

MC12026A

1.1 GHz Dual Modulus Prescaler

Description

The MC12026A 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°C
- The MC12026 is Pin Compatible with the MC12022
- Short Setup Time (t_{set}) 6.0 ns Typical @ 1.1 GHz
- Modulus Control Input Level is Compatible with Standard CMOS and TTL
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

Table 1. FUNCTIONAL TABLE

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

1. SW: H = V_{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_{CC} , L = GND to 0.8 V.

Table 2. MAXIMUM RATINGS

Characteristics	Symbol	Value	Unit
Power Supply Voltage, Pin 2	V_{CC}	-0.5 to 7.0	Vdc
Operating Temperature Range	T_{A}	-40 to 85	$^{\circ}\text{C}$
Storage Temperature Range	T_{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_{O}	10.0	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

NOTE: ESD data available upon request.



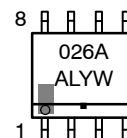
ON SemiconductorTM

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**SOIC-8 NB
D SUFFIX
CASE
751-07**

MARKING DIAGRAM*

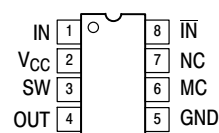


- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note [AND8002/D](#).

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

Device	Package	Shipping [†]
MC12026ADG	SOIC-8 NB (Pb-Free)	98 Units/Tube
MC12026ADR2G	SOIC-8 NB (Pb-Free)	2500/Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

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Table 3. ELECTRICAL CHARACTERISTICS ($V_{CC} = 4.5$ to 5.5 ; $T_A = -40$ to 85°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 Ω ; $I_O = 2.9$ 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 +8/9 at 1.1 GHz, $C_L = 8.0$ pF.
2. Divide Ratio of +16/17 at 1.1 GHz, $C_L = 8.0$ pF.
3. Assuming $R_L = 560 \Omega$ at 1.1 GHz.

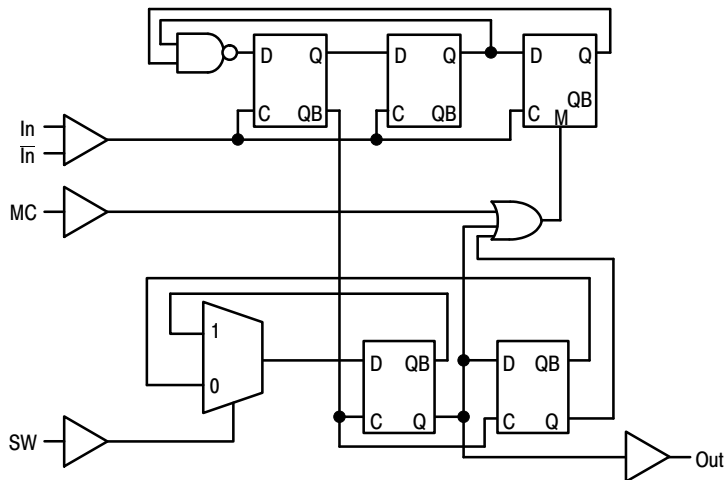
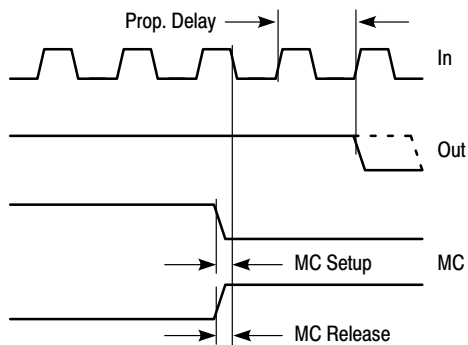


Figure 1. Logic Diagram (MC12026A)



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

Figure 2. Modulus Setup Time

MC12026A

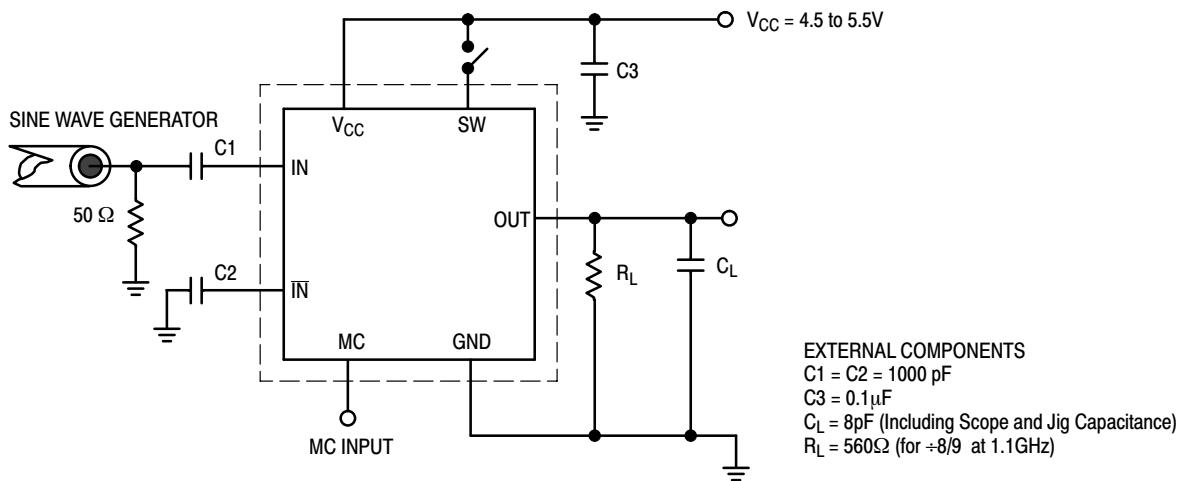


Figure 3. AC Test Circuit

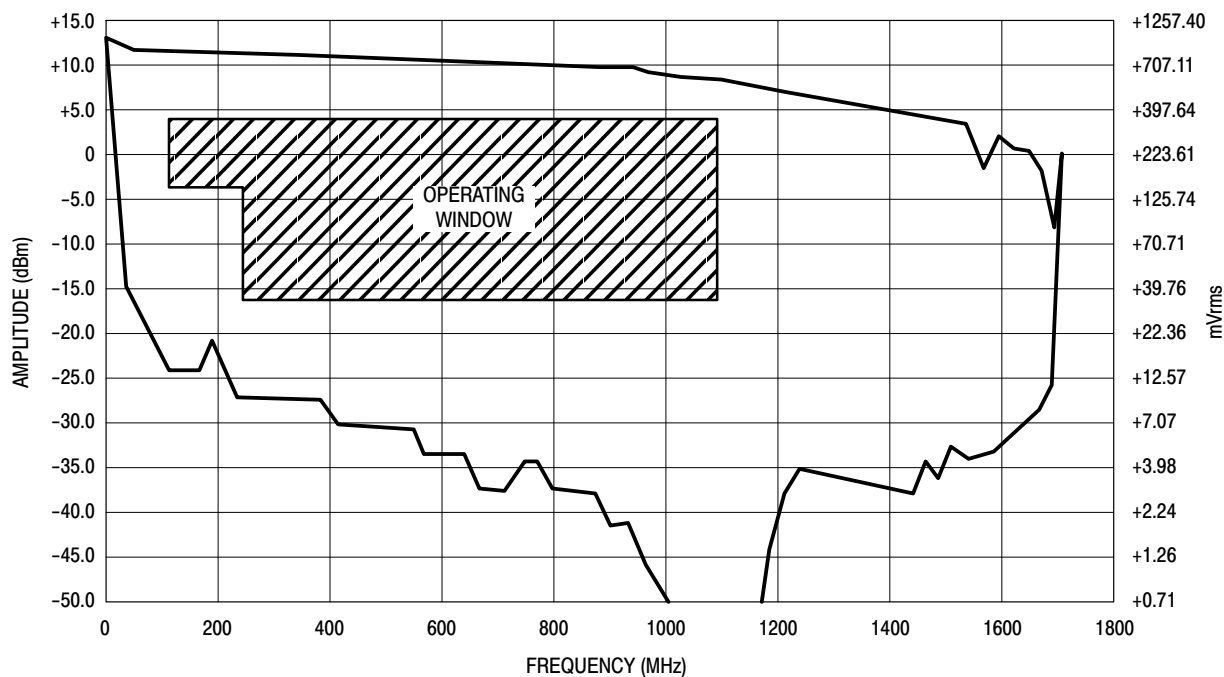


Figure 4. Input Signal Amplitude Versus Input Frequency

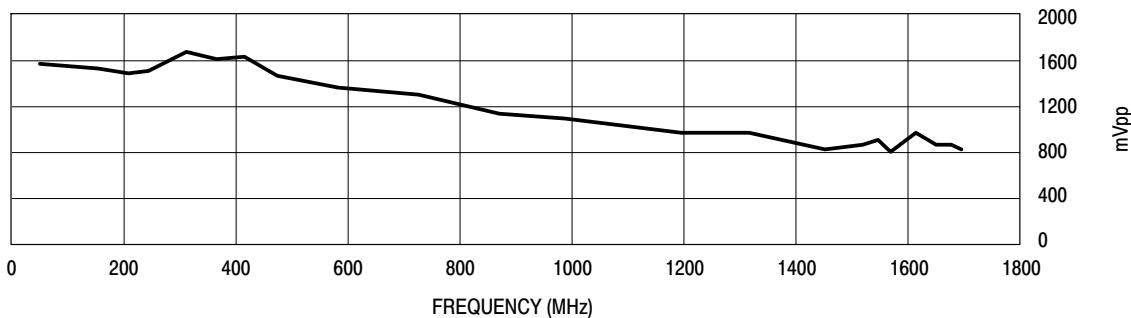
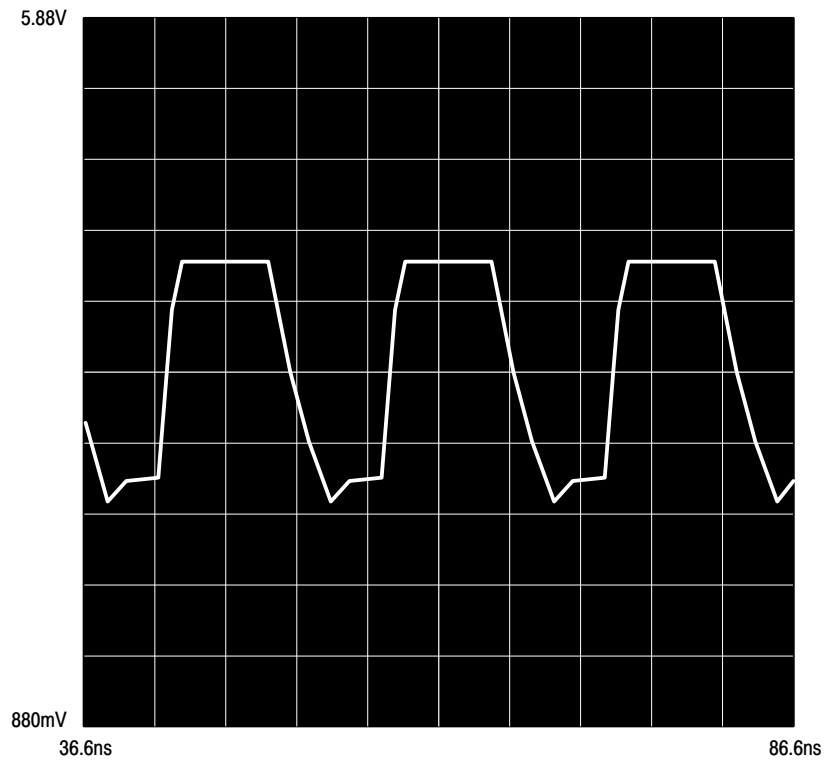


Figure 5. Output Amplitude Versus Input Frequency

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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

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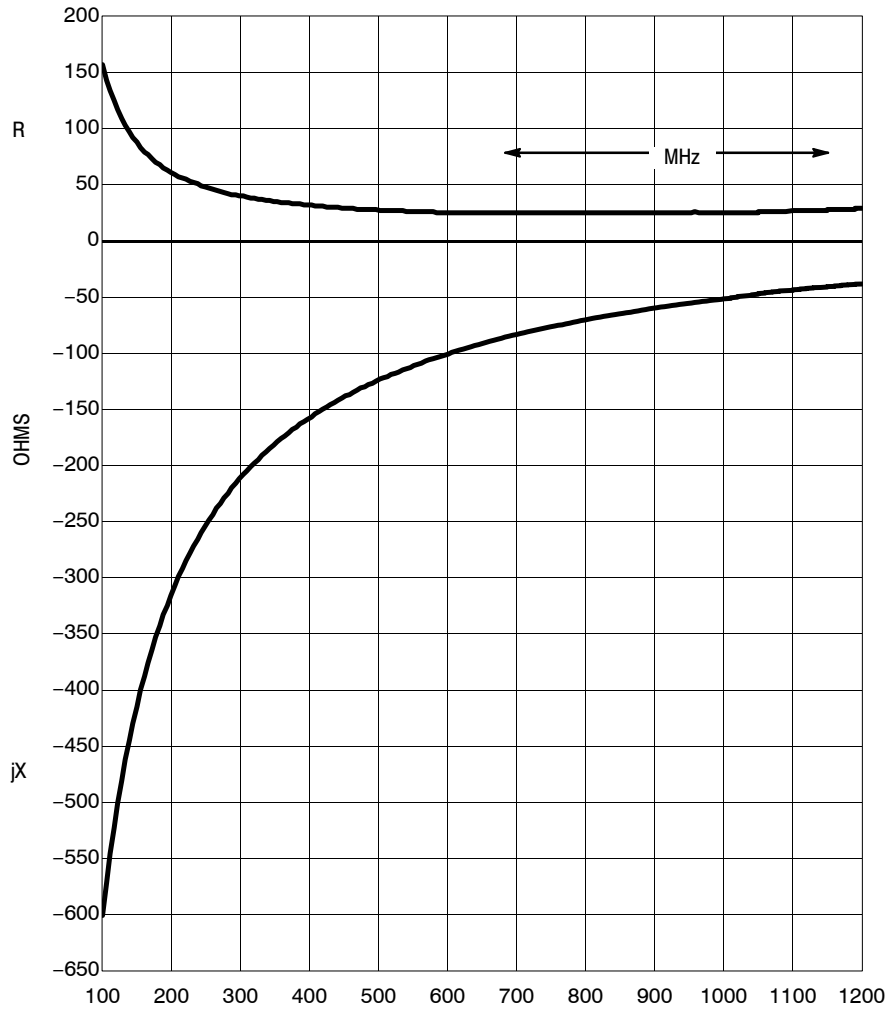
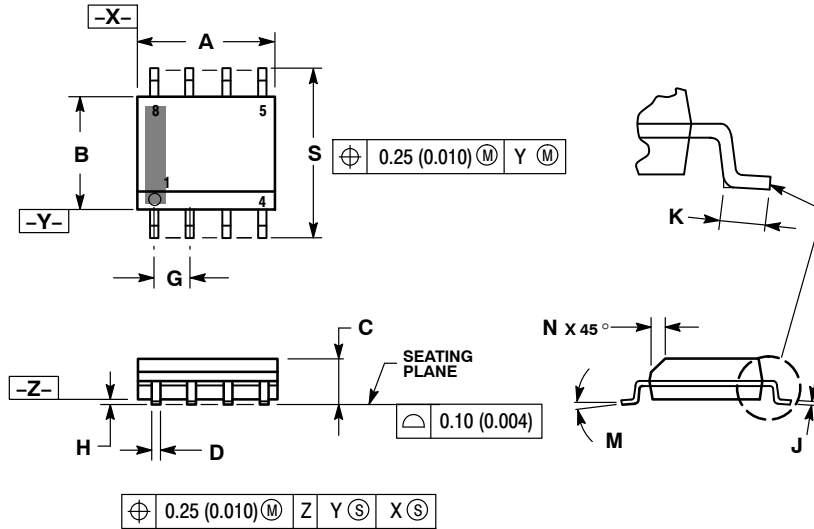


Figure 7. Typical Input Impedance Versus Input Frequency

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PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AK

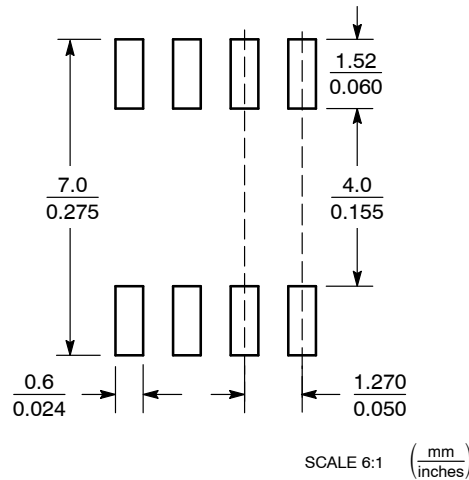


NOTES:

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.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

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

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDDERM/D](#).

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