

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.

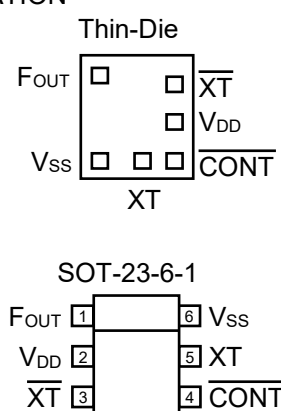
■PACKAGE OUTLINE

Discontinued	
NJU6368AC-C	NJU6368AF1
NJU6368BC-C	NJU6368BF1
NJU6368CC-C	NJU6368CF1
NJU6368DC-C	NJU6368DF1
NJU6368PC-C	NJU6368PF1

■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
			15/15pF
			15/15pF
			15/15pF
			15/15pF
			Non

■COORDINATES

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

Starting Point: Die Center Unit[um]

Die Size: 0.67x0.75mm

Thin-Die Thickness: $260 \pm 20\mu m$

Pad Size: 90x90um

Die Substrate: V_{DD} Level

■EXAMPLE OF PART NUMBER

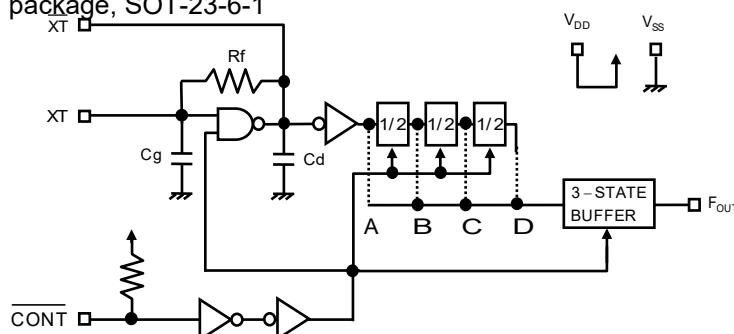
1) NJU6368AC-C

$F_{OUT} = f_0$, Die Thickness=260um

2) NJU6368CF1

$F_{OUT} = f_0/4$, Mold package, SOT-23-6-1

■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
XT	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
V_{SS}	$\text{V}_{\text{SS}}=0\text{V}$	
F_{OUT}	Frequency Output	
V_{DD}	$\text{V}_{\text{DD}}=3.3\text{V}/5.0\text{V}$	

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}	$\text{V}_{\text{SS}}-0.5$ to $\text{V}_{\text{DD}}+0.5$	V
Output Voltage	V_{O}	-0.5 to $\text{V}_{\text{DD}}+0.5$	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	°C
Storage Temperature Range	T_{stg}	-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.

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}	$\overline{\text{CONT}} = X_T = V_{SS}$, 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}	Note7)	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.

Note7) NISSHINBO's standard crystal is used for measurement of the oscillation frequency range and it does not guarantee oscillation.

Note8) When the power on and stand-by releasing, normal output is not resumed until after the oscillator stabilized.

(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}	Note7)	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.

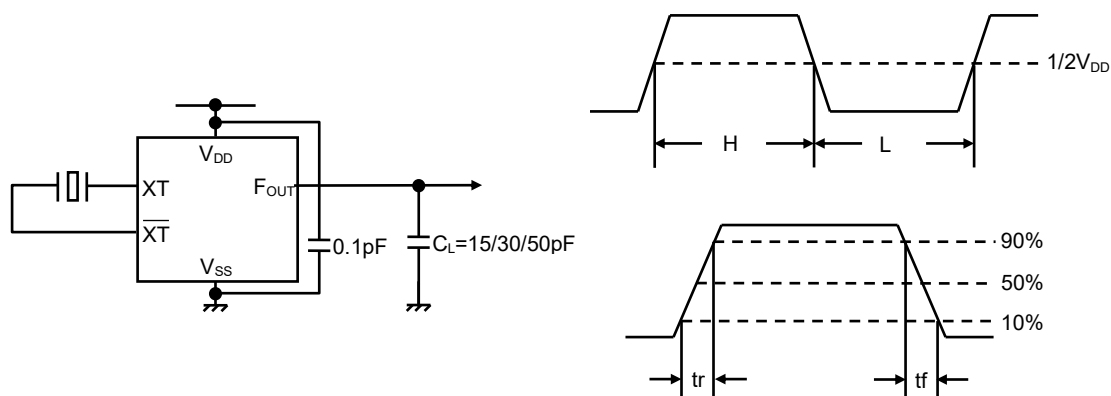
Note6) Excluding input current on CONT Terminal.

Note7) NISSHINBO's standard crystal is used for measurement of the oscillation frequency range and it does not guarantee oscillation.

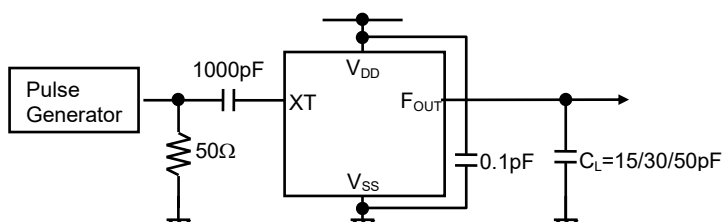
Note8) When the power on and stand-by releasing, normal output is not resumed until after the oscillator stabilized.

■ MEASUREMENT CIRCUITS

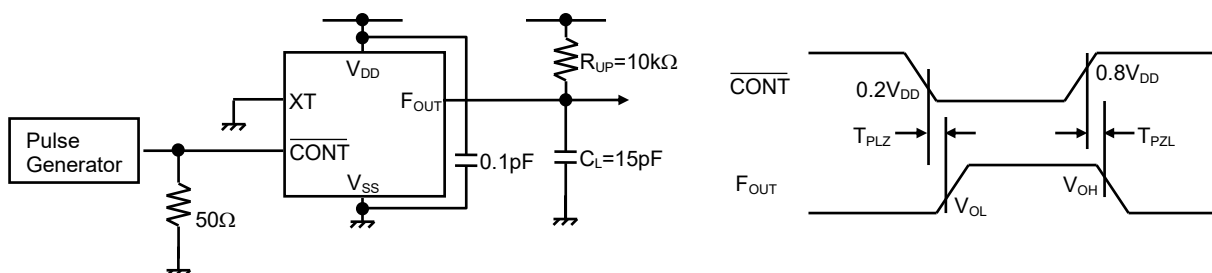
(1) Operating Current, Output Signal Symmetry, Output Signal Rise/Fall Time



(2) Check of Operation



(3) Output Disable/Enable Time



[CAUTION]

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