Function Description

The 5080x series are CMOS output VCXO ICs that provide a wide frequency pulling range. They employ BiCMOS oscillator circuit and special varicap diode fabrication process that provides a low phase noise characteristic and a wide frequency pulling range without any external components. The 5080 series are ideal for wide pulling range, low phase noise, VCXO modules.

Features

- Operation temperature range : -40~105℃
- Power supply voltage : 2.5V,3.3V
- Vc Input impedance : 5MΩ
- Standby function : Oscillation stop
- Crystal frequency : 10～160MHz
- Output : CMOS
- Divide function : 1/2, 1/4 ,1/8
- Small chip size : 0.65mm × 0.70mm
- Pull ability : ±100ppm minimum / Vc=1.65±1.65V
- Duty cycle : Within 50±5%

Order Information

XO — Series Name for XO

5080 — VCXO Series

x — Frequency Range

x	Frequency Range
A	20～70MHz
B	70～100MHz
D	90～125MHz
E	125～160MHz
Z	10～30MHz

H — VDD

Recommended VDD	
H	3.3V
L	1.8V

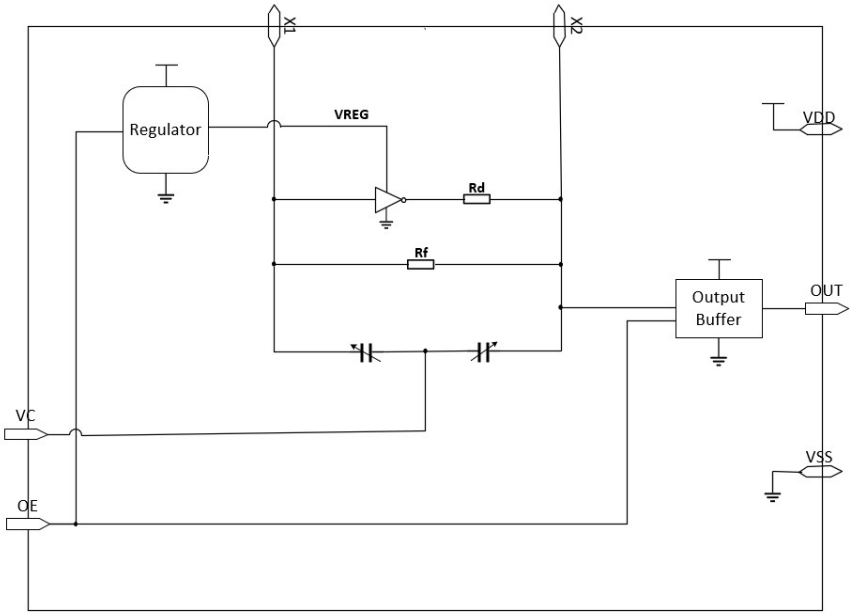
w — Divide Function
1: 1/1
2: 1/2 Divide
3: 1/4 Divide
4: 1/8 Divide

-3 / y

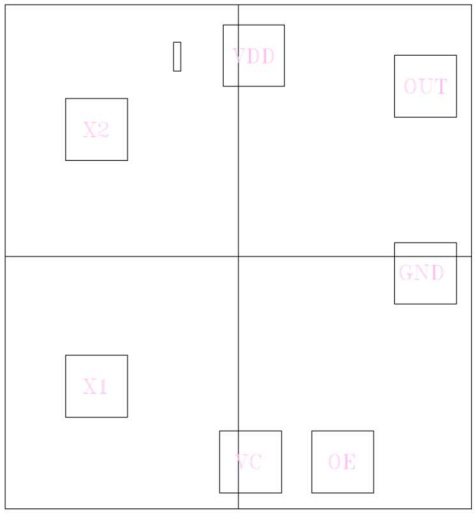
Thickness	IC Form	Definition
-3	WF	Wafer 130um
-3	DE	Chip 130um

Note: Power supply voltage of XO5080AHx is 2.5V/3.3V.

Function Block Diagram



Pad Configuration



Pad Location					
Pad Name	**X Coordinate**	**Y Coordinate**	**Pad Name**	**X Coordinate**	**Y Coordinate**
X2	-197.490	176.550	GND	260.375	-23.115
X1	-197.490	-179.660	OUT	260.375	237.365
VC	16.980	-285.350	VDD	21.620	279.470
OE	145.240	-285.350			

Note:
Die Size: 650 μm * 700 μm, No include Scribe Line（60 μm）
Pad Size: 80 μm * 80 μm

Pad Definition

Pad Name	Function	Location (μm)	
		x	y
VDD	Power Supply(P)	21.62	279.47
X1	Crystal Feedback(I)	-197.49	-179.66
X2	Crystal Drive(O)	-197.49	176.55
VC	Frequency Control Input	16.98	-285.35
OE	OSC Enable/Disable(I)	145.24	-285.35
GND	Ground(P)	260.375	-23.115
OUT	Frequency Output(O)	260.37	237.365
Chip Center		0	0

Selection Table

Part Number	Output Frequency（MHz）		Divide	Remarks
	Min.	Max.		
XO5080AH1	20.0	70.0	1/1	2.5V,3.3V Operation
XO5080AH2	10.0	35.0	1/2	
XO5080AH3	5.0	17.5	1/4	
XO5080AH4	2.5	8.75	1/8	
XO5080BH1	70	90.0	1/1	3.3V Operation
XO5080DH1	90.0	125.0	1/1	
XO5080EH1	125.0	160.0	1/1	
XO5080ZH1	10.0	30.0	1/1	
XO5080ZH2	5.0	15.0	1/2	
XO5080ZH3	2.5	7.5	1/4	
XO5080ZH4	1.25	3.25	1/8	

Absolute Maximum Ratings

VSS=0V, Ta=+ 25℃± 2℃

Parameter	Symbol	Condition	Ratings		Unit
			Min	Max	
Supply Voltage	VDD		VSS-0.5	5	V
Input Voltage	VIN	All Input Pin	VSS-0.5	VDD+0.5	V
Output Voltage	VOUT		VSS-0.5	VDD+0.5	V
Output Current	IOUT			25	mA
Junction Temperature	Tj		-55	150	℃
Storage Temperature	Tstg		-55	125	℃

Recommended Operating Condition

VSS=0V, Ta=－40℃~+105℃

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
Supply Voltage	VDD		2.25	-	3.63	V
“H” Input Voltage	VIH	OE pin	VDD×0.7			V
“L” Input Voltage	VIL	OE pin			VDD×0.3	V
Input Voltage	VIN	OE pin	VSS		VDD	V
Control Voltage	VC	VC pin	0		VDD	V
Output Load Capacitance	CL	CMOS			15	pF
Ambient Temperature	Topt		-40		105	℃

Electrical Specification

Unless otherwise stated, V_{DD} =2.25~3.63V, Vss=0V, Ta=-40~105℃

XO5080AH1
(20~70MHz)

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
"H" input current	I_{IH}	$V_{IN}=V_{DD}$			10	μA
"L" input current	I_{IL}	$V_{IN}=V_{SS}$			1	μA
"H" output voltage	V_{OH}	IOH=-5mA	VDD-0.4			V
"L" output voltage	V_{OL}	IOL=5mA			Vss+0.4	V
Current consumption	I_{DD}	C_L=15pF, V_{DD}=2.75V, OE≧V_{DD}-0.3V, F0=27MHz			8	mA
		C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, F0=27MHz			10	mA
Output off leak at osc. stop	I_z	OE≦0.3V			10	μA
Output Duty Ratio	Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range	Fcntr	Vc=1.25±1.25V 27MHz, Crystal *1	±80	±120		ppm
		Vc=1.65±1.65V 27MHz, Crystal *1	±100	±150		ppm
Rise time	Tr	C_L=15pF, 10～90% V_{DD}			5.0	ns
Fall time	Tf	C_L=15pF, 10～90% V_{DD}			5.0	ns
Output Enable Time	Tpe				2	ms
Output Disable Time	Tpd				100	ns
Modulation Band Width	Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<250

Phase Noise: Frequency =27MHz, VDD = 3.3V, VC=1.65V
Phase Jitter【12KHz～5MHz】< 0.5ps

Offset	Phase Noise (dBc)
1KHz	-130
10KHz	-150
100KHz	-158

Unless otherwise stated, V_{DD} =2.25~3.63V, Vss=0V, Ta=-40~105℃

XO5080AHx【x=2, 3】
(10~35MHz,5~17.5MHz)

Parameter		Symbol	Condition	Datasheet			Unit
				Min	Typ.	Max	
"H" input current		IIH	VIN=VDD			10	μA
"L" input current		IIL	VIN=VSS			1	μA
"H" output voltage		VOH	IOH＝-5mA	VDD-0.4			V
"L" output voltage		VOL	IOL=5mA			Vss+0.4	V
Current consump.	XO5080AH2	IDD	C_L=15pF, V_{DD}=2.75V, OE≧V_{DD}-0.3V, Crystal f=27MHz			7	mA
	XO5080AH3					5	
	XO5080AH2		C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, Crystal f=27MHz			8	mA
	XO5080AH3					6	
Output off leak at osc. stop		Iz	OE≦0.3V			10	μA
Output Duty Ratio		Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range		Fcntr	Vc=+1.25±1.25V 27MHz Crystal *1	±80	±120		ppm
			Vc=+1.65±1.65V 27MHz Crystal *1	±100	±150		ppm
Rise time		Tr	C_L=15pF, 10～90% V_{DD}			5.0	ns
Fall time		Tf	C_L=15pF, 90～10% V_{DD}			5.0	ns
Output Enable Time		Tpe				2	ms
Output Disable Time		Tpd				100	ns
Modulation Band Width		Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<300

Phase Noise: XO5080AH2, Crystal Frequency =27MHz, VDD = 3.3V, VC=1.65V
Phase Jitter【12KHz～5MHz】< 0.8ps

Offset	Phase Noise (dBc)
1KHz	-135
10KHz	-145
100KHz	-150

Unless otherwise stated, V_{DD} =2.97~3.63V, Vss=0V, Ta=-40~105℃

XO5080BH1
(70~100MHz)

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
"H" input current	IIH	VIN= V_{DD}			10	μA
"L" input current	IIL	VIN=VSS			1	μA
"H" output voltage	VOH	IOH＝-5mA	VDD-0.4			V
"L" output voltage	VOL	IOL=5mA			Vss+0.4	V
Current consumption	IDD	C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, F0=80MHz			14	mA
Output off leak at osc. stop	Iz	OE≦0.3V			10	μA
Output Duty Ratio	Duty	C_L=15pF, Vc=1/2 V_{DD}	45		55	%
Pull Range	Fcntr	Vc=1.65±1.65V 80MHz Crystal *1	±110			ppm
Rise time	Tr	C_L=15pF, 10～90% V_{DD}			5.0	ns
Fall time	Tf	C_L=15pF, 90～10% V_{DD}			5.0	ns
Output Enable Time	Tpe				2	ms
Output Disable Time	Tpd				100	ns
Modulation Band Width	Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<270

Phase Noise: Frequency =80MHz, VDD = 3.3V, VC=1.65V
Phase Jitter【12KHz～20MHz】< 0.3ps

Offset	Phase Noise (dBc)
1KHz	-130
10KHz	-150
100KHz	-160

Unless otherwise stated, V_{DD} =2.97~3.63V, Vss=0V, Ta=-40~105℃

XO5080DH1
(90~125MHz)

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
"H" input current	IIH	VIN=VDD			10	μA
"L" input current	IIL	VIN=VSS			1	μA
"H" output voltage	VOH	IOH＝-5mA	VDD-0.4			V
"L" output voltage	VOL	IOL=5mA			Vss+0.4	V
Current consumption	IDD	C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, F0=122.88MHz			24	mA
Current consumption at oscillation stop	IDDD	C_L=15pF, V_{DD}=3.63V, OE≦0.3V			3	mA
Output off leak at osc. stop	Iz	OE≦0.3V			10	μA
Output Duty Ratio	Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range	Fcntr	Vc=1.65±1.65V 122.88MHz, Crystal *1	±90	±120		ppm
Rise time	Tr	C_L=15pF, 10～90% V_{DD}			3.0	ns
Fall time	Tf	C_L=15pF, 90～10% V_{DD}			3.0	ns
Output Enable Time	Tpe				2	ms
Output Disable Time	Tpd				100	ns
Modulation Band Width	Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<300

Phase Noise: Frequency =122.88MHz, VDD = 3.3V, VC=1.65V

Phase Jitter【12KHz～20MHz】< 0.12ps

Offset	Phase Noise (dBc)
1KHz	-123
10KHz	-145
100KHz	-159

Unless otherwise stated, V_{DD} =2.97~3.63V, Vss=0V, Ta=-40~105℃

XO5080EH1
(125~160MHz)

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
"H" input current	IIH	VIN=VDD			10	μA
"L" input current	IIL	VIN=VSS			1	μA
"H" output voltage	VOH	IOH＝-5mA	VDD-0.4			V
"L" output voltage	VOL	IOL=5mA			Vss+0.4	V
Current consumption	IDD	C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, F0=125MHz			24	mA
Current consumption at oscillation stop	IDDD	C_L=15pF, V_{DD}=3.63V, OE≦0.3V			3	mA
Output off leak at osc. stop	Iz	OE≦0.3V			10	μA
Output Duty Ratio	Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range	Fcntr	Vc=1.65±1.65V 125MHz Crystal *1	±90	±120		ppm
Rise time	Tr	C_L=15pF, 10～90% V_{DD}			3.0	ns
Fall time	Tf	C_L=15pF, 90～10% V_{DD}			3.0	ns
Output Enable Time	Tpe				2	ms
Output Disable Time	Tpd				100	ns
Modulation Band Width	Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<300

Phase Noise: Frequency =125MHz, VDD = 3.3V, VC=1.65V

Phase Jitter【12KHz～20MHz】< 0.12ps

Offset	Phase Noise (dBc)
1KHz	-123
10KHz	-145
100KHz	-159

Unless otherwise stated, V_{DD} =2.97~3.63V, Vss=0V, Ta=-40~105℃

XO5080ZH1
(10~30MHz)

Parameter	Symbol	Condition	Datasheet			Unit
			Min	Typ.	Max	
"H" input current	I_{IH}	$V_{IN}=V_{DD}$			10	μA
"L" input current	I_{IL}	$V_{IN}=V_{SS}$			1	μA
"H" output voltage	V_{OH}	IOH＝-5mA	VDD-0.4			V
"L" output voltage	V_{OL}	IOL=5mA			Vss+0.4	V
Current consumption	I_{DD}	C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, F0=27MHz			8	mA
Output off leak at osc. stop	I_z	OE≦0.3V			10	μA
Output Duty Ratio	Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range	Fcntr	Vc=1.65±1.65V 27MHz Crystal *1	±100	±150		ppm
Rise time	Tr	C_L=15pF, 10～90% V_{DD}			5.0	ns
Fall time	Tf	C_L=15pF, 10～90% V_{DD}			5.0	ns
Output Enable Time	Tpe				2	ms
Output Disable Time	Tpd				100	ns
Modulation Band Width	Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<250

Phase Noise: Frequency =27MHz, VDD = 3.3V, VC=1.65V
Phase Jitter【12KHz～5MHz】< 0.5ps

Offset	Phase Noise (dBc)
1KHz	-137
10KHz	-154
100KHz	-158

Unless otherwise stated, V_{DD} =2.97~3.63V, Vss=0V, Ta=-40~105℃

XO5080ZHx【x=2, 3, 4】
(5~15MHz,2.5~7.5MHz,1.25MHz~3.75MHz)

Parameter		Symbol	Condition	Datasheet			Unit
				Min	Typ.	Max	
"H" input current		IIH	VIN=VDD			10	μA
"L" input current		IIL	VIN=VSS			1	μA
"H" output voltage		VOH	IOH＝-5mA	VDD-0.4			V
"L" output voltage		VOL	IOL=5mA			Vss+0.4	V
Current consump.	XO5080AH2	IDD	C_L=15pF, V_{DD}=3.63V, OE≧V_{DD}-0.3V, Crystal f=27MHz			7	mA
	XO5080AH3					7	
	XO5080AH4					6	
Output off leak at osc. stop		Iz	OE≦0.3V			10	μA
Output Duty Ratio		Duty	C_L=15pF, Vc=1/2VDD	45		55	%
Pull Range		Fcntr	Vc=+1.65±1.65V 27MHz Crystal *1	±100	±150		ppm
Rise time		Tr	C_L=15pF, 10～90% V_{DD}			5.0	ns
Fall time		Tf	C_L=15pF, 90～10% V_{DD}			5.0	ns
Output Enable Time		Tpe				2	ms
Output Disable Time		Tpd				100	ns
Modulation Band Width		Fc	Vc=1.35sinωt+1.65V, -3dB	15	20		KHz

Note:
1. Equivalent Parameter of Crystal is γ=C0/C1<300

Phase Noise: XO5080ZH2, Crystal Frequency =27MHz, VDD = 3.3V, VC=1.65V
Phase Jitter【12KHz～5MHz】< 0.8ps

Offset	Phase Noise (dBc)
1KHz	-135
10KHz	-145
100KHz	-150

Circuit Parameters of Oscillator (Reference Data for Circuit Design)

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Feedback Resistor	Rf	XO5080ZHx		100		KΩ
		XO5080A/BHx		62.5		
		XO5080D/EH1		50		
Driving Resistor	Rd	XO5080A/B/ZHx		500		Ω
		XO5080D/EH1		340		
Frequency deviation by IC	⊿fc/fc	Crystal fixed			25	ppm

*The above values are the design values and are not guaranteed by test.

Output Waveform

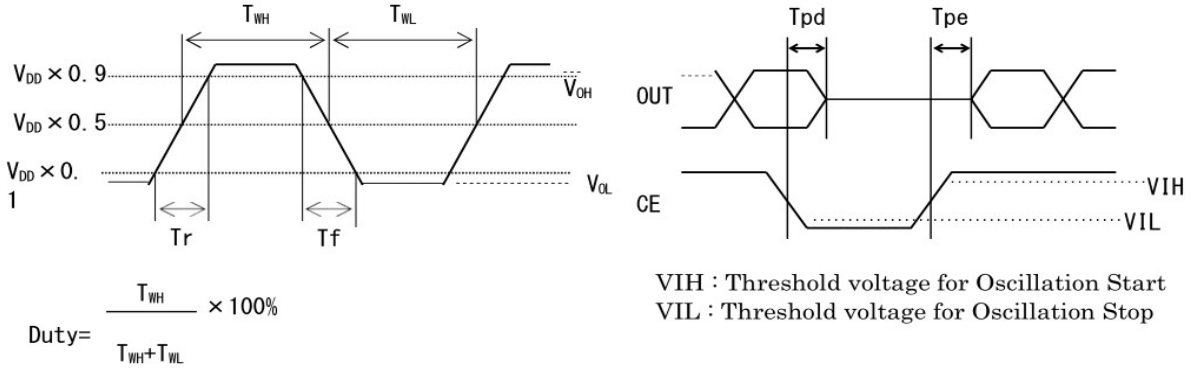
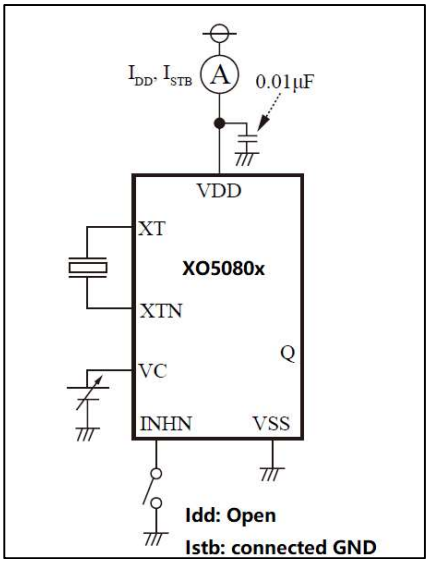
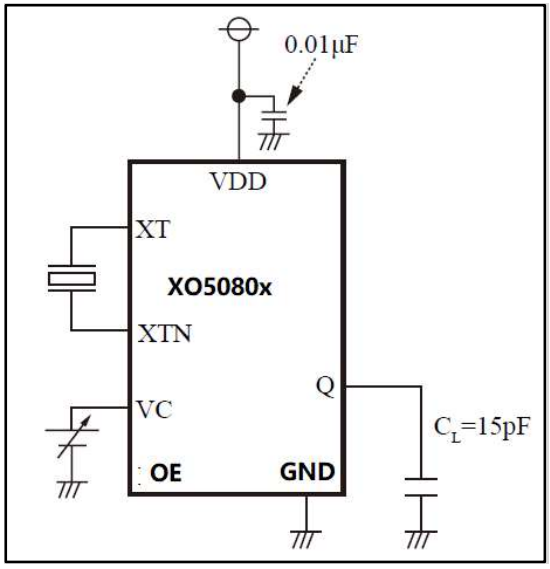


Fig. Output Wave Form (Duty, Tr, Tf, Tpd, Tpe)

Measurement Circuits





History log:

Revision	Description	Date
V2.3	1. Change datasheet format	2023/1/16
V2.4	1. Updated IDD meet actual result; 2. Updated Function Block Diagram meet designing.	2023/5/11
V2.5	1. Update some typo error	2023/10/31
V2.6	1. Update XO5080AHx Supply Voltage from 2.97V~3.63V to 2.25V~3.63V. 2. Update XO5080AHx IDD and pull range.	2024/8/23