

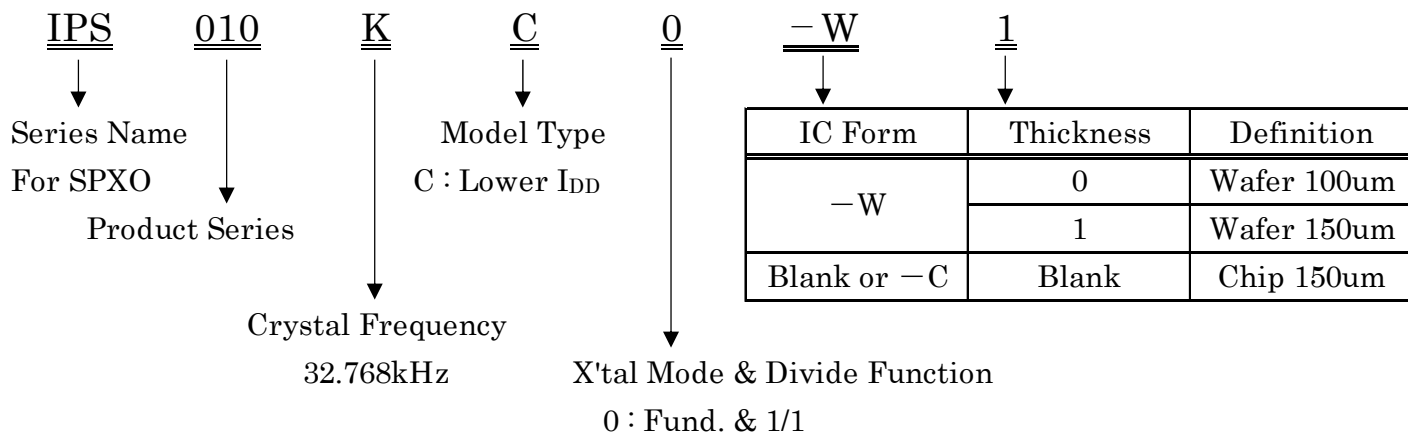
■ Description

IPS010KC0 is a CMOS oscillator IC which is specially designed to combine with the 32.768kHz crystal unit.

This product enables ultra low power consumption crystal oscillator by sophisticated design and specially tuned CMOS process. Since the power supply of the output stage can be set up independently, the interface to a receptacle is easy. This IC is small enough to form a micro size oscillator.

■ Features

- Power supply voltage : 1.2V~5.5V
- Crystal frequency : 32.768kHz
- Low power consumption : 0.35μA (V_{DD}=1.8V, No Load)
- Output : CMOS
- Small chip size : 0.74mm × 0.70mm
- Frequency stability to V_{DD} : Within ±0.5Hz
- Duty cycle : Within 50%±10%

1. Part number rule


2. Series

Part Number	Crystal Frequency f (kHz)	V _{DD}	T _a	Remarks
IPS010 K C 0	32.768	1.2V~5.5V	-40~125°C	<ul style="list-style-type: none"> • Low current consumption type • No pull up resistor (OE terminal)

3. Absolute Maximum Ratings

V_{SS}=0V, T_a=25°C±2°C

Parameter	Symbol	Condition	Ratings		
			Min	Max	Unit
Supply Voltage	V _{DD}		V _{SS} -0.5	7.0	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	°C
Storage Temperature	T _{stg}		-55	125	°C

4. Recommended Operating Condition

V_{SS}=0V

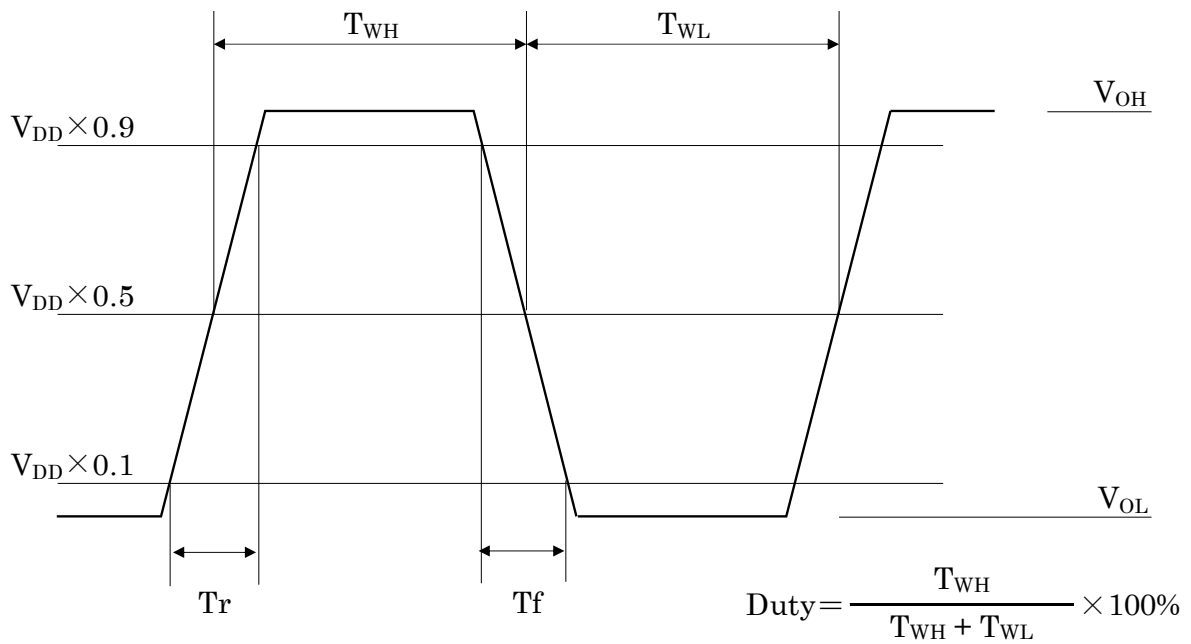
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V _{DD}		1.2	3.3	5.5	V	V _{DD}
“H” Input Voltage	V _{IH}		V _{DD} ×0.8			V	OE
“L” Input Voltage	V _{IL}				V _{DD} ×0.2	V	OE
Input Voltage	V _{IN}		V _{SS}		V _{DD}	V	OE
Crystal Frequency	f			32.768		kHz	X1,X2
Output Load Capacitance	CL	CMOS			15	pF	OUT
Ambient Temperature	T _{opt}		-40		125	°C	

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

5. Electrical Specification

 Unless otherwise stated, $V_{DD}=1.2V\sim 5.5V$, $V_{SS}=0V$, $T_a=-40^{\circ}C\sim 125^{\circ}C$

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output leak current	I_Z	$V_{DD}=5.5V$			10	μA
“H” output voltage	V_{OH}	$I_{OH}=-400\mu A$, $V_{DD}=1.5V\sim 5.5V$	$V_{DD}-0.4$			V
“L” output voltage	V_{OL}	$I_{OL}=400\mu A$, $V_{DD}=1.5V\sim 5.5V$			$V_{SS}+0.4$	
Current Consumption	I_{DD}	No Load, $V_{DD}=1.8V$		0.35	0.75	μA
		No Load, $V_{DD}=3.3V$		0.50	0.90	
		No Load, $V_{DD}=5.5V$		0.90	1.40	
		$CL=15pF$, $V_{DD}=1.8V$		1.25	1.65	
		$CL=15pF$, $V_{DD}=3.3V$		2.15	2.55	
		$CL=15pF$, $V_{DD}=5.5V$		3.70	4.20	
Standby Current	I_{DDD}	$OE \leq 0.3V$			0.7	μA
Rise Time / Fall Time	T_r/T_f	$CL=15pF$, $V_{DD}=1.2V\sim 1.5V$ 10%~90% V_{DD}			200	ns
		$CL=15pF$, $V_{DD}=1.5V\sim 5.5V$ 10%~90% V_{DD}				
Output Duty Cycle	Duty	$CL=15pF$, 1/2 V_{DD} point	40		60	%
Frequency V_{DD} deviation	F_{VSR}	$T_a=25^{\circ}C$			± 1.0	ppm/V
Osc. Start up Time	T_{start}			150	500	ms

 Note : Please use a crystal with $CI=100k\Omega$ or less.

 Fig. 5-1 Output Wave Form (Duty, T_r , T_f)

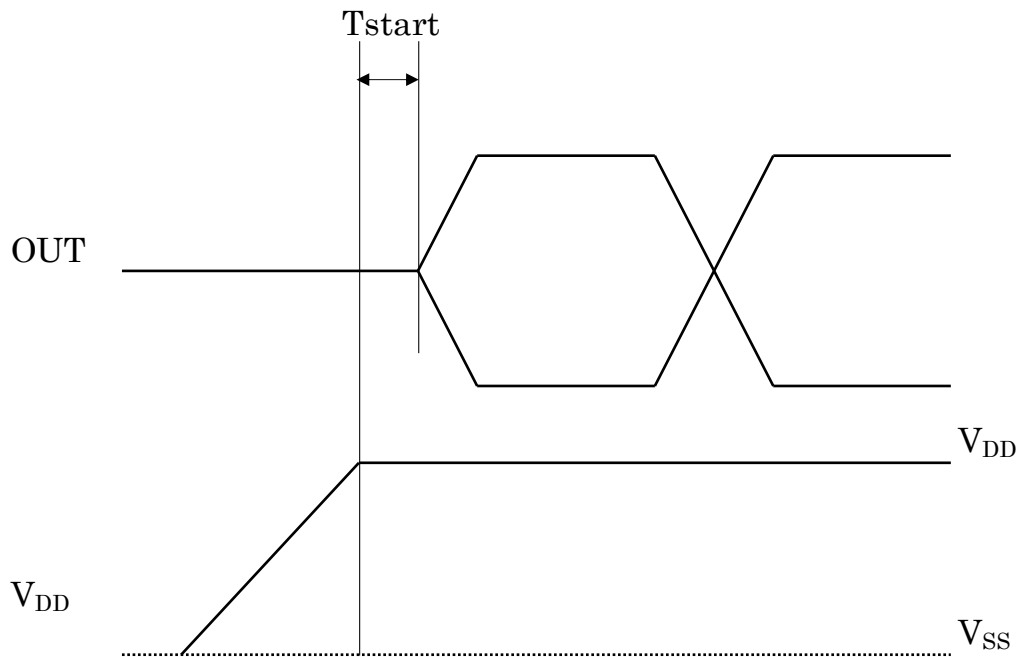


Fig. 5-2 Output Wave Form (T_{start})

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

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Regulated Voltage	Vreg			0.78		V
Feedback Resistor	Rf			50		M Ω
Driving Resistor	Rd			300		k Ω
Oscillation Capacitor	Cg			5.67		pF
	Cd			11.34		

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

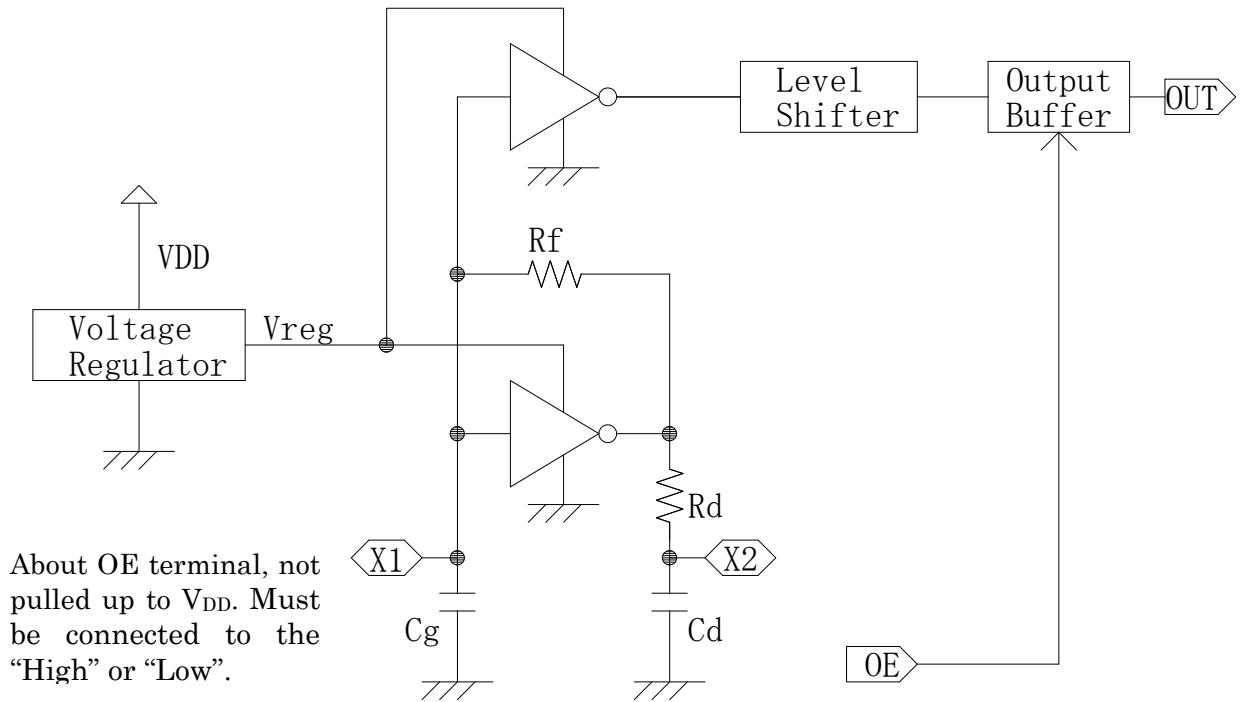
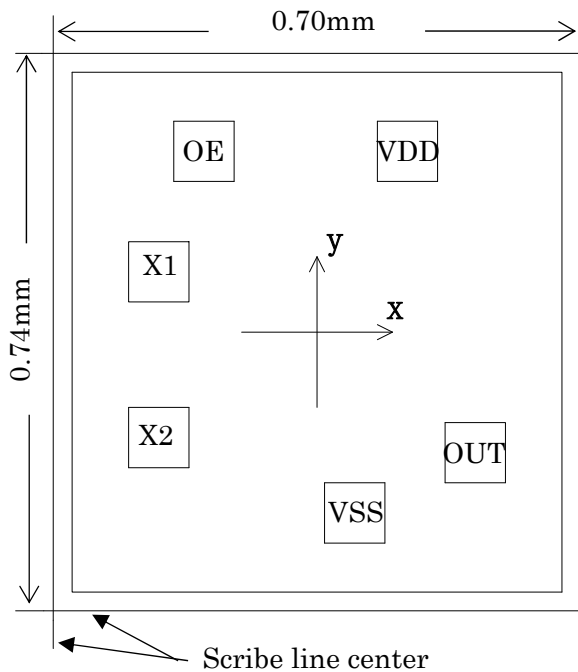


Fig.6-1 Block Diagram of IPS010KC0

7. Pad Layout



- Die Size: 0.70mm × 0.74mm
- Pad Size: 80um □
- Thickness: 150um±20um
- IC Backside: Gnd or Open

Pad Name	Function	Location (μm)	
		x	y
VDD	(+) Power Supply	119	239
OUT(Q)	Frequency Output	210	-158
VSS	(-) Ground	50	-242
X2	Crystal Drive	-211	-139
X1	Crystal Feedback	-211	84
OE	Output stop "L": High-Impedance	-152	242
Chip Center		0	0

