

1.1GHz Low Power Dual Modulus Prescaler

The MC12038A 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 1.1GHz in programmable frequency steps.

A Divide Ratio Control (SW) permits selection of a 127/128 or 255/256 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
- Supply Voltage of 4.5 to 5.5V
- Low-Power 4.8mA Typical
- Operating Temperature Range of -40 to +85°C
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL
- On-Chip Output Termination

FUNCTIONAL TABLE

SW	MC	Divide Ratio
H	H	127
H	L	128
L	H	255
L	L	256

Note: SW: H = V_{CC} , L = Open

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

DESIGN GUIDE

Criteria	Value	Unit
Internal Gate Count*	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	pJ

* Equivalent to a two-input NAND gate

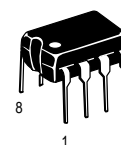
MAXIMUM RATINGS

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

MC12038A

MECL PLL COMPONENTS

÷127/128, ÷255/256
**DUAL MODULUS
PRESCALER**

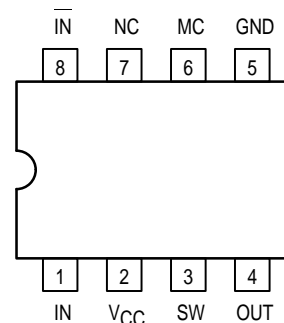


P SUFFIX
PLASTIC PACKAGE
CASE 626-05



D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-05

Pinout: 8-Lead Plastic (Top View)



ELECTRICAL CHARACTERISTICS ($V_{CC} = 4.5$ to $5.5V$; $T_A = -40^{\circ}C$ to $+85^{\circ}C$)

Symbol	Characteristic	Min	Typ	Max	Unit
f_t	Toggle Frequency (Sine Wave Input)	0.1	1.4	1.1	GHz
I_{CC}	Supply Current Output Unloaded (Pin 2) at 5.0Vdc		4.8	6.5	mA
V_{IH1}	Modulus Control Input High (MC)	2.0		$V_{CC} + 0.5V$	V
V_{IL1}	Modulus Control Input Low (MC)			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 ($C_L = 8pF$)	1.0	1.6		V_{p-p}
t_{set}	Modulus Setup Time MC to Out		11	16	ns
$V_{in(min)}$	Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	100 400		1500 1500	mVpp

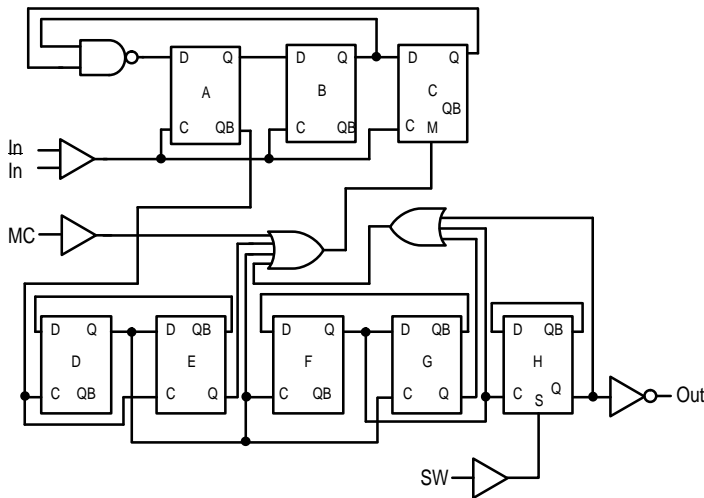


Figure 1. Logic Diagram (MC12038A)

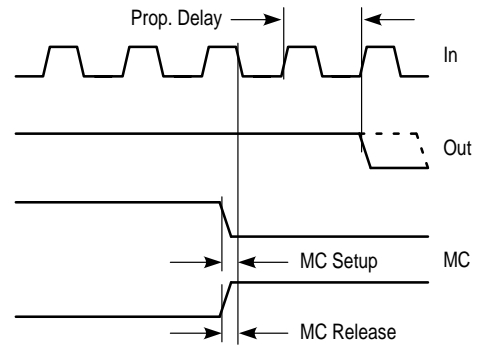
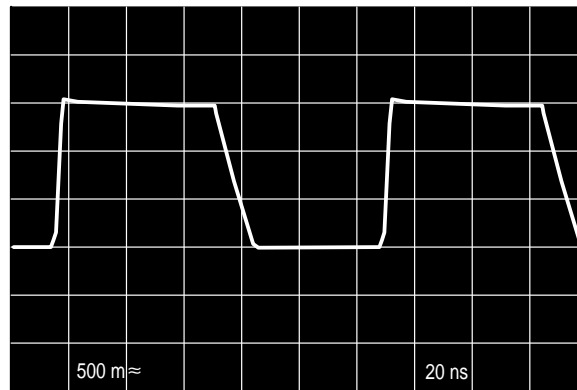


Figure 2. Modulus Setup Time



(± 128 , 1.1GHz Input Frequency, $V_{CC} = 5.0V$, $T_A = 25^{\circ}C$, Output Loaded)

Figure 3. Typical Output Waveforms

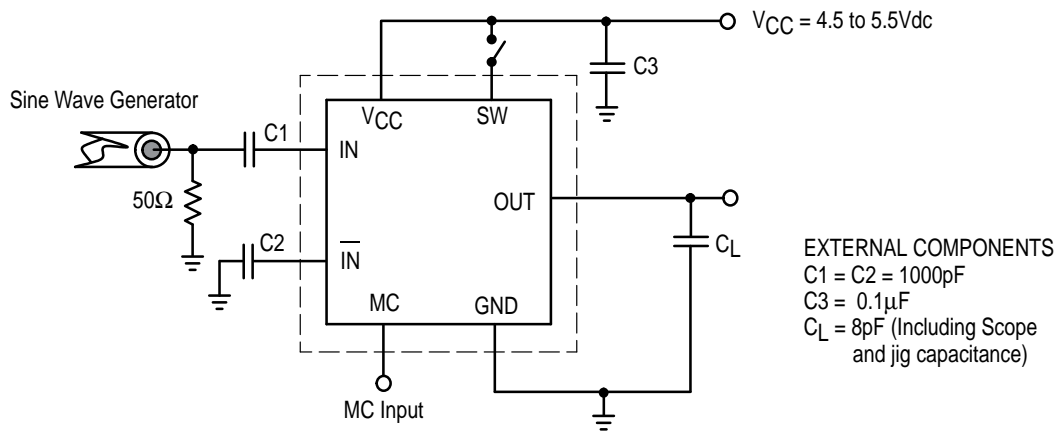


Figure 4. AC Test Circuit

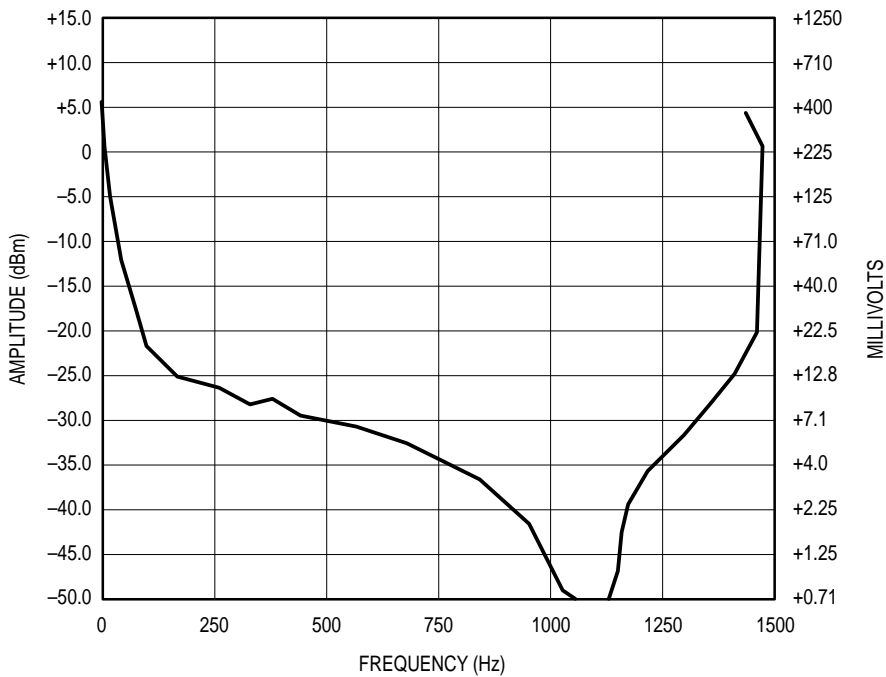


Figure 5. Input Signal Amplitude versus Input Frequency
Divide Ratio = 128; VCC = 5.0V; TA = 25°C

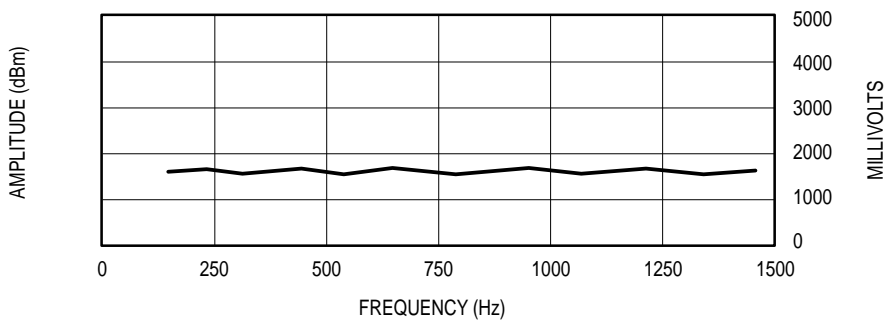


Figure 6. Output Amplitude versus Input Frequency

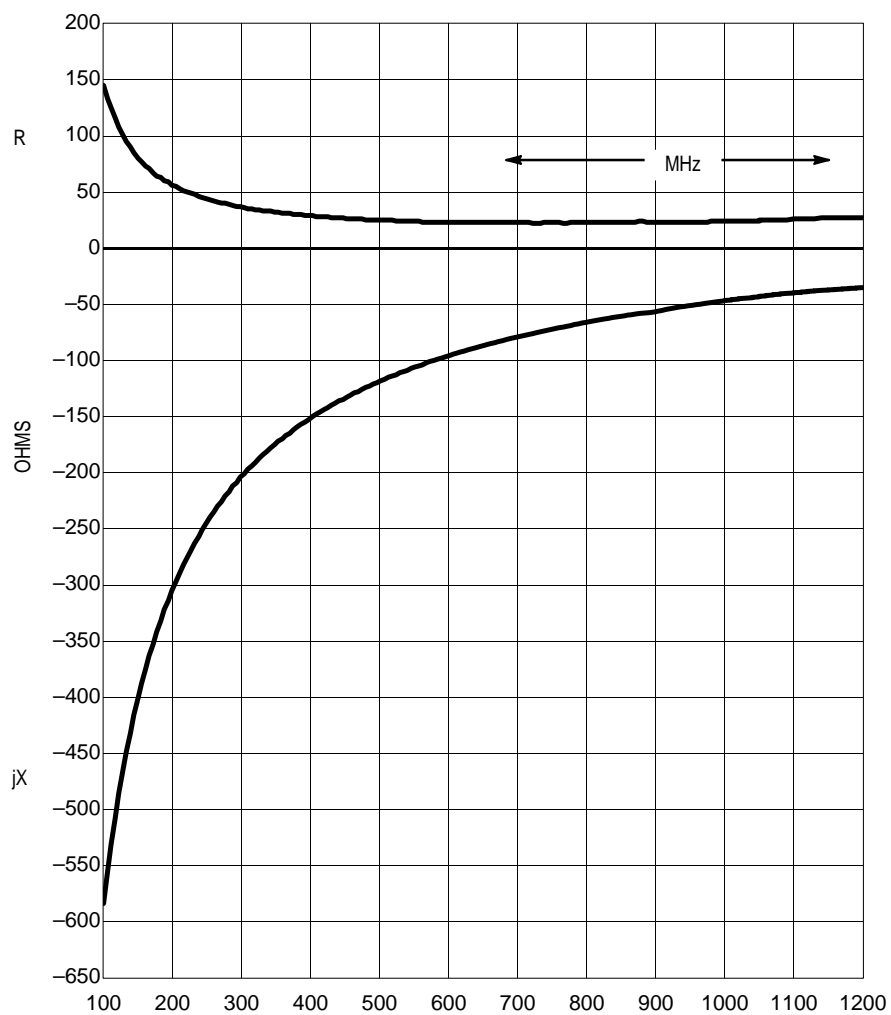
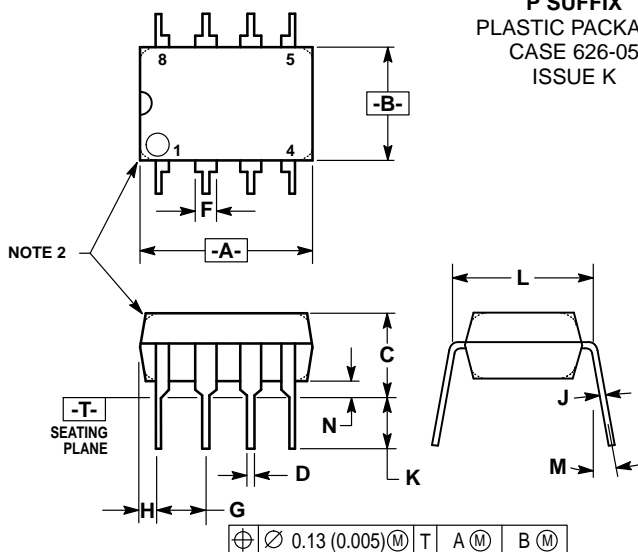


Figure 7. Typical Input Impedance versus Input Frequency

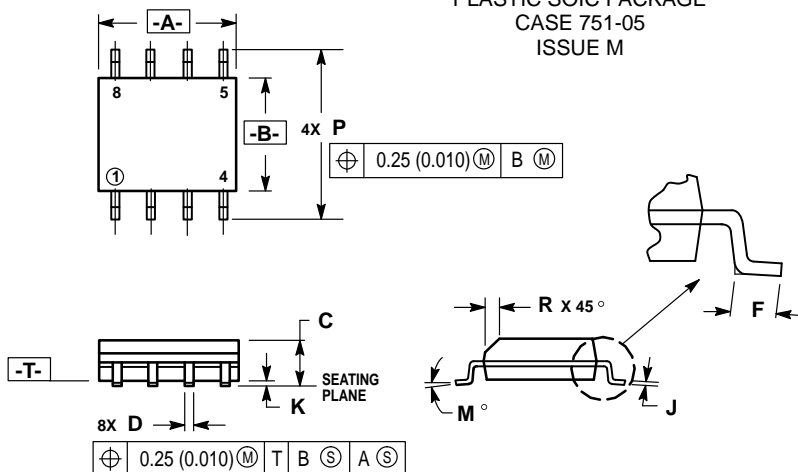
OUTLINE DIMENSIONS

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.


DIM	MILLIMETERS		INCHES	
	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
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 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.

DIM	MILLIMETERS		INCHES	
	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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