

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 SOT-23-6-1.

PACKAGE OUTLINE

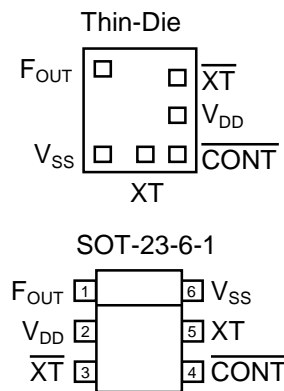


NJU6368XC-C NJU6368XF1

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-Die
- Package Outline Thin-Die/SOT-23-6-1
- 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

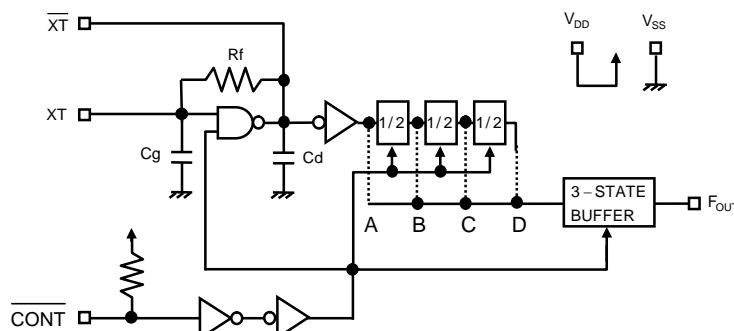
No	Pad Name	X	Y
1	F _{OUT}	-207	247
2	V _{SS}	-207	-247
3	XT	33	-247
4	$\overline{\text{CONT}}$	207	-247
5	V _{DD}	207	-17
8	$\overline{\text{XT}}$	207	172

EXAMPLE OF PART NUMBER

- 1) NJU6368AC-C
F_{OUT}= f_0 , Die Thickness=260um
- 2) NJU6368CF1
F_{OUT}= $f_0/4$, Mold package, SOT-23-6-1

Starting Point: Die Center Unit[um]
 Die Size: 0.67x0.75mm
 Thin-Die Thickness: 260±20um
 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 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(SOT-23-6-1)	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, Ta=25°C)

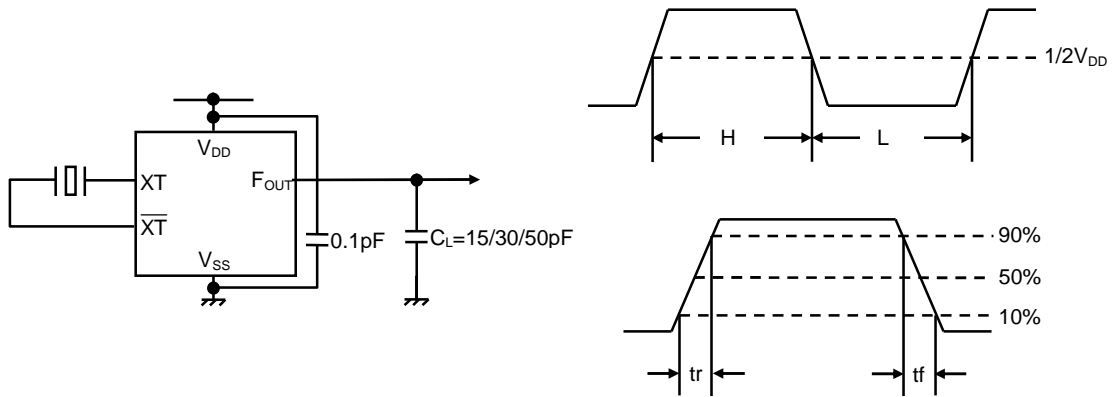
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I _{DD}	A version, fosc=16MHz, C _L =50pF			15	mA
		B version, fosc=16MHz, C _L =50pF			11	
		C version, fosc=16MHz, C _L =50pF			9	
		D version, fosc=16MHz, C _L =50pF			7	
		P version, fosc=16MHz, C _L =50pF Note5)			15	
Oscillation Stopping Current	I _{STB}	CONT = V _{SS} , No load		5	10	uA
Stand-by Current	I _{st}	CONT = XT = V _{SS} , No load Note6)			1	uA
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}	CONT = 0.8V _{DD}		27.0	40.0	uA
		CONT = 0.2V _{DD}		5.5	8.0	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			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 =50pF, @V _{DD} /2	45	50	55	
Output Signal Rise Time	tr	C _L =15pF, 10% to 90%		2	4	ns
		C _L =50pF, 10% to 90%		4	8	
Output Signal Fall Time	tf	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} =10kΩ			100	ns
Output Enable Time	t _{PZL}	C _L =15pF, R _{UP} =10kΩ			100	ns

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

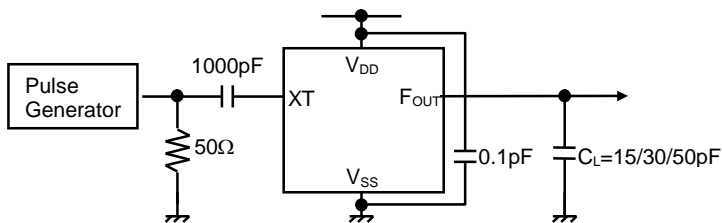
Note6) Excluding input current on CONT Terminal.

MEASUREMENT CIRCUITS

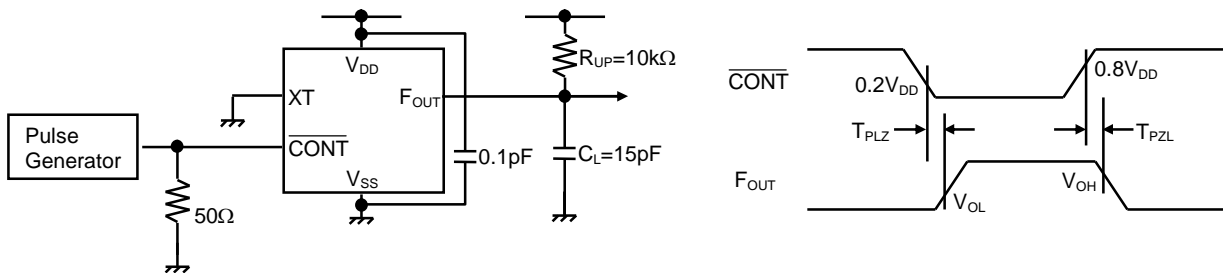
(1) Operating Current, Output Signal Symmetry, Output Signal Rise/Fall Time



(2) Check of Operation



(3) Output Disable/Enable Time



[CAUTION]
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