

### High Drive 3rd. Over Tone Quartz Crystal Oscillator

#### ■GENERAL DESCRIPTION

The NJU6370 series is a C-MOS 3rd. over tone quartz crystal oscillator that consists of an oscillation amplifier and 3-state output buffer.

The NJU6378 series has 4-types according to their frequency ranges as shown in the line-up table.

The oscillation amplifier is realized very low stand-by current using NAND circuit.

The 3-state output buffer is C-MOS compatible and can drive 50pF(@5V) C-MOS load.

#### ■PACKAGE OUTLINE

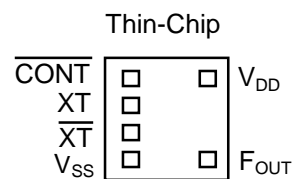


NJU6370XC-D

#### ■FEATURES

- Operating Voltage 2.7 to 5.5V
- Oscillation Frequency Range (See Line-up Table)
- Low Operating Current
- High Fan-out  $I_{OH}/I_{OL}=8mA@3.3V$   
 $I_{OH}/I_{OL}=16mA@5.0V$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors  $C_g$  and  $C_d$  on-chip
- Package Outline Thin-Chip
- C-MOS Technology

#### ■PAD LOCATION



#### ■LINE-UP TABLE

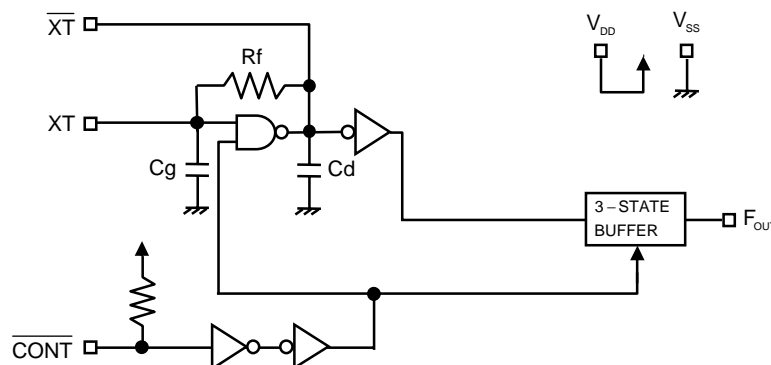
Type No.	Recommended Oscillation Frequency Range	Output Frequency	Cg/Cd
NJU6370	A	30 to 40 MHz	18/18pF
	B	40 to 50 MHz	16/16pF
	C	50 to 60 MHz	11/11pF
	D	60 to 75 MHz	10/10pF

#### ■COORDINATES

No	Pad Name	X	Y
1	$\overline{CONT}$	-178	231
2	XT	-178	77
3	$\overline{XT}$	-178	-77
4	$V_{SS}$	-178	-231
5	$F_{OUT}$	206	-231
8	$V_{DD}$	206	231

Starting Point: Chip Center Unit[um]  
 Chip Size: 0.7x0.75mm  
 Thin-Chip Thickness(-D): 200±20um  
 Pad Size: 90x90um

#### ■BLOCK DIAGRAM



## ■TERMINAL DESCRIPTION

SYMBOL	FUNCTION	
$\overline{\text{CONT}}$	Oscillation and 3-state Output Buffer Control	
	$\overline{\text{CONT}}$	$F_{\text{OUT}}$
	H or OPEN	Output frequency $f_0$ Note1)
	L	Oscillation Stop and High impedance Output
$\overline{\text{XT}}$	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
$V_{\text{SS}}$	$V_{\text{SS}}=0\text{V}$	
$F_{\text{OUT}}$	Frequency Output	
$V_{\text{DD}}$	$V_{\text{DD}}=2.5\text{V}/3.0\text{V}/5.0\text{V}$	

Note1) Refer to the line-up table.

## ■ABSOLUTE MAXIMUM RATINGS

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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V_{\text{DD}}$	-0.5 to +7.0	V
Input Voltage	$V_{\text{IN}}$	$V_{\text{SS}}-0.5$ to $V_{\text{DD}}+0.5$	V
Output Voltage	$V_{\text{O}}$	-0.5 to $V_{\text{DD}}+0.5$	V
Input Current	$I_{\text{IN}}$	$\pm 10$	MA
Output Current	$I_{\text{O}}$	$\pm 25$	MA
Operating Temperature Range	$T_{\text{opr}}$	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	-55 to +125	$^\circ\text{C}$

Note2) If the supply voltage( $V_{\text{DD}}$ ) is less than 7.0V, the input voltage must not over the  $V_{\text{DD}}$  level though 7.0V is limit specified.

Note3) Decoupling capacitor should be connected between  $V_{\text{DD}}$  and  $V_{\text{SS}}$  due to the stabilized operation for the circuit.

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V <sub>DD</sub>		2.7		5.5	V

(V<sub>DD</sub>=3.3V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I <sub>DD</sub>	A version, fosc=40MHz, C <sub>L</sub> =30pF			14	mA
		B version, fosc=50MHz, C <sub>L</sub> =30pF			16	
		C version, fosc=60MHz, C <sub>L</sub> =30pF			20	
		D version, fosc=75MHz, C <sub>L</sub> =30pF			25	
Oscillation Stopping Current	I <sub>STB</sub>	$\overline{\text{CONT}} = V_{SS}$ , No load		2	5	uA
Stand-by Current	I <sub>st</sub>	$\overline{\text{CONT}} = \text{XT} = V_{SS}$ , No load Note4)			1	uA
Input Voltage	V <sub>IH</sub>		2.31		3.3	V
	V <sub>IL</sub>		0		0.99	V
Output Current	I <sub>OH</sub>	V <sub>OH</sub> =2.97V	8			mA
	I <sub>OL</sub>	V <sub>OL</sub> =0.33V	8			mA
Input Current	I <sub>IN</sub>	$\overline{\text{CONT}} = 0.8V_{DD}$		10.0	15.0	uA
		$\overline{\text{CONT}} = 0.2V_{DD}$		1.8	3.0	uA
3-state Off Leakage Current	I <sub>oz</sub>	$\overline{\text{CONT}} = V_{SS}$ , F <sub>OUT</sub> = V <sub>DD</sub> or V <sub>SS</sub>			±0.1	uA
Feedback Resistance	R <sub>f</sub>	A version		4.5		kΩ
		B version		3.1		
		C version		3.9		
		D version		3.1		
Internal Capacitor	C <sub>g</sub> /C <sub>d</sub>	A version, fosc=40MHz		18/18		pF
		B version, fosc=50MHz		16/16		
		C version, fosc=60MHz		11/11		
		D version, fosc=75MHz		10/10		
Maximum Oscillation Frequency	F <sub>MAX</sub>	A version	40			MHz
		B version	50			
		C version	60			
		D version	75			
Output Signal Symmetry	SYM	C <sub>L</sub> =15pF, @V <sub>DD</sub> /2	45	50	55	%
		C <sub>L</sub> =30pF, @V <sub>DD</sub> /2	45	50	55	%
Output Signal Rise Time	tr	C <sub>L</sub> =15pF, 10% to 90%		2.5	5	ns
		C <sub>L</sub> =30pF, 10% to 90%		4	8	
Output Signal Fall Time	tf	C <sub>L</sub> =15pF, 90% to 10%		2,5	5	ns
		C <sub>L</sub> =30pF, 90% to 10%		4	8	
Output Disable time	T <sub>PLZ</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ			150	ns
Output Enable Time	T <sub>PZL</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ			150	ns

Note4) Excluding input current on  $\overline{\text{CONT}}$  Terminal.

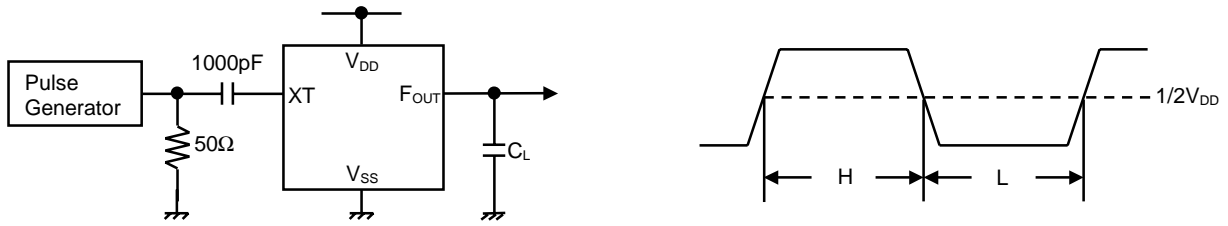
( $V_{DD}=5.0V, T_a=25^{\circ}C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	$I_{DD}$	A version, $f_{osc}=40MHz, C_L=50pF$			35	mA
		B version, $f_{osc}=50MHz, C_L=50pF$			40	
		C version, $f_{osc}=60MHz, C_L=50pF$			52	
		D version, $f_{osc}=75MHz, C_L=50pF$			60	
Oscillation Stopping Current	$I_{STB}$	$\overline{CONT} = V_{SS}$ , No load		5	10	uA
Stand-by Current	$I_{st}$	$\overline{CONT} = XT = V_{SS}$ , No load Note4)			1	uA
Input Voltage	$V_{IH}$		3.5		5.0	V
	$V_{IL}$		0		1.5	V
Output Current	$I_{OH}$	$V_{OH}=4.5V$	16			mA
	$I_{OL}$	$V_{OL}=0.5V$	16			mA
Input Current	$I_{IN}$	$\overline{CONT} = 0.8V_{DD}$		27.0	40.0	uA
		$\overline{CONT} = 0.2V_{DD}$		5.5	8.0	uA
3-state Off Leakage Current	$I_{OZ}$	$\overline{CONT} = V_{SS}$ , $F_{OUT} = V_{DD}$ or $V_{SS}$			$\pm 0.1$	uA
Feedback Resistance	$R_f$	A version		4.5		k $\Omega$
		B version		3.1		
		C version		3.9		
		D version		3.1		
Internal Capacitor	$C_g/C_d$	A version, $f_{osc}=40MHz$		18/18		pF
		B version, $f_{osc}=50MHz$		16/16		
		C version, $f_{osc}=60MHz$		11/11		
		D version, $f_{osc}=75MHz$		10/10		
Maximum Oscillation Frequency	$F_{MAX}$	A version	40			MHz
		B version	50			
		C version	60			
		D version	75			
Output Signal Symmetry	SYM	$C_L=15pF, @V_{DD}/2$	45	50	55	%
		$C_L=50pF, @V_{DD}/2$	45	50	55	
Output Signal Rise Time	$T_r$	$C_L=15pF, 10\% \sim 90\%$		2	4	ns
		$C_L=50pF, 10\% \sim 90\%$		5	10	
Output Signal Fall Time	$t_f$	$C_L=15pF, 90\% \sim 10\%$		2	4	ns
		$C_L=50pF, 90\% \sim 10\%$		5	10	
Output Disable time	$T_{PLZ}$	$C_L=15pF, R_{UP}=10k\Omega$			150	ns
Output Enable Time	$T_{PZL}$	$C_L=15pF, R_{UP}=10k\Omega$			150	ns

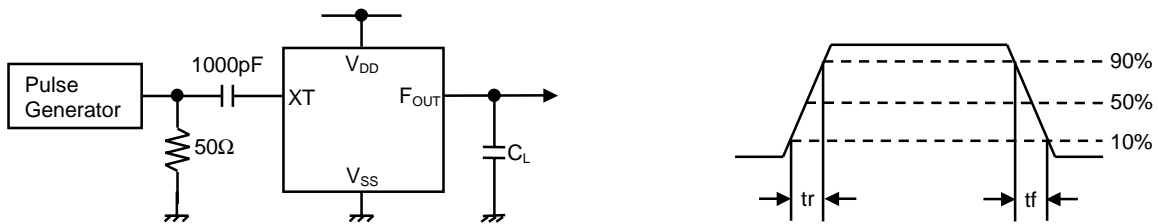
Note4) Excluding input current on  $\overline{CONT}$  Terminal.

MEASUREMENT CIRCUITS

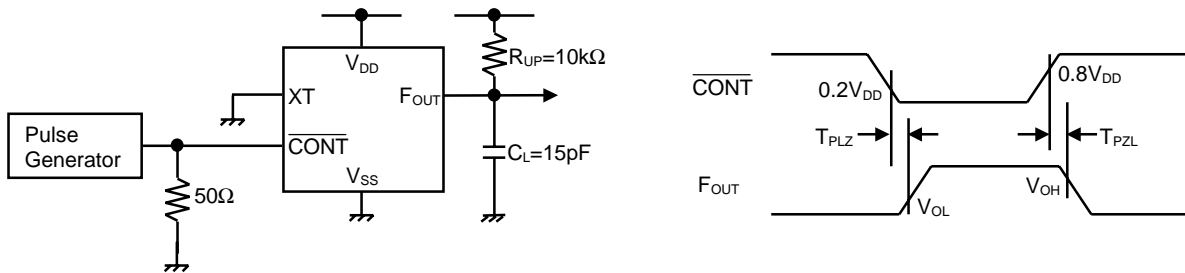
(1) Output Signal Symmetry ( $C_L=15/30/50\text{pF}$ )



(2) Output Signal Rise/Fall Time ( $C_L=15/30/50\text{pF}$ )



(3) Output Disable/Enable Time ( $C_L=15\text{pF}, R_{UP}=10\text{k}\Omega$ )



[CAUTION]  
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