Features

- Wide range of operating supply voltage: 1.5V to 5.5V
- Operation Frequency Range
  - XO6629Cx-C(10~33MHz)
- Low crystal drive current oscillation for miniature crystal units
- Ultra-Low power consumption (280uA/1.8V@XO6629C3-C)
- XO6629Cx-C series: for Wire Bonding Type C
- -45 to 125℃ operating temperature range
- Output Freq: Crystal Freq divided by 1/2/4/8/16
- Very low standby current
- 50±5% output duty cycle
- 15pF output drive capability
- Die form or Wafer form

Description

The XO6629Cx-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.

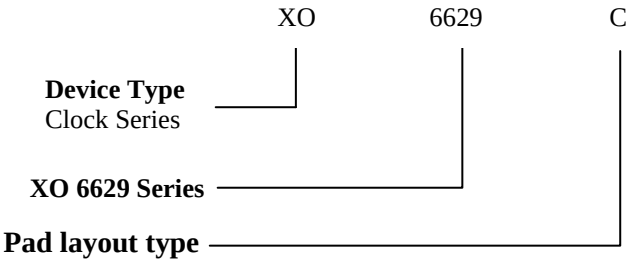
Application

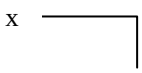
- MHz output low current
- 7050, 5032, 3225, 2520, 2016 crystal oscillator

Ordering Information

Part no.	Package type
XO6629Cx-C-zWF	Wafer form
XO6629Cx-C-zDE	Die form

Note 1: C suitable for C base
Note 2: z: -8(180um) or -3(130um), -4(100um)
Note 3: x: 1~5

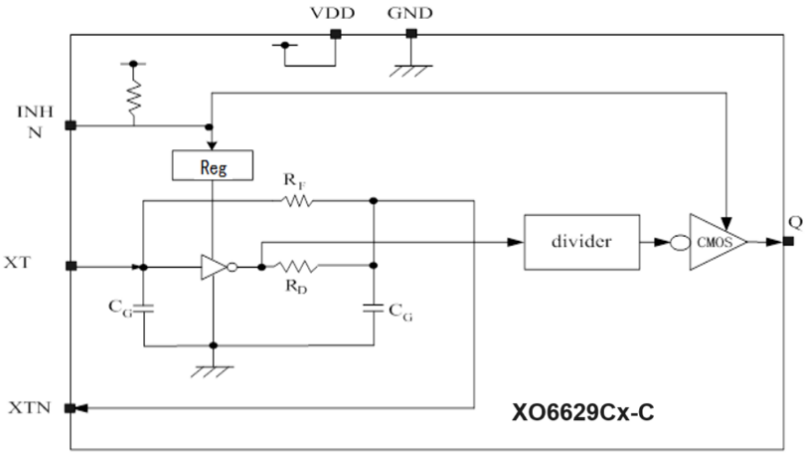




Oscillation frequency range, frequency divider function

Suffix	f_{output}	Frequency range
1	f_O	10 to 33MHz
2	$f_O/2$	
3	$f_O/4$	
4	$f_O/8$	
5	$f_O/16$	

Block Diagram



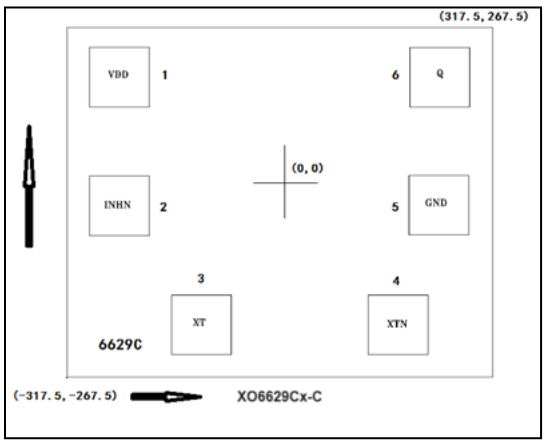
Function Description

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) or 220um±20um (-2), 100um±15um (-4), 150um+/-15um (-5) **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.	
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	

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 condi-tions above those indicated in the operational sec-tions 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	-	1.5	-	5.5	V
T_A	Operating temperature	-	-45	+25	+125	°C
f_0	Oscillation frequency*1	-	10		33	MHz

DC Electrical Characteristics

XO6629Cx-C(V_{DD} = 1.50 to 5.5V, 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		0.7Vcc	-	-	V
LOW-level input voltage	V_{IL}	OE Measurement		-	-	0.4	
	I_{DD1}	V_{DD} =1.8V(XO6629C1-C), no load			415		uA
	I_{DD2}	V_{DD} =3.3V(XO6629C1-C), no load			650		uA
	I_{DD3}	V_{DD} =1.8V(XO6629C2-C), no load			330		uA
	I_{DD4}	V_{DD} =3.3V(XO6629C2-C), no load			560		uA
	I_{DD5}	V_{DD} =1.8V(XO6629C3-C), no load			280		uA
	I_{DD6}	V_{DD} =3.3V(XO6629C3-C), no load			490		uA
	I_{DD7}	V_{DD} =1.8V(XO6629C4-C), no load			180		uA
	I_{DD8}	V_{DD} =3.3V(XO6629C4-C), no load			370		uA
	I_{DD9}	V_{DD} =1.8V(XO6629C5-C), no load			140		uA
	I_{DD10}	V_{DD} =3.3V(XO6629C5-C), no load			245		uA
Standby Current	I_{SB}	OE=off				10	uA
OE pull-up resistance	R_{PULL}	V_{DD} = 3.3V		-	6	-	MΩ
Output leakage current	I_Z	OE=OFF	V_O =V_{DD}	-	-	10	μA

AC Characteristics

XO6629Cx-C, T_A=-45 to 125℃ unless otherwise noted

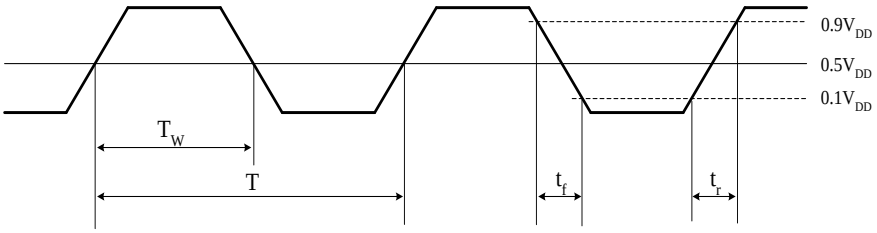
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Disable Delay	t_{OD}	Output Disable Function (OE)	-	-	100	ns
Output Enable Delay	t_{STR}	Output Enable Function (OE)	-	-	2	ms
Output rise time	Tr1	XO6629C1-C，0.1V_{DD} to 0.9V_{DD} V_{DD}=3.3V, C_L=15pf	-	2.5	4	ns
	Tr2	XO6629C2-C，0.1V_{DD} to 0.9V_{DD} V_{DD}=3.3V, C_L=15pf		3	5	ns
	Tr3	XO6629C3-C，0.1V_{DD} to 0.9V_{DD} V_{DD}=3.3V, C_L=15pf		3.5	6	ns
	Tr4	XO6629C4-C，0.1V_{DD} to 0.9V_{DD} V_{DD}=3.3V, C_L=15pf		4	7	ns
	Tr5	XO6629C5-C，0.1V_{DD} to 0.9V_{DD} V_{DD}=3.3V, C_L=15pf		4.5	8	ns
Output fall time	Tf1	XO6629C1-C，0.9V_{DD} to 0.1V_{DD} V_{DD}=3.3V, C_L=15pf	-	2.5	4	ns
	Tf2	XO6629C2-C，0.9V_{DD} to 0.1V_{DD} V_{DD}=3.3V, C_L=15pf		3	5	ns
	Tf3	XO6629C3-C，0.9V_{DD} to 0.1V_{DD} V_{DD}=3.3V, C_L=15pf		3.5	6	ns
	Tf4	XO6629C4-C，0.9V_{DD} to 0.1V_{DD} V_{DD}=3.3V, C_L=15pf		4	7	ns
	Tf5	XO6629C5-C，0.9V_{DD} to 0.1V_{DD} V_{DD}=3.3V, C_L=15pf		4.5	8	ns
Output duty cycle	Duty	T_A=25℃, C_L=15pF	45	50	55	%
V_{DD} Sensitivity		Frequency vs. V_{DD}+/-10%	-1	-	+1	ppm
OSC frequency range	f_R	Fundamental Crystal	10		33	MHz

Crystal Specifications

Parameters	Sym	Conditions	Min	Typ	Max	Units
Fundamental Crystal Resonator Frequency (XO6629Cx-C)	F_{XIN}	-	10		33	MHz
Maximum Sustainable Drive Level		-	-	-	100	μW
Operating Drive Level		-	-	20	-	μW
Crystal Shunt capacitance	C_O	-	-	-	4	pF
Effective Series Resistance, Fundamental, 10-33MHz	ESR	-	-	-	30	Ω

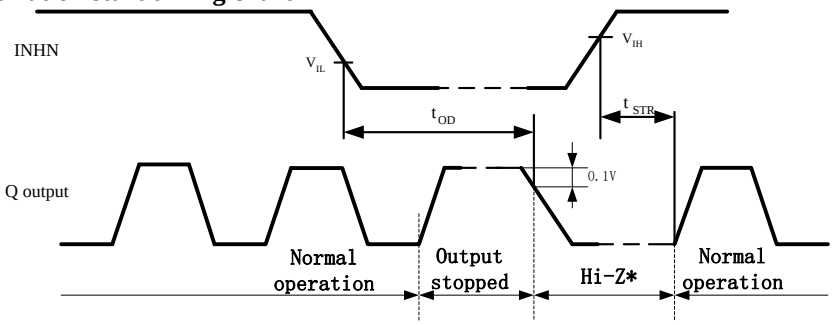
AC Electrical Characteristics

Output switching waveform



DUTY=Tw/T×100(%)

Output disable and oscillation start timing chart

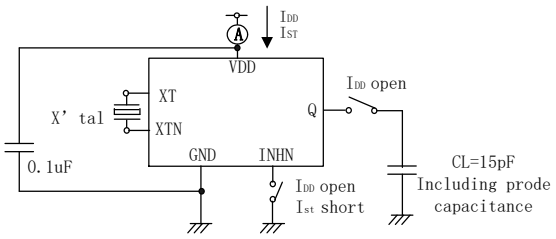


When INHN goes HIGH to LOW, the Q output goes HIGH once and then becomes high impedance.
When INHN goes LOW to HIGH, the Q output from high impedance to normal output operation when the oscillation starts (oscillation is detected)
*: the high –impedance interval in the figure is shown as a LOW level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

Measurement Circuit

Measurement cct1

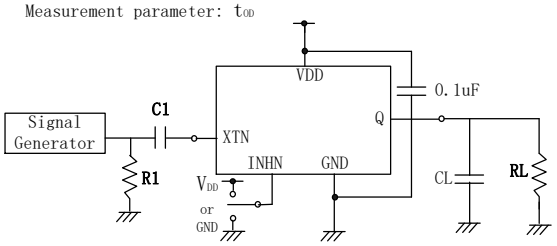
Measurement parameter: I_{DD}, I_{ST}, Duty, t_r, t_f



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

Measurement cct2

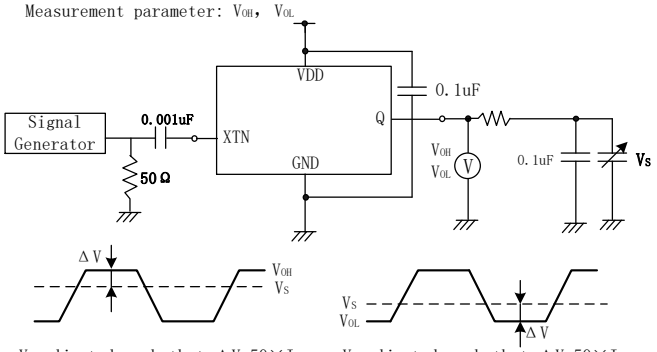
Measurement parameter: t_{OD}



XTN input signal:1Vp-p,sina wave
C1: 0.001uF CL:15pF
R1:50Ω RL: 1KΩ

Measurement cct3

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

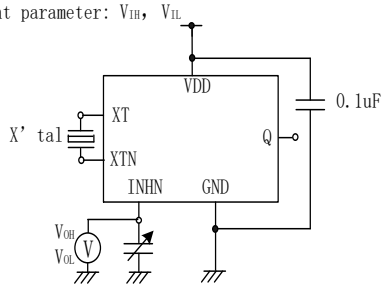


Vs adjusted such that ΔV=50×I_{OH} Vs adjusted such that ΔV=50×I_{OL}

XTN input signal:1Vp-p,sina wave

Measurement cct4

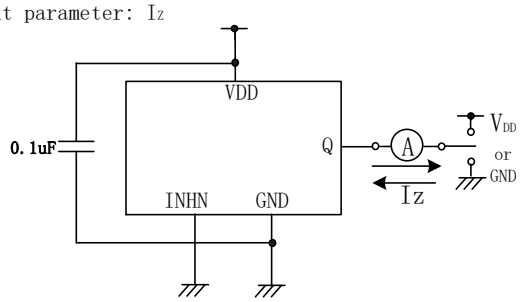
Measurement parameter: V_{IH}, V_{IL}



V_{IH}:Voltage is OV to V_{DD} transition that changes the output state.
V_{IL}:Voltage is V_{DD} to OV transition that changes the output state.
INHN has an oscillation stop function

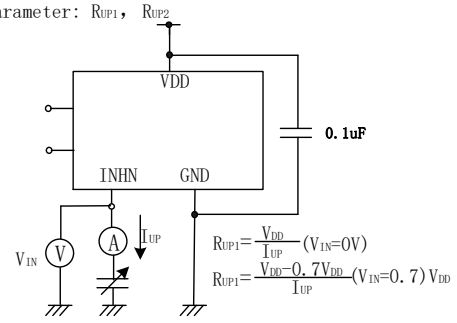
Measurement cct5

Measurement parameter: I_Z



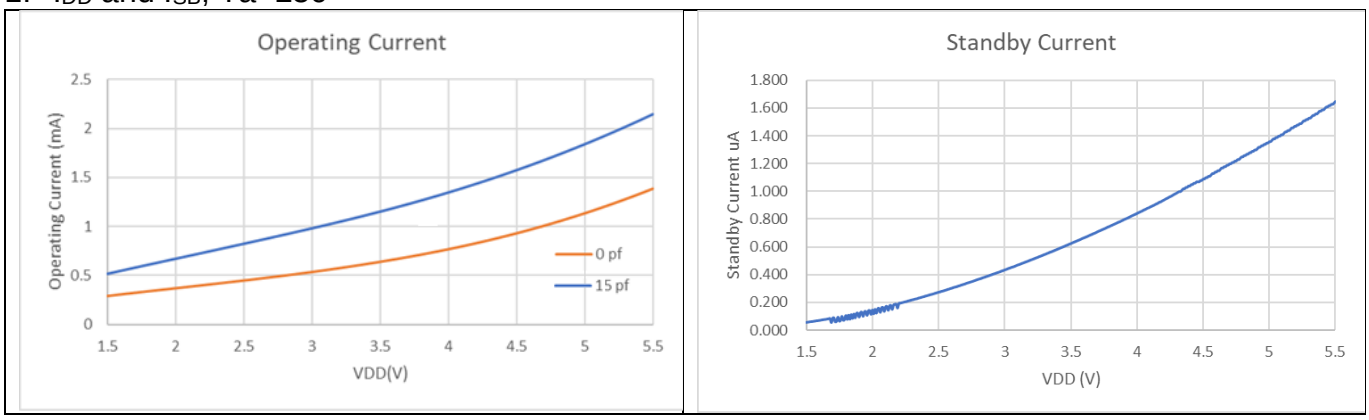
Measurement cct6

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

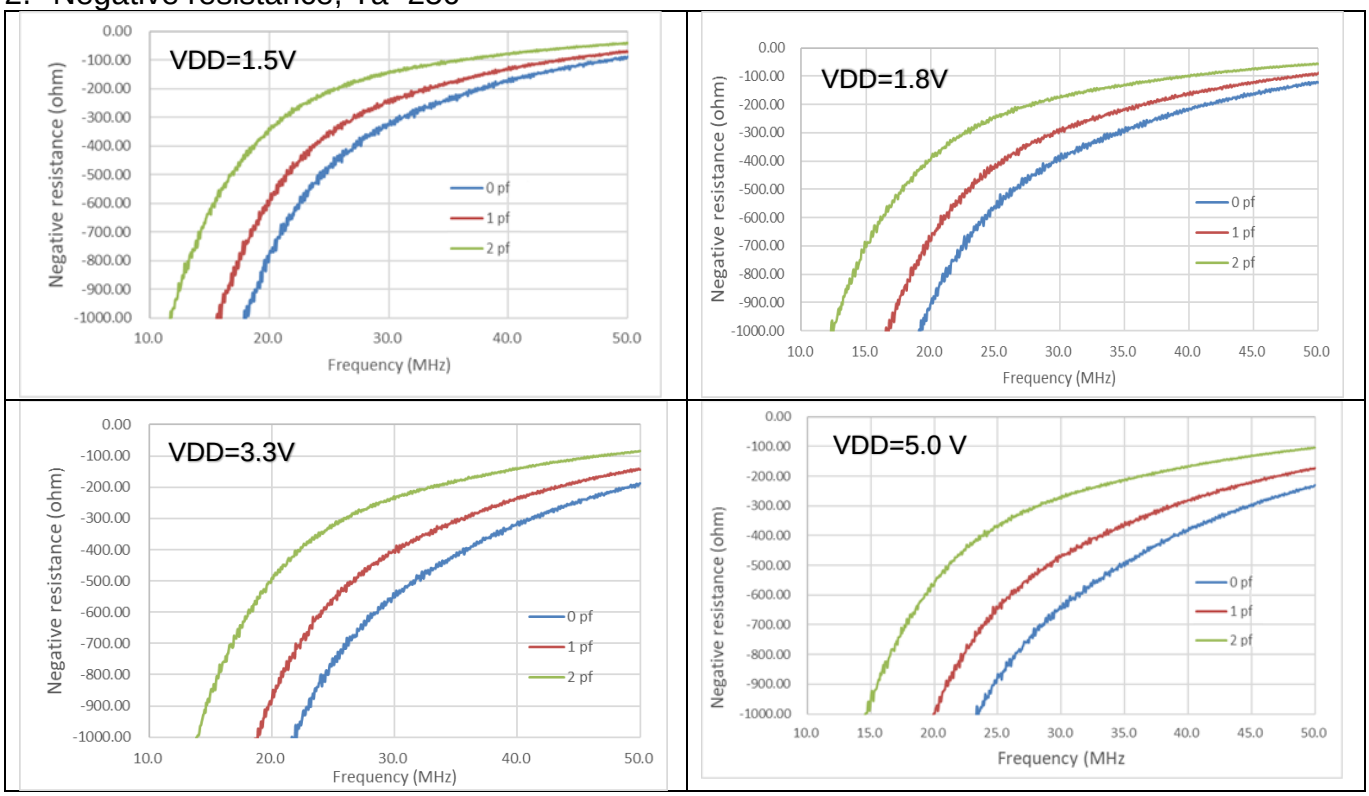


Test figure: XO6629Cx-C

1. I_{DD} and I_{SB}, Ta=25c



2. Negative resistance, Ta=25c



Revision History:

Revision	Description	Date
V1.0	Initiated	2024/4/26