# ÷2, ÷4, ÷8 1.1GHz Low Power Prescaler with Stand-By Mode

**MC12093**

**MECL PLL COMPONENTS**

**÷2, ÷4, ÷8**
**LOW POWER PRESCALER WITH STAND–BY MODE**

The MC12093 is a single modulus prescaler for low power frequency division of a 1.1GHz high frequency input signal. Motorola's advanced MOSAIC™ V technology is utilized to acheive low power dissipation of 6.75mW at a minimum supply voltage of 2.7V.

On-chip output termination provides output current to drive a 2pF (typical) high impedance load. If additional drive is required for the prescaler output, an external resistor can be added parallel from the OUT pin to GND to increase the output power. Care must be taken not to exceed the maximum allowable current through the output.

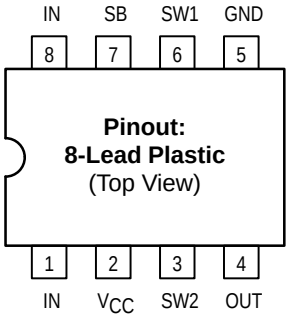
Divide ratio control inputs SW1 and SW2 select the required divide ratio of ÷2, ÷4, or ÷8.

Stand-By mode is featured to reduce current drain to 50µA typical when the standby pin SB is switched LOW disabling the prescaler.

- 1.1GHz Toggle Frequency
- Supply Voltage 2.7V to 5.5VDC
- Low Power 3.0mA Typical
- Operating Temperature –40°C to +85°C
- Divide by 2, 4 or 8 Selected by SW1 and SW2 Pins
- On–Chip Termination


**D SUFFIX**
PLASTIC SOIC PACKAGE
CASE 751-05


**SD SUFFIX**
PLASTIC SSOP PACKAGE
CASE 940-02



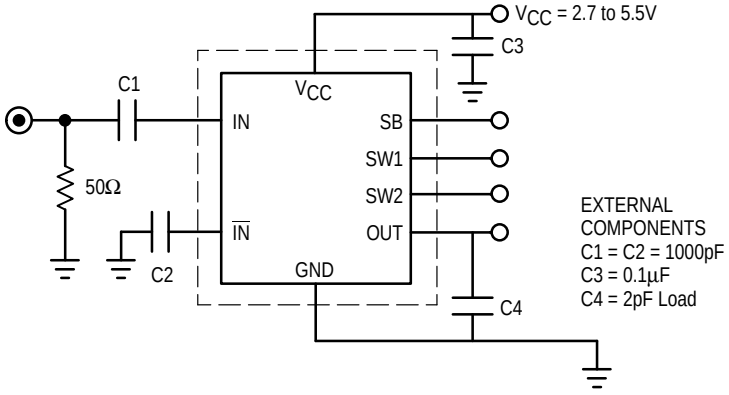

A LOW on the Stand-By Pin 7 disables the device.

**FUNCTION TABLE**

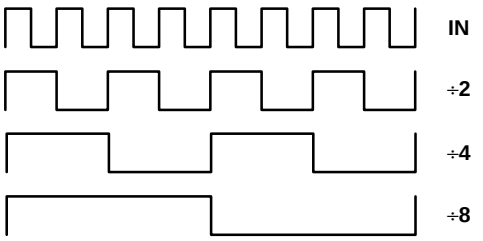
| SW1 | SW2 | Divide Ratio |
|---|---|---|
| L | L | 8 |
| H | L | 4 |
| L | H | 4 |
| H | H | 2 |

Note: SW1 & SW2: H = ($V_{CC}$–0.5V) to $V_{CC}$;
L = OPEN
SB: H = 2.0V to $V_{CC}$; L = GND to 0.8V

**AC TEST CIRCUIT**




**FUNCTION CHART**










MOTOROLA

**MAXIMUM RATINGS**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Power Supply Voltage, Pin 2 | –0.5 to +6.0 | VDC |
| $T_A$ | Operating Temperature Range | –40 to +85 | °C |
| $T_{stg}$ | Storage Temperature Range | –65 to +150 | °C |
| $I_O$ | Maximum Output Current, Pin 4 | 4.0 | mA |

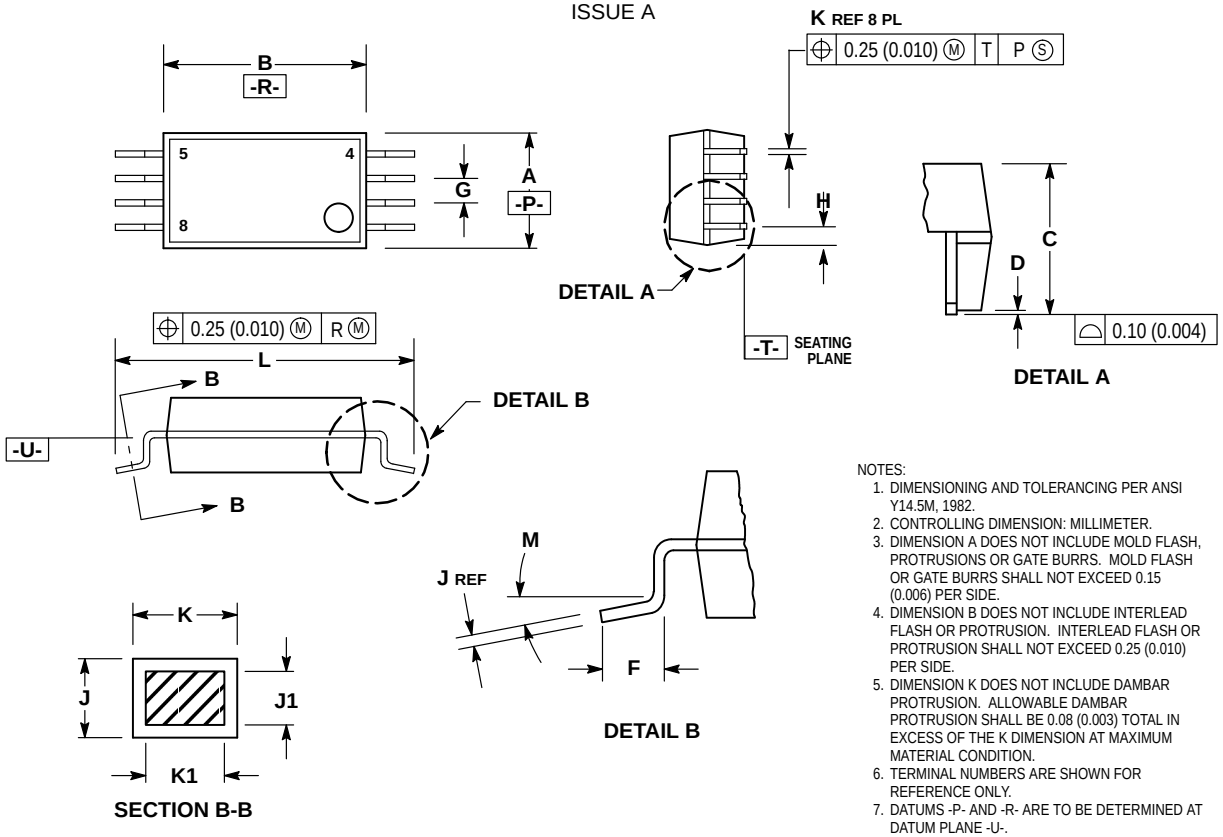
**ELECTRICAL CHARACTERISTICS** ($V_{CC}$ = 2.7 to 5.5V; $T_A$ = –40 to +85°C)

| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| ft | Toggle Frequency (Sine Wave) | 0.1 | 1.4 | 1.1 | GHz |
| $I_{CC}$ | Supply Current | | 3.0 | 4.5 | mA |
| ISB | Stand-By Current | | 120 | 200 | µA |
| $V_{IH1}$ | Stand-By Input HIGH (SB) | 2.0 | | $V_{CC}$ | V |
| $V_{IL1}$ | Stand-By Input LOW (SB) | GND | | 0.8 | V |
| $V_{IH2}$ | Divide Ratio Control Input HIGH (SW1 & SW2) | $V_{CC}$ – 0.5 | $V_{CC}$ | $V_{CC}$ + 0.5 | V |
| $V_{IL2}$ | Divide Ratio Control Input LOW (SW1 & SW2) | OPEN | OPEN | OPEN | |
| $V_{OUT}$ | Output Voltage Swing (2pF Load) | | | | $V_{PP}$ |
| | Output Frequency 12.5–350MHz[1] | 0.6 | 0.80 | | |
| | Output Frequency 350–400MHz[2] | 0.5 | 0.70 | | |
| | Output Frequency 400–450MHz[3] | 0.4 | 0.55 | | |
| | Output Frequency 450–550MHz[4] | 0.3 | 0.45 | | |
| $V_{IN}$ | Input Voltage Sensitivity 250–1100MHz | 100 | | 1000 | $mV_{PP}$ |
| | 100–250MHz | 400 | | 1000 | |

**1** Input frequency 1.1GHz, ÷8, minimum output frequency of 12.5MHz.
**2** Input frequency 700–800MHz, ÷2.
**3** Input frequency 800–900MHz, ÷2.
**4** Input frequency 900–1100MHz, ÷2.

## OUTLINE DIMENSIONS

**SD SUFFIX**
PLASTIC SSOP PACKAGE
CASE 940-02
ISSUE A

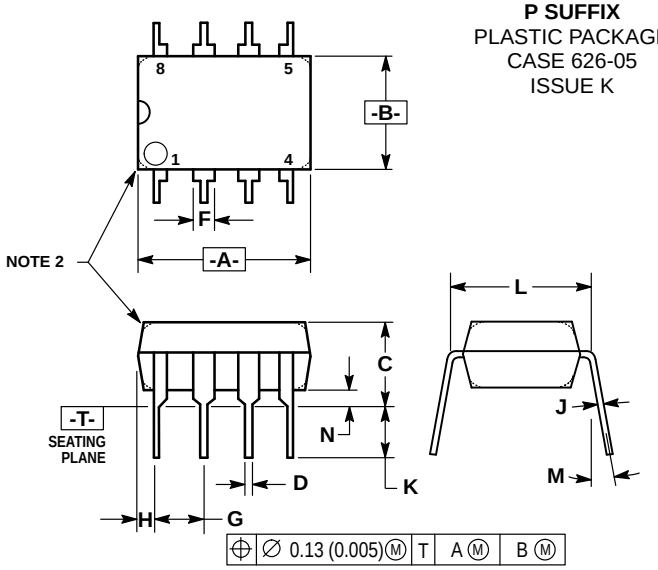



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DATUMS -P- AND -R- ARE TO BE DETERMINED AT DATUM PLANE -U-.
8. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -U-.
9. CROSS SECTION B-B TO BE DETERMINED AT 0.10 (0.004) TO 0.25 (0.010) FROM THE LEADTIP.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 2.87 | 3.13 | 0.113 | 0.123 |
| B | 5.20 | 5.38 | 0.205 | 0.212 |
| C | 1.73 | 1.99 | 0.068 | 0.078 |
| D | 0.05 | 0.21 | 0.002 | 0.008 |
| F | 0.55 | 0.95 | 0.022 | 0.037 |
| G | 0.65 BSC | | 0.026 BSC | |
| H | 0.50 | — | 0.020 | — |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| J1 | 0.09 | 0.16 | 0.004 | 0.006 |
| K | 0.22 | 0.38 | 0.009 | 0.015 |
| K1 | 0.22 | 0.33 | 0.009 | 0.013 |
| L | 7.65 | 7.90 | 0.301 | 0.311 |
| M | 0° | 8° | 0° | 8° |

## OUTLINE DIMENSIONS

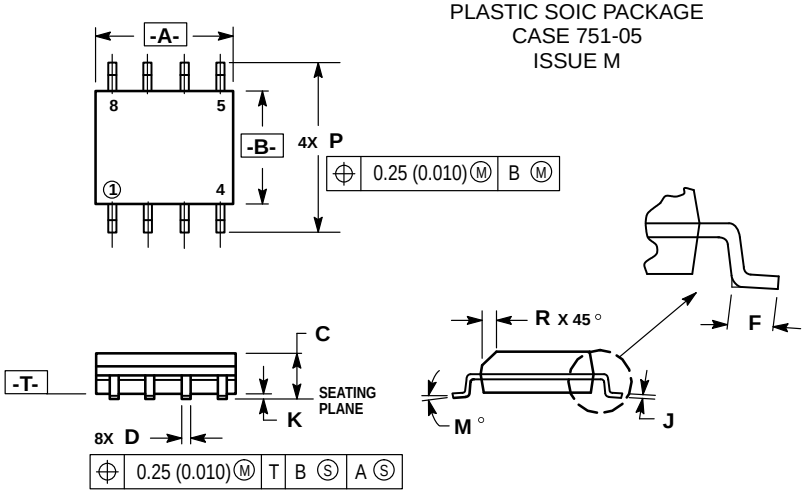
**P SUFFIX**
PLASTIC PACKAGE
CASE 626-05
ISSUE K




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 SOIC PACKAGE
CASE 751-05
ISSUE M




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS 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.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.196 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.18 | 0.25 | 0.007 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |



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