



Features

- Wide range of operating supply voltage:
 - XO6629CA-C(10~24MHz): 1.35V to 5.5V
 - XO6629CZ-C(12~33MHz): 1.35V to 5.5V
 - XO6629CB-C(12~35MHz): 1.62V to 5.5V
- Low crystal drive current oscillation for miniature crystal units
- Ultra-Low power consumption
(35uA/1.5V@XO6629CZ-C)
- XO6629CA(Z/B) series: for Wire Bonding Type C
- -45 to 125°C operating temperature range
- Crystal frequency 16.777216M
(XO6629CA-C /512)
- Crystal frequency 25.165824M
(XO6629CZ-C/768)
- Crystal frequency 33.554432M
(XO6629CB-C/1024)
- Output Freq: Crystal Freq divided by 512/768/1024
- Very low standby current
- 50±5% output duty cycle
- 15pF output drive capability
- Die form or Wafer form

Description

The XO6629CA(Z/B)-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.

Application

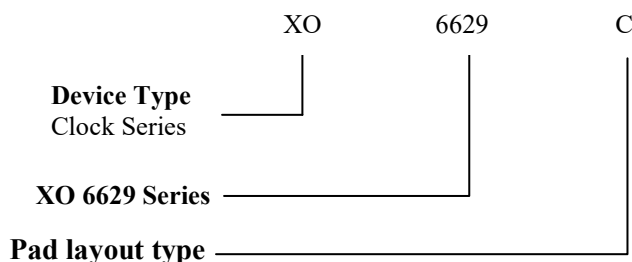
- 32.768KHz Crystal Oscillator
- 7050, 5032, 3225, 2520, 2016 crystal oscillator

Ordering Information

Part no.	Package type
XO6629CA-zWF-C	Wafer form
XO6629CZ-zWF-C	Wafer form
XO6629CB-zWF-C	Wafer form
XO6629CA-zDE-C	Die form
XO6629CZ-zDE-C	Die form
XO6629CB-zDE-C	Die form

Note 1: C suitable for C base

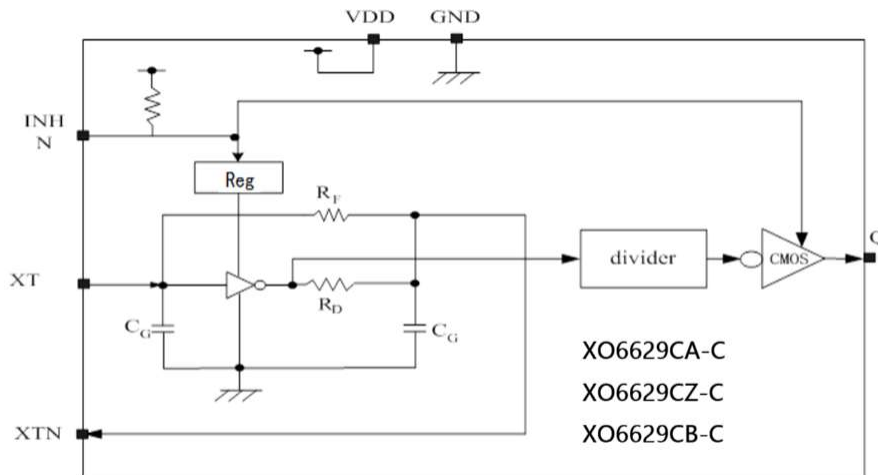
Note 2: z: -3(130um), -4(100um)



Oscillation frequency range, frequency divider function		
Suffix	f _{OUTPUT}	Frequency range
A	F ₀ /512	10~24MHz
Z	F ₀ /768	12~33MHz
B	F ₀ /1024	12~35MHz



Block Diagram



Function Description

Standby Function

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

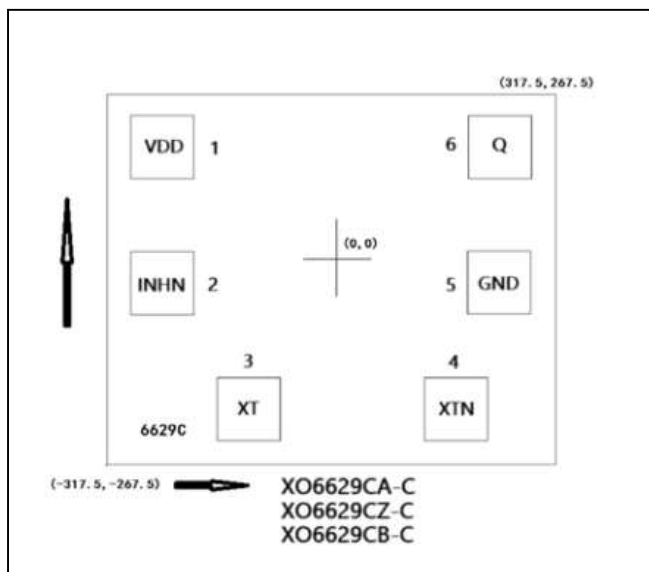
INHN	Q	Oscillator
HIGH (or open)	Output frequency	Normal operation
Low	High impedance	Stopped

Power-saving Pull-up Resistor

The INHN pin pull-up resistance RUP1 or RUP2 changes in response to the input level (HIGH or LOW). When INHN is tied LOW level, the pull-up resistance is large (RUP1), reducing the current consumed by the resistance. When INHN is left open circuit, the pull-up resistance is small (RUP2), 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.



Pad 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: 570μm*470μm (Not include scribe line), scribe line: 60μm

Die Thickness: 130μm±15μm (-3), 100μm±15μm (-4)

Pad Size: 80μm*80μm

Substrate Level: GND or Floating

Pad Description

Sym.	Type	Description	
XTN	O	Amplifier output.	Crystal oscillator connected between XT and XTN
XT	I	Amplifier input.	
INH	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	



Maximum Ratings

Storage Temperature	-65°C to +150°C
Supply Voltage to Ground Potential (V_{DD} to GND)	-0.5V to +5.5V
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.)

Sym.	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	Supply voltage	XO6629CA/Z-C	1.35	-	5.5	V
		XO6629CB-C	1.62		5.5	
T_A	Operating temperature	-	-45	+25	+125	°C
f_0	Oscillation frequency* ¹	XO6629CA-C	10	16.777216	24	MHz
		XO6629CZ-C	12	25.165824	33	
		XO6629CB-C	12	33.554432	35	

DC Electrical Characteristics

XO6629CA(Z/B)-C, T_A =-45 to 125°C unless otherwise noted

Parameter	Sym	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	$0.7V_{CC}$	-	-	V
LOW-level input voltage	V_{IL}	OE Measurement	-	-	0.4	
Operating Current	I_{DD1}	$V_{DD}=1.8V(XO6629CA-C)/512$, no load	-	45	70	uA
	I_{DD2}	$V_{DD}=3.3V(XO6629CA-C)/512$, no load	-	50	80	uA
	I_{DD3}	$V_{DD}=1.8V(XO6629CZ-C)/768$, no load	-	45	70	uA
	I_{DD4}	$V_{DD}=3.3V(XO6629CZ-C)/768$, no load	-	50	80	uA
	I_{DD5}	$V_{DD}=1.8V(XO6629CB-C)/1024$, no load		70	100	uA
	I_{DD6}	$V_{DD}=3.3V(XO6629CB-C)/1024$, no load		90	120	uA
Standby Current	I_{SB}	OE=GND			10	uA
OE pull-up resistance	R_{PULL}	$V_{DD}=3.3V$	-	2	-	MΩ
Output leakage current	I_Z	OE=GND $V_O=0$ or V_{DD}	-	-	10	μA

AC Characteristics

XO6629CA(Z/B)-C, T_A =-45 to 125°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	$Tr1$	1.8V/15pf, $0.2V_{DD}$ to $0.8V_{DD}$	-	15	25	ns
Output fall time	$Tf1$	1.8V/15pf, $0.8V_{DD}$ to $0.2V_{DD}$	-	15	25	ns
Output rise time	$Tr2$	3.3V/15pf, $0.1V_{DD}$ to $0.9V_{DD}$	-	12	25	ns
Output fall time	$Tf2$	3.3V/ 15pf, $0.9V_{DD}$ to $0.1V_{DD}$	-	12	25	ns
Output duty cycle	Duty	$T_A=25^\circ C$, $C_L=15pF$	45	50	55	%
Sensitivity of Frequency vs. V_{DD}		Frequency vs. $V_{DD}\pm 10\%$	-1	-	+1	ppm

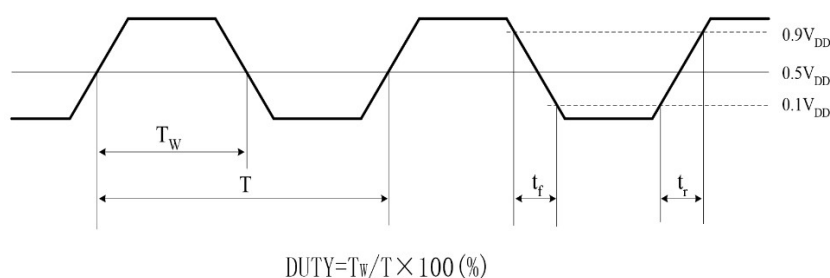


Crystal Specifications

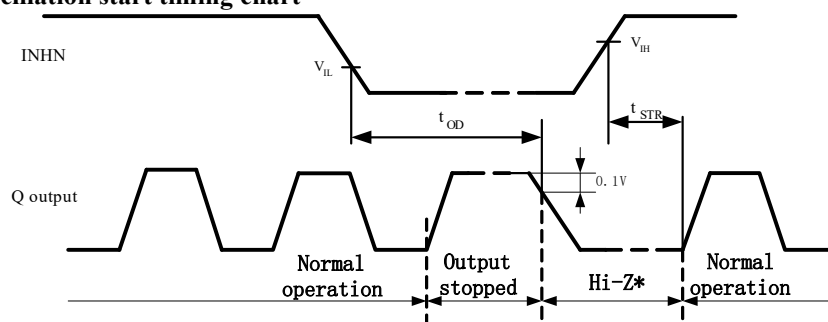
Parameters	Sym	Conditions	Min	Typ	Max	Units
Fundamental Crystal Resonator Frequency (XO6629CA-C)	F _{XIN}	-	-	16.777216	-	MHz
Fundamental Crystal Resonator Frequency (XO6629CZ-C)	F _{XIN}	-	-	25.165824	-	MHz
Fundamental Crystal Resonator Frequency (XO6629CB-C)	F _{XIN}	-	-	33.554432	-	MHz
Maximum Sustainable Drive Level		-	-	-	100	μW
Operating Drive Level		-	-	20	-	μW
Crystal Shunt capacitance	C _O	-	-	-	3	pF
Effective Series Resistance, Fundamental, 10-33MHz	ESR	-	-	-	30	Ω

AC Electrical Characteristics

Output switching waveform



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)

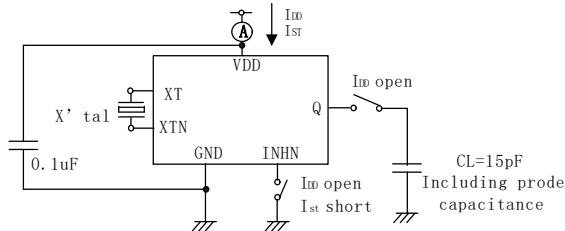
*: the high -impedance interval in the figure is shown as a LOW level due to the 1K Ω pull-down resistor connected to the Q pin(see “Measurement circuit 2” in the “Measurement circuits” section)



Measurement Circuit

Measurement cct1

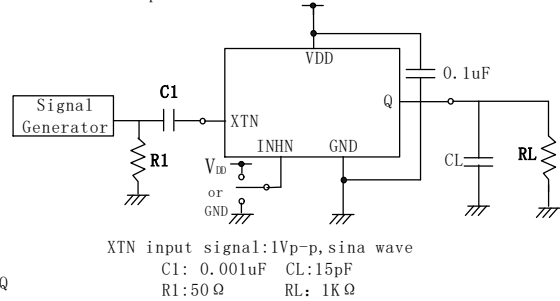
Measurement parameter: I_{DD} , I_{ST} , Duty, t_r , t_f



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

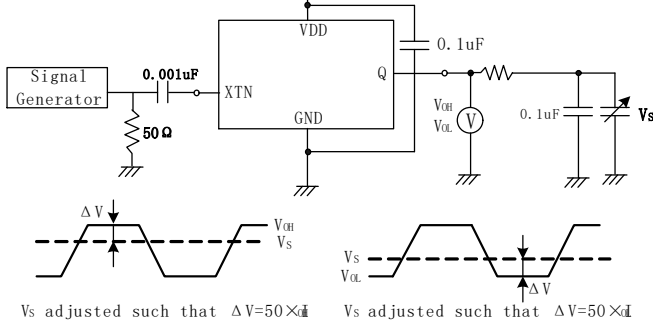
Measurement cct2

Measurement parameter: t_{DD}



Measurement cct3

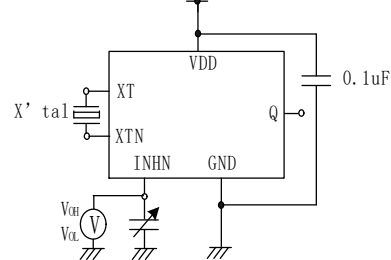
Measurement parameter: V_{OH} , V_{OL}



XTN input signal: 1Vp-p, sine wave

Measurement cct4

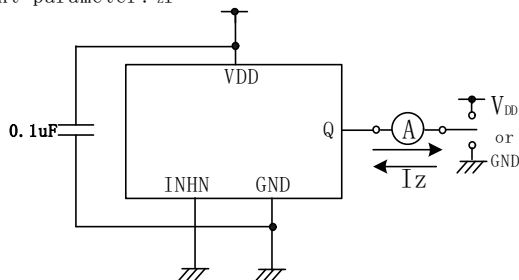
Measurement parameter: V_{IH} , V_{IL}



V_{IH} : Voltage is 0V to $\bar{H}$ transition that changes the output state.
 V_{IL} : Voltage is $\bar{H}$ to 0V transition that changes the output state.
INHN has an oscillation stop function

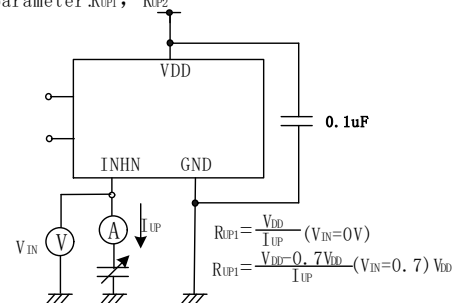
Measurement cct5

Measurement parameter: zI



Measurement cct6

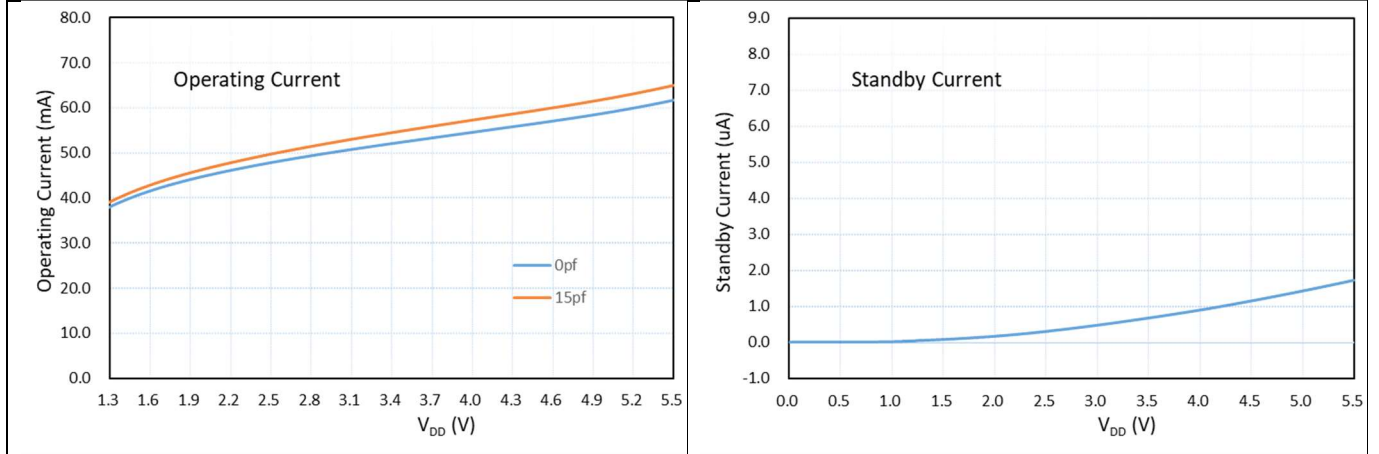
Measurement parameter: R_{UP1} , R_{F2}



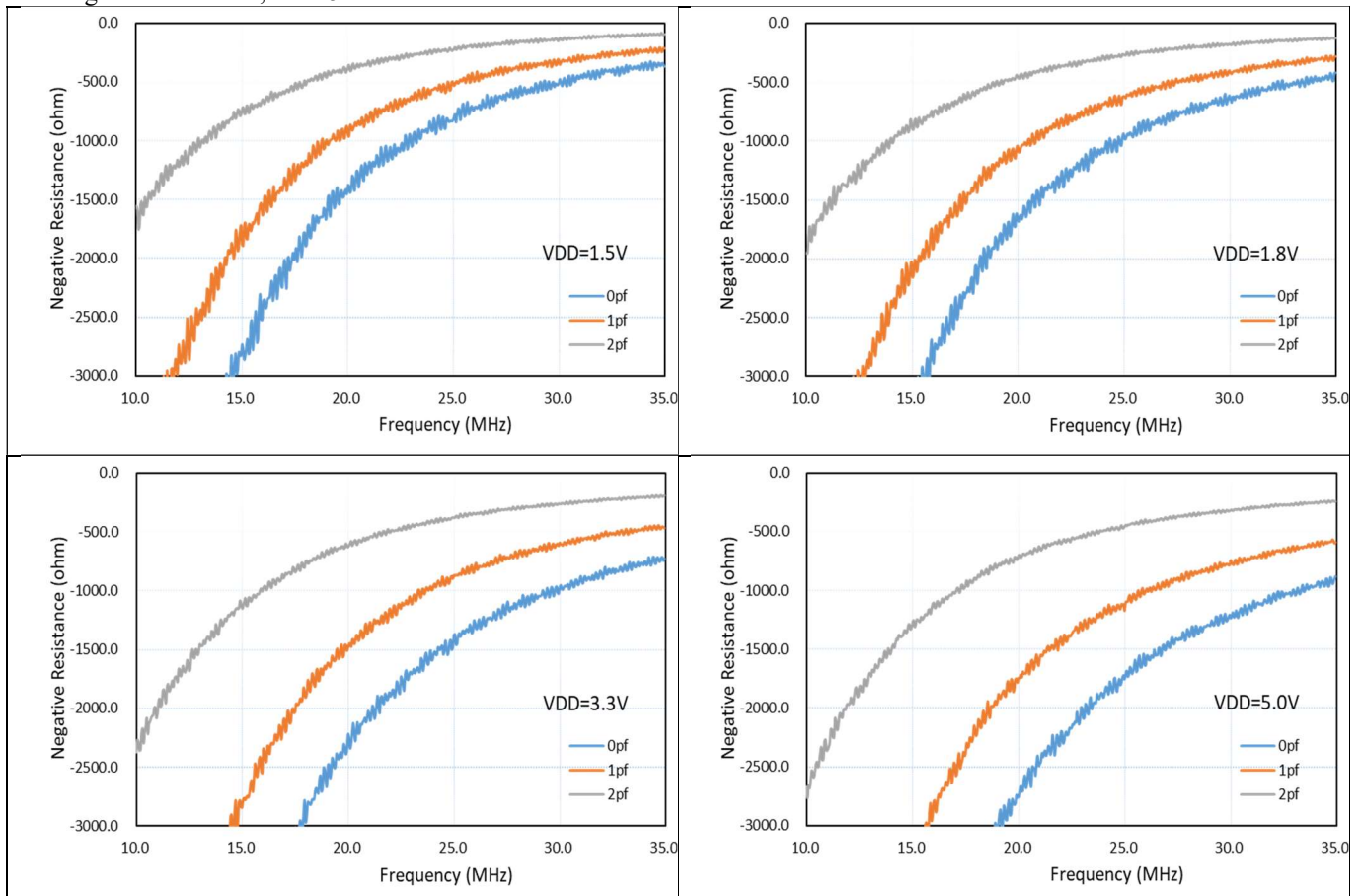


Test figure: XO6629CA-C

1. I_{DD} and I_{SB} , $T_a=25^\circ\text{C}$



2. Negative resistance, $T_a=25^\circ\text{C}$





Revision History:

Revision	Description	Date
VA.0	Initiated	2022/12/8
V1.0	Add XO6629C1~C5 -C	2023/12/7
V2.0	Delete XO6629C1~C5 -C	2024/4/26
V2.1	Updated Part No. and Tr/Tf	2024/11/21
V2.2	Add XO6629CB -C	2025/8/20