



Description

The ICS413 is a cost-effective clock synthesizer developed to optimize component count for PC motherboard and peripheral applications. The device locks all output frequencies to enhance system performance. By supporting common PC peripheral interface frequencies including 25 MHz for Ethernet, 24.576 MHz for audio, and selectable 14.318/24.576 MHz, the device lowers chip count enhancing system cost and reliability.

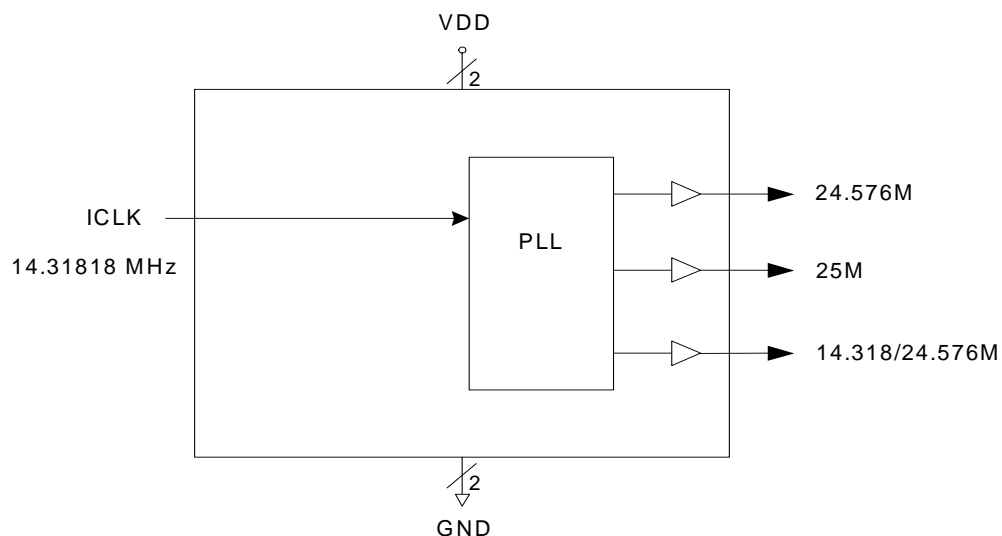
The ICS413 utilizes a low pin count 8-pin SOIC package to optimize board space.

ICS is a leader in low jitter and low power consumer application clock sources. These devices are capable of supporting CCD, video, audio, USB, CPU, and other peripherals.

Features

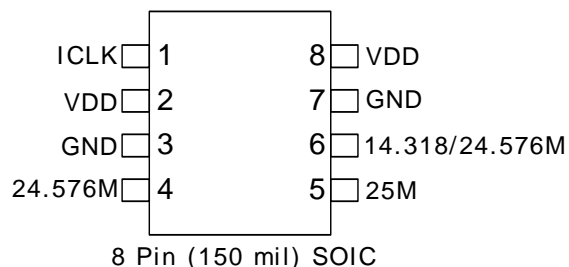
- Low operating voltage of 3.3V
- Accepts 14.31818 MHz clock input
- Fixed 25 MHz clocks for Ethernet
- Selectable 14.318/24.576 MHz clock
- Fixed 24.576 MHz clock
- Power consumption of 9 mA (typ) extends battery life in notebook applications
- Duty cycle of 45 to 55% (24.576M)
- Packaged in 8 pin SOIC
- Contact ICS for custom frequency requirements

Block Diagram





Pin Assignment



R (pin 6)	CLK Frequency (output on pin 6)
Pull-up	14.318 MHz
Pull-down	24.576 MHz

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	ICLK	Input	Clock connection. Connect to 14.31818 MHz clock.
2	VDD	Power	Connect to voltage supply.
3	GND	Power	Connect to ground.
4	24.576M	Output	24.576 MHz clock output.
5	25M	Output	25 MHz clock output.
6	14.318/24.576M	Input/ Output	Selectable 14.318/24.576 MHz clock output. No internal pull-up or pull-down resistors.
7	GND	Power	Connect to ground.
8	VDD	Power	Connect to voltage supply.

External Components

Series Termination Resistor

Clock output traces over one inch should use series termination. To series terminate a 50Ω trace (a commonly used trace impedance), place a 33Ω resistor in series with the clock line, as close to the clock output pin as possible. The nominal impedance of the clock output is 20Ω.

Decoupling Capacitor

As with any high performance mixed-signal IC, the ICS413 must be isolated from system power supply noise to perform optimally.

A decoupling capacitor of 0.01μF must be connected between each VDD and the PCB ground plane.



PCB Layout Recommendations

For optimum device performance and lowest output phase noise, the following guidelines should be observed.

- 1) The 0.01 μ F decoupling capacitor should be mounted on the component side of the board as close to the VDD pin as possible. No vias should be used between decoupling capacitor and VDD pin. The PCB trace to VDD pin should be kept as short as possible, as should the PCB trace to the ground via.
- 2) To minimize EMI the 33 Ω series termination resistor, if needed, should be placed close to the clock output.

- 3) An optimum layout is one with all components on the same side of the board, minimizing vias through other signal layers. Other signal traces should be routed away from the ICS413. This includes signal traces just underneath the device, or on layers adjacent to the ground plane layer used by the device.

Clock Selection at Power On

An external resistor selects either a 14.318 MHz or 24.576 MHz output clock on pin 6. A pull-up resistor selects 14.318 MHz and, conversely, a pull-down selects 24.576 MHz during Vdd ramp.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS413. These ratings, which are standard values for ICS commercially rated parts, are stress ratings only. 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 can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

Item	Rating
Supply Voltage, VDD	7 V
All Inputs and Outputs	-0.5 V to VDD+0.5 V
Ambient Operating Temperature	0 to +70 °C
Storage Temperature	-65 to +150 °C
Junction Temperature	175 °C
Soldering Temperature	260 °C

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Units
Ambient Operating Temperature	0	–	+70	°C
Power Supply Voltage (measured in respect to GND)	+3.00		+3.60	V



DC Electrical Characteristics

VDD=3.3V ±10% Notes: 1. Nominal switching threshold is VDD/2

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.0		3.6	V
Input High Voltage	V _{IH}		Vdd-0.5			V
Input Low Voltage	V _{IL}				0.5	V
Output High Voltage	V _{OH}	I _{OH} = -25 mA	2.4			V
Output Low Voltage	V _{OL}	I _{OL} = 25 mA			0.8	V
Operating Supply Current	IDD	No load		9		mA
Short Circuit Current	I _{OS}	Each output		50		mA
Pull-up or Pull-down Resistor	R	Pin 6		10		kΩ

AC Electrical Characteristics

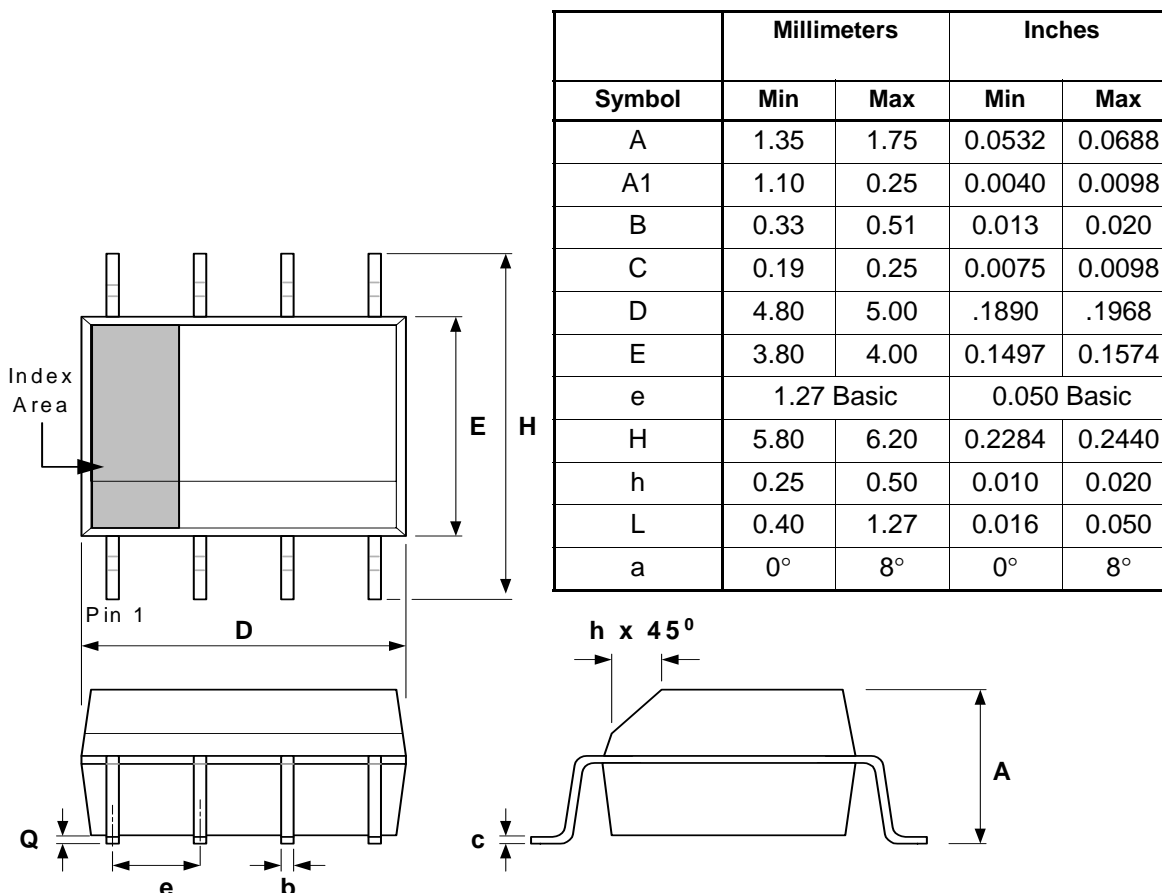
VDD = 3.3V ±10%, Ambient Temperature 0 to +70× C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency				14.31818		MHz
Output Rise Time	t _{OR}	0.8 to 2.0 V, C _L =15 pF		0.80		ns
Output Fall Time	t _{OF}	2.0 to 0.8 V, C _L =15 pF		0.80		ns
Output Clock Duty Cycle		at VDD/2, 24.576M	45	50	55	%
Absolute Jitter, Short Term		variation from mean		±125		ps
One Sigma Jitter				40		ps



Package Outline and Package Dimensions (8 pin SOIC, 150 Mil. Narrow Body)

Package dimensions are kept current with JEDEC Publication No. 95



Ordering Information

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
ICS413M	ICS413	Tubes	8 pin SOIC	0 to 70 °C
ICS413MT	ICS413	Tape and Reel	8 pin SOIC	0 to 70 °C

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