

32.768kHz output Tuning fork Quartz Crystal Oscillator IC

GENERAL DESCRIPTION

The NJU6229 is a CMOS oscillator IC which is designed for 32.768kHz tuning fork quartz unit.

The NJU6229 is ultra-small IC realizing to micro size oscillator unit. The oscillation current is ultra-low power consumption 1.00 μ A(TYP). This is applicable for the portable devices requiring small sized and low power XO module. The operating voltage is from 1.62 to 5.50V. The 3-state output buffer is C-MOS compatible of fan-out.

PACKAGE OUTLINE

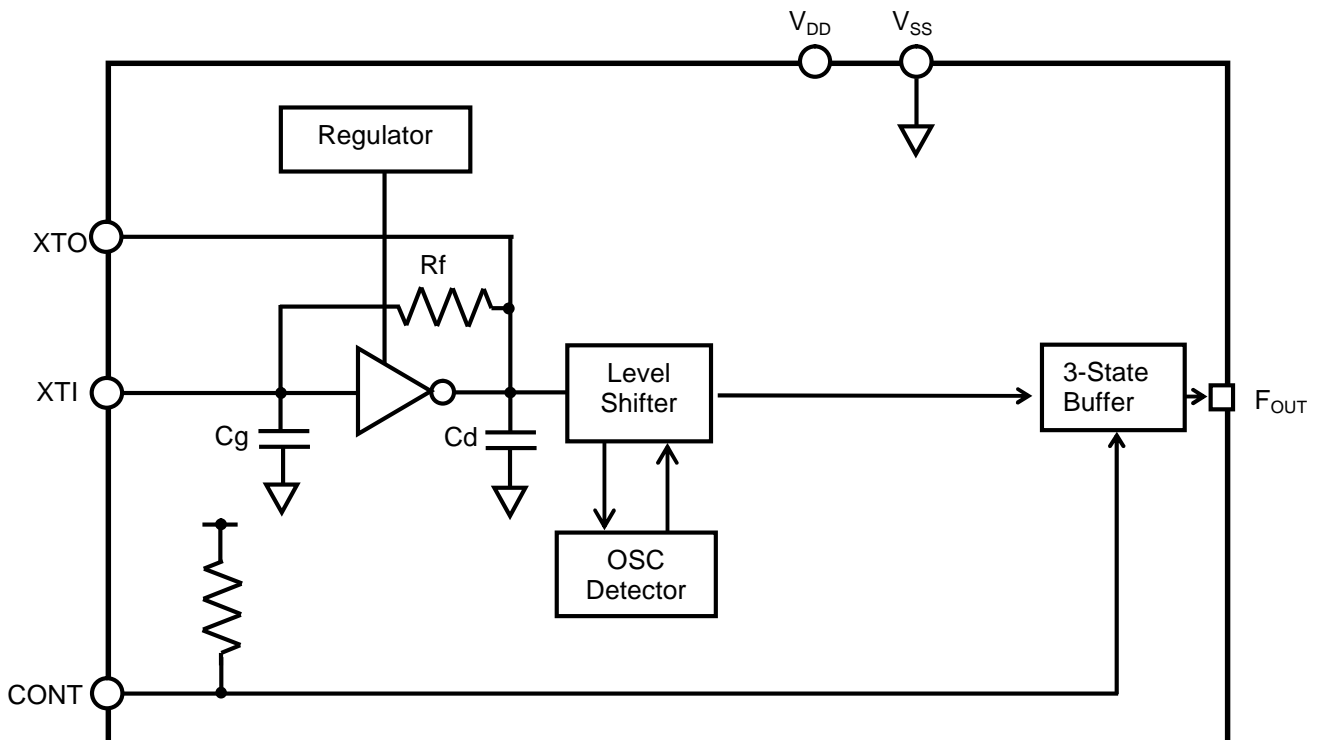


NJU6229XC-V

FEATURES

Oscillation Frequency	32.768kHz
Wide Operating Voltage	1.62 to 5.50V
Low power consumption	1.00 μ A ($V_{DD}=1.80V$, No load)
Output Disable Function	
3-State Output Buffer	
Variable Pull-up Resistance on-Die	
Oscillation Capacitors C_g and C_d on-Die	
Package Outline	Die/Wafer
C-MOS Technology	

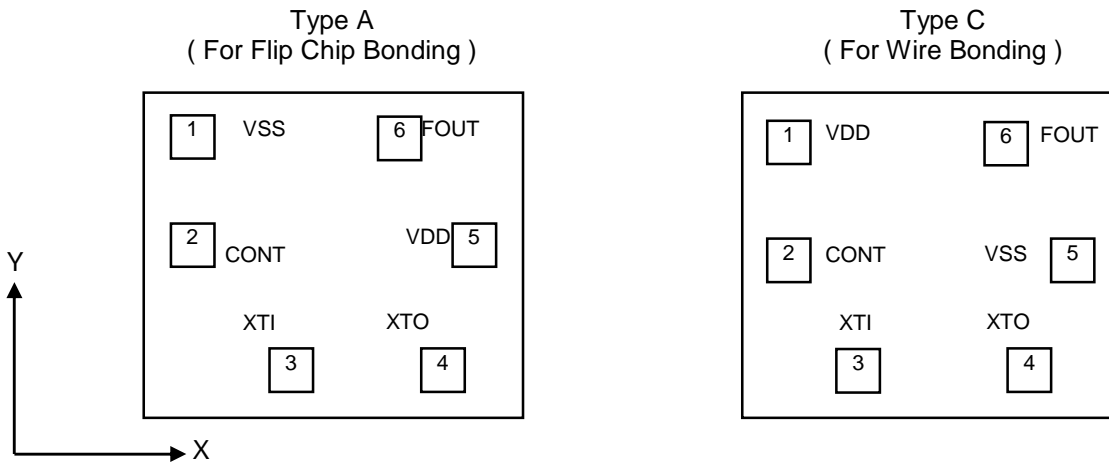
BLOCK DIAGRAM



LINE-UP TABLE

Type No.	Version	
	Type A	Type C
NJU6229	A	C

PAD LOCATION

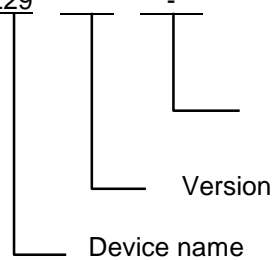


COORDINATES

Pad No.	X	Y
1	-151.5	160.0
2	-161.5	-46.0
3	-10.5	-160.0
4	151.5	-160.0
5	161.5	0
6	121.5	160.0

PART NUMBER

NJU6229



W-H: Wafer (200μm)
C-V: Chip (130μm)

Starting Point: Die Center Unit[μm]
 Die Size: 0.534 x 0.534mm
 Die Thickness (C-V): 130±15μm
 Wafer Thickness (W-H): 200±20μm
 Die Substrate: V_{SS} leve
 Pad size: Type-A: 80 x 80μm
 Type-C: 80 x 80μm

TERMINAL DESCRIPTION

SYMBOL	FUNCTION
CONT	3-state Output Buffer Control Terminal
	CONT F _{OUT}
	H or OPEN Output of f ₀
	L High-Z
XTI XTO	Quartz Crystal Connecting Terminals
V _{SS}	GND Terminal (V _{SS} =0V)
F _{OUT}	Frequency Output
V _{DD}	V _{DD} =1.62 to 5.50V

FUNCTIONAL DESCRIPTION

Output Disable Function

When CONT Terminal goes "Low", the F_{OUT} Terminal output becomes High impedance.

CONT	F _{OUT}	Oscillator
High(Open)	Frequency output	Normal operation
Low	Hi-Z	Normal operation

Variable Pull-up Resistance

The CONT Terminal pull-up resistance changes in response to the input level. When CONT is tied "LOW" level, the pull-up resistance is large, reducing the current consumed by the resistance. When CONT is left open circuit, the pull-up resistance is small, which increases the input susceptibility to external noise. However, the pull-up resistance ties the CONT Terminal "High" level to prevent external noise from unexpectedly stopping the output.

ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V, T_a=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	-0.5 to +6.0	V
Input Voltage	V _{IN}	V _{SS} -0.5 ~ V _{DD} +0.5	V
Output Voltage	V _O	-0.5 to V _{DD} +0.5	V
Input Current	I _{IN}	±10	mA
Output Current	I _O	±25	mA
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-55 to +150	°C

Note1) If the supply voltage(V_{DD}) is less than 6.0V, the input voltage must not over the V_{DD} level though 6.0V is limit specified

Note2) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.

ELECTRICAL CHARACTERISTICS

(Ta=+25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V _{DD}	fosc=32.768kHz	1.62		5.50	V
Input Voltage	V _{IN}	CONT	0		5.50	V
Output Voltage	V _{OUT}	F _{OUT}	0		V _{DD}	V

(V_{DD}=1.62 to 5.50V, V_{SS}=0V, Ta=+25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	V _{DD} =1.80V, No Load		1.00	2.00	μA
		V _{DD} =2.50V, No Load		1.30	2.60	
		V _{DD} =3.30V, No load		1.60	3.20	
		V _{DD} =5.00V, No load		2.70	5.40	
		V _{DD} =1.80V, CL=15pF		2.30	4.60	
		V _{DD} =2.50V, CL=15pF		3.00	6.00	
		V _{DD} =3.30V, CL=15pF		3.80	7.60	
		V _{DD} =5.00V, CL=15pF		5.80	11.60	
Oscillation Stopping Current	I _{STB}	V _{DD} =1.80V, CONT=V _{SS} , No load		0.65	1.30	μA
		V _{DD} =2.50V, CONT=V _{SS} , No load		0.70	1.40	
		V _{DD} =3.30V, CONT=V _{SS} , No load		0.75	1.50	
		V _{DD} =5.00V, CONT=V _{SS} , No load		0.90	1.80	
"High level" Output Voltage	V _{OH}	I _{OH} =-400μA, V _{DD} =1.62V~5.50V	V _{DD} -0.4		V _{DD}	V
"Low level" Output Voltage	V _{OL}	I _{OL} =400μA, V _{DD} =1.62V~5.50V			0.4	V
Input Voltage	V _{IH}	CONT	0.7V _{DD}			V
	V _{IL}	CONT			0.3V _{DD}	V
3-state Off Leakage Current	I _{OZ}	CONT=V _{SS} , F _{OUT} = V _{DD} or V _{SS}			±0.1	μA

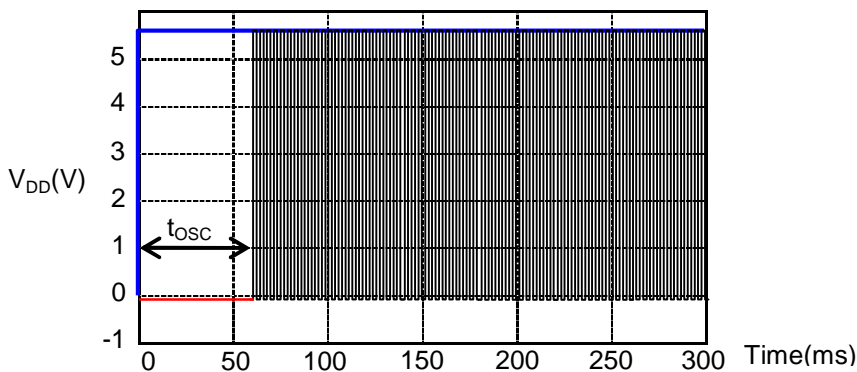
* Under development and tentative value.

($V_{DD}=1.62$ to $5.50V$, $V_{SS}=0V$, $T_a=+25^{\circ}C$)

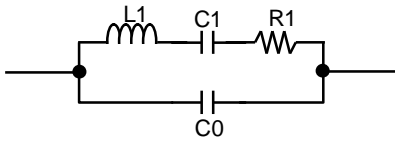
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Feedback Resistance	Rf			24		M
Internal Capacitor	Cg	fosc=32.768kHz		7		pF
	Cd	fosc=32.768kHz		8.5		pF
Output Signal Symmetry	SYM	$C_L=15pF$, @ $V_{DD}/2$	45	50	55	%
Output Signal Rise Time	tr	$C_L=15pF$ 0.1 V_{DD} to 0.9 V_{DD}			500	ns
Output Signal Fall Time	tf	$C_L=15pF$ 0.9 V_{DD} to 0.1 V_{DD}			500	ns
Output Disable time	t _{POZ}	$C_L=15pF$, $R_L=1k\Omega$			500	ns
Output Enable Time	t _{PZO}	$C_L=15pF$			50	μs
Oscillation Start up Time	T _{OSC}			150	500	ms

Note3) The oscillation frequency range has used NJRC's standard crystal for measurement. However it is not guaranteed. (Refer to EXAMPLE OF CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS)

(1)Output Signal



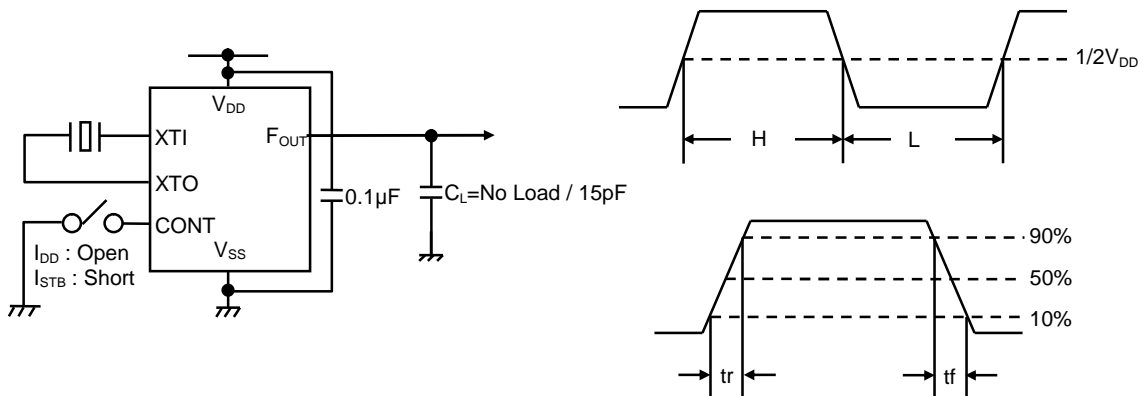
EXAMPLE OF CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS



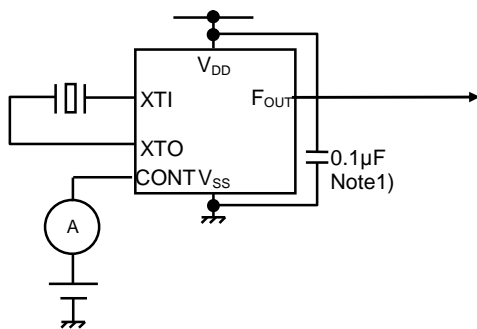
f0[kHz]	R1[Ω]	L1[H]	C1[fF]	C0[pF]
32.768	58.93k	3684.41	6.41	1.41

MEASUREMENT CIRCUITS

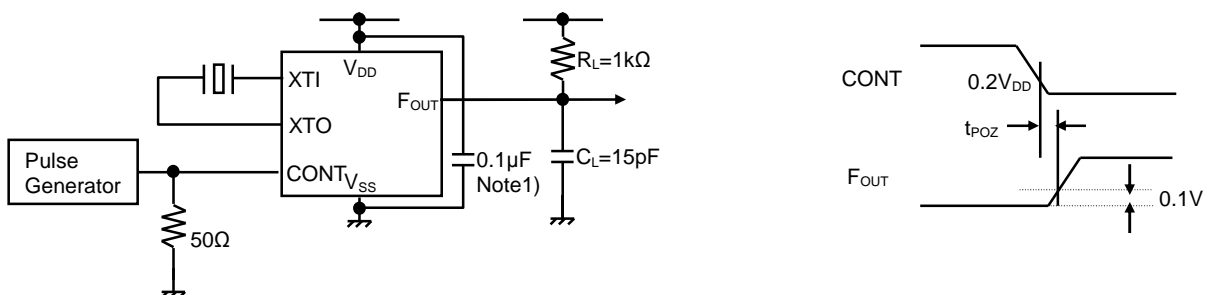
(1) Operating Current, Standby Current, Output Signal Symmetry, Output Signal Rise/Fall Time (C_L=15pF)



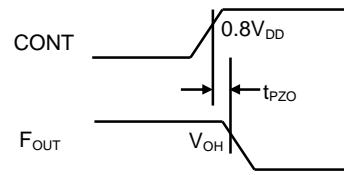
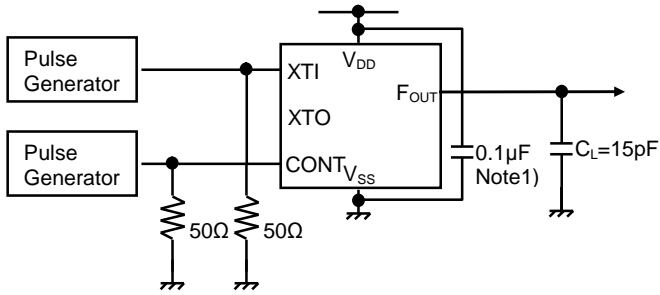
(2) Input Current



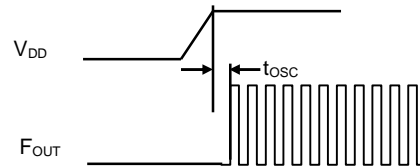
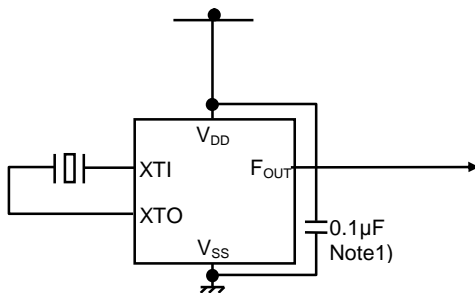
(3) Output Disable Time (C_L=15pF, R_L=1kΩ)



(4) Output Enable Time ($C_L=15\text{pF}$)



(5) Start up time



Note1) Decoupling capacitor between V_{DD} and V_{SS} is, should shorten the wiring as much as possible

[CAUTION]

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