

2.0 GHz Low Voltage Dual Modulus Prescaler

The MC12033 is a high frequency low voltage dual modulus prescaler used in phase–locked loop (PLL) applications. A high frequency input signal up to 2.0 GHz is provided for cordless and cellular communication services such as DECT, PHS, and PCS. The MC12033 can be operated down to a minimum supply voltage of 2.7 V required for battery operated portable systems.

The MC12033A can be used with CMOS synthesizer requiring positive edges to trigger internal counters such as Motorola's MC145XXX series in a PLL to provide tuning signal up to 2.0 GHz in programmable frequency steps. The MC12033B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

A Divide Ratio Control (SW) permits selection of a 32/33 or 64/65 divide ratio as desired.

The Modulus Control (MC) selects the proper divide number after SW has been biased to select the desired divide ratio.

NOTE: The "B" Version Is Not Recommended for New Designs

- 2.0 GHz Toggle Frequency
- Supply Voltage 2.7 V to 5.0 Vdc
- Low Power 10.0 mA Typical at VCC = 2.7 V
- Operating Temperature Range of –40 to 85°C
- The MC12033 is Pin Compatible With the MC12022
- Short Setup Time (t_{set}) 8ns Typical at 2.0 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL

FUNCTIONAL TABLE

sw	МС	Divide Ratio
Н	Н	32
Н	L	33
39174	Н	64
- W.E.	L	65

NOTES: 1. SW: $H = V_{CC}$, L = Open. A logic L can also be applied by grouunding this pin, but this is not recommended due to increased power soncumption. 2. MC: H = 2.0 V to V_{CC} , L = GND to 0.8 V.

MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Power Supply Voltage, Pin 2	Vcc	-0.5 to 7.0	Vdc
Operating Temperature Range	TA	-40 to 85	°C
Storage Temperature Range	Tstg	-65 to 150	°C
Modulus Control Input, Pin 6	MC	-0.5 to 6.5	Vdc
Maximum Output Current, Pin 4	Io	10.0	mA

NOTE: ESD data available upon request.



MC12033A MC12033B

MECL PLL COMPONENTS

÷32/33, ÷64/65

LOW VOLTAGE

DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

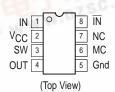


D SUFFIXPLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX PLASTIC PACKAGE CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temp Range	Package	
MC12033AD		SO-8	
MC12033AP	T. 400 to 1050C	Plastic	
MC12033BD	$T_A = -40^{\circ} \text{ to } +85^{\circ}\text{C}$	SO-8	
MC12033BP		Plastic	

MC12033A MC12033B

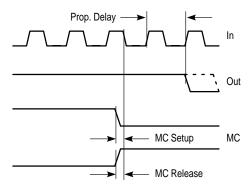
ELECTRICAL CHARACTERISTICS ($V_{CC} = 2.7 \text{ to } 5.0 \text{ V}$; $T_A = -40 \text{ to } 85^{\circ}\text{C}$, unless otherwise noted.)

Parameter	Symbol	Min	Тур	Max	Unit
Toggle Frequency (Sine Wave)	ft	0.5	2.4	2.0	GHz
Supply Current Output (Pin 2) $V_{CC} = 2.7 \text{ V}$ $V_{CC} = 5.0 \text{ V}$		_ _	10.0 13.0	12.5 16.0	mA
Modulus Control Input HIGH (MC)	V _{IH1}	2.0	-	VCC	V
Modulus Control Input LOW (MC)	V _{IL1}	Gnd	-	0.8	V
Divide Ratio Control Input HIGH (SW)	V _{IH2}	Vcc	Vcc	VCC	V
Divide Ratio Control Input LOW (SW)	V _{IL2}	OPEN	OPEN	OPEN	_
Output Voltage Swing (Note 1) $C_L = 8.0 \text{ pF}; R_L = 600 \Omega$	Vout	0.8	1.2	_	V _{pp}
Modulus Setup Time MC to OUT @ 2000 MHz	t _{set}	-	8.0	10	ns
Input Voltage Sensitivity 500–2000 MHz	VIN	100	-	1000	mVpp
Output Current (Note 2) V_{CC} = 2.7V, C_L = 8.0 pF, R_L = 600 Ω V_{CC} = 5.0 V, C_L = 8.0 pF, R_L = 1.5 k Ω		_ _	2.4 2.4	4.0 4.0	mA

NOTES: 1. Valid over voltage range 2.7 to 5.0 V; R_L = 600 Ω @ V_{CC} = 2.7 V; R_L = 1.5 k Ω @ V_{CC} = 5.0 V 2. Divide ratio of +32/33 @ 2.0 GHz

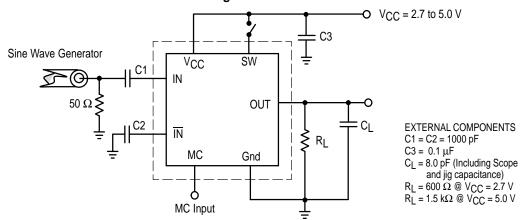
Figure 1. Logic Diagram (MC12033A)

Figure 2. Modulus Setup Time



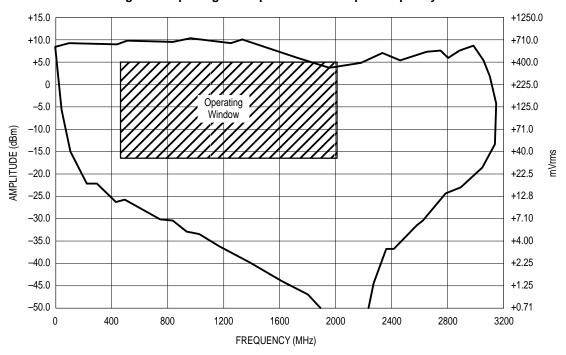
Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

Figure 3. AC Test Circuit



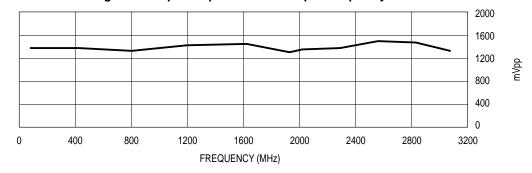
MC12033A MC12033B

Figure 4. Input Signal Amplitude versus Input Frequency



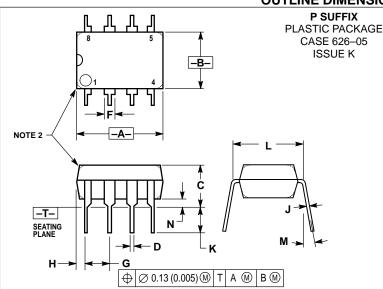
Divide Ratio = 64; V_{CC} = 5.0 V; T_A = 25°C

Figure 5. Output Amplitude versus Input Frequency



MC12033A MC12033B

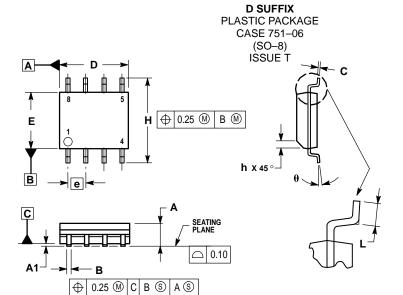
OUTLINE DIMENSIONS



NOTES:

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

	MILLIMETERS		INC	HES	
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 BSC		0.100 BSC		
Н	0.76	1.27	0.030	0.050	
7	0.20	0.30	0.008	0.012	
K	2.92	3.43	0.115	0.135	
L	7.62 BSC		0.300 BSC	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
- 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		
Α	1.35	1.75		
A1	0.10	0.25		
В	0.35	0.49		
С	0.19	0.25		
D	4.80	5.00		
Е	3.80	4.00		
е	1.27	1.27 BSC		
Н	5.80	6.20		
h	0.25	0.50		
L	0.40	1.25		
θ	0 °	7 °		

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