

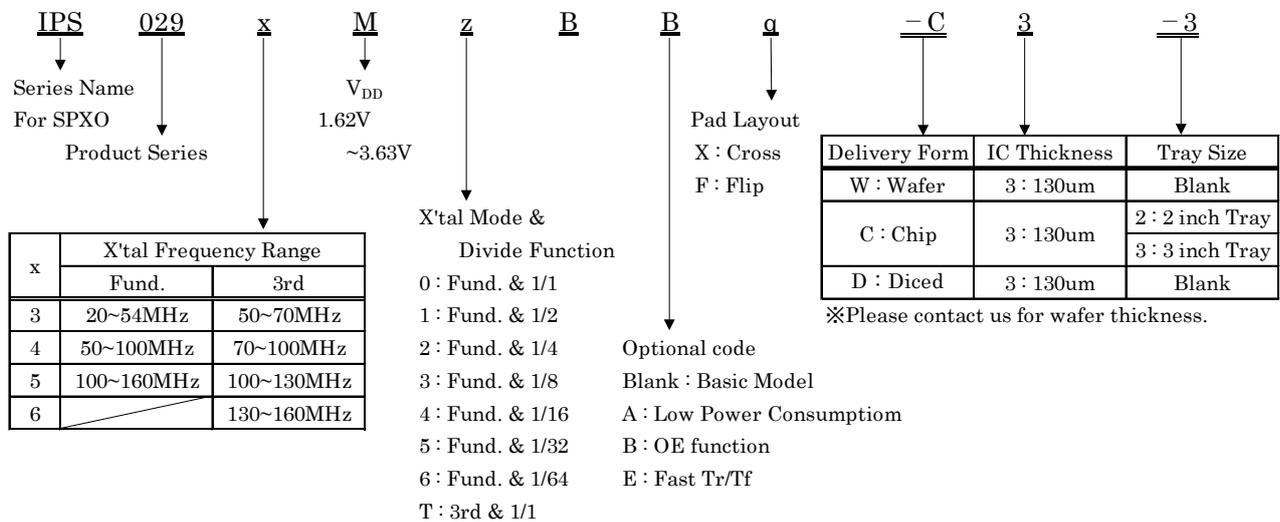
■ Description

IPS029*B series is the successor IC of IPS009BM series and IPS029xM series, for SPXO corresponding to the fundamental or 3rd overtone crystal from 20MHz to 160MHz. Chip size of this IC is small enough for 2016 size SMD. IPS029B series is the basic series, IPS029BA series features low power consumption, IPS029BB series includes OE functionality, and IPS029BE series offers high-speed Tr/Tf.

■ Features

- Operation temperature : -40°C~125°C
- Power supply voltage : 1.62V~3.63V
- Standby function : Oscillation stop / Output disable
- Frequency range : 20MHz~160MHz
- Output : CMOS
- Crystal mode : Fundamental & 3rd overtone
- Small chip size : 0.56mm × 0.56mm
- Divider function : 1/2, 1/4, 1/8, 1/16, 1/32 and 1/64

1. Part number rule



2. Series
2-1 IPS029xMzBq Basic Series

Part Number	Crystal Frequency f (MHz)		Crystal Mode	Divide	Output Frequency F0 (MHz)		Remarks
	Min.	Max.			Min.	Max.	
IPS029 3 M 0 B X	20.00	54.00	Fund	1/1	20.00	54.00	Basic series Fundamental
IPS029 3 M 0 B F							
IPS029 3 M 1 B X				1/2	10.00	27.00	
IPS029 3 M 1 B F							
IPS029 3 M 2 B X				1/4	5.00	13.50	
IPS029 3 M 2 B F							
IPS029 3 M 3 B X				1/8	2.50	6.75	
IPS029 3 M 3 B F							
IPS029 3 M 4 B X				1/16	1.25	3.38	
IPS029 3 M 4 B F							
IPS029 4 M 0 B X	50.00	100.00	Fund	1/1	50.00	100.00	Basic series 3rd Overtone
IPS029 4 M 0 B F							
IPS029 5 M 0 B X	100.00	160.00	Fund	1/1	100.00	160.00	
IPS029 5 M 0 B F							
IPS029 3 M T B X	50.00	70.00	3rd	1/1	50.00	70.00	
IPS029 3 M T B F							
IPS029 4 M T B X	70.00	100.00	3rd	1/1	70.00	100.00	
IPS029 4 M T B F							
IPS029 5 M T B X	100.00	130.00	3rd	1/1	100.00	130.00	
IPS029 5 M T B F							
IPS029 6 M T B X	130.00	160.00	3rd	1/1	130.00	160.00	
IPS029 6 M T B F							

Please contact us for gray color models.

2-2 IPS029xMzBAq Low Power Consumption Series

Part Number	Crystal Frequency f (MHz)		Crystal Mode	Divide	Output Frequency F0 (MHz)		Remarks
	Min.	Max.			Min.	Max.	
IPS029 3 M 0 B A X	20.00	54.00	Fund	1/1	20.00	54.00	Low Power Consumption
IPS029 3 M 0 B A F							
IPS029 3 M 1 B A X				1/2	10.00	27.00	
IPS029 3 M 1 B A F							
IPS029 3 M 2 B A X				1/4	5.00	13.50	
IPS029 3 M 2 B A F							
IPS029 3 M 3 B A X				1/8	2.50	6.75	
IPS029 3 M 3 B A F							
IPS029 3 M 4 B A X				1/16	1.25	3.38	
IPS029 3 M 4 B A F							
IPS029 3 M 5 B A X				1/32	0.62	1.69	
IPS029 3 M 5 B A F							
IPS029 3 M 6 B A X				1/64	0.31	0.84	
IPS029 3 M 6 B A F							
IPS029 5 M 0 B A X	100.00	150.00		1/1	100.00	150.00	
IPS029 5 M 0 B A F							
IPS029 5 M 1 B A F				1/2	50.00	75.00	
IPS029 5 M 2 B A F				1/4	25.00	37.50	
IPS029 5 M 3 B A F				1/8	12.50	18.75	
IPS029 3 M T B A F	50.00	70.00	3rd	1/1	50.00	70.00	
IPS029 4 M T B A F	70.00	100.00		1/1	70.00	100.00	
IPS029 5 M T B A F	100.00	130.00		1/1	100.00	130.00	
IPS029 6 M T B A F	130.00	160.00		1/1	130.00	160.00	

Please contact us for gray color models.

2-3 IPS029xMzBBq OE Series

Part Number	Crystal Frequency f (MHz)		Crystal Mode	Divide	Output Frequency F0 (MHz)		Remarks	
	Min.	Max.			Min.	Max.		
IPS029 3 M 0 B B X	20.00	54.00	Fund	1/1	20.00	54.00	OE function	
IPS029 3 M 0 B B F								
IPS029 3 M 1 B B X								
IPS029 3 M 1 B B F				1/2	10.00	27.00		
IPS029 3 M 2 B B X								
IPS029 3 M 2 B B F								
IPS029 4 M 0 B B X	50.00	100.00		1/4	5.00	13.50		OE function
IPS029 4 M 0 B B F								
IPS029 4 M 1 B B X								
IPS029 4 M 1 B B F				1/1	50.00	100.00		
IPS029 4 M 2 B B X								
IPS029 4 M 2 B B F								
IPS029 5 M 0 B B X	100.00	160.00	1/2	25	50	OE function		
IPS029 4 M 2 B B X								
IPS029 4 M 2 B B F	1/4	12.5	25	1/1	100.00		160.00	
IPS029 5 M 0 B B X								
IPS029 5 M 0 B B F								

Please contact us for gray color models.

2-4 IPS0293MTBEX high Tr/Tf Series

Part Number	Crystal Frequency f (MHz)		Crystal Mode	Divide	Output Frequency F0 (MHz)		Remarks
	Min.	Max.			Min.	Max.	
IPS029 3 M T B E X	50.00	70.00	3rd	1/1	50.00	70.00	high Tr/Tf output

3. Absolute Maximum Ratings

 $V_{SS}=0V, T_a=25^{\circ}C \pm 2^{\circ}C$

Parameter	Symbol	Condition	Ratings		
			Min	Max	Unit
Supply Voltage	V_{DD}		$V_{SS}-0.5$	5.0	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

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		1.62		3.63	V	V_{DD}
“H” Input Voltage	V_{IH}		$V_{DD} \times 0.8$			V	CE(OE)
“L” Input Voltage	V_{IL}				$V_{DD} \times 0.2$	V	CE(OE)
Input Voltage	V_{IN}		V_{SS}		V_{DD}	V	CE(OE)
Output Load Capacitance	CL	CMOS			15	pF	OUT
Ambient Temperature	T_{opt}		-40		125	$^{\circ}C$	

This IC has enough immunity against ESD and Latch-up, but handle with care.

5. Electrical Specification

5-1 IPS029xM0Bq / IPS029xM0BAq

 Unless otherwise stated, CL=15pF, V_{DD}=1.62V~3.63V, V_{SS}=0V, Ta=-40°C~125°C

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Output leak current	I _Z	CE=0V, X1=V _{DD} or V _{SS} V _{out} =V _{SS} ~V _{DD}			10	μA
“H” output voltage	V _{OH}	I _{OH} =-1.0mA	0.9V _{DD}			V
“L” output voltage	V _{OL}	I _{OL} =1.0mA			0.1V _{DD}	V
Output Disable Time	T _{plz}				100	ns
Output Enable Time	T _{pzl}				2.0	ms
Oscillation start up time	T _{start}	V _{DD} ≥ 1.62V			2.0	ms
Current consumption * CL=15pF i=2,3,4 j=2,3,4,5,6	I _{DD}	IPS0293M0B, f=27MHz, V _{DD} =1.8V			2.3	mA
		IPS0293M0B, f=27MHz, V _{DD} =3.3V			4.2	
		IPS0293M0BA, f=27MHz, V _{DD} =1.8V			2.0	
		IPS0293M0BA, f=27MHz, V _{DD} =3.3V			3.5	
		IPS0293M1B, f=27MHz, V _{DD} =1.8V			2.0	
		IPS0293M1B, f=27MHz, V _{DD} =3.3V			3.5	
		IPS0293M1BA, f=27MHz, V _{DD} =1.8V			1.5	
		IPS0293M1BA, f=27MHz, V _{DD} =3.3V			2.5	
		IPS0293MiB, f=27MHz, V _{DD} =1.8V			1.5	
		IPS0293MiB, f=27MHz, V _{DD} =3.3V			3.0	
		IPS0293MjBA, f=27MHz, V _{DD} =1.8V			1.0	
		IPS0293MjBA, f=27MHz, V _{DD} =3.3V			1.5	
		IPS0294M0B, f=100MHz, V _{DD} =1.8V			6.0	
		IPS0294M0B, f=100MHz, V _{DD} =3.3V			12.0	
		IPS0295M0B, f=150MHz, V _{DD} =1.8V			14.0	
		IPS0295M0B, f=150MHz, V _{DD} =3.3V			20.0	
		IPS0295M0BA, f=150MHz, V _{DD} =1.8V			12.0	
		IPS0295M0BA, f=150MHz, V _{DD} =3.3V			17.0	
Current consumption at oscillation stop	I _{DDD}	V _{DD} =3.3V, CE=GND			5.0	uA
Freq. V _{DD} deviation	F _{vst}	V _{DD} =1.8V±10%	IPS0293MzB(A) IPS0294M0B		±1.0	ppm
			IPS0295M0B(A)		±3.0	
		V _{DD} =3.3V±10%	IPS0293MzB(A) IPS0294M0B		±1.0	
			IPS0295M0B(A)		±2.0	

Output Duty Ratio	DUTY	1/2V _{DD} point	45	55	%	
Rise time / Fall time *CL=15pF	Tr / Tf	V _{DD} =1.62V~2.25V 10%~90%V _{DD}	IPS0293MzB(A)		6.5	ns
			IPS0294M0B		5.0	
			IPS0295M0B(A)		3.5	
		V _{DD} =2.25V~3.63V 10%~90%V _{DD}	IPS0293MzB(A)		4.0	
			IPS0294M0B		3.0	
			IPS0295M0B(A)		2.0	

5-2 IPS029xMzBB

 Unless otherwise stated, CL=15pF, V_{DD}=1.62V~3.63V, V_{SS}=0V, Ta=-40°C~125°C

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Output leak current	I _Z	OE=0V, X1=V _{DD} or V _{SS} V _{out} =V _{SS} ~V _{DD}			10	μA
“H” output voltage	V _{OH}	I _{OH} =-1.0mA	0.9V _{DD}			V
“L” output voltage	V _{OL}	I _{OL} =1.0mA			0.1V _{DD}	V
Output Disable Time	T _{plz}				100	ns
Output Enable Time	T _{pzl}				200	ns
Oscillation start up time	T _{start}	V _{DD} ≥ 1.62V			2.0	ms
Current consumption *CL=15pF	I _{DD}	IPS0293MzBB, f=27MHz, V _{DD} =1.8V			2.3	mA
		IPS0293MzBB, f=27MHz, V _{DD} =3.3V			4.2	
		IPS0294MzBB, f=100MHz, V _{DD} =1.8V			6.0	
		IPS0294MzBB, f=100MHz, V _{DD} =3.3V			12.0	
		IPS0295M0BB, f=150MHz, V _{DD} =1.8V			TBD	
		IPS0295M0BB, f=150MHz, V _{DD} =3.3V			TBD	
Current consumption at oscillation stop	I _{DDD}	f=54MHz, OE=GND			3.8	mA
		f=100MHz, OE=GND			5.0	
		f=150MHz, OE=GND			TBD	
Freq. V _{DD} deviation	F _{vst}	V _{DD} =1.8V±10%	IPS0293MzBB IPS0294MzBB		±1.0	ppm
			IPS0295M0BB		TBD	
		V _{DD} =3.3V±10%	IPS0293MzBB IPS0294MzBB		±1.0	
			IPS0295M0BB		TBD	
Output Duty Ratio	DUTY	1/2V _{DD} point	45	55	%	
Rise time / Fall time * CL=15pF	Tr / Tf	V _{DD} =1.62V~2.25V 10%~90%V _{DD}	IPS0293MzBB		6.5	ns
			IPS0294MzBB		5.0	
			IPS0295M0BB		TBD	
		V _{DD} =2.25V~3.63V 10%~90%V _{DD}	IPS0293MzBB		4.0	
			IPS0294MzBB		3.0	
			IPS0295M0BB		TBD	

5-3 IPS029xMTB / IPS0293MTBE

 Unless otherwise stated, $CL=15pF$, $V_{DD}=1.62V\sim 3.63V$, $V_{SS}=0V$, $T_a=-40^{\circ}C\sim 125^{\circ}C$

Parameter	Symbol	Condition	Specification			Unit	
			Min	Typ	Max		
Output leak current	I_Z	$CE=0V$, $X1=V_{DD}$ or V_{SS} $V_{out}=V_{SS}\sim V_{DD}$			10	μA	
“H” output voltage	V_{OH}	$I_{OH}=1.0mA$	$0.9V_{DD}$			V	
“L” output voltage	V_{OL}	$I_{OL}=1.0mA$			$0.1V_{DD}$	V	
Output Disable Time	T_{plz}				100	ns	
Output Enable Time	T_{pzl}				10.0	ms	
Oscillation start up time	T_{start}	$V_{DD}\geq 1.62V$			10.0	ms	
Current consumption	I_{DD}	IPS0293MTB, $f=65MHz$, $V_{DD}=1.8V$			13.5	mA	
		IPS0293MTB, $f=65MHz$, $V_{DD}=3.3V$			30.0		
		IPS0293MTBE, $f=65MHz$, $V_{DD}=1.8V$			15.0		
		IPS0293MTBE, $f=65MHz$, $V_{DD}=3.3V$			30.0		
		IPS0294MTB, $f=100MHz$, $V_{DD}=1.8V$			15.0		
		IPS0294MTB, $f=100MHz$, $V_{DD}=3.3V$			32.5		
		IPS0295MTB, $f=130MHz$, $V_{DD}=1.8V$			19.0		
		IPS0295MTB, $f=130MHz$, $V_{DD}=3.3V$			40.0		
		IPS0296MTB, $f=160MHz$, $V_{DD}=1.8V$			24.5		
		IPS0296MTB, $f=160MHz$, $V_{DD}=3.3V$			47.0		
Current consumption at oscillation stop	I_{DDD}	$V_{DD}=3.3V$, $CE=GND$			5.0	μA	
Freq. V_{DD} deviation	F_{vst}	$V_{DD}=1.8V\pm 10\%$	IPS0293MTB(E) IPS0294MTB			± 1.0	ppm
			IPS0295MTB IPS0296MTB			± 2.0	
		$V_{DD}=3.3V\pm 10\%$	All Models			± 1.0	
Output Duty Ratio	DUTY	$1/2V_{DD}$ point $-40^{\circ}C\sim 125^{\circ}C$	IPS0293MTB(E) IPS0294MTB	45		55	%
		$1/2V_{DD}$ point $-40^{\circ}C\sim 85^{\circ}C$	IPS0295MTB IPS0296MTB	45		55	
		$1/2V_{DD}$ point $85^{\circ}C\sim 125^{\circ}C$	IPS0295MTB IPS0296MTB	40		60	
Rise time / Fall time * $CL=15pF$	T_r / T_f	$V_{DD}=1.62V\sim 2.25V$ $10\%\sim 90\%V_{DD}$	IPS0293MTB			6.5	ns
			IPS0293MTBE			3.5	
			IPS0294MTB			5.0	
			IPS0295MTB			3.5	
			IPS0296MTB			3.5	
		$V_{DD}=2.25V\sim 3.63V$ $10\%\sim 90\%V_{DD}$	IPS0293MTB			4.0	
			IPS0293MTBE			2.0	
			IPS0294MTB			3.0	
			IPS0295MTB			2.0	
			IPS0296MTB			2.0	

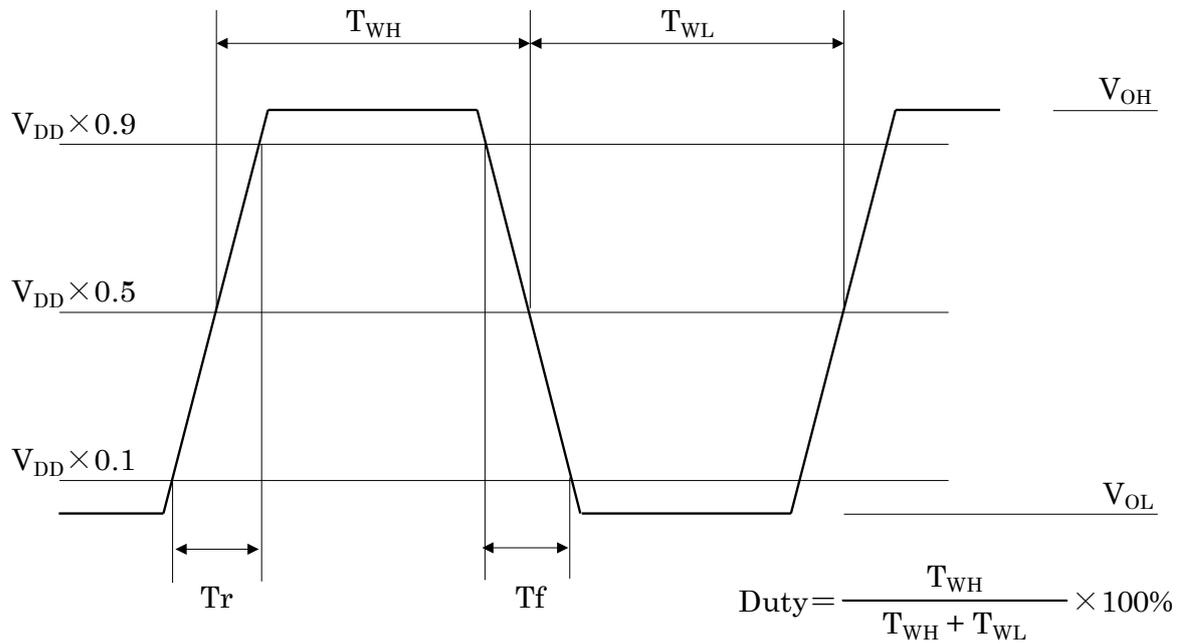
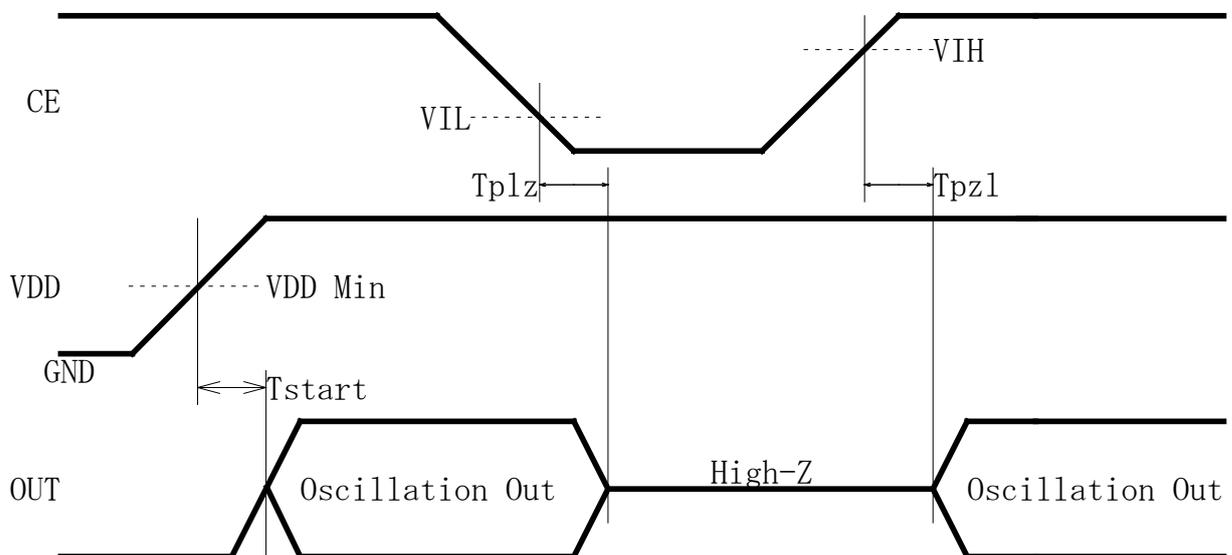


Fig. 5-1 Output Wave Form (Duty, Tr, Tf, VOH, VOL)



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

Fig. 5-2 Input output signal timing

* IPS029xMzBBq series are OE pins instead of CE pins.

6. Circuit Parameters of Oscillator (Reference Data for Circuit Design)
6-1 IPS029xMzB Series

Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Feedback Resistor	All Models	Rf	Refer to Fig. 6-1		300		kΩ
Driving Resistor	IPS0293MzB (y=0, 1, 2, 3, 4)	Rd	Refer to Fig. 6-1		1000		Ω
	IPS0294M0B				750		
	IPS0295M0B				250		
Oscillation Capacitor	IPS0293MzB (y=0, 1, 2, 3, 4)	Cg	Refer to Fig. 6-1		5.0		pF
		Cd			12.0		
	IPS0294M0B	Cg			3.0		
		Cd			5.0		
	IPS0295M0B	Cg			4.0		
		Cd			6.0		

6-2 IPS029xMzBA Series

Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Feedback Resistor	All Models	Rf	Refer to Fig. 6-1		200		kΩ
Driving Resistor	IPS0293MzBA (y=0,1,2,3,4,5,6)	Rd	Refer to Fig. 6-1		1000		Ω
	IPS0295M0BA				300		
Oscillation Capacitor	IPS0293MzBA (y=0,1,2,3,4,5,6)	Cg	Refer to Fig. 6-1		4.8		pF
		Cd			12.0		
	IPS0295M0BA	Cg			4.8		
		Cd			4.8		

6-3 IPS029xMzBB Series

Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Feedback Resistor	All Models	Rf	Refer to Fig. 6-2		300		kΩ
Driving Resistor	IPS0293MzBB (y=0, 1, 2)	Rd	Refer to Fig. 6-2		1000		Ω
	IPS0294MzBB (y=0, 1, 2)				750		
	IPS0295M0BB				250		
Oscillation Capacitor	IPS0293MzBB (y=0, 1, 2)	Cg	Refer to Fig. 6-2		5.0		pF
		Cd			12.0		
	IPS0294MzBB (y=0, 1, 2)	Cg			3.0		
		Cd			5.0		
	IPS0295M0BB	Cg			4.0		
		Cd			6.0		

6-4 IPS029xMTB Series / IPS0293MTBE

Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Feedback Resistor	IPS0293MTB	Rf	Refer to Fig. 6-1		4.0		kΩ
	IPS0293MTBE				3.25		
	IPS0294MTB				3.0		
	IPS0295MTB				2.5		
	IPS0296MTB				1.96		
Driving Resistor	IPS0293MTB	Rd	Refer to Fig. 6-1		500		Ω
	IPS0293MTBE				500		
	IPS0294MTB				250		
	IPS0295MTB				250		
	IPS0296MTB				125		
Oscillation Capacitor	IPS0293MTB	Cg	Refer to Fig. 6-1		8.0		pF
		Cd			10.0		
	IPS0293MTBE	Cg			8.0		
		Cd			10.0		
	IPS0294MTB	Cg			5.0		
		Cd			9.0		
	IPS0295MTB	Cg			4.0		
		Cd			8.0		
	IPS0296MTB	Cg			3.0		
		Cd			8.0		

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

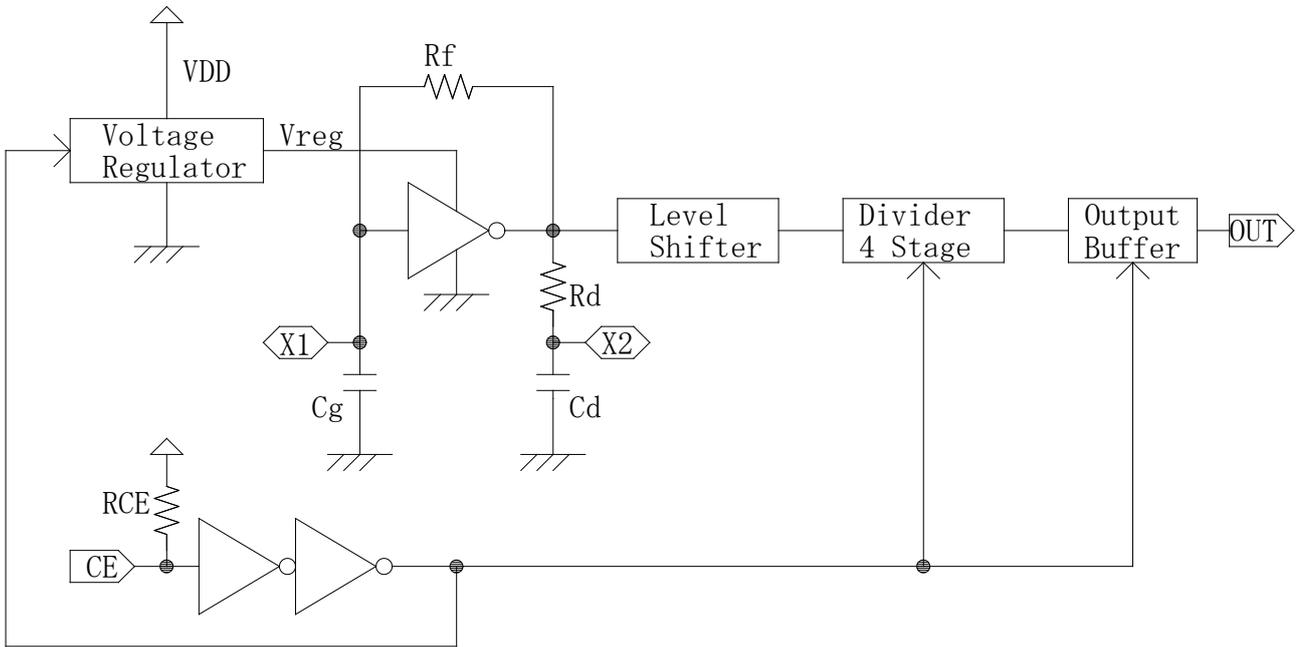


Fig. 6-1 Block Diagram (except for IPS029xMzBBq)

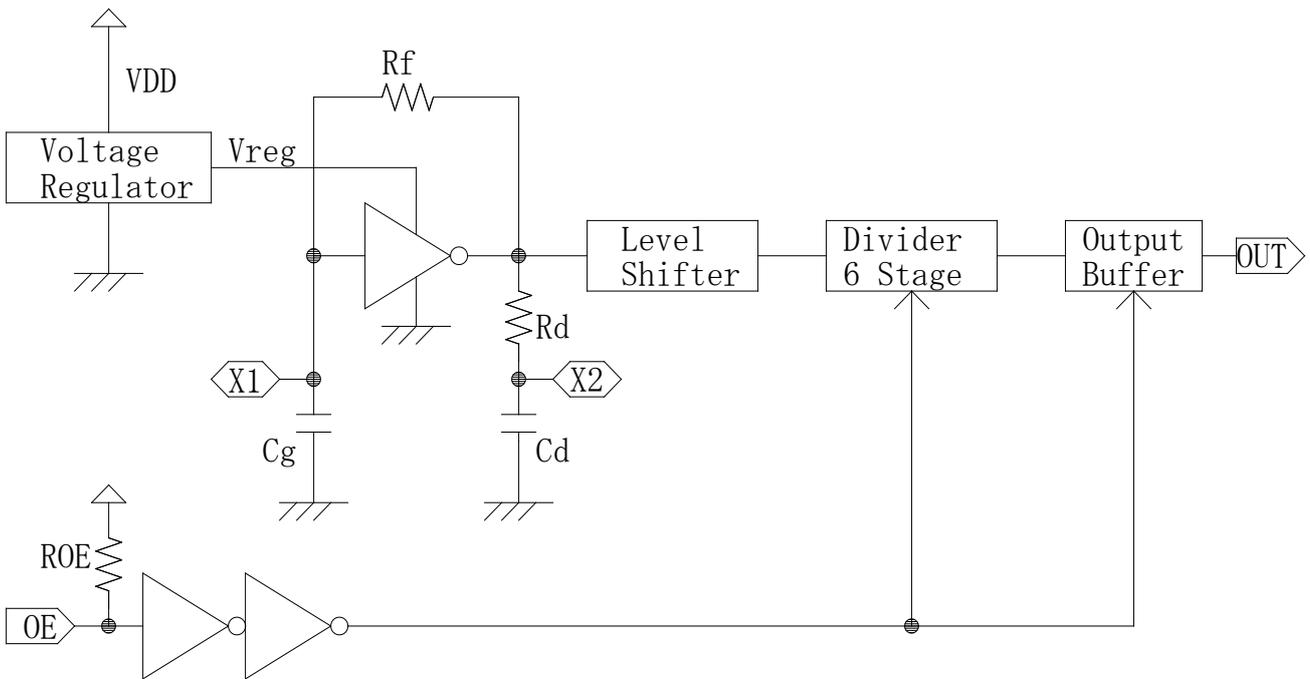
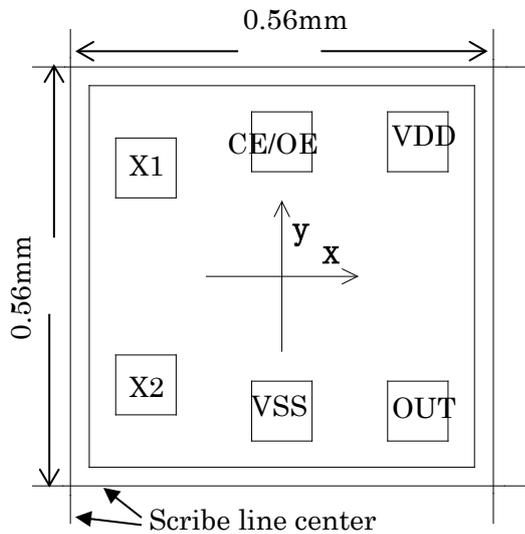
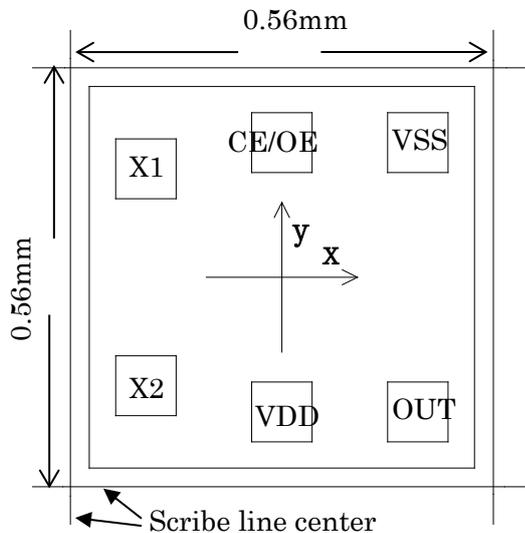


Fig. 6-2 Block Diagram (IPS029xMzBBq)

7. Pad Layout
7-1 Cross Type


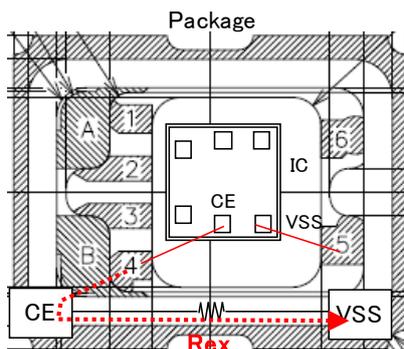
- Die Size: 0.56mm × 0.56mm
- Pad Size: 80um □
- Thickness: 130um ±10um
- IC Backside: Gnd or Open

Pad Name	Function	Location (μm)	
		x	y
X2	Crystal Drive	-181.00	-143.15
VSS	(-) Ground	0.00	-180.55
OUT(Q)	Frequency Output	181.00	-180.55
VDD	(+) Power Supply	181.00	180.55
CE/OE	Oscillation stop (CE) "L": High-Impedance	0.00	180.55
X1	Crystal Feedback	-181.00	143.15
Chip Center		0	0

7-2 Flip Type


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

Pad Name	Function	Location (μm)	
		x	y
X2	Crystal Drive	-181.00	-143.15
VDD	(+) Power Supply	0.00	-180.55
OUT(Q)	Frequency Output	181.00	-180.55
VSS	(-) Ground	181.00	180.55
CE/OE	Oscillation stop "L": High-Impedance	0.00	180.55
X1	Crystal Feedback	-181.00	143.15
Chip Center		0	0


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

* IPS029xMzBBq series are OE pins instead of CE pins.

8. Revision History

Revision No.	Revision Date	Revised items	Before Revision	After Revision
SC-4.4	2025/11/04	Wafer thickness 100um (Flip)	Listed	As requested
		IPS0293M4BAX	Under Development	Listed
		IPS0293M6BAX	Under Development	Listed
		IPS0293M0BBX	Under Development	Listed
		IPS0295M0BBX	Under Development	Listed
		I _{DDD} Condition (CE)	CE ≤ 0.3V	CE=GND
		I _{DDD} Condition (OE)	OE=Low	OE=GND
		Fig. 6-2 Block Diagram	None	Added
SC-4.5	2026/02/24	Pad Layout - Flip Type Location	Straight Type	Flip Type