

0.9V Operation Fundamental Quartz Crystal Oscillator IC

■GENERAL DESCRIPTION

The NJU6316 series is C-MOS quartz crystal oscillator IC for fundamental (up to 80MHz) 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 is 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

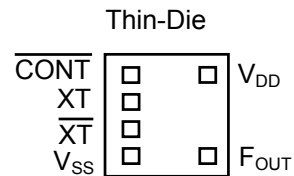


NJU6316XC-L

■FEATURES

- Operating Voltage 0.9 to 3.3V
- Maximum Oscillation Frequency 80MHz
- 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	
NJU6316	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

■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
6	V _{DD}	206	231

Starting Point: Die Center Unit[um]

Die Size: 0.7x0.75mm

Die Thickness (C-L): 140±10um

Wafer Thickness (W-L): 140±10um

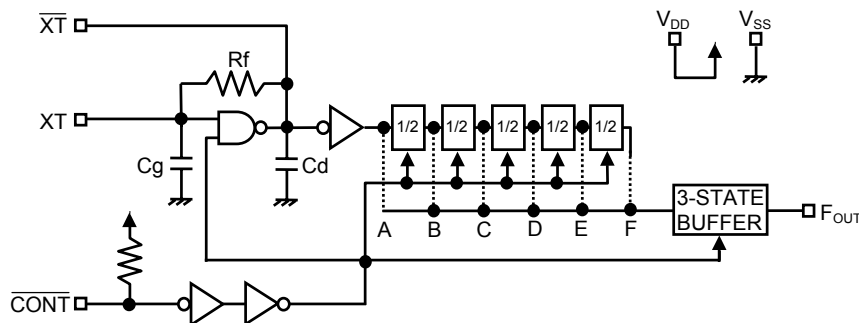
Pad size: 90x90um

Die Substrate: V_{DD} level

■EXAMPLE OF PART NUMBER

- 1) NJU6312AW-L
F_{OUT}= f_0 , Wafer Thickness=140um
- 2) NJU6312CC-L
F_{OUT}= $f_0/4$, Die Thickness=140um

■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 and f ₀ /32 (Note1)
	L Oscillation Stop and High impedance Output
XT XT	Quartz Crystal Connecting Terminals
V _{SS}	V _{SS} =0V
F _{OUT}	Frequency Output
V _{DD}	V _{DD} =1.2V/1.5V

Note1) Refer to the line-up table.

■ 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.

■ ELECTRICAL CHARACTERISTICS

(Ta=-40 to +85°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V _{DD}	8MHz≤fosc≤40MHz	0.9		3.3	V
		fosc≤80MHz	1.1		3.3	

(V_{DD}=1.2V, Ta=-40 to +85°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, fosc=16MHz, C _L =15pF			1.3	mA
		B version, fosc=16MHz, C _L =15pF			0.9	
		C version, fosc=16MHz, C _L =15pF			0.7	
		D version, fosc=16MHz, C _L =15pF			0.6	
		E version, fosc=16MHz, C _L =15pF			0.6	
		F version, fosc=16MHz, C _L =15pF			0.6	
Oscillation Stopping Current	I _{STB}	CONT=V _{SS} , No load		1	3	uA
Stand-by Current	I _{st}	CONT=XT=V _{SS} , No load Note4)			1	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	Ta=+25°C		255		kΩ
Internal Capacitor	C _g /C _d	Ta=+25°C, fosc=16MHz		8/9		pF
Maximum Oscillation Frequency	F _{MAX}		80			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
Start Up Time	t _{START}	C _L =15pF, V _{TRIGGER} =0.9V _{DD}		2	10	ns

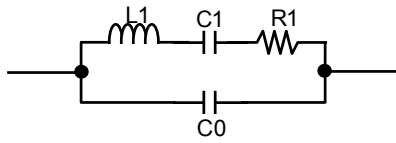
Note4) Excluding input current on CONT Terminal.

($V_{DD}=1.5V$, $T_a=-40$ to $+85^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	A version, $f_{osc}=16MHz$, $C_L=15pF$			2.0	mA
		B version, $f_{osc}=16MHz$, $C_L=15pF$			1.5	
		C version, $f_{osc}=16MHz$, $C_L=15pF$			1.2	
		D version, $f_{osc}=16MHz$, $C_L=15pF$			1.0	
		E version, $f_{osc}=16MHz$, $C_L=15pF$			1.0	
		F version, $f_{osc}=16MHz$, $C_L=15pF$			1.0	
Oscillation Stopping Current	I_{STB}	CONT= V_{SS} , No load		2	5	μA
Stand-by Current	I_{st}	CONT=XT= V_{SS} , No load Note4)			1	μA
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	μA
		CONT= $0.2V_{DD}$		0.6	0.9	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	$T_a=+25^{\circ}C$		255		k Ω
Internal Capacitor	Cg/Cd	$T_a=+25^{\circ}C$, $f_{osc}=16MHz$		8/9		pF
Maximum Oscillation Frequency	F_{MAX}		80			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}	$C_L=15pF$, $R_{UP}=10k\Omega$			250	ns
Output Enable Time	t_{PZL}	$C_L=15pF$, $R_{UP}=10k\Omega$			250	ns
Start Up Time	t_{START}	$C_L=15pF$, $V_{TRIGGER}=0.9V_{DD}$		2	10	ns

Note4) Excluding input current on CONT Terminal.

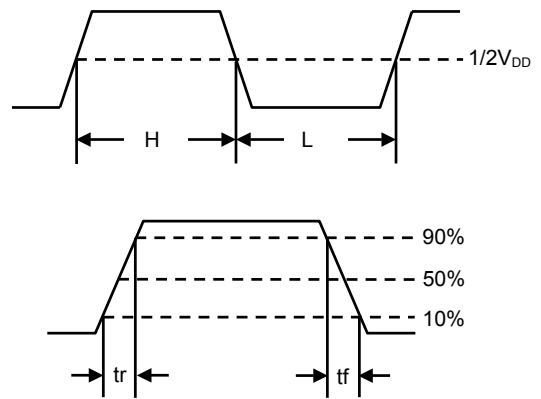
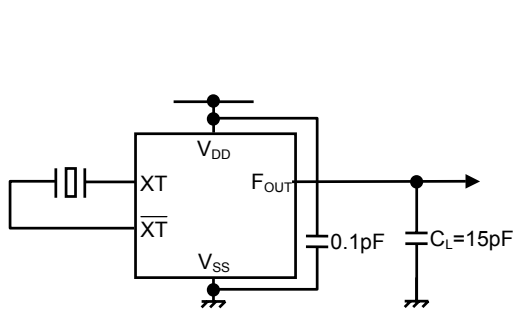
STANDARD CRYSTAL PARAMETERS FOR MEASUREMENT CIRCUITS



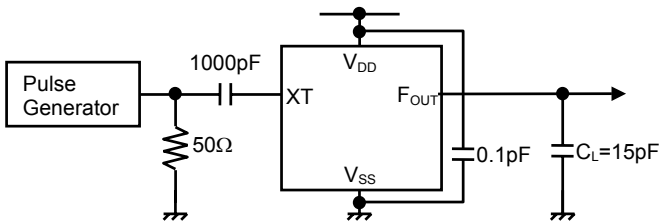
f[MHz]	R1[Ω]	L1[mH]	C1[fF]	C0[pF]
16	26.91	3.95	25.03	11.45
80	11.99	1.06	3.74	1.88

MEASUREMENT CIRCUITS

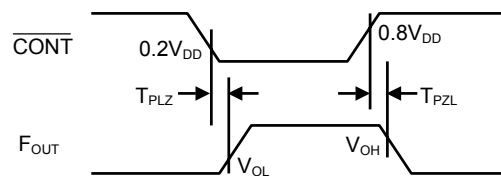
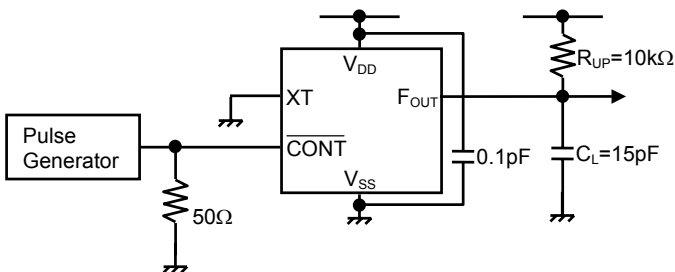
(1) Operating Current, Output Signal Symmetry, Output Signal Rise/Fall Time ($C_L=15\text{pF}$)



(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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