Features

- Wide range of operating supply voltage: 1.6V to 5.5V
- Low crystal drive current oscillation for miniature crystal units
- XO5127C/B-C series: for Wire Bonding
- XO5127Cx-C: C type package
- XO5127Bx-C: B type package (2016)
- -45 to 125℃ operating temperature range
- Crystal frequency (10MHz~60MHz)
- Output Freq: Crystal Freq divided by 1/2/4/8/16/32/64/128/256
- Very low standby current
- 50±5% output duty cycle
- 15pF output drive capability(C1/C2/C3/C4)
- 50pF output drive capability(C5/C6/C7/C8/C9)
- Die form or Wafer form

Description

The XO5127-C series are miniature crystal oscillator module ICs. The oscillator circuit stage has constant current drive, significantly reducing current consumption and crystal current, compared with existing devices, and significantly reducing the oscillator characteristics supply voltage dependency.

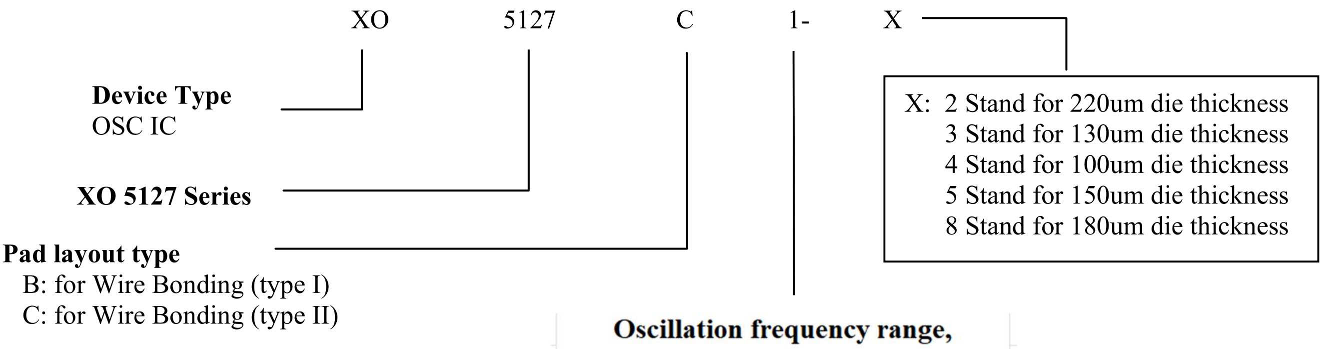
Applications

- Fundamental Crystal Oscillator
- 7050, 5032, 3225, 2520, 2016（XO5127B1-4-C）crystal oscillator

Ordering Information

Part No.	Package type
XO5127xy-zWF-C	Wafer form
XO5127xy-zDE-C	Die form

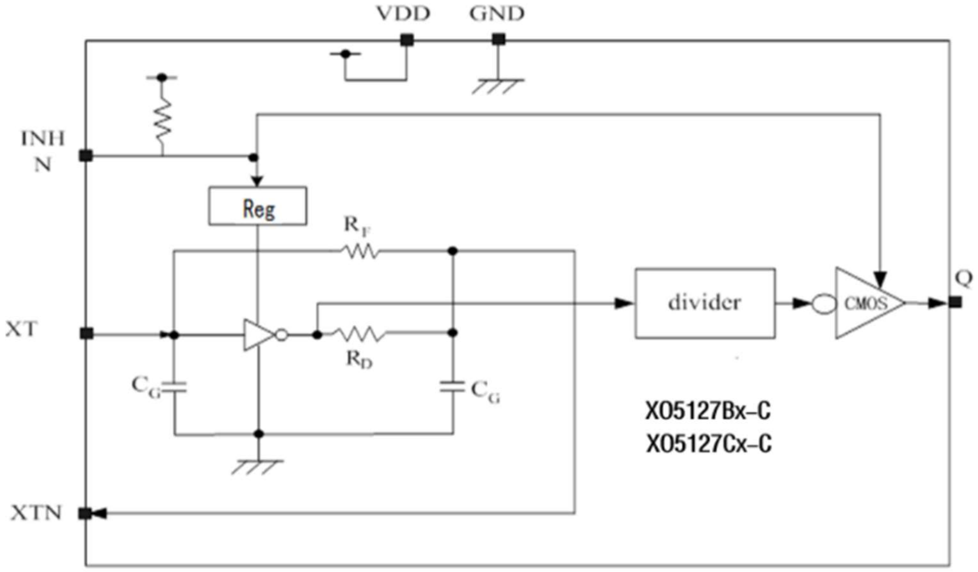
Note 1: x: B suitable for B Base, C suitable for C base
Note 2: y: 1/2/3/4/5/6/7/8/(1//2/4/8/16/32/64/128)
Note 3: z: -2(220um) or -3(130um), -4(100um), -5(150)



Oscillation frequency range, frequency divider function

Suffix	foutput	Frequency range
1	fo	10~60MHz
2	fo/2	
3	fo/4	
4	fo/8	
5	fo/16	
6	fo/32	
7	fo/64	20~60MHz
8	fo/128	
9	fo/256	

Block Diagram



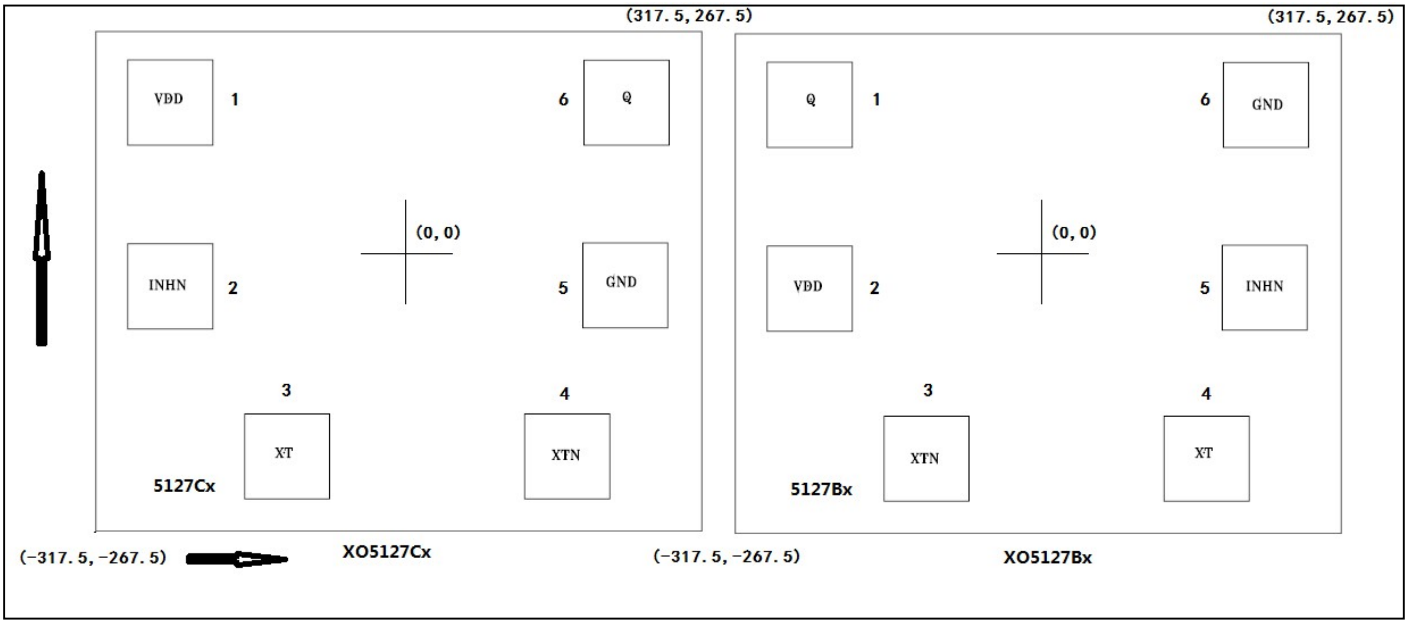
Function Description

Standby Function
When INHN goes LOW, the oscillator stops and the output on Q becomes high impedance.

INHN	Q	Oscillator
HIGH (or open)	F0/1/2/4/8/16/32/64/128 output frequency	Normal operation
Low	High impedance	Stopped

Power-saving Pull-up Resistor
The INHN pin pull-up resistance R_{UP1} or R_{UP2} changes in response to the input level (HIGH or LOW). When INHN is tied LOW level, the pull-up resistance is large (R_{UP1}), reducing the current consumed by the resistance. When INHN is left open circuit, the pull-up resistance is small (R_{UP2}), which increases the input susceptibility to external noise. However, the pull-up resistance ties the INHN pin HIGH level to prevent external noise from unexpectedly stopping the output.

Pin Configuration



Pad Coordinate File					
Pad Name	**X Coordinate**	**Y Coordinate**	**Pad Name**	**X Coordinate**	**Y Coordinate**
1	-214.85	168	4	158.35	-164.6
2	-214.85	-4.65	5	213.15	-3.85
3	-105.1	-164.6	6	214.2	167.9

Note: Substrate is connected to GND or floating.

Die Size: 635μm*535μm (Including scribe line)
Die Thickness: 130μm±15μm (-3) or 220um±20um (-2), 100um±15um (-4), 150um+/-15um (-5)
Pad Size: 80μm*80μm **Substrate Level:** GND or Floating

Pin Description

Pin Name	Type	Description	
XTN	O	Amplifier output.	Crystal oscillator connected between XT and XTN
XT	I	Amplifier input.	
INHN	I	Output state control input. Output High when LOW. Power-saving pull-up resistor built in.	
V_{DD}	P	Supply voltage	
GND	P	Ground	
Q	O	Output. Output frequency determined by fundamental crystal (f0 divided by 1/2/4/8/16/…/256)	

Absolute Maximum Ratings

Storage Temperature..- 65°C to +150°C
Supply Voltage to Ground Potential (V_{DD} to GND)............- 0.5V to +7.0V
DC Input (All Other Inputs except V_{DD} & GND) ... -0.5V to V_{DD} +0.5V
DC Output.. -0.5V to V_{DD} +0.5V
DC Output Current (all outputs)... 20mA

Note:
Stresses greater than those listed under 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 this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operating Conditions

(GND=0V, unless otherwise noted.)

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
V_{DD}	Supply voltage	-	1.6	-	5.5	V
T_A	Operating temperature	-	-45		+125	°C
f_0	Oscillation frequency*1	XO5127B/Cx-C (x=1/2/3/4/5/6)	10		60	MHz
		XO5127B/Cx-C (x =7/8/9)	20		60	MHz

DC Electrical Characteristics

XO5127C/B-C (VDD = 1.60 to 5.5V, TA = -40 to 85°C, unless otherwise noted.)

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
HIGH-level output voltage	V_{OH}	I_{OH}=1mA	V_{DD}-0.4	-	-	V
LOW-level output voltage	V_{OL}	I_{OL}=1mA	-	-	0.4	
HIGH-level input voltage	V_{IH}	OE Measurement	0.7V_{DD}	-	-	V
LOW-level input voltage	V_{IL}	OE Measurement	-	-	0.3V_{DD}	
Operating current	I_{CC}	V_{DD} =1.8V(25MHz), no loading	-	0.6	0.9	mA
		V_{DD} =3.3V(25MHz), no loading	-	1.0	1.5	mA
		V_{DD} =1.8V(40MHz), no loading	-	1.5	2.3	mA
		V_{DD} =3.3V(40MHz), no loading	-	2.5	3.8	mA
Standby Current	Isb	OE=off			10	uA
OE pull-up resistance	R_{PULL}	V_{DD} = 3.3V	-	2	-	MΩ
Output leakage current	I_Z	OE=OFF V_O =V_{DD}	-	-	10	μA

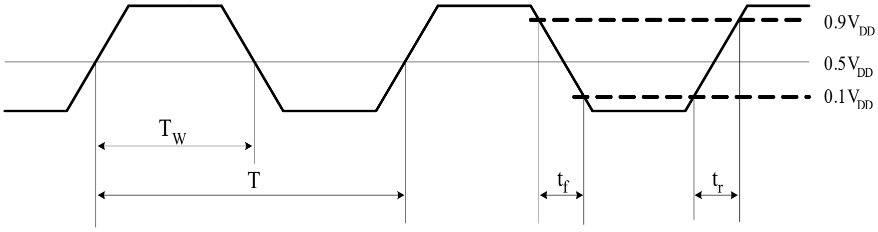
AC Electrical Characteristics

XO5127C/B-C, T_A=-40 to 85°C unless otherwise noted

Parameter	Symbol	Condition		MIN	TYP	MAX	Unit
Output Disable Delay	t_{OD}	Output Disable Function (OE)		-	-	100	ns
Output Enable Delay	t_{STR}	Output Enable Function (OE)		-	-	2	ms
Output rise time	t_r	C_L=15PF, 0.1VDD to 0.9VDD	V_{DD}=3.3V	-	1.85	3.5	ns
Output fall time	t_f	C_L=15PF, 0.1VDD to 0.9VDD	V_{DD}=3.3V	-	1.85	3.5	ns
Output duty cycle	Duty	T_A=25°C, C_L=15pF		45	50	55	%
V_{DD} Sensitivity Frequency vs. VDD+/-10%		Frequency vs. V_{DD}+/-10%		-1	-	1	ppm
OSC frequency range	f_R	Fundamental Crystal	XO5127B/Cx-C (x=1/2/3/4/5/6)	10		60	MHz
			XO5127B/Cx-C (x =7/8/9)	20		60	MHz

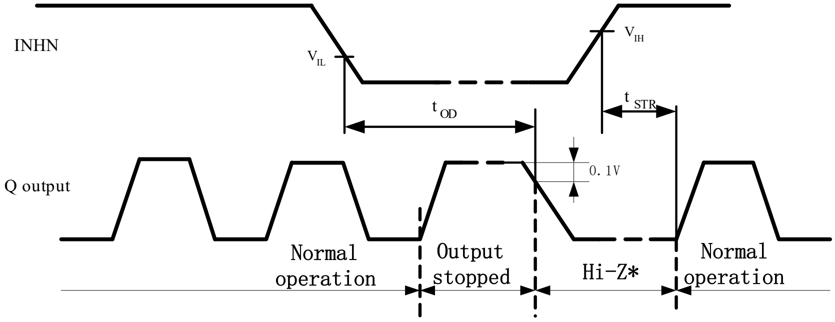
Output Waveform

Output switching waveform



DUTY=Tw/T×100(%)

Output disable and oscillation start timing chart



When INHN goes HIGH to LOW, the Q output goes HIGH once and then becomes high impedance.
When INHN goes LOW to HIGH, the Q output from high impedance to normal output operation when the oscillation starts (oscillation is detected)
*: the high –impedance interval in the figure is shown as a LOW level due to the 1KΩ pull-down resistor connected to the Q pin(see“Measurement circuit 2”in the “Measurement circuits” section)

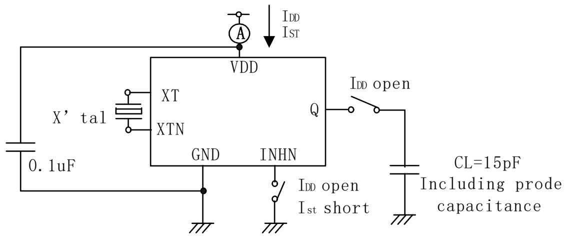
Crystal Specifications

Parameters	Symbol	Conditions	MIN	TYP	MAX	Unit
Fundamental Crystal Resonator Frequency (XO5127B/Cx-C)	F_{XIN}	x=1/2/3/4/5/6	10		60	MHz
		x=7/8/9	20		60	MHz
Maximum Sustainable Drive Level		-	-	-	200	µW
Operating Drive Level		-	-	50	-	µW
Crystal Shunt capacitance	C_O	-	-	-	4	pF
Effective Series Resistance, Fundamental, 10-50MHz	ESR	-	-	-	30	Ω

Measurement Circuit

Measurement cct1

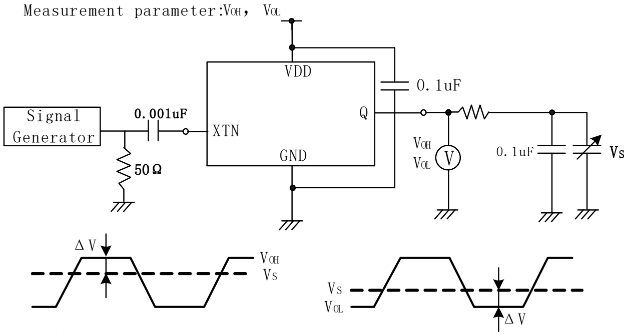
Measurement parameter:I_{DD}, I_{ST}, Duty, t_r, t_f



Note:The AC characteristics are observed using an oscilloscope on pin Q

Measurement cct3

Measurement parameter:V_{OH}, V_{OL}

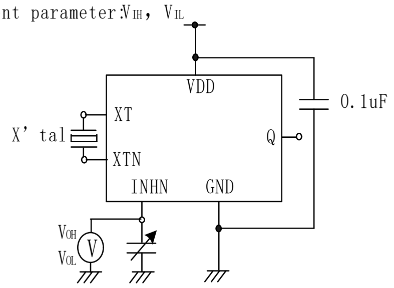


V_S adjusted such that $\Delta V=50\times I_{OH}$ V_S adjusted such that $\Delta V=50\times I_{OL}$

XTN input signal:1Vp-p,sina wave

Measurement cct4

Measurement parameter:V_{IH}, V_{IL}



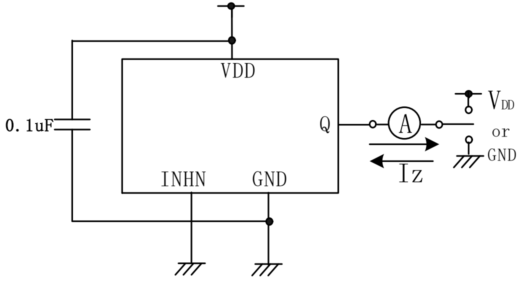
V_{IH}:Voltage is 0V to V_{DD} transition that changes the output state.

V_{IL}:Voltage is V_{DD} to 0V transition that changes the output state.

INHN has an oscillation stop function

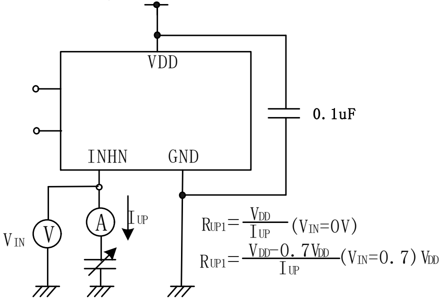
Measurement cct5

Measurement parameter: zI



Measurement cct6

Measurement parameter:R_{UP1}, R_{UP2}



Revision History

Revision	Description	Date
V1.0	1. Initial release	2024/7/4
V1.1	1．XO5127-C Frequency Range from 12~60MHz to 10~60MHz. 2．Update Icc according to the test results.	2024/8/23
V1.2	1. Update XO5127C7-C、XO5127C8-C Frequency Range from 10~60MHz to 20~60MHz.	2025/8/25