

# MC12026A

## 1.1 GHz 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 in a PLL to provide tuning signals up to 1.1 GHz in programmable frequency steps.

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.

### Features

- 1.1 GHz Toggle Frequency
- Supply Voltage 4.5 to 5.5 V
- Low Power 4.0 mA Typical
- Operating Temperature Range of  $-40$  to  $85^{\circ}\text{C}$
- The MC12026 is Pin Compatible with the MC12022
- Short Setup Time ( $t_{\text{set}}$ ) 6.0 ns Typical @ 1.1 GHz
- Modulus Control Input Level is Compatible with Standard CMOS and TTL

### FUNCTIONAL TABLE

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

1. SW: H =  $V_{\text{CC}}$ , L = Open. A logic L can also be applied by grounding this pin, but this is not recommended due to increased power consumption.
2. MC: H = 2.0 V to  $V_{\text{CC}}$ , L = GND to 0.8 V.

### MAXIMUM RATINGS

Characteristics	Symbol	Value	Unit
Power Supply Voltage, Pin 2	$V_{\text{CC}}$	$-0.5$ to $7.0$	Vdc
Operating Temperature Range	$T_{\text{A}}$	$-40$ to $85$	$^{\circ}\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	$-65$ to $150$	$^{\circ}\text{C}$
Modulus Control Input, Pin 6	MC	$-0.5$ to $6.5$	Vdc
Maximum Output Current, Pin 4	$I_{\text{O}}$	10.0	mA

NOTE: ESD data available upon request.



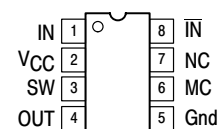
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### PIN CONNECTIONS



(Top View)

### ORDERING INFORMATION

Device	Package	Shipping
MC12026AD	SO-8	98 Units/Rail
MC12026ADR2	SO-8	2500 Tape & Reel

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.

# MC12026A

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

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sin Wave)	$f_t$	0.1	1.4	1.1	GHz
Supply Current Output Unloaded (Pin 2)	$I_{CC}$	–	4.0	5.3	mA
Modulus Control Input High (MC)	$V_{IH1}$	2.0	–	$V_{CC}$	V
Modulus Control Input Low (MC)	$V_{IL1}$	GND	–	0.8	V
Divide Ratio Control Input High (SW)	$V_{IH2}$	$V_{CC} - 0.5$ V	$V_{CC}$	$V_{CC} + 0.5$ V	V
Divide Ratio Control Input Low (SW)	$V_{IL2}$	OPEN	OPEN	OPEN	–
Output Voltage Swing ( $R_L = 560 \Omega$ ; $I_O = 5.5$ mA) (Note 1) ( $R_L = 1.1$ k $\Omega$ ; $I_O = 2.9$ mA) (Note 2)	$V_{out}$	1.0	1.6	–	$V_{pp}$
Modulus Setup Time MC to Out (Note 3)	$t_{SET}$	–	6.0	9.0	ns
Input Voltage Sensitivity 100–250 MHz 250–1100 MHz	$V_{in}$	400 100	– –	1000 1000	mVpp

1. Divide Ratio of  $\pm 8/9$  at 1.1 GHz,  $C_L = 8.0$  pF.
2. Divide Ratio of  $\pm 16/17$  at 1.1 GHz,  $C_L = 8.0$  pF.
3. Assuming  $R_L = 560 \Omega$  at 1.1 GHz.

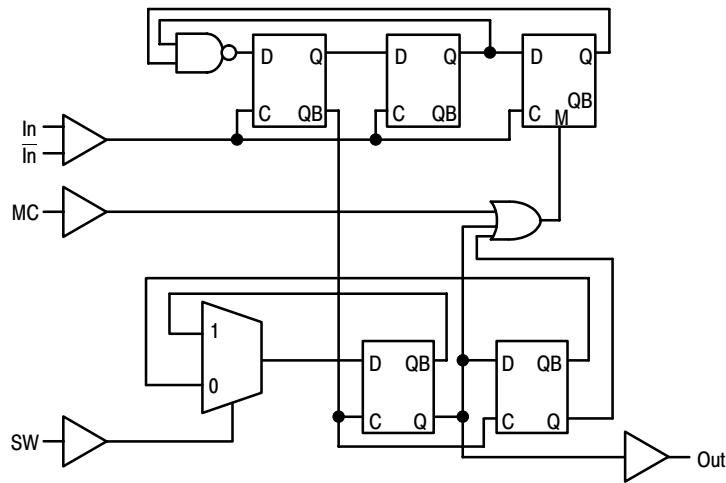
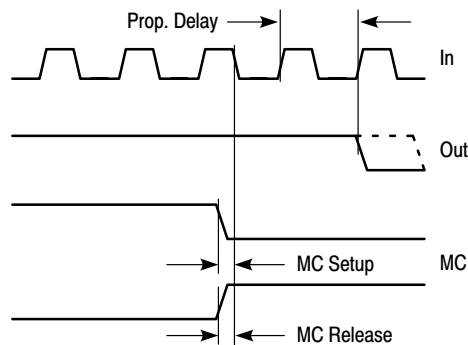


Figure 1. Logic Diagram (MC12026A)



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

Figure 2. Modulus Setup Time

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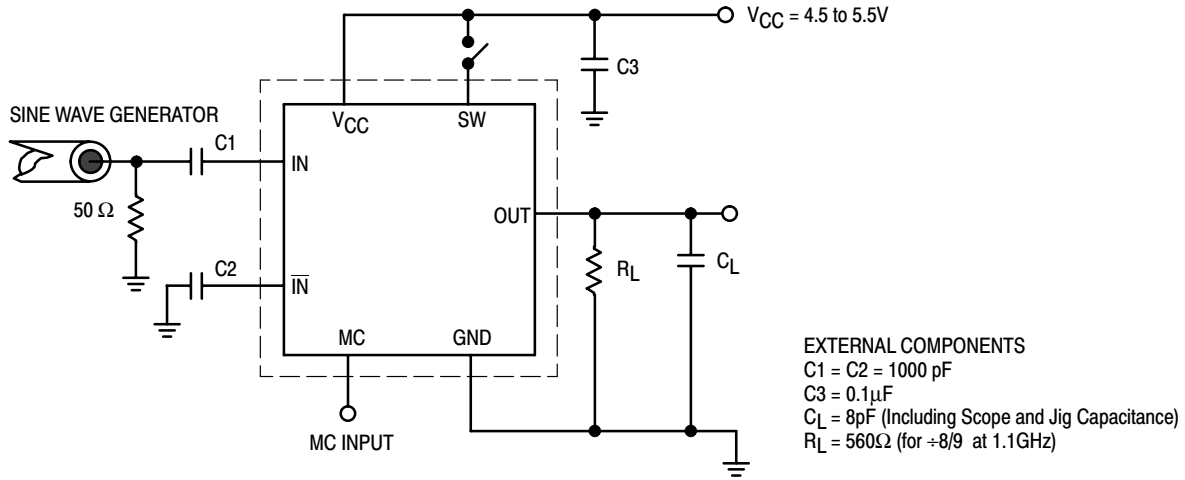


Figure 3. AC Test Circuit

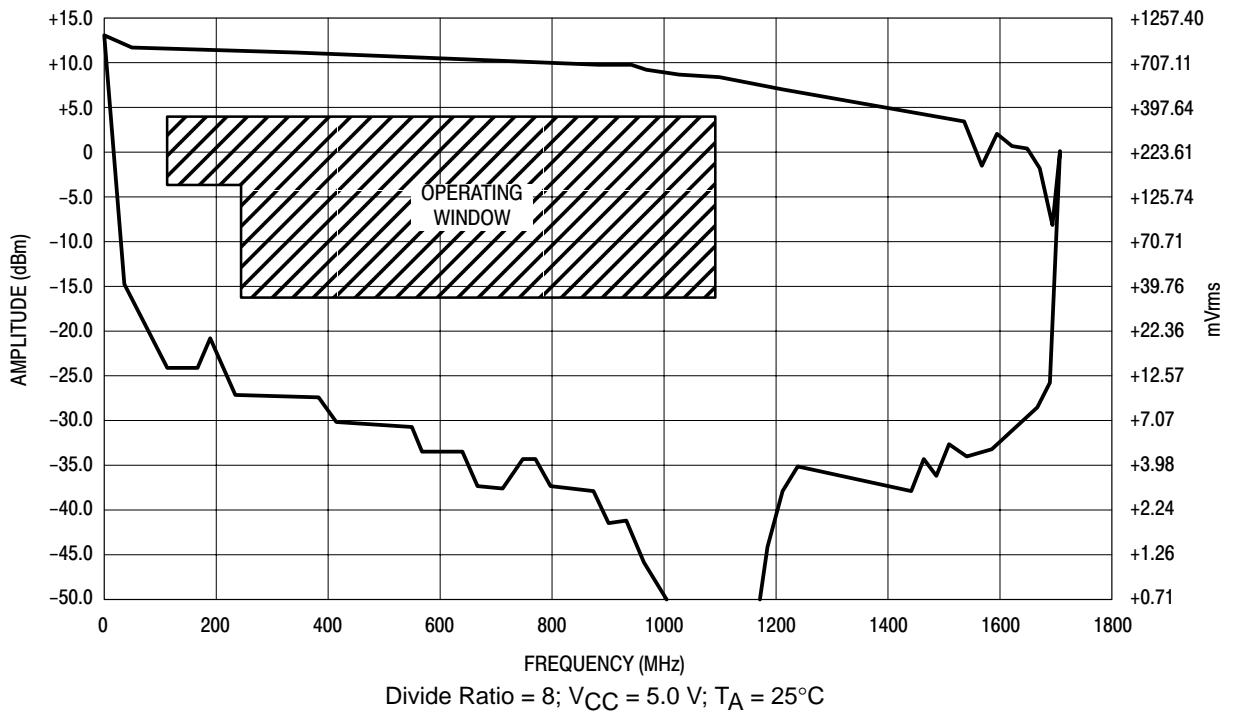


Figure 4. Input Signal Amplitude versus Input Frequency

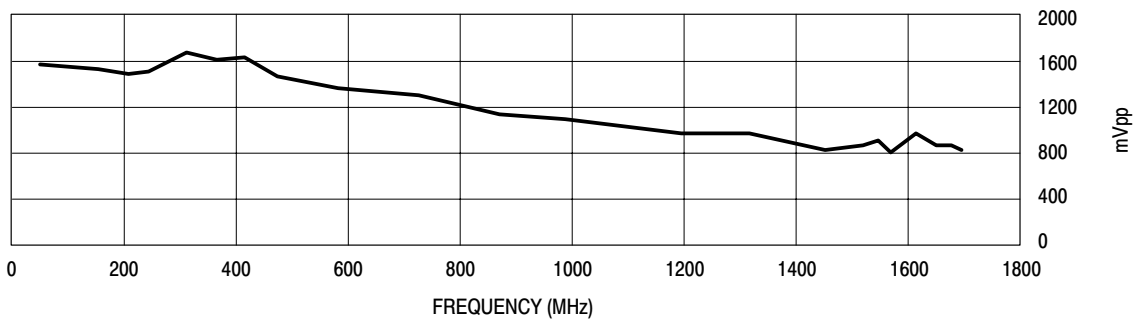
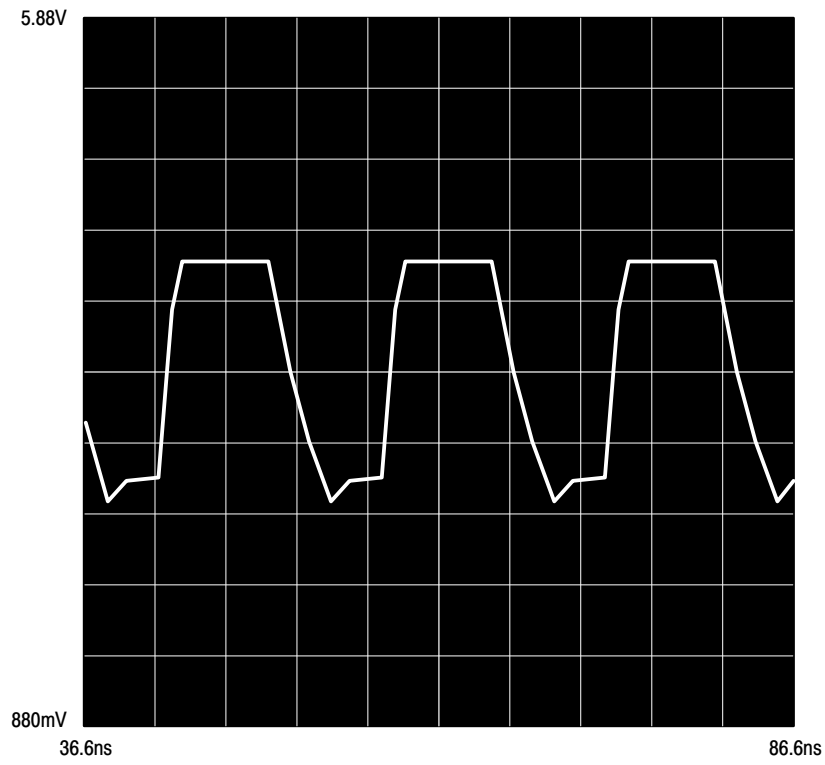


Figure 5. Output Amplitude versus Input Frequency

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(±8, 1.1 GHz Input Frequency,  $V_{CC} = 5.0$ ,  $T_A = 25^\circ\text{C}$ , Output Loaded With 8.0pF)

**Figure 6. Typical Output Waveform**

# MC12026A

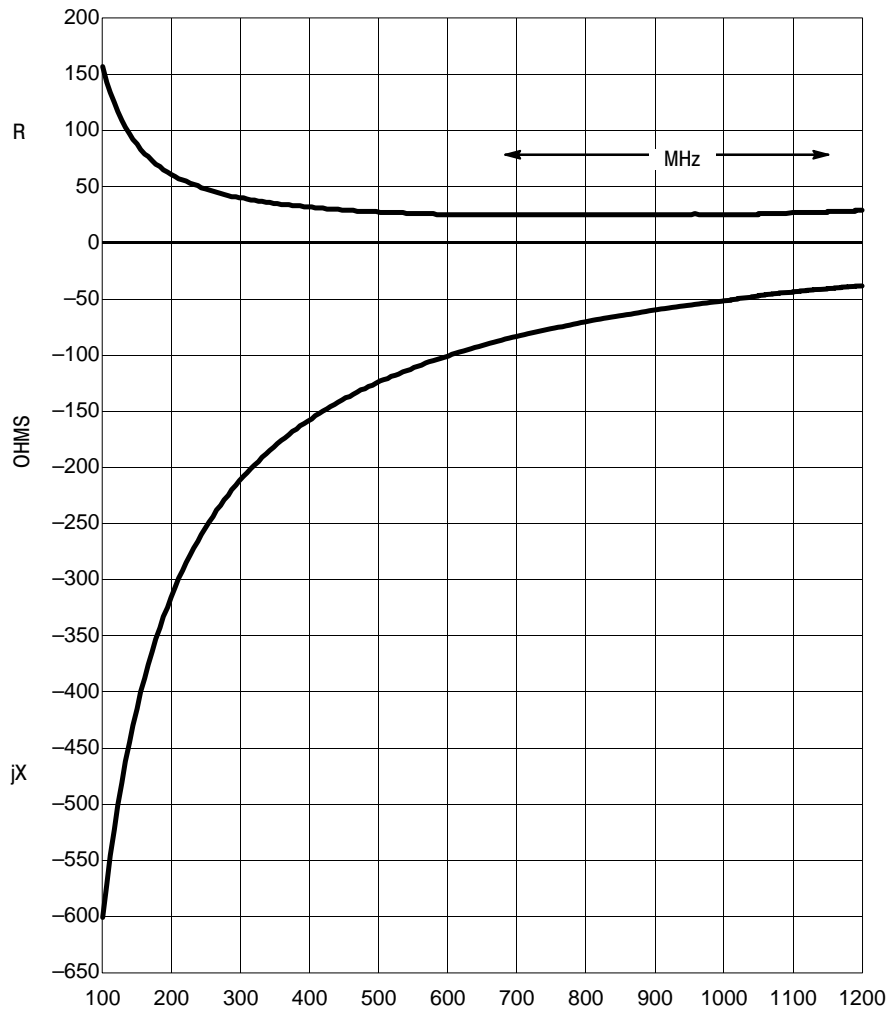
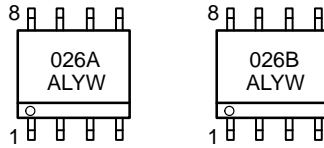


Figure 7. Typical Input Impedance versus Input Frequency

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## MARKING DIAGRAMS

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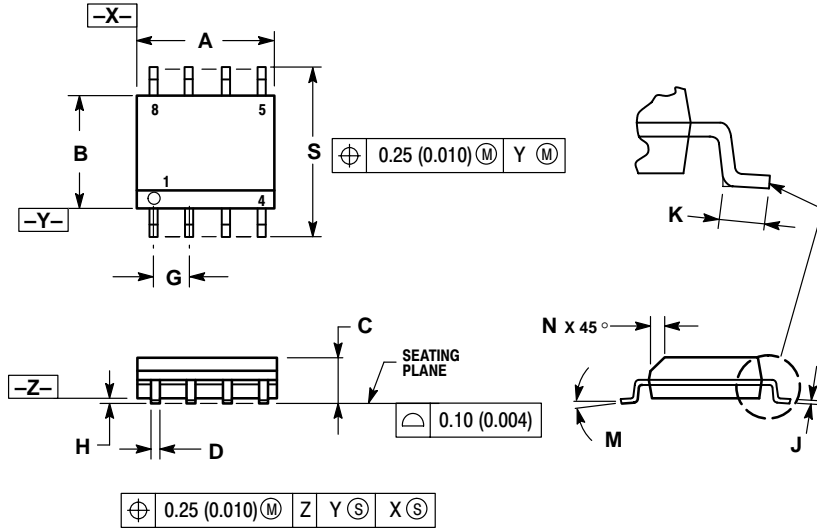


A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week

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## PACKAGE DIMENSIONS

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ISSUE W



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION 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	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

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