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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

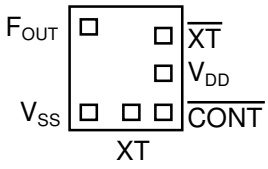

NJU6368XC-C NJU6368XF1

■ FEATURES

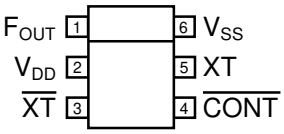
- Operating Voltage 2.7 to 5.5V
- Maximum Oscillation Frequency 50MHz
- Low Operating Current
- High Fan-out I_{OH}/I_{OL}=8mA@3.3V
  I_{OH}/I_{OL}=16mA@5.0V
- 3-Stage Divider Maximum Divider $f_0/8$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors Cg and Cg on-Die
- Package Outline Thin-Die/SOT-23-6-1
- C-MOS Technology

■ PAD LOCATION

Thin-Die



SOT-23-6-1



■ LINE-UP TABLE

Type No.		F_{OUT}	Internal Connect	Cg/Cd
NJU6368	A	f_0	Connected A Line	15/15pF
	B	$f_0/2$	Connected B Line	15/15pF
	C	$f_0/4$	Connected C Line	15/15pF
	D	$f_0/8$	Connected D Line	15/15pF
	P	f_0	Connected A Line	Non

■ COORDINATES

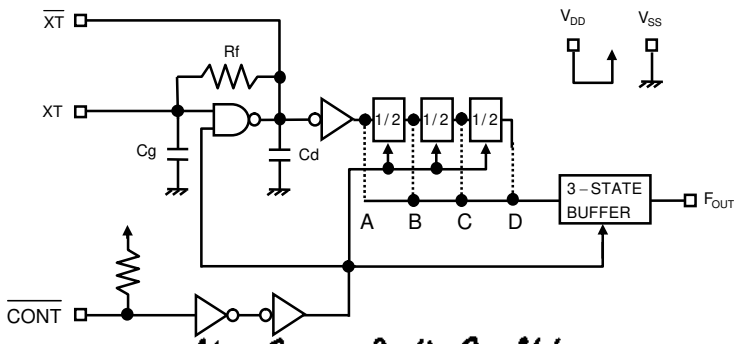
No	Pad Name	X	Y
1	F_{OUT}	-207	247
2	V_{SS}	-207	-247
3	XT	33	-247
4	$\overline{CONT}$	207	-247
5	V_{DD}	207	-17
8	$\overline{XT}$	207	172

Starting Point:Die Center Unit[um]
Die Size:0.67x0.75mm
Thin-Die Thickness:260±20um
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	
$\overline{CONT}$	Oscillation and 3-state Output Buffer Control	
	$\overline{CONT}$	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	
$\overline{XT}$		
V_{SS}	V_{SS}=0V	
F_{OUT}	Frequency Output	
V_{DD}	V_{DD}=3.3V/5.0V	

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}	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
Power Dissipation Note 4)	P_D	200(SOT-23-6-1)	mW
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 7.0V, the input voltage must not over the V_{DD} level though 7.0V is limit specified.

Note3) Decupling 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}	$\overline{CONT}$ =V_{SS}, No load		2	5	uA
Stand-by Current	Ist	$\overline{CONT}$ =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}	$\overline{CONT}$ =0.8V_{DD}		10.0	15.0	uA
		$\overline{CONT}$ =0.2V_{DD}		1.8	3.0	uA
3-state Off Leakage Current	I_{OZ}	$\overline{CONT}$ =V_{SS}, F_{OUT}= V_{DD} or V_{SS}			±0.1	uA
Feedback Resistance	Rf			255		kΩ
Internal Capacitor	Cg/Cd	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 Cg and 13pF for Cd.

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

(V_{DD}=5.0V,Ta=25°C)

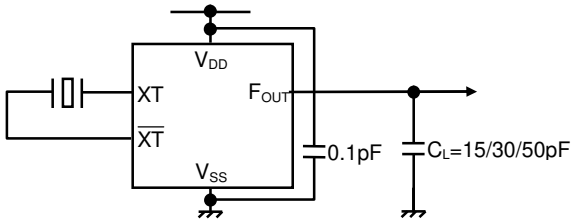
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I_{DD}	A version,fosc=16MHz,C_L=50pF			15	mA
		B version,fosc=16MHz,C_L=50pF			11	
		C version,fosc=16MHz,C_L=50pF			9	
		D version,fosc=16MHz,C_L=50pF			7	
		P version,fosc=16MHz,C_L=50pF Note5)			15	
Oscillation Stopping Current	I_{STB}	$\overline{CONT}$ =V_{SS}, No load		5	10	uA
Stand-by Current	Ist	$\overline{CONT}$ =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}	$\overline{CONT}$ =0.8V_{DD}		27.0	40.0	uA
		$\overline{CONT}$ =0.2V_{DD}		5.5	8.0	uA
3-state Off Leakage Current	I_{OZ}	$\overline{CONT}$ =V_{SS}, F_{OUT}= V_{DD} or V_{SS}			±0.1	uA
Feedback Resistance	Rf			255		kΩ
Internal Capacitor	Cg/Cd	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

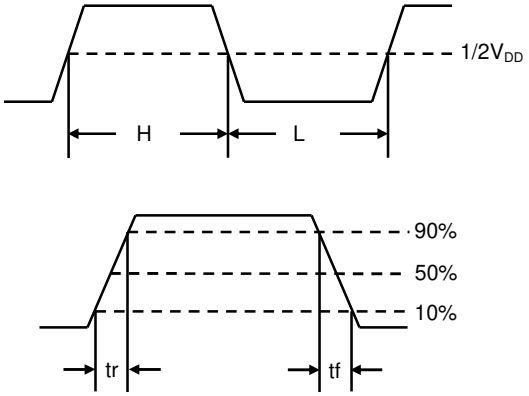
Note5) P version is measured with external capacitors contained 13pF for Cg and 13pF for Cd.

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

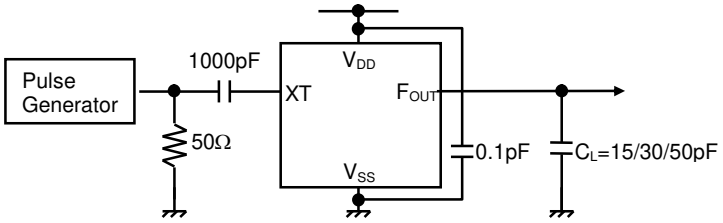
■ MEASUREMENT CIRCUITS

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





(2)Check of Operation



(3)Output Disable/Enable Time