

# 1.1GHz Dual Modulus Prescaler With Stand-By Mode

*Consider MC12053 for New Designs*

The MC12036 is a 1.1GHz  $\div 64/65$ ,  $\div 128/129$  dual modulus prescaler used in phase-locked loop (PLL) applications. Stand-By mode is featured to reduce current drain to 0.5mA typical when the standby pin (SB) is switched LOW, disabling the prescaler. On-chip output termination provides sufficient output current to drive a 12pF (typical) high impedance load.

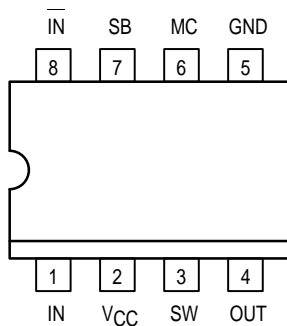
The MC12036A can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145xxx series in a PLL to provide tuning signals up to 1.1GHz in programmable frequency steps. The MC12036B can be used with CMOS synthesizers requiring negative edges to trigger 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.

- 1.1GHz Toggle Frequency
- Low Power 4.0mA Typical
- Stand-By Mode
- On-Chip Output Termination
- Supply Voltage 4.5V to 5.5V
- Operating Temperature Range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Short Setup Time ( $t_{\text{set}}$ ) 16ns Maximum @ 1.1GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL

Pinout: 8-Lead Plastic (Top View)

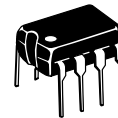


Design Criteria	Value	Unit
Internal Gate Count *	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	pJ

\*Equivalent to a two-input NAND gate.

## MC12036A MC12036B

### MECL PLL COMPONENTS $\div 64/65$ , $\div 128/129$ DUAL MODULUS PRESCALER WITH STAND-BY MODE



**P SUFFIX**  
8-LEAD PLASTIC PACKAGE  
CASE 626-05



**D SUFFIX**  
8-LEAD PLASTIC SOIC PACKAGE  
CASE 751-05

FUNCTION TABLE

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

Note: SW: H =  $V_{CC}$ , L = OPEN  
MC: H = 2.0V to  $V_{CC}$ , L = GND to 0.8V



**MAXIMUM RATINGS**

Symbol	Characteristic	Range	Unit
V <sub>CC</sub>	Power Supply Voltage, Pin 2	-0.5 to +7.0	Vdc
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range	-65 to +150	°C
MC	Modulus Control Input, Pin 6	-0.5 to +6.5	Vdc

**ELECTRICAL CHARACTERISTICS** (V<sub>CC</sub> = 4.5 to 5.5 Vdc, T<sub>A</sub> = -40°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit
f <sub>t</sub>	Toggle Frequency (Sine Wave Input)	0.1	1.4	1.1	GHz
I <sub>CC</sub>	Supply Current (Pin 2)	—	4.0	6.5	mA
V <sub>IH1</sub>	Modulus Control & Standby Input High (MC & SB)	2.0	—	V <sub>CC</sub>	V
V <sub>IL1</sub>	Modulus Control & Standby Input Low (MC & SB)	—	—	0.8	V
V <sub>IH2</sub>	Divide Ratio Control Input High (SW)	V <sub>CC</sub>	V <sub>CC</sub>	V <sub>CC</sub>	Vdc
V <sub>IL2</sub>	Divide Ratio Control Input Low (SW)	OPEN	OPEN	OPEN	—
V <sub>out</sub>	Output Voltage Swing, C <sub>L</sub> = 8pF	1.0	1.4	—	V <sub>p-p</sub>
t <sub>SET</sub>	Modulus Setup Time MC to Out	—	11	16	ns
V <sub>in</sub>	Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	100 400	— —	1000 1000	mVpp
ISB	Standby Current	—	0.5	—	mA

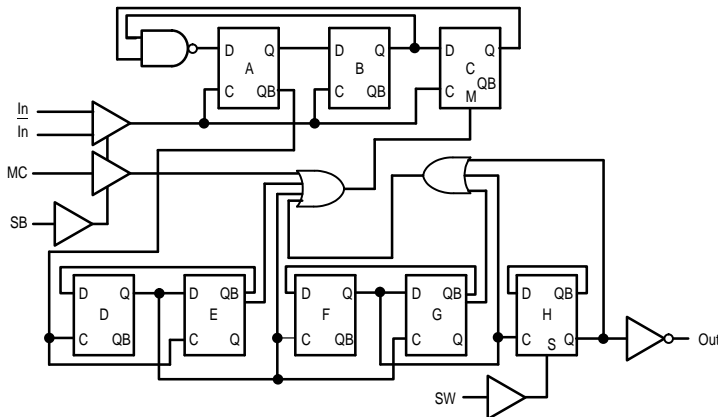
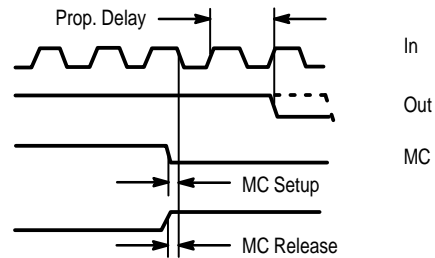
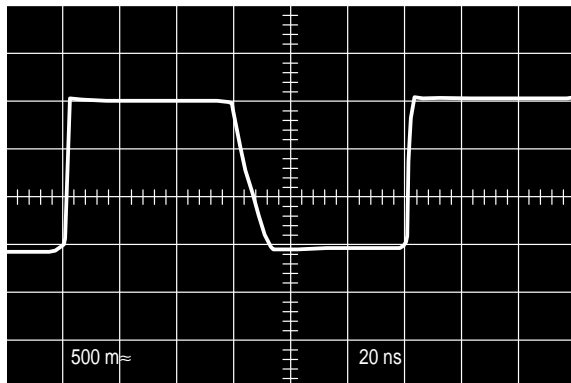


Figure 1. Logic Diagram (MC12036A)

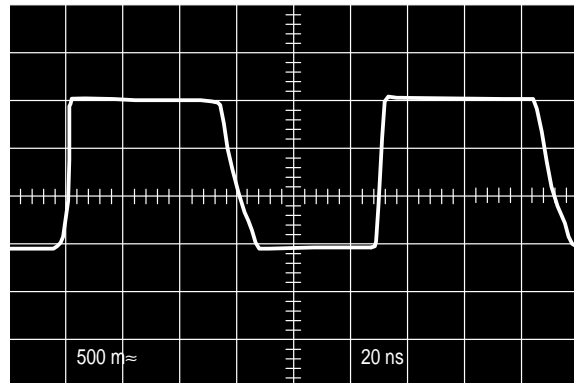


Modulus setup time MC to out is the MC setup or MC release plus the prop. delay.

Figure 2. Modulus Setup Time



(±64, 500MHz Input Frequency, V<sub>CC</sub> = 5.0V, T<sub>A</sub> = 25°C, Output Loaded)



(±128, 1.1GHz Input Frequency, V<sub>CC</sub> = 5.0V, T<sub>A</sub> = 25°C, Output Loaded)

Figure 3. Typical Output Waveform

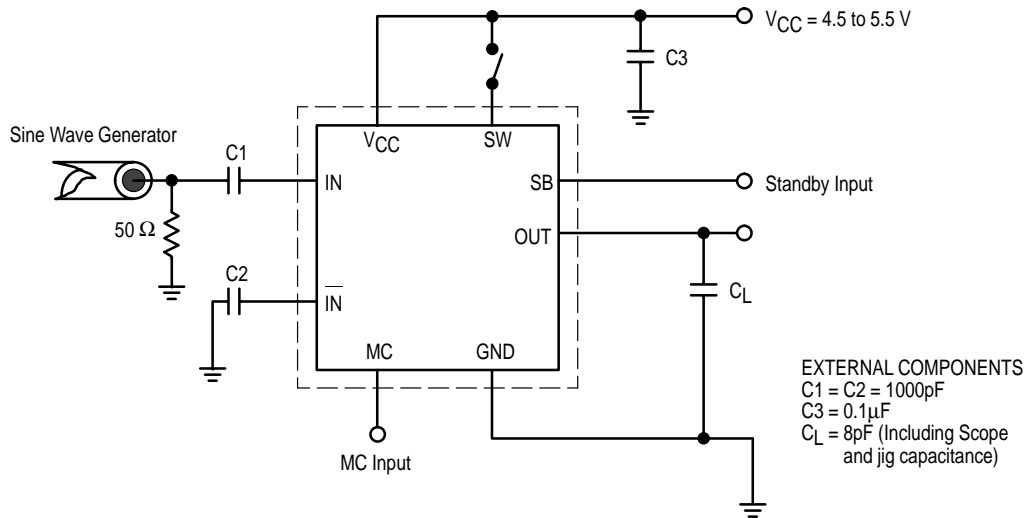


Figure 4. AC Test Circuit

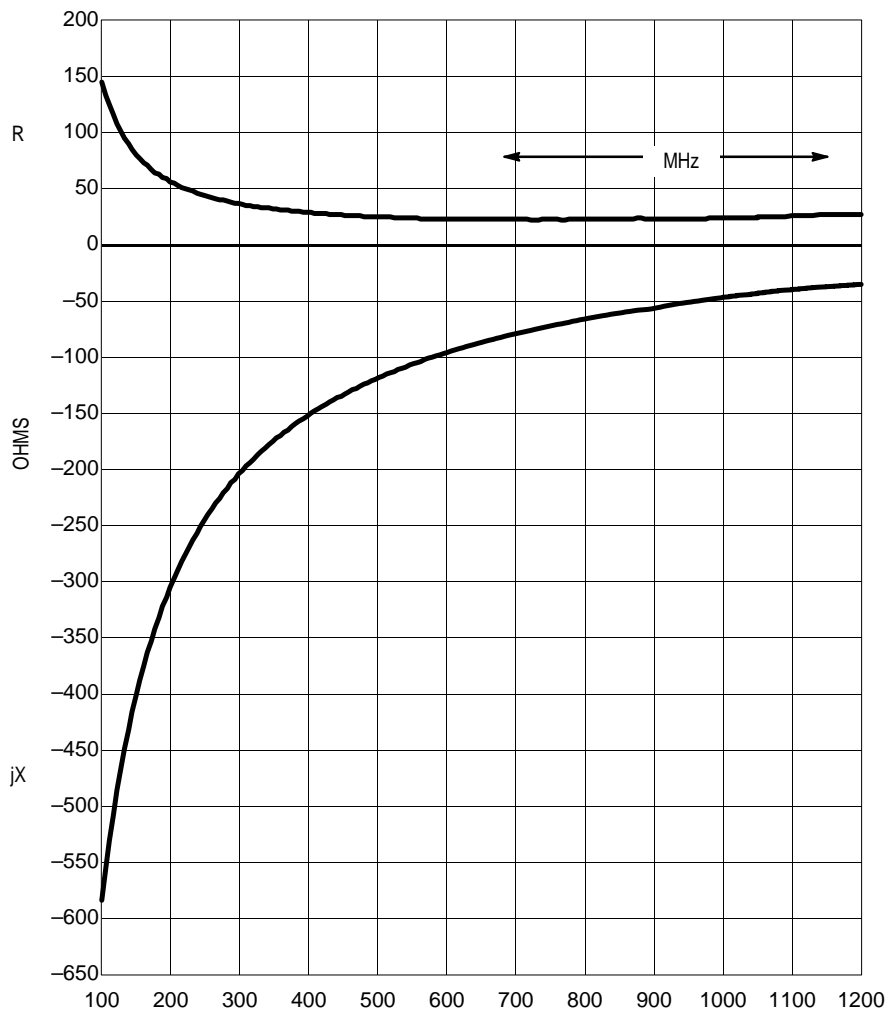


Figure 5. Typical Input Impedance versus Input Frequency

OUTLINE DIMENSIONS

**P SUFFIX**  
PLASTIC PACKAGE  
CASE 626-05  
ISSUE K

NOTE 2: (points to lead dimensions)

SEATING PLANE

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

⊕ ∅ 0.13 (0.005) Ⓜ T A Ⓜ B Ⓜ

**D SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751-05  
ISSUE R

NOTE 1: DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

NOTE 2: DIMENSIONS ARE IN MILLIMETERS.

NOTE 3: DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.

NOTE 4: MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

NOTE 5: DIMENSION B DOES NOT INCLUDE MOLD 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	0.18	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°	

⊕ 0.25 Ⓜ B Ⓜ

⊕ 0.25 Ⓜ C B Ⓢ A Ⓢ

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