■ Description

IPS020*HJ is the IC for Low Power HCSL output SPXO which covers the frequency from 95MHz to 180MHz.

■ Features

- Operation temperature : -40℃~125℃
- Power supply voltage : 1.71V~3.63V
- Standby function : Oscillation stop
- Crystal frequency : 95MHz~180MHz
- Output : Low Power HCSL
- Crystal mode : 3rd Overtone
- Small chip size : 0.65mm × 0.75mm
- Frequency stability to V_{DD} : Within ±2ppm
- Duty cycle : Within 50%±5%
- Pad layout : Straight type

1. Part number rule

IPS 020 x M z HJ S －W 1

- IPS: Series Name For SPXO
- 020: Product Series
- x:

x	Frequency Range
4	95~140MHz
5	135~180MHz

- M: V_{DD} 3.3V
- z: X'tal Mode & Divide Function T : 3rd & 1/1
- HJ: Output Type LPHCSL
- S: Pad Layout S : Straight
- －W 1:

IC Form	Thickness	Definition
－W	1	Wafer 150um
	0	Wafer 100um
Blank or －C	Blank	Chip 150um

2. Series

Part Number	Output	Crystal Frequency (MHz)			Divide	Output Frequency (MHz)		Remarks
		Mode.	Min.	Max.		Min.	Max.	
IPS020 4 M T H J S	LPHCSL	3rd	95	140	1/1	95	140	
IPS020 5 M T H J S			135	180		135	180	

Please contact us for other models.

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25℃± 2℃

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	Tj		-55	150	℃
Storage Temperature	Tstg		-55	125	℃

4. Recommended Operating Condition

V_{SS}=0V, Ta=-40℃~125℃

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		1.71	3.30	3.63	V	V_{DD}
“H” Input Voltage	V_{IH}		V_{DD}×0.7			V	CE
“L” Input Voltage	V_{IL}				V_{DD}×0.3	V	CE
Input Voltage	V_{IN}		V_{SS}		V_{DD}	V	CE
Output Load Resistance / Capacitance	RL	50Ω Trace		None		Ω	OUT
	CL	To GND		2.0		pF	
Ambient Temperature	Topt		-40		125	℃	

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

5. Electrical Specification

5-1 DC Characteristics

Unless otherwise stated, V_{DD}=1.71V~3.63V, V_{SS}=0V, Ta=-40℃~125℃

Parameter	Symbol	Condition		Specification			Unit
				Min	Typ	Max	
Output leak current	I_Z	CE=0.3V				10	μA
"L" input current	I_{IL}	V_{IN}=V_{SS}			-10		μA
"H" output voltage	V_{OH}			550		900	mV
"L" output voltage	V_{OL}			-150	0	150	mV
Current consumption	I_{DD}	V_{DD}=1.8V CE=Open 50Ω trace CL=2.0pF	IPS0204MTHJS F0=100MHz		10.0	15.0	mA
			IPS0205MTHJS F0=156.25MHz		13.0	20.0	
		V_{DD}=3.3V CE=Open 50Ω trace CL=2.0pF	IPS0204MTHJS F0=100MHz		12.0	20.0	
			IPS0205MTHJS F0=156.25MHz		15.0	24.0	
Current consumption at oscillation stop	I_{DDD}	CE≦0.3V				10	uA

5-2 Switching Characteristics

Unless otherwise stated, V_{DD}=1.71V~3.63V, V_{SS}=0V, Ta=-40℃~125℃

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	Tstart				10.0	ms
Output Disable Time	Tplz				200	ns
Output Enable Time	Tpzl				10.0	ms
Rise time / Fall time	Tr / Tf	20%~80% Vopp		0.45	0.70	ns
Output Duty Ratio	Duty	1/2Vopp point	45		55	%
Output Swing	Vopp		0.55			V
Freq. V_{DD} deviation	Fvst	V_{DD}=1.8V±5%			±2.0	ppm
		V_{DD}=3.3V±10%			±2.0	

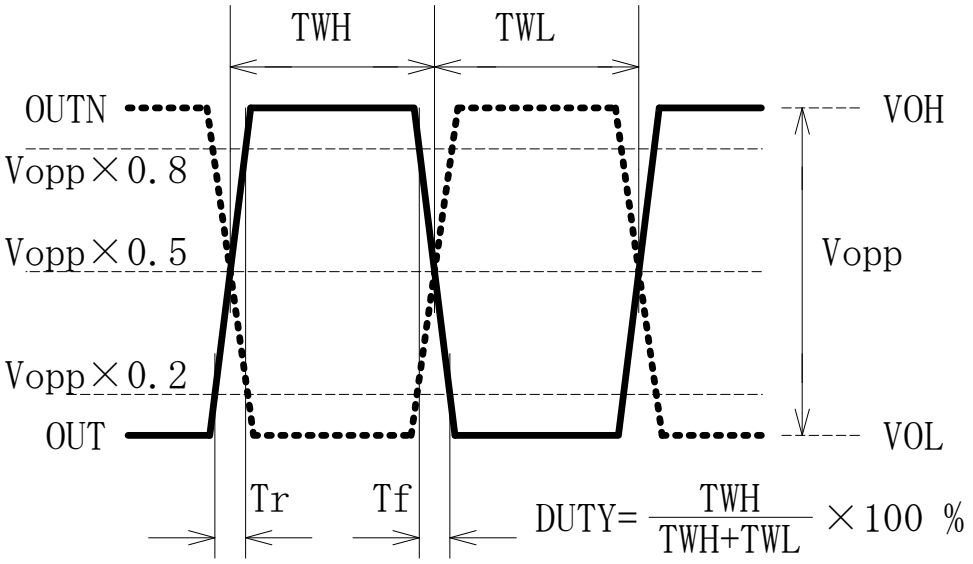
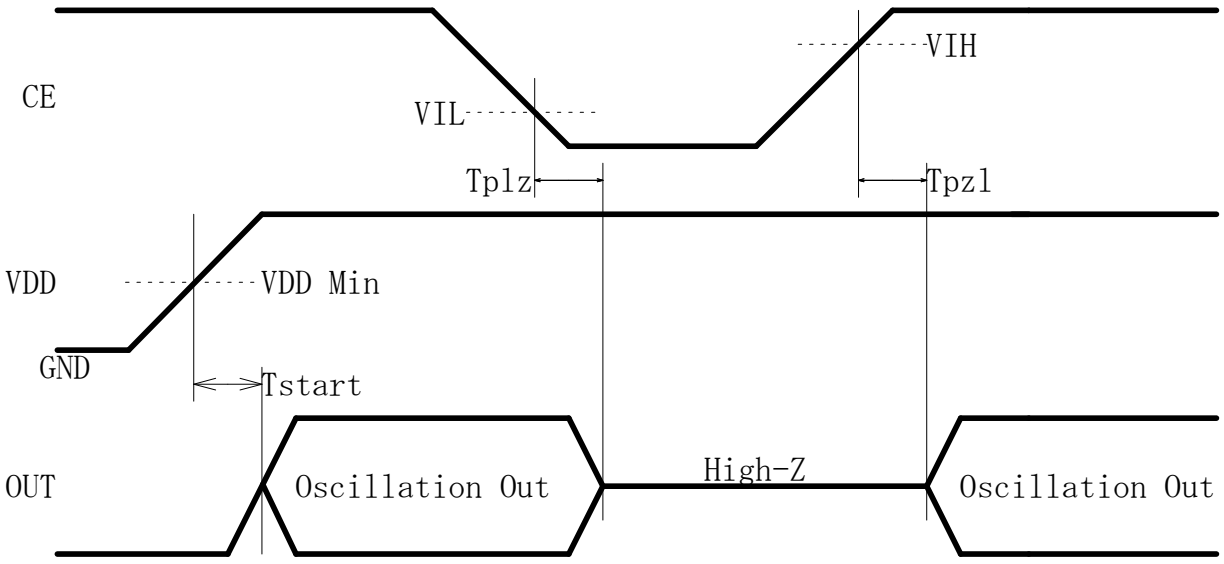


Fig. 5-1 Output Wave Form (Duty, Tr, Tf, V_{OH}, V_{OL}, Vopp)



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)

Ta=25℃

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Feedback Resistor	IPS0204MTHJS	Rf	Refer to Fig. 6-1		1.75		kΩ
	IPS0205MTHJS				0.75		
Driving Resistor	IPS0204MTHJS	Rd	Refer to Fig. 6-1		300		Ω
	IPS0205MTHJS				200		
Oscillation Capacitor	IPS0204MTHJS	Cg	Refer to Fig. 6-1		4.0		pF
		Cd			7.0		
	IPS0205MTHJS	Cg			3.0		
		Cd			7.0		

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

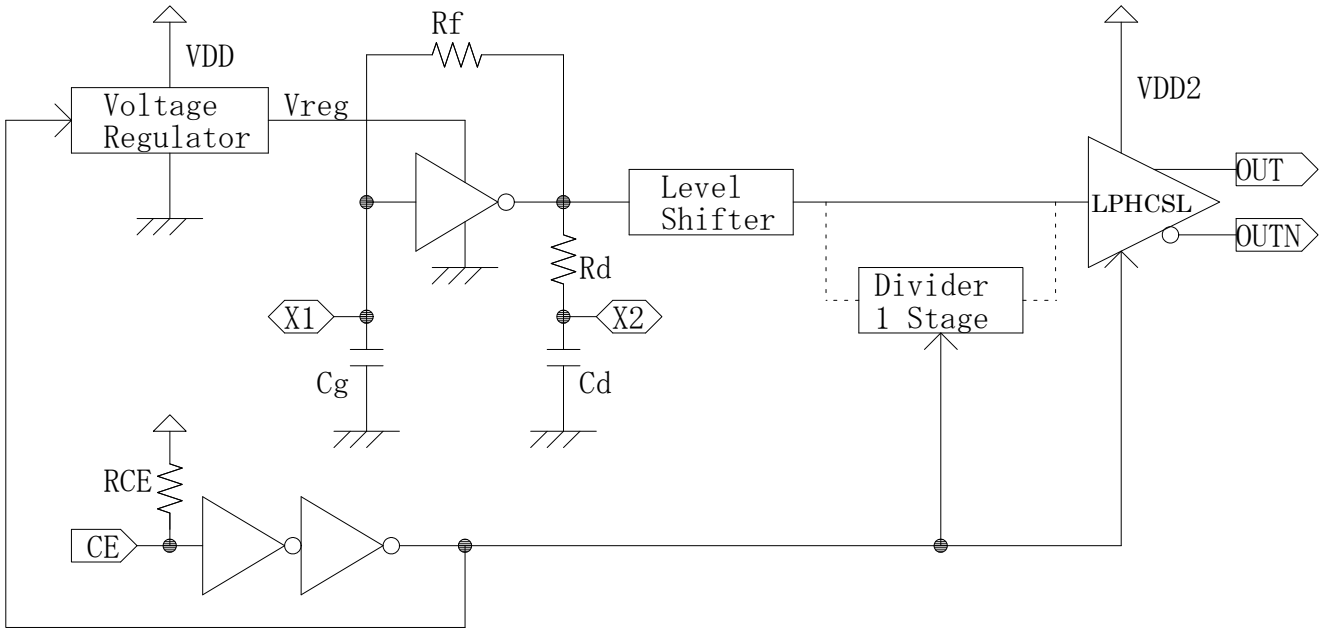
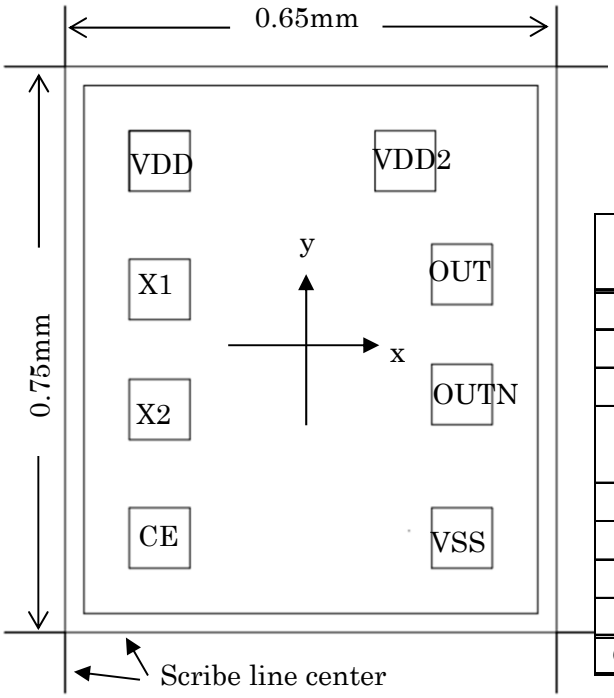


Fig. 6-1 Block Diagram

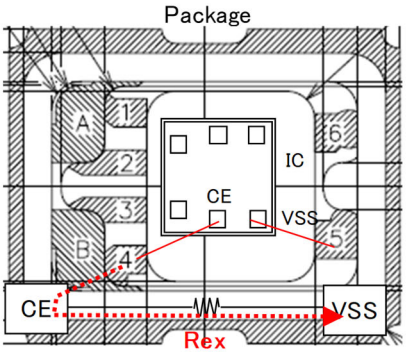
7. Pad Layout

7-1 Straight Type



・Die Size : 0.65mm × 0.75mm
・Pad Size : 80um □
・Thickness : 150um±20um
・IC Backside : Gnd or Open
・Swapping of OUT/OUTN with wire bond is acceptable

Pad Name	Function	Location (μm)	
		x	y
VDD	(+) Power Supply	-206	256
X1	Crystal Feedback	-206	83
X2	Crystal Drive	-206	-83
CE	Oscillation stop "L": High-Impedance	-206	-256
VSS	(−) Ground	206	-256
OUTN	OUT(Complementary)	206	-65
OUT	OUT(True)	206	108
VDD2	NC is acceptable	113	256
Chip Center		0	0

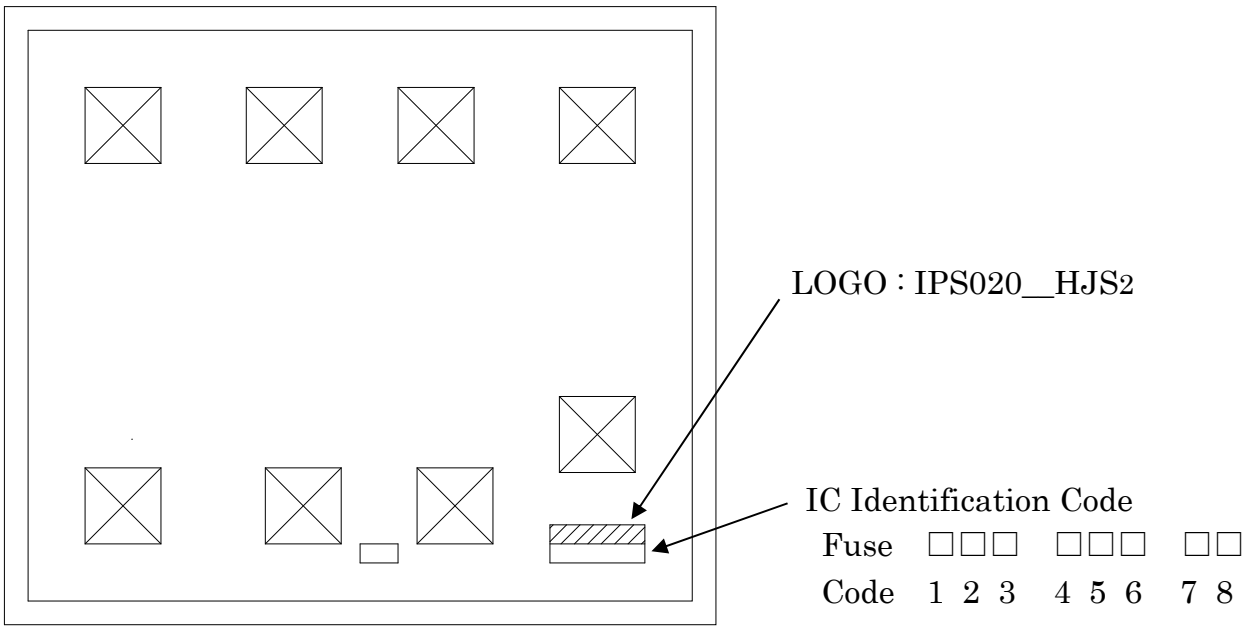


IMPORTANT Notice for CE function

※ 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

8. IC Part # Identification



Part #	Code 1~8
IPS0204MTHJS	■□□ ■□□ □□
IPS0205MTHJS	■□■ ■□□ □□

□ : Fuse no cut

■ : Fuse cut