

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.

FEATURES

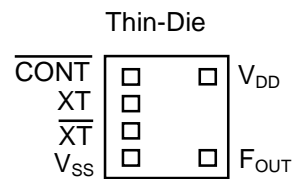
- Operating Voltage 2.3 to 3.6V
- Maximum Oscillation Frequency (See Line-up Table)
- High Fan-out $I_{OH}/I_{OL} = 6mA @ V_{DD} = 2.5V$
 $I_{OH}/I_{OL} = 8mA @ V_{DD} = 3.3V$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors C_g and C_d on-Die
- Package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

PACKAGE OUTLINE



NJU6397XC-X

PAD LOCATION



LINE-UP TABLE

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

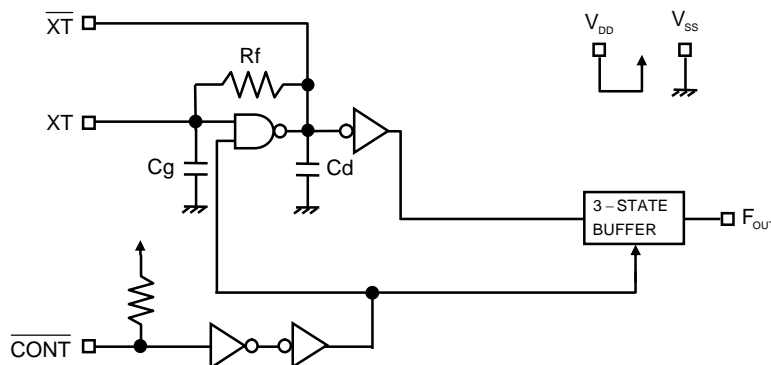
Note1) The oscillation frequency range has used NJRC's characteristics authentication crystal for measurement. However is not guaranteed.

COORDINATES

No	Pad Name	X	Y
1	CONT	-178	231
2	XT	-178	77
3	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	
$\overline{\text{CONT}}$	Oscillation and 3-state Output Buffer Control	
	$\overline{\text{CONT}}$	F_{OUT}
	H or OPEN	Output frequency f_0
	L	Oscillation Stop and High impedance Output
$\overline{\text{XT}}$	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
V_{SS}	$V_{\text{SS}}=0\text{V}$	
F_{OUT}	Frequency Output	
V_{DD}	$V_{\text{DD}}=2.5\text{V}/3.3\text{V}$	

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
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.

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}	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}		2.0		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}	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	R _f	A type		3.8		kΩ
		B type		3.8		
		C type		2.9		
Internal Capacitor	C _g /C _d	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	t _r	C _L =15pF, 10% to 90%		3	4	ns
Output Signal Fall Time	t _f	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.

($V_{DD}=3.3V, T_a=25^{\circ}C$)

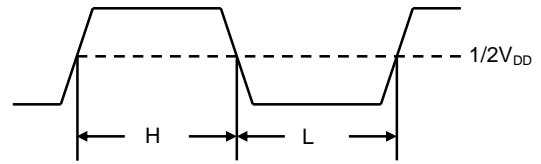
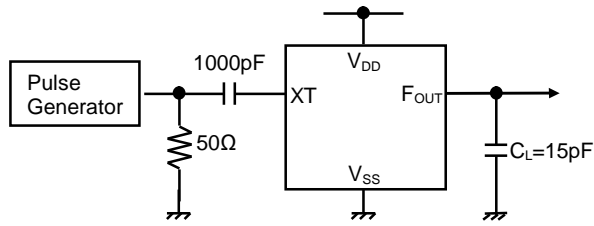
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD1}	A type, $f_{osc}=90MHz, C_L=15pF$		13	25	mA
		B type, $f_{osc}=110MHz, C_L=15pF$		13	28	
		C type, $f_{osc}=135MHz, C_L=15pF$		18	35	
Oscillation Stopping Current	I_{DD2}	CONT= V_{SS} , No load		5	10	μA
Stand-by Current	I_{st}	CONT=XT= V_{SS} , No load Note5)			1	μA
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}	CONT= $0.8V_{DD}$		12.5	18.0	μA
		CONT= $0.2V_{DD}$		2.5	3.5	μA
3-state Off Leakage Current	I_{OZ}	CONT= V_{SS} , $F_{OUT}=V_{DD}$ or V_{SS}			± 0.1	μA
Feedback Resistance	R_f	A type		3.8		k Ω
		B type		3.8		
		C type		2.9		
Internal Capacitor	C_g/C_d	A type, $f_{osc}=90MHz$		11/12		pF
		B type, $f_{osc}=110MHz$		9/10		
		C type, $f_{osc}=135MHz$		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	t_r	$C_L=15pF, 10\%$ to 90%		2	3	ns
Output Signal Fall Time	t_f	$C_L=15pF, 90\%$ to 10%		2	3	ns
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

Note5) Excluding input current on CONT Terminal.

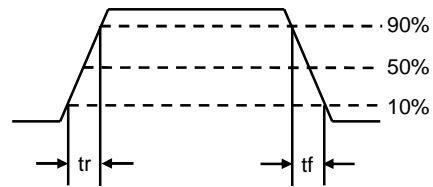
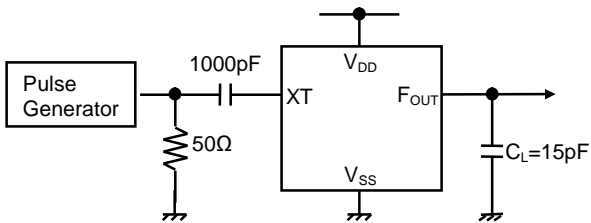
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MEASUREMENT CIRCUITS

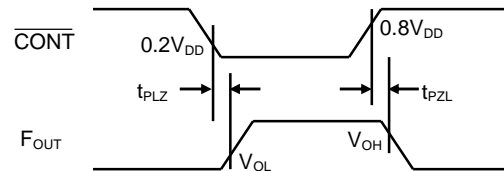
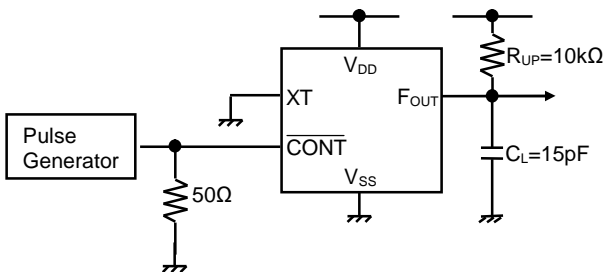
(1) Output Signal Symmetry ($C_L=15\text{pF}$)



(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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