

MC12026A

1.1 GHz Dual Modulus Prescaler

Description

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°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
- Pb-Free Packages are Available

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 | °C |
| Storage Temperature Range | T_{stg} | -65 to 150 | °C |
| Modulus Control Input, Pin 6 | MC | -0.5 to 6.5 | Vdc |
| Maximum Output Current, Pin 4 | I_O | 10.0 | mA |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

NOTE: ESD data available upon request.



ON Semiconductor™

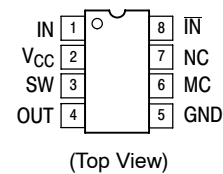
<http://onsemi.com>

MARKING DIAGRAM



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

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MC12026A

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 3) ($R_L = 1.1$ k Ω ; $I_O = 2.9$ mA) (Note 4) | V_{out} | 1.0 | 1.6 | - | V_{pp} |
| Modulus Setup Time MC to Out (Note 5) | t_{SET} | - | 6.0 | 9.0 | ns |
| Input Voltage Sensitivity 100–250 MHz 250–1100 MHz | V_{in} | 400 100 | - - | 1000 1000 | mVpp |

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

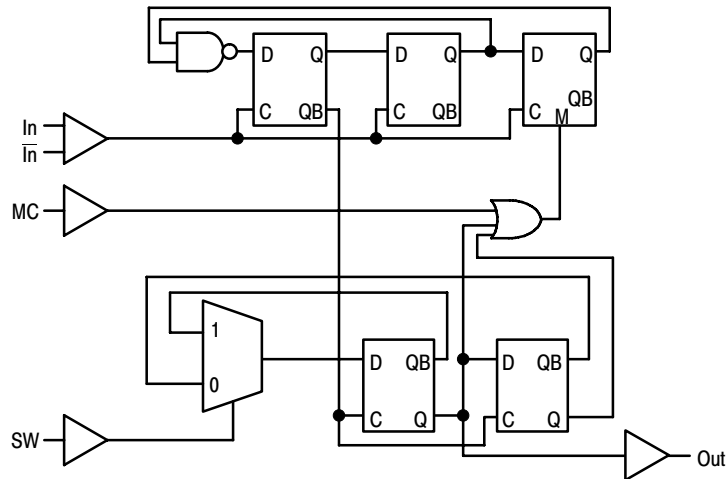
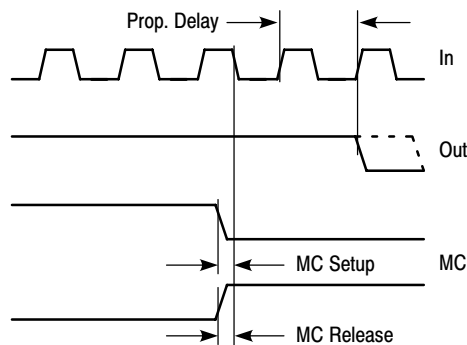


Figure 1. Logic Diagram (MC12026A)



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

Figure 2. Modulus Setup Time

MC12026A

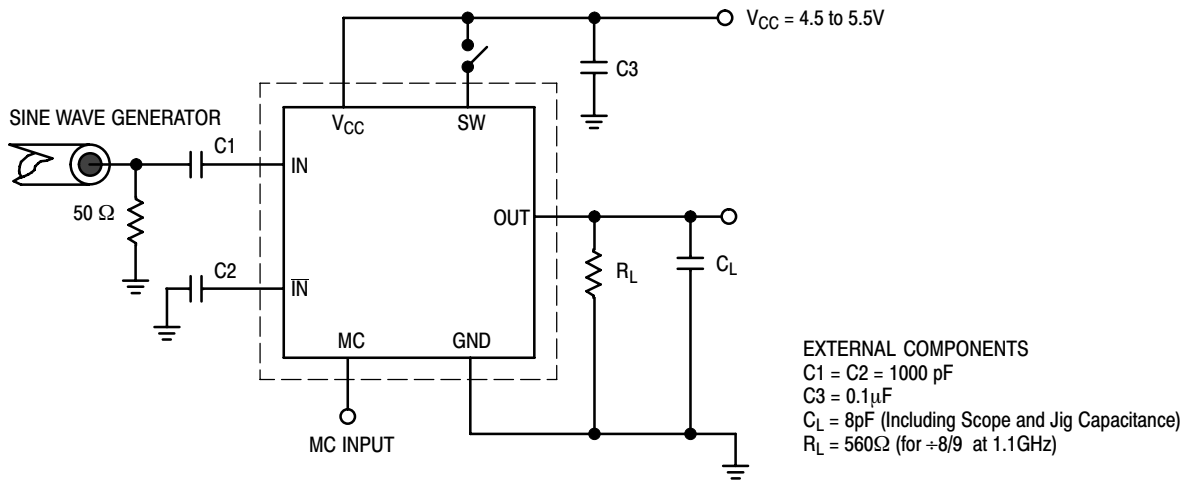


Figure 3. AC Test Circuit

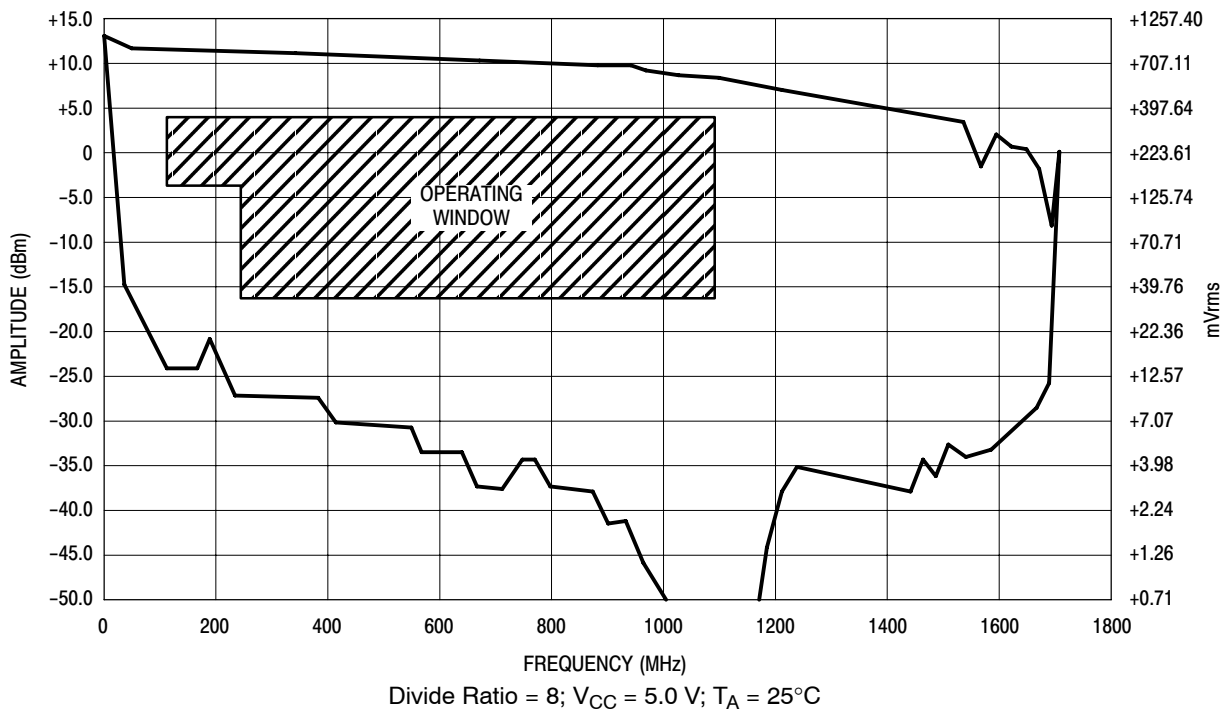


Figure 4. Input Signal Amplitude versus Input Frequency

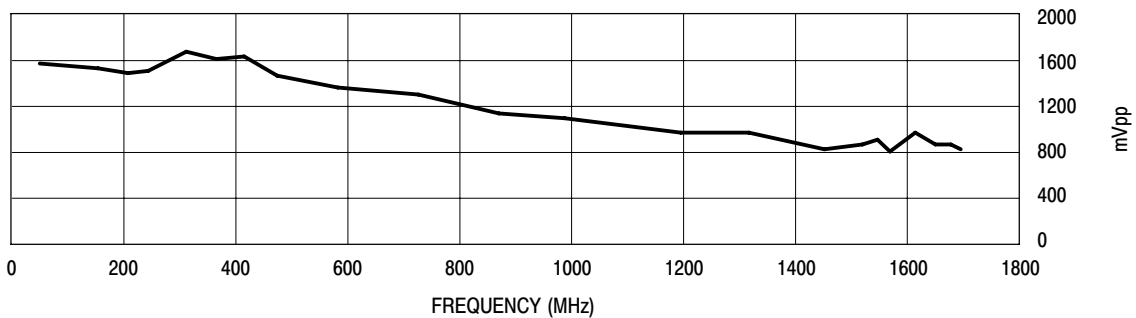
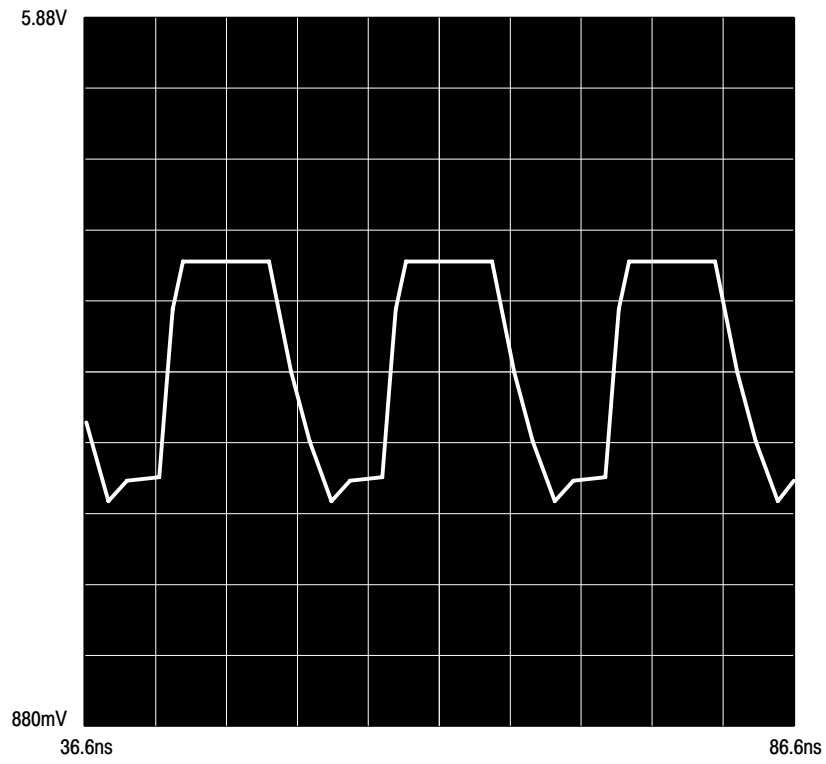


Figure 5. Output Amplitude versus Input Frequency

MC12026A



(±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

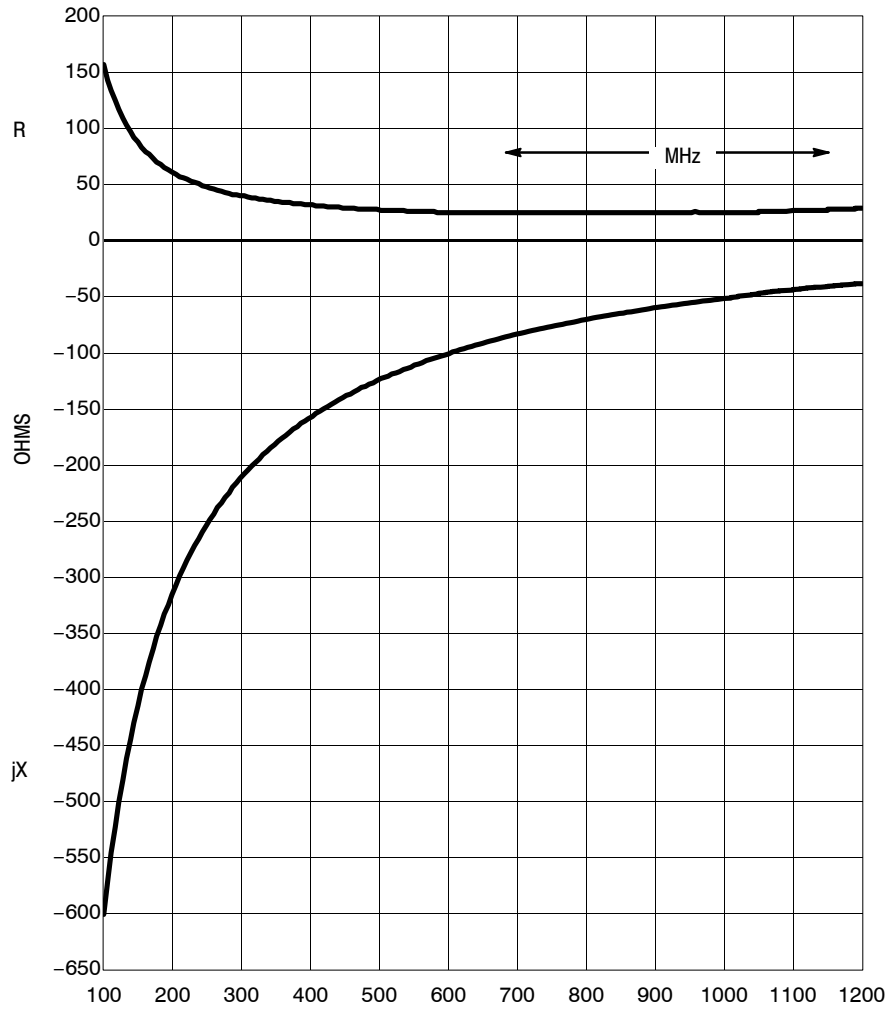


Figure 7. Typical Input Impedance versus Input Frequency

ORDERING INFORMATION

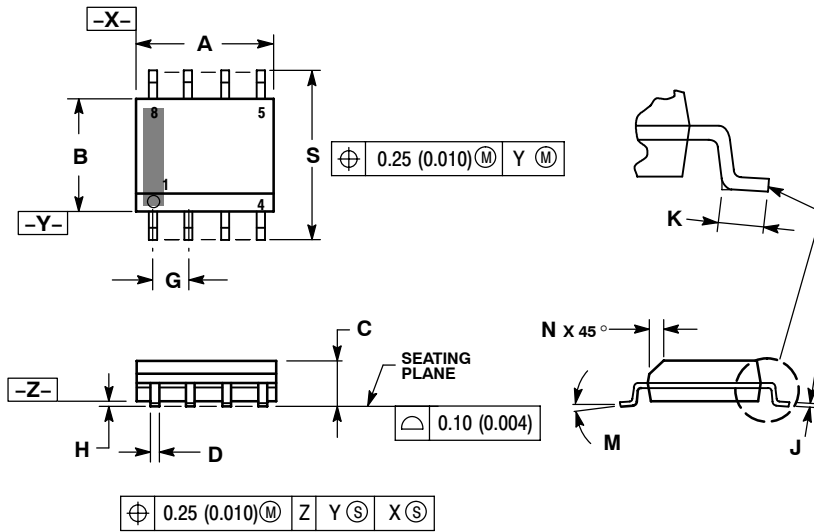
| Device | Package | Shipping [†] |
|--------------|---------------------|-----------------------|
| MC12026AD | SOIC-8 | 98 Units / Rail |
| MC12026ADG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC12026ADR2 | SOIC-8 | 2500 / Tape & Reel |
| MC12026ADR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |

[†]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.

MC12026A

PACKAGE DIMENSIONS

SOIC-8 NB CASE 751-07 ISSUE AG

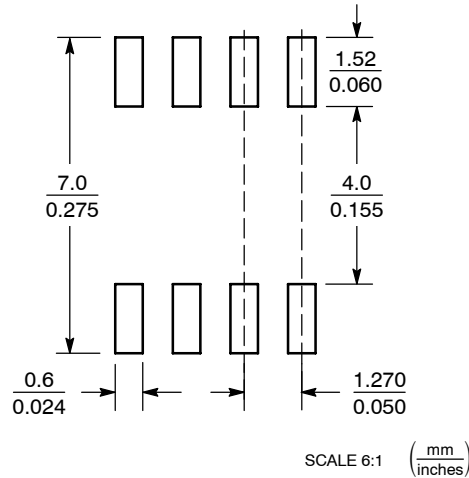


NOTES:

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, SOLDERRM/D.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.

MC12026A/D