


**MOTOROLA**

# 1.1 GHz Super Low Power Dual Modulus Prescaler With Stand-By Mode

The MC12053A is a super low power  $\div 64/65$ ,  $\div 128/129$  dual modulus prescaler. Motorola's advanced Bipolar MOSAIC™ V technology is utilized to achieve low power dissipation of 4.3 mW at a minimum supply voltage of 2.7 V.

The Divide Ratio Control input, SW, permits selection of divide ratio as desired. A HIGH on SW selects  $\div 64/65$ ; an OPEN on SW selects  $\div 128/129$ . The Modulus Control input, MC, selects the proper divide number after SW has been biased to select the desired divide ratio.

Stand-by mode is featured to reduce current drain to 50  $\mu$ A typical at 2.7 V when the stand-by pin, SB, is switched LOW, disabling the prescaler. On-chip output termination provides 500  $\mu$ A (typical) output current, which is sufficient to drive a CMOS synthesizer input high impedance load (8.0 pF typical).

- 1.1 GHz Toggle Frequency
- Supply Voltage of 2.7 to 5.5 V
- Low Power 1.5 mA Typical at  $V_{CC} = 2.7$  V
- Operating Temperature Range of  $-40$  to  $85^{\circ}\text{C}$
- On-Chip Output Termination
- The MC12053A Is Pin and Functionally Compatible With the MC12036
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL

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 =  $V_{CC} - 0.5$  to  $V_{CC}$ , 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 & SB: 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 $V_{CC}$	Vdc
Maximum Output Current, Pin 4	$I_O$	4.0	mA

NOTE: ESD data available upon request.

# MC12053A

## MECL PLL COMPONENTS $\div 64/65$ , $\div 128/129$ LOW POWER DUAL MODULUS PRESCALER WITH STAND-BY MODE

### SEMICONDUCTOR TECHNICAL DATA

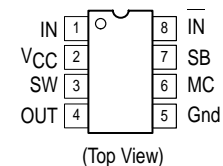


**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)



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

## PIN CONNECTIONS



## ORDERING INFORMATION

Device	Operating Temp Range	Package
MC12053AD	$T_A =$ $-40^{\circ}$ to $+85^{\circ}\text{C}$	SO-8
MC12053ASD		SSOP-8

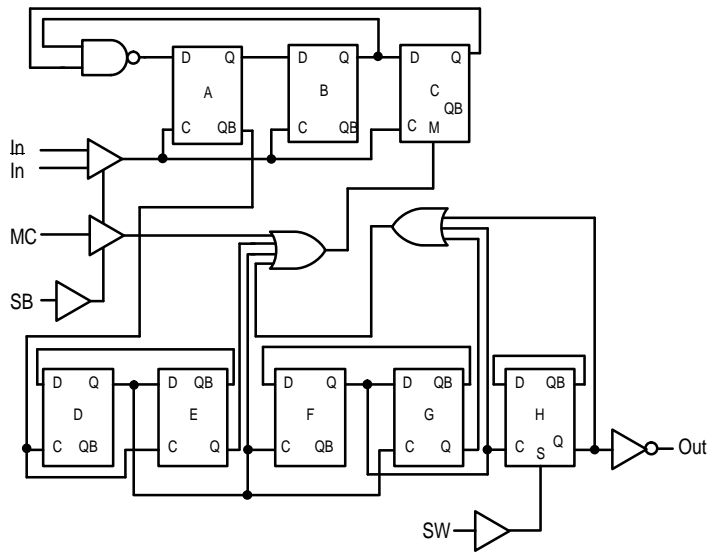
# MC12053A

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

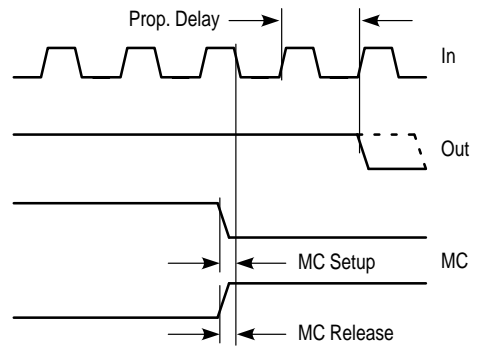
Characteristic		Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave Input)		$f_t$	0.1	1.4	1.1	GHz
Supply Current Output (Pin 2)	$V_{CC} = 2.7$ V $V_{CC} = 5.0$ V	$I_{CC}$	–	1.60 1.75	2.5 2.5	mA
Stand-By Current	$V_{CC} = 2.7$ V $V_{CC} = 5.0$ V	$I_{SB}$	–	50 100	250 250	$\mu\text{A}$
Modulus Control & Stand-By Input HIGH (MC & SB)		$V_{IH1}$	2.0	–	$V_{CC} + 0.5$	V
Modulus Control & Stand-By Input LOW (MC & SB)		$V_{IL1}$	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)		$V_{IL2}$	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 100–250 MHz	$V_{in}$	100 400	– –	1000 1000	mVpp

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

**Figure 1. Logic Diagram (MC12053A)**

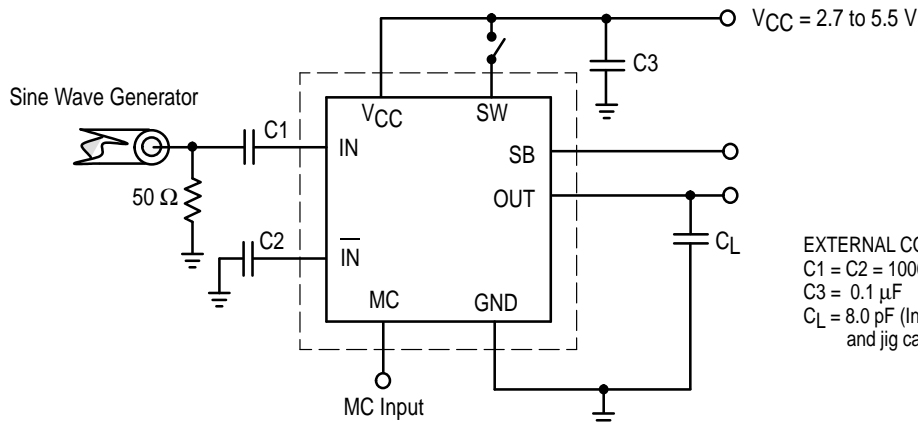


**Figure 2. Modulus Setup Time**



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

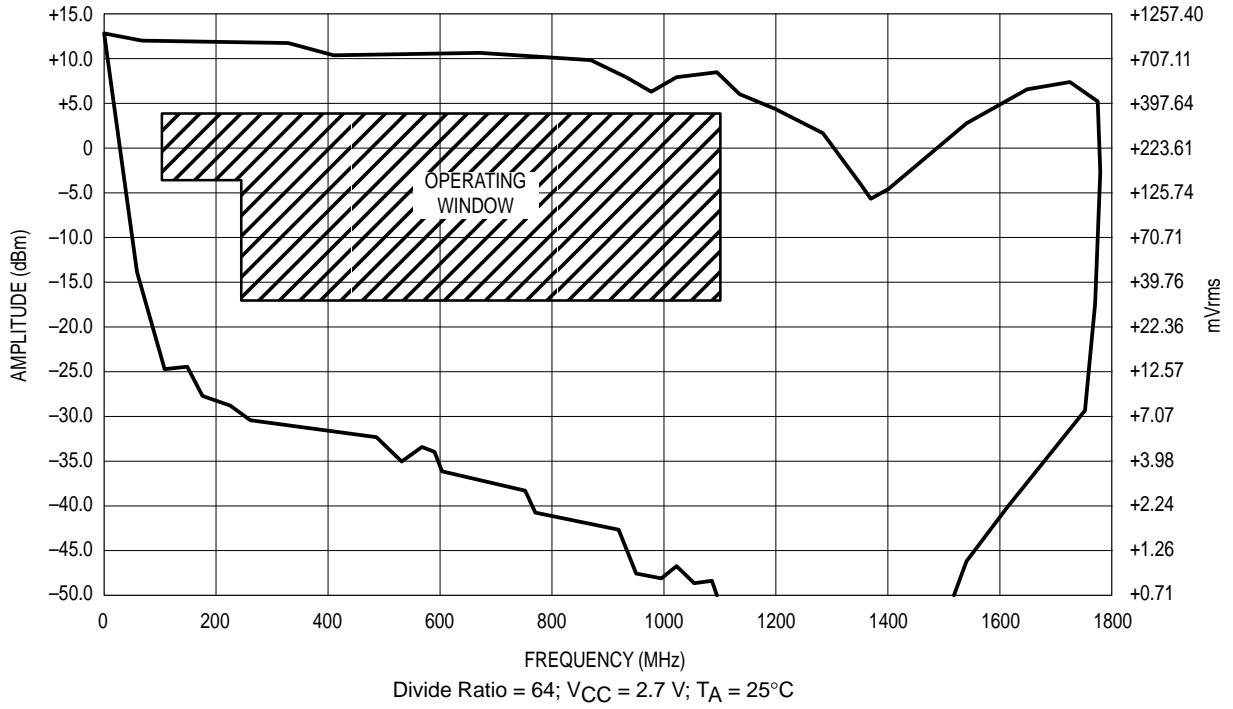
**Figure 3. AC Test Circuit**



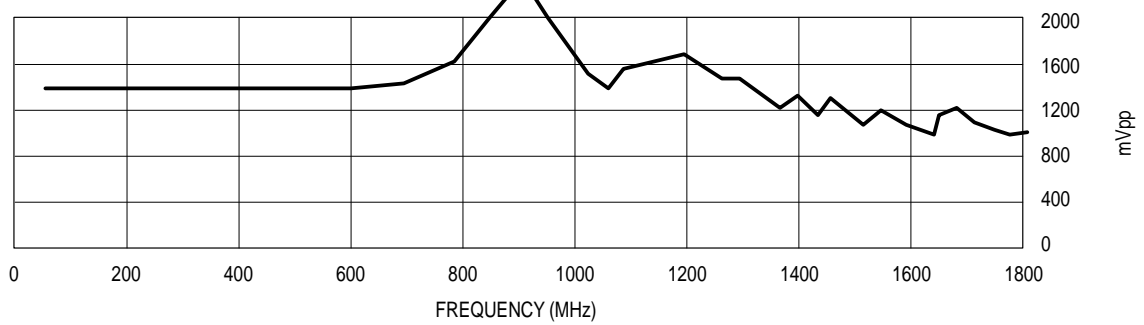
EXTERNAL COMPONENTS  
 $C1 = C2 = 1000$  pF  
 $C3 = 0.1$   $\mu\text{F}$   
 $C_L = 8.0$  pF (Including Scope and jig capacitance)

# MC12053A

## Figure 4. Input Signal Amplitude versus Input Frequency

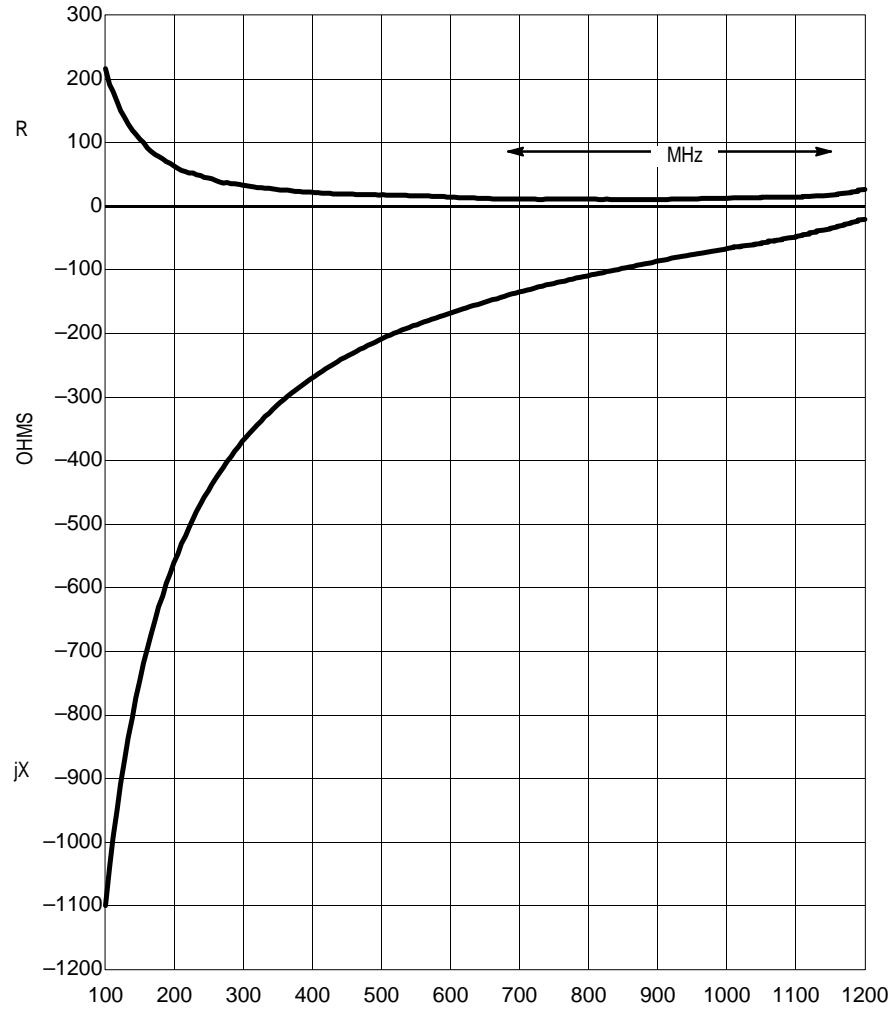


## Figure 5. Output Amplitude versus Input Frequency



# MC12053A

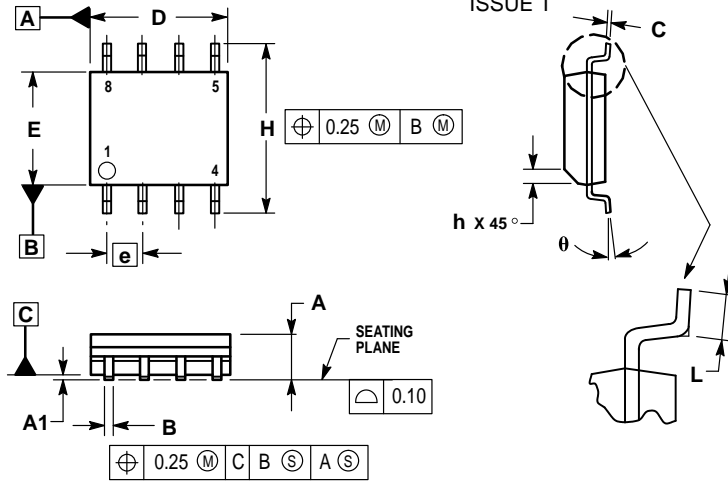
Figure 6. Typical Input Impedance versus Input Frequency



# MC12053A

## OUTLINE DIMENSIONS

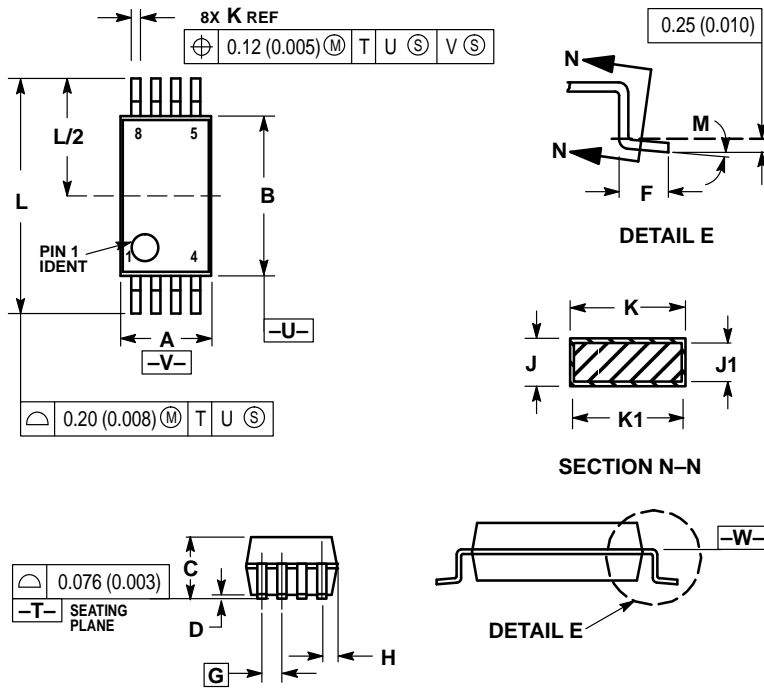
**D SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 751-06**  
**(SO-8)**  
**ISSUE T**



**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.

**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-.

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MC12053A/D