

High Frequency-Stability Fundamental Quartz Crystal Oscillator IC

■GENERAL DESCRIPTION

The NJU6314 series is a C-MOS IC for fundamental quartz crystal oscillator that consists of an oscillation amplifier, 6-stage divider and 3-state output buffer.

The operating voltage is from 2.0V to 3.6V and high frequency-stability based on most suitable oscillation circuit including Cg, Cd and Rf.

The 6-stage divider generates only one frequency selected of $f_0, f_0/2, f_0/4, f_0/8, f_0/16, f_0/32$ and $f_0/64$ by internal circuits is output.

The oscillation amplifier is realized very low stand-by current using NAND circuit.

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

■FEATURES

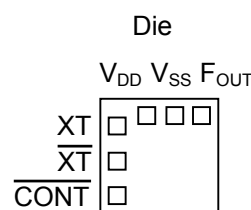
- High Frequency-Stability for Operating Voltage
- Operating Voltage 2.0 to 3.6V
- Maximum Oscillation Frequency 60MHz
- Low Operating Current
- 6-Stage Divider Maximum Divider $f_0/64$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors Cg and Cd on-Die
- Package Outline Die/Wafer
- C-MOS Technology

■PACKAGE OUTLINE



NJU6314XC-X

■PAD LOCATION



■LINE-UP TABLE

Type No.	F _{OUT}	Internal Connect	Cg/Cd
NJU6314	A f_0	Connected A Line	8/9pF
	B $f_0/2$	Connected B Line	8/9pF
	C $f_0/4$	Connected C Line	8/9pF
	D $f_0/8$	Connected D Line	8/9pF
	E $f_0/16$	Connected E Line	8/9pF
	F $f_0/32$	Connected F Line	8/9pF
	G $f_0/64$	Connected G Line	8/9pF

Note) Please contact us about the divider type (B to G) of 130um die and wafer.

■EXAMPLE OF PART NUMBER

1)NJU6314CW-L

F_{OUT}= $f_0/4$, Wafer Thickness=140um

2)NJU6314AC-V

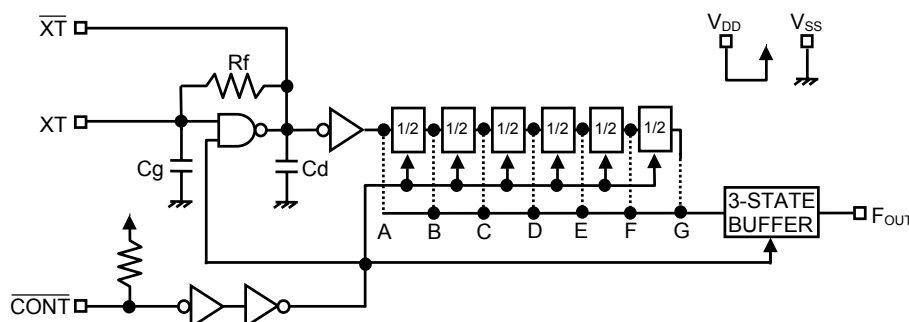
F_{OUT}= f_0 , Die Thickness=130um

■COORDINATES

No	Pad Name	X	Y
1	XT	-173	164
2	XT	-173	0
3	CONT	-173	-164
4	V _{DD}	-53	182
5	V _{SS}	67	182
6	F _{OUT}	187	182

Starting Point: Die Center Unit[um]
 Chip Size: 0.6x0.6mm
 Die Thickness(C-V): 130±10um
 Die Thickness(C-L): 140±10um
 Wafer Thickness(W-V): 130±10um
 Wafer Thickness(W-L): 140±10um
 Pad Size: 70x70um
 Die Substrate: V_{DD} Level

■BLOCK DIAGRAM



■ TERMINAL DESCRIPTION

SYMBOL	FUNCTION	
CONT	Oscillation and 3-state Output Buffer Control	
	CONT	F _{OUT}
	H or OPEN	Output either one frequency selected of f ₀ , f ₀ /2, f ₀ /4, f ₀ /8, f ₀ /16 f ₀ /32 and f ₀ /64 Note1)
	L	Oscillation Stop and High impedance Output
XT	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
V _{SS}	V _{SS} =0V	
F _{OUT}	Frequency Output	
V _{DD}	V _{DD} =2.5V/3.3V	

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) 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}		2.0		3.6	V

(V_{DD}=2.5V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, fosc=16MHz, C _L =15pF			2.5	mA
		B version, fosc=16MHz, C _L =15pF			2.0	
		C version, fosc=16MHz, C _L =15pF			1.5	
		D version, fosc=16MHz, C _L =15pF			1.5	
		E version, fosc=16MHz, C _L =15pF			1.5	
		F version, fosc=16MHz, C _L =15pF			1.5	
		G version, fosc=16MHz, C _L =15pF			1.5	
Oscillation Stopping Current	I _{STB}	CONT=V _{SS} , No load			1	uA
Stand-by Current	I _{st}	CONT=XT=V _{SS} , No load Note4)			1	uA
Input Voltage	V _{IH}		1.75		2.5	V
	V _{IL}		0		0.75	V
Output Current	I _{OH}	V _{OH} =2.25V	5			mA
	I _{OL}	V _{OL} =0.25V	5			mA
Input Current	I _{IN}	CONT=0.8V _{DD}		3.6	5.5	uA
		CONT=0.2V _{DD}		0.3	0.5	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			255		kΩ
Internal Capacitor	C _g /C _d	fosc=16MHz		8/9		pF
Maximum Oscillation Frequency	F _{MAX}		60			MHz
Output Signal Symmetry	SYM	C _L =15pF, @V _{DD} /2	45	50	55	%
		C _L =30pF, @V _{DD} /2	40	50	60	
Output Signal Rise Time	tr	C _L =15pF, 10% to 90%		2.8	5.5	ns
		C _L =30pF, 10% to 90%		4.5	9	
Output Signal Fall Time	tf	C _L =15pF, 90% to 10%		2.8	5.5	ns
		C _L =30pF, 90% to 10%		4.5	9	
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

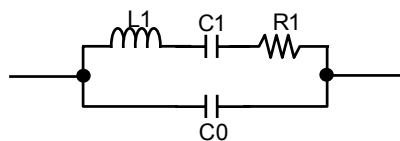
Note4) Excluding input current on CONT Terminal.

(V_{DD}=3.3V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, fosc=16MHz, C _L =15pF			3.5	mA
		B version, fosc=16MHz, C _L =15pF			3.0	
		C version, fosc=16MHz, C _L =15pF			2.5	
		D version, fosc=16MHz, C _L =15pF			2.5	
		E version, fosc=16MHz, C _L =15pF			2.5	
		F version, fosc=16MHz, C _L =15pF			2.5	
		G version, fosc=16MHz, C _L =15pF			2.5	
Oscillation Stopping Current	I _{STB}	CONT=V _{SS} , No load			1	uA
Stand-by Current	I _{st}	CONT=XT=V _{SS} , No load Note4)			1	uA
Input Voltage	V _{IH}		2.31		3.3	V
	V _{IL}		0		0.99	V
Output Current	I _{OH}	V _{OH} =2.97V	6			mA
	I _{OL}	V _{OL} =0.33V	6			mA
Input Current	I _{IN}	CONT=0.8V _{DD}		6.5	10	uA
		CONT=0.2V _{DD}		0.5	1	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			255		kΩ
Internal Capacitor	C _g /C _d	fosc=16MHz		8/9		pF
Maximum Oscillation Frequency	F _{MAX}		60			MHz
Output Signal Symmetry	SYM	C _L =15pF, @V _{DD} /2	45	50	55	%
		C _L =30pF, @V _{DD} /2	45	50	55	
Output Signal Rise Time	tr	C _L =15pF, 10% to 90%		2.5	5	ns
		C _L =30pF, 10% to 90%		4	8	
Output Signal Fall Time	tf	C _L =15pF, 90% to 10%		2.5	5	ns
		C _L =30pF, 90% to 10%		4	8	
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.

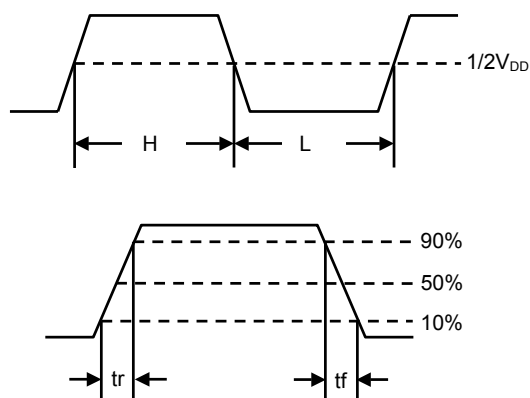
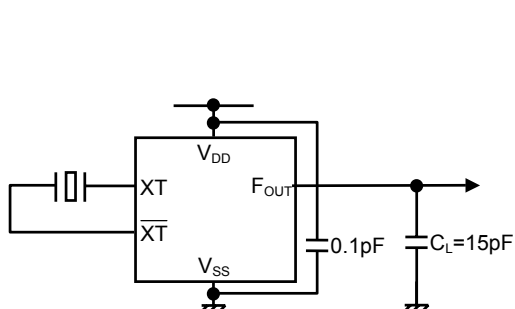
STANDARD CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS



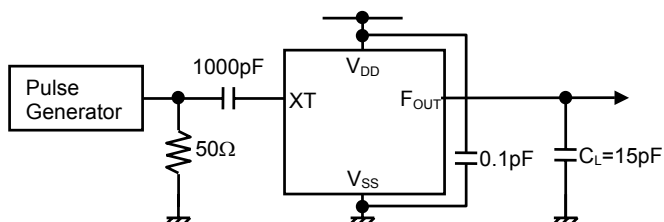
f[MHz]	R1[Ω]	L1[mH]	C1[fF]	C0[pF]
16	26.9	4.0	25.0	11.5
59	15.0	1.6	4.4	1.7

MEASUREMENT CIRCUITS

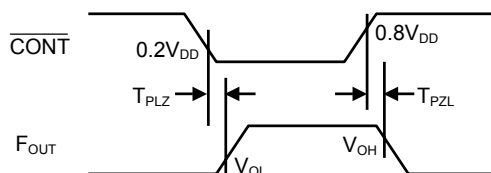
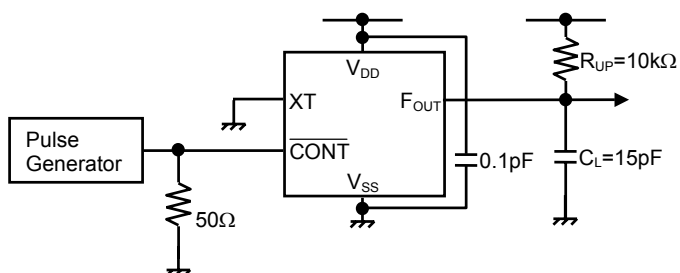
(1) Operating Current, Output Signal Symmetry, Output Signal Rise/Fall Time($C_L=15\text{pF}$)



(2) Evaluating Operation ($C_L=15\text{pF}$)



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



[CAUTION]
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