

## **Low-Cost 8-Pin Frequency Generator**

### **General Description**

The ICS9120-45 is a high performance frequency generator designed to support the clock requirements of communication and audio interfaces.

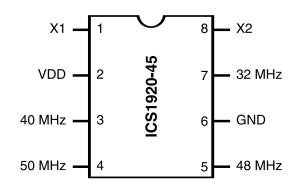
High accuracy, low-jitter PLLs meet the -96dB signal-tonoise ratios required by 16-bit audio systems. Fast output clock edge rates minimize board induced jitter.

The on-chip XTAL oscillator accuracy is better than ±100ppm for an AT cut, 18pF load crystal with initial accuracy of ppm plus TC, aging and load variation of ±20ppm each assuming 33pF ±5% external load capacitors.

#### **Features**

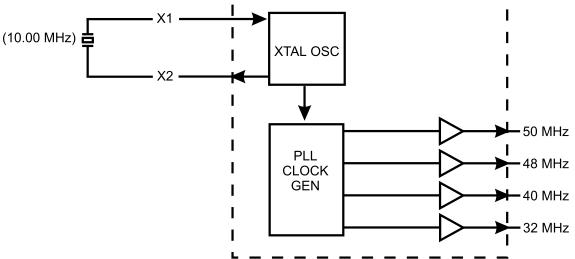
- Generates 32MHz, 40MHz and 48MHz
- Single 10 MHz crystal reference
- 49.92 MHz accuracy tracks 40.32 MHz reference
- 80ps one sigma jitter maintains 16-bit performance
- Output rise/fall times less than 1.5ns
- On-chip loop filter components
- 3.0-5.5V supply range 8-pin, 150-mil SOIC package

#### **Pin Configuration**



#### **Block Diagram**

# 8 Pin SOIC



This data sheet (ICS9120-45) is an addedum to the existing ICS9120-08/09 data sheet. All information in this data sheet supersedes the data found in the orginal ICS9120-08/09 data sheet.

# ICS9120-45



## **Pin Descriptions**

PIN NUMBER	PIN NAME	ТҮРЕ	DESCRIPTION
1	X1	Input	10.00 MHz input from crystal.
2	VDD	Power	+Power supply input.
3	40.00 MHz	Output	40 MHz clock output.
4	50.00 MHz	Output	50 MHz clock output.
5	48.00 MHz	Output	48 MHz clock output.
6	GND	Power	Ground return for Pin 2.
7	32.00 MHz	Output	32 MHz clock output.
8	X2	Output	10.00 MHz output.

Note: The 10.00 MHz crystal that is connected to pin 1 and 8 is a parallel resonant component that is designed to operate into a 8pF capacitive load. This device is a 5V power supply device.



## **Absolute Maximum Ratings**

AVDD, VDD referenced to GND ...... 7V

Operating temperature under bias.  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  Storage temperature.  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$ 

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

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,  $T_A = 0-70$  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	$I_{_{ m IL}}$	VIN=0V (For -09 only)	-	-8.3	-18.0	μΑ					
Input High Current	$I_{IH}$	VIN=VDD (For -09 only)	-	-	5.0	μΑ					
Output Low Voltage	$V_{OL}^{*}$	IOL=+10mA	-	0.15	0.4	V					
Output High Voltage	$V_{OH}^{*}$	IOH=-30mA	2.4	3.7	-	V					
Output Low Current	I <sub>OL</sub> *	VOL=0.8V	25.0	45.0	-	mA					
Output High Current	I_*	VOH=2.4V	-	-53.0	-35.0	mA					
Supply Current	$I_{CC}$	Unloaded	-	22.0	50.0	mA					
Supply Current	$I_{CC}$	Unloaded (For -09 only)	-	180.0	500.0	μA					
Pull-up Resistor Value	$R_{pu}^*$	(For -09 only)	-	400.0	800.0	k ohm					
		AC Characteristics									
Rise Time 0.8 to 2.0V	T <sub>r</sub> *	15pF load	-	0.9	2.0	ns					
Fall Time 2.0 to 0.8V	$T_{\rm f}^{*}$	15pF load	-	0.7	1.5	ns					
Rise Time 20% to 80%	$T_r^*$	15pF load	-	1.8	3.25	ns					
Fall Time 80% to 20%	$T_f^*$	15pF load	-	1.4	2.5	ns					
Duty Cycle	D <sub>t</sub> *	15pF load @ 50% of VDD; Except REFCLK	45.0	50.0	55.0	%					
Duty Cycle	$D_t^*$	15pf load @ 50% of VDD; REFCLK only	40.0	50.0	60.0	%					
Jitter, One Sigma	$T_{jis}^{*}$	For all frequencies except REFCLK	1	85.0	-	ps					
Jitter, Absolute	$T_{jab}$	For all frequencies except REFCLK	-700.0	380.0	700.0	ps					
Jitter, One Sigma	$T_{jis}^*$	REFCLK only	-	266.0	600.0	ps					
Jitter, Absolute	T <sub>jab</sub>	REFCLK only	-1.5	380.0	1.5	ns					
Input Frequency	F <sub>i</sub> *		11.0	14.0	17.0	MHz					
Output Frequency	F <sub>o</sub> *		11.0	-	42.0	MHz					
Power-up Time	$\mathrm{T_{pu}}^*$	0 to 33.8 MHz	-	5.5	12.0	ms					
Crystal Input Capacitance	C <sub>inx</sub> *	X1 (Pin 1)# X2 (Pin 8; -08 only)	-	5	-	pF					

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

# ICS9120-45

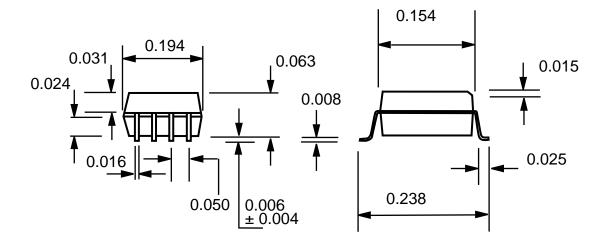


## **Electrical Characteristics at 3.3 V**

DC Characteristics									
PARAMETER	SYMBOL TEST CONDITIONS		MIN	TYP	MAX	UNITS			
Input Low Voltage V <sub>IL</sub>			-	-	0.2VDD	V			
Input High Voltage	$V_{_{ m IH}}$		0.7VDD	-	-	V			
		VIN=0V (For -09 only)	-	-3.6	-8.0	μΑ			
Input High Current	$I_{_{ m IH}}$	VIN=VDD (For -09 only)	-	-	5.0	μΑ			
Output Low Voltage	V <sub>oL</sub> *	IOL=6mA	-	0.05VDD	0.1	V			
Output High Voltage	$V_{_{ m OH}}^{*}$	IOH=-4.0mA	0.85VDD	0.94VDD	-	V			
Output Low Current	I <sub>OL</sub> *	VOL=0.2VDD	15.0	24.0	-	mA			
Output High Current	I_*	VOH=0.7VDD	-	-13.0	-8.0	mA			
Supply Current	$I_{CC}$	Unloaded	-	13.0	32.0	mA			
Supply Current	I <sub>CC</sub> (PD)	Unloaded (For -09 only)	-	50.0	110.0	μΑ			
Pull-up Resistor Value	R <sub>pu</sub> *	(For -09 only)	-	620.0	900.0	k ohm			
		AC Characteristics							
Rise Time 0.8 to 2.0V	T <sub>r</sub> *	15pF load	-	1.5	4.0	ns			
Fall Time 2.0 to 0.8V	$T_{\rm f}^{*}$	15pF load	-	1.0	3.0	ns			
Rise Time 20% to 80%	$T_r^*$	15pF load	-	2.2	4.0	ns			
Fall Time 80% to 20%	$T_{\rm f}^{*}$	15pF load	-	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 <sub>t</sub> *	15pF load @ 50% of VDD; REFCLK only	40.0	45.0	60.0	%			
Jitter, One Sigma	$T_{jis}^*$	For all frequencies except REFCLK	-	100.0	-	ps			
Jitter, Absolute	$\mathrm{T_{jab}}$	For all frequencies except REFCLK	-900.0	380.0	900.0	ps			
Jitter, One Sigma	T <sub>iis</sub> *	REFCLK only	-	266.0	600.0	ps			
Jitter, Absolute	T <sub>iab</sub>	REFCLK only	-1.5	380.0	1.5	ns			
Input Frequency	F <sub>i</sub> *		11.0	14.3	15.0	MHz			
Output Frequency	F.*		11.0	-	38.0	MHz			
Power-up Time	T <sub>pu</sub> *	0 to 33.8 MHz - 5.5 12.0 ms							
Crystal Input Capacitance	C <sub>inx</sub> *	X1 (Pin 1)# X2 (Pin 8; -08 only)	-	5	-	pF			

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





8-Pin SOIC Package

## **Ordering Information**

#### ICS9120M-45

Example:

