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MOTOROLA

MC12053A

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

The MC12053A is a super low power ÷64/65, ÷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 ÷64/65; an OPEN on SW selects ÷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 µA typical at 2.7 V when the stand–by pin, SB, is switched LOW, disabling the prescaler. On–chip output termination provides 500 µA (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°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

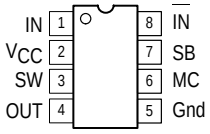
MECL PLL COMPONENTS ÷64/65, ÷128/129 LOW POWER DUAL MODULUS PRESCALER WITH STAND–BY MODE

SEMICONDUCTOR TECHNICAL DATA

D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO–8)

SD SUFFIX
PLASTIC PACKAGE
CASE 940
(SSOP–8)

PIN CONNECTIONS



(Top View)

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	°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
MC12053AD	T_A = – 40° to +85°C	SO–8
MC12053ASD		SSOP–8

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 5.5 V; T_A = –40 to 85°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	μA
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_{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 100–250 MHz	V_{in}	100 400	– –	1000 1000	mVpp

NOTE: Assumes 8.0 pF high impedance load.

Figure 1. Logic Diagram (MC12053A)

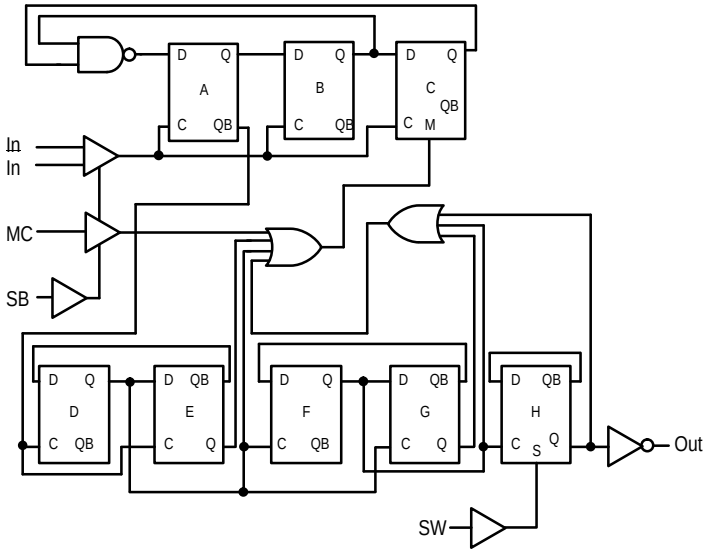
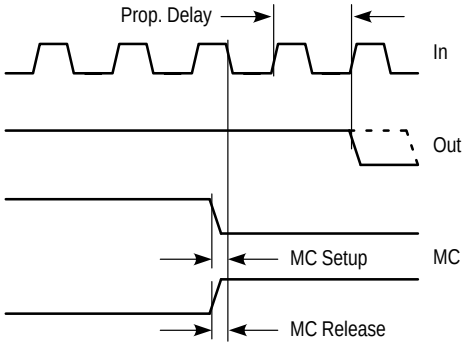
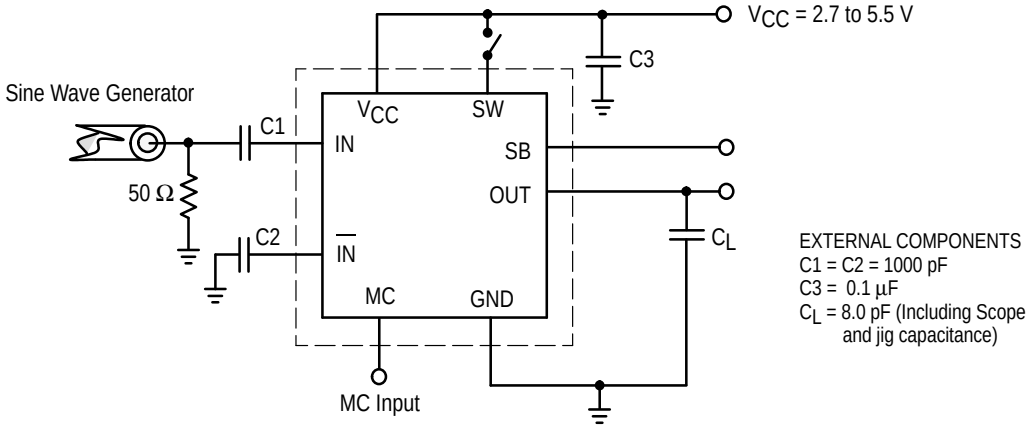


Figure 2. Modulus Setup Time



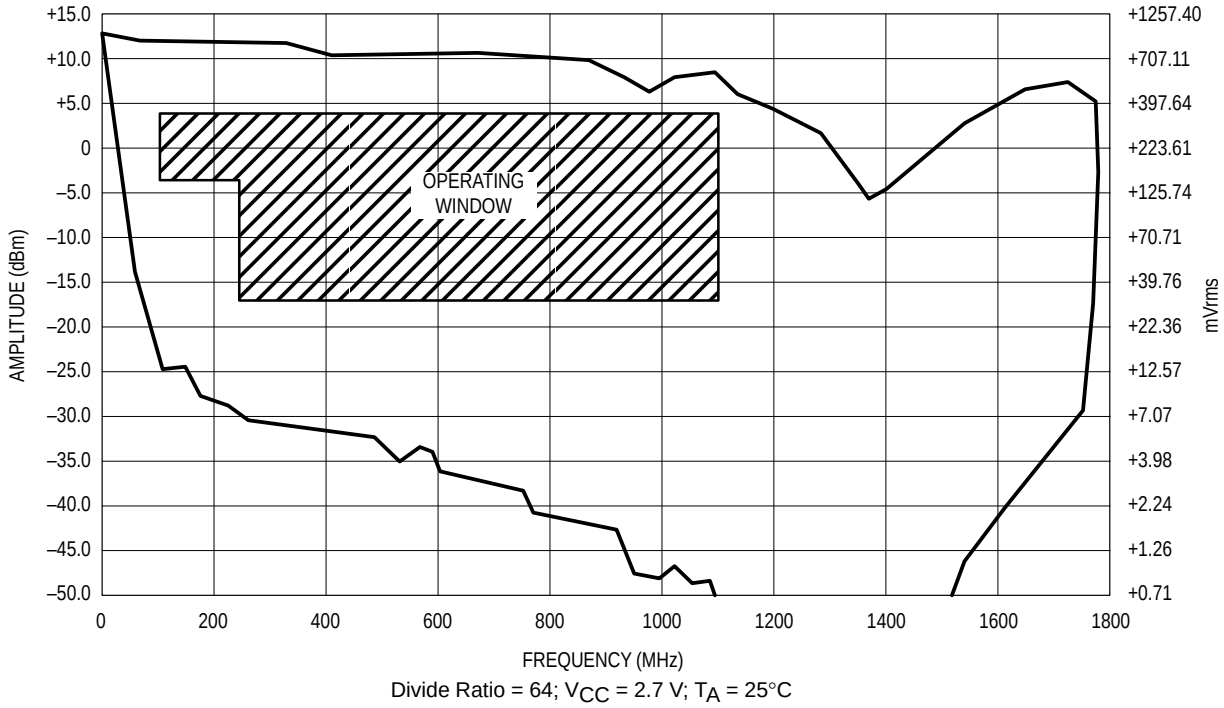
Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

Figure 3. AC Test Circuit



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

Figure 4. Input Signal Amplitude versus Input Frequency



Divide Ratio = 64; V_{CC} = 2.7 V; T_A = 25°C

Figure 5. Output Amplitude versus Input Frequency

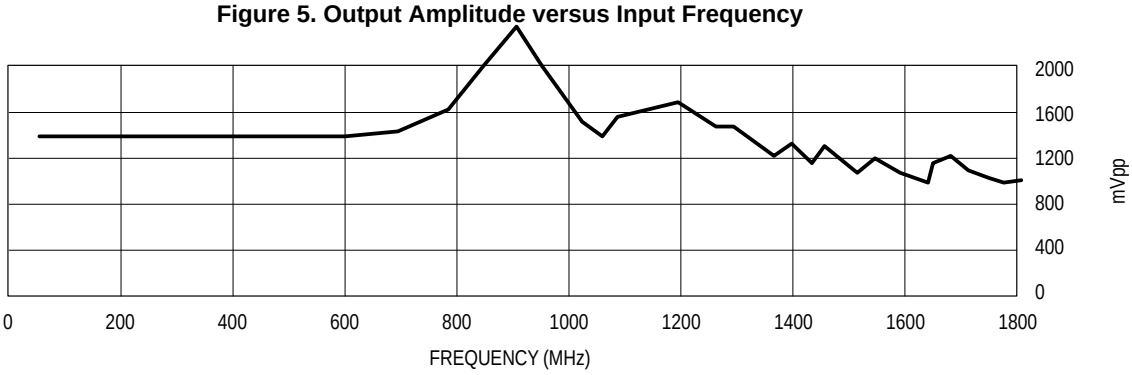
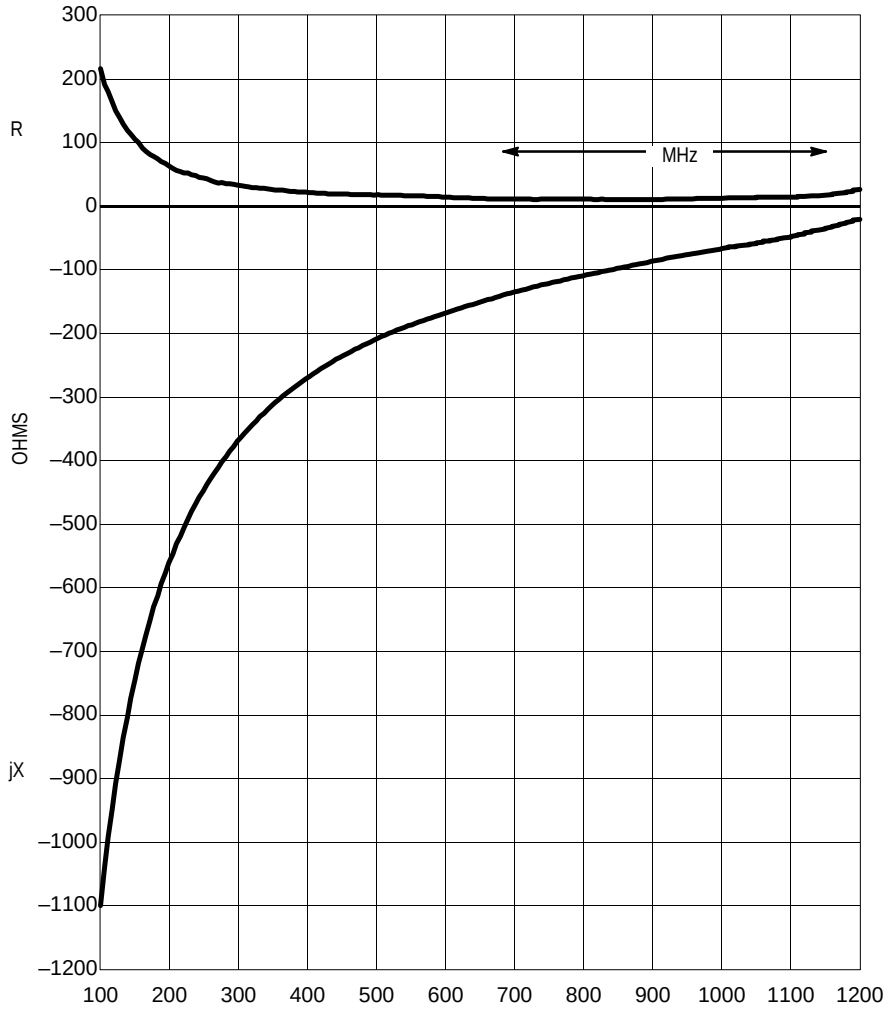
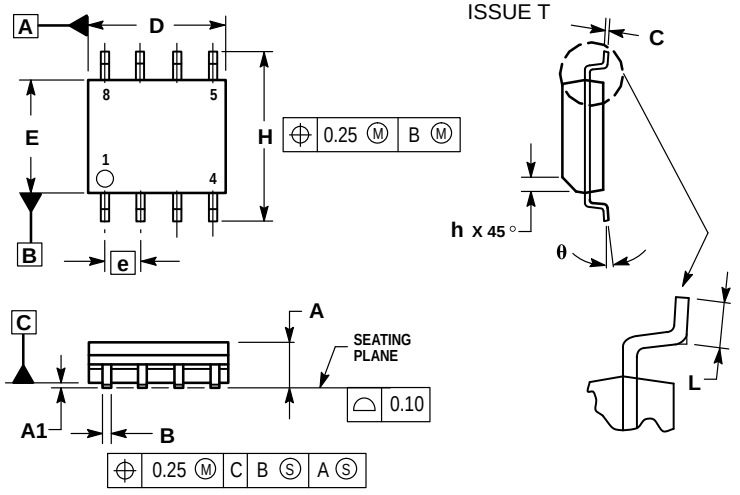


Figure 6. Typical Input Impedance versus Input Frequency



OUTLINE DIMENSIONS

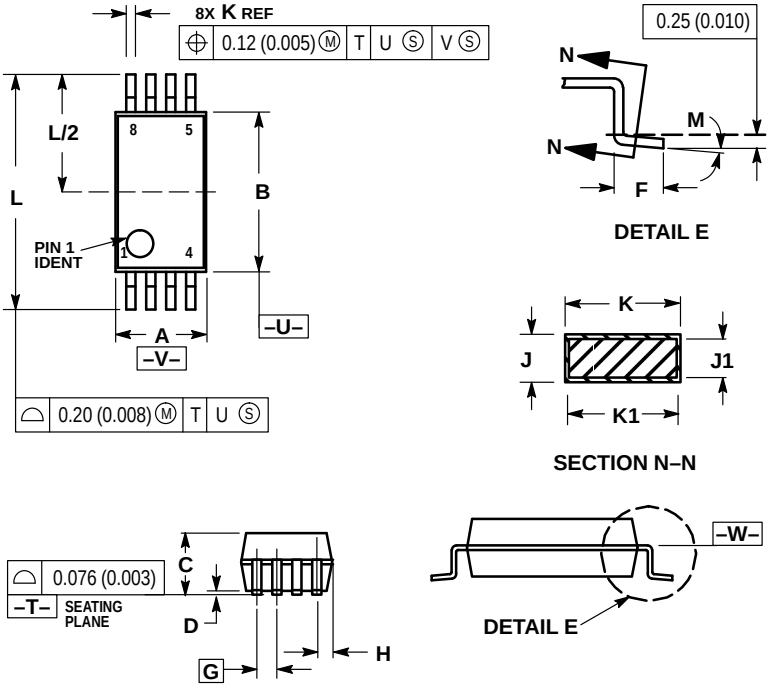
D SUFFIX
PLASTIC PACKAGE
CASE 751–06
(SO–8)
ISSUE T



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°

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–.

	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	0.63	0.95	0.024	0.037
G	0.65 BSC		0.026 BSC	
H	0.44	0.60	0.017	0.023
J	0.09	0.20	0.003	0.008
J1	0.09	0.16	0.003	0.006
K	0.25	0.38	0.010	0.015
K1	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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