2.0GHz Super Low Power Dual Modulus Prescaler

MC12054A

MECL PLL COMPONENTS

÷64/65, ÷128/129
LOW POWER
DUAL MODULUS PRESCALER

The MC12054A is a super low power dual modulus prescaler used in phase-locked loop applications. Motorola's advanced Bipolar MOSAIC™ V technology is utilized to achieve low power dissipation of 5.4mW at a minimum supply voltage of 2.7V.

The MC12054A can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145XXX series in a PLL to provide tuning signals up to 2.0GHz in programmable frequency steps.

A Divide Ratio Control (SW) permits selection of a 64/65 or 128/129 divide ratio as desired.

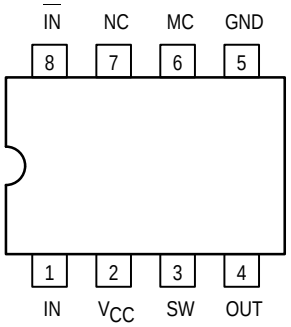
The Modulus Control (MC) selects the proper divide number after SW has been biased to select the desired divide ratio.

- 2.0GHz Toggle Frequency
- The MC12054 is Pin and Functionally Compatible with the MC12031
- Low Power 2.0mA Typical
- 2.6mA Maximum, –40°C to +85°C, V_{CC} = 2.7–5.5Vdc
- Short Setup Time (t_{set}) 10ns Maximum @ 2.0GHz
- Modulus Control Input Level is Compatible with Standard CMOS and TTL
- Maximum Input Voltage Should Be Limited to 6.5Vdc

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-05

SD SUFFIX
PLASTIC SSOP PACKAGE
CASE 940-02

Pinout: 8-Lead Plastic (Top View)



FUNCTIONAL TABLE

SW	MC	Divide Ratio
H	H	64
H	L	65
L	H	128
L	L	129

Note: SW: H = V_{CC}, L = Open
MC: H = 2.0V to V_{CC}, L = GND to 0.8V

MAXIMUM RATINGS

Symbol	Characteristic	Range	Unit
V_{CC}	Power Supply Voltage, Pin 2	–0.5 to +7.0	VDC
T_A	Operating Temperature Range	–40 to +85	°C
T_{stg}	Storage Temperature Range	–65 to +150	°C
MC	Modulus Control Input, Pin 6	–0.5 to +6.5	VDC

MOSAIC V is a trademark of Motorola

MOTOROLA

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 5.5 VDC, T_A = –40°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit
f_t	Toggle Frequency (Sine Wave Input)	0.1	2.5	2.0	GHz
I_{CC}	Supply Current (Pin 2)	–	2.0	2.6	mA
V_{IH1}	Modulus Control Input High (MC)	2.0	–	V_{CC} + 0.5V	V
V_{IL1}	Modulus Control Input Low (MC)	GND	–	0.8	V
V_{IH2}	Divide Ratio Control Input High (SW)	V_{CC} – 0.5V	V_{CC}	V_{CC} + 0.5V	VDC
V_{IL2}	Divide Ratio Control Input Low (SW)	Open	Open	Open	–
V_{out}	Output Voltage Swing [2] (C_L = 8pF, R_L = 1.65kΩ)	0.8	1.1	–	V_{PP}
t_{set}	Modulus Setup Time MC to Out @ 2000MHz	–	8	10	ns
V_{in}	Input Voltage Sensitivity 250–2000MHz 100–250MHz	100 400	– –	1000 1000	mV_{PP}
I_O	Output Current [1] V_{CC} = 2.7V, C_L = 8pF, R_L = 1.65kΩ V_{CC} = 5.0V, C_L = 8pF, R_L = 3.6kΩ	 – –	 1.0 1.0	 4.0 4.0	mA

1. Divide ratio of ÷64/65 @ 2.0GHz
2. Valid over voltage range 2.7–5.5V; R_L = 1.65kΩ @ V_{CC} = 2.7V; R_L = 3.6kΩ @ V_{CC} = 5.0V

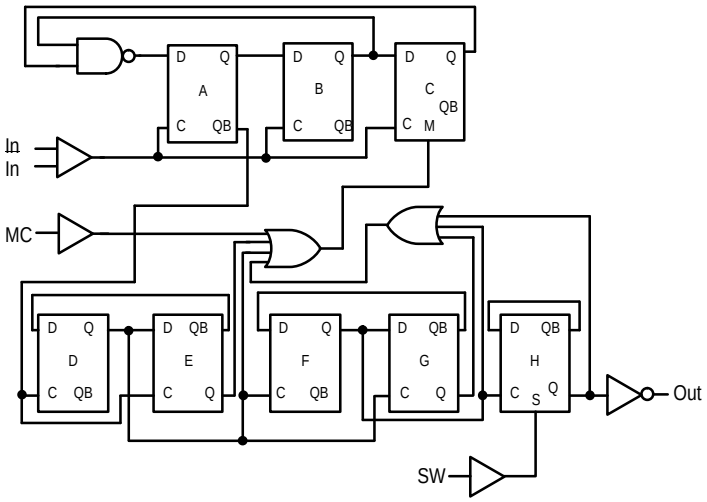
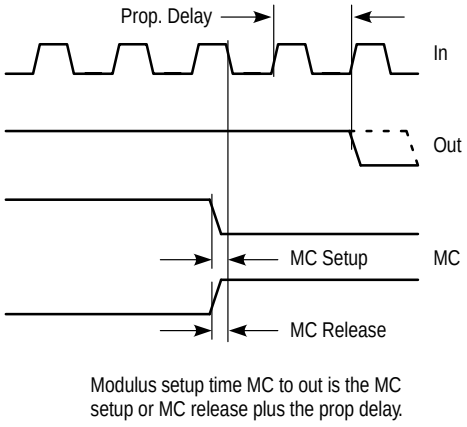
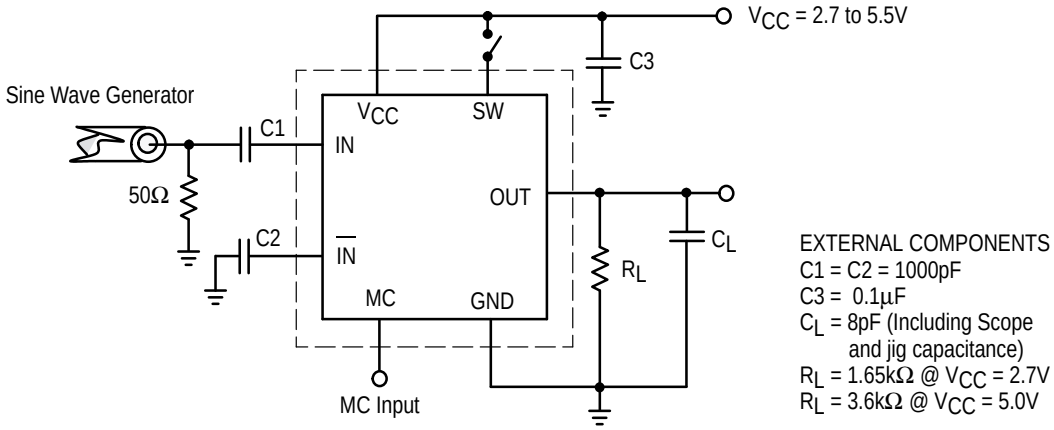


Figure 1. Logic Diagram (MC12054A)



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

Figure 2. Modulus Setup Time

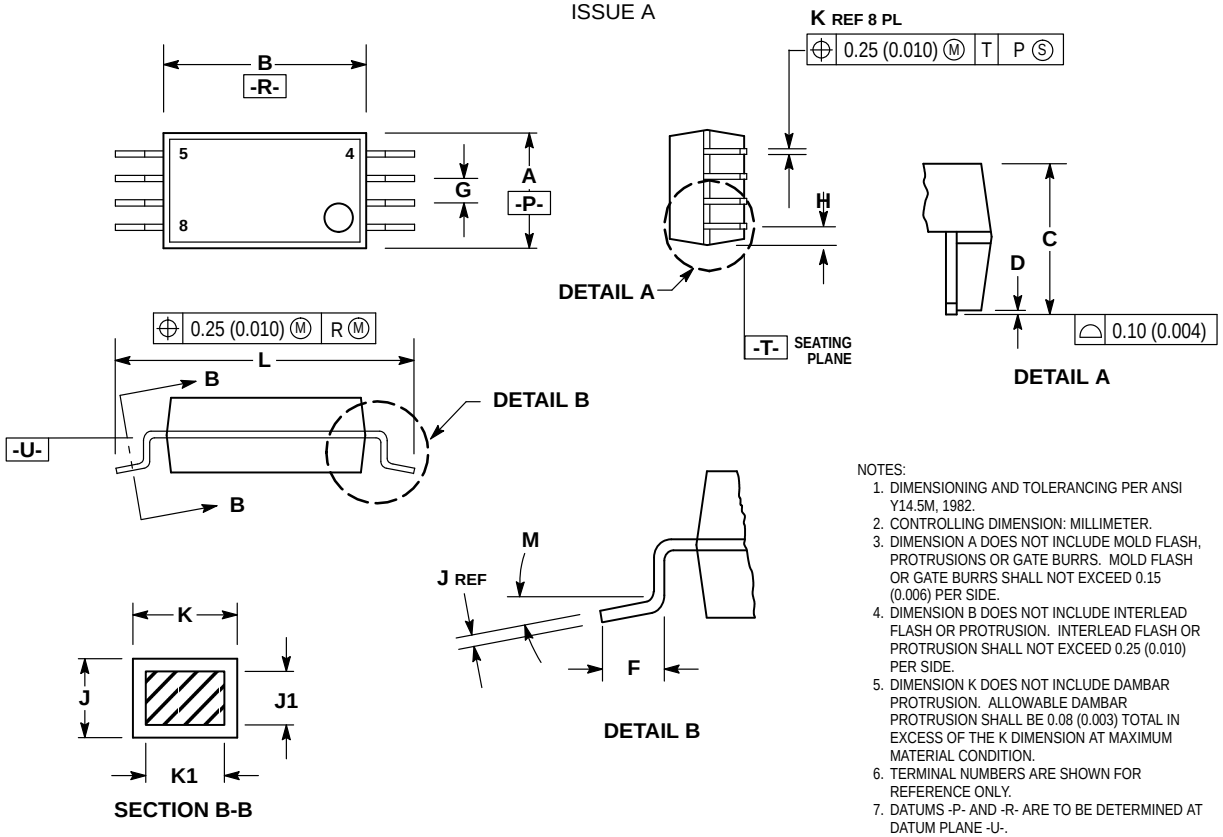


EXTERNAL COMPONENTS
C1 = C2 = 1000pF
C3 = 0.1µF
C_L = 8pF (Including Scope and jig capacitance)
R_L = 1.65kΩ @ V_{CC} = 2.7V
R_L = 3.6kΩ @ V_{CC} = 5.0V

Figure 3. AC Test Circuit

OUTLINE DIMENSIONS

SD SUFFIX
PLASTIC SSOP PACKAGE
CASE 940-02
ISSUE A

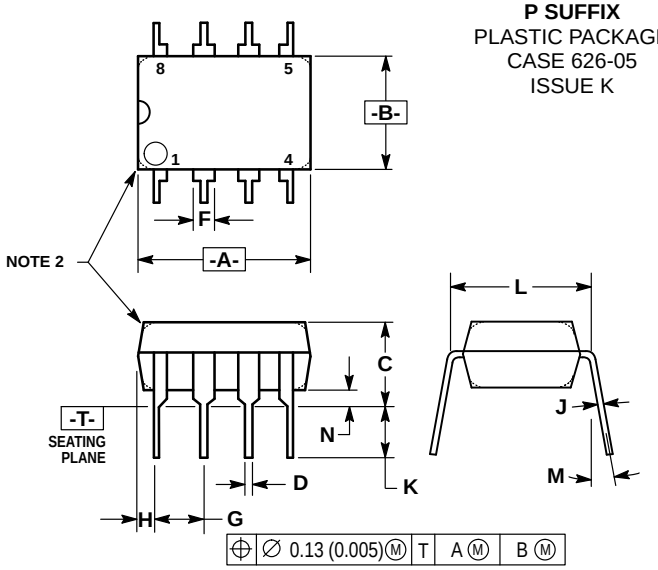


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD 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

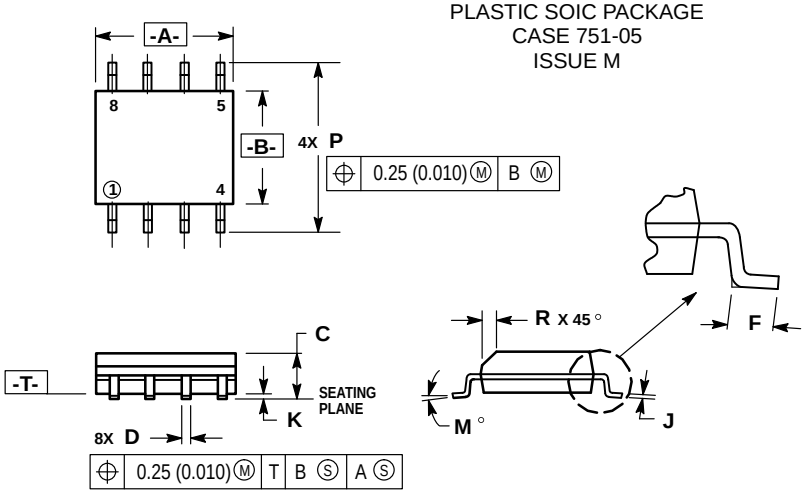
P SUFFIX
PLASTIC PACKAGE
CASE 626-05
ISSUE K



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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