

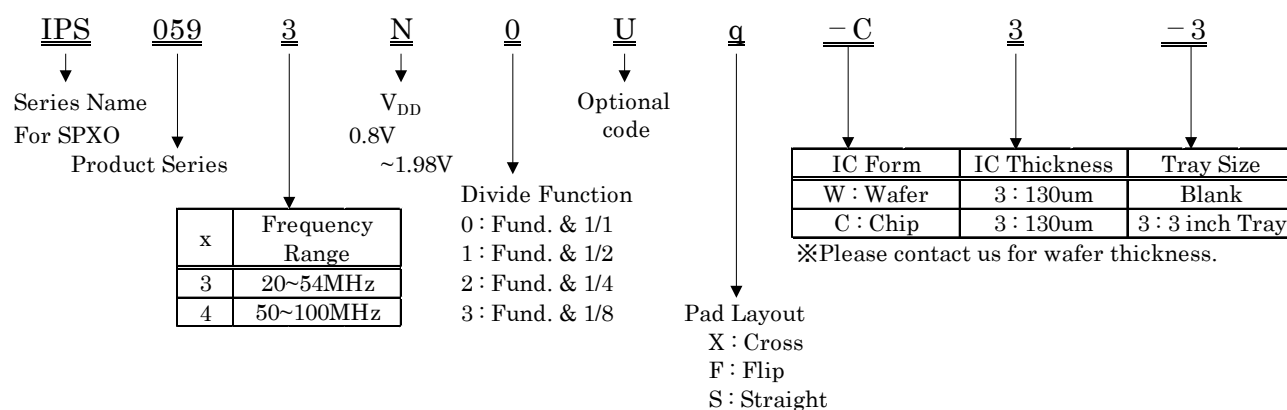
■ Description

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°C~125°C
- Standby function : Oscillation stop
- Output : CMOS
- Divider function : 1/2, 1/4

1. Part number rule



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				1/4	5.00	13.50	
IPS059 3 N 2 U X							
IPS059 3 N 2 U F				1/8	2.50	6.75	
IPS059 3 N 2 U S							
IPS059 3 N 3 U S				50.00	100.00	1/1	50.00
IPS059 4 N 0 U X							
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, $V_{SS}=0V$, $T_a=25^{\circ}C\pm 2^{\circ}C$

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	T_j		-55	150	$^{\circ}C$
Storage Temperature	T_{stg}		-55	125	$^{\circ}C$

4. Recommended Operating Condition

Unless otherwise stated, $V_{SS}=0V$, $T_a=-40^{\circ}C\sim 125^{\circ}C$

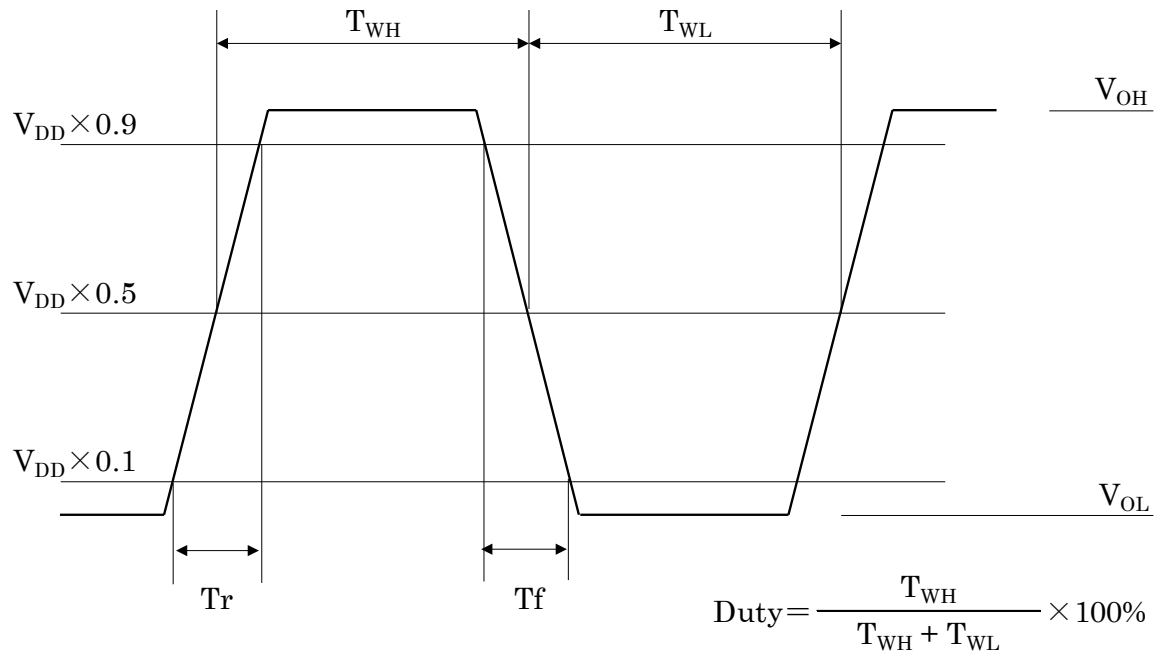
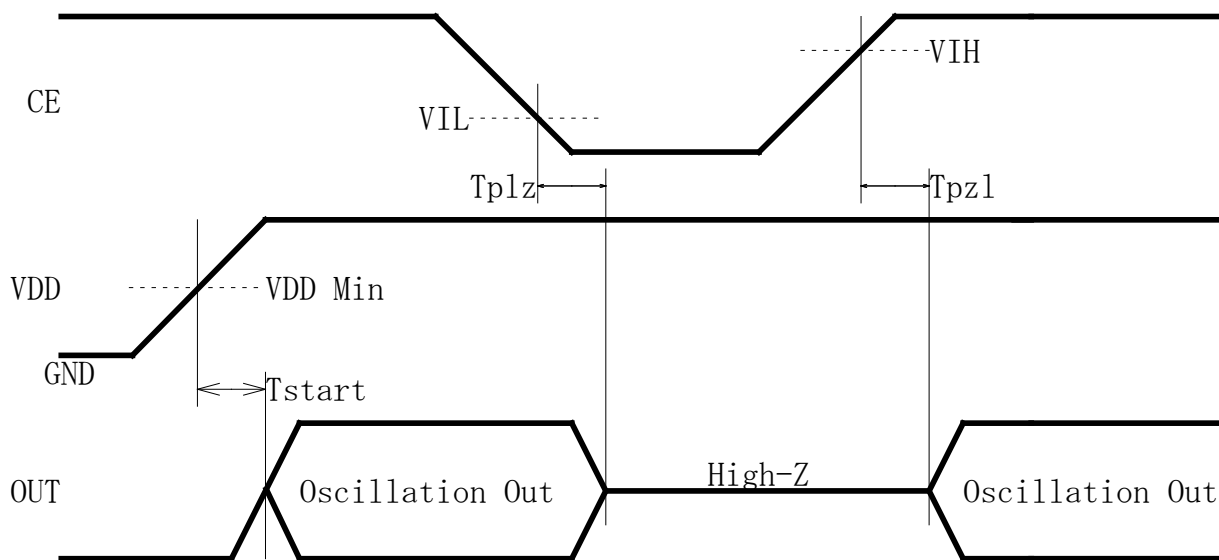
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		0.80		1.98	V	V_{DD}
Input Voltage	V_{IN}		V_{SS}		V_{DD}	V	CE
Output Load Capacitance	CL	CMOS			15	pF	OUT
Ambient Temperature	T_{opt}		-40		125	$^{\circ}C$	

5. Electrical Specification

5-1. IPS0593NzU

Unless otherwise stated, $V_{DD}=0.8V\sim1.98V$, $V_{SS}=0V$, $CL=15pF$, $T_a=-40^{\circ}C\sim125^{\circ}C$

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Output leak current	I_z	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	T_{plz}	OUT Pad			0.1	μs
Oscillation Enable Time	T_{pzl}	OUT Pad			5.0	ms
Oscillation Start up Time	T_{start}				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 $T_a=-40^{\circ}C\leq T_a\leq 105^{\circ}C$			20.0	
Freq. V_{DD} deviation	F_{VST}	$V_{DD}=0.9V\pm 10\%$			± 1.0	ppm
		$V_{DD}=1.8V\pm 10\%$			± 1.0	
Output Duty Ratio	Duty		45		55	%
Rise time/Fall time	T_r/T_f				5.0	ns

Fig. 5-1 Output wave form (Duty, T_r , T_f , 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

 $T_a=25^{\circ}\text{C}$

Parameter	Symbol	Condition	Typical value	Unit
Feedback Resistor	R_f		350	$\text{k}\Omega$
Driving Resistor	R_d		500	Ω
Oscillation Capacitor	C_g	Gate side	7.2	pF
	C_d	Drain side	7.2	pF

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

6-2 IPS0594

 $T_a=25^{\circ}\text{C}$

Parameter	Symbol	Condition	Typical value	Unit
Feedback Resistor	R_f		350	$\text{k}\Omega$
Driving Resistor	R_d		500	Ω
Oscillation Capacitor	C_g	Gate side	2.4	pF
	C_d	Drain side	2.4	pF

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

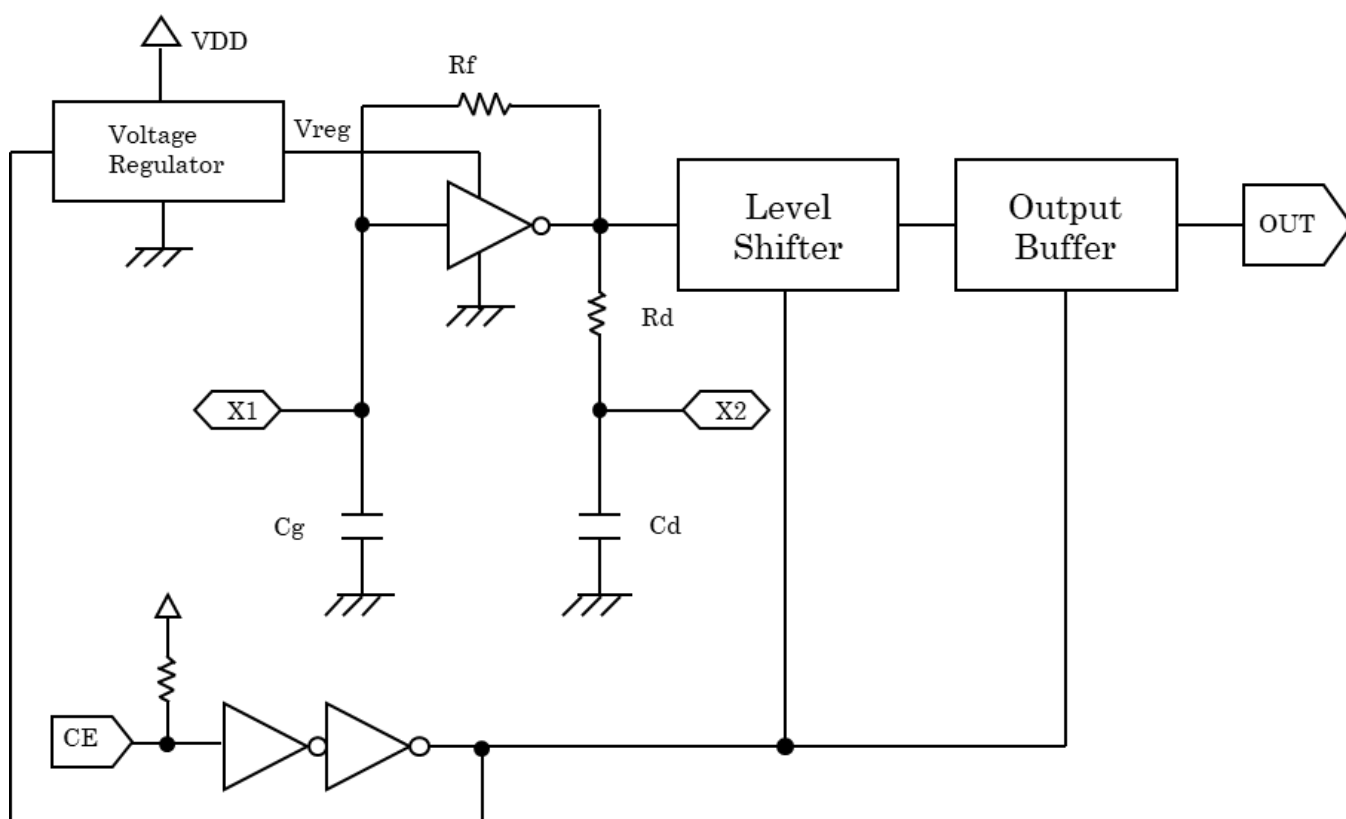
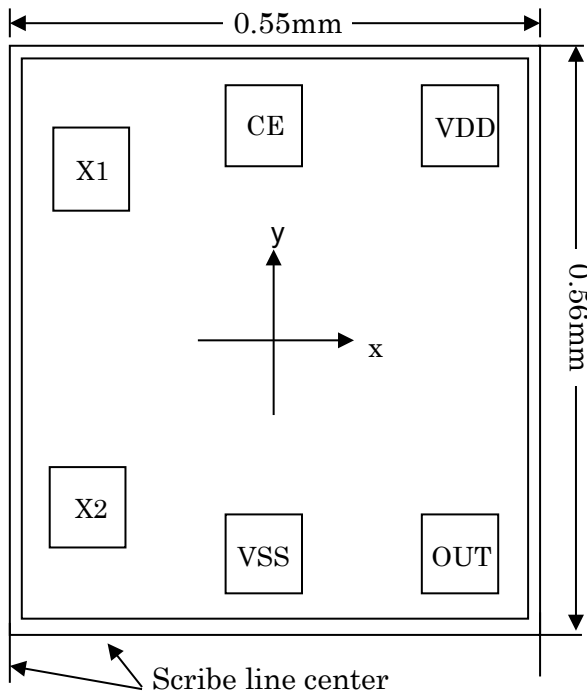


Fig. 6-1 Block Diagram

7. Pad Layout

7-1 Cross Type

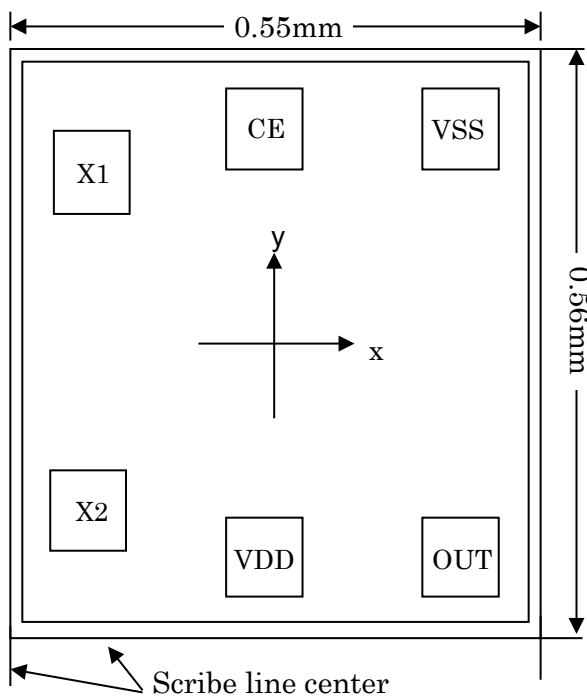


- Die Size: 0.55mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open
- Scribe Line: 80um

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

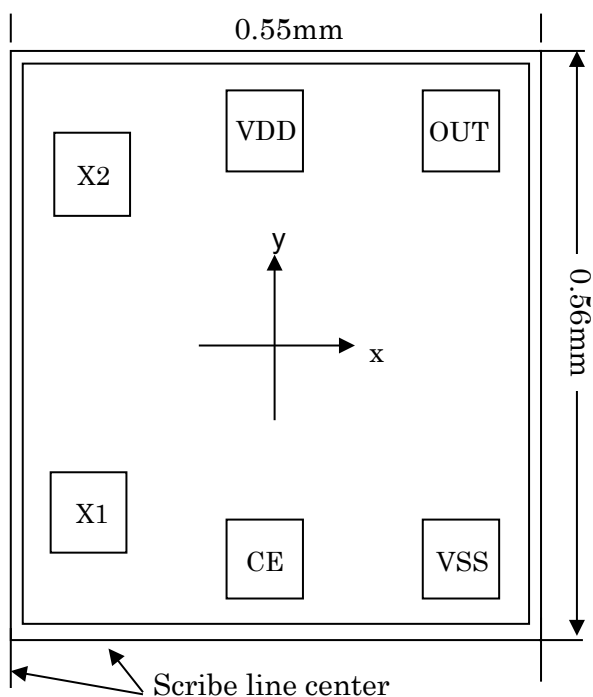


- Die Size: 0.55mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open
- Scribe Line: 80um

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

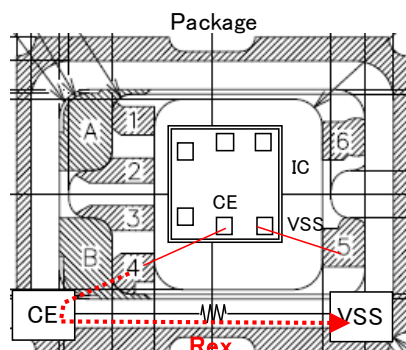
7-3 Straight Type



- 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	R _f =300k Ω	R _f =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
SC-9.6	2026/09/02	Pad Location (X1)	x= 175.55, y=-143.15	x=-175.55, y= 143.15