Accusilicon AS318-19 Low Noise Crystal Oscillator IC

Overview

AS318-19 is a low noise crystal oscillator IC supports 5MHz to 52MHz fundamental oscillation mode and 125℃ operation. This IC features low power consumption and low phase noise. It is ideal for miniature crystal oscillators.

Features

- Wide range of operating supply voltage: 1.60V to 3.63V
- Fundamental oscillator frequency range: 5MHz - 52MHz
- CMOS output
- Low power consumption
- Optimized low crystal drive level
- -40 to 125℃ operating temperature range
- High impedance in standby mode, oscillator stops
- 50±5% output duty cycle
- 15pF output drive capability

PAD Coordinates

XIN	（-165,-210）
XOUT	（165,-210）
VSS	（195,-40）
Q	（195,190）
VDD	(-195,190)
OE	(-195,-13)
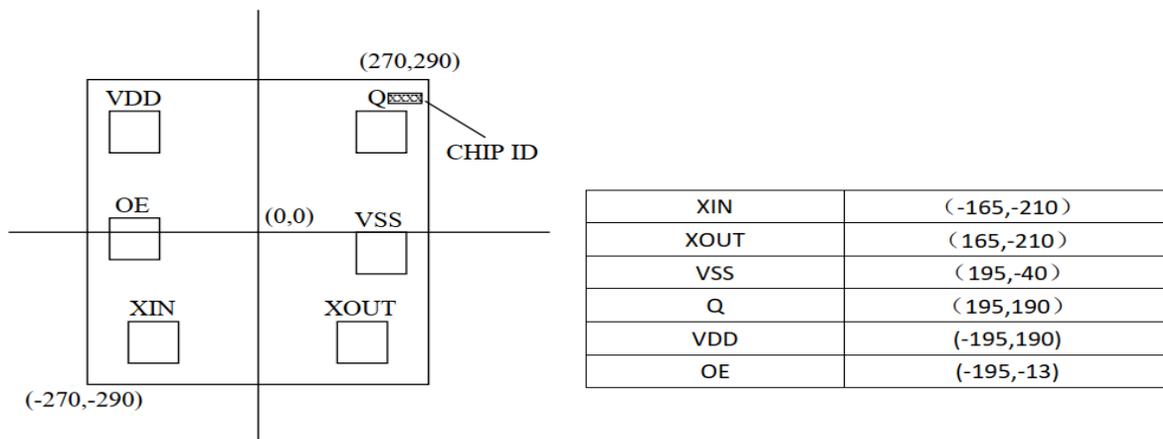
note: coordinate relative to the IC center, unit in um.

- Die size: 0.54mm X 0.58mm，Scribe line width: 80um
- AS318-19 will use Chip ID "ARJ2"
- PAD opening: 85umx85um
- Die thickness: 130um
- Chip base: Vss level

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PAD Functions

PAD Name	Function
VDD	Supply voltage
OE	Enable pin, with built-in pullup resistor, disable when LOW
XIN	Crystal connection
XOUT	Crystal connection
VSS	Ground
Q	Clock output

Block Diagram
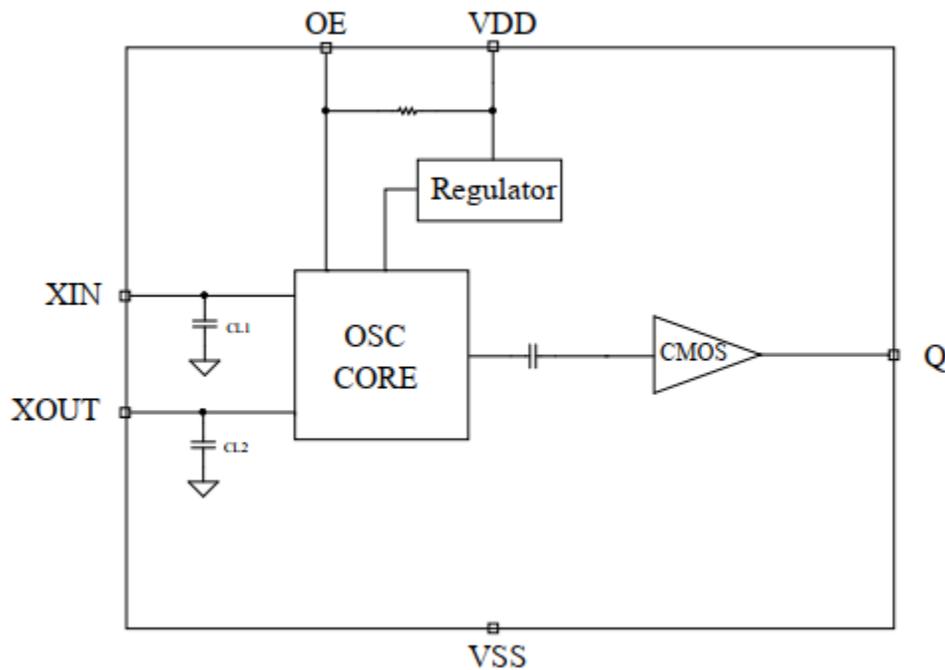
Electrical Specifications

Absolute Maximum Ratings

Symbol	Description	Min	Max	Unit
VDD	Supply Voltage		5.5	V
VIN	Input Voltages	-0.5	VDD+0.5	V
VOUT	Output Voltages	-0.5	VDD+0.5	V
TA	Operating Temperature	-40	125	°C
TS	Storage Temperature	-65	150	°C
ESD	HBM ESD Protection	2000		V

Recommended Operating Conditions (Vss=0V)

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit
Oscillator frequency	Fosc	VDD=1.6 to 3.63V	5		52	MHz
Output frequency	Fout	VDD=1.6 to 3.63V	5		52	MHz
Operating supply voltage	VDD	Between VDD and VSS	1.6		3.63	V
Input voltage	Vin	Input pins	Vss		VDD	V
Operating temperature	TA		-40		125	°C
Output load capacitance	Cout	Q output			15	pF

Note*: It is recommended that the power supply be filtered with a 0.1uF capacitor.

General Electrical Specification   (VDD=2.5~3.3V,Vss=0V,Temperature:-40~125°C)

Symbol	Description	Conditions	Min	Typ	Max	Unit
VOH	Q pin HIGH level		VDD-0.4		VDD	V
VOL	Q pin LOW level		0		0.4	V
VIH	OE pin HIGH level		0.7*VDD		VDD	V
VIL	OE pin LOW level		0		0.3*VDD	
Idd	Supply current	VDD=3.3V, @50MHz, 15Pf load		7.9	15.8	mA
Ist	Standby current				10	uA
Rpu	OE pull-up resistance		4.0	6.0	8.0	MΩ
CL1	Oscillator capacitance	Confirmed using monitor pattern on the wafer. Design value, excluding parasitic capacitance	5.4	6.8	8.2	pF
CL2	Oscillator capacitance		6.8	8.5	10.2	pF
DUTY	Clock Duty Cycle		45	50	55	%
Tr	Q pin rise time				5	ns
Tf	Q pin fall time				5	ns
Tpd	Q pin disable time				200	ns

Timing Chart

Figure 1. Output switching waveform

The diagram shows the output switching waveform with the following labels: $0.9V_{DD}$, $0.1V_{DD}$, T_W, T, t_r, t_f, and DUTY measurement voltage $0.5V_{DD}$, $\text{DUTY} = T_W / T \times 100\,(\%)$
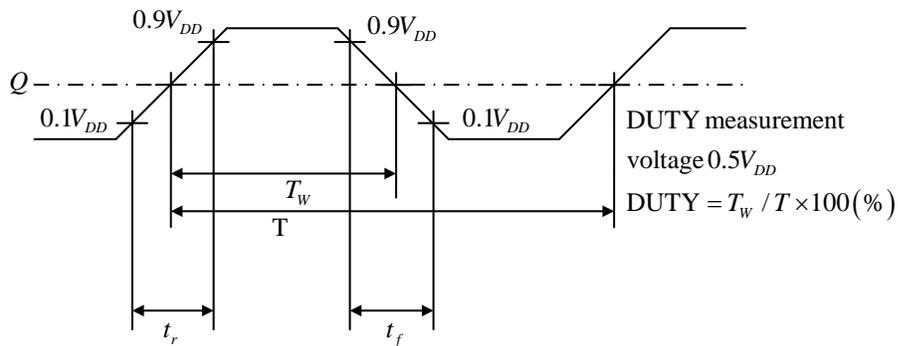
Function Description

OE pin function:

When OE pin is HIGH, AS318-19 is in working mode and Q outputs clock signal. When OE is LOW, Q output is in high impedance mode and AS318-19 is put to very low power stand-by mode. OE pin has an internal 6MΩ pull-up resistor.

OE Pin	Q pin output	Oscillator
HIGH or Open	Fout	Working
LOW	High-Z	Stopped

Oscillator detection function:

The AS318-19 IC has an oscillation detection circuit. The oscillation detection circuit disables the output until crystal oscillation becomes stable when oscillation circuit starts up. This function avoids the abnormal oscillation in the initial power up and in a reactivation by OE pin.
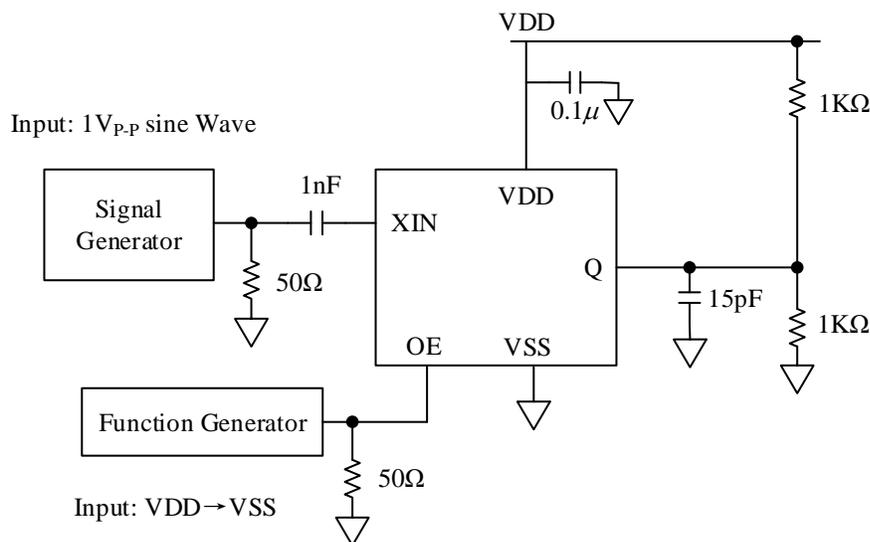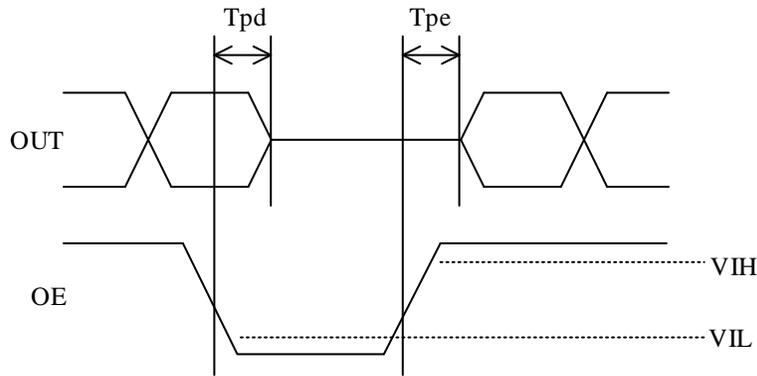
Measurement Circuits

Circuit #1: Measure Idd, Ist, DUTY, Tr, Tf
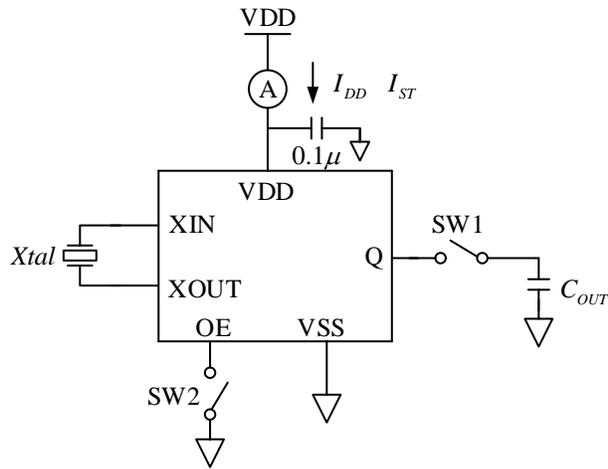
Parameter	SW1	SW2
Idd	OFF	OFF
Ist	ON or OFF	ON
DUTY, Tr, Tf	ON	OFF

Circuit #2: Measure Tpd

Input: $1V_{P-P}$ sine Wave

Input: VDD→VSS
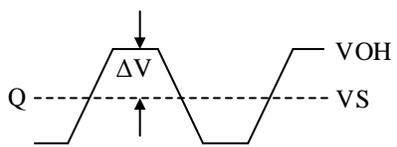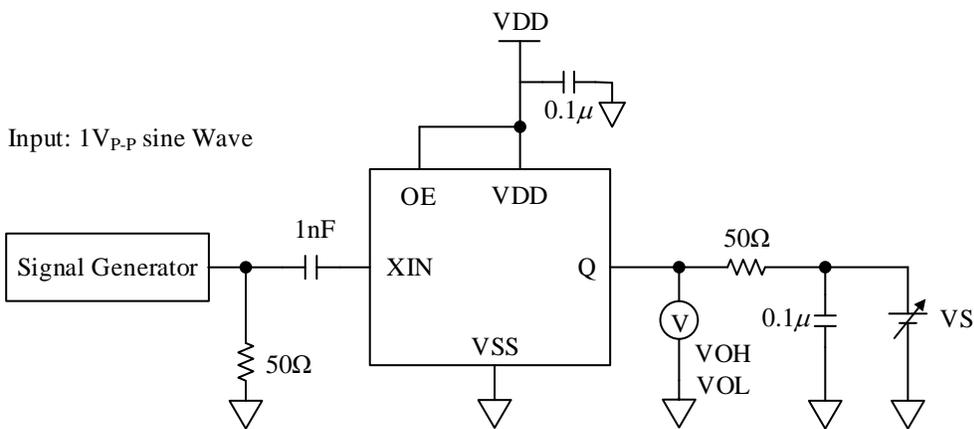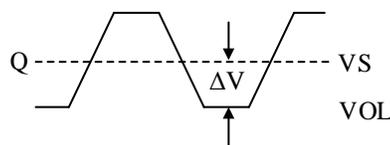
VIH: Threshold voltage for Output Start
VIL: Threshold voltage for Output Stop

Circuit #3: Measure VOH, VOL

Input: $1V_{P-P}$ sine Wave
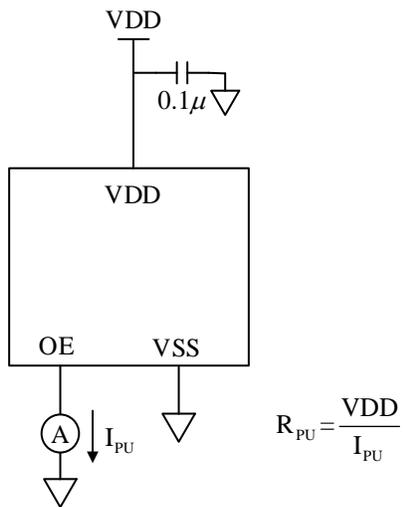
Adjust Vs so $\Delta V=50\times I_{OH}$ Adjust Vs so $\Delta V=50\times I_{OL}$

Circuit #4: Measure VIH, VIL

VDD

0.1μ

XIN

VDD

Q

Xtal

XOUT

OE   VSS

VIH
VIL   V

VIH: VSS→VDD voltage that
changes output state
VIL: VDD→VSS voltage that
changes output state

Circuit #5: Measure Rpu

VDD

0.1μ

VDD

OE   VSS

A I_{PU}
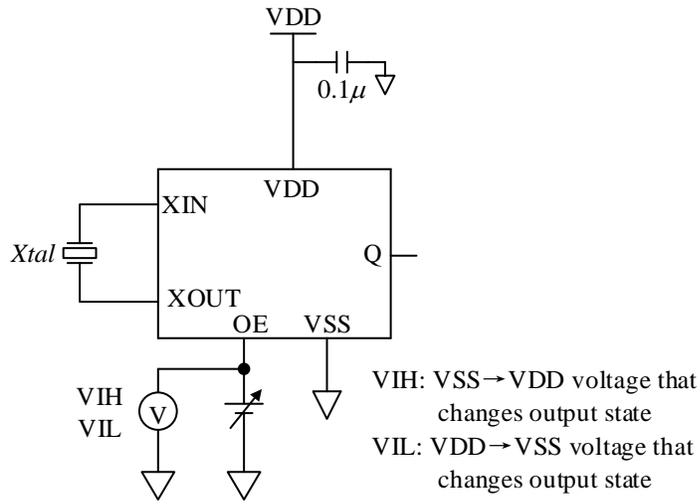
$$R_{PU} = \frac{VDD}{I_{PU}}$$

Reference Data

Output Waveforms (Crystal: 50MHz @3.3V,Output 50MHz):

Freq(1): 50.0MHz
Duty(1): 49.0%
Fall(1): 700ps
Rise(1): 1.35ns

Phase Noise: (Crystal: 50MHz @3.3V, Output: 50MHz)

Frequency offset	Phase Noise(dBc/Hz)
10Hz	-77.6
100Hz	-108.1
1KHz	-136.1
10KHz	-146.8
100KHz	-152.8
1MHz	-158.2
10MHz	-160.3

Drive Level: (Crystal: 50MHz, Output: 50MHz)

VDD	Drive level (uWatt)
3.3V	23.2

Negative Resistance: (Crystal: 50MHz @3.3V, Output: 50MHz C0=2pF) < -300Ω

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Ordering Information

Part No.	Package type
AS318-19-WF	Wafer from
AS318-19-DE	Die form