3rd. Over Tone Quartz Crystal Oscillator

■GENERAL DESCRIPTION

The NJU6397 series that is a C-MOS IC for quartz crystal oscillator consists of an oscillation amplifier and 3-state output buffer.

The series has three types of A, B and C. The frequency range of the A type is from 75 to 90MHz, and the B type is from 90 to 110MHz, and the C type is from 110 to 135MHz.

The oscillation amplifier realizes very low oscillation stop current with NAND circuit.

The 3-state output buffer is C-MOS compatible.

■PACKAGE OUTLINE

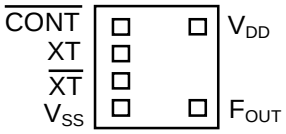
NJU6397XC-X

■FEATURES

- ●Operating Voltage 2.3 to 3.6V
- ●Maximum Oscillation Frequency (See Line-up Table)
- ●High Fan-out I_{OH}/I_{OL}= 6mA @V_{DD}=2.5V
  I_{OH}/I_{OL}= 8mA @V_{DD}=3.3V
- ●Oscillation Stop and Output Stand-by Function
- ●3-State Output Buffer
- ●Oscillation Capacitors Cg and Cg on-Die
- ●Package Outline Thin-Die/Wafer
- ●C-MOS Technology

■PAD LOCATION

Thin-Die



■LINE-UP TABLE

Type No.		Recommended Oscillation Frequency	Output Frequency	Cg/Cd
NJU6397	A	75 to 90MHz	f_0	11/12pF
	B	90 to 110MHz		9/10pF
	C	110 to 135MHz		8/9pF

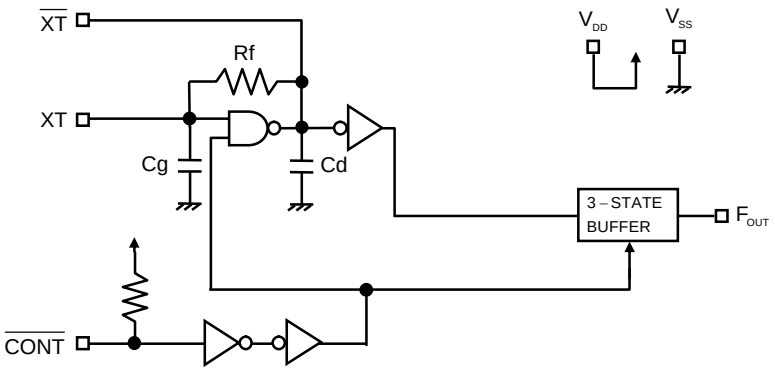
Note1) The oscillation frequency range has used NJRC's characteristics authentication crystal for measurement. However is not guaranteed.

■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:Die Center Unit[um]
Die Size:0.70x0.75mm
Thin-Die Thickness(C-D): 200±20um
Thin-Die Thickness(C-L): 140±10um
Wafer Thickness(W-H): 200±20um
Wafer Thickness(W-L): 140±10um
Pad Size: 90x90um
Die Substrate: V_{DD} Level

■BLOCK DIAGRAM



■TERMINAL DESCRIPTION

SYMBOL	FUNCTION	
$\overline{CONT}$	Oscillation and 3-state Output Buffer Control	
	$\overline{CONT}$	F_{OUT}
	H or OPEN	Output frequency f_0
	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/3.3V	

■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}		2.3		3.6	V
Recommended Oscillation Frequency	f	A type Note4)	75		90	MHz
		B type Note4)	90		110	
		C type Note4)	110		135	

Note4) The oscillation frequency range has used NJRC's characteristics authentication crystal for measurement. However it is not guaranteed.

A,B,C and E type

(V_{DD}=2.5V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD1}	A type, fosc=90MHz, C_L=15pF		10	20	mA
		B type, fosc=110MHz, C_L=15pF		10	20	
		C type, fosc=135MHz, C_L=15pF		15	30	
Oscillation Stopping Current	I_{DD2}	$\overline{CONT}$=V_{SS}, No load		2	5	uA
Stand-by Current	Ist	$\overline{CONT}$=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	6			mA
	I_{OL}	V_{OL}=0.3V	6			mA
Input Current	I_{IN}	$\overline{CONT}$=0.8V_{DD}		7.5	12.0	uA
		CONT=0.2V_{DD}		1.2	2.0	uA
3-state Off Leakage Current	I_{OZ}	CONT=V_{SS}, F_{OUT}= V_{DD} or V_{SS}			±0.1	uA
Feedback Resistance	Rf	A type		3.8		kΩ
		B type		3.8		
		C type		2.9		
Internal Capacitor	Cg/Cd	A type, fosc=90MHz		11/12		pF
		B type, fosc=110MHz		9/10		
		C type, fosc=135MHz		8/9		
Oscillation Frequency	f	Atype Note6)			90	MHz
		B type Note6)			110	
		C type Note6)			135	
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	4	ns
Output Signal Fall Time	tf	C_L=15pF, 90% to 10%		3	4	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 CONT Terminal.

Note6) The oscillation frequency has used NJRC's characteristics authentication crystal for measurement. However it is not guaranteed.

(V_{DD}=3.3V,Ta=25°C)

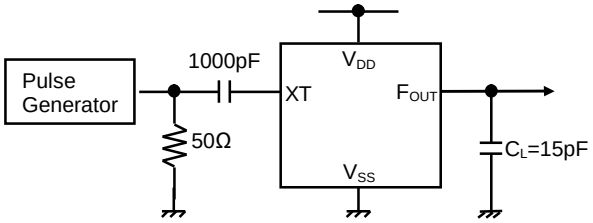
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD1}	A type, fosc=90MHz, C_L=15pF		13	25	mA
		B type, fosc=110MHz, C_L=15pF		13	28	
		C type, fosc=135MHz, C_L=15pF		18	35	
Oscillation Stopping Current	I_{DD2}	$\overline{CONT}$=V_{SS}, No load		5	10	uA
Stand-by Current	Ist	$\overline{CONT}$=XT=V_{SS}, No load Note5)			1	uA
Input Voltage	V_{IH}		2.3		3.3	V
	V_{IL}		0		1.0	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}		12.5	18.0	uA
		$\overline{CONT}$=0.2V_{DD}		2.5	3.5	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 type		3.8		kΩ
		B type		3.8		
		C type		2.9		
Internal Capacitor	Cg/Cd	A type, fosc=90MHz		11/12		pF
		B type, fosc=110MHz		9/10		
		C type, fosc=135MHz		8/9		
Oscillation Frequency	f	A type Note6)			90	MHz
		B type Note6)			110	
		C type Note6)			135	
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	3	ns
Output Signal Fall Time	tf	C_L=15pF, 90% to 10%		2	3	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

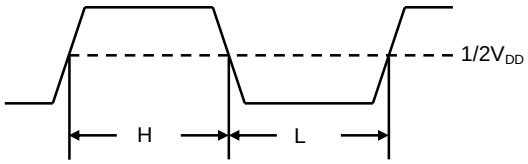
Note5) Excluding input current on CONT Terminal.

Note6) The oscillation frequency has used NJRC's characteristics authentication crystal for measurement. However it is not guaranteed.

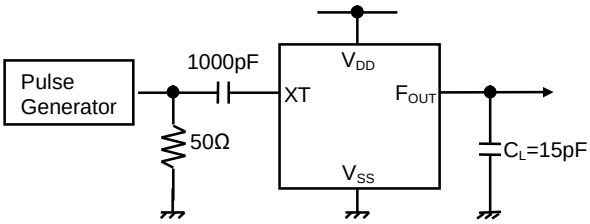
■MEASUREMENT CIRCUITS

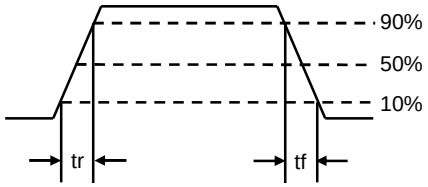
(1)Output Signal Symmetry(C_L=15pF)





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





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