

# QUARTZ CRYSTAL OSCILLATOR

## ■ GENERAL DESCRIPTION

The NJU6333 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 three versions A, H and Q 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.

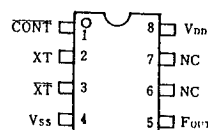
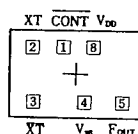
Driverbility of the 3-state output buffer is 24mA (sink/source), thus it can drive both of TTL and C-MOS load.

## ■ PACKAGE OUTLINE


**NJU6333XC**

**NJU6333XE**

## ■ PIN CONFIGURATION/PAD LOCATION



## ■ FEATURES

- Operating Voltage. -- 4.0~6.0V
- Maximum Oscillation Frequency (See Line-Up Table)
- Low Operating Current
- High Fan-out --  $I_{OL}/I_{OH}=24mA$
- 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

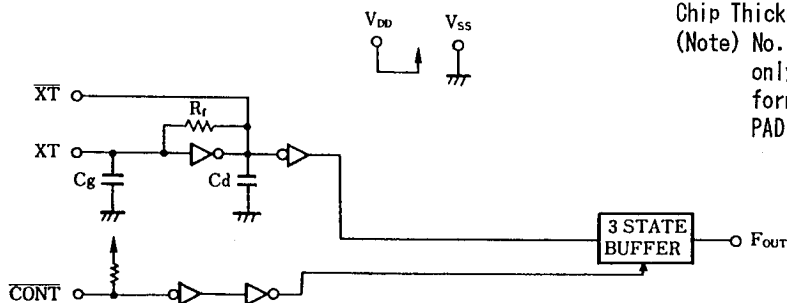
| Type No. | Recommended Osc. Freq. | Output Freq. | $C_g, C_d$ |
|----------|------------------------|--------------|------------|
| NJU6333A | 20~35MHz               | $f_o$        | 28pF       |
| 6333H    | 30~50MHz               |              | 20pF       |
| 6333Q    | 45~75MHz               |              | 17pF       |

## ■ COORDINATES

 Unit:  $\mu m$ 

| No. | PAD  | X    | Y    |
|-----|------|------|------|
| 1   | CONT | -130 | 248  |
| 2   | XT   | -414 | 248  |
| 3   | XT   | -414 | -232 |
| 4   | VSS  | 89   | -248 |
| 5   | FOUT | 446  | -228 |
| 8   | VDD  | 153  | 228  |

## ■ BLOCK DIAGRAM



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 ( $F_{OUT}$ )           |
|     |           | H Output Frequency $f_o$            |
|     |           | L Output High Impedance             |
| 2   | XT        | Quartz Crystal Connecting Terminals |
| 3   | XT        |                                     |
| 4   | $V_{SS}$  | GND                                 |
| 5   | $F_{OUT}$ | Output frequency $f_o$              |
| 8   | $V_{DD}$  | + 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              | $V_{DD}$  | -0.5 ~ +7.0                  | V                  |
| Input Voltage               | $V_{IN}$  | $V_{SS}-0.5 \sim V_{DD}+0.5$ | V                  |
| Output Voltage              | $V_o$     | -0.5 ~ $V_{DD}+0.5$          | V                  |
| Input Current               | $I_{IN}$  | $\pm 10$                     | mA                 |
| Output Current              | $I_o$     | $\pm 25$                     | mA                 |
| Power Dissipation           | $P_D$     | 200 (EMP)                    | mW                 |
| Operating Temperature Range | $T_{opr}$ | -40 ~ +85                    | $^{\circ}\text{C}$ |
| Storage Temperature Range   | $T_{stg}$ | -55 ~ +125                   | $^{\circ}\text{C}$ |

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

**■ ELECTRICAL CHARACTERISTICS**

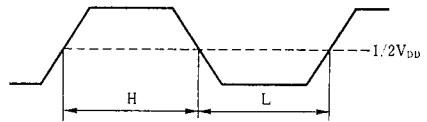
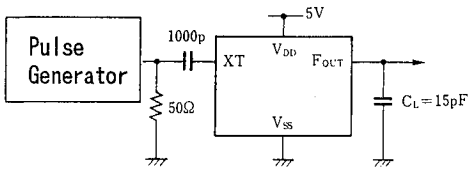
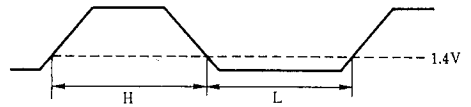
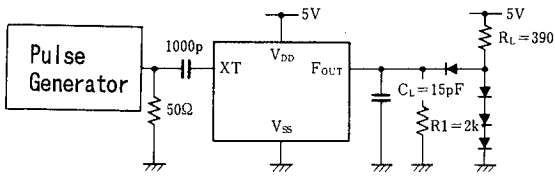
 (  $T_a=25^{\circ}\text{C}$ ,  $V_{DD}=5\text{V}$  )

| 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        | $V_{DD}$  |  | 4   |     | 6         | V             |
| Operating Current        | $I_{DD1}$ | A Version $f_{osc}=24\text{MHz}$ , No Load     |     |     | 25        | mA            |
|                          | $I_{DD2}$ | H Version $f_{osc}=48\text{MHz}$ , No Load     |     |     | 30        |               |
|                          | $I_{DD3}$ | Q Version $f_{osc}=48\text{MHz}$ , No Load     |     |     | 35        |               |
| Stand-by Current         | $I_{st}$  | CONT, XT= $V_{SS}$ , No Load (Note)            |     |     | 1         | $\mu\text{A}$ |
| Input Voltage            | $V_{IH}$  |  | 3.5 |     | 5.0       | V             |
|                          | $V_{IL}$  |  | 0   |     | 1.5       |               |
| Output Current           | $I_{OH}$  | $V_{DD}=5\text{V}$ , $V_{OH}=4.5\text{V}$      | 24  |     |           | mA            |
|                          | $I_{OL}$  | $V_{DD}=5\text{V}$ , $V_{OL}=0.5\text{V}$      | 24  |     |           |               |
| Input Current            | $I_{IN}$  | CONT Terminal, CONT= $V_{SS}$                  | 125 | 250 | 500       | $\mu\text{A}$ |
| 3-St Off-leakage Current | $I_{oz}$  | CONT= $V_{SS}$ , $F_{OUT}=V_{SS}$ or $V_{DD}$  |     |     | $\pm 0.1$ | $\mu\text{A}$ |
| Internal Capacitor       | Cg, Cd    | A Version                                      |     | 28  |           | pF            |
|                          |           | H Version                                      |     | 20  |           |               |
|                          |           | Q Version                                      |     | 17  |           |               |
| Max. Oscillation Freq.   | $f_{MAX}$ | A Version                                      | 35  |     |           | MHz           |
|                          |           | H Version                                      | 50  |     |           |               |
|                          |           | Q Version                                      | 75  |     |           |               |
| Output Signal Symmetry   | SYM       | $C_L=15\text{pF}$ at 1.4V                      | 45  | 50  | 55        | %             |
|                          |           | $C_L=15\text{pF}$ at 2.5V                      |     |     |           |               |
| Output Signal Rise Time  | $t_{r1}$  | $C_L=15\text{pF}$ , $R_L=390\Omega$ , 20%~80%  |     | 2   |           | ns            |
|                          | $t_{r2}$  | $C_L=15\text{pF}$ , $R_L=390\Omega$ , 0.4~2.4V |     | 2   |           |               |
|                          | $t_{r3}$  | $C_L=15\text{pF}$ , 10~90%                     |     | 3   |           |               |
| Output Signal Fall Time  | $t_{f1}$  | $C_L=15\text{pF}$ , $R_L=390\Omega$ , 80%~20%  |     | 2   |           | ns            |
|                          | $t_{f2}$  | $C_L=15\text{pF}$ , $R_L=390\Omega$ , 2.4~0.4V |     | 2   |           |               |
|                          | $t_{f3}$  | $C_L=15\text{pF}$ , 90~10%                     |     | 3   |           |               |

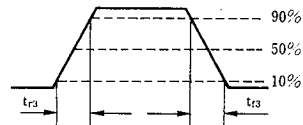
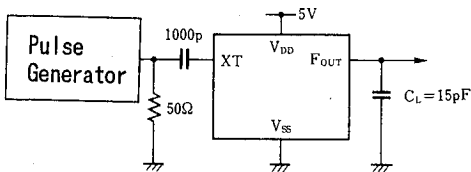
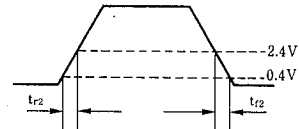
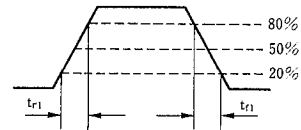
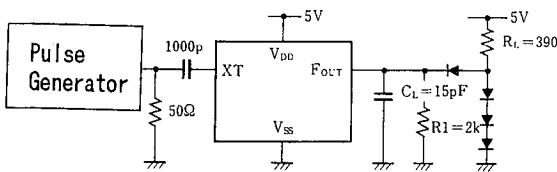
(Note) Excluding input current on CONT terminal.

■ MEASUREMENT CIRCUITS

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



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



# NJU6333 Series

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MEMO

**[CAUTION]**

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