ML12054A
2.0 GHz Super Low Power Dual Modulus Prescaler

MECL PLL COMPONENTS ÷64/65, ÷128/129
SEMICONDUCTOR TECHNICAL DATA

Legacy Device: *Motorola MC12054A*

The ML12054A is a super low power dual modulus prescaler used in phase-locked loop applications with low power dissipation of 5.4 mW at a minimum supply voltage of 2.7 V.

The ML12054A can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145xxx or Lansdale's ML145xxx series in a PLL to provide tuning signals up to 2.0 GHz in programmable frequency steps.

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
- The ML12054A is Pin and Functionally Compatible with the Motorola MC12031
- Low Supply Current 2.0 mA Typical
- 2.6mA Maximum, V_{CC} = 2.7 to 5.5 Vdc
- Short Setup Time (T_{set}) 10ns Maximum @ 2.0 GHz
- Modulus Control Input Level is Compatible with Standard CMOS and TTL
- Maximum Input Voltage Should Be Limited to 6.5 Vdc
- Operating Temperature Range T_A = –40 to 85°C

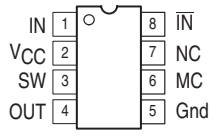
SO 8 = -5P
PLASTIC PACKAGE
CASE 751
(SO–8)

CROSS REFERENCE/ORDERING INFORMATION

PACKAGE	MOTOROLA	LANSDALE
SO 8	MC12054AD	ML12054A-5P

Note: Lansdale lead free (**Pb**) product, as it becomes available, will be identified by a part number prefix change from **ML** to **MLE**.

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}, 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.

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 6.5	Vdc

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 5.5 Vdc, T_A = –40 to 85°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave Input)	f_t	0.1	2.5	2.0	GHz
Supply Current (Pin 2)	I_{CC}	–	2.0	2.6	mA
Modulus Control Input High (MC)	V_{IH1}	2.0	–	V_{CC} + 0.5 V	V
Modulus Control Input Low (MC)	V_{IL1}	Gnd	–	0.8	V
Divide Ratio Control Input High (SW)	V_{IH2}	V_{CC} – 0.5 V	V_{CC}	V_{CC} + 0.5 V	VDC
Divide Ratio Control Input Low (SW)	V_{IL2}	Open	Open	Open	–
Output Voltage Swing (Note 2) (C_L = 8.0 pF, R_L = 1.65 kΩ)	V_{out}	0.8	1.1	–	V_{pp}
Modulus Setup Time MC to Out @ 2000 MHz	t_{set}	–	8.0	10	ns
Input Voltage Sensitivity 250–2000 MHz 100–250 MHz	V_{in}	100 400	– –	1000 1000	mVpp
Output Current (Note 1) V_{CC} = 2.7 V, C_L = 8.0 pF, R_L = 1.65 kΩ V_{CC} = 5.0 V, C_L = 8.0 pF, R_L = 3.6 kΩ	I_O	 – –	 1.0 1.0	 4.0 4.0	mA

NOTES: 1. Divide ratio of ÷64/65 @ 2.0 GHz
2. Valid over voltage range 2.7 to 5.5 V; R_L = 1.65 kΩ @ V_{CC} = 2.7 V; R_L = 3.6 kΩ @ V_{CC} = 5.0 V

Figure 1. Logic Diagram (ML12054A)

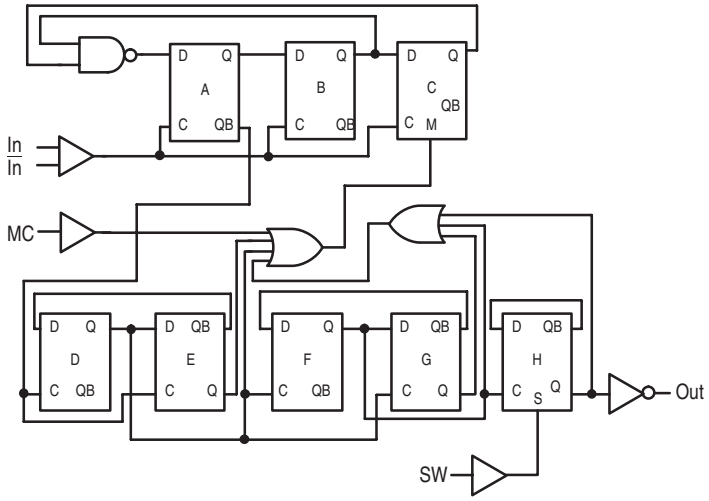
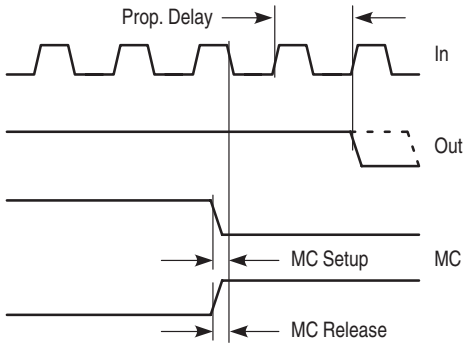
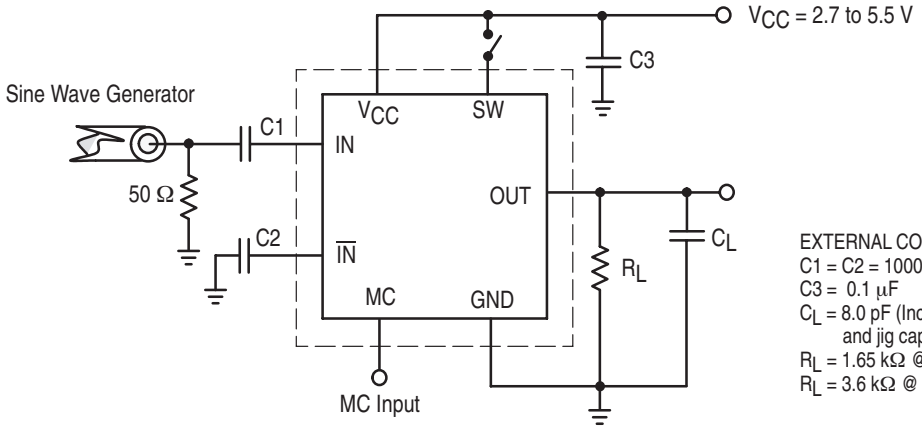


Figure 2. Modulus Setup Time



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)
R_L = 1.65 kΩ @ V_{CC} = 2.7 V
R_L = 3.6 kΩ @ V_{CC} = 5.0 V

Figure 4. Generic block diagram showing prescaler connection to PLL device

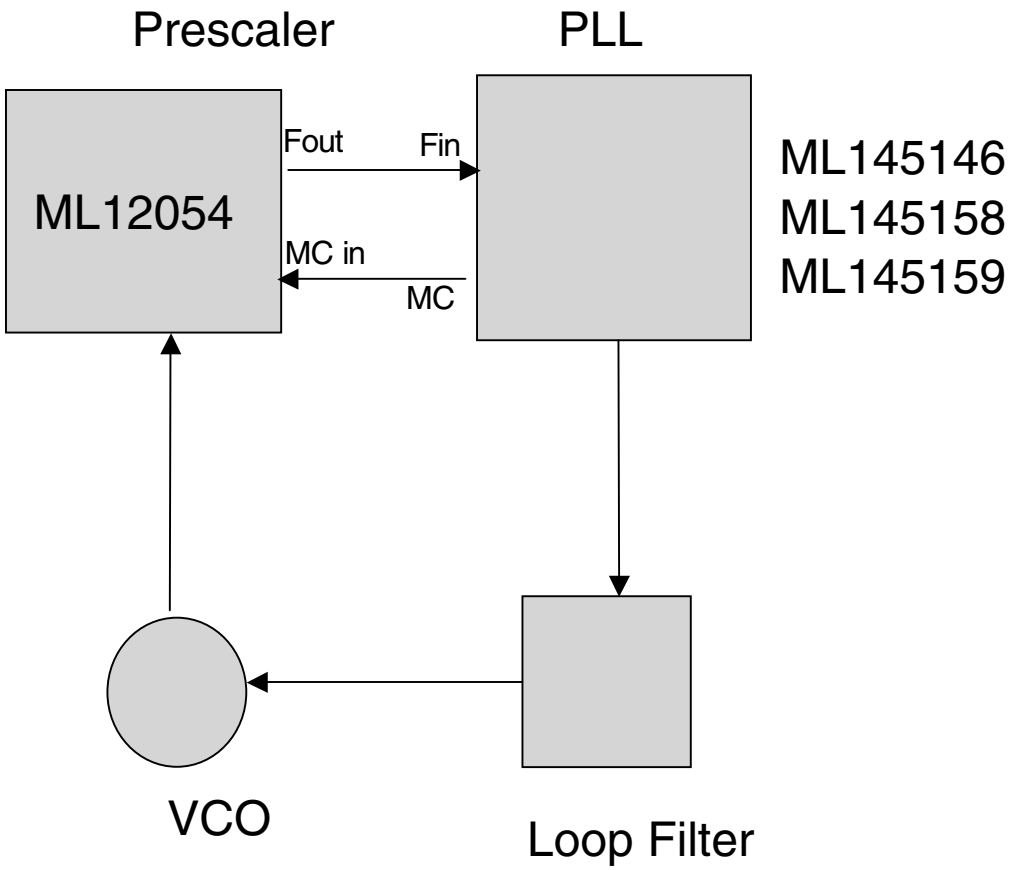
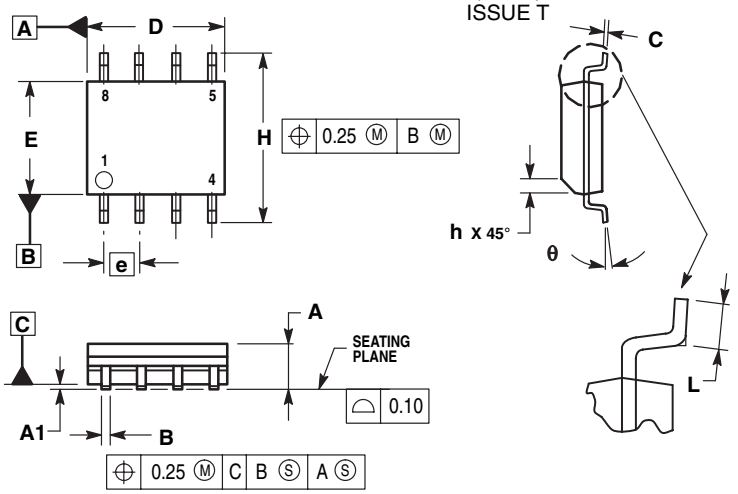


Figure 4 shows a generic block diagram for connecting a prescaler to a PLL device that supports dual modulus control. Application note AN535 decribes using a two-modulus prescaler technique.By using prescaler higher frequencies can be achieve than by a single CMOS PLL device.

OUTLINE DIMENSIONS

PLASTIC PACKAGE
(ML12054A-5P)
(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°