



MOTOROLA

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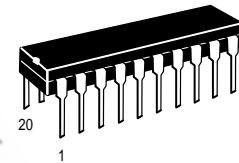
130 MHz Voltage Controlled Multivibrator

- High Frequency VCM Ideal for PLL Applications
- Single External Resistor Determines Center Frequency; Additional Resistor Determines f/V Sensitivity
- Internal Ripple Counter (1/2, 1/4, 1/8) for Low Frequency Applications, TTL/ECL Outputs
- VCO Output Enable Pins (TTL/ECL Level)
- +5.0 V Single Supply Voltage
- Packages: DIP, PLCC

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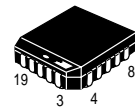
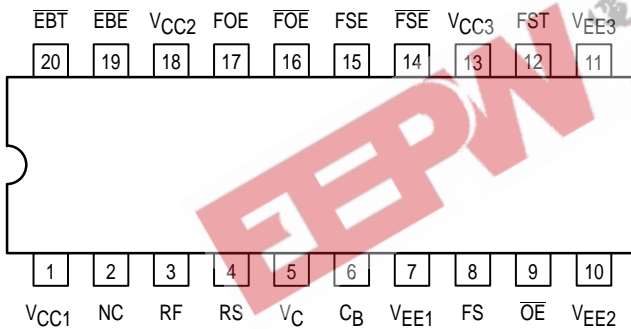
130 MHz VOLTAGE CONTROLLED MULTIVIBRATOR

SEMICONDUCTOR TECHNICAL DATA



P SUFFIX
PLASTIC PACKAGE
CASE 738

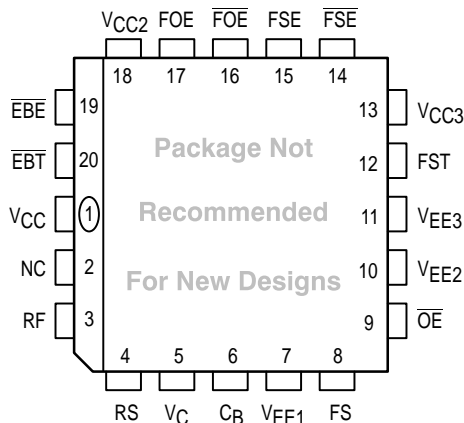
Pinout: 20-Lead Plastic Package (Top View)



FN SUFFIX
PLASTIC PACKAGE
CASE 775
(PLCC)

Not Recommended For New Designs

Pinout: 20-Lead PLCC Package (Top View)



PIN NAMES

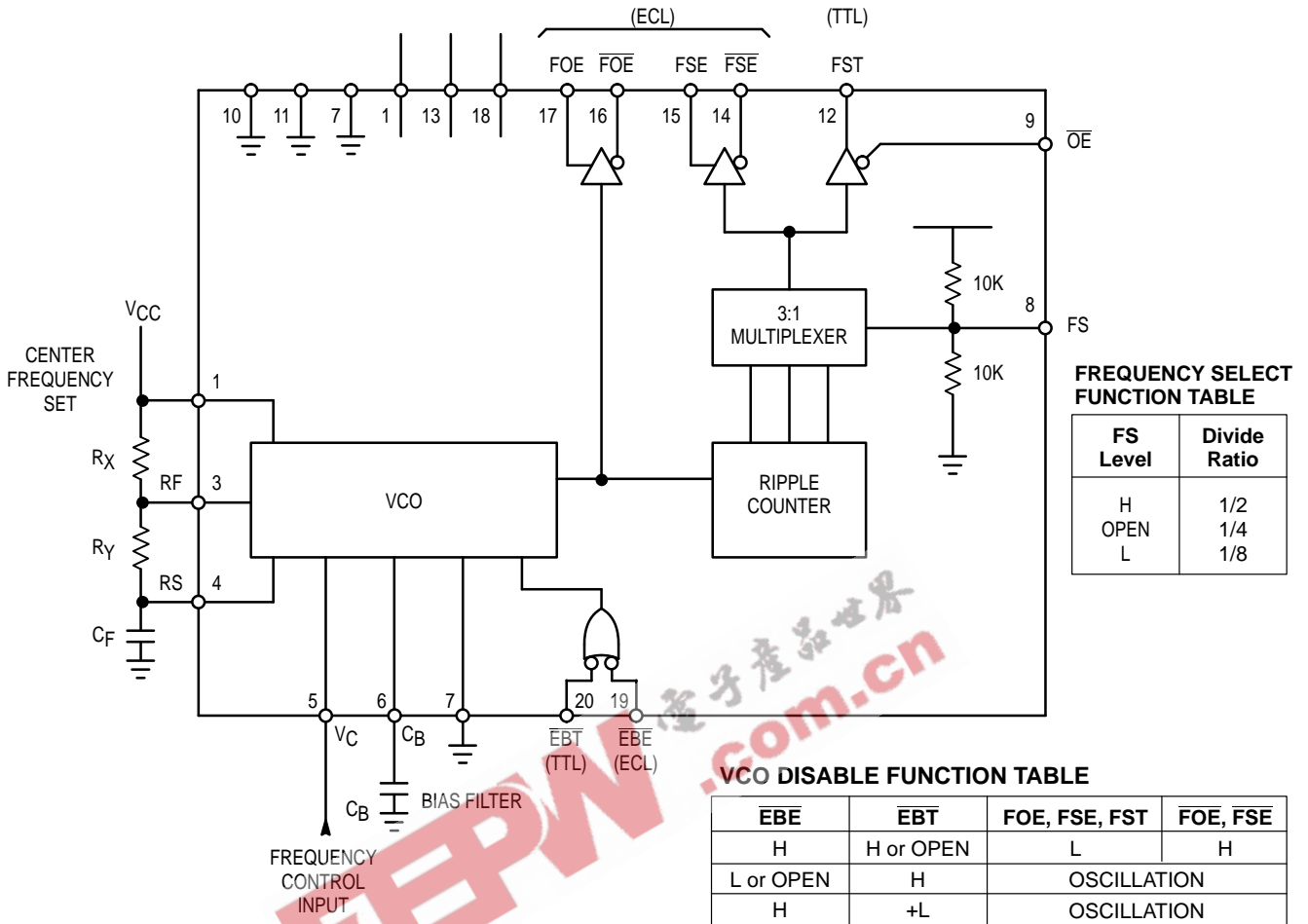
Pin	Function
RF, RS	Center Frequency Inputs
VC	Frequency Control Input
CB	Bias Filter Input
FS	Frequency Select Input
OE	TTL Output Enable
FST	TTL +2, +4, +8 Output
FSE, \overline{FSE}	Diff ECL +2, +4, +8 Outputs
FOE, \overline{FOE}	Diff ECL +1 Outputs
EBE	VCO Disable, ECL Level Input
EBT	VCO Disable, TTL Level Input

ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC12101P	$T_A = -40^\circ$ to $+75^\circ\text{C}$	Plastic

MC12101

Figure 1. Block Diagram



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Power Supply Voltage	V _{CC1} V _{CC2} V _{CC3}	-0.5 to 8.0	V
Input Voltage	V _{IN} (TTL)	-0.5 to V _{CC}	V
Input Voltage	V _{IN} (ECL)	-0.5 to V _{CC}	V
Output Source Current – Surge	I _{OUT} (ECL)	100	mA
Output Source Current – Continuous		50	mA
Junction Operating Temperature	T _J	140	°C
Storage Temperature	T _{STG}	-55 to 150	°C

NOTE: ESD data available upon request.

OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Ambient Temperature	T _A	0 to 75	°C
Supply Voltage	V _{CC}	4.75 to 5.25	V
TTL High Output Current	I _{OH} (TTL)	-1.0	mA
TTL Low Output Current	I _{OL} (TTL)	20	mA

MC12101

DC CHARACTERISTICS ($V_{CC} = 5.0\text{ V} \pm 5\%$; $R_X = 2.4\text{ k}\Omega$; $R_Y = 1.5\text{ k}\Omega$; $C_B = 0.001\text{ }\mu\text{F}$, unless otherwise noted.)

Characteristic	Symbol	0°C		25°C			75°C		Unit	Condition
		Min	Max	Min	Typ	Max	Min	Max		
Supply Current	I_{CC}	80	135	70	100	120	85	150	mA	$\overline{EBT} = \overline{EBE} = V_{CC}$ (ECL, TTL)
Output Low Voltage, TTL	V_{OLT}	–	–	–	–	0.5	–	–	V	$F_S = \text{GND}$
Output High Voltage, TTL	V_{OHT}	–	–	2.4	–	–	–	–	V	$F_S = \text{GND}$
Output Low Voltage, ECL	V_{OLE}	–	–	3.0	–	3.4	–	–	V	$V_{CC} = 5.0\text{ V}$, $R_L = 50\text{ }\Omega$, $V_T = 3.0\text{ V}$
Output High Voltage, ECL	V_{OHE}	–	–	3.9	–	4.19	–	–	V	$V_{CC} = 5.0\text{ V}$, $R_L = 50\text{ }\Omega$, $V_T = 3.0\text{ V}$
\overline{EBT} Input Low Current	I_{ILT}	–	–	–	–	400	–	–	μA	$V_{IN} = 0.4\text{ V}$
\overline{EBT} Input High Current	I_{IHT}	–	–	–	–	20	–	–	μA	$V_{IN} = 2.7\text{ V}$
		–	–	–	–	100	–	–	μA	$V_{IN} = 7.0\text{ V}$
\overline{EBE} Input High Current	I_{INHE}	–	–	–	–	250	–	–	μA	$V_{IN} = 4.19\text{ V}$
\overline{EBE} Input Low Current	I_{INLE}	–	–	1.0	–	–	–	–	μA	$V_{IN} = 3.05\text{ V}$
FS Input, Max "L" Level	V_{ILS}	–	–	–	–	1.2	–	–	V	$V_{CC} = 5.0\text{ V}$
FS Input, "Medium" Level	V_{IMS}	–	–	2.0	–	3.0	–	–	V	$V_{CC} = 5.0\text{ V}$
FS Input, Min "H" Level	V_{IHS}	–	–	3.8	–	–	–	–	V	$V_{CC} = 5.0\text{ V}$
\overline{EBT} Input Low Voltage	V_{ILT}	–	0.8	–	–	0.8	–	0.8	V	
\overline{EBT} Input High Voltage	V_{IHT}	2.0	–	2.0	–	–	2.0	–	V	
\overline{EBE} Input High Voltage	V_{IHE}	–	–	3.87	–	4.19	–	–	V	$V_{CC} = 5.0\text{ V}$
\overline{EBE} Input Low Voltage	V_{ILE}	–	–	3.05	–	3.52	–	–	V	$V_{CC} = 5.0\text{ V}$
V_C Input Voltage, $V_C = V_{CC} \div 2$	V_{LM}	–	–	± 1.1	± 1.3	± 1.5	–	–	V	$V_{CC} = 5.0\text{ V}$
C_B Output Voltage	V_{CB}	–	–	2.35	2.50	2.65	–	–	V	$V_{CC} = 5.0\text{ V}$

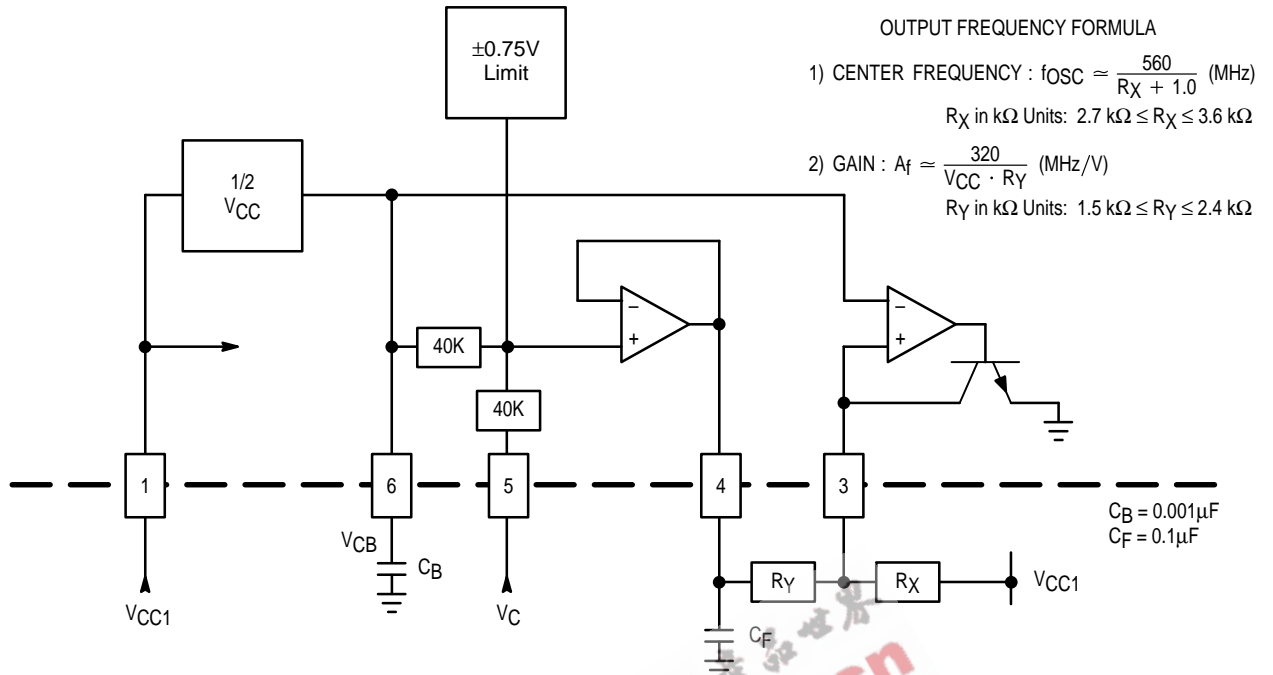
AC CHARACTERISTICS ($V_{CC} = 5.0\text{ V}$; $R_X = 2.4\text{ k}\Omega$; $R_Y = 1.5\text{ k}\Omega$; $C_B = 0.001\text{ }\mu\text{F}$; $V_T = 3.0\text{ V}$, unless otherwise noted.)

Characteristic	Symbol	0°C		25°C			75°C		Unit	Condition
		Min	Max	Min	Typ	Max	Min	Max		
Center Frequency ($V_{VC} - V_{CB} = 0\text{V}$)	FO	–	–	117	130	143	–	–	MHz	$V_{CC} = 2.0\text{ V}$ $V_{EE} = -3.0\text{ V}$
Frequency Range ($V_C = 1/2 V_{CC} \pm 1.5\text{V}$, $V_{CC} = 5.0\text{V}$)	$F_{MAX} - F_{MIN}$	–	–	68	80	92	–	–	MHz	
FOE/ \overline{FOE} /FSE/ \overline{FSE} Rise Time	t_{rE}	–	–	0.5	–	2.4	–	–	ns	
FOE/ \overline{FOE} /FSE/ \overline{FSE} Fall Time	t_{fE}	–	–	0.5	–	2.4	–	–	ns	
Reset Time	TTT	–	–	–	–	40	–	–	ns	$\overline{EBT} \sim \text{FST}$
Reset Time	TTO	–	–	–	–	25	–	–	ns	$\overline{EBT} \sim \overline{FOE}/\overline{FOE}$
Reset Time	TTS	–	–	–	–	35	–	–	ns	$\overline{EBT} \sim \overline{FSE}/\overline{FSE}$
Reset Time	TET	–	–	–	–	32	–	–	ns	$\overline{EBE} \sim \text{FST}$
Reset Time	TEO	–	–	–	–	12	–	–	ns	$\overline{EBE} \sim \overline{FOE}/\overline{FOE}$
Reset Time	TES	–	–	–	–	30	–	–	ns	$\overline{EBE} \sim \overline{FSE}/\overline{FSE}$

NOTE: Loading: ECL = 50 Ω to V_T ; TTL = 500 Ω , 50 pF

MC12101

Figure 2. VCO Detail



Notes:

- For optimum VCO linearity (MHz/V), the following resistor ranges are recommended:
 $3.6\text{ k}\Omega \leq R_X \leq 4.6\text{ k}\Omega$ ($R_Y = 2.0\text{ k}\Omega$)
 $1.5\text{ k}\Omega \leq R_Y \leq 2.4\text{ k}\Omega$ ($R_X = 3.3\text{ k}\Omega$)
- TTL output maximum frequency = 50 MHz
- Simultaneous use of both ECL and TTL outputs are not recommended due to excessive power consumption for the EIAJ Type II SO package

Figure 3. AC Test Circuit (FO/ t_{rE} / t_{fE} Measurement)

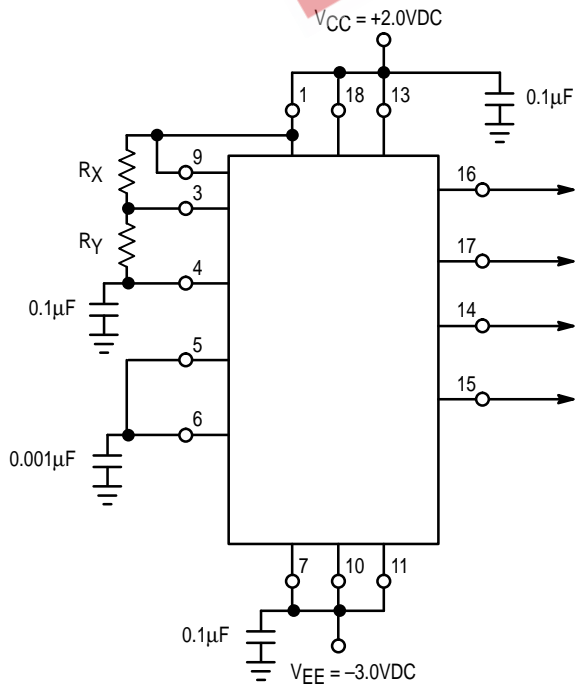
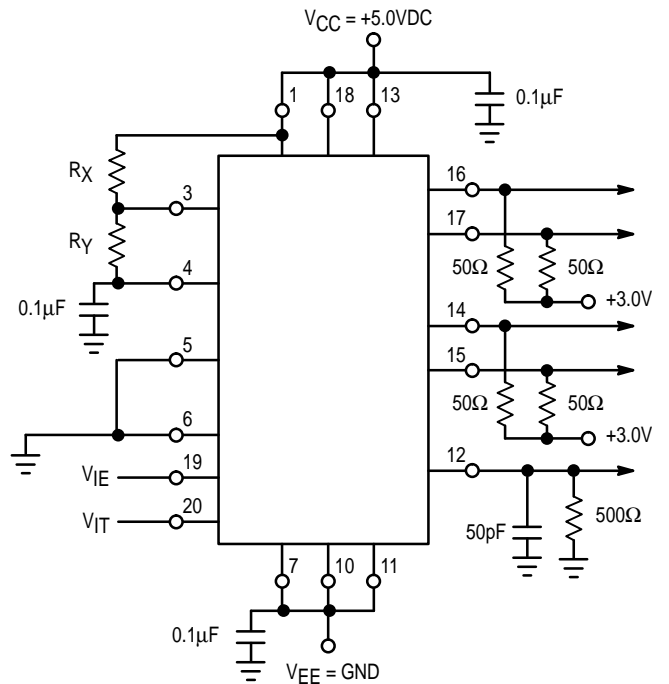
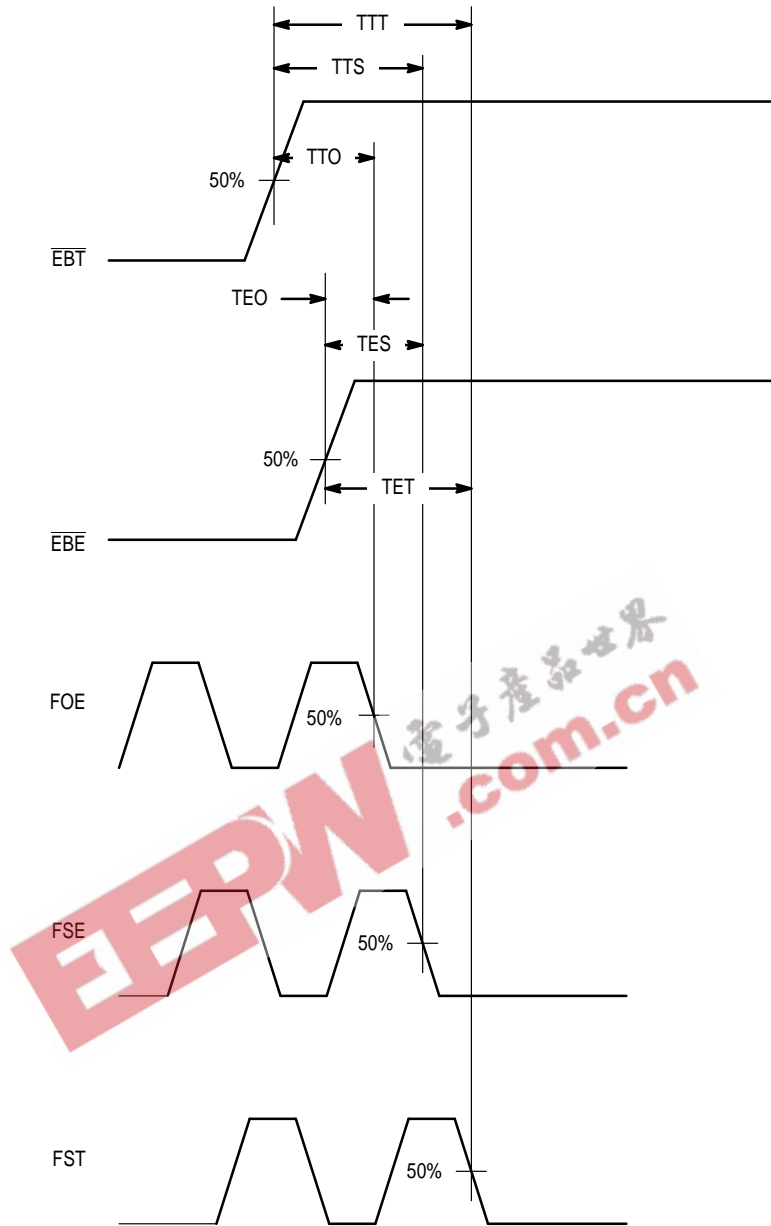


Figure 4. AC Test Circuit (Other Measurements)



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Figure 5. Switching Waveforms



VCO DISABLE FUNCTION TABLE

\overline{EBE}	\overline{EBT}	FOE, FSE, FST	$\overline{FOE}, \overline{FSE}$
H	H or OPEN	L	H
L or OPEN	H	OSCILLATION	
H	L	OSCILLATION	

MC12101

Figure 6. V_C versus Output Frequency
(Varying R_x @ $V_{CC} = 5.0$ V; $T_A = 25^\circ\text{C}$; $R_y = 2.0$ k Ω)

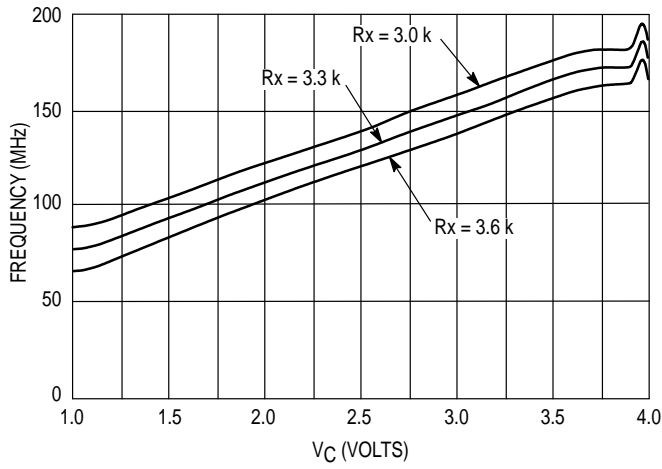


Figure 7. V_C versus Output Frequency
(Varying R_y @ $V_{CC} = 5.0$ V; $T_A = 25^\circ\text{C}$; $R_x = 3.3$ k Ω)

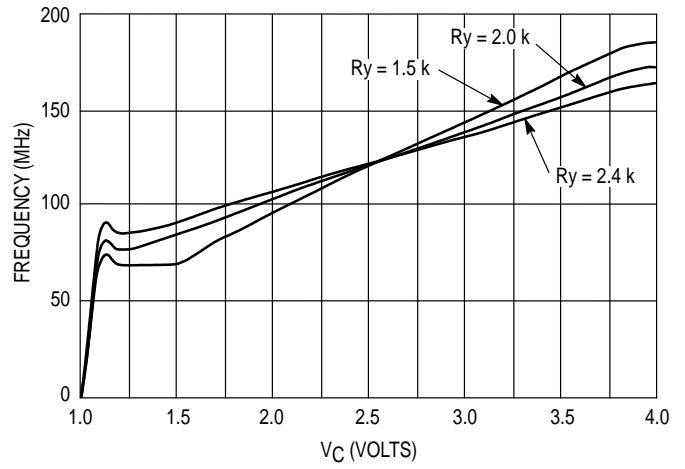


Figure 8. V_C versus Output Frequency
(Varying T_A @ $V_{CC} = 5.0$ V; $R_x = 3.3$ k Ω ; $R_y = 2.0$ k Ω)

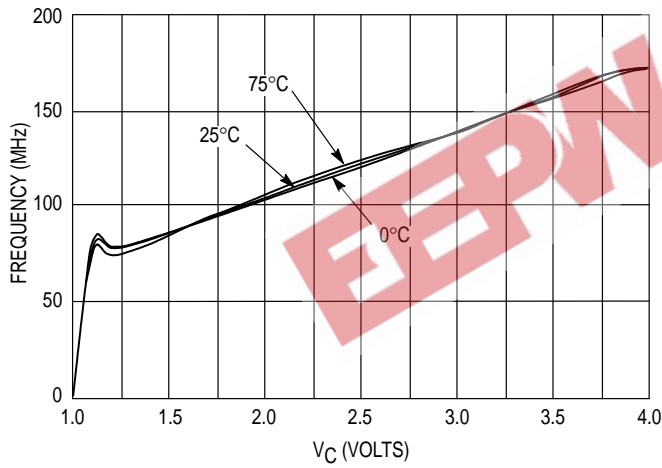
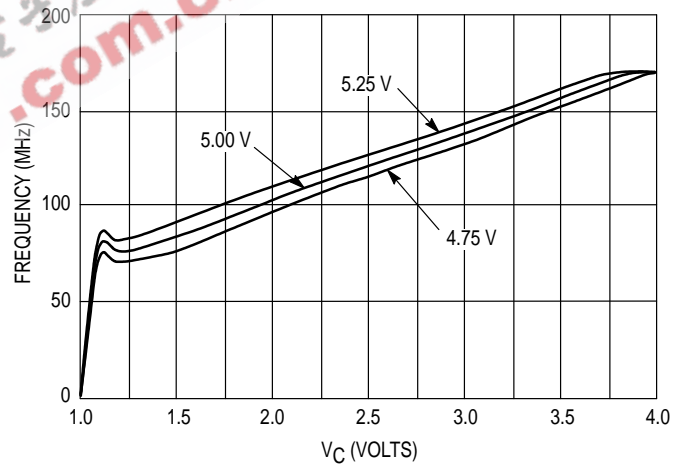


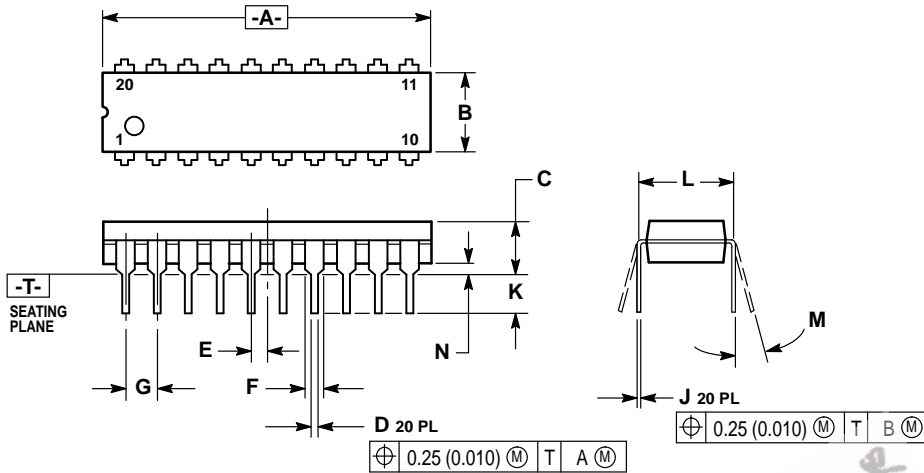
Figure 9. V_C versus Output Frequency
(Varying V_{CC} @ $R_x = 3.3$ k Ω ; $R_y = 2.0$ k Ω ; $T_A = 25^\circ\text{C}$)



MC12101

OUTLINE DIMENSIONS

P SUFFIX
PLASTIC PACKAGE
CASE 738-03
ISSUE E



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

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