

Legacy Device: Motorola MC12038A

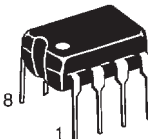
The ML12038 can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Lansdale's ML145xxx series in a PLL to provide tuning signals up to 1.1 GHz in programmable frequency steps.

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 4.5 to 5.5 V
- Low Power 4.8 mA Typical
- Operating Temperature Range $T_A = -40^\circ$ to $+85^\circ\text{C}$
- Short Set Up Time (t_{set}) 16ns Maximum @ 1.1 GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL
- On-Chip Output Termination

P DIP 8 = PP
PLASTIC PACKAGE
CASE 626-04



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



PACKAGE	MOTOROLA	LANSDALE
P-DIP 8	ML12038AP	ML12038PP
SO 8	ML12038AD	ML12038-5P

CROSS REFERENCE/ORDERING INFORMATION

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

FUNCTIONAL TABLE

SW	MC	Divide Ratio
H	H	127
H	L	128
L	H	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.

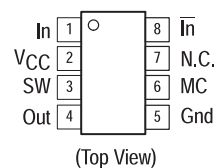
Design Criteria	Value	Unit
Internal Gate Count *	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	pJ

NOTE: *Equivalent to a two-input NAND gate.

MAXIMUM RATINGS

Characteristic	Symbol	Range	Unit
Power Supply Voltage, Pin 2	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

PIN CONNECTIONS



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

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave)	f_t	0.1	1.4	1.1	GHz
Supply Current Output Unloaded (Pin 2) at 5.0 Vdc	I_{CC}	–	4.8	6.5	mA
Modulus Control Input High (MC)	V_{IH1}	2.0	–	V_{CC}	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}	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 to 1100 MHz 100–250 MHz	$V_{in (min)}$	100 400	–	1500 1500	mVpp

Figure 1. Logic Diagram (ML12038)

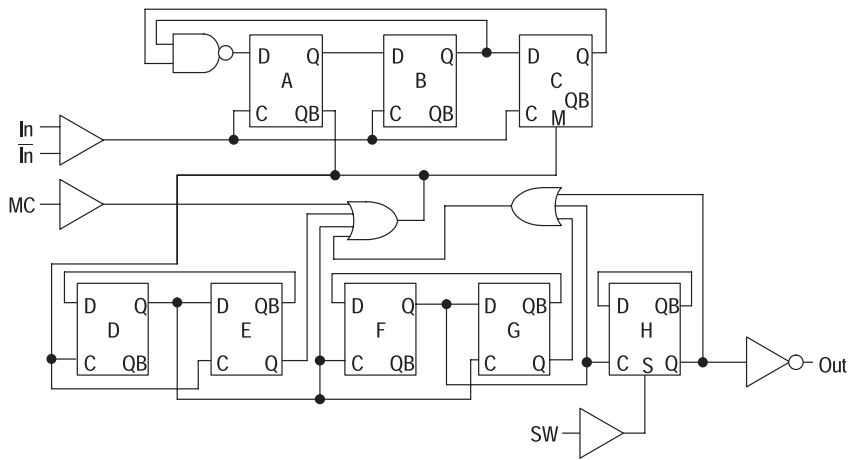


Figure 2. Modulus Setup Time

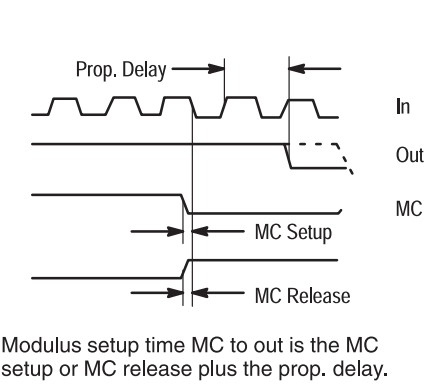
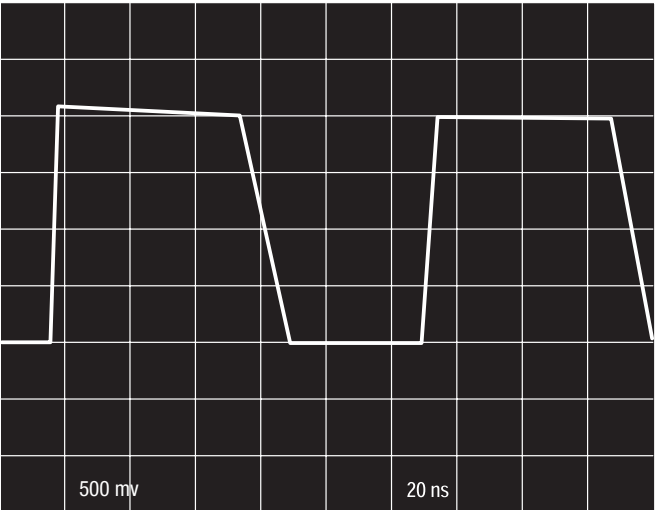


Figure 3. Typical Output Waveform



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

Figure 4. AC Test Circuit

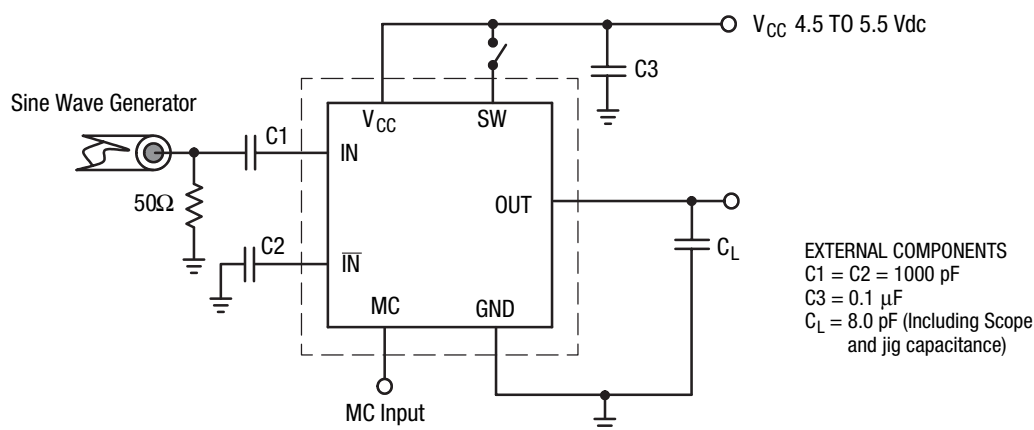


Figure 5. Input Signal Amplitude versus Input Frequency

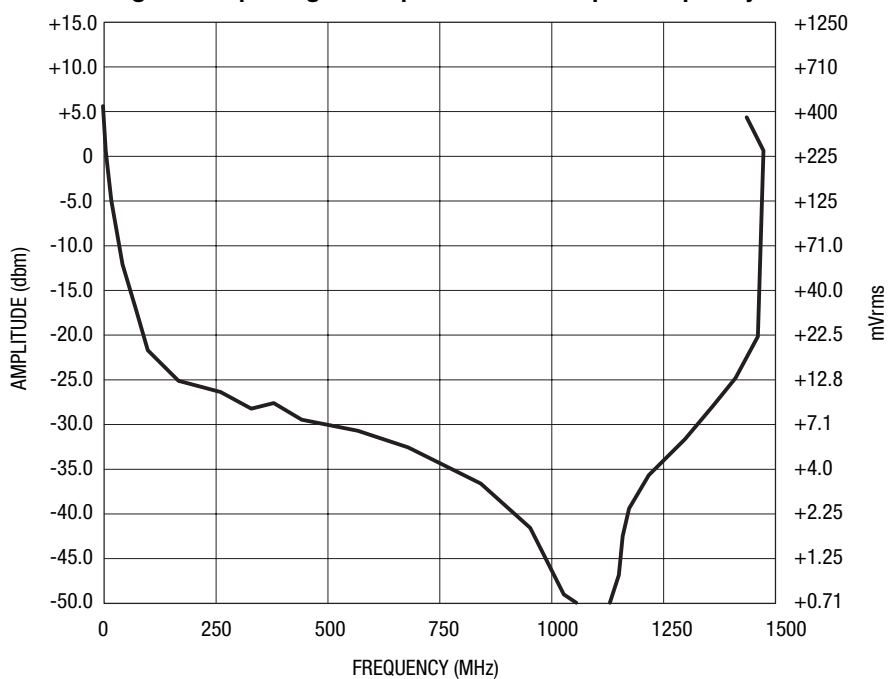
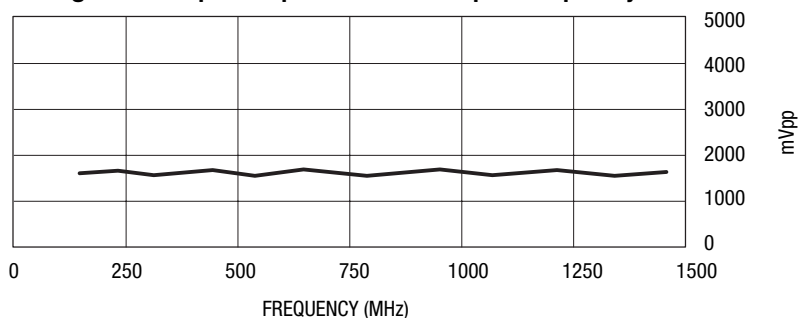
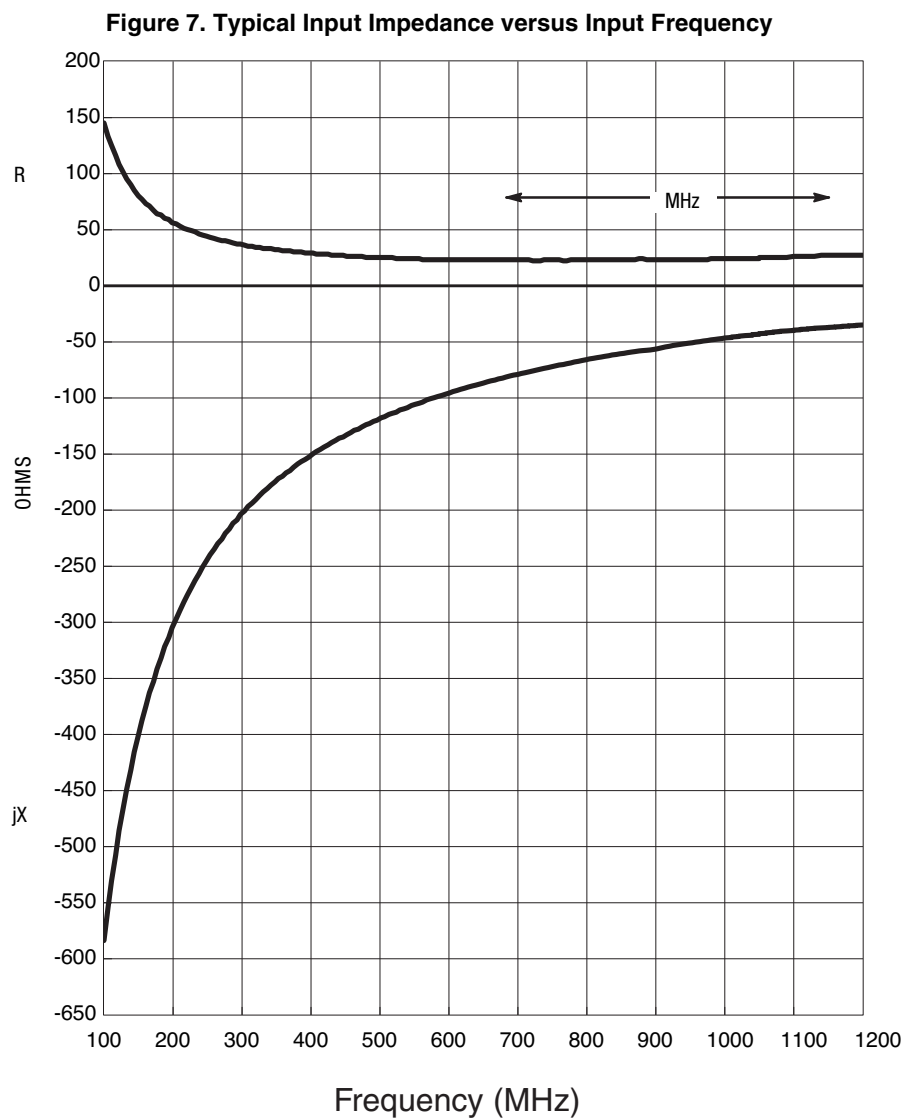
Divide Ratio = 128; V_{CC} = 5.0 V; T_A = 25°C

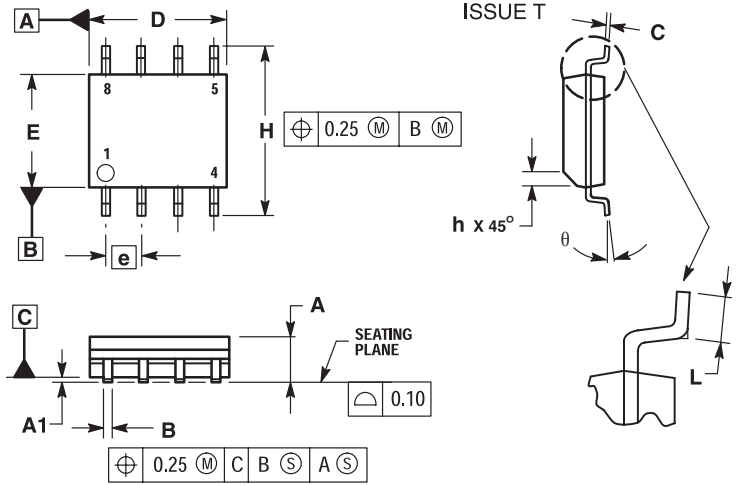
Figure 6. Output Amplitude versus Input Frequency





OUTLINE DIMENSIONS

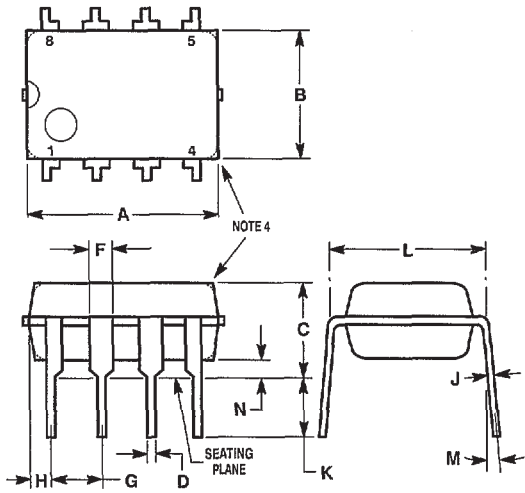
SO-8 = -5P
PLASTIC PACKAGE
(ML12038-5P)
CASE 751-06
(SO-8)
ISSUE T



- 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°

P DIP 8 = PP
PLASTIC PACKAGE
(ML12038PP)
CASE 626-04



- NOTES:
1. LEAD POSITIONAL TOLERANCE:
 $\phi 0.13 (0.005) \text{ (M)} \text{ T A (M) B (M)}$
 2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
 3. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
 4. DIMENSIONS A AND B ARE DATUMS.
 5. 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

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