

**MOTOROLA**

# 1.1 GHz Super Low Power Dual Modulus Prescaler

The MC12052A 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 2.7 mW at a minimum supply voltage of 2.7 V.

The MC12052A 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 1.1 GHz 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.

- 1.1 GHz Toggle Frequency
- The MC12052 is Pin and Functionally Compatible with the MC12022
- Low Power 1.0 mA Typical
- 2.0 mA Maximum,  $-40$  to  $85^{\circ}\text{C}$ ,  $V_{CC} = 2.7$  to  $5.5$  Vdc
- Short Setup Time ( $t_{set}$ ) 16 ns Maximum @ 1.1 GHz
- Modulus Control Input Level is Compatible with Standard CMOS and TTL
- Maximum Input Voltage Should Be Limited to 6.5 Vdc

MOSAIC V is a trademark of Motorola

## FUNCTIONAL TABLE

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

**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 $85$	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	$-65$ to $150$	$^{\circ}\text{C}$
Modulus Control Input, Pin 6	MC	$-0.5$ to $6.5$	Vdc

# MC12052A

## MECL PLL COMPONENTS ÷64/65, ÷128/129 LOW POWER DUAL MODULUS PRESCALER

### SEMICONDUCTOR TECHNICAL DATA

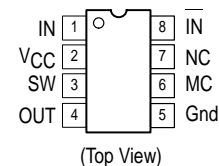


**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)



**SD SUFFIX**  
PLASTIC PACKAGE  
CASE 940  
(SSOP-8)

## PIN CONNECTIONS



## ORDERING INFORMATION

Device	Operating Temp Range	Package
MC12052AD	$T_A = -40^{\circ}$ to $+85^{\circ}\text{C}$	SO-8
MC12052ASD		SSOP-8

## MC12052A

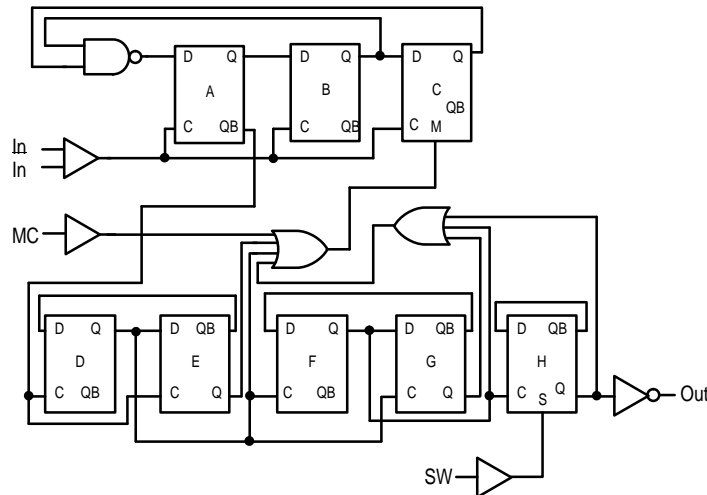
**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 2.7$  to  $5.5$  VDC,  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave Input)	$f_t$	0.1	1.4	1.1	GHz
Supply Current (Pin 2)	$I_{CC}$	–	1.0	2.0	mA
Modulus Control Input High (MC)	$V_{IH1}$	2.0	–	$V_{CC} + 0.5$ V	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	$V_{CC}$	$V_{CC} + 0.5$ V	VDC
Divide Ratio Control Input Low (SW)	$V_{IL2}$	Open	Open	Open	–
Output Voltage Swing (Note 2) ( $C_L = 8.0$ pF, $R_L = 3.3$ k $\Omega$ )	$V_{out}$	0.8	1.1	–	V <sub>PP</sub>
Modulus Setup Time MC to Out @ 1100 MHz	$t_{set}$	–	11	16	ns
Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	$V_{in}$	100 400	– –	1000 1000	mV <sub>PP</sub>
Output Current (Note 1) $V_{CC} = 2.7$ V, $C_L = 8.0$ pF, $R_L = 3.3$ k $\Omega$ $V_{CC} = 5.0$ V, $C_L = 8.0$ pF, $R_L = 7.2$ k $\Omega$	$I_O$	– –	0.5 0.5	3.0 3.0	mA

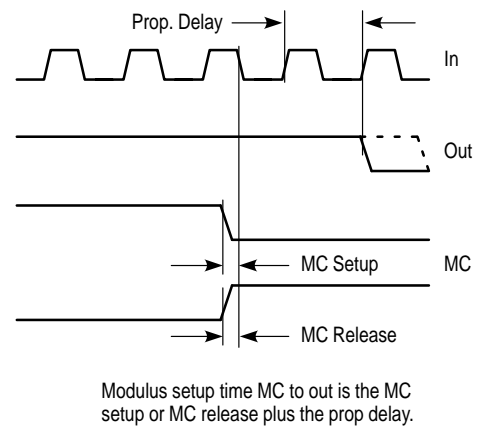
**NOTES:** 1. Divide ratio of +64/65 @ 1.1 GHz

2. Valid over voltage range 2.7 to 5.5 V;  $R_L = 3.3$  k $\Omega$  @  $V_{CC} = 2.7$  V;  $R_L = 7.2$  k $\Omega$  @  $V_{CC} = 5.0$  V

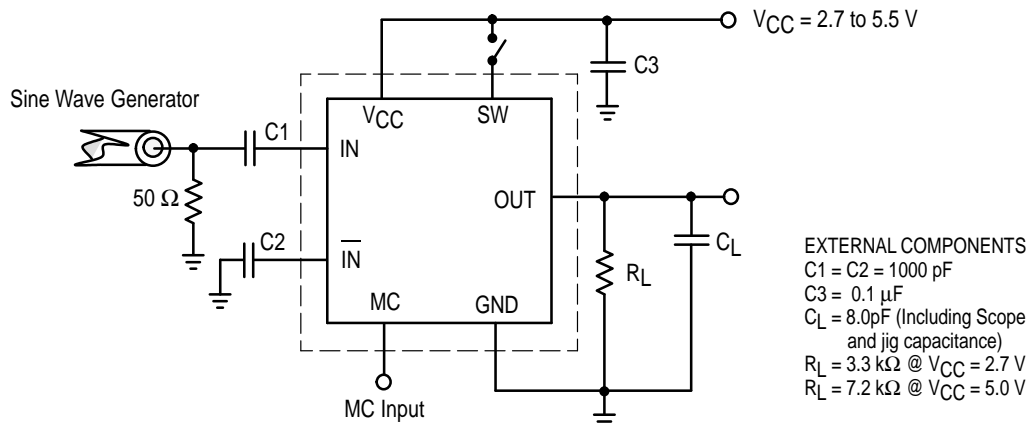
**Figure 1. Logic Diagram (MC12052A)**



**Figure 2. Modulus Setup Time**

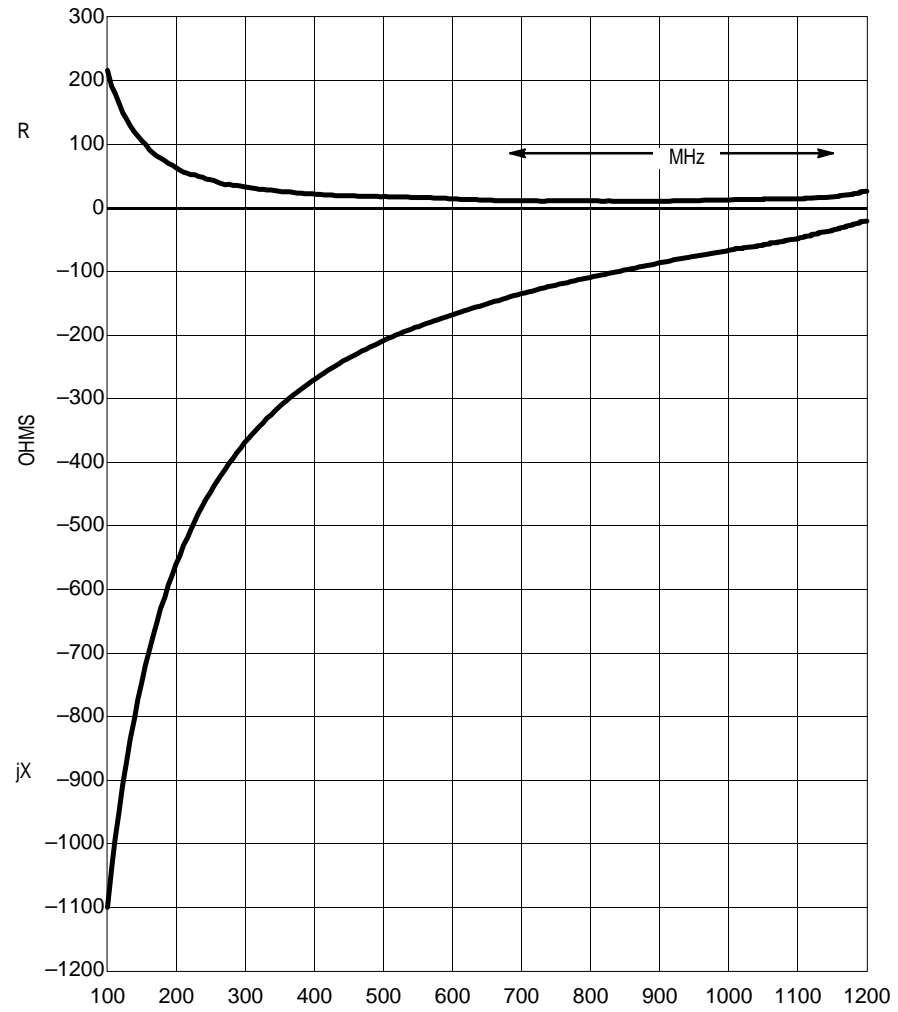


**Figure 3. AC Test Circuit**



# MC12052A

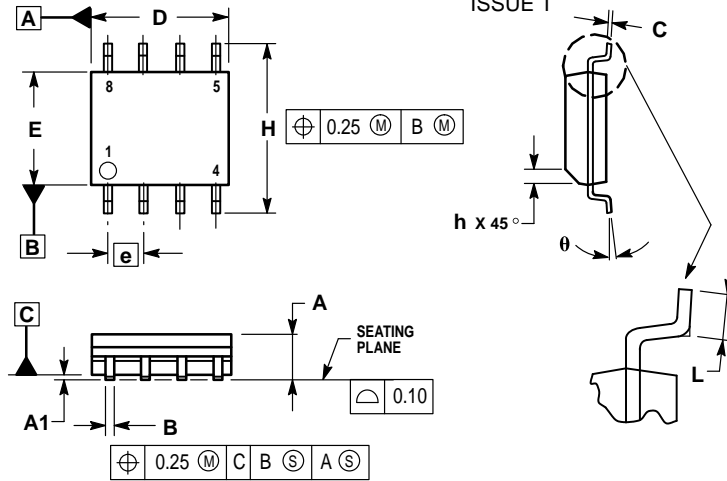
Figure 4. Typical Input Impedance versus Input Frequency



# MC12052A

## OUTLINE DIMENSIONS

### D SUFFIX PLASTIC PACKAGE CASE 751-06 (SO-8) ISSUE T

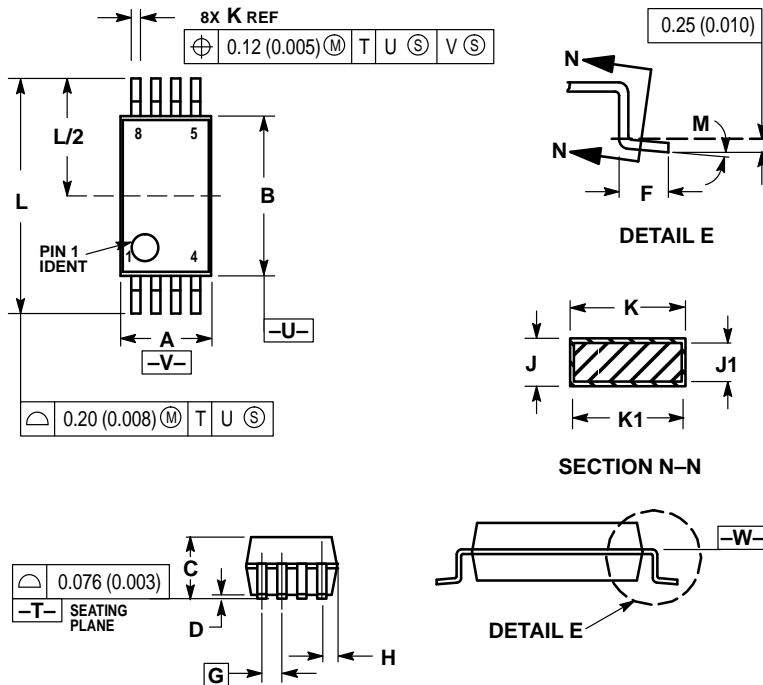


#### NOTES:

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.

DIM	MILLIMETERS	
	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
theta	0°	7°


### SD SUFFIX PLASTIC PACKAGE CASE 940-03 (SSOP-8) ISSUE B



#### 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 0.15 (0.006) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF K DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION K BY MORE THAN 0.07 (0.002) AT LEAST MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	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
E	0.63	0.95	0.024	0.037
F	0.65 BSC		0.026 BSC	
G	0.44	0.60	0.017	0.023
H	0.09	0.20	0.003	0.008
I	0.09	0.16	0.003	0.006
J	0.25	0.38	0.010	0.015
K	0.25	0.33	0.010	0.013
L	7.65	7.90	0.301	0.311
M	0°	8°	0°	8°

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