Integrated Circuit Systems, Inc.

ICS9117-02

Advanced Information

Frequency Generator for Modem Systems

General Description

The **ICS9117-02** is a low-cost, high-performance frequency generator designed to support fax/data modem systems. Data-pump and UART clocks are synthesized from a microcontroller crystal using high-accuracy, low-jitter PLLs, meeting the frequency tolerance and -96dB signal-to-noise ratios required by 16-bit DSP modem systems. Fast output clock edge rates minimize board induced jitter.

Exact frequency multiplying ratios ensure better than ±80 ppm frequency accuracy using a standard low cost crystal with external load capacitors (typically 33pF±5% for an 18pF series load crystal). Achieving ±80 ppm over four years requires the crystal to have ±20 ppm initial accuracy, ±20 ppm temperature and ±5 ppm/year aging coefficients.

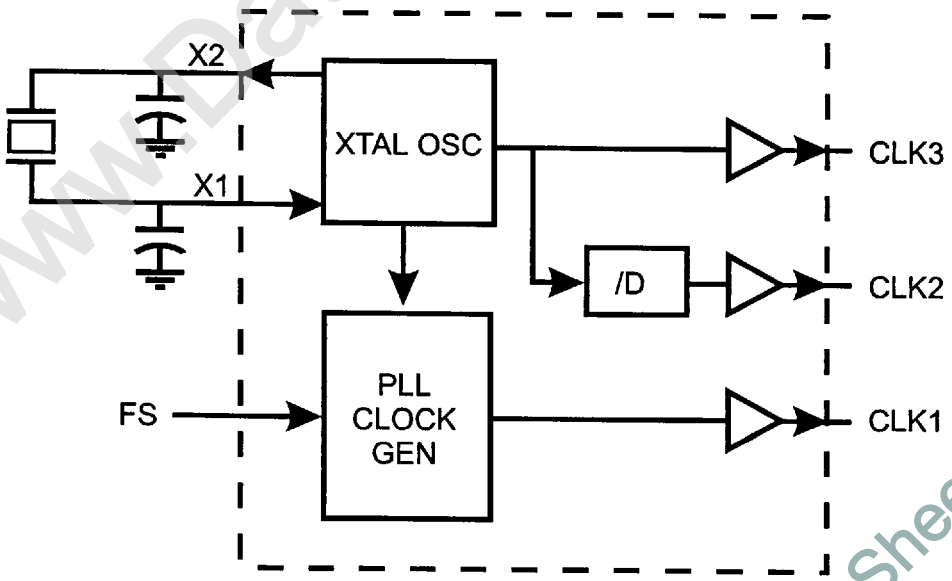
Features

- Generates the 35.2512 MHz microcontroller, 40.320 MHz datapump and selectable microcontroller clocks plus the UART clock.
- Less than ±80 ppm frequency variation including temperature, voltage, load and aging tolerances
- Single crystal reference minimizes crystal reliability and inventory issues
- 100 ps one sigma jitter maintains 16-bit performance
- Output rise/fall times less than 1.5ns
- On-chip loop filter components
- 3.0V or 5.5V operation
- 8-pin, 150-mil SOIC package

Applications

- Specifically designed to support the high-performance of fax/data modem and WLAN systems.

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.

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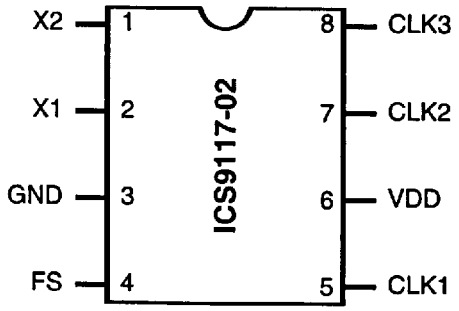
Pin Configuration



8-PIN SOIC

Functionality

X1, X2 (MHz)	FS	CLK3 (MHz)	CLK1 (MHz)	CLK2 (MHz)
22.1184	0	22.1184	35.2512	1.8432
44.4000	1	44.4000	40.320	1.8500

Pin Descriptions

PIN NUMBER	PIN NAME	TYPE	DESCRIPTION
1	X2	OUT	22.1 or 44.4 MHz crystal drive output.
2	X1	IN	22.1 or 44.4 MHz crystal or clock input.
3	GND	PWR	Power Gnd
4	FS	IN	Frequency selection inut (see frequency table).
5	CLK1	OUT	datapump clock output.
6	VDD	PWR	+5V or +3.3V power supply.
7	CLK2	OUT	UART clock output.
8	CLK3	OUT	Microcontroller clock output.

Absolute Maximum Ratings

AV_{DD}, 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 V_{DD} + 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 3.3V

Operating V_{DD} = +3.0 V to +3.7V; T_A = 0 °C 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	-	7.0	-25.0	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}=-10mA	2.4	3.7	-	V
Output Low Current	I_{OL}*	V=0.8V	20.0	35.0	-	mA
Output High Current	I_{OH}*	V=2.4V	-	-20.0	-10.0	mA
Supply Current	I_{CC}	Unloaded	-	14.0	30.0	mA
Pull-up Resistor Value	R_{pu}*		-	400.0	800.0	k ohm
AC Characteristics						
Rise Time	T_r*	15o/f kiadm 0.8 to 2.0V		1.2	2.0	ns
Fall Time	Tf*	15pF load, 2.0 to 0.8V		1.0	1.5	ns
Lock Time	TL*	15pF load, 20%to 80%			0	ms
Duty Cycle	Dt*	15pFload @50% of VDD; Except REFCLK	45	50	55	%
Duty Cycle	Dt*	15pF load@50% of VDD; Except REFCLK only	45	50	55	%
Jitter, One Sigmea	Tjis*	For all frequencies except REFCLK		70	100	ps
Jitter, Absolute	Tjab*	Forall frequencies except REFCLK	-300		+300	ps
Jitter, One Sigma	Tjis*	REFCLK only		200	300	ps
Jitter, Absolute	Tjab*	REFCLK only	-500		+500	ps
Input FrequencyRange	Fi*		4		28	MHz
Output Frequency Range	Fo*		11.7		+4	MHz
OutputMean Frequency Accuracy vs.Target	Foa*	With 14.318 MHzinput	-30		+80	ppm
Power-up Time	Tpu*	0 to 33.8 MHz		2.5	4.5	ms
Crystal Input Capacitance	C^{inx}*	X1 (Pin 1) X2 (Pin 8)		18		pF

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

Absolute Maximum Ratings

AV_{DD}, 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 - 0.5 V to V_{DD} + 0.5 V
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 5.0V-5.5V

Operating V_{DD} = +3.0 V to +3.7V; T_A = 0 °C 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	-	-4.0	-25	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}=-15mA	4.0	4.2	-	V
Output Low Current	I_{OL}*	V=0.8V	25.0	40.0	-	mA
Output High Current	I_{OH}*	V=2.4V	-	-85.0	-65	mA
Supply Current	I_{CC}	Unloaded	-	20.0	-35	mA
Pull-up Resistor Value	R_{pu}*		-	400.0	800.0	k ohm
AC Characteristics						
Rise Time	T_r*	15o/f kiadm 0.8 to 2.0V		0.8	1.5	ns
Fall Time	T_f*	15pF load, 2.0 to 0.8V		1.0	2..5	ns
Lock Time	T_L*	15pF load, 20%to 80%			10	ms
Duty Cycle	D_t*	15pFload @50% of VDD; Except REFCLK	45	50	55	%
Duty Cycle	D_t*	15pF load@50% of VDD; Except REFCLK only	45	50	55	%
Jitter, One Sigmea	T_{jis}*	For all frequencies except REFCLK		80	100	ps
Jitter, Absolute	T_{jab}*	Forall frequencies except REFCLK	-300		+300	ps
Jitter, One Sigma	T_{jis}*	REFCLK only		200	250	ps
Jitter, Absolute	T_{jab}*	REFCLK only	-500		+500	ps
Input FrequencyRange	F_i*		5		4.3	MHz
Output Frequency Range	F_o*		14		114	MHz
OutputMean Frequency Accuracy vs.Target	F_{oa}*	With 14.318 MHzinput	-80		+80	ppm
Power-up Time	T_{pu}*	0 to 33.8 MHz		2.5	4.5	ms
Crystal Input Capacitance	C^{inx}*	X1 (Pin 1) X2 (Pin 8)		18		pF

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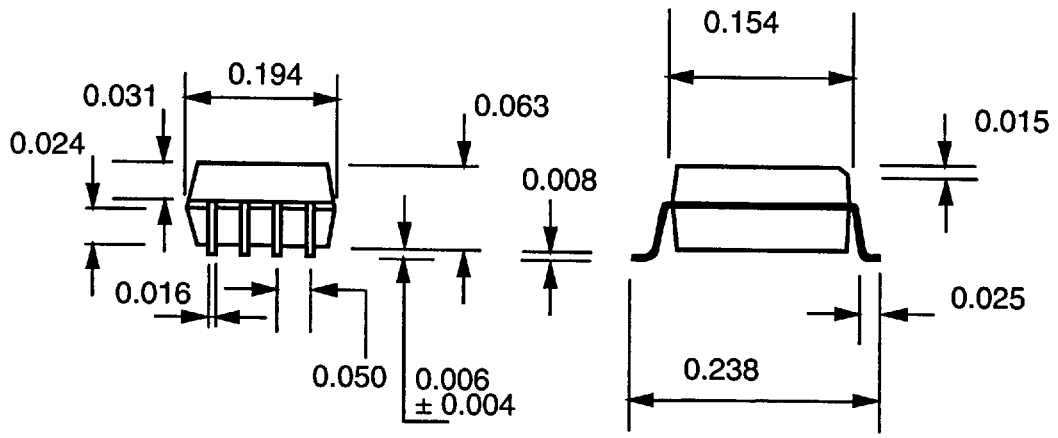

8-Pin SOIC

Ordering Information

ICS9117M-02

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