

## QUARTZ CRYSTAL OSCILLATOR

## GENERAL DESCRIPTION

The NJU6392 series is a 3V operation C-MOS quartz crystal oscillator which consists of an oscillation amplifier and a 3-state output buffer.

This series is classed into four versions A, B, C and P 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.

Drivability of the 3-state output buffer is 8mA (sink/source), thus it can drive C-MOS load.

## PACKAGE OUTLINE



NJU6392XC



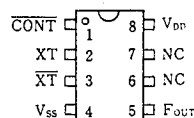
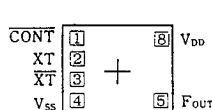
NJU6392XE

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## FEATURES

- Low Operating Voltage. — 2.4~3.6V
- Maximum Oscillation Frequency (See Line-Up Table)
- Low Operating Current
- High Fan-out —  $I_{OL}/I_{OH}=8mA$
- 3-state Output Buffer
- Oscillation Capacitors  $C_g$  and  $C_d$  on-chip
- Oscillation Output Stand-by Function
- Package Outline — CHIP / EMP 8
- C-MOS Technology

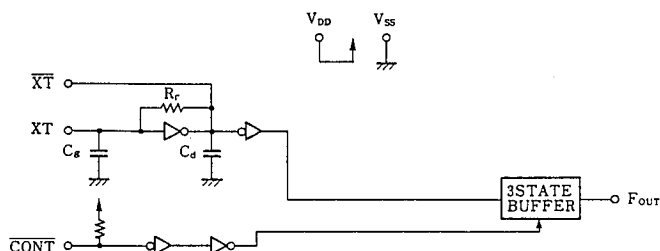
## PAD LOCATION/PIN CONFIGURATION



## LINE-UP TABLE

| Type No. | Recommended Osc. Freq. | Output Freq. | $C_g/C_d$ |
|----------|------------------------|--------------|-----------|
| NJU6392A | 20~35MHz               | $f_o$        | 27pF      |
| 6392B    | 30~50MHz               |              | 19pF      |
| 6392C    | 45~75MHz               |              | 12/14pF   |
| 6392P    | ~75MHz                 |              | No        |

## BLOCK DIAGRAM



## COORDINATES

Unit:  $\mu m$ 

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

# TERMINAL DESCRIPTION

| NO. | SYMBOL           | F U N C T I O N                           |
|-----|------------------|-------------------------------------------|
| 1   | CONT             | 3-State Output Control                    |
|     |                  | CONT Output (F <sub>OUT</sub> )           |
|     |                  | H or OPEN Output Frequency f <sub>o</sub> |
|     |                  | L Output High Impedance                   |
| 2   | XT               | Quartz Crystal Connecting Terminals       |
| 3   | XT               |                                           |
| 4   | V <sub>SS</sub>  | GND                                       |
| 5   | F <sub>OUT</sub> | Output frequency f <sub>o</sub>           |
| 8   | V <sub>DD</sub>  | + 3 V                                     |

# ABSOLUTE MAXIMUM RATINGS

(T<sub>a</sub>=25°C)

| P A R A M E T E R           | SYMBOL           | R A T I N G S                               | UNIT |
|-----------------------------|------------------|---------------------------------------------|------|
| Supply Voltage              | V <sub>DD</sub>  | -0.5 ~ +7.0                                 | V    |
| Input Voltage               | V <sub>IN</sub>  | V <sub>SS</sub> -0.5 ~ V <sub>DD</sub> +0.5 | V    |
| Output Voltage              | V <sub>o</sub>   | -0.5 ~ V <sub>DD</sub> +0.5                 | V    |
| Input Current               | I <sub>IN</sub>  | ±10                                         | mA   |
| Output Current              | I <sub>o</sub>   | ±25                                         | mA   |
| Power Dissipation           | P <sub>D</sub>   | 200 (EMP)                                   | mW   |
| Operating Temperature Range | T <sub>opr</sub> | -40 ~ +85                                   | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -55 ~ +125                                  | °C   |

(Note) Decoupling capacitor should be connected between V<sub>DD</sub>-V<sub>SS</sub> due to the stabilized operation for the circuit.

# ELECTRICAL CHARACTERISTICS

(T<sub>a</sub>=25°C, V<sub>DD</sub>=3V)

| 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>                |                                                                             | 2.4 |       | 3.6  | V    |
| Operating Current              | I <sub>DD1</sub>               | A Version f <sub>osc</sub> =24MHz, No Load                                  |     | 6     | 15   | mA   |
|                                | I <sub>DD2</sub>               | B Version f <sub>osc</sub> =48MHz, No Load                                  |     | 9     | 20   |      |
|                                | I <sub>DD3</sub>               | C Version f <sub>osc</sub> =48MHz, No Load<br>(Note 1)                      |     | 9     | 25   |      |
| 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>                |                                                                             | 2.4 |       | 3.0  | V    |
|                                | V <sub>IL</sub>                |                                                                             | 0   |       | 0.6  |      |
| Output Current                 | I <sub>OH</sub>                | V <sub>OH</sub> =2.7V                                                       | 8   |       |      | mA   |
|                                | I <sub>OL</sub>                | V <sub>OL</sub> =0.3V                                                       | 8   |       |      |      |
| Input Current                  | I <sub>IN</sub>                | CONT Terminal, CONT=V <sub>SS</sub>                                         | 75  | 150   | 300  | 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<br>(Note 3) | C <sub>g</sub> /C <sub>d</sub> | A Version f <sub>osc</sub> =24MHz, No Load                                  |     | 27    |      | pF   |
|                                |                                | B Version f <sub>osc</sub> =48MHz, No Load                                  |     | 19    |      |      |
|                                |                                | C Version f <sub>osc</sub> =48MHz, No Load                                  |     | 12/14 |      |      |
| Max. Oscillation Freq.         | f <sub>MAX</sub>               | A Version                                                                   | 35  |       |      | MHz  |
|                                |                                | B Version                                                                   | 50  |       |      |      |
|                                |                                | C/P Version (Note 1)                                                        | 75  |       |      |      |
| Output Signal Symmetry         | SYM                            | C <sub>L</sub> =15pF at 1.5V                                                | 45  | 50    | 55   | %    |
|                                |                                | C <sub>L</sub> =30pF at 1.5V                                                |     |       |      |      |
| Output Signal Rise Time        | t <sub>r1</sub>                | C <sub>L</sub> =15pF, 10~90%                                                |     | 2     | 4    | ns   |
|                                | t <sub>r2</sub>                | C <sub>L</sub> =30pF, 10~90%                                                |     |       | 6    |      |
| Output Signal Fall Time        | t <sub>f1</sub>                | C <sub>L</sub> =15pF, 90~10%                                                |     | 2     | 4    | ns   |
|                                | t <sub>f2</sub>                | C <sub>L</sub> =30pF, 90~10%                                                |     |       | 6    |      |

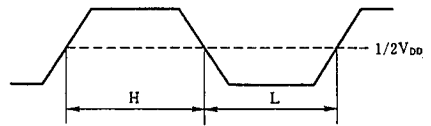
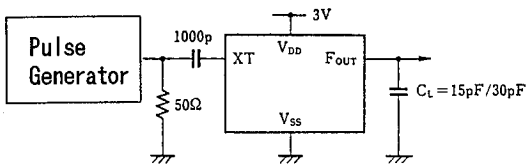
(Note 1) Only P Version is measured with external capacitors contained 3pF for C<sub>g</sub> and 3pF for C<sub>d</sub>.

(Note 2) Excluding input current on CONT terminal.

(Note 3) P Version is not mentioned due to internal oscillation capacitors C<sub>g</sub> and C<sub>d</sub> separated.

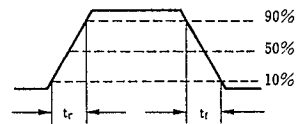
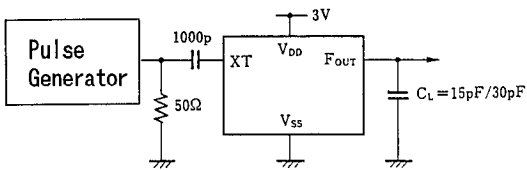
## MEASUREMENT CIRCUITS

### (1) Output Signal Symmetry



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### (2) Output Signal Rise / Fall Time



# NJU6392 Series

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## MEMO

**[CAUTION]**

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