

## Advance Information

# 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.

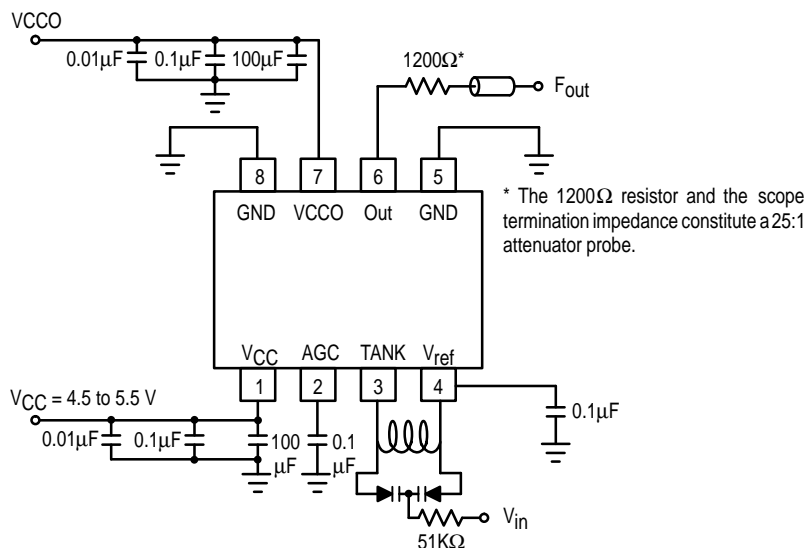
The MC12148 is based on the VCO circuit topology of the MC1648. The MC12148 has been realized utilizing Motorola's MOSAIC III advanced bipolar process technology which results in a design which can operate at a much higher frequency than the MC1648 while utilizing half the current. Please consult with 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 1100MHz
- Low-Power 20mA at 5.0Vdc Power Supply
- 8-Pin SOIC Package
- Phase Noise -90dBc/Hz at 25KHz Typical

**BLOCK DIAGRAM**  
(Typical Test Circuit)



**MC12148**

**LOW-POWER VOLTAGE  
CONTROLLED OSCILLATOR**

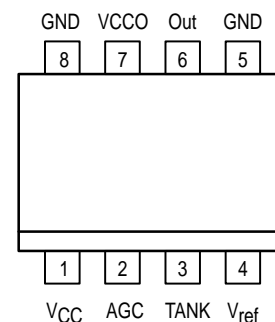


**D SUFFIX**  
SOIC PACKAGE  
CASE 751-05



**SD SUFFIX**  
SSOP PACKAGE  
CASE 940-02

**Pinout: 8-Lead SOIC (Top View)**



This document contains information on a new product. Specifications and information herein are subject to change without notice.



MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Power Supply Voltage, Pin 1	−0.5 to +7.0	Vdc
T <sub>A</sub>	Operating Temperature Range	−40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range	−65 to +150	°C

ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 5.0V; T<sub>A</sub> = −40°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit
I <sub>CC</sub>	Supply Current		19	25	mA
V <sub>OH</sub>	Output Level HIGH (1MΩ Impedance)	3.95	4.17	4.61	V
V <sub>OL</sub>	Output Level LOW (1MΩ Impedance)	3.04	3.41	3.60	V
ℒ(f)	CSR @ 25KHz Offset, 1Hz BW		−90		dBc/Hz
ℒ(f)	CSR @ 1MHz Offset, 1Hz BW		−120		dBc/Hz
SNR	SNR (Signal to Noise Ratio from Carrier)		40		dB
F <sub>sts</sub>	Frequency Stability	Supply Drift	3.6		KHz/mV
F <sub>stt</sub>		Thermal Drift	0.1		KHz/°C
H2	Second Harmonic (from Carrier)		−25		dBc

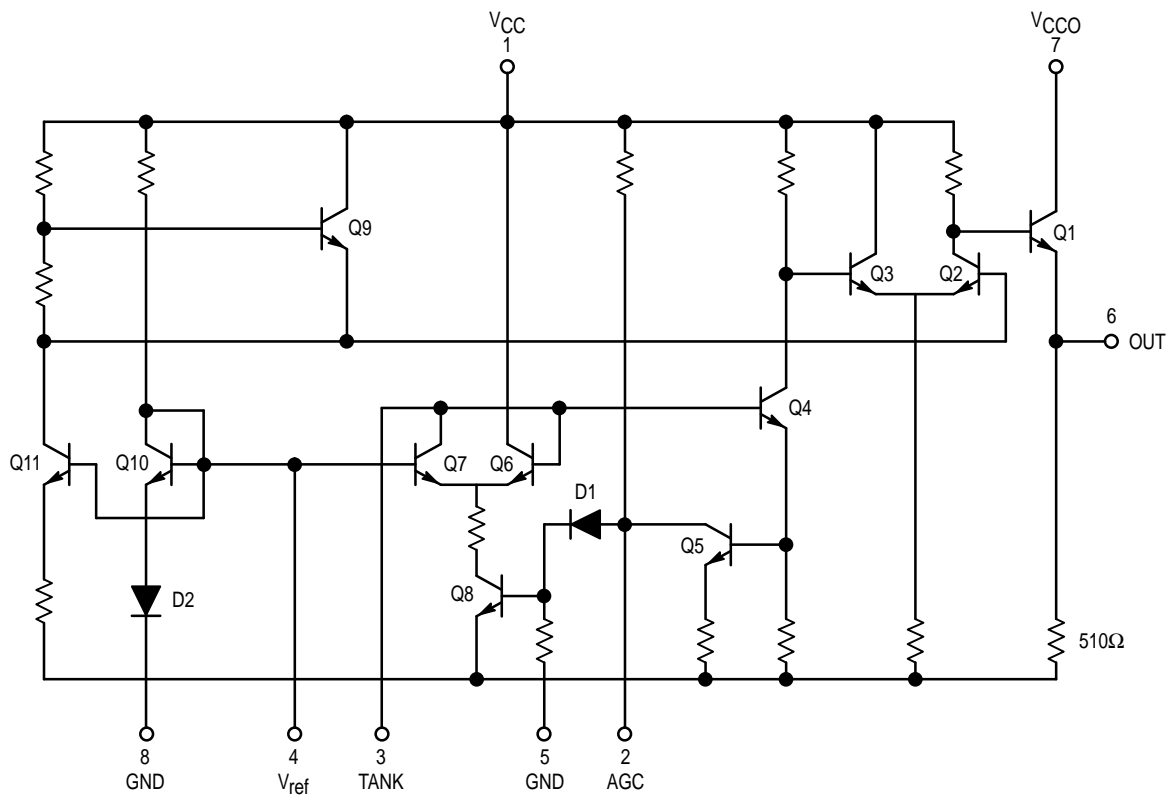
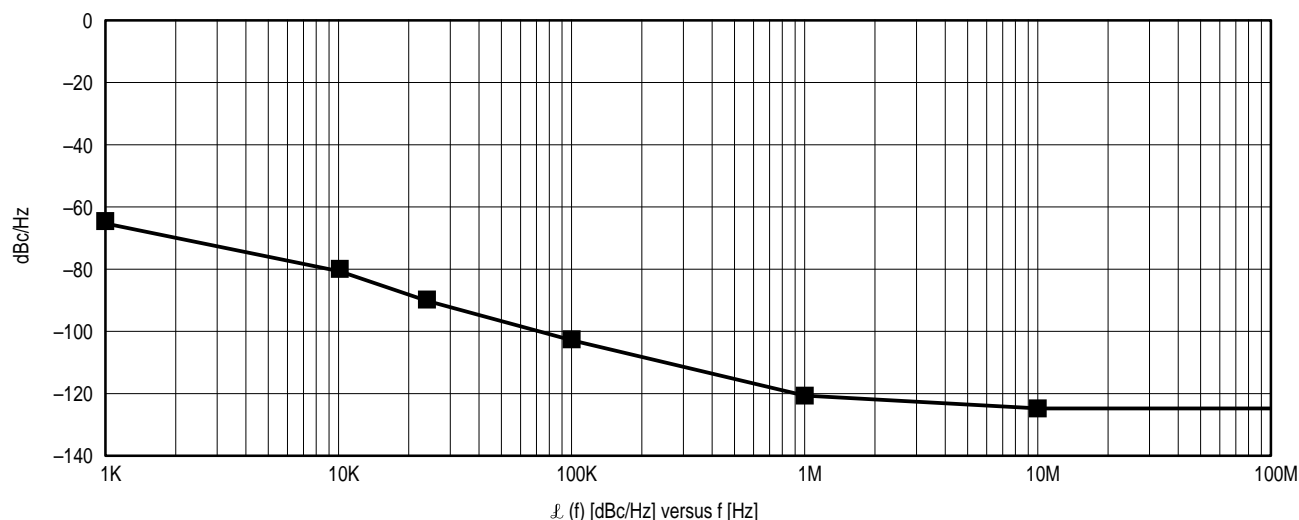


Figure 1. Circuit Schematic



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

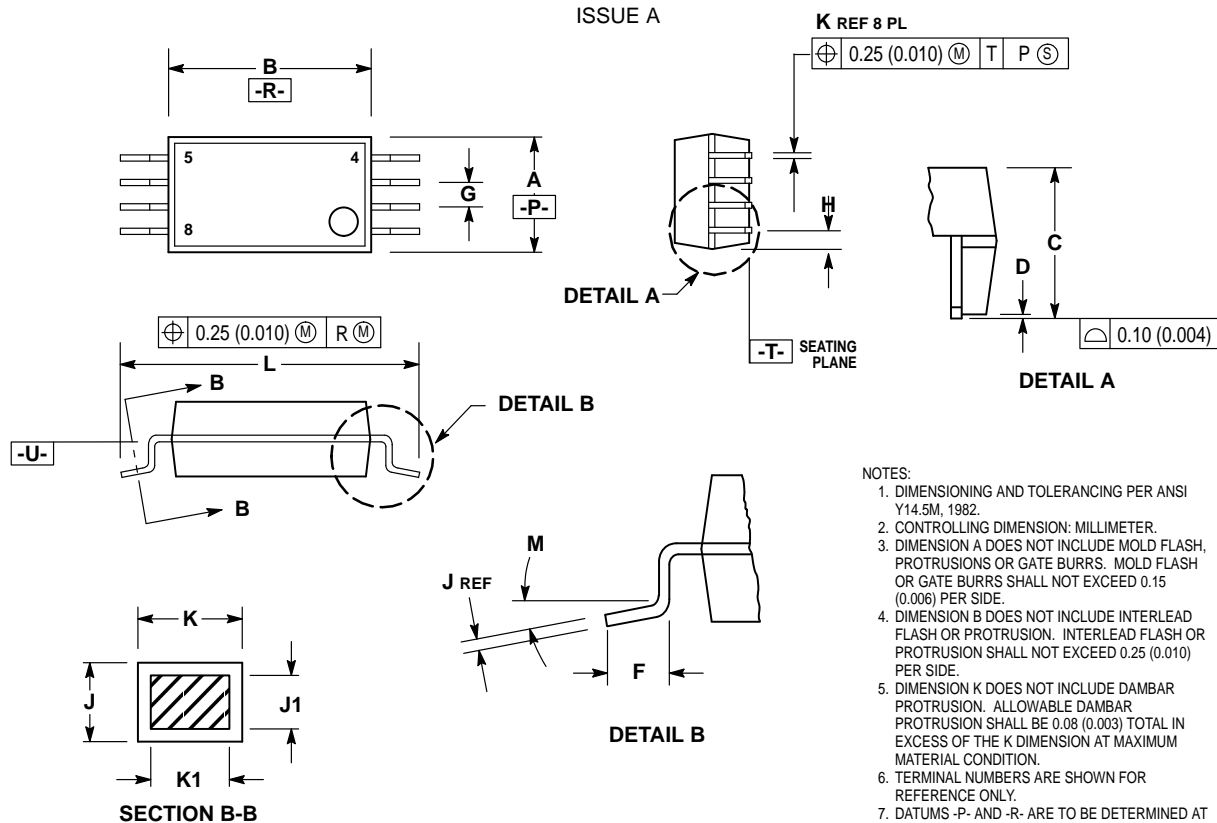
Loral Tuning Varactors GC1500 Series  
Loral  
16 Maple Road  
Chelmsford, Massachusetts 01824  
508-256-8101 or 508-256-4113

Alpha Tuning Diodes DVH6730 Series  
Alpha Semiconductor Devices Division  
20 Sylvan Road  
Woburn, MA 01801  
617-935-5150

\* At 1.1GHz, use a Coilcraft A01T Springair coil at 2.5nH and a Loral Varactor 3–8pF at  $V_{IN} = 1$  to 5V.

## OUTLINE DIMENSIONS

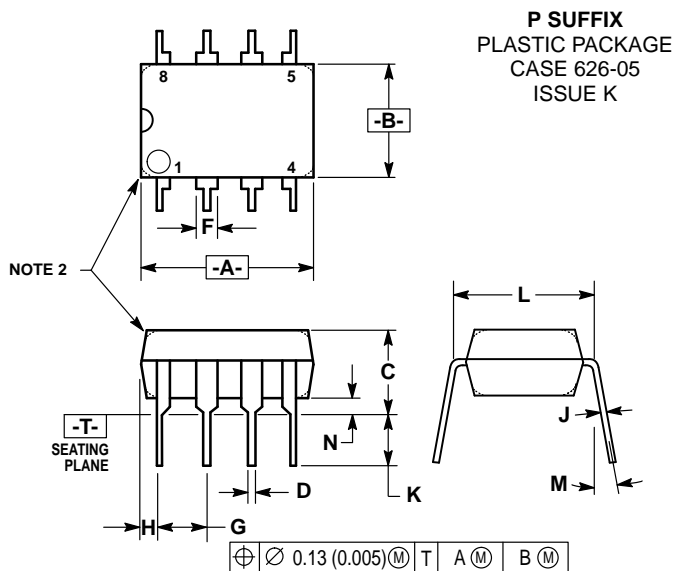
**SD SUFFIX**  
PLASTIC SSOP PACKAGE  
CASE 940-02  
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
  5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
  6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  7. DATUMS -P- AND -R- ARE TO BE DETERMINED AT DATUM PLANE -U-.
  8. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -U-.
  9. CROSS SECTION B-B TO BE DETERMINED AT 0.10 (0.004) TO 0.25 (0.010) FROM THE LEADTIP.

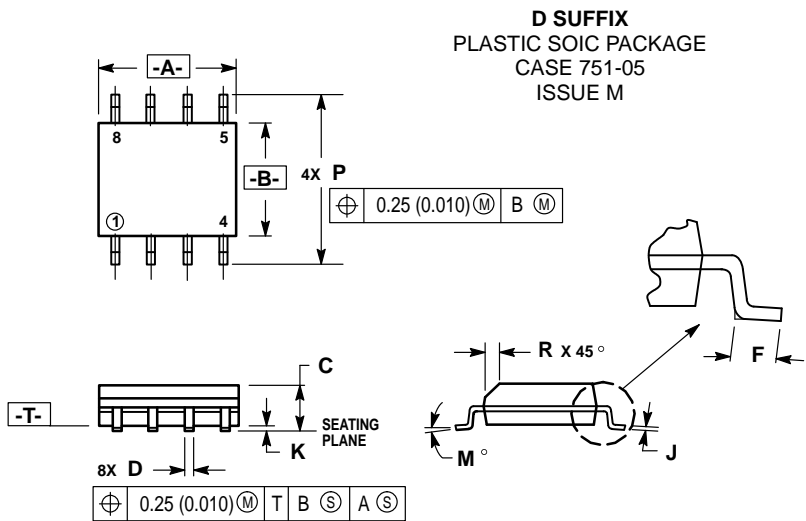
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.87	3.13	0.113	0.123
B	5.20	5.38	0.205	0.212
C	1.73	1.99	0.068	0.078
D	0.05	0.21	0.002	0.008
F	0.55	0.95	0.022	0.037
G	0.65 BSC		0.026 BSC	
H	0.50	—	0.020	—
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.22	0.38	0.009	0.015
K1	0.22	0.33	0.009	0.013
L	7.65	7.90	0.301	0.311
M	0°	8°	0°	8°

OUTLINE DIMENSIONS




- NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
  3. 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	1.78	0.040	0.070
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	0.76	1.01	0.030	0.040



- NOTES:
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  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

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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