

**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	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-65 to 150	$^{\circ}\text{C}$
Modulus Control Input, Pin 6	MC	-0.5 to 6.5	Vdc

NOTE: ESD data available upon request.

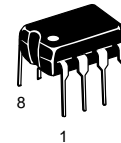
MC12028A MC12028B

MECL PLL COMPONENTS $\div 64/65, \div 128/129$ DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

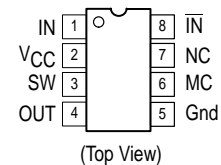


D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX
PLASTIC PACKAGE
CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temp Range	Package
MC12028AD	$T_A = -40^{\circ}$ to $+85^{\circ}\text{C}$	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	—	1500	mV _{pp}
		400	—	1500	
Output Current ($C_L = 12$ pF; $R_L = 2.2$ k Ω)	I_O	—	1.5	4.0	mA

Figure 1. Logic Diagram (MC12028A)

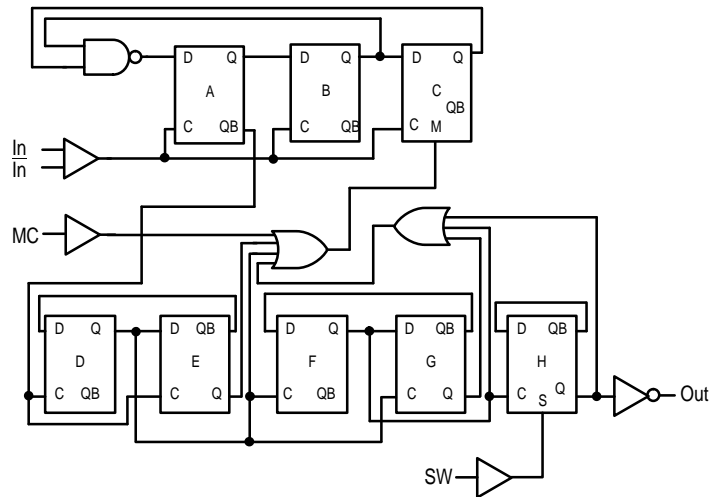


Figure 2. Modulus Setup Time

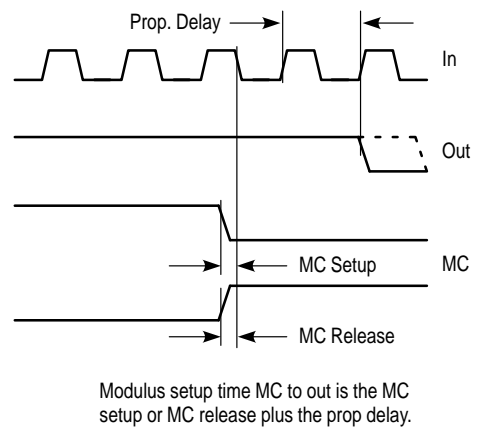
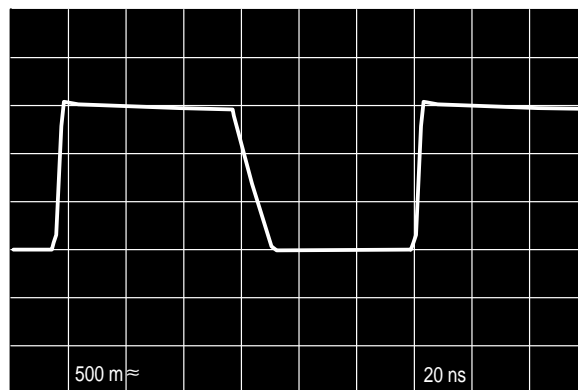


Figure 3. Typical Output Waveform



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Figure 4. AC Test Circuit

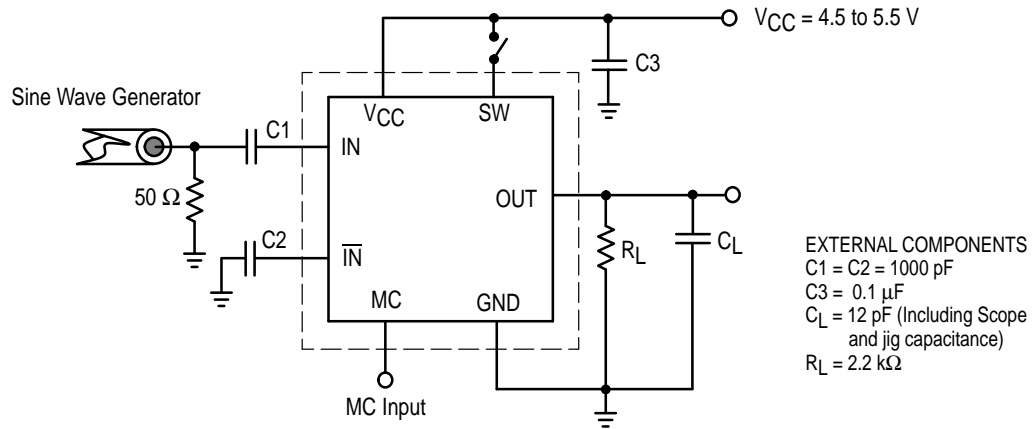
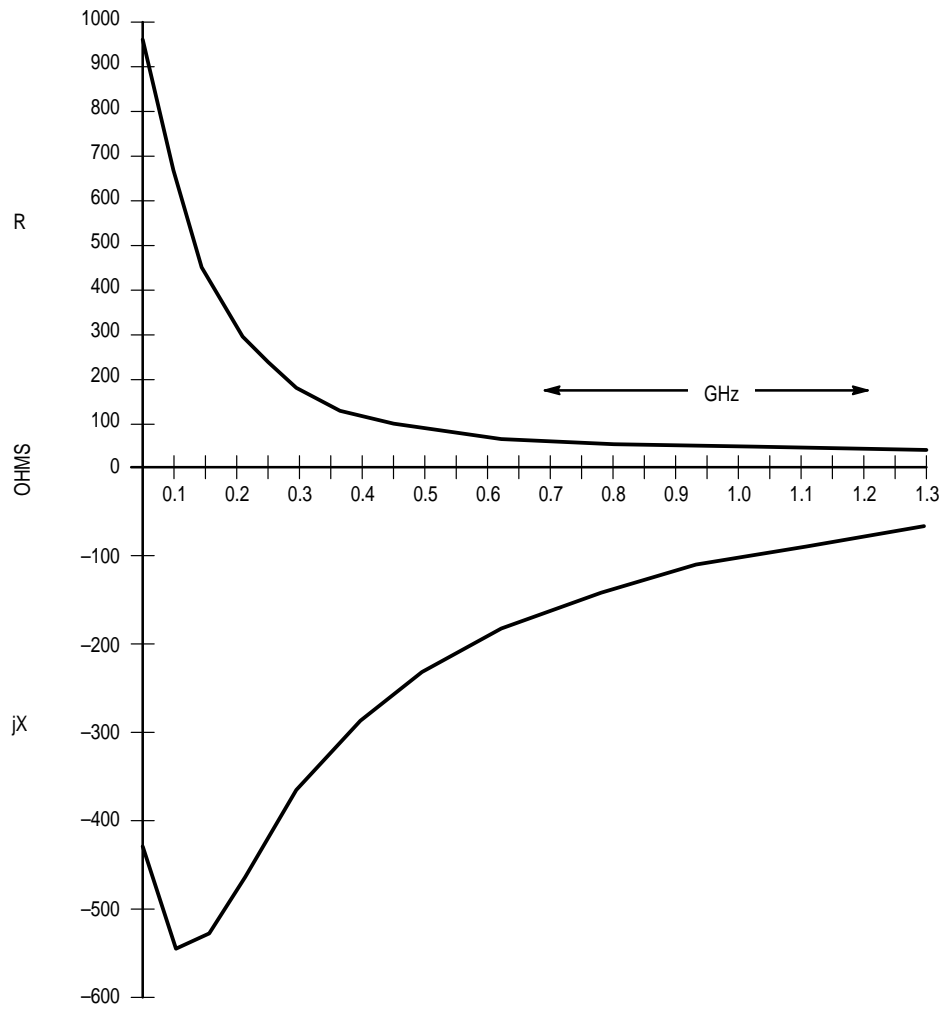
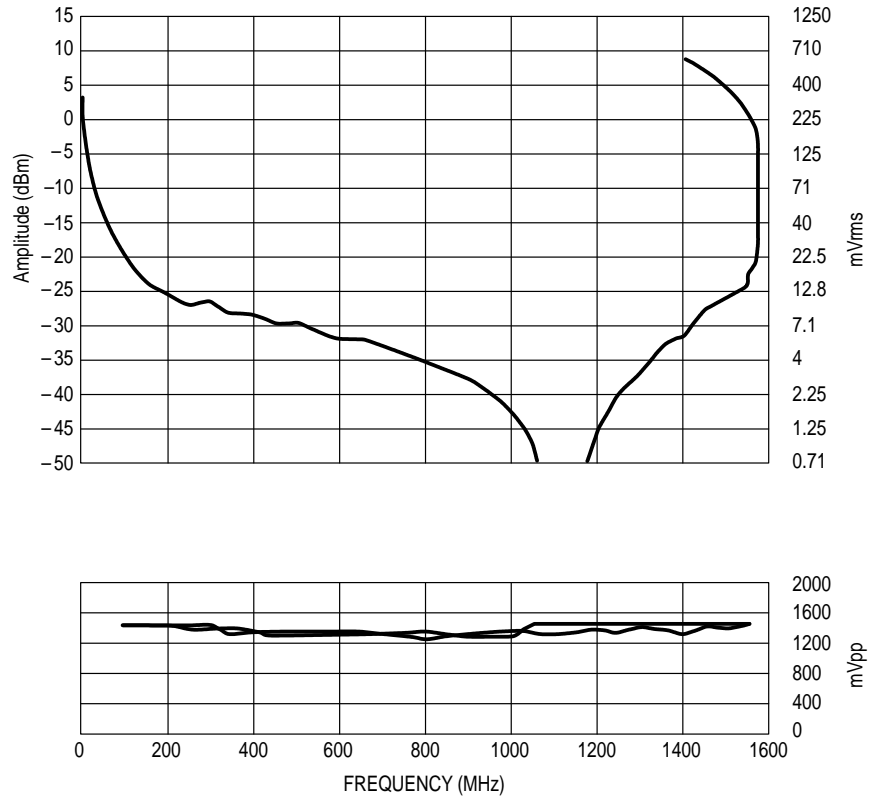


Figure 5. Typical Input Impedance versus Input Frequency



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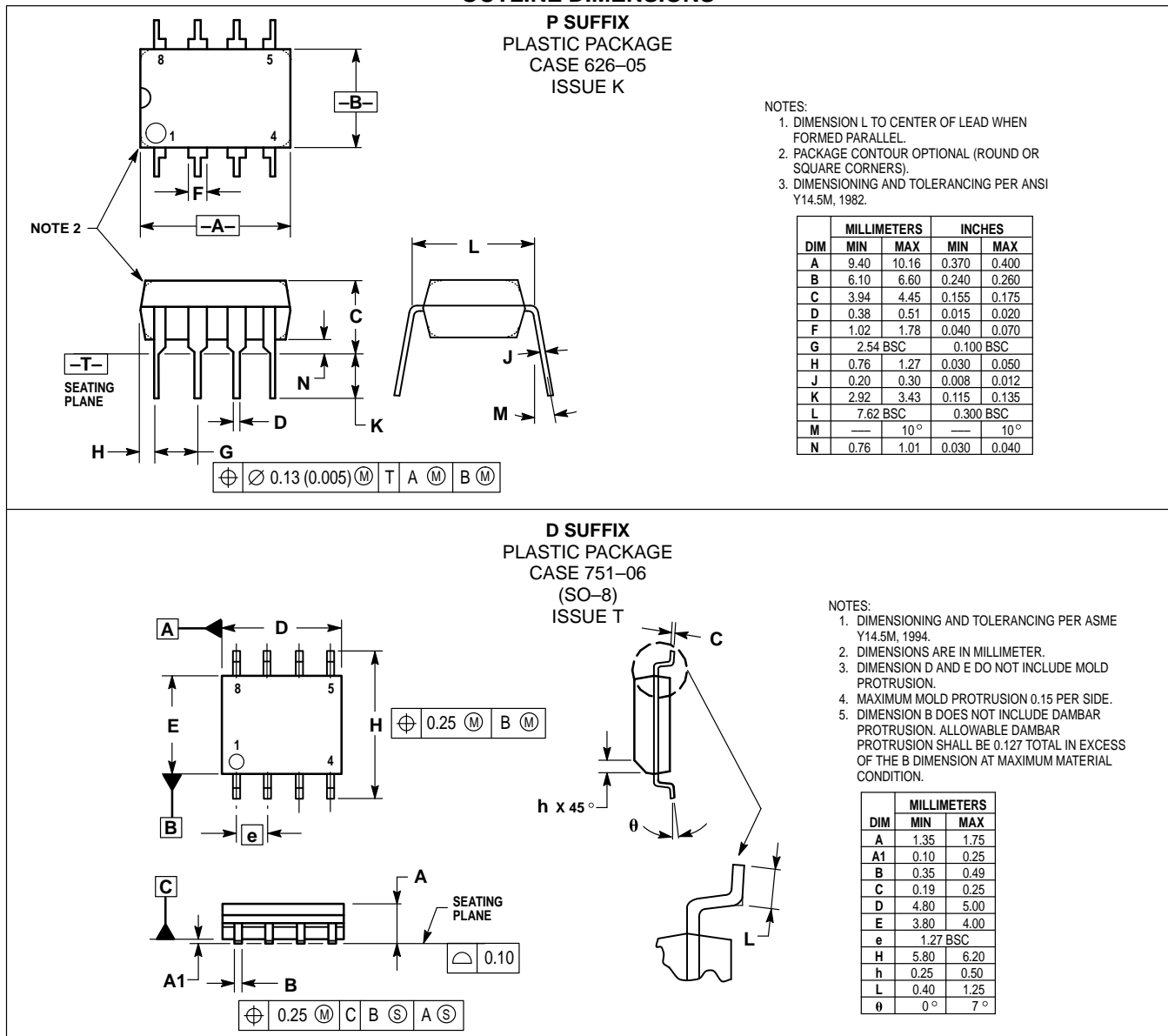
Figure 6. Input Signal Amplitude versus Input Frequency



Divide Ratio = 32

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OUTLINE DIMENSIONS



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