

## Small Sized Quartz Crystal Oscillator

### ■GENERAL DESCRIPTION

The NJU6366 series is a C-MOS fundamental quartz crystal oscillator that consists of an oscillation amplifier, 3-stage divider and 3-state output buffer.

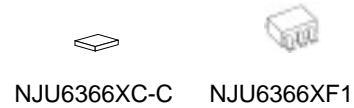
The 3-stage divider generates only one frequency selected of  $f_0, f_0/2, f_0/4$  and  $f_0/8$  by internal circuits is output.

The oscillation amplifier is realized very low stand-by current using NAND circuit.

The 3-state output buffer is C-MOS compatible

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

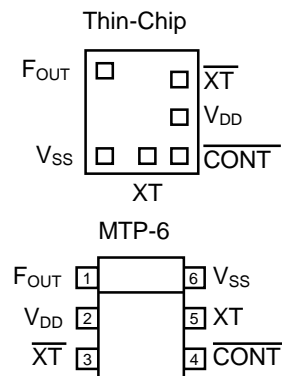
### ■PACKAGE OUTLINE



### ■FEATURES

- Operating Voltage 2.0 to 5.5V
- Maximum Oscillation Frequency 50MHz
- Low Operating Current
- High Fan-out  $I_{OH}/I_{OL}=4mA @ 2.5V$
- 3-Stage Divider One of  $f_0, f_0/2, f_0/4$  and  $f_0/8$
- 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/PIN CONFIGURATION



### ■LINE-UP TABLE

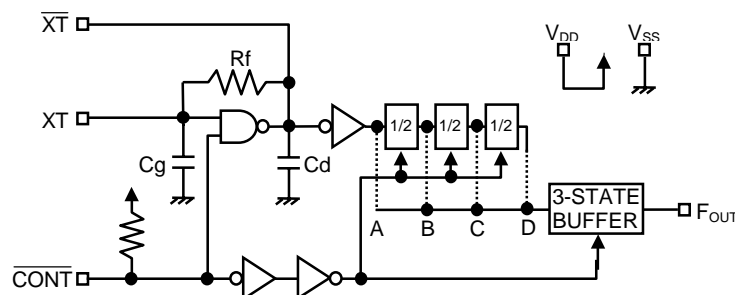
Type No.	F <sub>OUT</sub>	Internal Connect		C <sub>g</sub> /C <sub>d</sub>
		Connect	Non Connect	
NJU6366	A $f_0$	A Line	B,C,D Line	23/23pF
	B $f_0/2$	B Line	A,C,D Line	23/23pF
	C $f_0/4$	C Line	A,B,D Line	23/23pF
	D $f_0/8$	D Line	A,B,C Line	23/23pF

### ■COORDINATES

Pad Name	X	Y
F <sub>OUT</sub>	-207	247
V <sub>SS</sub>	-207	-247
XT	33	-247
CONT	207	-247
V <sub>DD</sub>	207	-17
XT	207	172

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

### ■BLOCK DIAGRAM



## ■TERMINAL DESCRIPTION

SYMBOL	FUNCTION
	Oscillation and 3-state Output Buffer Control
$\overline{\text{CONT}}$	$\overline{\text{CONT}}$ $F_{\text{OUT}}$
	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
$V_{\text{SS}}$	$V_{\text{SS}}=0\text{V}$
$F_{\text{OUT}}$	Frequency Output
$V_{\text{DD}}$	$V_{\text{DD}}=2.5\text{V}/3.0\text{V}/5.0\text{V}$

Note1) Refer to the line-up table.

## ■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V_{\text{DD}}$	-0.5~+7.0	V
Input Voltage	$V_{\text{IN}}$	$V_{\text{SS}}-0.5\sim V_{\text{DD}}+0.5$	V
Output Voltage	$V_{\text{O}}$	-0.5~ $V_{\text{DD}}+0.5$	V
Input Current	$I_{\text{IN}}$	±10	mA
Output Current	$I_{\text{O}}$	±25	mA
Power Dissipation Note4)	$P_{\text{D}}$	200(MTP-6)	mW
Operating Temperature Range	$T_{\text{opr}}$	-40~+85	°C
Storage Temperature Range	$T_{\text{stg}}$	-55~+125	°C

Note2) If the supply voltage( $V_{\text{DD}}$ ) is less than 7.0V, the input voltage must not over the  $V_{\text{DD}}$  level though 7.0V is limit specified.

Note3) Decoupling capacitor should be connected between  $V_{\text{DD}}$  and  $V_{\text{SS}}$  due to the stabilized operation for the circuit.

Note4) The power dissipation is the maximum value at only the package.

# NJU6366 Series

## ■ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V <sub>DD</sub>		2.0		5.5	V

(V<sub>DD</sub>=2.5V, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I <sub>DD</sub>	A version, fosc=16MHz, C <sub>L</sub> =15pF			5	mA
		B version, fosc=16MHz, C <sub>L</sub> =15pF			4	
		C version, fosc=16MHz, C <sub>L</sub> =15pF			3	
		D version, fosc=16MHz, C <sub>L</sub> =15pF			3	
Oscillation Stopping Current	I <sub>STB</sub>	$\overline{\text{CONT}} = V_{SS}$ , No load		2	5	uA
Stand-by Current	I <sub>st</sub>	$\overline{\text{CONT}} = \text{XT} = V_{SS}$ , No load Note5)			1	uA
Input Voltage	V <sub>IH</sub>		2.0		2.5	V
	V <sub>IL</sub>		0		0.5	V
Output Current	I <sub>OH</sub>	V <sub>OH</sub> =2.2V	4			mA
	I <sub>OL</sub>	V <sub>OL</sub> =0.3V	4			mA
Input Current	I <sub>IN</sub>	$\overline{\text{CONT}} = 0.8V_{DD}$		7.5	12.0	uA
		$\overline{\text{CONT}} = 0.2V_{DD}$		1.2	2.0	uA
3-state Off Leakage Current	I <sub>OZ</sub>	$\overline{\text{CONT}} = V_{SS}$ , F <sub>OUT</sub> = V <sub>DD</sub> or V <sub>SS</sub>			±0.1	uA
Feedback Resistance	R <sub>f</sub>			227		kΩ
Internal Capacitor	C <sub>g</sub> /C <sub>d</sub>	fosc=16MHz		23/23		pF
Maximum Oscillation Frequency	F <sub>MAX</sub>		50			MHz
Output Signal Symmetry	SYM	C <sub>L</sub> =15pF, @V <sub>DD</sub> /2	45	50	55	%
		C <sub>L</sub> =30pF, @V <sub>DD</sub> /2	45	50	55	
Output Signal Rise Time	tr	C <sub>L</sub> =15pF, 10%~90%		3	6	ns
		C <sub>L</sub> =30pF, 10%~90%		3	6	
Output Signal Fall Time	tf	C <sub>L</sub> =15pF, 90%~10%		3	6	ns
		C <sub>L</sub> =30pF, 90%~10%		3	6	
Output Disable time	T <sub>PLZ</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ			250	ns
Output Enable Time	T <sub>PZL</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ			250	ns

Note5) Excluding input current on  $\overline{\text{CONT}}$  Terminal.

# NJU6366 Series

( $V_{DD}=3.0V, T_a=25^{\circ}C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	$I_{DD}$	A version, $f_{osc}=16MHz, C_L=15pF$			6	mA
		B version, $f_{osc}=16MHz, C_L=15pF$			5	
		C version, $f_{osc}=16MHz, C_L=15pF$			4	
		D version, $f_{osc}=16MHz, C_L=15pF$			4	
Oscillation Stopping Current	$I_{STB}$	$\overline{CONT} = V_{SS}$ , No load		2	5	uA
Stand-by Current	$I_{st}$	$\overline{CONT} = XT = V_{SS}$ , No load Note5)			1	uA
Input Voltage	$V_{IH}$		2.4		3.0	V
	$V_{IL}$		0		0.6	V
Output Current	$I_{OH}$	$V_{OH}=2.7V$	5			mA
	$I_{OL}$	$V_{OL}=0.3V$	5			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 $V_{SS}$			$\pm 0.1$	uA
Feedback Resistance	$R_f$			227		k $\Omega$
Internal Capacitor	$C_g/C_d$	$f_{osc}=16MHz$		23/23		pF
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	$t_r$	$C_L=15pF, 10\% \sim 90\%$		3	6	ns
		$C_L=30pF, 10\% \sim 90\%$		3	6	
Output Signal Fall Time	$t_f$	$C_L=15pF, 90\% \sim 10\%$		3	6	ns
		$C_L=30pF, 90\% \sim 10\%$		3	6	
Output Disable time	$T_{PLZ}$	$C_L=15pF, R_{UP}=10k\Omega$			200	ns
Output Enable Time	$T_{PZL}$	$C_L=15pF, R_{UP}=10k\Omega$			200	ns

Note5) Excluding input current on  $\overline{CONT}$  Terminal.

# NJU6366 Series

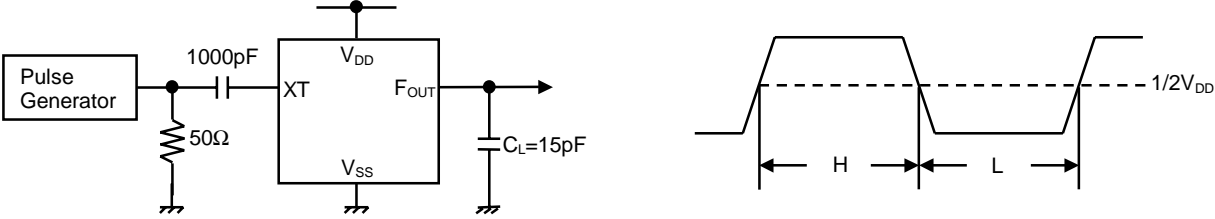
( $V_{DD}=5.0V, T_a=25^{\circ}C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	$I_{DD}$	A version, $f_{osc}=16MHz, C_L=15pF$			10	mA
		B version, $f_{osc}=16MHz, C_L=15pF$			9	
		C version, $f_{osc}=16MHz, C_L=15pF$			9	
		D version, $f_{osc}=16MHz, C_L=15pF$			8	
Oscillation Stopping Current	$I_{STB}$	$\overline{CONT} = V_{SS}$ , No load		5	10	$\mu A$
Stand-by Current	$I_{st}$	$\overline{CONT} = XT = V_{SS}$ , No load Note5)			1	$\mu A$
Input Voltage	$V_{IH}$		3.5		5.0	V
	$V_{IL}$		0		1.5	V
Output Current	$I_{OH}$	$V_{OH}=4.5V$	8			mA
	$I_{OL}$	$V_{OL}=0.5V$	8			mA
Input Current	$I_{IN}$	$\overline{CONT} = 0.8V_{DD}$		27.0	40.0	$\mu A$
		$\overline{CONT} = 0.2V_{DD}$		5.5	8.0	$\mu A$
3-state Off Leakage Current	$I_{OZ}$	$\overline{CONT} = V_{SS}$ , $F_{OUT} = V_{DD}$ or $V_{SS}$			$\pm 0.1$	$\mu A$
Feedback Resistance	$R_f$			227		k $\Omega$
Internal Capacitor	$C_g/C_d$	$f_{osc}=16MHz$		23/23		pF
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	$t_r$	$C_L=15pF, 10\% \sim 90\%$		3	6	ns
		$C_L=30pF, 10\% \sim 90\%$		3	6	
Output Signal Fall Time	$t_f$	$C_L=15pF, 90\% \sim 10\%$		3	6	ns
		$C_L=30pF, 90\% \sim 10\%$		3	6	
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

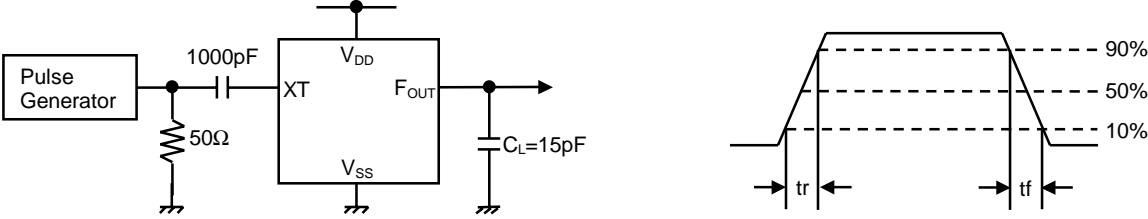
Note5) Excluding input current on  $\overline{CONT}$  Terminal.

■ MEASUREMENT CIRCUITS

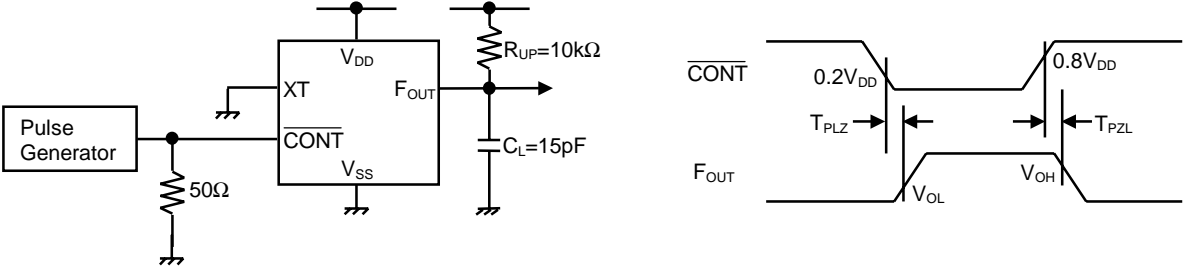
(1) Output Signal Symmetry ( $C_L=15\text{pF}$ )



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



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



**[CAUTION]**  
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