

0.9V Operation Fundamental Quartz Crystal Oscillator IC

■GENERAL DESCRIPTION

The NJU6315 series is C-MOS quartz crystal oscillator IC for fundamental (up to 50MHz) oscillation.

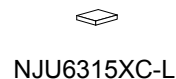
The operating voltage is from 0.9V to 3.3V, and the pad layout is suitable for wire bonding mount of existing-sized ceramic package.

The 5-stage divider generates only one frequency selected of f_0 , $f_0/2$, $f_0/4$, $f_0/8$, $f_0/16$ and $f_0/32$ by internal circuits its output.

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

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

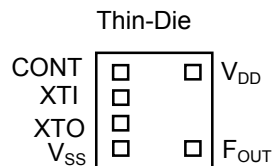
■PACKAGE OUTLINE



■FEATURES

- Operating Voltage 0.9 to 3.3V
- Maximum Oscillation Frequency 50MHz
- Low Operating Current
- 5-Stage Divider Maximum Divider $f_0/32$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors C_g and C_d on-Die
- Package Outline Thin-Die
- C-MOS Technology

■PAD LOCATION



■LINE-UP TABLE

Type No.	F_{OUT}	Internal Connect	C_g/C_d	
NJU6315	A	f_0	Connected A Line	9/10pF
	B*	$f_0/2$	Connected B Line	9/10pF
	C*	$f_0/4$	Connected C Line	9/10pF
	D*	$f_0/8$	Connected D Line	9/10pF
	E*	$f_0/16$	Connected E Line	9/10pF
	F*	$f_0/32$	Connected F Line	9/10pF

* Under Development

■COORDINATES

No	Pad Name	X	Y
1	CONT	-178	231
2	XTI	-178	77
3	XTO	-178	-77
4	V_{SS}	-178	-231
5	F_{OUT}	206	-231
6	V_{DD}	206	231

Starting Point: Die Center Unit[μ m]

Die Size: 0.7x0.75mm

Die Thickness (C-L): $140 \pm 10 \mu$ m

Wafer Thickness (W-L): $140 \pm 10 \mu$ m

Pad size: 90x90 μ m

Die Substrate: V_{DD} level

■EXAMPLE OF PART NUMBER

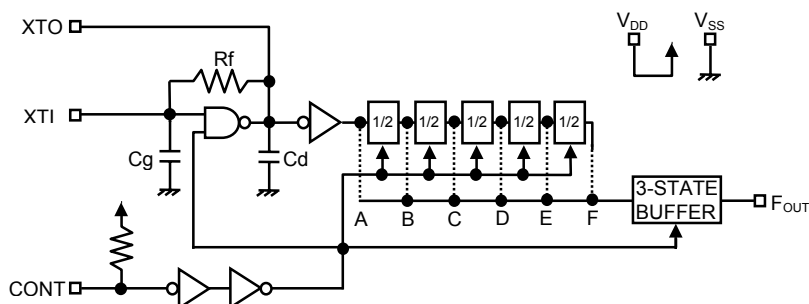
1)NJU6315AW-L

$F_{OUT}=f_0$, Wafer Thickness= 140μ m

2)NJU6315CC-L

$F_{OUT}=f_0/4$, Die Thickness= 140μ m

■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 f₀, f₀/2, f₀/4, f₀/8, f₀/16 and f₀/32 Note1)
	L Oscillation Stop and High impedance Output
XTI	Quartz Crystal Connecting Terminals
XTO	
V _{SS}	V _{SS} =0V
F _{OUT}	Frequency Output
V _{DD}	V _{DD} =1.2V/1.5V

Note1) Refer to the line-up table. (f₀/2, f₀/4, f₀/8, f₀/16 and f₀/32 type are under development.)

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	-0.5 to +3.6	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 3.6V, the input voltage must not over the V_{DD} level though 3.6V is limit specified.

Note3) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.

Note4) Please handle with care because of sensitive to ESD.

ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V _{DD}	8MHz≤f _{osc} ≤40MHz	0.9		3.3	V
		f _{osc} ≤50MHz	1.1		3.3	

(V_{DD}=1.2V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, f ₀ =50MHz, C _L =15pF		2.8	4.0	mA
Oscillation Stopping Current	I _{STB}	CONT=V _{SS} , No load		1	3	uA
Input Voltage	V _{IH}		0.84		1.2	V
	V _{IL}		0		0.36	V
Output Current	I _{OH}	V _{OH} =1.08V	2			mA
	I _{OL}	V _{OL} =0.12V	2			mA
Input Current	I _{IN}	CONT=0.8V _{DD}		3.0	4.5	uA
		CONT=0.2V _{DD}		0.5	0.7	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	f _{osc} =16MHz		9/10		pF
Oscillation Frequency	f _{MAX}	Recommendation Note5)			50	MHz
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			250	ns
Output Enable Time	t _{PZL}	C _L =15pF, R _{UP} =10kΩ			250	ns

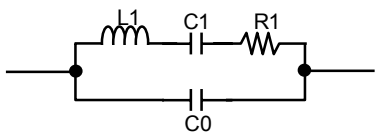
Note5) The oscillation frequency range has used NJRC's standard crystal for measurement. However it is not guaranteed. (Refer to EXAMPLE OF CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS)

(V_{DD}=1.5V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, f ₀ =50MHz, C _L =15pF		3.7	4.8	mA
Oscillation Stopping Current	I _{STB}	CONT=V _{SS} , No load		2	5	uA
Input Voltage	V _{IH}		1.05		1.5	V
	V _{IL}		0		0.45	V
Output Current	I _{OH}	V _{OH} =1.35V	2			mA
	I _{OL}	V _{OL} =0.15V	2			mA
Input Current	I _{IN}	CONT=0.8V _{DD}		3.0	4.5	uA
		CONT=0.2V _{DD}		0.6	0.9	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	f _{osc} =16MHz		9/10		pF
Oscillation Frequency	f _{MAX}	Recommendation Note6)			50	MHz
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			250	ns
Output Enable Time	t _{PZL}	C _L =15pF, R _{UP} =10kΩ			250	ns

Note5) The oscillation frequency range has used NJRC's standard crystal for measurement. However it is not guaranteed. (Refer to EXAMPLE OF CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS)

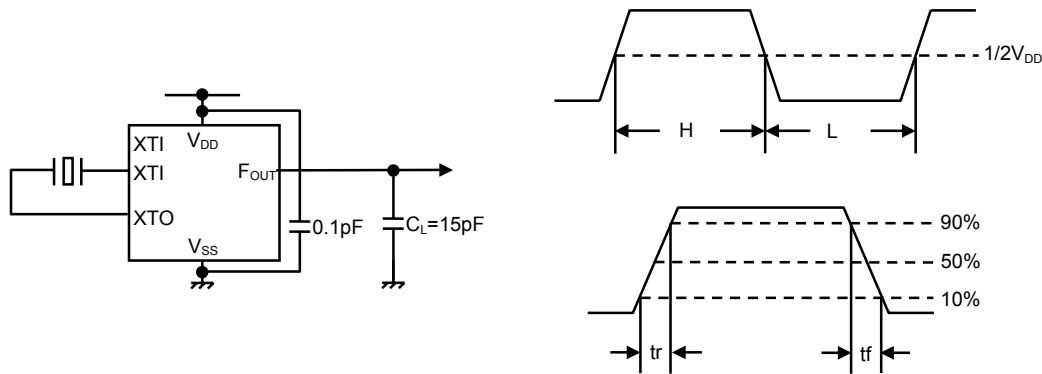
EXAMPLE OF CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS



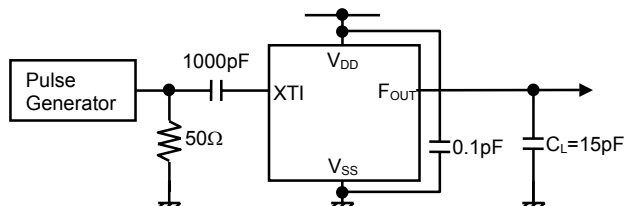
f[MHz]	R1[Ω]	L1[mH]	C1[fF]	C0[pF]
50	19.23	3.29	3.08	1.28

MEASUREMENT CIRCUITS

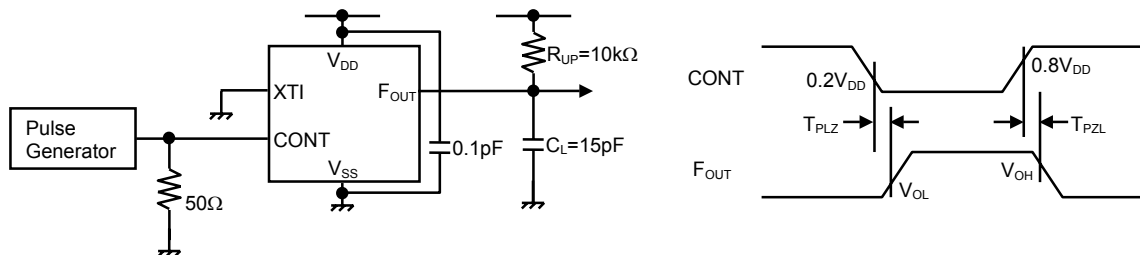
(1) Operating Current, Output Signal Symmetry, Output Signal Rise/Fall Time ($C_L=15\text{pF}$)



(2) Check of 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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