



MC12148

Low Power Voltage Controlled Oscillator

The MC12148 requires an external parallel tank circuit consisting of the inductor (L) and capacitor (C). A varactor diode may be incorporated into the tank circuit to provide a voltage variable input for the oscillator (VCO). This device may also be used in many other applications requiring a fixed frequency clock.

The MC12148 is ideal in applications requiring a local oscillator. Systems include electronic test equipment and digital high-speed telecommunications.

The MC12148 is based on the VCO circuit topology of the MC1648. The MC12148 has been realized utilizing Motorola's MOSAIC III advanced bipolar process technology which results in a design which can operate at a much higher frequency than the MC1648 while utilizing half the current. Please consult with the MC1648 data sheet for additional background information.

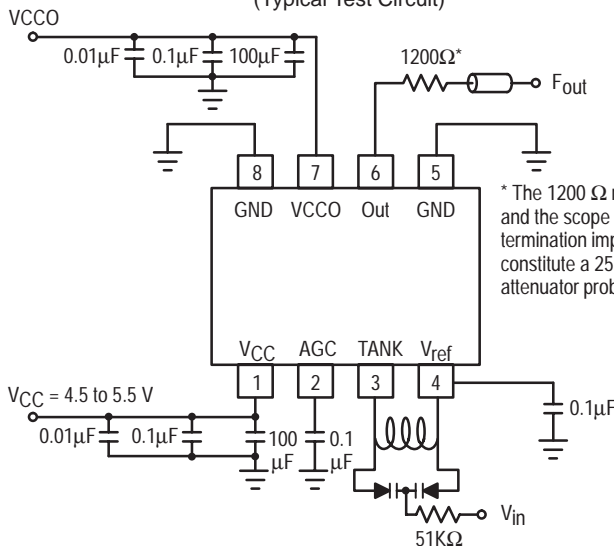
The ECL output circuitry of the MC12148 is not a traditional open emitter output structure and instead has an on-chip termination resistor with a nominal value of 500 ohms. This facilitates direct ac-coupling of the output signal into a transmission line. Because of this output configuration, an external pull-down resistor is not required to provide the output with a dc current path. This output is intended to drive one ECL load. If the user needs to fanout the signal, an ECL buffer such as the MC10EL16 Line Receiver/Driver should be used.

NOTE: The MC12148 is NOT useable as a crystal oscillator.

- Typical Operating Frequency Up to 1100 MHz
- Low-Power 20 mA at 5.0 Vdc Power Supply
- 8-Pin SOIC Package
- Phase Noise -90 dBc/Hz at 25 kHz Typical

NOT RECOMMENDED FOR NEW DESIGN
 DEVICE TO BE PHASED OUT.
 Consider MC12149 for New Designs.

BLOCK DIAGRAM
 (Typical Test Circuit)



* The 1200 Ω resistor and the scope termination impedance constitute a 25:1 attenuator probe.

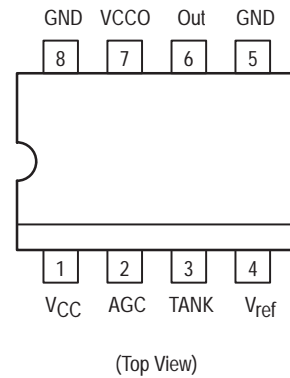
LOW POWER VOLTAGE CONTROLLED OSCILLATOR

SEMICONDUCTOR TECHNICAL DATA



D SUFFIX
 PLASTIC PACKAGE
 CASE 751
 (SO-8)

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC12148D	T _A = -40 to 85°C	SO-8

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MC12148

MAXIMUM RATINGS

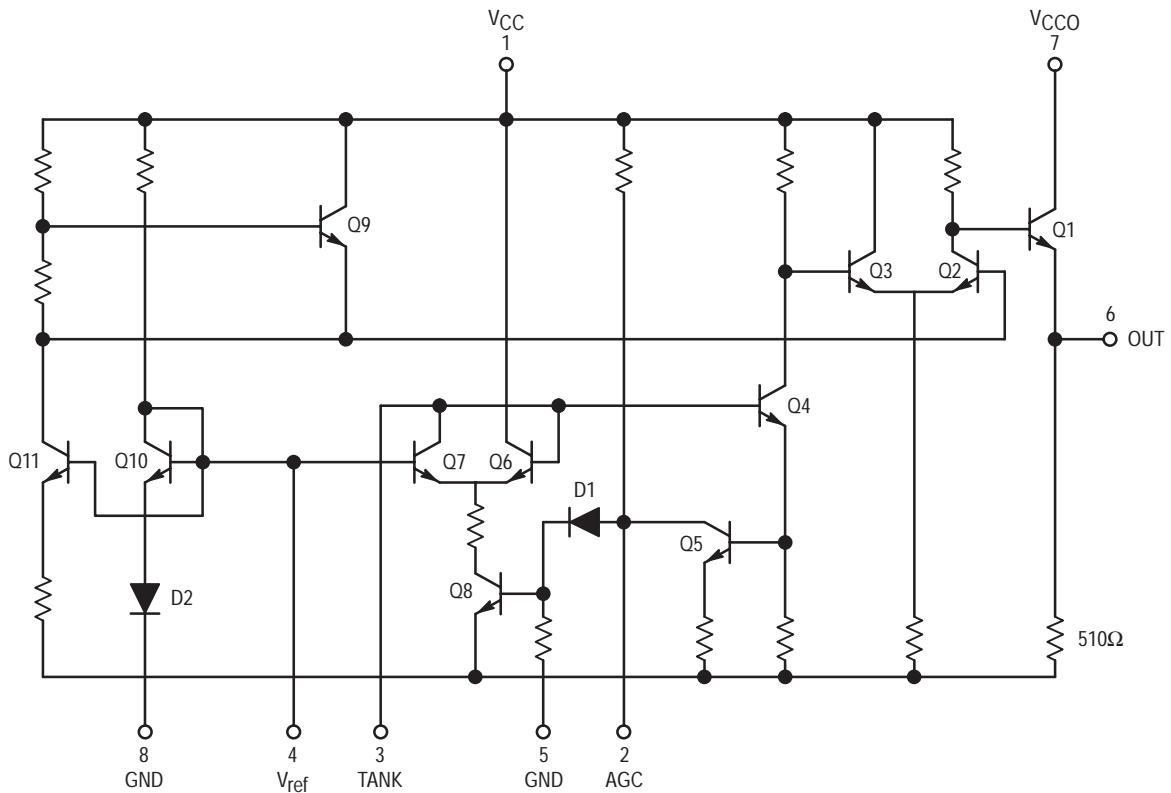
Parameter	Symbol	Value	Unit
Power Supply Voltage, Pins 1, 7	V_{CC}	-0.5 to 7.0	Vdc
Operating Temperature Range	T_A	-40 to 85	°C
Storage Temperature Range	T_{stg}	-65 to 150	°C

NOTE: ESD data available upon request.

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

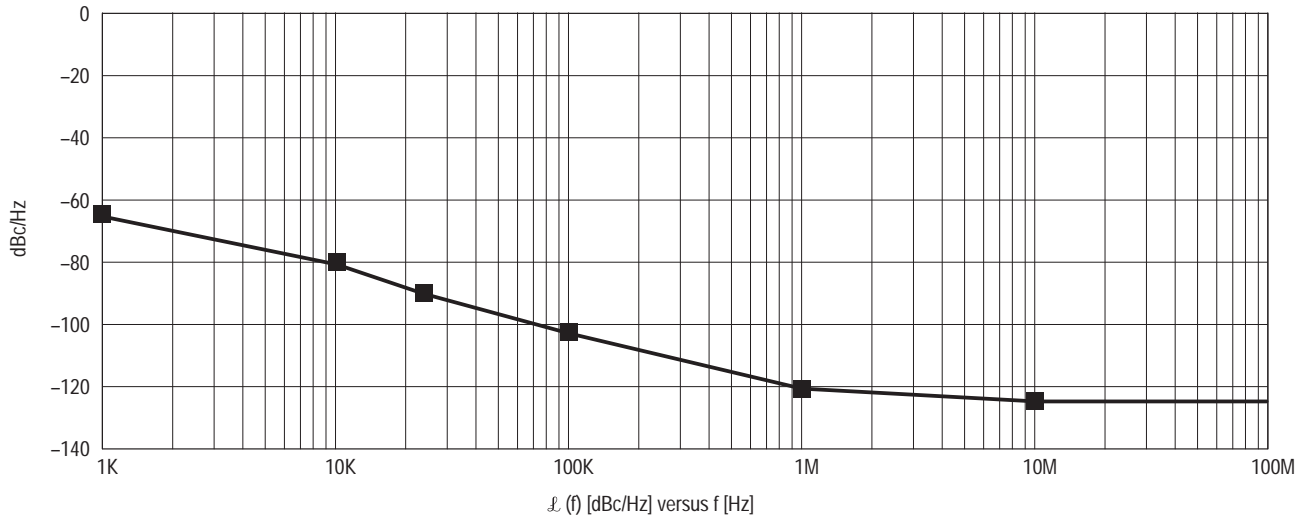
Characteristic	Symbol	Min	Typ	Max	Unit	
Supply Current	I_{CC}	-	19	25	mA	
Output Level HIGH (1.0 M Ω Impedance)	V_{OH}	3.95	4.17	4.61	V	
Output Level LOW (1.0 M Ω Impedance)	V_{OL}	3.04	3.41	3.60	V	
CSR @ 25 kHz Offset, 1.0 Hz BW	$\mathcal{L}(f)$	-	-90	-	dBc/Hz	
CSR @ 1.0 MHz Offset, 1.0 Hz BW	$\mathcal{L}(f)$	-	-120	-	dBc/Hz	
SNR (Signal to Noise Ratio from Carrier)	SNR	-	40	-	dB	
Frequency Stability	Supply Drift	Fsts	-	3.6	-	KHz/mV
	Thermal Drift	Fstt	-	0.1	-	KHz/°C
Second Harmonic (from Carrier)	H2	-	-25	-	dBc	

Figure 1. Circuit Schematic



MC12148

Figure 2. Typical Evaluation Results
(CSR MC12148 5.0 Vdc; V_{CC} @ 25°C; 930 MHz CW)



Tank Component Suppliers

Below are suppliers who manufacture tuning varactors and inductors which can be used to build an external tank circuit. Motorola has used these varactors and inductors for evaluation purposes, however, there are other vendors who manufacture similar products.

Coilcraft Inductors A01T thru A05T

Coilcraft—Coilcraft, Inc.
1102 Silver Lake Rd.
Gary, Illinois 60013
708-639-6400

Alpha Tuning Diodes DVH6730 Series

Alpha Semiconductor Devices Division
20 Sylvan Road
Woburn, MA 01801
617-935-5150

Loral Tuning Varactors GC1500 Series

Loral
16 Maple Road
Chelmsford, Massachusetts 01824
508-256-8101 or 508-256-4113

* At 1.1 GHz, use a Coilcraft A01T Springair coil at 2.5 nH and a Loral Varactor 3.0 to 8.0 pF at $V_{IN} = 1.0$ to 5.0 V.

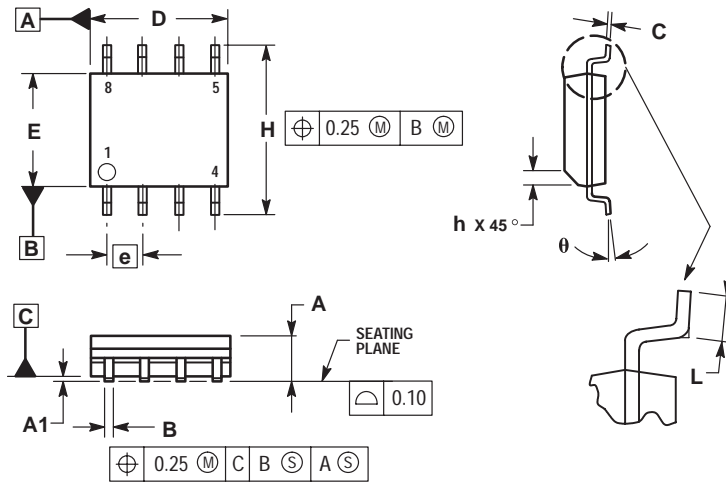
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MC12148

OUTLINE DIMENSIONS

D SUFFIX
PLASTIC PACKAGE
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°

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 2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.
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