

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

2.0 GHz MECL PLL ÷ 64/65, ÷ 128/129 LOW-POWER PRESCALER

The MC12032A 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 2.0 GHz in programmable frequency steps.

The MC12032B can be used with CMOS synthesizers requiring negative edges to trigger internal counters such as Fujitsu's MB87001.

A Divide Ratio Control (SW) permits selection of a 64/65 or 128/129 divide ratio as desired.

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

- 2.0 GHz Toggle Frequency
- MC12032A for Positive Edge Triggered Synthesizers
- MC12032B for Negative Edge Triggered Synthesizers
- 12 mA Maximum, -40°C to $+85^{\circ}\text{C}$, $V_{CC} = 5.5\text{ Vdc}$
- Modulus Control Input Level is Compatible with Standard CMOS and TTL
- Low-Power 8.5 mA Typical

Design 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

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 $+6.5$	Vdc

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

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave Input)	f_t	0.5	2.4	2.0	GHz
Supply Current Output Unloaded (Pin 2)	I_{CC}	—	8.5	12	mA
Modulus Control Input High (MC)	V_{IH1}	2.0	—	—	V
Modulus Control Input Low (MC)	V_{IL1}	—	—	0.8	V
Divide Ratio Control Input High (SW)	V_{IH2}	V_{CC}	V_{CC}	V_{CC}	V
Divide Ratio Control Input Low (SW)	V_{IL2}	Open	Open	Open	—
Output Voltage Swing ($C_L = 12\text{ pF}$, $R_L = 2.2\text{ k}\Omega$)	V_{out}	1.0	1.6	—	V_{p-p}
Modulus Setup Time MC to Out	t_{SET}	—	11	TBD	ns
Input Voltage Sensitivity ($\omega = 500\text{--}2000\text{ MHz}$)	$V_{in\ Min}$	100	—	1500	mVpp
Output Current ($C_L = 12\text{ pF}$, $R_L = 2.2\text{ k}\Omega$)	I_O	—	—	2.0	mA

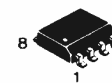
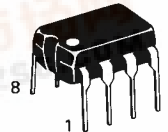
MC12032A MC12032B

MECL PLL COMPONENTS

LOW-POWER TWO MODULUS PRESCALER

÷ 64/65
÷ 128/129

P SUFFIX
PLASTIC PACKAGE
CASE 626



D SUFFIX
SOIC PACKAGE
CASE 751

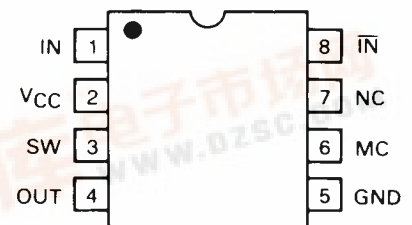
ORDERING INFORMATION

MC12032AP/BP Plastic
MC12032AD/BD SOIC

Note: For positive edge triggered synthesizers, order the MC12032A

For Negative edge triggered synthesizers, order the MC12032B

PRESCALER PIN ASSIGNMENT



(Top View)

FUNCTION TABLE

SW	MC	Divide Ratio
H	H	64
H	L	65
L	H	128
L	L	129

Note: SW: H = V_{CC} , L = Open
MC: H = 2.0 V to V_{CC}
L = Gnd to 0.8 V

LOGIC DIAGRAM (MC12032A)

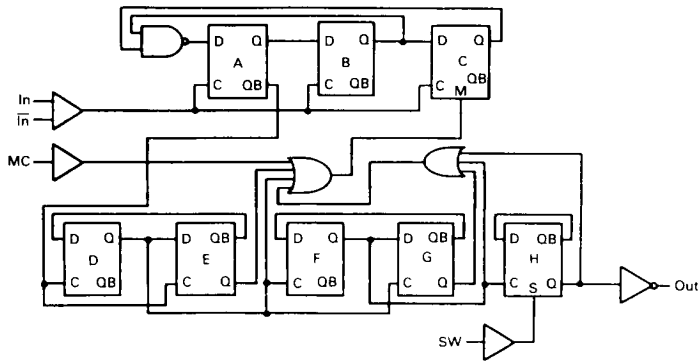


FIGURE 1 — MODULUS SETUP TIME

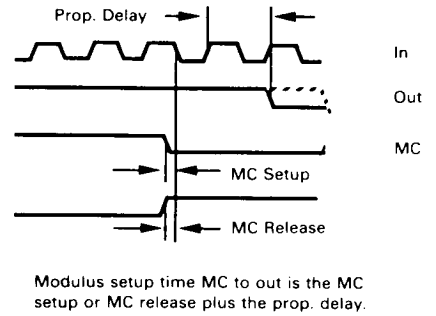


FIGURE 2 — TYPICAL OUTPUT WAVEFORMS

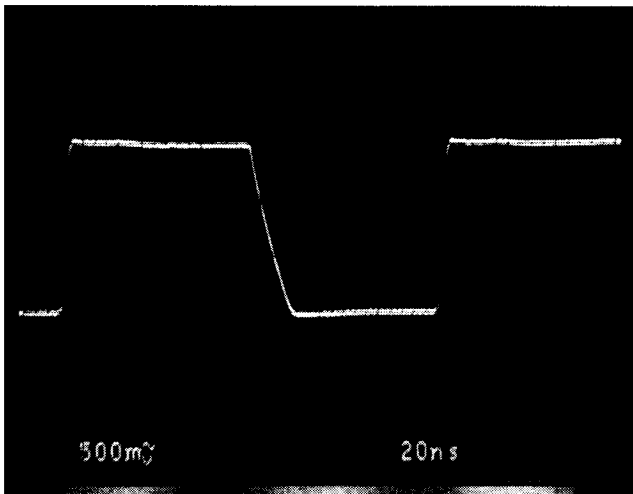


FIGURE 2A — ÷ 64, 500 MHz, 5.0 V, +25°C, OUTPUT LOADED

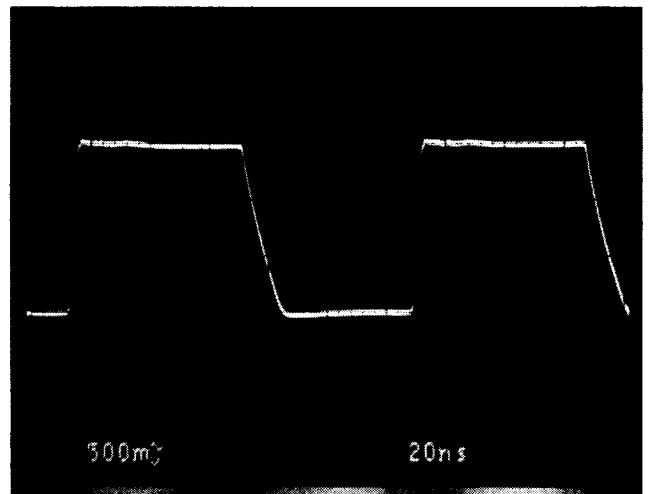


FIGURE 2B — ÷ 128, 1.1 GHz, 5.0 V, +25°C, OUTPUT LOADED

FIGURE 3 — AC TEST CIRCUIT

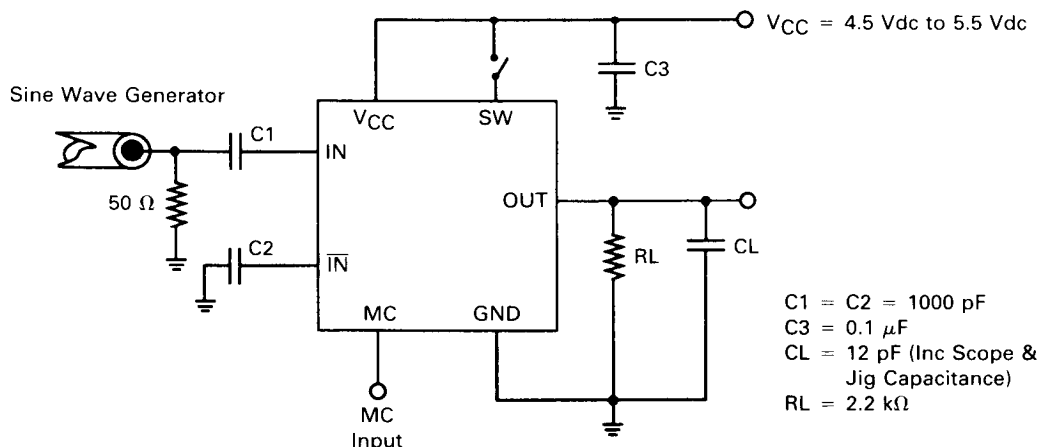


FIGURE 4A — INPUT SIGNAL AMPLITUDE versus INPUT FREQUENCY
 DIVIDE RATIO = 128

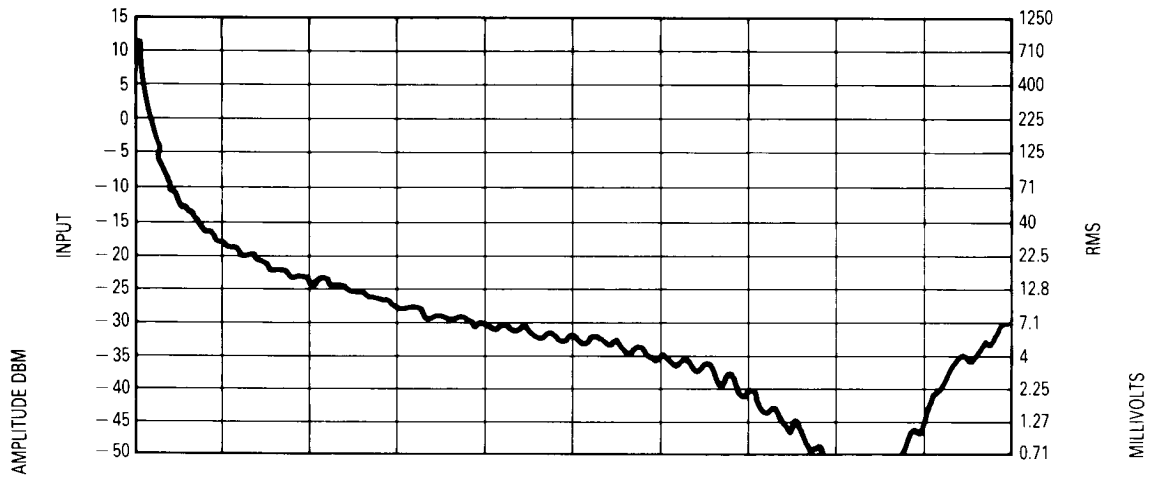


FIGURE 4B — OUTPUT AMPLITUDE versus INPUT FREQUENCY

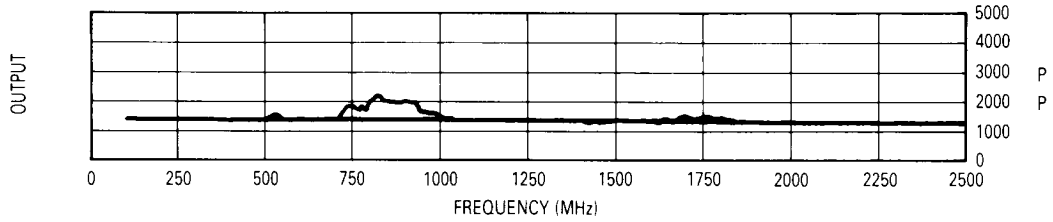
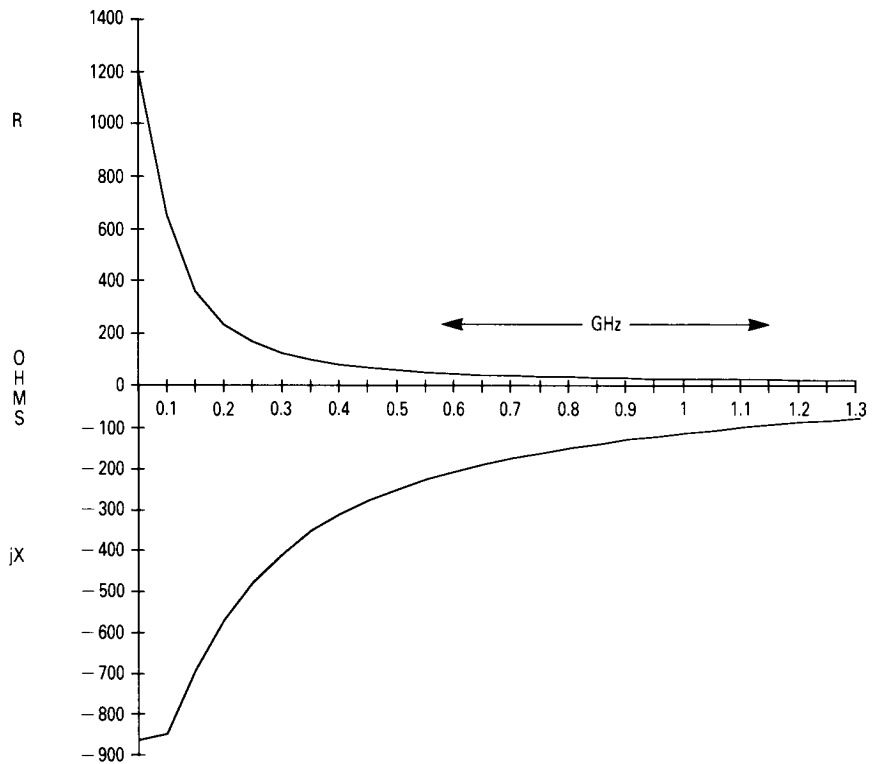
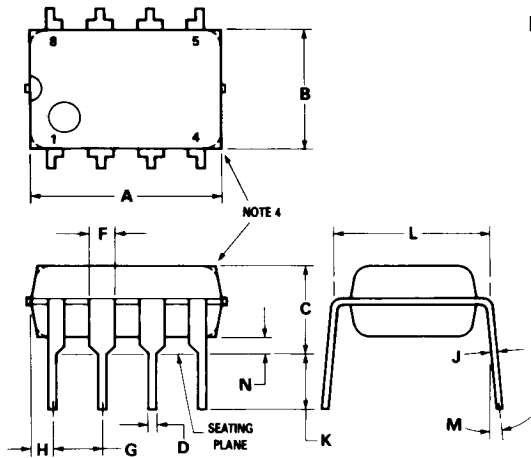


FIGURE 4C — TYPICAL INPUT IMPEDANCE versus INPUT FREQUENCY



OUTLINE DIMENSIONS

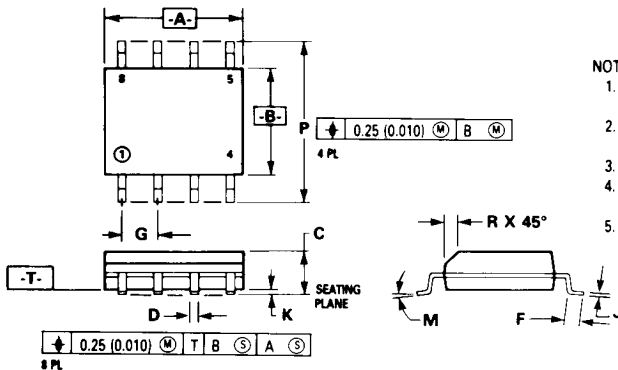
P SUFFIX PLASTIC PACKAGE CASE 626-04



- NOTES:
- LEAD POSITIONAL TOLERANCE:
 $\phi 0.13 (0.005) \text{ (M) T A (M) B (M)}$
 - DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
 - PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
 - DIMENSIONS A AND B ARE DATUMS.
 - 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	1.52	0.040	0.060
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	0.51	0.76	0.020	0.030

D SUFFIX PLASTIC SOIC PACKAGE CASE 751-03



- NOTES:
- DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
 - DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 - CONTROLLING DIM: MILLIMETER.
 - DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION.
 - MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

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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