

# MC12080

## 1.1 GHz Prescaler

### Description

The MC12080 is a single modulus divide by 10, 20, 40, 80 prescaler for low power frequency division of a 1.1 GHz high frequency input signal. Divide ratio control inputs SW1, SW2 and SW3 select the required divide ratio of  $\div 10$ ,  $\div 20$ ,  $\div 40$ , or  $\div 80$ .

An external load resistor is required to terminate the output. An 820  $\Omega$  resistor is recommended to achieve a 1.2 V<sub>pp</sub> output swing, when dividing a 1.1 GHz input signal by the minimum divide by ratio of 10, assuming a 8.0 pF load. Output current can be minimized dependent on conditions such as output frequency, capacitive load being driven, and output voltage swing required. Typical values for load resistors are included in the V<sub>out</sub> specification for various divide ratios at 1.1 GHz input frequency.

### Features

- 1.1 GHz Toggle Frequency
- Supply Voltage 4.5 to 5.5 V
- Low Power 3.7 mA Typical at V<sub>CC</sub> = 5.0 V
- Operating Temperature Range of -40 to 85°C
- These Devices are Pb-Free and are RoHS Compliant

Table 1. MAXIMUM RATINGS

| Rating                        | Symbol           | Value       | Unit |
|-------------------------------|------------------|-------------|------|
| Power Supply Voltage, Pin 2   | V <sub>CC</sub>  | -0.5 to 7.0 | Vdc  |
| Operating Temperature Range   | T <sub>A</sub>   | -40 to 85   | °C   |
| Storage Temperature Range     | T <sub>stg</sub> | -65 to 150  | °C   |
| Maximum Output Current, Pin 4 | I <sub>O</sub>   | 10          | mA   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 2. ATTRIBUTES

| Characteristics   | Value                   |
|---|-------------------------|
| ESD Protection Human Body Model<br>Machine Model              | > 1500 V<br>> 100 V     |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | Level 1                 |
| Flammability Rating Oxygen Index: 28 to 34                    | UL 94 V-0<br>@ 0.125 in |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test        |                         |

1. For additional information, see Application Note AND8003/D.



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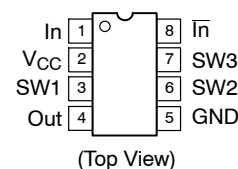
<http://onsemi.com>

### MARKING DIAGRAM



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

### PIN CONNECTIONS



### FUNCTION TABLE

| SW1 | SW2 | SW3 | Divide Ratio |
|-----|-----|-----|--------------|
| L   | L   | L   | 80           |
| L   | L   | H   | 40           |
| L   | H   | L   | 40           |
| L   | H   | H   | 20           |
| H   | L   | L   | 40           |
| H   | L   | H   | 20           |
| H   | H   | L   | 20           |
| H   | H   | H   | 10           |

NOTE: SW1, SW2 and SW3: H = V<sub>CC</sub>, L = Open.

### ORDERING INFORMATION

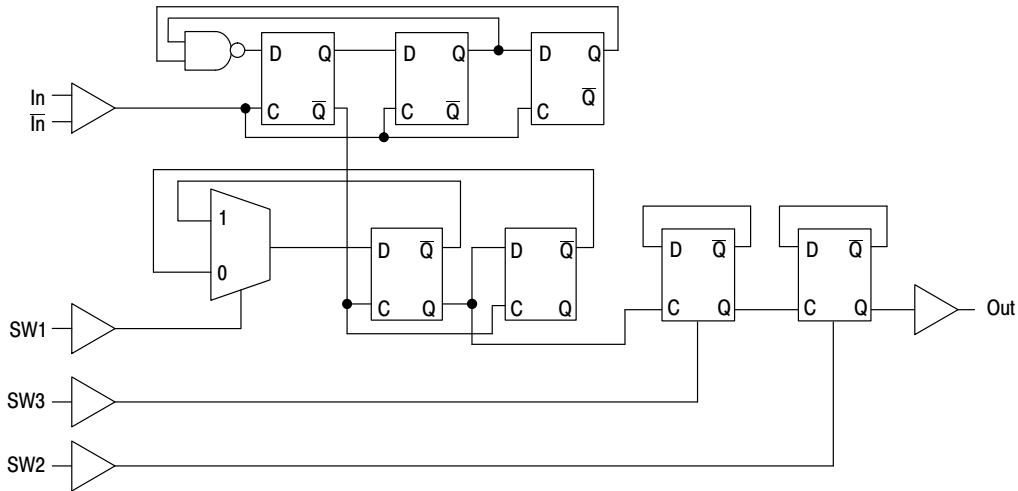
See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

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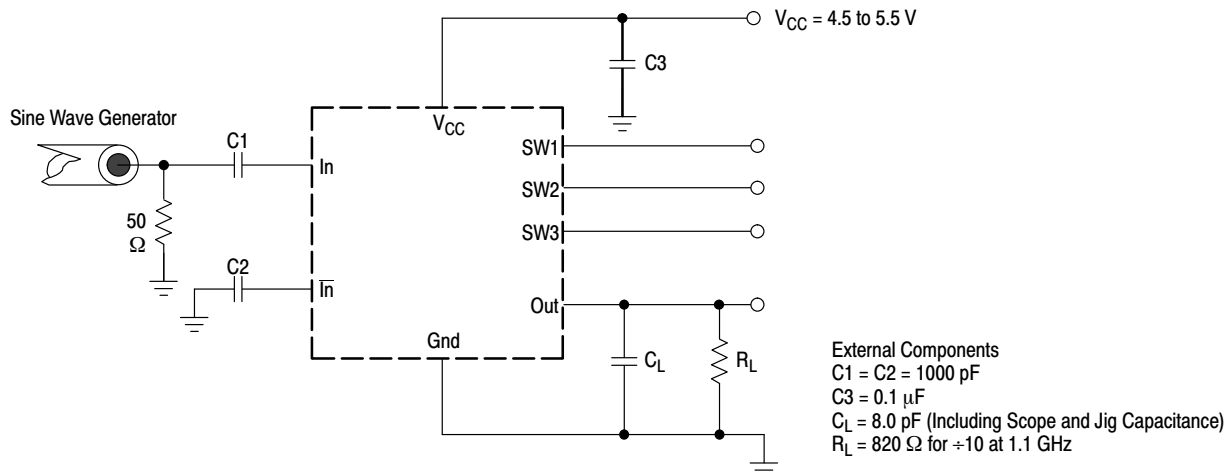
**Table 3. ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 4.5$  to  $5.5$  V;  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise noted.)

| Characteristic  | Symbol    | Min              | Typ      | Max              | Unit            |
|---|-----------|------------------|----------|------------------|-----------------|
| Toggle Frequency (Sine Wave)  | ft        | 0.1              | 1.4      | 1.1              | GHz             |
| Supply Current Output (Pin 2)   | $I_{CC}$  | –                | 3.7      | 5.0              | mA              |
| Input Voltage Sensitivity<br>100 to 250 MHz<br>250 to 1100 MHz  | $V_{in}$  | 400<br>100       | –<br>–   | 1000<br>1000     | mVpp            |
| Divide Ratio Control Input High (SW1, SW2, SW3)   | $V_{IH}$  | $V_{CC} - 0.5$ V | $V_{CC}$ | $V_{CC} + 0.5$ V | V               |
| Divide Ratio Control Input Low (SW1, SW2, SW3)  | $V_{IL}$  | Open             | Open     | Open             | –               |
| Output Voltage Swing (Note 1)<br>$R_L = 820\ \Omega$ , $I_O = 4.0$ mA for $\pm 10$<br>$R_L = 1.6$ k $\Omega$ , $I_O = 2.1$ mA for $\pm 20$<br>$R_L = 3.3$ k $\Omega$ , $I_O = 1.1$ mA for $\pm 40$<br>$R_L = 6.2$ k $\Omega$ , $I_O = 0.57$ mA for $\pm 80$ | $V_{out}$ | 0.8              | 1.2      | –                | V <sub>pp</sub> |

1. Assumes 8.0 pF load and 1.1 GHz input frequency (typical),  $I_O$  at  $V_{CC} = 5.0$  V and  $T_A = 25^\circ\text{C}$ .

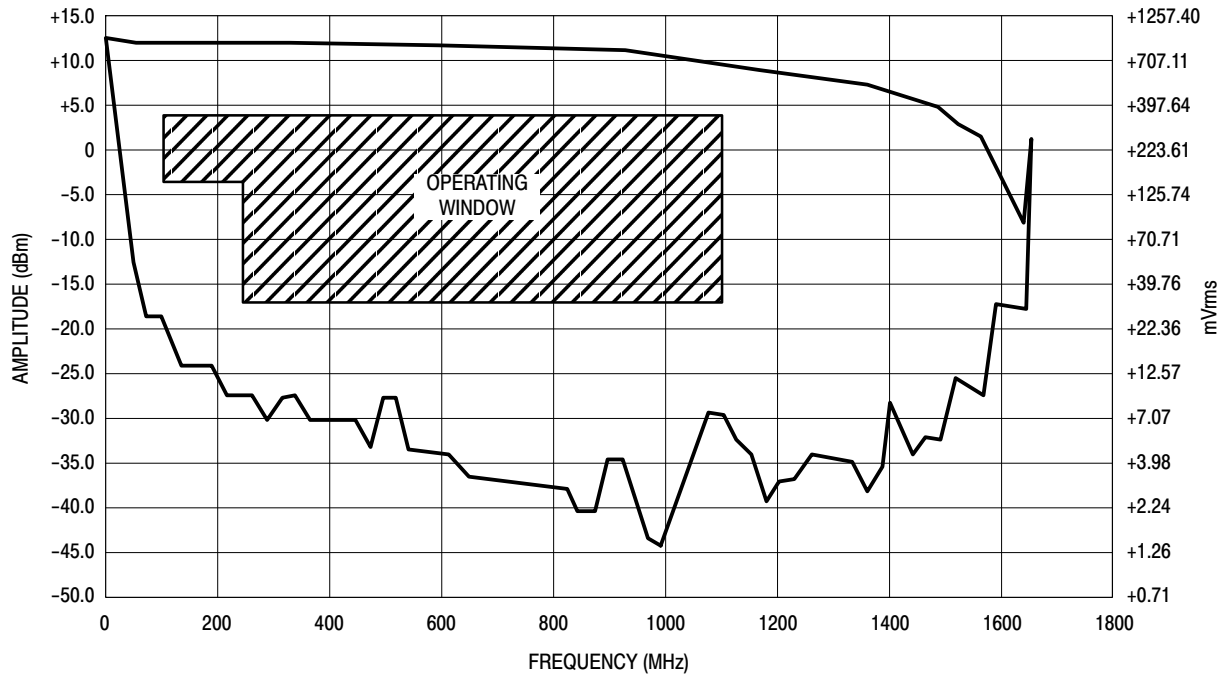


**Figure 1. Logic Diagram**

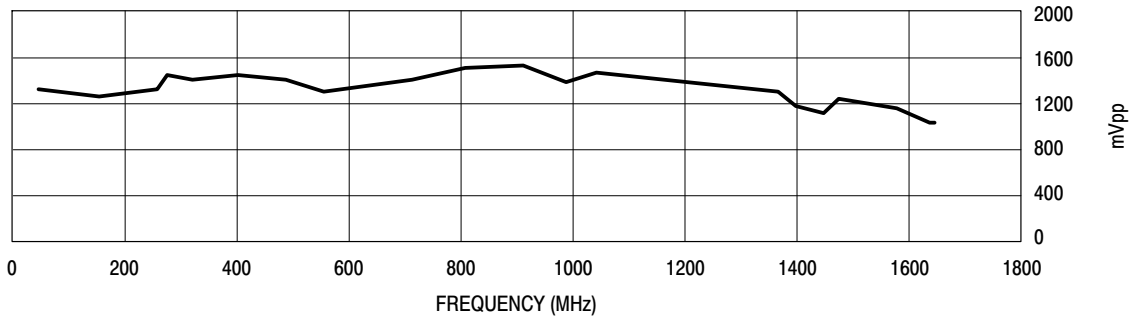


**Figure 2. AC Test Circuit**

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**Figure 3. Input Signal Amplitude versus Input Frequency**



**Figure 4. Output Amplitude versus Input Frequency**

## ORDERING INFORMATION

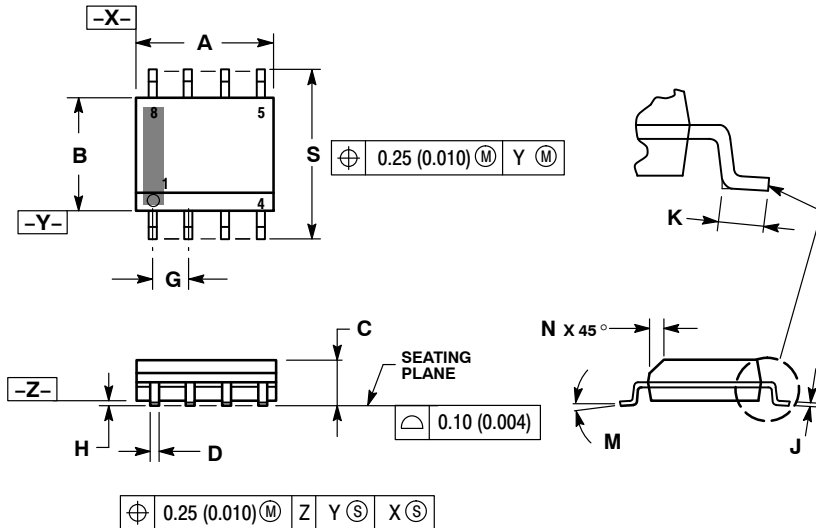
| Device      | Package             | Shipping <sup>†</sup> |
|-------------|---------------------|-----------------------|
| MC12080DG   | SOIC-8<br>(Pb-Free) | 98 Units / Rail       |
| MC12080DR2G |                     | 2500 / Tape & Reel    |

<sup>†</sup>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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## PACKAGE DIMENSIONS

### SOIC-8 NB CASE 751-07 ISSUE AK

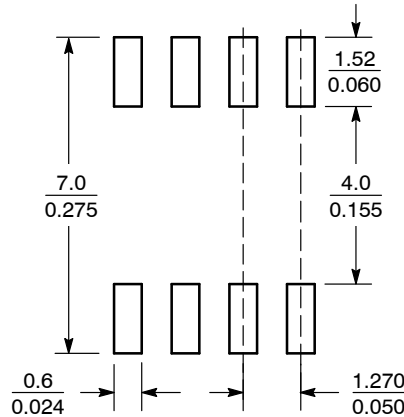


#### NOTES:

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\*



SCALE 6:1 (mm/inches)

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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