

3rd. Over Tone Quartz Crystal Oscillator for 135MHz Band

■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

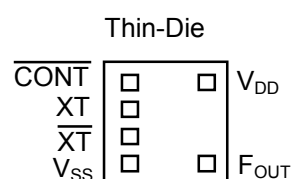


NJU6397XC-X

■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 C_g and C_d on-Die
- Package Outline Thin-Die/Wafer
- C-MOS Technology

■PAD LOCATION



■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

■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

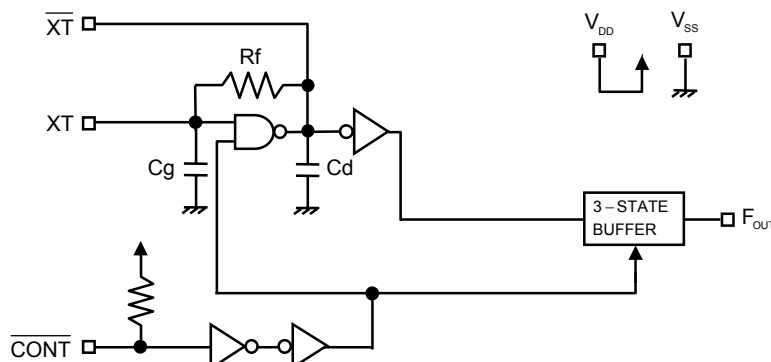
Wafer Thickness(W-H): 200±20um

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
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	$^\circ\text{C}$

Note1) 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.

Note2) 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 Note3)	75		90	MHz
		B type Note3)	90		110	
		C type Note3)	110		135	

Note3) The oscillation frequency range has used NJRC's standard 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 Note4)			1	uA
Input Voltage	V _{IH}		2.0		2.5	V
	V _{IL}		0		0.5	V
Output Current	I _{OH}	V _{OH} =2.2V	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			90	MHz
		B type			110	
		C type			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

Note4) Excluding input current on CONT Terminal.

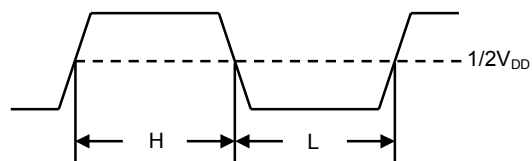
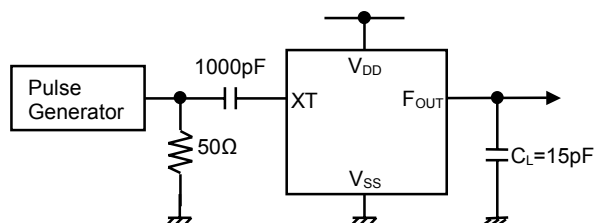
(V_{DD}=3.3V, Ta=25°C)

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}	CONT=V _{SS} , No load		5	10	uA
Stand-by Current	I _{st}	CONT=XT=V _{SS} , No load Note4)			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}	CONT=0.8V _{DD}		12.5	18.0	uA
		CONT=0.2V _{DD}		2.5	3.5	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			90	MHz
		B type			110	
		C type			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} =10kΩ			150	ns
Output Enable Time	t _{PZL}	C _L =15pF, R _{UP} =10kΩ			150	ns

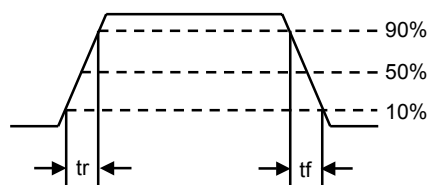
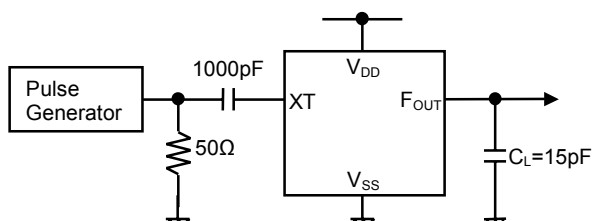
Note4) Excluding input current on CONT Terminal.

■ MEASUREMENT CIRCUITS

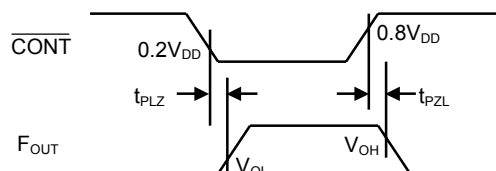
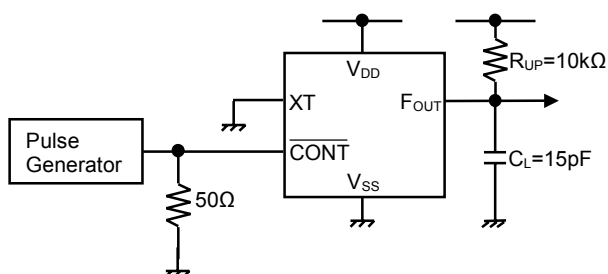
(1) Output Signal Symmetry ($C_L=15\text{pF}$)



(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]

The specifications on this data book are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this data book are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.