

## QUARTZ CRYSTAL OSCILLATOR

### ■ GENERAL DESCRIPTION

The NJU6375 series is a C-MOS quartz crystal oscillator which consists of an oscillation amplifier and a 3-state output buffer.

This series are classed into six versions A, B, C and H, J, K according to their oscillation frequency range mentioned in the line-up table.

The oscillation amplifier incorporates feed-back resistance and oscillation capacitors ( $C_g$ ,  $C_d$ ), therefore, it requires no external component except quartz crystal.

Driverability of the 3-state output buffer is 24mA in A, B and C versions, 16mA in H, J and K versions, thus it can drive both of TTL and C-MOS load.

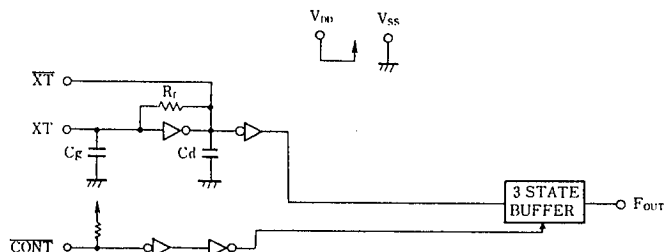
### ■ FEATURES

- Operating Voltage. — 4.0~6.0V
- Maximum Oscillation Frequency (See Line-Up Table)
- Low Operating Current
- High Fan-out —  $I_{OL}/I_{OH}=24\text{mA}$  (A, B and C versions)  
—  $I_{OL}/I_{OH}=16\text{mA}$  (H, J and K versions)
- 3-state Output Buffer
- Oscillation Capacitors  $C_g$  and  $C_d$  on-chip
- Oscillation and/or Output Stand-by Function
- Package Outline — CHIP / EMP 8
- C-MOS Technology

### ■ LINE-UP TABLE

| Type No. | Recommended Osc. Freq. | Output Freq. | $C_g, C_d$ |
|----------|------------------------|--------------|------------|
| NJU6375A | 20~35MHz               | $f_o$        | 28pF       |
| 6375B    | 30~50MHz               |              | 20pF       |
| 6375C    | 45~75MHz               |              | 17pF       |
| NJU6375H | 20~35MHz               |              | 28pF       |
| 6375J    | 30~50MHz               |              | 20pF       |
| 6375K    | 45~75MHz               |              | 17pF       |

### ■ BLOCK DIAGRAM



### ■ PACKAGE OUTLINE

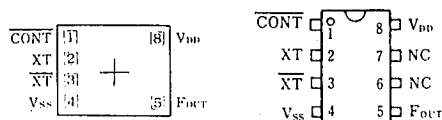


NJU6375XC



NJU6375XE

### ■ PAD LOCATION/PIN CONFIGURATION



### ■ COORDINATES

Unit:  $\mu\text{m}$

| No. | PAD  | X    | Y    |
|-----|------|------|------|
| 1   | CONT | -408 | 248  |
| 2   | XT   | -408 | 81   |
| 3   | XT   | -408 | -86  |
| 4   | VSS  | -408 | -248 |
| 5   | FOUT | 464  | -248 |
| 8   | VDD  | 464  | 248  |

Chip Size : 1.29 X 0.8mm  
 Chip Center :  $X=0\mu\text{m}, Y=0\mu\text{m}$   
 Chip Thickness :  $400\mu\text{m} \pm 30\mu\text{m}$   
 (Note) No.6 and 7 terminals are only for package type information. There are no PAD on the chip.

# 4

## ■ TERMINAL DESCRIPTION

| NO. | SYMBOL                   | F U N C T I O N                                                                                                                                                                                    |                             |                             |   |                        |   |                       |
|-----|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|---|------------------------|---|-----------------------|
| 1   | $\overline{\text{CONT}}$ | 3-State Output Control                                                                                                                                                                             |                             |                             |   |                        |   |                       |
|     |                          | <table><tr><td>CONT</td><td>Output ( <math>F_{\text{OUT}}</math> )</td></tr><tr><td>H</td><td>Output Frequency <math>f_0</math></td></tr><tr><td>L</td><td>Output High Impedance</td></tr></table> | CONT                        | Output ( $F_{\text{OUT}}$ ) | H | Output Frequency $f_0$ | L | Output High Impedance |
|     |                          | CONT                                                                                                                                                                                               | Output ( $F_{\text{OUT}}$ ) |                             |   |                        |   |                       |
|     |                          | H                                                                                                                                                                                                  | Output Frequency $f_0$      |                             |   |                        |   |                       |
| L   | Output High Impedance    |                                                                                                                                                                                                    |                             |                             |   |                        |   |                       |
|     |                          |                                                                                                                                                                                                    |                             |                             |   |                        |   |                       |
|     |                          |                                                                                                                                                                                                    |                             |                             |   |                        |   |                       |
| 2   | XT                       | Quartz Crystal Connecting Terminals                                                                                                                                                                |                             |                             |   |                        |   |                       |
| 3   | $\overline{\text{XT}}$   |                                                                                                                                                                                                    |                             |                             |   |                        |   |                       |
| 4   | $V_{\text{SS}}$          | GND                                                                                                                                                                                                |                             |                             |   |                        |   |                       |
| 5   | $F_{\text{OUT}}$         | Output frequency $f_0$                                                                                                                                                                             |                             |                             |   |                        |   |                       |
| 8   | $V_{\text{DD}}$          | + 5V                                                                                                                                                                                               |                             |                             |   |                        |   |                       |

## ■ ABSOLUTE MAXIMUM RATINGS

(  $T_a=25^\circ\text{C}$  )

| P A R A M E T E R           | SYMBOL           | R A T I N G S                              | 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              | $V_o$            | -0.5 ~ $V_{\text{DD}}+0.5$                 | V                |
| Input Current               | $I_{\text{IN}}$  | $\pm 10$                                   | mA               |
| Output Current              | $I_o$            | $\pm 25$                                   | mA               |
| Power Dissipation           | $P_D$            | 200 (EMP)                                  | mW               |
| Operating Temperature Range | $T_{\text{opr}}$ | -40 ~ +85                                  | $^\circ\text{C}$ |
| Storage Temperature Range   | $T_{\text{stg}}$ | -55 ~ +125                                 | $^\circ\text{C}$ |

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

# ELECTRICAL CHARACTERISTICS

• NJU6375A/B/C

( Ta=25°C, V<sub>DD</sub>=5V )

| P A R A M E T E R        | S Y M B O L                     | C O N D I T I O N S                                                         | M I N | T Y P | M A X | U N I T |
|--------------------------|---------------------------------|-----------------------------------------------------------------------------|-------|-------|-------|---------|
| Operating Voltage        | V <sub>DD</sub>                 |                                                                             | 4     |       | 6     | V       |
| Operating Current        | I <sub>DD1</sub>                | A Version f <sub>osc</sub> =24MHz, No Load                                  |       |       | 25    | mA      |
|                          | I <sub>DD2</sub>                | B Version f <sub>osc</sub> =48MHz, No Load                                  |       |       | 30    |         |
|                          | I <sub>DD3</sub>                | C Version f <sub>osc</sub> =48MHz, No Load                                  |       |       | 35    |         |
| Stand-by Current         | I <sub>st</sub>                 | CONT, XT=V <sub>SS</sub> , No Load(Note 1)                                  |       |       | 1     | μA      |
| Input Voltage            | V <sub>IH</sub>                 |                                                                             | 2.0   |       | 5.0   | V       |
|                          | V <sub>IL</sub>                 |                                                                             | 0     |       | 0.8   |         |
| Output Current           | I <sub>OH</sub>                 | V <sub>DD</sub> =5V, V <sub>OH</sub> =4.5V                                  | 24    |       |       | mA      |
|                          | I <sub>OL</sub>                 | V <sub>DD</sub> =5V, V <sub>OL</sub> =0.5V                                  | 24    |       |       |         |
| Input Current            | I <sub>IN</sub>                 | CONT Terminal, CONT=V <sub>SS</sub>                                         | 125   | 250   | 500   | μA      |
| 3-St Off-leakage Current | I <sub>oz</sub>                 | CONT=V <sub>SS</sub> , F <sub>OUT</sub> =V <sub>SS</sub> or V <sub>DD</sub> |       |       | ±0.1  | μA      |
| Internal Capacitor       | C <sub>g</sub> , C <sub>d</sub> | A Version                                                                   |       | 28    |       | pF      |
|                          |                                 | B Version                                                                   |       | 20    |       |         |
|                          |                                 | C Version                                                                   |       | 17    |       |         |
| Max. Oscillation Freq.   | f <sub>MAX</sub>                | A Version                                                                   | 35    |       |       | MHz     |
|                          |                                 | B Version                                                                   | 50    |       |       |         |
|                          |                                 | C Version                                                                   | 75    |       |       |         |
| Output Signal Symmetry   | SYM                             | C <sub>L</sub> =15pF at 1.4V                                                | 45    | 50    | 55    | %       |
|                          |                                 | C <sub>L</sub> =15pF at 2.5V                                                |       |       |       |         |
| Output Signal Rise Time  | t <sub>r1</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 20%~80%                         |       | 2     |       | ns      |
|                          | t <sub>r2</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 0.4~2.4V                        |       | 2     |       |         |
|                          | t <sub>r3</sub>                 | C <sub>L</sub> =15pF, 10~90%                                                |       | 3     |       |         |
| Output Signal Fall Time  | t <sub>f1</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 80%~20%                         |       | 2     |       | ns      |
|                          | t <sub>f2</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 2.4~0.4V                        |       | 2     |       |         |
|                          | t <sub>f3</sub>                 | C <sub>L</sub> =15pF, 90~10%                                                |       | 3     |       |         |

(Note 1) Excluding input current on CONT terminal.

• NJU6375H/J/K

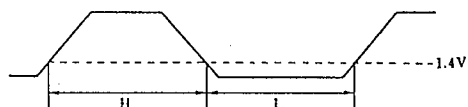
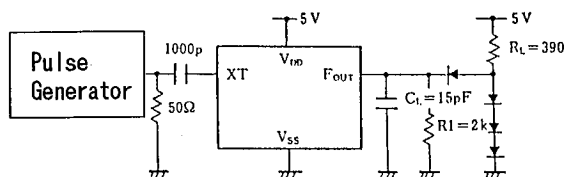
( Ta=25°C, V<sub>DD</sub>=5V )

| P A R A M E T E R        | SYMBOL                          | C O N D I T I O N S                                                         | MIN | TYP | MAX  | UNIT |
|--------------------------|---------------------------------|-----------------------------------------------------------------------------|-----|-----|------|------|
| Operating Voltage        | V <sub>DD</sub>                 |                                                                             | 4   |     | 6    | V    |
| Operating Current        | I <sub>DD1</sub>                | H Version f <sub>OSC</sub> =24MHz, No Load                                  |     |     | 25   | mA   |
|                          | I <sub>DD2</sub>                | J Version f <sub>OSC</sub> =48MHz, No Load                                  |     |     | 30   |      |
|                          | I <sub>DD3</sub>                | K Version f <sub>OSC</sub> =48MHz, No Load                                  |     |     | 35   |      |
| Stand-by Current         | I <sub>st</sub>                 | CONT, XT=V <sub>SS</sub> , No Load (Note 2)                                 |     |     | 1    | μA   |
| Input Voltage            | V <sub>IH</sub>                 |                                                                             | 2.0 |     | 5.0  | V    |
|                          | V <sub>IL</sub>                 |                                                                             | 0   |     | 0.8  |      |
| Output Current           | I <sub>OH</sub>                 | V <sub>DD</sub> =5V, V <sub>OH</sub> =4.5V                                  | 16  |     |      | mA   |
|                          | I <sub>OL</sub>                 | V <sub>DD</sub> =5V, V <sub>OL</sub> =0.5V                                  | 16  |     |      |      |
| Input Current            | I <sub>IN</sub>                 | CONT Terminal, CONT=V <sub>SS</sub>                                         | 125 | 250 | 500  | μA   |
| 3-St Off-leakage Current | I <sub>oz</sub>                 | CONT=V <sub>SS</sub> , F <sub>OUT</sub> =V <sub>SS</sub> or V <sub>DD</sub> |     |     | ±0.1 | μA   |
| Internal Capacitor       | C <sub>g</sub> , C <sub>d</sub> | H Version                                                                   |     | 28  |      | pF   |
|                          |                                 | J Version                                                                   |     | 20  |      |      |
|                          |                                 | K Version                                                                   |     | 17  |      |      |
| Max. Oscillation Freq.   | f <sub>MAX</sub>                | H Version                                                                   | 35  |     |      | MHz  |
|                          |                                 | J Version                                                                   | 50  |     |      |      |
|                          |                                 | K Version                                                                   | 75  |     |      |      |
| Output Signal Symmetry   | SYM                             | C <sub>L</sub> =15pF at 1.4V                                                | 40  | 50  | 60   | %    |
|                          |                                 | C <sub>L</sub> =15pF at 2.5V                                                | 45  | 50  | 55   |      |
| Output Signal Rise Time  | t <sub>r1</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 0.4~2.4V                        |     | 4   | 7    | ns   |
|                          | t <sub>r2</sub>                 | C <sub>L</sub> =50pF, 10~90%                                                |     | 5   | 7    |      |
| Output Signal Fall Time  | t <sub>f1</sub>                 | C <sub>L</sub> =15pF, R <sub>L</sub> =390Ω, 2.4~0.4V                        |     | 4   | 7    | ns   |
|                          | t <sub>f2</sub>                 | C <sub>L</sub> =50pF, 90~10%                                                |     | 5   | 7    |      |

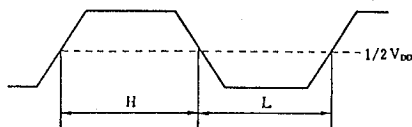
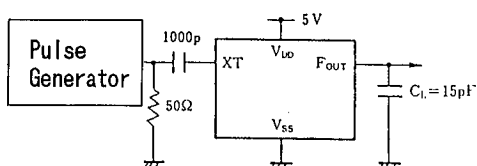
(Note 2) Excluding input current on CONT terminal.

**■ MEASUREMENT CIRCUITS 1 (NJU6375A/B/C)**
**(1-1) Output Signal Symmetry**

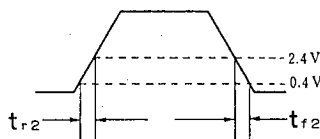
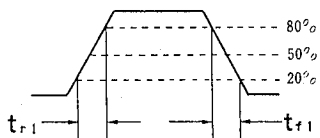
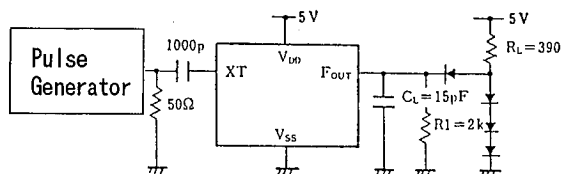
•TTL



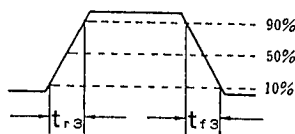
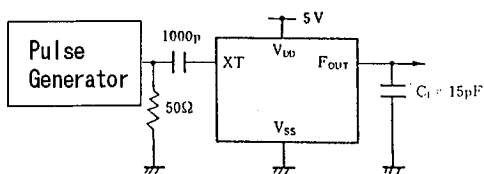
•C-MOS


**(1-2) Output Signal Rise / Fall Time**

•TTL

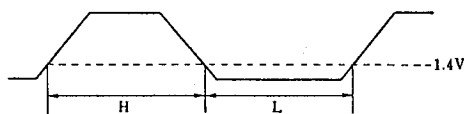
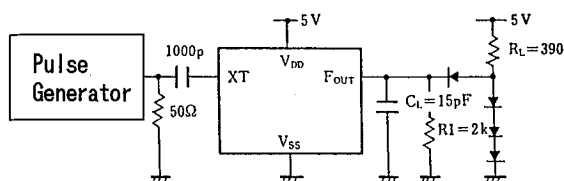


•C-MOS

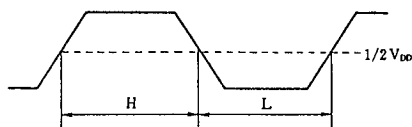
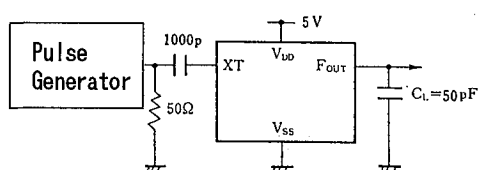


**■ MEASUREMENT CIRCUITS 2 (NJU6375H/J/K)**
**(2-1) Output Signal Symmetry**

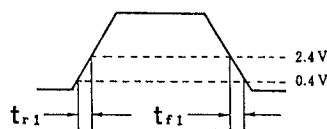
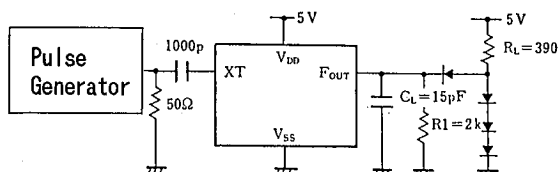
•TTL



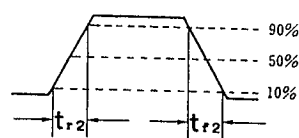
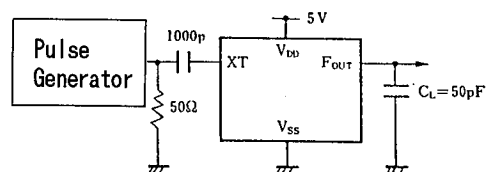
•C-MOS


**(2-2) Output Signal Rise / Fall Time**

•TTL



•C-MOS



# NJU6375 Series

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MEMO

**[CAUTION]**

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