

High Drive Fundamental Quartz Crystal Oscillator

■GENERAL DESCRIPTION

The NJU6368 series is a C-MOS fundamental quartz crystal oscillator that consists of an oscillation amplifier, 3-stage divider and 3-state output buffer.

The 3-stage divider generates only one frequency selected of $f_0, f_0/2, f_0/4$ and $f_0/8$ 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 and can drive 50pF(@5V) C-MOS load.

Furthermore, the package is small-sized MTP-6.

■PACKAGE OUTLINE



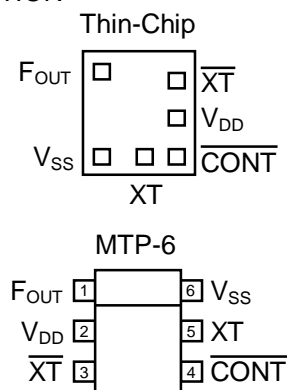
NJU6368XC-C

NJU6368XF1

■FEATURES

- Operating Voltage 2.7 to 5.5V
- Maximum Oscillation Frequency 50MHz
- Low Operating Current
- High Fan-out $I_{OH}/I_{OL}=8mA@3.3V$
 $I_{OH}/I_{OL}=16mA@5.0V$
- 3-Stage Divider Maximum Divider $f_0/8$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors C_g and C_d on-chip
- Package Outline Thin-Chip/MTP-6
- C-MOS Technology

■PAD LOCATION



■LINE-UP TABLE

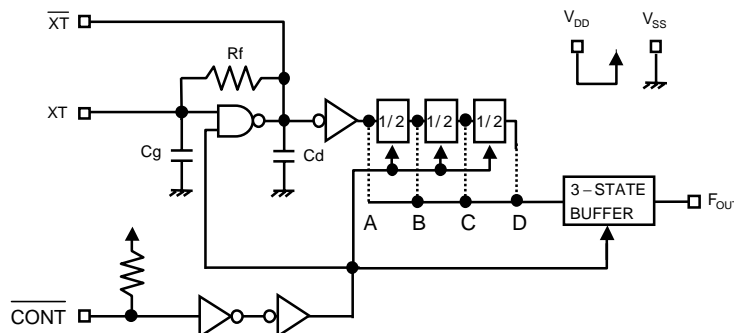
Type No.	F_{OUT}	Internal Connect	C_g/C_d
NJU6368	A	f_0	Connected A Line
	B	$f_0/2$	Connected B Line
	C	$f_0/4$	Connected C Line
	D	$f_0/8$	Connected D Line
	P	f_0	Connected A Line

■COORDINATES

No	Pad Name	X	Y
1	F_{OUT}	-207	247
2	V_{SS}	-207	-247
3	\overline{XT}	33	-247
4	\overline{CONT}	207	-247
5	V_{DD}	207	-17
8	$\overline{\overline{XT}}$	207	172

Starting Point: Chip Center Unit[um]
 Chip Size: 0.67x0.75mm
 Thin-Chip Thickness: 260±20um
 Pad Size: 90x90um

■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 either one frequency selected of f_0 , $f_0/2$, $f_0/4$ and $f_0/8$ (Note1)
	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}	$V_{\text{DD}}=3.3\text{V}/5.0\text{V}$	

Note1) Refer to the line-up table.

■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
Power Dissipation (Note 4)	P_{D}	200(MTP-6)	mW
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.

Note4) Power Dissipation is the maximum value of a package simple substance.

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V _{DD}		2.7		5.5	V

(V_{DD}=3.3V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, fosc=16MHz, C _L =30pF			8	mA
		B version, fosc=16MHz, C _L =30pF			6	
		C version, fosc=16MHz, C _L =30pF			4	
		D version, fosc=16MHz, C _L =30pF			3	
		P version, fosc=16MHz, C _L =30pF Note5)			8	
Oscillation Stopping Current	I _{STB}	$\overline{\text{CONT}} = V_{SS}$, No load		2	5	uA
Stand-by Current	I _{st}	$\overline{\text{CONT}} = \text{XT} = V_{SS}$, No load Note6)			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	8			mA
	I _{OL}	V _{OL} =0.33V	8			mA
Input Current	I _{IN}	$\overline{\text{CONT}} = 0.8V_{DD}$		10.0	15.0	uA
		$\overline{\text{CONT}} = 0.2V_{DD}$		1.8	3.0	uA
3-state Off Leakage Current	I _{OZ}	$\overline{\text{CONT}} = V_{SS}$, F _{OUT} = V _{DD} or V _{SS}			±0.1	uA
Feedback Resistance	R _f			255		KΩ
Internal Capacitor	C _g /C _d	fosc=16MHz, A/B/C/D version		15/15		pF
		P version		-		
Maximum Oscillation Frequency	F _{MAX}		50			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	4	ns
		C _L =30pF, 10% to 90%		4	8	
Output Signal Fall Time	tf	C _L =15pF, 90% to 10%		2	4	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

Note5) P version is measured with external capacitors contained 13pF for C_g and 13pF for C_d.

Note6) Excluding input current on $\overline{\text{CONT}}$ terminal.

($V_{DD}=5.0V, T_a=25^{\circ}C$)

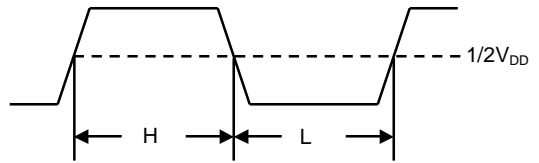
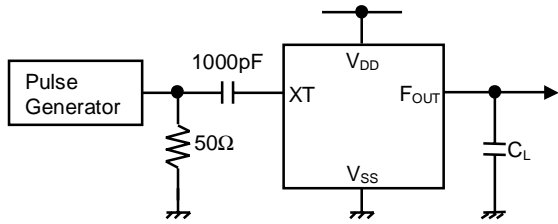
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	A version, $f_{osc}=16MHz, C_L=50pF$			15	mA
		B version, $f_{osc}=16MHz, C_L=50pF$			11	
		C version, $f_{osc}=16MHz, C_L=50pF$			9	
		D version, $f_{osc}=16MHz, C_L=50pF$			7	
		P version, $f_{osc}=16MHz, C_L=50pF$ Note5)			15	
Oscillation Stopping Current	I_{STB}	$\overline{CONT}=V_{SS}$, No load		5	10	μA
Stand-by Current	I_{st}	$\overline{CONT}=XT=V_{SS}$, No load Note6)			1	μA
Input Voltage	V_{IH}		3.5		5.0	V
	V_{IL}		0		1.5	V
Output Current	I_{OH}	$V_{OH}=4.5V$	16			mA
	I_{OL}	$V_{OL}=0.5V$	16			mA
Input Current	I_{IN}	$\overline{CONT}=0.8V_{DD}$		27.0	40.0	μA
		$\overline{CONT}=0.2V_{DD}$		5.5	8.0	μA
3-state Off Leakage Current	I_{OZ}	$\overline{CONT}=V_{SS}$, $F_{OUT}=V_{DD}$ or V_{SS}			± 0.1	μA
Feedback Resistance	R_f			255		$K\Omega$
Internal Capacitor	C_g/C_d	$f_{osc}=16MHz$, A/B/C/D version		15/15		μF
		P version		-		
Maximum Oscillation Frequency	F_{MAX}		50			MHz
Output Signal Symmetry	SYM	$C_L=15pF$, @ $V_{DD}/2$	45	50	55	%
		$C_L=50pF$, @ $V_{DD}/2$	45	50	55	
Output Signal Rise Time	t_r	$C_L=15pF$, 10% to 90%		2	4	ns
		$C_L=50pF$, 10% to 90%		4	8	
Output Signal Fall Time	t_f	$C_L=15pF$, 90% to 10%		2	4	ns
		$C_L=50pF$, 90% to 10%		4	8	
Output Disable time	T_{PLZ}	$C_L=15pF, R_{UP}=10k\Omega$			100	ns
Output Enable Time	T_{PZL}	$C_L=15pF, R_{UP}=10k\Omega$			100	ns

Note5) P version is measured with external capacitors contained 13pF for C_g and 13pF for C_d .

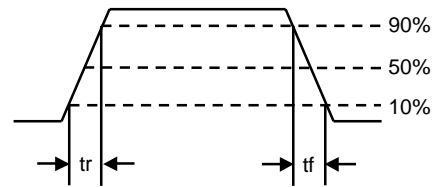
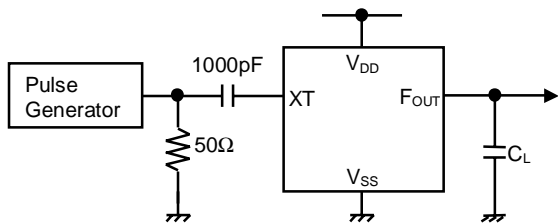
Note6) Excluding input current on \overline{CONT} Terminal.

MEASUREMENT CIRCUITS

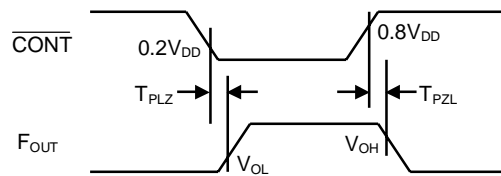
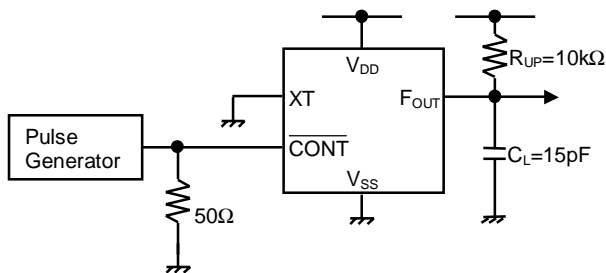
(1) Output Signal Symmetry ($C_L=15/30/50\text{pF}$)



(2) Output Signal Rise/Fall Time ($C_L=15/30/50\text{pF}$)



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



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