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MOTOROLA

# MC12080

# 1.1 GHz Prescaler

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 ÷10, ÷20, ÷40, or ÷80.

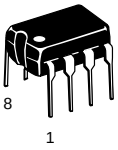
An external load resistor is required to terminate the output. A 820 Ω resistor is recommended to achieve a 1.2 $V_{pp}$ output swing, when dividing a 1.1 GHz input signal by the minimum divide by ratio of 10, assuming a 8.0 pF load. Output current can be minimized dependent on conditions such as output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

- 1.1 GHz Toggle Frequency
- Supply Voltage 4.5 to 5.5 V
- Low Power 3.7mA Typical at $V_{CC}$ = 5.0 V
- Operating Temperature Range of –40 to 85°C

**MECL PLL COMPONENTS**
**÷10/20/40/80 PRESCALER**

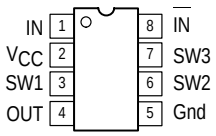
**SEMICONDUCTOR**
**TECHNICAL DATA**


**D SUFFIX**
PLASTIC PACKAGE
CASE 751
(SO–8)




**P SUFFIX**
PLASTIC PACKAGE
CASE 626

**PIN CONNECTIONS**




(Top View)

**FUNCTIONAL 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 = $V_{CC}$, L = Open.

**MAXIMUM RATINGS**

| Characteristic | Symbol | Range | 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 |
| Maximum Output Current, Pin 4 | $I_O$ | 10 | mA |

**NOTE:** ESD data available upon request.

**ORDERING INFORMATION**

| Device | Operating Temperature Range | Package |
|---|---|---|
| MC12080D | $T_A$ = – 40° to +85°C | SO–8 |
| MC12080P | | Plastic |

**ELECTRICAL CHARACTERISTICS** ($V_{CC}$ = 4.5 to 5.5 V; $T_A$ = –40 to 85°C, unless otherwise noted.)

| Parameter | 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 100–250 MHz<br>250–1100 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[1] $R_L$ = 820 Ω, $I_O$ = 4.0 mA for ÷10<br>$R_L$ = 1.6 kΩ, $I_O$ = 2.1 mA for ÷20<br>$R_L$ = 3.3 kΩ, $I_O$ = 1.1 mA for ÷40<br>$R_L$ = 6.2 kΩ, $I_O$ = 0.57 mA for ÷80 | $V_{out}$ | 0.8 | 1.2 | – | $V_{pp}$ |

**NOTE:** 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°C

**Figure 1. Logic Diagram (MC12080)**

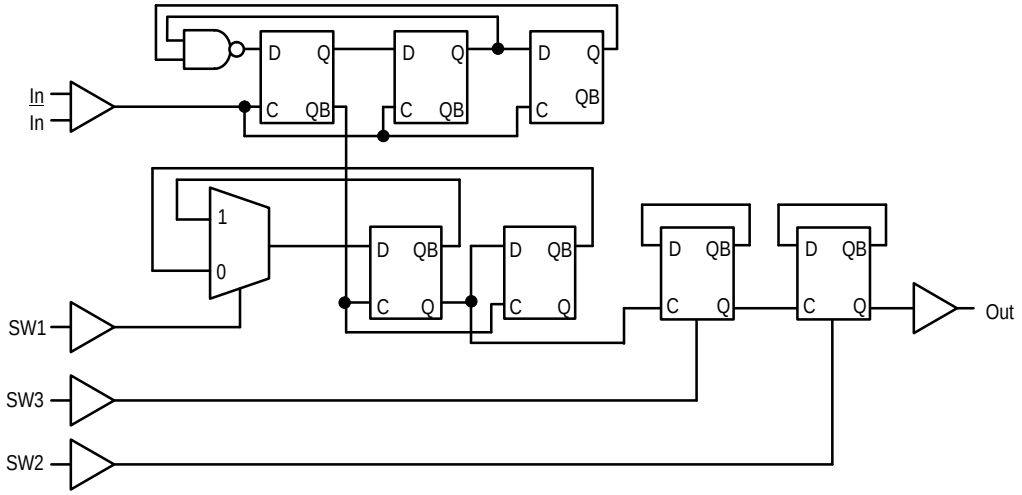
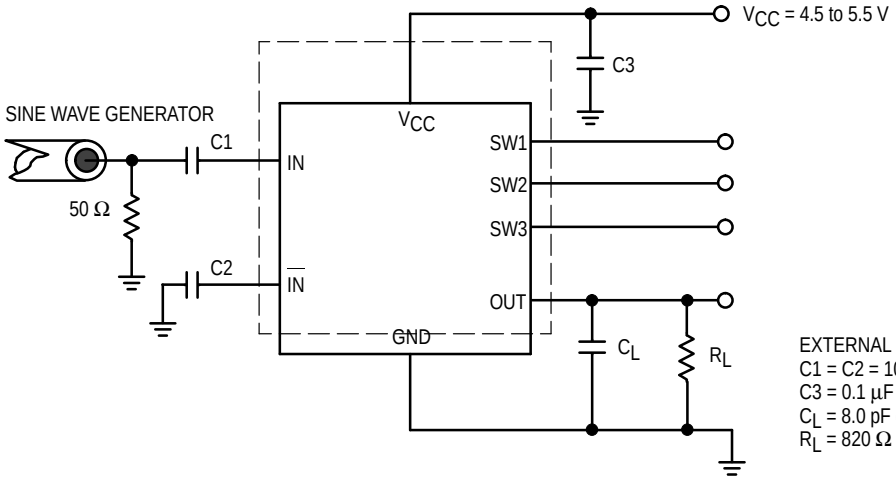
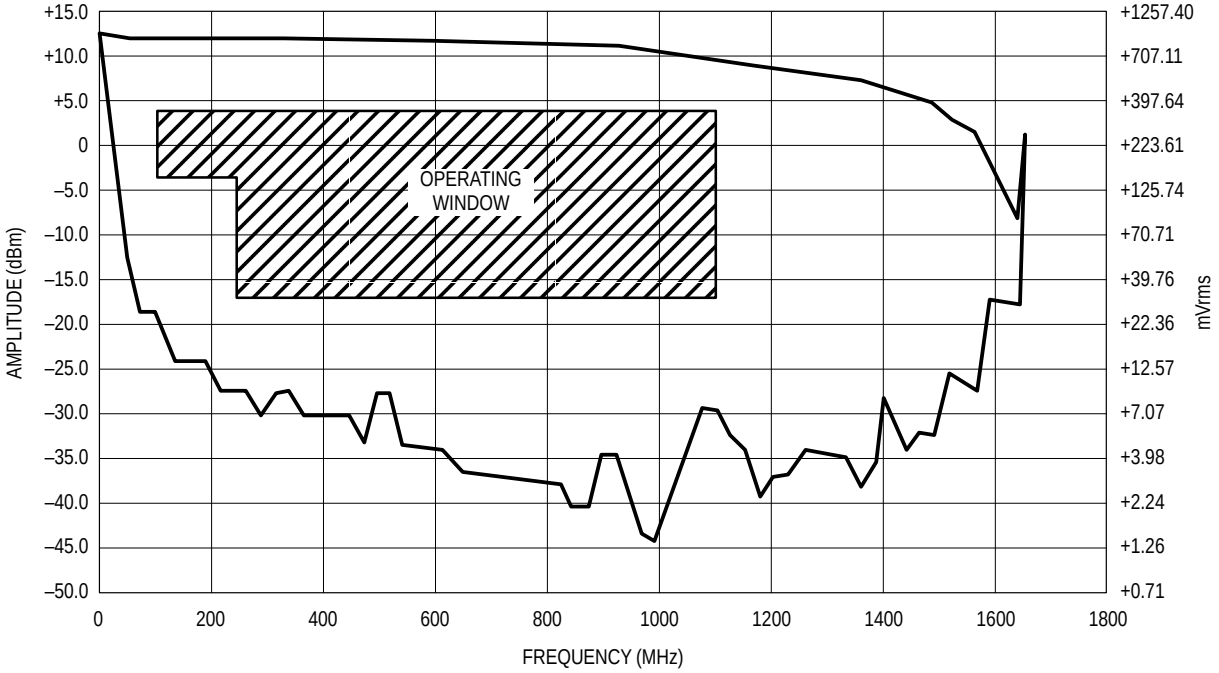



**Figure 2. AC Test Circuit**



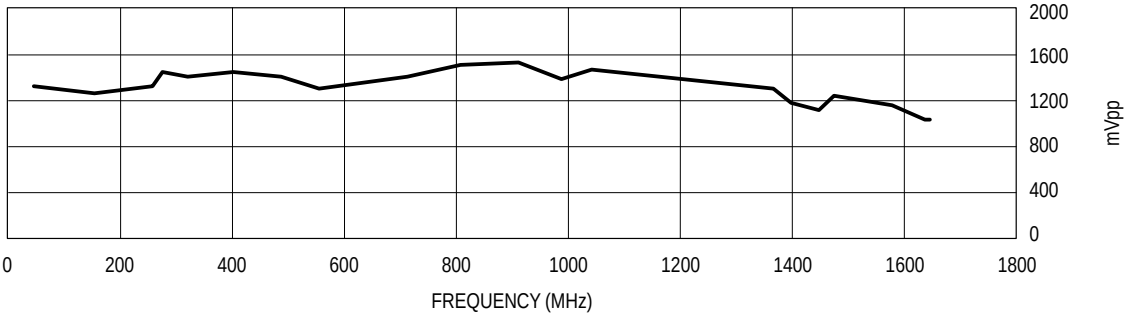

EXTERNAL COMPONENTS
C1 = C2 = 1000 pF
C3 = 0.1 μF
$C_L$ = 8.0 pF (Including Scope and Jig Capacitance)
$R_L$ = 820 Ω for ÷10 at 1.1 GHz

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



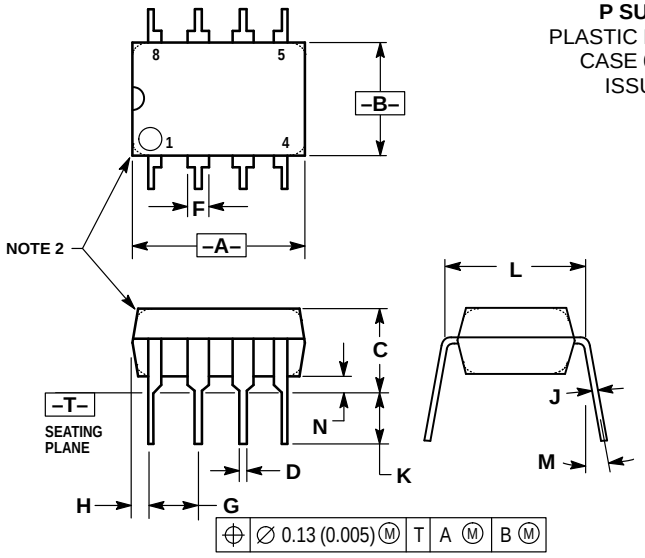

Divide Ratio = 10; $V_{CC}$ = 5.0 V; $T_A$ = 25°C

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



## OUTLINE DIMENSIONS

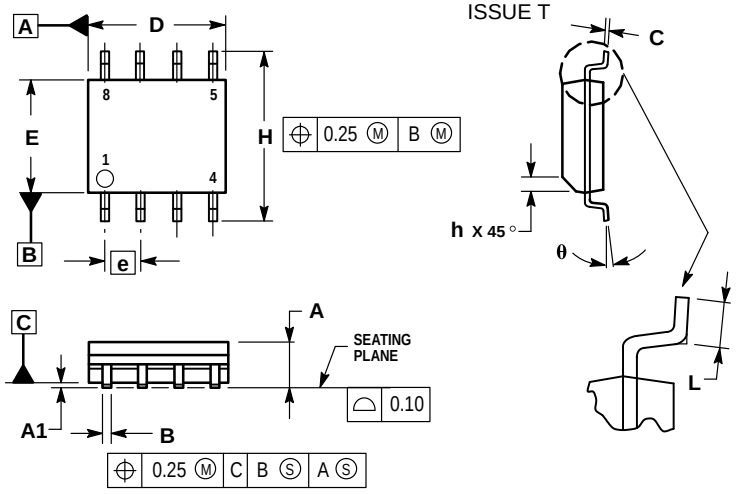
**P SUFFIX**
PLASTIC PACKAGE
CASE 626–05
ISSUE K




NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | 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 |

**D SUFFIX**
PLASTIC PACKAGE
CASE 751–06
(SO–8)
ISSUE T




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| B | 0.35 | 0.49 |
| C | 0.19 | 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 |
| θ | 0° | 7° |



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