Description

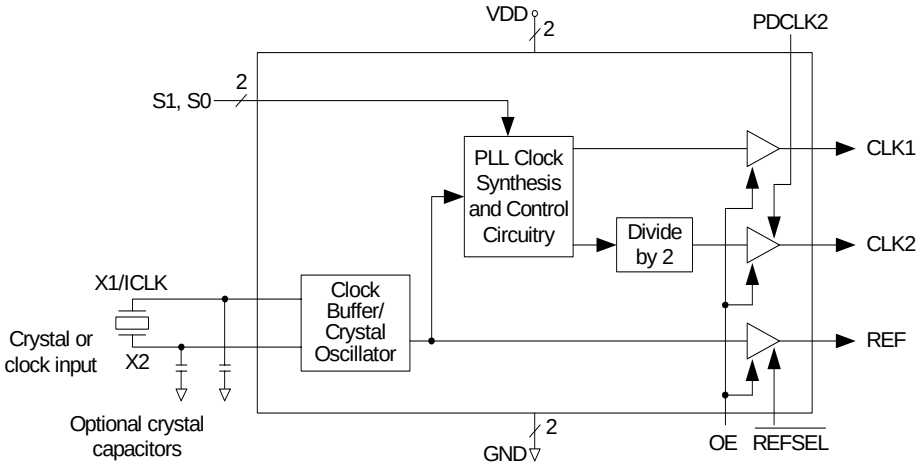
The ICS548-06 LOCO is a cost effective way to generate high quality, high frequency clock outputs and a reference clock from a lower frequency crystal or clock input. The name LOCO stands for LOw Cost Oscillator, as it is designed to replace crystal oscillators in most electronic systems. Using Phase-Locked-Loop (PLL) techniques, the device uses a standard fundamental mode, inexpensive crystal to produce output clocks up to 200MHz.

Stored in the chip's ROM is the ability to generate nine different popular multiplication factors, allowing one chip to output many common frequencies.

Features

- Zero ppm multiplication error
- Packaged in 16 pin TSSOP
- Low power CMOS technology
- Easy to cascade with other 5xx series
- Input crystal frequency of 5-27 MHz
- Input clock frequency of 2-50 MHz
- Output clock frequencies up to 200 MHz
- Duty Cycle of 45/55 up to 200 MHz
- Operating voltages of 3.0 to 5.5V
- Advanced, low power CMOS process

Block Diagram



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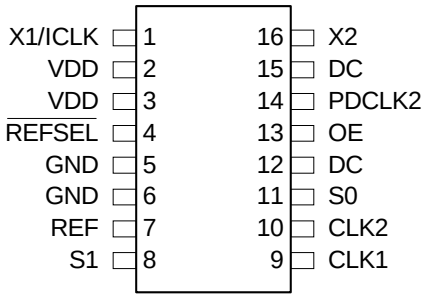
Pin Assignment



16-Pin 173 Mil
(0.65mm) TSSOP

$\overline{\text{REFSEL}}$ Table

$\overline{\text{REFSEL}}$	REF
0	ON
1	OFF

Clock Output Table

S1	S0	CLK1	CLK2
0	0	4X input	2X input
0	M	5.333X input	2.667X input
0	1	5X input	2.5X input
M	0	2.5X input	1.25X input
M	M	2X input	1X input
M	1	3.333X input	1.667X input
1	0	6X input	3X input
1	M	3X input	1.5X input
1	1	8X input	4X input

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	X1/ICLK	Input	Crystal connection or clock input.
2	VDD	Power	Connect to +3.3V or +5.0V. Must be the same as pin 3.
3	VDD	Power	Connect to +3.3V or +5.0V. Must be the same as pin 2.
4	$\overline{\text{REFSEL}}$	Input	Turns off reference clock when high. Internal pull-up.
5	GND	Power	Connect to ground.
6	GND	Power	Connect to ground.
7	REF	Output	Reference clock output.
8	S1	Input	Multiplier select pin 1. Connect to GND, VDD or float.
9	CLK1	Output	Clock1 output per table above.
10	CLK2	Output	Clock2 output per table above.
11	S0	Input	Multiplier select pin 0. Connect to GND, VDD or float.
12	DC	-	Do not connect anything to this pin.
13	OE	Input	Output enable.
14	PDCLK2	Input	Turns off Clock2 when high. Internal pull-up.
15	DC	-	Do not connect anything to this pin.
16	X2	Input	Crystal connection. Leave unconnected for clock input.

External Components

A minimum number of external components are required for proper operation. Decoupling capacitors of 0.01 µF should be connected between VDD on pin 2 and GND on pin ???, and between VDD on pin 3 and GND on pin ???, as close to the device as possible. A 33 Ω series terminating resistor should be used on each clock output if the trace is longer than 1 inch.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS548-06. 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)	+3.0		+5.5	V

DC Electrical Characteristics

VDD=3.3 V ±10%, Ambient temperature 0 to +70°C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.0		5.5	V
Input High Voltage, ICLK only	V_{IH}	Pin 1	(VDD/2)+1	VDD/2	5.5	V
Input Low Voltage, ICLK only	V_{IL}	Pin 1		VDD/2	(VDD/2)-1	V
Input High Voltage, S0, S1	V_{IH}		VDD-0.5			V
Input Low Voltage, S0, S1	V_{IL}				0.5	V
Output High Voltage	V_{OH}	I_{OH} = -8 mA	VDD-0.4			V
Output High Voltage	V_{OH}	I_{OH} = -25 mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 20 mA			0.4	V

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Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Short Circuit Current	I_{OS}	Each output		±70		mA
Operating Supply Current	I_{DD}	Note 1		11		mA
Input Capacitacnce, S1, S0				5		pF

Note: 1. Using a 20MHz crystal input, outputs of 100MHz and 50MHz.

AC Electrical Characteristics

VDD = 3.3V ±10%, Ambient Temperature 0 to +70° C, unless stated otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency, crystal input			5		27	MHz
Input Frequency, clock input			2		50	MHz
Output Frequency, VDD=5V			14		200	MHz
Output Frequency, VDD=3.3V			14		160	MHz
Output Rise Time	t_{OR}	0.8 to 2.0 V, C_L=15 pF		600		ps
Output Fall Time	t_{OF}	2.0 to 0.8 V, C_L=15 pF		600		ps
Output clock duty cycle		at VDD/2	45	49 to 51	55	%
Absolute Clock Period Jitter		Deviation from mean		±150		ps
One Sigma Clock Period Jitter				75		ps
Skew		CLK1 to CLK2	-250		250	ps

Note:1. The phase relationship between input and output clocks can change at power up. For a fixed phase relationship, see the ICS570 or the ICS527.

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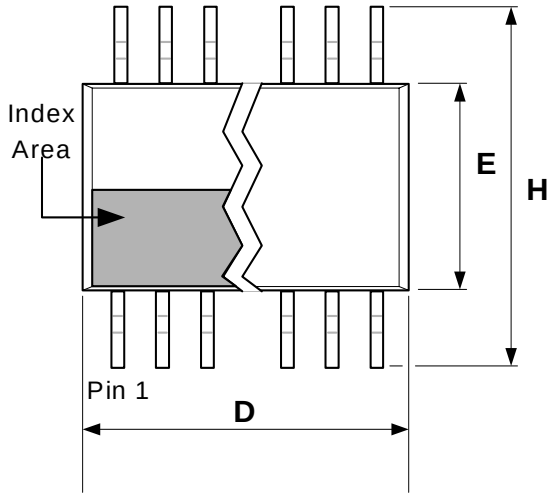
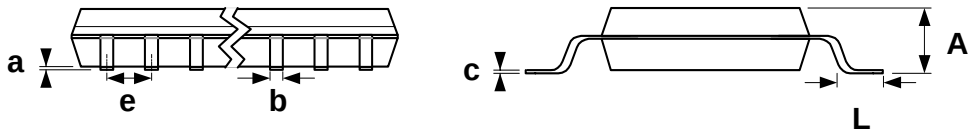
Package Outline and Package Dimensions (16 pin TSSOP, 173 Mil. Narrow Body)

Package dimensions are kept current with JEDEC Publication No. 95



	Millimeters		Inches	
Symbol	**Min**	**Max**	**Min**	**Max**
A	--	1.20	--	0.047
a	0.05	0.15	0.002	0.006
b	0.19	0.30	0.007	0.012
c	0.09	0.20	0.0035	0.008
D	4.90	5.10	0.193	0.201
E	4.30	4.50	0.169	0.177
e	0.65 Basic		0.0256 Basic	
H	6.40 Basic		0.252 Basic	
L	0.45	0.75	0.018	0.030



Ordering Information

Part / Order Number	Marking(both)	Shipping packaging	Package	Temperature
ICS548G-06	ICS (top line)	Tubes	16 pin TSSOP	0 to +70° C
ICS548G-06T	548G-06 (2nd line)	Tape and Reel	16 pin TSSOP	0 to +70° C