

1.1 GHz 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 1.1 GHz 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 5.5 V
- Low-Power 4.8 mA Typical
- Operating Temperature Range of −40 to 85°C
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL
- On-Chip Output Termination

FUNCTIONAL TABLE

sw	МС	Divide Ratio
Н	Н	127
Н	L	128
L	Н	255
L	L	256

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.

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

NOTE: * Equivalent to a two-input NAND gate

MAXIMUM RATINGS

Characteristic	Symbol	Range	Unit
Power Supply Voltage, Pin 2	VCC	-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 6.5	Vdc

NOTE: ESD data available upon request.

MC12038A

MECL PLL COMPONENTS ÷127/128, ÷255/256 DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

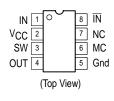


D SUFFIXPLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX PLASTIC PACKAGE CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC12038AD	$T_A = -40^{\circ} \text{ to } +85^{\circ}\text{C}$	SO-8
MC12038AP	1A = -40 to +65 C	Plastic

ELECTRICAL CHARACTERISTICS (V_{CC} = 4.5 to 5.5V; T_A = -40 to 85°C, unless otherwise noted.)

Characteristic	Symbol	Min	Тур	Max	Unit
Toggle Frequency (Sine Wave Input)	f _t	0.1	1.4	1.1	GHz
Supply Current Output Unloaded (Pin 2) at 5.0 Vdc	ICC	-	4.8	6.5	mA
Modulus Control Input High (MC)	VIH1	2.0	_	Vcc	V
Modulus Control Input Low (MC)	V _{IL1}	-	-	0.8	V
Divide Ratio Control Input High (SW)	V _{IH2}	VCC	Vcc	VCC	Vdc
Divide Ratio Control Input Low (SW)	V _{IL2}	Open	Open	Open	-
Output Voltage Swing (C _L = 8.0 pF)	V _{out}	1.0	1.6	_	V _{pp}
Modulus Setup Time MC to Out	t _{set}	-	11	16	ns
Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	Vin(min)	100 400	-	1500 1500	mVpp

Figure 1. Logic Diagram (MC12038A)

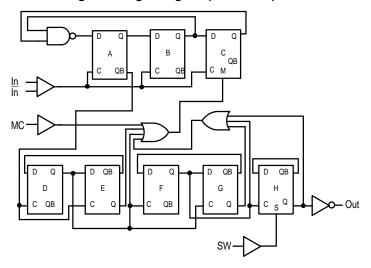
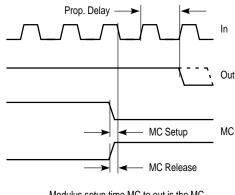
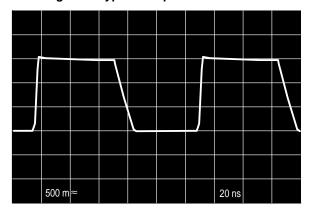


Figure 2. Modulus Setup Time



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

Figure 3. Typical Output Waveforms



(\pm 128, 1.1 GHz Input Frequency, V_{CC} = 5.0 V, T_A = 25°C, Output Loaded)

Figure 4. AC Test Circuit

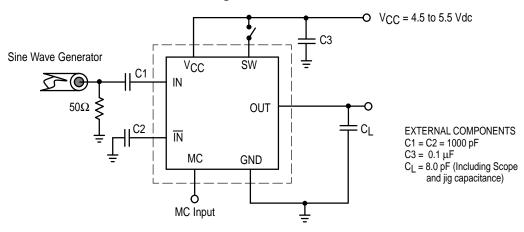
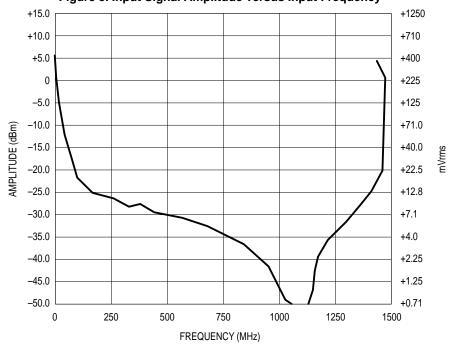


Figure 5. Input Signal Amplitude versus Input Frequency



Divide Ratio = 128; V_{CC} = 5.0 V; T_A = 25°C

Figure 6. Output Amplitude versus Input Frequency

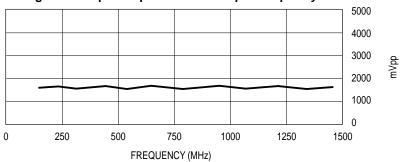
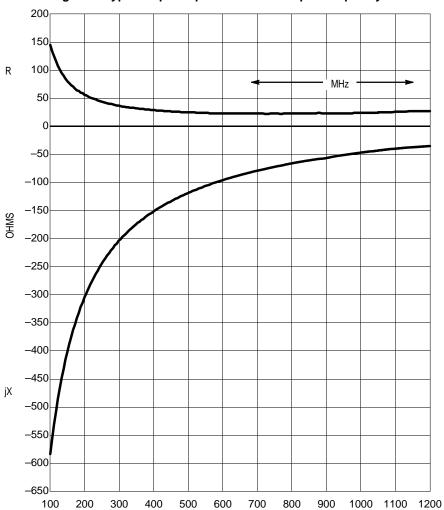
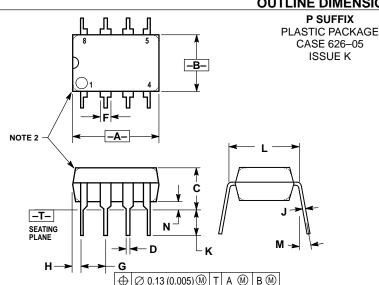


Figure 7. Typical Input Impedance versus Input Frequency



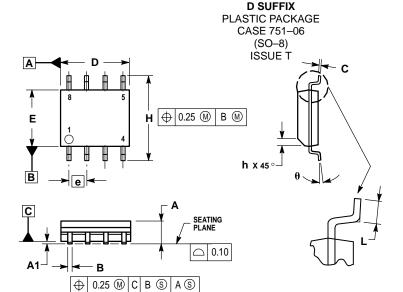
OUTLINE DIMENSIONS



NOTES:

- DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
- PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
- 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	MILLIMETERS		INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	9.40	10.16	0.370	0.400		
В	6.10	6.60	0.240	0.260		
С	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	2.54 BSC		0.100 BSC		
Н	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		



NOTES

- DIMENSIONING AND TOLERANCING PER ASME
- Y14.5M, 1994.
 2. DIMENSIONS ARE IN MILLIMETER.
- DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 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	
Α	1.35	1.75	
A1	0.10	0.25	
В	0.35	0.49	
C	0.19	0.25	
D	4.80	5.00	
Е	3.80	4.00	
е	1.27 BSC		
H	5.80	6.20	
h	0.25	0.50	
L	0.40	1.25	
θ	0 °	7 °	

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MC12038A/D