



Consider MC12052A for New Designs

1.1 GHz Low Power Dual Modulus Prescaler

The MC12022SLA can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145XXX series in a PLL to provide tuning signals up to 1.1 GHz in programmable frequency steps. This device is a reduced current version of the MC12022A/B.

The MC12022SLB can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

A Divide Ratio Control (SW) permits selection of a 64/65 or 128/129 divide ratio as desired.

The Modulus Control (MC) selects the proper divide number after SW has been biased to select the desired divide ratio.

- 1.1 GHz Toggle Frequency
- Supply Voltage of 4.5 to 5.5 V
- Low-Power 4.0 mA Typical
- Operating Temperature Range of -40 to 85°C
- Short Setup Time (t_{set}) 16 ns Maximum @ 1.1 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL

FUNCTIONAL TABLE

| SW | MC | Divide Ratio |
|----|----|--------------|
| H | H | 64 |
| H | L | 65 |
| L | H | 128 |
| L | L | 129 |

NOTES: 1. SW: H = V_{CC} , L = Open. A logic L can also be applied by grounding this pin, but this is not recommended due to increased power consumption.
2. MC: H = 2.0 V to V_{CC} , L = GND to 0.8 V.

DESIGN GUIDE

| Criteria | Value | Unit |
|---------------------------------|-------|------|
| Internal Gate Count* | 67 | ea |
| Internal Gate Propagation Delay | 200 | ps |
| Internal Gate Power Dissipation | 0.75 | mW |
| Speed Power Product | 0.15 | pJ |

NOTE: * Equivalent to a two-input NAND gate

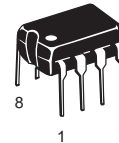
MC12022SLA MC12022SLB

MECL PLL COMPONENTS ÷64/65, ÷128/129 DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

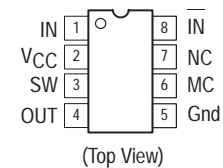


D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX
PLASTIC PACKAGE
CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

| Device | Operating Temp Range | Package |
|-------------|--------------------------|---------|
| MC12022SLAD | $T_A =$ -40° to +85°C | SO-8 |
| MC12022SLAP | | Plastic |
| MC12022SLBD | | SO-8 |
| MC12022SLBP | | Plastic |

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MC123456 PC123[dvicens1]

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|------------------------------|------------------|-------------|------|
| Power Supply Voltage, Pin 2 | V _{CC} | -0.5 to 7.0 | Vdc |
| Operating Temperature Range | T _A | -40 to 85 | °C |
| Storage Temperature Range | T _{stg} | -65 to 150 | °C |
| Modulus Control Input, Pin 6 | MC | -0.5 to 6.5 | Vdc |

NOTE: ESD data available upon request.

ELECTRICAL CHARACTERISTICS (V_{CC} = 4.5 to 5.5 V; T_A = -40°C to 85°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------------------|-------------------------|-----------------|-------------------------|------------------|
| Toggle Frequency (Sine Wave Input) | f _t | 0.1 | 1.4 | 1.1 | GHz |
| Supply Current Output Unloaded (Pin 2) at 5.0 Vdc | I _{CC} | - | 3.8 | 6.5 | mA |
| Modulus Control Input High (MC) | V _{IH1} | 2.0 | - | V _{CC} + 0.5 V | V |
| Modulus Control Input Low (MC) | V _{IL1} | - | - | 0.8 | V |
| Divide Ratio Control Input High (SW) | V _{IH2} | V _{CC} - 0.5 V | V _{CC} | V _{CC} - 0.5 V | Vdc |
| Divide Ratio Control Input Low (SW) | V _{IL2} | Open | Open | Open | - |
| Output Voltage Swing (C _L = 8.0 pF; R _L = 14.4 kΩ) | V _{out} | 1.0 | 1.6 | - | V _{pp} |
| Modulus Setup Time MC to Out | t _{set} | - | 11 | 16 | ns |
| Input Voltage Sensitivity 250–1100 MHz 100–250 MHz | V _{in(min)} | 100 400 | - - | 1500 1500 | mV _{pp} |
| Output Current (C _L = 8.0 pF; R _L = 4.4 kΩ, V _{CC} = 5.0 V) | I _O | - | .75 | 4.0 | mA |

Figure 1. Logic Diagram (MC12022SLA)

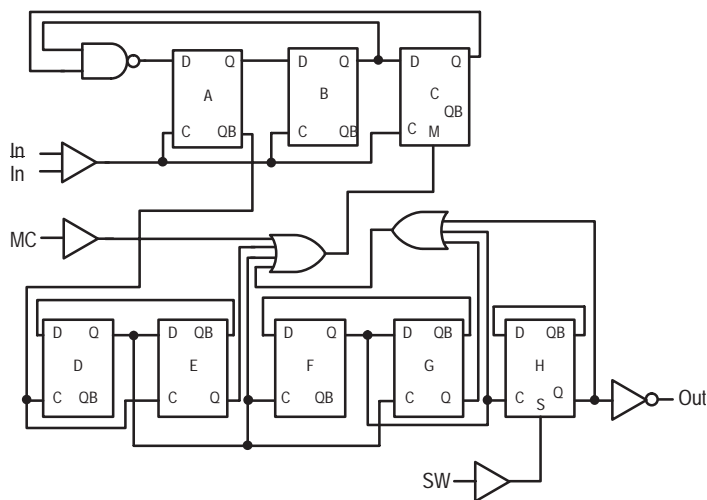
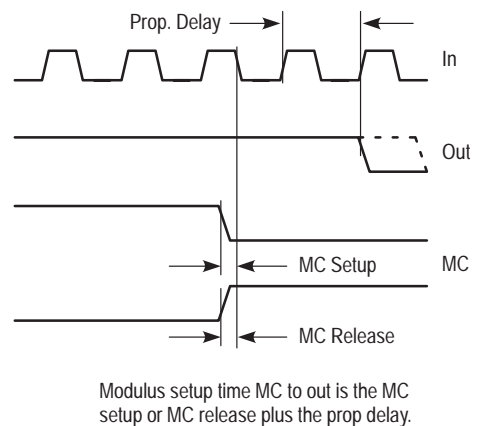


Figure 2. Modulus Setup Time

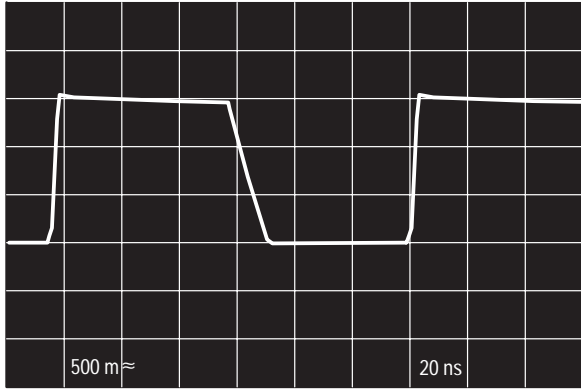


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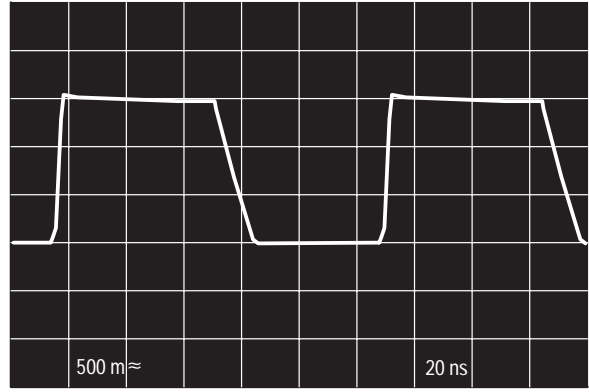
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MC123456 PC123[dviceno1]

Figure 3. Typical Output Waveforms

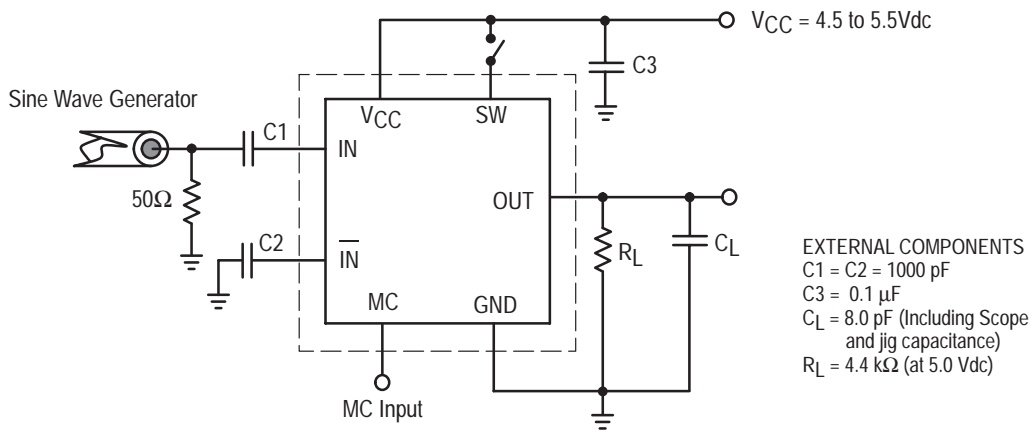


(+64, 500MHz Input Frequency, $V_{CC} = 5.0V$, $T_A = 25^\circ C$, Output Loaded)



(+128, 1.1GHz Input Frequency, $V_{CC} = 5.0V$, $T_A = 25^\circ C$, Output Loaded)

Figure 4. AC Test Circuit



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Figure 5. Input Signal Amplitude versus Input Frequency

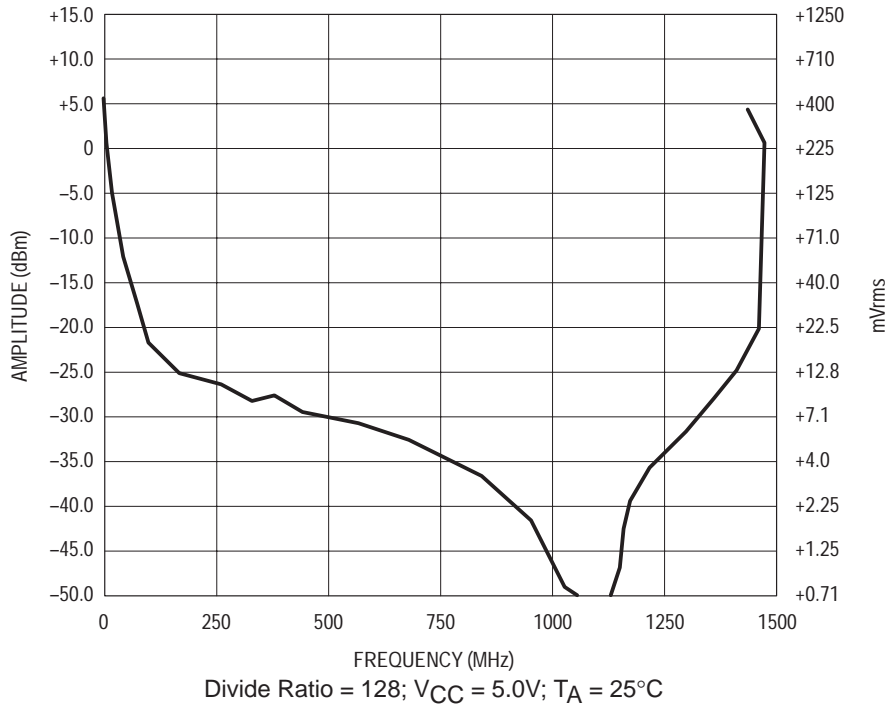
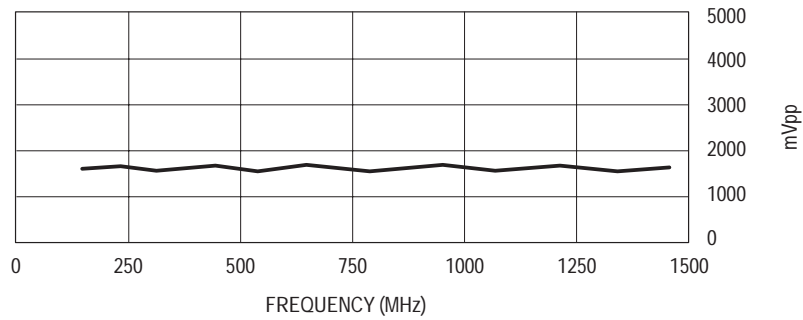


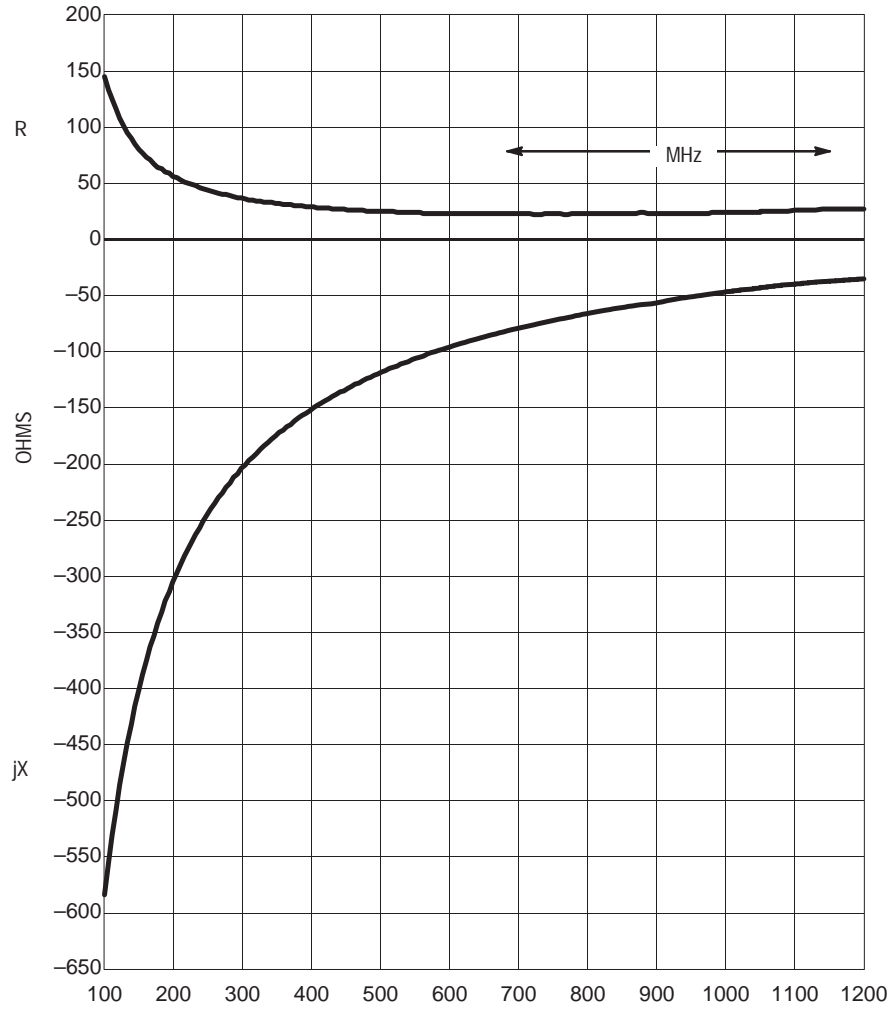
Figure 6. Output Amplitude versus Input Frequency



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Figure 7. Typical Input Impedance versus Input Frequency

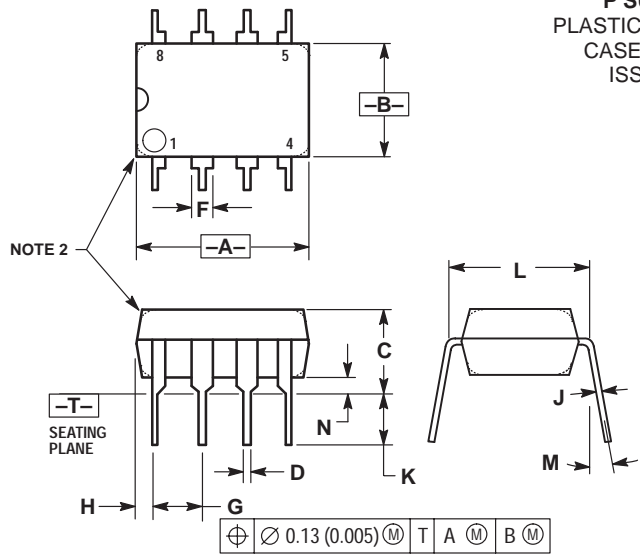


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OUTLINE DIMENSIONS

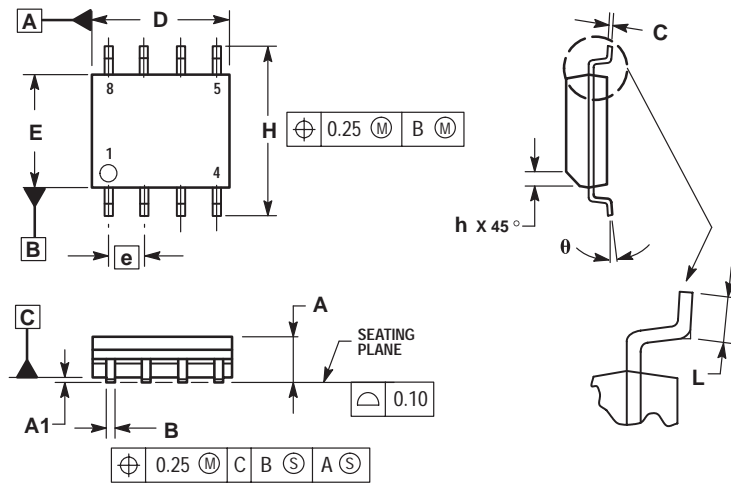
P SUFFIX
 PLASTIC PACKAGE
 CASE 626-05
 ISSUE K



- NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.40 | 10.16 | 0.370 | 0.400 |
| B | 6.10 | 6.60 | 0.240 | 0.260 |
| C | 3.94 | 4.45 | 0.155 | 0.175 |
| D | 0.38 | 0.51 | 0.015 | 0.020 |
| F | 1.02 | 1.78 | 0.040 | 0.070 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 0.76 | 1.27 | 0.030 | 0.050 |
| J | 0.20 | 0.30 | 0.008 | 0.012 |
| K | 2.92 | 3.43 | 0.115 | 0.135 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | --- | 10° | --- | 10° |
| N | 0.76 | 1.01 | 0.030 | 0.040 |

D SUFFIX
 PLASTIC PACKAGE
 CASE 751-06
 (SO-8)
 ISSUE T



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. DIMENSIONS ARE IN MILLIMETER.
 3. DIMENSION 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 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.


| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| B | 0.35 | 0.49 |
| C | 0.19 | 0.25 |
| D | 4.80 | 5.00 |
| E | 3.80 | 4.00 |
| e | 1.27 BSC | |
| H | 5.80 | 6.20 |
| h | 0.25 | 0.50 |
| L | 0.40 | 1.25 |
| θ | 0° | 7° |

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