MOTOROLA

SN74LS724

VOLTAGE-CONTROLLED OSCILLATOR

LOW POWER SCHOTTKY

VOLTAGE CONTROLLED OSCILLATOR

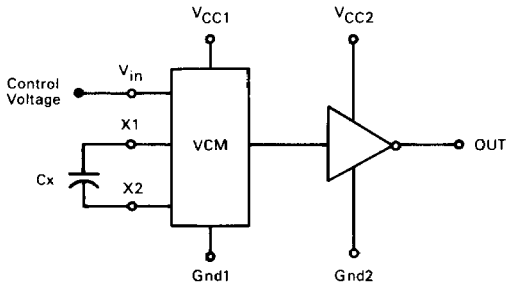
DESCRIPTION — The SN74LS724 is a low power Voltage Controlled Oscillator. With an external capacitor connected across Pins 1 and 8, the output frequency can be varied over a 3.5 to 1 range by adjusting the control voltage input (V_{in}) from 1.0 to 5.0 volts.

The LS724 is ideal for video game and microcomputer applications. It can be used to generate sound IF, a colorburst reference, and/or a microprocessor clock. Also, the output rise and fall times are slow compared to standard LS logic so the generation of electromagnetic interference is reduced.

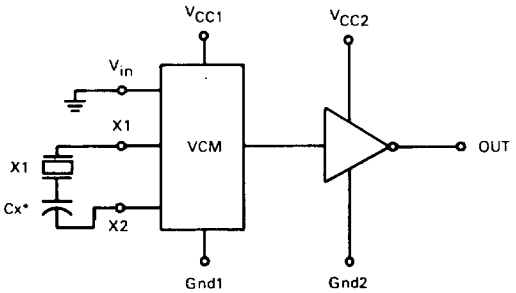
FEATURES:

- **CAN BE USED AS A VOLTAGE CONTROLLED OR CRYSTAL CONTROLLED OSCILLATOR**
- **8-PIN DIP REQUIRES MINIMAL PC BOARD SPACE**
- **REDUCED RISE AND FALL TIMES FOR LESS EMI**
- **LOW POWER — 45 mW MAX**

VOLTAGE CONTROLLED MULTIVIBRATOR



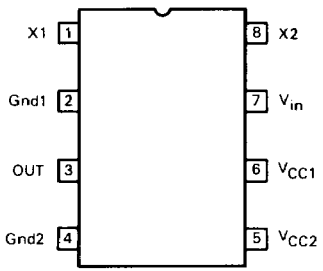
CRYSTAL OSCILLATOR



*Cx is optional

(Cx may be necessary to trim oscillator frequency or improve performance.)

CONNECTION DIAGRAM DIP
(TOP VIEW)



Case 626-04 (Plastic)
Case 693-02 (Ceramic)

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GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
I_{OH}	Output Current — High			-0.4	mA
I_{OL}	Output Current — Low			4.0	mA

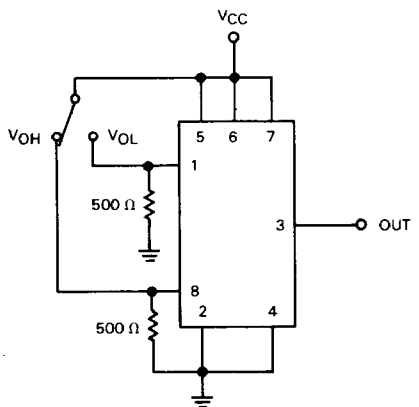
DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER	LIMITS			CONDITIONS
		MIN	MAX	UNITS	
V_{OH}	Output HIGH Voltage	2.7		V	I_{OH} = -0.4 mA, V_{CC} = MIN
V_{OL}	Output LOW Voltage		0.5	V	I_{OL} = 4.0 mA, V_{CC} = MIN
I_{IN}	Input HIGH Current		100	μA	V_{IN} = 5.0 V, V_{CC} = MAX
I_{OS}	Short Circuit Current	-8.0	-25	mA	V_O = 0 V, V_{CC} = MAX
I_{CC}	Supply Current		8.5	mA	V_{CC} = MAX

AC CHARACTERISTICS: V_{CC} = 5.0 V, T_A = 25°C, C_L = 15 pF

SYMBOL	TEST	CONDITIONS	VALUE			UNITS
			MIN	TYP	MAX	
f_{max}*	Maximum Operating Frequency	Cx = 10 pF, V_{IN} = 5.0 Vdc V_{CC} = 5.0 Vdc Load = 15 pF	11	16		MHz
f_{HIGH} f_{LOW}	Ratio of Frequency of Oscillation Over Specified Input Voltage Range	Cx = 100 pF V_{IN} HIGH = 5.0 Vdc V_{IN} LOW = 1.0 Vdc	3.5 to 1.0	4.0 to 1.0		—

*Due to the low power nature of this device, some degradation of output swing can be expected as output frequency exceeds 9.0 MHz. With V_{CC} = 5.0 V, the guaranteed V_{OH} level drops from 2.7 volts at 9.0 MHz to 2.0 volts at 16 MHz.



For dc test purposes the LS724 output can be forced into a HIGH (V_{OH}) or LOW (V_{OL}) logic state as shown.

APPLICATIONS INFORMATION

In order to improve frequency stability, separate V_{CC} and ground pins are provided to allow the oscillator to be isolated from the logic power supply. However, both ground lines must be connected externally to ensure proper operation. It is also recommended that the oscillator V_{CC} be bypassed with a good RF type capacitor of 500 to 1000 pF.

When used as a voltage controlled oscillator, the center frequency can be approximated by:

$$f_c\,(\text{MHz}) \simeq \frac{130}{Cx\,(\text{pF})} : V_{in} \simeq 4.25\ \text{V}$$

The relationship between control input voltage, external capacitance and output frequency can be found in Figure 1 which is valid for values of capacitance in excess of 100 pF. For values of capacitance less than 100 pF, Figure 2 should be used.

FREQUENCY STABILITY

Oscillator output frequency is somewhat dependent on temperature and power supply voltage. Typical frequency variation at V_{in} = 5.0 V is approximately ±10% over the V_{CC} range and approximately ±7% over the 0°C to 70°C temperature range. As with any oscillator, internal noise will also cause the output frequency to drift slightly.

FIGURE 1 — FREQUENCY CAPACITANCE PRODUCT

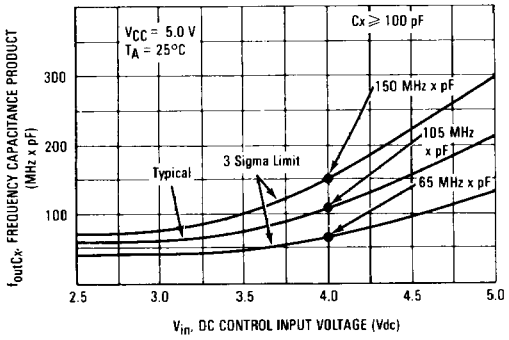
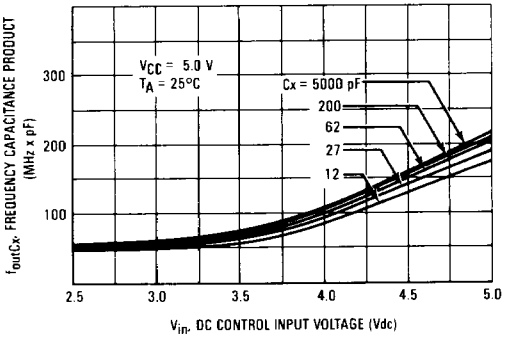


FIGURE 2 — FREQUENCY CAPACITANCE PRODUCT TYPICAL CURVES



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