1.1GHz Dual Modulus Prescaler With Stand-By Mode

MC12036A
MC12036B

MECL PLL COMPONENTS

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

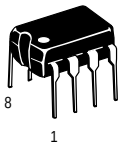
The MC12036 is a 1.1GHz ÷64/65, ÷128/129 dual modulus prescaler used in phase-locked loop (PLL) applications. Stand-By mode is featured to reduce current drain to 0.5mA typical when the standby pin (SB) is switched LOW, disabling the prescaler. On-chip output termination provides sufficient output current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

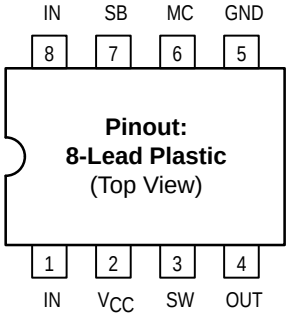
The Modulus Control (MC) selects the proper divide number after SW has been biased to select the desired divide ratio.

- 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
PLASTIC PACKAGE
CASE 626-05

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-05



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.

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

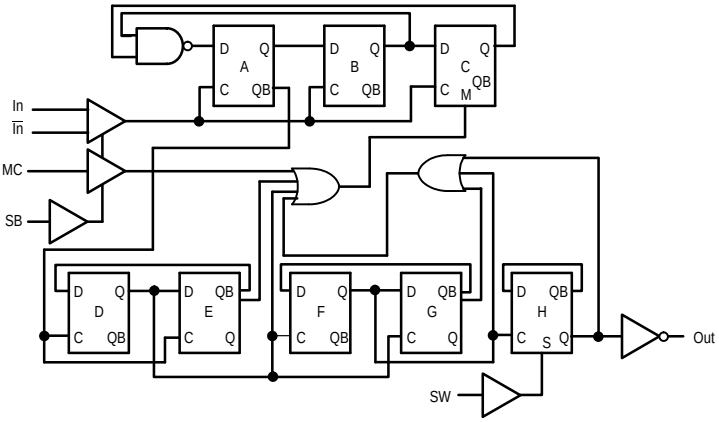
MAXIMUM RATINGS

Symbol	Characteristic	Range	Unit
V_{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

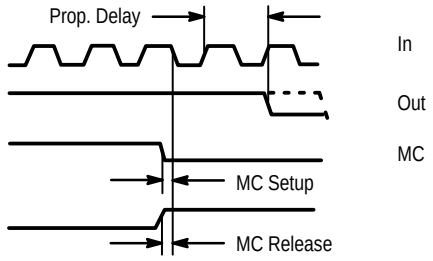
MOTOROLA

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
V_{IL1}	Modulus Control & Standby Input Low (MC & SB)	—	—	0.8	V
V_{IH2}	Divide Ratio Control Input High (SW)	V_{CC} – 0.5V	V_{CC}	V_{CC} + 0.5V	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

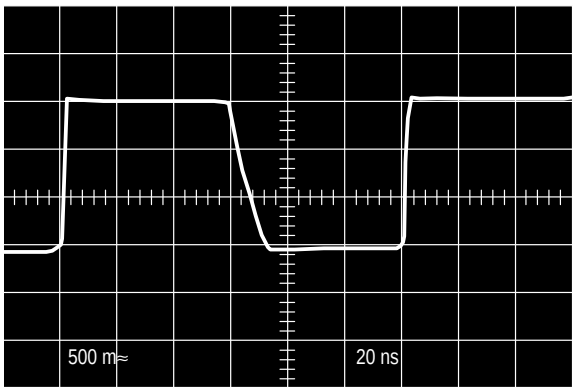


LOGIC DIAGRAM (MC12036A)

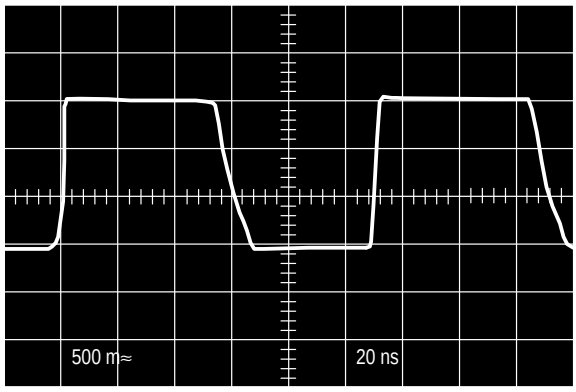


Modulus setup time MC to out is the MC setup or MC release plus the prop. delay.

Figure 1. 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 2. Typical Output Waveform

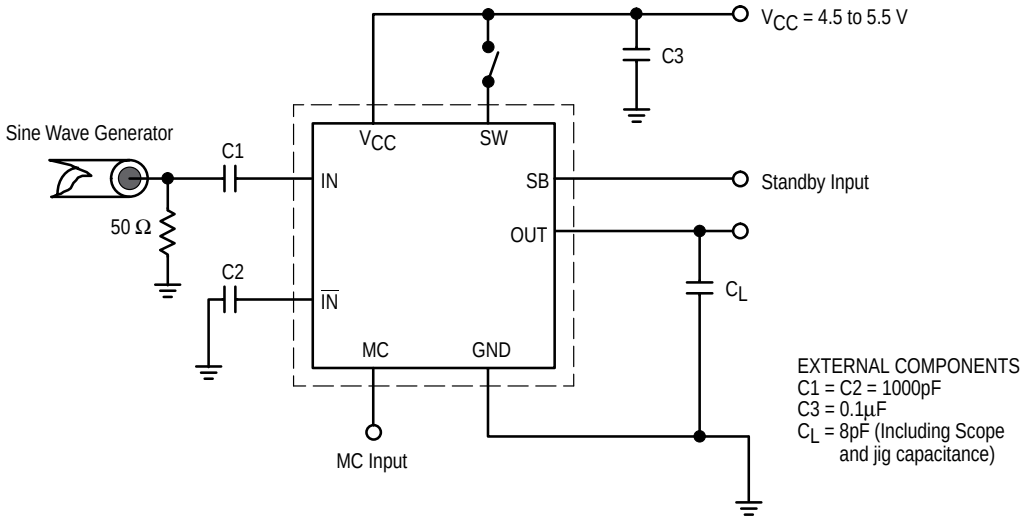


Figure 3. AC Test Circuit

OUTLINE DIMENSIONS

P SUFFIX
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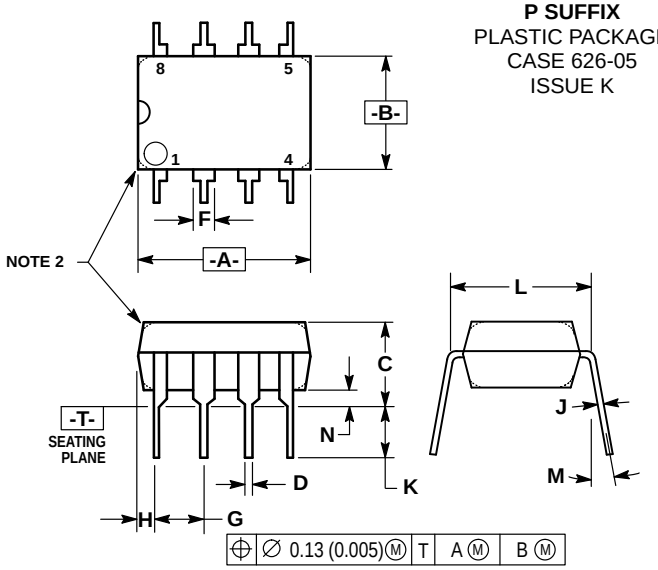
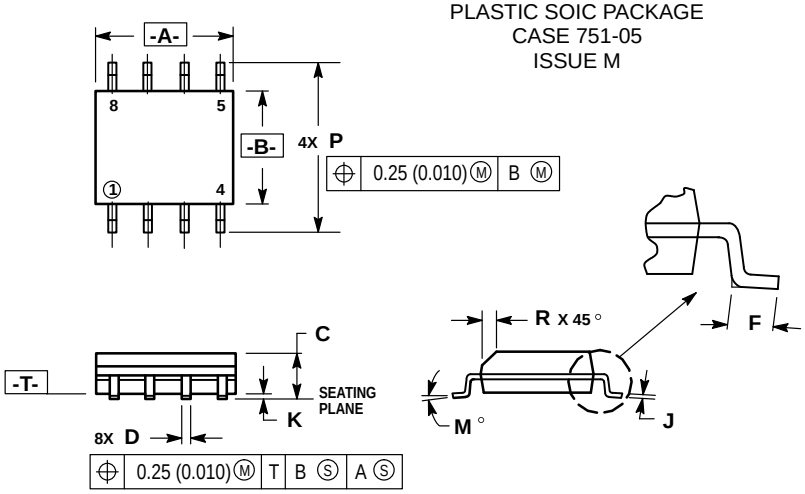
ISSUE K



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 M



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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