**IC WORKS**

W42C26
CPU Frequency Generator

FEATURES

- Small 14 pin SOIC/DIP package
- Supports 3.3V and 5V operation and Pentium™ processor
- Up to three output clocks available
- W42C26-01 provides:
    Selectable CPU clock
    14.3 MHz system clock
    7.2 MHz keyboard clock
- /STOPCPU input pin instantly starts and stops CPU clock glitch free
- /SLOWCPU input pin smoothly slows CPU clock to 8 MHz
- Customizable with single metal layer change
- Up to 16 selectable frequencies
- Smooth, glitch-free frequency transition
- TTL or CMOS input level compatible
- Integral loop filter components
- High performance, low power CMOS

FUNCTIONAL DESCRIPTION

The W42C26 provides a low cost solution for generating up to three simultaneous clock frequencies. It is ideal for CPU motherboard or portable applications.

The W42C26 incorporates an improved crystal oscillator circuit that provides excellent REFCLK duty cycle, jitter characteristics and frequency accuracy. On chip PLL loop filter components ensure excellent CPU clock stability, even with the noise typical of a digital system. Device functionality, including input/output options and frequency selection, is determined by a single metal mask that allows quick-turn customization capability. Both 3.3 volt and 5 volt VCC operation is supported. Smooth frequency transitions are provided between selected output frequencies.

The standard W42C26-01 and W42C26-14 options are designed for x86 based motherboards. They include CPU clock slow and stop functions for green PC implementation. The W42C26-16 is designed for NexGen based systems. The W42C26-15 is a general purpose clock device.
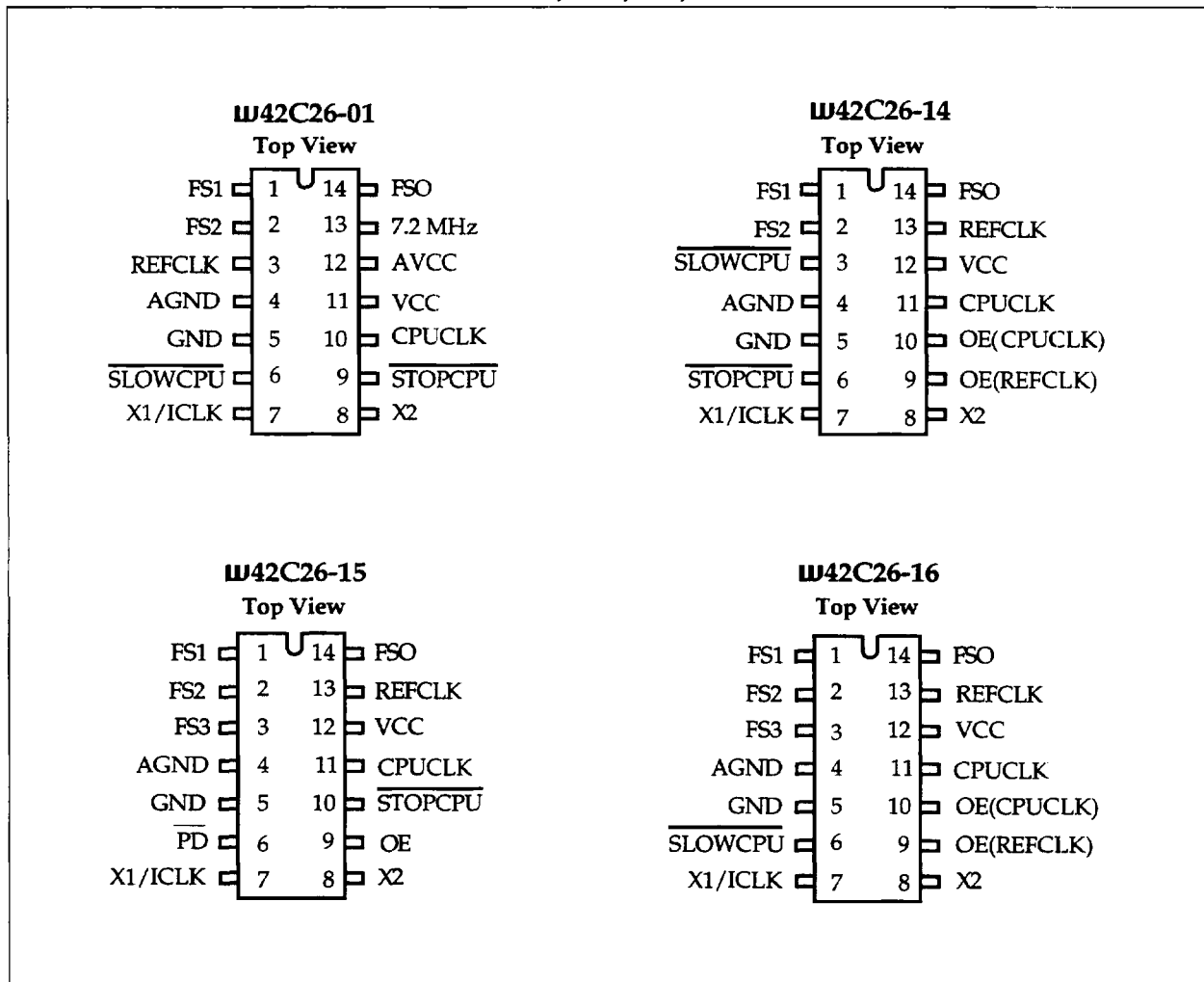
FUNCTIONAL BLOCK DIAGRAM: W42C26-01
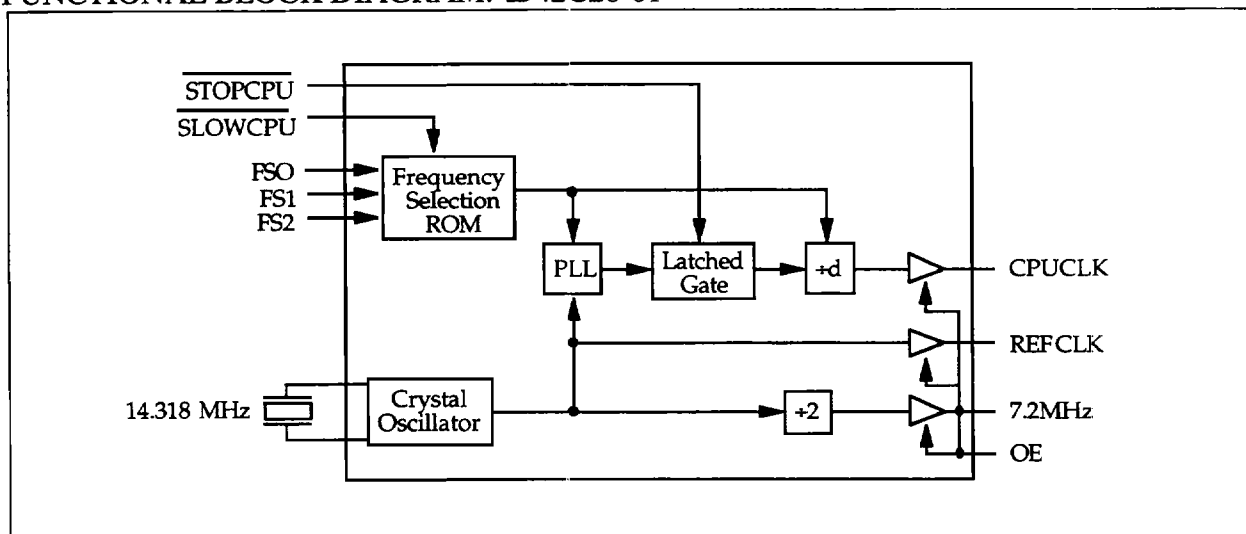
IMPROVED CRYSTAL OSCILLATOR CIRCUIT

The ω42C26 incorporates a crystal oscillator circuit designed to provide 50% duty cycle over a range of operating conditions including the addition of external crystal load capacitors to pins X1 and X2. (Crystal load capacitance is sometimes increased to match a particular crystal load requirement when absolute frequency accuracy is important.) Duty cycle is also maintained when using an external clock source (connected to pin X1, pin X2 is left open), as long as the external clock has good duty cycle.

Crystal load capacitance of the ω42C26 is about 12pf, which is becoming an industry standard. This helps to control frequency accuracy, assuming that a crystal which specifies a 12pf load condition is used. The circuit exhibits about 50% less clock jitter from the REFCLK output when compared to similar devices.

PIN CONFIGURATIONS: ω42C26-01, −14, -15, and −16

ω42C26-01
Top View

FS1	1	14	FSO
FS2	2	13	7.2 MHz
REFCLK	3	12	AVCC
AGND	4	11	VCC
GND	5	10	CPUCLK
SLOWCPU	6	9	STOPCPU
X1/ICLK	7	8	X2

ω42C26-14
Top View

FS1	1	14	FSO
FS2	2	13	REFCLK
SLOWCPU	3	12	VCC
AGND	4	11	CPUCLK
GND	5	10	OE(CPUCLK)
STOPCPU	6	9	OE(REFCLK)
X1/ICLK	7	8	X2

ω42C26-15
Top View

FS1	1	14	FSO
FS2	2	13	REFCLK
FS3	3	12	VCC
AGND	4	11	CPUCLK
GND	5	10	STOPCPU
PD	6	9	OE
X1/ICLK	7	8	X2

ω42C26-16
Top View

FS1	1	14	FSO
FS2	2	13	REFCLK
FS3	3	12	VCC
AGND	4	11	CPUCLK
GND	5	10	OE(CPUCLK)
SLOWCPU	6	9	OE(REFCLK)
X1/ICLK	7	8	X2

FREQUENCY SELECTION FOR W42C26 (using 14.318 MHz input)

Select Address	-01	-14	-15	-16
FS3-FS0	CPUOUT (MHz)	CPUOUT (MHz)	CPUOUT (MHz)	CPUOUT (MHz)
0	25	25	14.318	30
1	66.6	33.3	14.75	31
2	60	40	15.288	33.3
3	50	50	17.496	34.5
4	80	66.6	19.0	35
5	40	60	19.5	35.5
6	33.3	80	21.0	36
7	75	50	22.0	37.5
8	-	-	24.0	38.5
9	-	-	40.0	40
A	-	-	41.0	42
B	-	-	42.0	43.5
C	-	-	43.0	45
D	-	-	44.0	46.5
E	-	-	45.0	48.5
F	-	-	46.0	50.0

PIN DESCRIPTIONS: W42C26-01

| Input Selection	Input/ Output	Function
7.2 MHz	O	7.2 MHz output clock for use in keyboard applications (REFCLK ÷ 2)
AGND	-	Analog ground connection
AVCC	-	Analog power supply connection
CPUCLK	O	CPU Clock output (refer to Frequency Selection Table)
FS0	I	Frequency Selection input, LSB (1)
FS1	I	Frequency Selection input (1)
FS2	I	Frequency Selection input, MSB (1)
GND	-	Ground connection
OE(REFCLK)	I	REFCLK Output Enable, puts REFCLK output in high impedance state when low (Note 1)
OE(CPUCLK)	I	CPUCLK Output Enable, puts CPUCLK output in high impedance state when low (Note 1)
REFCLK	O	Reference Clock output, outputs crystal or input clock frequency (14.318 MHz)
$\overline{\text{SLOWCPU}}$	I	Slow CPU input. Slows CPUCLK output to 8 MHz when low (1)
$\overline{\text{STOPCPU}}$	I	Stop CPU input. When /STOPCPU is brought low, CPUCLK stops low (within a few CPUCLK clock cycles) without clock glitches or short output cycles. Likewise, when /STOPCPU is brought high, CPUCLK resumes to the selected frequency (again within a few CPUCLK clocks; the internal VCO is not stopped) without glitches. (1)
VCC	-	Power supply connection
X1/ICLK	I	Crystal connection or external clock frequency input (14.318 MHz)
X2	O	Crystal connection, leave this pin unconnected when using external clock

Note 1: All inputs, except for X1/ICLK, have an internal pull-up resistor. Unconnected inputs will assume a logic high condition.

w42C26 CUSTOMIZATION

Like other IC WORKS clock generator devices, the w42C26 is mask customizable to fit individual needs. Customizable features include frequency selection and various input and output functions. Please contact IC WORKS for further information.

FUNCTIONAL BLOCK DIAGRAM: w42C26 BASE FEATURE SET
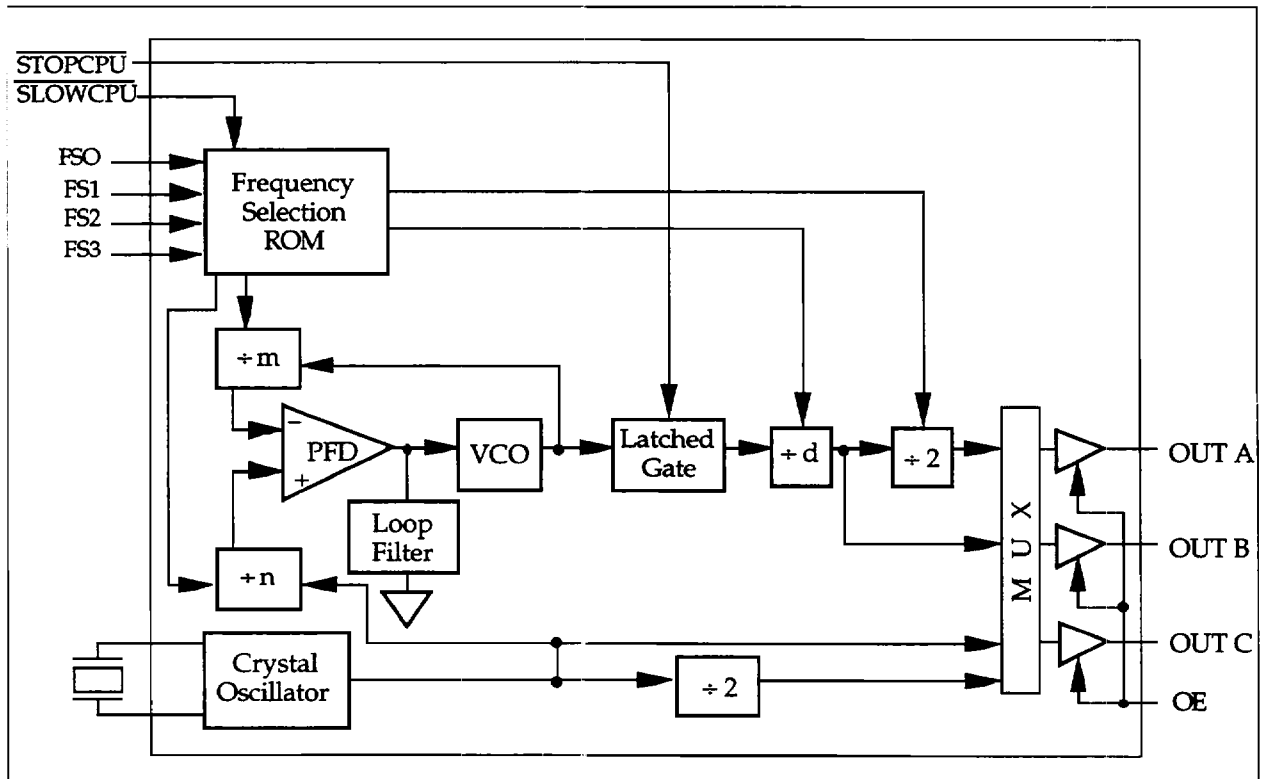
ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Rating	Unit
Voltage on Any Pin with Respect to Ground	V_{CC}, V_{IN}	-0.5 to 7.0	V
Storage Temperature	T_{STG}	-65 to +150	°C
Ambient Temperature Under Bias	T_B	-55 to +125	°C
Operating Temperature	T_A	0 to +70	°C

Note 1: Stresses greater than those listed in this table may cause permanent damage to the device. These represent a stress rating only. Operation of the device at these or any other conditions above those specified in the operating sections of this specification is not implied. Maximum conditions for extended periods may affect reliability.

ELECTRICAL CHARACTERISTICS AT 5.0V

DC ELECTRICAL CHARACTERISTICS ($0°C \leq T_A \leq 70°C$, $V_{CC} = 5 V \pm 10 \%$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current	I_{CC}	Note 2		25	30	mA
Input Low Voltage	V_{IL}	$V_{CC} = 5V$			0.8	V
Input High Voltage	V_{IH}	$V_{CC} = 5V$	2.0			V
Output Low Voltage	V_{OL}	$I_{OL} = 8 mA$			0.4	V
Output High Voltage	V_{OH}	$I_{OH} = -1 mA$	Vcc - .4V			
Output High Voltage	V_{OH}	$I_{OH} = -4 mA$	2.4			V
Input Capacitance	C_I	Except X1, X2			10	pF
Load Capacitance	C_L	Pins X1, X2		12		pF
Input Low Current	I_{IL}	$V_{IN} = 0V$ (incls pull-up resistor)			-100	μA
Input High Current	I_{IH}	$V_{IN} = V_{CC}$			10	μA
Input Pull-Up Resistor	R_P	$V_{IN} = 0V$		250		kΩ

Note 2: ɯ42C26-01 with no load, with 14.318 MHz crystal input, and CPUCLK running at 40 MHz. Power supply current varies with frequency.

AC CHARACTERISTICS ($0°C \leq T_A \leq 70°C$, $V_{CC} = 5V \pm 10 \%$)

Parameter	Symbol	Min	Typ	Max	Unit
Output Frequency	F_O	2		120	MHz
Input Frequency	F_I	2	14.318	32	MHz
Output Rise Time, 0.8 to 2.0V, 25pF Load	T_R		1	2	ns
Output Rise Time, 20 to 80% V_{CC}, 25pF Load	T_R		2	4	ns
Output Fall Time, 2.0 to 0.8V, 25pF Load	T_F		1	2	ns
Fall Time, 80 to 20% V_{CC}, 25pF Load	T_F		2	4	ns
Duty Cycle, 15pF Load	D_T	40	50	60	%
Jitter, 1 Sigma, All Frequencies	T_{J1S}			±150	ps
Jitter, Absolute, All Frequencies	T_{JABS}			±250	ps
Frequency Transition Time, 50 to 4MHz	T_{FT}			20	ms
Power-up Time, Off to 80 MHz	T_{PU}		15	30	ms

ELECTRICAL CHARACTERISTICS AT 3.3V

DC ELECTRICAL CHARACTERISTICS (0°C ≤ T_A ≤ 70°C, V_{CC} = 3.3V ± 10 %) (Note 2)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current	I_{CC}	Note 2		12	20	mA
Input Low Voltage	V_{IL}	V_{CC} = 3.3V			0.15Vcc	V
Input High Voltage	V_{IH}	V_{CC} = 3.3V	0.7Vcc			V
Output Low Voltage	V_{OL}	I_{OL} = 8 mA			0.4	V
Output High Voltage	V_{OH}	I_{OH} = - 4 mA	2.4			V
Input Capacitance	C_I	Except X1, X2			10	pF
Load Capacitance	C_L	Pins X1, X2		12		pF
Input Low Current	I_{IL}	V_{IN} = 0V (incl. pull-up res.)			-100	μA
Input High Current	I_{IH}	V_{IN} = V_{CC}			10	μA
Input Pull-Up Resistor	R_P	V_{IN} = 0V		250		kΩ

Note 2: W42C26-01 with no load, with 14.318 MHz crystal input, and CLK1 running at 40 MHz. Power supply current varies with frequency and output load capacitance.

AC CHARACTERISTICS (0°C ≤ T_A ≤ 70°C, V_{CC} = 3.3V ± 10 %)

Parameter	Symbol	Min	Typ	Max	Unit
Output Frequency (CPUCLK)	F_O	2		80	MHz
Input Frequency	F_I	2	14.318	32	MHz
Rise Time, 20 to 80% VCC, 15pF load	T_R		2	4	ns
Fall Time, 80 to 20% VCC, 15pF Load	T_F		2	4	ns
Duty Cycle, 15pF Load	D_T	40	50/50	60	%
Jitter, 1 Sigma, All Frequencies	T_{J1S}			±150	ps
Jitter, Absolute, All Frequencies	T_{JABS}			±250	ps
Frequency Transition Time, 50 to 4 MHz	T_{FT}			20	ms
Power-up Time, Off to 80 MHz	T_{PU}		15	30	ms

RECOMMENDED CIRCUIT CONFIGURATION

Pin	Left	Right	Pin
1	FS1	FS0	14
2	FS2	7.2 MHz	13
3	REFCLK	AVCC	12
4	AGND	VCC	11
5	GND	CPUCLK	10
6	SLOWCPU	STOPCPU	9
7	X1/ICLK	X2	8

VCC — Optional Ferrite Bead — 0.1 μF — 2.2 μF
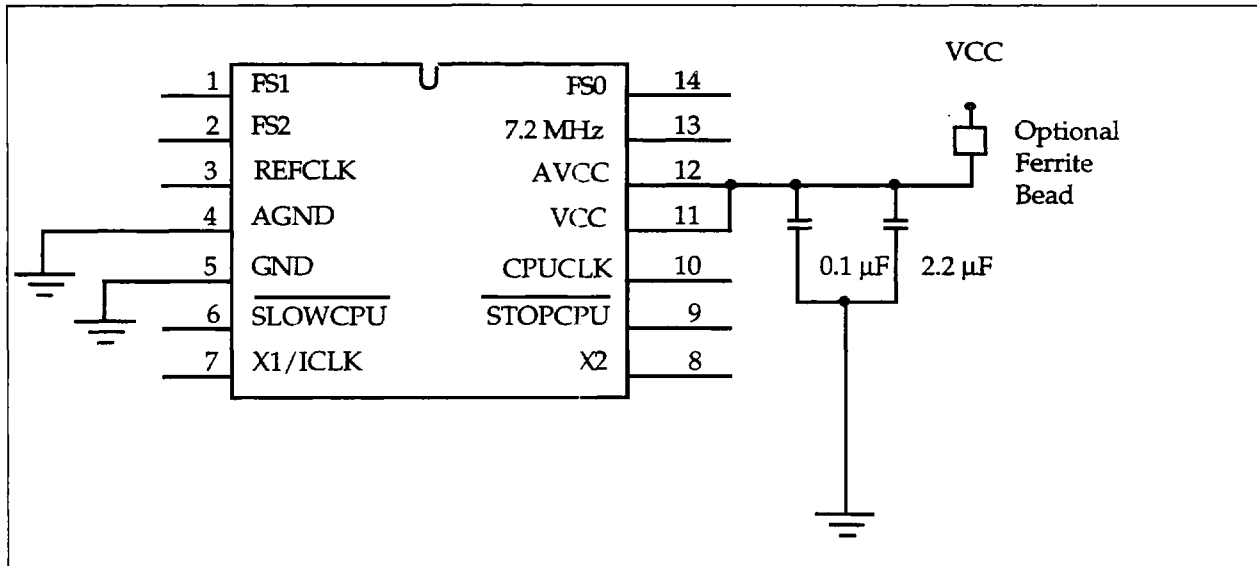
RECOMMENDED BOARD LAYOUT: ɯ42C26

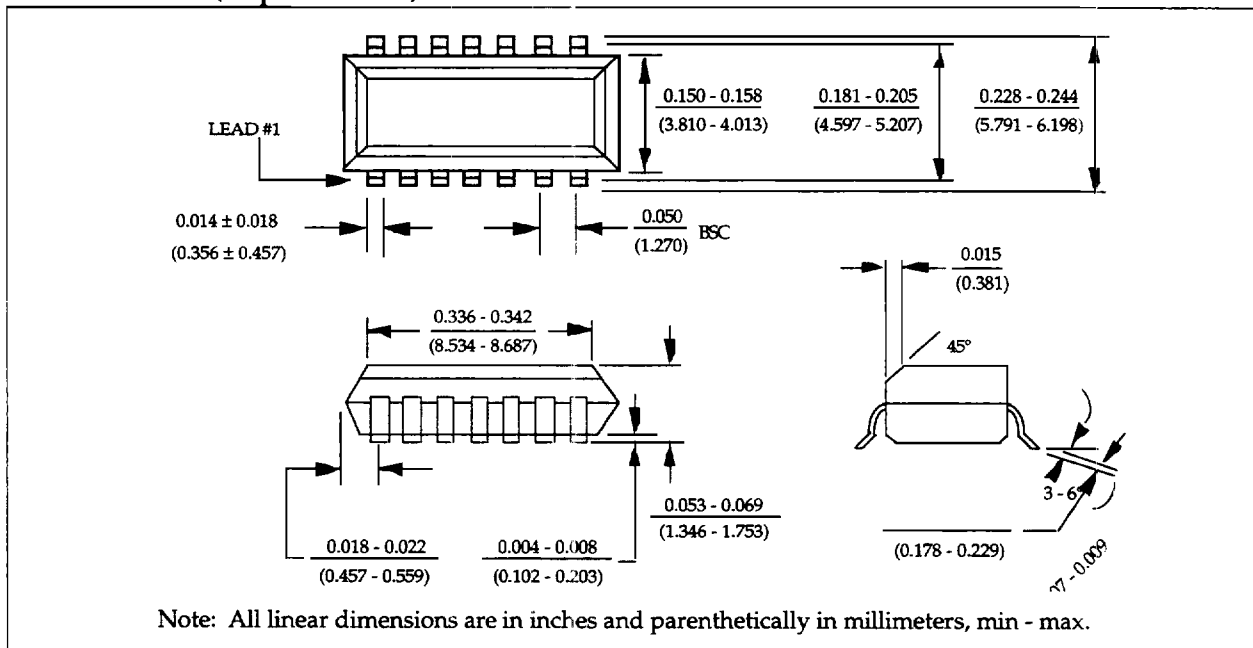For optimum performance in system applications, the above power supply decoupling scheme should be used. Both GND pins are connected directly to the power plane.

VCC decoupling is important to reduce phase jitter and EMI radiation. The 0.1μF decoupling capacitor should be placed as close to the VCC pins as possible, otherwise the increased trace inductance will negate its decoupling capability. The 2.2μF decoupling capacitor shown is optional but will improve power supply rejection. For further EMI protection, the VCC connection can be made via a ferrite bead, as shown above. When using the ɯ42C26, unused input select pins may be tied to either ground or VCC, or may be left unconnected; since internal pull-up resistors are incorporated on all logic input pins, an unconnected input will assume a logic 1 condition. Output clocks should use a series termination resistor (about 33 ohms) placed as close to the clock outputs as possible; this will also help to decrease jitter, EMI and clock signal ringing.
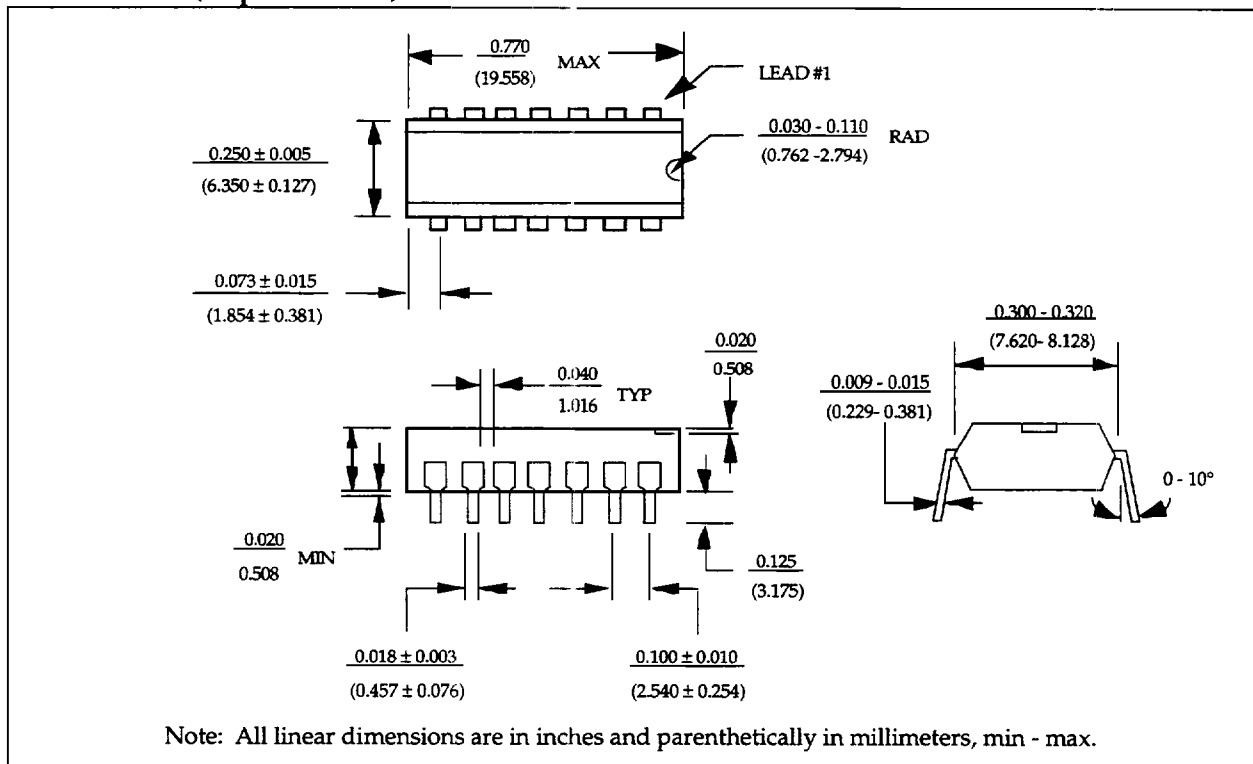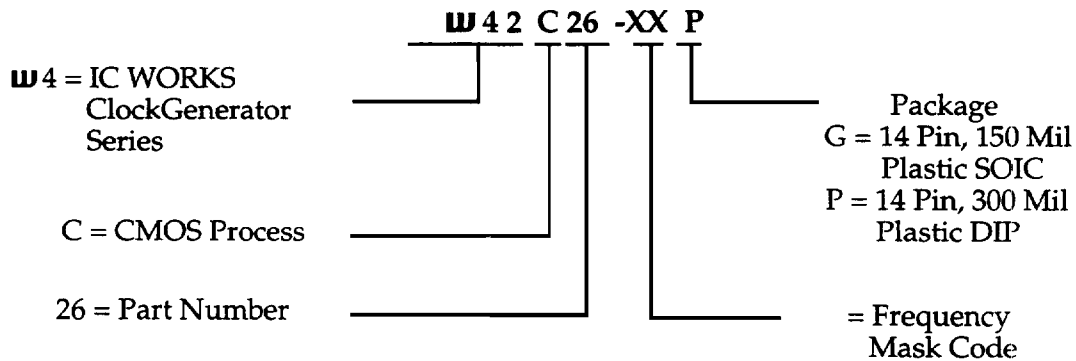
PACKAGING INFORMATION

Plastic SOIC (14 pin 150 mil)

Note: All linear dimensions are in inches and parenthetically in millimeters, min - max.

Plastic DIP (14 pin 300 mil)

Note: All linear dimensions are in inches and parenthetically in millimeters, min - max.

ORDERING INFORMATION

W 4 2   C 26   -XX   P

W4 = IC WORKS
        ClockGenerator
        Series

C = CMOS Process

26 = Part Number

Package
G = 14 Pin, 150 Mil
       Plastic SOIC
P = 14 Pin, 300 Mil
       Plastic DIP

= Frequency
   Mask Code

VALID PART NUMBERS

W42C26-01G	W42C26-14G	W42C26-15G	W42C26-16G
W42C26-01P	W42C26-14P	W42C26-15P	W42C26-16P

IC WORKS