

# 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<sub>CC</sub> = 5.5 Vdc
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL
- Low-Power 4.0 mA Typical

## **FUNCTIONAL TABLE**

sw	МС	Divide Ratio
Н	Н	32
Н	L	33
L	Н	64
L	L	65

NOTES: 1. SW: H = V<sub>CC</sub>, L = Open. A logic L can also be applied by grouunding this pin, but this is not recommended due to increased power soncumption.

2. MC: H = 2.0 V to V<sub>CC</sub>, 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	Vcc	-0.5 to 7.0	Vdc
Operating Temperature Range	TA	-40 to 85	°C
Storage Temperature Range	T <sub>stg</sub>	-65 to 150	°C
Modulus Control Input, Pin 6	MC	-0.5 to 6.5	Vdc

NOTE: ESD data available upon request.

# MC12028A MC12028B

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

SEMICONDUCTOR TECHNICAL DATA

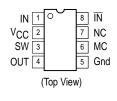


**D SUFFIX**PLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX PLASTIC PACKAGE CASE 626

# **PIN CONNECTIONS**



# **ORDERING INFORMATION**

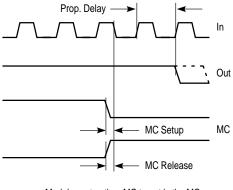
Device	Operating Temp Range	Package
MC12028AD		SO-8
MC12028AP	T <sub>A</sub> =-40° to +85°C	Plastic
MC12028BD	1A =-40 to +65 C	SO-8
MC120228BP		Plastic

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

Characteristic	Symbol	Min	Тур	Max	Unit
Toggle Frequency (Sine Wave Input)	f <sub>t</sub>	0.1	1.4	1.1	GHz
Supply Current Output Unloaded (Pin 2)	Icc	-	4.0	6.5	mA
Modulus Control Input High (MC)	V <sub>IH1</sub>	2.0	_	VCC	V
Modulus Control Input Low (MC)	V <sub>IL1</sub>	-	-	0.8	V
Divide Ratio Control Input High (SW)	V <sub>IH2</sub>	VCC	Vcc	VCC	Vdc
Divide Ratio Control Input Low (SW)	V <sub>IL2</sub>	Open	Open	Open	_
Output Voltage Swing ( $C_L = 12 \text{ pF}$ ; $R_L = 2.2 \text{ k}\Omega$ )	V <sub>out</sub>	1.0	1.6		V <sub>pp</sub>
Modulus Setup Time MC to Out	t <sub>set</sub>	-	11	16	ns
Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	V <sub>in</sub>	100 400	- -	1500 1500	mVpp
Output Current (C <sub>L</sub> = 12 pF; R <sub>L</sub> = 2.2 k $\Omega$ )	IO	-	1.5	4.0	mA

Figure 1. Logic Diagram (MC12028A)

Figure 2. Modulus Setup Time



Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

Figure 3. Typical Output Waveform

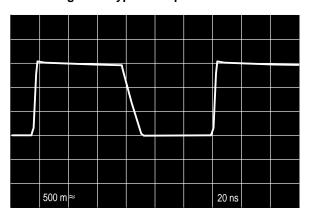


Figure 4. AC Test Circuit

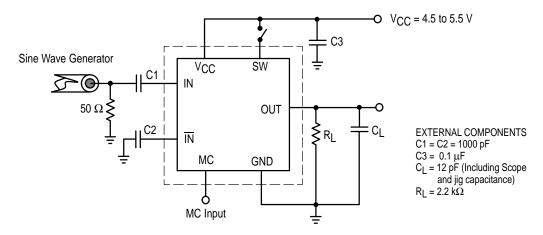


Figure 5. Typical Input Impedance versus Input Frequency

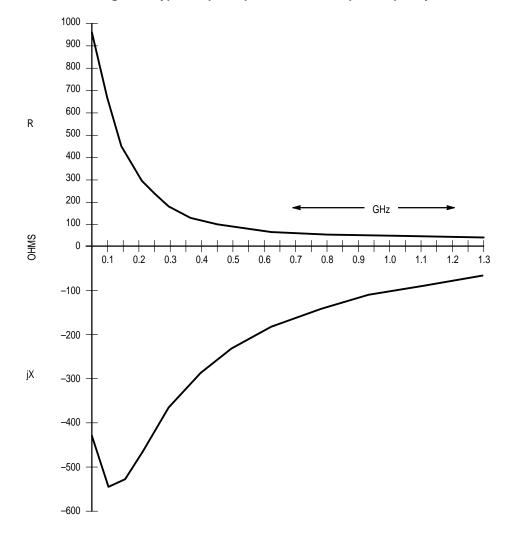
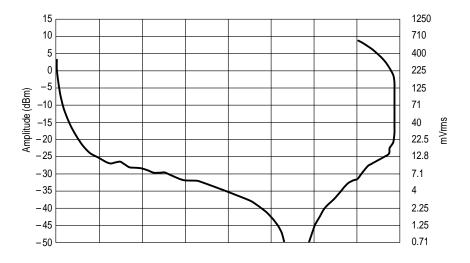
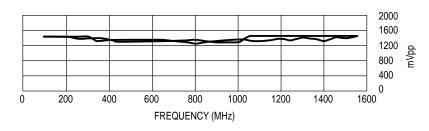


Figure 6. Input Signal Amplitude versus Input Frequency





Divide Ratio = 32

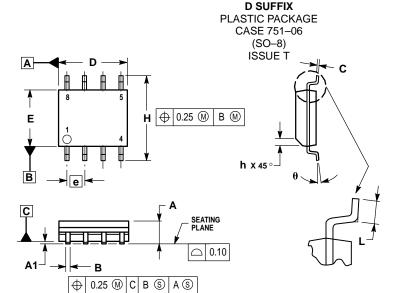
#### **OUTLINE DIMENSIONS**

# **P SUFFIX** Д PLASTIC PACKAGE CASE 626-05 ISSUE K -B-NOTE 2 \_T\_ SEATING PLANE $\oplus$ | Ø 0.13 (0.005) M | T | A M | B M

#### NOTES:

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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
Α	9.40	10.16	0.370	0.400
В	6.10	6.60	0.240	0.260
С	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
Н	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



#### NOTES

- DIMENSIONING AND TOLERANCING PER ASME
- Y14.5M, 1994.
  2. DIMENSIONS ARE IN MILLIMETER.
- DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
  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.

	MILLIMETERS			
DIM	MIN	MAX		
Α	1.35	1.75		
A1	0.10	0.25		
В	0.35	0.49		
C	0.19	0.25		
D	4.80	5.00		
Е	3.80	4.00		
е	1.27	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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MC12028A/D

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