

3rd. Over Tone Small Sized Quartz Crystal Oscillator

■ GENERAL DESCRIPTION

The NJU6376 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 four versions G, H, J and K according to their oscillation frequency range 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.

Furthermore, the package is small-sized SOT-23-6-1.

■ PACKAGE OUTLINE



NJU6376XC-C

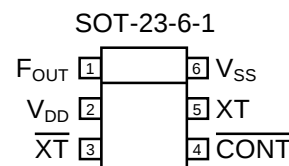
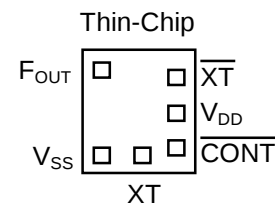


NJU6376XF1

■ FEATURES

- Operating Voltage 2.2 to 5.5V
- Oscillation Frequency Range (See Line-up Table)
- Low Operating Current
- High Fan-out $I_{OH}/I_{OL}=4mA @2.5V$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors C_g and C_d on-chip
- Package Outline Chip/SOT-23-6-1
- C-MOS Technology

■ PAD LOCATION/PIN CONFIGURATION



■ LINE-UP TABLE

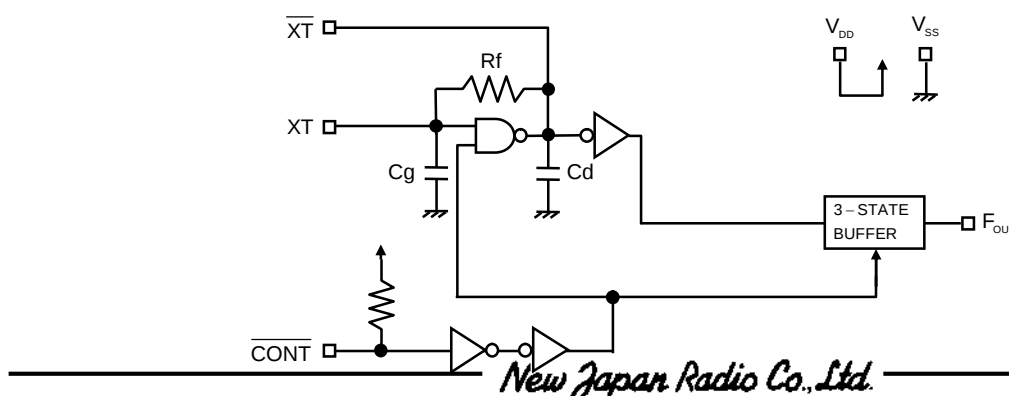
Type No.	Recommended Oscillation Frequency Range	Output Frequency	C_g/C_d
NJU6376	G 30 to 40MHz	f_0	18/18pF
	H 40 to 50MHz		16/16pF
	J 50 to 60MHz		11/11pF
	K 60 to 75MHz		10/10pF

■ COORDINATION

Pad Name	X	Y
F_{OUT}	-220	245
V_{SS}	-205	-230
XT	13	-230
$\overline{CONT}$	205	-191
V_{DD}	205	0
$\overline{XT}$	205	191

Starting Point: Chip Center Unit[μm]
 Chip Size: 0.70x0.75mm
 Thin-Chip Thickness(-C): $260 \pm 20 \mu m$
 Pad Size: 90x90 μm

■ BLOCK DIAGRAM



New Japan Radio Co., Ltd.

■ TERMINAL DESCRIPTION

SYMBOL	FUNCTION	
$\overline{\text{CONT}}$	Oscillation and 3-state Output Buffer Control	
	$\overline{\text{CONT}}$	F_{OUT}
	H or OPEN	Output frequency f_0 Note1)
	L	Oscillation Stop and High impedance Output
XT	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
V_{SS}	$V_{\text{SS}}=0\text{V}$	
F_{OUT}	Frequency Output	
V_{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_{DD}	-0.5 to +7.0	V
Input Voltage	V_{IN}	$V_{\text{SS}}-0.5$ to $V_{\text{DD}}+0.5$	V
Output Voltage	V_{O}	-0.5 to $V_{\text{DD}}+0.5$	V
Input Current	I_{IN}	± 10	mA
Output Current	I_{O}	± 25	mA
Power Dissipation Note4)	P_{D}	200(SOT-23-6-1)	mW
Operating Temperature Range	T_{opr}	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +125	$^\circ\text{C}$

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

Note4) The power dissipation is the maximum value at only the package.

■ 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}	G version, fosc=40MHz, C _L =15pF			6	mA
		H version, fosc=50MHz, C _L =15pF			9	
		J version, fosc=60MHz, C _L =15pF			9	
		K version, fosc=75MHz, C _L =15pF			10	
Oscillation Stopping Current	I _{STB}	$\overline{\text{CONT}} = V_{SS}$, No load		2	5	uA
Stand-by Current	I _{st}	$\overline{\text{CONT}} = \text{XT} = V_{SS}$, No load Note5)			1	uA
Input Voltage	V _{IH}		2.0		2.5	V
	V _{IL}		0		0.5	V
Output Current	I _{OH}	V _{OH} =2.2V	4			mA
	I _{OL}	V _{OL} =0.3V	4			mA
Input Current	I _{IN}	$\overline{\text{CONT}} = 0.8V_{DD}$		7.5	12.0	uA
		$\overline{\text{CONT}} = 0.2V_{DD}$		1.2	2.0	uA
3-state Off Leakage Current	I _{oz}	$\overline{\text{CONT}} = V_{SS}$, F _{OUT} = V _{DD} or V _{SS}			±0.1	uA
Feedback Resistance	R _f	G version		4.5		kΩ
		H version		3.1		
		J version		3.9		
		K version		3.1		
Internal Capacitor	C _g /C _d	G version, fosc=40MHz		18/18		pF
		H version, fosc=50MHz		16/16		
		J version, fosc=60MHz		11/11		
		K version, fosc=75MHz		10/10		
Maximum Oscillation Frequency	F _{MAX}	G version	40			MHz
		H version	50			
		J version	60			
		K version	75			
Output Signal Symmetry	SYM	C _L =15pF, @V _{DD} /2	45	50	55	%
Output Signal Rise Time	t _r	C _L =15pF, 10% to 90%		3	6	ns
Output Signal Fall Time	t _f	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

Note5) Excluding input current on $\overline{\text{CONT}}$ Terminal.

(V_{DD}=3.0V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	G version, fosc=40MHz, C _L =15pF			8	mA
		H version, fosc=50MHz, C _L =15pF			10	
		J version, fosc=60MHz, C _L =15pF			11	
		K version, fosc=75MHz, C _L =15pF			12	
Oscillation Stopping Current	I _{STB}	CONT = V _{SS} , No load		2	5	uA
Stand-by Current	I _{st}	CONT = XT = V _{SS} , No load Note5)			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}	CONT = 0.8V _{DD}		10.0	15.0	uA
		CONT = 0.2V _{DD}		1.8	3.0	uA
3-state Off Leakage Current	I _{OZ}	CONT = V _{SS} , F _{OUT} = V _{DD} or V _{SS}			±0.1	uA
Feedback Resistance	R _f	G version		4.5		kΩ
		H version		3.1		
		J version		3.9		
		K version		3.1		
Internal Capacitor	C _g /C _d	G version, fosc=40MHz		18/18		pF
		H version, fosc=50MHz		16/16		
		J version, fosc=60MHz		11/11		
		K version, fosc=75MHz		10/10		
Maximum Oscillation Frequency	F _{MAX}	G version	40			MHz
		H version	50			
		J version	60			
		K version	75			
Output Signal Symmetry	SYM	C _L =15pF, @V _{DD} /2	45	50	55	%
Output Signal Rise Time	t _r	C _L =15pF, 10% to 90%		2.5	5	ns
Output Signal Fall Time	t _f	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

Note5) Excluding input current on CONT Terminal.

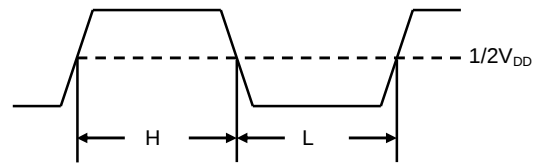
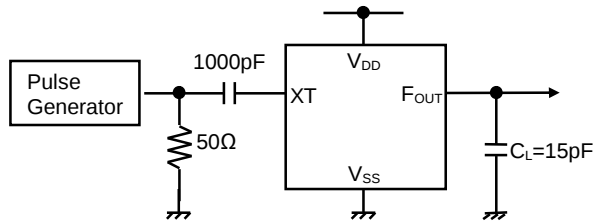
(V_{DD}=5.0V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	G version, fosc=40MHz, C _L =15pF			22	mA
		H version, fosc=50MHz, C _L =15pF			25	
		J version, fosc=60MHz, C _L =15pF			32	
		K version, fosc=75MHz, C _L =15pF			34	
Oscillation Stopping Current	I _{STB}	$\overline{\text{CONT}} = V_{SS}$, No load		5	10	uA
Stand-by Current	I _{st}	$\overline{\text{CONT}} = \text{XT} = V_{SS}$, No load Note5)			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}	$\overline{\text{CONT}} = 0.8V_{DD}$		27.0	40.0	uA
		$\overline{\text{CONT}} = 0.2V_{DD}$		5.5	8.0	uA
3-state Off Leakage Current	I _{OZ}	$\overline{\text{CONT}} = V_{SS}$, F _{OUT} = V _{DD} or V _{SS}			±0.1	uA
Feedback Resistance	R _f	G version		4.5		kΩ
		H version		3.1		
		J version		3.9		
		K version		3.1		
Internal Capacitor	C _g /C _d	G version, fosc=40MHz		18/18		pF
		H version, fosc=50MHz		16/16		
		J version, fosc=60MHz		11/11		
		K version, fosc=75MHz		10/10		
Maximum Oscillation Frequency	F _{MAX}	G version	40			MHz
		H version	50			
		J version	60			
		K version	75			
Output Signal Symmetry	SYM	C _L =15pF, @V _{DD} /2	45	50	55	%
Output Signal Rise Time	t _r	C _L =15pF, 10% to 90%		2	4	ns
Output Signal Fall Time	t _f	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

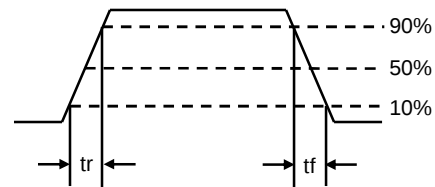
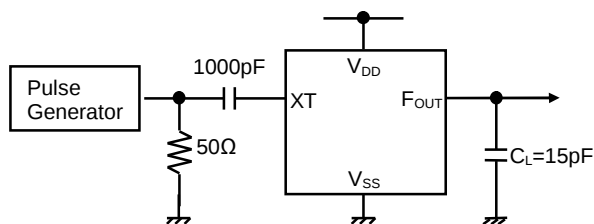
Note5) Excluding input current on $\overline{\text{CONT}}$ Terminal.

■ MEASUREMENT CIRCUITS

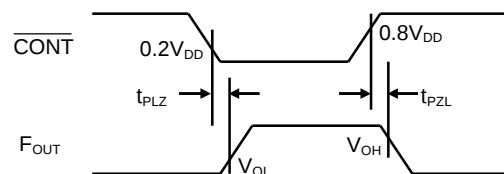
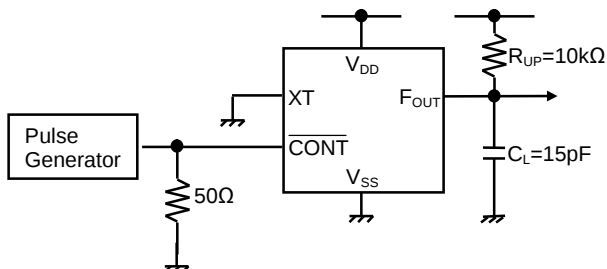
(1) Output Signal Symmetry($C_L=15\text{pF}$)



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



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



[CAUTION]

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