



# Frequency Generator for Digital Video Systems

## General Description

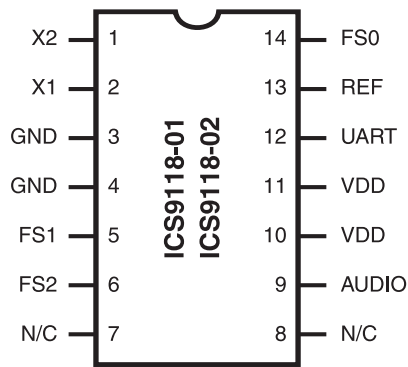
The ICS9118-01 and ICS9118-02 are low-cost, high-performance clock generators designed to support digital video systems. 27 MHz VIDEO, 1.8 MHz UART and AUDIO clocks are generated from the recovered 27 MHz signal. The on-chip crystal oscillator can be used in conjunction with an external D/A conversion circuit to provide  $\pm 130$  ppm clock recovery using a standard 27 MHz crystal (contact ICS for application details).

The audio clock is synthesized from 27 MHz using a high accuracy, low jitter PLL to meet the synchronization and -96dB signal-to-noise ratios required by 16-bit DSP systems. Fast output clock edge rates minimize board-induced jitter.

## Features

- Generates 27 MHz VIDEO, 1.8 MHz UART and synchronous AUDIO codec clocks
- Selectable AUDIO clock supports 256x and 384x over-sampling of 16.00, 22.05, 24.00, 32.00, 44.10 and 48.00 kHz
- On-chip crystal oscillator enables 27 MHz clock recovery
- 80ps one sigma jitter maintains 16-bit performance
- 3.0V - 5.5V supply range
- 14-pin, 150-mil SOIC package

## Pin Configuration



**14-Pin SOIC  
ICS9118-02 Obsolete**

## Applications

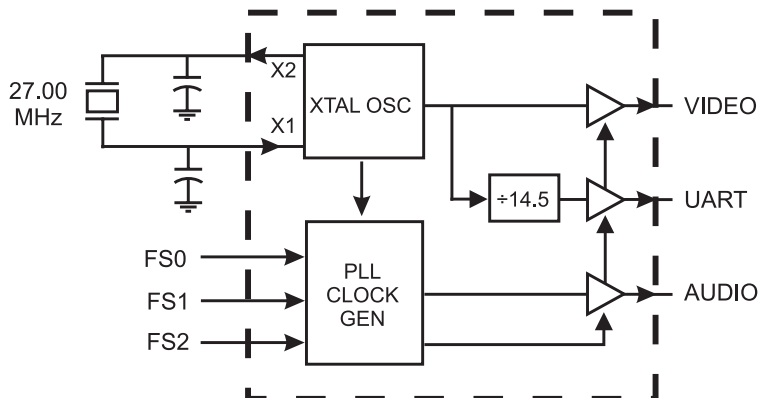
- Specifically designed to support the high performance clocking requirements of digital video set-top and multi-media systems

## Functionality

VDD=3.0-5.5V, TEMP=0-70°

X1, X2 (MHz)	FS [2:0]	AUDIO 01 (MHz)	AUDIO 02 (MHz)	REF (MHz)	UART (MHz)
27.00	000	Tristate	Tristate	Tristate	Tristate
27.00	001	4.096	6.144	27.00	1.8620
27.00	010	5.644	8.467. 2	27.00	1.8620
27.00	011	6.144	9.216	27.00	1.8620
27.00	100	8.192	12.288	27.00	1.8620
27.00	101	11.289	16.934. 2	7.00	1.8620
27.00	110	12.288	18.432	27.00	1.8620
27.00	111	Low	Low	Low	Low

## Block Diagram



# ICS9118-01

## ICS9118-02 Obsolete



### Pin Descriptions for ICS9118-01

PIN NUMBER	PIN NAME	TYPE	DESCRIPTION
1	X2	OUT	XTAL output which includes XTAL load capacitance.
2	X1	IN	XTAL or external reference frequency input. This input includes XTAL load capacitance and feedback bias normally 27.0MHz
3,4	VSS	PWR	Ground for logic, PCLK and fixed frequency output buffers.
5,6,14	FS(0:2)	IN	Frequency multiplier select pins. See Functionality table. These inputs have internal pullup devices.
7	N/C	-	Not internally connected.
8	N/C	-	Not internally connected.
9	AUDIO	OUT	Audio clock output. See Functionality table.
10,11	VDD	PWR	Power for logic, PCLK and fixed frequency output buffers.
12	UART	OUT	UART clock output fixed out 1.8620MHz.
13	REF	OUT	Video clock output fixed out 27.00MHz.



## Absolute Maximum Ratings

AVDD, VDD 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 3.3V

Operating V<sub>DD</sub> = +3.0 V to +3.7V; T<sub>A</sub> = 0°C to 70°C unless otherwise stated

DC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Low Voltage	V <sub>IL</sub>		-	-	0.8	V
Input High Voltage	V <sub>IH</sub>		2.0	-	-	V
Input Low Current	I <sub>IL</sub>	V <sub>IN</sub> =0V	-	-10.0	-18	μA
Input High Current	I <sub>IH</sub>	V <sub>IN</sub> =V <sub>DD</sub>	-	-	5.0	μA
Output Low Voltage	V <sub>OL</sub> *	I <sub>OL</sub> =+10mA	-	0.15	0.4	V
Output High Voltage	V <sub>OH</sub> *	I <sub>OH</sub> =-10mA	2.4	3.0	-	V
Output Low Current	I <sub>OL</sub> *	V=0.8V	20.0	35.0	-	mA
Output High Current	I <sub>OH</sub> *	V=2.4V	-	-20.0	-10.0	mA
Supply Current	I <sub>CC</sub>	V <sub>DD</sub> =3.3V±10%	-	14.0	25.0	mA
Pull-up Resistor Value	R <sub>pu</sub> *		-	400.0	800.0	k ohm
AC Characteristics						
Rise Time	T <sub>r</sub> *	15pF load 0.8 to 2.0V	-	1.0	1.5	ns
Fall Time	T <sub>f</sub> *	15pF load, 2.0 to 0.8V	-	1.0	1.5	ns
Lock Time	T <sub>L</sub> *	15pF load, 20%to 80%			10.0	ms
Duty Cycle	D <sub>t</sub> *	15pF load @50% of V <sub>DD</sub> ; Except UART	45.0	50.0	55.0	%
Duty Cycle	D <sub>t</sub> *	15pF load@50% of V <sub>DD</sub> ; Except UART	40.0	45.0	50.0	%
Jitter, One Sigma	T <sub>j1s</sub> *	Audio		50.0	80.0	ps
Jitter, Absolute	T <sub>jab</sub> *	Audio	-300.0		+300.0	ps
Jitter, One Sigma	T <sub>j1s</sub> *	REFCLK, UART		1.0	3.0	%
Jitter, Absolute	T <sub>jab</sub> *	REFCLK, UART			+5.0	%
Output Mean Frequency Accuracy vs.Target	F <sub>oa</sub> *	With 27.0 MHz input	-80.0		+80.0	ppm
Power-up Time	T <sub>pu</sub> *	From V <sub>DD</sub> =1.6V to 1st crossing of Audio Select. V <sub>DD</sub> supply Ramp <40ms.		2.5	4.5	ms
Crystal Input Capacitance	C <sub>inx</sub> *	X1 (Pin 1) X2 (Pin 8)		18.0		pF

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

# ICS9118-01

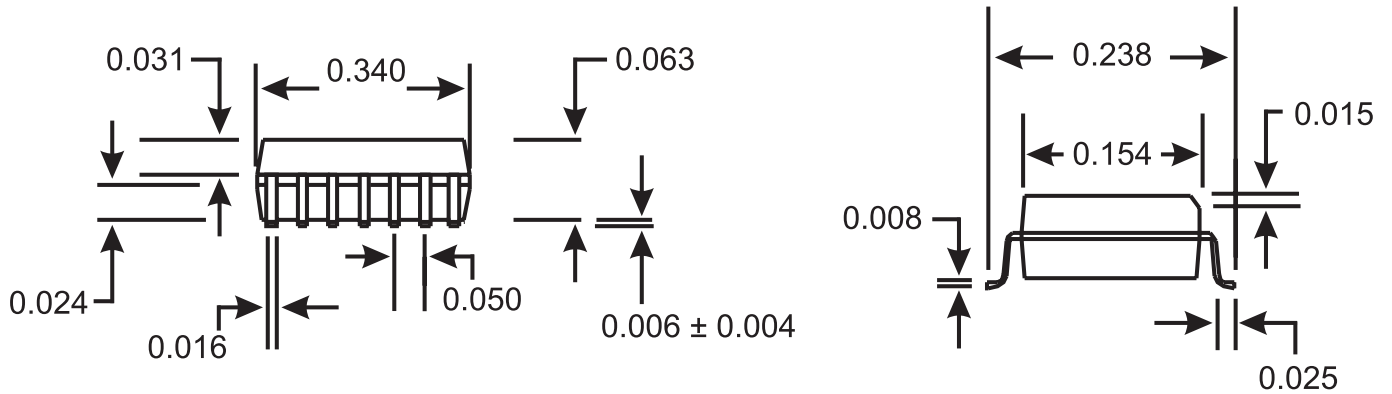
## ICS9118-02 Obsolete



### Electrical Characteristics at 5 V

$V_{DD} = +4.5$  to  $+5.5$  V,  $T_A = 0$  to  $70^\circ\text{C}$  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	$I_{IL}$	$V_{IN}=0\text{V}$	-	8.3	-18.0	$\mu\text{A}$
Input High Current	$I_{IH}$	$V_{IN}=V_{DD}$	-	-	5.0	$\mu\text{A}$
Output Low Voltage	$V_{OL}^*$	$I_{OL}=+10\text{mA}$	-	0.15	0.4	V
Output High Voltage	$V_{OH}^*$	$I_{OH}=-30\text{mA}$	2.7	4.1	-	V
Output Low Current	$I_{OL}^*$	$V_{OL}=0.8\text{V}$	25.0	45.0	-	mA
Output High Current	$I_{OH}^*$	$V_{OH}=2.4\text{V}$	-	-53.0	-35.0	mA
Supply Current	$I_{DD}^*$	Unloaded	-	22.0	30	mA
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		1.0	1.5	ns
Fall Time	$T_f^*$	15pF load 2.0 to 0.8V		1.0	1.5	ns
Lock Time	$T_L^*$	15pF load, 20% to 80%			10.0	ms
Duty Cycle	$D_t^*$	15pF load @ 50% of $V_{DD}$ ; Except UART	45.0	50.0	55.0	%
Duty Cycle	$D_t^*$	15pF load @ 50% of $V_{DD}$ ; UART only	40.0	45.0	50.0	%
Jitter, One Sigma	$T_{j1s}^*$	Audio		50.0	80.0	ps
Jitter, Absolute	$T_{jab}^*$	Audio	-300		+300	ps
Jitter, One Sigma	$T_{j1s}^*$	REFCLK, UART		1.0	3	%
Jitter Absolute	$T_{jab}^*$	REFCLK, UART	-5.0		+5	%
Output Mean Frequency Accuracy vs. Target	$F_{oa}^*$	With 14.318 MHz input	-80.0		+80.0	ppm
Power-up Time	$T_{pu}^*$	From $V_{DD}=1.6\text{V}$ to 1st crossing. $V_{DD}$ supply Ramp <40ms.		2.5	4.5	ms
Crystal Input Capacitance	$C_{inx}^*$	X1 (Pin 1), X2 (Pin 8)		18		pF



14 Pin SOIC Package

## Ordering Information

ICS9118M-01

Example:

ICS XXXX M-PPP

