

# 1.1GHz Dual Modulus Prescaler

The MC12026 is a high frequency, low voltage dual modulus prescaler used in phase-locked loop (PLL) applications.

The MC12026A 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.

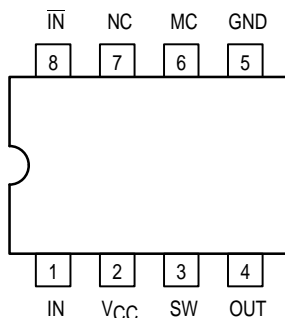
The MC12026B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

A Divide Ratio Control (SW) permits selection of an 8/9 or 16/17 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
- Supply Voltage 4.5V to 5.5V
- Low Power 4.0mA Typical
- Operating Temperature Range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- The MC12026 is Pin Compatible With the MC12022
- Short Setup Time ( $t_{\text{set}}$ ) 6ns Typical @ 1.1GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL

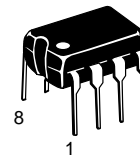
**Pinout: 8-Lead Plastic (Top View)**



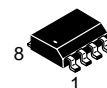
## MC12026A MC12026B

### MECL PLL COMPONENTS

$\div 8/9, \div 16/17$   
**DUAL MODULUS PRESCALER**



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



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

### FUNCTION TABLE

SW	MC	Divide Ratio
H	H	8
H	L	9
L	H	16
L	L	17

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 $+85$	$^{\circ}\text{C}$
$T_{\text{stg}}$	Storage Temperature Range	$-65$ to $+150$	$^{\circ}\text{C}$
MC	Modulus Control Input, Pin 6	$-0.5$ to $+6.5$	Vdc
$I_O$	Maximum Output Current, Pin 4	10.0	mA



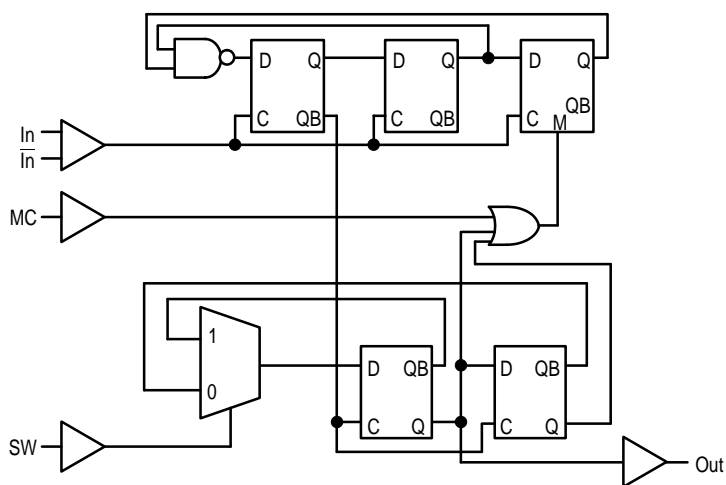
### ELECTRICAL CHARACTERISTICS ( $V_{CC} = 4.5$ to $5.5$ ; $T_A = -40$ to $+85^\circ\text{C}$ )

Symbol	Characteristic	Min	Typ	Max	Unit
f <sub>t</sub>	Toggle Frequency (Sin Wave)	0.1	1.4	1.1	GHz
I <sub>CC</sub>	Supply Current Output Unloaded (Pin 2)	—	4.0	5.3	mA
V <sub>IH1</sub>	Modulus Control Input High (MC)	2.0	—	V <sub>CC</sub>	V
V <sub>IL1</sub>	Modulus Control Input Low (MC)	GND	—	0.8	V
V <sub>IH2</sub>	Divide Ratio Control Input High (SW)	V <sub>CC</sub> – 0.5V	V <sub>CC</sub>	V <sub>CC</sub> + 0.5V	V
V <sub>IL2</sub>	Divide Ratio Control Input Low (SW)	OPEN	OPEN	OPEN	—
V <sub>out</sub>	Output Voltage Swing (R <sub>L</sub> = 560Ω; I <sub>O</sub> = 5.5mA) <sup>1</sup> (R <sub>L</sub> = 1.1kΩ; I <sub>O</sub> = 2.9mA) <sup>2</sup>	1.0	1.6	—	V <sub>p-p</sub>
t <sub>SET</sub>	Modulus Setup Time MC to Out <sup>3</sup>	—	6	9	ns
V <sub>in</sub>	Input Voltage Sensitivity 100–250MHz 250–1100MHz	400 100	— —	1000 1000	mVpp

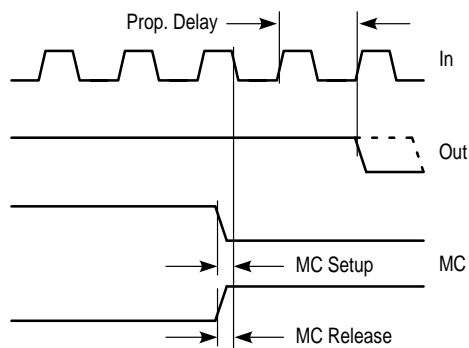
1 Divide Ratio of  $\div 8/9$  at 1.1GHz,  $C_I = 8\text{pF}$

**2 Divide Ratio of  $\div 16/17$  at 1.1GHz,  $C_1 = 8\text{pF}$**

**3** Assuming  $R_L = 560\Omega$  at 1.1GHz



**Figure 1. Logic Diagram (MC12026A)**



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

### Figure 2. Modulus Setup Time

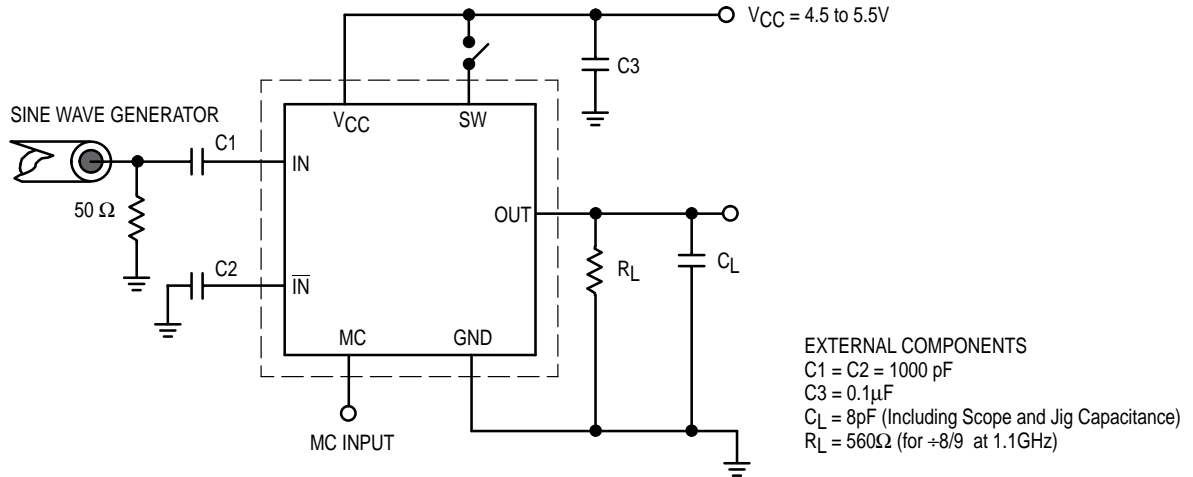


Figure 3. AC Test Circuit

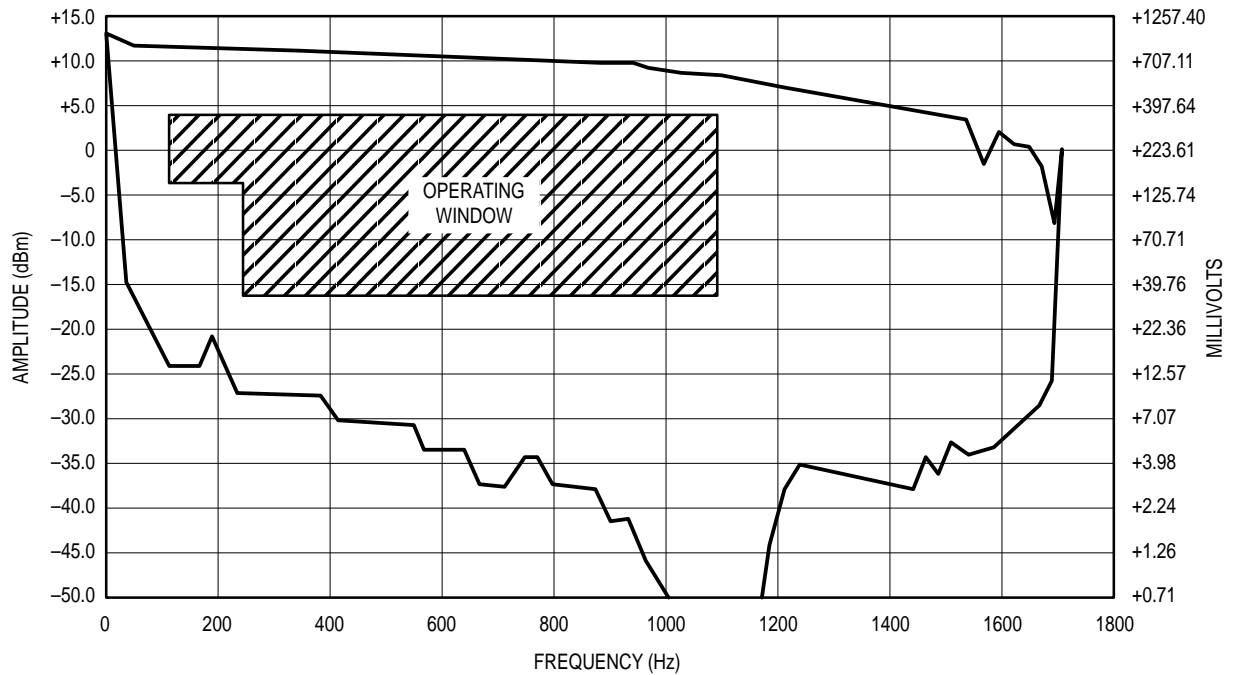


Figure 4. Input Signal Amplitude versus Input Frequency

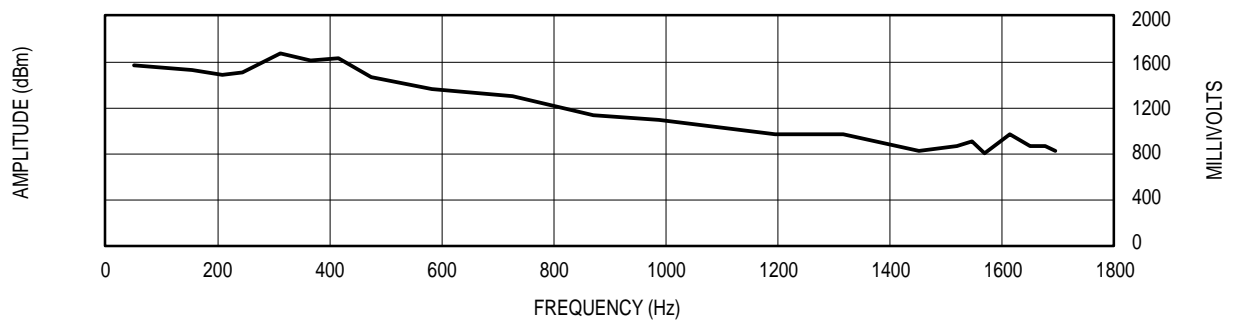
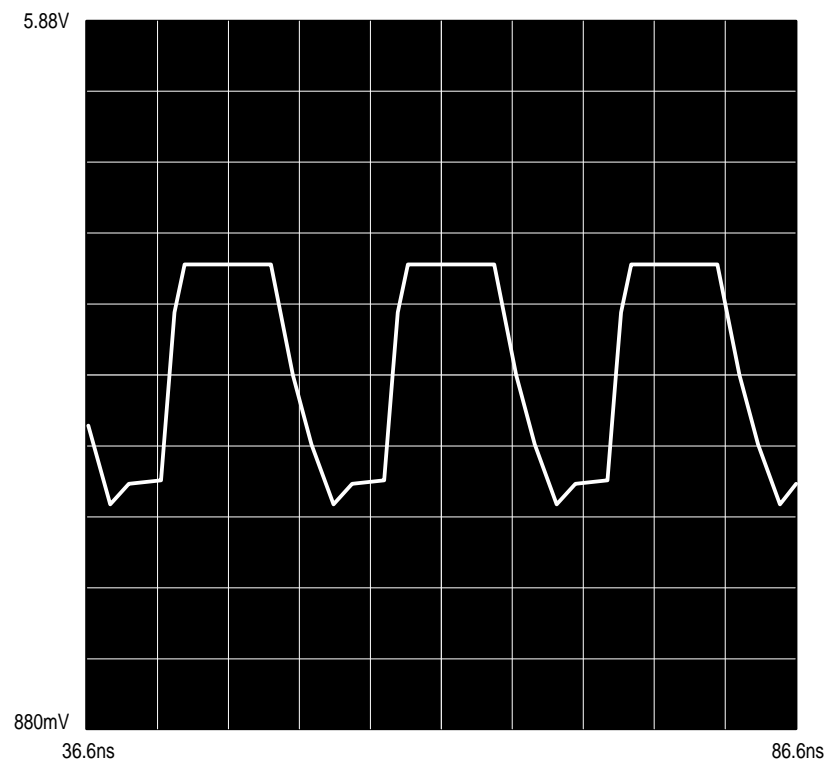
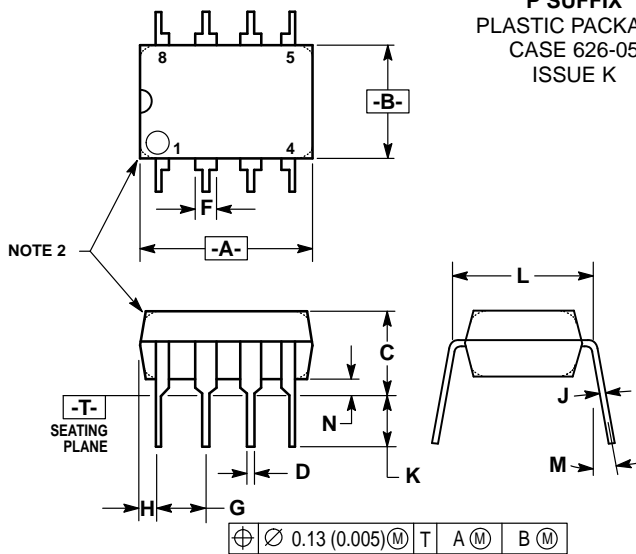
Divide Ratio = 8;  $V_{CC} = 5.0\text{V}$ ;  $T_A = 25^\circ\text{C}$ 

Figure 5. Output Amplitude versus Input Frequency



**Figure 6. Typical Output Waveform**  
( $\pm 8$ , 1.1GHz Input Frequency,  $V_{CC} = 5.0$ ,  $T_A = 25^\circ\text{C}$ , Output Loaded With 8pF)

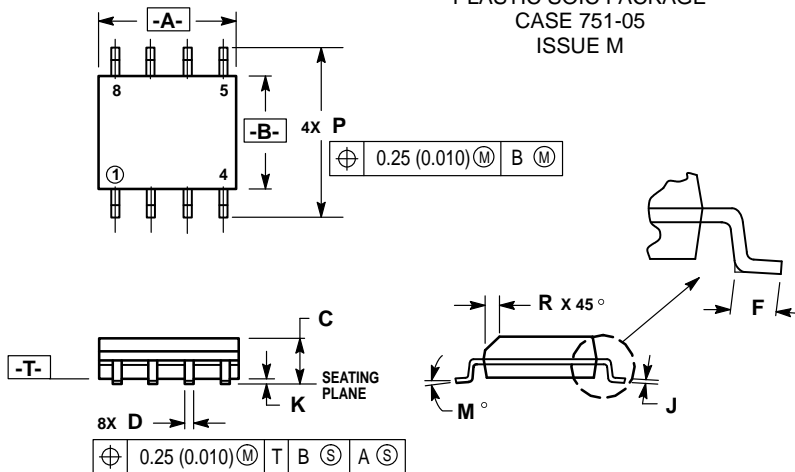
## OUTLINE DIMENSIONS

**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.


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

**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.

DIM	MILLIMETERS		INCHES	
	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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