Integrated Circuit Systems, Inc.

ICS9120-54

Frequency Generator for CD-ROM Systems

General Description

The **ICS9120-54** is a high performance frequency generator designed to support digital compact disk drive systems. It offers all clock frequencies required for the servo and decoder sections of these devices. These frequencies are synthesized from a single 16.9344 MHz on-chip oscillator.

High accuracy, low jitter PLLs meet the 150 ppm frequency tolerance required by these systems. Fast output clock edge rates minimize board induced jitter.

Unlike competitive devices, the **ICS9120-54** operates over the entire 3.0-5.5V range.

Features

- Generates 33.8688 MHz or 42.83 MHz decode clocks plus the 20 and 40 MHz fixed clocks
- Single 8.4672 MHz crystal or system clock reference
- 100ps one sigma jitter maintains 16-bit performance
- Output rise/fall times less than 2.0ns
- On-chip loop filter components
- 3.3V-5V supply range
- 8-pin, 150-mil SOIC

Applications

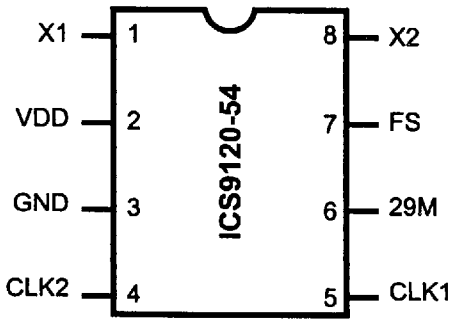
- Specifically designed to support the high performance requirements of CD-ROM drive systems

Functionality

X1, X2 (MHz)	FS	CLK1 Divisor	CLK1	CLK2
8.4672	0	2x43÷17	33.8688	16.934
8.4672	1	2x43÷17	42.83	21.415

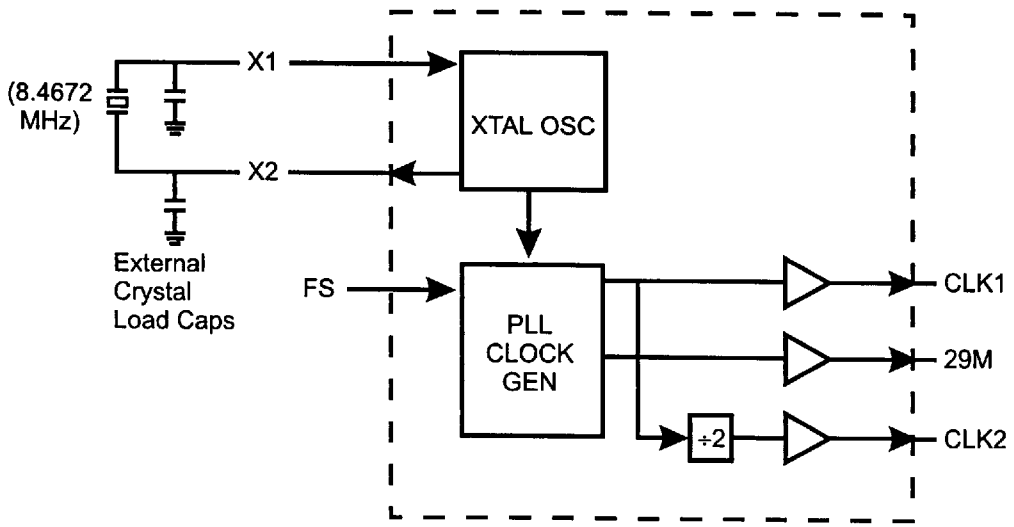
Clock	X1, X2 (MHz)	Output (MHz)
29M	8.4672	29.030

Pin Configuration



8-Pin SOIC

Block Diagram



Pin Descriptions

PIN NUMBER	PIN NAME	TYPE	DESCRIPTION
1	X1	Input	Crystal or external clock source. Has feedback bias for crystal.
2	VDD	Power	+Power supply input.
3	GND	Power	Ground return for Pin 2.
4	CLK2	Output	CLK1/2 output clock.
5	CLK1	Output	33.8/42.83 MHz selectable clock output.
6	29M	Output	29MHz fixedoutput clock.
7	FS	Input	Input selector for CLK1/CLK2.
8	X2	Output	Crystal output drive.

Absolute Maximum Ratings

AVDD, V_{DD} referenced to GND 7V

Operating temperature under bias ..... 0°C to +70°C

Storage temperature ..... -65°C to +150°C

Voltage on I/O pins referenced to GND ..... GND -0.5V to VDD +0.5V

Power dissipation ..... 0.5 Watts

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 at 5 V

V_{DD} = +4.5 to +5.5 V, T_A = 0 to 70°C unless otherwise stated

DC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Low Voltage	V_{IL}		-	-	0.8	V
Input High Voltage	V_{IH}		2.0	-	-	V
Input Low Current	I_{IL}	V_{IN}=0V	-18.0	-8.3	-	µA
Input High Current	I_{IH}	V_{IN}=V_{DD}	-	-	5.0	µA
Output Low Voltage	V_{OL}*	I_{OL}=+10mA	-	0.15	0.4	V
Output High Voltage	V_{OH}*	I_{OH}=-30mA	2.4	3.7	-	V
Output Low Current	I_{OL}*	V_{OL}=0.8V	25.0	45.0	-	mA
Output High Current	I_{OH}*	V_{OH}=2.4V	-	-53.0	-35.0	mA
Supply Current	I_{DD}	Unloaded	-	22.0	50.0	mA
Supply Current, Power-down	I_{CC}(PD)	Unloaded	-	180.0	500.0	µA
Pull-up Resistor Value	R_{PU}*		-	400.0	800.0	k ohm
AC Characteristics						
Rise Time	T_r*	15pF load, 0.8 to 2.0V	-	0.9	2.0	ns
Fall Time	T_f*	15pF load, 2.0 to 0.8V	-	0.7	1.5	ns
Rise Time	T_r*	15pF load, 20% to 80%	-	1.8	3.25	ns
Fall Time	T_f*	15pF load, 80% to 20%	-	1.4	2.5	ns
Duty Cycle	D_t*	15pF load @ 50% of VDD; Except REFCLK	45.0	50.0	55.0	%
Duty Cycle	D_t*	15pF load @ 50% of VDD; Except REFCLK	40.0	50.0	60.0	%
Jitter, One Sigma	T_{jis}*	For all frequencies except REFCLK	-	100.0	150.0	ps
Jitter, Absolute	T_{jab}*	For all frequencies except REFCLK	-600.0	380.0	600.0	ps
Jitter, One Sigma	T_{jis}*	REFCLK only	-	266.0	450.0	ps
Jitter, Absolute	T_{jab}*	REFCLK only	-1200	750.0	1200	ps
Input Frequency Range	F_i*		11.0	14.0	17.0	MHz
Output Frequency Range	F_o*		11.0	-	42.0	MHz
Output Mean Frequency Accuracy vs. Target	F_{oe}*	With 14.318 MHz input	-0.125	-	-0.04	%
Power-up Time	T_{pu}*	0 to 33.8 MHz	-	5.5	12.0	ms
Crystal Input Capacitance	C_{inx}*	X1 (Pin 1) X2 (Pin 8)	-	5	-	pF

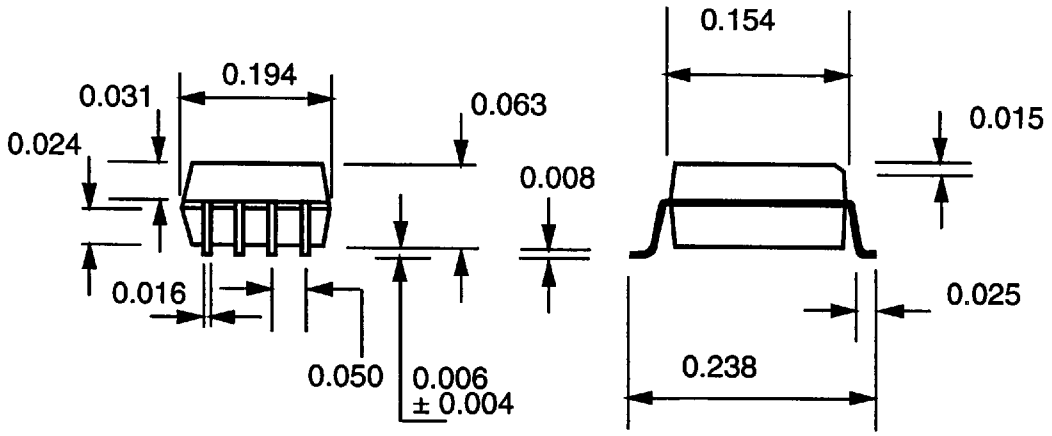
*Parameter is guaranteed by design and characterization. Not 100% tested in production.

Electrical Characteristics at 3.3 V

V_{DD} = +3.0 to +3.7V, T_A = 0°C-70°C unless otherwise stated

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
DC Characteristics						
Input Low Voltage	V_{IL}		-	-	$0.2V_{DD}$	V
Input High Voltage	V_{IH}		$0.7V_{DD}$	-	-	V
Input Low Current	I_{IL}	V_{IN}=0V	-8.0	-3.6	-	µA
Input High Current	I_{IH}	V_{IN}=V_{DD}	-	-	5.0	µA
Output Low Voltage	V_{OL}*	I_{OL}=6.0mA	-	$0.05V_{DD}$	0.1	V
Output High Voltage	V_{OH}*	I_{OH}=4.0mA	$0.85V_{DD}$	$0.94V_{DD}$	-	V
Output Low Current	I_{OL}*	VoL=$0.2V_{DD}$	15.0	24.0	-	mA
Output High Current	I_{OH}*	V_{OH}=$0.7V_{DD}$	-	-13.0	-8.0	mA
Supply Current	I_{DD}	Unloaded	-	13.0	32.0	mA
Supply Current	I_{DD} (PD)	Unloaded	-	50.0	110.0	µA
Pull-up Resistor Value	R_{PU}*		-	620.0	900.0	k ohm
AC Characteristics						
Rise Time	T_r*	15pF load 0.8 to 2.0V	-	1.5	4.0	ns
Fall Time	T_f*	15pF load 2.0 to 0.8V	-	1.0	3.0	ns
Rise Time	T_r*	15pF load 20% to 80%	-	2.2	4.0	ns
Fall Time	T_f*	15pF load 80% to 20%	-	1.5	3.0	ns
Duty Cycle	D_t*	15pF load @ 50% of VDD Except REFCLK	45.0	50.0	55.0	%
Duty Cycle	D_t*	15pF load @ 50% of VDD Except REFCLK	40.0	45.0	60.0	%
Jitter, One Sigma	T_{jis}*	For all frequencies except REFCLK	-	150.0	200	ps
Jitter Absolute	T_{jab}*	For all frequencies except REFCLK	-650.0	380.0	650.0	ps
Jitter, One Sigma	T_{jis}*	REFCLK only	-	266.0	400.0	ps
Jitter Absolute	T_{jab}*	REFCLK only	-100.0	750.0	1000	ps
Input Frequency	F_i*		11.0	14.3	15.0	MHz
Output Frequency Range	F_o*		11.0	-	38.0	MHz
Output Mean Frequency Accuracy vs. Target	F_{oa}*	With 14.318MHz input	-0.125	-	-0.04	%
Power-up Time	T_{pu}*	0 to 33.8 MHz	-	5.5	12.0	ms
Crystal Input Capacitance	C_{inx}*	X1 (Pin 1), X2 (Pin 8)	-	5	-	pF

*Parameter is guaranteed by design and characterization. Not 100% tested in production.



8-Pin SOIC Package

Ordering Information

ICS9120M-54

Example:

ICS XXXX M-PPP

Pattern Number (2 or 3-digit number for parts with ROM code pattern)

Package Type
M =SOIC

Device Type (consists of 3 or 4-digit numbers)

Prefix
ICS, AV=Standard Device