PRELIMINARY

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

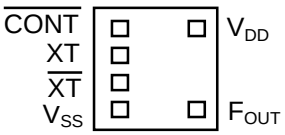
NJU6370XC-D

■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 Cg and Cg on-chip
- ●Package Outline Thin-Chip
- ●C-MOS Technology

■PAD LOCATION

Thin-Chip



■LINE-UP TABLE

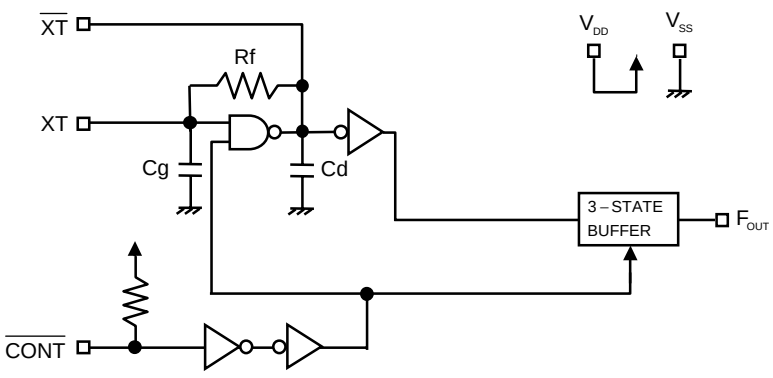
Type No.		Recommended Oscillation Frequency Range	Output Frequency	Cg/Cd
NJU6370	A	30 to 40 MHz	f_0	18/18pF
	B	40 to 50 MHz		16/16pF
	C	50 to 60 MHz		11/11pF
	D	60 to 75 MHz		10/10pF

■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



■TREMINAL DESCRIPTION

SYMBOL	FUNCTION
$\overline{CONT}$	Oscillation and 3-state Output Buffer Control

$\overline{CONT}$	F_{OUT}
H or OPEN	Output frequency f_0 Note1)
L	Oscillation Stop and High impedance Output

XT $\overline{XT}$	Quartz Crystal Connecting Terminals
V_{SS}	V_{SS}=0V
F_{OUT}	Frequency Output
V_{DD}	V_{DD}=2.5V/3.0V/5.0V

Note1) Refer to the line-up table.

■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	-0.5 to +7.0	V
Input Voltage	V_{IN}	V_{SS}-0.5 to 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	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-55 to +125	°C

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

Note3) Decupling 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}		2.7		5.5	V

(V_{DD}=3.3V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	A version,fosc=40MHz,C_L=30pF			14	mA
		B version,fosc=50MHz,C_L=30pF			16	
		C version,fosc=60MHz,C_L=30pF			20	
		D version,fosc=75MHz,C_L=30pF			25	
Oscillation Stopping Current	I_{STB}	$\overline{CONT}$ =V_{SS}, No load		2	5	uA
Stand-by Current	Ist	$\overline{CONT}$ =XT=V_{SS}, No load Note4)			1	uA
Input Voltage	V_{IH}		2.31		3.3	V
	V_{IL}		0		0.99	V
Output Current	I_{OH}	V_{OH}=2.97V	8			mA
	I_{OL}	V_{OL}=0.33V	8			mA
Input Current	I_{IN}	$\overline{CONT}$ =0.8V_{DD}		10.0	15.0	uA
		$\overline{CONT}$ =0.2V_{DD}		1.8	3.0	uA
3-state Off Leakage Current	I_{OZ}	$\overline{CONT}$ =V_{SS}, F_{OUT}= V_{DD} or V_{SS}			±0.1	uA
Feedback Resistance	Rf	A version		4.5		kΩ
		B version		3.1		
		C version		3.9		
		D version		3.1		
Internal Capacitor	Cg/Cd	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_{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=30pF, @V_{DD}/2	45	50	55	%
Output Signal Rise Time	tr	C_L=15pF,10% to 90%		2.5	5	ns
		C_L=30pF,10% to 90%		4	8	
Output Signal Fall Time	tf	C_L=15pF,90% to 10%		2,5	5	ns
		C_L=30pF,90% to 10%		4	8	
Output Disable time	T_{PLZ}	C_L=15pF,R_{UP}=10kΩ			150	ns
Output Enable Time	T_{PZL}	C_L=15pF,R_{UP}=10kΩ			150	ns

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

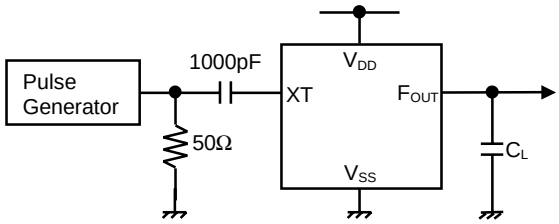
(V_{DD}=5.0V,Ta=25°C)

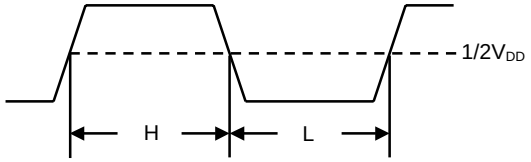
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	A version,fosc=40MHz,C_L=50pF			35	mA
		B version,fosc=50MHz,C_L=50pF			40	
		C version,fosc=60MHz,C_L=50pF			52	
		D version,fosc=75MHz,C_L=50pF			60	
Oscillation Stopping Current	I_{STB}	$\overline{CONT}$ =V_{SS}, No load		5	10	uA
Stand-by Current	Ist	$\overline{CONT}$ =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}			±0.1	uA
Feedback Resistance	Rf	A version		4.5		kΩ
		B version		3.1		
		C version		3.9		
		D version		3.1		
Internal Capacitor	Cg/Cd	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_{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	Tr	C_L=15pF,10%~90%		2	4	ns
		C_L=50pF,10%~90%		5	10	
Output Signal Fall Time	tf	C_L=15pF,90%~10%		2	4	ns
		C_L=50pF,90%~10%		5	10	
Output Disable time	T_{PLZ}	C_L=15pF,R_{UP}=10kΩ			150	ns
Output Enable Time	T_{PZL}	C_L=15pF,R_{UP}=10kΩ			150	ns

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

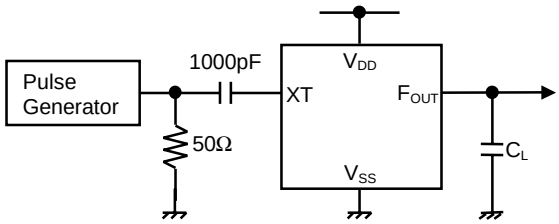
■MEASURMENT CIRCUITS

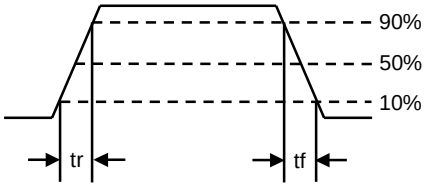
(1)Output Signal Symmetry(C_L=15/30/50pF)





(2)Output Signal Rise/Fall Time(C_L=15/30/50pF)





(3)Output Disable/Enable Time(C_L=15pF,R_{UP}=10kΩ)