



**Integrated
Circuit
Systems, Inc.**

ICS2628

Advance Information

3 Volt Motherboard Frequency Generator

T-50-23

Features

- Operates from a single 3V to 5V supply
- Two standard parts, ICS2628-022 and ICS2628-034
- Four independent clock generators
- Each clock can be individually powered down
- Six output clocks
- On-chip loop filter components
- Can generate clocks up to 80 MHz
- 14.318 MHz oscillator circuitry
- 20 pin DIP or SOIC package
- Single chip for 16, 20 and 25 MHz 286 and 386 CPUs

Description

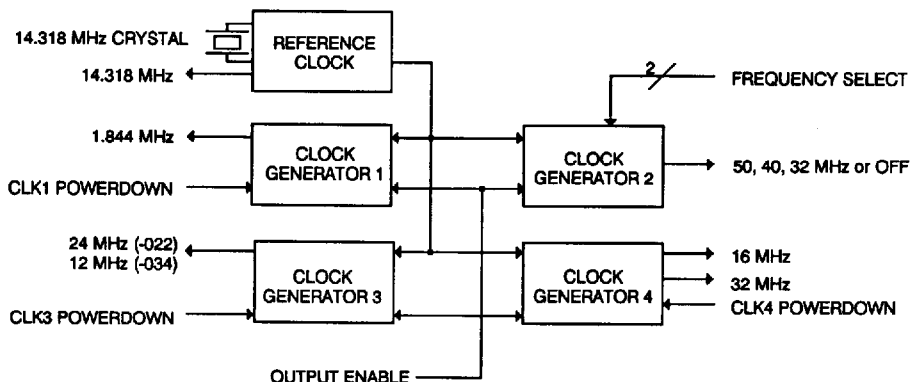
The 3 volt capability of the ICS2628 is designed to generate clocks for portable computer motherboards, including notebooks and handheld computers. The only external components required are an input crystal and decoupling capacitors. High performance applications may also require high speed clock termination components. The chip includes four independent clock generators plus the reference crystal oscillator clock to produce all necessary system frequencies, including master clock, CPU clock, keyboard clock, floppy disk controller clock, serial communications clock and bus clocks. Different frequencies on the CPUCLK can be selected using the frequency select pins. All clocks have a powerdown mode, which is accomplished from a hardware pin. When powered down, all outputs stop in a low condition. When all four clocks are powered down, the 14.318 MHz reference clock also shuts off.

Applications

Laptop/Notebook Computers: The 3 volt ICS2628 is the ideal solution for generating clocks in portables. The user can save power and board space by using this single part instead of oscillators. The ICS2628 further reduces the current consumption by having the ability to completely shut down the individual clocks when not in use. Standard parts with powerdown for portable computers include the ICS2628-022 and ICS2628-034.

The frequencies and powerdown options in the ICS2628 are mask programmable. Customer specific masks can be made. ICS also offers standard versions such as those described in this data sheet.

Block Diagram



ADVANCE INFORMATION documents contain information on new products in the sampling or preproduction phase of development. Characteristic data and other specifications are subject to change without notice.



ICS2628

Decoding Table for CPU Clock

SCLK21 Pin 19	SCLK20 Pin 20	CPUCLK (MHz) Pin 17
0	0	OFF
0	1	32
1	0	40
1	1	50

1.84MHz	1	20	SCLK20	1.84MHz	1	20	SCLK20
X2	2	19	SCLK21	X2	2	19	SCLK21
X1	3	18	PDCLK1*	X1	3	18	PDCLK1*
VDD	4	17	CPUCLK	VDD	4	17	CPUCLK
VSS	5	16	VDD	VSS	5	16	VDD
24 MHz	6	15	VSS	12 MHz	6	15	VSS
16 MHz	7	14	REFCLK	16 MHz	7	14	REFCLK
32 MHz	8	13	AVDD	32 MHz	8	13	AVDD
AVSS	9	12	FDCLK4*	AVSS	9	12	FDCLK4*
OE	10	11	PDCLK3*	OE	10	11	PDCLK3*

ICS2628-022

ICS2628-034

Pin Descriptions

PIN NUMBER	PIN NAME	PIN TYPE	DESCRIPTION
1	1.84 MHz	Output	1.84 MHz clock output
2	X2	Output	CRYSTAL connection
3	X1	Input	CRYSTAL connection
4	VDD	--	DIGITAL POWER SUPPLY
5	VSS	--	DIGITAL GROUND
6	12 MHz or 24 MHz	Output	24 MHz (ICS2628-022) or 12 MHz (ICS2628-034) clock output
7	16 MHz	Output	16 MHz clock output
8	32 MHz	Output	32 MHz clock output
9	AVSS	--	ANALOG GROUND
10	OE	Input	OUTPUT ENABLE. Tristates all output clocks when low
11	PDCLK3*	Input	Powers down 24 (-24) or 12 MHz (-12) clock on pin#6 when low
12	FDCLK4*	Input	Powers down 16 and 32 MHz clocks on pin#7 and #8 when low
13	AVDD	--	ANALOG POWER SUPPLY
14	REFCLK	Output	14.318 MHz REFERENCE CLOCK output
15	VSS	--	DIGITAL GROUND
16	VDD	--	DIGITAL POWER SUPPLY
17	CPUCLK	Output	CPU CLOCK output (see decoding table)
18	PDCLK1*	Input	Powers down 1.84 MHz clock when low
19	SCLK21	Input	CPU CLOCK2 frequency SELECT 1
20	SCLK20	Input	CPU CLOCK2 frequency SELECT 0



ICS2628

Absolute Maximum Ratings

Ambient Temperature under bias	0 °C to 70 °C
Storage temperature	-40 °C to 150 °C
Voltage on I/O pins referenced to GND	-0.5 to 7.0 Volts

Standard Test Conditions

The characteristics below apply for the following standard test conditions, unless otherwise noted. All voltages are referenced to GND. Positive current flows into the referenced pin.

Operating Temperature range	0 °C to 70 °C
Power supply voltage	3.0 to 5.25 Volts

Note: Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

Electrical Characteristics

(V_{DD} = +2.7V to +3.7V, T_A = 0 °C to 70 °C unless otherwise stated)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
DC CHARACTERISTICS						
V _{IL}	Input Low Voltage			0.2V _{DD}	V	V _{DD} = 3.3V
V _{IH}	Input High Voltage	0.7V _{DD}			V	V _{DD} = 3.3V
I _{IL}	Input Low Current			-2	μA	V _{IN} = 0V
I _{IH}	Input High Current			2	μA	V _{IN} = V _{DD}
V _{OL}	Output Low Voltage			0.1	V	I _{OL} = 1mA
V _{OH}	Output High Voltage	V _{DD} -1V			V	I _{OH} = -1mA, V _{DD} = 3.3V
I _{OC}	Supply Current		16	20	mA	¹ No load, ICS2628-022 V _{DD} = 3.3V
F _D	Output Frequency Change over Supply and Temperature		0.005	0.05	%	With respect to typical frequency
I _{SC}	Short circuit current		15		mA	Each output clock
I _{DDSTDBY}	Standby Supply Current		20	25	μA	All clocks off 3.3V
AC CHARACTERISTICS						
t _{Cr}	Input Clock Rise Time			20	ns	
t _f	Input Clock Fall time			20	ns	
t _r	Rise time (.2V _{DD} to .8V _{DD})			4	ns	15 pf load
t _f	Fall time (.8V _{DD} to .2V _{DD})			4	ns	15 pf load
d _t	Duty cycle	43/57	48/52	57/43	%	15 pf load
d _t	Duty cycle, reference clocks	40/60	43/57	60/40	%	
f _i	Input Frequency	5	14.318	20	MHz	
t _{pu}	Power up time		5		ms	From off to 50 MHz

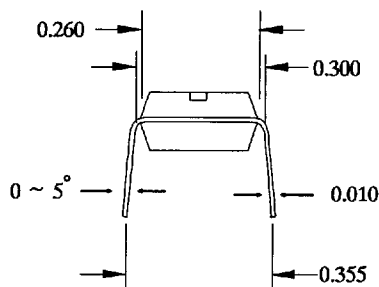
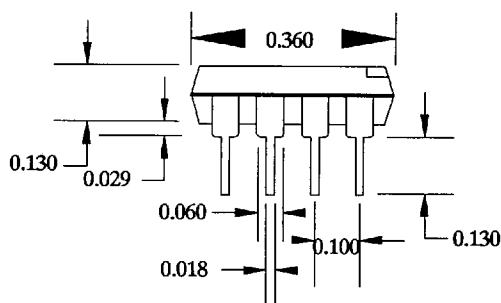
Notes:

1. CPU clock on ICS2628-022 running at 50 MHz. Power supply current can change substantially with different mask configurations. Consult ICS for questions no supply current for your application.

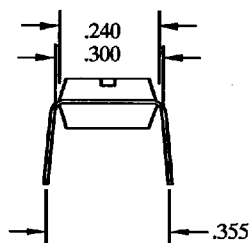
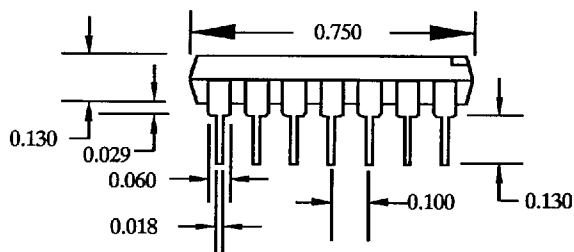


T-90-20

DIP Packages



8 Pin DIP Package



14 Pin DIP Package

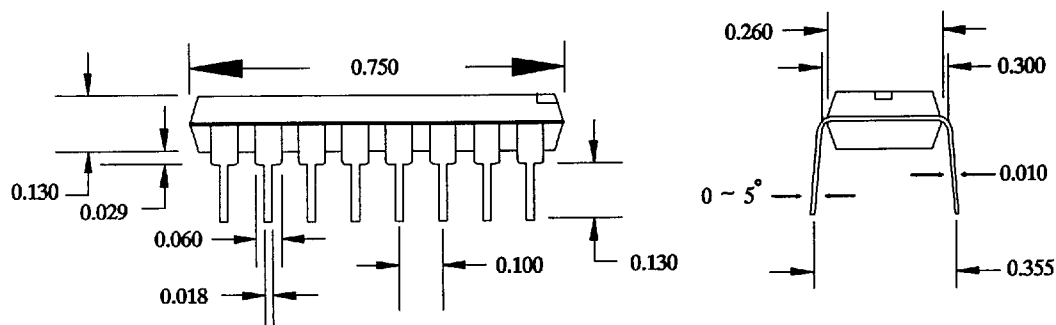
Ordering Information:

All ICS devices in DIP packages carry an "N" designation. See individual data sheets for more specific information.

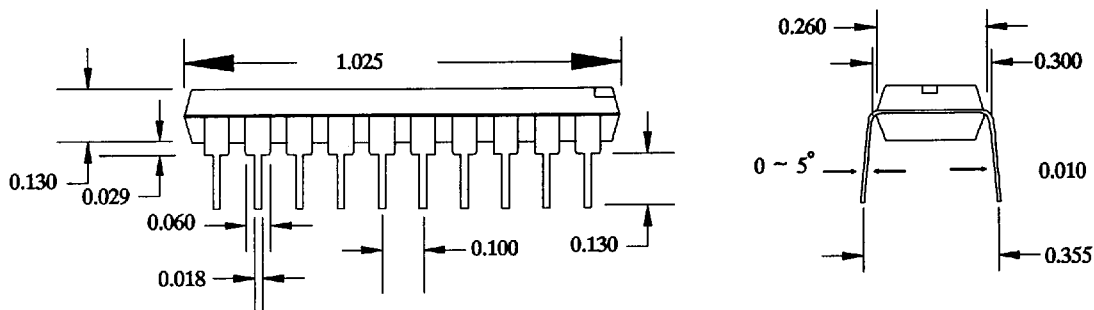
Example: ICSXXXXN



DIP Packages



16 Pin DIP Package



20 Pin DIP Package

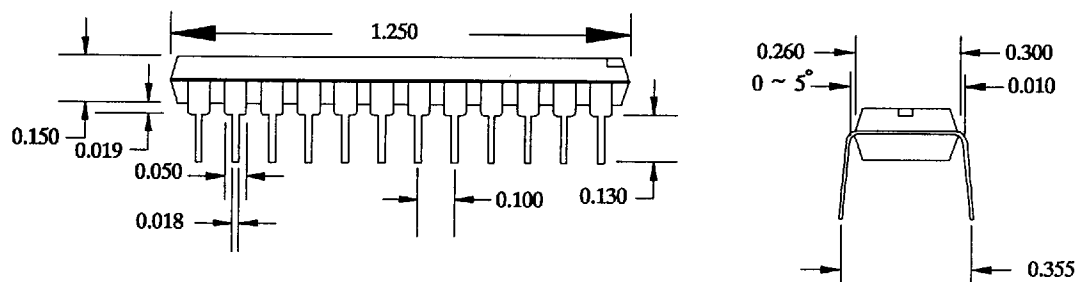
Ordering Information:

All ICS devices in DIP packages carry an "N" designation. See individual data sheets for more specific information.

Example: ICSXXXXN



DIP Packages



24 Pin DIP Package

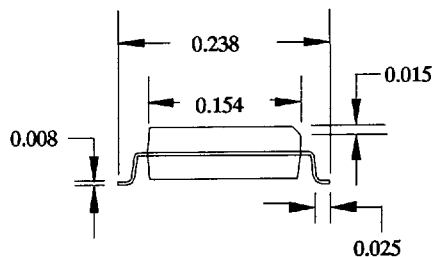
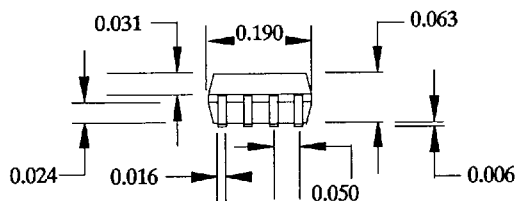
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All ICS devices in DIP packages carry an "N" designation. See individual data sheets for more specific information.

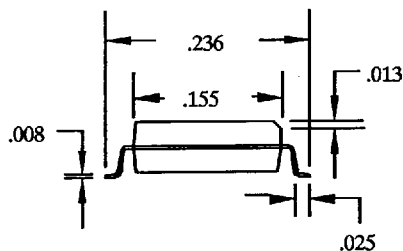
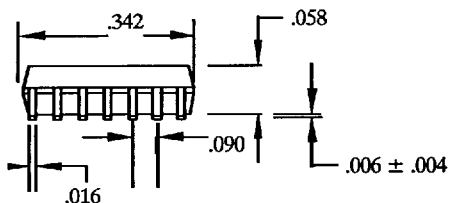
Example: ICSXXXXN



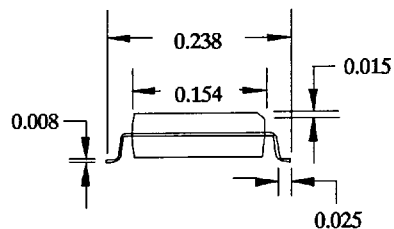
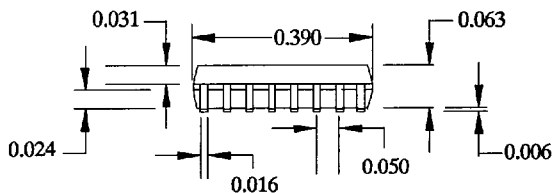
SO Packages



8 Pin SO Package



14 Pin SO Package



16 Pin SO Package

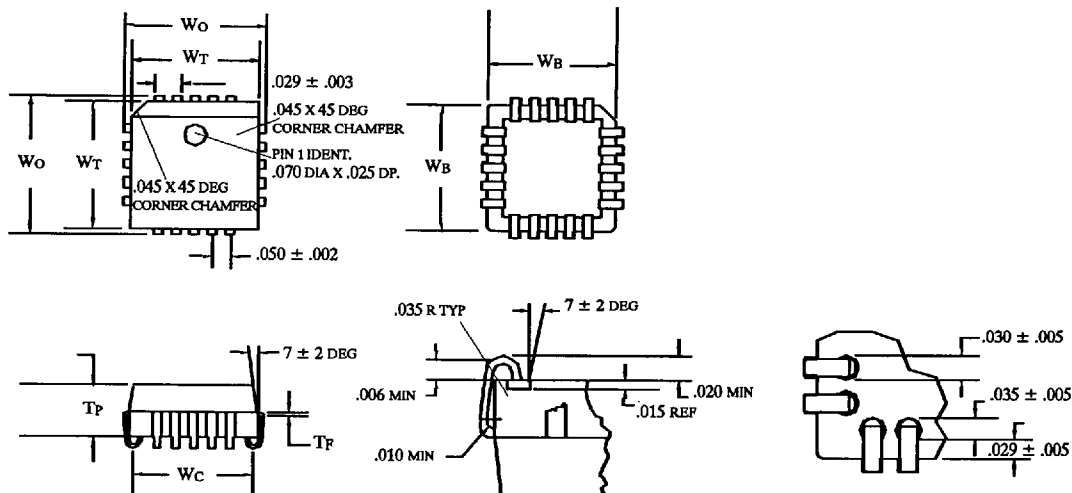
Ordering Information:

All ICS devices in SO packages carry an "M" designation. See individual data sheets for more specific information.

Example: ICSXXXXM



PLCC Packages



LEAD COUNT	FRAME THICKNESS T_F +/- .0003	PKG. THICKNESS T_P +/- .004	PKG. WIDTH TOP W_T +/- .004	PKG. WIDTH BOTTOM W_B +/- .066	OVERALL PKG. WIDTH W_o +/- .005	CONTACT WIDTH W_o + .010/- .030
20L	0.010	0.152	0.350	0.323	0.390	0.320
28L	0.010	0.152	0.450	0.423	0.490	0.420
44L	0.010	0.152	0.650	0.623	0.690	0.620
52L	0.010	0.152	0.750	0.723	0.790	0.720
68L	0.008	0.150	0.950	0.923	0.990	0.920
84L	0.008	0.150	1.160	1.123	1.190	1.120

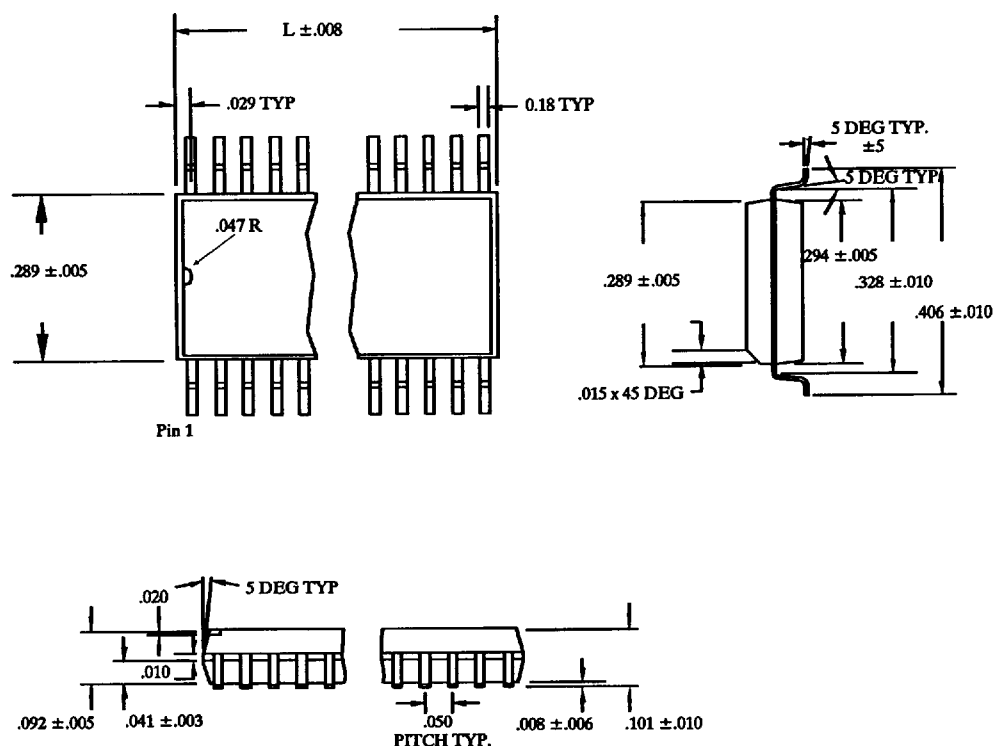
Ordering Information:

All ICS devices in PLCC packages carry a "V" designation. See individual data sheets for more specific information.

Example: ICSXXXXXV



SOIC Packages



SOIC Packages (wide body)

LEAD COUNT	14L	16L	18L	20L	24L	28L	32L
DIMENSION L	.354	.404	.454	.504	.604	.704	.704

Ordering Information:

All ICS devices in SOIC packages carry an "M" designation. See individual data sheets for more specific information.

Example: ICSXXXXM