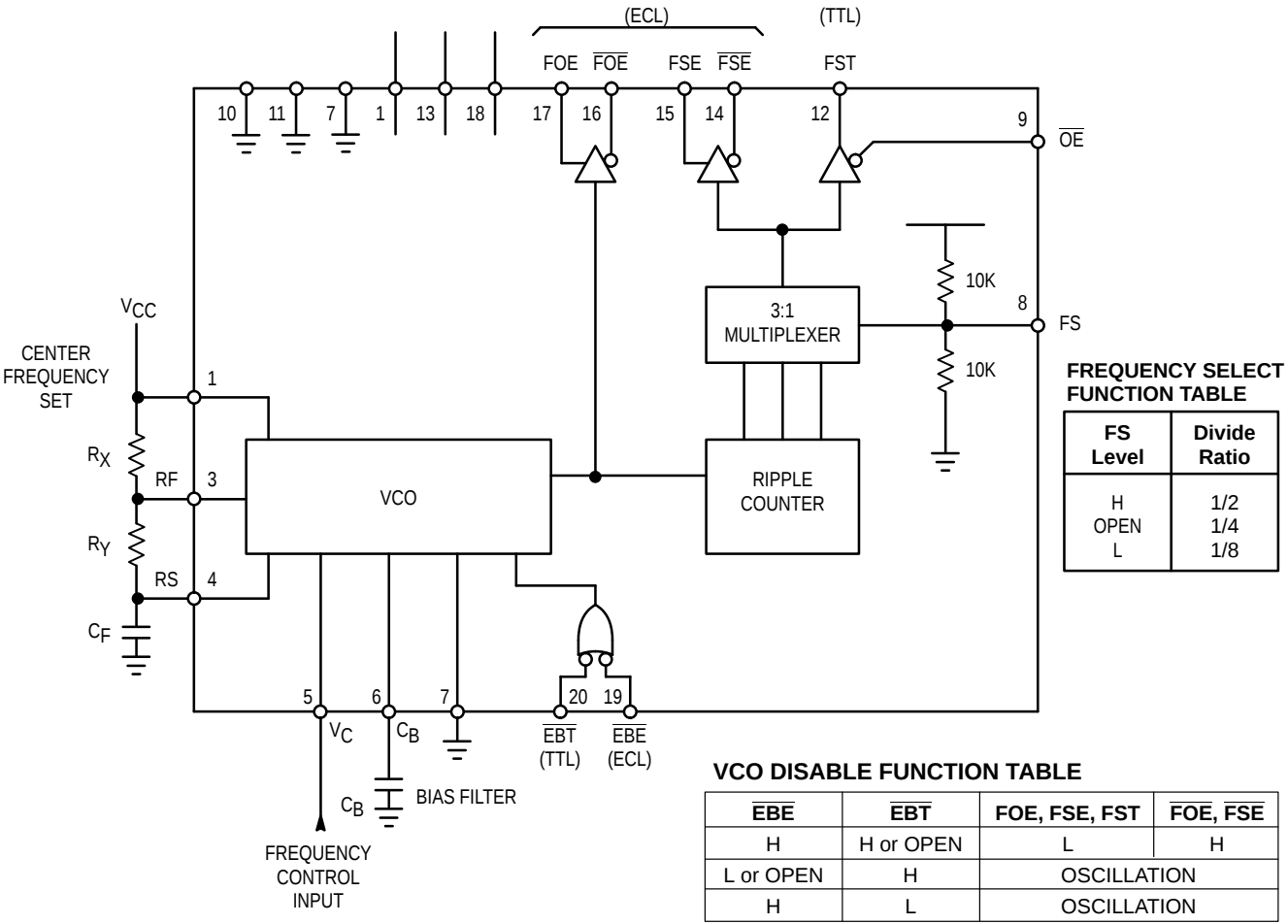


Figure 1. Block Diagram

ABSOLUTE MAXIMUM RATINGS

| Symbol                                                   | Parameter                          | Value                   | Unit |
|----------------------------------------------------------|------------------------------------|-------------------------|------|
| V <sub>CC1</sub><br>V <sub>CC2</sub><br>V <sub>CC3</sub> | Power Supply Voltage               | −0.5 to +8.0            | V    |
| V <sub>IN</sub> (TTL)                                    | Input Voltage                      | −0.5 to V <sub>CC</sub> | V    |
| V <sub>IN</sub> (ECL)                                    | Input Voltage                      | −0.5 to V <sub>CC</sub> | V    |
| I <sub>OUT</sub> (ECL)                                   | Output Source Current – Surge      | 100                     | mA   |
|                                                          | Output Source Current – Continuous | 50                      | mA   |
| T <sub>J</sub>                                           | Junction Operating Temperature     | +140                    | °C   |
| T <sub>STG</sub>                                         | Storage Temperature                | −55 to +150             | °C   |

OPERATING CONDITIONS

| Symbol                | Parameter               | Value          | Unit |
|-----------------------|-------------------------|----------------|------|
| T <sub>A</sub>        | Ambient Temperature     | 0 to +75       | °C   |
| V <sub>CC</sub>       | Supply Voltage          | +4.75 to +5.25 | V    |
| I <sub>OH</sub> (TTL) | TTL High Output Current | −1.0           | mA   |
| I <sub>OL</sub> (TTL) | TTL Low Output Current  | 20             | mA   |

**DC CHARACTERISTICS** ( $V_{CC} = 5.0V \pm 5\%$ ;  $R_X = 2.4k\Omega$ ;  $R_Y = 1.5k\Omega$ ;  $C_B = 0.001\mu F$ )

| Symbol            | Characteristic                                         | 0°C |     | 25°C      |           |           | 75°C |     | Unit    | Condition                                                |
|-------------------|--------------------------------------------------------|-----|-----|-----------|-----------|-----------|------|-----|---------|----------------------------------------------------------|
|                   |                                                        | Min | Max | Min       | Typ       | Max       | Min  | Max |         |                                                          |
| I <sub>CC</sub>   | Supply Current                                         | 80  | 135 | 70        | 100       | 120       | 85   | 150 | mA      | $\overline{EBT} = \overline{EBE} = V_{CC}$<br>(ECL, TTL) |
| V <sub>OLT</sub>  | Output Low Voltage, TTL                                |     |     |           |           | 0.5       |      |     | V       | $F_S = GND$                                              |
| V <sub>OHT</sub>  | Output High Voltage, TTL                               |     |     | 2.4       |           |           |      |     | V       | $F_S = GND$                                              |
| V <sub>OLE</sub>  | Output Low Voltage, ECL                                |     |     | 3.0       |           | 3.4       |      |     | V       | $V_{CC} = 5.0V$ , $R_L = 50\Omega$ ,<br>$V_T = 3.0V$     |
| V <sub>OHE</sub>  | Output High Voltage, ECL                               |     |     | 3.9       |           | 4.19      |      |     | V       | $V_{CC} = 5.0V$ , $R_L = 50\Omega$ ,<br>$V_T = 3.0V$     |
| I <sub>ILT</sub>  | $\overline{EBT}$ Input Low Current                     |     |     |           |           | 400       |      |     | $\mu A$ | $V_{IN} = 0.4V$                                          |
| I <sub>IHT</sub>  | $\overline{EBT}$ Input High Current                    |     |     |           |           | 20        |      |     | $\mu A$ | $V_{IN} = 2.7V$                                          |
|                   |                                                        |     |     |           |           | 100       |      |     | $\mu A$ | $V_{IN} = 7.0V$                                          |
| I <sub>INHE</sub> | $\overline{EBE}$ Input High Current                    |     |     |           |           | 250       |      |     | $\mu A$ | $V_{IN} = 4.19V$                                         |
| I <sub>INLE</sub> | $\overline{EBE}$ Input Low Current                     |     |     | 1.0       |           |           |      |     | $\mu A$ | $V_{IN} = 3.05V$                                         |
| V <sub>ILS</sub>  | FS Input, Max "L" Level                                |     |     |           |           | 1.2       |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>IMS</sub>  | FS Input, "Medium" Level                               |     |     | 2.0       |           | 3.0       |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>IHS</sub>  | FS Input, Min "H" Level                                |     |     | 3.8       |           |           |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>ILT</sub>  | $\overline{EBT}$ Input Low Voltage                     |     | 0.8 |           |           | 0.8       |      | 0.8 | V       |                                                          |
| V <sub>IHT</sub>  | $\overline{EBT}$ Input High Voltage                    | 2.0 |     | 2.0       |           |           | 2.0  |     | V       |                                                          |
| V <sub>IHE</sub>  | $\overline{EBE}$ Input High Voltage                    |     |     | 3.87      |           | 4.19      |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>ILE</sub>  | $\overline{EBE}$ Input Low Voltage                     |     |     | 3.05      |           | 3.52      |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>LM</sub>   | V <sub>C</sub> Input Voltage,<br>$V_C = V_{CC} \div 2$ |     |     | $\pm 1.1$ | $\pm 1.3$ | $\pm 1.5$ |      |     | V       | $V_{CC} = 5.0V$                                          |
| V <sub>CB</sub>   | C <sub>B</sub> Output Voltage                          |     |     | 2.35      | 2.50      | 2.65      |      |     | V       | $V_{CC} = 5.0V$                                          |

**AC CHARACTERISTICS** ( $V_{CC} = 5.0V$ ;  $R_X = 2.4k\Omega$ ;  $R_Y = 1.5k\Omega$ ;  $C_B = 0.001\mu F$ ;  $V_T = 3.0V$ )

| Symbol                                 | Characteristic                                                       | 0°C |     | 25°C |     |     | 75°C |     | Unit | Condition                                |
|----------------------------------------|----------------------------------------------------------------------|-----|-----|------|-----|-----|------|-----|------|------------------------------------------|
|                                        |                                                                      | Min | Max | Min  | Typ | Max | Min  | Max |      |                                          |
| FO                                     | Center Frequency ( $V_{VC} - V_{CB} = 0V$ )                          |     |     | 117  | 130 | 143 |      |     | MHz  | $V_{CC} = +2.0V$<br>$V_{EE} = -3.0V$     |
| F <sub>MAX</sub> –<br>F <sub>MIN</sub> | Frequency Range<br>( $V_C = 1/2 V_{CC} \pm 1.5V$ , $V_{CC} = 5.0V$ ) |     |     | 68   | 80  | 92  |      |     | MHz  |                                          |
| t <sub>rE</sub>                        | FOE/ $\overline{FOE}$ /FSE/ $\overline{FSE}$ Rise Time               |     |     | 0.5  |     | 2.4 |      |     | ns   |                                          |
| t <sub>fE</sub>                        | FOE/ $\overline{FOE}$ /FSE/ $\overline{FSE}$ Fall Time               |     |     | 0.5  |     | 2.4 |      |     | ns   |                                          |
| TTT                                    | Reset Time                                                           |     |     |      |     | 40  |      |     | ns   | $\overline{EBT} \sim FST$                |
| TTO                                    | Reset Time                                                           |     |     |      |     | 25  |      |     | ns   | $\overline{EBT} \sim FOE/\overline{FOE}$ |
| TTS                                    | Reset Time                                                           |     |     |      |     | 35  |      |     | ns   | $\overline{EBT} \sim FSE/\overline{FSE}$ |
| TET                                    | Reset Time                                                           |     |     |      |     | 32  |      |     | ns   | $\overline{EBE} \sim FST$                |
| TEO                                    | Reset Time                                                           |     |     |      |     | 12  |      |     | ns   | $\overline{EBE} \sim FOE/\overline{FOE}$ |
| TES                                    | Reset Time                                                           |     |     |      |     | 30  |      |     | ns   | $\overline{EBE} \sim FSE/\overline{FSE}$ |

Loading: ECL = 50 $\Omega$  to V<sub>T</sub>; TTL = 500 $\Omega$ , 50pF

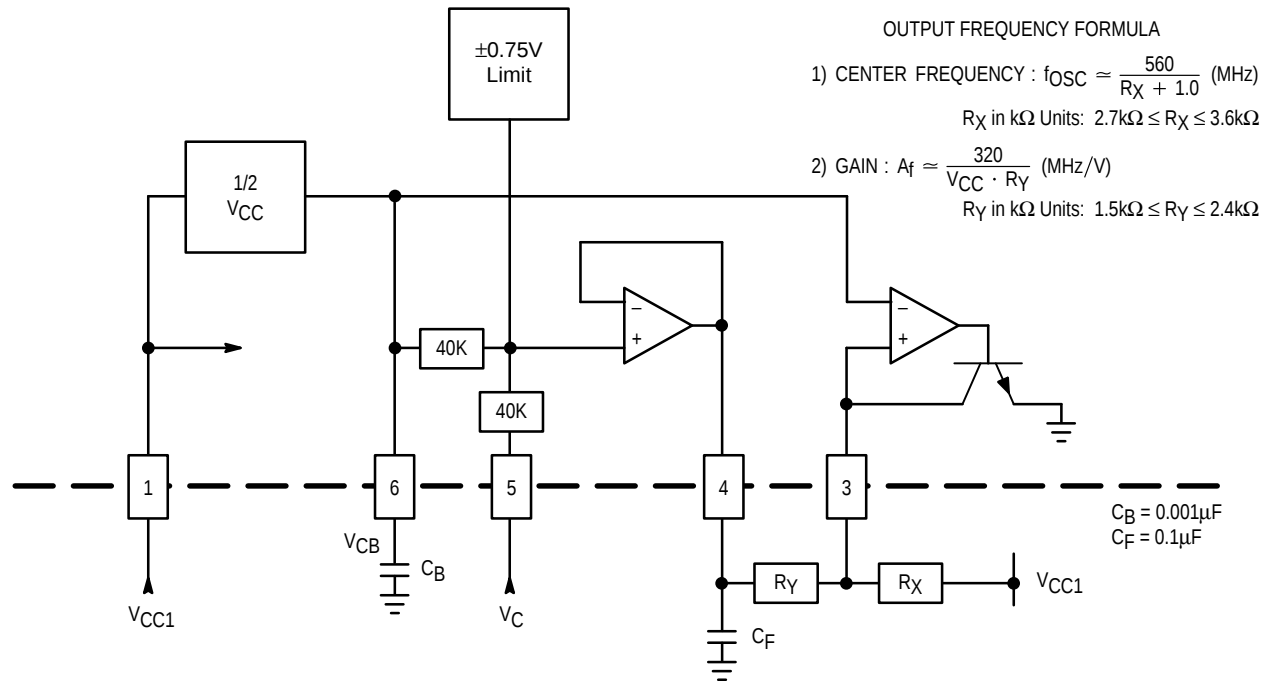


Figure 2. VCO Detail

**Notes:**

- For optimum VCO linearity (MHz/V), the following resistor ranges are recommended:  
 $3.6k\Omega \leq R_X \leq 4.6k\Omega$  ( $R_Y = 2.0k\Omega$ )  
 $1.5k\Omega \leq R_Y \leq 2.4k\Omega$  ( $R_X = 3.3k\Omega$ )
- TTL output maximum frequency = 50MHz
- Simultaneous use of both ECL and TTL outputs are not recommended due to excessive power consumption for the EIAJ Type II SO package

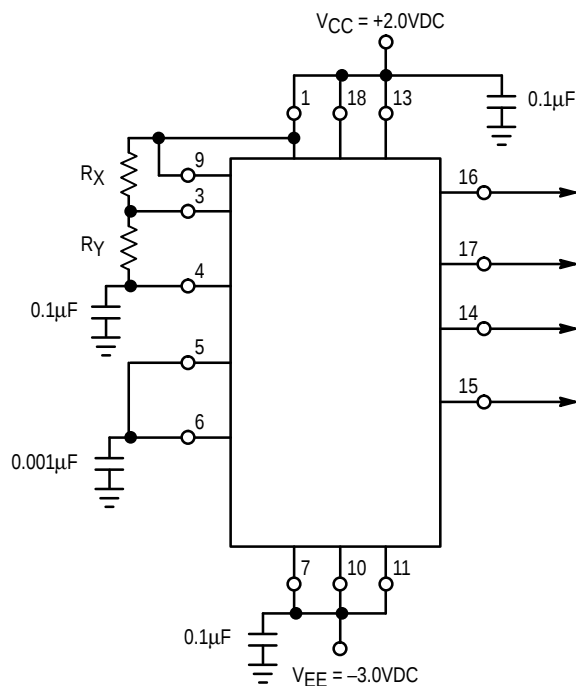
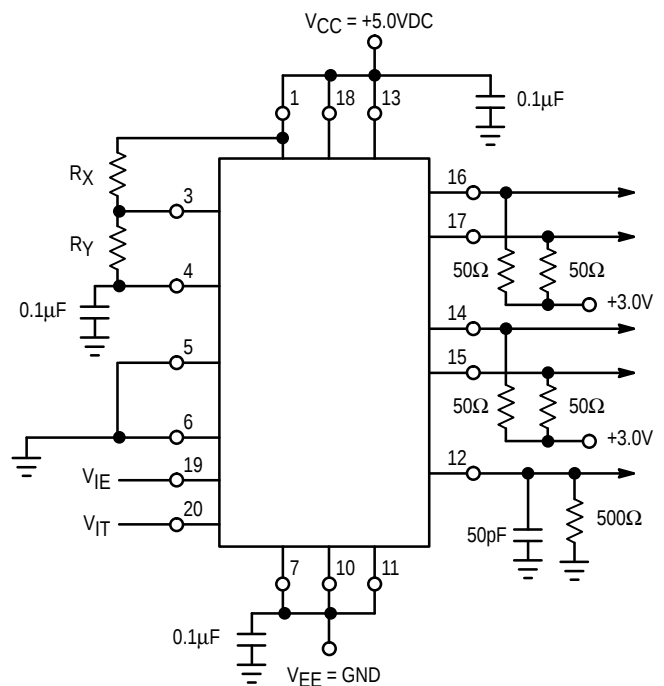
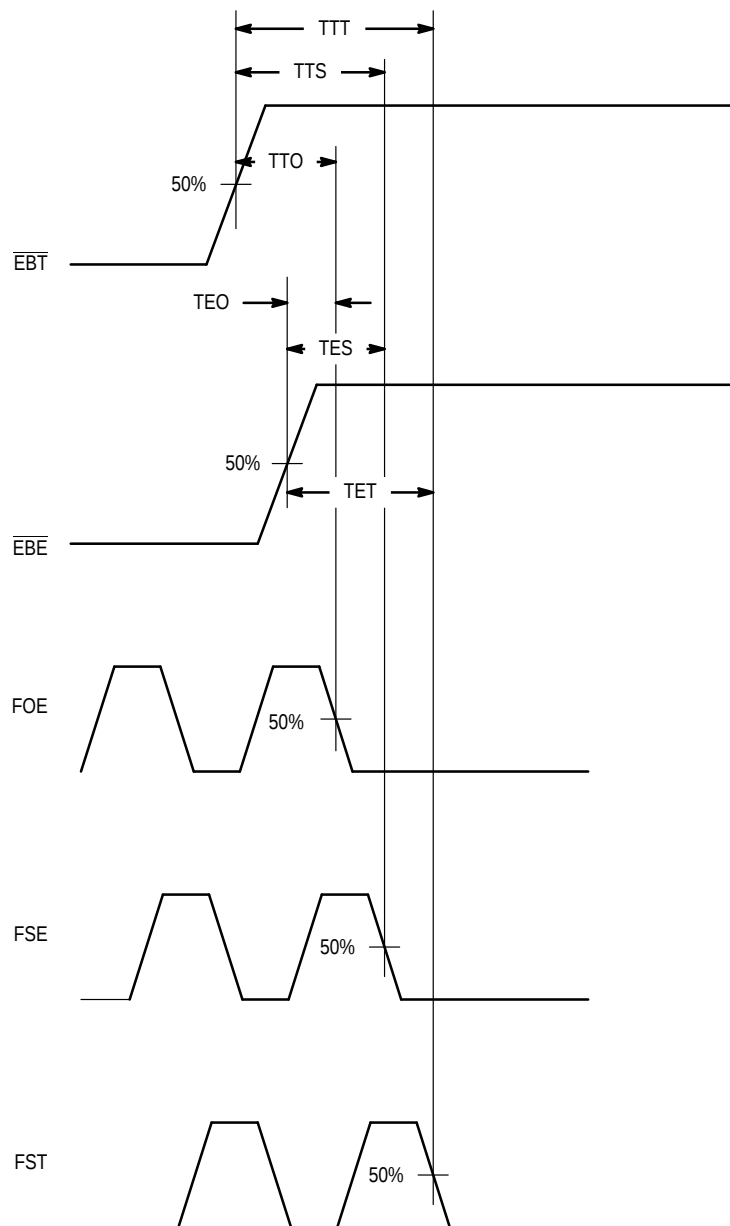
Figure 3. AC Test Circuit (FO/ $t_{rE}$ / $t_{fE}$  Measurement)

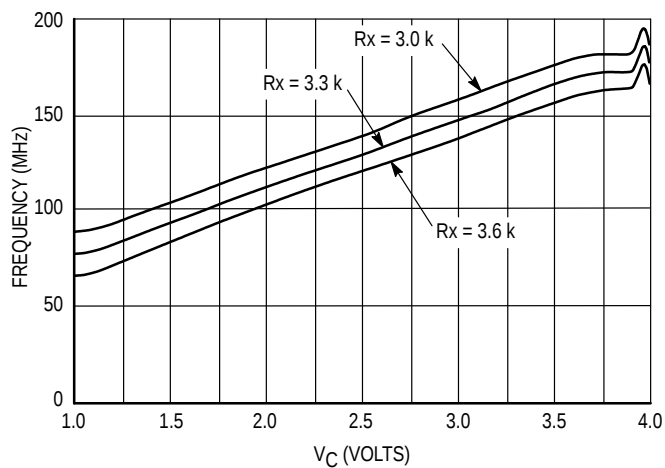
Figure 4. AC Test Circuit (Other Measurements)



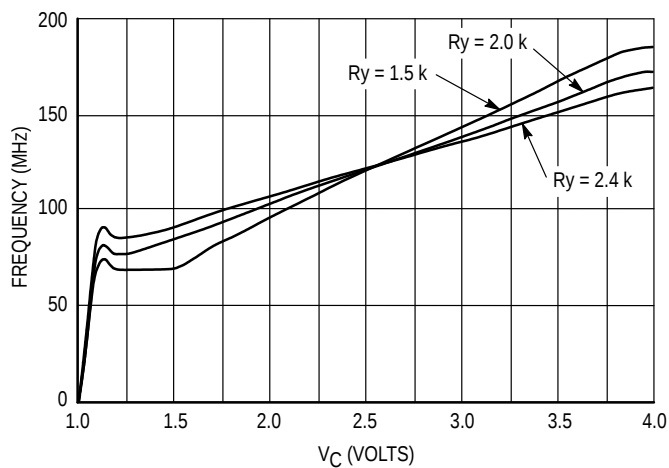
### Figure 5. Switching Waveforms

### VCO DISABLE FUNCTION TABLE

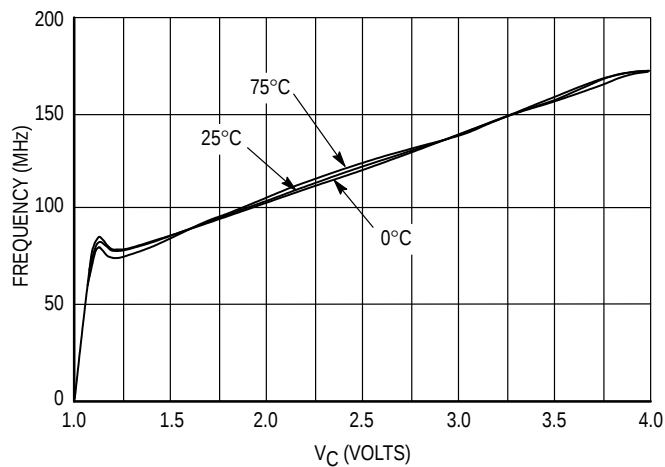
| EBE       | EBT       | FOE, FSE, FST | FOE, FSE |
|-----------|-----------|---------------|----------|
| H         | H or OPEN | L             | H        |
| L or OPEN | H         | OSCILLATION   |          |
| H         | L         | OSCILLATION   |          |



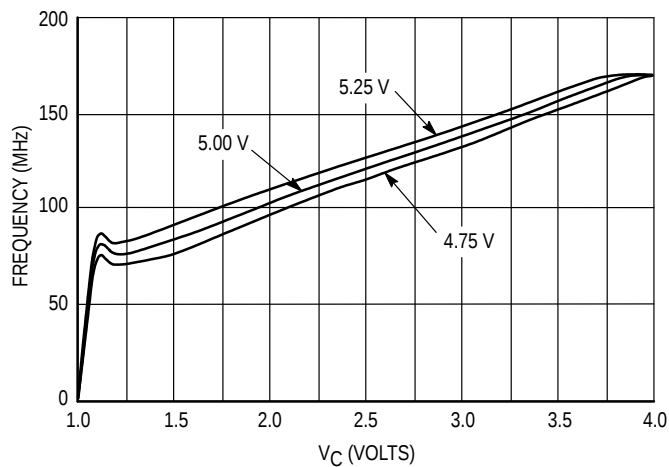
**Figure 6.  $V_C$  versus Output Frequency**  
Varying  $R_x$  @  $V_{CC} = 5.0$  V;  $T_A = 25^\circ\text{C}$ ;  $R_y = 2.0$  k $\Omega$



**Figure 7.  $V_C$  versus Output Frequency**  
Varying  $R_y$  @  $V_{CC} = 5.0$  V;  $T_A = 25^\circ\text{C}$ ;  $R_x = 3.3$  k $\Omega$



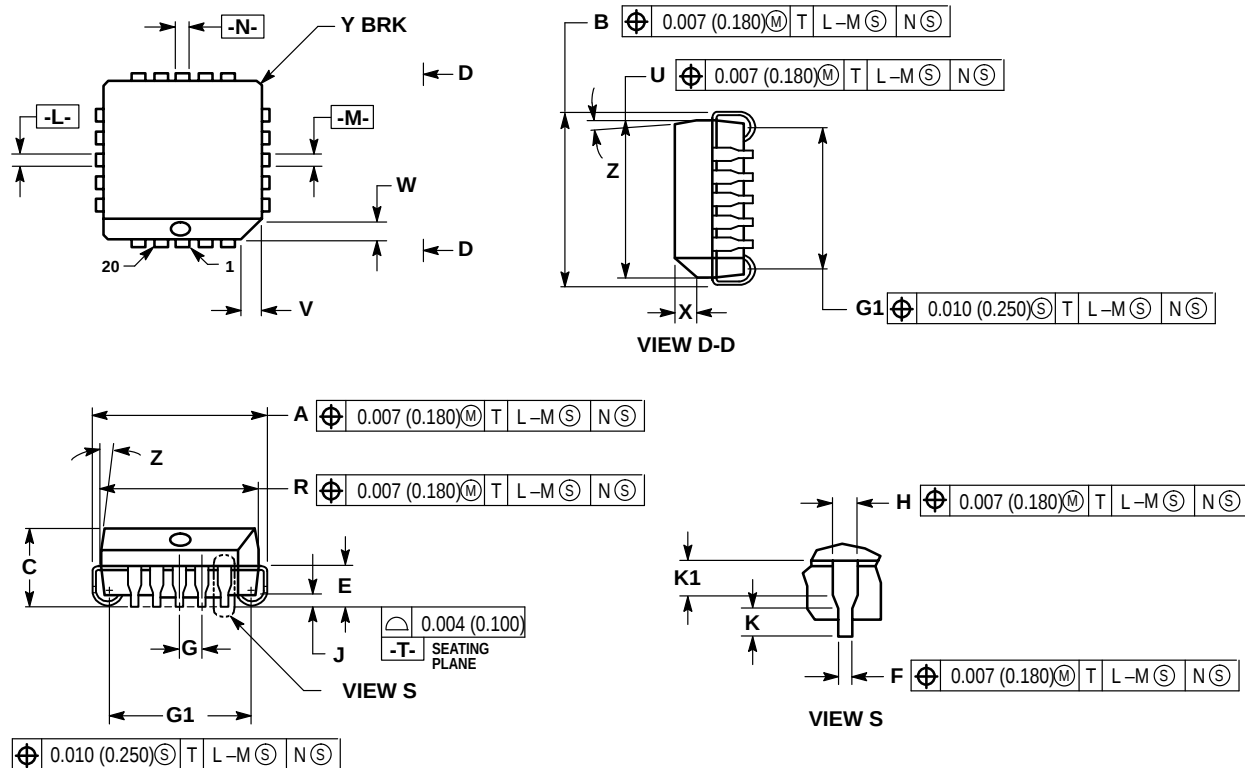
**Figure 8.  $V_C$  versus Output Frequency**  
Varying  $T_A$  @  $V_{CC} = 5.0$  V;  $R_x = 3.3$  k $\Omega$ ;  $R_y = 2.0$  k $\Omega$



**Figure 9.  $V_C$  versus Output Frequency**  
Varying  $V_{CC}$  @  $R_x = 3.3$  k $\Omega$ ;  $R_y = 2.0$  k $\Omega$ ;  $T_A = 25^\circ\text{C}$

## OUTLINE DIMENSIONS

FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 775-02  
ISSUE C

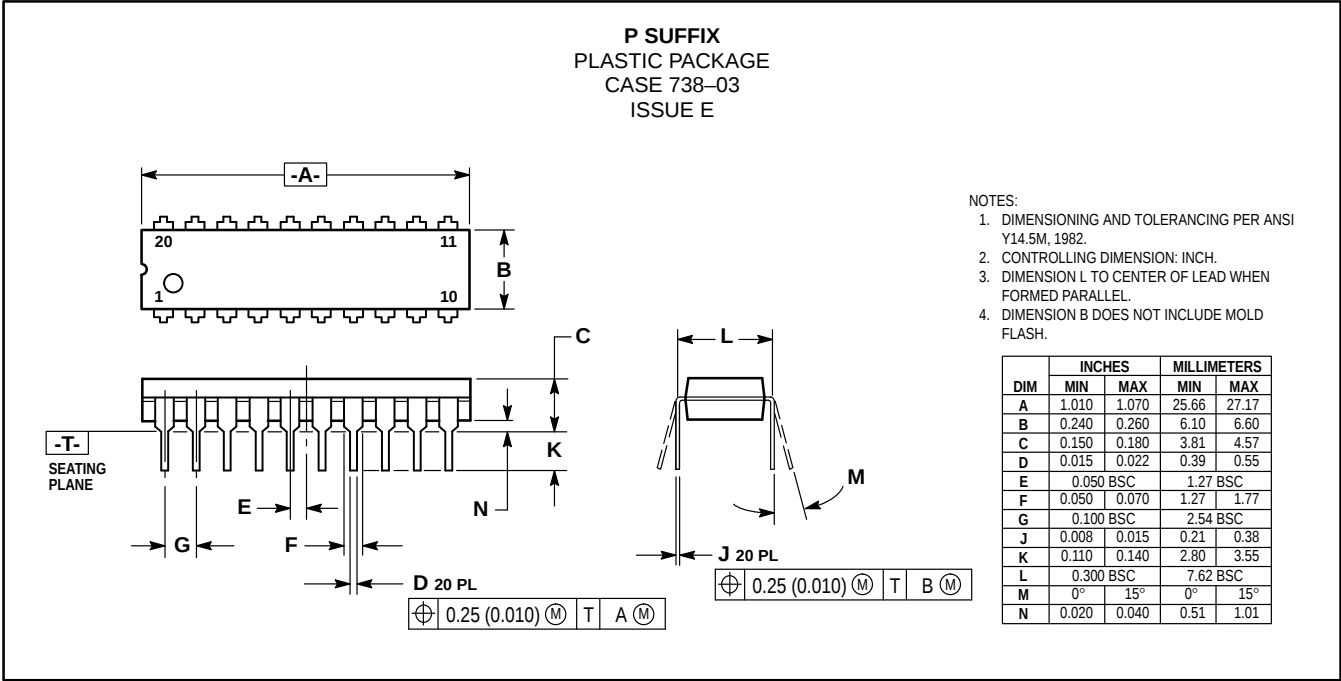


## NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.385     | 0.395 | 9.78        | 10.03 |
| B   | 0.385     | 0.395 | 9.78        | 10.03 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | —     | 0.51        | —     |
| K   | 0.025     | —     | 0.64        | —     |
| R   | 0.350     | 0.356 | 8.89        | 9.04  |
| U   | 0.350     | 0.356 | 8.89        | 9.04  |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | —         | 0.020 | —           | 0.50  |
| Z   | 2°        | 10°   | 2°          | 10°   |
| G1  | 0.310     | 0.330 | 7.88        | 8.38  |
| K1  | 0.040     | —     | 1.02        | —     |

OUTLINE DIMENSIONS



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