



MOTOROLA

1.1 GHz Dual Modulus Prescaler

The MC12028A 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.

The MC12028B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

A Divide Ratio Control (SW) permits selection of a 32/33 or 64/65 divide ratio as desired.

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

NOTE: The "B" Version Is Not Recommended for New Designs

- 1.1 GHz Toggle Frequency
- MC12028A for Positive Edge Triggered Synthesizers
- 6.5 mA Maximum, -40 to 85°C, V_{CC} = 5.5 Vdc
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL
- Low-Power 4.0 mA Typical

FUNCTIONAL TABLE

| SW | MC | Divide Ratio |
|----|----|--------------|
| H | H | 32 |
| H | L | 33 |
| L | H | 64 |
| L | L | 65 |

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

MAXIMUM RATINGS

| Characteristic | Symbol | Range | 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.

Order this document by MC12028A/D

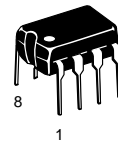
MC12028A MC12028B

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

SEMICONDUCTOR
TECHNICAL DATA

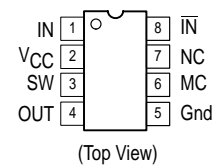


D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX
PLASTIC PACKAGE
CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

| Device | Operating Temp Range | Package |
|-----------|--------------------------------|---------|
| MC12028AD | T _A = -40° to +85°C | SO-8 |
| MC12028AP | | Plastic |
| MC12028BD | | SO-8 |
| MC12028BP | | Plastic |

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ELECTRICAL CHARACTERISTICS ($V_{CC} = 4.5$ to $5.5V$; $T_A = -40$ to $85^\circ C$, 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) | I_{CC} | – | 4.0 | 6.5 | mA |
| Modulus Control Input High (MC) | V_{IH1} | 2.0 | – | V_{CC} | V |
| Modulus Control Input Low (MC) | V_{IL1} | – | – | 0.8 | V |
| Divide Ratio Control Input High (SW) | V_{IH2} | V_{CC} | V_{CC} | V_{CC} | Vdc |
| Divide Ratio Control Input Low (SW) | V_{IL2} | Open | Open | Open | — |
| Output Voltage Swing ($C_L = 12$ pF; $R_L = 2.2$ k Ω) | 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} | 100 400 | – – | 1500 1500 | mV _{pp} |
| Output Current ($C_L = 12$ pF; $R_L = 2.2$ k Ω) | I_O | – | 1.5 | 4.0 | mA |

Figure 1. Logic Diagram (MC12028A)

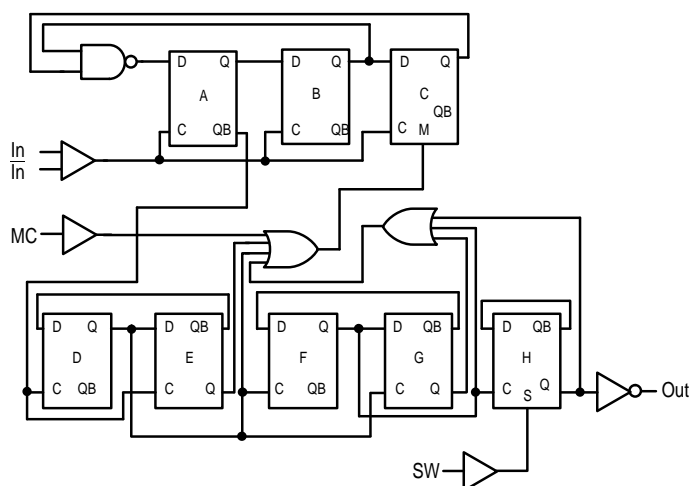


Figure 2. Modulus Setup Time

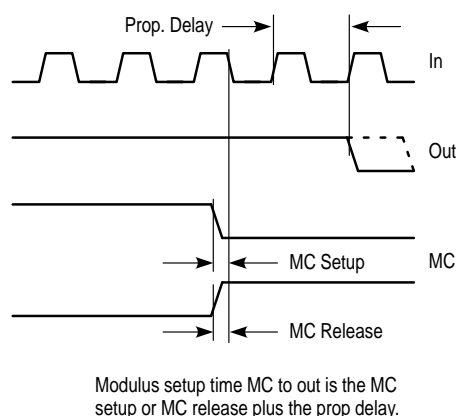
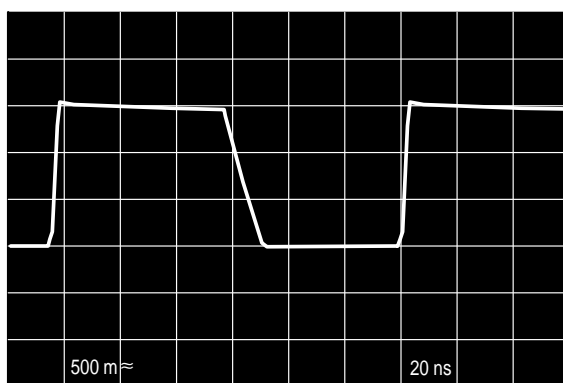


Figure 3. Typical Output Waveform



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Figure 4. AC Test Circuit

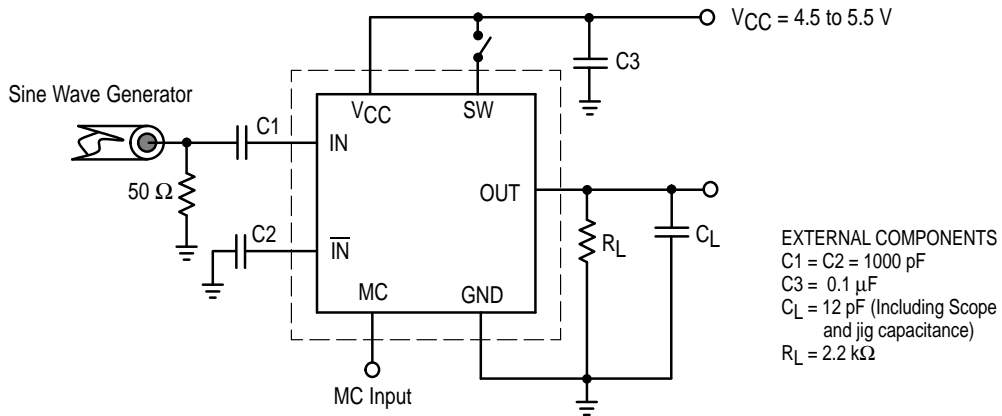
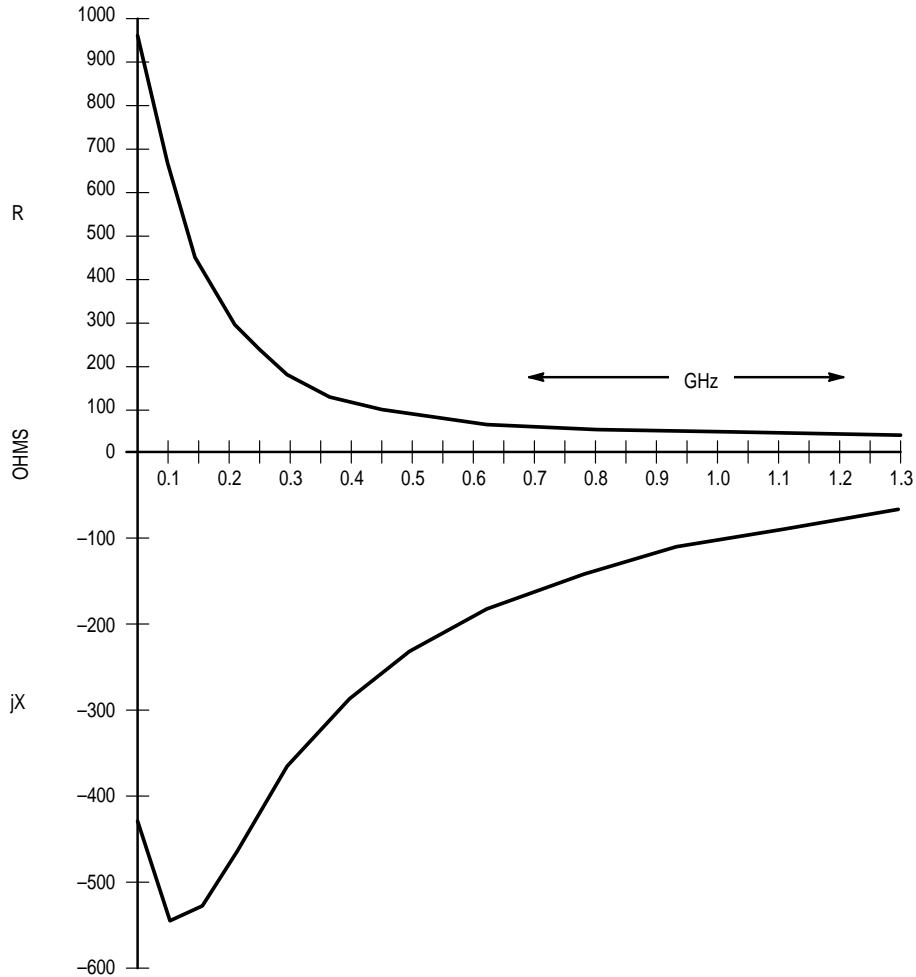
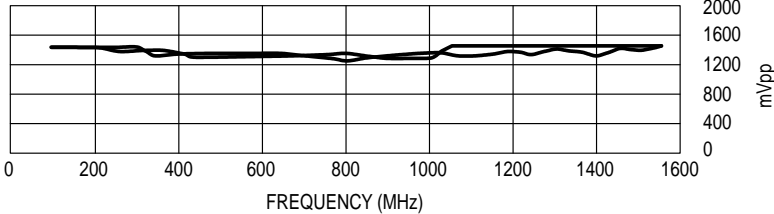
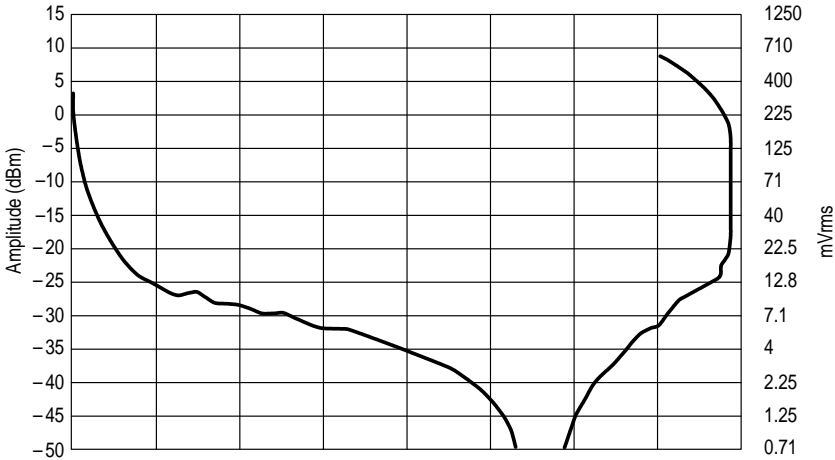


Figure 5. Typical Input Impedance versus Input Frequency



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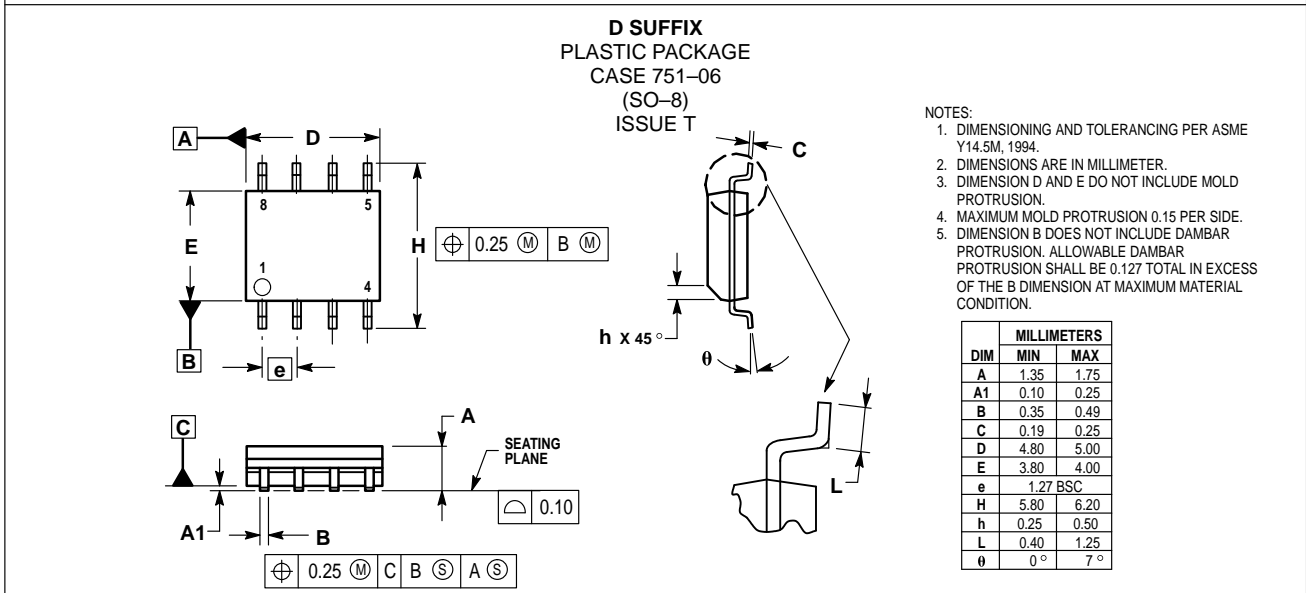
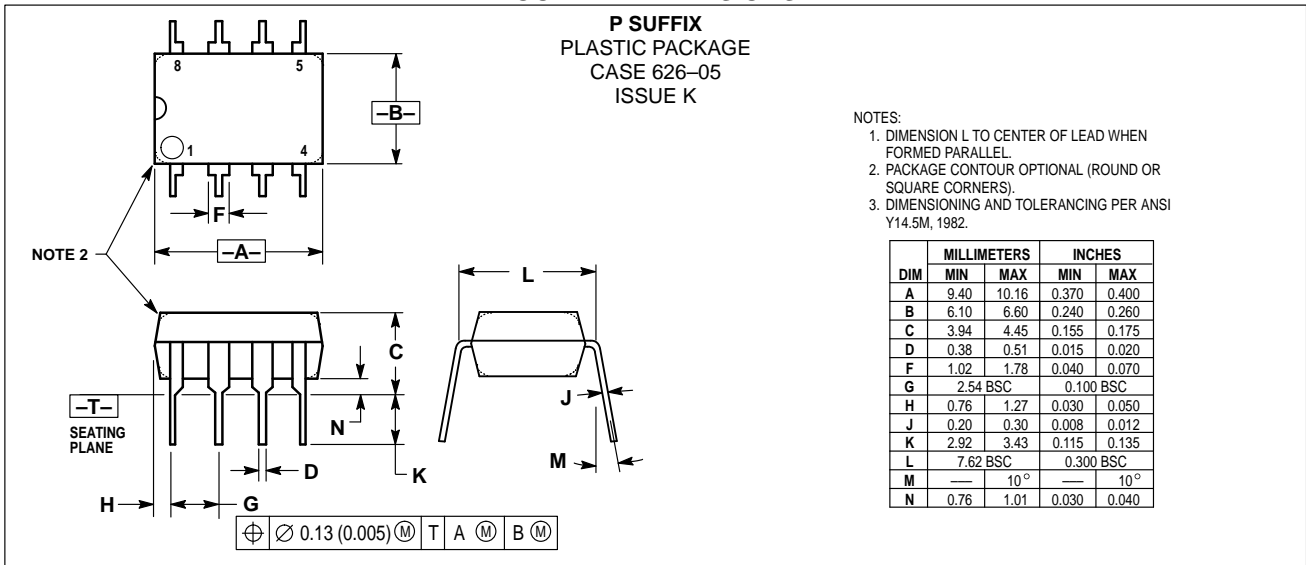
Figure 6. Input Signal Amplitude versus Input Frequency



Divide Ratio = 32

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