Description

The ICS9112CM-18 is a low jitter, low skew, high performance Phase Lock Loop (PLL) based zero delay buffer for high speed applications. Based on ICS' proprietary low jitter PLL techniques, the device provides eight low skew outputs at speeds up to 160 MHz at 3.3V. The ICS9112-18 includes a bank of four outputs running at 1/2X. In the zero delay mode, the rising edge of the input clock is aligned with the rising edges of all eight outputs. Compared to competitive CMOS devices, the ICS9112CM-18 has the lowest jitter.

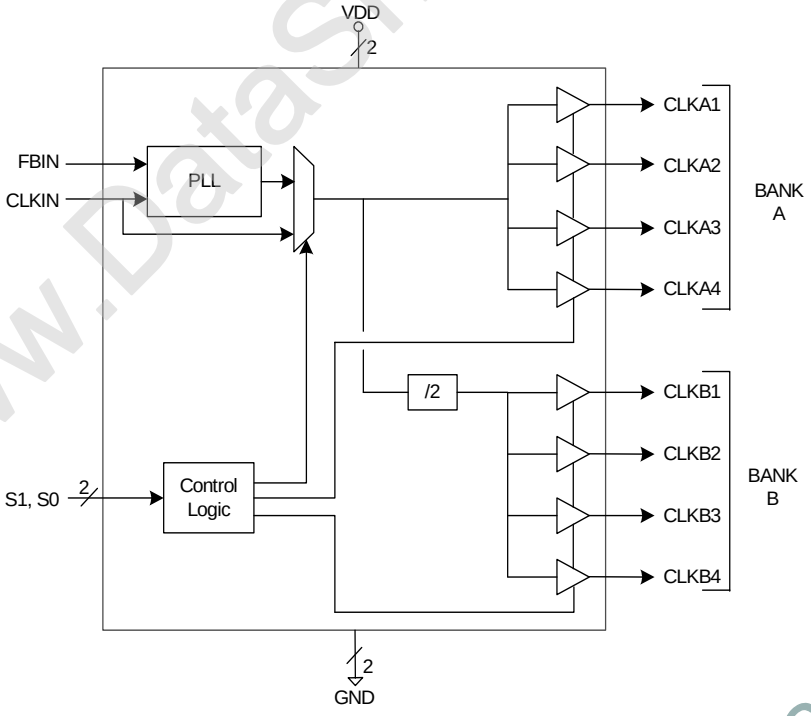
ICS manufactures the largest variety of clock generators and buffers and is the largest clock supplier in the world.

The older ICS9112BM-18 is not recommended for new designs.

Features

- Packaged in 16 pin SOIC
- Zero input-output delay
- Four 1X outputs plus four 1/2X outputs
- Output to output skew is less than 250 ps
- Output clocks up to 160 MHz at 3.3V
- Ability to generate 2X the input
- Full CMOS outputs with 18 mA output drive capability at TTL levels at 3.3V
- Spread Smart™ technology works with spread spectrum clock generators
- Advanced, low power, sub micron CMOS process
- Operating voltage of 3.3V or 5V

Block Diagram



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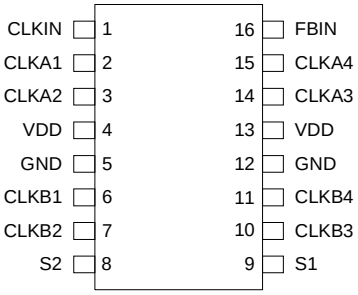
Pin Assignment



16 Pin (150 mil) SOIC

Feedback Configuration Table

Feedback From	CLKA1:A4	CLKB1:B4
Bank A	CLKIN	CLKIN/2
Bank B	2XCLKIN	CLKIN

Output Clock Mode Select Table

S2	S1	Clocks A1:A4	Clocks B1:B4	Internet Generation	PLL Status
0	0	Tri-state (high impedance)	Tri-state (high impedance)	None	On
0	1	Running	Tri-state (high impedance)	PLL	On
1	0	Running	Running	Buffer only (no zero delay)	Off
1	1	Running	Running	PLL	On

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	CLKIN	Input	Clock input. Connect to input clock source.
2 - 3	CLKA1:A4	Output	Clock A bank of four outputs.
4	VDD	Power	Power supply. Connect pin to same voltage as pin 13 (either 3.3V or 5V).
5	GND	Power	Connect to ground.
6 - 7	CLKB1:B4	Output	Clock B bank of four outputs. These are low skew divide by two of bank A.
8	S2	Input	Select input 2. Selects mode for outputs per table above.
9	S1	Input	Select input 1. Selects mode for outputs per table above.
10 - 11	CLKB1:B4	Output	Clock B bank of four outputs. These are low skew divide by two of bank A.
12	GND	Power	Connect to ground.
13	VDD	Power	Power supply. Connect pin to same voltage as pin 4 (either 3.3V or 5V).
14 - 15	CLKA1:A4	Output	Clock A bank of four outputs.
16	FBIN	Input	Feedback input. Determines outputs per table above.

External Components

The ICS9112CM-18 requires a minimum number of external components for proper operation. Decoupling capacitors of 0.1µF should be connected between VDD and GND, as close to the part as possible. A 33Ω series terminating resistor should be used on each clock output to reduce reflections.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS9112CM-18. 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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.0		5.5	V
Input High Voltage	V_{IH}	CLKIN pin only	(VDD/2)+1	VDD/2		V
Input Low Voltage	V_{IL}	CLKIN pin only		VDD/2	(VDD/2)-1	V
Input High Voltage	V_{IH}		2			V
Input Low Voltage	V_{IL}				0.8	V
Output High Voltage	V_{OH}	I_{OH} = -18mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 18mA			0.4	V
Output High Voltage	V_{OH}	I_{OH} = -5mA	VDD-0.4			V

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Supply Current 100 MHz, CLKIN	IDD	No Load S1=S2=1		44		mA
Short Circuit Current	I_{OS}	Each output		± 65		mA
Input Capacitance	C_{IN}	S1, S1, FBIN		7		pF

AC Electrical Characteristics

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

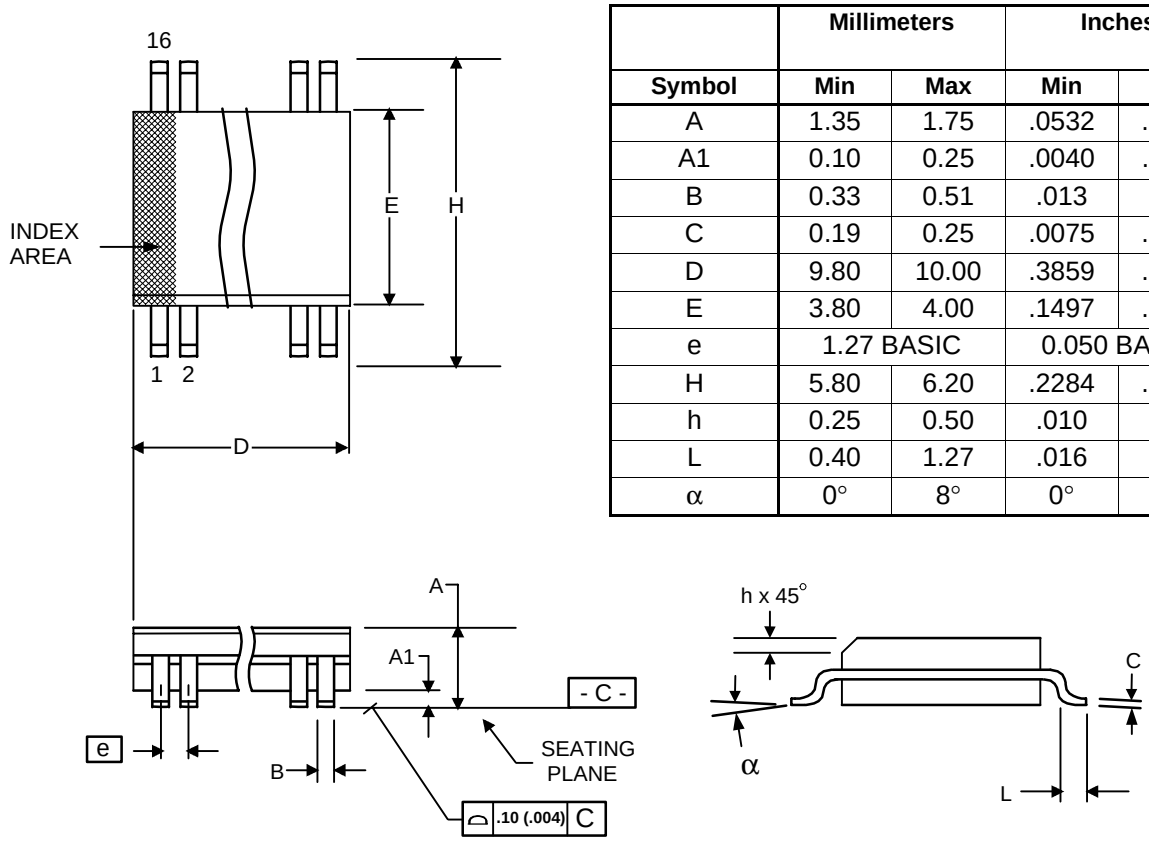
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency		FBIN to CLKA1 S1=S2=1	20		160	MHz
Output Frequency		FBIN to CLKA1 S1=S2=1	20		160	MHz
Output Rise Time	t_{OR}	0.8 to 2.0 V, C_L=30pF			1.5	ns
Output Fall Time	t_{OF}	0.8 to 2.0 V, C_L=30pF			1.5	ns
Output Clock Duty Cycle		at 1.4V	40	50	60	%
Device to Device skew, equally loaded		rising edges at VDD/2			700	ps
Output to Output skew, equally loaded		rising edges at VDD/2			200	ps
Maximum Absolute Jitter				300		ps
Cycle to Cycle Jitter		30pF loads 66.67 MHz outputs			400	ps
		15pF loads 66.67 MHz outputs			400	ps
Skew from Output Bank A to Output Bank B		All outputs equally loaded			400	ps
Delay CLKIN Rising Edge to FBIN Rising Edge		measured at VDD/2			±250	ps
PLL Lock Time	t_{LOCK}	Stable power supply, valid clocks on CLKIN, FBIN			1	ms

Thermal Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Ambient	θ_{JA}	Still air		120		°C/W
	θ_{JA}	1 m/s air flow		115		°C/W
	θ_{JA}	3 m/s air flow		105		°C/W
Thermal Resistance Junction to Case	θ_{JC}			58		°C/W

Package Outline and Package Dimensions (16 pin SOIC, 150 Mil. Narrow Body)

Package dimensions are kept current with JEDEC Publication No. 95



	Millimeters		Inches	
Symbol	**Min**	**Max**	**Min**	**Max**
A	1.35	1.75	.0532	.0688
A1	0.10	0.25	.0040	.0098
B	0.33	0.51	.013	.020
C	0.19	0.25	.0075	.0098
D	9.80	10.00	.3859	.3937
E	3.80	4.00	.1497	.1574
e	1.27 BASIC		0.050 BASIC	
H	5.80	6.20	.2284	.2440
h	0.25	0.50	.010	.020
L	0.40	1.27	.016	.050
α	0°	8°	0°	8°

Ordering Information

Part / Order Number	Marking	Shipping packaging	Package	Temperature
ICS9112BM-18	**Not recommended for new designs**			
ICS9112BM-18T	**Not recommended for new designs**			
ICS9112CM-18	9112CM-18	Tubes	16 pin SOIC	0 to 70° C
ICS9112CM-18T	9112CM-18	Tape and Reel	16 pin SOIC	0 to 70° C