MOTOROLA



# MC12058

# 1.1 GHz Low Power Dual Modulus Prescaler

The MC12058 is a low power ÷126/128, ÷254/256 dual modulus prescaler. Motorola's advanced Bipolar MOSAIC™ V technology is utilized to achieve low power dissipation of 3.0 mW at a minimum supply voltage of 2.7 V. The MC12058 can be operated down to a minimum supply voltage of 2.7 V required for battery operated portable systems.

On–chip output termination provides 250 μA (typical) output current to drive a 8.0 pF (typical) high impedance load. The Divide Ratio Control input, SW, permits selection of divide ratio as desired. A HIGH on SW selects ÷126/128; an OPEN on SW selects ÷254/256. The Modulus Control input, MC, selects the proper divide number after SW has been biased to select the desired divide ratio.

- 1.1 GHz Toggle Frequency
- Supply Voltage 2.7 to 5.5 V
- Low Power 1.1 mA Typical at $V_{CC}$ = 3.0 V
- Operating Temperature Range of –40 to 85°C
- On–Chip Output Termination

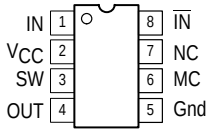
MOSAIC V is a trademark of Motorola

**MECL PLL COMPONENTS**
**÷126/128, ÷254/256**
**LOW POWER**
**DUAL MODULUS PRESCALER**

**SEMICONDUCTOR**
**TECHNICAL DATA**


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

**PIN CONNECTIONS**




(Top View)

**FUNCTIONAL TABLE**

| SW | MC | Divide Ratio |
|---|---|---|
| H | H | 126 |
| H | L | 128 |
| L | H | 254 |
| L | L | 256 |

**NOTES:** 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.

**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 |
| Modulus Control Input, Pin 6 | MC | –0.5 to $V_{CC}$ | Vdc |
| Maximum Output Current, Pin 4 | $I_O$ | 4.0 | mA |

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

**ORDERING INFORMATION**

| Device | Operating Temp Range | Package |
|---|---|---|
| MC12058D | $T_A$ = – 40 to 85°C | SO–8 |

**ELECTRICAL CHARACTERISTICS** ($V_{CC}$ = 2.7 to 5.5 V; $T_A$ = –40 to 85°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Toggle Frequency (Sine Wave Input) | $f_t$ | 0.1 | 1.4 | 1.1 | GHz |
| Supply Current Output (Pin 2) | $I_{CC}$ | – | 1.1 | 2.0 | mA |
| Modulus Control Input HIGH (MC) | $V_{IH1}$ | 2.0 | – | $V_{CC}$ + 0.5 | V |
| Modulus Control Input LOW (MC) | $V_{IL1}$ | Gnd | – | 0.8 | V |
| Divide Ratio Control Input HIGH (SW) | $V_{IH2}$ | $V_{CC}$ – 0.5 | $V_{CC}$ | $V_{CC}$ + 0.5 | V |
| Divide Ratio Control Input LOW (SW) | $V_{IH2}$ | Open | Open | Open | – |
| Output Voltage Swing (Note 1) | $V_{out}$ | 0.8 | 1.1 | – | $V_{pp}$ |
| Modulus Setup Time MC to OUT at 1100 MHz | $t_{set}$ | – | 11 | 16 | ns |
| Input Voltage Sensitivity 250–1100 MHz<br>100–250 MHz | $V_{in}$ | 100<br>400 | –<br>– | 1000<br>1000 | mVpp |

**NOTE:** Assumes 8.0 pF high impedance load.



**Figure 1. Logic Diagram (MC12058)**

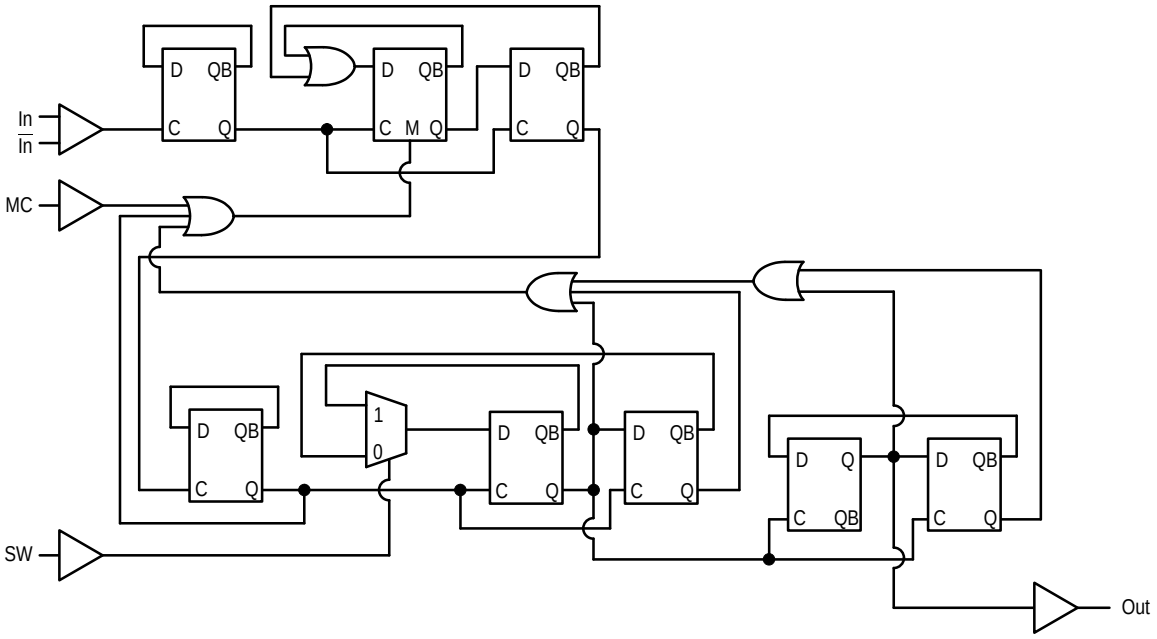
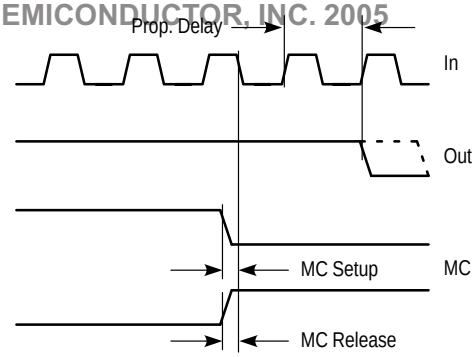


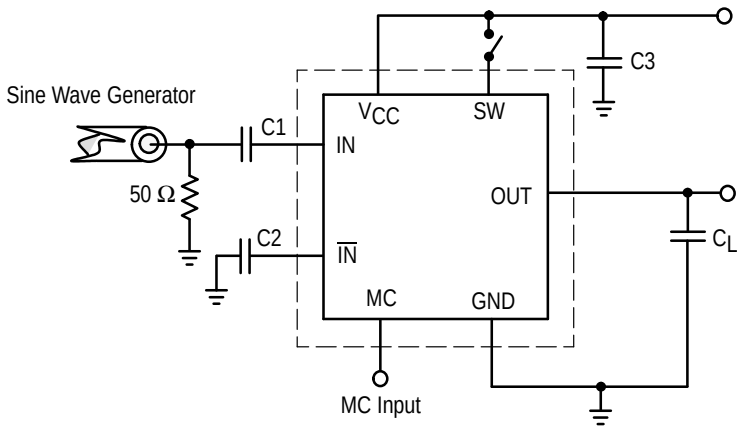
**Figure 2. Modulus Setup Time**






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

**Figure 3. AC Test Circuit**




EXTERNAL COMPONENTS
C1 = C2 = 1000 pF
C3 = 0.1 μF
$C_L$ = 8.0 pF (Including Scope and jig capacitance)

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


Divide Ratio = 126; $V_{CC}$ = 5.5 V; $T_A$ = 25°C

**Figure 5. Output Amplitude versus Input Frequency**

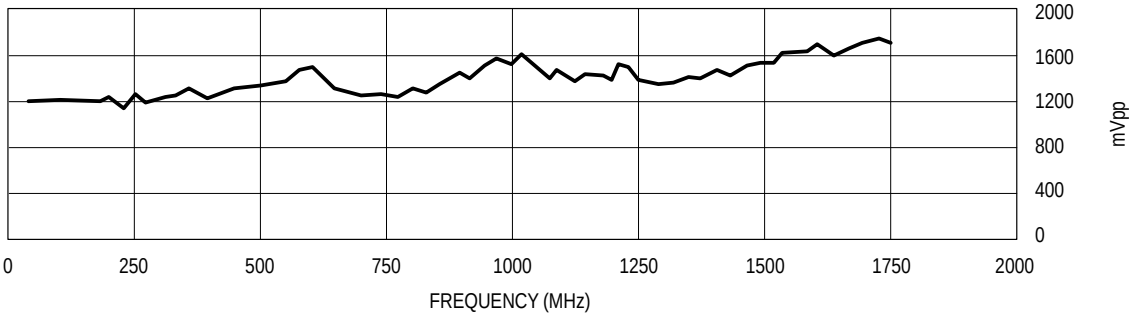
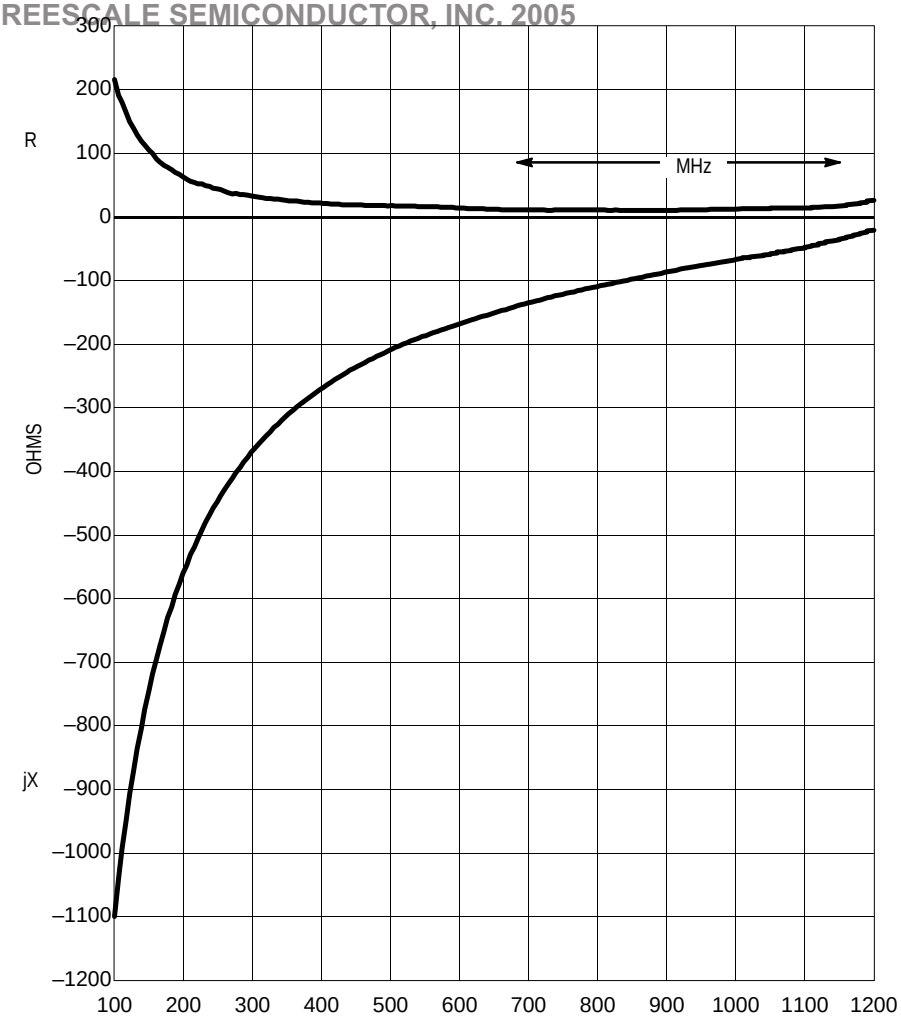


**Figure 6. Typical Input Impedance versus Input Frequency**

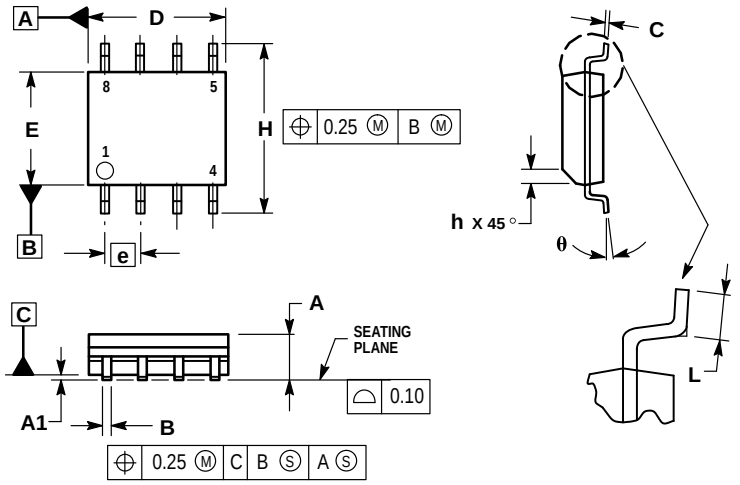




## OUTLINE DIMENSIONS



**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° |





**How to reach us:**
**USA / EUROPE / Locations Not Listed**: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 1–303–675–2140 or 1–800–441–2447

**JAPAN**: Motorola Japan Ltd.; SPD, Strategic Planning Office, 141,
4–32–1 Nishi–Gotanda, Shinagawa–ku, Tokyo, Japan. 81–3–5487–8488

**Customer Focus Center: 1–800–521–6274**

**Mfax**™: RMFAX0@email.sps.mot.com – TOUCHTONE 1–602–244–6609
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**ASIA / PACIFIC**: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298

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