■ Description

IPS059xNzUq is successor of IPS0593N0X and IPS029xN series. IPS059xNzUq is the Low operation voltage (0.8V~1.98V) CMOS output SPXO IC.

■ Features

- Operating Voltage : 0.8V~1.98V
- Output frequency : 20MHz~100MHz
- Crystal mode : Fundamental
- Chip size : 0.55mm × 0.56mm
- Operation temperature : -40℃~125℃
- Standby function : Oscillation stop
- Output : CMOS
- Divider function : 1/2, 1/4

1. Part number rule

IPS059 3 N 0 U q −C 3 −3

- IPS059: Series Name For SPXO, Product Series
- 3: Frequency Range

x	Frequency Range
3	20~54MHz
4	50~100MHz

- N: V_{DD} 0.8V ~1.98V
- 0: Divide Function
  - 0 : Fund. & 1/1
  - 1 : Fund. & 1/2
  - 2 : Fund. & 1/4
  - 3 : Fund. & 1/8
- U: Optional code
- q: Pad Layout
  - X : Cross
  - F : Flip
  - S : Straight
- −C 3 −3

IC Form	IC Thickness	Tray Size
W : Wafer	3 : 130um	Blank
C : Chip	3 : 130um	3 : 3 inch Tray

※Please contact us for wafer thickness.

2. Series

Part Number	Crystal Frequency f (MHz)			Divide	Output Frequency F0 (MHz)		Remarks
	Mode	Min.	Max.		Min.	Max.	
IPS059 3 N 0 U X	Fund.	20.00	54.00	1/1	20.00	54.00	
IPS059 3 N 0 U F							
IPS059 3 N 0 U S							
IPS059 3 N 1 U X				1/2	10.00	27.00	
IPS059 3 N 1 U F							
IPS059 3 N 1 U S							
IPS059 3 N 2 U X				1/4	5.00	13.50	
IPS059 3 N 2 U F							
IPS059 3 N 2 U S							
IPS059 3 N 3 U S				1/8	2.50	6.75	
IPS059 4 N 0 U X		50.00	100.00	1/1	50.00	100.00	
IPS059 4 N 0 U F							
IPS059 4 N 1 U X				1/2	25.00	50.00	
IPS059 4 N 1 U F							
IPS059 4 N 2 U X				1/4	12.50	25.00	
IPS059 4 N 2 U F							

Please contact us for gray-colored models.

3. Absolute Maximum Ratings

Unless otherwise stated, V_{SS}=0V, Ta=25℃±2℃

Parameter	Symbol	Condition	Ratings		
			Min	Max	Unit
Supply Voltage	V_{DD}		V_{SS}-0.5	3.5	V
Input Voltage	V_{IN}	All Input Pin	V_{SS}-0.5	V_{DD}+0.5	V
Output Voltage	V_{OUT}		V_{SS}-0.5	V_{DD}+0.5	V
Output Current	I_{OUT}			25	mA
Junction Temperature	Tj		-55	150	℃
Storage Temperature	Tstg		-55	125	℃

4. Recommended Operating Condition

Unless otherwise stated, V_{SS}=0V, Ta=-40℃~125℃

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		0.80		1.98	V	V_{DD}
Input Voltage	V_{IN}		V_{SS}		V_{DD}	V	CE
Output Load Capacitance	CL	CMOS			15	pF	OUT
Ambient Temperature	Topt		-40		125	℃	

5. Electrical Specification

5-1. IPS0593NzU

Unless otherwise stated, V_{DD}=0.8V~1.98V, V_{SS}=0V, CL=15pF, Ta=-40℃~125℃

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Output leak current	Iz	CE=Low, V_{DD}=1.05V			20	μA
"H" input voltage	V_{IH}	CE Pad	0.8V_{DD}			V
"L" input voltage	V_{IL}	CE Pad			0.2V_{DD}	V
"L" input current	I_{IL}	CE Pad, V_{IL}=0V		-10		μA
Oscillation Disable Time	Tplz	OUT Pad			0.1	μs
Oscillation Enable Time	Tpzl	OUT Pad			5.0	ms
Oscillation Start up Time	Tstart				5.0	ms
"H" output voltage	V_{OH}	OUT Pad, I_{OH}=-1.0mA, V_{DD}=0.9V	0.9V_{DD}			V
"L" output voltage	V_{OL}	OUT Pad, I_{OL}=1.0mA, V_{DD}=0.9V			0.1V_{DD}	V
Current consumption *f=54MHz	I_{DD}	IPS0593N0U[X/F], V_{DD}=0.9V			3.5	mA
		IPS0593N0U[X/F], V_{DD}=1.8V			5.5	
		IPS0593N0US, V_{DD}=0.9V			4.5	
		IPS0593N0US, V_{DD}=1.8V			6.5	
		IPS0593N1U[X/F/S], V_{DD}=0.9V			3.0	
		IPS0593N1U[X/F/S], V_{DD}=1.8V			5.0	
		IPS0593N2U[X/F/S], V_{DD}=0.9V			2.5	
		IPS0593N2U[X/F/S], V_{DD}=1.8V			4.0	
		IPS0593N3US, V_{DD}=0.9V			2.3	
		IPS0593N3US, V_{DD}=1.8V			3.0	
Current consumption at oscillation disable	I_{DDD}	Except below, CE=GND			50.0	μA
		IPS0593NzUS, CE=GND Ta=-40℃≦Ta≦105℃			20.0	
Freq. V_{DD} deviation	F_{VST}	V_{DD}=0.9V±10%			±1.0	ppm
		V_{DD}=1.8V±10%			±1.0	
Output Duty Ratio	Duty		45		55	%
Rise time/Fall time	Tr/Tf				5.0	ns

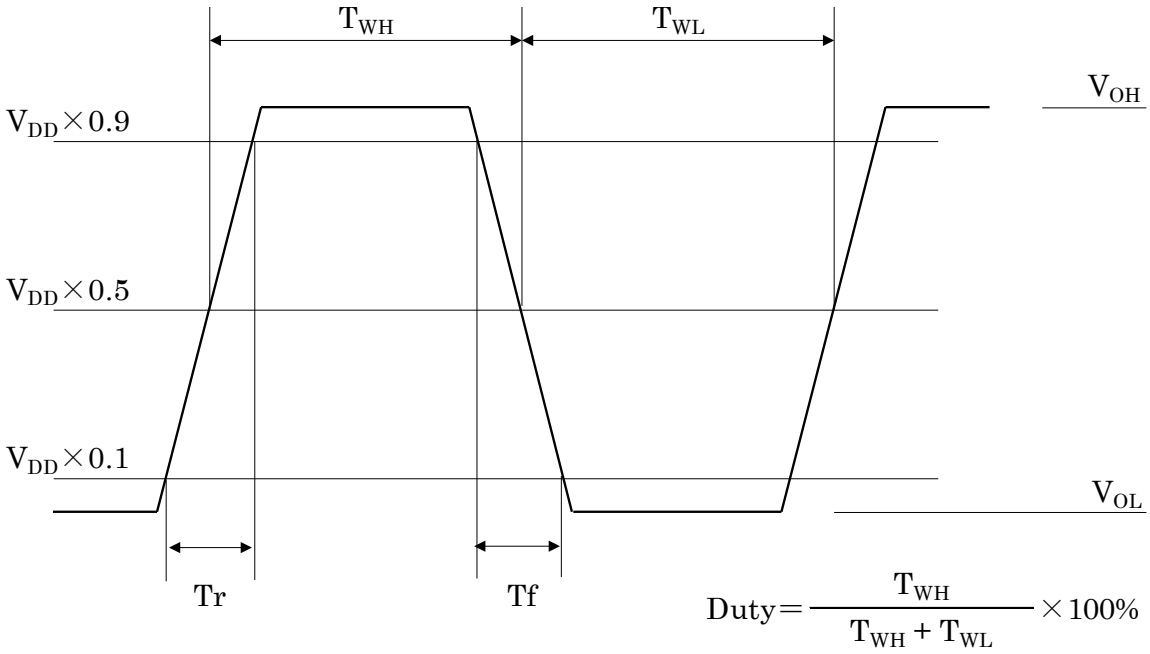
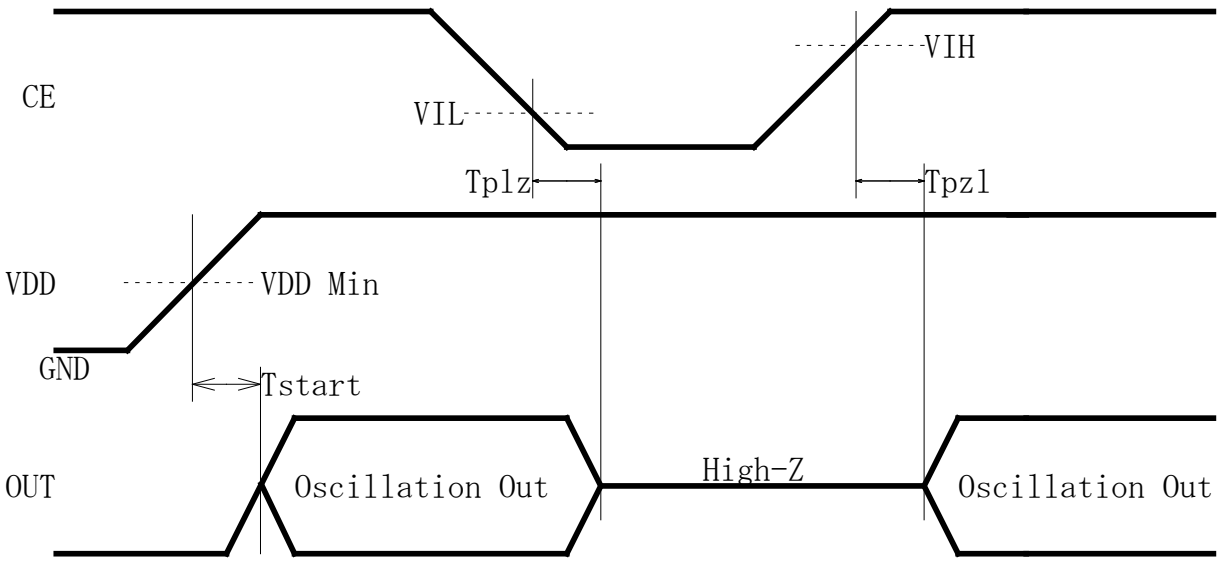


Fig. 5-1 Output wave form (Duty, Tr, Tf, V_{OH}, V_{OL})



V_{IH} : Threshold voltage for Oscillation Start
V_{IL} : Threshold voltage for Oscillation Stop

Fig. 5-2 Input output signal timing

6. Circuit Parameters of Oscillator (Reference Data for Circuit Design)

6-1 IPS0593

Ta=25℃

Parameter	Symbol	Condition	Typical value	Unit
Feedback Resistor	Rf		350	kΩ
Driving Resistor	Rd		500	Ω
Oscillation Capacitor	Cg	Gate side	7.2	pF
	Cd	Drain side	7.2	pF

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

6-2 IPS0594

Ta=25℃

Parameter	Symbol	Condition	Typical value	Unit
Feedback Resistor	Rf		350	kΩ
Driving Resistor	Rd		500	Ω
Oscillation Capacitor	Cg	Gate side	2.4	pF
	Cd	Drain side	2.4	pF

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

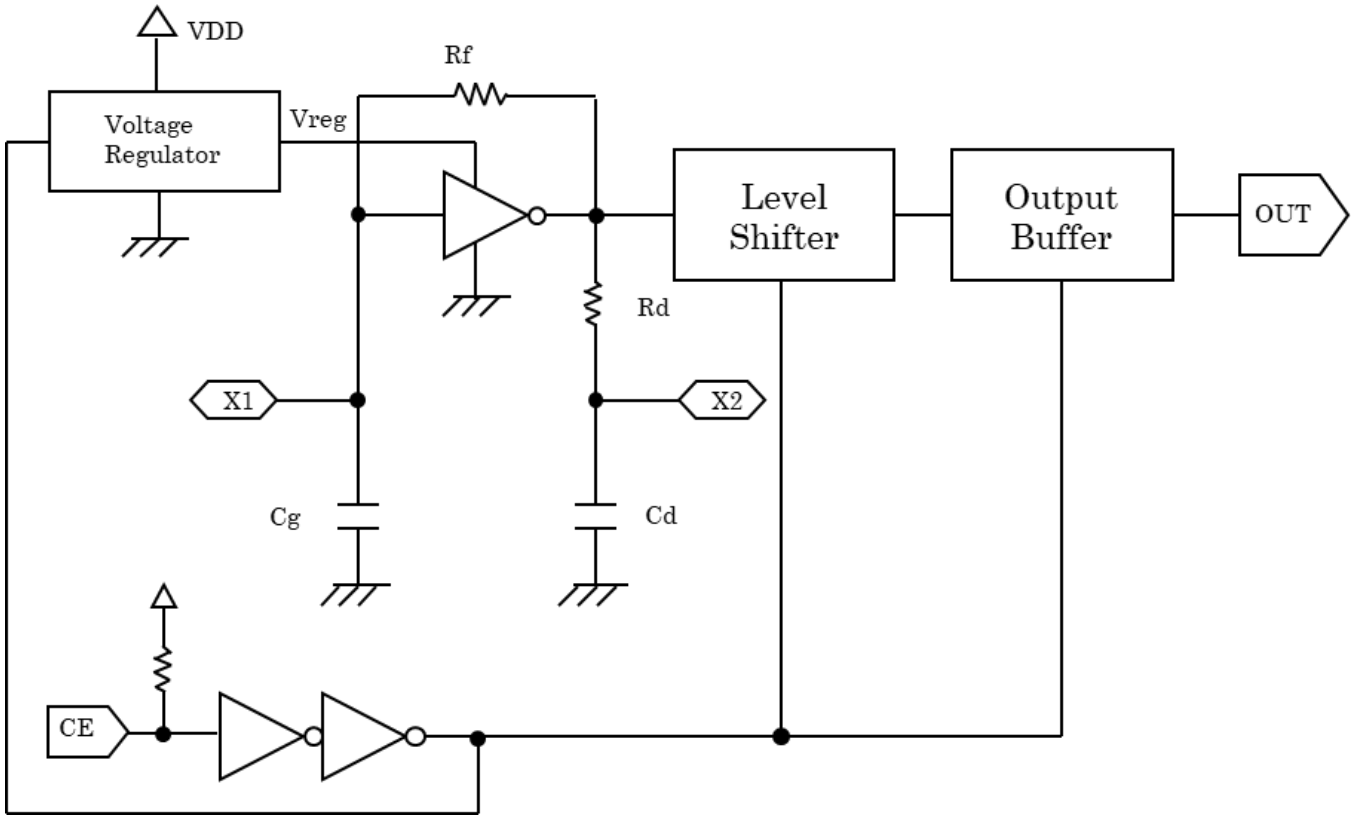
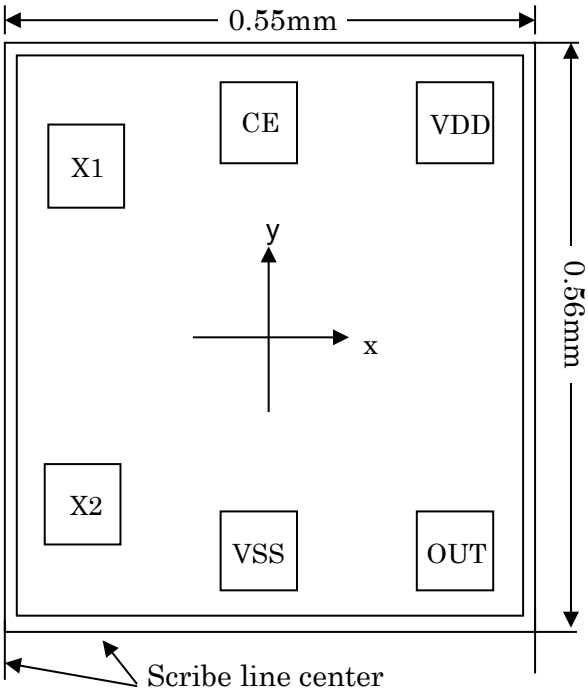


Fig. 6-1 Block Diagram

7. Pad Layout

7-1 Cross Type

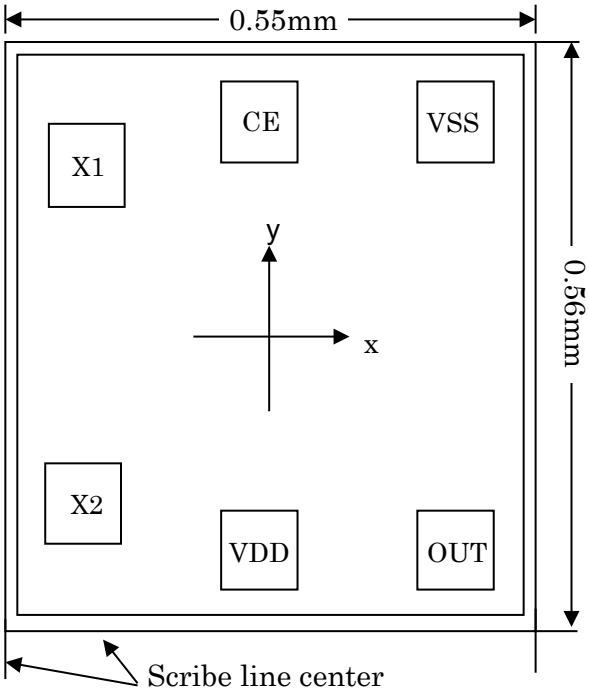


- Die Size: 0.55mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open
- Scribe Line: 80um

Pad Name	Function	Location (μm)	
		x	y
X2	Crystal Drive	-175.55	-143.15
VSS	(−) Ground	0.00	-180.55
OUT(Q)	Frequency Output	175.55	-180.55
VDD	(+) Power Supply	175.55	180.55
CE	Oscillation stop "L": High-Impedance	0.00	180.55
X1	Crystal Feedback	175.55	-143.15
Chip Center		0	0

Fig. 7-1 Pad Layout of Cross Type

7-2 Flip Type

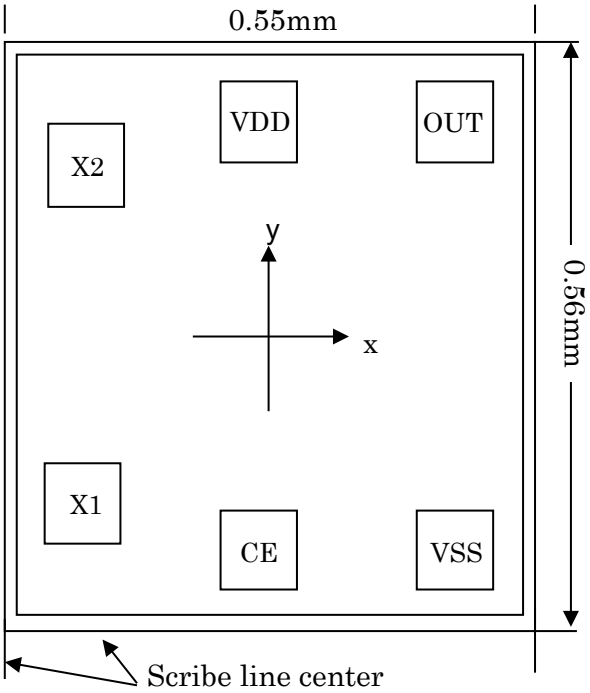


- Die Size: 0.55mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open
- Scribe Line: 80um

Pad Name	Function	Location (μm)	
		x	y
X2	Crystal Drive	-175.55	-143.15
VDD	(+) Power Supply	0.00	-180.55
OUT(Q)	Frequency Output	175.55	-180.55
VSS	(−) Ground	175.55	180.55
CE	Oscillation stop "L": High-Impedance	0.00	180.55
X1	Crystal Feedback	175.55	-143.15
Chip Center		0	0

Fig. 7-2 Pad Layout of Flip Type

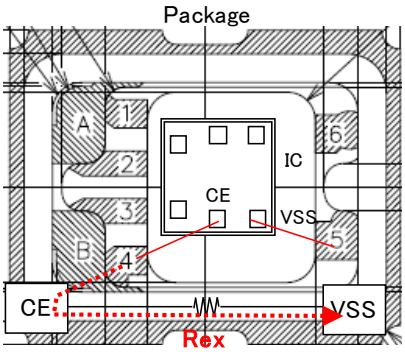
7-3 Straight Type



- Die Size: 0.55mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open
- Scribe Line: 80um

Pad Name	Function	Location (μm)	
		x	y
X1	Crystal Feedback	-175.55	-143.15
CE	Oscillation stop, "L": High-Impedance	0	-180.55
VSS	(-)Ground	175.55	-180.55
OUT(Q)	Frequency Output	175.55	180.55
VDD	(+)Power Supply	0	180.55
X2	Crystal Drive	-175.55	143.15
Chip Center		0	0

Fig. 7-3 Pad Layout of Straight Type



IMPORTANT Notice for CE function

※ Oscillation will not be activated when CE=Open after CE=Low if Rex is not large.

※ Reference value of Rex is over 10MΩ with CE=Open usage.

※ There is no such issue with CE=VDD usage.

Rex： Resistance value between CE and VSS of package

8. Revision History

Revision No.	Revision Date	Revised items	Before Revision	After Revision
SC-9.3	2025/11/04	Wafer thickness 100um (Flip)	Listed	As requested
		1.Part number rule	Tray size：2	Tray size：3
		Data sheet Number	SS-4	SC-9
		I_{DDD} Condition (CE)	CE=0V	CE=GND
		6-1 IPS0593 / Feedback Resistor	Rf=300kΩ	Rf=350kΩ
SC-9.4	2026/02/24	I_{DD} Parameter	*CL=15pF, F0=54MHz	*f=54MHz
SC-9.5	2026/07/08	IPS0593N0US	Unlisted	Listed
		IPS0593N1US	Unlisted	Listed
		IPS0593N2US	Unlisted	Listed
		IPS0593N3US	Unlisted	Listed