

# 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.

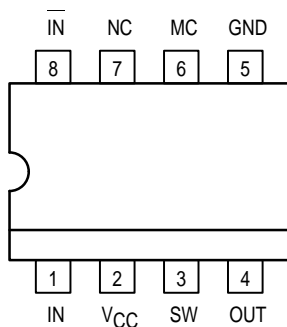
A Divide Ratio Control (SW) permits selection of an 8/9 or 16/17 divide ratio as desired.

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

**NOTE: The "B" Version Is Not Recommended for New Designs**

- 1.1GHz Toggle Frequency
- Supply Voltage 4.5V to 5.5V
- Low Power 4.0mA Typical
- Operating Temperature Range of -40°C to +85°C
- The MC12026 is Pin Compatible With the MC12022
- Short Setup Time ( $t_{set}$ ) 6ns Typical @ 1.1GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL

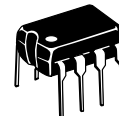
Pinout: 8-Lead Plastic (Top View)



## MC12026A MC12026B

### MECL PLL COMPONENTS

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



**P SUFFIX**  
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	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

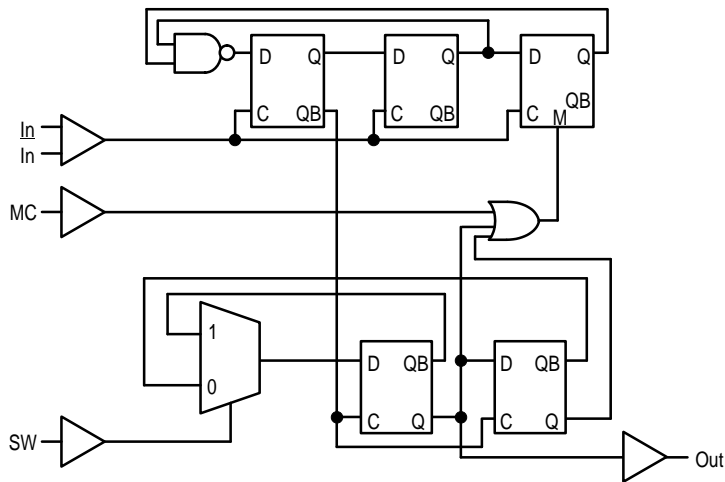
Symbol	Characteristic	Range	Unit
$V_{CC}$	Power Supply Voltage, Pin 2	-0.5 to +7.0	Vdc
$T_A$	Operating Temperature Range	-40 to +85	°C
$T_{stg}$	Storage Temperature Range	-65 to +150	°C
MC	Modulus Control Input, Pin 6	-0.5 to +6.5	Vdc
$I_O$	Maximum Output Current, Pin 4	10.0	mA



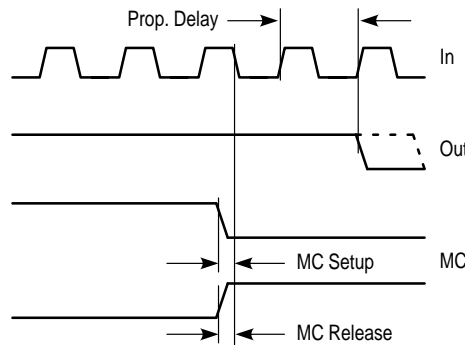
**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 4.5$  to  $5.5$ ;  $T_A = -40$  to  $+85^{\circ}C$ )

Symbol	Characteristic	Min	Typ	Max	Unit
$f_t$	Toggle Frequency (Sin Wave)	0.1	1.4	1.1	GHz
$I_{CC}$	Supply Current Output Unloaded (Pin 2)	—	4.0	5.3	mA
$V_{IH1}$	Modulus Control Input High (MC)	2.0	—	$V_{CC}$	V
$V_{IL1}$	Modulus Control Input Low (MC)	GND	—	0.8	V
$V_{IH2}$	Divide Ratio Control Input High (SW)	$V_{CC} - 0.5V$	$V_{CC}$	$V_{CC} + 0.5V$	V
$V_{IL2}$	Divide Ratio Control Input Low (SW)	OPEN	OPEN	OPEN	—
$V_{out}$	Output Voltage Swing ( $R_L = 560\Omega$ ; $I_O = 5.5mA$ ) <sup>1</sup> ( $R_L = 1.1k\Omega$ ; $I_O = 2.9mA$ ) <sup>2</sup>	1.0	1.6	—	$V_{p-p}$
$t_{SET}$	Modulus Setup Time MC to Out <sup>3</sup>	—	6	9	ns
$V_{in}$	Input Voltage Sensitivity 100–250MHz 250–1100MHz	400 100	— —	1000 1000	mVpp

1. Divide Ratio of +8/9 at 1.1GHz,  $C_L = 8pF$
2. Divide Ratio of +16/17 at 1.1GHz,  $C_L = 8pF$
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**

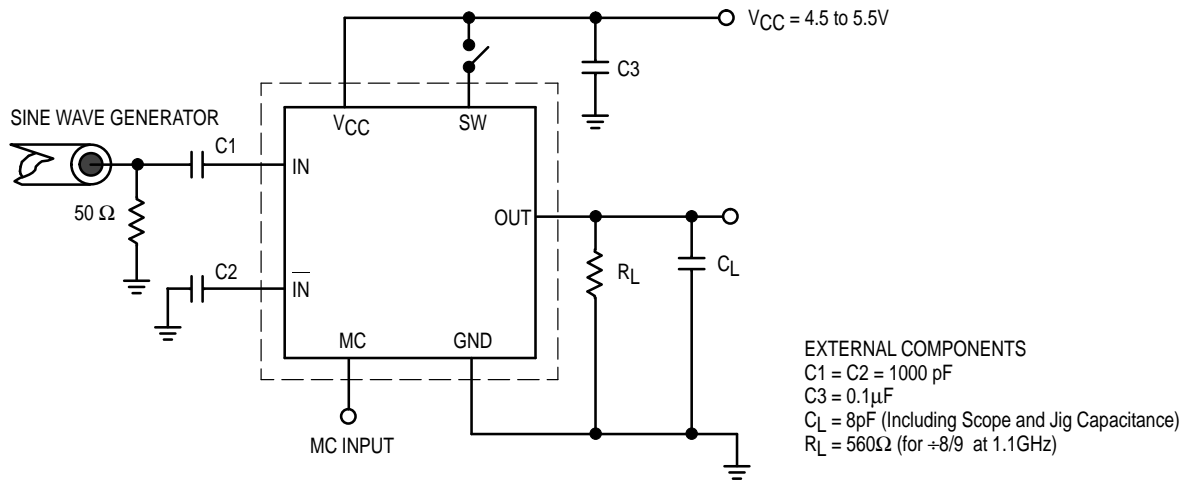


Figure 3. AC Test Circuit

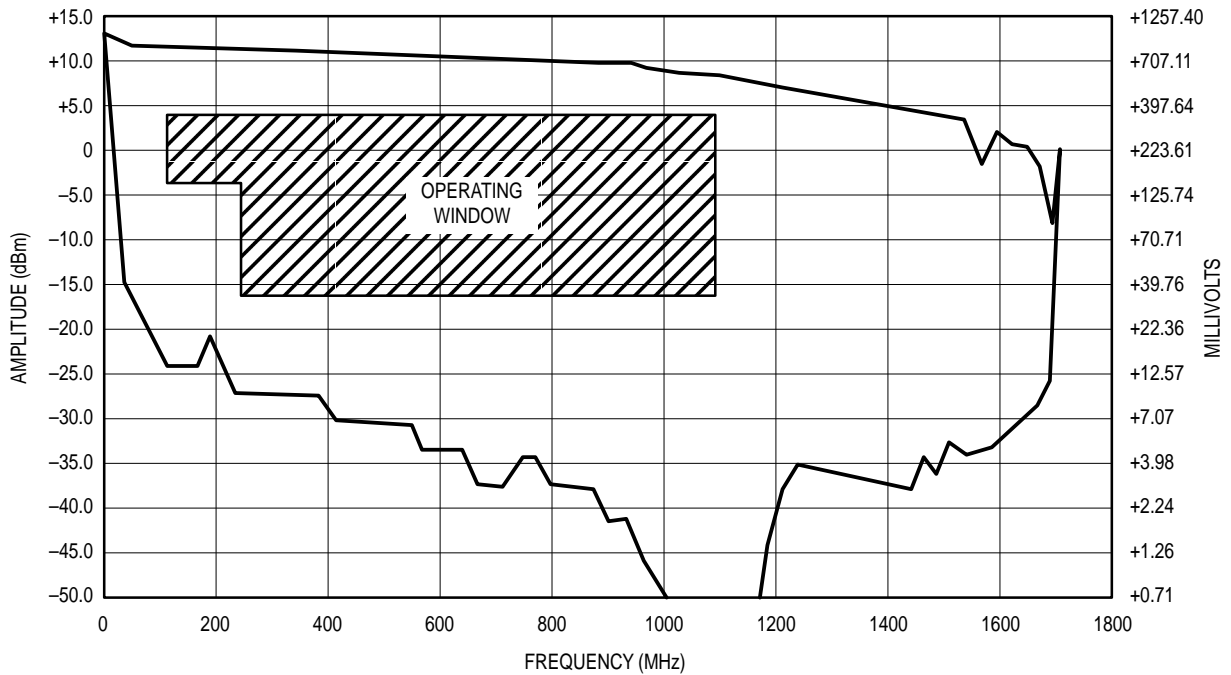


Figure 4. Input Signal Amplitude versus Input Frequency  
 Divide Ratio = 8; VCC = 5.0V; TA = 25°C

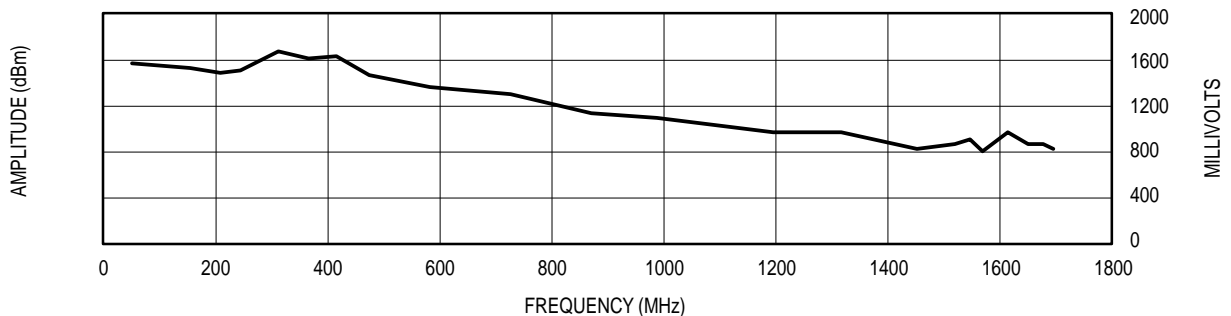
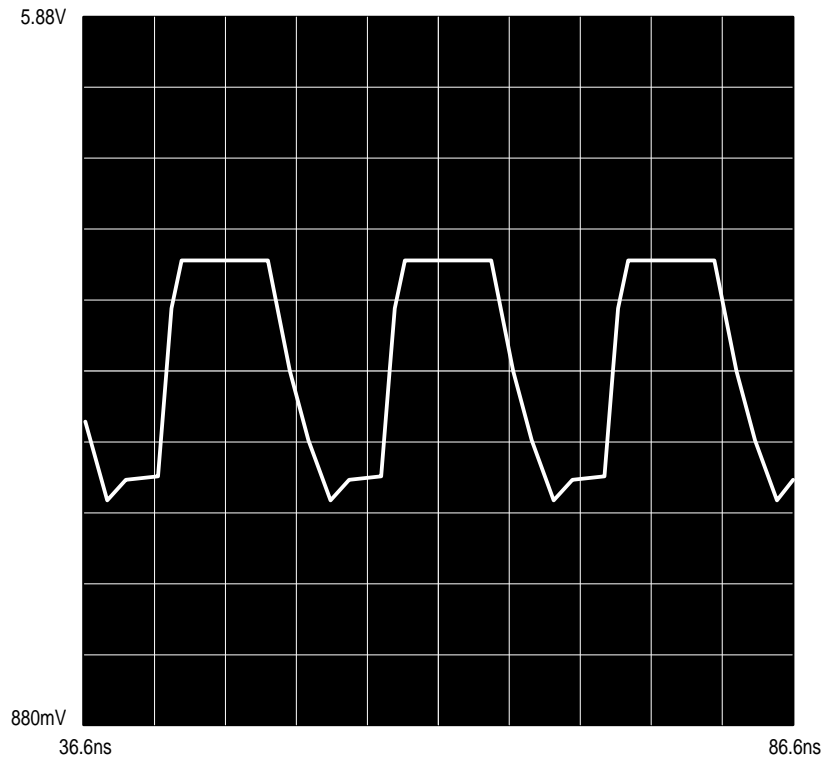


Figure 5. Output Amplitude versus Input Frequency



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

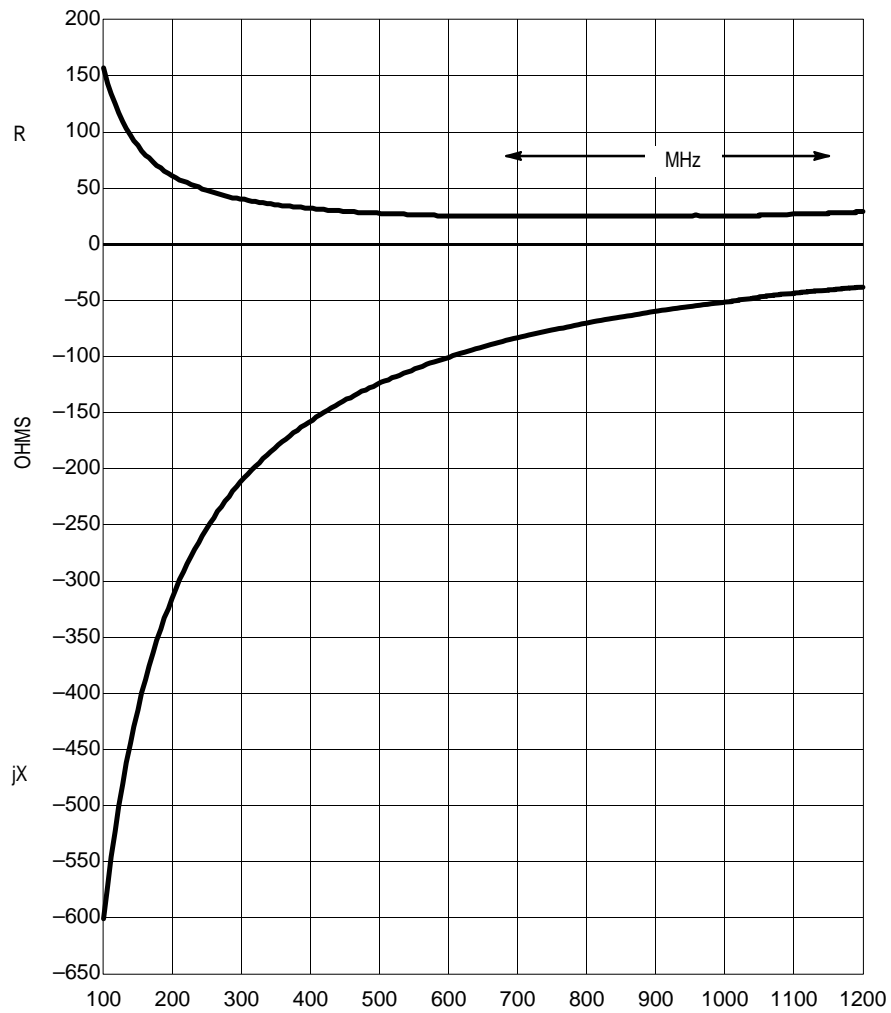


Figure 7. Typical Input Impedance versus Input Frequency

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

$\oplus \text{ } \ominus 0.13 (0.005) \text{ } \textcircled{M} \text{ } T \text{ } A \text{ } \textcircled{M} \text{ } B \text{ } \textcircled{M}$

**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
$\theta$	0° 7°	

$\oplus \text{ } \ominus 0.25 \text{ } \textcircled{M} \text{ } C \text{ } B \text{ } \textcircled{S} \text{ } A \text{ } \textcircled{S}$

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