1.1GHz Dual Modulus Prescaler With Stand–By Mode

Consider MC12053 for New Designs

MC12036A
MC12036B

MECL PLL COMPONENTS

÷64/65, ÷128/129
DUAL MODULUS PRESCALER
WITH STAND–BY MODE

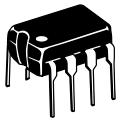
The MC12036 is a 1.1GHz ÷64/65, ÷128/129 dual modulus prescaler used in phase–locked loop (PLL) applications. Stand–By mode is featured to reduce current drain to 0.5mA typical when the standby pin (SB) is switched LOW, disabling the prescaler. On–chip output termination provides sufficient output current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

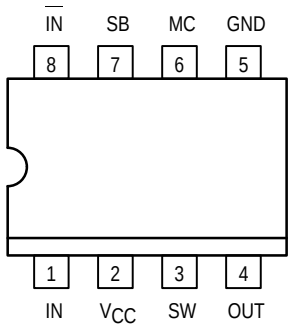
- 1.1GHz Toggle Frequency
- Low Power 4.0mA Typical
- Stand–By Mode
- On–Chip Output Termination
- Supply Voltage 4.5V to 5.5V
- Operating Temperature Range of –40°C to +85°C
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL



P SUFFIX
8–LEAD PLASTIC PACKAGE
CASE 626–05

D SUFFIX
8–LEAD PLASTIC SOIC PACKAGE
CASE 751–05

Pinout: 8–Lead Plastic (Top View)



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

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.

MAXIMUM RATINGS

Symbol	Characteristic	Range	Unit
V_{CC}	Power Supply Voltage, Pin 2	–0.5 to +7.0	Vdc
T_A	Operating Temperature Range	–40 to +85	°C
T_{stg}	Storage Temperature Range	–65 to +150	°C
MC	Modulus Control Input, Pin 6	–0.5 to +6.5	Vdc

ELECTRICAL CHARACTERISTICS (V_{CC} = 4.5 to 5.5 Vdc, T_A = –40°C to +85°C)

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

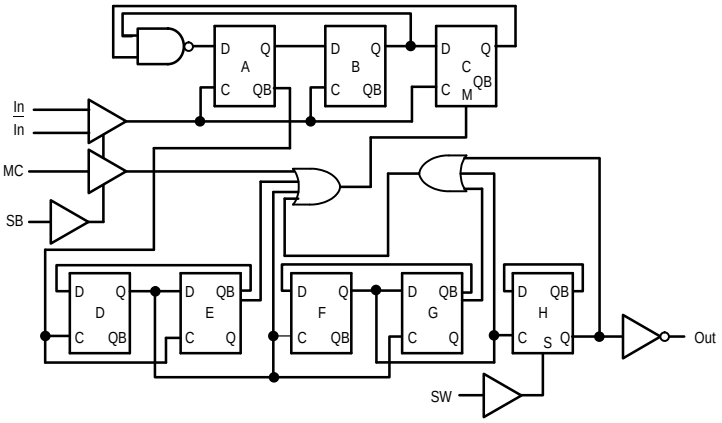
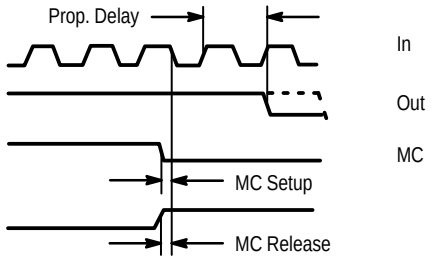
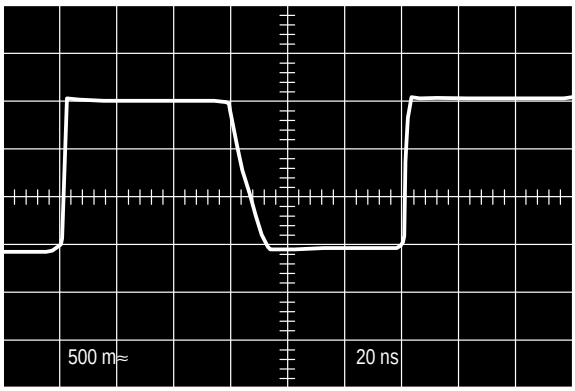


Figure 1. Logic Diagram (MC12036A)

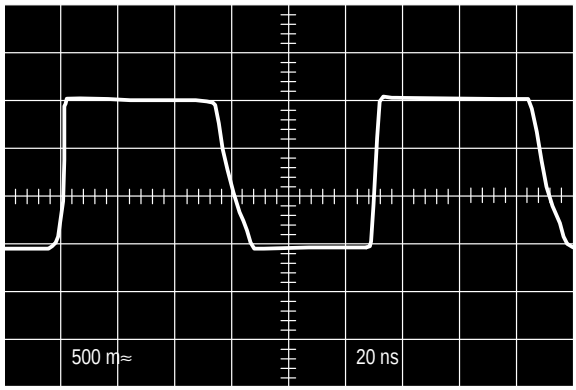


Modulus setup time MC to out is the MC setup or MC release plus the prop. delay.

Figure 2. Modulus Setup Time



(÷64, 500MHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)



(÷128, 1.1GHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)

Figure 3. Typical Output Waveform

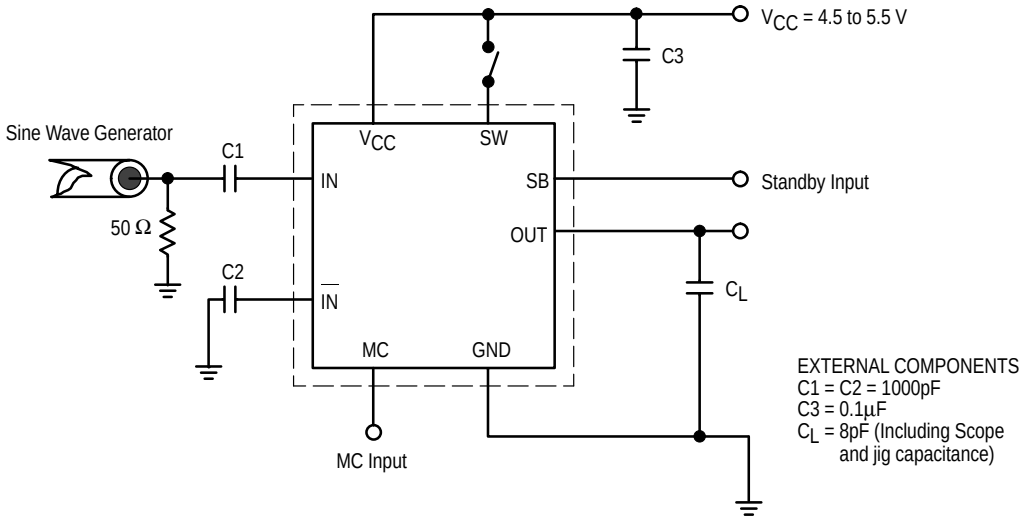


Figure 4. AC Test Circuit

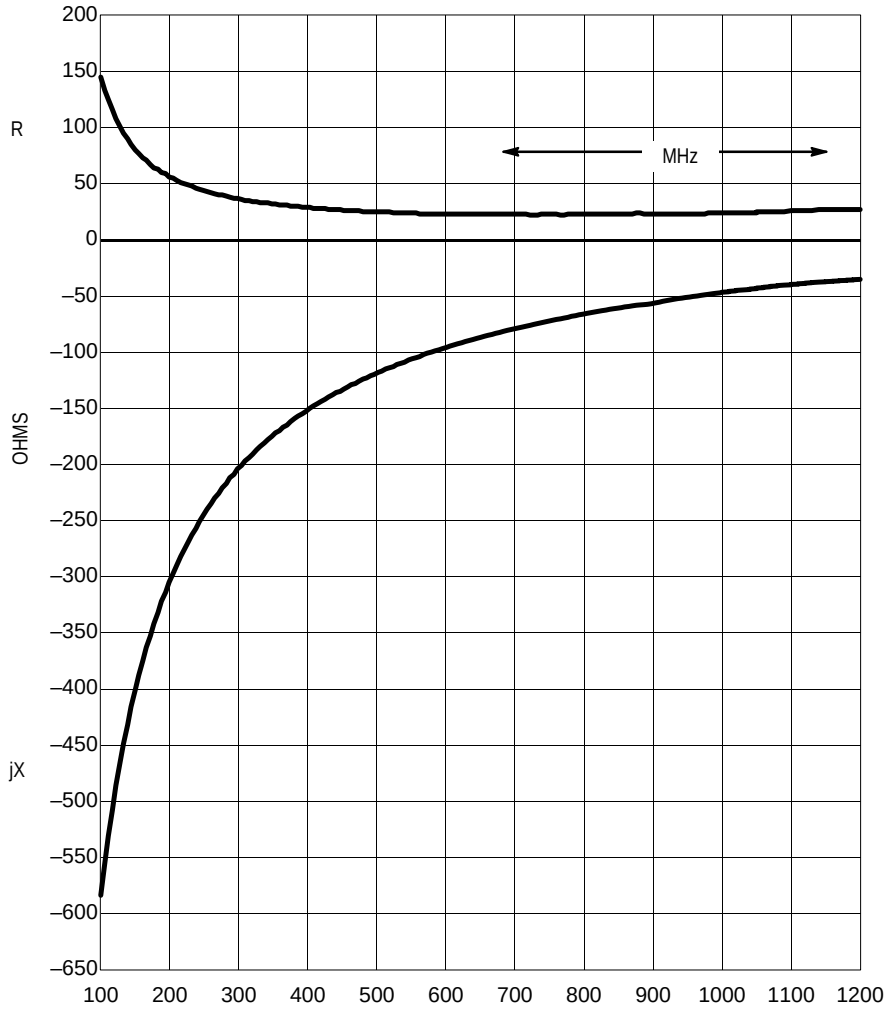
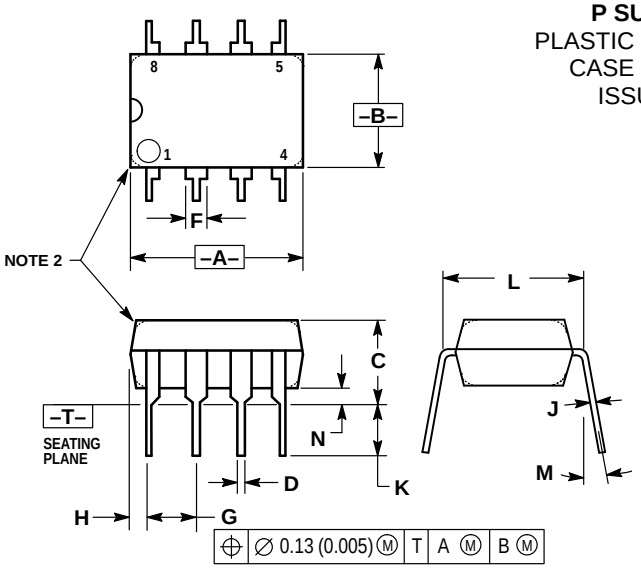


Figure 5. Typical Input Impedance versus Input Frequency

OUTLINE DIMENSIONS

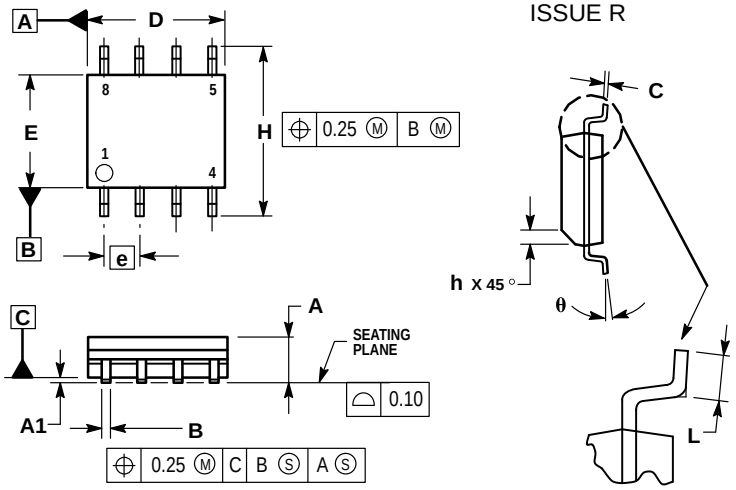
P SUFFIX
PLASTIC PACKAGE
CASE 626–05
ISSUE K



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.

	MILLIMETERS		INCHES	
DIM	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 SOIC PACKAGE
CASE 751–05
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
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.

	MILLIMETERS	
DIM	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°

How to reach us:
USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405; Denver, Colorado 80217. 303–675–2140 or 1–800–441–2447

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 81–3–3521–8315

ASIA / PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298