3rd. Over Tone Quartz Crystal Oscillator

■GENERAL DESCRIPTION

The NJU6377 series is a C-MOS 3rd. over tone quartz crystal oscillator that consists of an oscillation amplifier and 3-state output buffer.

The type numbers are classed into three versions E, F, G and H according to their oscillation frequency range mentioned 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.

■PACKAGE OUTLINE

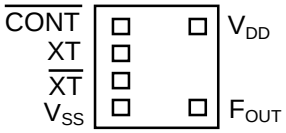
NJU6377XC-D

■FEATURES

- ●Operating Voltage 2.2 to 5.5V
- ●Oscillation Frequency Range (See Line-up Table)
- ●Low Operating Current
- ●High Fan-out I_{OH}/I_{OL}=4mA@2.5V
  I_{OH}/I_{OL}=5mA@3.0V
  I_{OH}/I_{OL}=8mA@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

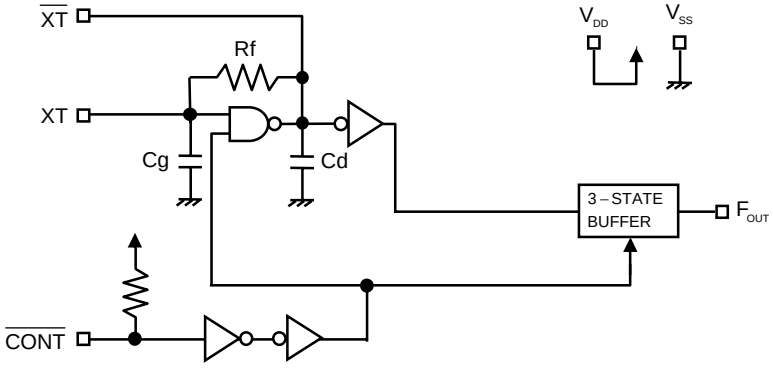
Type No.		Recommended Oscillation Frequency Range	Output Frequency	Cg/Cd
NJU6377	E	30 to 40 MHz	f_0	18/18pF
	F	40 to 50 MHz		16/16pF
	G	50 to 60 MHz		11/11pF
	H	60 to 75 MHz		10/10pF

■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	Quartz Crystal Connecting Terminals
$\overline{XT}$	
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}		2.2		5.5	V

(V_{DD}=2.5V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	E version,fosc=40MHz,C_L=15pF			6	mA
		F version,fosc=50MHz,C_L=15pF			9	
		G version,fosc=60MHz,C_L=15pF			9	
		H version,fosc=75MHz,C_L=15pF			10	
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}		2.0		2.5	V
	V_{IL}		0		0.5	V
Output Current	I_{OH}	V_{OH}=2.7V	4			mA
	I_{OL}	V_{OL}=0.3V	4			mA
Input Current	I_{IN}	$\overline{CONT}$ =0.8V_{DD}		7.5	12.0	uA
		$\overline{CONT}$ =0.2V_{DD}		1.2	2.0	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	E version		4.5		KΩ
		F version		3.1		
		G version		3.9		
		H version		3.1		
Internal Capacitor	Cg/Cd	E version,fosc=40MHz		18/18		pF
		F version,fosc=50MHz		16/16		
		G version,fosc=60MHz		11/11		
		H version,fosc=75MHz		10/10		
Maximum Oscillation Frequency	F_{MAX}	E version	40			MHz
		F version	50			
		G version	60			
		H version	75			
Output Signal Symmetry	SYM	C_L=15pF, @V_{DD}/2	45	50	55	%
Output Signal Rise Time	tr	C_L=15pF,10% to 90%		3	6	ns
Output Signal Fall Time	tf	C_L=15pF,90% to 10%		3	6	ns
Output Disable time	T_{PLZ}	C_L=15pF,R_{UP}=10kΩ			200	ns
Output Enable Time	T_{PZL}	C_L=15pF,R_{UP}=10kΩ			200	ns

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

(V_{DD}=3.0V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	E version,fosc=40MHz,C_L=15pF			8	mA
		F version,fosc=50MHz,C_L=15pF			10	
		G version,fosc=60MHz,C_L=15pF			11	
		H version,fosc=75MHz,C_L=15pF			12	
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}		2.1		3.0	V
	V_{IL}		0		0.9	V
Output Current	I_{OH}	V_{OH}=2.7V	5			mA
	I_{OL}	V_{OL}=0.3V	5			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	E version		4.5		KΩ
		F version		3.1		
		G version		3.9		
		H version		3.1		
Internal Capacitor	Cg/Cd	E version,fosc=40MHz		18/18		pF
		F version,fosc=50MHz		16/16		
		G version,fosc=60MHz		11/11		
		H version,fosc=75MHz		10/10		
Maximum Oscillation Frequency	F_{MAX}	E version	40			MHz
		F version	50			
		G version	60			
		H version	75			
Output Signal Symmetry	SYM	C_L=15pF, @V_{DD}/2	45	50	55	%
Output Signal Rise Time	tr	C_L=15pF,10% to 90%		2.5	5	ns
Output Signal Fall Time	tf	C_L=15pF,90% to 10%		2.5	5	ns
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.

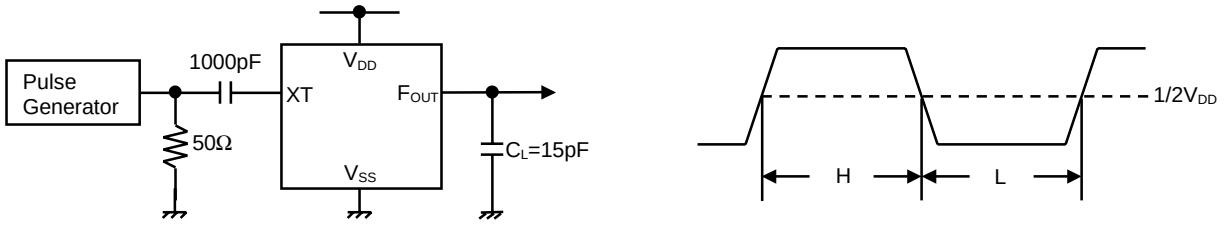
(V_{DD}=5.0V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	E version,fosc=40MHz,C_L=15pF			22	mA
		F version,fosc=50MHz,C_L=15pF			25	
		G version,fosc=60MHz,C_L=15pF			32	
		H version,fosc=75MHz,C_L=15pF			34	
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	8			mA
	I_{OL}	V_{OL}=0.5V	8			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	E version		4.5		KΩ
		F version		3.1		
		G version		3.9		
		H version		3.1		
Internal Capacitor	Cg/Cd	E version,fosc=40MHz		18/18		pF
		F version,fosc=50MHz		16/16		
		G version,fosc=60MHz		11/11		
		H version,fosc=75MHz		10/10		
Maximum Oscillation Frequency	F_{MAX}	E version	40			MHz
		F version	50			
		G version	60			
		H version	75			
Output Signal Symmetry	SYM	C_L=15pF, @V_{DD}/2	45	50	55	%
Output Signal Rise Time	tr	C_L=15pF,10% to 90%		2	4	ns
Output Signal Fall Time	tf	C_L=15pF,90% to 10%		2	4	ns
Output Disable time	T_{PLZ}	C_L=15pF,R_{UP}=10kΩ			100	ns
Output Enable Time	T_{PZL}	C_L=15pF,R_{UP}=10kΩ			100	ns

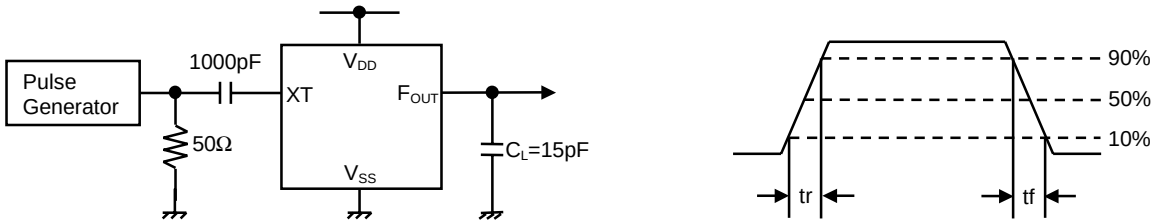
Note4) Excluding input current on $\overline{CONT}$ Terminal.

■MEASURMENT CIRCUITS

(1)Output Signal Symmetry(C_L=15pF)



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



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