



## 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.

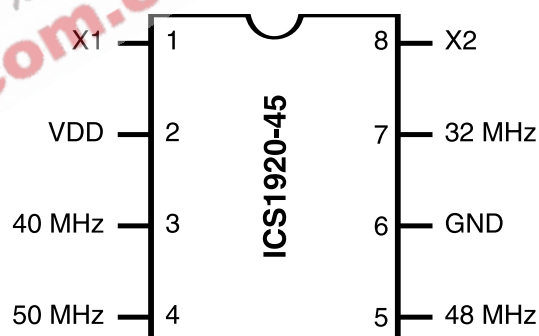
High accuracy, low-jitter PLLs meet the -96dB signal-to-noise ratios required by 16-bit audio systems. Fast output clock edge rates minimize board induced jitter.

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

### Features

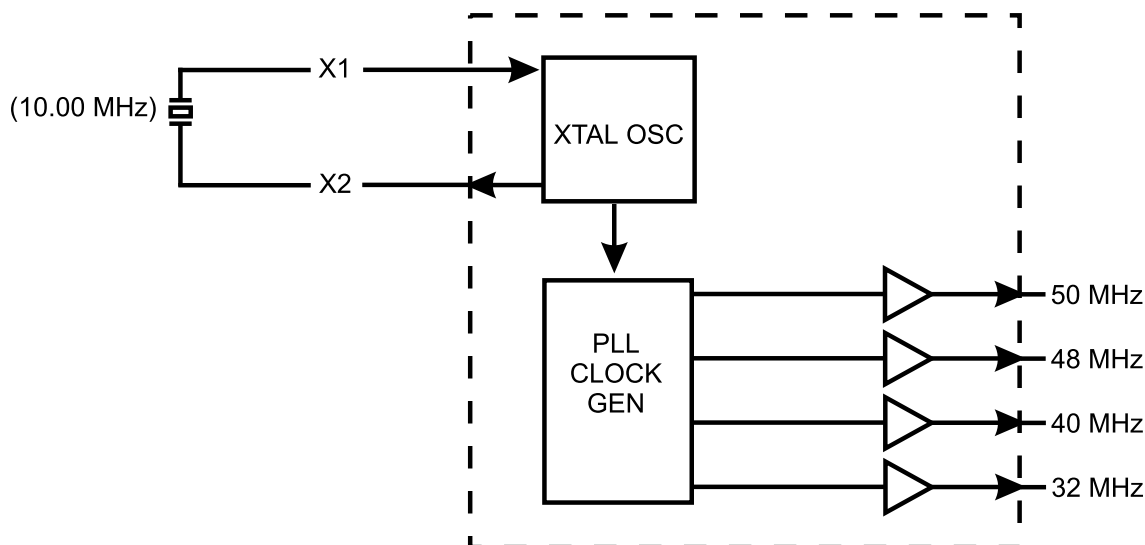
- Generates 32MHz, 40MHz and 48MHz
- Single 10 MHz crystal reference
- 49.92 MHz accuracy tracks 40.32 MHz reference
- 80ps one sigma jitter maintains 16-bit performance
- Output rise/fall times less than 1.5ns
- On-chip loop filter components
- 3.0-5.5V supply range
- 8-pin, 150-mil SOIC package

### Pin Configuration



**8 Pin SOIC**

### Block Diagram



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

# ICS9120-45



## Pin Descriptions

PIN NUMBER	PIN NAME	TYPE	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.

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## 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 5 V

V<sub>DD</sub> = +4.5 to +5.5 V, T<sub>A</sub> = 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 <sub>IL</sub>	VIN=0V (For -09 only)	-	-8.3	-18.0	μA
Input High Current	I <sub>IH</sub>	VIN=VDD (For -09 only)	-	-	5.0	μA
Output Low Voltage	V <sub>OL</sub> *	IOL=+10mA	-	0.15	0.4	V
Output High Voltage	V <sub>OH</sub> *	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 <sub>OH</sub> *	VOH=2.4V	-	-53.0	-35.0	mA
Supply Current	I <sub>CC</sub>	Unloaded	-	22.0	50.0	mA
Supply Current	I <sub>CC</sub>	Unloaded (For -09 only)	-	180.0	500.0	μA
Pull-up Resistor Value	R <sub>pu</sub> *	(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 <sub>f</sub> *	15pF load	-	0.7	1.5	ns
Rise Time 20% to 80%	T <sub>r</sub> *	15pF load	-	1.8	3.25	ns
Fall Time 80% to 20%	T <sub>f</sub> *	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 <sub>t</sub> *	15pF load @ 50% of VDD; REFCLK only	40.0	50.0	60.0	%
Jitter, One Sigma	T <sub>jis</sub> *	For all frequencies except REFCLK	-	85.0	-	ps
Jitter, Absolute	T <sub>jab</sub>	For all frequencies except REFCLK	-700.0	380.0	700.0	ps
Jitter, One Sigma	T <sub>jis</sub> *	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	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

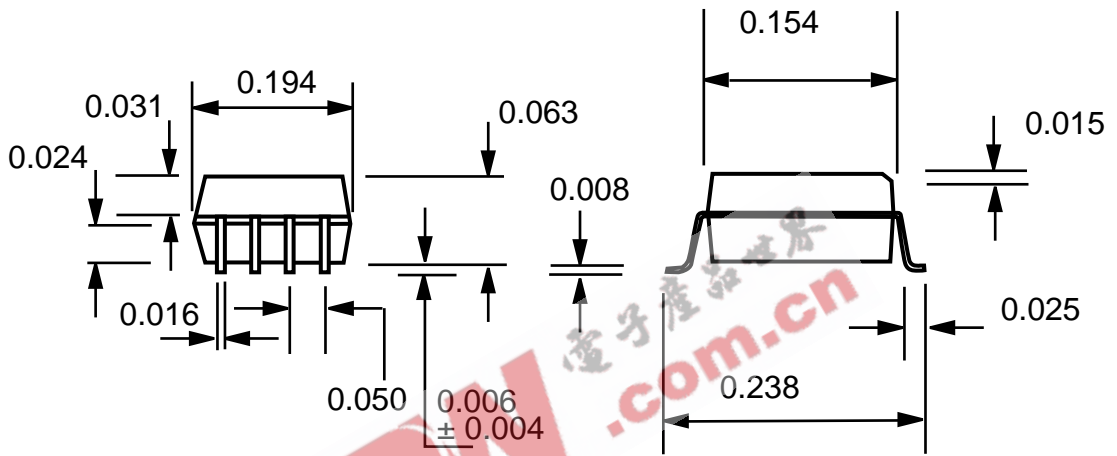
\* Parameter is guaranteed by design and characterization. Not 100% tested in production.



**Electrical Characteristics at 3.3 V**

DC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Low Voltage	$V_{IL}$		-	-	0.2VDD	V
Input High Voltage	$V_{IH}$		0.7VDD	-	-	V
Input Low Current	$I_{IL}$	VIN=0V (For -09 only)	-	-3.6	-8.0	$\mu$ A
Input High Current	$I_{IH}$	VIN=VDD (For -09 only)	-	-	5.0	$\mu$ A
Output Low Voltage	$V_{OL}^*$	IOL=6mA	-	0.05VDD	0.1	V
Output High Voltage	$V_{OH}^*$	IOH=-4.0mA	0.85VDD	0.94VDD	-	V
Output Low Current	$I_{OL}^*$	VOL=0.2VDD	15.0	24.0	-	mA
Output High Current	$I_{OH}^*$	VOH=0.7VDD	-	-13.0	-8.0	mA
Supply Current	$I_{CC}$	Unloaded	-	13.0	32.0	mA
Supply Current	$I_{CC}(PD)$	Unloaded (For -09 only)	-	50.0	110.0	$\mu$ A
Pull-up Resistor Value	$R_{pu}^*$	(For -09 only)	-	620.0	900.0	k ohm
AC Characteristics						
Rise Time 0.8 to 2.0V	$T_r^*$	15pF load	-	1.5	4.0	ns
Fall Time 2.0 to 0.8V	$T_f^*$	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%	$T_f^*$	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	$D_t^*$	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	$T_{jab}^*$	For all frequencies except REFCLK	-900.0	380.0	900.0	ps
Jitter, One Sigma	$T_{jis}^*$	REFCLK only	-	266.0	600.0	ps
Jitter, Absolute	$T_{jab}^*$	REFCLK only	-1.5	380.0	1.5	ns
Input Frequency	$F_i^*$		11.0	14.3	15.0	MHz
Output Frequency	$F_o^*$		11.0	-	38.0	MHz
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; -08 only)	-	5	-	pF

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8-Pin SOIC Package

### Ordering Information

#### ICS9120M-45

Example:

**ICS XXXX M-PPP**

